SHORTFORM

Semiconductor Products and Systems 1983

This publication aims to provide condensed information on the vast range of standard devices currently produced by SGS.
For easy consultation the products have been divided into several sections according to the main product families and in some cases depending on the main application sectors.
Each device is presented along with its essential electrical characteristics. If further information is required SGS will provide individual data sheets for all the devices on request.
All the data sheets for the individual devices are collected in "databooks" organized according to product families. These can be acquired through SGS sales network.

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TELECOMMUNICATIONS PRODUCTS

Telecommunications is for SGS a priority market. The company sees its present and near future technology as being exactly suited to this market.
In addition the IRI-STET group (of which SGS-ATES is a member) has a heavy bias towards telecommunications which naturally gives an added incentive to the company's commitment to telecomms.
To date SGS has been involved in a number of projects with both Italian and other worldwide telecommunications manufacturers.
SGS has a wide range of products, both actual and under development for telecomms, that can roughly be split into two groups, telephone and centralized equipment.
In the sector of telephone equipment SGS has developed a lead in the production of integrated speech circuits and has produced, in addition to the world's first integrated speech circuit, the LS285, the LS156 for the Italian market and the LS288 according to German specifications.
At present the SGS telephone range includes:

- speech circuit
- dual tone MF generators
- line interface circuits
- loop disconnect diallers
- electronic bells
- protection circuits

The range of devices for centralized equipment includes:

- crosspoints
- balanced modulators
- channel amplifiers
- expandors
- CODECs and PCM filter
- op-amps.
- digital switching matrix
- crosspoints for PABX's

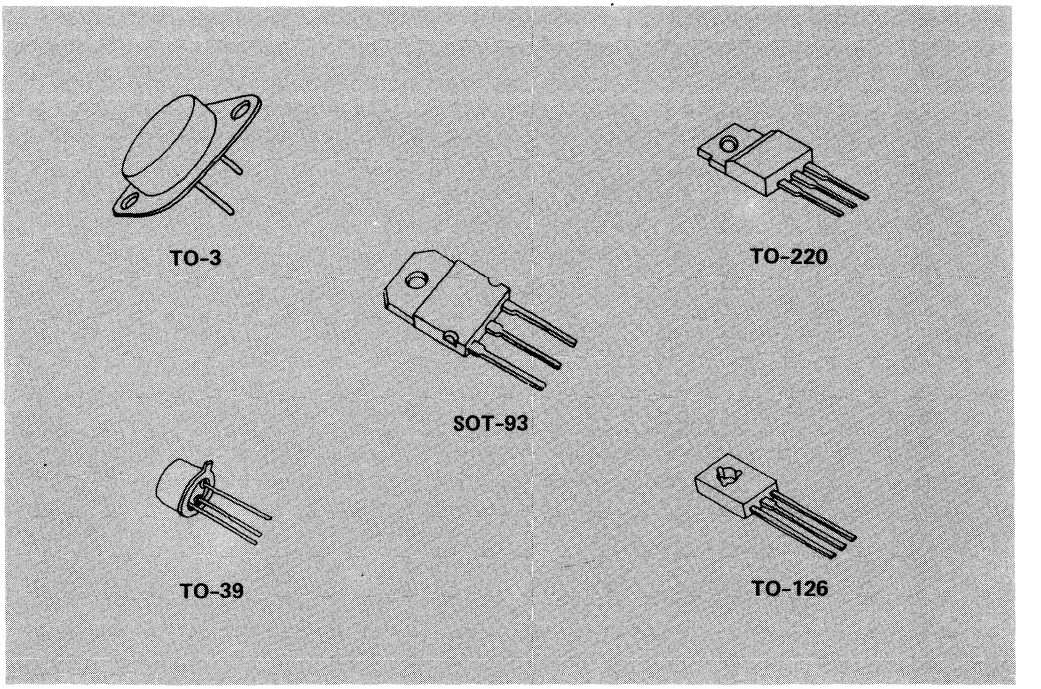
Other products not specifically intended for the telecomms market included a wide range of switching transistors, linear and digital integrated circuits.
These products coupled with the range of microprocessors which include the Z8, Z80, Z8000 and M3870 families, give SGS a very strong presence in the telecomms field.

TELECOMMUNICATIONS PRODUCTS

INDEX OF THE SGS PRODUCT RANGE

POWER TRANSISTORS

SGS power transistors cover a wide range of technologies optimized for almost every application.
These include epitaxial base (medium voltage, high ruggedness, general purpose) epitaxial planar (high speed with good voltage capability) multiepitaxial planar (high current switching) and multiepitaxial mesa (high voltage-high power switching) and NOW N-channel POWER MOS.
A wide choice of packages are available.
In order to be easy to use following power transistor selector guides cover only a part of the complete range. Other voltage ratings and gain selections shown on the full data sheets are equally available.
Many older devices which are less popular for new designs are also in production. Your nearest SGS sales office or distributor has full details available on request.



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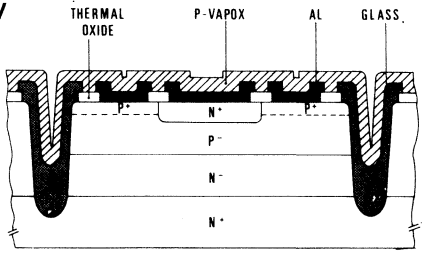
POWER TRANSISTORS & DARLINGTONS

GENERAL PURPOSE

EPITAXIAL BASE – I_{CM} 1 to 15A; V_{CEO} 22 to 180V



NPN and PNP types
(perfect complementary pairs)
Medium V_{CEO} range (22 to 100V)
Medium switching speed
Medium f_T (2 to 20 MHz)
High ruggedness
Monolithic Darlington capability

EPITAXIAL BASE

I_C (A)	V_{CBO} (V)	V_{CEO} (V)	P_{tot} (W)	Package	NPN	PNP	@ h_{FE} min	@ I_C/V_{CE} (A/V)	V_{CEsat} max (V)	@ I_C/I_B (A/mA)
1	40	40	30	TO-220	**TIP29**	**TIP30**	15	1/4	0.7	1/125
1	60	60	30	TO-220	**TIP29A**	**TIP30A**	15	1/4	0.7	1/125
1	80	80	30	TO-220	**TIP29B**	**TIP30B**	15	1/4	0.7	1/125
1	100	100	30	TO-220	**TIP29C**	**TIP30C**	15	1/4	0.7	1/125
2	45	45	25	TO-126	**BD233**	**BD234**	25	1/2	0.6	1/100
2	55	45	30	TO-220	**BD239**	**BD240**	15	1/4	0.7	1/200
2	60	60	25	TO-126	**BD235**	**BD236**	25	1/2	0.6	1/100
2	70	60	30	TO-220	**BD239A**	**BD240A**	15	1/4	0.7	1/200
2	100	80	25	TO-126	**BD237**	**BD238**	25	1/2	0.6	1/100
2	90	80	30	TO-220	**BD239B**	**BD240B**	15	1/4	0.7	1/200
2	115	100	30	TO-220	**BD239C**	**BD240C**	15	1/4	0.7	1/200
2	60	60	50	TO-220	**TIP110**	**TIP115**	1000	1/4	2.5	2/8
2	80	80	50	TO-220	**TIP111**	**TIP116**	1000	1/4	2.5	2/8
2	100	100	50	TO-220	**TIP112**	**TIP117**	1000	1/4	2.5	2/8
3	45	45	30	TO-126	**BD175**	**BD176**	15	1/2	0.8	1/100
3	60	60	30	TO-126	**BD177**	**BD178**	15	1/2	0.8	1/100
3	80	80	30	TO-126	**BD179**	**BD180**	15	1/2	0.8	1/100
3	55	45	40	TO-220	**BD241**	**BD242**	25	1/4	1.2	3/600
3	40	40	40	TO-220	**TIP31**	**TIP32**	25	1/4	1.2	3/375
3	70	60	40	TO-220	**BD241A**	**BD242A**	25	1/4	1.2	3/600
3	60	60	40	TO-220	**TIP31A**	**TIP32A**	25	1/4	1.2	3/375
3	90	80	40	TO-220	**BD241B**	**BD242B**	25	1/4	1.2	3/600
3	80	80	40	TO-220	**TIP31B**	**TIP32B**	25	1/4	1.2	3/375
3	115	100	40	TO-220	**BD241C**	**BD242C**	25	1/4	1.2	3/600
3	100	100	40	TO-220	**TIP31C**	**TIP32C**	25	1/4	1.2	3/375

POWER TRANSISTORS & DARLINGTONS

EPITAXIAL BASE (continued)

I_C (A)	V_{CBO} (V)	V_{CEO} (V)	P_{tot} (W)	Package	NPN	PNP	@ h_{FE} min	@ I_C/V_{CE} (A/V)	V_{CEsat} max (V)	@ I_C/I_B (A/mA)
4	40	40	40	TO-126	2N5190	2N5193	25	1.5/2	0.6	1.5/150
4	60	60	40	TO-126	BD677	BD678	750	1.5/3	2.5	1.5/6
4	80	80	40	TO-126	BD679	BD680	750	1.5/3	2.5	1.5/6
4	80	80	40	TO-126	2N5192	2N5195	20	1.5/2	0.6	1.5/150
4	100	100	40	TO-126	BD681	BD682	750	1.5/3	2.5	1.5/6
4	22	22	36	TO-126	BD433	BD434	50	2/1	0.5	2/200
4	32	32	36	TO-126	BD435	BD436	50	2/1	0.5	2/200
4	45	45	36	TO-126	BD437	BD438	40	2/1	0.6	2/200
4	45	45	40	TO-126	BD675A	BD676A	750	2/3	2.8	2/8
4	45	45	50	TO-220	BD533	BD534	25	2/2	0.8	2/200
4	60	60	36	TO-126	BD439	BD440	25	2/1	0.8	2/200
4	60	60	40	TO-126	BD677A	BD678A	750	2/3	2.8	2/8
4	60	60	50	TO-220	BD535	BD536	25	2/2	0.8	2/200
4	80	80	36	TO-126	BD441	BD442	15	2/1	0.8	2/200
4	80	80	40	TO-126	BD679A	BD680A	750	2/3	2.8	2/8
4	80	80	50	TO-220	BD537	BD538	15	2/2	0.8	2/200
4	180	180	10	TO-39	BDW91	BDW92	1000	2/5	2	2/4
5	60	60	65	TO-220	TIP120	TIP125	1000	3/3	2	3/12
5	80	80	65	TO-220	TIP121	TIP126	1000	3/3	2	3/12
5	100	100	65	TO-220	TIP122	TIP127	1000	3/3	2	3/12
6	45	45	50	TO-220	BDW23	BDW24	750	2/3	2	2/8
6	60	60	50	TO-220	BDW23A	BDW24A	750	2/3	2	2/8
6	80	80	50	TO-220	BDW23B	BDW24B	750	2/3	2	2/8
6	100	100	50	TO-220	BDW23C	BDW24C	750	2/3	2	2/8
6	140	140	60	TO-220	BDX53E	BDX54E	500	2/5	2	2/10
6	150	150	15	TO-39	BDX53S	BDX54S	500	2/5	2	2/8
6	160	160	60	TO-220	BDX53F	BDX54F	500	2/5	2	2/10
6	45	45	65	TO-220	BD243	BD244	15	3/4	1.5	6/1000
6	40	40	65	TO-220	TIP41	TIP42	15	3/4	1.5	6/600
6	60	60	65	TO-220	BD243A	BD244A	15	3/4	1.5	6/1000
6	60	60	65	TO-220	TIP41A	TIP42A	15	3/4	1.5	6/600
6	80	80	65	TO-220	BD243B	BD244B	15	3/4	1.5	6/1000
6	80	80	65	TO-220	TIP41B	TIP42B	15	3/4	1.5	6/600
6	100	100	65	TO-220	BD243C	BD244C	15	3/4	1.5	6/1000
6	100	100	65	TO-220	TIP41C	TIP42C	15	3/4	1.5	6/600
7	80	70	40	TO-220	2N6292	2N6107	30	4/2	1	2/200
7	40	30	40	TO-220	2N6288	2N6111	30	4/3	1	3/300

* Darlington types.

