DISCRETE SEMICONDUCTORS

Wideband Transistors and Wideband Hybrid IC Modules

BOOK SC14 1989

Philips Components

PHILIPS

WIDEBAND TRANSISTORS AND
WIDEBAND HYBRID IC MODULES

SELECTION GUIDE

WIDEBAND TRANSISTORS

This table shows the most preferred types of transistors listed against their envelope type numbers.
For detailed information see the relevant data sheet.

Wideband transistors f_T up to 7.5 GHz

Envelope	Polarity npn	Polarity pnp	transistor type						
SOT37	●		BFQ34T	BFQ65	BFR90A	BFR91A	BFR96S	BFR134	BFT24
		●	BFQ23	BFQ32S	BFQ51				
SOT23	●		BFQ67	BFR92A	BFR93A	BFR106	BFT25		
		●	BFT92	BFT93					
SOT89	●		BFQ18	BFQ19A					
		●	BFQ149						
SOT122	●		BFQ34	BFQ68	BFQ136				
SOT103	●		BFG34	BFG65	BFG90A	BFG91A	BFG96	BFG195	BFG134
		●	BFG23	BFG32	BFG51				
SOT143	●		BFG17A	BFG67	BFG92A	BFG93A	BFG197		
SOT173	●		BFP90A	BFP91A	BFP96	BFQ66			
		●	BFQ23C	BFQ32C	BFQ51C				
TO-72	●		BFQ22S	BFQ53	BFQ63				
		●	BFQ24	BFQ32M	BFQ52				
SOT223	●		BFG35	BFG97	BFG135	BFG198			
SOT172A2	●		BFQ135						
SOT32	●		BFQ162	BFQ232	BFQ262				
		●	BFQ252						

CATV AMPLIFIER MODULES

type number	frequency range MHz	power gain (dB) at f = 50 MHz	application	page
BGY61		12.5 to 13.5		741
BGY65	5 to 200	18.0 to 19.0	reverse amplifier	745
BGY67		21.5 to 22.5		749
BGY67A		23.5 to 24.5		753
BGY50	40 to 300	12.1 to 12.9	preamplifier	709
BGY51			post amplifier	709
BGY52	40 to 300	16.0 to 16.8	preamplifier	713
BGY53			post amplifier	713
BGY54	40 to 300	16.6 to 17.4	preamplifier	717
BGY55			post amplifier	717
BGY56	40 to 300	21.4 to 22.6	preamplifier	721
BGY57			post amplifier	721
BGY58	40 to 300	32.0 to 34.0	line extender	725
BGY58A	40 to 330	33.0 to 35.0	line extender	729
BGY59	40 to 300	37.5 to 39.5	line extender	733
BGY60	40 to 300	32.5 to 34.5	interstage amp post amplifier	737
BGD102	40 to 450	18.0 to 19	power doubler	685
BGD104	40 to 450	19.5 to 20.5	amplifiers	685
BGD102E	40 to 450	18.0 to 19.0	power doubler	689
BGD104E	40 to 450	19.5 to 20.5	amplifiers	689
BGE85A	40 to 450	17.6 to 19.2	output amplifier	697
BGE88	40 to 450	33.0 to 36.0	amplifier	701
BGY80	40 to 450	12.1 to 12.9	preamplifier	757
BGY81			post amplifier	757
BGY84	40 to 450	16.5 to 17.5	preamplifier	761
BGY85			post amplifier	761
BGY84A	40 to 450	18.0 to 18.8	preamplifier	765
BGY85A			post amplifier	765
BGY84H	40 to 450	14.6 to 16.2	trunk amplifier	769
BGY85H			trunk amplifier	769
BGY86	40 to 450	21.5 to 22.5	preamplifier	773
BGY87			post amplifier	773
BGY88	40 to 450	33.5 to 35.5	line extender	777
BGY89	40 to 450	37.0 to 39.0	line extender	781

All modules normally operate at V_B = 24 V, but are able to withstand supply transients up to 30 V.

CATV AMPLIFIER MODULES (continued)

type number	frequency range MHz	power gain (dB) at f = 50 MHz	application	page
BGY580	40 to 550	12.0 to 13.0	preamplifier	785
BGY581			post amplifier	785
BGY584*	40 to 550	16.5 to 17.5	preamplifier	789
BGY585*			post amplifier	789
BGY584A*	40 to 550	17.7 to 18.7	preamplifier	793
BGY585A*			post amplifier	793
BGY586	40 to 550	21.5 to 22.5	preamplifier	797
BGY587			post amplifier	797
BGD502*	40 to 550	18.0 to 19.0	power doubler	693
BGD504*		19.5 to 20.5	power doubler	693
BGX885	40 to 860	16.5 to 17.5	40 to 80 MHz amp	705

All modules normally operate at V_B = 24 V but are able to withstand supply transients up to 30 V.

* Specifications also supplied for 450 MHz bandwidth operation.

Hybrid ICs for wideband amplifiers

12 V supply voltage; 'Low noise'

	type	stage	gain (dB)	$V_{o(RMS)}$ (dBμV) −60 dB IMD (note 1) min. values	noise figure (dB)	max. VSWR typ. values (note 2) input	output	supply current (mA)	page
low	OM2045	1	12	99	3.6	2.0	1.4	11.5	885
output	OM2050	2	18	100	5.2	1.5	1.9	18	891
	OM2060	3	23	107	5.4	1.4	1.6	56	897
medium	OM2061	3	28	107	4.4	1.5	1.7	51	903
output	OM2062	3	28	105	4.4	1.3	1.4	50	(note 3)
	OM2063	3	29	105	3.6	2.2	1.5	52	(note 3)
high output	OM2070	3	28	112	4.8	2.3	1.9	100	909

12 V supply voltage

	type	stage	gain (dB)	$V_{o(RMS)}$ (dBμV)	noise figure (dB)	VSWR input	VSWR output	supply current (mA)	page
low	OM345	1	12	97	5.5	2.0	1.4	11.5	855
medium	OM350	2	18	98	6.0	1.5	1.9	18	861
medium	OM360	3	23	105	7.0	1.3	1.5	55	867
output	OM361	3	28	105	6.0	1.5	1.7	50	873
high output	OM370	3	28	111	7.0	2.3	1.9	105	879

24 V supply voltage

	type	stage	gain (dB)	$V_{o(RMS)}$ (dBμV)	noise figure (dB)	VSWR input	VSWR output	supply current (mA)	page
	OM320	2	15.5	92	5.5	2.2	2.5	33	809
low output	OM321	2	15.5	98	6.0	2.5	2.0	33	815
	OM335	3	27	98	5.5	1.9	3.2	35	833
	OM322	2	15	103	7.0	1.7	1.7	60	821
medium output	OM336	3	22	105	7.0	1.4	1.6	65	839
	OM339	3	28	105	6.0	1.5	1.5	66	851
high	OM323*	2	15	112	9.0	1.9	2.3	100	827
output	OM337*	3	26	113	9.8	2.3	1.8	115	843

* Also available in A-version for external coil and output capacitor.

Notes

1. Measured at −60 dB intermodulation distortion to DIN 45004, par. 6.3: 3-tone, f = 470 MHz.
2. The typical maximum VSWR occurring in the frequency range 40-860 MHz, for a sample connected to a 75 Ω line.
3. In development.

TYPE NUMBER SURVEY
(alphanumeric)

RATINGS | **CHARACTERISTICS** (typical values unless otherwise specified)

type number	npn or pnp	envelope	V_{CEO} V	I_C mA	P_{tot} mW	f_T GHz	F dB	at f MHz	G_{UM} dB	at f MHz	V_o* mV	PL1** dBm	IT0** dBm	I_C mA	V_{CE} V	page
BF689K	n	TO-92	15	25	360	1.8	3.0	200	16	200	–	–	–	–	–	63
BF763	n	TO-92	15	25	500	1.8	5.0	800	–	–	–	–	–	–	–	65
BFG17A	n	SOT143	15	50	300	2.8	2.5	800	15	800	–	–	–	–	–	67
BFG23	p	SOT123	12	35	180	5.0	3.7	800	14.5	800	400	16	35	30	8	73
BFG32	p	SOT103	15	75	700	4.5	4.3	800	13.5	800	500	18	37	70	10	79
BFG33	n	SOT143	7	20	300	12	2.5	2000	10.5	2000	–	–	–	–	–	85
BFG34	n	SOT103	18	150	1000	3.7	2.3	800	14.5	800	750	22	41	90	10	87
BFG35	n	SOT223	18	150	1000	4.0	–	–	11	800	–	–	–	–	–	93
BFG51	p	SOT103	15	25	180	5.0	3.4	800	16.5	800	150	7	26	14	10	97
BFG65	n	SOT103	10	50	300	7.5	3.0	2000	10.5	2000	–	–	–	–	–	105
BFG67	n	SOT143	10	50	300	7.5	3.0	2000	10	2000	–	–	–	–	–	113
BFG90A	n	SOT103	15	25	180	5.0	2.4	800	19	800	150	8	27	14	10	117
BFG91A	n	SOT103	12	35	300	6.0	2.3	800	17.5	800	425	17	36	30	8	127
BFG92A	n	SOT143	15	25	300	5.0	1.8	800	9.5	2000	–	–	–	–	–	137
BFG93A	n	SOT143	12	35	300	6.0	1.6	800	9	2000	–	–	–	–	–	141
BFG96	n	SOT103	15	150	700	5.0	3.7	800	15	800	700	21	40	70	10	145
BFG97	n	SOT223	15	100	1000	5.5	–	–	12	800	–	–	–	–	–	155
BFG134	n	SOT103F	15	150	1000	7.0	–	–	14.5	800	–	–	–	–	–	159
BFG135	n	SOT223	15	150	1000	7.0	–	–	12	800	–	–	–	–	–	163
BFG195	n	SOT103	10	100	500	7.5	1.9	800	11	2000	–	–	–	–	–	167
BFG197	n	SOT143	10	100	300	7.5	1.4	800	11	2000	–	–	–	–	–	169
BFG198	n	SOT223	10	100	1000	8.0	–	–	15	800	–	–	–	–	–	175
BFP90A	n	SOT173	15	30	250	5.0	2.4	800	19.5	800	150	8	27	14	10	179
BFP91A	n	SOT173	12	50	350	6.0	2.3	800	18.5	800	425	17	36	30	8	189
BFP96	n	SOT173	15	100	500	5.0	2.5	800	15	800	700	21	40	70	10	195

* Typical reference value at $d_{im} = -60$ dB.
** Typical reference values.

RATINGS | **CHARACTERISTICS** (typical values unless otherwise specified)

type number	npn or pnp	envelope	V_{CEO} V	I_C mA	P_{tot} mW	f_T GHz	F dB	at f MHz	G_{UM} dB	at f MHz	V_o* mV	PL1** dBm	IT0** dBm	I_C mA	V_{CE} V	page
BFQ17	n	SOT89	25	150	1000	1.2	–	–	6.5	800	–	–	–	–	–	201
BFQ18A	n	SOT89	15	150	1000	3.6	–	–	–	–	700	21	40	80	10	205
BFQ19	n	SOT89	15	75	500	5.0	–	–	7.5	800	500	18	37	50	10	209
BFQ22S	n	TO-72	12	35	150	5.0	1.9	500	16	500	300	14	33	30	5	213
BFQ23	p	SOT37	12	35	180	5.0	2.4	500	16.5	500	300	14	33	30	5	217
BFQ23C	p	SOT173	12	50	350	5.0	3.7	800	15	800	400	16	35	30	8	225
BFQ24	p	TO-72	12	35	150	5.0	2.4	500	15	500	300	14	33	30	5	233
BFQ32	p	SOT37	15	75	500	4.2	3.8	500	14	500	500	18	37	50	10	237
BFQ32C	p	SOT173	15	100	500	4.5	4.3	800	13	800	500	19	38	70	10	241
BFQ32M	p	TO-72	15	75	250	4.5	2.3	500	11	500	–	–	–	–	–	249
BFQ32S	p	SOT37	15	100	700	4.5	4.3	800	10	800	600	20	39	70	10	251
BFQ33	n	SOT100	7	20	140	12.0	2.5	2000	13	2000	–	–	–	–	–	259
BFQ33C	n	SOT173	7	20	140	12.0	3.0	2000	13.3	2000	–	–	–	–	–	265
BFQ34	n	SOT122	18	150	2250	3.9	8.0	500	16.3	500	1200	26	45	120	15	271
BFQ34T	n	SOT37	18	150	1000	3.7	–	–	19.5	300	1000	24	43	100	10	281
BFQ51	p	SOT37	15	25	180	5.0	2.4	800	18	500	150	7	26	14	10	291
BFQ51C	p	SOT173	15	30	250	5.0	2.5	800	16.5	800	150	8	27	14	10	299
BFQ52	p	TO-72	15	25	150	5.0	2.7	500	17	500	150	7	26	14	10	307
BFQ53	n	TO-72	15	25	150	5.0	2.4	500	18	500	150	7	26	14	10	311
BFQ54	p	SOT122	18	150	2250	4.5	–	–	16	500	–	–	–	–	–	315
BFQ54T	p	SOT37	18	150	1000	4.5	–	–	18	300	–	–	–	–	–	319
BFQ63	n	TO-72	15	75	250	4.5	2.3	500	11.5	500	500	18	37	50	10	323
BFQ65	n	SOT37	10	50	300	7.5	3.0	2000	8	2000	–	–	–	–	–	327
BFQ66	n	SOT173	10	50	350	7.5	3.0	2000	11.5	2000	–	–	–	–	–	331
BFQ67	n	SOT23	10	50	180	7.5	3.0	2000	8	2000	–	–	–	–	–	337

* Typical reference value at d_{im} = −60 dB.
** Typical reference values.

RATINGS | **CHARACTERISTICS** (typical values unless otherwise specified)

type number	npn or pnp	envelope	V_{CEO} V	I_C mA	P_{tot} mW	f_T GHz	F at dB	f MHz	G_{UM} at dB	f MHz	V_o* mV	PL1** dBm	IT0** dBm	I_C mA	V_{CE} V	page
BFQ68	n	SOT122	18	300	4500	4.0	–	–	13	800	1600	28	47	240	15	341
BFQ135	n	SOT172A2	19	150	2700	6.5	–	–	13.5	800	–	–	–	–	–	351
BFQ136	n	SOT122	18	600	9000	4.0	–		12.5	800	2500	33	52	500	15	355
BFQ149	p	SOT89	15	75	1000	3.6	3.75	500	12	500	–	–	–	–	–	363
BFQ162	n	SOT32	10	500	3000	1.0	–	–	–	–	–	–	–	–	–	367
BFQ163	n	SOT5	10	500	3000	1.0	–	–	–	–	–	–	–	–	–	371
BFQ232	n	SOT32	65	300	3000	1.0	–	–	–	–	–	–	–	–	–	375
BFQ233	n	SOT5	65	300	3000	1.0	–	–	–	–	–	–	–	–	–	379
BFQ234	n	SOT172A1	65	300	3000	1.0	–	–	–	–	–	–	–	–	–	383
BFQ252	p	SOT32	65	300	3000	1.0	–	–	–	–	–	–	–	–	–	387
BFQ253	p	SOT5	65	300	3000	1.0	–	–	–	–	–	–	–	–	–	391
BFQ254	p	SOT172A1	65	300	3000	1.0	–	–	–	–	–	–	–	–	–	395
BFQ262	n	SOT32	65	400	3000	1.0	–	–	–	–	–	–	–	–	–	399
BFQ263	n	SOT5	65	400	5000	1.0	–	–	–	–	–	–	–	–	–	403
BFQ268	n	SOT172A1	65	400	5000	1.0	–	–	–	–	–	–	–	–	–	405
BFR49	n	SOT100	15	25	180	5.0	2.5	1000	17	1000	–	–	–	–	–	409
BFR53	n	SOT23	10	50	250	2.0	5.0	500	10.5	800	100	5	24	30	5	415
BFR64	n	SOT48	25	200	3500	1.0	6.0	200	–	–	–	–	–	–	–	423
BFR65	n	SOT48	25	400	5000	> 1.0	–	–	–	–	–	–	–	–	–	431
BFR90	n	SOT37	15	25	180	5.0	2.4	500	19.5	500	150	7	26	14	10	439
BFR90A	n	SOT37	15	25	180	5.0	2.4	800	15	800	150	8	27	14	10	447
BFR91	n	SOT37	12	35	180	5.0	1.9	500	18	500	300	14	33	30	5	461
BFR91A	n	SOT37	12	35	300	6.0	2.3	800	14	800	425	17	36	30	8	469
BFR92	n	SOT23	15	25	200	5.0	2.4	500	18	500	150	7	26	14	10	481
BFR92A	n	SOT23	15	25	200	5.0	2.4	800	15	800	150	8	27	14	10	489

* Typical reference value at d_{im} = –60 dB.
** Typical reference values.

RATINGS | **CHARACTERISTICS** (typical values unless otherwise specified)

type number	npn or pnp	envelope	V_{CEO} V	I_C mA	P_{tot} mW	f_T GHz	F dB	at f MHz	G_{UM} dB	at f MHz	V_o* mV	PL1** dBm	IT0** dBm	I_C mA	V_{CE} V	page
BFR93	n	SOT23	12	35	200	5.0	1.9	500	16.5	500	300	14	33	30	5	501
BFR93A	n	SOT23	12	35	250	5.0	2.3	800	14	800	425	16	35	30	8	509
BFR94	n	SOT48	25	150	3500	3.5	5.0	500	13.5	500	700	21	40	90	20	521
BFR95	n	TO-39	25	150	1500	3.5	9.0	200	–	–	1000	24	43	80	18	531
BFR96	n	SOT37	15	75	500	5.0	3.3	500	15.2	500	500	18	37	50	10	535
BFR96S	n	SOT37	15	100	700	5.0	4.0	800	11.5	800	700	21	40	70	10	543
BFR106	n	SOT23	15	100	350	3.3	3.5	–	11	800	–	–	–	–	–	555
BFR134	n	SOT37	15	150	1000	7.0	–	–	11.5	800	–	–	–	–	–	559
BFS17	n	SOT23	15	25	250	1.3	4.5	500	–	–	–	–	–	–	–	565
BFS17A	n	SOT23	15	25	300	2.8	2.5	800	13.5	800	150	7	26	14	10	571
BFT24	n	SOT37	5	2.5	30	2.3	3.8	500	17	500	–	–	–	–	–	577
BFT25	n	SOT23	5	6.5	50	2.3	3.8	500	18	500	–	–	–	–	–	585
BFT92	n	SOT23	15	25	200	5.0	2.7	500	18	500	150	7	26	14	10	593
BFT93	p	SOT23	12	35	200	5.0	2.4	500	16.5	500	300	14	33	30	5	599
BFW16A	n	TO-39	25	150	1500	1.2	<6.0	200	–	–	–	–	–	–	–	605
BFW17A	n	TO-39	25	150	1500	1.1	–	–	–	–	–	–	–	–	–	615
BFW30	n	TO-72	10	50	250	1.6	<5.0	500	–	–	100	5	24	30	6	623
BFW92	n	SOT37	15	25	190	1.6	4.0	500	–	–	–	–	–	–	–	629
BFW92A	n	SOT37	15	25	200	2.8	2.5	800	13	800	150	7	26	14	10	637
BFW93	n	SOT37	10	50	190	1.7	<5.0	500	10.5	800	100	5	24	30	5	641
BFX89	n	TO-72	15	25	200	1.2	3.3	200	–	–	–	–	–	–	–	649
BFY90	n	TO-72	15	25	200	1.4	2.5	200	–	–	–	–	–	–	–	661
2N918	n	TO-72	15	50	200	<0.9	<0.6	60	36	200	–	–	–	–	–	677

* Typical reference value at $d_{im} = -60$ dB.
** Typical reference values.

CATV AMPLIFIER MODULES

type number	frequency range MHz	power gain at f = 50 MHz dB	slope cable equivalent dB	application	page
BGD102	40 to 450	18.0 to 19.9	0.5 to 2.5	power doubler	685
BGD102E	40 to 450	18.0 to 19	0.5 to 2.0	power doubler	689
BGD104	40 to 450	19.5 to 20.5	0.5 to 2.5	power doubler	685
BGD104E	40 to 450	19.5 to 20.5	0.5 to 2.0	power doubler	689
BGD502	40 to 450	19.0 to 20.0	0.2 to 1.8	power doubler	693
BGD504	40 to 450	19.5 to 20.5	0 to 1.65	power doubler	693
BGE85A	40 to 450	17.6 to 19.2	0.3 to 1.8	output amplifier	697
BGE88	40 to 450	33.0 to 36.0	0.5 to 2.5	amplifier	701
BGE88-01	40 to 450	33.0 to 36.0	0.5 to 2.5	amplifier	701
BGX885	40 to 860	16.5 to 17.5	0.2 to 1.2	amplifier	705
BGY50	40 to 300	12.1 to 12.9	0.2 to 0.8	preamplifier	709
BGY51	40 to 300	12.1 to 12.9	0.2 to 0.8	post amplifier	709
BGY52	40 to 300	16.0 to 16.8	0 to 1.0	preamplifier	713
BGY53	40 to 300	16.0 to 16.8	0 to 1.0	post amplifier	713
BGY54	40 to 300	16.6 to 17.4	0 to 1.0	preamplifier	717
BGY55	40 to 300	16.6 to 17.4	0 to 1.0	post amplifier	717
BGY56	40 to 300	21.4 to 22.6	0 to 1.0	preamplifier	721
BGY57	40 to 300	21.4 to 22.6	0 to 1.0	post amplifier	721
BGY58	40 to 300	32.0 to 34.0	0.5 to 1.5	line extender	725
BGY58A	40 to 330	33.0 to 35.0	0.5 to 1.5	line extender	729
BGY59	40 to 300	37.5 to 39.5	0 to 1.5	line extender	733
BGY60	40 to 300	32.5 to 34.5	0.5 to 1.5	interstage amplifier (2 x 17 dB)	737
BGY61	5 to 200	12.5 to 13.5	−0.2 to 0.5	reverse amplifier	741
BGY65	5 to 200	18.0 to 19.0	−0.2 to 0.5	reverse amplifier	745
BGY67	5 to 200	21.5 to 22.5	−0.2 to 0.5	reverse amplifier	749
BGY67A	5 to 200	23.5 to 24.5	−0.2 to 0.5	reverse amplifier	753
BGY80	40 to 450	12.1 to 12.9	0.2 to 1.5	preamplifier	757
BGY81	40 to 450	12.1 to 12.9	0.2 to 1.5	post amplifier	757
BGY84	40 to 450	16.5 to 17.5	0.5 to 1.5	preamplifier	761
BGY84A	40 to 450	18.0 to 18.8	0.3 to 1.5	preamplifier	765
BGY84H	40 to 450	14.6 to 16.2		trunk amplifier	769
BGY85	40 to 450	16.5 to 17.5	0.5 to 1.5	post amplifier	761
BGY85A	40 to 450	18.0 to 18.8	0.3 to 1.5	post amplifier	765
BGY85H	40 to 450	14.6 to 16.2		trunk amplifier	769
BGY86	40 to 450	21.5 to 22.5	0.2 to 1.5	preamplifier	773
BGY87	40 to 450	21.5 to 22.5	0.2 to 1.5	post amplifier	773
BGY88	40 to 450	33.5 to 35.5	0.5 to 2.5	line extender	777
BGY89	40 to 450	37.0 to 39.0	0 to 2.5	line extender	781
BGY580	40 to 550	12.0 to 13.0	0.5 to 2.0	preamplifier	785
BGY581	40 to 550	12.0 to 13.0	0.5 to 2.0	post amplifier	785
BGY584	40 to 550	16.5 to 17.5	0.5 to 2.0	preamplifier	789
BGY584A	40 to 550	17.7 to 18.7	0.5 to 2.0	preamplifier	793
BGY585	40 to 550	16.5 to 17.5	0.5 to 2.0	post amplifier	789
BGY585A	40 to 550	17.7 to 18.7	0.5 to 2.0	post amplifier	793
BGY586	40 to 550	21.5 to 22.5	0.5 to 2.0	preamplifier	797
BGY587	40 to 550	21.5 to 22.5	0.5 to 2.0	post amplifier	797
BGY588	40 to 550	33.5 to 35.5	0 to 2.5	line extender	801

Hybrid wideband amplifiers

type	frequency range MHz	transducer gain dB	output voltage at d_{im} = −60 dB dBμV	supply voltage V	page
OM320	40-860	15.5	⩾92	24	809
OM321	40-860	15.5	⩾98	24	815
OM322	40-860	15	⩾103	24	821
OM323	40-860	15	⩾112	24	827
OM323A	40-860	15	⩾112	24	827
OM335	40-860	27	⩾98	24	833
OM336	40-860	22	⩾105	24	839
OM337	40-860	26	⩾113	24	843
OM337A	40-860	26	⩾113	24	843
OM339	40-860	28	⩾105	24	851
OM345	40-860	12	⩾97	12	655
OM350	40-860	18	⩾98	12	861
OM360	40-860	23	⩾105	12	867
OM361	40-860	28	⩾105	12	873
OM370	40-860	28	⩾111	12	879
OM926*	10-2000	19	⩾103	15	
OM2045	40-860	12	⩾99	12	885
OM2050	40-860	18	⩾100	12	891
OM2060	40-860	23	⩾107	12	897
OM2061	40-860	28	⩾107	12	903
OM2062*		28	⩾105	12	
OM2063*		28	⩾105	12	
OM2070	40-860	28	⩾112	12	909

Hybrid video amplifiers

OM325*	Video amplifier for monitors.
OM375*	Buffered video amplifier for monitors.
OM3016*	Video preamplifier >200 MHz for monitors.
OM3026*	Video preamplifier >300 MHz for monitors.

* In development.

MARKING LIST

Types in SOT-23, SOT-89 and SOT-143 envelopes are marked with a code as listed below.
The actual type number and data code are on the packing.

The envelope number is mentioned in those cases where the same marking code appears twice.

mark	type no.
A1	BAW56
A2	BAT18
A3	BAT17
A4	BAV70
A5	BRY61
A51	BRY62
A6	BAS16
A61	BAS28
A7	BAV99
A8	BAS19
A81	BAS20
A82	BAS21
A9	
A91	BAS17
AA	BCW60A
(SOT-23)	
AA	BCX51
(SOT-89)	
AB	BCW60B
(SOT-23)	
AB	BCX51-6
(SOT-89)	
AC	BCW60C
(SOT-23)	
AC	BCX51-10
(SOT-89)	
AD	BCW60D
(SOT-23)	
AD	BCX51-16
(SOT-89)	
AE	BCX52
AF	BCX52-6
AG	BCX70G
AH	BCX70H
(SOT-23)	
AH	BCX53
(SOT-89)	
AJ	BCX70J
(SOT-23)	
AJ	BCX53-6
(SOT-89)	
AK	BCX70K
(SOT-23)	
AK	BCX53-10
(SOT-89)	
AL	BCX53-16
AM	BCX52-16
AR1	BSR40
AR2	BSR41
AR3	BSR42
AR4	BSR43
AS1	BST50
AS2	BST51
AS3	BST52
AT1	BST39
AT2	BST40
B1	
B2	BSV52
B3	
B4	BSV52R
B5	BSR12
B6	
B7	
B8	BSR12R
BA	BCW61A
(SOT-23)	
BA	BCX54
(SOT-89)	
BB	BCW61B
(SOT-23)	
BB	BCX54-6
(SOT-89)	
BC	BCW61C
(SOT-23)	
BC	BCX54-10
(SOT-89)	
BD	BCW61D
(SOT-23)	
BD	BCX54-16
(SOT-89)	
BE	BCX55
BF	BCX55-6
BG	BCX71G
(SOT-23)	
BG	BCX55-10
(SOT-89)	
BH	BCX71H
(SOT-23)	
BH	BCX56
(SOT-89)	
BJ	BCX71J
(SOT-23)	
BJ	BCX56-6
(SOT-89)	
BK	BCX71K
(SOT-23)	
BK	BCX56-10
(SOT-89)	
BL	BCX56-16
BM	BCX55-16
BR1	BSR30
BR2	BSR31
BR3	BSR32
BR4	BSR33
BS1	BST60
BS2	BST61
BS3	BST62
BT1	BST15
BT2	BST16
C1	BCW29
C2	BCW30
C3	
C4	BCW29R
C5	BCW30R
C6	
C7	BCF29
C77	BCF29R
C8	BCF30
C9	BCF30R
C91	BCV62
CA	BCX68
CAC	BC868
CE	BCX69
CEC	BC869
D1	BCW31
D2	BCW32
D3	BCW33
D4	BCW31R
D5	BCW32R
D6	BCW33R
D7	BCF32

mark	type no.	mark	type no.	mark	type no.	mark	type no.
D77	BCF32R	H31	BCW89R	M61		S4	
D8	BCF33	H4	BCW69R	M62	PBMF4391	S5	
D81	BCF33R	H5	BCW70R	M63	PBMF4392	S6	BF510
D91	BCV61	H6		M64	PBMF4393	S7	BF511
DA	BF622	H7	BCF70	M74	BSS83	S8	BF512
DB	BF623	H71	BCF70R	M8		S9	BF513
DC	BF620	H8		M89	BF989	T1	BCX17
DF	BF621	H9		M9		T2	BCX18
E1	BFS17	H91		M90	BF990	T3	BSS63
E2		K1	BCW71	M91	BF991	T4	BCX17R
E3		K2	BCW72	M92	BF992	T5	BCX18R
E4	BFS17R	K3	BCW81	M94	BF994	T6	BSS63R
E5		K31	BCW81R	M96	BF996	T7	BSR15
E6	BFG17A	K4	BCW71R	M97	BFR101A	T71	BSR15R
E7		K5	BCW72R	M98	BFR101B	T8	BSR16
E8		K6		N1	BFR53	T81	BSR16R
F1	BFS18	K7	BCV71	N2		T9	BSR18
F2	BFS19	K71	BCV71R	N3		T91	BSR18R
F3	BF840	K8	BCV72	N4	BFR53R	T92	BSR18A
F31	BF841	K81	BCV72R	N5		T93	BSR18AR
F4	BFS18R	K9	BCF81	O1		U1	BCX19
F5	BFS19R	K91	BCF81R	O2	BST82	U2	BCX20
F6		KM	BST80	O3		U3	BSS64
F7		KN	BST84	O4		U4	BCX19R
F8	BF824	KO	BST86	P1	BFR92	U5	BCX20R
FA	BFQ17	L2		P2	BFR92A	U6	BSS64R
FB	BFQ19	L20	BAS29	P3		U7	BSR13
FD	BCV26	L21	BAS31	P4	BFR92R	U8	BSR14
FF	BCV27	L22	BAS35	P5	BFR92AR	U81	BSR14R
(SOT-23)		L3		P6		U9	BSR17
FF	BFQ18A						
(SOT-89)		L30	BAV23	P7		U91	BSR17R
FG	BFQ149	L4	BAT54	P8		U92	BSR17A
G1	BFS20	L41	BAT74	P9		U93	BSR17AR
G2	BF550	L5		R1	BFR93	V1	
G3	BF536	L51	BAS56	R2	BFR93A	V2	BFQ67
G4	BFS20R	LM	BST120	R3		V3	BFG67
G5	BF550R	LN	BST122	R4	BFR93R	V4	BFT25R
G6	BF569	M1	BFR30	R5	BFR93AR	V5	
G7	BF579	M2	BFR32	R6		V6	
G8	BF660	M3	BFT46	R7	BFR106	V7	
G81	BF660R	M31	BSD20	R8		V8	
G9	BF767	M32	BSD22	R9		V9	
H1	BCW69	M4	BSR56	S1	BBY31	W1	BFT92
H2	BCW70	M5	BSR57	S2	BBY40	W2	
H3	BCW89	M6	BSR58	S3		W3	

mark	type no.	mark	type no.	mark	type no.	mark	type no.
W4	BFT92R	Z11	BZX84–C2V4	3G	BC857C	6ER	BC818-16R
W5		Z12	–C2V7	3GR	BC857CR	6F	BC818-25
W6		Z13	–C3V0	3K	BC858B	6FR	BC818-25R
W7		Z14	–C3V3	3KR	BC858BR	6G	BC818-40
W8		Z15	–C3V6	3L	BC858C	6GR	BC818-40R
W9		Z16	BZX84–C3V9	3LR	BC858CR	6Y2	BZV49–C6V2
X1	BFT93	Z17	–C4V3	3Y0	BZV49-C3V0	6Y8	–C6V8
X2		1A	BC846A	3Y3	BZV49-C3V3	7Y5	–C7V5
X3		1BR	BC846AR	3Y6	BZV49-C3V6	8Y2	–C8V2
X4	BFT93R	1E	BC847A	3Y9	BZV49-C3V9	9Y1	–C9V1
X5		1ER	BC847AR	4A	BC859A	10Y	BZV49–C10
X6		1F	BC847B	4AR	BC859AR	11Y	–C11
X7		1FR	BC847BR	4B	BC859B	12Y	–C12
X8		1G	BC847C	4BR	BC859BR	13Y	–C13
X9		1GR	BC847CR	4C	BC859C	15Y	–C15
Y1	BZX84–C11	1J	BC848A	4CR	BC859CR	16Y	BZV49–C16
Y2	–C12	1JR	BC848AR	4E	BC860A	18Y	–C18
Y3	–C13	1K	BC848B	4ER	BC860AR	20Y	–C20
Y4	–C15	1KR	BC848BR	4F	BC860B	22Y	–C22
Y5	–C16	1L	BC848C	4FR	BC860BR	24Y	–C24
Y6	BZX84–C18	1LR	BC848CR	4G	BC860C	27Y	BZV49–C27
Y7	–C20	1V	BF820	4GR	BC860CR	30Y	–C30
Y8	–C22	1W	BF821	4Y3	BZV49–C4V3	33Y	–C33
Y9	–C24	1X	BF822	4Y7	BZV49–C4V7	36Y	–C36
Y10	–C27	1Y	BF823	5A	BC807-16	39Y	–C39
Y11	BZX84–C30	2B	BC849B	5AR	BC807-16R	43Y	BZV49–C43
Y12	–C33	2BR	BC849BR	5B	BC807-25	47Y	–C47
Y13	–C36	2C	BC849C	5BR	BC807-25R	51Y	–C51
Y14	–C39	2CR	BC849CR	5C	BC807-40	56Y	–C56
Y15	–C43	2F	BC850B	5CR	BC807-40R	62Y	–C62
Y16	BZX84–C47	2FR	BC850BR	5E	BC808-16	68Y	BZV49–C68
Y17	–C51	2G	BC850C	5ER	BC808-16R	75Y	–C75
Y18	–C56	2GR	BC850CR	5F	BC808-25		
Y19	–C62	2Y4	BZV49–C2V4	5FR	BC808-25R		
Y20	–C68	2Y7	BZV49–C2V7	5G	BC808-40		
Y21	BZX84–C75	3A	BC856A	5GR	BC808-40R		
Z1	–C4V7	3AR	BC856AR	5Y1	BZV49-C5V1		
Z2	–C5V1	3B	BC856B	5Y6	BZV49-C5V6		
Z3	–C5V6	3BR	BC856BR	6A	BC917-16		
Z4	–C6V2	3E	BC857A	6AR	BC817-16R		
Z5	BZX84–C6V8	3ER	BC857AR	6B	BC817-25		
Z6	–C7V5	3F	BC857B	6BR	BC817-25R		
Z7	–C8V2	3FR	BC857BR	6C	BC817-40		
Z8	–C9V1	3J	BC858A	6CR	BC817-40R		
Z9	–C10	3JR	BC858AR	6E	BC818-16		

GENERAL

PRO ELECTRON TYPE DESIGNATION CODE FOR SEMICONDUCTOR DEVICES

This type designation code applies to discrete semiconductor devices – as opposed to integrated circuits –, multiples of such devices and semiconductor chips.

"Although not all type numbers accord with the Pro Electron system, the following explanation is given for the ones that do."

A basic type number consists of:

TWO LETTERS FOLLOWED BY A SERIAL NUMBER

FIRST LETTER

The first letter gives information about the material used for the active part of the devices.

A. GERMANIUM or other material with band gap of 0,6 to 1,0 eV.
B. SILICON or other material with band gap of 1,0 to 1,3 eV.
C. GALLIUM-ARSENIDE or other material with band gap of 1,3 eV or more.
R. COMPOUND MATERIALS (e.g. Cadmium-Sulphide).

SECOND LETTER

The second letter indicates the function for which the device is primarily designed.

A. DIODE; signal, low power
B. DIODE; variable capacitance
C. TRANSISTOR; low power, audio frequency ($R_{th\ j\text{-}mb} > 15$ K/W)
D. TRANSISTOR; power, audio frequency ($R_{th\ j\text{-}mb} \leqslant 15$ K/W)
E. DIODE; tunnel
F. TRANSISTOR; low power, high frequency ($R_{th\ j\text{-}mb} > 15$ K/W)
G. MULTIPLE OF DISSIMILAR DEVICES – MISCELLANEOUS; e.g. oscillator
H. DIODE; magnetic sensitive
L. TRANSISTOR; power, high frequency ($R_{th\ j\text{-}mb} \leqslant 15$ K/W)
N. PHOTO-COUPLER
P. RADIATION DETECTOR; e.g. high sensitivity phototransistor
Q. RADIATION GENERATOR; e.g. light-emitting diode (LED)
R. CONTROL AND SWITCHING DEVICE; e.g. thyristor, low power ($R_{th\ j\text{-}mb} > 15$ K/W)
S. TRANSISTOR; low power, switching ($R_{th\ j\text{-}mb} > 15$ K/W)
T. CONTROL AND SWITCHING DEVICE; e.g. thyristor, power ($R_{th\ j\text{-}mb} \leqslant 15$ K/W)
U. TRANSISTOR; power, switching ($R_{th\ j\text{-}mb} \leqslant 15$ K/W)
X. DIODE: multiplier, e.g. varactor, step recovery
Y. DIODE; rectifying, booster
Z. DIODE; voltage reference or regulator (transient suppressor diode, with third letter W)

SERIAL NUMBER

Three figures, running from 100 to 999, for devices primarily intended for consumer equipment.*
One letter (Z, Y, X, etc.) and two figures, running from 10 to 99, for devices primarily intended for industrial/professional equipment.*
This letter has no fixed meaning except W, which is used for transient suppressor diodes.

VERSION LETTER

It indicates a minor variant of the basic type either electrically or mechanically. The letter never has a fixed meaning, except letter R, indicating reverse voltage, e.g. collector to case or anode to stud.

SUFFIX

Sub-classification can be used for devices supplied in a wide range of variants called associated types. Following sub-coding suffixes are in use:

1. VOLTAGE REFERENCE and VOLTAGE REGULATOR DIODES: *ONE LETTER and ONE NUMBER*
   The LETTER indicates the nominal tolerance of the Zener (regulation, working or reference) voltage
   A. 1% (according to IEC 63: series E96)
   B. 2% (according to IEC 63: series E48)
   C. 5% (according to IEC 63: series E24)
   D. 10% (according to IEC 63: series E12)
   E. 20% (according to IEC 63: series E6)
   The number denotes the typical operating (Zener) voltage related to the nominal current rating for the whole range.
   The letter 'V' is used instead of the decimal point.

2. TRANSIENT SUPPRESSOR DIODES: *ONE NUMBER*
   The NUMBER indicates the maximum recommended continuous reversed (stand-off) voltage V_R. The letter 'V' is used as above.

3. CONVENTIONAL and CONTROLLED AVALANCHE RECTIFIER DIODES and THYRISTORS: *ONE NUMBER*
   The NUMBER indicates the rated maximum repetitive peak reverse voltage (V_{RRM}) or the rated repetitive peak off-state voltage (V_{DRM}), whichever is the lower. Reversed polarity is indicated by letter R, immediately after the number.

4. RADIATION DETECTORS: *ONE NUMBER,* preceded by a hyphen (–)
   The NUMBER indicates the depletion layer in μm. The resolution is indicated by a version LETTER.

5. ARRAY OF RADIATION DETECTORS and GENERATORS: *ONE NUMBER,* preceded by a stroke (/).
   The NUMBER indicates how many basic devices are assembled into the array.

* When these serial numbers are exhausted the serial number for consumer types may be extended to four figures, and that for industrial types to three figures.

RATING SYSTEMS

The rating systems described are those recommended by the International Electrotechnical Commission (IEC) in its Publication 134.

DEFINITIONS OF TERMS USED

Electronic device. An electronic tube or valve, transistor or other semiconductor device.

Note
This definition excludes inductors, capacitors, resistors and similar components.

Characteristic. A characteristic is an inherent and measurable property of a device. Such a property may be electrical, mechanical, thermal, hydraulic, electro-magnetic, or nuclear, and can be expressed as a value for stated or recognized conditions. A characteristic may also be a set of related values, usually shown in graphical form.

Bogey electronic device. An electronic device whose characteristics have the published nominal values for the type. A bogey electronic device for any particular application can be obtained by considering only those characteristics which are directly related to the application.

Rating. A value which establishes either a limiting capability or a limiting condition for an electronic device. It is determined for specified values of environment and operation, and may be stated in any suitable terms.

Note
Limiting conditions may be either maxima or minima.

Rating system. The set of principles upon which ratings are established and which determine their interpretation.

Note
The rating system indicates the division of responsibility between the device manufacturer and the circuit designer, with the object of ensuring that the working conditions do not exceed the ratings.

ABSOLUTE MAXIMUM RATING SYSTEM

Absolute maximum ratings are limiting values of operating and environmental conditions applicable to any electronic device of a specified type as defined by its published data, which should not be exceeded under the worst probable conditions.

These values are chosen by the device manufacturer to provide acceptable serviceability of the device, taking no responsibility for equipment variations, environmental variations, and the effects of changes in operating conditions due to variations in the characteristics of the device under consideration and of all other electronic devices in the equipment.

The equipment manufacturer should design so that, initially and throughout life, no absolute maximum value for the intended service is exceeded with any device under the worst probable operating conditions with respect to supply voltage variation, equipment component variation, equipment control adjustment, load variations, signal variation, environmental conditions, and variations in characteristics of the device under consideration and of all other electronic devices in the equipment.

DESIGN MAXIMUM RATING SYSTEM

Design maximum ratings are limiting values of operating and environmental conditions applicable to a bogey electronic device of a specified type as defined by its published data, and should not be exceeded under the worst probable conditions.

These values are chosen by the device manufacturer to provide acceptable serviceability of the device, taking responsibility for the effects of changes in operating conditions due to variations in the characteristics of the electronic device under consideration.

The equipment manufacturer should design so that, initially and throughout life, no design maximum value for the intended service is exceeded with a bogey device under the worst probable operating conditions with respect to supply voltage variation, equipment component variation, variation in characteristics of all other devices in the equipment, equipment control adjustment, load variation, signal variation and environmental conditions.

DESIGN CENTRE RATING SYSTEM

Design centre ratings are limiting values of operating and environmental conditions applicable to a bogey electronic device of a specified type as defined by its published data, and should not be exceeded under normal conditions.

These values are chosen by the device manufacturer to provide acceptable serviceability of the device in average applications, taking responsibility for normal changes in operating conditions due to rated supply voltage variation, equipment component variation, equipment control adjustment, load variation, signal variation, environmental conditions, and variations in the characteristics of all electronic devices.

The equipment manufacturer should design so that, initially, no design centre value for the intended service is exceeded with a bogey electronic device in equipment operating at the stated normal supply voltage.

LETTER SYMBOLS FOR TRANSISTORS AND SIGNAL DIODES

based on IEC Publication 148

LETTER SYMBOLS FOR CURRENTS, VOLTAGES AND POWERS

Basic letters

The basic letters to be used are:

I, i = current
V, v = voltage
P, p = power.

Lower-case basic letters shall be used for the representation of instantaneous values which vary with time.
In all other instances upper-case basic letters shall be used.

Subscripts

A, a	Anode terminal
(AV), (av)	Average value
B, b	Base terminal, for MOS devices: Substrate
(BR)	Breakdown
C, c	Collector terminal
D, d	Drain terminal
E, e	Emitter terminal
F, f	Forward
G, g	Gate terminal
K, k	Cathode terminal
M, m	Peak value
O, o	As third subscript: The terminal not mentioned is open circuited
R, r	As first subscript: Reverse. As second subscript: Repetitive. As third subscript: With a specified resistance between the terminal not mentioned and the reference terminal.
(RMS), (rms)	Root-mean-square value
S, s	As first or second subscript: Source terminal (for FETS only) As second subscript: Non-repetitive (not for FETS) As third subscript: Short circuit between the terminal not mentioned and the reference terminal
X, x	Specified circuit
Z, z	Replaces R to indicate the actual working voltage, current or power of voltage reference and voltage regulator diodes.

Note: No additional subscript is used for DC values.

Upper-case subscripts shall be used for the indication of:

a) continuous (DC) values (without signal)
Example I_B

b) instantaneous total values
Example i_B

c) average total values
Example $I_{B(AV)}$

d) peak total values
Example I_{BM}

e) root-mean-square total values
Example $I_{B(RMS)}$

Lower-case subscripts shall be used for the indication of values applying to the varying component alone:

a) instantaneous values
Example i_b

b) root-mean-square values
Example $I_{b(rms)}$

c) peak values
Example I_{bm}

d) average values
Example $I_{b(av)}$

Note: If more than one subscript is used, subscript for which both styles exist shall either be all upper-case or all lower-case.

Additional rules for subscripts

Subscripts for currents

Transistors: If it is necessary to indicate the terminal carrying the current, this should be done by the first subscript (conventional current flow from the external circuit into the terminal is positive).

Examples: I_B, i_B, i_b, I_{bm}

Diodes: To indicate a forward current (conventional current flow into the anode terminal) the subscript F or f should be used; for a reverse current (conventional current flow out of the anode terminal) the subscript R or r should be used.

Examples: I_F, I_R, i_F, $I_{f(rms)}$

Subscripts for voltages

Transistors: If it is necessary to indicate the points between which a voltage is measured, this should be done by the first two subscripts. The first subscript indicates the terminal at which the voltage is measured and the second the reference terminal or the circuit node. Where there is no possibility of confusion, the second subscript may be omitted.

Examples: V_{BE}, v_{BE}, v_{be}, V_{bem}

Diodes: To indicate a forward voltage (anode positive with respect to cathode), the subscript F or f should be used; for a reverse voltage (anode negative with respect to cathode) the subscript R or r should be used.

Examples: V_F, V_R, v_F, V_{rm}

Subscripts for supply voltages or supply currents

Supply voltages or supply currents shall be indicated by repeating the appropriate terminal subscript.

Examples: V_{CC}, I_{EE}

Note: If it is necessary to indicate a reference terminal, this should be done by a third subscript

Example : V_{CCE}

Subscripts for devices having more than one terminal of the same kind

If a device has more than one terminal of the same kind, the subscript is formed by the appropriate letter for the terminal followed by a number; in the case of multiple subscripts, hyphens may be necessary to avoid misunderstanding.

Examples: I_{B2} = continuous (DC) current flowing into the second base terminal

V_{B2-E} = continuous (DC) voltage between the terminals of second base and emitter

Subscripts for multiple devices

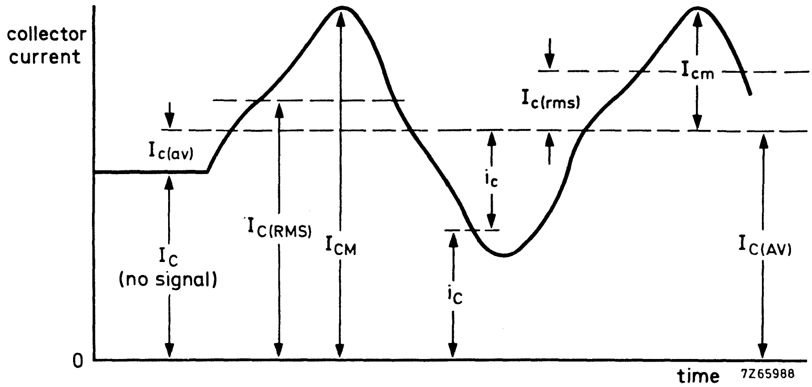
For multiple unit devices, the subscripts are modified by a number preceding the letter subscript; in the case of multiple subscripts, hyphens may be necessary to avoid misunderstanding.

Examples: I_{2C} = continuous (DC) current flowing into the collector terminal of the second unit

V_{1C-2C} = continuous (DC) voltage between the collector terminals of the first and the second unit.

Application of the rules

The figure below represents a transistor collector current as a function of time. It consists of a continuous (DC) current and a varying component.



LETTER SYMBOLS FOR ELECTRICAL PARAMETERS

Defenition

For the purpose of this Publication, the term "electrical parameter" applies to four-pole matrix parameters, elements of electrical equivalent circuits, electrical impedances and admittances, inductances and capacitances.

Basic letters

The following is a list of the most important basic letters used for electrical parameters of semiconductor devices.

B, b = susceptance; imaginary part of an admittance

C = capacitance

G, g = conductance; real part of an admittance

H, h = hybrid parameter

L = inductance

R, r = resistance; real part of an impedance

X, x = reactance; imaginary part of an impedance

Y, y = admittance;

Z, z = impedance;

Upper-case letters shall be used for the representation of:

a) electrical parameters of external circuits and of circuits in which the device forms only a part;

b) all inductances and capacitances.

Lower-case letters shall be used for the representation of electrical parameters inherent in the device (with the exception of inductances and capacitances).

Subscripts

General subscripts

The following is a list of the most important general subscripts used for electrical parameters of semiconductor devices:

F, f	=	forward; forward transfer
I, i (or 1)	=	input
L, l	=	load
O, o (or 2)	=	output
R, r	=	reverse; reverse transfer
S, s	=	source

Examples: Z_S, h_f, h_F

The upper-case variant of a subscript shall be used for the designation of static (d.c.) values.

Examples : h_{FE} = static value of forward current transfer ratio in common-emitter configuration **(DC current gain)**

R_E = **DC value of the external emitter resistance**

Note: The static value is the slope of the line from the origin to the operating point on the appropriate characteristic curve, i.e. the quotient of the appropriate electrical quantities at the operating point.

The lower-case variant of a subscript shall be used for the designation of small-signal values.

Examples: h_{fe} = small-signal value of the short-circuit forward current transfer ratio in common-emitter configuration

$Z_e = R_e + jX_e$ = small-signal value of the external impedance

Note: If more than one subscript is used, subscripts for which both styles exist shall either be all upper-case or all lower-case

Examples: h_{FE}, y_{RE}, h_{fe}

Subscripts for four-pole matrix parameters

The first letter subscript (or double numeric subscript) indicates input, output, forward transfer or reverse transfer

Examples: h_i (or h_{11})
h_o (or h_{22})
h_f (or h_{21})
h_r (or h_{12})

A further subscript is used for the identification of the circuit configuration. When no confusion is possible, this further subscript may be omitted.

Examples: h_{fe} (or h_{21e}), h_{FE} (or h_{21E})

Distinction between real and imaginary parts

If it is necessary to distinguish between real and imaginary parts of electrical parameters, no additional subscripts should be used. If basic symbols for the real and imaginary parts exist, these may be used.

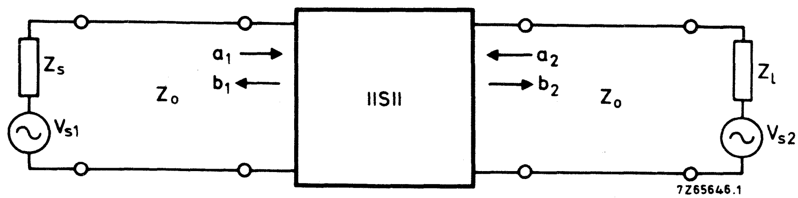
Examples: $Z_i = R_i + jX_i$
$y_{fe} = g_{fe} + jb_{fe}$

If such symbols do not exist or if they are not suitable, the following notation shall be used:

Examples: Re (h_{ib}) etc. for the real part of h_{ib}
Im (h_{ib}) etc. for the imaginary part of h_{ib}

SCATTERING PARAMETERS

In distinction to the conventional h, y and z-parameters, s-parameters relate to travelling wave conditions. The figure below shows a two-port network with the incident and reflected waves a_1, b_1, a_2 and b_2.



$$a_1 = \frac{V_{i1}}{\sqrt{Z_o}} \qquad a_2 = \frac{V_{i2}}{\sqrt{Z_o}} \qquad ^{1)}$$

$$b_1 = \frac{V_{r1}}{\sqrt{Z_o}} \qquad b_2 = \frac{V_{r2}}{\sqrt{Z_o}}$$

Z_o = characteristic impedance of the transmission line in which the two-port is connected.

V_i = incident voltage

V_r = reflected (generated) voltage

The four-pole equations for s-parameters are:

$$b_1 = s_{11}a_1 + s_{12}a_2$$

$$b_2 = s_{21}a_1 + s_{22}a_2$$

Using the subscripts i for 11, r for 12, f for 21 and o for 22, it follows that:

$$s_i = s_{11} = \left.\frac{b_1}{a_1}\right| a_2 = 0$$

$$s_r = s_{12} = \left.\frac{b_1}{a_2}\right| a_1 = 0$$

$$s_f = s_{21} = \left.\frac{b_2}{a_1}\right| a_2 = 0$$

$$s_o = s_{22} = \left.\frac{b_2}{a_2}\right| a_1 = 0$$

[1]) The squares of these quantities have the dimension of power.

The s-parameters can be named and expressed as follows:

$s_i = s_{11}$ = Input reflection coefficient.
The complex ratio of the reflected wave and the incident wave at the input, under the conditions $Z_l = Z_o = 50\ \Omega$ and $V_{s2} = 0$.

$s_r = s_{12}$ = Reverse transmission coefficient.
The complex ratio of the generated wave at the input and the incident wave at the output, under the conditions $Z_s = Z_o = 50\ \Omega$ and $V_{s1} = 0$.

$s_f = s_{21}$ = Forward transmission coefficient.
The complex ratio of the generated wave at the output and the incident wave at the input, under the conditions $Z_l = Z_o = 50\ \Omega$ and $V_{s2} = 0$.

$s_o = s_{22}$ = Output reflection coefficient.
The complex ratio of the reflected wave and the incident wave at the output, under the conditions $Z_s = Z_o = 50\ \Omega$ and $V_{s1} = 0$.

TAPE AND REEL SPECIFICATION

Semiconductors in SOT23 and SOT143 encapsulations can be delivered in reel packing for automatic placement on hybrid circuits and printed-circuit boards. The devices are placed with the mounting side downwards in compartments.

Separate reel packing for SOT89 and SOT223 encapsulations are given in Figs 2 and 3 respectively.

The configuration of the reel and flange is given in Fig. 6.

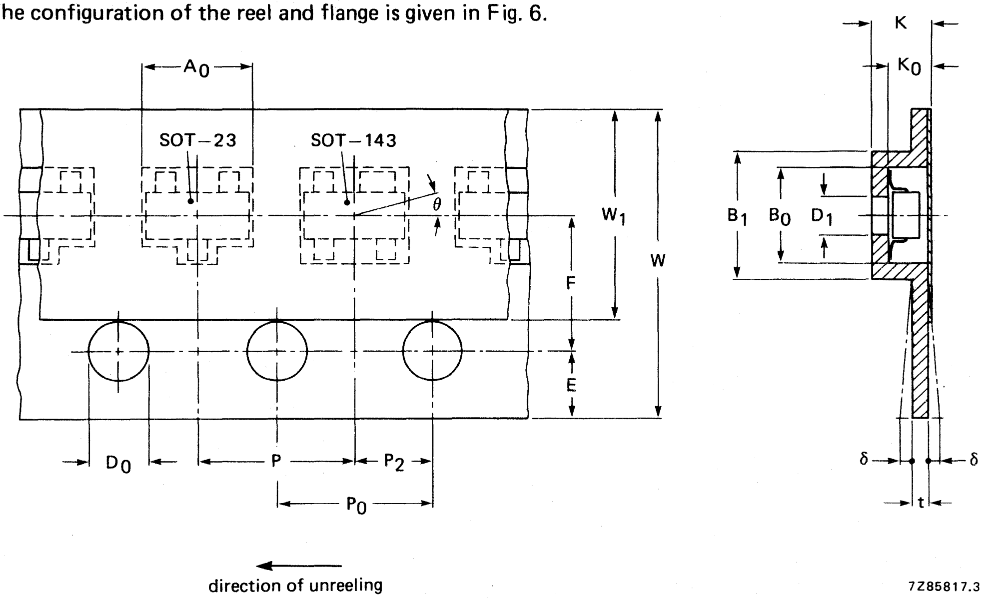


Fig. 1 Configuration of bandolier. Dimensions in mm.

Compartment			tol.
length	A_0	component length	+0,2
width	B_0	component width	+0,2
depth	K_0	0,95	+0,2
width outside	B_1	3,3	max.
pitch	P	4,0	±0,1
deviation	Θ	15°	max.
hole diameter	D_1	1	min.
Sprocket hole			
diameter	D_0	1,5	+0,1
pitch	P_0	4,0	±0,1
distance	E	1,75	±0,1
cumulative (10)			
pitch error		±0,1	

Centre line dimensions			tol.
length direction	P_2	2,0	±0,05
width direction	F	3,5	±0,05
Fixing tape			
width	W_1	5,5	±0,25
thickness	–	0,1	max.
Carrier tape			
width	W	8,0	±0,2
bending	δ	0,3	max.
thickness	t	0,4	max.
Overall thickness	K	1,5	max.

Semiconductors in SOT89 encapsulations can also be delivered in reel packing for automatic placement on hybrid circuits and printed-circuit boards. The devices are placed with the mounting side downwards in compartments.

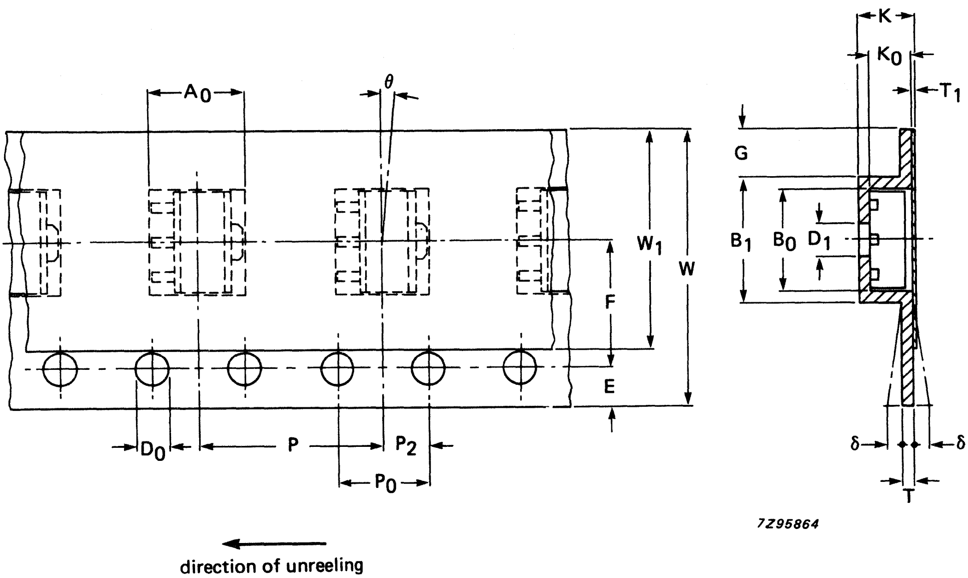


Fig.2 Configuration of bandolier. Dimensions in mm.

Compartment			tol.
length	A_0 component length		
width	B_0 component width		
depth	K_0 component depth		
width outside	B_1	5,7	max.
pitch	P	8,0	± 0,1
deviation	Θ	± 5°	max.
hole diam.	D_1	1,5	min.
Sprocket hole			
diameter	D_0	1,5	+ 0,1
pitch	P_0	4,0	± 0,1
distance	E	1,75	± 0,1
cumulative (10) pitch error		± 0,1	

Centre line dimensions			tol.
length direction	P_2	2,0	± 0,05
width direction	F	5,5	± 0,1
Fixing tape			
width	W_1	9,5	max.
thickness	T_1	0,1	max.
Carrier tape			
width	W	12	± 0,2
bending	δ	0,3	max.
thickness	T	0,4	max.
Overall thickness	K	2,4	max.
distance	G	1,8	min.

Semiconductors in SOT223 encapsulations can also be delivered in reel packing for automatic placement on hybrid circuits and printed-circuit boards. The devices are placed with the mounting side downwards in compartments.

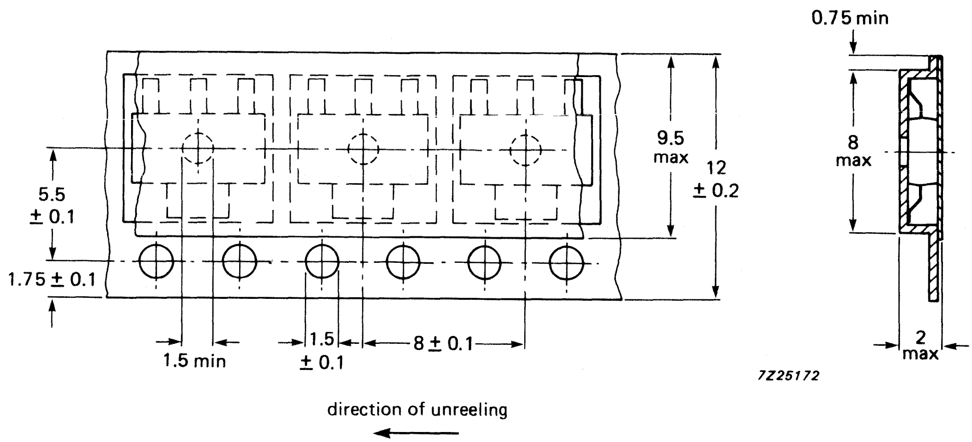


Fig.3 Configuration of bandolier. Dimensions in mm.

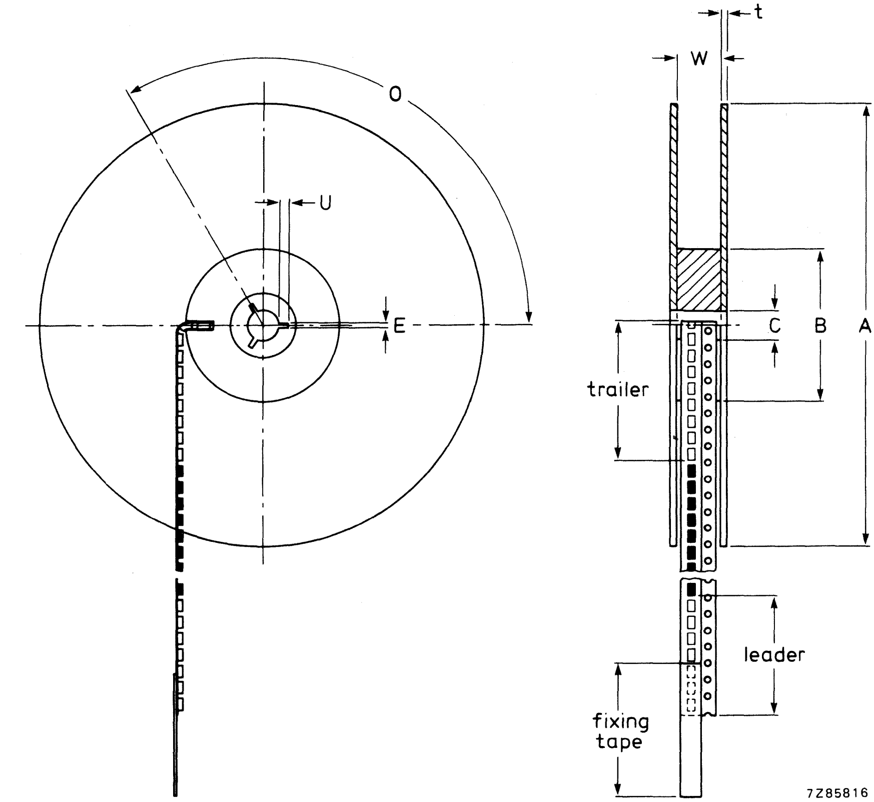


Fig.4 Configuration of reel and flange (dimensions in mm).

Flange			tol.
diameter	A	180	+0 −2
thickness	t	1,5	+0,5 −0,1
space between flanges	W	9,5	± 0,5

Hub			tol.
diameter	B	62	± 1,5
spindle hole	C	12,75	+0,15 −0
key slit			
width	E	2	± 0,5
depth	U	4	± 0,5
location	O	120	degrees

Amount of devices per reel

The bandolier of a 180 mm reel contains at least 3000 devices with no more than 15 empty compartments (0,5%). Three consecutive empty places might be found provided this gap is followed by 6 consecutive devices.

The carrier tape (leader) starts with at least 75 empty positions (equivalent to 300 mm); the covering foil is at least 300 mm. In order to fix the carrier tape a self-adhesive tape of 20 to 50 mm is applied.

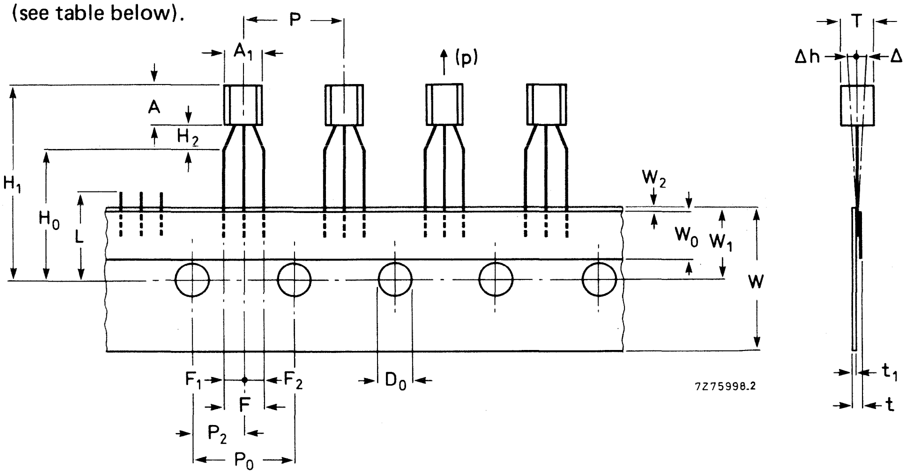
At the end of the bandolier (trailer) at least 75 empty positions (equivalent to a length of 300 mm) and 300 mm foil. For fixing onto the reel a self-adhesive tape of 20 to 50 mm is applied.

TO-92 VARIANT TRANSISTORS ON TAPE

MECHANICAL DATA

Dimensions in mm

Fig. 1 (see table below).



Item	Symbol	Specifications				Remarks
		min.	nom.	max.	tol.	
Body width	A_1	4,0		4,8		
Body height	A	4,8		5,2		
Body thickness	T	3,9		4,2		
Pitch of component	P		12,7		± 1	
Feed hole pitch	P_o		12,7		± 0,3	Cumulative pitch error 1,0 mm/20 pitch
Feed hole centre to component centre	P_2		6,35		± 0,4	To be measured at bottom of clinch
Distance between outer leads	F		5,08		+ 0,6 −0,2	
Component alignment	Δh		0	1		At top of body
Tape width	W		18		± 0,5	
Hold-down tape width	W_o		6		± 0,2	
Hole position	W_1		9		+ 0,7 −0,5	
Hold-down tape position	W_2		0,5		± 0,2	
Lead wire clinch height	H_o		16		± 0,5	
Component height	H_1			32,25		
Length of snipped leads	L			11,0		
Feed hole diameter	D_o		4		± 0,2	
Total tape thickness	t			1,2		t_1 0,3-0,6
Lead-to-lead distance	F_1, F_2		2,54		+ 0,4 −0,1	
Clinch height	H_2			3		
Pull-out force	(p)	6N				

PACKING

The transistors are supplied on tape in boxes (ammopack) or on reels. The number per reel is 1600 and per ammobox 2000*.

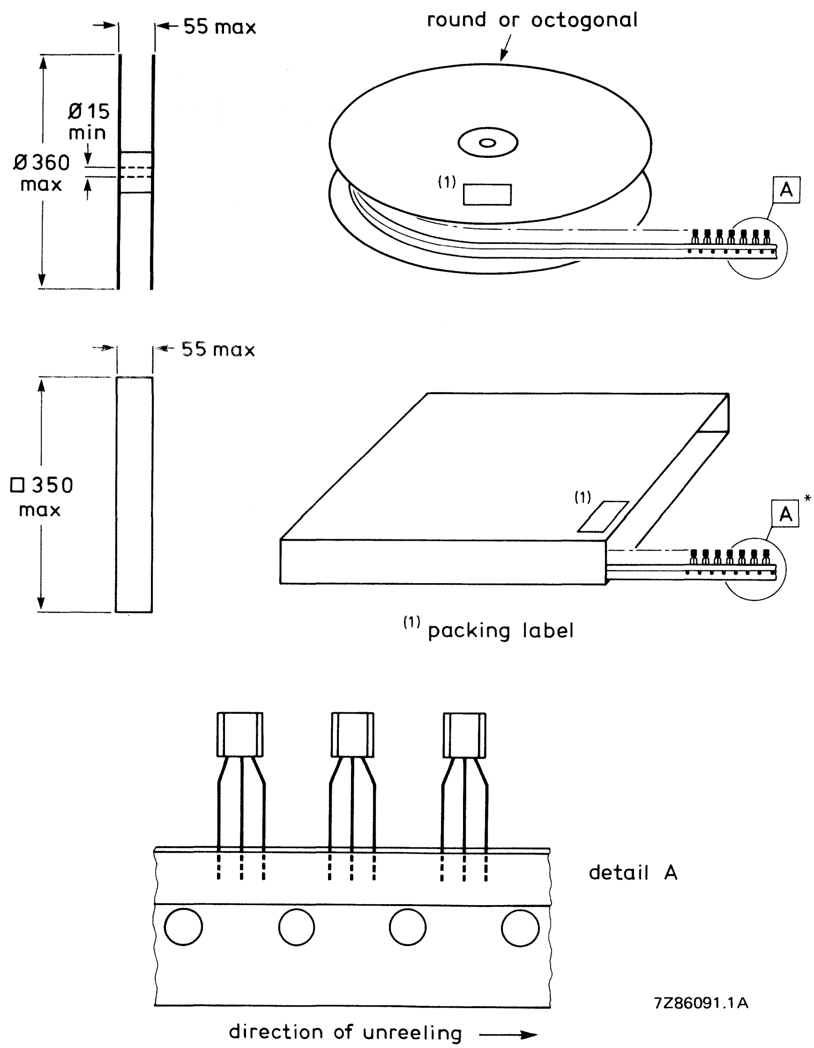


Fig. 2 Dimensions (in mm) of reel and box.

DROPOUTS

A maximum of 0,5% of the specified number of transistors in each packing may be missing. Up to 3 consecutive components may be missing provided the gap is followed by 6 consecutive components.

TAPE SPLICING

Slice the carrier tape on the back and/or front so that the feed hole pitch (P_O) is maintained (see Fig. 3).

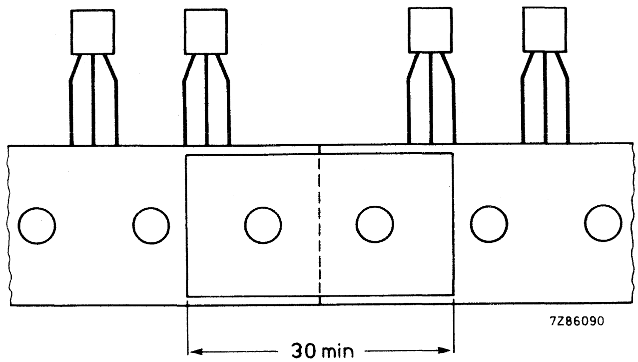


Fig. 3 Jointing tape with splicing patch.

* The ammobox has 80 layers of 25 transistors each.
Each layer contains 25 transistors plus one empty position in order to fold the layer correctly.
The ammobox is accessible from both sides enabling the user to choose between "normal" (see Fig. 2) and "reverse" tape.

SOLDERING RECOMMENDATIONS

SMD devices are ideally suited for placement onto thick and thin film substrates and printed boards.

To assure reliable and consistent connections particular attention should be paid to:

1. **Flux**

   A non-active flux is recommended. Where active fluxes are employed, great care in subsequent substrate cleaning must be exercised.

2. **Metal-alloy solder or solder paste**

   Correct choice of solder alloy or solder paste to be employed e.g. 62% Sn, 36% Pb, 2% Ag or 60% Sn/40% Pb. Any paste used should contain at least 85% metal dry weight.

3. **Soldering temperature**

   This will vary according to the actual method employed.

REFLOW SOLDERING

The preferred techique for mounting microminiature components on hybrid thick and thin-film is the method of reflow soldering.

The tags of SOT23, SOT143, SOT223 and SOT89 envelopes are pre-tinned and the best results are obtained if a similar solder is applied to the corresponding soldering areas on the substrate. This can be done by either dipping the substrate in a solder bath or by screen printing a solder paste.
The maximum temperature of the leads or tab during the soldering cycle should not exceed 285 °C.
The most economic method of soldering is a process in which all different components are soldered simultaneously for example SOT23, SOT143, SOT223 or SOT89 devices, capacitors and resistors.

Having first been fluxed, all components are positioned on the substrate. The slight adhesive force of the flux is sufficient to keep the components in place. Solder paste contains a flux and has therefore good inherent adhesive properties which eases positioning of the components.

With the components in position the substrate is heated to a point where the solder begins to flow. This can be done on a heating plate or on a conveyor belt running through an infrared tunnel. The maximum allowed temperature of the plastic body of a device must be kept below 280 °C during the soldering cycle. For further temperature behaviour during the soldering process see Figs 2 and 3.

The surface tension of the liquid solder tends to draw the tags of the device towards the centre of the soldering area and has thus a correcting affect on slight mispositionings. However, if the layout leaves something to be desired the same effect can result in undesirable shifts; particularly if the soldering areas on the substrate and the components are not concentrally arranged. This problem can be solved using a standard contact pattern, which leaves sufficient scope for the self-positioning effect (see Figs 4 to 9).

After cooling the connections may be visually inspected and, where necessary, repaired with a light soldering iron. Finally any remaining flux must be removed carefully.

WAVE SOLDERING

The normal (dual) wave soldering process can also be applied to SOD80, SOT23, SOD87 and SOT143 envelopes. We do not recommend SOT89 to be used with wave soldering process.

IMMERSION SOLDERING

Where a complete substrate or printed circuit board is immersed in solder:
a. The temperature of the soldering bath should not exceed 280 °C.
b. The duration of the soldering cycle should not exceed 10 seconds.
c. Forced cooling may be applied (see Fig. 1).

HAND SOLDERING

It is possible to solder microminiature devices with a light hand-held soldering iron, but this method has obvious drawbacks and should therefore be restricted to laboratory use and/or incidental repairs on production circuits.

1. It is time-consuming and expensive.
2. The device cannot be positioned accurately and therefore the connecting tags may come into contact with the substrate and damage it.
3. There is a great risk of breaking either substrate or even internal connections inside the encapsulation.
4. The envelope may be damaged by the iron.

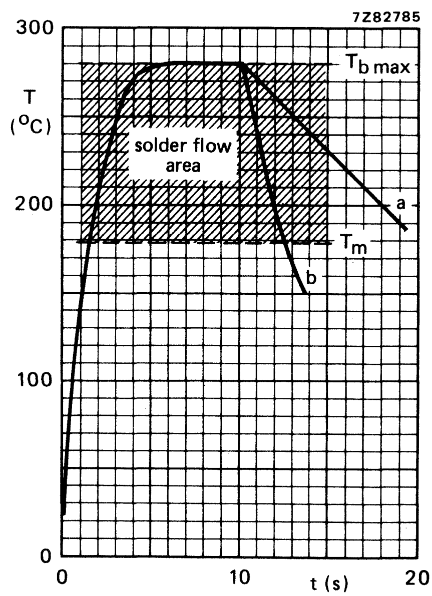
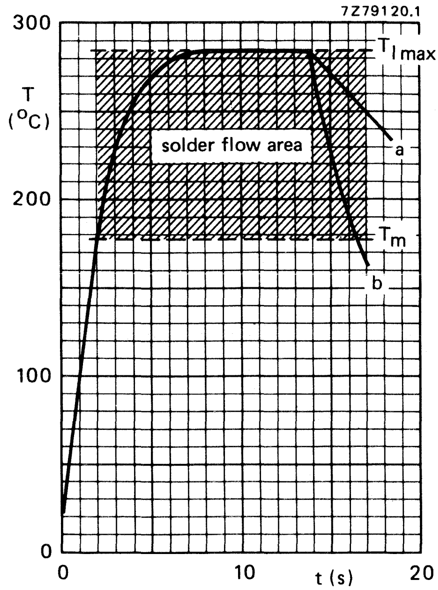


Fig.1 Device temperature during *immersion* soldering.

Maximum time of immersion in soldering bath is 10 seconds at an ambient temperature of 25 °C.

a = free convection cooling; b = forced cooling.
$T_{b\,max}$ = maximum bath temperature (280 °C).
T_m = melting temperature of solder (179 °C).



a = free convection cooling

b = permissible forced cooling

$T_{l\,max}$ = maximum lead or tab temperature = 285 °C

T_m = melting point of the solder is 179 °C

T_{amb} = 25 °C

Time of heat supply:
without preheating max. 14 s
with preheating max. 10 s

Maximum time of preheating 45 s

Fig.2 Reflow soldering without preheating.

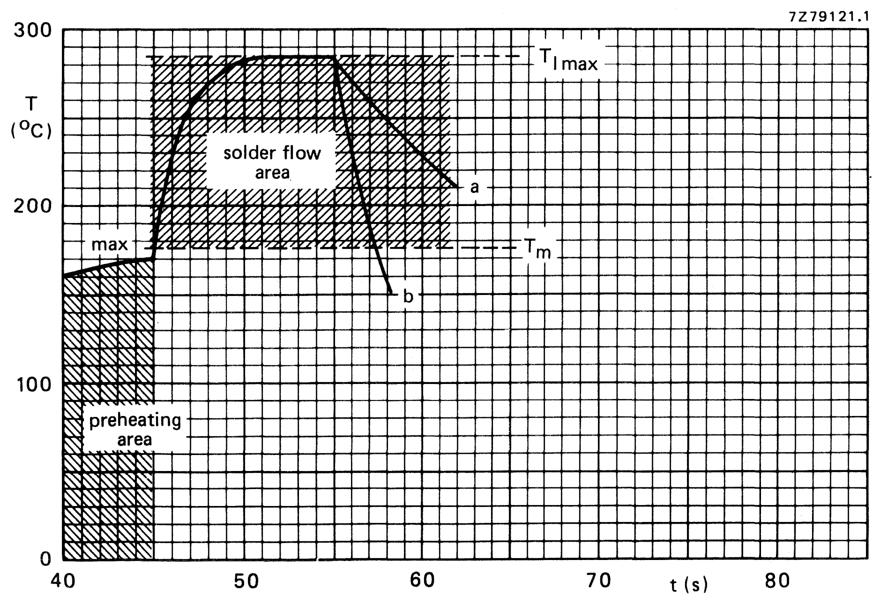


Fig.3 Reflow soldering with preheating.

Minimum required dimensions of metal connection pads on hybrid thick and thin-film substrates.

Dimensions in mm

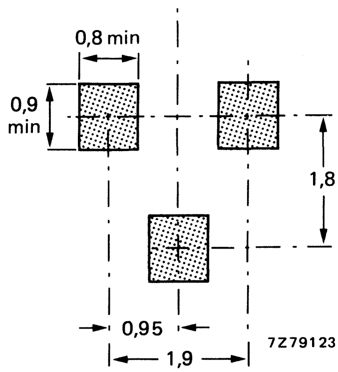


Fig.4 SOT23 pattern.

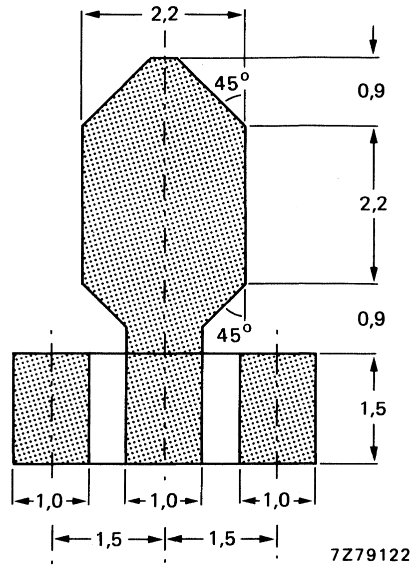


Fig.5 SOT89 pattern.

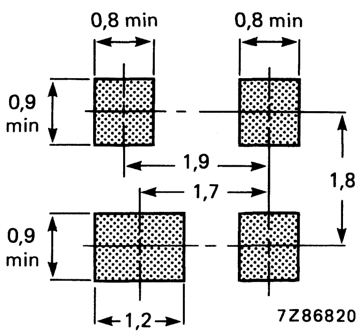


Fig.6 SOT143 pattern.

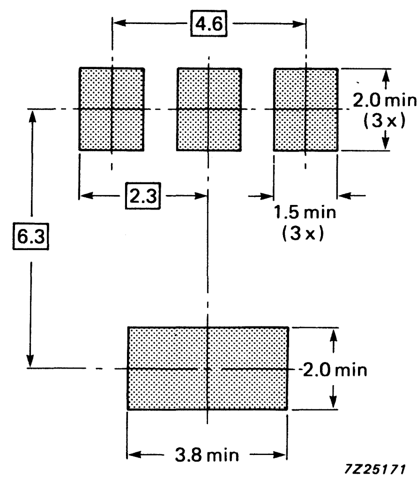


Fig.7 SOT223 pattern.

Minimum required dimensions of metal connection pads on hybrid thick and thin-film substrates.

Dimensions in mm

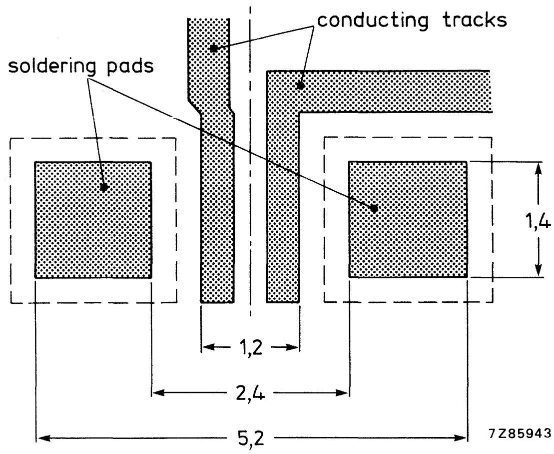


Fig.8 SOD80 pattern.

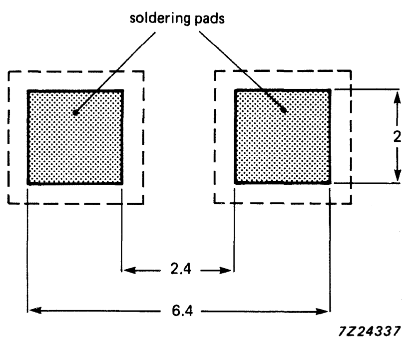


Fig. 9 SOD87 pattern.

SOLDERING RECOMMENDATIONS SOT37 AND SOT103

Transistors in SOT37 and SOT103 envelopes may be mounted with leads flat (Fig. 1) or bent (Figs 2 and 3). Different soldering procedures apply for the different styles of mounting.

FLAT-LEAD MOUNTING

Soldering by hand

Avoid putting any force on the leads during or just after soldering.

Solder the four leads one at a time, *not* simultaneously.

Proceed from one lead to the adjacent lead, *not* to the opposite one.

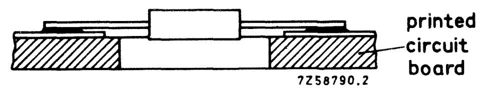


Fig. 1

Solder temperature	max.	300	°C
Soldering time	max.	5	s
Solder-to-case distance	min.	2	mm

BENT-LEAD MOUNTING

If leads are bent, all four may be soldered simultaneously if desired.

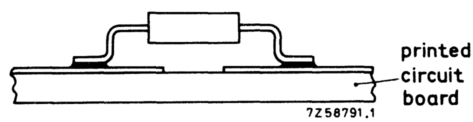


Fig. 2

Solder temperature	max.	300	°C
Soldering time	max.	10	s

DIP OR WAVE SOLDERING

When dip or wave soldering, the maximum allowable temperature of the solder is 260 °C. This temperature must not be in contact with the joint for more than 5 seconds. The total contact time of successive solder waves must not exceed 5 seconds. The device may be mounted up to the lead projections, but the temperature of the body must not exceed the specified storage maximum.

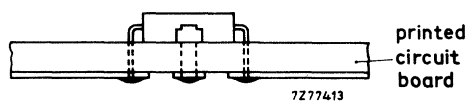


Fig. 3

Solder temperature	max.	260	°C
Soldering time	max.	5	s

SOLDER RECOMMENDATIONS FOR SOT48 AND SOT122

A brass nut is supplied with each transistor for securing it to a heatsink.

Screw thread, diameter and nuts:

stud diameter	thread	maximum diameter of threaded stud	nut thickness
¼"	8-32UNC-2A(B)	4,14 mm	3,5 mm SOT-48 5,0 mm SOT-122

To ensure optimum heat transfer and to avoid damage to the threaded stud of the transistor the following recommendations should be observed:

1. Diameter of the mounting hole in the heatsink 4,15 + 0,05; −0 mm (max. 4,2 mm).
2. Heatsink surfaces at the mounting hole to be flat, parallel, and free of burrs or oxydation.
3. Torque on nut: minimum 0,75 Nm (7,5 kgcm), maximum 0,85 Nm (8,5 kgcm).
4. Recommended distance from the top surface of the heatsink to surface of printed-circuit board: 2,9 + 0; −0,2 mm.

Tension in the transistor leads sets the limit on spacing between heatsink and printed-circuit board; in general, the leads can withstand more pull in the downward direction than in the upward direction.

Solder the leads to the connection pads with resin-cored tin-lead solder, using an iron of normal temperature. Soldering iron temperatures as high as 350 ^{o}C are safely tolerable; the transistor can withstand an interior temperature of 250 ^{o}C for about ten minutes.

The leads may be tinned, if required, by dipping them into a solder bath at about 230 ^{o}C; each lead may be dipped up to its full length. A flux of the quality of Super-Safe is recommended; after tinning, surplus flux should be rinsed away with tap water.

MOUNTING AND SOLDERING RECOMMENDATIONS FOR CATV HYBRIDS

Mounting

1. The heatsink surface must be flat, free of burrs, oxidation and parallel to the mounting surface.
2. The heatsink, mounting base and ground leads should be properly r.f. grounded.
3. Heatsink compound should be applied sparingly and evenly on the mounting base.

   Suitable heatsink compounds:

   Dow Corning 340,
   Eccotherm TC-5 (E&C),
   Wakefield 120.

   When mounting CATV hybrid components, the UNC screws must first be turned finger-tight. The screws should then be tightened to within the tolerance of minimum 0,5 Nm to maximum 0,7 Nm.

Soldering

Devices may be soldered directly into a circuit using a soldering iron with a maximum temperature of 260 ^{o}C for not more than 3 s when the soldered joints are a minimum of 3 mm from the module.

THERMAL CHARACTERISTICS

The heat generated in a semiconductor chip normally flows by various paths to the surroundings (ambient).

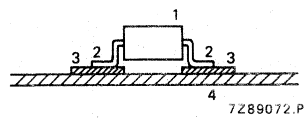


Fig.1.

1. Heat radiation from the envelope to ambient (1).
   This heat transfer can be neglected when the envelope is mounted on a substrate or printed board.
2. Heat transmission via leads (2) soldering points (3) and substrate (4).

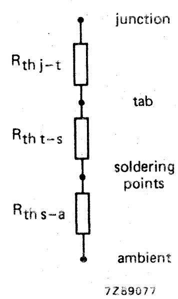


Fig.2 Thermal behaviour of heat flow when the device is mounted on a substrate or printed board.

$R_{th\ j\text{-}t}$ = Thermal resistance from junction to tab.

$R_{th\ t\text{-}s}$ = Thermal resistance from tab to soldering points.

$R_{th\ s\text{-}a}$ = Thermal resistance from soldering points to ambient.

Internal $R_{th} = R_{th\ j\text{-}t} + R_{th\ t\text{-}s}$ = 320 K/W (SOT23/143).

Heat transfer from soldering points to ambient (Fig.3)

This depends on the shape and material of tracks and substrate. In Figures 4 to 8 standard mounting conditions are given to set up the maximum power ratings for SOT23, SOT143, SOT89, SOD87 and SOT223 encapsulations.

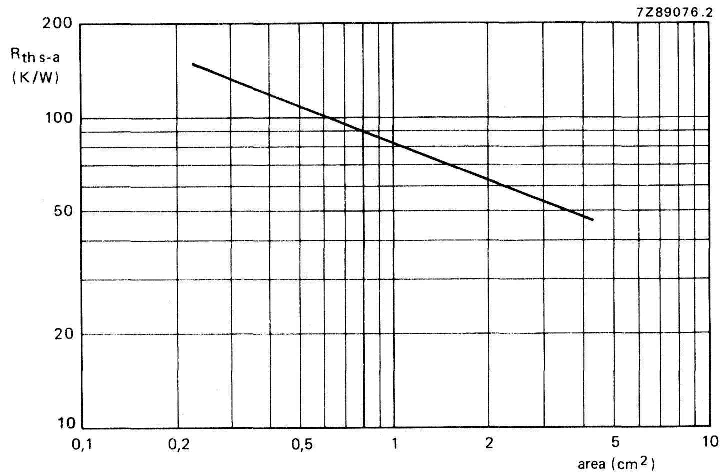


Fig.3 Heat transfer from soldering points to ambient.

Ceramic substrate

The $R_{th\ s\text{-}a}$ depends on the size of the ceramic substrate due to good conductive properties.

Printed board

$R_{th\ s\text{-}a}$ = 150 K/W for SOT23 and SOT143 envelopes mounted on a printed board.
P_{tot} = 250 mW for SOT23 and SOT143 envelopes mounted on a printed board.

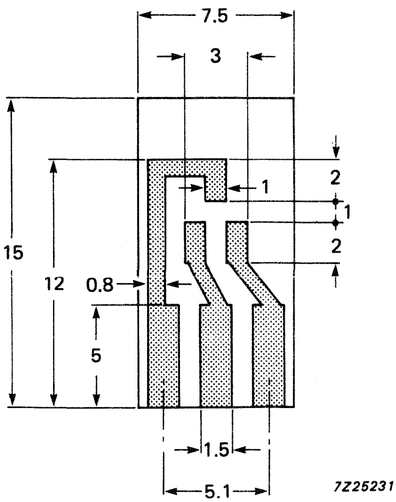


Fig.4 Test circuit for SOT23.

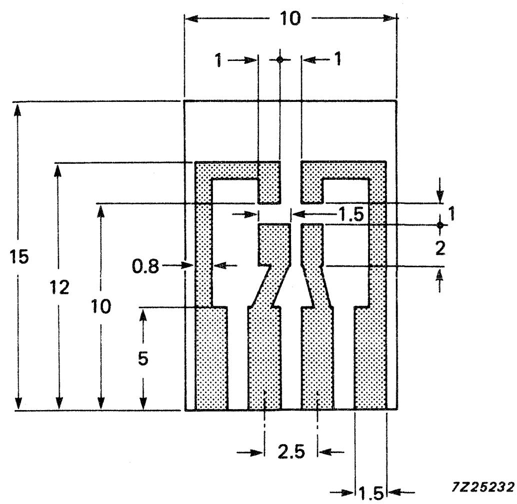


Fig.5 Test circuit for SOT143.

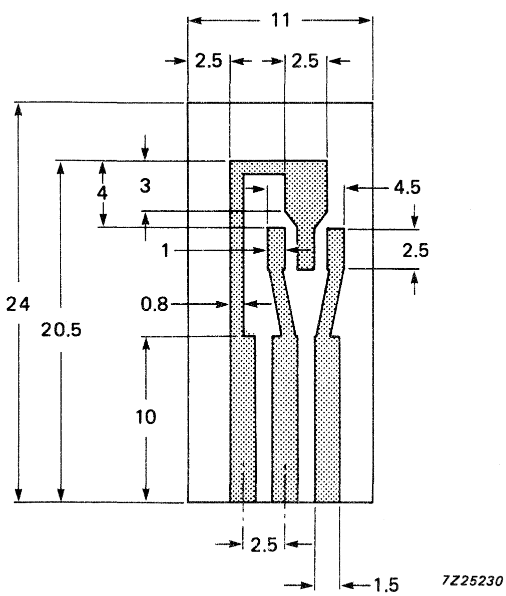


Fig.6 Test circuit for SOT89.

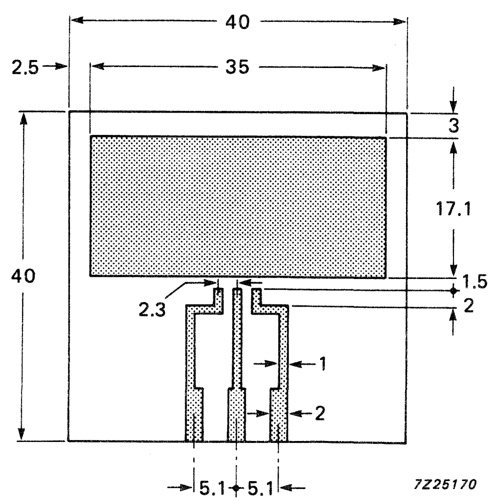


Fig.7 Test circuit for SOT223.

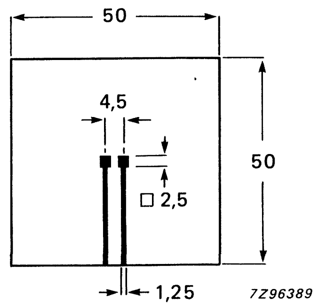


Fig.8 Test circuit for SOD87.

DEVICE DATA

Wideband transistors

N-P-N H.F. WIDEBAND TRANSISTOR

N-P-N transistor in a TO-92 envelope intended for application as an amplifier or oscillator in the v.h.f. and u.h.f. range.

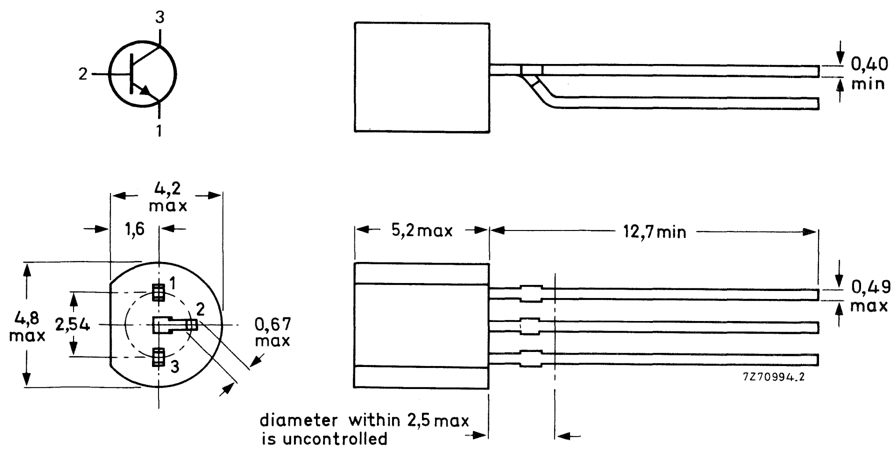
QUICK REFERENCE DATA

Collector-base voltage (open emitter)	V_{CBO}	max.	25 V
Collector-emitter voltage (open base)	V_{CEO}	max.	15 V
Collector current (d.c.)	I_C	max.	25 mA
Total power dissipation up to T_{amb} = 60 °C	P_{tot}	max.	360 mW
D.C. current gain			
I_C = 2 mA; V_{CE} = 5 V	h_{FE}	min.	20
I_C = 20 mA; V_{CE} = 5 V	h_{FE}	35 to	70
Transition frequency at f = 500 MHz			
I_C = 15 mA; V_{CE} = 5 V	f_T	typ.	1,8 GHz

MECHANICAL DATA

Dimensions in mm

Fig. 1 TO-92 variant.



RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

Collector-base voltage (open emitter)	V_{CBO}	max.	25	V
Collector-emitter voltage				
open base	V_{CEO}	max.	15	V
$R_{BE} \leqslant 50\ \Omega$	V_{CER}	max.	25	V
Emitter-base voltage (open collector)	V_{EBO}	max.	3,5	V
Collector current				
d.c.	I_C	max.	25	mA
peak value; $t_p < 1\ \mu s$	I_{CM}	max.	50	mA
Total power dissipation up to T_{amb} = 60 °C	P_{tot}	max.	360	mW
→ Junction temperature	T_j	max.	175	°C
Storage temperature	T_{stg}		−55 to +150	°C

THERMAL RESISTANCE

From junction to ambient in free air	$R_{th\ j\text{-}a}$	=	250	K/W

CHARACTERISTICS

T_j = 25 °C unless otherwise specified

Collector cut-off current				
V_{CB} = 15 V; I_E = 0	I_{CBO}	max.	50	nA
Emitter cut-off current				
V_{EB} = 2 V; I_C = 0	I_{EBO}	max.	1,0	μA
Saturation voltages				
I_C = 25 mA; I_B = 1,25 mA	V_{CEsat}	max.	1,0	V
	V_{BEsat}	max.	1,0	V
D.C. current gain				
I_C = 2 mA; V_{CE} = 5 V	h_{FE}	min.	20	
I_C = 20 mA; V_{CE} = 5 V	h_{FE}		35 to 70	
Transition frequency at f = 500 MHz				
I_C = 15 mA; V_{CE} = 5 V	f_T	typ.	1,8	GHz
Feedback capacitance				
I_C = 2 mA; V_{CE} = 5 V; T_{amb} = 25 °C	C_{re}	typ.	1,1	pF
Noise figure at f = 100 MHz				
I_C = 2 mA; V_{CE} = 5 V; Z_S = 60 Ω; T_{amb} = 25 °C	F	typ.	4,0	dB
Noise figure at f = 200 MHz				
I_C = 2 mA; V_{CE} = 5 V; Z_S = 60 Ω; T_{amb} = 25 °C	F	typ.	3,0	dB
Power gain at f = 100 MHz				
I_C = 2 mA; V_{CE} = 5 V; Z_S = 60 Ω; R_L = 2 kΩ; T_{amb} = 25 °C	G_p	typ.	16	dB
Power gain at f = 200 MHz				
I_C = 2 mA; V_{CE} = 5 V; Z_S = 60 Ω; R_L = 920 Ω; T_{amb} = 25 °C	G_p	typ.	16	dB

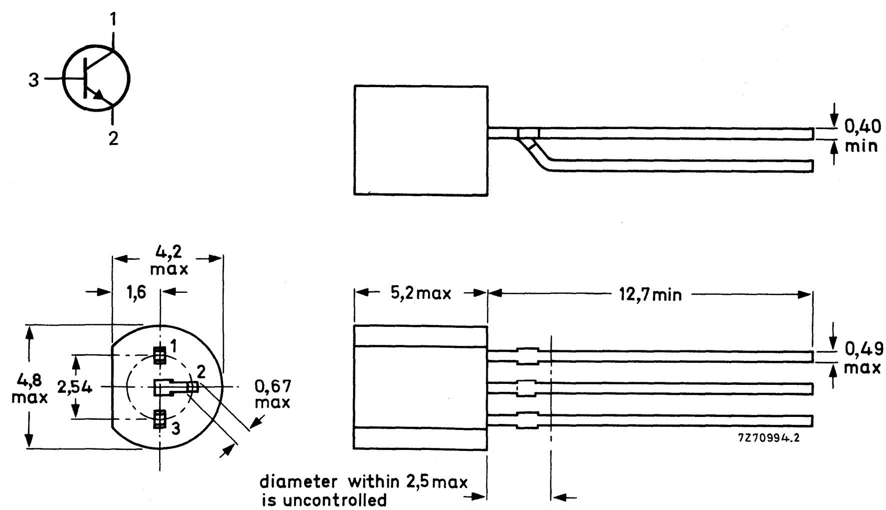
N-P-N H.F. WIDEBAND TRANSISTOR

N-P-N transistor in a TO-92 envelope. It is primarily intended for use in H.F. amplifiers and u.h.f. oscillators.

QUICK REFERENCE DATA

Collector-emitter breakdown voltage	$V_{(BR)CEO}$	max.	15	V
Collector-base breakdown voltage	$V_{(BR)CBO}$	max.	25	V
Collector current (d.c.)	I_C	max.	25	mA
Total power dissipation up to T_{amb} = 25 °C	P_{tot}	max.	500	mW
Junction temperature	T_j	max.	175	°C ←
D.C. current gain I_C = 5 mA; V_{CE} = 10 V	h_{FE}	min. / max.	25 / 250	
Transition frequency at f = 100 MHz I_C = 5 mA; V_{CE} = 10 V	f_T	typ.	1,8	GHz
Noise figure at Z_S = 60 Ω I_C = 5 mA; V_{CE} = 10 V; f = 800 MHz	F	typ.	5,0	dB

Fig. 1 TO-92var. Dimensions in mm



RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

Collector-emitter voltage	V_{CEO}	max.	15 V
Collector-base voltage	V_{CBO}	max.	25 V
Collector current (d.c.)	I_C	max.	25 mA
Total power dissipation up to T_{amb} = 25 °C	P_{tot}	max.	500 mW
→ Junction temperature	T_j	max.	175 °C
Storage temperature	T_s		−65 to +150 °C

THERMAL RESISTANCE

From junction to ambient in free air	$R_{th\ j\text{-}a}$	=	250 K/W

CHARACTERISTICS

T_j = 25 °C unless otherwise specified

Collector-emitter breakdown voltage I_C = 1 mA; I_B = 0	$V_{(BR)CEO}$	max.	15 V
Collector-base breakdown voltage I_C = 10 μA; I_E = 0	$V_{(BR)CBO}$	max.	25 V
Collector cut-off current I_E = 0; V_{CB} = 10 V	I_{CBO}	max.	50 nA
D.C. current gain I_C = 5 mA; V_{CE} = 10 V	h_{FE}	min.	25
		max.	250
Collector-emitter saturation voltage I_C = 10 mA, I_B = 1 mA	V_{CEsat}	max.	0,5 V
Transition frequency at f = 100 MHz I_C = 5 mA; V_{CE} = 10 V	f_T	typ.	1,8 GHz
Noise figure at Z_S = 60 Ω I_C = 5 mA; V_{CE} = 10 V; f = 800 MHz; T_{amb} = 25 °C	F	typ.	5,0 dB

SILICON PLANAR EPITAXIAL TRANSISTOR

BFG17A is an npn wideband transistor in a microminature SOT143 envelope with double emitter bonding. The device contains a BFW92A crystal. This transistor is intended for use in wideband (40 to 860 MHz) aerial amplifiers using SMD technology.

QUICK REFERENCE DATA

Collector-base voltage (open emitter)	V_{CBO}	max.	25	V
Collector-emitter voltage (open base)	V_{CEO}	max.	15	V
Collector current (DC)	I_C	max.	50	mA
Total power dissipation up to T_{amb} = 25 °C	P_{tot}	max.	300	mW
Junction temperature	T_j	max.	175	°C
DC current gain I_C = 2 mA; V_{CE} = 1 V	h_{FE}		20 to 150	
Transition frequency at f = 500 MHz I_C = 25 mA; V_{CE} = 5 V	f_t	typ.	2.8	GHz
Feedback capacitance at f = 1 MHz I_C = 0; V_{CE} = 5 V	C_{re}	typ.	0.06	pF
Noise figure I_C = 2 mA; V_{CE} = 5 V; f = 800 MHz; Z_s = 600 Ω; T_{amb} = 25 °C	F	typ.	2.5	dB
Maximum unilateral power gain at f = 800 MHz; I_C = 14 mA; V_{CE} = 10 V; T_{amb} = 25 °C	G_{UM}	typ.	15	dB

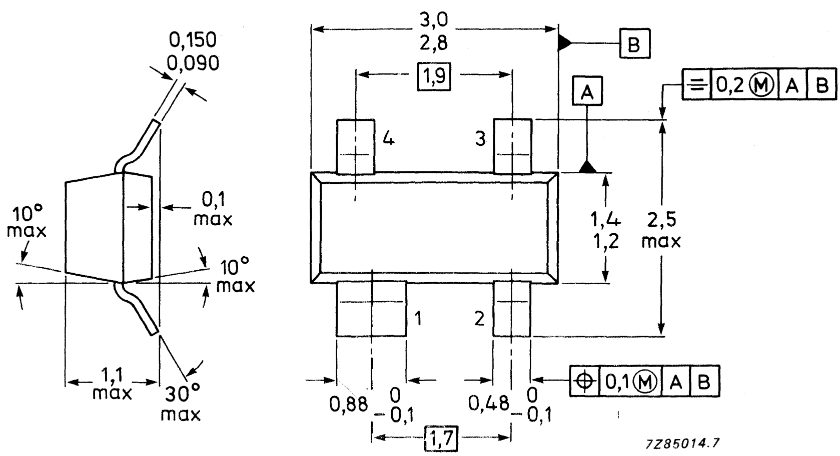
MECHANICAL DATA

SOT143 (see Fig. 1).

MECHANICAL DATA

Fig. 1 SOT143.

Dimensions in mm
Marking code: E6



TOP VIEW

Pinning

1 = collector
2 = base
3,4 = emitter

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134).

Collector-base voltage (open emitter)	V_{CBO}	max.	25	V
Collector-emitter voltage (open base)	V_{CEO}	max.	15	V
Emitter-base voltage (open collector)	V_{EBO}	max.	2.5	V
Collector current (DC)	I_C	max.	25	mA
Total power dissipation up to T_{amb} = 25 °C mounted on a ceramic substrate 8 x 10 x 0.7 mm	P_{tot}	max.	300	mW
Storage temperature range	T_{stg}		−65 to 150	°C
Junction temperature	T_j	max.	175	°C

THERMAL RESISTANCE

From junction to ambient mounted on ceramic substrate 8 x 10 x 0.7 mm	$R_{th\ j\text{-}a}$	=	430	K/W

CHARACTERISTICS

T_j = 25 °C unless otherwise specified

Collector cut-off current			
I_E = 0, V_{CB} = 10 V	I_{CBO}	max.	50 nA
DC current gain			
I_C = 2 mA; V_{CE} = 1 V	h_{FE}		20 to 150
I_C = 25 mA; V_{CE} = 1 V	h_{FE}	min.	20
Transition frequency at f = 500 MHz			
I_C = 25 mA; V_{CE} = 5 V	f_T	typ.	2.8 GHz
Noise figure			
I_C = 2 mA; V_{CE} = 5 V; f = 800 MHz			
Z_s = 60 Ω; T_{amb} = 25 °C	F	typ.	2.5 dB
Collector capacitance at f = 1 MHz			
I_E = 0; V_{CB} = 10 V	C_c	typ.	0.7 pF
Emitter capacitance at f = 1 MHz			
I_C = 0; V_{EB} = 0.5 V	C_e	typ.	1.25 pF
Feedback capacitance at f = 1 MHz			
I_C = 0; V_{CE} = 5 V	C_{re}	typ.	0.6 pF
Maximum unilateral power gain at f = 800 MHz			
I_C = 14 mA; V_{CE} = 10 V; T_{amb} = 25 °C; S_{re} = 0			
$G_{UM} = 10 \log \dfrac{\lvert s_{fe} \rvert^2}{(1 - \lvert s_{ie} \rvert^2)(1 - \lvert s_{oe} \rvert^2)}$	G_{UM}	typ.	15 dB

Output voltage at d_{im} = —dB
(DIN 45004B, para. 6,3: 3-tone)
I_C = 14 mA; V_{CE} = 10 V; Z_L = 75 Ω
$V_p = V_o$; f_p = 795.25 MHz
$V_q = V_o$ −6 dB; f_q = 803.25 MHz
$V_r = V_o$ −6 dB; f_r = 805.25 MHz
Measured at $f_{(p + q - r)}$ = 793.25 MHz | V_o | typ. | 150 mV

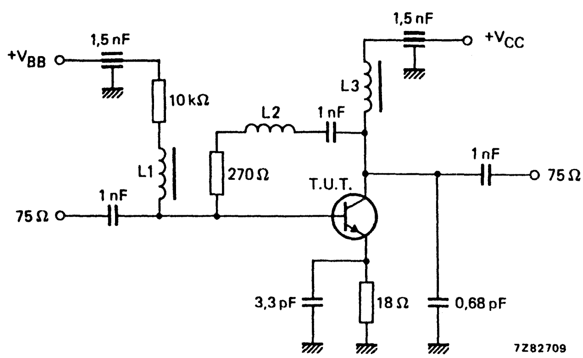


Fig. 2 Intermodulation distortion and second harmonic distortion MATV test circuit.
L1 = L3 = 5 μH Ferroxcube choke.
L2 = 3 turns Copper wire (0.4 mm), internal diameter 3 mm, windinding pitch 1 mm.

Table 1 Scatter parameters.

I_C (mA)	f (MHz)	s_{ie} (°)	s_{re} (°)	s_{fe} (°)	s_{oe} (°)	G_{UM} (dB)
5	40	0.84/−19.4	14.3/168.2	0.02/67.7	0.98/−5.1	41.9
	100	0.77/−50.0	12.83/147.8	0.02/65.6	0.95/−13.0	35.7
	200	0.61/−84.3	9.31/128.7	0.03/54.4	0.80/−19.3	25.9
	500	0.51/−136;7	5.21/99.3	0.05/47.0	0.69/−26.2	18.5
	800	0.47/−157.4	3.51/84.6	0.06/50.3	0.63/−32.0	14.2
	1000	0.46/−168.7	2.86/75.4	0.07/51.4	0.64/−34.2	12.5
	1200	0.47/179.8	2.36/68.1	0.07/53.5	0.63/−38.9	10.7
	1500	0.46/173.4	1.96/60.2	0.09/56.8	0.57/−42.7	8.6
	2000	0.47/157.3	1.44/45.6	0.11/59.8	0.56/−55.6	5.9
10	40	0.75/−27.9	24.57/163.4	0.02/67.9	0.96/−8.1	42.8
	100	0.65/−68.5	19.95/138.6	0.02/58.9	0.86/−17.9	34.3
	200	0.52/−107.8	13.04/118.2	0.03/51.3	0.70/−22.3	26.6
	500	0.48/−152.8	6.31/91.7	0.04/54.2	0.59/−25.4	19.0
	800	0.45/−170.1	4.11/79.0	0.06/59.1	0.56/−30.5	14.9
	1000	0.46/−178.9	3.30/71.0	0.06/60.4	0.57/−32.2	13.1
	1200	0.47/171.4	2.72/64.6	0.07/62.0	0.56/−36.5	11.4
	1500	0.46/167.3	2.22/57.0	0.09/63.6	0.51/−40.8	9.3
	2000	0.47/152.7	1.63/43.4	0.11/64.3	0.51/−53.7	6.7
15	40	0.69/−34.4	31.29/159.8	0.02/62.6	0.94/−10.2	42.3
	100	0.59/−80.7	23.65/132.7	0.02/55.5	0.81/−20.2	34.0
	200	0.49/−120.7	14.46/112.6	0.02/52.5	0.64/−22.6	26.7
	500	0.47/−160.1	6.61/88.3	0.04/58.2	0.55/−23.7	19.1
	800	0.45/−174.7	4.25/76.3	0.05/63.3	0.53/−28.8	15.0
	1000	0.46/177.6	3.39/68.7	0.06/64.0	0.55/−30.6	13.2
	1200	0.47/168.6	2.79/62.6	0.07/65.0	0.54/−34.8	11.5
	1500	0.47/165.2	2.27/55.2	0.09/65.7	0.50/−39.6	9.4
	2000	0.48/151.1	1.65/42.0	0.11/66.0	0.51/−52.8	6.8
20	40	0.65/−39.4	35.51/157.2	0.02/54.5	0.93/−11.4	42.3
	100	0.56/−89.4	25.64/128.6	0.02/57.3	0.77/−20.9	33.7
	200	0.47/−128.5	14.99/109.0	0.02/53.5	0.61/−21.7	26.6
	500	0.47/−163.8	6.62/86.0	0.04/61.0	0.54/−22.0	19.0
	800	0.45/−176.8	4.21/74.5	0.05/66.0	0.52/−27.4	14.9
	1000	0.46/175.9	3.35/67.1	0.06/65.9	0.55/−29.4	13.1
	1200	0.47/167.4	2.75/61.2	0.07/66.7	0.55/−33.8	11.4
	1500	0.47/164.2	2.23/53.8	0.09/67.3	0.50/−38.8	9.3
	2000	0.48/150.4	1.62/40.9	0.11/67.1	0.51/−52.5	6.6
30	40	0.58/−51.2	39.39/150.7	0.01/57.5	0.89/−13.0	40.6
	100	0.50/−105.8	25.05/121.1	0.02/54.2	0.72/−19.3	32.3
	200	0.45/−141.0	13.65/103.2	0.02/55.2	0.60/−17.9	25.6
	500	0.46/−169.0	5.79/82.5	0.03/64.8	0.57/−19.0	18.0
	800	0.45/179.7	3.65/71.7	0.05/67.9	0.56/−25.7	13.8
	1000	0.46/173.1	2.89/64.5	0.06/67.9	0.58/−28.6	12.1
	1200	0.48/165.1	2.37/58.9	0.07/68.4	0.58/−33.9	10.4
	1500	0.48/161.8	1.91/51.9	0.09/69.2	0.53/−39.1	8.2
	2000	0.49/148.0	1.40/39.3	0.11/69.0	0.54/−53.8	5.6

P-N-P 2 GHz WIDEBAND TRANSISTOR

P-N-P transistor in a four-lead dual emitter plastic envelope (SOT-103). This device is designed for application in wideband amplifiers, such as MATV and CATV systems, up to 2 GHz.

N-P-N complement is BFG91A.

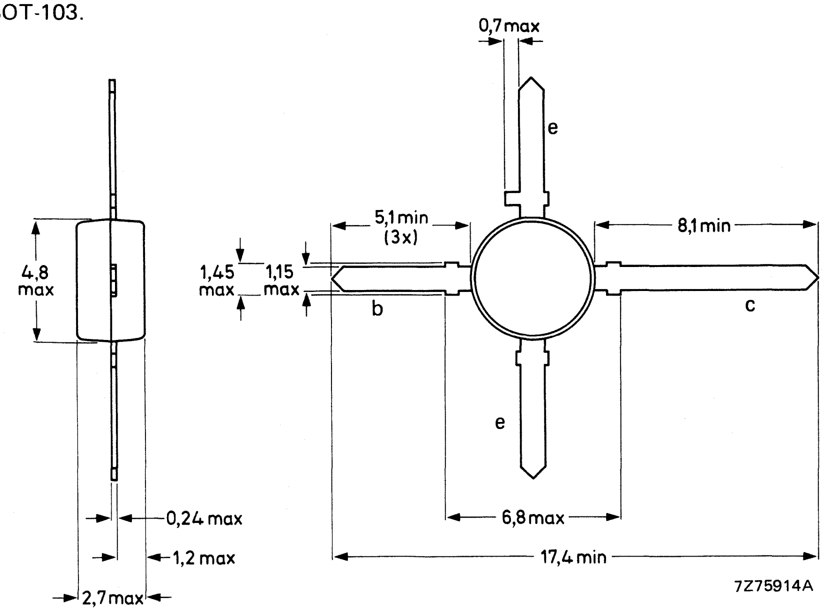
QUICK REFERENCE DATA

Collector-base voltage (open emitter)	$-V_{CBO}$	max.	15	V
Collector-emitter voltage (open base)	$-V_{CEO}$	max.	12	V
Collector current (d.c.)	$-I_C$	max.	35	mA
Total power dissipation up to T_{amb} = 60 °C	P_{tot}	max.	180	mW
Junction temperature	T_j	max.	175	°C ←
D.C. current gain $-I_C$ = 30 mA; $-V_{CE}$ = 5 V	h_{FE}	min.	20	
Transition frequency at f = 500 MHz $-I_C$ = 30 mA; $-V_{CE}$ = 5 V	f_T	typ.	5,0	GHz
Feedback capacitance at f = 1 MHz I_C = 0; $-V_{CE}$ = 10 V	C_{re}	typ.	0,8	pF
Noise figure at optimum source impedance $-I_C$ = 30 mA; $-V_{CE}$ = 8 V; f = 800 MHz	F	typ.	3,7	dB

MECHANICAL DATA

Dimensions in mm

Fig. 1 SOT-103.



RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

Collector-base voltage (open emitter)	$-V_{CBO}$	max.	15 V
Collector-emitter voltage (open base)	$-V_{CEO}$	max.	12 V
Emitter-base voltage (open collector)	$-V_{EBO}$	max.	2 V
Collector current			
d.c.	$-I_C$	max.	35 mA
peak value; f > 1 MHz	$-I_{CM}$	max.	50 mA
Total power dissipation up to T_{amb} = 60 °C	P_{tot}	max.	180 mW
Storage temperature	T_{stg}		−65 to +150 °C
→ Junction temperature	T_j	max.	175 °C

THERMAL RESISTANCE

From junction to ambient (free air) mounted on a fibre-glass print (see Fig. 2)	$R_{th\ j\text{-}a}$		500 K/W

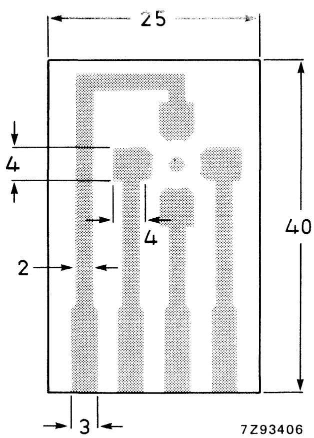


Fig. 2 Requirements for fibre-glass print (dimensions in mm). Single-sided 35 μm Cu-clad epoxy fibre-glass print, thickness 1,5 mm. Tracks are fully tin-lead plated. Shaded area is Cu.

CHARACTERISTICS

T_j = 25 °C unless otherwise specified

Collector cut-off current I_E = 0; $-V_{CB}$ = 5 V	$-I_{CBO}$	max.	50 nA
D.C. current gain $-I_C$ = 30 mA; $-V_{CE}$ = 5 V	h_{FE}	min.	20
Transition frequency at f = 500 MHz $-I_C$ = 30 mA; $-V_{CE}$ = 5 V	f_T	typ.	5,0 GHz
Noise figure at optimum source impedance and $-V_{CE}$ = 8 V; f = 800 MHz; T_{amb} = 25 °C			
at $-I_C$ = 4 mA	F	typ.	2,3 dB
at $-I_C$ = 30 mA	F	typ.	3,7 dB

Collector capacitance at f = 1 MHz $I_E = i_e = 0$; $-V_{CB} = 10$ V	C_c	typ.	1,2 pF
Emitter capacitance at f = 1 MHz $I_C = i_c = 0$; $-V_{EB} = 0,5$ V	C_e	typ.	1,8 pF
Feedback capacitance at f = 1 MHz $I_C = 0$; $-V_{CE} = 10$ V	C_{re}	typ.	0,8 pF
Maximum unilateral power gain (s_{re} assumed to be zero) $G_{UM} = 10 \log \frac{\lvert s_{fe}\rvert^2}{[1-\lvert s_{ie}\rvert^2]\,[1-\lvert s_{oe}\rvert^2]}$ $-I_C = 30$ mA; $-V_{CE} = 5$ V; f = 800 MHz; $T_{amb} = 25\ ^oC$ $-I_C = 30$ mA; $-V_{CE} = 5$ V; f = 2 GHz; $T_{amb} = 25\ ^oC$	G_{UM}	typ. typ.	14,5 dB 7,0 dB
Output voltage at $d_{im} = -60$ dB $I_C = -30$ mA; $-V_{CE} = 8$ V; $R_L = 75\ \Omega$; $T_{amb} = 25\ ^oC$ $V_p = V_o$ at $d_{im} = -60$ dB ; $f_p = 795,25$ MHz $V_q = V_o - 6$ dB ; $f_q = 803,25$ MHz $V_r = V_o - 6$ dB ; $f_r = 805,25$ MHz measured at $f_{(p+q-r)} = 793,25$ MHz	V_o	typ.	400 mV
Second harmonic distortion (see Fig. 3) $-I_C = 30$ mA; $-V_{CE} = 8$ V; $R_L = 75\ \Omega$; VSWR < 2; $T_{amb} = 25\ ^oC$ $V_p = V_o = 60$ mV at $f_p = 250$ MHz $V_q = V_o = 60$ mV at $f_q = 560$ MHz measured at $f_{(p+q)} = 810$ MHz	d_2	typ.	−50 dB

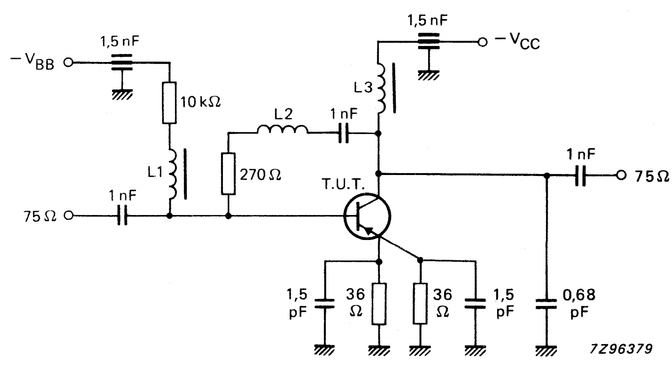


Fig. 3 Intermodulation distortion and second harmonic distortion MATV test circuit.

L1 = L3 = 5 μH micro-choke
L2 = 3 turns Cu wire (0,4 mm), internal diameter 3 mm, winding pitch 1 mm

s-parameters (common emitter) at $-V_{CE}$ = 5 V; typical values

$-I_C$ mA	f MHz	s_{ie}	s_{fe}	s_{re}	s_{oe}	G_{UM} dB
	40	0,54/ −29,5°	12,3/168,4°	0,02/ 78,6°	0,97/ −11,8°	36,1
	100	0,56/ −64,9°	11,1/149,9°	0,04/ 65,3°	0,89/ −27,2°	29,3
	200	0,61/−103,7°	8,9/130,0°	0,07/ 50,0°	0,73/ −44,8°	24,3
5	500	0,65/−154,8°	4,5/ 97,4°	0,09/ 34,6°	0,42/ −69,9°	16,4
	800	0,66/−171,6°	3,1/ 82,9°	0,10/ 34,4°	0,41/ −80,1°	13,0
	1000	0,68/−179,6°	2,5/ 73,4°	0,11/ 34,2°	0,42/ −89,7°	11,6
	2000	0,67/+144,3°	1,3/ 49,7°	0,15/ 49,5°	0,29/−115,8°	5,1
	40	0,31/ −53,6°	18,0/165,0°	0,01/ 76,2°	0,95/ −16,1°	35,6
	100	0,43/ −98,5°	15,4/144,0°	0,03/ 61,9°	0,82/ −36,2°	29,5
	200	0,56/−131,6°	11,3/123,0°	0,05/ 49,0°	0,63/ −57,4°	24,9
10	500	0,65/−169,0°	5,3/ 94,1°	0,07/ 43,5°	0,33/ −86,7°	17,3
	800	0,66/+178,8°	3,5/ 81,7°	0,08/ 46,8°	0,33/ −95,0°	13,8
	1000	0,67/+172,7°	2,8/ 72,7°	0,09/ 47,6°	0,35/−104,4°	12,1
	2000	0,67/+140,0°	1,5/ 51,5°	0,15/ 58,5°	0,22/−133,4°	6,2
	40	0,21/−116,7°	22,6/162,0°	0,01/ 73,9°	0,91/ −20,1°	35,1
	100	0,42/−134,0°	18,5/138,9°	0,02/ 61,2°	0,75/ −44,0°	29,8
	200	0,57/−154,2°	12,7/118,0°	0,03/ 52,4°	0,55/ −67,8°	25,3
20	500	0,66/−178,3°	5,8/ 92,1°	0,05/ 54,5°	0,29/−101,8°	18,0
	800	0,66/+173,0°	3,8/ 79,9°	0,07/ 57,8°	0,29/−108,3°	14,4
	1000	0,66/+168,7°	3,0/ 72,0°	0,09/ 57,6°	0,31/−116,7°	12,5
	2000	0,68/+137,5°	1,6/ 52,1°	0,16/ 63,8°	0,20/−150,2°	6,8
	40	0,29/−147,1°	24,0/161,0°	0,01/ 72,2°	0,88/ −21,8°	34,6
	100	0,47/−151,7°	19,3/137,4°	0,02/ 62,0°	0,72/ −47,2°	29,9
	200	0,59/−162,6°	13,0/116,4°	0,03/ 56,1°	0,51/ −72,0°	25,4
30	500	0,68/+177,7°	5,7/ 91,3°	0,05/ 60,1°	0,27/−107,9°	18,2
	800	0,66/+170,0°	3,8/ 79,3°	0,07/ 62,5°	0,27/−113,2°	14,5
	1000	0,67/+166,6°	3,0/ 71,6°	0,08/ 61,8°	0,30/−121,1°	12,5
	2000	0,70/+136,5°	1,6/ 52,0°	0,16/ 65,9°	0,20/−156,2°	7,0

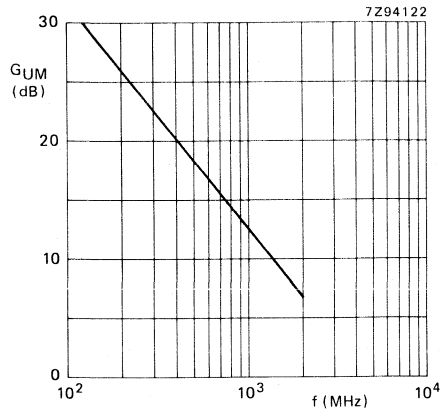


Fig. 4 $-V_{CE} = 5$ V; $-I_C = 30$ mA; $T_{amb} = 25$ °C; typical values.

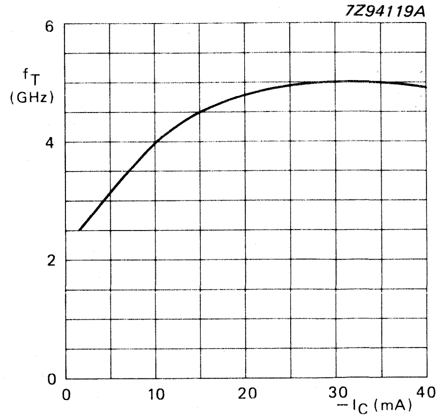


Fig. 5 $-V_{CE} = 5$ V; f = 500 MHz; $T_{amb} = 25$ °C; typical values.

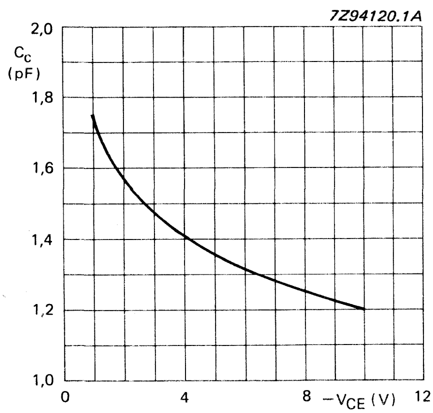


Fig. 6 $I_E = i_e = 0$; f = 1 MHz; $T_j = 25$ °C; typical values.

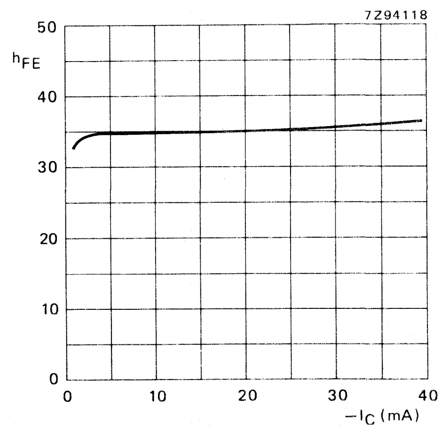


Fig. 7 $-V_{CE} = 5$ V; $T_j = 25$ °C; typical values.

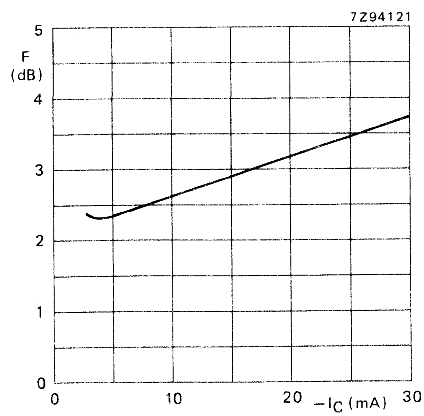


Fig. 8 $-V_{CE} = 8$ V; f = 800 MHz; Z_S = opt.; $T_{amb} = 25$ °C; typical values.

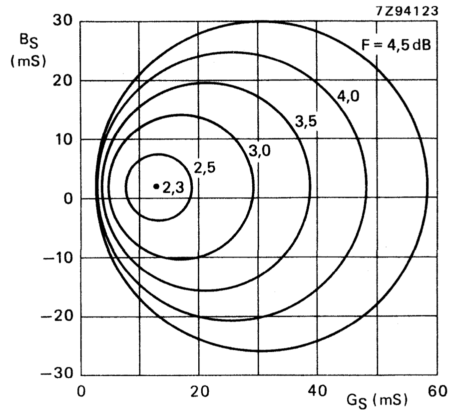


Fig. 9 Circles of constant noise figure; $-V_{CE}$ = 8 V $-I_C$ = 4 mA; f = 800 MHz; T_{amb} = 25 °C; typical values.

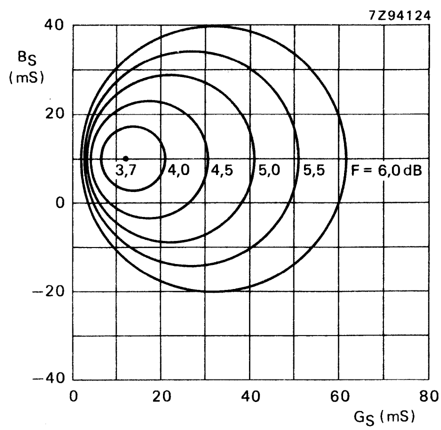


Fig. 10 Circles of constant noise figure; $-V_{CE}$ = 8 V; $-I_C$ = 30 mA; f = 800 MHz; T_{amb} = 25 °C; typical values.

P-N-P 2 GHz WIDEBAND TRANSISTOR

P-N-P transistor in a four-lead dual emitter plastic envelope (SOT-103). The device is designed for application in wideband amplifiers, such as MATV and CATV systems, up to 2 GHz.

N-P-N complement is BFG96.

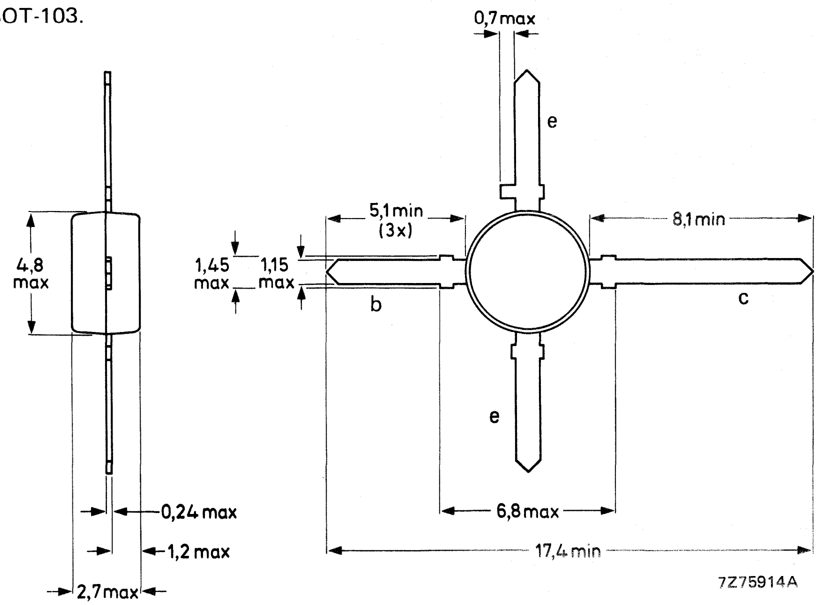
QUICK REFERENCE DATA

Collector-base voltage (open emitter)	$-V_{CBO}$	max.	20 V
Collector-emitter voltage (open base)	$-V_{CEO}$	max.	15 V
Collector current (d.c.)	$-I_C$	max.	75 mA
Total power dissipation up to T_{amb} = 70 °C	P_{tot}	max.	700 mW
Junction temperature	T_j	max.	175 °C
D.C. current gain $-I_C$ = 50 mA; $-V_{CE}$ = 10 V	h_{FE}	min.	20
Transition frequency at f = 500 MHz $-I_C$ = 50 mA; $-V_{CE}$ = 10 V	f_T	typ.	4,5 GHz
Feedback capacitance at f = 1 MHz I_C = 0; $-V_{CE}$ = 10 V	C_{re}	typ.	1,4 pF
Noise figure at optimum source impedance $-I_C$ = 50 mA; $-V_{CE}$ = 10 V; f = 800 MHz	F	typ.	4,3 dB

MECHANICAL DATA

Dimensions in mm

Fig. 1 SOT-103.



RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

Collector-base voltage (open emitter)	$-V_{CBO}$	max.	20 V
Collector-emitter voltage (open base)	$-V_{CEO}$	max.	15 V
Emitter-base voltage (open collector)	$-V_{EBO}$	max.	3 V
Collector current			
d.c.	$-I_C$	max.	75 mA
peak value; > 1 MHz	$-I_{CM}$	max.	150 mA
Total power dissipation up to T_{amb} = 70 °C mounted on print (see Fig. 2)	P_{tot}	max.	700 mW
Storage temperature	T_{stg}		−65 to +175 °C
Junction temperature	T_j	max.	175 °C

THERMAL RESISTANCE

From junction to ambient (free air) mounted on a fibre-glass print (see Fig. 2)	$R_{th\ j\text{-}a}$	150 K/W
From junction to case	$R_{th\ j\text{-}c}$	75 K/W

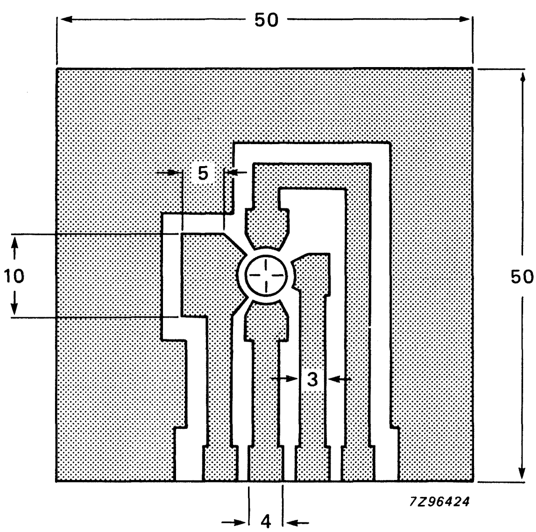


Fig. 2 Requirements for fibre-glass print (dimensions in mm). Single-sided 35 µm Cu-clad epoxy fibre-glass print, thickness 1,5 mm. Tracks are fully tin-lead plated. Shaded area is Cu.

CHARACTERISTICS

T_j = 25 °C unless otherwise specified

Collector cut-off current $I_E = 0$; $-V_{CB}$ = 10 V	$-I_{CBO}$	max.	100 nA
D.C. current gain $-I_C$ = 50 mA; $-V_{CE}$ = 10 V	h_{FE}	min.	20
Transition frequency at f = 500 MHz $-I_C$ = 50 mA; $-V_{CE}$ = 10 V	f_T	typ.	4,5 GHz
Noise figure at optimum source impedance and $-I_C$ = 50 mA; $-V_{CE}$ = 10 V; f = 800 MHz; T_{amb} = 25 °C	F	typ.	4,3 dB

Collector capacitance at f = 1 MHz $I_E = i_e = 0; -V_{CB} = 10$ V	C_c	typ.	2,0 pF
Emitter capacitance at f = 1 MHz $I_C = i_c = 0; -V_{EB} = 0{,}5$ V	C_e	typ.	5,0 pF
Feedback capacitance at f = 1 MHz $I_C = 0; -V_{CE} = 10$ V	C_{re}	typ.	1,4 pF

Maximum unilateral power gain (s_{re} assumed to be zero)

$$G_{UM} = 10 \log \frac{|s_{fe}|^2}{[1-|s_{ie}|^2]\,[1-|s_{oe}|^2]}$$

$-I_C = 50$ mA; $-V_{CE} = 10$ V; f = 800 MHz ; $T_{amb} = 25$ °C	G_{UM}	typ.	13,5 dB
$-I_C = 50$ mA; $-V_{CE} = 10$ V; f = 2 GHz ; $T_{amb} = 25$ °C		typ.	6,0 dB

Output voltage at $d_{im} = -60$ dB
$-I_C = 70$ mA; $-V_{CE} = 10$ V;
$R_L = 75\ \Omega$; $T_{amb} = 25$ °C

$V_p = V_o$ at $d_{im} = -60$ dB ; $f_p = 795{,}25$ MHz
$V_q = V_o - 6$ dB ; $f_q = 803{,}25$ MHz
$V_r = V_o - 6$ dB ; $f_r = 805{,}25$ MHz

measured at $f_{(p+q-r)} = 793{,}25$ MHz	V_o	typ.	500 mV

Second harmonic distortion (see Fig. 3)
$-I_C = 70$ mA; $-V_{CE} = 10$ V; $R_L = 75\ \Omega$;
VSWR < 2; $T_{amb} = 25$ °C

$V_p = V_o = 150$ mV at $f_p = 250$ MHz
$V_q = V_o = 150$ mV at $f_q = 560$ MHz

measured at $f_{(p+q)} = 810$ MHz	d_2	typ.	−50 dB

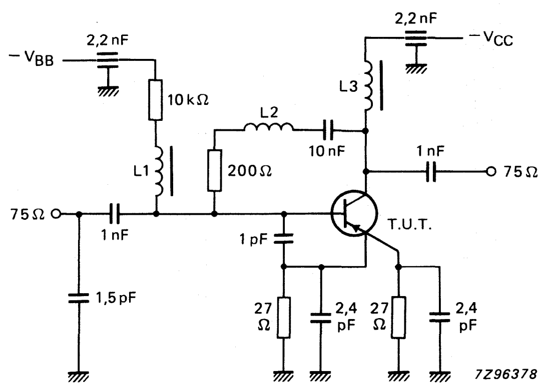


Fig. 3 Intermodulation distortion and second harmonic distortion test circuit.

L1 = L3 = 5 μH micro-choke
L2 = 1,5 turns Cu wire (0,4 mm), internal diameter 3 mm, winding pitch 1 mm

s-parameters (common emitter) at $-V_{CE}$ = 10 V, T_{amb} = 25 °C; typical values.

I_C mA	f MHz	s_{ie}	s_{fe}	s_{re}	s_{oe}	G_{UM} dB
	40	0,75/ −42,7°	13,8/159,7°	0,03/ 70,9°	0,93/ −20,1°	35,4
	100	0,74/ −90,7°	10,8/133,3°	0,06/ 49,2°	0,74/ −41,9°	27,5
	200	0,75/−128,8°	7,0/112,1°	0,08/ 33,6°	0,52/ −59,2°	21,8
5	500	0,74/−167,7°	3,0/ 83,6°	0,09/ 25,1°	0,32/ −79,5°	13,4
	800	0,74/−178,7°	2,0/ 69,0°	0,10/ 26,8°	0,37/ −89,3°	10,1
	1000	0,74/−172,2°	1,6/ 59,3°	0,11/ 27,7°	0,41/ −99,6°	8,4
	2000	0,76/+139,8°	0,8/ 33,3°	0,14/ 47,5°	0,40/−139,1°	2,6
	40	0,61/ −63,4°	22,1/153,0°	0,03/ 65,7°	0,88/ −30,7°	35,3
	100	0,67/−115,6°	15,2/124,9°	0,05/ 44,3°	0,62/ −61,2°	28,4
	200	0,73/−146,7°	9,0/106,0°	0,06/ 34,0°	0,41/ −85,1°	23,1
10	500	0,74/−176,1°	3,8/ 83,3°	0,07/ 36,2°	0,25/−117,2°	15,3
	800	0,73/+173,2°	2,5/ 70,5°	0,09/ 40,5°	0,28/−119,4°	11,5
	1000	0,73/+168,5°	2,0/ 62,1°	0,10/ 41,8°	0,33/−126,0°	9,6
	2000	0,75/+137,4°	1,0/ 38,2°	0,16/ 53,3°	0,31/−159,4°	4,1
	40	0,50/ −93,5°	30,5/146,0°	0,02/ 60,6°	0,81/ −43,2°	35,5
	100	0,66/−138,4°	18,7/118,4°	0,03/ 42,7°	0,53/ −82,0°	29,4
	200	0,72/−160,8°	10,5/101,8°	0,04/ 38,9°	0,38/−111,9°	24,3
20	500	0,74/+178,5°	4,3/ 83,3°	0,06/ 48,9°	0,28/−148,3°	16,5
	800	0,73/+168,9°	2,8/ 71,6°	0,08/ 52,5°	0,30/−147,7°	12,6
	1000	0,73/+165,2°	2,2/ 63,3°	0,09/ 52,3°	0,54/−150,6°	10,7
	2000	0,75/+135,5°	1,2/ 42,2°	0,17/ 57,5°	0,30/ 176,9°	5,3
	40	0,48/−111,8°	34,6/142,5°	0,02/ 58,6°	0,76/ −50,3°	35,7
	100	0,67/−148,2°	20,1/115,3°	0,03/ 43,8°	0,50/ −93,2°	29,9
	200	0,73/−166,2°	11,0/ 99,9°	0,03/ 43,7°	0,38/−124,1°	24,8
30	500	0,74/+175,8°	4,5/ 83,2°	0,05/ 55,4°	0,32/−158,2°	17,0
	800	0,73/+168,4°	2,1/ 72,1°	0,08/ 57,7°	0,32/−157,9°	13,0
	1000	0,73/+164,3°	2,3/ 64,2°	0,09/ 56,6°	0,35/−159,8°	11,2
	2000	0,75/+134,8°	1,2/ 44,0°	0,17/ 59,2°	0,32/ 167,5°	5,8
	40	0,49/−131,2°	38,8/139,8°	0,01/ 57,1°	0,70/ −58,7°	35,9
	100	0,69/−157,6°	21,1/112,6°	0,02/ 46,5°	0,48/−104,7°	30,3
	200	0,73/−171,3°	11,5/ 98,3°	0,03/ 49,5°	0,39/−134,9°	25,2
50	500	0,75/+174,1°	4,6/ 82,4°	0,05/ 61,6°	0,35/−165,6°	17,4
	800	0,73/+166,8°	3,0/ 71,5°	0,08/ 62,0°	0,34/−165,3°	13,5
	1000	0,73/+162,7°	2,4/ 64,1°	0,09/ 59,9°	0,37/−166,8°	11,4
	2000	0,76/+134,0°	1,2/ 45,3°	0,18/ 60,9°	0,34/ 160,9°	6,0

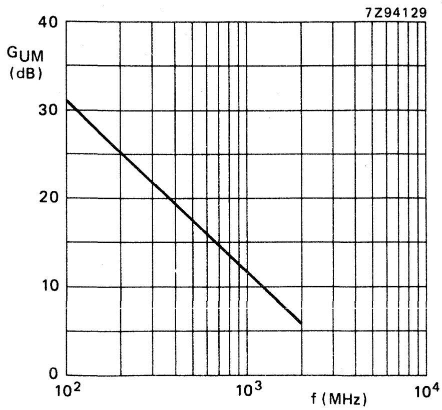


Fig. 4 $-V_{CE}$ = 10 V; $-I_C$ = 50 mA; T_{amb} = 25 °C; typical values.

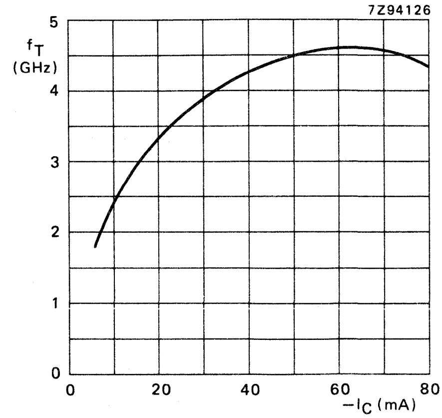


Fig. 5 $-V_{CE}$ = 10 V; f = 500 MHz; T_j = 25 °C; typical values.

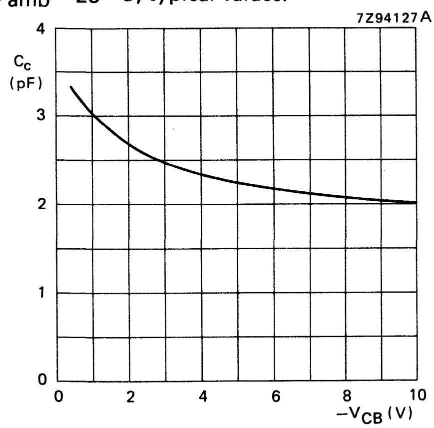


Fig. 6 $I_E = i_e = 0$; f = 1 MHz; T_j = 25 °C; typical values.

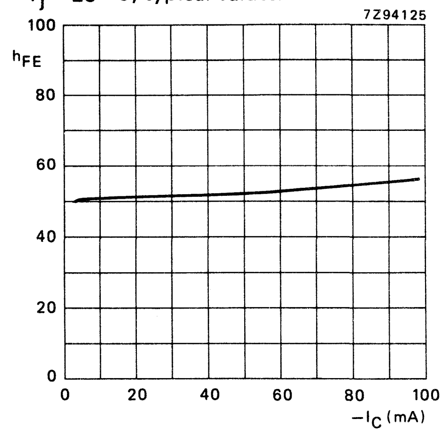


Fig. 7 $-V_{CE}$ = 10 V; T_j = 25 °C; typical values.

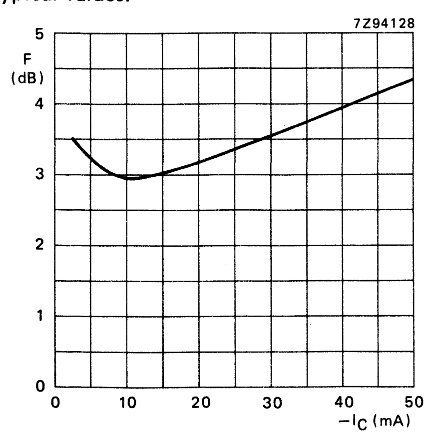


Fig. 8 $-V_{CE}$ = 10 V; f = 800 MHz; Z_S = opt.; T_{amb} = 25 °C; typical values.

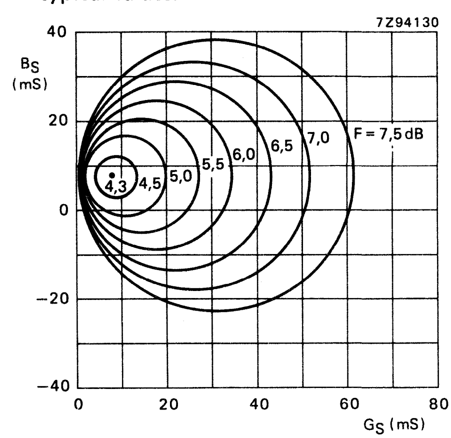


Fig. 9 Circles of constant noise figure; $-V_{CE}$ = 10 V; $-I_C$ = 50 mA; f = 800 MHz; T_{amb} = 25 °C; typical values.

NPN MICROWAVE TRANSISTOR

BFG33 is an npn transistor in a microminiature SOT143 envelope with double emitter bonding. The device contains a BFQ33 crystal and is for use in circuits using SMD technology.

Features

- Extremely high transition frequency
- Very low noise at high frequencies.

QUICK REFERENCE DATA

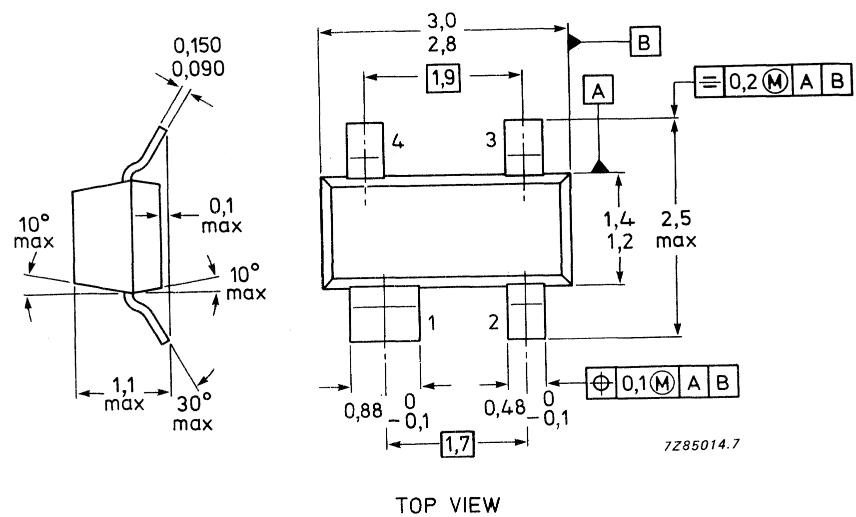
Collector-base voltage (open emitter)	V_{CBO}	max.	9.0	V
Collector-emitter voltage (open base)	V_{CEO}	max.	7.0	V
Collector current (DC)	I_C	max.	20	mA
Total power dissipation up to T_{amb} = 25 °C mounted on a ceramic substrate 8 x 10 x 0.7 mm	P_{tot}	max.	300	mW
Junction temperature	T_j	max.	150	°C
Transition frequency at f = 1.5 GHz I_C = 14 mA; V_{CE} = 5 V; T_{amb} = 25 °C	f_t	typ.	12	GHz
Noise figure at optimum source impedance I_C = 5 mA; V_{CE} = 5 V; f = 2 GHz; T_{amb} = 25 °C	F	typ.	2.5	dB

MECHANICAL DATA

Dimensions in mm

Marking code: V6

Fig. 1 SOT143.



Pinning

1 = collector
2 = base
3,4 = emitter

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134).

Collector-base voltage (open emitter)	V_{CBO}	max.	9.0	V
Collector-emitter voltage (open base)	V_{CEO}	max.	7.0	V
Emitter-base voltage (open collector)	V_{EBO}	max.	2.0	V
Collector current (DC)	I_C	max.	20	mA
Total power dissipation up to T_{amb} = 25 °C mounted on a ceramic substrate 8 x 10 x 0.7 mm	P_{tot}	max.	300	mW
Storage temperature range	T_{stg}		–65 to 150	°C
Junction temperature	T_j	max.	150	°C

THERMAL RESISTANCE

From junction to ambient mounted on ceramic substrate 8 x 10 x 0.7 mm	$R_{th\ j\text{-}a}$	=	430	K/W

CHARACTERISTICS

T_j = 25 °C unless otherwise specified

Collector cut-off current $I_E = 0$; $V_{CB} = 5$ V	I_{CBO}	max.	50	nA
DC current gain $I_C = 14$ mA; $V_{CE} = 5$ V	h_{FE}	min.	25	
Transition frequency at f = 1.5 GHz $I_C = 14$ mA; $V_{CE} = 5$ V; $T_{amb} = 25$ °C	f_t	typ.	12	GHz
Noise figure at optimum source impedance $I_C = 5$ mA; $V_{CE} = 5$ V; f = 2 GHz; $T_{amb} = 25$ °C	F	typ.	2.5	dB
Maximum unilateral power gain $I_C = 14$ mA; $V_{CE} = 5$ V; f = 2 GHz; $T_{amb} = 25$ °C; $S_{re} = 0$ $G_{UM} = 10 \log \frac{\lvert S_{fe} \rvert^2}{(1 - \lvert S_{ie} \rvert^2)(1 - \lvert S_{oe} \rvert^2)}$	G_{UM}	typ.	10.5	dB

N-P-N 1 GHz WIDEBAND TRANSISTOR

N-P-N transistor in a four-lead dual-emitter plastic envelope (SOT-103). This device is designed for wide-band application in CATV and MATV amplifier systems and features high output voltage capabilities.

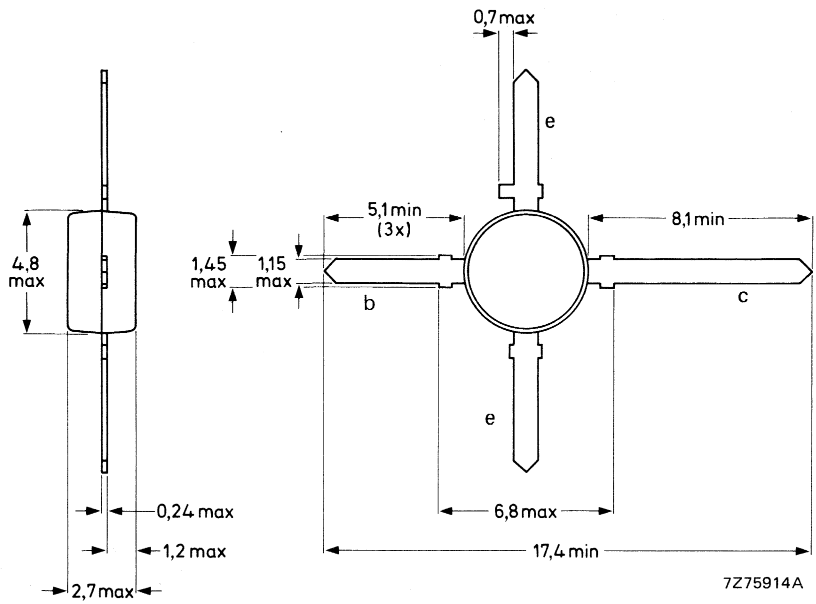
QUICK REFERENCE DATA

Collector-base voltage (open emitter)	V_{CBO}	max.	25	V
Collector-emitter voltage (open base)	V_{CEO}	max.	18	V
Collector current (d.c.)	I_C	max.	150	mA
Total power dissipation up to T_{amb} = 45 °C	P_{tot}	max.	1	W
Junction temperature	T_j	max.	175	°C
D.C. current gain I_C = 100 mA; V_{CE} = 10 V	h_{FE}	min.	25	
Transition frequency at f = 500 MHz I_C = 100 mA; V_{CE} = 10 V	f_T	typ.	3,7	GHz
Noise figure at optimum source impedance I_C = 20 mA; V_{CE} = 10 V; f = 800 MHz	F	typ.	2,3	dB
Output power at 1 dB gain compression V_{CE} = 10 V; I_C = 90 mA; f = 800 MHz	P_{L1}	typ.	+22	dBm
Third order intercept point V_{CE} = 10 V; I_C = 90 mA; f = 800 MHz	ITO	typ.	+41	dBm

MECHANICAL DATA

Dimensions in mm

Fig. 1 SOT-103.



RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

Collector-base voltage (open emitter)	V_{CBO}	max.	25	V
Collector-emitter voltage (open base)	V_{CEO}	max.	18	V
Emitter-base voltage (open collector)	V_{EBO}	max.	2	V
Collector current (d.c.)	I_C	max.	150	mA
Total power dissipation up to T_{amb} = 45 °C mounted on a fibre-glass p.c.b. (see Fig. 2)	P_{tot}	max.	1	W
Storage temperature	T_{stg}		−65 to +175	°C
Junction temperature	T_j	max.	175	°C

THERMAL RESISTANCE

From junction to ambient mounted on a glass-fibre p.c.b. (see Fig. 2)	$R_{th\ j\text{-}a}$	=	130	K/W
From junction to case	$R_{th\ j\text{-}c}$	=	50	K/W

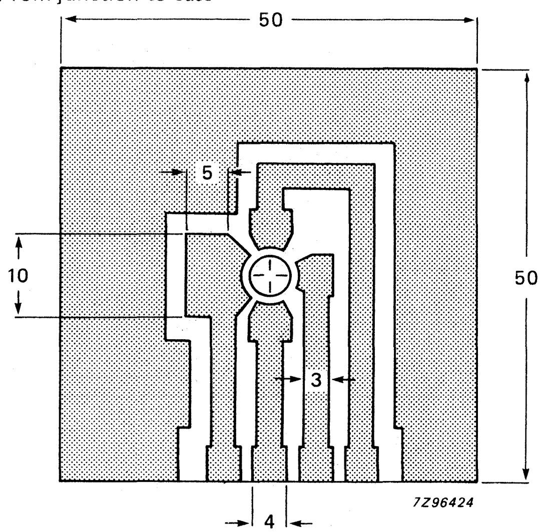


Fig. 2 Requirements for fibre-glass print (dimensions in mm). Single-sided 35 μm Cu-clad epoxy fibre-glass print, thickness 1,5 mm. Tracks are fully tin-lead plated. Shaded area is Cu.

CHARACTERISTICS

T_j = 25 °C unless otherwise specified

Collector cut-off current I_E = 0; V_{CB} = 15 V	I_{CBO}	max.	100	μA
D.C. current gain I_C = 100 mA; V_{CE} = 10 V	h_{FE}	min.	25	
Transition frequency at f = 500 MHz I_C = 100 mA; V_{CE} = 10 V	f_T	typ.	3,7	GHz
Collector output capacitance at f = 1 MHz $I_E = i_e$ = 0; V_{CB} = 10 V	C_c	typ.	2,3	pF
Emitter capacitance at f = 1 MHz $I_C = i_e$ = 0; V_{EB} = 0,5 V	C_e	typ.	10	pF
Feedback capacitance at f = 1 MHz I_E = 0; V_{CE} = 10 V	C_{re}	typ.	1,2	pF

Maximum unilateral power gain (s_{re} assumed to be zero)

$$G_{UM} = 10 \log \frac{|s_{fe}|^2}{[1-|s_{ie}|^2]\,[1-|s_{oe}|^2]}$$

I_C = 100 mA; V_{CE} = 10 V; f = 800 MHz; T_{amb} = 25 °C	G_{UM}	typ.	14,5 dB
I_C = 100 mA; V_{CE} = 10 V; f = 2 GHz; T_{amb} = 25 °C		typ.	7,0 dB
Noise figure at optimum source impedance			
I_C = 20 mA; V_{CE} = 10 V; f = 800 MHz; T_{amb} = 25 °C	F	typ.	2,3 dB
Output power at 1 dB gain compression			
V_{CE} = 10 V; I_C = 90 mA; f = 800 MHz; T_{amb} = 25 °C	P_{L1}	typ.	+22 dBm
V_{CE} = 10 V; I_C = 100 mA; f = 300 MHz; T_{amb} = 25 °C		typ.	+24 dBm
Third order intercept point			
V_{CE} = 10 V; I_C = 90 mA; f = 800 MHz; T_{amb} = 25 °C	ITO	typ.	+41 dBm
V_{CE} = 10 V; I_C = 100 mA; f = 300 MHz; T_{amb} = 25 °C		typ.	+43 dBm
Output voltage at d_{im} = −60 dB I_C = 500 mA; V_{CE} = 15 V; R_L = 75 Ω; T_{amb} = 25 °C $V_p = V_o$ at d_{im} = −60 dB, f_p = 795,25 MHz $V_q = V_o$ − 6 dB at f_q = 803,25 MHz $V_r = V_o$ − 6 dB at f_r = 805,25 MHz measured at $f_{(p+q-r)}$ = 793,25 MHz	V_o	typ.	750 mV
Second harmonic distortion (see Fig. 3) I_C = 100 mA; V_{CE} = 10 V; R_L = 75 Ω; VSWR < 2; T_{amb} = 25 °C $V_p = V_o$ = 316 mV at f_p = 250 MHz $V_q = V_o$ = 316 mV at f_q = 560 MHz measured at $f_{(p+q)}$ = 810 MHz	d_2	typ.	−55 dB

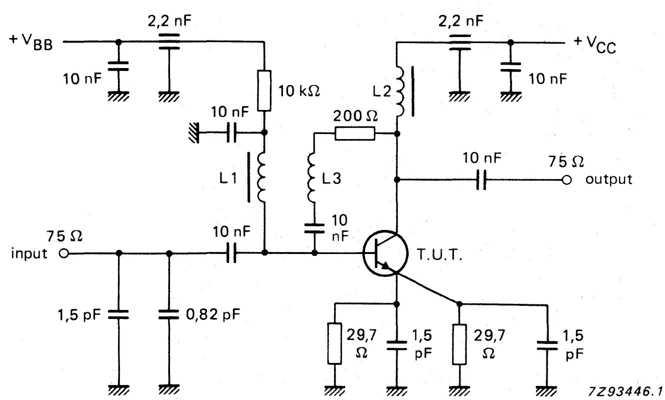


Fig. 3 Intermodulation distortion and second harmonic distortion test circuit.

L1 = L2 = 5 μH Ferroxcube choke
L3 = 2 turns Cu wire (0,5 mm), internal diameter 4 mm, winding pitch 2 mm

s-parameters (common emitter) at V_{CE} = 10 V; T_{amb} = 25 °C; typical values.

I_C mA	f MHz	s_{ie}	s_{fe}	s_{re}	s_{oe}	G_{UM} dB
	40	0,91/ −40,7°	13,5/156,6°	0,03/ 69,3°	0,95/ −16,4°	40,1
	100	0,95/ −87,6°	10,3/131,2°	0,05/ 46,6°	0,77/ −32,1°	29,6
	200	0,85/−126,7°	6,6/109,7°	0,07/ 30,2°	0,59/ −42,3°	22,9
5	500	0,78/−167,3°	2,8/ 79,9°	0,07/ 20,9°	0,45/ −58,1°	14,1
	800	0,78/+177,2°	1,8/ 64,7°	0,07/ 27,3°	0,51/ −73,6°	10,7
	1000	0,78/+169,7°	1,5/ 54,6°	0,07/ 33,5°	0,56/ −86,6°	9,1
	1200	0,82/+162,2°	1,1/ 48,7°	0,07/ 45,7°	0,52/−101,5°	7,4
	2000	0,82/+140,5°	0,7/ 27,6°	0,12/ 71,3°	0,42/−138,0°	2,2
	40	0,85/ −48,2°	20,9/154,7°	0,03/ 66,3°	0,92/ −23,3°	40,2
	100	0,80/ −98,7°	14,8/126,7°	0,05/ 43,6°	0,68/ −45,0°	30,6
	200	0,78/−135,7°	4,0/106,9°	0,06/ 30,4°	0,47/ −58,5°	24,1
10	500	0,76/−171,8°	3,8/ 81,8°	0,06/ 28,6°	0,30/ −74,9°	15,7
	800	0,76/+175,0°	2,5/ 68,5°	0,07/ 36,9°	0,36/ −85,8°	12,2
	1000	0,76/+168,4°	2,0/ 58,8°	0,07/ 41,3°	0,41/ −97,4°	10,4
	1200	0,79/+161,2°	1,6/ 53,9°	0,08/ 51,0°	0,38/−111,8°	8,8
	2000	0,80/+140,6°	1,0/ 30,6°	0,14/ 66,8°	0,36/−142,8°	4,6
	40	0,81/ −56,5°	28,5/151,5°	0,02/ 63,0°	0,89/ −31,3°	40,6
	100	0,76/−108,9°	19,0/122,8°	0,04/ 41,7°	0,60/ −59,9°	31,4
	200	0,75/−143,2°	11,2/104,7°	0,05/ 31,7°	0,39/ −80,3°	25,3
20	500	0,74/−175,9°	4,7/ 82,7°	0,06/ 36,2°	0,23/−107,6°	17,0
	800	0,73/+172,5°	3,0/ 70,7°	0,07/ 44,3°	0,27/−110,2°	13,2
	1000	0,74/+166,8°	2,4/ 62,2°	0,08/ 47,6°	0,31/−118,3°	11,5
	1200	0,78/+159,0°	1,9/ 58,9°	0,09/ 55,1°	0,29/−133,5°	10,2
	2000	0,77/+140,3°	1,2/ 35,4°	0,14/ 63,7°	0,28/−155,5°	6,1
	40	0,79/ −61,1°	32,7/149,4°	0,02/ 61,8°	0,87/ −35,7°	40,7
	100	0,75/−113,4°	21,1/121,0°	0,04/ 40,7°	0,58/ −68,2°	31,8
	200	0,74/−146,2°	12,1/104,0°	0,05/ 32,5°	0,38/ −92,8°	25,8
30	500	0,73/−177,0°	5,0/ 83,7°	0,06/ 39,5°	0,23/−127,4°	17,6
	800	0,73/+172,0°	3,3/ 72,0°	0,07/ 47,2°	0,25/−126,8°	13,9
	1000	0,73/+166,9°	2,6/ 63,9°	0,08/ 49,8°	0,29/−132,4°	12,1
	1200	0,77/+158,6°	2,1/ 61,1°	0,09/ 56,7°	0,28/−147,9°	10,8
	2000	0,76/+140,0°	1,4/ 38,3°	0,15/ 62,3°	0,24/−165,7°	6,6
	40	0,78/ −64,6°	36,7/147,3°	0,02/ 60,0°	0,86/ −40,3°	41,0
	100	0,73/−118,1°	22,9/119,4°	0,04/ 39,7°	0,56/ −76,5°	32,2
	200	0,73/−148,9°	13,0/102,6°	0,04/ 33,2°	0,37/−104,5°	26,3
50	500	0,73/−178,1°	5,3/ 94,3°	0,06/ 42,6°	0,25/−142,7°	18,1
	800	0,72/+170,5°	3,5/ 73,1°	0,07/ 49,4°	0,25/−142,0°	14,3
	1000	0,72/+165,2°	2,7/ 64,8°	0,08/ 51,5°	0,30/−145,6°	12,3
	1200	0,76/+157,5°	2,3/ 63,0°	0,09/ 58,0°	0,29/−161,1°	11,2
	2000	0,75/+139,9°	1,4/ 40,5°	0,15/ 60,8°	0,24/−177,2°	7,0

s-parameters (common emitter) at V_{CE} = 10 V; T_{amb} = 25 °C; typical values.

I_C mA	f MHz	s_{ie}	s_{fe}	s_{re}	s_{oe}	G_{UM} dB
	40	0,78/ −67,3°	38,4/146,4°	0,02/ 59,1°	0,84/ −42,8°	41,1
	100	0,74/−112,0°	23,5/118,2°	0,04/ 39,3°	0,55/ −81,1°	32,4
	200	0,73/−151,1°	13,3/102,3°	0,04/ 33,9°	0,37/−110,4°	26,4
75	500	0,72/−178,4°	5,5/ 84,4°	0,06/ 43,8°	0,27/−149,1°	18,3
	800	0,72/ +170,2°	3,5/ 73,1°	0,07/ 50,3°	0,27/−148,8°	14,4
	1000	0,72/ +164,6°	2,8/ 65,6°	0,09/ 52,1°	0,30/−151,7°	12,4
	1200	0,76/ +157,8°	2,3/ 63,8°	0,09/ 58,3°	0,30/−166,8°	11,3
	2000	0,75/ +139,5°	1,5/ 41,7°	0,16/ 59,7°	0,24/ +175,2°	7,2
	40	0,78/ −68,3°	38,9/145,2°	0,02/ 58,2°	0,83/ −44,4°	41,0
	100	0,74/−121,6°	23,5/117,2°	0,04/ 38,8°	0,54/ −83,1°	23,3
	200	0,73/−151,6°	13,1/101,3°	0,04/ 33,7°	0,37/−112,7°	26,4
100	500	0,73/−179,4°	5,4/ 83,8°	0,06/ 44,3°	0,27/−151,3°	18,2
	800	0,73/ +170,6°	3,5/ 73,4°	0,07/ 50,6°	0,27/−150,9°	14,5
	1000	0,72/ +165,3°	2,8/ 65,4°	0,09/ 52,2°	0,30/−153,4°	12,4
	1200	0,77/ +157,3°	2,3/ 64,1°	0,09/ 58,3°	0,30/−168,6°	11,3
	2000	0,75/ +139,4°	1,5/ 41,9°	0,15/ 59,7°	0,24/ +175,2°	7,0

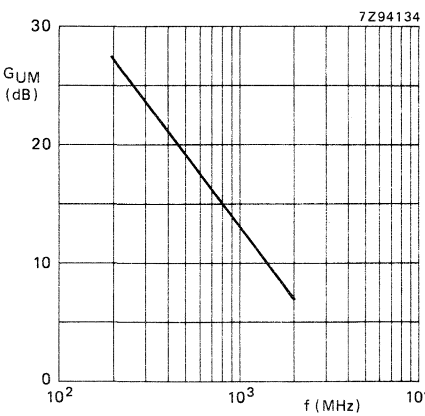


Fig. 4 V_{CE} = 10 V; I_C = 100 mA; T_{amb} = 25 °C; typical values.

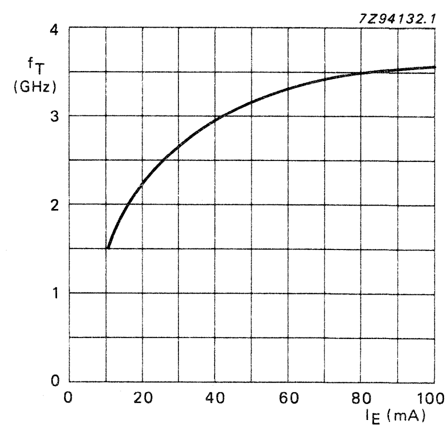


Fig. 5 V_{CE} = 10 V; f = 500 MHz; T_j = 25 °C; typical values.

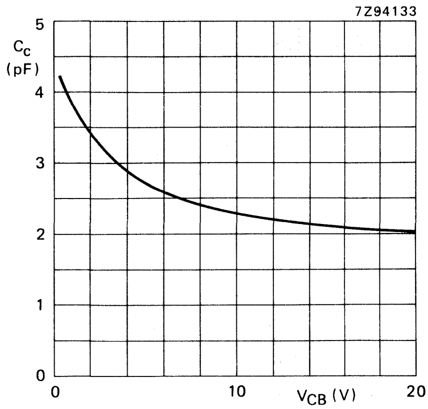


Fig. 6 $I_E = i_e = 0$; f = 1 MHz; $T_j = 25\ ^oC$; typical values.

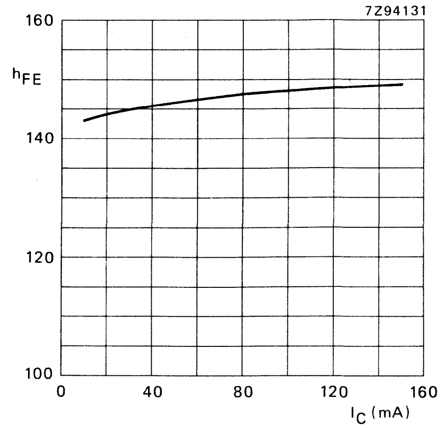


Fig. 7 $V_{CE} = 10$ V; $T_j = 25\ ^oC$; typical values.

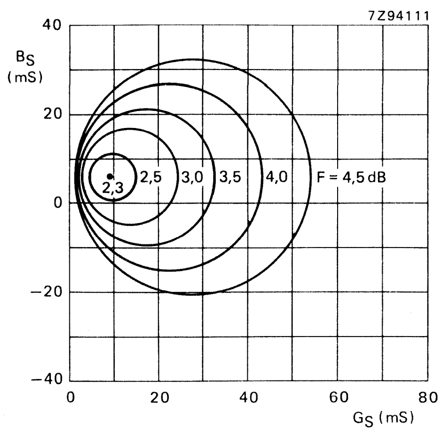


Fig. 8 Circles of constant noise figure; $V_{CE} = 10$ V; $I_C = 20$ mA; f = 800 MHz; $T_{amb} = 25\ ^oC$; typical values.

NPN 1 GHz WIDEBAND TRANSISTOR

NPN transistor in a plastic SOT-223 envelope, primarily designed for VHF, UHF, and microwave wideband amplifiers up to a frequency of 1 GHz.

The device features excellent output voltage capabilities.

QUICK REFERENCE DATA

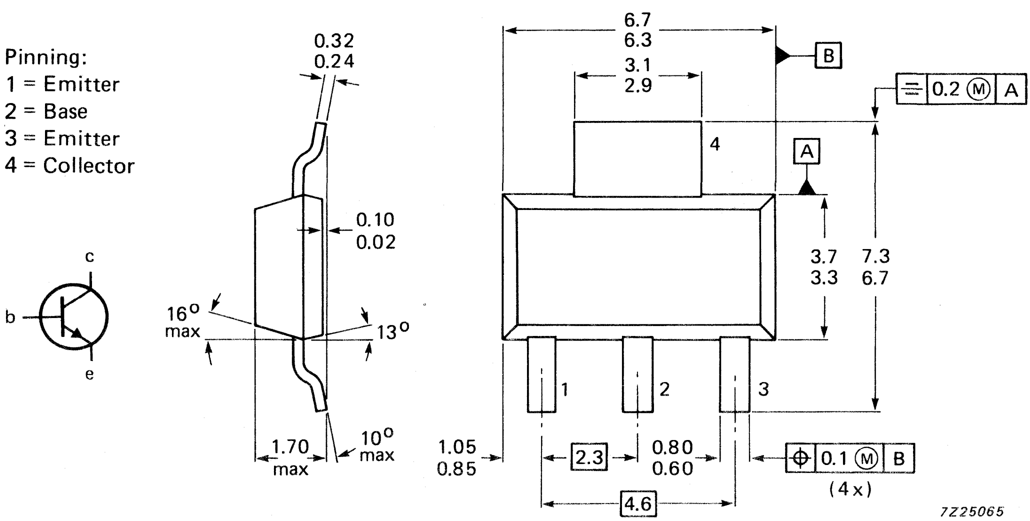
Collector-base voltage (open emitter)	V_{CBO}	max.	25	V
Collector-emitter voltage (open base)	V_{CEO}	max.	18	V
Collector current (DC)	I_C	max.	150	mA
Total power dissipation at T_{amb} = 45 °C	P_{tot}	max.	1	W
DC current gain I_C = 100 mA; V_{CE} = 10 V	h_{FE}	min. typ.	25 140	
Transition frequency at f = 500 MHz I_C = 100 mA; V_{CE} = 10 V	f_T	typ.	4.0	GHz
Maximum power gain at f = 800 MHz I_C = 100 mA; V_{CE} = 10 V	G_{UM}	typ.	11	dB
Output voltage at d_{im} = −60 dB I_C = 100 mA; V_{CE} = 10 V; R_L = 75 Ω $f_{(p+q-r)}$ = 793.25 MHz	V_o	typ.	750	mV

MECHANICAL DATA

Dimensions in mm

Fig. 1 SOT-223.

Pinning:
1 = Emitter
2 = Base
3 = Emitter
4 = Collector



RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

Collector-base voltage (open emitter)	V_{CBO}	max.	25	V
Collector-emitter voltage (open base)	V_{CEO}	max.	18	V
Emitter-base voltage (open collector)	V_{EBO}	max.	2	V
Collector current (DC)	I_C	max.	150	mA
Total power dissipation at T_{amb} = 45 °C*	P_{tot}	max.	1	W
Storage temperature range	T_{stg}	−65 to + 175		°C
Junction temperature	T_j	max.	175	°C

THERMAL RESISTANCE

From junction to case	$R_{th\ j\text{-}c}$	=	35	K/W
From junction to ambient in free air*	$R_{th\ j\text{-}a}$	=	130	K/W

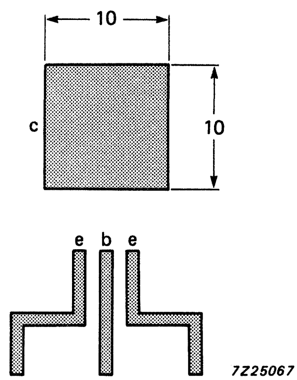


Fig. 2 Single-sided 35 μm Cu-clad epoxy fibreglass printed circuit board; thickness 1.5 mm; tracks fully tin plated; Cu area shown shaded. (Dimensions in mm).

* Mounted on a fibreglass printed circuit board as shown in Fig. 2.

CHARACTERISTICS

T_j = 25 °C unless otherwise specified

Collector cut-off current $I_E = 0$; $V_{CB} = 15$ V	I_{CBO}	max.	100	μA
DC current gain $I_C = 100$ mA; $V_{CE} = 10$ V	h_{FE}	min. typ.	25 140	
Transition frequency at f = 500 MHz $I_C = 100$ mA; $V_{CE} = 10$ V	f_T	typ.	4	GHz
Collector capacitance at f = 1 MHz $I_E = i_e = 0$; $V_{CB} = 10$ V	C_c	typ.	2	pF
Emitter capacitance at f = 1 MHz $I_C = i_c = 0$; $V_{EB} = 0.5$ V	C_e	typ.	10	pF
Feedback capacitance at f = 1 MHz $I_C = 0$; $V_{CE} = 10$ V	C_{re}	typ.	1.2	pF
Maximum power gain at f = 500 MHz $I_C = 100$ mA; $V_{CE} = 10$ V	G_{UM}	typ.	15	dB
Maximum power gain at f = 800 MHz $I_C = 100$ mA; $V_{CE} = 10$ V	G_{UM}	typ.	11	dB
Output voltage at $d_{im} = -60$ dB (DIN 45004B) $I_C = 100$ mA; $V_{CE} = 10$ V; $R_L = 75\ \Omega$ $V_p = V_o$ at $d_{im} = -60$ dB; $f_p = 795.25$ MHz $V_q = V_o - 6$ dB; $f_q = 803.25$ MHz $V_r = V_o - 6$ dB; $f_r = 805.25$ MHz measured at $f_{(p+q-r)} = 793.25$ MHz	V_o	typ.	750	mV

P-N-P 2 GHz WIDEBAND TRANSISTOR

P-N-P transistor in a four-lead dual emitter plastic envelope (SOT-103). This device is designed for application in wideband amplifiers, such as in CATV and MATV systems, up to 2 GHz.

N-P-N complement is BFG90A.

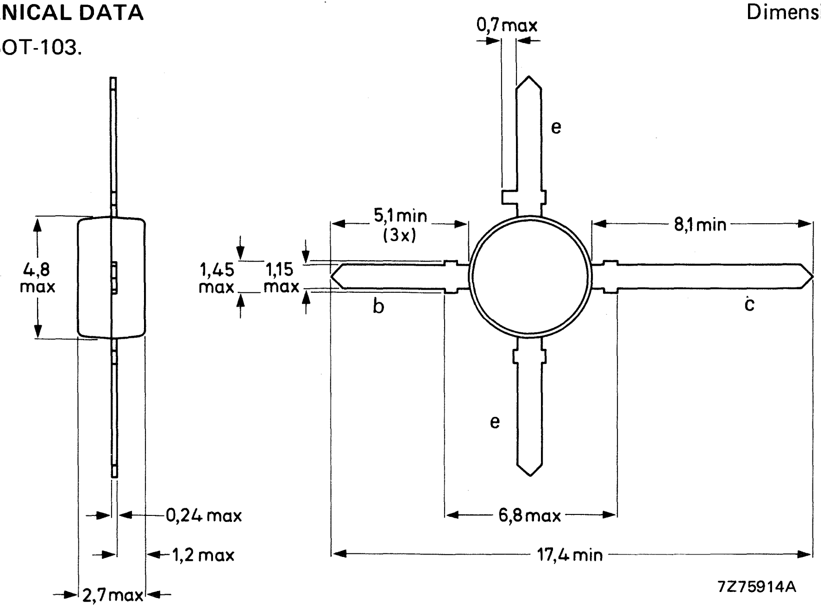
QUICK REFERENCE DATA

Collector-base voltage (open emitter)	$-V_{CBO}$	max.	20	V
Collector-emitter voltage (open base)	$-V_{CEO}$	max.	15	V
Collector current (d.c.)	$-I_C$	max.	25	mA
Total power dissipation up to T_{amb} = 60 °C	P_{tot}	max.	180	mW
Junction temperature	T_j	max.	175	°C
D.C. current gain $-I_C$ = 14 mA; $-V_{CE}$ = 10 V	h_{FE}	min.	20	
Transition frequency at f = 500 MHz $-I_C$ = 14 mA; $-V_{CE}$ = 10 V	f_T	typ.	5	GHz
Feedback capacitance at f = 1 MHz I_C = 0; $-V_{CE}$ = 10 V	C_{re}	typ.	0,45	pF
Noise figure at optimum source impedance $-I_C$ = 14 mA; $-V_{CE}$ = 10 V; f = 800 MHz	F	typ.	3,4	dB

MECHANICAL DATA

Dimensions in mm

Fig. 1 SOT-103.



RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

Collector-base voltage (open emitter)	$-V_{CBO}$	max.	20 V
Collector-emitter voltage (open base)	$-V_{CEO}$	max.	15 V
Emitter-base voltage (open collector)	$-V_{EBO}$	max.	2 V
Collector current			
d.c.	$-I_C$	max.	25 mA
peak value; f > 1 MHz	$-I_{CM}$	max.	35 mA
Total power dissipation up to T_{amb} = 60 °C	P_{tot}	max.	180 mW
Storage temperature	T_{stg}		−65 to +150 °C
→ Junction temperature	T_j	max.	175 °C

THERMAL RESISTANCE

From junction to ambient (free air) mounted on a fibre-glass print (see Fig. 2)	$R_{th\ j\text{-}a}$		500 K/W

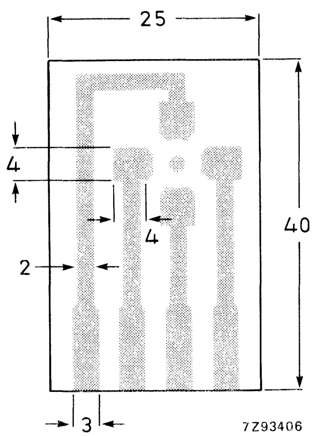


Fig. 2 Requirements for fibre-glass print (dimensions in mm). Single-sided 35 μm Cu-clad epoxy fibre-glass print, thickness 1,5 mm. Tracks are fully tin-lead plated. Shaded area is Cu.

CHARACTERISTICS

T_j = 25 °C unless otherwise specified

Collector cut-off current			
I_E = 0; $-V_{CB}$ = 10 V	$-I_{CBO}$	max.	50 nA
D.C. current gain			
$-I_C$ = 14 mA; $-V_{CE}$ = 10 V	h_{FE}	min.	20
Transition frequency at f = 500 MHz			
$-I_C$ = 14 mA; $-V_{CE}$ = 10 V	f_T	typ.	5,0 GHz
Noise figure at optimum source impedance and $-V_{CE}$ = 10 V; f = 800 MHz; T_{amb} = 25 °C			
at $-I_C$ = 4 mA	F	typ.	2,4 dB
at $-I_C$ = 14 mA	F	typ.	3,4 dB

Collector capacitance at f = 1 MHz $I_E = i_e = 0; -V_{CB} = 10$ V	C_c	typ.	0,9 pF
Emitter capacitance at f = 1 MHz $I_C = i_c = 0; -V_{EB} = 0{,}5$ V	C_e	typ.	1,1 pF
Feedback capacitance at f = 1 MHz $I_C = 0; -V_{CE} = 10$ V	C_{re}	typ.	0,45 pF
Maximum unilateral power gain (s_{re} assumed to be zero) $G_{UM} = 10 \log \dfrac{\lvert s_{fe}\rvert^2}{[1-\lvert s_{ie}\rvert^2]\,[1-\lvert s_{oe}\rvert^2]}$			
$-I_C = 14$ mA; $-V_{CE} = 10$ V; f = 800 MHz; $T_{amb} = 25$ °C	G_{UM}	typ.	16,5 dB
$-I_C = 14$ mA; $-V_{CE} = 10$ V; f = 2 GHz; $T_{amb} = 25$ °C	G_{UM}	typ.	8,5 dB
Output voltage at $d_{im} = -60$ dB $-I_C = 14$ mA; $-V_{CE} = 10$ V; $R_L = 75\ \Omega$; $T_{amb} = 25$ °C $V_p = V_o$ at $d_{im} = -60$ dB ; $f_p = 795{,}25$ MHz $V_q = V_o -6$ dB ; $f_q = 803{,}25$ MHz $V_r = V_o -6$ dB ; $f_r = 805{,}25$ MHz measured at $f_{(p+q+r)} = 793{,}25$ MHz	V_o	typ.	150 mV
Seconds harmonic distortion (see Fig. 3) $-I_C = 14$ mA; $-V_{CE} = 10$ V; $R_L = 75\ \Omega$; VSWR < 2; $T_{amb} = 25$ °C $V_p = V_o = 150$ mV at $f_p = 250$ MHz $V_q = V_o = 150$ mV at $f_q = 560$ MHz measured at $f_{(p+q)} = 810$ MHz	d_2	typ.	−50 dB

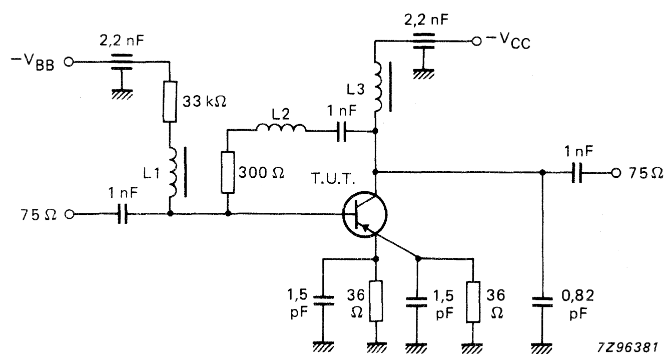


Fig. 3 Intermodulation distortion and second harmonic distortion MATV test circuit.

L1 = L3 = 5 μH micro-choke
L2 = 3 turns Cu wire (0,4 mm), internal diameter 3 mm, winding pitch 1 mm

s-parameters (common emitter) at $-V_{CE}$ = 10 V; T_{amb} = 25 °C; typical values.

$-I_C$ mA	f MHz	s_{ie}	s_{fe}	s_{re}	s_{oe}	G_{UM} dB
	40	0,66/ 67,4°	13,1/132,5°	0,04/ 48,9°	0,98/+81,6°	38,4
	100	0,65/ 41,0°	12,3/131,7°	0,04/ 63,7°	0,96/+49,7°	35,6
	200	0,63/ −25,4°	10,4/136,5°	0,05/ 64,1°	0,82/+ 2,7°	27,5
	500	0,50/ −61,8°	6,5/105,8°	0,08/ 44,8°	0,58/−19,6°	19,3
5	800	0,48/−173,2°	4,7/ 87,7°	0,10/ 46,9°	0,49/−29,3°	15,9
	1000	0,46/−170,1°	3,7/ 81,1°	0,10/ 44,7°	0,43/−33,1°	13,4
	1200	0,47/+178,4°	3,0/ 77,4°	0,11/ 44,8°	0,38/−46,5°	11,3
	1500	0,54/+169,8°	2,8/ 57,0°	0,13/ 51,1°	0,34/−48,1°	11,1
	2000	0,46/+144,6°	2,0/ 22,4°	0,15/ 4,0°	0,31/−89,8°	7,4
	40	0,44/+ 60,2°	19,4/137,8°	0,04/ 34,2°	0,96/+79,6°	37,9
	100	0,45/+ 24,4°	17,8/129,8°	0,04/ 58,6°	0,91/+43,5°	33,6
	200	0,47/ −49,4°	14,3/127,2°	0,05/ 57,9°	0,73/ −4,7°	27,5
	500	0,46/ 92,9°	7,7/ 97,6°	0,07/ 48,4°	0,46/−25,9°	19,7
10	800	0,47/−176,4°	5,4/ 82,6°	0,09/ 53,8°	0,38/−30,9°	16,4
	1000	0,48/−179,6°	4,2/ 77,1°	0,09/ 52,5°	0,33/−35,6°	14,0
	1200	0,48/+167,7°	3,3/ 75,6°	0,10/ 53,5°	0,29/−45,9°	11,9
	1500	0,53/+159,7°	3,3/ 57,5°	0,12/ 58,7°	0,27/−48,7°	12,0
	2000	0,48/+137,2°	2,2/ −3,9°	0,15/ 11,3°	0,24/−91,2°	8,1
	40	0,34/+ 53,8°	22,3/136,9°	0,04/ 34,1°	0,95/+78,2°	37,4
	100	0,37/+ 11,9°	19,9/131,0°	0,03/ 54,7°	0,88/+41,3°	33,1
	200	0,42/ −64,7°	15,9/123,1°	0,04/ 57,3°	0,69/ −8,5°	27,6
	500	0,46/−160,6°	7,9/ 96,8°	0,06/ 54,0°	0,40/−26,8°	19,7
14	800	0,47/−174,4°	5,5/ 81,7°	0,08/ 56,7°	0,34/−32,1°	16,5
	1000	0,48/+175,9°	4,2/ 75,7°	0,08/ 54,9°	0,30/−37,0°	14,1
	1200	0,50/+164,4°	3,4/ 74,5°	0,09/ 56,4°	0,27/−44,1°	12,3
	1500	0,55/+158,1°	3,2/ 54,6°	0,11/ 62,4°	0,24/−45,1°	12,0
	2000	0,49/+134,9°	2,2/ −5,4°	0,14/ 13,4°	0,22/−90,9°	8,5

s-parameters (common emitter) at $-V_{CE}$ = 5 V; T_{amb} = 25 °C; typical values.

$-I_C$ mA	f MHz	s_{ie}	s_{fe}	s_{re}	s_{oe}	G_{UM} dB
	40	0,15/ +3,5°	21,7/136,8°	0,04/ 28,1°	0,91/ +75,5°	34,6
	100	0,31/ −46,9°	18,4/142,5°	0,04/ 64,9°	0,80/ +35,6°	30,2
	200	0,45/ −83,8°	14,2/120,9°	0,04/ 56,5°	0,59/ −15,5°	25,8
	500	0,55/−175,0°	6,6/ 94,1°	0,06/ 52,3°	0,32/ −34,4°	18,4
20	800	0,58/ +177,2°	4,6/ 79,2°	0,08/ 58,4°	0,27/ −36,0°	15,4
	1000	0,57/ +170,3°	3,5/ 73,8°	0,08/ 58,1°	0,24/ −41,3°	12,9
	1200	0,59/ +159,5°	2,8/ 72,9°	0,09/ 59,3°	0,21/ −47,7°	11,1
	1500	0,54/ +150,9°	2,2/ 56,0°	0,11/ 67,6°	0,18/ −36,0°	8,3
	2000	0,58/ +132,1°	1,9/ −6,2°	0,14/ 16,0°	0,19/−108,6°	7,4
	40	0,15/ −27,1°	22,0/138,1°	0,04/ 34,0°	0,90/ +75,4°	34,0
	100	0,32/ −61,0°	18,7/131,1°	0,03/ 64,9°	0,78/ +34,3°	30,1
	200	0,45/ −80,4°	14,1/119,5°	0,04/ 54,0°	0,56/ −15,9°	25,6
	500	0,57/−179,4°	6,4/ 92,4°	0,06/ 53,9°	0,31/ −34,4°	18,3
25	800	0,57/ +174,6°	4,5/ 78,9°	0,08/ 59,2°	0,26/ −35,4°	15,1
	1000	0,59/ +167,5°	3,4/ 73,1°	0,08/ 58,3°	0,23/ −40,1°	12,8
	1200	0,61/ +157,3°	2,8/ 71,8°	0,08/ 61,8°	0,21/ −48,5°	11,1
	1500	0,56/ +151,1°	2,2/ 75,3°	0,10/ 68,9°	0,18/ −24,3°	8,4
	2000	0,60/ +131,8°	1,8/ −6,7°	0,14/ 17,6°	0,19/ −96,0°	7,4
	40	0,19/ −46,2°	21,9/138,3°	0,04/ 28,3°	0,88/ +74,7°	33,3
	100	0,34/ −73,1°	18,2/129,2°	0,03/ 63,7°	0,77/ +30,6°	29,6
	200	0,47/ −67,1°	13,9/118,9°	0,04/ 56,8°	0,55/ −16,8°	25,5
	500	0,58/−176,6°	6,2/ 92,5°	0,05/ 56,9°	0,29/ −30,8°	18,1
30	800	0,59/ +167,6°	4,3/ 77,7°	0,08/ 60,3°	0,26/ −35,6°	14,9
	1000	0,60/ +167,4°	3,3/ 72,7°	0,08/ 59,9°	0,23/ −37,6°	12,6
	1200	0,63/ +157,3°	2,7/ 70,8°	0,09/ 63,1°	0,21/ −45,9°	10,9
	1500	0,57/ +156,7°	2,2/ 49,2°	0,11/ 70,6°	0,19/ −45,4°	8,6
	2000	0,63/ +130,5°	1,8/ −8,2°	0,14/ 19,2°	0,20/ −95,7°	7,5

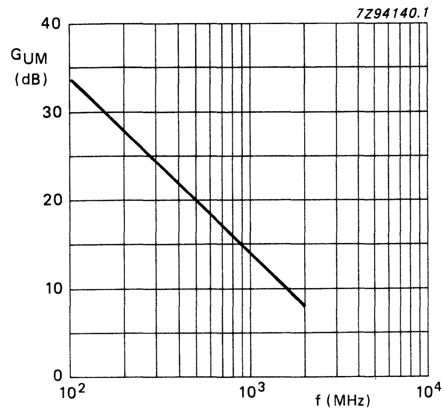


Fig. 4 $-V_{CE}$ = 10 V; $-I_C$ = 14 mA; T_{amb} = 25 °C; typical values.

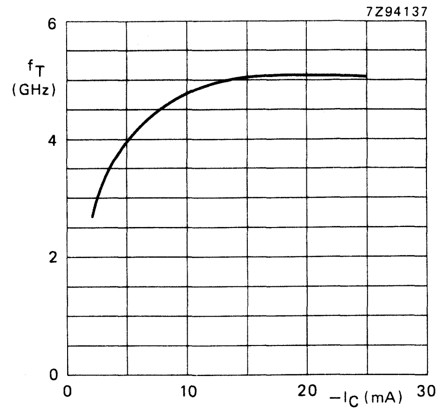


Fig. 5 $-V_{CE}$ = 10 V; f = 500 MHz; T_j = 25 °C; typical values.

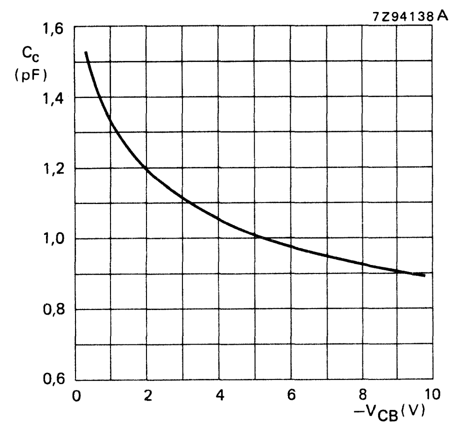


Fig. 6 $I_E = i_e = 0$; f = 1 MHz; T_j = 25 °C; typical values.

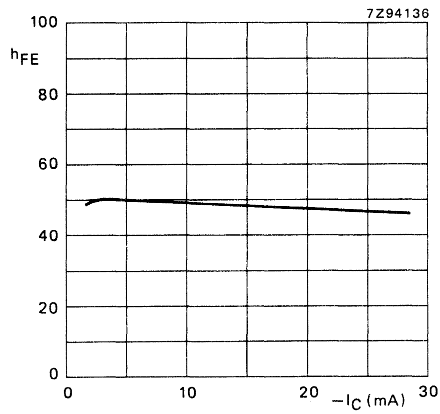


Fig. 7 $-V_{CE}$ = 10 V; T_j = 25 °C; typical values.

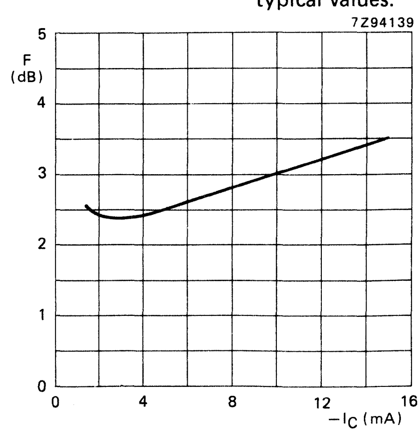


Fig. 8 $-V_{CE}$ = 10 V; f = 800 MHz; Z_S = opt.; T_{amb} = 25 °C.

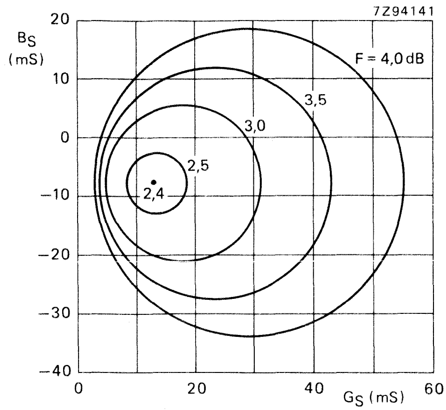


Fig. 9 Circles of constant noise figure; $-V_{CE}$ = 10 V; $-I_C$ = 4 mA; f = 800 MHz; typical values.

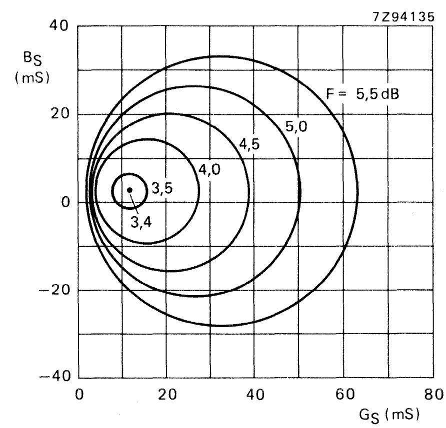


Fig. 10 Circles of constant noise figure; $-V_{CE}$ = 10 V; $-I_C$ = 14 mA; f = 800 MHz; typical values.

N-P-N 2 GHz WIDEBAND TRANSISTOR

N-P-N transistor in a four-lead dual-emitter plastic envelope (SOT-103). It is designed for wideband application in the GHz range, such as satellite TV systems (SATV) and repeater amplifiers in fibre-optical systems. The device features a very high transition frequency, high gain and a very low noise figure up to high frequencies.

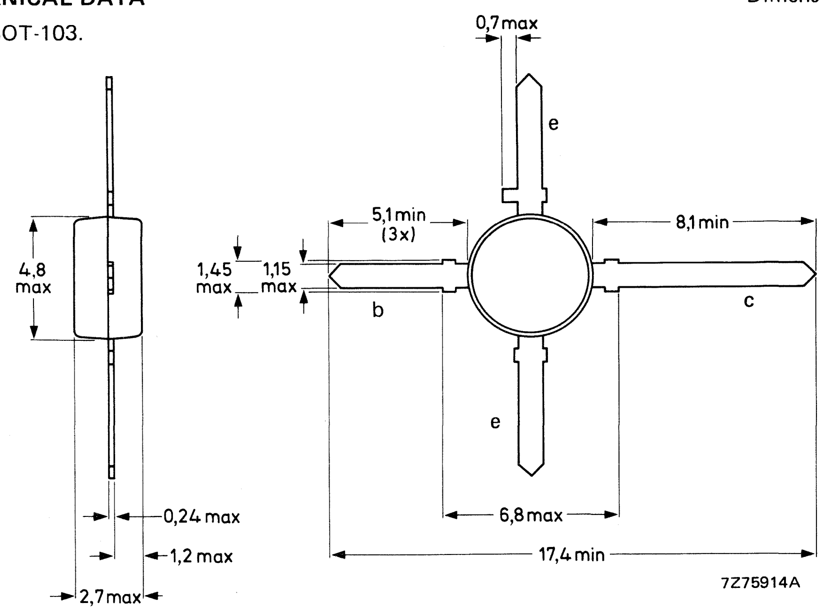
QUICK REFERENCE DATA

Collector-base voltage (open emitter)	V_{CBO}	max.	20 V
Collector-emitter voltage (open base)	V_{CEO}	max.	10 V
Collector current (d.c.)	I_C	max.	50 mA
Total power dissipation up to T_{amb} = 60 °C	P_{tot}	max.	300 mW
Junction temperature	T_j	max.	175 °C ←
D.C. current gain I_C = 15 mA; V_{CE} = 5 V	h_{FE}	min.	60
Transition frequency at f = 500 MHz I_C = 15 mA; V_{CE} = 8 V	f_T	typ.	7,5 GHz
Noise figure at Z_S = 60 Ω; I_C = 15 mA; V_{CE} = 8 V; f = 2 GHz	F	typ.	3,0 dB
Maximum unilateral power gain at f = 2 GHz I_C = 15 mA; V_{CE} = 8 V	G_{UM}	typ.	10,5 dB

MECHANICAL DATA

Dimensions in mm

Fig. 1 SOT-103.



RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

Collector-base voltage (open emitter)	V_{CBO}	max.	20 V
Collector-emitter voltage (open base)	V_{CEO}	max.	10 V
Emitter-base voltage (open collector)	V_{EBO}	max.	2,5 V
Collector current (d.c.)	I_C	max.	50 mA
Total power dissipation up to T_{amb} = 60 °C mounted on a fibre-glass p.c.b. (see Fig. 2)	P_{tot}	max.	300 mW
Storage temperature	T_{stg}		−65 to +150 °C
→ Junction temperature	T_j	max.	175 °C

THERMAL RESISTANCE

From junction to ambient (free air) mounted on a glass-fibre p.c.b. (see Fig. 2)	$R_{th\ j\text{-}a}$	=	300 K/W

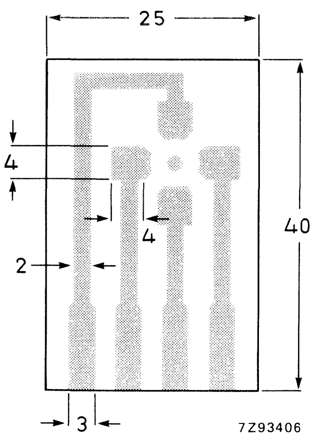


Fig. 2 Requirements for fibre-glass print (dimensions in mm). Single-sided 35 μm Cu-clad epoxy fibre-glass print, thickness 1,5 mm. Tracks are fully tin-lead plated. Shaded area is Cu.

CHARACTERISTICS

T_j = 25 °C unless otherwise specified

Collector cut-off current I_E = 0; V_{CB} = 5 V	I_{CBO}	max.	50 nA
D.C. current gain I_C = 15 mA; V_{CE} = 5 V	h_{FE}	min. typ.	60 100
Transition frequency at f = 500 MHz I_C = 15 mA; V_{CE} = 8 V	f_T	typ.	7,5 GHz
Collector capacitance at f = 1 MHz I_E = i_e = 0; V_{CB} = 8 V	C_c	typ.	1,1 pF
Emitter capacitance at f = 1 MHz I_C = i_c = 0; V_{EB} = 0,5 V	C_e	typ.	1,3 pF
Feedback capacitance at f = 1 MHz I_E = 0; V_{CE} = 8 V	C_{re}	typ.	0,5 pF

Maximum unilateral power gain (s_{re} assumed to be zero)

$$G_{UM} = 10 \log \frac{|s_{fe}|^2}{[1-|s_{ie}|^2]\,[s_{oe}|^2]}$$

I_C = 15 mA; V_{CE} = 8 V; f = 800 MHz; T_{amb} 25 °C	G_{UM}	typ.	18,5 dB
I_C = 15 mA; V_{CE} = 8 V; f = 2 GHz; T_{amb} = 25 °C		typ.	10,5 dB
Noise figure at optimum source impedance and V_{CE} = 8 V; f = 800 MHz; T_{amb} = 25 °C;			
I_C = 5 mA	F	typ.	0,8 dB
I_C = 15 mA		typ.	1,5 dB
Noise figure at Z_S = 60 Ω and V_{CE} = 8 V; f = 2 GHz; T_{amb} = 25 °C;			
I_C = 5 mA	F	typ.	2,5 dB
I_C = 15 mA		typ.	3,0 dB

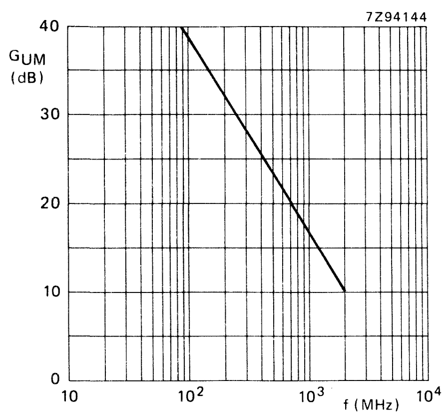


Fig. 3 V_{CE} = 8 V; I_C = 15 mA; T_{amb} = 25 °C; typical values.

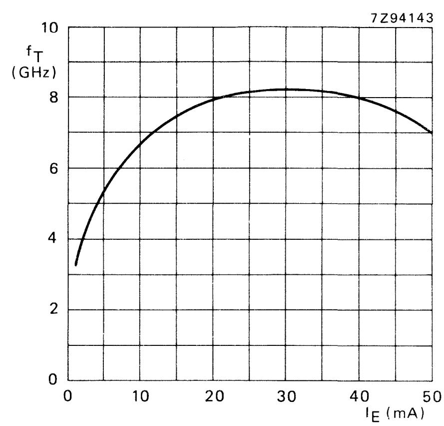


Fig. 4 V_{CE} = 8 V; f = 500 MHz; typical values.

s-parameters (common emitter) at V_{CE} = 8 V; T_{amb} = 25 °C; typical values

I_C mA	f MHz	s_{ie}	s_{fe}	s_{re}	s_{oe}	G_{UM} dB
5	40	0,86/ −11,0°	15,0/173,8°	0,01/ 85,5°	0,98/ −5,7°	42,8
	100	0,85/ −31,0°	14,6/159,5°	0,02/ 72,7°	0,96/−16,8°	40,4
	200	0,74/ −58,3°	12,4/143,0°	0,04/ 62,0°	0,81/−29,4°	30,0
	500	0,62/−114,9°	8,0/109,7°	0,07/ 44,1°	0,57/−51,2°	21,8
	800	0,54/−141,0°	5,5/ 94,8°	0,08/ 43,7°	0,46/−59,3°	17,3
	1000	0,52/−155,9°	4,5/ 85,5°	0,08/ 42,9°	0,43/−61,7°	15,3
	1200	0,50/−170,7°	3,7/ 78,8°	0,09/ 44,8°	0,39/−64,9°	13,3
	1500	0,51/+179,4°	3,1/ 72,3°	0,10/ 49,7°	0,34/−72,3°	11,7
	2000	0,50/+159,2°	2,3/ 60,6°	0,11/ 54,7°	0,33/−85,7°	9,1
10	40	0,75/ −17,4°	26,0/169,9°	0,01/ 78,7°	0,95/ −9,4°	42,4
	100	0,72/ −46,3°	24,0/151,2°	0,02/ 67,2°	0,89/−24,9°	37,6
	200	0,60/ −81,7°	18,0/131,8°	0,03/ 57,3°	0,68/−39,7°	30,0
	500	0,52/−138,7°	9,8/101,3°	0,05/ 48,9°	0,41/−59,2°	22,0
	800	0,48/−159,5°	6,5/ 89,3°	0,06/ 53,7°	0,34/−64,8°	17,9
	1000	0,48/−171,7°	5,2/ 81,5°	0,07/ 55,0°	0,31/−66,2°	16,0
	1200	0,48/+175,6°	4,2/ 76,4°	0,08/ 57,6°	0,27/−68,1°	14,1
	1500	0,48/+169,3°	4,0/ 70,5°	0,10/ 61,4°	0,25/−76,4°	12,5
	2000	0,48/+150,8°	2,7/ 60,2°	0,12/ 63,0°	0,25/−89,4°	10,0
15	40	0,66/ −22,8°	33,9/167,0°	0,01/ 77,8°	0,94/−12,0°	42,7
	100	0,62/ −58,5°	29,9/145,5°	0,02/ 64,3°	0,83/−30,2°	36,8
	200	0,53/ −97,7°	21,1/125,5°	0,03/ 56,4°	0,60/−45,0°	29,8
	500	0,50/−149,2°	10,4/ 97,8°	0,04/ 53,9°	0,34/−62,4°	22,2
	800	0,47/−167,8°	6,8/ 86,8°	0,06/ 59,6°	0,29/−66,8°	18,5
	1000	0,47/−178,4°	5,5/ 79,9°	0,07/ 60,8°	0,26/−68,1°	16,2
	1200	0,48/+169,9°	4,5/ 75,3°	0,08/ 62,7°	0,23/−69,5°	14,4
	1500	0,48/+165,1°	3,8/ 69,5°	0,10/ 65,7°	0,21/−78,5°	12,8
	2000	0,48/+147,3°	2,8/ 60,0°	0,12/ 66,1°	0,21/−91,5°	10,5
20	40	0,60/ −27,3°	39,4/164,9°	0,01/ 72,7°	0,92/−13,9°	42,1
	100	0,56/ −67,7°	33,1/141,8°	0,02/ 62,9°	0,79/−33,4°	36,2
	200	0,49/−108,4°	22,6/121,8°	0,03/ 56,3°	0,54/−47,9°	29,8
	500	0,49/−155,6°	10,7/ 95,9°	0,04/ 57,2°	0,31/−63,7°	22,2
	800	0,47/−172,1°	6,0/ 85,5°	0,06/ 63,0°	0,26/−67,5°	18,2
	1000	0,47/+178,1°	5,6/ 79,0°	0,07/ 63,6°	0,24/−68,6°	16,3
	1200	0,49/+167,1°	4,6/ 74,8°	0,08/ 65,8°	0,20/−69,9°	14,6
	1500	0,48/+162,9°	3,8/ 69,0°	0,10/ 68,0°	0,20/−79,3°	12,9
	2000	0,48/+145,5°	2,9/ 59,7°	0,13/ 67,7°	0,20/−92,6°	10,4
30	40	0,50/ −35,8°	46,8/161,7°	0,01/ 73,5°	0,90/−16,5°	41,7
	100	0,48/ −83,7°	37,2/136,5°	0,02/ 60,8°	0,72/−37,5°	35,7
	200	0,46/−124,2°	23,9/117,0°	0,02/ 57,6°	0,47/−50,6°	29,7
	500	0,49/−163,7°	10,7/ 93,5°	0,04/ 62,0°	0,27/−63,3°	22,1
	800	0,47/−177,5°	6,0/ 84,0°	0,06/ 67,1°	0,23/−66,4°	18,2
	1000	0,48/+173,9°	5,6/ 77,7°	0,07/ 67,4°	0,22/−67,3°	16,3
	1200	0,50/+163,8°	4,6/ 73,8°	0,08/ 69,1°	0,19/−68,4°	14,6
	1500	0,48/+160,3°	3,8/ 68,1°	0,10/ 70,6°	0,18/−79,1°	12,9
	2000	0,49/+143,4°	2,9/ 59,1°	0,13/ 69,5°	0,18/−92,6°	10,5

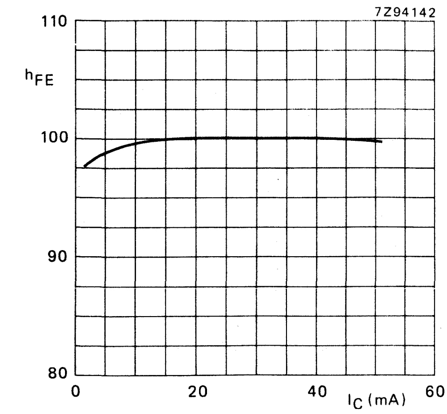


Fig. 5 V_{CE} = 5 V; T_j = 25 °C; typical values.

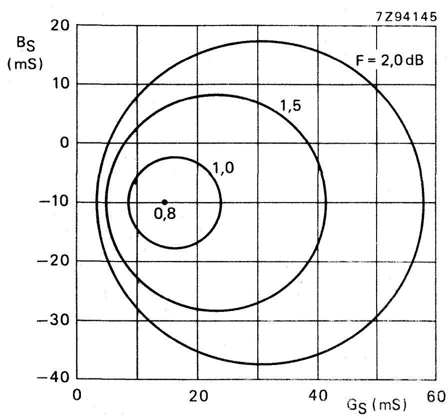


Fig. 6 Circles of constant noise figure; V_{CE} = 8 V; I_C = 5 mA; f = 800 MHz; T_{amb} = 25 °C; typical values.

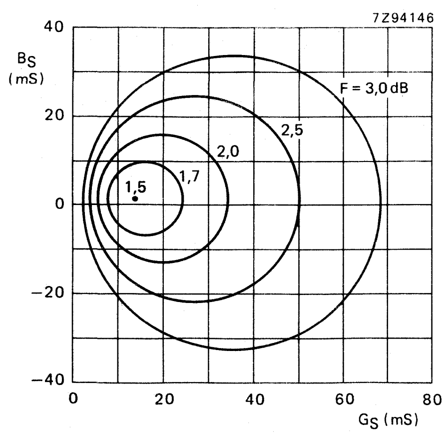


Fig. 7 Circles of constant noise figure; V_{CE} = 8 V; I_C = 15 mA; f = 800 MHz; T_{amb} = 25 °C; typical values.

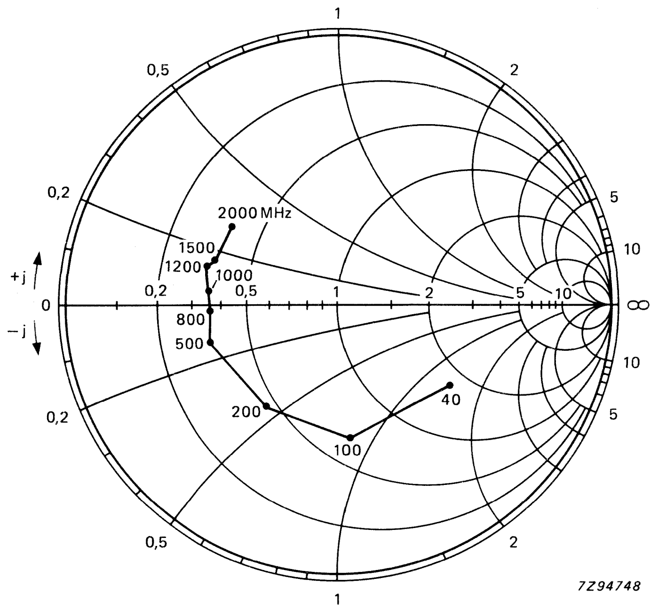


Fig. 8 Input impedance, derived from input reflection coefficient s_{ie} coordinates, in ohm x 50.

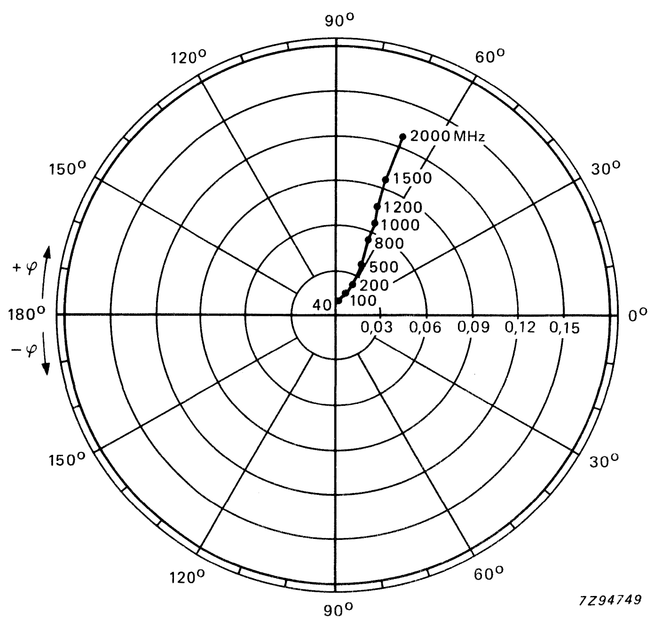


Fig. 9 Reverse transmission coefficient s_{re}.

Conditions for Figs 8, 9, 10 and 11: V_{CE} = 8 V; I_C = 30 mA; T_{amb} = 25 °C; typical values.

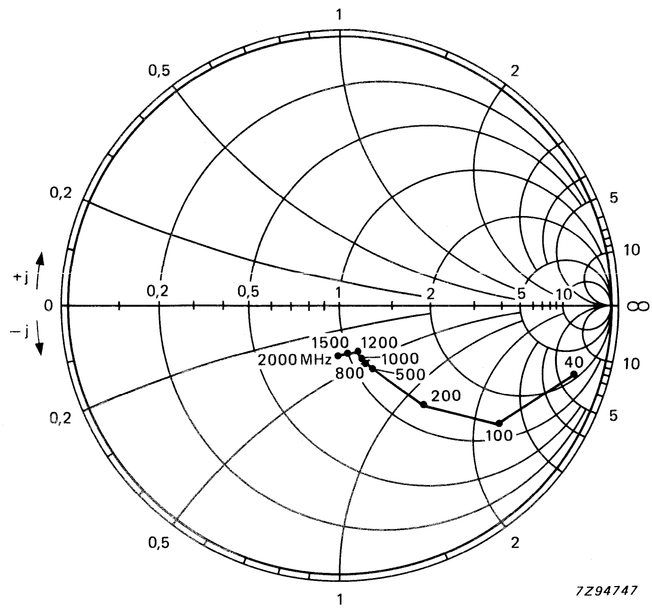


Fig. 10 Output impedance, derives from output reflection coefficient s_{oe} coordinates, in ohm x 50.

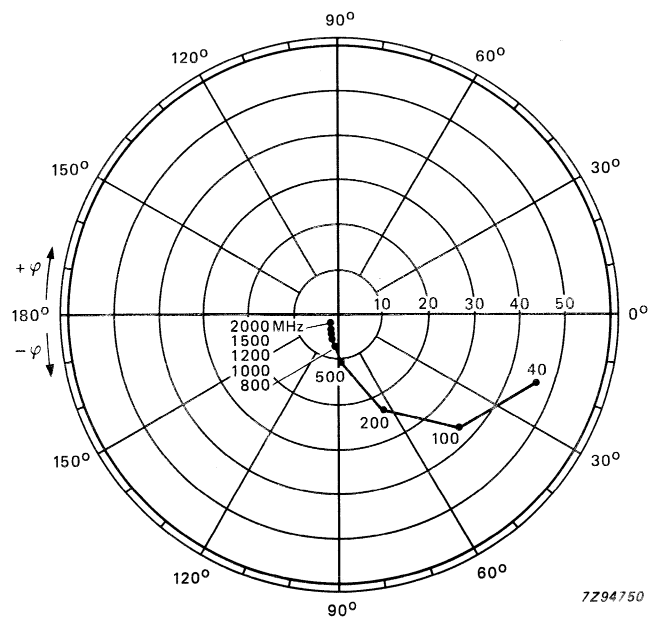


Fig. 11 Forward transmission coefficient s_{fe}.

N-P-N 2 GHz WIDEBAND TRANSISTOR

N-P-N transistor in a four-lead dual-emitter plastic envelope (SOT-143). It is designed for wideband application in the GHz range, such as satellite TV systems (SATV) and repeater amplifiers in fibre-optical systems. The device features a very high transition frequency, high gain and a very low noise figure up to high frequencies.

QUICK REFERENCE DATA

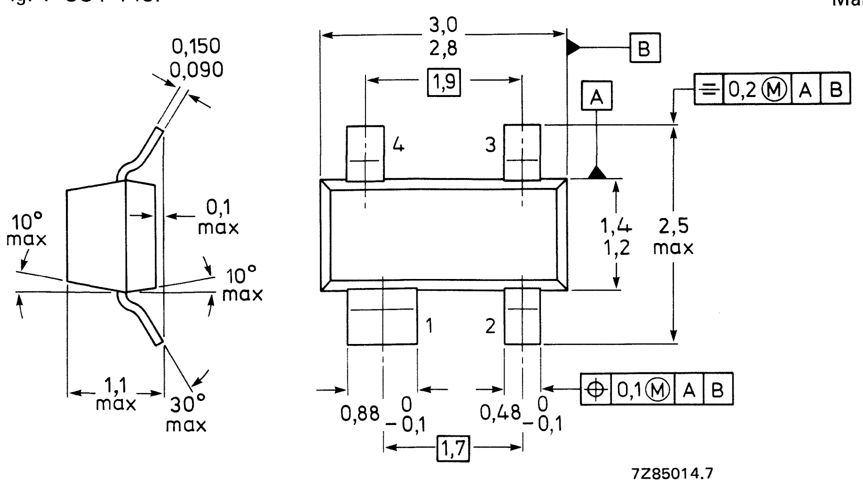
Collector-base voltage	V_{CBO}	max.	20	V
Collector-emitter voltage	V_{CEO}	max.	10	V
Collector current (d.c.)	I_C	max.	50	mA
Total power dissipation up to T_{amb} = 25 °C	P_{tot}	max.	300	mW
Junction temperature	T_j	max.	175	°C
D.C. current gain I_C = 15 mA; V_{CE} = 5 V	h_{FE}	min.	60	
		typ.	100	
Transition frequency at f = 500 MHz I_C = 15 mA; V_{CE} = 8 V	f_T	typ.	7,5	GHz
Maximum unilateral power gain at f = 2 GHz I_C = 15 mA; V_{CE} = 8 V; T_{amb} = 25 °C	G_{UM}	typ.	10,0	dB
Noise figure at f = 2 GHz Z_S = 60 Ω; T_{amb} = 25 °C				
I_C = 5 mA; V_{CE} = 8 V	F	typ.	2,5	dB
I_C = 15 mA; V_{CE} = 8 V	F	typ.	3,0	dB

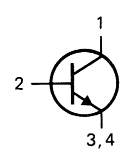
MECHANICAL DATA

Dimensions in mm

Fig. 1 SOT-143.

Marking code: V3





TOP VIEW

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

Collector-base voltage (open emitter)	V_{CBO}	max.	20	V
Collector-emitter voltage (open base)	V_{CEO}	max.	10	V
Emitter-base voltage (open collector)	V_{EBO}	max.	2,5	V
Collector current (d.c.)	I_C	max.	50	mA
Total power dissipation up to T_{amb} = 25 °C mounted on a ceramic substrate of 8 mm x 10 mm x 0,7 mm	P_{tot}	max.	300	mW
Storage temperature	T_{stg}	−65 to + 150		°C
→ Junction temperature	T_j	max.	175	°C

THERMAL RESISTANCE

From junction to ambient mounted on a ceramic substrate of 8 mm x 10 mm x 0,7 mm	$R_{th\ j\text{-}a}$	=	430	K/W

CHARACTERISTICS

T_j = 25 °C unless otherwise specified

Collector cut-off current $I_E = 0$; $V_{CB} = 10$ V	I_{CBO}	max.	50	nA
D.C. current gain $I_C = 15$ mA; $V_{CE} = 5$ V	h_{FE}	min.	60	
		typ.	100	
Transition frequency at f = 500 MHz $I_C = 15$ mA; $V_{CE} = 8$ V	f_T	typ.	7,5	GHz
Collector capacitance at f = 1 MHz $I_E = I_e = 0$; $V_{CB} = 8$ V	C_c	typ.	0,7	pF
Emitter capacitance at f = 1 MHz $I_C = I_c = 0$; $V_{EB} = 0,5$ V	C_e	typ.	1,3	pF
Feedback capacitance at f = 1 MHz $I_C = 0$; $V_{CE} = 8$ V	C_{re}	typ.	0,5	pF

Maximum unilateral power gain (s_{re} assumed to be zero)

$$G_{UM} = 10 \log \frac{|s_{fe}|^2}{[1-|s_{ie}|^2]\,[1-|s_{oe}|^2]}$$

at $I_C = 15$ mA; $V_{CE} = 8$ V; f = 2 GHz; $T_{amb} = 25$ °C	G_{UM}	typ.	10,0	dB

Noise figures at f = 800 MHz; Z_S = opt.; $T_{amb} = 25$ °C; $V_{CE} = 8$ V

$I_C = 5$ mA	F	typ.	0,8	dB
$I_C = 15$ mA	F	typ.	1,5	dB

Noise figures at f = 2 GHz; $Z_S = 60\ \Omega$; $T_{amb} = 25$ °C; $V_{CE} = 8$ V

$I_C = 5$ mA	F	typ.	2,5	dB
$I_C = 15$ mA	F	typ.	3,0	dB

s-parameters (common emitter) at V_{CE} = 8 V; T_{amb} = 25 °C; typical values.

I_C mA	f MHz	s_{ie}	s_{fe}	s_{re}	s_{oe}	G_{UM} dB
	40	0,96/ −6,8°	5,8/177,8°	0,01/ 84,5°	0,99/ −3,2°	44,1
	100	0,98/ −20,8°	5,6/165,8°	0,03/ 77,5°	1,01/ −10,0°	46,5
	200	0,89/ −40,1°	5,1/153,2°	0,05/ 66,8°	0,91/ −19,0°	28,7
	500	0,81/ −89,3°	4,3/121,5°	0,09/ 43,4°	0,79/ −38,5°	21,5
2	800	0,68/−123,0°	3,3/102,0°	0,11/ 33,8°	0,67/ −50,0°	15,7
	1000	0,64/−139,9°	2,8/ 89,8°	0,11/ 28,0°	0,65/ −54,5°	13,7
	1200	0,60/−157,3°	2,3/ 81,1°	0,11/ 25,8°	0,62/ −61,7°	11,5
	1500	0,59/−173,3°	2,0/ 71,8°	0,11/ 27,4°	0,55/ −69,3°	9,5
	2000	0,57/+161,7°	1,5/ 56,3°	0,10/ 32,2°	0,54/ −85,8°	6,7
	40	0,91/ −10,9°	13,5/174,8°	0,01/ 83,3°	0,98/ −5,9°	44,2
	100	0,91/ −30,3°	12,6/159,5°	0,03/ 72,2°	0,96/ −17,0°	40,9
	200	0,79/ −56,3°	10,6/143,5°	0,04/ 60,3°	0,81/ −29,5°	29,3
	500	0,64/−115,9°	7,4/109,8°	0,07/ 41,4°	0,58/ −50,8°	21,5
5	800	0,55/−145,5°	5,2/ 93,5°	0,08/ 39,9°	0,48/ −59,5°	17,1
	1000	0,53/−161,4°	4,2/ 84,0°	0,08/ 39,1°	0,44/ −62,2°	15,0
	1200	0,52/−176,5°	3,5/ 77,8°	0,08/ 41,2°	0,42/ −67,1°	13,1
	1500	0,51/+172,2°	2,9/ 69,1°	0,09/ 44,6°	0,38/ −75,7°	11,3
	2000	0,50/+149,8°	2,2/ 56,7°	0,11/ 49,8°	0,38/ −89,5°	8,7
	40	0,85/ −16,1°	23,5/170,6°	0,01/ 80,1°	0,96/ −9,7°	43,8
	100	0,81/ −42,6°	21,3/151,8°	0,02/ 67,2°	0,89/ −25,2°	38,0
	200	0,67/ −76,3°	16,6/133,0°	0,04/ 55,5°	0,68/ −40,0°	29,6
	500	0,54/−137,5°	9,5/101,5°	0,05/ 45,7°	0,42/ −60,2°	21,9
10	800	0,49/−161,8°	6,3/ 88,5°	0,07/ 49,2°	0,35/ −67,0°	17,7
	1000	0,49/−175,2°	5,1/ 80,5°	0,07/ 50,6°	0,32/ −68,9°	15,8
	1200	0,49/+171,5°	4,2/ 75,8°	0,08/ 53,4°	0,29/ −72,5°	13,9
	1500	0,47/+163,5°	3,5/ 67,5°	0,09/ 55,3°	0,28/ −82,1°	12,3
	2000	0,47/+142,5°	2,6/ 56,8°	0,12/ 57,7°	0,29/ −94,5°	9,6
	40	0,80/ −20,1°	31,0/167,8°	0,01/ 76,4°	0,94/ −12,2°	43,5
	100	0,74/ −51,8°	26,9/146,8°	0,02/ 64,1°	0,83/ −30,3°	37,2
	200	0,60/ −89,4°	19,9/126,7°	0,03/ 54,0°	0,60/ −45,5°	29,8
	500	0,51/−147,5°	10,3/ 98,0°	0,05/ 49,7°	0,35/ −64,9°	22,1
15	800	0,47/−168,5°	6,7/ 86,5°	0,06/ 54,6°	0,29/ −70,8°	18,1
	1000	0,47/+179,2°	5,4/ 79,3°	0,07/ 55,9°	0,27/ −72,8°	16,1
	1200	0,48/+166,5°	4,4/ 75,0°	0,08/ 58,4°	0,24/ −75,8°	14,3
	1500	0,46/+160,0°	3,7/ 67,0°	0,10/ 59,2°	0,24/ −86,0°	12,5
	2000	0,45/+139,5°	2,7/ 56,8°	0,12/ 60,2°	0,25/ −97,8°	10,0
	40	0,76/ −23,8°	37,2/165,4°	0,01/ 75,6°	0,92/ −14,3°	43,3
	100	0,69/ −60,0°	31,2/142,6°	0,02/ 61,7°	0,78/ −34,3°	36,8
	200	0,55/ −99,6°	21,8/122,5°	0,03/ 53,6°	0,54/ −49,5°	29,8
	500	0,49/−152,5°	10,6/ 96,0°	0,04/ 53,0°	0,31/ −68,0°	22,2
20	800	0,46/−172,9°	7,0/ 85,0°	0,06/ 58,1°	0,26/ −73,3°	18,2
	1000	0,46/+175,9°	5,5/ 78,3°	0,07/ 59,3°	0,24/ −75,3°	16,1
	1200	0,47/+163,5°	4,6/ 74,3°	0,08/ 61,5°	0,21/ −78,3°	14,5
	1500	0,45/+157,9°	3,8/ 66,4°	0,10/ 61,4°	0,22/ −88,9°	12,8
	2000	0,45/+137,8°	2,8/ 56,7°	0,12/ 61,7°	0,22/−100,2°	10,2

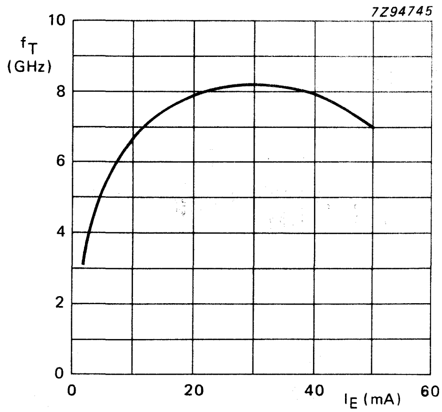


Fig. 2 V_{CE} = 8 V; f = 500 MHz; T_{amb} = 25 °C; typical values.

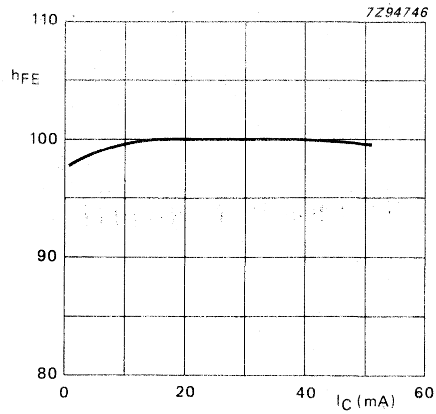


Fig. 3 V_{CE} = 5 V; T_{amb} = 25 °C; typical values.

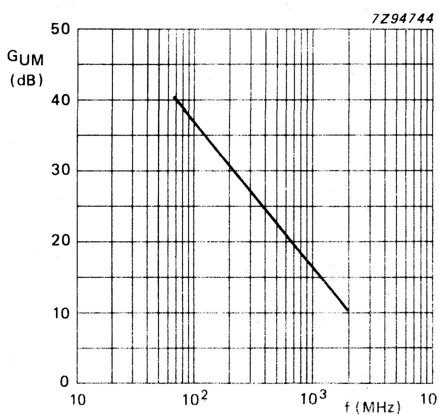


Fig. 4 V_{CE} = 8 V; I_C = 15 mA; T_{amb} = 25 °C; typical values.

N-P-N 2 GHz WIDEBAND TRANSISTOR

N-P-N transistor in a four-lead dual-emitter plastic envelope (SOT-103). This device is designed for application in wideband amplifiers, such as in CATV and MATV systems, up to 2 GHz.

P-N-P complement is BFG51.

QUICK REFERENCE DATA

Collector-base voltage (open emitter)	V_{CBO}	max.	20	V
Collector-emitter voltage (open base)	V_{CEO}	max.	15	V
Collector current (d.c.)	I_C	max.	25	mA
Total power dissipation up to T_{amb} = 60 °C	P_{tot}	max.	180	mW
Junction temperature	T_j	max.	175	°C ←
D.C. current gain I_C = 14 mA; V_{CE} = 10 V	h_{FE}	min.	40	
Transition frequency at f = 500 MHz I_C = 14 mA; V_{CE} = 10 V	f_T	typ.	5,0	GHz
Feedback capacitance at f = 1 MHz I_C = 0; V_{CE} = 10 V	C_{re}	typ.	0,35	pF
Noise figure at Z_S = opt.; T_{amb} = 25 °C; I_C = 14 mA; V_{CE} = 10 V; f = 800 MHz	F	typ.	2,4	dB
Maximum unilateral power gain at f = 800 MHz I_C = 14 mA; V_{CE} = 10 V	G_{UM}	typ.	19	dB
Output power at 1 dB gain compression V_{CE} = 10 V; I_C = 14 mA; f = 800 MHz	P_{L1}	typ.	+8	dBm
Third order intercept point V_{CE} = 10 V; I_C = 14 mA; f = 800 MHz	ITO	typ.	+27	dBm

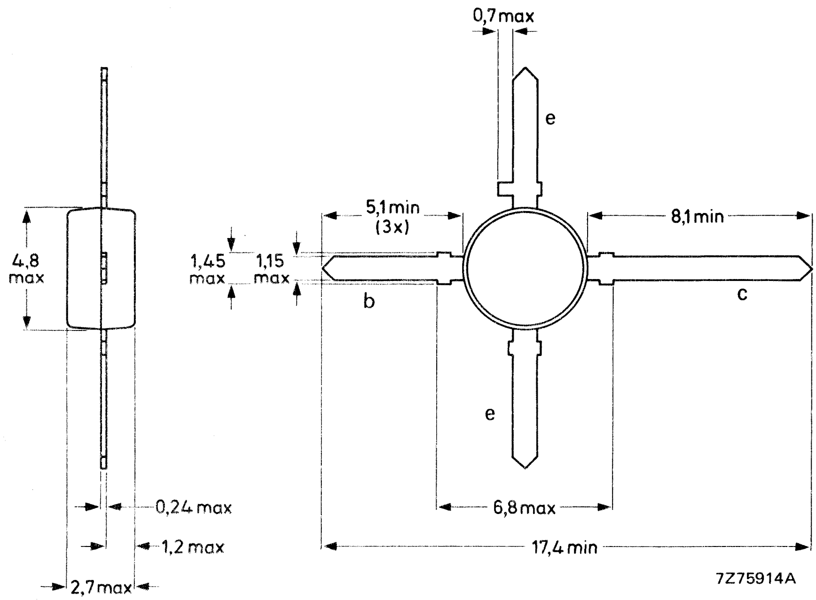
MECHANICAL DATA

SOT-103 (see Fig. 1).

MECHANICAL DATA

Dimensions in mm

Fig. 1 SOT-103.



RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

Collector-base voltage (open emitter)	V_{CBO}	max.	20	V
Collector-emitter voltage (open base)	V_{CEO}	max.	15	V
Emitter-base voltage (open collector)	V_{EBO}	max.	2	V
Collector current (d.c.)	I_C	max.	25	mA
Total power dissipation up to T_{amb} = 60 °C	P_{tot}	max.	180	mW
Storage temperature	T_{stg}		−65 to +150	°C
→ Junction temperature	T_j	max.	175	°C

THERMAL RESISTANCE

From junction to ambient in free air and mounted on glass-fibre p.c.b. (see Fig. 2) $R_{th\ j\text{-}a}$ = 500 K/W

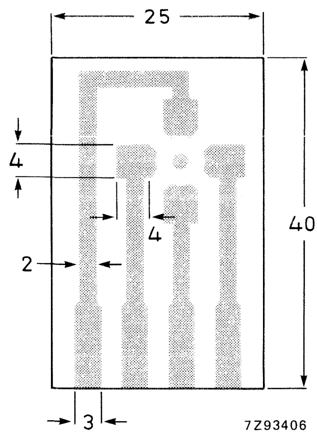


Fig. 2 Requirements for fibre-glass print (dimensions in mm). Single-sided 35 μm Cu-clad epoxy fibre-glass print, thickness 1,5 mm. Tracks are fully tin-lead plated. Shaded area is Cu.

CHARACTERISTICS

T_j = 25 °C unless otherwise specified

Collector cut-off current $I_E = 0$; $V_{CB} = 10$ V	I_{CBO}	max.	50 nA
D.C. current gain $I_C = 14$ mA; $V_{CE} = 10$ V	h_{FE}	min. typ.	40 90
Transition frequency at f = 500 MHz $I_C = 14$ mA; $V_{CE} = 10$ V	f_T	typ.	5,0 GHz
Collector capacitance at f = 1 MHz $I_E = i_e = 0$; $V_{CB} = 10$ V	C_c	typ.	0,7 pF
Emitter capacitance at f = 1 MHz $I_C = i_c = 0$; $V_{EB} = 0,5$ V	C_e	typ.	1,2 pF
Feedback capacitance at f = 1 MHz $I_C = 0$; $V_{CE} = 10$ V	C_{re}	typ.	0,35 pF

Maximum unilateral power gain (s_{re} assumed to be zero)

$$G_{UM} = 10 \log \frac{|s_{fe}|^2}{[1-|s_{ie}|^2]\,[1-|s_{oe}|^2]}$$

$I_C = 14$ mA; $V_{CE} = 10$ V; f = 800 MHz; $T_{amb} = 25$ °C	G_{UM}	typ.	19,0 dB
$I_C = 14$ mA; $V_{CE} = 10$ V; f = 2 GHz; $T_{amb} = 25$ °C	G_{UM}	typ.	10,5 dB

Noise figure at $T_{amb} = 25$ °C

$I_C = 4$ mA; $V_{CE} = 10$ V; f = 800 MHz; Z_S = opt.	F	typ.	1,7 dB
$I_C = 14$ mA; $V_{CE} = 10$ V; f = 800 MHz; Z_S = opt.	F	typ.	2,4 dB
$I_C = 4$ mA; $V_{CE} = 10$ V; f = 2 GHz; $Z_S = 60\ \Omega$	F	typ.	3,6 dB

Output power at 1 dB gain compression I_C = 14 mA; V_{CE} = 10 V; T_{amb} = 25 ^oC; R_L = 75 Ω; measured at f = 800 MHz	P_{L1}	typ.	+8 dBm
Third order intercept point (see Fig. 3) I_C = 14 mA; V_{CE} = 10 V; R_L = 75 Ω; T_{amb} = 25 ^oC; P_p = ITO − 6 dB; f_p = 800 MHz; P_q = ITO − 6 dB; f_q = 801 MHz; measured at $f_{(2q-p)}$ = 802 MHz and at $f_{(2p-q)}$ = 799 MHz	ITO	typ.	+27 dBm
Output voltage at d_{im} = −60 dB I_C = 14 mA; V_{CE} = 10 V; R_L = 75 Ω; T_{amb} = 25 ^oC $V_p = V_o$ at d_{im} = −60 dB; f_p = 795,25 MHz $V_q = V_o$ −6 dB ; f_q = 803,25 MHz $V_r = V_o$ −6 dB ; f_r = 805,25 MHz measured at $f_{(p+q-r)}$ = 793,25 MHz	V_o	typ.	150 mV
Second harmonic distortion (see Fig. 3) I_C = 14 mA; V_{CE} = 10 V; R_L = 75 Ω; VSWR < 2; T_{amb} = 25 ^oC $V_p = V_o$ = 60 mV at f_p = 250 MHz $V_q = V_o$ = 60 mV at f_q = 560 MHz measured at $f_{(p+q)}$ = 810 MHz	d_2	typ.	−50 dB

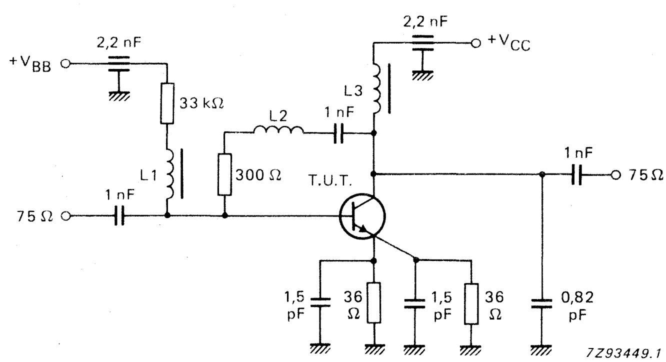


Fig. 3 Intermodulation distortion and second harmonic distortion MATV test circuit.

L1 = L3 = 5 μH Ferroxcube choke
L2 = 3 turns Cu wire (0,4 mm), internal diameter 3 mm, winding pitch 1 mm

s-parameters (common emitter) at V_{CE} = 10 V; T_{amb} = 25 °C; typical values

I_C mA	f MHz	s_{ie}	s_{fe}	s_{re}	s_{oe}	G_{UM} dB
	40	0,85/ −10,3°	15,9/173,9°	0,01/ 79,5°	0,99/ −4,1°	45,9
	100	0,84/ −29,2°	15,5/160,1°	0,02/ 74,0°	0,98/−12,5°	42,6
	200	0,73/ −55,3°	13,2/143,8°	0,03/ 64,3°	0,85/−21,6°	31,3
	500	0,58/−109,4°	8,6/111,5°	0,05/ 48,9°	0,66/−34,9°	23,0
5	800	0,49/−135,3°	5,9/ 97,2°	0,06/ 50,2°	0,58/−40,0°	18,4
	1000	0,47/−150,0°	4,9/ 88,2°	0,07/ 50,1°	0,56/−41,2°	16,5
	1200	0,45/−165,4°	4,0/ 81,3°	0,07/ 51,3°	0,54/−44,5°	14,5
	1500	0,44/−175,5°	3,3/ 76,0°	0,08/ 56,1°	0,47/−48,7°	12,5
	2000	0,43/+164,4°	2,5/ 64,4°	0,09/ 59,5°	0,46/−61,0°	9,7
	40	0,75/ −15,6°	26,0/170,7°	0,01/ 76,9°	0,98/ −6,5°	45,4
	100	0,72/ −41,8°	24,3/152,8°	0,02/ 70,4°	0,98/−17,5°	39,7
	200	0,60/ −74,8°	18,8/133,8°	0,02/ 60,2°	0,76/−27,1°	31,1
	500	0,48/−130,9°	10,4/103,6°	0,04/ 53,2°	0,55/−36,3°	23,0
10	800	0,43/−152,5°	6,9/ 91,8°	0,05/ 57,9°	0,48/−39,6°	18,8
	1000	0,43/−164,9°	5,6/ 84,2°	0,06/ 59,0°	0,48/−40,3°	16,9
	1200	0,43/−178,7°	4,6/ 78,5°	0,06/ 60,5°	0,46/−42,7°	15,1
	1500	0,42/+174,8°	3,8/ 73,8°	0,08/ 64,6°	0,41/−47,3°	13,1
	2000	0,41/+156,4°	2,8/ 63,5°	0,10/ 65,6°	0,40/−59,5°	10,5
	40	0,69/ −19,1°	32,0/168,7°	0,01/ 75,0°	0,97/ −7,8°	45,6
	100	0,65/ −49,8°	28,8/148,5°	0,02/ 68,6°	0,90/−20,0°	38,8
	200	0,53/ −86,1°	21,1/128,8°	0,02/ 58,9°	0,70/−29,0°	30,8
	500	0,46/−136,5°	10,8/100,5°	0,04/ 56,5°	0,50/−35,7°	23,0
14	800	0,42/−159,5°	7,1/ 89,5°	0,05/ 61,8°	0,45/−38,6°	19,0
	1000	0,42/−170,8°	5,8/ 82,7°	0,06/ 62,6°	0,45/−39,2°	17,1
	1200	0,42/+176,6°	4,7/ 77,5°	0,06/ 64,0°	0,44/−41,4°	15,3
	1500	0,42/+171,2°	3,9/ 72,8°	0,07/ 67,4°	0,39/−46,4°	13,3
	2000	0,41/+153,5°	2,9/ 62,9°	0,10/ 68,0°	0,38/−58,5°	10,5

s-parameters (common emitter) at V_{CE} = 5 V; T_{amb} = 25 °C; typical values

I_C mA	f MHz	s_{ie}	s_{fe}	s_{re}	s_{oe}	G_{UM} dB
	40	0,58/ −26,9°	38,9/165,5°	0,01/ 72,8°	0,95/−10,2°	44,1
	100	0,54/ −66,6°	33,1/142,5°	0,01/ 64,2°	0,84/−24,2°	37,2
	200	0,47/−107,4°	22,6/122,3°	0,02/ 57,4°	0,62/−32,2°	30,3
	500	0,46/−153,9°	10,7/ 96,8°	0,03/ 59,9°	0,44/−36,2°	22,6
20	800	0,44/−170,2°	7,0/ 86,8°	0,05/ 65,3°	0,41/−39,1°	18,6
	1000	0,45/−179,6°	5,6/ 80,4°	0,06/ 66,0°	0,41/−39,7°	16,7
	1200	0,46/+169,6°	4,6/ 75,8°	0,06/ 67,4°	0,39/−41,9°	15,0
	1500	0,45/+165,3°	3,8/ 71,0°	0,08/ 70,3°	0,35/−47,6°	13,1
	2000	0,45/+148,8°	2,8/ 61,7°	0,10/ 70,2°	0,34/−60,2°	10,5
	40	0,47/ −42,2°	43,2/159,9°	0,01/ 69,0°	0,92/−12,1°	42,0
	100	0,46/ −93,3°	33,0/133,8°	0,01/ 58,1°	0,76/−24,7°	35,1
	200	0,45/−132,2°	20,4/114,8°	0,02/ 58,3°	0,57/−27,8°	28,9
	500	0,49/−166,2°	9,2/ 93,5°	0,03/ 64,4°	0,46/−29,5°	21,4
30	800	0,47/−178,6°	6,0/ 84,8°	0,04/ 69,7°	0,44/−34,8°	17,5
	1000	0,48/+173,9°	4,8/ 79,0°	0,05/ 70,0°	0,45/−36,7°	15,7
	1200	0,50/+165,0°	3,9/ 74,5°	0,06/ 71,4°	0,43/−40,6°	14,1
	1500	0,49/+160,8°	3,3/ 70,0°	0,07/ 74,4°	0,39/−46,8°	12,1
	2000	0,50/+145,2°	2,4/ 60,8°	0,10/ 74,0°	0,38/−61,1°	9,7

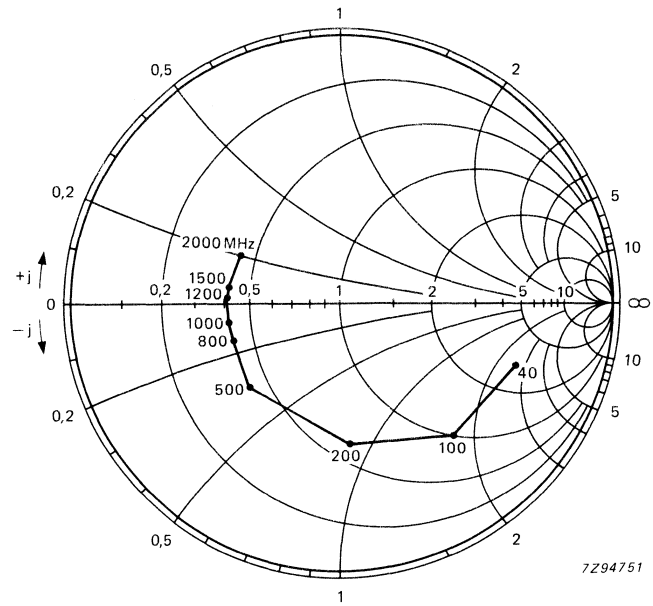


Fig. 4 Input impedance, derived from input reflection coefficient s_{ie} coordinates, in ohm x 50.

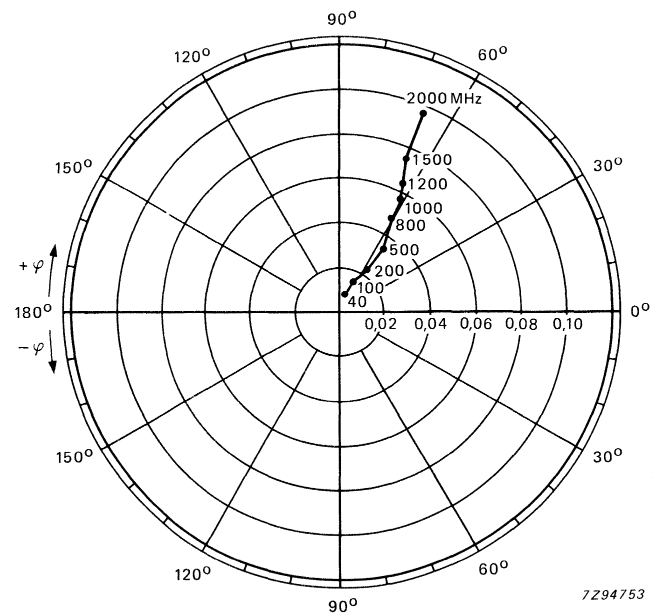


Fig. 5 Reverse transmission coefficient s_{re}.

Conditions for Figs 4 to 7: V_{CE} = 10 V; I_C = 14 mA; T_{amb} = 25 °C.

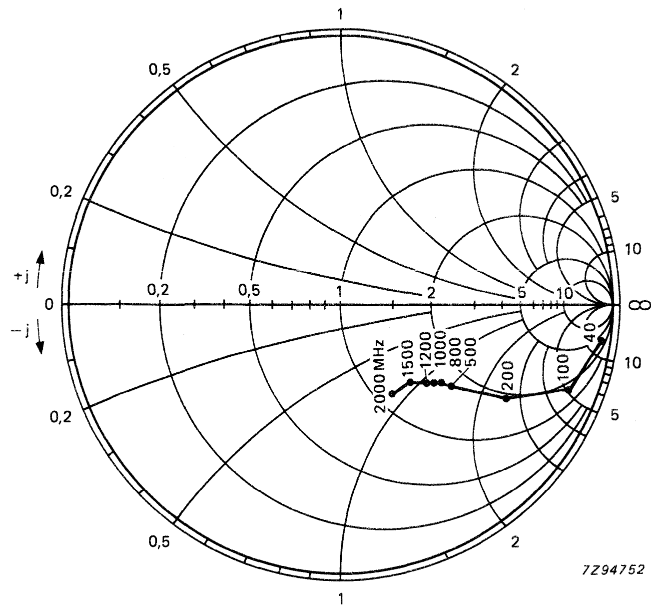


Fig. 6 Output impedance, derived from output reflection coefficient s_{oe} coordinates, in ohm x 50.

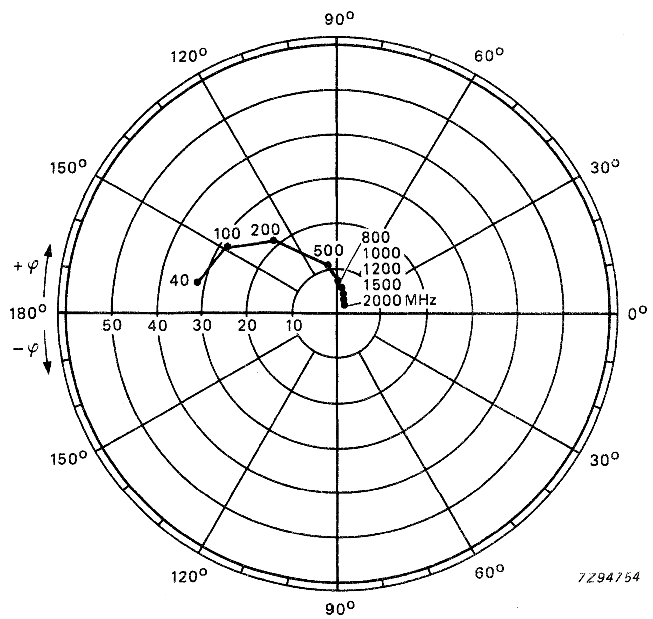


Fig. 7 Forward transmission coefficient s_{fe}.

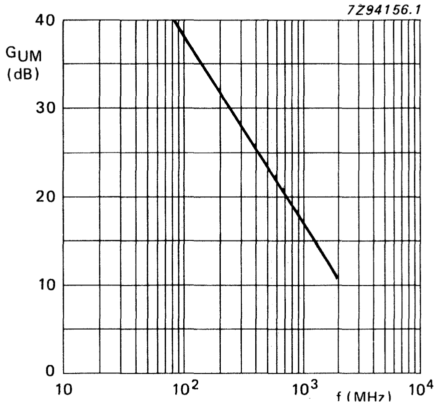


Fig. 8 V_{CE} = 10 V; I_C = 14 mA; T_{amb} = 25 °C; typical values.

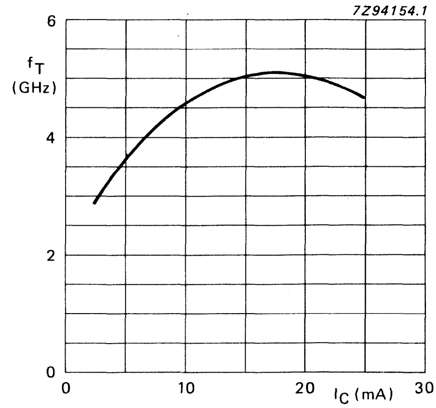


Fig. 9 V_{CE} = 10 V; f = 500 MHz; T_j = 25 °C; typical values.

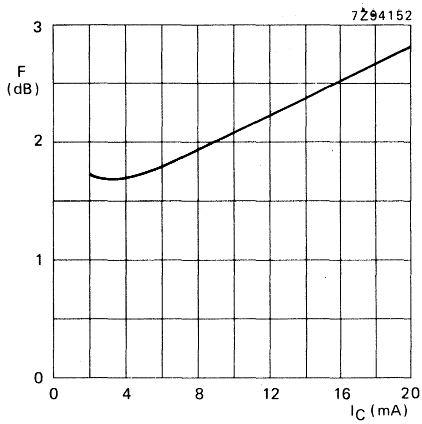


Fig. 10 V_{CE} = 10 V; f = 800 MHz; Z_S = opt.; T_{amb} = 25 °C; typical values.

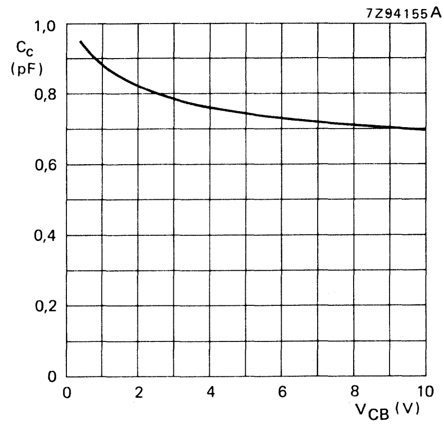


Fig. 11 $I_E = i_e = 0$; f = 1 MHz; T_j = 25 °C; typical values.

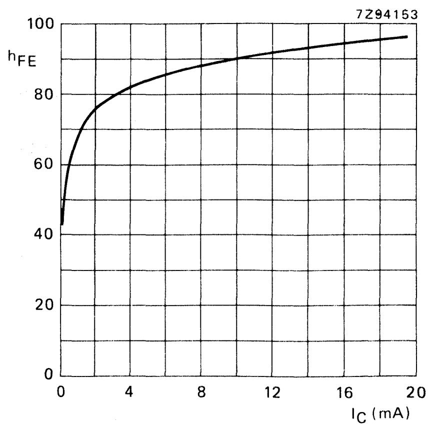


Fig. 12 V_{CE} = 10 V; T_j = 25 °C; typical values.

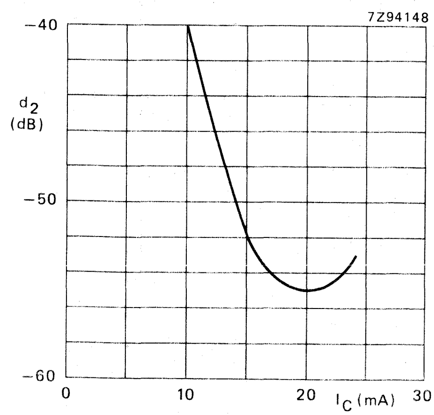


Fig. 13 V_{CE} = 10 V; V_o = 60 mV; $f_{(p+q)}$ = 810 MHz; T_{amb} = 25 °C; typical values.

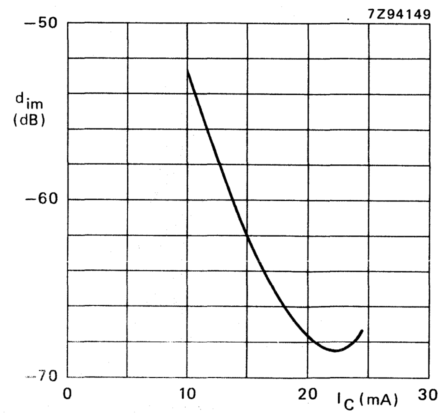


Fig. 14 V_{CE} = 10 V; V_o = 150 mV; $f_{(p+q)}$ = 793,25 MHz; T_{amb} = 25 °C; typical values.

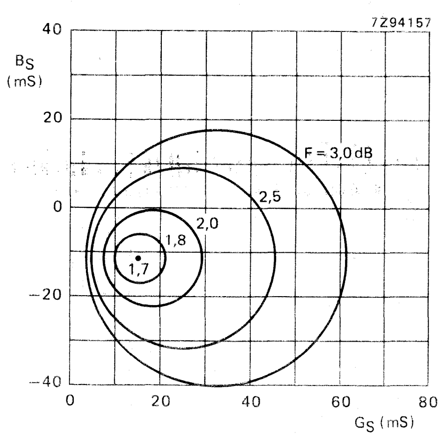


Fig. 15 Circles of constant noise figure; I_C = 4 mA; V_{CE} = 10 V; f = 800 MHz; typical values.

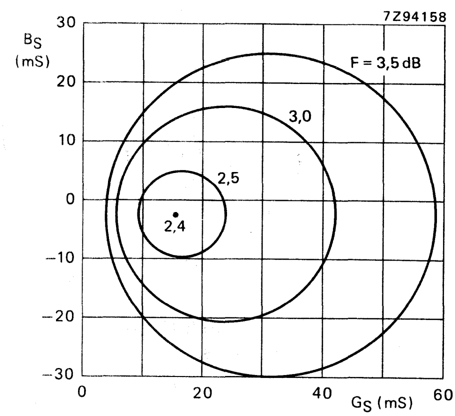


Fig. 16 Circles of constant noise figure; I_C = 14 mA; V_{CE} = 10 V; f = 800 MHz; typical values.

CLASS-B OPERATION

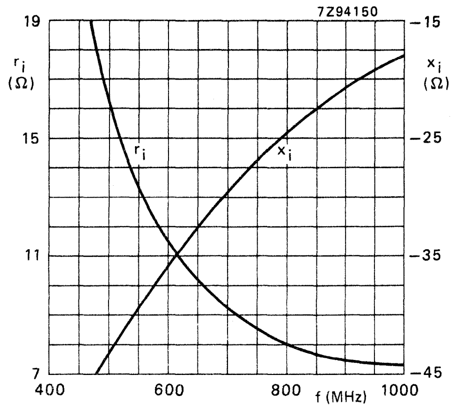


Fig. 17 Input impedance (series components).

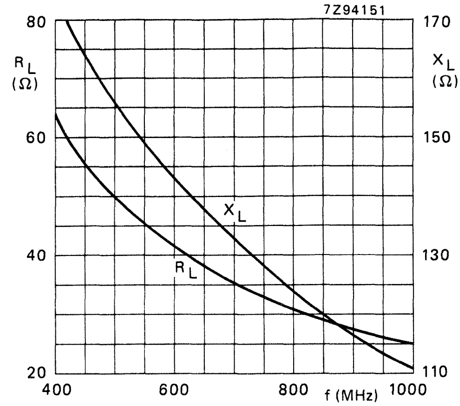


Fig. 18 Load impedance (series components).

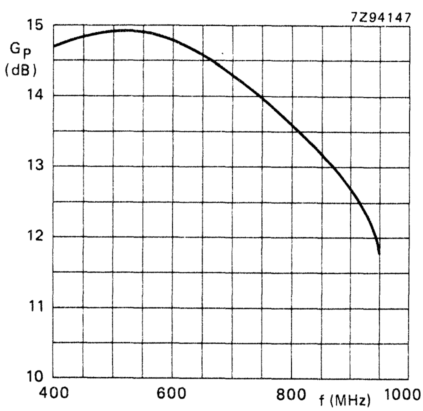


Fig. 19 Power gain versus frequency.