POWER TRANSISTORS & DARLINGTONS

EPITAXIAL BASE (continued)

	I_C (A)	V_{CBO} (V)	V_{CEO} (V)	P_{tot} (W)	Package	NPN	PNP	@ h_{FE} min	@ I_C/V_{CE} (A/V)	@ V_{CEsat} max (V)	@ I_C/I_B (A/mA)
*	8	40	40	65	TO-220	2N6386		1000	3/3	2	3/6
*	8	45	45	60	TO-220	BDX53	BDX54	750	3/3	2	3/12
*	8	60	60	60	TO-220	BDX53A	BDX54A	750	3/3	2	3/12
*	8	60	60	90	TO-3	MJ1000	MJ900	1000	3/3	2	3/12
*	8	80	80	60	TO-220	BDX53B	BDX54B	750	3/3	2	3/12
*	8	80	80	90	TO-3	MJ1001	MJ901	1000	3/3	2	3/12
*	8	100	100	60	TO-220	BDX53C	BDX54C	750	3/3	2	3/12
*	8	60	60	70	TO-220	TIP130	TIP135	1000	4/4	2	4/16
*	8	80	80	70	TO-220	TIP131	TIP136	1000	4/4	2	4/16
*	8	100	100	70	TO-220	TIP132	TIP137	1000	4/4	2	4/16
*	10	45	45	100	TO-3	BDX85	BDX86	1000	3/3	2	4/16
*	10	60	60	100	TO-3	BDX85A	BDX86A	1000	3/3	2	4/16
*	10	80	80	100	TO-3	BDX85B	BDX86B	1000	3/3	2	4/16
*	10	100	100	100	TO-3	BDX85C	BDX86C	1000	3/3	2	4/16
*	10	60	60	125	SOT-93	TIP140	TIP145	1000	5/4	3	10/40
*	10	80	80	125	SOT-93	TIP141	TIP146	1000	5/4	3	10/40
*	10	100	100	125	SOT-93	TIP142	TIP147	1000	5/4	3	10/40
*	10	60	60	65	TO-220	2N6387		1000	5/3	2	5/10
*	10	60	60	150	TO-3	MJ3000	MJ2500	1000	5/3	2	5/20
	10	60	60	150	TO-3	2N5877	2N5875	20	4/4	1	5/500
	10	70	60	75	TO-220	MJE3055T	MJE2955T	20	4/4	1.1	4/400
	10	80	60	150	TO-3	2N3715	2N3791	30	3/2	0.8	5/500
*	10	80	80	65	TO-220	2N6388		1000	5/3	2	5/10
*	10	80	80	150	TO-3	MJ3001	MJ2501	1000	5/3	2	5/20
	10	80	80	150	TO-3	2N5878	2N5876	20	4/4	1	5/500
	10	100	80	150	TO-3	2N3716	2N3792	30	3/2	0.8	5/500
	12	45	45	75	TO-220	BD705	BD706	20	4/4	1	4/400
	12	60	60	75	TO-220	BD707	BD708	15	4/4	1	4/400
	12	80	80	75	TO-220	BD709	BD710	15	4/4	1	4/400
	12	100	100	75	TO-220	BD711	BD712	15	4/4	1	4/400
*	12	60	60	125	SOT-93	BDV65	BDV64	1000	5/4	2	5/20
*	12	80	80	125	SOT-93	BDV65A	BDV64A	1000	5/4	2	5/20
*	12	100	100	125	SOT-93	BDV65B	BDV64B	1000	5/4	2	5/20
*	12	45	45	80	TO-220	BDW93	BDW94	750	5/3	2	5/20
*	12	60	60	80	TO-220	BDW93A	BDW94A	750	5/3	2	5/20
*	12	80	80	80	TO-220	BDW93B	BDW94B	750	5/3	2	5/20
*	12	100	100	80	TO-220	BDW93C	BDW94C	750	5/3	2	5/20
*	12	45	45	120	TO-3	BDX87	BDX88	1000	5/3	2	6/24

* Darlington types.

POWER TRANSISTORS & DARLINGTONS

EPITAXIAL BASE (continued)

	I_C (A)	V_{CBO} (V)	V_{CEO} (V)	P_{tot} (W)	Package	NPN	PNP	h_{FE} @ I_C/V_{CE} min	(A/V)	V_{CEsat} @ I_C/I_B max (V)	(A/mA)
*	12	60	60	120	TO-3	BDX87A	BDX88A	1000	5/3	2	6/24
*	12	80	80	120	TO-3	BDX87B	BDX88B	1000	5/3	2	6/24
*	12	100	100	120	TO-3	BDX87C	BDX88C	1000	5/3	2	6/24
	15	100	60	115	TO-3	2N3055E	MJ2955	20	4/4	1.1	4/400
	15	45	45	90	TO-220	BD905	BD906	15	5/4	1	5/500
	15	45	45	125	TO-3	BDW51	BDW52	20	5/4	1	5/500
	15	60	60	90	TO-220	BD907	BD908	15	5/4	1	5/500
	15	60	60	125	TO-3	BDW51A	BDW52A	20	5/4	1	5/500
	15	80	80	90	TO-220	BD909	BD910	15	5/4	1	5/500
	15	80	80	125	TO-3	BDW51B	BDW52B	20	5/4	1	5/500
	15	100	100	90	TO-220	BD911	BD912	15	5/4	1	5/500
	15	100	100	125	TO-3	BDW51C	BDW52C	20	5/4	1	5/500
	15	50	40	150	TO-3	2N3771		15	15/4	2	15/1500
	15	100	60	150	TO-3	2N3772		15	10/4	1.4	10/1500
*	16	60	60	150	TO-3	MJ4033	MJ4030	1000	10/3	4	16/80
*	16	80	80	150	TO-3	MJ4034	MJ4031	1000	10/3	4	16/80
*	16	100	100	150	TO-3	MJ4035	MJ4032	1000	10/3	4	16/80
*	20	60	60	160	TO-3	2N6282	2N6285	750	10/3	3	20/200
*	20	80	80	160	TO-3	2N6283	2N6286	750	10/3	3	20/200
*	20	100	100	160	TO-3	2N6284	2N6287	750	10/3	3	20/200
	25	40	40	125	SOT-93	TIP35	TIP36	25	1.5/4	1.8	15/1500
	25	60	60	125	SOT-93	TIP35A	TIP36A	25	1.5/4	1.8	15/1500
	25	80	80	125	SOT-93	TIP35B	TIP36B	25	1.5/4	1.8	15/1500
	25	100	100	125	SOT-93	TIP35C	TIP36C	25	1.5/4	1.8	15/1500
	25	60	60	200	TO-3	2N5885	2N5883	20	10/4	1	15/1500
	25	80	80	200	TO-3	2N5886	2N5884	20	10/4	1	15/1500
*	30	60	60	200	TO-3	MJ11012	MJ11011	200	30/5	4	30/300
*	30	90	90	200	TO-3	MJ11014	MJ11013	200	30/5	4	30/300
*	30	120	120	200	TO-3	MJ11016	MJ11015	200	30/5	4	30/300
	30	40	40	200	TO-3	2N5301	2N4398	15	15/2	0.75	10/1000
	30	60	60	200	TO-3	2N5302	2N4399	15	15/2	0.75	10/1000
	30	80	80	200	TO-3	2N5303	2N5745	15	10/2	1	10/1000

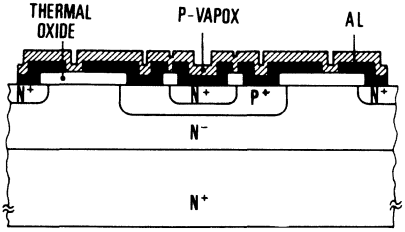
* Darlington types.

POWER TRANSISTORS & DARLINGTONS

LOW & MEDIUM VOLTAGE FAST SWITCHING

EPITAXIAL PLANAR - I_{CM} 0.5 to 10A; V_{CEO} 45 to 350V

NPN and PNP types
Good voltage capability (V_{CES} up to 400V)
Low saturation voltage
Low leakage
Very high f_T (up to 100 MHz).
Very high speed
Moderate ruggedness
Total base-collector passivation



EPITAXIAL PLANAR

I_C (A)	V_{CBO} (V)	V_{CEO} (V)	P_{tot} (W)	Package	NPN	PNP	@ h_{FE} min	@ I_C/V_{CE} (A/V)	V_{CEsat} max (V)	I_C/I_B (A/mA)
0.5	300	300	20	TO-126	**MJE340**	**MJE350**	30	0.05/10	—	—
1	45	45	12	TO-126	**BD135**	**BD136**	40	0.15/2	0.5	0.5/50
1	60	60	12	TO-126	**BD137**	**BD138**	40	0.15/2	0.5	0.5/50
1	80	80	12	TO-126	**BD139**	**BD140**	40	0.15/2	0.5	0.5/50
1	120	120	10	TO-39	**2N5682**	**2N5680**	40	0.25/2	1	0.5/50
1	200	200	10	TO-39		**2N5415**	30	0.05/10	2.5	0.05/5
1	300	250	10	TO-39	**2N3440**		40	0.02/10	0.5	0.05/4
1	350	300	10	TO-39		**2N5416**	30	0.05/10	2.5	0.05/5
1	450	350	10	TO-39	**2N3439**		40	0.02/10	0.5	0.05/4
1.5	120	120	5	TO-39	**BSW67**		15	1/5	1	1/150
1.5	150	150	5	TO-39	**BSW68**		15	1/5	1	1/150
2	50	45	25	TO-126	**BD375**	**BD376**	40	0.15/2	1	1/100
2	75	60	25	TO-126	**BD377**	**BD378**	40	0.15/2	1	1/100
2	100	80	25	TO-126	**BD379**	**BD380**	40	0.15/2	1	1/100
3	250	150	10	TO-39	**BU125S**		30	0.25/3	1.5	0.5/50
3	200	200	25	TO-126	**BU325**		30	0.5/5	1.5	0.5/50
3	250	200	10	TO-39	**BUY49S**		40	0.5/5	0.2	0.5/50
3	40	40	6	TO-39		**2N4234**	30	0.25/1	0.6	1/125
5	100	60	5	TO-39	**BFX34**		40	2/2	1	5/500
5	65	60	5	TO-39		**BSS44**	40	2/2	1	5/500
5	150	80	7	TO-39	**2N4897**		40	2/2	1	5/500
5	100	80	11.7	TO-39	**2N5154**	**2N5153**	70	2.5/5	0.7	2.5/250
5	100	100	6	TO-39	**2N5338**		20	5/2	1.2	5/500
5	100	100	6	TO-39	**2N5339**		40	5/2	1.2	5/500
7	130	60	10	TO-39	**BU125**		15	5/2	1	5/500
7	100	60	10	TO-39	**BUY68**		40	1/1	1	5/500
7	150	120	10	TO-39	**BUY47**		15	5/5	1	5/500
7	330	—	60	TO-220	**BU407D**		8	5/1	1	5/650
7	330	150	60	TO-220	**BU407**		10	5/1	1	5/500
7	200	170	10	TO-39	**BUY48**		15	5/5	1	5/500
7	400	—	60	TO-220	**BU406D**		8	5/1	1	5/650
7	400	200	60	TO-220	**BU406**		10	5/1	1	5/500
7	400	200	50	TO-3	**BUY18S**		20	1/5	1	5/500
* 8	330	150	60	TO-220	**BU807**		100	5/2	1.5	5/50
* 8	400	200	60	TO-220	**BU806**		100	5/2	1.5	5/50

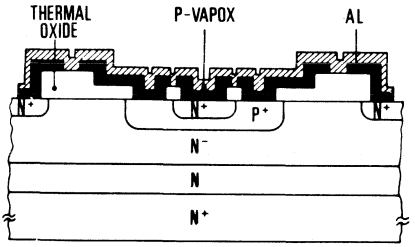
* Darlingotn types.