Conditions for Figs 17 to 19:

V_{CE} = 10 V; P_L = 100 mW; T_{amb} = 25 °C; typical values.

OPERATING NOTE for Figs 17 to 19:

A base-emitter resistor of 82 Ω is recommended to avoid oscillation. This resistor must be effective for r.f. only.

N-P-N 2 GHz WIDEBAND TRANSISTOR

N-P-N transistor in a four-lead dual-emitter plastic envelope (SOT-103). This device is designed for application in wideband amplifiers, such as in CATV and MATV systems, up to 2 GHz.

P-N-P complement is BFG23.

QUICK REFERENCE DATA

Collector-base voltage (open emitter)	V_{CBO}	max.	15 V
Collector-emitter voltage (open base)	V_{CEO}	max.	12 V
Collector current (d.c.)	I_C	max.	35 mA
Total power dissipation up to T_{amb} = 60 °C	P_{tot}	max.	300 mW
Junction temperature	T_j	max.	175 °C ←
D.C. current gain I_C = 30 mA; V_{CE} = 5 V	h_{FE}	min.	40
Transition frequency at f = 500 MHz I_C = 30 mA; V_{CE} = 5 V	f_T	typ.	6,0 GHz
Feedback capacitance at f = 1 MHz I_C = 0; V_{CE} = 5 V	C_{re}	typ.	0,5 pF
Noise figure at optimum source impedance I_C = 30 mA; V_{CE} = 8 V; f = 800 MHz	F	typ.	2,3 dB
Maximum unilateral power gain at f = 800 MHz I_C = 30 mA; V_{CE} = 8 V	G_{UM}	typ.	17,5 dB
Output power at 1 dB gain compression V_{CE} = 8 V; I_C = 30 mA; f = 800 MHz	P_{L1}	typ.	+17 dBm
Third order intercept point V_{CE} = 8 V; I_C = 30 mA; f = 800 MHz	ITO	typ.	+36 dBm

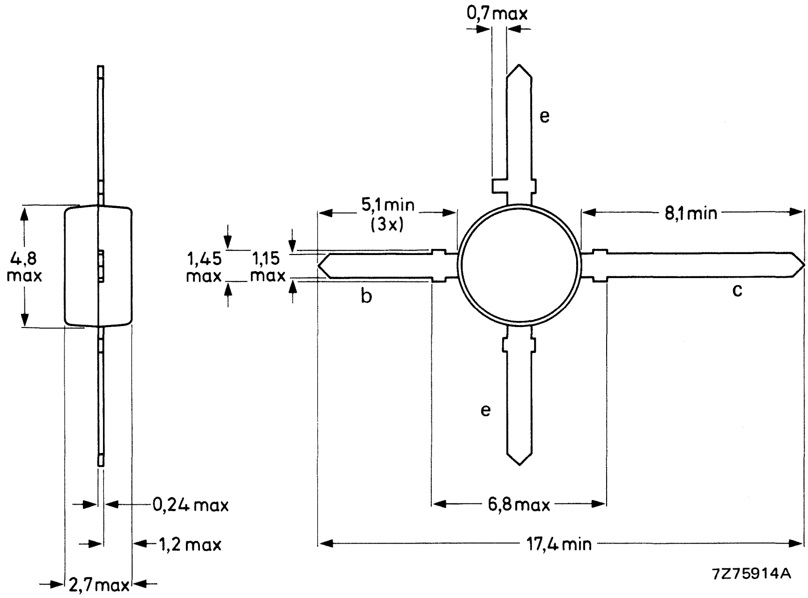
MECHANICAL DATA

SOT-103 (see Fig. 1).

MECHANICAL DATA

Dimensions in mm

Fig. 1 SOT-103.



RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

Collector-base voltage (open emitter)	V_{CBO}	max.	15	V
Collector-emitter voltage (open base)	V_{CEO}	max.	12	V
Emitter-base voltage (open collector)	V_{EBO}	max.	2	V
Collector current				
d.c.	I_C	max.	35	mA
peak value; f > 1 MHz	I_{CM}	max.	50	mA
Total power dissipation up to T_{amb} = 60 °C	P_{tot}	max.	300	mW
Storage temperature	T_{stg}		−65 to +150	°C
→ Junction temperature	T_j	max.	175	°C

THERMAL RESISTANCE

From junction to ambient in free air mounted on glass-fibre p.c.b. (see Fig. 2)	$R_{th\ j\text{-}a}$	=	300 K/W

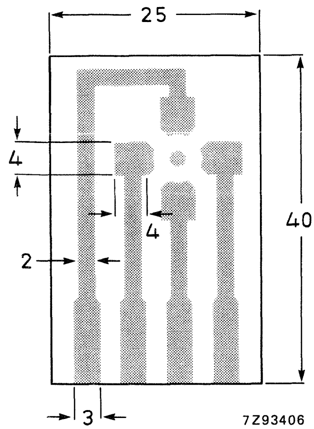


Fig. 2 Requirements for fibre-glass print (dimensions in mm). Single-sided 35 μm Cu-clad epoxy fibre-glass print, thickness 1,5 mm. Tracks are fully tin-lead plated. Shaded area is Cu.

CHARACTERISTICS

T_j = 25 °C unless otherwise specified

Collector cut-off current $I_E = 0$; $V_{CB} = 5$ V	I_{CBO}	max.	50 nA
D.C. current gain $I_C = 30$ mA; $V_{CE} = 5$ V	h_{FE}	min. typ.	40 90
Transition frequency at f = 500 MHz $I_C = 30$ mA; $V_{CE} = 5$ V	f_T	typ.	6,0 GHz
Collector output capacitance at f = 1 MHz $I_E = i_e = 0$; $V_{CB} = 10$ V	C_c	typ.	0,9 pF
Emitter capacitance at f = 1 MHz $I_C = i_c = 0$; $V_{EB} = 0,5$ V	C_e	typ.	2,5 pF
Feedback capacitance at f = 1 MHz $I_E = 0$; $V_{CE} = 10$ V	C_{re}	typ.	0,6 pF

Maximum unilateral power gain (s_{re} assumed to be zero)

$$G_{UM} = 10 \log \frac{|s_{fe}|^2}{[1-|s_{ie}|^2]\,[1-|s_{oe}|^2]}$$

$I_C = 30$ mA; $V_{CE} = 8$ V; f = 800 MHz; $T_{amb} = 25$ °C $I_C = 30$ mA; $V_{CE} = 8$ V; f = 2 GHz; $T_{amb} = 25$ °C	G_{UM}	typ. typ.	17,5 dB 9,5 dB

Noise figure at optimum source impedance
$V_{CE} = 8$ V; f = 800 MHz; $T_{amb} = 25$ °C

$I_C = 4$ mA $I_C = 30$ mA	F	typ. typ.	1,6 dB 2,3 dB

Output power at 1 dB gain compression V_{CE} = 8 V; I_C = 30 mA; T_{amb} = 25 °C; R_L = 75 Ω; measured at f = 800 MHz	P_{L1}	typ.	+17 dBm
Third order intercept point (see Fig. 3) I_C = 30 mA; V_{CE} = 8 V; R_L = 75 Ω; T_{amb} = 25 °C; P_p = ITO − 6 dB; f_p = 800 MHz; P_q = ITO − 6 dB; f_q = 801 MHz; measured at $f_{(2q-p)}$ = 802 MHz and at $f_{(2p-q)}$ = 799 MHz	ITO	typ.	+36 dBm
Output voltage at d_{im} = −60 dB I_C = 30 mA; V_{CE} = 8 V; R_L = 75 Ω; T_{amb} = 25 °C V_p = V_o at d_{im} = −60 dB ; f_p = 795,25 MHz V_q = V_o −6 dB ; f_q = 803,25 MHz V_r = V_o −6 dB ; f_r = 805,25 MHz measured at $f_{(p+q-r)}$ = 793,25 MHz	V_o	typ.	425 mV
Second harmonic distortion (see Fig. 3) V_{CE} = 8 V; I_C = 30 mA; R_L = 75 Ω; VSWR < 2; T_{amb} = 25 °C V_p = V_o = 200 mV at f_p = 250 MHz V_q = V_o = 200 mV at f_q = 560 MHz measured at $f_{(p+q)}$ = 810 MHz	d_2	typ.	−50 dB

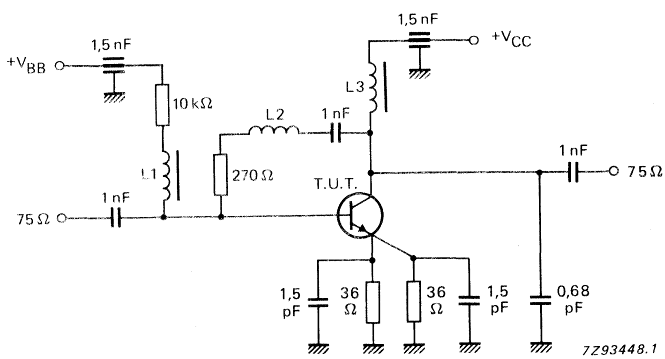


Fig. 3 Intermodulation distortion and second harmonic distortion MATV test circuit.

L1 = L3 = 5 μH Ferroxcube choke
L2 = 3 turns Cu wire (0,4 mm), internal diameter 3 mm, winding pitch 1 mm

s-parameters (common emitter) at V_{CE} = 8 V; T_{amb} = 25 °C; typical values

I_C mA	f MHz	s_{ie}	s_{fe}	s_{re}	s_{oe}	G_{UM} dB
	40	0,87/ −12,7°	1,0/173,4°	0,01/ 82,7°	0,99/ −3,3°	41,7
	100	0,88/ −35,0°	6,9/159,0°	0,03/ 71,2°	0,97/−10,1°	35,8
	200	0,80/ −66,1°	5,8/142,0°	0,05/ 57,7°	0,88/−18,5°	26,3
	500	0,77/−125,7°	3,9/106,8°	0,08/ 33,0°	0,75/−30,8°	19,2
2	800	0,72/−154,0°	2,7/ 90,0°	0,08/ 27,5°	0,68/−38,5°	14,4
	1000	0,71/−168,4°	2,2/ 79,2°	0,08/ 25,1°	0,68/−41,8°	12,7
	1200	0,72/+178,8°	1,8/ 71,3°	0,07/ 27,2°	0,68/−48,7°	10,8
	1500	0,71/+166,3°	1,5/ 63,8°	0,06/ 36,2°	0,60/−54,7°	8,5
	2000	0,73/+145,3°	1,1/ 50,1°	0,07/ 57,0°	0,58/−73,0°	6,0
	40	0,73/ −19,4°	15,3/170,4°	0,01/ 79,1°	0,99/ −6,5°	43,5
	100	0,73/ −50,8°	14,3/152,0°	0,02/ 65,9°	0,94/−17,7°	35,6
	200	0,67/ −89,5°	11,2/132,3°	0,04/ 52,7°	0,77/−27,5°	27,4
	500	0,66/−145,6°	6,1/ 99,5°	0,05/ 37,4°	0,56/−37,8°	19,9
5	800	0,64/−168,6°	4,1/ 85,8°	0,06/ 40,9°	0,50/−43,8°	15,8
	1000	0,64/+179,7°	3,3/ 77,0°	0,06/ 43,6°	0,50/−44,8°	13,9
	1200	0,65/+168,8°	2,7/ 71,0°	0,06/ 48,5°	0,48/−49,8°	12,2
	1500	0,65/+159,3°	2,3/ 64,0°	0,07/ 56,8°	0,43/−56,3°	10,3
	2000	0,67/+140,5°	1,7/ 51,9°	0,09/ 66,5°	0,42/−73,0°	7,9
	40	0,57/ −29,4°	25,4/166,5°	0,01/ 76,3°	0,97/−10,2°	41,5
	100	0,58/ −71,8°	22,1/144,3°	0,02/ 61,5°	0,86/−25,2°	34,5
	200	0,57/−114,0°	15,6/123,8°	0,03/ 51,0°	0,64/−35,5°	27,9
	500	0,61/−160,7°	7,6/ 95,0°	0,04/ 47,4°	0,43/−43,0°	20,5
10	800	0,60/−178,5°	5,0/ 83,3°	0,05/ 54,5°	0,38/−46,8°	16,6
	1000	0,60/+171,9°	4,0/ 75,7°	0,06/ 57,4°	0,38/−47,5°	14,7
	1200	0,62/+162,1°	3,3/ 70,8°	0,07/ 61,1°	0,36/−50,9°	13,0
	1500	0,61/+154,8°	2,7/ 64,0°	0,08/ 66,2°	0,32/−58,4°	11,2
	2000	0,63/+137,2°	2,0/ 53,2°	0,11/ 70,0°	0,32/−73,9°	8,9
	40	0,39/ −47,1°	37,2/161,5°	0,01/ 71,7°	0,94/−14,7°	41,8
	100	0,47/ −99,9°	29,9/136,3°	0,02/ 59,8°	0,77/−32,6°	34,4
	200	0,52/−137,7°	19,2/116,3°	0,02/ 53,2°	0,52/−41,9°	28,4
	500	0,59/−171,6°	8,6/ 91,8°	0,04/ 58,7°	0,33/−46,5°	21,0
20	800	0,57/+174,5°	5,6/ 81,8°	0,05/ 64,6°	0,30/−49,5°	17,1
	1000	0,59/+166,5°	4,5/ 74,5°	0,06/ 66,4°	0,30/−49,6°	15,2
	1200	0,61/+157,6°	3,7/ 70,3°	0,07/ 68,9°	0,28/−51,7°	13,6
	1500	0,59/+151,8°	3,0/ 63,8°	0,09/ 71,4°	0,25/−60,3°	11,8
	2000	0,61/+134,9°	2,3/ 53,7°	0,12/ 71,6°	0,25/−75,4°	9,4
	40	0,31/ −65,9°	44,7/158,2°	0,01/ 71,3°	0,92/−17,6°	41,7
	100	0,45/−118,8°	33,5/131,5°	0,01/ 59,5°	0,71/−36,6°	34,5
	200	0,51/−149,7°	20,6/112,5°	0,02/ 56,8°	0,46/−44,3°	29,7
	500	0,58/−176,5°	8,9/ 90,0°	0,03/ 64,1°	0,29/−47,4°	21,2
30	800	0,57/+171,5°	5,8/ 80,3°	0,05/ 69,6°	0,27/−49,9°	17,5
	1000	0,58/+164,2°	4,6/ 73,7°	0,06/ 69,9°	0,26/−50,0°	15,4
	1200	0,61/+155,8°	3,8/ 69,8°	0,07/ 71,7°	0,24/−51,4°	13,8
	1500	0,58/+150,6°	3,1/ 63,3°	0,09/ 73,3°	0,22/−60,9°	11,9
	2000	0,61/+133,9°	2,4/ 53,4°	0,12/ 72,5°	0,22/−75,9°	9,5

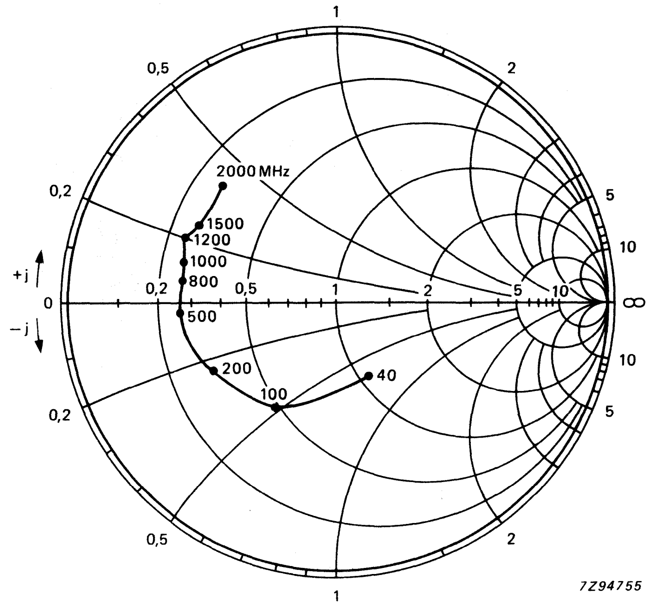


Fig. 4 Input impedance, derived from input reflection coefficient s_{ie} coordinates, in ohm x 50.

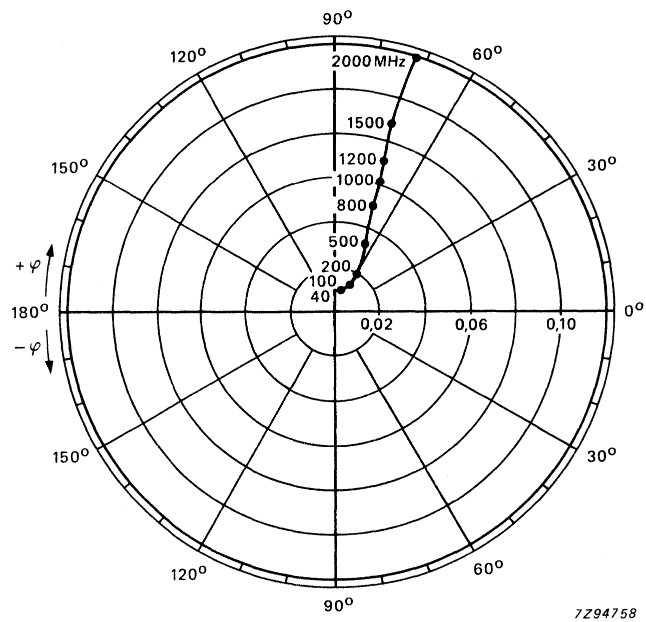


Fig. 5 Reverse transmission coefficient s_{re}.

Conditions for Figs 4 to 7: V_{CE} = 8 V; I_C = 30 mA; T_{amb} = 25 °C.

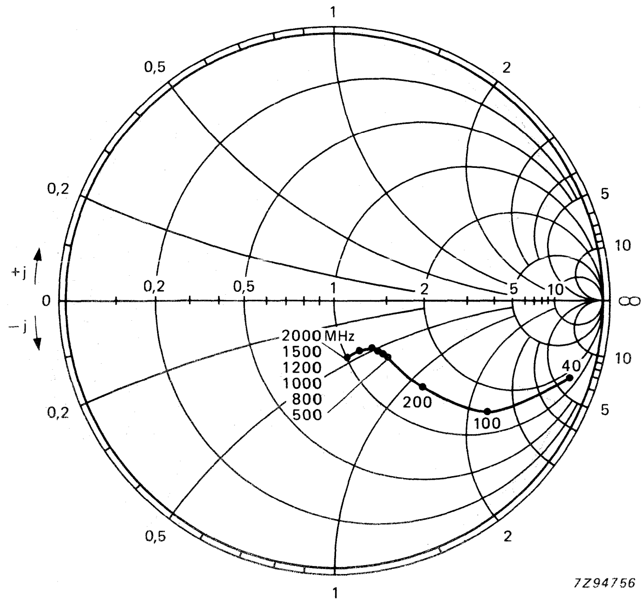


Fig. 6 Output impedance, derived from output reflection coefficient s_{oe} coordinates, in ohm x 50.

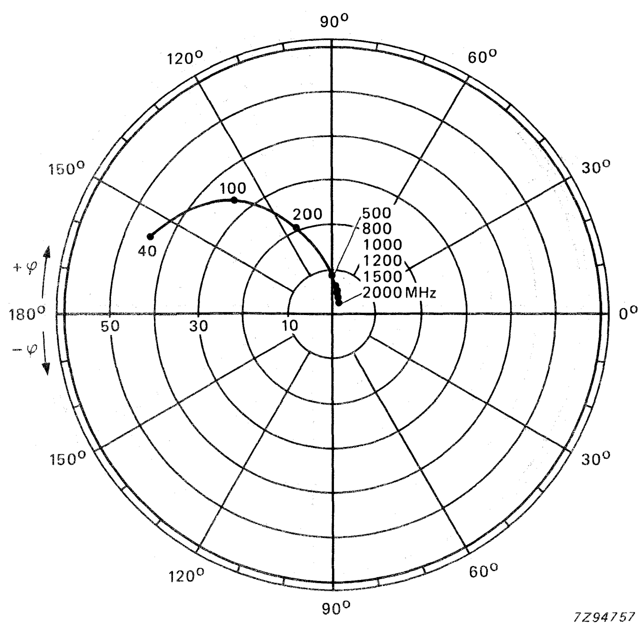


Fig. 7 Forward transmission coefficient s_{fe}.

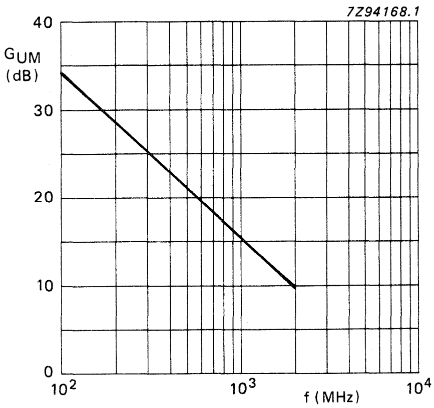


Fig. 8 V_{CE} = 8 V; I_C = 30 mA; T_{amb} = 25 °C; typical values.

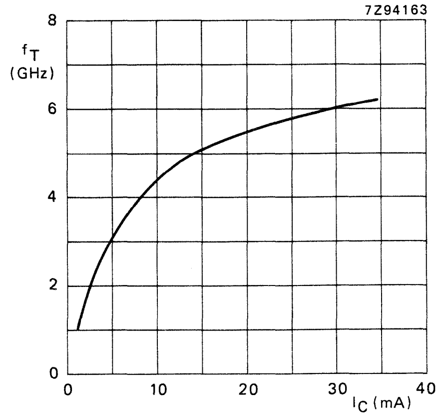


Fig. 9 V_{CE} = 8 V; f = 500 MHz; T_j = 25 °C; typical values.

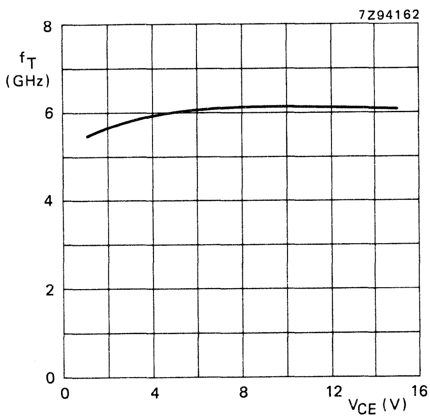


Fig. 10 I_C = 30 mA; f = 500 MHz; T_j = 25 °C; typical values.

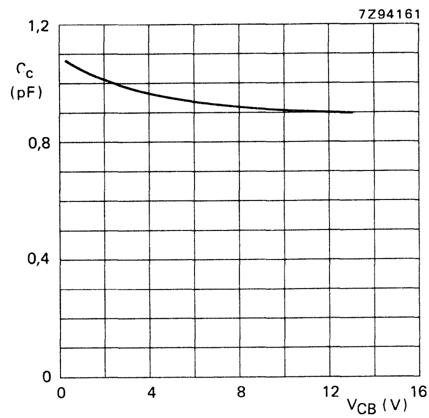


Fig. 11 $I_E = i_e$ = 0; f = 1 MHz; T_j = 25 °C; typical values.

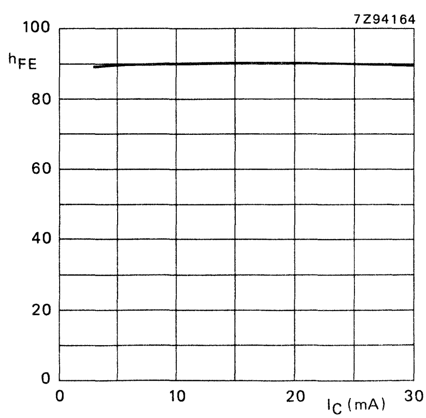


Fig. 12 V_{CE} = 5 V; T_j = 25 °C; typical values.

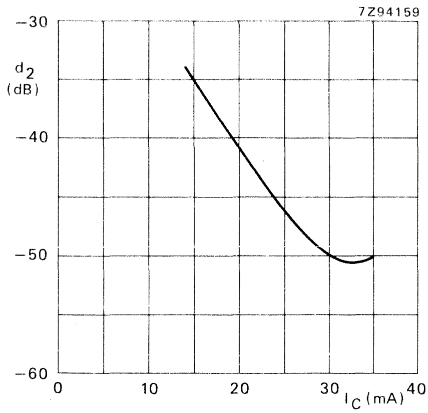


Fig. 13 V_{CE} = 8 V; V_o = 200 mV; $f_{(p+q)}$ = 810 MHz; T_{amb} = 25 °C; typical values.

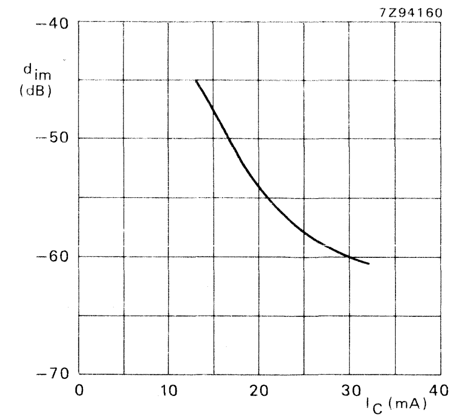


Fig. 14 V_{CE} = 8 V; V_o = 425 mV; $f_{(p+q-r)}$ = 793,25 MHz; T_{amb} = 25 °C; typical values.

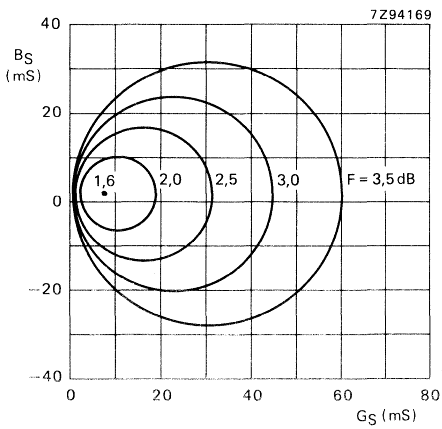


Fig. 15 Circles of constant noise figure; I_C = 4 mA; V_{CE} = 8 V; f = 800 MHz; T_{amb} = 25 °C; typical values.

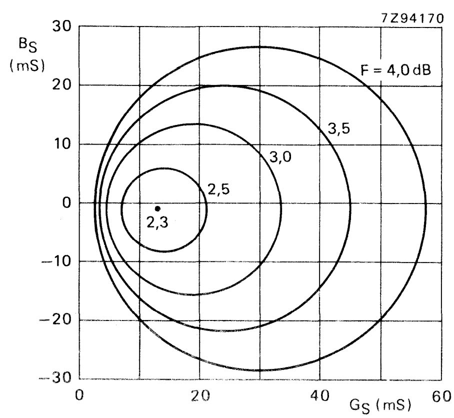


Fig. 16 Circles of constant noise figure; I_C = 30 mA; V_{CE} = 8 V; f = 800 MHz; T_{amb} = 25 °C; typical values.

CLASS-B OPERATION

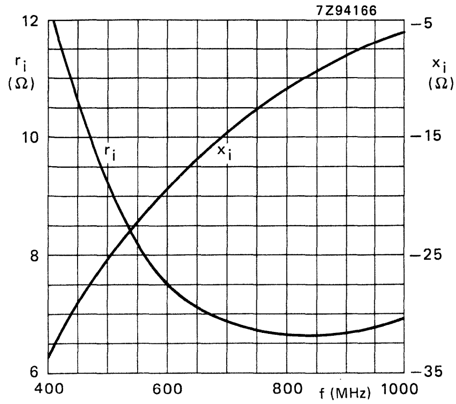


Fig. 17 Input impedance (series components).

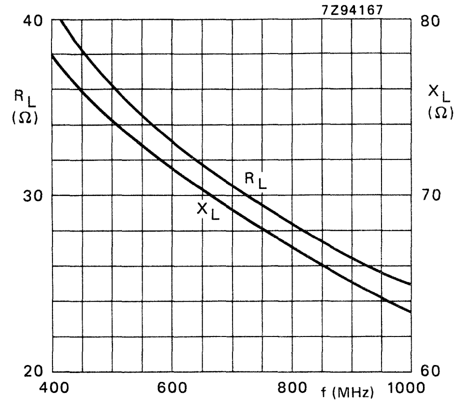


Fig. 18 Load impedance (series components).

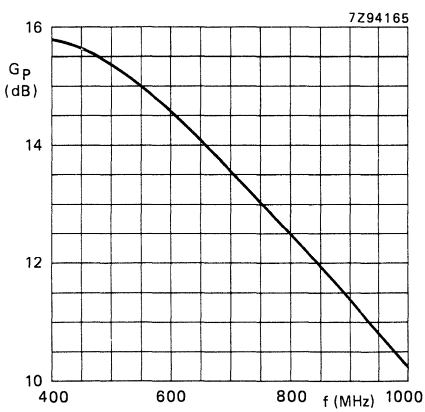


Fig. 19 Power gain versus frequency.

Conditions for Figs 17 to 19:

V_{CE} = 7,5 V; P_L = 160 mW; T_{amb} = 25 °C; typical values.

OPERATING NOTE for Figs 17 to 19:

A base-emitter resistor of 82 Ω is recommended to avoid oscillation. This resistor must be effective for r.f. only.

N-P-N 2 GHz WIDEBAND TRANSISTOR

N-P-N transistor in a four-lead dual-emitter SOT-143 envelope. The device is primarily intended for use in v.h.f. and u.h.f. wideband amplifiers and features low noise and high power gain.

QUICK REFERENCE DATA

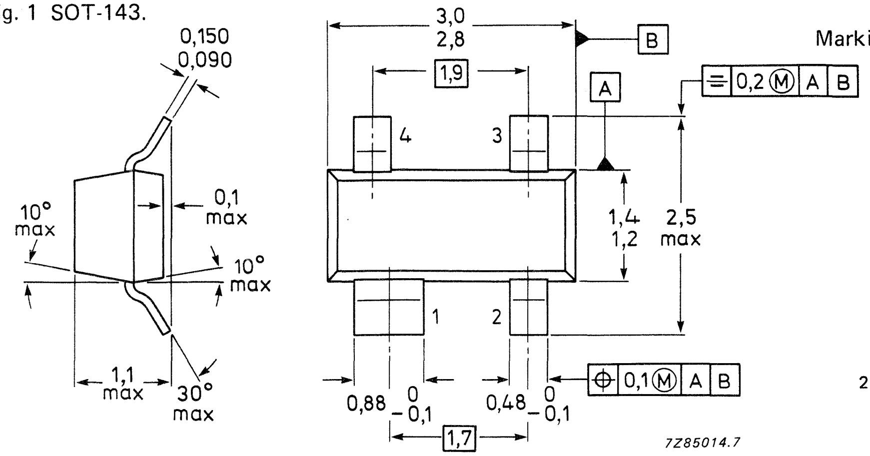
Collector-base voltage (open emitter)	V_{CBO}	max.	20	V
Collector-emitter voltage (open base)	V_{CEO}	max.	15	V
Collector current (d.c.)	I_C	max.	25	mA
Total power dissipation up to T_{amb} = 25 °C	P_{tot}	max.	300	mW
Junction temperature	T_j	max.	175	°C ←
D.C. current gain I_C = 14 mA; V_{CE} = 10 V	h_{FE}	min.	40	
		typ.	90	
Transition frequency at f = 500 MHz I_C = 14 mA; V_{CE} = 10 V	f_T	typ.	5,0	GHz
Feedback capacitance at f = 1 MHz I_C = 0; V_{CE} = 10 V	C_{re}	typ.	0,35	pF
Noise figure at f = 800 MHz I_C = 4 mA; V_{CE} = 10 V; Z_S = opt.	F	typ.	1,8	dB
Maximum unilateral power gain I_C = 14 mA; V_{CE} = 10 V f = 800 MHz	G_{UM}	typ.	17,5	dB
f = 2 GHz		typ.	9,5	dB

MECHANICAL DATA

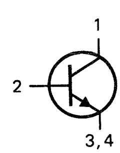
Dimensions in mm

Fig. 1 SOT-143.

Marking code: P8



TOP VIEW



RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

Collector-base voltage (open emitter)	V_{CBO}	max.	20 V
Collector-emitter voltage (open base)	V_{CEO}	max.	15 V
Emitter-base voltage (open collector)	V_{EBO}	max.	2 V
Collector current (d.c.)	I_C	max.	25 mA
Total power dissipation up to T_{amb} = 25 °C and mounted on a ceramic substrate of 8 mm x 10 mm x 0,7 mm	P_{tot}	max.	300 mW
Storage temperature	T_{stg}		−65 to +150 °C
→ Junction temperature	T_j	max.	175 °C

THERMAL RESISTANCE

From junction to ambient and mounted on a ceramic substrate of 8 mm x 10 mm x 0,7 mm	$R_{th\ j\text{-}a}$		430 K/W

CHARACTERISTICS

T_j = 25 °C unless otherwise specified

Collector cut-off current $I_E = 0$; V_{CB} = 10 V	I_{CBO}	max.	50 nA
D.C. current gain I_C = 14 mA; V_{CE} = 10 V	h_{FE}	min. typ.	40 90
Transition frequency at f = 500 MHz I_C = 14 mA; V_{CE} = 10 V	f_T	typ.	5,0 GHz
Collector capacitance at f = 1 MHz $I_E = I_e = 0$; V_{CB} = 10 V	C_c	typ.	0,6 pF
Emitter capacitance at f = 1 MHz $I_C = I_c = 0$; V_{EB} = 0,5 V	C_e	typ.	1,2 pF
Feedback capacitance at f = 1 MHz $I_C = 0$; V_{CE} = 10 V	C_{re}	typ.	0,35 pF

Maximum unilateral power gain (s_{re} assumed to be zero)

$$G_{UM} = 10 \log \frac{|s_{fe}|^2}{[1-|s_{ie}|^2]\,[1-|s_{oe}|^2]}$$

I_C = 14 mA; V_{CE} = 10 V; T_{amb} = 25 °C: f = 800 MHz f = 2 GHz	G_{UM}	 typ. typ.	 17,5 dB 9,5 dB
Noise figure at f = 800 MHz and T_{amb} = 25 °C I_C = 4 mA; V_{CE} = 10 V; Z_S = opt.	F	typ.	1,8 dB

s-parameters (common emitter) at V_{CE} = 5 V; T_{amb} = 25 °C; typical values

I_C mA	f MHz	s_{ie}	s_{fe}	s_{re}	s_{oe}	G_{UM} dB
	40	0,87/ −9,1°	7,0/174,7°	0,01/ 82,1°	1,00/ −2,8°	50,0
	100	0,88/ −26,2°	6,9/162,5°	0,02/ 75,2°	1,01/ −9,0°	39,6
	200	0,79/ −49,8°	6,1/148,0°	0,04/ 65,0°	0,92/−16,6°	28,2
	500	0,68/−102,5°	4,6/115,2°	0,07/ 44,4°	0,81/−30,0°	20,6
2	800	0,59/−153,5°	3,2/ 97,7°	0,07/ 39,3°	0,73/−39,7°	15,3
	1000	0,56/−149,0°	2,7/ 86,8°	0,08/ 36,6°	0,73/−44,0°	13,6
	1200	0,54/−164,7°	2,2/ 78,4°	0,08/ 36,1°	0,72/−50,8°	11,5
	1500	0,53/−178,6°	1,9/ 70,8°	0,08/ 40,6°	0,63/−57,9°	9,0
	2000	0,51/ 158,1°	1,4/ 55,7°	0,08/ 46,3°	0,63/−76,2°	6,3
	40	0,74/ −14,0°	14,4/172,1°	0,01/ 80,4°	0,99/ −4,8°	45,2
	100	0,73/ −37,7°	13,8/156,7°	0,02/ 71,0°	0,98/−13,8°	39,6
	200	0,64/ −68,7°	11,4/138,8°	0,03/ 60,1°	0,84/−22,8°	28,7
	500	0,55/−126,5°	7,0/106,5°	0,05/ 46,3°	0,66/−35,0°	21,0
5	800	0,50/−152,7°	4,7/ 91,5°	0,06/ 47,4°	0,59/−42,8°	16,6
	1000	0,49/−166,7°	3,9/ 82,7°	0,06/ 47,8°	0,59/−45,9°	14,8
	1200	0,48/ 179,7°	3,2/ 76,1°	0,07/ 49,8°	0,58/−51,3°	12,9
	1500	0,48/ 169,9°	2,6/ 69,0°	0,08/ 54,2°	0,51/−58,7°	10,8
	2000	0,48/ 148,9°	1,9/ 56,0°	0,09/ 57,5°	0,51/−75,9°	8,2
	40	0,59/ −21,1°	23,6/168,8°	0,01/ 73,4°	0,98/ −7,3°	44,3
	100	0,57/ −53,7°	21,6/149,8°	0,02/ 67,1°	0,92/−19,0°	36,7
	200	0,50/ −92,0°	16,2/129,8°	0,02/ 56,9°	0,74/−28,5°	28,9
	500	0,48/−146,3°	8,7/100,2°	0,04/ 52,2°	0,54/−37,6°	21,4
10	800	0,46/−167,6°	5,7/ 87,5°	0,05/ 56,9°	0,49/−44,1°	17,3
	1000	0,46/−179,1°	4,6/ 80,0°	0,06/ 57,9°	0,50/−46,6°	15,5
	1200	0,47/ 169,1°	3,8/ 74,6°	0,06/ 60,0°	0,48/−51,1°	13,7
	1500	0,46/ 162,3°	3,1/ 67,9°	0,08/ 62,4°	0,44/−59,1°	11,7
	2000	0,46/ 142,8°	2,3/ 56,3°	0,09/ 63,8°	0,44/−75,9°	9,2
	40	0,50/ −26,3°	28,8/166,7°	0,01/ 74,4°	0,98/ −8,8°	43,9
	100	0,49/ −64,6°	25,4/145,8°	0,02/ 66,4°	0,89/−21,5°	36,2
	200	0,46/−105,3°	18,2/125,5°	0,02/ 57,5°	0,68/−30,6°	29,0
	500	0,47/−154,3°	9,2/ 97,9°	0,03/ 56,7°	0,50/−37,8°	21,6
14	800	0,45/−173,4°	6,0/ 86,0°	0,05/ 61,1°	0,46/−44,0°	17,5
	1000	0,46/ 176,3°	4,8/ 78,8°	0,05/ 52,2°	0,46/−46,4°	15,7
	1200	0,47/ 165,3°	3,9/ 73,9°	0,06/ 63,8°	0,45/−50,7°	13,9
	1500	0,46/ 159,5°	3,2/ 67,3°	0,08/ 65,4°	0,41/−59,1°	12,0
	2000	0,46/ 140,6°	2,4/ 56,1°	0,10/ 65,9°	0,41/−75,8°	9,5
	40	0,42/ −33,9°	34,3/164,1°	0,01/ 73,6°	0,97/−10,4°	43,3
	100	0,43/ −79,0°	28,8/141,3°	0,01/ 63,1°	0,84/−24,0°	35,4
	200	0,42/−120,1°	19,7/121,0°	0,02/ 58,1°	0,63/−31,3°	29,0
	500	0,46/−162,0°	9,4/ 95,5°	0,03/ 60,6°	0,46/−37,1°	21,6
20	800	0,45/−178,4°	6,1/ 84,5°	0,05/ 65,0°	0,43/−43,5°	17,6
	1000	0,46/ 172,4°	4,9/ 77,8°	0,05/ 65,6°	0,44/−45,9°	15,7
	1200	0,48/ 162,3°	4,0/ 73,1°	0,06/ 66,9°	0,43/−50,1°	14,0
	1500	0,46/ 157,2°	3,3/ 66,7°	0,08/ 67,3°	0,39/−58,9°	12,1
	2000	0,47/ 138,9°	2,5/ 55,8°	0,10/ 67,6°	0,39/−75,9°	9,5

s-parameters (common-emitter) at V_{CE} = 10 V; T_{amb} = 25 °C; typical values.

I_C mA	f MHz	s_{ie}	s_{fe}	s_{re}	s_{oe}	G_{UM} dB
2	40	0,87/ −8,9°	6,8/174,8°	0,01/ 80,8°	1,00/ −2,5°	49,9
	100	0,88/ −25,8°	6,8/162,8°	0,02/ 76,3°	1,01/ −8,8°	39,5
	200	0,79/ −49,3°	6,0/148,3°	0,04/ 64,8°	0,92/−16,3°	28,2
	500	0,69/−101,8°	4,5/115,5°	0,07/ 44,9°	0,82/−29,8°	20,6
	800	0,59/−131,9°	3,2/ 98,0°	0,08/ 39,1°	0,73/−39,6°	15,2
	1000	0,56/−148,5°	2,7/ 87,0°	0,08/ 36,3°	0,73/−43,8°	13,5
	1200	0,54/−164,1°	2,2/ 78,6°	0,08/ 36,3°	0,72/−50,7°	11,5
	1500	0,53/−178,2°	1,8/ 71,0°	0,08/ 40,5°	0,64/−57,8°	9,0
	2000	0,52/ 158,5°	1,4/ 55,8°	0,08/ 46,3°	0,63/−76,2°	6,3
5	40	0,73/ −14,1°	14,6/172,2°	0,01/ 77,9°	0,99/ −4,8°	44,6
	100	0,72/ −37,9°	14,1/156,6°	0,02/ 71,0°	0,98/−13,8°	39,7
	200	0,63/ −69,2°	11,6/138,7°	0,03/ 60,3°	0,83/−22,9°	28,6
	500	0,55/−127,0°	7,1/106,4°	0,05/ 46,4°	0,66/−35,0°	21,1
	800	0,50/−153,1°	4,8/ 91,5°	0,06/ 48,0°	0,58/−42,7°	16,6
	1000	0,49/−167,1°	3,9/ 82,8°	0,06/ 48,6°	0,59/−45,8°	14,8
	1200	0,48/ 179,5°	3,2/ 76,2°	0,07/ 50,2°	0,58/−51,1°	12,9
	1500	0,48/ 169,8°	2,6/ 69,2°	0,08/ 54,7°	0,51/−58,6°	10,8
	2000	0,47/ 148,7°	2,0/ 56,3°	0,09/ 58,0°	0,51/−75,8°	8,2
10	40	0,59/ −20,9°	23,7/168,9°	0,01/ 76,7°	0,98/ −7,2°	43,5
	100	0,57/ −53,5°	21,6/149,9°	0,02/ 67,5°	0,92/−18,8°	36,7
	200	0,50/ −91,7°	16,2/130,0°	0,02/ 58,0°	0,74/−28,3°	28,9
	500	0,48/−146,0°	8,7/100,5°	0,04/ 52,4°	0,55/−37,3°	21,5
	800	0,46/−167,3°	5,7/ 87,7°	0,05/ 57,2°	0,49/−43,7°	17,3
	1000	0,46/−178,8°	4,6/ 80,3°	0,06/ 58,3°	0,50/−46,3°	15,5
	1200	0,47/ 169,4°	3,8/ 74,8°	0,06/ 60,2°	0,48/−50,9°	13,7
	1500	0,46/ 162,5°	3,1/ 68,0°	0,08/ 62,7°	0,44/−58,9°	11,7
	2000	0,46/ 143,1°	2,3/ 56,5°	0,09/ 64,0°	0,44/−75,6°	9,2
14	40	0,51/ −25,9°	28,5/166,9°	0,01/ 72,3°	0,98/ −8,5°	43,9
	100	0,50/ −63,8°	25,4/146,1°	0,02/ 65,3°	0,89/−21,3°	36,2
	200	0,46/−104,5°	18,2/125,8°	0,02/ 57,6°	0,69/−30,3°	29,0
	500	0,47/−153,6°	9,2/ 98,2°	0,03/ 55,7°	0,50/−37,5°	21,6
	800	0,45/−172,9°	6,0/ 86,2°	0,05/ 61,3°	0,46/−43,7°	17,5
	1000	0,46/ 176,8°	4,8/ 79,0°	0,05/ 62,6°	0,46/−46,2°	15,7
	1200	0,47/ 165,8°	3,9/ 74,1°	0,06/ 63,7°	0,45/−50,4°	14,0
	1500	0,46/ 159,9°	3,2/ 67,5°	0,08/ 65,3°	0,41/−58,9°	12,0
	2000	0,46/ 140,9°	2,4/ 56,4°	0,09/ 65,9°	0,41/−75,6°	9,5
20	40	0,42/ −32,2°	34,3/165,3°	0,01/ 72,8°	0,97/ −9,3°	43,3
	100	0,43/ −77,0°	28,8/142,5°	0,01/ 65,2°	0,85/−22,9°	35,7
	200	0,43/−118,2°	19,7/122,1°	0,02/ 58,3°	0,64/−30,8°	29,0
	500	0,46/−160,6°	9,5/ 96,5°	0,03/ 61,6°	0,47/−36,0°	21,7
	800	0,45/−177,2°	6,1/ 85,5°	0,05/ 65,4°	0,43/−42,3°	17,6
	1000	0,46/ 173,6°	4,9/ 78,8°	0,05/ 66,7°	0,44/−44,8°	15,8
	1200	0,48/ 163,5°	4,0/ 74,1°	0,06/ 68,0°	0,43/−49,1°	14,1
	1500	0,46/ 158,3°	3,3/ 67,5°	0,08/ 68,9°	0,39/−57,7°	12,1
	2000	0,47/ 139,9°	2,5/ 56,7°	0,10/ 68,4°	0,40/−74,7°	9,6

N-P-N 2 GHz WIDEBAND TRANSISTOR

N-P-N transistor in a four-lead dual-emitter SOT-143 envelope. The device is primarily intended for use in u.h.f. and microwave amplifiers and features low noise and high power gain.

QUICK REFERENCE DATA

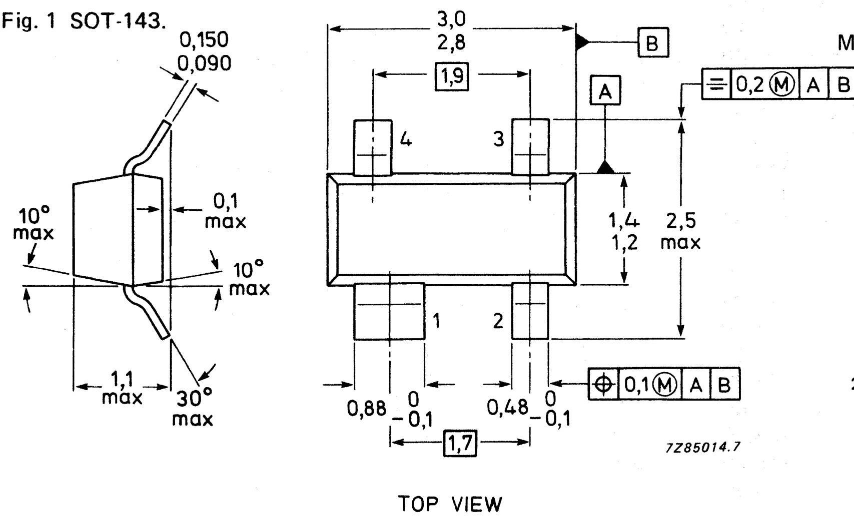
Collector-base voltage (open emitter)	V_{CBO}	max.	15	V
Collector-emitter voltage (open base)	V_{CEO}	max.	12	V
Collector current (d.c.)	I_C	max.	35	mA
Total power dissipation up to T_{amb} = 25 °C	P_{tot}	max.	300	mW
Junction temperature	T_j	max.	175	°C ←
D.C. current gain I_C = 30 mA; V_{CE} = 5 V	h_{FE}	min.	40	
		typ.	90	
Transition frequency at f = 500 MHz I_C = 30 mA; V_{CE} = 5 V	f_T	typ.	6,0	GHz
Feedback capacitance at f = 1 MHz I_C = 0; V_{CE} = 5 V	C_{re}	typ.	0,6	pF
Noise figure at f = 800 MHz I_C = 4 mA; V_{CE} = 8 V; Z_S = opt.	F	typ.	1,6	dB
Maximum unilateral power gain I_C = 30 mA; V_{CE} = 8 V, f = 800 MHz	G_{UM}	typ.	17,0	dB
f = 2 GHz		typ.	9,0	dB

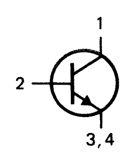
MECHANICAL DATA

Dimensions in mm

Fig. 1 SOT-143.

Marking code: R8





RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

Collector-base voltage (open emitter)	V_{CBO}	max.	15 V
Collector-emitter voltage (open base)	V_{CEO}	max.	12 V
Emitter-base voltage (open collector)	V_{EBO}	max.	2 V
Collector current (d.c.)	I_C	max.	35 mA
Total power dissipation up to T_{amb} = 25 °C and mounted on a ceramic substrate of 8 mm x 10 mm x 0,7 mm	P_{tot}	max.	300 mW
Storage temperature	T_{stg}		−65 to +150 °C
→ Junction temperature	T_j	max.	175 °C

THERMAL RESISTANCE

From junction to ambient and mounted on a ceramic substrate of 8 mm x 10 mm x 0,7 mm	$R_{th\ j\text{-}a}$		430 K/W

CHARACTERISTICS

T_j = 25 °C unless otherwise specified

Collector cut-off current $I_E = 0$; $V_{CB} = 5$ V	I_{CBO}	max.	50 nA
D.C. current gain $I_C = 30$ mA; $V_{CE} = 5$ V	h_{FE}	min. typ.	40 90
Transition frequency at f = 500 MHz $I_C = 30$ mA; $V_{CE} = 5$ V	f_T	typ.	6,0 GHz
Collector capacitance at f = 1 MHz $I_E = I_e = 0$; $V_{CB} = 5$ V	C_c	typ.	0,9 pF
Emitter capacitance at f = 1 MHz $I_C = I_c = 0$; $V_{EB} = 0,5$ V	C_e	typ.	2,5 pF
Feedback capacitance $I_C = 0$; $V_{CE} = 5$ V	C_{re}	typ.	0,6 pF

Maximum unilateral power gain (s_{re} assumed to be zero)

$$G_{UM} = 10 \log \frac{|s_{fe}|^2}{[1-|s_{ie}|^2]\,[1-|s_{oe}|^2]}$$

$I_C = 30$ mA; $V_{CE} = 8$ V; $T_{amb} = 25$ °C: f = 800 MHz f = 2 GHz	G_{UM}	typ. typ.	17,0 dB 9,0 dB
Noise figure at f = 800 MHz and $T_{amb} = 25$ °C $I_C = 4$ mA; $V_{CE} = 8$ V; Z_S = opt.	F	typ.	1,6 dB

s-parameters (common emitter) at V_{CE} = 5 V; T_{amb} = 25 °C; typical values

I_C mA	f MHz	s_{ie}	s_{fe}	s_{re}	s_{oe}	G_{UM} dB
	40	0,93/ −10,4°	7,1/174,6°	0,02/ 84,9°	1,00/ −3,3°	52,9
	100	0,93/ −30,9°	7,0/160,6°	0,03/ 73,5°	1,00/ −11,9°	52,8
	200	0,83/ −58,3°	6,0/144,6°	0,06/ 60,4°	0,88/ −22,1°	27,2
	500	0,74/−115,5°	4,2/110,2°	0,10/ 36,5°	0,71/ −40,3°	18,9
2	800	0,67/−144,9°	2,9/ 92,5°	0,11/ 29,0°	0,61/ −51,6°	13,9
	1000	0,65/−161,0°	2,4/ 81,5°	0,11/ 25,2°	0,60/ −55,8°	12,0
	1200	0,64/−175,0°	2,0/ 73,9°	0,10/ 25,2°	0,58/ −62,7°	9,9
	1500	0,64/+171,3°	1,7/ 64,5°	0,11/ 28,1°	0,52/ −72,1°	8,1
	2000	0,63/+148,8°	1,2/ 49,6°	0,10/ 35,4°	0,52/ −90,7°	5,5
	40	0,86/ −17,1°	16,2/171,0°	0,01/ 81,2°	0,99/ −7,5°	46,5
	100	0,83/ −46,6°	15,2/152,3°	0,03/ 66,6°	0,92/ −21,4°	36,9
	200	0,72/ −82,0°	11,6/133,0°	0,05/ 53,3°	0,73/ −34,7°	27,8
	500	0,63/−140,5°	6,5/101,0°	0,07/ 38,0°	0,48/ −52,8°	19,6
5	800	0,60/−164,4°	4,3/ 87,0°	0,08/ 39,2°	0,41/ −61,7°	15,4
	1000	0,59/−177,4°	3,5/ 78,3°	0,08/ 39,9°	0,39/ −64,2°	13,4
	1200	0,59/+170,7°	2,9/ 72,9°	0,09/ 43,3°	0,37/ −69,0°	11,6
	1500	0,58/+160,8°	2,4/ 64,2°	0,10/ 46,6°	0,34/ −79,5°	9,9
	2000	0,58/+140,3°	1,8/ 51,8°	0,11/ 51,4°	0,35/ −95,8°	7,4
	40	0,78/ −25,7°	27,2/166,2°	0,01/ 78,4°	0,97/ −12,5°	44,5
	100	0,72/ −64,9°	23,2/143,3°	0,03/ 61,1°	0,83/ −31,4°	35,5
	200	0,62/−105,0°	16,2/123,2°	0,04/ 50,0°	0,59/ −45,9°	28,1
	500	0,59/−155,7°	7,9/ 95,5°	0,05/ 44,9°	0,34/ −63,2°	20,3
10	800	0,56/−175,9°	5,1/ 83,5°	0,07/ 50,4°	0,29/ −70,7°	16,2
	1000	0,57/+173,2°	4,1/ 76,3°	0,07/ 52,3°	0,27/ −72,7°	14,3
	1200	0,58/+162,5°	3,4/ 72,1°	0,08/ 55,6°	0,25/ −76,2°	12,5
	1500	0,56/+154,8°	2,8/ 63,8°	0,10/ 56,6°	0,25/ −88,2°	10,8
	2000	0,56/+135,3°	2,1/ 52,8°	0,13/ 58,5°	0,26/−102,7°	8,4
	40	0,65/ −39,4°	42,2/159,3°	0,01/ 72,3°	0,91/ −19,7°	42,7
	100	0,60/ −89,5°	31,6/132,8°	0,02/ 55,5°	0,69/ −42,9°	34,8
	200	0,55/−129,0°	19,7/114,0°	0,02/ 50,4°	0,44/ −57,0°	28,4
	500	0,57/−168,3°	8,8/ 91,5°	0,04/ 54,8°	0,24/ −74,1°	20,8
20	800	0,55/+175,7°	5,6/ 81,0°	0,06/ 60,5°	0,21/ −80,3°	16,8
	1000	0,55/+166,5°	4,5/ 74,8°	0,07/ 61,7°	0,19/ −82,5°	14,8
	1200	0,57/+156,9°	3,7/ 71,1°	0,08/ 64,0°	0,17/ −85,5°	13,2
	1500	0,54/+150,5°	3,1/ 63,0°	0,10/ 63,0°	0,18/−130,7°	11,4
	2000	0,55/+131,8°	2,3/ 53,3°	0,13/ 62,3°	0,20/−111,3°	9,0
	40	0,58/ −50,3°	50,7/154,7°	0,01/ 69,7°	0,87/ −24,2°	42,2
	100	0,56/−104,9°	35,1/127,1°	0,02/ 53,8°	0,61/ −48,7°	34,5
	200	0,54/−141,0°	20,7/109,8°	0,02/ 52,4°	0,37/ −61,2°	28,4
	500	0,56/−173,6°	8,9/ 89,5°	0,04/ 60,0°	0,20/ −77,6°	20,8
30	800	0,55/+172,3°	5,7/ 79,7°	0,06/ 64,8°	0,18/ −83,1°	16,9
	1000	0,56/+164,0°	4,5/ 73,8°	0,07/ 65,3°	0,17/ −85,3°	14,9
	1200	0,58/+154,8°	3,7/ 70,6°	0,08/ 67,1°	0,15/ −88,3°	13,3
	1500	0,55/+148,9°	3,1/ 62,5°	0,10/ 65,2°	0,16/−100,8°	11,5
	2000	0,55/+130,5°	2,3/ 53,0°	0,13/ 63,7°	0,18/−114,1°	9,1

s-parameters (common-emitter) at V_{CE} = 8 V; T_{amb} = 25 °C; typical values

I_C mA	f MHz	s_{ie}	s_{fe}	s_{re}	s_{oe}	G_{UM} dB
	40	0,94/ −9,9°	7,1/174,8°	0,01/ 84,5°	1,00/ −2,8°	53,5
	100	0,94/ −30,0°	7,0/161,3°	0,03/ 73,7°	1,00/ −11,0°	53,4
	200	0,83/ −56,5°	6,1/145,5°	0,05/ 61,5°	0,89/ −20,5°	27,7
	500	0,74/−113,2°	4,3/111,4°	0,09/ 37,8°	0,73/ −37,8°	19,4
2	800	0,66/−142,9°	3,0/ 93,7°	0,10/ 30,8°	0,63/ −48,7°	14,3
	1000	0,64/−159,0°	2,5/ 82,5°	0,10/ 27,0°	0,62/ −52,8°	12,4
	1200	0,63/−173,3°	2,0/ 74,6°	0,10/ 26,9°	0,61/ −59,6°	10,3
	1500	0,62/+172,7°	1,7/ 65,5°	0,10/ 29,8°	0,54/ −68,5°	8,3
	2000	0,63/+149,9°	1,3/ 50,5°	0,10/ 37,8°	0,54/ −87,0°	5,7
	40	0,87/ −15,9°	15,9/171,6°	0,01/ 81,6°	0,99/ −6,5°	46,7
	100	0,84/ −43,8°	14,8/153,5°	0,03/ 68,2°	0,93/ −19,3°	37,7
	200	0,72/ −78,0°	11,6/134,5°	0,05/ 54,8°	0,76/ −31,6°	28,3
	500	0,63/−136,7°	6,7/102,2°	0,07/ 38,8°	0,52/ −48,3°	20,0
5	800	0,59/−161,4°	4,4/ 87,9°	0,08/ 40,0°	0,44/ −56,7°	15,7
	1000	0,58/−174,8°	3,6/ 79,0°	0,08/ 40,8°	0,43/ −59,3°	13,7
	1200	0,58/+172,8°	2,9/ 73,4°	0,08/ 44,0°	0,41/ −63,9°	11,9
	1500	0,57/+162,6°	2,5/ 64,9°	0,09/ 47,2°	0,37/ −73,9°	10,1
	2000	0,57/+141,9°	1,8/ 52,3°	0,11/ 52,4°	0,38/ −90,2°	7,6
	40	0,80/ −23,3°	26,3/167,2°	0,01/ 78,3°	0,97/ −11,0°	44,6
	100	0,74/ −60,0°	22,9/145,1°	0,03/ 62,7°	0,85/ −28,1°	36,3
	200	0,62/ −99,1°	16,2/125,0°	0,04/ 50,9°	0,62/ −41,6°	28,4
	500	0,58/−151,7°	8,1/ 96,7°	0,05/ 45,4°	0,38/ −56,3°	20,6
10	800	0,55/−172,9°	5,3/ 84,4°	0,06/ 50,5°	0,32/ −63,4°	16,5
	1000	0,55/+175,8°	4,2/ 77,0°	0,07/ 52,3°	0,31/ −64,9°	14,5
	1200	0,56/+164,5°	3,5/ 72,4°	0,08/ 55,1°	0,29/ −68,2°	12,8
	1500	0,54/+156,7°	2,9/ 64,3°	0,10/ 56,6°	0,28/ −79,7°	11,1
	2000	0,54/+136,8°	2,1/ 53,1°	0,12/ 58,5°	0,28/ −94,3°	8,6
	40	0,70/ −35,0°	41,2/160,7°	0,01/ 75,1°	0,92/ −17,3°	43,5
	100	0,63/ −82,0°	31,7/134,8°	0,02/ 57,6°	0,72/ −38,6°	35,4
	200	0,55/−122,2°	20,2/115,6°	0,03/ 50,9°	0,47/ −51,0°	28,7
	500	0,55/−164,6°	9,1/ 92,2°	0,04/ 54,4°	0,27/ −63,8°	21,0
20	800	0,53/+178,4°	5,8/ 81,6°	0,06/ 60,2°	0,24/ −69,5°	17,0
	1000	0,54/+168,8°	4,6/ 75,3°	0,07/ 61,3°	0,22/ −70,7°	15,0
	1200	0,55/+158,7°	3,8/ 71,4°	0,08/ 63,4°	0,20/ −72,9°	13,4
	1500	0,52/+152,5°	3,2/ 63,5°	0,10/ 63,0°	0,21/ −85,9°	11,6
	2000	0,53/+133,3°	2,4/ 53,4°	0,13/ 62,3°	0,22/ −99,5°	9,2
	40	0,65/ −42,9°	49,0/156,7°	0,01/ 72,7°	0,89/ −20,9°	43,0
	100	0,58/ −94,4°	35,1/129,5°	0,02/ 54,7°	0,65/ −43,2°	35,0
	200	0,53/−132,8°	21,1/111,5°	0,03/ 51,8°	0,40/ −53,7°	28,7
	500	0,54/−169,5°	9,2/ 90,5°	0,04/ 58,8°	0,23/ −64,8°	21,1
30	800	0,52/+175,3°	5,9/ 80,5°	0,06/ 63,6°	0,21/ −70,2°	17,0
	1000	0,53/+166,4°	4,7/ 74,3°	0,07/ 64,6°	0,20/ −71,4°	15,1
	1200	0,55/+156,8°	3,9/ 70,8°	0,08/ 66,1°	0,18/ −73,2°	13,4
	1500	0,52/+150,9°	3,2/ 63,0°	0,10/ 64,8°	0,19/ −87,3°	11,7
	2000	0,53/+132,2°	2,4/ 53,0°	0,13/ 63,5°	0,20/−100,8°	9,0

N-P-N 2 GHz WIDEBAND TRANSISTOR

N-P-N transistor in a four-lead dual-emitter plastic envelope (SOT-103). This device is designed for application in wideband amplifiers, such as CATV and MATV systems, up to 2 GHz.

P-N-P complement is BFG32.

QUICK REFERENCE DATA

Collector-base voltage (open emitter)	V_{CBO}	max.	20	V
Collector-emitter voltage (open base)	V_{CEO}	max.	15	V
Collector current (d.c.)	I_C	max.	75	mA
Total power dissipation up to T_{amb} = 70 ^oC	P_{tot}	max.	700	mW
Junction temperature	T_j	max.	175	^oC
D.C. current gain I_C = 50 mA; V_{CE} = 10 V	h_{FE}	min.	25	
Transition frequency at f = 500 MHz I_C = 50 mA; V_{CE} = 10 V	f_T	typ.	5,0	GHz
Feedback capacitance at f = 1 MHz I_C = 0; V_{CE} = 10 V	C_{re}	typ.	1,0	pF
Maximum unilateral power gain at f = 800 MHz I_C = 50 mA; V_{CE} = 10 V	G_{UM}	typ.	15,0	dB
Output power at 1 dB gain compression V_{CE} = 10 V; I_C = 70 mA; f = 800 MHz	P_{L1}	typ.	+21	dBm
Third order intercept point V_{CE} = 10 V; I_C = 70 mA; f = 800 MHz	ITO	typ.	+40	dBm

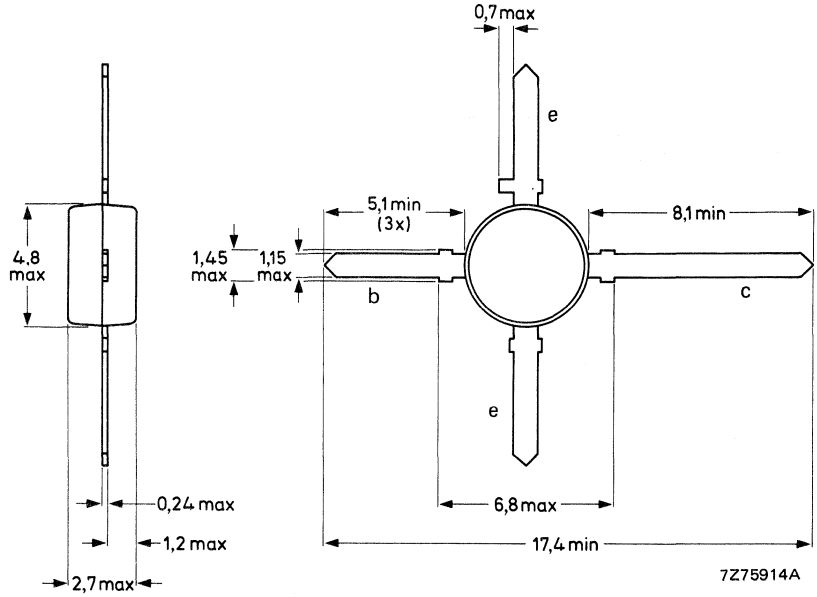
MECHANICAL DATA

SOT-103 (see Fig. 1).

MECHANICAL DATA

Dimensions in mm

Fig. 1 SOT-103.



RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

Collector-base voltage (open emitter)	V_{CBO}	max.	20	V
Collector-emitter voltage (open base)	V_{CEO}	max.	15	V
Emitter-base voltage (open collector)	V_{EBO}	max.	3	V
Collector current (d.c.)	I_C	max.	75	mA
Total power dissipation up to T_{amb} = 70 °C mounted on a p.c. board (see Fig. 2)	P_{tot}	max.	700	mW
Storage temperature	T_{stg}		−65 to +175	°C
Junction temperature	T_j	max.	175	°C

THERMAL RESISTANCE

From junction to ambient in free air mounted on glass-fibre p.c.b. (see Fig. 2)	$R_{th\ j-a}$	=	150 K/W
From junction to case	$R_{th\ j-c}$	=	75 K/W

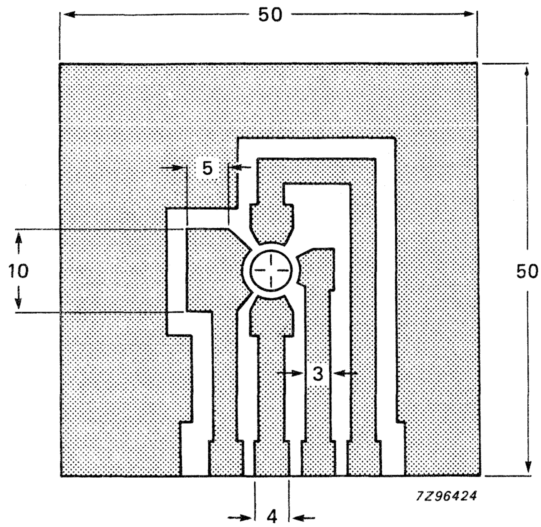


Fig. 2 Requirements for fibre-glass print (dimensions in mm). Single-sided 35 μm Cu-clad epoxy fibre-glass print, thickness 1,5 mm. Tracks are fully tin-lead plated. Shaded area is Cu.

CHARACTERISTICS

T_j = 25 °C unless otherwise specified

Collector cut-off current $I_E = 0$; $V_{CB} = 10$ V	I_{CBO}	max.	100 nA
D.C. current gain $I_C = 50$ mA; $V_{CE} = 10$ V	h_{FE}	min.	25
		typ.	50
Transition frequency at f = 500 MHz $I_C = 50$ mA; $V_{CE} = 10$ V	f_T	typ.	5,0 GHz
Collector capacitance at f = 1 MHz $I_E = i_e = 0$; $V_{CB} = 10$ V	C_c	typ.	1,5 pF
Emitter capacitance at f = 1 MHz $I_C = i_c = 0$; $V_{EB} = 0,5$ V	C_e	typ.	6,5 pF
Feedback capacitance at f = 1 MHz $I_C = 0$; $V_{CE} = 10$ V	C_{re}	typ.	1,0 pF
Noise figure at Z_S = opt. and T_{amb} = 25 °C $I_C = 70$ mA; $V_{CE} = 10$ V; f = 800 MHz	F	typ.	4,0 dB

Maximum unilateral power gain (s_{re} assumed to be zero)

$$G_{UM} = 10 \log \frac{|s_{fe}|^2}{[1-|s_{ie}|^2]\,[1-|s_{oe}|^2]}$$

$I_C = 50$ mA; $V_{CE} = 10$ V; f = 800 MHz; T_{amb} = 25 °C	G_{UM}	typ.	15,0 dB
$I_C = 50$ mA; $V_{CE} = 10$ V; f = 2 GHz; T_{amb} = 25 °C		typ.	8,0 dB

Output power at 1 dB gain compression I_C = 70 mA; V_{CE} = 10 V; T_{amb} = 25 °C; R_L = 75 Ω; measured at f = 800 MHz	P_{L1}	typ.	+21 dBm
Third order intercept point (see Fig. 3) I_C = 70 mA; V_{CE} = 10 V; R_L = 75 Ω; T_{amb} = 25 °C; P_p = ITO – 6 dB; f_p = 800 MHz; P_q = ITO – 6 dB; f_q = 801 MHz; measured at $f_{(2q-p)}$ = 802 MHz and at $f_{(2p-q)}$ = 799 MHz	ITO	typ.	+40 dBm
Output voltage at d_{im} = –60 dB I_C = 70 mA; V_{CE} = 10 V; R_L = 75 Ω; T_{amb} = 25 °C $V_p = V_o$ at d_{im} = –60 dB ; f_p = 795,25 MHz $V_q = V_o$ –6 dB ; f_q = 803,25 MHz $V_r = V_o$ –6 dB ; f_r = 805,25 MHz measured at $f_{(p+q-r)}$ = 793,25 MHz	V_o	typ.	700 mV
Second harmonic distortion (see Fig. 3) I_C = 70 mA; V_{CE} = 10 V; R_L = 75 Ω; VSWR < 2; T_{amb} = 25 °C $V_p = V_o$ = 320 mV at f_p = 250 MHz $V_q = V_o$ = 320 mV at f_q = 560 MHz measured at $f_{(p+q)}$ = 810 MHz	d_2	typ.	–52 dB

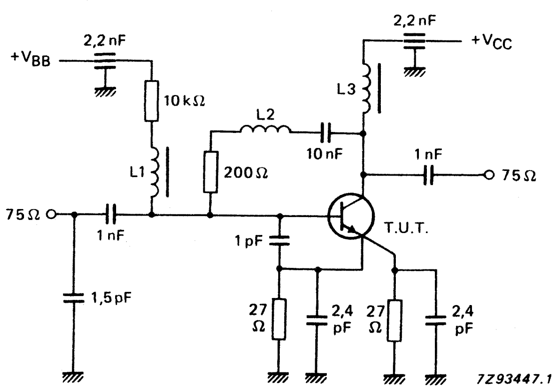


Fig. 3 Intermodulation distortion and second harmonic distortion MATV test circuit.

L1 = L3 = 5 μH micro-choke
L2 = 1,5 turns Cu wire (0,4 mm), internal diameter 3 mm, winding pitch 1 mm.

s-parameters (common emitter) at V_{CE} = 10 V; T_{amb} = 25 °C; typical values

I_C mA	f MHz	s_{ie}	s_{fe}	s_{re}	s_{oe}	G_{UM} dB
	40	0,68/ −50,8°	26,0/155,5°	0,02/ 67,1°	0,90/ −22,7°	38,2
	100	0,68/−106,4°	18,2/126,5°	0,03/ 46,0°	0,65/ −45,7°	30,3
	200	0,68/−142,5°	10,8/107,9°	0,04/ 38,0°	0,41/ −56,9°	24,1
	500	0,71/−173,4°	4,6/ 84,5°	0,05/ 41,2°	0,25/ −69,3°	16,6
10	800	0,69/ +173,9°	3,0/ 73,3°	0,07/ 49,3°	0,25/ −78,7°	12,7
	1000	0,70/ +166,7°	2,4/ 65,8°	0,08/ 52,5°	0,25/ −82,7°	10,8
	1200	0,72/ +159,6°	1,9/ 61,5°	0,09/ 56,9°	0,24/ −91,4°	9,3
	1500	0,71/ +153,2°	1,7/ 53,2°	0,11/ 60,2°	0,25/−103,8°	7,7
	2000	0,73/ +138,2°	1,2/ 42,7°	0,14/ 63,2°	0,29/−126,1°	5,5
	40	0,60/ −64,1°	33,5/150,8°	0,02/ 64,6°	0,86/ −29,5°	28,4
	100	0,65/−121,2°	21,8/121,5°	0,03/ 45,0°	0,56/ −56,5°	30,8
	200	0,66/−152,0°	12,4/104,8°	0,03/ 40,9°	0,33/ −70,6°	24,9
	500	0,70/−177,4°	5,1/ 83,8°	0,05/ 49,3°	0,19/ −90,4°	17,3
15	800	0,68/ +171,4°	3,3/ 73,5°	0,07/ 56,4°	0,19/ −98,2°	13,4
	1000	0,69/ +164,8°	2,6/ 66,7°	0,08/ 58,4°	0,18/−102,4°	11,5
	1200	0,72/ +157,8°	2,2/ 62,8°	0,09/ 61,7°	0,17/−110,5°	10,0
	1500	0,70/ +152,1°	1,8/ 54,6°	0,12/ 63,1°	0,20/−121,3°	8,4
	2000	0,72/ +137,2°	1,4/ 44,7°	0,15/ 64,1°	0,23/−139,8°	6,3
	40	0,55/ −75,5°	39,4/147,3°	0,02/ 60,6°	0,83/ −34,8°	38,6
	100	0,63/−130,6°	24,0/118,3°	0,02/ 43,9°	0,51/ −64,8°	31,1
	200	0,66/−156,7°	13,3/102,8°	0,03/ 44,2°	0,29/ −82,0°	25,3
	500	0,70/−179,7°	5,4/ 83,5°	0,05/ 54,3°	0,17/−108,8°	17,7
20	800	0,68/ +170,0°	3,5/ 73,7°	0,07/ 60,3°	0,17/−115,6°	13,9
	1000	0,69/ +163,7°	2,8/ 67,0°	0,08/ 61,3°	0,16/−119,4°	11,9
	1200	0,72/ +156,9°	2,3/ 63,5°	0,09/ 64,0°	0,15/−129,7°	10,5
	1500	0,69/ +151,5°	2,0/ 55,5°	0,12/ 64,3°	0,18/−136,5°	8,8
	2000	0,71/ +136,7°	1,5/ 45,9°	0,16/ 63,9°	0,21/−152,0°	6,7
	40	0,51/ −92,9°	47,3/142,3°	0,02/ 58,4°	0,79/ −42,7°	38,8
	100	0,62/−142,5°	26,5/114,3°	0,02/ 44,5°	0,44/ −76,6°	31,5
	200	0,65/−162,4°	14,4/100,6°	0,03/ 49,2°	0,25/ −98,8°	25,9
	500	0,69/ +177,9°	5,8/ 83,0°	0,05/ 60,3°	0,17/−132,5°	18,2
30	800	0,68/ +168,5°	3,8/ 73,8°	0,07/ 64,7°	0,17/−136,9°	14,3
	1000	0,69/ +162,5°	3,0/ 67,5°	0,08/ 64,7°	0,16/−143,7°	12,4
	1200	0,71/ +155,8°	2,4/ 64,4°	0,10/ 66,4°	0,15/−155,4°	10,9
	1500	0,68/ +150,8°	2,1/ 56,3°	0,12/ 65,7°	0,18/−156,5°	9,3
	2000	0,71/ +136,2°	1,6/ 47,2°	0,16/ 64,4°	0,21/−168,4°	7,3
	40	0,49/−113,0°	55,6/136,3°	0,01/ 57,1°	0,71/ −52,4°	39,1
	100	0,63/−153,5°	28,5/110,2°	0,02/ 48,7°	0,39/ −90,8°	32,0
	200	0,65/−168,7°	15,3/ 98,3°	0,02/ 56,7°	0,24/−117,4°	26,3
	500	0,69/ +175,9°	6,0/ 82,4°	0,05/ 65,8°	0,20/−149,7°	18,6
50	800	0,67/ +167,2°	3,9/ 73,6°	0,07/ 68,1°	0,19/−154,7°	15,0
	1000	0,69/ +161,5°	3,1/ 67,7°	0,09/ 67,2°	0,18/−162,2°	12,8
	1200	0,71/ +155,1°	2,6/ 65,0°	0,10/ 68,7°	0,18/−173,8°	11,3
	1500	0,68/ +150,3°	2,2/ 56,9°	0,13/ 66,7°	0,19/−172,1°	9,7
	2000	0,70/ +135,7°	1,7/ 48,3°	0,17/ 64,9°	0,21/−177,2°	8,0

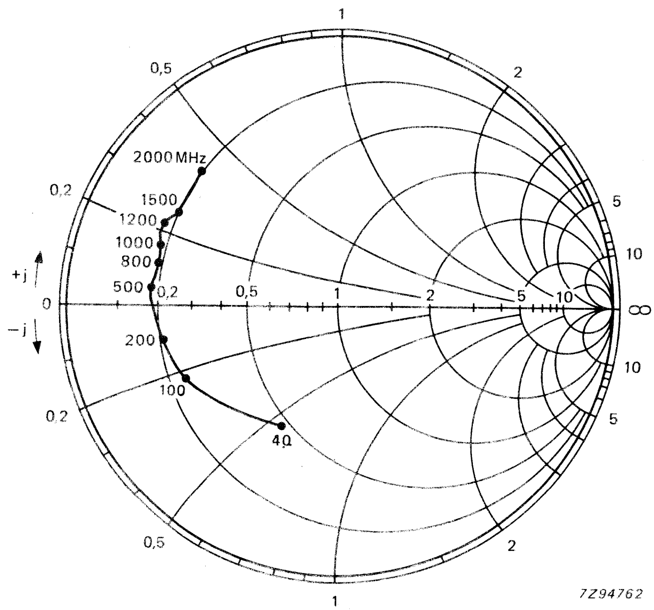


Fig. 4 Input impedance, derived from input reflection coefficient s_{ie} coordinates, in ohm x 50.

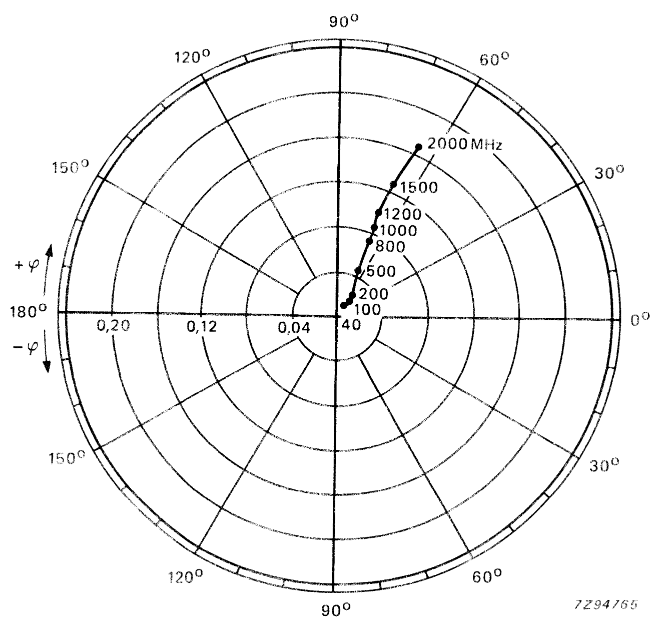


Fig. 5 Reverse transmission coefficient s_{re}.

Conditions for Figs 4 to 7: $V_{CE} = 10$ V; $I_C = 50$ mA; $T_{amb} = 25$ °C.

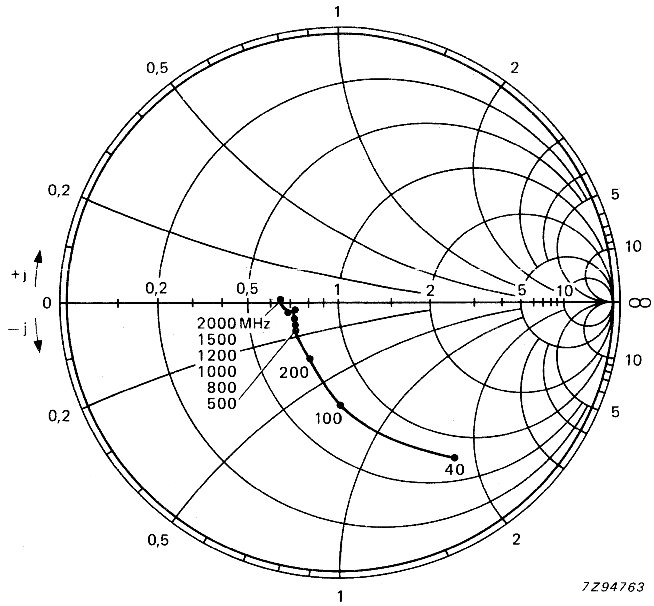


Fig. 6 Ouput impedance, derived from output reflection coefficient s_{oe} coordinates, in ohm x 50.

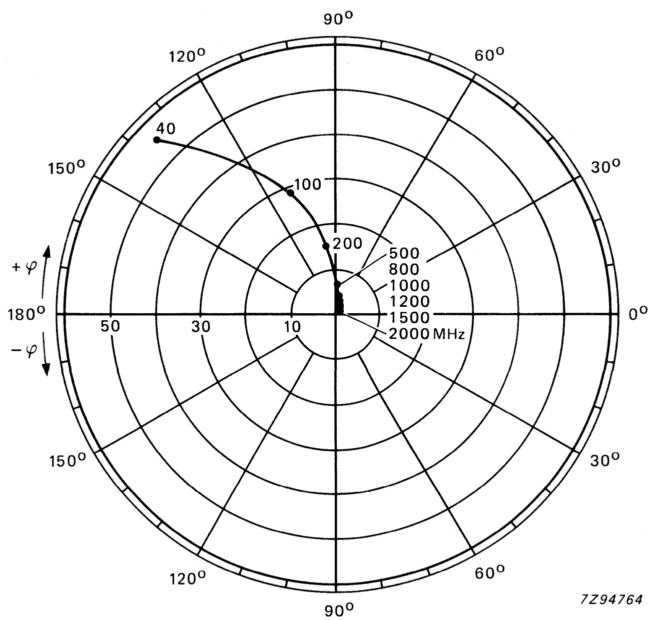


Fig. 7 Forward transmission coefficient s_{fe}.

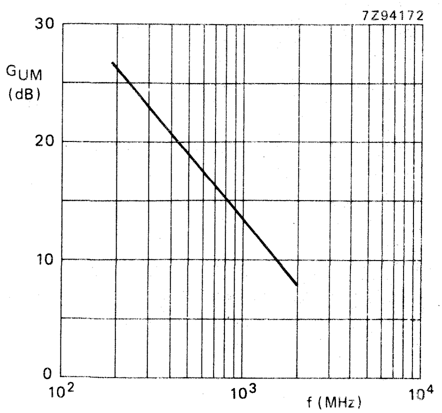


Fig. 8 V_{CE} = 10 V; I_C = 50 mA; T_{amb} = 25 °C; typical values.

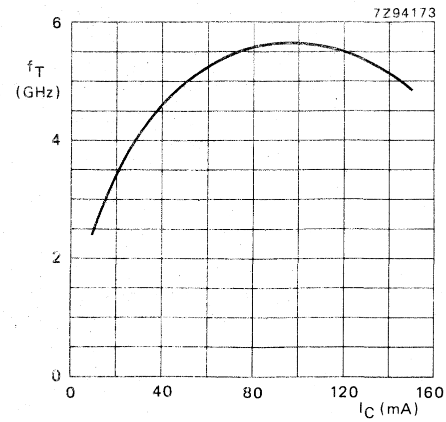


Fig. 9 V_{CE} = 10 V; f = 500 MHz; T_j = 25 °C; typical values.

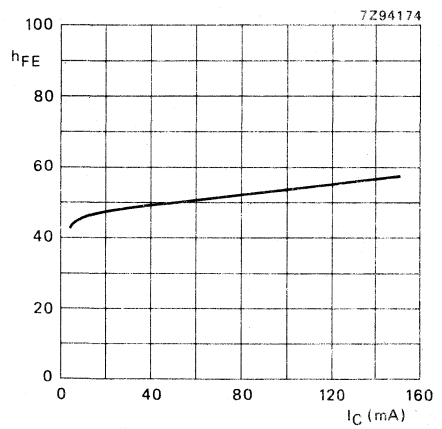


Fig. 10 V_{CE} = 10 V; T_j = 25 °C; typical values.

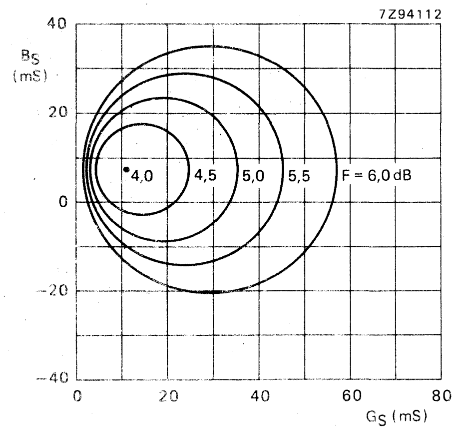


Fig. 11 Circles of constant noise figure I_C = 70 mA; V_{CE} = 10 V; f = 800 MHz; typical values.

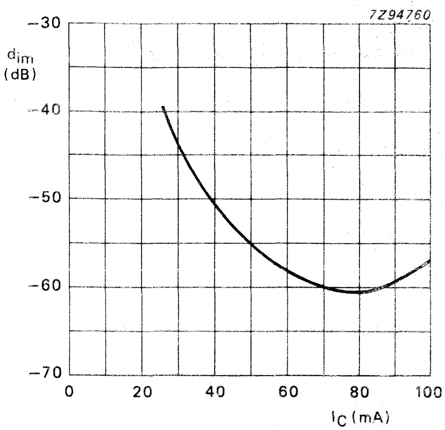


Fig. 12 V_{CE} = 10 V; V_o = 700 mV; $f_{(p+q-r)}$ = 793,25 MHz; T_{amb} = 25 °C; typical values.

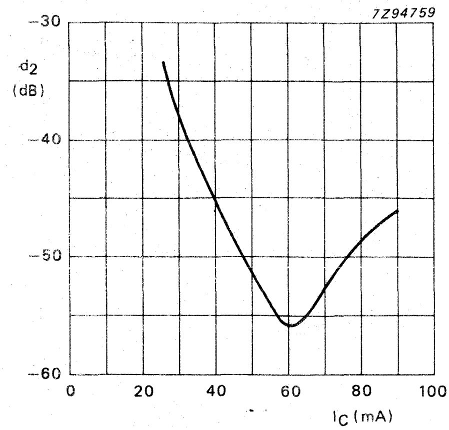


Fig. 13 V_{CE} = 10 V; V_o = 320 mV; $f_{(p+q)}$ = 810 MHz; T_{amb} = 25 °C; typical values.

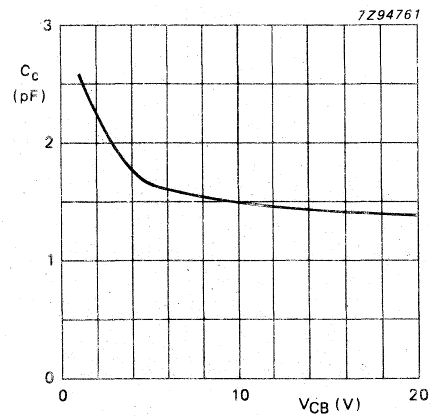


Fig. 14 $I_E = i_e = 0$; f = 1 MHz; T_j = 25 °C; typical values.

CLASS-B OPERATION

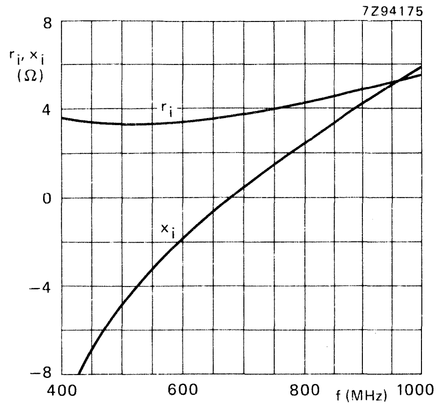


Fig. 15 Input impedance (series components).

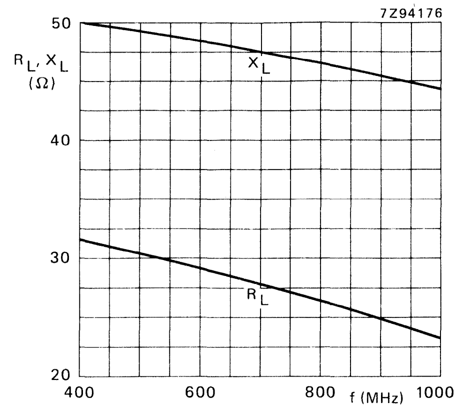


Fig. 16 Load impedance (series components).

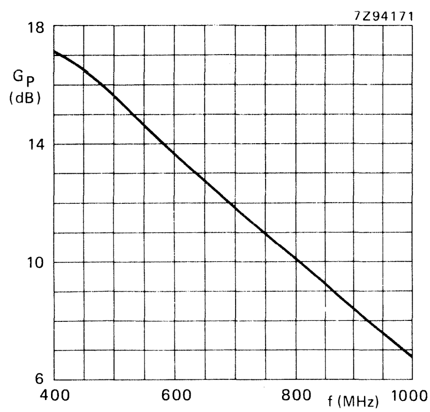


Fig. 17 Power gain versus frequency.

Conditions for Figs 15 to 17:

V_{CE} = 10 V; P_L = 500 mW; T_{amb} = 25 °C; typical values.

OPERATING NOTE for Figs 15 to 17:

A resistance of 39 Ω between base and emitter is recommended to avoid oscillation. This resistance must be effective for r.f. only.

NPN 1 GHz WIDEBAND TRANSISTOR

NPN transistor in a plastic SOT-223 envelope, primarily designed for VHF, UHF, and microwave wideband amplifiers up to a frequency of 1 GHz.

The device features excellent output voltage capabilities.

QUICK REFERENCE DATA

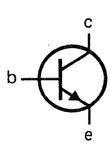
Collector-base voltage (open emitter)	V_{CBO}	max.	20	V
Collector-emitter voltage (open base)	V_{CEO}	max.	15	V
Collector current (DC)	I_C	max.	100	mA
Total power dissipation at T_{amb} = 30 °C*	P_{tot}	max.	1	W
DC current gain I_C = 70 mA; V_{CE} = 10 V	h_{FE}	min. typ.	25 90	
Transition frequency at f = 500 MHz I_C = 70 mA; V_{CE} = 10 V	f_T	typ.	5.5	GHz
Maximum power gain at f = 800 MHz I_C = 70 mA; V_{CE} = 10 V	G_{UM}	typ.	12	dB
Output voltage at d_{im} = –60 dB I_C = 70 mA; V_{CE} = 10 V; R_L = 75 Ω $f_{(p+q-r)}$ = 793.25 MHz	V_o	typ.	700	mV

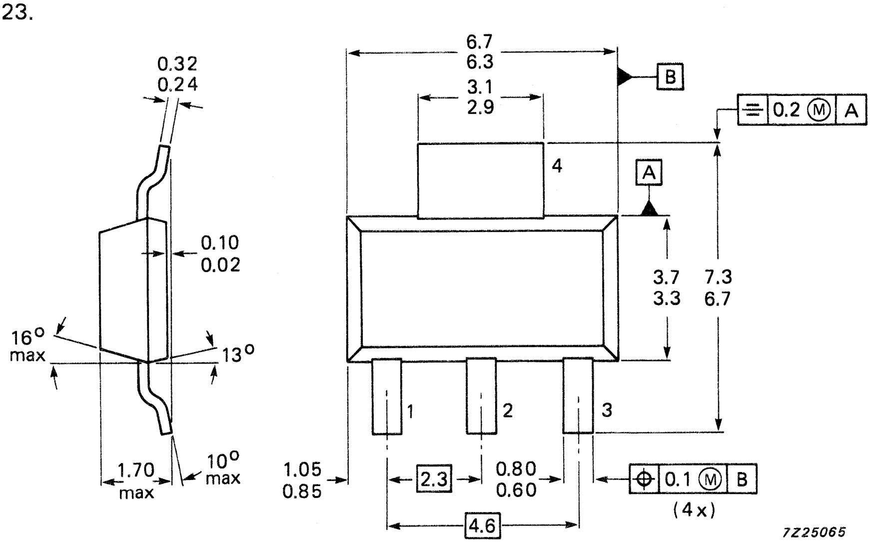
MECHANICAL DATA

Dimensions in mm

Fig. 1 SOT-223.

Pinning:
1 = emitter
2 = base
3 = emitter
4 = collector





RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

Collector-base voltage (open emitter)	V_{CBO}	max.	20	V
Collector-emitter voltage (open base)	V_{CEO}	max.	15	V
Emitter-base voltage (open collector)	V_{EBO}	max.	3.0	V
Collector current (DC)	I_C	max.	100	mA
Total power dissipation at T_{amb} = 30 °C*	P_{tot}	max.	1	W
Storage temperature range	T_{stg}	−65 to + 175		°C
Junction temperature	T_j	max.	175	°C

THERMAL RESISTANCE

From junction to case	$R_{th\ j\text{-}c}$	=	50	K/W
From junction to ambient in free air*	$R_{th\ j\text{-}a}$	=	145	K/W

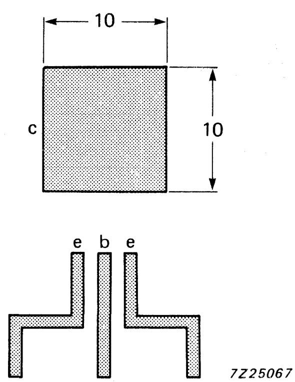


Fig. 2 Single-sided 35 μm Cu-clad epoxy fibreglass printed circuit board; thickness 1.5 mm; tracks fully tin plated; Cu area shown shaded. (Dimensions in mm).

* Mounted on a fibreglass printed circuit board as shown in Fig. 2.

CHARACTERISTICS

T_j = 25 °C unless otherwise specified

Collector cut-off current $I_E = 0$; $V_{CB} = 10$ V	I_{CBO}	max.	100 nA
DC current gain $I_C = 70$ mA; $V_{CE} = 10$ V	h_{FE}	min. typ.	25 90
Transition frequency at f = 500 MHz $I_C = 70$ mA; $V_{CE} = 10$ V	f_T	typ.	5.5 GHz
Collector capacitance at f = 1 MHz $I_E = i_e = 0$; $V_{CB} = 10$ V	C_c	typ.	1.5 pF
Emitter capacitance at f = 1 MHz $I_C = i_c = 0$; $V_{EB} = 0.5$ V	C_e	typ.	6.5 pF
Feedback capacitance at f = 1 MHz $I_C = 0$; $V_{CE} = 10$ V	C_{re}	typ.	1.0 pF
Maximum power gain at f = 500 MHz $I_C = 70$ mA; $V_{CE} = 10$ V	G_{UM}	typ.	16 dB
Maximum power gain at f = 800 MHz $I_C = 70$ mA; $V_{CE} = 10$ V	G_{UM}	typ.	12 dB
Output voltage at $d_{im} = -60$ dB (DIN 45004B) $I_C = 70$ mA; $V_{CE} = 10$ V; $R_L = 75\ \Omega$ $V_p = V_o$ at $d_{im} = -60$ dB; $f_p = 795.25$ MHz $V_q = V_o - 6$ dB; $f_q = 803.25$ MHz $V_r = V_o - 6$ dB; $f_r = 805.25$ MHz measured at $f_{(p+q-r)} = 793.25$ MHz	V_o	typ.	700 mV

NPN 2 GHz WIDEBAND TRANSISTOR

NPN planar epitaxial transistor in a plastic SOT103F envelope, intended for wideband amplifier applications. The small emitter structures ensure high output voltage capabilities at a low distortion level. The distribution of the active areas across the surface of the device gives an excellent temperature profile.

QUICK REFERENCE DATA

Collector-base voltage (open emitter)	V_{CBO}	max.	25 V
Collector-emitter voltage (open base)	V_{CEO}	max.	15 V
Collector current (DC)	I_C	max.	150 mA
Total power dissipation up to T_c = 140 °C (note 1)	P_{tot}	max.	1.0 W
Junction temperature	T_j	max.	175 °C
DC current gain I_C = 100 mA; V_{CE} = 10 V	h_{FE}	min.	80
Transition frequency at f = 1000 MHz I_C = 100 mA; V_{CE} = 10 V; T_{amb} = 25 °C	f_T	typ.	7.0 GHz
Maximum power gain at f = 800 MHz I_C = 100 mA; V_{CE} = 10 V	G_{UM}	typ;	14.5 dB
Maximum power gain at f = 2 GHz I_C = 100 mA; V_{CE} = 10 V	G_{UM}	typ.	8.0 dB
Output voltage at d_{im} = –60 dB I_C = 100 mA; V_{CE} = 10 V; R_L = 75 Ω; $f_{(p+q-r)}$ = 793.25 MHz	V_o	typ.	850 mV

MECHANCIAL DATA

SOT103F (see Fig. 1)

DEVELOPMENT DATA

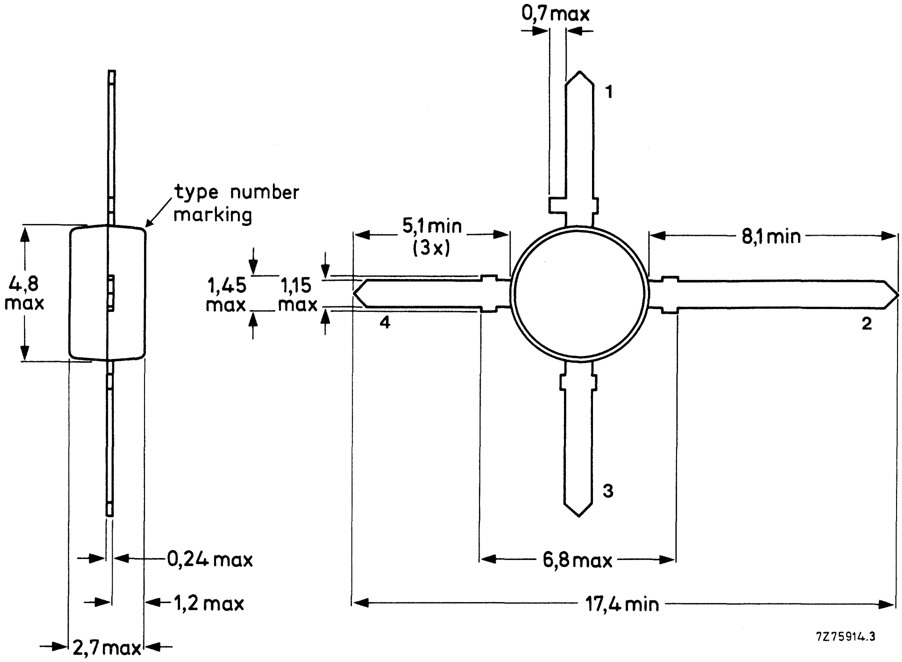
Note

1. T_c, case temperature measured on soldering point of collector tab.

MECHANICAL DATA

Dimensions in mm

Fig. 1 SOT103F.



Pinning

1/3. Emitter
2. Collector
4. Base

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

Collector-base voltage (open emitter)	V_{CBO}	max.	25	V
Collector-emitter voltage (open base)	V_{CEO}	max.	15	V
Emitter-base voltage (open collector)	V_{EBO}	max.	2.0	V
Collector current (DC)	I_C	max.	150	mA
Total power dissipation up to T_c = 140 °C	P_{tot}	max.	1	W
Storage temperature range	T_{stg}		−65 to 150	°C
Junction temperature	T_j	max.	175	°C

THERMAL RESISTANCE

From junction to case	$R_{th\ j\text{-}c}$	=	35 K/W

CHARACTERISTICS

$T_j = 25\ ^oC$ unless otherwise specified

Collector cut-off current $I_E = 0$, $V_{CB} = 10$ V	I_{CBO}	max.	1 μA
DC current gain $I_C = 100$ mA; $V_{CE} = 10$ V	h_{FE}	min.	80
Transition frequency at f = 1000 MHz $I_C = 100$ mA; $V_{CE} = 10$ V; $T_{amb} = 25\ ^oC$	f_T	typ.	7.0 GHz
Collector capacitance at f = 1 MHz $I_E = i_e = 0$; $V_{CB} = 10$ V	C_c	typ.	2.0 pF
Emitter capacitance at f = 1 MHz $I_C = i_c = 0$; $V_{EB} = 0.5$ V	C_e	typ.	6.0 pF
Feedback capacitance at f = 1 MHz $I_C = 0$; $V_{CE} = 10$ V	C_{re}	typ.	1.2 pF
Maximum power gain at f = 800 MHz $I_C = 100$ mA; $V_{CE} = 10$ V; $T_{amb} = 25\ ^oC$	G_{UM}	typ.	14.5 dB
Maximum power gain at f = 2 GHz $I_C = 100$ mA; $V_{CE} = 10$ V; $T_{amb} = 25\ ^oC$	G_{UM}	typ.	7.0 dB
Output voltage at $d_{im} = -60$ dB (DIN 45004B); $T_{amb} = 25\ ^oC$ $I_C = 100$ mA; $V_{CE} = 10$ V; $R_L = 75\ \Omega$ $V_p = V_o$ at $d_{im} = -60$ dB; $f_p = 445.25$ MHz $V_q = V_o -6$ dB; $f_q = 453.25$ MHz $V_r = V_o -6$ dB; $f_r = 455.25$ MHz Measured at $f_{(p+q-r)} = 443.25$ MHz	V_o	typ.	900 mV
Output voltage at $d_{im} = -60$ dB (DIN 45004B); $T_{amb} = 25\ ^oC$ $I_C = 100$ mA; $V_{CE} = 10$ V; $R_L = 75\ \Omega$ $V_p = V_o$ at $d_{im} = -60$ dB; $f_p = 795.25$ MHz $V_q = V_o -6$ dB; $f_q = 803.25$ MHz $V_r = V_o -6$ dB; $f_r = 805.25$ MHz Measured at $f_{(p+q-r)} = 793.25$ MHz	V_o	typ.	850 mV

DEVELOPMENT DATA

NPN 1 GHz WIDEBAND TRANSISTOR

NPN transistor in a plastic SOT-223 envelope, primarily designed for VHF, UHF, and microwave wideband amplifiers up to a frequency of 1 GHz.

The device features excellent output voltage capabilities.

QUICK REFERENCE DATA

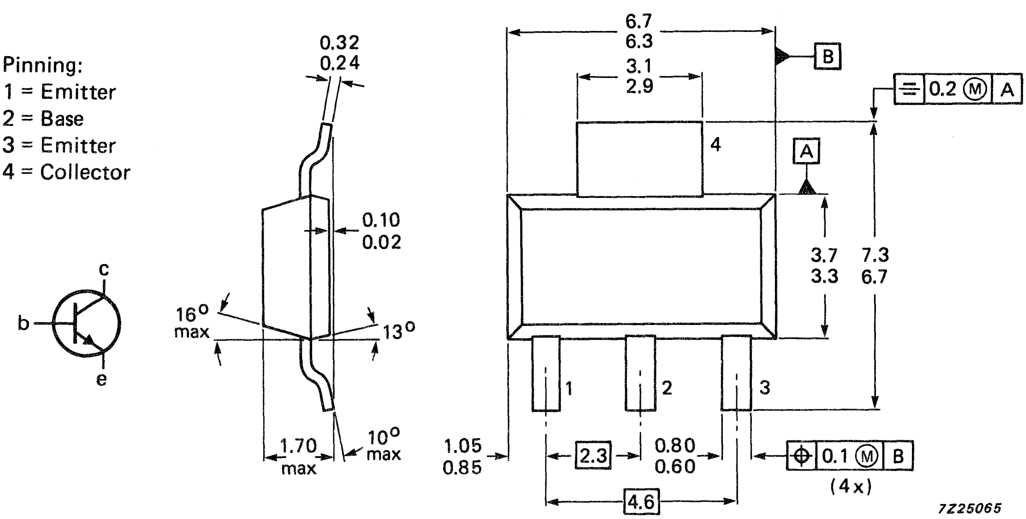
Collector-base voltage (open emitter)	V_{CBO}	max.	25	V
Collector-emitter voltage (open base)	V_{CEO}	max.	15	V
Collector current (DC)	I_C	max.	150	mA
Total power dissipation at T_{amb} = 60 °C*	P_{tot}	max.	1	W
DC current gain I_C = 100 mA; V_{CE} = 10 V	h_{FE}	min. typ.	80 120	
Transition frequency at f = 1 GHz I_C = 100 mA; V_{CE} = 10 V	f_T	typ.	7.0	GHz
Maximum power gain at f = 800 MHz I_C = 100 mA; V_{CE} = 10 V	G_{UM}	typ.	12	dB
Output voltage at d_{im} = −60 dB I_C = 100 mA; V_{CE} = 10 V; R_L = 75 Ω $f_{(p+q-r)}$ = 793.25 MHz	V_o	typ.	850	mV

MECHANICAL DATA

Dimensions in mm

Fig. 1 SOT-223.

Pinning:
1 = Emitter
2 = Base
3 = Emitter
4 = Collector



RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

Collector-base voltage (open emitter)	V_{CBO}	max.	25	V
Collector-emitter voltage (open base)	V_{CEO}	max.	15	V
Emitter-base voltage (open collector)	V_{EBO}	max.	2	V
Collector current (DC)	I_C	max.	150	mA
Total power dissipation at T_{amb} = 60 °C*	P_{tot}	max.	1	W
Storage temperature range	T_{stg}	−65 to + 175		°C
Junction temperature	T_j	max.	175	°C

THERMAL RESISTANCE

From junction to case	$R_{th\ j\text{-}c}$	=	20	K/W
From junction to ambient in free air*	$R_{th\ j\text{-}a}$	=	115	K/W

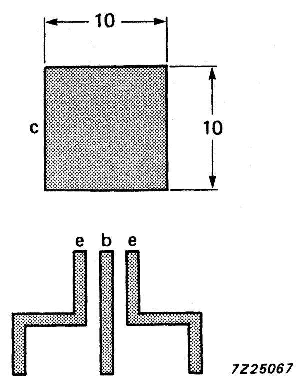


Fig. 2 Single-sided 35 μm Cu-clad epoxy fibreglass printed circuit board; thickness 1.5 mm; tracks fully tin plated; Cu area shown shaded. (Dimensions in mm).

* Mounted on a fibreglass printed circuit board as shown in Fig. 2.

CHARACTERISTICS

T_j = 25 °C unless otherwise specified

Collector cut-off current $I_E = 0; V_{CB} = 10$ V	I_{CBO}	max.	50 μA
DC current gain $I_C = 100$ mA; $V_{CE} = 10$ V	h_{FE}	min. typ.	80 120
Transition frequency at f = 1 GHz $I_C = 100$ mA; $V_{CE} = 10$ V	f_T	typ.	7.0 GHz
Collector capacitance at f = 1 MHz $I_E = i_e = 0; V_{CB} = 10$ V	C_c	typ.	2 pF
Emitter capacitance at f = 1 MHz $I_C = i_c = 0; V_{EB} = 0.5$ V	C_e	typ.	6.0 pF
Feedback capacitance at f = 1 MHz $I_C = 0; V_{CE} = 10$ V	C_{re}	typ.	1.2 pF
Maximum power gain at f = 500 MHz $I_C = 100$ mA; $V_{CE} = 10$ V	G_{UM}	typ.	16 dB
Maximum power gain at f = 800 MHz $I_C = 100$ mA; $V_{CE} = 10$ V	G_{UM}	typ.	12 dB
Output voltage at $d_{im} = -60$ dB (DIN 45004B) $I_C = 100$ mA; $V_{CE} = 10$ V; $R_L = 75\ \Omega$ $V_p = V_o$ at $d_{im} = -60$ dB; $f_p = 795.25$ MHz $V_q = V_o - 6$ dB; $f_q = 803.25$ MHz $V_r = V_o - 6$ dB; $f_r = 805.25$ MHz measured at $f_{(p+q-r)} = 793.25$ MHz	V_o	typ.	850 mV

N-P-N 2 GHz WIDEBAND TRANSISTOR

N-P-N transistor in a four-lead dual-emitter plastic envelope (SOT-103). It is designed for wideband application in the GHz range, such as satellite TV systems (SATV) and repeater amplifiers in fibre-optical systems. The device features a very high transition frequency, high gain and a very low noise figure up to high frequencies.

QUICK REFERENCE DATA

Collector-base voltage (open emitter)	V_{CBO}	max.	20	V
Collector-emitter voltage (open base)	V_{CEO}	max.	10	V
Collector current (d.c.)	I_C	max.	100	mA
Total power dissipation up to T_{amb} = 50 °C	P_{tot}	max.	500	mW
Junction temperature	T_j	max.	175	°C ←
D.C. current gain I_C = 50 mA, V_{CE} = 5 V	h_{FE}	min.	40	
Transition frequency at f = 2 GHz I_C = 50 mA; V_{CE} = 8 V	f_T	typ.	7,5	GHz
Maximum unilateral power gain at f = 2 GHz I_C = 50 mA; V_{CE} = 8 V	G_{UM}	typ.	11,0	dB

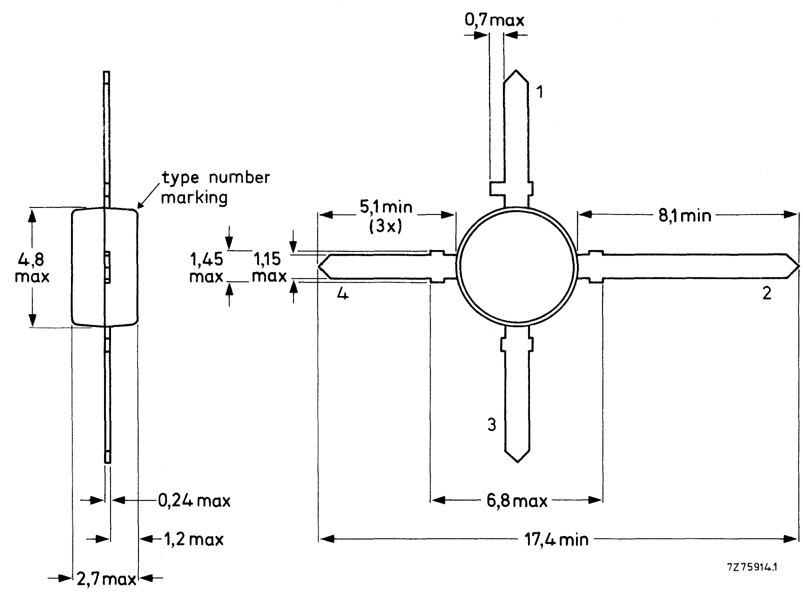
MECHANICAL DATA

Dimensions in mm

Fig. 1 SOT-103.

Lead reference:

1 = emitter
2 = collector
3 = emitter
4 = base



RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

Collector-base voltage (open emitter)	V_{CBO}	max.	20	V
Collector-emitter voltage (open base)	V_{CEO}	max.	10	V
Emitter-base voltage (open collector)	V_{EBO}	max.	2,5	V
Collector current (d.c.)	I_C	max.	100	mA
Total power dissipation up to T_{amb} = 50 °C*	P_{tot}	max.	500	mW
Storage temperature	T_{stg}		−65 to +150	°C
→ Junction temperature	T_j	max.	175	°C

THERMAL RESISTANCE

From junction to ambient*	$R_{th\ j\text{-}a}$	=	200	K/W

CHARACTERISTICS

T_j = 25 °C unless otherwise specified

Collector cut-off current $I_E = 0$; $V_{CB} = 5$ V	I_{CBO}	max.	100	nA
D.C. current gain $I_C = 50$ mA; $V_{CE} = 5$ V	h_{FE}	min.	40	
Transition frequency at f = 2 GHz $I_C = 50$ mA; $V_{CE} = 8$ V	f_T	typ.	7,5	GHz
Collector capacitance at f = 1 MHz $I_E = i_e = 0$; $V_{CB} = 8$ V	C_c	typ.	1,5	pF
Emitter capacitance at f = 1 MHz $I_C = i_c = 0$; $V_{EB} = 0,5$ V	C_e	typ.	3,3	pF
Feedback capacitance at f = 1 MHz $I_C = 0$; $V_{CE} = 8$ V	C_{re}	typ.	0,85	pF

Maximum unilateral power gain (s_{re} assumed to be zero)

$$G_{UM} \text{ (in dB)} = 10 \log \frac{|s_{fe}|^2}{[1 - |s_{ie}|^2]\,[1 - |s_{oe}|^2]}$$

$I_C = 50$ mA; $V_{CE} = 8$ V; f = 2 GHz ; T_{amb} = 25 °C	G_{UM}	typ.	11,0	dB

Noise figure at optimum source impedance and
V_{CE} = 8V; f = 800 MHz; T_{amb} = 25 °C

$I_C = 15$ mA	F	typ.	1,4	dB
$I_C = 50$ mA	F	typ.	1,9	dB

* Mounted on a printed-circuit board of 40 mm x 25 mm x 1,5 mm.

NPN 2 GHz WIDEBAND TRANSISTOR

NPN transistor in a microminiature SOT143 envelope. It is designed for wideband applications in the GHz range, such as satellite TV systems (SATV) and repeater amplifiers in fibre-optical systems. The device features a very high transition frequency, high gain and a very low noise figure up to high frequencies.

QUICK REFERENCE DATA

Collector-base voltage (open emitter)	V_{CBO}	max.	20	V
Collector-emitter voltage (open base)	V_{CEO}	max.	10	V
Collector current (DC)	I_C	max.	100	mA
Total power dissipation up to T_{amb} = 25 °C	P_{tot}	max.	300	mW
Junction temperature	T_j	max.	175	°C
Transition frequency at f = 2 GHz I_C = 50 mA; V_{CE} = 4 V; T_{amb} = 25 °C	f_T	typ.	7.5	GHz
Feedback capacitance at f = 1 MHz I_C = 0; V_{CE} = 8 V;	C_{re}	typ.	0.85	pF
Maximum unilateral power gain at f = 2 GHz I_C = 50 mA; T_{amb} = 25 °C V_{CE} = 4 V	G_{UM}	typ.	11	dB
V_{CE} = 6 V		typ.	11	dB

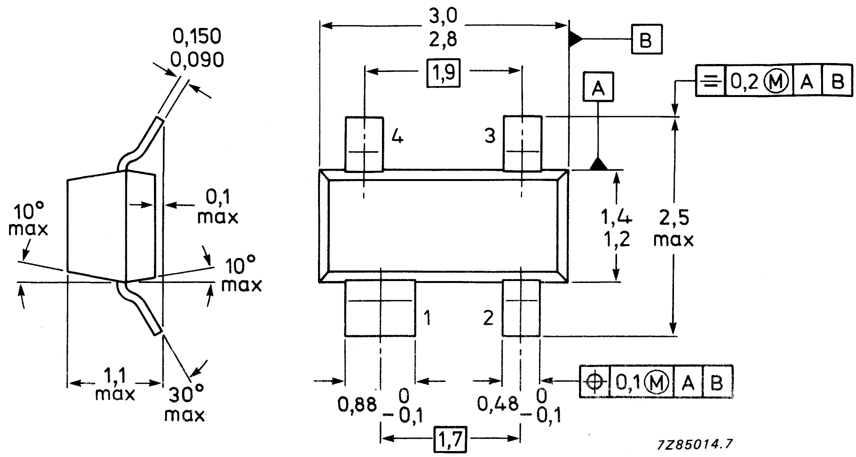
MECHANICAL DATA

SOT143 (see Fig. 1).

MECHANICAL DATA

Fig. 1 SOT143.

Dimensions in mm
Marking code: V5



TOP VIEW

Pinning:

1 = collector
2 = base
3, 4 = emitter

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134).

Collector-base voltage (open emitter)	V_{CBO}	max.	20	V
Collector-emitter voltage (open base)	V_{CEO}	max.	10	V
Emitter-base voltage (open collector)	V_{EBO}	max.	2.5	V
Collector current (DC)	I_C	max.	100	mA
Total power dissipation up to T_{amb} = 25 °C (note 1)	P_{tot}	max.	300	mW
Storage temperature range	T_{stg}		−65 to 150	°C
Junction temperature	T_j	max.	175	°C

Note

1. Mounted on a ceramic substrate measuring 8 x 10 x 0.7 mm.

THERMAL RESISTANCE

From junction to ambient in free air mounted on a ceramic substrate 8 x 10 x 0.7 mm	$R_{th\ j\text{-}a}$	=	430 K/W

CHARACTERISTICS

T_j = 25 °C unless otherwise specified.

Collector cut-off current I_E = 0, V_{CB} = 5 V	I_{CBO}	max.	100 nA
DC current gain I_C = 50 mA; V_{CE} = 5 V	h_{FE}	min. typ.	40 90
Transition frequency at f = 2 GHz I_C = 50 mA; V_{CE} = 4 V; T_{amb} = 25 °C	f_T	typ.	7.5 GHz
Noise figure at optimum source impedance I_C = 15 mA; V_{CE} = 8 V; f = 800 MHz; T_{amb} = 25 °C I_C = 50 mA; V_{CE} = 6 V; f = 800 MHz; T_{amb} = 25 °C	F	typ. typ.	1.4 dB 1.9 dB
Collector capacitance at f = 1 MHz I_E = i_e = 0; V_{CB} = 8 V;	C_c	typ.	1.5 pF
Emitter capacitance at f = 1 MHz I_C = i_c = 0; V_{EB} = 0.5 V	C_e	typ.	3.3 pF
Feedback capacitance at f = 1 MHz I_C = 0; V_{CE} = 8 V;	C_{re}	typ.	0.85 pF

Maximum unilateral power gain at f = 2 GHz

$$G_{UM} = 10 \log \frac{|s_{fe}|^2}{(1 - |s_{ie}|^2)(1 - |s_{oe}|^2)}$$

I_E = 50 mA; V_{CE} = 4 V; T_{amb} = 25 °C I_E = 50 mA. V_{CE} = 6 V; T_{amb} = 25 °C	G_{UM}	typ. typ.	11 dB 11 dB

Table 1 Scatter parameters (common emitter) at V_{CE} = 4.00 V.

I_C mA	f MHz	s_{ie}	s_{fe}	s_{re}	s_{oe}	G dB
10	40	0.36/−49.60	20.42/165.10	0.02/69.80	1.08/−14.90	34.7
	100	0.54/−100.40	17.36/141.80	0.03/57.20	0.94/−38.00	35.7
	200	0.69/−134.80	11.94/120.50	0.04/43.60	0.65/−59.60	26.7
	500	0.82/−166.80	5.61/91.20	0.05/34.60	0.40/−89.50	20.6
	800	0.84/−178.70	3.68/78.00	0.06/40.20	0.37/−99.90	17.1
	1000	0.85/175.20	2.89/70.10	0.06/44.30	0.35/−103.50	15.2
	1200	0.86/169.30	2.37/66.20	0.07/50.90	0.34/−109.20	13.8
	1500	0.84/164.40	2.02/56.50	0.08/54.90	0.37/−113.90	12.0
	2000	0.84/153.50	1.49/46.10	0.11/62.60	0.40/−123.60	9.7
15	40	0.29/−72.80	26.00/162.30	0.02/66.90	1.06/−18.90	37.6
	100	0.55/−119.0	20.87/137.30	0.03/55.10	0.88/−46.20	34.4
	200	0.70/−146.8	13.71/116.50	0.04/44.00	0.58/−70.30	27.5
	500	0.83/−172.1	6.12/89.50	0.04/41.60	0.36/−104.20	21.5
	800	0.84/177.80	4.00/77.50	0.06/49.00	0.34/−113.80	17.7
	1000	0.85/172.40	3.14/70.30	0.06/52.80	0.32/−117.50	15.9
	1200	0.86/166.80	2.58/66.90	0.07/58.10	0.31/−123.50	14.5
	1500	0.84/162.50	2.20/57.30	0.09/59.90	0.34/−125.70	12.6
	2000	0.83/151.90	1.64/47.80	0.12/64.60	0.37/−133.10	10.1
20	40	0.28/−93.50	30.55/160.20	0.02/65.40	1.05/−22.10	40.3
	100	0.57/−130.70	23.42/133.80	0.02/54.40	0.83/−52.50	34.2
	200	0.72/−153.70	14.69/113.80	0.03/45.80	0.54/−78.40	28.0
	500	0.83/−175.10	6.43/88.50	0.04/47.40	0.35/−114.50	21.8
	800	0.83/175.80	4.19/77.20	0.06/54.60	0.33/−137.80	18.1
	1000	0.85/170.80	3.28/70.30	0.06/57.80	0.32/−126.90	16.2
	1200	0.86/165.30	2.71/67.40	0.07/62.20	0.31/−133.50	14.9
	1500	0.83/161.40	2.31/57.80	0.09/62.60	0.33/−133.80	12.8
	2000	0.83/151.00	1.73/48.70	0.12/56.20	0.36/−139.90	10.3
30	40	0.31/−119.70	36.73/157.00	0.02/62.30	1.01/−26.90	47.3
	100	0.62/−143.80	26.39/129.30	0.02/52.40	0.76/−61.30	34.3
	200	0.75/−161.80	15.92/110.30	0.03/47.90	0.48/−89.90	28.7
	500	0.83/−178.40	6.74/87.30	0.04/54.90	0.34/−126.70	22.2
	800	0.83/173.60	4.38/76.70	0.05/61.50	0.33/−133.60	18.5
	1000	0.85/169.00	3.43/70.30	0.06/63.00	0.32/−138.00	16.6
	1200	0.86/163.80	2.84/67.80	0.07/66.90	0.32/−144.60	15.3
	1500	0.83/160.20	2.42/58.30	0.10/65.10	0.34/−143.10	13.2
	2000	0.83/149.80	1.82/49.60	0.13/66.40	0.35/−148.10	10.8
50	40	0.40/−140.60	44.62/152.60	0.02/54.80	0.96/−33.50	45.4
	100	0.68/−155.50	29.14/124.00	0.02/51.80	0.68/−72.50	34.6
	200	0.77/−167.80	16.87/106.60	0.02/53.70	0.44/−103.10	29.4
	500	0.84/178.70	6.92/86.00	0.04/62.30	0.35/−112.10	22.7
	800	0.84/171.70	4.49/75.80	0.06/66.20	0.34/−143.80	18.8
	1000	0.85/167.50	3.51/70.00	0.07/67.50	0.33/−147.80	16.9
	1200	0.86/162.50	2.91/67.80	0.08/70.20	0.33/−154.40	15.6
	1500	0.83/159.00	2.48/58.30	0.10/67.20	0.34/−151.30	13.4
	2000	0.82/148.80	1.88/50.00	0.13/66.90	0.36/−155.20	11.0

Table 2 Scatter parameters (common emitter) at V_{CE} = 8.00 V.

I_C mA	f	s_{ie}	s_{fe}	s_{re}	s_{oe}	G dB
5	40	0.57/−25.70	12.45/169.20	0.02/74.60	1.10/−9.00	30.5
	100	0.63/−66.00	11.47/149.80	0.04/62.30	1.03/−24.90	35.1
	200	0.70/−106.10	8.71/129.00	0.06/46.80	0.80/−41.50	26.2
	500	0.83/−152.50	4.63/95.30	0.07/25.70	0.54/−64.80	19.9
	800	0.84/−169.00	3.08/79.80	0.07/24.30	0.48/−75.60	16.3
	1000	0.86/−177.10	2.43/70.30	0.07/25.20	0.47/−75.60	14.5
	1200	0.86/175.90	1.98/65.20	0.07/31.40	0.46/−86.30	12.8
	1500	0.86/169.50	1.68/55.30	0.07/40.10	0.47/−93.20	11.3
	2000	0.86/157.50	1.22/43.60	0.09/57.20	0.50/−107.60	9.0
10	40	0.41/−42.30	20.42/165.60	0.02/69.20	1.08/−14.10	34.9
	100	0.56/−92.90	17.56/142.80	0.03/58.80	0.95/−36.50	36.6
	200	0.68/−129.60	12.22/121.80	0.04/44.10	0.66/−57.30	27.0
	500	0.81/−164.60	5.83/92.00	0.05/33.90	0.41/−86.50	20.8
	800	0.83/−177.10	3.82/78.80	0.06/39.00	0.37/−96.70	17.2
	1000	0.84/176.50	3.01/70.80	0.06/43.00	0.35/−100.40	15.4
	1200	0.85/170.30	2.47/66.90	0.07/49.00	0.34/−105.80	13.9
	1500	0.83/165.30	2.10/57.30	0.08/53.80	0.36/−110.90	12.1
	2000	0.83/154.30	1.55/47.00	0.11/61.80	0.40/−121.00	9.7
15	40	0.34/−59.10	26.30/163.00	0.02/66.90	1.06/−18.10	37.9
	100	0.55/−110.20	21.36/138.30	0.03/55.30	0.89/−44.60	34.9
	200	0.69/−141.80	14.19/117.50	0.04/44.40	0.59/−68.10	27.7
	500	0.81/−170.00	6.40/90.30	0.05/40.10	0.36/−101.50	21.4
	800	0.82/179.30	4.18/78.30	0.06/47.20	0.33/−111.10	17.7
	1000	0.83/173.60	3.28/71.00	0.06/51.40	0.32/−114.40	15.9
	1200	0.84/167.70	2.70/67.70	0.07/56.70	0.31/−120.90	14.3
	1500	0.82/163.50	2.30/58.20	0.09/58.90	0.33/−123.30	12.6
	2000	0.82/152.60	1.71/48.50	0.12/63.60	0.36/−130.80	10.1
20	40	0.31/−74.20	30.90/160.90	0.02/66.70	1.04/−21.20	41.3
	100	0.57/−121.50	24.24/134.80	0.02/53.80	0.83/−50.90	34.5
	200	0.70/−148.90	15.38/114.70	0.03/44.90	0.54/−76.30	28.2
	500	0.81/−173.10	6.75/89.30	0.04/45.50	0.35/−112.20	21.8
	800	0.82/177.20	4.39/77.80	0.06/53.00	0.32/−44.90	18.1
	1000	0.83/171.90	3.45/71.00	0.06/55.90	0.31/−124.90	16.2
	1200	0.84/166.30	2.84/68.10	0.07/61.10	0.30/−131.50	14.7
	1500	0.82/162/30	2.42/58.70	0.09/61.20	0.33/−131.90	13.0
	2000	0.81/151.70	1.81/49.50	0.12/64.50	0.35/−138.10	10.3
30	40	0.31/−95.50	37.63/157.60	0.02/63.80	1.01/−26.00	47.5
	100	0.60/−134.20	27.51/130.30	0.02/53.10	0.77/−59.70	34.6
	200	0.72/−156.50	16.67/111.10	0.03/46.60	0.49/−87.70	28.8
	500	0.82/−176.40	7.10/87.80	0.04/51.90	0.34/−125.01	22.3
	800	0.82/175.00	4.62/77.30	0.06/59.40	0.32/−132.00	18.5
	1000	0.83/170.20	3.62/71.00	0.06/61.40	0.31/−136.50	16.6
	1200	0.84/164.60	2.99/68.40	0.07/64.70	0.30/−143.40	15.2
	1500	0.81/161.10	2.54/59.00	0.10/63.60	0.32/−141.80	13.2
	2000	0.81/150.60	1.92/50.40	0.13/65.10	0.34/−146.60	10.7

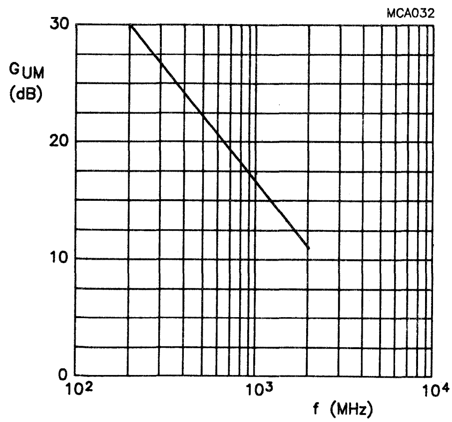


Fig. 2 V_{CE} = 8 V; I_C = 50 mA; T_{amb} = 25 °C; typical values.

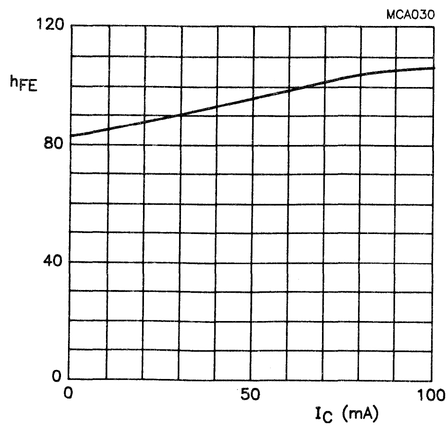


Fig. 3 Typical values.

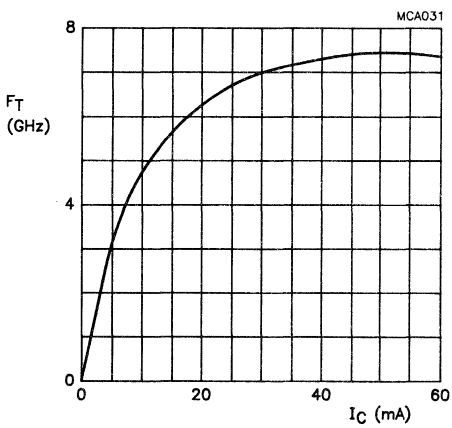


Fig. 4 V_{CE} = 4 V; f = 2 GHz; T_{amb} = 25 °C; typical values.

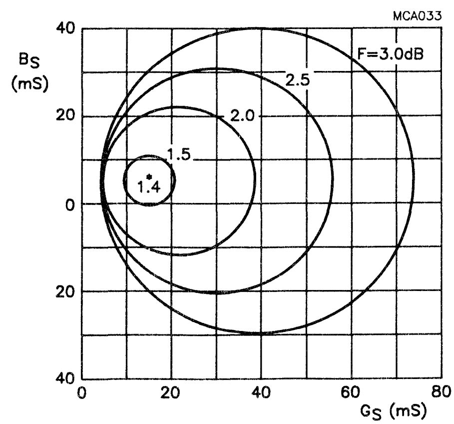


Fig. 5 V_{CE} = 8 V; I_C = 15 mA; f = 800 MHz; typical values.

NPN 1 GHz WIDEBAND TRANSISTOR

NPN transistor in a plastic SOT-223 envelope, primarily designed for VHF, UHF, and microwave wideband amplifiers up to a frequency of 1 GHz.

The device features excellent output voltage capabilities.

QUICK REFERENCE DATA

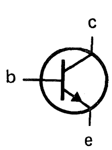
Collector-base voltage (open emitter)	V_{CBO}	max.	20	V
Collector-emitter voltage (open base)	V_{CEO}	max.	10	V
Collector current (DC)	I_C	max.	100	mA
Total power dissipation at T_{amb} = 50 °C	P_{tot}	max.	1	W
DC current gain I_C = 50 mA; V_{CE} = 5 V	h_{FE}	min. typ.	40 100	
Transition frequency at f = 1 GHz I_C = 50 mA; V_{CE} = 8 V	f_T	typ.	8.0	GHz
Maximum power gain at f = 800 MHz I_C = 50 mA; V_{CE} = 8 V	G_{UM}	typ.	15	dB
Output voltage at d_{im} = −60 dB I_C = 50 mA; V_{CE} = 8 V; R_L = 75 Ω $f_{(p+q-r)}$ = 793.25 MHz	V_o	typ.	700	mV

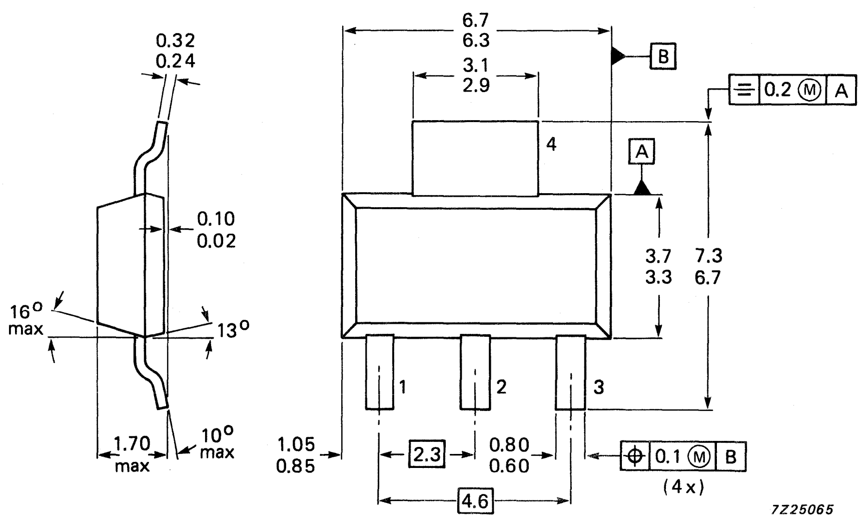
MECHANICAL DATA

Dimensions in mm

Fig. 1 SOT-223

Pinning:
1 = Emitter
2 = Base
3 = Emitter
4 = Collector





RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

Collector-base voltage (open emitter)	V_{CBO}	max.	20	V
Collector-emitter voltage (open base)	V_{CEO}	max.	10	V
Emitter-base voltage (open collector)	V_{EBO}	max.	2.5	V
Collector current (DC)	I_C	max.	100	mA
Total power dissipation at T_{amb} = 45 °C*	P_{tot}	max.	1	W
Storage temperature range	T_{stg}	−65 to + 175		°C
Junction temperature	T_j	max.	175	°C

THERMAL RESISTANCE

From junction to case	$R_{th\ j\text{-}c}$	=	40	K/W
From junction to ambient in free air*	$R_{th\ j\text{-}a}$	=	125	K/W

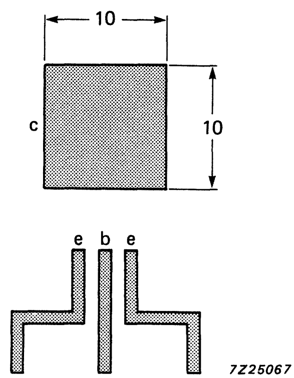


Fig. 2 Single-sided 35 μm Cu-clad epoxy fibreglass printed circuit board; thickness 1.5 mm; tracks fully tin plated; Cu area shown shaded. (Dimensions in mm).

* Mounted on a fibreglass printed circuit board as shown in Fig. 2.

CHARACTERISTICS

T_j = 25 °C unless otherwise specified

Collector cut-off current $I_E = 0$; $V_{CB} = 5$ V	I_{CBO}	max.	100 nA
DC current gain $I_C = 50$ mA; $V_{CE} = 5$ V	h_{FE}	min. typ.	40 100
Transition frequency at f = 1 GHz $I_C = 50$ mA; $V_{CE} = 8$ V	f_T	typ.	8.0 GHz
Collector capacitance at f = 1 MHz $I_E = i_e = 0$; $V_{CB} = 8$ V	C_c	typ.	1.5 pF
Emitter capacitance at f = 1 MHz $I_C = i_c = 0$; $V_{EB} = 0.5$ V	C_e	typ.	3.0 pF
Feedback capacitance at f = 1 MHz $I_C = 0$; $V_{CE} = 8$ V	C_{re}	typ.	0.8 pF
Maximum power gain at f = 500 MHz $I_C = 50$ mA; $V_{CE} = 8$ V	G_{UM}	typ.	18 dB
Maximum power gain at f = 800 MHz $I_C = 50$ mA; $V_{CE} = 8$ V	G_{UM}	typ.	15 dB
Output voltage at $d_{im} = -60$ dB (DIN 45004B) $I_C = 50$ mA; $V_{CE} = 8$ V; $R_L = 75\ \Omega$ $V_p = V_o$ at $d_{im} = -60$ dB; $f_p = 795.25$ MHz $V_q = V_o - 6$ dB; $f_q = 803.25$ MHz $V_r = V_o - 6$ dB; $f_r = 805.25$ MHz measured at $f_{(p+q-r)} = 793.25$ MHz	V_o	typ.	700 mV

N-P-N 2 GHz WIDEBAND TRANSISTOR

N-P-N transistor in a sub-miniature HERMETICALLY SEALED micro-stripline envelope. The BFP90A features low noise, high gain and low distortion figures.

This device is designed for v.h.f. and u.h.f. wideband amplifiers and applications in the GHz range.

P-N-P complement is BFQ51C.

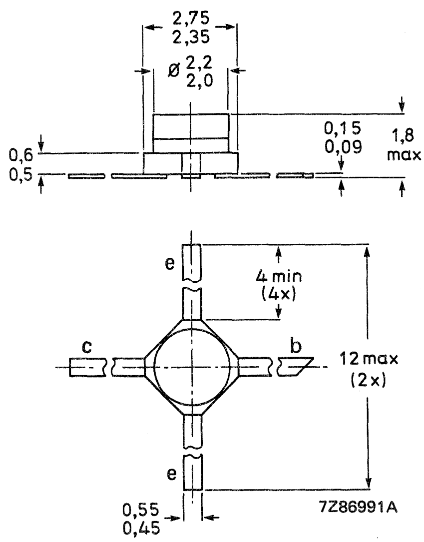
QUICK REFERENCE DATA

Collector-base voltage	V_{CBO}	max.	20	V
Collector-emitter voltage	V_{CEO}	max.	15	V
Collector current (d.c.)	I_C	max.	30	mA
Total power dissipation up to T_{amb} = 125 °C	P_{tot}	max.	250	mW
Junction temperature	T_j	max.	175	°C
D.C. current gain I_C = 14 mA; V_{CE} = 10 V	h_{FE}	min. typ.	40 90	
Transition frequency at f = 500 MHz I_C = 14 mA; V_{CE} = 10 V	f_T	typ.	5,0	GHz
Maximum unilateral power gain I_C = 14 mA; V_{CE} = 10 V at f = 500 MHz at f = 800 MHz	G_{UM}	typ. typ.	23,5 19,5	dB dB

MECHANICAL DATA

Dimensions in mm

Fig. 1 SOT-173.



Marking code: P0

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

Collector-base voltage (open emitter)	V_{CBO}	max.	20	V
Collector-emitter voltage (open base)	V_{CEO}	max.	15	V
Emitter-base voltage (open collector)	V_{EBO}	max.	2	V
Collector current (d.c.)	I_C	max.	30	mA
Total power dissipation up to T_{amb} = 125 °C mounted on a ceramic cubstrate of 0,7 mm x 10 cm^2	P_{tot}	max.	250	mW
Storage temperature	T_{stg}	−65 to + 150		°C
Junction temperature	T_j	max.	175	°C

THERMAL RESISTANCE

From junction to ambient in free air mounted on a ceramic substrate of 0,7 mm x 10 cm^2	$R_{th\ j\text{-}a}$	=	200	K/W

CHARACTERISTICS

T_j = 25 °C unless otherwise specified

Collector cut-off current $I_E = 0$; V_{CB} = 10 V	I_{CBO}	max.	50	nA
D.C. current gain I_C = 14 mA; V_{CE} = 10 V	h_{FE}	min.	40	
		typ.	90	
Transition frequency at f = 500 MHz I_C = 14 mA; V_{CE} = 10 V	f_T	typ.	5,0	GHz
Collector capacitance at f = 1 MHz $I_E = i_e = 0$; V_{CB} = 10 V	C_c	typ.	0,5	pF
Emitter capacitance at f = 1 MHz $I_C = i_c = 0$; V_{EB} = 0,5 V	C_e	typ.	1,2	pF
Feedback capacitance at f = 1 MHz $I_C = 0$; V_{CE} = 10 V	C_{re}	typ.	0,3	pF

Maximum unilateral power gain (s_{re} assumed to be zero)

$$G_{UM} = 10 \log \frac{|s_{fe}|^2}{[1 - |s_{ie}|^2]\ [1 - |s_{oe}|^2]}$$

at I_C = 14 mA; V_{CE} = 10 V; T_{amb} = 25 °C				
f = 500 MHz	G_{UM}	typ.	23,5	dB
f = 800 MHz	G_{UM}	typ.	19,5	dB
Noise figure at f = 800 MHz; Z_S = opt.; T_{amb} = 25 °C				
I_C = 4 mA; V_{CE} = 10 V	F	typ.	1,7	dB
I_C = 14 mA; V_{CE} = 10 V	F	typ.	2,4	dB

s-parameters (common emitter) at V_{CE} = 10 V; T_{amb} = 25 °C; typical values

I_C mA	f MHz	s_{ie}	s_{fe}	s_{re}	s_{oe}	G_{UM} dB
	40	0,89/ −8,4°	7,0/174,9°	0,006/83,5°	0,99/ −2,3°	40,7
	100	0,88/ −20,8°	6,9/167,0°	0,015/79,6°	0,98/ −5,4°	37,3
	200	0,84/ −40,7°	6,6/154,0°	0,028/70,2°	0,95/−10,2°	31,8
	500	0,72/ −87,4°	5,0/126,0°	0,053/51,7°	0,86/−19,6°	23,0
2	800	0,64/−116,6°	3,7/107,3°	0,063/43,9°	0,81/−24,9°	18,3
	1000	0,59/−132,4°	3,1/ 98,1°	0,066/42,4°	0,79/−27,8°	15,9
	1200	0,56/−145,7°	2,7/ 90,6°	0,068/41,1°	0,77/−30,4°	14,2
	1500	0,55/−162,1°	2,0/ 77,6°	0,073/36,9°	0,82/−34,0°	12,5
	2000	0,54/+175,6°	1.6/ 64,3°	0,076/41,3°	0,80/−39,6°	10,2
	40	0,78/ −12,7°	14,8/172,3°	0,006/81,4°	0,98/ −3,7°	41,5
	100	0,76/ −30,9°	14,0/160,8°	0,014/75,3°	0,96/ −8,8°	37,7
	200	0,70/ −58,3°	12,4/144,1°	0,024/64,9°	0,89/−15,1°	31,6
	500	0,58/−112,1°	7,8/114,7°	0,040/50,6°	0,74/−23,5°	23,1
5	800	0,52/−138,8°	5,5/ 98,5°	0,048/50,1°	0,69/−26,4°	19,0
	1000	0,49/−153,6°	4,4/ 91,2°	0,052/51,7°	0,67/−28,5°	16,6
	1200	0,48/−163,4°	3,8/ 84,5°	0,056/53,2°	0,66/−30,5°	15,2
	1500	0,49/−178,1°	3,0/ 73,8°	0,064/50,8°	0,70/−33,9°	13,7
	2000	0,48/+162,9°	2,3/ 62,7°	0,075/56,0°	0,70/−38,8°	11,3
	40	0,65/ −18,3°	23,5/169,2°	0,005/79,9°	0,98/ −5,4°	43,8
	100	0,63/ −43,4°	21,5/154,2°	0,012/71,9°	0,93/−12,3°	37,5
	200	0,56/ −78,1°	17,4/134,5°	0,020/61,1°	0,82/−19,0°	31,3
	500	0,49/−132,4°	9,5/107,0°	0,032/54,4°	0,65/−24,0°	23,1
10	800	0,46/−154,9°	0,4/ 93,3°	0,041/58,0°	0,62/−26,1°	19,3
	1000	0,44/−167,1°	5,1/ 87,4°	0,047/60,6°	0,61/−27,6°	17,1
	1200	0,44/−174,8°	4,3/ 81,7°	0,052/62,5°	0,60/−29,7°	15,5
	1500	0,46/+171,1°	3,5/ 71,3°	0,060/60,4°	0,64/−32,7°	14,3
	2000	0,45/+154,8°	2,7/ 61,4°	0,075/63,5°	0,64/−37,6°	11,8
	40	0,56/ −22,6°	28,1/167,9°	0,005/78,8°	0,98/ −6,3°	44,4
	100	0,54/ −53,4°	25,2/150,4°	0,011/69,5°	0,92/−14,0°	37,4
	200	0,51/ −91,1°	19,6/130,4°	0,018/59,7°	0,79/−20,8°	31,5
	500	0,47/−143,6°	10,1/103,3°	0,028/56,0°	0,63/−24,5°	23,5
14	800	0,47/−164,4°	6,6/ 70,0°	0,037/59,9°	0,60/−26,0°	19,5
	1000	0,44/−174,9°	5,4/ 84,7°	0,043/62,4°	0,59/−27,5°	17,5
	1200	0,45/+177,0°	4,5/ 79,3°	0,049/64,0°	0,59/−29,4°	15,9
	1500	0,47/+167,8°	3,7/ 70,4°	0,059/62,5°	0,62/−32,4°	14,5
	2000	0,46/+152,2°	2,9/ 61,0°	0,075/64,7°	0,62/−37,5°	12,3

S-parameters (common emitter) at V_{CE} = 10 V; T_{amb} = 25 °C; typical values (continued)

I_C mA	f MHz	s_{ie}	s_{fe}	s_{re}	s_{oe}	G_{UM} dB
	40	0,52/ −28,1°	33,9/164,9°	0,005/77,6°	0,96/ −7,5°	43,0
	100	0,50/ −64,1°	29,3/145,4°	0,011/67,4°	0,88/−15,5°	37,1
	200	0,46/−104,5°	21,0/124,4°	0,016/59,7°	0,73/−20,8°	30,8
	500	0,46/−150,2°	10,3/101,0°	0,026/61,4°	0,60/−22,1°	23,2
20	800	0,44/−165,7°	6,7/ 89,7°	0,037/66,1°	0,58/−23,9°	19,2
	1000	0,44/−175,7°	5,4/ 84,2°	0,044/68,6°	0,58/−25,7°	17,4
	1200	0,44/+178,5°	4,5/ 79,6°	0,050/69,8°	0,57/−27,9°	15,7
	1500	0,46/+164,3°	3,7/ 69,2°	0,058/65,8°	0,62/−31,4°	14,4
	2000	0,46/+149,9°	2,3/ 60,3°	0,075/67,5°	0,62/−36,6°	12,2
	40	0,48/ −33,4°	36,8/162,7°	0,005/75,8°	0,95/ −8,2°	42,6
	100	0,47/ −72,9°	30,3/141,7°	0,010/65,2°	0,85/−16,2°	36,3
	200	0,45/−113,4°	21,0/121,1°	0,015/59,1°	0,71/−20,2°	30,5
	500	0,45/−156,0°	9,9/ 99,1°	0,025/62,9°	0,60/−20,8°	22,8
25	800	0,45/−170,1°	6,5/ 88,1°	0,036/67,9°	0,58/−23,1°	19,0
	1000	0,44/−179,1°	5,2/ 83,2°	0,043/69,9°	0,58/−25,0°	17,0
	1200	0,44/+175,4°	4,3/ 78,9°	0,050/71,2°	0,58/−27,4°	15,4
	1500	0,47/+162,2°	3,5/ 68,5°	0,058/67,3°	0,62/−31,2°	14,2
	2000	0,48/+148,5°	2,7/ 59,4°	0,074/68,8°	0,62/−36,6°	11,8

s-parameters (common emitter) at V_{CE} = 5 V; T_{amb} = 25 °C; typical values

I_C mA	f MHz	s_{ie}	s_{fe}	s_{re}	s_{oe}	G_{UM} dB
	40	0,87/ −8,2°	6,7/175,5°	0,007/84,2°	1,00/ −2,4°	43,1
	100	0,86/ −20,9°	6,6/166,5°	0,016/78,8°	0,99/ −6,0°	38,7
	200	0,83/ −40,3°	6,2/154,3°	0,031/69,8°	0,96/−11,0°	32,3
	500	0,71/ −87,9°	4,6/125,4°	0,058/49,9°	0,86/−21,3°	22,3
2	800	0,65/−119,8°	3,5/105,6°	0,069/40,3°	0,80/−26,6°	17,7
	1000	0,59/−134,3°	2,9/ 97,1°	0,071/37,9°	0,78/−29,6°	15,2
	1200	0,58/−148,1°	2,5/ 88,8°	0,074/36,0°	0,76/−32,2°	13,6
	1500	0,55/−163,0°	2,0/ 76,3°	0,077/35,9°	0,78/−35,0°	11,6
	2000	0,52/+174,5°	1,6/ 62,9°	0,030/40,2°	0,76/−40,5°	9,2
	40	0,74/ −13,1°	14,5/172,7°	0,006/81,9°	0,99/ −4,1°	44,2
	100	0,72/ −32,6°	13,9/160,4°	0,015/74,7°	0,97/ −9,7°	38,0
	200	0,68/ −60,3°	12,2/143,9°	0,026/63,7°	0,90/−16,7°	31,6
	500	0,57/−115,7°	7,6/113,6°	0,043/48,2°	0,73/−25,9°	22,8
5	800	0,54/−144,5°	5,3/ 96,6°	0,050/45,9°	0,67/−28,9°	18,6
	1000	0,50/−157,0°	4,3/ 90,0°	0,054/47,4°	0,65/−30,7°	16,4
	1200	0,50/−168,3°	3,7/ 83,4°	0,058/48,6°	0,64/−32,8°	14,9
	1500	0,50/+178,9°	2,9/ 72,7°	0,067/49,5°	0,67/−34,9°	13,2
	2000	0,49/+160,3°	2,2/ 61,3°	0,078/54,2°	0,66/−39,7°	10,7

s-parameters (common emitter) at V_{CE} = 5 V; T_{amb} = 25 °C; typical values (continued)

I_C mA	f MHz	s_{ie}	s_{fe}	s_{re}	s_{oe}	G_{UM} dB
	40	0,59/ −20,3°	23,3/169,2°	0,006/79,7°	0,98/ −5,8°	43,8
	100	0,57/ −48,4°	21,4/152,9°	0,013/70,4°	0,93/−13,3°	37,0
	200	0,54/ −84,5°	17,1/133,6°	0,021/59,5°	0,81/−20,4°	30,9
	500	0,49/−139,3°	9,2/105,3°	0,032/52,2°	0,64/−25,4°	22,8
10	800	0,49/−162,1°	6,1/ 91,0°	0,040/55,4°	0,60/−26,9°	18,8
	1000	0,47/−173,0°	4,9/ 85,1°	0,046/58,1°	0,59/−27,9°	16,8
	1200	0,47/+178,0°	4,1/ 79,4°	0,051/59,8°	0,59/−30,0°	15,3
	1500	0,48/+169,1°	3,4/ 70,7°	0,064/59,8°	0,61/−34,3°	13,8
	2000	0,48/+153,0°	2,6/ 60,5°	0,080/62,6°	0,60/−39,4°	11,4
	40	0,51/ −25,7°	28,1/167,4°	0,005/78,8°	0,98/ −6,9°	43,5
	100	0,50/ −59,3°	25,0/149,1°	0,012/68,4°	0,91/−15,3°	36,6
	200	0,49/ −98,5°	19,1/128,7°	0,019/58,4°	0,77/−22,3°	30,8
	500	0,48/−149,2°	9,7/102,2°	0,029/55,2°	0,61/−25,8°	22,9
14	800	0,48/−168,9°	6,3/ 89,1°	0,038/59,3°	0,57/−27,2°	18,9
	1000	0,47/−178,5°	5,1/ 83,6°	0,044/61,8°	0,57/−28,6°	16,9
	1200	0,48/+173,6°	4,3/ 78,2°	0,050/63,1°	0,56/−30,6°	15,5
	1500	0,48/+164,7°	3,5/ 69,5°	0,062/63,3°	0,60/−33,6°	13,9
	2000	0,48/+149,7°	2,7/ 59,5°	0,079/65,2°	0,59/−38,8°	11,5
	40	0,42/ −34,0°	33,1/165,0°	0,005/77,1°	0,97/ −8,0°	43,1
	100	0,44/ −74,8°	28,2/144,4°	0,011/66,3°	0,87/−17,0°	36,2
	200	0,46/−115,0°	20,3/123,6°	0,016/57,7°	0,73/−22,8°	30,5
	500	0,48/−159,0°	9,8/ 99,1°	0,026/58,9°	0,58/−24,3°	22,8
20	800	0,49/−174,7°	6,3/ 87,0°	0,036/63,8°	0,56/−26,0°	18,9
	1000	0,48/+176,5°	5,1/ 82,0°	0,042/65,9°	0,56/−27,7°	16,9
	1200	0,49/+169,6°	4,3/ 76,8°	0,049/66,9°	0,56/−30,0°	15,4
	1500	0,49/+160,6°	3,4/ 68,0°	0,061/66,8°	0,60/−32,6°	13,8
	2000	0,49/+146,6°	2,6/ 58,7°	0,079/68,4°	0,60/−38,0°	11,4
	40	0,35/ −67,3°	33,6/155,3°	0,005/69,1°	0,91/−10,0°	38,9
	100	0,45/−116,5°	24,2/130,1°	0,010/56,5°	0,78/−16,4°	32,7
	200	0,50/−147,5°	14,8/112,3°	0,013/54,2°	0,67/−17,0°	27,3
	500	0,53/−174,4°	6,6/ 95,1°	0,022/63,7°	0,62/−18,9°	19,9
30	800	0,54/+175,0°	4,3/ 85,5°	0,032/69,0°	0,61/−23,0°	16,2
	1000	0,53/+168,1°	3,5/ 81,2°	0,039/70,9°	0,61/−25,9°	14,4
	1200	0,55/+162,6°	3,0/ 76,1°	0,045/71,9°	0,61/−29,1°	13,0
	1500	0,57/+154,5°	2,4/ 67,8°	0,057/71,4°	0,64/−33,2°	11,5
	2000	0,57/+141,1°	1,8/ 58,7°	0,075/73,4°	0,64/−39,8°	9,2

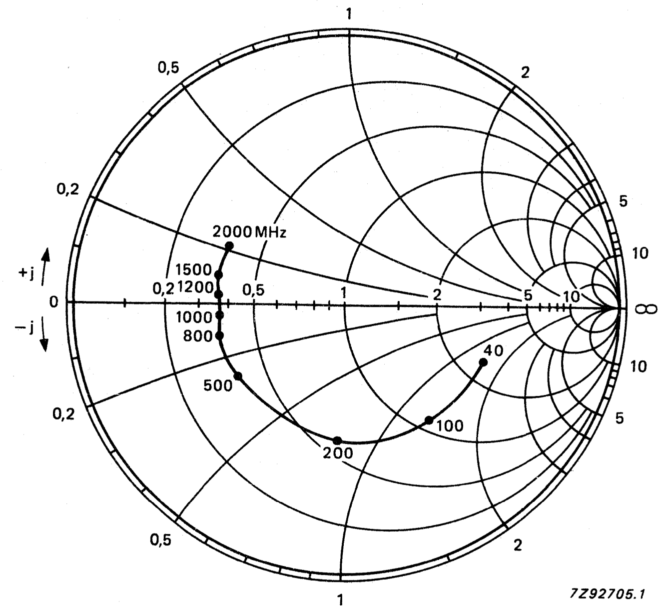


Fig. 2 Input impedance, derived from input reflection coefficient s_{ie} coordinates, in ohm x 50.

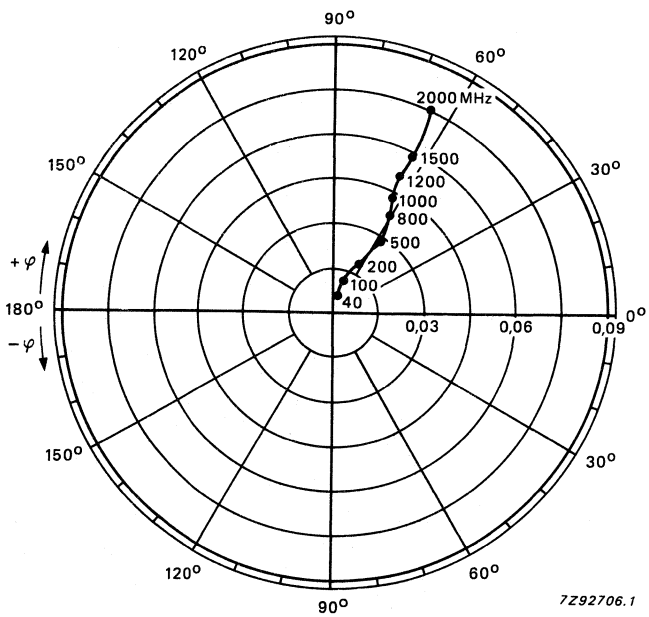


Fig. 3 Reverse transmission coefficient s_{re}.

Conditions for Figs 2 to 5: V_{CE} = 10 V; I_C = 14 mA; T_{amb} = 25 °C.

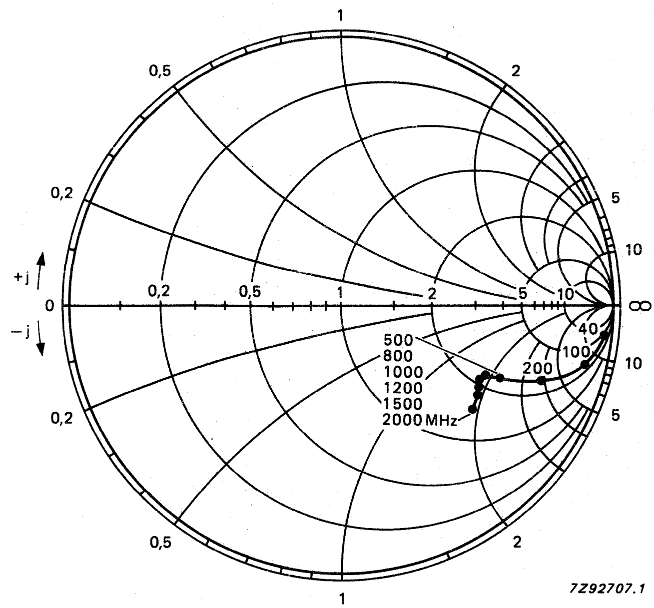


Fig. 4 Output impedance, derived from output reflection coefficient s_{oe} coordinates, in ohm x 50.

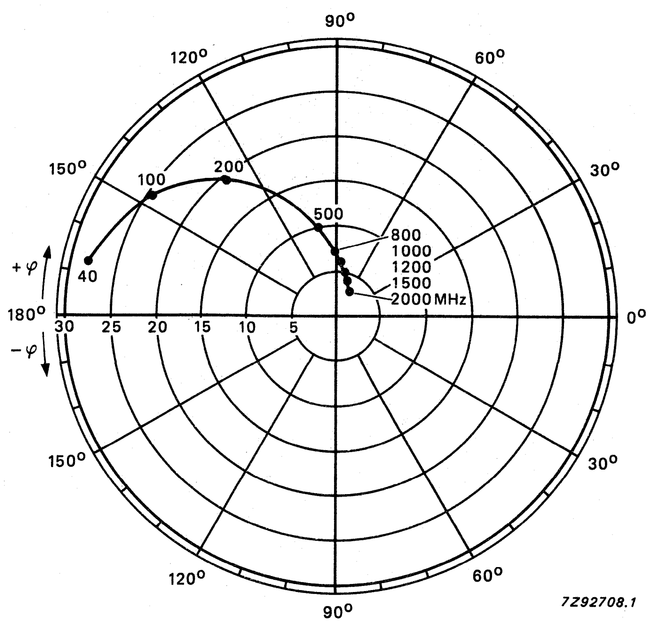


Fig. 5 Forward transmission coefficient s_{fe}.

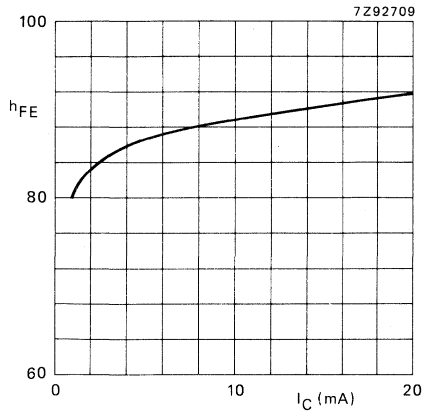


Fig. 6 V_{CE} = 10 V; T_j = 25 ^oC; typical values.

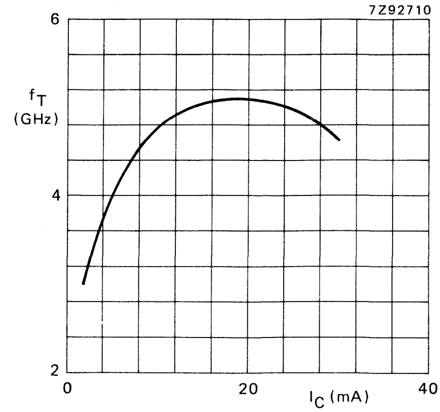


Fig. 7 V_{CE} = 10 V; f = 500 MHz; T_j = 25 ^oC; typical values.

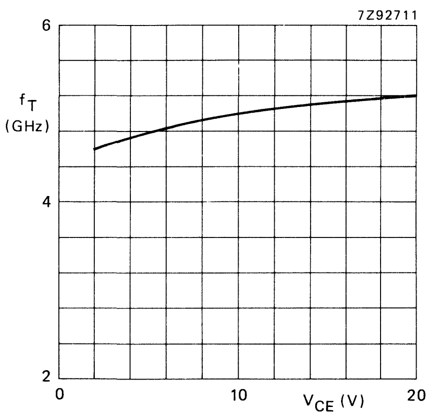


Fig. 8 I_C = 14 mA; f = 500 MHz; T_j = 25 ^oC; typical values.

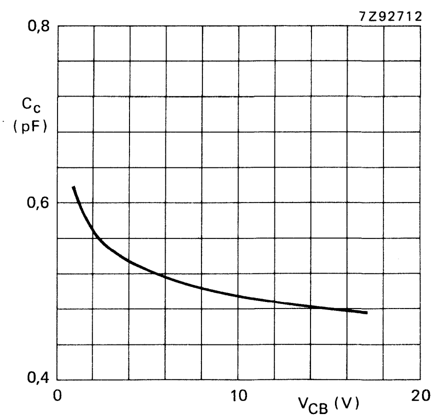


Fig. 9 I_E = i_e = 0; f = 1 MHz; T_j = 25 ^oC; typical values.

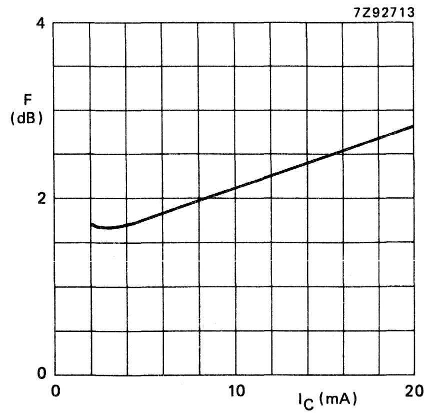


Fig. 10 V_{CE} = 10 V; f = 800 MHz; Z_S = opt.; T_{amb} = 25 °C; typical values.

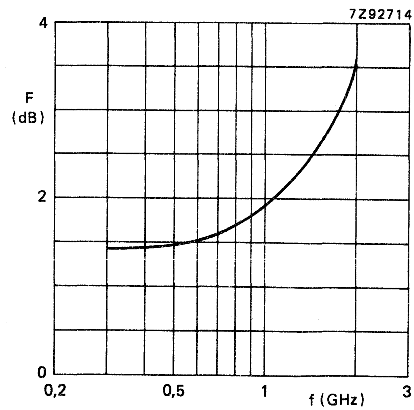


Fig. 11 V_{CE} = 10 V; I_C = 4 mA; Z_S = opt.; T_{amb} = 25 °C; typical values.

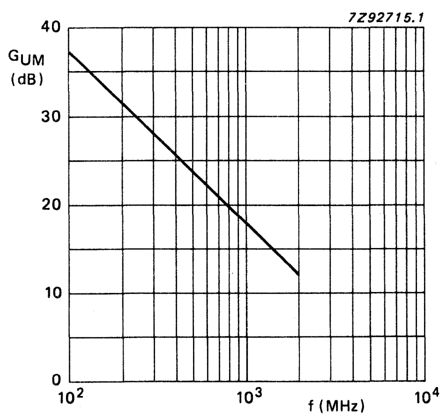


Fig. 12 V_{CE} = 10 V; I_C = 14 mA; T_{amb} = 25 °C. typical values.

N-P-N 2 GHz WIDEBAND TRANSISTOR

Gold-metallized n-p-n transistor in a sub-miniature HERMETICALLY SEALED micro-stripline envelope. The BFP91A features low noise, high gain and low distortion figures.

This device is designed for v.h.f. and u.h.f. wideband amplifiers and applications in the GHz range.

P-N-P complement is BFQ23C.

QUICK REFERENCE DATA

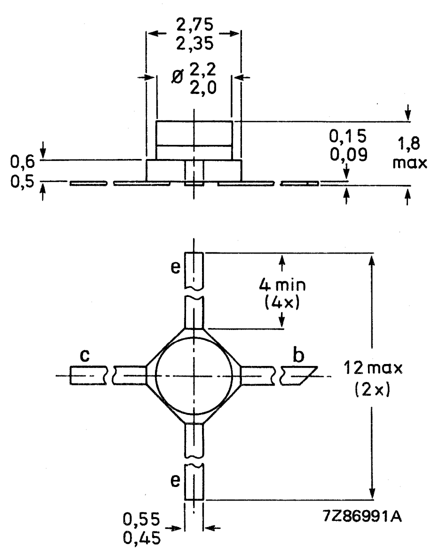
Collector-base voltage	V_{CBO}	max.	15	V
Collector-emitter voltage	V_{CEO}	max.	12	V
Collector current (d.c.)	I_C	max.	50	mA
Total power dissipation up to T_{amb} = 105 °C	P_{tot}	max.	350	mW
Junction temperature	T_j	max.	175	°C
D.C. current gain I_C = 30 mA; V_{CE} = 5 V	h_{FE}	min.	40	
Transition frequency at f = 500 MHz I_C = 30 mA; V_{CE} = 5 V	f_T	typ.	6,0	GHz
Maximum unilateral power gain I_C = 30 mA; V_{CE} = 8 V at f = 500 MHz	G_{UM}	typ.	22,5	dB
at f = 800 MHz	G_{UM}	typ.	18,5	dB

MECHANICAL DATA

Dimensions in mm

Fig. 1 SOT-173.

Marking code: P1



RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

Collector-base voltage (open emitter)	V_{CBO}	max.	15	V
Collector-emitter voltage (open base)	V_{CEO}	max.	12	V
Emitter-base voltage (open collector)	V_{EBO}	max.	2	V
Collector current (d.c.)	I_C	max.	50	mA
Total power dissipation up to T_{amb} = 105 °C mounted on a ceramic substrate of 0,7 mm x 10 cm^2	P_{tot}	max.	350	mW
Storage temperature	T_{stg}	−65 to + 150		°C
Junction temperature	T_j	max.	175	°C

THERMAL RESISTANCE

From junction to ambient in free air mounted on a ceramic substrate of 0,7 mm x 10 cm^2	$R_{th\ j\text{-}a}$	=	200	K/W

CHARACTERISTICS

T_j = 25 °C unless otherwise specified

Collector cut-off current $I_E = 0$; $V_{CB} = 10$ V	I_{CBO}	max.	50	nA
D.C. current gain $I_C = 30$ mA; $V_{CE} = 5$ V	h_{FE}	min.	40	
		typ.	90	
Transition frequency at f = 500 MHz $I_C = 30$ mA; $V_{CE} = 5$ V	f_T	typ.	6,0	GHz
Collector capacitance at f = 1 MHz $I_E = i_e = 0$; $V_{CB} = 10$ V	C_c	typ.	0,7	pF
Emitter capacitance at f = 1 MHz $I_C = i_c = 0$; $V_{EB} = 0,5$ V	C_e	typ.	2,5	pF
Feedback capacitance at f = 1 MHz $I_C = 0$; $V_{CE} = 10$ V	C_{re}	typ.	0,5	pF

Maximum unilateral power gain (s_{re} assumed to be zero)

$$G_{UM} = 10 \log \frac{|s_{fe}|^2}{[1 - |s_{ie}|^2]\ [1 - |s_{oe}|^2]}$$

at $I_C = 30$ mA; $V_{CE} = 8$ V; $T_{amb} = 25$ °C, f = 500 MHz	G_{UM}	typ.	22,5	dB
f = 800 MHz		typ.	18,5	dB
Noise figure at f = 800 MHz; Z_S = opt.; $T_{amb} = 25$ °C, $I_C = 4$ mA; $V_{CE} = 8$ V	F	typ.	1,6	dB
$I_C = 30$ mA; $V_{CE} = 8$ V		typ.	2,3	dB

s-parameters (common emitter) at V_{CE} = 8 V; T_{amb} = 25 °C; typical values.

I_C mA	f MHz	s_{ie}	s_{fe}	s_{re}	s_{oe}	G_{UM} dB
2	40	0,92/ −13,6°	6,8/172,5°	0,011/81,7°	0,99/ −3,9°	41,8
	100	0,90/ −33,2°	6,8/160,7°	0,027/72,9°	0,97/ −9,0°	36,2
	200	0,86/ −62,0°	6,0/143,6°	0,048/59,0°	0,92/−15,6°	29,5
	500	0,79/−117,3°	3,8/111,1°	0,075/35,5°	0,78/−26,8°	19,9
	800	0,73/−144,5°	2,6/ 93,6°	0,080/27,4°	0,73/−32,5°	14,9
	1000	0,71/−157,6°	2,1/ 85,2°	0,081/25,5°	0,72/−36,6°	12,7
	1200	0,71/−167,6°	1,8/ 77,8°	0,081/24,7°	0,72/−40,5°	11,3
	1500	0,68/−178,8°	1,5/ 68,1°	0,090/24,5°	0,69/−46,5°	8,8
	2000	0,68/+163,8°	1,2/ 54,6°	0,088/30,2°	0,68/−55,2°	6,7
5	40	0,81/ −19,5°	16,0/169,4°	0,011/79,3°	0,98/ −6,9°	42,7
	100	0,79/ −46,6°	14,5/153,7°	0,024/67,7°	0,93/−15,8°	36,2
	200	0,74/ −82,4°	11,8/133,9°	0,040/52,9°	0,80/−25,4°	29,3
	500	0,69/−136,4°	6,5/103,9°	0,056/36,1°	0,60/−35,3°	21,0
	800	0,66/−158,8°	4,3/ 89,5°	0,061/35,2°	0,55/−38,5°	16,7
	1000	0,65/−169,4°	3,5/ 82,7°	0,064/36,8°	0,54/−41,3°	14,8
	1200	0,65/−177,2°	2,9/ 76,7°	0,066/38,6°	0,53/−44,3°	13,1
	1500	0,60/+172,1°	2,3/ 68,5°	0,083/42,5°	0,49/−49,2°	10,5
	2000	0,60/+158,0°	1,8/ 56,9°	0,095/48,3°	0,49/−56,1°	8,2
10	40	0,70/ −27,3°	26,2/165,5°	0,010/76,7°	0,97/−10,5°	43,6
	100	0,68/ −63,2°	22,8/146,5°	0,021/62,8°	0,86/−23,2°	35,7
	200	0,66/−102,8°	16,9/125,5°	0,032/49,2°	0,68/−34,3°	29,7
	500	0,64/−150,7°	8,3/ 98,9°	0,043/40,6°	0,46/−41,9°	21,7
	800	0,63/−167,1°	5,5/ 86,1°	0,048/45,8°	0,43/−43,1°	17,9
	1000	0,62/−176,9°	4,4/ 81,2°	0,056/47,4°	0,41/−45,2°	15,8
	1200	0,62/−176,9°	3,6/ 76,1°	0,061/49,9°	0,40/−47,6°	14,0
	1500	0,57/+165,6°	3,0/ 68,6°	0,084/53,2°	0,36/−52,3°	11,8
	2000	0,58/+153,5°	2,3/ 58,0°	0,103/55,7°	0,35/−58,1°	9,4
20	40	0,55/ −40,8°	40,6/160,3°	0,009/73,3°	0,93/−15,8°	12,4
	100	0,57/ −86,4°	32,5/137,6°	0,017/58,1°	0,77/−32,6°	35,9
	200	0,59/−125,5°	21,6/117,0°	0,024/48,7°	0,54/−43,9°	30,0
	500	0,62/−163,2°	9,9/ 94,4°	0,035/49,6°	0,34/−49,0°	22,6
	800	0,60/−176,3°	6,3/ 84,5°	0,046/55,5°	0,30/−49,2°	18,3
	1000	0,59/+175,8°	5,1/ 79,3°	0,053/58,1°	0,30/−49,9°	16,4
	1200	0,59/+171,1°	4,3/ 74,8°	0,061/59,7°	0,30/−52,0°	14,9
	1500	0,55/+161,8°	3,4/ 68,6°	0,088/61,0°	0,25/−57,7°	12,5
	2000	0,56/+150,8°	2,6/ 58,8°	0,111/61,2°	0,25/−61,8°	10,1
30	40	0,48/ −50,4°	48,6/157,4°	0,008/71,2°	0,91/−18,7°	42,5
	100	0,53/ −99,7°	36,9/133,2°	0,015/56,5°	0,71/−37,4°	35,8
	200	0,57/−135,7°	23,2/113,3°	0,021/49,7°	0,48/−48,0°	30,2
	500	0,60/−167,9°	10,4/ 93,1°	0,032/54,2°	0,29/−52,2°	22,5
	800	0,59/−180,0°	6,6/ 83,6°	0,044/54,9°	0,27/−52,0°	18,5
	1000	0,59/+173,4°	5,3/ 78,6°	0,053/61,8°	0,27/−52,2°	16,7
	1200	0,59/+169,2°	4,4/ 74,3°	0,060/62,8°	0,26/−54,3°	45,0
	1500	0,56/+160,2°	3,5/ 68,2°	0,089/63,3°	0,21/−59,7°	12,8
	2000	0,55/+149,4°	2,7/ 59,0°	0,113/62,3°	0,21/−64,5°	10,5

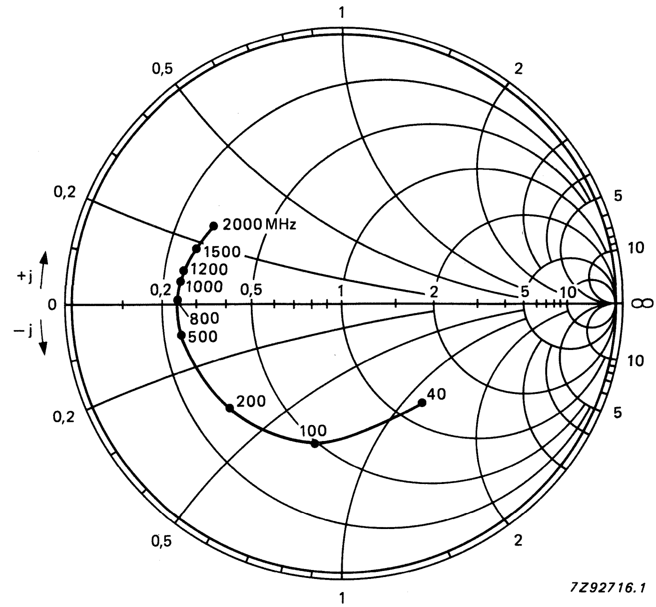


Fig. 2 Input impedance, derived from input reflection coefficient s_{ie} coordinates, in ohm x 50.

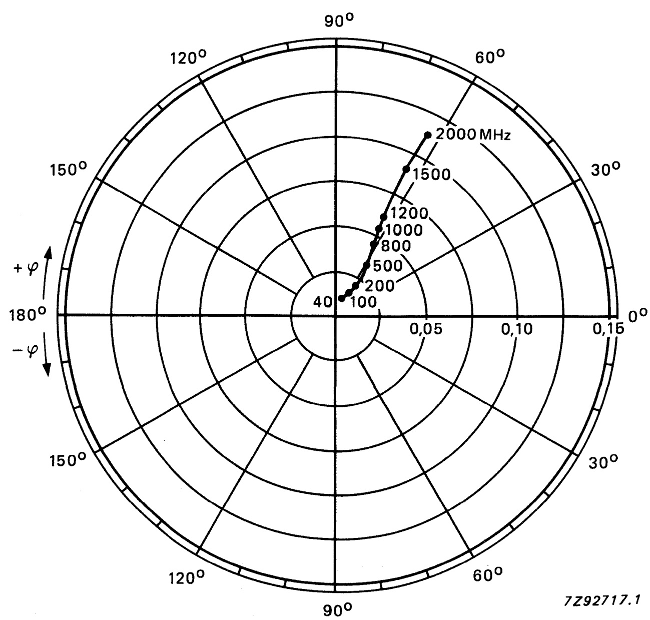


Fig. 3 Reverse transmission coefficient s_{re}.

Conditions for Figs 2 to 5: V_{CE} = 8 V; I_C = 30 mA; T_{amb} = 25 °C.

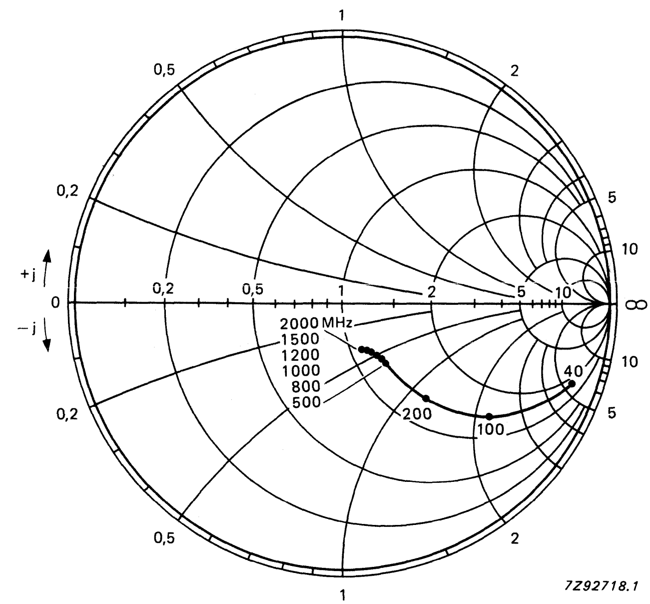


Fig. 4 Output impedance, derived from output reflection coefficient s_{oe} coordinates, in ohm x 50.

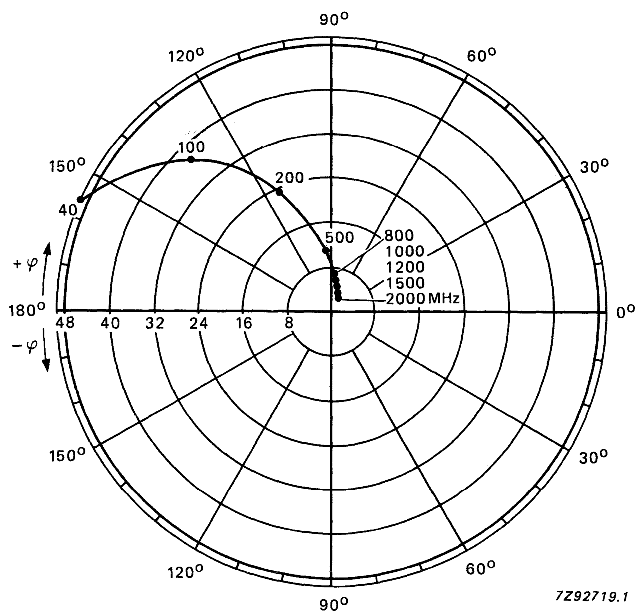


Fig. 5 Forward transmission coefficient s_{fe}.

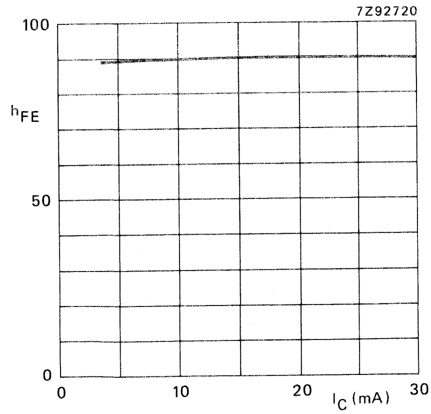


Fig. 6 V_{CE} = 5 V; T_j = 25 °C; typical values.

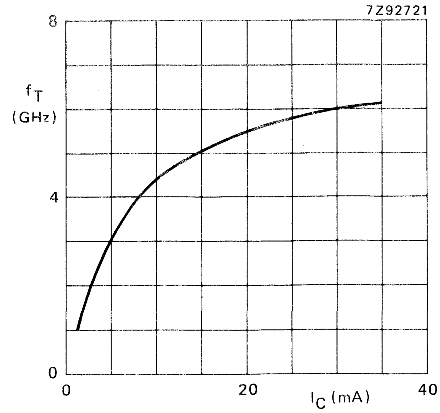


Fig. 7 V_{CE} = 5 V; f = 500 MHz; T_j = 25 °C; typical values.

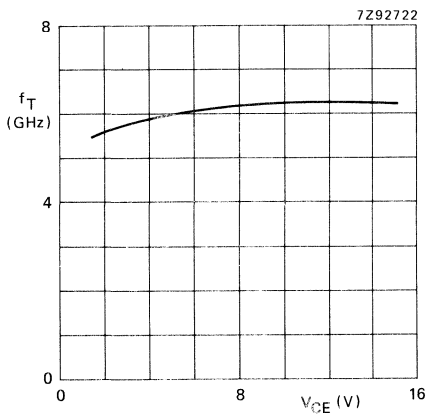


Fig. 8 I_C = 30 mA; f = 500 MHz; T_j = 25 °C; typical values.

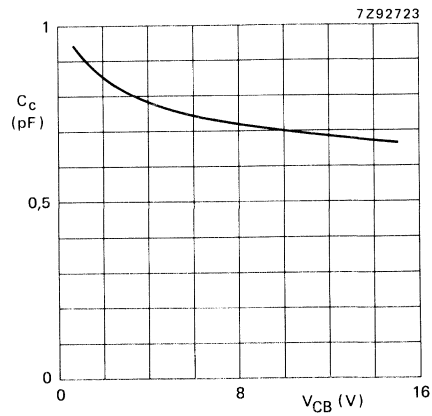


Fig. 9 $I_E = i_e = 0$; f = 1 MHz; T_j = 25 °C; typical values.

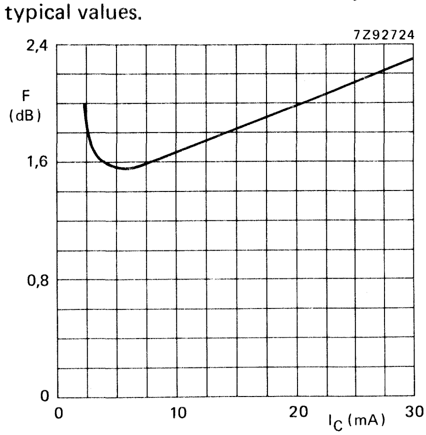


Fig. 10 V_{CE} = 8 V; f = 800 MHz; Z_S = opt.; T_{amb} = 25 °C; typical values.

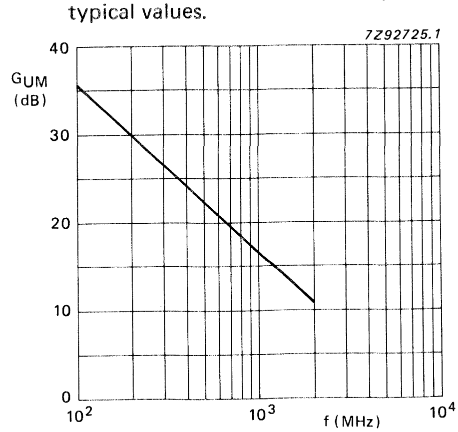


Fig. 11 V_{CE} = 8 V; I_C = 30 mA; T_{amb} = 25 °C; typical values.

N-P-N 2 GHz WIDEBAND TRANSISTOR

N-P-N transistor in a sub-miniature HERMETICALLY SEALED micro-stripline envelope. The BFP96 features low noise, high gain and low distortion figures.

This device is designed for v.h.f. and u.h.f. wideband amplifiers and applications in the GHz range.

P-N-P complement is BFQ32C.

QUICK REFERENCE DATA

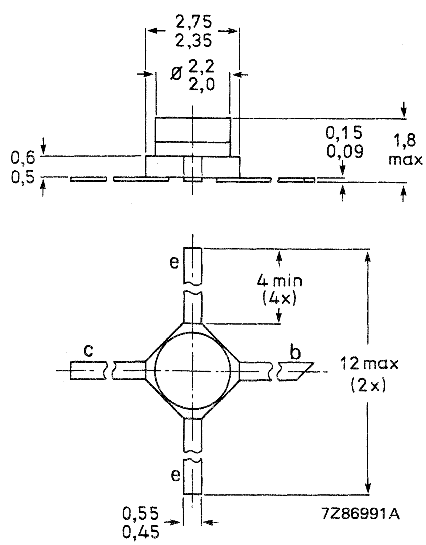
Collector-base voltage	V_{CBO}	max.	20	V
Collector-emitter voltage	V_{CEO}	max.	15	V
Collector current (d.c.)	I_C	max.	100	mA
Total power dissipation up to T_{amb} = 75 °C	P_{tot}	max.	500	mW
Junction temperature	T_j	max.	175	°C
D.C. current gain I_C = 50 mA; V_{CE} = 10 V	h_{FE}	min.	25	
Transition frequency at f = 500 MHz I_C = 50 mA; V_{CE} = 10 V	f_T	typ.	5,0	GHz
Maximum unilateral power gain I_C = 50 mA; V_{CE} = 10 V at f = 500 MHz	G_{UM}	typ.	19,0	dB
at f = 800 MHz	G_{UM}	typ.	15,0	dB

MECHANICAL DATA

Dimensions in mm

Fig. 1 SOT-173.

Marking code: P6



RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

Collector-base voltage (open emitter)	V_{CBO}	max.	20	V
Collector-emitter voltage (open base)	V_{CEO}	max.	15	V
Emitter-base voltage (open collector)	V_{EBO}	max.	3	V
Collector current (d.c.)	I_C	max.	100	mA
Total power dissipation up to T_{amb} = 75 °C mounted on a ceramic substrate of 0,7 mm x 10 cm²	P_{tot}	max.	500	mW
Storage temperature	T_{stg}	−65 to + 150		°C
Junction temperature	T_j	max.	175	°C

THERMAL RESISTANCE

From junction to ambient in free air mounted on a ceramic cubstrate of 0,7 mm x 10 cm²	$R_{th\ j\text{-}a}$	=	200	K/W

CHARACTERISTICS

T_j = 25 °C unless otherwise specified

Collector cut-off current $I_E = 0$; $V_{CB} = 10$ V	I_{CBO}	max.	100	nA
D.C. current gain $I_C = 50$ mA; $V_{CE} = 10$ V	h_{FE}	min.	25	
Transition frequency at f = 500 MHz $I_C = 50$ mA; $V_{CE} = 10$ V	f_T	typ.	5,0	GHz
Collector capacitance at f = 1 MHz $I_E = i_e = 0$; $V_{CB} = 10$ V	C_c	typ.	1,3	pF
Emitter capacitance at f = 1 MHz $I_C = i_c = 0$; $V_{EB} = 0,5$ V	C_e	typ.	5,5	pF
Feedback capacitance at f = 1 MHz $I_C = 0$; $V_{CE} = 10$ V	C_{re}	typ.	1,0	pF

Maximum unilateral power gain (s_{re} assumed to be zero)

$$G_{UM} = 10 \log \frac{|s_{fe}|^2}{[1 - |s_{ie}|^2]\ [1 - |s_{oe}|^2]}$$

at $I_C = 50$ mA; $V_{CE} = 10$ V; $T_{amb} = 25$ °C				
f = 500 MHz	G_{UM}	typ.	19,0	dB
f = 800 MHz	G_{UM}	typ.	15,0	dB
Noise figure at f = 800 MHz; Z_S = opt.; $T_{amb} = 25$ °C $I_C = 50$ mA; $V_{CE} = 10$ V	F	typ.	3,7	dB

s-parameters (common emitter) at V_{CE} = 10 V; T_{amb} = 25 °C; typical values.

I_C mA	f MHz	s_{ie}	s_{fe}	s_{re}	s_{oe}	G_{UM} dB
10	40	0,73/ −50,1°	26,3/153,9°	0,020/67,3°	0,90/ −22,1°	38,9
	100	0,72/ −99,3°	18,7/128,4°	0,036/47,4°	0,67/ −41,7°	31,2
	200	0,71/−136,2°	11,2/108,6°	0,045/37,3°	0,44/ −51,9°	25,0
	500	0,71/−167,7°	4,8/ 88,2°	0,057/38,8°	0,29/ −58,8°	17,1
	800	0,71/−179,3°	3,1/ 75,9°	0,070/45,0°	0,29/ −63,8°	13,3
	1000	0,70/+174,9°	2,5/ 71,1°	0,078/48,9°	0,29/ −66,8°	11,3
	1200	0,70/+170,2°	2,1/ 65,5°	0,087/51,1°	0,30/ −71,5°	9,8
	1500	0,71/+161,3°	1,7/ 55,4°	0,098/50,5°	0,34/ −74,2°	8,1
	2000	0,72/+152,0°	1,3/ 42,8°	0,119/52,1°	0,35/ −87,0°	5,9
15	40	0,67/ −60,5°	32,9/150,2°	0,018/64,0°	0,87/ −27,4°	39,1
	100	0,69/−111,5°	22,0/123,6°	0,031/44,8°	0,60/ −50,0°	31,5
	200	0,70/−144,2°	12,9/105,5°	0,038/37,5°	0,38/ −62,3°	25,8
	500	0,71/−171,5°	5,5/ 86,8°	0,051/43,0°	0,23/ −69,8°	18,0
	800	0,71/+178,5°	3,5/ 75,4°	0,064/49,2°	0,22/ −73,2°	14,1
	1000	0,69/+173,1°	2,8/ 70,4°	0,075/52,1°	0,22/ −75,1°	12,1
	1200	0,70/+169,0°	2,4/ 65,1°	0,085/53,7°	0,23/ −80,0°	10,6
	1500	0,70/+159,7°	1,9/ 57,0°	0,100/54,0°	0,26/ −82,8°	8,8
	2000	0,71/+151,3°	1,5/ 45,0°	0,121/54,1°	0,26/ −93,0°	6,6
20	40	0,64/ −69,4°	38,8/146,7°	0,017/61,9°	0,84/ −32,3°	39,3
	100	0,67/−120,4°	24,3/120,1°	0,027/43,8°	0,54/ −57,4°	31,8
	200	0,69/−149,7°	13,9/103,5°	0,034/39,4°	0,33/ −71,9°	26,2
	500	0,71/−173,4°	5,8/ 86,5°	0,048/47,3°	0,20/ −83,3°	18,5
	800	0,71/+177,4°	3,7/ 75,6°	0,063/52,6°	0,18/ −86,7°	14,5
	1000	0,70/+172,2°	3,0/ 71,0°	0,075/55,0°	0,18/ −87,5°	12,6
	1200	0,70/+168,5°	2,5/ 65,7°	0,085/56,0°	0,19/ −91,8°	11,1
	1500	0,69/+159,0°	2,1/ 58,1°	0,102/56,6°	0,21/ −91,4°	9,3
	2000	0,70/+151,0°	1,5/ 46,4°	0,124/55,7°	0,22/−100,8°	7,0
30	40	0,61/ −79,4°	45,6/142,2°	0,016/59,2°	0,79/ −39,3°	39,4
	100	0,66/−128,6°	26,8/116,6°	0,025/43,9°	0,48/ −68,1°	32,2
	200	0,68/−155,2°	14,8/101,3°	0,031/43,0°	0,28/ −87,0°	26,5
	500	0,70/−176,0°	6,1/ 86,1°	0,047/53,4°	0,17/−107,7°	18,8
	800	0,69/+175,6°	3,9/ 76,3°	0,066/58,7°	0,16/−110,7°	14,7
	1000	0,68/+170,5°	3,1/ 72,2°	0,079/60,9°	0,16/−109,9°	12,6
	1200	0,69/+167,1°	2,6/ 67,2°	0,090/61,3°	0,16/−111,5°	11,2
	1500	0,69/+158,4°	2,2/ 59,2°	0,107/59,5°	0,17/−104,7°	9,9
	2000	0,70/+150,5°	1,6/ 47,9°	0,132/57,5°	0,17/−112,6°	7,4
50	40	0,58/ −91,5°	52,3/136,8°	0,015/56,4°	0,71/ −47,1°	39,3
	100	0,64/−137,0°	28,4/112,4°	0,022/44,8°	0,41/ −78,0°	32,2
	200	0,66/−159,6°	15,5/ 99,2°	0,028/17,9°	0,25/−100,3°	26,6
	500	0,68/−176,9°	6,6/ 85,6°	0,048/57,9°	0,17/−124,8°	19,0
	800	0,68/−175,5°	4,2/ 76,1°	0,069/61,0°	0,16/−128,5°	15,0
	1000	0,68/+170,4°	3,3/ 72,8°	0,082/62,4°	0,15/−128,1°	13,2
	1200	0,68/+166,8°	2,8/ 66,8°	0,094/62,1°	0,16/−129,4°	11,8
	1500	0,69/+157,6°	2,3/ 59,7°	0,106/60,7°	0,14/−122,7°	10,3
	2000	0,70/+149,6°	1,7/ 48,7°	0,130/58,0°	0,19/−129,8°	7,8

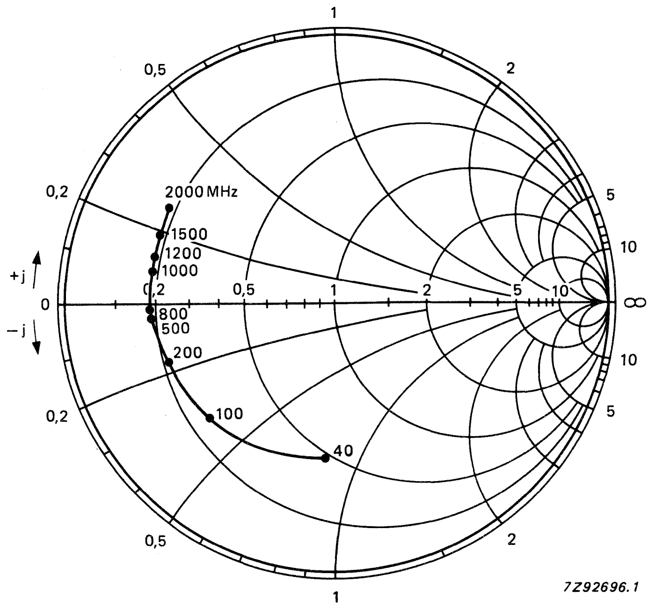


Fig. 2 Input impedance, derived from input reflection coefficient s_{ie} coordinates, in ohm x 50.

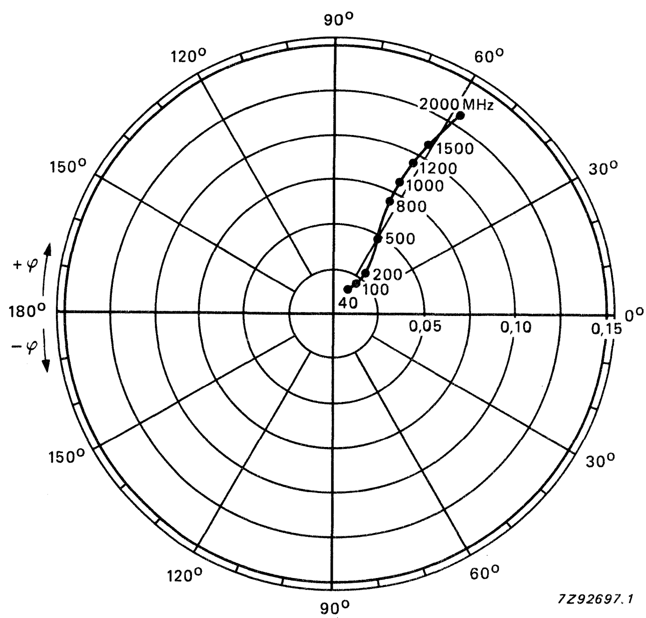


Fig. 3 Reverse transmission coefficient s_{re}.

Conditions for Figs 2 to 5: V_{CE} = 10 V; I_C = 50 mA; T_{amb} = 25 °C.

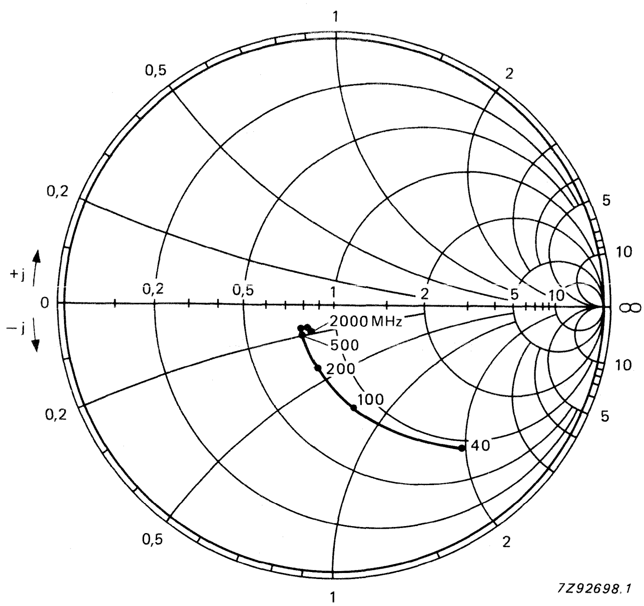


Fig. 4 Output impedance, derived from output reflection coefficient s_{oe} coordinates, in ohm x 50.

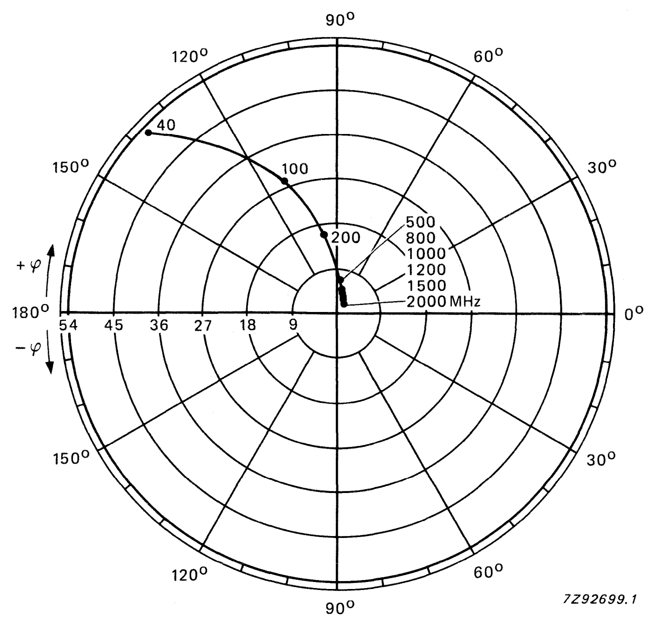


Fig. 5 Forward transmission coefficient s_{fe}.

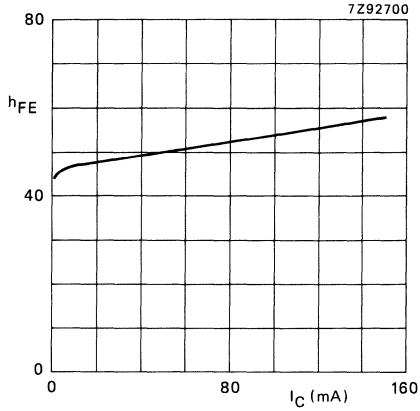


Fig. 6 V_{CE} = 10 V; T_j = 25 °C; typical values.

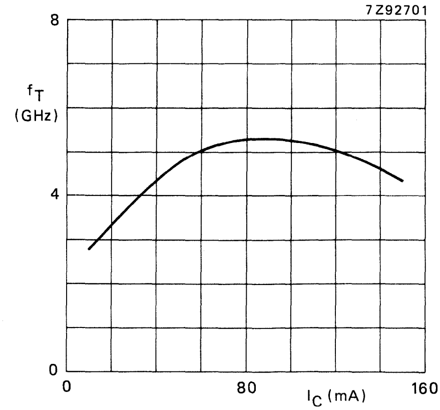


Fig. 7 V_{CE} = 10 V; f = 500 MHz; T_j = 25 °C; typical values.

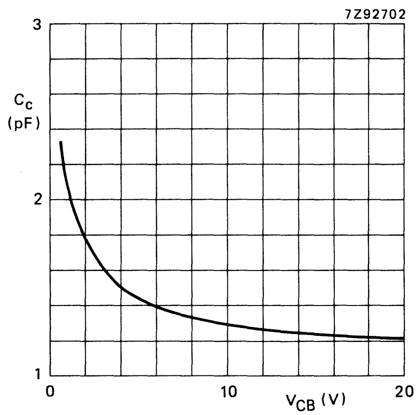


Fig. 8 $I_E = i_e$; f = 1 MHz; T_j = 25 °C; typical values.

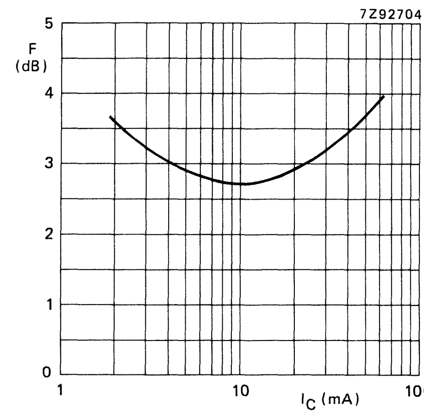


Fig. 9 V_{CE} = 10 V; f = 800 MHz; Z_S = opt.; T_{amb} = 25 °C; typical values.

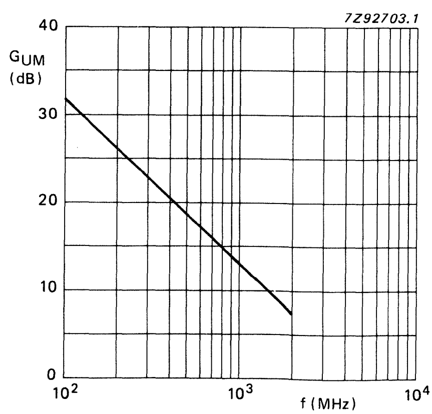


Fig. 10 V_{CE} = 10 V; I_C = 50 mA; T_{amb} = 25 °C; typical values.

N-P-N H.F. WIDEBAND TRANSISTOR

N-P-N multi-emitter transistor in a SOT-89 plastic envelope intended for application in thick and thin-film circuits. The transistor has extremely good intermodulation properties and a high power gain. It is primarily intended for:

- Output and driver stages of channel and band serial amplifiers with high output power for bands I, II, III and IV/V (40–860 MHz).
- Output and driver stages of wideband amplifiers.

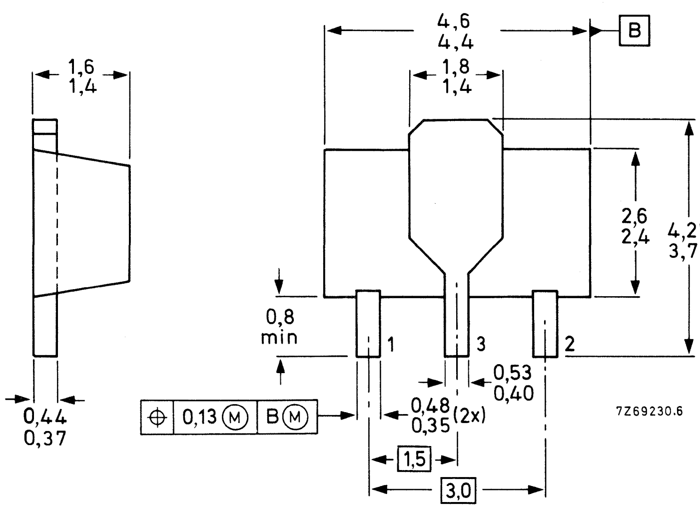
QUICK REFERENCE DATA

Collector-base voltage (open emitter; peak value)	V_{CBOM}	max.	40	V
Collector-emitter voltage (open base)	V_{CEO}	max.	25	V
Collector current (peak value; f > 1 MHz)	I_{CM}	max.	300	mA
Total power dissipation up to T_{amb} = 25 °C	P_{tot}	max.	1	W
Junction temperature	T_j	max.	175	°C
Transition frequency at f = 500 MHz I_C = 150 mA; V_{CE} = 15 V	f_T	typ.	1,2	GHz
Feedback capacitance at f = 1 MHz I_C = 10 mA; V_{CE} = 15 V;	C_{re}	typ.	1,9	pF

MECHANICAL DATA

Dimensions in mm

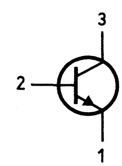
Fig. 1 SOT-89.



BOTTOM VIEW

Marking code

BFQ17 = FA



See also *Soldering recommendations*.

RATINGS Limiting values in accordance with the Absolute Maximum System (IEC 134)

Collector-base voltage (open emitter; peak value)	V_{CBOM}	max.	40	V	
Collector-emitter voltage ($R_{BE} \leq 50\ \Omega$; peak value)	V_{CERM}	max.	40	V	[1]
Collector-emitter voltage (open base)	V_{CEO}	max.	25	V	[1]
Emitter-base voltage (open collector)	V_{EBO}	max.	2	V	
Collector current (d.c.)	I_C	max.	150	mA	
Collector current (peak value; f > 1 MHz)	I_{CM}	max.	300	mA	
Total power dissipation up to T_{amb} = 25 °C mounted on a ceramic substrate area = 2,5 cm^2; thickness = 0,7 mm	P_{tot}	max.	1	W	
Storage temperature	T_{stg}		−65 to +150	°C	
Junction temperature	T_j	max.	175	°C	

THERMAL RESISTANCE

From junction to collector tab	$R_{th\ j-tab}$	=	30	K/W
From junction to ambient in free air mounted on a ceramic substrate area = 2,5 cm^2; thickness = 0,7 mm	$R_{th\ j-a}$	=	125	K/W

[1] I_C = 10 mA.

CHARACTERISTICS

T_j = 25 °C unless otherwise specified

Collector cut-off current				
$I_E = 0$; $V_{CB} = 20$ V; $T_j = 150$ °C	I_{CBO}	max.	20	μA
Saturation voltage				
$I_C = 100$ mA; $I_B = 10$ mA	V_{CEsat}	max.	0,5	V
D.C. current gain				
$I_C = 50$ mA; $V_{CE} = 5$ V	h_{FE}	min.	25	
$I_C = 150$ mA; $V_{CE} = 5$ V	h_{FE}	min.	25	
Transition frequency at f = 500 MHz [1]				
$I_C = 150$ mA; $V_{CE} = 15$ V	f_T	typ.	1,2	GHz
Collector capacitance at f = 1 MHz				
$I_E = I_e = 0$; $V_{CB} = 15$ V	C_c	max.	4	pF
Feedback capacitance at f = 1 MHz				
$I_C = 10$ mA; $V_{CE} = 15$ V; $T_{amb} = 25$ °C	C_{re}	typ.	1,9	pF

Max. unilateral power gain (s_{re} assumed to be zero)

$$G_{UM} = 10 \log \frac{|s_{fe}|^2}{(1 - |s_{ie}|^2)(1 - |s_{oe}|^2)}$$

$I_C = 60$ mA; $V_{CE} = 15$ V; $T_{amb} = 25$ °C;				
f = 200 MHz	G_{UM}	typ.	16	dB
f = 800 MHz	G_{UM}	typ.	6,5	dB

[1]) Measured under pulse conditions.

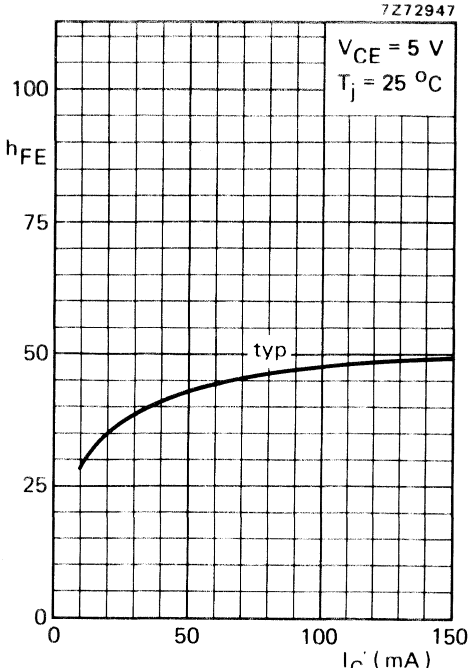


Fig. 2. V_{CE} = 5V; T_j = 25 °C; typical values

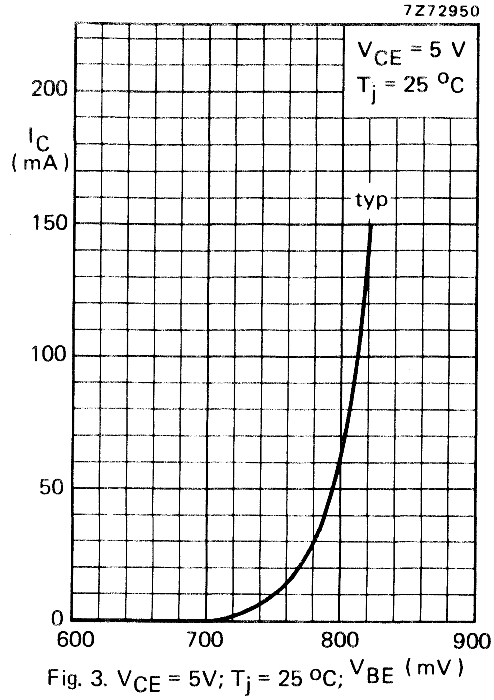


Fig. 3. V_{CE} = 5V; T_j = 25 °C; typical values

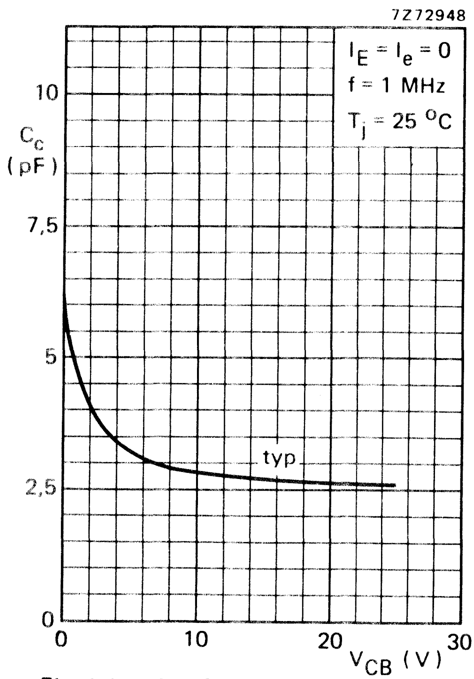


Fig. 4. $I_E = i_e = 0$; f = 1 MHz; T_j = 25 °C; typical values

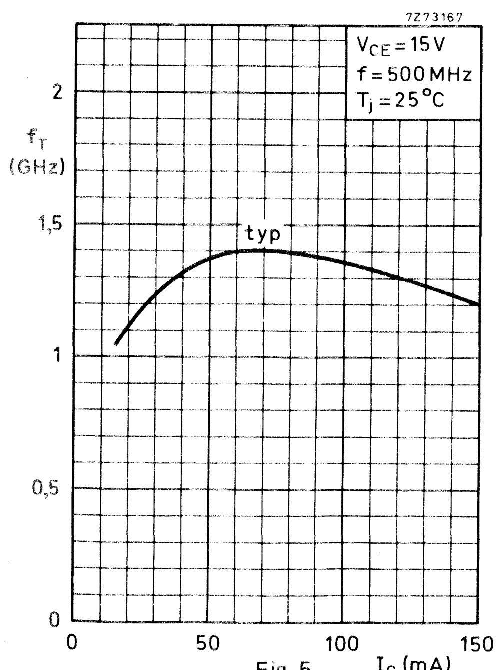


Fig. 5. V_{CE} = 15V; f = 500 MHz; T_j = 25 °C; typical values

N-P-N H.F. WIDEBAND TRANSISTOR

N-P-N transistor in a plastic SOT-89 envelope intended for application in thick and thin-film circuits. It is primarily intended for MATV purposes.

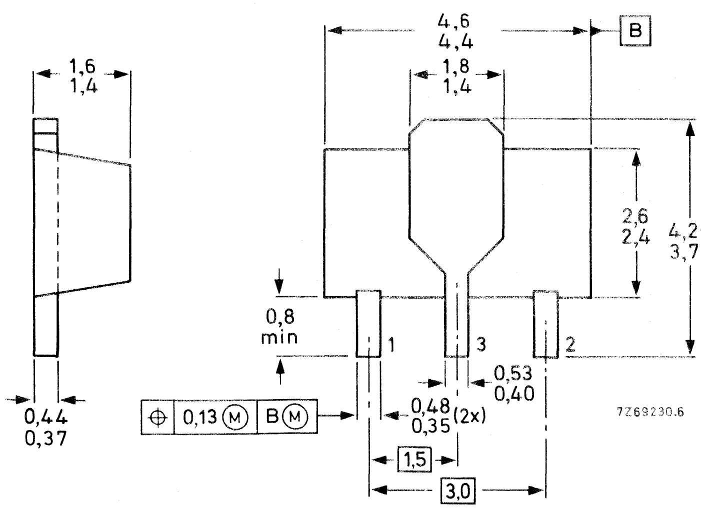
QUICK REFERENCE DATA

Collector-base voltage (open emitter)	V_{CBO}	max.	25	V
Collector-emitter voltage (open base)	V_{CEO}	max.	15	V
Collector current (d.c.)	I_C	max.	150	mA
Total power dissipation up to T_{amb} = 25 °C	P_{tot}	max.	1	W
Junction temperature	T_j	max.	175	°C
Transition frequency at f = 500 MHz I_C = 100 mA; V_{CE} = 10 V	f_T	typ.	3,6	GHz
Feedback capacitance at f = 10,7 MHz I_C = 0; V_{CE} = 10 V	C_{re}	typ.	1,2	pF
Intermodulation distortion I_C = 80 mA; V_{CE} = 10 V; R_L = 75 Ω measured at $f_{(p+q-r)}$ = 793,25 MHz	d_{im}	max.	−60	dB

MECHANICAL DATA

Dimensions in mm

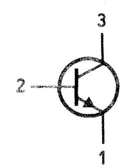
Fig. 1 SOT-89.



BOTTOM VIEW

Marking code

BFQ18A = FF



See also soldering recommendations

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

Collector-base voltage (open emitter)	V_{CBO}	max.	25	V
Collector-emitter voltage (open base)	V_{CEO}	max.	15	V
Emitter-base voltage (open collector)	V_{EBO}	max.	2	V
Collector current (d.c.)	I_C	max.	150	mA
Total power dissipation up to T_{amb} = 25 °C *	P_{tot}	max.	1	W
Storage temperature	T_{stg}	−65 to + 150		°C
→ Junction temperature	T_j	max.	175	°C

THERMAL RESISTANCE

From junction to collector tab	$R_{th\ j\text{-}tab}$	=	25	K/W
From junction to ambient in free air *	$R_{th\ j\text{-}a}$	=	125	K/W

CHARACTERISTICS

T_{amb} = 25 °C unless otherwise specified

D.C. current gain **				
I_C = 50 mA; V_{CE} = 10 V	h_{FE}	min.	25	
I_C = 100 mA; V_{CE} = 10 V	h_{FE}	min.	25	
Transition frequency at f = 500 MHz **				
I_C = 50 mA; V_{CE} = 10 V	f_T	typ.	3,2	GHz
I_C = 100 mA; V_{CE} = 10 V	f_T	typ.	3,6	GHz
Collector capacitance at f = 1 MHz				
$I_E = I_e = 0$; V_{CB} = 10 V	C_c	typ.	2,0	pF
Emitter capacitance at f = 1 MHz				
$I_C = I_c = 0$; V_{EB} = 0,5 V	C_e	typ.	11	pF
Feedback capacitance at f = 10,7 MHz				
$I_C = 0$; V_{CE} = 10 V	C_{re}	typ.	1,2	pF

* The device mounted on a ceramic substrate area = 2,5 cm^2; thickness = 0,7 mm.

** Measured under pulse conditions.

Intermodulation distortion (see Fig. 2)

I_C = 80 mA; V_{CE} = 10 V; R_L = 75 Ω

V_p = V_o = 700 mV at f_p = 795,25 MHz

V_q = V_o −6 dB at f_q = 803,25 MHz

V_r = V_o −6 dB at f_r = 805,25 MHz

Measured at $f_{(p+q-r)}$ = 793,25 MHz | d_{im} | max. | −60 dB

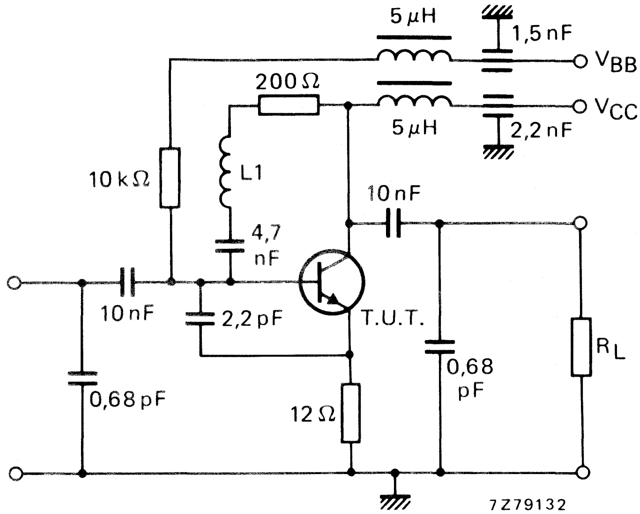


Fig. 2 MATV-test circuit (40—860 MHz).

N-P-N 1 GHz WIDEBAND TRANSISTOR

N-P-N transistor in a SOT-89 plastic envelope intended for application in thick- and thin-film circuits.
It is primarily intended for use in u.h.f. and microwave amplifiers such as in aerial amplifiers, radar systems, oscilloscopes, spectrum analysers etc.
The transistor features very low intermodulation distortion and high power gain. Thanks to its very high transition frequency, it also has excellent wideband properties and low noise up to high frequencies.

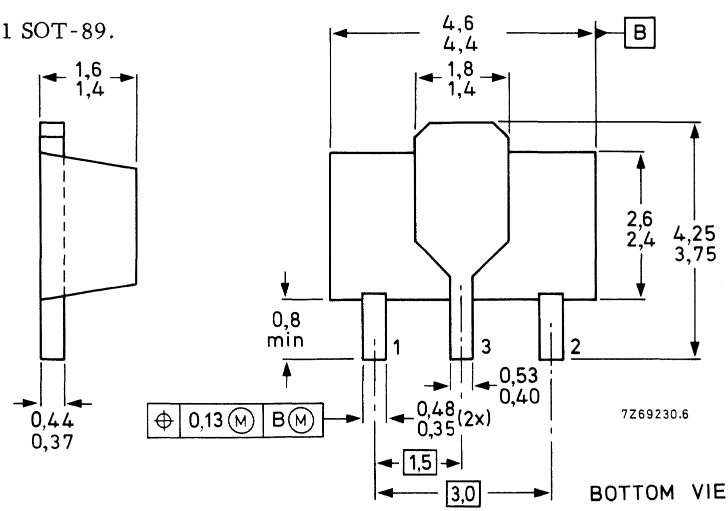
QUICK REFERENCE DATA

Collector-base voltage (open emitter)	V_{CBO}	max.	20	V
Collector-emitter voltage (open base)	V_{CEO}	max.	15	V
Collector current (d.c.)	I_C	max.	75	mA
Total power dissipation up to T_{amb} = 87,5 °C	P_{tot}	max.	500	mW
Junction temperature	T_j	max.	175	°C ←
Transition frequency at f = 500 MHz I_C = 50 mA; V_{CE} = 10 V	f_T	typ.	5	GHz
Feedback capacitance at f = 1 MHz I_C = 10 mA; V_{CE} = 10 V;	C_{re}	typ.	1,3	pF
Noise figure at optimum source impedance I_C = 50 mA; V_{CE} = 10 V; f = 500 MHz;	F	typ.	3,3	dB

MECHANICAL DATA

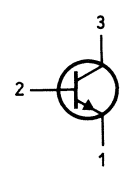
Dimensions in mm

Fig. 1 SOT-89.



Marking code

BFQ19 = FB



See also soldering recommendations

RATINGS Limiting values in accordance with the Absolute Maximum System (IEC134)

Collector-base voltage (open emitter)	V_{CBO}	max.	20	V
Collector-emitter voltage (open base)	V_{CEO}	max.	15	V
Emitter-base voltage (open collector)	V_{EBO}	max.	3,3	V
Collector current (d.c.)	I_C	max.	75	mA
Collector current (peak value); f > 1 MHz	I_{CM}	max.	150	mA
Total power dissipation up to T_{amb} = 87,5 °C mounted on a ceramic substrate area = 2,5 cm^2; thickness = 0,7 mm	P_{tot}	max.	500	mW
Storage temperature	T_{stg}		−65 to +150	°C
→ Junction temperature	T_j	max.	175	°C

THERMAL RESISTANCE

From junction to collector tab	$R_{th\,j-tab}$	=	40	K/W
From junction to ambient in free air mounted on a ceramic substrate area = 2,5 cm^2; thickness = 0,7 mm	$R_{th\,j-a}$	=	125	K/W

CHARACTERISTICS

$T_j = 25\ ^{o}C$ unless otherwise specified

Collector cut-off current				
$I_E = 0$: $V_{CB} = 10$ V	I_{CBO}	max.	100	nA
D.C. current gain [1]				
$I_C = 50$ mA: $V_{CE} = 10$ V	h_{FE}	min.	25	
		typ.	50	
$I_C = 75$ mA: $V_{CE} = 10$ V	h_{FE}	min.	25	
		typ.	52	
Transition frequency at f = 500 MHz [1]				
$I_C = 50$ mA: $V_{CE} = 10$ V	f_T	min.	4, 0	GHz
		typ.	5, 0	GHz
$I_C = 75$ mA: $V_{CE} = 10$ V	f_T	min.	4, 4	GHz
		typ.	5, 5	GHz
Collector capacitance at f = 1 MHz				
$I_E = I_e = 0$: $V_{CB} = 10$ V	C_c	typ.	1, 6	pF
Emitter capacitance at f = 1 MHz				
$I_C = I_c = 0$: $V_{EB} = 0, 5$ V	C_e	typ.	5, 0	pF
Feedback capacitance at f = 1 MHz				
$I_C = 10$ mA: $V_{CE} = 10$ V: $T_{amb} = 25\ ^{o}C$	C_{re}	typ.	1, 3	pF
Noise figure at optimum source impedance				
$I_C = 50$ mA: $V_{CE} = 10$ V: f = 500 MHz: $T_{amb} = 25\ ^{o}C$	F	typ.	3, 3	dB

Max. unilateral power gain (s_{re} assumed to be zero)

$$G_{UM} = 10 \log \frac{|s_{fe}|^2}{(1 - |s_{ie}|^2)(1 - |s_{oe}|^2)}$$

$I_C = 50$ mA; $V_{CE} = 10$ V; $T_{amb} = 25\ ^{o}C$:				
f = 200 MHz	G_{UM}	typ.	18, 5	dB
f = 500 MHz	G_{UM}	typ.	11, 5	dB
f = 800 MHz	G_{UM}	typ.	7, 5	dB

1) Measured under pulse conditions.

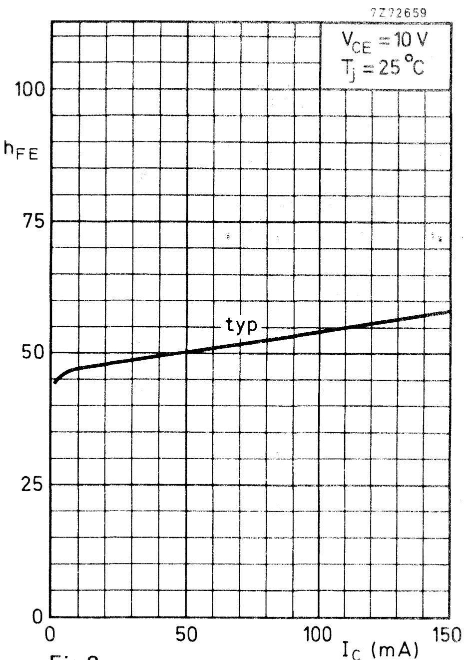


Fig.2.

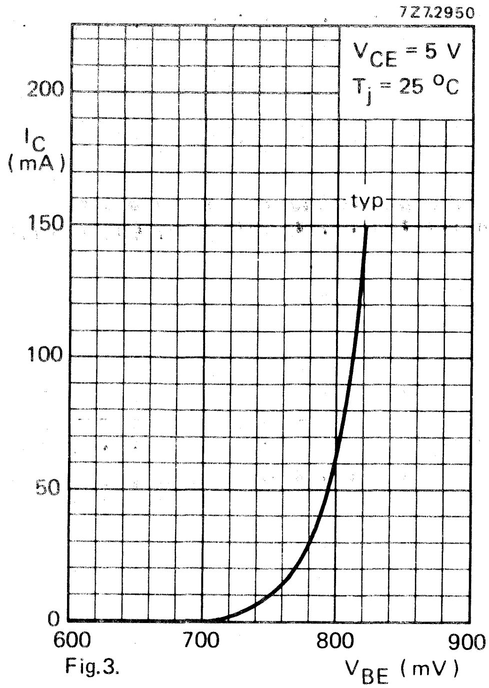


Fig.3.

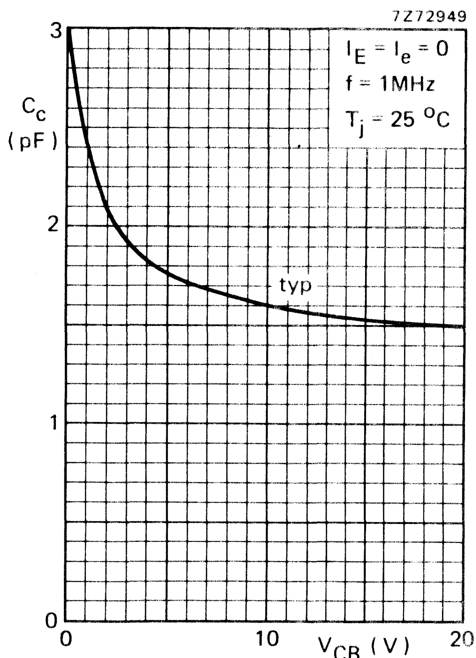


Fig.4.

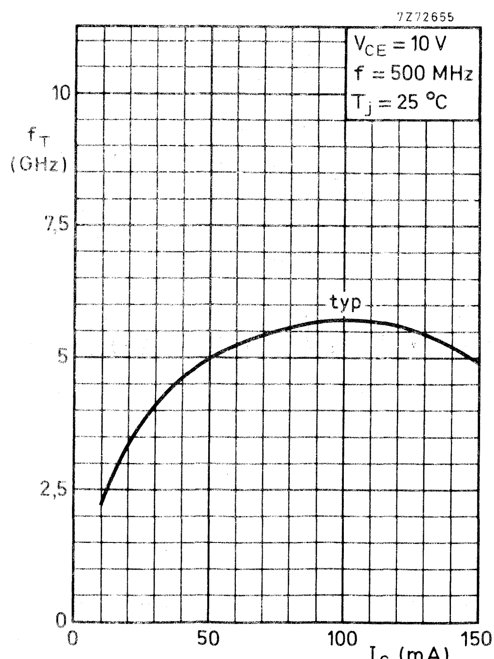


Fig.5.

N-P-N H.F. WIDEBAND TRANSISTOR

N-P-N transistor in a TO-72 metal envelope with insulated electrodes and a shield lead connected to the case. It is primarily intended for use in u.h.f. and microwave aerial amplifiers, radar systems, oscilloscopes, spectrum analysers etc.

The transistor has extremely high power gain and good low noise performance.

P-N-P complement is BFQ24.

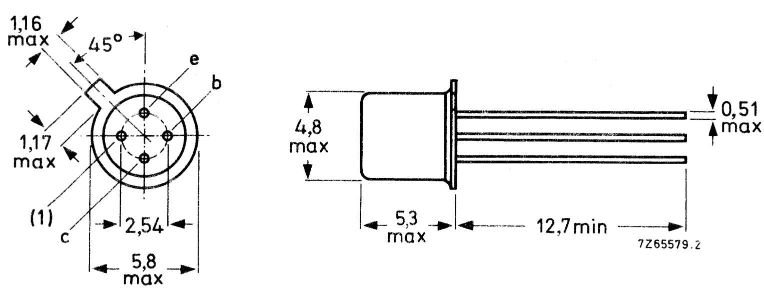
QUICK REFERENCE DATA

Collector-base voltage (open emitter)	V_{CBO}	max.	15	V
Collector-emitter voltage (open base)	V_{CEO}	max.	12	V
Collector current (d.c.)	I_C	max.	35	mA
Total power dissipation up to T_{amb} = 65 °C	P_{tot}	max.	150	mW
Junction temperature	T_j	max.	200	°C
Transition frequency at f = 500 MHz I_C = 30 mA; V_{CE} = 5 V	f_T	typ.	5,0	GHz
Feedback capacitance at f = 1 MHz I_C = 0; V_{CE} = 5 V	C_{re}	typ.	0,65	pF
Noise figure at optimum source impedance I_C = 2 mA; V_{CE} = 5 V; f = 500 MHz	F	typ.	1,9	dB
Maximum unilateral power gain I_C = 30 mA; V_{CE} = 5 V; f = 500 MHz	G_{UM}	typ.	16,0	dB

MECHANICAL DATA

Dimensions in mm

Fig. 1 TO-72 with insulated electrodes.



(1) Shield lead connected to case.

Accessories: 56246 (distance disc).

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

Collector-base voltage (open emitter)	V_{CBO}	max.	15	V
Collector-emitter voltage (open base)	V_{CEO}	max.	12	V
Emitter-base voltage (open collector)	V_{EBO}	max.	2	V
Collector current (d.c.)	I_C	max.	35	mA
Collector current (peak value) at $f > 1$ MHz	I_{CM}	max.	50	mA
Total power dissipation up to $T_{amb} = 65\ ^oC$	P_{tot}	max.	150	mW
Storage temperature	T_{stg}	−65 to + 200		^oC
Junction temperature	T_j	max.	200	^oC

THERMAL RESISTANCE

From junction to ambient in free air	$R_{th\ j\text{-}a}$	=	900	K/W
From junction to case	$R_{th\ j\text{-}c}$	=	600	K/W

CHARACTERISTICS

$T_j = 25\ ^oC$ unless otherwise specified

Collector cut-off current				
$I_E = 0$; $V_{CB} = 5$ V	I_{CBO}	max.	50	nA
D.C. current gain				
$I_C = 10$ mA; $V_{CE} = 5$ V	h_{FE}		50 to 150	
Transition frequency (note)				
$I_C = 30$ mA; $V_{CE} = 5$ V; f = 500 MHz	f_T	typ.	5,0	GHz
Feedback capacitance (note)				
$I_C = 0$; $V_{CE} = 5$ V; f = 1 MHz; $T_{amb} = 25\ ^oC$	C_{re}	typ.	0,65	pF
Noise figure at optimum source impedance (note)				
$I_C = 2$ mA; $V_{CE} = 5$ V; f = 500 MHz; $T_{amb} = 25\ ^oC$	F	typ.	1,9	dB
$I_C = 10$ mA; $V_{CE} = 5$ V; f = 200 MHz; $T_{amb} = 25\ ^oC$	F	max.	2,5	dB

Maximum unilateral power gain (note)

s_{re} assumed to be zero

$$G_{UM} = 10 \log \frac{|s_{fe}|^2}{(1 - |s_{ie}|^2)(1 - |s_{oe}|^2)}$$

$I_C = 10$ mA; $V_{CE} = 5$ V; f = 200 MHz; $T_{amb} = 25\ ^oC$	G_{UM}	min.	21,0	dB
$I_C = 30$ mA; $V_{CE} = 5$ V; f = 500 MHz; $T_{amb} = 25\ ^oC$	G_{UM}	typ.	16,0	dB

Note

Shield lead grounded.

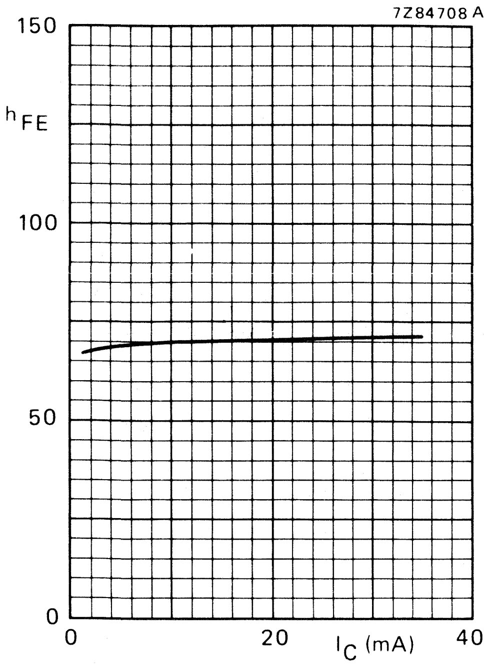


Fig. 2.

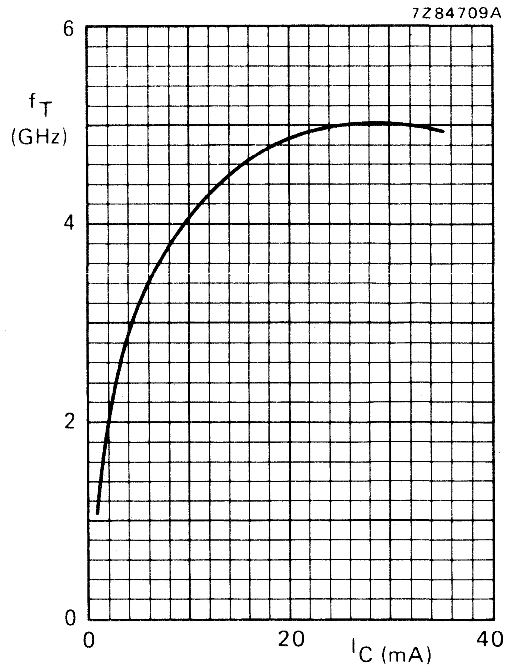


Fig. 3.

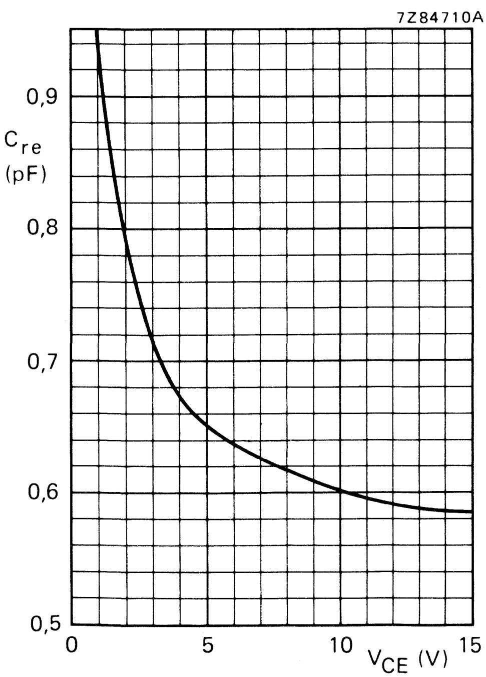


Fig. 4.

Conditions for Figs 2, 3 and 4:

Fig. 2 V_{CE} = 5 V; T_j = 25 °C; typical values.

Fig. 3 V_{CE} = 5 V; f = 500 MHz; T_j = 25 °C; shield lead grounded; typical values.

Fig. 4 I_C = 0; f = 1 MHz; T_{amb} = 25 °C; shield lead grounded; typical values.

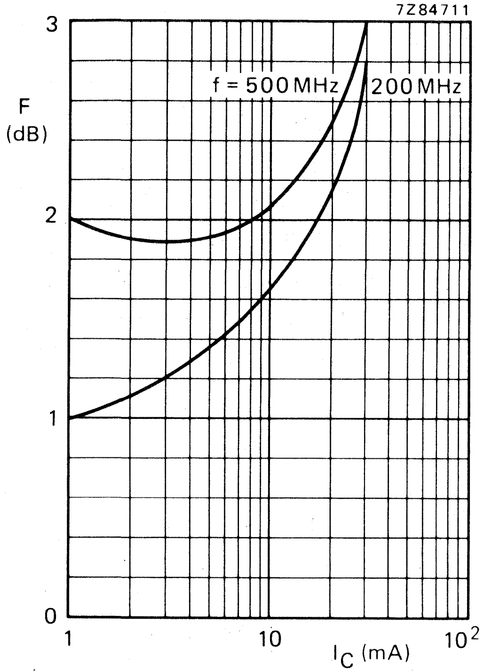


Fig. 5 V_{CE} = 5 V; Z_S = optimum; T_{amb} = 25 °C; typical values; shield lead grounded; typ. values.

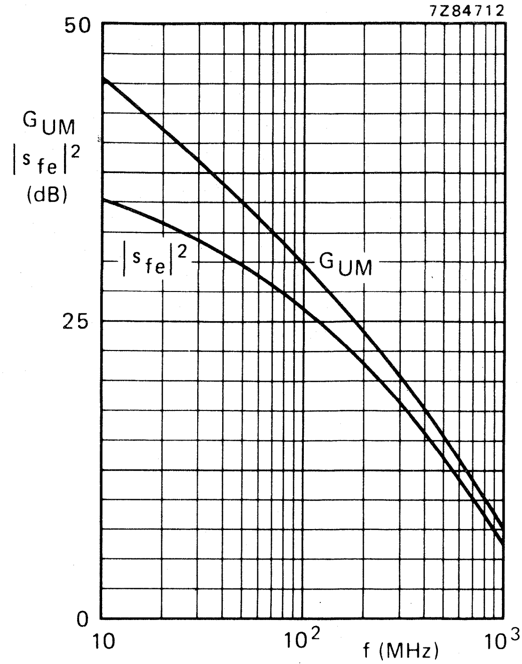


Fig. 6 V_{CE} = 5 V; I_C = 30 mA; T_{amb} = 25 °C; typical values; shield lead grounded; typ. values.

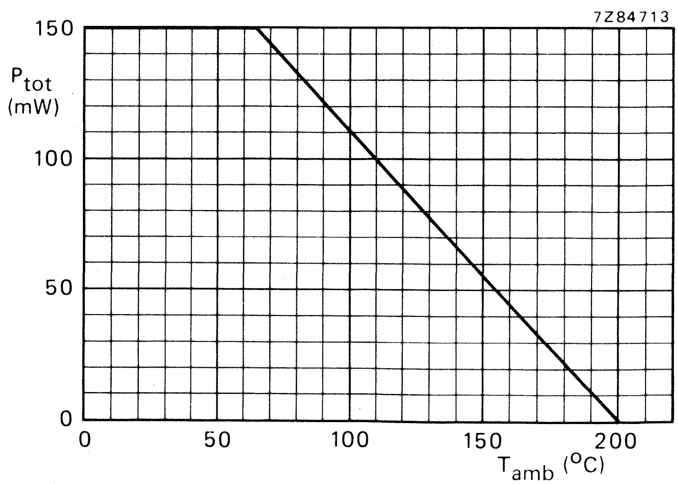


Fig. 7 Power derating curve versus ambient temperature.

P-N-P 1 GHz WIDEBAND TRANSISTOR

P-N-P transistor in a plastic SOT-37 envelope. It is primarily intended for use in u.h.f. and microwave amplifiers such as in aerial amplifiers, radar systems, oscilloscopes, spectrum analysers etc.

The transistor features low intermodulation distortion and high power gain; thanks to its very high transition frequency, it also has excellent wideband properties and low noise up to high frequencies.

N-P-N complements are BFR91 and BFR91A.

QUICK REFERENCE DATA

Collector-base voltage (open emitter)	$-V_{CBO}$	max.	15	V
Collector-emitter voltage (open base)	$-V_{CEO}$	max.	12	V
Collector current (d.c.)	$-I_C$	max.	35	mA
Total power dissipation up to T_{amb} = 60 °C	P_{tot}	max.	180	mW
Junction temperature	T_j	max.	175	°C
Transition frequency at f = 500 MHz $-I_C$ = 30 mA; $-V_{CE}$ = 5 V	f_T	typ.	5,0	GHz
Feedback capacitance at f = 1 MHz $-I_C$ = 2 mA; $-V_{CE}$ = 5 V	C_{re}	typ.	0,8	pF
Noise figure at optimum source impedance $-I_C$ = 2 mA; $-V_{CE}$ = 5 V; f = 500 MHz	F	typ.	2,4	dB

MECHANICAL DATA (see Fig. 1)

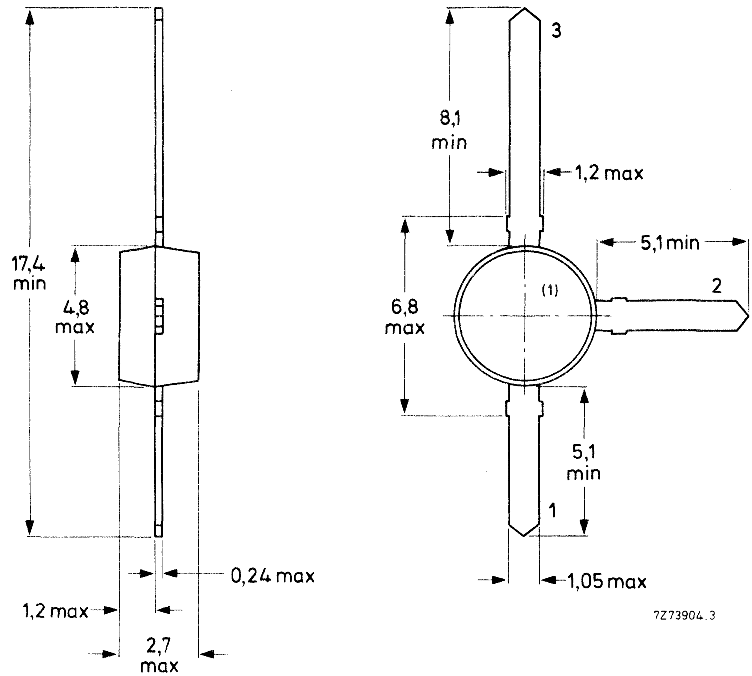
MECHANICAL DATA

Dimensions in mm

Fig. 1 SOT-37.

Connections

1. Base
2. Emitter
3. Collector



(1) = type number marking.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

Collector-base voltage (open emitter)	$-V_{CBO}$	max.	15	V
Collector-emitter voltage (open base)	$-V_{CEO}$	max.	12	V
Emitter-base voltage (open collector)	$-V_{EBO}$	max.	2	V
Collector current (d.c.)	$-I_C$	max.	35	mA
Collector current (peak value) at f > 1 MHz	$-I_{CM}$	max.	50	mA
Total power dissipation up to T_{amb} = 60 °C	P_{tot}	max.	180	mW
Storage temperature	T_{stg}	–65 to + 150		°C
→ Junction temperature	T_j	max.	175	°C

THERMAL RESISTANCE

From junction to ambient in free air mounted on a fibre-glass print of 40 mm x 25 mm x 1 mm — $R_{th\ j\text{-}a}$ = 500 K/W

CHARACTERISTICS

T_j = 25 °C unless otherwise specified

Collector cut-off current $I_E = 0; -V_{CB} = 5$ V	$-I_{CBO}$	max.	50 nA
D.C. current gain $-I_C = 30$ mA; $-V_{CE} = 5$ V	h_{FE}	min.	20
Transition frequency f = 500 MHz; $-I_C = 30$ mA; $-V_{CE} = 5$ V	f_T	typ.	5,0 GHz
Collector capacitance f = 1 MHz; $I_E = I_e = 0; -V_{CB} = 10$ V	C_c	typ.	1,2 pF
Emitter capacitance f = 1 MHz; $I_C = I_c = 0; -V_{EB} = 0,5$ V	C_e	typ.	1,8 pF
Feedback capacitance f = 1 MHz; $I_C = 0; -V_{CE} = 10$ V	C_{re}	typ.	0,8 pF
Noise figure at optimum source impedance $-I_C = 2$ mA; $-V_{CE} = 5$ V; f = 500 MHz; $T_{amb} = 25$ °C	F	typ.	2,4 dB
Maximum unilateral power gain (s_{re} assumed to be zero) $-I_C = 30$ mA; $-V_{CE} = 5$ V; f = 500 MHz; $T_{amb} = 25$ °C $G_{UM} = 10 \log \frac{\lvert s_{fe}\rvert^2}{[1-\lvert s_{ie}\rvert^2]\,[1-\lvert s_{oe}\rvert^2]}$	G_{UM}	typ.	15,0 dB
Output voltage at $d_{im} = -60$ dB $I_C = 30$ mA; $V_{CE} = 5$ V; $R_L = 75\ \Omega$; $T_{amb} = 25$ °C $V_p = V_o$ at $d_{im} = -60$ dB ; $f_p = 495,25$ MHz $V_q = V_o -6$ dB ; $f_q = 503,25$ MHz $V_r = V_o -6$ dB ; $f_r = 505,25$ MHz measured at $f_{(p+q-r)} = 495,25$ MHz	V_o	typ.	300 mV

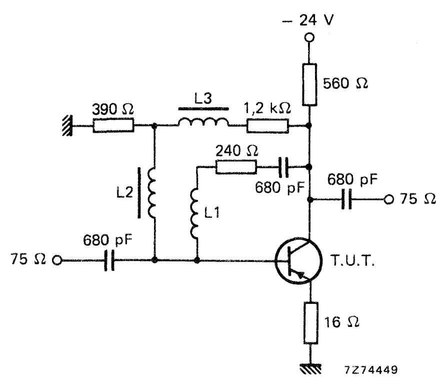


Fig. 2 Intermodulation distortion test circuit.

L1: 4 turns Cu wire (0,35); winding pitch 1 mm; internal diameter 4 mm.
L2 and L3: 5 µH (code number 3122 108 20150)

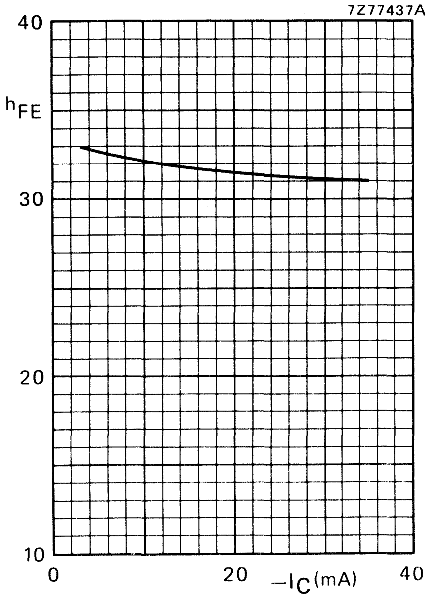


Fig. 3 $-V_{CE}$ = 5 V; T_j = 25 °C; typical values.

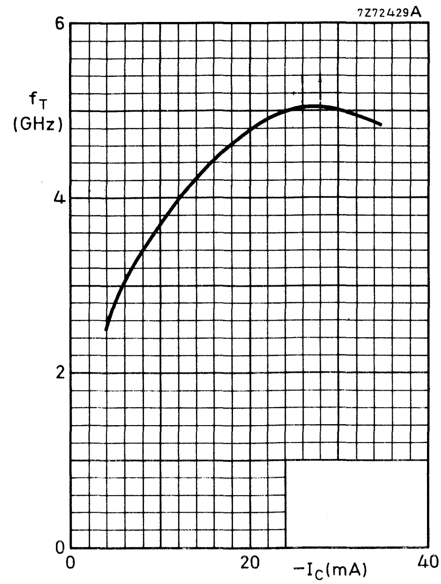


Fig. 4 $-V_{CE}$ = 5 V; f = 500 MHz; T_j = 25 °C; typical values.

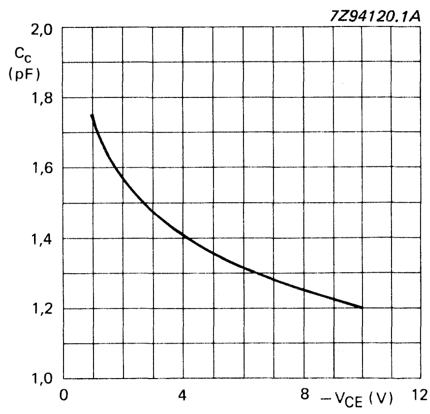


Fig. 5 $I_E = I_e = 0$; f = 1 MHz; T_j = 25 °C; typical values.

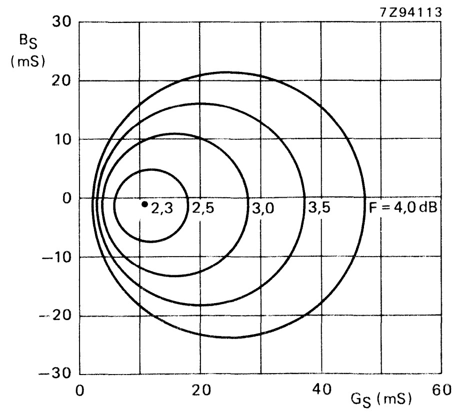


Fig. 6 Circles of constant noise figure; $-V_{CE}$ = 8 V; $-I_C$ = 4 mA; f = 800 MHz; T_{amb} = 25 °C; typical values.

s-parameters (common-emitter) at $-V_{CE}$ = 5 V; T_{amb} = 25 °C; typical values.

I_C mA	f MHz	s_{ie}	s_{fe}	s_{re}	s_{oe}	G_{UM} dB
	40	0,62/ −21,2°	13,5/167,5°	0,02/ 81,6°	0,96/ −10,3°	36,0
	100	0,58/ −55,1°	11,8/145,8°	0,04/ 67,7°	0,86/ −27,5°	29,0
	200	0,48/ −97,1°	8,4/124,0°	0,07/ 58,2°	0,63/ −41,8°	21,9
	500	0,44/−156,7°	4,3/ 92,0°	0,11/ 53,5°	0,38/ −58,5°	14,2
5	800	0,43/+177,0°	2,9/ 76,9°	0,14/ 56,9°	0,31/ −66,6°	10,4
	1000	0,44/+161,3°	2,3/ 67,5°	0,16/ 57,0°	0,28/ −70,4°	8,5
	1200	0,47/+146,3°	1,9/ 61,5°	0,19/ 58,2°	0,24/ −73,8°	7,0
	1500	0,47/+137,8°	1,7/ 52,3°	0,23/ 57,8°	0,22/ −89,5°	5,7
	2000	0,50/+111,7°	1,3/ 40,1°	0,30/ 55,8°	0,20/−115,8°	3,7
	40	0,38/ −36,0°	20,4/162,3°	0,02/ 79,1°	0,92/ −15,6°	35,0
	100	0,38/ −83,8°	16,0/137,0°	0,03/ 67,2°	0,75/ −37,0°	28,4
	200	0,37/−128,4°	10,4/115,7°	0,05/ 62,9°	0,49/ −51,5°	22,2
	500	0,41/−173,8°	4,8/ 88,3°	0,10/ 64,6°	0,27/ −68,3°	14,7
10	800	0,40/+166,0°	3,2/ 75,0°	0,14/ 65,7°	0,22/ −76,5°	11,0
	1000	0,42/+152,8°	2,6/ 66,8°	0,17/ 64,1°	0,19/ −82,2°	9,1
	1200	0,46/+139,3°	2,1/ 61,5°	0,20/ 63,7°	0,15/ −85,2°	7,7
	1500	0,45/+133,5°	1,8/ 52,5°	0,25/ 60,6°	0,16/−104,0°	6,3
	2000	0,48/+108,5°	1,4/ 41,0°	0,32/ 56,2°	0,15/−135,1°	4,3
	40	0,25/ −52,3°	23,7/159,6°	0,02/ 77,2°	0,09/ −18,4°	34,5
	100	0,31/−106,0°	17,8/133,2°	0,03/ 68,9°	0,69/ −41,6°	28,2
	200	0,34/−145,3°	11,1/112,6°	0,05/ 67,7°	0,43/ −55,8°	22,3
	500	0,41/+179,3°	4,9/ 87,0°	0,09/ 69,1°	0,23/ −73,6°	14,9
15	800	0,40/+161,7°	3,3/ 74,2°	0,15/ 68,6°	0,19/ −82,3°	11,1
	1000	0,42/+149,7°	2,6/ 66,4°	0,18/ 66,4°	0,16/ −89,4°	9,3
	1200	0,46/+136,9°	2,2/ 61,3°	0,20/ 65,4°	0,12/ −93,6°	7,9
	1500	0,45/+131,8°	1,9/ 52,3°	0,26/ 61,7°	0,14/−113,6°	6,5
	2000	0,48/+107,4°	1,5/ 41,1°	0,33/ 56,3°	0,13/−146,5°	4,5
	40	0,17/ −74,7°	25,4/157,7°	0,01/ 77,9°	0,87/ −20,2°	34,3
	100	0,29/−123,5°	18,6/131,1°	0,03/ 71,0°	0,65/ −44,3°	28,2
	200	0,34/−155,1°	11,4/110,8°	0,04/ 70,9°	0,40/ −58,6°	22,4
	500	0,41/+175,5°	5,0/ 86,3°	0,09/ 71,7°	0,21/ −77,4°	15,0
20	800	0,40/+159,3°	3,3/ 73,6°	0,15/ 70,4°	0,18/ −86,2°	11,2
	1000	0,43/+148,0°	2,6/ 66,0°	0,18/ 67,5°	0,15/ −94,7°	9,4
	1200	0,47/+135,6°	2,2/ 61,0°	0,21/ 66,3°	0,11/ −91,0°	8,0
	1500	0,45/+131,0°	1,9/ 52,0°	0,26/ 62,1°	0,13/−120,5°	6,6
	2000	0,48/+107,0°	1,5/ 40,8°	0,33/ 56,4°	0,13/−154,2°	4,6
	40	0,15/−129,3°	27,2/155,9°	0,01/ 76,8°	0,82/ −22,2°	33,7
	100	0,29/−146,9°	19,3/128,8°	0,02/ 74,2°	0,60/ −47,2°	28,0
	200	0,35/−166,7°	11,5/109,0°	0,04/ 75,3°	0,36/ −61,4°	22,4
	500	0,41/+171,2°	5,0/ 85,3°	0,09/ 74,7°	0,19/ −81,8°	15,0
30	800	0,41/+156,7°	3,3/ 72,9°	0,15/ 71,8°	0,16/ −91,0°	11,2
	1000	0,44/+146,2°	2,6/ 65,5°	0,18/ 68,8°	0,19/−101,0°	9,4
	1200	0,48/+134,5°	2,2/ 60,5°	0,21/ 67,3°	0,10/−107,6°	8,0
	1500	0,46/+130,1°	1,9/ 51,5°	0,26/ 62,5°	0,12/−128,1°	6,6
	2000	0,49/+106,4°	1,5/ 40,3°	0,33/ 56,6°	0,12/−162,1°	4,7

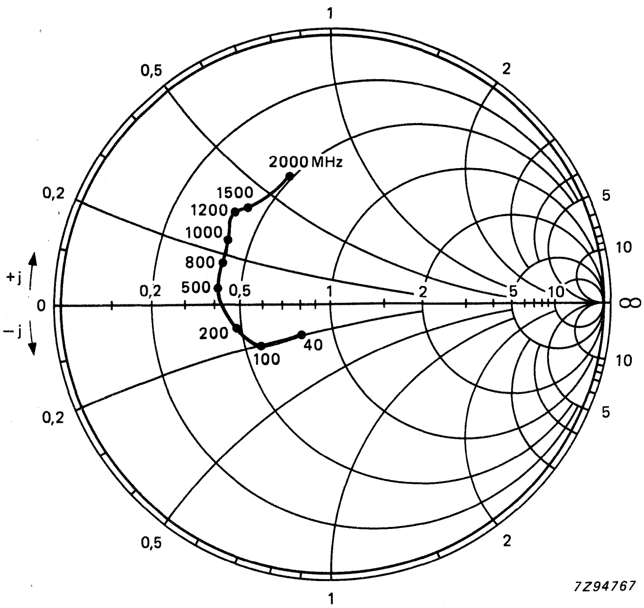


Fig. 7 Input impedance, derived from input reflection coefficient s_{ie} coordinates, in ohm x 50.

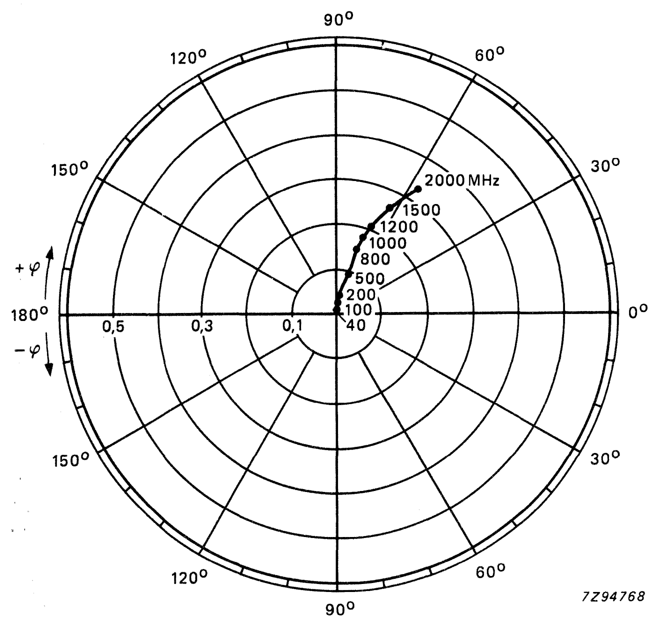


Fig. 8 Reverse transmission coefficient s_{re}.

Conditions for figs 7 to 10: $-V_{CE}$ = 5 V; $-I_C$ = 30 mA; T_{amb} = 25 °C; typical values.

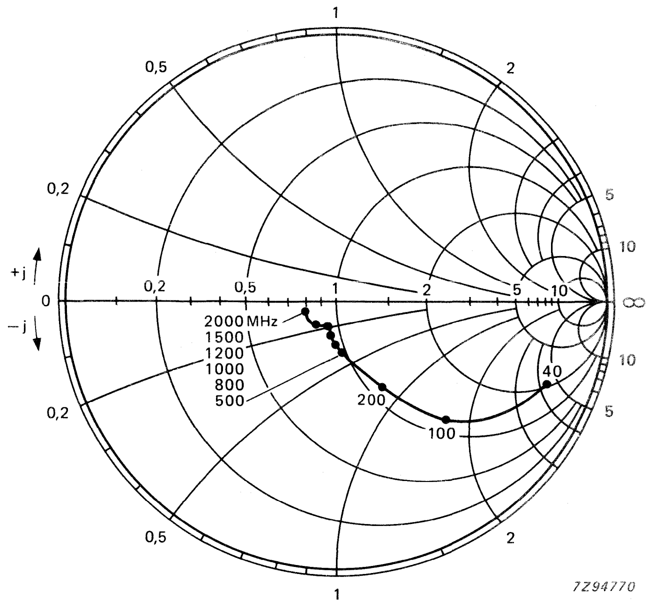


Fig. 9 Output impedance, derived from output reflection coefficient s_{oe} coordinates, in ohm x 50.

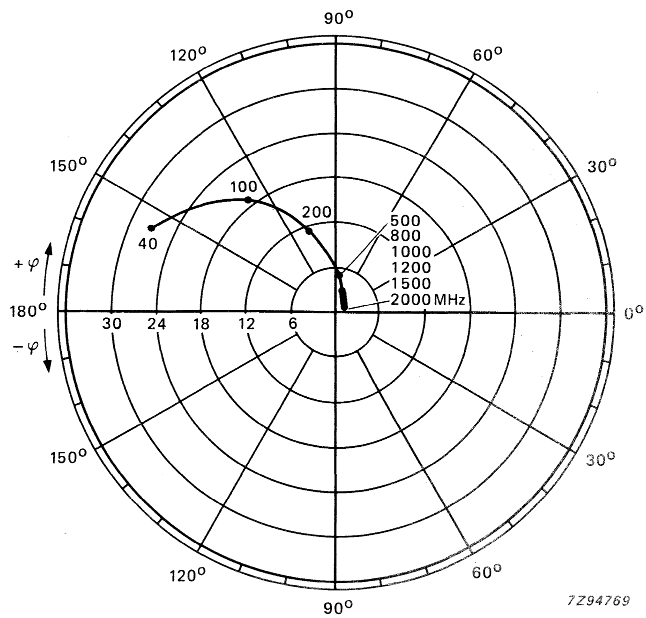


Fig. 10 Forward transmission coefficient s_{fe}.

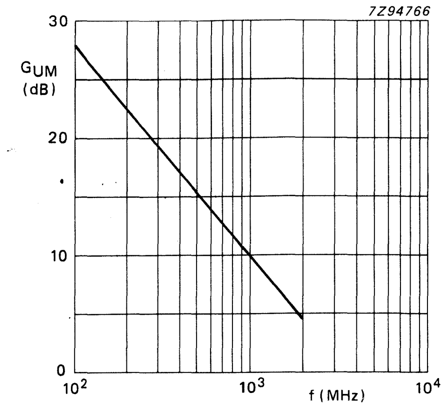


Fig. 11 $-V_{CE}$ = 5 V; $-I_C$ = 30 mA;
T_{amb} = 25 °C; typical values.

P-N-P 2 GHz WIDEBAND TRANSISTOR

P-N-P transistor in a sub-miniature HERMETICALLY SEALED micro-stripline envelope. It is primarily intended for use in u.h.f. and microwave amplifiers such as aerial amplifiers, radar systems, oscilloscopes, spectrum analysers etc.

The transistor features low intermodulation distortion and high power gain due to its very high transition frequency, excellent wideband properties and low noise up to high frequencies.

N-P-N complement is BFP91A.

QUICK REFERENCE DATA

Collector-base voltage	$-V_{CBO}$	max.	15	V
Collector-emitter voltage	$-V_{CEO}$	max.	12	V
Collector current (d.c.)	$-I_C$	max.	50	mA
Total power dissipation up to T_{amb} = 105 °C	P_{tot}	max.	350	mW
Junction temperature	T_j	max.	175	°C
D.C. current gain $-I_C$ = 30 mA; $-V_{CE}$ = 5 V	h_{FE}	min.	20	
Transition frequency at f = 500 MHz $-I_C$ = 30 mA; $-V_{CE}$ = 5 V	f_T	typ.	5,0	GHz
Maximum unilateral power gain $-I_C$ = 30 mA; $-V_{CE}$ = 8 V				
at f = 500 MHz	G_{UM}	typ.	20,0	dB
at f = 800 MHz	G_{UM}	typ.	16,0	dB

MECHANICAL DATA

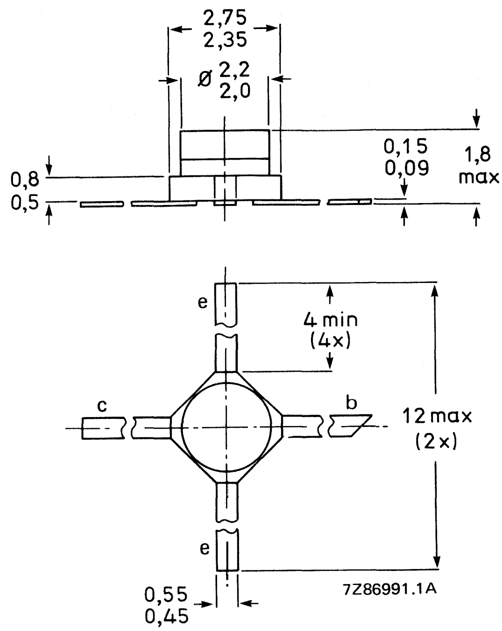
SOT-173 (see Fig. 1).

MECHANICAL DATA

Dimensions in mm

Fig. 1 SOT-173.

Marking code: C3



RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

Collector-base voltage (open emitter)	$-V_{CBO}$	max.	15 V
Collector-emitter voltage (open base)	$-V_{CEO}$	max.	12 V
Emitter-base voltage (open collector)	$-V_{EBO}$	max.	2 V
Collector current (d.c.)	$-I_C$	max.	50 mA
Total power dissipation up to T_{amb} = 105 °C mounted on a ceramic substrate of 0,7 mm x 10 cm^2	P_{tot}	max.	350 mW
Storage temperature	T_{stg}		−65 to +150 °C
Junction temperature	T_j	max.	175 °C

THERMAL RESISTANCE

From junction to ambient in free air mounted on a ceramic substrate of 0,7 mm x 10 cm^2	$R_{th\ j\text{-}a}$	200 K/W

CHARACTERISTICS

T_j = 25 °C unless otherwise specified

Collector cut-off current $I_E = 0; -V_{CB} = 5$ V	$-I_{CBO}$	max.	50 nA
D.C. current gain $-I_C = 30$ mA; $-V_{CE} = 5$ V	h_{FE}	min.	20
Transition frequency at f = 500 MHz $-I_C = 30$ mA; $-V_{CE} = 5$ V	f_T	typ.	5,0 GHz
Collector capacitance at f = 1 MHz $I_E = I_e = 0; -V_{CB} = 10$ V	C_c	typ.	1,0 pF
Emitter capacitance at f = 1 MHz $I_C = I_c = 0; -V_{EB} = 0,5$ V	C_e	typ.	1,8 pF
Feedback capacitance at f = 1 MHz $I_C = 0; -V_{CE} = 10$ V;	C_{re}	typ.	0,8 pF

Maximum unilateral power gain (s_{re} assumed to be zero)

$$G_{UM} = 10 \log \frac{|s_{fe}|^2}{[1-|s_{ie}|^2]\,[1-|s_{oe}|^2]}$$

at $-I_C = 30$ mA; $-V_{CE} = 8$ V; $T_{amb} = 25$ °C;			
f = 500 MHz	G_{UM}	typ.	20,0 dB
f = 800 MHz	G_{UM}	typ.	16,0 dB
Noise figures at f = 800 MHz; Z_S = opt.; $T_{amb} = 25$ °C			
$-I_C = 4$ mA; $-V_{CE} = 8$ V	F	typ.	2,3 dB
$-I_C = 30$ mA; $-V_{CE} = 8$ V	F	typ.	3,7 dB

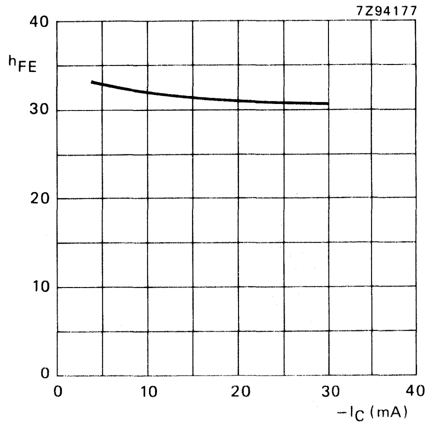


Fig. 2 $-V_{CE} = 5$ V; $T_j = 25$ °C; typical values.

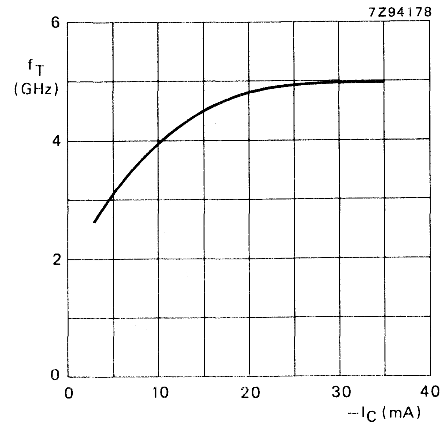


Fig. 3 $-V_{CE} = 5$ V; f = 500 MHz; $T_j = 25$ °C; typical values.

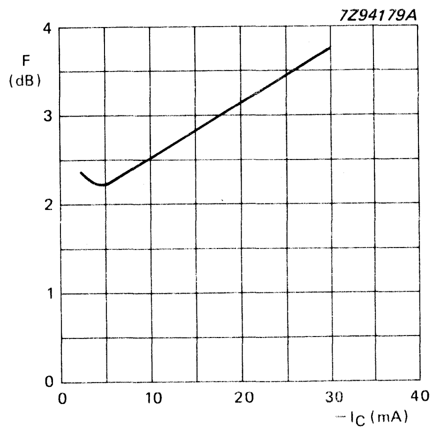


Fig. 4 $-V_{CE} = 8$ V; f = 800 MHz; $T_{amb} = 25$ °C; Z_s = optimum; typical values.

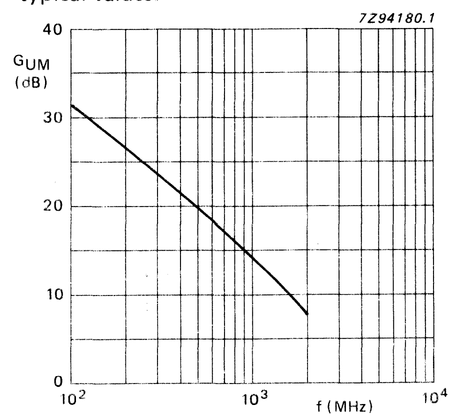


Fig. 5 $-V_{CE} = 8$ V; $-I_C = 30$ mA; $T_{amb} = 25$ °C; typical values.

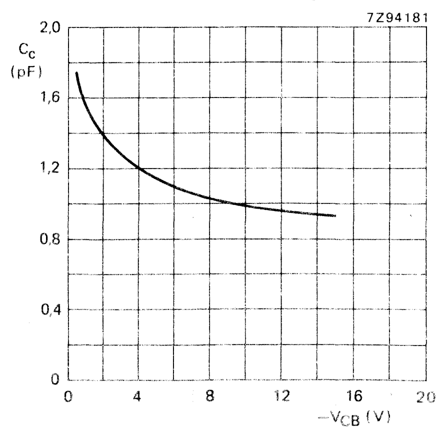
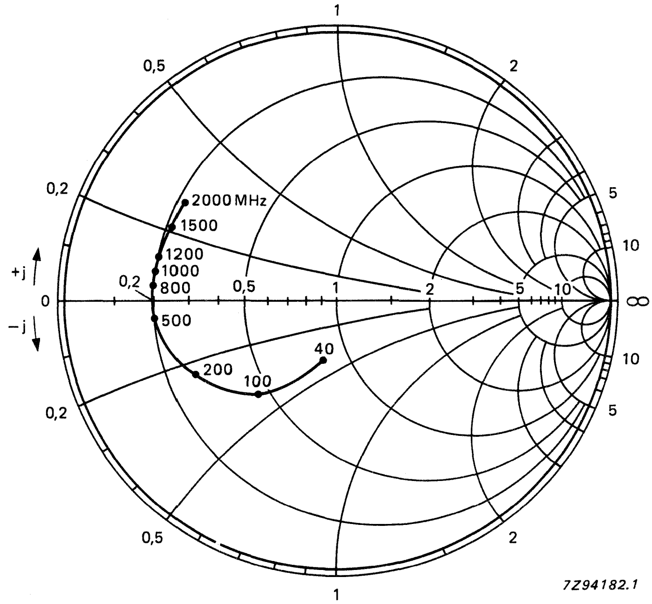


Fig. 6 $I_E = I_e = 0$; f = 1 MHz; $T_j = 25$ °C; typical values.

s-parameters (common emitter) at $-V_{CE}$ = 8 V; T_{amb} = 25 °C

I_C mA	f MHz	s_{ie}	s_{fe}	s_{re}	s_{oe}	G_{UM} dB
	40	0,84/ −13,4°	6,6/172,9°	0,019/ 82,8°	0,99/ −5,7°	38,7
	100	0,83/ −32,3°	6,4/161,1°	0,047/ 73,3°	0,95/ −14,1°	31,3
	200	0,80/ −60,8°	5,7/143,8°	0,083/ 59,4°	0,87/ −25,7°	25,7
	500	0,74/−114,6°	3,7/112,1°	0,136/ 35,8°	0,66/ −45,8°	17,3
2	800	0,71/−142,7°	2,6/ 92,5°	0,149/ 25,7°	0,55/ −54,2°	12,9
	1000	0,68/−154,3°	2,1/ 83,3°	0,153/ 23,1°	0,52/ −58,0°	10,5
	1200	0,67/−164,3°	1,7/ 75,5°	0,153/ 20,8°	0,50/ −62,2°	8,4
	1500	0,65/−178,0°	1,4/ 63,9°	0,156/ 17,3°	0,53/ −65,3°	6,9
	2000	0,66/+165,5°	1,1/ 48,9°	0,154/ 16,4°	0,50/ −75,3°	4,8
	40	0,66/ −22,5°	13,5/169,4°	0,017/ 79,7°	0,97/ −10,2°	37,4
	100	0,66/ −52,0°	12,4/153,7°	0,039/ 67,5°	0,90/ −24,2°	31,6
	200	0,66/ −89,6°	10,1/132,9°	0,064/ 52,4°	0,74/ −41,3°	26,0
	500	0,68/−141,5°	5,5/103,0°	0,091/ 34,5°	0,46/ −64,5°	18,5
5	800	0,67/−162,7°	3,7/ 87,8°	0,100/ 31,9°	0,36/ −72,6°	14,6
	1000	0,66/−172,1°	3,0/ 80,6°	0,106/ 32,6°	0,34/ −75,4°	12,6
	1200	0,67/−179,7°	2,5/ 73,8°	0,111/ 33,0°	0,32/ −79,4°	11,0
	1500	0,63/+168,5°	2,0/ 64,9°	0,122/ 34,1°	0,33/ −76,7°	8,7
	2000	0,64/+155,6°	1,5/ 51,9°	0,136/ 35,6°	0,30/ −84,8°	6,5
	40	0,47/ −35,4°	20,4/165,5°	0,014/ 76,9°	0,93/ −14,9°	36,0
	100	0,52/ −76,4°	17,7/146,4°	0,032/ 62,8°	0,82/ −33,9°	31,2
	200	0,59/−115,9°	13,1/124,3°	0,048/ 49,2°	0,62/ −54,7°	26,3
	500	0,65/−157,4°	6,4/ 97,9°	0,066/ 40,4°	0,35/ −80,0°	19,1
10	800	0,65/−173,4°	4,2/ 84,7°	0,078/ 43,3°	0,27/ −89,0°	15,2
	1000	0,65/+178,9°	3,4/ 78,8°	0,087/ 45,7°	0,24/ −91,3°	13,3
	1200	0,65/+172,9°	2,9/ 72,9°	0,096/ 47,0°	0,23/ −94,9°	11,9
	1500	0,63/+161,2°	2,4/ 65,1°	0,111/ 46,5°	0,23/ −91,9°	10,0
	2000	0,65/+150,1°	1,8/ 53,0°	0,133/ 46,8°	0,20/ −99,0°	7,5
	40	0,29/ −63,8°	26,8/162,1°	0,012/ 74,1°	0,89/ −19,5°	35,8
	100	0,45/−108,1°	22,0/140,1°	0,025/ 59,7°	0,74/ −43,0°	31,3
	200	0,58/−139,5°	15,1/118,3°	0,036/ 49,0°	0,52/ −66,6°	26,7
	500	0,65/−168,7°	7,0/ 94,6°	0,051/ 47,8°	0,29/ −95,4°	19,7
20	800	0,66/−179,3°	4,5/ 82,9°	0,066/ 52,3°	0,22/−106,4°	15,8
	1000	0,66/+173,0°	3,7/ 77,4°	0,077/ 54,7°	0,20/−109,3°	14,0
	1200	0,66/+168,2°	3,1/ 72,0°	0,088/ 55,3°	0,19/−112,9°	12,5
	1500	0,65/+156,7°	2,5/ 64,7°	0,108/ 55,0°	0,18/−107,3°	10,6
	2000	0,66/+146,8°	1,9/ 53,1°	0,132/ 53,4°	0,16/−114,3°	8,1
	40	0,23/ −93,3°	29,3/160,2°	0,010/ 72,3°	0,86/ −21,6°	35,4
	100	0,45/−125,5°	23,5/137,3°	0,021/ 59,0°	0,70/ −47,1°	31,3
	200	0,58/−149,5°	15,5/115,7°	0,030/ 50,6°	0,48/ −71,6°	26,7
	500	0,66/−173,2°	7,1/ 93,2°	0,046/ 52,8°	0,26/−101,2°	20,0
30	800	0,66/+176,4°	4,6/ 81,9°	0,062/ 57,4°	0,21/−112,3°	16,0
	1000	0,66/+170,5°	3,7/ 76,5°	0,074/ 59,1°	0,19/−115,4°	14,0
	1200	0,66/+165,8°	3,1/ 71,1°	0,085/ 59,5°	0,18/−118,5°	12,5
	1500	0,65/+154,9°	2,5/ 63,7°	0,106/ 58,4°	0,16/−113,0°	10,7
	2000	0,66/+145,5°	1,9/ 52,4°	0,132/ 56,3°	0,14/−120,0°	8,1

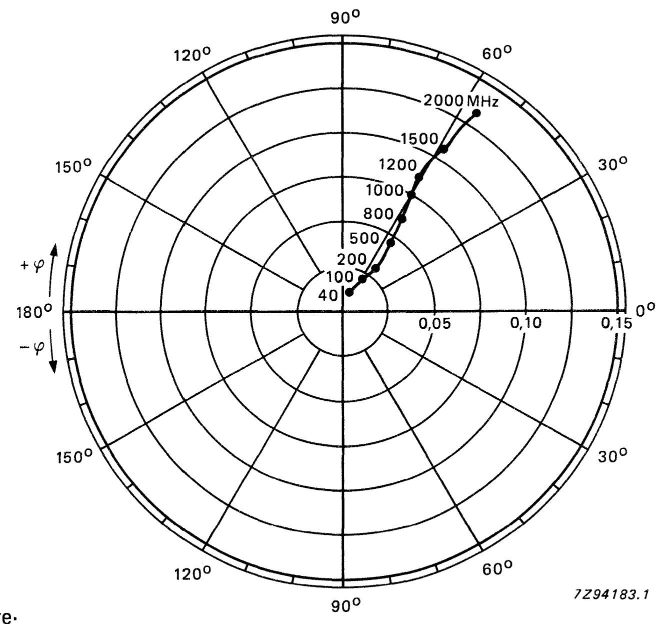
$-V_{CE}$ = 8 V
$-I_C$ = 30 mA
T_{amb} = 25 °C



Input impedance derived from input reflection coefficient s_{ie} co-ordinates in ohm x 50.

Fig. 7.

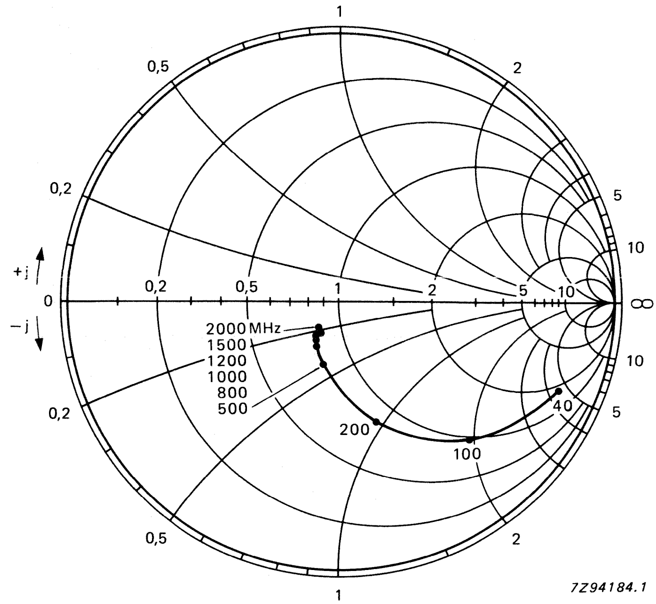
$-V_{CE}$ = 8 V
$-I_C$ = 30 mA
T_{amb} = 25 °C



Reverse transmission coefficient s_{re}.

Fig. 8.

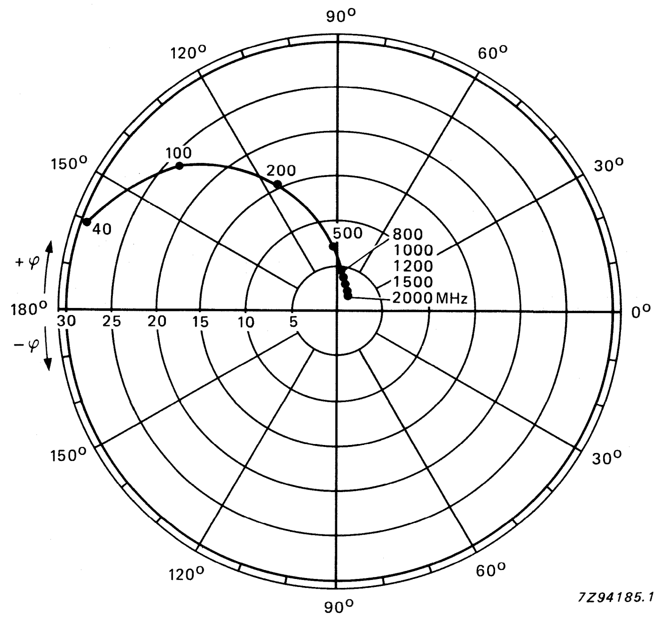
$-V_{CE}$ = 8 V
$-I_C$ = 30 mA
T_{amb} = 25 ^oC



Output impedance derived from output reflection coefficient s_{oe} co-ordinates on ohm x 50.

Fig. 9.

$-V_{CE}$ = 8 V
$-I_C$ = 30 mA
T_{amb} = 25 ^oC



Forward transmission coefficient s_{fe}.

Fig. 10.

P-N-P H.F. WIDEBAND TRANSISTOR

P-N-P transistor in a TO-72 metal envelope with insulated electrodes and a shield lead connected to the case. It is primarily intended for use in u.h.f. and microwave amplifiers such as in aerial amplifiers, radar systems, oscilloscopes, spectrum analysers etc.

The transistor features extremely high power gain coupled with good low noise performance.

N-P-N complement is BFQ22S.

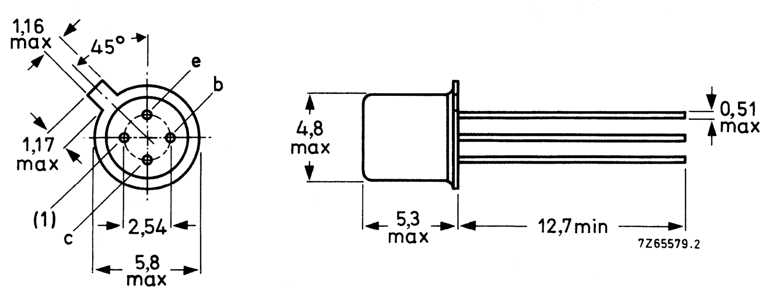
QUICK REFERENCE DATA

Collector-base voltage (open emitter)	$-V_{CBO}$	max.	15	V
Collector-emitter voltage (open base)	$-V_{CEO}$	max.	12	V
Collector current (d.c.)	$-I_C$	max.	35	mA
Total power dissipation up to T_{amb} = 65 °C	P_{tot}	max.	150	mW
Junction temperature	T_j	max.	200	°C
Transition frequency at f = 500 MHz $-I_C$ = 30 mA; $-V_{CE}$ = 5 V	f_T	typ.	5,0	GHz
Feedback capacitance at f = 1 MHz I_C = 0; $-V_{CE}$ = 5 V; T_{amb} = 25 °C	C_{re}	typ.	0,8	pF
Noise figure at optimum source impedance $-I_C$ = 2 mA; $-V_{CE}$ = 5 V; f = 500 MHz	F	typ.	2,4	dB
Maximum unilateral power gain $-I_C$ = 30 mA; $-V_{CE}$ = 5 V; f = 500 MHz	G_{UM}	typ.	15,0	dB

MECHANICAL DATA

Dimensions in mm

Fig. 1 TO-72 with insulated electrodes.



(1) shield lead connected to case.

Accessories: 56246 (distance disc).

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

Collector-base voltage (open emitter)	$-V_{CBO}$	max.	15	V
Collector-emitter voltage (open base)	$-V_{CEO}$	max.	12	V
Emitter-base voltage (open collector)	$-V_{EBO}$	max.	2	V
Collector current (d.c.)	$-I_C$	max.	35	mA
Collector current (peak value) at f > 1 MHz	$-I_{CM}$	max.	50	mA
Total power dissipation up to T_{amb} = 65 °C	P_{tot}	max.	150	mW
Storage temperature	T_{stg}		−65 to +200	°C
Junction temperature	T_j	max.	200	°C

THERMAL RESISTANCE

From junction to ambient in free air	$R_{th\ j\text{-}a}$	=	900	K/W
From junction to case	$R_{th\ j\text{-}c}$	=	600	K/W

CHARACTERISTICS

T_j = 25 °C unless otherwise specified

Collector cut-off current $I_E = 0$; $-V_{CB} = 5$ V	$-I_{CBO}$	max.	50	nA
D.C. current gain $-I_C = 30$ mA; $-V_{CE} = 5$ V	h_{FE}	min. typ.	20 50	
Transition frequency (note 1) $-I_C = 30$ mA; $-V_{CE} = 5$ V; f = 500 MHz	f_T	typ.	5,0	GHz
Collector capacitance (note 2) $I_E = I_e = 0$; $-V_{CB} = 5$ V; f = 1 MHz	C_c	typ.	1,2	pF
Emitter capacitance $I_C = I_c = 0$; $-V_{EB} = 0{,}5$ V; f = 1 MHz	C_e	typ.	2,5	pF
Feedback capacitance (note 1) $I_C = 0$; $-V_{CE} = 5$ V; f = 1 MHz	C_{re}	typ.	0,8	pF
Noise figure at optimum source impedance (note 1) $-I_C = 2$ mA; $-V_{CE} = 5$ V; f = 500 MHz; T_{amb} = 25 °C	F	typ.	2,4	dB

Maximum unilateral power gain (note 1)
s_{re} assumed to be zero

$$G_{UM} = 10 \log \frac{|s_{fe}|^2}{[1-|s_{ie}|^2]\,[1-|s_{oe}|^2]}$$

$-I_C = 30$ mA; $-V_{CE} = 5$ V; f = 500 MHz; T_{amb} = 25 °C	G_{UM}	typ.	15,0	dB

Notes

1. Shield lead grounded.
2. Shield lead not connected.

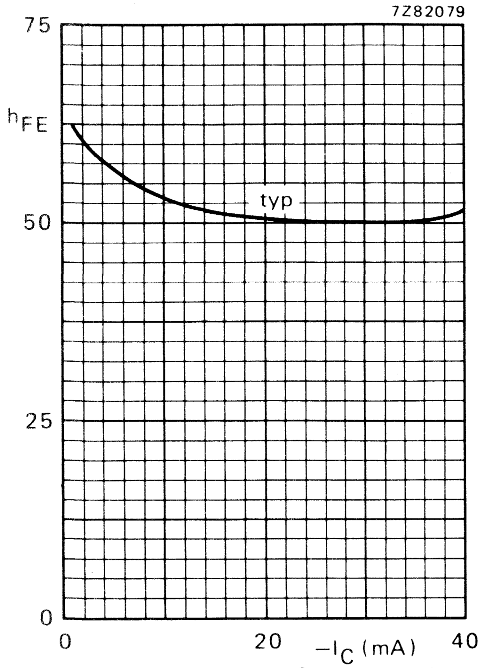


Fig. 2 $-V_{CE}$ = 5 V; T_j = 25 °C; typical values.

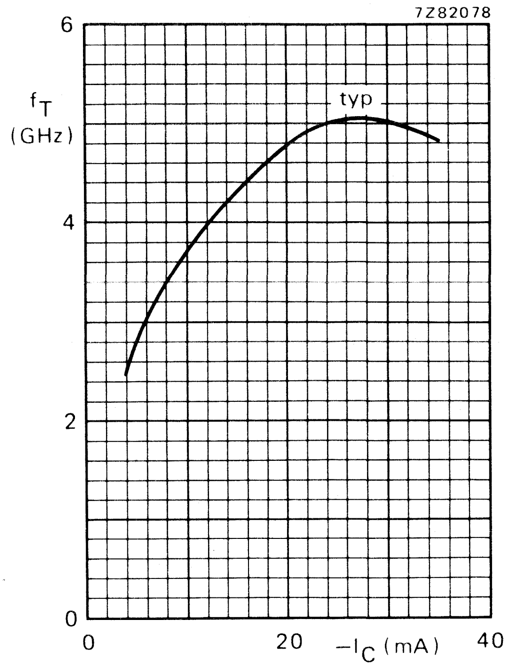


Fig. 3 $-V_{CE}$ = 5 V; f = 500 MHz; T_j = 25 °C; typical values.

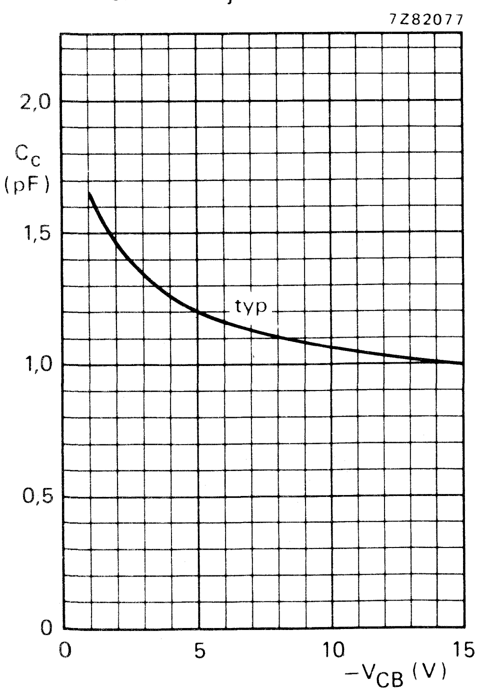


Fig. 4 $I_E = I_e = 0$; f = 1 MHz; T_j = 25 °C; typical values.

P-N-P 1 GHz WIDEBAND TRANSISTOR

P-N-P transistor in a plastic SOT-37 envelope.

It is intended for use in u.h.f. applications such as broadband aerial amplifiers (30 MHz to 860 MHz) and in microwave amplifiers such as radar systems, spectrum analysers etc.

The BFQ32 offers a high transition frequency and a low intermodulation distortion figure over a wide current range.

N-P-N complement is BFR96.

QUICK REFERENCE DATA

Collector-base voltage (open emitter)	$-V_{CBO}$	max.	20	V
Collector-emitter voltage (open base)	$-V_{CEO}$	max.	15	V
Collector current (d.c.)	$-I_C$	max.	75	mA
Total power dissipation up to T_{amb} = 60 °C	P_{tot}	max.	500	mW
Junction temperature	T_j	max.	175	°C
Transition frequency at f = 500 MHz $-I_C$ = 50 mA; $-V_{CE}$ = 10 V	f_T	min.	3,6	GHz
Feedback capacitance at f = 1 MHz $-I_C$ = 10 mA; $-V_{CE}$ = 10 V	C_{re}	max.	1,4	pF
Noise figure at optimum source impedance $-I_C$ = 50 mA; $-V_{CE}$ = 10 V; f = 500 MHz	F	typ.	3,75	dB
Output voltage at d_{im} = −60 dB $-I_C$ = 50 mA; $-V_{CE}$ = 10 V; R_L = 75 Ω; $f_{(p+q-r)}$ = 493,25 MHz	V_o	typ.	500	mV

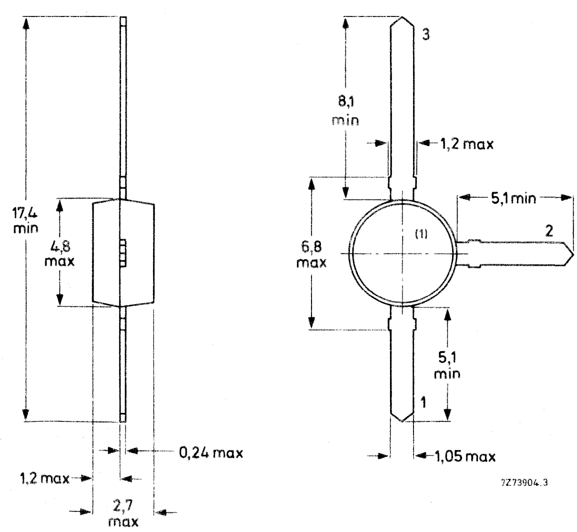
MECHANICAL DATA

Dimensions in mm

Fig. 1 SOT-37.

Connections

1. Base
2. Emitter
3. Collector



(1) = type number marking.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

Collector-base voltage (open emitter)	$-V_{CBO}$	max.	20	V
Collector-emitter voltage (open base)	$-V_{CEO}$	max.	15	V
Emitter-base voltage (open collector)	$-V_{EBO}$	max.	3	V
Collector current (d.c.)	$-I_C$	max.	75	mA
Collector current (peak value); f > 1 MHz	$-I_{CM}$	max.	150	mA
Total power dissipation up to T_{amb} = 60 °C mounted on a fibre-glass print of 40 mm x 25 mm x 1 mm	P_{tot}		500	mW
Storage temperature	T_{stg}	−65 to + 175		°C
Junction temperature	T_j	max.	175	°C

THERMAL RESISTANCE

From junction to ambient in free air mounted on a fibre-glass print of 40 mm x 25 mm x 1 mm	$R_{th\ j\text{-}a}$	=	230	K/W

CHARACTERISTICS

T_j = 25 °C unless otherwise specified

Collector cut-off current I_E = 0; $-V_{CB}$ = 10 V	$-I_{CBO}$	max.	100	nA
D.C. current gain $-I_C$ = 50 mA; $-V_{CE}$ = 10 V	h_{FE}	min.	20	
$-I_C$ = 75 mA; $-V_{CE}$ = 10 V	h_{FE}	min.	20	
Transition frequency at f = 500 MHz $-I_C$ = 50 mA; $-V_{CE}$ = 10 V	f_T	min.	3,6	GHz
		typ	4,2	GHz
$-I_C$ = 75 mA; $-V_{CE}$ = 10 V	f_T	min.	4,0	GHz
		typ	4,6	GHz
Collector capacitance at f = 1 MHz $I_E = I_e$ = 0; $-V_{CB}$ = 10 V	C_c	typ	1,3	pF
Emitter capacitance at f = 1 MHz $I_C = I_c$ = 0; $-V_{EB}$ = 0,5 V	C_e	typ	6	pF
Feedback capacitance at f = 1 MHz $-I_C$ = 10 mA; $-V_{CE}$ = 10 V	C_{re}	max.	1,4	pF
		typ	1,25	pF

Noise figure at optimum source impedance			
$-I_C$ = 50 mA; $-V_{CE}$ = 10 V; f = 500 MHz; T_{amb} = 25 °C	F	typ.	3,75 dB
Maximum unilateral power gain (s_{re} assumed to be zero)			
$$G_{UM} = 10 \log \frac{\lvert s_{fe}\rvert^2}{[1-\lvert s_{ie}\rvert^2]\,[1-\lvert s_{oe}\rvert^2]}$$			
$-I_C$ = 50 mA; $-V_{CE}$ = 10 V; f = 500 MHz; T_{amb} = 25 °C	G_{UM}	typ.	14,0 dB
Output voltage at d_{im} = −60 dB $-I_C$ = 50 mA; $-V_{CE}$ = 10 V; R_L = 75 Ω; T_{amb} = 25 °C			
$V_p = V_o$ at d_{im} = −60 dB ; f_p = 495,25 MHz $V_q = V_o$ −6 dB ; f_q = 503,25 MHz $V_r = V_o$ −6 dB ; f_r = 505,25 MHz			
measured at $f_{(p+q-r)}$ = 495,25 MHz	V_o	typ.	500 mV

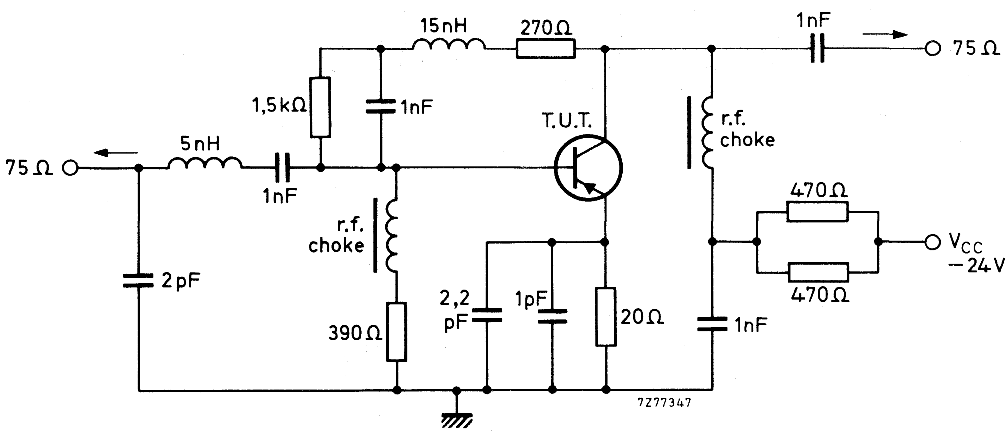


Fig. 2 Intermodulation test circuit.

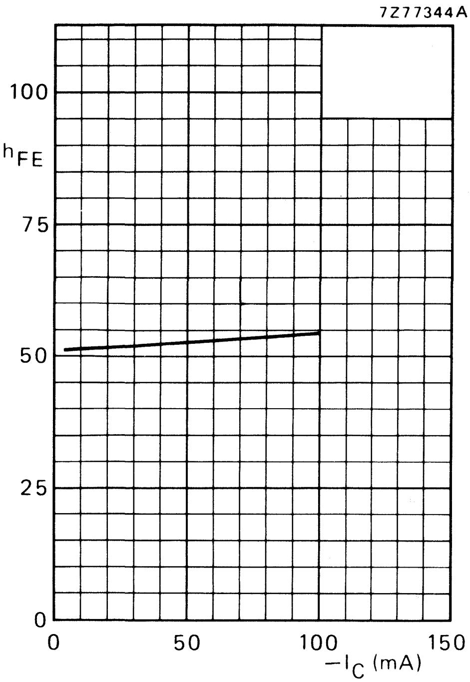


Fig. 3 $-V_{CE}$ = 10 V; T_j = 25 °C; typical values.

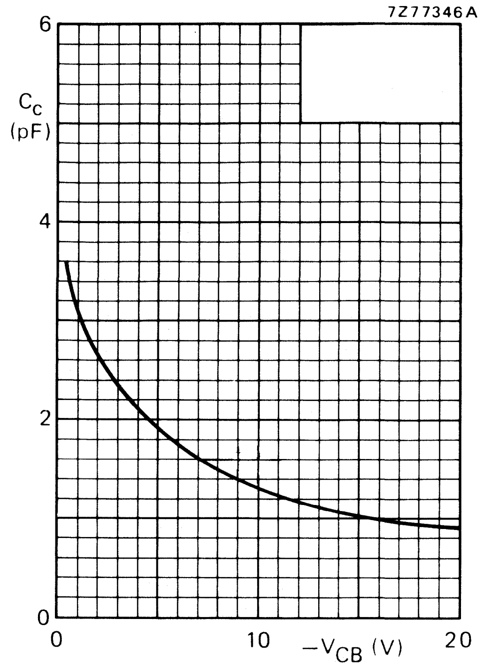


Fig. 4 $I_E = i_e = 0$; f = 1 MHz; T_j = 25 °C; typical values.

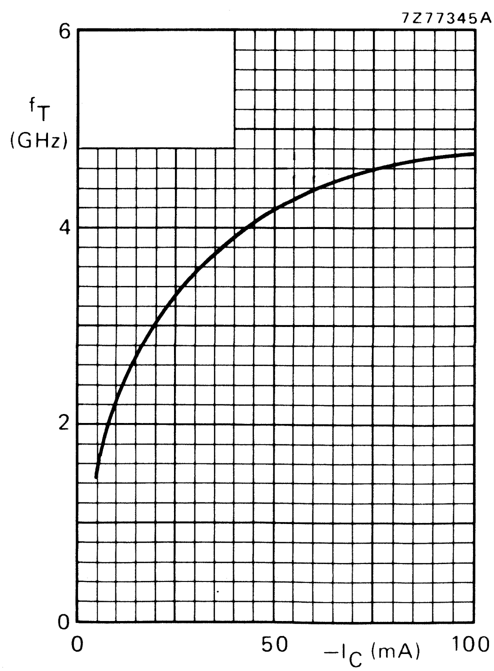


Fig. 5 $-V_{CE}$ = 10 V; f = 500 MHz; T_j = 25 °C; typical values.

P-N-P 2 GHz WIDEBAND TRANSISTOR

P-N-P transistor in a sub-miniature HERMETICALLY SEALED micro-stripline envelope. It is intended for use in u.h.f. applications such as broadband aerial amplifiers. Microwave applications include radar systems, spectrum analysers etc.

The BFQ32C features a high transition frequency and a low intermodulation distortion figure over a wide current range.

N-P-N complement is BFP96.

QUICK REFERENCE DATA

Collector-base voltage	$-V_{CBO}$	max.	20	V
Collector-emitter voltage	$-V_{CEO}$	max.	15	V
Collector current (d.c.)	$-I_C$	max.	100	mA
Total power dissipation up to T_{amb} = 75 °C	P_{tot}	max.	500	mW
Junction temperature	T_j	max.	175	°C
D.C. current gain $-I_C$ = 50 mA; $-V_{CE}$ = 10 V	h_{FE}	min.	20	
Transition frequency at f = 500 MHz $-I_C$ = 50 mA; $-V_{CE}$ = 10 V	f_T	typ.	4,5	GHz
Maximum unilateral power gain $-I_C$ = 50 mA; $-V_{CE}$ = 10 V at f = 500 MHz	G_{UM}	typ.	18,0	dB
at f = 800 MHz	G_{UM}	typ.	14,0	dB

MECHANICAL DATA

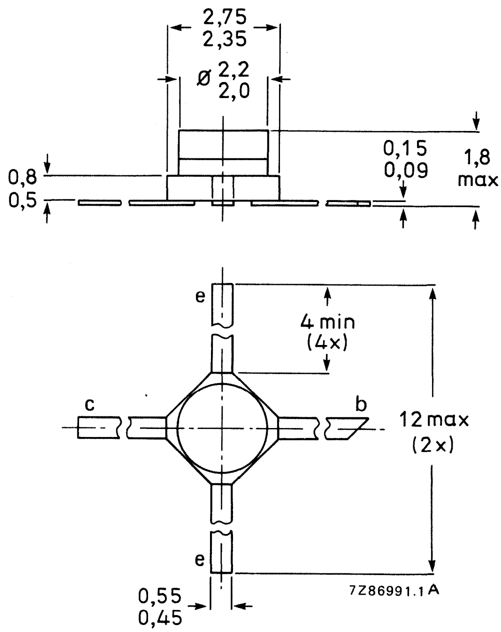
SOT-173 (see Fig. 1).

MECHANICAL DATA

Dimensions in mm

Fig. 1 SOT-173.

Marking code: C2



RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

Collector-base voltage (open emitter)	$-V_{CBO}$	max.	20	V
Collector-emitter voltage (open base)	$-V_{CEO}$	max.	15	V
Emitter-base voltage (open collector)	$-V_{EBO}$	max.	3	V
Collector current (d.c.)	$-I_C$	max.	100	mA
Total power dissipation up to T_{amb} = 75 °C mounted on a ceramic substrate of 0,7 mm x 10 cm^2	P_{tot}	max.	500	mW
Storage temperature	T_{stg}		−65 to +150	°C
Junction temperature	T_j	max.	175	°C

THERMAL RESISTANCE

From junction to ambient in free air, mounted on a ceramic substrate of 0,7 mm x 10 cm^2	$R_{th\ j\text{-}a}$	200	K/W

CHARACTERISTICS

T_j = 25 °C unless otherwise specified

Collector cut-off current $I_E = 0$; $-V_{CB} = 10$ V	$-I_{CBO}$	max.	100 nA
D.C. current gain $-I_C = 50$ mA; $-V_{CE} = 10$ V	h_{FE}	min.	20
Transition frequency at f = 500 MHz $-I_C = 50$ mA; $-V_{CE} = 10$ V	f_T	typ.	4,5 GHz
Collector capacitance at f = 1 MHz $I_E = I_e = 0$; $-V_{CB} = 10$ V	C_c	typ.	1,9 pF
Emitter capacitance at f = 1 MHz $I_C = I_c = 0$; $-V_{EB} = 0,5$ V	C_e	typ.	5,0 pF
Feedback capacitance at f = 1 MHz $I_C = 0$; $-V_{CE} = 10$ V	C_{re}	typ.	1,4 pF

Maximum unilateral power gain (s_{re} assumed to be zero)

$$G_{UM} = 10 \log \frac{|s_{fe}|^2}{[1-|s_{ie}|^2]\,[1-|s_{oe}|^2]}$$

at $-I_C = 50$ mA; $-V_{CE} = 10$ V; $T_{amb} = 25$ °C f = 500 MHz f = 800 MHz	G_{UM}	typ. typ.	18,0 dB 14,0 dB
Noise figures at f = 800 MHz; Z_S = opt.; $T_{amb} = 25$ °C; $-I_C = 50$ mA; $-V_{CE} = 10$ V	F	typ.	4,3 dB

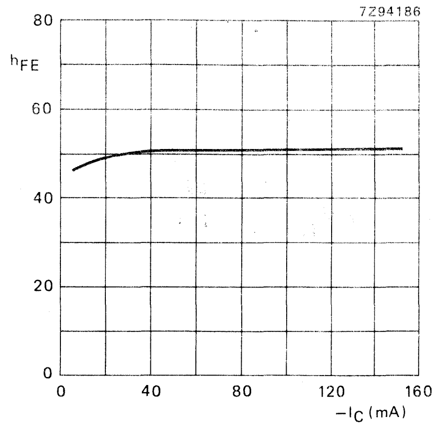


Fig. 2 $-V_{CE}$ = 10 V; T_j = 25 °C; typical values.

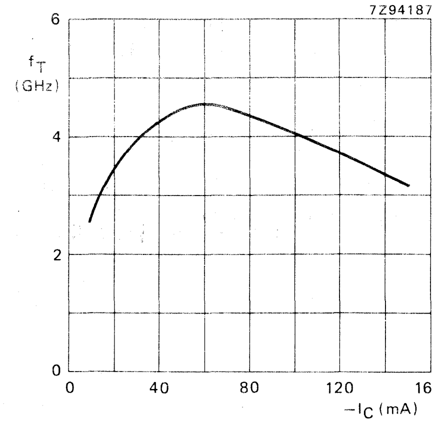


Fig. 3 $-V_{CE}$ = 10 V; f = 500 MHz; T_j = 25 °C; typical values.

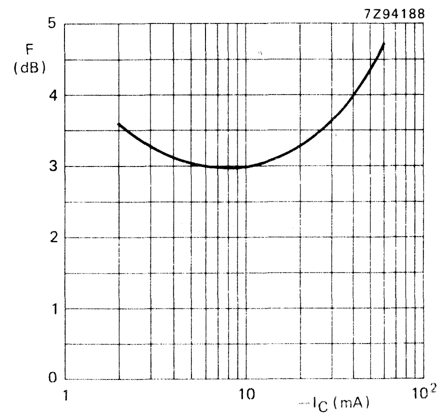


Fig. 4 $-V_{CE}$ = 10 V; f = 800 MHz; T_{amb} = 25 °C; Z_s = optimum; typical values.

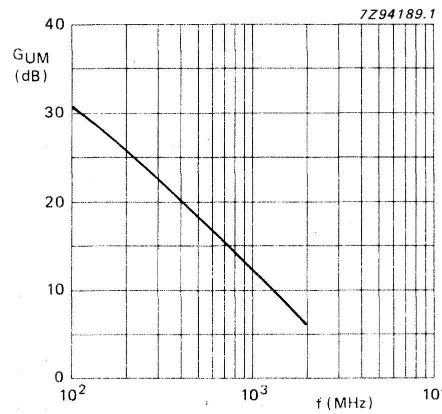


Fig. 5 $-V_{CE}$ = 10 V; $-I_C$ = 50 mA; T_{amb} = 25 °C; typical values.

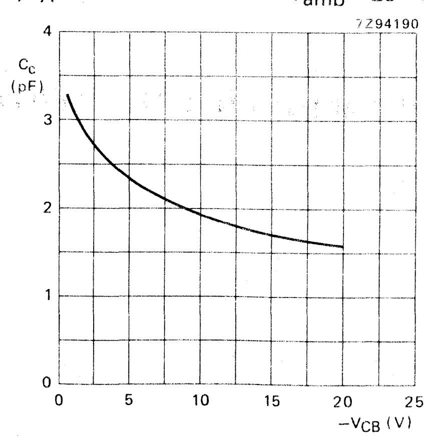


Fig. 6 $I_E = I_e = 0$; f = 1 MHz; T_j = 25 °C; typical values.

s-parameters (common emitter) at $-V_{CE}$ = 10 V; T_{amb} = 25 °C; typical values.

I_C mA	f MHz	s_{ie}	s_{fe}	s_{re}	s_{oe}	G_{UM} dB
	40	0,49/ −69,3°	20,4/153,8°	0,023/ 66,3°	0,88/ −26,1°	33,9
	100	0,64/−117,9°	14,7/127,8°	0,042/ 45,4°	0,65/ −51,6°	28,0
	200	0,72/−148,5°	8,8/107,1°	0,051/ 33,3°	0,41/ −70,4°	22,9
	500	0,76/−173,5°	3,8/ 85,3°	0,061/ 32,9°	0,26/ −88,9°	15,6
10	800	0,76/+176,5°	2,4/ 73,4°	0,071/ 38,7°	0,25/ −96,4°	11,6
	1000	0,76/+171,4°	2,0/ 66,9°	0,079/ 42,5°	0,26/−100,5°	10,1
	1200	0,76/+167,0°	1,7/ 60,7°	0,087/ 45,0°	0,27/−105,9°	8,7
	1500	0,73/+157,7°	1,3/ 51,6°	0,111/ 50,7°	0,29/−102,5°	6,0
	2000	0,75/+147,2°	1,0/ 39,5°	0,136/ 53,3°	0,31/−115,7°	3,9
	40	0,45/ −81,6°	24,5/151,2°	0,021/ 64,7°	0,85/ −31,0°	34,5
	100	0,62/−127,4°	16,6/124,3°	0,036/ 44,9°	0,60/ −60,6°	28,4
	200	0,71/−154,0°	9,8/105,7°	0,044/ 36,4°	0,38/ −83,1°	23,5
	500	0,75/−176,8°	4,2/ 85,4°	0,057/ 40,7°	0,24/−106,2°	16,1
15	800	0,75/+174,1°	2,6/ 72,9°	0,071/ 46,8°	0,22/−113,4°	12,2
	1000	0,74/+168,5°	2,2/ 67,6°	0,083/ 50,1°	0,22/−115,9°	10,3
	1200	0,74/+164,4°	1,8/ 61,9°	0,093/ 51,9°	0,23/−120,1°	8,9
	1500	0,73/+156,9°	1,5/ 54,1°	0,114/ 54,3°	0,26/−122,0°	7,0
	2000	0,76/+147,5°	1,1/ 42,1°	0,138/ 54,7°	0,28/−131,5°	5,0
	40	0,42/ −95,3°	27,9/148,7°	0,019/ 63,2°	0,83/ −35,6°	34,8
	100	0,63/−136,0°	18,1/121,9°	0,032/ 44,6°	0,56/ −68,5°	29,0
	200	0,71/−158,8°	10,5/104,2°	0,039/ 38,7°	0,36/ −94,6°	24,1
	500	0,74/−178,8°	4,4/ 85,3°	0,053/ 45,7°	0,20/−117,4°	16,6
20	800	0,74/+173,0°	2,8/ 73,5°	0,070/ 51,6°	0,23/−129,4°	12,7
	1000	0,74/+167,6°	2,3/ 68,5°	0,083/ 54,4°	0,22/−131,6°	10,8
	1200	0,74/+163,5°	1,9/ 63,0°	0,094/ 55,6°	0,23/−134,6°	9,4
	1500	0,73/+156,7°	1,6/ 55,2°	0,116/ 56,7°	0,23/−137,0°	7,5
	2000	0,75/+147,3°	1,2/ 43,4°	0,142/ 55,8°	0,25/−145,7°	5,4
	40	0,42/−120,4°	32,2/145,8°	0,016/ 61,2°	0,79/ −42,2°	35,2
	100	0,65/−148,4°	20,1/119,5°	0,025/ 44,4°	0,53/ −80,2°	29,9
	200	0,73/−165,5°	11,3/102,0°	0,031/ 41,5°	0,36/−111,0°	25,0
	500	0,76/+179,3°	4,7/ 84,6°	0,046/ 51,1°	0,27/−141,8°	17,5
30	800	0,76/+172,1°	3,0/ 74,7°	0,064/ 56,4°	0,26/−150,4°	13,6
	1000	0,76/+167,5°	2,4/ 69,5°	0,077/ 58,5°	0,25/−153,6°	11,6
	1200	0,76/+163,8°	2,0/ 64,5°	0,088/ 59,0°	0,25/−156,1°	10,0
	1500	0,74/+155,7°	1,7/ 56,8°	0,119/ 59,7°	0,24/−150,9°	8,1
	2000	0,76/+146,1°	1,3/ 45,3°	0,146/ 57,8°	0,25/−157,6°	6,0
	40	0,46/−137,3°	36,6/141,9°	0,013/ 58,9°	0,73/ −50,0°	35,6
	100	0,68/−157,1°	21,5/116,3°	0,020/ 45,6°	0,49/ −92,1°	30,5
	200	0,74/−170,4°	11,8/100,1°	0,026/ 46,9°	0,36/−124,6°	25,5
	500	0,76/−177,5°	4,9/ 84,0°	0,043/ 57,7°	0,30/−153,4°	18,0
50	800	0,76/+171,0°	3,1/ 74,9°	0,063/ 61,4°	0,28/−161,8°	14,0
	1000	0,76/+166,6°	2,5/ 69,8°	0,076/ 62,5°	0,27/−165,5°	12,0
	1200	0,76/+162,9°	2,1/ 64,9°	0,089/ 62,4°	0,27/−168,1°	10,5
	1500	0,74/+155,2°	1,7/ 57,6°	0,123/ 61,0°	0,23/−165,0°	8,2
	2000	0,76/+146,1°	1,3/ 46,7°	0,151/ 58,4°	0,23/−172,4°	6,2

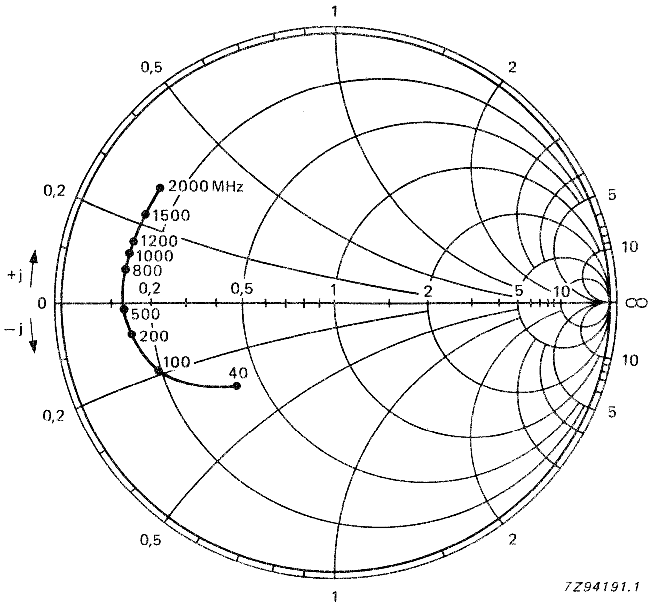


Fig. 7 $-V_{CE}$ = 10 V; $-I_C$ = 50 mA; T_{amb} = 25 °C; typical values.

Input impedance derived from input reflection coefficient s_{ie} co-ordinates in ohm x 50.

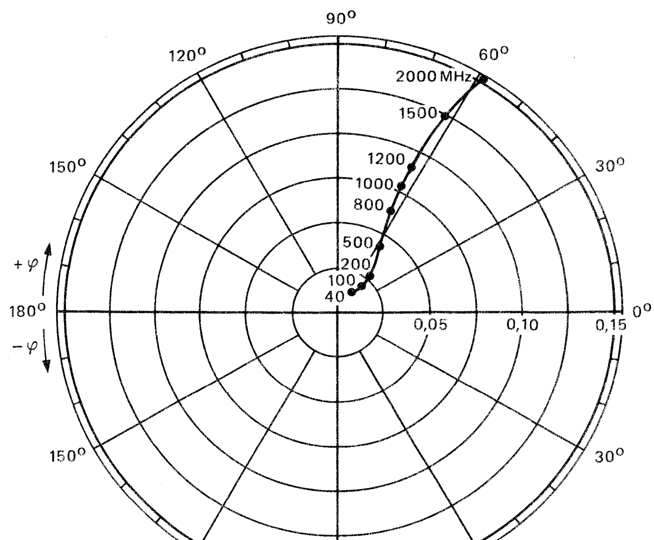


Fig. 8 $-V_{CE}$ = 10 V; $-I_C$ = 50 mA; T_{amb} = 25 °C; typical values.

Reverse transmission coefficient s_{re}.

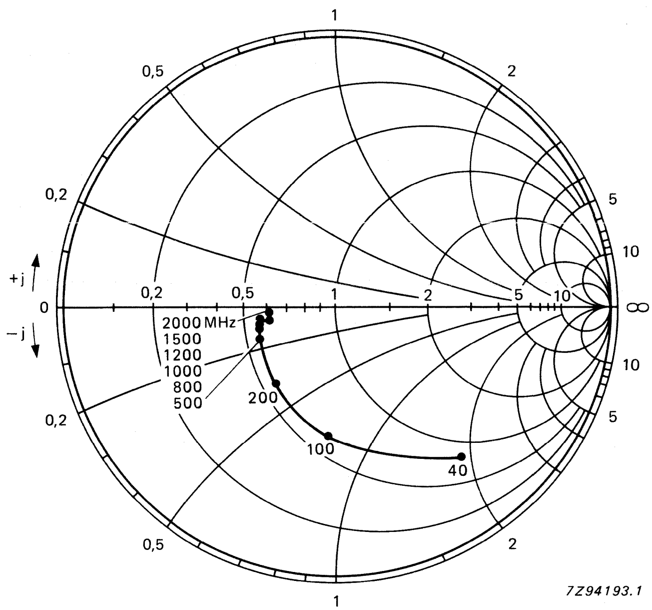


Fig. 9 $-V_{CE}$ = 10 V; $-I_C$ = 50 mA; T_{amb} = 25 °C; typical values.

Output impedance derived from output reflection coefficient s_{oe} co-ordinates in ohm x 50.

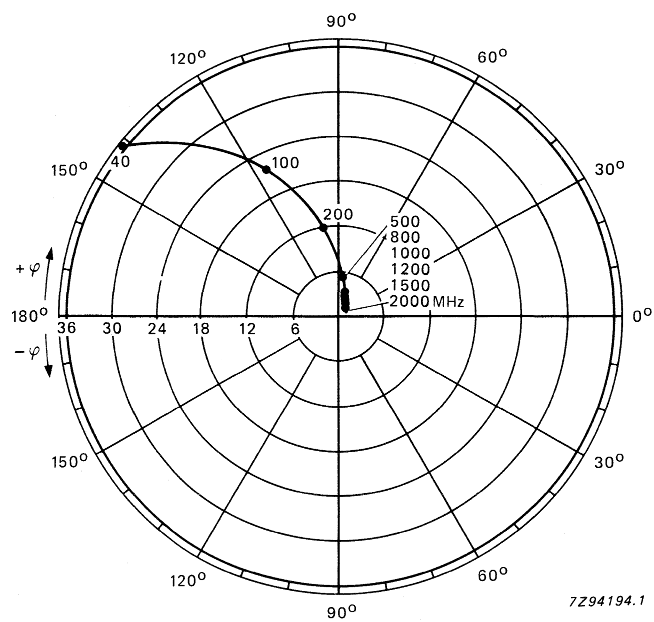


Fig. 10 $-V_{CE}$ = 10 V; $-I_C$ = 50 mA; T_{amb} = 25 °C; typical values.

Forward transmission coefficient s_{fe}.

P-N-P H.F. WIDEBAND TRANSISTOR

P-N-P transistor in a TO-72 metal envelope with insulated electrodes and a shield lead connected to the case. It is primarily intended for use in u.h.f. and microwave amplifiers such as aerial amplifiers, radar systems, oscilloscopes, spectrum analysers etc.

The transistor features high power gain, high transition frequency and low noise up to high frequencies.

N-P-N complement is BFQ63.

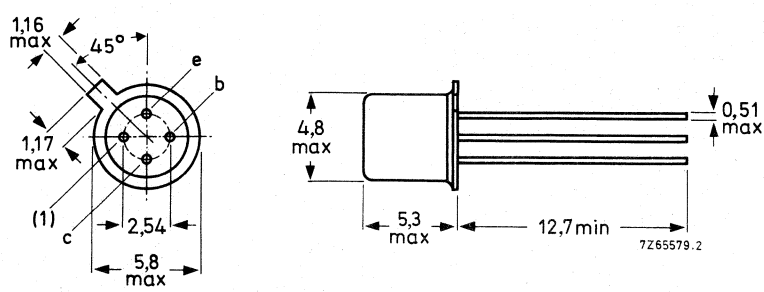
QUICK REFERENCE DATA

Collector-base voltage (open emitter)	$-V_{CBO}$	max.	20	V
Collector-emitter voltage (open base)	$-V_{CEO}$	max.	15	V
Collector current (d.c.)	$-I_C$	max.	75	mA
Total power dissipation up to T_{amb} = 50 °C	P_{tot}	max.	250	mW
Junction temperature	T_j	max.	200	°C
Transition frequency at f = 500 MHz $-I_C$ = 50 mA; $-V_{CE}$ = 5 V	f_T	typ.	4,5	GHz
Feedback capacitance at f = 1 MHz $-I_C$ = 10 mA; $-V_{CE}$ = 10 V	C_{re}	typ.	1,4	pF
Noise figure at optimum source impedance $-I_C$ = 10 mA; $-V_{CE}$ = 5 V; f = 200 MHz	F	typ.	1,9	dB
Maximum unilateral power gain $-I_C$ = 20 mA; $-V_{CE}$ = 5 V; f = 200 MHz	G_{UM}	typ.	18,0	dB

MECHANICAL DATA

Dimensions in mm

Fig. 1 TO-72 with insulated electrodes.



(1) Shield lead connected to case.

Accessories: 56246 (distance disc).

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

Collector-base voltage (open emitter)	$-V_{CBO}$	max.	20	V
Collector-emitter voltage (open base)	$-V_{CEO}$	max.	15	V
Emitter-base voltage (open collector)	$-V_{EBO}$	max.	3	V
Collector current (d.c.)	$-I_C$	max.	75	mA
Collector current (peak value) at f > 1 MHz	$-I_{CM}$	max.	150	mA
Total power dissipation up to T_{amb} = 50 °C	P_{tot}	max.	250	mW
Storage temperature	T_{stg}	−65 to	+ 200	°C
Junction temperature	T_j	max.	200	°C

THERMAL RESISTANCE

From junction to ambient in free air	$R_{th\ j\text{-}a}$	=	600	K/W
From junction to case	$R_{th\ j\text{-}c}$	=	350	K/W

CHARACTERISTICS

T_j = 25 °C unless otherwise specified

Collector cut-off current				
$-I_E = 0$; $-V_{CB} = 10$ V	$-I_{CBO}$	max.	100	nA
D.C. current gain				
$-I_C = 20$ mA; $-V_{CE} = 5$ V	h_{FE}	min.	20	
$-I_C = 50$ mA; $-V_{CE} = 5$ V	h_{FE}	min.	20	
Transition frequency (note 1)				
$-I_C = 50$ mA; $-V_{CE} = 5$ V; f = 500 MHz	f_T	typ.	4,5	GHz
Collector capacitance (note 2)				
$I_E = i_e = 0$; $-V_{CB} = 10$ V; f = 1 MHz	C_c	typ.	1,8	pF
Emitter capacitance				
$I_C = i_c = 0$; $-V_{EB} = 0,5$ V; f = 1 MHz	C_e	typ.	0,4	pF
Feedback capacitance (note 1)				
$-I_C = 10$ mA; $-V_{CE} = 10$ V; f = 1 MHz; T_{amb} = 25 °C	C_{re}	typ.	1,4	pF
Noise figure at optimum source impedance (note 1)				
$-I_C = 10$ mA; $-V_{CE} = 5$ V; f = 200 MHz; T_{amb} = 25 °C	F	typ.	1,9	dB
$-I_C = 10$ mA; $-V_{CE} = 5$ V; f = 500 MHz; T_{amb} = 25 °C	F	typ.	2,3	dB

Maximum unilateral power gain (note 1)
s_{re} assumed to be zero

$$G_{UM} = 10 \log \frac{|s_{fe}|^2}{(1 - |s_{ie}|^2)\,(1 - |s_{oe}|^2)}$$

$-I_C = 20$ mA; $-V_{CE} = 5$ V; f = 200 MHz; T_{amb} = 25 °C	G_{UM}	typ.	18,0	dB
$-I_C = 50$ mA; $-V_{CE} = 5$ V; f = 500 MHz; T_{amb} = 25 oC	G_{UM}	typ.	11,0	dB

Notes

1. Shield lead grounded.
2. Shield lead and emitter lead connected to bridge earth.

P-N-P 1 GHz WIDEBAND TRANSISTOR

P-N-P transistor in a plastic SOT-37 envelope.

It is intended for use in u.h.f. applications such as broadcast aerial amplifiers and in microwave amplifiers such as radar systems, spectrum analysers etc.

The BFQ32S offers a high transition frequency and a low modulation distortion figure over a wide current range.

N-P-N complement is BFR96S.

QUICK REFERENCE DATA

Collector-base voltage (open emitter)	$-V_{CBO}$	max.	20	V
Collector-emitter voltage (open base)	$-V_{CEO}$	max.	15	V
Collector current (d.c.)	$-I_C$	max.	100	mA
Total power dissipation up to T_{amb} = 70 °C	P_{tot}	max.	700	mW
Junction temperature	T_j	max.	175	°C
Transition frequency at f = 500 MHz $-I_C$ = 70 mA; $-V_{CE}$ = 10 V	f_T	typ.	4,5	GHz
Output voltage at d_{im} = −60 dB $-I_C$ = 70 mA; $-V_{CE}$ = 10 V $f_{(p+q-r)}$ = 793,25 MHz	V_o	typ.	600	mV
Noise figure at optimum source impedance $-I_C$ = 50 mA; $-V_{CE}$ = 10 V; f = 800 MHz	F	typ.	4,3	dB
Maximum unilateral power gain $-I_C$ = 70 mA; $-V_{CE}$ = 10 V; f = 800 MHz	G_{UM}	typ.	10,0	dB

MECHANICAL DATA (see Fig. 1) Dimensions in mm

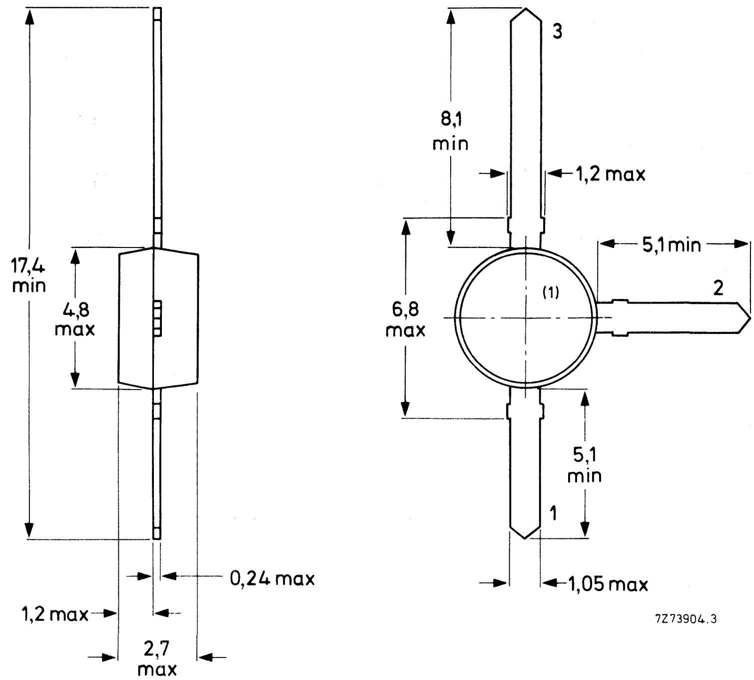
MECHANICAL DATA

Dimensions in mm

Fig. 1 SOT-37

Connections

1. Base
2. Emitter
3. Collector



(1) = type number marking.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

Collector-base voltage (open emitter)	$-V_{CBO}$	max.	20	V
Collector-emitter voltage (open base)	$-V_{CEO}$	max.	15	V
Emitter-base voltage (open collector)	$-V_{EBO}$	max.	3	V
Collector current (d.c.)	$-I_C$	max.	100	mA
Total power dissipation up to T_{amb} = 70 °C mounted on a fibre-glass print of 50 mm x 50 mm x 1,5 mm (see Fig. 3)	P_{tot}	max.	700	mW
Storage temperature	T_{stg}	−65 to + 175		°C
Junction temperature	T_j	max.	175	°C

THERMAL RESISTANCE

From junction to ambient in free air mounted on a fibre-glass print of 50 mm x 50 mm x 1,5 mm (see Fig. 3)	$R_{th\ j-a}$	=	150	K/W
From junction to case	$R_{th\ j-c}$	=	50	K/W

CHARACTERISTICS

T_j = 25 °C unless otherwise specified

Collector cut-off current			
$I_E = 0$; $-V_{CB} = 10$ V	$-I_{CBO}$	max.	100 nA
D.C. current gain			
$-I_C = 70$ mA; $-V_{CE} = 10$ V	h_{FE}	min.	20
Transition frequency at f = 500 MHz			
$-I_C = 70$ mA; $-V_{CE} = 10$ V	f_T	typ.	4,5 GHz
Collector capacitance at f = 1 MHz			
$I_E = 0$; $-V_{CB} = 10$ V	C_c	typ.	1,8 pF
Emitter capacitance at f = 1 MHz			
$I_C = 0$; $-V_{EB} = 0,5$ V	C_e	typ.	6,0 pF
Feedback capacitance at f = 1 MHz			
$I_C = 0$; $-V_{CE} = 10$ V	C_{re}	typ.	1,3 pF
Output voltage at $d_{im} = -60$ dB (see Fig. 2)			
$-I_C = 70$ mA; $-V_{CE} = 10$ V; $R_L = 75\ \Omega$; $T_{amb} = 25$ °C			
$V_p = V_o$ at $d_{im} = -60$ dB ; $f_p = 795,25$ MHz			
$V_q = V_o -6$ dB; $f_q = 803,25$ MHz			
$V_r = V_o -6$ dB; $f_r = 805,25$ MHz			
measured at $f_{(p+q-r)} = 793,25$ MHz	V_o	typ.	600 mV
Noise figure at optimum source impedance			
$-I_C = 50$ mA; $-V_{CE} = 10$ V; f = 800 MHz; $T_{amb} = 25$ °C	F	typ.	4,3 dB

Maximum unilateral power gain (s_{re} assumed to be zero)

$$G_{UM} = 10 \log \frac{|s_{fe}|}{[1-|s_{ie}|^2]\,[1-|s_{oe}|^2]}$$

$-I_C = 70$ mA; $-V_{CE} = 10$ V; f = 800 MHz; $T_{amb} = 25$ °C	G_{UM}	typ.	10,0 dB

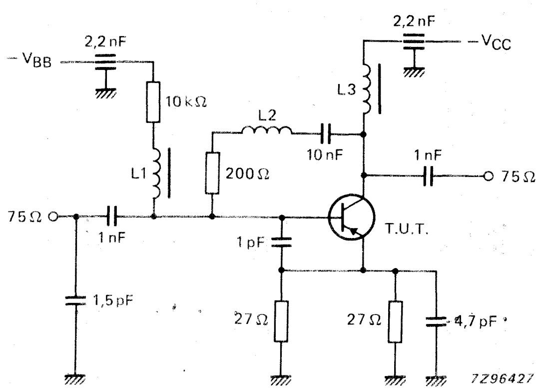


Fig. 2 Intermodulation distortion and second harmonic distortion test circuit.

L1 = L3 = 5 μH micro choke.
L2 = 1½ turns Cu wire (0,4 mm); internal diameter 3,0 mm; winding pitch 1 mm.

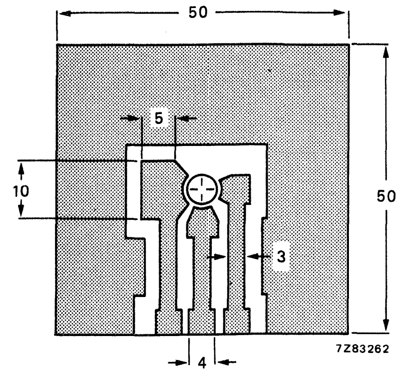


Fig. 3 Requirements for fibre-glass print (Dimensions in mm).
Single-sided 35 μm Cu-clad epoxy fibre-glass print, thickness 1,5 mm.
Tracks are fully tin-plated. Shaded area is Cu.

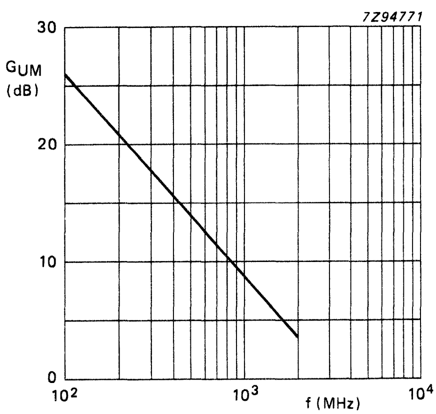


Fig. 4 $-V_{CE}$ = 10 V; $-I_C$ = 70 mA;
T_{amb} = 25 °C; typical values.

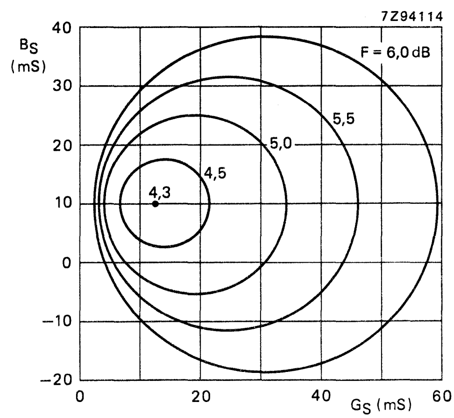


Fig. 5 Circles of constant noise figure;
$-V_{CE}$ = 10 V; $-I_C$ = 50 mA; f = 800 MHz;
T_{amb} = 25 °C; typical values.

s-parameters (common emitter) at $-V_{CE}$ = 10 V; T_{amb} = 25 °C; typical values.

I_C mA	f MHz	s_{ie}	s_{fe}	s_{re}	s_{oe}	G_{UM} dB
	40	0,57/ −58,5°	21,9/149,1°	0,03/ 67,4°	0,83/ −31,3°	33,5
	100	0,54/−115,0°	14,0/119,9°	0,05/ 52,1°	0,55/ −59,6°	25,9
	200	0,51/−150,4°	8,0/101,3°	0,06/ 52,2°	0,32/ −76,0°	19,8
	500	0,54/+174,6°	3,4/ 76,8°	0,11/ 58,3°	0,21/−102,6°	12,3
10	800	0,53/+156,0°	2,2/ 62,8°	0,16/ 60,2°	0,22/−111,4°	8,6
	1000	0,54/+144,8°	1,8/ 54,3°	0,19/ 59,1°	0,22/−117,8°	6,8
	1200	0,58/+133,4°	1,5/ 48,9°	0,22/ 59,3°	0,21/−127,1°	5,6
	1500	0,56/+124,8°	1,3/ 38,8°	0,28/ 56,2°	0,26/−136,9°	4,3
	2000	0,59/ +99,9°	1,0/ 28,0°	0,36/ 52,5°	0,30/−155,2°	2,6
	40	0,41/ −87,0°	29,7/140,9°	0,02/ 64,6°	0,72/ −44,1°	33,5
	100	0,47/−140,2°	16,8/113,0°	0,04/ 58,2°	0,42/ −78,8°	26,5
	200	0,48/−168,6°	9,1/ 97,5°	0,06/ 62,9°	0,25/−101,7°	20,6
	500	0,52/+168,4°	3,8/ 76,7°	0,11/ 66,3°	0,20/−135,8°	13,1
20	800	0,51/+151,9°	2,5/ 63,8°	0,18/ 64,6°	0,21/−139,1°	9,4
	1000	0,53/+141,5°	2,0/ 56,0°	0,21/ 61,8°	0,21/−148,3°	7,6
	1200	0,57/+130,1°	1,7/ 51,3°	0,24/ 61,0°	0,20/−159,0°	6,4
	1500	0,54/+123,0°	1,5/ 41,2°	0,30/ 55,8°	0,24/−160,3°	5,0
	2000	0,56/ +98,4°	1,2/ 30,4°	0,38/ 50,3°	0,27/−174,2°	3,4
	40	0,37/−105,8°	33,1/136,9°	0,02/ 66,1°	0,66/ −50,9°	33,5
	100	0,46/−151,1°	17,6/110,5°	0,03/ 62,8°	0,38/ −88,7°	26,6
	200	0,47/−170,5°	9,5/ 96,1°	0,05/ 68,0°	0,24/−114,6°	20,9
	500	0,52/+166,1°	3,9/ 76,5°	0,11/ 69,2°	0,22/−146,2°	13,4
30	800	0,51/+150,5°	2,6/ 64,1°	0,18/ 66,0°	0,22/−149,9°	9,7
	1000	0,52/+140,3°	2,1/ 56,7°	0,21/ 62,8°	0,22/−159,1°	7,9
	1200	0,57/+129,1°	1,7/ 52,3°	0,25/ 61,5°	0,22/−169,9°	6,7
	1500	0,53/+122,2°	1,5/ 42,0°	0,31/ 55,7°	0,25/−169,0°	5,3
	2000	0,56/ +97,6°	1,2/ 31,5°	0,39/ 49,6°	0,28/+178,0°	3,6
	40	0,35/−127,2°	35,9/133,0°	0,02/ 67,2°	0,59/ −58,3°	33,5
	100	0,46/−160,9°	16,2/108,0°	0,03/ 67,6°	0,34/ −99,7°	26,8
	200	0,47/−175,8°	9,7/ 94,8°	0,05/ 72,6°	0,23/−127,1°	21,1
	500	0,52/+164,3°	4,0/ 76,3°	0,12/ 71,5°	0,23/−155,0°	13,6
50	800	0,51/+149,3°	2,6/ 64,2°	0,18/ 67,0°	0,23/−158,1°	9,8
	1000	0,52/+139,4°	2,1/ 57,0°	0,22/ 63,4°	0,24/−166,9°	8,0
	1200	0,57/+128,3°	1,8/ 52,8°	0,25/ 62,0°	0,24/−177,8°	6,9
	1500	0,53/+121,5°	1,5/ 42,8°	0,31/ 55,8°	0,27/−175,6°	5,4
	2000	0,56/ +96,8°	1,2/ 32,3°	0,40/ 49,3°	0,29/+171,5°	3,8
	40	0,35/−137,4°	36,1/131,1°	0,02/ 67,0°	0,54/ −62,3°	33,4
	100	0,46/−165,0°	18,2/107,0°	0,03/ 70,5°	0,32/−105,3°	26,7
	200	0,48/−177,8°	9,7/ 94,3°	0,05/ 74,3°	0,23/−133,1°	21,1
	500	0,52/+163,7°	3,9/ 76,0°	0,12/ 72,2°	0,24/−158,5°	13,6
70	800	0,51/+149,0°	2,6/ 63,9°	0,19/ 67,4°	0,24/−161,1°	10,0
	1000	0,53/+139,1°	2,1/ 56,8°	0,22/ 63,7°	0,25/−169,7°	8,0
	1200	0,58/+128,1°	1,8/ 52,7°	0,26/ 62,2°	0,24/−179,7°	6,9
	1500	0,54/+121,2°	1,5/ 42,6°	0,32/ 55,7°	0,27/−178,0°	5,4
	2000	0,56/ +96,5°	1,2/ 32,3°	0,40/ 49,1°	0,29/+169,2°	3,9

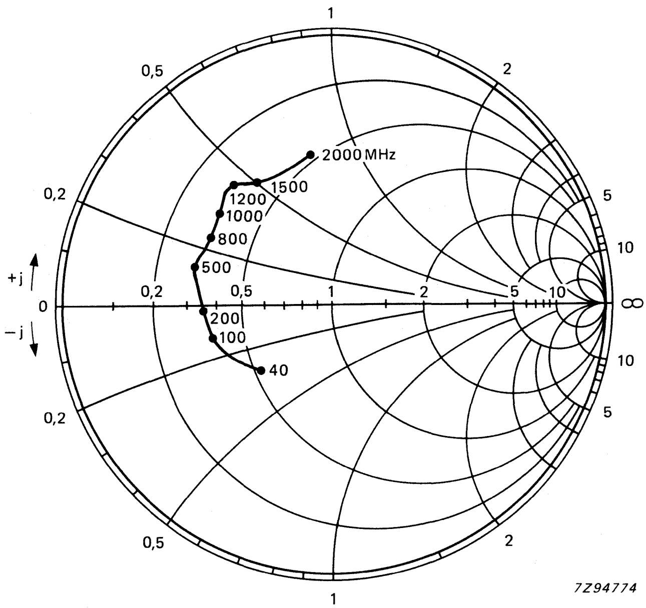


Fig. 6 Input impedance, derived from input reflection coefficient s_{ie} coordinates, in ohm x 50.

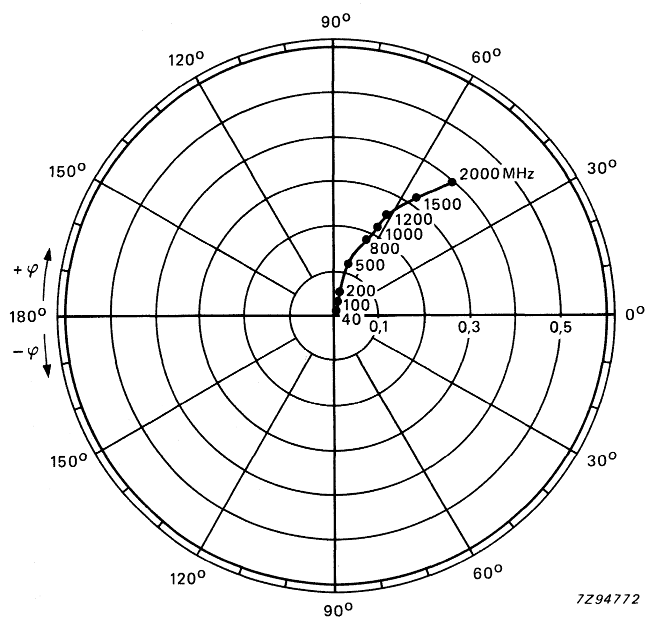


Fig. 7 Reverse transmission coefficient s_{re}.

Conditions for Figs 6 to 9: $-V_{CE}$ = 10 V; $-I_C$ = 70 mA; T_{amb} = 25 °C; typical values.

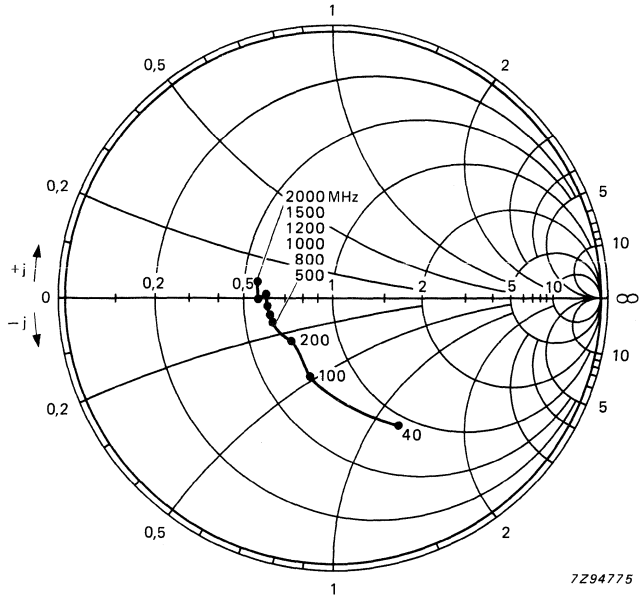


Fig. 8 Output impedance, derived from output reflection coefficient s_{oe} coordinates, in ohm x 50.

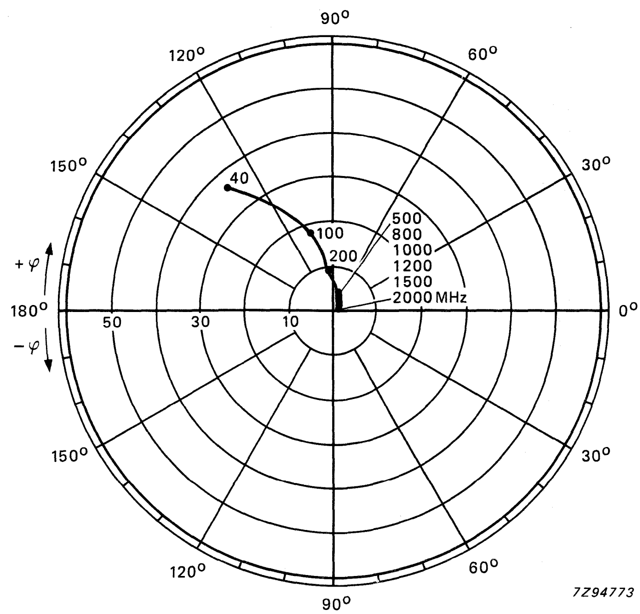


Fig. 9 Forward transmission coefficient s_{fe}.

N-P-N MICROWAVE TRANSISTOR

The BFQ is an N-P-N transistor in a miniature hermetically sealed microstripline encapsulation, featuring an extremely high transition frequency of 12 GHz and very low noise.

It is primarily intended for use in microwave amplifier applications.

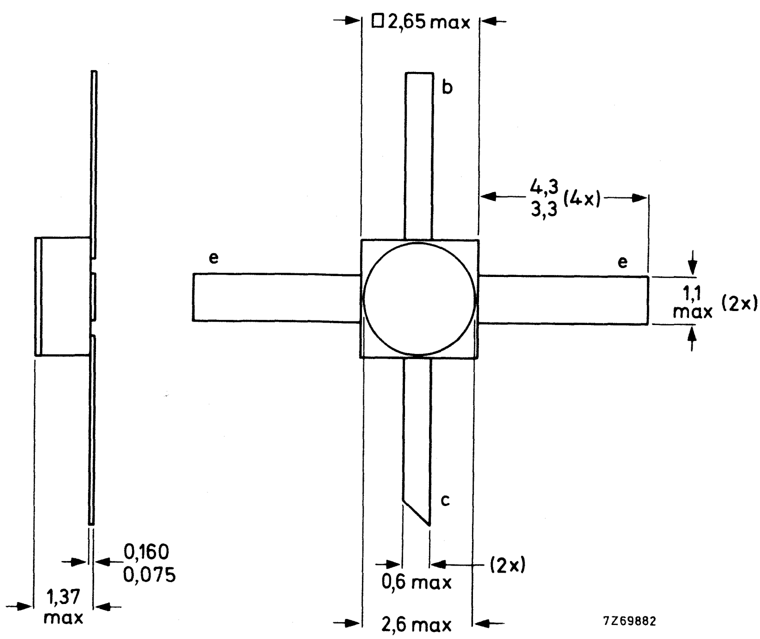
QUICK REFERENCE DATA

Collector-base voltage (open emitter)	V_{CBO}	max.	9	V
Collector-emitter voltage (open base)	V_{CEO}	max.	7	V
Collector current (d.c.)	I_C	max.	20	mA
Total power dissipation up to T_{amb} = 80 °C	P_{tot}	max.	140	mW
Transition frequency at f = 1,5 GHz I_C = 14 mA; V_{CE} = 5 V	f_T	typ.	12	GHz
Noise figure at optimum source impedance I_C = 5 mA; V_{CE} = 5 V; f = 2 GHz	F	typ.	2,5	dB
Maximum unilateral power gain I_C = 14 mA; V_{CE} = 5 V; f = 2 GHz; T_{amb} = 25 °C	G_{UM}	typ.	13,7	dB

MECHANICAL DATA

Dimensions in mm

Fig. 1 SOT-100.



RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

Collector-base voltage (open emitter)	V_{CBO}	max.	9	V
Collector-emitter voltage (open base)	V_{CEO}	max.	7	V
Emitter-base voltage (open collector)	V_{EBO}	max.	2	V
Collector current (d.c.)	I_C	max.	20	mA
Total power dissipation up to T_{amb} = 80 °C	P_{tot}	max.	140	mW
Storage temperature	T_{stg}	−65 to + 150		°C
→ Junction temperature	T_j	max.	175	°C

THERMAL RESISTANCE

From junction to ambient in free air mounted on a fibre-glass print of 40 mm x 25 mm x 1 mm — $R_{th\ j\text{-}a}$ = 500 K/W

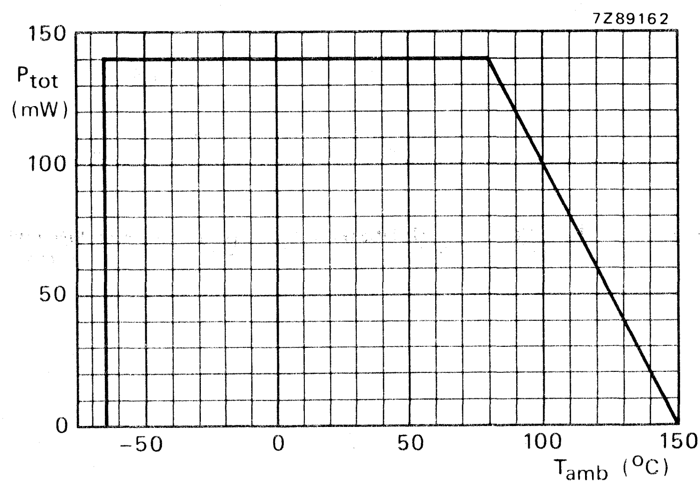


Fig. 2 Power derating curve versus ambient temperature.

CHARACTERISTICS

T_{amb} = 25 °C unless otherwise specified

Collector cut-off current			
$I_E = 0$; $V_{CB} = 5$ V	I_{CBO}	<	50 nA
D.C. current gain*			
$I_C = 14$ mA; $V_{CE} = 5$ V	h_{FE}	>	25
Collector capacitance at f = 1 MHz			
$I_E = I_e = 0$; $V_{CB} = 5$ V	C_c	typ.	0,45 pF
Feedback capacitance at f = 1 MHz			
$I_C = 0$; $V_{CE} = 5$ V	C_{re}	typ.	0,2 pF
Transition frequency at f = 1,5 GHz*			
$I_C = 14$ mA; $V_{CE} = 5$ V	f_T	typ.	12 GHz
Noise figure at optimum source impedance			
$I_C = 5$ mA; $V_{CE} = 5$ V; f = 2 GHz	F	typ.	2,5 dB
$I_C = 5$ mA; $V_{CE} = 5$ V; f = 4 GHz	F	typ.	3,8 dB

Maximum unilateral power gain (s_{re} assumed to be zero)

$$G_{UM} = 10 \log \frac{|s_{fe}|^2}{(1-|s_{ie}|^2)(1-|s_{oe}|^2)}$$

$I_C = 14$ mA; $V_{CE} = 5$ V; f = 2 GHz	G_{UM}	typ.	13,7 dB
$I_C = 14$ mA; $V_{CE} = 5$ V; f = 4 GHz	G_{UM}	typ.	7,4 dB
s-parameters (common emitter)			
$I_C = 14$ mA; $V_{CE} = 5$ V; $R_S = R_L = 50\ \Omega$; f = 2 GHz			
Input reflection coefficient	s_{ie}	typ.	0,18/−155°
Reverse transmission coefficient	s_{re}	typ.	0,10/ +49°
Forward transmission coefficient	s_{fe}	typ.	4,3 / +75°
Output reflection coefficient	s_{oe}	typ.	0,43/ −56°
$I_C = 14$ mA; $V_{CE} = 5$ V; $R_S = R_L = 50\ \Omega$; f = 4 GHz			
Input reflection coefficient	s_{ie}	typ.	0,19/+171°
Reverse transmission coefficient	s_{re}	typ.	0,14/ +34°
Forward transmission coefficient	s_{fe}	typ.	2,0 / +48°
Output reflection coefficient	s_{oe}	typ.	0,50/ −89°

* Measured under pulse conditions.

Conditions for Figs 3 and 4:
V_{CE} = 5 V; I_C = 14 mA;
T_{amb} = 25 °C; typical values.

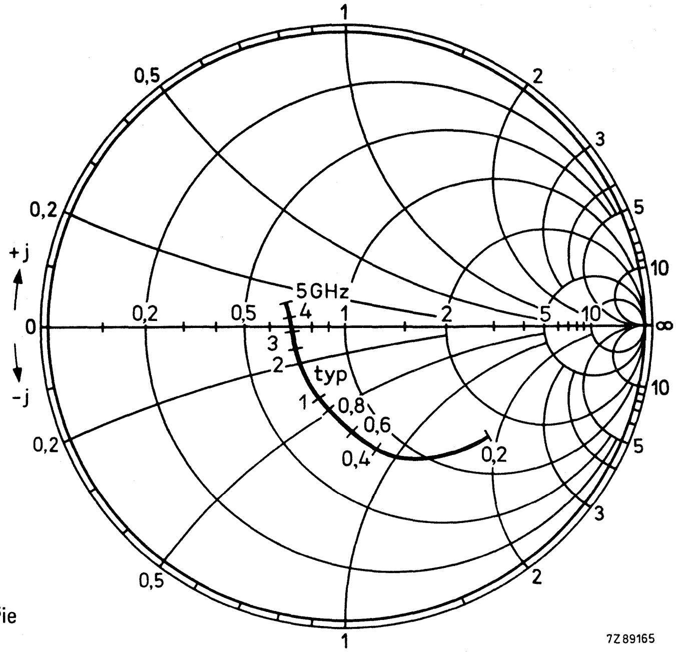


Fig. 3 Input impedance derived from input reflection coefficient s_{ie} co-ordinates in ohm x 50.

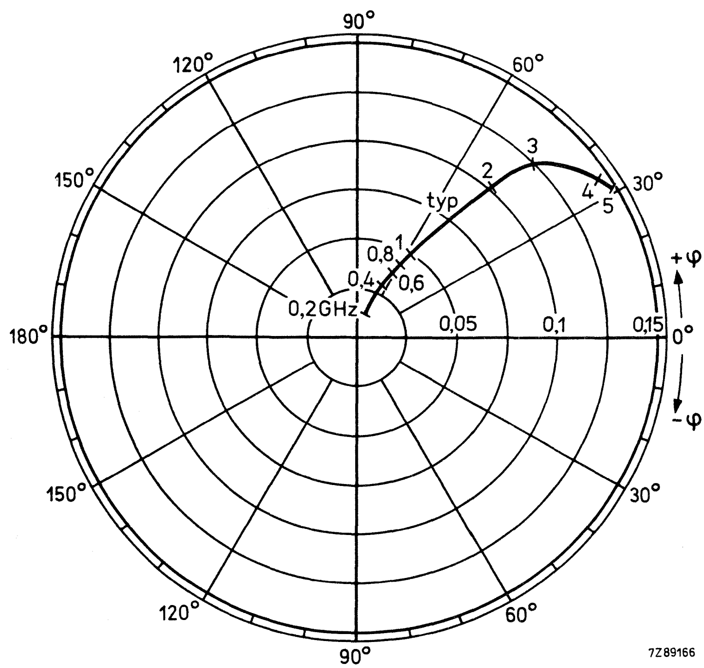


Fig. 4 Reverse transmission coefficient s_{re}.

Conditions for Figs 5 and 6:

V_{CE} = 5 V; I_C = 14 mA;
T_{amb} = 25 °C; typical values.

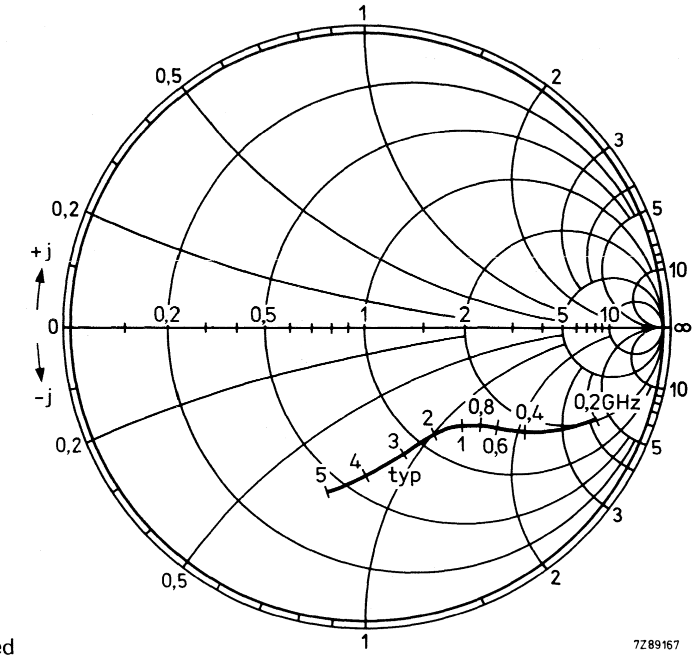


Fig. 5 Output impedance derived from output reflection coefficient s_{oe} co-ordinates in ohm x 50.

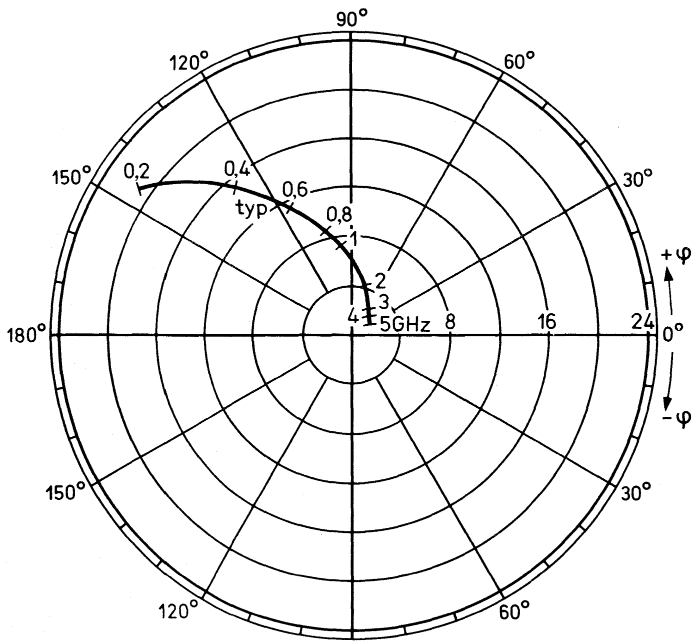


Fig. 6 Forward transmission coefficient s_{fe}.

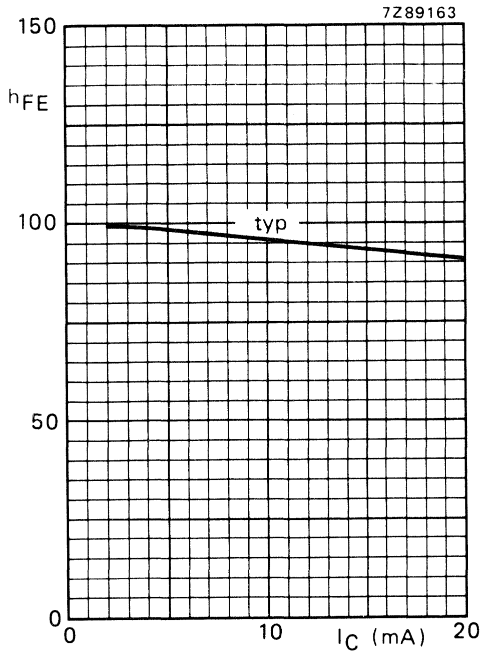


Fig. 7 V_{CE} = 5 V; T_j = 25 °C.

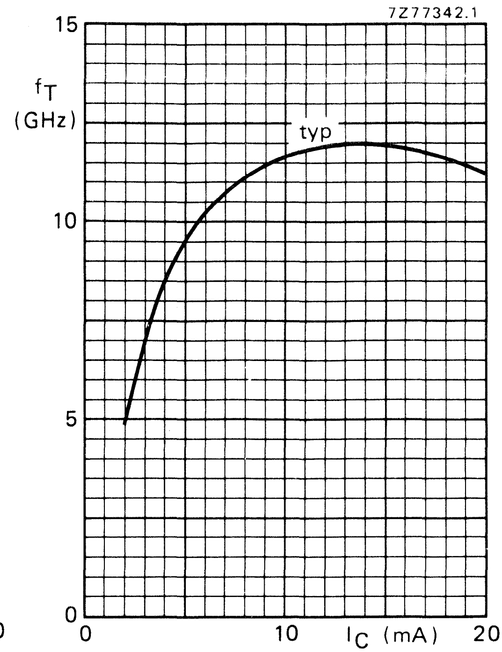


Fig. 8 V_{CE} = 5 V; f = 1,5 GHz; T_j = 25 °C.

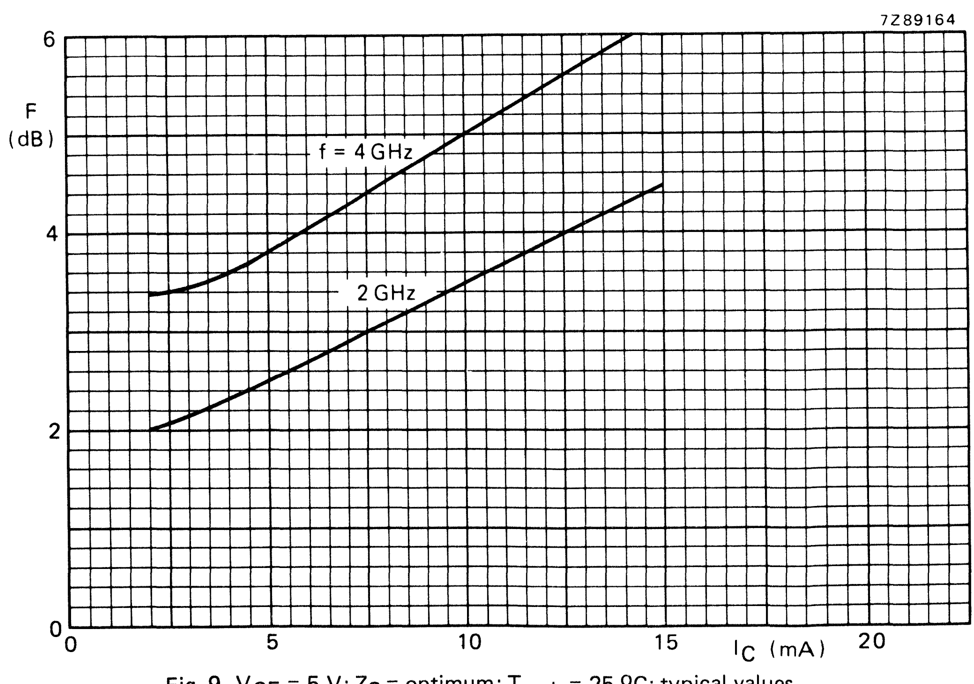


Fig. 9 V_{CE} = 5 V; Z_S = optimum; T_{amb} = 25 °C; typical values.

N-P-N MICROWAVE TRANSISTOR

N-P-N transistor in a sub-miniature HERMETICALLY sealed microstripline encapsulation.
This device features extremely high transition frequency of 12 GHz and very low noise.
The BFQ33C is primarily intended for microwave amplifier applications.

QUICK REFERENCE DATA

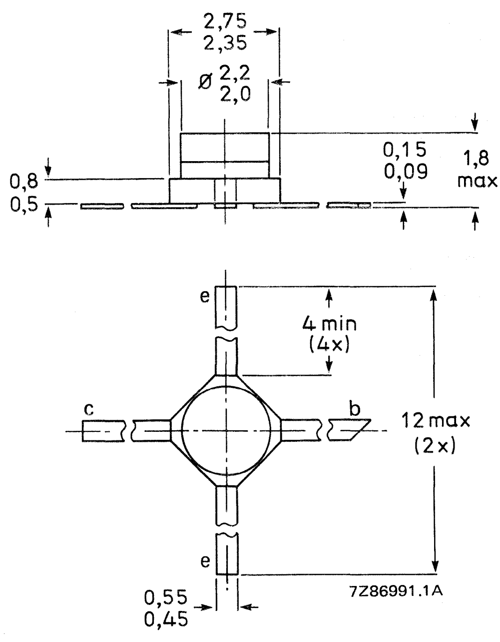
Collector-base voltage (open emitter)	V_{CBO}	max.	9 V
Collector-emitter voltage (open base)	V_{CEO}	max.	7 V
Collector current (d.c.)	I_C	max.	20 mA
Total power dissipation up to T_{amb} = 120 °C	P_{tot}	max.	140 mW
Transition frequency at f = 1,5 GHz I_C = 14 mA; V_{CE} = 5 V	f_T	typ.	12 GHz
Noise figure at optimum source impedance I_C = 5 mA; V_{CE} = 5 V; f = 2 GHz	F	typ.	3,0 dB
Maximum unilateral power gain at f = 2 GHz; I_C = 14 mA; V_{CE} = 5 V	G_{UM}	typ.	12,5 dB

MECHANICAL DATA

Dimensions in mm

Fig. 1 SOT-173.

Marking code: Q3



RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

Collector-base voltage (open emitter)	V_{CBO}	max.	9	V
Collector-emitter voltage (open base)	V_{CEO}	max.	7	V
Emitter-base voltage (open collector)	V_{EBO}	max.	2	V
Collector current (d.c.)	I_C	max.	20	mA
Total power dissipation up to T_{amb} = 120 °C	P_{tot}	max.	140	mW
Storage temperature	T_{stg}		−65 to +150	°C
→ Junction temperature	T_j	max.	175	°C

THERMAL RESISTANCE

From junction to ambient in free air mounted on a ceramic substrate of 0,7 mm x 10 cm^2	$R_{th\ j\text{-}a}$		200	K/W

CHARACTERISTICS

T_j = 25 °C unless otherwise specified

Collector cut-off current $I_E = 0$; V_{CB} = 5 V	I_{CBO}	max.	50	nA
D.C. current gain I_C = 14 mA; V_{CE} = 5 V	h_{FE}	min.	50	
Transition frequency at f = 1,5 GHz I_C = 14 mA; V_{CE} = 5 V; T_{amb} = 25 °C	f_T	typ.	12	GHz
Collector capacitance at f = 1 MHz $I_E = I_e = 0$; V_{CB} = 5 V	C_c	typ.	0,35	pF
Feedback capacitance at f = 1 MHz $I_C = 0$; V_{CE} = 5 V	C_{re}	typ.	0,2	pF
Noise figure at optimum source impedance I_C = 5 mA; V_{CE} = 5 V; f = 2 GHz; T_{amb} = 25 °C	F	typ.	3,0	dB

Maximum unilateral power gain (s_{re} assumed to be zero)

$$G_{UM} = 10 \log \frac{|s_{fe}|^2}{[1-|s_{ie}|^2]\,[1-|s_{oe}|^2]}$$

at I_C = 14 mA; V_{CE} = 5 V; T_{amb} = 25 °C

f = 2 GHz	G_{UM}	typ.	12,5	dB
f = 4 GHz	G_{UM}	typ.	7,5	dB

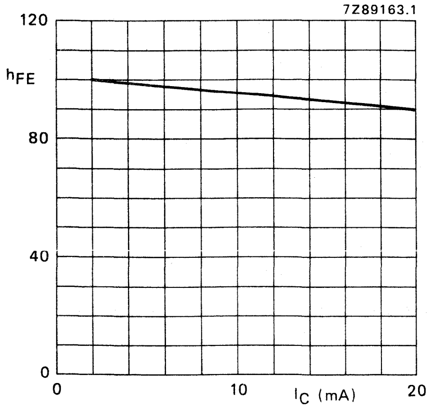


Fig. 2 V_{CE} = 5 V; T_j = 25 °C; typical values.

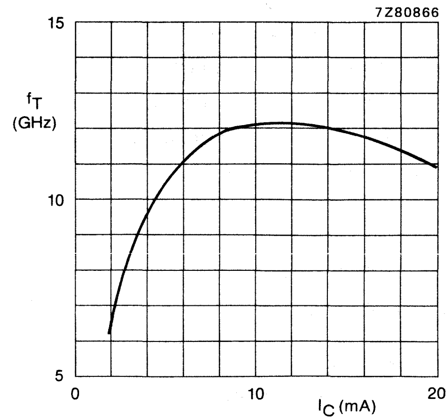


Fig. 3 V_{CE} = 5 V; f = 1,5 GHz; T_{amb} = 25 °C; typical values.

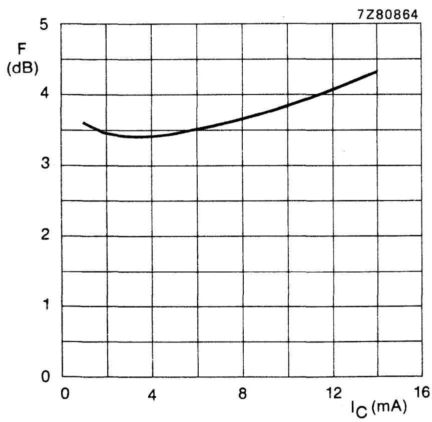


Fig. 4 V_{CE} = 5 V; Z_S = 60 Ω; T_{amb} = 25 °C; f = 2 GHz; typical values.

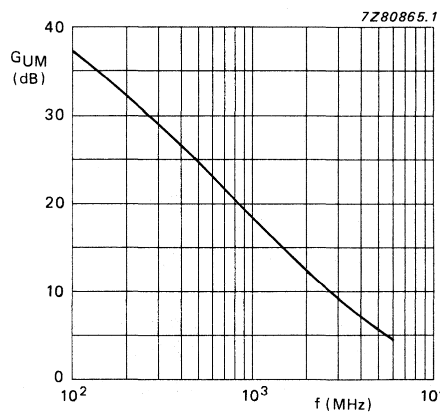


Fig. 5 V_{CE} = 5 V; I_C = 14 mA; T_{amb} = 25 °C; Z_S = 60 Ω; typical values.

s-parameters (common-emitter) at V_{CE} = 5 V; T_{amb} = 25 °C; typical values.

I_C mA	f MHz	s_{ie}	s_{fe}	s_{re}	s_{oe}	G_{UM} dB
	100	0,82/ −12,3°	12,6/168,1°	0,013/ 82,1°	0,97/ −7,6°	39,1
	200	0,78/ −24,2°	12,0/156,1°	0,024/ 77,0°	0,93/ −14,6°	34,5
	300	0,72/ −33,9°	11,0/146,1°	0,034/ 72,3°	0,89/ −20,3°	30,8
	400	0,67/ −42,9°	10,1/138,3°	0,043/ 69,4°	0,85/ −25,3°	28,1
	500	0,62/ −50,0°	9,2/131,3°	0,050/ 67,4°	0,81/ −28,6°	25,9
	600	0,57/ −56,3°	8,3/124,8°	0,056/ 65,6°	0,77/ −31,4°	24,0
	700	0,53/ −61,5°	7,6/119,8°	0,062/ 64,4°	0,74/ −33,8°	22,5
	800	0,49/ −66,6°	6,9/115,2°	0,068/ 63,7°	0,71/ −35,7°	21,0
	900	0,45/ −67,3°	6,3/111,4°	0,073/ 63,6°	0,69/ −36,1°	19,8
5	1000	0,41/ −71,8°	5,8/107,4°	0,078/ 62,6°	0,66/ −37,4°	18,6
	1200	0,35/ −78,7°	5,1/100,5°	0,088/ 61,8°	0,63/ −39,7°	16,8
	1500	0,29/ −80,0°	3,9/ 89,6°	0,098/ 57,6°	0,63/ −40,0°	14,4
	2000	0,23/ −88,5°	3,2/ 79,8°	0,125/ 56,7°	0,59/ −44,2°	12,3
	2500	0,19/−100,7°	2,7/ 70,8°	0,147/ 55,1°	0,56/ −49,5°	10,3
	3000	0,16/−101,6°	2,3/ 64,1°	0,169/ 53,0°	0,57/ −53,7°	9,1
	3500	0,15/−112,5°	2,1/ 60,4°	0,211/ 53,4°	0,55/ −58,2°	8,3
	4000	0,10/−124,8°	1,9/ 52,7°	0,219/ 49,5°	0,52/ −68,6°	7,1
	5000	0,02/+127,0°	1,6/ 38,9°	0,267/ 43,5°	0,45/ −92,3°	5,3
	6000	0,14/ +56,1°	1,4/ 24,3°	0,298/ 32,4°	0,44/−122,2°	4,1
	100	0,61/ −20,1°	21,2/161,3°	0,011/ 78,8°	0,93/ −11,4°	37,3
	200	0,55/ −37,8°	18,7/144,7°	0,020/ 73,3°	0,85/ −20,6°	32,5
	300	0,47/ −50,7°	15,9/132,7°	0,027/ 69,6°	0,77/ −26,2°	29,0
	400	0,42/ −61,6°	13,8/124,5°	0,034/ 68,2°	0,71/ −30,3°	26,6
	500	0,37/ −68,8°	11,9/118,0°	0,040/ 68,0°	0,66/ −32,5°	24,7
	600	0,34/ −75,4°	10,3/112,2°	0,045/ 67,7°	0,63/ −33,9°	23,0
	700	0,29/ −81,0°	9,2/108,0°	0,050/ 67,6°	0,60/ −35,4°	21,6
	800	0,29/ −86,0°	8,2/104,4°	0,055/ 67,9°	0,58/ −36,4°	20,5
	900	0,26/ −85,1°	7,4/101,4°	0,060/ 68,2°	0,57/ −36,0°	19,4
14	1000	0,23/ −91,1°	6,7/ 78,3°	0,065/ 68,0°	0,55/ −36,6°	18,4
	1200	0,20/ −99,8°	5,7/ 92,9°	0,076/ 67,7°	0,53/ −38,4°	16,8
	1500	0,15/−101,4°	4,4/ 83,0°	0,088/ 63,9°	0,55/ −37,7°	14,6
	2000	0,12/−110,6°	3,6/ 75,4°	0,114/ 63,2°	0,53/ −41,8°	12,5
	2500	0,10/−132,5°	2,9/ 67,8°	0,137/ 61,3°	0,51/ −46,9°	10,7
	3000	0,07/−137,0°	2,6/ 61,8°	0,160/ 59,1°	0,52/ −51,3°	9,6
	3500	0,07/−163,9°	2,3/ 60,0°	0,191/ 61,8°	0,55/ −54,0°	8,4
	4000	0,05/+163,7°	2,1/ 52,0°	0,208/ 56,2°	0,47/ −65,6°	7,5
	5000	0,11/ +81,7°	1,8/ 37,9°	0,261/ 49,2°	0,41/ −91,1°	5,8
	6000	0,23/ +56,0°	1,5/ 24,0°	0,291/ 38,3°	0,41/−122,9°	4,6

Conditions for Figs 6 and 7 :

V_{CE} = 5 V; I_C = 14 mA;
T_{amb} = 25 °C; typical values.

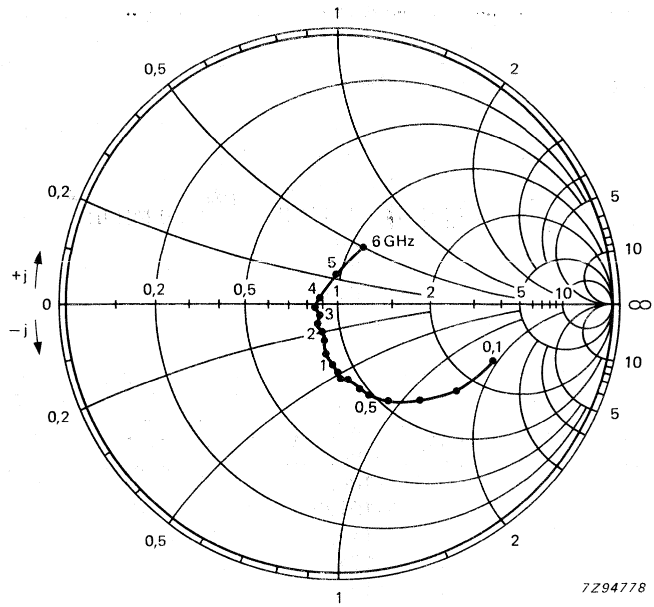


Fig. 6 Input impedance derived from input reflection coefficient s_{ie} co-ordinates in ohms x 50.

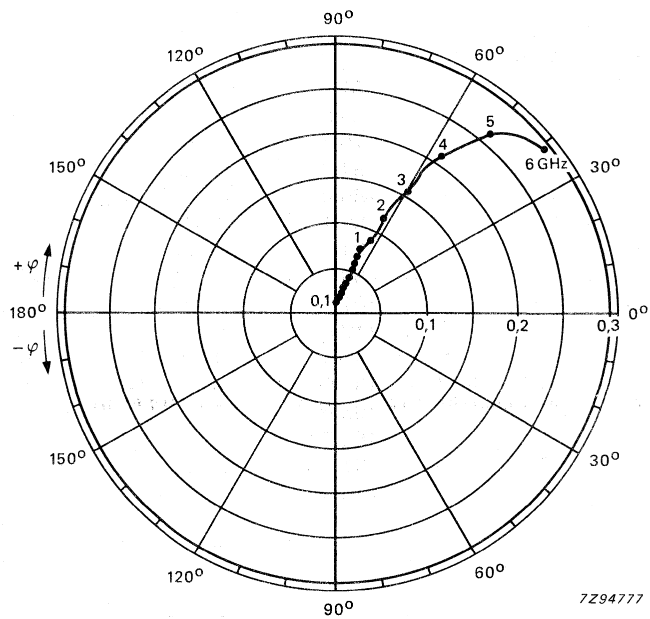


Fig. 7 Reverse transmission coefficient s_{re}.

Conditions for Figs 8 and 9:

V_{CE} = 5 V; I_C = 14 mA;
T_{amb} = 25 °C; typical values.

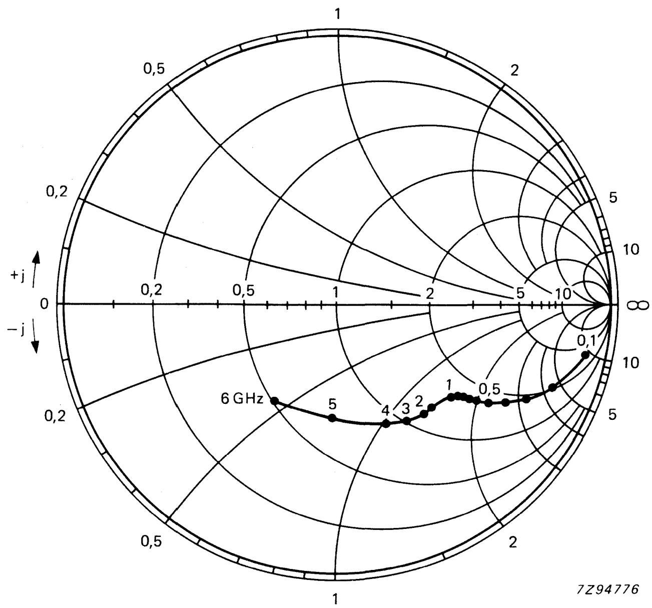


Fig. 8 Output impedance derived from output reflection coefficient s_{oe} co-ordinates in ohms x 50.

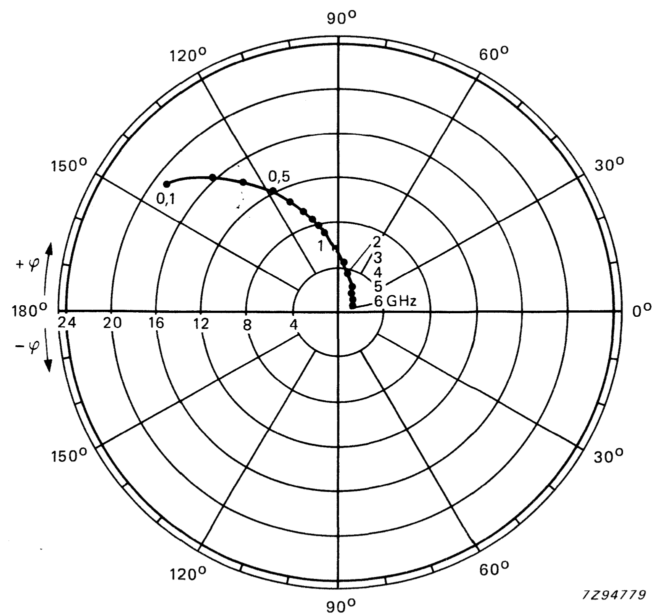


Fig. 9 Forward transmission coefficient s_{fe}.

N-P-N 1 GHz WIDEBAND TRANSISTOR

N-P-N transistor primarily intended for driver and final stages in MATV system amplifiers. This device is also suitable for use in low power band IV and V equipment. Diffused emitter ballasting resistors and the application of gold sandwich metallization ensure an optimum temperature profile and excellent reliability properties. This device features high output voltage capabilities.

The transistor has a ¼″ capstan envelope with ceramic cap. All leads are isolated from the stud.

QUICK REFERENCE DATA

Collector-base voltage (open emitter)	V_{CBO}	max.	25	V
Collector-emitter voltage (open base)	V_{CEO}	max.	18	V
Collector current (d.c.)	I_C	max.	150	mA
Total power dissipation (d.c.) up to T_{mb} = 125 °C	P_{tot}	max.	2,25	W
Operating junction temperature	T_j	max.	200	°C
Transition frequency at f = 500 MHz I_C = 150 mA; V_{CE} = 15 V	f_T	min.	3,5	GHz
Output voltage at d_{im} = −60 dB I_C = 120 mA; V_{CE} = 15 V; R_L = 75 Ω $f_{(p+q-r)}$ = 793,25 MHz	V_o	typ.	1,2	V
Output power at 1 dB gain compression	P_{L1}	typ.	+26	dBm
Third order intercept point	ITO	typ.	+45	dBm

MECHANICAL DATA

SOT-122 (see Fig. 1).

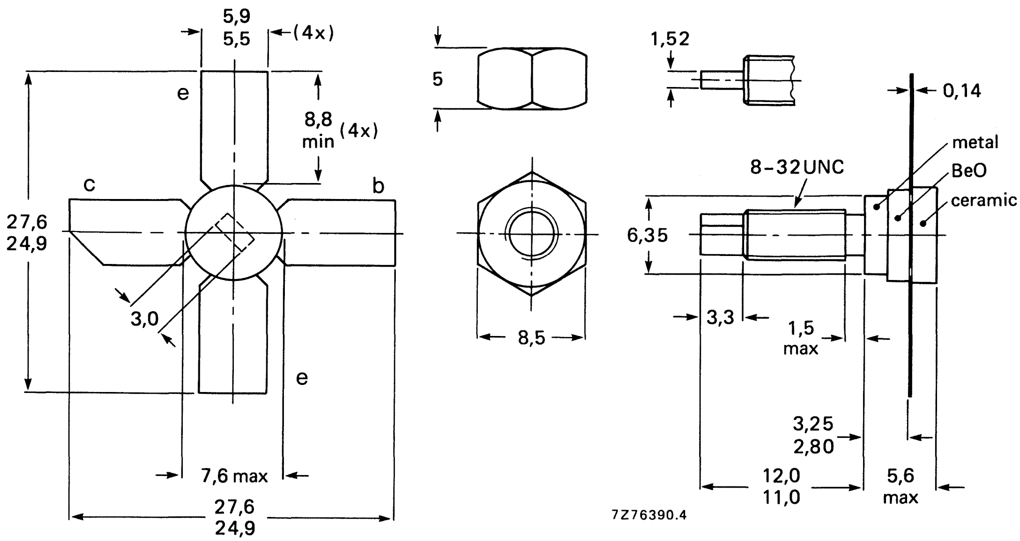
PRODUCT SAFETY

This device incorporates beryllium oxide, the dust of which is toxic. The device is entirely safe provided that the BeO disc is not damaged.

MECHANICAL DATA

Dimensions in mm

Fig. 1 SOT-122.



Torque on nut:	min.	0,75 Nm	
		(7,5 kg cm)	
	max.	0,85 Nm	
		(8,5 kg cm)	

Diameter of clearance hole in heatsink: max. 4,2 mm.
Mounting hole to have no burrs at either end.
De-burring must leave surface flat; do not chamfer or countersink either end of hole.

When locking is required an adhesive is preferred instead of a lock washer.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

Collector-base voltage (open emitter)	V_{CBO}	max.	25	V
Collector-emitter voltage (open base) (see Fig. 3)	V_{CEO}	max.	18	V
Emitter-base voltage (open collector)	V_{EBO}	max.	2	V
Collector current (d.c.)	I_C	max.	150	mA
Total power dissipation (d.c.) up to T_{mb} = 125 °C (see Fig. 3)	P_{tot}	max.	2,25	W
Storage temperature	T_{stg}		−65 to +150	°C
Operating junction temperature	T_j	max.	200	°C

THERMAL RESISTANCE

From junction to mounting base	$R_{th\ j\text{-}mb}$ =	15,0	K/W
From mounting base to heatsink	$R_{th\ mb\text{-}h}$ =	0,6	K/W

CHARACTERISTICS

T_j = 25 °C unless otherwise specified

Collector cut-off current				
I_E = 0; V_{CB} = 15 V	I_{CBO}	max.	100	μA
D.C. current gain				
I_C = 75 mA; V_{CE} = 15 V	h_{FE}	min.	25	
I_C = 150 mA; V_{CE} = 15 V	h_{FE}	min.	25	
Transition frequency at f = 500 MHz				
I_C = 75 mA; V_{CE} = 15 V	f_T	min.	3,0	GHz
		typ.	3,5	GHz
I_C = 150 mA; V_{CE} = 15 V	f_T	min.	3,5	GHz
		typ.	4,0	GHz
Collector capacitance at f = 1 MHz				
$I_E = I_e$ = 0; V_{CB} = 15 V	C_c	typ.	2,0	pF
		max.	2,75	pF
Emitter capacitance at f = 1 MHz				
$I_C = I_c$ = 0; V_{EB} = 0,5 V	C_e	typ.	11	pF
Feedback capacitance at f = 1 MHz				
I_C = 10 mA; V_{CE} = 15 V; T_{amb} = 25 °C	C_{re}	typ.	1,0	pF
		max.	1,35	pF
Collector-stud capacitance*	C_{cs}	typ.	0,8	pF
Noise figure measured in MATV test circuit (see Fig. 2)				
I_C = 120 mA; V_{CE} = 15 V; f = 500 MHz; T_{amb} = 25 °C	F	typ.	8	dB

Maximum unilateral power gain (s_{re} assumed to be zero)

$$G_{UM} = 10 \log \frac{|s_{fe}|^2}{(1 - |s_{ie}|^2)(1 - |s_{oe}|^2)}$$

I_C = 120 mA; V_{CE} = 15 V; f = 500 MHz; T_{amb} = 25 °C	G_{UM}	typ.	16,3	dB

Output voltage at d_{im} = −60 dB (see Figs 2 and 4)
(DIN 45004B, par. 6.3.: 3-tone)
I_C = 120 mA; V_{CE} = 15 V; R_L = 75 Ω; T_{amb} = 25 °C

$V_p = V_o$ at d_{im} = −60 dB; f_p = 795,25 MHz
$V_q = V_o$ −6 dB ; f_q = 803,25 MHz
$R_r = V_o$ −6 dB ; f_r = 805,25 MHz

measured at $f_{(p+q-r)}$ = 793,25 MHz	V_o	typ.	1,2	V

* Measured with grounded emitter and base.

Output power at 1 dB gain compression (see Fig. 2)
I_C = 120 mA; V_{CE} = 15 V
R_L = 75 Ω; T_{amb} = 25 °C
measured at f = 800 MHz | P_{L1} | typ. | +26 dBm

Third order intercept point (see Fig. 2)
I_C = 120 mA; V_{CE} = 15 V
R_L = 75 Ω; T_{amb} = 25 °C
P_p = ITO − 6 dB; f_p = 800 MHz
P_q = ITO − 6 dB; f_q = 801 MHz
measured at $f_{(2q-p)}$ = 802 MHz and
at $f_{(2p-q)}$ = 799 MHz | ITO | typ. | +45 dBm

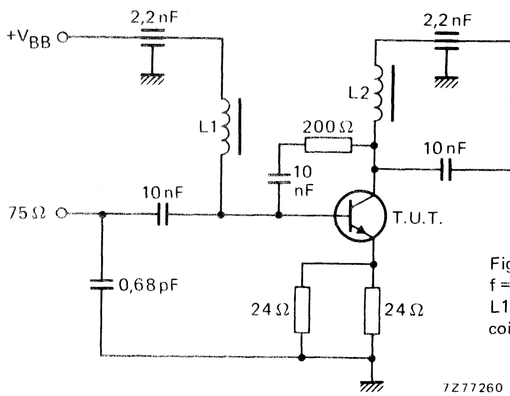


Fig. 2 MATV test circuit
f = 40 MHz to 860 MHz.
L1 = L2 = 5 μH Ferroxcube
coil (cat. no. 3122 108 20153).

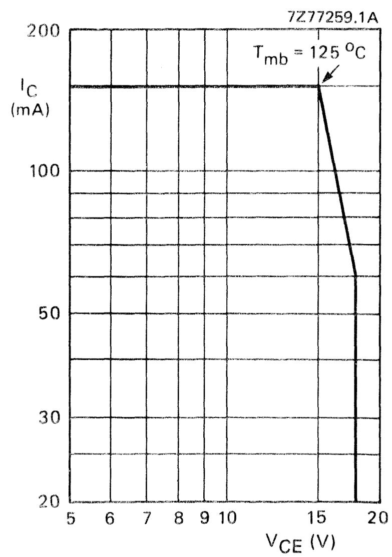


Fig. 3 D.C. SOAR.

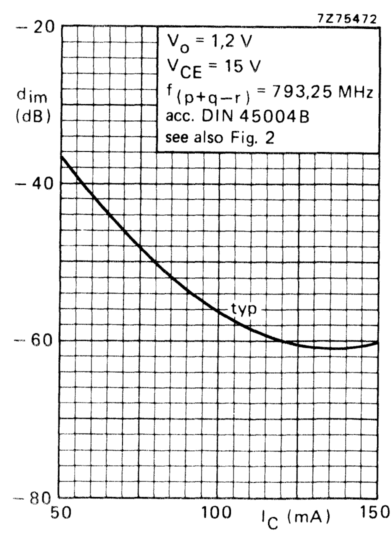


Fig. 4.

s-parameters (common emitter) at V_{CE} = 7,5 V; T_{amb} = 25 °C; typical values.

I_C mA	f MHz	s_{ie}	s_{re}	s_{fe}	s_{oe}	G_{UM} dB
50	40	0,47/ −72°	0,02/64°	30,5/147°	0,85/ −34°	36,3
	200	0,55/−154°	0,06/52°	11,3/101°	0,36/ −84°	23,2
	500	0,54/+ 177°	0,08/58°	4,9/ 78°	0,25/−104°	15,6
	800	0,52/+ 160°	0,12/58°	3,2/ 63°	0,25/−113°	11,8
	1000	0,50/+ 150°	0,15/57°	2,6/ 54°	0,26/−118°	9,9
	1200	0,48/+ 142°	0,18/54°	2,2/ 46°	0,28/−122°	8,3
75	40	0,45/ −76°	0,02/64°	32,1/144°	0,83/ −36°	36,2
	200	0,54/−156°	0,05/53°	11,6/100°	0,35/ −90°	23,4
	500	0,54/+ 176°	0,08/59°	5,0/ 78°	0,24/−112°	15,7
	800	0,51/+ 160°	0,13/59°	3,3/ 63°	0,24/−121°	11,9
	1000	0,49/+ 150°	0,16/57°	2,7/ 55°	0,24/−124°	10,1
	1200	0,46/+ 142°	0,18/54°	2,3/ 47°	0,26/−128°	8,6
100	40	0,44/ −79°	0,02/63°	33,0/145°	0,82/ −37°	36,2
	200	0,54/−157°	0,06/54°	11,8/100°	0,35/ −93°	23,5
	500	0,53/+ 175°	0,09/60°	5,1/ 78°	0,23/−117°	15,8
	800	0,51/+ 159°	0,13/59°	3,3/ 64°	0,23/−126°	11,9
	1000	0,49/+ 150°	0,16/57°	2,7/ 55°	0,24/−129°	10,1
	1200	0,46/+ 142°	0,19/54°	2,3/ 47°	0,26/−131°	8,6
120	40	0,43/ −81°	0,02/63°	33,5/145°	0,82/ −38°	36,2
	200	0,54/−157°	0,05/55°	11,9/ 99°	0,35/ −95°	23,6
	500	0,53/+ 175°	0,09/60°	5,1/ 77°	0,23/−119°	15,8
	800	0,51/+ 159°	0,13/59°	3,3/ 63°	0,23/−128°	11,9
	1000	0,48/+ 149°	0,16/56°	2,7/ 55°	0,24/−131°	10,0
	1200	0,46/+ 141°	0,19/53°	2,3/ 47°	0,25/−132°	8,5
150	40	0,43/ −82°	0,02/63°	33,6/145°	0,81/ −39°	36,1
	200	0,54/−158°	0,05/55°	11,8/ 99°	0,34/ −96°	23,5
	500	0,53/+ 175°	0,09/60°	5,1/ 77°	0,23/−121°	15,8
	800	0,51/+ 159°	0,13/59°	3,3/ 63°	0,23/−129°	11,9
	1000	0,49/+ 149°	0,16/56°	2,7/ 55°	0,24/−132°	10,1
	1200	0,47/+ 141°	0,19/53°	2,3/ 47°	0,25/−134°	8,6

s-parameters (common emitter) at V_{CE} = 15 V; T_{amb} = 25 °C; typical values.

I_C mA	f MHz	s_{ie}	s_{re}	s_{fe}	s_{oe}	G_{UM} dB
50	40	0,48/ −65°	0,02/62°	31,0/148°	0,83/ −30°	36,0
	200	0,53/−149°	0,04/52°	12,0/102°	0,37/ −73°	23,7
	500	0,52/+179°	0,08/58°	5,2/ 78°	0,25/ −89°	16,0
	800	0,50/+162°	0,12/59°	3,4/ 64°	0,26/ −99°	12,2
	1000	0,47/+152°	0,14/57°	2,8/ 55°	0,28/−104°	10,4
	1200	0,45/+144°	0,17/55°	2,3/ 47°	0,31/−109°	8,7
75	40	0,46/ −68°	0,02/62°	32,9/148°	0,82/ −32°	36,2
	200	0,52/−151°	0,04/53°	12,5/101°	0,36/ −79°	23,9
	500	0,51/+178°	0,08/59°	5,4/ 78°	0,24/ −97°	16,2
	800	0,48/+161°	0,12/59°	3,5/ 64°	0,24/−106°	12,3
	1000	0,46/+152°	0,15/57°	2,8/ 56°	0,26/−110°	10,3
	1200	0,44/+144°	0,17/55°	2,4/ 48°	0,28/−114°	8,9
100	40	0,47/ −69°	0,02/62°	33,9/147°	0,81/ −34°	36,3
	200	0,51/−151°	0,04/54°	12,6/101°	0,35/ −82°	23,9
	500	0,50/+178°	0,08/59°	5,5/ 78°	0,23/−101°	16,3
	800	0,48/+161°	0,12/59°	3,5/ 64°	0,23/−109°	12,3
	1000	0,45/+152°	0,15/57°	2,9/ 56°	0,25/−113°	10,5
	1200	0,43/+144°	0,18/54°	2,4/ 48°	0,27/−117°	8,8
120	40	0,47/ −69°	0,02/62°	34,6/146°	0,81/ −34°	36,5
	200	0,51/−151°	0,04/54°	12,7/101°	0,35/ −83°	24,0
	500	0,50/+178°	0,08/60°	5,5/ 78°	0,23/−103°	16,3
	800	0,48/+161°	0,12/59°	3,5/ 64°	0,23/−112°	12,3
	1000	0,45/+152°	0,15/57°	2,9/ 56°	0,24/−115°	10,5
	1200	0,43/+144°	0,18/54°	2,4/ 48°	0,26/−118°	8,8
150	40	0,49/ −70°	0,02/61°	34,8/146°	0,80/ −35°	36,5
	200	0,52/−152°	0,04/54°	12,6/100°	0,34/ −84°	23,9
	500	0,50/+178°	0,08/60°	5,4/ 78°	0,23/−103°	16,1
	800	0,48/+162°	0,12/59°	3,5/ 64°	0,23/−111°	12,3
	1000	0,46/+152°	0,15/57°	2,8/ 55°	0,24/−114°	9,6
	1200	0,44/+144°	0,18/54°	2,4/ 48°	0,27/−117°	8,9

Conditions for Figs 5 and 6:
V_{CE} = 15 V; I_C = 120 mA;
T_{amb} = 25 °C; typical values.

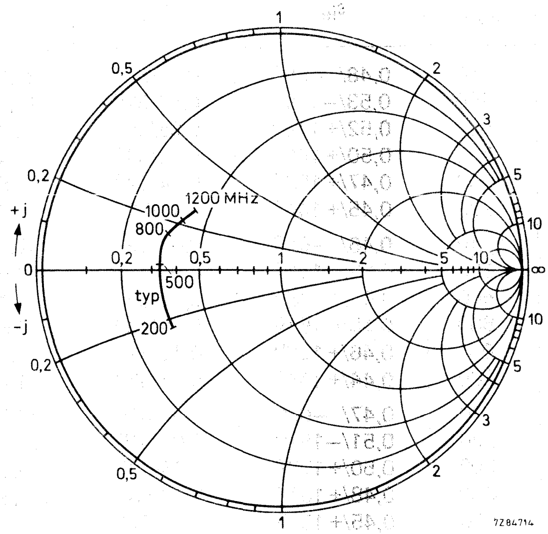


Fig. 5 Input impedance derived from input reflection coefficient s_{ie} co-ordinates in ohm x 50.

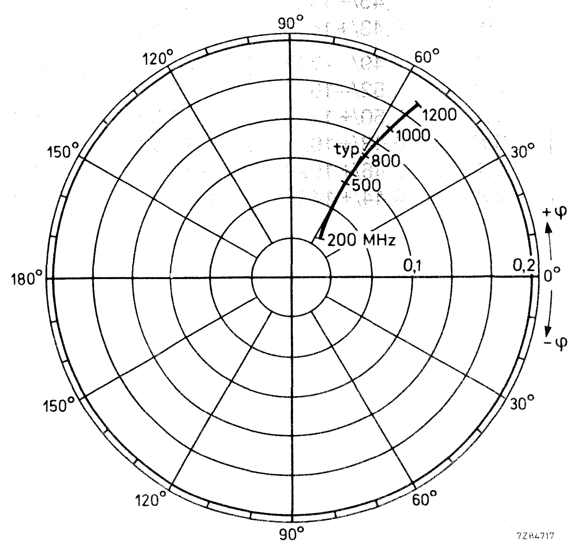


Fig. 6 Reverse transmission coefficient s_{re}.

Conditions for Figs 7 and 8:
V_{CE} = 15 V; I_C = 120 mA;
T_{amb} = 25 °C; typical values.

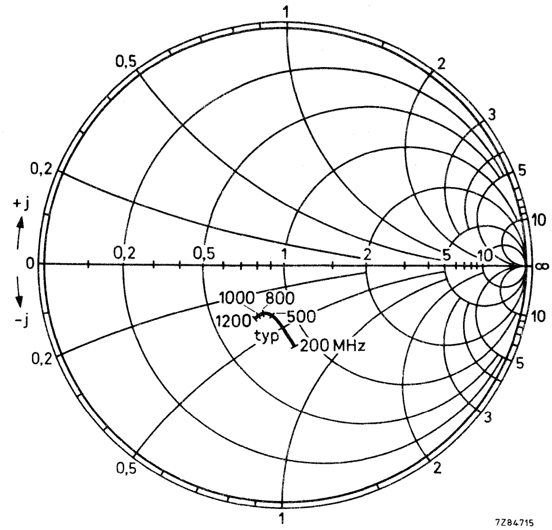


Fig. 7 Output impedance derived from output reflection coefficient s_{oe} co-ordinates in ohm x 50.

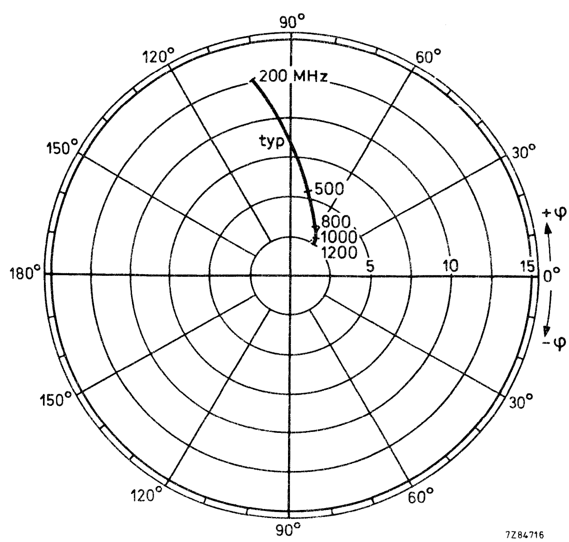


Fig. 8 Forward transmission coefficient s_{fe}.

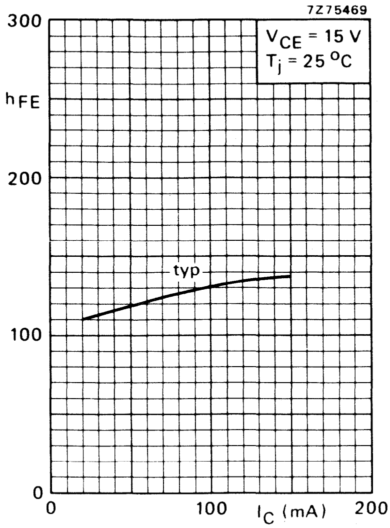


Fig. 9 V_{CE} = 15 V; T_j = 25 °C; typical values.

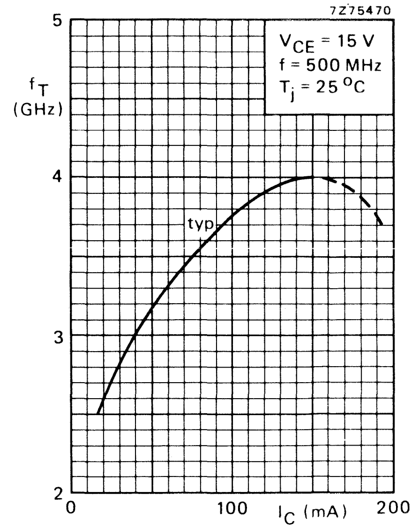


Fig. 10 V_{CE} = 15 V; f = 500 MHz; T_j = 25 °C; typical values.

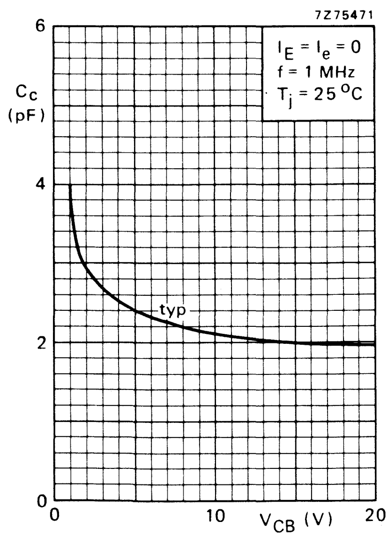


Fig. 11 I_E = i_e = 0; f = 1 MHz; T_j = 25 °C; typical values.

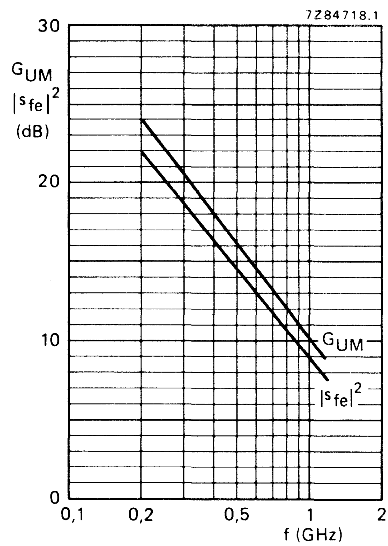


Fig. 12 V_{CE} = 15 V; I_C = 120 mA; T_{amb} = 25 °C; typical values

N-P-N 1 GHz WIDEBAND TRANSISTOR

N-P-N transistor in a plastic SOT-37 envelope, intended for wideband amplification applications. The device features high output voltage capabilities.

QUICK REFERENCE DATA

Collector-base voltage (open emitter)	V_{CBO}	max.	25	V
Collector-emitter voltage (open base)	V_{CEO}	max.	18	V
Collector current (d.c.)	I_C	max.	150	mA
Total power dissipation up to T_{amb} = 45 °C	P_{tot}	max.	1	W
Junction temperature	T_j	max.	175	°C
D.C. current gain I_C = 100 mA; V_{CE} = 10 V	h_{FE}	min.	25	
Transition frequency at f = 500 MHz I_C = 100 mA; V_{CE} = 10 V	f_T	typ.	3,7	GHz
Maximum power gain at f = 300 MHz I_C = 100 mA; V_{CE} = 10 V	G_{UM}	typ.	19,5	dB
Output voltage at d_{im} = −60 dB I_C = 100 mA; V_{CE} = 10 V; R_L = 75 Ω; $f_{(p+q-r)}$ = 285,25 MHz	V_o	typ.	1,0	V
Output power at 1 dB gain compression V_{CE} = 10 V; I_C = 100 mA; f = 300 MHz	P_{L1}	typ.	+ 24	dBm
Third order intercept point V_{CE} = 10 V; I_C = 100 mA; f = 300 MHz	ITO	typ.	+ 43	dBm

MECHANICAL DATA

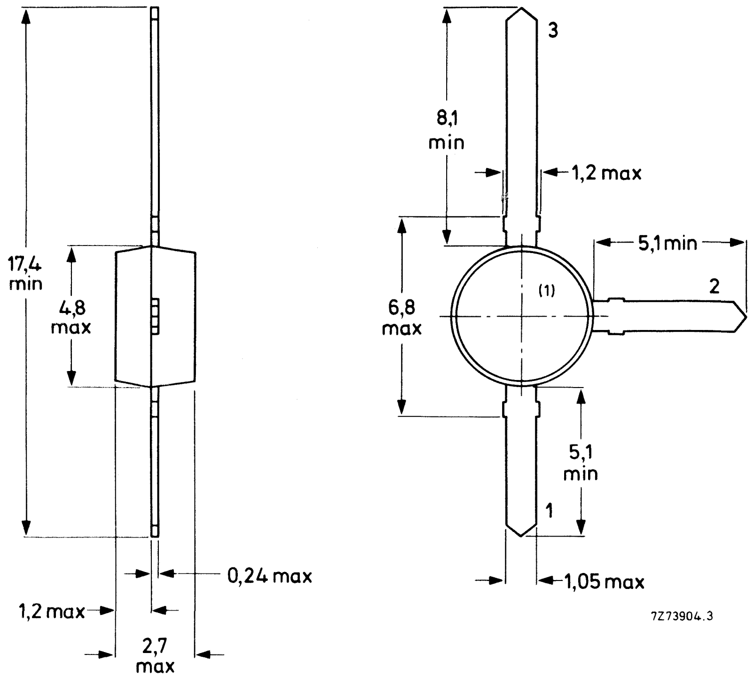
SOT-37 (see Fig. 1).

MECHANICAL DATA

Dimensions in mm

Fig. 1 SOT-37.

Connections:
1. Base
2. Emitter
3. Collector



(1) = type number marking.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

Collector-base voltage (open emitter)	V_{CBO}	max.	25	V
Collector-emitter voltage (open base)	V_{CEO}	max.	18	V
Emitter-base voltage (open collector)	V_{EBO}	max.	2	V
Collector current (d.c.)	I_C	max.	150	mA
Total power dissipation up to T_{amb} = 45 °C (see Fig. 2)	P_{tot}	max.	1	W
Storage temperature	T_{stg}	−65 to + 175		°C
Junction temperature	T_j	max.	175	°C

THERMAL RESISTANCE

From junction to case	$R_{th\ j\text{-}c}$	=	50 K/W
From junction to ambient (free air) mounted on a fibre-glass print (see Fig. 2)	$R_{th\ j\text{-}a}$	=	130 K/W

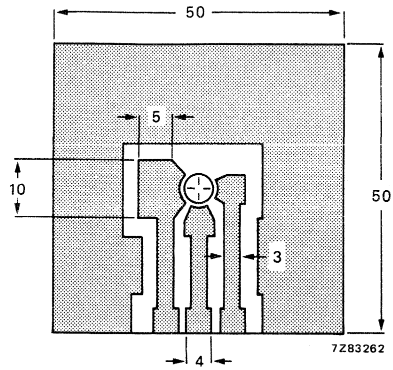


Fig. 2 Requirements for fibre-glass print (Dimensions in mm). Single-sided 35 μm Cu-clad epoxy fibre-glass print, thickness 1,5 mm. Tracks are fully tin-plated. Shaded area is Cu.

CHARACTERISTICS

T_j = 25 °C unless otherwise specified

Collector cut-off current $I_E = 0$; $V_{CB} = 15$ V	I_{CBO}	max.	100 μA
D.C. current gain $I_C = 100$ mA; $V_{CE} = 10$ V	h_{FE}	min.	25
Transition frequency at f = 500 MHz $I_C = 100$ mA; $V_{CE} = 10$ V	f_T	typ.	3,7 GHz
Collector capacitance at f = 1 MHz $I_E = i_e = 0$; $V_{CB} = 10$ V	C_c	typ.	2,0 pF
Emitter capacitance at f = 1 MHz $I_C = i_c = 0$; $V_{EB} = 0,5$ V	C_e	typ.	10 pF
Feedback capacitance at f = 1 MHz $I_C = 0$; $V_{CE} = 10$ V	C_{re}	typ.	1,2 pF
Maximum power gain at f = 300 MHz; T_{amb} = 25 °C $I_C = 100$ mA; $V_{CE} = 10$ V	G_{UM}	typ.	19,5 dB
Second harmonic distortion (see Fig. 3) $I_C = 100$ mA; $V_{CE} = 10$ V; $R_L = 75\ \Omega$; T_{amb} = 25 °C $V_p = V_o$ = 316 mV = 50 dBmV ; f_p = 66 MHz $V_q = V_o$ = 316 mV = 50 dBmV ; f_q = 144 MHz Measured at $f_{(p+q)}$ = 210 MHz	d_2	typ.	−55 dB

CHARACTERISTICS (continued)

Output voltage at d_{im} = −60 dB (see Fig. 3) (DIN 45004B); T_{amb} = 25 °C; I_C = 100 mA; V_{CE} = 10 V; R_L = 75 Ω $V_p = V_o$ at d_{im} = −60 dB; f_p = 287,25 MHz $V_q = V_o$ −6 dB; f_q = 294,25 MHz $V_r = V_o$ −6 dB; f_r = 295,25 MHz Measured at $f_{(p+q-r)}$ = 285,25 MHz	V_o	typ.	1,0 V
Output voltage at d_{im} = −60 dB (see Fig. 3) (DIN 45004B); T_{amb} = 25 °C; I_C = 90 mA; V_{CE} = 10 V; R_L = 75 Ω $V_p = V_o$ at d_{im} = −60 dB; f_p = 797,25 MHz $V_q = V_o$ −6 dB; f_q = 803,25 MHz $V_r = V_o$ −6 dB; f_r = 805,25 MHz Measured at $f_{(p+q-r)}$ = 793,25 MHz	V_o	typ.	750 mV
Output power at 1 dB gain compression			
V_{CE} = 10 V; I_C = 100 mA; f = 300 MHz; T_{amb} = 25 °C	P_{L1}	typ.	+ 24 dBm
V_{CE} = 10 V; I_C = 90 mA; f = 800 MHz; T_{amb} = 25 °C	P_{L1}	typ.	+ 22 dBm
Third order intercept point			
V_{CE} = 10 V; I_C = 100 mA; f = 300 MHz; T_{amb} = 25 °C	ITO	typ.	+ 43 dBm
V_{CE} = 10 V; I_C = 90 mA; f = 800 MHz; T_{amb} = 25 °C	ITO	typ.	+ 41 dBm

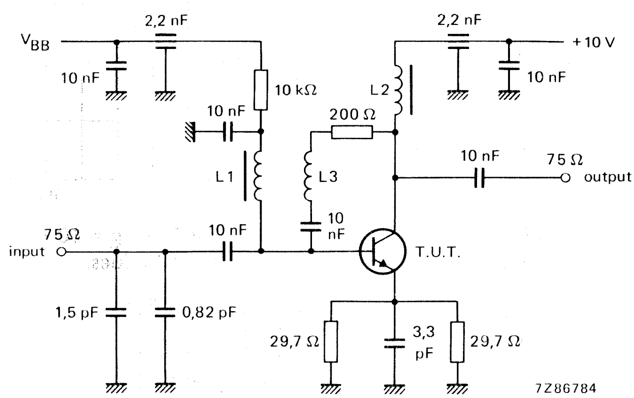


Fig. 3 Intermodulation distortion and second harmonic distortion MATV test circuit.

L1 = L2 = 5 μH Ferroxcube choke

L3 = 2 turns Cu wire (0,5 mm), internal diameter 4 mm, winding pitch 2 mm.

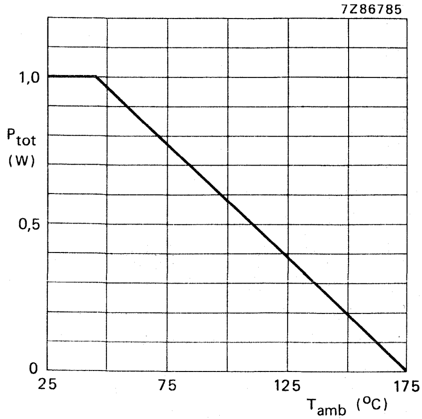


Fig. 4 Power derating curve.

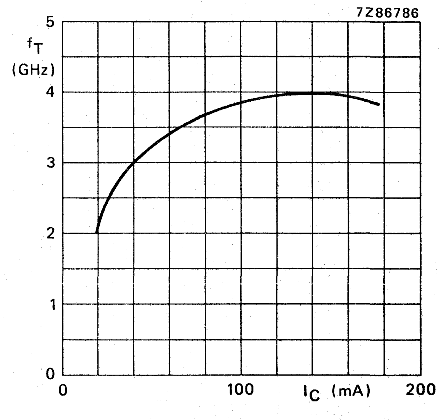


Fig. 5 V_{CE} = 10 V; f = 500 MHz; T_j = 25 °C; typical values.

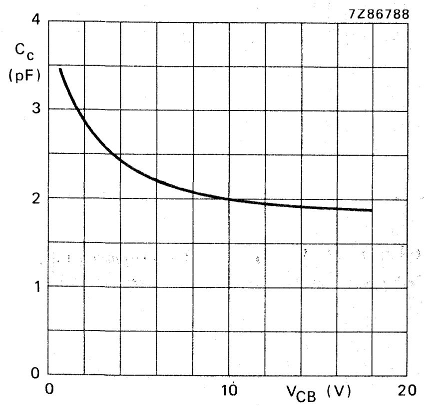


Fig. 6 I_E = 0; f = 1 MHz; T_j = 25 °C; typical values.

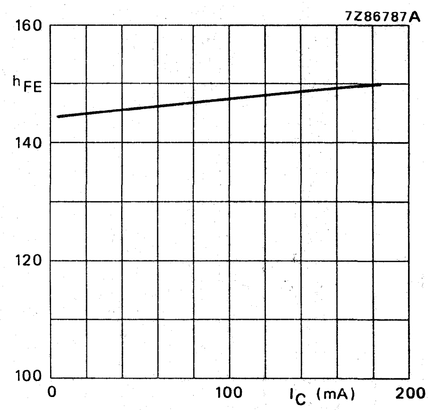


Fig. 7 V_{CE} = 10 V; T_j = 25 °C; typical values.

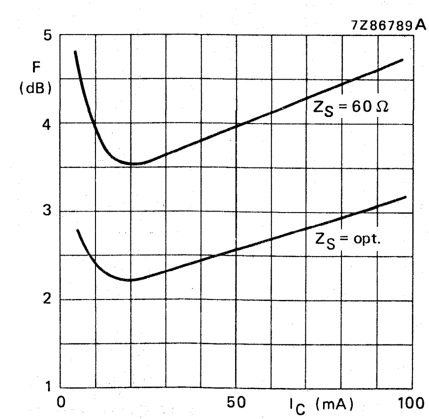


Fig. 8 V_{CE} = 10 V; f = 800 MHz; T_{amb} = 25 °C; typical values.

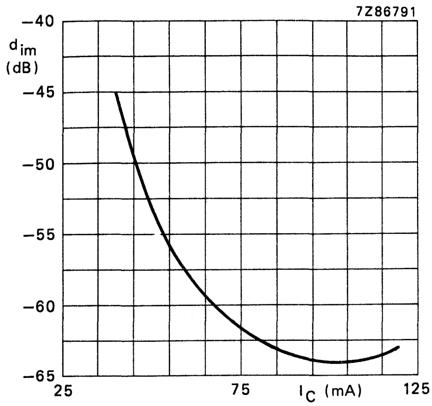


Fig. 9 V_{CE} = 10 V; V_o = 58 dBmV; $f_{(p+q-r)}$ = 285,25 MHz; T_{amb} = 25 °C; typical values.

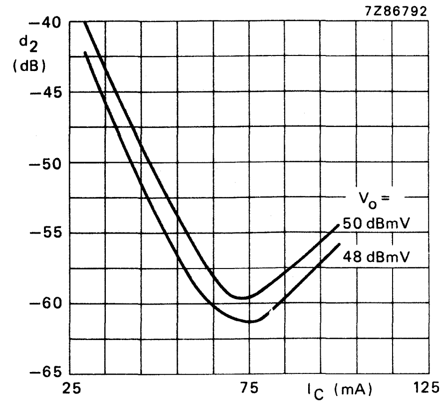


Fig. 10 V_{CE} = 10 V; f_p = 66 MHz; f_p = 144 MHz; $f_{(p+q)}$ = 210 MHz; T_{amb} = 25 °C; typical values.

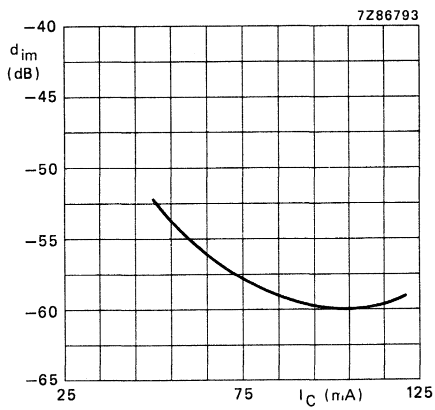


Fig. 11 V_{CE} = 19 V; V_o = 750 mV; $f_{(p+q-r)}$ = 793,25 MHz; T_{amb} = 25 °C; typical values.

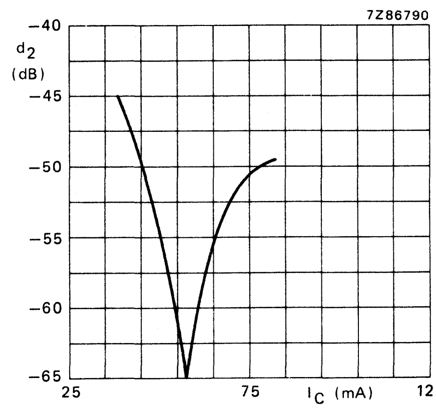


Fig. 12 V_{CE} = 10 V; V_o = 48 dBmV; f_p = 560 MHz; f_q = 250 MHz; $f_{(p+q-r)}$ = 810 MHz; T_{amb} = 25 °C; typical values.

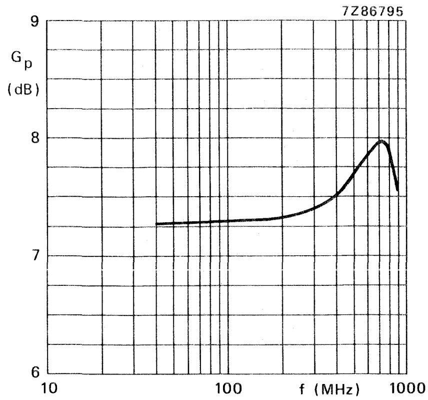


Fig. 13 Gain measured in test circuit (see Fig. 3); T_{amb} = 25 °C; typical values.

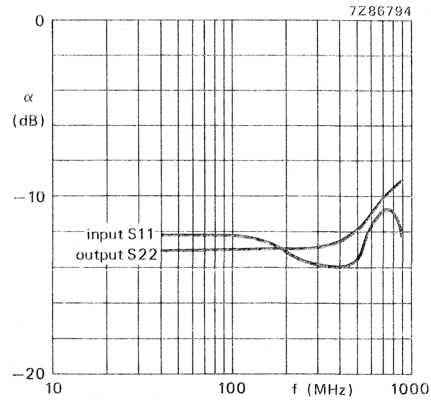


Fig. 14 Return losses measured in test circuit (see Fig. 3); T_{amb} = 25 °C; typical values.

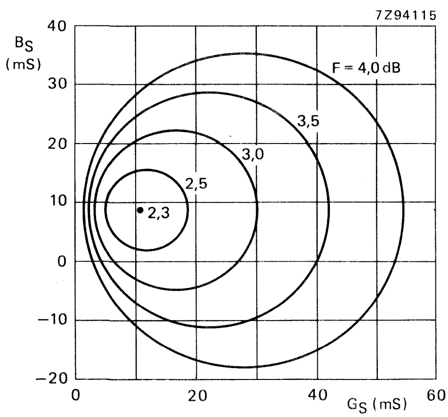


Fig. 15 Circles of constant noise figure; V_{CE} = 10 V; I_C = 20 mA; f = 800 MHz; T_{amb} = 25 °C; typical values.

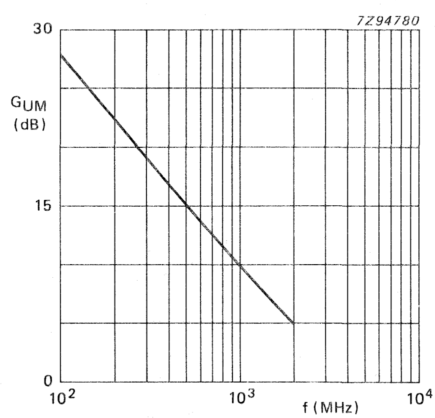


Fig. 16 V_{CE} = 10 V; I_C = 100 mA; T_{amb} = 25 °C; typical values.

s-parameters (common emitter) at V_{CE} = 10 V; T_{amb} = 25 °C; typical values.

I_C mA	f MHz	s_{ie}	s_{fe}	s_{re}	s_{oe}	G_{UM} dB
	40	0,79/ −45,4°	20,9/153,0°	0,03/ 68,1°	0,89/ −21,2°	37,6
	100	0,66/ −98,3°	14,2/122,8°	0,04/ 49,5°	0,64/ −41,2°	27,8
	200	0,57/−137,7°	8,3/103,0°	0,06/ 46,5°	0,43/ −49,9°	20,9
	500	0,58/−178,3°	3,6/ 76,2°	0,08/ 57,1°	0,33/ −64,5°	13,3
10	800	0,57/+162,0°	2,3/ 61,2°	0,12/ 67,7°	0,36/ −80,5°	9,6
	1000	0,59/+150,0°	1,9/ 51,5°	0,15/ 70,1°	0,38/ −90,4°	7,9
	1200	0,63/+138,5°	1,5/ 45,4°	0,18/ 72,9°	0,38/−100,6°	6,6
	1500	0,61/+127,8°	1,3/ 35,7°	0,25/ 72,3°	0,43/−115,6°	5,2
	2000	0,66/+101,8°	1,0/ 25,8°	0,36/ 68,1°	0,48/−143,1°	3,4
	40	0,71/ −54,4°	29,0/147,8°	0,02/ 66,3°	0,84/ −29,5°	37,5
	100	0,58/−109,5°	18,0/118,0°	0,04/ 51,3°	0,53/ −53,8°	28,3
	200	0,51/−145,8°	10,0/100,8°	0,05/ 53,3°	0,33/ −64,9°	21,8
	500	0,52/+178,2°	4,2/ 77,3°	0,09/ 62,9°	0,23/ −84,0°	14,1
20	800	0,51/+160,0°	2,8/ 63,8°	0,14/ 67,7°	0,26/ −96,2°	10,5
	1000	0,53/+148,4°	2,2/ 55,0°	0,17/ 67,4°	0,27/−105,0°	8,7
	1200	0,58/+136,8°	1,8/ 49,4°	0,20/ 68,5°	0,27/−113,0°	7,3
	1500	0,55/+128,4°	1,6/ 39,4°	0,26/ 66,5°	0,33/−125,2°	6,0
	2000	0,59/+103,2°	1,2/ 28,0°	0,35/ 63,0°	0,33/−148,3°	4,2
	40	0,64/ −63,0°	36,6/142,7°	0,02/ 63,8°	0,78/ −38,2°	37,6
	100	0,51/−118,9°	20,7/114,0°	0,03/ 54,2°	0,45/ −67,5°	28,6
	200	0,46/−151,9°	11,2/ 98,9°	0,05/ 59,5°	0,27/ −83,6°	22,3
	500	0,48/+175,1°	4,7/ 78,1°	0,10/ 66,3°	0,19/−112,1°	14,7
50	800	0,47/+158,1°	3,1/ 65,7°	0,15/ 67,6°	0,22/−119,0°	11,1
	1000	0,49/+146,5°	2,5/ 57,8°	0,18/ 66,0°	0,22/−126,4°	9,3
	1200	0,53/+134,6°	2,1/ 52,6°	0,22/ 66,0°	0,21/−135,5°	7,9
	1500	0,51/+127,9°	1,8/ 42,9°	0,27/ 62,6°	0,27/−141,4°	6,6
	2000	0,54/+103,0°	1,4/ 31,4°	0,36/ 58,5°	0,32/−159,4°	4,8
	40	0,63/ −65,1°	38,0/141,4°	0,02/ 64,5°	0,76/ −40,3°	37,6
	100	0,51/−121,0°	21,1/113,2°	0,03/ 54,8°	0,44/ −70,7°	28,7
	200	0,45/−153,5°	11,5/ 98,5°	0,05/ 60,0°	0,26/ −88,2°	22,5
	500	0,48/+174,7°	4,8/ 78,1°	0,10/ 66,9°	0,19/−118,4°	14,8
70	800	0,47/+157,8°	3,1/ 65,9°	0,15/ 67,6°	0,21/ +12,9°	11,1
	1000	0,48/+146,2°	2,5/ 58,2°	0,19/ 65,8°	0,22/−131,8°	9,3
	1200	0,53/+134,3°	2,1/ 53,1°	0,22/ 65,6°	0,21/−141,0°	8,0
	1500	0,50/+127,7°	1,8/ 43,4°	0,28/ 61,9°	0,26/−145,3°	6,6
	2000	0,53/+103,0°	1,4/ 31,9°	0,36/ 57,6°	0,31/−162,4°	4,9
	40	0,63/ −66,9°	38,9/140,1°	0,02/ 63,1°	0,75/ −42,0°	37,6
	100	0,50/−122,8°	21,1/112,4°	0,03/ 54,8°	0,43/ −73,1°	28,6
	200	0,45/−153,6°	11,4/ 98,0°	0,05/ 60,7°	0,25/ −91,3°	22,4
	500	0,48/+174,2°	4,7/ 77,8°	0,10/ 66,9°	0,19/−122,4°	14,8
100	800	0,47/+157,5°	3,1/ 65,8°	0,16/ 67,5°	0,21/−126,3°	11,1
	1000	0,49/+146,0°	2,5/ 58,0°	0,19/ 65,5°	0,22/−135,1°	9,3
	1200	0,53/+134,0°	2,1/ 53,1°	0,22/ 55,2°	0,21/−144,5°	8,0
	1500	0,50/+127,5°	1,8/ 43,4°	0,28/ 61,3°	0,26/−147,9°	6,6
	2000	0,53/+102,9°	1,4/ 32,0°	0,38/ 57,1°	0,30/−164,4°	4,8

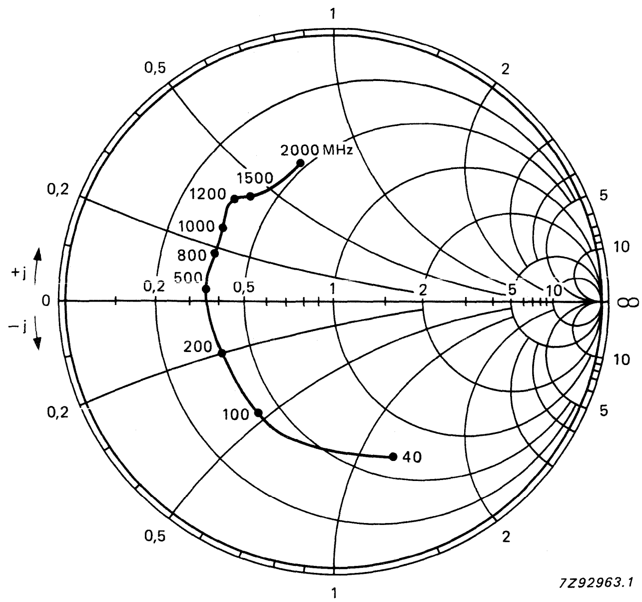


Fig. 17 Input reflection coefficient s_{ie}.

Conditions for Figs 17 and 18:
V_{CE} = 10 V; I_C = 100 mA; T_{amb} = 25 °C; typical values.

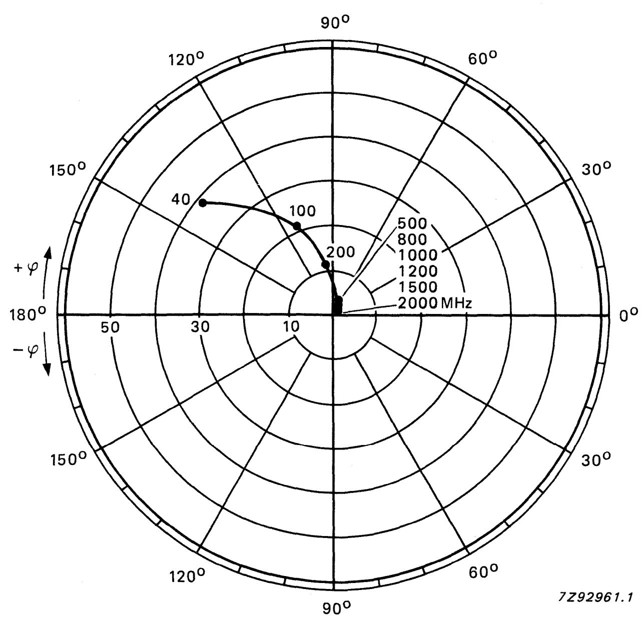


Fig. 18 Forward transmission coefficient s_{fe}.

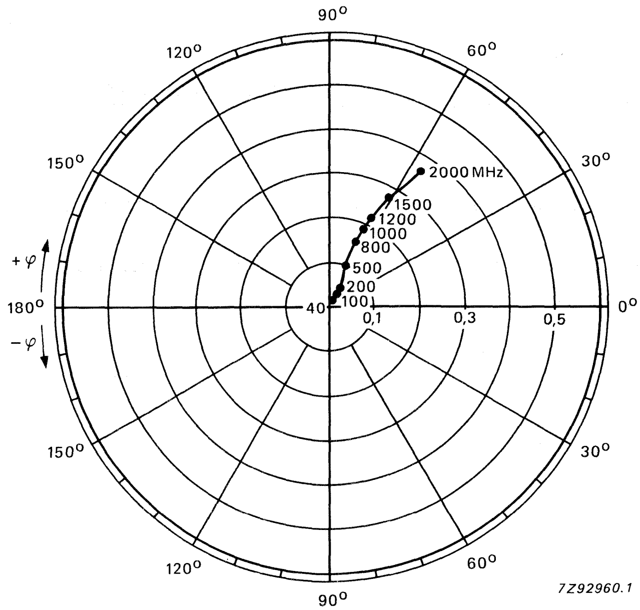


Fig. 19 Reverse transmission coefficient s_{re}.

Conditions for Figs 19 and 20:
V_{CE} = 10 V; I_C = 100 mA; T_{amb} = 25 °C; typical values.

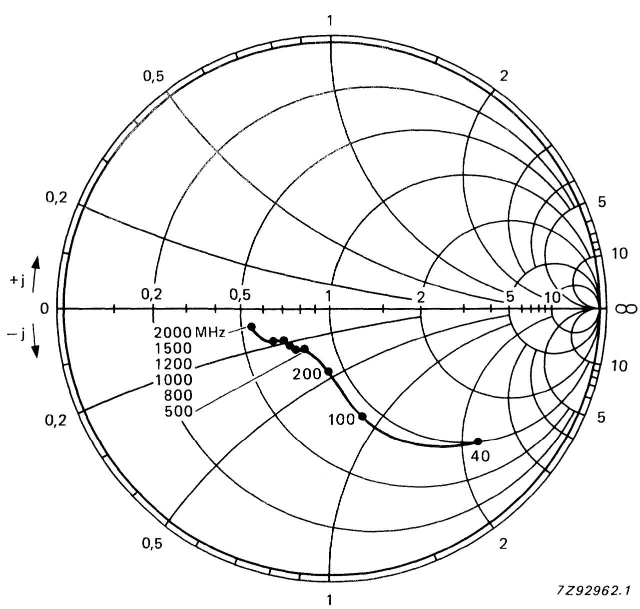


Fig. 20 Output reflection coefficient s_{oe}.

P-N-P 1 GHz WIDEBAND TRANSISTOR

P-N-P transistor in a plastic SOT-37 envelope. It is primarily intended for use in u.h.f. and microwave amplifiers such as in aerial amplifiers, radar systems, oscilloscopes, spectrum analysers etc.

The transistor features extremely high power gain coupled with good low noise performance.

N-P-N complements are BFR90 and BFR90A.

QUICK REFERENCE DATA

Collector-base voltage (open emitter)	$-V_{CBO}$	max.	20	V
Collector-emitter voltage (open base)	$-V_{CEO}$	max.	15	V
Collector current (d.c.)	$-I_C$	max.	25	mA
Total power dissipation up to T_{amb} = 60 °C	P_{tot}	max.	180	mW
Junction temperature	T_j	max.	175	°C
Transition frequency at f = 500 MHz $-I_C$ = 14 mA; $-V_{CE}$ = 10 V	f_T	typ.	5,0	GHz
Feedback capacitance at f = 1 MHz I_C = 0; $-V_{CE}$ = 10 V	C_{re}	typ.	0,45	pF
Noise figure at optimum source impedance $-I_C$ = 4 mA; $-V_{CE}$ = 10 V; f = 800 MHz; T_{amb} = 25 °C	F	typ.	2,4	dB

MECHANICAL DATA (see Fig. 1)

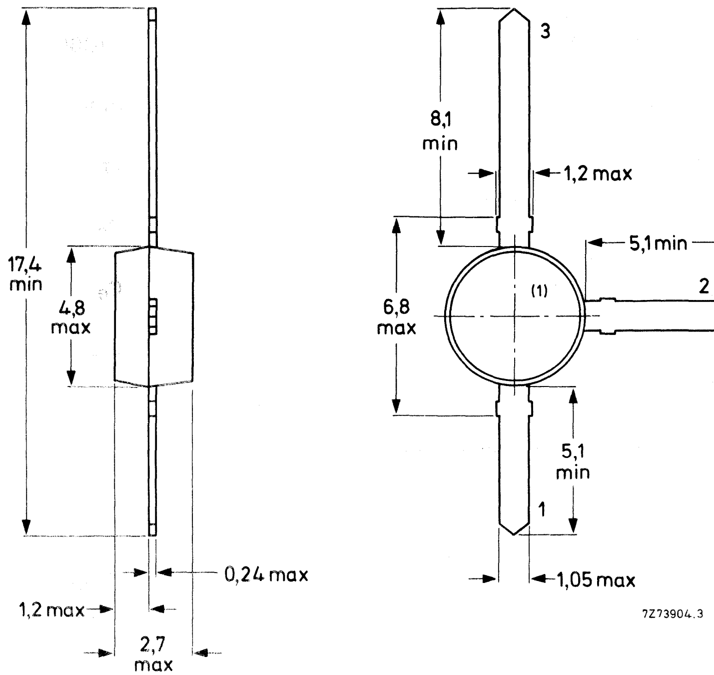
MECHANICAL DATA

Dimensions in mm

Fig. 1 SOT-37.

Connections

1. Base
2. Emitter
3. Collector



(1) = type number marking.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

Collector-base voltage (open emitter)	$-V_{CBO}$	max.	20	V
Collector-emitter voltage (open base)	$-V_{CEO}$	max.	15	V
Emitter-base voltage (open collector)	$-V_{EBO}$	max.	2	V
Collector current (d.c.)	$-I_C$	max.	25	mA
Collector current (peak value) at f > 1 MHz	$-I_{CM}$	max.	35	mA
Total power dissipation up to T_{amb} = 60 °C	P_{tot}	max.	180	mW
Storage temperature	T_{stg}		−65 to +150	°C
→ Junction temperature	T_j	max.	175	°C

THERMAL RESISTANCE

From junction to ambient in free air mounted on a fibre-glass print of 40 mm x 25 mm x 1 mm	$R_{th\ j\text{-}a}$	=	500	K/W

CHARACTERISTICS

T_j = 25 °C unless otherwise specified

Collector cut-off current			
$I_E = 0; -V_{CB} = 10$ V	$-I_{CBO}$	max.	50 nA
D.C. current gain			
$-I_C = 14$ mA; $-V_{CE} = 10$ V	h_{FE}	min.	20
Transition frequency at f = 500 MHz			
$-I_C = 14$ mA; $-V_{CE} = 10$ V	f_T	typ.	5,0 GHz
Collector capacitance at f = 1 MHz			
$I_E = I_e = 0; -V_{CB} = 10$ V	C_c	typ.	0,65 pF
Emitter capacitance at f = 1 MHz			
$I_C = I_c = 0; -V_{EB} = 0,5$ V	C_e	typ.	1,2 pF
Feedback capacitance at f = 1 MHz			
$I_C = 0; -V_{CE} = 10$ V	C_{re}	typ.	0,45 pF
Noise figure at optimum source impedance			
$-I_C = 4$ mA; $-V_{CE} = 10$ V; f = 800 MHz; $T_{amb} = 25$ °C	F	typ.	2,4 dB

Maximum unilateral power gain (s_{re} assumed to be zero)

$$G_{UM} = 10 \log \frac{|s_{fe}|^2}{[1-|s_{ie}|^2]\,[1-|s_{oe}|^2]}$$

$-I_C = 14$ mA; $-V_{CE} = 10$ V; $T_{amb} = 25$ °C

f = 500 MHz	G_{UM}	typ.	18,0 dB
f = 800 MHz	G_{UM}	typ.	14,0 dB

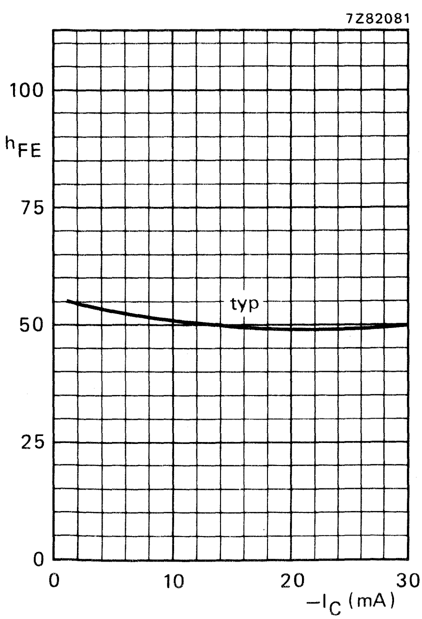


Fig. 2 $-V_{CE} = 10$ V; $T_j = 25$ °C; typical values.

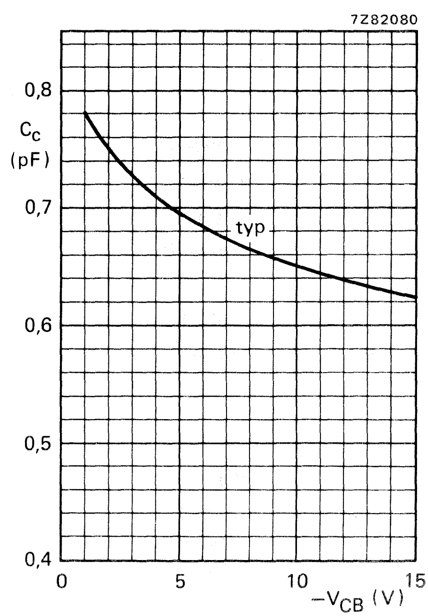


Fig. 3 $I_E = i_e = 0$; f = 1 MHz; $T_j = 25$ °C; typical values.

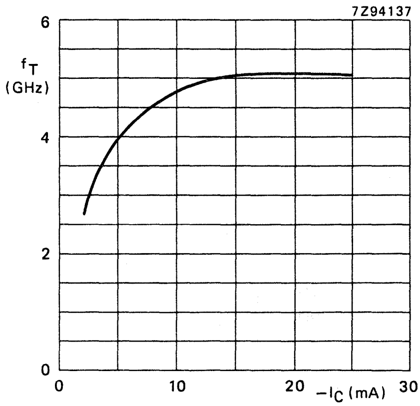


Fig. 4 $-V_{CE}$ = 10 V; f = 500 MHz; T_j = 25 °C; typical values.

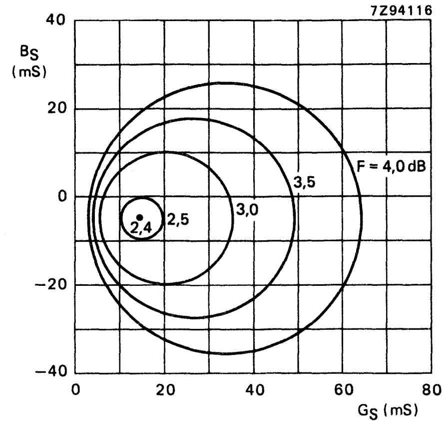


Fig. 5 Circles of constant noise figure. $-V_{CE}$ = 10 V; $-I_C$ = 4 mA; f = 800 MHz; T_{amb} = 25 °C; typical values.

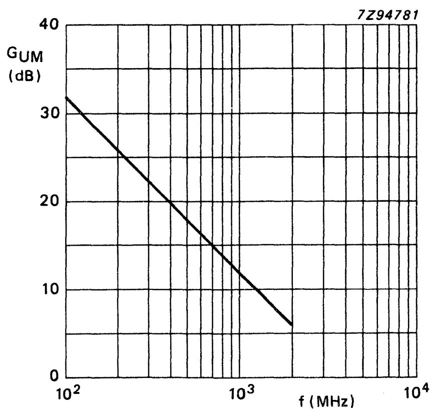


Fig. 6 $-V_{CE}$ = 10 V; $-I_C$ = 14 mA; T_{amb} = 25 °C; typical values.

s-parameters (common emitter) at $-V_{CE}$ = 10 V; T_{amb} = 25 °C; typical values.

I_C mA	f MHz	s_{ie}	s_{fe}	s_{re}	s_{oe}	G_{UM} dB
	40	0,89/ −4,7°	6,6/175,9°	0,01/ 86,5°	1,00/ −1,9°	44,8
	100	0,89/ −15,1°	6,5/164,8°	0,03/ 80,9°	1,01/ −8,5°	42,5
	200	0,79/ −33,5°	5,7/150,1°	0,05/ 73,4°	0,90/−16,3°	26,7
	500	0,58/ −73,1°	4,4/118,5°	0,10/ 59,2°	0,78/−31,2°	18,6
2	800	0,40/−100,3°	3,3/100,1°	0,13/ 56,7°	0,65/−39,3°	13,4
	1000	0,31/−116,4°	2,8/ 88,5°	0,14/ 54,3°	0,62/−42,4°	11,4
	1200	0,24/−142,0°	2,3/ 79,0°	0,15/ 53,4°	0,58/−45,6°	9,3
	1500	0,23/−166,8°	2,0/ 71,5°	0,18/ 56,1°	0,50/−50,3°	7,6
	2000	0,21/+146,0°	1,6/ 56,1°	0,21/ 56,3°	0,44/−64,2°	5,0
	40	0,73/ −8,3°	13,0/172,7°	0,01/ 85,8°	0,97/ −4,1°	38,5
	100	0,70/ −23,9°	12,4/157,1°	0,02/ 78,3°	0,95/−13,7°	35,4
	200	0,56/ −47,2°	10,0/138,3°	0,04/ 71,4°	0,80/−23,0°	26,0
	500	0,33/ −91,9°	6,1/106,3°	0,08/ 64,6°	0,61/−34,5°	18,2
5	800	0,21/−118,3°	4,1/ 91,1°	0,11/ 66,3°	0,52/−39,5°	13,9
	1000	0,16/−140,0°	3,4/ 82,0°	0,13/ 65,0°	0,49/−41,8°	12,0
	1200	0,14/−179,1°	2,9/ 74,8°	0,15/ 63,9°	0,46/−43,3°	10,2
	1500	0,16/+168,5°	2,4/ 68,3°	0,18/ 65,1°	0,41/−49,2°	8,6
	2000	0,18/+121,9°	1,9/ 55,1°	0,23/ 62,0°	0,36/−62,4°	6,1
	40	0,54/ −12,2°	19,2/168,8°	0,01/ 80,9°	0,95/ −6,3°	37,5
	100	0,50/ −32,7°	17,4/149,7°	0,02/ 76,7°	0,89/−17,8°	32,9
	200	0,36/ −59,7°	12,9/129,0°	0,03/ 72,8°	0,70/−26,5°	25,8
	500	0,20/−110,8°	6,8/ 99,3°	0,07/ 71,2°	0,51/−33,8°	18,2
10	800	0,13/−138,7°	4,5/ 86,7°	0,11/ 72,5°	0,46/−37,9°	14,1
	1000	0,11/−170,2°	3,7/ 78,8°	0,13/ 70,5°	0,43/−40,0°	12,3
	1200	0,13/+150,8°	3,1/ 72,4°	0,15/ 68,9°	0,41/−40,9°	10,6
	1500	0,16/+151,1°	2,6/ 66,3°	0,18/ 68,8°	0,37/−47,6°	8,9
	2000	0,19/+110,7°	2,0/ 54,2°	0,23/ 64,4°	0,32/−61,0°	6,5
	40	0,44/ −14,2°	21,8/167,5°	0,01/ 82,2°	0,93/ −7,1°	36,5
	100	0,39/ −37,5°	19,1/146,9°	0,02/ 78,0°	0,86/−19,3°	32,2
	200	0,27/ −66,9°	13,7/125,8°	0,03/ 74,2°	0,66/−27,3°	25,6
	500	0,16/−124,1°	6,9/ 97,8°	0,07/ 73,6°	0,49/−32,9°	18,0
14	800	0,12/−153,3°	4,5/ 85,2°	0,11/ 74,3°	0,44/−36,9°	14,0
	1000	0,12/+175,7°	3,7/ 77,7°	0,13/ 72,3°	0,42/−39,0°	12,3
	1200	0,15/+143,0°	3,1/ 71,5°	0,15/ 70,6°	0,40/−39,7°	10,6
	1500	0,17/+145,1°	2,6/ 65,5°	0,19/ 69,9°	0,36/−46,9°	9,0
	2000	0,20/+108,3°	2,0/ 53,4°	0,23/ 65,3°	0,31/−60,3°	6,5

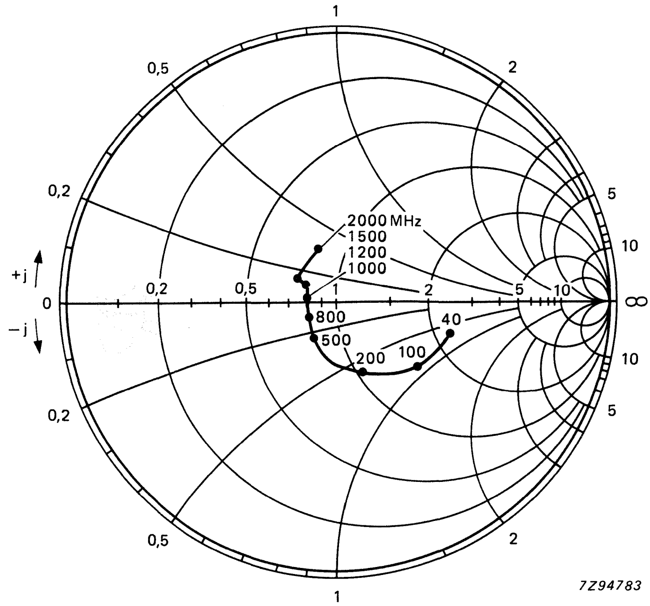


Fig. 7 Input impedance, derived from input reflection coefficient s_{ie} coordinates, in ohm x 50.

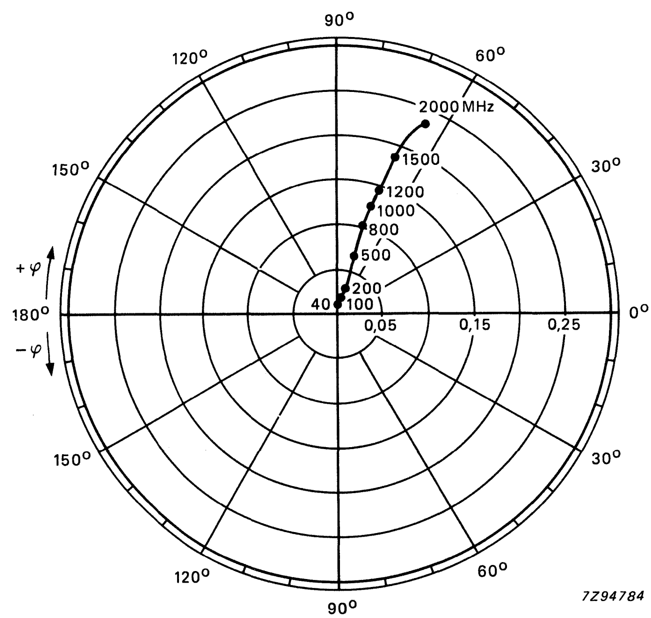


Fig. 8 Reverse transmission coefficient s_{re}.

Conditions for Figs 7 to 10: $-V_{CE}$ = 10 V; $-I_C$ = 14 mA; T_{amb} = 25 °C; typical values.

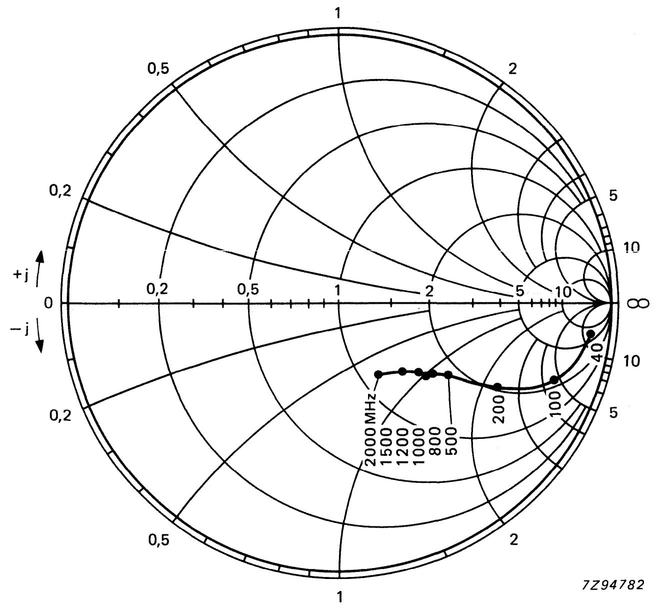


Fig. 9 Output impedance, derived from output reflection coefficient s_{oe} coordinates, in ohm x 50.

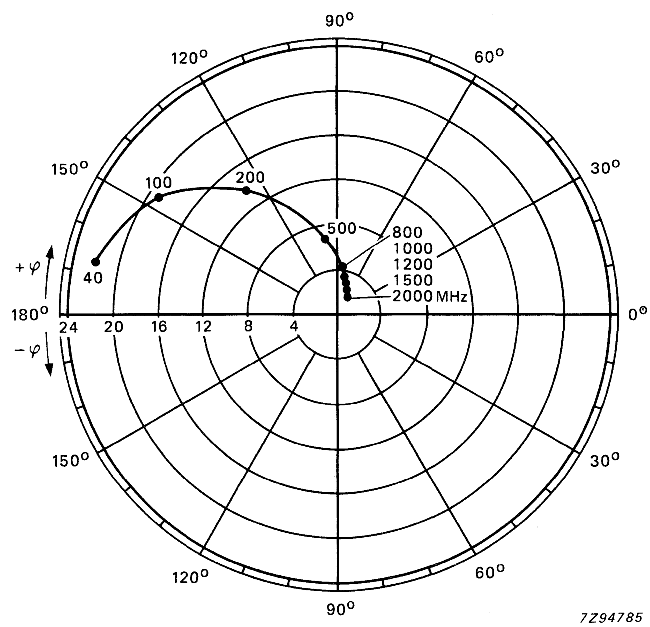


Fig. 10 Forward transmission coefficient s_{fe}.

P-N-P 2 GHz WIDEBAND TRANSISTOR

P-N-P transistor in a sub-miniature HERMETICALLY SEALED micro-stripline envelope. It is primarily intended for use in u.h.f. and microwave amplifiers such as aerial amplifiers, radar systems, oscilloscopes, spectrum analysers etc.

The transistor features extremely high power gain coupled with good low noise performance.

N-P-N complement is BFP90A.

QUICK REFERENCE DATA

Collector-base voltage	$-V_{CBO}$	max.	20	V
Collector-emitter voltage	$-V_{CEO}$	max.	15	V
Collector current (d.c.)	$-I_C$	max.	30	mA
Total power dissipation up to T_{amb} = 125 °C	P_{tot}	max.	250	mW
Junction temperature	T_j	max.	175	°C
D.C. current gain $-I_C$ = 14 mA; $-V_{CE}$ = 10 V	h_{FE}	min.	20	
Transition frequency at f = 500 MHz $-I_C$ = 14 mA; $-V_{CE}$ = 10 V	f_T	typ.	5,0	GHz
Maximum unilateral power gain $-I_C$ = 14 mA; $-V_{CE}$ = 10 V at f = 500 MHz at f = 800 MHz	G_{UM}	typ. typ.	20,5 16,5	dB dB

MECHANICAL DATA

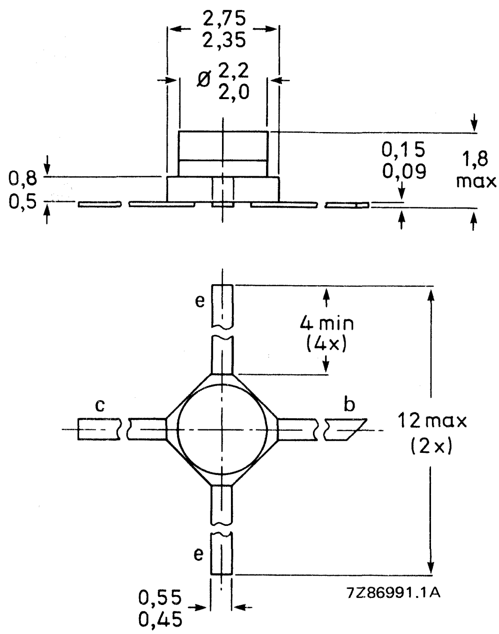
SOT-173 (see Fig. 1).

MECHANICAL DATA

Dimensions in mm

Fig. 1 SOT-173.

Marking code: C1



RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

Collector-base voltage (open emitter)	$-V_{CBO}$	max.	20 V
Collector-emitter voltage (open base)	$-V_{CEO}$	max.	15 V
Emitter-base voltage (open collector)	$-V_{EBO}$	max.	2 V
Collector current (d.c.)	$-I_C$	max.	30 mA
Total power dissipation up to T_{amb} = 125 °C mounted on a ceramic substrate of 0,7 mm x 10 cm^2	P_{tot}	max.	250 mW
Storage temperature	T_{stg}		−65 to +150 °C
Junction temperature	T_j	max.	175 °C

THERMAL RESISTANCE

From junction to ambient in free air mounted on a ceramic substrate of 0,7 mm x 10 cm^2	$R_{th\ j\text{-}a}$	200 K/W

CHARACTERISTICS

T_j = 25 °C unless otherwise specified

Collector cut-off current $I_E = 0$; $-V_{CB} = 10$ V	$-I_{CBO}$	max.	50 nA
D.C. current gain $-I_C = 14$ mA; $-V_{CE} = 10$ V	h_{FE}	min. typ.	20 50
Transition frequency at f = 500 MHz $-I_C = 14$ mA; $-V_{CE} = 10$ V	f_T	typ.	5,0 GHz
Collector capacitance at f = 1 MHz $I_E = I_e = 0$; $-V_{CB} = 10$ V	C_c	typ.	0,65 pF
Emitter capacitance at f = 1 MHz $I_C = I_c = 0$; $-V_{EB} = 0,5$ V	C_e	typ.	1,1 pF
Feedback capacitance at f = 1 MHz $I_C = 0$; $-V_{CE} = 10$ V	C_{re}	typ.	0,45 pF

Maximum unilateral power gain (s_{re} assumed to be zero)

$$G_{UM} = 10 \log \frac{|s_{fe}|^2}{[1-|s_{ie}|^2]\,[1-|s_{oe}|^2]}$$

at $-I_C = 14$ mA; $-V_{CE} = 10$ V; $T_{amb} = 25$ °C f = 500 MHz f = 800 MHz	G_{UM}	typ. typ.	20,5 dB 16,5 dB
Noise figures at f = 800 MHz; Z_S = opt.; $T_{amb} = 25$ °C $-I_C = 4$ mA; $-V_{CE} = 10$ V $-I_C = 14$ mA; $-V_{CE} = 10$ V	F	typ. typ.	2,5 dB 3,5 dB

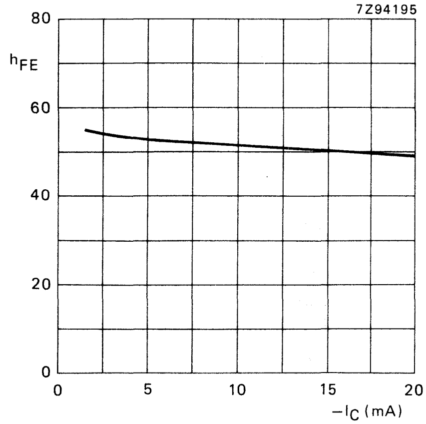


Fig. 2 $-V_{CE}$ = 10 V; T_j = 25 °C; typical values.

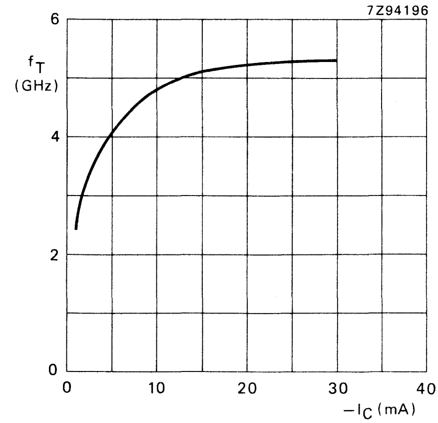


Fig. 3 $-V_{CE}$ = 10 V; f = 500 MHz; T_j = 25 °C; typical values.

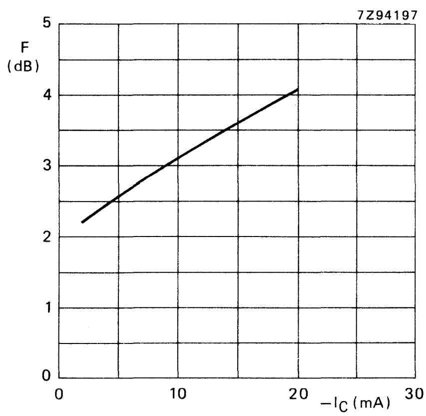


Fig. 4 $-V_{CE}$ = 10 V; f = 800 MHz; T_{amb} = 25 °C; Z_s = optimum; typical values.

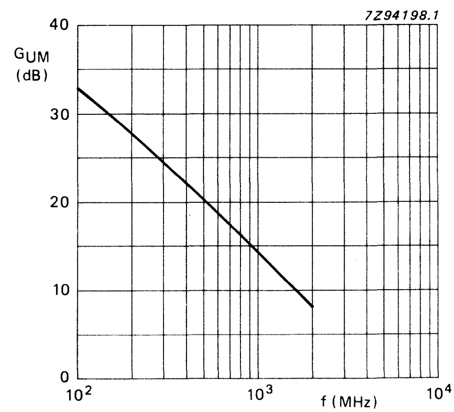


Fig. 5 $-V_{CE}$ = 10 V; $-I_C$ = 14 mA; T_{amb} = 25 °C; typical values.

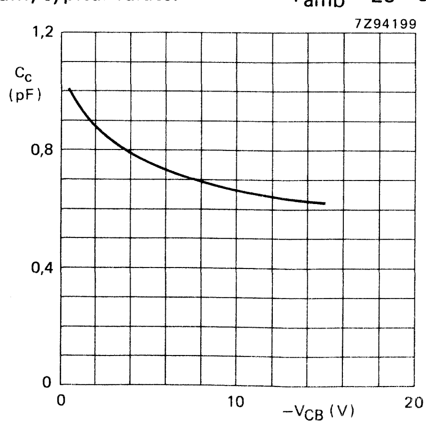


Fig. 6 $I_E = I_e = 0$; f = 1 MHz; T_j = 25 °C; typical values.

s-parameters (common-emitter) at $-V_{CE}$ = 10 V; T_{amb} = 25 °C; typical values.

I_C mA	f MHz	s_{ie}	s_{fe}	s_{re}	s_{oe}	G_{UM} dB
2	40	0,87/ +8,2°	6,4/174,8°	0,011/ 84,6°	0,99/ −3,5°	39,3
	100	0,85/ −20,5°	6,3/165,9°	0,026/ 79,1°	0,98/ −8,7°	35,6
	200	0,81/ −39,7°	5,9/151,5°	0,050/ 70,1°	0,93/−16,4°	28,7
	500	0,68/ −84,3°	4,4/122,4°	0,094/ 51,5°	0,79/−31,4°	19,8
	800	0,59/−112,1°	3,2/103,5°	0,116/ 43,6°	0,70/−38,8°	14,9
	1000	0,54/−125,2°	2,7/ 94,6°	0,124/ 41,0°	0,66/−42,3°	12,6
	1200	0,52/−137,2°	2,3/ 86,3°	0,133/ 20,0°	0,65/−45,7°	10,9
	1500	0,47/−149,4°	1,7/ 73,8°	0,140/ 34,3°	0,64/−46,7°	8,2
	2000	0,44/−169,4°	1,4/ 59,6°	0,157/ 31,7°	0,61/−54,1°	6,0
5	40	0,72/ −13,1°	12,9/172,0°	0,010/ 82,6°	0,98/ −5,8°	39,4
	100	0,69/ −32,2°	12,3/159,6°	0,023/ 74,9°	0,94/−14,1°	33,9
	200	0,64/ −60,2°	10,8/141,4°	0,041/ 64,1°	0,84/−24,9°	28,3
	500	0,54/−112,2°	6,7/111,8°	0,070/ 19,5°	0,62/−39,7°	20,1
	800	0,50/−137,3°	4,6/ 95,5°	0,085/ 47,2°	0,53/−44,5°	15,9
	1000	0,47/−148,5°	3,7/ 88,1°	0,094/ 46,8°	0,50/−46,2°	13,7
	1200	0,46/−158,2°	3,1/ 81,5°	0,103/ 46,6°	0,49/−48,6°	12,1
	1500	0,44/−169,7°	2,5/ 71,1°	0,117/ 44,5°	0,49/−47,9°	10,0
	2000	0,44/+173,2°	1,9/ 58,5°	0,139/ 42,8°	0,47/−54,0°	7,7
10	40	0,55/ −19,4°	19,1/169,1°	0,009/ 80,3°	0,96/ −8,3°	38,2
	100	0,53/ −46,6°	17,7/153,6°	0,020/ 71,4°	0,89/−19,4°	33,2
	200	0,50/−82,2°	14,4/133,1°	0,033/ 60,6°	0,74/−31,9°	27,9
	500	0,47/−133,7°	7,8/105,0°	0,054/ 51,9°	0,50/−44,1°	20,2
	800	0,46/−153,7°	5,2/ 90,9°	0,069/ 52,8°	0,42/−46,7°	16,2
	1000	0,45/−162,5°	4,2/ 84,6°	0,079/ 53,3°	0,41/−47,4°	14,2
	1200	0,46/−170,3°	3,5/ 78,7°	0,088/ 53,2°	0,40/−49,5°	12,6
	1500	0,45/−178,8°	2,8/ 69,6°	0,106/ 51,6°	0,40/−47,4°	10,8
	2000	0,46/+166,7°	2,2/ 58,2°	0,128/ 49,9°	0,39/−52,9°	8,5

s-parameters (common emitter) at $-V_{CE}$ = 10 V; T_{amb} = 25 °C; typical values.

I_C mA	f MHz	s_{ie}	s_{fe}	s_{re}	s_{oe}	G_{UM} dB
	40	0,46/ −24,2°	22,3/168,0°	0,008/ 79,0°	0,94/ −9,2°	37,3
	100	0,45/ −56,1°	20,1/151,0°	0,019/ 69,9°	0,86/−21,2°	32,9
	200	0,45/ −94,5°	15,6/130,6°	0,030/ 59,9°	0,70/−34,0°	27,8
	500	0,47/−142,0°	8,3/102,9°	0,049/ 54,1°	0,46/−44,4°	20,5
14	800	0,48/−159,2°	5,4/ 89,6°	0,064/ 54,9°	0,39/−46,5°	16,5
	1000	0,47/−169,9°	4,4/ 83,9°	0,075/ 55,8°	0,38/−46,2°	14,6
	1200	0,47/−174,6°	3,7/ 78,8°	0,084/ 55,8°	0,37/−47,5°	13,1
	1500	0,46/+174,6°	2,8/ 68,3°	0,099/ 54,1°	0,37/−46,9°	10,6
	2000	0,47/+160,6°	2,2/ 57,0°	0,121/ 52,1°	0,35/−52,5°	8,3
	40	0,35/ −31,2°	25,1/166,3°	0,007/ 77,6°	0,93/−10,4°	37,3
	100	0,38/ −70,2°	22,3/148,0°	0,017/ 68,7°	0,83/−23,7°	32,7
	200	0,42/−110,1°	16,8/126,4°	0,027/ 59,8°	0,65/−36,5°	27,7
	500	0,47/−151,9°	8,5/100,4°	0,044/ 56,7°	0,42/−45,4°	20,5
20	800	0,48/−166,0°	5,5/ 87,3°	0,060/ 58,4°	0,37/−46,6°	16,6
	1000	0,48/−173,2°	4,4/ 81,9°	0,070/ 58,8°	0,36/−46,8°	14,6
	1200	0,49/−179,4°	3,7/ 76,4°	0,079/ 58,4°	0,35/−48,8°	13,1
	1500	0,48/+172,6°	2,9/ 67,9°	0,095/ 57,0°	0,35/−45,6°	10,8
	2000	0,49/+159,6°	2,2/ 56,8°	0,117/ 55,4°	0,34/−51,4°	8,5
	40	0,29/ −38,0°	26,4/165,4°	0,007/ 76,2°	0,91/−10,9°	36,5
	100	0,35/ −80,7°	23,2/146,6°	0,016/ 67,8°	0,81/−24,7°	32,5
	200	0,41/−119,2°	17,1/124,4°	0,025/ 60,1°	0,63/−37,1°	27,7
	500	0,48/−156,2°	8,5/ 99,0°	0,042/ 58,2°	0,41/−44,6°	20,5
25	800	0,50/−168,8°	5,5/ 86,4°	0,057/ 60,0°	0,36/−45,4°	16,7
	1000	0,50/−175,2°	4,4/ 80,9°	0,067/ 60,2°	0,35/−45,5°	14,7
	1200	0,51/+178,6°	3,7/ 75,5°	0,077/ 59,7°	0,34/−47,6°	13,2
	1500	0,49/+170,8°	2,8/ 67,0°	0,093/ 58,2°	0,35/−44,9°	10,8
	2000	0,50/+158,2°	2,2/ 56,2°	0,114/ 56,8°	0,34/−50,8°	8,5

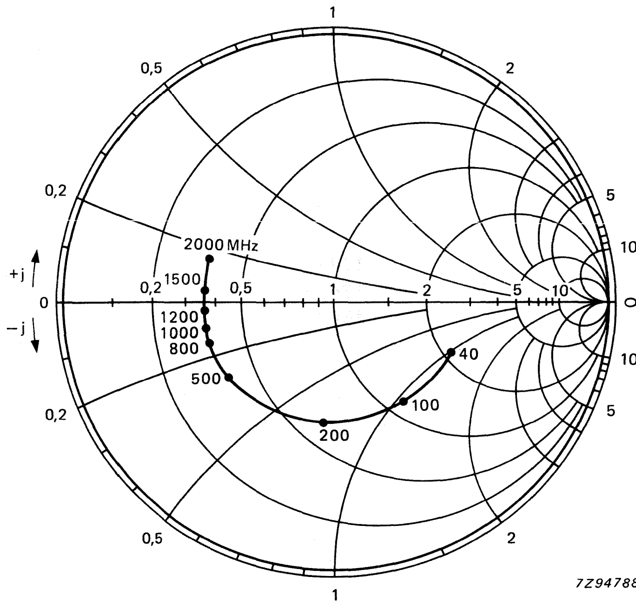


Fig. 7 $-V_{CE}$ = 10 V; $-I_C$ = 14 mA; T_{amb} = 25 °C; typical values.

Input impedance derived from input reflection coefficient s_{ie} co-ordinates in ohm x 50.

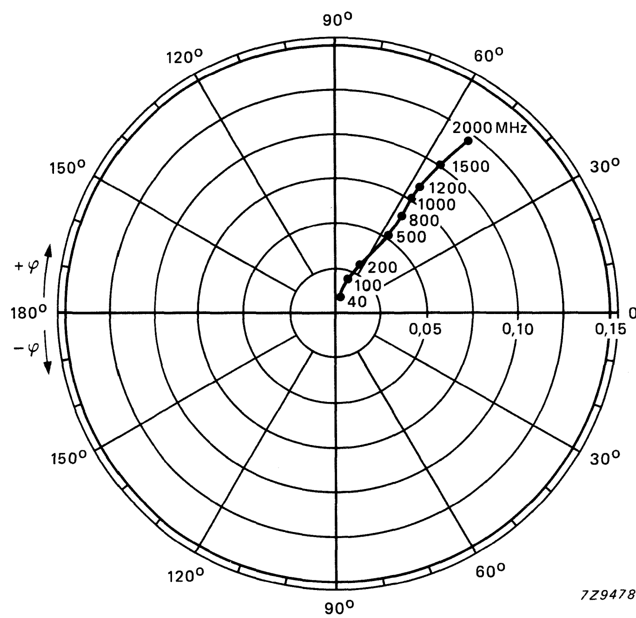


Fig. 8 $-V_{CE}$ = 10 V; $-I_C$ = 14 mA; T_{amb} = 25 °C; typical values.

Reverse transmission coefficient s_{re}.

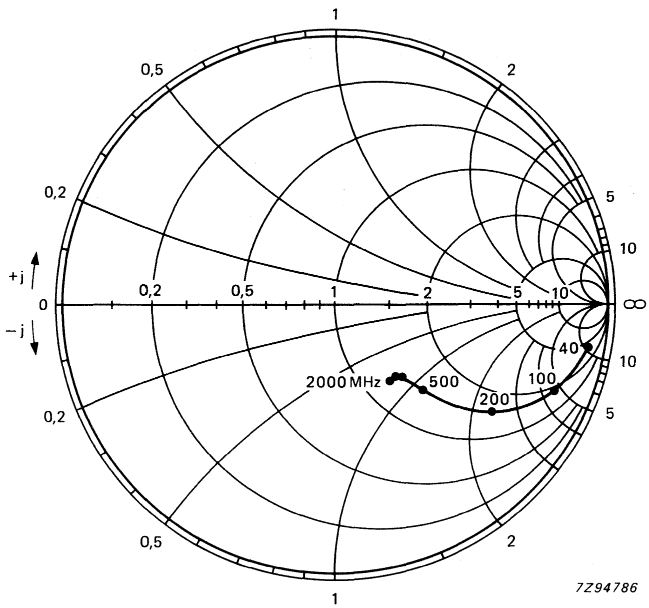


Fig. 9 $-V_{CE}$ = 10 V; $-I_C$ = 14 mA; T_{amb} = 25 °C; typical values.

Output impedance derived from output reflection coefficient s_{oe} co-ordinates in ohm x 50.

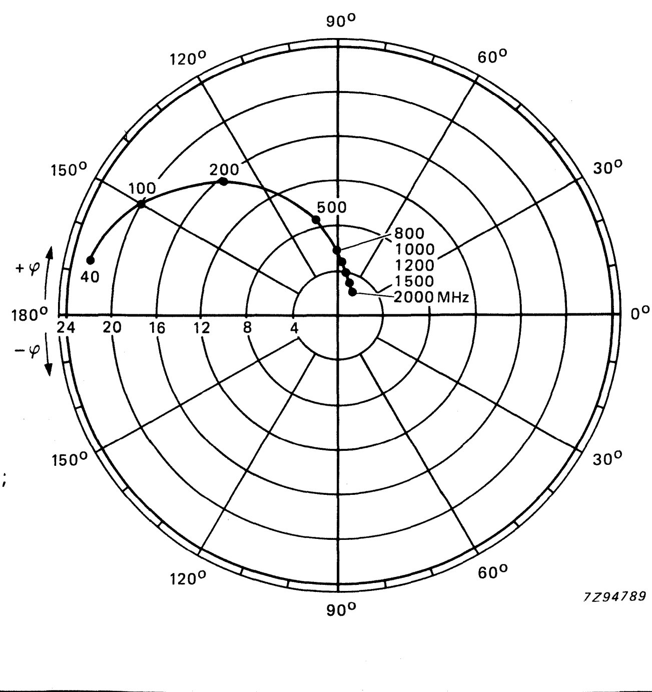


Fig. 10 $-V_{CE}$ = 10 V; $-I_C$ = 14 mA; T_{amb} = 25 °C; typical values.

Forward transmission coefficient s_{fe}.

P-N-P H.F. WIDEBAND TRANSISTOR

P-N-P transistor in a TO-72 metal envelope with insulated electrodes and a shield lead connected to the case. It is primarily intended for use in u.h.f. and microwave amplifiers such as in aerial amplifiers, radar systems, oscilloscopes, spectrum analysers etc.

The transistor features extremely high power gain coupled with good low noise performance.

N-P-N complement is BFQ53.

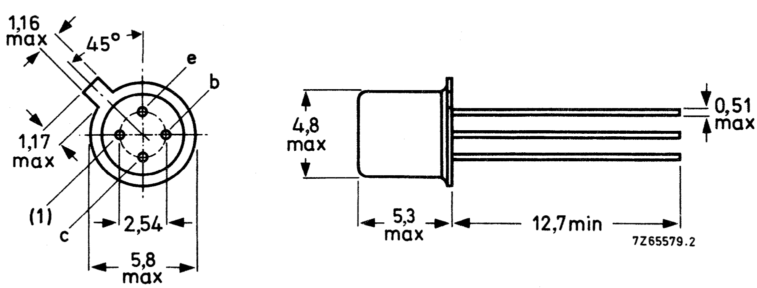
QUICK REFERENCE DATA

Collector-base voltage (open emitter)	$-V_{CBO}$	max.	20	V
Collector-emitter voltage (open base)	$-V_{CEO}$	max.	15	V
Collector current (d.c.)	$-I_C$	max.	25	mA
Total power dissipation up to T_{amb} = 65 °C	P_{tot}	max.	150	mW
Junction temperature	T_j	max.	200	°C
Transition frequency at f = 500 MHz $-I_C$ = 14 mA; $-V_{CE}$ = 10 V	f_T	typ.	5,0	GHz
Feedback capacitance at f = 1 MHz I_C = 0; $-V_{CE}$ = 10 V	C_{re}	typ.	0,5	pF
Noise figure at optimum source impedance $-I_C$ = 2 mA; $-V_{CE}$ = 10 V; f = 500 MHz	F	typ.	2,7	dB
Maximum unilateral power gain $-I_C$ = 14 mA; $-V_{CE}$ = 10 V; f = 500 MHz	G_{UM}	typ.	17,0	dB

MECHANICAL DATA

Dimensions in mm

Fig. 1 TO-72 with insulated electrodes.



(1) shield lead connected to case.

Accessories: 56246 (distance disc).

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

Collector-base voltage (open emitter)	$-V_{CBO}$	max.	20	V
Collector-emitter voltage (open base)	$-V_{CEO}$	max.	15	V
Emitter-base voltage (open collector)	$-V_{EBO}$	max.	2	V
Collector current (d.c.)	$-I_C$	max.	25	mA
Collector current (peak value) at f > 1 MHz	$-I_{CM}$	max.	35	mA
Total power dissipation up to T_{amb} = 65 °C	P_{tot}	max.	150	mW
Storage temperature	T_{stg}		−65 to +200	°C
Junction temperature	T_j	max.	200	°C

THERMAL RESISTANCE

From junction to ambient in free air	$R_{th\ j\text{-}a}$	=	900	K/W
From junction to case	$R_{th\ j\text{-}c}$	=	600	K/W

CHARACTERISTICS

T_j = 25 °C unless otherwise specified

Collector cut-off current $I_E = 0; -V_{CB} = 10$ V	$-I_{CBO}$	max.	50	nA
D.C. current gain $-I_C = 14$ mA; $-V_{CE} = 10$ V	h_{FE}	min. typ.	20 50	
Transition frequency (note 1) $-I_C = 14$ mA; $-V_{CE} = 10$ V; f = 500 MHz	f_T	typ.	5,0	GHz
Collector capacitance (note 2) $I_E = I_e = 0; -V_{CB} = 10$ V; f = 1 MHz	C_c	typ.	0,85	pF
Emitter capacitance $I_C = I_c = 0; -V_{EB} = 0{,}5$ V; f = 1 MHz	C_e	typ.	1,2	pF
Feedback capacitance (note 1) $I_C = 0; -V_{CE} = 10$ V; f = 1 MHz	C_{re}	typ.	0,5	pF
Noise figure at optimum source impedance (note 1) $-I_C = 2$ mA; $-V_{CE} = 10$ V; f = 500 MHz; $T_{amb} = 25$ °C	F	typ.	2,7	dB

Maximum unilateral power gain (note 1)
(s_{re} assumed to be zero)

$$G_{UM} = 10 \log \frac{|s_{fe}|^2}{(1 - |s_{ie}|^2)\,(1 - |s_{oe}|^2)}$$

$-I_C = 14$ mA; $-V_{CE} = 10$ V; f = 500 MHz; $T_{amb} = 25$ °C	G_{UM}	typ.	17,0	dB

Notes

1. Shield lead grounded.
2. Shield lead not connected.

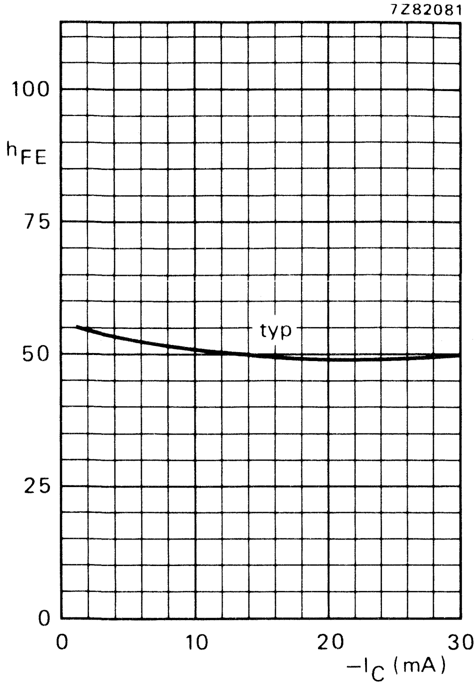


Fig. 2 $-V_{CE}$ = 10 V; T_j = 25 °C; typ. values.

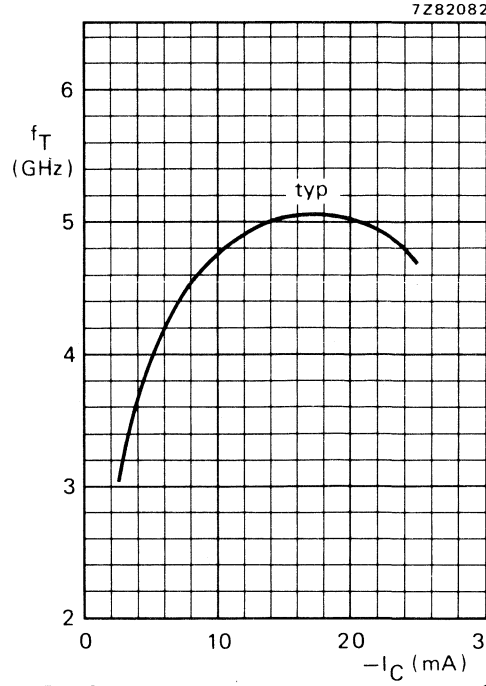


Fig. 3 $-V_{CE}$ = 10 V; f = 500 MHz; T_j = 25 °C; typical values.

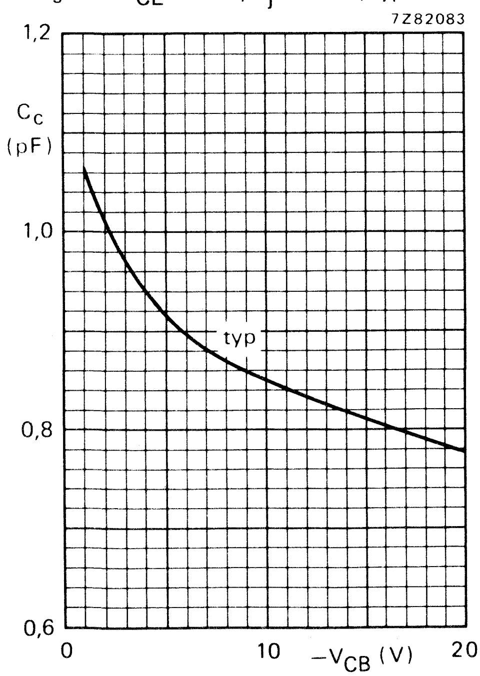


Fig. 4 I_E = I_e = 0; f = 1 MHz; T_j = 25 °C; typical values.

N-P-N H.F. WIDEBAND TRANSISTOR

N-P-N transistor in a TO-72 metal envelope with insulated electrodes and a shield lead connected to the case. It is primarily intended for use in u.h.f. and microwave amplifiers such as in aerial amplifiers, radar systems, oscilloscopes, spectrum analysers etc.

The transistor features extremely high power gain coupled with good low noise performance.

P-N-P complement is BFQ52.

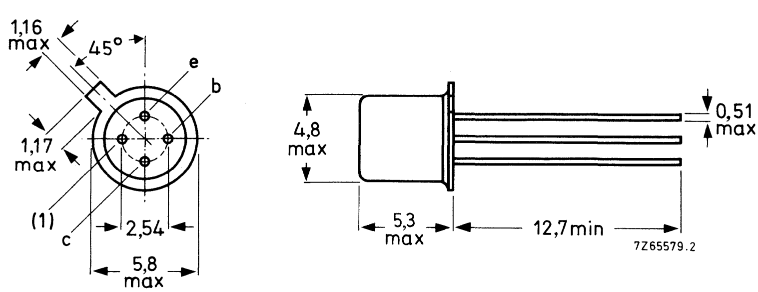
QUICK REFERENCE DATA

Collector-base voltage (open emitter)	V_{CBO}	max.	20 V
Collector-emitter voltage (open base)	V_{CEO}	max.	15 V
Collector current (d.c.)	I_C	max.	25 mA
Total power dissipation up to T_{amb} = 65 °C	P_{tot}	max.	150 mW
Junction temperature	T_j	max.	200 °C
Transition frequency at f = 500 MHz I_C = 14 mA; V_{CE} = 10 V	f_T	typ.	5,0 GHz
Feedback capacitance at f = 1 MHz I_C = 0; V_{CE} = 10 V	C_{re}	typ.	0,45 pF
Noise figure at optimum source impedance I_C = 2 mA; V_{CE} = 10 V; f = 500 MHz	F	typ.	2,4 dB
Maximum unilateral power gain I_C = 14 mA; V_{CE} = 10 V; f = 500 MHz	G_{UM}	typ.	18,0 dB

MECHANICAL DATA

Dimensions in mm

Fig. 1 TO-72 with insulated electrodes.



(1) shield lead connected to case.

Accessories: 56246 (distance disc).

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

Collector-base voltage (open emitter)	V_{CBO}	max.	20	V
Collector-emitter voltage (open base)	V_{CEO}	max.	15	V
Emitter-base voltage (open collector)	V_{EBO}	max.	2	V
Collector current (d.c.)	I_C	max.	25	mA
Collector current (peak value) at f > 1 MHz	I_{CM}	max.	35	mA
Total power dissipation up to T_{amb} = 65 °C	P_{tot}	max.	150	mW
Storage temperature	T_{stg}		−65 to +200	°C
Junction temperature	T_j	max.	200	°C

THERMAL RESISTANCE

From junction to ambient in free air	$R_{th\ j\text{-}a}$	=	900	K/W
From junction to case	$R_{th\ j\text{-}c}$	=	600	K/W

CHARACTERISTICS

T_j = 25 °C unless otherwise specified

Collector cut-off current $I_E = 0$; $V_{CB} = 10$ V	I_{CBO}	max.	50	nA
D.C. current gain $I_C = 14$ mA; $V_{CE} = 10$ V	h_{FE}	min. typ.	25 50	
Transition frequency (note 1) $I_C = 14$ mA; $V_{CE} = 10$ V; f = 500 MHz	f_T	typ.	5,0	GHz
Collector capacitance (note 2) $I_E = I_e = 0$; $V_{CB} = 10$ V; f = 1 MHz	C_c	typ.	0,75	pF
Emitter capacitance $I_C = I_c = 0$; $V_{EB} = 0{,}5$ V; f = 1 MHz	C_e	typ.	1,2	pF
Feedback capacitance (note 1) $I_C = 0$; $V_{CE} = 10$ V; f = 1 MHz	C_{re}	typ.	0,45	pF
Noise figure at optimum source impedance (note 1) $I_C = 2$ mA; $V_{CE} = 10$ V; f = 500 MHz; T_{amb} = 25 °C	F	typ.	2,4	dB

Maximum unilateral power gain (note 1)

s_{re} assumed to be zero

$$G_{UM} = \frac{|s_{fe}|^2}{(1 - |s_{ie}|^2)\,(1 - |s_{oe}|^2)}$$

$I_C = 14$ mA; $V_{CE} = 10$ V; f = 500 MHz; T_{amb} = 25 °C	G_{UM}	typ.	18,0	dB

Notes

1. Shield lead connected
2. Shield lead not connected.

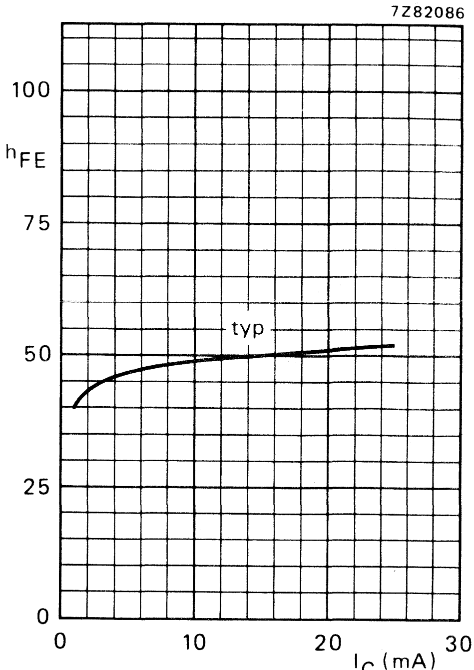


Fig. 2 V_{CE} = 10 V; T_j = 25 °C; typ. values.

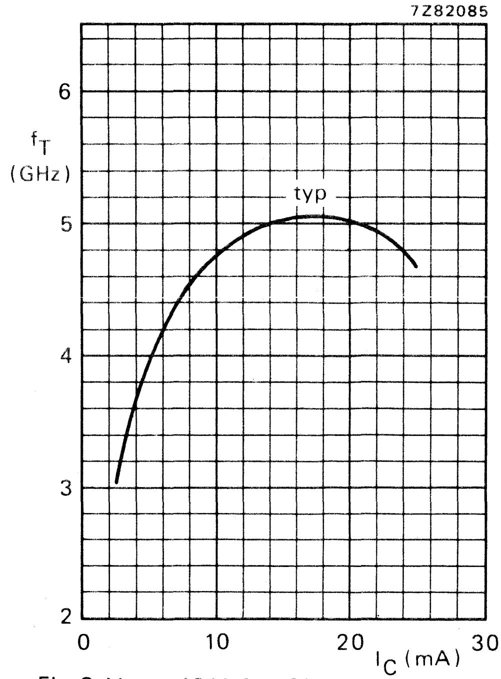


Fig. 3 V_{CE} = 10 V; f = 500 MHz; T_j = 25 °C; typical values.

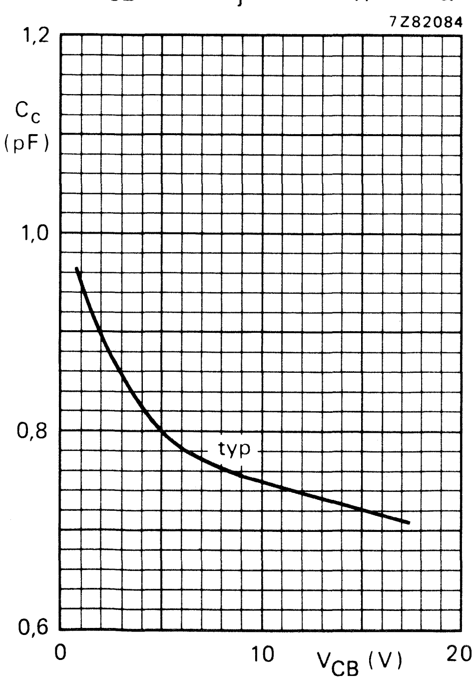


Fig. 4 I_E = I_e = 0; f = 1 MHz; T_j = 25 °C; typical values.

PNP 1 GHz WIDEBAND TRANSISTOR

The BFQ54 is a pnp transistor in a SOT122 package, primarily intended for MATV and microwave amplifiers, such as radar systems, spectrum analysers etc.

Emitter ballasting resistors ensure an optimum temperature profile and excellent reliability properties.

Its npn complement is the BFQ34.

The transistor has a 1/4" capstan envelope with ceramic cap. All leads are isolated from the stud.

QUICK REFERENCE DATA

Collector-base voltage (open emitter)	$-V_{CBO}$	max.	25	V
Collector-emitter voltage (open base)	$-V_{CEO}$	max.	18	V
Collector current (DC)	$-I_C$	max.	150	mA
Total power dissipation up to T_{mb} = 125 °C	P_{tot}	max.	2.25	W
Operating junction temperature	T_j	max.	200	°C
Transition frequency at f = 500 MHz $-I_C$ = 150 mA; $-V_{CE}$ = 15 V; T_j = 25 °C	f_T	typ.	4.5	GHz
Output voltage at d_{im} = −60 dB $-I_C$ = 120 mA; $-V_{CE}$ = 15 V; R_L = 75 Ω; T_{amb} = 25 °C; $f_{(p+q-r)}$ = 793.25 MHz	V_o	typ.	900	mV

MECHANICAL DATA

SOT122 (see Fig. 1).

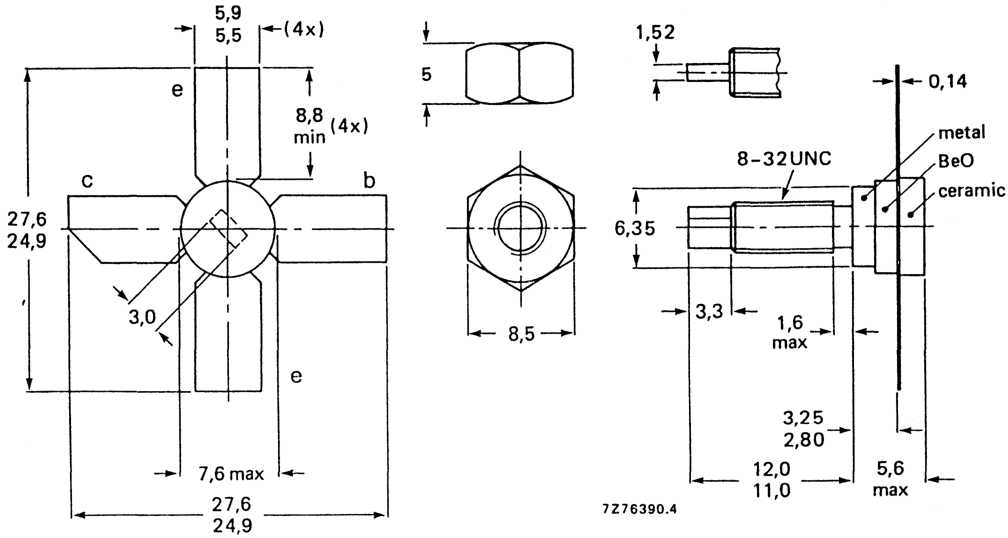
PRODUCT SAFETY

This device incorporates beryllium oxide, the dust of which is toxic. The device is entirely safe provided that the BeO disc is not damaged.

MECHANICAL DATA

Dimensions in mm

Fig. 1 SOT122.



Torque on nut:	min.	0.75 Nm	Diameter of clearance hole in heatsink: max. 4.2 mm
		(7.5 kg cm)	mounting hole to have no burrs at either end.
	max.	0.85 Nm	De-burrings must leave surface flat; do not chamfer or
		(8.5 kg cm)	countersink either end of the hole.

When locking is required an adhesive is preferred instead of a lock washer.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134).

Collector-base voltage (open emitter)	$-V_{CBO}$	max.	25	V
Collector-emitter voltage (open base)	$-V_{CEO}$	max.	18	V
Emitter-base voltage (open collector)	$-V_{EBO}$	max.	2	V
Collector current (DC)	$-I_C$	max.	150	mA
Total power dissipation up to T_{mb} = 125 °C	P_{tot}	max.	2.25	W
Storage temperature range	T_{stg}		−65 to +150	°C
Operating junction temperature	T_j	max.	200	°C

THERMAL RESISTANCE

From junction to mounting base	$R_{th\ j\text{-}mb}$	=	28	K/W
From mounting base to heatsink	$R_{th\ mb\text{-}h}$	=	0.6	K/W

CHARACTERISTICS

T_{amb} = 25 °C unless otherwise specified

Collector cut-off current			
$I_E = 0$; $-V_{CB} = 15$ V	I_{CBO}	max.	50 μA
DC current gain			
$-I_C = 150$ mA; $-V_{CE} = 15$ V	h_{FE}	min.	25
	h_{FE}	typ.	75
Transition frequency at f = 500 MHz (note 1)			
$-I_C = 150$ mA; $-V_{CE} = 15$ V	f_T	typ.	4.5 GHz
Collector capacitance at f = 1 MHz			
$I_E = i_e = 0$; $-V_{CB} = 15$ V	C_c	typ.	2.0 pF
Emitter capacitance at f = 1 MHz			
$I_C = i_c = 0$; $-V_{EB} = 0.5$ V	C_e	typ.	6.5 pF
Feedback capacitance at f = 1 MHz			
$I_C = 0$ mA; $V_{CE} = 15$ V	C_{re}	typ.	1.3 pF
Collector-stud capacitance	C_{cs}	typ.	1.2 pF
Maximum unilateral power gain (s_{re} assumed to be zero)			
$-I_C = 120$ mA; $-V_{CE} = 15$ V; f = 500 MHz			
$G_{UM} = 10 \log \frac{\lvert s_{fe} \rvert^2}{(1 - \lvert s_{ie} \rvert^2)(1 - \lvert s_{oe} \rvert)^2}$	G_{UM}	typ.	16 dB
Output voltage at d_{im} = 60 dB			
(DIN 45005B, para 6.3: 3-tone)			
$-I_C = 120$ mA; $-V_{CE} = 15$ V; $R_L = 75\ \Omega$			
$V_p = V_o$ at $d_{im} = -60$ dB; f_p = 795.25 MHz			
$V_q = V_o -6$ dB; f_q = 803.25 MHz			
$V_r = V_o -6$ dB; f_r = 805.25 MHz			
measured at $f_{(p+q-r)}$ = 793.25 MHz	V_o	typ.	900 mV

Note

1. Measured under pulse conditions.

PNP 1 GHz WIDEBAND TRANSISTOR

PNP transistor in a plastic SOT37 package. It is primarily intended for use in MATV and microwave amplifiers such as in aerial amplifiers, radar systems, oscilloscopes, spectrum analysers etc.

Emitter ballasting resistors and application of gold sandwich metallization ensure an optimum temperature profile and excellent reliability properties.

NPN complement is BFQ34T.

QUICK REFERENCE DATA

Collector-base voltage (open emitter)	$-V_{CBO}$	max.	25	V
Collector-emitter voltage (open base)	$-V_{CEO}$	max.	18	V
Collector current (DC)	$-I_C$	max.	150	mA
Total power dissipation up to T_{amb} = 45 °C	P_{tot}	max.	1000	mW
Junction temperature	T_j	max.	175	°C
Transition frequency at f = 500 MHz $-I_C$ = 100 mA; $-V_{CE}$ = 10 V	f_T	typ.	4.5	GHz
Feedback capacitance at f = 1 MHz I_C = 0; $-V_{CE}$ = 10 V; T_{amb} = 25 °C	C_{re}	typ.	1.7	pF
Output voltage at d_{im} = −60 dB $-I_C$ = 100 mA; $-V_{CE}$ = 10 V; R_L = 75 Ω; T_{amb} = 25 °C; $f_{(p+q-r)}$ = 793.25 MHz	V_o	typ.	700	mV

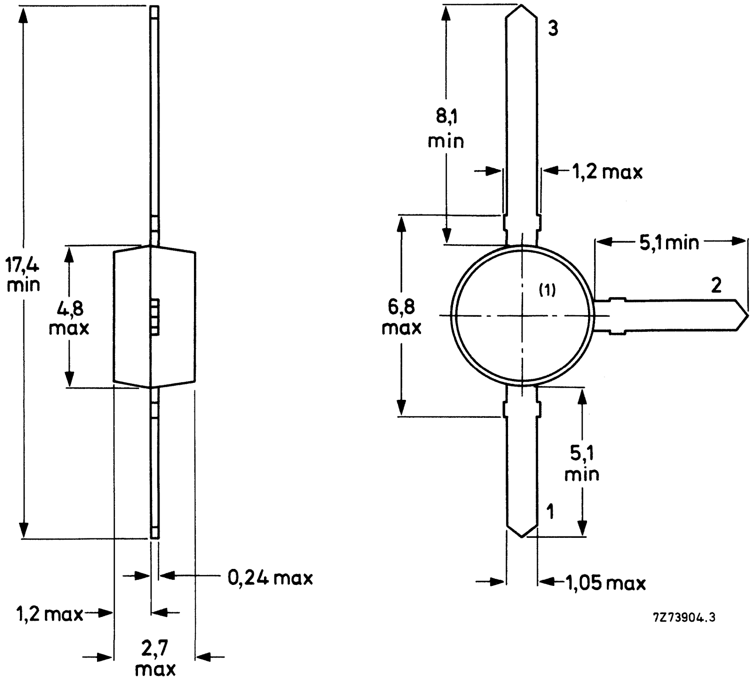
MECHANICAL DATA

SOT37 (see Fig. 1).

MECHANICAL DATA

Dimensions in mm

Fig. 1 SOT3'



Pinning

1. Base
2. Emitter
3. Collector

(1) Type number marking

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134).

Collector-base voltage (open emitter)	$-V_{CBO}$	max.	25	V
Collector-emitter voltage (open base)	$-V_{CEO}$	max.	18	V
Emitter-base voltage (open collector)	$-V_{EBO}$	max.	2	V
Collector current (DC)	$-I_C$	max.	150	mA
Total power dissipation up to T_{amb} = 45 ^{o}C	P_{tot}	max.	1	W
Storage temperature range	T_{stg}		−65 to +175	^{o}C
Junction temperature	T_j	max.	175	^{o}C

THERMAL RESISTANCE

From junction to case	$R_{th\ j\text{-}c}$	=	50 K/W
From junction to ambient (free air) mounted on a fibre-glass print (see Fig. 2)	$R_{th\ j\text{-}a}$	=	130 K/W

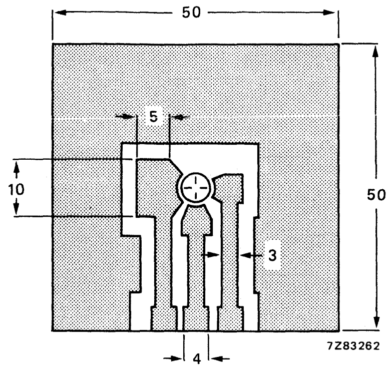


Fig. 2 Requirements for fibre-glass print (dimensions in mm). Single-sided 35 μm copper-clad epoxy fibre-glass print, thickness 1.5 mm. Tracks are fully solder-tinned. Shaded area is copper.

CHARACTERISTICS

T_j = 25 ^oC unless otherwise specified.

Collector cut-off current $I_E = 0; -V_{CB} = 15$ V	I_{CBO}	max.	50 μA
DC current gain (note 1) $-I_C = 100$ mA; $-V_{CE} = 10$ V	h_{FE}	min.	25
		typ.	50
Transition frequency at f = 500 MHz (note 1) $-I_C = 100$ mA; $-V_{CE} = 10$ V	f_T	typ.	4.5 GHz
Collector capacitance at f = 1 MHz $I_E = i_e = 0; -V_{CB} = 10$ V	C_c	typ.	2.7 pF
Emitter capacitance at f = 1 MHz $I_C = i_c = 0; -V_{EB} = 0.5$ V	C_e	typ.	6.5 pF
Feedback capacitance at f = 1 MHz $I_C = 0; V_{CE} = 10$ V	C_{re}	typ.	1.7 pF

Note

1. Measured under pulse conditions.

CHARACTERISTICS (continued)

Maximum power gain at f = 300 MHz; T_{amb} = 25 °C I_C = 100 mA; $-V_{CE}$ = 10 V	G_{UM}	typ.	18 dB
Output voltage at d_{im} = −60 dB (see Fig. 3). (DIN 45004B); T_{amb} = 25 °C $-I_C$ = 100 mA; $-V_{CE}$ = 10 V; R_L = 75 Ω; $V_p = V_o$ at d_{im} = −60 dB; f_p = 797.25 MHz $V_q = V_o$ −6 dB; f_q = 803.25 MHz $V_r = V_o$ −6 dB; f_r = 805.25 MHz Measured at $f_{(p+q-r)}$ = 793.25 MHz	V_o	typ.	700 mV

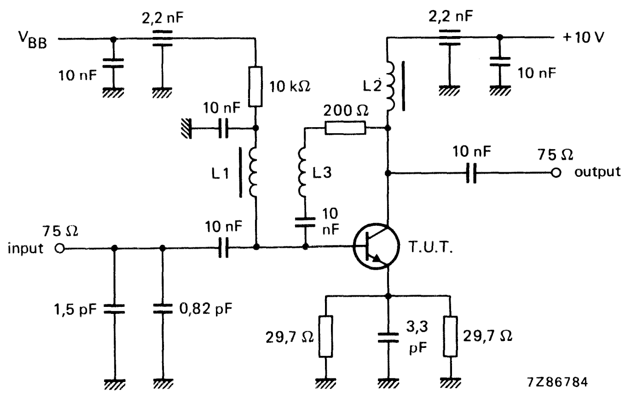


Fig. 3 Intermodulation distortion and second harmonic distortion MATV test circuit.
L1 = L2 = 5 μH Ferroxcube choke
L3 = 2 turns Cu wire (0.5 mm) internal diameter 4 mm, winding pitch 2 mm.

N-P-N H.F. WIDEBAND TRANSISTOR

N-P-N transistor in a TO-72 metal envelope with insulated electrodes and a shield lead connected to the case. It is primarily intended for use in u.h.f. and microwave amplifiers such as in aerial amplifiers, radar systems, oscilloscopes, spectrum analysers etc.

The transistor features the combination of high power gain, high transition frequency and low noise up to high frequencies.

P-N-P complement is BFQ32M.

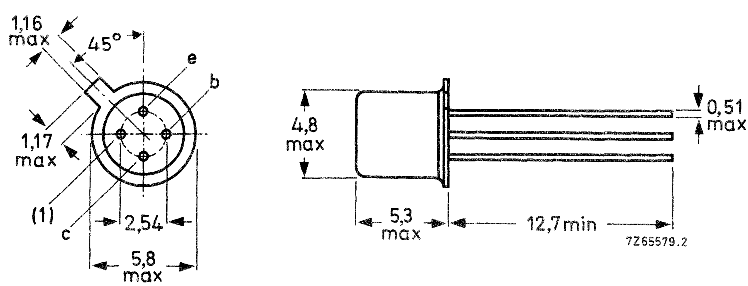
QUICK REFERENCE DATA

Collector-base voltage (open emitter)	V_{CBO}	max.	20	V
Collector-emitter voltage (open base)	V_{CEO}	max.	15	V
Collector current (d.c.)	I_C	max.	75	mA
Total power dissipation up to T_{amb} = 50 °C	P_{tot}	max.	250	mW
Junction temperature	T_j	max.	200	°C
Transition frequency at f = 500 MHz I_C = 50 mA; V_{CE} = 5 V	f_T	typ.	4,5	GHz
Feedback capacitance at f = 1 MHz I_C = 0; V_{CE} = 10 V	C_{re}	typ.	1,0	pF
Noise figure at optimum source impedance I_C = 10 mA; V_{CE} = 5 V; f = 200 MHz	F	max.	3,0	dB
Maximum unilateral power gain I_C = 20 mA; V_{CE} = 5 V; f = 200 MHz	G_{UM}	min.	17,5	dB

MECHANICAL DATA

Dimensions in mm

Fig. 1 TO-72 with insulated electrodes.



(1) shield lead connected to case.

Accessories: 56246 (distance disc).

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

Collector-base voltage (open emitter)	V_{CBO}	max.	20 V
Collector-emitter voltage (open base)	V_{CEO}	max.	15 V
Emitter-base voltage (open collector)	V_{EBO}	max.	3 V
Collector current (d.c.)	I_C	max.	75 mA
Collector current (peak value) at f > 1 MHz	I_{CM}	max.	150 mA
Total power dissipation up to T_{amb} = 50 °C	P_{tot}	max.	250 mW
Storage temperature	T_{stg}	−65 to +200 °C	
Junction temperature	T_j	max.	200 °C

THERMAL RESISTANCE

From junction to ambient in free air	$R_{th\ j\text{-}a}$	=	600 K/W
From junction to case	$R_{th\ j\text{-}c}$	=	350 K/W

CHARACTERISTICS

T_j = 25 °C unless otherwise specified

Collector cut-off current I_E = 0; V_{CB} = 10 V	I_{CBO}	max.	100 nA
D.C. current gain I_C = 20 mA; V_{CE} = 5 V	h_{FE}	min. max.	50 150
Transition frequency (note 1) I_C = 50 mA; V_{CE} = 5 V; f = 500 MHz	f_T	typ.	4,5 GHz
Collector capacitance (note 2) I_C = i_c = 0; V_{CB} = 5 V; f = 1 MHz	C_c	typ.	1,3 pF
Feedback capacitance (note 2) I_C = 0; V_{CE} = 10 V; f = 1 MHz	C_{re}	typ. max.	1,0 pF 1,4 pF
Noise figure at optimum source impedance (note 1) I_C = 10 mA; V_{CE} = 5 V; f = 200 MHz; T_{amb} = 25 °C I_C = 10 mA; V_{CE} = 5 V; f = 500 MHz; T_{amb} = 25 °C	 F F	 max. typ.	 3,0 dB 2,3 dB

Maximum unilateral power gain (note 1)

s_{re} assumed to be zero

$$G_{UM} = 10 \log \frac{|s_{fe}|^2}{[1-|s_{ie}|^2]\,[1-|s_{oe}|^2]}$$

I_C = 20 mA; V_{CE} = 5 V; f = 200 MHz; T_{amb} = 25 °C	G_{UM}	min.	17,5 dB
I_C = 50 mA; V_{CE} = 5 V; f = 500 MHz; T_{amb} = 25 °C	G_{UM}	typ.	11,5 dB

Notes

1. Shield lead grounded.
2. Shield lead and emitter lead connected to bridge earth.

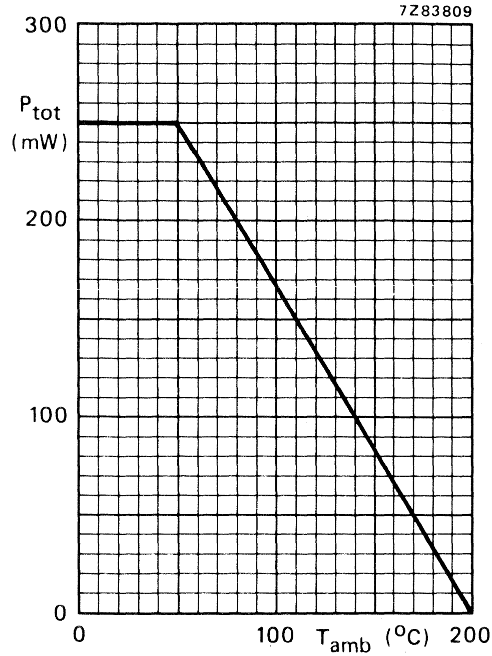


Fig. 2 Maximum permissible power dissipation in free air as a function of ambient temperature.

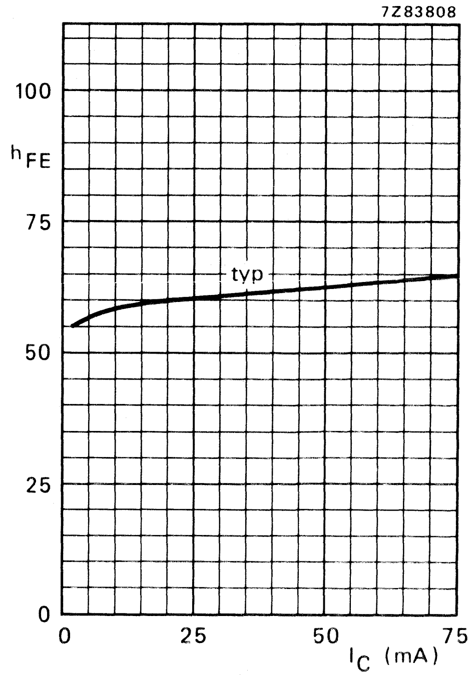


Fig. 3 V_{CE} = 5 V; T_j = 25 °C; typical values.

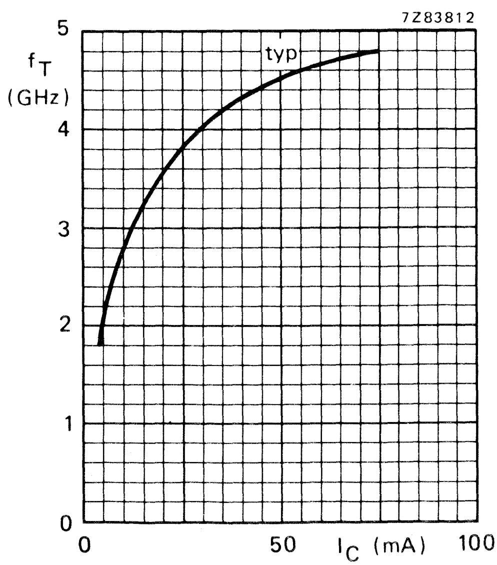


Fig. 4 V_{CE} = 5 V; f = 500 MHz; T_j = 25 °C; typical values.

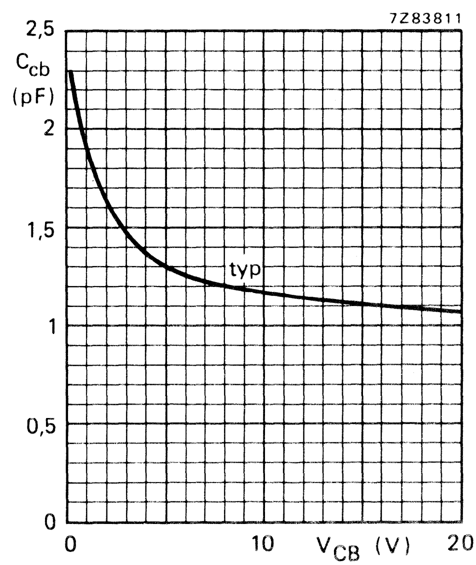


Fig. 5 $I_C = i_c = 0$; f = 1 MHz; T_j = 25 °C; typical values.

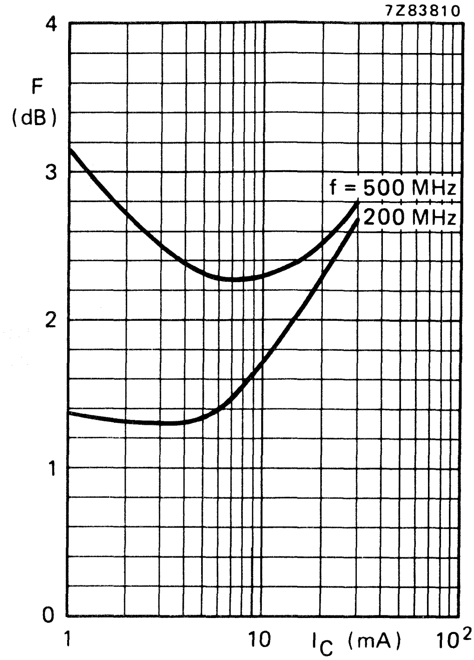


Fig. 6 V_{CE} = 5 V; Z_S = optimum; T_{amb} = 25 °C; typical values.

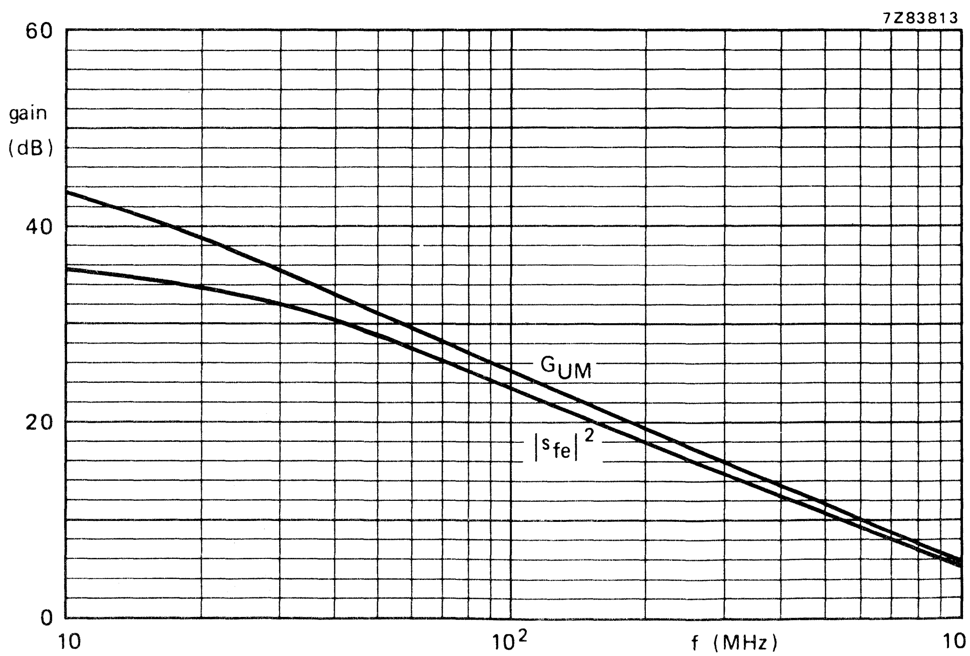


Fig. 7 V_{CE} = 5 V; I_C = 50 mA; T_{amb} = 25 °C; typical values.

N-P-N 2 GHz WIDEBAND TRANSISTOR

N-P-N transistor in a three-lead plastic envelope (SOT-37). It is designed for wideband application in the GHz range, such as satellite TV systems (SATV) and repeater amplifiers in fibre-optical systems. The device features a very high transition frequency and a very low noise figure up to high frequencies.

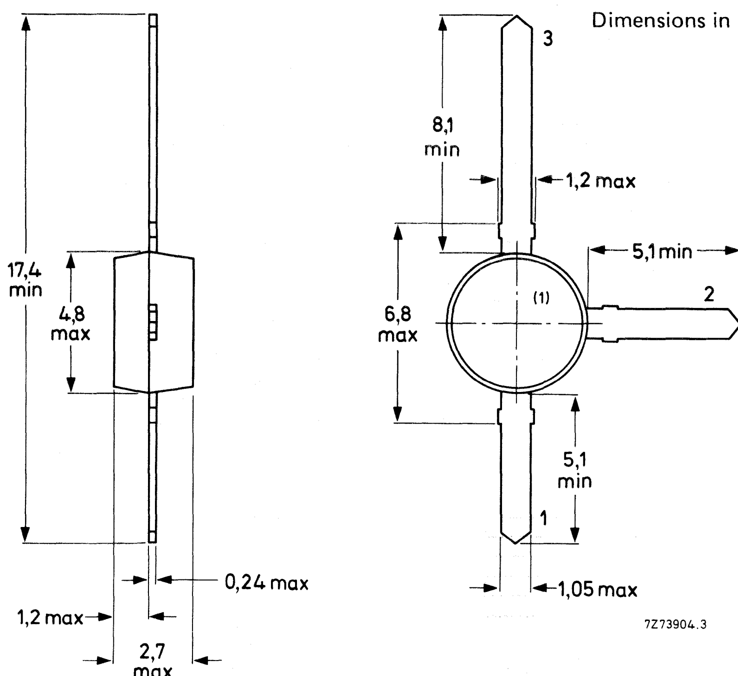
QUICK REFERENCE DATA

Collector-base voltage	V_{CBO}	max.	20	V
Collector-emitter voltage	V_{CEO}	max.	10	V
Collector current (d.c.)	I_C	max.	50	mA
Total power dissipation up to T_{amb} = 60 °C	P_{tot}	max.	300	mW
Junction temperature	T_j	max.	175	°C ←
D.C. current gain I_C = 15 mA; V_{CE} = 5 V	h_{FE}	min. typ.	60 100	
Transition frequency at f = 500 MHz I_C = 15 mA; V_{CE} = 8 V	f_T	typ.	7,5	GHz
Maximum unilateral power gain at f = 2 GHz I_C = 15 mA; V_{CE} = 8 V	G_{UM}	typ.	8,0	dB
Noise figure at f = 2 GHz I_C = 15 mA; V_{CE} = 8 V; Z_s = 60 Ω	F	typ.	3,0	dB

MECHANICAL DATA

Dimensions in mm

Fig. 1 SOT-37.