POWER TRANSISTORS & DARLINGTONS

LOW & MEDIUM VOLTAGE FAST SWITCHING, HIGH RUGGEDNESS

MULTIEPITAXIAL PLANAR – I_{CM} 1 to 70A, V_{CEO} 75 to 450V

I_C range up to 70A
Good h_{FE} linearity
Very low leakage
High switching speed
High $E_{s/b}$ capability
Totale base-collector passivation



MULTIEPITAXIAL PLANAR

	I_C (A)	V_{CBO} (V)	V_{CEO} (V)	P_{tot} (W)	Package	NPN	h_{FE} @ I_C/V_{CE} min (A/V)	V_{CEsat} @ I_C/I_B max (V) (A/mA)	
	1	350	250	40	TO-220	**TIP47**	10	1/10	1	1/200
	1	400	300	40	TO-220	**TIP48**	10	1/10	1	1/200
	1	450	350	40	TO-220	**TIP49**	10	1/10	1	1/200
	1	500	400	40	TO-220	**TIP50**	10	1/10	1	1/200
	1.5	600	300	40	TO-126	**MJE13002**	5	1/2	1	1/250
	1.5	700	400	40	TO-126	**MJE13003**	5	1/2	1	1/250
*	2.5	600	400	36	TO-126	**BU801**	100	1/3	2.2	1/15
	3	250	200	15	TO-126	**BUY49P**	40	0.5/5	0.2	0.5/50
	4	40	30	30	TO-220	**D44C1/2/3**	25/100/40	0.2/1	0.5	1/100/50/50
	4	55	45	30	TO-220	**D44C4/5/6**	25/100/40	0.2/1	0.5	1/100/50/50
	4	70	60	30	TO-220	**D44C7/8/9**	25/100/40	0.2/1	0.5	1/100/50/50
	4	90	80	30	TO-220	**D44C10/11/12**	25/100/40	0.2/1	0.5	1/100/50/50
	4	200	125	31	TO-220	**D44Q1**	20	2/10	1	2/200
	4	250	175	31	TO-220	**D44Q3**	20	2/10	1	2/200
	4	300	225	31	TO-220	**D44Q5**	20	2/10	1	2/200
*	6	400	350	60	TO-220	**BU910**	20	4/1.8	1.8	2.5/50
*	6	450	400	60	TO-220	**BU911**	20	4/1.8	1.8	2.5/50
*	6	500	450	60	TO-220	**BU912**	20	4/1.8	1.8	2/50
	7	140	90	50	TO-220	**2N6702**	20	5/2	0.8	5/500
*	7	600	400	75	TO-220	**BU810**	100	2/2	3	7/700
	10	30	30	50	TO-220	**D44H1/2**	20/40	4/1	1	8/800/400
	10	45	45	50	TO-220	**D44H4/5**	20/40	4/1	1	8/800/400
	10	60	60	50	TO-220	**D44H7/8**	20/40	4/1	1	8/800/400
	10	80	80	50	TO-220	**D44H10/11**	20/40	4/1	1	8/800/400
	10	100	80	60	TO-3	**BDY91**	20	10/5	0.5	5/500
	10	120	100	60	TO-3	**BDY90**	20	10/5	0.5	5/500
	10	150	120	140	TO-3	**2N6354**	20	5/2	0.5	5/500
*	10	400	350	105	SOT-93	**BU920P**	50	7/1.8	1.8	5/50
*	10	450	400	105	SOT-93	**BU921P**	50	7/1.8	1.8	5/50
*	10	500	450	105	SOT-93	**BU922P**	50	7/1.8	1.8	5/50

*Darlington types

MULTIEPITAXIAL PLANAR (continued)

	I_C (A)	V_{CBO} (V)	V_{CEO} (V)	P_{tot} (W)	Package	NPN	h_{FE} min @ I_C/V_{CE} (A/V)	V_{CEsat} max (V) @ I_C/I_B (A/mA)
	12	300	250	120	TO-3	**BUX42**	8 @ 6/4	1.2 @ 4/400
	15	150	110	140	TO-3	**2N6496**	12 @ 8/2	1 @ 8/800
	15	250	200	120	TO-3	**BUX41**	8 @ 8/4	1.2 @ 5/500
*	15	400	350	105	SOT-93	**BU930P**	40 @ 10/1.8	1.8 @ 8/100
*	15	450	400	105	SOT-93	**BU931P**	40 @ 10/1.8	1.8 @ 8/100
*	15	500	450	105	SOT-93	**BU932P**	53 @ 8/1.8	1.8 @ 8/150
*	15	400	350	150	TO-3	**BU930**	100 @ 7/1.6	1.8 @ 10/250
*	15	450	400	150	TO-3	**BU931**	100 @ 7/1.6	1.8 @ 10/250
*	15	500	450	150	TO-3	**BU932**	53 @ 8/1.8	1.8 @ 8/450
*	16	450	350	175	TO-3	**SGS10004**	10 @ 16/5	1.8 @ 8/400
*	16	500	400	175	TO-3	**SGS10005**	10 @ 16/5	1.8 @ 8/400
*	16	450	350	150	SOT-93	**SGS10004P**	10 @ 16/5	1.8 @ 8/400
*	16	500	400	150	SOT-93	**SGS10005P**	10 @ 16/5	1.8 @ 8/400
	18	220	160	120	TO-3	**BUX41N**	8 @ 12/4	1.2 @ 8/800
	20	120	75	140	TO-3	**2N5039**	20 @ 10/5	1 @ 10/1000
	20	150	90	140	TO-3	**2N5038**	20 @ 12/5	1 @ 12/1200
	20	160	125	120	TO-3	**BUX40**	8 @ 15/4	1.2 @ 10/1000
	20	220	160	150	TO-3	**BUX11N**	10 @ 15/4	0.6 @ 8/800
	20	250	200	150	TO-3	**BUX11**	10 @ 12/4	0.6 @ 6/600
	20	300	250	150	TO-3	**BUX12**	10 @ 10/4	1 @ 5/500
*	20	400	350	175	TO-3	**MJ10004**	50 @ 5/5	1.9 @ 10/400
*	20	450	400	175	TO-3	**MJ10005**	50 @ 5/5	1.9 @ 10/400
*	20	400	350	150	SOT-93	**MJ10004P**	50 @ 5/5	1.9 @ 10/400
*	20	450	400	150	SOT-93	**MJ10005P**	50 @ 5/5	1.9 @ 10/400
	25	120	80	175	TO-3	**BDY57**	20 @ 10/4	1.4 @ 10/1000
	25	160	125	175	TO-3	**BDY58**	20 @ 10/4	1.4 @ 10/1000
	25	160	125	150	TO-3	**BUX10**	10 @ 20/4	0.6 @ 10/1000
	30	120	90	140	TO-3	**2N5671**	20 @ 20/5	0.75 @ 15/1200
	30	150	120	140	TO-3	**2N5672**	20 @ 20/5	0.75 @ 15/1200
	40	150	120	140	TO-3 (M)	**2N6033**	10 @ 40/2	1 @ 40/4000
	40	250	200	250	TO-3 (M)	**BUV21**	10 @ 25/4	0.6 @ 12/1200
	40	300	250	250	TO-3 (M)	**BUV22**	10 @ 20/4	1 @ 10/1000
	50	120	90	140	TO-3 (M)	**2N6032**	10 @ 50/2.6	1.3 @ 50/5000
	50	160	125	250	TO-3 (M)	**BUV20**	10 @ 50/4	0.6 @ 25/2500
	60	300	200	350	TO-3 (M)	**BUR51**	15 @ 50/4	1 @ 30/2000
	60	350	250	350	TO-3 (M)	**BUR52**	15 @ 40/4	1.8 @ 25/2000
	70	200	125	350	TO-3 (M)	**BUR50**	15 @ 50/4	1 @ 35/2000

* Darlington types

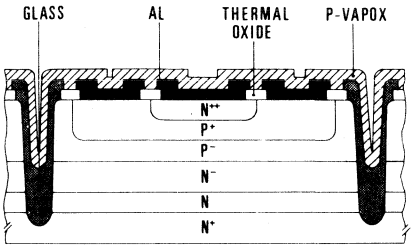
(M) Modified TO-3 with 1-5 mm pins

POWER TRANSISTORS

HIGH VOLTAGE FAST SWITCHING

MULTIEPITAXIAL MESA – I_{CM} 4 to 30A; V_{CEO} 325 to 600V

NPN and PNP types
High voltage (V_{CBO} up to 1000V)
High power
Very good $I_{s/b}$ and $E_{s/b}$ performance
High switching speed
High f_T (20 MHz)
Good stability



MULTIEPITAXIAL MESA

I_C (A)	V_{CBO} (V)	V_{CEO} (V)	P_{tot} (W)	Package	NPN	PNP	@ h_{FE} min	@ I_C/V_{CE} (A/V)	V_{CEsat} max (V)	I_C/I_B (A/mA)
2	800	400	40	TO-220	**BUX84**		5	1/3	1.5	0.3/30
2	800	400	40	TO-220	**BUX84A**		5	1/3	0.8	0.3/30
3	350	250	100	SOT-93	**TIP51**		5	3/1.5	1.5	3/600
3	400	300	100	SOT-93	**TIP52**		5	3/1.5	1.5	3/600
3	450	350	100	SOT-93	**TIP53**		5	3/1.5	1.5	3/600
3	500	400	100	SOT-93	**TIP54**		5	3/1.5	1.5	3/600
4	700	400	75	TO-220	**MJE13005**		10	1/5	0.6	2/500
5	850	400	85	TO-220	**BUV46**		5	3.5/5	1.5	2.5/500
5	850	400	100	SOT-93	**BUW11**		5	3/1.5	1.5	3/600
6	400	350	75	TO-3		**BUW22**	12	0.5/5	1.5	2.5/1000
6	450	400	75	TO-3		**BUW22A**	12	0.5/5	1.5	2.5/1000
6	400	350	65	TO-220		**BUW22P**	12	0.5/5	1.5	2.5/1000
6	450	400	65	TO-220		**BUW22AP**	12	0.5/5	1.5	2.5/1000
6	800	375	75	TO-3	**BU326**		25 •	1/5	1.5	2.5/500
6	800	375	113	SOT-93	**BU426**		25 •	0.6/5	1.5	2.5/500
6	800	400	60••	TO-3	**BU326S**		3.5	4/5	1.5	2.5/500
6	900	400	75	TO-3	**BU326A**		25 •	1/5	1.5	2.5/500
6	900	400	113	SOT-93	**BU426A**		25 •	0.6/5	1.5	2.5/500
8	450	400	120	TO-3	**BUX44**		8	4/4	1.5	4/800
8	700	400	80	TO-220	**MJE13007**		8	2/5	1.5	5/1000
8	850	400	125	TO-3	**2N6545**		4	8/5	1.5	5/1000
8	850	400	125	SOT-93	**BUW12**		5	6/1.5	1.5	6/1200
8	1000	450	125	SOT-93	**BUW12A**		5	6/1.5	1.5	6/1200
8.5	850	400	107	TO-3	**BUX47**		3	9/3	1.5	6/1200
9	850	400	120	SOT-93	**BUV47**		3.2	8/3	1.5	5/1000
9	1000	450	120	SOT-93	**BUV47A**		3.2	8/3	1.5	5/1000

• Typical •• Tcase = 75°C

POWER TRANSISTORS

MULTIEPITAXIAL MESA (continued)

I_C (A)	V_{CBO} (V)	V_{CEO} (V)	P_{tot} (W)	Package	NPN	PNP	@ h_{FE} min	@ I_C/V_{CE} (A/V)	V_{CEsat} max (V)	@ I_C/I_B (A/mA)
10	450	450	125	TO-3		BUW32A	12	1/5	1.5	5/1500
10	400	350	105	SOT-93		BUW32P	12	1/5	1.5	5/1500
10	400	350	125	TO-3		BUW32	12	1/5	1.5	5/1500
10	450	400	105	SOT-93		BUW32AP	12	1/5	1.5	5/1500
10	400	325	120	TO-3	BUX43		8	5/4	2	5/1000
10	800	325	100	TO-3	BUY69B		15	2.5/10	3.3	8/2500
10	500	400	125	TO-3	BUW34		15	1/5	1.5	5/1000
10	800	400	125	TO-3	BUW35		15	1/5	1.5	5/1000
10	450	400	150	TO-3	BUX14		8	6/4	1.6	6/1200
10	800	400	100	TO-3	BUX80		5	5/1.5	1.5	5/1000
10	1000	400	100	TO-3	BUY69A		15	2.5/10	3.3	8/2500
10	900	450	125	TO-3	BUW36		15	1/5	1.5	5/1000
10	1000	450	100	TO-3	BUX81		3.2	8/3	3	8/2500
15	400	350	150	TO-3		BUW42	12	3/5	1.5	10/3000
15	450	400	150	TO-3		BUW42A	12	3/5	1.5	10/3000
15	400	350	125	SOT-93		BUW42P	12	3/5	1.5	10/3000
15	450	400	125	SOT-93		BUW42AP	12	3/5	1.5	10/3000
15	400	325	150	TO-3	BUX13		8	8/4	1.5	8/1600
15	500	400	175	TO-3	BUW44		6	6/1.5	3	10/2000
15	800	400	175	TO-3	BUW45		7	7/1.5	1.5	10/2000
15	850/450	400	175	TO-3	BUX48		5	15/3	1.5	10/2000
15	850	400	175	TO-3	2N6547		5	15/5	1.5	10/2000
15	900	450	175	TO-3	BUW46		7	7/1.5	1.5	10/2000
15	1000	450	175	TO-3	BUX48A		5	12/3	1.5	8/1600
15	1000	600	175	TO-3	BUX48B		5	6/1.5	2	8/2500
15	1000	700	175	TO-3	BUX48C		4	6/1.5	2	8/2500
15	500	500	250	TO-3	BUV25		8	8/4	1	8/1600
15	850	400	150	SOT-93	BUV48		5	15/5	5	15/3000
15	1000	450	150	SOT-93	BUV48A		5	12/5	5	12/2400
15	1000	600	150	SOT-93	BUV48B		4	6/1.5	2	8/2500
15	1000	700	150	SOT-93	BUV48C		4	6/1.5	2	8/2500
20	450	400	250	TO-3	BUV24		8	12/4	1	12/2400
30	400	325	250	TO-3	BUV23		8	16/4	1	16/3200
30	850	400	250	TO-3	BUX98		5	20/1.5	1.5	20/4000
30	1000	450	250	TO-3	BUX98A		4.8	24/5	5	24/5000
30	1000	600	250	TO-3	BUX98B		2.5	20/3	3	20/8000
30	1000	700	250	TO-3	BUX98C		2.5	20/3	3	20/8000

POWER TRANSISTORS

HIGH VOLTAGE POWER MOS FAST SWITCHING

N-CHANNEL POWER MOS

Type	PACKAGE	$V_{(BR)\ DSS}$ (V)	I_D max (cont) (A)	$R_{DS\ (on)}$ max (Ω)	P_{tot} (W)	G_{fs} min (S)	C_{iss} max (pF)
SGSP322	TO-220	50	10	0.15	75	3	550
SGSP422	SOT-93	50	10	0.15	75	3	550
SGSP522	TO-3	50	10	0.15	75	3	550
SGSP321	TO-220	60	10	0.15	75	3	550
SGSP421	SOT-93	60	10	0.15	75	3	550
SGSP521	TO-3	60	10	0.15	75	3	550
SGSP102	TO-39	80	1	2	15	0.45	70
SGSP152	TO-39	80	5	0.6	15	1.8	270
SGSP202	SOT-32	80	1	2	18	0.45	70
SGSP302	TO-220	80	1	2	18	0.45	70
SGSP312	TO-220	80	7	0.3	75	2.5	470
SGSP352	TO-220	80	5	0.6	50	1.8	270
SGSP512	TO-3	80	7	0.3	75	2.5	470
SGSP101	TO-39	100	1	2	15	0.45	70
SGSP151	TO-39	100	5	0.6	15	1.8	270
SGSP201	SOT-32	100	1	2	18	0.45	70
SGSP301	TO-220	100	1	2	18	0.45	70
SGSP311	TO-220	100	7	0.3	75	2.5	470
SGSP351	TO-220	100	5	0.6	50	1.8	270
SGSP511	TO-3	100	7	0.3	75	2.5	470
SGSP142	TO-39	350	0.2	36	15	0.14	60
SGSP332	TO-220	350	3	2.5	75	2.5	450
SGSP342	TO-220	350	0.2	36	18	0.14	60
SGSP532	TO-3	350	3	2.5	75	2.5	450
SGSP141	TO-39	400	0.2	36	15	0.14	60
SGSP331	TO-220	400	3	2.5	75	2.5	450
SGSP341	TO-220	400	0.2	36	18	0.14	60
SGSP531	TO-3	400	3	2.5	75	2.5	450

SMALL SIGNAL TRANSISTORS

SGS has a range of small signal silicon transistors optimized to cover the widest possible range while maintaining the high economy demanded by this market.

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SMALL SIGNAL TRANSISTORS

NPN GENERAL PURPOSE TRANSISTORS – TO-18

V_{CEO} V_{CER}* (V)	h_{FE} @ I_C min/max	(mA)	Type	$V_{CE(sat)}$ (V) @ I_C max	(mA)	f_T (MHz) min	t_s t_{off}* (ns)	P_{tot} (mW)	ALSO AVAILABLE
55	50/–	50	**BSX33**	0.3	150	60	800*	500	
25	75/260	100	**BC377**	0.7	500	300 typ.	–	375	
40	75/260	100	**BC378**	0.7	500	300 typ.	–	375	
30	100/300	150	**2N2222**	1.6	500	250	225	500	2N2221
40	100/300	150	**2N2222A**	1	500	250	225	500	2N2221A
50*	100/300	150	**2N956**	1.5	150	70	–	500	2N718A
55	60/180	150	**BFR18**	0.25	150	60	–	500	
80	40/–	150	**2N720A**	5	150	50	–	500	
80	100/300	150	**2N3700**	0.5	500	100 typ.	–	500	2N3302

NPN GENERAL PURPOSE TRANSISTORS – TO-39

V_{CEO} V_{CER}* (V)	h_{FE} @ I_C min/max	(mA)	Type	$V_{CE(sat)}$ (V) @ I_C max	(mA)	f_T (MHz) min	t_s t_{off}* (ns)	P_{tot} (mW)	ALSO AVAILABLE
40	40/250	100	**BC140**	0.35 typ.	500	50	850*	800	
60	40/250	100	**BC141**	0.35 typ.	500	50	850*	800	
30	40/–	150	**BFY51**	0.35	150	50	160 typ.	800	BFY52
30	100/300	150	**2N2219**	1.6	500	250	225	800	2N2218
35	30/–	150	**BFY50**	0.2	150	60	140 typ.	800	
40	50/250	150	**2N3053**	1.4	150	100 typ.	–	800	
40	100/300	150	**2N2219A**	1	500	250	225	800	2N2218A
50*	40/120	150	**2N1613**	1.5	150	60	–	800	
50*	100/300	150	**2N1711**	1.5	150	70	–	800	
55	40/120	150	**BFY56A**	0.25	150	60	800*	800	BFY56
60	40/240	150	**BC301**	0.5	150	120 typ.	–	800	BC302
60	40/120	150	**2N3108**	1.4	150	100 typ.	–	800	2N3110
60	100/300	150	**2N3107**	1.4	150	100 typ.	–	800	2N3109
65	40/120	150	**2N2102**	0.5	150	60	30*	1000	

SMALL SIGNAL TRANSISTORS

NPN GENERAL PURPOSE TRANSISTORS – TO-39 (continued)

V_{CEO} V_{CER}* (V)	h_{FE} @ I_C min/max	(mA)	Type	$V_{CE(sat)}$ @ I_C (V) max	(mA)	f_T (MHz) min	t_s t_{off}* (ns)	P_{tot} (mW)	ALSO AVAILABLE
80	40/240	150	**BC300**	0.5	150	120 typ.	–	800	
80	40/120	150	**BSY55**	0.6	150	100 typ.	–	800	BSY53
80	40/120	150	**2N1893**	5	150	50	–	800	
80	40/120	150	**2N3020**	0.5	500	80 typ.	–	800	
80	100/300	150	**BSY56**	0.6	150	100 typ.	–	800	BSY54
80	100/300	150	**2N3019**	0.5	500	100 typ.	–	800	
40	40/240	500	**BC440**	1	1000	50	–	1000	
50	40/250	500	**2N5321**	0.8	500	50	800*	1000	
60	40/240	500	**BC441**	1	1000	50	–	1000	
75	30/130	500	**2N5320**	0.5	500	50	800*	1000	

PNP GENERAL PURPOSE TRANSISTORS – TO-18

V_{CEO} (V)	h_{FE} @ I_C min/max	(mA)	Type	$V_{CE(sat)}$ @ I_C/I_B (V) max	(mA)	f_T (MHz) min	t_s t_{off}* (ns)	P_{tot} (mW)	ALSO AVAILABLE
30	90/–	10	**BFX48**	0.3	50/5	400	160*	360	
40	50/–	10	**BCY70**	0.5	50/5	250	350	350	
40	100/300	10	**2N3251**	0.5	50/5	300	200	360	2N3250
40	150/300	10	**2N4035**	0.3	50/5	450	150*	360	
45	100/600	10	**BCY71**	0.5	50/5	200	–	350	BCY72
40	100/300	150	**2N2907**	0.4	150/15	200	80	400	
45	100/300	150	**2N3504**	0.4	150/15	200	40	400	2N3505
60	40/120	150	**2N2906A**	0.4	150/15	200	80	400	2N2906
60	100/300	150	**2N2907A**	0.4	150/15	200	80	400	

SMALL SIGNAL TRANSISTORS

PNP GENERAL PURPOSE TRANSISTORS – TO-39

V_{CEO} (V)	h_{FE} @ I_C min/max	(mA)	Type	$V_{CE(sat)}$ @ (V) max	I_C/I_B (mA)	f_T (MHz) min	t_s t_{off}* (ns)	P_{tot} (mW)	ALSO AVAILABLE
55	.85/–	100	**BFX38**	0.5	500/50	100	350	800	BFX39
75	40/–	100	**BFX41**	0.5	500/50	100	350	800	
75	85/–	100	**BFX40**	0.5	500/50	100	350	800	
80	100/300	100	**2N4033**	0.5	500/50	150	350	800	2N4031/2
40	50/250	150	**2N4037**	0.3	150/15	100	110	700	
40	100/230	150	**2N2905**	0.4	150/15	200	80	600	
60	40/240	150	**BC303**	0.65	150/15	75	–	850	BC304
60	40/120	150	**2N2904A**	0.4	150/15	200	80	600	2N2904
60	100/300	150	**2N2905A**	0.4	150/15	200	80	600	
65	40/140	150	**2N4036**	0.65	150/15	60	700*	1000	
40	40/250	500	**BC460**	1	1000/100	50	–	1000	
60	40/250	500	**BC461**	1	1000/100	50	–	1000	
75	30/130	500	**2N5322**	0.7	500/50	50	1000*	1000	2N5323

NPN TRANSISTORS FOR LOW LEVEL, LOW NOISE APPLICATIONS – TO-18

V_{CEO} (V)	h_{FE} @ I_C min/max	(mA)	Type	$V_{CE(sat)}$ @ (V) max	I_C/I_B (mA)	f_T (MHz) min	NF (dB)	P_{tot} (mW)	ALSO AVAILABLE
45	100/500	0.01	**2N930**	1	10/0.5	30	3	300	
60	100/500	0.01	**2N2484**	0.35	1/0.1	60	3	360	2N2483
60	130/–	0.01	**BFR17**	0.35	1/0.1	70	3	360	
60	150/300	1	**BFY76**	0.35	1/01	100	4	360	
20	110/800*	2	**BC108**	0.6	100/5	100	10	300	
20	200/800*	2	**BC109**	0.6	100/5	100	4	300	
45	110/450*	2	**BC107**	0.6	100/5	100	10	300	
45	120/630	2	**BCY59**	0.7	100/2.5	100	6	360	BCY58

* h_{fe} @ 1 KHz.

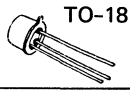
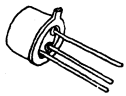
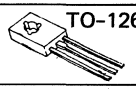
SMALL SIGNAL TRANSISTORS

PNP TRANSISTORS FOR LOW LEVEL, LOW NOISE APPLICATIONS – TO-18

V_{CEO} (V)	h_{FE} @ I_C min/max	(I_C mA)	Type	$V_{CE(sat)}$ (V) @ I_C/I_B max	(I_C mA)	f_T (MHz) min	NF (dB)	P_{tot} (mW)	ALSO AVAILABLE
45	250/500	0.01	**2N3964**	0.25	10/0.5	50	2	360	2N3965
80	70/230	0.01	**BFX37**	0.4	50/5	40	3.5	360	
80	100/300	0.01	**2N3963**	0.25	10/0.5	40	3	360	2N3962
25	125/500*	2	**BC178**	0.25	50/5	200 typ.	10	300	BC179
45	120/460	2	**BCY79**	0.8	100/2.5	180 typ.	6	390	BCY78
45	125/500*	2	**BC177**	0.25	50/5	200 typ.	10	300	
50	110/450	2	**BC478**	0.25	50/5	150 typ.	6	360	BC479
80	110/250	2	**BC477**	0.25	50/5	150 typ.	10	360	

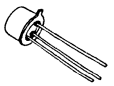
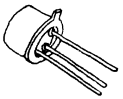
* h_{fe} @ 1 KHz.