Connections:

1. Base
2. Emitter
3. Collector

(1) Type number marking.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

Collector-base voltage (open emitter)	V_{CBO}	max.	20	V
Collector-emitter voltage (open base)	V_{CEO}	max.	10	V
Emitter-base voltage (open collector)	V_{EBO}	max.	2,5	V
Collector current (d.c.)	I_C	max.	50	mA
Total power dissipation up to T_{amb} = 60 °C mounted on a fibre-glass print of 40 mm x 25 mm x 1 mm	P_{tot}	max.	300	mW
Storage temperature	T_{stg}		−65 to +150	°C
→ Junction temperature	T_j	max.	175	°C

THERMAL RESISTANCE

From junction to ambient in free air mounted on a fibre-glass print of 40 mm x 25 mm x 1 mm	$R_{th\ j\text{-}a}$		300	K/W

CHARACTERISTICS

T_j = 25 °C unless otherwise specified

Collector cut-off current $I_E = 0$; $V_{CB} = 10$ V	I_{CBO}	max.	50	nA
D.C. current gain $I_C = 15$ mA; $V_{CE} = 5$ V	h_{FE}	min.	60	
		typ.	100	
Transition frequency at f = 500 MHz $I_C = 15$ mA; $V_{CE} = 8$ V	f_T	typ.	7,5	GHz
Collector capacitance at f = 1 MHz $I_E = i_e = 0$; $V_{CB} = 8$ V	C_c	typ.	0,8	pF
Emitter capacitance at f = 1 MHz $I_C = i_c = 0$; $V_{EB} = 0,5$ V	C_e	typ.	1,3	pF
Feedback capacitance $I_C = 0$; $V_{CE} = 8$ V	C_{re}	typ.	0,5	pF

Maximum unilateral power gain (s_{re} assumed to be zero)

$$G_{UM} = 10 \log \frac{|s_{fe}|^2}{[1-|s_{ie}|^2]\,[1-|s_{oe}|^2]}$$

$I_C = 15$ mA; $V_{CE} = 8$ V; f = 800 MHz; $T_{amb} = 25$ °C	G_{UM}	typ.	16,0	dB
$I_C = 15$ mA; $V_{CE} = 8$ V; f = 2 GHz; $T_{amb} = 25$ °C	G_{UM}	typ.	8,0	dB
Noise figure at f = 800 MHz; Z_s = opt.; $T_{amb} = 25$ °C				
$I_C = 5$ mA; $V_{CE} = 8$ V	F	typ.	0,8	dB
$I_C = 15$ mA; $V_{CE} = 8$ V	F	typ.	1,5	dB
Noise figure at f = 2 GHz; $Z_S = 60\ \Omega$; $T_{amb} = 25$ °C				
$I_C = 5$ mA; $V_{CE} = 8$ V	F	typ.	2,5	dB
$I_C = 15$ mA; $V_{CE} = 8$ V	F	typ.	3,0	dB

s-parameters (common emitter) at V_{CE} = 8 V; T_{amb} = 25 °C; typical values

I_C mA	f MHz	s_{ie}	s_{fe}	s_{re}	s_{oe}	GUM dB
	40	0,87/ −12,9°	15,83/171,2°	0,01/82,0°	0,98/ −6,5°	45,3
	100	0,81/ −31,0°	14,92/155,8°	0,02/74,8°	0,93/−15,7°	37,1
	200	0,69/ −54,6°	12,40/138,3°	0,04/67,0°	0,83/−25,9°	29,8
5	500	0,42/−105,7°	7,12/104,9°	0,07/59,1°	0,59/−40,4°	19,7
	800	0,34/−128,7°	4,89/ 91,3°	0,10/63,0°	0,58/−49,1°	16,1
	1000	0,35/−142,8°	4,13/ 83,2°	0,12/63,7°	0,58/−58,0°	14,6
	2000	0,25/+128,0°	2,08/ 56,8°	0,20/67,8°	0,38/−63,3°	7,3
	40	0,75/ −19,1°	26,88/165,6°	0,01/80,0°	0,96/−10,2°	43,8
	100	0,65/ −43,3°	23,08/144,9°	0,02/71,7°	0,86/−22,1°	35,5
	200	0,49/ −70,7°	16,71/125,2°	0,03/66,4°	0,70/−31,6°	28,6
10	500	0,28/−126,5°	8,21/ 96,9°	0,06/66,4°	0,48/−40,0°	19,8
	800	0,24/−136,7°	5,39/ 86,8°	0,10/70,8°	0,50/−48,9°	16,1
	1000	0,26/−147,8°	4,49/ 79,9°	0,12/70,5°	0,51/−58,9°	14,6
	2000	0,22/+114,8°	2,28/ 56,5°	0,21/68,8°	0,32/−61,8°	7,8
	40	0,67/ −23,8°	34,23/161,4°	0,01/78,3°	0,94/−12,6°	42,9
	100	0,54/ −51,8°	27,41/138,1°	0,02/71,0°	0,80/−25,5°	34,7
	200	0,39/ −80,0°	18,52/118,7°	0,03/68,4°	0,63/−33,2°	28,2
15	500	0,22/−130,3°	8,47/ 93,5°	0,06/70,2°	0,44/−38,8°	19,7
	800	0,20/−140,8°	5,57/ 84,9°	0,10/73,6°	0,47/−48,4°	16,0
	1000	0,22/+147,5°	4,64/ 78,4°	0,12/72,9°	0,48/−59,0°	14,7
	2000	0,21/+109,8°	2,34/ 56,2°	0,22/68,7°	0,31/−61,0°	8,0
	40	0,61/ −27,4°	39,76/158,4°	0,01/76,8°	0,92/−14,2°	42,4
	100	0,47/ −58,0°	30,05/133,7°	0,02/70,4°	0,75/−27,5°	34,2
	200	0,32/ −86,2°	19,38/114,7°	0,03/70,4°	0,58/−33,5°	28,0
20	500	0,19/−136,8°	8,65/ 92,0°	0,06/72,4°	0,41/−37,5°	19,7
	800	0,18/−145,1°	5,62/ 83,5°	0,10/75,3°	0,46/−47,9°	16,1
	1000	0,20/−151,9°	4,63/ 77,7°	0,12/74,1°	0,47/−58,8°	14,6
	2000	0,21/−107,3°	2,37/ 55,7°	0,22/69,0°	0,30/−60,6°	8,1
	40	0,51/ −33,2°	46,18/154,6°	0,01/75,6°	0,89/−16,4°	41,4
	100	0,37/ −67,3°	32,56/128,1°	0,02/70,6°	0,69/−29,1°	33,7
	200	0,26/ −97,3°	20,04/110,7°	0,03/72,3°	0,53/−32,7°	27,8
30	500	0,17/−151,6°	8,64/ 89,7°	0,06/74,6°	0,39/−35,6°	19,6
	800	0,16/−152,2°	5,61/ 82,1°	0,10/76,7°	0,44/−46,9°	16,0
	1000	0,19/−157,7°	4,62/ 76,4°	0,12/75,1°	0,46/−58,3°	14,5
	2000	0,22/+106,4°	2,37/ 55,0°	0,23/69,3°	0,29/−60,0°	8,1

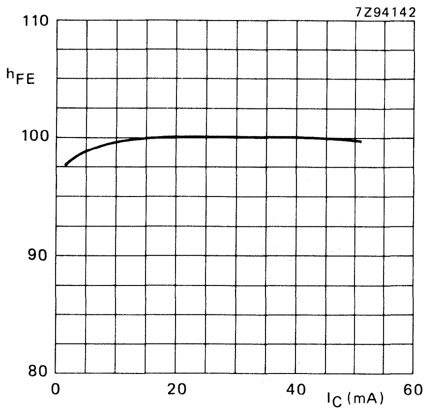


Fig. 2 V_{CE} = 8 V; T_j = 25 °C; typical values.

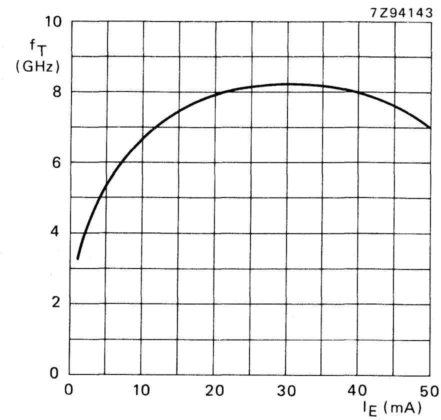


Fig. 3 V_{CE} = 8 V; T_j = 25 °C; typical values.

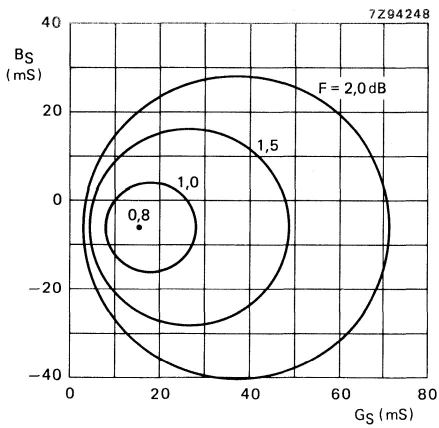


Fig. 4 Circles of constant noise figure;
V_{CE} = 8 V; I_C = 5 mA; f = 800 MHz; typical values.

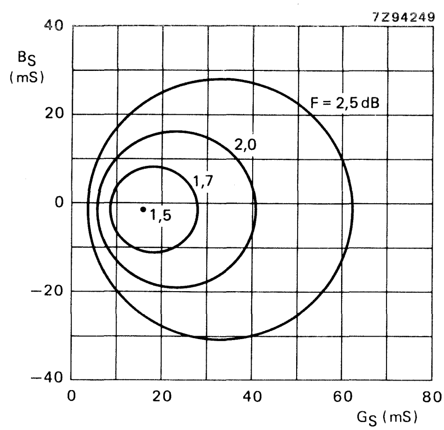


Fig. 5 Circles of constant noise figure;
V_{CE} = 8 V; I_C = 15 mA; f = 800 MHz; typ. values.

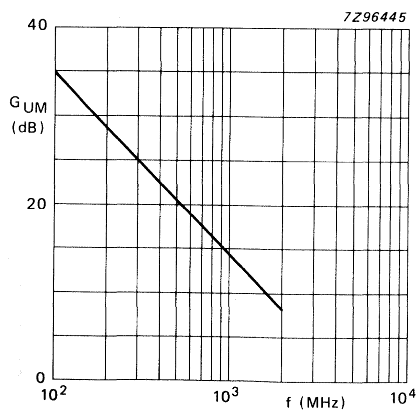


Fig. 6 V_{CE} = 8 V; I_C = 15 mA; T_{amb} = 25 °C; typical values.

N-P-N 2 GHz WIDEBAND TRANSISTOR

Small-signal planar epitaxial n-p-n transistor in HERMETICALLY SEALED microstripline envelope. It is designed for wideband application in the GHz range, such as satellite TV systems (SATV) and repeater amplifiers in fibre-optical systems. The device features a very high transition frequency and a very low noise figure up to high frequencies

QUICK REFERENCE DATA

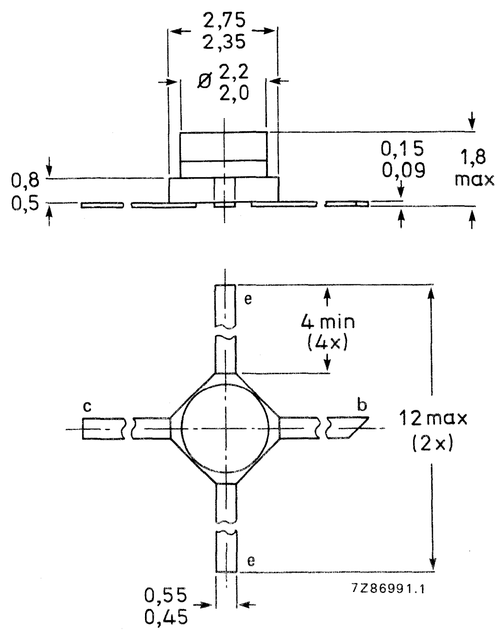
Collector-base voltage	V_{CBO}	max.	20	V
Collector-emitter voltage	V_{CEO}	max.	10	V
Collector current (d.c.)	I_C	max.	50	mA
Total power dissipation up to T_{amb} = 105 °C	P_{tot}	max.	350	mW
Junction temperature	T_j	max.	175	°C
D.C. current gain I_C = 15 mA; V_{CE} = 5 V	h_{FE}	min. typ.	60 100	
Transition frequency at f = 500 MHz I_C = 15 mA; V_{CE} = 8 V	f_T	typ.	7,5	GHz
Maximum unilateral power gain at f = 2 GHz I_C = 15 mA; V_{CE} = 8 V	G_{UM}	typ.	11,5	dB

MECHANICAL DATA

Dimensions in mm

Fig. 1 SOT-173.

Marking code: Q6



RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

Collector-base voltage (open emitter)	V_{CBO}	max.	20	V
Collector-emitter voltage (open base)	V_{CEO}	max.	10	V
Emitter-base voltage (open collector)	V_{EBO}	max.	2,5	V
Collector current (d.c.)	I_C	max.	50	mA
Total power dissipation up to T_{amb} = 105 °C mounted on a ceramic substrate of 0,7 mm x 10 cm^2	P_{tot}	max.	350	mW
Storage temperature	T_{stg}	–65 to + 150		°C
Junction temperature	T_j	max.	175	°C

THERMAL RESISTANCE

From junction to ambient in free air mounted on a ceramic substrate of 0,7 mm x 10 cm^2	$R_{th\ j\text{-}a}$		200	K/W

CHARACTERISTICS

T_j = 25 °C unless otherwise specified

Collector cut-off current $I_E = 0$; V_{CB} = 5 V	I_{CBO}	max.	50	nA
D.C. current gain I_C = 15 mA; V_{CE} = 5 V	h_{FE}	min. typ.	60 100	
Transition frequency at f = 500 MHz I_C = 15 mA; V_{CE} = 8 V	f_T	typ.	7,5	GHz
Collector capacitance at f = 1 MHz $I_E = i_e = 0$; V_{CB} = 8 V	C_c	typ.	0,7	pF
Emitter capacitance at f = 1 MHz $I_C = i_c = 0$; V_{EB} = 0,5 V	C_e	typ.	1,3	pF
Feedback capacitance $I_C = 0$; V_{CE} = 8 V	C_{re}	typ.	0,4	pF

Maximum unilateral power gain (s_{re} assumed to be zero)

$$G_{UM} = 10 \log \frac{|s_{fe}|^2}{(1 - |s_{ie}|^2)\,(1 - |s_{oe}|^2)}$$

I_C = 15 mA; V_{CE} = 8 V; f = 2 GHz; T_{amb} = 25 °C	G_{UM}	typ.	11,5	dB
Noise figure at f = 2 GHz; Z_S = 60 Ω; T_{amb} = 25 °C I_C = 5 mA; V_{CE} = 8 V	F	typ.	2,5	dB
I_C = 15 mA; V_{CE} = 8 V	F	typ. max.	3,0 4,0	dB dB

s-parameters (common emitter) at V_{CE} = 8 V; T_{amb} = 25 °C; typical values.

I_C mA	f MHz	s_{ie}	s_{fe}	s_{re}	s_{oe}	G_{UM} dB
	100	0,86/ −30,0°	15,8/160,5°	0,024/74,1°	0,97/ −16,1°	42,1
	200	0,79/ −56,5°	14,0/143,8°	0,043/62,5°	0,87/ −28,2°	33,3
	300	0,73/ −77,9°	11,8/130,6°	0,056/53,6°	0,76/ −37,0°	28,5
	400	0,68/ −95,3°	10,1/121,2°	0,064/48,0°	0,67/ −43,6°	25,4
	500	0,66/−108,1°	8,7/114,1°	0,070/44,8°	0,62/ −48,0°	23,4
	600	0,63/−119,0°	7,7/107,9°	0,074/42,7°	0,57/ −50,6°	21,6
	700	0,62/−127,8°	6,7/103,2°	0,079/41,6°	0,53/ −52,6°	20,1
	800	0,59/−135,8°	6,1/ 99,2°	0,081/40,8°	0,50/ −54,8°	18,8
5	900	0,58/−141,0°	5,5/ 95,5°	0,084/40,8°	0,49/ −55,5°	17,8
	1000	0,57/−147,4°	5,0/ 92,0°	0,087/40,7°	0,46/ −56,5°	16,7
	1200	0,56/−157,0°	4,2/ 85,9°	0,092/41,2°	0,44/ −59,5°	15,0
	1500	0,53/−168,7°	3,4/ 77,5°	0,092/37,7°	0,44/ −60,6°	13,0
	2000	0,54/+171,9°	2,6/ 65,8°	0,103/40,6°	0,41/ −66,5°	10,6
	2500	0,54/+158,8°	2,2/ 57,8°	0,114/44,6°	0,39/ −75,2°	9,1
	3000	0,53/+144,8°	1,8/ 49,2°	0,129/48,1°	0,39/ −83,1°	7,3
	3500	0,55/+134,0°	1,6/ 41,9°	0,148/50,4°	0,37/ −96,2°	6,3
	4000	0,54/+120,2°	1,5/ 32,1°	0,170/49,9°	0,37/−109,0°	5,7

I_C mA	f MHz	s_{ie}	s_{fe}	s_{re}	s_{oe}	G_{UM} dB
	100	0,68/ −54,8°	31,3/147,5°	0,020/65,8°	0,86/ −28,0°	38,4
	200	0,61/ −92,4°	23,3/126,6°	0,031/54,6°	0,67/ −43,8°	32,0
	300	0,57/−115,8°	17,5/114,4°	0,038/49,8°	0,52/ −51,5°	27,9
	400	0,55/−131,0°	13,9/106,8°	0,042/48,7°	0,44/ −56,5°	25,4
	500	0,55/−141,0°	11,5/101,6°	0,046/49,3°	0,40/ −59,3°	23,5
	600	0,53/−149,3°	9,8/ 96,7°	0,051/50,4°	0,36/ −60,2°	21,9
	700	0,54/−155,5°	8,5/ 93,3°	0,055/51,6°	0,34/ −61,2°	20,6
	800	0,54/−160,6°	7,5/ 90,4°	0,058/52,9°	0,32/ −62,4°	19,5
15	900	0,52/−164,6°	6,7/ 87,8°	0,063/54,1°	0,31/ −62,3°	18,3
	1000	0,52/−169,1°	6,1/ 85,4°	0,067/55,1°	0,30/ −62,6°	17,5
	1200	0,51/−176,1°	5,1/ 80,3°	0,075/56,5°	0,28/ −64,7°	15,8
	1500	0,50/+171,5°	4,2/ 73,5°	0,081/55,8°	0,28/ −66,6°	14,1
	2000	0,52/+157,8°	3,2/ 63,8°	0,100/57,3°	0,26/ −68,2°	11,5
	2500	0,52/+148,1°	2,6/ 57,2°	0,120/58,6°	0,25/ −75,5°	9,9
	3000	0,51/+135,6°	2,2/ 49,1°	0,143/58,2°	0,25/ −81,8°	8,4
	3500	0,54/+127,6°	2,0/ 42,1°	0,167/57,5°	0,24/ −96,0°	7,8
	4000	0,52/+114,6°	1,8/ 33,4°	0,191/54,3°	0,24/−110,9°	6,7

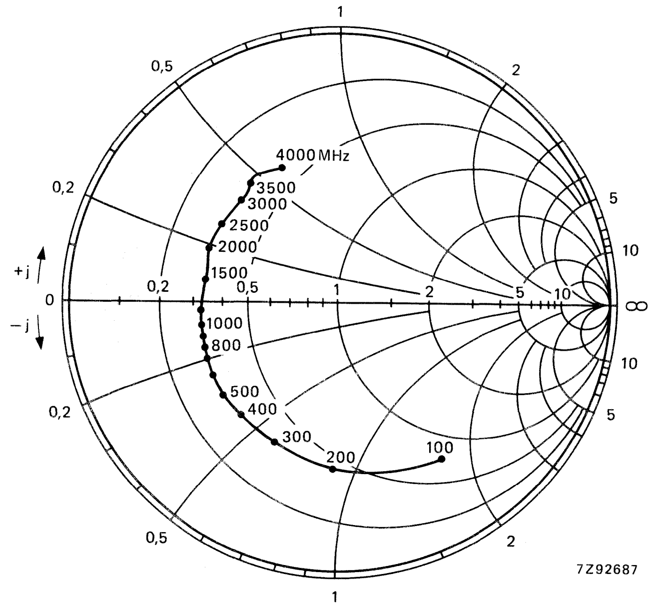


Fig. 2 Input impedance, derived from input reflection coefficient s_{ie} coordinates, in ohm x 50.

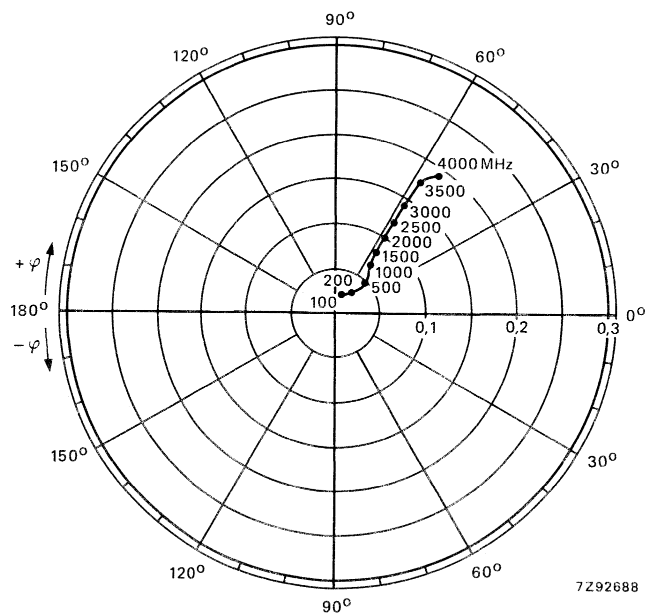


Fig. 3 Reverse transmission coefficient s_{re}.

Conditions for Figs 2 to 5: V_{CE} = 8 V; I_C = 15 mA; T_{amb} = 25 °C; typical values.

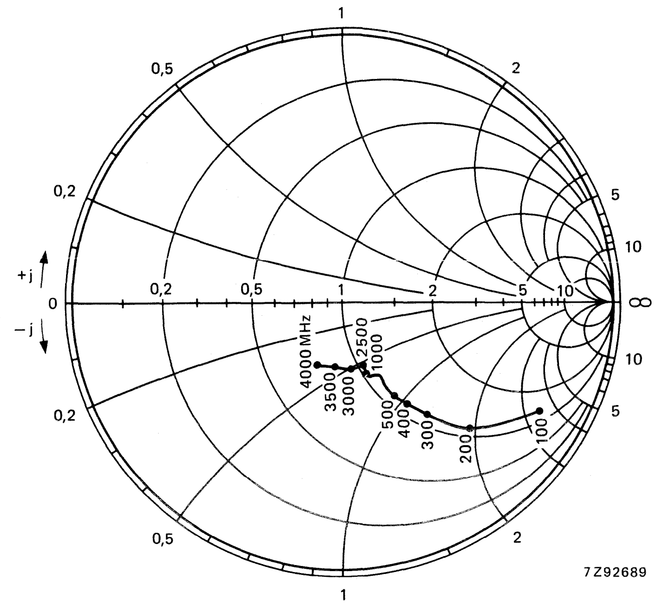


Fig. 4 Output impedance, derived from output reflection coefficient s_{oe} coordinates, in ohm x 50.

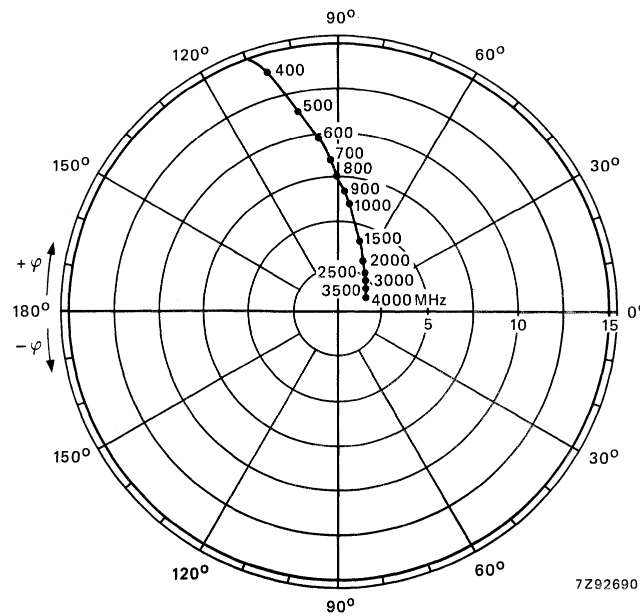


Fig. 5 Forward transmission coefficient s_{fe}.

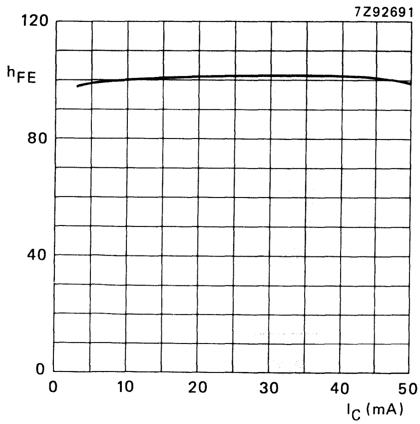


Fig. 6 V_{CE} = 5 V; T_j = 25 °C; typ. values.

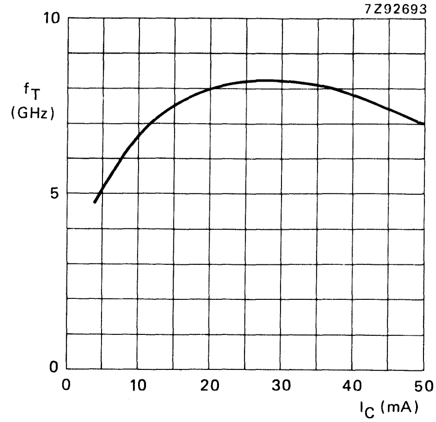


Fig. 7 V_{CE} = 8 V; f = 500 MHz; T_j = 25 °C; typ. values.

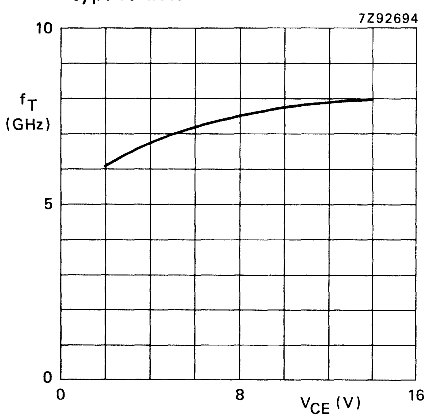


Fig. 8 I_C = 15 mA; f = 500 MHz; T_j = 25 °C; typ. values.

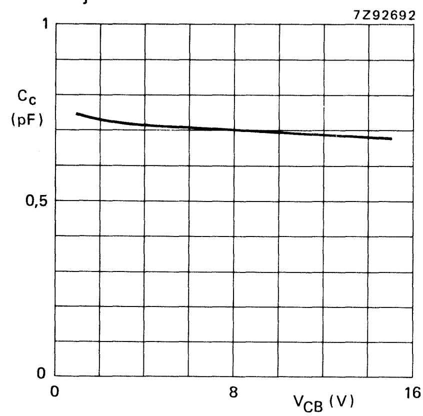


Fig. 9 $I_E = i_e = 0$; f = 1 MHz; T_j = 25 °C; typ. values.

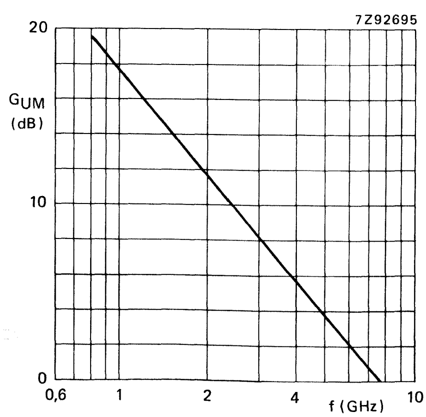


Fig. 10 V_{CE} = 8 V; I_C = 15 mA; T_{amb} = 25 °C; typ. values.

N-P-N 2 GHz WIDEBAND TRANSISTOR

N-P-N transistor in a plastic SOT-23 envelope. It is designed for wideband application in the GHz range, such as satellite TV systems (SATV) and repeater amplifiers in fibre-optical systems. The device features a very high transition frequency and a very low noise figure up to high frequencies.

QUICK REFERENCE DATA

Collector-base voltage, open emitter	V_{CBO}	max.	20	V
Collector-emitter voltage, open base	V_{CEO}	max.	10	V
Collector current (d.c.)	I_C	max.	50	mA
Total power dissipation up to T_{amb} = 25 °C	P_{tot}	max.	300	mW ←
Junction temperature	T_j	max.	175	°C ←
D.C. current gain I_C = 15 mA; V_{CB} = 5 V	h_{FE}	typ.	100	
Transition frequency at f = 500 MHz I_C = 15 mA; V_{CE} = 8 V	f_T	typ.	7,5	GHz
Maximum unilateral power gain at f = 2 GHz I_C = 15 mA; V_{CE} = 8 V	G_{UM}	typ.	8,0	dB

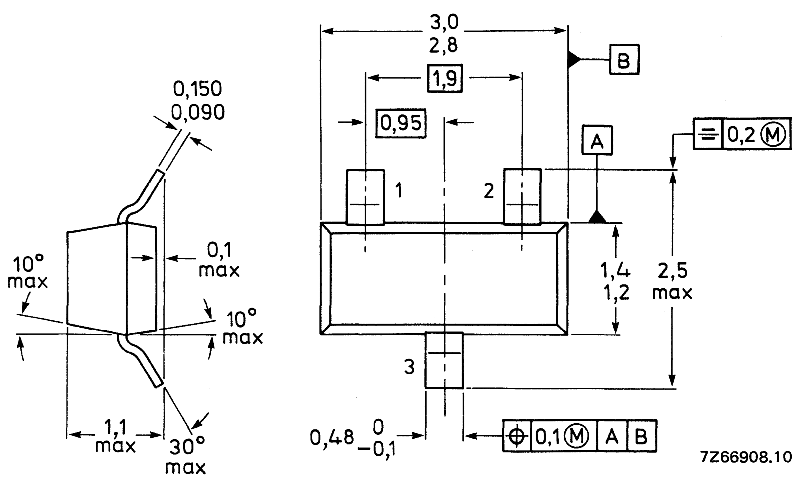
MECHANICAL DATA

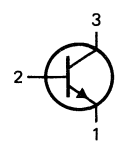
Dimensions in mm

Fig. 1 SOT-23.

Marking code

BFQ67 = V2





TOP VIEW

If required, the R-version (reverse pinning) is available on request.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

Collector-base voltage (open emitter)	V_{CBO}	max.	20	V
Collector-emitter voltage (open base)	V_{CEO}	max.	10	V
Emitter-base voltage (open collector)	V_{EBO}	max.	2,5	V
Collector current (d.c.)	I_C	max.	50	mA
→ Total power dissipation up to T_{amb} = 25 °C	P_{tot}	max.	300	mW
Storage temperature	T_{stg}	−65 to + 150		°C
→ Junction temperature	T_j	max.	175	°C

THERMAL RESISTANCE

From junction to ambient in free air*	$R_{th\ j\text{-}a}$	=	430	K/W

CHARACTERISTICS

T_j = 25 °C unless otherwise specified

Collector cut-off current $I_E = 0$; $V_{CB} = 5$ V	I_{CBO}	max.	50	nA
D.C. current gain $I_C = 15$ mA; $V_{CB} = 5$ V	h_{FE}	typ.	100	
Transition frequency at f = 500 mHz $I_C = 15$ mA; $V_{CE} = 8$ V	f_T	typ.	7,5	GHz
Collector capacitance at f = 1 MHz $I_E = i_e = 0$; $V_{CB} = 8$ V	C_c	typ.	0,7	pF
Emitter capacitance at f = 1 MHz $I_C = i_c = 0$; $V_{EB} = 0,5$ V	C_e	typ.	1,3	pF
Feedback capacitance at f = 1 MHz $I_C = 0$; $V_{CE} = 8$ V	C_{re}	typ.	0,5	pF

Maximum unilateral power gain (s_{re} assumed to be zero)

$$G_{UM} = 10 \log \frac{|s_{fe}|^2}{[1-|s_{ie}|^2]\,[1-|s_{oe}|^2]}$$

$I_C = 15$ mA; $V_{CE} = 8$ V; f = 2 GHz; T_{amb} = 25 °C	G_{UM}	typ.	8,0	dB
Noise figure at f = 2 GHz; $R_S = 60\ \Omega$; T_{amb} = 25 °C $I_C = 5$ mA; $V_{CE} = 8$ V	F	typ.	2,5	dB
$I_C = 15$ mA; $V_{CE} = 8$ V	F	typ.	3,0	dB

* Mounted on a ceramic substrate of 8 mm x 10 mm x 0,7 mm.

s-parameters (common emitter) at V_{CE} = 8 V; typical values.

I_C mA	f MHz	s_{ie}	s_{fe}	s_{re}	s_{oe}	G_{UM} dB
	40	0,93/ −9,5°	7,07/174,6°	0,01/83,2°	1,00/ −4,5°	46,7
	100	0,90/ −22,8°	6,96/163,5°	0,03/76,3°	0,97/−10,4°	36,4
	200	0,84/ −42,1°	6,35/150,4°	0,06/66,4°	0,91/−17,9°	29,2
2	500	0,61/ −90,7°	4,40/117,2°	0,10/45,7°	0,67/−32,6°	17,5
	800	0,55/−118,0°	3,24/102,6°	0,12/42,2°	0,60/−38,2°	13,7
	1000	0,54/−135,5°	2,76/ 93,5°	0,12/41,2°	0,55/−43,6°	11,9
	2000	0,47/ 177,3°	1,57/ 64,5°	0,15/60,0°	0,47/−65,3°	6,1
	40	0,84/ −14,9°	15,47/170,5°	0,01/80,7°	0,99/ −7,9°	44,5
	100	0,78/ −36,1°	14,35/154,8°	0,03/71,1°	0,92/−18,0°	35,4
	200	0,68/ −63,3°	11,97/137,7°	0,05/60,6°	0,79/−29,0°	28,5
5	500	0,45/−119,8°	6,74/106,1°	0,08/49,7°	0,47/−40,1°	18,6
	800	0,42/−143,5°	4,55/ 94,7°	0,09/53,8°	0,41/−41,5°	14,8
	1000	0,43/−155,4°	3,80/ 87,4°	0,10/56,1°	0,37/−46,7°	13,1
	2000	0,35/ 169,2°	2,04/ 63,5°	0,18/69,4°	0,34/−63,3°	7,3
	40	0,74/ −22,8°	25,66/165,6°	0,01/77,5°	0,96/−12,1°	43,0
	100	0,65/ −51,2°	22,19/145,5°	0,03/66,8°	0,84/−26,3°	34,6
	200	0,53/ −85,2°	16,35/126,4°	0,04/58,1°	0,64/−38,4°	28,0
10	500	0,38/−144,4°	8,01/ 99,5°	0,06/58,0°	0,33/−42,8°	19,2
	800	0,36/−161,9°	5,29/ 90,0°	0,09/64,0°	0,30/−41,2°	15,5
	1000	0,38/ 169,9°	4,27/ 84,0°	0,10/66,0°	0,27/−47,0°	13,6
	2000	0,30/ 160,0°	2,29/ 62,8°	0,20/72,6°	0,27/−61,2°	7,9
	40	0,67/ −28,3°	32,67/162,1°	0,01/75,8°	0,94/−14,9°	42,5
	100	0,57/ −62,8°	26,66/139,6°	0,02/64,6°	0,78/−31,4°	34,2
	200	0,46/ −99,5°	18,35/120,6°	0,04/58,7°	0,56/−42,8°	27,9
15	500	0,36/−154,8°	8,49/ 96,8°	0,06/62,9°	0,27/−42,8°	19,5
	800	0,34/ 169,3°	5,55/ 88,4°	0,09/68,4°	0,26/−39,7°	15,7
	1000	0,36/ 176,8°	4,47/ 82,5°	0,10/69,7°	0,23/−46,3°	13,9
	2000	0,29/ 155,7°	2,37/ 62,3°	0,21/73,4°	0,25/−59,8°	8,2
	40	0,63/ −32,5°	37,50/159,4°	0,01/74,2°	0,93/−17,2°	42,0
	100	0,52/ −70,8°	29,23/135,5°	0,02/63,4°	0,73/−34,7°	34,0
	200	0,42/−108,8°	19,22/117,4°	0,03/59,7°	0,50/−45,0°	27,8
20	500	0,35/−162,0°	8,69/ 95,0°	0,06/64,9°	0,23/−41,6°	19,6
	800	0,33/−175,1°	5,62/ 86,9°	0,09/70,7°	0,24/−38,1°	15,7
	1000	0,36/−178,7°	4,57/ 81,7°	0,10/71,6°	0,21/−45,0°	14,0
	2000	0,28/−153,5°	2,40/ 62,0°	0,21/73,8°	0,24/−58,9°	8,2

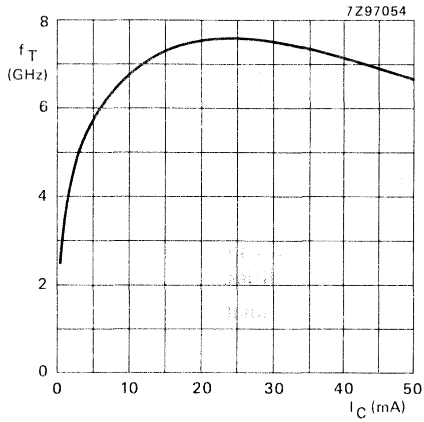


Fig. 2 V_{CE} = 8 V; f = 500 MHz; typical values.

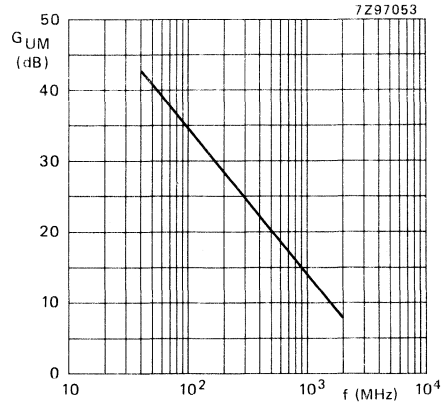


Fig. 3 V_{CE} = 8 V; I_C = 15 mA; T_{amb} = 25 °C; typical values.

N-P-N 1 GHz WIDEBAND TRANSISTOR

N-P-N transistor primarily intended for final stages in MATV system amplifiers. This device is also suitable for use in low power band IV and V equipment. Diffused emitter ballasting resistors and the application of gold sandwich metallization ensure an optimum temperature profile and excellent reliability properties. The device features very high output voltage capabilities.

The transistor has a ¼" capstan envelope with ceramic cap. All leads are isolated from the stud.

QUICK REFERENCE DATA

Collector-base voltage (open emitter)	V_{CBO}	max.	25	V
Collector-emitter voltage (open base)	V_{CEO}	max.	18	V
Collector current (d.c.)	I_C	max.	300	mA
Total power dissipation up to T_{mb} = 110 °C	P_{tot}	max.	4,5	W
Operating junction temperature	T_j	max.	200	°C
Transition frequency at f = 500 MHz I_C = 240 mA; V_{CE} = 15 V	f_T	typ.	4,0	GHz
Output voltage at d_{im} = −60 dB I_C = 240 mA; V_{CE} = 15 V; R_L = 75 Ω $f_{(p+q-r)}$ = 793,25 MHz	V_o	typ.	1,6	V
Output power at 1 dB gain compression	P_{L1}	typ.	+28	dBm
Third order intercept point	ITO	typ.	+47	dBm

MECHANICAL DATA

SOT-122 (see Fig. 1).

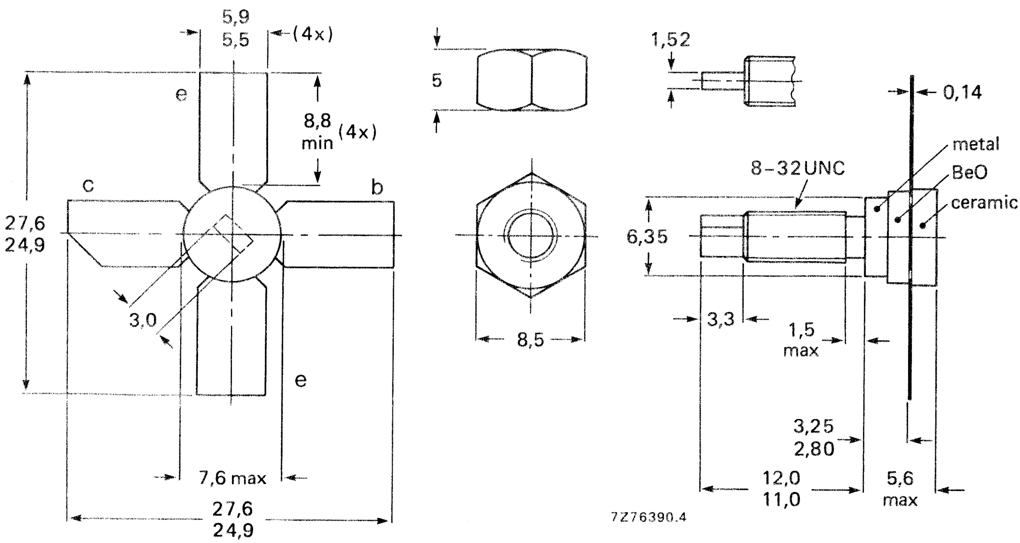
PRODUCT SAFETY

This device incorporates beryllium oxide, the dust of which is toxic. The device is entirely safe provided that the BeO disc is not damaged.

MECHANICAL DATA

Fig. 1 SOT-122.

Dimensions in mm



Torque on nut:	min.	0,75 Nm
		(7,5 kg cm)
	max.	0,85 Nm
		(8,5 kg cm)

Diameter of clearance hole in heatsink: max. 4,2 mm.
Mounting hole to have no burrs at either end.
De-burring must leave surface flat; do not chamfer or countersink either end of hole.

When locking is required an adhesive is preferred instead of a lock washer.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

Collector-base voltage (open emitter)	V_{CBO}	max.	25	V
Collector-emitter voltage (open base)	V_{CEO}	max.	18	V
Emitter-base voltage (open collector)	V_{EBO}	max.	2	V
Collector current (d.c.)	I_C	max.	300	mA
Total power dissipation up to T_{mb} = 110 °C (see Fig. 7)	P_{tot}	max.	4,5	W
Storage temperature	T_{stg}		−65 to +150	°C
Operating junction temperature	T_j	max.	200	°C

THERMAL RESISTANCE

From junction to mounting base	$R_{th\ j\text{-}mb}$	=	20,0	K/W
From mounting base to heatsink	$R_{th\ mb\text{-}h}$	=	0,6	K/W

CHARACTERISTICS

T_j = 25 °C unless otherwise specified

Collector cut-off current			
$I_E = 0$; $V_{CB} = 15$ V	I_{CBO}	max.	50 μA
D.C. current gain			
$I_C = 240$ mA; $V_{CE} = 15$ V	h_{FE}	min.	25
Transition frequency at f = 500 MHz			
$I_C = 240$ mA; $V_{CE} = 15$ V	f_T	typ.	4 GHz
Collector capacitance at f = 1 MHz			
$I_E = I_e = 0$; $V_{CB} = 15$ V	C_c	typ.	3,8 pF
Emitter capacitance at f = 1 MHz			
$I_C = I_c = 0$; $V_{EB} = 0{,}5$ V	C_e	typ.	20 pF
Feedback capacitance at f = 1 MHz			
$I_C = 0$; $V_{CE} = 15$ V	C_{re}	typ.	2,3 pF
Collector-stud capacitance*	C_{cs}	typ.	0,8 pF

Maximum unilateral power gain (s_{re} assumed to be zero)

$$G_{UM} = 10 \log \frac{|s_{fe}|^2}{(1 - |s_{ie}|^2)(1 - |s_{oe}|^2)}$$

$I_C = 240$ mA; $V_{CE} = 15$ V; f = 800 MHz; $T_{amb} = 25$ °C	G_{UM}	typ.	13 dB

Output voltage at $d_{im} = -60$ dB (see Figs 2 and 12)
(DIN 45004B, par. 6.3: 3-tone)
$I_C = 240$ mA; $V_{CE} = 15$ V; $R_L = 75\ \Omega$; $T_{amb} = 25$ °C

$V_p = V_o$ at $d_{im} = -60$ dB; $f_p = 795{,}25$ MHz
$V_q = V_o -6$ dB ; $f_q = 803{,}25$ MHz
$V_r = V_o -6$ dB ; $f_r = 805{,}25$ MHz

measured at $f_{(p+q-r)} = 793{,}25$ MHz	V_o	typ.	1,6 V

* Measured with emitter and base grounded.

Output power at 1 dB gain compression (see Fig. 2) I_C = 240 mA; V_{CE} = 15 V R_L = 75 Ω; T_{amb} = 25 °C measured at f = 800 MHz	P_{L1}	typ.	+28 dBm
Third order intercept point (see Fig. 2) I_C = 240 mA; V_{CE} = 15 V R_L = 75 Ω; T_{amb} = 25 °C P_p = ITO – 6 dB; f_p = 800 MHz P_q = ITO – 6 dB; f_q = 801 MHz measured at $f_{(2q-p)}$ = 802 MHz and at $f_{(2p-q)}$ = 799 MHz	ITO	typ.	+47 dBm

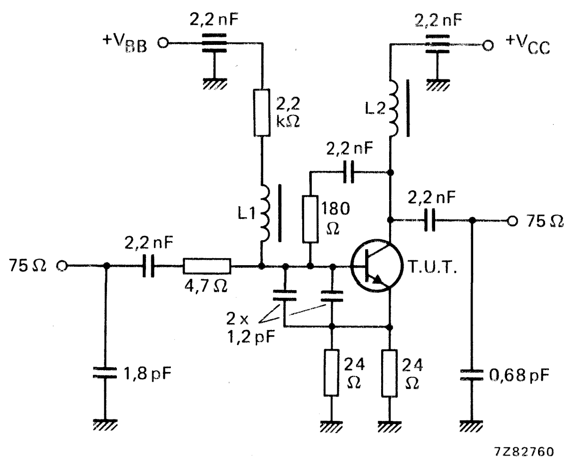


Fig. 2 Intermodulation distortion MATV test circuit. Power gain at f = 40 MHz to 860 MHz is typical 7 dB.

L1 = L2 = 5 μH micro choke.

s-parameters (common emitter) at V_{CE} = 7,5 V; T_{amb} = 25 °C; typical values.

I_C mA	f MHz	s_{ie}	s_{re}	s_{fe}	s_{oe}	G_{UM} dB
	40	0,66/−135,7°	0,02/41,1°	30,4/124,0°	0,64/ −79,0°	34,4
	100	0,77/−164,0°	0,03/33,6°	14,8/101,2°	0,45/−125,3°	28,3
	200	0,80/−176,3°	0,03/44,1°	7,7/ 89,1°	0,39/−147,9°	22,9
50	500	0,80/+170,2°	0,06/55,3°	3,1/ 70,3°	0,38/−159,5°	14,9
	800	0,78/+157,0°	0,09/60,5°	2,0/ 57,2°	0,42/−165,6°	10,9
	1000	0,78/+152,4°	0,11/61,8°	1,6/ 48,1°	0,43/−167,6°	9,0
	1200	0,75/+142,7°	0,13/59,9°	1,4/ 41,1°	0,46/−171,2°	7,5
	40	0,67/−146,1°	0,02/40,9°	33,5/121,5°	0,64/ −90,4°	35,4
	100	0,78/−167,5°	0,02/37,2°	15,6/100,4°	0,49/−134,4°	29,1
	200	0,80/−178,3°	0,03/47,0°	8,1/ 89,2°	0,45/−155,5°	23,6
100	500	0,79/+168,9°	0,06/60,4°	3,4/ 72,0°	0,43/−170,5°	15,8
	800	0,77/+156,1°	0,09/62,0°	2,2/ 59,5°	0,44/−174,5°	11,7
	1000	0,77/+151,5°	0,11/61,9°	1,8/ 51,5°	0,44/−178,5°	9,9
	1200	0,74/+141,8°	0,14/59,4°	1,5/ 44,0°	0,46/−178,5°	8,0
	40	0,68/−149,0°	0,02/40,8°	34,3/120,6°	0,64/ −94,6°	35,7
	100	0,78/−168,8°	0,02/38,8°	15,9/100,0°	0,50/−138,0°	29,3
	200	0,80/−179,0°	0,03/49,0°	8,2/ 89,2°	0,47/−158,2°	23,8
150	500	0,79/+168,5°	0,06/61,6°	3,4/ 72,5°	0,45/−173,2°	15,9
	800	0,77/+155,8°	0,09/62,5°	2,2/ 60,3°	0,46/−177,1°	11,8
	1000	0,76/+151,2°	0,12/62,1°	1,8/ 52,5°	0,46/+177,1°	9,9
	1200	0,73/+141,6°	0,14/59,1°	1,5/ 45,1°	0,47/+177,1°	7,9
	40	0,68/−150,7°	0,02/40,5°	34,7/120,0°	0,64/ −97,3°	37,2
	100	0,78/−169,7°	0,02/39,6°	15,9/ 99,7°	0,51/−140,4°	29,4
	200	0,80/−179,8°	0,03/50,1°	8,2/ 89,0°	0,49/−159,8°	23,9
200	500	0,79/+168,2°	0,06/62,1°	3,4/ 72,6°	0,47/−174,8°	16,0
	800	0,77/+155,6°	0,09/62,6°	2,2/ 60,5°	0,47/−178,6°	11,8
	1000	0,76/+150,9°	0,12/62,1°	1,8/ 52,9°	0,46/+175,5°	9,9
	1200	0,73/+141,4°	0,14/59,0°	1,5/ 45,3°	0,47/+174,6°	7,9
	40	0,69/−151,9°	0,02/40,1°	34,6/119,4°	0,63/ −99,4°	35,9
	100	0,79/−170,3°	0,02/39,9°	15,8/ 99,5°	0,52/−141,8°	29,6
	200	0,80/+180,0°	0,03/51,0°	8,1/ 88,9°	0,49/−160,9°	23,8
250	500	0,80/+168,0°	0,06/62,5°	3,4/ 72,6°	0,47/−175,6°	16,2
	800	0,78/+155,4°	0,09/62,8°	2,2/ 60,6°	0,48/−179,5°	12,1
	1000	0,77/+150,8°	0,12/62,1°	1,8/ 53,0°	0,47/+174,5°	10,1
	1200	0,73/+141,3°	0,14/58,9°	1,5/ 45,6°	0,47/+173,9°	7,9
	40	0,69/−152,9°	0,02/39,7°	34,4/118,9°	0,62/−101,2°	35,6
	100	0,79/−170,8°	0,02/40,1°	15,5/ 99,2°	0,52/−143,2°	29,4
	200	0,80/+179,6°	0,03/51,5°	8,0/ 88,8°	0,50/−161,7°	23,7
300	500	0,80/+167,9°	0,06/62,8°	3,4/ 72,5°	0,48/−176,2°	16,2
	800	0,78/+155,3°	0,09/62,9°	2,2/ 60,5°	0,48/+179,8°	12,1
	1000	0,77/+150,6°	0,12/62,1°	1,8/ 53,0°	0,47/+173,9°	10,1
	1200	0,74/+141,1°	0,14/59,1°	1,5/ 45,5°	0,48/+173,4°	8,1

s-parameters (common emitter) at V_{CE} = 15 V; T_{amb} = 25 °C; typical values.

I_C mA	f MHz	s_{ie}	s_{re}	s_{fe}	s_{oe}	G_{UM} dB
	40	0,63/−132,3°	0,02/41,8°	33,5/126,6°	0,62/ −72,9°	34,8
	100	0,75/−161,1°	0,02/34,0°	16,4/103,0°	0,41/−115,2°	28,7
	200	0,78/−174,8°	0,03/40,7°	8,6/ 90,1°	0,34/−139,4°	23,3
50	500	0,78/+ 169,9°	0,06/56,8°	3,6/ 71,4°	0,34/−153,8°	15,7
	800	0,77/+ 157,5°	0,08/60,9°	2,3/ 57,6°	0,37/−157,4°	11,8
	1000	0,74/+ 150,3°	0,10/61,8°	1,9/ 48,8°	0,40/−160,3°	9,8
	1200	0,73/+ 143,2°	0,12/61,0°	1,5/ 41,2°	0,42/−162,9°	7,7
	40	0,63/−140,5°	0,02/41,6°	36,4/125,0°	0,61/ −82,0°	35,4
	100	0,76/−164,8°	0,02/37,3°	17,5/102,3°	0,44/−126,8°	29,5
	200	0,78/−176,8°	0,03/46,7°	9,1/ 90,3°	0,39/−149,8°	24,0
100	500	0,77/+ 168,8°	0,06/60,3°	3,6/ 72,6°	0,38/−164,2°	16,2
	800	0,76/+ 156,7°	0,09/62,1°	2,4/ 60,0°	0,39/−168,6°	12,1
	1000	0,73/+ 149,6°	0,11/61,7°	2,0/ 51,2°	0,40/−170,8°	10,1
	1200	0,72/+ 142,6°	0,13/60,2°	1,7/ 44,6°	0,42/−172,6°	8,6
	40	0,64/−143,2°	0,02/41,1°	37,6/123,9°	0,60/ −86,5°	35,7
	100	0,76/−166,0°	0,02/38,3°	17,9/101,8°	0,45/−131,0°	29,8
	200	0,78/−177,5°	0,03/48,1°	9,3/ 90,2°	0,41/−153,1°	24,2
150	500	0,77/+ 168,2°	0,06/61,2°	3,9/ 73,1°	0,40/−167,7°	16,5
	800	0,76/+ 156,3°	0,09/62,2°	2,5/ 60,6°	0,40/−172,0°	12,5
	1000	0,72/+ 149,2°	0,11/61,5°	2,0/ 52,2°	0,41/−174,6°	10,0
	1200	0,72/+ 142,2°	0,13/59,5°	1,7/ 45,3°	0,42/−176,1°	8,6
	40	0,65/−144,0°	0,02/40,6°	38,5/122,8°	0,60/ −90,2°	36,0
	100	0,76/−166,7°	0,02/39,0°	18,0/101,2°	0,46/−133,7°	29,9
	200	0,78/−177,9°	0,03/49,1°	9,3/ 89,9°	0,42/−155,2°	24,3
200	500	0,77/+ 168,0°	0,06/61,6°	3,9/ 73,3°	0,41/−169,7°	16,5
	800	0,76/+ 156,1°	0,09/62,3°	2,5/ 60,9°	0,41/−174,0°	12,7
	1000	0,72/+ 149,1°	0,11/61,5°	2,1/ 52,8°	0,42/−175,7°	10,5
	1200	0,71/+ 142,1°	0,13/59,2°	1,7/ 45,8°	0,42/−177,3°	8,5
	40	0,66/−144,9°	0,02/40,7°	38,6/122,1°	0,60/ −91,6°	36,2
	100	0,76/−167,0°	0,02/39,2°	18,0/100,8°	0,46/−135,4°	29,9
	200	0,78/−178,1°	0,03/49,5°	9,3/ 89,7°	0,43/−156,2°	24,3
250	500	0,77/+ 167,8°	0,06/62,0°	3,9/ 73,2°	0,42/−170,3°	16,6
	800	0,76/+ 156,1°	0,09/62,4°	2,5/ 61,0°	0,41/−174,8°	12,8
	1000	0,72/+ 148,9°	0,11/61,5°	2,0/ 52,6°	0,41/−177,2°	10,0
	1200	0,72/+ 141,8°	0,14/58,8°	1,7/ 45,7°	0,41/−178,3°	8,6
	40	0,67/−145,2°	0,02/40,1°	38,7/121,3°	0,59/ −93,3°	37,2
	100	0,77/−167,3°	0,02/39,0°	17,9/100,3°	0,46/−136,5°	30,0
	200	0,79/−178,2°	0,03/49,6°	9,2/ 89,4°	0,43/−156,8°	24,4
300	500	0,78/+ 167,7°	0,06/62,0°	3,9/ 72,9°	0,42/−170,6°	16,7
	800	0,76/+ 156,1°	0,09/62,4°	2,5/ 60,8°	0,41/−174,7°	12,8
	1000	0,73/+ 148,8°	0,11/61,4°	2,0/ 52,5°	0,41/−177,4°	10,1
	1200	0,72/+ 142,0°	0,14/59,2°	1,7/ 45,7°	0,42/+ 177,4°	8,6

Conditions for Figs 3 and 4:

V_{CE} = 15 V; I_C = 240 mA;
T_{amb} = 25 °C; typical values.

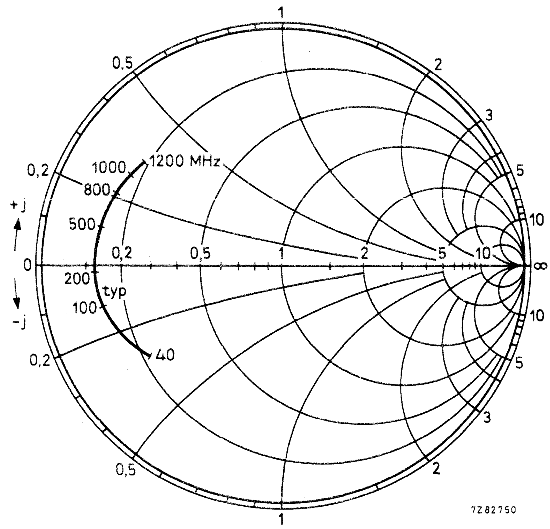


Fig. 3 Input impedance derived from input reflection coefficient s_{ie} co-ordinates in ohm x 50.

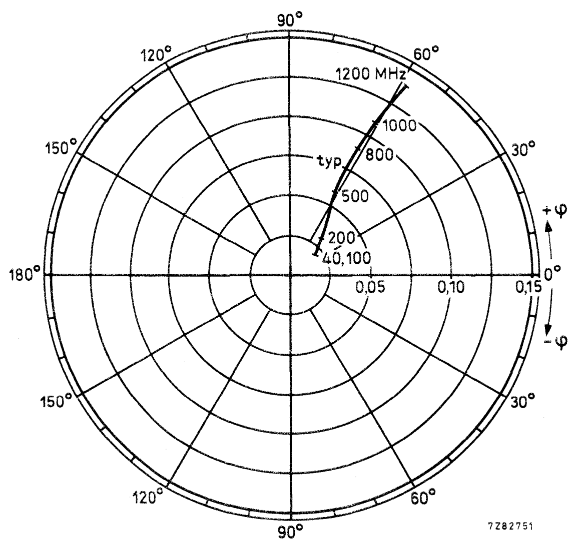


Fig. 4 Reverse transmission coefficient s_{re}.

Conditions for Figs 5 and 6:
V_{CE} = 15 V; I_C = 240 mA;
T_{amb} = 25 °C; typical values.

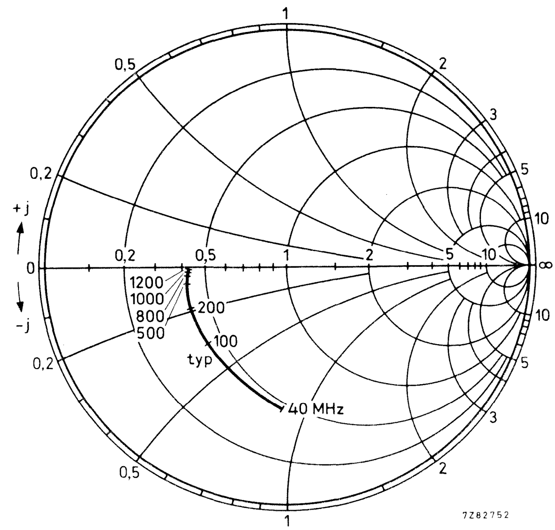


Fig. 5 output impedance derived from output reflection coefficient s_{oe} co-ordinates in ohm x 50.

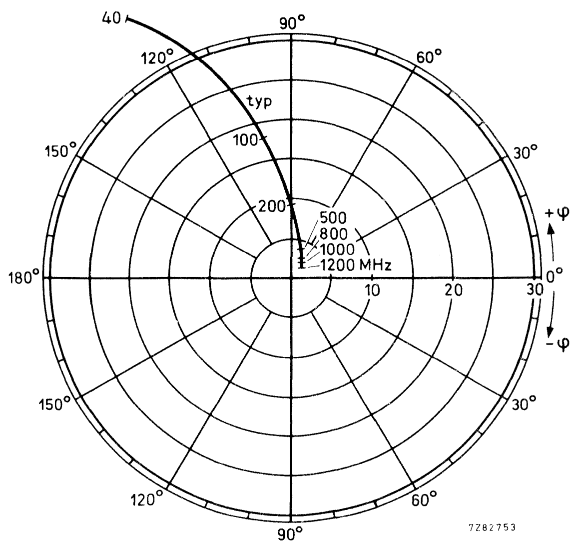


Fig. 6 Forward transmission coefficient s_{fe}.

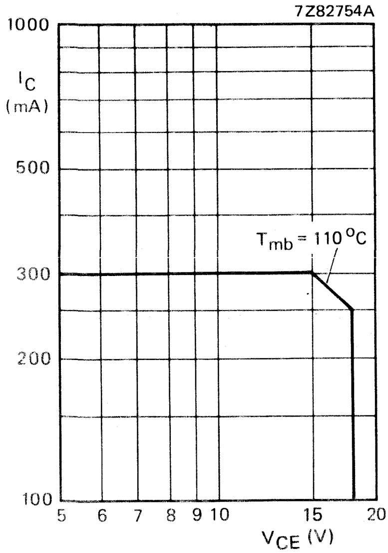


Fig. 7 D.C. SOAR.

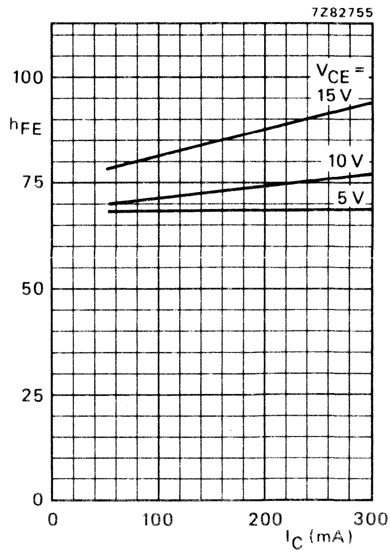


Fig. 8 T_j = 25 °C; typical values.

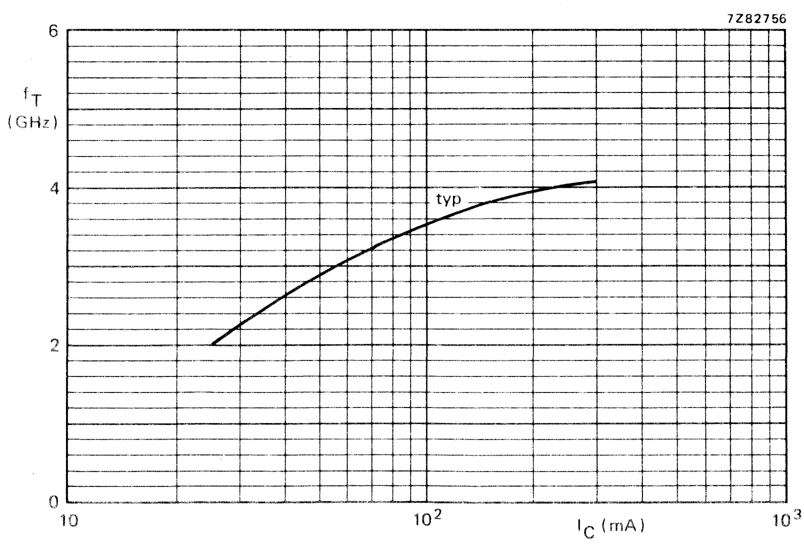


Fig. 9 V_{CE} = 15 V; f = 500 MHz; T_j = 25 °C; typical values.

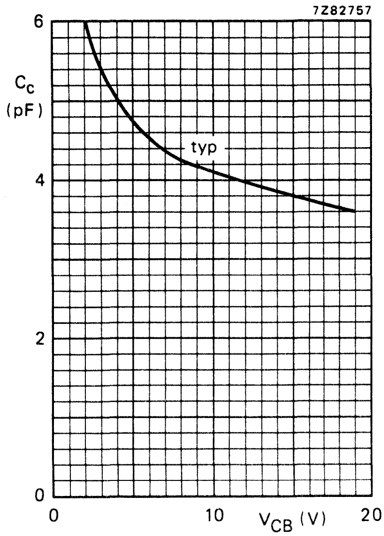


Fig. 10.

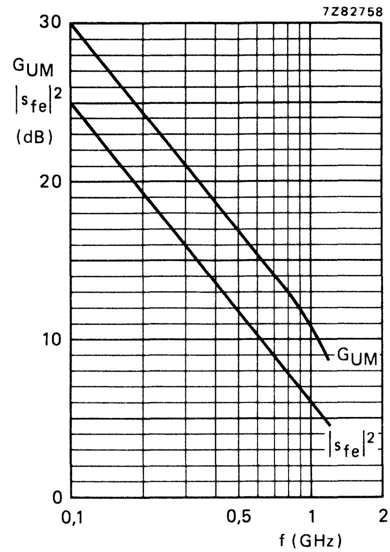


Fig. 11.

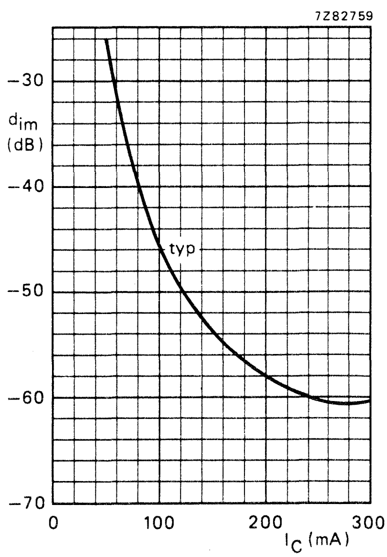


Fig. 12.

Conditions for Figs 10, 11 and 12:

Fig. 10 $I_E = I_e = 0$; $T_{amb} = 25$ °C; typ. values.

Fig. 11 $V_{CE} = 15$ V; $I_C = 240$ mA; $T_{amb} = 25$ °C; typical values.

Fig. 12 $V_{CE} = 15$ V; $V_o = 1{,}6$ V; $f_{(p+q-r)} = 793{,}25$ MHz; $T_{amb} = 25$ °C; measured in MATV test circuit (see Fig. 2); typical values.

NPN 1 GHz WIDEBAND TRANSISTOR

NPN transistor in a ceramic SOT172A2 package. It is primarily intended for use in MATV and microwave amplifiers, such as in aerial amplifiers, radar systems, oscilloscopes, spectrum analysers etc.

Emitter ballasting resistors and application of gold sandwich metallization ensure an optimum temperature profile and excellent reliability properties.

QUICK REFERENCE DATA

Collector-base voltage (open emitter)	V_{CBO}	max.	25 V
Collector-emitter voltage (open base)	V_{CEO}	max.	19 V
Collector current (DC)	I_C	max.	150 mA
Total power dissipation up to T_{mb} = 120 °C	P_{tot}	max.	2.7 W
Junction temperature	T_j	max.	200 °C
DC current gain I_C = 120 mA; V_{CE} = 18 V	h_{FE}	min.	55
Transition frequency at f = 1000 MHz I_C = 120 mA; V_{CE} = 18 V; T_{amb} = 25 °C	f_T	typ.	6.5 GHz
Maximum power gain at f = 500 MHz I_C = 120 mA; V_{CE} = 18 V	G_{UM}	typ.	17 dB
Maximum power gain at f = 800 MHz I_C = 120 mA; V_{CE} = 18 V	G_{UM}	typ.	13.5 dB
Output voltage at d_{im} = −60 dB I_C = 120 mA; $-V_{CE}$ = 18 V; R_L = 75 Ω; $f_{(p+q-r)}$ = 793.25 MHz	V_o	typ.	1.2 V

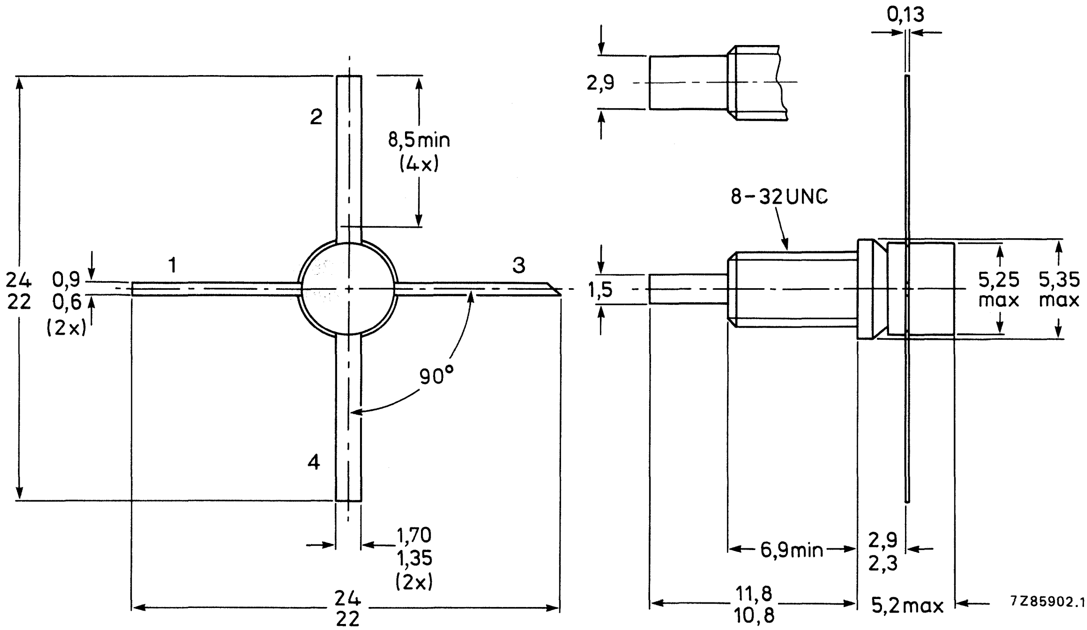
MECHANICAL DATA

SOT172A2 (see Fig. 1)

MECHANICAL DATA

Dimensions in mm

Fig. 1 SOT172A2.



Pinning

1. Base
2/4. Emitter
3. Collector

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134).

Collector-base voltage (open emitter)	V_{CBO}	max.	25	V
Collector-emitter voltage (open base)	V_{CEO}	max.	19	V
Emitter-base voltage (open collector)	V_{EBO}	max.	2	V
Collector current (DC)	I_C	max.	150	mA
Total power dissipation up to T_{mb} = 120 °C	P_{tot}	max.	2.7	W
Storage temperature range	T_{stg}		−65 to +150	°C
Junction temperature	T_j	max.	200	°C

THERMAL RESISTANCE

From junction to case	$R_{th\,j\text{-}c}$	=	20 K/W

CHARACTERISTICS

$T_j = 25\ ^oC$ unless otherwise specified

Collector cut-off current $I_E = 0$; $V_{CB} = 18$ V	I_{CBO}	max.	50 μA
DC current gain $I_C = 120$ mA; $V_{CE} = 18$ V	h_{FE}	min.	55
Transition frequency at f = 1000 MHz $I_C = 120$ mA; $V_{CE} = 18$ V; $T_{amb} = 25\ ^oC$	f_T	typ.	6.5 GHz
Collector capacitance at f = 1 MHz $I_E = i_e = 0$; $V_{CB} = 18$ V	C_c	typ.	1.8 pF
Emitter capacitance at f = 1 MHz $I_C = i_c = 0$; $-V_{EB} = 0.5$ V	C_e	typ.	5.5 pF
Feedback capacitance at f = 1 MHz $I_C = 0$ mA; $V_{CE} = 18$ V	C_{re}	typ. max.	1.0 pF 1.2 pF
Maximum power gain at f = 500 MHz; $T_{amb} = 25\ ^oC$ $I_C = 120$ mA; $V_{CE} = 18$ V;	G_{UM}	typ.	17 dB
Maximum power gain at f = 800 MHz; $T_{amb} = 25\ ^oC$ $I_C = 120$ mA; $V_{CE} = 18$ V	G_{UM}	typ.	13.5 dB
Output voltage at $d_{im} = 60$ dB (DIN 45004B) $T_{amb} = 25\ ^oC$; $I_C = 120$ mA; $V_{CE} = 18$ V; $R_L = 75\ \Omega$ $V_p = V_o$ at $d_{im} = -60$ dB; $f_p = 445.25$ MHz $V_q = V_o -6$ dB; $f_q = 453.25$ MHz $V_r = V_o -6$ dB; $f_r = 455.25$ MHz Measured at $f_{(p+q-r)} = 443.25$ MHz	V_o	typ.	1.35 mV
Output voltage at $d_{im} = -60$ dB (DIN 45004B); $T_{amb} = 25\ ^oC$; $I_C = 120$ mA; $V_{CE} = 18$ V; $R_L = 75\ \Omega$ $V_p = V_o$ at $d_{im} = -60$ dB; $f_p = 797.25$ MHz $V_q = V_o -6$ dB; $f_q = 803.25$ MHz $V_r = V_o -6$ dB; $f_r = 805.25$ MHz Measured at $f_{(p+q-r)} = 793.25$ MHz	V_o	typ.	1.2 V

N-P-N 1 GHz WIDEBAND TRANSISTOR

N-P-N transistor primarily intended for final stages in u.h.f. amplifiers. The integrated diffused emitter ballasting resistors and application of gold sandwich metallization ensure an optimum temperature profile and excellent reliability properties. This device features extremely high output voltage capabilities. The transistor has a ¼″ capstan envelope with ceramic cap. All leads are isolated from the stud.

QUICK REFERENCE DATA

Collector-base voltage, open emitter	V_{CBO}	max.	25	V
Collector-emitter voltage, open base	V_{CEO}	max.	18	V
Collector current (d.c.)	I_C	max.	600	mA
Total power dissipation up to T_{mb} = 100 °C	P_{tot}	max.	9	W ←
Junction temperature	T_j	max.	200	°C
Transition frequency at f = 500 MHz I_C = 500 mA; V_{CE} = 15 V	f_T	typ.	4,0	GHz
Maximum unilateral power gain at f = 800 MHz I_C = 500 mA; V_{CE} = 15 V	G_{UM}	typ.	12,5	dB
Output voltage at d_{im} = −60 dB I_C = 500 mA; V_{CE} = 15 V; R_L = 75 Ω; $f_{(p+q-r)}$ = 793,25 MHz	V_o	typ.	2,5	V

MECHANICAL DATA

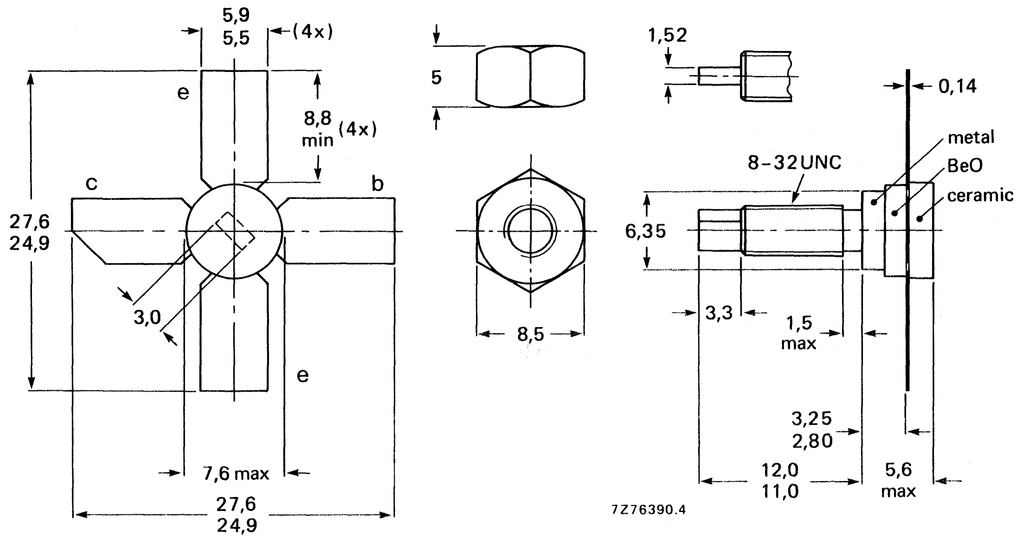
SOT-122 (see Fig. 1).

PRODUCT SAFETY. This device incorporates beryllium oxide, the dust of which is toxic. The device is entirely safe provided that the BeO disc is not damaged.

MECHANICAL DATA

Dimensions in mm

Fig. 1 SOT-122.



Torque on nut: min. 0,75 Nm (7,5 kg.cm)
max. 0,85 Nm (8,5 kg.cm)

Diameter of clearance hole: max. 4,2 mm.
Mounting hole to have no burrs at either end.
De-burring must leave surface flat; do not chamfer or countersink either end of hole.

When locking is required an adhesive is preferred instead of a lock washer.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

Collector-base voltage, open emitter	V_{CBO}	max.	25	V
Collector-emitter voltage, open base	V_{CEO}	max.	18	V
Emitter-base voltage, open collector	V_{EBO}	max.	2	V
Collector current (d.c.)	I_C	max.	600	mA
→ Total power dissipation up to T_{mb} = 100 °C	P_{tot}	max.	9	W
Storage temperature	T_{stg}		−65 to + 150	°C
Junction temperature	T_j	max.	200	°C

THERMAL RESISTANCE

From junction to mounting base	$R_{th\ j\text{-}mb}$	=	11	K/W
From mounting base to heatsink	$R_{th\ mb\text{-}h}$	=	0,6	K/W

CHARACTERISTICS

T_j = 25 °C unless otherwise specified

Collector cut-off current $I_E = 0$; V_{CB} = 15 V	I_{CBO}	max.	75 μA
D.C. current gain I_C = 500 mA; V_{CE} = 15 V	h_{FE}	min.	25
Transition frequency at f = 500 MHz I_C = 500 mA; V_{CE} = 15 V	f_T	typ.	4,0 GHz
Collector capacitance at f = 1 MHz $I_E = i_e = 0$; V_{CB} = 15 V	C_c	typ.	7,0 pF
Emitter capacitance at f = 1 MHz $I_C = i_c = 0$; V_{EB} = 0,5 V	C_e	typ.	40 pF
Feedback capacitance $I_C = 0$; V_{CE} = 15 V	C_{re}	typ.	4,0 pF
Collector-stud capacitance*	C_{cs}	typ.	0,8 pF
Maximum unilateral power gain (s_{re} assumed to be zero) $G_{UM} = 10 \log \frac{\lvert s_{fe}\rvert^2}{[1 - \lvert s_{ie}\rvert^2]\ [1 - \lvert s_{oe}\rvert^2]}$ I_C = 500 mA; V_{CE} = 15 V; f = 800 MHz; T_{amb} = 25 °C	G_{UM}	typ.	12,5 dB
Output voltage at d_{im} = –60 dB (see Fig. 2) I_C = 500 mA; V_{CE} = 15 V; R_L = 75 Ω; T_{amb} = 25 °C $V_p = V_o$ at d_{im} = –60 dB; f_p = 795,25 MHz $V_q = V_o$ –6 dB ; f_q = 803,25 MHz $V_r = V_o$ –6 dB ; f_r = 805,25 MHz measured at $f_{(p+q-r)}$ = 793,25 MHz	V_o	typ.	2,5 V

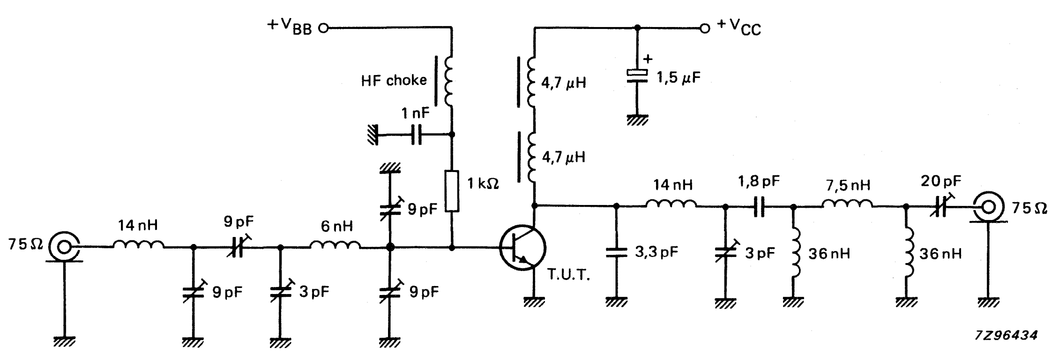


Fig. 2 High gain test circuit.

* Measured with emitter and base grounded.

s-parameters (common emitter) at V_{CE} = 15 V; T_{amb} = 25 °C; typical values

I_C mA	f MHz	s_{ie}	s_{fe}	s_{re}	s_{oe}	G_{UM} dB
	40	0,87/−161,9°	27,9/104,8°	0,017/24,5°	0,60/−140,2°	37,0
	100	0,89/−174,2°	11,7/ 92,6°	0,019/29,3°	0,58/−163,7°	30,0
	200	0,90/+180,0°	5,8/ 85,8°	0,024/43,0°	0,58/−172,5°	24,3
100	500	0,89/+171,6°	2,4/ 70,3°	0,044/59,9°	0,59/−178,3°	16,3
	800	0,82/+164,3°	1,6/ 58,1°	0,068/64,2°	0,60/+179,0°	12,3
	1000	0,86/+159,9°	1,2/ 51,7°	0,086/66,1°	0,60/+176,4°	9,4
	1200	0,86/+155,6°	1,1/ 42,4°	0,105/63,7°	0,60/+173,8°	8,6
	40	0,87/−165,2°	29,3/103,8°	0,014/26,2°	0,65/−146,8°	37,9
	100	0,90/−175,8°	12,1/ 92,7°	0,017/34,9°	0,65/−167,3°	31,3
	200	0,90/+179,1°	6,1/ 86,9°	0,023/49,7°	0,65/−175,5°	25,3
200	500	0,89/+170,7°	2,5/ 72,7°	0,046/63,5°	0,65/+177,7°	17,2
	800	0,88/+163,5°	1,6/ 61,4°	0,072/65,8°	0,64/+173,6°	12,6
	1000	0,86/+159,2°	1,3/ 55,3°	0,090/66,5°	0,63/+170,6°	10,5
	1200	0,84/+155,1°	1,2/ 48,9°	0,109/63,3°	0,62/+167,8°	9,0
	40	0,88/−166,4°	29,6/103,2°	0,013/26,8°	0,67/−149,3°	38,5
	100	0,90/−176,1°	12,3/ 92,7°	0,016/36,2°	0,67/−168,5°	31,6
	200	0,90/+178,6°	6,2/ 86,9°	0,023/51,8°	0,67/−176,2°	25,6
300	500	0,89/+171,0°	2,5/ 73,5°	0,046/69,6°	0,67/+176,6°	17,4
	800	0,88/+163,8°	1,6/ 63,2°	0,072/66,2°	0,66/+172,0°	12,6
	1000	0,86/+159,5°	1,4/ 56,9°	0,091/66,7°	0,64/+168,7°	11,1
	1200	0,85/+154,5°	1,2/ 49,5°	0,110/63,3°	0,63/+165,8°	9,3
	40	0,88/−166,8°	29,6/102,7°	0,013/26,8°	0,69/−150,8°	38,7
	100	0,90/−176,4°	12,1/ 92,4°	0,016/36,9°	0,68/+169,2°	31,6
	200	0,90/+178,5°	6,1/ 87,1°	0,023/52,4°	0,68/−176,7°	25,6
400	500	0,89/+170,7°	2,5/ 74,1°	0,047/65,2°	0,68/+176,0°	17,5
	800	0,88/+163,4°	1,6/ 64,1°	0,073/66,3°	0,66/+171,4°	12,5
	1000	0,86/+159,0°	1,3/ 56,4°	0,092/66,7°	0,65/+168,0°	10,5
	1200	0,85/+154,6°	1,2/ 50,7°	0,111/63,1°	0,64/+164,9°	9,4
	40	0,88/−167,0°	29,3/102,2°	0,013/27,0°	0,69/−151,8°	38,6
	100	0,90/−176,6°	12,1/ 92,2°	0,016/37,0°	0,69/−169,5°	31,7
	200	0,90/+178,6°	6,1/ 86,8°	0,023/52,8°	0,68/−176,8°	25,6
500	500	0,89/+170,5°	2,5/ 73,5°	0,047/65,2°	0,68/+175,8°	17,5
	800	0,88/+164,0°	1,6/ 62,5°	0,073/66,5°	0,67/+171,0°	12,5
	1000	0,86/+159,2°	1,3/ 56,6°	0,092/66,7°	0,65/+167,7°	10,5
	1200	0,84/+154,8°	1,2/ 50,6°	0,112/63,1°	0,64/+164,7°	9,2

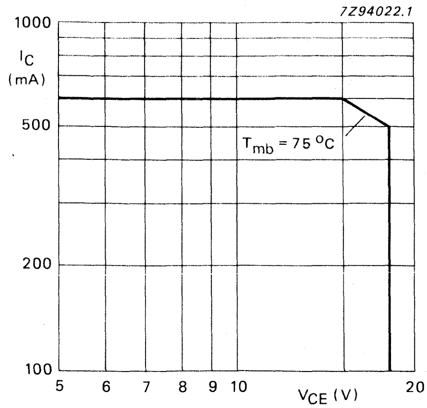


Fig. 3 D.C. SOAR.

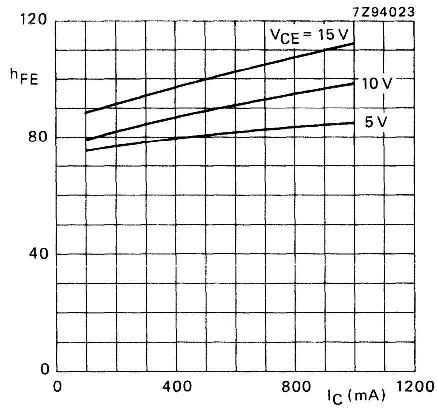


Fig. 4 T_j = 25 °C; typ. values.

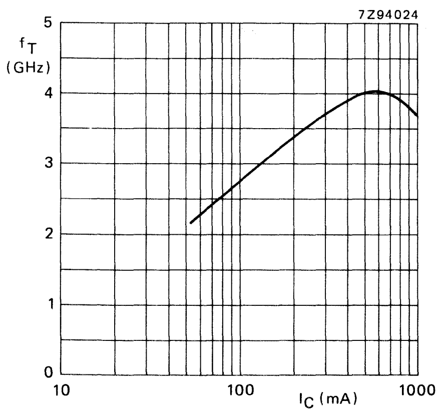


Fig. 5 V_{CE} = 15 V; f = 500 MHz;
T_j = 25 °C; typical values.

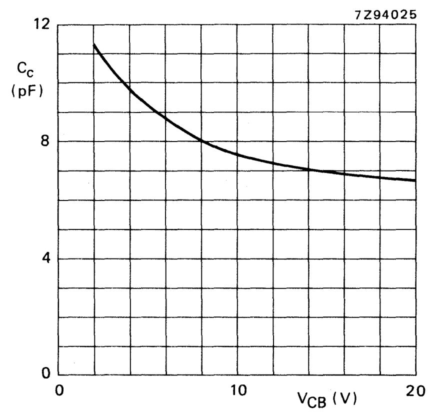


Fig. 6 $I_E = i_e = 0$; f = 1 MHz;
T_j = 25 °C; typical values.

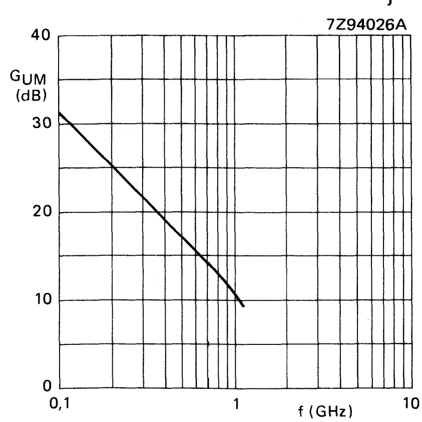
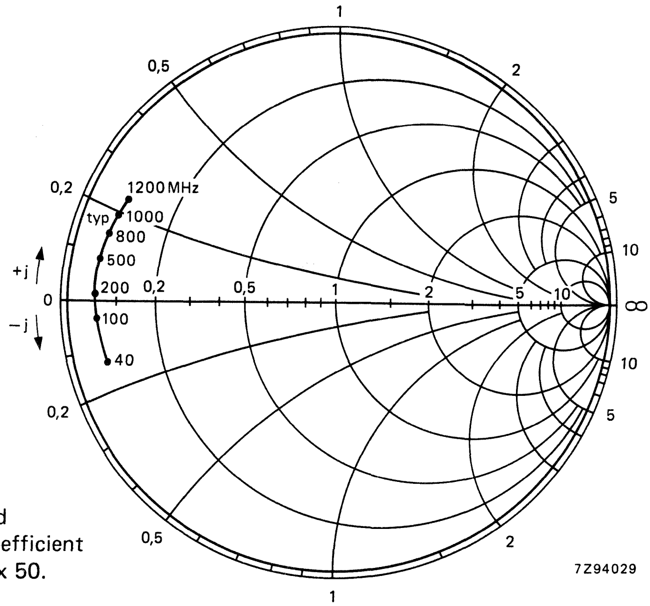


Fig. 7 V_{CE} = 15 V; I_C = 500 mA;
T_{amb} = 25 °C; typical values.

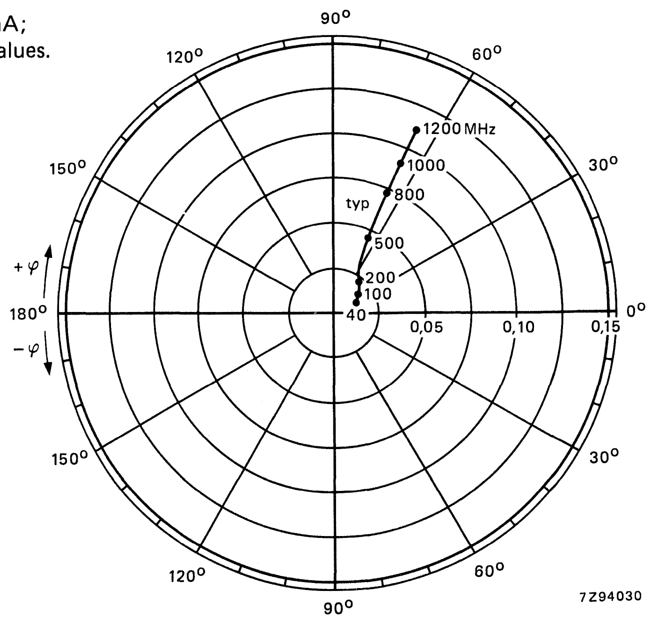


Input impedance derived from input reflection coefficient s_{ie} co-ordinates in ohm x 50.

Fig. 8.

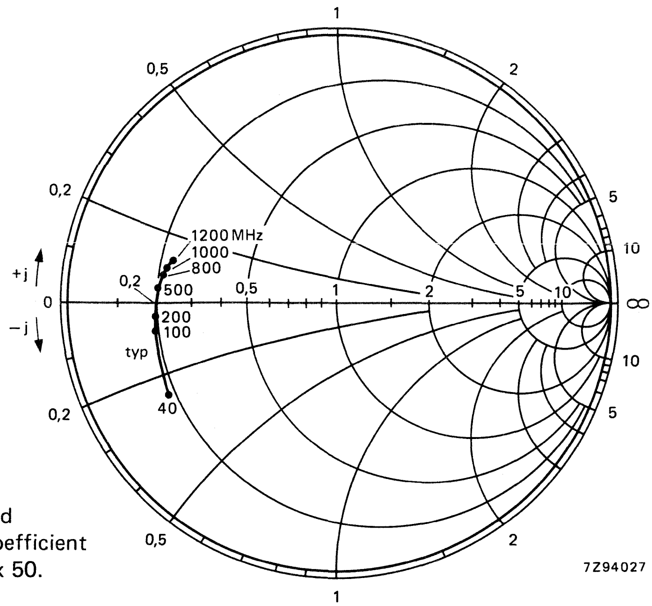
Conditions for Figs 8 and 9:

V_{CE} = 15 V; I_C = 500 mA;
T_{amb} = 25 °C; typical values.



Reverse transmission coefficient s_{re}.

Fig. 9.

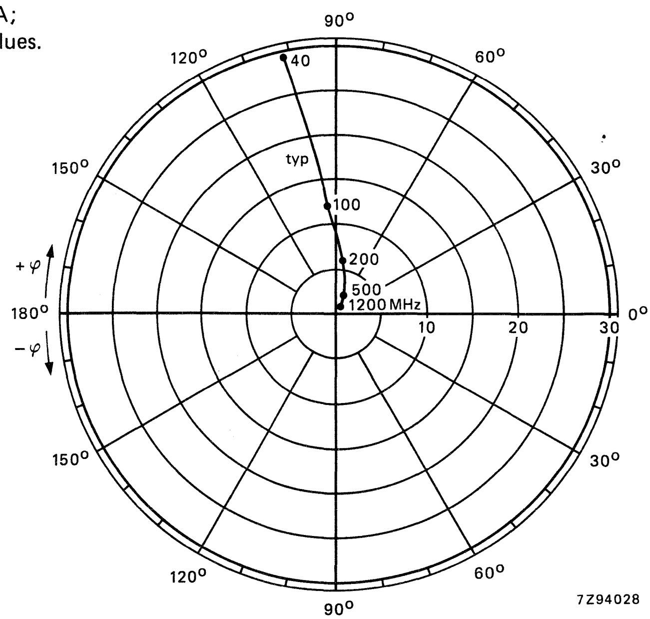


Output impedance derived from output reflection coefficient s_{oe} co-ordinates in ohm x 50.

Fig. 10.

Conditions for Figs 9 and 10:

V_{CE} = 15 V; I_C = 500 mA;
T_{amb} = 25 °C; typical values.



Forward transmission coefficient s_{fe}.

Fig. 11.

SILICON PLANAR EPITAXIAL TRANSISTOR

The BFQ149 is a PNP transistor in a SOT89 envelope, containing a BFQ32 crystal. The transistor is intended for use in UHF applications such as broadband aerial amplifiers (30 MHz to 860 MHz) and in microwave amplifiers such as radar systems, spectrum analyzers etc. using SMD technology.

QUICK REFERENCE DATA

Collector-base voltage (open emitter)	$-V_{CBO}$	max.	20	V
Collector-emitter voltage (open base)	$-V_{CEO}$	max.	15	V
Collector current (DC)	$-I_C$	max.	75	mA
Total power dissipation up to T_{amb} = 25 °C mounted on a ceramic substrate, area 2.5 cm^2, thickness = 0.7 mm	P_{tot}	max.	1	W
Junction temperature	T_j	max.	150	°C
DC current gain				
$-I_C$ = 50 mA; $-V_{CE}$ = 10 V	h_{FE}	min.	20	
$-I_C$ = 75 mA; $-V_{CE}$ = 10 V	h_{FE}	min.	20	
Transition frequency at f = 500 MHz				
$-I_C$ = 50 mA; $-V_{CE}$ = 10 V	f_T	min.	3.6	GHz
		typ.	4.2	GHz
$-I_C$ = 75 mA; $-V_{CE}$ = 10 V	f_T	min.	4.0	GHz
		typ.	4.6	GHz
Noise figure at f = 500 MHz, R_s = 60 Ω				
$-I_C$ = 50 mA; $-V_{CE}$ = 10 V; T_{amb} = 25 °C	F	typ.	3.75	dB
Maximum unilateral power gain at f = 500 MHz				
$-I_C$ = 50 mA; $-V_{CE}$ = 10 V; T_{amb} = 25 °C	G_{um}	typ.	12	dB

MECHANICAL DATA

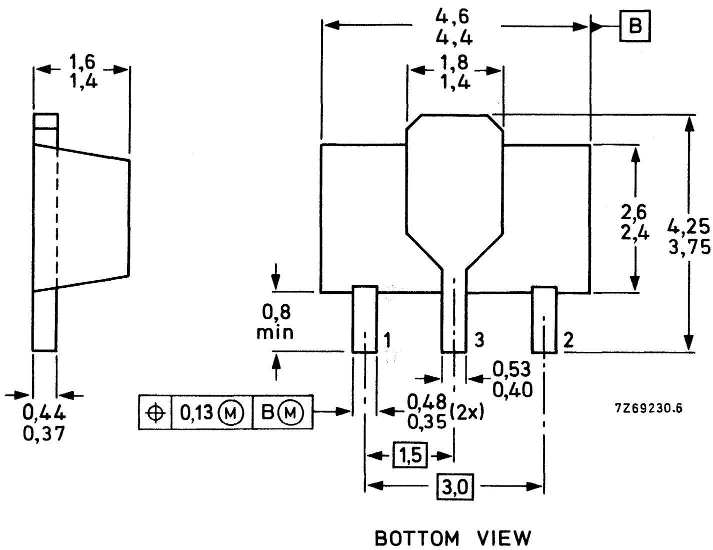
SOT-89 (See Fig. 1).

MECHANICAL DATA

Fig. 1 SOT89.

Dimensions in mm

Marking code: V2



RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134).

Collector-base voltage (open emitter)	$-V_{CBO}$	max.	20 V
Collector-emitter voltage (open base)	$-V_{CEO}$	max.	15 V
Emitter-base voltage (open collector)	$-V_{EBO}$	max.	3.0 V
Collector current (DC)	$-I_C$	max.	75 mA
Collector current (peak value); f min 1 MHz	$-I_{CM}$	max.	150 mA
Total power dissipation up tp T_{amb} = 25 °C mounted on a ceramic substrate, area = 2.5 cm^2, thickness = 0.7 mm	P_{tot}	max.	1 W
Storage temperature range	T_{stg}		−65 to 150 °C
Junction temperature	T_j	max.	150 °C

THERMAL RESISTANCE

From junction to ambient mounted on a ceramic substrate, area = 2.5 cm^2, thickness = 0.7 mm	$R_{th\ j\text{-}a}$		125 K/W

CHARACTERISTICS

$T_j = 25\ ^oC$ unless otherwise specified.

Collector cut off current			
$I_E = 0$, $-V_{CB} = 10$ V	I_{CBO}	max.	100 nA
DC current gain			
$-I_C = 50$ mA; $-V_{CE} = 10$ V	h_{FE}	min.	20
$-I_C = 75$ mA; $-V_{CE} = 10$ V	h_{FE}	min.	20
Transition frequency at f = 500 MHz			
$-I_C = 50$ mA; $-V_{CE} = 10$ V; $T_{amb} = 25\ ^oC$	f_T	min.	3.6 GHz
		typ.	4.2 GHz
$-I_C = 75$ mA; $-V_{CE} = 10$ V; $T_{amb} = 25\ ^oC$	f_T	min.	4.0 GHz
		typ.	4.[illegible] GHz
Collector capacitance			
$-V_{CB} = 10$ V; $I_E = 0$; f = 1 MHz	C_c	typ.	2.0 pF
Emitter capacitance			
$-V_{EB} = 0.5$ V; $I_C = 0$; f = 1 MHz	C_e	typ.	4.0 pF
Feedback capacitance			
$-V_{CE} = 10$ V; $I_C = 0$; f = 1 MHz	C_{re}	typ.	1.7 pF
Noise figure at f = 500 MHz; $R_s = 60\ \Omega$			
$-V_{CE} = 10$ V; $-I_C = 50$ mA; $T_{amb} = 25\ ^oC$	F	typ.	3.75 dB
Maximum unilateral power gain (s_{re} assumed to be zero)			
$-V_{CE} = 10$ V; $-I_C = 50$ mA; f = 500 MHz; $T_{amb} = 25\ ^oC$			
$G_{UM} = 10 \log \frac{\lvert s_{fe} \rvert^2}{(1 - \lvert s_{ie} \rvert^2)(1 - \lvert s_{oe} \rvert^2)}$	G_{UM}	typ.	12 dB

Table 1 S-parameters (common emitter) at V_{CE} = 10 V; typical values.

I_C mA	f MHz	s_{ie}	s_{fe}	s_{re}	s_{oe}	G_{UM}
10	40	0.42/−56.8	18.15/153.9	0.02/71.9	0.90/−21.2	33.3
	100	0.48/−115.9	12.21/123.6	0.04/56.5	0.64/−44.0	25.1
	200	0.49/−151.0	6.99/103.3	0.06/55.7	0.40/−53.0	18.8
	500	0.51/−176.5	2.99/78.0	0.11/63.6	0.27/−62.6	11.1
	800	0.52/159.3	1.98/63.7	0.17/66.1	0.27/−70.6	7.6
	1000	0.54/149.0	1.60/55.6	0.20/66.2	0.27/−76.0	5.9
	1200	0.57/137.7	1.37/50.3	0.24/66.7	0.27/−82.1	4.7
	1500	0.53/129.6	1.17/40.7	0.30/63.2	0.30/−89.4	3.2
	2000	0.56/104.4	0.96/31.2	0.41/58.9	0.31/−104.4	1.7
20	40	0.29/−88.4	24.14/148.1	0.02/70.4	0.84/−28.7	33.4
	100	0.43/−139.9	14.51/117.6	0.03/61.0	0.52/−54.8	25.5
	200	0.46/−164.5	7.95/99.7	0.05/65.6	0.31/−64.8	19.5
	500	0.49/170.8	3.31/77.5	0.12/70.0	0.20/−79.5	11.7
	800	0.50/155.9	2.18/64.4	0.18/68.6	0.20/−85.6	8.2
	1000	0.51/146.2	1.77/57.0	0.22/67.1	0.20/−91.5	6.5
	1200	0.54/135.0	1.51/52.1	0.26/66.3	0.20/−95.1	5.3
	1500	0.50/128.5	1.30/42.2	0.32/61.3	0.24/−100.2	3.8
	2000	0.52/103.8	1.08/32.3	0.42/56.1	0.25/−112.2	2.3
30	40	0.27/−111.5	27.56/144.5	0.02/69.9	0.79/−33.3	33.5
	100	0.43/−151.5	15.55/114.5	0.03/64.3	0.46/−60.8	25.8
	200	0.46/−170.6	8.30/97.8	0.05/70.2	0.26/−71.5	19.7
	500	0.48/168.5	3.42/77.0	0.12/72.0	0.17/−89.8	11.9
	800	0.49/154.4	2.25/64.4	0.19/69.6	0.18/−94.2	8.4
	1000	0.51/145.0	1.82/57.3	0.22/67.3	0.18/13.1	6.7
	1200	0.53/133.0	1.56/52.4	0.27/66.1	0.17/−103.9	5.5
	1500	0.49/128.0	1.34/42.7	0.33/60.7	0.22/−106.9	4.0
	2000	0.50/103.4	1.11/32.6	0.43/55.0	0.23/−117.2	2.4
50	40	0.29/−134.0	30.36/140.3	0.02/68.9	0.73/−38.2	33.3
	100	0.44/−161.4	16.10/111.3	0.03/69.8	0.40/−66.3	25.8
	200	0.46/−175.9	8.44/95.8	0.05/74.5	0.22/−77.6	19.8
	500	0.48/166.6	3.44/76.4	0.12/73.9	0.16/−98.7	12.0
	800	0.49/153.2	2.27/64.0	0.19/70.2	0.17/−101.6	8.4
	1000	0.51/144.2	1.84/57.0	0.23/67.7	0.17/−107.5	6.7
	1200	0.54/133.2	1.58/52.3	0.27/66.3	0.16/−111.6	5.5
	1500	0.49/127.5	1.36/42.5	0.34/60.2	0.21/−112.3	4.0
	2000	0.50/103.1	1.12/32.5	0.43/54.5	0.22/−121.6	2.5
70	40	0.32/−144.1	31.28/137.7	0.02/69.0	0.68/−40.8	33.0
	100	0.46/−165.9	15.91/109.3	0.03/72.2	0.36/−68.2	25.6
	200	0.47/−178.2	8.24/94.5	0.05/75.9	0.20/−78.3	19.6
	500	0.49/165.8	3.35/75.7	0.12/74.6	0.15/−99.6	11.8
	800	0.50/152.8	2.21/63.2	0.19/70.6	0.17/−101.9	8.2
	1000	0.52/143.9	1.78/56.3	0.23/68.0	0.17/−107.6	6.5
	1200	0.54/133.0	1.53/51.6	0.27/66.6	0.16/−112.0	5.4
	1500	0.50/127.2	1.32/41.7	0.34/60.5	0.21/−122.9	3.9
	2000	0.52/102.9	1.09/32.0	0.44/54.7	0.23/−122.7	2.3

NPN HIGH FREQUENCY TRANSISTOR

NPN silicon epitaxial transistor with a gold sandwich metallization to ensure optimum temperature profile and excellent reliability properties. It features high frequency behaviour and a low output capacitance.

This device is primarily intended for application in the pre-stage of the driver for high-resolution colour graphics monitors.

QUICK REFERENCE DATA

Collector-base voltage (open emitter)	V_{CBO}	max.	20 V
Collector-emitter voltage (open base)	V_{CEO}	max.	10 V
Collector current (DC)	I_C	max.	500 mA
Total power dissipation up to T_{mb} = 115 °C	P_{tot}	max.	3 W
Junction temperature	T_j	max.	175 °C
DC current gain I_C = 300 mA; V_{CE} = 5 V	h_{FE}	min.	25
Transition frequency at f = 100 MHz I_C = 300 mA; V_{CE} = 5 V; T_{amb} = 25 °C	f_T	min.	1.0 GHz

MECHANICAL DATA

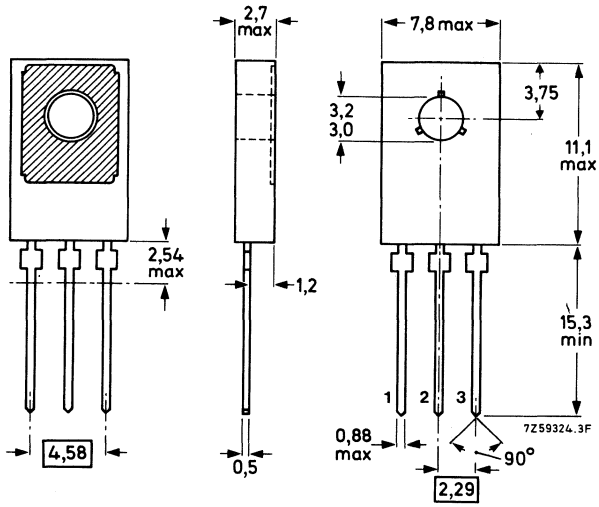
SOT32 (see Fig. 1)

MECHANICAL DATA

Dimensions in mm

Fig. 1 Plastic TO-126 (SOT32).

Collector connected to metal part of mounting surface.



Pinning

1 = emitter
2 = collector
3 = base

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134).

Collector-base voltage (open emitter)	V_{CBO}	max.	20	V
Collector-emitter voltage (open base)	V_{CEO}	max.	10	V
Emitter-base voltage (open collector)	V_{EBO}	max.	3	V
Collector current (DC)	I_C	max.	500	mA
Total power dissipation up to T_{mb} = 115 °C	P_{tot}	max.	3	W
Storage temperature range	T_{stg}		−65 to +175	°C
Junction temperature	T_j	max.	175	°C

THERMAL RESISTANCE

From junction to mounting-base	$R_{th\,j\text{-}mb}$	=	20 K/W
From junction to ambient (in free air)	$R_{th\,j\text{-}a}$	=	100 K/W

CHARACTERISTICS

T_j = 25 °C unless otherwise specified

Collector-base breakdown voltage open emitter; I_C = 5 mA	$V_{(BR)CBO}$	min.	20 V
Collector-emitter breakdown voltage open base; I_C = 10 mA	$V_{(BR)CEO}$	min.	10 V
Emitter-base breakdown voltage open collector; I_E = 1 mA	$V_{(BR)EBO}$	min.	3 V
Collector cut-off current V_{BE} = 0; V_{CE} = 10 V	I_{CES}	max.	2.5 mA
DC current gain I_C = 300 mA; V_{CE} = 5 V	h_{FE}	min.	25
Collector-base capacitance at f = 1 MHz I_C = 0; V_{CB} = 5 V	C_{cb}	typ.	4.2 pF
Collector capacitance at f = 1 MHz $I_E = i_e$ = 0; V_{CB} = 5 V	C_c	typ.	5.8 pF
Transition frequency at f = 100 MHz I_C = 300 mA; V_{CE} = 5 V	f_T	min.	1.0 GHz

NPN HIGH FREQUENCY TRANSISTOR

NPN silicon epitaxial transistor with a gold sandwich metallization to ensure optimum temperature profile and excellent reliability properties. It features high frquency behaviour and a low output capacitance.

This transistor is primarily intended for application in the pre-stage of the driver for high-resolution colour graphics monitors.

QUICK REFERENCE DATA

Collector-base voltage (open emitter)	V_{CBO}	max.	20 V
Collector-emitter voltage (open base)	V_{CEO}	max.	10 V
Collector current (DC)	I_C	max.	500 mA
Total power dissipation up to T_{case} = 95 °C	P_{tot}	max.	3 W
Junction temperature	T_j	max.	200 °C
DC current gain I_C = 300 mA; V_{CE} = 5 V	h_{FE}	min.	25
Transition frequency at f = 500 MHz I_C = 300 mA; V_{CE} = 5 V; T_{amb} = 25 °C	f_T	min.	1.0 GHz

MECHANICAL DATA

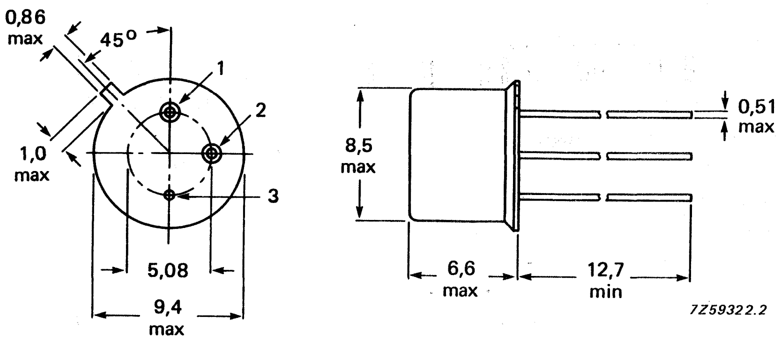
SOT5 (see Fig. 1)

MECHANICAL DATA

Dimensions in mm

Fig. 1 TO-39 (SOT5).

Collector connected to case



Pinning

1 = emitter
2 = base
3 = collector

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134).

Collector-base voltage (open emitter)	V_{CBO}	max.	20	V
Collector-emitter voltage (open base)	V_{CEO}	max.	10	V
Emitter-base voltage (open collector)	V_{EBO}	max.	3	V
Collector current (DC)	I_C	max.	500	mA
Total power dissipation up to T_{case} = 95 °C	P_{tot}	max.	3	W
Storage temperature range	T_{stg}		−65 to +175	°C
Junction temperature	T_j	max.	200	°C

THERMAL RESISTANCE

From junction to case	$R_{th\ j\text{-}ca}$	=	35 K/W
From junction to ambient (in free air)	$R_{th\ j\text{-}a}$	=	250 K/W

CHARACTERISTICS

T_j = 25 °C unless otherwise specified

Collector-base breakdown voltage open emitter; I_C = 5 mA	$V_{(BR)CBO}$	min.	20 V
Collector-emitter breakdown voltage open base; I_C = 10 mA	$V_{(BR)CEO}$	min.	10 V
Emitter-base breakdown voltage open collector; I_E = 1 mA	$V_{(BR)EBO}$	min.	3 V
Collector cut-off current V_{BE} = 0; V_{CE} = 10 V	I_{CES}	max.	2.5 mA
DC current gain I_C = 300 mA; V_{CE} = 5 V	h_{FE}	min.	25
Collector-base capacitance at f = 1 MHz I_C = 0; V_{CB} = 5 V	C_{cb}	typ.	4.5 pF
Collector capacitance at f = 1 MHz I_E = i_e = 0; V_{CB} = 5 V	C_c	typ.	6.0 pF
Transition frequency at f = 500 MHz I_C = 300 mA; V_{CE} = 5 V	f_T	min.	1 GHz

NPN HIGH FREQUENCY HIGH VOLTAGE TRANSISTOR

NPN silicon epitaxial transistor with emitter ballasting resistors and a gold sandwich metallization to ensure optimum temperature profile and excellent reliability properties. It features high break-down voltages and a low output capacitance.

This transistor is primarily intended for application in the buffer stage of the driver for high-resolution colour graphics monitors.

Its pnp complement is the BFQ252.

QUICK REFERENCE DATA

Collector-base voltage (open emitter)	V_{CBO}	max.	100	V
Collector-emitter voltage (open base)	V_{CEO}	max.	65	V
Collector current (DC)	I_C	max.	300	mA
Total power dissipation up to T_{mb} = 115 °C	P_{tot}	max.	3	W
Junction temperature	T_j	max.	175	°C
DC current gain I_C = 50 mA; V_{CE} =10 V	h_{FE}	min.	20	
Transition frequency at f = 100 MHz I_C = 50 mA; V_{CE} = 10 V; T_{amb} = 25 °C	f_T	min.	1.0	GHz

MECHANICAL DATA

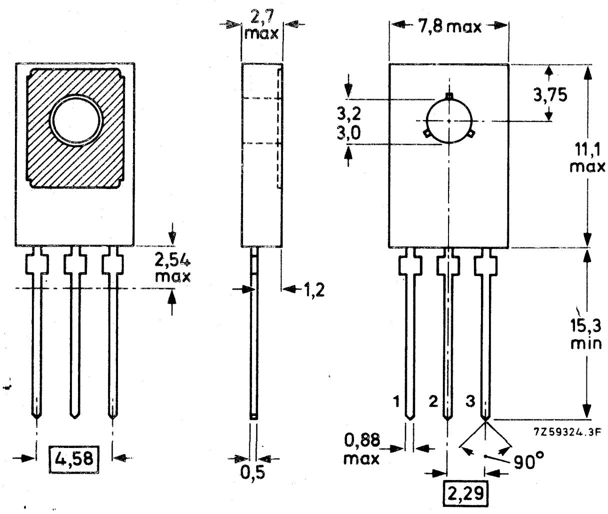
SOT32 (see Fig. 1)

MECHANICAL DATA

Dimensions in mm

Fig. 1 Plastic TO-126 (SOT32).

Collector connected to metal part of mounting surface.



Pinning

1 = emitter
2 = collector
3 = base

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134).

Collector-base voltage (open emitter)	V_{CBO}	max.	100	V
Collector-emitter voltage (open base)	V_{CEO}	max.	65	V
Emitter-base voltage (open collector)	V_{EBO}	max.	3	V
Collector current (DC)	I_C	max.	300	mA
Total power dissipation up to T_{mb} = 115 °C	P_{tot}	max.	3	W
Storage temperature range	T_{stg}		−65 to +175	°C
Junction temperature	T_j	max.	175	°C

THERMAL RESISTANCE

From junction to mounting-base	$R_{th\,j\text{-}mb}$	=	20 K/W
From junction to ambient (in free air)	$R_{th\,j\text{-}a}$	=	100 K/W

CHARACTERISTICS

T_j = 25 °C unless otherwise specified

Collector-base breakdown voltage open emitter; I_C = 0.1 mA	$V_{(BR)CBO}$	min.	100 V
Collector-emitter breakdown voltage open base; I_C = 10 mA	$V_{(BR)CEO}$	min.	65 V
Emitter-base breakdown voltage open collector; I_E = 0.1 mA	$V_{(BR)EBO}$	min.	3 V
Collector cut-off current I_B = 0; V_{CE} = 50 V	I_{CES}	max.	100 μA
Collector cut-off current I_E = 0; V_{CB} = 50 V	I_{CBO}	max.	20 μA
DC current gain I_C = 50 mA; V_{CE} = 10 V	h_{FE}	min.	20
Collector-base capacitance at f = 1 MHz I_C = 0; V_{CB} = 10 V	C_{cb}	typ.	2.0 pF
Transition frequency at f = 100 MHz I_C = 50 mA; V_{CE} = 10 V	f_T	min.	1.0 GHz
		typ.	1.4 GHz

NPN HIGH FREQUENCY HIGH VOLTAGE TRANSISTOR

NPN silicon epitaxial transistor with emitter ballasting resistors and a gold sandwich metallization to ensure optimum temperature profile and excellent reliability properties. It features high break-down voltages and a low output capacitance.

This transistor is primarily intended for application in the buffer stage of the driver for high-resolution colour graphics.

Its pnp complement is the BFQ253.

QUICK REFERENCE DATA

Collector-base voltage (open emitter)	V_{CBO}	max.	100	V
Collector-emitter voltage (open base)	V_{CEO}	max.	65	V
Collector current (DC)	I_C	max.	300	mA
Total power dissipation up to T_{case} = 122 °C	P_{tot}	max.	3	W
Junction temperature	T_j	max.	200	°C
DC current gain I_C = 50 mA; V_{CE} = 10 V	h_{FE}	min.	20	
Transition frequency at f = 500 MHz I_C = 50 mA; V_{CE} = 10 V; T_{amb} = 25 °C	f_T	min.	1.0	GHz

MECHANICAL DATA

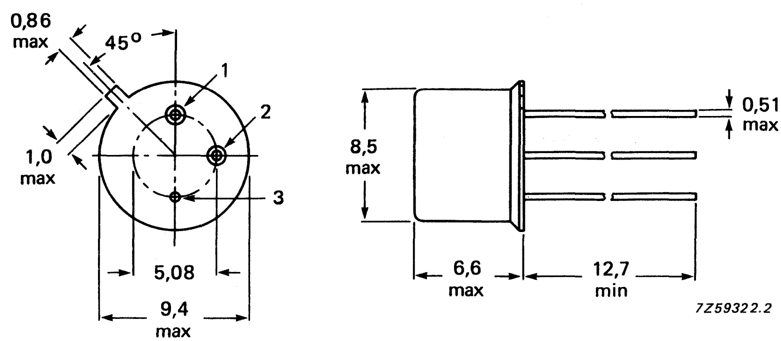
SOT5 (see Fig. 1)

MECHANICAL DATA

Dimensions in mm

Fig. 1 TO-39 (SOT5).

Collector connected to case



Pinning

1 = emitter
2 = base
3 = collector

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134).

Collector-base voltage (open emitter)	V_{CBO}	max.	100	V
Collector-emitter voltage (open base)	V_{CEO}	max.	65	V
Emitter-base voltage (open collector)	V_{EBO}	max.	3	V
Collector current (DC)	I_C	max.	300	mA
Total power dissipation up to T_{case} = 122 °C	P_{tot}	max.	3	W
Storage temperature range	T_{stg}		−65 to +175	°C
Junction temperature	T_j	max.	200	°C

THERMAL RESISTANCE

From junction to case	$R_{th\,j\text{-}ca}$	=	26 K/W
From junction to ambient (in free air)	$R_{th\,j\text{-}a}$	=	250 K/W

CHARACTERISTICS

T_j = 25 °C unless otherwise specified

Collector-base breakdown voltage open emitter; I_C = 0.1 mA	$V_{(BR)CBO}$	min.	100 V
Collector-emitter breakdown voltage open base; I_C = 10 mA	$V_{(BR)CEO}$	min.	65 V
Emitter-base breakdown voltage open collector; I_E = 0.1 mA	$V_{(BR)EBO}$	min.	3 V
Collector cut-off current I_B = 0; V_{CE} = 50 V	I_{CES}	max.	100 μA
Collector cut-off current I_E = 0; V_{CB} = 50	I_{CBO}	max.	20 μA
DC current gain I_C = 50 mA; V_{CE} = 10 V	h_{FE}	min.	20
Collector-base capacitance at f = 1 MHz I_C = 0; V_{CB} = 10 V	C_{cb}	typ.	2.0 pF
Transition frequency at f = 500 MHz I_C = 50 mA; V_{CE} = 10 V	f_T	min.	1.0 GHz
		typ.	1.4 GHz

NPN HIGH FREQUENCY HIGH VOLTAGE TRANSISTOR

NPN silicon epitaxial transistor with emitter ballasting resistors and a gold sandwich metallization to ensure optimum temperature profile and excellent reliability properties. It features high break-down voltages and a low output capacitance.

This transistor is primarily intended for application in the buffer stage of the driver for high-resolution colour graphics monitors.

Its pnp complement is the BFQ254.

The transistor has a 4-lead stud envelope with a ceramic cap (SOT172). All leads are isolated from the stud.

QUICK REFERENCE DATA

Collector-base voltage (open emitter)	V_{CBO}	max.	100 V
Collector-emitter voltage (open base)	V_{CEO}	max.	65 V
Collector current (DC)	I_C	max.	300 mA
Total power dissipation up to T_{case} = 140 °C	P_{tot}	max.	3 W
Junction temperature	T_j	max.	200 °C
DC current gain I_C = 50 mA; V_{CE} = 10 V	h_{FE}	min.	20
Transition frequency at f = 500 MHz I_C = 50 mA; V_{CE} = 10 V; T_{amb} = 25 °C	f_T	min.	1.0 GHz

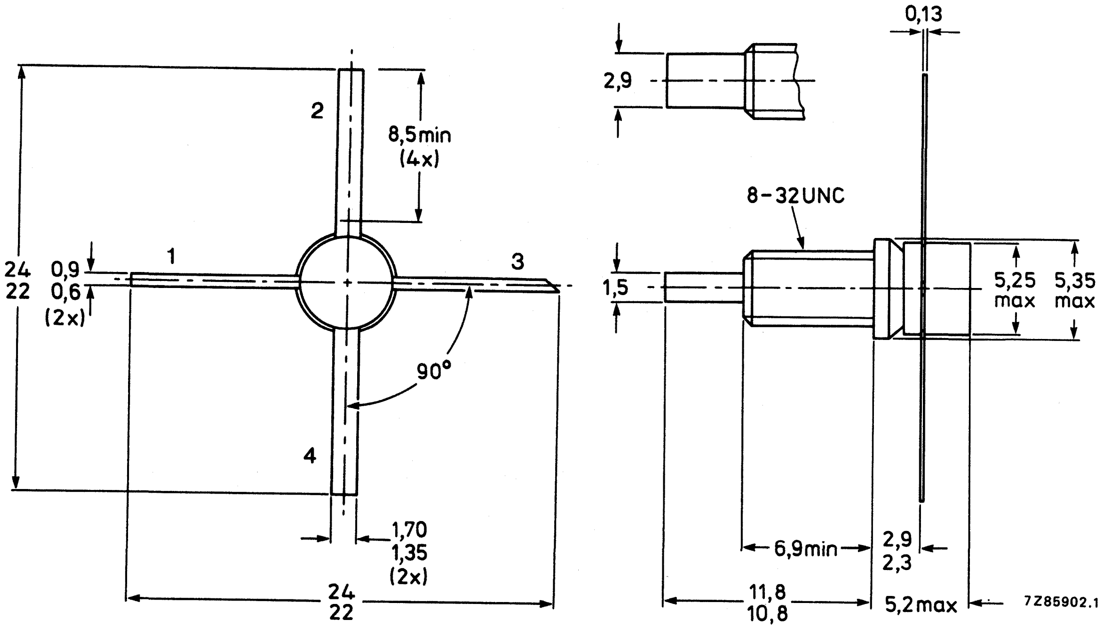
MECHANICAL DATA

SOT172A1 (see Fig. 1)

MECHANICAL DATA

Dimensions in mm

Fig. 1 SOT172A1.



Pinning

1 = collector
2,4 = base
3 = emitter

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134).

Collector-base voltage (open emitter)	V_{CBO}	max.	100	V
Collector-emitter voltage (open base)	V_{CEO}	max.	65	V
Emitter-base voltage (open collector)	V_{EBO}	max.	3	V
Collector current (DC)	I_C	max.	300	mA
Total power dissipation up to T_{case} = 140 °C	P_{tot}	max.	3	W
Storage temperature range	T_{stg}		−65 to +175	°C
Junction temperature	T_j	max.	200	°C

THERMAL RESISTANCE

From junction to mounting-base	$R_{th\ j\text{-}mb}$	=	20 K/W
From mounting-base to heatsink	$R_{th\ mb\text{-}hs}$	=	0.8 K/W

CHARACTERISTICS

T_j = 25 °C unless otherwise specified

Collector-base breakdown voltage open emitter; I_C = 0.1 mA	$V_{(BR)CBO}$	min.	100 V
Collector-emitter breakdown voltage open base; I_C = 10 mA	$V_{(BR)CEO}$	min.	65 V
Emitter-base breakdown voltage open collector; I_E = 0.1 mA	$V_{(BR)EBO}$	min.	3 V
Collector cut-off current I_B = 0; V_{CE} = 50 V	I_{CES}	max.	100 μA
Collector cut-off current I_E = 0; V_{CB} = 50	I_{CBO}	max.	20 μA
DC current gain I_C = 50 mA; V_{CE} = 10 V	h_{FE}	min.	20
Collector-base capacitance at f = 1 MHz I_C = 0; V_{CB} = 10 V	C_{cb}	typ.	2.0 pF
Transition frequency at f = 500 MHz I_C = 50 mA; V_{CE} = 10 V	f_T	min. typ.	1.0 GHz 1.4 GHz

PNP HIGH FREQUENCY HIGH VOLTAGE TRANSISTOR

PNP silicon epitaxial transistor with emitter ballasting resistors and a gold sandwich metallization to ensure optimum temperature profile and excellent reliability properties. It features high break-down voltages and a low output capacitance.

This transistor is primarily intended for application in the buffer stage of the driver for high-resolution colour graphics monitors.

Its npn complement is the BFQ232.

QUICK REFERENCE DATA

Collector-base voltage (open emitter)	$-V_{CBO}$	max.	100	V
Collector-emitter voltage (open base)	$-V_{CEO}$	max.	65	V
Collector current (DC)	$-I_C$	max.	300	mA
Total power dissipation up to T_{mb} = 115 °C	P_{tot}	max.	3	W
Junction temperature	T_j	max.	175	°C
DC current gain $-I_C$ = 50 mA; $-V_{CE}$ = 10 V	h_{FE}	min.	20	
Transition frequency at f = 100 MHz $-I_C$ = 50 mA; $-V_{CE}$ = 10 V; T_{amb} = 25 °C	f_T	min.	1.0	GHz

MECHANICAL DATA

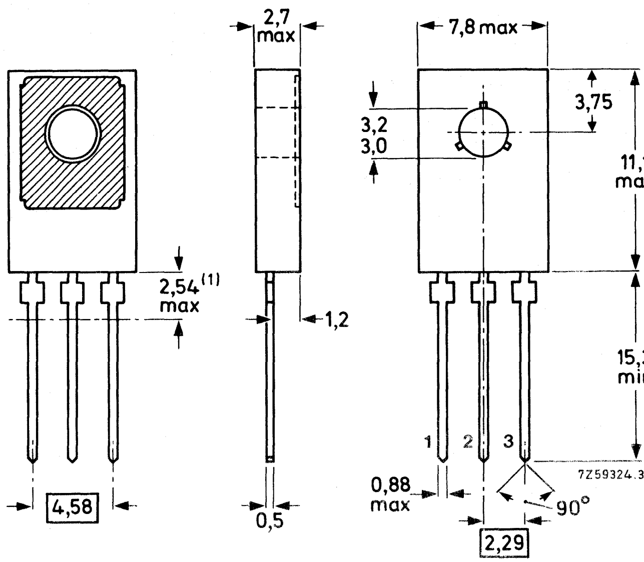
SOT32 (see Fig. 1).

MECHANICAL DATA

Dimensions in mm

Fig. 1 Plastic TO-126 (SOT32).

Collector connected to metal part of mounting surface.



Pinning

1 = emitter
2 = collector
3 = base

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134).

Collector-base voltage (open emitter)	$-V_{CBO}$	max.	100	V
Collector-emitter voltage (open base)	$-V_{CEO}$	max.	65	V
Emitter-base voltage (open collector)	$-V_{EBO}$	max.	3	V
Collector current (DC)	$-I_C$	max.	300	mA
Total power dissipation up to T_{mb} = 115 °C	P_{tot}	max.	3	W
Storage temperature range	T_{stg}		−65 to +175	°C
Junction temperature	T_j	max.	175	°C

THERMAL RESISTANCE

From junction to mounting-base	$R_{th\,j\text{-}mb}$	=	20 K/W
From junction to ambient (in free air)	$R_{th\,j\text{-}a}$	=	100 K/W

CHARACTERISTICS

T_j = 25 °C unless otherwise specified

Collector-base breakdown voltage open emitter; I_C = 0.1 mA	$-V_{(BR)CBO}$	min.	100 V
Collector-emitter breakdown voltage open base; I_C = 10 mA	$-V_{(BR)CEO}$	min.	65 V
Emitter-base breakdown voltage open collector; I_E = 0.1 mA	$-V_{(BR)EBO}$	min.	3 V
Collector cut-off current I_B = 0; $-V_{CE}$ = 50 V	$-I_{CES}$	max.	100 μA
Collector cut-off current I_E = 0; $-V_{CB}$ = 50 V	$-I_{CBO}$	max.	20 μA
DC current gain $-I_C$ = 50 mA; $-V_{CE}$ = 10 V	h_{FE}	min.	20
Collector-base capacitance at f = 1 MHz I_C = 0; $-V_{CB}$ = 10 V	C_{cb}	typ.	2.5 pF
Transition frequency at f = 100 MHz $-I_C$ = 50 mA; $-V_{CE}$ = 10 V	f_T	min.	1.0 GHz
		typ.	1.3 GHz

PNP HIGH FREQUENCY HIGH VOLTAGE TRANSISTOR

PNP silicon epitaxial transistor with emitter ballasting resistors and a gold sandwich metallization to ensure optimum temperature profile and excellent reliability properties. It features high break-down voltages and a low output capacitance.

This transistor is primarily intended for application in the buffer stage of the driver for high-resolution colour graphics monitors.

Its npn complement is the BFQ233.

QUICK REFERENCE DATA

Collector-base voltage (open emitter)	$-V_{CBO}$	max.	100 V
Collector-emitter voltage (open base)	$-V_{CEO}$	max.	65 V
Collector current (DC)	$-I_C$	max.	300 mA
Total power dissipation up to T_{case} = 122 °C	P_{tot}	max.	3 W
Junction temperature	T_j	max.	200 °C
DC current gain $-I_C$ = 50 mA; $-V_{CE}$ = 10 V	h_{FE}	min.	20
Transition frequency at f = 500 MHz $-I_C$ = 50 mA; $-V_{CE}$ = 10 V; T_{amb} = 25 °C	f_T	min.	1.0 GHz

MECHANICAL DATA

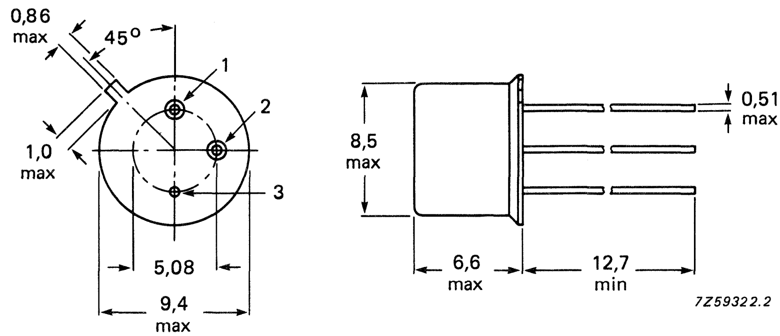
SOT5 (see Fig. 1).

MECHANICAL DATA

Dimensions in mm

Fig. 1 TO-39 (SOT5).

Collector connected to case



Pinning

1 = emitter
2 = base
3 = collector

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134).

Collector-base voltage (open emitter)	$-V_{CBO}$	max.	100	V
Collector-emitter voltage (open base)	$-V_{CEO}$	max.	65	V
Emitter-base voltage (open collector)	$-V_{EBO}$	max.	3	V
Collector current (DC)	$-I_C$	max.	300	mA
Total power dissipation up to T_{case} = 122 °C	P_{tot}	max.	3	W
Storage temperature range	T_{stg}		−65 to +175	°C
Junction temperature	T_j	max.	200	°C

THERMAL RESISTANCE

From junction to case	$R_{th\,j\text{-}ca}$	=	26 K/W
From junction to ambient (in free air)	$R_{th\,j\text{-}a}$	=	250 K/W

CHARACTERISTICS

$T_j = 25\ ^oC$ unless otherwise specified

Collector-base breakdown voltage open emitter; $I_C = 0.1$ mA	$-V_{(BR)CBO}$	min.	100 V
Collector-emitter breakdown voltage open base; $I_C = 10$ mA	$-V_{(BR)CEO}$	min.	65 V
Emitter-base breakdown voltage open collector; $I_E = 0.1$ mA	$-V_{(BR)EBO}$	min.	3 V
Collector cut-off current $I_B = 0$; $-V_{CE} = 50$ V	$-I_{CES}$	max.	100 μA
Collector cut-off current $I_E = 0$; $-V_{CB} = 50$ V	$-I_{CBO}$	max.	20 μA
DC current gain $-I_C = 50$ mA; $-V_{CE} = 10$ V	h_{FE}	min.	20
Collector-base capacitance at f = 1 MHz $I_C = 0$; $-V_{CB} = 10$ V	C_{cb}	typ.	2.5 pF
Transition frequency at f = 500 MHz $-I_C = 50$ mA; $-V_{CE} = 10$ V	f_T	min.	1.0 GHz
		typ.	1.3 GHz

PNP HIGH FREQUENCY HIGH VOLTAGE TRANSISTOR

PNP silicon epitaxial transistor with emitter ballasting resistors and a gold sandwich metallization to ensure optimum temperature profile and excellent reliability properties. It features high break-down voltages and a low output capacitance.

This transistor is primarily intended for application in the buffer stage of the driver for high-resolution colour graphics monitors.

Its npn complement is the BFQ234.

The transistor has a 4-lead stud envelope with a ceramic cap (SOT172).

All leads are isolated from the stud.

QUICK REFERENCE DATA

Collector-base voltage (open emitter)	$-V_{CBO}$	max.	100 V
Collector-emitter voltage (open base)	$-V_{CEO}$	max.	65 V
Collector current (DC)	$-I_C$	max.	300 mA
Total power dissipation up to T_{case} = 140 °C	P_{tot}	max.	3 W
Junction temperature	T_j	max.	200 °C
DC current gain $-I_C$ = 50 mA; $-V_{CE}$ = 10 V	h_{FE}	min.	20
Transition frequency at f = 500 MHz $-I_C$ = 50 mA; $-V_{CE}$ = 10 V; T_{amb} = 25 °C	f_T	min.	1.0 GHz

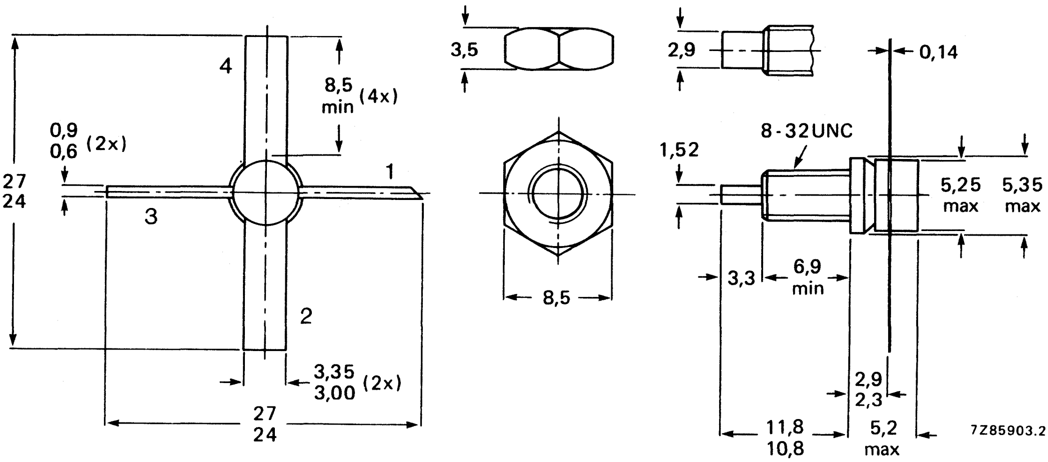
MECHANICAL DATA

SOT172A1 (see Fig. 1).

MECHANICAL DATA

Dimensions in mm

Fig. 1 SOT172A1.



Pinning

1 = collector
2,4 = base
3 = emitter

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134).

Collector-base voltage (open emitter)	$-V_{CBO}$	max.	100	V
Collector-emitter voltage (open base)	$-V_{CEO}$	max.	65	V
Emitter-base voltage (open collector)	$-V_{EBO}$	max.	3	V
Collector current (DC)	$-I_C$	max.	300	mA
Total power dissipation up to T_{case} = 140 °C	P_{tot}	max.	3	W
Storage temperature range	T_{stg}		−65 to +175	°C
Junction temperature	T_j	max.	200	°C

THERMAL RESISTANCE

From junction to mounting-base	$R_{th\ j\text{-}mb}$	=	20 K/W
From mounting-base to heatsink	$R_{th\ mb\text{-}hs}$	=	0.8 K/W

CHARACTERISTICS

$T_j = 25\ ^oC$ unless otherwise specified

Collector-base breakdown voltage open emitter; $I_C = 0.1$ mA	$-V_{(BR)CBO}$	min.	100 V
Collector-emitter breakdown voltage open base; $I_C = 10$ mA	$-V_{(BR)CEO}$	min.	65 V
Emitter-base breakdown voltage open collector; $I_E = 0.1$ mA	$-V_{(BR)EBO}$	min.	3 V
Collector cut-off current $I_B = 0$; $-V_{CE} = 50$ V	$-I_{CES}$	max.	100 μA
Collector cut-off current $I_E = 0$; $-V_{CB} = 50$ V	$-I_{CBO}$	max.	20 μA
DC current gain $-I_C = 50$ mA; $-V_{CE} = 10$ V	h_{FE}	min.	20
Collector-base capacitance at f = 1 MHz $I_C = 0$; $-V_{CB} = 10$ V	C_{cb}	typ.	2.5 pF
Transition frequency at f = 500 MHz $-I_C = 50$ mA; $-V_{CE} = 10$ V	f_T	min. typ.	1.0 GHz 1.3 GHz

NPN HIGH FREQUENCY HIGH VOLTAGE TRANSISTOR

NPN silicon epitaxial transistor with emitter ballasting resistors and a gold sandwich metallization to ensure optimum temperature profile and excellent reliability properties. It features high break-down voltages and a low output capacitance.

This transistor is primarily intended for application in the buffer stage of the driver for high-resolution colour graphics monitors.

QUICK REFERENCE DATA

Collector-base voltage (open emitter)	V_{CBO}	max.	100	V
Collector-emitter voltage (open base)	V_{CEO}	max.	65	V
Collector current (DC)	I_C	max.	400	mA
Total power dissipation up to T_{mb} = 85 °C	P_{tot}	max.	5	W
Junction temperature	T_j	max.	175	°C
DC current gain I_C = 100 mA; V_{CE} = 10 V	h_{FE}	min.	15	
Transition frequency at f = 100 MHz I_C = 100 mA; V_{CE} = 10 V; T_{amb} = 25 °C	f_T	min.	1.0	GHz

MECHANICAL DATA

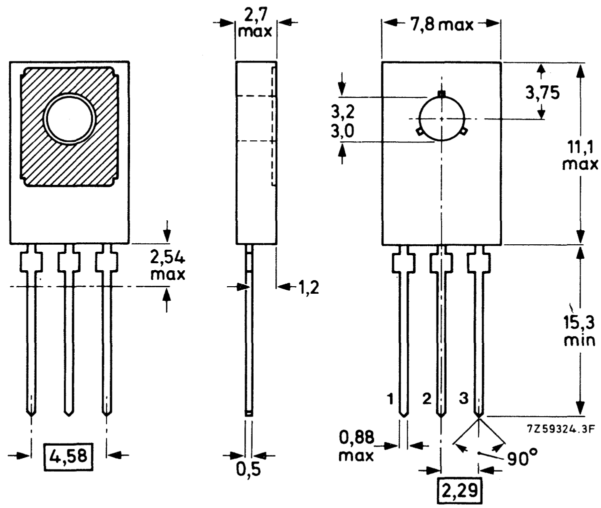
SOT32 (see Fig. 1)

MECHANICAL DATA

Dimensions in mm

Fig. 1 Plastic TO-126 (SOT32).

Collector connected to metal part of mounting surface.



Pinning

1 = emitter
2 = collector
3 = base

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134).

Collector-base voltage (open emitter)	V_{CBO}	max.	100	V
Collector-emitter voltage (open base)	V_{CEO}	max.	65	V
Emitter-base voltage (open collector)	V_{EBO}	max.	3	V
Collector current (DC)	I_C	max.	400	mA
Total power dissipation up to T_{mb} = 85 °C	P_{tot}	max.	5	W
Storage temperature range	T_{stg}		−65 to +175	°C
Junction temperature	T_j	max.	175	°C

THERMAL RESISTANCE

From junction to mounting-base	$R_{th\,j\text{-}mb}$	=	18 K/W
From junction to ambient (in free air)	$R_{th\,j\text{-}a}$	=	100 K/W

CHARACTERISTICS

$T_j = 25\ ^{o}C$ unless otherwise specified

Collector-base breakdown voltage open emitter; $I_C = 0.1$ mA	$V_{(BR)CBO}$	min.	100 V
Collector-emitter breakdown voltage open base; $I_C = 10$ mA	$V_{(BR)CEO}$	min.	65 V
Emitter-base breakdown voltage open collector; $I_E = 0.1$ mA	$V_{(BR)EBO}$	min.	3 V
Collector cut-off current $I_B = 0$; $V_{CE} = 50$ V	I_{CES}	max.	100 μA
Collector cut-off current $I_E = 0$; $V_{CB} = 50$ V	I_{CBO}	max.	20 μA
DC current gain $I_C = 100$ mA; $V_{CE} = 10$ V	h_{FE}	min.	15
Collector-base capacitance at f = 1 MHz $I_C = 0$; $V_{CB} = 10$ V	C_{cb}	typ.	2.0 pF
Collector capacitance at f = 1 MHz $I_E = i_e = 0$; $V_{CB} = 10$ V	C_c	typ.	3.5 pF
Transition frequency at f = 100 MHz $I_C = 100$ mA; $V_{CE} = 10$ V	f_T	min.	1.0 GHz
		typ.	1.4 GHz

NPN HIGH FREQUENCY HIGH VOLTAGE TRANSISTOR

NPN silicon epitaxial transistor with emitter ballasting resistors and a gold sandwich metallization to ensure optimum temperature profile and excellent reliability properties. It features high break-down voltages and a low output capacitance.

This transistor is primarily intended for application in the buffer stage of the driver for high-resolution colour graphics monitors.

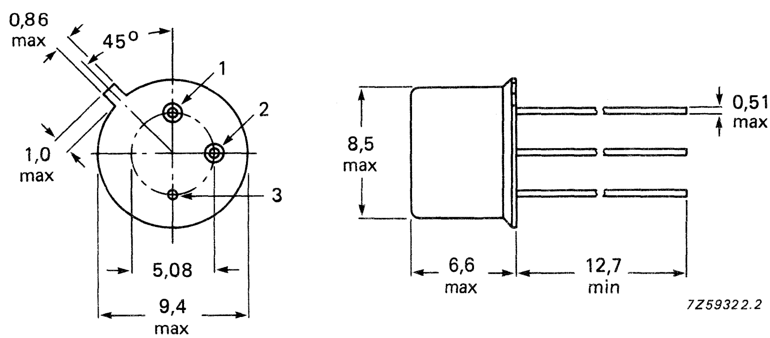
QUICK REFERENCE DATA

Collector-base voltage (open emitter)	V_{CBO}	max.	100	V
Collector-emitter voltage (open base)	V_{CEO}	max.	65	V
Collector current (DC)	I_C	max.	400	mA
Total power dissipation up to T_{case} = 95 °C	P_{tot}	max.	5	W
Junction temperature	T_j	max.	200	°C
DC current gain I_C = 100 mA; V_{CE} = 10 V	h_{FE}	min.	15	
Transition frequency at f = 100 MHz I_C = 100 mA; V_{CE} = 10 V; T_{amb} = 25 °C	f_T	min.	1.0	GHz

MECHANICAL DATA

Dimensions in mm

Fig. 1 SOT5.



Pinning

1 = emitter
2 = base
3 = collector

NPN HIGH FREQUENCY HIGH VOLTAGE TRANSISTOR

NPN silicon epitaxial transistor with emitter ballasting resistors and a gold sandwich metallization to ensure optimum temperature profile and excellent reliability properties. It features high break-down voltages and a low output capacitance.

This transistor is primarily intended for application in the buffer stage of the driver for high-resolution colour graphics monitors.

The transistor has a 4-lead stud envelope with a ceramic cap (SOT172).

All leads are isolated from the stud.

QUICK REFERENCE DATA

Collector-base voltage (open emitter)	V_{CBO}	max.	100 V
Collector-emitter voltage (open base)	V_{CEO}	max.	65 V
Collector current (DC)	I_C	max.	400 mA
Total power dissipation up to T_{mb} = 100 °C	P_{tot}	max.	5 W
Junction temperature	T_j	max.	200 °C
DC current gain I_C = 100 mA; V_{CE} = 10 V	h_{FE}	min.	15
Transition frequency at f = 500 MHz I_C = 100 mA; V_{CE} = 10 V; T_{amb} = 25 °C	f_T	min.	1.0 GHz

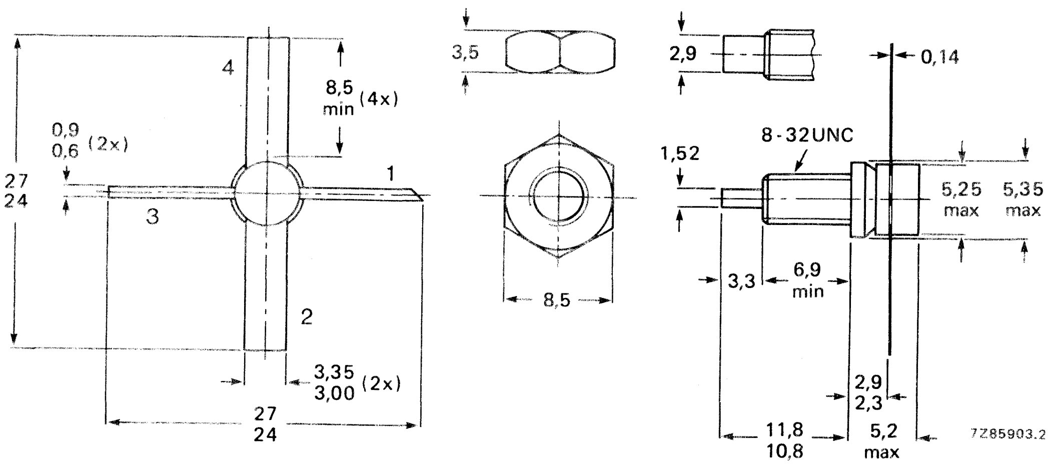
MECHANICAL DATA

SOT172A1 (see Fig. 1)

MECHANICAL DATA

Fig. 1 SOT172A1.

Dimensions in mm



Pinning

1 = collector
2,4 = base
3 = emitter

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134).

Collector-base voltage (open emitter)	V_{CBO}	max.	100	V
Collector-emitter voltage (open base)	V_{CEO}	max.	65	V
Emitter-base voltage (open collector)	V_{EBO}	max.	3	V
Collector current (DC)	I_C	max.	400	mA
Total power dissipation up to T_{mb} = 100 °C	P_{tot}	max.	5	W
Storage temperature range	T_{stg}		−65 to +175	°C
Junction temperature	T_j	max.	200	°C

THERMAL RESISTANCE

From junction to mounting-base	$R_{th\ j\text{-}mb}$	=	20 K/W
From mounting-base to heatsink	$R_{th\ mb\text{-}hs}$	=	0.8 K/W

CHARACTERISTICS

T_j = 25 °C unless otherwise specified

Collector-base breakdown voltage open emitter; I_C = 0.1 mA	$V_{(BR)CBO}$	min.	100 V
Collector-emitter breakdown voltage open base; I_C = 10 mA	$V_{(BR)CEO}$	min.	65 V
Emitter-base breakdown voltage open collector; I_E = 0.1 mA	$V_{(BR)EBO}$	min.	3 V
Collector cut-off current I_B = 0; V_{CE} = 50 V	I_{CES}	max.	100 μA
Collector cut-off current I_E = 0; V_{CB} = 50 V	I_{CBO}	max.	20 μA
DC current gain I_C = 100 mA; V_{CE} = 10 V	h_{FE}	min.	15
Collector-base capacitance at f = 1 MHz I_C = 0; V_{CB} = 10 V	C_{cb}	typ.	2.0 pF
Output capacitance at f = 1 MHz I_E = i_e = 0; V_{CB} = 10 V	C_{ob}	typ.	4.0 pF
Transition frequency at f = 500 MHz I_C = 100 mA; V_{CE} = 10 V	f_T	min. typ.	1.0 GHz 1.4 GHz

N-P-N 2 GHz WIDEBAND TRANSISTOR

N-P-N transistor in a miniature hermetically sealed micro stripline encapsulation featuring a high transition frequency and low noise. It is suitable for amplifiers up to S-band frequencies in instrumentation and microwave systems.

QUICK REFERENCE DATA

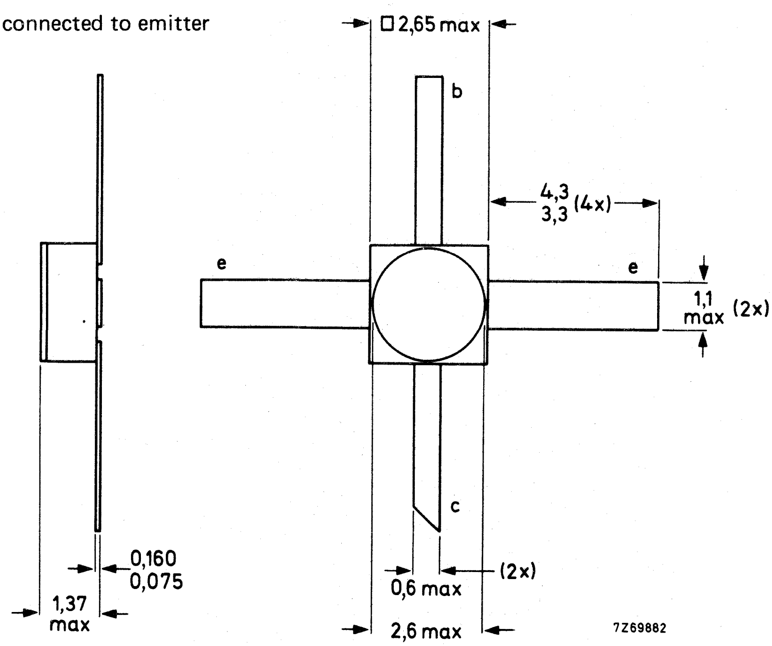
Collector-base voltage (open emitter)	V_{CBO}	max	20	V
Collector-emitter voltage (open base)	V_{CEO}	max	15	V
Collector current (d.c.)	I_C	max	25	mA
Total power dissipation up to T_{amb} = 110 °C	P_{tot}	max	180	mW
Transition frequency I_C = 14 mA; V_{CE} = 10 V	f_T	typ	5,0	GHz
Noise figure at optimum source impedance I_C = 2 mA; V_{CE} = 10 V; f = 1 GHz	F	typ	2,5	dB
Transducer power gain I_C = 14 mA; V_{CE} = 10 V; f = 1 GHz	$\|s_{fe}\|^2$	typ	15,5	dB

MECHANICAL DATA

Dimensions in mm

Fig. 1 SOT-100.

Metallized lid connected to emitter



RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

Collector-base voltage (open emitter; I_C = 10 μA)	V_{CBO}	max	20	V
Collector-emitter voltage (open base; I_C = 10 mA)	V_{CEO}	max	15	V
Emitter-base voltage (open collector; I_E = 10 μA)	V_{EBO}	max	2	V
Collector current (d.c.)	I_C	max	25	mA
Total power dissipation up to T_{amb} = 110 °C	P_{tot}	max	180	mW
Storage temperature	T_{stg}	−65 to + 200		°C
Junction temperature	T_j	max	200	°C

THERMAL RESISTANCE

From junction to ambient in free air mounted on a fibre-glass print of 40 mm x 25 mm x 1 mm	$R_{th\ j\text{-}a}$	=	500	K/W

CHARACTERISTICS

T_{amb} = 25 °C unless otherwise specified

Collector cut-off current I_E = 0; V_{CB} = 10 V	I_{CBO}	max.	50	nA
D.C. current gain I_C = 14 mA; V_{CE} = 10 V	h_{FE}	min.	25	
Transition frequency I_C = 14 mA; V_{CE} = 10 V; f = 500 MHz	f_T	typ	5,0	GHz
Collector capacitance at f = 1 MHz $I_E = I_e$ = 0; V_{CB} = 10 V	C_c	typ	0,35	pF
Emitter capacitance at f = 1 MHz $I_C = I_c$ = 0; V_{EB} = 0,5 V	C_e	typ	1,1	pF
Feedback capacitance at f = 1 MHz I_C = 2 mA; V_{CE} = 10 V	C_{re}	typ	0,3	pF
Noise figure at optimum source impedance I_C = 2 mA; V_{CE} = 10 V; f = 1 GHz	F	typ	2,5	dB
I_C = 2 mA; V_{CE} = 10 V; f = 4 GHz	F	typ	6,5	dB

Maximum unilateral power gain (s_{re} assumed to be zero)

$$G_{UM} = 10 \log \frac{|s_{fe}|^2}{[1-|s_{ie}|^2]\,[1-|s_{oe}|^2]}$$

I_C = 14 mA; V_{CE} = 10 V; f = 1 GHz	G_{UM}	typ	17,0	dB
I_C = 14 mA; V_{CE} = 10 V; f = 4 GHz	G_{UM}	typ	6,5	dB
Transducer power gain I_C = 14 mA; V_{CE} = 10 V; f = 1 GHz	$\|s_{fe}\|^2$	typ	15,5	dB
I_C = 14 mA; V_{CE} = 10 V; f = 4 GHz	$\|s_{fe}\|^2$	typ	3,5	dB

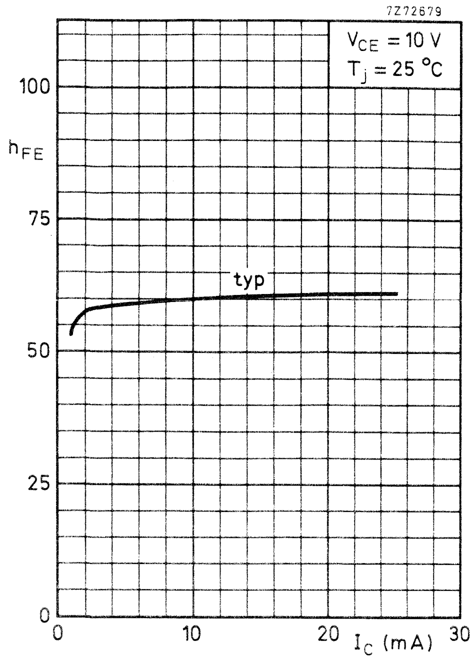


Fig. 2 V_{CE} = 10 V; T_j = 25 °C; typical values.

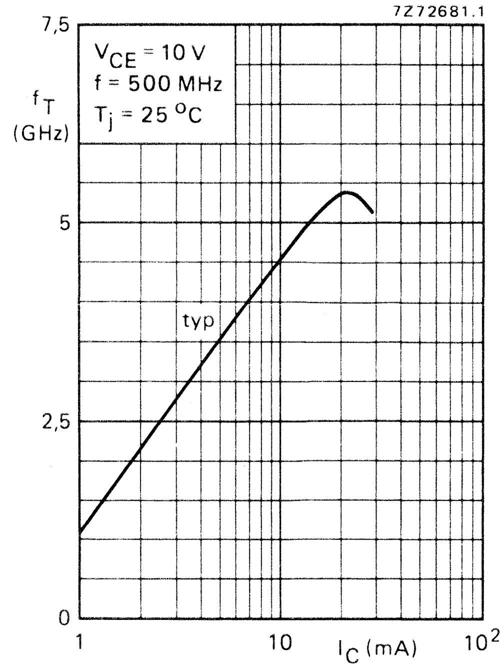


Fig. 3 V_{CE} = 10 V; f = 500 MHz; T_j = 25 °C; typical values.

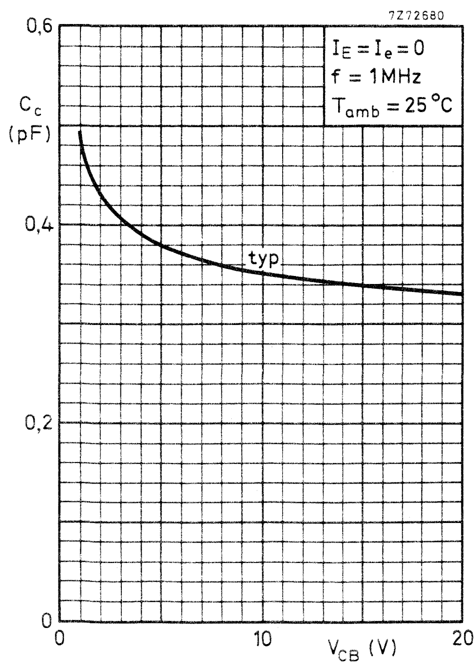


Fig. 4 $I_E = i_e = 0$; f = 1 MHz; T_{amb} = 25 °C; typical values.

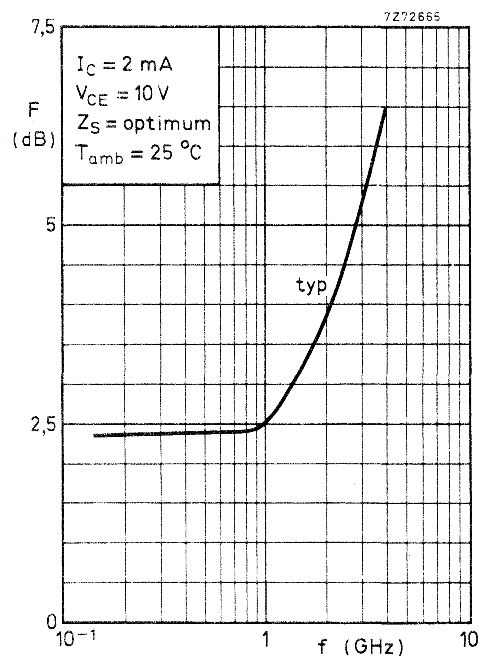


Fig. 5 V_{CE} = 10 V; I_C = 2 mA; Z_S = opt.; T_{amb} = 25 °C; typical values.

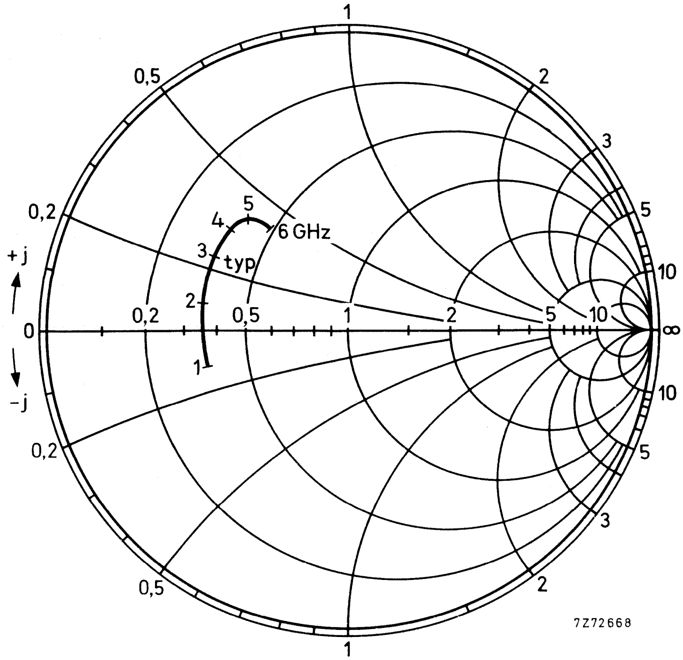


Fig. 6 V_{CE} = 10 V; I_C = 14 mA; T_{amb} = 25 °C; typical values.

Input impedance derived from input reflection coefficient s_{ie} co-ordinates in ohm x 50.

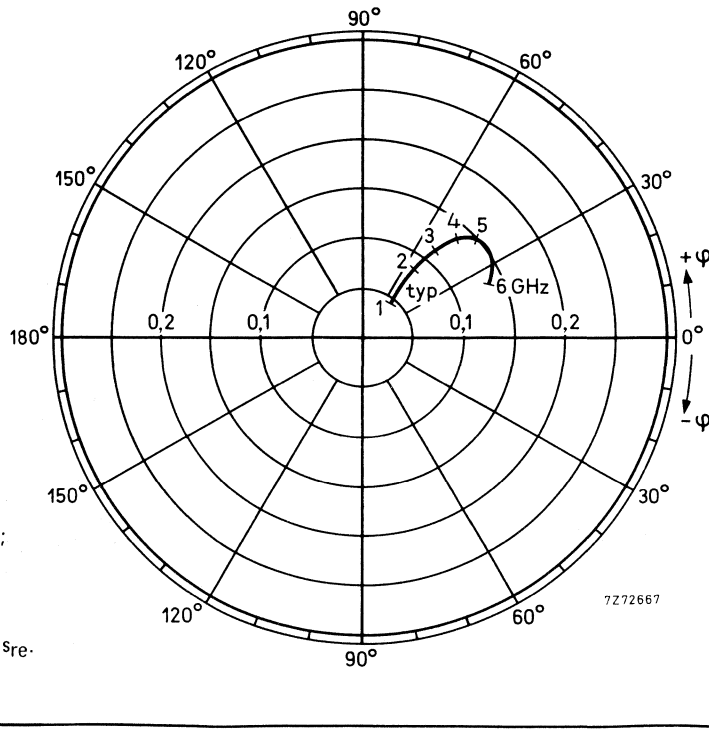


Fig. 7 V_{CE} = 10 V; I_C = 14 mA; T_{amb} = 25 °C; typical values.

Reverse transmission coefficient s_{re}.

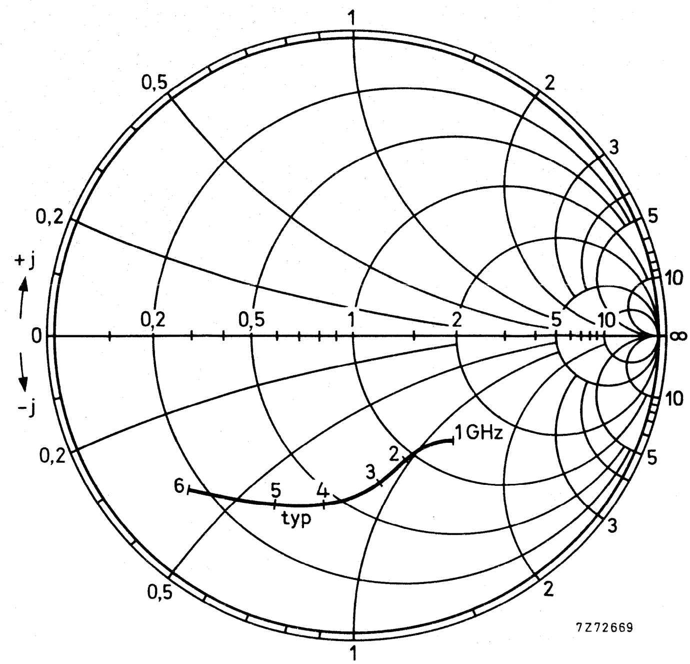


Fig. 8 V_{CE} = 10 V; I_C = 14 mA; T_{amb} = 25 °C; typical values.

Output impedance derived from output reflection coefficient s_{oe} co-ordinates in ohm x 50.

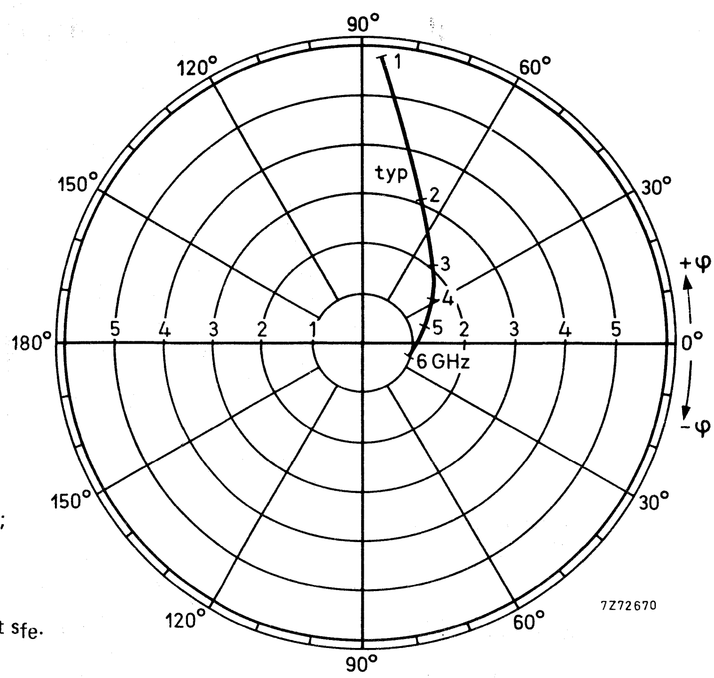


Fig. 9 V_{CE} = 10 V; I_C = 14 mA; T_{amb} = 25 °C; typical values.

Forward transmission coefficient s_{fe}.

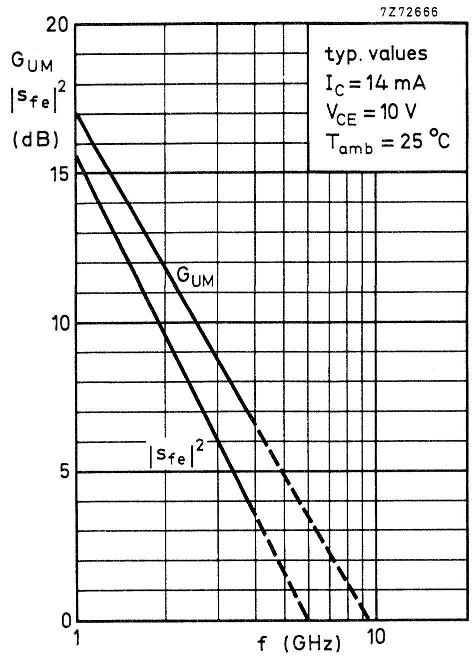


Fig. 10 V_{CE} = 10 V; I_C = 14 mA; T_{amb} = 25 °C; typical values.

N-P-N H.F. WIDEBAND TRANSISTOR

N-P-N multi-emitter transistor in a plastic SOT-23 envelope intended for application in thick and thin-film circuits. The transistor has very low intermodulation distortion and very high power gain. It is primarily intended for:
- Wideband vertical amplifiers in high speed oscilloscopes.
- Television distribution amplifiers.

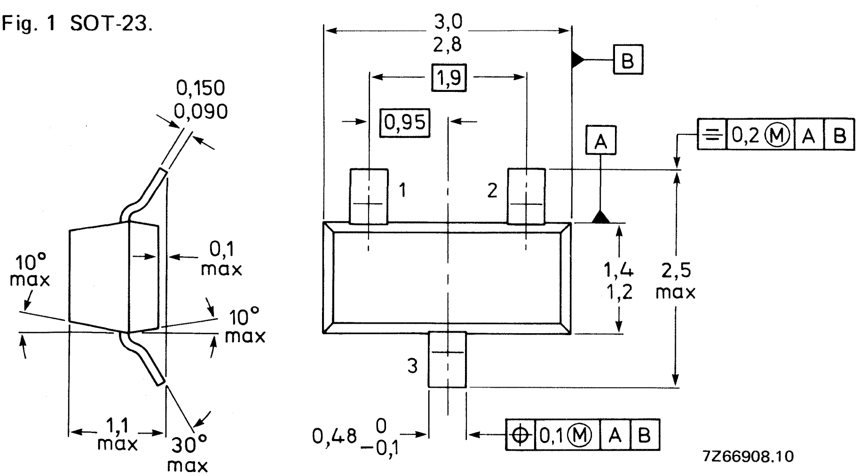
QUICK REFERENCE DATA

Collector-base voltage (open emitter)	V_{CBO}	max.	18	V
Collector-emitter voltage (open base)	V_{CEO}	max.	10	V
Collector current (peak value; f > 1 MHz)	I_{CM}	max.	100	mA
Total power dissipation up to T_{amb} = 25 °C	P_{tot}	max.	300	mW
Junction temperature	T_j	max.	150	°C
Feedback capacitance at f = 1 MHz I_C = 2 mA; V_{CE} = 5 V	C_{re}	typ.	0,9	pF
Transition frequency at f = 500 MHz I_C = 25 mA; V_{CE} = 5 V	f_T	typ.	2,0	GHz
Max. unilateral power gain I_C = 30 mA; V_{CE} = 5 V; f = 200 MHz	G_{UM}	typ.	22	dB
I_C = 30 mA; V_{CE} = 5 V; f = 800 MHz	G_{UM}	typ.	10,5	dB
Intermodulation distortion at T_{amb} = 25 °C I_C = 30 mA; V_{CE} = 5 V; R_L = 37,5 Ω V_o = 100 mV at f_p = 183 MHz V_o = 100 mV at f_q = 200 MHz measured at $f_{(2q-p)}$ = 217 MHz	d_{im}	typ.	−60	dB

MECHANICAL DATA

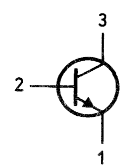
Dimensions in mm

Fig. 1 SOT-23.



Marking code

BFR53 = N1



If required, the R-version (reverse pinning) is available on request.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

Collector-base voltage (open emitter)	V_{CBO}	max.	18	V
Collector-emitter voltage (open base)	V_{CEO}	max.	10	V
Emitter-base voltage (open collector)	V_{EBO}	max.	2,5	V
Collector current (d.c.)	I_C	max.	50	mA
Collector current (peak value: f > 1 MHz)	I_{CM}	max.	100	mA
→ Total power dissipation up to T_{amb} = 25 °C	P_{tot}	max.	300	mW
→ Storage temperature	T_{stg}	−65 to	+150	°C
→ Junction temperature	T_j	max.	150	°C

THERMAL RESISTANCE

From junction to ambient*	$R_{th\ j\text{-}a}$	=	430	K/W

CHARACTERISTICS

T_j = 25 °C unless otherwise specified

Collector cut-off current				
$I_E = 0$; $V_{CB} = 10$ V	I_{CBO}	max.	50	nA
D.C. current gain				
$I_C = 25$ mA; $V_{CE} = 5$ V	h_{FE}	min.	25	
$I_C = 50$ mA; $V_{CE} = 5$ V	h_{FE}	min.	25	
Transition frequency at f = 500 MHz				
$I_C = 25$ mA; $V_{CE} = 5$ V	f_T	typ.	2,0	GHz
Collector capacitance at f = 1 MHz				
$I_E = I_e = 0$; $V_{CB} = 5$ V	C_c	typ.	0,9	pF
Emitter capacitance at f = 1 MHz				
$I_C = I_c = 0$; $V_{EB} = 0,5$ V	C_e	typ.	1,5	pF
Feedback capacitance at f = 1 MHz				
$I_C = 2$ mA; $V_{CE} = 5$ V; $T_{amb} = 25$ °C	C_{re}	typ.	0,9	pF

* Mounted on a ceramic substrate of 8 mm x 10 mm x 0,7 mm.

Noise figure at f = 500 MHz *

I_C = 2 mA; V_{CE} = 5 V; T_{amb} = 25 °C G_S = 20 mS; B_S is tuned	F	max.	5,0 dB

Max. unilateral power gain (s_{re} assumed to be zero)

$$G_{UM} = 10 \log \frac{|s_{fe}|^2}{[1-|s_{ie}|^2]\,[1-|s_{oe}|^2]}$$

I_C = 30 mA; V_{CE} = 5 V; f = 200 MHz; T_{amb} = 25 °C	G_{UM}	typ.	22 dB
I_C = 30 mA; V_{CE} = 5 V; f = 800 MHz; T_{amb} = 25 °C	G_{UM}	typ.	10,5 dB

Intermodulation distortion *

I_C = 30 mA; V_{CE} = 5 V; R_L = 37,5 Ω

V_o = 100 mV at f_p = 183 MHz
V_o = 100 mV at f_q = 200 MHz

measured at $f_{(2q-p)}$ = 217 MHz	d_{im}	typ.	−60 dB

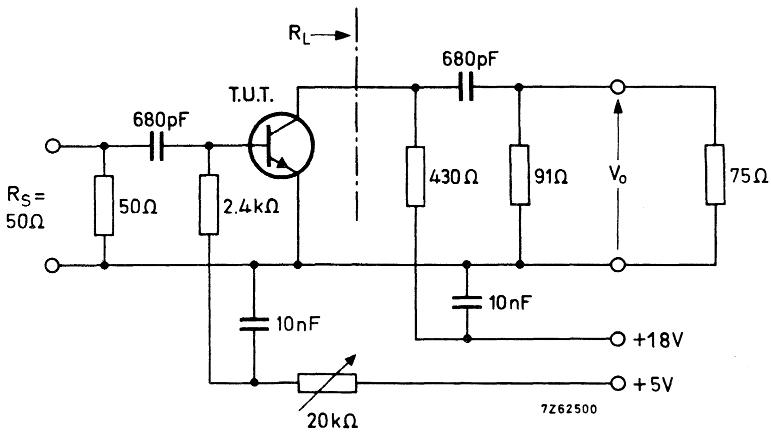


Fig. 2 Test circuit.

* Crystal mounted in a BFW30 envelope.

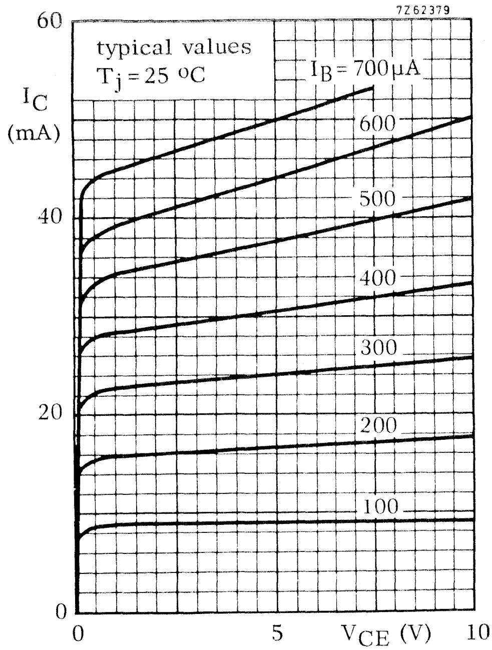


Fig. 3 T_j = 25 °C; typical values.

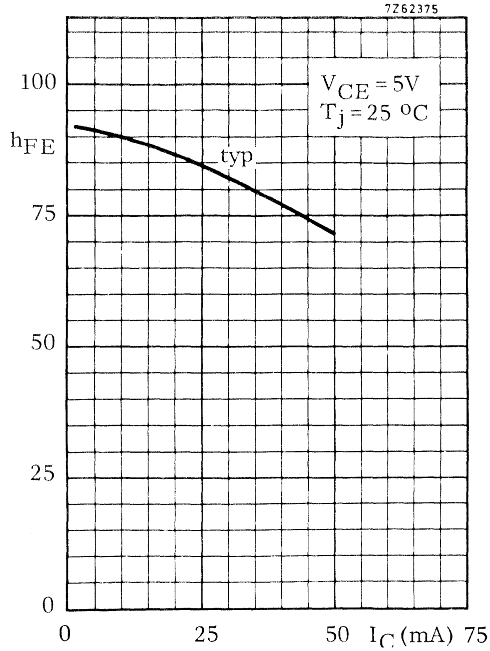


Fig. 4 V_{CE} = 5 V; T_j = 25 °C; typical values.

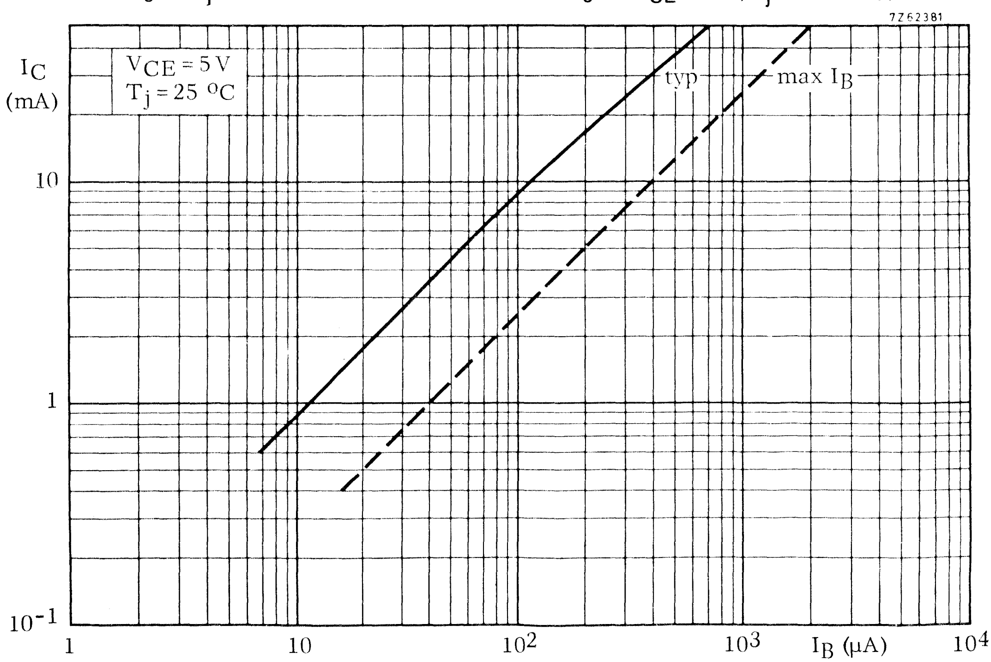


Fig. 5 V_{CE} = 5 V; T_j = 25 °C.

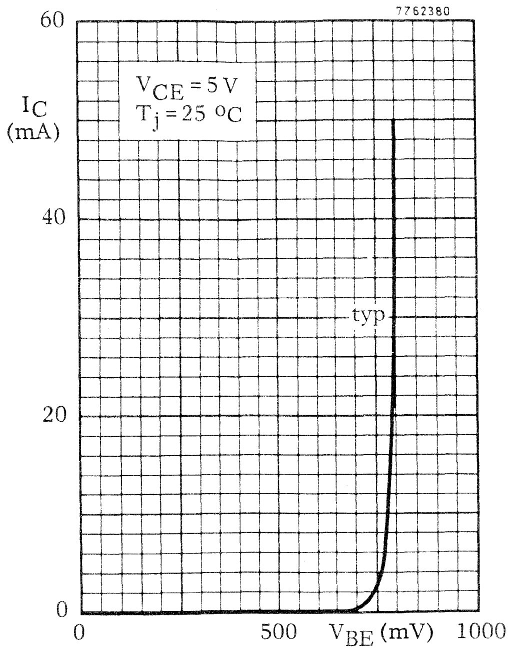


Fig. 6 $V_{CE} = 5$ V; $T_j = 25$ °C; typical values.

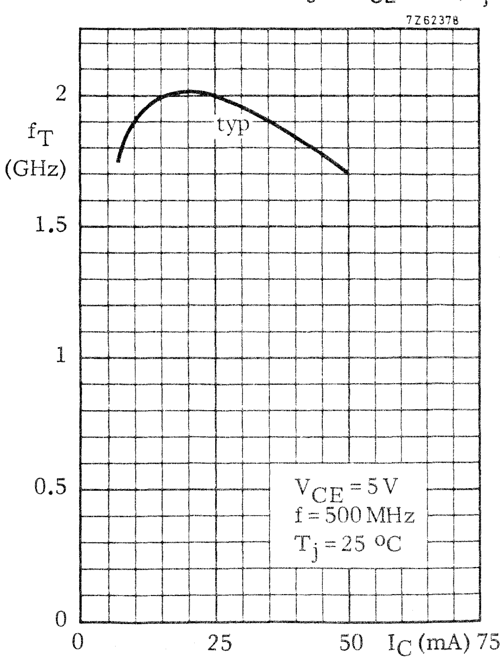


Fig. 7 $V_{CE} = 5$ V; f = 500 MHz; $T_j = 25$ °C; typical values.

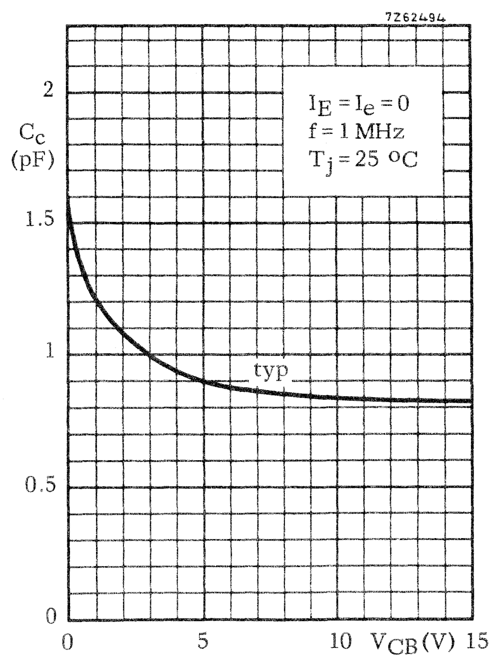


Fig. 8 $I_E = i_e = 0$; f = 1 MHz; $T_j = 25$ °C; typical values.

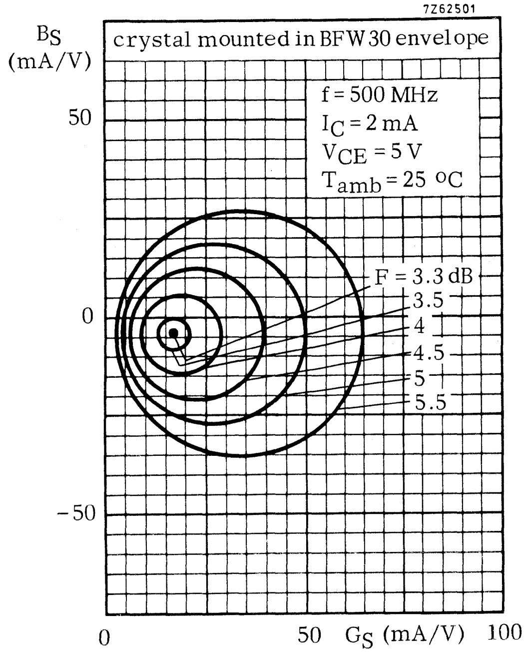


Fig. 9 Circles of constant noise figure; V_{CE} = 5 V; I_C = 2 mA; f = 500 MHz; T_{amb} = 25 °C; typ. values.

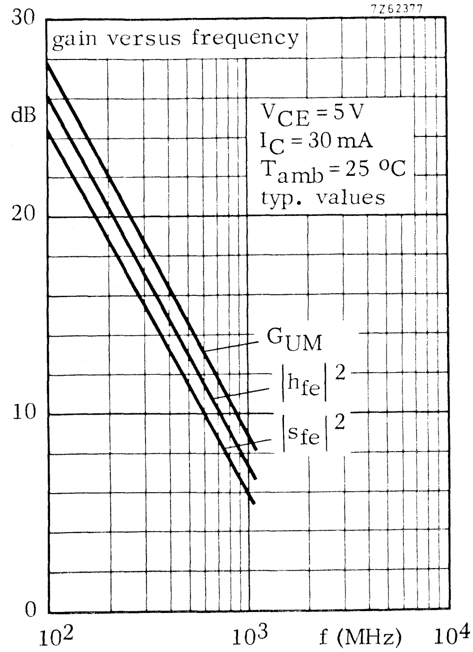


Fig. 10 V_{CE} = 5 V; I_C = 30 mA; T_{amb} = 25 °C; typical values.

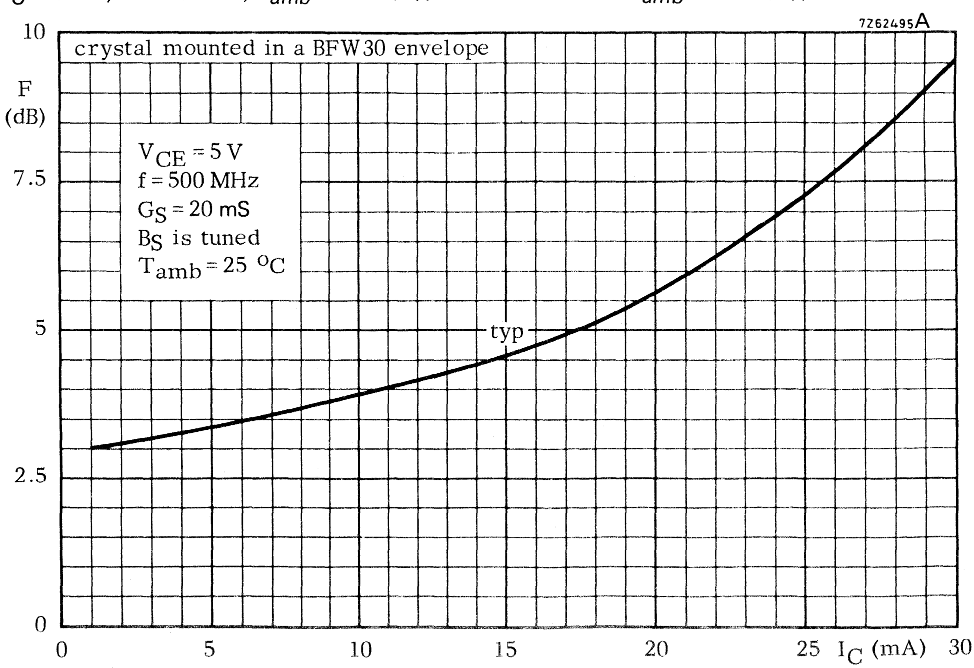


Fig. 11 V_{CE} = 5 V; f = 500 MHz; G_S = 20 mS; B_S = tuned; T_{amb} = 25 °C; typical values.

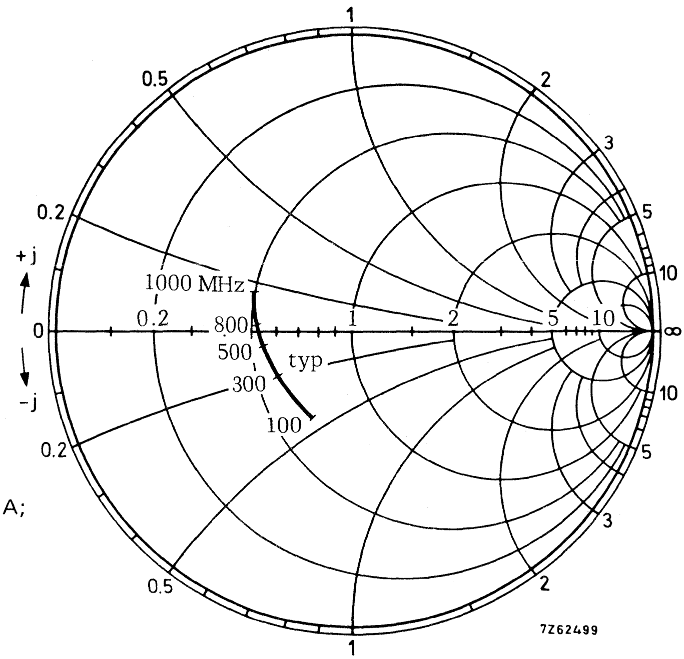


Fig. 12 V_{CE} = 5 V; I_C = 30 mA; T_{amb} = 25 °C; typical values.

Input impedance derived from input reflection coefficient s_{ie} coordinates in ohm x 50.

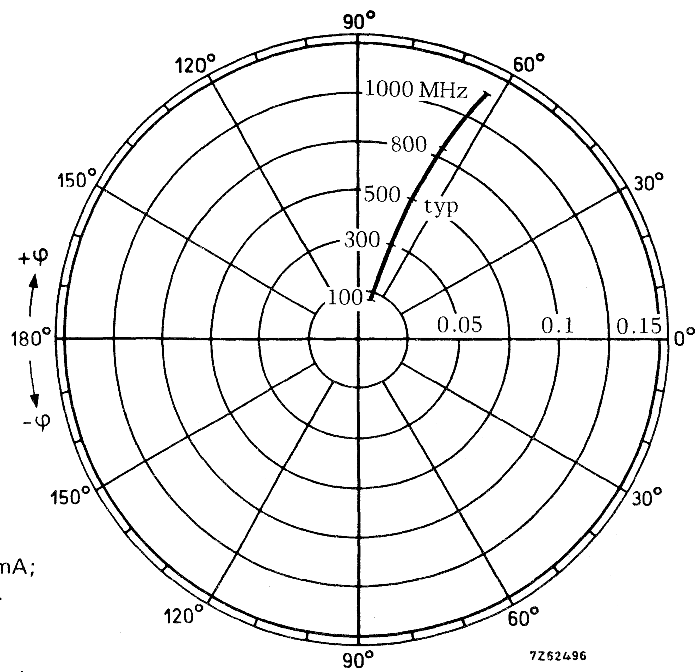


Fig. 13 V_{CE} = 5 V; I_C = 30 mA; T_{amb} = 25 °C; typical values.

Reverse transmission coefficient s_{re}.

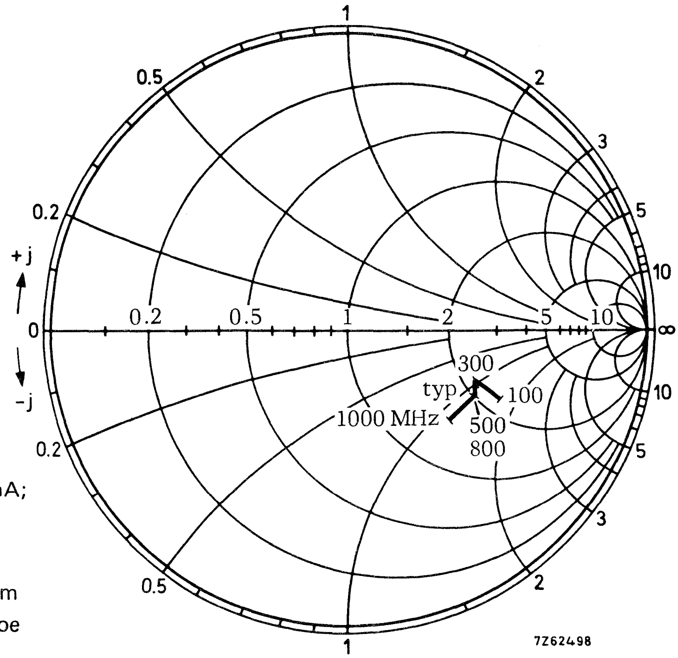


Fig. 14 V_{CE} = 5 V; I_C = 30 mA; T_{amb} = 25 °C; typical values.

Output impedance derived from output reflection coefficient s_{oe} coordinates in ohm x 50.

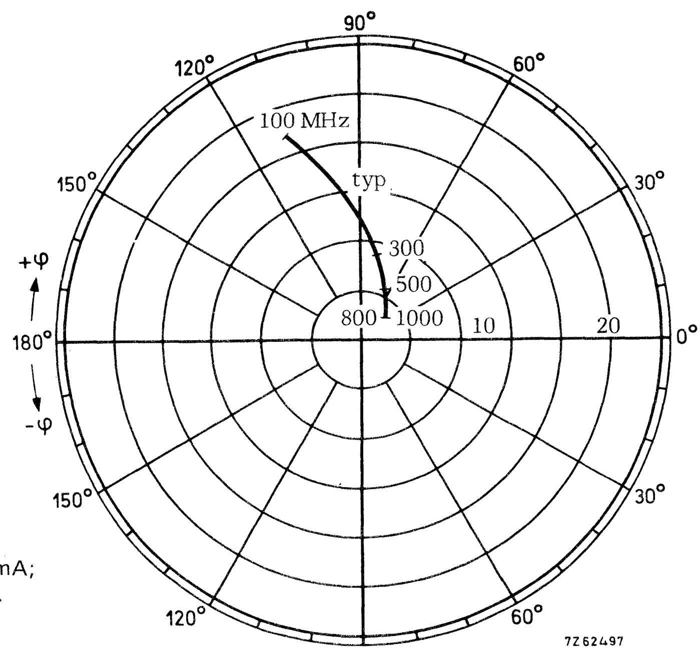


Fig. 15 V_{CE} = 5 V; I_C = 30 mA; T_{amb} = 25 °C; typical values.

Forward transmission coefficient s_{fe}.

N-P-N H.F. WIDEBAND TRANSISTOR

N-P-N multi-emitter transistor in a capstan envelope. The transistor has extremely good intermodulation properties and high power gain.

The device is primarily intended for:

- Final and driver stages of channel and band aerial amplifiers with high output power for band I, II, III and IV/V (40-860 MHz).
- Final and driver stages of wideband amplifiers (40-230 MHz).
- Final stages of the wideband vertical amplifier in high-speed oscilloscopes.
- Frequency multiplier and oscillator circuits.

QUICK REFERENCE DATA

Collector-base voltage (open emitter; peak value)	V_{CBOM}	max.	40	V
Collector-emitter voltage (open base)	V_{CEO}	max.	25	V
Collector current (peak value)	I_{CM}	max.	500	mA
Total power dissipation up to T_{mb} = 60 °C; f ≥ 1 MHz	P_{tot}	max.	3,5	W
Junction temperature	T_j	max.	175	°C ←
Transition frequency at f = 500 MHz I_C = 75 mA; V_{CE} = 20 V	f_T	min.	1200	MHz
Output power at f = 200 MHz I_C = 70 mA; V_{CE} = 20 V; d_{im} = −30 dB	P_o	typ.	150	mW
Power gain at f = 200 MHz I_C = 70 mA; V_{CE} = 20 V	G_p	typ.	16	dB

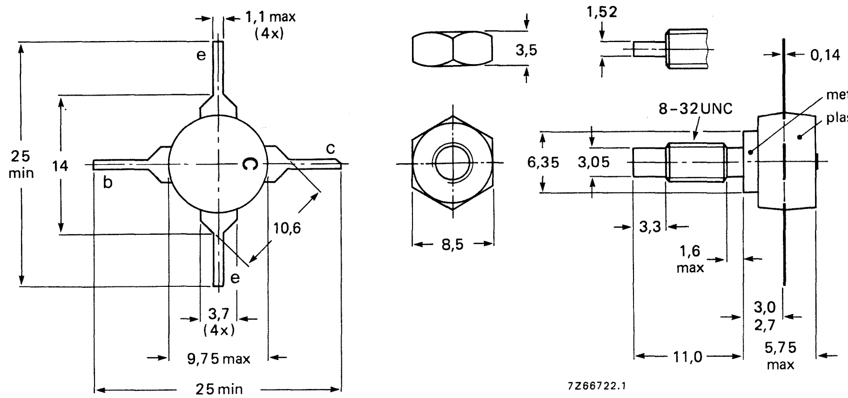
MECHANICAL DATA (see next page)

PRODUCT SAFETY. This device incorporates beryllium oxide, the dust of which is toxic. The device is entirely safe provided that the BeO disc is not damaged.

MECHANICAL DATA

Dimensions in mm

Fig. 1 SOT-48.



When locking is required an adhesive instead of a lock washer is preferred.

Torque on nut: min. 0,75 Nm (7,5 kg cm); max. 0,85 Nm (8,5 kg cm)

Diameter of clearance hole in heatsink: max. 4,17 mm.
Mounting hole to have no burrs at either end.
De-burring must leave surface flat; do not chamfer or countersink either end of hole.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

Collector-base voltage (open emitter; peak value)	V_{CBOM}	max.	40	V	1)
Collector-emitter voltage (R_{BE} = 10 Ω; peak value)	V_{CERM}	max.	40	V	2)
Collector-emitter voltage (open base)	V_{CEO}	max.	25	V	2)
Emitter-base voltage (open collector)	V_{EBO}	max.	3,5	V	3)
Collector current (d.c.)	I_C	max.	200	mA	
Collector current (peak value) f > 1 MHz	I_{CM}	max.	500	mA	
Power dissipation (f > 1 MHz; see SOAR)					
Total power dissipation up to T_{mb} = 60 °C	P_{tot}	max.	3,5	W	
Storage temperature	T_{stg}	−40 to +150		°C	
→ Junction temperature	T_j	max.	175	°C	

THERMAL RESISTANCE

From junction to mounting base	$R_{th\ j\text{-}mb}$	=	25	K/W
From mounting base to heatsink	$R_{th\ mb\text{-}h}$	=	0,5	K/W

1) at I_C = 100 μA.
2) at I_C = 10 mA.
3) at I_E = 100 μA.

CHARACTERISTICS

T_j = 25 °C unless otherwise specified

Collector cut-off current				
I_E = 0; V_{CB} = 20 V	I_{CBO}	max.	10	μA
Saturation voltage				
I_C = 100 mA; I_B = 10 mA	V_{CEsat}	max.	0,75	V
D.C. current gain				
I_C = 50 mA; V_{CE} = 5 V	h_{FE}	min.	25	
I_C = 150 mA; V_{CE} = 5 V	h_{FE}	min.	25	
Collector capacitance at f = 1 MHz				
I_E = I_e = 0; V_{CB} = 20 V	C_c	max.	4,5	pF
Feedback capacitance at f = 1 MHz				
I_C = 10 mA; V_{CE} = 20 V; T_{mb} = 25 °C	C_{re}	typ.	1,7	pF
Noise figure at f = 200 MHz				
I_C = 40 mA; V_{CE} = 20 V; R_S = 75 Ω; T_{mb} = 25 °C	F	typ.	6	dB
Transition frequency at f = 500 MHz				
I_C = 15 mA; V_{CE} = 20 V	f_T	typ.	1000	MHz
I_C = 75 mA; V_{CE} = 20 V	f_T	min.	1200	MHz
I_C = 150 mA; V_{CE} = 20 V	f_T	typ.	1200	MHz
Output power at f = 200 MHz; T_{mb} = 25 °C				
I_C = 70 mA; V_{CE} = 20 V; VSWR at output < 2				
f_p = 202 MHz; f_q = 205 MHz; d_{im} = –30 dB		min.	130	mW
measured at $f_{(2q-p)}$ = 208 MHz (channel 9)	P_o	typ.	150	mW
Output power at f = 800 MHz; T_{mb} = 25 °C				
I_C = 70 mA; V_{CE} = 20 V; VSWR at output < 2				
f_p = 798 MHz; f_q = 802 MHz; d_{im} = –30 dB		min.	70	mW
measured at $f_{(2q-p)}$ = 806 MHz (channel 62)	P_o	typ.	90	mW
Power gain (not neutralized) T_{mb} = 25 °C		min.	15	dB
I_C = 70 mA; V_{CE} = 20 V; f = 200 MHz	G_p	typ.	16	dB
I_C = 70 mA; V_{CE} = 20 V; f = 800 MHz	G_p	typ.	6,5	dB

CHARACTERISTICS (continued)

Intermodulation characteristics

1. Output power at f = 200 MHz; T_{mb} = 25 °C
   I_C = 70 mA; V_{CE} = 20 V; VSWR at output < 2
   f_p = 202 MHz; f_q = 205 MHz; d_{im} = −30 dB
   measured at $f_{(2q-p)}$ = 208 MHz (channel 9)

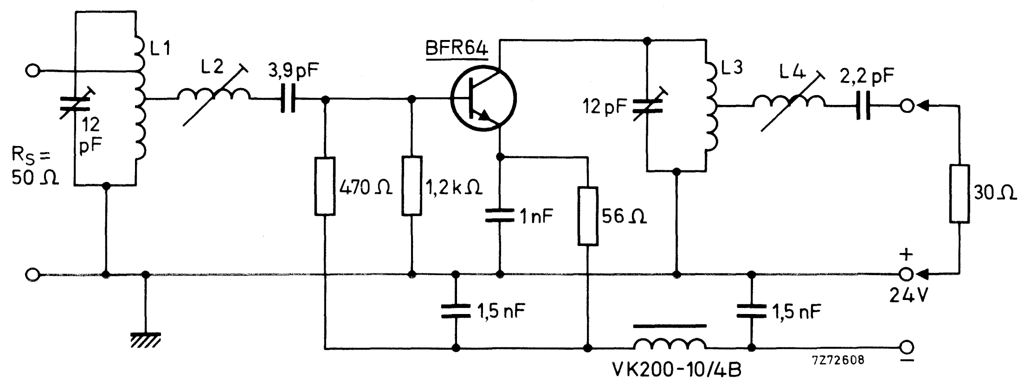


Fig. 2.

Coil data:

L1 = 3 turns silver-plated Cu wire (1,4 mm); winding pitch 2,7 mm; int. dia. 8 mm; taps at 0,5 turn and 1,5 turns from earth.
L2 = 5,5 turns silver-plated Cu wire (1,4 mm); winding pitch 2,2 mm; int. dia. 8 mm
L3 = 3 turns silver-plated Cu wire (1,4 mm); winding pitch 3,3 mm; int. dia. 8 mm
L4 = 5,5 turns silver-plated Cu wire (1,4 mm); winding pitch 2,2 mm; int. dia. 11 mm

Basis of adjustment

The intermodulation at an intermodulation distortion of −30 dB is caused by h.f. output current-voltage clipping.
The maximum undistorted output power is realized, if

a. Current and voltage clipping take place concurrently.
   This occurs if

$$R_L = \frac{V_{CE} - V_{CEK}}{I_C},$$

   in which V_{CEK} is the high-frequency knee voltage.

b. The h.f. collector current is as small as possible.
   This is so if $-C_L = +C_{oe}$,
   in which C_{oe} is the output capacitance of the transistor at short-circuited input.

For maximum output power at an intermodulation distortion of −30 dB, the (experimentally found) values of R_L and C_L are:
R_L = 220 Ω; C_L = −4 pF.

Adjustment procedure

1. Remove the transistor and connect a dummy consisting of a 220 Ω resistor in parallel with a 4 pF capacitor between the collector and emitter connections of the output circuit.
2. Tune and match the output circuit for zero reflection at 205 MHz (VSWR = 1). After this adjustment, no further change may be made in the output circuit.
3. Replace the dummy by the transistor. Tune and match the input circuit for maximum power gain and good band-pass curve. The VSWR of the output will then, in most cases, be ≤ 2 over the whole channel. Corrections can be made by tuning L2; this will not disturb the band-pass curve.

Intermodulation characteristics

2. Output power at f = 800 MHz; T_{mb} = 25 °C
   I_C = 70 mA; V_{CE} = 20 V; VSWR at output < 2
   f_p = 798 MHz; f_q = 802 MHz; d_{im} = −30 dB
   measured at $f_{(2q-p)}$ = 806 MHz (channel 62)

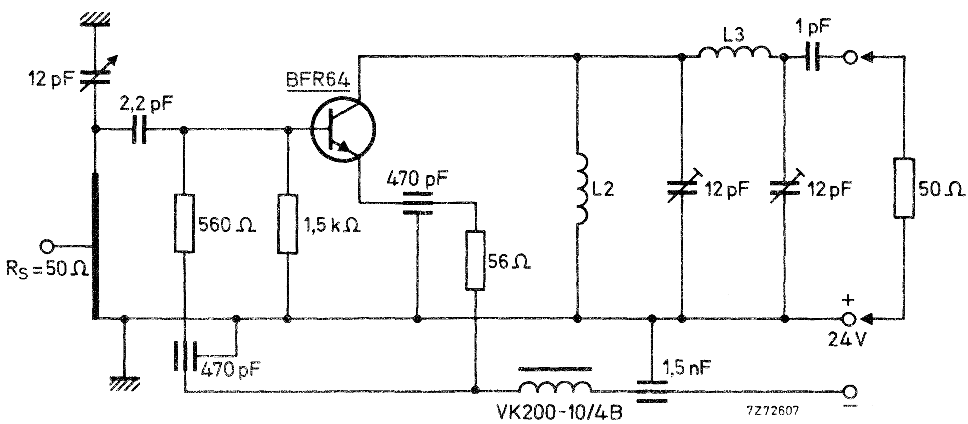


Fig. 3 Test circuit.

Coil data:

L1 = 25 mm x 7 mm x 0,85 mm silver-plated Cu strip
Tap of the input at 5 mm from earth.
L2 = 13 turns enamelled Cu wire (0,6 mm); int. dia. 8 mm
L3 = 1,5 turns Cu wire (1,3 mm); int. dia. 8 mm

CHARACTERISTICS (continued)

Basis of adjustment

At 800 MHz no dummy can be used to adjust for optimum collector load because at these frequencies the impedance transformations of a dummy are too high. A small signal at the mid-channel frequency of 802 MHz is fed to the input and increased until clipping occurs; that is, until the output power no longer increases linearily with the input signal. This clipping can be eliminated by tuning the output circuit, thereby making the output power equal to

$$P_o = \frac{I_C(V_{CE} - V_{CEK})}{2} = 480 \text{ mW.}$$

The output circuit is adjusted for minimum intermodulation if the input signal is as small as possible at P_o = 480 mW. With this adjusting method, care must be taken that the transistor is not damaged by second breakdown (the voltage swing may not exceed the rated V_{CER} value). Therefore as soos as clipping occurs, the increase of the input signal should be stopped until the clipping has been eliminated. After this adjustment has been made no further change may be made in the output circuit. Adjust the input circuit for maximum power gain and good band-pass curve. The VSWR of the output is then $\leqslant$ 2 over the whole channel.

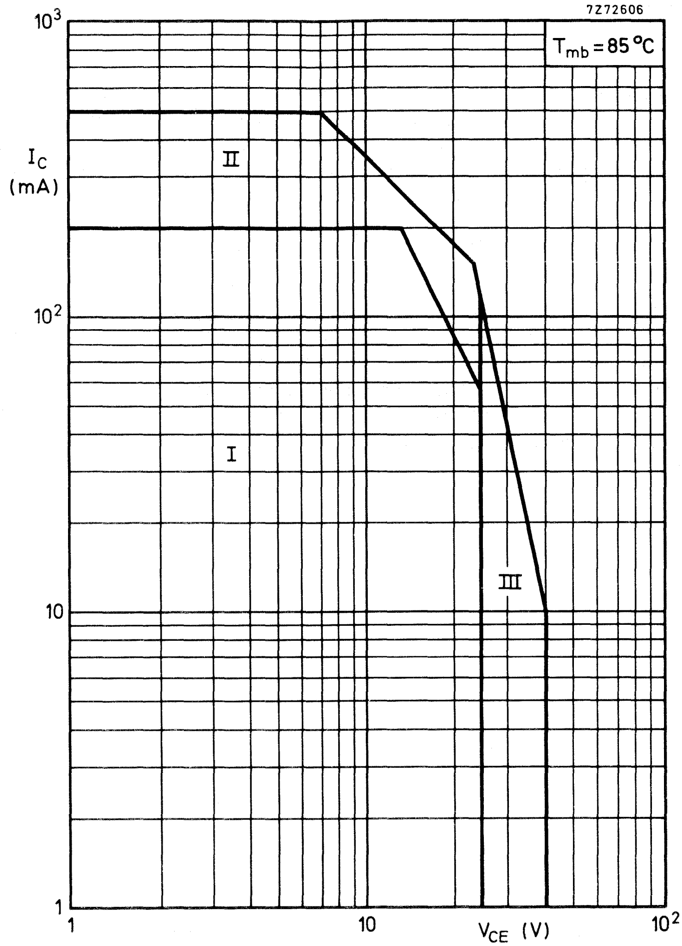


Fig. 4 Safe Operating ARea with the transistor forward biased.

I Region of permissible d.c. operation

II Permissible extension for repetitive pulsed operation; f > 1 MHz

III Repetitive pulse operation in this region is allowable; provided $R_{BE} < 10\ \Omega$ and f > 1 MHz

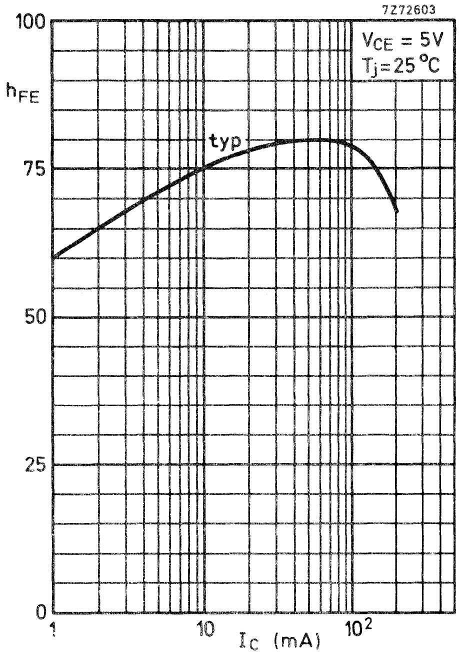


Fig. 5 V_{CE} = 5 V; T_j = 25 °C; typical values.

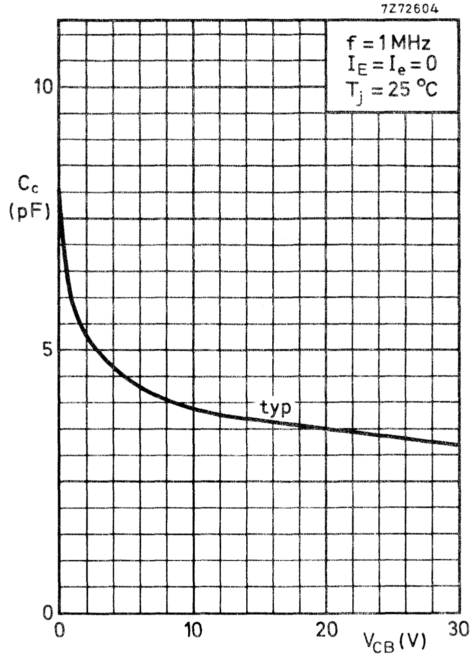


Fig. 6 $I_E = i_e = 0$; T_j = 25 °C; typical values.

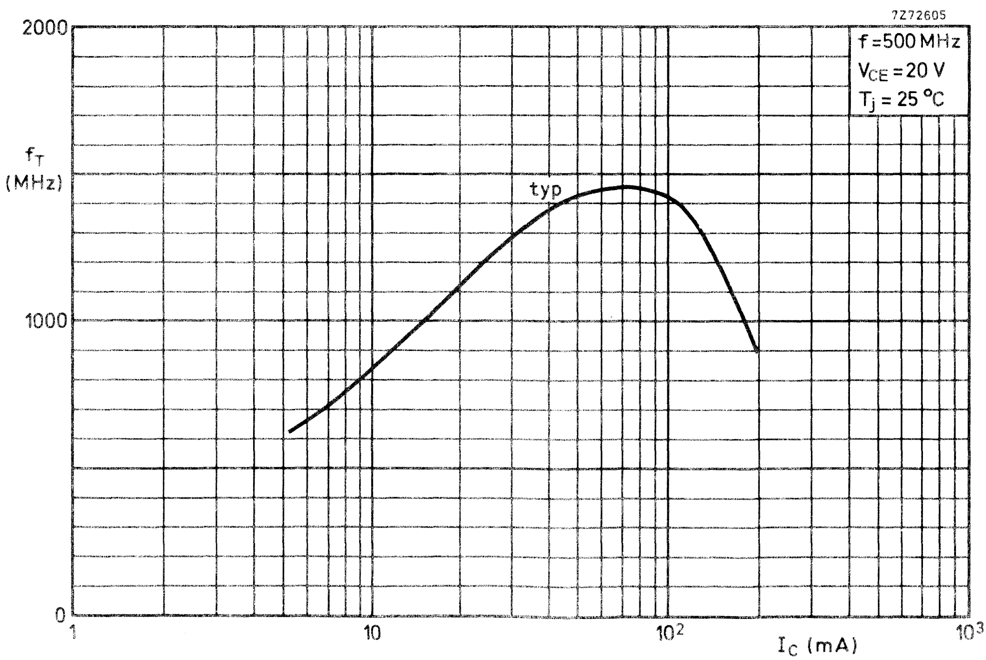


Fig. 7 V_{CE} = 5 V; f = 500 MHz; T_j = 25 °C; typical values.

N-P-N H.F. WIDEBAND TRANSISTOR

N-P-N multi-emitter silicon transistor in a capstan envelope. The transistor has extremely good intermodulation properties and high power gain.

The device is primarily intended for channel amplifiers in aerial amplifier systems as well as other applications where an excellent f_T linearity and higher signal handling capabilities than available in existing devices are required.

QUICK REFERENCE DATA

Collector-base voltage (open emitter; peak value)	V_{CBOM}	max.	40	V
Collector-emitter voltage (open base)	V_{CEO}	max.	25	V
Collector current (peak value)	I_{CM}	max.	1000	mA
Junction temperature	T_j	max.	200	^oC
Transition frequency at f = 500 MHz I_C = 200 mA; V_{CE} = 20 V	f_T	min.	1200	MHz
Output power at f = 200 MHz I_C = 200 mA; V_{CE} = 20 V; d_{im} = −30 dB	P_o	typ.	450	mW
Power gain at f = 200 MHz I_C = 200 mA; V_{CE} = 20 V	G_p	typ.	19	dB

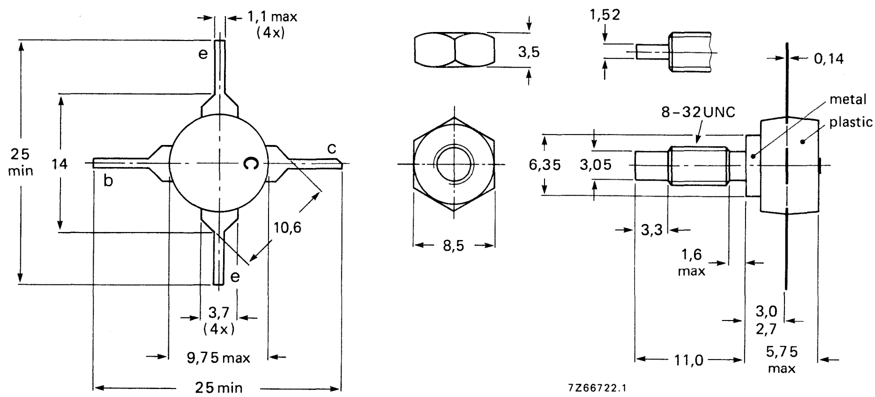
MECHANICAL DATA (see next page)

PRODUCT SAFETY. This device incorporates beryllium oxide, the dust of which is toxic. The device is entirely safe provided that the BeO disc is not damaged.

MECHANICAL DATA

Dimensions in mm

Fig. 1 SOT-48.



When locking is required an adhesive instead of a lock washer is preferred.

Torque on nut: min. 0,75 Nm (7,5 kg cm)
0,85 Nm (8,5 kg cm)

Diameter of clearance hole in heatsink: max. 4,17 mm.
Mounting hole to have no burrs at either end.
De-burring must leave surface flat; do not chamfer or countersink either end of hole.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

Collector-base voltage (open emitter; peak value)	V_{CBOM}	max.	40	V
Collector-emitter voltage (R_{BE} = 10 Ω; peak value)	V_{CERM}	max.	40	V
Collector-emitter voltage (open base)	V_{CEO}	max.	25	V
Emitter-base voltage (open collector)	V_{EBO}	max.	3,5	V
Collector current (d.c.)	I_C	max.	400	mA
Collector current (peak value) f > 1 MHz	I_{CM}	max.	1000	mA
Total power dissipation up to T_{mb} = 125 °C	P_{tot}	max.	5	W
Storage temperature	T_{stg}		−65 to +200	°C
Junction temperature	T_j	max.	200	°C

THERMAL RESISTANCE

From junction to mounting base	$R_{th\ j\text{-}mb}$	=	15	K/W
From mounting base to heatsink	$R_{th\ mb\text{-}h}$	=	0,5	K/W

CHARACTERISTICS

T_j = 25 °C unless otherwise specified

Collector-base breakdown voltage				
open emitter, I_C = 1 mA	$V_{(BR)CBO}$	min.	40	V
Collector-emitter breakdown voltage				
R_{BE} = 10 Ω, I_C = 5 mA	$V_{(BR)CER}$	min.	40	V
open base, I_C = 5 mA	$V_{(BR)CEO}$	min.	25	V
Emitter-base breakdown voltage				
open collector; I_E = 1 mA	$V_{(BR)EBO}$	min.	3,5	V
Collector cut-off current				
I_E = 0; V_{CB} = 20 V	I_{CBO}	max.	100	μA
Saturation voltage				
I_C = 200 mA; I_B = 20 mA	V_{CEsat}	max.	0,75	V
D.C. current gain				
I_C = 200 mA; V_{CE} = 20 V	h_{FE}	min.	30	
I_C = 400 mA; V_{CE} = 20 V	h_{FE}	min.	20	
Collector capacitance at f = 1 MHz				
$I_E = I_e$ = 0; V_{CB} = 20 V	C_c	max.	10	pF
Feedback capacitance at f = 1 MHz				
I_C = 10 mA; V_{CE} = 20 V; T_{mb} = 25 °C	C_{re}	typ.	3,5	pF
Collector-stud capacitance	C_{cs}	typ.	2	pF
Transition frequency at f = 500 MHz				
I_C = 200 mA; V_{CE} = 20 V	f_T	min.	1200	MHz
I_C = 400 mA; V_{CE} = 20 V	f_T	min.	1000	MHz
Output power at f = 200 MHz; T_{mb} = 25 °C				
I_C = 200 mA; V_{CE} = 20 V; VSWR at output $<$ 2				
f_p = 202 MHz; f_q = 205 MHz; d_{im} = −30 dB				
measured at $f_{(2q-p)}$ = 208 MHz (channel 9)	P_o	typ.	450	mW
Power gain (not neutralized) T_{mb} = 25 °C				
I_C = 200 mA; V_{CE} = 20 V; f = 200 MHz	G_p	min.	15	dB
		typ.	19	dB
I_C = 200 mA; V_{CE} = 20 V; f = 800 MHz	G_p	typ.	4,5	dB

CHARACTERISTICS (continued)

Intermodulation characteristics

1. Output power at f = 200 MHz; T_{mb} = 25 °C
   I_C = 200 mA; V_{CE} = 20 V; VSWR at output < 2
   f_p = 202 MHz; f_q = 205 MHz; d_{im} = −30 dB
   measured at $f_{(2q\text{-}p)}$ = 208 MHz (channel 9)

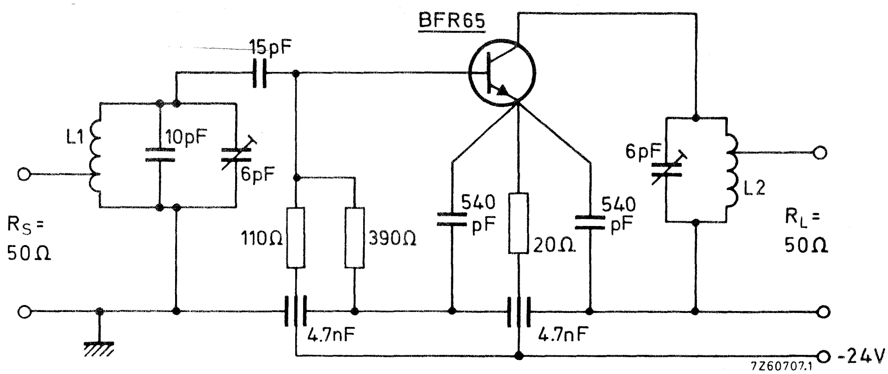


Fig. 2.

Coil data:

L1 = 1 turn silver plated Cu wire (1,4 mm); int. diam. 8 mm; tap at 0,75 turn from earth.
L2 = 3 turns silver plated Cu wire (1,4 mm); int. diam. 8 mm; winding pitch 2,7 mm; tap at 2,5 turns from earth.

Basis of adjustment

The intermodulation at an intermodulation distortion of −30 dB is caused by h.f. output current — voltage clipping.
The maximum undistorted output power is realised, if

a. Current and voltage clipping take place concurrently.
   This occurs if

$$R_L = \frac{V_{CE} - V_{CEK}}{I_C},$$

   in which V_{CEK} is the high frequency knee voltage.

b. The h.f. collector current is as small as possible.
   This is so if $-C_L = +C_{oe}$,
   in which C_{oe} is the output capacitance of the transistor at short-circuited input.

For maximum output power at an intermodulation distortion of −30 dB, the (experimentally found) values of R_L and C_L are:
R_L = 91 Ω; C_L = −6,8 pF.

Adjustment procedure

1. Remove the transistor and connect a dummy consisting of a 91 Ω resistor in parallel with a 6,8 pF capacitor between the collector and emitter connections of the output circuit.
2. Tune and match the output circuit for zero reflection at 205 MHz (VSWR = 1). After this adjustment, no further change may be made in the output circuit.
3. Replace the dummy by the transistor. Tune and match the input circuit for maximum power gain and good band pass curve.
   The VSWR of the output will then, in most cases, be $\leqslant 2$ over the whole channel.

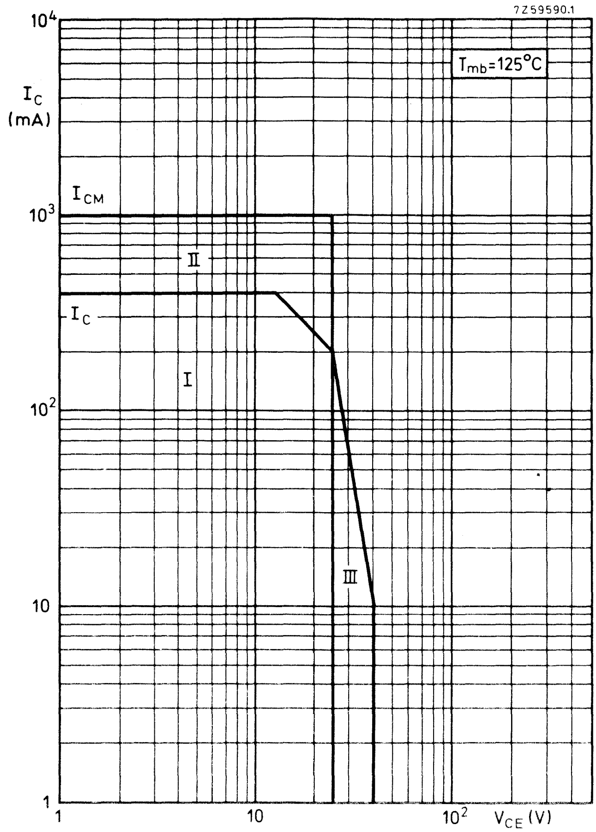


Fig. 3 Safe Operating ARea with the transistor forward biased; T_{mb} = 125 °C.

I Region of permissible d.c. operation
II Permissible extension for repetitive pulsed operation; f > 1 MHz
III Repetitive pulsed operation in this region is allowable, provided f > 1 MHz; R_{BE} < 10 Ω

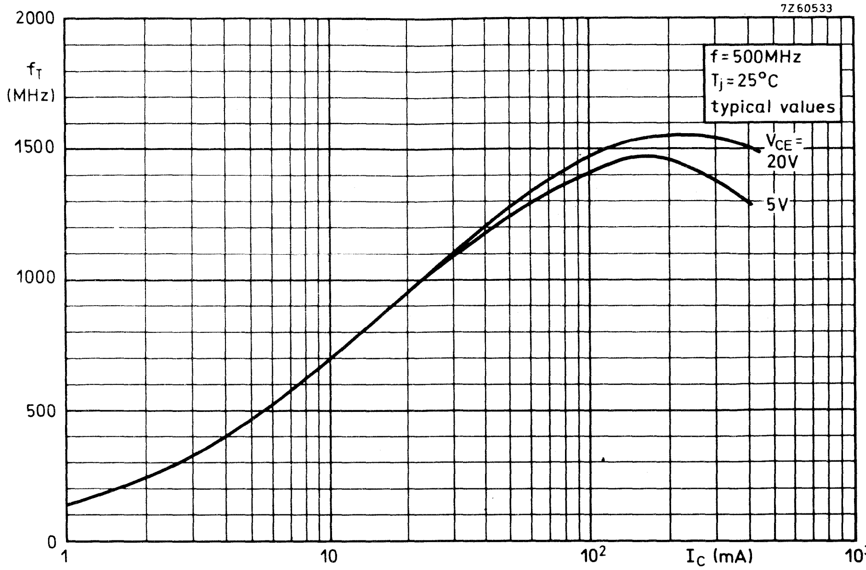


Fig. 4 f = 500 MHz; T_j = 25 °C; typical values.

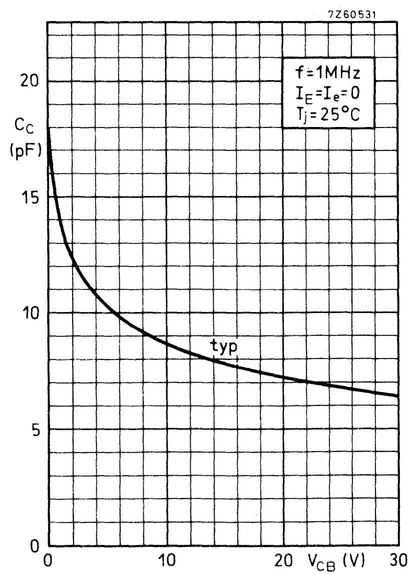


Fig. 5 $I_E = i_e = 0$; f = 1 MHz; T_j = 25 °C; typical values.

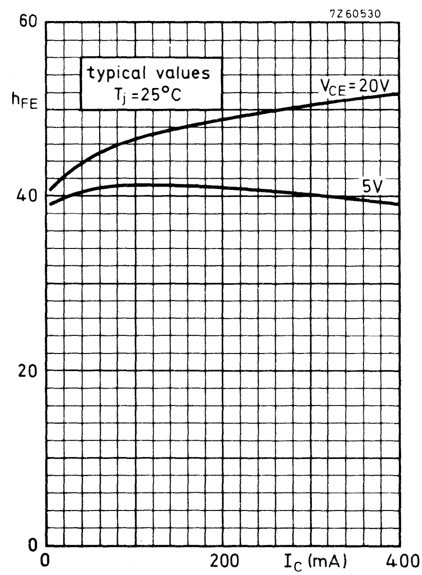


Fig. 6 T_j = 25 °C; typical values.

N-P-N 1 GHz WIDEBAND TRANSISTOR

N-P-N transistor in a plastic SOT-37 envelope. It is primarily intended for use in u.h.f. and microwave amplifiers such as in aerial amplifiers, radar systems, oscilloscopes, spectrum analysers etc.

The transistor features low intermodulation distortion and high power gain; thanks to its very high transition frequency, it also has excellent wideband properties and low noise up to high frequencies.

P-N-P complement is BFQ51.

QUICK REFERENCE DATA

Collector-base voltage (open emitter)	V_{CBO}	max.	20	V
Collector-emitter voltage (open base)	V_{CEO}	max.	15	V
Collector current (d.c.)	I_C	max.	25	mA
Total power dissipation up to T_{amb} = 60 °C	P_{tot}	max.	180	mW
Junction temperature	T_j	max.	175	°C
Transition frequency at f = 500 MHz I_C = 14 mA; V_{CE} = 10 V	f_T	typ.	5,0	GHz
Feedback capacitance at f = 1 MHz I_C = 0; V_{CE} = 10 V	C_{re}	typ.	0,4	pF
Noise figure at optimum source impedance I_C = 2 mA; V_{CE} = 10 V; f = 500 MHz	F	typ.	2,4	dB
Max. unilateral power gain I_C = 14 mA; V_{CE} = 10 V; f = 500 MHz	G_{UM}	typ.	19,5	dB
Output voltage at d_{im} = −60 dB I_C = 14 mA; V_{CE} = 10 V; R_L = 75 Ω; $f_{(p+q-r)}$ = 493,25 MHz	V_o	typ.	150	mV

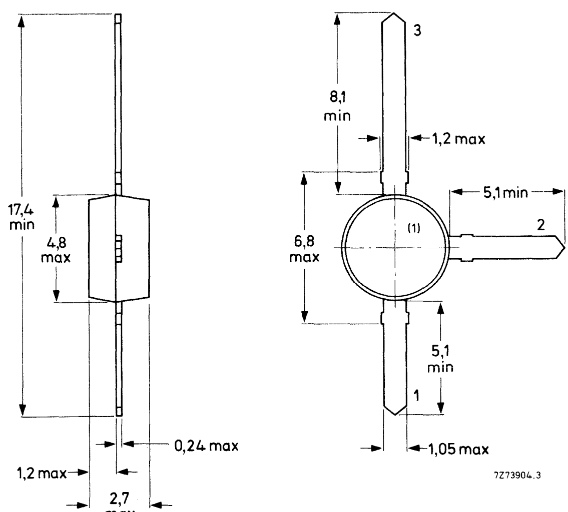
MECHANICAL DATA

Dimensions in mm

Fig. 1 SOT-37.

Connections

1. Base
2. Emitter
3. Collector



(1) = type number marking.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

Collector-base voltage (open emitter)	V_{CBO}	max.	20 V
Collector-emitter voltage (open base)	V_{CEO}	max.	15 V
Emitter-base voltage (open collector)	V_{EBO}	max.	2 V
Collector current (d.c.)	I_C	max.	25 mA
Total power dissipation up to T_{amb} = 60 °C	P_{tot}	max.	180 mW
Storage temperature	T_{stg}		−65 to +150 °C
Junction temperature	T_j	max.	175 °C

THERMAL RESISTANCE

From junction to ambient in free air and mounted on a glass-fibre print of 40 mm x 25 mm x 1 mm (Fig. 2)	$R_{th\ j\text{-}a}$	=	500 K/W

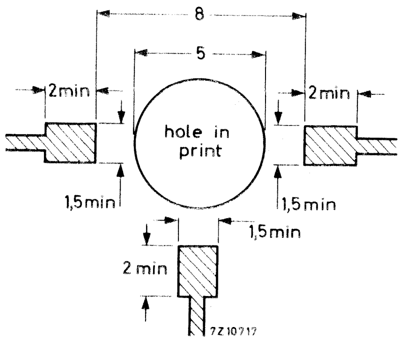


Fig. 2 Requirements for fibre-glass print. (Dimensions in mm)

CHARACTERISTICS

T_j = 25 °C unless otherwise specified

Collector cut-off current $I_E = 0$; $V_{CB} = 10$ V	I_{CBO}	max.	50 nA
D.C. current gain $I_C = 14$ mA; $V_{CE} = 10$ V	h_{FE}	min. typ.	40 90
Transition frequency at f = 500 MHz $I_C = 14$ mA; $V_{CE} = 10$ V	f_T	typ.	5,0 GHz
Collector capacitance at f = 1 MHz $I_E = I_e = 0$; $V_{CB} = 10$ V	C_c	typ.	0,5 pF
Emitter capacitance at f = 1 MHz $I_C = I_c = 0$; $V_{EB} = 0,5$ V	C_e	typ.	1,2 pF
Feedback capacitance at f = 1 MHz $I_C = 0$; $V_{CE} = 10$ V	C_{re}	typ.	0,4 pF
Noise figure at optimum source impedance $I_C = 2$ mA; $V_{CE} = 10$ V; f = 500 MHz; $T_{amb} = 25$ °C	F	typ.	2,4 dB

Max. unilateral power gain (s_{re} assumed to be zero)

$$G_{UM} = 10 \log \frac{|s_{fe}|^2}{[1-|s_{ie}|^2]\,[1-|s_{oe}|^2]}$$

$I_C = 14$ mA; $V_{CE} = 10$ V; f = 500 MHz; $T_{amb} = 25$ °C	G_{UM}	typ.	19,5 dB

Output voltage at $d_{im} = -60$ dB
$I_C = 14$ mA; $V_{CE} = 10$ V;
$R_L = 75\ \Omega$; $T_{amb} = 25$ °C

$V_p = V_o$ at $d_{im} = -60$ dB ; $f_p = 495,25$ MHz
$V_q = V_o -6$ dB ; $f_q = 503,25$ MHz
$V_r = V_o -6$ dB ; $f_r = 505,25$ MHz

measured at $f_{(p+q-r)} = 495,25$ MHz	V_o	typ.	150 mV

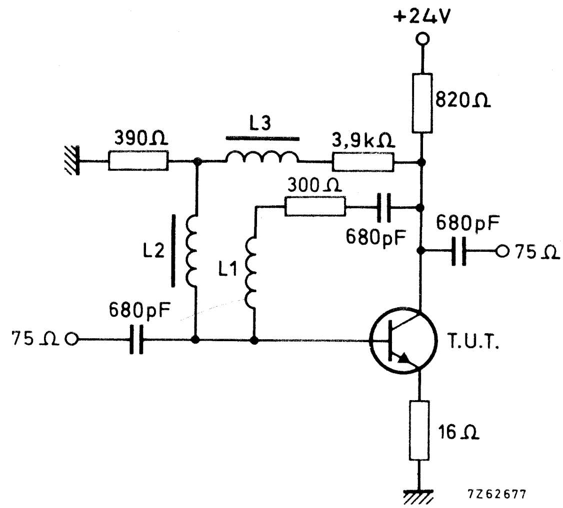


Fig. 3 Intermodulation test circuit.

L1 = 4 turns Cu wire (0,35 mm); winding pitch 1 mm; int. diam. 4 mm
L2 and L3 5 μH (code number: 3122 108 20150)

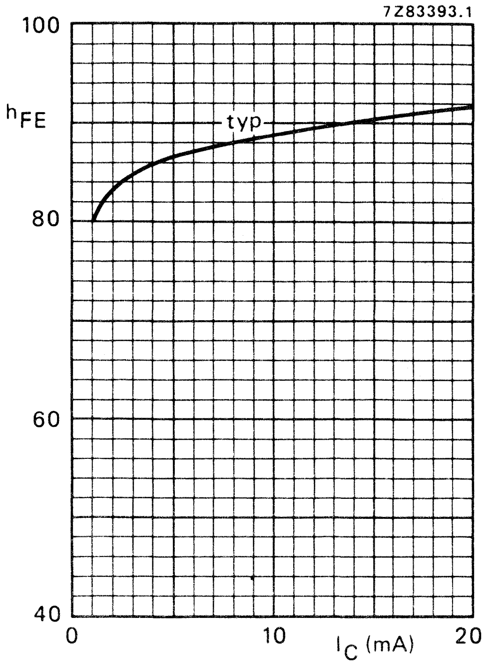


Fig. 4 V_{CE} = 10 V; T_j = 25 °C; typical values.

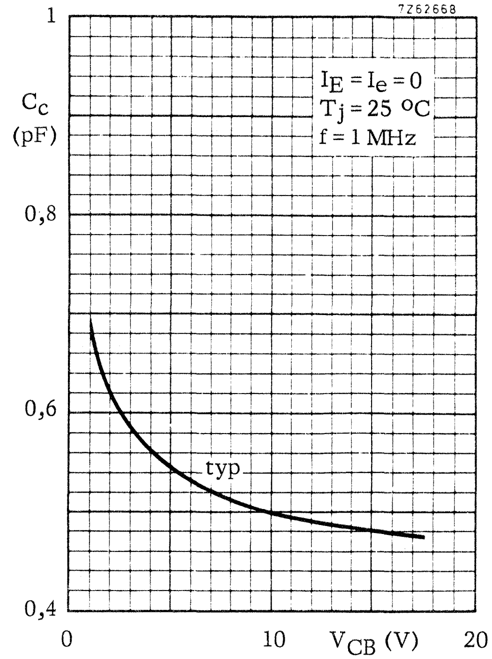


Fig. 5 I_E = i_e = 0; T_j = 25 °C; typical values.

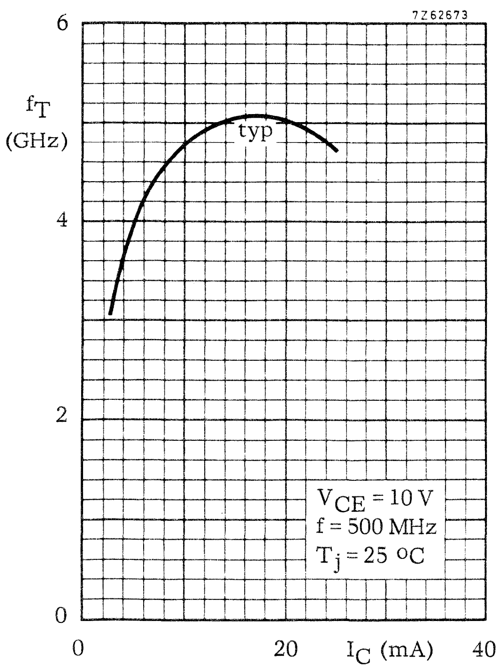


Fig. 6 V_{CE} = 10 V; f = 500 MHz; T_j = 25 °C; typical values.

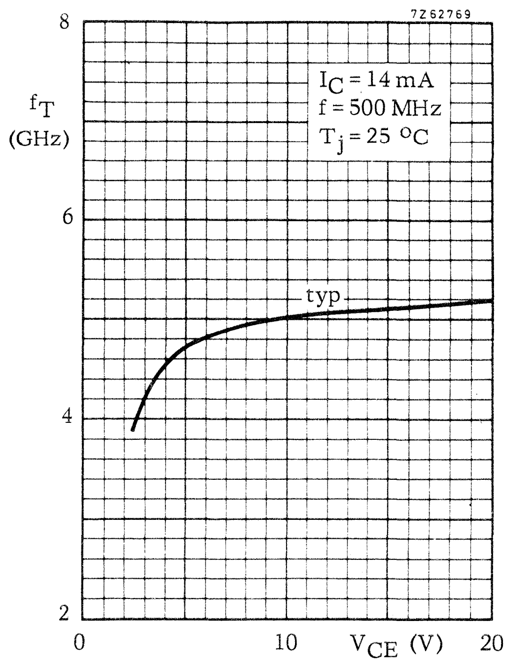


Fig. 7 I_C = 14 mA; f = 500 MHz; T_j = 25 °C; typical values.

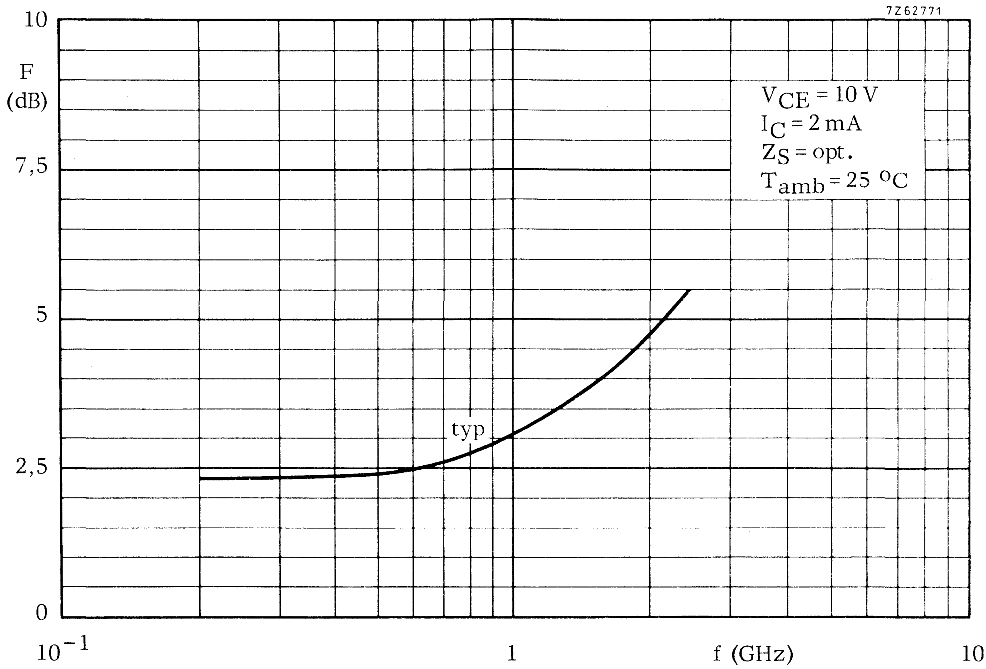


Fig. 8 V_{CE} = 10 V; I_C = 2 mA; Z_S = opt.; T_{amb} = 25 °C; typical values.

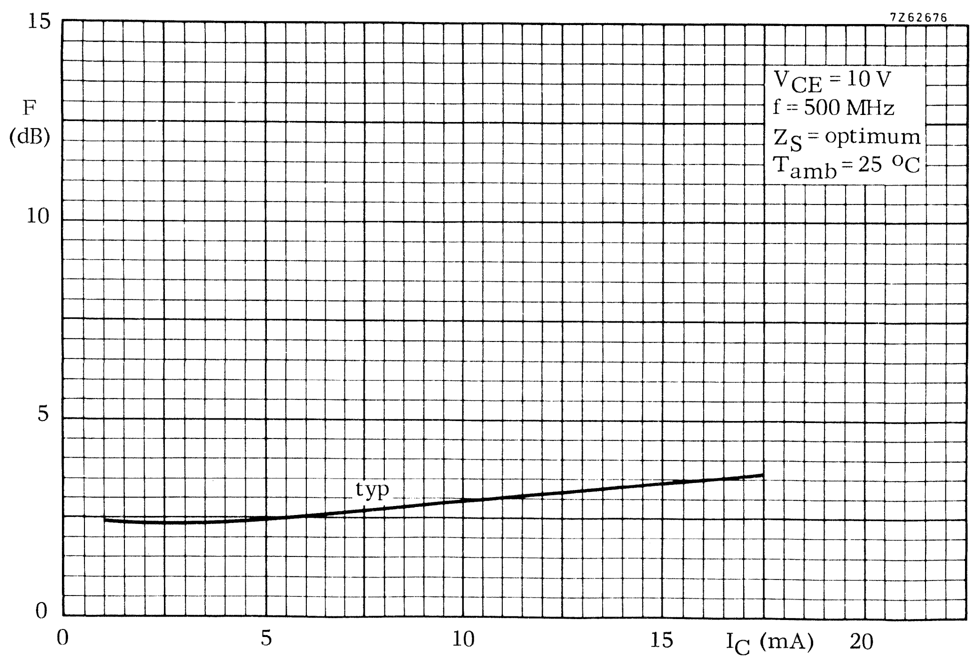


Fig. 9 V_{CE} = 10 V; f = 500 MHz; Z_S = opt.; T_{amb} = 25 °C; typical values.

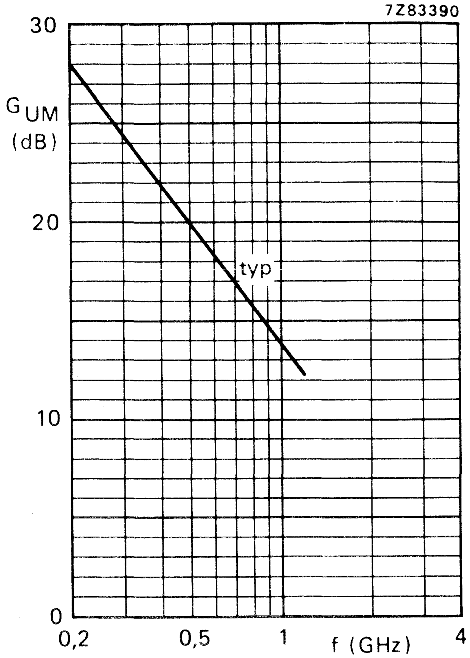


Fig. 10 V_{CE} = 10 V; I_C = 14 mA; T_{amb} = 25 °C; typical values.

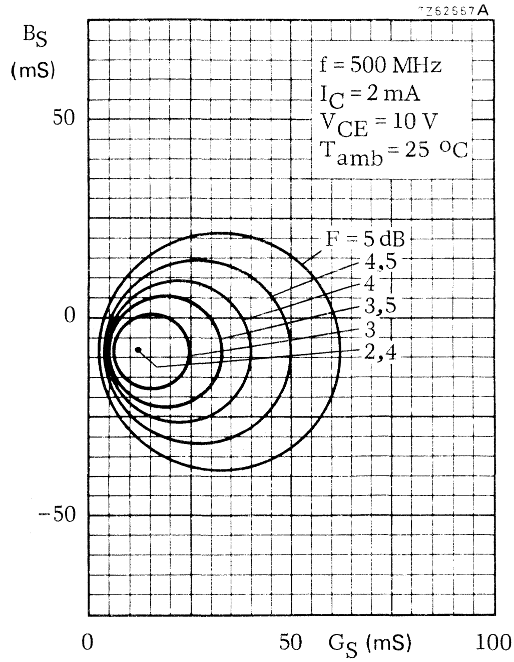


Fig. 11 Circles of constant noise figure; V_{CE} = 10 V; I_C = 2 mA; f = 500 MHz; T_{amb} = 25 °C; typical values.

N-P-N 1 GHz WIDEBAND TRANSISTOR

N-P-N transistor in a plastic SOT-37 envelope primarily intended for use in v.h.f. and u.h.f. wideband amplifiers. P-N-P complement is BFQ51.

Features of this device:

- low noise
- low intermodulation distortion
- high power gain
- gold metallization

QUICK REFERENCE DATA

Collector-base voltage (open emitter)	V_{CBO}	max.	20 V
Collector-emitter voltage (open base)	V_{CEO}	max.	15 V
Collector current (d.c.)	I_C	max.	25 mA
Total power dissipation up to T_{amb} = 60 °C	P_{tot}	max.	180 mW
Junction temperature	T_j	max.	175 °C
Transition frequency at f = 500 MHz I_C = 14 mA; V_{CE} = 10 V	f_T	typ.	5,0 GHz
Feedback capacitance at f = 1 MHz I_C = 0; V_{CE} = 10 V	C_{re}	typ.	0,35 pF
Maximum unilateral power gain at f = 800 MHz I_C = 14 mA; V_{CE} = 10 V	G_{UM}	typ.	15,5 dB
Noise figure at Z_S = 60 Ω I_C = 4 mA; V_{CE} = 10 V; f = 800 MHz	F	typ.	1,8 dB
Output voltage at d_{im} = −60 dB I_C = 14 mA; V_{CE} = 10 V; R_L = 75 Ω $f_{(p+q-r)}$ = 793,25 MHz	V_o	typ.	150 mV
Output power at 1 dB gain compression	P_{L1}	typ.	+ 8 dBm
Third order intercept point	ITO	typ.	+ 27 dBm

MECHANICAL DATA

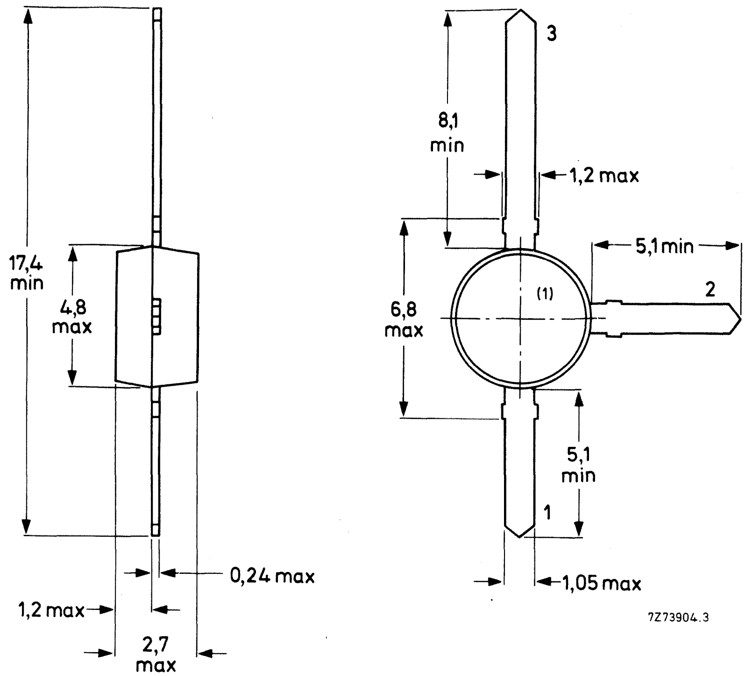
SOT-37 (see Fig. 1).

MECHANICAL DATA

Dimensions in mm

Fig. 1 SOT-37.

Connections
1. Base
2. Emitter
3. Collector



(1) = type number marking.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

Collector-base voltage (open emitter)	V_{CBO}	max.	20 V
Collector-emitter voltage (open base)	V_{CEO}	max.	15 V
Emitter-base voltage (open collector)	V_{EBO}	max.	2 V
Collector current (d.c.)	I_C	max.	25 mA
Total power dissipation up to T_{amb} = 60 °C	P_{tot}	max.	180 mW
Storage temperature	T_{stg}	−65 to + 150 °C	
→ Junction temperature	T_j	max.	175 °C

THERMAL RESISTANCE

From junction to ambient in free air mounted on a fibre-glass print (see Fig. 2) of 40 mm x 25 mm x 1 mm — $R_{th\ j\text{-}a}$ = 500 K/W

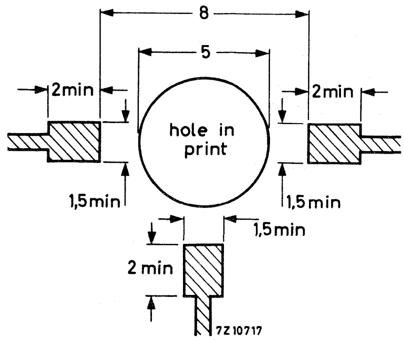


Fig. 2 Requirements for fibre-glass print. (Dimensions in mm.)

CHARACTERISTICS

T_j = 25 °C unless otherwise specified

Collector cut-off current $I_E = 0$; $V_{CB} = 10$ V	I_{CBO}	max.	50 nA
D.C. current gain $I_C = 14$ mA; $V_{CE} = 10$ V	h_{FE}	min. typ.	40 90
Transition frequency at f = 500 MHz $I_C = 14$ mA; $V_{CE} = 10$ V	f_T	typ.	5,0 GHz
Collector capacitance at f = 1 MHz $I_E = I_e = 0$; $V_{CB} = 10$ V	C_c	typ.	0,6 pF
Emitter capacitance at f = 1 MHz $I_C = I_c = 0$; $V_{EB} = 0,5$ V	C_e	typ.	1,2 pF
Feedback capacitance at f = 1 MHz $I_C = 0$; $V_{CE} = 10$ V	C_{re}	typ.	0,35 pF
Noise figure at T_{amb} = 25 °C $I_C = 4$ mA; $V_{CE} = 10$ V; $Z_S = 60\ \Omega$; f = 800 MHz $I_C = 4$ mA; $V_{CE} = 10$ V; $Z_S = Z_{opt}$; f = 2 GHz	F F	typ. typ.	1,7 dB 3,6 dB

Maximum unilateral power gain (s_{re} assumed to be zero)

$$G_{UM} = 10 \log \frac{|s_{fe}|^2}{(1 - |s_{ie}|^2)(1 - |s_{oe}|^2)}$$

$I_C = 14$ mA; $V_{CE} = 10$ V; f = 800 MHz; T_{amb} = 25 °C	G_{UM}	typ.	15,5 dB

Output voltage at d_{im} = −60 dB (see Figs 3 and 15)
(DIN 45004B, par. 6.3: 3-tone)
I_C = 14 mA; V_{CE} = 10 V; R_L = 75 Ω; VSWR < 2; T_{amb} = 25 °C
$V_p = V_o$ at d_{im} = −60 dB; f_p = 795,25 MHz
$V_q = V_o$ −6 dB ; f_q = 803,25 MHz
$V_r = V_o$ −6 dB ; f_r = 805,25 MHz
Measured at $f_{(p+q-r)}$ = 793,25 MHz — V_o typ. 150 mV

Second harmonic distortion (see Figs 3 and 16)
I_C = 14 mA; V_{CE} = 10 V; R_L = 75 Ω; VSWR < 2; T_{amb} = 25 °C
V_p = 60 mV at f_p = 250 MHz
V_q = 60 mV at f_q = 560 MHz
measured at $f_{(p+q)}$ = 810 MHz — d_2 typ. −50 dB

Output power at 1 dB gain compression (see Fig. 3)
I_C = 14 mA; V_{CE} = 10 V
R_L = 75 Ω; T_{amb} = 25 °C
measured at f = 800 MHz — P_{L1} typ. 8 dBm

Third order intercept point (see Fig. 3)
I_C = 14 mA; V_{CE} = 10 V
R_L = 75 Ω; T_{amb} = 25 °C
P_p = ITO − 6 dB; f_p = 800 MHz
P_q = ITO − 6 dB; f_q = 801 MHz
measured at $f_{(2q-p)}$ = 802 MHz and
at $f_{(2p-q)}$ = 799 MHz — ITO typ. 27 dBm

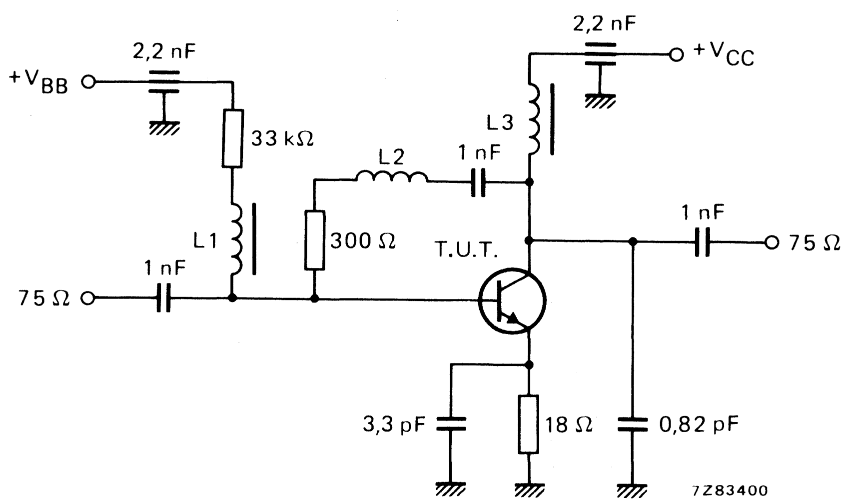


Fig. 3 Intermodulation distortion and second harmonic distortion test circuit.

L1 = L3 = 5 μH micro choke
L2 = 3 turns Cu wire (0,4 mm); internal diameter 3 mm; winding pitch 1 mm

s-parameters (common emitter) at V_{CE} = 5 V; T_{amb} = 25 °C; typical values.

I_C mA	f MHz	s_{ie}	s_{re}	s_{fe}	s_{oe}	G_{UM} dB
2	40	0,91/ −7,7°	0,01/84°	6,8/173°	0,99/ −2,7°	46,0
	200	0,79/ −37,3°	0,03/71°	6,5/143°	0,93/−12,5°	29,2
	500	0,52/ −81,0°	0,06/59°	4,6/116°	0,80/−22,5°	19,1
	800	0,34/−114,5°	0,08/58°	3,3/ 97°	0,73/−27,0°	14,2
	1000	0,26/−137,6°	0,09/59°	2,8/ 87°	0,70/−30,0°	12,2
	1200	0,22/−165,0°	0,10/61°	2,4/ 79°	0,67/−33,0°	10,4
5	40	0,80/ −11,7°	0,01/81°	14,4/169°	0,99/ −4,5°	44,6
	200	0,59/ −51,0°	0,03/68°	11,2/134°	0,85/−17,0°	28,4
	500	0,29/ −95,0°	0,05/66°	6,3/103°	0,70/−22,0°	19,3
	800	0,16/−130,0°	0,07/69°	4,2/ 88°	0,64/−26,0°	14,9
	1000	0,12/−162,0°	0,09/70°	3,4/ 81°	0,63/−28,0°	12,9
	1200	0,12/+ 158,0°	0,10/71°	2,9/ 74°	0,61/−31,0°	11,3
10	40	0,67/ −16,7°	0,01/80°	23,3/164°	0,97/ −6,6°	42,2
	200	0,39/ −63,0°	0,02/70°	14,5/122°	0,76/−18,0°	27,7
	500	0,15/−109,0°	0,05/73°	7,0/ 96°	0,64/−20,0°	19,3
	800	0,09/−152,0°	0,07/75°	4,6/ 84°	0,60/−24,0°	15,2
	1000	0,07/+ 155,0°	0,09/75°	3,7/ 77°	0,59/−26,0°	13,2
	1200	0,10/+ 124,0°	0,11/74°	3,1/ 72°	0,58/−29,0°	11,7
14	40	0,58/ −20,0°	0,01/79°	28,3/160°	0,96/ −7,8°	41,9
	200	0,30/ −71,0°	0,02/72°	15,5/117°	0,72/−18,0°	27,9
	500	0,11/−119,0°	0,05/75°	7,2/ 93°	0,62/−19,0°	19,3
	800	0,07/−177,0°	0,07/77°	4,6/ 82°	0,59/−23,0°	15,1
	1000	0,08/+ 138,0°	0,09/76°	3,8/ 76°	0,58/−25,0°	13,4
	1200	0,12/+ 118,0°	0,11/76°	3,2/ 71°	0,57/−28,0°	11,9
20	40	0,49/ −25,0°	0,01/78°	32,9/157°	0,94/ −9,0°	40,9
	200	0,22/ −82,0°	0,02/74°	15,9/112°	0,69/−17,0°	27,1
	500	0,09/−143,0°	0,05/78°	7,1/ 91°	0,61/−18,0°	19,1
	800	0,08/+ 160,0°	0,07/78°	4,5/ 80°	0,59/−22,0°	15,0
	1000	0,10/+ 130,0°	0,09/78°	3,7/ 75°	0,58/−24,0°	13,2
	1200	0,14/+ 115,0°	0,11/77°	3,1/ 69°	0,57/−28,0°	11,6
30	40	0,36/ −38,9°	0,01/76°	31,2/151°	0,90/−10,3°	37,7
	200	0,18/−122,0°	0,02/75°	14,0/106°	0,66/−14,0°	25,5
	500	0,15/−175,0°	0,05/80°	6,1/ 88°	0,61/−16,0°	17,8
	800	0,17/+ 148,0°	0,07/80°	3,9/ 78°	0,59/−21,0°	13,8
	1000	0,19/+ 131,0°	0,09/79°	3,1/ 72°	0,59/−24,0°	11,8
	1200	0,23/+ 119,0°	0,11/79°	2,7/ 67°	0,57/−28,0°	10,6

s-parameters (common emitter) at V_{CE} = 10 V; T_{amb} = 25 °C; typical values.

I_C mA	f MHz	s_{ie}	s_{re}	s_{fe}	s_{oe}	G_{UM} dB
2	40	0,91/ −7,5°	0,01/84°	7,0/173°	0,99/ −2,6°	46,0
	200	0,81/ −36,0°	0,03/72°	6,3/149°	0,94/−12,0°	30,0
	500	0,54/ −78,0°	0,06/59°	4,6/118°	0,82/−21,0°	19,6
	800	0,35/−110,0°	0,08/58°	3,4/ 98°	0,74/−26,0°	14,6
	1000	0,27/−132,0°	0,08/59°	2,8/ 89°	0,72/−29,0°	12,4
	1200	0,22/−159,0°	0,09/61°	2,5/ 80°	0,69/−0,32°	11,0
5	40	0,81/ −11,1°	0,01/82°	14,4/169°	0,99/ −4,3°	44,8
	200	0,61/ −48,0°	0,03/69°	11,1/135°	0,86/−16,0°	28,8
	500	0,31/ −90,0°	0,05/66°	6,4/105°	0,71/−22,0°	21,2
	800	0,17/−120,0°	0,07/69°	4,3/ 90°	0,66/−25,0°	15,3
	1000	0,11/−148,0°	0,08/70°	3,5/ 82°	0,64/−27,0°	13,2
	1200	0,10/+167,0°	0,10/71°	3,0/ 76°	0,63/−30,0°	11,8
10	40	0,70/ −15,2°	0,01/80°	23,0/164°	0,97/ −6,1°	42,4
	200	0,42/ −58,0°	0,02/70°	14,8/124°	0,78/−17,0°	28,3
	500	0,17/ −95,0°	0,05/73°	7,3/ 97°	0,65/−20,0°	19,8
	800	0,07/−104,0°	0,07/75°	4,7/ 85°	0,62/−23,0°	15,6
	1000	0,04/−174,0°	0,09/75°	3,9/ 79°	0,61/−25,0°	13,8
	1200	0,07/+120,0°	0,10/75°	3,3/ 73°	0,59/−28,0°	12,2
14	40	0,63/ −18,0°	0,01/79°	28,2/161°	0,96/ −7,2°	42,3
	200	0,34/ −63,0°	0,02/72°	15,9/119°	0,74/−17,0°	28,0
	500	0,13/ −98,0°	0,05/75°	7,5/ 95°	0,63/−19,0°	19,8
	800	0,05/−136,0°	0,07/77°	4,8/ 83°	0,61/−22,0°	15,5
	1000	0,04/+133,0°	0,09/76°	3,9/ 77°	0,60/−25,0°	13,8
	1200	0,08/+108,0°	0,10/76°	3,3/ 72°	0,58/−28,0°	12,2

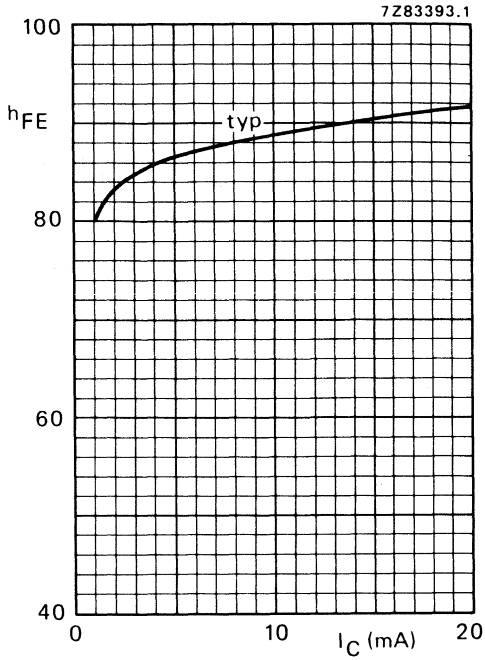


Fig. 4 V_{CE} = 10 V; T_j = 25 °C; typ. values.