HIGH VOLTAGE TRANSISTORS

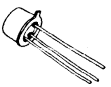
Polarity	V_{CEO} (V)	h_{FE} @ I_C min/max	(I_C mA)	Type	$V_{CE(sat)}$ (V) @ I_C/I_B max	(I_C mA)	f_T (MHz) min	P_{tot} (mW)	PACKAGE
PNP	150	40/–	10	**BFW43**	0.5	10/1	60	400	 TO-18
NPN	180	30/–	10	**BC394**	0.3	10/1	50	400	
PNP	180	50/–	10	**BC393**	0.3	10/1	50	400	
NPN	200	40/–	30	**BSS72S**	0.5	50/5	200	500	
PNP	200	40/250	30	**BSS75S**	0.4	30/3	200	500	
PNP	150	40/–	10	**BFW44**	0.5	10/1	60	700	 TO-39
PNP	180	80/300	10	**BFX91**	0.25	10/1	40	700	
PNP	180	80/300	10	**2N3931**	0.25	10/1	60	700	
PNP	200	30/150	10	**2N5415S**	2.5	50/5	15	1000	
NPN	250	25/–	30	**BF258**	1	30/6	90 typ.	1000	
NPN	150	30/–	30	**2N3114**	1	50/5	40	800	
NPN	250	30/–	30	**BF458**	1	50/10	90 typ.	1250	 TO-126
NPN	300	30/–	30	**BF459**	1	50/10	90 typ.	1250	

SMALL SIGNAL TRANSISTORS

NPN TRANSISTORS FOR FAST AND ULTRA FAST SWITCHES

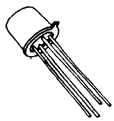
V_{CEO} (V)	h_{FE} @ I_C min/max	(mA)	Type	$V_{CE(sat)}$ (V) @ I_C/I_B max	(mA)	f_T (MHz) min	t_s t_{off}* (ns)	P_{tot} (mW)	PACKAGE
12	30/120	10	**BSX28**	0.25	30/3	400	13	360	TO-18
15	30/120	10	**2N708**	0.4	10/1	300	75*	360	
15	30/120	10	**2N914**	0.7	200/20	300	20	360	
15	40/120	10	**BSX20**	0.6	100/10	450	13	360	
15	40/120	10	**2N2369**	0.25	10/1	500	13	360	
15	40/120	10	**2N2369A**	0.2	10/1	500	13	360	
15	30/120	30	**BSX26**	0.5	300/30	350	18	360	
20	30/120	30	**2N3014**	0.18	100/10	350	18	360	
20	40/120	30	**BSX39**	0.28	100/10	350	18	360	
15	25/–	100	**2N3013**	0.5	300/30	350	18	360	
30	60/150	100	**2N4013**	0.20	100/10	300	60*	500	
30	30/120	150	**2N2845**	0.4	150/15	350	40*	360	
40	60/150	100	**BSX32**	0.5	500/50	300	60*	800	TO-39
50	60/150	100	**2N3725**	0.52	500/50	300	60*	800	

PNP TRANSISTORS FOR FAST AND ULTRA FAST SWITCHES

V_{CEO} (V)	h_{FE} @ I_C min/max	(mA)	Type	$V_{CE(sat)}$ (V) @ I_C/I_B max	(mA)	f_T (MHz) min	t_{off} (ns)	P_{tot} (mW)	PACKAGE
12	30/120	30	**BSX29**	0.2	30/3	400	90	360	TO-18
12	40/120	30	**2N2894**	0.2	100/10	400	90	360	
20	30/120	30	**2N3209**	0.2	30/3	400	90	360	

SMALL SIGNAL TRANSISTORS

TRANSISTORS FOR RF APPLICATIONS (For current production or maintenance only)

Polar.	Max. ratings		Type	Main function	Trans. freq.		Noise figure			Gain		PACKAGE
	V_{CEO} (V)	I_C (mA)			f_T (MHz)	@ I_C (mA)	NF (dB)	and I_C (mA)	f (MHz)	P_G (dB)	f MHz)	
PNP	35	20	**BF272S**	VHF/UHF amp.	900	3	3	3	800	16	800	TO-72
PNP	35	20	**BF316A**	VHF/UHF osc.	600	3	5	3	800	12	800	
PNP	35	20	**BFR38**	VHF/UBF amp.	1000	3	3.5	3	800	14	800	
NPN	25	25	**BF271**	IF amplifier	900	10	–	–	–	24	36	
NPN	30	25	**BFY90**	Wide-band amp.	1400	25	5.5	2	800	8	800	
NPN	12	50	**2N5179**	VHF amplifier	1400	5	3	1.5	200	21	200	
NPN	15	50	**2N918**	UHF oscillator	900	4	5	1	60	21	200	
NPN	25	150	**BFW16A**	Wide-band amp.	1200	150	5	30	200	6.5	800	TO-39
NPN	30	200	**BFR36**	VHF/UHF amp.	1400	70	4.5	70	200	16	200	
NPN	20	400	**2N5109**	Wide-band amp.	1500	50	3	10	200	13	200	
NPN	20	500	**2N4427**	VHF/UHF amp.	800	50	–	–	–	–	–	
NPN	30	500	**2N3866**	VHF/UHF amp.	800	50	–	–	–	–	–	

SPECIAL ASSEMBLIES

Special assemblies are single packages containing several chips. Advantages offered by these assemblies in addition to compactness and reliability are the wide range of characteristics available and the realization of complex functions not obtainable from single chip solutions. The assemblies listed here are standard devices although SGS will, on request, consider fabrication of special assemblies according to customer specifications.

CONTENTS

SPECIAL ASSEMBLIES

DUAL SILICON NPN/PNP DIFFERENTIAL AMPLIFIERS (see circuit connection [a] page)

Type	P_D (W)	V_{CBO} (V)	V_{CEO} (V)	I_C (mA)	h_{FE} min	and V_{CEsat} max (V)	@ I_C (mA)	NF max (dB)	f_T min (MHz)	t_{on} max (ns)	t_{off} max (ns)	Package
BFX79	0.5	80	60	500	60	0.25	150	3	50	–	–	TO-39
BFX80	0.4	60	60	50	160	0.35	1	4	40	–	–	TO-39
BFX81	0.4	25	20	200	40	0.2	30	–	350	60	90	TO-39
2N4854	0.6	60	40	600	50	0.4	150	8	200	60	350	TO-39

DUAL SILICON NPN DIFFERENTIAL AMPLIFIERS

Type	P_D (W)	V_{CBO} (V)	V_{CEO} (V)	I_C (mA)	h_{FE} min	and V_{CEsat} max (V)	@ I_C (mA)	NF max (dB)	f_T min (MHz)	h_{FE1}/h_{FE2} max	$\lvert V_{BE1}-V_{BE2}\rvert$ max (mV)	Package
BFX10	0.5	60	30	500	40	0.25	150	10	200	0.8-1.25	5	TO-39
BFX15	0.5	80	40	500	80	0.6	1	–	50	0.9-1.1	5	TO-39
BFX70	0.5	100	60	500	50	1.2	50	8	60	0.9-1.1	5	TO-39
BFX71	0.5	100	60	500	50	1.2	50	8	50	0.8-1.1	15	TO-39
BFX99	0.5	100	60	500	50	0.6	50	8	60	0.9-1.1	1.5	TO-39
BFY81	0.4	45	45	50	150	0.35	1	4	60	0.8-1.25	10	TO-39
BFY82	0.4	60	45	100	50	1	10	–	250	0.8-1.25	15	TO-39
BFY83	0.5	100	60	500	50	0.4	10	8	50	0.8-1.25	15	TO-39
BFY84	0.3	30	12	200	20	0.4	10	6	600	0.8-1.25	15	TO-39
2N2060	0.6	100	60	500	50	1.2	50	8	60	0.9-1.1	5	TO-39
2N2060A	0.6	100	60	500	50	0.6	50	8	60	0.9-1.1	1.5	TO-39
2N2223	0.6	100	60	500	50	1.2	50	8	50	0.8-1.25	15	TO-39
2N2223A	0.6	100	60	500	50	1.2	50	8	50	0.9-1.1	5	TO-39
2N2903	0.2	60	30	50	125	1	1	7	150	0.8-1.25	5	TO-39
2N2903A	0.2	60	30	50	125	1	1	7	150	0.9-1.1	3	TO-39
2N2914	0.3	45	45	30	150	0.35	1	3	60	–	–	TO-39
2N2915	0.3	45	45	30	150	0.35	1	4	60	0.9-1.1	3	TO-39
2N2917	0.3	45	45	30	150	0.35	1	4	60	0.8-1.25	5	TO-39
2N2919	0.3	60	60	30	150	0.35	1	4	60	0.9-1.1	3	TO-39
2N2920	0.5	60	60	30	300	0.35	1	3	60	0.9-1.1	3	TO-39
2N2920A	0.5	60	60	30	300	0.35	1	3	60	0.9-1.1	1.5	TO-39
2N3410	0.5	60	30	500	50	0.15	10	4	250	0.9-1.1	10	TO-39
2N3411	0.5	60	30	500	50	0.15	10	4	250	0.9-1.1	5	TO-39
2N3423	0.3	30	15	50	20	0.4	3	3.5•	600	0.8-1.25	10	TO-39
2N3424	0.3	30	15	50	20	0.4	3	3.5•	600	0.9-1.1	5	TO-39
2N3680	0.3	60	50	30	150	0.7	1	3	60	0.8-1.25	3	TO-39
2N3810	0.5	60	60	50	150	0.25	1	3	80	0.9-1.1	5	TO-39

• Typical value.

SPECIAL ASSEMBLIES

DUAL SILICON PNP DIFFERENTIAL AMPLIFIERS

Type	P_D (W)	V_{CBO} (V)	V_{CEO} (V)	I_C (mA)	h_{FE} min	and @ V_{CEsat} max (V)	I_C (mA)	NF max (dB)	f_T min (MHz)	h_{FE1}/h_{FE2} max	$\lvert V_{BE1}-V_{BE2}\rvert$ max (mV)	Package
BFX11	0.4	45	45	500	80	0.25	50	5	130	0.8-1.25	5	TO-39
BFX36	0.4	60	60	100	90	0.4	50	3	40	0.9-1.1	3	TO-39
2N3350	0.4	60	45	200	150	0.5	50	4	40	0.9-1.1	5	TO-39
2N3726	0.4	45	45	300	115	0.25	50	4	200	0.9-1.1	5	TO-39
2N4015	0.4	60	60	300	115	0.25	50	4	135	0.9-1.1	5	TO-39
2N4020	0.4	45	45	200	180	0.4	50	2	50	0.8-1.25	5	TO-39
2N4023	0.4	45	45	200	180	0.4	50	2	50	0.9-1.1	3	TO-39
2N4024	0.4	60	60	200	90	0.4	50	3	40	0.9-1.1	3	TO-39
2N4025	0.4	60	60	200	180	0.4	50	2	50	0.9-1.1	3	TO-39

SILICON DARLINGTON AMPLIFIERS

Type	Polarity	P_D (W)	V_{CBO} (V)	V_{CEO} (V)	I_C (mA)	h_{FE} min	and @ V_{CEsat} max (V)	I_C (mA)	NF max (dB)	Package
BFX66	NPN	0.5	100	60	300	2000	1.3	100	6	TO-72
BFX67	NPN	0.5	60	60	300	7000	1.6	100	–	TO-72
2N997	NPN	0.5	75	40	300	7000	1.6	100	–	TO-18
2N998	NPN	0.5	100	60	300	5000	1.2	50	6	TO-72
2N999	NPN	0.5	60	60	300	7000	1.6	100	–	TO-72

QUAD SILICON TRANSISTORS (see circuit connections page)

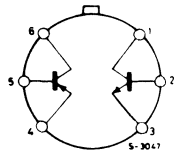
Type	Polarity	P_D (W)	V_{CBO} (V)	V_{CEO} (V)	I_C (mA)	h_{FE} min	and @ V_{CEsat} max (V)	I_C (mA)	f_T min (MHz)	Con-nection	Package
BGY17	NPN	1	60	40	700	25	0.45	500	250	(b)	DIP 14
SHQ2222	NPN	1.9	60	40	700	100	0.4	150	350	(b)	DIP 14F
SHQ2907	PNP	1.9	60	40	500	100	0.4	150	200	(c)	DIP 14F
SPQ2483	NPN	0.9	60	40	50	150	0.5	10	50	(b)	DIP 14
SPQ2484	NPN	0.9	60	40	50	300	0.5	10	50	(b)	DIP 14
SPQ6001	2NPN/2PNP	1.25	60	30	500	20	1.4	300	200	(d)	DIP 14
SPQ6002	2NPN/2PNP	1.25	60	30	500	30	1.4	300	200	(d)	DIP 14
SPQ6501	2NPN/2PNP	1.25	60	30	500	20	1.4	300	200	(e)	DIP 14
SPQ6502	2NPN/2PNP	1.25	60	30	500	30	1.4	300	200	(e)	DIP 14

◆ Circuit connections: see pag. 39.

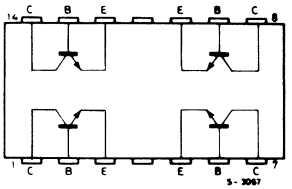
SPECIAL ASSEMBLIES

CIRCUIT CONNECTIONS

top view



(a)



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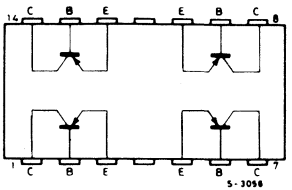

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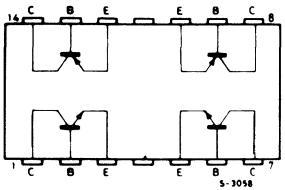

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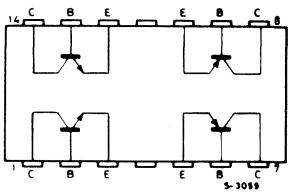
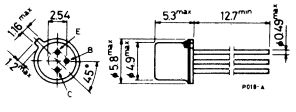


(e)

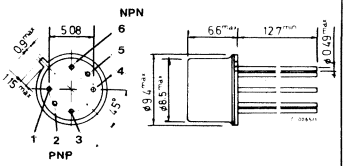
PACKAGES (outline drawings)

DIMENSIONS IN MILLIMETRES

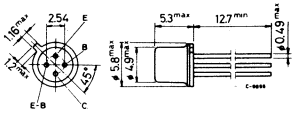
TO-18



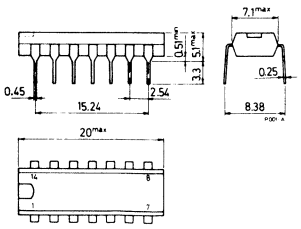
TO-39



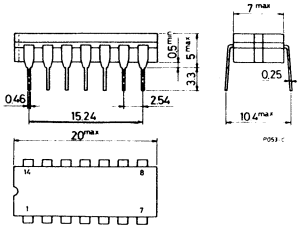
TO-72



DIP14 (Plastic)



DIP14F (Ceramic frit-seal)



LINEAR INTEGRATED CIRCUITS

The linear integrated circuits listed in the following pages cover audio amplifiers, industrial circuits, operational amplifiers, radio and tape recorder circuits, telecommunications circuits, television circuits and voltage regulators. They are available in all the standard packages and in certain cases they are also available in micropackages for mounting in hybrid circuits.

CONTENTS

INDUSTRIAL CIRCUITS

BRIDGE DRIVERS

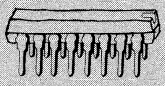
Type	Function	Description	PACKAGE
L 293	Quad Push-Pull Driver	For 1A/36V push-pull drivers for use singly or as two bridges. Each driver controlled by logic input; each bridge controlled by enable input. Connects directly to low level logic.	DIP16 Co (0.4)
L293E	Quad Push-Pull Driver	Same as L293 plus external emitter connections to each driver for load current sensing.	DIP20
L298	Dual Bridge Driver	For 2A/50V push-pull drivers for use as two bridges. Each driver controlled by logic input; each bridge controlled by enable input. External connections to each bridge for load current sensing. Connects directly to low level logic.	Multiwatt® 15

SWITCHMODE DRIVERS

Type	Function	Description	PACKAGE
L292	Switchmode DC motor driver	Output current, regulated by internal PWM chopper, proportional to input voltage. Delivers up to 2A at 36V with bridge output stage. With L290 and L291 forms complete DC motor servopositioning system.	Multiwatt® 15
L294	Switchmode solenoid driver	Controlled by TTL-compatible logic input, delivers 4A at 50V to drive high speed solenoids. Current regulated by constant ripple PWM chopper and externally adjustable. Features latched diagnostic output and protection circuits.	Multiwatt® 15
L295	Dual Switchmode Driver	Two 50V/2.5A switchmode drivers controlled by TTL - compatible logic inputs. Current regulated by constant frequency PWM circuit and externally adjustable.	Multiwatt® 15

LINEAR DRIVERS

Type	Function	Description	PACKAGE
L149	4A Linear Driver	Push-pull current booster delivering up to 4A with current gain typically 10000. Operates at up to 40V and features 30V/μs slew rate.	Pentawatt®
L165	Power op. amp.	3A power op. amp. with supply voltage to 36V and slew rate of 8V/μs. Inputs are ground compatible and device is 50A protected.	Pentawatt®
L465	Power op. amp.	3.5A high efficiency power op. amp. with supply voltage to 36V and slew rate of 14V/μs. Inputs are ground compatible and device is 50A protected.	Pentawatt®
L272	Dual power op. amp.	Two 1.5A/28V power op. amp. for DC motor driving/ power-supply applications. Features low saturations, ground compatible inputs plus large common-mode and differential mode range.	DIP16 Co (0.4)
L272M	Dual power op. amp.	Same as L272 except packaged in Minidip for applications where dissipation is lower.	Minidip

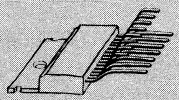


DIP16 Co
(Plastic Copper-frame 0.4)

DIP20 (Plastic)

Minidip

Pentawatt®



Multiwatt 15®

DARLINGTON ARRAYS

Type	N°	V_{CEX}	I_o	Input	Configuration	PACKAGE
L201	7	50V	0.5A	General purpose	● →	DIP16Co(0.3)
L202	7	50V	0.5A	14 - 25V PMOS	● →	DIP16Co(0.3)
L203	7	50V	0.5A	5V TTL/CMOS	● →	DIP16Co(0.3)
L204	7	50V	0.5A	6 - 15V CMOS/AMOS	● →	DIP16Co(0.3)
L601	8	90V	0.5A	General purpose	● →	DIP18Co(0.4)
L602	8	90V	0.4A	14 - 25V PMOS	● →	DIP18Co(0.4)
L603	8	90V	0.4A	5V TTL/CMOS	● →	DIP18Co(0.4)
L604	8	90V	0.4A	6 - 15V CMOS/PMOS	● →	DIP18Co(0.4)
L702	4	90V	2A	5V TTL	●	Multiwatt 11
L7150	4	50V	1.5A	5V TTL/CMOS	● →	Multiwatt 15®
L7152	4	50V	1.5A	6 - 15V CMOS/PMOS	● →	Multiwatt 15®
L7180	4	80V	1.5A	5V TTL/CMOS	● →	Multiwatt 15®
L7182	4	80V	1.5A	6 - 15V CMOS/PMOS	● →	Multiwatt 15®
ULN2001A	7	50V	0.5A	General purpose	● →	DIP16Co (0.4)
ULN2002A	7	50V	0.5A	14 - 25V PMOS	● →	DIP16Co(0.4)
ULN2003A	7	50V	0.5A	5V TTL/CMOS	● →	DIP16Co(0.4)
ULN2004A	7	50V	0.5A	6 - 15V CMOS/PMOS	● →	DIP16Co(0.4)
ULN2064B	4	50V	1.5A	5V TLL/CMOS	● →	DIP16Co(0.4)

DARLINGTON ARRAYS (continued)

Type	N°	V_{CEX}	I_o	Input	Configuration	PACKAGE
ULN2065B	4	50V	1.5A	5V TLL/CMOS	● →|←	DIP16Co(0.4)
ULN2066B	4	50V	1.5A	6 - 15V CMOS/PMOS	● →|←	DIP16Co(0.4)
ULN2067B	4	50V	1.5A	6 - 15V CMOS/PMOS	● →|←	DIP16Co(0.4)
ULN2068B	4	50V	1.5A	5V CMOS/TLL	▷ ● →|←	DIP16Co(0.4)
ULN2069B	4	50V	1.5A	5V CMOS/TLL	▷ ● →|←	DIP16Co(0.4)
ULN2070B	4	50V	1.5A	6 - 15V CMOS/PMOS	▷ ● →|←	DIP16Co(0.4)
ULN2071B	4	50V	1.5A	6 - 15V CMOS/PMOS	▷ ● →|←	DIP16Co(0.4)
ULN2074B	4	50V	1.5A	General purpose	■	DIP16Co(0.4)
ULN2075B	4	50V	1.5A	General purpose	■	DIP16Co(0.4)
ULN2076B	4	50V	1.5A	6 - 15V CMOS/PMOS	■	DIP16Co(0.4)
ULN2077B	4	50V	1.5A	6 - 15V CMOS/PMOS	■	DIP16Co(0.4)
ULN2801A	8	50V	0.5A	General purpose	● →|←	DIP18Co(0.4)
ULN2802A	8	50V	0.5A	14 - 25V PMOS	● →|←	DIP18Co(0.4)
ULN2803A	8	50V	0.5A	5V TTL/CMOS	● →|←	DIP18Co(0.4)
ULN2804A	8	50V	0.5A	6 - 15V CMOS/PMOS	● →|←	DIP18Co(0.4)
ULN2805A	8	50V	0.5A	High Output TLL	● →|←	DIP18Co(0.4)

● = common emitters;
■ = isolated darlingtons;
→|← = integral suppression diodes;
▷ = predriver stage;

SPECIAL FUNCTIONS

Type	Function	Description	PACKAGE
L290	Tachometer converter	Processes signals from optical encoder to give tacho and position outputs. Also generates reference voltage and pulse outputs. With L291 and L292 form 3-chip DC motor servopositioning system.	DIP16 Co (0.4)
L291	D/A converter and error amplifier	Contains 5-bit D/A converter with switchable polarity, error amplifier and position amplifier. With L290 and L292 forms complete 3-chip DC motor servopositioning system.	DIP16 (Co (0.4)
L297	Stepper motor controller	Contains translator plus PWM choppers for two-phase bipolar and four-phase unipolar PM motors. Driven by step clock and direction inputs and generates normal, wave drive and half step sequences. With L293E or L298 forms complete bipolar step motor interface.	DIP20
L297A	Stepper motor controller	As L297A plus pulse doubler on step clock input for double stepping.	DIP20
L3654	Printer solenoid driver	Ten bit SIPO shift register with open collector outputs handling 250mA each at up to 45V. Serial output allows cascading without limit.	DIP16 Co (0.4)
L5832	Solenoid controller	With one or two external darlingtons drives solenoids efficiently with PWM regulated current. Can provide single or two level current wafeforms and the waveshape is externally adjustable.	DIP16 Co (0.4)
L120A	Triac/SCR Phase control	For use as phase controller in industrial and consumer applications	DIP16 Co (0.4)
L121A	Triac/SCR Burst control	For use as burst controller in industrial and consumer applications	DIP16 Co (0.4)

TELECOM CIRCUITS

TELEPHONE SPEECH CIRCUITS

Type	Function	Features	PACKAGE
LS285/A	Speech circuit	Replaces hybrid circuit (2/4 wire interface) in telephones. Provides automatic gain control and works typically with dynamic transducers	DIP14 Co (0.4)
LS288	Programmable speech circuit	Telephone speech circuit with programmable gains, automatic gain control and fixed gain operation. Suitable for both piezoceramic and dynamic transducers.	DIP16 Co (0.4)
LS156	Speech circuit with MF tone interface	Telephone speech circuit incorporating Mf interface. Automatic gain control for voice signals. Designed for piezoceramic transducers. Automatically adjusts balancing impedance to match line.	DIP16 Co (0.4)
LS356	Speech circuit with MF tone interface	Telephone speech circuit incorporating MF interface. Features automatic gain control for voice signal and fixed gain mode. Used typically with dynamic transducers but a small loudspeakers can be used for receiver thanks to high current available at output.	DIP16 Co (0.4)
LS656	Speech circuit with MF tone interface and low drop	Same as LS356 plus low voltage drop.	DIP16 Co (0.4)
LS348	Fully programmable speech circuit	Telephone speech circuit with adjustable gains, AGC range. Can work with both dynamic and piezoceramic transducers and the voltage drop is particularly low. Can be set to sandby state, consuming very little current but still matching AC & DC impedances to line.	DIP20
LS388	Low consumption speech circuit	Telephone speech circuit with programmable gains, automatic gain control and fixed gain operation. Both send and receive gains can be set to very high levels. Special features include low voltage drop and very low current consumption.	DIP16 Co (0.4)

OTHER TELECOM CIRCUITS

Type	Function	Features	PACKAGE
LS188	Microphone preamplifier	Designed for use with a magnetic or piezoceramic transducer to replace carbon microphon in conventional telephones. Pin-programmable gain.	Minidip
LS1240	Electronic two-tone ringer	Replaces mechanical bell in telephones. Features include low current consumption, integrated rectifier bridge and low component count.	Minidip
LS346	Polarity guard with voltage drop	Integrated polarity guard, designed for FM dialling telephones. Drop is typically 100mV with 10mA line current.	Minidip
LS5018 **LS5060** **LS5120**	Overvoltage protection circuits	Integrated transient overvoltage suppressors for crowbar applications where very large transients (lightning, induced etc) can damage sensitive components. Breackover voltage (18V, 60V or 120V) is independent of transient rise time. Other features include very high current capability and failsafe operation.	Minidip
LS496	Quad relay driver	Contains four drives for bipolar relays. Each driver controlled by logic inputs all four drivers controlled by common disable input. All outputs short circuit protected.	DIP16 Co (0.4)
LS025	Balanced modulator	Single of split supply - Low distortion - Low noise.	TO-100 S0-14
LS045	Channel amplifier	Low quiescent current (1mA) - Low distortion - High gain.	TO-99 S0-8
LS150	Compandor	80 dB dynamic range - High accuracy (± 0.2 dB) - Low noise	DIP14 DIP14F
LS342	Multifrequency interface	Interfaces multifrequences tone diallers to the line.	Minidip