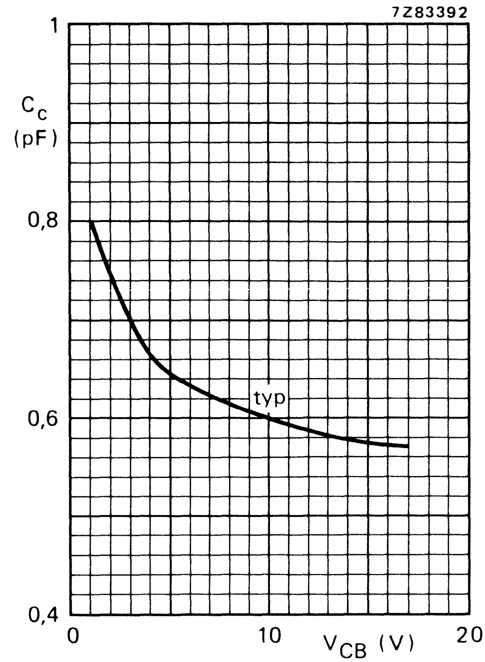


Fig. 5 $I_E = I_e = 0$; f = 1 MHz; T_j = 25 °C; typ. values.

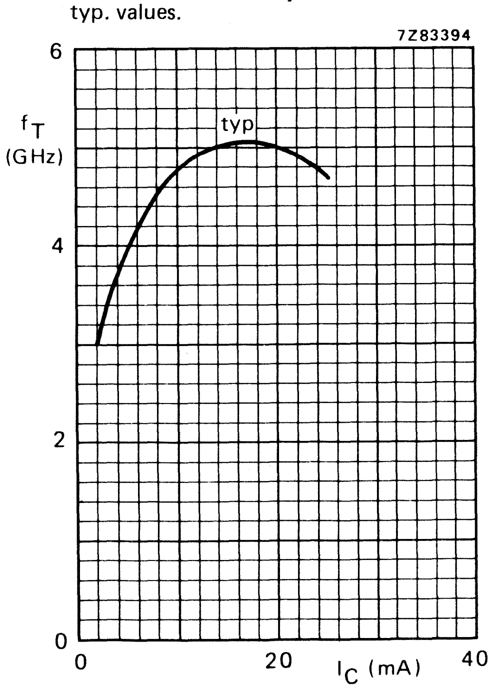


Fig. 6 V_{CE} = 10 V; f = 500 MHz; T_j = 25 °C; typical values.

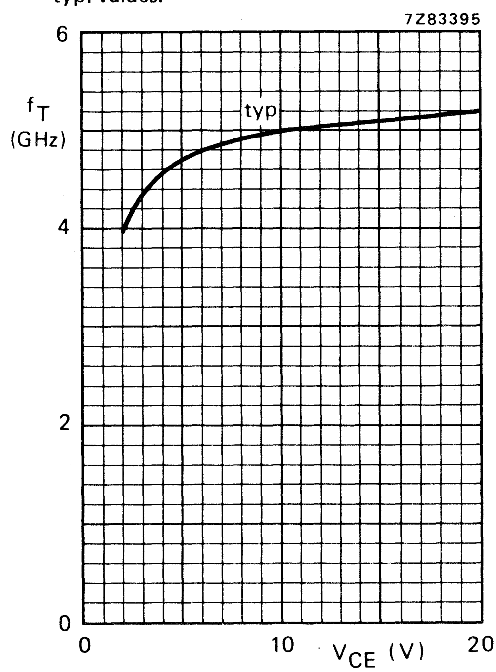


Fig. 7 I_C = 14 mA; f = 500 MHz; T_j = 25 °C; typical values.

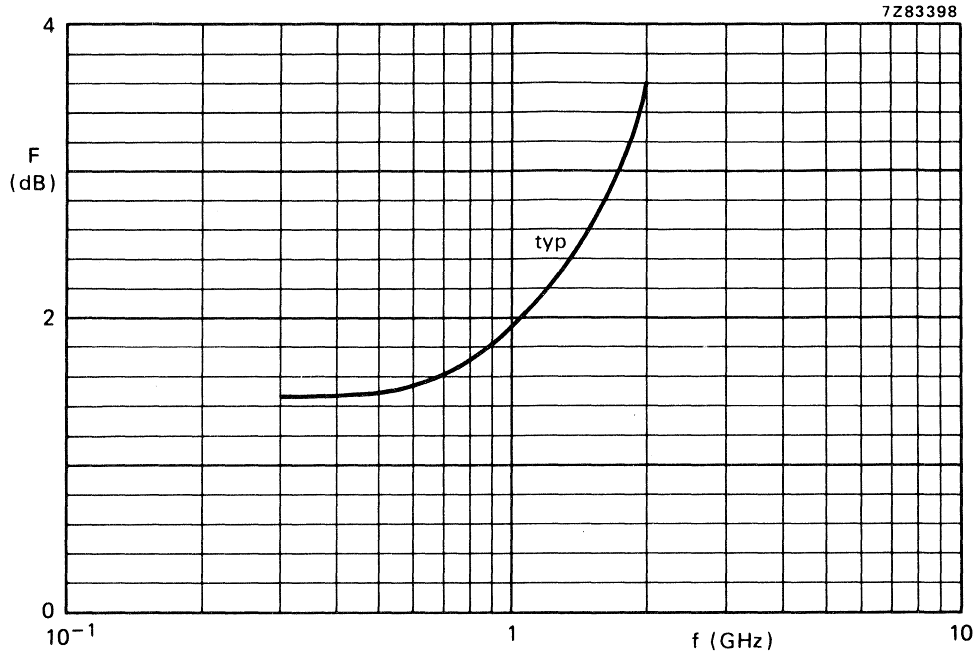


Fig. 8 V_{CE} = 10 V; I_C = 4 mA; Z_S = optimum; T_{amb} = 25 ^oC; typical values.

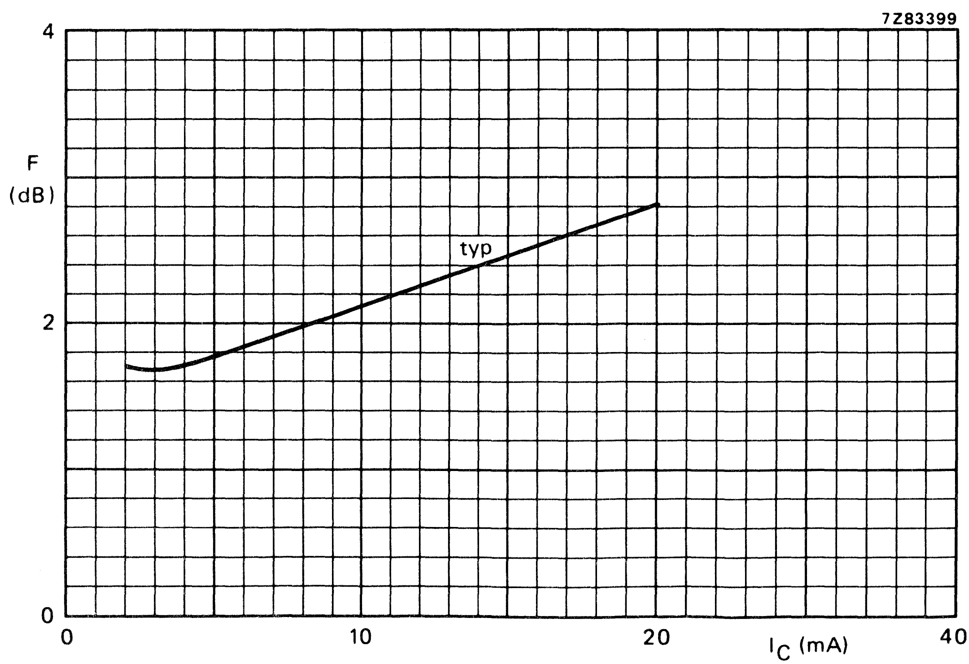


Fig. 9 V_{CE} = 10 V; f = 800 MHz; Z_S = optimum; T_{amb} = 25 ^oC; typical values.

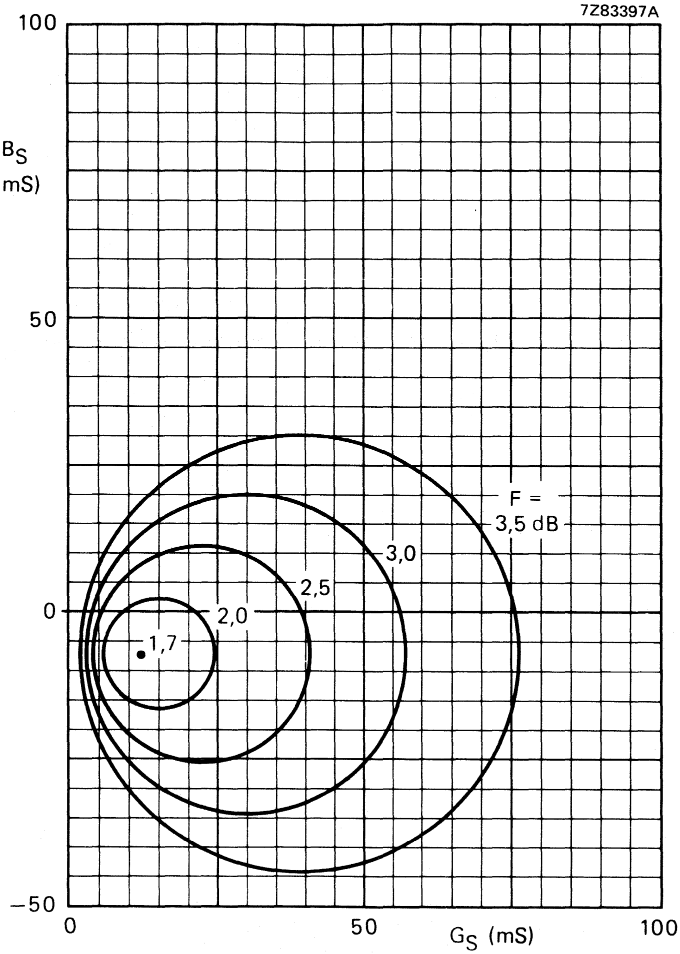


Fig. 10 Circles of constant noise figure.
V_{CE} = 10 V; I_C = 4 mA; f = 800 MHz; T_{amb} = 25 °C; typical values.

Conditions for Figs 11 and 12:
V_{CE} = 10 V; I_C = 14 mA;
T_{amb} = 25 °C; typical values.

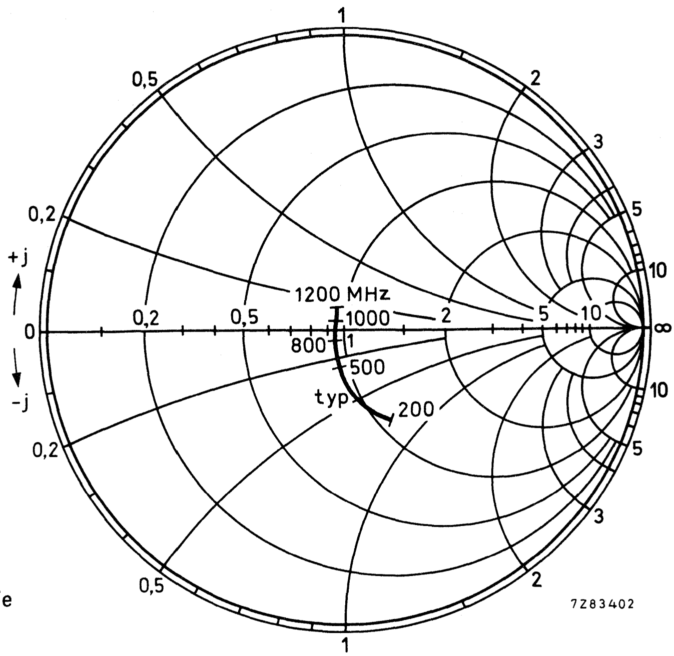


Fig. 11 Input impedance derived from input reflection coefficient s_{ie} co-ordinates in ohm x 50.

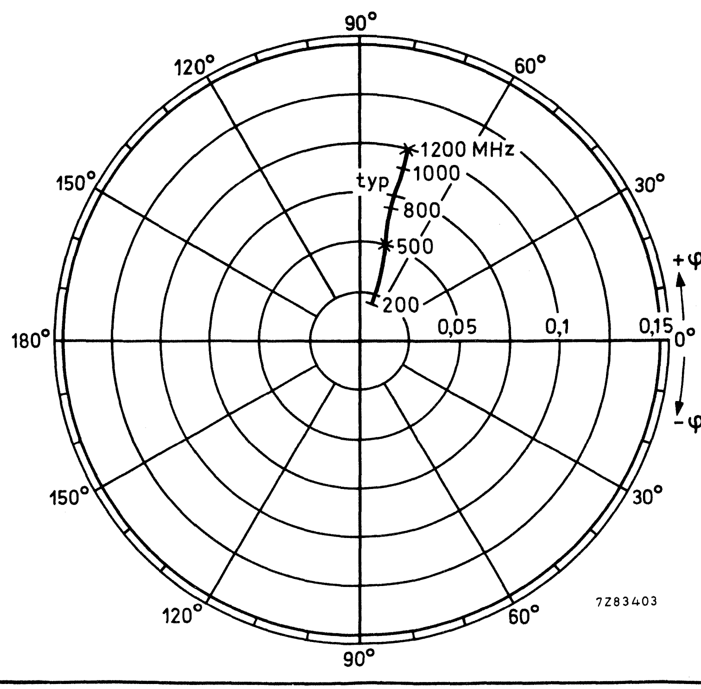


Fig. 12 Reverse transmission coefficient s_{re}.

Conditions for Figs 13 and 14:
V_{CE} = 10 V; I_C = 14 mA;
T_{amb} = 25 °C; typical values.

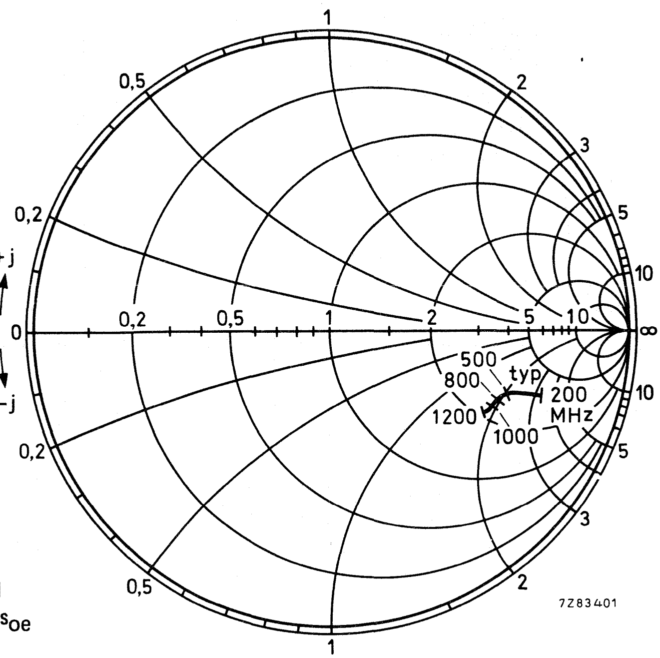


Fig. 13 Output impedance derived from output reflection coefficient s_{oe} co-ordinates in ohm x 50.

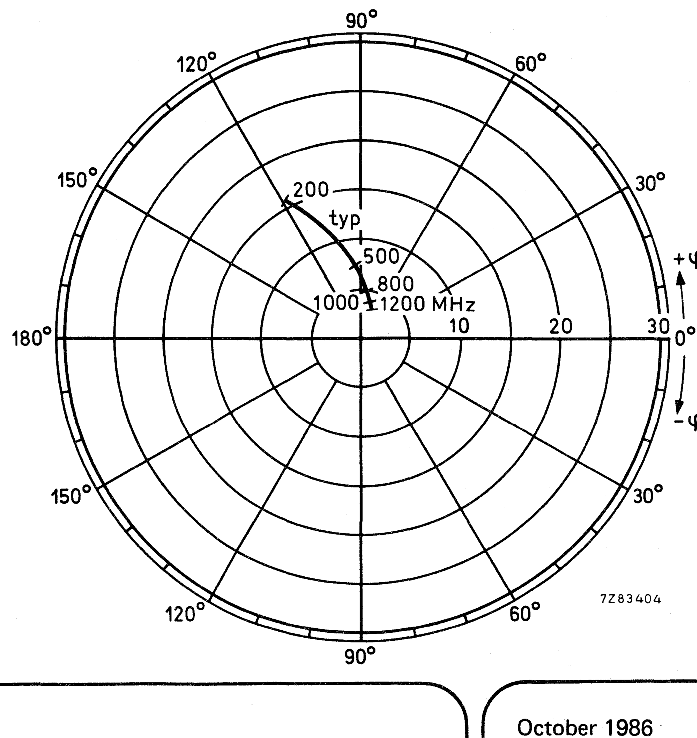


Fig. 14 Forward transmission coefficient s_{fe}.

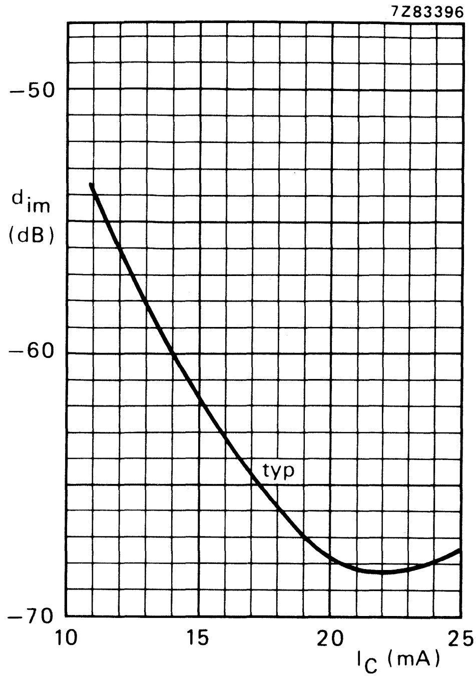


Fig. 15.

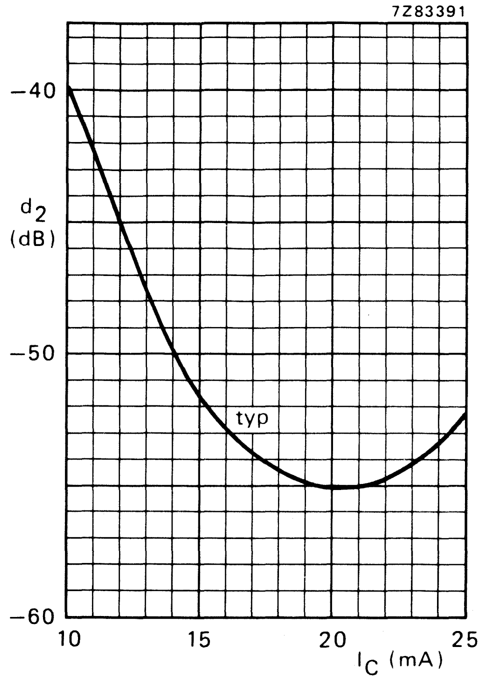


Fig. 16.

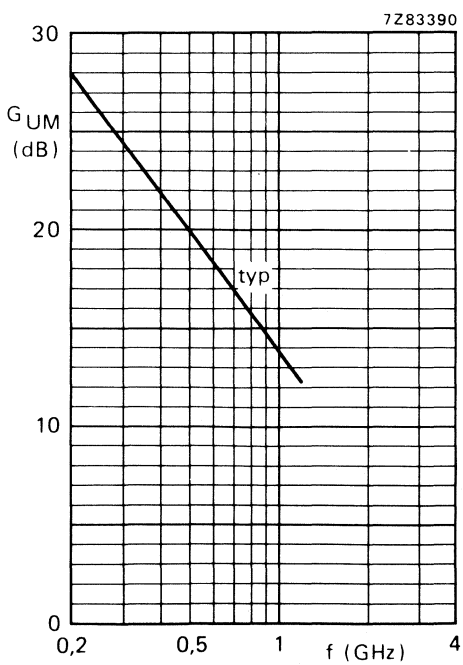


Fig. 15 V_{CE} = 10 V; V_o = 43,5 dBmV = 150 mV; $f_{(p+q-r)}$ = 793,25 MHz; T_{amb} = 25 ^oC; typ. values. measured in test circuit (see Fig. 3).

Fig. 16 V_{CE} = 10 V; V_o = 60 mV; $f_{(p+q)}$ = 810 MHz; T_{amb} = 25 ^oC; measured in test circuit (see Fig. 3); typical values.

Fig. 17 V_{CE} = 10 V; I_C = 14 mA; T_{amb} = 25 ^oC; typical values.

CLASS-B OPERATION

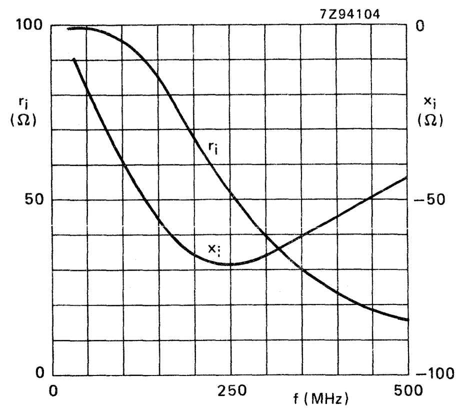


Fig. 18 Input impedance (series components).

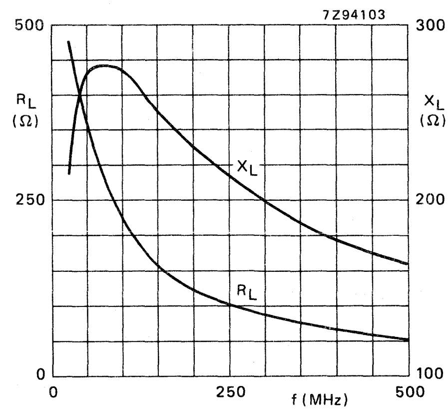


Fig. 19 Load impedance (series components).

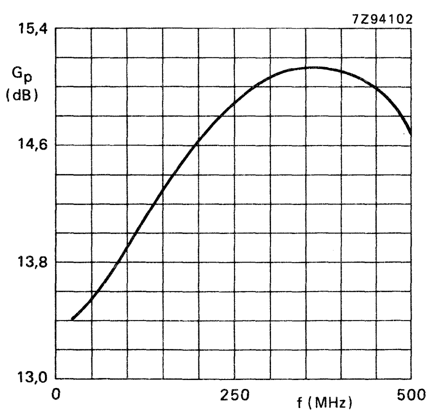


Fig. 20 Power gain versus frequency.

Conditions for Figs 18 to 20:

V_{CE} = 10 V; P_L = 100 mW; T_{amb} = 25 °C; typical values.

OPERATING NOTE for Figs 18 to 20:

A base-emitter resistor of 100 Ω is recommended to avoid oscillation. This resistor must be effective for r.f. only.

N-P-N 1 GHz WIDEBAND TRANSISTOR

N-P-N transistor in a plastic SOT-37 envelope. It is primarily intended for use in u.h.f. and microwave amplifiers such as in aerial amplifiers, radar systems, oscilloscopes, spectrum analysers etc.

The transistor features very low intermodulation distortion and high power gain; thanks to its very high transition frequency, it also has excellent wideband properties and low noise up to high frequencies.

P-N-P complement is BFQ23.

QUICK REFERENCE DATA

Collector-base voltage (open emitter)	V_{CBO}	max.	15	V
Collector-emitter voltage (open base)	V_{CEO}	max.	12	V
Collector current (d.c.)	I_C	max.	35	mA
Total power dissipation up to T_{amb} = 60 °C	P_{tot}	max.	180	mW
Junction temperature	T_j	max.	175	°C ←
Transition frequency at f = 500 MHz I_C = 30 mA; V_{CE} = 5 V	f_T	typ.	5,0	GHz
Feedback capacitance at f = 1 MHz I_C = 0; V_{CE} = 5 V	C_{re}	typ.	0,8	pF
Noise figure at optimum source impedance I_C = 2 mA; V_{CE} = 5 V; f = 500 MHz	F	typ.	1,9	dB
Max. unilateral power gain I_C = 30 mA; V_{CE} = 5 V; f = 500 MHz	G_{UM}	typ.	18,0	dB
Output voltage at d_{im} = −60 dB I_C = 30 mA; V_{CE} = 5 V; R_L = 75 Ω; $f_{(p+q-r)}$ = 493,25 MHz	V_o	typ.	300	mV

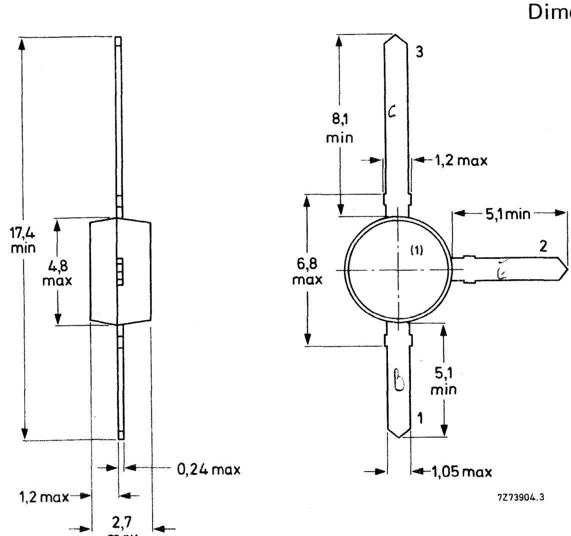
MECHANICAL DATA

Dimensions in mm

Fig. 1 SOT-37.

Connections

1. Base
2. Emitter
3. Collector



(1) = type number marking.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

Collector-base voltage (open emitter)	V_{CBO}	max.	15	V
Collector-emitter voltage (open base)	V_{CEO}	max.	12	V
Emitter-base voltage (open collector)	V_{EBO}	max.	2	V
Collector current (d.c.)	I_C	max.	35	mA
Total power dissipation up to T_{amb} = 60 °C	P_{tot}	max.	180	mW
Storage temperature	T_{stg}		−65 to +150	°C
→ Junction temperature	T_j	max.	175	°C

THERMAL RESISTANCE

From junction to ambient in free air and mounted on a glass-fibre print of 40 mm x 25 mm x 1 mm	$R_{th\ j\text{-}a}$	=	500	K/W

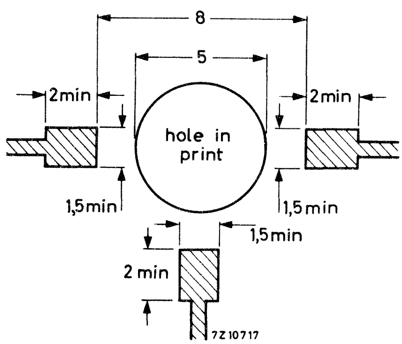


Fig. 2 Requirements for fibre-glass print. (Dimensions in mm)

CHARACTERISTICS

T_j = 25 °C unless otherwise specified

Collector cut-off current $I_E = 0$; $V_{CB} = 5$ V	I_{CBO}	max.	50 nA
D.C. current gain $I_C = 30$ mA; $V_{CE} = 5$ V	h_{FE}	min. typ.	40 90
Transition frequency at f = 500 MHz $I_C = 30$ mA; $V_{CE} = 5$ V	f_T	typ.	5,0 GHz
Collector capacitance at f = 1 MHz $I_E = I_e = 0$; $V_{CB} = 10$ V	C_c	typ.	0,7 pF
Emitter capacitance at f = 1 MHz $I_C = I_c = 0$; $V_{EB} = 0{,}5$ V	C_e	typ.	2,5 pF
Feedback capacitance at f = 1 MHz $I_C = 0$; $V_{CE} = 5$ V	C_{re}	typ.	0,8 pF
Noise figure at optimum source impedance $I_C = 2$ mA; $V_{CE} = 5$ V; f = 500 MHz; $T_{amb} = 25$ °C	F	typ.	1,9 dB

Max. unilateral power gain (s_{re} assumed to be zero)

$$G_{UM} = 10 \log \frac{|s_{fe}|^2}{[1-|s_{ie}|^2]\,[1-|s_{oe}|^2]}$$

$I_C = 30$ mA; $V_{CE} = 5$ V; f = 500 MHz; $T_{amb} = 25$ °C	G_{UM}	typ.	18,0 dB

Output voltage at d_{im} = --60 dB
$I_C = 30$ mA; $V_{CE} = 5$ V;
$R_L = 75\ \Omega$; $T_{amb} = 25$ °C

$V_p = V_o$ at d_{im} = −60 dB ; f_p = 495,25 MHz
$V_q = V_o$ −6 dB ; f_q = 503,25 MHz
$V_r = V_o$ −6 dB ; f_r = 505,25 MHz

measured at $f_{(p+q-r)}$ = 493,25 MHz	V_o	typ.	300 mV

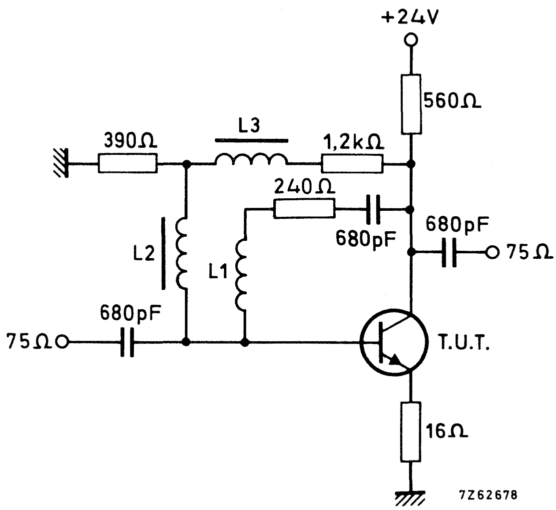


Fig. 3 Intermodulation test circuit.

L1 = 4 turns Cu wire (0,35 mm); winding pitch 1 mm; int. diam. 4 mm
L2 and L3 5 μH (code number: 3122 108 20150)

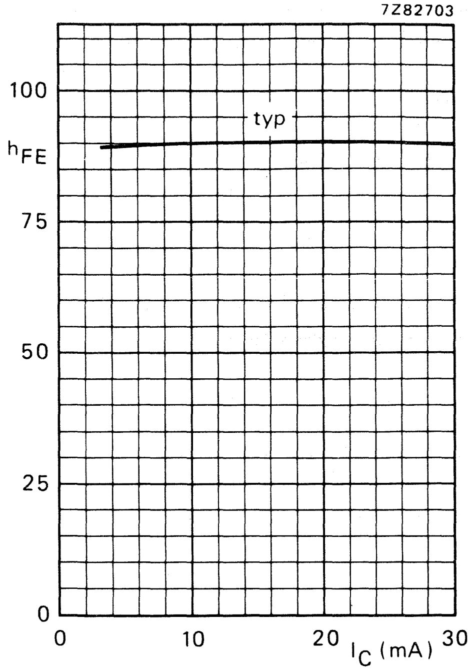


Fig. 4 V_{CE} = 5 V; T_j = 25 °C; typical values.

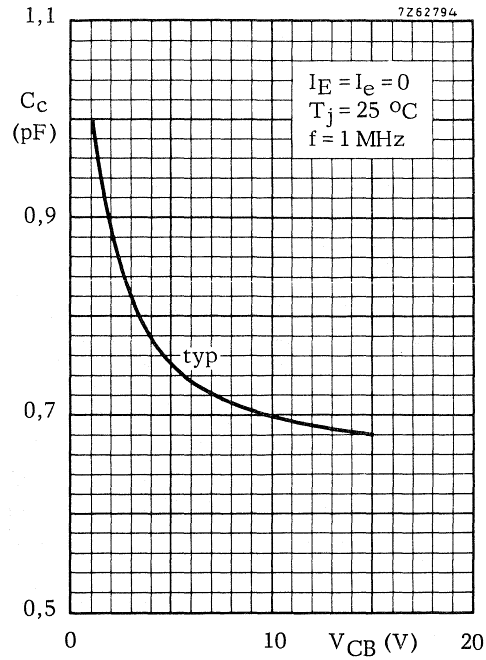


Fig. 5 $I_E = i_e = 0$; T_j = 25 °C; f = 1 MHz; typical values.

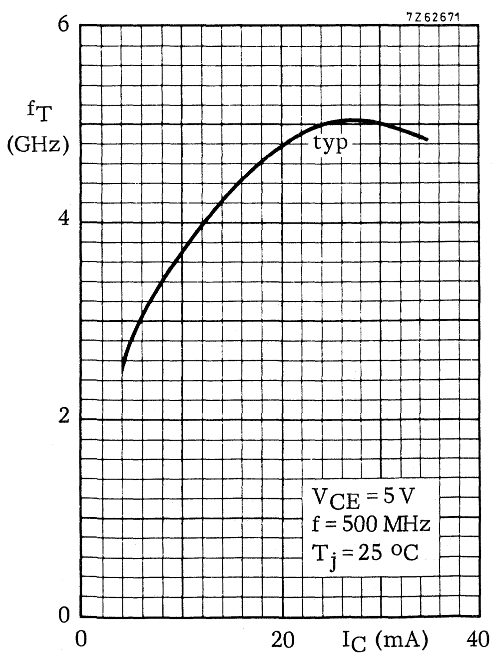


Fig. 6 V_{CE} = 5 V; f = 500 MHz; T_j = 25 °C.

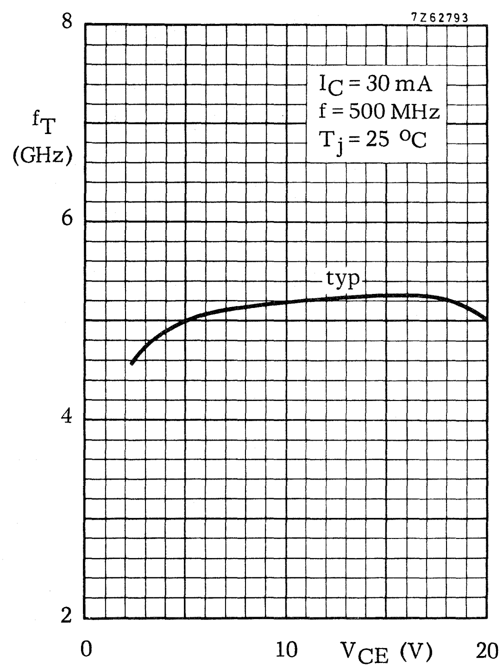


Fig. 7 I_C = 30 mA; f = 300 MHz; T_j = 25 °C.

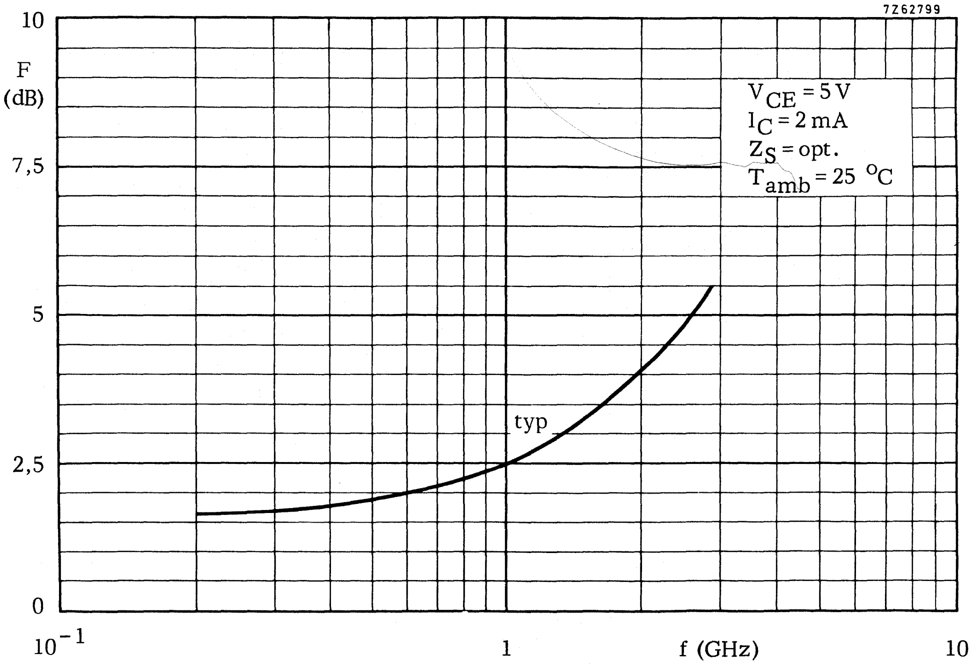


Fig. 8 V_{CE} = 5 V; I_C = 2 mA; Z_S = opt.; T_{amb} = 25 °C; typical values.

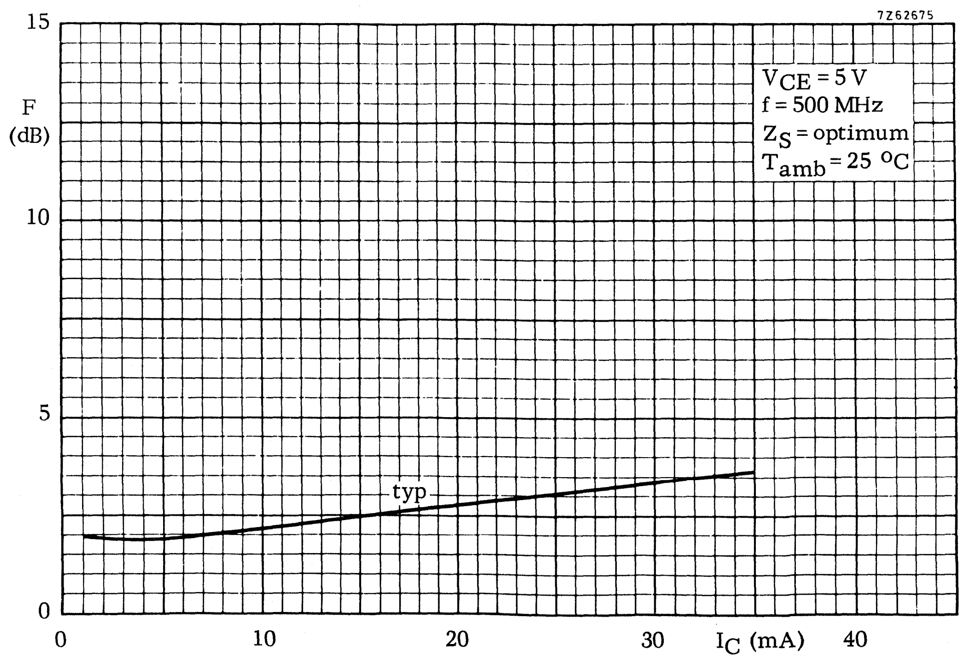


Fig. 9 V_{CE} = 5 V; f = 500 MHz; Z_S = opt.; T_{amb} = 25 °C; typical values.

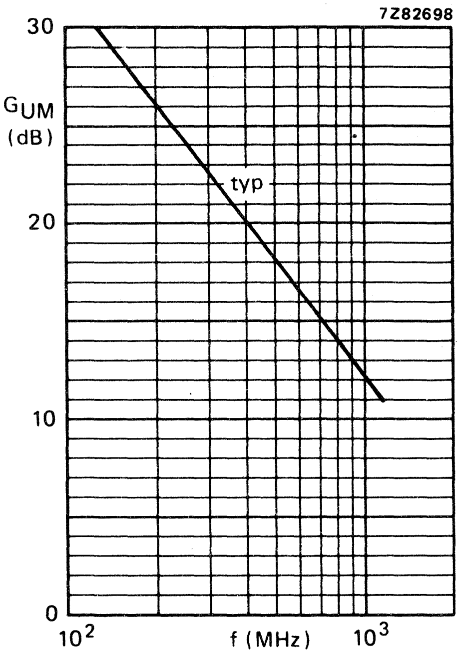


Fig. 10 V_{CE} = 5 V; I_C = 30 mA; T_{amb} = 25 °C; typical values.

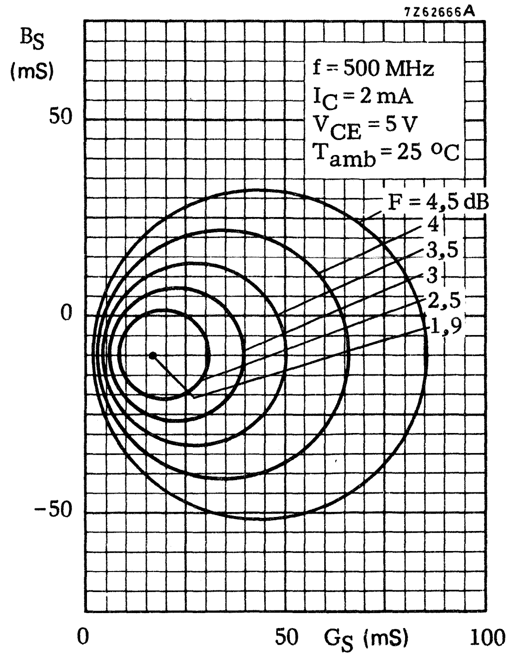


Fig. 11 Circles of constant noise figure; V_{CE} = 5 V; I_C = 2 mA; f = 500 MHz; T_{amb} = 25 °C; typical values.

N-P-N 1 GHz WIDEBAND TRANSISTOR

N-P-N transistor in a plastic SOT-37 envelope primarily intended for use in u.h.f. and microwave amplifiers. P-N-P complement is BFQ23.

Features of this device:

- low noise;
- very low intermodulation distortion;
- high power gain;
- gold metallization.

QUICK REFERENCE DATA

Collector-base voltage (open emitter)	V_{CBO}	max.	15	V
Collector-emitter voltage (open base)	V_{CEO}	max.	12	V
Collector current (d.c.)	I_C	max.	35	mA
Total power dissipation up to T_{amb} = 60 °C	P_{tot}	max.	300	mW
Junction temperature	T_j	max.	175	°C ←
Transition frequency at f = 500 MHz I_C = 30 mA; V_{CE} = 5 V	f_T	typ.	6,0	GHz
Feedback capacitance at f = 1 MHz I_C = 0; V_{CE} = 10 V	C_{re}	typ.	0,6	pF
Noise figure at optimum source impedance I_C = 4 mA; V_{CE} = 8 V; f = 800 MHz	F	typ.	1,6	dB
Maximum unilateral power gain I_C = 30 mA; V_{CE} = 8 V; f = 800 MHz	G_{UM}	typ.	14,0	dB
Output voltage at d_{im} = −60 dB (see Fig. 3) I_C = 30 mA; V_{CE} = 8 V; R_L = 75 Ω $f_{(p+q-r)}$ = 793,25 MHz	V_o	typ.	425	mV
Output power at 1 dB gain compression	P_{L1}	typ.	+ 17	dBm
Third order intercept point	ITO	typ.	+ 36	dBm

MECHANICAL DATA

SOT-37 (see Fig. 1).

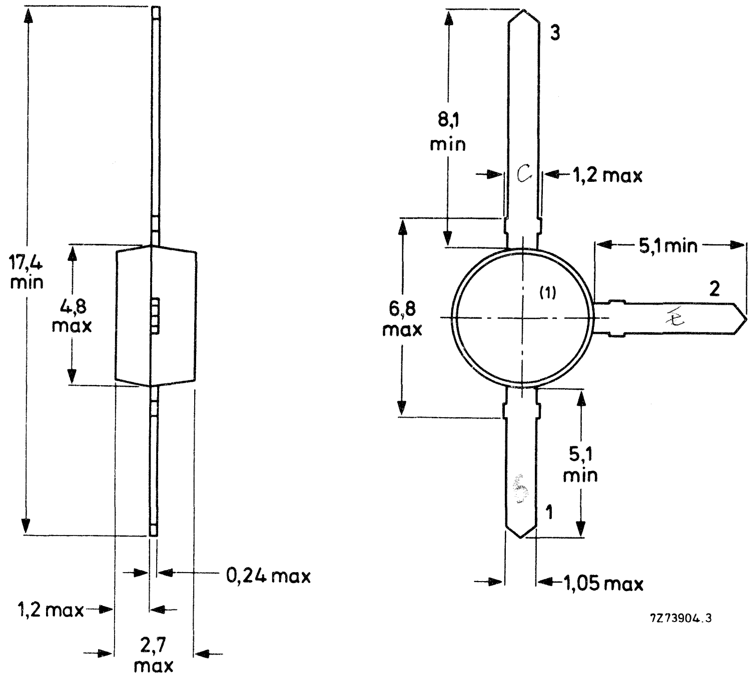
MECHANICAL DATA

Dimensions in mm

Fig. 1 SOT-37.

Connections

1. Base
2. Emitter
3. Collector



(1) = type number marking.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

Collector-base voltage (open emitter)	V_{CBO}	max.	15	V
Collector-emitter voltage (open base)	V_{CEO}	max.	12	V
Emitter-base voltage (open collector)	V_{EBO}	max.	2	V
Collector current (d.c.)	I_C	max.	35	mA
Total power dissipation up to T_{amb} = 60 °C	P_{tot}	max.	300	mW
Storage temperature	T_{stg}	−65 to +	150	°C
→ Junction temperature	T_j	max.	175	°C

THERMAL RESISTANCE

From junction to ambient in free air mounted on a fibre-glass print (see Fig. 2) of 40 mm x 25 mm x 1 mm $R_{th\ j\text{-}a}$ = 300 K/W

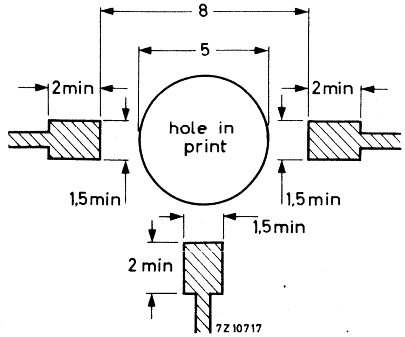


Fig. 2 Requirements for fibre-glass print. (Dimensions in mm.)

CHARACTERISTICS

T_j = 25 °C unless otherwise specified

Collector cut-off current $I_E = 0$; $V_{CB} = 5$ V	I_{CBO}	max.	50 nA
D.C. current gain $I_C = 30$ mA; $V_{CE} = 5$ V	h_{FE}	min. typ.	40 90
Transition frequency at f = 500 MHz $I_C = 30$ mA; $V_{CE} = 5$ V	f_T	typ.	6,0 GHz
Collector capacitance at f = 1 MHz $I_E = I_e = 0$; $V_{CB} = 10$ V	C_c	typ.	0,9 pF
Emitter capacitance at f = 1 MHz $I_C = I_c = 0$; $V_{EB} = 0,5$ V	C_e	typ.	2,5 pF
Feedback capacitance at f = 1 MHz $I_C = 0$; $V_{CE} = 10$ V; $T_{amb} = 25$ °C	C_{re}	typ.	0,6 pF
Noise figure at optimum source impedance $I_C = 4$ mA; $V_{CE} = 8$ V; f = 800 MHz; $T_{amb} = 25$ °C $I_C = 30$ mA; $V_{CE} = 8$ V; f = 800 MHz; $T_{amb} = 25$ °C	F F	typ. typ.	1,6 dB 2,3 dB

Maximum unilateral power gain (s_{re} assumed to be zero)

$$G_{UM} = 10 \log \frac{|s_{fe}|^2}{(1 - |s_{ie}|^2)(1 - |s_{oe}|^2)}$$

$I_C = 30$ mA; $V_{CE} = 8$ V; f = 800 MHz; $T_{amb} = 25$ °C	G_{UM}	typ.	14,0 dB

Output voltage at d_{im} = −60 dB (see Figs 3 and 14) (DIN 45004B, par. 6.3: 3-tone) I_C = 30 mA; V_{CE} = 8 V; R_L = 75 Ω; T_{amb} = 25 °C $V_p = V_o$ at d_{im} = −60 dB; f_p = 795,25 MHz $V_q = V_o$ −6 dB ; f_q = 803,25 MHz $V_r = V_o$ −6 dB ; f_r = 805,25 MHz Measured at $f_{(p+q-r)}$ = 793,25 MHz	V_o	typ.	425 mV
Output voltage at d_2 = −50 dB (see Figs 3 and 15) I_C = 30 mA; V_{CE} = 8 V; R_L = 75 Ω; T_{amb} = 25 °C $V_p = V_o$ at d_2 = −50 dB; f_p = 250 MHz $V_q = V_o$ at d_2 = −50 dB; f_q = 560 MHz measured at $f_{(p+q)}$ = 810 MHz	V_o	typ.	200 mV
Output power at 1 dB gain compression (see Fig. 3) I_C = 30 mA; V_{CE} = 8V R_L = 75 Ω; T_{amb} = 25 °C measured at f = 800 MHz	P_{L1}	typ.	+ 17 dBm
Third order intercept point (see Fig. 3) I_C = 30 mA; V_{CE} = 8 V R_L = 75 Ω; T_{amb} = 25 °C P_p = ITO − 6 dB; f_p = 800 MHz P_q = ITO − 6 dB; f_q = 801 MHz measured at $f_{(2q-p)}$ = 802 MHz and at $f_{(2p-q)}$ = 799 MHz	ITO	typ.	+ 36 dBm

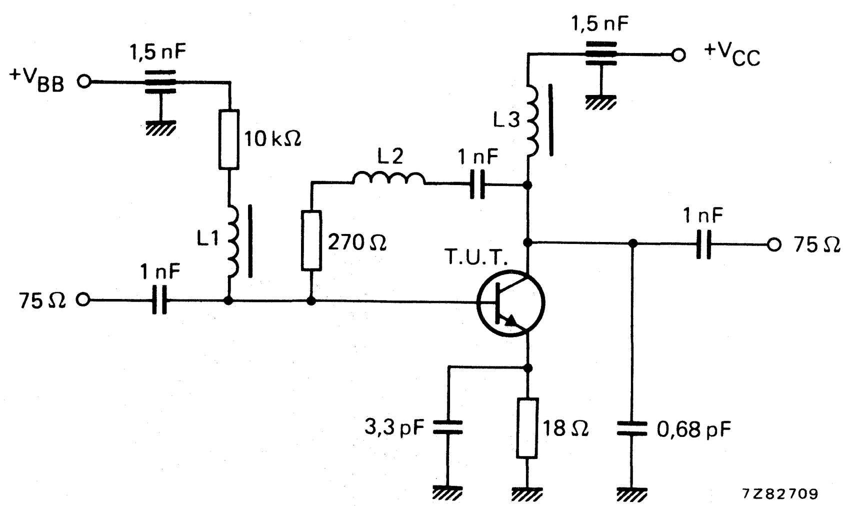


Fig. 3 Intermodulation distortion and second harmonic distortion test circuit.

L1 = L3 = 5 μH micro choke
L2 = 3 turns Cu wire (0,4 mm); internal diameter 3 mm; winding pitch 1 mm

s-parameters (common emitter) at V_{CE} = 8 V; T_{amb} = 25 °C; typical values.

The figures given in the tables below can also be used for operation at V_{CE} = 5 V. Only slight differences for the s-parameters may occur.

I_C mA	f MHz	s_{ie}	s_{re}	s_{fe}	s_{oe}	G_{UM} dB
	40	0,89/ −12,9°	0,01/75°	9,5/166°	0,97/ −6,1°	38,7
	100	0,85/ −30,7°	0,03/70,6°	8,7/155°	0,94/−13,5°	33,7
	200	0,75/ −57,1°	0,05/61,5°	7,4/138°	0,87/−22,5°	27,1
2	500	0,48/−113°	0,08/50,9°	4,4/106°	0,72/−34,2°	17,2
	800	0,37/−153°	0,09/51,9°	3,0/ 86,3°	0,64/−40,0°	12,5
	1000	0,34/−178°	0,10/55,0°	2,6/ 77,0°	0,61/−47,8°	10,9
	1200	0,34/+159°	0,11/58,5°	2,2/ 68,0°	0,58/−53,9°	9,2
	40	0,79/ −18,4°	0,01/74°	17,8/162°	0,94/ −9,1°	38,6
	100	0,71/ −42,1°	0,03/67,1°	15,2/146°	0,87/−19,5°	32,8
	200	0,57/ −72,8°	0,04/60,0°	11,5/126°	0,75/−28,7°	26,5
5	500	0,31/−127°	0,07/60,1°	5,8/ 98,2°	0,59/−36,1°	17,6
	800	0,25/−168°	0,09/63,6°	3,8/ 82,0°	0,54/−41,0°	13,4
	1000	0,25/+165°	0,11/65,2°	3,2/ 74,4°	0,51/−46,7°	11,7
	1200	0,26/+141°	0,13/66,1°	2,7/ 66,7°	0,49/−52,2°	10,1
	40	0,67/ −25,3°	0,01/71°	27,9/156°	0,90/−12,8°	38,7
	100	0,55/ −55,1°	0,02/65,1°	21,8/136°	0,78/−25,6°	32,4
	200	0,40/ −88,2°	0,04/62,4°	14,7/116°	0,62/−33,4°	26,2
10	500	0,20/−141°	0,06/68,3°	6,7/ 93,0°	0,51/−35,9°	18,0
	800	0,16/+177°	0,09/70,0°	4,3/ 79,3°	0,48/−40,3°	13,9
	1000	0,18/+151°	0,12/69,7°	3,5/ 72,5°	0,46/−44,2°	12,1
	1200	0,21/+130°	0,14/68,9°	3,0/ 65,1°	0,43/−50,7°	10,6
	40	0,51/ −34,7°	0,01/69°	39,7/149°	0,84/−17,4°	38,6
	100	0,38/ −70,5°	0,02/65,8°	27,7/126°	0,66/−29,5°	32,0
	200	0,26/−104°	0,03/68,0°	16,8/109°	0,51/−32,5°	26,1
20	500	0,16/−158°	0,06/74,0°	7,3/ 89,3°	0,45/−33,4°	18,4
	800	0,14/+155°	0,10/73,6°	4,6/ 77,5°	0,42/−39,1°	14,2
	1000	0,17/+133°	0,12/72,3°	3,8/ 71,2°	0,41/−43,6°	12,5
	1200	0,21/+115°	0,14/70,5°	3,2/ 64,4°	0,39/−51,0°	11,0
	40	0,46/ −36,5°	0,01/73°	43,3/150°	0,87/−16,9°	39,9
	100	0,32/ −73,7°	0,02/69,2°	29,1/124°	0,66/−27,2°	32,2
	200	0,20/−109°	0,03/72,0°	17,1/106°	0,50/−28,1°	26,1
30	500	0,14/−174°	0,06/75,6°	7,4/ 87,2°	0,41/−31,7°	18,3
	800	0,15/+143°	0,10/74,7°	4,8/ 74,9°	0,39/−41,0°	14,0
	1000	0,16/+124°	0,12/72,9°	3,9/ 70,5°	0,38/−42,8°	12,6
	1200	0,21/+111°	0,15/71,0°	3,3/ 63,8°	0,37/−51,0°	11,2

Conditions for Figs 4 and 5:
V_{CE} = 8 V; I_C = 30 mA;
T_{amb} = 25 °C; typical values.

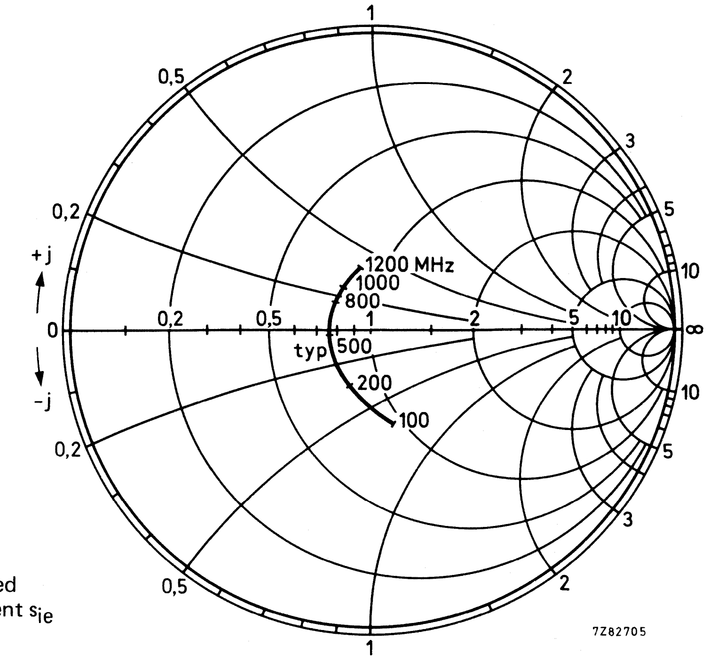


Fig. 4 Input impedance derived from input reflection coefficient s_{ie} co-ordinates in ohm × 50.

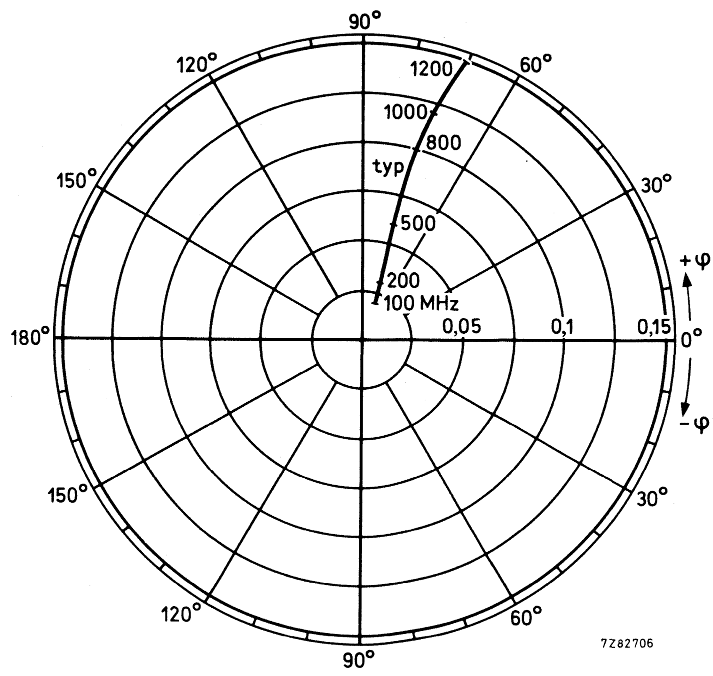


Fig. 5 Reverse transmission coefficient s_{re}.

Conditions for Figs 6 and 7:
V_{CE} = 8 V; I_C = 30 mA;
T_{amb} = 25 °C; typical values.

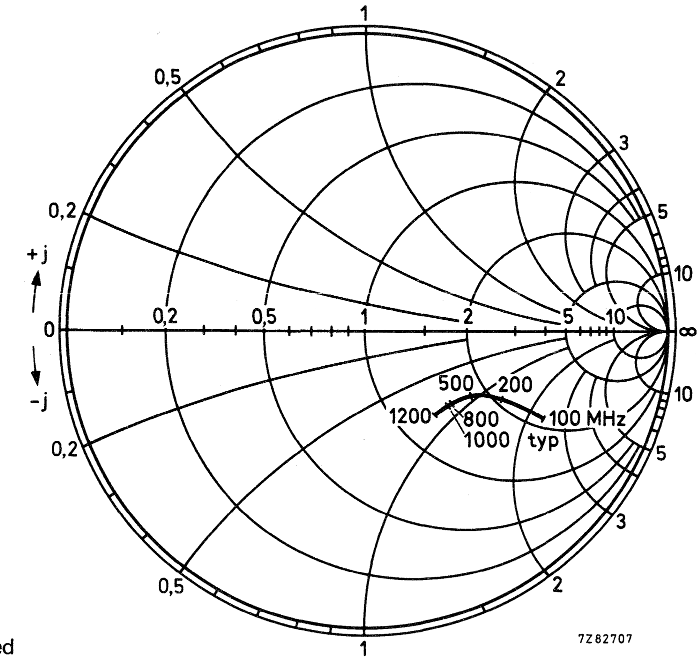


Fig. 6 Output impedance derived from output reflection coefficient s_{oe} co-ordinates in ohm x 50.

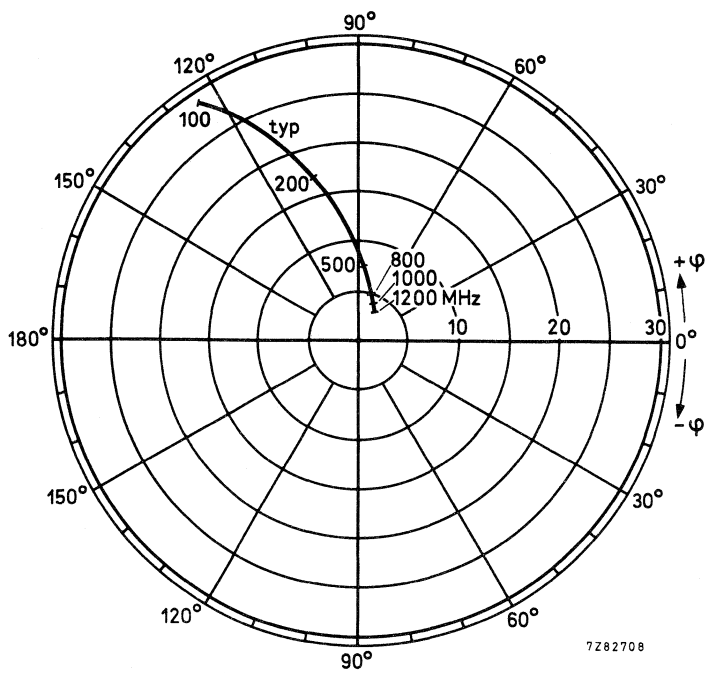


Fig. 7 Forward transmission coefficient s_{fe}.

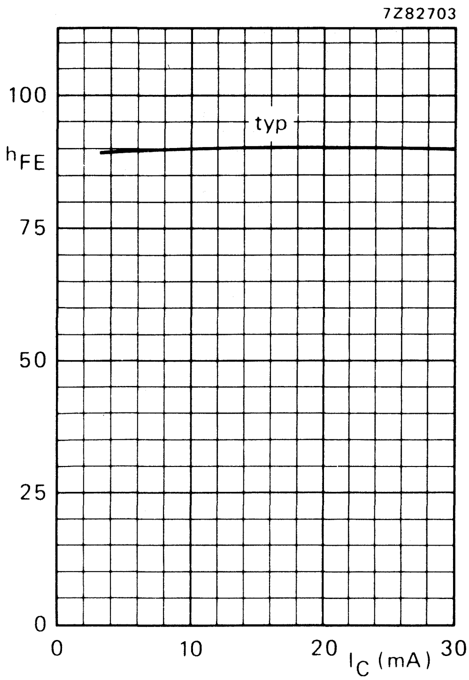


Fig. 8 $V_{CE} = 5$ V; $T_j = 25$ °C; typ. values.

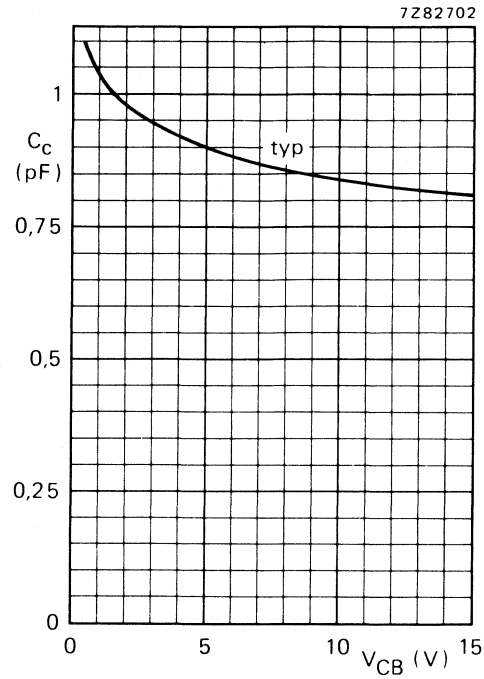


Fig. 9 $I_E = I_e = 0$; f = 1 MHz; $T_j = 25$ °C; typical values.

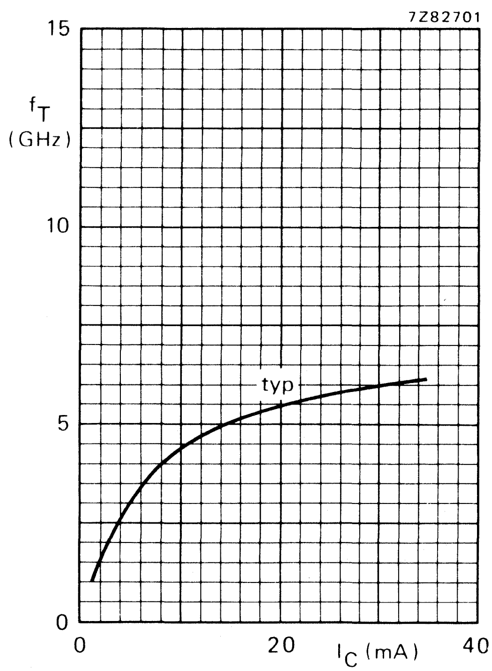


Fig. 10 $V_{CE} = 5$ V; f = 500 MHz; $T_j = 25$ °C; typical values.

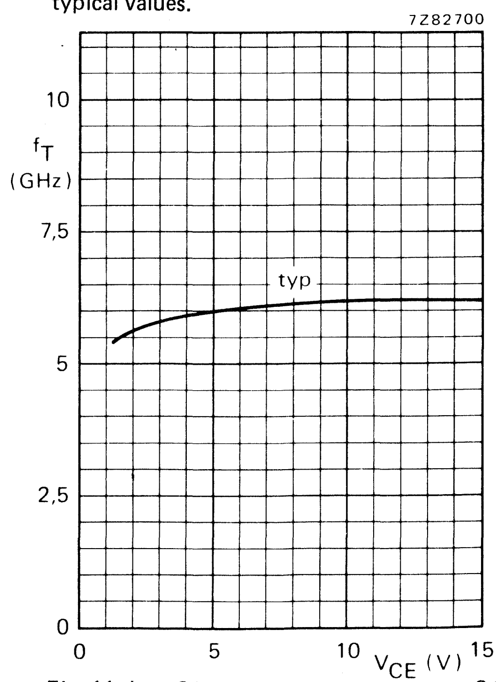


Fig. 11 $I_C = 30$ mA; f = 500 MHz; $T_j = 25$ °C; typical values.

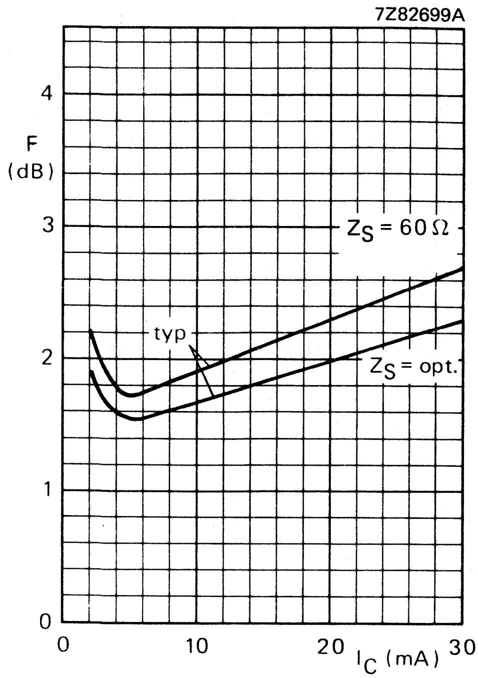


Fig. 12 $V_{CE} = 8$ V; f = 800 MHz; $T_{amb} = 25$ °C; typ. values.

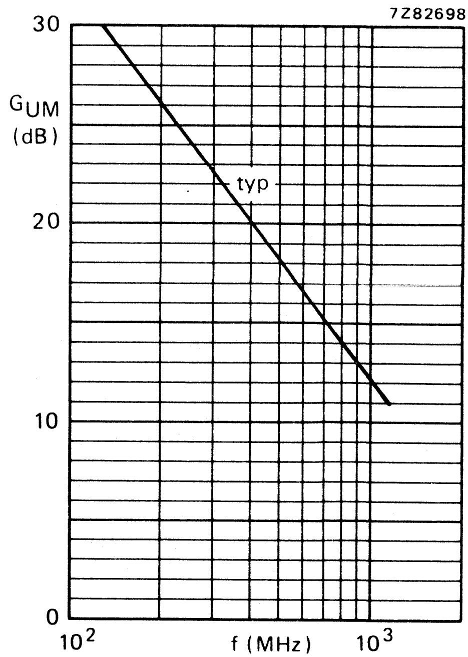


Fig. 13 $V_{CE} = 8$ V; $I_C = 30$ mA; $T_{amb} = 25$ °C. typ. values.

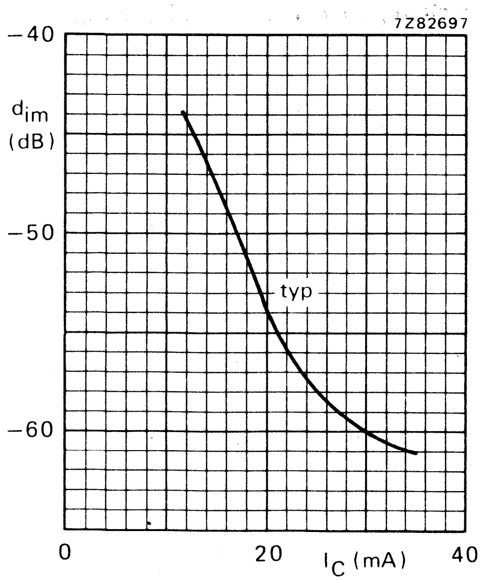


Fig. 14 $V_{CE} = 8$ V; $V_o = 425$ mV = 52,6 dBmV; $f_{(p+q-r)} = 793{,}25$ MHz; $T_{amb} = 25$ °C; measured in test circuit (see Fig. 3); typical values.

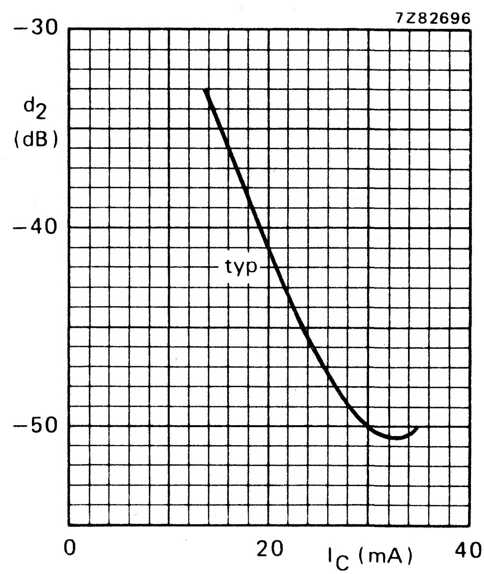


Fig. 15 $V_{CE} = 8$ V; $V_o = 200$ mV = 46 dBmV; $f_{(p+q)} = 810$ MHz; $T_{amb} = 25$ °C; measured in test circuit (see Fig. 3); typical values.

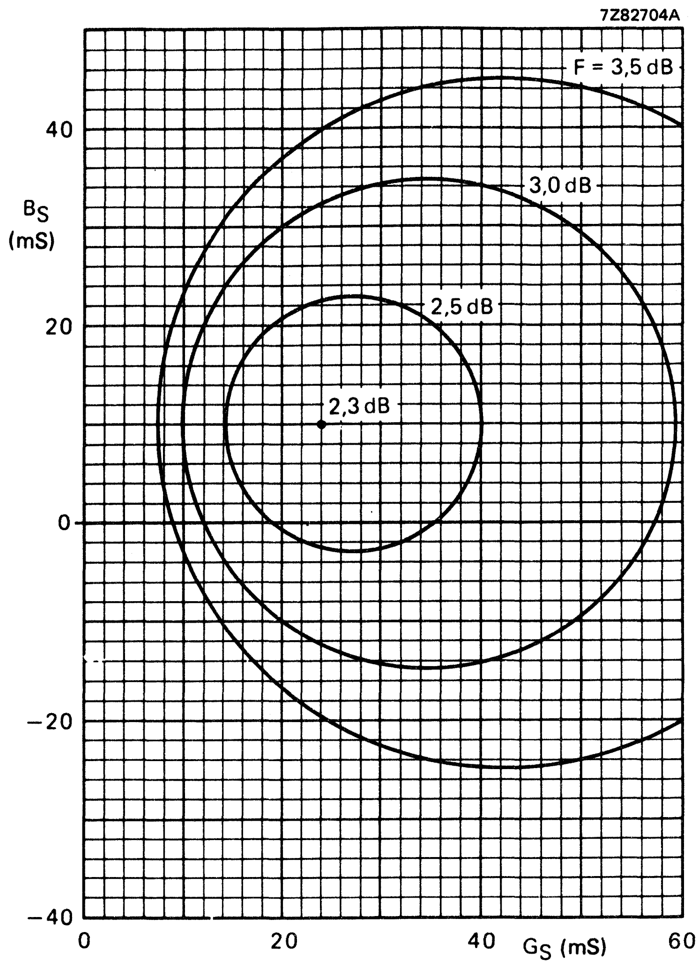


Fig. 16 Circles of constant noise figure.
V_{CE} = 8 V; I_C = 30 mA; f = 800 MHz;
T_{amb} = 25 °C; typical values.

CLASS-B OPERATION

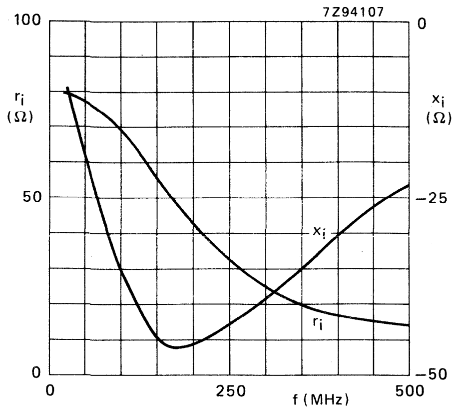


Fig. 17 Input impedance (series components).

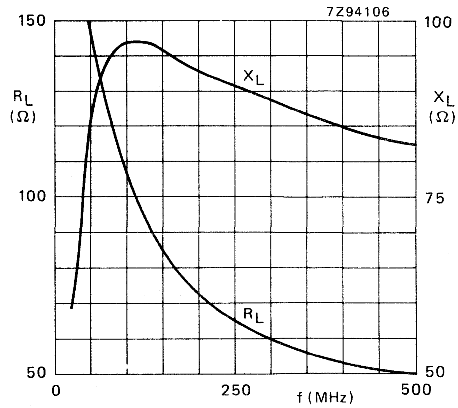


Fig. 18 Load impedance (series components).

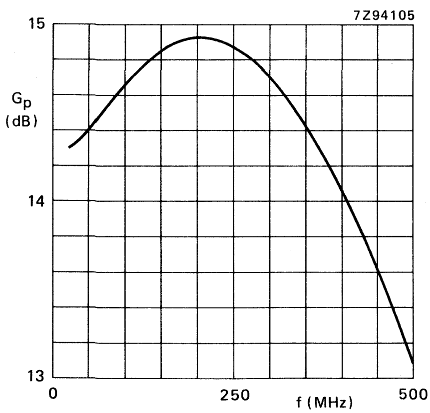


Fig. 19 Power gain versus frequency.

Conditions for Figs 17 to 19:

V_{CE} = 7,5 V; P_L = 160 mW; T_{amb} = 25 °C; typical values.

OPERATING NOTE for Figs 17 to 19:

A base-emitter resistor of 82 Ω is recommended to avoid oscillation. This resistor must be effective for r.f. only.

N-P-N 1 GHz WIDEBAND TRANSISTOR

N-P-N transistor in a plastic SOT-23 envelope. It is primarily intended for use in u.h.f. and microwave amplifiers in thick and thin-film circuits, such as in aerial amplifiers, radar systems, oscilloscopes, spectrum analysers etc. The transistor features low intermodulation distortion and high power gain; thanks to its very high transition frequency, it also has excellent wideband properties and low noise up to high frequencies.

P-N-P complement is BFT92.

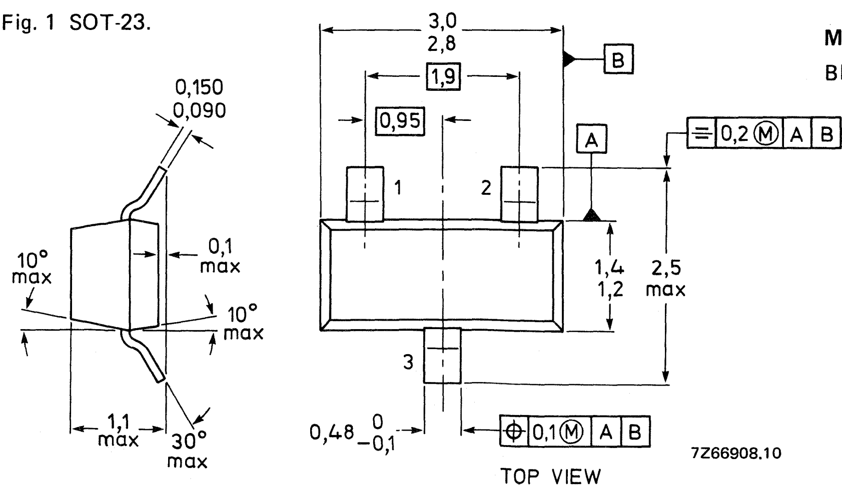
QUICK REFERENCE DATA

Collector-base voltage (open emitter)	V_{CBO}	max.	20	V
Collector-emitter voltage (open base)	V_{CEO}	max.	15	V
Collector current (d.c.)	I_C	max.	25	mA
Total power dissipation up to T_{amb} = 25 °C	P_{tot}	max.	300	mW
Junction temperature	T_j	max.	175	°C
Transition frequency at f = 500 MHz I_C = 14 mA; V_{CE} = 10 V	f_T	typ.	5,0	GHz
Feedback capacitance at f = 1 MHz I_C = 2 mA; V_{CE} = 10 V	C_{re}	typ.	0,4	pF
Noise figure at optimum source impedance I_C = 2 mA; V_{CE} = 10 V; f = 500 MHz	F	typ.	2,4	dB
Max. unilateral power gain I_C = 14 mA; V_{CE} = 10 V; f = 500 MHz	G_{UM}	typ.	18,0	dB
Output voltage at d_{im} = −60 dB (see Fig. 2) I_C = 14 mA; V_{CE} = 10 V; R_L = 75 Ω; T_{amb} = 25 °C $f_{(p+q-r)}$ = 493,25 MHz	V_o	typ.	150	mV

MECHANICAL DATA

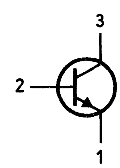
Dimensions in mm

Fig. 1 SOT-23.



Marking code

BFR92 = P1



If required, the R-version (reverse pinning) is available on request.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

Collector-base voltage (open emitter)	V_{CBO}	max.	20	V
Collector-emitter voltage (open base)	V_{CEO}	max.	15	V
Emitter-base voltage (open collector)	V_{EBO}	max.	2	V
Collector current (d.c.)	I_C	max.	25	mA
→ Total power dissipation up to T_{amb} = 25 °C	P_{tot}	max.	300	mW
Storage temperature	T_{stg}		−65 to +150	°C
→ Junction temperature	T_j	max.	175	°C

THERMAL RESISTANCE

From junction to ambient	$R_{th\ j\text{-}a}$	=	430	K/W

CHARACTERISTICS

T_j = 25 °C unless otherwise specified

Collector cut-off current $I_E = 0$; $V_{CB} = 10$ V	I_{CBO}	max.	50	nA
D.C. current gain $I_C = 14$ mA; $V_{CE} = 10$ V	h_{FE}	min. typ.	25 50	
Transition frequency at f = 500 MHz $I_C = 14$ mA; $V_{CE} = 10$ V	f_T	typ.	5,0	GHz
Collector capacitance at f = 1 MHz $I_E = I_e = 0$; $V_{CB} = 10$ V	C_c	typ.	0,75	pF
Emitter capacitance at f = 1 MHz $I_C = I_c = 0$; $V_{EB} = 0{,}5$ V	C_e	typ.	0,8	pF
Feedback capacitance at f = 1 MHz $I_C = 2$ mA; $V_{CE} = 10$ V; $T_{amb} = 25$ °C	C_{re}	typ.	0,4	pF

* Mounted on a ceramic substrate of 8 mm x 10 mm x 0,7 mm.

Noise figure at optimum source impedance*			
I_C = 2 mA; V_{CE} = 10 V; f = 500 MHz; T_{amb} = 25 °C	F	typ.	2,4 dB
Max. unilateral power gain (s_{re} assumed to be zero)			
$G_{UM} = 10 \log \frac{\|s_{fe}\|^2}{[1-\|s_{ie}\|^2][1-\|s_{oe}\|^2]}$			
I_C = 14 mA; V_{CE} = 10 V; f = 500 MHz; T_{amb} = 25 °C	G_{UM}	typ.	18,0 dB
Output voltage at d_{im} = −60 dB (see Fig. 2) (DIN 45004B; par. 6.3.: 3-tone)			
I_C = 14 mA; V_{CE} = 10 V; R_L = 75 Ω			
$V_p = V_o$ at d_{im} = −60 dB ; f_p = 495,25 MHz			
$V_q = V_o$ −6 dB ; f_q = 503,25 MHz			
$V_r = V_o$ −6 dB ; f_r = 505,25 MHz			
measured at $f_{(p+q-r)}$ = 493,25 MHz	V_o	typ.	150 mV

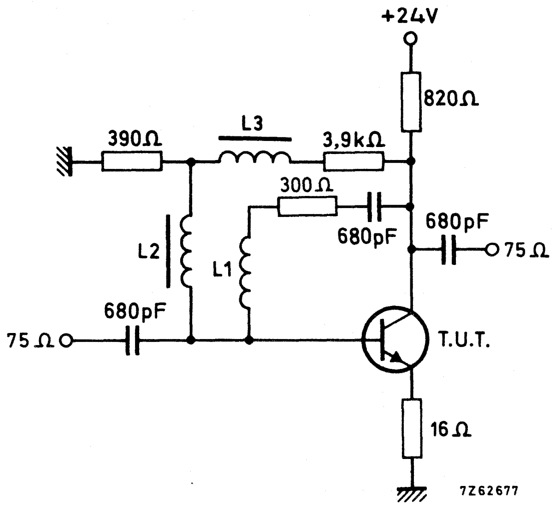


Fig. 2 Intermodulation test circuit.

L1 = 4 turns Cu wire (0,35 mm); winding pitch 1 mm; int. dia. 4 mm
L2 = L3 = 5 μH (code number: 3122 108 20150)

* Crystal mounted in a BFR90 envelope.

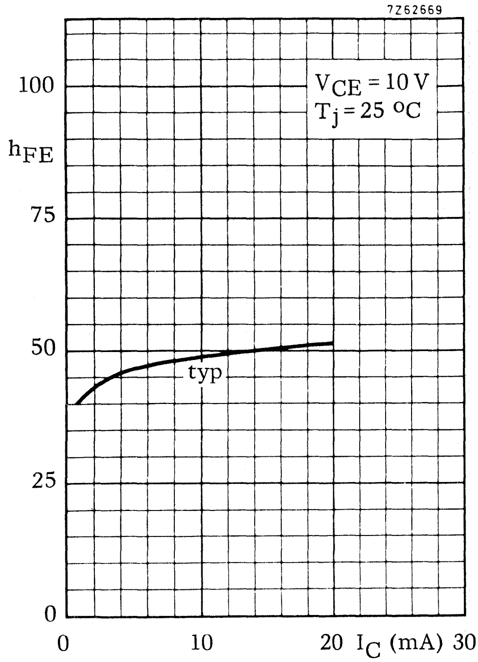


Fig. 3 V_{CE} = 10 V; T_j = 25 °C; typical values.

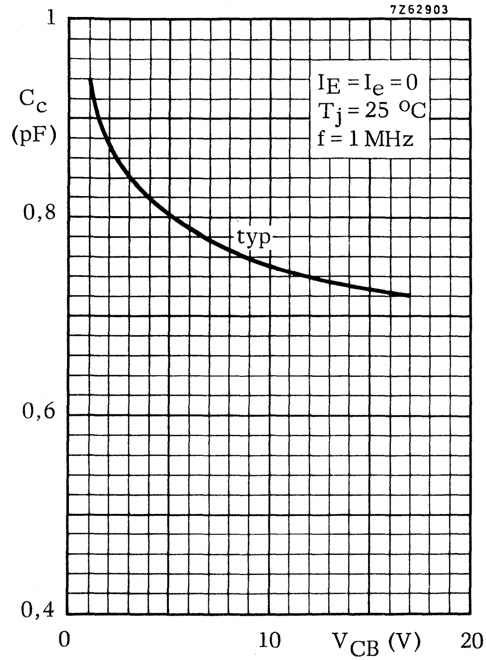


Fig. 4 $I_E = I_e = 0$; f = 1 MHz; T_j = 25 °C; typical values.

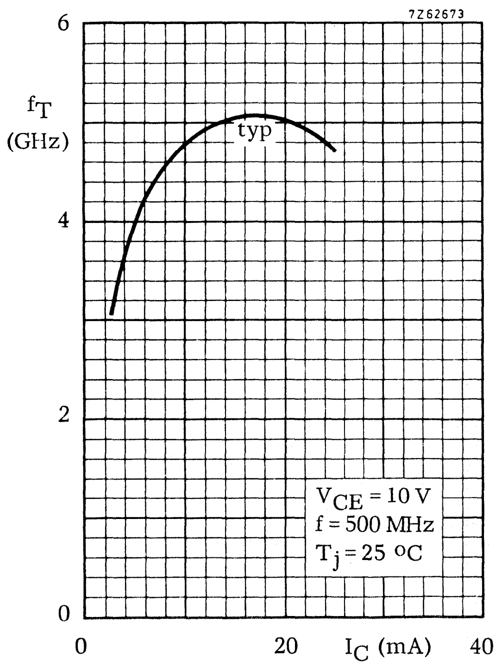


Fig. 5 V_{CE} = 10 V; f = 500 MHz; T_j = 25 °C; typical values.

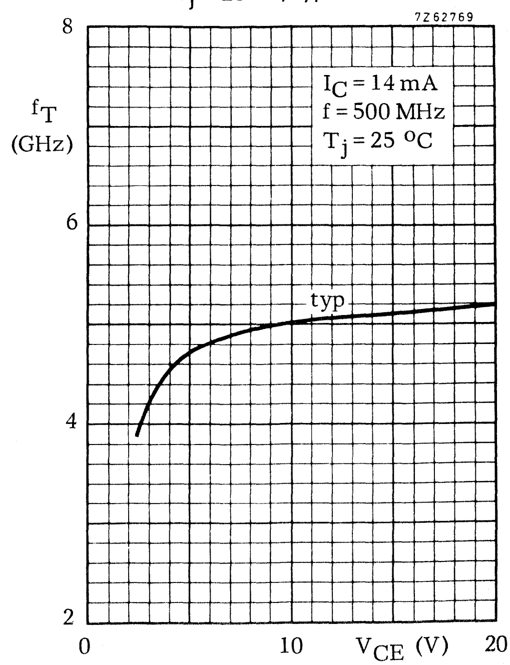


Fig. 6 I_C = 14 mA; f = 500 MHz; T_j = 25 °C; typical values.

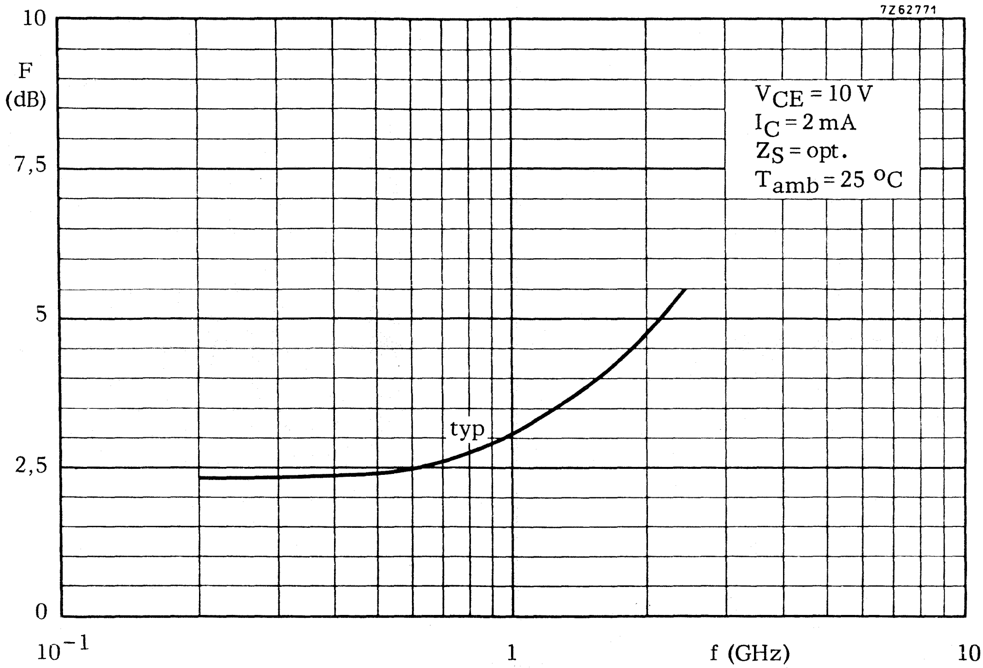


Fig. 7 V_{CE} = 10 V; I_C = 2 mA; Z_S = opt.; T_{amb} = 25 °C; typical values.

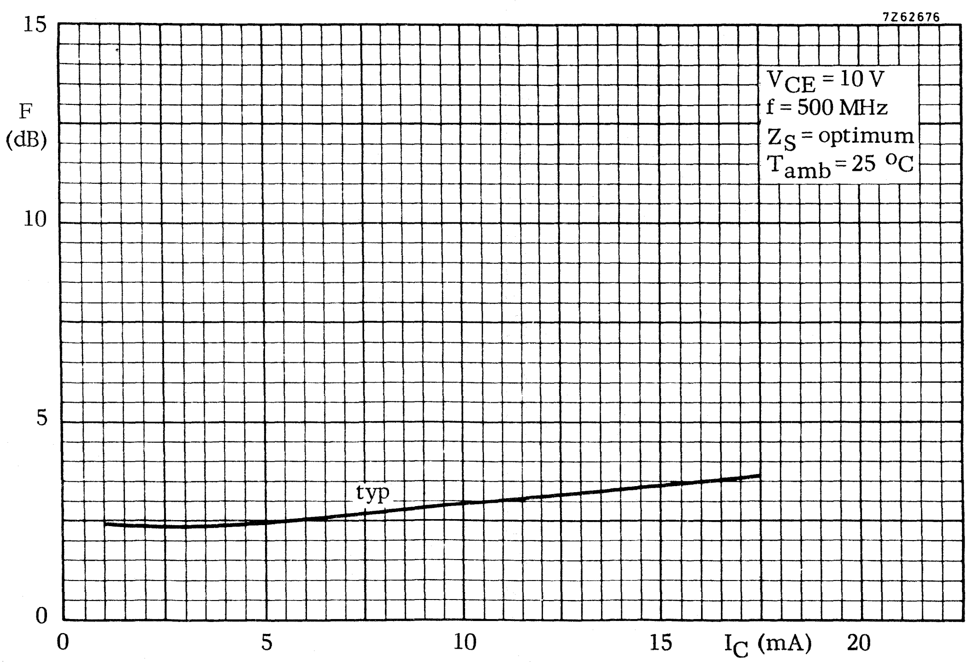


Fig. 8 V_{CE} = 10 V; f = 500 MHz; Z_S = opt.; T_{amb} = 25 °C; typical values.

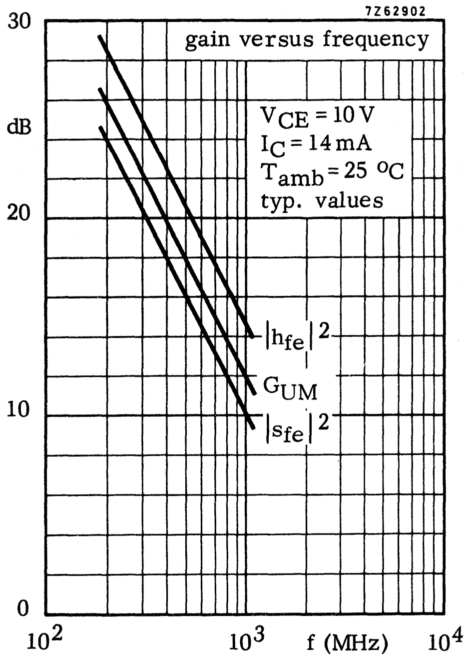


Fig. 9 V_{CE} = 10 V; I_C = 14 mA; T_{amb} = 25 °C; typical values.

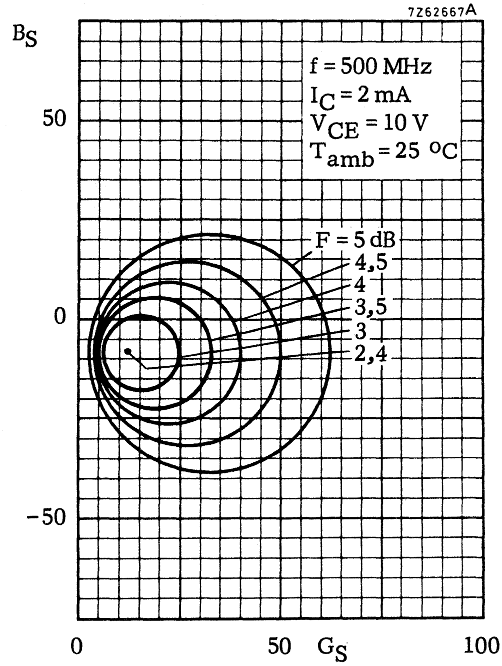


Fig. 10 Circles of constant noise figure; V_{CE} = 10 V; I_C = 2 mA; f = 500 MHz; T_{amb} = 25 °C; typical values.

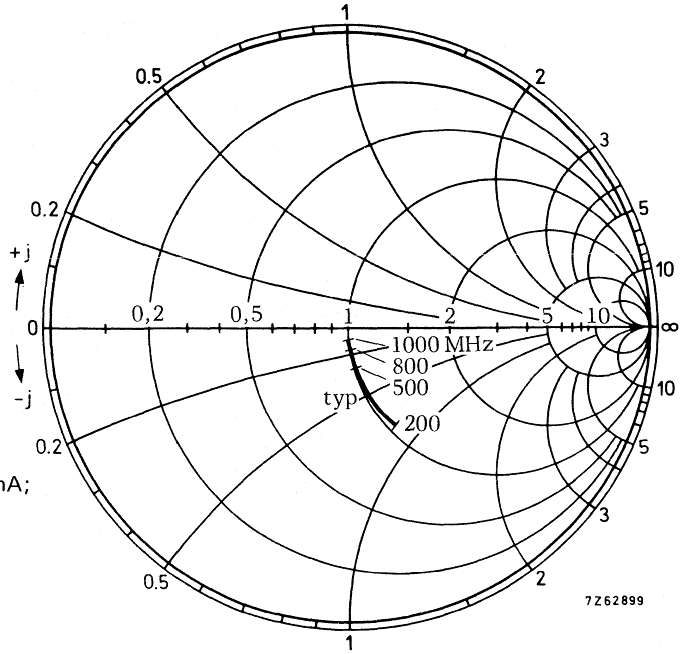


Fig. 11 V_{CE} = 10 V; I_C = 14 mA; T_{amb} = 25 ^oC; typical values.

Input impedance derived from input reflection coefficient s_{ie} coordinates in ohm x 50

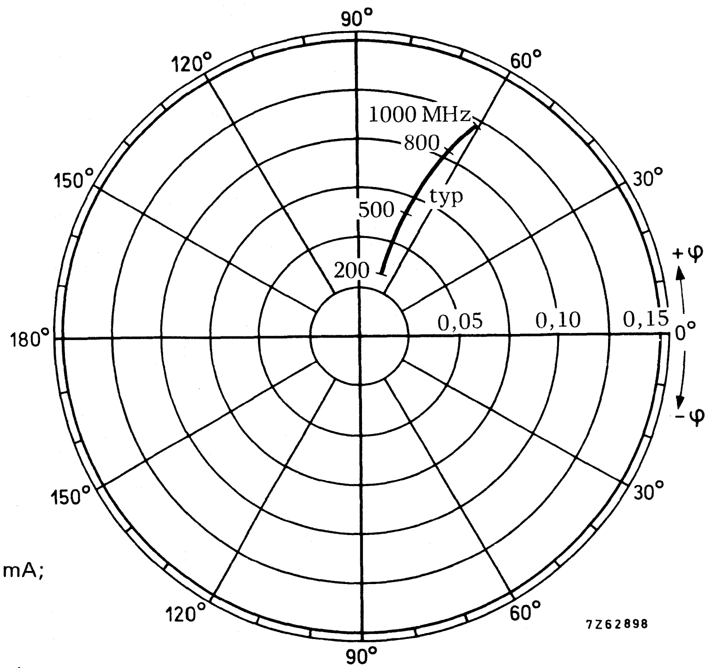


Fig. 12 V_{CE} = 10 V; I_C = 14 mA; T_{amb} = 25 ^oC; typical values.

Reverse transmission coefficient s_{re}

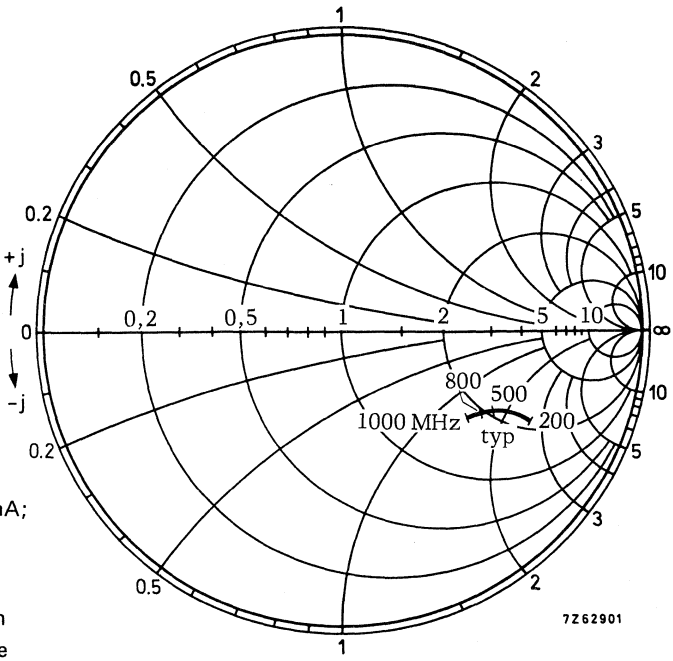


Fig. 13 V_{CE} = 10 V; I_C = 14 mA; T_{amb} = 25 °C; typical values.

Output impedance derived from output reflection coefficient s_{oe} coordinates in ohm x 50

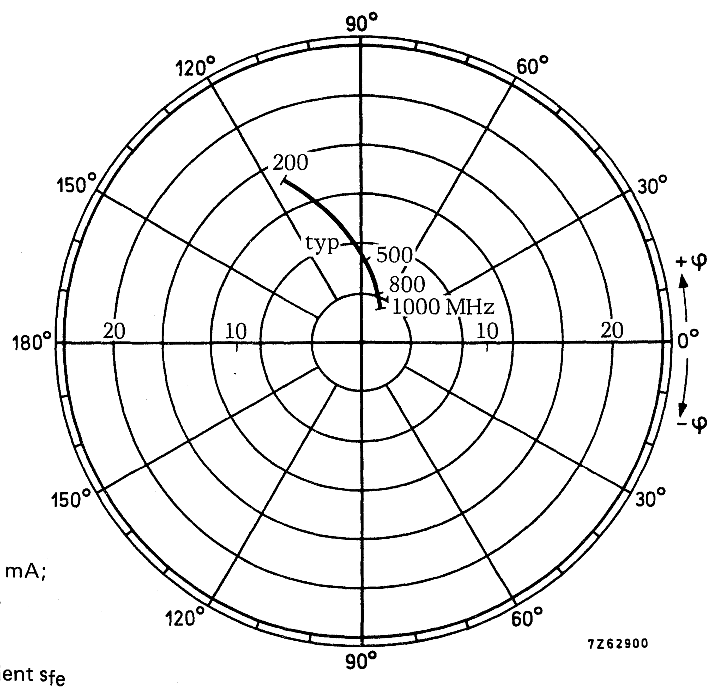


Fig. 14 V_{CE} = 10 V; I_C = 14 mA; T_{amb} = 25 °C; typical values.

Forward transmission coefficient s_{fe}

N-P-N 1 GHz WIDEBAND TRANSISTOR

N-P-N transistor in a plastic SOT-23 envelope. It is primarily intended for use in v.h.f./u.h.f. broadband amplifiers. The transistor features:

- low noise;
- low intermodulation distortion;
- high power gain.

P-N-P complement is BFT92

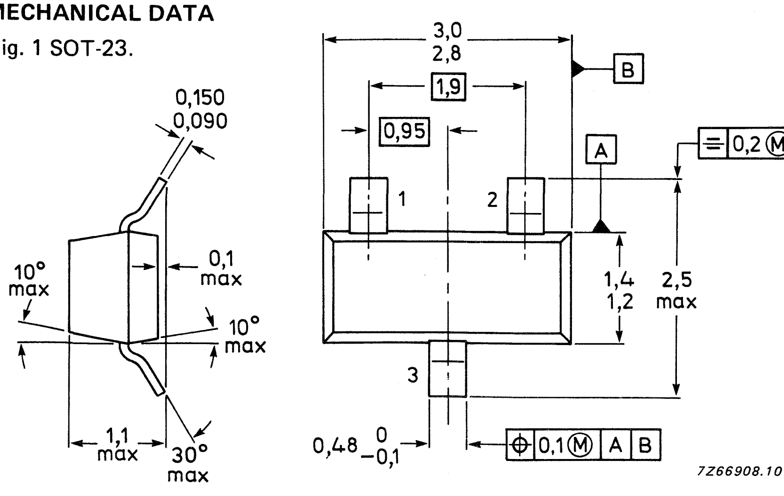
QUICK REFERENCE DATA

Collector-base voltage (open emitter)	V_{CBO}	max.	20	V
Collector-emitter voltage (open-base)	V_{CEO}	max.	15	V
Collector current (d.c.)	I_C	max.	25	mA
Total power dissipation up to T_{amb} = 25 °C	P_{tot}	max.	300	mW ←
Junction temperature	T_j	max.	175	°C ←
Transition frequency at f = 500 MHz I_C = 14 mA; V_{CE} = 10 V	f_T	typ.	5,0	GHz
Feedback capacitance at f = 1 MHz I_C = 0; V_{CE} = 10 V	C_{re}	typ.	0,35	pF
Noise figure at R_S = 60 Ω I_C = 4 mA; V_{CE} = 10 V; f = 800 MHz	F	typ.	1,8	dB
Output voltage at d_{im} = −60 dB I_C = 14 mA; V_{CE} = 10 V; R_L = 75 Ω $f_{(p+q-r)}$ = 793,25 MHz	V_o	typ.	150	mV

MECHANICAL DATA

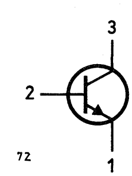
Dimensions in mm

Fig. 1 SOT-23.



Marking code

BFR92A = P2



If required, the R-version (reverse pinning) is available on request.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

Collector-base voltage (open emitter)	V_{CBO}	max.	20	V
Collector-emitter voltage (open base)	V_{CEO}	max.	15	V
Emitter-base voltage (open collector)	V_{EBO}	max.	2,0	V
Collector current (d.c.)	I_C	max.	25	mA
→ Total power dissipation up to T_{amb} = 25 °C	P_{tot}	max.	300	mW
Storage temperature	T_{stg}		−65 to +150	°C
→ Junction temperature	T_j	max.	175	°C

THERMAL RESISTANCE

From junction to ambient*	$R_{th\ j\text{-}a}$	=	430	K/W

CHARACTERISTICS

T_j = 25 °C unless otherwise specified

Collector cut-off current $I_E = 0$; V_{CB} = 10 V	I_{CBO}	max.	60	nA
D.C. current gain I_C = 14 mA; V_{CE} = 10 V	h_{FE}	min. typ.	40 90	
Transition frequency at f = 500 MHz I_C = 14 mA; V_{CE} = 10 V	f_T	typ.	5,0	GHz
Collector capacitance at f = 1 MHz $I_E = I_e = 0$; V_{CB} = 10 V	C_c	typ.	0,6	pF
Emitter capacitance at f = 1 MHz $I_C = I_c = 0$; V_{EB} = 0,5 V	C_e	typ.	1,2	pF
Feedback capacitance at f = 1 MHz $I_C = 0$; V_{CE} = 10 V; T_{amb} = 25 °C	C_{re}	typ.	0,35	pF
Noise figure at T_{amb} = 25 °C I_C = 4 mA; V_{CE} = 10 V; R_S = 60 Ω; f = 800 MHz	F	typ.	1,8	dB

Maximum unilateral power gain (s_{re} assumed to be zero)

$$G_{UM} = 10 \log \frac{|s_{fe}|^2}{[1-|s_{ie}|^2]\,[1-|s_{oe}|^2]}$$

I_C = 14 mA; V_{CE} = 10 V; f = 800 MHz; T_{amb} = 25 °C	G_{UM}	typ.	15,5	dB

* Mounted on a ceramic substrate of 8 mm x 10 mm x 0,7 mm.

Output voltage at d_{im} = −60 dB (see Figs 2 and 16)*
(DIN 45004B, par. 6.3: 3-tone)
I_C = 14 mA; V_{CE} = 10 V; R_L = 75 Ω; VSWR < 2; T_{amb} = 25 °C
$V_p = V_o$ at d_{im} = −60 dB; f_p = 795,25 MHz
$V_q = V_o$ −6 dB ; f_q = 803,25 MHz
$V_r = V_o$ −6 dB ; f_r = 805,25 MHz
Measured at $f_{(p+q-r)}$ = 793,25 MHz — V_o typ. 150 mV

Second harmonic distortion (see Figs 2 and 18)*
I_C = 14 mA; V_{CE} = 10 V; R_L = 75 Ω; VSWR < 2; T_{amb} = 25 °C
V_p = 60 mV at f_p = 250 MHz
V_q = 60 mV at f_q = 560 MHz
measured at $f_{(p+q)}$ = 810 MHz — d_2 typ. −50 dB

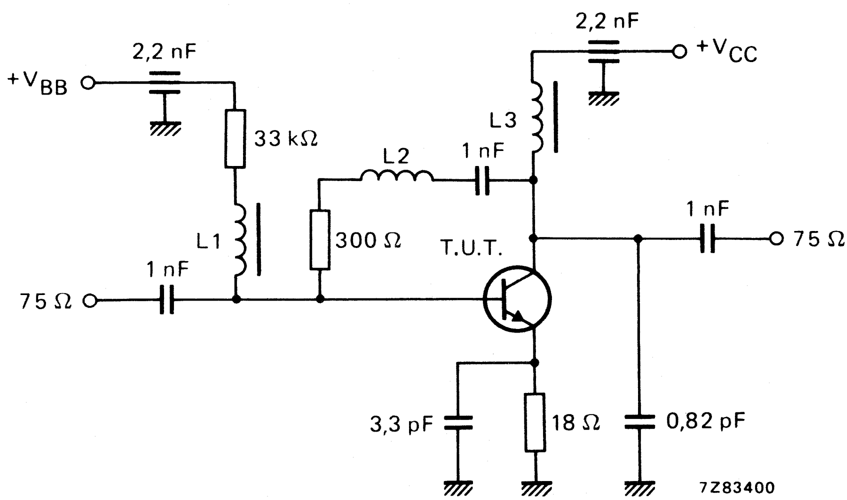


Fig. 2 Intermodulation distortion and second harmonic distortion MATV test circuit.

L1 = L3 = 5 μH micro choke
L2 = 3 turns Cu wire (0,4 mm); internal diameter 3 mm; winding pitch 1 mm

* Measured on same crystal in a SOT-37 envelope (BFR90A).

s-parameters (common emitter) at V_{CE} = 5 V; T_{amb} = 25 °C; typical values.

I_C mA	f MHz	s_{ie}	s_{re}	s_{fe}	s_{oe}
	40	0,88/ −8,9°	0,009/83,6°	6,7/174,2°	1,00/ −2,7°
	100	0,86/ −21,9°	0,022/78,3°	6,5/164,2°	0,98/ −6,6°
	200	0,80/ −42,2°	0,041/69,0°	6,0/149,2°	0,94/−12,2°
2	500	0,61/ −87,2°	0,073/54,9°	4,2/119,1°	0,81/−20,2°
	800	0,48/−117,4°	0,086/52,7°	3,1/100,5°	0,74/−22,9°
	1000	0,44/−133,8°	0,092/54,2°	2,6/ 91,4°	0,71/−24,2°
	1200	0,41/−147,6°	0,099/57,5°	2,2/ 84,3°	0,70/−25,7°
	40	0,75/ −14,4°	0,008/81,8°	14,4/170,2°	0,99/ −4,9°
	100	0,70/ −34,0°	0,020/74,2°	13,3/155,3°	0,94/−11,2°
	200	0,60/ −61,7°	0,034/65,0°	10,9/135,8°	0,84/−17,9°
5	500	0,40/−111,1°	0,057/61,1°	6,2/106,9°	0,67/−21,9°
	800	0,32/−139,7°	0,074/65,5°	4,2/ 92,4°	0,62/−22,2°
	1000	0,30/−153,2°	0,086/68,2°	3,4/ 85,3°	0,61/−22,8°
	1200	0,29/−166,2°	0,100/70,9°	2,9/ 79,6°	0,60/−24,0°
	40	0,61/ −21,1°	0,008/79,7°	22,9/165,2°	0,97/ −7,3°
	100	0,54/ −48,5°	0,017/71,4°	19,8/145,8°	0,88/−15,5°
	200	0,42/ −82,1°	0,028/65,2°	14,4/124,7°	0,74/−20,8°
10	500	0,30/−132,3°	0,050/69,0°	7,1/ 99,6°	0,59/−20,5°
	800	0,26/−158,0°	0,072/73,7°	4,7/ 87,8°	0,56/−20,3°
	1000	0,25/−168,3°	0,088/75,2°	3,8/ 82,2°	0,56/−20,9°
	1200	0,25/−179,3°	0,104/76,6°	3,2/ 77,5°	0,55/−22,1°
	40	0,53/ −26,0°	0,007/78,6°	27,7/162,4°	0,96/ −8,7°
	100	0,45/ −58,1°	0,016/70,5°	22,6/140,7°	0,85/−17,2°
	200	0,36/ −94,4°	0,025/66,6°	15,6/119,7°	0,70/−21,0°
14	500	0,27/−142,8°	0,049/72,5°	7,3/ 96,9°	0,57/−19,1°
	800	0,25/−166,0°	0,072/76,5°	4,7/ 86,1°	0,55/−19,1°
	1000	0,24/−174,8°	0,088/77,4°	3,8/ 80,5°	0,55/−19,9°
	1200	0,24/ 174,8°	0,105/78,4°	3,2/ 76,2°	0,54/−21,3°
	40	0,45/ −33,1°	0,007/77,0°	32,3/158,8°	0,94/−10,1°
	100	0,38/ −71,8°	0,015/69,5°	24,7/135,0°	0,80/−18,4°
	200	0,31/−110,6°	0,023/68,3°	16,0/114,6°	0,66/−20,1°
20	500	0,26/−154,5°	0,047/75,5°	7,2/ 94,3°	0,56/−17,3°
	800	0,25/−174,2°	0,071/78,7°	4,7/ 84,3°	0,55/−17,8°
	1000	0,25/ 178,5°	0,088/79,3°	3,7/ 79,1°	0,54/−18,9°
	1200	0,26/ 169,9°	0,104/80,0°	3,2/ 74,9°	0,54/−20,5°

s-parameters (common emitter) at V_{CE} = 10 V; T_{amb} = 25 °C; typical values.

I_C mA	f MHz	s_{ie}	s_{re}	s_{fe}	s_{oe}
	40	0,89/ −8,7°	0,008/83,6°	6,8/174,4°	1,00/ −2,5°
	100	0,86/ −21,2°	0,021/78,5°	6,5/164,6°	0,98/ −6,1°
	200	0,80/ −40,9°	0,038/69,5°	6,0/149,6°	0,94/−11,3°
2	500	0,61/ −85,3°	0,069/55,8°	4,3/119,8°	0,82/−18,7°
	800	0,48/−115,4°	0,081/53,8°	3,1/101,2°	0,75/−21,3°
	1000	0,44/−131,4°	0,086/55,5°	2,6/ 92,1°	0,73/−22,5°
	1200	0,40/−145,6°	0,093/58,9°	2,2/ 85,0°	0,72/−23,9°
	40	0,77/ −13,6°	0,008/81,8°	14,2/170,5°	0,99/ −4,5°
	100	0,73/ −32,3°	0,019/74,7°	13,2/155,8°	0,95/−10,3°
	200	0,62/ −58,8°	0,032/65,6°	11,0/136,8°	0,85/−16,6°
5	500	0,41/−107,2°	0,054/61,4°	6,3/107,7°	0,69/−20,4°
	800	0,32/−135,9°	0,071/65,9°	4,2/ 92,9°	0,64/−20,8°
	1000	0,30/−150,0°	0,082/68,6°	3,5/ 86,1°	0,63/−21,3°
	1200	0,28/−162,9°	0,095/71,5°	2,9/ 80,5°	0,62/−22,4°
	40	0,66/ −19,4°	0,007/80,1°	22,5/165,9°	0,97/ −6,6°
	100	0,58/ −44,7°	0,017/71,8°	19,5/147,0°	0,90/−14,1°
	200	0,45/ −76,2°	0,027/65,4°	14,5/126,0°	0,76/−19,3°
10	500	0,29/−125,1°	0,049/68,7°	7,2/100,6°	0,62/−19,2°
	800	0,24/−151,8°	0,070/73,5°	4,7/ 88,8°	0,59/−19,0°
	1000	0,24/−162,9°	0,084/75,2°	3,8/ 82,6°	0,58/−19,7°
	1200	0,23/−174,8°	0,099/76,8°	3,2/ 78,3°	0,58/−20,9°
	40	0,60/ −23,2°	0,007/78,6°	27,2/163,0°	0,96/ −7,9°
	100	0,51/ −52,5°	0,016/70,6°	22,6/141,8°	0,86/−15,8°
	200	0,38/ −86,2°	0,025/66,4°	15,7/120,7°	0,72/−19,6°
14	500	0,26/−134,3°	0,047/72,0°	7,5/ 97,8°	0,60/−18,0°
	800	0,22/−159,3°	0,069/76,2°	4,8/ 86,8°	0,57/−18,0°
	1000	0,22/−169,0°	0,085/77,3°	3,9/ 81,3°	0,57/−18,7°
	1200	0,22/ 179,8°	0,100/78,5°	3,3/ 76,8°	0,57/−20,1°
	40	0,54/ −28,2°	0,007/77,4°	31,7/159,9°	0,95/ −9,1°
	100	0,45/ −61,7°	0,015/69,5°	24,7/136,8°	0,82/−16,8°
	200	0,33/ −97,5°	0,023/67,5°	16,3/116,2°	0,68/−18,8°
20	500	0,24/−143,7°	0,046/74,4°	7,4/ 95,3°	0,59/−16,4°
	800	0,22/−166,4°	0,069/78,0°	4,8/ 85,2°	0,57/−16,9°
	1000	0,22/−174,7°	0,084/78,7°	3,8/ 80,1°	0,57/−17,8°
	1200	0,22/ 176,3°	0,100/79,7°	3,3/ 76,0°	0,57/−19,4°

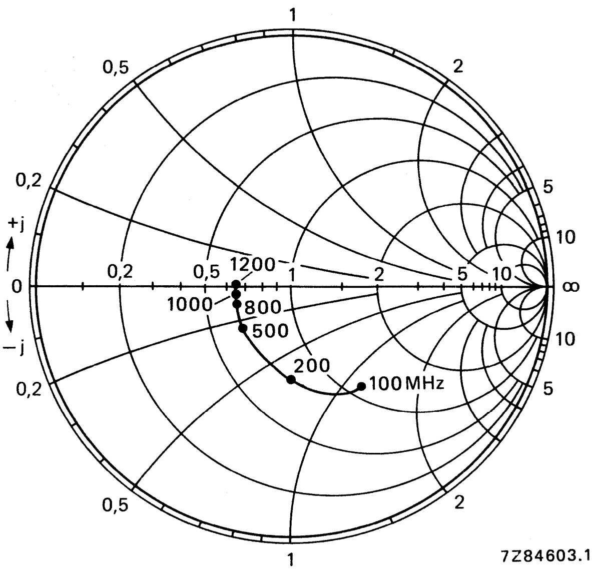


Fig. 3 Input impedance derived from input reflection coefficient s_{ie} co-ordinates in ohm x 50.
V_{CE} = 10 V; I_C = 14 mA; T_{amb} = 25 °C; typical values.

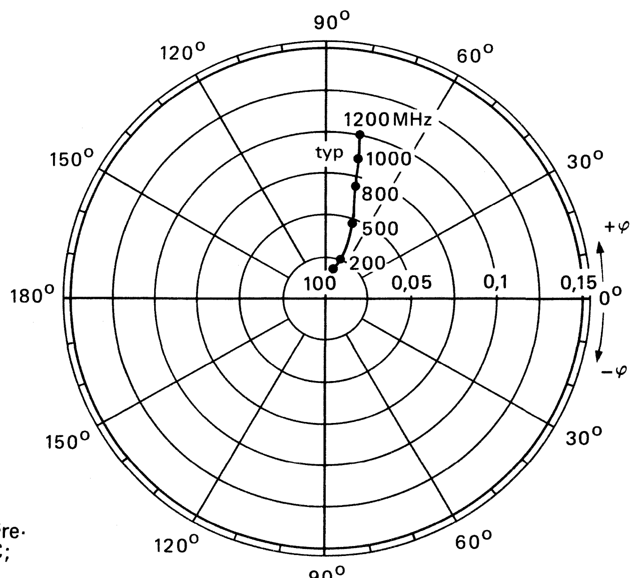


Fig. 4 Reverse transmission coefficient s_{re}.
V_{CE} = 10 V; I_C = 14 mA; T_{amb} = 25 °C; typical values.

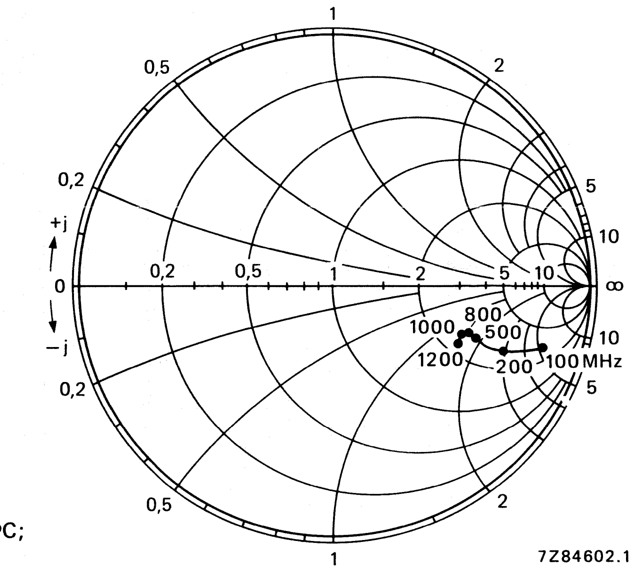


Fig. 5 Output impedance derived from output reflection coefficient s_{oe} co-ordinates in ohm x 50.
V_{CE} = 10 V; I_C = 14 mA; T_{amb} = 25 °C; typical values.

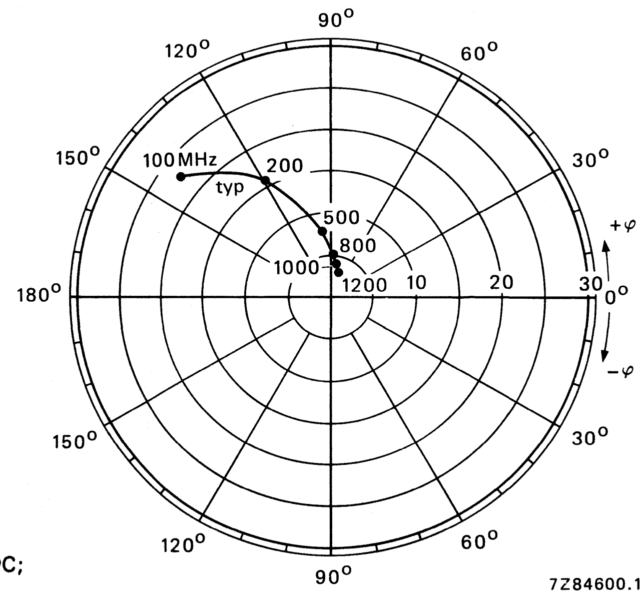


Fig. 6 Forward transmission coefficient s_{fe}.
V_{CE} = 10 V; I_C = 14 mA; T_{amb} = 25 °C; typical values.

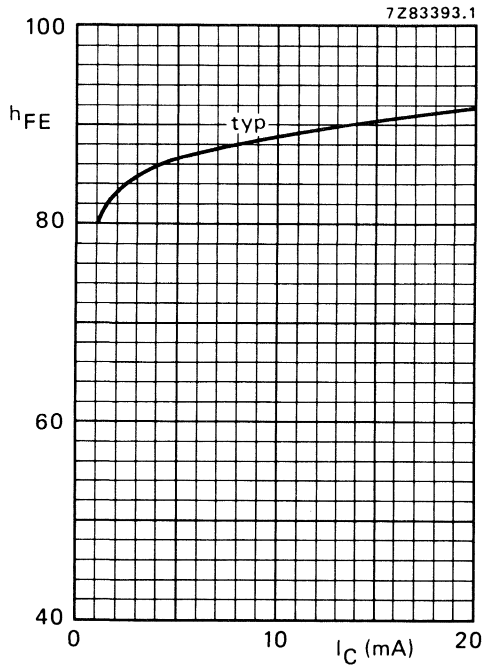


Fig. 7 V_{CE} = 10 V; T_j = 25 °C; typical values.

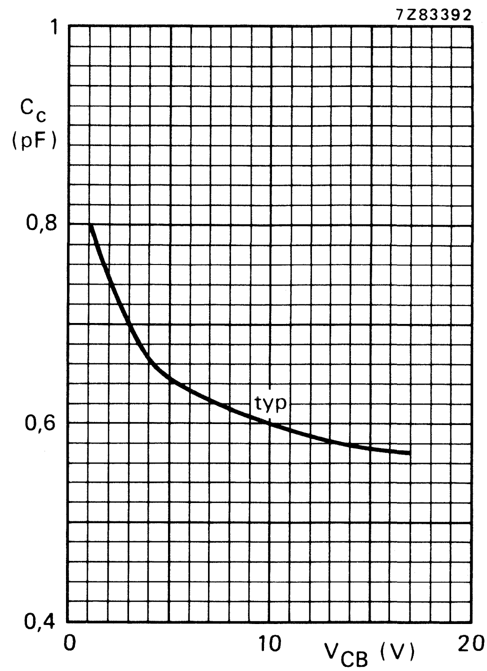


Fig. 8 $I_E = I_e = 0$; f = 1 MHz; T_j = 25 °C; typical values.

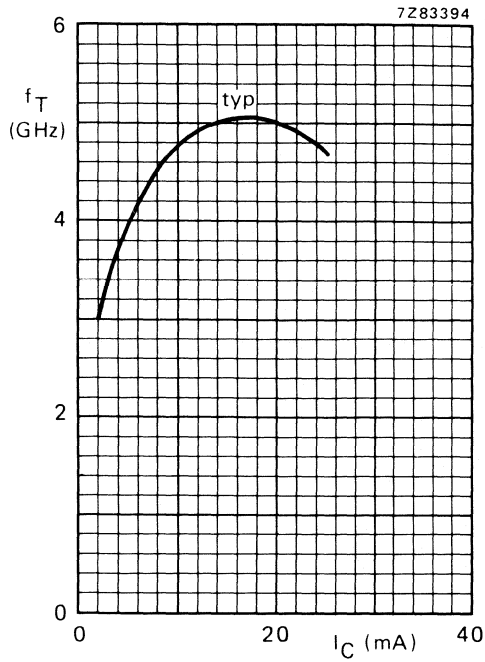


Fig. 9 V_{CE} = 10 V; f = 500 MHz; T_j = 25 °C; typical values.

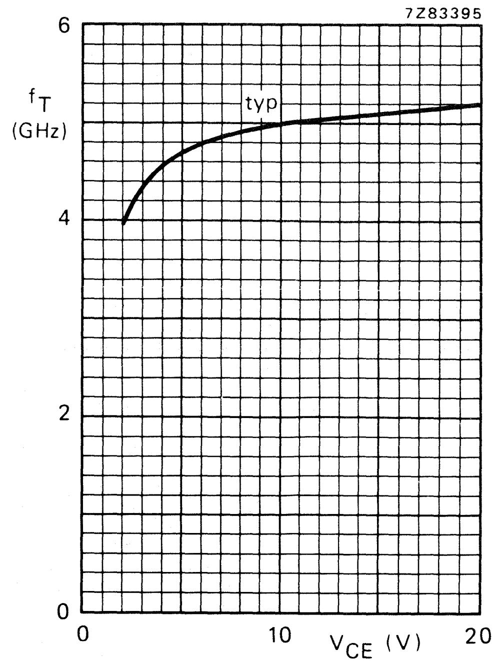


Fig. 10 I_C = 14 mA; f = 500 MHz; T_j = 25 °C; typical values.

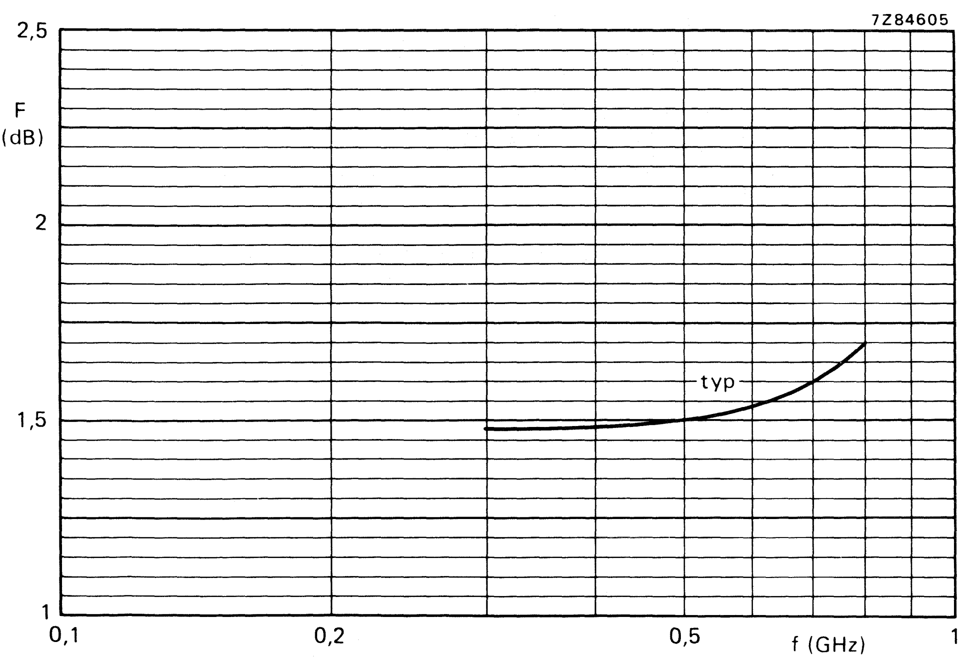


Fig. 11 V_{CE} = 10 V; I_C = 4 mA; Z_S = optimum; T_{amb} = 25 °C; typical values.

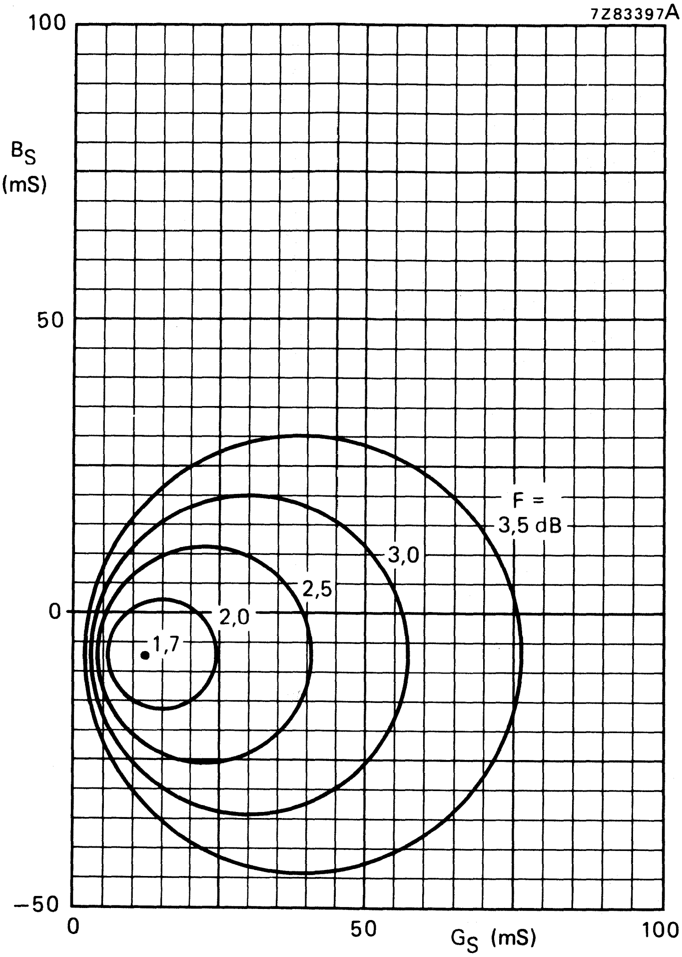


Fig. 12 Circles of constant noise figure.
V_{CE} = 10 V; I_C = 4 mA; f = 800 MHz; T_{amb} = 25 °C;
typical values.

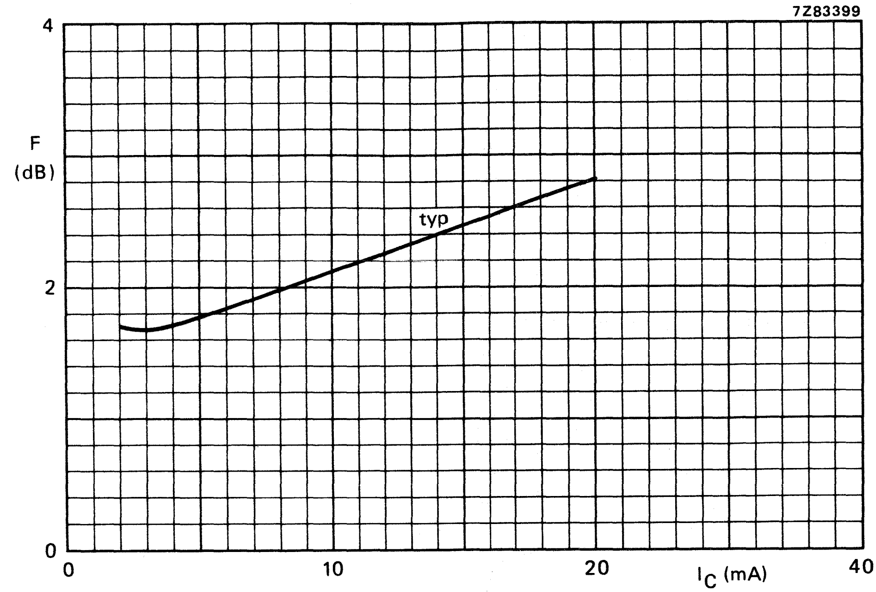


Fig. 13 V_{CE} = 10 V; f = 800 MHz; Z_S = optimum; T_{amb} = 25 °C; typical values.

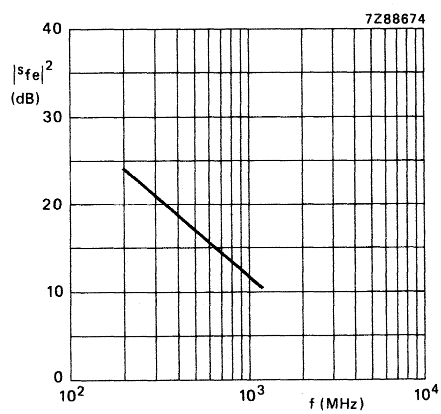


Fig. 14 V_{CE} = 10 V; I_C = 14 mA; T_{amb} = 25 °C; typical values.

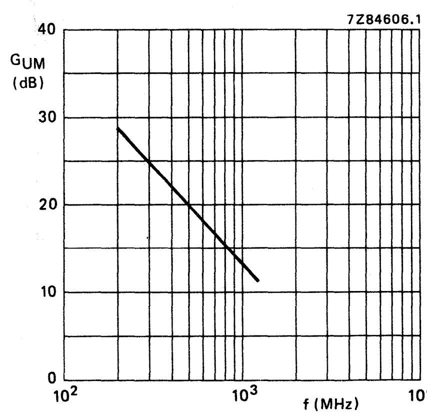


Fig. 15 V_{CE} = 10 V; I_C = 14 mA; T_{amb} = 25 °C; typical values.

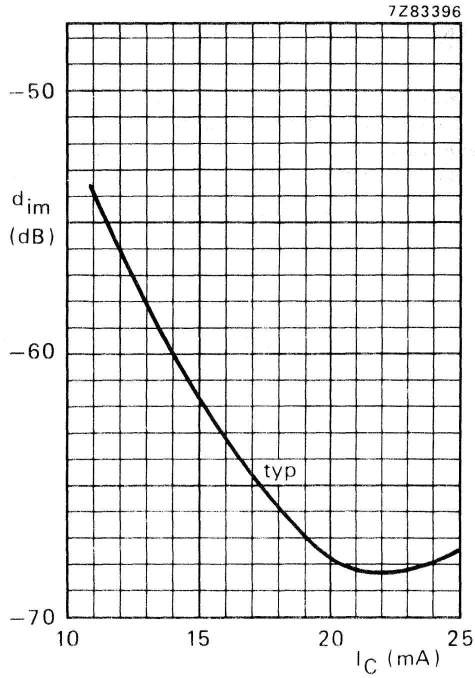


Fig. 16 V_{CE} = 10 V; V_o = 43,5 dBmV = 150 mV; $f_{(p+q-r)}$ = 793,25 MHz; T_{amb} = 25 °C; measured in MATV test circuit (see Fig. 2); typical values.

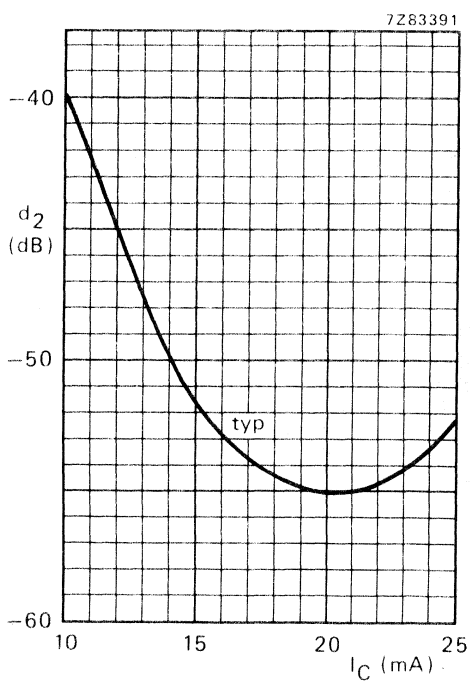


Fig. 17 V_{CE} = 10 V; V_o = 60 mV; $f_{(p+q)}$ = 810 MHz; T_{amb} = 25 °C; measured in MATV test circuit (see Fig. 2); typical values.

N-P-N 1 GHz WIDEBAND TRANSISTOR

N-P-N transistor in a SOT-23 plastic envelope. It is primarily intended for use in u.h.f. and microwave amplifiers in thick and thin-film circuits, such as in aerial amplifiers, radar systems, oscilloscopes, spectrum analysers etc. The transistor features very low intermodulation distortion and high power gain; thanks to its very high transition frequency, it also has excellent wideband properties and low noise up to high frequencies.

P-N-P complement is the BFT93.

QUICK REFERENCE DATA

Collector-base voltage (open emitter)	V_{CBO}	max.	15	V
Collector-emitter voltage (open base)	V_{CEO}	max.	12	V
Collector current (d.c.)	I_C	max.	35	mA
Total power dissipation up to T_{amb} = 25 °C	P_{tot}	max.	300	mW ←
Junction temperature	T_j	max.	175	°C ←
Transition frequency at f = 500 MHz I_C = 30 mA; V_{CE} = 5 V	f_T	typ.	5	GHz
Feedback capacitance at f = 1 MHz I_C = 2 mA; V_{CE} = 5 V	C_{re}	typ.	0,8	pF
Noise figure at optimum source impedance I_C = 2 mA; V_{CE} = 5 V; f = 500 MHz;	F	typ.	1,9	dB
Max. unilateral power gain I_C = 30 mA; V_{CE} = 5 V; f = 500 MHz;	G_{UM}	typ.	16,5	dB
Intermodulation distortion at T_{amb} = 25 °C I_C = 30 mA; V_{CE} = 5 V; R_L = 75 Ω; V_o = 300 mV $f_{(p+q-r)}$ = 493,25 MHz	d_{im}	typ.	−60	dB

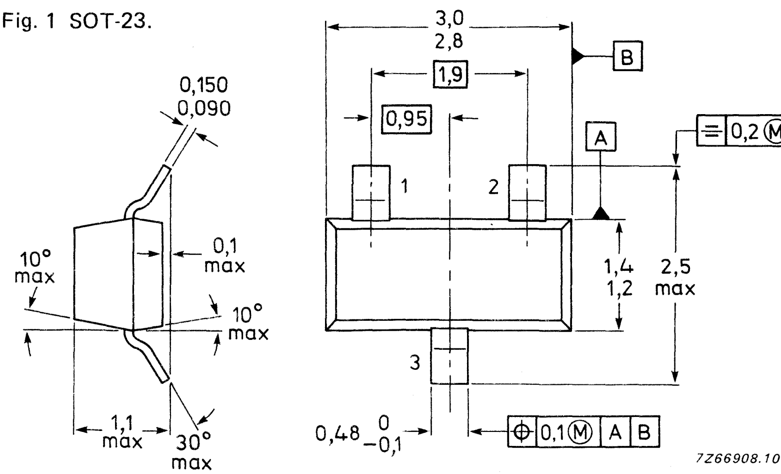
MECHANICAL DATA

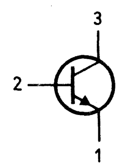
Dimensions in mm

Fig. 1 SOT-23.

Marking code

BFR93 = R1





TOP VIEW

If required, the R-version (reverse pinning) is available on request.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

Collector-base voltage (open emitter)	V_{CBO}	max.	15 V
Collector-emitter voltage (open base)	V_{CEO}	max.	12 V
Emitter-base voltage (open collector)	V_{EBO}	max.	2,0 V
Collector current (d.c.)	I_C	max.	35 mA
→ Total power dissipation up to T_{amb} = 25 °C	P_{tot}	max.	300 mW
Storage temperature	T_{stg}	−65 to	+150 °C
→ Junction temperature	T_j	max.	175 °C

THERMAL RESISTANCE

→ From junction to ambient*	$R_{th\ j\text{-}a}$	=	430 K/W

CHARACTERISTICS

T_j = 25 °C unless otherwise specified

Collector cut-off current $I_E = 0$; $V_{CB} = 10$ V	I_{CBO}	max.	50 nA
D.C. current gain ** $I_C = 30$ mA; $V_{CE} = 5$ V	h_{FE}	min. typ.	25 50
Transition frequency at f = 500 MHz ** $I_C = 30$ mA; $V_{CE} = 5$ V	f_T	typ.	5 GHz
Collector capacitance at f = 1 MHz $I_E = I_e = 0$; $V_{CB} = 10$ V	C_c	typ.	0,7 pF
Emitter capacitance at f = 1 MHz $I_C = I_c = 0$; $V_{EB} = 0{,}5$ V	C_e	typ.	1,8 pF
Feedback capacitance at f = 1 MHz $I_C = 2$ mA; $V_{CE} = 5$ V; $T_{amb} = 25$ °C	C_{re}	typ.	0,8 pF

* Mounted on a ceramic substrate of 8 mm x 10 mm x 0,7 mm.
** Measured under pulse conditions.

Noise figure at optimum source impedance *			
I_C = 2 mA; V_{CE} = 5 V; f = 500 MHz; T_{amb} = 25 °C	F	typ.	1,9 dB
Max. unilateral power gain (s_{re} assumed to be zero)			

$$G_{UM} = 10 \log \frac{|s_{fe}|^2}{(1 - |s_{ie}|^2)(1 - |s_{oe}|^2)}$$

I_C = 30 mA; V_{CE} = 5 V; f = 500 MHz; T_{amb} = 25 °C	G_{UM}	typ.	16,5 dB
Intermodulation distortion at T_{amb} = 25 °C *			
I_C = 30 mA; V_{CE} = 5 V; R_L = 75 Ω; V.S.W.R. < 2			
$V_p = V_o$ = 300 mV at f_p = 495,25 MHz			
$V_q = V_o$ − 6 dB at f_q = 503,25 MHz			
$V_r = V_o$ − 6 dB at f_r = 505,25 MHz			
Measured at $f_{(p+q-r)}$ = 493,25 MHz	d_{im}	typ.	−60 dB

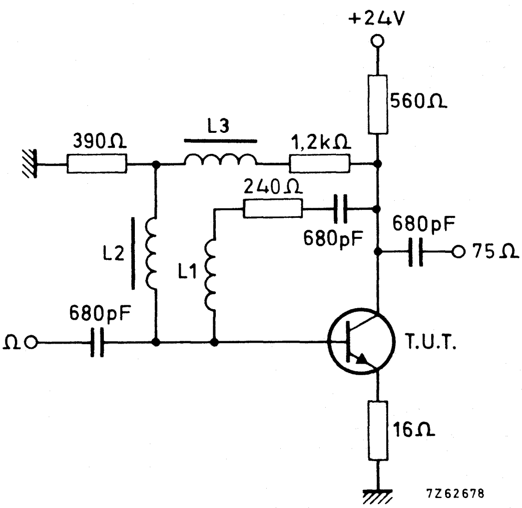


Fig. 2 Intermodulation test circuit.

L1 = 4 turns Cu wire (0,35); winding pitch 1 mm; int. dia. 4 mm
L2 and L3 5 μH (code number: 3122 108 20150)

* Crystal mounted in a BFR91 envelope.

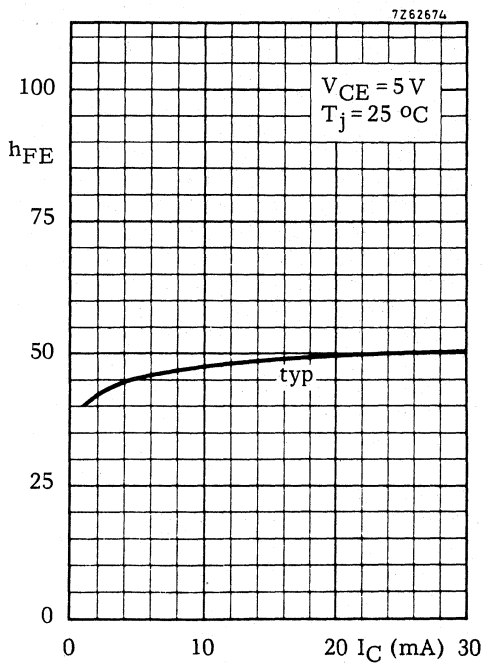


Fig. 3.

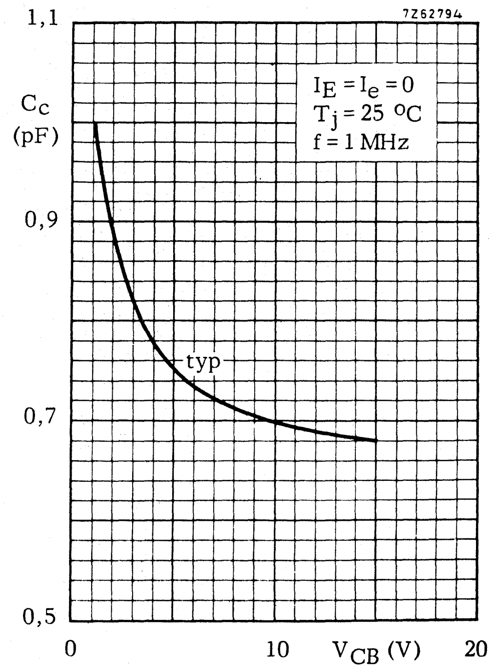


Fig. 4.

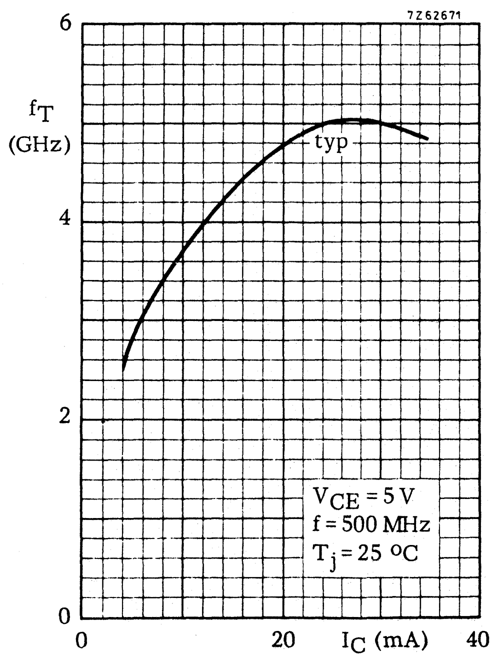


Fig. 5.

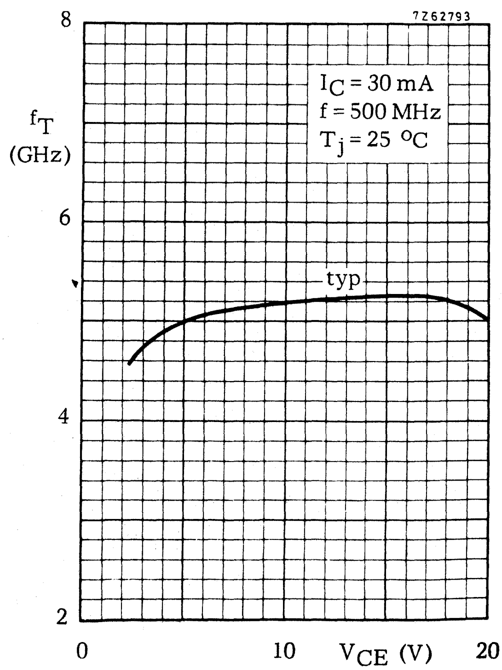


Fig. 6.

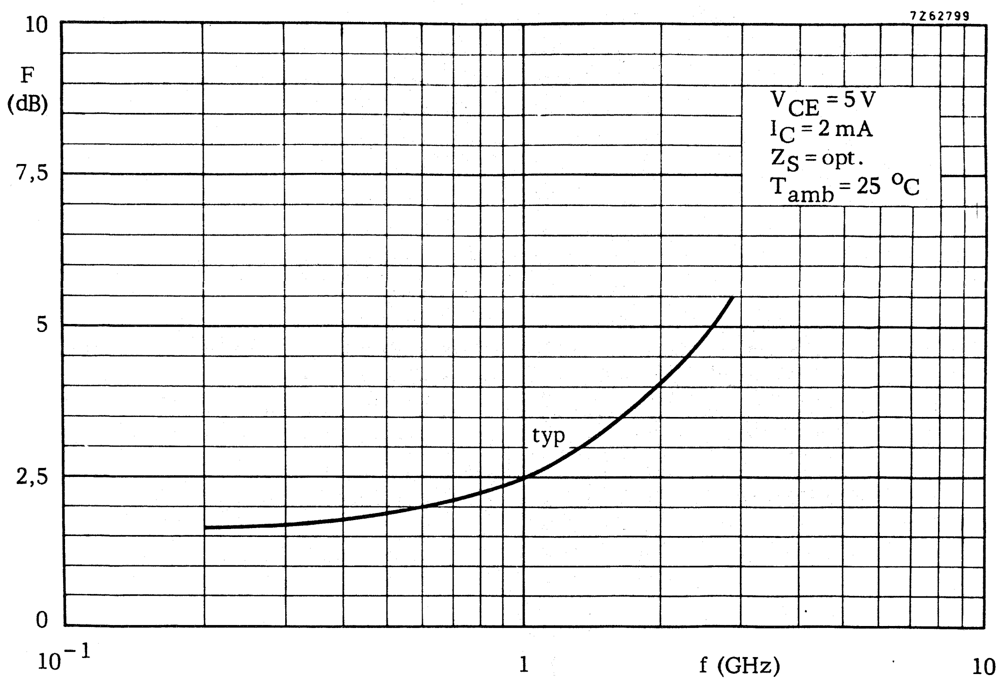

7Z62799
10
F
(dB)
7,5
5
2,5
0
V_{CE} = 5 V
I_C = 2 mA
Z_S = opt.
T_{amb} = 25 °C
typ
10^{-1}
1
f (GHz)
10

Fig. 7.

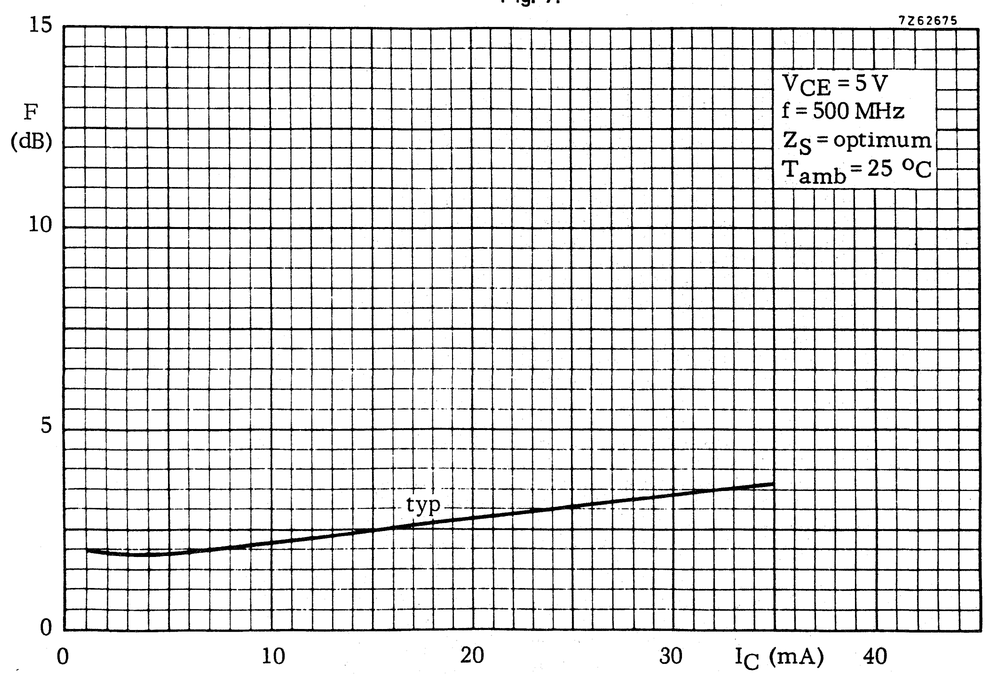

7Z62675
15
F
(dB)
10
5
0
V_{CE} = 5 V
f = 500 MHz
Z_S = optimum
T_{amb} = 25 °C
typ
0
10
20
30
I_C (mA)
40

Fig. 8.

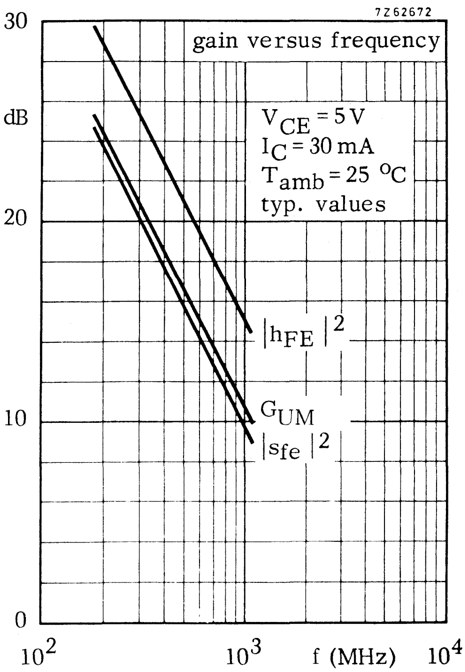

7Z62672
gain versus frequency
30
dB
20
10
0
V_{CE} = 5 V
I_C = 30 mA
T_{amb} = 25 °C
typ. values
$|h_{FE}|^2$
G_{UM}
$|s_{fe}|^2$
10^2
10^3
f (MHz)
10^4

Fig. 9.

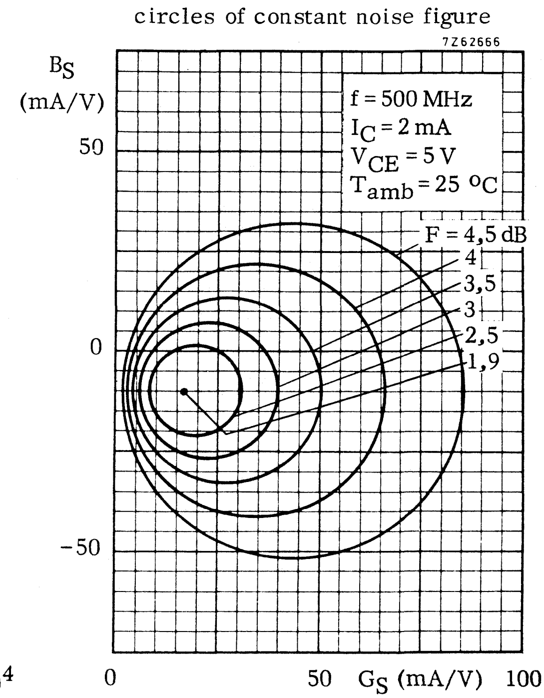

circles of constant noise figure
7Z62666
B_S
(mA/V)
50
0
−50
f = 500 MHz
I_C = 2 mA
V_{CE} = 5 V
T_{amb} = 25 °C
F = 4,5 dB
4
3,5
3
2,5
1,9
0
50
G_S (mA/V)
100

Fig. 10.

V_{CE} = 5 V
I_C = 30 mA
T_{amb} = 25 °C

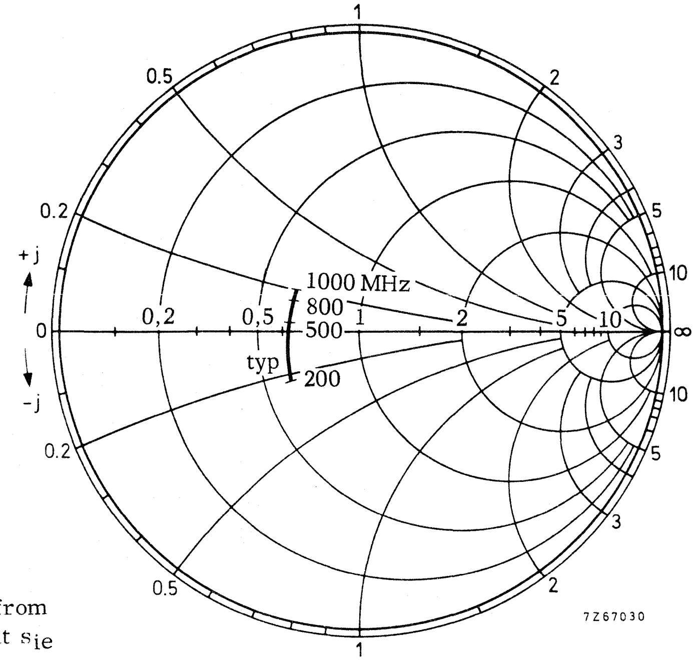


Fig. 11.

Input impedance derived from input reflection coefficient s_{ie} coordinates in ohm x 50

V_{CE} = 5 V
I_C = 30 mA
T_{amb} = 25 °C

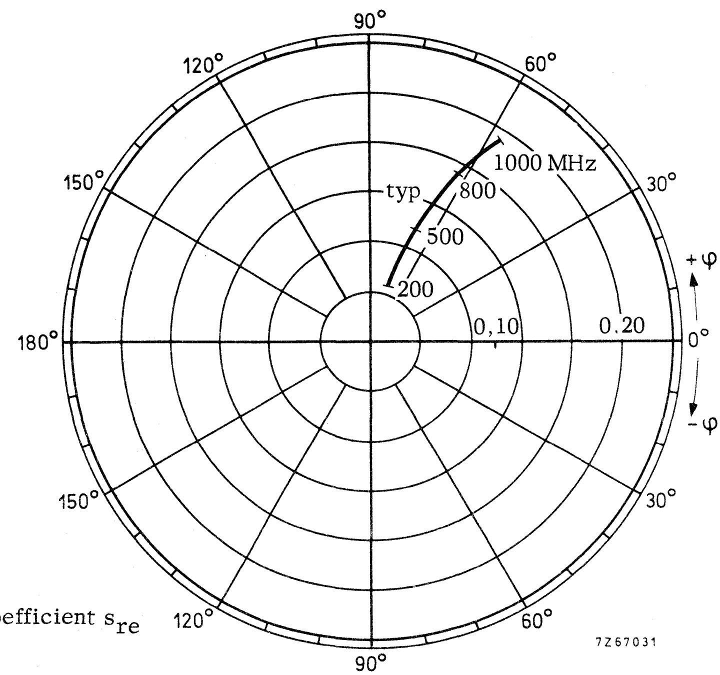


Fig. 12.

Reverse transmission coefficient s_{re}

V_{CE} = 5 V
I_C = 30 mA
T_{amb} = 25 °C

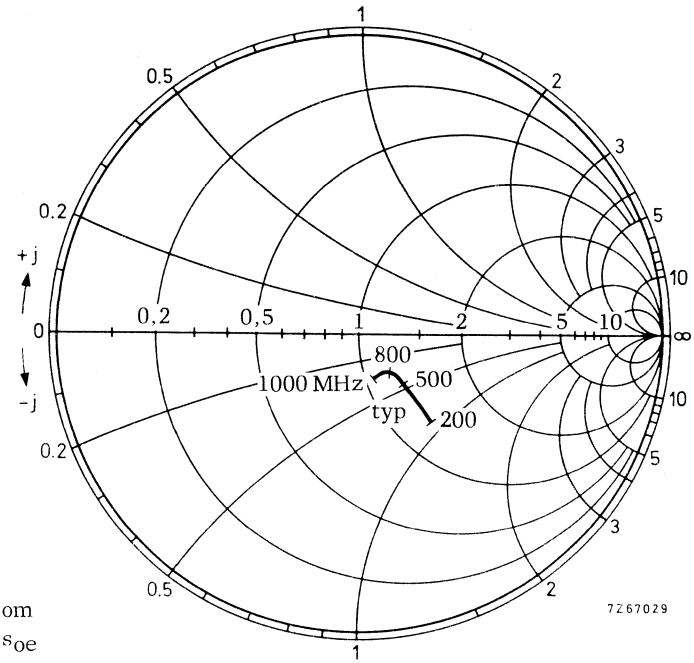


Fig. 13.

Output impedance derived from output reflection coefficient s_{oe} coordinates in ohm x 50

V_{CE} = 5 V
I_C = 30 mA
T_{amb} = 25 °C

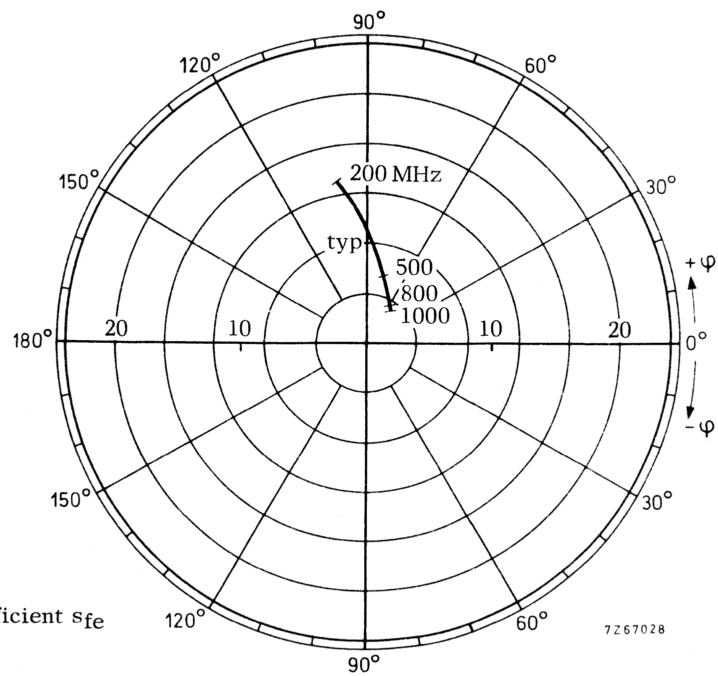


Fig. 14.

Forward transmission coefficient s_{fe}

N-P-N 1 GHz WIDEBAND TRANSISTOR

N-P-N transistors in a SOT-23 plastic envelope. They are primarily intended for use in v.h.f./u.h.f. broadband amplifiers. The transistors feature:

- low noise;
- very low intermodulation distortion;
- high power gain;
- P-N-P complement is the BFT93

QUICK REFERENCE DATA

Collector-base voltage (open emitter)	V_{CBO}	max.	15	V
Collector-emitter voltage (open base)	V_{CEO}	max.	12	V
Collector current (d.c.)	I_C	max.	35	mA
Total power dissipation up to T_{amb} = 25 °C	P_{tot}	max.	300	mW
Junction temperature	T_j	max.	175	°C
Transition frequency at f = 500 MHz I_C = 30 mA; V_{CE} = 5 V	f_T	typ.	5	GHz
Feedback capacitance at f = 1 MHz I_C = 0; V_{CE} = 5 V; T_{amb} = 25 °C	C_{re}	typ.	0,6	pF
Noise figure at optimum source impedance I_C = 4 mA; V_{CE} = 8 V; f = 800 MHz	F	typ.	1,6	dB
Output voltage at d_{im} = −60 dB I_C = 30 mA; V_{CE} = 8 V; R_L = 75 Ω; T_{amb} = 25 °C $f_{(p+q-r)}$ = 793,25 MHz	V_o	typ.	425	mV

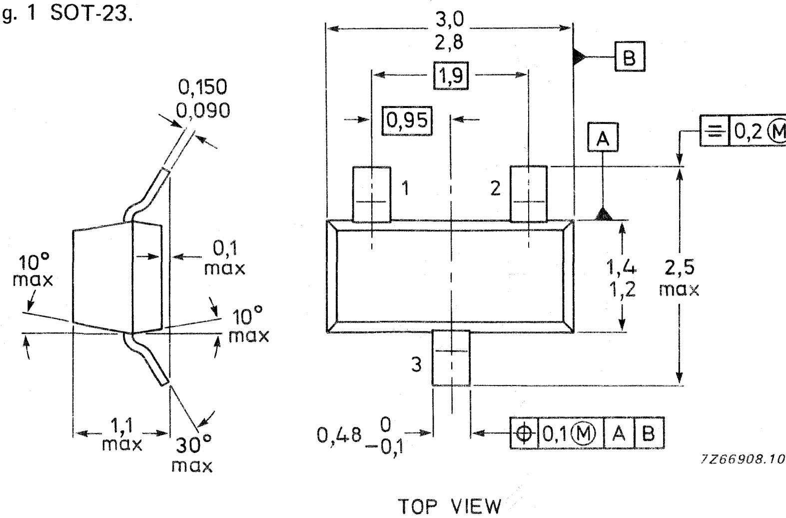
MECHANICAL DATA

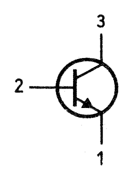
Dimensions in mm

Fig. 1 SOT-23.

Marking code

BFR93A = R2





If required, the R-version (reverse pinning) is available on request

See also *Soldering recommendations.*

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

Collector-base voltage (open emitter)	V_{CBO}	max.	15 V
Collector-emitter voltage (open base)	V_{CEO}	max.	12 V
Emitter-base voltage (open collector)	V_{EBO}	max.	2,0 V
Collector current (d.c.)	I_C	max.	35 mA
→ Total power dissipation up to T_{amb} = 25 °C *	P_{tot}	max.	300 mW
Storage temperature	T_{stg}	−65 to + 150 °C	
→ Junction temperature	T_j	max.	175 °C

THERMAL RESISTANCE

→ From junction to ambient*	$R_{th\ j\text{-}a}$	=	430 K/W

CHARACTERISTICS

T_j = 25 °C unless otherwise specified

Collector cut-off current I_E = 0; V_{CB} = 5 V	I_{CBO}	max.	50 nA
D.C. current gain▲ I_C = 30 mA; V_{CE} = 5 V	h_{FE}	min. typ.	40 90
Transition frequency at f = 500 MHz▲ I_C = 30 mA; V_{CE} = 5 V	f_T	typ.	5 GHz
Collector capacitance at f = 1 MHz I_E = I_e = 0; V_{CB} = 5 V	C_c	typ.	0,7 pF
Emitter capacitance at f = 1 MHz I_C = I_c = 0; V_{EB} = 0,5 V	C_e	typ.	1,9 pF
Feedback capacitance at f = 1 MHz I_C = 0; V_{CE} = 5 V; T_{amb} = 25 °C	C_{re}	typ.	0,6 pF
Noise figure at optimum source impedance▲ I_C = 4 mA; V_{CE} = 8 V; f = 800 MHz	F	typ.	1,6 dB
I_C = 30 mA; V_{CE} = 8 V; f = 800 MHz	F	typ.	2,3 dB

Maximum unilateral power gain (s_{re} assumed to be zero)
See Figs 10 to 15

$$G_{UM}\text{ (in dB)} = 10 \log \frac{|s_{fe}|^2}{(1 - |s_{ie}|^2)(1 - |s_{oe}|^2)}$$

I_C = 30 mA; V_{CE} = 8 V; f = 800 MHz; T_{amb} = 25 °C	G_{UM}	typ.	14 dB

▲ Measured under pulse conditions.
* Mounted on a ceramic substrate of 8 mm x 10 mm x 0,7 mm.

Output voltage at d_{im} = –60 dB (see Figs 2 and 15)*
(DIN 45004B, par. 6.3: 3-tone)
I_C = 30 mA; V_{CE} = 8 V; R_L = 75 Ω; T_{amb} = 25 °C
$V_p = V_o$ at d_{im} = –60 dB; f_p = 795,25 MHz
$V_q = V_o$ –6 dB ; f_q = 803,25 MHz
$V_r = V_o$ –6 dB ; f_r = 805,25 MHz
Measured at $f_{(p+q-r)}$ = 793,25 MHz — V_o typ. 425 mV

Second harmonic distortion (see Figs 2 and 16)*
I_C = 30 mA; V_{CE} = 8 V; R_L = 75 Ω; T_{amb} = 25 °C
V_p = 200 mV at f_p = 250 MHz
V_q = 200 mV at f_q = 560 MHz
measured at $f_{(p+q)}$ = 810 MHz — d_2 typ. –50 dB

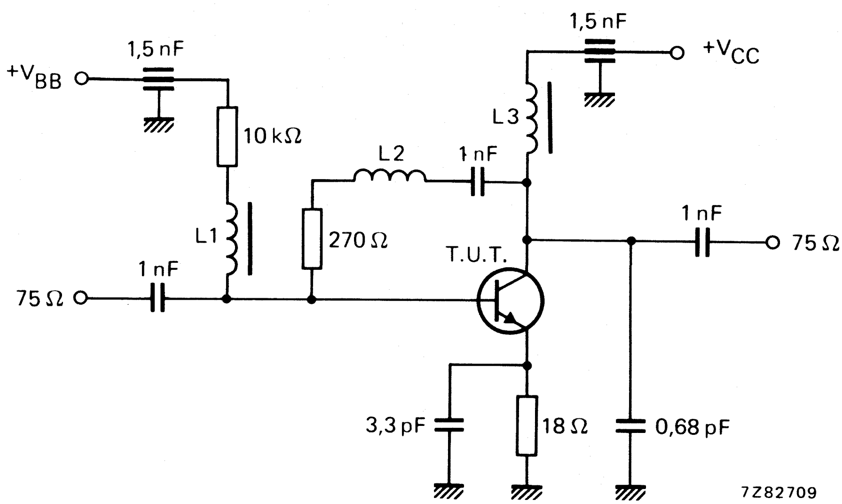


Fig. 2 Intermodulation distortion and second harmonic distortion MATV test circuit.

L1 = L3 = 5 μH micro choke
L2 = 3 turns Cu wire (0,4 mm); internal diameter 3 mm; winding pitch 1 mm.

* Measured on same crystal in a SOT-37 envelope (BFR91A).

s-parameters (common emitter)

V_{CE} V	I_C mA	f MHz	s_{ie}	s_{re}	s_{fe}	s_{oe}
		40	0,89/ −12,4°	0,016/82,3°	7,0/171,8°	0,88/ −4,8°
		100	0,87/ −30,1°	0,038/74,2°	6,7/160,1°	0,96/−11,3°
		200	0,80/ −56,3°	0,067/61,8°	6,0/142,3°	0,88/−20,1°
5	2	500	0,64/−109,5°	0,106/44,3°	3,8/110,6°	0,69/−31,9°
		800	0,57/−140,3°	0,116/41,8°	2,7/ 91,5°	0,60/−35,5°
		1000	0,54/−154,5°	0,119/43,9°	2,2/ 82,8°	0,58/−38,0°
		1200	0,53/−166,6°	0,124/48,2°	1,9/ 75,1°	0,56/−40,2°
		40	0,77/ −19,9°	0,015/79,4°	15,1/166,8°	0,97/ −8,8°
		100	0,72/ −46,9°	0,033/68,6°	13,5/149,7°	0,89/−19,6°
		200	0,62/ −81,4°	0,053/57,0°	10,5/128,5°	0,73/−30,3°
5	5	500	0,48/−134,4°	0,079/52,6°	5,5/100,5°	0,51/−37,3°
		800	0,45/−159,8°	0,099/57,8°	3,6/ 85,6°	0,44/−37,9°
		1000	0,44/−170,8°	0,114/61,0°	3,0/ 78,8°	0,42/−39,3°
		1200	0,43/ 179,8°	0,131/64,2°	2,5/ 72,9°	0,41/−40,9°
		40	0,63/ −29,7°	0,013/76,5°	24,4/161,0°	0,95/−13,5°
		100	0,56/ −66,2°	0,028/64,8°	20,0/139,4°	0,80/−17,8°
		200	0,47/−105,4°	0,042/57,8°	13,6/118,0°	0,59/−37,3°
5	10	500	0,41/−152,0°	0,070/62,6°	6,4/ 94,8°	0,39/−39,0°
		800	0,39/−171,7°	0,099/67,6°	4,1/ 82,7°	0,35/−38,2°
		1000	0,39/ 179,6°	0,119/69,1°	3,4/ 76,7°	0,34/−39,1°
		1200	0,39/ 171,6°	0,140/70,5°	2,8/ 71,5°	0,33/−40,7°
		40	0,47/ −44,2°	0,012/73,8°	35,2/154,0°	0,90/−19,2°
		100	0,42/ −90,7°	0,023/63,9°	25,4/129,3°	0,68/−35,0°
		200	0,39/−129,4°	0,034/62,9°	15,6/109,7°	0,47/−41,0°
5	20	500	0,37/−165,1°	0,067/70,5°	6,8/ 90,9°	0,32/−38,4°
		800	0,37/ 179,5°	0,101/73,2°	4,4/ 80,3°	0,29/−37,4°
		1000	0,36/ 173,0°	0,124/73,4°	3,6/ 75,4°	0,29/−38,3°
		1200	0,37/ 166,2°	0,148/73,6°	3,0/ 70,3°	0,28/−40,0°
		40	0,39/ −56,3°	0,011/72,3°	40,8/149,5°	0,86/−22,5°
		100	0,38/−106,8°	0,021/64,5°	27,4/124,0°	0,61/−37,9°
		200	0,37/−141,6°	0,032/66,4°	16,0/105,8°	0,41/−41,1°
5	30	500	0,37/−171,0°	0,067/73,5°	6,9/ 88,9°	0,29/−36,6°
		800	0,37/ 175,9°	0,102/75,2°	4,4/ 79,1°	0,27/−36,0°
		1000	0,36/ 170,0°	0,126/74,8°	3,6/ 74,2°	0,27/−37,1°
		1200	0,37/ 163,9°	0,150/74,6°	3,0/ 69,5°	0,27/−39,0°

s-parameters (common emitter)

V_{CE} V	I_C mA	f MHz	s_{ie}	s_{re}	s_{fe}	s_{oe}
		40	0,90/ −12,2°	0,015/82,1°	6,9/171,7°	0,99/ −4,8°
		100	0,88/ −29,2°	0,036/74,5°	6,6/160,4°	0,96/−10,8°
		200	0,81/ −54,7°	0,064/62,4°	5,9/143,1°	0,89/−19,2°
8	2	500	0,64/−107,0°	0,103/44,9°	3,8/111,5°	0,71/−30,6°
		800	0,56/−138,1°	0,112/42,1°	2,7/ 92,2°	0,62/−34,1°
		1000	0,54/−152,6°	0,116/44,1°	2,3/ 83,6°	0,60/−36,4°
		1200	0,52/−165,2°	0,120/48,5°	1,9/ 75,9°	0,58/−38,6°
		40	0,78/ −19,2°	0,014/79,4°	14,8/166,9°	0,98/ −8,6°
		100	0,73/ −44,6°	0,032/69,0°	13,5/150,4°	0,90/−18,7°
		200	0,63/ −78,1°	0,051/57,5°	10,5/129,4°	0,75/−28,9°
8	5	500	0,48/−131,2°	0,077/52,5°	5,6/101,3°	0,53/−35,7°
		800	0,44/−157,3°	0,096/57,7°	3,7/ 86,3°	0,46/−36,2°
		1000	0,42/−168,3°	0,110/61,0°	3,0/ 79,5°	0,44/−37,5°
		1200	0,42/−178,3°	0,126/64,3°	2,6/ 73,6°	0,43/−39,0°
		40	0,66/ −27,7°	0,013/76,7°	24,0/161,5°	0,95/−12,9°
		100	0,58/ −62,0°	0,027/65,4°	19,9/140,4°	0,81/−26,3°
		200	0,48/−100,1°	0,041/58,0°	13,8/119,0°	0,61/−35,5°
8	10	500	0,40/−148,2°	0,068/62,2°	6,5/ 95,4°	0,42/−37,0°
		800	0,38/−169,1°	0,096/67,4°	4,2/ 83,0°	0,37/−36,2°
		1000	0,37/−178,3°	0,116/69,0°	3,4/ 77,4°	0,36/−37,0°
		1200	0,37/ 173,6°	0,136/70,5°	2,9/ 72,5°	0,35/−38,5°
		40	0,53/ −39,6°	0,012/73,8°	34,7/154,8°	0,91/−18,1°
		100	0,45/ −83,0°	0,023/63,9°	25,6/130,5°	0,70/−33,2°
		200	0,39/−122,0°	0,034/62,2°	15,9/110,6°	0,49/−39,0°
8	20	500	0,35/−161,3°	0,066/69,7°	7,0/ 91,4°	0,34/−36,2°
		800	0,35/−177,9°	0,098/72,7°	4,5/ 80,7°	0,31/−35,1°
		1000	0,34/ 175,2°	0,121/73,1°	3,7/ 75,8°	0,31/−36,0°
		1200	0,34/ 168,3°	0,143/73,4°	3,1/ 71,2°	0,30/−37,5°
		40	0,47/ −48,0°	0,011/72,2°	40,3/150,8°	0,87/−20,9°
		100	0,41/ −95,5°	0,021/63,8°	27,5/125,4°	0,63/−35,7°
		200	0,36/−132,8°	0,032/64,9°	16,4/106,8°	0,44/−38,9°
8	30	500	0,35/−166,6°	0,065/72,3°	7,1/ 89,6°	0,32/−34,4°
		800	0,34/ 178,8°	0,100/74,4°	4,5/ 79,7°	0,30/−33,6°
		1000	0,34/ 172,7°	0,122/74,4°	3,7/ 74,7°	0,30/−34,7°
		1200	0,34/ 166,0°	0,145/74,3°	3,1/ 70,3°	0,29/−36,5°

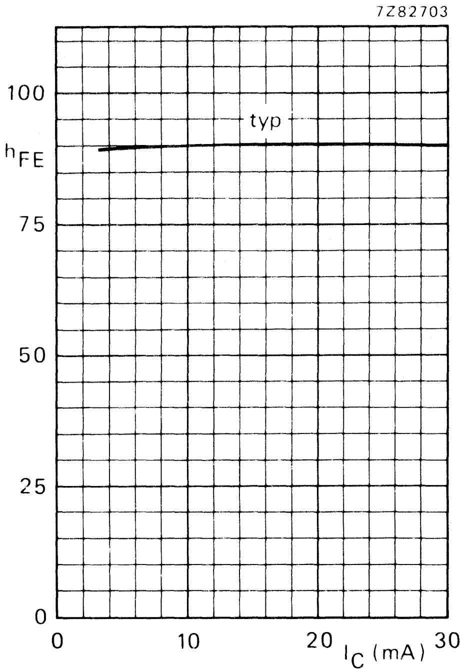


Fig. 3 V_{CE} = 5 V; T_j = 25 °C.

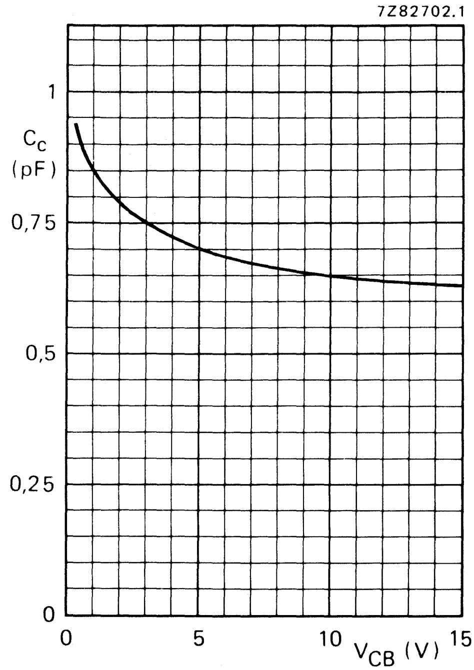


Fig. 4 Typical values collector capacitance
$I_E = I_e = 0$; f = 1 MHz; T_j = 25 °C.

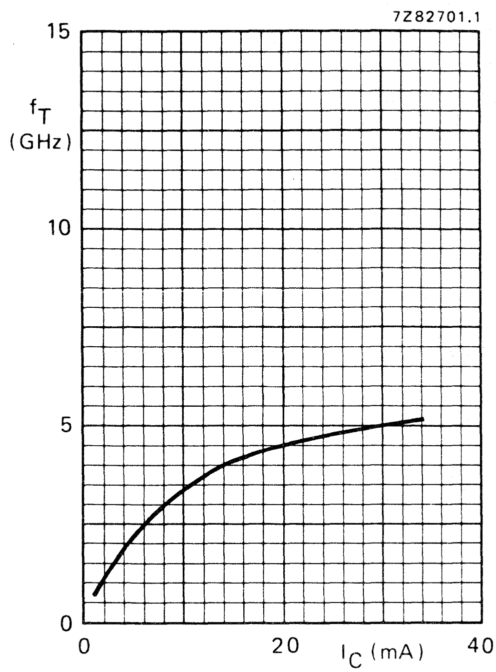


Fig. 5 Typical values transition frequency at V_{CE} = 5 V; f = 500 MHz; T_j = 25 °C.

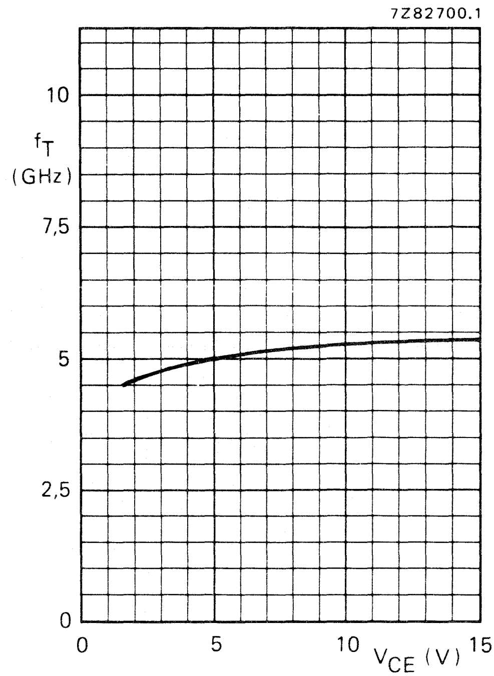


Fig. 6 Typical values transition frequency at I_C = 30 mA; f = 500 MHz; T_j = 25 °C.

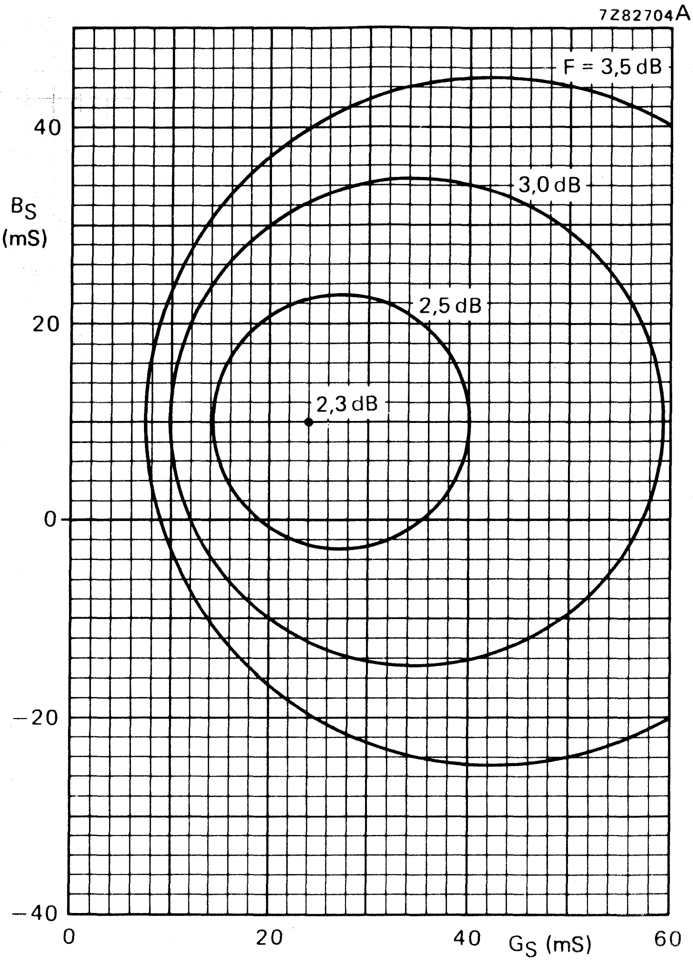


Fig. 7 Circles of constant noise figure.
V_{CE} = 8 V; I_C = 30 mA; f = 800 MHz;
T_{amb} = 25 °C; typical values.

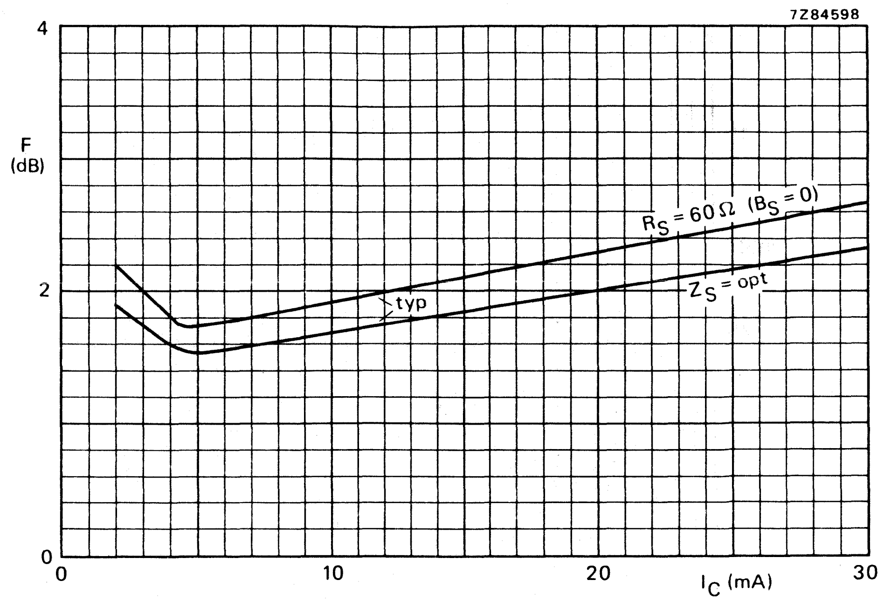


Fig. 8 V_{CE} = 8 V; f = 800 MHz; T_{amb} = 25 °C.

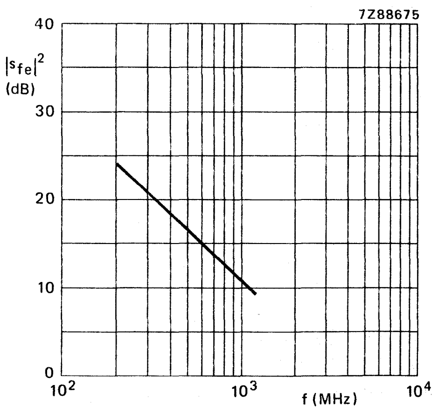


Fig. 9 Typical values forward transmission coefficient as a function of frequency. V_{CE} = 8 V; I_C = 30 mA; T_{amb} = 25 °C.

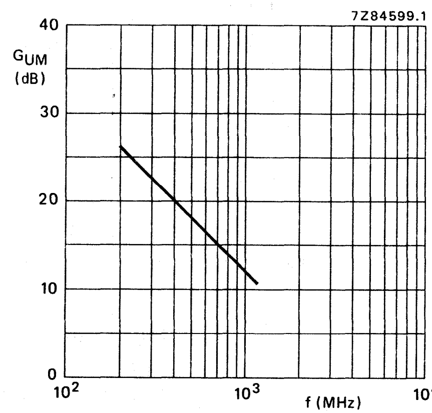


Fig. 10 Typical values unilateral power power gain as a function of frequency. V_{CE} = 8 V; I_C = 30 mA; T_{amb} = 25 °C.

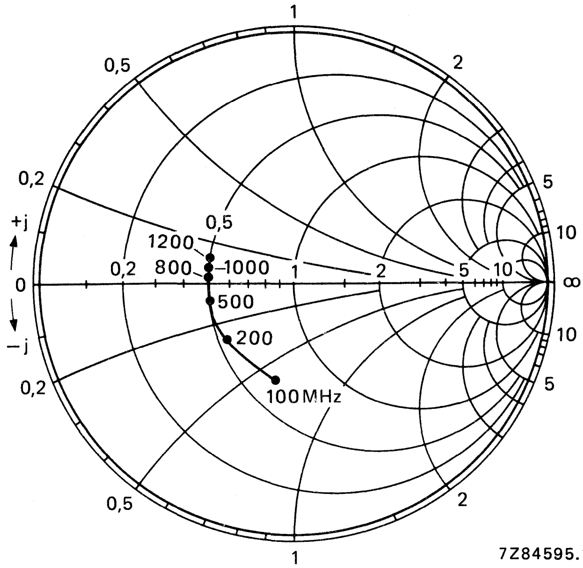


Fig. 11 Input impedance derived from input reflection coefficient s_{ie} co-ordinates in ohm x 50.
$V_{CE} = 8$ V; $I_C = 30$ mA; $T_{amb} = 25$ °C.

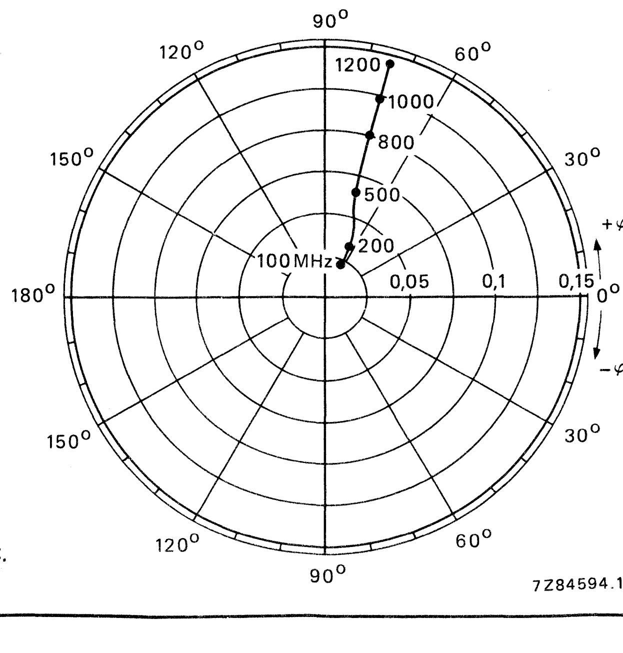


Fig. 12 Reverse transmission coefficient s_{re}.
$V_{CE} = 8$ V; $I_C = 30$ mA; $T_{amb} = 25$ °C.

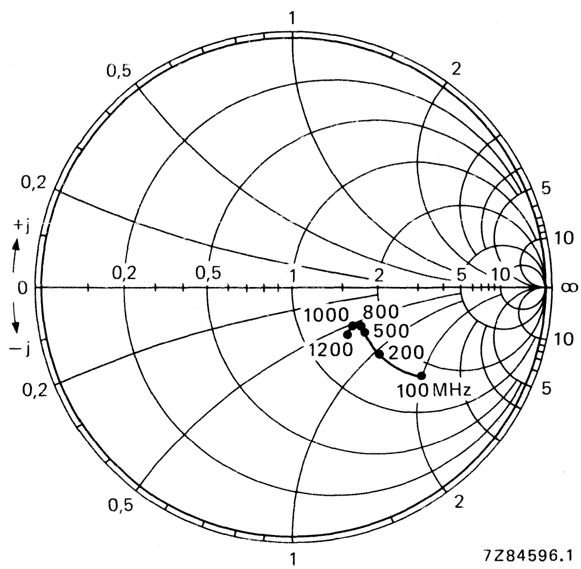


Fig. 13 Output impedance derived from output reflection coefficient s_{oe} co-ordinates in ohm x 50.
V_{CE} = 8 V; I_C = 30 mA; T_{amb} = 25 °C.

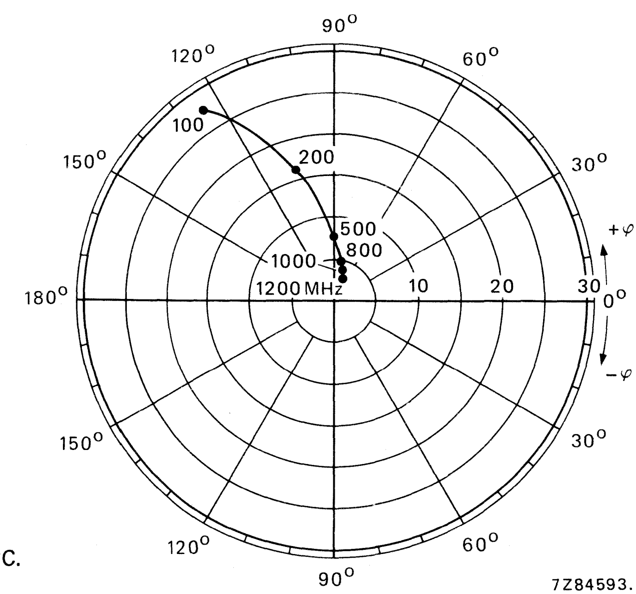


Fig. 14 Forward transmission coefficient s_{fe}.
V_{CE} = 8 V; I_C = 30 mA; T_{amb} = 25 °C.

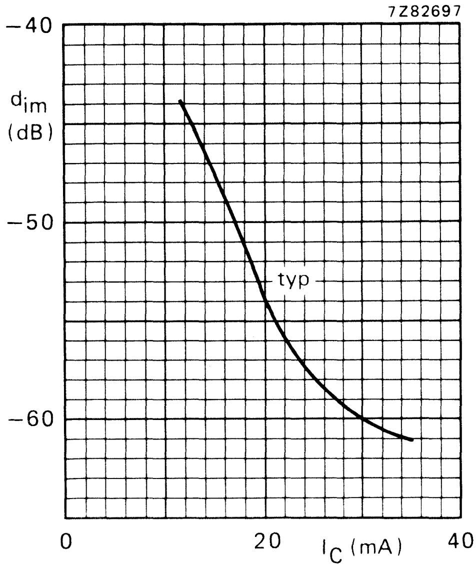


Fig. 15 V_{CE} = 8 V; V_o = 425 mV = 52,6 dBmV; $f_{(p+q-r)}$ = 793,25 MHz; T_{amb} = 25 °C; measured in MATV test circuit (see Fig. 2).

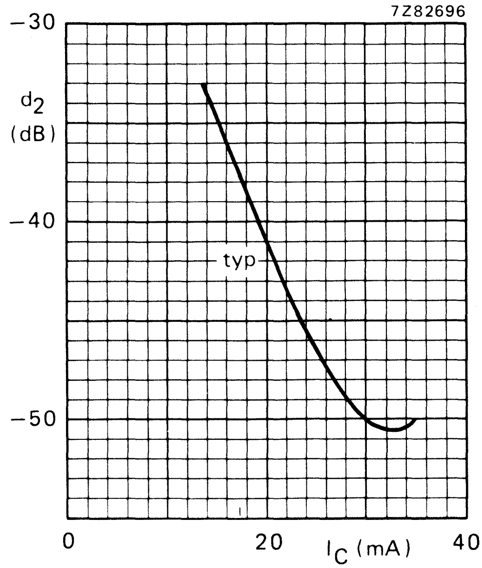


Fig. 16 V_{CE} = 8 V; V_o = 200 mV = 46 dBmV; $f_{(p+q)}$ = 810 MHz; T_{amb} = 25 °C; measured in MATV test circuit (see Fig. 2).

N-P-N H.F. WIDEBAND TRANSISTOR

N-P-N resistance-stabilized transistor in a SOT-48 capstan envelope featuring extremely low cross modulation, intermodulation and second harmonic distortion. Thanks to its high transition frequency it has a high power gain in conjunction with good wideband properties and low noise up to high frequencies.

It is primarily intended for CATV and MATV applications.

QUICK REFERENCE DATA

Collector-base voltage (open emitter)	V_{CBO}	max.	30	V
Collector-emitter voltage (open base)	V_{CEO}	max.	25	V
Collector current (d.c.)	I_C	max.	150	mA
Total power dissipation up to T_h = 145 °C; f > 1 MHz	P_{tot}	max.	3,5	W
Junction temperature	T_j	max.	200	°C
Transition frequency at f = 500 MHz I_C = 90 mA; V_{CE} = 20 V	f_T	typ.	3,5	GHz
Cross modulation distortion (channel 13) I_C = 90 mA; V_{CE} = 20 V; V_o = 48 dBmV	d_{cm}	typ. max.	−61 −57	dB dB
I_C = 90 mA; V_{CE} = 20 V; V_o = 32 dBmV	d_{cm}	typ. max.	−93 −89	dB dB
Intermodulation distortion at $f_{(p+q-r)}$ = 194,25 MHz I_C = 90 mA; V_{CE} = 20 V; V_o = 60 dBmV	d_{im}	typ.	−63	dB
Broadband power gain I_C = 90 mA; V_{CE} = 20 V	G_p	min. typ.	10 11	dB dB
Noise figure at f = 200 MHz I_C = 90 mA; V_{CE} = 20 V	F	typ. max.	8 10	dB dB
2nd harmonic distortion at $f_p + f_q$ = 210 MHz I_C = 90 mA; V_{CE} = 20 V; V_o = 48 dBmV	d_2	max.	−56	dB

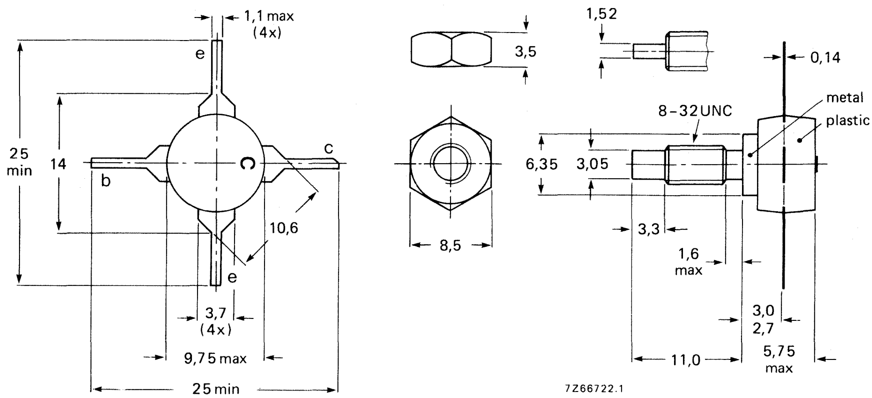
MECHANICAL DATA (see next page)

PRODUCT SAFETY. These devices incorporate beryllium oxide, the dust of which is toxic. The devices are entirely safe provided that the BeO disc is not damaged.

MECHANICAL DATA

Dimensions in mm

Fig. 1 SOT-48.



When locking is required an adhesive instead of a lock washer is preferred.

Torque on nut: min.	0,75 Nm (7,5 kg cm)	Diameter of clearance hole in heatsink: max. 4,17 mm. Mounting hole to have no burrs at either end.
max.	0,85 Nm (8,5 kg cm)	De-burring must leave surface flat; do not chamfer or countersink either end of hole.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

Collector-base voltage (open emitter)	V_{CBO}	max.	30	V
Collector-emitter voltage (R_{BE} = 10 Ω)	V_{CER}	max.	35	V
Collector-emitter voltage (open base)	V_{CEO}	max.	25	V
Emitter-base voltage (open collector)	V_{EBO}	max.	3	V
Collector current (d.c.)	I_C	max.	150	mA
Collector current (peak value); f > 1 MHz	I_{CM}	max.	300	mA
Total power dissipation (d.c.) up to T_h = 160 °C	P_{tot}	max.	2,5	W
Total power dissipation up to T_h = 145 °C; f > 1 MHz	P_{tot}	max.	3,5	W
Storage temperature	T_{stg}		−65 to + 200	°C
Junction temperature	T_j	max.	200	°C

THERMAL RESISTANCE

From junction to mounting base	$R_{th\ j\text{-}mb}$	=	15	K/W
From mounting base to heatsink	$R_{th\ mb\text{-}h}$	=	0,6	K/W

CHARACTERISTICS

T_j = 25 °C unless otherwise specified

Collector cut-off current			
$I_E = 0$; $V_{CB} = 20$ V	I_{CBO}	max.	50 μA
D.C. current gain			
$I_C = 50$ mA; $V_{CE} = 20$ V	h_{FE}	min.	30
$I_C = 150$ mA; $V_{CE} = 20$ V	h_{FE}	min.	30
Transition frequency at f = 500 MHz			
$I_C = 90$ mA; $V_{CE} = 20$ V	f_T	typ.	3,5 GHz
$I_C = 150$ mA; $V_{CE} = 20$ V	f_T	typ.	3,5 GHz
Collector capacitance at f = 1 MHz			
$I_E = I_e = 0$; $V_{CB} = 20$ V	C_c	typ.	3,5 pF
Emitter capacitance at f = 1 MHz			
$I_C = I_c = 0$; $V_{EB} = 0,5$ V	C_e	typ.	12 pF
Feedback capacitance at f = 1 MHz			
$I_C = 10$ mA; $V_{CE} = 20$ V	C_{re}	typ.	1,3 pF
Collector-stud capacitance at f = 1 MHz	C_{cs}	typ.	2 pF
Noise figure at optimum source impedance			
$I_C = 90$ mA; $V_{CE} = 20$ V; f = 500 MHz; $T_{amb} = 25$ °C	F	typ.	5 dB
Maximum unilateral power gain (s_{re} assumed to be zero)			
$G_{UM} = 10 \log \frac{\lvert s_{fe}\rvert^2}{(1 - \lvert s_{ie}\rvert^2)(1 - \lvert s_{oe}\rvert^2)}$			
$I_C = 90$ mA; $V_{CE} = 20$ V; f = 500 MHz; $T_{amb} = 25$ °C	G_{UM}	typ.	13,5 dB

CHARACTERISTICS (continued)

Output voltage at d_{im} = −60 dB (see Fig. 2)
(DIN 45004B, par. 6.3: 3-tone); T_{amb} = 25 °C
I_C = 90 mA; V_{CE} = 20 V; R_L = 75 Ω

$V_p = V_o$ at d_{im} = −60 dB; f_p = 495,25 MHz				
$V_q = V_o$ −6 dB ; f_q = 503,25 MHz				
$R_r = V_o$ −6 dB ; f_r = 505,25 MHz				
measured at $f_{(p+q-r)}$ = 493,25 MHz	V_o	typ.	700	mV

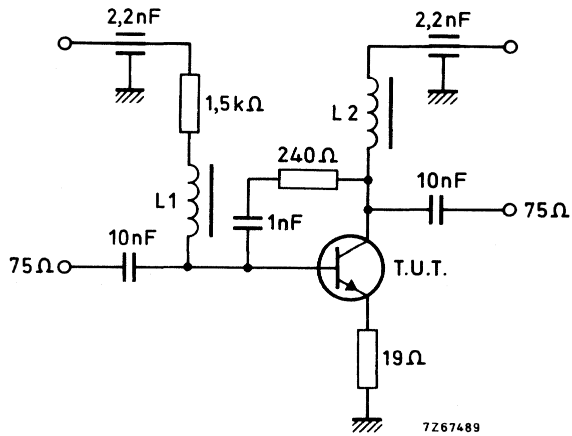


Fig. 2 MATV test circuit.

L1 = L2 = 5 μH Ferroxcube coil (code number: 3122 108 20153)

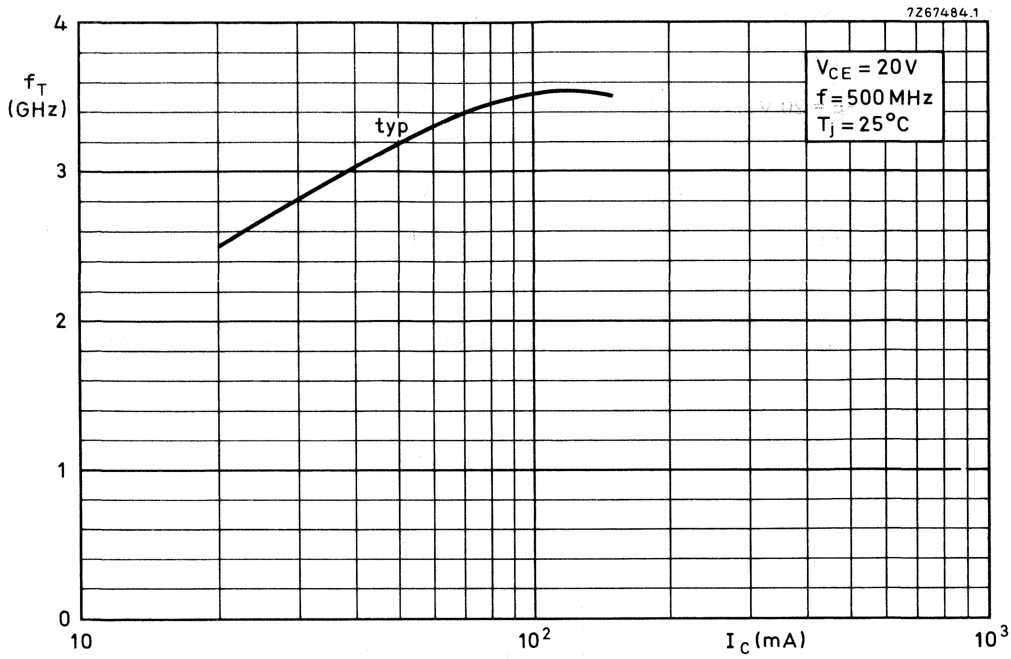


Fig. 3 V_{CE} = 20 V; f = 500 MHz; T_j = 25 °C; typical values.

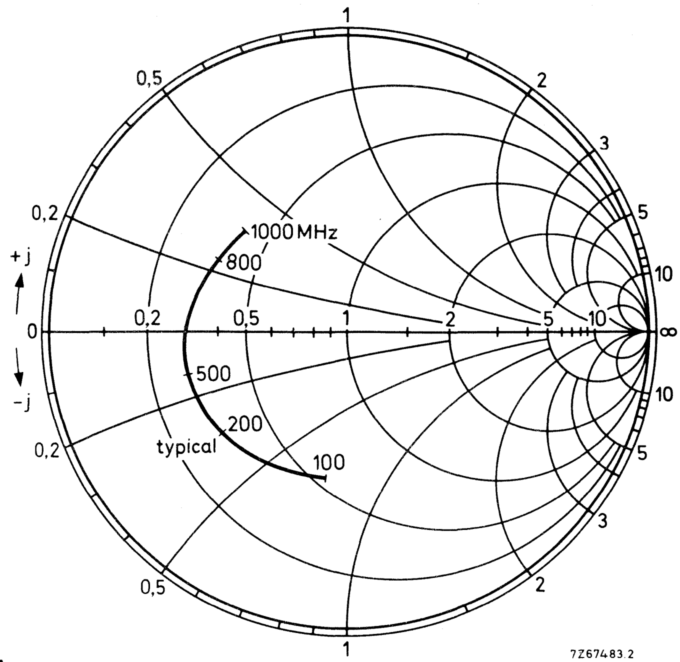


Fig. 4 V_{CE} = 20 V; I_C = 90 mA; T_{amb} = 25 °C; typical values.

Input reflection coefficient s_{ie}

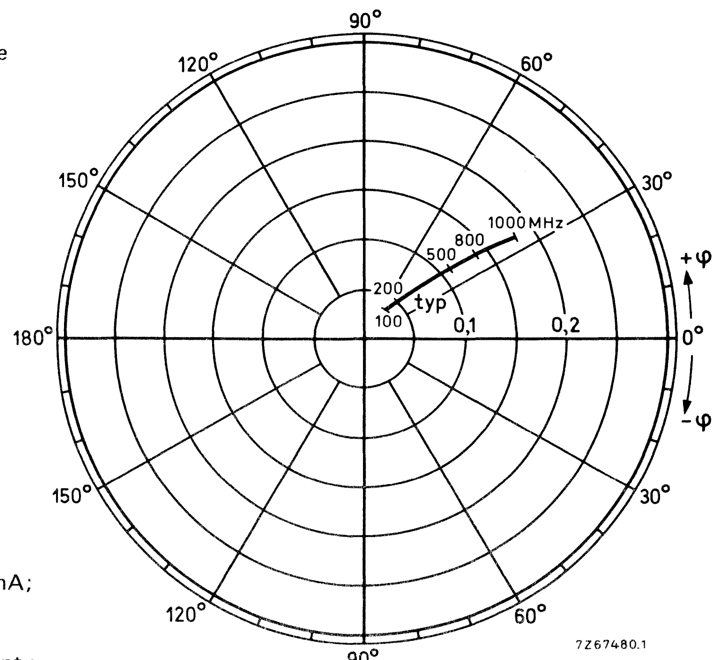


Fig. 5 V_{CE} = 20 V; I_C = 90 mA; T_{amb} = 25 °C; typical values.

Reverse transmission coefficient s_{re}

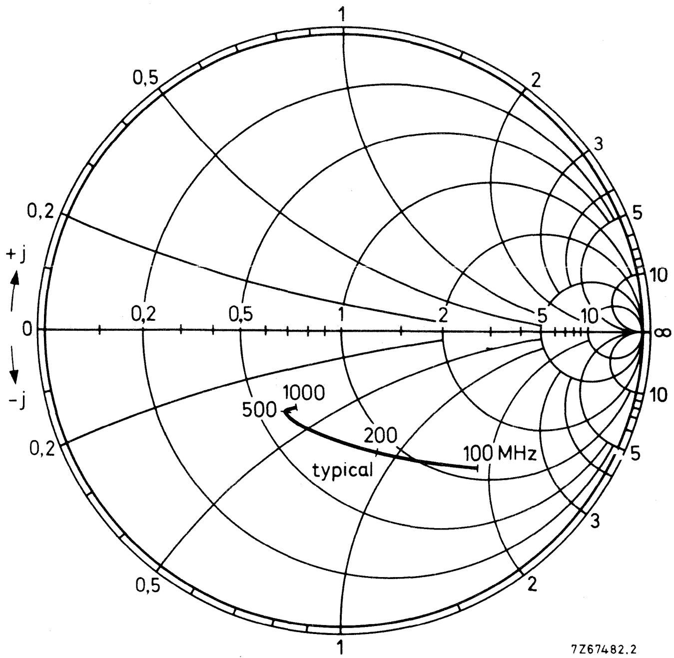


Fig. 6 V_{CE} = 20 V; I_C = 90 mA;
T_{amb} = 25 °C; typical values.

Output reflection coefficient s_{oe}

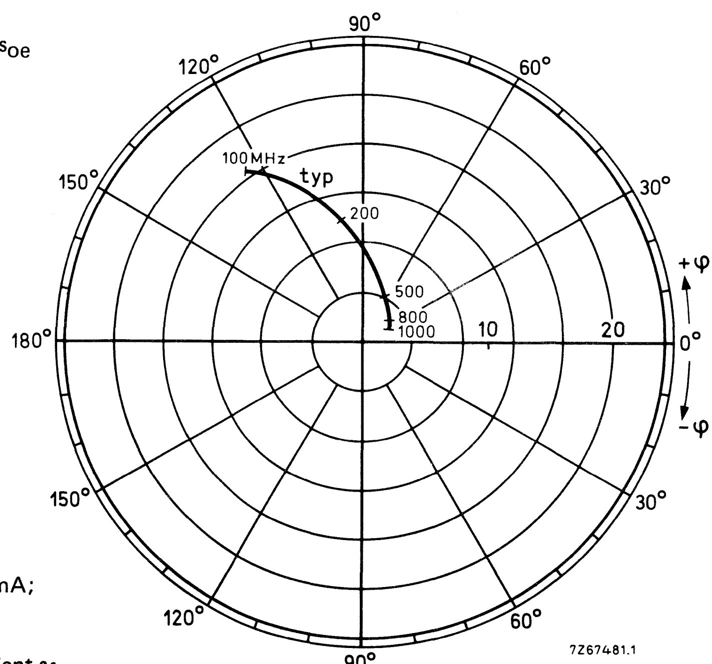


Fig. 7 V_{CE} = 20 V; I_C = 90 mA;
T_{amb} = 25 °C; typical values.

Forward transmission coefficient s_{fe}

APPLICATION INFORMATION

T_{amb} = 25 °C unless otherwise specified

Cross modulation distortion (channel 13)*			
I_C = 90 mA; V_{CE} = 20 V; V_o = 48 dBmV	d_{cm}	typ. max.	−61 dB −57 dB
I_C = 90 mA; V_{CE} = 20 V; V_o = 32 dBmV	d_{cm}	typ. max.	−93 dB −89 dB
Intermodulation distortion I_C = 90 mA; V_{CE} = 20 V; R_L = 75 Ω V_p = V_o = 60 dBmV at f_p = 196,25 MHz V_q = V_o −6 dB at f_q = 203,25 MHz V_r = V_o −6 dB at f_r = 205,25 MHz Measured at $f_{(p+q-r)}$ = 194,25 MHz	d_{im}	typ.	−63 dB
Power gain I_C = 90 mA; V_{CE} = 20 V	G_p	min. typ.	10 dB 11 dB
Noise figure I_C = 90 mA; V_{CE} = 20 V; f = 200 MHz	F	typ. max.	8 dB 10 dB
2nd harmonic distortion I_C = 90 mA; V_{CE} = 20 V f_p = 66 MHz; f_q = 144 MHz; $f_p + f_q$ = 210 MHz; V_o = 48 dBmV	d_2	max.	−56 dB

* In 12-channel measuring equipment; channel 13 unmodulated.
V_o = output level/signal, according to NCTA measuring standard.

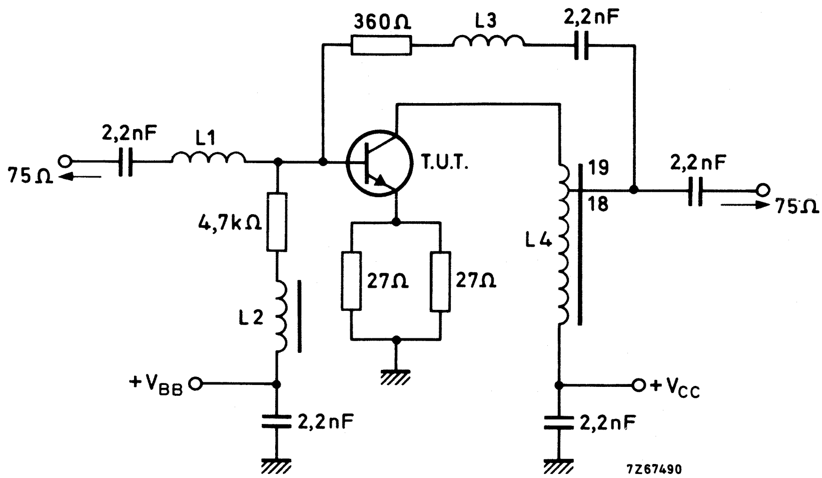


Fig. 8 CATV test circuit.

Frequency range 40 to 300 MHz (flatness gain ± 0,2 dB)			
Return losses input and output		<	−16 dB
Power gain	G_p	typ.	11 dB

L1 = 2 turns closely wound enamelled Cu wire (0,7 mm); int. diam. 3 mm
L2 = 5 μH Ferroxcube coil (code number 3122 108 20153)
L3 = 5 turns closely wound enamelled Cu wire (0,7 mm); int. diam. 4,7 mm
L4 = 19 turns enamelled Cu wire (0,3 mm) on Ferroxcube core (code no. 4322 020 91001)

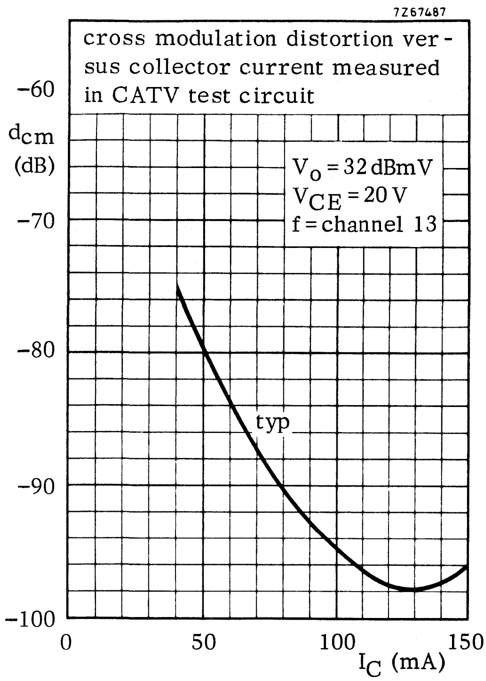


Fig. 9 V_o = 32 dBmV; V_{CE} = 20 V; f = ch. 13; typical values.

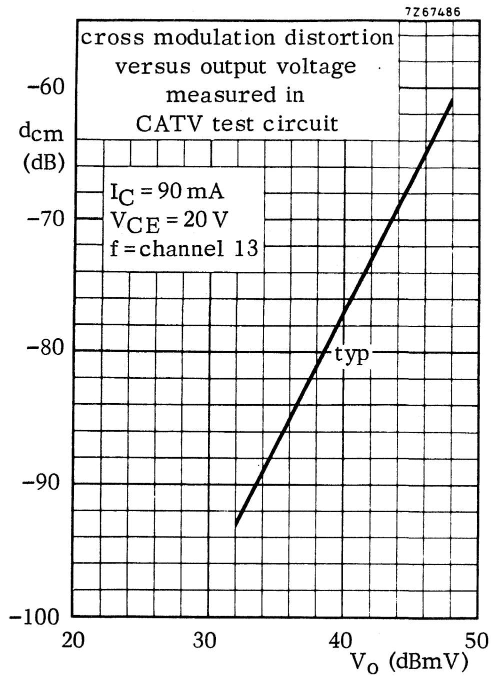


Fig. 10 V_{CE} = 20 V; I_C = 90 mA; f = ch. 13; typical values.

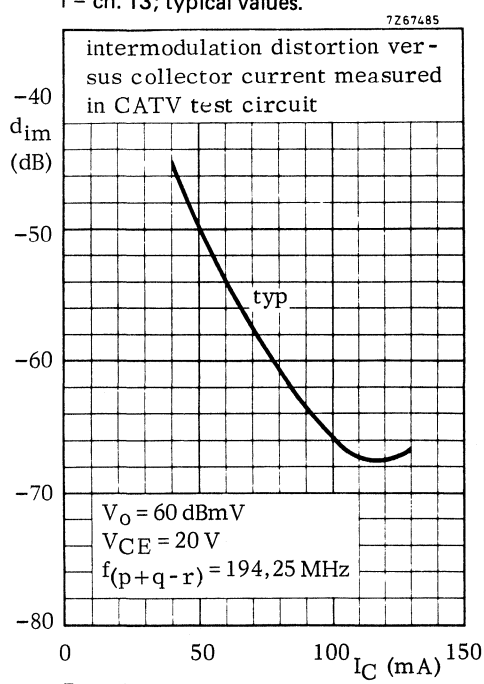


Fig. 11 V_{CE} = 20 V; V_o = 60 dBmV; $f_{(p+q-r)}$ = 194,25 MHz; typical values.

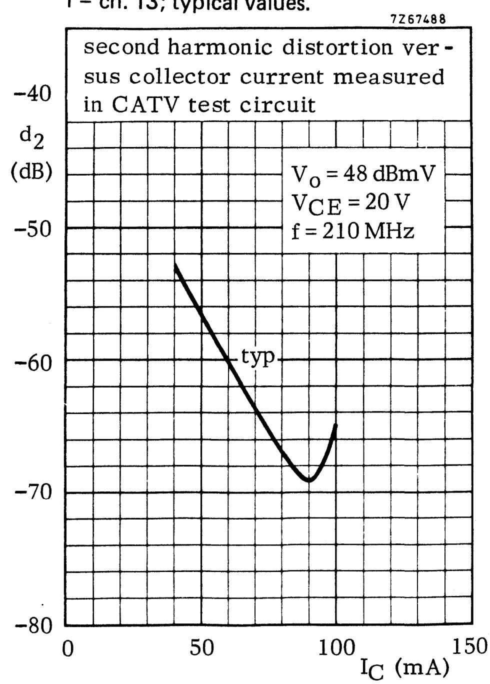


Fig. 12 V_{CE} = 20 V; V_o = 48 dBmV; f = 210 MHz; typical values.

N-P-N H.F. WIDEBAND TRANSISTOR

N-P-N resistance stabilized transistor in a TO-39 metal envelope, with collector connected to the case.

Due to very linear characteristics the transistor features low cross modulation, intermodulation and second harmonic distortion. Thanks to its high transition frequency it has a high power gain combined with excellent wideband properties and low noise up to high frequencies.

The BFR95 is primarily intended for CATV and MATV applications.

QUICK REFERENCE DATA

Collector-base voltage (open emitter)	V_{CBO}	max.	30	V
Collector-emitter voltage (open base)	V_{CEO}	max.	25	V
Collector current (d.c.)	I_C	max.	150	mA
Total power dissipation up to T_{mb} = 125 °C	P_{tot}	max.	1,5	W
Junction temperature	T_j	max.	200	°C
Transition frequency at f = 500 MHz I_C = 80 mA; V_{CE} = 20 V	f_T	typ.	3,5	GHz
Cross modulation distortion (channel 13) I_C = 80 mA; V_{CE} = 18 V; V_o = 48 dBmV	d_{cm}	typ. max.	−61 −57	dB dB
I_C = 80 mA; V_{CE} = 18 V; V_o = 32 dBmV	d_{cm}	typ. max.	−93 −89	dB dB
Intermodulation distortion at $f_{(p+q-r)}$ = 194,25 MHz I_C = 80 mA; V_{CE} = 18 V; V_o = 60 dBmV	d_{im}	typ.	−64	dB
Power gain I_C = 80 mA; V_{CE} = 18 V	G_p	min. typ.	8 9	dB dB
Noise figure at f = 200 MHz I_C = 80 mA; V_{CE} = 18 V	F	typ. max.	9 10	dB dB
Second harmonic distortion at $f_{(p+q)}$ = 210 MHz I_C = 80 mA; V_{CE} = 18 V; V_o = 48 dBmV	d_2	typ.	−62	dB

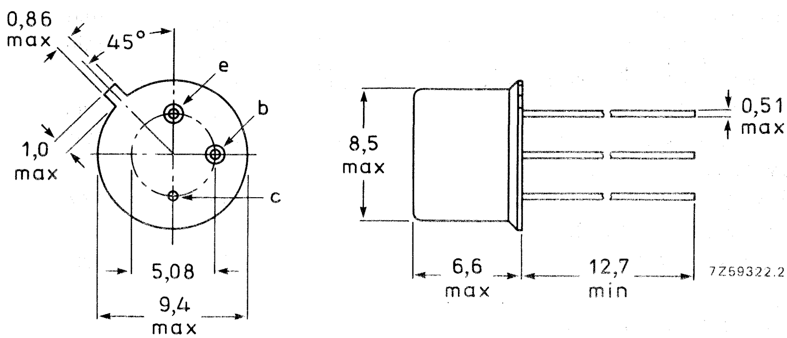
MECHANICAL DATA (see next page)

MECHANICAL DATA

Dimensions in mm

Fig. 1 TO-39

Collector connected to case



Maximum lead diameter guaranteed only for 12,7 mm.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

Collector-base voltage (open emitter) note 1	V_{CBO}	max.	30 V
Collector-emitter voltage (R_{BE} = 10 Ω) note 2	V_{CER}	max.	35 V
Collector-emitter voltage (open base) note 2	V_{CEO}	max.	25 V
Emitter-base voltage (open collector) note 3	V_{EBO}	max.	3 V
Collector current (d.c.)	I_C	max.	150 mA
Collector current (peak value); f > 1 MHz	I_{CM}	max.	300 mA
Total power dissipation			
up to T_{amb} = 25 °C	P_{tot}	max.	0,7 W
up to T_{mb} = 125 °C	P_{tot}	max.	1,5 W
Storage temperature	T_{stg}		−65 to +200 °C
Junction temperature	T_j	max.	200 °C

THERMAL RESISTANCE

From junction to ambient in free air	$R_{th\ j\text{-}a}$	=	250 K/W
From junction to mounting base	$R_{th\ j\text{-}mb}$	=	50 K/W

Notes

1. At I_C = 100 μA.
2. At I_C = 10 mA.
3. At I_E = 100 μA.

CHARACTERISTICS

T_j = 25 °C unless otherwise specified

Collector cut-off current			
I_E = 0; V_{CB} = 20 V	I_{CBO}	max.	50 μA
D.C. current gain			
I_C = 50 mA; V_{CE} = 20 V	h_{FE}	min.	30
I_C = 150 mA; V_{CE} = 20 V	h_{FE}	min.	30
Transition frequency at f = 500 MHz			
I_C = 80 mA; V_{CE} = 20 V	f_T	typ.	3,5 GHz
I_C = 150 mA; V_{CE} = 20 V	f_T	typ.	3,5 GHz
Collector capacitance at f = 1 MHz			
$I_E = I_e$ = 0; V_{CB} = 20 V	C_c	typ.	3,5 pF
Feedback capacitance at f = 1 MHz			
I_C = 10 mA; V_{CE} = 20 V	C_{re}	typ.	1,6 pF

APPLICATION INFORMATION

Measuring conditions: I_C = 80 mA; V_{CE} = 18 V; T_{amb} = 25 °C

Cross modulation (channel 13) (note)			
V_o = 48 dBmV	d_{cm}	typ. max.	−61 dB −57 dB
V_o = 32 dBmV	d_{cm}	typ. max.	−93 dB −89 dB
Intermodulation distortion			
$V_p = V_o$ = 60 dBmV at f_p = 196,25 MHz			
$V_q = V_o$ −6 dB at f_q = 203,25 MHz			
$V_r = V_o$ −6 dB at f_r = 205,25 MHz			
Measured at $f_{(p+q-r)}$ = 194,25 MHz	d_{im}	typ.	−64 dB
Power gain	G_p	min. typ.	8 dB 9 dB
Noise figure at f = 200 MHz	F	typ. max.	9 dB 10 dB
2nd harmonic distortion at $f_{(p+q)}$ = 210 MHz			
f_p = 66 MHz; f_q = 144 MHz; V_o = 48 dBmV	d_2	typ. max.	−62 dB −56 dB

Note

In 12-channel measuring equipment; channel 13 unmodulated.
V_o = output level/signal, in accordance with NCTA measuring standard.

APPLICATION INFORMATION

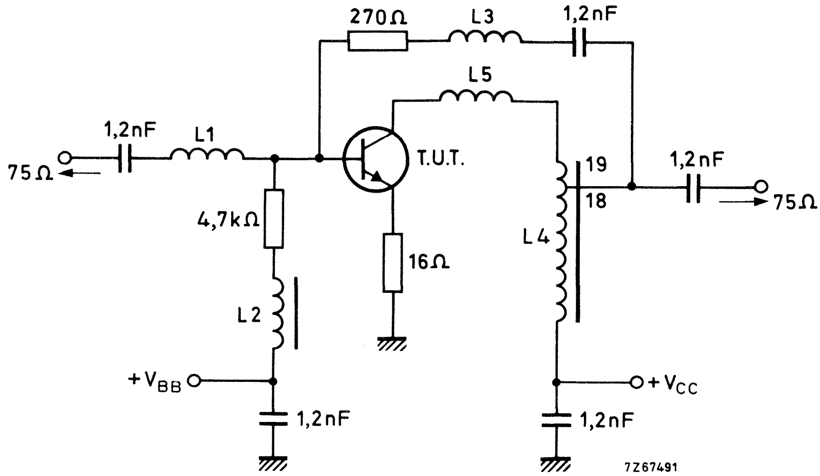


Fig. 2 CATV test circuit.
Frequency range 40 to 300 MHz
Power gain G_p typ. 9 dB

L1 = 2 turns closely wound enamelled Cu wire (0,7 mm); int. dia. 3 mm
L2 = 5 μH Ferroxcube coil (cat. no. 3122 108 20153)
L3 = 3 turns closely wound enamelled Cu wire (0,7 mm); int. dia. 4,7 mm
L4 = 19 turns enamelled Cu wire (0,3 mm) on Ferroxcube core (cat. no. 4322 020 91001)
L5 = 2 turns closely wound enamelled Cu wire (0,7 mm); int. dia. 3 mm.

N-P-N 1 GHz WIDEBAND TRANSISTOR

N-P-N transistor in a plastic SOT-37 envelope. It is primarily intended for use in u.h.f. and microwave amplifiers such as in aerial amplifiers, radar systems, oscilloscopes, spectrum analysers, etc. The transistor features very low intermodulation distortion and high power gain; thanks to its very high transition frequency, it also has excellent wideband properties and low noise up to high frequencies. P-N-P complement is BFQ32.

QUICK REFERENCE DATA

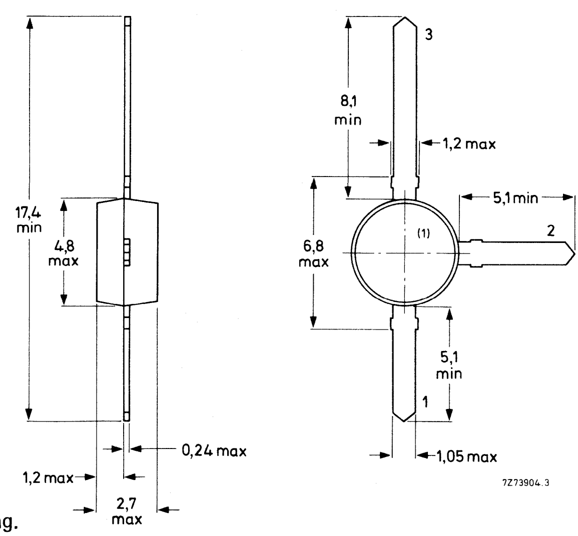
Collector-base voltage (open emitter)	V_{CBO}	max.	20	V
Collector-emitter voltage (open base)	V_{CEO}	max.	15	V
Collector current (d.c.)	I_C	max.	75	mA
Total power dissipation up to T_{amb} = 60 °C	P_{tot}	max.	500	mW
Junction temperature	T_j	max.	175	°C
Transition frequency at f = 500 MHz I_C = 50 mA; V_{CE} = 10 V	f_T	typ.	5,0	GHz
Feedback capacitance at f = 1 MHz I_C = 10 mA; V_{CE} = 10 V	C_{re}	max.	1,4	pF
Noise figure at optimum source impedance I_C = 50 mA; V_{CE} = 10 V; f = 500 MHz	F	typ.	3,3	dB
Maximum unilateral power gain I_C = 50 mA; V_{CE} = 10 V; f = 500 MHz	G_{UM}	typ.	15,2	dB
Output voltage at d_{im} = −60 dB I_C = 50 mA; V_{CE} = 10 V; R_L = 75 Ω $f_{(p+q-r)}$ = 493,25 MHz	V_o	typ.	500	mV

MECHANICAL DATA

Dimensions in mm

Fig. 1 SOT-37.

Connections
1. Base
2. Emitter
3. Collector



(1) = type number marking.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

Collector-base voltage (open emitter)	V_{CBO}	max.	20	V
Collector-emitter voltage (open base)	V_{CEO}	max.	15	V
Emitter-base voltage (open collector)	V_{EBO}	max.	3	V
Collector current (d.c.)	I_C	max.	75	mA
Collector current (peak value); f > 1 MHz	I_{CM}	max.	150	mA
Total power dissipation up to T_{amb} = 60 °C mounted on a fibre-glass print of 40 mm x 35 mm x 1,5 mm	P_{tot}	max.	500	mW
Storage temperature	T_{stg}	−65 to + 175		°C
Junction temperature	T_j	max.	175	°C

THERMAL RESISTANCE

From junction to ambient in free air mounted on a fibre-glass print of 40 mm x 35 mm x 1,5 mm	$R_{th\ j\text{-}a}$	=	230	K/W
From junction to case	$R_{th\ j\text{-}c}$	=	70	K/W

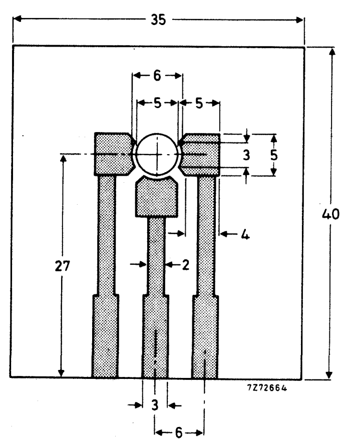


Fig. 2 Requirements for fibre-glass print.

Single-sided 35 μm Cu-clad epoxy fibre-glass print, thickness 1,5 mm.
Tracks are fully tin-lead plated. Dimensions in mm.

CHARACTERISTICS

T_j = 25 °C unless otherwise specified

Collector cut-off current				
$I_E = 0$; $V_{CB} = 10$ V	I_{CBO}	max.	100	nA
D.C. current gain				
$I_C = 50$ mA; $V_{CE} = 10$ V	h_{FE}	min.	25	
		typ.	50	
$I_C = 75$ mA; $V_{CE} = 10$ V	h_{FE}	min.	25	
		typ.	52	
Transition frequency at f = 500 MHz				
$I_C = 50$ mA; $V_{CE} = 10$ V	f_T	min.	4,0	GHz
		typ.	5,0	GHz
$I_C = 75$ mA; $V_{CE} = 10$ V	f_T	min.	4,4	GHz
		typ.	5,5	GHz
Collector capacitance at f = 1 MHz				
$I_E = I_e = 0$; $V_{CB} = 10$ V	C_c	typ.	1,3	pF
Emitter capacitance at f = 1 MHz				
$I_C = I_c = 0$; $V_{EB} = 0{,}5$ V	C_e	typ.	6,5	pF
Feedback capacitance at f = 1 MHz				
$I_C = 10$ mA; $V_{CE} = 10$ V; $T_{amb} = 25$ °C	C_{re}	typ.	1,0	pF
		max.	1,4	pF
Noise figure at optimum source impedance				
$I_C = 50$ mA; $V_{CE} = 10$ V; f = 500 MHz; $T_{amb} = 25$ °C	F	typ.	3,3	dB
$I_C = 50$ mA; $V_{CE} = 10$ V; f = 800 MHz; $T_{amb} = 25$ °C	F	typ.	3,8	dB

Maximum unilateral power gain (s_{re} assumed to be zero)

$$G_{UM} = 10 \log \frac{|s_{fe}|^2}{(1 - |s_{ie}|^2)(1 - |s_{oe}|^2)}$$

$I_C = 50$ mA; $V_{CE} = 10$ V; f = 500 MHz; $T_{amb} = 25$ °C	G_{UM}	typ.	15,2	dB
$I_C = 50$ mA; $V_{CE} = 10$ V; f = 800 MHz; $T_{amb} = 25$ °C	G_{UM}	typ.	11,5	dB

CHARACTERISTICS (continued)

Output voltage at d_{im} = −60 dB (see Fig. 3)
(DIN 45004B, par. 6.3: 3-tone); T_{amb} = 25 °C
I_C = 50 mA; V_{CE} = 10 V; R_L = 75 Ω

$V_p = V_o$ at d_{im} = −60 dB; f_p = 495,25 MHz
$V_q = V_o$ −6 dB ; f_q = 503,25 MHz
$R_r = V_o$ −6 dB ; f_r = 505,25 MHz
measured at $f_{(p+q-r)}$ = 493,25 MHz — V_o typ. 500 mV

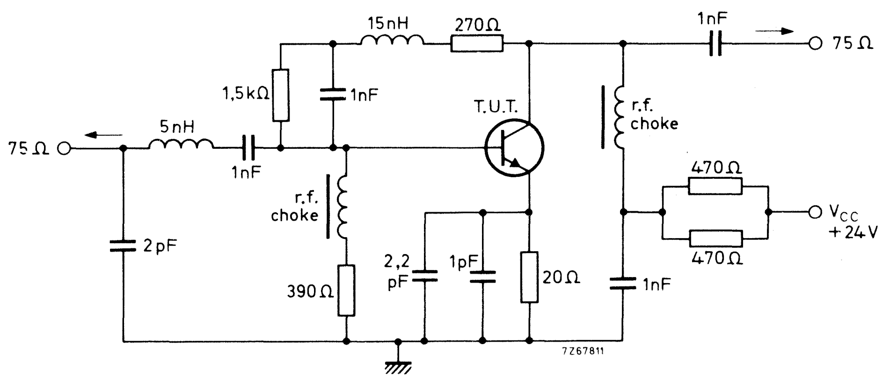


Fig. 3 Intermodulation test circuit.

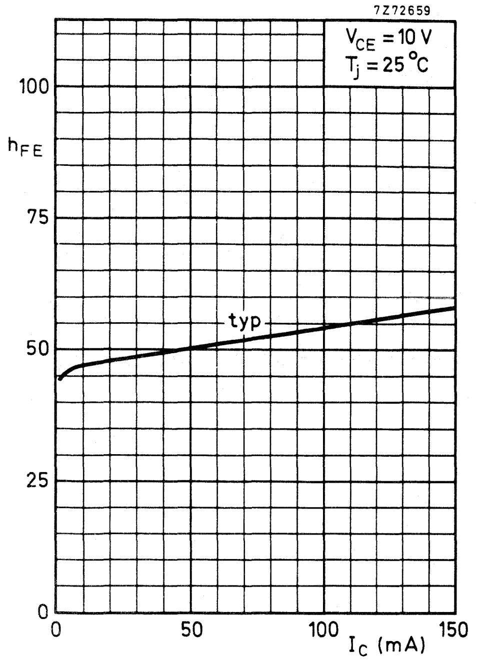


Fig. 4 V_{CE} = 10 V; T_j = 25 °C; typ. values.

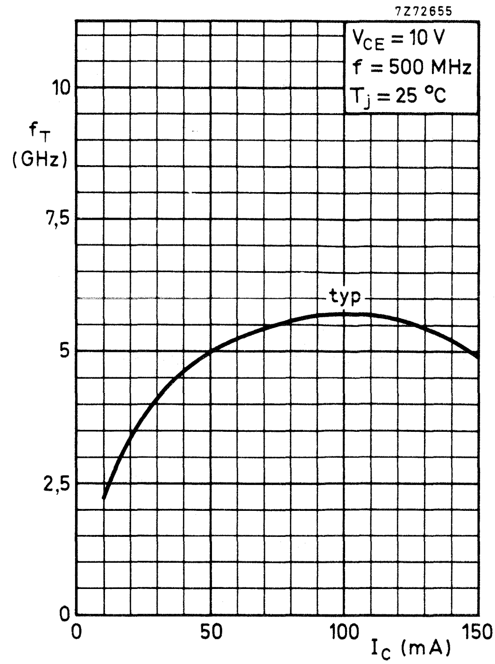


Fig. 5 V_{CE} = 10 V; f = 500 MHz; T_j = 25 °C; typical values.

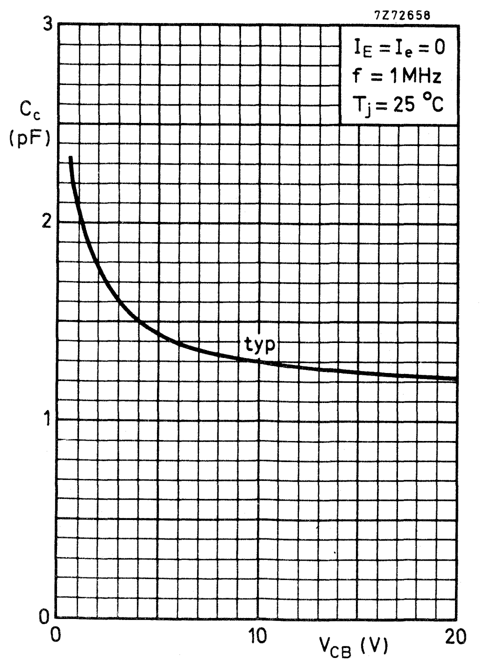


Fig. 6 $I_E = I_e = 0$; f = 1 MHz; T_j = 25 °C; typical values.

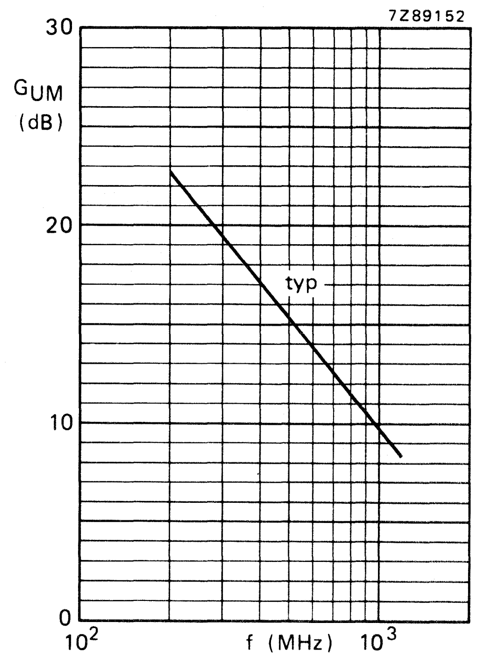


Fig. 7 V_{CE} = 10 V; I_C = 50 mA; T_{amb} = 25 °C; typical values.

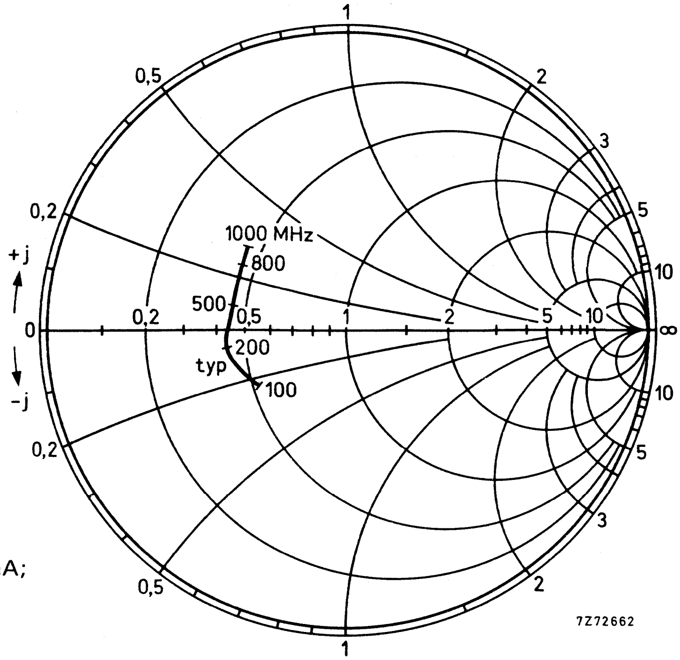


Fig. 8 V_{CE} = 10 V; I_C = 50 mA; T_{amb} = 25 °C; typical values.

Input impedance derived from input reflection coefficient s_{ie} co-ordinates in ohm x 50

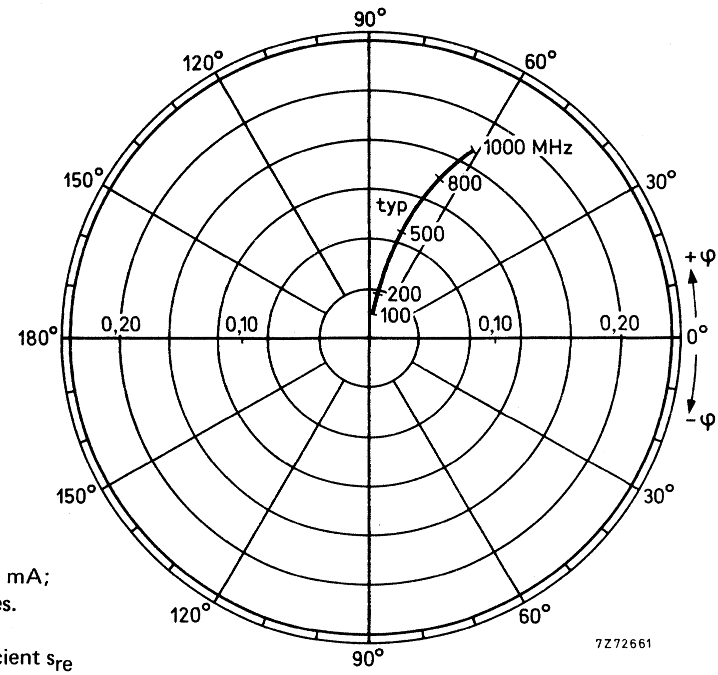


Fig. 9 V_{CE} = 10 V; I_C = 50 mA; T_{amb} = 25 °C; typical values.

Reverse transmission coefficient s_{re}

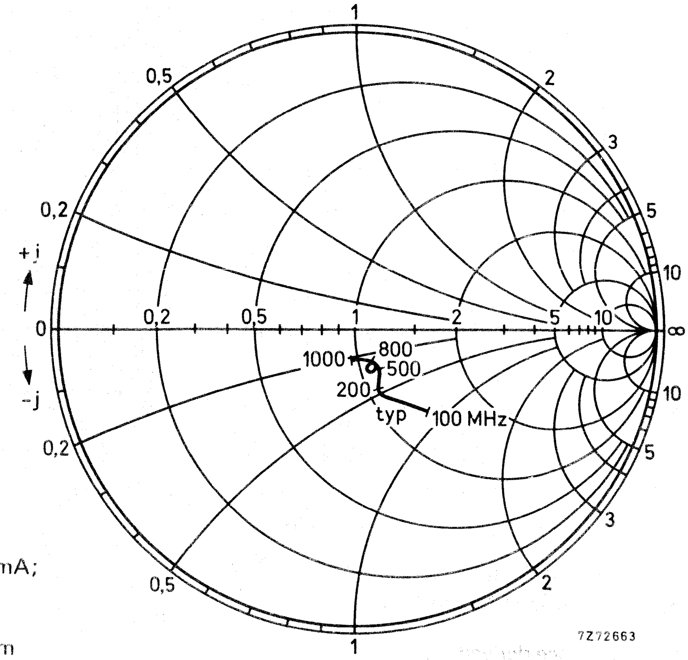


Fig. 10 V_{CE} = 10 V; I_C = 50 mA; T_{amb} = 25 °C; typical values.

Output impedance derived from output reflection coefficient s_{oe} co-ordinates in ohm x 50

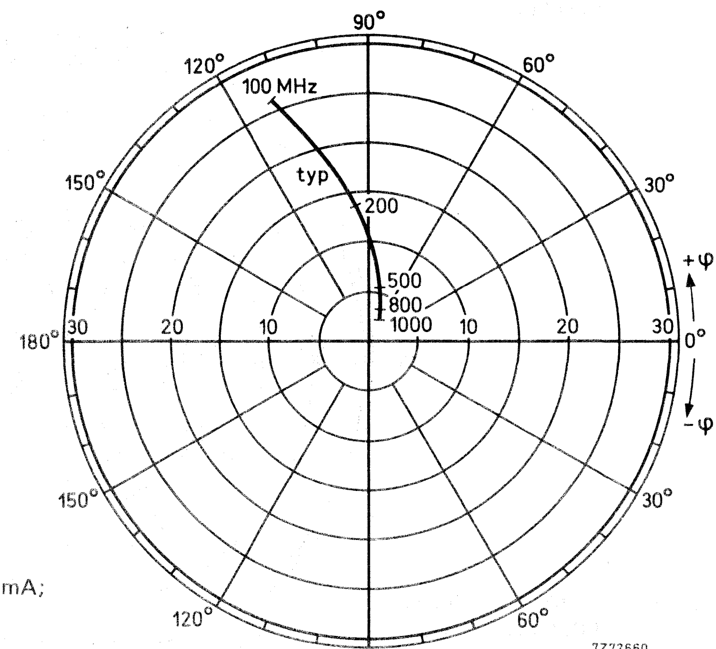


Fig. 11 V_{CE} = 10 V; I_C = 50 mA; T_{amb} = 25 °C; typical values.

Forward transmission coefficient s_{fe}

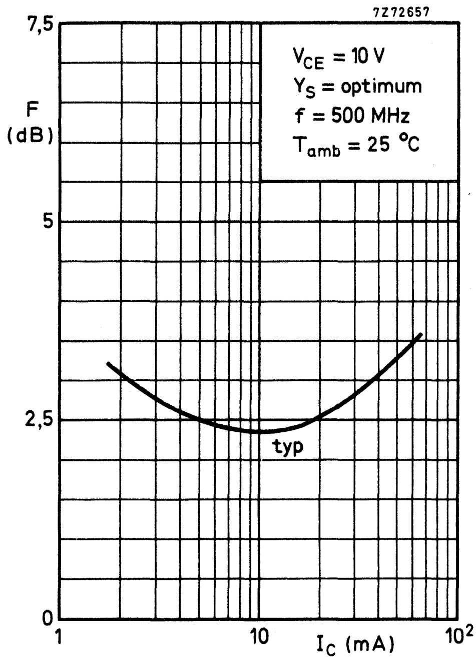


Fig. 12 V_{CE} = 10 V; f = 500 MHz;
Y_S = optimum; T_{amb} = 25 °C; typical values.

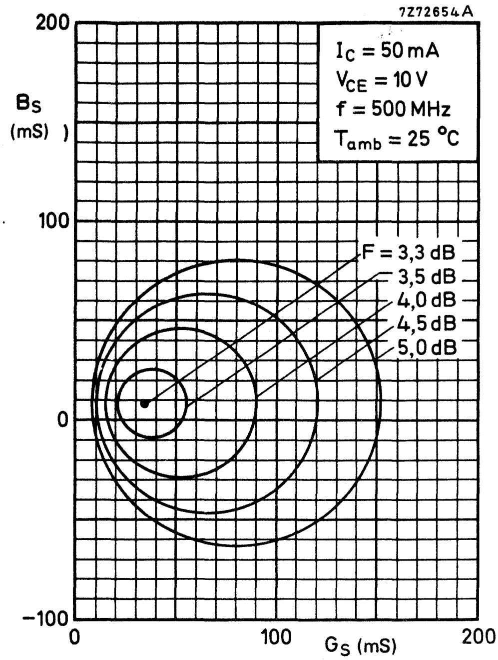


Fig. 13 Circles of constant noise figure.
I_C = 50 mA; V_{CE} = 10 V; f = 500 MHz;
T_{amb} = 25 °C; typical values.

N-P-N 1 GHz WIDEBAND TRANSISTOR

N-P-N transistor in a plastic SOT-37 envelope, primarily intended for MATV applications. The device features excellent output voltage capabilities. P-N-P complement is BFQ32S.

QUICK REFERENCE DATA

Collector-base voltage (open emitter)	V_{CBO}	max.	20	V
Collector-emitter voltage (open base)	V_{CEO}	max.	15	V
Collector current (d.c.)	I_C	max.	100	mA
Total power dissipation up to T_{amb} = 70 °C	P_{tot}	max.	700	mW
Junction temperature	T_j	max.	175	°C
Transition frequency at f = 500 MHz I_C = 70 mA; V_{CE} = 10 V	f_T	typ.	5,0	GHz
Feedback capacitance at f = 1 MHz I_C = 0; V_{CE} = 10 V	C_{re}	typ.	1,0	pF
Noise figure at optimum source impedance I_C = 70 mA; V_{CE} = 10 V; f = 800 MHz	F	typ.	4,0	dB
Maximum unilateral power gain I_C = 70 mA; V_{CE} = 10 V; f = 800 MHz	G_{UM}	typ.	11,5	dB
Output voltage at d_{im} = −60 dB (see Fig. 3) I_C = 70 mA; V_{CE} = 10 V; R_L = 75 Ω $f_{(p+q-r)}$ = 793,25 MHz	V_o	typ.	700	mV
Output power at 1 dB gain compression	P_{L1}	typ.	+ 21	dBm
Third order intercept point	ITO	typ.	+ 40	dBm

MECHANICAL DATA

SOT-37 (see Fig. 1).

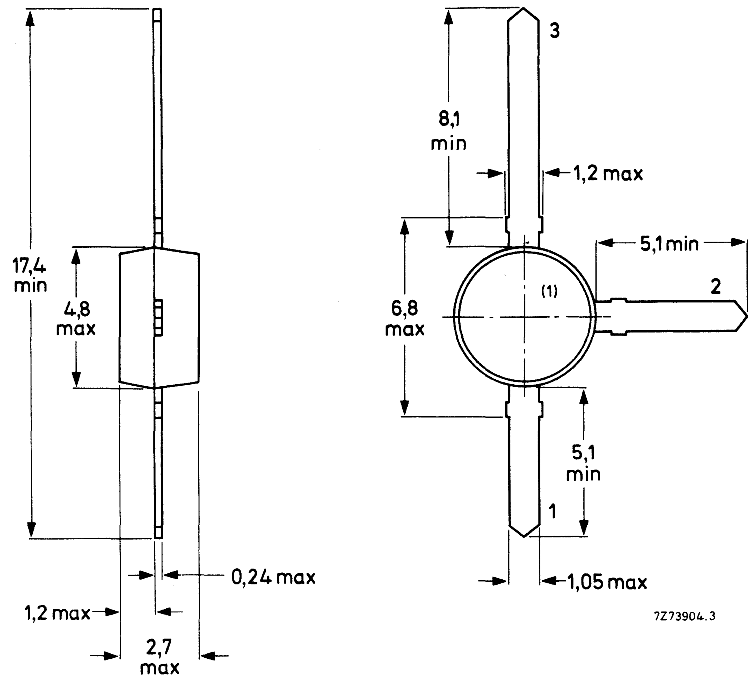
MECHANICAL DATA

Dimensions in mm

Fig. 1 SOT-37.

Connections

1. Base
2. Emitter
3. Collector



(1) = type number marking.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

Collector-base voltage (open emitter)	V_{CBO}	max.	20	V
Collector-emitter voltage (open base)	V_{CEO}	max.	15	V
Emitter-base voltage (open collector)	V_{EBO}	max.	3	V
Collector current (d.c.)	I_C	max.	100	mA
Total power dissipation up to T_{amb} = 70 °C mounted on a fibre-glass print (see Fig. 2) of 50 mm x 50 mm x 1,5 mm	P_{tot}	max.	700	mW
Storage temperature	T_{stg}	−65 to + 175		°C
Junction temperature	T_j	max.	175	°C

THERMAL RESISTANCE

From junction to ambient in free air mounted on a fibre-glass print (see Fig. 2) of 50 mm x 50 mm x 1,5 mm	$R_{th\ j\text{-}a}$	=	150	K/W
From junction to case	$R_{th\ j\text{-}c}$	=	50	K/W

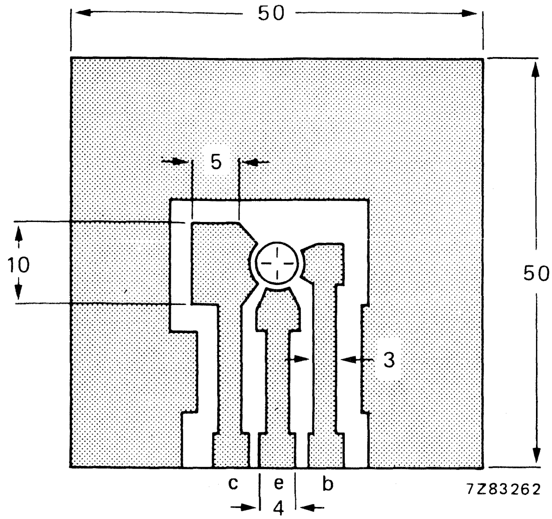


Fig. 2 Requirements for fibre-glass print. (Dimensions in mm.) Single-sided 35 μm Cu-clad epoxy fibre-glass print, thickness 1,5 mm. Tracks are fully tin-lead plated. Shaded area is Cu.

CHARACTERISTICS

T_j = 25 °C unless otherwise specified

Collector cut-off current $I_E = 0$; $V_{CB} = 10$ V	I_{CBO}	max.	100 nA
D.C. current gain $I_C = 70$ mA; $V_{CE} = 10$ V	h_{FE}	min.	25
Transition frequency at f = 500 MHz $I_C = 70$ mA; $V_{CE} = 10$ V	f_T	typ.	5,0 GHz
Collector capacitance at f = 1 MHz $I_E = I_e = 0$; $V_{CB} = 10$ V	C_c	typ.	1,5 pF
Emitter capacitance at f = 1 MHz $I_C = I_c = 0$; $V_{EB} = 0,5$ V	C_e	typ.	6,5 pF
Feedback capacitance at f = 1 MHz $I_C = 0$; $V_{CE} = 10$ V	C_{re}	typ.	1,0 pF
Noise figure at optimum source impedance $I_C = 70$ mA; $V_{CE} = 10$ V; f = 800 MHz; $T_{amb} = 25$ °C	F	typ.	4,0 dB

Maximum unilateral power gain (s_{re} assumed to be zero)

$$G_{UM} = 10 \log \frac{|s_{fe}|^2}{(1 - |s_{ie}|^2)\,(1 - |s_{oe}|^2)}$$

$I_C = 70$ mA; $V_{CE} = 10$ V; f = 800 MHz; $T_{amb} = 25$ °C	G_{UM}	typ.	11,5 dB

Output voltage at d_{im} = −60 dB (see Figs 3 and 5) (DIN45004B, par. 6.3: 3-tone) I_C = 70 mA; V_{CE} = 10 V; R_L = 75 Ω; T_{amb} = 25 °C $V_p = V_o$ at d_{im} = −60 dB; f_p = 795,25 MHz $V_q = V_o$ −6 dB; f_q = 803,25 MHz $V_r = V_o$ −6 dB; f_r = 805,25 MHz Measured at $f_{(p+q-r)}$ = 793,25 MHz	V_o	typ.	700 mV
Second harmonic distortion (see Figs 3 and 6) I_C = 70 mA; V_{CE} = 10 V; R_L = 75 Ω; T_{amb} = 25 °C $V_p = V_o$ = 316 mV = 50 dBmV; f_p = 250 MHz $V_q = V_o$ = 316 mV = 50 dBmV; f_q = 560 MHz measured at $f_{(p+q)}$ = 810 MHz	d_2	typ.	−52 dB
Output power at 1 dB gain compression (see Fig. 3) I_C = 70 mA; V_{CE} = 10 V R_L = 75 Ω; T_{amb} = 25 °C measured at f = 800 MHz	P_{L1}	typ.	+ 21 dBm
Third order intercept point (see Fig. 3) I_C = 70 mA; V_{CE} = 10 V R_L = 75 Ω; T_{amb} = 25 °C P_p = ITO − 6 dB; f_p = 800 MHz P_q = ITO − 6 dB; f_q = 801 MHz and at $f_{(2p-q)}$ = 799 MHz	ITO	typ.	+ 40 dBm

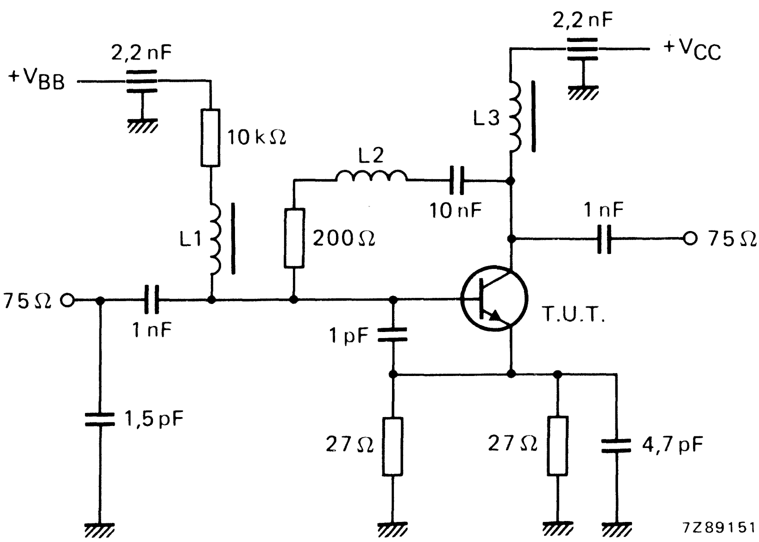


Fig. 3 Intermodulation distortion and second harmonic distortion test circuit.

L1 = L3 = 5 μH micro choke
L2 = 1½ turns Cu wire (0,4 mm); internal diameter 3,0 mm; winding pitch 1 mm

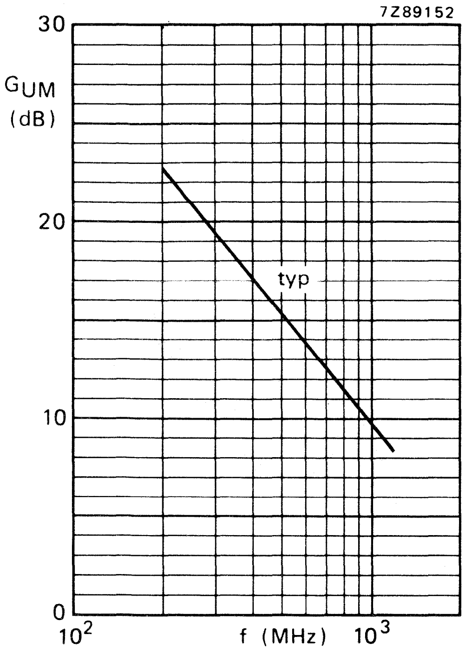


Fig. 4 V_{CE} = 10 V; I_C = 70 mA; T_{amb} = 25 °C; typical values.

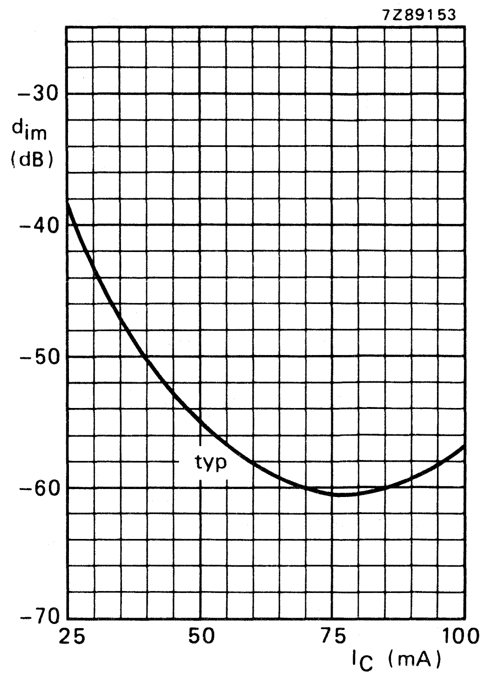


Fig. 5.