LINEAR INTEGRATED CIRCUITS

OPERATIONAL AMPLIFIERS AND COMPARATORS

Device	Temperature Range (°C)	Frequency compensat.	CMR (dB)	Input Bias Curr. (nA)	Slew Rate (V/μs)	Max supply Voltage (V)	Package
LS101T	-55 to 125		90	120	10	± 22	TO-99
LS101AT	-55 to 125		96	30	10	± 22	
LS107T	-55 to 125	●	96	30	0.7	± 22	
LS141T	-55 to 125	●	90	80	0.5	± 22	
LS141AT	-55 to 125	●	95	30	0.7	± 22	
LS141CT	0 to 70	●	90	80	0.5	± 18	
LS148T	-55 to 125		90	80	5.5	± 22	
LS148AT	-55 to 125		95	20	5.5	± 22	
LS148CT	0 to 70		90	80	5.5	± 22	
LS201T	0 to 70		90	250	10	± 22	
LS201AT	-25 to 85		96	30	10	± 22	
LS207T	-25 to 85	●	96	30	0.7	± 22	
LS301AT	0 to 70		90	70	10	± 18	
LS307T	0 to 70	●	90	70	0.5	± 18	
LS709T	-55 to 125		90	200	0.25	± 18	
LS709AT	-55 to 125		110	100	0.25	± 18	
LS709CT	0 to 70		90	300	0.25	± 18	
LS776T	-55 to 125	●	90	15	0.35	± 18	
LS776CT	0 to 70	●	90	15	0.8	± 18	
LS204T*	-25 to 85	●	100	50	1.5	± 18	
LS204AT*	-55 to 125	●	100	50	1.5	± 18	
LS204CT*	0 to 70	●	95	80	1	± 18	
LM339N	0 to 70°C	***		25		36	
LM339AN	0 to 70°C	***		25		36	
LS141CM.	0 to 70	●	90	80	0.5	± 18	Minidip
LS148CB	0 to 70		90	80	5.5	± 22	
LS201B	0 to 70		90	250	10	± 22	
LS301AB	0 to 70		90	70	10	± 18	
LS307B	0 to 70	●	90	70	0.5	± 18	
LS776CB	0 to 70	●	90	15	0.8	± 18	
LS204CB*	0 to 70	●	95	80	1	± 18	
LS4558NB*	0 to 70	●	90	50	1.5	± 18	
MC1458P1*	0 to 70	●	90	80	0.5	± 18	
MC1458CP1*	0 to 70	●	90	80	0.5	± 18	
LS141CM	0 to 70	●	90	80	0.5	± 18	SO-8
LC148CM	0 to 70		90	80	5.5	± 22	
LS201M	0 to 70		90	250	10	± 22	
LS301AM	0 to 70		90	70	10	± 18	
LS307M	0 to 70	●	90	70	0.5	± 18	
LS776CM	0 to 70	●	90	15	0.8	± 18	
LS204M*	-25 to 85	●	100	50	1.5	± 18	
LS204CM*	0 to 70	●	95	80	1	± 18	
LS4558NM*	0 to 70	●	90	50	1.5	± 18	
MC1458M*	0 to 70	●	90	80	0.5	± 18	
MC1458CM*	0 to 70	●	90	80	0.5	± 18	
LM324N**	-25 to 85	●	70	45		32	DIP-14
LM324AN**	-55 to 125	●	85	45		32	
LM2902N**	0 to 70	●	70	45		32	
LS709CB	0 to 70		90	300	0.25	± 18	
LS404CB**	0 to 70	●	90	100	1	± 18	
LM324CM**	-25 to 85	●	70	45		32	SO-14
LM2902CM**	0 to 70	●	70	45		32	
LS404M**	-25 to 85	●	94	50	1	± 18	
LS404CM**	0 to 70	●	90	100	1	± 18	

* Dual ** Quad. *** Comparators.

VOLTAGE REGULATORS

STANDARD – Positive

I_o max (A)	Type	Regulated output voltage (V)												Package
			5	6	7.5	8	9	10	12	15	18	20	24	
2 (*)	L78S00CV L78S00CT/T		• •		• •		• •	• •	• •	• •	• •		• •	TO-220L TO-3
1.5	LM117K LM217K LM317K LM317T	1.2V ← adjustable → 37V												TO-3 TO-3 TO-3 TO-220L
1	L7800CV L7800CT/T		• •	• •		• •			• •	• •	• •	• •	• •	TO-220L TO-3
0.5	L78M00CV		•	•		•			•	•	•	•	•	TO-220L
0.15	L123CB L123CT/T	2V ← adjustable → 36V												DIP-14 TO-100
	L146CB L146CT/T	2V ← adjustable → 77V												DIP-14Co(0.4) TO-100

STANDARD – Negative

I_o max (A)	Type	Regulated output voltage (V)									Package
			-5	-5.2	-8	-12	-15	-18	-20	-24	
1	L7900CV L7900CT/T		• •	• •	• •	• •	• •	• •	• •	• •	TO-220L TO-3

(*) Proprietary SGS selection.

LOW DROP

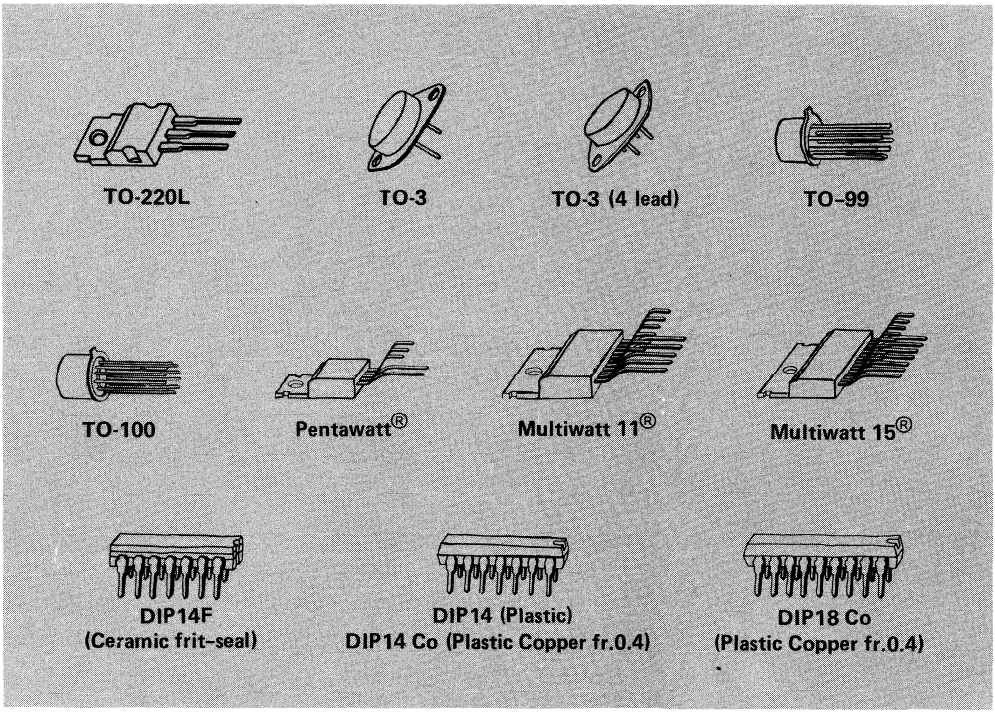
Type	Low drop	Very low drop	Transient protection				Reset	Short circuit protection	Reverse voltage protection	Output voltage		
			±100	± 80	± 60	± 40				5V	8.5V	10V
L387		•					•	•	•	•		
L487		•		•			•	•	•	•		
L2605 L2685 L2610	• • •		• • •					• • •	• • •	•	• •	• •
L4705 L4785 L4710		• • •		• • •				• • •	• • •	•	• •	• •
L4805 L4885 L4810		• • •			• • •			• • •	• • •	•	• •	• •
LM2930A LM2931A		• •			• •	•		• •	• •	• •		

LINEAR INTEGRATED CIRCUITS

PROPRIETARY

I_o max (A)	Type	Regulated output voltage (V)					Package
			5	8.5	10		
4	L296 (*)	5.1V ← adjustable → 40V					Multiwatt 15®
2	L200CH/CV L200CT/T	2.9V ← adjustable → 36V					Pentawatt® TO-3 (4 lead)
0.5	L387		•				Pentawatt®
	L487		•				Pentawatt®
	L2600V		•	•	•		TO-220L
	L4700CV		•	•	•		TO-220L
	L4800CV		•	•	•		TO-220L
0.4	LM2930A		•				TO-220L
	LM2931A		•				TO-220L

(*) Switch mode power supply.



LINEAR INTEGRATED CIRCUITS

AUTOMOTIVE CIRCUITS

IGNITION CONTROL

Type	Function	Features	PACKAGE
L482	Electronic ignition controller (Hall-effect pickup)	For hall-effect pickup breakerless ignition systems. Drives an external darlington to provide regulated current in ignition coil with low power dissipation. Can also be used as dwell control section and driver stage in microprocessor-controlled systems. Includes protection against permanent conduction, overvoltage and dump transients to 120V.	DIP16 Co (0.4)
L497	Electronic ignition controller (Hall-effect pick-up)	For hall-effect pickup breakerless ignition systems. Drives an external darlington to provide regulated current in the ignition coil with low power dissipation. Can also be used as dwell control section and driver stage in microprocessor-controlled systems. Includes protection against permanent conduction, overvoltages and dump transients to 120V. Built in timer for calibrated control of dwell angle when 90% of required coil current not reached.	SO-16P
L484	Electronic ignition controller (Magnetic pickup)	For breakerless ignition systems with magnetic pickups. Drives an external darlington to provide regulated current with low dissipation. Features zero crossing detection plus protection against overvoltages and dump transients to 120V. Pickup signal referred to ground. Circuit is insensitive to variations in pickup waveform.	SO-16P

FUEL INJECTION

Type	Function	Features	PACKAGE
L583	Injector solenoid controller	Connected directly to control micro and driving two external darlingtons, provides high current peak to open injector then lower holding current to keep it open. Includes switchmode regulation and dump protection up to 80V.	DIP16 Co (0.4)
L483	Injector solenoid driver	Connected directly to control micro, provides high current peak (4A) to open injector then lower holdling current (1A) to keep it open. Includes dump protection up to 80V.	Pentawatt®

FLASHER CONTROL

Type	Function	Features	PACKAGE
L486	Direction indicator driver	Drives flashing direction indicators in automobiles. Faults indicated by automatic speedup of flash rate. Features high current capability (1A) and dump protection to 80V.	Minidip

LINEAR INTEGRATED CIRCUITS

CONSUMER APPLICATION GUIDE

TV

FUNCTION		DEVICE
Complete sound channel		TDA1190Z TDA2190 TDA3190 TDA4190
Deflection	Horizontal	TDA1180P
	Vertical	TDA1170 TDA1170D TDA1170N TDA1170S TDA1470 TDA1670 TDA1770 TDA2170 TDA2270
Video IF System		TDA440S TDA4420
TV signal identification		TDA4431 TDA4433
Varicap supply		TAA550A TAA550B TAA550C
TV channels display driver		TDA4092

Preamplifiers

FUNCTION	DEVICE
General purpose	TBA231A
Tape	TDA1054M TDA2054M TDA3410 TDA3420
Hi-Fi	TDA2310
Infrared receiver	TDA2320
Stereo preamplifier	TDA2320A

Tape Recorders

FUNCTION	DEVICE
DC Motor Regulators	TCA900 TCA910 TDA1151
Multifunction	TDA7270S

Audio Power Amplifiers

APPLICATION	DEVICE
Car radio	TBA810P TBA810S TBA810CB TDA2002 TDA2003 TDA2004 TDA2005
Portable radio	TBA820 TBA820M TDA1904 TDA1905 TDA2820M
TV receiver	TBA800 TCA940N TDA1905 TDA1908 TDA2006 TDA2008 TDA2009
Hi-Fi and Hi-Fi TV	TDA1910 TDA2009 TDA2010 TDA2020 TDA2030 TDA2030A TDA2040
Driver	TDA2020D TDA2030A

Radio

FUNCTION	DEVICE
IF/FM radio system	TCA3089 TCA3189
AM/FM radio	TDA1220A TDA1220B TDA1220L TDA2220
FM stereo decoder	TEA1330