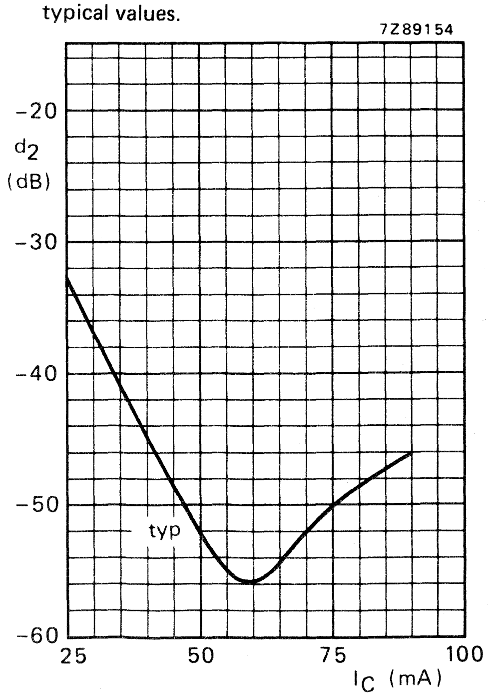


Fig. 6.

Intermodulation distortion (Fig. 5) and second harmonic distortion (Fig. 6) are measured in circuit (see Fig. 3).

Fig. 5 V_{CE} = 10 V; V_o = 700 mV = 56,9 dBmV; $f_{(p+q-r)}$ = 793,25 MHz; T_{amb} = 25 °C; typ. values.

Fig. 6 V_{CE} = 10 V; V_o = 316 mV = 50 dBmV; $f_{(p+q)}$ = 810 MHz; T_{amb} = 25 °C; typ. values.

s-parameters (common emitter) at V_{CE} = 5 V; T_{amb} = 25 °C; typical values.

I_C mA	f MHz	s_{ie}	s_{re}	s_{fe}	s_{oe}	G_{UM} dB
5	40	0,75/ −41,5°	0,026/+69,1°	15,1/+155,2°	0,93/ −17,4°	35,9
	200	0,62/−128,1°	0,064/+41,9°	7,1/+106,9°	0,53/ −43,3°	20,6
	500	0,55/−174,6°	0,087/+47,0°	3,2/ +79,8°	0,40/ −53,2°	12,4
	800	0,56/+158,7°	0,115/+56,5°	2,1/ +65,0°	0,39/ −63,2°	8,8
	1000	0,58/+146,7°	0,135/+59,2°	1,7/ +56,6°	0,39/ −72,5°	7,1
	1200	0,61/+135,5°	0,159/+61,7°	1,4/ +48,9°	0,39/ −83,0°	5,7
10	40	0,60/ −59,1°	0,022/+64,1°	24,3/+147,2°	0,86/ −26,6°	35,5
	200	0,54/−146,1°	0,050/+49,4°	9,1/+100,7°	0,38/ −54,7°	21,4
	500	0,50/+175,8°	0,087/+59,3°	3,9/ +78,6°	0,27/ −62,8°	13,4
	800	0,52/+152,4°	0,129/+63,7°	2,5/ +65,8°	0,27/ −72,2°	9,7
	1000	0,53/+141,0°	0,157/+63,9°	2,1/ +58,0°	0,27/ −80,7°	8,2
	1200	0,56/+130,7°	0,186/+63,3°	1,7/ +51,2°	0,27/ −90,9°	6,6
30	40	0,39/−105,6°	0,015/+60,7°	39,6/+133,3°	0,69/ −44,1°	35,5
	200	0,44/−168,4°	0,041/+65,9°	11,1/ +94,3°	0,23/ −78,2°	22,1
	500	0,46/+165,1°	0,094/+70,3°	4,7/ +77,3°	0,16/ −88,4°	14,6
	800	0,48/+145,4°	0,146/+69,2°	3,0/ +66,5°	0,16/ −98,3°	10,8
	1000	0,51/+135,6°	0,175/+66,6°	2,5/ +60,1°	0,16/−109,3°	9,4
	1200	0,53/+126,2°	0,206/+64,2°	2,1/ +54,0°	0,17/−119,7°	8,0
50	40	0,37/−129,3°	0,013/+63,4°	44,6/+127,8°	0,62/ −51,4°	35,7
	200	0,43/−174,7°	0,040/+71,5°	11,5/ +92,5°	0,19/ −89,2°	22,7
	500	0,45/+162,4°	0,095/+72,7°	4,8/ +76,8°	0,14/−101,5°	14,7
	800	0,48/+143,4°	0,151/+70,1°	3,1/ +66,5°	0,14/−111,5°	11,1
	1000	0,50/+134,3°	0,182/+67,4°	2,5/ +60,4°	0,14/−121,5°	9,3
	1200	0,52/+124,9°	0,215/+64,8°	2,1/ +54,6°	0,15/−130,7°	7,9
70	40	0,38/−141,7°	0,011/+65,1°	46,9/+124,9°	0,57/ −55,8°	35,8
	200	0,43/−177,6°	0,040/+73,7°	11,6/ +91,6°	0,18/ −96,3°	22,3
	500	0,46/+161,2°	0,095/+73,9°	4,9/ +76,5°	0,13/−109,5°	14,9
	800	0,49/+143,1°	0,150/+70,6°	3,1/ +66,4°	0,13/−120,7°	11,1
	1000	0,49/+133,5°	0,186/+67,7°	2,5/ +60,2°	0,14/−126,2°	9,2
	1200	0,52/+124,1°	0,218/+65,0°	2,1/ +54,6°	0,15/−135,3°	7,9

s-parameters (common emitter) at V_{CE} = 10 V; T_{amb} = 25 °C; typical values.

I_C mA	f MHz	s_{ie}	s_{re}	s_{fe}	s_{oe}	G_{UM} dB
5	40	0,77/ −38,9°	0,023/+69,1°	15,2/+156,2°	0,93/ −15,4°	36,2
	200	0,62/−124,0°	0,059/+43,1°	7,4/+108,3°	0,57/ −38,0°	21,2
	500	0,54/−172,5°	0,081/+48,0°	3,4/ +80,8°	0,45/ −46,8°	13,1
	800	0,55/+159,9°	0,106/+57,8°	2,2/ +65,9°	0,43/ −57,1°	9,3
	1000	0,56/+147,2°	0,126/+61,5°	1,8/ +57,5°	0,43/ −64,9°	7,6
	1200	0,58/+135,9°	0,150/+64,4°	1,5/ +50,1°	0,42/ −74,7°	6,1
10	40	0,62/ −54,5°	0,020/+64,9°	24,5/+148,7°	0,87/ −23,5°	36,0
	200	0,53/−142,3°	0,046/+49,6°	9,6/+102,0°	0,42/ −47,8°	21,9
	500	0,48/+177,6°	0,080/+59,4°	4,2/ +79,4°	0,31/ −54,2°	14,0
	800	0,50/+153,2°	0,118/+64,0°	2,7/ +66,4°	0,31/ −63,5°	10,3
	1000	0,52/+142,3°	0,143/+64,1°	2,2/ +59,1°	0,31/ −70,0°	8,7
	1200	0,54/+131,8°	0,168/+64,3°	1,8/ +52,4°	0,30/ −79,5°	7,1
30	40	0,41/ −94,4°	0,014/+62,2°	40,9/+135,0°	0,72/ −39,2°	36,2
	200	0,42/−164,6°	0,039/+65,5°	11,8/ +95,1°	0,25/ −64,5°	22,6
	500	0,42/+167,0°	0,087/+70,4°	4,9/ +77,9°	0,19/ −71,1°	14,8
	800	0,45/+146,6°	0,136/+69,3°	3,2/ +67,1°	0,18/ −79,1°	11,2
	1000	0,47/+136,6°	0,166/+67,2°	2,6/ +60,6°	0,18/ −83,8°	9,5
	1200	0,49/+126,3°	0,196/+65,0°	2,2/ +54,6°	0,17/ −95,1°	8,2
50	40	0,36/−114,4°	0,012/+62,7°	46,5/+129,6°	0,63/ −45,7°	36,1
	200	0,40/−171,0°	0,038/+70,4°	12,3/ +93,1°	0,20/ −71,4°	22,7
	500	0,41/+163,9°	0,090/+72,4°	5,1/ +77,1°	0,16/ −79,7°	15,1
	800	0,44/+144,7°	0,140/+70,1°	3,3/ +66,7°	0,15/ −86,0°	11,4
	1000	0,47/+135,3°	0,168/+67,3°	2,7/ +60,8°	0,14/ −95,3°	9,8
	1200	0,49/+125,2°	0,197/+65,0°	2,3/ +55,2°	0,14/−106,6°	8,5
70	40	0,35/−125,4°	0,012/+63,6°	49,1/+125,7°	0,58/ −49,5°	36,2
	200	0,40/−173,7°	0,038/+72,7°	12,4/ +92,0°	0,18/ −74,8°	22,8
	500	0,41/+162,6°	0,091/+73,2°	5,2/ +76,7°	0,15/ −82,0°	15,2
	800	0,44/+144,1°	0,143/+70,2°	3,3/ +66,4°	0,14/ −87,4°	11,5
	1000	0,46/+134,6°	0,175/+67,3°	2,7/ +60,2°	0,13/ −95,3°	9,7
	1200	0,48/+124,1°	0,200/+64,8°	2,3/ +54,6°	0,13/−109,5°	8,4

Conditions for Figs 7 and 8:
V_{CE} = 10 V; I_C = 70 mA;
T_{amb} = 25 °C; typical values.

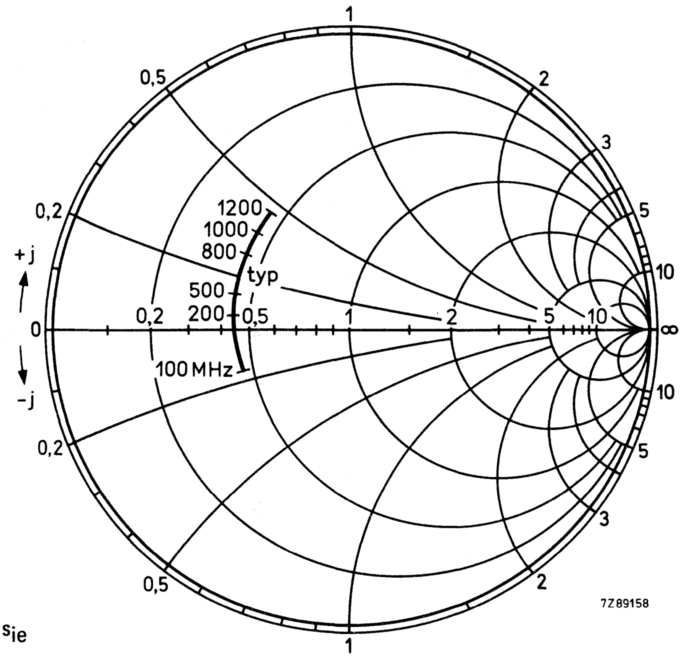


Fig. 7 Input impedance derived from input reflection coefficient s_{ie} co-ordinates in ohm x 50.

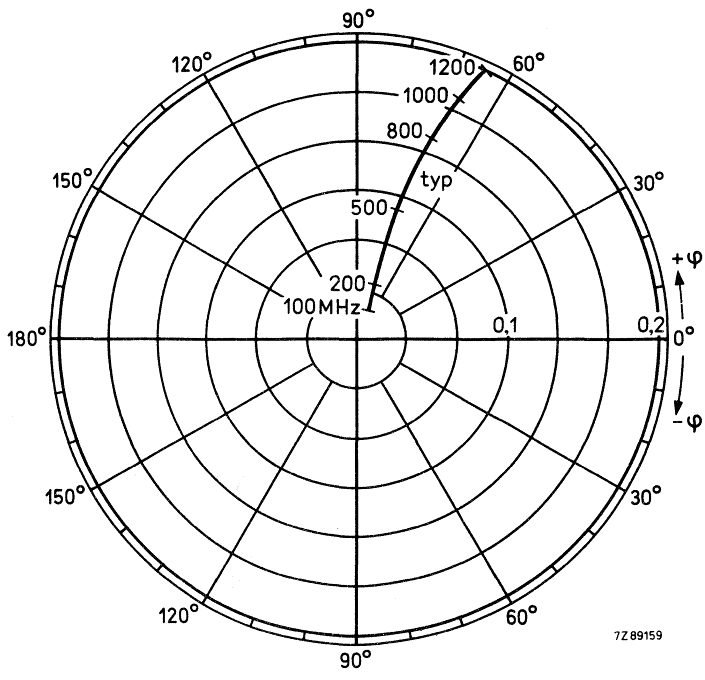


Fig. 8 Reverse transmission coefficient s_{re}.

Conditions for Figs 9 and 10:
V_{CE} = 10 V; I_C = 70 mA;
T_{amb} = 25 °C; typical values.

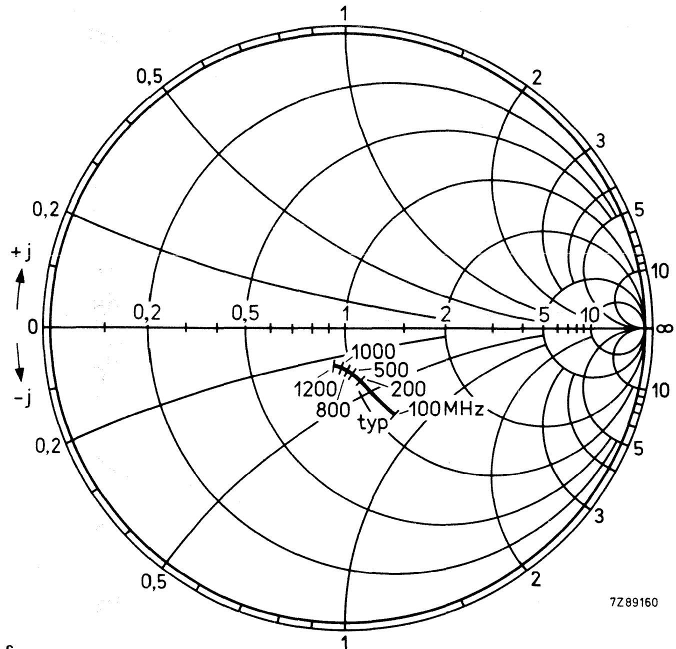


Fig. 9 Output impedance derived from output reflection coefficient s_{oe} co-ordinates in ohm x 50.

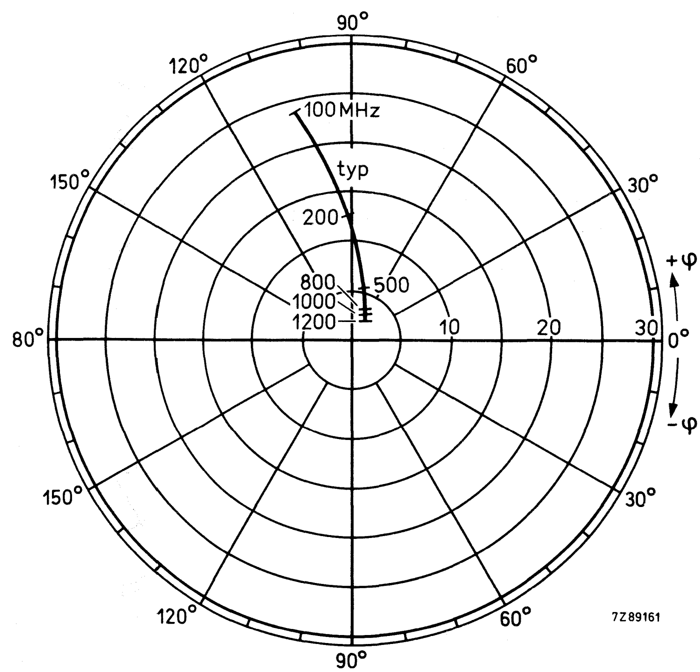


Fig. 10 Forward transmission coefficient s_{fe}.

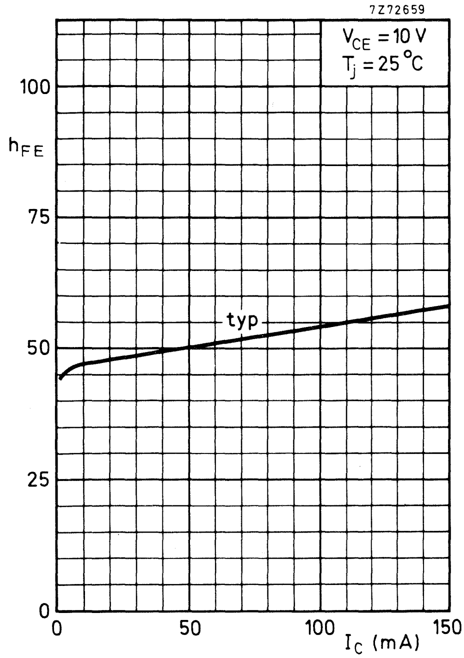


Fig. 11 V_{CE} = 10 V; T_j = 25 °C; typical values.

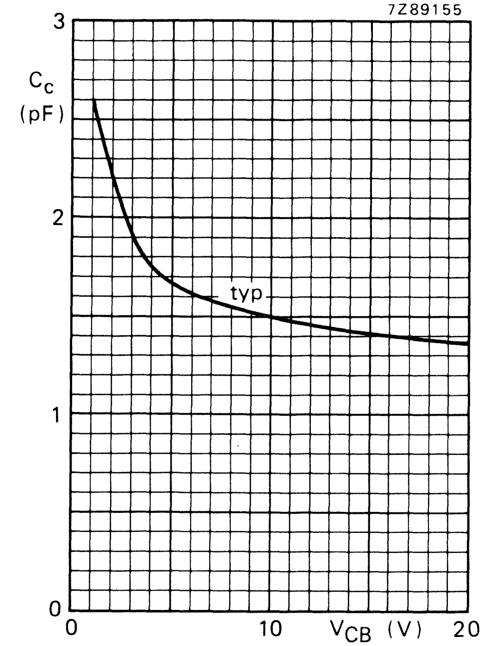


Fig. 12 $I_E = I_e = 0$; f = 1 MHz; T_j = 25 °C; typical values.

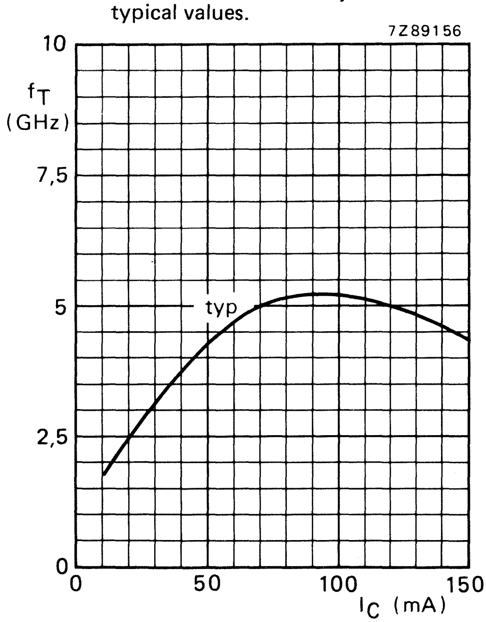


Fig. 13 V_{CE} = 10 V; f = 500 MHz; T_j = 25 °C; typical values.

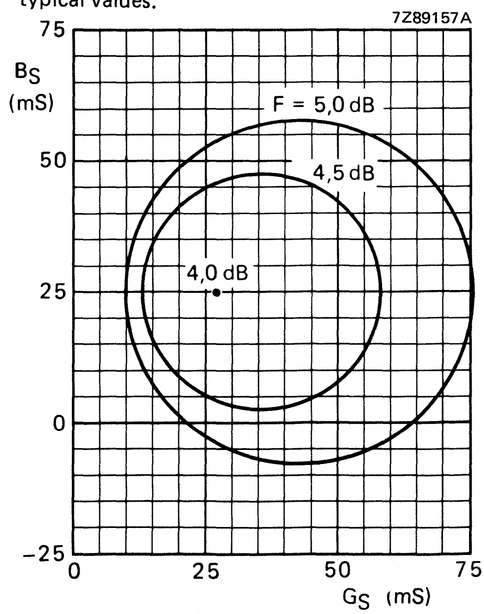


Fig. 14 Circles of constant noise figure. V_{CE} = 10 V; I_C = 70 mA; f = 800 MHz; T_{amb} = 25 °C; typical values.

CLASS-B OPERATION

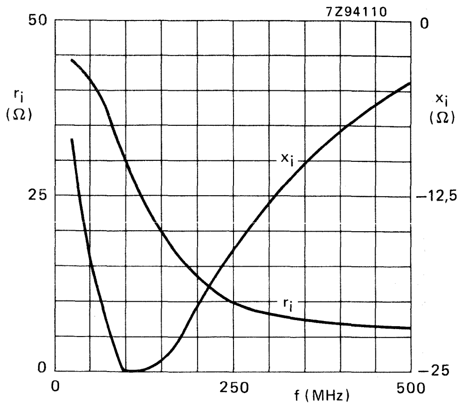


Fig. 15 Input impedance (series components).

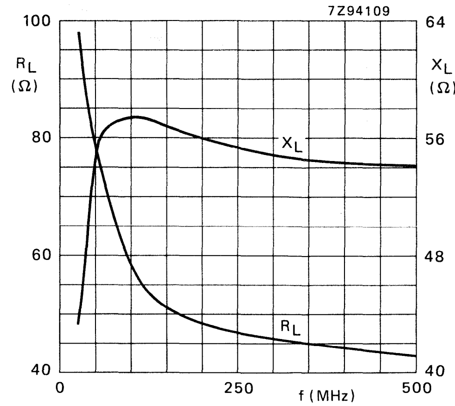


Fig. 16 Load impedance (series components).

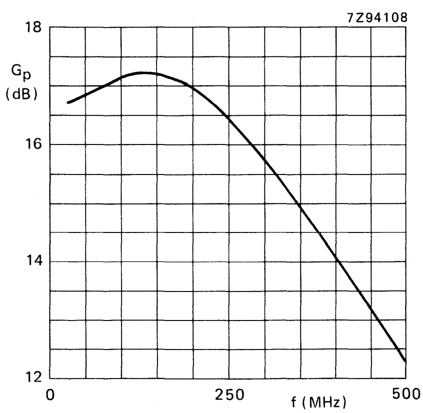


Fig. 17 Power gain versus frequency.

Conditions for Figs 15 to 17:

V_{CE} = 10 V; P_L = 500 mW; T_{amb} = 25 °C; typical values.

OPERATING NOTE for Figs 15 to 17:

A base-emitter resistor of 47 Ω is recommended to avoid oscillation. This resistor must be effective for r.f. only.

NPN 1 GHz WIDEBAND TRANSISTOR

The BFR106 is a npn silicon planar epitaxial transistor in a SOT23 microminiature plastic envelope. It is primarily intended for low noise, general RF applications using SMD-technology.

QUICK REFERENCE DATA

Collector-base voltage (open emitter)	V_{CBO}	max.	20	V
Collector-emitter voltage (open base)	V_{CEO}	max.	15	V
Collector current (DC)	I_C	max.	100	mA
Total power dissipation up to T_{amb} = 25 °C	P_{tot}	max.	350	mW
Junction temperature	T_j	max.	175	°C
DC current gain I_C = 20 mA; V_{CE} = 8 V	h_{FE}	min.	25	
Transition frequency at f = 500 MHz I_C = 20 mA; V_{CE} = 8 V	f_T	typ.	3.3	GHz
Maximum unilateral power gain at f = 800 MHz I_C = 20 mA; V_{CE} = 8 V; T_{amb} = 25 °C	G_{UM}	typ.	11	dB
Output voltage at d_{im} = −60 dB I_C = 50 mA; V_{CE} = 7 V; R_L = 75 Ω; T_{amb} 25 °C $f_{(p+q-r)}$ = 793.25 MHz	V_O	typ.	350	mV

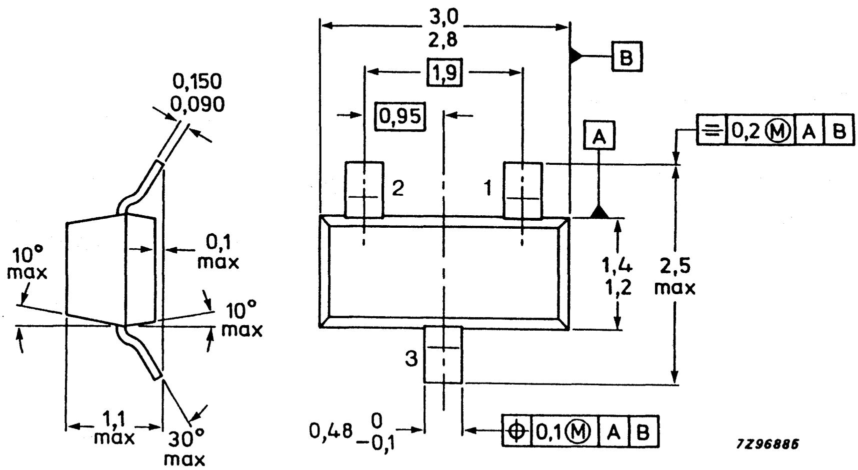
MECHANICAL DATA

SOT23 (see Fig. 1).

MECHANICAL DATA

Dimensions in mm

Fig. 1 SOT23.



Marking code: R7

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134).

Collector-base voltage (open emitter)	V_{CBO}	max.	20	V
Collector-emitter voltage (open base)	V_{CEO}	max.	15	V
Emitter-base voltage (open collector)	V_{EBO}	max.	3	V
Collector current (DC)	I_C	max.	100	mA
Total power dissipation up to T_{amb} = 25 °C (note 1)	P_{tot}	max.	350	mW
Storage temperature	T_{stg}		−65 to +175	°C
Junction temperature	T_j	max.	175	°C

Note

1. Mounted on a ceramic substrate measuring 8 x 10 x 0.7 mm.

THERMAL RESISTANCE

From junction to ambient in free air mounted on a ceramic substrate of 8 x 10 x 0.7 mm	$R_{th\,j\text{-}a}$	=	430 K/W

CHARACTERISTICS

$T_j = 25\ ^oC$ unless otherwise specified.

Collector cut-off current $I_E = 0$; $V_{CB} = 10$ V	I_{CBO}	max.	100 nA
DC current gain $I_E = 20$ mA; $V_{CE} = 8$ V	h_{FE}	min.	25
Transition frequency at f = 500 MHz $I_E = 20$ mA; $V_{CE} = 8$ V; $T_{amb} = 25\ ^oC$	f_T	typ.	3.3 GHz
Collector capacitance at f = 1 MHz $I_E = i_e = 0$; $V_{CB} = 10$ V	C_c	typ.	1.5 pF
Emitter capacitance at f = 1 MHz $I_C = i_c = 0$; $V_{EB} = 0.5$ V	C_e	typ.	4.5 pF
Feedback capacitance at f = 1 MHz $I_C = 0$; $V_{CE} = 10$ V	C_{re}	typ.	1.2 pF
Noise figure at optimum source impedance $I_C = 20$ mA; $V_{CE} = 8$ V; $T_{amb} = 25\ ^oC$	F	typ.	3.5 dB

Maximum unilateral power gain at f = 800 MHz;
$I_E = 20$ mA; $V_{CE} = 8$V; $T_{amb} = 25\ ^oC$

$$G_{UM} = 10 \log \frac{|s_{fe}|^2}{(1 - |s_{ie}|^2)(1 - |s_{oe}|^2)}$$

Output voltages at $d_{im} = 60$ dB $T_{amb} = 25\ ^oC$; $I_C = 50$ mA; $V_{CE} = 7$ V; $R_L = 75\ \Omega$; $f_{(p+q-r)} = 793.25$ MHz	V_O	typ.	350 mV
Second harmonic distortion $T_{amb} = 25\ ^oC$ $I_C = 50$ mA, $V_{CE} = 7$ V, $R_L = 75\ \Omega$, $f_{(p+q)} = 810$ MHz, $V_O = 200$ mV	d_2	typ.	−56 dB

NPN 1 GHz WIDEBAND TRANSISTOR

NPN transistor in a plastic SOT37 package. It is primarily intended for use in MATV and microwave amplifiers, such as in aerial amplifiers, radar systems, oscilloscopes, spectrum analyzers, etc.

Emitter ballasting resistors and application of gold sandwich metallization ensure an optimum temperature profile and excellent reliability properties.

QUICK REFERENCE DATA

Collector-base voltage (open emitter)	V_{CBO}	max.	25 V
Collector-emitter voltage (open base)	V_{CEO}	max.	15 V
Collector current (DC)	I_C	max.	150 mA
Total power dissipation up to T_{amb} = 60 °C	P_{tot}	max.	1 W
Junction temperature	T_j	max.	175 °C
DC current gain I_C = 100 mA; V_{CE} = 10 V	h_{FE}	min.	80
Transition frequency at f = 1 GHz I_C = 100 mA; V_{CE} = 10 V; T_{amb} = 25 °C	f_T	typ.	7.0 GHz
Maximum power gain I_C = 100 mA; V_{CE} = 10 V; f = 500 MHz	G_{UM}	typ.	16 dB
I_C = 100 mA; V_{CE} = 10 V; f = 800 MHz		typ.	11.5 dB
Output voltage at d_{im} = −60 dB I_C = 90 mA; V_{CE} = 10 V; R_L = 75 Ω; $f_{(p+q-r)}$ = 793.25 MHz	V_O	typ.	950 mV

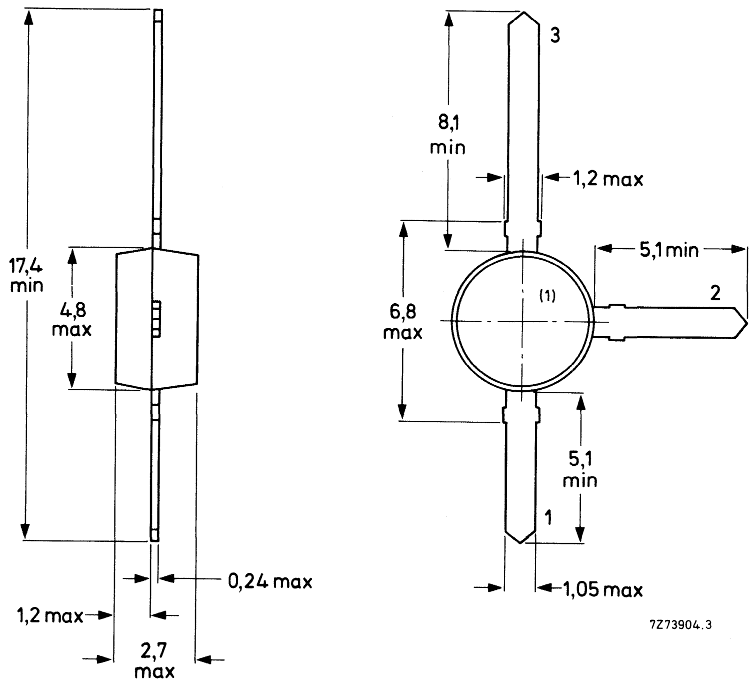
MECHANICAL DATA

SOT37 (see Fig. 1).

MECHANICAL DATA

Dimensions in mm

Fig. 1 SOT37.



Pinning

1 = base
2 = emitter
3 = collector

(1) = type number marking.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134).

Collector-base voltage (open emitter)	V_{CBO}	max.	25	V
Collector-emitter voltage (open base)	V_{CEO}	max.	15	V
Emitter-base voltage (open collector)	V_{EBO}	max.	2	V
Collector current (DC)	I_C	max.	150	mA
Total power dissipation up to T_{amb} = 60 °C	P_{tot}	max.	1	W
Storage temperature range	T_{stg}		−65 to +175	°C
Junction temperature	T_j	max.	175	°C

THERMAL RESISTANCE

From junction to case	$R_{th\ j\text{-}c}$	=	35 K/W
From junction to ambient (free air) mounted on a fibre-glass print (see Fig. 2)	$R_{th\ j\text{-}a}$	=	115 K/W

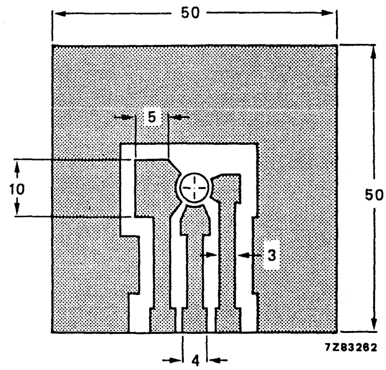


Fig. 2 Requirements for fibre-glass print (dimensions in mm).
Single-sided 35 μm copper-clad epoxy fibre-glass print, thickness 1.5 mm. Tracks are fully tin-plated.
Shaded area is copper.

CHARACTERISTICS

T_j = 25 °C unless otherwise specified.

Collector cut-off current $I_E = 0$; $V_{CB} = 10$ V	I_{CBO}	max.	50 μA
DC current gain $I_C = 100$ mA; $V_{CE} = 10$ V	h_{FE}	min.	80
Transition frequency at f = 1 GHz $I_C = 100$ mA; $V_{CE} = 10$ V; $T_{amb} = 25$ °C	f_T	typ.	7.0 GHz
Collector capacitance at f = 1 MHz $I_E = i_e = 0$; $V_{CB} = 10$ V	C_c	typ.	2.5 pF
Emitter capacitance at f = 1 MHz $I_C = i_c = 0$; $V_{EB} = 0.5$ V	C_e	typ.	6.0 pF
Feedback capacitance at f = 1 MHz $I_C = 0$ mA; $V_{CE} = 10$V;	C_{re}	typ.	1.2 pF

CHARACTERISTICS (continued)

Maximum power gain			
I_C = 100 mA; V_{CE} = 10 V; T_{amb} = 25 °C; f = 500 MHz	G_{UM}	typ.	16 dB
I_C = 100 mA; V_{CE} = 10 V; T_{amb} = 25 °C; f = 800 MHz		typ.	11.5 dB
Output voltage at d_{im} = −60 dB (DIN 45004B) T_{amb} = 25 °C; I_C = 90 mA; V_{CE} = 10 V; R_L = 75 Ω V_p = V_O at d_{im} = −60 dB; f_p = 445.25 MHz V_q = V_O − 6 dB; f_q = 453.25 MHz V_r = V_O − 6 dB; f_r = 455.25 MHz Measured at $f_{(p+q-r)}$ = 443.25 MHz	V_O	typ.	900 mV
Output voltage at d_{im} = −60 dB (see Fig. 3) (DIN 45005B); T_{amb} = 25 °C; I_C = 90 mA; V_{CE} = 10 V; R_L = 75 Ω V_p = V_O at d_{im} = −60 dB; f_p = 797.25 MHz V_q = V_O − 6 dB; f_q = 803.25 MHz V_r = V_O − 6 dB; f_r = 805.25 MHz Measured at $f_{(p+q-r)}$ = 793.25 MHz	V_O	typ.	850 V

Table 1 s-parameter (common emitter) at V_{CE} = 10 V.

I_C mA	f MHz	s_{ie}	s_{re}	s_{fe}	s_{oe}	G_{UM} dB
10	40	0.80/−37.3	19.5/154.9	0.024/70.6	0.91/−20.3	38.1
	100	0.66/−80.1	14.4/129.0	0.046/54.4	0.70/−40.4	28.5
	200	0.53/−121.6	8.8/106.5	0.061/48.0	0.48/−53.3	21.6
	500	0.47/−170.6	4.0/80.0	0.080/56.4	0.35/−70.2	13.6
	800	0.47/165.5	2.6/63.5	0.128/65.5	0.35/−84.2	9.8
	1000	0.49/152.3	2.1/55.4	0.158/69.9	0.35/−95.9	8.1
	1200	0.52/140.9	1.7/47.0	0.193/70.3	0.37/−109.0	6.9
	1500	0.59/128.4	1.4/33.7	0.251/64.7	0.42/−124.4	5.6
	2000	0.63/105.3	1.1/20.5	0.363/58.1	0.52/149.3	4.3
20	40	0.73/−43.8	26.4/150.5	0.023/68.6	0.87/−26.6	37.9
	100	0.57/−89.9	18.0/123.9	0.041/54.6	0.61/−50.9	28.9
	200	0.46/−130.3	10.7/103.5	0.056/52.9	0.39/−66.1	22.4
	500	0.42/−175.5	4.6/80.4	0.096/61.4	0.27/−85.2	14.5
	800	0.43/162.4	3.0/65.7	0.142/65.9	0.26/−97.8	10.7
	1000	0.44/149.4	2.4/58.5	0.174/67.4	0.26/−108.7	8.7
	1200	0.47/138.3	2.0/51.0	0.207/66.8	0.28/−120.8	7.6
	1500	0.53/127.6	1.6/37.6	0.261/60.6	0.33/−134.0	6.2
	2000	0.57/106.2	1.3/23.6	0.359/54.4	0.42/−154.2	4.9
50	40	0.65/−50.5	33.1/146.2	0.022/66.6	0.82/−33.4	37.7
	100	0.55/−98.9	21.0/119.7	0.038/55.8	0.54/−61.7	29.2
	200	0.41/−138.0	12.0/101.2	0.054/57.8	0.33/−81.1	22.9
	500	0.38/−178.1	5.1/80.8	0.102/64.9	0.22/−104.8	15.1
	800	0.39/158.7	3.3/67.5	0.153/66.4	0.21/−117.2	11.2
	1000	0.40/145.9	2.7/60.9	0.188/66.4	0.21/−128.5	9.5
	1200	0.45/135.5	2.3/53.9	0.222/64.9	0.23/−138.8	8.2
	1500	0.48/124.5	1.8/41.2	0.279/57.8	0.28/−147.9	6.7
	2000	0.52/104.4	1.5/27.4	0.363/51.2	0.36/−162.5	5.3
70	40	0.64/−52.2	34.4/145.2	0.21/66.0	0.81/−35.2	37.7
	100	0.48/−100.8	21.5/118.7	0.037/56.0	0.52/−64.6	29.2
	200	0.40/−139.7	12.2/100.7	0.054/58.6	0.32/−85.0	22.9
	500	0.38/−179.6	5.2/80.7	0.103/65.3	0.22/−109.8	15.2
	800	0.38/158.1	3.3/67.4	0.157/66.2	0.21/−122.1	11.3
	1000	0.39/144.8	2.7/61.6	0.191/66.0	0.21/−133.0	9.6
	1200	0.42/134.0	2.3/53.9	0.225/64.2	0.23/−152.5	8.2
	1500	0.47/123.8	1.8/41.8	0.282/57.1	0.28/−152.2	6.7
	2000	0.51/104.0	1.5/28.1	0.365/50.3	0.35/−165.6	5.3
100	40	0.63/−54.1	35.3/144.3	0.022/65.2	0.80/−36.8	37.5
	100	0.48/−103.2	21.8/118.0	0.037/55.4	0.51/−67.2	29.2
	200	0.41/−141.7	12.3/100.3	0.053/58.3	0.31/−89.1	23.0
	500	0.38/178.4	5.2/80.7	0.103/65.2	0.22/−115.3	15.3
	800	0.39/175.3	3.4/67.8	0.156/66.0	0.21/−127.7	11.4
	1000	0.44/144.6	2.7/61.8	0.189/65.8	0.21/−138.9	9.6
	1200	0.43/133.9	2.3/54.5	0.223/63.9	0.23/−147.8	8.4
	1500	0.48/123.4	1.9/42.3	0.279/56.7	0.28/−155.3	7.0
	2000	0.52/103.4	1.5/23.9	0.360/49.4	0.35/−167.5	5.5

N-P-N H.F. WIDEBAND TRANSISTOR

N-P-N transistor in a plastic SOT-23 envelope. It is intended for a wide range of v.h.f. and u.h.f. applications in thick and thin-film circuits.

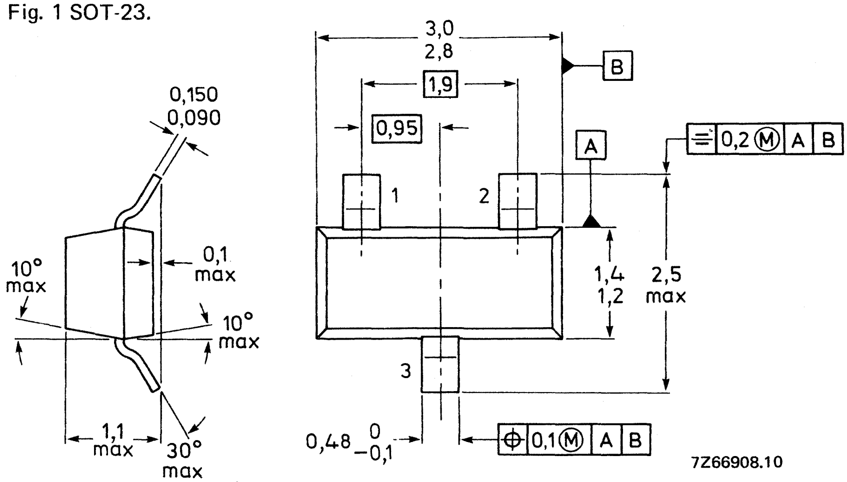
QUICK REFERENCE DATA

Collector-base voltage (open emitter; peak value)	V_{CBOM}	max.	25	V
Collector-emitter voltage (open base)	V_{CEO}	max.	15	V
Collector current (peak value)	I_{CM}	max.	50	mA
Total power dissipation up to T_{amb} = 25 °C	P_{tot}	max.	300	mW
Junction temperature	T_j	max.	150	°C
D.C. current gain I_C = 2 mA; V_{CE} = 1 V	h_{FE}		20 to 150	
Transition frequency I_C = 25 mA; V_{CE} = 5 V; f = 500 MHz	f_T	typ.	1,3	GHz
Noise figure I_C = 2 mA; V_{CE} = 5 V; R_S = 50 Ω; f = 500 MHz	F	typ.	4,5	dB

MECHANICAL DATA

Dimensions in mm

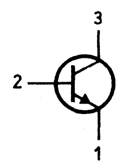
Fig. 1 SOT-23.



TOP VIEW

Marking code

BFS17 = E1



If required, the R-version (reverse pinning) is available on request.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

Collector-base voltage (open emitter; peak value)	V_{CBOM}	max.	25	V
Collector-emitter voltage (open base) I_C = 10 mA	V_{CEO}	max.	15	V
Emitter-base voltage (open collector)	V_{EBO}	max.	2,5	V
Collector current (d.c.)	I_C	max.	25	mA
Collector current (peak value)	I_{CM}	max.	50	mA
→ Total power dissipation up to T_{amb} = 25 °C	P_{tot}	max.	300	mW
→ Storage temperature	T_{stg}	−65 to + 150		°C
→ Junction temperature	T_j	max.	150	°C

THERMAL RESISTANCE

→ From junction to ambient*	$R_{th\ j\text{-}a}$	=	430	K/W

CHARACTERISTICS

T_j = 25 °C unless otherwise specified

Collector cut-off current				
$I_E = 0$; V_{CB} = 10 V	I_{CBO}	max.	10	nA
$I_E = 0$; V_{CB} = 10 V; T_j = 100 °C	I_{CBO}	max.	10	μA
D.C. current gain				
I_C = 2 mA; V_{CE} = 1 V	h_{FE}		20 to 150	
I_C = 25 mA; V_{CE} = 1 V	h_{FE}	min.	20	
Transition frequency				
I_C = 2 mA; V_{CE} = 5 V; f = 500 MHz	f_T	typ.	1,0	GHz
I_C = 25 mA; V_{CE} = 5 V; f = 500 MHz	f_T	typ.	1,3	GHz
Collector capacitance at f = 1 MHz				
$I_E = I_e = 0$; V_{CB} = 10 V	C_c	max.	1,5	pF

* Mounted on a ceramic substrate of 8 mm x 10 mm x 0,7 mm.

Emitter capacitance at f = 1 MHz			
$I_C = I_c = 0$; $V_{EB} = 0{,}5$ V	C_e	max.	2,0 pF
Feedback capacitance at f = 1 MHz			
$I_C = 1$ mA; $V_{CE} = 5$ V	C_{re}	typ.	0,65 pF
Noise figure*			
$I_C = 2$ mA; $V_{CE} = 5$ V;			
f = 500 MHz; $R_S = 50\ \Omega$	F	typ.	4,5 dB
Intermodulation distortion			
$I_C = 10$ mA; $V_{CE} = 6$ V; $R_L = 37{,}5\ \Omega$; $T_{amb} = 25\ ^oC$			
$V_o = 100$ mV at $f_p = 183$ MHz			
$V_o = 100$ mV at $f_q = 200$ MHz			
measured at $f_{(2q-p)} = 217$ MHz	d_{im}	typ.	−45 dB

* Crystal mounted in a BFY90 envelope.

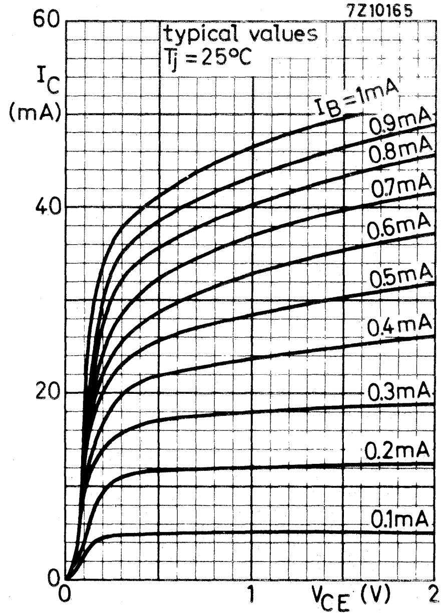


Fig. 2 T_j = 25 °C; typical values.

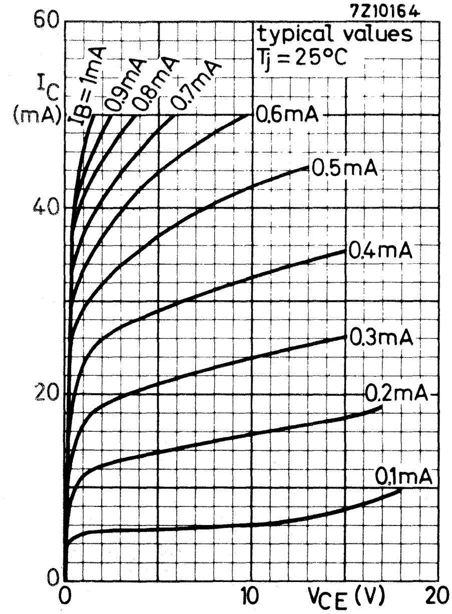


Fig. 3 T_j = 25 °C; typical values.

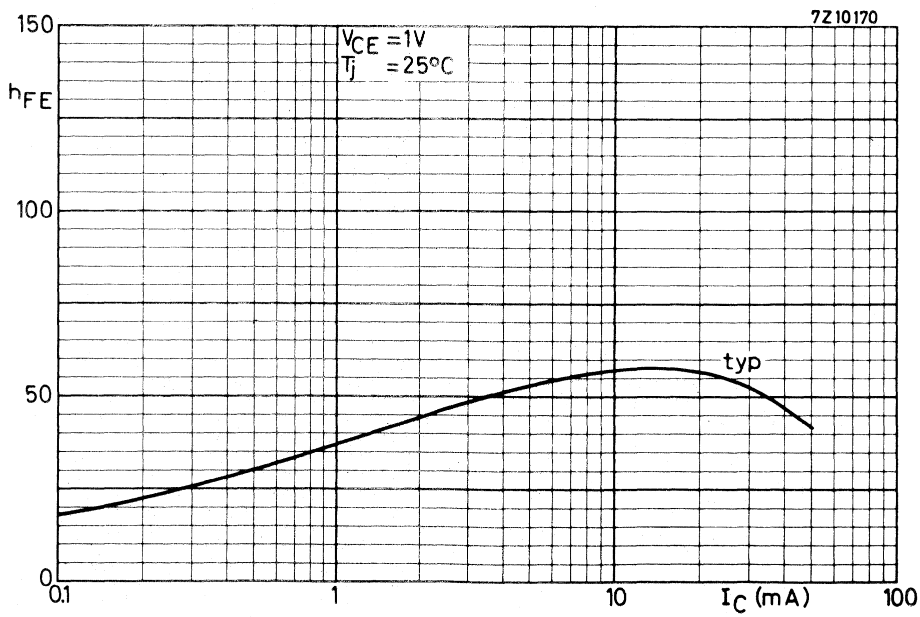


Fig. 4 V_{CE} = 1 V; T_j = 25 °C; typical values.

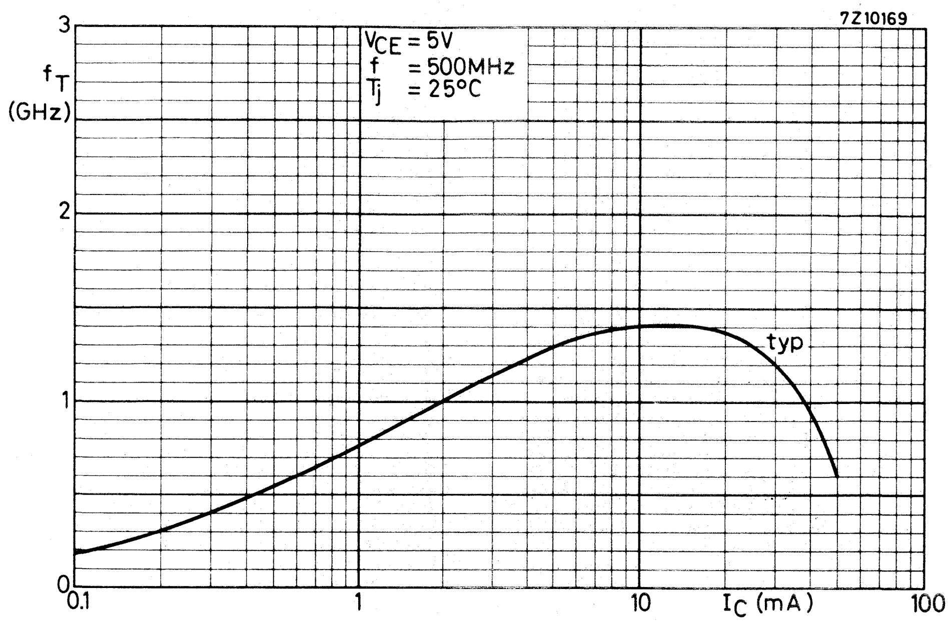


Fig. 5 V_{CE} = 5 V; f = 500 MHz; T_j = 25 °C; typical values.

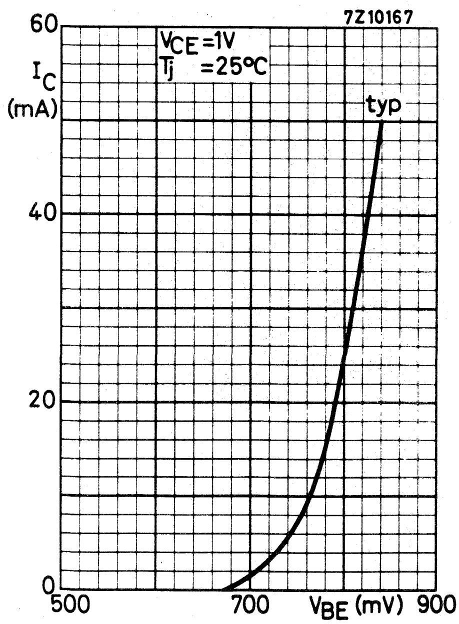


Fig. 6 V_{CE} = 1 V; T_j = 25 °C; typical values.

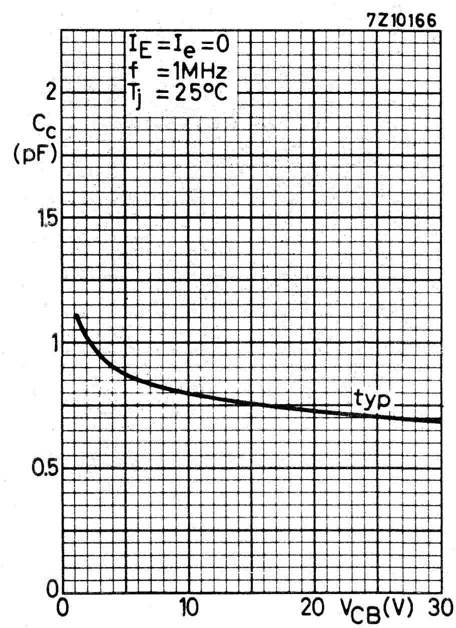


Fig. 7 $I_E = I_e = 0$; f = 1 MHz; T_j = 25 °C; typical values.

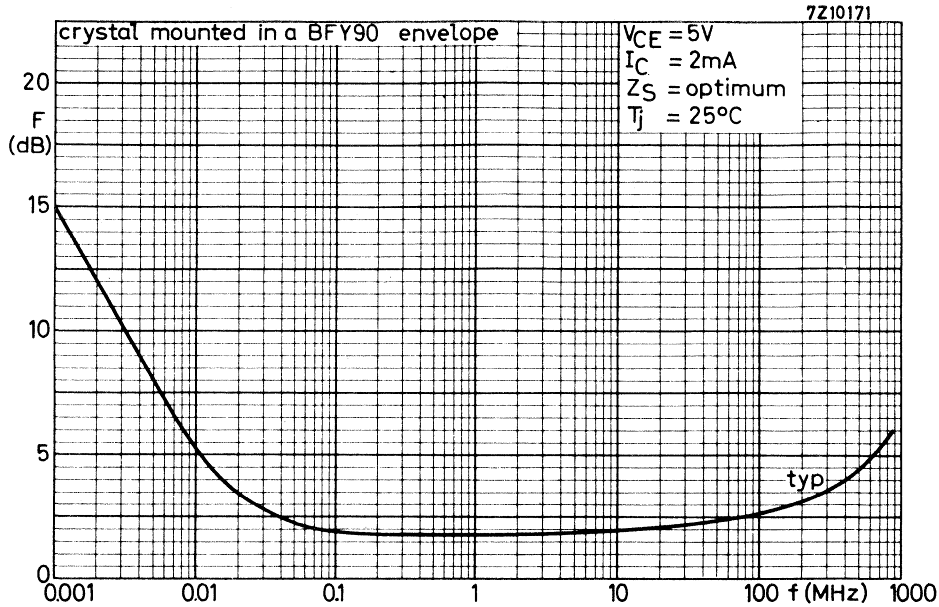


Fig. 8 V_{CE} = 5 V; I_C = 2 mA; Z_S = optimum; T_j = 25 °C; typical values.

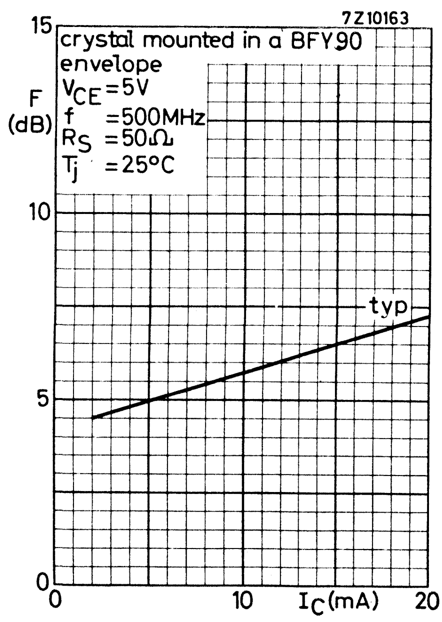


Fig. 9 V_{CE} = 5 V; f = 500 MHz; R_S = 50 Ω; T_j = 25 °C; typical values.

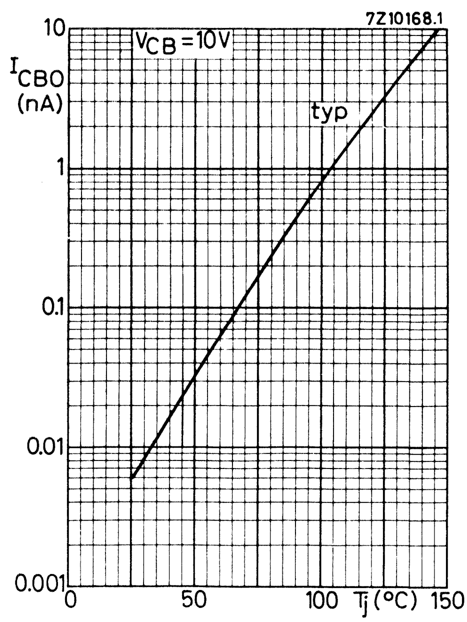


Fig. 10 V_{CB} = 10 V; typical values.

N-P-N 1 GHz WIDEBAND TRANSISTOR

N-P-N transistor in a plastic SOT-23 envelope. It is intended for a wide range of v.h.f. and u.h.f. applications in thick and thin-film circuits.

The BFS17A is the successor to the BFS17 and offers a higher power gain and an improved noise behaviour.

QUICK REFERENCE DATA

Collector-base voltage (open emitter)	V_{CBO}	max.	25	V
Collector-emitter voltage (open base)	V_{CEO}	max.	15	V
Collector current (d.c.)	I_C	max.	25	mA
Total power dissipation up to T_{amb} = 25 °C	P_{tot}	max.	300	mW
Junction temperature	T_j	max.	175	°C
D.C. current gain I_C = 2 mA; V_{CE} = 1 V	h_{FE}		20 to 150	
Transition frequency at f = 500 MHz I_C = 25 mA; V_{CE} = 5 V	f_T	typ.	2,8	GHz
Noise figure I_C = 2 mA; V_{CE} = 5 V; f = 800 MHz	F	typ.	2,5	dB
Output voltage at d_{im} = −60 dB V_{CE} = 10 V; I_C = 14 mA; Z_L = 75 Ω $f_{(p+q-r)}$ = 793,25 MHz	V_o	typ.	150	mV
Maximum unilateral power gain at f = 800 MHz V_{CE} = 10 V; I_C = 14 mA	G_{UM}	typ.	13,5	dB

MECHANICAL DATA (see Fig. 1).

If required, the R-version (reverse pinning) is available on request.

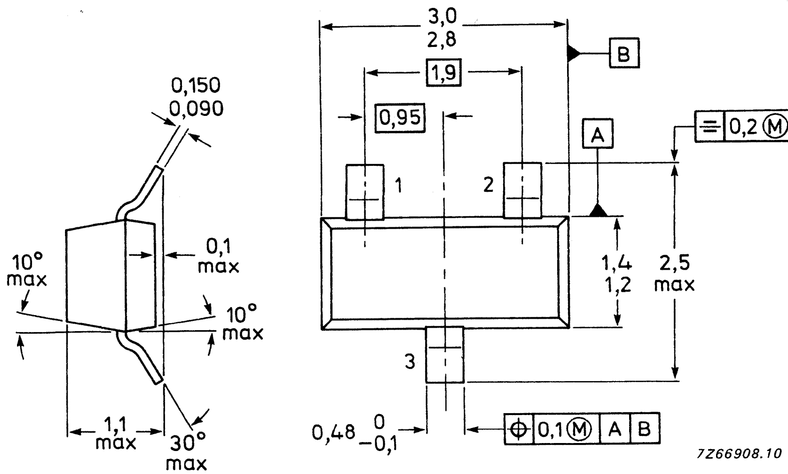
MECHANICAL DATA

Fig. 1 SOT-23.

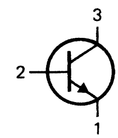
Dimensions in mm

Marking code

BFS17A = E2



TOP VIEW



RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

Collector-base voltage (open emitter)	V_{CBO}	max.	25	V
Collector-emitter voltage (open base)	V_{CEO}	max.	15	V
Emitter-base voltage (open collector)	V_{EBO}	max.	2,5	V
Collector current (d.c.)	I_C	max.	25	mA
Collector current (peak value)	I_{CM}	max.	50	mA
Total power dissipation up to T_{amb} = 25 °C*	P_{tot}	max.	300	mW
Storage temperature	T_{stg}	−65 to + 150		°C
→ Junction temperature	T_j	max.	175	°C

THERMAL RESISTANCE

From junction to ambient*	$R_{th\ j\text{-}a}$	=	430	K/W

* Mounted on a ceramic substrate of 8 mm x 10 mm x 0,7 mm.

CHARACTERISTICS

T_j = 25 °C unless otherwise specified

Collector cut-off current				
$I_E = 0$; $V_{CB} = 10$ V	I_{CBO}	max.	50	nA
D.C. current gain				
$I_C = 2$ mA; $V_{CE} = 1$ V	h_{FE}		20 to 150	
$I_C = 25$ mA; $V_{CE} = 1$ V		min.	20	
Transition frequency at f = 500 MHz				
$I_C = 25$ mA; $V_{CE} = 5$ V	f_T	typ.	2,8	GHz
Collector capacitance at f = 1 MHz				
$I_E = 0$; $V_{CB} = 10$ V	C_c	typ.	0,7	pF
Emitter capacitance at f = 1 MHz				
$I_C = 0$; $V_{EB} = 0{,}5$ V	C_e	typ.	1,25	pF
Feedback capacitance at f = 1 MHz				
$I_C = 0$; $V_{CE} = 5$ V	C_{re}	typ.	0,6	pF

Maximum unilateral power gain
(s_{re} assumed to be zero)

$$G_{UM} = 10 \log \frac{|s_{fe}|^2}{[1-|s_{ie}|^2]\;[1-|s_{oe}|^2]}$$

$I_C = 14$ mA; $V_{CE} = 10$ V; f = 800 MHz	G_{UM}	typ.	13,5	dB
Noise figure at f = 800 MHz				
$I_C = 2$ mA; $V_{CE} = 5$ V; $Z_S = 60\ \Omega$; $T_{amb} = 25$ °C	F	typ.	2,5	dB

Output voltage at $d_{im} = -60$ dB
(DIN 45004B, par. 6,3: 3-tone)

$I_C = 14$ mA; $V_{CE} = 10$ V; $Z_L = 75\ \Omega$

$V_p = V_o$; $f_p = 795{,}25$ MHz
$V_q = V_o - 6$ dB; $f_q = 803{,}25$ MHz
$V_r = V_o - 6$ dB; $f_r = 805{,}25$ MHz

Measured at $f_{(p+q-r)} = 793{,}25$ MHz	V_o	typ.	150	mV

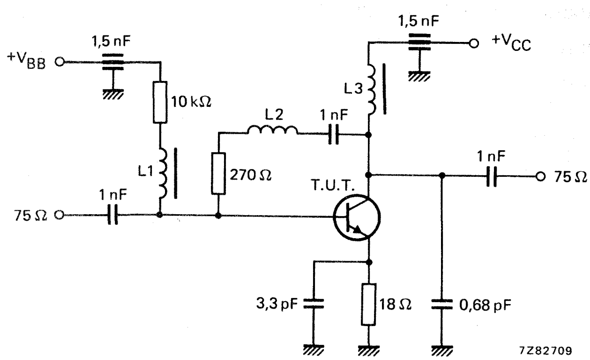


Fig. 2 Intermodulation distortion and second harmonic distortion MATV test circuit.
L1 = L3 = 5 µH Ferroxcube choke.
L2 = 3 turns Cu wire (0,4 mm), internal diameter 3 mm, winding pitch 1 mm.

s-parameters (common emitter) at V_{CE} = 5 V; typical values.

I_C mA	f MHz	s_{ie}	s_{fe}	s_{ie}	s_{oe}	G_{UM} dB
2	40	0,94/ −11,1°	6,50/173,0°	0,01/83,1°	1,00/ −4,1°	45,7
	100	0,89/ −27,6°	6,22/158,7°	0,03/74,1°	0,96/ −9,8°	34,0
	200	0,79/ −50,3°	5,38/143,2°	0,06/63,8°	0,89/−16,0°	25,7
	500	0,50/−103,1°	3,37/107,0°	0,09/47,1°	0,68/−24,3°	14,5
	800	0,43/−130,7°	2,43/ 93,1°	0,11/47,9°	0,64/−28,0°	10,9
	1000	0,43/−148,2°	2,08/ 84,5°	0,12/50,1°	0,62/−32,6°	9,3
	1200	0,41/−172,5°	1,73/ 75,8°	0,13/51,6°	0,54/−31,6°	7,1
5	40	0,84/ −19,0°	14,43/167,4°	0,01/80,2°	0,98/ −7,6°	42,5
	100	0,74/ −45,0°	12,92/147,3°	0,03/67,8°	0,89/−16,9°	32,5
	200	0,60/ −75,6°	9,60/128,6°	0,05/58,6°	0,75/−23,1°	25,3
	500	0,38/−133,5°	4,94/ 98,3°	0,07/54,6°	0,52/−23,7°	15,9
	800	0,35/−158,6°	3,25/ 86,5°	0,09/60,3°	0,52/−25,6°	12,2
	1000	0,37/−171,2°	2,71/ 79,9°	0,11/62,7°	0,50/−30,1°	10,5
	1200	0,41/+166,1°	2,31/ 73,4°	0,12/64,3°	0,43/−24,8°	8,9
10	40	0,73/ −28,7°	23,50/160,9°	0,01/76,3°	0,95/−11,7°	41,0
	100	0,59/ −64,1°	18,60/136,3°	0,02/63,7°	0,79/−22,4°	31,6
	200	0,46/ −99,8°	12,38/117,6°	0,04/58,6°	0,62/−26,1°	25,0
	500	0,35/−156,4°	5,64/ 92,5°	0,06/62,4°	0,44/−20,2°	16,5
	800	0,34/−175,1°	3,67/ 82,7°	0,09/67,9°	0,46/−22,2°	12,8
	1000	0,36/+175,8°	3,00/ 76,7°	0,11/69,3°	0,44/−26,6°	11,1
	1200	0,43/+158,2°	2,56/ 71,6°	0,13/70,6°	0,38/−19,1°	9,7
14	40	0,65/ −35,6°	28,67/156,8°	0,01/74,8°	0,93/−13,7°	40,5
	100	0,52/ −75,9°	20,73/131,2°	0,02/62,5°	0,74/−24,3°	31,2
	200	0,41/−113,1°	13,17/113,0°	0,03/60,3°	0,57/−25,8°	24,9
	500	0,35/−164,2°	5,85/ 90,3°	0,06/65,2°	0,42/−17,6°	16,8
	800	0,34/−179,4°	3,76/ 81,3°	0,09/70,6°	0,44/−20,1°	13,0
	1000	0,37/+173,9°	3,04/ 75,8°	0,11/71,7°	0,43/−24,8°	11,2
	1200	0,44/+154,6°	2,63/ 69,7°	0,13/72,4°	0,38/−17,0°	10,0
20	40	0,58/ −44,3°	33,42/152,4°	0,01/72,4°	0,90/−15,8°	39,6
	100	0,45/ −89,5°	22,57/125,6°	0,02/61,8°	0,69/−25,0°	30,9
	200	0,38/−125,9°	13,53/108,7°	0,03/62,5°	0,53/−24,2°	24,8
	500	0,35/−171,5°	5,80/ 87,8°	0,06/68,0°	0,42/−15,0°	16,7
	800	0,35/+176,2°	3,68/ 79,4°	0,09/72,5°	0,44/−18,4°	12,8
	1000	0,38/+170/1°	3,01/ 74,2°	0,11/73,5°	0,43/−23,1°	11,1
	1200	0,46/+153,2°	2,63/ 69,3°	0,12/74,1°	0,38/−15,8°	10,1

s-parameters (common emitter) at V_{CE} = 10 V; typical values.

I_C mA	f MHz	s_{ie}	s_{fe}	s_{ie}	s_{oe}	G_{UM} dB
2	40	0,94/ −10,5°	6,35/173,2°	0,01/83,2°	1,00/ −3,5°	45,5
	100	0,89/ −26,1°	6,15/159,7°	0,03/74,7°	0,97/ −8,7°	34,6
	200	0,80/ −47,7°	5,37/144,2°	0,05/64,9°	0,91/−13,8°	26,5
	500	0,51/ −98,2°	3,40/108,9°	0,08/48,8°	0,72/−21,3°	15,1
	800	0,42/−126,1°	2,45/ 94,6°	0,10/50,0°	0,69/−25,0°	11,4
	1000	0,41/−144,2°	2,09/ 85,6°	0,11/52,1°	0,66/−29,0°	9,7
	1200	0,39/−170,5°	1,76/ 77,1°	0,12/53,1°	0,59/−28,1°	7,5
5	40	0,85/ −18,0°	14,09/168,2°	0,01/81,0°	0,99/ −6,3°	44,0
	100	0,76/ −41,4°	12,61/149,1°	0,03/69,2°	0,91/−14,4°	33,3
	200	0,61/ −70,9°	9,69/130,0°	0,04/60,1°	0,79/−19,9°	26,0
	500	0,38/−126,8°	5,04/ 99,2°	0,07/54,9°	0,57/−20,6°	16,5
	800	0,33/−152,2°	3,35/ 87,9°	0,08/61,2°	0,57/−22,7°	12,7
	1000	0,35/−165,9°	2,75/ 81,0°	0,10/64,0°	0,55/−26,4°	10,9
	1200	0,39/+168,5°	2,35/ 74,1°	0,11/65,4°	0,49/−22,3°	9,3
10	40	0,76/−25,9 °	22,67/161,9°	0,01/76,6°	0,96/ −9,8°	42,1
	100	0,63/ −57,9°	18,55/138,5°	0,02/65,1°	0,83/−19,2°	32,5
	200	0,47/ −91,5°	12,47/119,0°	0,03/59,8°	0,67/−22,4°	25,6
	500	0,33/−151,1°	5,82/ 93,0°	0,06/62,2°	0,50/−17,7°	17,1
	800	0,31/−169,4°	3,78/ 83,6°	0,08/68,4°	0,51/−19,6°	13,3
	1000	0,33/−178,6°	3,10/ 77,9°	0,10/70,0°	0,50/−23,5°	11,6
	1200	0,39/+158,8°	2,65/ 71,9°	0,12/70,8°	0,45/−17,8°	10,1
14	40	0,70/ −30,8°	27,63/158,1°	0,01/74,7°	0,95/−11,6°	41,5
	100	0,55/ −67,6°	20,66/133,4°	0,02/63,8°	0,78/−20,9°	32,0
	200	0,42/−102,5°	13,42/115,4°	0,03/60,9°	0,62/−22,4°	25,5
	500	0,32/−158,3°	5,97/ 91,4°	0,06/65,1°	0,48/−15,7°	17,1
	800	0,31/−174,4°	3,88/ 81,8°	0,08/70,5°	0,50/−18,3°	13,5
	1000	0,34/+177,7°	3,14/ 76,7°	0,10/71,9°	0,49/−22,2°	11,6
	1200	0,40/+156,0°	2,71/ 70,2°	0,12/72,3°	0,44/−15,9°	10,3
20	40	0,65/ −37,4°	32,19/154,4°	0,01/73,2°	0,92/−13,4°	40,8
	100	0,49/ −76,7°	22,74/127,9°	0,02/62,7°	0,73/−21,8°	31,7
	200	0,38/−112,6°	13,78/110,5°	0,03/62,3°	0,59/−21,1°	25,3
	500	0,32/−164,7°	6,05/ 88,6°	0,06/67,4°	0,47/−13,6°	17,2
	800	0,31/−179,0°	3,84/ 80,1°	0,08/72,4°	0,50/−16,8°	13,4
	1000	0,34/+173,5°	3,14/ 75,1°	0,10/73,1°	0,49/−21,0°	11,6
	1200	0,40/+155,0°	2,69/ 69,8°	0,12/73,6°	0,44/−14,7°	10,3

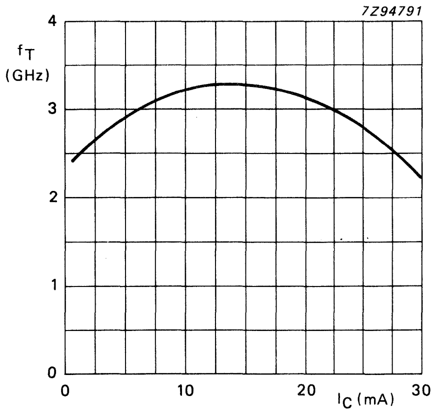


Fig. 3 V_{CE} = 5 V; f = 500 MHz; T_{amb} = 25 °C; typical values.

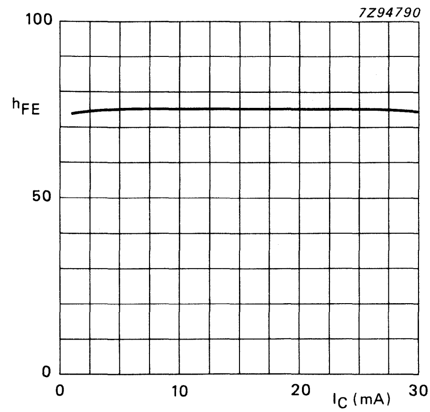


Fig. 4 V_{CE} = 1 V; T_{amb} = 25 °C; typical values.

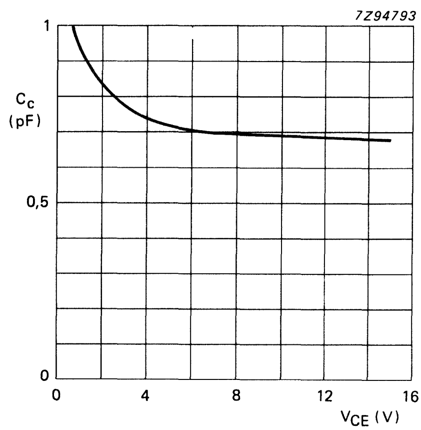


Fig. 5 I_E = 0; f = 1 MHz; T_{amb} = 25 °C; typical values.

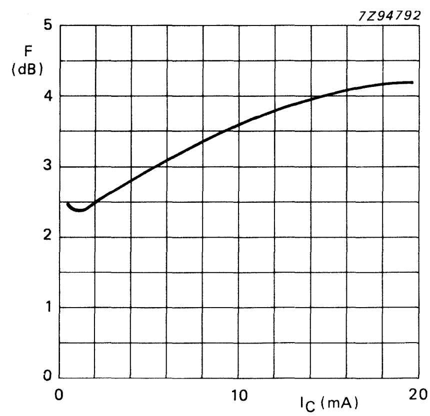


Fig. 6 V_{CE} = 5 V; T_{amb} = 25 °C; f = 800 MHz; Z_S = 60 Ω; typical values.

N-P-N H.F. WIDEBAND TRANSISTOR

N-P-N transistor in a plastic SOT-37 envelope. It is primarily intended for use in u.h.f. low power amplifiers such as in pocket phones, paging systems, etc. The transistor features low current consumption (100 μA — 1 mA); thanks to its high transition frequency, it also has excellent wideband properties and low noise up to high frequencies.

QUICK REFERENCE DATA

Collector-base voltage (open emitter)	V_{CBO}	max.	8	V
Collector-emitter voltage (open base)	V_{CEO}	max.	5	V
Collector current (d.c.)	I_C	max.	2,5	mA
Total power dissipation up to T_{amb} = 135 °C	P_{tot}	max.	30	mW
Junction temperature	T_j	max.	175	°C
Transition frequency at f = 500 MHz I_C = 1 mA; V_{CE} = 1 V	f_T	typ.	2,3	GHz
Feedback capacitance at f = 1 MHz I_C = 1 mA; V_{CE} = 1 V	C_{re}	max.	0,4	pF
Noise figure at optimum source impedance I_C = 1 mA; V_{CE} = 1 V; f = 500 MHz	F	typ.	3,8	dB
Max. unilateral power gain I_C = 1 mA; V_{CE} = 1 V; f = 500 MHz	G_{UM}	typ.	17	dB

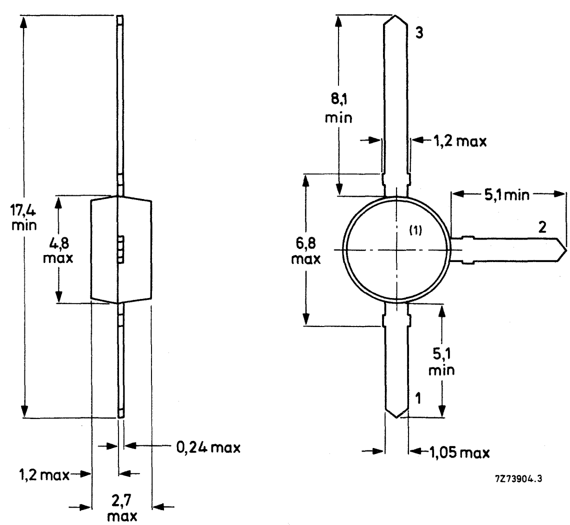
MECHANICAL DATA

Dimensions in mm

Fig. 1 SOT-37.

Connections

1. Base
2. Emitter
3. Collector



(1) = type number marking.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

Collector-base voltage (open emitter)	V_{CBO}	max.	8	V
Collector-emitter voltage (open base)	V_{CEO}	max.	5	V
Emitter-base voltage (open collector)	V_{EBO}	max.	2	V
Collector current (d.c.)	I_C	max.	2,5	mA
Collector current (peak value; f > 1 MHz)	I_{CM}	max.	5,0	mA
Total power dissipation up to T_{amb} = 135 °C	P_{tot}	max.	30	mW
Storage temperature	T_{stg}	–65 to + 150		°C
→ Junction temperature	T_j	max.	175	°C

THERMAL RESISTANCE

From junction to ambient in free air mounted on a glass-fibre print of 40 mm x 25 mm x 1 mm (see Fig. 2)	$R_{th\ j\text{-}a}$	=	500	K/W

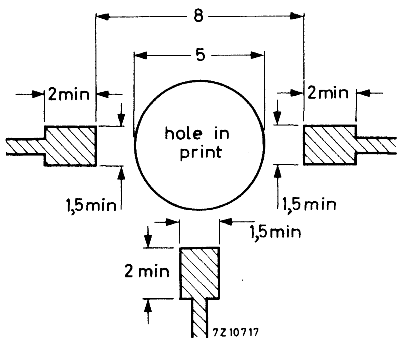


Fig. 2 Requirements for glass-fibre print. Dimensions in mm.

CHARACTERISTICS

T_j = 25 °C unless otherwise specified

Collector cut-off current				
$I_E = 0$; $V_{CB} = 5$ V	I_{CBO}	max.	50	nA
D.C. current gain				
$I_C = 10\ \mu A$; $V_{CE} = 1$ V	h_{FE}	min.	20	
		typ.	30	
$I_C = 1$ mA; $V_{CE} = 1$ V	h_{FE}	min.	20	
		typ.	40	
Saturation voltages				
$I_C = 10\ \mu A$; $I_B = 1\ \mu A$	V_{CEsat}	max.	200	mV
	V_{BEsat}	max.	750	mV
$I_C = 1$ mA; $I_B = 0{,}1$ mA	V_{CEsat}	max.	175	mV
	V_{BEsat}	max.	900	mV
Transition frequency at f = 500 MHz				
$I_C = 1$ mA; $V_{CE} = 1$ V	f_T	min.	1,2	GHz
		typ.	2,3	GHz
Collector capacitance at f = 1 MHz				
$I_E = I_e = 0$; $V_{CB} = 0{,}5$ V	C_c	max.	0,55	pF
Emitter capacitance at f = 1 MHz				
$I_C = I_c = 0$; $V_{EB} = 0$	C_e	max.	0,45	pF
Feedback capacitance at f = 1 MHz				
$I_C = 1$ mA; $V_{CE} = 1$ V; $T_{amb} = 25$ °C	C_{re}	max.	0,4	pF
Noise figure at optimum source impedance				
$I_C = 0{,}1$ mA; $V_{CE} = 1$ V; f = 500 MHz; $T_{amb} = 25$ °C	F	typ.	5,5	dB
$I_C = 1$ mA; $V_{CE} = 1$ V; f = 500 MHz; $T_{amb} = 25$ °C	F	typ.	3,8	dB
Max. unilateral power gain (s_{re} assumed to be zero)				
$G_{UM} = 10 \log \dfrac{\lvert s_{fe}\rvert^2}{(1-\lvert s_{ie}\rvert^2)(1-\lvert s_{oe}\rvert^2)}$				
$I_C = 1$ mA; $V_{CE} = 1$ V; f = 200 MHz; $T_{amb} = 25$ °C	G_{UM}	typ.	24	dB
$I_C = 1$ mA; $V_{CE} = 1$ V; f = 500 MHz; $T_{amb} = 25$ °C	G_{UM}	typ.	17	dB
$I_C = 1$ mA; $V_{CE} = 1$ V; f = 800 MHz; $T_{amb} = 25$ °C	G_{UM}	typ.	11	dB

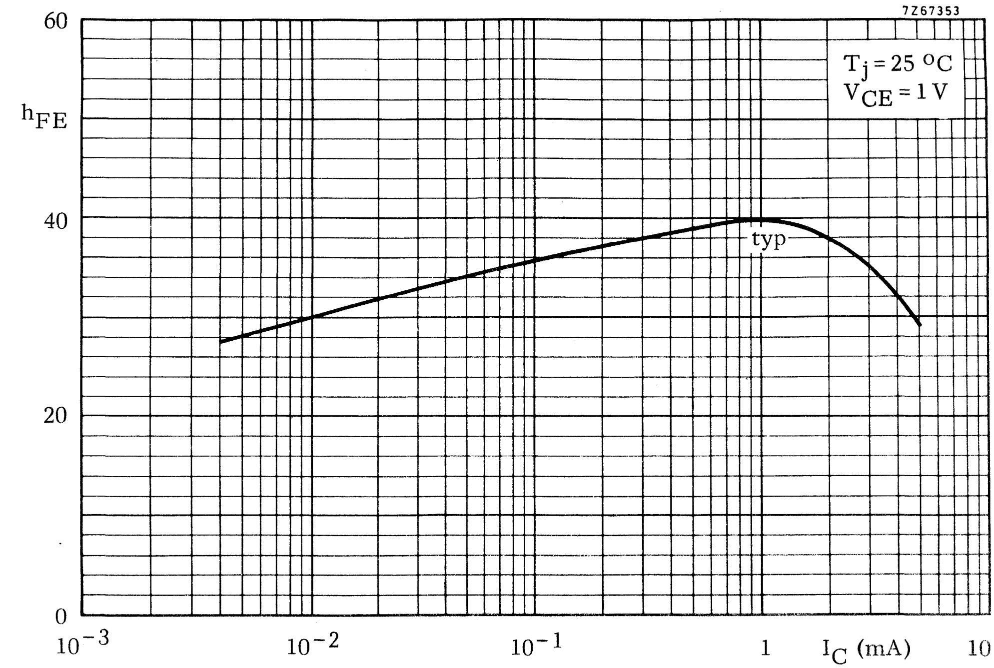


Fig. 3 $V_{CE} = 1$ V; $T_j = 25\ ^oC$; typical values.

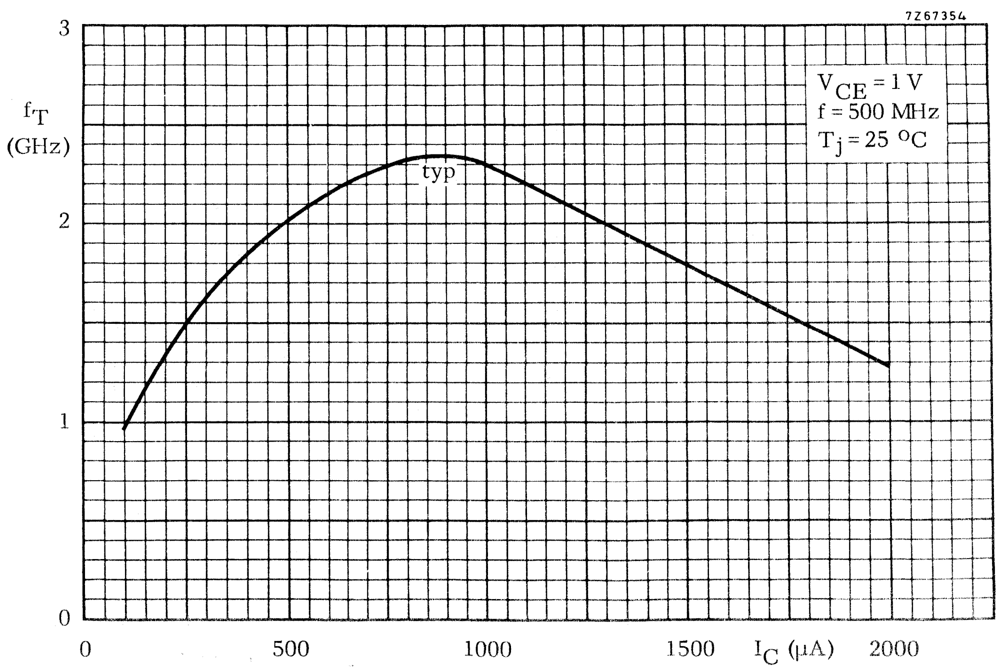


Fig. 4 $V_{CE} = 1$ V; f = 500 MHz; $T_j = 25\ ^oC$; typical values.

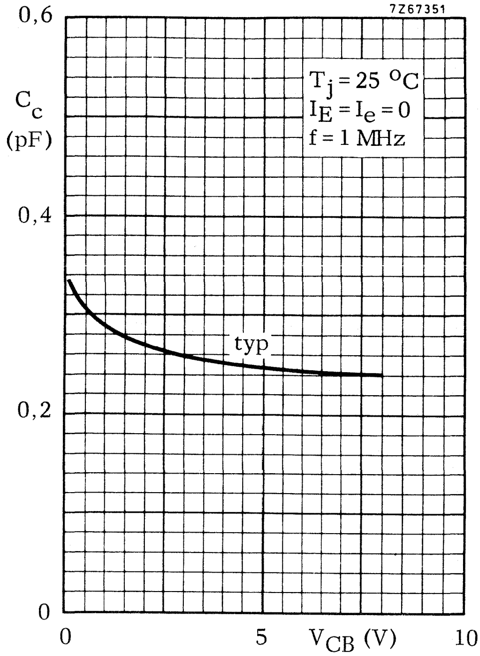


Fig. 5 $I_E = I_e = 0$; f = 1 MHz; $T_j = 25\ ^oC$; typical values.

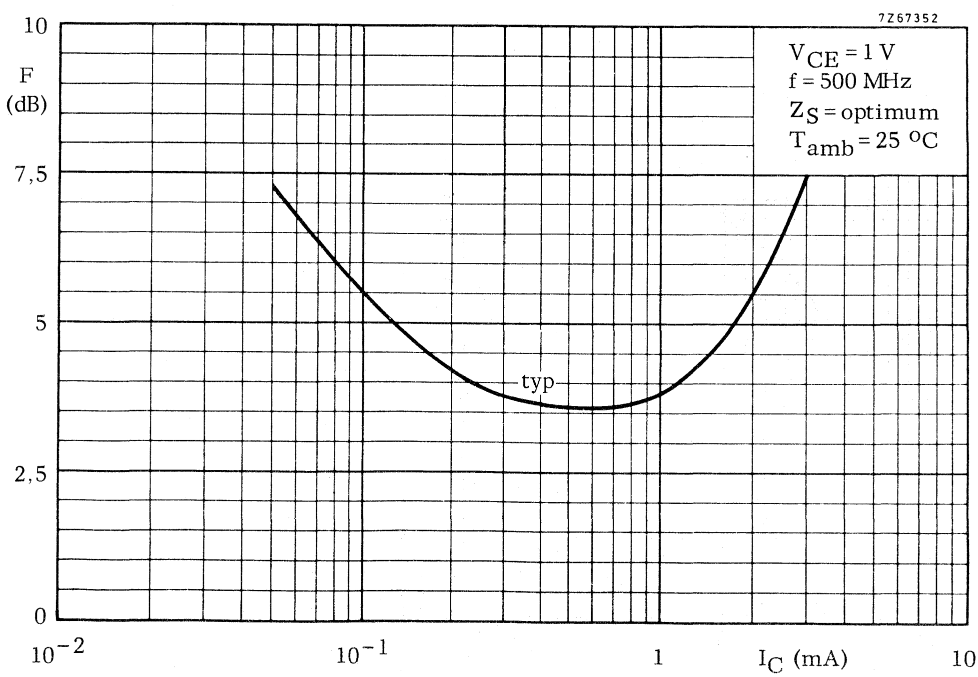


Fig. 6 $V_{CE} = 1$ V; f = 500 MHz; Z_S = opt.; $T_{amb} = 25\ ^oC$; typical values.

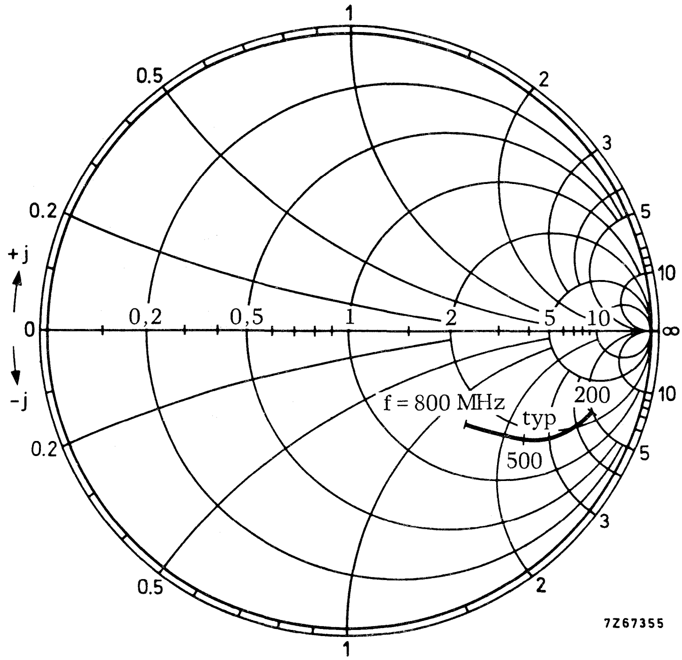


Fig. 7 $V_{CE} = 1$ V; $I_C = 1$ mA; $T_{amb} = 25$ °C; typical values.

Input impedance derived from input reflection coefficient s_{ie} coordinates in ohm x 50

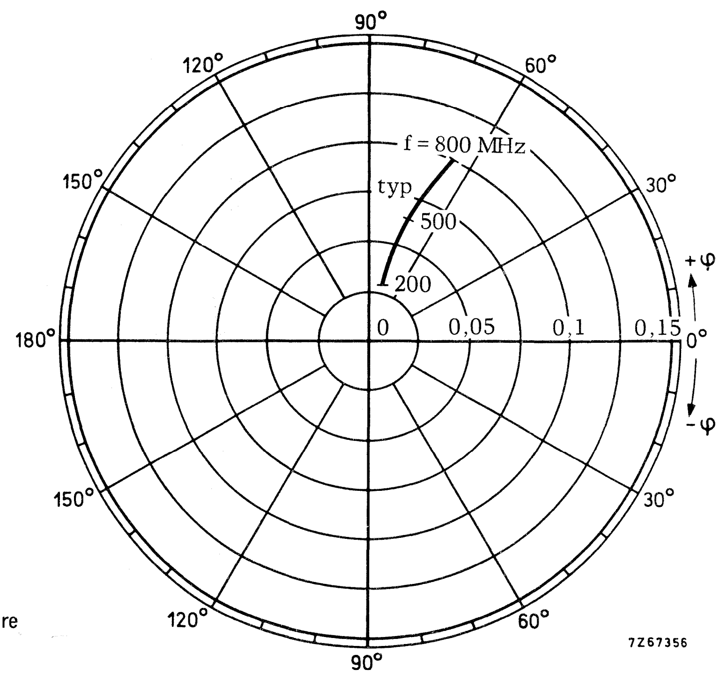


Fig. 8 $V_{CE} = 1$ V; $I_C = 1$ mA; $T_{amb} = 25$ °C; typical values.

Reverse transmission coefficient s_{re}

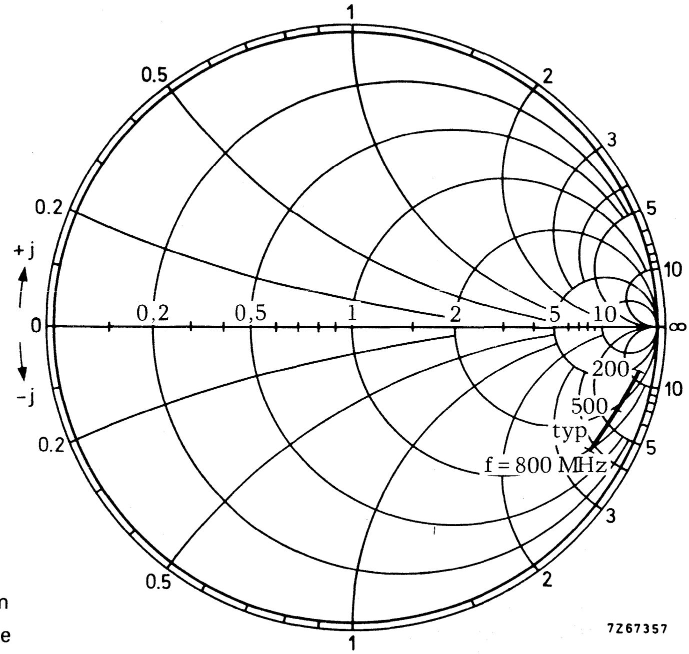


Fig. 9 V_{CE} = 1 V; I_C = 1 mA; T_{amb} = 25 °C; typical values.

Output impedance derived from output reflection coefficient s_{oe} coordinates in ohm x 50

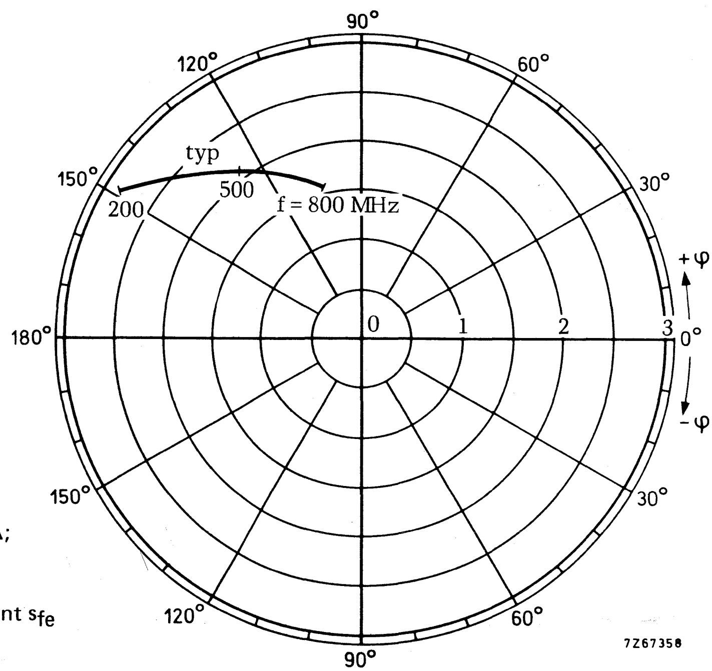


Fig. 10 V_{CE} = 1 V; I_C = 1 mA; T_{amb} = 25 °C; typical values.

Forward transmission coefficient s_{fe}

N-P-N H.F. WIDEBAND TRANSISTOR

N-P-N transistor in a plastic SOT-23 envelope, primarily intended for use in u.h.f. low power amplifiers in thick and thin-film circuits, such as in pocket phones, paging systems, etc. The transistor features low current consumption (100 μA – 1 mA); thanks to its high transition frequency, it also has excellent wideband properties and low noise up to high frequencies.

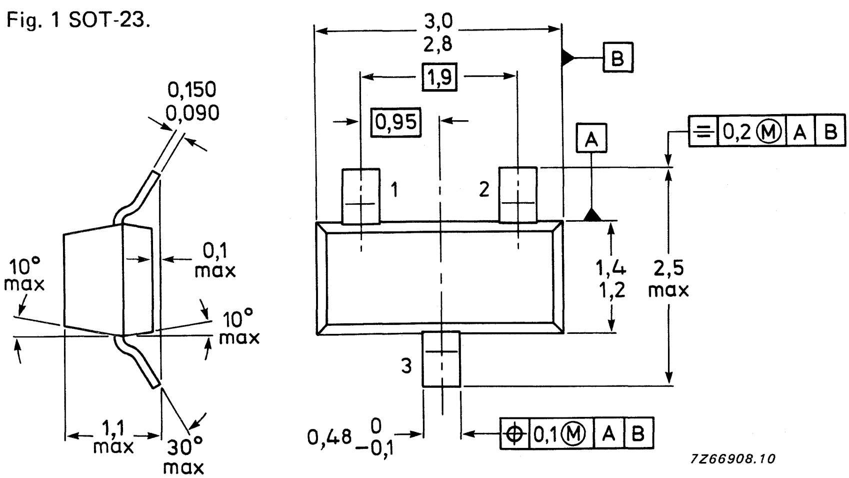
QUICK REFERENCE DATA

Collector-base voltage (open emitter)	V_{CBO}	max.	8	V
Collector-emitter voltage (open base)	V_{CEO}	max.	5	V
Collector current (d.c.)	I_C	max.	6,5	mA
Total power dissipation up to T_{amb} = 25 °C	P_{tot}	max.	300	mW ←
Junction temperature	T_j	max.	175	°C ←
Transition frequency at f = 500 MHz I_C = 1 mA; V_{CE} = 1 V	f_T	typ.	2,3	GHz
Feedback capacitance at f = 1 MHz I_C = 1 mA; V_{CE} = 1 V	C_{re}	max.	0,45	pF
Noise figure at optimum source impedance I_C = 1 mA; V_{CE} = 1 V; f = 500 MHz	F	typ.	3,8	dB
Max. unilateral power gain I_C = 1 mA; V_{CE} = 1 V; f = 500 MHz	G_{UM}	typ.	18	dB

MECHANICAL DATA

Dimensions in mm

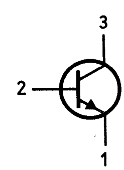
Fig. 1 SOT-23.



TOP VIEW

Marking code

BFT25 = V1



If required, the R-version (reverse pinning) is available on request.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

Collector-base voltage (open emitter)	V_{CBO}	max.	8	V
Collector-emitter voltage (open base)	V_{CEO}	max.	5	V
Emitter-base voltage (open collector)	V_{EBO}	max.	2	V
Collector current (d.c.)	I_C	max.	6,5	mA
Collector current (peak value; f > 1 MHz)	I_{CM}	max.	10	mA
→ Total power dissipation up to T_{amb} = 25 °C	P_{tot}	max.	300	mW
Storage temperature	T_{stg}	−65 to + 150		°C
→ Junction temperature	T_j	max.	175	°C

THERMAL RESISTANCE

→ From junction to ambient*	$R_{th\ j\text{-}a}$	=	430	K/W

CHARACTERISTICS

T_j = 25 °C unless otherwise specified

Collector cut-off current				
$I_E = 0$; $V_{CB} = 5$ V	I_{CBO}	max.	50	nA
D.C. current gain				
$I_C = 10$ µA; $V_{CE} = 1$ V	h_{FE}	min.	20	
		typ.	30	
$I_C = 1$ mA; $V_{CE} = 1$ V	h_{FE}	min.	20	
		typ.	40	
Saturation voltages				
$I_C = 10$ µA; $I_B = 1$ µA	V_{CEsat}	max.	200	mV
	V_{BEsat}	max.	750	mV
$I_C = 1$ mA; $I_B = 0,1$ mA	V_{CEsat}	max.	175	mV
	V_{BEsat}	max.	900	mV
Transition frequency at f = 500 MHz				
$I_C = 1$ mA; $V_{CE} = 1$ V	f_T	min.	1,2	GHz
		typ.	2,3	GHz

* Mounted on a ceramic substrate of 8 mm x 10 mm x 0,7 mm.

Collector capacitance at f = 1 MHz			
$I_E = I_e = 0$; $V_{CB} = 0{,}5$ V	C_c	max.	0,6 pF
Emitter capacitance at f = 1 MHz			
$I_C = I_c = 0$; $V_{EB} = 0$	C_e	max.	0,5 pF
Feedback capacitance at f = 1 MHz			
I_C = 1 mA; V_{CE} = 1 V; T_{amb} = 25 °C	C_{re}	max.	0,45 pF
Noise figure at optimum source impedance			
I_C = 0,1 mA; V_{CE} = 1 V; f = 500 MHz; T_{amb} = 25 °C	F	typ.	5,5 dB
I_C = 1 mA; V_{CE} = 1 V; f = 500 MHz; T_{amb} = 25 °C	F	typ.	3,8 dB
Maximum unilateral power gain (s_{re} assumed to be zero)			

$$G_{UM} \text{ (in dB)} = 10 \log \frac{|s_{fe}|^2}{(1 - |s_{ie}|^2)(1 - |s_{oe}|^2)}$$

I_C = 1 mA; V_{CE} = 1 V; f = 200 MHz; T_{amb} = 25 °C	G_{UM}	typ.	25,0 dB
I_C = 1 mA; V_{CE} = 1 V; f = 500 MHz; T_{amb} = 25 °C	G_{UM}	typ.	18,0 dB
I_C = 1 mA; V_{CE} = 1 V; f = 800 MHz; T_{amb} = 25 °C	G_{UM}	typ.	12,0 dB

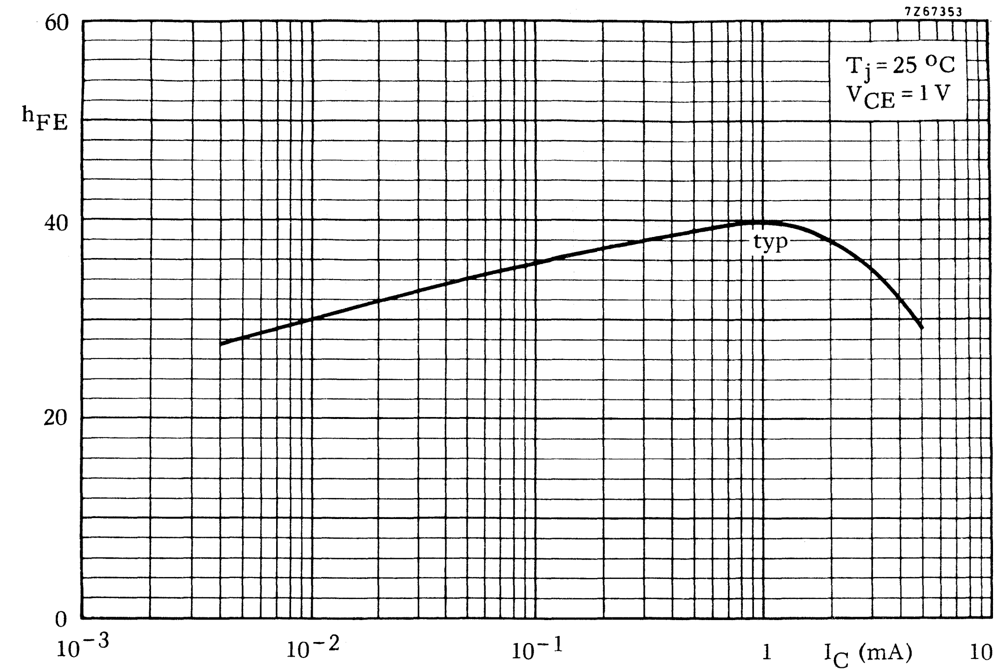


Fig. 2 $V_{CE} = 1$ V; $T_j = 25\ ^oC$; typical values.

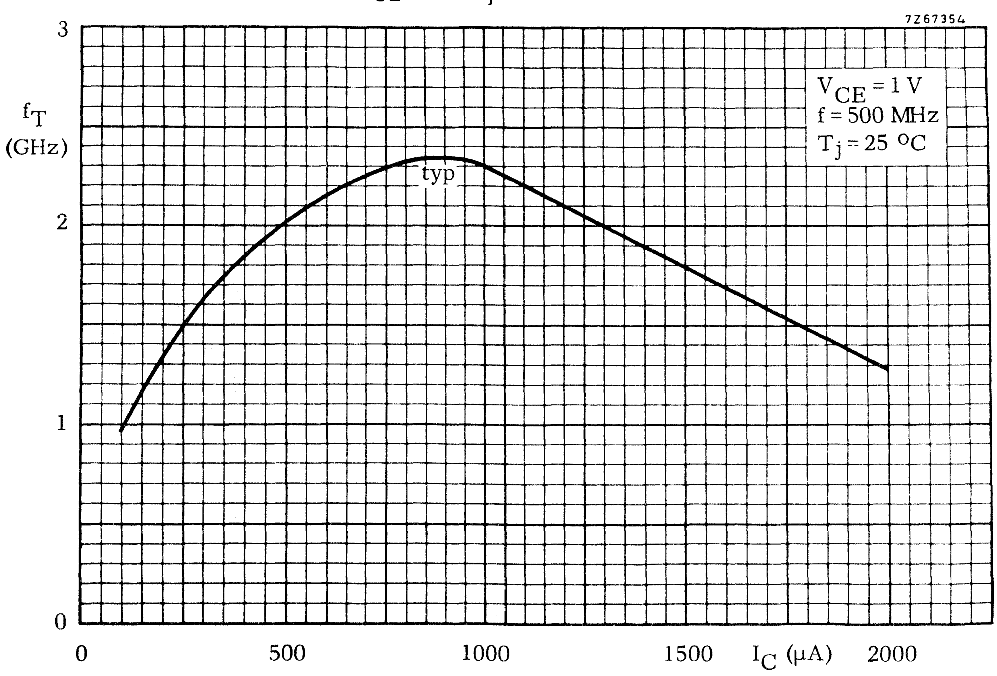


Fig. 3 $V_{CE} = 1$ V; f = 500 MHz; $T_j = 25\ ^oC$; typical values.

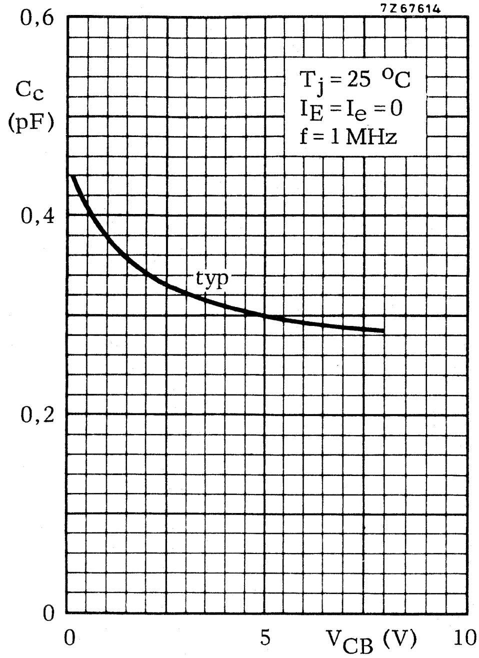


Fig. 4 $I_E = I_e = 0$; f = 1 MHz; $T_j = 25\ ^oC$; typical values.

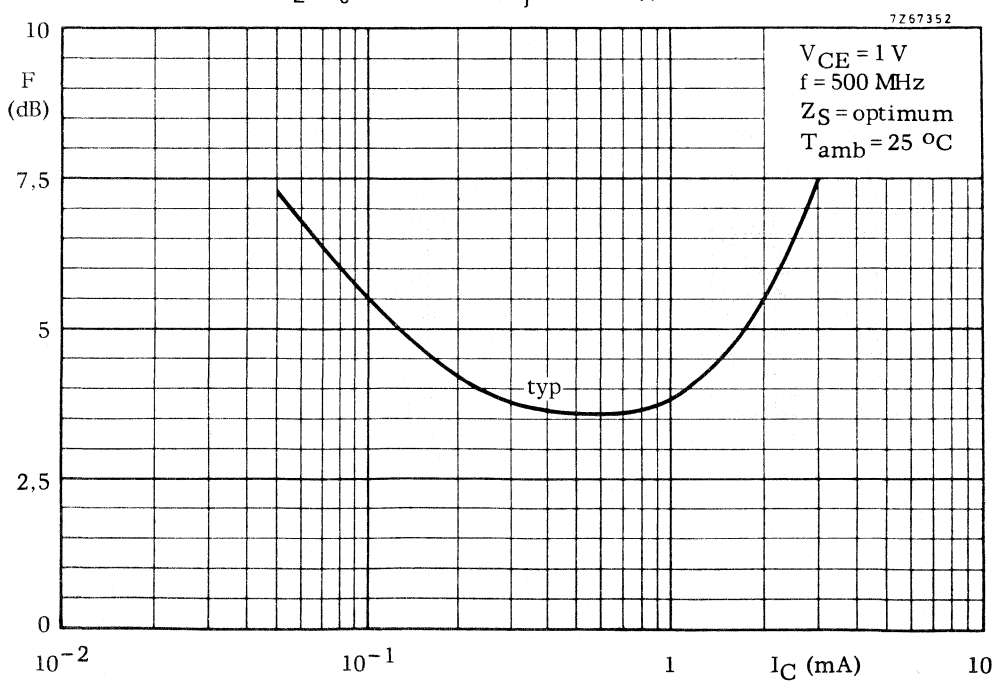


Fig. 5 $V_{CE} = 1$ V; f = 500 MHz; Z_S = opt.; $T_{amb} = 25\ ^oC$; typical values.

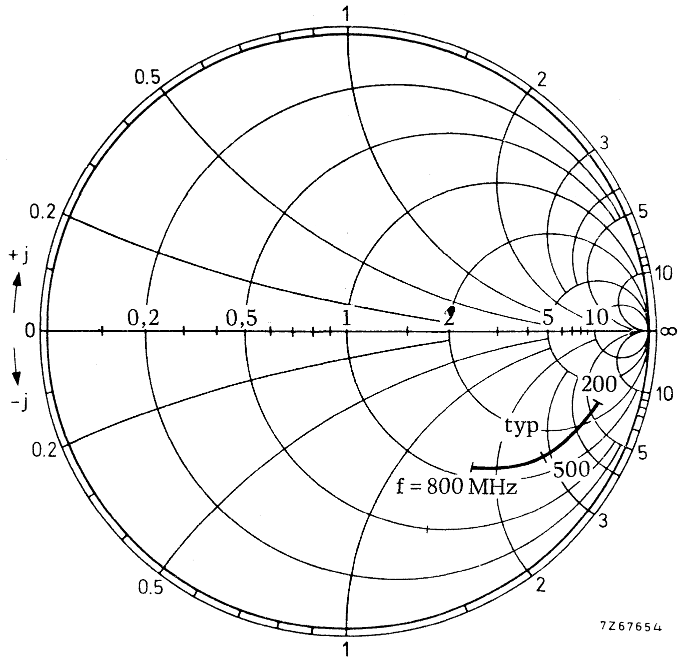


Fig. 6 V_{CE} = 1 V; I_C = 1 mA; T_{amb} = 25 °C; typical values.

Input impedance derived from input reflection coefficient s_{ie} coordinates in ohm x 50

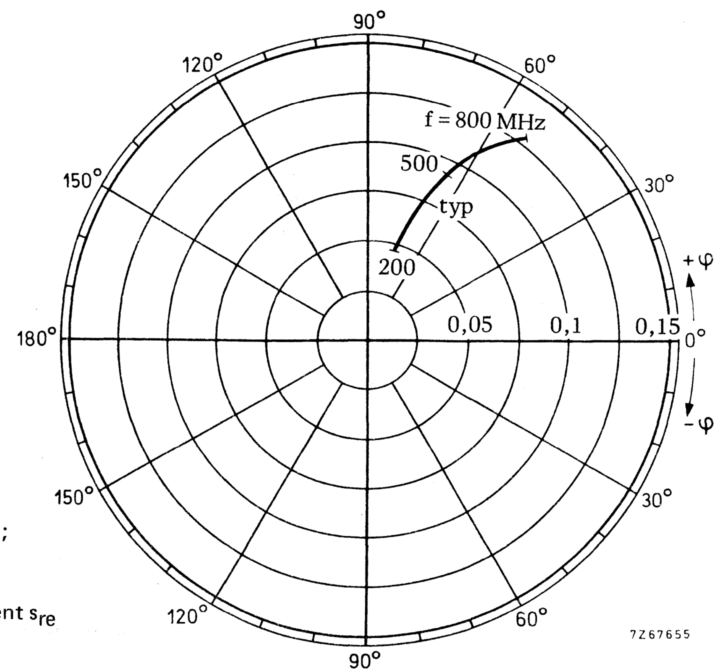


Fig. 7 V_{CE} = 1 V; I_C = 1 mA; T_{amb} = 25 °C; typical values.

Reverse transmission coefficient s_{re}

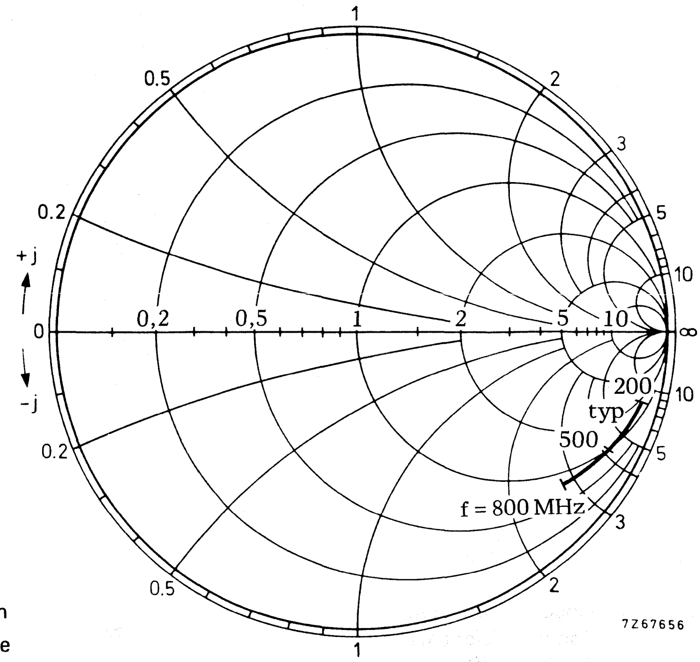


Fig. 8 V_{CE} = 1 V; I_C = 1 mA; T_{amb} = 25 °C; typical values.

Output impedance derived from output reflection coefficient s_{oe} coordinates in ohm x 50

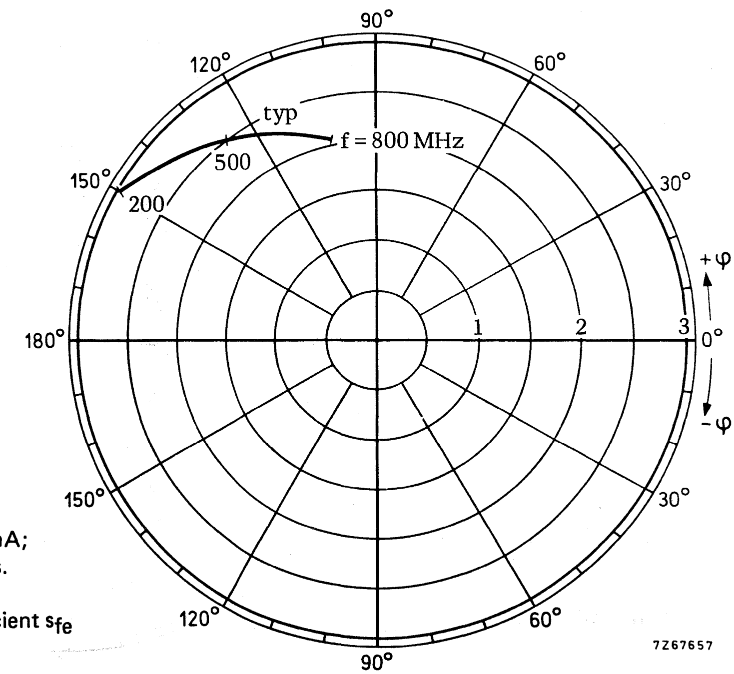


Fig. 9 V_{CE} = 1 V; I_C = 1 mA; T_{amb} = 25 °C; typical values.

Forward transmission coefficient s_{fe}

SILICON PLANAR EPITAXIAL TRANSISTORS

P-N-P transistor in a microminiature plastic envelope. It is primarily intended for use in u.h.f. and microwave amplifiers in thick and thin-film circuits, such as in aerial amplifiers, radar systems, oscilloscopes, spectrum analysers, etc.

The transistor features low intermodulation distortion and high power gain; thanks to its very high transition frequency, it also has excellent wideband properties and low noise up to high frequencies.

N-P-N complements are BFR92 and BFR92A.

QUICK REFERENCE DATA

Collector-base voltage (open emitter)	$-V_{CBO}$	max.	20	V
Collector-emitter voltage (open base)	$-V_{CEO}$	max.	15	V
Collector current (d.c.)	$-I_C$	max.	25	mA
Total power dissipation up to T_{amb} = 25 °C	P_{tot}	max.	300	mW ←
Junction temperature	T_j	max.	175	°C ←
Transition frequency at f = 500 MHz $-I_C$ = 14 mA; $-V_{CE}$ = 10 V	f_T	typ.	5	GHz
Feedback capacitance at f = 1 MHz $-I_C$ = 2 mA; $-V_{CE}$ = 10 V; T_{amb} = 25 °C	C_{re}	typ.	0,7	pF
Noise figure at optimum source impedance $-I_C$ = 2 mA; $-V_{CE}$ = 10 V; f = 500 MHz; T_{amb} = 25 °C	F	typ.	2,7	dB
Max. unilateral power gain $-I_C$ = 14 mA; $-V_{CE}$ = 10 V; f = 500 MHz; T_{amb} = 25 °C	G_{UM}	typ.	18	dB
Intermodulation distortion at T_{amb} = 25 °C $-I_C$ = 14 mA; $-V_{CE}$ = 10 V; R_L = 75 Ω; V_o = 150 mV $f_{(p+q-r)}$ = 493,25 MHz	d_{im}	typ.	−60	dB

MECHANICAL DATA

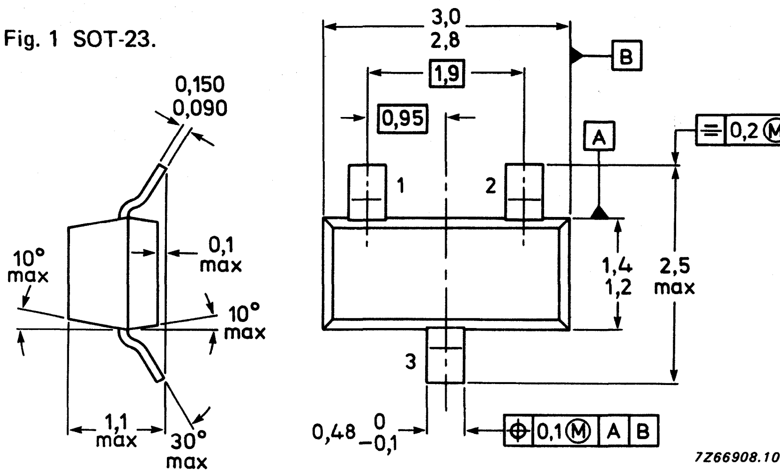
(See next page).

See also *Soldering recommendations.*

MECHANICAL DATA

Fig. 1 SOT-23.

Dimensions in mm

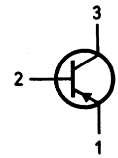


TOP VIEW

If required, the R-version (reverse pinning) is available on request.

Marking code

BFT92 = W1



RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

Collector-base voltage (open emitter)	$-V_{CBO}$	max.	20	V
Collector-emitter voltage (open base)	$-V_{CEO}$	max.	15	V
Emitter-base voltage (open collector)	$-V_{EBO}$	max.	2	V
Collector current (d.c.)	$-I_C$	max.	25	mA
Collector current (peak value; f > 1 MHz)	$-I_{CM}$	max.	35	mA
Total power dissipation up to T_{amb} = 25 °C	P_{tot}	max.	300	mW
Storage temperature	T_{stg}		−65 to + 150	°C
Junction temperature	T_j	max.	175	°C

THERMAL RESISTANCE

From junction to ambient*	$R_{th\ j\text{-}a}$	=	430 K/W

* Mounted on a ceramic substrate of 8 mm x 10 mm x 0,7 mm.

CHARACTERISTICS

T_j = 25 °C unless otherwise specified

Collector cut-off current $I_E = 0; -V_{CB} = 10$ V	$-I_{CBO}$	max.	50 nA
D.C. current gain $-I_C = 14$ mA; $-V_{CE} = 10$ V	h_{FE}	min. typ.	20 50
Transition frequency at f = 500 MHz $-I_C = 14$ mA; $-V_{CE} = 10$ V	f_T	typ.	5,0 GHz
Collector capacitance at f = 1 MHz $I_E = I_e = 0; -V_{CB} = 10$ V	C_c	typ.	0,75 pF
Emitter capacitance at f = 1 MHz $I_C = I_c = 0; -V_{EB} = 0{,}5$ V	C_e	typ.	0,8 pF

T_{amb} = 25 °C

Feedback capacitance at f = 1 MHz $-I_C = 2$ mA; $-V_{CE} = 10$ V	C_{re}	typ.	0,7 pF
Noise figure at optimum source impedance * $-I_C = 2$ mA; $-V_{CE} = 10$ V; f = 500 MHz	F	typ.	2,7 dB
Max. unilateral power gain (s_{re} assumed to be zero) $G_{UM} = 10 \log \frac{\lvert s_{fe}\rvert^2}{(1 - \lvert s_{ie}\rvert^2)(1 - \lvert s_{oe}\rvert^2)}$ $-I_C = 14$ mA; $-V_{CE} = 10$ V; f = 500 MHz	G_{UM}	typ.	18,0 dB
Output voltage at $d_{im} = -60$ dB (see Fig. 2) (DIN 45004B, par. 6.3.: 3-tone) $-I_C = 14$ mA; $-V_{CE} = 10$ V; $R_L = 75\ \Omega$ $V_p = V_o$ at $d_{im} = -60$ dB; $f_p = 495{,}25$ MHz $V_q = V_o - 6$ dB ; $f_q = 503{,}25$ MHz $R_r = V_o - 6$ dB ; $f_r = 505{,}25$ MHz measured at $f_{(p+q-r)} = 493{,}25$ MHz	V_o	typ.	150 mV

* Crystal mounted in SOT-37 envelope.

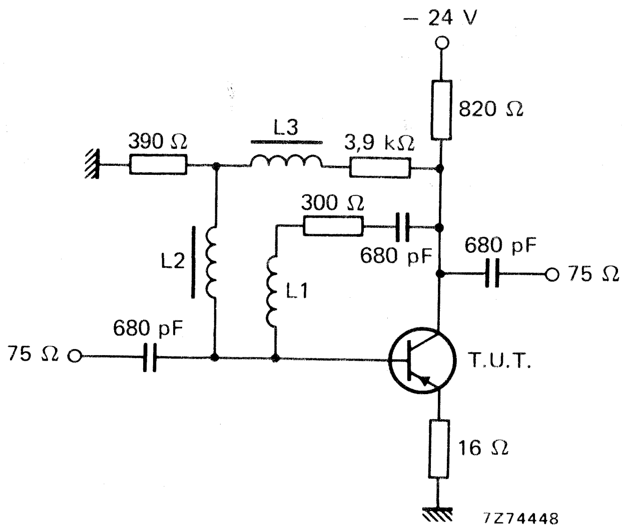


Fig. 2 Intermodulation test circuit.

L1 = 4 turns Cu wire (0,35 mm); winding pitch 1 mm; int. dia. 4 mm.
L2 = L3 = 5 μH (catalogue number: 3122 108 20150).

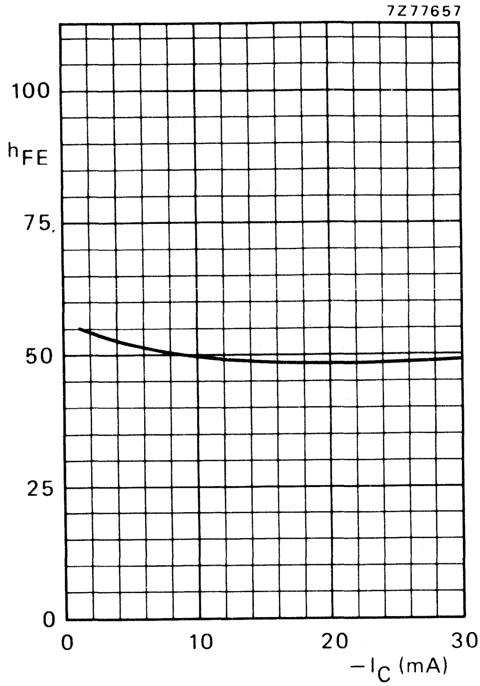


Fig. 3 $-V_{CE}$ = 10 V; T_j = 25 ^oC; typical values.

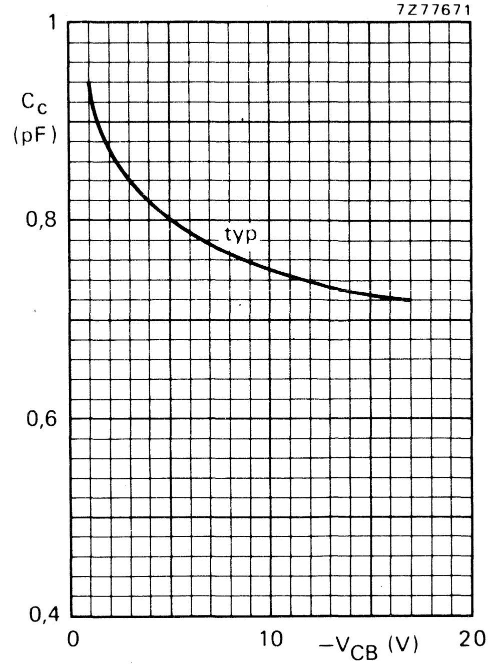


Fig. 4 $I_E = I_e = 0$; T_j = 25 ^oC; f = 1 MHz; typical values.

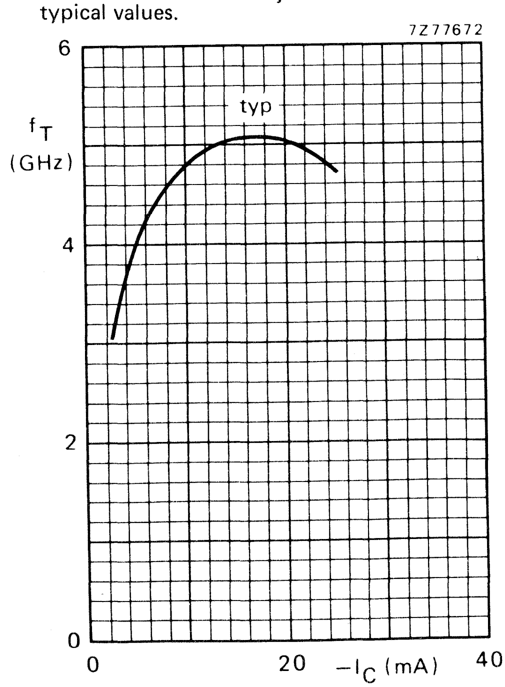


Fig. 5 $-V_{CE}$ = 10 V; f = 500 MHz; T_j = 25 ^oC; typical values.

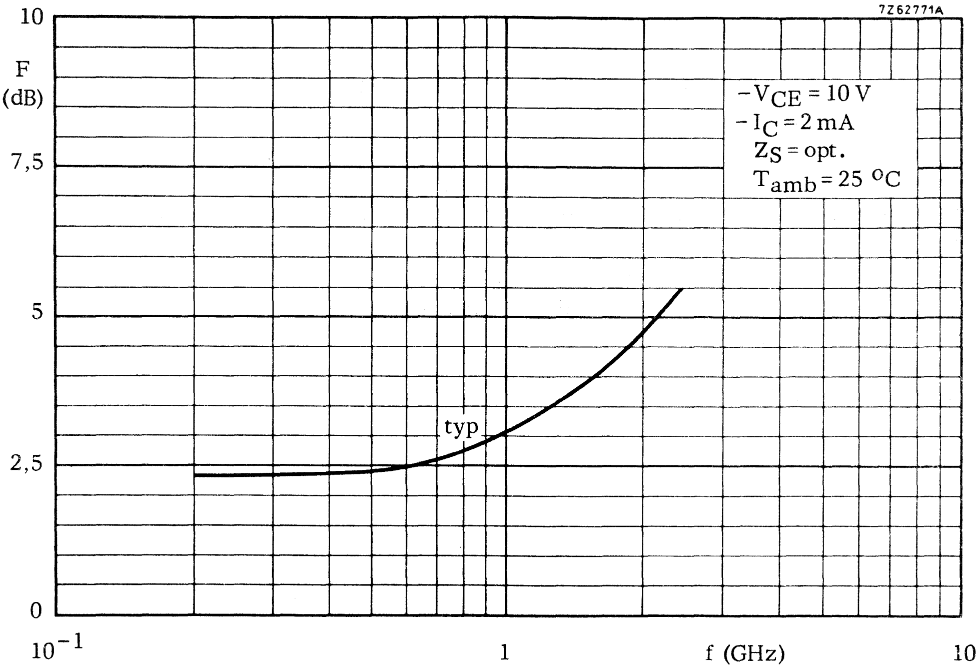


Fig. 6 $-V_{CE} = 10$ V; $-I_C = 2$ mA; Z_S = opt.; $T_{amb} = 25$ °C; typical values.

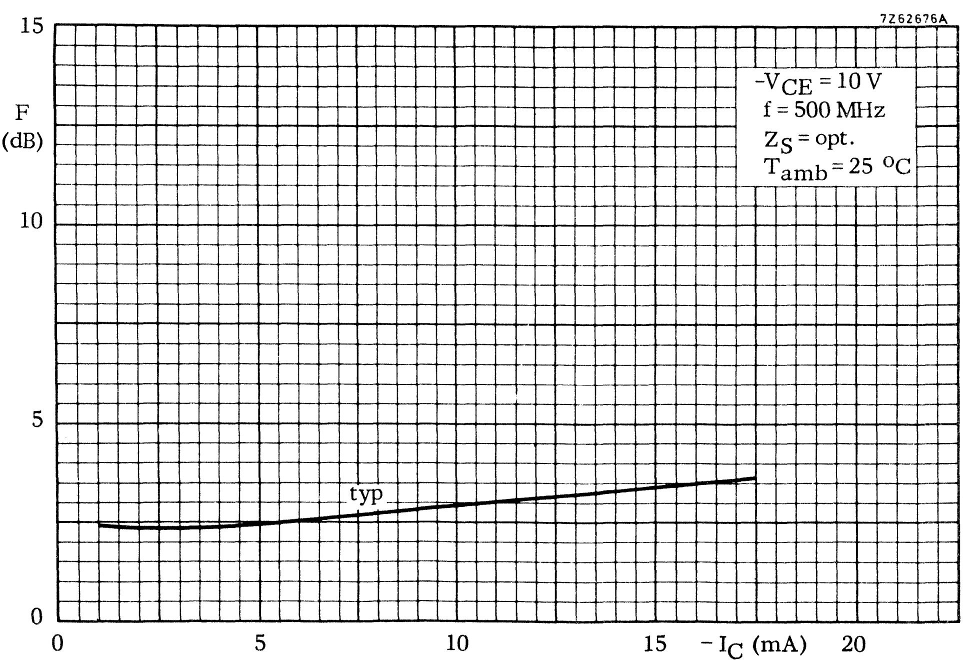


Fig. 7 $-V_{CE} = 10$ V; f = 500 MHz; Z_S = opt.; $T_{amb} = 25$ °C; typical values.

P-N-P 1 GHz WIDEBAND TRANSISTOR

P-N-P transistor in a plastic SOT-23 envelope. It is primarily intended for use in u.h.f. and microwave amplifiers in thick and thin-film circuits, such as in aerial amplifiers, radar systems, oscilloscopes, spectrum analyses, etc.

The transistor features low intermodulation distortion and high power gain; thanks to its very high transition frequency, it also has excellent wideband properties and low noise up to high frequencies.

N-P-N complements are BFR93 and BFR93A.

QUICK REFERENCE DATA

Collector-base voltage (open emitter)	$-V_{CBO}$	max.	15	V
Collector-emitter voltage (open base)	$-V_{CEO}$	max.	12	V
Collector current (d.c.)	$-I_C$	max.	35	mA
Total power dissipation up to T_{amb} = 25 °C	P_{tot}	max.	300	mW ←
Junction temperature	T_j	max.	175	°C ←
Transition frequency at f = 500 MHz $-I_C$ = 30 mA; $-V_{CE}$ = 5 V	f_T	typ.	5,0	GHz
Feedback capacitance at f = 1 MHz $-I_C$ = 2 mA; $-V_{CE}$ = 5 V	C_{re}	typ.	1,0	pF
Noise figure at optimum source impedance $-I_C$ = 2 mA; $-V_{CE}$ = 5 V; f = 500 MHz	F	typ.	2,4	dB
Max. unilateral power gain $-I_C$ = 30 mA; $-V_{CE}$ = 5 V; f = 500 MHz	G_{UM}	typ.	16,5	dB
Output voltage at d_{im} = −60 dB $-I_C$ = 30 mA; $-V_{CE}$ = 5 V; R_L = 75 Ω $f_{(p+q-r)}$ = 493,25 MHz	V_o	typ.	300	mV

MECHANICAL DATA

Dimensions in mm

Marking code

BFT93 = X1

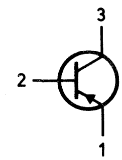
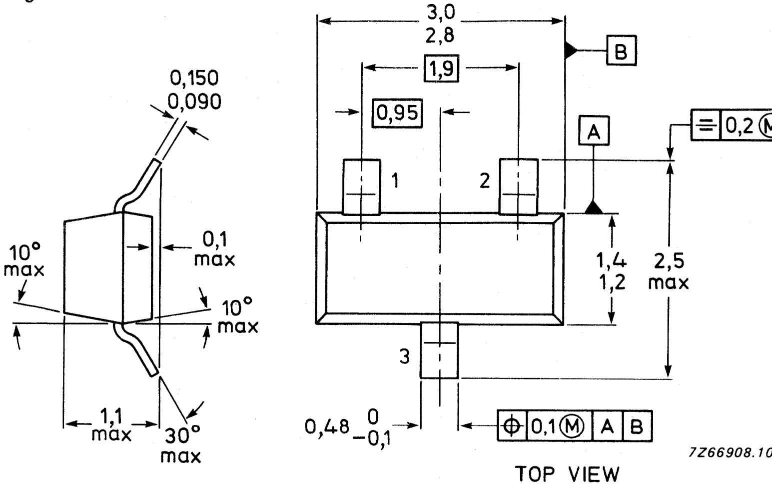


Fig. 1 SOT-23.



If required, the R-version (reverse pinning) is available on request.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

Collector-base voltage (open emitter)	$-V_{CBO}$	max.	15	V
Collector-emitter voltage (open base)	$-V_{CEO}$	max.	12	V
Emitter-base voltage (open collector)	$-V_{EBO}$	max.	2	V
Collector current (d.c.)	$-I_C$	max.	35	mA
Collector current (peak value; f > 1 MHz)	$-I_{CM}$	max.	50	mA
Total power dissipation up to T_{amb} = 25 °C	P_{tot}	max.	300	mW
Storage temperature	T_{stg}		−65 to + 150	°C
Junction temperature	T_j	max.	175	°C

THERMAL RESISTANCE

From junction to ambient*	$R_{th\ j\text{-}a}$	=	430 K/W

* Mounted on a ceramic substrate of 8 mm x 10 mm x 0,7 mm.

CHARACTERISTICS

T_j = 25 °C unless otherwise specified

Collector cut-off current $I_E = 0; -V_{CB} = 5$ V	$-I_{CBO}$	max.	50 nA
D.C. current gain $-I_C = 30$ mA; $-V_{CE} = 5$ V	h_{FE}	min. typ.	20 50
Transition frequency at f = 500 MHz $-I_C = 30$ mA; $-V_{CE} = 5$ V	f_T	typ.	5,0 GHz
Collector capacitance at f = 1 MHz $I_E = I_e = 0; -V_{CB} = 10$ V	C_c	typ.	0,95 pF
Emitter capacitance at f = 1 MHz $I_C = I_c = 0; -V_{EB} = 0,5$ V	C_e	typ.	1,8 pF

T_{amb} = 25 °C

Feedback capacitance at f = 1 MHz $-I_C = 2$ mA; $-V_{CE} = 5$ V	C_{re}	typ.	1,0 pF
Noise figure at optimum source impedance * $-I_C = 2$ mA; $-V_{CE} = 5$ V; f = 500 MHz	F	typ.	2,4 dB
Max. unilateral power gain (s_{re} assumed to be zero) $G_{UM} = 10 \log \frac{\lvert s_{fe}\rvert^2}{(1 - \lvert s_{ie}\rvert^2)(1 - \lvert s_{oe}\rvert^2)}$ $-I_C = 30$ mA; $-V_{CE} = 5$ V; f = 500 MHz	G_{UM}	typ.	16,5 dB
Output voltage at d_{im} = −60 dB (see Fig. 2) $-I_C = 30$ mA; $-V_{CE} = 5$ V; $R_L = 75\ \Omega$ $V_p = V_o$ at d_{im} = −60 dB; f_p = 495,25 MHz $V_q = V_o$ −6 dB ; f_q = 503,25 MHz $V_r = V_o$ −6 dB ; f_r = 505,25 MHz measured at $f_{(p+q-r)}$ = 443,25 MHz	V_o	typ.	300 mV

* Crystal mounted in SOT-37 envelope.

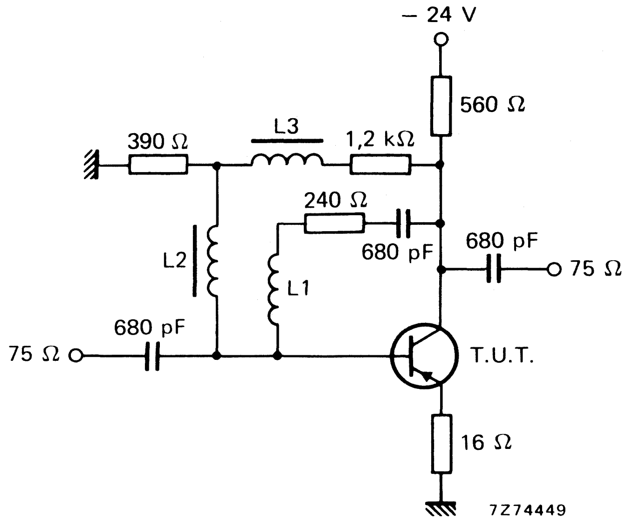


Fig. 2 Intermodulation test circuit.

L1 = 4 turns Cu wire (0,35); winding pitch 1 mm; int. dia. 4 mm.
L2 and L3 = 5 μH (catalogue number: 3122 108 20150).

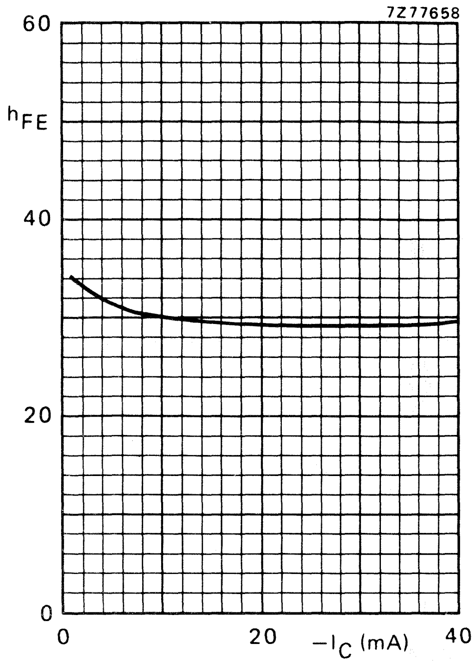


Fig. 3 $-V_{CE}$ = 5 V; T_j = 25 °C; typical values.

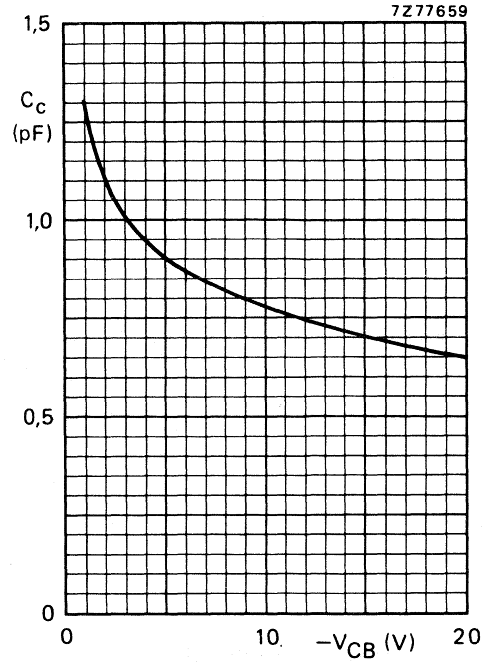


Fig. 4 $I_E = I_e = 0$; T_j = 25 °C; f = 1 MHz; typical values.

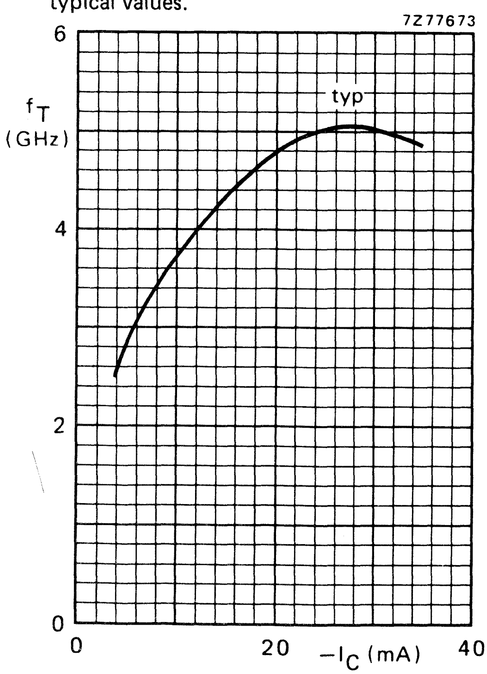


Fig. 5 $-V_{CE}$ = 5 V; T_j = 25 °C; f = 500 MHz; typical values.

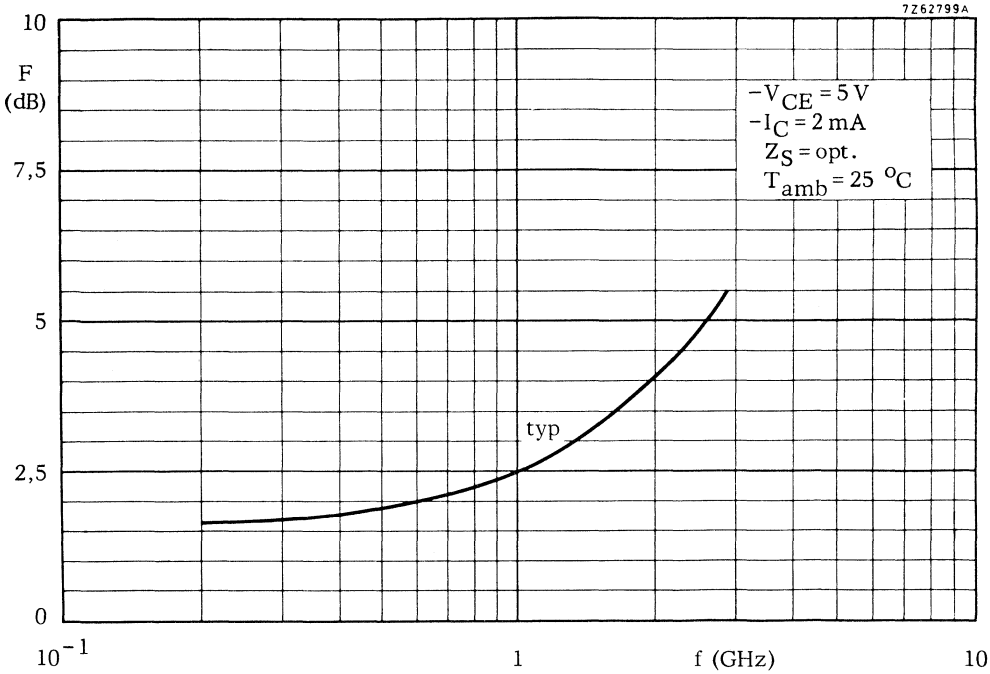


Fig. 6 $-V_{CE} = 5$ V; $-I_C = 2$ mA; Z_S = opt.; $T_{amb} = 25\ ^oC$; typical values.

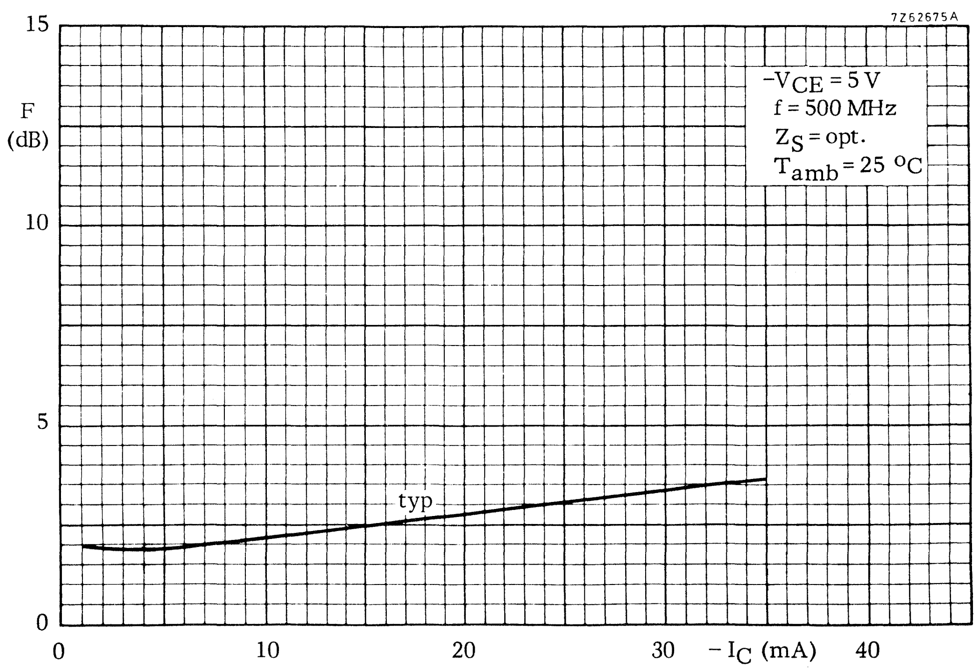


Fig. 7 $-V_{CE} = 5$ V; f = 500 MHz; Z_S = opt.; $T_{amb} = 25\ ^oC$; typical values.

N-P-N H.F. WIDEBAND TRANSISTOR

N-P-N multi-emitter transistor in a TO-39 metal envelope, with the collector connected to the case. The transistor has extremely good intermodulation properties and a high power gain. It is a ruggedized version of the BFW16, which it succeeds. It is primarily intended for:

- Final and driver stages of channel and band aerial amplifiers with high output power for bands I, II, III and IV/V (40–860 MHz).
- Final stage of the wideband vertical amplifier in high speed oscilloscopes.

QUICK REFERENCE DATA

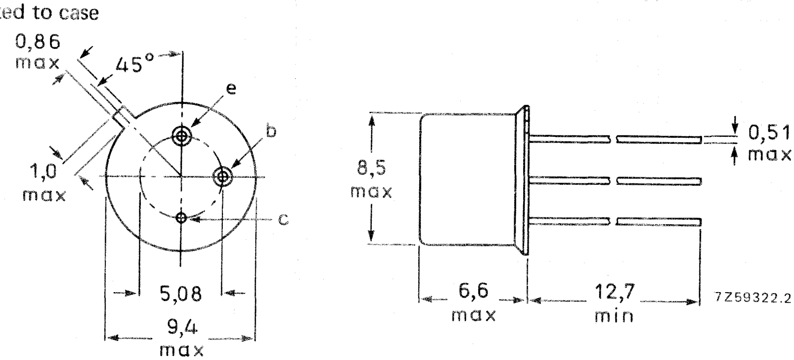
Collector-base voltage (open emitter; peak value)	V_{CBOM}	max.	40	V
Collector-emitter voltage (open base)	V_{CEO}	max.	25	V
Collector current (peak value; f > 1 MHz)	I_{CM}	max.	300	mA
Total power dissipation up to T_{amb} = 125 °C	P_{tot}	max.	1,5	W
Junction temperature	T_j	max.	200	°C
Feedback capacitance at f = 1 MHz; I_C = 10 mA; V_{CE} = 15 V	C_{re}	typ.	1,7	pF
Transition frequency; I_C = 150 mA; V_{CE} = 15 V; f = 500 MHz	f_T	typ.	1,2	GHz
Power gain (not neutralized); I_C = 70 mA; V_{CE} = 18 V; f = 200 MHz	G_p	typ.	16	dB
f = 800 MHz	G_p	typ.	6,5	dB
Output power; d_{im} = −30 dB; VSWR at output < 2; I_C = 70 mA; V_{CE} = 18 V; f = 200 MHz	P_o	typ.	150	mW
f = 800 MHz	P_o	typ.	90	mW

MECHANICAL DATA

Dimensions in mm

Collector connected to case

Fig. 1 TO-39.



Maximum lead diameter is guaranteed only for 12,7 mm.

Accessories: 56245 (distance disc).

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

Collector-base voltage (open emitter; peak value)	V_{CBOM}	max.	40	V
Collector-emitter voltage ($R_{BE} \leqslant 50\ \Omega$) peak value	V_{CERM}	max.	40	V
Collector-emitter voltage (open base)	V_{CEO}	max.	25	V
Emitter-base voltage (open collector)	V_{EBO}	max.	2	V
Collector current (d.c.)	I_C	max.	150	mA
Collector current (peak value; f > 1 MHz)	I_{CM}	max.	300	mA
Total power dissipation up to T_{amb} = 125 °C	P_{tot}	max.	1,5	W
Storage temperature	T_{stg}	−65 to + 200		°C
Junction temperature	T_j	max.	200	°C

THERMAL RESISTANCE

From junction to ambient in free air	$R_{th\ j\text{-}a}$	=	250	K/W
From junction to mounting base	$R_{th\ j\text{-}mb}$	=	50	K/W
From mounting base to heatsink mounted with top clamping washer of 56218 and a boron nitride washer for electrical insulation	$R_{th\ mb\text{-}h}$	=	1,2	K/W

CHARACTERISTICS

T_j = 25 °C unless otherwise specified

Collector cut-off current				
$I_E = 0$; $V_{CB} = 20$ V; $T_j = 150$ °C	I_{CBO}	max.	20	μA
Knee voltage				
$I_C = 100$ mA; I_B = value for which $I_C = 110$ mA at $V_{CE} = 1$ V	V_{CEK}	max.	0,75	V

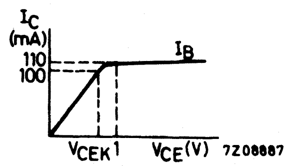


Fig. 2

D.C. current gain				
$I_C = 50$ mA; $V_{CE} = 5$ V	h_{FE}	min.	25	
$I_C = 150$ mA; $V_{CE} = 5$ V	h_{FE}	min.	25	
Transition frequency				
$I_C = 150$ mA; $V_{CE} = 15$ V; f = 500 MHz	f_T	typ.	1,2	GHz
Collector capacitance at f = 1 MHz				
$I_E = I_e = 0$; $V_{CB} = 15$ V	C_c	max.	4	pF
Feedback capacitance at f = 1 MHz				
$I_C = 10$ mA; $V_{CE} = 15$ V; $T_{amb} = 25$ °C	C_{re}	typ.	1,7	pF
Noise figure at f = 200 MHz				
$I_C = 30$ mA; $V_{CE} = 15$ V; $Z_S = 75\ \Omega$; $T_{amb} = 25$ °C	F	max.	6	dB
Power gain (not neutralized)				
$I_C = 70$ mA; $V_{CE} = 18$ V; $T_{amb} = 25$ °C				
f = 200 MHz	G_p	typ.	16	dB
f = 800 MHz	G_p	typ.	6,5	dB

CHARACTERISTICS (continued)

Intermodulation characteristics

1. Output power at f = 200 MHz; T_{amb} = 25 °C
   I_C = 70 mA; V_{CE} = 18 V; V.S.W.R. at output < 2
   f_p = 202 MHz; f_q = 205 MHz; d_{im} = −30 dB
   measured at $f_{(2q-p)}$ = 208 MHz (Channel 9) — P_o min. 130 mW; typ. 150 mW

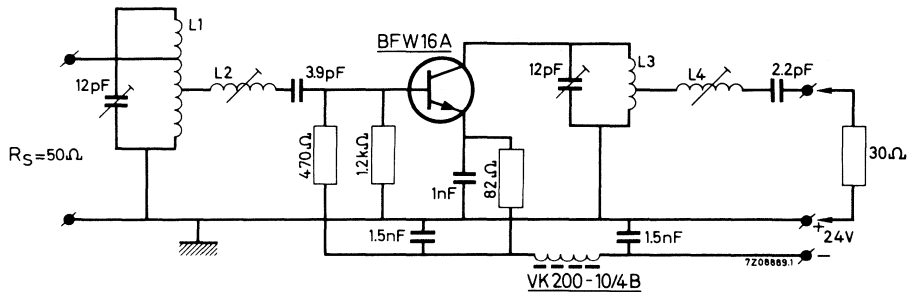


Fig. 3 Test circuit.

Coil data:

L1 = 3 turns silver plated Cu wire (1,4 mm); winding pitch 2,7 mm; int. diam. 8 mm; taps at 0,5 turn and 1,5 turns from earth.
L2 = 5,5 turns silver plated Cu wire (1,4 mm); winding pitch 2,2 mm; int. diam. 8 mm.
L3 = 3 turns silver plated Cu wire (1,4 mm); winding pitch 3,3 mm; int. diam. 8 mm.
L4 = 5,5 turns silver plated Cu wire (1,4 mm); winding pitch 2,2 mm; int. diam. 11 mm.

CHARACTERISTICS (continued)

Basis of adjustment

The intermodulation at an intermodulation distortion of –30 dB is caused by h.f. output current – voltage clipping.
The maximum undistorted output power is realised, if

a. Current and voltage clipping take place concurrently.
This occurs if

$$R_L = \frac{V_{CE} - V_{CEK}}{I_C},$$

in which V_{CEK} is the high frequency knee voltage.

b. The h.f. collector current is as small as possible.
This is so if $-C_L = +C_{oe}$,
in which C_{oe} is the output capacitance of the transistor at short circuited input.

For maximum output power at an intermodulation distortion of –30 dB, the (experimentally found) value of R_L and C_L are:
$R_L = 220\ \Omega$; $C_L = -5{,}6$ pF.

C_{oe} is found by 4 pF of the transistor and 1,6 pF by the mounting system concerning of a borium nitride washer between the envelope of the transistor and the chassis.

Adjustment procedure

1. Remove the transistor and connect a dummy consisting of a 220 Ω resistor in parallel with a 5,6 pF capacitor between the collector and emitter connections of the output circuit.
2. Tune and match the output circuit for zero reflection at 205 MHz (V.S.W.R. = 1).
After this adjustment, no further change may be made in the output circuit.
3. Replace the dummy by the transistor. Tune and match the input circuit for maximum power gain and good band pass curve.
The V.S.W.R. of the output will then, in most cases, be ⩽ 2 over the whole channel.
Corrections can be made by tuning L2; this will not disturb the band pass curve.

CHARACTERISTICS (continued)

Intermodulation characteristics

2. Output power at f = 800 MHz; T_{amb} = 25 °C
   I_C = 70 mA; V_{CE} = 18 V; V.S.W.R. at output < 2
   f_p = 798 MHz; f_q = 802 MHz; d_{im} = −30 dB
   measured at $f_{(2q-p)}$ = 806 MHz (Channel 62) — P_o — min. 70 mW; typ. 90 mW

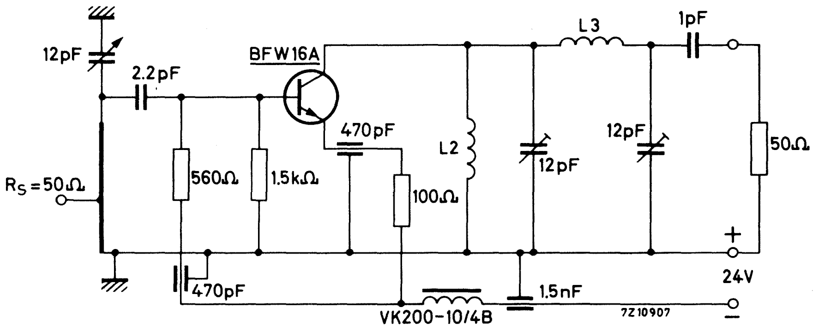


Fig. 4 Test circuit.

Coil data:

L1 = 25 mm x 7 mm x 0,85 mm silver plated Cu strip
Tap of the input at 5 mm from earth.

L2 = 13 turns enamelled Cu wire (0,6 mm); int. diam 8 mm.

L3 = 1,5 turns Cu wire (1,3 mm); int. diam. 8 mm.

Basis of adjustment

At 800 MHz no dummy can be used to adjust for optimum collector load because at these frequencies the impedance transformations of a dummy are too high. A small signal at the mid-channel frequency of 802 MHz is fed to the input and increased until clipping occurs; that is, until the output power no longer increases linearily with the input signal. This clipping can be eliminated by tuning the output circuit, thereby making the output power equal to

$$P_o = \frac{I_C(V_{CE} - V_{CEK})}{2} = 480 \text{ mW}.$$

The output circuit is adjusted for minimum intermodulation if the input signal is as small as possible at P_o = 480 mW.
With this adjusting method care must be taken, that the transistor is not destructed by second breakdown (the voltage swing may not exceed the rated V_{CER} value). Therefor as soon as clipping occurs, the increase of the input signal should be stopped until the clipping has been eliminated. After this adjustment has been made no further change may be made in the output circuit.
Adjust the input circuit for maximum power gain and good band pass curve. The V.S.W.R. of the output is then ⩽ 2 over the whole channel.

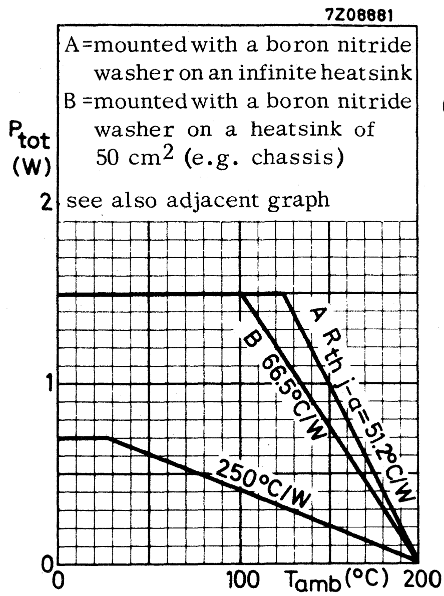


Fig. 5

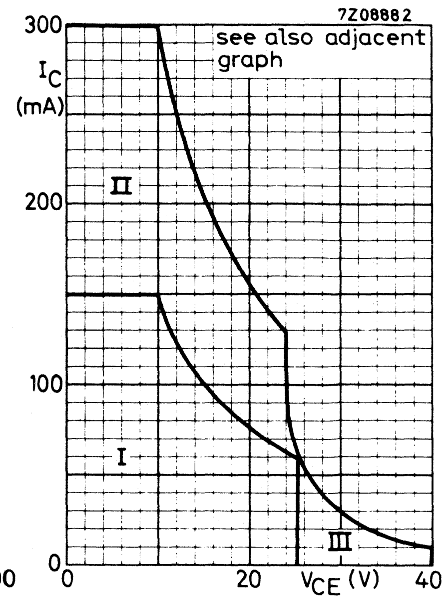


Fig. 6

I = Region of permissible operation under all base-emitter conditions and at all frequencies, including d.c.

II = Additional region of operation at f ⩾ 1 MHz.

III = Operating under pulsed conditions is allowed, provided the transistor is cut-off with $R_{BE} \leqslant 50\ \Omega$ and f ⩾ 1 MHz.

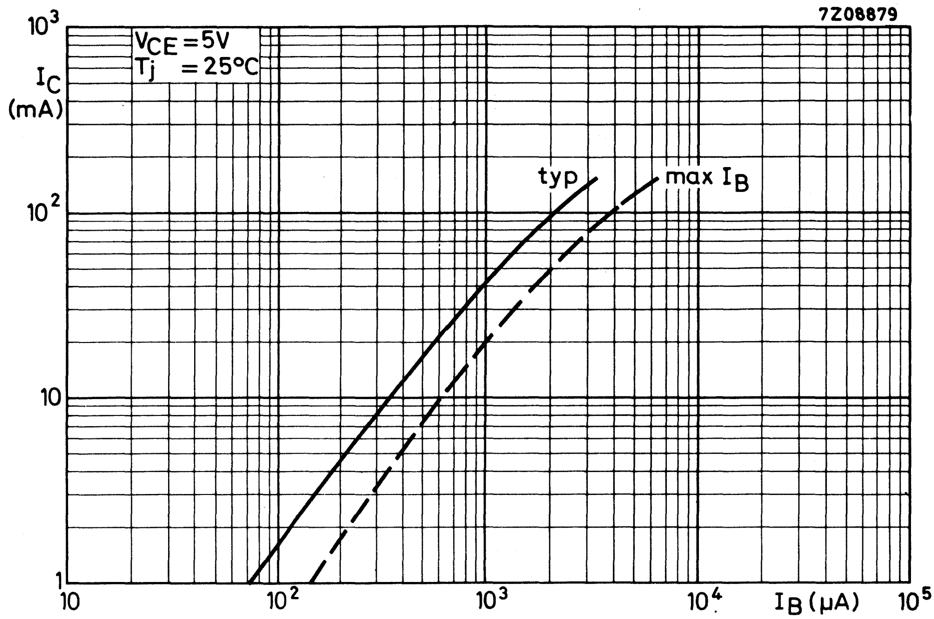


Fig. 7 V_{CE} = 5 V; T_j = 25 °C

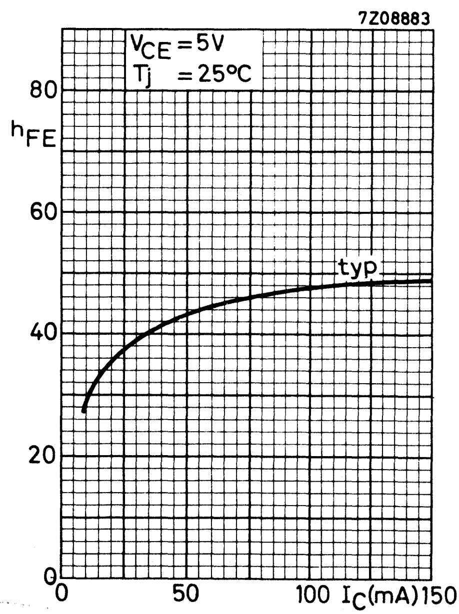


Fig. 8 V_{CE} = 5 V; T_j = 25 °C; typical values.

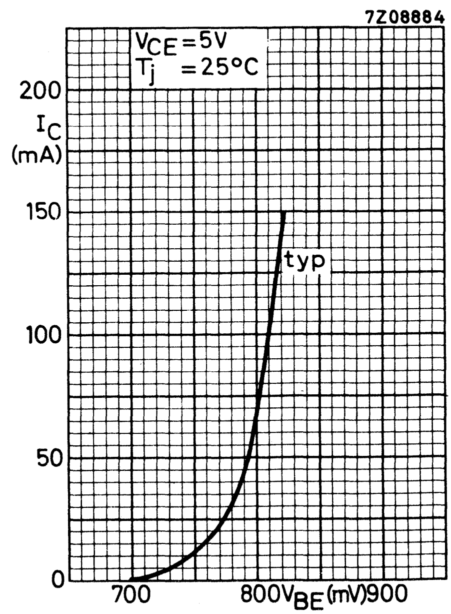


Fig. 9 V_{CE} = 5 V; T_j = 25 °C; typical values.

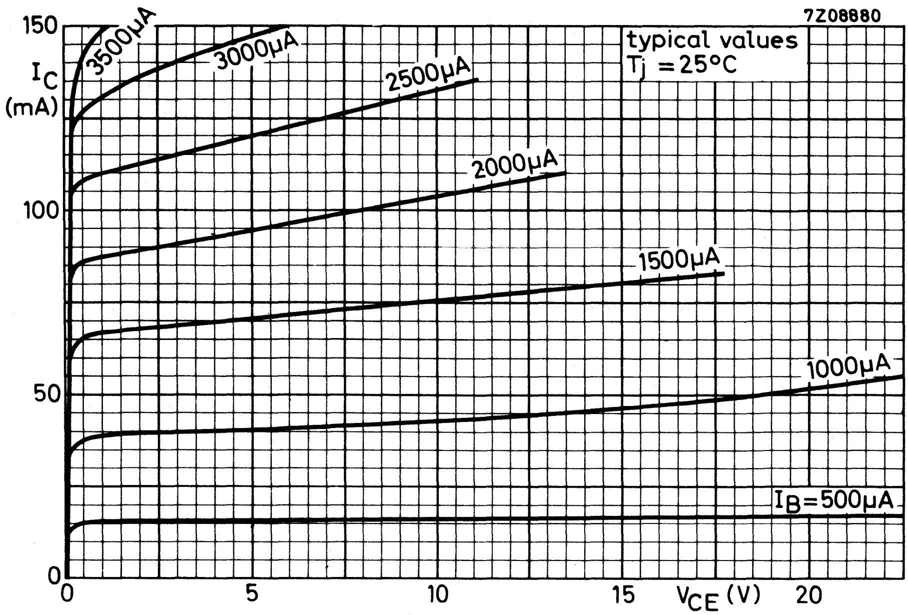


Fig. 10 $T_j = 25\ ^{o}C$; typical values.

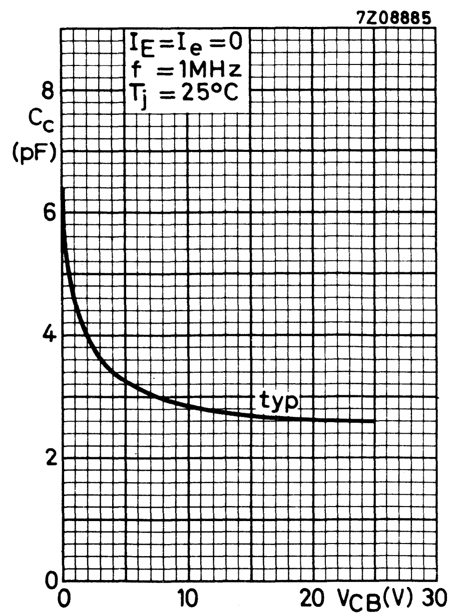


Fig. 11 $I_E = I_e = 0$; f = 1 MHz; $T_j = 25\ ^{o}C$; typical values.

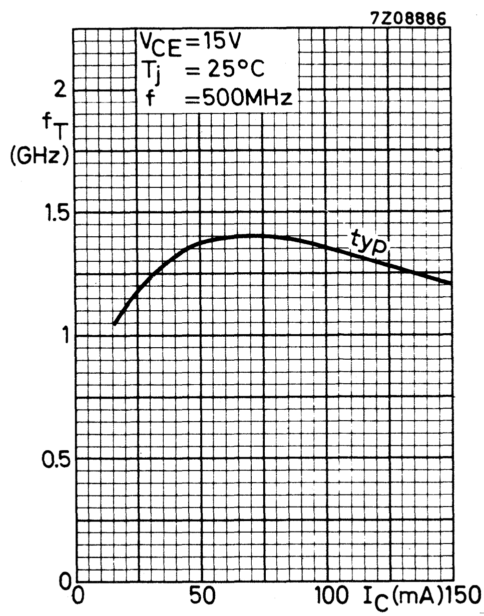


Fig. 12 V_{CE} = 15 V; f = 500 MHz; $T_j = 25\ ^{o}C$; typical values.

APPLICATION INFORMATION

Performance of channel- and band amplifiers*

Frequency range	channel 4 61-68	channel 9 202-209	channel 55 742-750	band I 47-68	band II 87,5-108	band III 174-230	MHz
Transistor used in							
final stage	BFW16A	BFW16A	BFW16A	BFW16A	BFW16A	BFW16A	
driver stage		BFW16A	BFW16A			BFW16A	
second stage			BFY90				
first stage	BFY90	BFY90	BFY90	BFY90	BFY90	BFY90	
Output power at							
d_{im} = −30 dB	150**	150**	100				mW
d_{im} = −50 dB					30		mW
d_{im} = −60 dB				10		10	mW
Power gain	50	44	26,5	51	43	39	dB
Noise figure	7	6	8	6,0-6,5	6,5	6,5	dB
V.S.W.R. over the whole channel or band							
for the input	< 2	< 2	< 2	< 2	< 2	< 2	
for the output	< 2	< 2	< 2	< 2	< 2	< 2	
Load impedance	30	30	50	30	30	30	Ω
Source impedance	60	60	50	60	60	60	Ω

* Application information bulletins of all these amplifiers and a study of intermodulation are available on request.

** V_o = 2,2 V over R_L = 30 Ω or
V_o = 3 V over R_L = 60 Ω.

N-P-N H.F. WIDEBAND TRANSISTOR

N-P-N multi-emitter transistor in a TO-39 metal envelope, with the collector connected to the case. The transistor has extremely good intermodulation properties and a high power gain. It is a ruggedized version of the BFW17, which it succeeds. It is primarily intended for final and driver stages of channel and band aerial amplifiers with high output power for bands I, II and III (40–230 MHz).

QUICK REFERENCE DATA

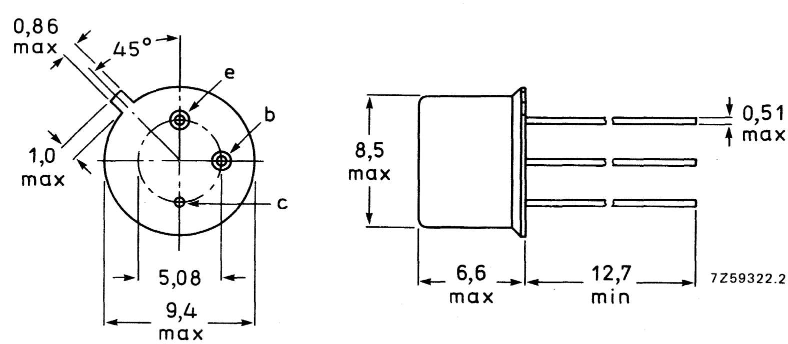
Collector-base voltage (open emitter; peak value)	V_{CBOM}	max.	40	V
Collector-emitter voltage (open base)	V_{CEO}	max.	25	V
Collector current (peak value; f > 1 MHz)	I_{CM}	max.	300	mA
Total power dissipation up to T_{mb} = 125 °C	P_{tot}	max.	1,5	W
Junction temperature	T_j	max.	200	°C
Feedback capacitance at f = 1 MHz I_C = 10 mA; V_{CE} = 15 V	C_{re}	typ.	1,7	pF
Transition frequency I_C = 150 mA; V_{CE} = 15 V; f = 500 MHz	f_T	typ.	1,1	GHz
Power gain (not neutralized) I_C = 70 mA; V_{CE} = 18 V; f = 200 MHz	G_p	typ.	16	dB
Output power d_{im} = −30 dB; VSWR at output < 2; I_C = 70 mA; V_{CE} = 18 V	P_o	typ.	150	mW

MECHANICAL DATA

Dimensions in mm

Collector connected to case

Fig. 1 TO-39.



Maximum lead diameter is guaranteed only for 12,7 mm.

Accessories: 56245 (distance disc).

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

Collector-base voltage (open emitter; peak value)	V_{CBOM}	max.	40	V
Collector-emitter voltage ($R_{BE} \leq 50\ \Omega$) peak value	V_{CERM}	max.	40	V
Collector-emitter voltage (open base)	V_{CEO}	max.	25	V
Emitter-base voltage (open collector)	V_{EBO}	max.	2	V
Collector current (d.c.)	I_C	max.	150	mA
Collector current (peak value; f > 1 MHz)	I_{CM}	max.	300	mA
Total power dissipation up to T_{mb} = 125 °C	P_{tot}	max.	1,5	W
Storage temperature	T_{stg}		−65 to +200	°C
Junction temperature	T_j	max.	200	°C

THERMAL RESISTANCE

From junction to ambient in free air	$R_{th\ j\text{-}a}$	=	250	K/W
From junction to mounting base	$R_{th\ j\text{-}mb}$	=	50	K/W
From mounting base to heatsink mounted with top clamping washer of 56218 and a boron nitride washer for electrical insulation	$R_{th\ mb\text{-}h}$	=	1,2	K/W

CHARACTERISTICS

T_j = 25 °C unless otherwise specified

Collector cut-off current $I_E = 0$; V_{CB} = 20 V; T_j = 150 °C	I_{CBO}	max.	20	µA
Knee voltage I_C = 100 mA; I_B = value for which I_C = 110 mA at V_{CE} = 1 V	V_{CEK}	max.	0,75	V

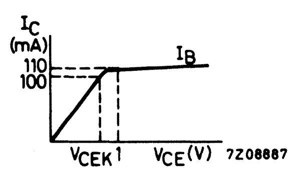


Fig. 2.

D.C. current gain			
I_C = 50 mA; V_{CE} = 5 V	h_{FE}	min.	25
I_C = 150 mA; V_{CE} = 5 V	h_{FE}	min.	25
Transition frequency			
I_C = 150 mA; V_{CE} = 15 V; f = 500 MHz	f_T	typ.	1,1 GHz
Collector capacitance at f = 1 MHz			
$I_E = I_e = 0$; V_{CB} = 15 V	C_c	max.	4,0 pF
Feedback capacitance at f = 1 MHz			
I_C = 10 mA; V_{CE} = 15 V; T_{amb} = 25 °C	C_{re}	typ.	1,7 pF
Power gain (not neutralized)			
I_C = 70 mA; V_{CE} = 18 V			
f = 200 MHz; T_{amb} = 25 °C	G_p	typ.	16 dB
Intermodulation characteristics			
Output power at f = 200 MHz; T_{amb} = 25 °C			
I_C = 70 mA; V_{CE} = 18 V; V.S.W.R. at output < 2			
f_p = 202 MHz; f_q = 205 MHz; d_{im} = −30 dB			
measured at $f_{(2q-p)}$ = 208 MHz (Channel 9)	P_o	typ.	150 mW

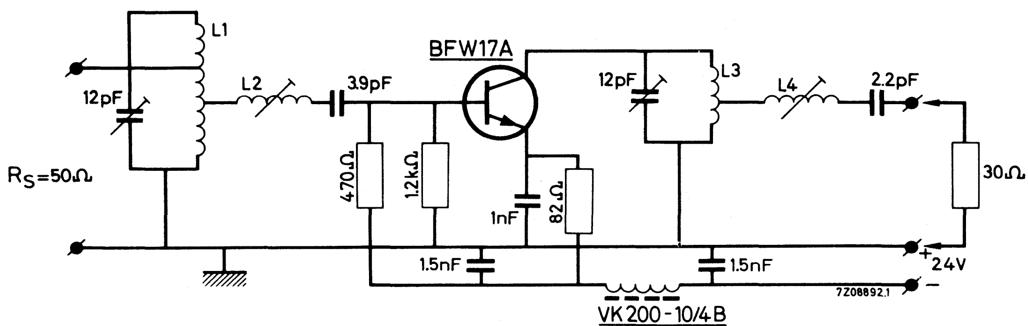


Fig. 3 Test circuit.

Coil data:

L1 = 3 turns silver plated Cu wire (1,4 mm); winding pitch 2,7 mm; int. diam. 8 mm; taps at 0,5 turn and 1,5 turns from earth.
L2 = 5,5 turns silver plated Cu wire (1,4 mm); winding pitch 2,2 mm; int. diam. 8 mm.
L3 = 3 turns silver plated Cu wire (1,4 mm); winding pitch 3,3 mm; int. diam. 8 mm.
L4 = 5,5 turns silver plated Cu wire (1,4 mm); winding pitch 2,2 mm; int. diam. 11 mm.

CHARACTERISTICS (continued)

Basis of adjustment

The intermodulation at an intermodulation distortion of −30 dB is caused by h.f. output current - voltage clipping.
The maximum undistorted output power is realised, if

a. Current and voltage clipping take place concurrently.
This occurs if

$$R_L = \frac{V_{CE} - V_{CEK}}{I_C}$$

in which V_{CEK} is the high frequency knee voltage.

b. The h.f. collector current is as small as possible.
This is so if $-C_L = +C_{oe}$,
in which C_{oe} is the output capacitance of the transistor at short circuited input.

For maximum output power at an intermodulation distortion of −30 dB, the (experimentally found) values of R_L and C_L are:
$R_L = 220\ \Omega$; $C_L = -5{,}6$ pF.
C_{oe} is found by 4 pF of the transistor and 1,6 pF by the mounting system concerning of a borium nitride washer between the envelope of the transistor and the chassis.

Adjustment procedure

1. Remove the transistor and connect a dummy consisting of a 220 Ω resistor in parallel with a 5,6 pF capacitor between the collector and emitter connections of the output circuit.
2. Tune and match the output circuit for zero reflection at 205 MHz (V.S.W.R. = 1). After this adjustment, no further change may be made in the output circuit.
3. Replace the dummy by the transistor. Tune and match the input circuit for maximum power gain and good band pass curve.
The V.S.W.R. of the output will then, in most cases, be ⩽ 2 over the whole channel.
Corrections can be made by tuning L2; this will not disturb the band pass curve.

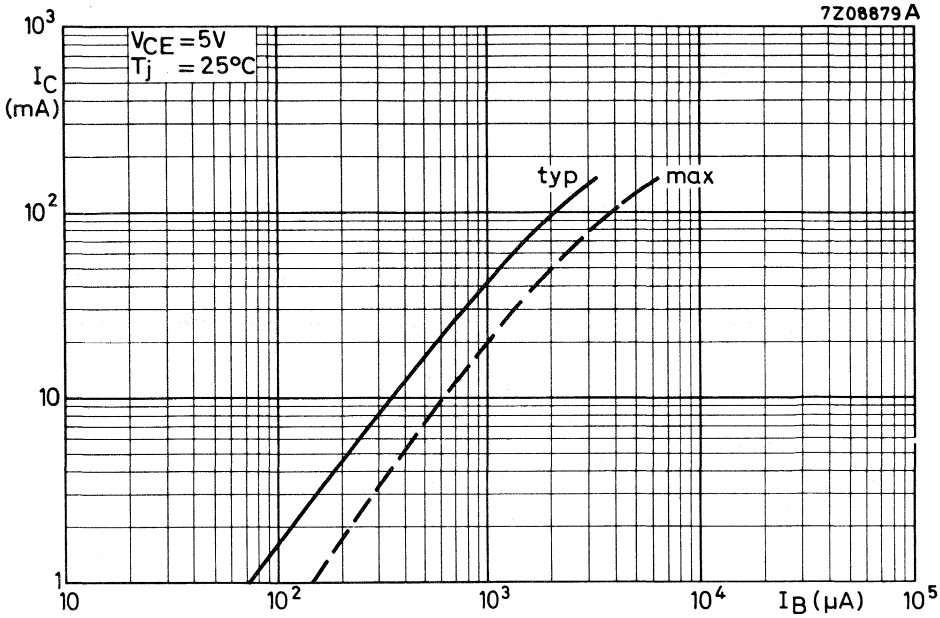


Fig. 4 V_{CE} = 5 V; T_j = 25 °C.

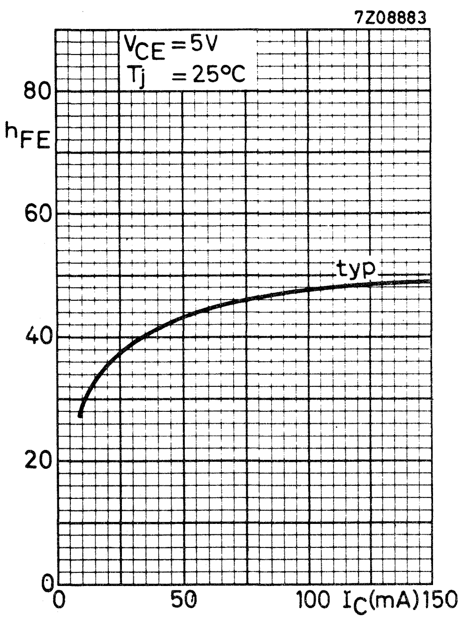


Fig. 5 V_{CE} = 5 V; T_j = 25 °C; typical values.

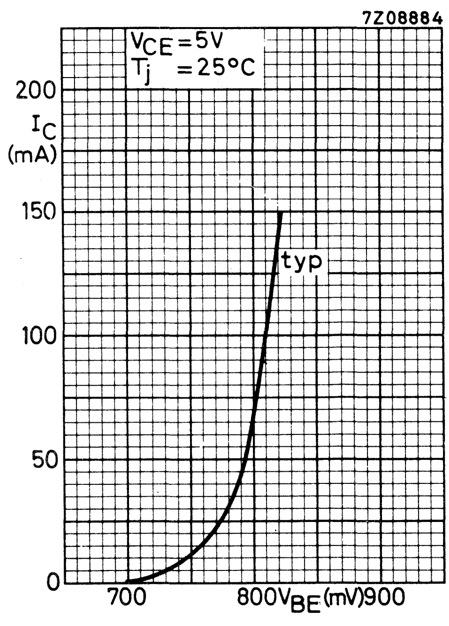


Fig. 6 V_{CE} = 5 V; T_j = 25 °C; typical values.

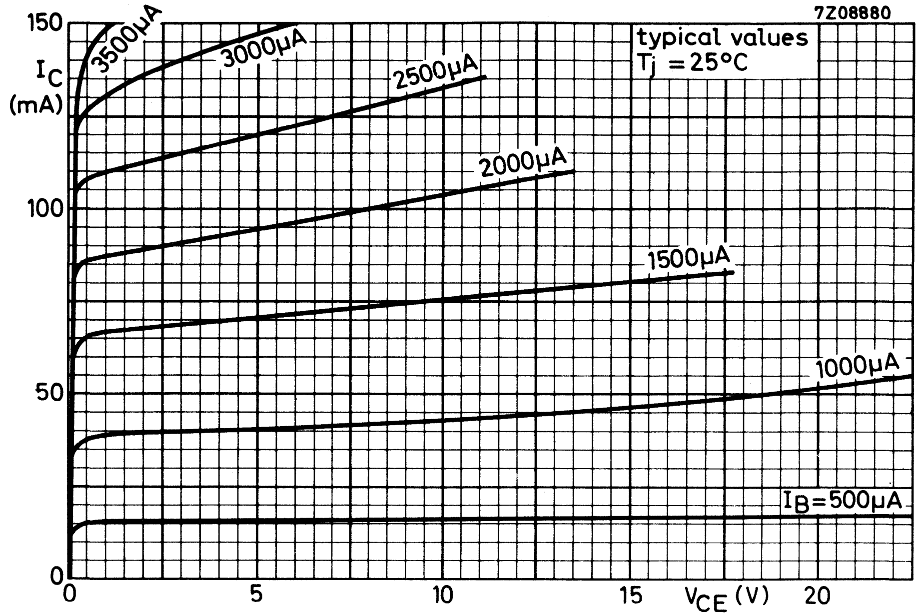


Fig. 7 T_j = 25 °C; typical values.

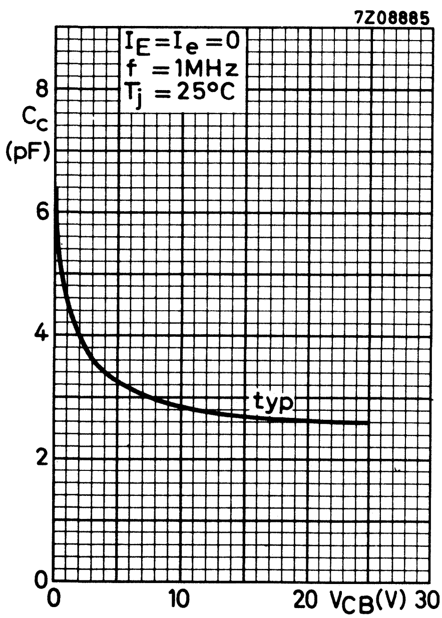


Fig. 8 $I_E = i_e = 0$; f = 1 MHz;
T_j = 25 °C; typical values.

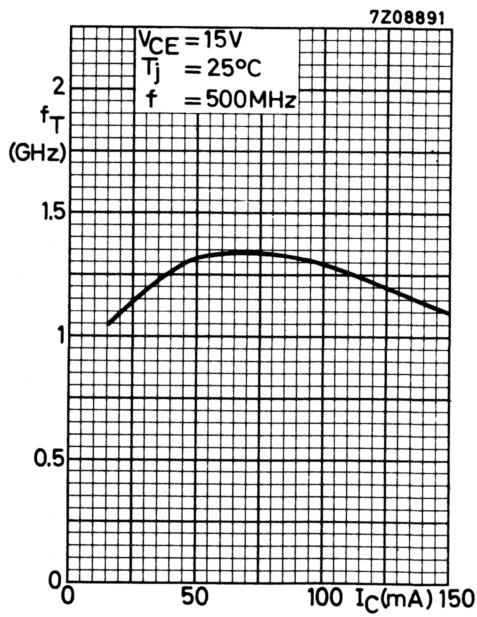


Fig. 9 V_{CE} = 15 V; f = 500 MHz;
T_j = 25 °C; typical values.

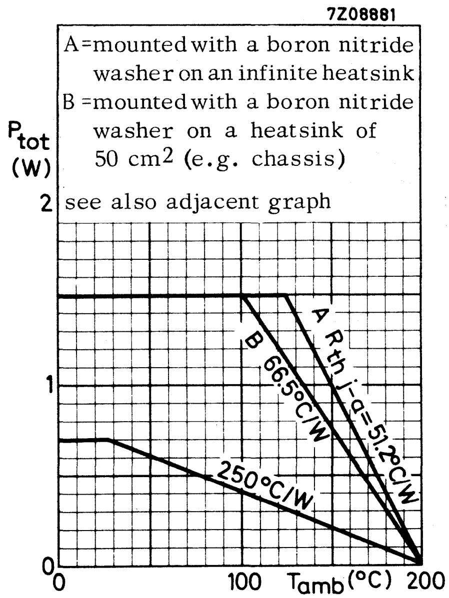


Fig. 10.

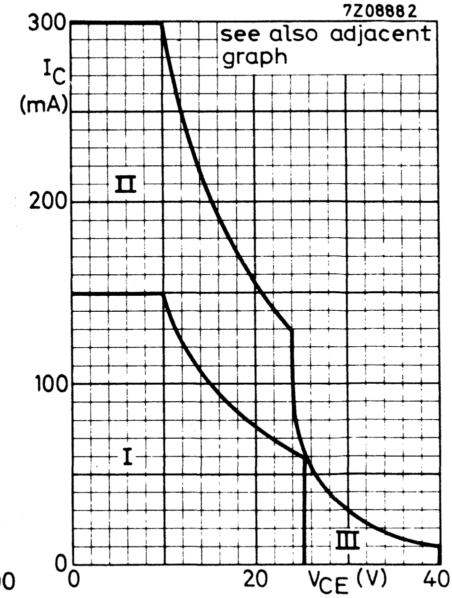


Fig. 11.

I = Region of permissible operation under all base-emitter conditions and at all frequencies, including d.c.

II = Additional region of operation at f ⩾ 1 MHz

III = Operating under pulsed conditions is allowed, provided the transistor is cut-off with $R_{BE} \leqslant 50\,\Omega$ and f ⩾ 1 MHz.

N-P-N H.F. WIDEBAND TRANSISTOR

N-P-N multi-emitter transistor in a TO-72 metal envelope, with insulated electrodes and a shield lead connected to the case. The transistor has very low intermodulation distortion and very high power gain. It is primarily intended for:
- Wideband vertical amplifiers in high speed oscilloscopes.
- Wideband aerial amplifiers (40–860 MHz).
- Television distribution amplifiers.

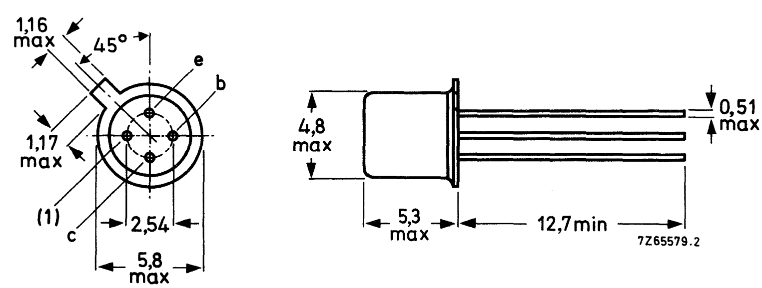
QUICK REFERENCE DATA

Collector-base voltage (open emitter; peak value)	V_{CBOM}	max.	20	V
Collector-emitter voltage (open base)	V_{CEO}	max.	1C	V
Collector current (peak value; f > 1 MHz)	I_{CM}	max.	100	mA
Total power dissipation up to T_{amb} = 25 °C	P_{tot}	max.	250	mW
Junction temperature	T_j	max.	200	°C
Feedback capacitance at f = 1 MHz I_C = 2 mA; V_{CE} = 5 V	C_{re}	typ.	0,8	pF
Transition frequency I_C = 50 mA; V_{CE} = 5 V; f = 500 MHz	f_T	typ.	1,6	GHz
Power gain (not neutralized) I_C = 30 mA; V_{CE} = 5 V; f = 200 MHz f = 800 MHz	G_p	typ. typ.	2,1 7,5	dB dB
Intermodulation distortion I_C = 30 mA; V_{CE} = 6 V; R_L = 37,5 Ω; V_o = 100 mV at f_p = 183 MHz; V_o = 100 mV at f_q = 200 MHz; measured at $f_{(2q-p)}$ = 217 MHz	d_{im}	typ.	−60	dB

MECHANICAL DATA

Dimensions in mm

Fig. 1 TO-72.



(1) = shield lead (connected to case).

Accessories: 56246 (distance disc).

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

Collector-base voltage (open emitter; peak value)	V_{CBOM}	max.	20	V
Collector-emitter voltage (open base)	V_{CEO}	max.	10	V
Emitter-base voltage (open collector)	V_{EBO}	max.	2,5	V
Collector current (d.c.)	I_C	max.	50	mA
Collector current (peak value; f > 1 MHz)	I_{CM}	max.	100	mA
Total power dissipation up to T_{amb} = 25 °C	P_{tot}	max.	250	mW
Storage temperature	T_{stg}		−65 to +200	°C
Junction temperature	T_j	max.	200	°C

THERMAL RESISTANCE

From junction to ambient in free air	$R_{th\ j\text{-}a}$	=	700	K/W
From junction to case	$R_{th\ j\text{-}c}$	=	500	K/W

CHARACTERISTICS

T_j = 25 °C unless otherwise specified

Collector cut-off current			
$I_E = 0$; V_{CB} = 10 V	I_{CBO}	max.	50 nA
D.C. current gain			
I_C = 25 mA; V_{CE} = 5 V	h_{FE}	min.	25
I_C = 50 mA; V_{CE} = 5 V	h_{FE}	min.	25
Transition frequency*			
I_C = 50 mA; V_{CE} = 5 V; f = 500 MHz	f_T	typ.	1,6 GHz
Collector capacitance at f = 1 MHz**			
$I_E = I_e = 0$; V_{CB} = 5 V	C_c	max.	1,5 pF
Feedback capacitance at f = 1 MHz*			
I_C = 2 mA; V_{CE} = 5 V	$-C_{re}$	typ.	0,8 pF
Noise figure*			
I_C = 2 mA; V_{CE} = 5 V			
f = 500 MHz; Z_s = 50 Ω	F	max.	5,0 dB

Power gain (not neutralized)*		f = 200	800 MHz
I_C = 30 mA; V_{CE} = 5 V; T_{amb} = 25 °C	G_p	> 19	dB
		typ. 21	7,5 dB

Intermodulation distortion*			
I_C = 30 mA; V_{CE} = 6 V; R_L = 37,5 Ω; T_{amb} = 25 °C			
V_o = 100 mV at f_p = 183 MHz			
V_o = 100 mV at f_q = 200 MHz			
measured at $f_{(2q-p)}$ = 217 MHz	d_{im}	typ.	−60 dB

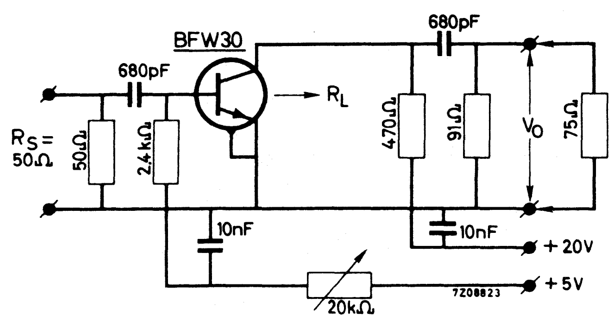


Fig. 2 Test circuit.

* Shield lead grounded.
** Shield lead not connected.

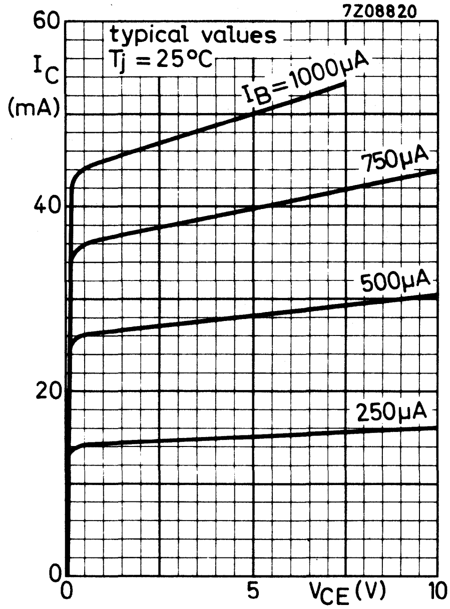


Fig. 3 $T_j = 25\,°C$; typical values.

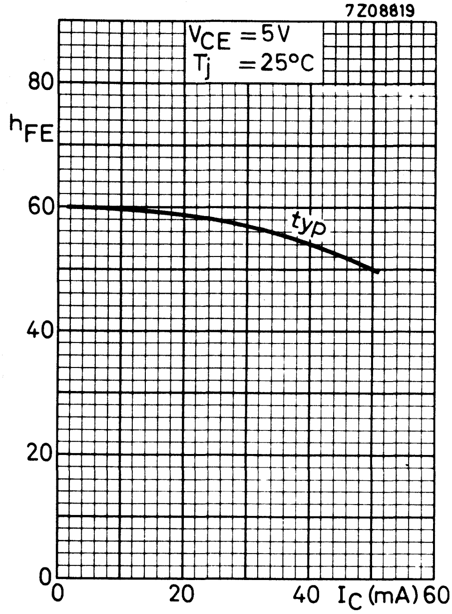


Fig. 4 $V_{CE} = 5$ V; $T_j = 25\,°C$; typical values.

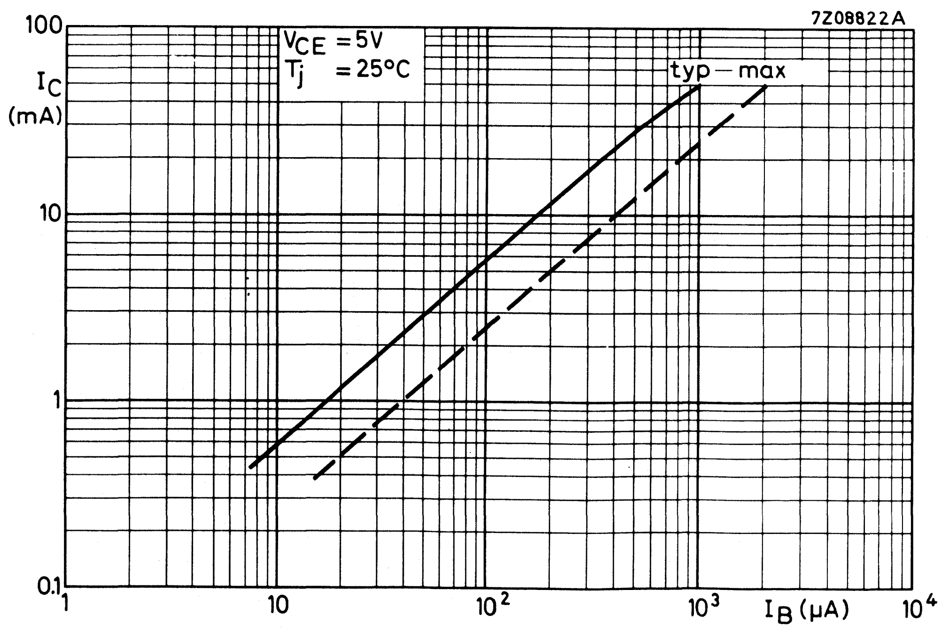


Fig. 5 $V_{CE} = 5$ V; $T_j = 25\,°C$.

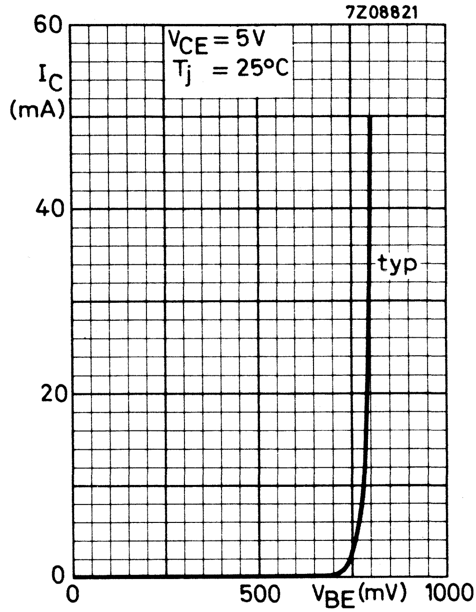


Fig. 6 V_{CE} = 5 V; T_j = 25 °C; typical values.

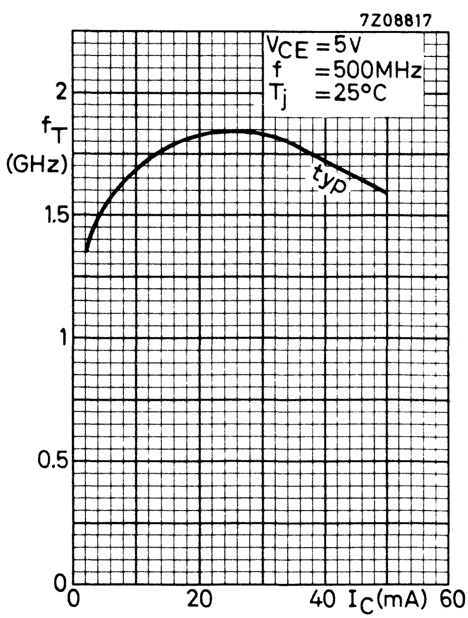


Fig. 7 V_{CE} = 5 V; f = 500 MHz;
T_j = 25 °C; typical values.

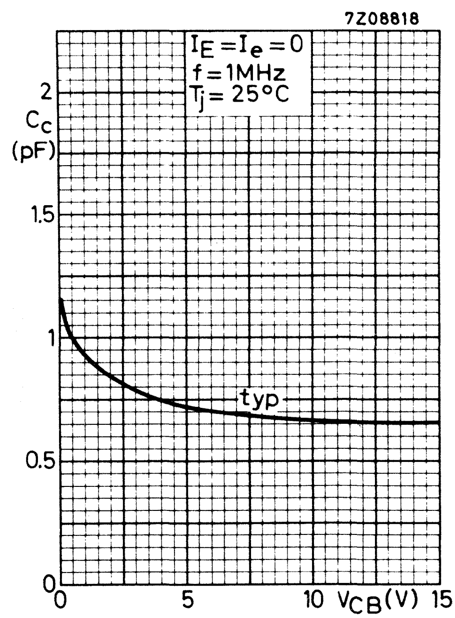


Fig. 8 $I_E = i_e = 0$; f = 1 MHz;
T_j = 25 °C; typical values.

N-P-N H.F. WIDEBAND TRANSISTOR

N-P-N transistor in a plastic SOT-37 envelope. It has a low noise over a wide current range, a very high power gain and good intermodulation properties.
It is primarily intended for:
- Wideband aerial amplifiers (40 - 860 MHz)
- Channel and band aerial amplifiers for band I, II, III and IV/V (40 - 860 MHz)
- Television distribution amplifiers
- Low noise wideband vertical amplifier in high speed oscilloscopes

QUICK REFERENCE DATA

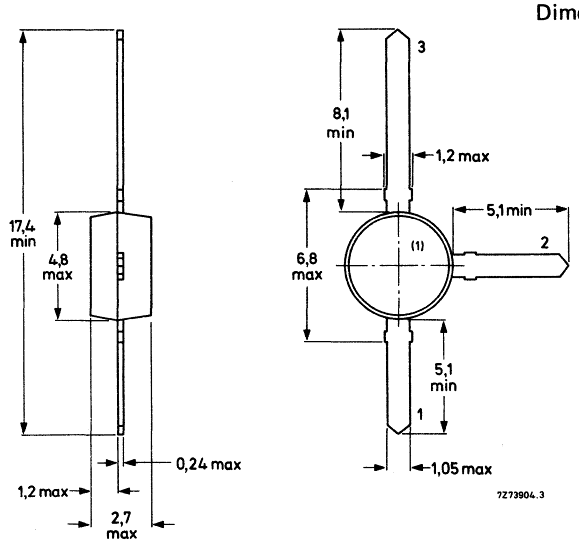
Collector-base voltage (open emitter; peak value)	V_{CBOM}	max.	25		V
Collector-emitter voltage (open base)	V_{CEO}	max.	15		V
Collector current (peak value; f > 1 MHz)	I_{CM}	max.	50		mA
Total power dissipation up to T_{amb} = 70 °C	P_{tot}	max.	200		mW
Junction temperature	T_j	max.	175		°C ←
Transition frequency at f = 500 MHz I_C = 25 mA; V_{CE} = 5 V	f_T	typ.	1,6		GHz
Feedback capacitance at f = 1 MHz I_C = 2 mA; V_{CE} = 5 V	C_{re}	typ.	0,6		pF
Noise figure at f = 500 MHz I_C = 2 mA; V_{CE} = 5 V	F	typ.	4		dB
Power gain (not neutralized)		f =	200	800	MHz
I_C = 10 mA; V_{CE} = 10 V	G_p	typ.	23	11	dB
Output power at d_{im} = −30 dB VSWR at output < 2; I_C = 10 mA; V_{CE} = 10 V	P_o	typ.	8	8	mW

MECHANICAL DATA

Dimensions in mm

Fig. 1 SOT-37.

Connections
1. Base
2. Emitter
3. Collector



(1) = type number marking.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

Collector-base voltage (open emitter; peak value)	V_{CBOM}	max.	25	V
Collector-emitter voltage (open base)	V_{CEO}	max.	15	V
Emitter-base voltage (open collector)	V_{EBO}	max.	2,5	V
Collector current (d.c.)	I_C	max.	25	mA
Collector current (peak value; f > 1 MHz)	I_{CM}	max.	50	mA
Total power dissipation up to T_{amb} = 70 °C	P_{tot}	max.	200	mW
Storage temperature	T_{stg}		−65 to +150	°C
→ Junction temperature	T_j	max.	175	°C

THERMAL RESISTANCE

From junction to ambient in free air mounted on a glass-fibre print of 40 mm x 25 mm x 1 mm (Fig. 2)	$R_{th\ j\text{-}a}$	=	400	K/W

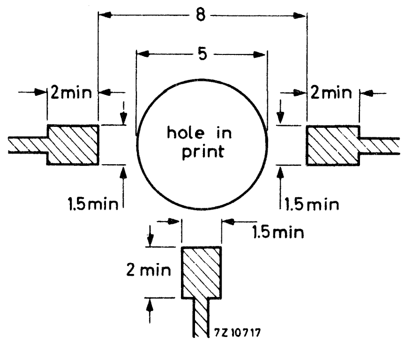


Fig. 2 Requirements for fibre-glass print (dimensions in mm).

CHARACTERISTICS

T_j = 25 °C unless otherwise specified

Collector cut-off current			
I_E = 0; V_{CB} = 10 V	I_{CBO}	max.	50 nA
Knee voltage			
I_C = 20 mA; I_B = value for which I_C = 22 mA at V_{CE} = 1 V	V_{CEK}	max.	0,75 V

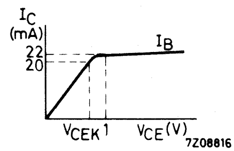


Fig. 3.

D.C. current gain			
I_C = 2 mA; V_{CE} = 1 V	h_{FE}	min.	20
		max.	150
I_C = 25 mA; V_{CE} = 1 V	h_{FE}	min.	20
Transition frequency at f = 500 MHz			
I_C = 2 mA; V_{CE} = 5 V	f_T	typ.	1,0 GHz
I_C = 25 mA; V_{CE} = 5 V	f_T	typ.	1,6 GHz
Collector capacitance at f = 1 MHz			
I_E = I_e = 0; V_{CB} = 10 V	C_c	typ.	0,7 pF
Emitter capacitance at f = 1 MHz			
I_C = I_c = 0; V_{EB} = 0,5 V	C_e	typ.	1,5 pF
Feedback capacitance at f = 1 MHz			
I_C = 2 mA; V_{CE} = 5 V; T_{amb} = 25 °C	C_{re}	typ.	0,6 pF
Noise figure at f = 500 MHz			
I_C = 2 mA; V_{CE} = 5 V; R_S = 50 Ω; T_{amb} = 25 °C	F	typ.	4,0 dB
Power gain (not neutralized)			
I_C = 10 mA; V_{CE} = 10 V; T_{amb} = 25 °C;			
f = 200 MHz	G_p	typ.	23 dB
f = 800 MHz		typ.	11 dB

CHARACTERISTICS (continued)

Intermodulation characteristics

1. Output power at f = 200 MHz; T_{amb} = 25 °C
   I_C = 10 mA; V_{CE} = 10 V; VSWR at output < 2
   f_p = 202 MHz; f_q = 205 MHz; d_{im} = −30 dB
   measured at $f_{(2q-p)}$ = 208 MHz (Channel 9) — P_o typ. 8 mW

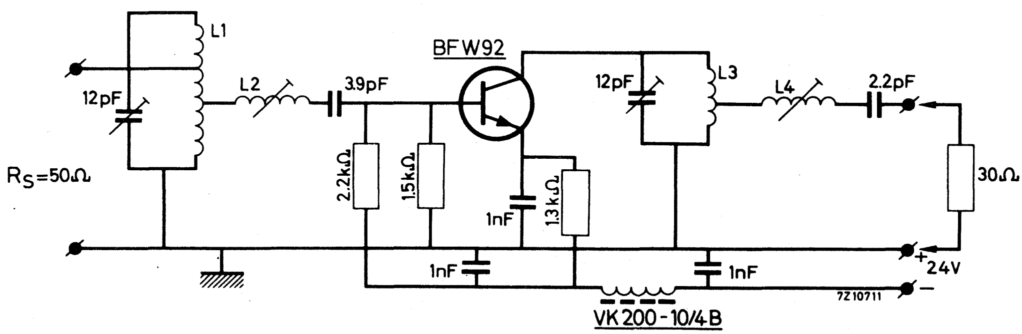


Fig. 4 Test circuit.

Coil data:

L1 = 3 turns silver plated Cu wire (1,4 mm); winding pitch 2,7 mm; int. diam. 8 mm; taps at 0,5 turn and 1,5 turns from earth.
L2 = 5,5 turns silver plated Cu wire (1,4 mm); winding pitch 2,2 mm; int. diam. 8 mm.
L3 = 3 turns silver plated Cu wire (1,4 mm); winding pitch 3,3 mm; int. diam. 8 mm.
L4 = 5,5 turns silver plated Cu wire (1,4 mm); winding pitch 2,2 mm; int. diam. 11 mm.

Basis of adjustment

The intermodulation at an intermodulation distortion of −30 dB is caused by h.f. output current - voltage clipping.
The maximum undistorted output power is realised, if

a. Current and voltage clipping take place concurrently.
This occurs if

$$R_L = \frac{V_{CE} - V_{CEK}}{I_C},$$

in which V_{CEK} is the high frequency knee voltage.

b. The h.f. collector current is as small as possible.
This is so if $-C_L = +C_{oe}$,
in which C_{oe} is the output capacitance of the transistor at short circuited input.

For maximum output power at an intermodulation distortion of −30 dB, the (experimentally found) values of R_L and C_L are:
$R_L = 820\ \Omega$; $C_L = -1{,}0$ pF.

Adjustment procedure

1. Remove the transistor and connect a dummy consisting of a 820 Ω resistor in parallel with a 1,0 pF capacitor between the collector and emitter connections of the output circuit.
2. Tune and match the output circuit for zero reflection at 205 MHz (VSWR = 1). After this adjustment, no further change may be made in the output circuit.
3. Replace the dummy by the transistor. Tune and match the input circuit for maximum power gain and good band pass curve.
The VSWR of the output will then, in most cases, be ≤ 2 over the whole channel.
Corrections can be made by tuning L2; this will not disturb the band pass curve.

CHARACTERISTICS (continued)

Intermodulation characteristics

2. Output power at f = 800 MHz; T_{amb} = 25 °C
   I_C = 10 mA; V_{CE} = 10 V; VSWR at output < 2
   f_p = 798 MHz; f_q = 802 MHz; d_{im} = −30 dB
   measured at $f_{(2q-p)}$ = 806 MHz (Channel 62) — P_o typ. 8 mW

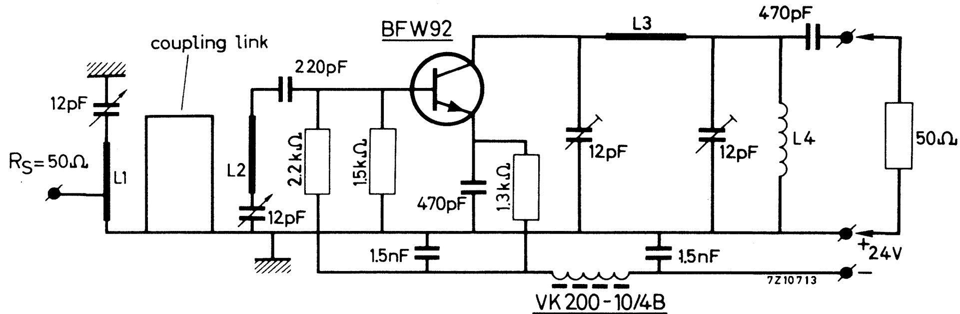


Fig. 5 Test circuit.

Coil data:

L1 = 24 mm x 6 mm x 0,5 mm silver plated Cu strip.
Tap of the input at 5 mm from earth.
L2 = 15 mm x 6 mm x 0,5 mm silver plated Cu strip.
L3 = 20 mm x 8 mm x 0,5 mm silver plated Cu strip.
L4 = 4 turns enamelled Cu wire (0,5 mm); winding pitch 1,5 mm; int. diam. 4 mm
Coupling link: 42 mm silver plated Cu wire (1 mm).

Basis of adjustment

At 800 MHz no dummy can be used to adjust for optimum collector load because at these frequencies the impedance transformations of a dummy are too high. A small signal at the mid-channel frequency of 802 MHz is fed to the input and increased until clipping occurs; that is, until the output power no longer increases linearily with the input signal. This clipping can be eliminated by tuning the output circuit, thereby making the output power equal to

$$P_o = \frac{I_C\,(V_{CE} - V_{CEK})}{2} = 40 \text{ mW}$$

The output circuit is adjusted for minimum intermodulation if the input signal is as small as possible at P_o = 40 mW.
After this adjustment has been made no further change may be made in the output circuit.
Adjust the input circuit for maximum power gain and good band pass curve.
The VSWR of the output is then ≤ 2 over the whole channel.

Intermodulation characteristics

3. Intermodulation distortion

I_C = 10 mA; V_{CE} = 6 V; R_L = 37,5 Ω; T_{amb} = 25 °C
V_o = 100 mV at f_p = 183 MHz
V_o = 100 mV at f_q = 200 MHz
measured at $f_{(2q-p)}$ = 217 MHz — d_{im} typ. −45 dB

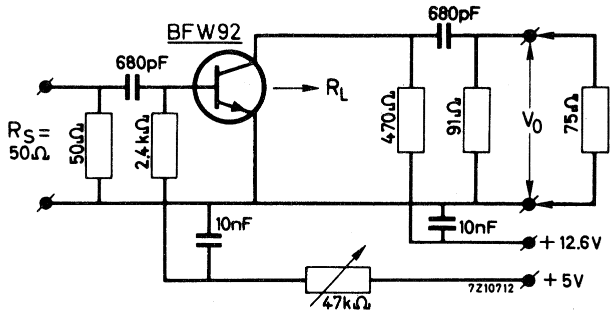


Fig. 6 Test circuit.

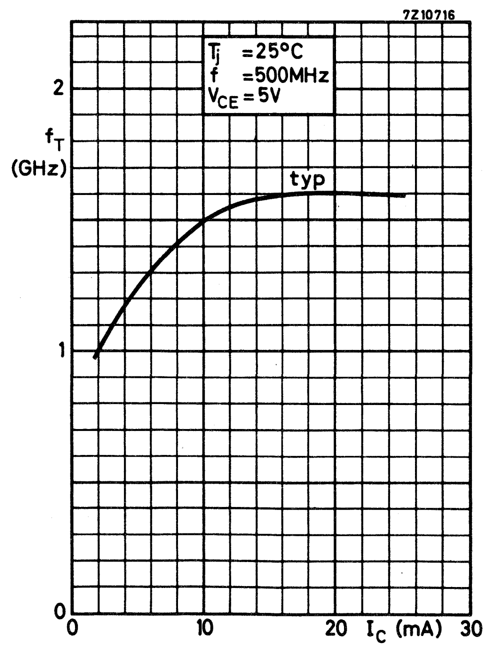


Fig. 7 V_{CE} = 5 V; f = 500 MHz; T_j = 25 °C; typical values.

N-P-N 1 GHz WIDEBAND TRANSISTOR

N-P-N transistor in a plastic SOT-37 envelope primarily intended for use in amplifiers in the 40-860 MHz range. The BFW92A is the successor to the BFW92 and offers higher power gain and improved noise behaviour.

QUICK REFERENCE DATA

Collector-base voltage (open emitter)	V_{CBO}	max.	25	V
Collector-emitter voltage (open base)	V_{CEO}	max.	15	V
Collector current (d.c.)	I_C	max.	25	mA
Total power dissipation up to T_{amb} = 70 °C	P_{tot}	max.	200	mW
Junction temperature	T_j	max.	175	°C ←
Transition frequency at f = 500 MHz I_C = 25 mA; V_{CE} = 5 V	f_T	typ.	2,8	GHz
Feedback capacitance at f = 1 MHz I_C = 0; V_{CE} = 5 V	C_{re}	typ.	0,45	pF
Noise figure at f = 800 MHz I_C = 2 mA; V_{CE} = 5 V; Z_S = 60 Ω	F	typ.	2,5	dB
Maximum unilateral power gain at f = 800 MHz I_C = 14 mA; V_{CE} = 10 V	G_{UM}	typ.	13	dB
Output voltage at d_{im} = –60 dB I_C = 14 mA; V_{CE} = 10 V; R_L = 75 Ω $f_{(p+q-r)}$ = 793,25 MHz	V_o	typ.	150	mV

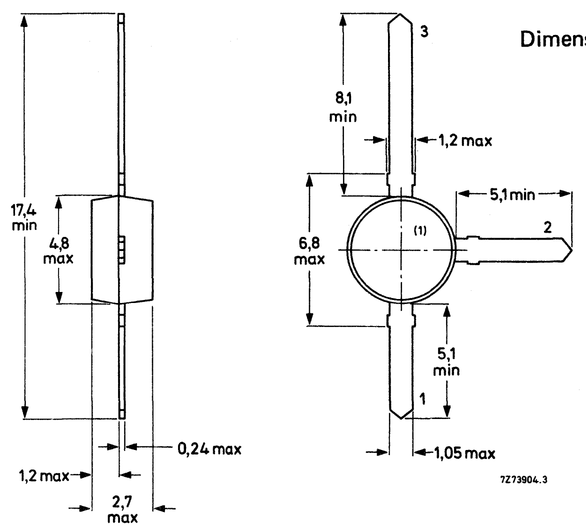
MECHANICAL DATA

Fig. 1 SOT-37.

Dimensions in mm

Connections

1. Base
2. Emitter
3. Collector



(1) Type number marking.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

Collector-base voltage (open emitter)	V_{CBO}	max.	25	V
Collector-emitter voltage (open base)	V_{CEO}	max.	15	V
Emitter-base voltage (open collector)	V_{EBO}	max.	2,5	V
Collector current (d.c.)	I_C	max.	25	mA
Collector current (peak)	I_{CM}	max.	50	mA
Total power dissipation up to T_{amb} = 70 °C	P_{tot}	max.	200	mW
Storage temperature	T_{stg}	−65 to + 150		°C
→ Junction temperature	T_j	max.	175	°C

THERMAL RESISTANCE

From junction to ambient in free air mounted on a fibre-glass print (see Fig. 2) of 40 mm x 25 mm x 1 mm — $R_{th\ j\text{-}a}$ = 400 K/W

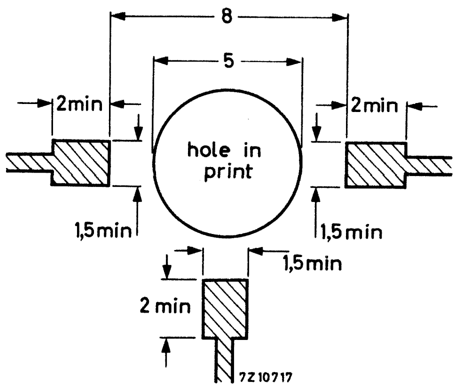


Fig. 2 Requirements for fibre-glass print (dimensions in mm).

CHARACTERISTICS

T_j = 25 °C unless otherwise specified

Collector cut-off current			
$I_E = 0$; $V_{CB} = 10$ V	I_{CBO}	max.	50 nA
D.C. current gain			
$I_C = 2$ mA; $V_{CE} = 1$ V	h_{FE}	min.	20
		max.	150
$I_C = 25$ mA; $V_{CE} = 1$ V	h_{FE}	min.	20

Transition frequency at f = 500 MHz I_C = 25 mA; V_{CE} = 5 V	f_T	typ.	2,8 GHz
Collector capacitance at f = 1 MHz I_E = 0; V_{CB} = 10 V	C_c	typ.	0,8 pF
Emitter capacitance at f = 1 MHz I_C = 0; V_{EB} = 0,5 V	C_e	typ.	1,4 pF
Feedback capacitance at f = 1 MHz I_C = 0; V_{CE} = 5 V	C_{re}	typ.	0,45 pF
Noise figure at f = 800 MHz and T_{amb} = 25 °C I_C = 2 mA; V_{CE} = 5 V; Z_S = 60 Ω	F	typ.	2,5 dB
Output voltage at d_{im} = −60 dB (see Fig. 3) I_C = 14 mA; V_{CE} = 10 V; R_L = 75 Ω; T_{amb} = 25 °C $V_p = V_o$ at d_{im} = −60 dB; f_p = 795,25 MHz $V_q = V_o$ −6 dB ; f_q = 803,25 MHz $V_r = V_o$ −6 dB ; f_r = 805,25 MHz Measured at $f_{(p+q-r)}$ = 793,25 MHz	V_o	typ.	150 mV
Maximum unilateral power gain at f = 800 MHz I_C = 14 mA; V_{CE} = 10 V; T_{amb} = 25 °C	G_{UM}	typ.	13 dB

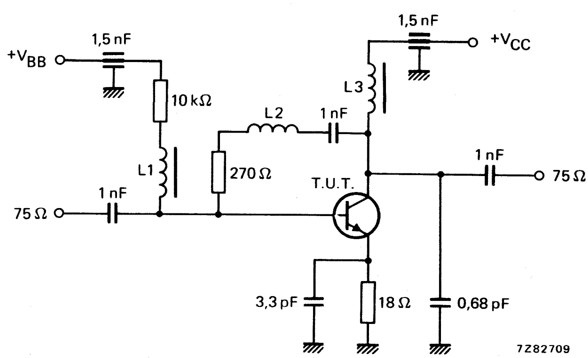


Fig. 3 Intermodulation distortion and second harmonic distortion MATV test circuit.

L1 = L3 = 5 μH microchoke
L2 = 3 turns Cu wire (0,4 mm); internal diameter 3 mm; winding pitch 1 mm

S-parameters (common emitter) at I_C = 14 mA; V_{CE} = 10 V; T_{amb} = 25 °C; typical values.

f MHz	s_{ie}	s_{re}	s_{fe}	s_{oe}
40	0,56/ −30°	0,01/76°	27,5/156°	0,94/ 10°
100	0,42/ −64°	0,02/69°	20,4/131°	0,81/−17°
200	0,28/−100°	0,03/68°	12,7/109°	0,70/−19°
500	0,18/−161°	0,05/74°	5,7/ 87°	0,63/−23°
800	0,18/+163°	0,08/75°	3,6/ 74°	0,63/−31°
1000	0,19/+145°	0,10/75°	2,9/ 66°	0,62/−36°

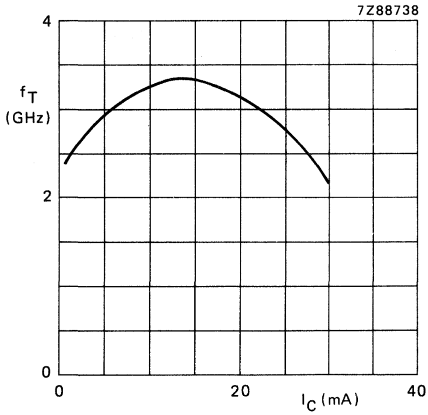


Fig. 4 V_{CE} = 5 V; f = 500 MHz; T_j = 25 °C; typical values.

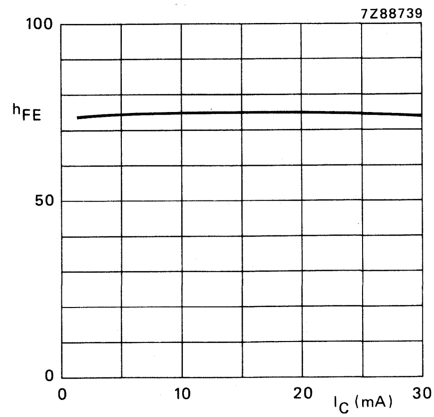


Fig. 5 V_{CE} = 5 V; T_j = 25 °C; typical values.

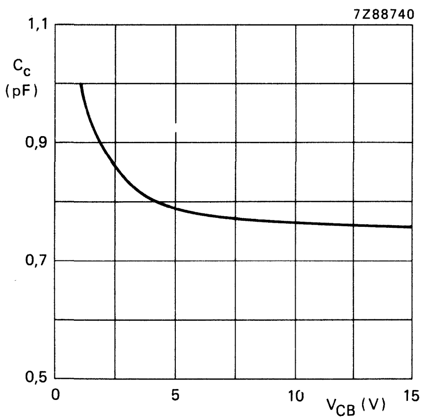


Fig. 6 $I_E = i_e = 0$; T_j = 25 °C; typical values.

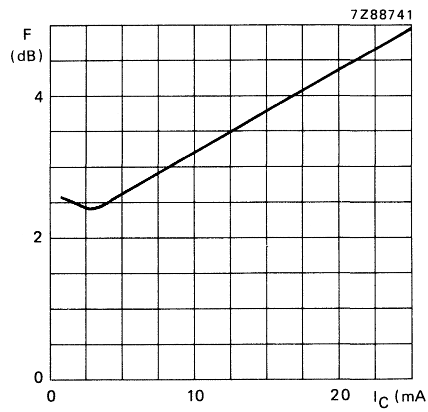


Fig. 7 V_{CE} = 5 V; T_{amb} = 25 °C; f = 800 MHz; Z_S = 60 Ω; typical values.

N-P-N H.F. WIDEBAND TRANSISTOR

N-P-N transistor in a plastic SOT-37 envelope.
The device is intended for use in v.h.f. - u.h.f. applications, primarily wideband aerial amplifiers 40 - 860 MHz.
It is intended for mounting on miniature printed-circuit boards.

QUICK REFERENCE DATA

Collector-base voltage (open emitter)	V_{CBO}	max.	18	V
Collector-emitter voltage (open base)	V_{CEO}	max.	10	V
Collector current (peak value; f > 1 MHz)	I_{CM}	max.	100	mA
Total power dissipation up to T_{amb} = 70 °C	P_{tot}	max.	200	mW
Junction temperature	T_j	max.	175	°C
Feedback capacitance at f = 1 MHz; I_C = 2 mA; V_{CE} = 5 V	C_{re}	typ.	0,6	pF
Transition frequency at f = 500 MHz; I_C = 50 mA; V_{CE} = 5 V	f_T	typ.	1,7	GHz
Max. unilateral power gain; I_C = 30 mA; V_{CE} = 5 V; f = 200 MHz	G_{UM}	typ.	22	dB
I_C = 30 mA; V_{CE} = 5 V; f = 800 MHz	G_{UM}	typ.	10,5	dB
Intermodulation distortion at T_{amb} = 25 °C; I_C = 30 mA; V_{CE} = 5 V; R_L = 37,5 Ω; V_O = 100 mV at f_p = 183 MHz; V_O = 100 mV at f_q = 200 MHz; measured at $f_{(2q-p)}$ = 217 MHz	d_{im}	typ.	−60	dB

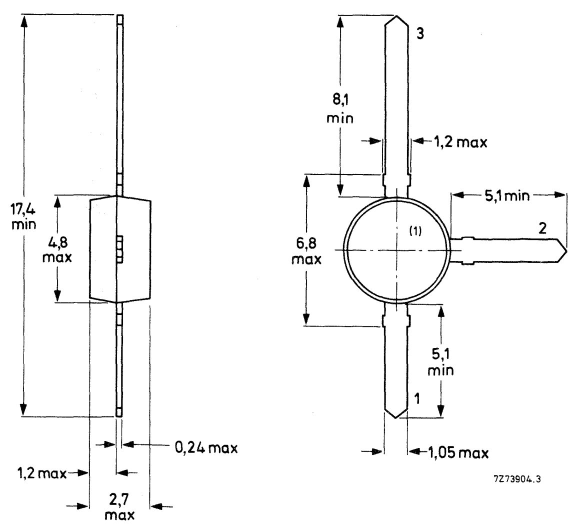
MECHANICAL DATA

Dimensions in mm

Fig. 1 SOT-37.

Connections

1. Base
2. Emitter
3. Collector



(1) = type number marking.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

Collector-base voltage (open emitter)	V_{CBO}	max.	18	V
Collector-emitter voltage (open base)	V_{CEO}	max.	10	V
Emitter-base voltage (open collector)	V_{EBO}	max.	2,5	V
Collector current (d.c.)	I_C	max.	50	mA
Collector current (peak value; f > 1 MHz)	I_{CM}	max.	100	mA
Total power dissipation up to T_{amb} = 70 °C	P_{tot}	max.	190	mW
Storage temperature	T_{stg}		−65 to +150	°C
→ Junction temperature	T_j	max.	175	°C

THERMAL RESISTANCE

From junction to ambient in free air mounted on a glass-fibre print of 40 mm x 25 mm x 1 mm (Fig. 2)	$R_{th\ j\text{-}a}$	=	400	K/W

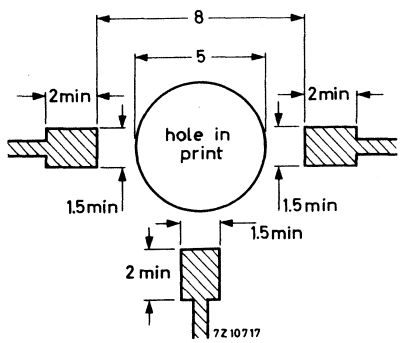


Fig. 2 Requirements for fibre-glass print (dimensions in mm).

CHARACTERISTICS

T_j = 25 °C unless otherwise specified

Collector cut-off current				
$I_E = 0$; $V_{CB} = 10$ V	I_{CBO}	max.	50	nA
D.C. current gain				
$I_C = 25$ mA; $V_{CE} = 5$ V	h_{FE}	min.	25	
$I_C = 50$ mA; $V_{CE} = 5$ V	h_{FE}	min.	25	
Transition frequency at f = 500 MHz				
$I_C = 50$ mA; $V_{CE} = 5$ V	f_T	typ.	1,7	GHz
Collector capacitance at f = 1 MHz				
$I_E = I_e = 0$; $V_{CB} = 5$ V	C_c	typ.	0,7	pF
Emitter capacitance at f = 1 MHz				
$I_C = I_c = 0$; $V_{EB} = 0,5$ V	C_e	typ.	1,5	pF

Feedback capacitance at f = 1 MHz			
I_C = 2 mA; V_{CE} = 5 V; T_{amb} = 25 °C	C_{re}	typ.	0,6 pF
Noise figure at f = 500 MHz			
I_C = 2 mA; V_{CE} = 5 V; G_S = 20 mS			
B_S is tuned; T_{amb} = 25 °C	F	max.	5,0 dB
Max. unilateral power gain (s_{re} assumed to be zero)			
$G_{UM} = 10 \log \frac{\lvert s_{fe}\rvert^2}{[1-\lvert s_{ie}\rvert^2][1-\lvert s_{oe}\rvert^2]}$			
I_C = 30 mA; V_{CE} = 5 V; f = 200 MHz; T_{amb} = 25 °C	G_{UM}	typ.	22 dB
I_C = 30 mA; V_{CE} = 5 V; f = 800 MHz; T_{amb} = 25 °C	G_{UM}	typ.	10,5 dB
Intermodulation distortion at T_{amb} = 25 °C			
I_C = 30 mA; V_{CE} = 5 V; R_L = 37,5 Ω			
V_o = 100 mV at f_p = 183 MHz			
V_o = 100 mV at f_q = 200 MHz			
measured at $f_{(2q-p)}$ = 217 MHz	d_{im}	typ.	−60 dB

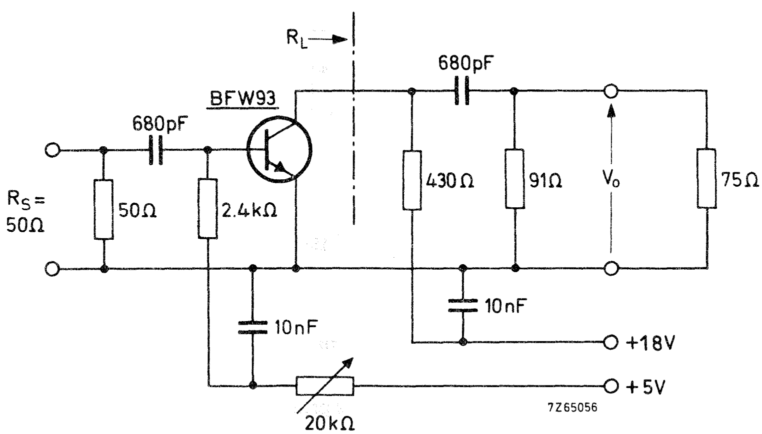


Fig. 3 Test circuit.

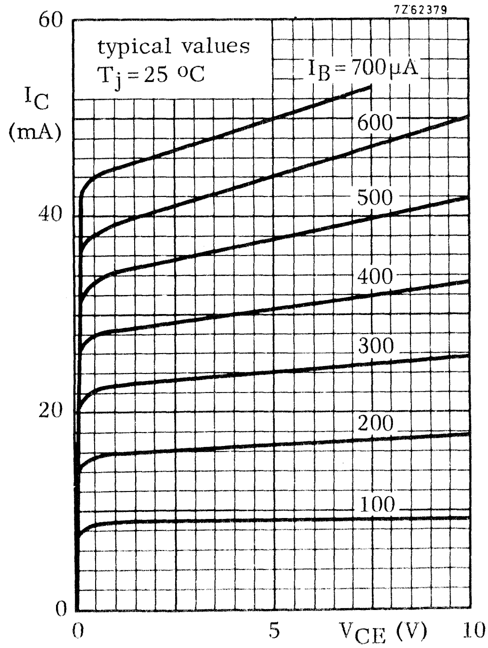


Fig. 4 $T_j = 25\ ^oC$; typical values.

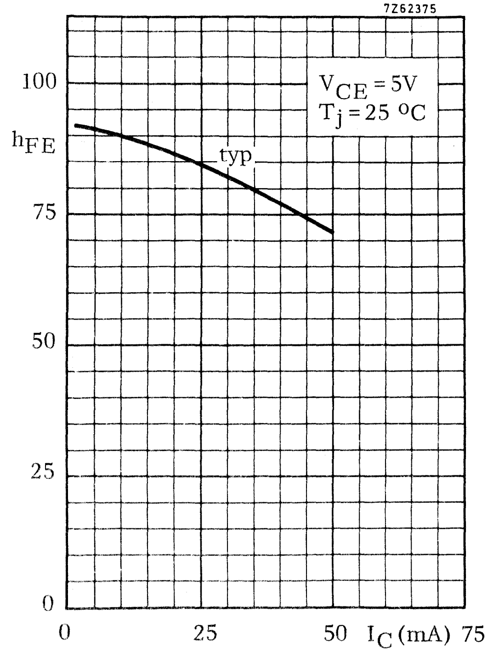


Fig. 5 $V_{CE} = 5$ V; $T_j = 25\ ^oC$; typical values.

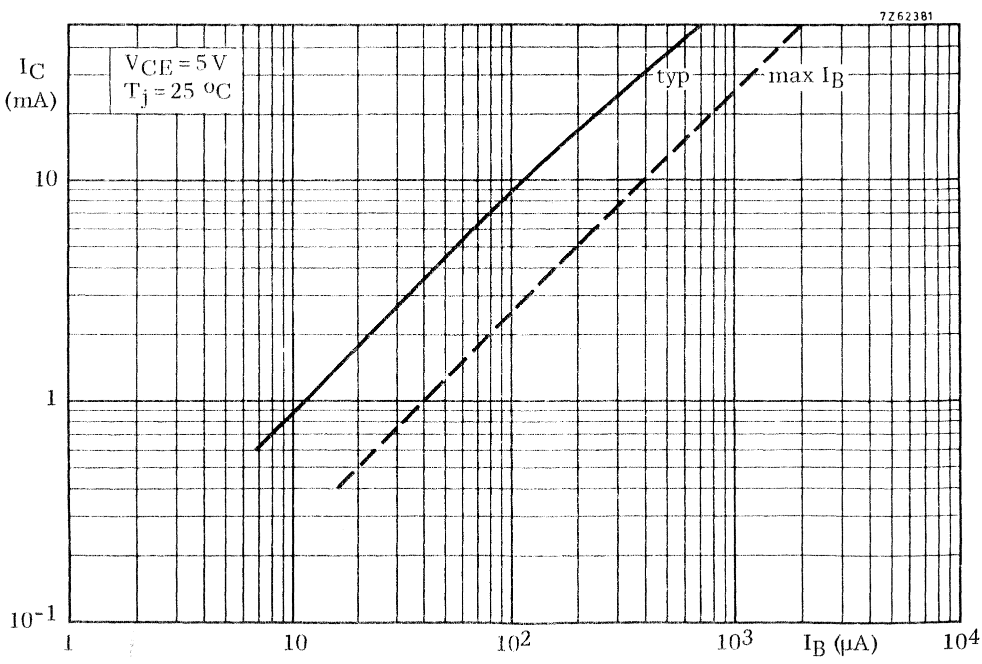


Fig. 6 $V_{CE} = 5$ V; $T_j = 25\ ^oC$.

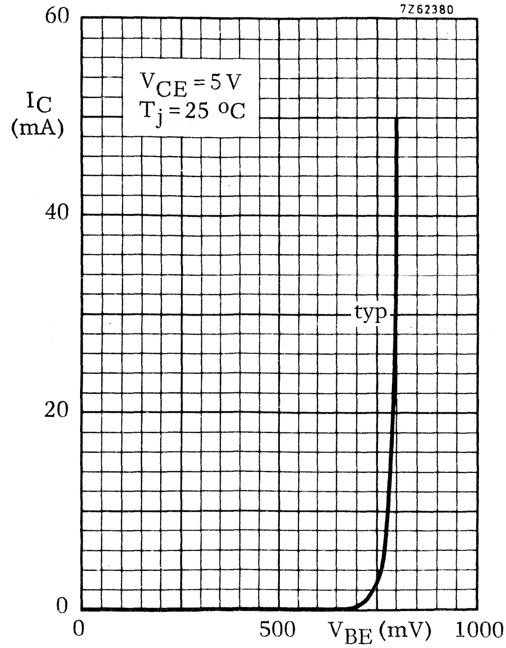


Fig. 7 V_{CE} = 5 V; T_j = 25 °C; typical values.

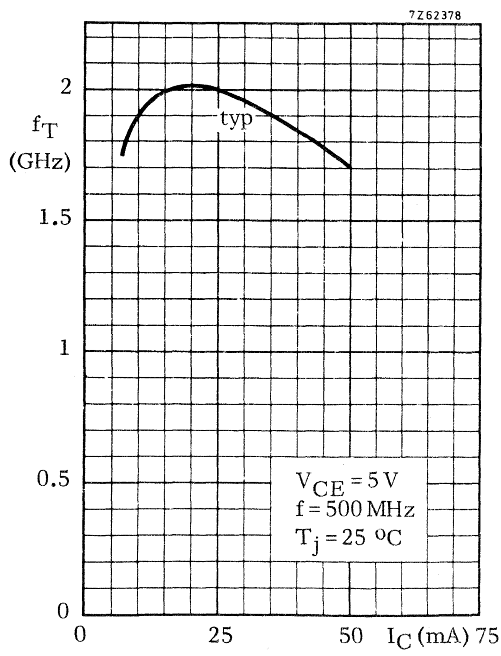


Fig. 8 V_{CE} = 5 V; f = 500 MHz; T_j = 25 °C; typical values.

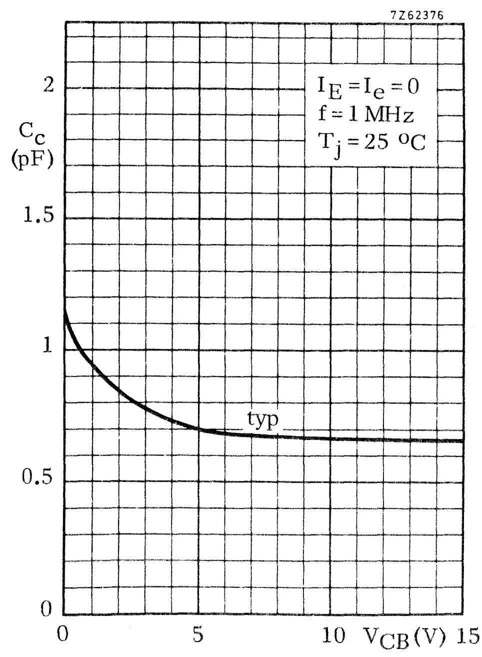


Fig. 9 $I_E = i_e = 0$; f = 1 MHz; T_j = 25 °C; typical values.

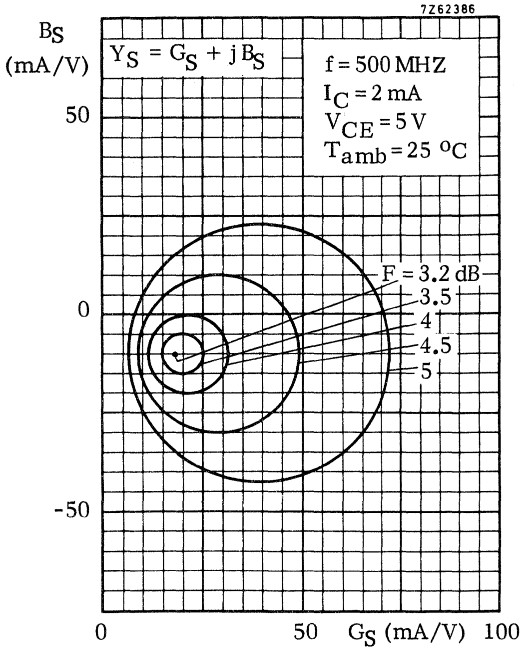


Fig. 10 V_{CE} = 5 V; I_C = 2 mA; f = 500 MHz; T_{amb} = 25 °C; typical values.

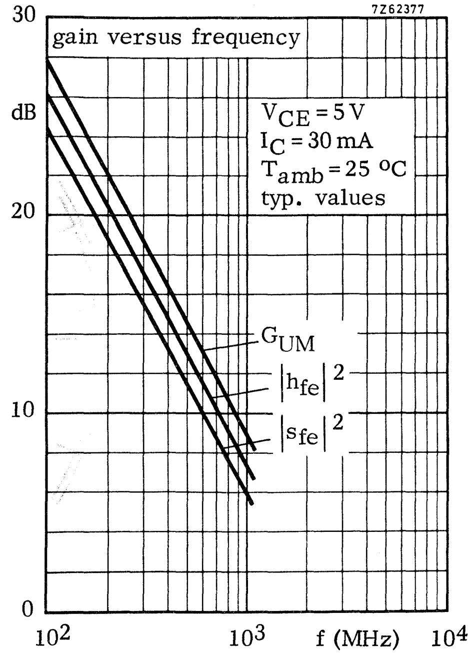


Fig. 11 V_{CE} = 5 V; I_C = 30 mA; T_{amb} = 25 °C; typical values.

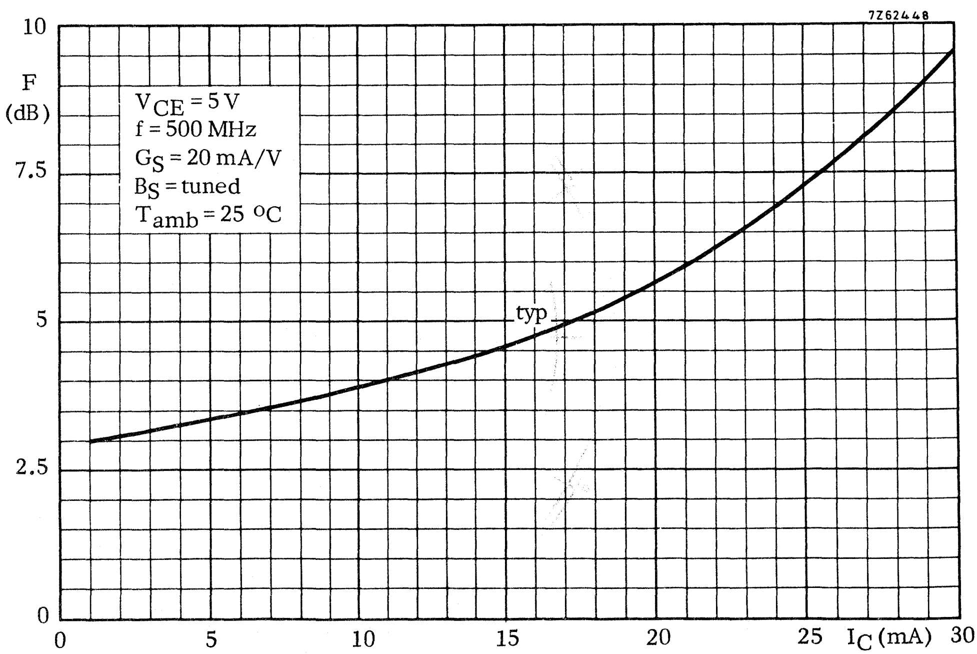


Fig. 12 V_{CE} = 5 V; f = 500 MHz; G_S = 20 mS; B_S = tuned; T_{amb} = 25 °C; typical values.

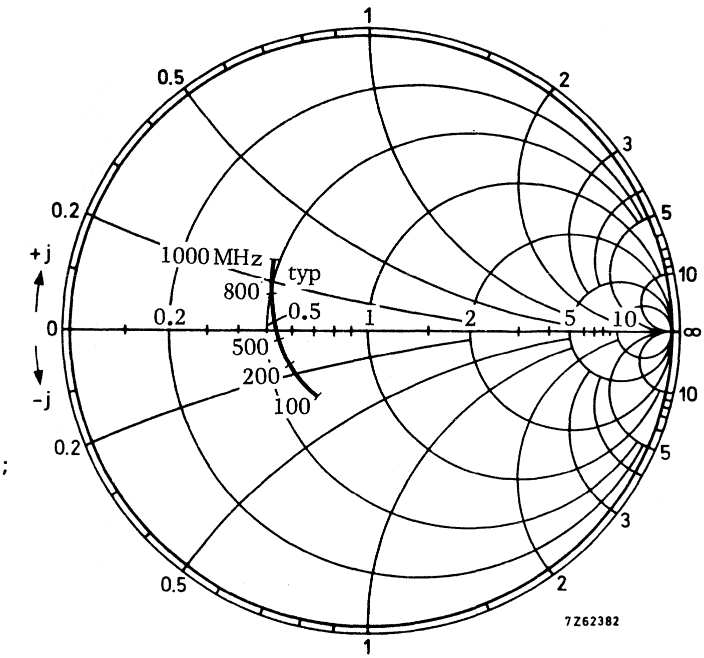


Fig. 13 V_{CE} = 5 V; I_C = 30 mA; T_{amb} = 25 °C; typical values.

Input impedance derived from input reflection coefficient s_{ie} coordinates in ohm x 50

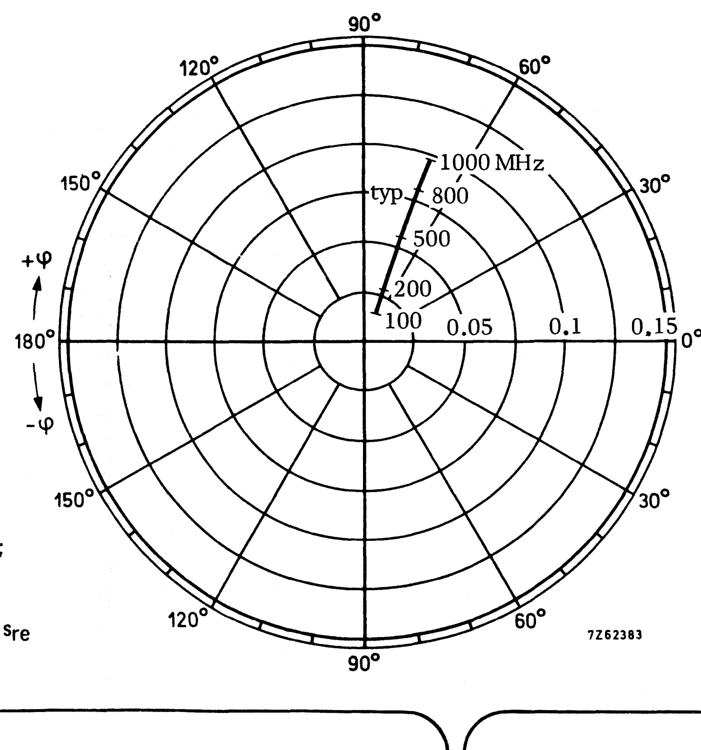


Fig. 14 V_{CE} = 5 V; I_C = 30 mA; T_{amb} = 25 °C; typical values.

Reverse transmission coefficient s_{re}

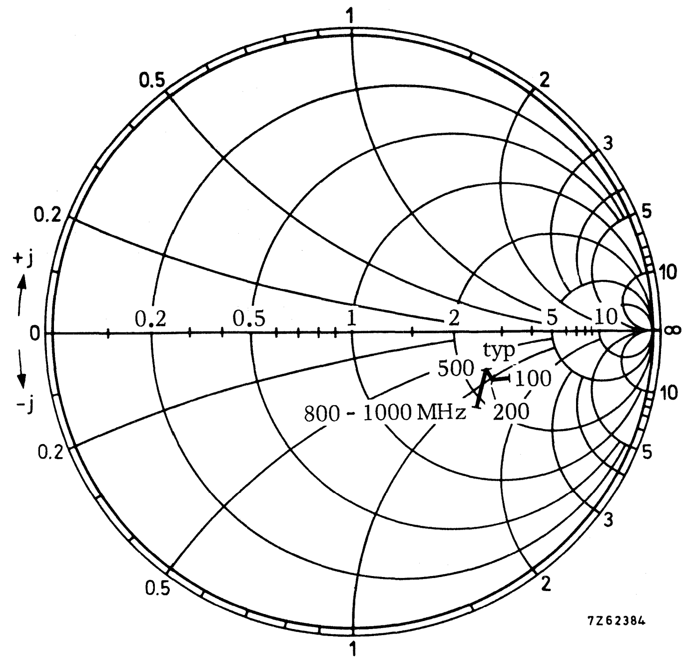


Fig. 15 V_{CE} = 5 V; I_C = 30 mA; T_{amb} = 25 °C; typical values.

Output impedance derived from output reflection coefficient s_{oe} coordinates in ohm x 50

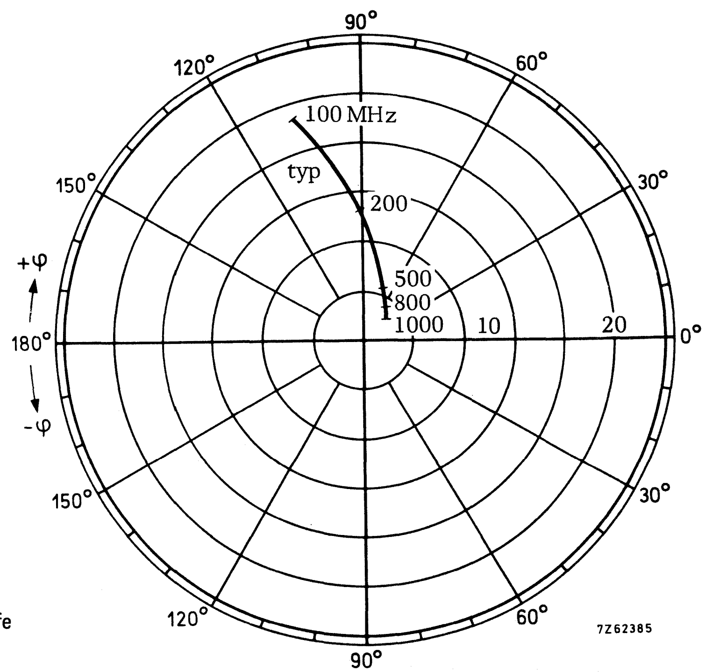


Fig. 16 V_{CE} = 5 V; I_C = 30 mA; T_{amb} = 25 °C; typical values.

Forward transmission coefficient s_{fe}

N-P-N H.F. WIDEBAND TRANSISTOR

N-P-N transistor in a TO-72 metal envelope, with insulated electrodes and a shield lead connected to the case. The transistor has a low noise, a very high power gain and good intermodulation properties. It is primarily intended for:

- Channel aerial amplifiers for bands I, II, III and IV/V (40–860 MHz).
- Wideband aerial amplifiers (40–860 MHz).

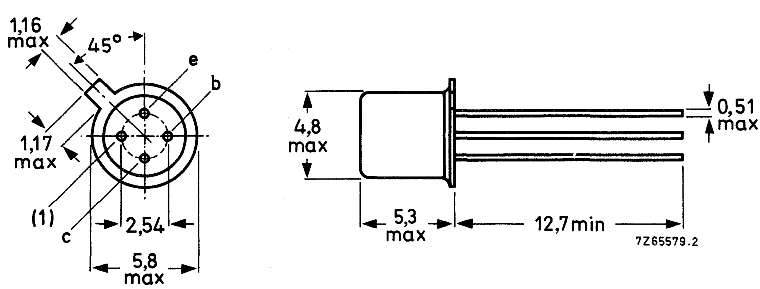
QUICK REFERENCE DATA

Collector-base voltage (open emitter; peak value)	V_{CBOM}	max.		30	V
Collector-emitter voltage (open base)	V_{CEO}	max.		15	V
Collector current (peak value; f > 1 MHz)	I_{CM}	max.		50	mA
Total power dissipation up to T_{amb} = 25 °C	P_{tot}	max.		200	mW
Junction temperature	T_j	max.		200	°C
Transition frequency I_C = 25 mA; V_{CE} = 5 V; f = 500 MHz	f_T	typ.		1,2	GHz
Feedback capacitance I_C = 2 mA; V_{CE} = 5 V; f = 1 MHz	C_{re}	typ.		0,6	pF
			f = 200	800	MHz
Noise figure at optimum source impedance I_C = 2 mA; V_{CE} = 5 V	F	typ.	3,3	7	dB
Power gain (not neutralized) I_C = 8 mA; V_{CE} = 10 V	G_p	typ.	22	7	dB
Output power d_{im} = −30 dB; VSWR at output < 2; I_C = 8 mA; V_{CE} = 10 V	P_o	typ.	6	6	mW

MECHANICAL DATA

Dimensions in mm

Fig. 1 TO-72.



(1) = shield lead (connected to case).

Accessories: 56246 (distance disc).

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

Collector-base voltage (open emitter; peak value)	V_{CBOM}	max.	30	V
Collector-emitter voltage (peak value) $R_{BE} \leqslant 50\ \Omega$	V_{CERM}	max.	30	V
Collector-emitter voltage (open base)	V_{CEO}	max.	15	V
Emitter-base voltage (open collector)	V_{EBO}	max.	2,5	V
Collector current (d.c.)	I_C	max.	25	mA
Collector current (peak value; f > 1 MHz)	I_{CM}	max.	50	mA
Total power dissipation up to T_{amb} = 25 °C	P_{tot}	max.	200	mW
Storage temperature	T_{stg}	−65 to +	200	°C
Junction temperature	T_j	max.	200	°C

THERMAL RESISTANCE

From junction to ambient in free air	$R_{th\ j\text{-}a}$	=	880	K/W
From junction to case	$R_{th\ j\text{-}c}$	=	580	K/W

CHARACTERISTICS

T_j = 25 °C unless otherwise specified

Collector cut-off current			
$I_E = 0$; $V_{CB} = 15$ V	I_{CBO}	max.	10 nA
Knee voltage			
$I_C = 20$ mA; I_B = value for which $I_C = 22$ mA at $V_{CE} = 1$ V	V_{CEK}	max.	0,75 V

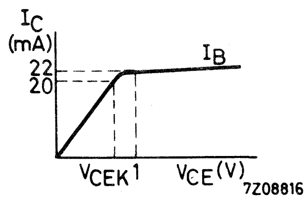


Fig. 2.

D.C. current gain			
$I_C = 2$ mA; $V_{CE} = 1$ V	h_{FE}		20 to 150
$I_C = 25$ mA; $V_{CE} = 1$ V	h_{FE}		20 to 125
Transition frequency*			
$I_C = 2$ mA; $V_{CE} = 5$ V; f = 500 MHz	f_T	typ.	1,0 GHz
$I_C = 25$ mA; $V_{CE} = 5$ V; f = 500 MHz	f_T	typ.	1,2 GHz
Collector capacitance at f = 1 MHz**			
$I_E = I_e = 0$; $V_{CB} = 10$ V	C_c	max.	1,7 pF
Feedback capacitance at f = 1 MHz*			
$I_C = 2$ mA; $V_{CE} = 5$ V; $T_{amb} = 25$ °C	C_{re}	typ.	0,6 pF
Noise figure*			
$I_C = 2$ mA; $V_{CE} = 5$ V; $T_{amb} = 25$ °C			
f = 200 MHz; optimum source impedance	F	max.	4,0 dB
f = 500 MHz; $Z_S = 50\ \Omega$	F	max.	6,5 dB
f = 800 MHz; optimum source impedance	F	typ.	7,0 dB

Power gain (not neutralized)*

			f = 200	800 MHz
$I_C = 8$ mA; $V_{CE} = 10$ V; $T_{amb} = 25$ °C	G_p	min.	19	– dB
		typ.	22	7,0 dB

* Shield lead grounded.
** Shield lead not connected.

CHARACTERISTICS (continued)

Intermodulation characteristics*

1. Output power at f = 200 MHz; T_{amb} = 25 °C
   I_C = 8 mA; V_{CE} = 10 V; V.S.W.R. at output < 2
   f_p = 202 MHz; f_q = 205 MHz; d_{im} = −30 dB
   measured at $f_{(2q-p)}$ = 208 MHz (Channel 9) | P_o | typ. | 6 mW

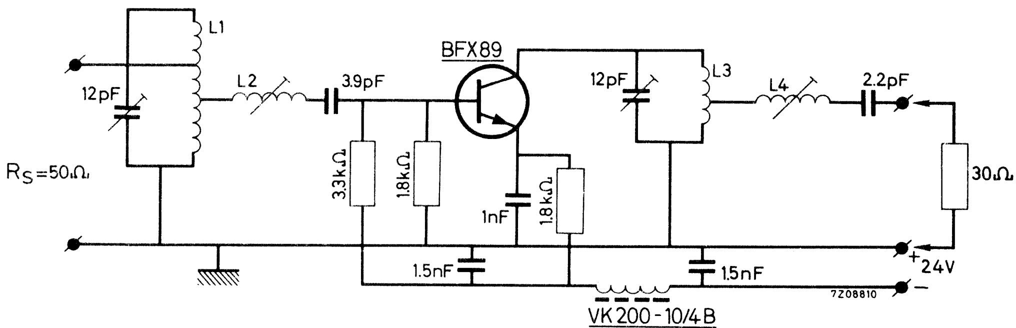


Fig. 3 Test circuit.

Coil data:

L1 = 3 turns silver plated Cu wire (1,4 mm); winding pitch 2,7 mm; int. diam. 8 mm; taps at 0,5 turn and 1,5 turns from earth.
L2 = 5,5 turns silver plated Cu wire (1,4 mm); winding pitch 2,2 mm; int. diam. 8 mm.
L3 = 3 turns silver plated Cu wire (1,4 mm); winding pitch 3,3 mm; int. diam. 8 mm.
L4 = 5,5 turns silver plated Cu wire (1,4 mm); winding pitch 2,2 mm; int. diam. 11 mm.

* Shield lead grounded.

CHARACTERISTICS

Basis of adjustment

The intermodulation at an intermodulation distortion of −30 dB is caused by h.f. output current – voltage clipping.
The maximum undistorted output power is realised, if

a. Current and voltage clipping take place concurrently.
   This occurs if

$$R_L = \frac{V_{CE} - V_{CEK}}{I_C},$$

   in which V_{CEK} is the high frequency knee voltage.

b. The h.f. collector current is as small as possible.
   This is so if $-C_L = +C_{oe}$,
   in which C_{oe} is the output capacitance of the transistor at short circuited input.

For maximum output power at an intermodulation distortion of −30 dB, the (experimentally found) values of R_L and C_L are:
$R_L = 1\ k\Omega$; $C_L = -1{,}8\ pF$

Adjustment procedure

1. Remove the transistor and connect a dummy consisting of a 1 kΩ resistor in parallel with a 1,8 pF capacitor between the collector and emitter connections of the output circuit.
2. Tune and match the output circuit for zero reflection at 205 MHz (V.S.W.R. = 1). After this adjustment, no further change may be made in the output circuit.
3. Replace the dummy by the transistor. Tune and match the input circuit for maximum power gain and good band pass curve.
   The V.S.W.R. of the output will then, in most cases, be ≤ 2 over the whole channel.
   Corrections can be made by tuning L2; this will not disturb the band pass curve.

CHARACTERISTICS (continued)

Intermodulation characteristics*

2. Output power at f = 800 MHz; T_{amb} = 25 °C
   I_C = 8 mA; V_{CE} = 10 V; V.S.W.R. at output < 2
   f_p = 798 MHz; f_q = 802 MHz; d_{im} = −30 dB
   measured at $f_{(2q-p)}$ = 806 MHz (Channel 62) — P_o typ. 6 mW

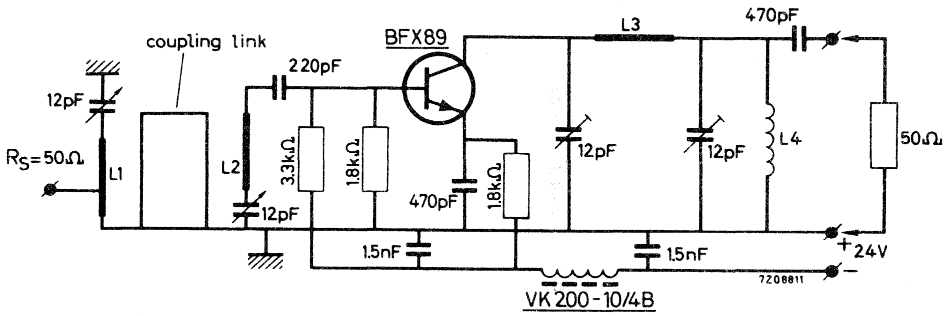


Fig. 4 Test circuit.

Coil data:

L1 = 24 mm x 6 mm x 0,5 mm silver plated Cu strip.
Tap of the input at 5 mm from earth.
L2 = 15 mm x 6 mm x 0,5 mm silver plated Cu strip.
L3 = 20 mm x 8 mm x 0,5 mm silver plated Cu strip.
L4 = 4 turns enamelled Cu wire (0,5 mm); winding pitch 1,5 mm; int. diam. 4 mm.
Coupling link: 42 mm silver plated Cu wire (1 mm).

Basis of adjustment

At 800 MHz no dummy can be used to adjust for optimum collector load because at these frequencies the impedance transformations of a dummy are too high. A small signal at the mid-channel frequency of 802 MHz is fed to the input and increased until clipping occurs; that is, until the output power no longer increases linearily with the input signal. This clipping can be eliminated by tuning the output circuit, thereby making the output power equal to

$$P_o = \frac{I_C\,(V_{CE} - V_{CEK})}{2} = 35\ \text{mW}$$

The output circuit is adjusted for minimum intermodulation if the input signal is as small as possible at P_o = 35 mW.
After this adjustment has been made no further change may be made in the output circuit.
Adjust the input circuit for maximum power gain and good band pass curve.
The V.S.W.R. of the output is then ⩽ 2 over the whole channel.

* Shield lead grounded.

CHARACTERISTICS

Intermodulation characteristics*

3. Intermodulation distortion
   I_C = 8 mA; V_{CE} = 6 V; R_L = 37,5 Ω; T_{amb} = 25 °C
   V_o = 100 mV at f_p = 183 MHz
   V_o = 100 mV at f_q = 200 MHz
   measured at $f_{(2q-p)}$ = 217 MHz — d_{im} typ. −40 dB

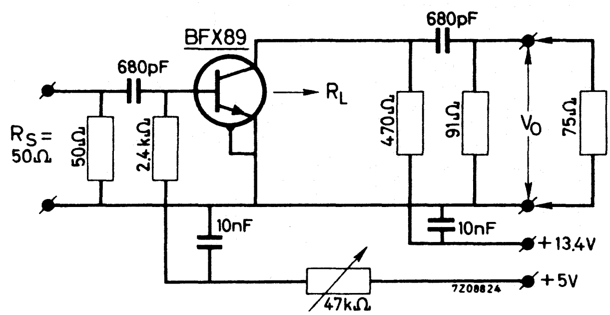


Fig. 5 Test circuit.

* Shield lead grounded.

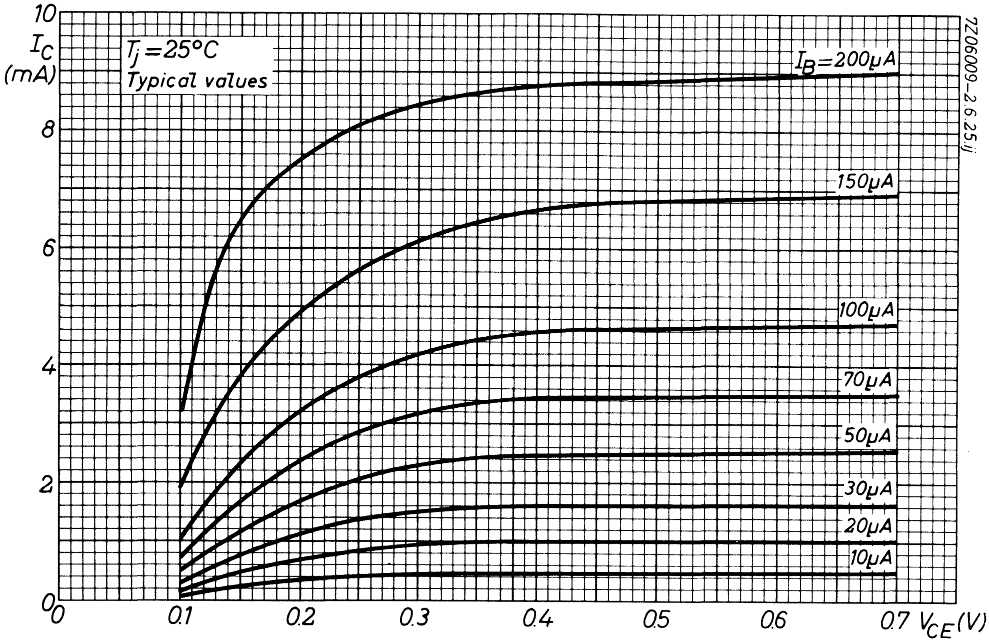


Fig. 6 T_j = 25 °C; typical values.

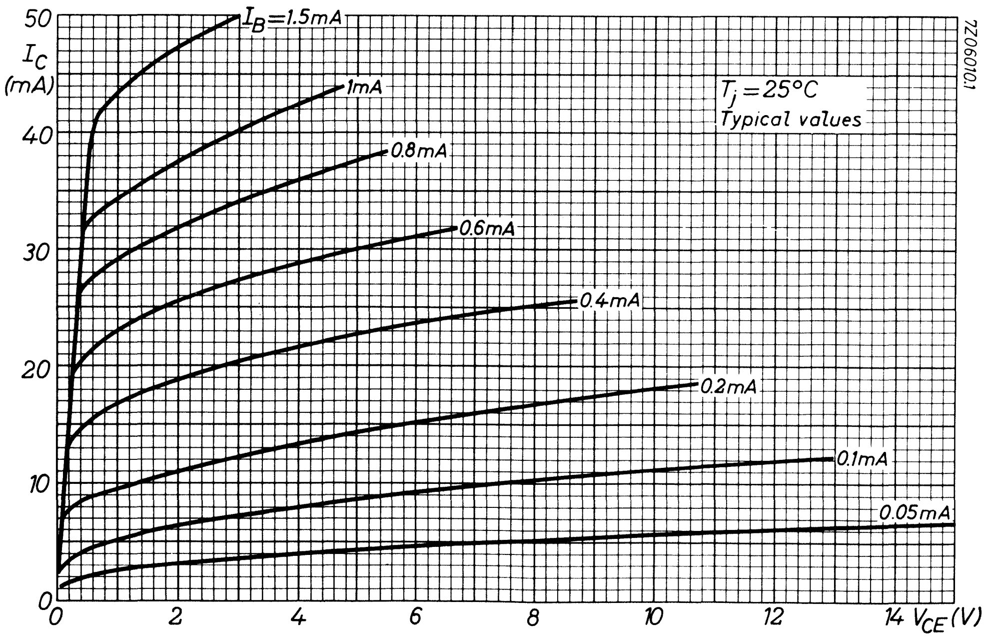


Fig. 7 T_j = 25 °C; typical values.

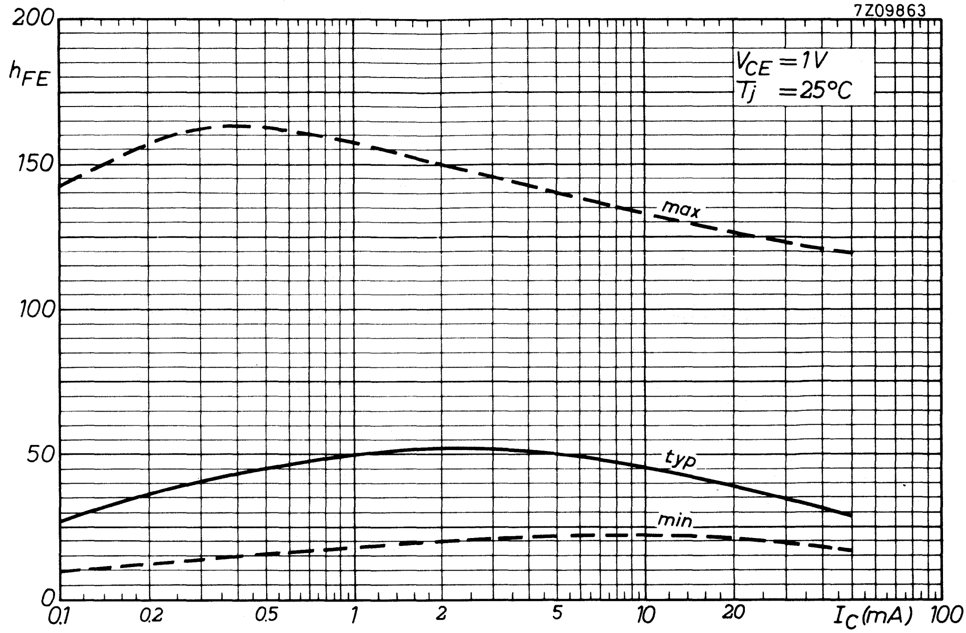


Fig. 8 V_{CE} = 1 V; T_j = 25 °C.

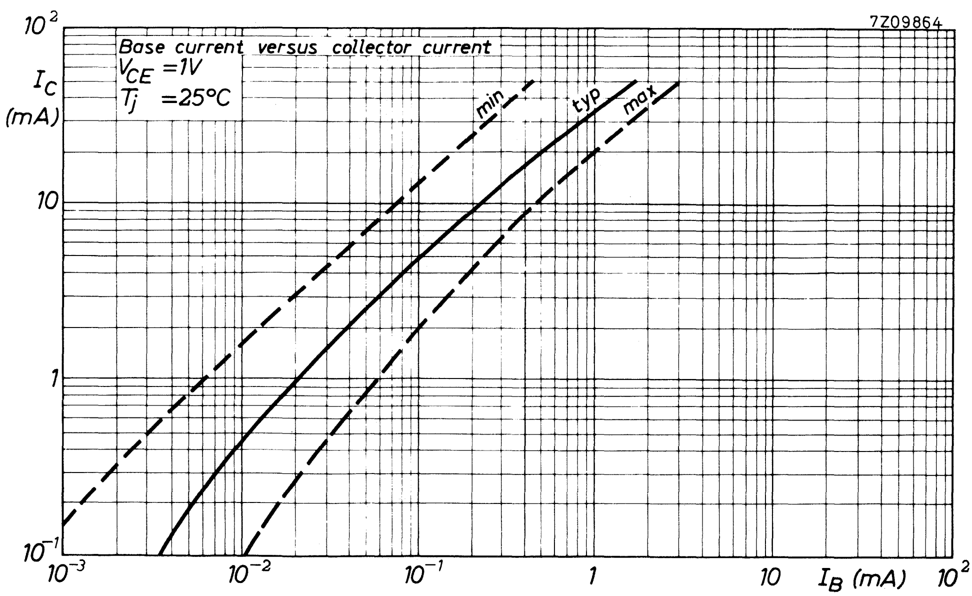


Fig. 9 V_{CE} = 1 V; T_j = 25 °C.

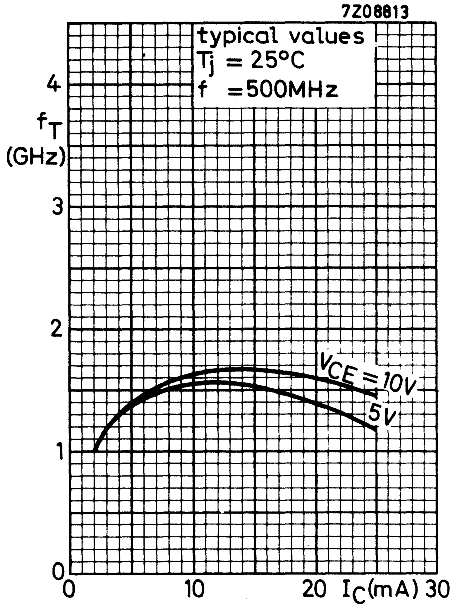


Fig. 10 f = 500 MHz; T_j = 25 °C; typical values.

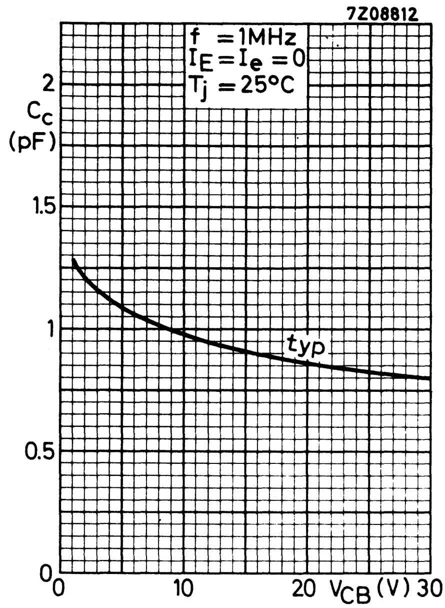


Fig. 11 $I_E = i_e = 0$; f = 1 MHz; T_j = 25 °C; typical values.

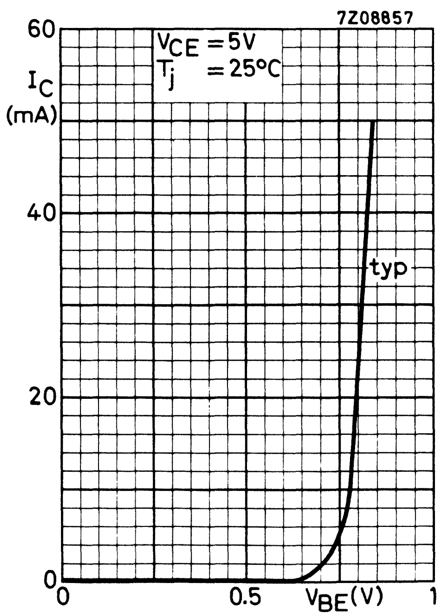


Fig. 12 V_{CE} = 5 V; T_j = 25 °C; typical values.

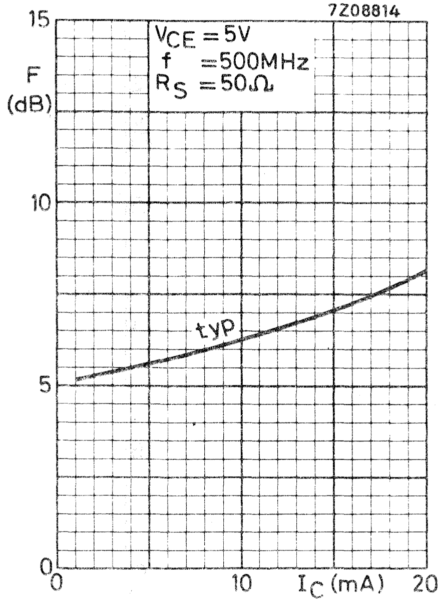


Fig. 13 V_{CE} = 5 V; f = 500 MHz; Z_S = 50 Ω; T_{amb} = 25 °C; typical values.

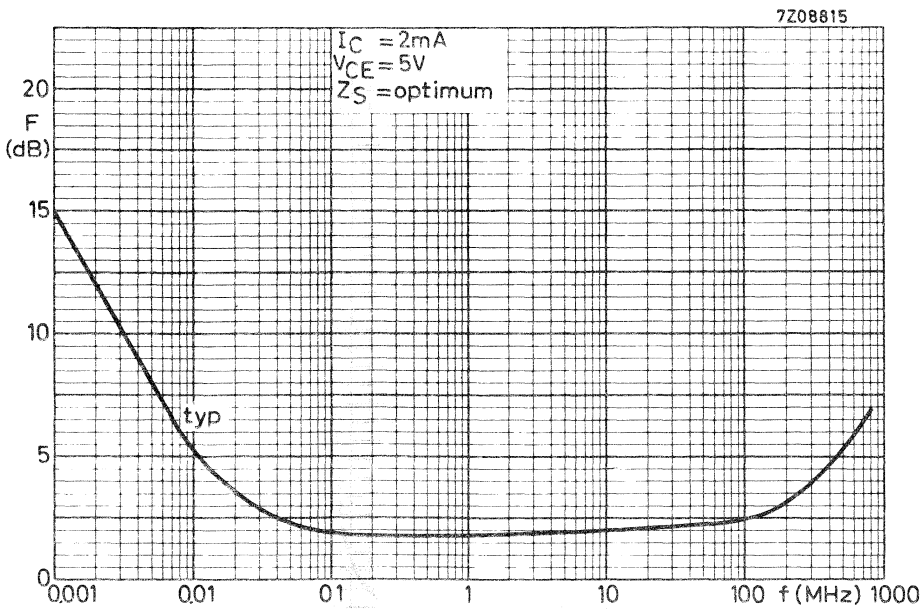


Fig. 14 V_{CE} = 5 V; I_C = 2 mA; Z_S = opt.; T_{amb} = 25 °C; typical values.

N-P-N H.F. WIDEBAND TRANSISTOR

N-P-N transistor in a TO-72 metal envelope with insulated electrodes and a shield lead connected to the case.
The transistor has very low noise over a wide current range, a very high power gain and excellent intermodulation properties.
It is primarily intended for:
- Channel- and band aerial amplifiers for band I, II, III and IV/V (40-860 MHz)
- Wide band aerial amplifiers (40-860 MHz)
- Television distribution amplifiers
- Low noise wide band vertical amplifier in high speed oscilloscopes

It is also suitable for military- and industrial applications, such as:
- R.F. amplifiers and mixers for communication equipment
- Microwave telephony link systems, wide band i.f. amplifiers
- Large bandwidth radar i.f. amplifiers

QUICK REFERENCE DATA

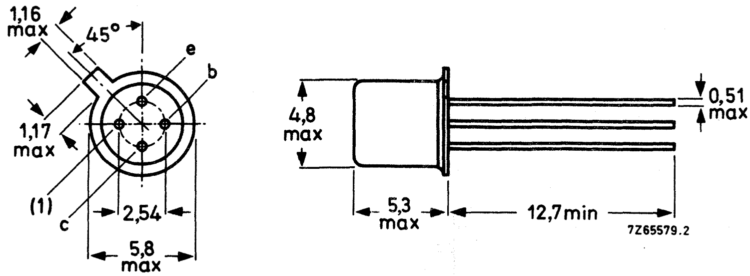
Collector-base voltage (open emitter; peak value)	V_{CBOM}	max.	30	V
Collector-emitter voltage (open base)	V_{CEO}	max.	15	V
Collector current (peak value; f > 1 MHz)	I_{CM}	max.	50	mA
Total power dissipation up to T_{amb} = 25 °C	P_{tot}	max.	200	mW
Junction temperature	T_j	max.	200	°C
Transition frequency				
I_C = 25 mA; V_{CE} = 5 V; f = 500 MHz	f_T	typ.	1,4	GHz
Feedback capacitance at f = 1 MHz				
I_C = 2 mA; V_{CE} = 5 V	C_{re}	typ.	0,6	pF
Noise figure at optimum source impedance				
I_C = 2 mA; V_{CE} = 5 V				
f = 200 MHz	F	typ.	2,5	dB
f = 800 MHz	F	typ.	5,5	dB
Power gain (not neutralized)				
I_C = 14 mA; V_{CE} = 10 V				
f = 200 MHz	G_p	typ.	23	dB
f = 800 MHz	G_p	typ.	8	dB
Output power				
d_{im} = −30 dB; V.S.W.R. at output < 2				
I_C = 14 mA; V_{CE} = 10 V				
f = 200 MHz	P_o	typ.	12	mW
f = 800 MHz	P_o	typ.	12	mW

MECHANICAL DATA (see next page)

MECHANICAL DATA

Dimensions in mm

Fig. 1 TO-72.



(1) = shield lead (connected to case).

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

Collector-base voltage (open emitter; peak value)	V_{CBOM}	max.	30	V
Collector-emitter voltage (peak value) $R_{BE} \leq 50\,\Omega$; $I_C = 10$ mA	V_{CERM}	max.	30	V
Collector-emitter voltage (open base); $I_C = 10$ mA	V_{CEO}	max.	15	V
Emitter-base voltage (open collector)	V_{EBO}	max.	2,5	V
Collector current (d.c.)	I_C	max.	25	mA
Collector current (peak value; f > 1 MHz)	I_{CM}	max.	50	mA
Total power dissipation up to $T_{amb} = 25\,^oC$	P_{tot}	max.	200	mW
Storage temperature	T_{stg}		−65 to + 200	^oC
Junction temperature	T_j	max.	200	^oC

THERMAL RESISTANCE

From junction to ambient in free air	$R_{th\ j\text{-}a}$	=	880	K/W
From junction to case	$R_{th\ j\text{-}c}$	=	580	K/W

CHARACTERISTICS

T_j = 25 °C unless otherwise specified

Collector cut-off current			
I_E = 0; V_{CB} = 15 V	I_{CBO}	min.	10 nA
Knee voltage			
I_C = 20 mA; I_B = value for which I_C = 22 mA at V_{CE} = 1 V	V_{CEK}	min.	0,75 V

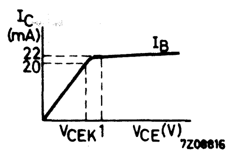


Fig. 2.

D.C. current gain			
I_C = 2 mA; V_{CE} = 1 V	h_{FE}		25 to 150
I_C = 25 mA; V_{CE} = 1 V	h_{FE}		20 to 125
Transition frequency*			
I_C = 2 mA; V_{CE} = 5 V; f = 500 MHz	f_T	min.	1,0 GHz
		typ.	1,1 GHz
I_C = 25 mA; V_{CE} = 5 V; f = 500 MHz	f_T	min.	1,3 GHz
		typ.	1,4 GHz
Collector capacitance at f = 1 MHz**			
I_E = I_e = 0; V_{CB} = 10 V	C_c	max.	1,5 pF
Feedback capacitance at f = 1 MHz*			
I_C = 2 mA; V_{CE} = 5 V; T_{amb} = 25 °C	C_{re}	typ.	0,6 pF
		max.	0,8 pF
Noise figure*			
I_C = 2 mA; V_{CE} = 5 V; T_{amb} = 25 °C			
f = 100 kHz; optimum source resistance	F	max.	4 dB
f = 200 MHz; optimum source impedance	F	max.	3,5 dB
f = 500 MHz; Z_S = 50 Ω	F	max.	5 dB
f = 800 MHz; optimum source impedance	F	typ.	5,5 dB
Power gain (not neutralized)*			
I_C = 14 mA; V_{CE} = 10 V; T_{amb} = 25 °C			
f = 200 MHz	G_p	min.	21 dB
		typ.	23 dB
f = 800 MHz	G_p	typ.	8 dB

* Shield lead grounded.

** Shield lead not connected.

CHARACTERISTICS (continued)

Intermodulation characteristics*

1. Output power at f = 200 MHz; T_{amb} = 25 °C
   I_C = 14 mA; V_{CE} = 10 V; V.S.W.R. at output < 2
   f_p = 202 MHz; f_q = 205 MHz; d_{im} = −30 dB
   measured at $f_{(2q-p)}$ = 208 MHz (Channel 9) — P_o min. 10 mW; typ. 12 mW

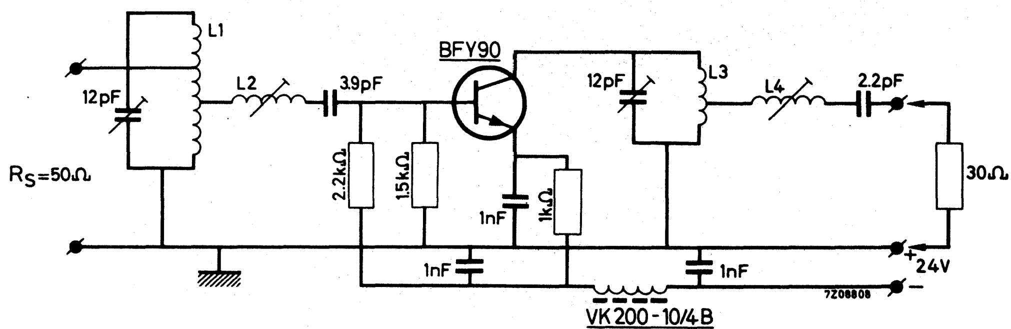


Fig. 3 Test circuit.

Coil data:

L1 = 3 turns silver plated Cu wire (1,4 mm); winding pitch 2,7 mm; int. diam. 8 mm; taps at 0,5 turn and 1,5 turns from earth.
L2 = 5,5 turns silver plated Cu wire (1,4 mm); winding pitch 2,2 mm; int. diam. 8 mm.
L3 = 3 turns silver plated Cu wire (1,4 mm); winding pitch 3,3 mm; int. diam. 8 mm.
L4 = 5,5 turns silver plated Cu wire (1,4 mm); winding pitch 2,2 mm; int. diam. 11 mm.

* Shield lead grounded.

CHARACTERISTICS

Basis of adjustment

The intermodulation at an intermodulation distortion of −30 dB is caused by h.f. output current – voltage clipping.
The maximum undistorted output power is realised, if

a. Current and voltage clipping take place concurrently.
   This occurs if

$$R_L = \frac{V_{CE} - V_{CEK}}{I_C},$$

   in which V_{CEK} is the high frequency knee voltage.

b. The h.f. collector current is as small as possible.
   This is so if $-C_L = +C_{oe}$,
   in which C_{oe} is the output capacitance of the transistor at short circuited input.

For maximum output power at an intermodulation distortion of −30 dB, the (experimentally found) values of R_L and C_L are:
$R_L = 560\ \Omega$; $C_L = -1,8$ pF

Adjustment procedure

1. Remove the transistor and connect a dummy consisting of a 560 Ω resistor in parallel with a 1,8 pF capacitor between the collector and emitter connections of the output circuit.
2. Tune and match the output circuit for zero reflection at 205 MHz (V.S.W.R. = 1). After this adjustment, no further change may be made in the output circuit.
3. Replace the dummy by the transistor. Tune and match the input circuit for maximum power gain and good band pass curve.
   The V.S.W.R. of the output will then, in most cases, be ⩽ 2 over the whole channel.
   Corrections can be made by tuning L2; this will not disturb the band pass curve.

CHARACTERISTICS (continued)

Intermodulation characteristics*

2. Output power at f = 800 MHz; T_{amb} = 25 °C
   I_C = 14 MHz; V_{CE} = 10 V; V.S.W.R. at output < 2
   f_p = 798 MHz; f_q = 802 MHz; d_{im} = −30 dB
   measured at $f_{(2q-p)}$ = 806 MHz (Channel 62) P_o typ. 12 mW

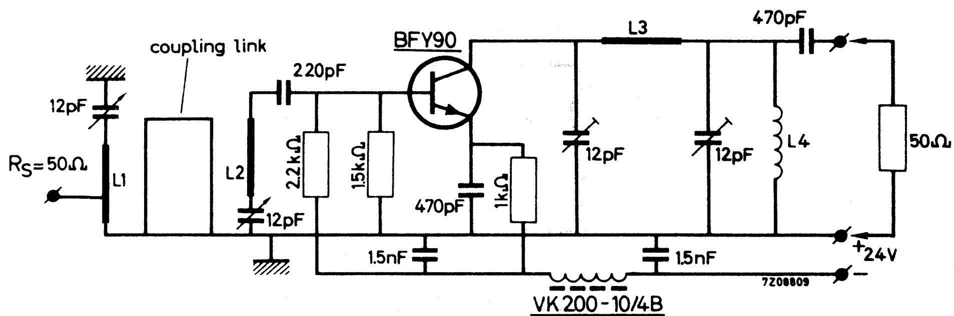


Fig. 4 Test circuit.

Coil data:

L1 = 24 mm x 6 mm x 0,5 mm silver plated Cu strip.
Tap of the input at 5 mm from earth.
L2 = 15 mm x 6 mm x 0,5 mm silver plated Cu strip.
L3 = 20 mm x 8 mm x 0,5 mm silver plated Cu strip.
L4 = 4 turns enamelled Cu wire (0,5 mm); winding pitch 1,5 mm; int. diam. 4 mm.
Coupling link: 42 mm silver plated Cu wire (1 mm).

Basis of adjustment

At 800 MHz no dummy can be used for optimum collector load because at these frequencies the impedance transformations of a dummy are too high. A small signal at the mid-channel frequency of 802 MHz is fed to the input and increased until clipping occurs; that is, until the output power no longer increases linearily with the input signal. This clipping can be eliminated by tuning the output circuit, thereby making the output power equal to

$$P_o = \frac{I_C\,(V_{CE} - V_{CEK})}{2} = 60\ \text{mW}$$

The output circuit is adjusted for minimum intermodulation if the input signal is as small as possible at P_o = 60 mW.
After this adjustment has been made no further change may be made in the output circuit.
Adjust the input circuit for maximum power gain and good band pass curve.
The V.S.W.R. of the output is then ⩽ 2 over the whole channel.

* Shield lead grounded.

CHARACTERISTICS

Intermodulation characteristics*

3. Intermodulation distortion
   I_C = 14 mA; V_{CE} = 6 V; R_L = 37,5 Ω; T_{amb} = 25 °C
   V_o = 100 mV at f_p = 183 MHz
   V_o = 100 mV at f_q = 200 MHz
   measured at $f_{(2q-p)}$ = 217 MHz — d_{im} typ. −50 dB

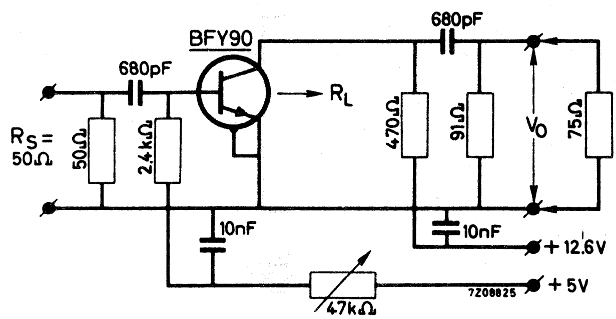


Fig. 5 Test circuit.

y parameters at f = 500 MHz (common emitter)*
I_C = 2 mA; V_{CE} = 5 V; T_{amb} = 25 °C

Input conductance	g_{ie}	typ.	16 mS
Input capacitance	C_{ie}	typ.	3,75 pF
Feedback admittance	$\lvert y_{re}\rvert$	typ.	1,55 mS
Phase angle of feedback admittance	φ_{re}	typ.	258°
Transfer admittance	$\lvert y_{fe}\rvert$	typ.	45 mS
Phase angle of transfer admittance	φ_{fe}	typ.	285°
Output conductance	g_{oe}	typ.	0,19 mS
Output capacitance	C_{oe}	typ.	1,9 pF

Maximum unilateralised power gain

$$G_{UM} = \frac{|y_{fe}|^2}{4 g_{ie} g_{oe}}$$

I_C = 2 mA; V_{CE} = 5 V; f = 500 MHz; T_{amb} = 25 °C — G_{UM} typ. 22 dB

* Shield lead grounded.

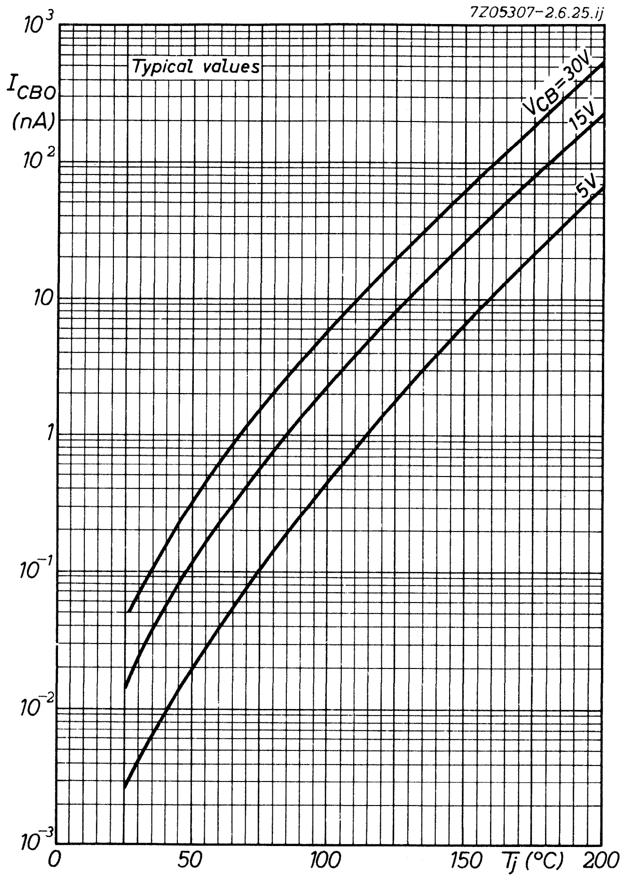


Fig. 6 Typical values.

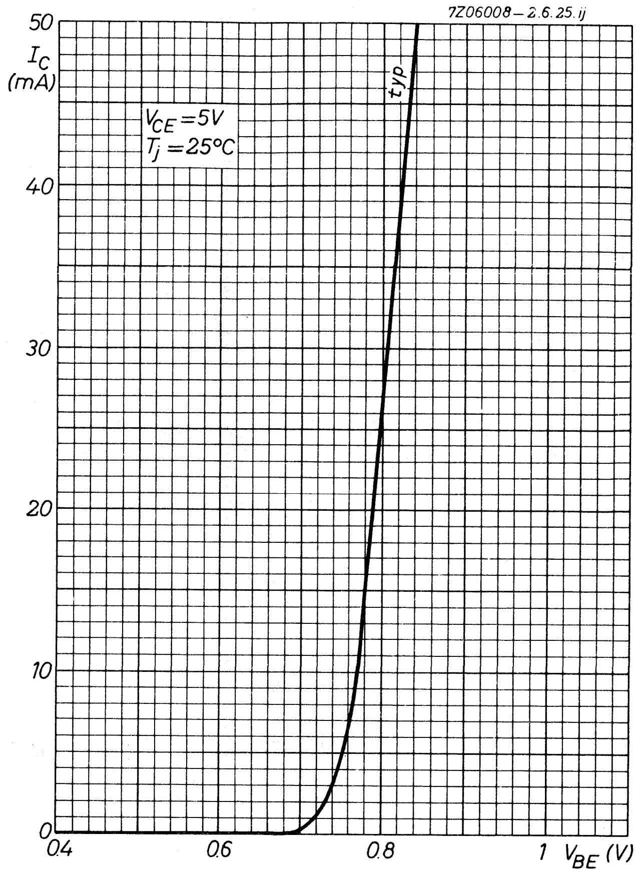


Fig. 7 V_{CE} = 5 V; T_j = 25 °C; typical values.

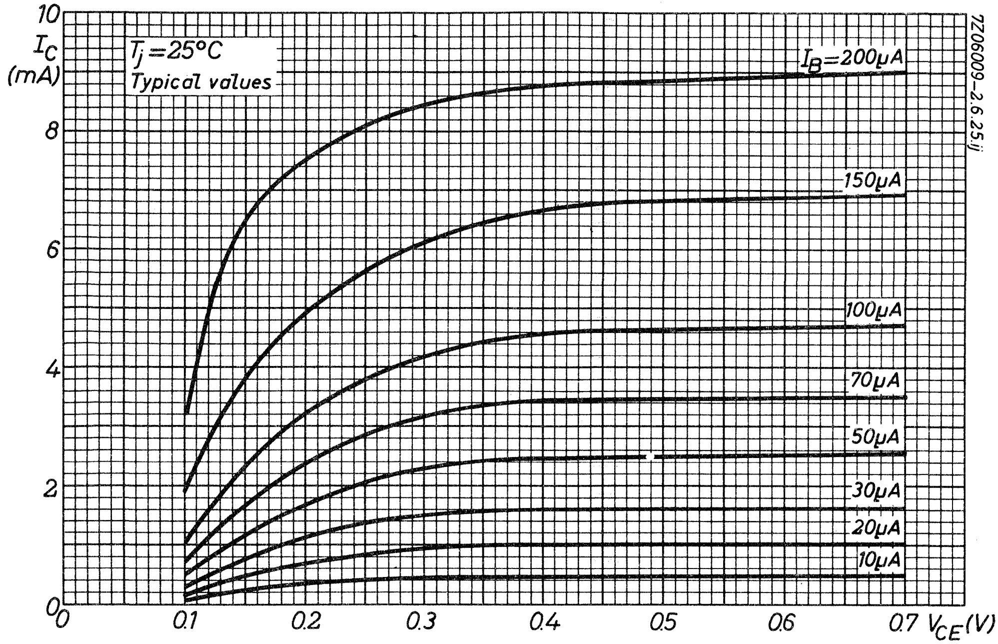


Fig. 8 T_j = 25 °C; typical values.

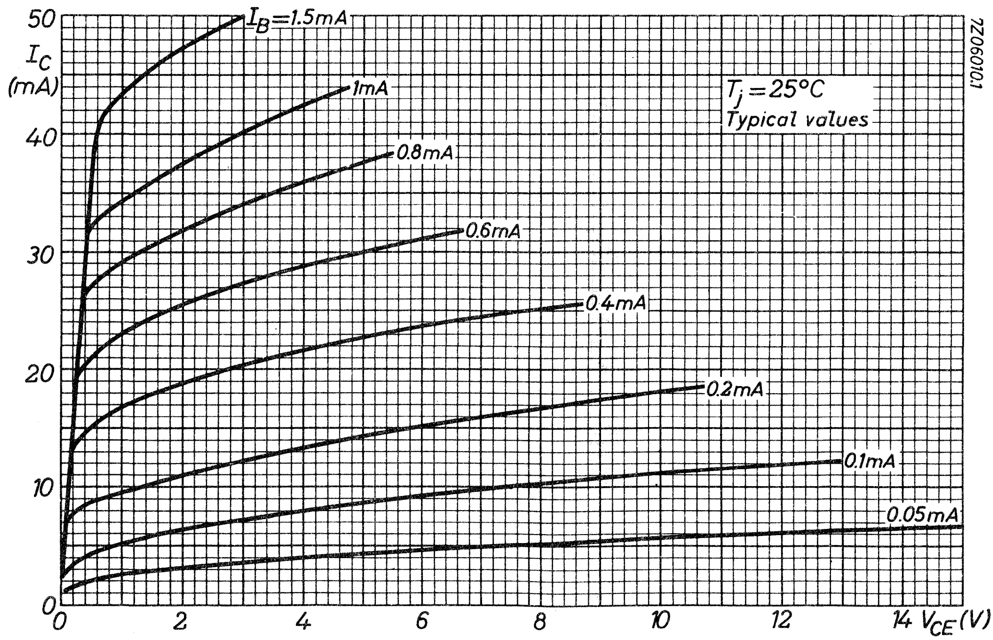


Fig. 9 T_j = 25 °C; typical values.

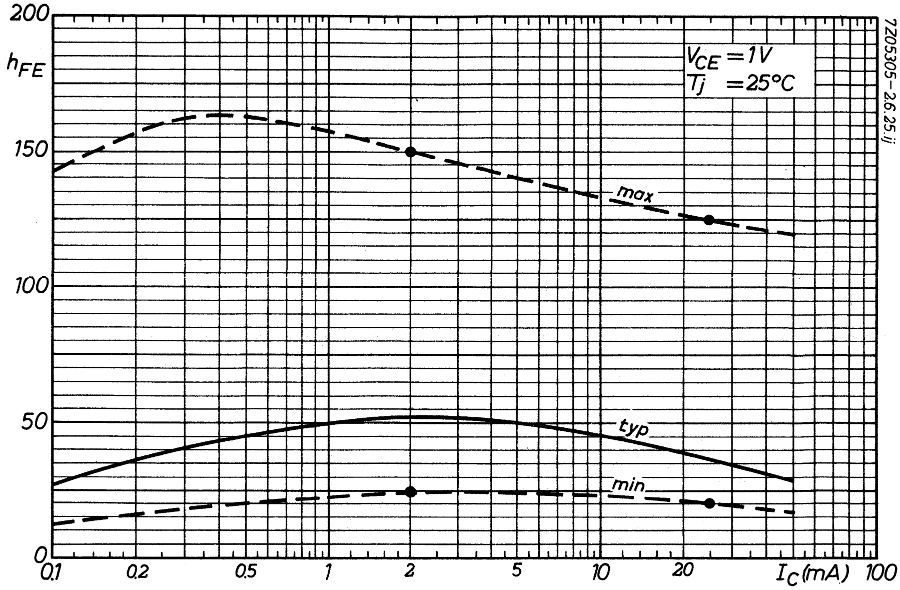


Fig. 10 V_{CE} = 1 V; T_j = 25 °C.

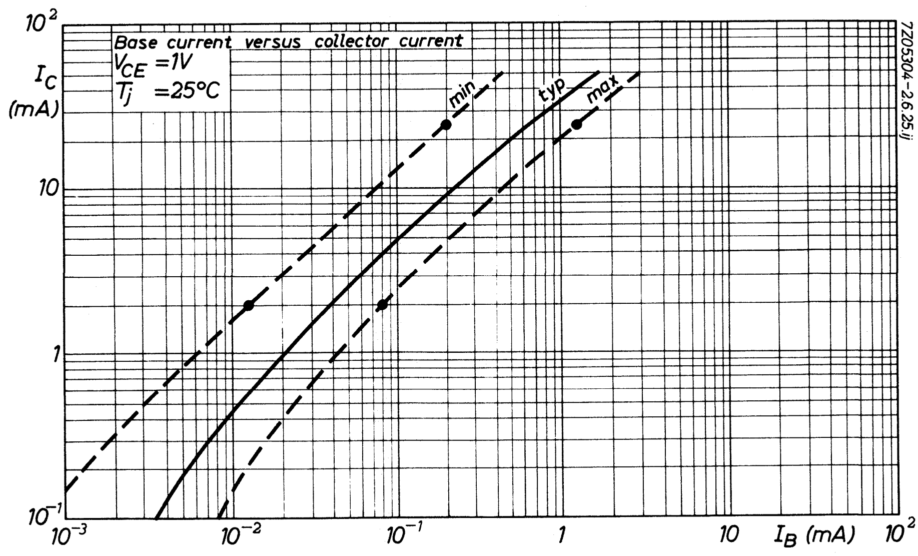


Fig. 11 V_{CE} = 1 V; T_j = 25 °C.

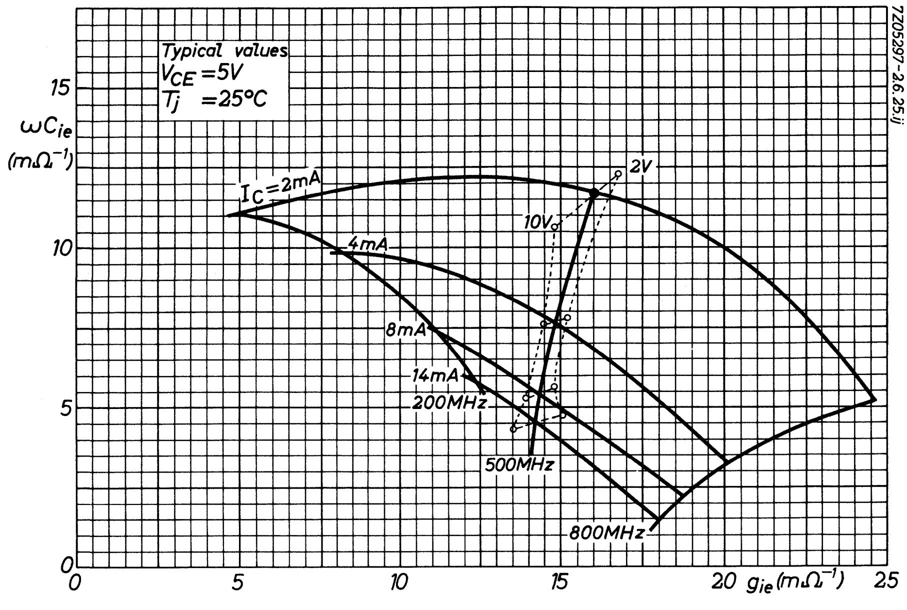


Fig. 12 V_{CE} = 5 V; T_{amb} = 25 °C; typical values.

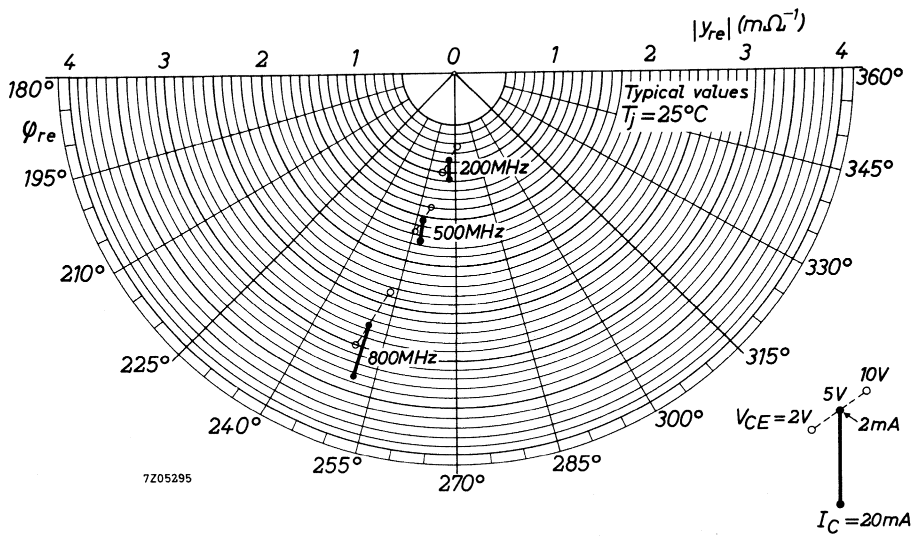


Fig. 13 T_{amb} = 25 °C; typical values.

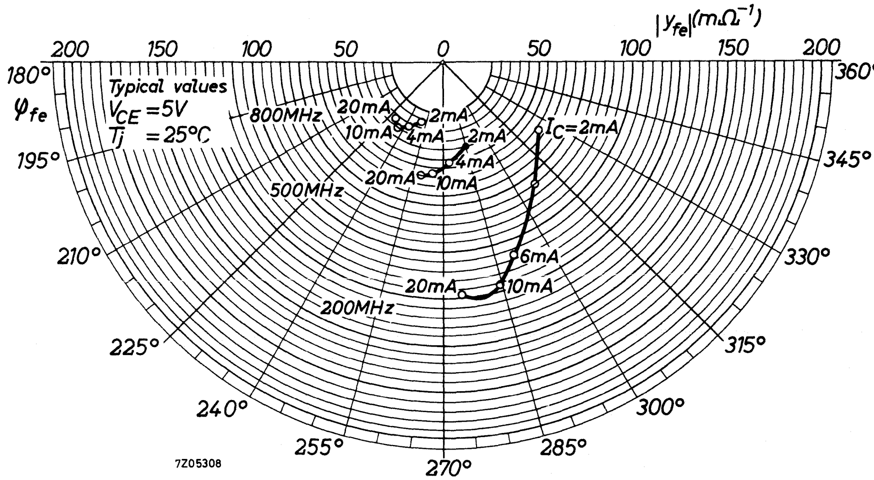


Fig. 14 V_{CE} = 5 V; T_{amb} = 25 °C; typical values.

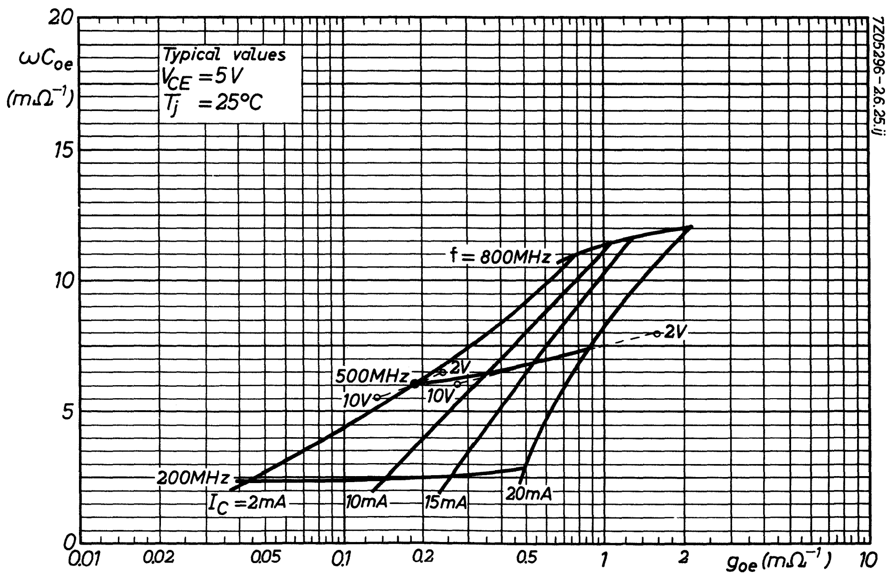


Fig. 15 V_{CE} = 5 V; T_{amb} = 25 °C; typical values.

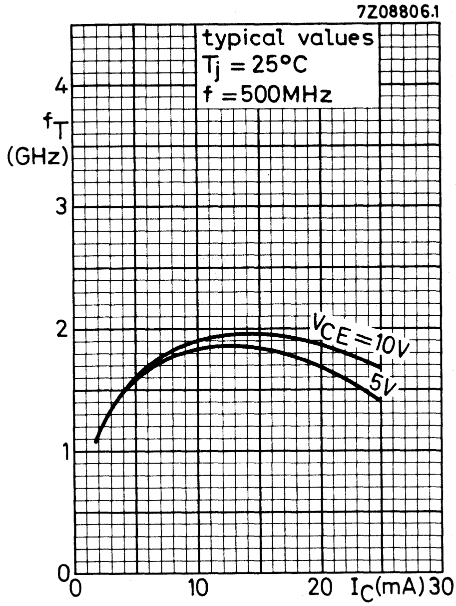


Fig. 16 f = 500 MHz; T_j = 25 °C; typical values.

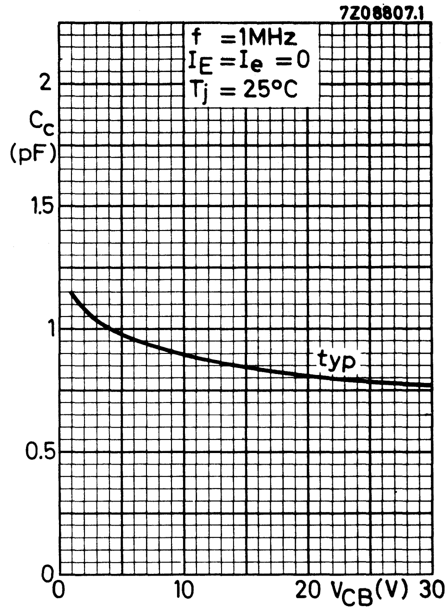


Fig. 17 $I_E = i_e = 0$; f = 1 MHz; T_j = 25 °C; typical values.

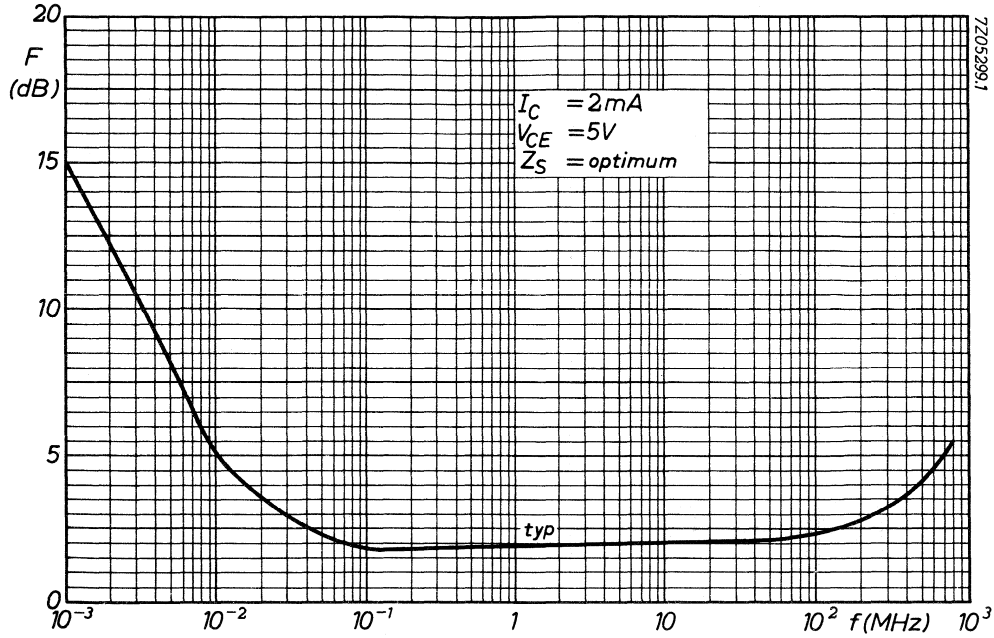


Fig. 18 V_{CE} = 5 V; I_C = 2 mA; Z_S = opt.; T_{amb} = 25 °C; typical values.

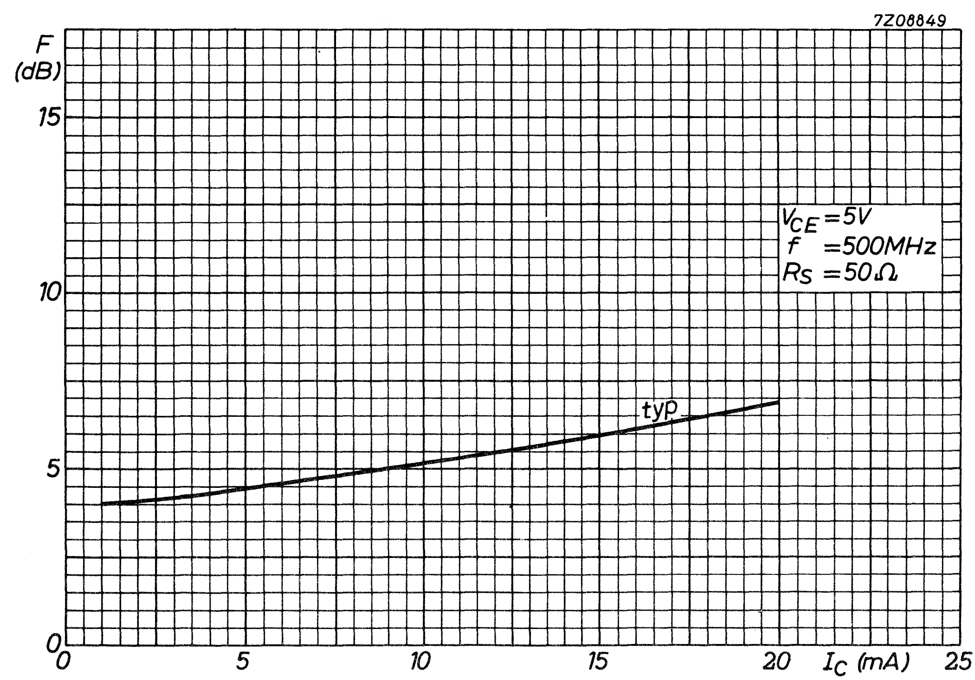


Fig. 19 V_{CE} = 5 V; f = 500 MHz; Z_S = 50 Ω; T_{amb} = 25 °C; typical values.

N-P-N H.F. WIDEBAND TRANSISTOR

N-P-N transistor in TO-72 metal envelope with insulated electrodes and a shield lead connected to the case. The 2N918 is primarily intended for low power amplifiers and oscillators in the v.h.f. and u.h.f. ranges for industrial service.

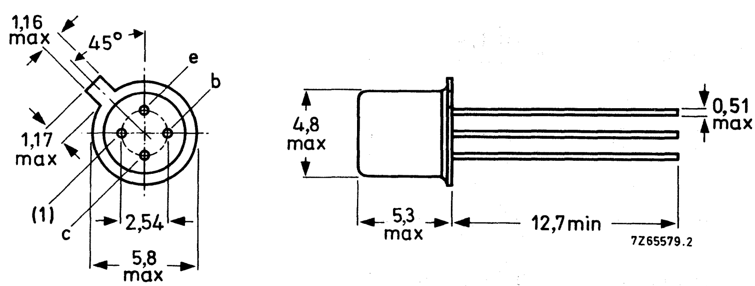
QUICK REFERENCE DATA

Collector-base voltage (open emitter)	V_{CBO}	max.	30	V
Collector-emitter voltage (open base)	V_{CEO}	max.	15	V
Collector current (d.c.)	I_C	max.	50	mA
Total power dissipation up to T_{amb} = 25 °C	P_{tot}	max.	200	mW
Junction temperature	T_j	max.	200	°C
Transition frequency I_C = 6 mA; V_{CE} = 10 V	f_T	min.	900	MHz
Maximum unilateralized power gain I_C = 6 mA; V_{CE} = 12 V; f = 200 MHz	G_{UM}	typ.	36	dB
Noise figure at f = 60 MHz I_C = 1 mA; V_{CE} = 6 V; Z_S = 400 Ω	F	max.	6,0	dB

MECHANICAL DATA

Dimensions in mm

Fig. 1 TO-72.



(1) = shield lead (connected to case).

Accessories: 56246 (distance disc).

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

Collector-base voltage (open emitter)	V_{CBO}	max.	30	V
Collector-emitter voltage (open base)	V_{CEO}	max.	15	V
Emitter-base voltage (open collector)	V_{EBO}	max.	3	V
Collector current (d.c.)	I_C	max.	50	mA
Total power dissipation up to T_{amb} = 25 °C	P_{tot}	max.	200	mW
Storage temperature	T_{stg}	−65 to + 200		°C
Junction temperature	T_j	max.	200	°C

THERMAL RESISTANCE

From junction to ambient in free air	$R_{th\ j\text{-}a}$	=	880	K/W
From junction to case	$R_{th\ j\text{-}c}$	=	580	K/W

CHARACTERISTICS

T_j = 25 °C unless otherwise specified. All measurements taken with ungrounded shield lead.

Collector cut-off current			
$I_E = 0$; V_{CB} = 15 V	I_{CBO}	max.	10 nA
$I_E = 0$; V_{CB} = 15 V; T_j = 150 °C	I_{CBO}	max.	1 μA
Saturation voltages			
I_C = 10 mA; I_B = 1 mA	V_{CEsat}	max.	0,4 V
	V_{BEsat}	max.	1 V
D.C. current gain			
I_C = 3 mA; V_{CE} = 1 V	h_{FE}	min.	20
Collector capacitance at f = 140 kHz			
$I_E = I_e = 0$; V_{CB} = 10 V	C_c	max.	1,7 pF
$I_E = I_e = 0$; V_{CB} = 0	C_c	max.	3,0 pF
Emitter capacitance at f = 140 kHz			
$I_C = I_c = 0$; V_{EB} = 0,5 V	C_e	max.	2,0 pF
Transition frequency			
I_C = 6 mA; V_{CE} = 10 V*	f_T	min.	900 MHz
Noise figure at f = 60 MHz			
I_C = 1 mA; V_{CE} = 6 V; Z_S = 400 Ω; T_{amb} = 25 °C	F	max.	6,0 dB
Oscillator power output at f = 500 MHz			
$-I_E$ = 8 mA; V_{CB} = 15 V; T_{amb} = 25 °C	P_o	min.	30 mW

Maximum unilateralised power gain

$$G_{UM} = \frac{|y_{fe}|^2}{4 g_{ie} g_{oe}}$$

I_C = 6 mA; V_{CE} = 12 V; f = 200 MHz; T_{amb} = 25 °C	G_{UM}	typ.	36 dB

* JEDEC registration: I_C = 4 mA; V_{CE} = 10 V, $f_T > 600$ MHz.

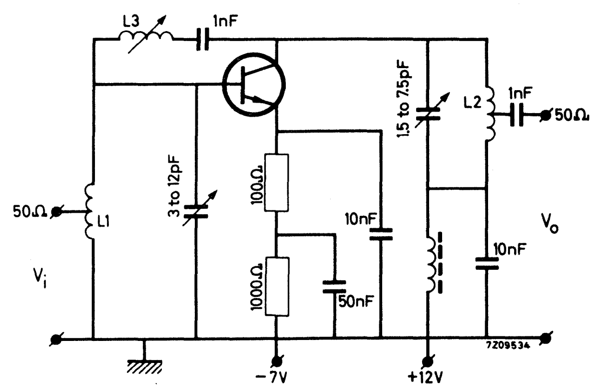
CHARACTERISTICS (continued)

Available power gain at f = 200 MHz

I_C = 6 mA; V_{CE} = 12 V; T_{amb} = 25 °C	G_p	min.	15 dB

Basic circuit for measuring the available neutralised power gain (Fig. 2)

Grounded shield lead



L1 = 3,5 turns tinned Cu wire, 1,3 mm
d = 8 mm; length = 11 mm
Tap at ≈ 2 turns from earth side

L2 = 8 turns tinned Cu wire, 1,3 mm
d = 3 mm; length = 22 mm
Tap at 1 turn from earth side

L3 = 0,4 to 0,65 μH

DEVICE DATA

CATV amplifier modules

CATV AMPLIFIER MODULES

type number	frequency range MHz	power gain (dB) at f = 50 MHz	application	page
BGY61		12.5 to 13.5		741
BGY65	5 to 200	18.0 to 19.0	reverse amplifier	745
BGY67		21.5 to 22.5		749
BGY67A		23.5 to 24.5		753
BGY50	40 to 300	12.1 to 12.9	preamplifier	709
BGY51			post amplifier	709
BGY52	40 to 300	16.0 to 16.8	preamplifier	713
BGY53			post amplifier	713
BGY54	40 to 300	16.6 to 17.4	preamplifier	717
BGY55			post amplifier	717
BGY56	40 to 300	21.4 to 22.6	preamplifier	721
BGY57			post amplifier	721
BGY58	40 to 300	32.0 to 34.0	line extender	725
BGY58A	40 to 330	33.0 to 35.0	line extender	729
BGY59	40 to 300	37.5 to 39.5	line extender	733
BGY60	40 to 300	32.5 to 34.5	interstage amp post amplifier	735
BGD102	40 to 450	18.0 to 19	power doubler	685
BGD104	40 to 450	19.5 to 20.5	amplifiers	685
BGD102E	40 to 450	18.0 to 19.0	power doubler	689
BGD104E	40 to 450	19.5 to 20.5	amplifiers	689
BGE85A	40 to 450	17.6 to 19.2	output amplifier	697
BGE88	40 to 450	33.0 to 36.0	amplifier	701
BGY80	40 to 450	12.1 to 12.9	preamplifier	757
BGY81			post amplifier	757
BGY84	40 to 450	16.5 to 17.5	preamplifier	761
BGY85			post amplifier	761
BGY84A	40 to 450	18.0 to 18.8	preamplifier	765
BGY85A			post amplifier	765
BGY84H	40 to 450	14.6 to 16.2	trunk amplifier	769
BGY85H			trunk amplifier	769
BGY86	40 to 450	21.5 to 22.5	preamplifier	773
BGY87			post amplifier	773
BGY88	40 to 450	33.5 to 35.5	line extender	777
BGY89	40 to 450	37.0 to 39.0	line extender	781

All modules normally operate at V_B = 24 V, but are able to withstand supply transients up to 30 V.

CATV AMPLIFIER MODULES (continued)

type number	frequency range MHz	power gain (dB) at f = 50 MHz	application	page
BGY580	40 to 550	12.0 to 13.0	preamplifier	785
BGY581			post amplifier	785
BGY584*	40 to 550	16.5 to 17.5	preamplifier	789
BGY585*			post amplifier	789
BGY584A*	40 to 550	17.7 to 18.7	preamplifier	793
BGY585A*			post amplifier	793
BGY586	40 to 550	21.5 to 22.5	preamplifier	797
BGY587			post amplifier	797
BGD502*	40 to 550	18.0 to 19.0	power doubler	693
BGD504*		19.5 to 20.5	power doubler	693
BGX885	40 to 860	16.5 to 17.5	40 to 80 MHz amp	705

All modules normally operate at V_B = 24 V but are able to withstand supply transients up to 30 V.

* Specifications also supplied for 450 MHz bandwidth operation.

CATV POWER-DOUBLER AMPLIFIER MODULES

Power-doubler amplifier modules for CATV systems operating at frequencies up to 450 MHz.

BGD102: 18,5 dB gain;
BGD104: 20,0 dB gain.

Features:

- excellent linearity;
- high output level;
- optimal reliability ensured by TiPtAu metallized crystals, silicon nitride passivation and rugged construction.

QUICK REFERENCE DATA

			BGD102	BGD104	
Frequency range	f		40 to 450	40 to 450	MHz
Source impedance and load impedance	$Z_S = Z_L$	=	75	75	Ω
Power gain at f = 50 MHz	G_P		18,5 ±0,5	20,0 ±0,5	dB
Slope cable equivalent f = 40 MHz to 450 MHz	SL		0,5 to 2,5	0,5 to 2,5	dB
Flatness of frequency response f = 40 MHz to 450 MHz	FL	max.	±0,3	±0,3	dB
Return losses at input and output f = 40 MHz to 450 MHz	S_{11-22}	min.	18	18	dB
2nd order distortion V_o = 46 dBmV	d_2	max.	−73	−73	dB
Composite triple beat; 60 channels V_o = 46 dBmV	CTB	max.	−65	−64	dB
Cross modulation V_o = 46 dBmV at 60 channels	X_{mod}	max.	−67	−66	dB
Noise figure f = 40 MHz to 450 MHz	F	max.	7	7	dB
D.C. supply voltage	$+V_B$	=	24	24	V*
Total d.c. current consumption at V_B = +24 V	I_{tot}	max.	435	435	mA

MECHANICAL DATA

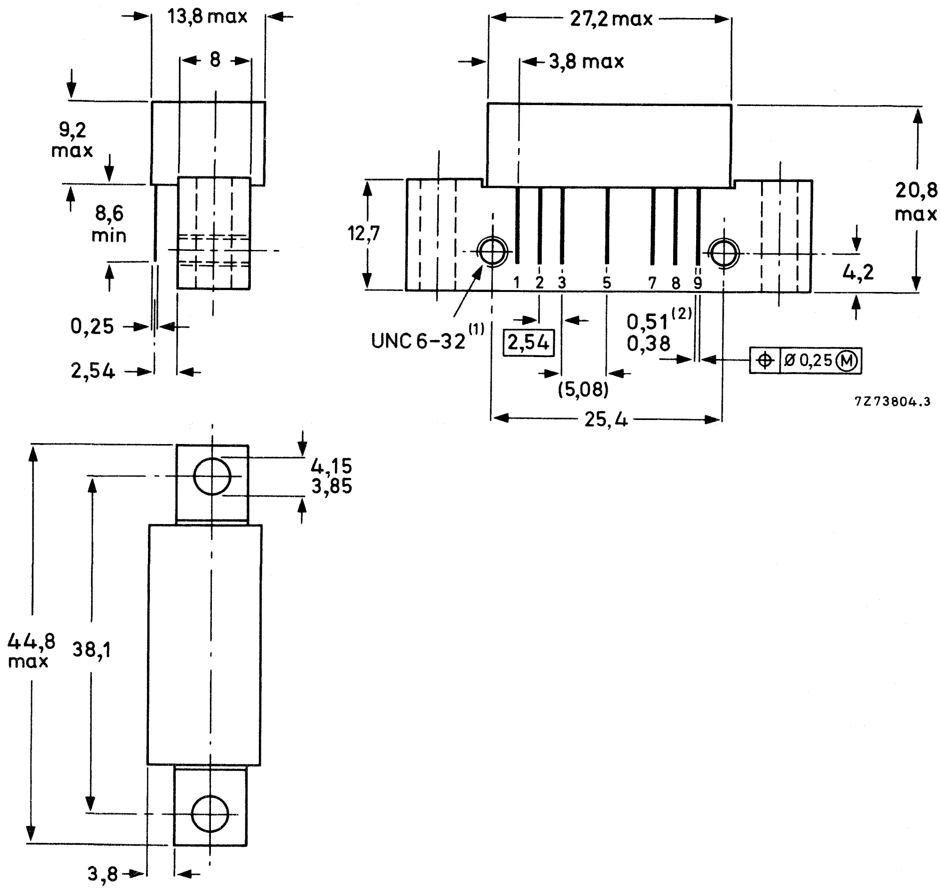
SOT-115 (see Fig. 1).

* The modules normally operate at V_B = 24 V, but are able to withstand supply transients up to 30 V.

MECHANICAL DATA

Dimensions in mm

Fig. 1 SOT-115.



(1) Screw 6-32UNC-2A available upon request (see "Accessories")
(2) Gold-plated leads.

See "Mounting and Soldering Recommendations".

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

R.F. input voltage	V_i	max. 65	dBmV
Storage temperature	T_{stg}	−40 to +100	°C
Operating mounting base temperature	T_{mb}	−20 to +100	°C

CHARACTERISTICS

Supply voltage V_B = +24 V; T_{mb} = 35 °C

			BGD102	BGD104	
Power gain at f = 50 MHz	G_P		18,5 ±0,5	20,0 ±0,5	dB
Power gain at f = 450 MHz	G_P		19,2–21,2	20,5–22,5	dB
Slope cable equivalent f = 40 MHz to 450 MHz	SL		0,5 to 2,5	0,5 to 2,5	dB
Flatness of frequency response f = 40 MHz to 450 MHz	FL	max.	±0,3	±0,3	dB
Return losses at input and output $Z_S = Z_L = 75\ \Omega$; f = 40 MHz to 450 MHz	$S_{11\text{-}22}$	min.	18	18	dB
2nd order distortion V_o = 46 dBmV; channel 2 V_o = 46 dBmV; channel H5 Measured at channel H14	d_2	max.	−73	−73	dB
Composite triple beat at 60 channels V_o = 46 dBmV; tested in channel H22	CTB	max.	−65	−64	dB
Cross modulation at 60 channels V_o = 46 dBmV; tested in channel 2	X_{mod}	max.	−67	−66	dB
Noise figure f = 40 MHz to 450 MHz	F	max.	7	7	dB
Total d.c. current consumption	I_{tot}	max.	435	435	mA

CATV POWER-DOUBLER AMPLIFIER MODULES

Power-doubler amplifier modules for CATV systems operating at frequencies up to 450 MHz.

BGD102E: 18,5 dB gain;
BGD104E: 20,0 dB gain.

Features:

- excellent linearity;
- high output level;
- optimal reliability ensured by TiPtAu metallized crystals, silicon nitride passivation and rugged construction.

QUICK REFERENCE DATA

			BGD102E	BGD104E	
Frequency range	f		40 to 450	40 to 450	MHz
Source impedance and load impedance	Z_S=Z_L	=	75	75	Ω
Power gain at f = 50 MHz	G_P		18,5 ±0,5	20,0 ±0,5	dB
Slope cable equivalent f = 40 MHz to 450 MHz	SL		0,5 to 2,0	0,5 to 2,0	dB
Flatness of frequency response f = 40 MHz to 450 MHz	FL	max.	±0,3	±0,3	dB
Return losses at input and output at f = 40 MHz	$S_{11\text{-}22}$	min.	20	20	dB
at f = 450 MHz	$S_{11\text{-}22}$	max.	18	18	dB
Output voltage at d_{im} = –60 dB f(p+q–r)= 438,25 MHz (DIN 45004B, par.6.3: 3-tone)	V_o	min.	65,0	64,5	dBmV
2nd order distortion V_o = 46 dBmV	d_2	max.	–73	–73	dB
Noise figure f = 40 MHz to 450 MHz	F	max.	7	7	dB
D.C. supply voltage	$+V_B$	=	24	24	V*
Total d.c. current consumption at V_B = +24 V	I_{tot}	max.	435	435	mA

MECHANICAL DATA

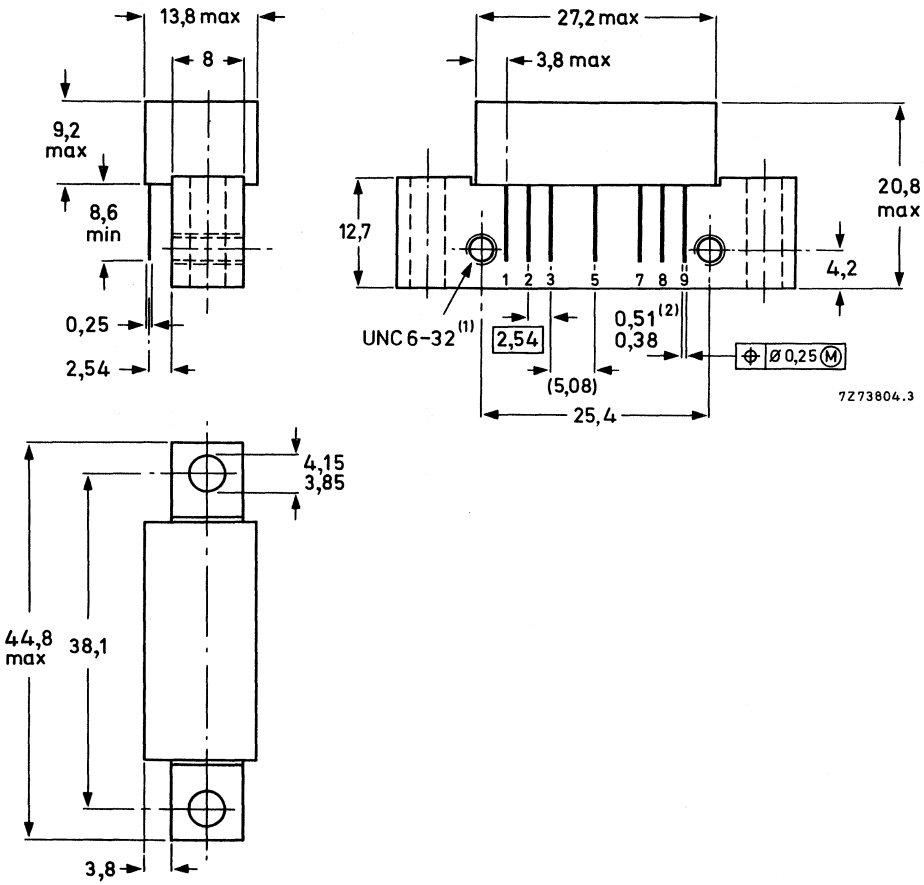
SOT-115 (see Fig. 1).

* The modules normally operate at V_B = 24 V, but are able to withstand supply transients up to 30 V.

MECHANICAL DATA

Dimensions in mm

Fig. 1 SOT-115.



(1) Screw 6-32UNC-2A available upon request (see "Accessories").
(2) Gold-plated leads.

See "Mounting and Soldering Recommendations"

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

R.F. input voltage	V_i	max.	65 dBmV
Storage temperature	T_{stg}		−40 to +100 °C
Operating mounting base temperature	T_{mb}		−20 to +100 °C

CHARACTERISTICS

Supply voltage V_B = +24 V; T_{mb} = 35 °C

			BGD102E	BGD104E	
Power gain at f = 50 MHz	G_P		18,5 ±0,5	20,0 ±0,5	dB
Power gain at f = 450 MHz	G_P		19,2–21,2	20,5–22,5	dB
Slope cable equivalent f = 40 MHz to 450 MHz	SL		0,5 to 2,0	0,5 to 2,0	dB
Flatness of frequency response f = 40 MHz to 450 MHz	FL	max.	±0,3	±0,3	dB
Return losses at input and output at $Z_S = Z_L$ = 75 Ω;					
f = 40 MHz to 80 MHz	$S_{11\text{-}22}$	min.	20	20	dB
f = 80 MHz to 160 MHz	$S_{11\text{-}22}$	min.	19	19	dB
f = 160 MHz to 450 MHz	$S_{11\text{-}22}$	min.	18	18	dB
Output voltage at d_{im} = −60 dB (DIN 45004B,6.3: 3-tone) $V_p = V_o$; f_p = 440,25 MHz $V_q = V_o$ −6 dB; f_q = 447,25 MHz $V_r = V_o$ −6 dB; f_r = 449,25 MHz Measured at $f_{(p+q-r)}$ = 438,25 MHz	V_o	min.	65,0	64,5	dBmV
2nd order distortion V_o = 46 dBmV; channel 2 V_o = 46 dBmV; channel H5 Measured at channel H14	d_2	max.	−73	−73	dB
Composite triple beat at 60 channels V_o = 46 dBmV; tested in channel H22	CTB	max.	−65	−64	dB
Cross modulation at 60 channels V_o = 46 dBmV; tested in channel 2	X_{mod}	max.	−67	−66	dB
Noise figure f = 40 MHz to 450 MHz	F	max.	7	7	dB
Total d.c. current consumption	I_{tot}	max.	435	435	mA

CATV POWER-DOUBLER AMPLIFIER MODULES

Hybrid amplifier modules for use in CATV systems and operating at frequencies up to 550 MHz.

BGD502: 18.5 dB gain
BGD504: 20.0 dB gain.

FEATURES

- Excellent linearity
- Extremely low noise
- Optimal reliability ensured by TiPtAu metallized crystals, silicon nitride glass barrier and rugged construction.

QUICK REFERENCE DATA

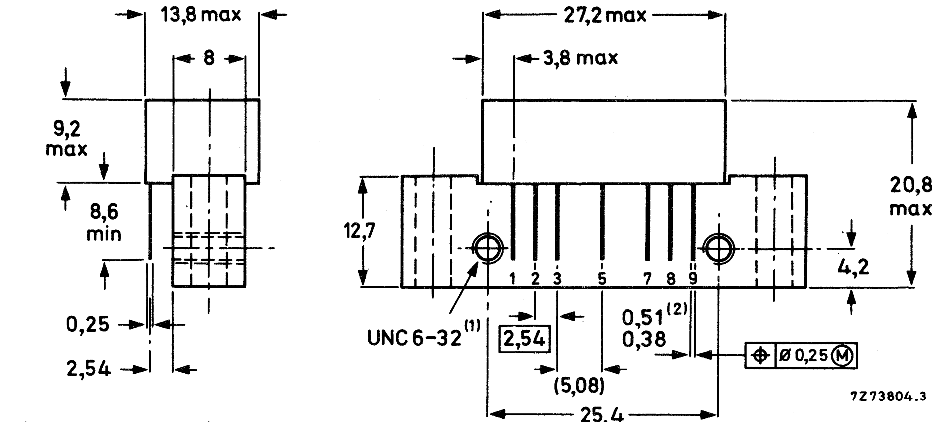
			BGD502	BGD504	
Frequency range	f		40 to 550	40 to 550	MHz
Source impedance and load impedance	$Z_S = Z_L$	=	75	75	Ω
Power gain at f = 50 MHz	G_p		18.0 to 19.0	19.5 to 20.5	dB
Slope cable equivalent f = 40 MHz to 550 MHz	SL		0.2 to 2.2	0.2 to 2.2	dB
Flatness of frequency response f = 40 MHz to 550 MHz	FL	max.	±0.3	±0.3	dB
Return losses at input and output f = 40 MHz to 550 MHz	s_{11-22}	min.	18	18	dB
Output voltage at d_{im} = –60 dB (DIN 45004B, par. 6.3: 3-tone)	V_O	min.	64	63.5	dBmV
2nd-order distortion V_O = 44 dBmV	d_2	max.	–72	–70	dB
Composite triple beat; 60 channels V_O = 44 dBmV	CTB	max.	–65	–64	dB
Cross modulation V_O = 44 dBmV	X_{mod}	max.	–68	–67	dB
Noise figure f = 550 MHz	F	max.	8.0	8.0	dB
DC supply voltage (note 1)	$+V_B$	=	24	24	V
Total DC current consumption at V_B = +24 V	I_{tot}	max.	435	435	mA
Operating case temperature range	T_{case}	max.	–20 to +100		°C

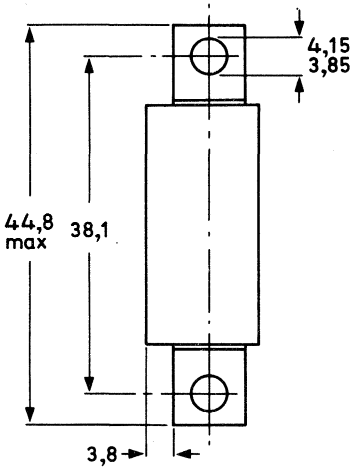
Note

1. The modules normally operate at V_B = 24 V, but are able to withstand supply transients up to 30 V.

MECHANICAL DATA Dimensions in mm

Fig. 1 SOT115.





Terminal connections

1	= input
2, 3, 7, 8	= common
5	= $+V_B$
9	= output

(1) Screw 6-32UNC-2A available upon request (see 'Accessories').
(2) Gold-plated leads.

See 'Mounting and Soldering Recommendations'.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134).

RF input voltage	V_i	max.	60	dBmV
Storage temperature range	T_{stg}		–40 to +100	°C
Operating case temperature range	T_{case}		–20 to +100	°C

CHARACTERISTICS

V_B = +24V; $Z_s = Z_b$ = 75 Ω; T_{case} = 35 °C; bandwidth = 40 MHz to 450 MHz.

			BGD502	BGD504	
Power gain					
f = 50 MHz	G_p		19.0 to 20.0	19.5 to 20.5	dB
f = 450 MHz			18.6 to 20.6	20.0 to 22.0	dB
Slope cable equivalent					
f = 40 MHz to 450 MHz	SL		0.2 to 1.8	0 to 1.65	dB
Flatness of frequency response					
f = 40 MHz to 450 MHz	FL	max.	0.3	0.3	dB
Return losses at input and output					
$Z_S = Z_L$ = 75 Ω;					
f = 40 MHz to 80 MHz	$S_{11\text{-}22}$	min.	20	20	dB
f = 80 MHz to 160 MHz		min.	19	19	dB
f = 160 MHz to 450 MHz		min.	18	18	dB
Second order distortion					
V_p = 46 dBmV; f_p = 55.25 MHz					
V_q = 46 dBmV; f_q = 391.25 MHz					
Measured at $f_p + f_q$ = 446.5 MHz	d_2		−75	−73	dB
Composite triple beat at 60					
channels flat; V_O = 46 dBmV					
Measured in channel H22	CTB		−67	−66	dB
Cross-modulation distortion on 60					
channels flat; V_O = 46 dBmV					
Measured at channel 2	X_{mod}		−67	−66	dB
Output voltage at d_{im} = −60					
$V_p = V_O$; f_p = 440.25 MHz;					
$V_q = V_p$ − 6 dB; f_q = 447.25 MHz;					
$V_r = V_p$ − 6 dB; f_r = 449.25 MHz;					
Measured at					
$f_p + f_q - f_r$ = 438.25 MHz	V_O		67	66.5	dBmV
Noise figure at f = 450 MHz	F		7.0	7.0	dB
Total DC current consumption	I_{tot}	typ.	415	415	mA
		max.	435	435	mA

CHARACTERISTICS (continued)

Supply voltage V_B = +24 V; $Z_S = Z_L$ = 75 Ω; T_{case} = 35 °C; bandwidth = 40 MHz to 550 MHz.

			BGD502	BGD504	
Power gain at f = 50 MHz	G_p		18.0 to 19.0	19.5 to 20.5	dB
Power gain at f = 550 MHz	G_p		18.8 to 20.8	20.2 to 22.2	dB
Slope cable equivalent f = 40 MHz to 550 MHz	SL		0.2 to 2.2	0.2 to 2.2	dB
Flatness of frequency response f = 40 MHz to 550 MHz	FL	max.	±0.3	±0.3	dB
Return losses at input and output $Z_S = Z_L$ = 75 Ω f = 40 MHz to 80 MHz	$S_{11\text{-}22}$	min.	20	20	dB
f = 80 MHz to 160 MHz		min.	19	19	dB
f = 160 MHz to 550 MHz	$S_{11\text{-}22}$	min.	18	18	dB
Output voltage at d_{im} = −60 dB (DIN 45004B; para 6.3: 3-tone) $V_p = V_O$; f_p = 540.25 MHz $V_q = V_O$ − 6 dB; f_q = 547.25 MHz $V_r = V_O$ − 6 dB; f_r = 549.25 MHz Tested at $f_{(p+q-r)}$ = 538.25 MHz	V_O	min.	64	63.5	dBmV
2nd-order distortion V_p = 44 dBmV; f_p = 55.25 MHz (ch. 2) V_q = 44 dBmV; f_q = 493.25 MHz (ch. 18) Measured at $f_{(p+q)}$ = 548.5 MHz (ch. 27)	d_2	max.	−72	−70	dB
Composite triple beat at 77 channels V_O = 44 dBmV; tested at channel 27	CTB	max.	−65	−64	dB
Cross modulation at 77 channels V_O = 44 dBmV; tested in channel 2	X_{mod}	max.	−68	−67	dB
Noise figure f = 550 MHz	F	max.	8.0	8.0	dB
Total DC current consumption	I_{tot}	typ.	415	415	mA
		max.	435	435	mA

CATV AMPLIFIER MODULES

Hybrid amplifier modules for CATV systems operating at frequencies up to 450 MHz.

BGE85A: 18.5 dB output amplifier module.

FEATURES

- Excellent linearity
- Extremely low noise
- Optimal reliability ensured by TiPtAu metallized crystals, silicon nitride passivation and rugged construction.

QUICK REFERENCE DATA

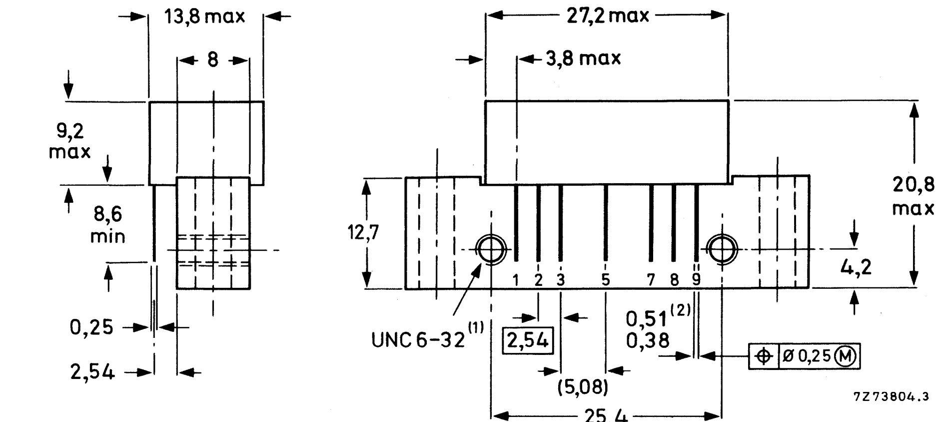
Frequency range	f		40-450	MHz
Source and load impedance	$Z_S = Z_L$		75	Ω
Power gain at f = 50 MHz	G_p		17.6 to 19.2	dB
Slope cable equivalent f = 40 MHz to 450 MHz	SL		0.3 to 1.8	dB
Flatness of frequency response f = 40 MHz to 450 MHz	FL	max.	±0.2	dB
Return losses at input and output f = 40 MHz	$S_{11\text{-}22}$	min.	20	dB
f = 450 MHz		min.	18	dB
Output voltage at d_{im} = –60 dB (DIN 45004B, par. 6.3: 3-tone)	V_O	min.	60.5	dBmV
Second order distortion V_O = 46 dBmV	d_2	max.	–72	dB
Noise figure f = 40 MHz to 450 MHz	F	max.	7.0	dB
DC supply voltage	$+V_B$		24	V
Total DC current consumption at V_B = +24 V	I_{tot}	typ.	200	mA

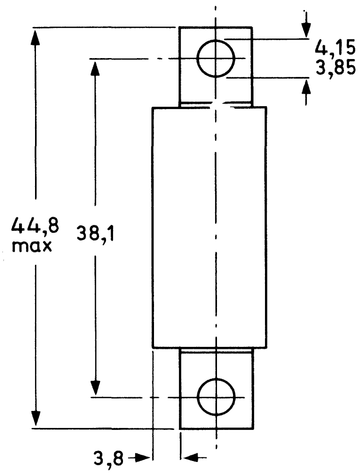
MECHANICAL DATA

SOT115 (see Fig. 1).

MECHANICAL DATA

Fig. 1 SOT115.





Terminal connections

1	= input
2, 3, 7, 8	= common
5	= $+V_B$
9	= output

(1) Screw 6-32 UNC-2A available upon request (see 'Accessories').
(2) Leads gold-plated.

See 'Mounting and soldering recommendations'.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134).

RF input voltage	V_i	max.	65	dBmV
Storage temperature range	T_{stg}		−40 to +100	°C
Operating case temperature range	T_{case}		−20 to +100	°C

CHARACTERISTICS

V_B = +24 V; T_{case} = 30 °C.

Power gain at f = 50 MHz	G_p		17.6 to 19.2	dB
Slope cable equivalent f = 40 MHz to 450 MHz	SL		0.3 to 1.8	dB
Flatness of frequency response f = 40 MHz to 450 MHz	FL	max.	±0.2	dB
Return losses at input and output $Z_S = Z_L = 75\ \Omega$ f = 40 MHz to 80 MHz	$S_{11\text{-}22}$	min.	20	dB
f = 80 MHz to 160 MHz		min.	19	dB
f = 160 MHz to 450 MHz		min.	18	dB
Output voltage at d_{im} = −60 dB (DIN 45004B, para 6.3: 3-tone) $V_p = V_O$; f_p = 440.25 MHz $V_q = V_O - 6$ dB; f_q = 447.25 MHz $V_r = V_O - 6$ dB; f_r = 449.25 MHz Measured at $f_{(p+q-r)}$ = 438.25	V_O	min.	60.5	dBmV
2nd order distortion V_O = 46 dBmV; channel 2 V_O = 46 dBmV; channel H5 Measured at channel H14	d_2	max.	−72	dB
Noise figure f = 40 MHz to 450 MHz	F	max.	7.0	dB
Total DC current consumption	I_{tot}	typ.	200	mA
		max.	230	mA

CATV AMPLIFIER MODULES

Low cost hybrid amplifier modules for use in CATV Systems, operating at frequencies up to 450 MHz.

BGE88: 34.5 dB
BGE88/01: 34.5 dB

FEATURES

- Excellent linearity
- Extremely low noise
- Optimal reliability ensured by application of TiPtAu metallized crystals, silicon nitride glass barrier and a rugged construction.

QUICK REFERENCE DATA

			BGE88	BGE88/01	
Frequency range	f		40 to 450	40 to 450	MHz
Source and load impedance	$Z_S = Z_L$		75	75	Ω
Power gain at f = 50 MHz	G_p		33 to 36	33 to 36	dB
Slope cable equivalent f = 40 MHz to 450 MHz	SL		0.5 to 2.5	0.5 to 2.5	dB
Flatness of frequency response f = 40 MHz to 450 MHz	FL	max.	0.3	0.3	dB
Return losses at input and output	$S_{11\text{-}22}$	min.	15.5	15.5	dB
Second order distortion V_O = 46 dBmV	d_2	max.	−70	−70	dB
Output voltage at d_{im} = −60 dB (DIN 45004B, par. 6.3: 3-tone)	V_O		60	59	dBmV
Noise figure at 450 MHz	F	max.	6.0	6.0	dB
DC supply voltage (note 1)	$+V_B$		24	24	V
Total DC current consumption	I_{tot}		290	250	mA
Operating case temperature range	T_{case}		−20 to +100	−20 to +100	°C

MECHANICAL DATA

SOT115 (see Fig. 1).

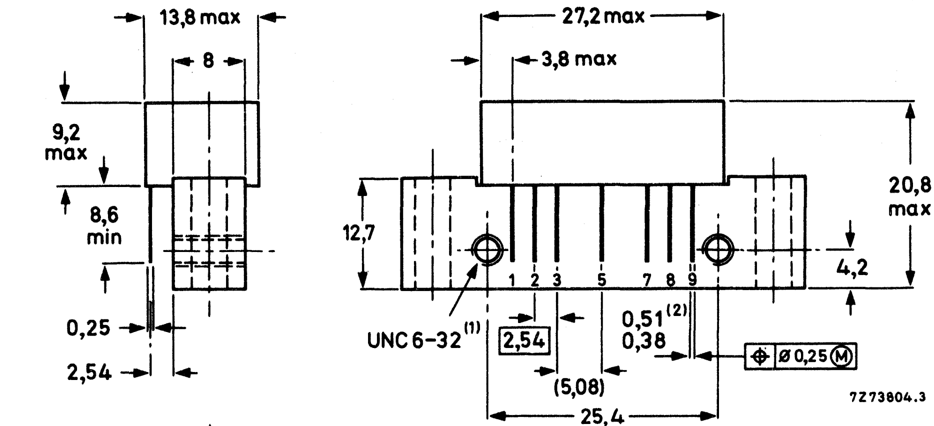
Note

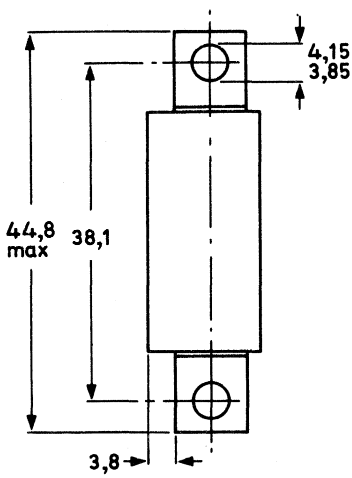
1. The modules normally operate at V_B = +24 V DC, but are able to withstand supply transients up to 30 V.

MECHANICAL DATA

Dimensions in mm

Fig. 1 SOT115.





Terminal connections

1	= input
2, 3, 7, 8	= common
5	= $+V_B$
9	= output

(1) Screw 6-32 UNC-2A available upon request (see 'Accessories')
(2) Leads gold-plated.

See 'Mounting and soldering recommendations'.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134).

RF input voltage	V_i	max.	60	dBmV
Storage temperature range	T_{stg}		−40 to +100	°C
Operating case temperature range	T_{case}		−20 to +100	°C

CHARACTERISTICS

Supply voltage V_B = +24 V DC; T_{case} = 30 °C.

			BGE88	BGE88/01	
Power gain at f = 50 MHz	G_p		33 to 36	33 to 36	dB
Slope cable equivalent f = 40 MHz to 450 MHz	SL		0.5 to 2.5	0.5 to 2.5	dB
Flatness of frequency response f = 40 MHz to 450 MHz	FL	max.	0.3	0.3	dB
Return losses at input and output $Z_S = Z_L = 75\ \Omega$; f = 40 MHz to 80 MHz	$S_{11\text{-}22}$	min.	20	20	dB
f = 80 MHz to 160 MHz		min.	18.5	18.5	dB
f = 160 MHz to 320 MHz		min.	17	17	dB
f = 320 MHz to 450 MHz		min.	15.5	15.5	dB
Second order distortion V_p = 46 dBmV; f_p = 55.25 MHz V_q = 46 dBmV; f_q = 343.25 MHz Measured at $f_p + f_q$ = 398.5 MHz	d_2		−70	−70	dB
Output voltage at d_{im} = −60 dB $V_p = V_O$; f_p = 440.25 MHz; $V_q = V_O$ − 6 dB; f_q = 447.25 MHz; $V_r = V_O$ − 6 dB; f_r = 449.25 MHz; Measured at $f_p + f_q - f_r$ = 438.25 MHz	V_O		60	59	dBmV
Noise figure at f = 450 MHz	F		6.0	6.0	dB
Total DC current consumption V_B = +24 V DC	I_{tot}	typ.	290	250	mA
		max.	330	260	mA

CATV AMPLIFIER MODULE

Hybrid amplifier module for application in CATV/MATV amplifier systems operating at frequencies from 40 MHz up to 860 MHz.

Features:

- excellent linearity
- extremely low noise
- optimum reliability ensured by TiPtAu metallized crystals, silicon nitride glass barrier and rugged construction

QUICK REFERENCE DATA

Frequency range	f		40 to 860	MHz
Source impedance and load impedance	$Z_S = Z_L$		75	Ω
Power gain at f = 50 MHz	G_p		17 ± 0,5	dB
Slope cable equivalent f = 40 MHz to 860 MHz	SL		0,2 to 1,2	dB
Flatness of frequency response f = 40 MHz to 860 MHz	FL	max.	± 0,5	dB ←
Return losses at input and output f = 40 MHz (decrease 1,5 dB/octave)	S_{11-22}	min.	20	dB
Output voltage at d_{im} = 60 dB (DIN 45004, par. 6.3: 3-tone) $f_{(p+q-r)}$ = 339,25 MHz	V_o	min.	61	dBmV
$f_{(p+q-r)}$ = 849,25 MHz	V_o	min.	60	dBmV ←
2nd order distortion $f_{(p+q)}$ = 750 MHz	d_2	max.	−53	dB ←
Noise figures f = 350 MHz	F	max.	7,5	dB
f = 860 MHz	F	max.	8,0	dB
D.C. supply voltage	$+V_B$	=	24	V*
Total d.c. current consumption V_B = + 24 V	I_{tot}	typ.	240	mA
Operating case temperature	T_c		−20 to 100	°C

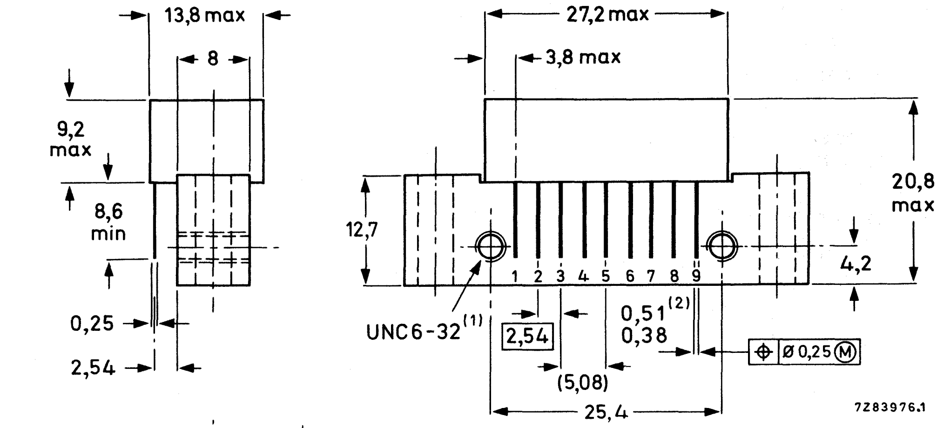
MECHANICAL DATA

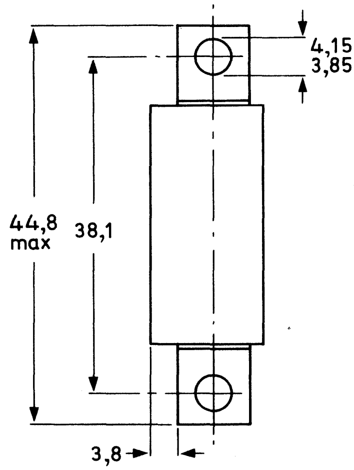
SOT-115 (see Fig. 1).

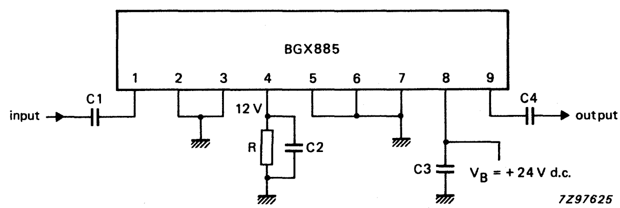
* The module normally operates at V_B = 24 V, but is able to withstand incidental supply transients up to 30 V.

MECHANICAL DATA Dimensions in mm

Fig. 1 SOT-115.







C1, C2, C3 and C4 are 10 nF ceramic multilayer capacitors

R is a 200 Ω – 1 Watt resistor.

Terminal connections:

1	= input
2, 3, 5, 6, 7	= common
8	= + V_B (24 Vdc)
9	= output
4	= 12 V–60 mA supply terminal

(1) Screw 6-32UNC-2A available upon request.

See "Mounting and Soldering Recommendations".

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

R.F. input voltage	V_i	max.	60 dBmV
Storage temperature	T_{stg}	–40 to + 100	°C
Operating case temperature	T_c	–20 to + 100	°C

CHARACTERISTICS

Supply voltage $V_B = + 24$ V; $Z_S = Z_L = 75\ \Omega$; $T_c = 30\ ^oC$

Power gain at f = 50 MHz	G_p		17 ± 0,5 dB
Slope cable equivalent f = 40 MHz to 860 MHz	SL		0,2 to 1,2 dB
Flatness of frequency response f = 40 MHz to 860 MHz	FL	max.	± 0,5 dB ←
Return losses at input and output $Z_S = Z_L = 75\ \Omega$ f = 40 MHz	$S_{11\text{-}22}$	min.	20 dB
Decrease per octave *			1,5 dB
Voltage output at $d_{im} = -60$ dB (DIN 45004B, par. 6.3: 3-tone) $V_p = V_o$; $f_p = 341{,}25$ MHz $V_q = V_p - 6$ dB; $f_q = 348{,}25$ MHz $V_r = V_p - 6$ dB; $f_r = 350{,}25$ MHz Measured at $f_{(p+q-r)} = 339{,}25$ MHz	V_o	min.	61 dBmV
$V_p = V_o$; $f_p = 851{,}25$ MHz $V_q = V_p - 6$ dB; $f_q = 858{,}25$ MHz $V_r = V_p - 6$ dB; $f_r = 860{,}25$ MHz Measured at $f_{(p+q-r)} = 849{,}25$ MHz	V_o	min.	60 dBmV ←
Second harmonic distortion $V_p = 59$ dBmV at $f_p = 350$ MHz $V_q = 59$ dBmV at $f_q = 400$ MHz Measured at $f_{(p+q)} = 750$ MHz	d_2	max.	−53 dB ←
Noise figures f = 350 MHz	F	max.	7,5 dB
f = 860 MHz	F	max.	8,0 dB
Total d.c. current consumption	I_{tot}	typ.	220 mA
		max.	240 mA

* $S_{11\text{-}22}$ has a minimum of 10 dB at f between 800 MHz and 860 MHz.

HYBRID V.H.F. PUSH-PULL AMPLIFIER MODULES

Hybrid amplifier modules intended for CATV systems.

QUICK REFERENCE DATA

			BGY50	BGY51	
Frequency range	f		40 to 300	40 to 300	MHz
Source impedance and load impedance	$Z_S = Z_L$	=	75	75	Ω
Power gain at f = 50 MHz	G_p		12,5 ± 0,4	12,5 ± 0,4	dB
Slope cable equivalent f = 40 MHz to 300 MHz	SL		+ 0,2 to + 0,8	+ 0,2 to + 0,8	dB
Flatness of frequency response f = 40 MHz to 300 MHz	FL	max.	± 0,2	± 0,2	dB
Return losses at input and output f = 40 MHz to 300 MHz	$S_{11\text{-}22}$	min.	20	20	dB
Output voltage at d_{im} = –60 dB (DIN 45004, par. 6.3: 3-tone)	V_o	min.	61	63,5	dBmV
2nd harmonic distortion at V_o = 50 dBmV	d_2	max.	–71	–73	dB
Noise figure f = 40 MHz to 300 MHz	F	max.	7	8	dB
D.C. supply voltage	$+V_B$	=	24	24	V *
Total d.c. current consumption at V_B = + 24 V	I_{tot}	typ.	160	200	mA
Operating mounting base temperature	T_{mb}		–20 to + 90	–20 to + 90	°C

MECHANICAL DATA

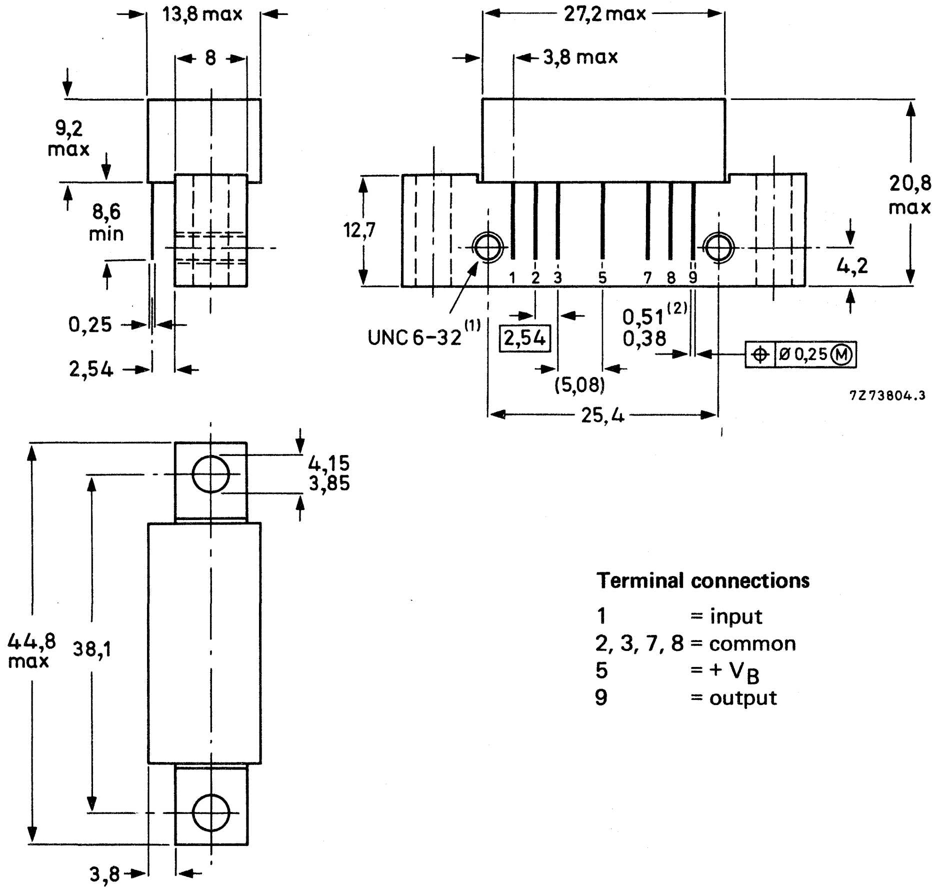
SOT-115 (see Fig. 1).

* The modules are able to withstand incidental short peaks in the supply voltage up to a maximum of 30 V.

MECHANICAL DATA

Dimensions in mm

Fig. 1 SOT-115.



Terminal connections

1	= input
2, 3, 7, 8	= common
5	= + V_B
9	= output

(1) Screw 6-32UNC-2A available upon request (see "Accessories").

(2) Tin-plated leads. Gold-plated leads available upon request.

See "Mounting and Soldering Recommendations".

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

R.F. input voltage	V_i	max.	67 dBmV
Storage temperature	T_{stg}	−40 to +100	°C
Operating mounting base temperature	T_{mb}	−20 to +90	°C

CHARACTERISTICS

Supply voltage V_B = + 24 V; T_{amb} = 25 °C

			BGY50	BGY51	
Power gain at f = 50 MHz	G_p		12,5 ± 0,4	12,5 ± 0,4	dB
Slope cable equivalent f = 40 MHz to 300 MHz	SL		+0,2 to +0,8	+0,2 to +0,8	dB
Flatness of frequency response f = 40 MHz to 300 MHz	FL	max.	± 0,2	± 0,2	dB
Return losses at input and output $Z_S = Z_L = 75\ \Omega$; f = 40 MHz to 300 MHz	$S_{11\text{-}22}$	min.	20	20	dB
Output voltage at d_{im} = −60 dB (DIN 45004, par. 6.3: 3-tone) $V_p = V_o$; f_p = 287,25 MHz $V_q = V_o$ −6 dB; f_q = 294,25 MHz $V_r = V_o$ −6 dB; f_r = 296,25 MHz Measured at $f_{(p+q-r)}$ = 285,25 MHz	V_o	min.	61	63,5	dBmV
2nd harmonic distortion $V_p = V_o$ = 50 dBmV; f_p = 55,25 MHz $V_q = V_o$ = 50 dBmV; f_q = 211,25 MHz Measured at $f_{(p+q)}$ = 266,5 MHz	d_2	max.	−71	−73	dB
Noise figure f = 40 MHz to 300 MHz	F	max.	7	8	dB
Total d.c. current consumption	I_{tot}	typ.	160	200	mA
		max.	180	220	mA

HYBRID V.H.F. PUSH-PULL AMPLIFIER MODULES

Hybrid amplifier modules intended for CATV systems.

QUICK REFERENCE DATA

			BGY52	BGY53	
Frequency range	f		40 to 300	40 to 300	MHz
Source impedance and load impedance	$Z_S = Z_L$	=	75	75	Ω
Power gain at f = 50 MHz	G_p		16,4 ± 0,4	16,4 ± 0,4	dB
Slope cable equivalent f = 40 MHz to 300 MHz	SL		0 to + 1,0	0 to + 1,0	dB
Flatness of frequency response f = 40 MHz to 300 MHz	FL	max.	± 0,1	± 0,1	dB
Return losses at input and output f = 40 MHz to 300 MHz	$S_{11\text{-}22}$	min.	20	20	dB
Output voltage at d_{im} = −60 dB (DIN 45004, par. 6.3: 3-tone)	V_o	min.	61	63,5	dBmV
2nd harmonic distortion at V_o = 50 dBmV	d_2	max.	−71	−73	dB
Noise figure f = 40 MHz to 300 MHz	F	max.	6	7	dB
D.C. supply voltage	$+V_B$	=	24	24	V *
Total d.c. current consumption at V_B = + 24 V	I_{tot}	typ.	160	200	mA
Operating mounting base temperature	T_{mb}		−20 to + 90	−20 to + 90	^oC

MECHANICAL DATA

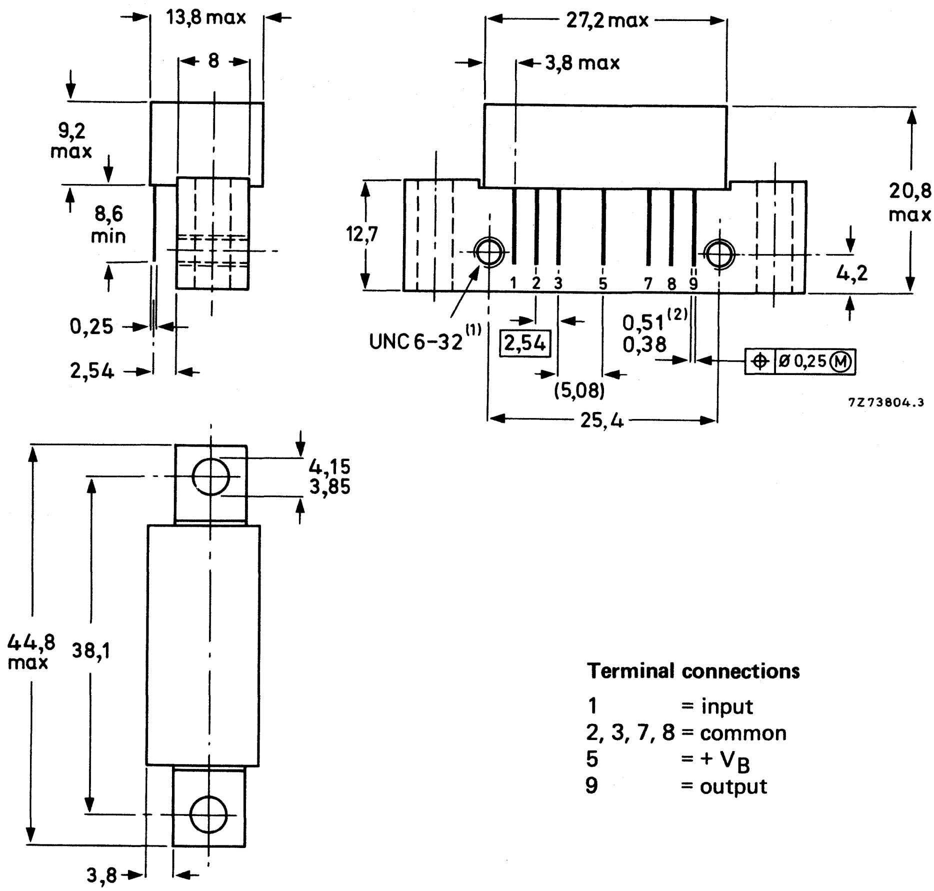
SOT-115 (see Fig. 1).

* The modules are able to withstand incidental short peaks in the supply voltage up to a maximum of 30 V.

MECHANICAL DATA

Dimensions in mm

Fig. 1 SOT-115.



Terminal connections

1	= input
2, 3, 7, 8	= common
5	= + V_B
9	= output

(1) Screw 6-32UNC-2A available upon request (see "Accessories").

(2) Tin-plated leads. Gold-plated leads available upon request.

See 'Mounting and Soldering Recommendations'.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

R.F. input voltage	V_i	max.	65 dBmV
Storage temperature	T_{stg}	−40 to +100	°C
Operating mounting base temperature	T_{mb}	−20 to +90	°C

CHARACTERISTICS

Supply voltage V_B = + 24 V; T_{amb} = 25 °C

			BGY52	BGY53	
Power gain at f = 50 MHz	G_p		16,4 ± 0,4	16,4 ± 0,4	dB
Slope cable equivalent f = 40 MHz to 300 MHz	SL		0 to + 1,0	0 to + 1,0	dB
Flatness of frequency response f = 40 MHz to 300 MHz	FL	max.	± 0,1	± 0,1	dB
Return losses at input and output $Z_S = Z_L$ = 75 Ω; f = 40 MHz to 300 MHz	$S_{11\text{-}22}$	min.	20	20	dB
Output voltage at d_{im} = −60 dB (DIN 45004, par. 6.3: 3-tone) $V_p = V_o$; f_p = 287,25 MHz $V_q = V_o$ −6 dB; f_q = 294,25 MHz $V_r = V_o$ −6 dB; f_r = 296,25 MHz Measured at $f_{(p+q-r)}$ = 285,25 MHz	V_o	min.	61	63,5	dBmV
2nd harmonic distortion $V_p = V_o$ = 50 dBmV; f_p = 55,25 MHz $V_q = V_o$ = 50 dBmV; f_q = 211,25 MHz Measured at $f_{(p+q)}$ = 266,5 MHz	d_2	max.	−71	−73	dB
Noise figure f = 40 MHz to 300 MHz	F	max.	6	7	dB
Total d.c. current consumption	I_{tot}	typ.	160	200	mA
		max.	180	220	mA

CATV AMPLIFIER MODULES

Hybrid amplifier modules for CATV systems operating at frequencies up to 300 MHz.

BGY54: 17 dB input amplifier module;
BGY55: 17 dB output amplifier module.

Features:

- excellent linearity;
- extremely low noise;
- optimal reliability ensured by TiPtAu metallized crystals, silicon nitride passivation and rugged construction.

QUICK REFERENCE DATA

			BGY54	BGY55	
Frequency range	f		40 to 300	40 to 300	MHz
Source impedance and load impedance	$Z_S = Z_L$	=	75	75	Ω
Power gain at f = 50 MHz	G_p		17,0 ± 0,4	17,0 ± 0,4	dB
Slope cable equivalent f = 40 MHz to 300 MHz	SL		0 to 1,0	0 to 1,0	dB
Flatness of frequency response f = 40 MHz to 300 MHz	FL	max.	± 0,1	± 0,1	dB
Return losses at input and output f = 40 MHz to 300 MHz	$S_{11\text{-}22}$	min.	20	20	dB
Output voltage at d_{im} = –60 dB (DIN 45004, par. 6.3: 3-tone)	V_o	min.	61	63,5	dBmV
2nd order distortion V_o = 50 dBmV	d_2	max.	–71	–73	dB
Composite triple beat 32 channels V_o = 46 dBmV	CTB	max.	–65	–67	dB
Output capability X_{mod} = –57 dB; 32 channels flat	V_o	min.	47,5	50	dBmV
Noise figure f = 40 MHz to 300 MHz	F	max.	6	6,5	dB
D.C. supply voltage	$+V_B$	=	24	24	V*
Total d.c. current consumption at V_B = + 24 V	I_{tot}	typ.	160	200	mA
Operating mounting base temperature	T_{mb}		–20 to + 90	–20 to + 90	°C

MECHANICAL DATA

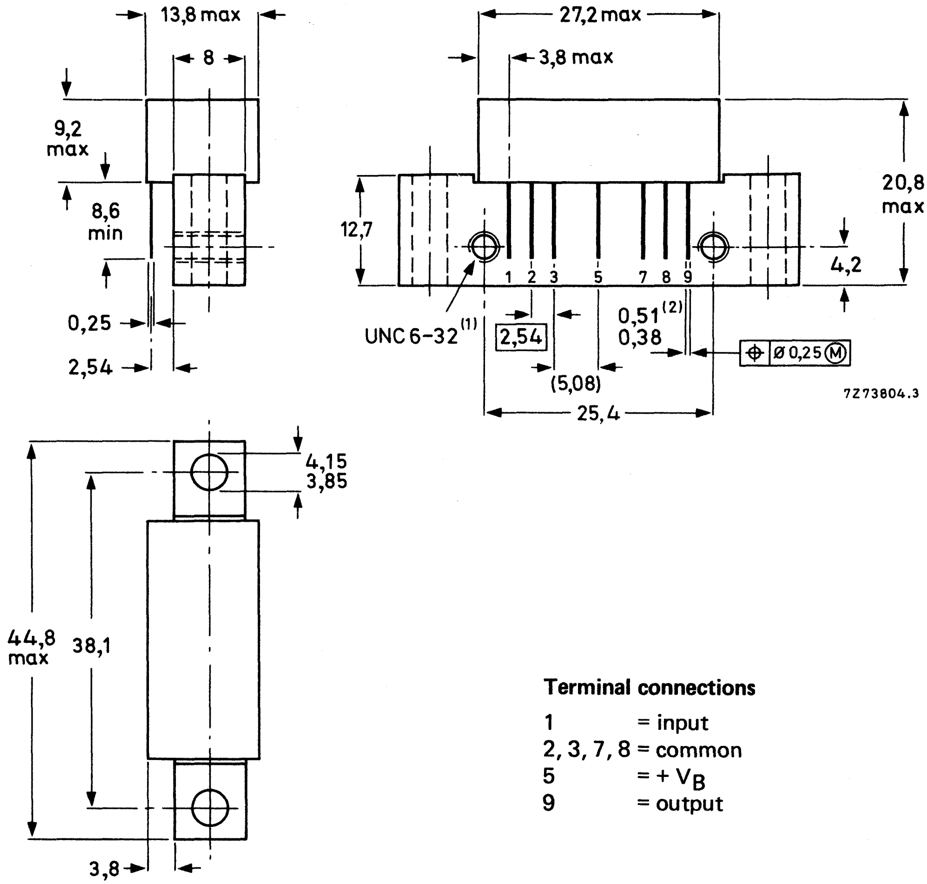
SOT-115 (see Fig. 1).

* The modules normally operate at V_B = 24 V, but are able to withstand supply transients up to 30 V.

MECHANICAL DATA

Dimensions in mm

Fig. 1 SOT-115.



Terminal connections

1	= input
2, 3, 7, 8	= common
5	= + V_B
9	= output

(1) Screw 6-32UNC-2A available upon request (see "Accessories").
(2) Tin-plated leads. Gold-plated leads available upon request.

See 'Mounting and Soldering Recommendations'.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

R.F. input voltage	V_i	max.	65 dBmV
Storage temperature	T_{stg}		−40 to + 100 °C
Operating mounting base temperature	T_{mb}		−20 to + 90 °C

CHARACTERISTICS

Supply voltage V_B = + 24 V; T_{amb} = 25 °C

			BGY54	BGY55	
Power gain at f = 50 MHz	G_p		17,0 ± 0,4	17,0 ± 0,4	dB
Slope cable equivalent f = 40 MHz to 300 MHz	SL		0 to 1,0	0 to 1,0	dB
Flatness of frequency response f = 40 MHz to 300 MHz	FL	max.	± 0,1	± 0,1	dB
Return losses at input and output $Z_S = Z_L = 75\ \Omega$; f = 40 MHz to 300 MHz	$S_{11\text{-}22}$	min.	20	20	dB
Output voltage at d_{im} = −60 dB (DIN 45004, 6.3: 3-tone) $V_p = V_o$; f_p = 287,25 MHz $V_q = V_o$−6 dB; f_q = 294,25 MHz $V_r = V_o$−6 dB; f_r = 296,25 MHz Measured at $f_{(p+q-r)}$ = 285,25 MHz	V_o	min.	61	63,5	dBmV
2nd order distortion V_o = 50 dBmV; f_p = 55,25 MHz V_o = 50 dBmV; f_q = 211,25 MHz Measured at $f_{(p+q)}$ = 266,5 MHz	d_2	max.	−71	−73	dB
Composite triple beat 32 channels V_o = 46 dBmV; channel W	CTB	max.	−65	−67	dB
Output capability on channel W X_{mod} = −57 dB; 32 channels flat	V_o	min.	47,5	50	dBmV
Noise figure f = 40 MHz to 300 MHz	F	max.	6	6,5	dB
Total d.c. current consumption	I_{tot}	typ.	160	200	mA
		max.	180	220	mA

HYBRID V.H.F. PUSH-PULL AMPLIFIER MODULES

Hybrid amplifier modules intended for CATV systems.

QUICK REFERENCE DATA

			BGY56	BGY57	
Frequency range	f		40 to 300	40 to 300	MHz
Source impedance and load impedance	$Z_S = Z_L$	=	75	75	Ω
Power gain at f = 50 MHz	G_p		22,0 ± 0,6	22,0 ± 0,6	dB
Slope cable equivalent f = 40 MHz to 300 MHz	SL		0 to + 1,0	0 to + 1,0	dB
Flatness of frequency response f = 40 MHz to 300 MHz	FL	max.	± 0,2	± 0,2	dB
Return losses at input and output f = 40 MHz to 300 MHz	$S_{11\text{-}22}$	min.	20	20	dB
Output voltage at d_{im} = −60 dB (DIN 45004, par. 6.3: 3-tone)	V_o	min.	61,5	64	dBmV
2nd harmonic distortion at V_o = 50 dBmV	d_2	max.	−64	−66	dB
Noise figure f = 40 MHz to 300 MHz	F	max.	6	7	dB
D.C. supply voltage	$+V_B$	=	24	24	V *
Total d.c. current consumption at V_B = + 24 V	I_{tot}	typ.	160	200	mA
Operating mounting base temperature	T_{mb}		−20 to + 90	−20 to + 90	°C

MECHANICAL DATA

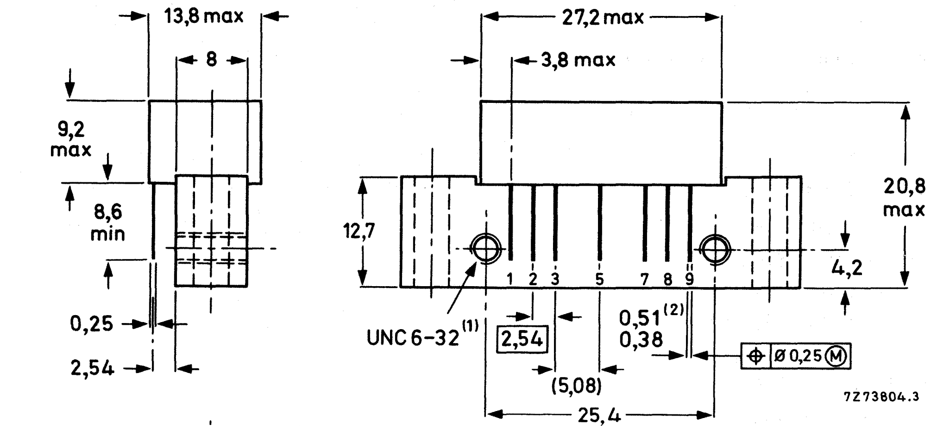
SOT-115 (see Fig. 1).

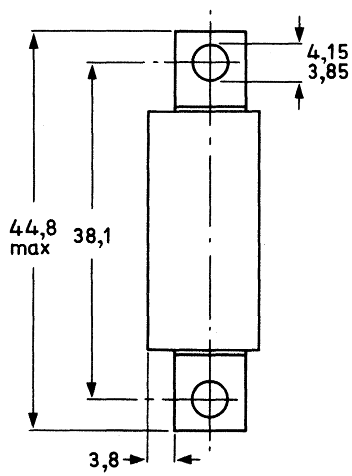
* The modules are able to withstand incidental short peaks in the supply voltage up to a maximum of 30 V.

MECHANICAL DATA

Dimensions in mm

Fig. 1 SOT-115.





Terminal connections

1	= input
2, 3, 7, 8	= common
5	= + V_B
9	= output

(1) Screw 6-32UNC-2A available upon request (see "Accessories").

(2) Leads tin-plated. Gold-plated leads available upon request.

See 'Mounting and Soldering Recommendations'.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

R.F. input voltage	V_i	max.	63	dBmV
Storage temperature	T_{stg}		−40 to +100	°C
Operating mounting base temperature	T_{mb}		−20 to +90	°C

CHARACTERISTICS

Supply voltage V_B = + 24 V; T_{amb} = 25 °C			BGY56	BGY57	
Power gain at f = 50 MHz	G_p		22,0 ± 0,6	22,0 ± 0,6	dB
Slope cable equivalent f = 40 MHz to 300 MHz	SL		0 to + 1,0	0 to + 1,0	dB
Flatness of frequency response f = 40 MHz to 300 MHz	FL	max.	± 0,2	± 0,2	dB
Return losses at input and output $Z_S = Z_L$ = 75 Ω; f = 40 MHz to 300 MHz	$S_{11\text{-}22}$	min.	20	20	dB
Output voltage at d_{im} = −60 dB (DIN 45004 par. 6.3: 3-tone) $V_p = V_o$; f_p = 287,25 MHz $V_q = V_o$ −6 dB; f_q = 294,25 MHz $V_r = V_o$ −6 dB; f_r = 296,25 MHz Measured at $f_{(p+q-r)}$ = 285,25 MHz	V_o	min.	61,5	64	dBmV
2nd harmonic distortion $V_p = V_o$ = 50 dBmV; f_p = 55,25 MHz $V_q = V_o$ = 50 dBmV; f_q = 211,25 MHz Measured at $f_{(p+q)}$ = 266,5 MHz	d_2	max.	−64	−66	dB
Noise figure f = 40 MHz to 300 MHz	F	max.	6	7	dB
Total d.c. current consumption	I_{tot}	typ.	160	200	mA
		max.	180	220	mA

HYBRID V.H.F. PUSH-PULL AMPLIFIER MODULE

Hybrid amplifier module intended for CATV systems.

QUICK REFERENCE DATA

Frequency range	f		40 to 300	MHz
Source impedance and load impedance	$Z_S = Z_L$	=	75	Ω
Power gain at f = 50 MHz	G_p		33,0 ± 1,0	dB
Slope cable equivalent f = 40 MHz to 300 MHz	SL		+ 0,5 to + 1,5	dB
Flatness of frequency response f = 40 MHz to 300 MHz	FL	max.	± 0,3	dB
Return losses at input and output f = 40 MHz to 300 MHz	$S_{11\text{-}22}$	min.	20	dB
Output voltage at d_{im} = −60 dB (DIN 45004, par. 6.3: 3-tone)	V_o	min.	64	dBmV
2nd harmonic distortion at V_o = 50 dBmV	d_2	max.	−70	dB
Noise figure f = 40 MHz to 300 MHz	F	max.	6	dB
D.C. supply voltage	$+V_B$	=	24	V*
Total d.c. current consumption at V_B = + 24 V	I_{tot}	typ.	320	mA
Operating mounting base temperature	T_{mb}		−20 to + 90	°C

MECHANICAL DATA

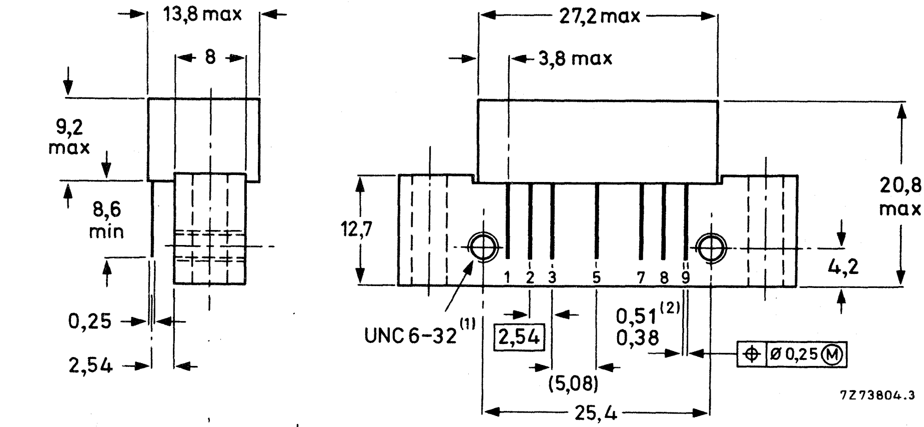
SOT-115 (see Fig. 1).

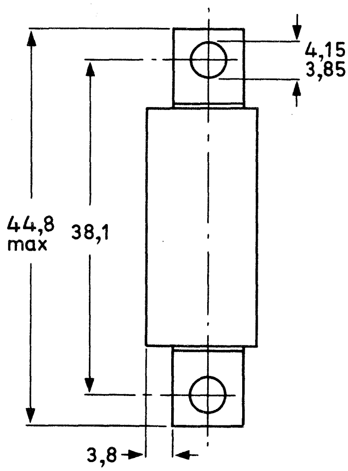
* The module is able to withstand incidental short peaks in the supply voltage up to a maximum of 30 V.

MECHANICAL DATA

Dimensions in mm

Fig. 1 SOT-115.





Terminal connections

1	= input
2, 3, 7, 8	= common
5	= + V_B
9	= output

(1) Screw 6-32UNC-2A available upon request (see "Accessories").
(2) Leads tin-plated. Gold-plated leads available upon request.

See 'Mounting and Soldering Recommendations'.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

R.F. input voltage	V_i	max.	55 dBmV
Storage temperature	T_{stg}		−40 to +100 °C
Operating mounting base temperature	T_{mb}		−20 to +90 °C

CHARACTERISTICS

Supply voltage V_B = + 24 V; T_{amb} = 25 °C

Power gain at f = 50 MHz	G_p		33,0 ± 1,0 dB
Slope cable equivalent f = 40 MHz to 300 MHz	SL		+ 0,5 to + 1,5 dB
Flatness of frequency response f = 40 MHz to 300 MHz	FL	max.	± 0,3 dB
Return losses at input and output $Z_S = Z_L$ = 75 Ω; f = 40 MHz to 300 MHz	$S_{11\text{-}22}$	min.	20 dB
Output voltage at d_{im} = −60 dB (DIN 45004, par. 6.3: 3-tone) $V_p = V_o$; f_p = 287,25 MHz $V_q = V_o$ −6 dB; f_q = 294,25 MHz $V_r = V_o$ −6 dB; f_r = 296,25 MHz Measured at $f_{(p+q-r)}$ = 285,25 MHz	V_o	min.	64 dBmV
2nd harmonic distortion $V_p = V_o$ = 50 dBmV; f_p = 55,25 MHz $V_q = V_o$ = 50 dBmV; f_q = 211,25 MHz Measured at $f_{(p+q)}$ = 266,5 MHz	d_2	max.	−70 dB
Noise figure f = 40 MHz to 300 MHz	F	max.	6 dB
Total d.c. current consumption	I_{tot}	typ. max.	320 mA 340 mA

CATV AMPLIFIER MODULE

Hybrid amplifier module for use as 34 dB line extender in CATV systems operating at frequencies up to 330 MHz.

Features:
- excellent linearity;
- extremely low noise;
- optimal reliability ensured by TiPtAu metallized crystals, silicon nitride passivation and rugged construction.

QUICK REFERENCE DATA

Frequency range	f		40 to 330	MHz
Source impedance and load impedance	$Z_S = Z_L$		75	Ω
Power gain at f = 50 MHz	G_p		34,0 ± 1,0	dB
Slope cable equivalent f = 40 MHz to 330 MHz	SL		0,5 to 1,5	dB
Flatness of frequency response f = 40 MHz to 330 MHz	FL	max.	± 0,3	dB
Return losses at input and output f = 40 MHz to 330 MHz	$S_{11\text{-}22}$	min.	20	dB
Output voltage at d_{im} = –60 dB (DIN 45004B, par. 6.3: 3-tone)	V_o	min.	64	dBmV
2nd order distortion at channel R V_o = 50 dBmV on channel 2 and 13	d_2	max.	–70	dB
Composite triple beat 32 channels V_o = 46 dBmV	CTB	⩽	–67	dB
Output capability X_{mod} = –57 dB; 32 channels flat	V_o	min.	50	dBmV
Noise figure f = 40 MHz to 330 MHz	F	max.	6	dB
D.C. supply voltage	$+V_B$	=	24	V*
Total d.c. current consumption at V_B = + 24 V	I_{tot}	typ.	320	mA
Operating mounting base temperature	T_{mb}		–20 to + 90	°C

MECHANICAL DATA

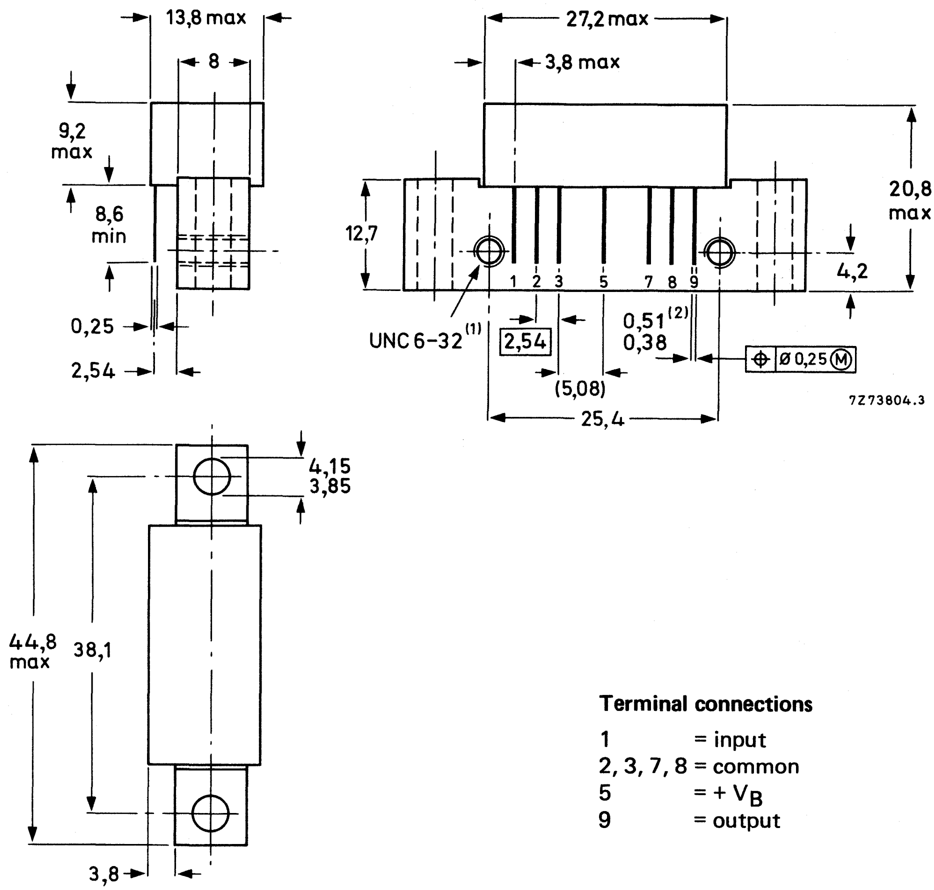
SOT-115 (see Fig. 1).

* The module normally operates at V_B = 24 V, but is able to withstand supply transients up to 30 V.

MECHANICAL DATA

Dimensions in mm

Fig. 1 SOT-115.



Terminal connections

1	= input
2, 3, 7, 8	= common
5	= + V_B
9	= output

(1) Screw 6-32UNC-2A available upon request (see "Accessories").

(2) Leads gold-plated.

See 'Mounting and Soldering Recommendations'.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

R.F. input voltage	V_i	max.	55	dBmV
Storage temperature	T_{stg}	−40 to + 100		°C
Operating mounting base temperature	T_{mb}	−20 to + 90		°C

CHARACTERISTICS

Supply voltage V_B = + 24 V; T_{amb} = 25 °C

Power gain at f = 50 MHz	G_p		34,0 ± 1,0	dB
Slope cable equivalent f = 40 MHz to 330 MHz	SL		0,5 to 1,5	dB
Flatness of frequency response f = 40 MHz to 330 MHz	FL	max.	± 0,3	dB
Return losses at input and output $Z_S = Z_L$ = 75 Ω; f = 40 MHz to 330 MHz	$S_{11\text{-}22}$	min.	20	dB
Output voltage at d_{im} = −60 dB (DIN 45004, 6.3: 3-tone) $V_p = V_o$; f_p = 287,25 MHz $V_q = V_o$−6 dB; f_q = 294,25 MHz $V_r = V_o$−6 dB; f_r = 296,25 MHz Measured at $f_{(p+q-r)}$ = 285,25 MHz	V_o	min.	64	dBmV
2nd order distortion V_o = 50 dBmV; channel 2 V_o = 50 dBmV; channel 13 Measured at channel R	d_2	max.	−70	dB
Composite triple beat 32 channels V_o = 46 dBmV; channel W	CTB	max.	−67	dB
Composite triple beat 40 channels V_o = 46 dBmV; channel W	CTB	max.	−63	dB
Output capability on channel W X_{mod} = −57 dB; 32 channels flat	V_o	min.	50	dBmV
X_{mod} = −57 dB; 40 channels flat	V_o	min.	49,5	dBmV
Noise figure f = 40 MHz to 330 MHz	F	max.	6	dB
Total d.c. current consumption	I_{tot}	typ. max.	320 340	mA mA

HYBRID V.H.F. PUSH-PULL AMPLIFIER MODULE

Hybrid amplifier module intended for CATV systems up to 300 MHz.

QUICK REFERENCE DATA

Frequency range	f		40 to 300	MHz
Source impedance and load impedance	$Z_S = Z_L$	=	75	Ω
Power gain at f = 50 MHz	G_p		38,5 ±1,0	dB
Slope cable equivalent f = 40 MHz to 300 MHz	SL		0 to + 1,5	dB
Flatness of frequency response f = 40 MHz to 300 MHz	FL	max.	± 0,3	dB
Return losses at input and output f = 40 MHz to 300 MHz	$S_{11\text{-}22}$	min.	18	dB
Output voltage at d_{im} = −60 dB (DIN45004B, par. 6,3: 3-tone)	V_o	min.	64	dBmV
2nd harmonic distortion at V_o = 50 dBmV	d_2	max.	−68	dB
Noise figure f = 40 MHz to 300 MHz	F	max.	6	dB
D.C. supply voltage	$+V_B$	=	24	V*
Total d.c. current consumption at V_B = +24 V	I_{tot}	typ.	320	mA
Operating mounting base temperature	T_{mb}		−20 to +90	°C

MECHANICAL DATA

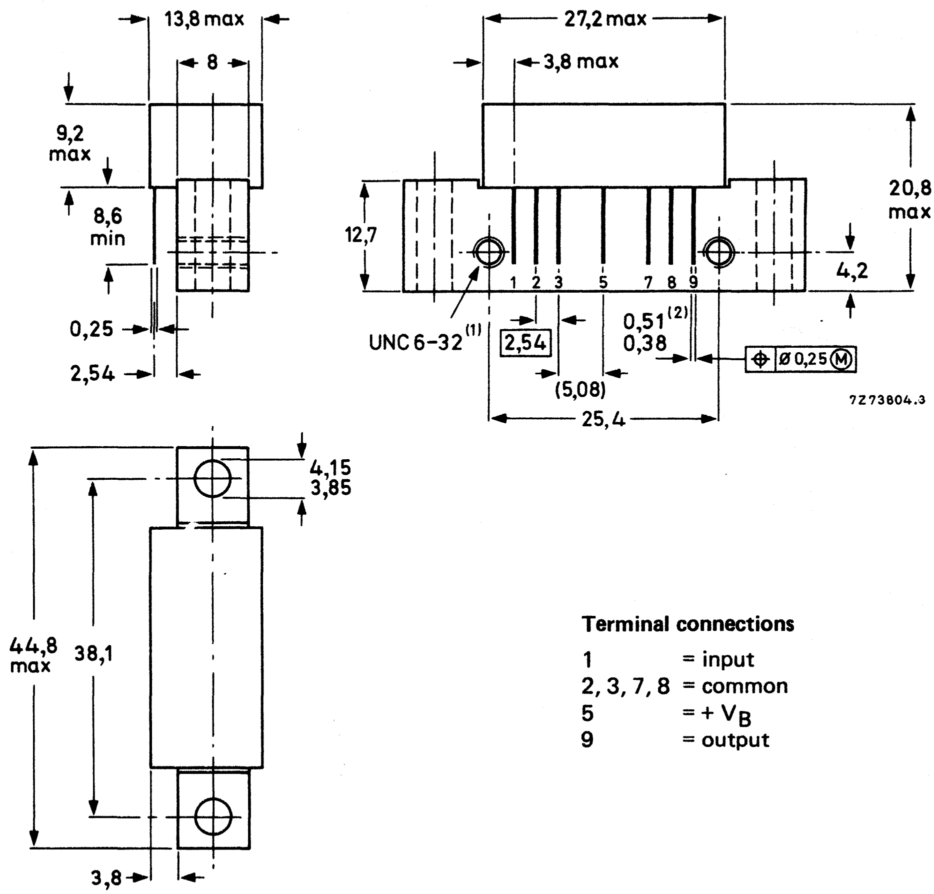
SOT-115 (see Fig. 1).

* The module normally operates at V_B = 24 V, but is able to withstand supply transients up to 30 V.

MECHANICAL DATA

Dimensions in mm

Fig. 1 SOT-115.



Terminal connections

1	= input
2, 3, 7, 8	= common
5	= + V_B
9	= output

(1) Screw 6-32UNC-2A available upon request (see "Accessories").

(2) Leads tin-plated. Gold-plated leads available upon request.

See "Mounting and Soldering Recommendations".

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

R.F. input voltage	V_i	max.	53 dBmV
Storage temperature	T_{stg}	−40 to +100	°C
Operating mounting base temperature	T_{mb}	−20 to +90	°C

CHARACTERISTICS

Supply voltage V_B = +24 V; T_{amb} = 25 °C

Power gain at f = 50 MHz	G_p		38,5 ± 1,0 dB
Slope cable equivalent f = 40 MHz to 300 MHz	SL		0 to +1,5 dB
Flatness of frequency response f = 40 MHz to 300 MHz	FL	max.	± 0,3 dB
Return losses at input and output $Z_S = Z_L$ = 75 Ω; f = 40 MHz to 300 MHz	$S_{11\text{-}22}$	min.	18 dB
Output voltage at d_{im} = −60 dB (DIN45004B, par. 6.3: 3-tone) $V_p = V_o$; f_p = 287,25 MHz $V_q = V_o$ −6 dB; f_q = 294,25 MHz $V_r = V_o$ −6 dB; f_r = 296,25 MHz Measured at $f_{(p+q-r)}$ = 285,25 MHz	V_o	min.	64 dBmV
2nd harmonic distortion $V_p = V_o$ = 50 dBmV; f_p = 55,25 MHz $V_q = V_o$ = 50 dBmV; f_q = 211,25 MHz Measured at $f_{(p+q)}$ = 266,5 MHz	d_2	max.	−68 dB
Noise figure f = 40 MHz to 300 MHz	F	max.	6 dB
Total d.c. current consumption	I_{tot}	typ. max.	320 mA 340 mA

HYBRID V.H.F. PUSH-PULL AMPLIFIER MODULE

Interstage hybrid amplifier module intended for CATV systems up to 300 MHz. The inputs and outputs of the stages have been terminated separately.

QUICK REFERENCE DATA for total amplifier unless otherwise specified

Frequency range	f		40 to 300		MHz
Source impedance and load impedance	$Z_S = Z_L$	=	75		Ω
Power gain at f = 50 MHz	G_p		33,5 ± 1,0		dB
Slope cable equivalent f = 40 MHz to 300 MHz	SL		+0,5 to +1,5		dB
Flatness of frequency response f = 40 MHz to 300 MHz	FL	max.	±0,3		dB
			pre-stage	**final stage**	
Return losses at input and output f = 40 MHz to 300 MHz	s_{11}	min.	20	18	dB
	s_{22}	min.	18	20	dB
Output voltage at d_{im} = −60 dB (DIN45004B, par. 6.3: 3-tone)	V_o	min.	64		dBmV
2nd harmonic distortion at V_o = 50 dBmV	d_2	max.	−66		dB
Noise figure f = 40 MHz to 300 MHz	F	max.	6		dB
D.C. supply voltage	$+V_B$	=	24		V*
Total d.c. current consumption at V_B = +24 V	I_{tot}	typ.	320		mA
Operating mounting base temperature	T_{mb}		−20 to +90		°C

MECHANICAL DATA

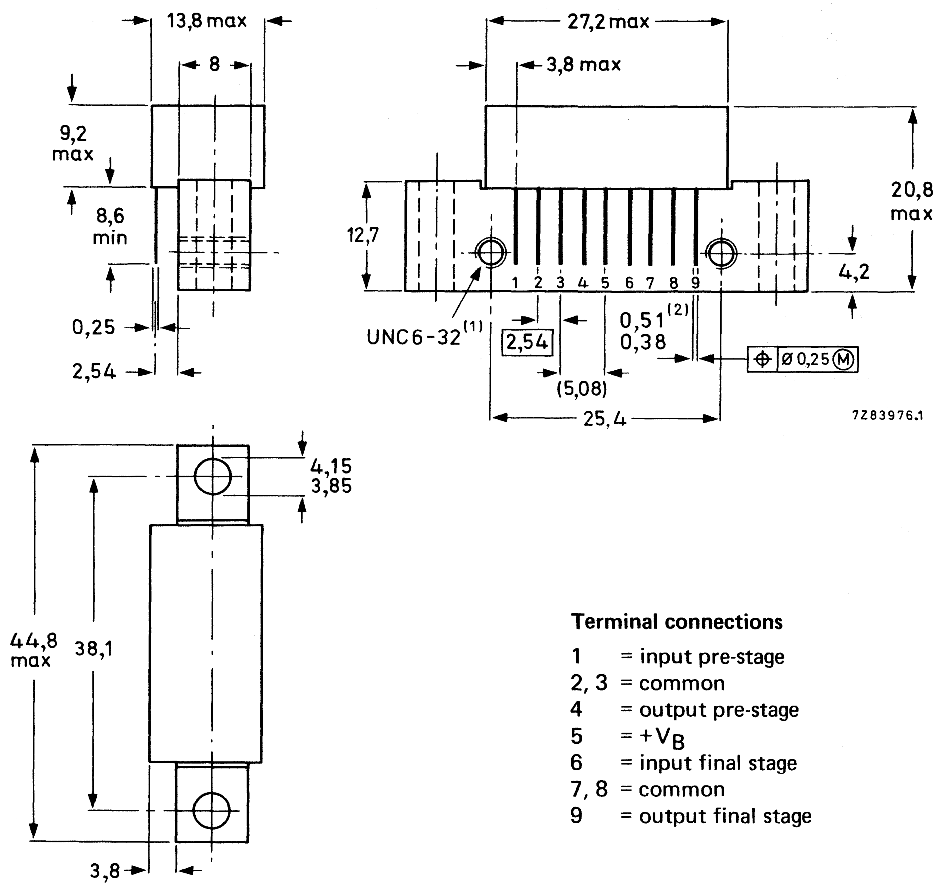
SOT-115 (see Fig. 1).

* The module normally operates at V_B = 24 V, but is able to withstand supply transients up to 30 V.

MECHANICAL DATA

Dimensions in mm

Fig. 1 SOT-115.



Terminal connections

1 = input pre-stage
2, 3 = common
4 = output pre-stage
5 = $+V_B$
6 = input final stage
7, 8 = common
9 = output final stage

(1) Screw 6-32UNC-2A available upon request (see "Accessories").
(2) Leads tin-plated. Gold-plated leads available on request.

See "Mounting and Soldering Recommendations".

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

R.F. input voltage total amplifier	V_i	max. 55	dBmV
Storage temperature	T_{stg}	−40 to + 100	°C
Operating mounting base temperature	T_{mb}	−20 to +90	°C

CHARACTERISTICS for total amplifier unless otherwise specified.

Supply voltage $V_B = +24$ V; $T_{amb} = 25$ °C

Power gain at f = 50 MHz	G_p		33,5 ± 1,0		dB
Slope cable equivalent f = 40 MHz to 300 MHz	SL		+0,5 to +1,5		dB
Flatness of frequency response f = 40 MHz to 300 MHz	FL	max.	± 0,3		dB
			pre-stage	**final stage**	
Return losses at input and output $Z_S = Z_L = 75\ \Omega$; f = 40 MHz to 300 MHz	s_{11}	min.	20	18	dB
	s_{22}	min.	18	20	dB
Output voltage at $d_{im} = -60$ dB (DIN45004B, par. 6.3: 3-tone) $V_p = V_o$; $f_p = 287,25$ MHz $V_q = V_o - 6$ dB; $f_q = 294,25$ MHz $V_r = V_o - 6$ dB; $f_r = 296,25$ MHz Measured at $f_{(p+q-r)} = 285,25$ MHz	V_o	min.	64		dBmV
2nd harmonic distortion $V_p = V_o = 50$ dBmV; $f_p = 55,25$ MHz $V_q = V_o = 50$ dBmV; $f_q = 211,25$ MHz Measured at $f_{(p+q)} = 266,5$ MHz	d_2	max.	−66		dB
Noise figure f = 40 MHz to 300 MHz	F	max.	6		dB
Total d.c. current consumption	I_{tot}	typ.	320		mA
		max.	340		mA

CATV AMPLIFIER MODULE

Hybrid amplifier module for use in CATV systems and operating at frequencies from 5 MHz to 200 MHz. The device is intended as a reverse amplifier for use in two-way systems.

QUICK REFERENCE DATA

Frequency range	f		5 to 200	MHz
Source impedance and load impedance	$Z_S = Z_L$		75	Ω
Power gain at f = 10 MHz	G_p		13,0 ± 0,5	dB
Slope cable equivalent f = 5 MHz to 200 MHz	SL		−0,2 to + 0,5	dB
Flatness of frequency response f = 5 MHz to 200 MHz	FL	max.	± 0,2	dB
Return losses at input and output f = 5 MHz to 200 MHz	$S_{11\text{-}22}$	min.	20	dB
Output voltage at d_{im} = −60 dB; measured at 33,25 MHz (DIN 45004B, par. 6.3: 3-tone)	V_o	min.	67	dBmV
2nd-order distortion V_o = 50 dBmV	d_2	max.	−72	dB
Composite triple beat; 22 channels V_o = 50 dBmV	CTB	max.	−68	dB
Cross modulation at 22 channels V_o = 50 dBmV	X_{mod}	max.	−61	dB
Noise figure f = 200 MHz	F	max.	7	dB
D.C. supply voltage	$+V_B$	=	24	V*
Total d.c. current consumption V_B = + 24 V	I_{tot}	typ.	215	mA
Operating mounting base temperature	T_{mb}		−20 to + 90	°C

MECHANICAL DATA

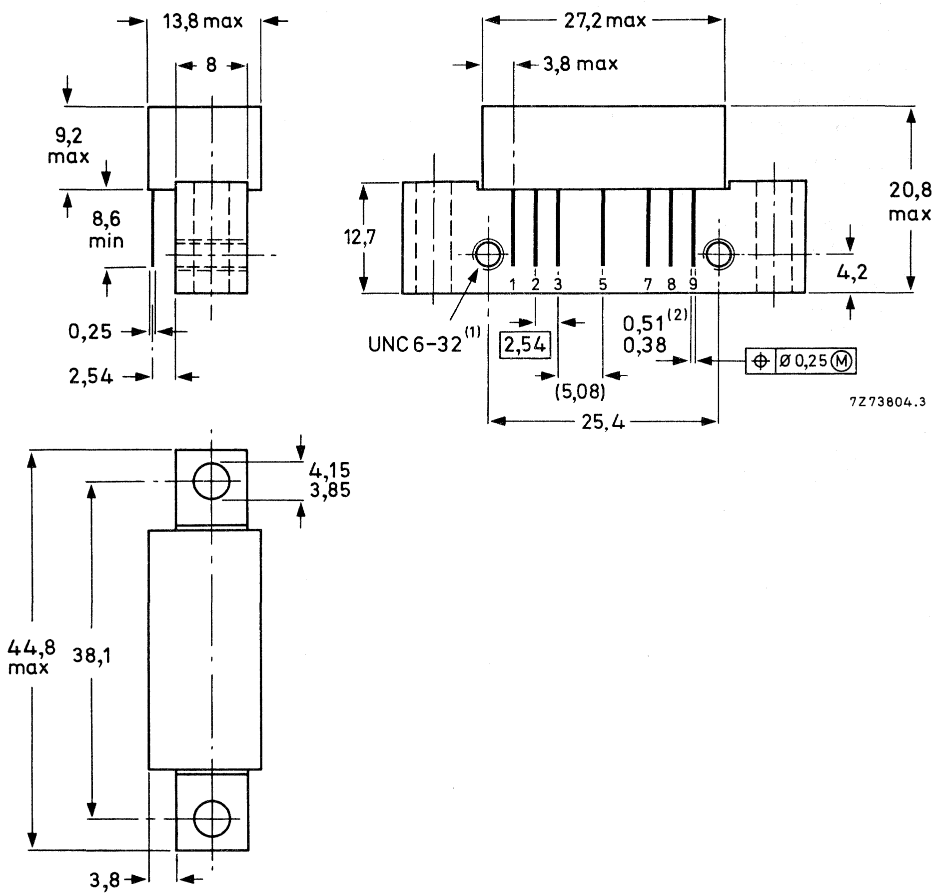
SOT-115 (see Fig. 1).

* The module normally operates at V_B = 24 V, but is able to withstand supply transient up to 30 V.

MECHANICAL DATA

Dimensions in mm

Fig. 1 SOT-115.



(1) Screw 6-32UNC-2A available upon request (see "Accessories").

(2) Leads gold-plated.

See "Mounting and Soldering Recommendations".

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

R.F. input voltage	V_i	max.	67 dBmV
Storage temperature	T_{stg}	−40 to + 100	°C
Operating mounting base temperature	T_{mb}	−20 to + 90	°C

CHARACTERISTICS at T_{mb} = 30 °C unless otherwise specified

Supply voltage V_B = + 24 V

Power gain at f = 10 MHz	G_p		13,0 ± 0,5 dB
Slope cable equivalent f = 5 MHz to 200 MHz	SL		−0,2 to + 0,5 dB
Flatness of frequency response f = 5 MHz to 200 MHz	FL	max.	± 0,2 dB
Return losses at input and output $Z_S = Z_L$ = 75 Ω; f = 5 MHz to 200 MHz	S_{11-22}	min.	20 dB
Output voltage at d_{im} = −60 dB (DIN 45004B, par. 6.3: 3-tone) $V_p = V_o$; f_p = 35,25 MHz $V_q = V_o$ −6 dB; f_q = 42,25 MHz $V_r = V_o$ − 6 dB; f_r = 44,25 MHz Measured at $f_{(p+q-r)}$ = 33,25 MHz	V_o	min.	67 dBmV
Output voltage at d_{im} = −60 dB (DIN 45004B, par. 6.3: 3-tone) $V_p = V_o$; f_p = 187,25 MHz $V_q = V_o$ −6 dB; f_q = 194,25 MHz $V_r = V_o$ −6 dB; f_r = 196,25 MHz Measured at $f_{(p+q-r)}$ = 185,25 MHz	V_o	min.	64 dBmV
2nd-order distortion V_o = 50 dBmV; f_p = 83,25 MHz V_o = 50 dBmV; f_q = 109,25 MHz Measured at $f_{(p+q)}$ = 192,5 MHz	d_2	max.	−72 dB
Composite triple beat on 22 channels V_o = 50 dBmV; measured in channel 7	CTB	max.	−68 dB
Cross modulation at 22 channels V_o = 50 dBmV; measured in channel 2	X_{mod}	max.	−61 dB
Noise figure f = 200 MHz	F	max.	7,0 dB
Total d.c. current consumption	I_{tot}	typ. max.	215 mA 230 mA

CATV REVERSE AMPLIFIER MODULE

Hybrid amplifier module for use in CATV systems and operating at frequencies from 5 MHz to 200 MHz. This device is intended as a reverse amplifier for use in two-way systems.

QUICK REFERENCE DATA

Frequency range	f		5 to 200	MHz
Source impedance and load impedance	$Z_S = Z_L$		75	Ω
Power gain at f = 10 MHz	G_p		18,5 ± 0,5	dB
Slope cable equivalent f = 5 MHz to 200 MHz	SL		−0,2 to + 0,5	dB
Flatness of frequency response f = 5 MHz to 200 MHz	FL	max.	± 0,2	dB
Return losses at input and output f = 5 MHz to 200 MHz	$S_{11\text{-}22}$	min.	20	dB
Output voltage at d_{im} = −60 dB; measured at 33,25 MHz (DIN 45004B, par. 6.3: 3-tone)	V_o	min.	67	dBmV
2nd-order distortion V_o = 50 dBmV	d_2	max.	−72	dB
Composite triple beat; 22 channels V_o = 50 dBmV	CTB	max.	−68	dB
Cross modulation at 22 channels V_o = 50 dBmV	X_{mod}	max.	−61	dB
Noise figure f = 200 MHz	F	max.	5,5	dB
D.C. supply voltage	$+V_B$	=	24	V*
Total d.c. current consumption V_B = + 24 V	I_{tot}	typ.	215	mA
Operating mounting base temperature	T_{mb}		−20 to + 90	°C

MECHANICAL DATA

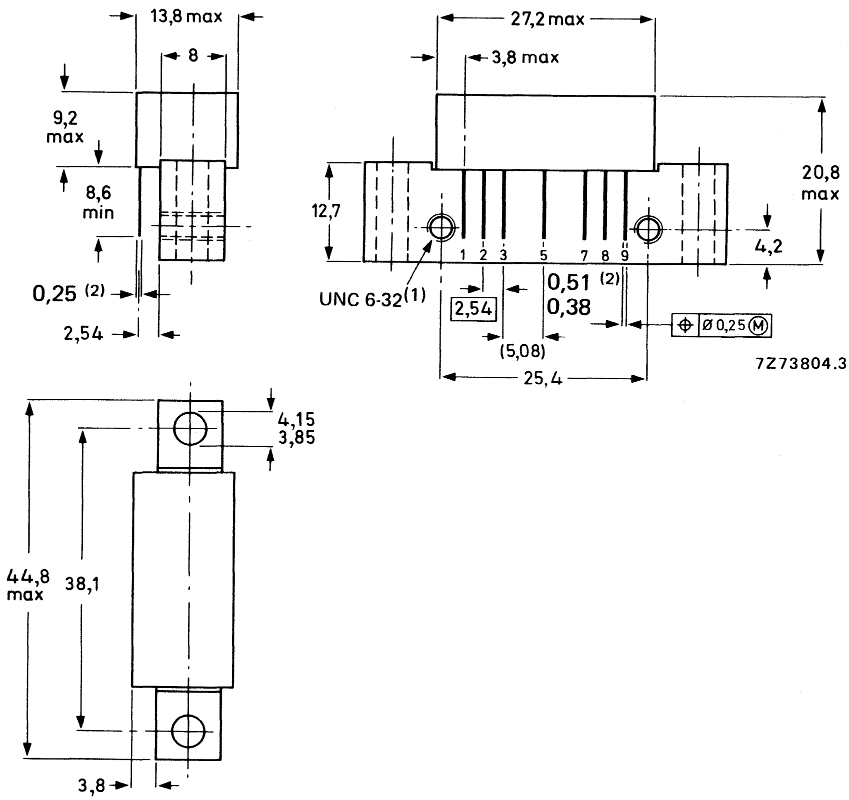
SOT-115 (see Fig. 1).

* The module normally operates at V_B = 24 V, but is able to withstand supply transients up to 30 V.

MECHANICAL DATA

Dimensions in mm

Fig. 1 SOT-115.



(1) Screw 6-32UNC-2A available upon request (see "Accessories").
(2) Leads gold-plated.

See "Mounting and Soldering Recommendations".

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

R.F. input voltage	V_i	max.	65 dBmV
Storage temperature	T_{stg}	−40 to + 100	°C
Operating mounting base temperature	T_{mb}	−20 to + 90	°C

CHARACTERISTICS

Supply voltage V_B = + 24 V at T_{mb} = 30 °C unless otherwise specified

Power gain at f = 10 MHz	G_p		18,5 ± 0,5	dB
Slope cable equivalent f = 5 MHz to 200 MHz	SL		−0,2 to + 0,5	dB
Flatness of frequency response f = 5 MHz to 200 MHz	FL	max.	± 0,2	dB
Return losses at input and output $Z_S = Z_L = 75\ \Omega$; f = 5 MHz to 200 MHz	$S_{11\text{-}22}$	min.	20	dB
Output voltage at d_{im} = −60 dB (DIN 45004B; par. 6.3: 3-tone) $V_p = V_o$; f_p = 33,25 MHz $V_q = V_o$ −6 dB; f_q = 42,25 MHz $V_r = V_o$ −6 dB; f_r = 44,25 MHz Measured at $f_{(p+q)}$ = 33,25 MHz	V_o	min.	67	dBmV
Output voltage at d_{im} = −60 dB (DIN 45004B; par. 6.3: 3-tone) $V_p = V_o$; f_p = 187,25 MHz $V_q = V_o$ −6 dB; f_q = 194,25 MHz $V_r = V_o$ −6 dB; f_r = 196,25 MHz Measured at $f_{(p+q-r)}$ = 185,25 MHz	V_o	min.	64	dBmV
2nd-order distorion V_o = 50 dBmV; f_p = 83,25 MHz V_o = 50 dBmV; f_q = 109,25 MHz Measured at $f_{(p+q)}$ = 192,5 MHz	d_2	max.	−72	dB
Composite triple beat at 22 channels V_o = 50 dBmV; measured in channel 7	CTB	max.	−68	dB
Cross modulation at 22 channels V_o = 50 dBmV; measured in channel 2	X_{mod}	max.	−61	dB
Noise figure f = 200 MHz	F	max.	5,5	dB
Total d.c. current consumption	I_{tot}	typ. max.	215 230	mA mA

CATV REVERSE AMPLIFIER MODULE

Hybrid amplifier module for use in CATV systems and operating at frequencies from 5 MHz to 200 MHz. The device is intended as a reverse amplifier for use in two-way systems.

QUICK REFERENCE DATA

Frequency range	f		5 to 200	MHz
Source impedance and load impedance	$Z_S = Z_L$		75	Ω
Power gain at f = 10 MHz	G_p		22,0 ± 0,5	dB
Slope cable equivalent f = 5 MHz to 200 MHz	SL		−0,2 to + 0,5	dB
Flatness of frequency response f = 5 MHz to 200 MHz	FL	max.	± 0,2	dB
Return losses at input and output f = 5 MHz to 200 MHz	S_{11-22}	min.	20	dB
Output voltage at d_{im} = −60 dB; measured at 33,25 MHz (DIN 45004B, par. 6.3: 3-tone)	V_o	min.	67	dBmV
2nd-order distortion V_o = 50 dBmV	d_2	max.	−67	dB
Composite triple beat; 22 channels V_o = 50 dBmV	CTB	max.	−67	dB
Cross modulation at 22 channels V_o = 50 dBmV	X_{mod}	max.	−60	dB
Noise figure f = 200 MHz	F	max.	5,5	dB
D.C. supply voltage	+ V_B	=	24	V*
Total d.c. current consumption V_B = + 24 V	I_{tot}	typ.	215	mA
Operating mounting base temperature	T_{mb}		−20 to + 90	°C

MECHANICAL DATA

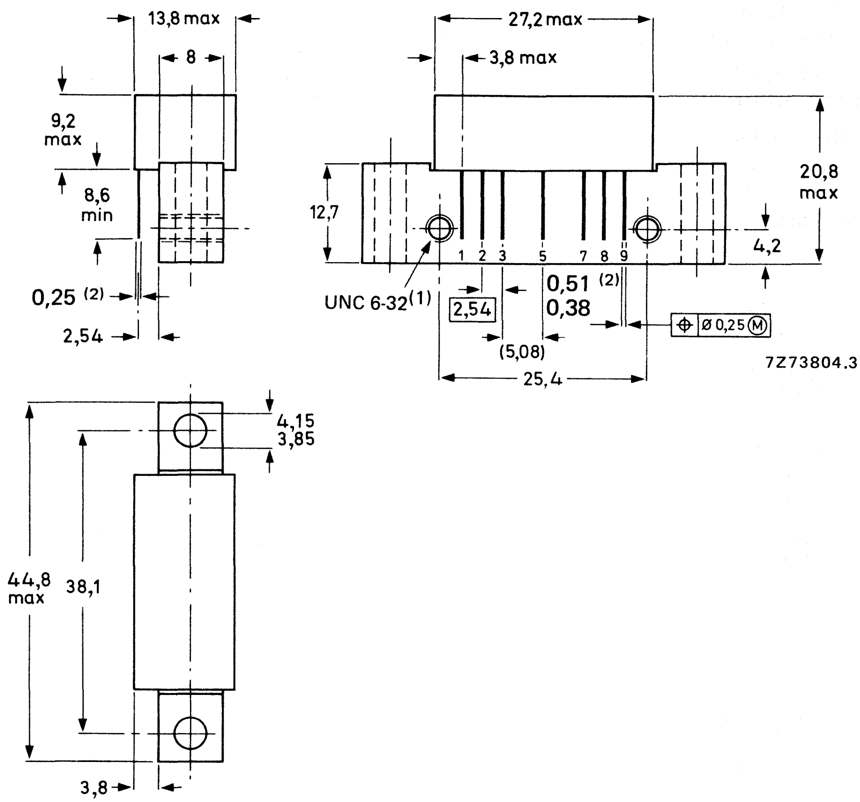
Sot-115 (see Fig. 1).

* The module normally operates at V_B = 24 V, but is able to withstand supply transients up to 30 V.

MECHANICAL DATA

Dimensions in mm

Fig. 1 SOT-115.



(1) Screw 6-32UNC-2A available upon request (see "Accessories").
(2) Leads gold-plated.

See 'Mounting and Soldering Recommendations'.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

R.F. input voltage	V_i	max.	65 dBmV
Storage temperature	T_{stg}		−40 to +100 °C
Operating mounting base temperature	T_{mb}		−20 to +90 °C

CHARACTERISTICS at T_{mb} = 30 °C unless otherwise specified

Supply voltage V_B = + 24 V

Power gain at f = 10 MHz	G_p		22,0 ± 0,5 dB
Slope cable equivalent f = 5 MHz to 200 MHz	SL		−0,2 to + 0,5 dB
Flatness of frequency response f = 5 MHz to 200 MHz	FL	max.	± 0,2 dB
Return losses at input and output $Z_S = Z_L$ = 75 Ω; f = 5 MHz to 200 MHz	$S_{11\text{-}22}$	min.	20 dB
Output voltage at d_{im} = −60 dB (DIN 45004B, par. 6.3: 3-tone) $V_p = V_o$; f_p = 33,25 MHz $V_q = V_o$ −6 dB; f_q = 42,25 MHz $V_r = V_o$ −6 dB; f_r = 44,25 MHz Measured at $f_{(p+q-r)}$ = 33,25 MHz	V_o	min.	67 dBmV
Output voltage at d_{im} = −60 dB (DIN 45004B, par. 6.3: 3-tone) $V_p = V_o$; f_p = 187,25 MHz $V_q = V_o$ −6 dB; f_q = 194,25 MHz $V_r = V_o$ −6 dB; f_r = 196,25 MHz Measured at $f_{(p+q-r)}$ = 185,25 MHz	V_o	min.	64 dBmV
2nd-order distortion V_o = 50 dBmV; f_p = 83,25 MHz V_o = 50 dBmV; f_q = 109,25 MHz Measured at $f_{(p+q)}$ = 192,5 MHz	d_2	max.	−67 dB
Composite triple beat at 22 channels V_o = 50 dBmV; measured on channel 7	CTB	max.	−67 dB
Cross modulation at 22 channels V_o = 50 dBmV; measured in channel 2	X_{mod}	max.	−60 dB
Noise figure f = 200 MHz	F	max.	5,5 dB
Total d.c. current consumption	I_{tot}	typ. max.	215 mA 230 mA

CATV AMPLIFIER MODULE

Hybrid amplifier module for use in CATV systems and operating at frequencies from 5 MHz to 200 MHz. This device is intended as a reverse amplifier for use in two-way systems.

QUICK REFERENCE DATA

Frequency range	f	5	to	200	MHz
Source impedance and load impedance	$Z_S = Z_L$			75	Ω
Power gain at f = 10 MHz	G_p	24,0	±	0,5	dB
Slope cable equivalent f = 5 MHz to 200 MHz	SL	−0,2	to	+ 0,5	dB
Flatness of frequency response f = 5 MHz to 200 MHz	FL	max.		+ 0,2	dB
Return losses at input and output f = 5 MHz to 200 MHz	$S_{11\text{-}22}$	min.		20	dB
Output voltage at d_{im} = −60 dB; measured at 33,25 MHz (DIN 45004B, par. 6,3: 3-tone)	V_o	min.		67	dBmV
2nd-order distortion V_o = 50 dBmV	d_2	max.		−67	dB
Composite triple beat; 22 channels V_o = 50 dBmV	CTB	max.		−67	dB
Cross modulation at 22 channels V_o = 50 dBmV	X_{mod}	max.		−59	dB
Noise figure f = 200 MHz	F	max.		5,5	dB
D.C. supply voltage	$+V_B$	=		24	V*
Total d.c. current consumption V_B = + 24 V	I_{tot}	typ.		215	mA
Operating mounting base temperature	T_{mb}	−20	to	+ 90	°C

MECHANICAL DATA

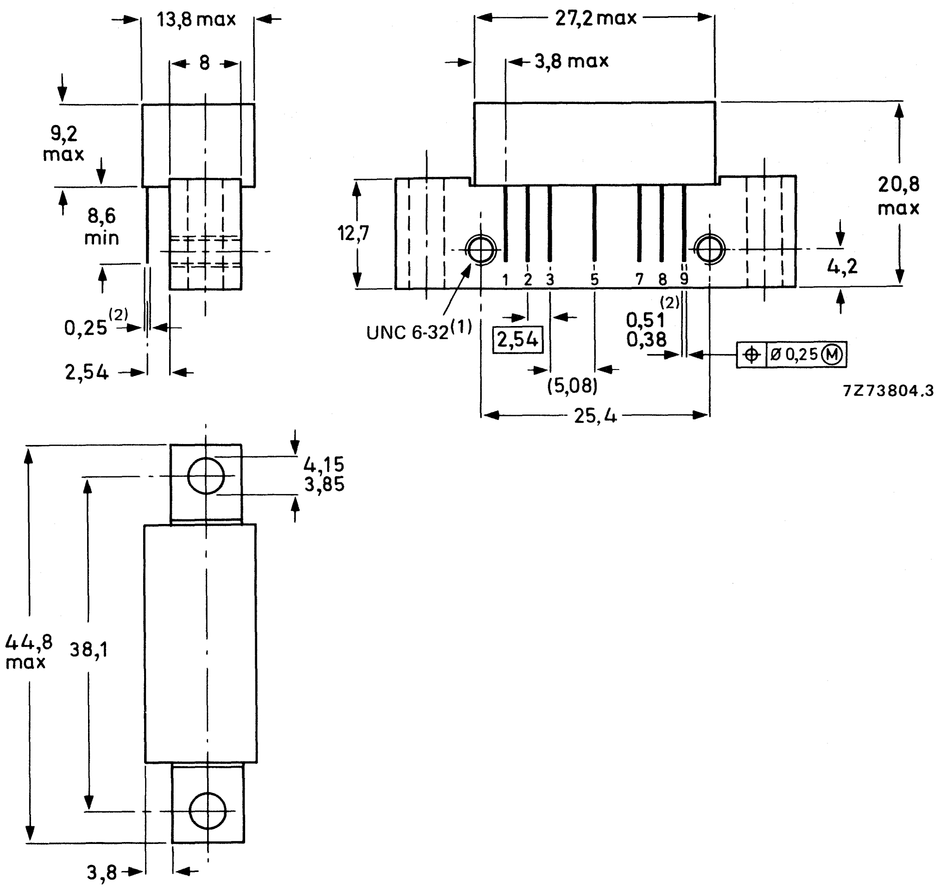
SOT-115 (see Fig. 1).

* The module normally operates at V_B = 24 V, but is able to withstand supply transients up to 30 V.

MECHANICAL DATA

Dimensions in mm

Fig. 1 SOT-115.



(1) Screw 6-32UNC-2A available upon request (see Accessories'').
(2) Leads available in gold-plated and tin-plated execution.

See 'Mounting and Soldering Recommendations'.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

R.F. input voltage	V_i	max.	63 dBmV
Storage temperature	T_{stg}	−40 to +100	°C
Operating mounting base temperature	T_{mb}	−20 to +90	°C

CHARACTERISTICS at T_{mb} = 30 °C unless otherwise specified

Supply voltage V_B = + 24 V

Power gain at f = 10 MHz	G_p	24,0 ± 0,5	dB
Slope cable equivalent f = 5 MHz to 200 MHz	SL	−0,2 to + 0,5	dB
Flatness of frequency response f = 5 MHz to 200 MHz	FL	max. ± 0,2	dB
Return losses at input and output $Z_S = Z_L$ = 75 Ω; f = 5 MHz to 200 MHz	$S_{11\text{-}22}$	min. 20	dB
Output voltage at d_{im} = −60 dB (DIN 45004B, par. 6,3: 3-tone) $V_p = V_o$; f_p = 35,25 MHz $V_q = V_o$ −6 dB; f_q = 42,25 MHz $V_r = V_o$ −6 dB; f_r = 44,25 MHz Measured at $f_{(p+q-r)}$ = 33,25 MHz	V_o	min. 67	dBmV
Output voltage at d_{im} = −60 dB (DIN 45004B, par. 6,3: 3-tone) $V_p = V_o$; f_p = 187,25 MHz $V_q = V_o$ −6 dB; f_q = 194,25 MHz $V_r = V_o$ −6 dB; f_r = 196,25 MHz Measured at $f_{(p+q-r)}$ = 185,25 MHz	V_o	min. 64	dBmV
2nd order distortion V_o = 50 dBmV; f_p = 83,25 MHz V_o = 50 dBmV; f_q = 109,25 MHz Measured at $f_{(p+q)}$ =192,5 MHz	d_2	max. −67	dB
Composite triple beat at 22 channels V_o = 50 dBmV; measured on channel 7	CTB	max. −67	dB
Cross modulation at 22 channels V_o = 50 dBmV; measured in channel 2	X_{mod}	max. −59	dB
Noise figure f = 200 MHz	F	max. 5,5	dB
Total d.c. current consumption	I_{tot}	typ. 215 max. 230	mA mA

CATV AMPLIFIER MODULES

Hybrid amplifier modules for use in CATV systems and operating at frequencies up to 450 MHz.

BGY80: 12.5 dB pre-amplifier
BGY81: 12.5 dB final-amplifier.

FEATURES

- Excellent linearity
- Extremely low noise
- Optimal reliability ensured by application of TiPtAu metallized crystals, silicon nitride glass barrier and a rugged construction.

QUICK REFERENCE DATA

			BGY80	BGY81	
Frequency range	f		40 to 450	40 to 450	MHz
Source and load impedance	$Z_S = Z_L$		75	75	Ω
Power gain at 50 MHz	G_p		12 to 13	12 to 13	dB
Slope cable equivalent f = 40 MHz to 450 MHz	SL		0.2 to 1.5	0.2 to 1.5	dB
Flatness of frequency response f = 40 MHz to 450 MHz	FL	max.	0.2	0.2	dB
Return losses at input and output	$S_{11\text{-}22}$		18	18	dB
Second order distortion at V_O = 46 dBmV	d_2		−72	−74	dB
Composite triple beat at V_O = 46 dBmV	CTB		−54	−58	dB
Cross-modulation distortion at V_O = 46 dBmV	X_{mod}		−59	−62	dB
Output voltage at d_{im} = −60 dB (DIN45004B, par. 6.3: 3-tone)	V_O		61.5	64	dBmV
Noise figure at 450 MHz	F		7.5	8.0	dB
DC supply voltage (note 1)	$+V_B$		24	24	V
Total DC current consumption	I_{tot}		200	240	mA
Operating case temperature range	T_{case}		−20 to +100	−20 to +100	°C

MECHANICAL DATA

SOT115 (see Fig. 1).

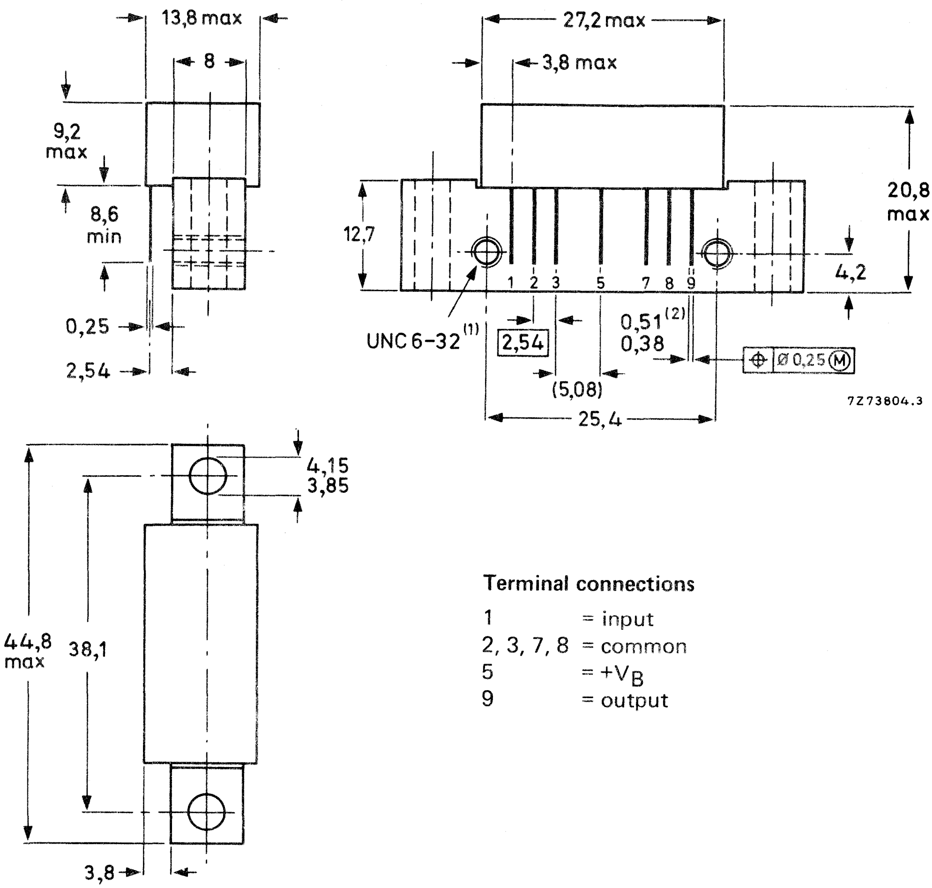
Note

1. The modules normally operate at V_B = +24 V DC, but are able to withstand supply transients up to 30 V.

MECHANICAL DATA

Dimensions in mm

Fig. 1 SOT115.



Terminal connections

1	= input
2, 3, 7, 8	= common
5	= $+V_B$
9	= output

(1) Screw 6-32 UNC-2A available upon request (see "Accessories").
(2) Leads gold plated.

See 'Mounting and soldering recommendations'.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134).

RF input voltage	V_i	max.	60	dBmV
Storage temperature range	T_{stg}		−40 to +100	°C
Operating case temperature range	T_{case}		−20 to +100	°C

CHARACTERISTICS

			BGY80	BGY81	
Power gain					
f = 50 MHz	G_p		12.0 to 13.0	12.0 to 13.0	dB
f = 450 MHz	G_p		12.5 to 14	12.5 to 14	dB
Slope cable equivalent					
f = 40 MHz to 450 MHz	SL		0.2 to 1.5	0.2 to 1.5	dB
Flatness of frequency response					
f = 40 MHz to 450 MHz	FL	max.	0.2	0.2	dB
Return losses at input and output					
$Z_S = Z_L = 75\ \Omega$;					
f = 40 MHz to 80 MHz	$S_{11\text{-}22}$	min.	20	20	dB
f = 80 MHz to 160 MHz		min.	19	19	dB
f = 160 MHz to 450 MHz		min.	18	18	dB
Second order distortion					
V_p = 46 dBmV; f_p = 55.25 MHz					
V_q = 46 dBmV; f_q = 391.25 MHz					
Measured at $f_p + f_q$ = 446.5 MHz	d_2		−72	−74	dB
Composite triple beat at 60 channels flat; V_O = 46 dBmV					
Measured in channel H22	CTB		−54	−58	dB
Cross-modulation distortion on 60 channels flat; V_O = 46 dBmV					
Measured at channel 2	X_{mod}		−59	−62	dB
Composite second order distortion on 60 channels flat; V_O = 46 dBmV					
Measured at channel H22 on 446.5 MHz	CSO		−58	−61	dB
Output voltage at d_{im} = −60					
$V_p = V_O$; f_p = 440.25 MHz;					
$V_q = V_O$ − 6 dB; f_q = 447.25 MHz;					
$V_r = V_O$ − 6 dB; f_r = 449.25 MHz;					
Measured at $f_p + f_q - f_r$ = 438.25 MHz	V_O		61.5	64	dBmV
Noise figure at f = 450 MHz	F		7.5	8.0	dB
Total DC current consumption	I_{tot}	typ.	180	220	mA

CATV AMPLIFIER MODULES

Hybrid amplifier modules for CATV systems operating at frequencies up to 450 MHz.

BGY84: 17,0 dB input amplifier module
BGY85: 17,0 dB output amplifier module

Features:

- excellent linearity;
- extremely low noise;
- optimal reliability ensured by TiPtAu metallized crystals, silicon nitride passivation and rugged construction.

QUICK REFERENCE DATA

			BGY84	BGY85	
Frequency range	f		40 to 450	40 to 450	MHz
Source impedance and load impedance	$Z_S = Z_L$		75	75	Ω
Power gain at f = 50 MHz	G_p		17,0 ± 0,5	17,0 ± 0,5	dB
Slope cable equivalent f = 40 MHz to 450 MHz	SL		0,5 to 1,5	0,5 to 1,5	dB
Return losses at input and output f = 40 MHz	$S_{11\text{-}22}$	min.	20	20	dB
f = 450 MHz	$S_{11\text{-}22}$	min.	18	18	dB
Output voltage at d_{im} = −60 dB (DIN 45004B, par. 6.3: 3-tone)	V_o	min.	60	62,5	dBmV
2nd order distortion V_o = 46 dBmV	d_2	max.	−70	−70	dB
Composite triple beat 60 channels V_o = 46 dBmV	CTB	max.	−55	−58	dB
Cross modulation distortion V_o = 46 dBmV; 60 channels	X_{mod}	max.	−57	−60	dB
Noise figure f = 40 MHz to 450 MHz	F	max.	6,5	7,0	dB
D.C. supply voltage	$+V_B$	=	24	24	V*
Total d.c. current consumption at V_B = + 24 V	I_{tot}	typ.	180	220	mA

MECHANICAL DATA

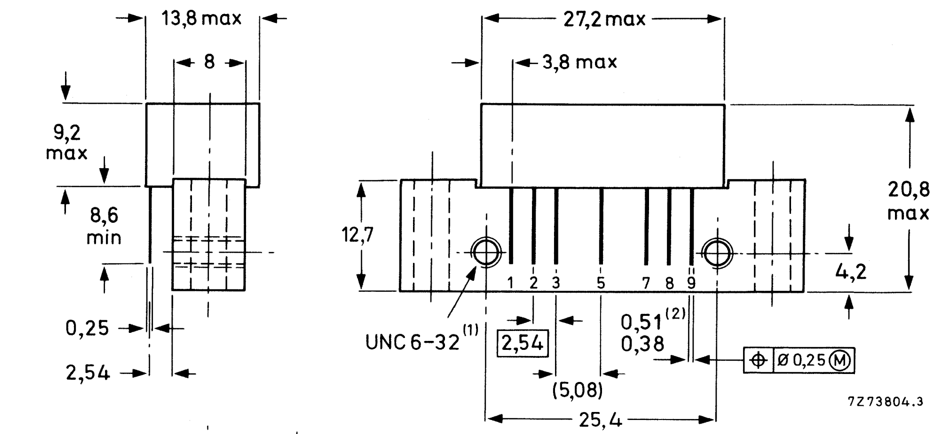
SOT-115 (see Fig. 1).

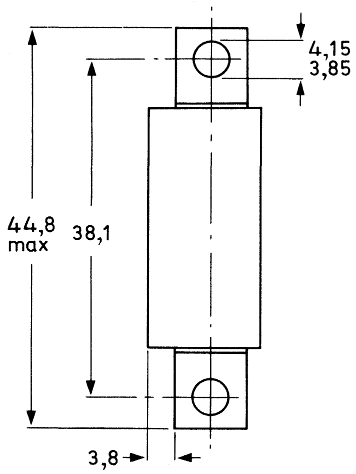
* The modules normally operate at V_B = 24 V, but are able to withstand supply transients up to 30 V.

MECHANICAL DATA

Dimensions in mm

Fig. 1 SOT-115.





Terminal connections

1	= input
2, 3, 7, 8	= common
5	= $+V_B$
9	= output

(1) Screw 6-32UNC-2A available on request (see "Accessories").

(2) Gold plated leads.

See "Mounting and Soldering Recommendations".

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

R.F. input voltage	V_i	max.	65 dBmV
Storage temperature	T_{stg}		−40 to + 100 °C
Operating mounting base temperature	T_{mb}		−20 to + 100 °C

CHARACTERISTICS

Supply voltage V_B = + 24 V; T_{mb} = 30 °C

			BGY84	BGY85	
Power gain f = 50 MHz f = 450 MHz	G_p		17,0 ± 0,5 17,3 to 18,8	17,0 ± 0,5 17,3 to 18,8	dB dB
Slope cable equivalent f = 40 MHz to 450 MHz	SL		+ 0,5 to + 1,5	+ 0,5 to 1,5	dB
Flatness of frequency response f = 40 MHz to 450 MHz	FL	max.	± 0,2	± 0,2	dB
Return losses at input and output $Z_S = Z_L$ = 75 Ω f = 40 to 80 MHz f = 80 to 160 MHz f = 160 to 450 MHz	$S_{11\text{-}22}$	min. min. min.	20 19 18	20 19 18	dB dB dB
Output voltage at d_{im} = −60 dB (DIN 45004B, 6.3: 3-tone) $V_p = V_o$; f_p = 440,25 MHz $V_q = V_o$ −6 dB; f_q = 447,25 MHz $V_r = V_o$ −6 dB; f_r = 449,25 MHz Measured at $f_{(p+q-r)}$ = 438,25 MHz	V_o	min.	60	62,5	dBmV
2nd order distortion V_o = 46 dBmV; channel 2 V_o = 46 dBmV; channel H5 Measured at channel H14	d_2	max.	−70	−70	dB
Composite triple beat 60 channels V_o = 46 dBmV; channel H22	CTB	max.	−55	−58	dB
Cross modulation distortion V_o = 46 mVdB; 60 channels Measured at channel 2	X_{mod}	max.	−57	−60	dB
Noise figure f = 40 MHz to 450 MHz	F	max.	6,5	7,0	dB
Total d.c. current consumption	I_{tot}	typ. max.	180 200	220 240	mA mA

CATV AMPLIFIER MODULES

Hybrid amplifier modules for CATV systems operating at frequencies up to 450 MHz.

BGY84A: 18,5 dB input amplifier module
BGY85A: 18,5 dB output amplifier module

Features:

- excellent linearity;
- extremely low noise;
- optimal reliability ensured by TiPtAu metallized crystals, silicon nitride passivation and rugged construction.

QUICK REFERENCE DATA

			BGY84A	BGY85A	
Frequency range	f		40 to 450	40 to 450	MHz
Source impedance and load impedance	$Z_S = Z_L$		75	75	Ω
Power gain at f = 50 MHz	G_p		18,4 ± 0,4	18,4 ± 0,4	dB
Slope cable equivalent f = 40 MHz to 450 MHz	SL		0,3 to 1,5	0,3 to 1,5	dB
Flatness of frequency response f = 40 MHz to 450 MHz	FL	max.	± 0,2	± 0,2	dB
Return losses at input and output f = 40 MHz	$S_{11\text{-}22}$	min.	20	20	dB
f = 450 MHz	$S_{11\text{-}22}$	min.	18	18	dB
Output voltage at d_{im} = –60 dB (DIN 45004B, par. 6.3: 3-tone)	V_o	min.	60	62,5	dBmV
2nd order distortion V_o = 46 dBmV	d_2	max.	–72	–72	dB
Composite triple beat 60 channels V_o = 46 dBmV	CTB	max.	–55	–59	dB
Cross modulation distortion V_o = 46 dBmV; 60 channels	X_{mod}	max.	–58	–61	dB
Noise figure f = 40 MHz to 450 MHz	F	max.	6,5	7,0	dB
D.C. supply voltage	$+V_B$	=	24	24	V*
Total d.c. current consumption at V_B = + 24 V	I_{tot}	typ.	180	220	mA

MECHANICAL DATA

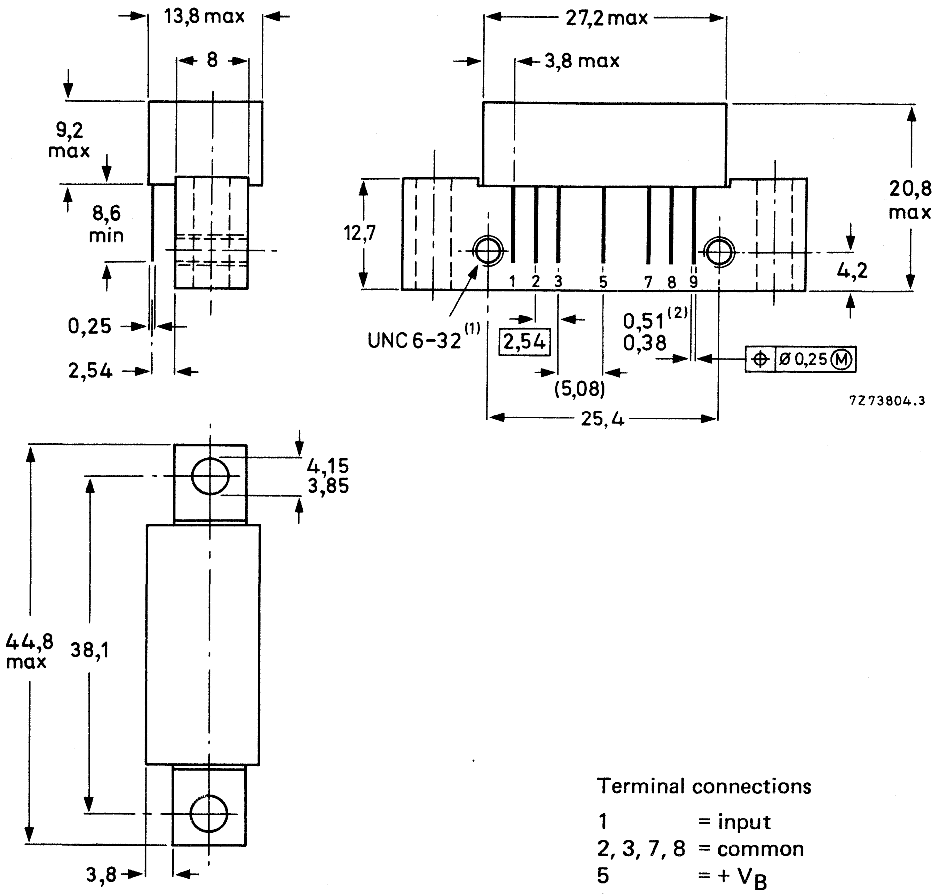
SOT-115 (see Fig. 1).

* The modules normally operate at V_B = 24 V, but are able to withstand supply transients up to 30 V.

MECHANICAL DATA

Dimensions in mm

Fig. 1 SOT-115.



Terminal connections

1	= input
2, 3, 7, 8	= common
5	= + V_B
9	= output

(1) Screw 6-32UNC-2A available on request (see "Accessories").
(2) Leads gold-plated.

See "Mounting and Soldering Recommendations".

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

R.F. input voltage	V_i	max.	65 dBmV
Storage temperature	T_{stg}	−40 to + 100	^oC
Operating mounting base temperature	T_{mb}	−20 to + 100	^oC

CHARACTERISTICS

Supply voltage V_B = + 24 V; T_{mb} = 30 ^oC

			BGY84A	BGY85A
Power gain at f = 50 MHz	G_p		18,4 ± 0,4	18,4 ± 0,4 dB
Power gain at f = 450 MHz	G_p		18,7 to 20,2	18,7 to 20,2 dB
Slope cable equivalent f = 40 MHz to 450 MHz	SL		+ 0,3 to 1,5	+ 0,3 to 1,5 dB
Flatness of frequency response f = 40 MHz to 450 MHz	FL	max.	± 0,2	± 0,2 dB
Return losses at input and output $Z_S = Z_L$ = 75 Ω f = 40 to 80 MHz	$S_{11\text{-}22}$	min.	20	20 dB
f = 80 to 160 MHz	$S_{11\text{-}22}$	min.	19	19 dB
f = 160 to 450 MHz	$S_{11\text{-}22}$	min.	18	18 dB
Output voltage at d_{im} = −60 dB (DIN 45004B, 6.3: 3-tone) $V_p = V_o$; f_p = 440,25 MHz $V_q = V_o$ −6 dB; f_q = 447,25 MHz $V_r = V_o$ −6 dB; f_r = 449,25 MHz Measured at $f_{(p+q-r)}$ = 438,25 MHz	V_o	min.	60	62,5 dBmV
2nd order distortion V_o = 46 dBmV; channel 2 V_o = 46 dBmV; channel H5 Measured at channel H14	d_2	max.	−72	−72 dB
Composite triple beat 60 channels V_o = 46 dBmV; measured channel H22	CTB	max.	−55	−59 dB
Cross modulation distortion V_o = 46 dBmV; 60 channels Measured at channel 2	X_{mod}	max.	−58	−61 dB
Noise figure f = 40 MHz to 450 MHz	F	max.	6,5	7,0 dB
Total d.c. current consumption	I_{tot}	typ.	180	220 mA
		max.	200	240 mA

CATV AMPLIFIER MODULES

High slope pre-emphasis hybrid amplifier for use in CATV systems.

BGY84H: 20.5 dB trunk amplifier.
BGY85H: 20.5 dB trunk amplifier with improved performance.

FEATURES

- Excellent linearity
- High slope of 5.1 dB so that total cable slope can be equalised by the slope of the module.
- Optimal reliability ensured by application of TiPtAu metallized crystals, silicon nitride glass barrier and a rugged construction.

QUICK REFERENCE DATA

			BGY84H	BGY85H	
Frequency range	f		50 to 450	50 to 450	MHz
Source and load impedance	$Z_S = Z_L$		75	75	Ω
Power gain					
f = 50 MHz (note 1)	G_p		14.6 to 16.2	14.6 to 16.2	dB
f = 450 MHz			20.0 to 21.0	20.0 to 21.0	dB
Delta gain	Δ_{gain}		4.7 to 5.5	4.7 to 5.5	dB
Flatness of frequency response					
f = 40 MHz to 450 MHz	FL	max.	0.2	0.2	dB
Return losses at input and output	$S_{11\text{-}22}$	min.	18	18	dB
Intermodulation distortion	d_{im}		−60	−60	dB
Second order distortion	d_2	max.	−72	−72	dB
Composite triple beat	CTB		−63	−65	dB
Cross-modulation distortion	x_{mod}		−63	−65	dB
Noise figure	F	max.	7.0	7.0	dB
DC supply voltage (note 2)	$+V_B$		24	24	V
Total DC current consumption	I_{tot}		220	220	mA
Operating case temperature	T_{case}	max.	100	100	^oC

MECHANICAL DATA

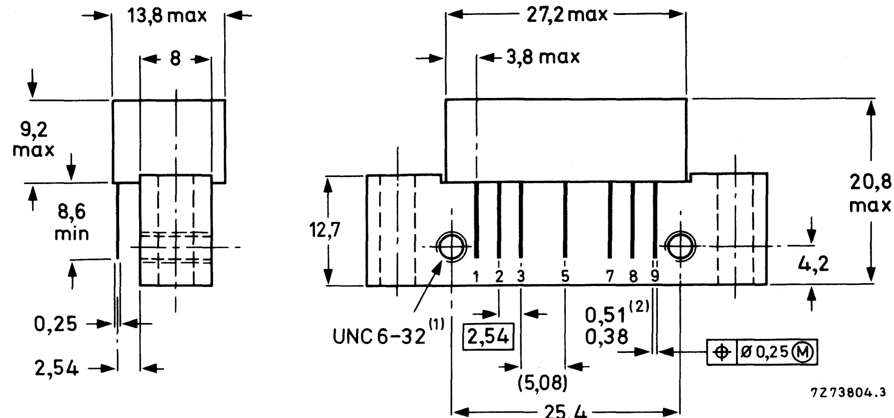
SOT115 (see Fig. 1).

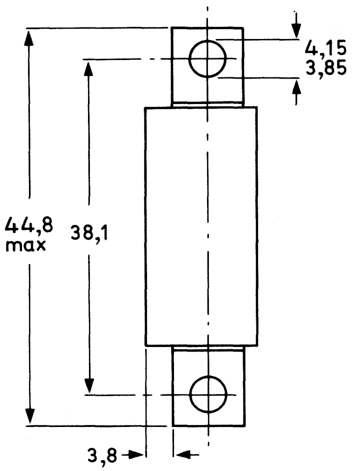
Note

1. Gain at 50 MHz with respect to the limits of gain at 450 MHz and delta gain.
2. The module normally operate at V_B = +24 V DC, but are able to withstand supply transients up to 30 V.

MECHANICAL DATA Dimensions in mm

Fig. 1 SOT115.





Terminal connections

1	= input
2, 3, 7, 8	= common
5	= $+V_B$
9	= output

(1) Screw 6-32 UNC-2A available upon request (see 'Accessoreis').

(2) Leads gold-plated.

See 'Mounting and soldering recommendations'.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134).

RF input voltage	V_i	max.	65	dBmV
Storage temperature range	T_{stg}		−40 to +100	°C
Operating case temperature range	T_{case}		−20 to +100	°C

CHARACTERISTICS

Supply voltage V_B = +24 V DC; T_{case} = 30 °C; $Z_S = Z_L$ = 75 Ω.

			BGY84H	BGY85H	
Power gain					
f = 50 MHz	G_p		14.6 to 16.2	14.6 to 16.2	dB
f = 450 MHz			20.0 to 21.0	20.0 to 21.0	dB
Delta gain					
f = 50 MHz to 450 MHz (note 1)	Δ_{gain}		4.7 to 5.5	4.7 to 5.5	dB
Flatness of frequency response					
f = 40 MHz to 450 MHz	FL	max.	0.2	0.2	dB
Return losses at input and output					
$Z_S = Z_L$ = 75 Ω;					
f = 40 MHz to 80 MHz	$S_{11\text{-}22}$	min.	20	20	dB
f = 80 MHz to 160 MHz		min.	19	19	dB
f = 160 MHz to 450 MHz		min.	18	18	dB
Output voltage at d_{im} = −60 dB (DIN 45004B, 6.3: 3-tone) $V_p = V_O$; f_p = 287.25 MHz; $V_q = V_O$ − 6 dB; f_q = 294.25 MHz; $V_r = V_O$ − 6 dB; f_r = 296.25 MHz; Measured at $f_p + f_q - f_r$ = 285.25 MHz	V_O		64.0	65.0	dBmV
Output voltage at d_{im} = −60 dB (DIN 45004B, 6.3: 3-tone) $V_p = V_O$; f_p = 387.25 MHz; $V_q = V_O$ − 6 dB; f_q = 394.25 MHz; $V_r = V_O$ − 6 dB; f_r = 396.25 MHz; Measured at $f_p + f_q - f_r$ = 385.25 MHz	V_O		63.0	64.0	dBmV

Note

1. Flatness calculation is based upon the following formula which describes the 'ideal' gain versus frequency curve:

$$G_f = G_{50} + \Delta G\,(a \cdot (f\text{-}50) + b \cdot (f\text{-}50)^2 + c \cdot (f\text{-}50)^3)$$

in which: G_{50} = measured gain at 50 MHz;
ΔG = measured difference in gain between 450 and 50 MHz;
a = 3.132×10^{-3}
b = 1.993×10^{-6}
c = -8.934×10^{-9}.

CHARACTERISTICS (continued)

			BGY84H	BGY85H	
Output voltage at d_{im} = −60 dB (DIN 45005B, 6.3: 3-tone) $V_p = V_O$; f_p = 440.25 MHz; $V_q = V_O - 6$ dB; f_q = 447.25 MHz; $V_r = V_O - 6$ dB; f_r = 449.25 MHz; Measured at $f_p + f_q - f_r$ = 438.25 MHz	V_O		60	59	dBmV
Second order distortion V_p = 46 dBmV; f_p = 55.25 MHz V_q = 46 dBmV; f_q = 343.25 MHz Measured at $f_p + f_q$ = 398.5 MHz	d_2		−70	−70	dB
Composite triple beat on 36 channels flat V_O = 46 dBmV Measured in channel H20	CTB		−63	−65	dB
Measured in channel H22			−57	−59	dB
Cross-modulation distortion V_O = 46 dBmV; on 36 channels flat measured in channel 2	X_{mod}		−63	−65	dB
On 60 channels measured in channel 2	X_{mod}		−59	−61	dB
Noise figure at f = 450 MHz	F		7.0	7.0	dB
Total DC current consumption V_B = +24 V DC	I_{tot}	typ.	220	220	mA
		max.	240	240	mA

CATV AMPLIFIER MODULES

Hybrid amplifier modules for use in CATV systems and operating at frequencies up to 450 MHz.

BGY86: 22 dB preamplifier
BGY87: 22 dB final amplifier

Features

- excellent linearity
- extremely low noise
- optimal reliability ensured by TiPtAu metallized crystals, silicon nitride glass barrier and rugged construction

QUICK REFERENCE DATA

			BGY86	BGY87	
Frequency range	f		40 to 450	40 to 450	MHz
Source impedance and load impedance	$Z_S = Z_L$	=	75	75	Ω
Power gain at f = 50 MHz	G_p		22,0 ± 0,5	22,0 ± 0,5	dB
Slope cable equivalent f = 40 MHz to 450 MHz	SL		0,2 to 1,5	0,2 to 1,5	dB
Flatness of frequency response f = 40 MHz to 450 MHz	FL	max.	± 0,2	± 0,2	dB
Return losses at input and output f = 40 MHz to 450 MHz	$S_{11\text{-}22}$	min.	18	18	dB
Output voltage at d_{im} = −60 dB (DIN 45004B, par. 6.3: 3-tone)	V_o	min.	61,5	64	dBmV
2nd-order distortion V_o = 46 dBmV	d_2	max.	−68	−72	dB
Composite triple beat V_o = 46 dBmV	CTB	max.	−54	−58	dB ←
Cross modulation V_o = 46 dBmV	X_{mod}	max.	−53	−55	dB ←
Noise figure f = 450 MHz	F	max.	6,0	6,5	dB
D.C. supply voltage*	$+V_B$	=	24	24	V*
Total d.c. current consumption at V_B = + 24 V	I_{tot}	max.	200	240	mA
Operating case temperature	T_c		−20 to + 100		°C

MECHANICAL DATA

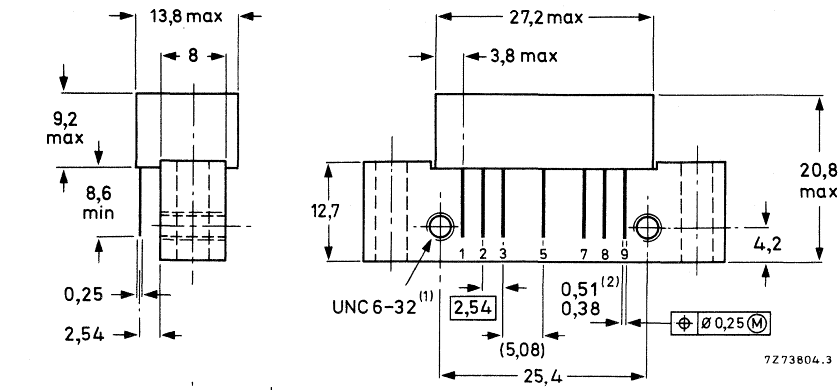
SOT-115 (see Fig. 1).

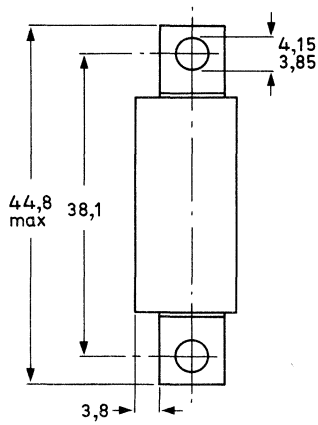
* The modules normally operate at V_B = 24 V, but are able to withstand supply transients up to 30 V.

MECHANICAL DATA

Dimensions in mm

Fig. 1 SOT-115.





⊕ Positional accuracy.

Ⓜ Maximum Material Condition.

Terminal connections

1	= input
2, 3, 7, 8	= common
5	= + V_B
9	= output

(1) Screw 6-32UNC-2A available upon request (see "Accessories").
(2) Gold-plated leads.

See "Mounting and Soldering Recommendations".

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

R.F. input voltage	V_i	max.	60 dBmV
Storage temperature	T_{stg}	−40 to + 100	°C
Operating case temperature	T_c	−20 to + 100	°C

CHARACTERISTICS

Supply voltage V_B = + 24 V; $Z_S = Z_L$ = 75 Ω; T_c = 30 °C

			BGY86	BGY87	
Power gain at f = 50 MHz	G_p		22,0 ± 0,5	22,0 ± 0,5	dB
Power gain at f = 450 MHz	G_p		22,0 to 23,5	22,0 to 23,5	dB
Slope cable equivalent f = 40 MHz to 450 MHz	SL		0,2 to 1,5	0,2 to 1,5	dB
Flatness of frequency response f = 40 MHz to 450 MHz	FL	max.	± 0,2	± 0,2	dB
Return losses at input and output $Z_S = Z_L$ = 75 Ω f = 40 MHz to 80 MHz	$S_{11\text{-}22}$	min.	20	20	dB
f = 80 MHz to 160 MHz	$S_{11\text{-}22}$	min.	19	19	dB
f = 160 MHz to 450 MHz	$S_{11\text{-}22}$	min.	18	18	dB
Output voltage at d_{im} = −60 dB (DIN 45004B, 6.3: 3-tone) $V_p = V_o$; f_p = 440,25 MHz $V_q = V_o$ −6 dB; f_q = 447,25 MHz $V_r = V_o$ −6 dB; f_r = 449,25 MHz Measured at $f_{(p+q-r)}$ = 438,25 MHz	V_o	min.	61,5	64,0	dBmV
2nd-order distortion V_o = 46 dBmV; f_p = 55,25 MHz (ch. 2) V_o = 46 dBmV; f_q = 391,25 MHz (ch. H13) Tested at $f_{(p+q)}$ = 446,5 MHz (ch. H22)	d_2	max.	−68	−72	dB
Composite triple beat at 60 channels V_o = 46 dBmV; tested at channel H22	CTB	max.	−54	−58	dB ←
Cross modulation at 60 channels V_o = 46 dBmV; tested in channel 2	X_{mod}	max.	−53	−55	dB ←
Noise figure f = 450 MHz	F	max.	6,0	6,5	dB
Total d.c. current consumption	I_{tot}	typ.	180	220	mA
		max.	200	240	mA

CATV AMPLIFIER MODULE

Hybrid amplifier module for use as 34,5 dB line extender in CATV systems and operating at frequencies up to 450 MHz.

Features

- excellent linearity
- extremely low noise
- optimum reliability ensured by TiPtAu metallized crystals, silicon nitride glass barrier and rugged construction.

QUICK REFERENCE DATA

Frequency range	f		40 to 450	MHz
Source impedance and load impedance	$Z_S = Z_L$		75	Ω
Power gain f = 50 MHz f = 450 MHz	G_P		34,5 ± 1,0 35 to 37	dB dB
Slope cable equivalent f = 40 MHz to 450 MHz	SL		0,5 to 2,5	dB
Flatness of frequency response f = 40 MHz to 450 MHz	FL	max.	±0,3	dB
Return losses at input and output f = 40 MHz to 450 MHz	$S_{11\text{-}22}$	min.	18	dB
Intermodulation distortion at V_o = 62 dBmV (DIN 45004, par. 6.3: 3-tone)	d_{im}	max.	−60	dB
2nd-order distortion V_o = 46 dBmV	d_2	max.	−70	dB
Composite triple beat; 60 channels V_o = 46 dBmV	CTB	max.	−58	dB
Cross modulation distortion V_o = 46 dBmV; 60 channels	X_{mod}	max.	−59	dB
Noise figure f = 450 MHz	F	max.	6	dB
D.C. supply voltage	$+V_B$	=	24	V*
Total d.c. current consumption V_B = +24 V	I_{tot}	typ.	320	mA
Operating mounting base temperature	T_{mb}		−20 to 100	°C

MECHANICAL DATA

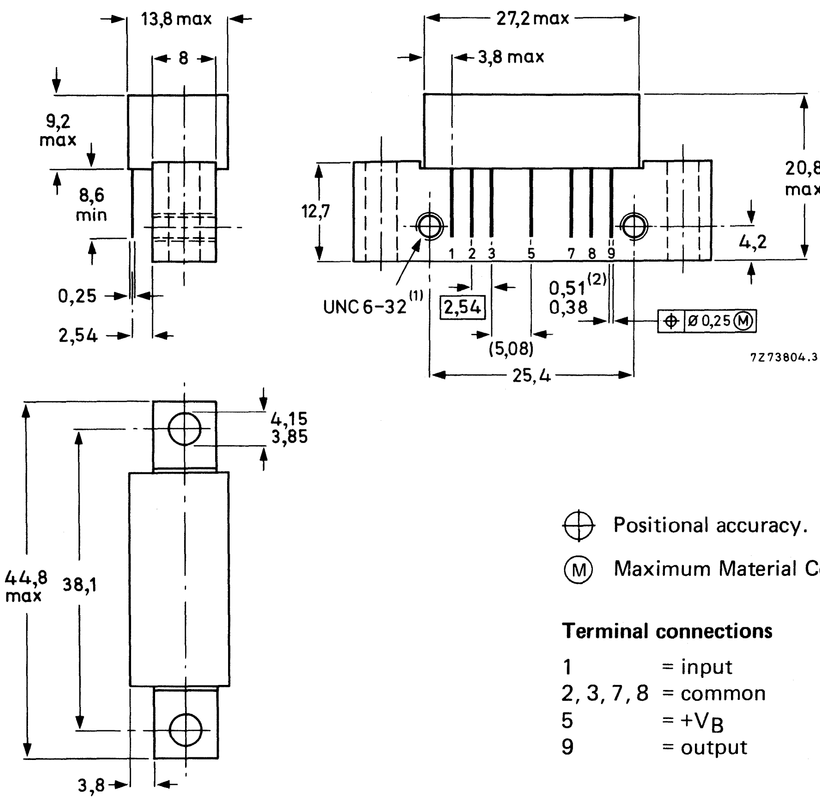
SOT-115 (see Fig. 1).

* The module normally operates at V_B = 24 V, but is able to withstand incidental supply transients up to 30 V.

MECHANICAL DATA

Dimensions in mm

Fig. 1 SOT-115.



⊕ Positional accuracy.

Ⓜ Maximum Material Condition.

Terminal connections

1	= input
2, 3, 7, 8	= common
5	= $+V_B$
9	= output

(1) Screw 6-32UNC-2A available upon request.
(2) Goldplated leads.

See "Mounting and Soldering Recommendations"

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

R.F. input voltage	V_i	max.	55 dBmV
Storage temperature	T_{stg}		−40 to +100 °C
Operating mounting base temperature	T_{mb}		−20 to +100 °C

CHARACTERISTICS

Supply voltage V_B = +24 V; $Z_S = Z_L$ = 75 Ω; T_{mb} = 35 °C

Power gain f = 50 MHz f = 450 MHz	G_P		34,5 ± 1,0 dB 35,0 to 37,0 dB
Slope cable equivalent f = 40 MHz to 450 MHz	SL		0,5 to 2,5 dB
Flatness of frequency response f = 40 MHz to 450 MHz	FL	max.	±0,3 dB
Return losses at input and output $Z_S = Z_L$ = 75 Ω; f = 40 MHz to 80 MHz f = 80 MHz to 160 MHz f = 160 MHz to 450 MHz	$S_{11\text{-}22}$	 min. min. min.	 20 dB 19 dB 18 dB
Intermodulation distortion (DIN 45004B, par. 6.3: 3-tone) $V_p = V_o$ = 62 dBmV f_p = 440,25 MHz $V_q = V_o$ −6 dB; f_q = 447,25 MHz $V_r = V_o$ −6 dB; f_r = 449,25 MHz measured at $f_{(p+q-r)}$ = 438,25 MHz	d_{im}	max.	−60 dB
2nd-order distortion V_p = 46 dBmV; f_p = 55,25 MHz V_q = 46 dBmV; f_q = 343,25 MHz tested at $f_{(p+q)}$ = 398,50 in channel H14	d_2	max.	−70 dB
Composite triple beat 60 channels flat V_o = 46 dBmV; tested in channel H22	CTB	max.	−58 dB
Cross modulation distortion 60 channels flat V_o = 46 dBmV; tested in channel 2	X_{mod}	max.	−59 dB
Noise figure f = 450 MHz	F	max.	6 dB
Total d.c. current consumption	I_{tot}	typ. max.	320 mA 340 mA

CATV AMPLIFIER MODULES

Hybrid amplifier module for use as a 38 dB line extender in CATV systems and operating at frequencies up to 450 MHz.

FEATURES

- Excellent linearity
- Extremely low noise
- Optimal reliability ensured by application of TiPtAu metallized crystals, silicon nitride glass barrier and a rugged construction.

QUICK REFERENCE DATA

Frequency range	f		40 to 450	MHz
Source and load impedance	$Z_S = Z_L$		75	Ω
Power gain at f = 50 MHz	G_p		37 to 39	dB
Slope cable equivalent f = 40 MHz to 450 MHz	SL		0 to 2.5	dB
Flatness of frequency response f = 40 MHz to 450 MHz	FL	max.	0.4	dB
Return losses at input and output f = 40 MHz to 450 MHz	$S_{11\text{-}22}$	min.	18	dB
Output voltage at d_{im} = −60 dB (DIN 45004B, par. 6.3: 3-tone)	V_O	min.	63	dBmV
Second order distortion V_O = 46 dBmV	d_2	max.	−70	dB
Composite triple beat V_O = 46 dBmV; 60 channels	CTB	max.	−58	dB
Cross modulation distortion V_O = 46 dBmV; 60 channels	X_{mod}	max.	−58	dB
Noise figure at f = 450 MHz	F	max.	5.5	dB
DC supply voltage (note 1)	$+V_B$		24	V
Total DC current consumption	I_{tot}	typ.	320	mA
Operating case temperature range	T_{case}		−20 to 100	°C

MECHANICAL DATA

SOT115 (see Fig. 1).

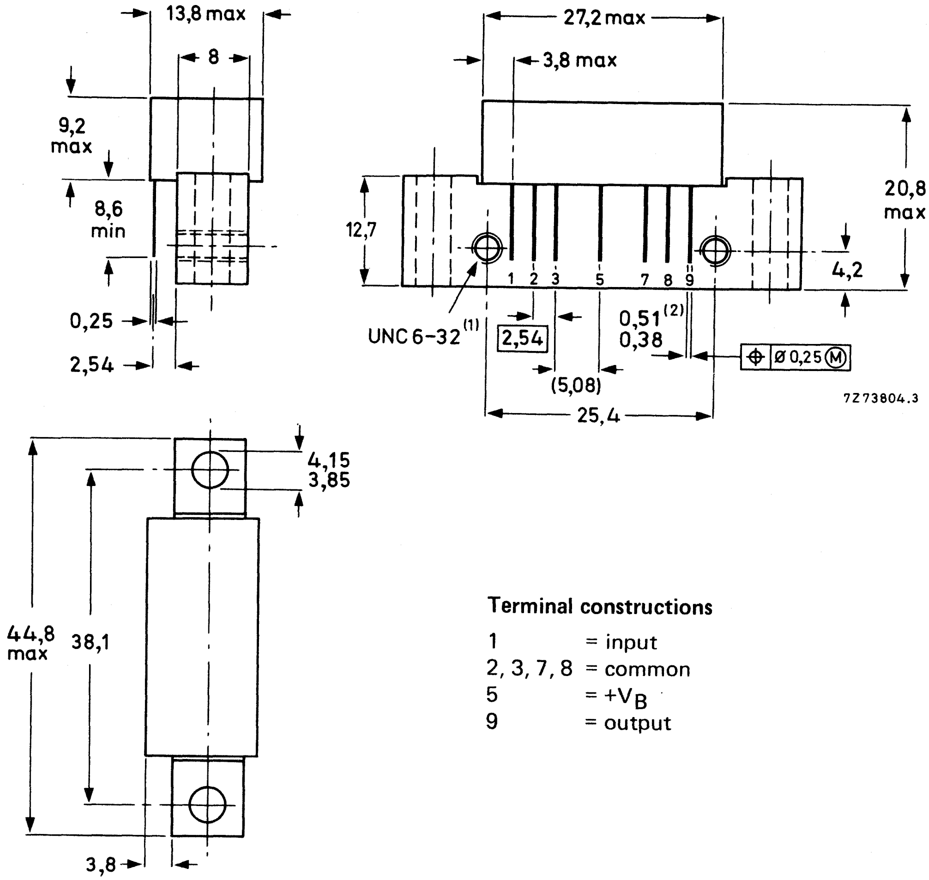
Note

1. The module normally operates at V_B = 24 V, but is able to withstand incidental supply transients up to 30 V.

MECHANICAL DATA

Dimensions in mm

Fig. 1 SOT115.



Terminal constructions

1	= input
2, 3, 7, 8	= common
5	= $+V_B$
9	= output

(1) Screw 6-32 UNC-2A available upon request (see 'Accessories').
(2) Leads gold-plated.

See 'Mounting and soldering recommendations'.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134).

RF input voltage	V_i	max.	55 dBmV
Storage temperature range	T_{stg}		−40 to +100 °C
Operating case temperature range	T_{case}		−20 to +100 °C

CHARACTERISTICS

Supply voltage V_B = +24 V; Z_S = Z_L = 75 Ω; T_{case} = 35 °C.

Power gain at f = 50 MHz	G_p		37 to 39 dB
Slope cable equivalent f = 40 MHz to 450 MHz	SL		0 tp 2.5 dB
Flatness of frequency response f = 40 MHz to 450 MHz	FL	max.	0.4 dB
Return losses at input and output Z_S = Z_L = 75 Ω; f = 40 MHz to 80 MHz	$S_{11\text{-}22}$	min.	20 dB
f = 80 MHz to 160 MHz		min.	19 dB
f = 160 MHz to 450 MHz		min.	18 dB
Intermodulation distortion (DIN 45004B, par. 6.3; 3-tone) V_p = V_O = 63 dBmV; f_p = 440.25 MHz V_q = V_O −6 dB; f_q = 447.25 MHz V_r = V_O − 6 dB; f_r = 449.25 MHz Measured at $f_{(p+q-r)}$ = 438.25 MHz	d_{im}	max.	−60 dB
Second order distortion V_p = 46 dBmV; f_p = 55.25 MHz V_q = 46 dBmV; f_q = 343.25 MHz tested at $f_{(p+q)}$ = 398.50 in channel H14	d_2	max.	70 dB
Composite triple beat 60 channels flat V_O = 46 dBmV; tested in channel H22	CTB	max.	58 dB
Cross-modulation distortion on 60 channels flat V_O = 46 dBmV; tested in channel 2	X_{mod}	max.	−58 dB
Noise figure at f = 450 MHz	F	max.	5.5 dB
Total DC current consumption	I_{tot}	typ.	320 mA
		max.	340 mA

CATV AMPLIFIER MODULES

Hybrid amplifier modules for use in CATV systems and operating at frequencies up to 550 MHz.

BGY580: 12.5 dB pre-amplifier
BGY585: 12.5 dB final-amplifier

FEATURES

- Excellent linearity
- Extremely low noise
- Optimal reliability ensured by application of TiPtAu metallized crystals, silicon nitride glass barrier and a rugged construction.

QUICK REFERENCE DATA

			BGY580	BGY581	
Frequency range	f		40 to 550	40 to 550	MHz
Source and load impedance	$Z_S = Z_L$		75	75	Ω
Power gain at f = 50 MHz	G_p		12 to 13	12 to 13	dB
Slope cable equivalent f = 40 MHz to 550 MHz	SL		0.5 to 2.0	0.5 to 2.0	dB
Flatness of frequency response f = 40 MHz to 550 MHz	FL	max.	0.2	0.2	dB
Return losses at input and output	$S_{11\text{-}22}$		18	18	dB
Second order distortion V_O = 44 dBmV	d_2		–70	–72	dB
Output voltage at d_{im} = –60 dB (DIN 45004B; 6.3: 3-tone)	V_O		59	61.5	dBmV
Composite triple beat V_O = 44 dBmV	CTB		–52	–56	dB
Cross-modulation distortion V_O = 44 dBmV	x_{mod}		–59	–62	dB
Noise figure at 550 MHz	F		8.5	9.0	dB
DC supply voltage (note 1)	$+V_B$		24	24	V
Total DC current	I_{tot}		200	240	mA
Operating case temperature range	T_{case}		–20 to +100	–20 to +100	°C

MECHANICAL DATA

SOT115 (see Fig. 1).

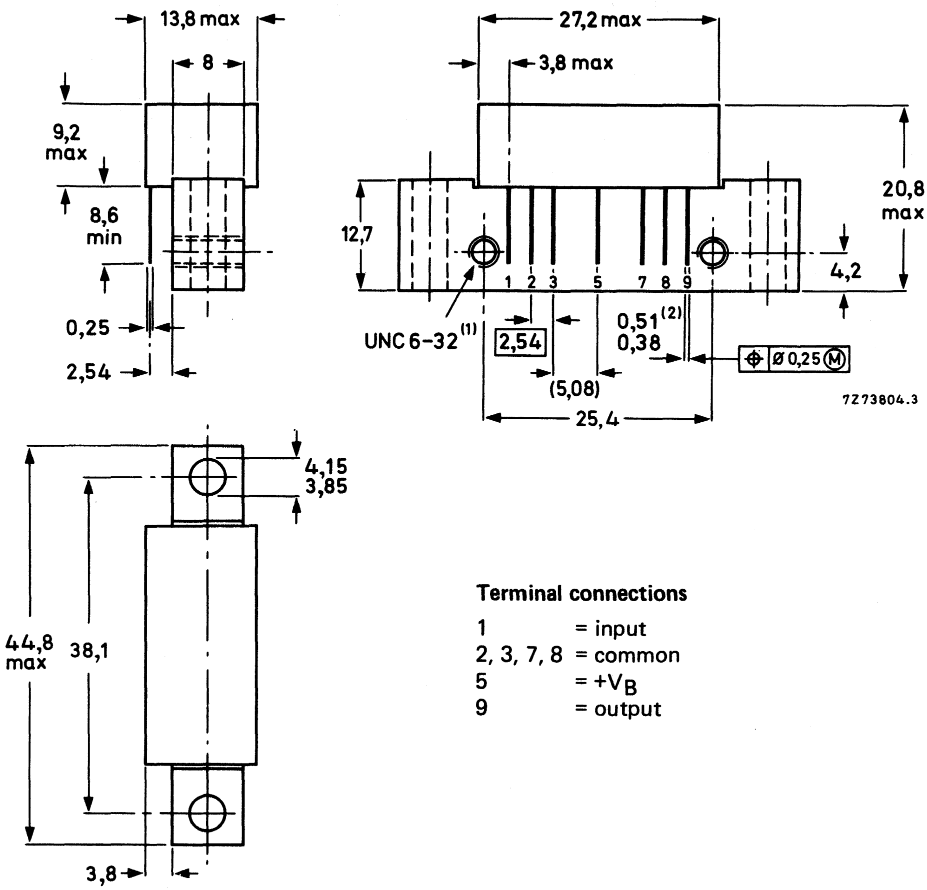
Note

1. The modules normally operate at V_B = +24 V DC, but are able to withstand supply transients up to 30 V.

MECHANICAL DATA

Dimensions in mm

Fig. 1 SOT115.



Terminal connections

1	= input
2, 3, 7, 8	= common
5	= $+V_B$
9	= output

(1) Screw 6-32 UNC-2A available upon request (see 'Accessories').
(2) Leads gold-plated.

See 'Mounting and soldering recommendations'.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC).

RF input voltage	V_i	max.	60	dBmV
Storage temperature range	T_{stg}		−40 to +100	°C
Operating case temperature range	T_{case}		−20 to +100	°C

CHARACTERISTICS

V_B = +24 V DC; T_{case} = 30 °C.

			BGY580	BGY581	
Power gain					
f = 50 MHz	G_p		12.0 to 13.0	12.0 to 13.0	dB
f = 550 MHz	G_p		12.5 to 14.5	12.5 to 14.5	dB
Slope cable equivalent					
f = 40 MHz to 550 MHz	SL		0.5 to 2.0	0.5 to 2.0	dB
Flatness of frequency response					
f = 40 MHz to 450 MHz	FL	max.	0.2	0.2	dB
Return losses at input and output					
$Z_S = Z_L = 75\ \Omega$;					
f = 40 MHz to 80 MHz	$S_{11\text{-}22}$	min.	20	20	dB
f = 80 MHz to 160 MHz		min.	19	19	dB
f = 160 MHz to 550 MHz		min.	18	18	dB
Second order distortion					
V_p = 44 dBmV; f_p = 55.25 MHz;					
V_q = 44 dBmV; f_q = 493.25 MHz;					
Measured on $f_p + f_q$ = 548.5 MHz	d_2		−70	−72	dB
Composite triple beat on 77 channels flat					
V_O = 44 dBmV					
Measured in channel 27	CTB		−52	−56	dB
Cross-modulation distortion on 77 channels flat; V_O = 44 dBmV					
Measured in channel 2	X_{mod}		−59	−62	dB
Composite second order distortion on 77 channels flat; V_O = 44 dBmV					
Measured in channel 27 on 548.5 MHz	CSO		−56	−59	dB
Output voltage at d_{im} = −60 dB					
(DIN 4500B, 6.3: 3-tone)					
$V_p = V_O$; f_p = 540.25 MHz;					
$V_q = V_p - 6$ dB; f_q = 547.25 MHz;					
$V_r = V_p - 6$ dB; f_r = 549.25 MHz;					
Measured at					
$f_p + f_q - f_r$ = 538.25 MHz	V_O		59	61.5	dBmV
Noise figure at f = 550 MHz	F		8.5	9.0	dB
Total DC current consumption					
V_B = +24 V DC	I_{tot}	typ.	180	220	mA
		max.	220	240	mA

CATV AMPLIFIER MODULES

Hybrid amplifier modules for use in CATV systems and operating at frequencies up to 550 MHz.

BGY584: 17.0 dB pre-amplifier
BGY585: 17.0 final-amplifier.

FEATURES

- Excellent linearity
- Extremely low noise
- Optimal reliability ensured by application of TiPtAu metallized crystals, silicon nitride glass barrier and a rugged construction.

QUICK REFERENCE DATA

			BGY584	BGY585	
Frequency range	f		40 to 550	40 to 550	MHz
Source and load impedance	$Z_S = Z_L$		75	75	Ω
Power gain at f = 50 MHz	G_p		16.5 to 17.5	16.5 to 17.5	dB
Slope cable equivalent f = 40 MHz to 550 MHz	SL		0.5 to 2.0	0.5 to 2.0	dB
Flatness of frequency response f = 40 MHz to 550 MHz	FL	max.	0.2	0.2	dB
Return losses at input and output	$S_{11\text{-}22}$		20	20	dB
Second order distortion	d_2		−68	−70	dB
Output voltage at d_{im} = −60 dB	V_O		58.5	61	dBmV
Composite triple beat	CTB		−56	−59	dB
Cross-modulation distortion	X_{mod}		−59	−62	dB
Composite second order	CSO		−56	−59	dB
Noise figure at 550 MHz	F		7.0	8.0	dB
DC supply voltage (note 1)	$+V_B$		24	24	V
Total DC current	I_{tot}		200	240	mA
Operating case temperature range	T_{case}		−20 to +100	−20 to +100	°C

MECHANICAL DATA

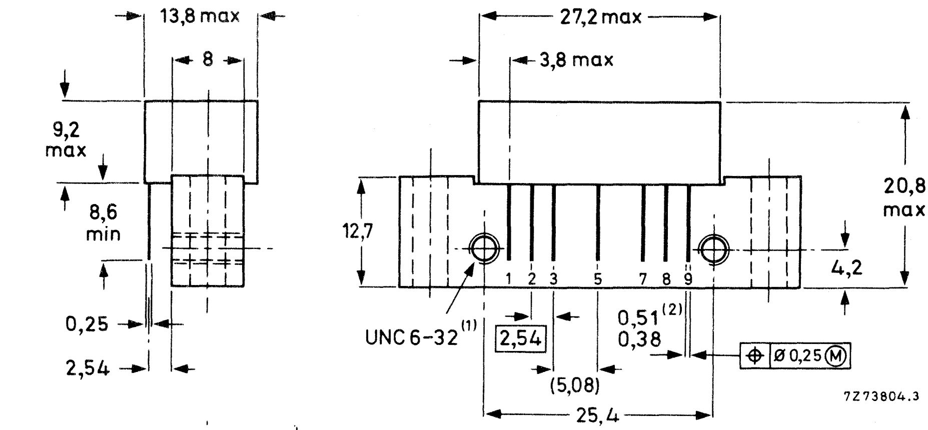
SOT115 (see Fig. 1).

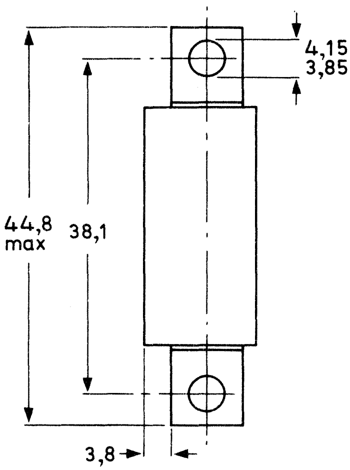
Note

1. The module normally operate at V_B = +24 V DC, but are able to withstand supply transients up to 30 V.

MECHANICAL DATA

Fig. 1 SOT115.





Terminal connections

1	= input
2, 3, 7, 8	= common
5	= $+V_B$
9	= output

(1) Screw 6-32 UNC-2A available upon request (see 'Accessories'

(2) Leads gold-plated.

See 'Mounting and soldering recommendations'.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134).

RF input voltage	V_I	max.	60	dBmV
Storage temperature range	T_{stg}		−40 to +100	°C
Operating case temperature range	T_{case}		−20 to +100	°C

CHARACTERISTICS

V_B = +24 V DC; T_{case} = 30 °C; bandwidth = 40 MHz to 450 MHz.

			BGY584	BGY585	
Power gain					
f = 50 MHz	G_p		16.5 to 17.5	16.5 to 17.5	dB
f = 450 MHz	G_p		17.4 to 18.8	17.4 to 18.8	dB
Slope cable equivalent					
f = 40 MHz to 450 MHz	SL		0.5 to 1.8	0.5 to 1.8	dB
Flatness of frequency response					
f = 40 MHz to 450 MHz	FL	max.	0.2	0.2	dB
Return losses at input and output					
$Z_S = Z_L = 75\ \Omega$;					
f = 40 MHz to 80 MHz	$S_{11\text{-}22}$	min.	20	20	dB
f = 80 MHz to 160 MHz		min.	19	19	dB
f = 160 MHz to 450 MHz		min.	18	18	dB
Second order distortion					
V_p = 46 dBmV; f_p = 55.25 MHz					
V_q = 46 dBmV; f_q = 391.25 MHz					
Measured on $f_p + f_q$ = 446.5 MHz	d_2		−73	−75	dB
Composite triple beat					
60 channels flat; V_O = 46 dBmV					
Measured at channel H22	CTB		−58	−61	dB
Cross-modulation distortion					
60 channels flat; V_O = 46 dBmV					
Measured at channel 2	x_{mod}		−58	−61	dB
Composite second order distortion					
60 channels flat; V_O = 46 dBmV					
Measured in channel H22 at 446.5 MHz	CSO		−58	−61	dB
Output voltage at d_{im} = −60 dB					
(DIN 45004B, par. 6: 3-tone)					
f_p = 440.25 MHz; $V_p = V_O$;					
f_q = 447.25 MHz; $V_q = V_p - 6$ dB;					
f_r = 449.25 MHz; $V_r = V_p - 6$ dB;					
Measured at					
$f_p + f_q - f_r$ = 438.25 MHz	V_O		61.5	64	dBmV
Noise figure at f = 450 MHz	F		6.0	7.0	dB
Total DC current consumption					
V_B = +24 V DC	I_{tot}	typ.	180	220	mA
		max.	200	240	mA

CHARACTERISTICS

V_B = +24 V DC; T_{case} = 30 °C; Bandwidth = 40 MHz to 550 MHz.

			BGY584	BGY585	
Power gain					
f = 50 MHz	G_p		16.5 to 17.5	16.5 to 17.5	dB
f = 550 MHz	G_p		17.6 to 19.0	17.6 to 19.0	dB
Slope cable equivalent f = 40 MHz to 550 MHz	SL		0.5 to 2.0	0.5 to 2.0	dB
Flatness of frequency response f = 40 MHz to 550 MHz	FL	max.	0.2	0.2	dB
Return losses at input and output $Z_S = Z_L$ = 75 Ω; f = 40 MHz to 550 MHz	$S_{11\text{-}22}$		20	20	dB
Second order distortion V_p = 44 dBmV; f_p = 55.25 MHz V_q = 44 dBmV; f_q = 493.25 MHz Measured on $f_p + f_q$ = 548.5 MHz	d_2		−68	−70	dB
Output voltage at d_{im} = −60 dB (DIN 45004B, par. 6.3: 3-tone) $V_p = V_O$; f_p = 540.25 MHz; $V_q = V_p$ − 6 dB; f_q = 547.25 MHz; $V_r = V_p$ − 6 dB; f_r = 549.25 MHz; Measured at $f_p + f_q - f_r$ = 538.25 MHz	V_O		58.5	61	dBmV
Composite triple beat 77 channels flat; V_O = 44 dBmV Measured in channel 27	CTB		−56	−59	dB
Cross-modulation distortion 77 channels flat V_O = 44 dBmV Measured in channel 2	X_{mod}		−59	−62	dB
Composite second order distortion on 77 channels flat; V_O = 44 dBmV Measured in channel 27 on 548.5 MHz	CSO		−56	−59	dB
Noise figure at f = 550 MHz	F		7.0	8.0	dB
Total DC current consumption V_B = +24 V DC	I_{tot}	typ.	180	220	mA
		max.	200	240	mA

CATV AMPLIFIER MODULES

Hybrid amplifier modules for use in CATV systems and operating at frequencies up to 550 MHz.

BGY584A: 18,2 dB preamplifier
BGY585A: 18,2 dB final amplifier

Features

- excellent linearity
- extremely low noise
- optimal reliability ensured by TiPtAu metallized crystals, silicon nitride glass barrier and rugged construction

QUICK REFERENCE DATA

			BGY584A	BGY585A	
Frequency range	f		40 to 550	40 to 550	MHz
Source impedance and load impedance	$Z_S = Z_L$	=	75	75	Ω
Power gain at f = 50 MHz	G_p		18,2 ± 0,5	18,2 ± 0,5	dB
Slope cable equivalent f = 40 MHz to 550 MHz	SL		0,5 to 2,0	0,5 to 2,0	dB
Flatness of frequency reponse f = 40 MHz to 550 MHz	FL	max.	± 0,2	± 0,2	dB
Return losses at input and output f = 40 MHz to 550 MHz	$S_{11\text{-}22}$	min.	18	18	dB
Output voltage at d_{im} = –60 dB (DIN 45004B, par. 6.3: 3-tone)	V_o	min.	59,0	61,5	dBmV
2-nd order distortion V_o = 44 dBmV	d_2	max.	–70	–72	dB
Composite triple beat V_o = 44 dBmV	CTB	max.	–55	–59	dB ←
Cross modulation V_o = 44 dBmV	X_{mod}	max.	–59	–62	dB
Noise figure f = 550 MHz	F	max.	7,0	8,0	dB
D.C. supply voltage*	$+V_B$	=	24	24	V*
Total d.c. current consumption at V_B = + 24 V	I_{tot}	max.	200	240	mA
Operating case temperature	T_c		–20 to + 100		°C

MECHANICAL DATA

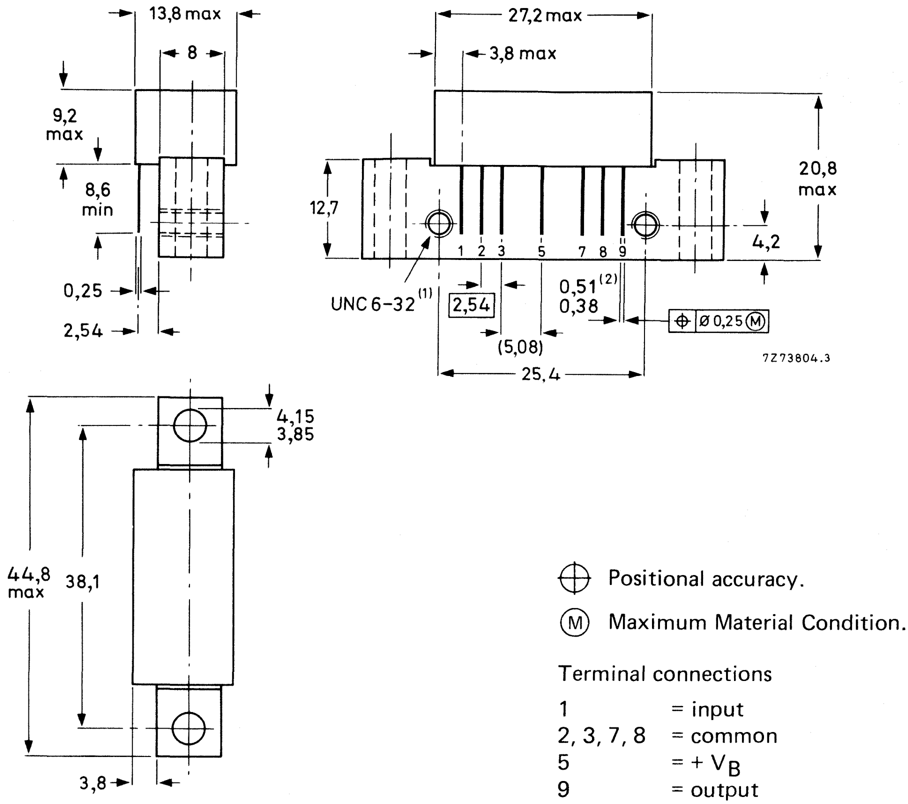
SOT-115 (see Fig. 1).

* The modules normally operate at V_B = 24 V, but are able to withstand supply transients up to 30 V.

MECHANICAL DATA

Dimensions in mm

Fig. 1 SOT-115.



(1) Screw 6-32UNC-2A available upon request (see "Accessories").
(2) Gold-plated leads.

See "Mounting and Soldering recommendations".

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

R.F. input voltage	V_i	max.	60 dBmV
Storage temperature	T_{stg}	−40 to + 100	°C
Operating case temperature	T_c	−20 to + 100	°C

CHARACTERISTICS

V_B = +24 V DC; T_{case} = 30 °C; Z_S = Z_L = 75 Ω; bandwidth = 450 MHz.

			BGY584A	BGY585A	
Power gain					
f = 50 MHz	G_p		17.7 to 18.7	17.7 to 18.7	dB
f = 450 MHz			18.6 to 19.8	18.6 to 19.8	dB
Slope cable equivalent					
f = 40 MHz to 450 MHz	SL		0.5 to 1.8	0.5 to 1.8	dB
Flatness of frequency response					
f = 40 MHz to 450 MHz	FL	max.	0.2	0.2	dB
Return losses at input and output					
Z_S = Z_L = 75 Ω;					
f = 40 MHz to 80 MHz	$S_{11\text{-}22}$	min.	20	20	dB
f = 80 MHz to 160 MHz		min.	19	19	dB
f = 160 MHz to 450 MHz		min.	18	18	dB
Second order distortion					
V_P = 46 dBmV; f_p = 55.25 MHz					
V_q = 46 dBmV; f_q = 391.25 MHz					
Measured on $f_p + f_q$ = 446.5 MHz	d_2		−73	−75	dB
Composite triple beat					
60 channels flat; V_O = 46 dBmV					
Measured at channel H22	CTB		−57	−61	dB
Cross-modulation distortion					
60 channels flat; V_O = 46 dBmV					
Measured at channel 2	X_{mod}		−58	−61	dB
Composite second order distortion					
60 channels flat; V_O = 46 dBmV					
Measured in channel H22 at 446.5 MHz	CSO		−58	−61	dB
Output voltage at d_{im} = −60 dB					
(DIN 45004B, par. 6.3: 3-tone)					
$V_p = V_O$; f_p = 440.25 MHz;					
$V_q = V_O$ − 6 dB; f_q = 447.25 MHz;					
$V_r = V_O$ − 6 dB; f_r = 449.25 MHz;					
Measured at					
$f_p + f_q - f_r$ = 438.25 MHz	V_O		61.5	64	dB
Noise figure at f = 450 MHz	F		6.0	7.0	dB
Total DC current consumption					
V_B = +24 V DC	I_{tot}	typ.	180	220	mA
		max.	200	240	mA

CHARACTERISTICS (continued)

Supply voltage V_B = + 24 V; $Z_S = Z_L$ = 75 Ω; T_c = 30 °C; bandwidth = 550 MHz.

			BGY584A	BGY585A	
Power gain at f = 50 MHz	G_p		18,2 ± 0,5	18,2 ± 0,5	dB
Power gain at f = 550 MHz	G_p		18,8 to 20,0	18,8 to 20,0	dB
Slope cable equivalent f = 40 MHz to 550 MHz	SL		0,5 to 2,0	0,5 to 2,0	dB
Flatness of frequency response f = 40 MHz to 550 MHz	FL	max.	± 0,2	± 0,2	dB
Return losses at input and output $Z_S = Z_L$ = 75 Ω f = 40 MHz to 80 MHz		min.	20	20	dB
f = 80 MHz to 160 MHz	$S_{11\text{-}22}$	min.	19	19	dB
f = 160 MHz to 550 MHz		min.	18	18	dB
Output voltage at d_{im} = −60 dB (DIN 45004B, 6.3: 3-tone) $V_p = V_o$; f_p = 540,25 MHz $V_q = V_o$ −6 dB; f_q = 547,25 MHz $V_r = V_o$ −6 dB; f_r = 549,25 MHz Measured at $f_{(p+q-r)}$ = 538,25 MHz	V_o	min.	59,0	61,5	dBmV
2nd-order distortion V_o = 44 dBmV; f_p = 55,25 MHz (ch. 2) V_o = 44 dBmV; f_q = 493,25 MHz (ch. 18) Tested at $f_{(p+q)}$ = 548,5 MHz (ch. 27)	d_2	max.	−70	−72	dB
Composite triple beat at 77 channels V_o = 44 dBmV; tested at channel 27	CTB	max.	−56	−59	dB
Cross modulation at 77 channels V_o = 44 dBmV; tested in channel 2	X_{mod}	max.	−59	−62	dB
Noise figure f = 550 MHz	F	max.	7,0	8,0	dB
Total d.c. current consumption	I_{tot}	typ.	180	220	mA
		max.	200	240	mA

CATV AMPLIFIER MODULES

Hybrid amplifier modules for use in CATV systems and operating at frequencies up to 550 MHz.

BGY586: 22 dB preamplifier
BGY587: 22 dB final amplifier

Features

- excellent linearity
- extremely low noise
- optimal reliability ensured by TiPtAu metallized crystals, silicon nitride glass barrier and rugged construction

QUICK REFERENCE DATA

			BGY586	BGY587	
Frequency range	f		40 to 550	40 to 550	MHz
Source impedance and load impedance	$Z_S = Z_L$	=	75	75	Ω
Power gain at f = 50 MHz	G_p		22,0 ± 0,5	22,0 ± 0,5	dB
Slope cable equivalent f = 40 MHz to 550 MHz	SL		0,5 to 2,0	0,5 to 2,0	dB
Flatness of frequency response f = 40 MHz to 550 MHz	FL	max.	± 0,2	± 0,2	dB
Return losses at input and output f = 40 MHz to 550 MHz	$S_{11\text{-}22}$	min.	18	18	dB
Output voltage at d_{im} = −60 dB (DIN 45004B, par. 6.3: 3-tone)	V_o	min.	58,5	61,0	dBmV
2nd-order distortion V_o = 44 dBmV	d_2	max.	−62	−66	dB
Composite triple beat V_o = 44 dBmV	CTB	max.	−53	−57	dB
Cross modulation V_o = 44 dBmV	X_{mod}	max.	−55	−59	dB
Noise figure f = 550 MHz	F	max.	6,5	7,0	dB
D.C. supply voltage*	$+V_B$	=	24	24	V*
Total d.c. current consumption at V_B = + 24 V	I_{tot}	max.	200	240	mA
Operating case temperature	T_c		−20 to + 100		°C

MECHANICAL DATA

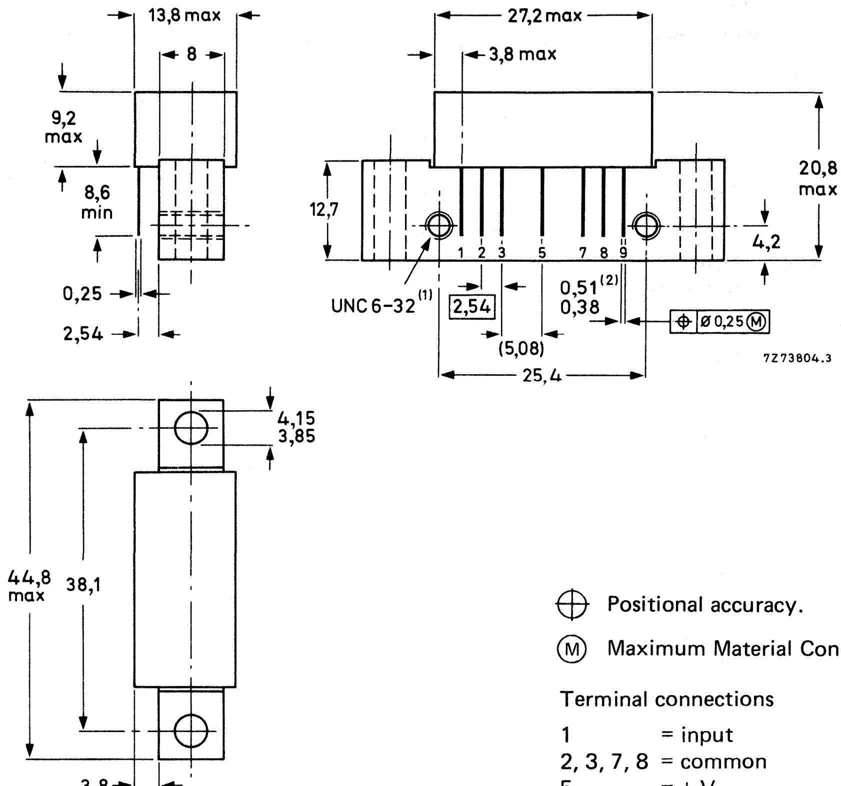
SOT-115 (see Fig. 1).

* The modules normally operate at V_B = 24 V, but are able to withstand supply transients up to 30 V.

MECHANICAL DATA

Dimensions in mm

Fig. 1 SOT-115.



⌖ Positional accuracy.

Ⓜ Maximum Material Condition.

Terminal connections

1	= input
2, 3, 7, 8	= common
5	= + V_B
9	= output

(1) Screw 6-32UNC-2A available upon request (see "Accessories").
(2) Gold-plated leads.

See "Mounting and Soldering Recommendations".

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

R.F. input voltage	V_i	max.	60 dBmV
Storage temperature	T_{stg}		−40 to + 100 °C
Operating case temperature	T_c		−20 to + 100 °C

CHARACTERISTICS

Supply voltage V_B = + 24 V; $Z_S = Z_L$ = 75 Ω; T_c = 30 °C

			BGY586	BGY587	
Power gain at f = 50 MHz	G_p		22,0 ± 0,5	22,0 ± 0,5	dB
Power gain at f = 550 MHz	G_p	min.	22,0	22,0	dB
Slope cable equivalent f = 40 MHz to 550 MHz	SL		0,5 to 2,0	0,5 to 2,0	dB
Flatness of frequency response f = 40 MHz to 550 MHz	FL	max.	± 0,2	± 0,2	dB
Return losses at input and output $Z_S = Z_L$ = 75 Ω f = 40 MHz to 80 MHz		min.	20	20	dB
f = 80 MHz to 160 MHz	$S_{11\text{-}22}$	min.	19	19	dB
f = 160 MHz to 550 MHz		min.	18	18	dB
Output voltage at d_{im} = −60 dB (DIN 45004B, 6.3: 3-tone) $V_p = V_o$; f_p = 540,25 MHz $V_q = V_o$ −6 dB; f_q = 547,25 MHz $V_r = V_o$ −6 dB; f_r = 549,25 MHz Measured at $f_{(p+q-r)}$ = 538,25 MHz	V_o	min.	58,5	61,0	dBmV
2nd-order distortion V_o = 44 dBmV; f_p = 55,25 MHz (ch. 2) V_o = 44 dBmV; f_q = 493,25 MHz (ch. 18) Tested at $f_{(p+q)}$ = 548,5 MHz (ch. 27)	d_2	max.	−62	−66	dB
Composite triple beat at 77 channels V_o = 44 dBmV; tested at channel 27	CTB	max.	−53	−57	dB
Cross modulation at 77 channels V_o = 44 dBmV; tested in channel 2	X_{mod}	max.	−55	−59	dB
Noise figure f = 550 MHz	F	max.	6,5	7,0	dB
Total d.c. current consumption	I_{tot}	typ.	180	220	mA
		max.	200	240	mA

CATV AMPLIFIER MODULES

Hybrid amplifier modules for use in CATV systems and operating at frequencies up to 550 MHz.
BGY588: 34.5 dB line-extender.

FEATURES

- Excellent linearity
- Extremely low noise
- Optimal reliability ensured by application of TiPtAu metallized crystals, silicon nitride glass barrier and a rugged construction.

QUICK REFERENCE DATA

Frequency range	f		40 to 550	MHz
Source and load impedance	$Z_S = Z_L$		75	Ω
Power gain at f = 50 MHz	G_p		33.5 to 35.5	dB
Slope cable equivalent f = 40 MHz to 550 MHz	SL		0 to 2.5	dB
Flatness of frequency response f = 40 MHz to 550 MHz	FL	max.	0.4	dB
Return losses at input and output	$S_{11\text{-}22}$	min.	18	dB
Second order distortion V_O = 44 dBmV	d_2	max.	−68	dB
Composite triple beat V_O = 44 dBmV	CTB	max.	−57	dB
Cross-modulation distortion V_O = 44 dBmV	x_{mod}	max.	−59	dB
Output voltage at d_{im} = −60 dB (DIN 45004B, para 6.3: 3-tone)	V_O	min.	61	dBmV
Noise figure at 550 MHz	F	max.	6.5	dB
DC supply voltage (note 1)	V_B		24	V
Total DC current	I_{tot}		320	mA
Operating case temperature	T_{case}		−20 to +100	°C

MECHANICAL DATA

SOT115 (see Fig. 1).

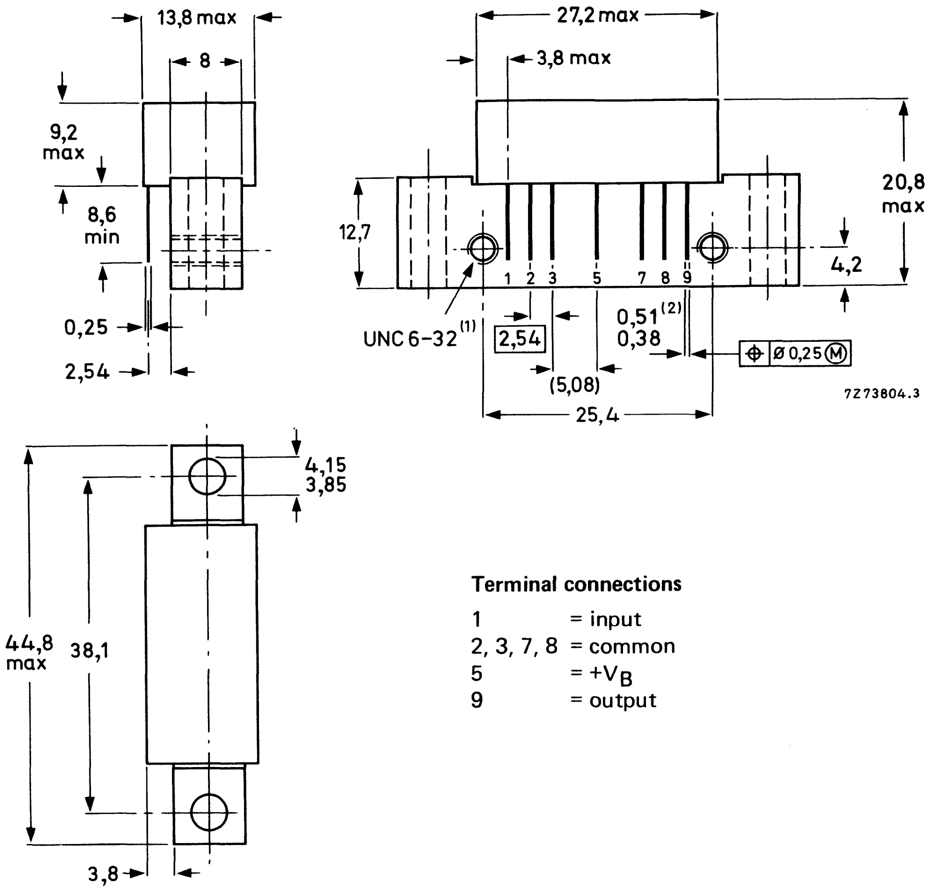
Note

1. The module normally operates at V_B = +24 V DC, but is able to withstand incidental supply transients up to 30 V.

MECHANICAL DATA

Dimensions in mm

Fig. 1 SOT115.



Terminal connections

1	= input
2, 3, 7, 8	= common
5	= $+V_B$
9	= output

(1) Screw 6-32 UNC-2A available upon request (see 'Accessories').
(2) Leads gold-plated.

See 'Mounting and soldering recommendations'.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134).

RF input voltage	V_i	max.	60	dBmV
Storage temperature range	T_{stg}		−40 to +100	°C
Operating case temperature range	T_{case}		−20 to +100	°C

CHARACTERISTICS

V_B = +24 V DC; T_{case} = 30 ^oC; Bandwidth = 40 MHz to 550 MHz.

Power gain				
f = 50 MHz	G_p		33.5 to 35.5	dB
f = 550 MHz			35.0 to 37	dB
Slope cable equivalent				
f = 40 MHz to 450 MHz	SL		0 to 2.5	dB
Flatness of frequency response				
f = 40 MHz to 450 MHz	FL	max.	0.4	dB
Return losses at input and output				
$Z_S = Z_L = 75\ \Omega$;				
f = 40 MHz to 80 MHz	$s_{11\text{-}22}$	min.	20	dB
f = 80 MHz to 160 MHz		min.	19	dB
f = 160 MHz to 550 MHz		min.	18	dB
Second order distortion				
V_p = 44 dBmV; f_p = 55.25 MHz				
V_q = 44 dBmV; f_q = 493.25 MHz				
Measured on $f_p + f_q$ = 548.5 MHz	d_2	max.	−68	dB
Composite triple beat				
77 channels flat V_O = 44 dBmV				
Measured at channel 27	CTB	max.	−57	dB
Cross-modulation distortion				
77 channels flat V_O = 44 dBmV				
Measured at channel 2	x_{mod}	max.	−59	dB
Composite second order distortion				
77 channels flat; V_O = 44 dBmV				
Measured in channel 27 on 548.5 MHz	CSO	max.	−57	dB
Output voltage at d_{im} = −60 dB				
(DIN 45004B, para 6.3: 3-tone)				
$V_p = V_O$; f_p = 540.25 MHz;				
$V_q = V_O$ − 6 dB; f_q = 547.25 MHz;				
$V_r = V_O$ − 6 dB; f_r = 549.25 MHz;				
Measured on $f_p + f_q - f_r$ = 538.25 MHz	V_O	min.	61	dBmV
Noise figure at f = 550 MHz	F	max.	6.5	dB
Total DC current consumption				
V_B = +24 V DC	I_{tot}	typ.	320	mA
		max.	340	mA

CHARACTERISTICS

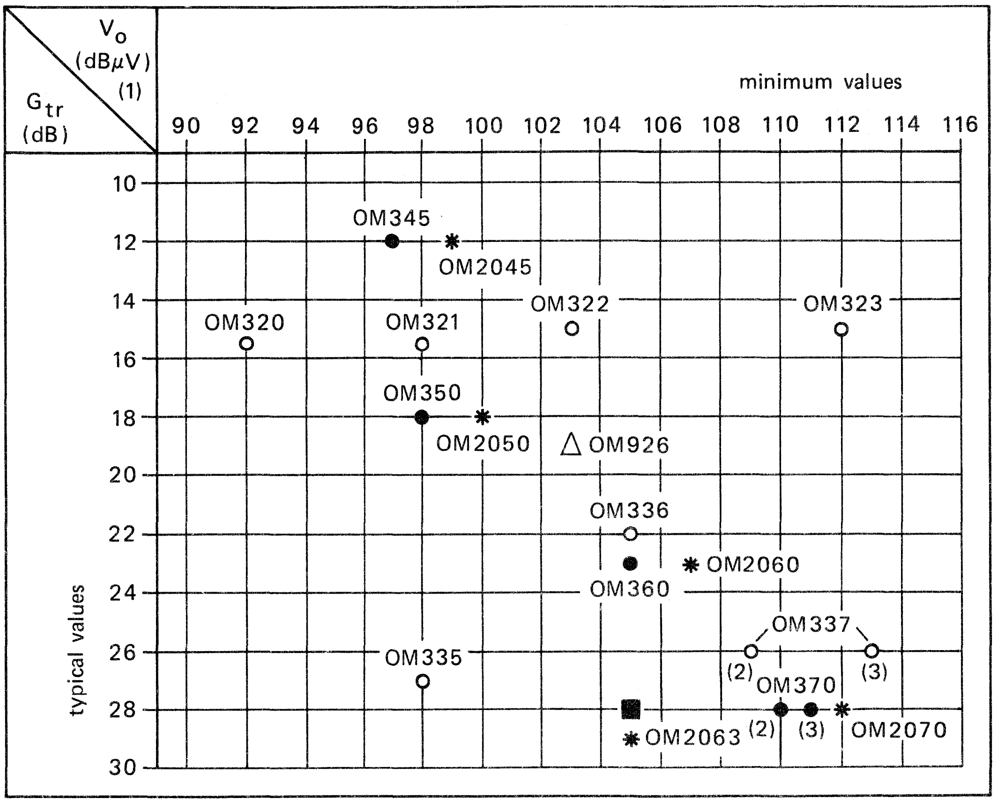
V_B = +24 V DC; T_{case} = 35 °C; bandwidth 40 MHz to 450 MHz.

Power gain				
f = 50 MHz	G_p		33.5 to 35.5	dB
f = 450 MHz	G_p		35 to 37	dB
Slope cable equivalent				
f = 40 MHz to 450 MHz	SL		0.5-2.5	dB
Flatness of frequency response				
f = 40 MHz to 450 MHz	FL	max.	0.3	dB
Return losses at input and output				
$Z_S = Z_L = 75\ \Omega$;				
f = 40 MHz to 80 MHz	s_{11-22}	min.	20	dB
f = 80 MHz to 160 MHz		min.	19	dB
f = 160 MHz to 450 MHz		min.	18	dB
Second order distortion				
V_p = 46 dBmV; f_p = 55.25 MHz				
V_q = 46 dBmV; f_q = 391.25 MHz				
Measured on $f_p + f_q$ = 446.5 MHz	d_2	max.	72	dB
Composite triple beat				
60 channels flat; V_O = 46 dBmV				
Measured in channel H22	CTB	max.	61	dB
Cross modulation				
60 channels flat; V_O = 46 dBmV				
Measured in channel 2	x_{mod}	max.	59	dB
Composite second order distortion				
60 channels flat; V_O = 46 dBmV				
Measured in channel H22 at 446.5 MHz	CSO	max.	−59	dB
Noise figure at f = 450 MHz	F	max.	6.0	dB
Output voltage at d_{im} = −60 dB				
(DIN 45004B, para 6.3: 3-tone)				
$V_p = V_O$; f_p = 440.25 MHz;				
$V_q = V_O - 6$ dB; f_q = 447.25 MHz;				
$V_r = V_O - 6$ dB; f_r = 449.25 MHz;				
Measured on $f_p = f_q - f_r$ = 438.25 MHz	V_O	min.	64	dBmV
Total DC current consumption				
V_B = +24 V DC	I_{tot}	typ.	320	mA
		max.	340	mA

DEVICE DATA

Hybrid ICs for wideband amplifiers

HYBRID ICs FOR WIDE-BAND AMPLIFIERS



● 12 V types
○ 24 V types
✱ 12 V-low noise types
△ in development
■ o OM339
● OM369
△ OM2062

7Z83427.1

(1) At −60 dB intermodulation distortion (DIN 45004, par. 6.3: 3-tone).
(2) UHF.
(3) VHF.

Fig. 1 Type/performance in matrix survey.

The matrix survey (Fig. 1) and the tables next page show both the 12 V and 24 V ranges.

Note that the modules are available in the combination of high gain- high output voltage.

Hybrid IC's for wideband amplifiers

12 V supply voltage; 'Low noise'

	type	stage	gain (dB)	$V_{o(RMS)}$ (dBμV) −60 dB IMD (note 1) min. values	noise figure (dB)	max. VSWR typ. values (note 2) input	output	supply current (mA)	page
low	OM2045	1	12	99	3.6	2.0	1.4	11.5	885
output	OM2050	2	18	100	5.2	1.5	1.9	18	891
	OM2060	3	23	107	5.4	1.4	1.6	56	897
medium	OM2061	3	28	107	4.4	1.5	1.7	51	903
output	OM2062	3	28	105	4.4	1.3	1.4	50	(note 3)
	OM2063	3	29	105	3.6	2.2	1.5	52	(note 3)
high output	OM2070	3	28	112	4.8	2.3	1.9	100	909

12 V supply voltage

	type	stage	gain (dB)	$V_{o(RMS)}$ (dBμV)	noise figure (dB)	VSWR input	VSWR output	supply current (mA)	page
low	OM345	1	12	97	5.5	2.0	1.4	11.5	855
medium	OM350	2	18	98	6.0	1.5	1.9	18	861
medium	OM360	3	23	105	7.0	1.3	1.5	55	867
output	OM361	3	28	105	6.0	1.5	1.7	50	873
high output	OM370	3	28	111	7.0	2.3	1.9	105	879

24 V supply voltage

	type	stage	gain (dB)	$V_{o(RMS)}$ (dBμV)	noise figure (dB)	VSWR input	VSWR output	supply current (mA)	page
	OM320	2	15.5	92	5.5	2.2	2.5	33	809
low output	OM321	2	15.5	98	6.0	2.5	2.0	33	815
	OM335	3	27	98	5.5	1.9	3.2	35	833
	OM322	2	15	103	7.0	1.7	1.7	60	821
medium output	OM336	3	22	105	7.0	1.4	1.6	65	839
	OM339	3	28	105	6.0	1.5	1.5	66	851
high	OM323*	2	15	112	9.0	1.9	2.3	100	827
output	OM337*	3	26	113	9.8	2.3	1.8	115	843

* Also available in A-version for external coil and output capacitor.

Notes

1. Measured at −60 dB intermodulation distortion to DIN 45004, par. 6.3: 3-tone, f = 470 MHz.
2. The typical maximum VSWR occurring in the frequency range 40-860 MHz, for a sample connected to a 75 Ω line.
3. In development.

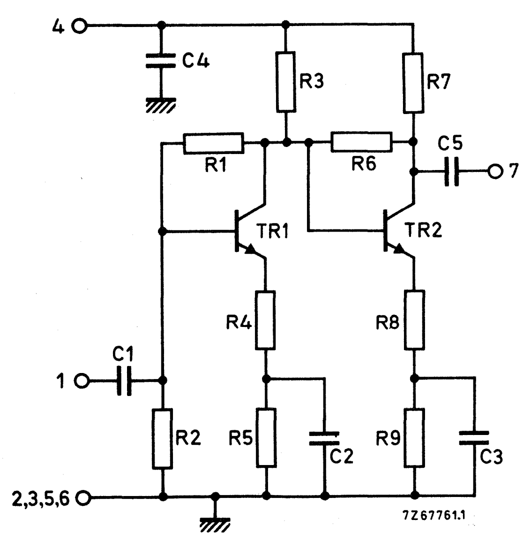
HYBRID VHF/UHF WIDE-BAND AMPLIFIER

Two-stage wide-band amplifier in the hybrid technique, designed for use in mast-head booster amplifiers, as pre-amplifier in MATV systems, and as general-purpose amplifier for v.h.f. and u.h.f. applications

QUICK REFERENCE DATA				
Frequency range	f		40 to 860	MHz
Source and load (characteristic) impedance	$R_S = R_\ell = Z_o$	=	75	Ω
Transducer gain	$G_{tr} = \|s_f\|^2$	typ.	15, 5	dB
Flatness of frequency response	$\pm\Delta\|s_f\|^2$	typ.	1	dB
Output voltage at −60 dB intermodulation distortion (DIN45004, 3-tone)	$V_{o(rms)}$	>	92	dBμV
Noise figure	F	typ.	5, 5	dB
D.C. supply voltage	V_B	=	24	V ± 10%
Operating ambient temperature	T_{amb}		−20 to +70	°C

ENCAPSULATION 7-pin, in-line, resin-coated body, see MECHANICAL DATA

CIRCUIT DIAGRAM



RATINGS Limiting values in accordance with the Absolute Maximum System (IEC 134)

Operating ambient temperature	T_{amb}		−20 to +70	°C
Storage temperature	T_{stg}		−40 to +125	°C
D.C. supply voltage	V_B	max.	28	V
Peak voltages on pins 1 and 7	V_{1M}, V_{7M}	max.	28	V
	$-V_{1M}$, V_{7M}	max.	10	V
Peak incident powers on pins 1 and 7	P_{I1M}, P_{I7M}	max.	100	mW

CHARACTERISTICS

Measuring conditions

V.H.F.-U.H.F. test socket	catalogue no. 3504 110 01840 *			
Ambient temperature	T_{amb}	=	25	°C
D.C. supply voltage	V_B	=	24	V
Source impedance and load impedance	R_S, R_ℓ	=	75	Ω
Characteristic impedance of h.f. connections	Z_o	=	75	Ω
Frequency range	f		40 to 860	MHz

Performance

Supply current	I_B	typ.	23	mA
Transducer gain	$G_{tr} = \lvert s_f \rvert^2$		13 to 18	dB
		typ.	15,5	dB
Flatness of frequency response	$\pm\Delta \lvert s_f \rvert^2$	typ.	1	dB
Individual maximum v.s.w.r.				
input	$VSWR_{(i)}$	typ.	2,2	**
output	$VSWR_{(o)}$	typ.	2,5	**
Back attenuation				
f = 100 MHz	$\lvert s_r \rvert^2$	typ.	30	dB
f = 860 MHz	$\lvert s_r \rvert^2$	typ.	24	dB
Output voltage at −60 dB intermodulation distortion (DIN45004, par. 6.3: 3-tone)	$V_{o(rms)}$	>	92	dBμV
		typ.	94	dBμV
Noise figure	F	typ.	5,5	dB

s-parameters	$s_f = s_{21}$	$s_i = s_{11}$
	$s_r = s_{12}$	$s_o = s_{22}$

* This socket can be made available for customer reference purposes.
** Highest value, for a sample, occurring in the frequency range.

OPERATING CONDITIONS

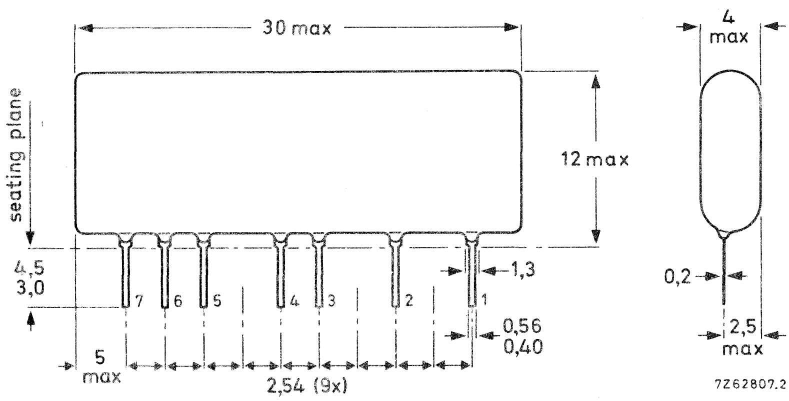
Ambient temperature range	T_{amb}		−20 to +70	°C
D.C. supply voltage	V_B	=	24	V ±10%
Frequency range	f		40 to 860	MHz
Source impedance and load impedance	R_S, R_ℓ	=	75	Ω

MECHANICAL DATA

Dimensions in mm

Encapsulation

The device is resin coated.



Terminal connections

1	= Input
2, 3, 5, 6	= Common
4	= Supply (+)
7	= Output

Soldering recommendations

Hand soldering

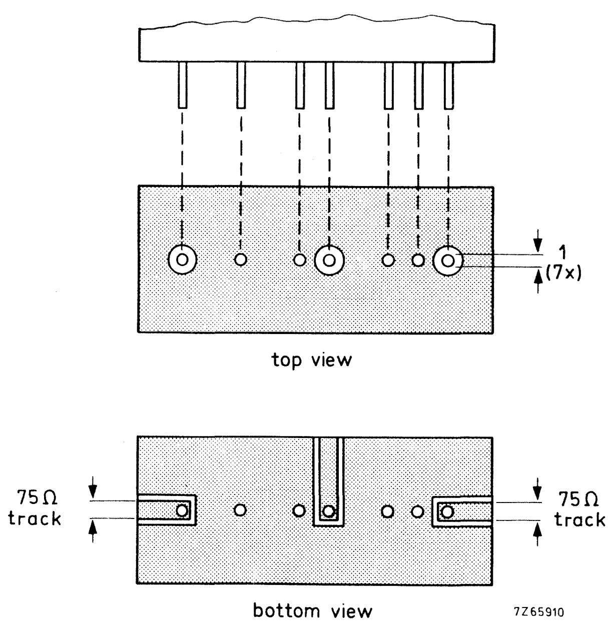
Maximum contact time for a soldering-iron temperature of 260 °C; up to seating plane: 5 s

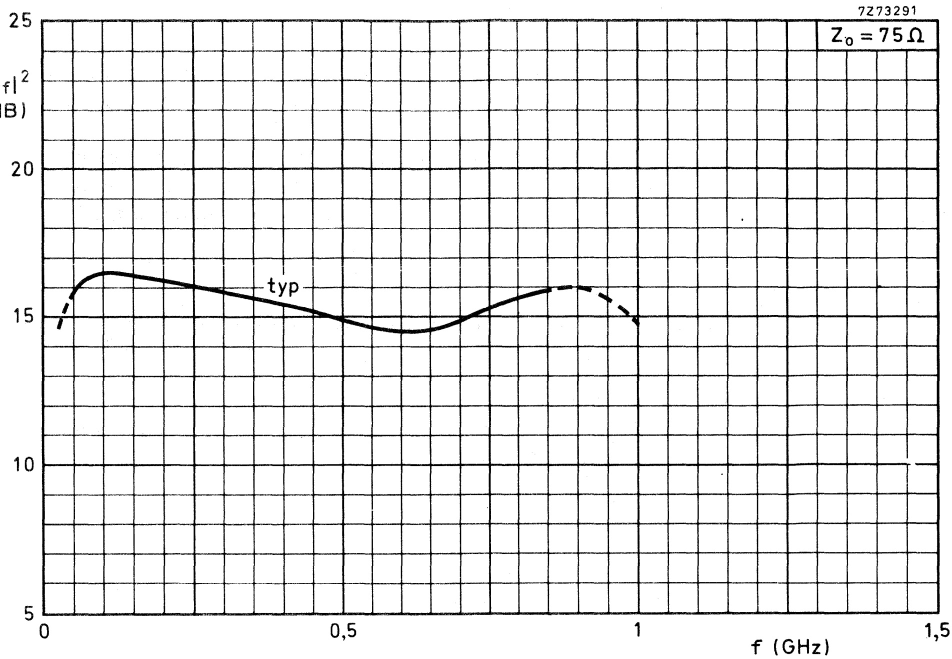
Dip or wave soldering

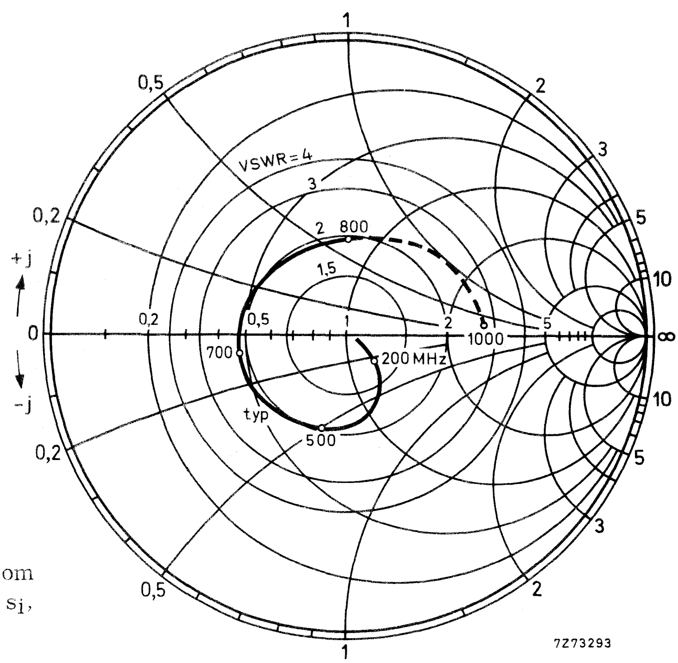
260 °C is the maximum permissible temperature of the solder; it must not be in contact with the joint for more than 5 seconds. The total contact time of successive solder waves must not exceed 5 seconds.
The device may be mounted against the printed-circuit board, but the temperature of the device must not exceed 125 °C. If the printed-circuit board has been pre-heated, forced cooling may be necessary immediately after soldering to keep the temperature below the allowable limit.

Mounting recommendations

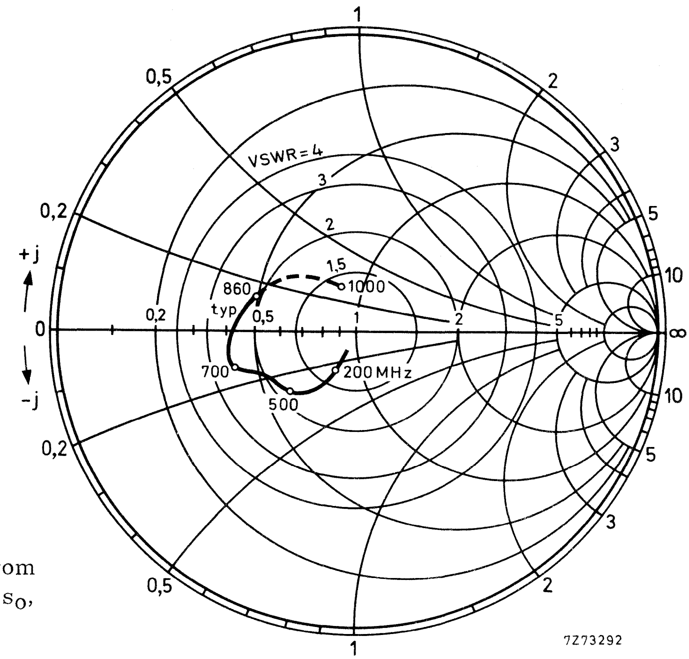
The module should preferably be mounted on double-sided printed-circuit board, see the example shown below.
Input and output should be connected to 75 Ω tracks.
The connections to the "common" pins should be as close to the seating plane as possible.







Input impedance derived from input reflection coefficient s_i, co-ordinates in ohm x 75.



Output impedance derived from output reflection coefficient s_o, co-ordinates in ohm x 75.

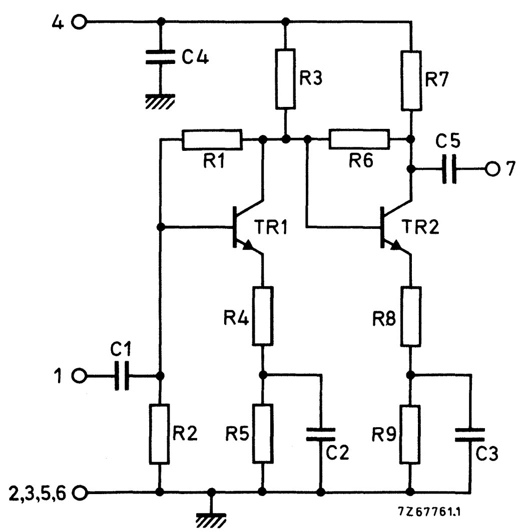
HYBRID VHF/UHF WIDE BAND AMPLIFIER

Two-stage wide-band amplifier in the hybrid technique, designed for use in mast-head booster-amplifiers, as pre-amplifier in MATV systems, and as general-purpose amplifier for v.h.f. and u.h.f. applications.

QUICK REFERENCE DATA				
Frequency range	f		40 to 860	MHz
Source and load (characteristic) impedance	$R_S = R_\ell = Z_o$	=	75	Ω
Transducer gain	$G_{tr} = \|s_f\|^2$	typ.	15,5	dB
Flatness of frequency response	$\pm\Delta\|s_f\|^2$	typ.	1	dB
Output voltage at −60 dB intermodulation distortion (DIN45004, 3-tone)	$V_{o(rms)}$	>	98	dBμV
Noise figure	F	typ.	6	dB
D.C. supply voltage	V_B	=	24	V ±10%
Operating ambient temperature	T_{amb}		−20 to +70	°C

ENCAPSULATION 7-pin, in-line, resin-coated body, see MECHANICAL DATA

CIRCUIT DIAGRAM



RATINGS Limiting values in accordance with the Absolute Maximum System (IEC 134)

Operating ambient temperature	T_{amb}		−20 to +70	°C
Storage temperature	T_{stg}		−40 to +125	°C
D.C. supply voltage	V_B	max.	28	V
Peak voltages on pins 1 and 7	V_{1M}, V_{7M}	max.	28	V
	$-V_{1M}$, $-V_{7M}$	max.	10	V
Peak incident powers on pins 1 and 7	P_{I1M}, P_{I7M}	max.	100	mW

CHARACTERISTICS

Measuring conditions

V.H.F.-U.H.F. test socket	catalogue no. 3504 110 01840 *			
Ambient temperature	T_{amb}	=	25	°C
D.C. supply voltage	V_B	=	24	V
Source impedance and load impedance	R_s, R_ℓ	=	75	Ω
Characteristic impedance of h.f. connections	Z_o	=	75	Ω
Frequency range	f	=	40 to 860	MHz

Performance

Supply current	I_B	typ.	33	mA
Transducer gain	$G_{tr} = \|s_f\|^2$		13 to 18	dB
		typ.	15,5	dB
Flatness of frequency response	$\pm\Delta\|s_f\|^2$	typ.	1	dB
Individual maximum v.s.w.r.				
input	$VSWR_{(i)}$	typ.	2,5	**
output	$VSWR_{(o)}$	typ.	2,0	**
Back attenuation				
f = 100 MHz	$\|s_r\|^2$	typ.	30	dB
f = 860 MHz	$\|s_r\|^2$	typ.	26	dB
Output voltage at −60 dB intermodulation distortion (DIN45004, par. 6.3: 3-tone)	$V_{o(rms)}$	>	98	dBμV
		typ.	100	dBμV
Noise figure	F	typ.	6	dB

s-parameters:	$s_f = s_{21}$	$s_i = s_{11}$
	$s_r = s_{12}$	$s_o = s_{22}$

* This socket can be made available for customer reference purposes.
** Highest value, for a sample, occurring in the frequency range.

OPERATING CONDITIONS

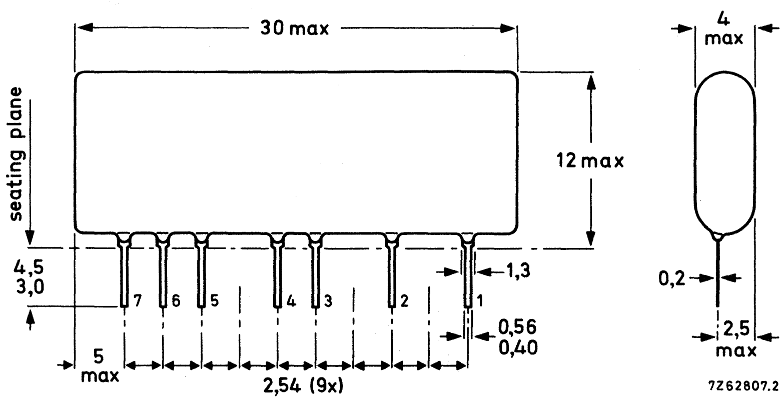
Ambient temperature range	T_{amb}		−20 to + 70	°C
D.C. supply voltage	V_B	=	24	V ±10%
Frequency range	f		40 to 860	MHz
Source impedance and load impedance	R_s, R_ℓ	=	75	Ω

MECHANICAL DATA

Dimensions in mm

Encapsulation

The device is resin coated.



Terminal connections

1	= Input
2, 3, 5, 6	= Common
4	= Supply (+)
7	= Output

Soldering recommendations

Hand soldering

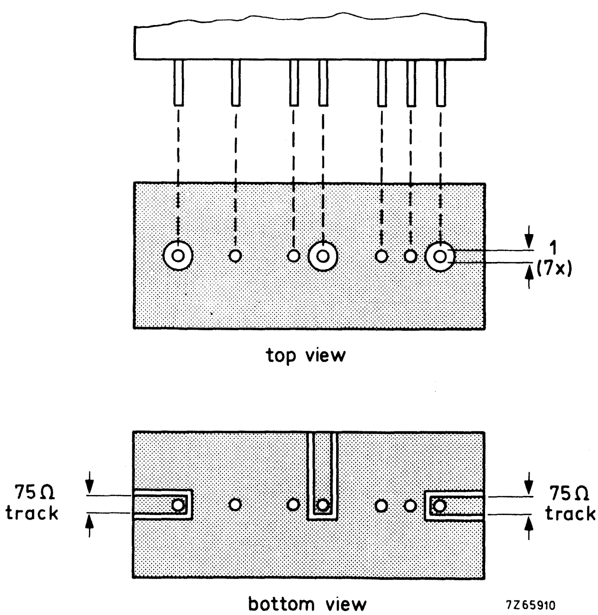
Maximum contact time for a soldering-iron temperature of 260 °C; up to seating plane: 5 s

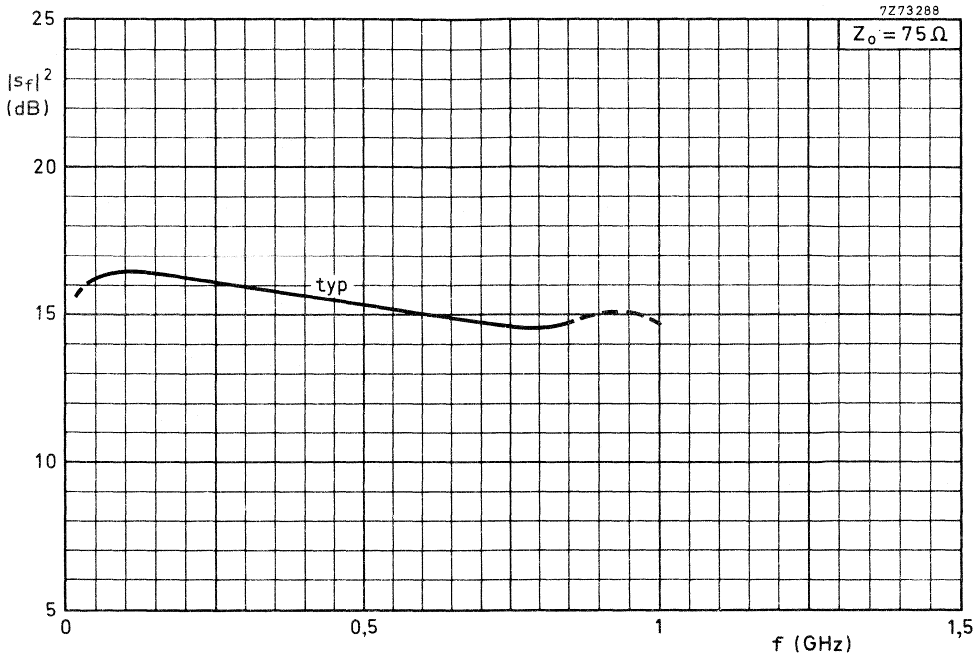
Dip or wave soldering

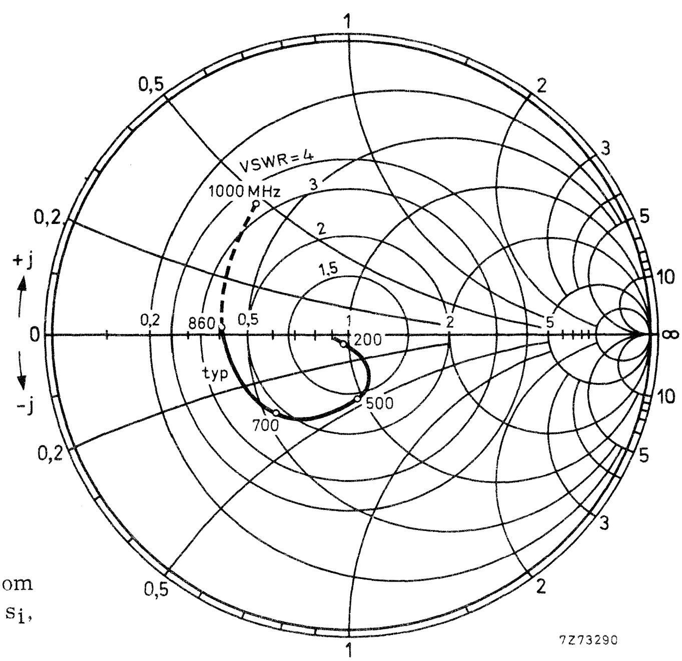
260 °C is the maximum permissible temperature of the solder; it must not be in contact with the joint for more than 5 seconds. The total contact time of successive solder waves must not exceed 5 seconds.
The device may be mounted against the printed-circuit board, but the temperature of the device must not exceed 125 °C. If the printed-circuit board has been pre-heated, forced cooling may be necessary immediately after soldering to keep the temperature below the allowable limit.

Mounting recommendations

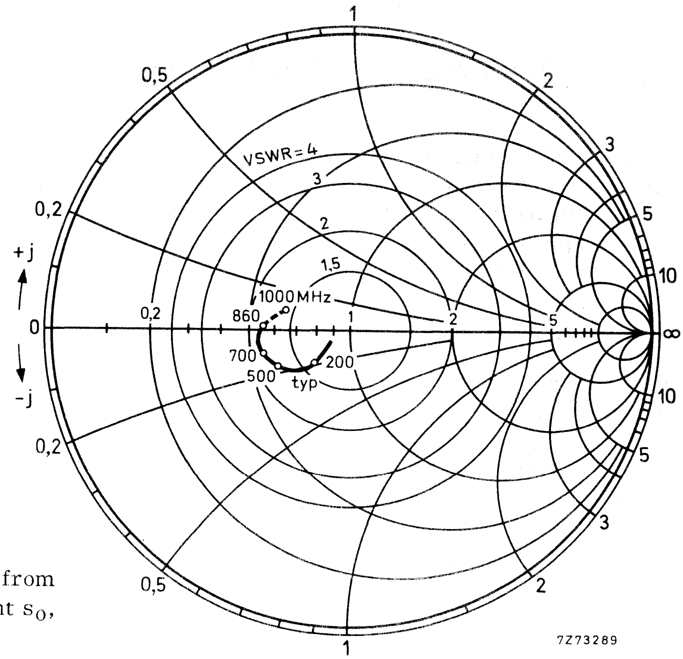
The module should preferably be mounted on double-sided printed-circuit board, see the example shown below.
Input and output should be connected to 75 Ω tracks.
The connections to the "common" pins should be as close to the seating plane as possible.







Input impedance derived from input reflection coefficient s_i, co-ordinates in ohm x 75.



Output impedance derived from output reflection coefficient s_o, co-ordinates in ohm x 75.

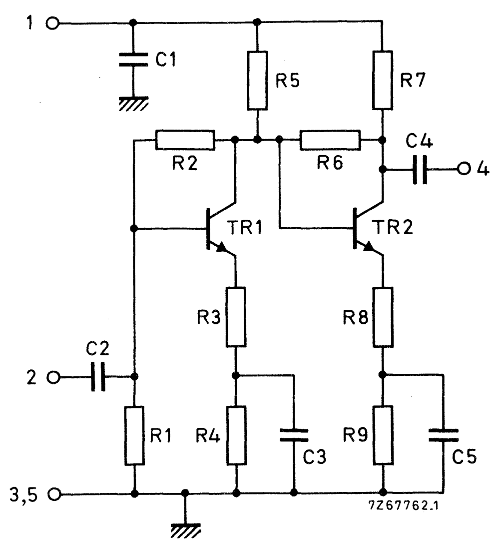
HYBRID VHF/UHF WIDE-BAND AMPLIFIER

Two-stage wide-band amplifier in the hybrid technique, designed for use as distribution amplifier in MATV and CATV systems and as general-purpose amplifier for v.h.f. and u.h.f. applications. Except for the encapsulation coating, the OM322 and OM175 have the same specification. OM322 will replace OM175.

QUICK REFERENCE DATA				
Frequency range	f		40 to 860	MHz
Source and load (characteristic) impedance	$R_S = R_\ell = Z_o$		75	Ω
Transducer gain	$G_{tr} = \lvert s_f \rvert^2$	typ.	15	dB
Flatness of frequency response	$\pm\Delta \lvert s_f \rvert^2$	typ.	0, 3	dB
Output voltage at −60 dB intermodulation distortion (DIN45004, 3-tone)	$V_{o(rms)}$	>	103	dBμV
Noise figure	F	typ.	7	dB
D.C. supply voltage	V_B	=	24	V ±10%
Operating ambient temperature	T_{amb}		−20 to +70	°C

ENCAPSULATION 5-lead, resin coated body on metal base, see MECHANICAL DATA

CIRCUIT DIAGRAM



RATINGS Limiting values in accordance with the Absolute Maximum System (IEC134)

Operating ambient temperature	T_{amb}		−20 to +70	°C
Operating mounting-base temperature	T_{mb}	max.	100	°C
Storage temperature	T_{stg}		−40 to +125	°C
D.C. supply voltage	V_B	max.	28	V
Peak voltages on pins 2 and 4	V_{2M}, V_{4M}	max.	28	V
	$-V_{2M}$, $-V_{4M}$	max.	10	V
Peak incident powers on pins 2 and 4	P_{I2M}, P_{I4M}	max.	100	mW

CHARACTERISTICS

Measuring conditions

Ambient temperature	T_{amb}	=	25	°C
D.C. supply voltage	V_B	=	24	V
Source impedance and load impedance	R_s, R_ℓ	=	75	Ω
Characteristic impedance of h.f. connections	Z_o	=	75	Ω
Frequency range	f	=	40 to 860	MHz

Performance

Supply current	I_B	typ.	60	mA	
Transducer gain	$G_{tr} = \|s_f\|^2$		14 to 16	dB	
		typ.	15	dB	
Flatness of frequency response	$\pm\Delta\|s_f\|^2$	typ.	0,3	dB	
		<	0,5	dB	
Individual maximum v.s.w.r.					
input	$VSWR_{(i)}$	typ.	1,7		[1]
output	$VSWR_{(o)}$	typ.	1,7		[1]
Back attenuation					
f = 100 MHz	$\|s_r\|^2$	typ.	31	dB	
f = 860 MHz	$\|s_r\|^2$	typ.	25	dB	
Output voltage at −60 dB intermodulation distortion (DIN45004, par. 6.3: 3-tone)	$V_{o(rms)}$	>	103	dBμV	
		typ.	105	dBμV	
Noise figure	F	typ.	7	dB	

s-parameters:	$s_f = s_{21}$	$s_i = s_{11}$
	$s_r = s_{12}$	$s_o = s_{22}$

[1]) Highest value, for a sample, occurring in the frequency range.

OPERATING CONDITIONS

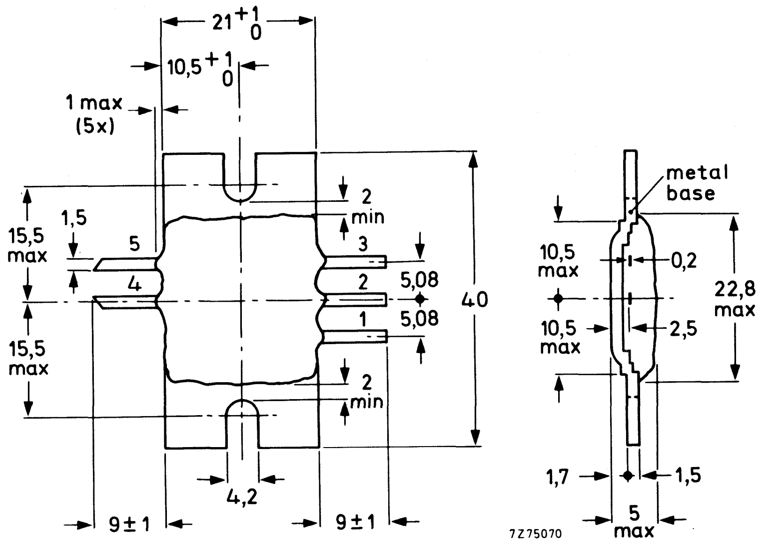
Ambient temperature range	T_{amb}	−20 to +70	°C
D.C. supply voltage	V_B	= 24	V ± 10%
Frequency range	f	40 to 860	MHz
Source impedance and load impedance	R_S, R_ℓ	= 75	Ω

MECHANICAL DATA

Dimensions in mm

Encapsulation

The device is resin coated and mounted on a metal mounting base.



Terminal connections

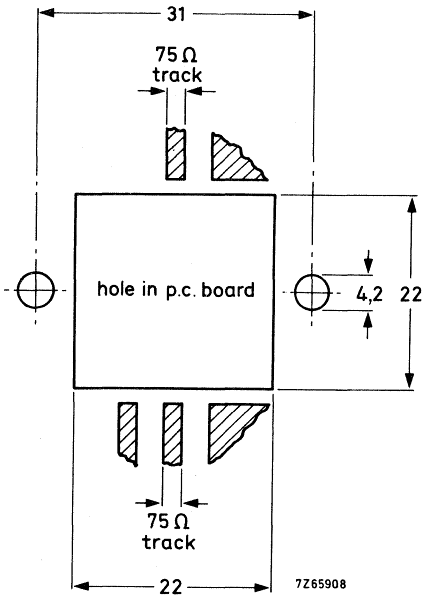
1	= Supply (+)
2	= Input
3 and 5	= Common (internally connected to metal base)
4	= Output

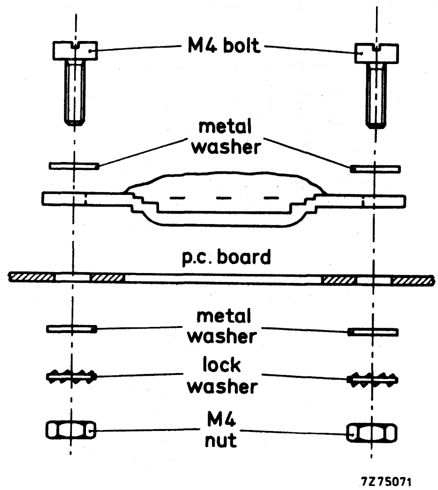
Soldering recommendations

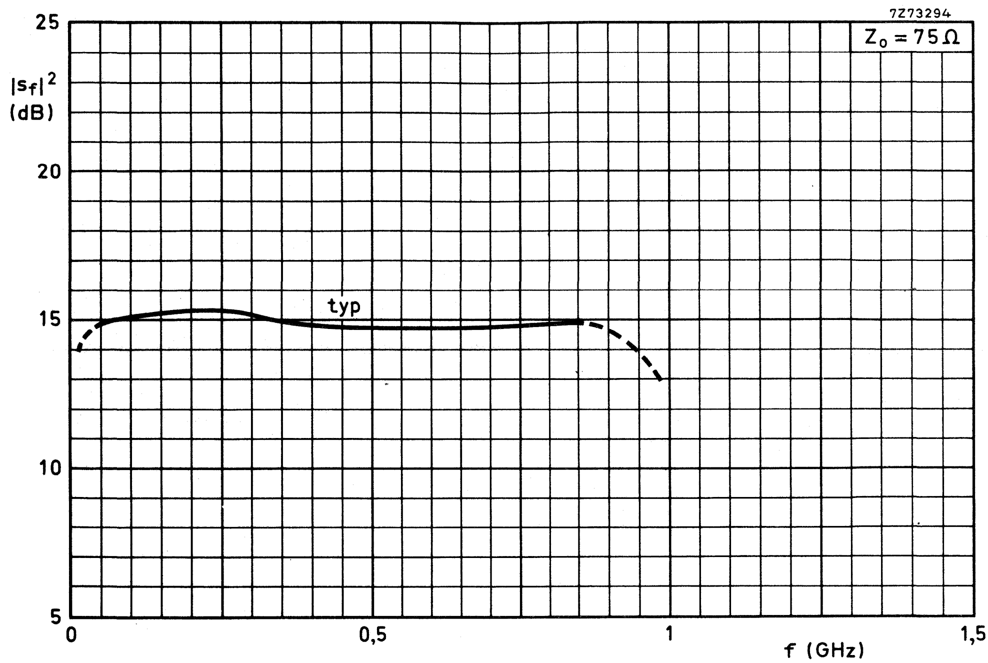
Maximum contact time for a soldering-iron temperature of 260 °C 5 s

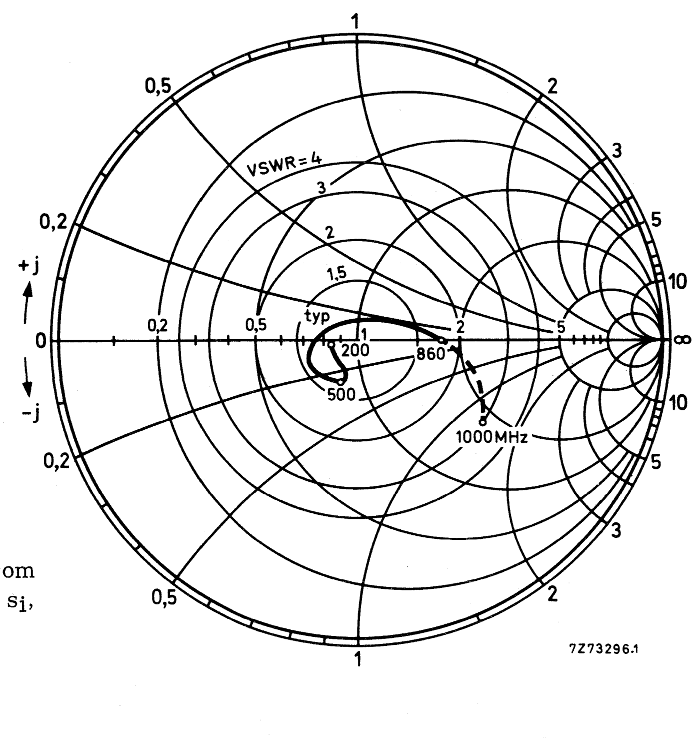
Mounting recommendations

The module should preferably be mounted on a double-sided printed-circuit board, see the examples shown below. Input and output should be connected to 75 Ω tracks.

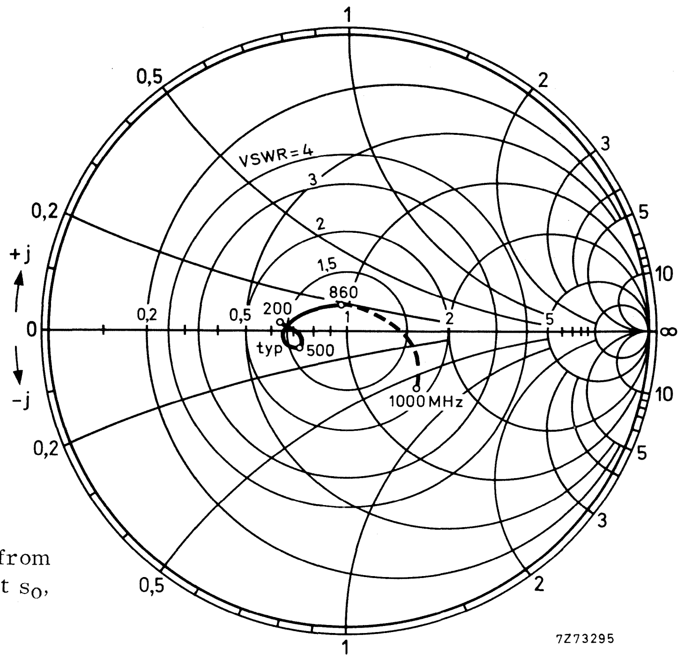








Input impedance derived from input reflection coefficient s_i, co-ordinates in ohm x 75



Output impedance derived from output reflection coefficient s_o, co-ordinates in ohm x 75

HYBRID V.H.F./U.H.F. WIDE-BAND AMPLIFIER

Two-stage wide-band amplifier in the hybrid technique, designed for use in MATV systems, and as general purpose amplifier for v.h.f. and u.h.f. applications requiring a high output level.
The OM323A needs an external collector-coil and blocking capacitor, whereas, the OM323 has these components built-in.

QUICK REFERENCE DATA

Frequency range	f		40 to 860	MHz
Source and load (characteristic) impedance	$R_s = R_\ell = Z_o$	=	75	Ω
Transducer gain	$G_{tr} = \lvert s_f \rvert^2$	typ	15	dB
Flatness of frequency response	$\pm\Delta \lvert s_f \rvert^2$	typ	0,5	dB
Output voltage at −60 dB intermodulation distortion (DIN45004, 3-tone); f = 470 MHz	$V_{o(rms)}$	typ	113	dBμV
Noise figure	F	typ	9	dB
D.C. supply voltage	V_B	=	24	V ± 10%
Operating mounting-base temperature	T_{mb}		−30 to +100	°C

ENCAPSULATION 9-pin, in-line, resin-coated body on a right-angled metal mounting tab, see MECHANICAL DATA

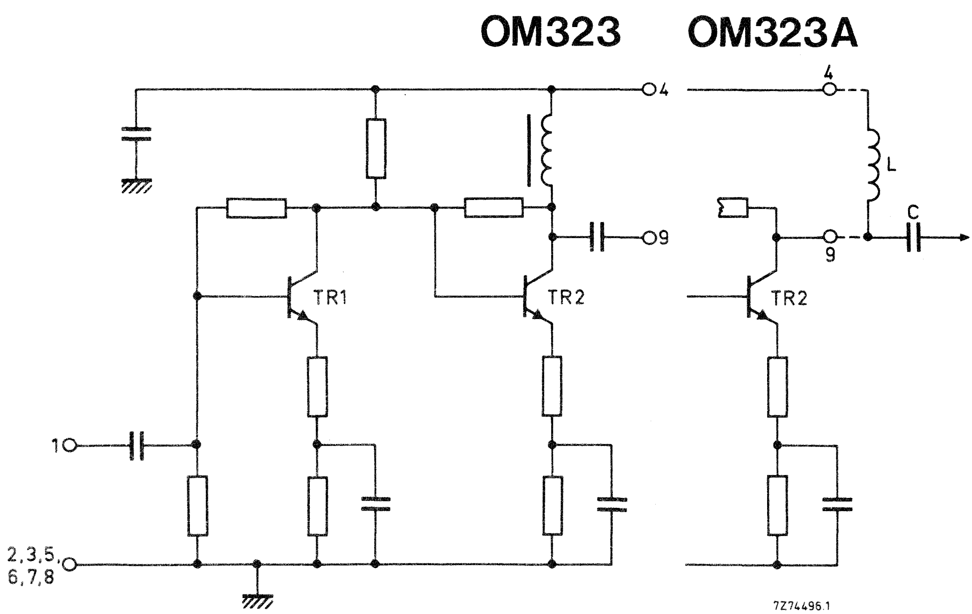


Fig. 1 Circuit diagram.

RATINGS Limiting values in accordance with the Absolute Maximum System (IEC134)

Operating mounting-base temperature	T_{mb}		−30 to +100	°C
Storage temperature	T_{stg}		−40 to +125	°C
D.C. supply voltage	V_B	max	28	V
Peak voltages on pin 1	V_{1M}	max	28	V
	$-V_{1M}$	max	24	V
Peak voltages on pin 9	V_{9M}	max	28	V
	$-V_{9M}$	max	4	V
Peak incident powers on pins 1 and 9	P_{I1M}, P_{I9M}	max	100	mW

CHARACTERISTICS

Measuring conditions

V.H.F.—U.H.F. test socket	catalogue no. 3504 110 01830 *			
Mounting base temperature	T_{mb}	=	25	°C
D.C. supply voltage	V_B	=	24	V
Source impedance and load impedance	R_s, R_ℓ	=	75	Ω
Characteristic impedance of h.f. connections	Z_o	=	75	Ω
Frequency range	f	=	40 to 860	MHz

Performance

Supply current	I_B		95 to 105	mA
		typ	100	mA
Transducer gain	$G_{tr} = \|s_f\|^2$		14 to 17	dB
		typ	15	dB
Flatness of frequency response	$\pm\Delta \|s_f\|^2$	typ	0,5	dB
Individual maximum v.s.w.r.				
input	$VSWR_{(i)}$	typ	1,9	**
output	$VSWR_{(o)}$	typ	2,3	**
Back attenuation				
f = 100 MHz	$\|s_r\|^2$	typ	29	dB
f = 650 MHz	$\|s_r\|^2$	typ	25,5	dB
f = 860 MHz	$\|s_r\|^2$	typ	24	dB

* This socket can be made available for customer reference purposes.
** Highest value, for a sample, occurring in the frequency range.

Output voltage			
at −60 dB intermodulation distortion			
(DIN45004, par. 6.3: 3-tone)		>	112 dBμV
f = 40–230 MHz	$V_{o(rms)}$	typ	114 dBμV
f = 470 MHz	$V_{o(rms)}$	typ	113 dBμV
f = 860 MHz	$V_{o(rms)}$	typ	112 dBμV
Noise figure			
channel 2	F	typ	8 dB
channel 65	F	typ	9 dB

s-parameters:	$s_f = s_{21}$	$s_i = s_{11}$
	$s_r = s_{12}$	$s_o = s_{22}$

OPERATING CONDITIONS

Mounting-base temperature range	T_{mb}	−30 to +100	°C
D.C. supply voltage	V_B	= 24	V ± 10%
Frequency range	f	40 to 860	MHz
Source impedance and load impedance	R_s, R_ℓ	= 75	Ω

THERMAL DATA

a. The maximum permissible temperature at the mounting base is 100 °C.

b. When the mounting tab is screwed to a double-sided printed-circuit board with dimensions 37 mm x 51 mm, its temperature will be 57 °C above the temperature of the surrounding free air.

c. When a heatsink is fixed to the mounting tab and the pins are soldered into a double-sided printed-circuit board with dimensions 37 mm x 51 mm, the tab will reach the temperatures stated in the following table.

Notes

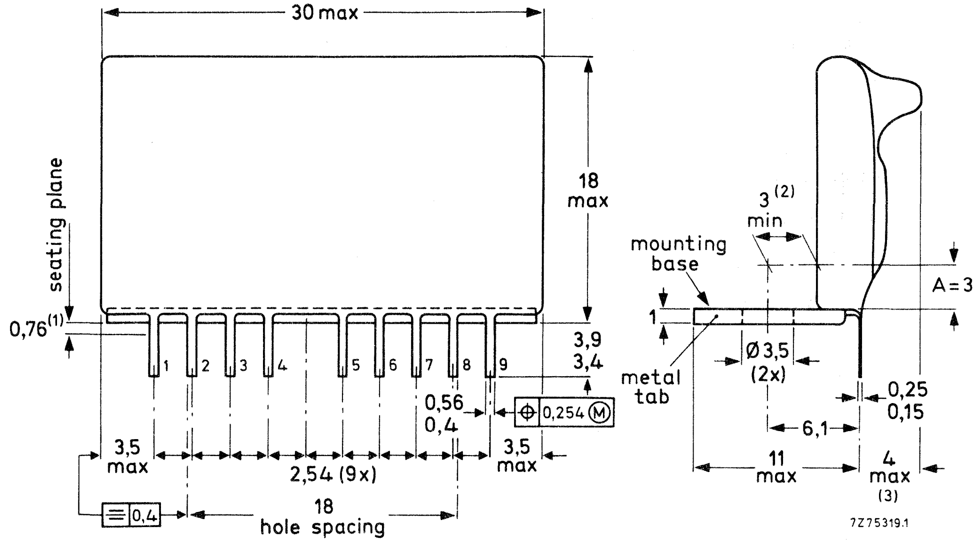
1. When the device is fixed only to a heatsink, not to a printed-circuit board, the values of the second column of the table should be increased by 2 °C and those of the third column decreased by 2 °C.
2. The user is free to realize proper cooling by using differently shaped sinks, or, preferably, by fixing the tab to any convenient part of the equipment (e.g. a wall of the metal cabinet).

heatsink data thickness 1 mm	$T_{mb} - T_{amb}$ °C	$T_{amb\ max}$ °C
Bright aluminium heatsink L-shaped bar, length 100 mm, height 165 mm	24	76
Blackened aluminium heatsink L-shaped bar; length 50 mm, height 70 mm	23	77

MECHANICAL DATA

Dimensions in mm

The amplifier is resin coated and has a metal mounting tab at a right angle to the encapsulation part.



(1) Tolerance applies within this zone.
(2) Distance applies within zone A.
(3) For the OM323A: 3 mm maximum.

Fig. 2 Encapsulation.

Terminal connections

1	= Input
2, 3, 5, 6, 7, 8	= Common, connected to mounting tab
4	= Supply (+)
9	= Output

Soldering recommendations

Hand soldering

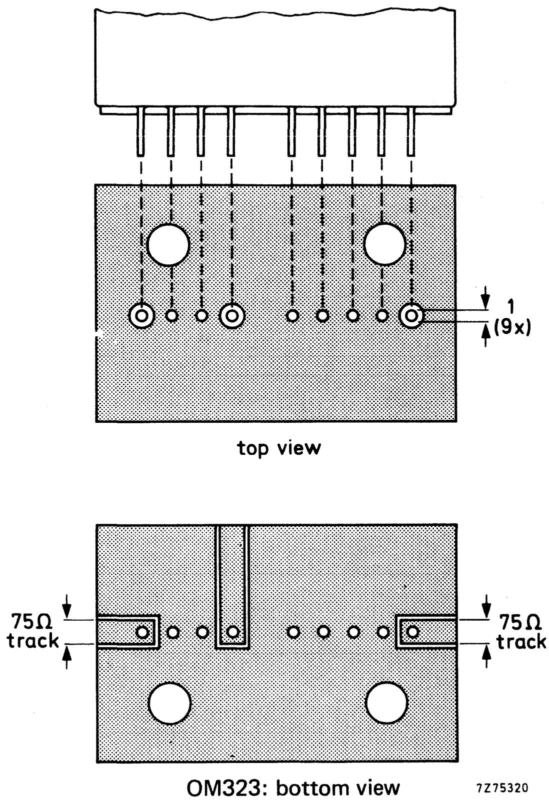
Maximum contact time for a soldering-iron temperature of 260 °C up to the seating plane is 5 s.

Dip or wave soldering

260 °C is the maximum permissible temperature of the solder; it must not be in contact with the joint for more than 5 seconds. The total contact time of successive solder waves must not exceed 5 seconds. The device may be mounted against the printed-circuit board, but the temperature of the device must not exceed 125 °C. If the printed-circuit board has been pre-heated, forced cooling may be necessary immediately after soldering to keep the temperature below the allowable limit.

Mounting recommendations

The module should preferably be mounted on a double-sided printed-circuit board, see the following example. An example is also given of heatsink mounting.
Input and output should be connected to 75 Ω tracks.
The connections to the common pins should be as close to the seating plane as possible.



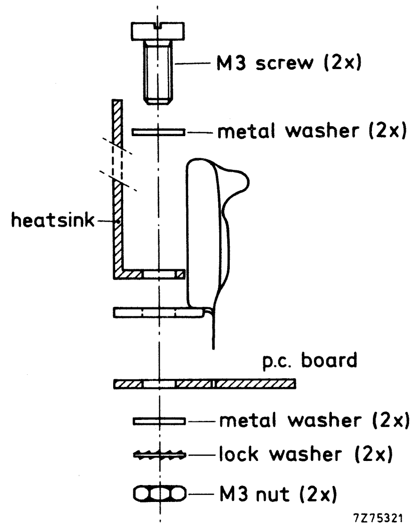
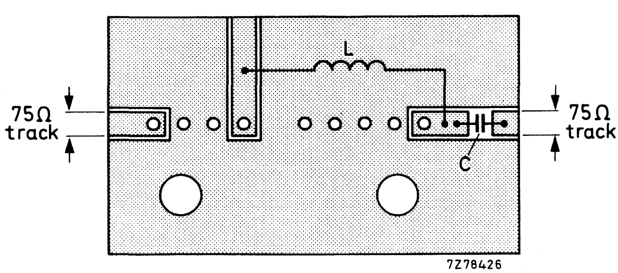


Fig. 4 Example of heatsink mounting.



OM323A: bottom view

L > 5 μH; e.g. catalogue no. 3122 108 20150 or 27 turns enamelled Cu wire (0,3 mm) wound on a ferrite core with a diameter of 1,6 mm.
C > 220 pF ceramic capacitor.

Fig. 3 Printed-circuit board holes and tracks for the OM323 and OM323A.

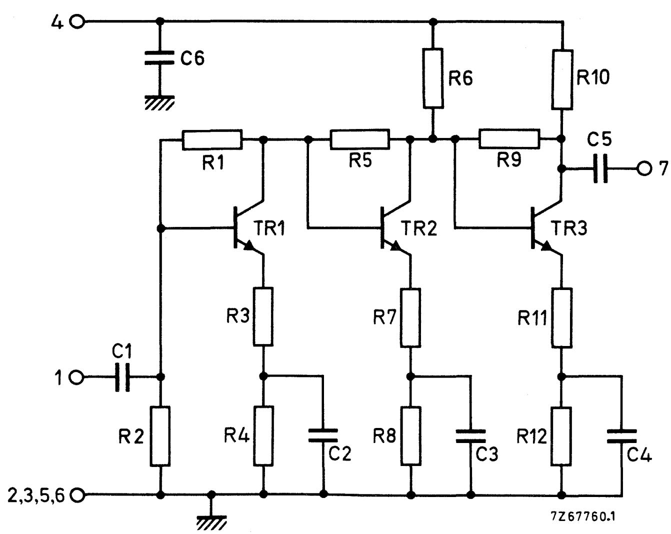
HYBRID VHF/UHF WIDE-BAND AMPLIFIER

Three-stage wide-band amplifier in the hybrid technique, designed for use in mast-head booster-amplifiers, as pre-amplifier in MATV systems, and as general-purpose amplifier for v.h.f. and u.h.f. applications.

QUICK REFERENCE DATA				
Frequency range	f		40 to 860	MHz
Source and load (characteristic) impedance	$R_S = R_\ell = Z_o$	=	75	Ω
Transducer gain	$G_{tr} = \lvert s_f \rvert^2$	typ.	27	dB
Flatness of frequency response	$\pm\Delta \lvert s_f \rvert^2$	typ.	1,6	dB
Output voltage at −60 dB intermodulation distortion (DIN45004, 3-tone)	$V_{o(rms)}$	>	98	dBμV
Noise figure	F	typ.	5,5	dB
D.C. supply voltage	V_B	=	24	V ±10%
Operating ambient temperature	T_{amb}		−20 to +70	°C

ENCAPSULATION 7-pin, in-line, resin-coated body, see MECHANICAL DATA

CIRCUIT DIAGRAM



RATINGS Limiting values in accordance with the Absolute Maximum System (IEC 134)

Operating ambient temperature	T_{amb}		−20 to +70	°C
Storage temperature	T_{stg}		−40 to +125	°C
D.C. supply voltage	V_B	max.	28	V
Peak voltages on pins 1 and 7	V_{1M}, V_{7M}	max.	28	V
	$-V_{1M}$, $-V_{7M}$	max.	10	V
Peak incident powers on pins 1 and 7	P_{I1M}, P_{I7M}	max.	100	mW

CHARACTERISTICS

Measuring conditions

V.H.F.-U.H.F. test socket	catalogue no. 3504 110 01840 *			
Ambient temperature	T_{amb}	=	25	°C
D.C. supply voltage	V_B	=	24	V
Source impedance and load impedance	R_S, R_ℓ	=	75	Ω
Characteristic impedance of h.f. connections	Z_o	=	75	Ω
Frequency range	f	=	40 to 860	MHz

Performance

Supply current	I_B	typ.	35	mA
Transducer gain	$G_{tr} = \|s_f\|^2$		23 to 31	dB
		typ.	27	dB
Flatness of frequency response	$\pm\Delta\|s_f\|^2$	typ.	1,6	dB
Individual maximum v.s.w.r.				
input	$VSWR_{(i)}$	typ.	1,9	**
output	$VSWR_{(o)}$	typ.	3,2	**
Back attenuation				
f = 100 MHz	$\|s_r\|^2$	typ.	46	dB
f = 860 MHz	$\|s_r\|^2$	typ.	40	dB
Output voltage at −60 dB intermodulation distortion (DIN45004, par. 6.3: 3-tone)	$V_{o(rms)}$	>	98	dBμV
		typ.	101	dBμV
Noise figure	F	typ.	5,5	dB

s-parameters:	$s_f = s_{21}$	$s_i = s_{11}$
	$s_r = s_{12}$	$s_o = s_{22}$

* This socket can be made available for customer reference purposes.

** Highest value, for a sample, occurring in the frequency range.

OPERATING CONDITIONS

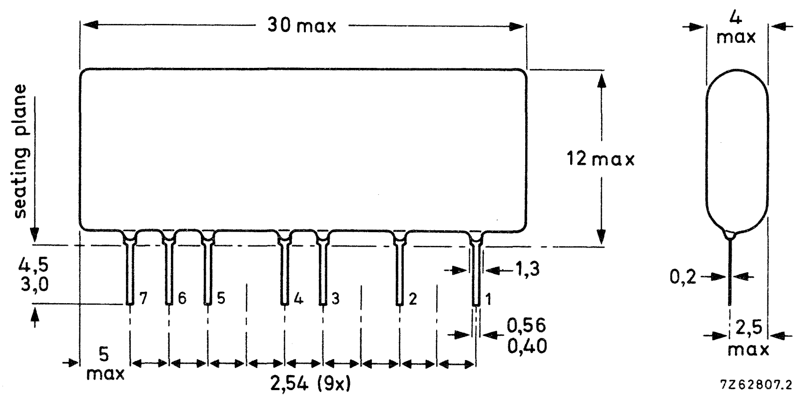
Ambient temperature range	T_{amb}		−20 to +70	°C
D.C. supply voltage	V_B	=	24	V ±10%
Frequency range	f		40 to 860	MHz
Source impedance and load impedance	R_S, R_ℓ	=	75	Ω

MECHANICAL DATA

Dimensions in mm

Encapsulation

The device is resin coated.



Terminal connections

1	= Input
2, 3, 5, 6	= Common
4	= Supply (+)
7	= Output

Soldering recommendations

Hand soldering

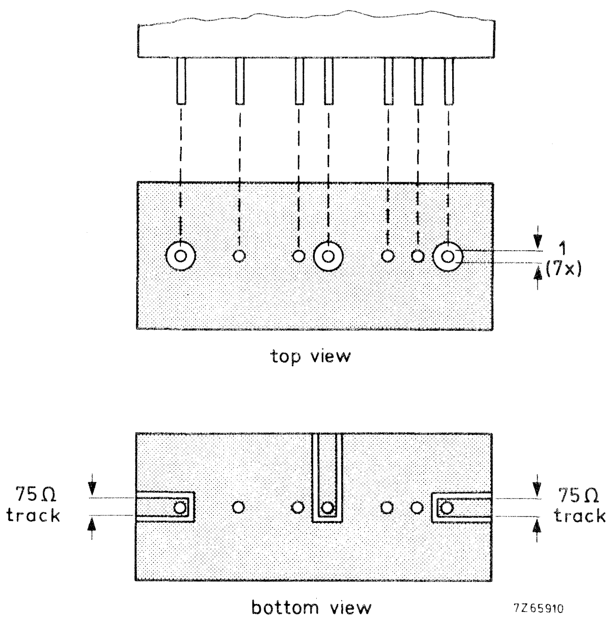
Maximum contact time for a soldering-iron temperature of 260 °C; up to seating plane: 5 s

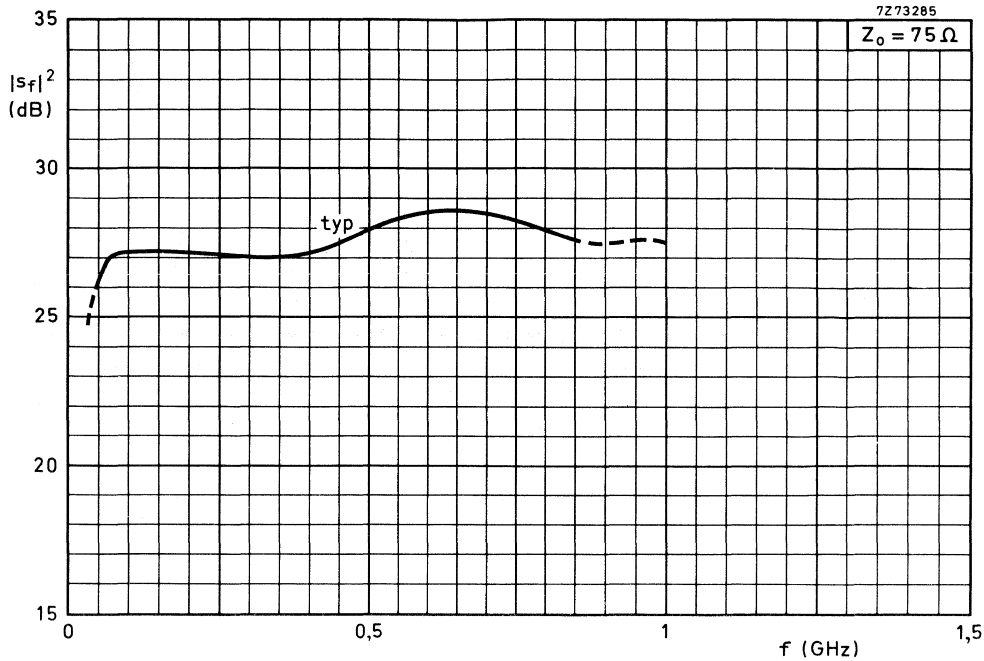
Dip or wave soldering

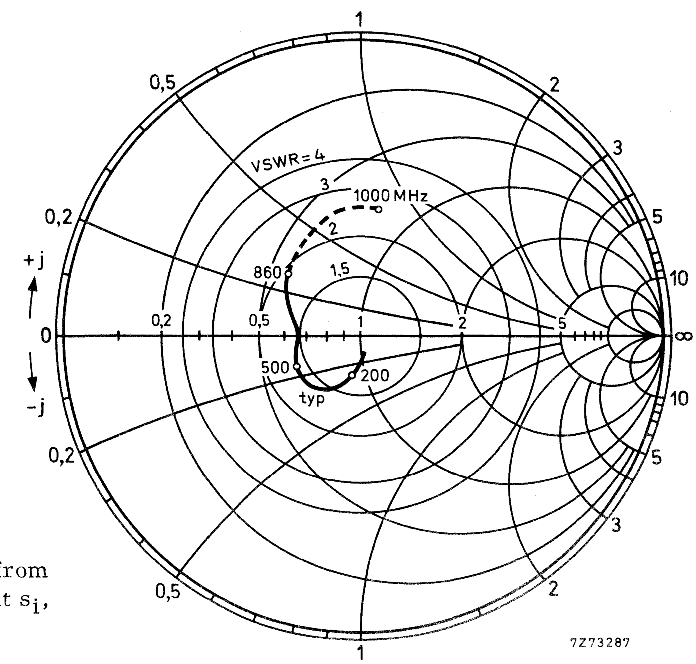
260 °C is the maximum permissible temperature of the solder; it must not be in contact with the joint for more than 5 seconds. The total contact time of successive solder waves must not exceed 5 seconds.
The device may be mounted against the printed-circuit board, but the temperature of the device must not exceed 125 °C. If the printed-circuit board has been pre-heated, forced cooling may be necessary immediately after soldering to keep the temperature below the allowable limit.

Mounting recommendations

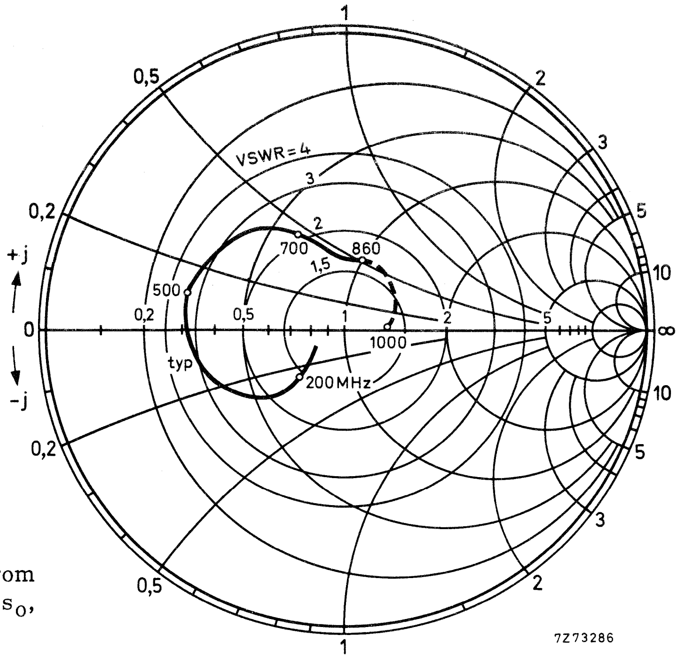
The module should preferably be mounted on double-sided printed-circuit board, see the example shown below.
Input and output should be connected to 75 Ω tracks.
The connections to the "common" pins should be as close to the seating plane as possible.







Input impedance derived from input reflection coefficient s_i, co-ordinates in ohm x 75.



Output impedance derived from output reflection coefficient s_o, co-ordinates in ohm x 75.

HYBRID VHF/UHF WIDE-BAND AMPLIFIER

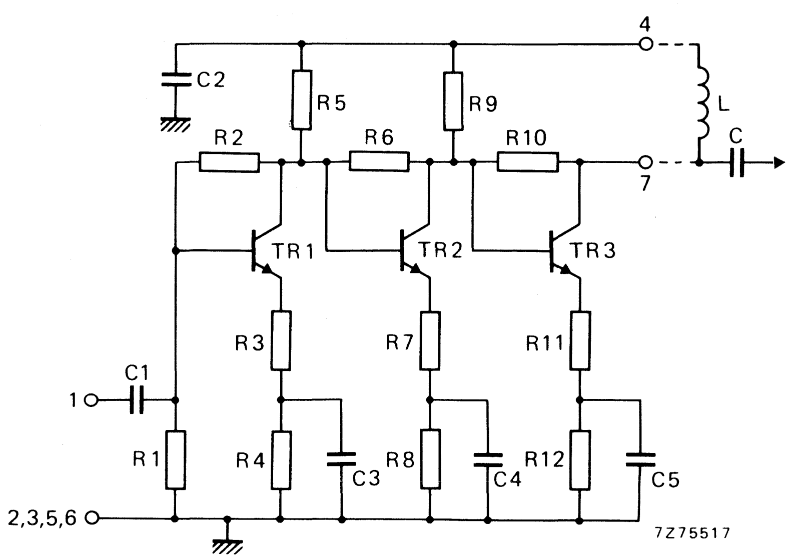
Three-stage wide-band amplifier in the hybrid technique, designed for use in mast-head booster-amplifiers, as preamplifier in MATV systems, and as general-purpose amplifier for v.h.f. and u.h.f. applications.

QUICK REFERENCE DATA

Frequency range	f		40 to 860	MHz
Source and load (characteristic) impedance	$R_s = R_\ell = Z_o$	=	75	Ω
Transducer gain	$G_{tr} = \|s_f\|^2$	typ.	22	dB
Flatness of frequency response	$\pm\Delta\|s_f\|^2$	typ.	1,0	dB
Output voltage at −60 dB intermodulation distortion (DIN 45004, 3-tone)	$V_{o(rms)}$	>	105	dBμV
Noise figure	F	typ.	7	dB
D.C. supply voltage	V_B	=	24	V ±10%
Operating ambient temperature	T_{amb}		−20 to +70	°C

ENCAPSULATION 7-pin, in-line, resin-coated body, see MECHANICAL DATA

CIRCUIT DIAGRAM



RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

Operating ambient temperature	T_{amb}		−20 to +70	°C
Storage temperature	T_{stg}		−40 to +125	°C
D.C. supply voltage	V_B	max.	28	V
Peak voltages on pins 1 and 7	V_{1M}, V_{7M}	max.	28	V
	$-V_{1M}$, $-V_{7M}$	max.	10	V
Peak incident powers on pins 1 and 7	P_{I1M}, P_{I7M}	max.	100	mW

CHARACTERISTICS

Measuring conditions

V.H.F.-U.H.F. test socket	catalogue no. 3504 110 01840 *			
Ambient temperature	T_{amb}	=	25	°C
D.C. supply voltage	V_B	=	24	V
Source impedance and load impedance	R_s, R_ℓ	=	75	Ω
Characteristic impedance of h.f. connections	Z_o	=	75	Ω
Frequency range	f	=	40 to 860	MHz

Performance

Supply current	I_B	typ.	65	mA
Transducer gain	$G_{tr} = \|s_f\|^2$		20 to 24	dB
		typ.	22	dB
Flatness of frequency response	$\pm\Delta\|s_f\|^2$	typ.	1,0	dB
Individual maximum v.s.w.r.				
input	$VSWR_{(i)}$	typ.	1,4	**
output	$VSWR_{(o)}$	typ.	1,6	**
Back attenuation				
f = 100 MHz	$\|s_r\|^2$	typ.	42	dB
f = 860 MHz	$\|s_r\|^2$	typ.	40	dB
Output voltage at −60 dB intermodulation distortion (DIN 45004, par. 6.3: 3-tone)	$V_{o(rms)}$	>	105	dBμV
		typ.	107	dBμV
Noise figure	F	typ.	7	dB

s-parameters:	$s_f = s_{21}$	$s_i = s_{11}$
	$s_r = s_{12}$	$s_o = s_{22}$

* This socket can be made available for customer reference purposes.
** Highest value, for a sample, occurring in the frequency range.

OPERATING CONDITIONS

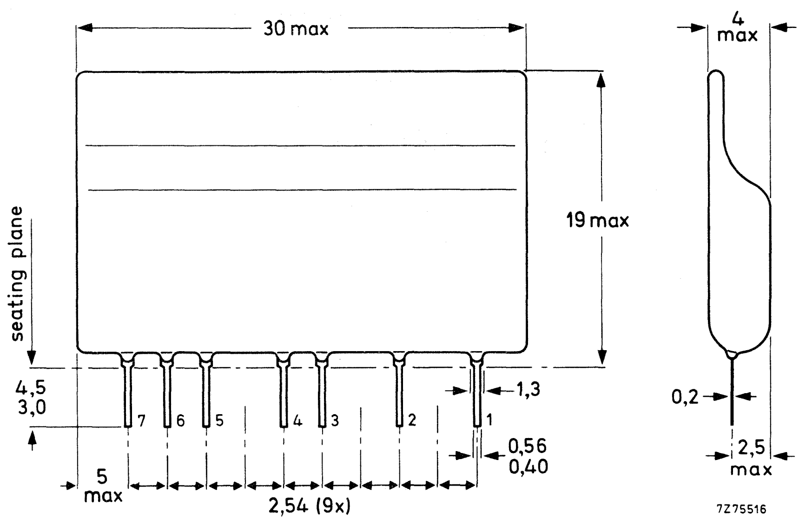
Ambient temperature range	T_{amb}	−20 to +70 °C
D.C. supply voltage	V_B	= 24 V ±10%
Frequency range	f	40 to 860 MHz
Source impedance and load impedance	R_s, R_ℓ	= 75 Ω

MECHANICAL DATA

Dimensions in mm

Encapsulation

The device is resin coated.



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Terminal connections

1 = Input
2, 3, 5, 6 = Common
4 = Supply (+)
7 = Output.

Soldering recommendations

Hand soldering

Maximum contact time for a soldering-iron temperature of 260 °C up to the seating plane is 5 s.

Dip or wave soldering

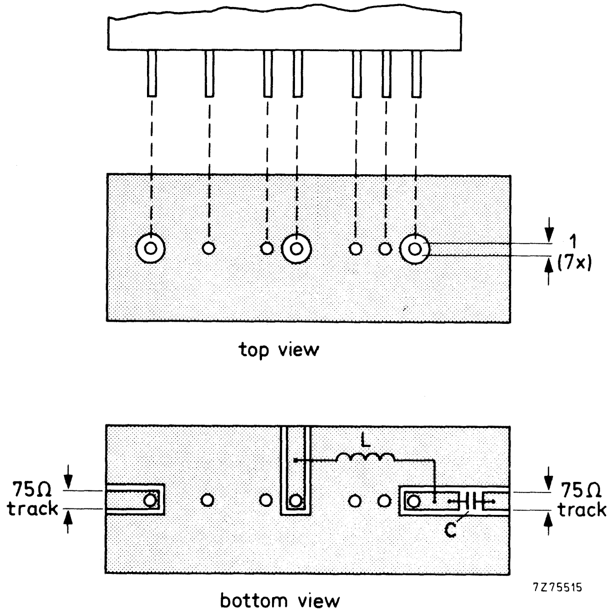
260 °C is the maximum permissible temperature of the solder; it must not be in contact with the joint for more than 5 seconds. The total contact time of successive solder waves must not exceed 5 seconds. The device may be mounted against the printed-circuit board, but the temperature of the device must not exceed 125 °C. If the printed-circuit board has been pre-heated, forced cooling may be necessary immediately after soldering to keep the temperature below the allowable limit.

Mounting recommendations

The module should preferably be mounted on double-sided printed-circuit board, see the example shown below.

Input and output should be connected to 75 Ω tracks.

The connections to the 'common' pins should be as close to the seating plane as possible.



$L > 5\ \mu H$; e.g. catalogue no. 3122 108 20150 or 27 turns enamelled Cu wire (0,3 mm) wound on a ferrite core with a diameter of 1,6 mm.

$C > 220$ pF ceramic capacitor.

HYBRID V.H.F./U.H.F. WIDE-BAND AMPLIFIER

Three-stage wide-band amplifier in the hybrid technique, designed for use in MATV systems, and as general purpose amplifier for v.h.f. and u.h.f. applications requiring a high output level.
The OM337A needs an external collector-coil and blocking capacitor, whereas, the OM337 has these components built-in.

QUICK REFERENCE DATA

Frequency range	f		40 to 860	MHz
Source and load (characteristic) impedance	$R_s = R_\ell = Z_o$	=	75	Ω
Transducer gain	$G_{tr} = \|s_f\|^2$	typ.	26	dB
Flatness of frequency response	$\pm\Delta \|s_f\|^2$	typ.	1	dB
Output voltage at −60 dB intermodulation distortion (DIN45004, 3-tone); f = 470 MHz	$V_{o(rms)}$	typ.	112	dBμV
Noise figure	F	typ.	9,8	dB
D.C. supply voltage	V_B	=	24	V ± 10%
Operating mounting-base temperature	T_{mb}		−30 to +100	°C

ENCAPSULATION 9-pin, in-line, resin-coated body on a right-angled metal mounting tab, see MECHANICAL DATA

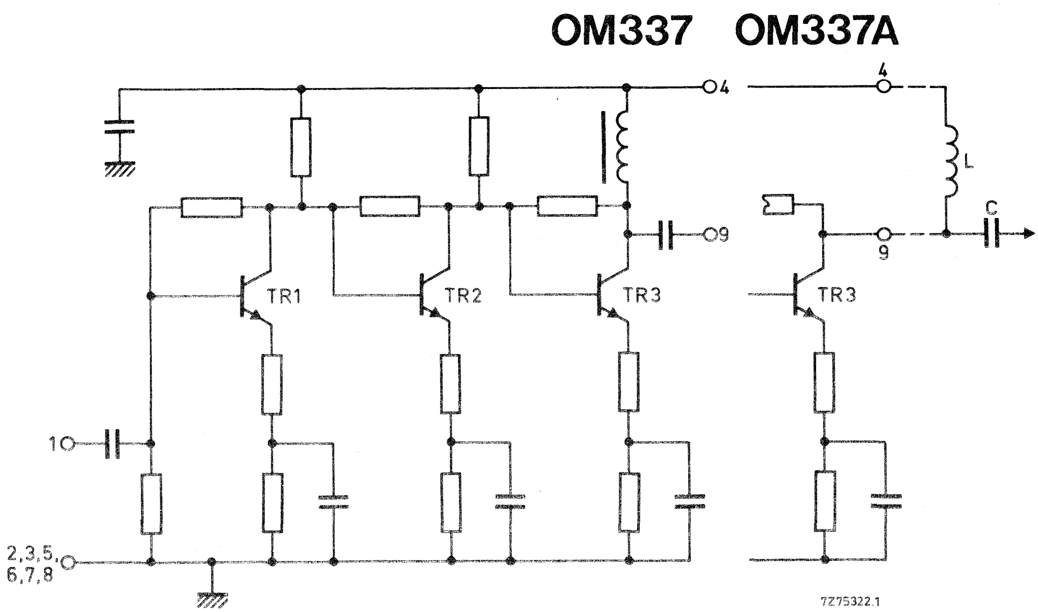


Fig. 1 Circuit diagram.

RATINGS Limiting values in accordance with the Absolute Maximum System (IEC134)

Operating mounting-base temperature	T_{mb}		−30 to +100	°C
Storage temperature	T_{stg}		−40 to +125	°C
D.C. supply voltage	V_B	max.	28	V
Peak voltages on pin 1	V_{1M}	max.	28	V
	$-V_{1M}$	max.	24	V
Peak voltages on pin 9	V_{9M}	max.	28	V
	$-V_{9M}$	max.	4	V
Peak incident powers on pins 1 and 9	P_{I1M}, P_{I9M}	max.	100	mW

CHARACTERISTICS

Measuring conditions

V.H.F.—U.H.F. test socket	catalogue no.		3504 110 01830*	
Mounting base temperature	T_{mb}	=	25	°C
D.C. supply voltage	V_B	=	24	V
Source impedance and load impedance	R_s, R_ℓ	=	75	Ω
Characteristic impedance of h.f. connections	Z_o	=	75	Ω
Frequency range	f	=	40 to 860	MHz

Performance

Supply current	I_B		110 to 120	mA
		typ.	115	mA
Transducer gain	$G_{tr} = \lvert s_f \rvert^2$		23 to 29	dB
		typ.	26	dB
Flatness of frequency response	$\pm\Delta \lvert s_f \rvert^2$	typ.	1	dB
Individual maximum v.s.w.r.				
input	$VSWR_{(i)}$	typ.	2,3	**
output	$VSWR_{(o)}$	typ.	1,8	**
Back attenuation				
f = 100 MHz	$\lvert s_r \rvert^2$	typ.	44	dB
f = 650 MHz	$\lvert s_r \rvert^2$	typ.	41	dB
f = 860 MHz	$\lvert s_r \rvert^2$	typ.	43	dB

* This socket can be made available for customer reference purposes.
** Highest value, for a sample, occurring in the frequency range.

Output voltage			
at −60 dB intermodulation distortion			
(DIN45004, par. 6.3: 3-tone)		>	113 dBμV
f = 40–230 MHz	$V_{o(rms)}$	typ.	114 dBμV
f = 470 MHz	$V_{o(rms)}$	typ.	112 dBμV
f = 860 MHz	$V_{o(rms)}$	typ.	110 dBμV
Noise figure			
channel 2	F	typ.	7 dB
channel 65	F	typ.	9,8 dB

s-parameters:	$s_f = s_{21}$	$s_i = s_{11}$
	$s_r = s_{12}$	$s_o = s_{22}$

OPERATING CONDITIONS

Mounting-base temperature range	T_{mb}		−30 to +100 °C
D.C. supply voltage	V_B	=	24 V ± 10%
Frequency range	f		40 to 860 MHz
Source impedance and load impedance	R_s, R_ℓ	=	75 Ω

THERMAL DATA

a. The maximum permissible temperature at the mounting base is 100 °C.

b. When the mounting tab is screwed to a double-sided printed-circuit board with dimensions 37 mm x 51 mm, its temperature will be 57 °C above the temperature of the surrounding free air.

c. When a heatsink is fixed to the mounting tab and the pins are soldered into a double-sided printed-circuit board with dimensions 37 mm x 51 mm, the tab will reach the temperatures stated in the following table.

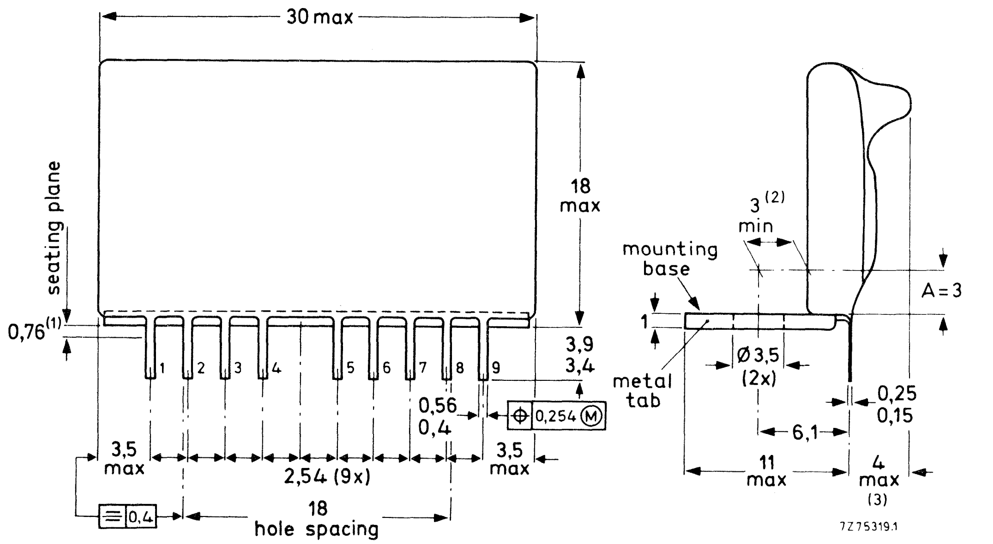
Notes:
1. When the device is fixed only to a heatsink, not to a printed-circuit board, the values of the second column of the table should be increased by 2 °C and those of the third column decreased by 2 °C.
2. The user is free to realize proper cooling by using differently shaped sinks, or, preferably, by fixing the tab to any convenient part of the equipment (e.g. a wall of the metal cabinet).

heatsink data thickness 1 mm	$T_{mb} - T_{amb}$ °C	$T_{amb\,max}$ °C
Bright aluminium heatsink L-shaped bar; length 100 mm, height 65 mm	27,5	72,5
Blackened aluminium heatsink L-shaped bar; length 50 mm, height 70 mm	26,5	73,5

MECHANICAL DATA

Dimensions in mm

The amplifier is resin coated and has a metal mounting tab at a right angle to the encapsulated part.



(1) Tolerance applies within this zone.
(2) Distance applies within zone A.
(3) For the OM337A: 3 mm maximum.

Fig. 2 Encapsulation.

Terminal connections

1	=	Input
2, 3, 5, 6, 7, 8	=	Common, connected to mounting tab
4	=	Supply (+)
9	=	Output

Soldering recommendations

Hand soldering

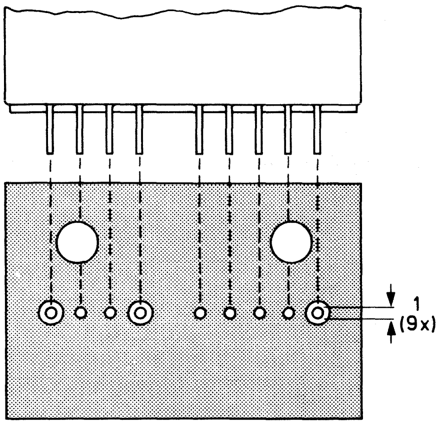
Maximum contact time for a soldering-iron temperature of 260 °C up to the seating plane is 5 s.

Dip or wave soldering

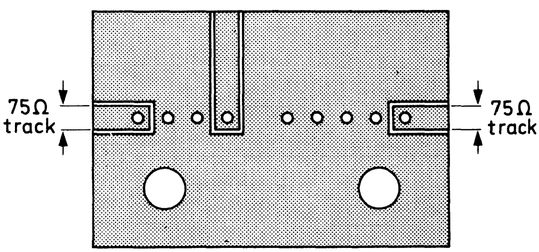
260 °C is the maximum permissible temperature of the solder; it must not be in contact with the joint for more than 5 seconds. The total contact time of successive solder waves must not exceed 5 seconds. The device may be mounted against the printed-circuit board, but the temperature of the device must not exceed 125 °C. If the printed-circuit board has been pre-heated, forced cooling may be necessary immediately after soldering to keep the temperature below the allowable limit.

Mounting recommendations

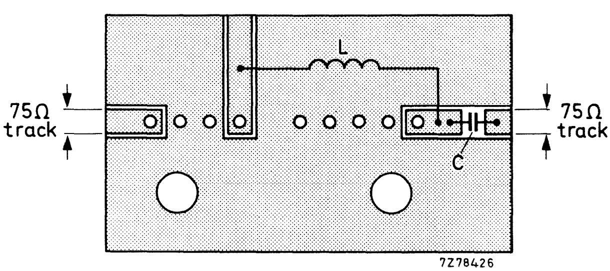
The module should preferably be mounted on a double-sided printed-circuit board, see the following example. An example is also given of heatsink mounting.
Input and output should be connected to 75 Ω tracks.
The connections to the common pins should be as close to the seating plane as possible.



top view



OM337: bottom view.



OM337A: bottom view.

Fig. 3 Printed-circuit board holes and tracks for the OM337 and OM337A.

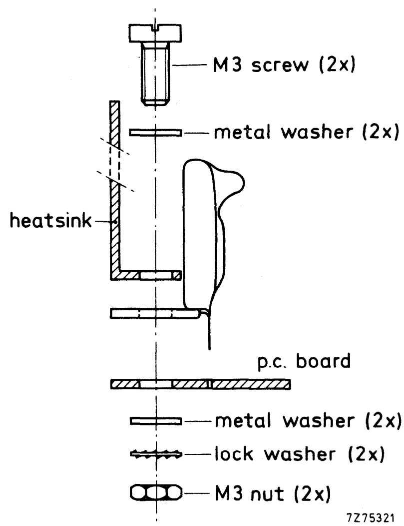


Fig. 4 Example of heatsink mounting.

L > 5 μH; e.g. catalogue no. 3122 108 20150 or 27 turns enamelled Cu wire (0,3 mm) wound on a ferrite core with a a diameter of 1,6 mm.
C > 220 pF ceramic capacitor.

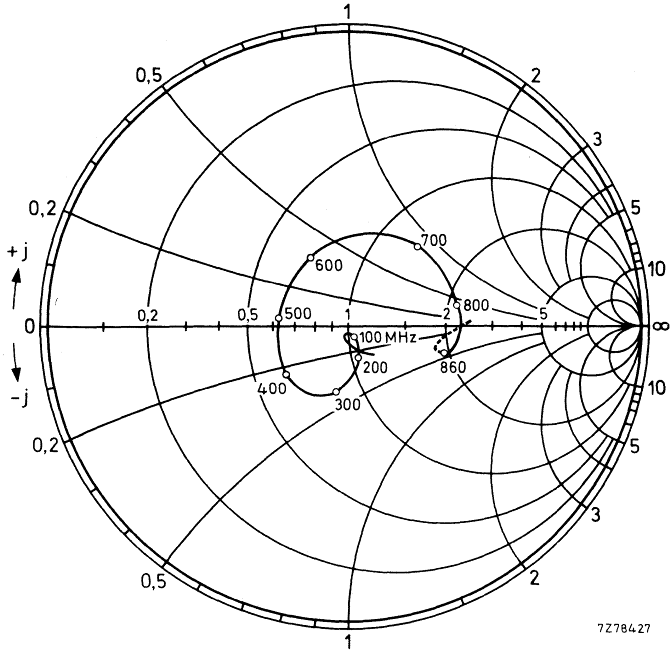


Fig. 5 Input impedance derived from input reflection coefficient s_i, co-ordinates in ohm x 75; typical values.

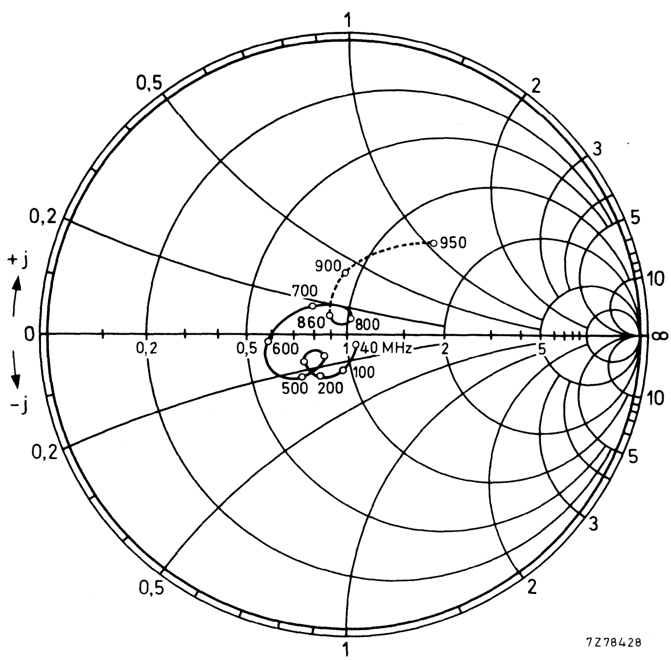


Fig. 6 Output impedance derived from output reflection coefficient s_o, co-ordinates in ohm x 75; typical values.

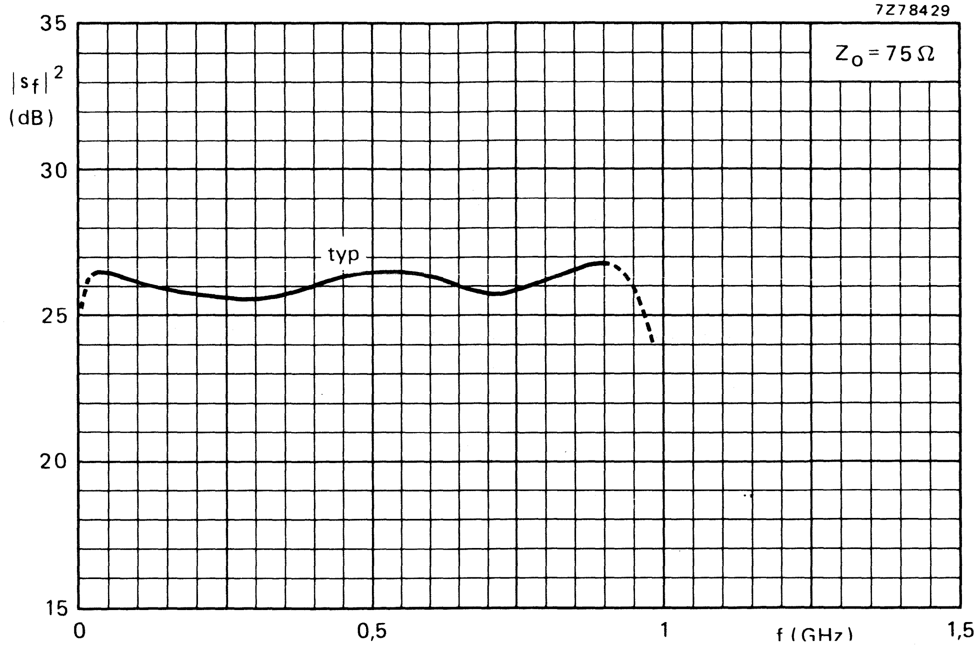


Fig. 7 Transducer gain as a function of frequency.

HYBRID INTEGRATED CIRCUIT VHF/UHF WIDE-BAND AMPLIFIER

Three-stage wide-band amplifier in the hybrid integrated circuit technique, designed for use in mast-head booster-amplifiers, as amplifier in MATV systems, and as general-purpose amplifier for v.h.f. and u.h.f. applications.

QUICK REFERENCE DATA

Frequency range	f		40 to 860	MHz
Source and load (characteristic) impedance	$R_S = R_\ell = Z_o$	=	75	Ω
Transducer gain	$G_{tr} = \|s_f\|^2$	typ.	28	dB
Flatness of frequency response	$\pm\Delta\|s_f\|^2$	typ.	1,5	dB
Output voltage at −60 dB intermodulation distortion (DIN 45004, 3-tone)	$V_{o(rms)}$	>	105	dBμV
Noise figure	F	typ.	6	dB
D.C. supply voltage	V_B	=	24	V ±10%
Operating ambient temperature	T_{amb}		−20 to +70	°C

ENCAPSULATION 7-pin, in-line, resin-coated body, see MECHANICAL DATA (Fig. 2)

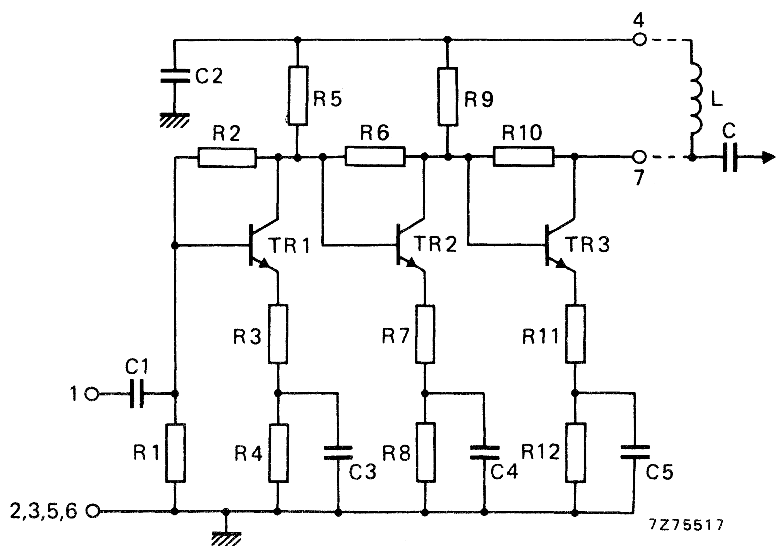


Fig. 1 Circuit diagram.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

Operating ambient temperature	T_{amb}	−20 to +70	°C
Storage temperature	T_{stg}	−40 to +125	°C
D.C. supply voltage	V_B	max. 28	V
Peak voltages on pins 1 and 7	V_{1M}, V_{7M}	max. 28	V
	$-V_{1M}, -V_{7M}$	max. 10	V
Peak incident powers on pins 1 and 7	P_{I1M}, P_{I7M}	max. 100	mW

CHARACTERISTICS

Measuring conditions

V.H.F.-U.H.F. test socket	catalogue no. 3504 110 01840 *		
Ambient temperature	T_{amb}	= 25	°C
D.C. supply voltage	V_B	= 24	V
Source impedance and load impedance	R_s, R_ℓ	= 75	Ω
Characteristic impedance of h.f. connections	Z_o	= 75	Ω
Frequency range	f	= 40 to 860	MHz

Performance

Supply current	I_B	typ. 67	mA
Transducer gain	$G_{tr} = \|s_f\|^2$	25 to 30	dB
		typ. 28	dB
Flatness of frequency response	$\pm\Delta\|s_f\|^2$	typ. 1,5	dB
Individual maximum v.s.w.r.			
input	$VSWR_{(i)}$	typ. 1,5	**
output	$VSWR_{(o)}$	typ. 1,5	**
Back attenuation			
f = 100 MHz	$\|s_r\|^2$	typ. 46	dB
f = 860 MHz	$\|s_r\|^2$	typ. 31	dB
Output voltage at −60 dB intermodulation distortion (DIN 45004, par. 6.3: 3-tone)	$V_{o(rms)}$	> 105	dBμV
		typ. 107	dBμV
Noise figure	F	typ. 6	dB

s-parameters:	$s_f = s_{21}$	$s_i = s_{11}$
	$s_r = s_{12}$	$s_o = s_{22}$

* This socket can be made available for customer reference purposes.

** Highest value, for a sample, occurring in the frequency range.

OPERATING CONDITIONS

Ambient temperature range	T_{amb}	−20 to +70 °C
D.C. supply voltage	V_B	= 24 V ±10%
Frequency range	f	40 to 860 MHz
Source impedance and load impedance	R_s, R_ℓ	= 75 Ω

MECHANICAL DATA

Dimensions in mm

The device is resin coated.

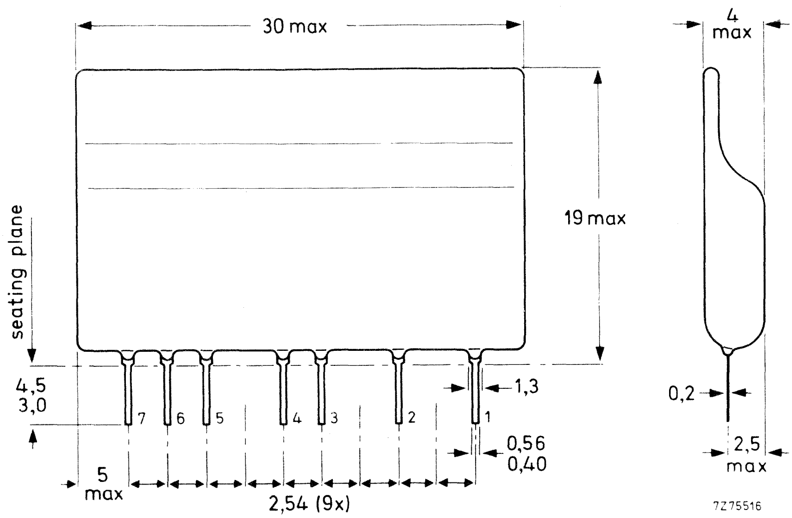


Fig. 2 Encapsulation.

Terminal connections

1 = input
2, 3, 5, 6 = common
4 = supply (+)
7 = output

Soldering recommendations

Hand soldering

Maximum contact time for a soldering-iron temperature of 260 °C up to the seating plane is 5 s.

Dip or wave soldering

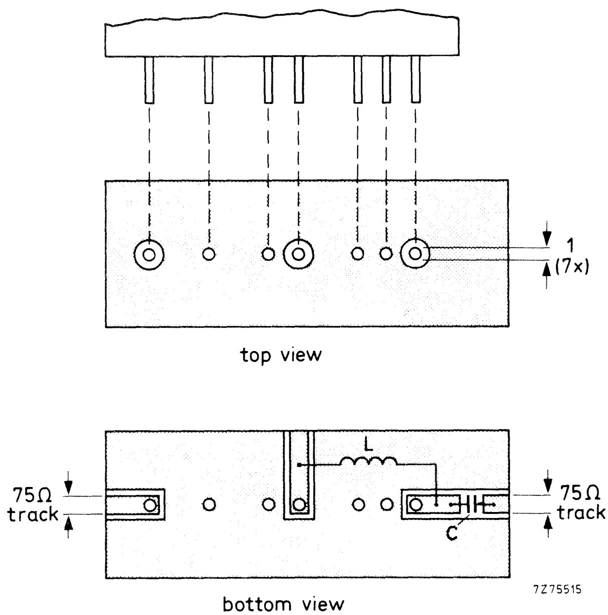
260 °C is the maximum permissible temperature of the solder; it must not be in contact with the joint for more than 5 seconds. The total contact time of successive solder waves must not exceed 5 seconds. The device may be mounted against the printed-circuit board, but the temperature of the device must not exceed 125 °C. If the printed-circuit board has been pre-heated, forced cooling may be necessary immediately after soldering to keep the temperature below the allowable limit.

Mounting recommendations

The module should preferably be mounted on double-sided printed-circuit board, see the example shown below.

Input and output should be connected to 75 Ω tracks.

The connections to the 'common' pins should be as close to the seating plane as possible.



L > 5 μH; e.g. catalogue no. 3122 108 20150 or 27 turns enamelled Cu wire (0,3 mm) wound on a ferrite core with a diameter of 1,6 mm.
C > 220 pF ceramic capacitor.

Fig. 3 Printed-circuit board holes and tracks.

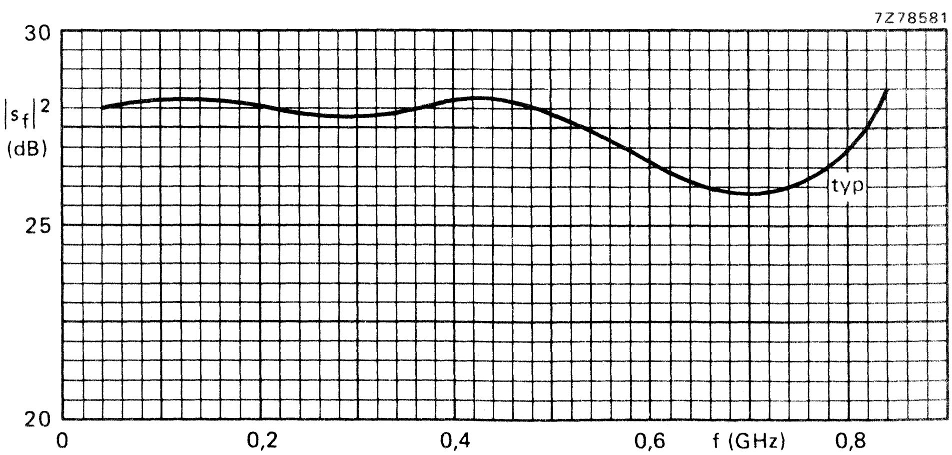


Fig. 4 Transducer gain as a function of frequency; Z_o = 75 Ω.

HYBRID INTEGRATED CIRCUIT VHF/UHF WIDE-BAND AMPLIFIER

One-stage wide-band amplifier in hybrid integrated circuit technique on a thin-film substrate, intended for aerial amplifiers in car radios, caravans or RATV and MATV applications.

QUICK REFERENCE DATA

D.C. supply voltage	V_B	=	12	V ± 10%
Frequency range	f		40 to 860	MHz
Source and load (characteristic) impedance	$R_s = R_\ell = Z_o$	=	75	Ω
Transducer gain	$G_{tr} = \lvert s_f \rvert^2$	typ.	12	dB
Flatness of frequency response	$\pm \Delta \lvert s_f \rvert^2$	typ.	1	dB
Output voltage at −60 dB intermodulation distortion (DIN 45004, 3-tone)	$V_{o(rms)}$	typ.	99	dBμV
Noise figure	F	typ.	5,5	dB
Operating ambient temperature	T_{amb}		−20 to + 70	°C

ENCAPSULATION 5-pin, in-line, resin-coated body, see MECHANICAL DATA (Fig. 2)

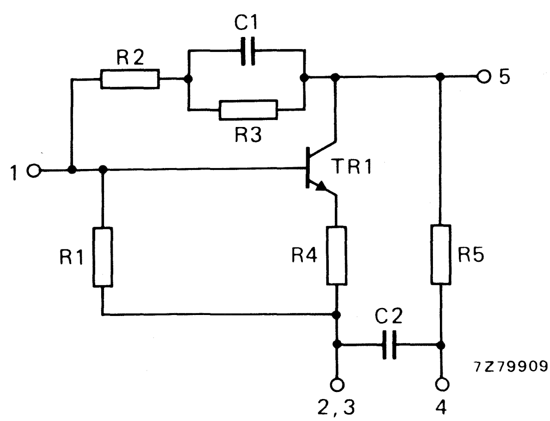


Fig. 1 Circuit diagram.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

Operating ambient temperature	T_{amb}		−20 to +70	°C
Storage temperature	T_{stg}		−40 to +125	°C
D.C. supply voltage	V_B	max.	15	V
Peak incident powers on pins 1 and 5	P_{I1M}, P_{I5M}	max.	100	mW

CHARACTERISTICS

Measuring conditions

Ambient temperature	T_{amb}	=	25	°C
D.C. supply voltage	V_B	=	12	V
Source impedance and load impedance	R_s, R_ℓ	=	75	Ω
Characteristic impedance of h.f. connections	Z_o	=	75	Ω
Frequency range	f	=	40 to 860	MHz

Performance

Supply current	I_B	typ.	11,5	mA
Transducer gain	$G_{tr} = \|s_f\|^2$	typ.	12	dB
Flatness of frequency response	$\pm \Delta \|s_f\|^2$	typ.	1	dB
Individual maximum v.s.w.r.				
input	$VSWR_{(i)}$	typ.	2,0	*
output	$VSWR_{(o)}$	typ.	1,4	*
Back attenuation				
f = 100 MHz	$\|s_r\|^2$	typ.	22	dB
f = 860 MHz	$\|s_r\|^2$	typ.	19	dB
Output voltage at −60 dB intermodulation distortion (DIN 45004, par. 6.3: 3-tone)	$V_{o(rms)}$	typ.	99	dBμV
Noise figure	F	typ.	5,5	dB

s-parameters:	$s_f = s_{21}$	$s_i = s_{11}$
	$s_r = s_{12}$	$s_o = s_{22}$

* Highest value, for a sample, occuring in the frequency range.

OPERATING CONDITIONS

Ambient temperature range	T_{amb}		−20 to + 70 °C
D.C. supply voltage	V_B	=	12 V ±10%
Frequency range	f		40 to 860 MHz
Source impedance and load impedance	R_s, R_ℓ	=	75 Ω

MECHANICAL DATA

Dimensions in mm

The device is resin coated.

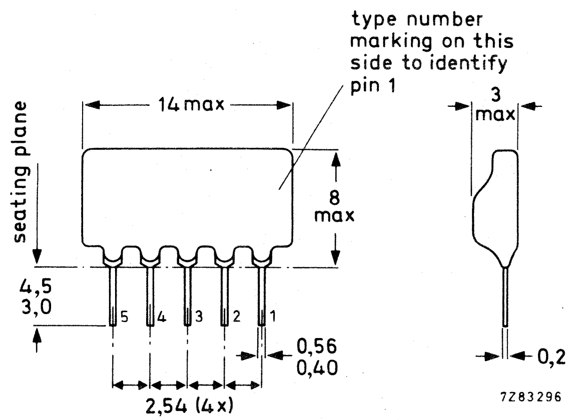


Fig. 2 Encapsulation.

Terminal connections

1	=	input
2,3	=	common
4	=	supply (+)
5	=	output

Soldering recommendations

Hand soldering

Maximum contact time for a soldering-iron temperature of 260 °C up to the seating plane is 5 s.

Dip or wave soldering

260 °C is the maximum permissible temperature of the solder; it must not be in contact with the joint for more than 5 seconds. The total contact time of successive solder waves must not exceed 5 seconds. The device may be mounted against the printed-circuit board, but the temperature of the device must not exceed 125 °C. If the printed-circuit board has been pre-heated, forced cooling may be necessary immediately after soldering to keep the temperature below the allowable limit.

Mounting recommendations

The module should preferably be mounted on double-sided printed-circuit board, see the example shown below.

Input and output should be connected to 75 Ω tracks.

The connections to the 'common' pins should be as close to the seating plane as possible.

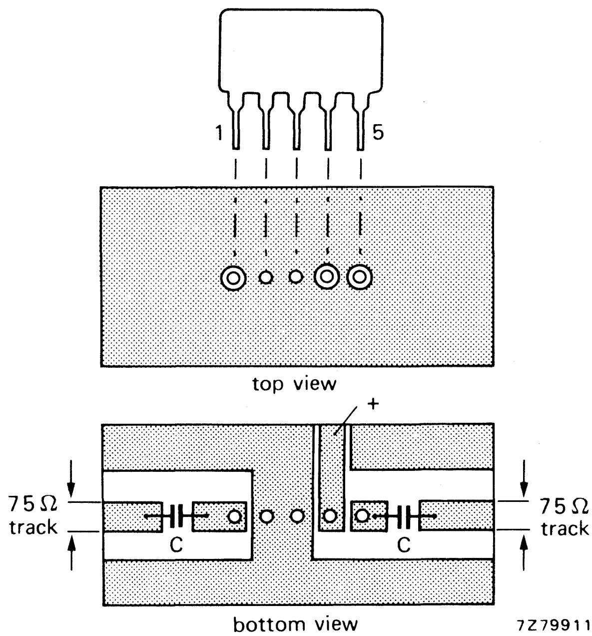


Fig. 3 Printed-circuit board holes and tracks.
C > 220 pF ceramic capacitor.

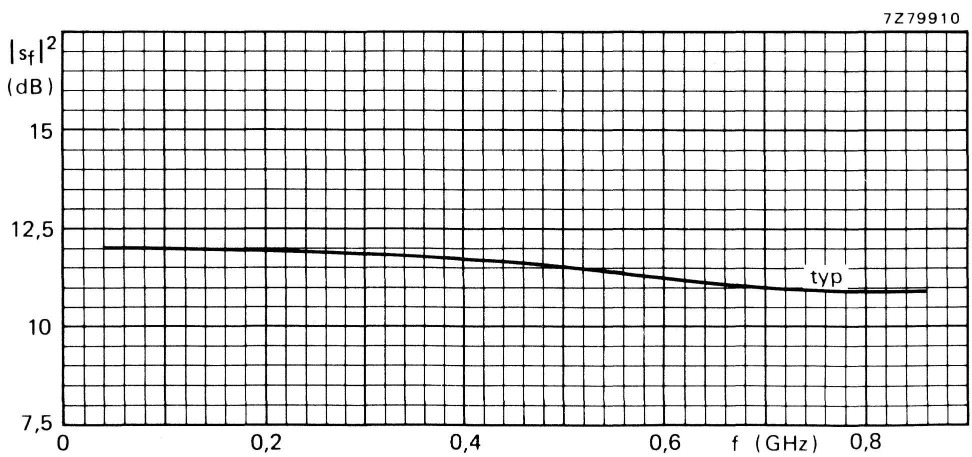


Fig. 4 Transducer gain as a function of frequency; Z_o = 75 Ω.

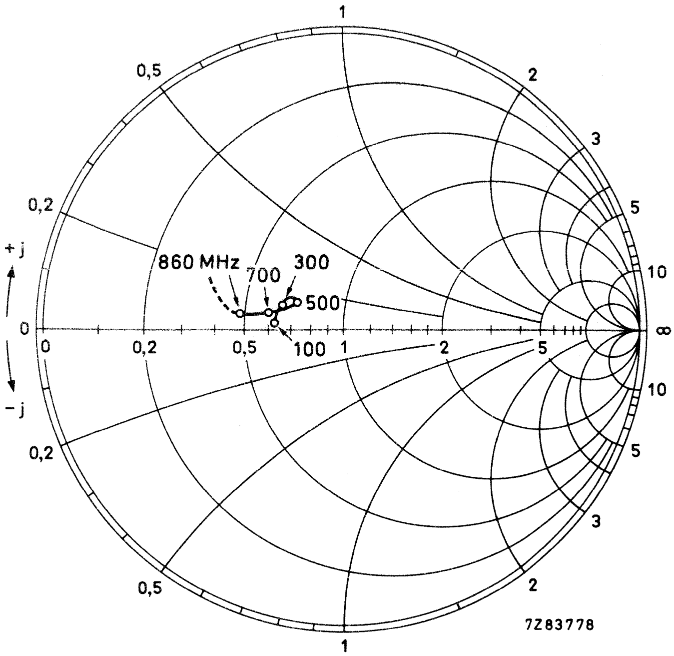


Fig. 5 Input impedance derived from input reflection coefficient s_i, co-ordinates in ohm x 75; typical values.

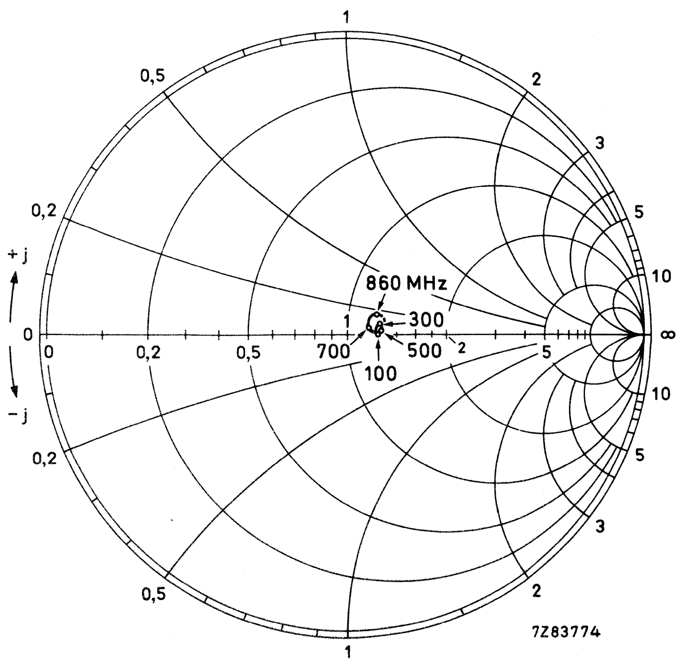


Fig. 6 Output impedance derived from output reflection coefficient s_o, co-ordinates in ohm x 75; typical values.

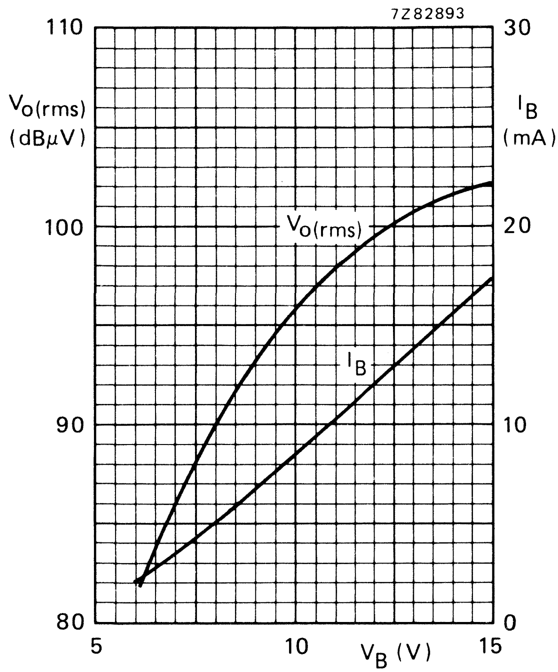


Fig. 7 Output voltage and supply current as a function of the supply voltage; typical values.

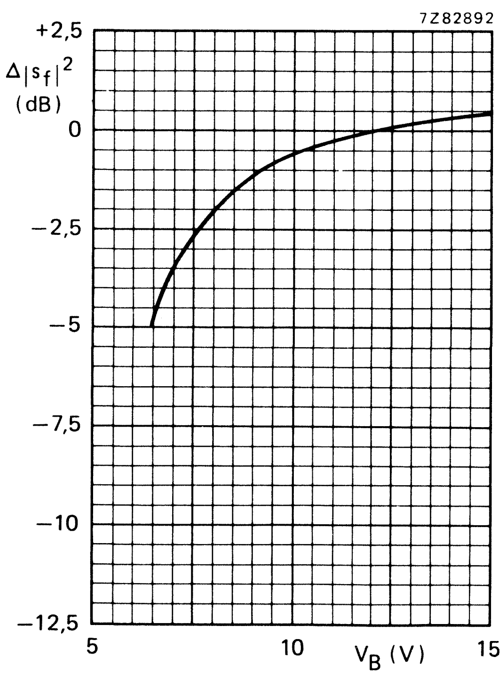


Fig. 8 Variation of transducer gain with supply voltage; reference 0 dB at 12 V; f = 100 to 860 MHz; typical values.

HYBRID INTEGRATED CIRCUIT VHF/UHF WIDE-BAND AMPLIFIER

Two-stage wide-band amplifier in hybrid integrated circuit technique on a thin-film substrate, intended for RATV and MATV applications.

QUICK REFERENCE DATA

D.C. supply voltage	V_B	=	12	V ± 10%
Frequency range	f		40 to 860	MHz
Source and load (characteristic) impedance	$R_s = R_\ell = Z_o$	=	75	Ω
Transducer gain	$G_{tr} = \|s_f\|^2$	typ.	18	dB
Flatness of frequency response	$\pm \Delta \|s_f\|^2$	typ.	1	dB
Output voltage at −60 dB intermodulation distortion (DIN 45004, 3-tone)	$V_{o(rms)}$	typ.	100	dBμV
Noise figure	F	typ.	6	dB
Operating ambient temperature	T_{amb}		−20 to +70	°C

ENCAPSULATION 5-pin, in-line, resin-coated body, see MECHANICAL DATA (Fig. 2)

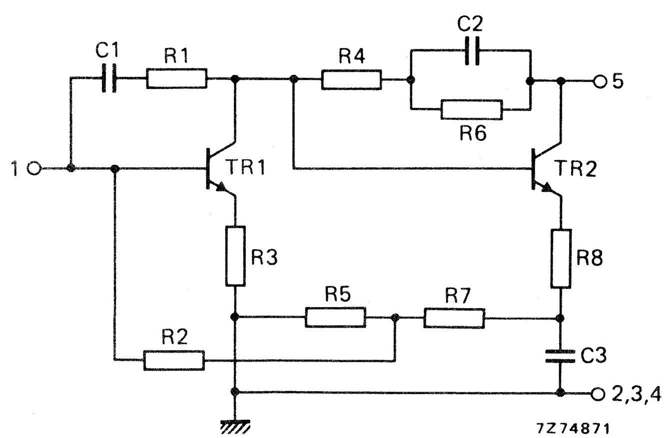


Fig. 1 Circuit diagram.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

Operating ambient temperature	T_{amb}	−20 to + 70	°C
Storage temperature	T_{stg}	−40 to + 125	°C
D.C. supply voltage	V_B	max. 15	V
Peak incident powers on pins 1 and 5	P_{I1M}, P_{I5M}	max. 100	mW

CHARACTERISTICS

Measuring conditions

Ambient temperature	T_{amb}	= 25	°C
D.C. supply voltage	V_B	= 12	V
Source impedance and load impedance	R_s, R_ℓ	= 75	Ω
Characteristic impedance of h.f. connections	Z_o	= 75	Ω
Frequency range	f	= 40 to 860	MHz

Performance

Supply current	I_B	typ. 18	mA
Transducer gain	$G_{tr} = \|s_f\|^2$	typ. 18	dB
Flatness of frequency response	$\pm \Delta \|s_f\|^2$	typ. 1	dB
Individual maximum v.s.w.r.			
input	$VSWR_{(i)}$	typ. 1,5	*
output	$VSWR_{(o)}$	typ. 1,9	*
Back attenuation			
f = 100 MHz	$\|s_r\|^2$	typ. 29	dB
f = 860 MHz	$\|s_r\|^2$	typ. 25	dB
Output voltage at −60 dB intermodulation distortion (DIN 45004, par. 6.3: 3-tone)	$V_{o(rms)}$	typ. 100	dBμV
Noise figure	F	typ. 6	dB

s-parameters:		
	$s_f = s_{21}$	$s_i = s_{11}$
	$s_r = s_{12}$	$s_o = s_{22}$

* Highest value, for a sample, occuring in the frequency range.

OPERATING CONDITIONS

Ambient temperature range	T_{amb}	−20 to + 70	°C
D.C. supply voltage	V_B	= 12	V ± 10%
Frequency range	f	40 to 860	MHz
Source impedance and load impedance	R_s, R_ℓ	= 75	Ω

MECHANICAL DATA

Dimensions in mm

The device is resin coated.

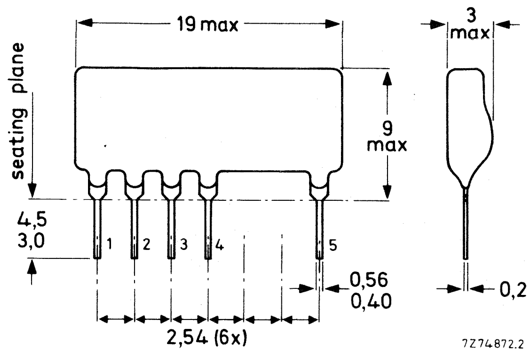


Fig. 2 Encapsulation.

Terminal connections

1 = input
2,3,4 = common
5 = output/supply(+)

Soldering recommendations

Hand soldering

Maximum contact time for a soldering-iron temperature of 260 °C up to the seating plane is 5 s.

Dip or wave soldering

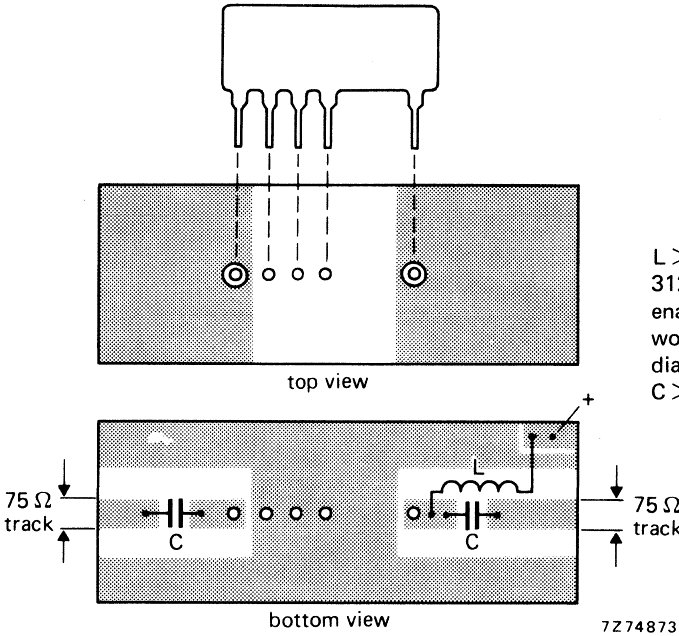
260 °C is the maximum permissible temperature of the solder; it must not be in contact with the joint for more than 5 seconds. The total contact time of successive solder waves must not exceed 5 seconds. The device may be mounted against the printed-circuit board, but the temperature of the device must not exceed 125 °C. If the printed-circuit board has been pre-heated, forced cooling may be necessary immediately after soldering to keep the temperature below the allowable limit.

Mounting recommendations

The module should preferably be mounted on double-sided printed-circuit board, see the example shown below.

Input and output should be connected to 75 Ω tracks.

The connections to the 'common' pins should be as close to the seating plane as possible.



L > 5 μH; e.g. catalogue no. 3122 108 20150 or 27 turns enamelled Cu wire (0,3 mm) wound on a ferrite core with a diameter of 1,6 mm.
C > 220 pF ceramic capacitor.

Fig. 3 Printed-circuit board holes and tracks.

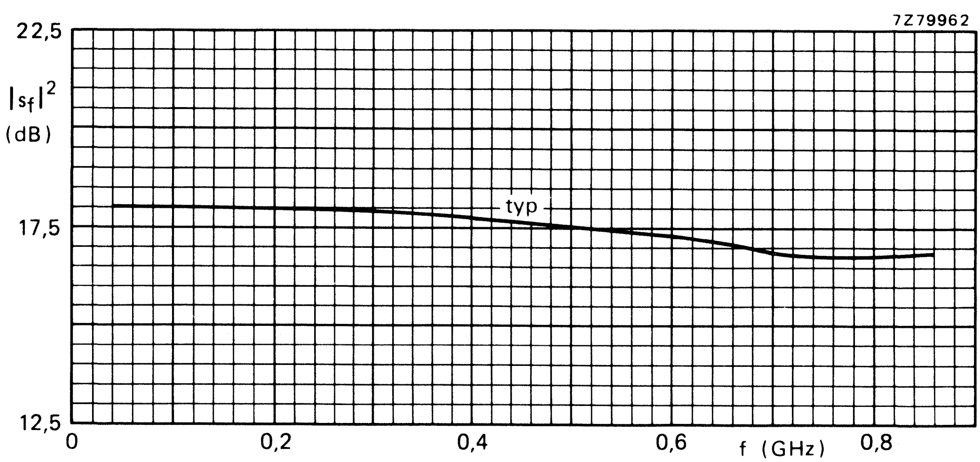


Fig. 4 Transducer gain as a function of frequency; Z_o = 75 Ω.

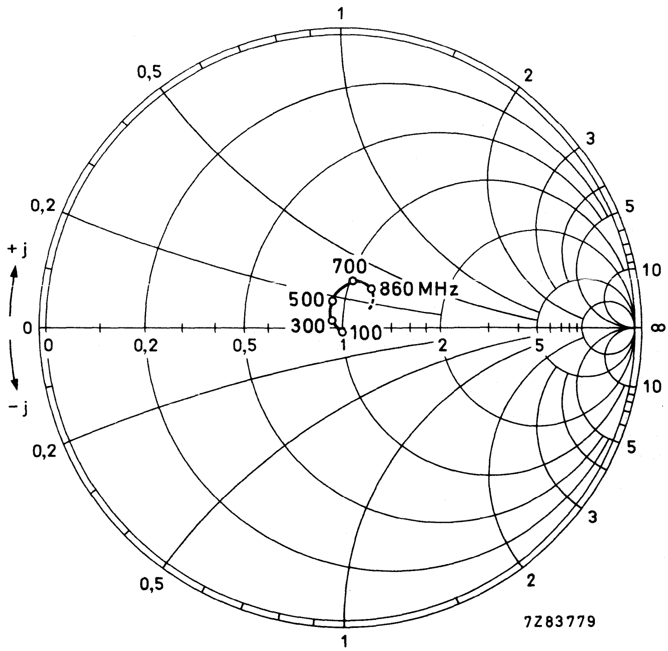


Fig. 5 Input impedance derived from input reflection coefficient s_i, co-ordinates in ohm x 75; typical values.

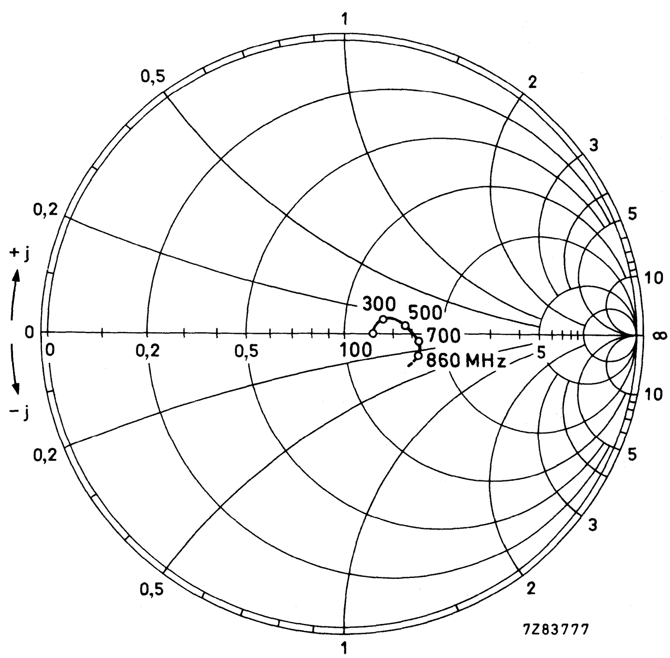


Fig. 6 Output impedance derived from output reflection coefficient s_o, co-ordinates in ohm x 75; typical values.

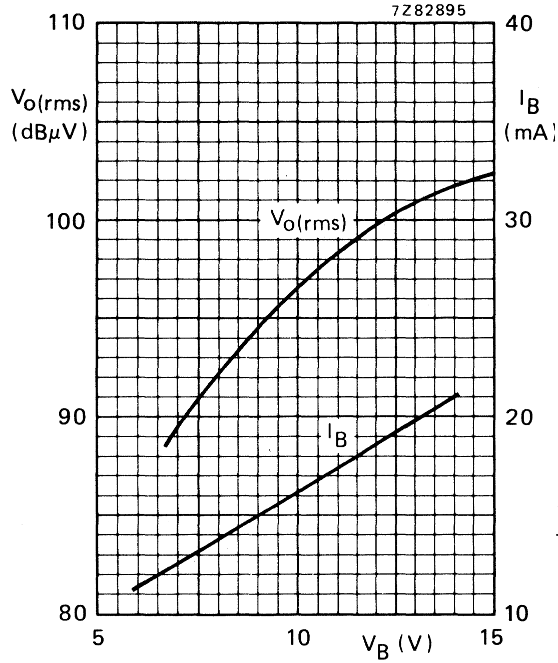


Fig. 7 Output voltage and supply current as a function of the supply voltage; typical values.

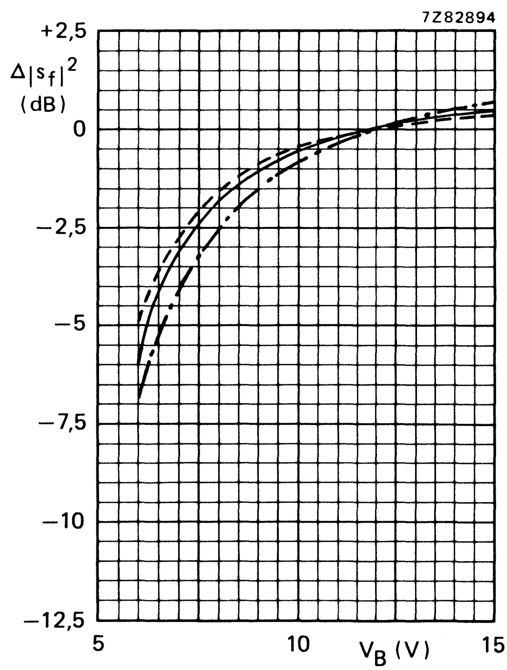


Fig. 8 Variation of transducer gain with supply voltage; reference 0 dB at 12 V:
——— f = 500 MHz;
– – – – f = 100 MHz;
—·—·—· f = 860 MHz;
typical values.

HYBRID INTEGRATED CIRCUIT VHF/UHF WIDE-BAND AMPLIFIER

Three-stage wide-band amplifier in hybrid integrated circuit technique on a thin-film substrate, intended for use in mast-head booster-amplifiers, as preamplifier in MATV systems, and as general-purpose amplifier for v.h.f. and u.h.f. applications.

QUICK REFERENCE DATA

Frequency range	f		40 to 860	MHz
Source and load (characteristic) impedance	$R_s = R_\ell = Z_o$	=	75	Ω
Transducer gain	$G_{tr} = \|s_f\|^2$	typ.	23	dB
Flatness of frequency response	$\pm\Delta\|s_f\|^2$	typ.	0,5	dB
Output voltage at −60 dB intermodulation distortion (DIN 45004, 3-tone)	$V_{o(rms)}$	>	105	dBμV
Noise figure	F	typ.	7	dB
D.C. supply voltage	V_B	=	12	V ± 10%
Operating ambient temperature	T_{amb}		−20 to +70	°C

ENCAPSULATION 8-pin, in-line, resin-coated body, see MECHANICAL DATA (Fig. 2)

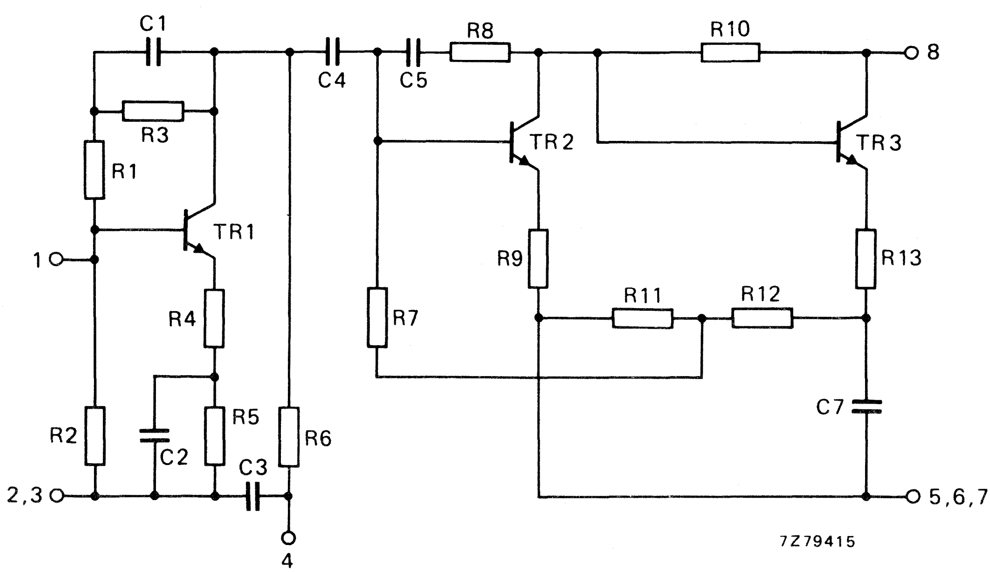


Fig. 1 Circuit diagram.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

Operating ambient temperature	T_{amb}		−20 to +70	°C
Storage temperature	T_{stg}		−40 to +125	°C
D.C. supply voltage	V_B	max.	15	V
Peak incident powers on pins 1 and 7	P_{I1M}, P_{I7M}	max.	100	mW

CHARACTERISTICS

Measuring conditions

Ambient temperature	T_{amb}	=	25	°C
D.C. supply voltage	V_B	=	12	V
Source impedance and load impedance	R_s, R_ℓ	=	75	Ω
Characteristic impedance of h.f. connections	Z_o	=	75	Ω
Frequency range	f	=	40 to 860	MHz

Performance

Supply current	I_B	typ.	55	mA
Transducer gain	$G_{tr} = \|s_f\|^2$	typ.	23	dB
			21 to 25	dB
Flatness of frequency response	$\pm\Delta\|s_f\|^2$	typ.	0,5	dB
Individual maximum v.s.w.r.				
input	$VSWR_{(i)}$	typ.	1,3	*
output	$VSWR_{(o)}$	typ.	1,5	*
Back attenuation				
f = 100 MHz	$\|s_r\|^2$	typ.	42	dB
f = 860 MHz	$\|s_r\|^2$	typ.	33	dB
Output voltage at −60 dB intermodulation distortion (DIN 45004, par. 6.3: 3-tone)	$V_{o(rms)}$	>	105	dBμV
		typ.	107	dBμV
Noise figure	F	typ.	7	dB

s-parameters:		
	$s_f = s_{21}$	$s_i = s_{11}$
	$s_r = s_{12}$	$s_o = s_{22}$

* Highest value, for a sample, occurring in the frequency range.

OPERATING CONDITIONS

Ambient temperature range	T_{amb}	−20 to +70 °C
D.C. supply voltage	V_B	= 12 V ± 10%
Frequency range	f	40 to 860 MHz
Source impedance and load impedance	R_s, R_ℓ	= 75 Ω

MECHANICAL DATA

Dimensions in mm

The device is resin coated.

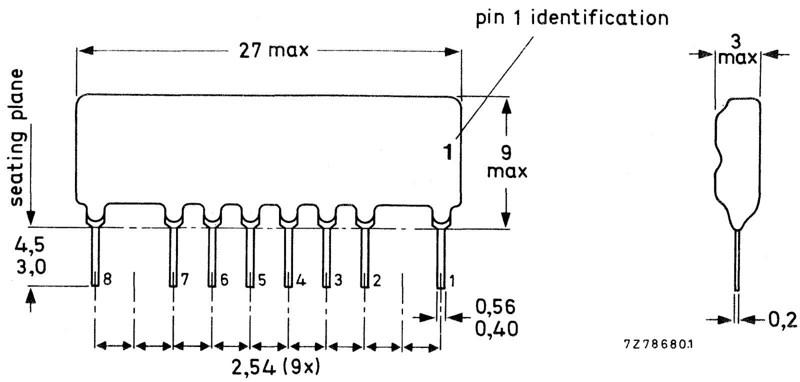


Fig. 2 Encapsulation.

Terminal connections

1 = input
2, 3, 5, 6, 7 = common
4 = supply (+)
8 = output/supply (+)

Soldering recommendations

Hand soldering

Maximum contact time for a soldering-iron temperature of 260 °C up to the seating plane is 5 s.

Dip or wave soldering

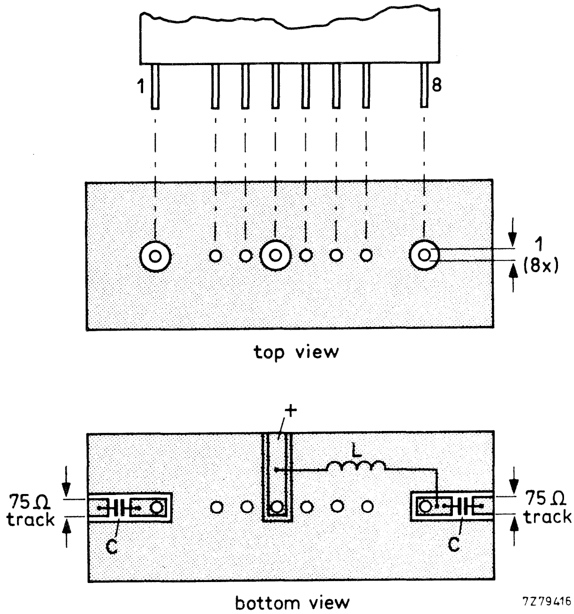
260 °C is the maximum permissible temperature of the solder; it must not be in contact with the joint for more than 5 seconds. The total contact time of successive solder waves must not exceed 5 seconds. The device may be mounted against the printed-circuit board, but the temperature of the device must not exceed 125 °C. If the printed-circuit board has been pre-heated, forced cooling may be necessary immediately after soldering to keep the temperature below the allowable limit.

Mounting recommendations

The module should preferably be mounted on double-sided printed-circuit board, see the example shown below.

Input and output should be connected to 75 Ω tracks.

The connections to the 'common' pins should be as close to the seating plane as possible.



L > 5 μH; e.g. catalogue no. 3122 108 20150 or 27 turns enamelled Cu wire (0,3 mm) wound on a ferrite core with a diameter of 1,6 mm.
C > 220 pF ceramic capacitor.

Fig. 3 Printed-circuit board holes and tracks.

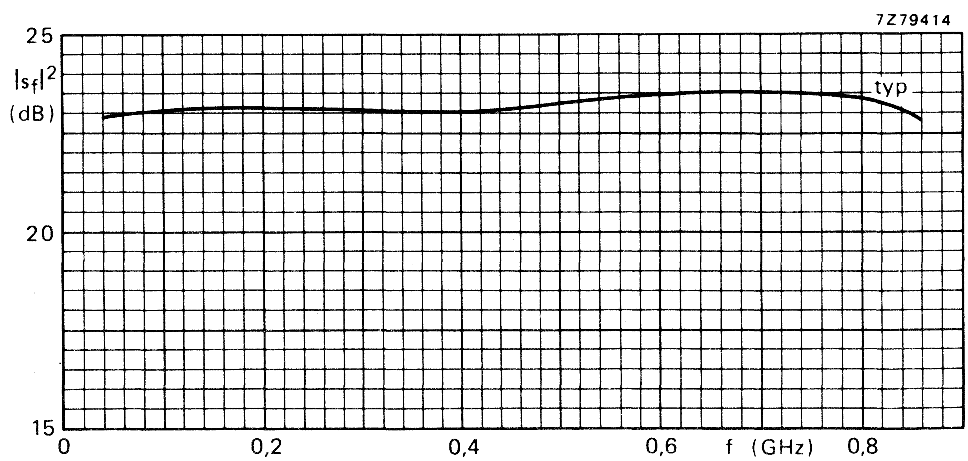


Fig. 4 Transducer gain as a function of frequency; Z_o = 75 Ω.

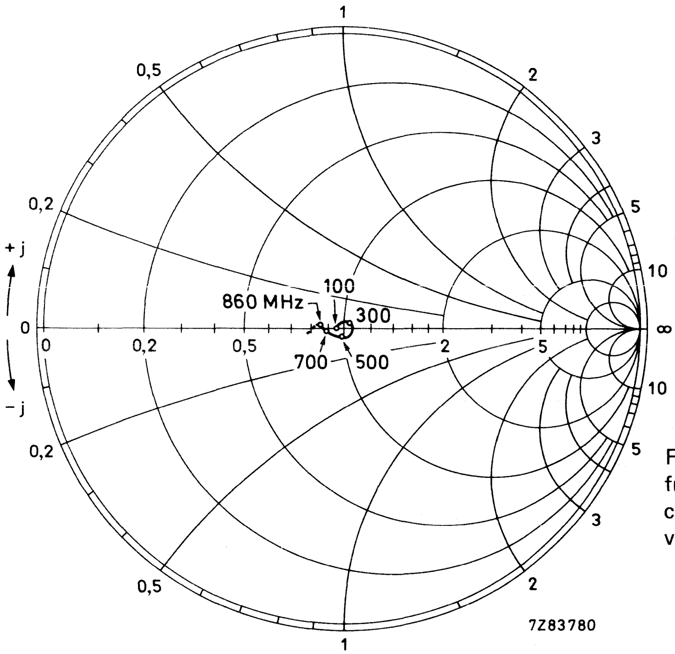


Fig. 5 Input impedance derived from input reflection coefficient s_i, co-ordinates in ohm x 75; typical values.

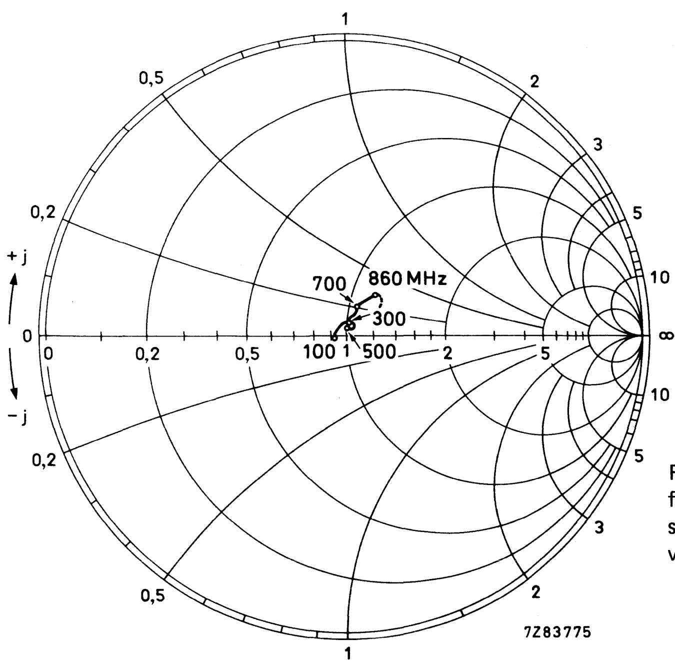


Fig. 6 Output impedance derived from output reflection coefficient s_o, co-ordinates in ohm x 75; typical values.

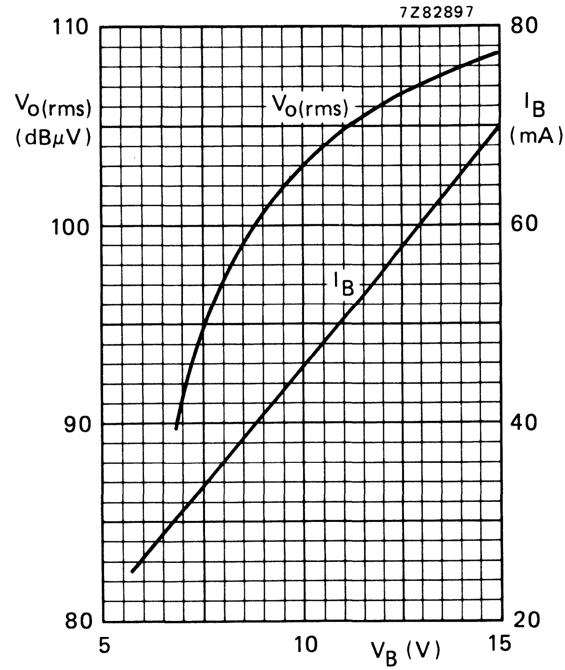


Fig. 7 Output voltage and supply current as a function of the supply voltage; typical values.

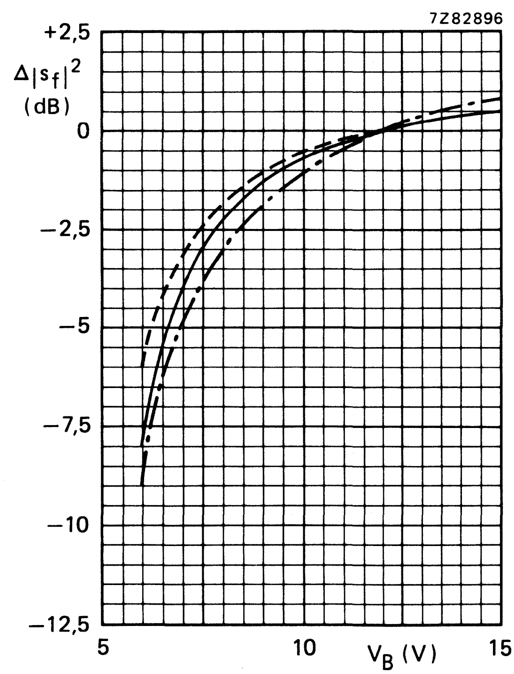


Fig. 8 Variation of transducer gain with supply voltage; reference 0 dB at 12 V;
——— f = 500 MHz;
– – – – f = 100 MHz;
—.—.— f = 860 MHz;
typical values.

HYBRID INTEGRATED CIRCUIT VHF/UHF WIDE-BAND AMPLIFIER

Three-stage wide-band amplifier in hybrid integrated circuit technique on a thin-film substrate, intended for use in mast-head booster-amplifiers, as an amplifier in MATV systems, and as general-purpose amplifier for v.h.f. and u.h.f. applications.

QUICK REFERENCE DATA

Frequency range	f		40 to 860	MHz
Source and load (characteristic) impedance	$R_s = R_\ell = Z_o$	=	75	Ω
Transducer gain	$G_{tr} = \lvert s_f \rvert^2$	typ.	28	dB
Flatness of frequency response	$\pm\Delta\lvert s_f \rvert^2$	typ.	1	dB
Output voltage at −60 dB intermodulation distortion (DIN 45004, 3-tone)	$V_{o(rms)}$	>	105	dBμV
Noise figure	F	typ.	6	dB
D.C. supply voltage	V_B	=	12	V ± 10%
Operating ambient temperature	T_{amb}		−20 to +70	°C

ENCAPSULATION 8-pin, in-line, resin-coated body, see MECHANICAL DATA (Fig. 2)

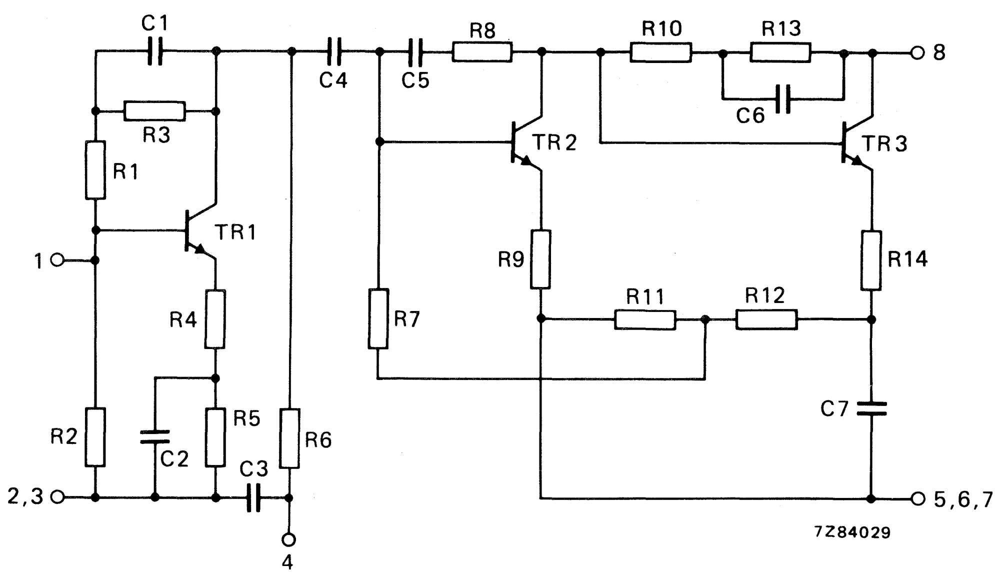


Fig. 1 Circuit diagram.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

Operating ambient temperature	T_{amb}		−20 to +70	°C
Storage temperature	T_{stg}		−40 to +125	°C
D.C. supply voltage	V_B	max.	15	V
Peak incident powers on pins 1 and 8	P_{I1M}, P_{I8M}	max.	100	mW

CHARACTERISTICS

Measuring conditions

Ambient temperature	T_{amb}	=	25	°C
D.C. supply voltage	V_B	=	12	V
Source impedance and load impedance	R_s, R_ℓ	=	75	Ω
Characteristic impedance of h.f. connections	Z_o	=	75	Ω
Frequency range	f	=	40 to 860	MHz

Performance

Supply current	I_B	typ.	50	mA
Transducer gain	$G_{tr} = \|s_f\|^2$	typ.	28	dB
			26 to 31	dB
Flatness of frequency response	$\pm\Delta\|s_f\|^2$	typ.	1	dB
Individual maximum v.s.w.r.				
input	$VSWR_{(i)}$	typ.	1,5	*
output	$VSWR_{(o)}$	typ.	1,7	*
Back attenuation				
f = 100 MHz	$\|s_r\|^2$	typ.	45	dB
f = 860 MHz	$\|s_r\|^2$	typ.	35	dB
Output voltage at −60 dB intermodulation distortion (DIN 45004, par. 6,3; 3-tone)	$V_{o(rms)}$	>	105	dBμV
		typ.	107	dBμV
Noise figure	F	typ.	6	dB

s-parameters:	$s_f = s_{21}$	$s_i = s_{11}$
	$s_r = s_{12}$	$s_o = s_{22}$

* Highest value, for a sample, occurring in the frequency range.

OPERATING CONDITIONS

Ambient temperature range	T_{amb}		−20 to +70	°C
D.C. supply voltage	V_B	=	12	V ± 10%
Frequency range	f		40 to 860	MHz
Source impedance and load impedance	R_s, R_ℓ	=	75	Ω

MECHANICAL DATA

Dimensions in mm

The device is resin coated.

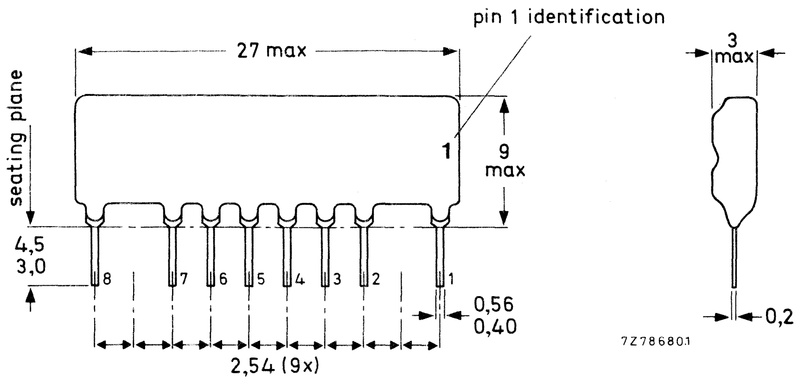


Fig. 2 Encapsulation.

Terminal connections

1 = input
2, 3, 5, 6, 7 = common
4 = supply (+)
8 = output/supply (+)

Soldering recommendations

Hand soldering

Maximum contact time for a soldering-iron temperature of 260 °C up to the seating plane is 5 s.

Dip or wave soldering

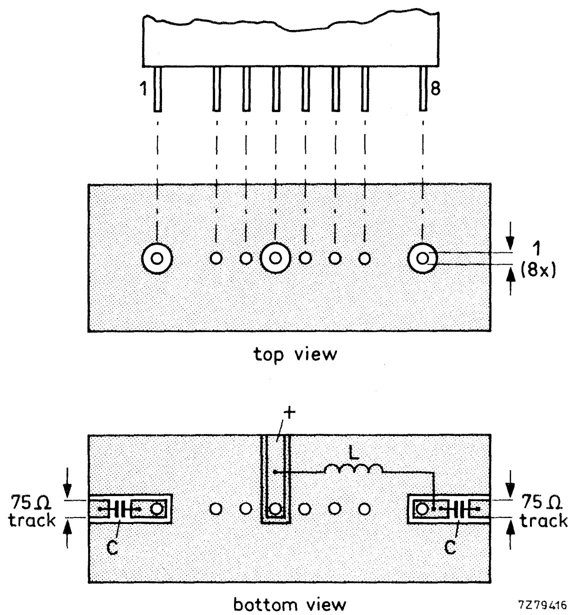
260 °C is the maximum permissible temperature of the solder; it must not be in contact with the joint for more than 5 seconds. The total contact time of successive solder waves must not exceed 5 seconds. The device may be mounted against the printed-circuit board, but the temperature of the device must not exceed 125 °C. If the printed-circuit board has been pre-heated, forced cooling may be necessary immediately after soldering to keep the temperature below the allowable limit.

Mounting recommendations

The module should preferably be mounted on double-sided printed-circuit board, see the example shown below.

Input and output should be connected to 75 Ω tracks.

The connections to the 'common' pins should be as close to the seating plane as possible.



L > 5 μH; e.g. catalogue no. 3122 108 20150 or 27 turns enamelled Cu wire (0,3 mm) wound on a ferrite core (material 4B1; catalogue number 3122 104 91110) with a diameter of 1,6 mm.
C > 220 pF ceramic capacitor.

Fig. 3 Printed-circuit board holes and tracks.

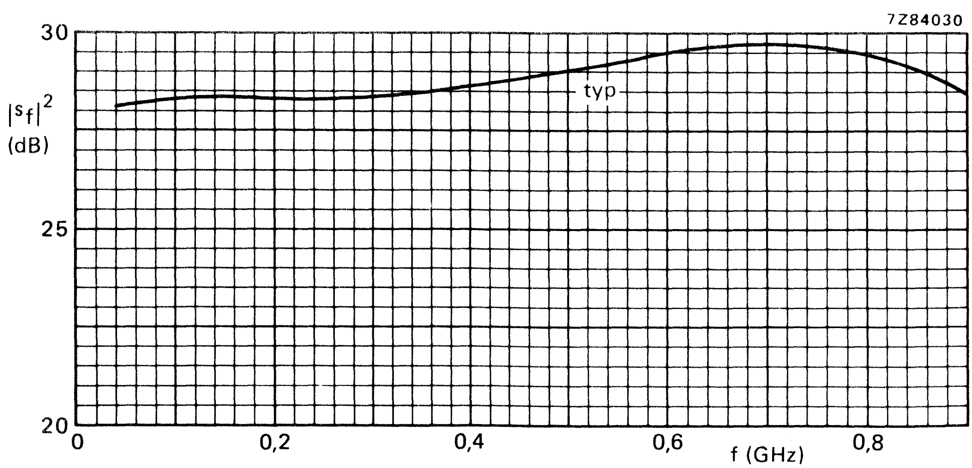


Fig. 4 Transducer gain as a function of frequency; Z_o = 75 Ω.

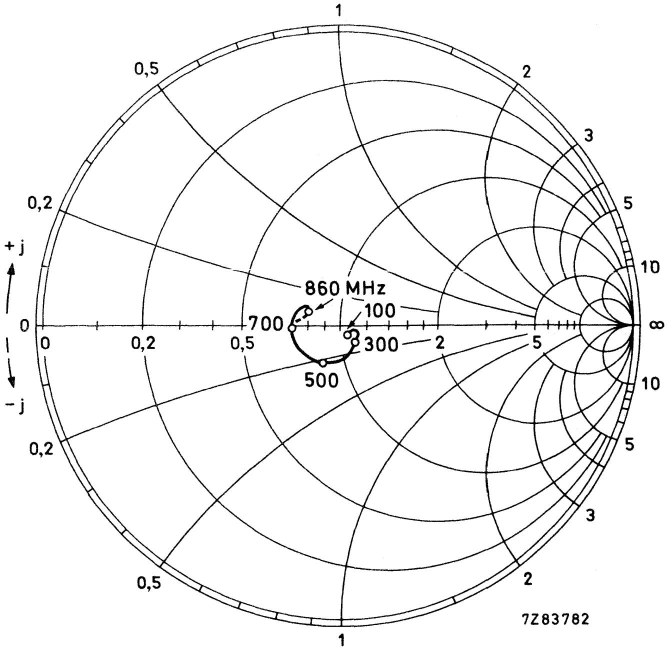


Fig. 5 Input impedance derived from input reflection coefficient s_i, co-ordinates in ohm x 75; typical values.

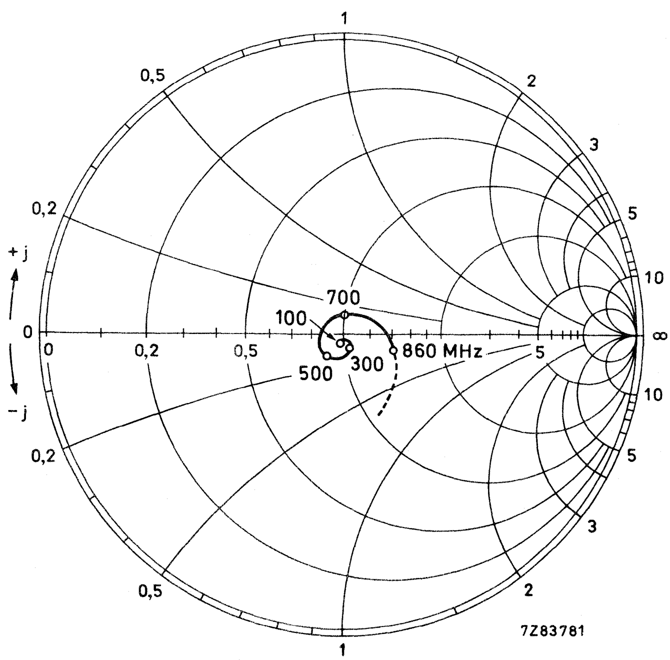


Fig. 6 Output impedance derived from output reflection coefficient s_o, co-ordinates in ohm x 75; typical values.

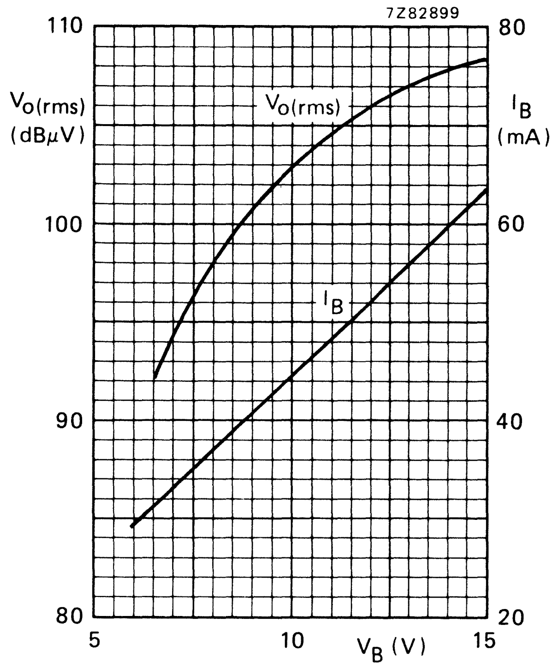


Fig. 7 Output voltage and supply current as a function of the supply voltage; typical values.

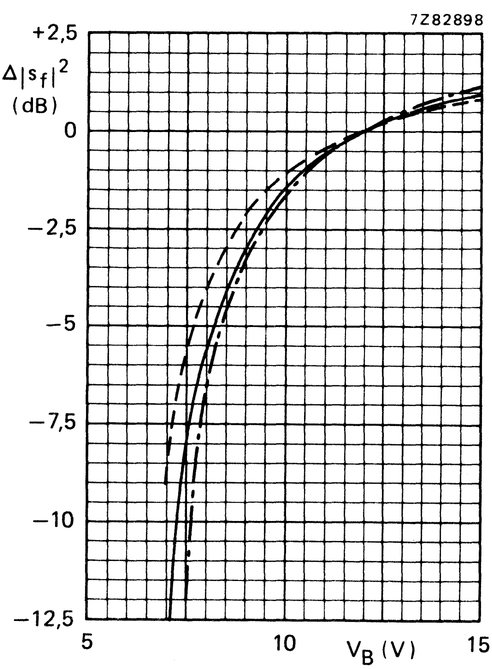


Fig. 8 Variation of transducer gain with supply voltage; reference 0 dB at 12 V;
——— f = 500 MHz;
– – – – f = 100 MHz;
—·—·— f = 860 MHz;
typical values.

HYBRID INTEGRATED CIRCUIT VHF/UHF WIDE-BAND AMPLIFIER

Three-stage wide-band amplifier in hybrid integrated circuit technique on a thin-film substrate, intended for use in mast-head booster-amplifiers, as an amplifier in MATV and CATV systems, and as general-purpose amplifier for v.h.f. and u.h.f. applications.

QUICK REFERENCE DATA

Frequency range	f		40 to 860	MHz
Source and load (characteristic) impedance	$R_s = R_\ell = Z_o$	=	75	Ω
Transducer gain	$G_{tr} = \lvert s_f \rvert^2$	typ.	28	dB
Flatness of frequency response	$\pm\Delta \lvert s_f \rvert^2$	typ.	1	dB
Output voltage at −60 dB intermodulation distortion (DIN 45004, 3-tone)				
VHF	$V_{o(rms)}$	typ.	113	dBμV
UHF	$V_{o(rms)}$	typ.	112	dBμV
Noise figure	F	typ.	7	dB
D.C. supply voltage	V_B	=	12	V ± 10%
Operating ambient temperature	T_{amb}		−20 to +70	°C

ENCAPSULATION 9-pin, in-line, resin-coated body, see MECHANICAL DATA (Fig.2)

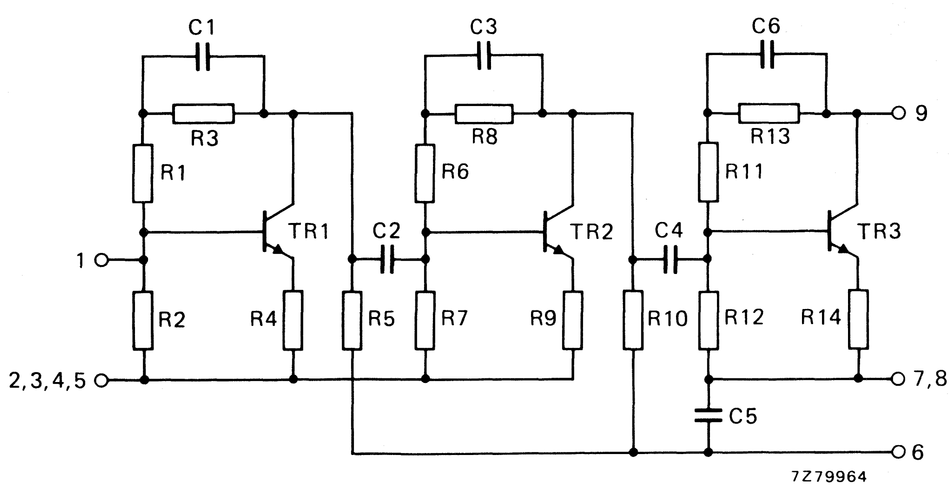


Fig. 1 Circuit diagram.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

Operating ambient temperature	T_{amb}		−20 to +70	°C
Storage temperature	T_{stg}		−40 to +125	°C
D.C. supply voltage	V_B	max.	15	V
Peak incident powers on pins 1 and 8	P_{I1M}, P_{I8M}	max.	100	mW

CHARACTERISTICS

Measuring conditions

Ambient temperature	T_{amb}	=	25	°C
D.C. supply voltage	V_B	=	12	V
Source impedance and load impedance	R_s, R_ℓ	=	75	Ω
Characteristic impedance of h.f. connections	Z_o	=	75	Ω
Frequency range	f	=	40 to 860	MHz

Performance

Supply current	I_B	typ.	105	mA
Transducer gain	$G_{tr} = \|s_f\|^2$	typ.	28	dB
			26 to 31	dB
Flatness of frequency response	$\pm\Delta\|s_f\|^2$	typ.	1	dB
Individual maximum v.s.w.r.				
input	$VSWR_{(i)}$	typ.	2,3	*
output	$VSWR_{(o)}$	typ.	1,9	*
Back attenuation				
f = 100 MHz	$\|s_r\|^2$	typ.	45	dB
f = 860 MHz	$\|s_r\|^2$	typ.	35	dB
Output voltage at −60 dB intermodulation distortion (DIN 45004, par. 6,3; 3-tone)				
VHF	$V_{o(rms)}$	>	111	dBμV
		typ.	113	dBμV
UHF	$V_{o(rms)}$	>	110	dBμV
		typ.	112	dBμV
Noise figure	F	typ.	7	dB

s-parameters:	$s_f = s_{21}$	$s_i = s_{11}$
	$s_r = s_{12}$	$s_o = s_{22}$

* Highest value, for a sample, occurring in the frequency range.

OPERATING CONDITIONS

Ambient temperature range	T_{amb}		−20 to +70 °C
D.C. supply voltage	V_B	=	12 V ± 10%
Frequency range	f		40 to 860 MHz
Source impedance and load impedance	R_s, R_ℓ	=	75 Ω

MECHANICAL DATA

Dimensions in mm

The device is resin coated.

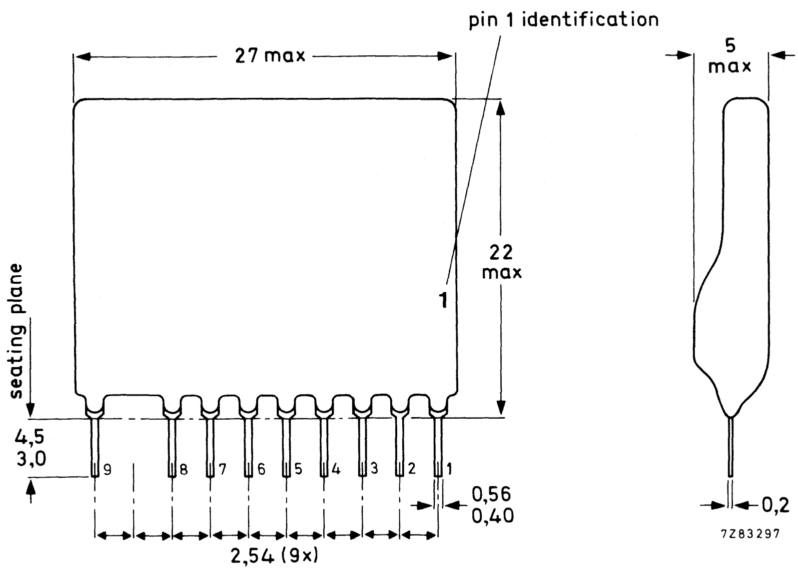


Fig. 2 Encapsulation.

Terminal connections

1	= input
2, 3, 4, 5 and 7, 8	= common
6	= supply (+)
9	= output/supply (+)

Soldering recommendations

Hand soldering

Maximum contact time for a soldering-iron temperature of 260 °C up to the seating plane is 5 s.

Dip or wave soldering

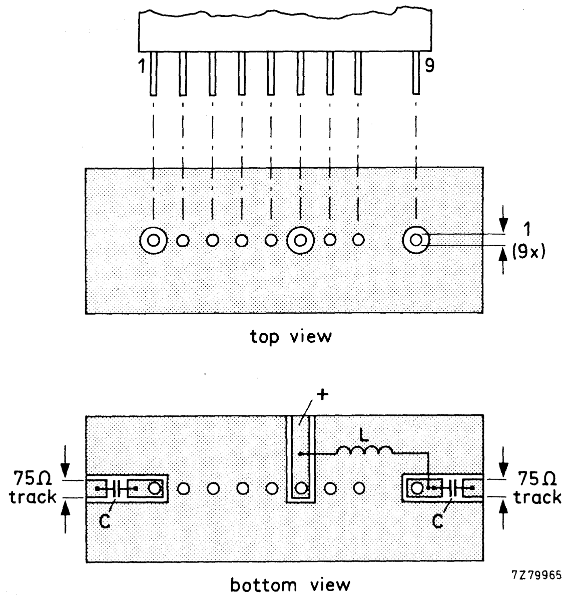
260 °C is the maximum permissible temperature of the solder; it must not be in contact with the joint for more than 5 seconds. The total contact time of successive solder waves must not exceed 5 seconds. The device may be mounted against the printed-circuit board, but the temperature of the device must not exceed 125 °C. If the printed-circuit board has been pre-heated, forced cooling may be necessary immediately after soldering to keep the temperature below the allowable limit.

Mounting recommendations

The module should preferably be mounted on double-sided printed-circuit board, see the example shown below.

Input and output should be connected to 75 Ω tracks.

The connections to the 'common' pins should be as close to the seating plane as possible.



L > 5 μH; e.g. catalogue no. 3122 108 20150 or 27 turns enamelled Cu wire (0,3 mm) wound on a ferrite core (material 4B1; catalogue no. 3122 104 91110) with a diameter of 1,6 mm.
C > 220 pF ceramic capacitor.

Fig. 3 Printed-circuit board holes and tracks.

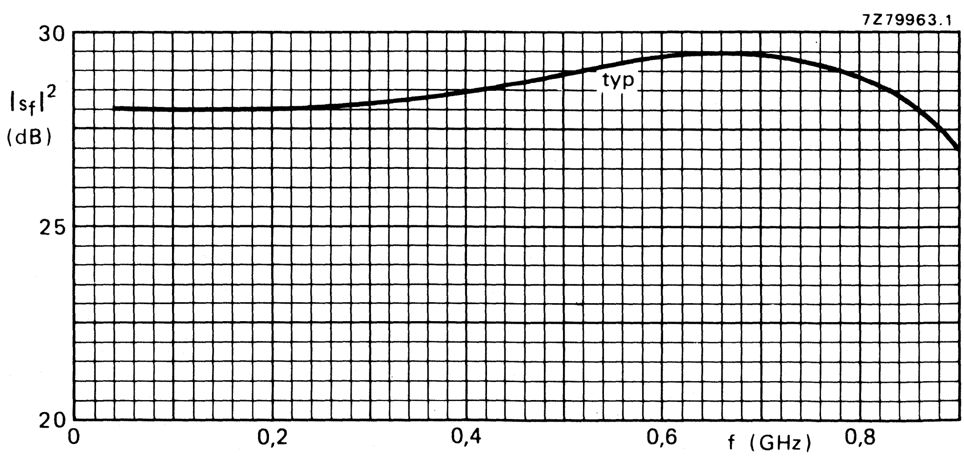


Fig. 4 Transducer gain as a function of frequency; Z_o = 75 Ω.

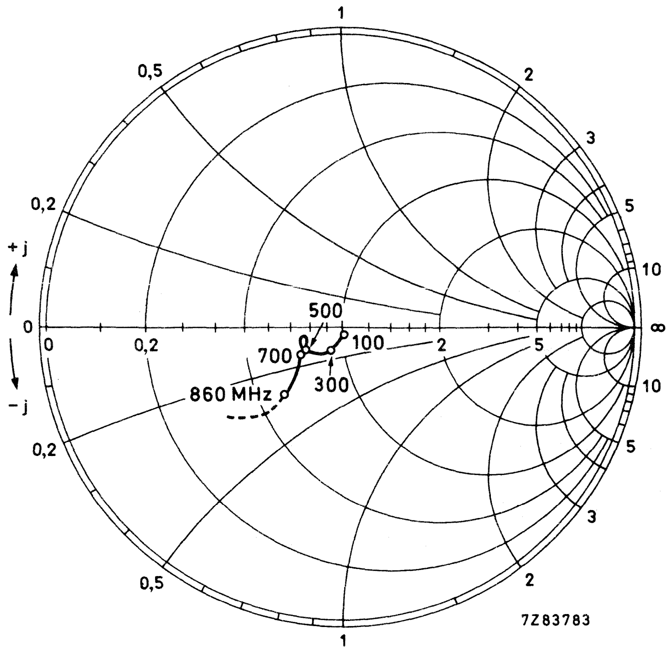


Fig. 5 Input impedance derived from input reflection coefficient s_i, co-ordinates in ohm x 75; typical values.

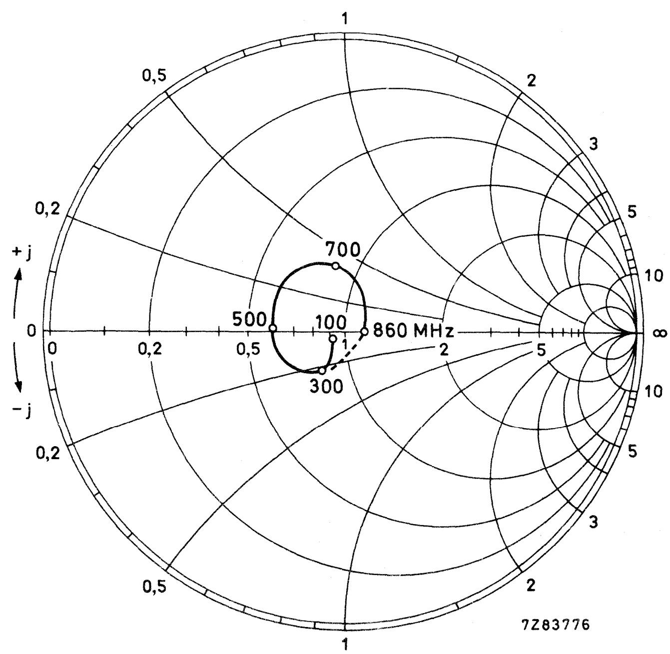


Fig. 6 Output impedance derived from output reflection coefficient s_o, co-ordinates in ohm x 75; typical values.

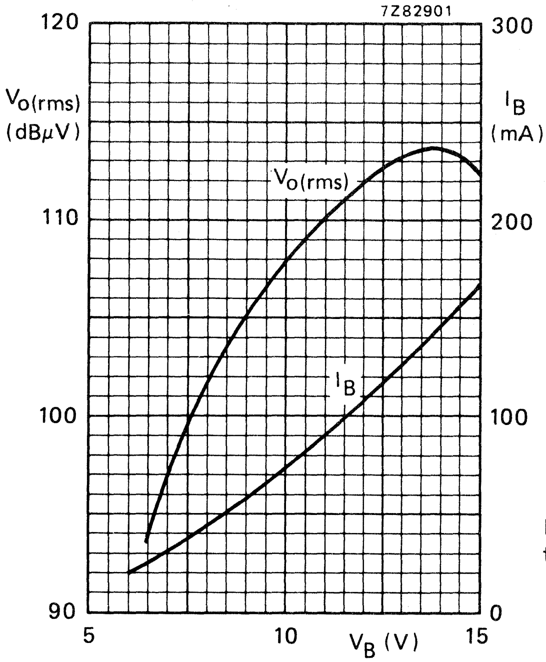


Fig. 7 Output voltage and supply current as a function of the supply voltage; typical values.

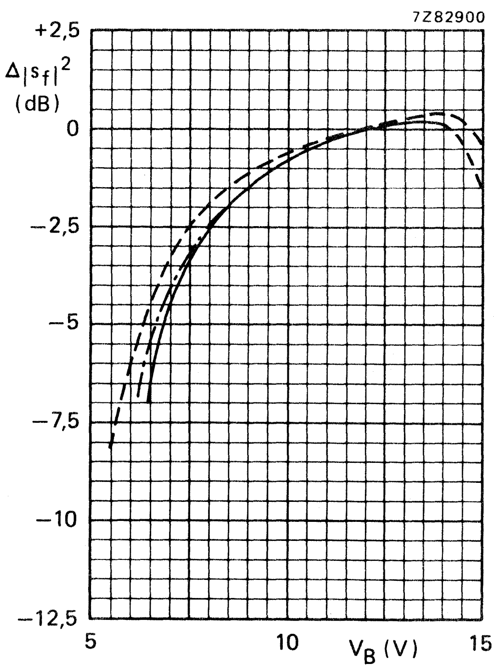


Fig. 8 Variation of transducer gain with supply voltage; reference 0 dB at 12 V;
——— f = 500 MHz;
– – – – f = 100 MHz;
—·—·— f = 860 MHz;
typical values.

HYBRID INTEGRATED CIRCUIT VHF/UHF WIDE-BAND AMPLIFIER

One-stage wide-band amplifier in hybrid integrated circuit technique on a thin-film substrate, intended for aerial amplifiers in car radios, caravans or RATV and MATV applications.

QUICK REFERENCE DATA

D.C. supply voltage	V_B	=	12	V ± 10%
Frequency range	f		40 to 860	MHz
Source and load (characteristic) impedance	$R_s = R_\ell = Z_o$	=	75	Ω
Transducer gain	$G_{tr} = \lvert s_f \rvert^2$	typ.	12	dB
Flatness of frequency response	$\pm \Delta \lvert s_f \rvert^2$	typ.	1	dB
Output voltage at −60 dB intermodulation distortion (DIN 45004, 3-tone)	$V_{o(rms)}$	typ.	99	dBμV
Noise figure	F	typ.	3,6	dB
Operating ambient temperature	T_{amb}		−20 to + 70	°C

ENCAPSULATION 5-pin, in-line, resin-coated body, see MECHANICAL DATA (Fig. 2)

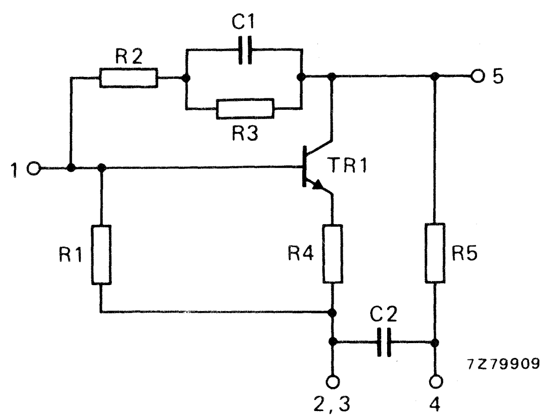


Fig. 1 Circuit diagram.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

Operating ambient temperature	T_{amb}		−20 to +70	°C
Storage temperature	T_{stg}		−40 to +125	°C
D.C. supply voltage	V_B	max.	15	V
Peak incident powers on pins 1 and 5	P_{I1M}, P_{I5M}	max.	100	mW

CHARACTERISTICS

Measuring conditions

Ambient temperature	T_{amb}	=	25	°C
D.C. supply voltage	V_B	=	12	V
Source impedance and load impedance	R_s, R_ℓ	=	75	Ω
Characteristic impedance of h.f. connections	Z_o	=	75	Ω
Frequency range	f	=	40 to 860	MHz

Performance

Supply current	I_B	typ.	11,5	mA
Transducer gain	$G_{tr} = \|s_f\|^2$	typ.	12	dB
Flatness of frequency response	$\pm \Delta \|s_f\|^2$	typ.	1	dB
Individual maximum v.s.w.r.				
input	$VSWR_{(i)}$	typ.	2,0	*
output	$VSWR_{(o)}$	typ.	1,4	*
Back attenuation				
f = 100 MHz	$\|s_r\|^2$	typ.	22	dB
f = 860 MHz	$\|s_r\|^2$	typ.	19	dB
Output voltage at −60 dB intermodulation distortion (DIN 45004, par. 6.3: 3-tone)	$V_{o(rms)}$	typ.	99	dBμV
Noise figure	F	typ.	3,6	dB

s-parameters:	$s_f = s_{21}$	$s_i = s_{11}$
	$s_r = s_{12}$	$s_o = s_{22}$

* Highest value, for a sample, occuring in the frequency range.

OPERATING CONDITIONS

Ambient temperature range	T_{amb}		−20 to + 70 °C
D.C. supply voltage	V_B	=	12 V ±10%
Frequency range	f		40 to 860 MHz
Source impedance and load impedance	R_s, R_ℓ	=	75 Ω

MECHANICAL DATA

Dimensions in mm

The device is resin coated.

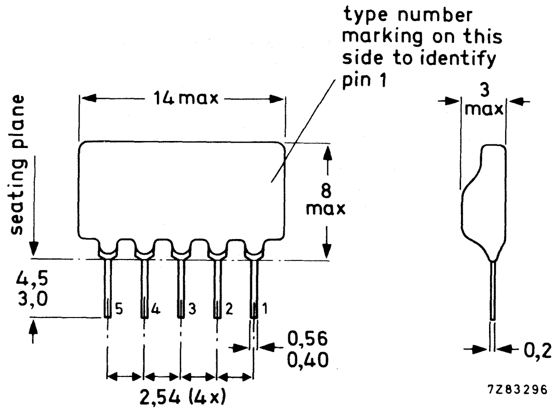


Fig. 2 Encapsulation.

Terminal connections

1 = input
2,3 = common
4 = supply (+)
5 = output

Soldering recommendations

Hand soldering

Maximum contact time for a soldering-iron temperature of 260 °C up to the seating plane is 5 s.

Dip or wave soldering

260 °C is the maximum permissible temperature of the solder; it must not be in contact with the joint for more than 5 seconds. The total contact time of successive solder waves must not exceed 5 seconds. The device may be mounted against the printed-circuit board, but the temperature of the device must not exceed 125 °C. If the printed-circuit board has been pre-heated, forced cooling may be necessary immediately after soldering to keep the temperature below the allowable limit.

Mounting recommendations

The module should preferably be mounted on double-sided printed-circuit board, see the example shown below.

Input and output should be connected to 75 Ω tracks.

The connections to the 'common' pins should be as close to the seating plane as possible.

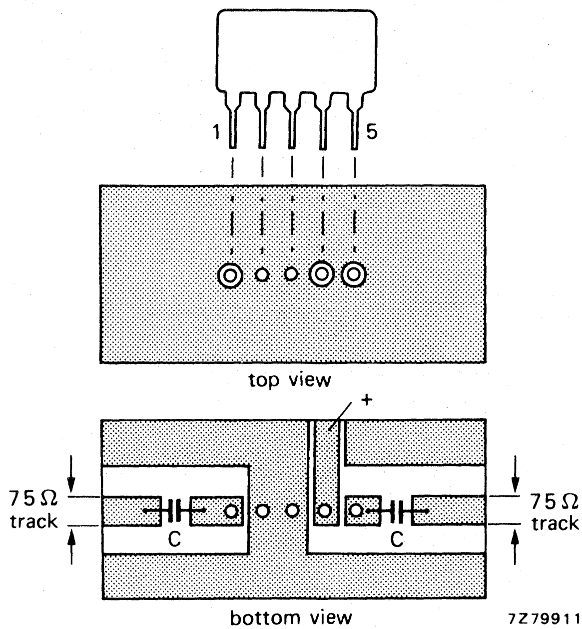


Fig. 3 Printed-circuit board holes and tracks.
C > 220 pF ceramic capacitor.

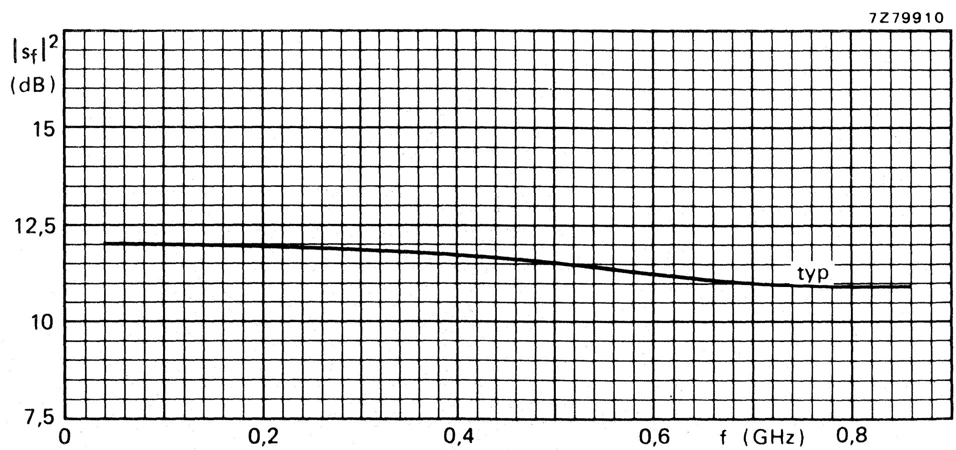


Fig. 4 Transducer gain as a function of frequency; Z_o = 75 Ω.

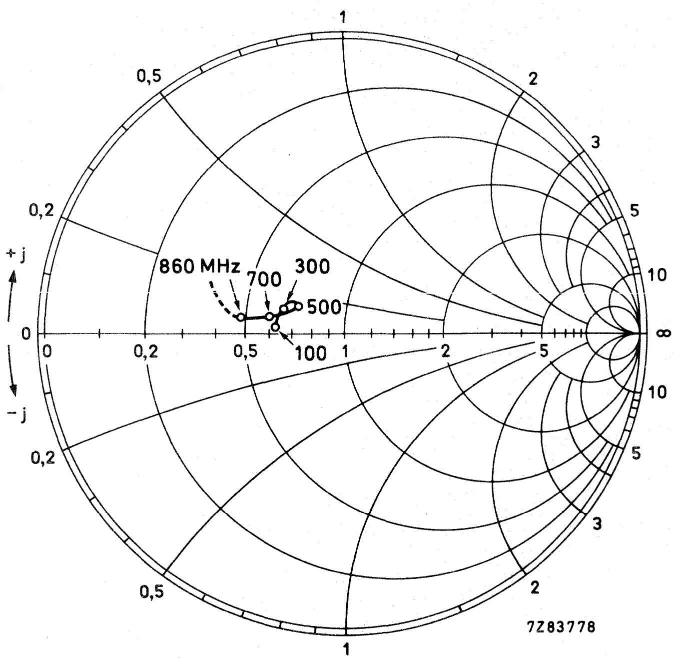


Fig. 5 Input impedance derived from input reflection coefficient s_i, co-ordinates in ohm x 75; typical values.

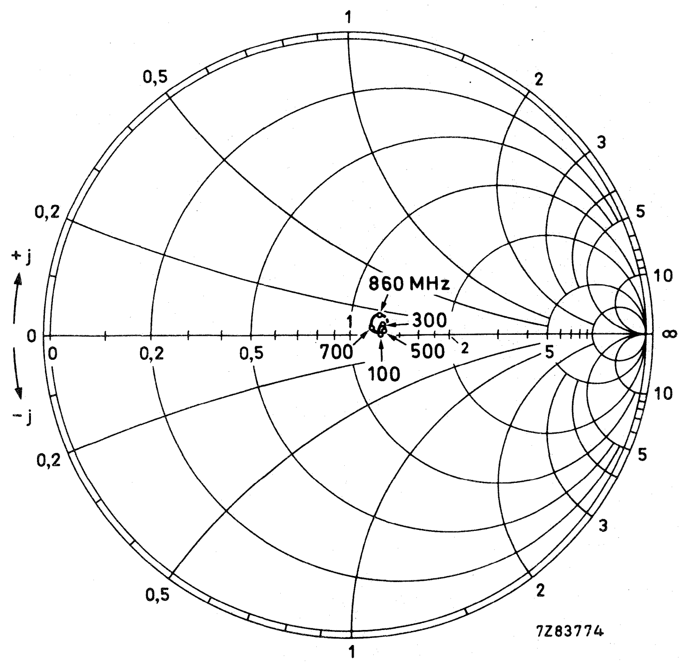


Fig. 6 Output impedance derived from output reflection coefficient s_o, co-ordinates in ohm x 75; typical values.

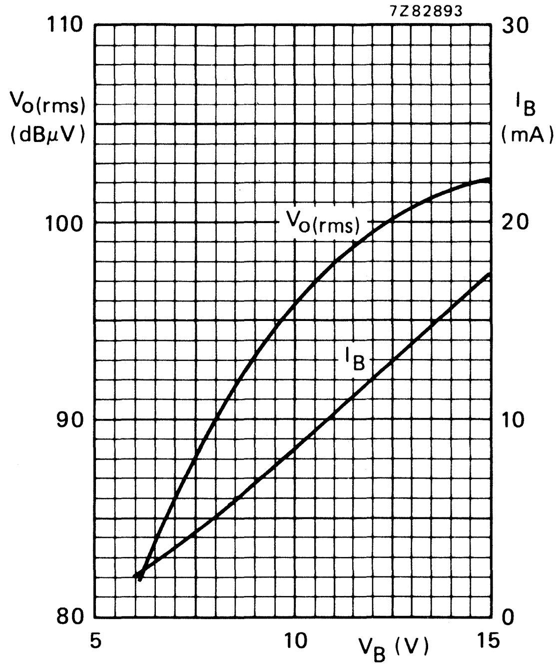


Fig. 7 Output voltage and supply current as a function of the supply voltage; typical values.

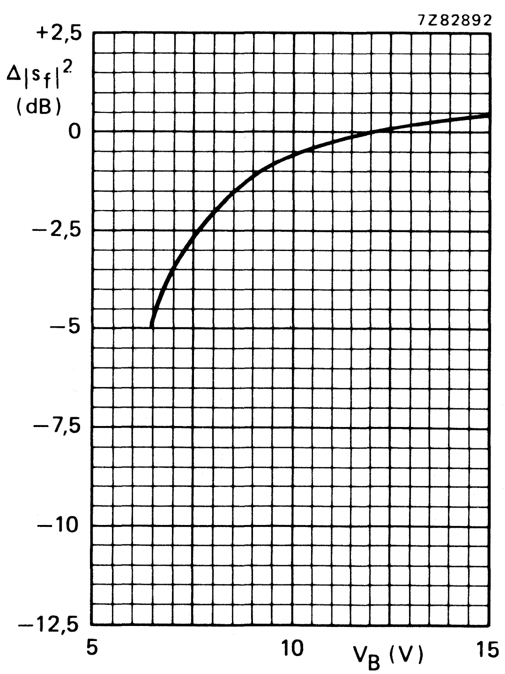


Fig. 8 Variation of transducer gain with supply voltage; reference 0 dB at 12 V; f = 100 to 860 MHz; typical values.

HYBRID INTEGRATED CIRCUIT VHF/UHF WIDE-BAND AMPLIFIER

Two-stage wide-band amplifier in hybrid integrated circuit technique on a thin-film substrate, intended for RATV and MATV applications.

QUICK REFERENCE DATA

D.C. supply voltage	V_B	=	12	V ± 10%
Frequency range	f		40 to 860	MHz
Source and load (characteristic) impedance	$R_s = R_\ell = Z_o$	=	75	Ω
Transducer gain	$G_{tr} = \|s_f\|^2$	typ.	18	dB
Flatness of frequency response	$\pm \Delta \|s_f\|^2$	typ.	1	dB
Output voltage at −60 dB intermodulation distortion (DIN 45004, 3-tone)	$V_{o(rms)}$	typ.	100	dBμV
Noise figure	F	typ.	5,2	dB
Operating ambient temperature	T_{amb}		−20 to +70	°C

ENCAPSULATION 5-pin, in-line, resin-coated body, see MECHANICAL DATA (Fig. 2)

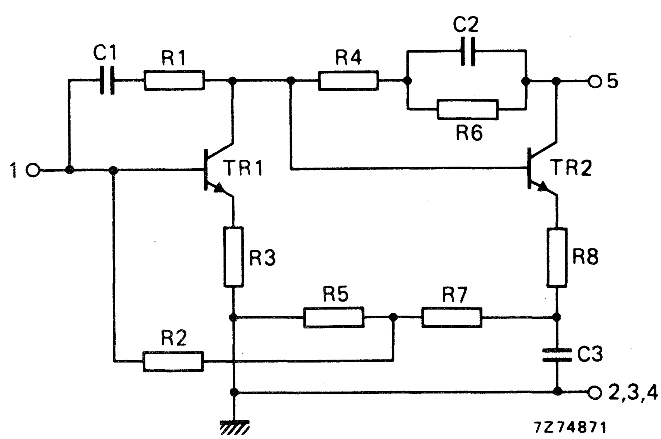


Fig. 1 Circuit diagram.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

Operating ambient temperature	T_{amb}	−20 to +70	°C
Storage temperature	T_{stg}	−40 to +125	°C
D.C. supply voltage	V_B	max. 15	V
Peak incident powers on pins 1 and 5	P_{I1M}, P_{I5M}	max. 100	mW

CHARACTERISTICS

Measuring conditions

Ambient temperature	T_{amb}	= 25	°C
D.C. supply voltage	V_B	= 12	V
Source impedance and load impedance	R_s, R_ℓ	= 75	Ω
Characteristic impedance of h.f. connections	Z_o	= 75	Ω
Frequency range	f	= 40 to 860	MHz

Performance

Supply current	I_B	typ. 18	mA
Transducer gain	$G_{tr} = \lvert s_f \rvert^2$	typ. 18	dB
Flatness of frequency response	$\pm \Delta \lvert s_f \rvert^2$	typ. 1	dB
Individual maximum v.s.w.r.			
input	$VSWR_{(i)}$	typ. 1,5	*
output	$VSWR_{(o)}$	typ. 1,9	*
Back attenuation			
f = 100 MHz	$\lvert s_r \rvert^2$	typ. 29	dB
f = 860 MHz	$\lvert s_r \rvert^2$	typ. 25	dB
Output voltage at −60 dB intermodulation distortion (DIN 45004, par. 6.3: 3-tone)	$V_{o(rms)}$	typ. 100	dBμV
Noise figure	F	typ. 5,2	dB

s-parameters: $s_f = s_{21}$ $s_i = s_{11}$
$s_r = s_{12}$ $s_o = s_{22}$

* Highest value, for a sample, occuring in the frequency range.

OPERATING CONDITIONS

Ambient temperature range	T_{amb}	−20 to + 70	°C
D.C. supply voltage	V_B	= 12	V ± 10%
Frequency range	f	40 to 860	MHz
Source impedance and load impedance	R_s, R_ℓ	= 75	Ω

MECHANICAL DATA

Dimensions in mm

The device is resin coated.

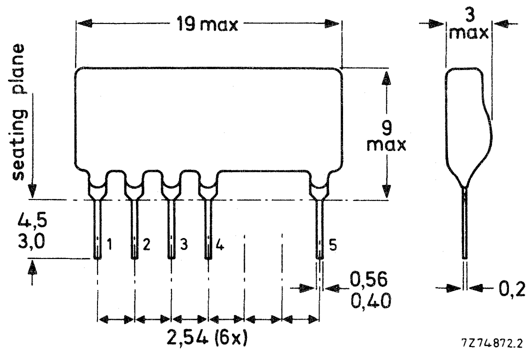


Fig. 2 Encapsulation.

Terminal connections

1 = input
2,3,4 = common
5 = output/supply(+)

Soldering recommendations

Hand soldering

Maximum contact time for a soldering-iron temperature of 260 °C up to the seating plane is 5 s.

Dip or wave soldering

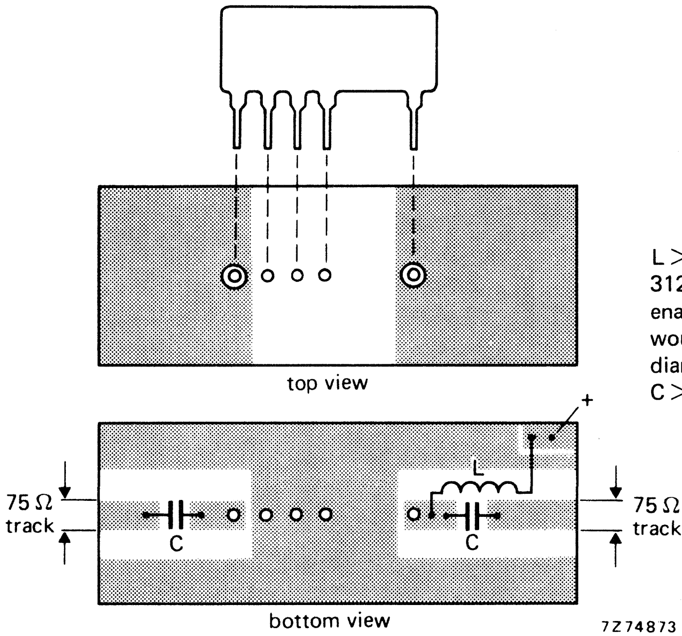
260 °C is the maximum permissible temperature of the solder; it must not be in contact with the joint for more than 5 seconds. The total contact time of successive solder waves must not exceed 5 seconds. The device may be mounted against the printed-circuit board, but the temperature of the device must not exceed 125 °C. If the printed-circuit board has been pre-heated, forced cooling may be necessary immediately after soldering to keep the temperature below the allowable limit.

Mounting recommendations

The module should preferably be mounted on double-sided printed-circuit board, see the example shown below.

Input and output should be connected to 75 Ω tracks.

The connections to the 'common' pins should be as close to the seating plane as possible.



L > 5 μH; e.g. catalogue no. 3122 108 20150 or 27 turns enamelled Cu wire (0,3 mm) wound on a ferrite core with a diameter of 1,6 mm.
C > 220 pF ceramic capacitor.

Fig. 3 Printed-circuit board holes and tracks.

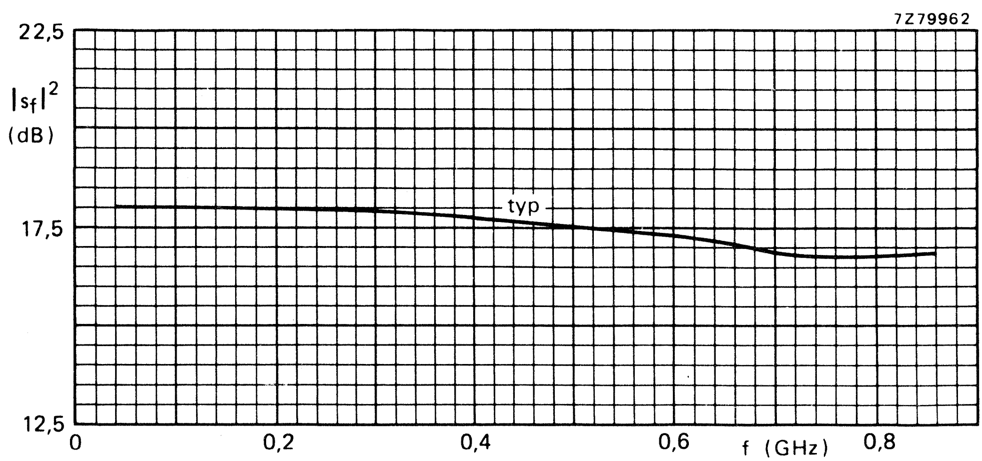


Fig. 4 Transducer gain as a function of frequency; Z_o = 75 Ω.

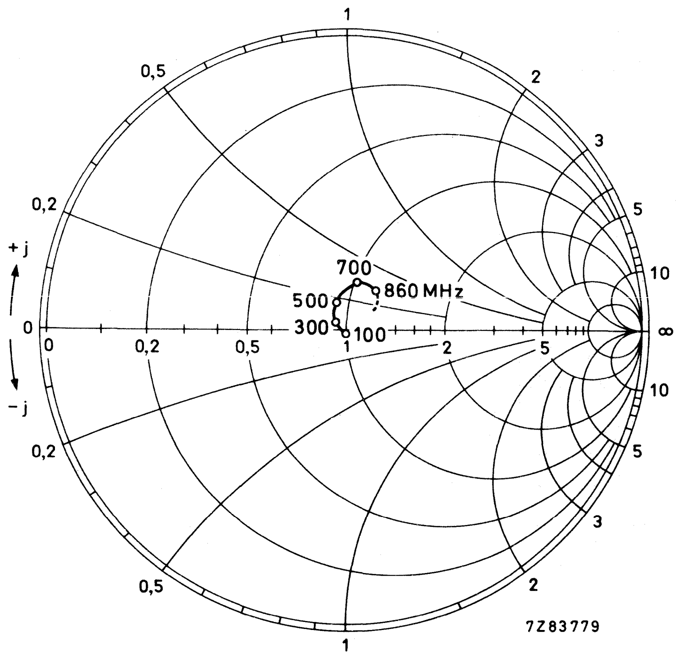


Fig. 5 Input impedance derived from input reflection coefficient s_i, co-ordinates in ohm x 75; typical values.

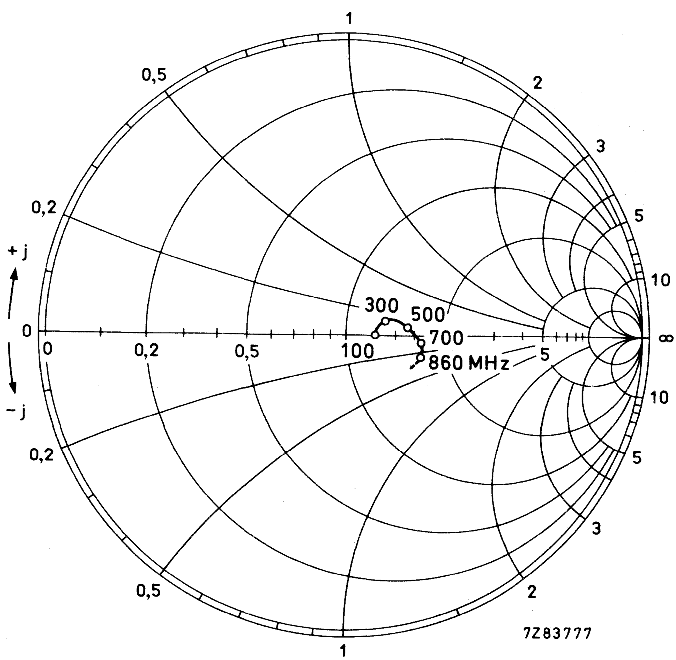


Fig. 6 Output impedance derived from output reflection coefficient s_o, co-ordinates in ohm x 75; typical values.

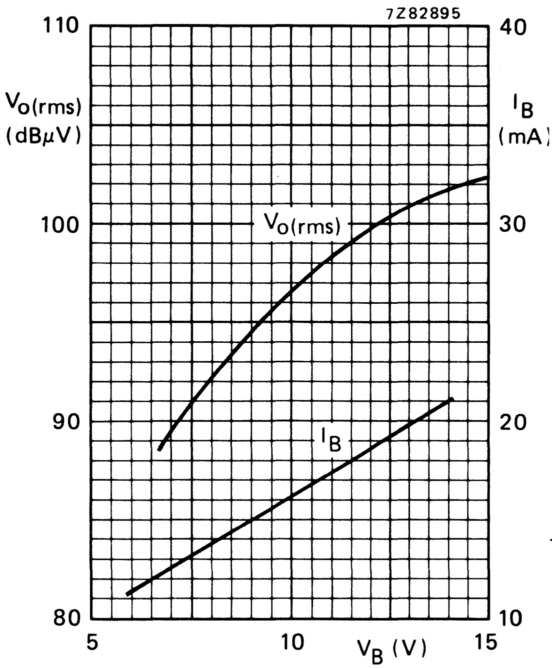


Fig. 7 Output voltage and supply current as a function of the supply voltage; typical values.

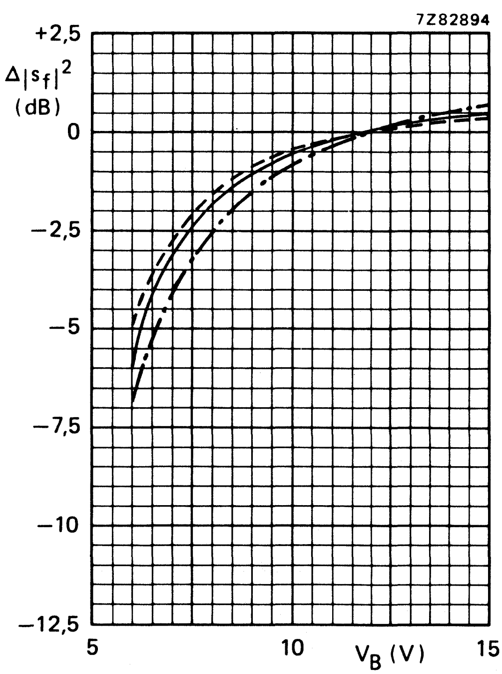


Fig. 8 Variation of transducer gain with supply voltage; reference 0 dB at 12 V:
——— f = 500 MHz;
– – – – f = 100 MHz;
—·—·—· f = 860 MHz;
typical values.

HYBRID INTEGRATED CIRCUIT VHF/UHF WIDE-BAND AMPLIFIER

Three-stage wide-band amplifier in hybrid integrated circuit technique on a thin-film substrate, intended for use in mast-head booster-amplifiers, as preamplifier in MATV systems, and as general-purpose amplifier for v.h.f. and u.h.f. applications.

QUICK REFERENCE DATA

Frequency range	f		40 to 860	MHz
Source and load (characteristic) impedance	$R_s = R_\ell = Z_o$	=	75	Ω
Transducer gain	$G_{tr} = \lvert s_f \rvert^2$	typ.	23	dB
Flatness of frequency response	$\pm\Delta\lvert s_f \rvert^2$	typ.	0,5	dB
Output voltage at −60 dB intermodulation distortion (DIN 45004, 3-tone)	$V_{o(rms)}$	>	105	dBμV
Noise figure	F	typ.	5,4	dB
D.C. supply voltage	V_B	=	12	V ± 10%
Operating ambient temperature	T_{amb}		−20 to +70	°C

ENCAPSULATION 8-pin, in-line, resin-coated body, see MECHANICAL DATA (Fig. 2)

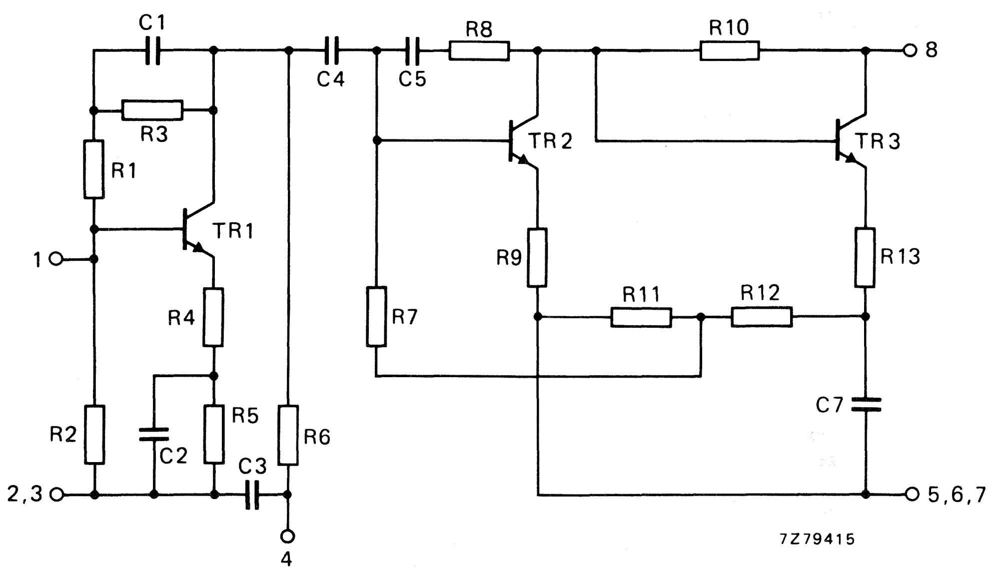


Fig. 1 Circuit diagram.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

Operating ambient temperature	T_{amb}		−20 to +70	°C
Storage temperature	T_{stg}		−40 to +125	°C
D.C. supply voltage	V_B	max.	15	V
Peak incident powers on pins 1 and 7	P_{I1M}, P_{I7M}	max.	100	mW

CHARACTERISTICS

Measuring conditions

Ambient temperature	T_{amb}	=	25	°C
D.C. supply voltage	V_B	=	12	V
Source impedance and load impedance	R_s, R_ℓ	=	75	Ω
Characteristic impedance of h.f. connections	Z_o	=	75	Ω
Frequency range	f	=	40 to 860	MHz

Performance

Supply current	I_B	typ.	55	mA
Transducer gain	$G_{tr} = \|s_f\|^2$	typ.	23	dB
			21 to 25	dB
Flatness of frequency response	$\pm\Delta\|s_f\|^2$	typ.	0,5	dB
Individual maximum v.s.w.r.				
input	$VSWR_{(i)}$	typ.	1,3	*
output	$VSWR_{(o)}$	typ.	1,5	*
Back attenuation				
f = 100 MHz	$\|s_r\|^2$	typ.	42	dB
f = 860 MHz	$\|s_r\|^2$	typ.	33	dB
Output voltage at −60 dB intermodulation distortion (DIN 45004, par. 6.3: 3-tone)	$V_{o(rms)}$	>	105	dBμV
		typ.	107	dBμV
Noise figure	F	typ.	5,4	dB

s-parameters:	$s_f = s_{21}$	$s_i = s_{11}$
	$s_r = s_{12}$	$s_o = s_{22}$

* Highest value, for a sample, occurring in the frequency range.

OPERATING CONDITIONS

Ambient temperature range	T_{amb}	−20 to +70 °C
D.C. supply voltage	V_B	= 12 V ± 10%
Frequency range	f	40 to 860 MHz
Source impedance and load impedance	R_s, R_ℓ	= 75 Ω

MECHANICAL DATA

Dimensions in mm

The device is resin coated.

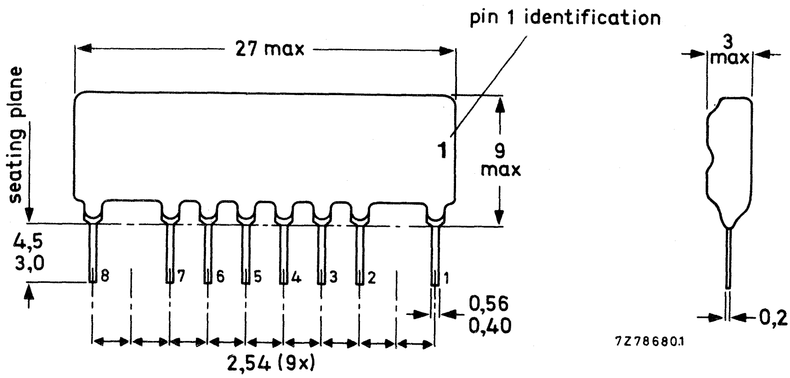


Fig. 2 Encapsulation.

Terminal connections

1	= input
2, 3, 5, 6, 7	= common
4	= supply (+)
8	= output/supply (+)

Soldering recommendations

Hand soldering

Maximum contact time for a soldering-iron temperature of 260 °C up to the seating plane is 5 s.

Dip or wave soldering

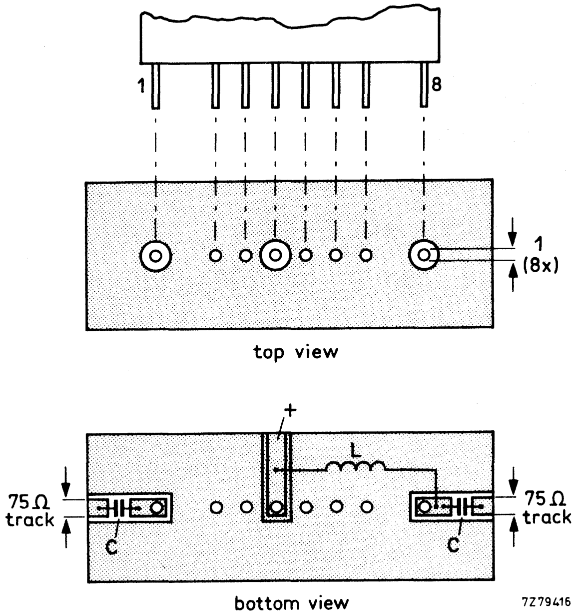
260 °C is the maximum permissible temperature of the solder; it must not be in contact with the joint for more than 5 seconds. The total contact time of successive solder waves must not exceed 5 seconds. The device may be mounted against the printed-circuit board, but the temperature of the device must not exceed 125 °C. If the printed-circuit board has been pre-heated, forced cooling may be necessary immediately after soldering to keep the temperature below the allowable limit.

Mounting recommendations

The module should preferably be mounted on double-sided printed-circuit board, see the example shown below.

Input and output should be connected to 75 Ω tracks.

The connections to the 'common' pins should be as close to the seating plane as possible.



L > 5 μH; e.g. catalogue no. 3122 108 20150 or 27 turns enamelled Cu wire (0,3 mm) wound on a ferrite core with a diameter of 1,6 mm.
C > 220 pF ceramic capacitor.

Fig. 3 Printed-circuit board holes and tracks.

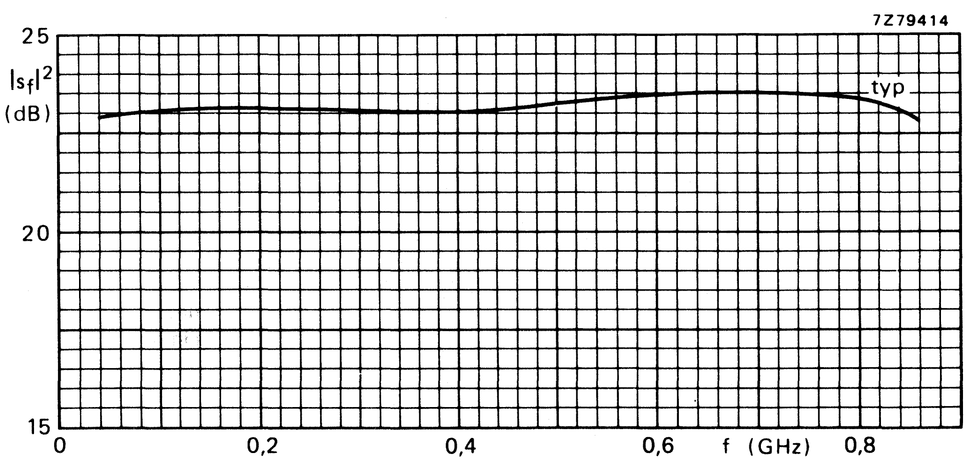


Fig. 4 Transducer gain as a function of frequency; Z_o = 75 Ω.

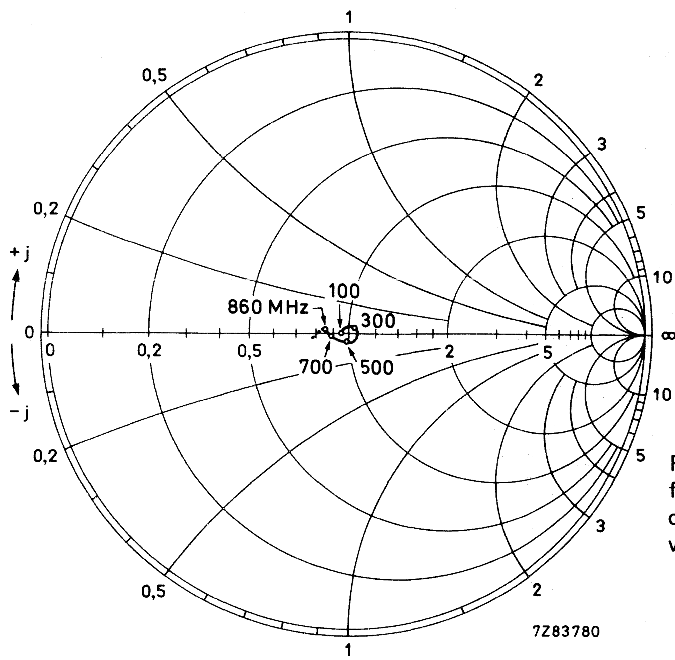


Fig. 5 Input impedance derived from input reflection coefficient s_i, co-ordinates in ohm x 75; typical values.

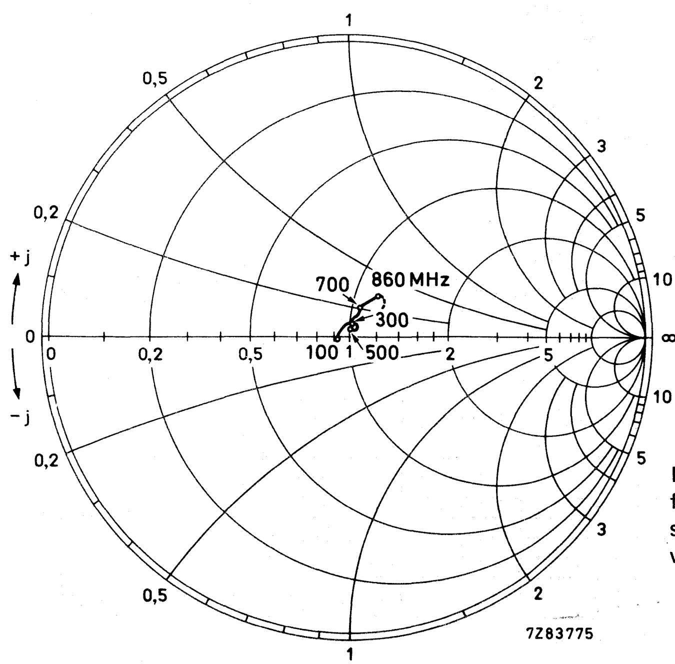


Fig. 6 Output impedance derived from output reflection coefficient s_o, co-ordinates in ohm x 75; typical values.

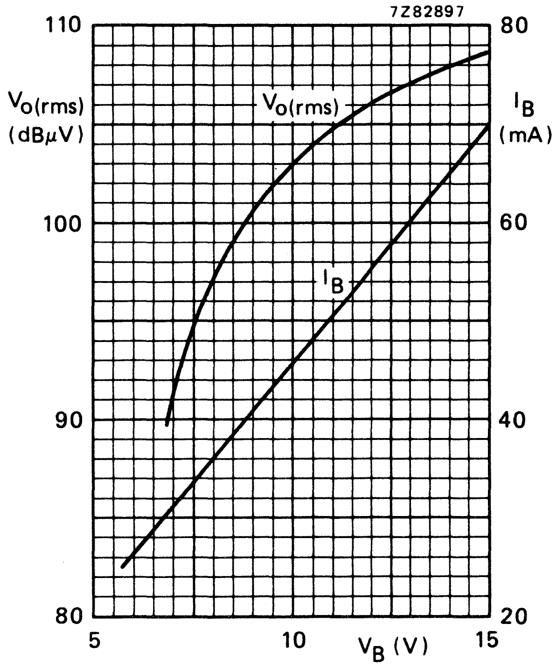


Fig. 7 Output voltage and supply current as a function of the supply voltage; typical values.

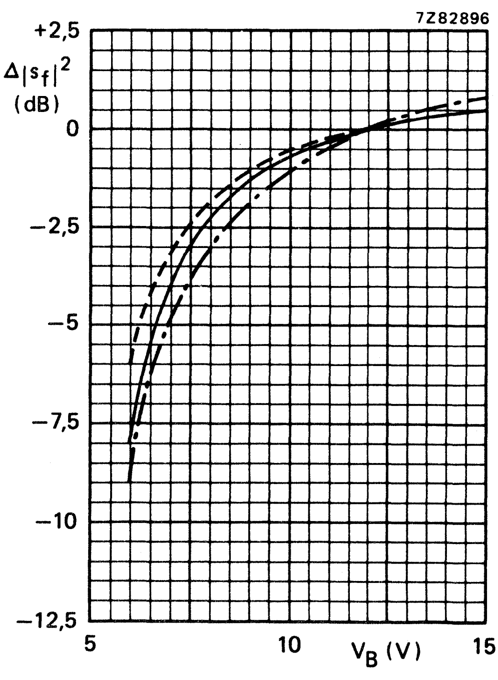


Fig. 8 Variation of transducer gain with supply voltage; reference 0 dB at 12 V;
——— f = 500 MHz;
– – – – f = 100 MHz;
—·—·— f = 860 MHz;
typical values.

HYBRID INTEGRATED CIRCUIT VHF/UHF WIDE-BAND AMPLIFIER

Three-stage wide-band amplifier in hybrid integrated circuit technique on a thin-film substrate, intended for use in mast-head booster-amplifiers, as an amplifier in MATV systems, and as general-purpose amplifier for v.h.f. and u.h.f. applications.

QUICK REFERENCE DATA

Frequency range	f		40 to 860	MHz
Source and load (characteristic) impedance	$R_s = R_\ell = Z_o$	=	75	Ω
Transducer gain	$G_{tr} = \|s_f\|^2$	typ.	28	dB
Flatness of frequency response	$\pm\Delta\|s_f\|^2$	typ.	1	dB
Output voltage at −60 dB intermodulation distortion (DIN 45004, 3-tone)	$V_{o(rms)}$	>	105	dBμV
Noise figure	F	typ.	4,4	dB
D.C. supply voltage	V_B	=	12	V ± 10%
Operating ambient temperature	T_{amb}		−20 to +70	°C

ENCAPSULATION 8-pin, in-line, resin-coated body, see MECHANICAL DATA (Fig. 2)

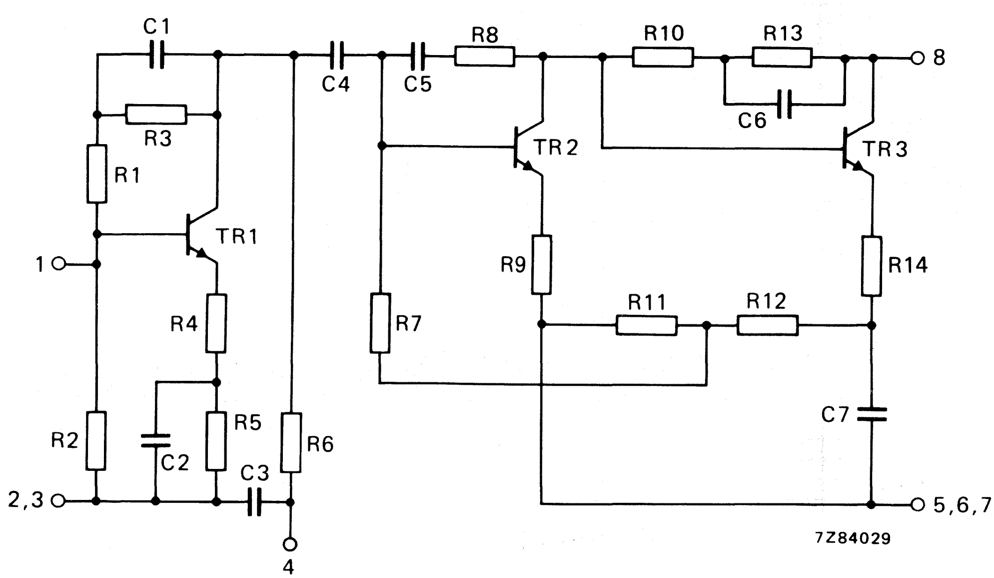


Fig. 1 Circuit diagram.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

Operating ambient temperature	T_{amb}		−20 to +70	°C
Storage temperature	T_{stg}		−40 to +125	°C
D.C. supply voltage	V_B	max.	15	V
Peak incident powers on pins 1 and 8	P_{I1M}, P_{I8M}	max.	100	mW

CHARACTERISTICS

Measuring conditions

Ambient temperature	T_{amb}	=	25	°C
D.C. supply voltage	V_B	=	12	V
Source impedance and load impedance	R_s, R_ℓ	=	75	Ω
Characteristic impedance of h.f. connections	Z_o	=	75	Ω
Frequency range	f	=	40 to 860	MHz

Performance

Supply current	I_B	typ.	50	mA
Transducer gain	$G_{tr} = \lvert s_f \rvert^2$	typ.	28	dB
			26 to 31	dB
Flatness of frequency response	$\pm\Delta\lvert s_f \rvert^2$	typ.	1	dB
Individual maximum v.s.w.r.				
input	$VSWR_{(i)}$	typ.	1,5	*
output	$VSWR_{(o)}$	typ.	1,7	*
Back attenuation				
f = 100 MHz	$\lvert s_r \rvert^2$	typ.	45	dB
f = 860 MHz	$\lvert s_r \rvert^2$	typ.	35	dB
Output voltage at −60 dB intermodulation distortion (DIN 45004, par. 6,3; 3-tone)	$V_{o(rms)}$	>	105	dBμV
		typ.	107	dBμV
Noise figure	F	typ.	4,4	dB

s-parameters:		
	$s_f = s_{21}$	$s_i = s_{11}$
	$s_r = s_{12}$	$s_o = s_{22}$

* Highest value, for a sample, occurring in the frequency range.

OPERATING CONDITIONS

Ambient temperature range	T_{amb}		−20 to +70	°C
D.C. supply voltage	V_B	=	12	V ± 10%
Frequency range	f		40 to 860	MHz
Source impedance and load impedance	R_s, R_ℓ	=	75	Ω

MECHANICAL DATA

Dimensions in mm

The device is resin coated.

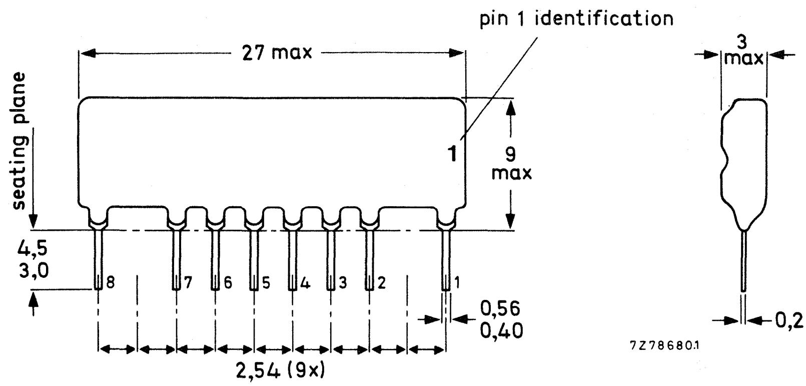


Fig. 2 Encapsulation.

Terminal connections

1	= input
2, 3, 5, 6, 7	= common
4	= supply (+)
8	= output/supply (+)

Soldering recommendations

Hand soldering

Maximum contact time for a soldering-iron temperature of 260 °C up to the seating plane is 5 s.

Dip or wave soldering

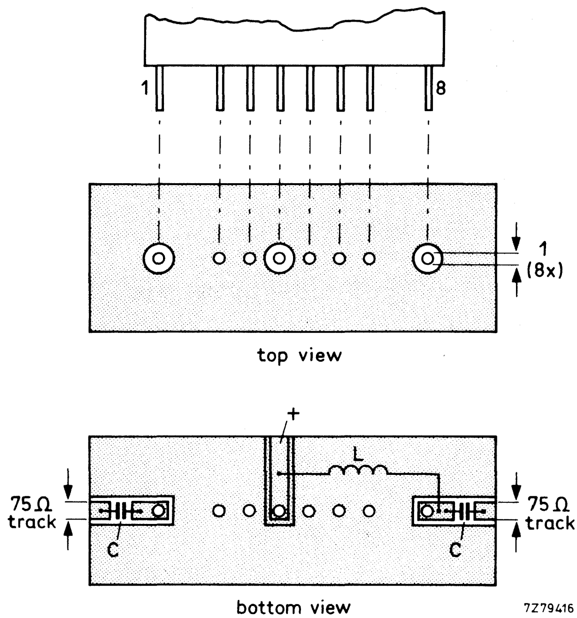
260 °C is the maximum permissible temperature of the solder; it must not be in contact with the joint for more than 5 seconds. The total contact time of successive solder waves must not exceed 5 seconds. The device may be mounted against the printed-circuit board, but the temperature of the device must not exceed 125 °C. If the printed-circuit board has been pre-heated, forced cooling may be necessary immediately after soldering to keep the temperature below the allowable limit.

Mounting recommendations

The module should preferably be mounted on double-sided printed-circuit board, see the example shown below.

Input and output should be connected to 75 Ω tracks.

The connections to the 'common' pins should be as close to the seating plane as possible.



L > 5 μH; e.g. catalogue no. 3122 108 20150 or 27 turns enamelled Cu wire (0,3 mm) wound on a ferrite core (material 4B1; catalogue number 3122 104 91110) with a diameter of 1,6 mm.
C > 220 pF ceramic capacitor.

Fig. 3 Printed-circuit board holes and tracks.

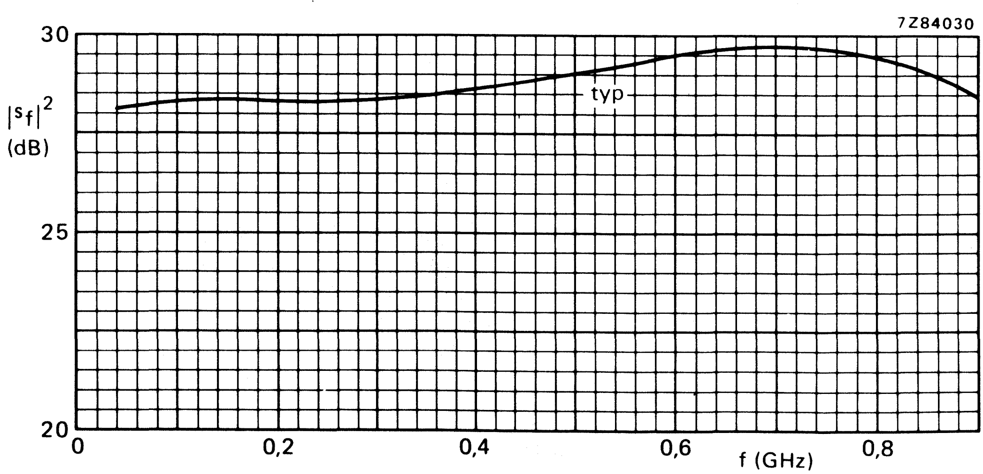


Fig. 4 Transducer gain as a function of frequency; Z_o = 75 Ω.

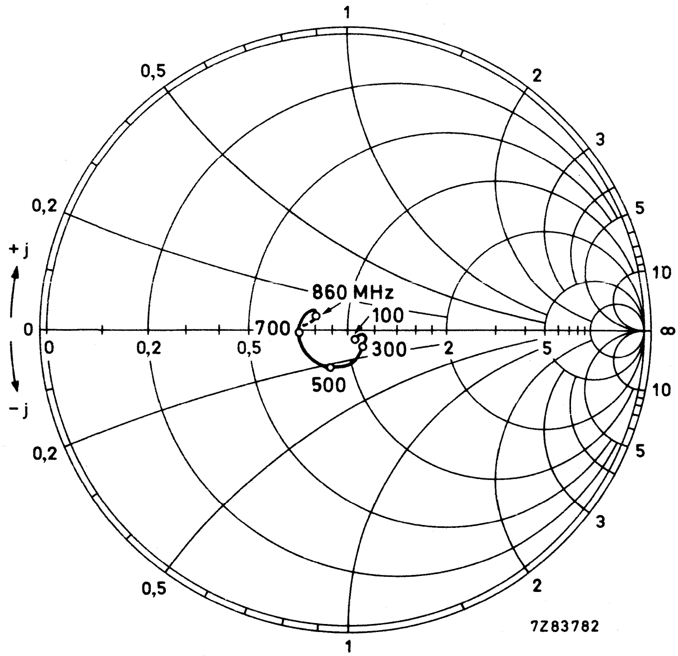


Fig. 5 Input impedance derived from input reflection coefficient s_i, co-ordinates in ohm x 75; typical values.

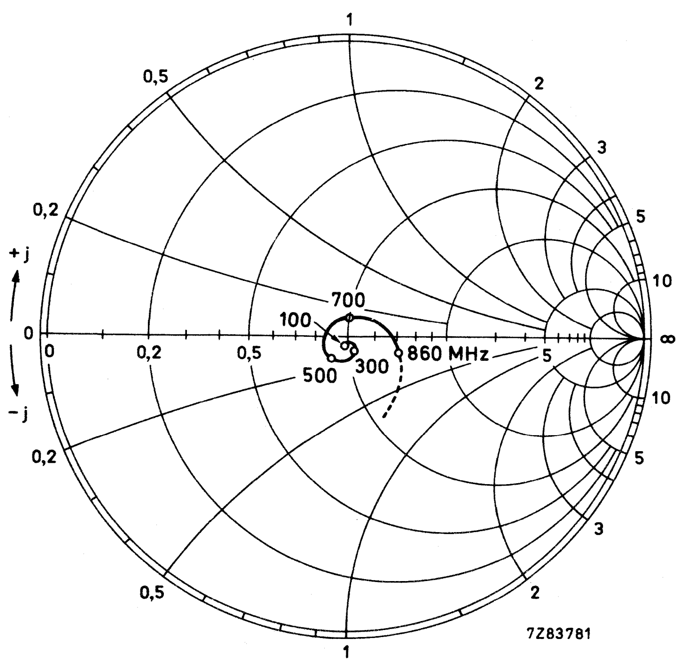


Fig. 6 Output impedance derived from output reflection coefficient s_o, co-ordinates in ohm x 75; typical values.

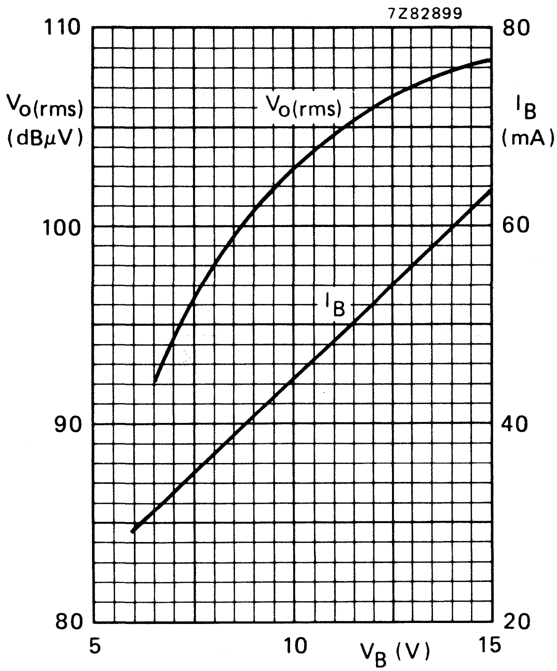


Fig. 7 Output voltage and supply current as a function of the supply voltage; typical values.

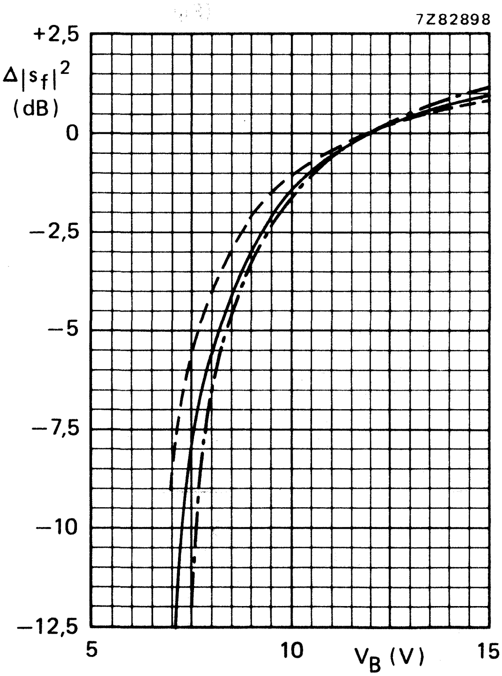


Fig. 8 Variation of transducer gain with supply voltage; reference 0 dB at 12 V;
——— f = 500 MHz;
– – – – f = 100 MHz;
—.—.—. f = 860 MHz;
typical values.

HYBRID INTEGRATED CIRCUIT VHF/UHF WIDE-BAND AMPLIFIER

Three-stage wide-band amplifier in hybrid integrated circuit technique on a thin-film substrate, intended for use in mast-head booster-amplifiers, as an amplifier in MATV and CATV systems, and as general-purpose amplifier for v.h.f. and u.h.f. applications.

QUICK REFERENCE DATA

Frequency range	f		40 to 860	MHz
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Transducer gain	$G_{tr} = \lvert s_f \rvert^2$	typ.	28	dB
Flatness of frequency response	$\pm\Delta\lvert s_f \rvert^2$	typ.	1	dB
Output voltage at −60 dB intermodulation distortion (DIN 45004, 3-tone)				
VHF	$V_{o(rms)}$	typ.	113	dBμV
UHF	$V_{o(rms)}$	typ.	112	dBμV
Noise figure	F	typ.	4,8	dB
D.C. supply voltage	V_B	=	12	V ± 10%
Operating ambient temperature	T_{amb}		−20 to +70	°C

ENCAPSULATION 9-pin, in-line, resin-coated body, see MECHANICAL DATA (Fig.2)

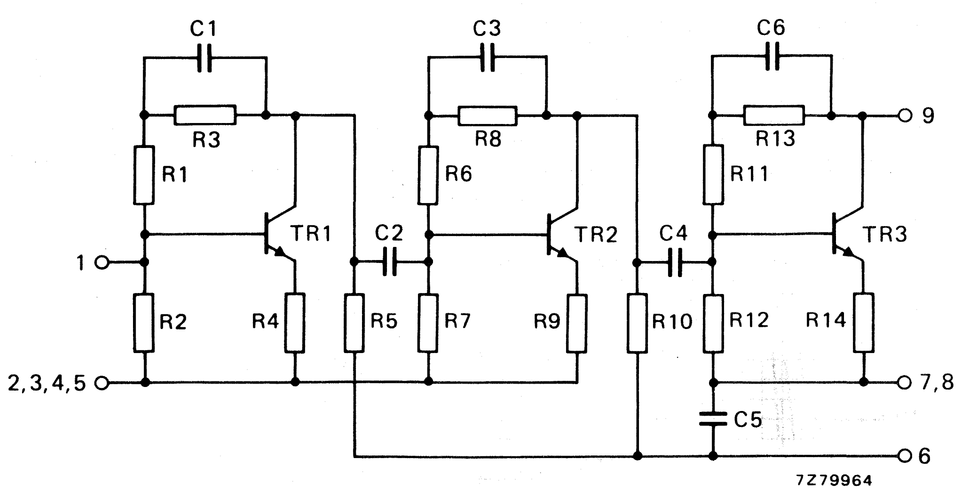

Fig. 1 Circuit diagram.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

Operating ambient temperature	T_{amb}		−20 to +70	°C
Storage temperature	T_{stg}		−40 to +125	°C
D.C. supply voltage	V_B	max.	15	V
Peak incident powers on pins 1 and 8	P_{I1M}, P_{I8M}	max.	100	mW

CHARACTERISTICS

Measuring conditions

Ambient temperature	T_{amb}	=	25	°C
D.C. supply voltage	V_B	=	12	V
Source impedance and load impedance	R_s, R_ℓ	=	75	Ω
Characteristic impedance of h.f. connections	Z_o	=	75	Ω
Frequency range	f	=	40 to 860	MHz

Performance

Supply current	I_B	typ.	105	mA
Transducer gain	$G_{tr} = \|s_f\|^2$	typ.	28	dB
			26 to 31	dB
Flatness of frequency response	$\pm\Delta\|s_f\|^2$	typ.	1	dB
Individual maximum v.s.w.r.				
input	$VSWR_{(i)}$	typ.	2,3	*
output	$VSWR_{(o)}$	typ.	1,9	*
Back attenuation				
f = 100 MHz	$\|s_r\|^2$	typ.	45	dB
f = 860 MHz	$\|s_r\|^2$	typ.	35	dB
Output voltage at −60 dB intermodulation distortion (DIN 45004, par. 6,3; 3-tone)				
VHF	$V_{o(rms)}$	>	111	dBμV
		typ.	113	dBμV
UHF	$V_{o(rms)}$	>	110	dBμV
		typ.	112	dBμV
Noise figure	F	typ.	4,8	dB

s-parameters:		
	$s_f = s_{21}$	$s_i = s_{11}$
	$s_r = s_{12}$	$s_o = s_{22}$

* Highest value, for a sample, occurring in the frequency range.

OPERATING CONDITIONS

Ambient temperature range	T_{amb}		−20 to +70	°C
D.C. supply voltage	V_B	=	12	V ± 10%
Frequency range	f		40 to 860	MHz
Source impedance and load impedance	R_s, R_ℓ	=	75	Ω

MECHANICAL DATA

Dimensions in mm

The device is resin coated.

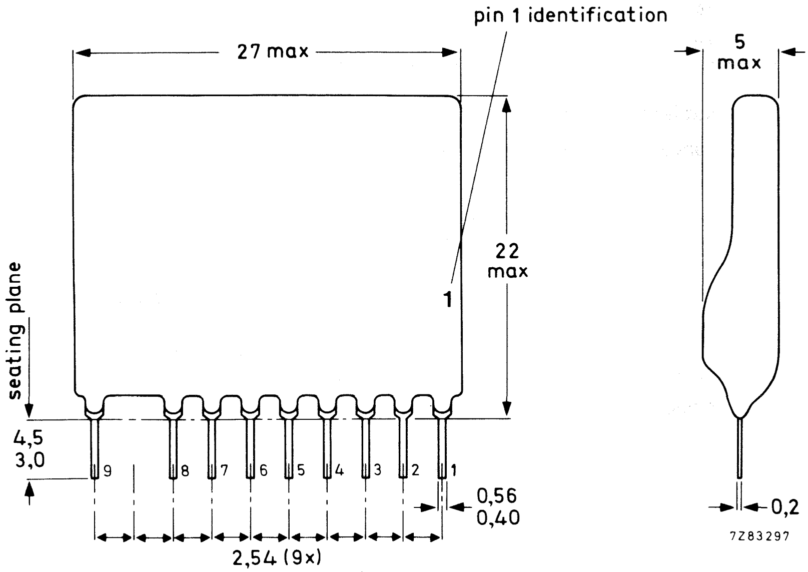

Fig. 2 Encapsulation.

Terminal connections

1	= input
2, 3, 4, 5 and 7, 8	= common
6	= supply (+)
9	= output/supply (+)

Soldering recommendations

Hand soldering

Maximum contact time for a soldering-iron temperature of 260 °C up to the seating plane is 5 s.

Dip or wave soldering

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The module should preferably be mounted on double-sided printed-circuit board, see the example shown below.

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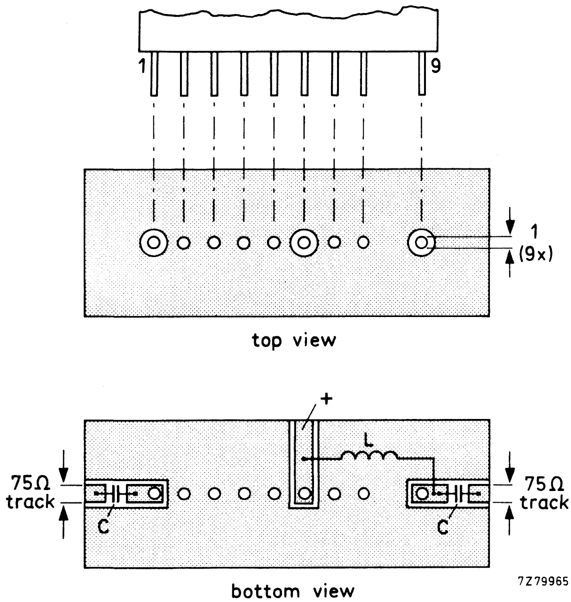
The connections to the 'common' pins should be as close to the seating plane as possible.



$L > 5\ \mu H$; e.g. catalogue no. 3122 108 20150 or 27 turns enamelled Cu wire (0,3 mm) wound on a ferrite core (material 4B1; catalogue no. 3122 104 91110) with a diameter of 1,6 mm.
$C > 220$ pF ceramic capacitor.

Fig. 3 Printed-circuit board holes and tracks.

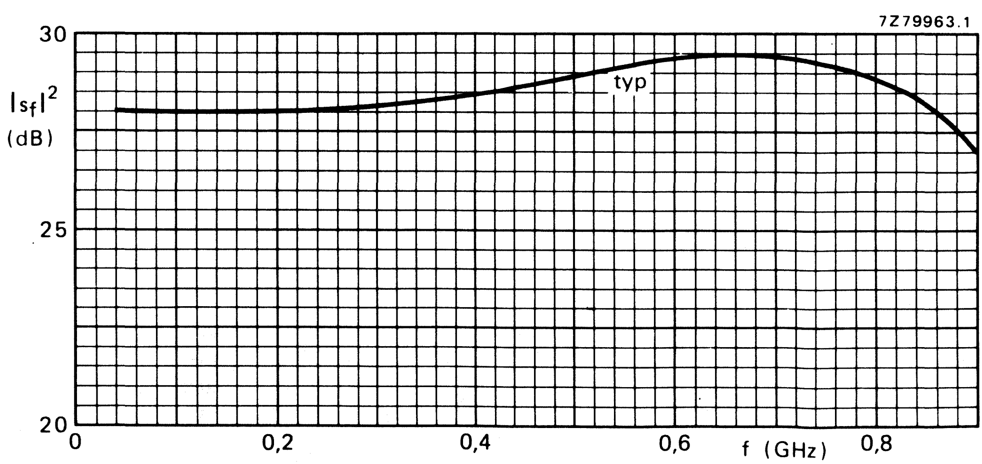


Fig. 4 Transducer gain as a function of frequency; $Z_o = 75\ \Omega$.

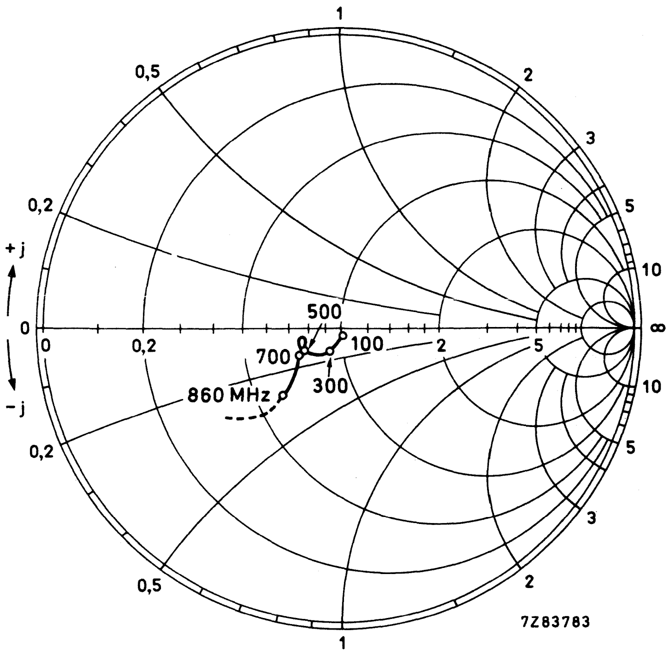


Fig. 5 Input impedance derived from input reflection coefficient s_i, co-ordinates in ohm x 75; typical values.

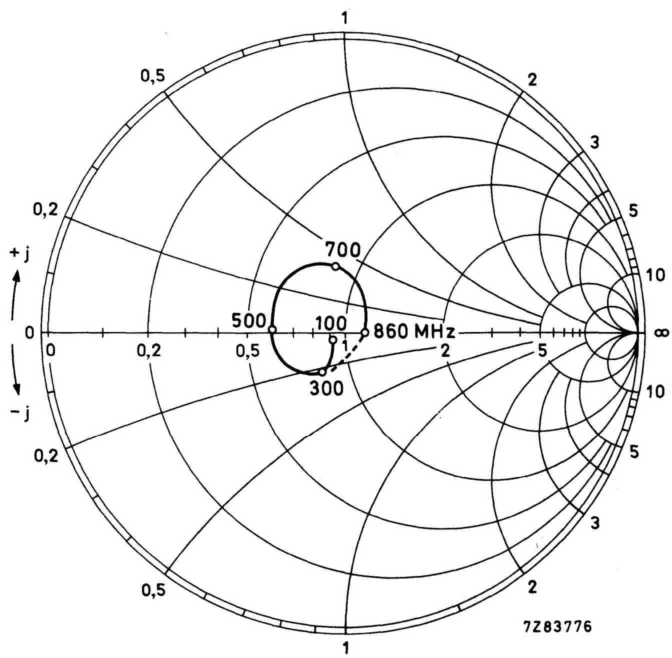


Fig. 6 Output impedance derived from output reflection coefficient s_o, co-ordinates in ohm x 75; typical values.

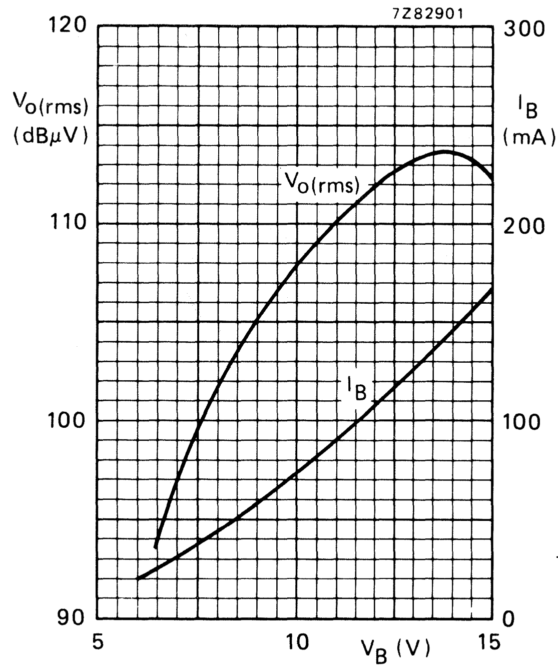


Fig. 7 Output voltage and supply current as a function of the supply voltage; typical values.

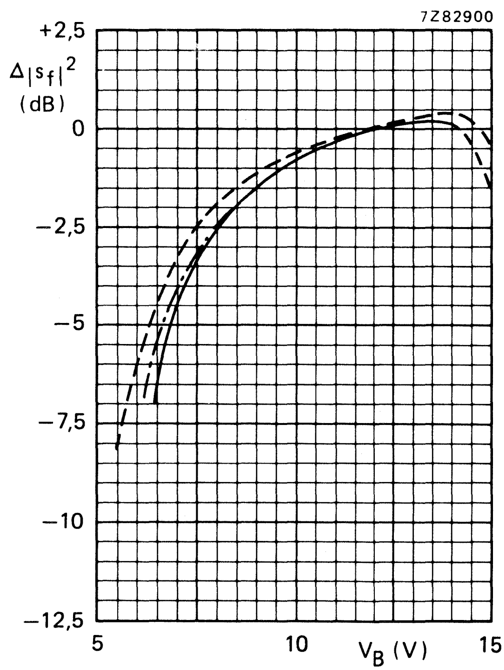
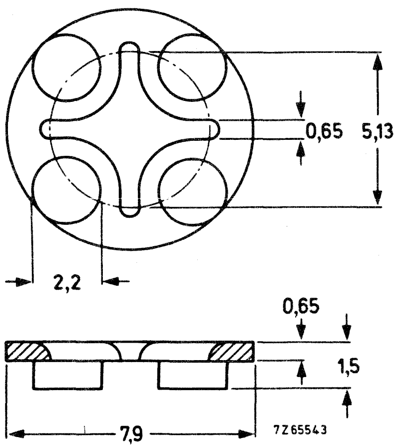


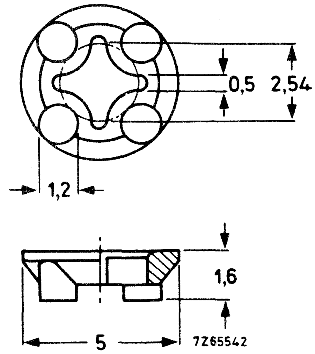
Fig. 8 Variation of transducer gain with supply voltage; reference 0 dB at 12 V;
——— f = 500 MHz;
– – – – f = 100 MHz;
—·—·—· f = 860 MHz;
typical values.

MECHANICAL DATA

Dimensions in mm



Distance disc 56245 for TO-5 or TO-39; insulating material.

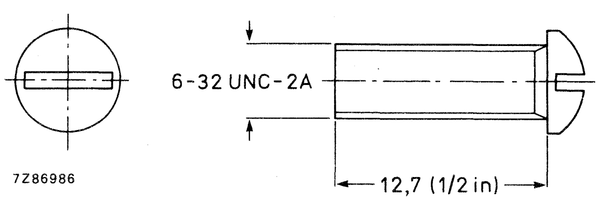


Distance disc 56246 for TO-18 or TO-72; insulating material.

Maximum permissible temperature: 100 ^{o}C.

ROUND HEAD SCREW 6-32 UNC-2A

Available, upon request, under type number 56396 or 12 NC code number 9390 298 10xx0.



INDEX OF TYPE NUMBERS

The inclusion of a type number in this publication does not necessarily imply its availability.

Key to handbook sections

A = Accessories
FET = Field-effect transistors
I = Infrared devices
LED = Light-emitting diodes
LCD = Liquid crystal displays
Mm = Surface-mounted devices
M = Microwave transistors
P = Low-frequency power transistors and modules
PDT = Photodiodes or transistors
Ph = Photoconductive devices
PhC = Photocouplers
PM = PowerMOS transistors
R = Rectifier diodes
RFP = RF power transistors and modules
RT = Triplers
SEN = Semiconductor sensors
SD = Small-signal diodes
Sm = Small-signal transistors
Sp = Special diodes
SP = Low-frequency switching power diodes
St = Rectifier stacks
T = Tuner diodes
Th = Thyristors
Tri = Triacs
TS = Transient suppressor diodes
Vrf = Voltage reference diodes
Vrg = Voltage regulator diodes
WBT = Wideband hybrid IC transistors
WBM = Wideband hybrid IC modules

* series.

type no.	book	section
2N4856	SC07	FET
2N4857	SC07	FET
2N4858	SC07	FET
2N4859	SC07	FET
2N4860	SC07	FET
2N4861	SC07	FET
2N5086	SC04	Sm
2N5087	SC04	Sm
2N5088	SC04	Sm
2N5400	SC04	Sm
2N5401	SC04	Sm
2N5415	SC04	Sm
2N5416	SC04	Sm
2N5550	SC04	Sm
2N5551	SC04	Sm
2N6659	SC07	FET
2N6660	SC07	FET
2N6661	SC07	FET
2PA733	SC04	Sm
2PA1015/L	SC04	Sm
2PC945	SC04	Sm
2PC1815/L	SC04	Sm
4N25	SC12	PhC
4N25A	SC12	PhC
4N26	SC12	PhC
4N27	SC12	PhC
4N28	SC12	PhC
4N35	SC12	PhC
4N36	SC12	PhC
4N37	SC12	PhC
4N38	SC12	PhC
4N38A	SC12	PhC
56201d	SC06	A
56201j	SC06	A
56245	SC04/14	A
56246	SC04/14	A
56261a	SC06	A
56264	S2a/b	A
56295	S2a/b	A
56326	SC06	A
56339	SC06	A
56352	SC06	A
56353	SC06	A
56354	SC06	A
56359b	S2/4	A

type no.	book	section
56359c	S2/4	A
56359d	S2/4	A
56360a	S2/4	A
56363	S2/4	A
56364	S2/4	A
56367	S2/4	A
56368b	S2/4	A
56368c	S2/4	A
56369	S2/4	A
56378	S2/4	A
56379	S2/4	A
56387a	SC06	A
56387b	SC06	A
56397	SC01	A

DATA HANDBOOK SYSTEM

DATA HANDBOOK SYSTEM

Our Data Handbook System comprises more than 60 books with specifications on electronic components, subassemblies and materials. It is made up of six series of handbooks:

INTEGRATED CIRCUITS

DISCRETE SEMICONDUCTORS

DISPLAY COMPONENTS

PASSIVE COMPONENTS*

PROFESSIONAL COMPONENTS**

MATERIALS*

The contents of each series are listed on pages iii to viii.

The data handbooks contain all pertinent data available at the time of publication, and each is revised and reissued periodically.

When ratings or specifications differ from those published in the preceding edition they are indicated with arrows in the page margin. Where application is given it is advisory and does not form part of the product specification.

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Product specialists are at your service and enquiries will be answered promptly.

* Will replace the Components and materials (green) series of handbooks.
** Will replace the Electron tubes (blue) series of handbooks.

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This series of handbooks comprises:

code	handbook title
IC01	**Radio, audio and associated systems** Bipolar, MOS
IC02a/b	**Video and associated systems** Bipolar, MOS
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IC04	**HE4000B logic family** CMOS
IC05	**Advanced Low-power Schottky (ALS) Logic Series**
IC06	**High-speed CMOS; PC74HC/HCT/HCU** Logic family
IC07	**Advanced CMOS logic (ACL)**
IC08	**ECL 10K and 100K logic families**
IC09N	**TTL logic series**
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IC11	**Linear Products**
Supplement to IC11	**Linear Products**
IC12	**I^2C-bus compatible ICs**
IC13	**Semi-custom** Programmable Logic Devices (PLD)
IC14	**Microcontrollers** NMOS, CMOS
IC15	**FAST TTL logic series**
Supplement to IC15	**FAST TTL logic series**
IC16	**CMOS integrated circuits for clocks and watches**
IC17	**ICs for Telecom** Bipolar, MOS Radio pagers Mobile telephones ISDN
IC18	**Microprocessors and peripherals**
IC19	**Data communication products**

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This series of data handbooks comprises:

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S2a	**SC02***	**Power diodes**
S2b	**SC03***	**Thyristors and triacs**
S3	**SC04***	**Small-signal transistors**
S4a	**SC05**	**Low-frequency power transistors and hybrid IC power modules**
S4b	**SC06**	**High-voltage and switching power transistors**
S5	**SC07**	**Small-signal field-effect transistors**
S6	**SC08***	**RF power transistors**
	SC09	**RF power modules**
S7	**SC10**	**Surface mounted semiconductors**
S8a	**SC11***	**Light emitting diodes**
S8b	**SC12**	**Optocouplers**
S9	**SC13***	**PowerMOS transistors**
S10	**SC14**	**Wideband transistors and wideband hybrid IC modules**
S11	**SC15**	**Microwave transistors**
S15**	**SC16**	**Laser diodes**
S13	**SC17**	**Semiconductor sensors**
S14	**SC18***	**Liquid crystal displays and driver ICs for LCDs**

* Not yet issued with the new code in this series of handbooks.
** New handbook in this series; will be issued shortly.

DISPLAY COMPONENTS

This series of data handbooks comprises:

current code	new code	handbook title
T8	**DC01**	**Colour display components**
T16	**DC02**	**Monochrome monitor tubes and deflection units**
C2	**DC03***	**Television tuners, coaxial aerial input assemblies**
C3	**DC04***	**Loudspeakers**
C20	**DC05***	**Wire-wound components for TVs and monitors**

* These handbooks are currently issued in another series; they are not yet issued in the Display Components series of handbooks.

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current code	new code	handbook title
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C11	**PA02***	**Varistors, thermistors and sensors**
C12	**PA03***	**Potentiometers, encoders and switches**
C7	**PA04***	**Variable capacitors**
C22	**PA05***	**Film capacitors**
C15	**PA06***	**Ceramic capacitors**
C9	**PA07***	**Piezoelectric quartz devices**
C13	**PA08***	**Fixed resistors**

* Not yet issued with the new code in this series of handbooks.

PROFESSIONAL COMPONENTS

This series of data handbooks comprises:

current code	new code	handbook title
T1	*	**Power tubes for RF heating and communications**
T2a	*	**Transmitting tubes for communications, glass types**
T2b	*	**Transmitting tubes for communications, ceramic types**
T3	**PC01****	**High-power klystrons**
T4	*	**Magnetrons for microwave heating**
T5	**PC02****	**Cathode-ray tubes**
T6	**PC03****	**Geiger-Müller tubes**
T9	**PC04****	**Photo and electron multipliers**
T10	**PC05**	**Plumbicon camera tubes and accessories**
T11	**PC06**	**Circulators and Isolators**
T12	**PC07**	**Vidicon and Newvicon camera tubes and deflection units**
T13	**PC08**	**Image intensifiers**
T15	**PC09****	**Dry reed switches**
C8	**PC10**	**Variable mains transformers; annular fixed transformers**
	PC11	**Solid state image sensors and peripheral integrated circuits**

* These handbooks will not be reissued.
** Not yet issued with the new code in this series of handbooks.

MATERIALS

This series of data handbooks comprises:

current code	new code	handbook title
C4 C5	MA01*	**Soft Ferrites**
C16	MA02**	**Permanent magnet materials**
C19	MA03**	**Piezoelectric ceramics**

* Handbooks C4 and C5 will be reissued as one handbook having the new code MA01.

** Not yet issued with the new code in this series of handbooks.

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