Transistor Array

FUNCTION	DEVICE
NPN array	LS159 TBA331

AUDIO POWER AMPLIFIERS

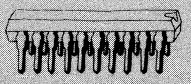
Type	V_s max (V)	G_V (dB) (open loop)	@ P_o (W)	and R_L (Ω)	V_s (V)	I_o (Ap)	Package
TBA800	30	80	5	16	24	1.5 ■ 2 •	FINDIP-H
TBA810CB/ACB	20	80	6 7	4 2	14.4 14.4	3 ■ 4 •	FINDIP-H/I
TBA810P/AP	20	80	6 7	4 2	14.4 14.4	3 ■ 4 •	FINDIP-H/I
TBA810S/AS	20	80	7 6	4 4	16 14.4	2.5 ■ 3.5 •	FINDIP-H/I
TBA820/M	16	75	1.6 0.3	4 4	9 4	1.5	Minidip
TDA2820M	15	44(°)	2x0.65 2x0.02	4 32	6 3	1	Minidip
TCA940N	28	75	10	4	20	3.5 •	FINDIP-I
TDA1904	20	80	4.5	4	14	2	DIP16 Co (0.4)
TDA1905	30	80	6	4	14	2.5 ■ 3 •	DIP16 Co (0.4)
TDA1908/8A	30	80	8	8	22	3 ■ 3.5 •	FINDIP-H/I
TDA2002	18	80	8 5.2	2 4	14.4 14.4	3.5 ■ 4.5 •	Pentawatt®
TDA2003	18	80	10 6	2 4	14.4 14.4	3.5 ■ 4.5 •	Pentawatt®
TDA2004	18	90	2x6.5 2x6.5	4 3.2	14.4 13.2	3.5 ■ 4.5	Multiwatt 11®
TDA2005	18	90	20* 2x6.5	4 3.2	14.4 13.2	3.5 ■ 4.5 •	Multiwatt 11®
TDA2006	30	90	12 8	4 8	± 12 ± 12	3 ■	Pentawatt®
TDA2008	28	80	12 8	4 8	22 22	3 ■ 4.5 •	Pentawatt®
TDA2009	28	90	2x10 20*	4 8	23 23	3.5 ■ 4.5 •	Multiwatt 11®

■ Repetitive • Non repetitive * Bridge configuration (°) Closed loop

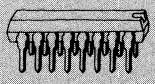
Hi-Fi AUDIO POWER AMPLIFIERS

Type	V_S max (V)	G_V (dB) (open loop)	@ P_O (W)	and d (%)	and R_L (Ω)	and V_S (V)	I_O (Ap)	Notes	PACKAGE
TDA1910	30	75	12	0.5	4	24	3	Muting. Ther. protection	Multiwatt 11®
			7.5	0.5	8	24			
TDA2009	28	90	2x10	—	4	23	3.5	Stereo and Bridge configur.	Multiwatt 11®
			20*	—	8	23			
TDA2010	± 18	100	12	1	4	± 14	3.5	Ther. and short circuit protect.	DIP14 (P004-O)
			9	1	8	± 14			DIP14 (C-0058)
TDA2020	± 22	100	20	1	4	± 18	3.5	Ther. and short circuit protec.	DIP14 (P004-O)
			16.5	1	8	± 18			DIP14 (C-0058)
TDA2020D•	± 25	100	—	—	—	—	1	Output stage driver with short-circ. prot.	DIP14 (P004-O)
									DIP14 (C-0058)
TDA2030	± 18	90	14	0.5	4	± 14	3.5	Thermal and short-circ. prot.	Pentawatt®
			9	0.5	8	± 14			
TDA2030A	± 22	90	18	0.5	4	± 16	3.5	Thermal and short-circ. prot.	Pentawatt®
			12	0.5	8	± 16			
TDA2040	± 20	78	22	0.5	4	± 16	4	Complete series of protection	Pentawatt®
			12	0.5	8	± 16			

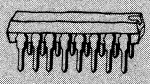
* Bridge • Driver.



DIP20 (Plastic)



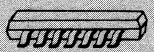
DIP16 (Plastic)



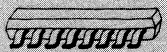
DIP16 Co (Plastic Copper fr.0.3)
DIP16 Co (Plastic Copper fr.0.4)

Minidip

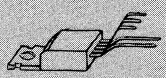
SO-8 (Micropackage)



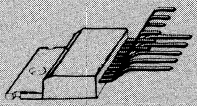
SO-14 (Micropackage)



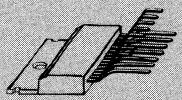
SO-16P (Micropackage)



Pentawatt®



Multiwatt 11®

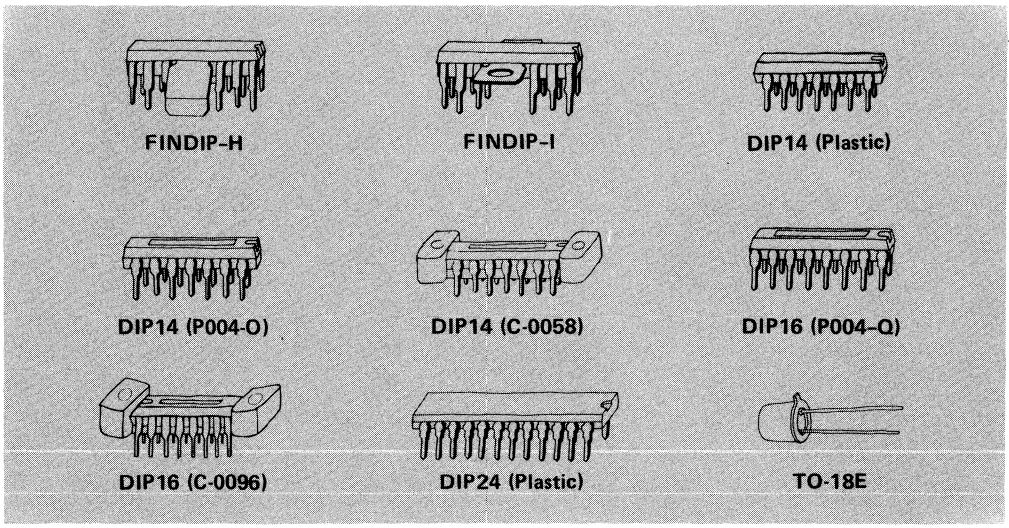


Multiwatt 15®

LINEAR INTEGRATED CIRCUITS

TV CIRCUITS

Type	Description	PACKAGE
TAA550A	Voltage stabilizers (varicap supply): 30 to 32V	TO-18E
TAA550B	Voltage stabilizers (varicap supply): 32 to 34V	TO-18E
TAA550C	Voltage stabilizers (varicap supply): 34 to 36V	TO-18E
TDA440S	Video IF amplifier and detector	DIP16 Co (0.4)
TDA1170	TV vertical deflection system	FINDIP-H
TDA1170D	TV vertical deflection system	DIP16 Co (0.4)
TDA1170N	TV vertical deflection system	FINDIP-I
TDA1170S	TV vertical deflection system	FINDIP-H/I
TDA1180P	Horizontal deflection system	DIP16 Co (0.3)
TDA1190Z	Complete TV sound channel	FINDIP-H
TDA1470	Vertical deflection system	DIP16 (P004-Q)
TDA1670	Class-B vertical deflection system	Multiwatt 15®
TDA1770	Class-B vertical deflection system	DIP20
TDA2170	Vertical deflection output circuit	Multiwatt 11®
TDA2190	Complete sound channel with CCC and VCR facilities	DIP16 (P004-Q) DIP16 (C-0096)
TDA2270	Vertical deflection output circuit	DIP16 Co (0.4)
TDA3190	Complete TV sound channel	DIP16 Co (0.4)
TDA4092	5 bit binary to 7-segment decoder driver	DIP24
TDA4190	Complete TV sound channel with DC control	DIP20
TDA4420	TV vision IF amplifier with AFC	DIP18 Co (0.4)
TDA4431	TV signal identif. circuit and AFC interf.	DIP14 Co (0.3)
TDA4433	TV signal identif. circuit and AFC interf.	DIP14 Co (0.3)



LINEAR INTEGRATED CIRCUITS

RADIO CIRCUITS

Type	Description	f_{max} (MHz)	V_s Range (V)	I_d (mA)	V_o (V_{rms})	d (%)	AM REJ (dB)	PACKAGE
TCA3089	IF/FM amp. and detector	10.7	8.5-16	23	0.4	0.5	55	DIP16Co(0.4)
TCA3189	IF/FM radio system	10.7	8.5-16	31	0.5	0.5	55	DIP16Co(0.4)
TDA1220A	3-12V AM/FM radio	30	3-16	12	0.1	1	50	DIP16Co(0.4)
TDA1220B	AM/FM Quality Radio	30	3-16	9	0.1	0.4	50	DIP16Co(0.4)
TDA1220L	Low Voltage AM/FM radio	30	2-8	5	0.08	0.4	50	DIP16Co(0.4)
TDA2220	AM/FM Quality radio	30	—	—	—	0.3	55	DIP18Co(0.4)

AUDIO PREAMPLIFIERS

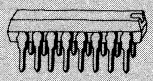
Type	Description	PACKAGE
TBA231A	Dual preamplifier	DIP14 Co (0.3)
TDA1054M	Preamplifier for cassette recorders with ALC	DIP16
TDA2054M	Preamplifier for CrO_2 cassette recorders with ALC	DIP16
TDA2310	Hi-Fi dual preamplifier	DIP14 Co (0.3)
TDA2320	Preamplifier for Infrared Remote Control System	Minidip
TDA2320A	Low-voltage stereo preamplifier	Minidip
TDA3410	Very low noise dual preamplifier with autoreverse	DIP16 Co (0.4)
TDA3420	Very low noise dual preamplifier	DIP16 Co (0.4)

TRANSISTOR ARRAY

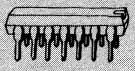
Type	Description	PACKAGE
LS159	High reliability transistor array (5 NPN)	SO-14
TBA331	General purpose transistor array (5 NPN)	DIP14

DC MOTOR SPEED REGULATORS

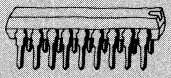
Type	V_s Range (V)	V_M (V)	I_o Limit. (mA)	$R_{th\ j-c/j-a}$ (°C/W)	V_{ref} (V)	Line Reg. (% /V)	Load Reg. (%/mA)	PACKAGE
TCA900	5.5-12	3.6	400	10/100	2.6	0.1	0.005	TO-126
TCA910	10-16	5.6	400	10/100	2.6	0.1	0.005	TO-126
TDA1151	2.5-18	3.6	600	10/100	1.2	0.1	0.005	TO-126



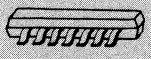
DIP16 (Plastic)
DIP16 Co (Plastic Copper fr.0.4)



DIP14 (Plastic)
DIP14 Co (Plastic Copper fr.0.3)
DIP14 Co (Plastic Copper fr.0.4)

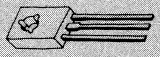


DIP18 Co (Plastic Copper fr.0.4)



SO-14 (Micropackage)

Minidip



TO-126 (SOT-32)

CMOS B SERIES DEVICES

FEATURES

- Very low power dissipation: typically 10 nW/gate; 10 μW/package (MSI)
- Wide supply voltage range: 3 to 18V for HCC 4000B/4500B/40100B series
  3 to 15V for HCF 4000B/4500B/40100B series
- High noise immunity: 45% of supply voltage/typ (1V min. guaranteed)
- High speed operation: 10 MHz for gates and flip-flops; 5 MHz for MSI
- Direct interface with HLL (H 100 family): V_{DD}= 10.8 to 18V for HCC 4000B/4500B/40100B series
  V_{DD}= 10.8 to 15V for HCF 4000B/4500B/40100B series
  No external components or special rules needed
- DTL and TTL compatibility
- Output drive current standardized for HCC and HCF 4000B/4500B/40100B series
- Excellent temperature stability: ± 1.5% shift in transfer characteristics over -55°C to +125°C
- Inputs fully protected
- High input impedance: 10^{12} Ω typ.
- Low output impedance
- Single phase clock
- HCC/HCF 4000B/4500B/40100B types meet all requirements of Jedec "Standard specifications for description of B-series CMOS devices".
- Packeges: plastic DIP HCF 4XXXBE; ceramic DIP HCC 4XXXBD; HCC/HCF 4XXXBF (frit seal) ceramic flat package HCC 4XXXBK; plastic micropackage HCF 4XXXBM; also available in chip form.

ABSOLUTE MAXIMUM RATINGS

V_{DD}	DC supply voltage:	-0.5V to +20V for HCC 4000B/4500B/40100B series -0.5V to +18V for HCF 4000B/4500B/40100B series
P_{tot}	Total power dissipation (per package):	200 mW
V_I	Input voltage:	-0.5V to V_{DD} +0.5V
T_{op}	Operating temperature:	HCC types: -55°C to +125°C HCF types: -40°C to + 85°C
T_{stg}	Storage temperature:	-65°C to +150°C

RECOMMENDED OPERATING CONDITIONS

V_{DD}	Supply voltage	=	3 to 18V for HCC 4000B/4500B/40100B series
		=	3 to 15V for HCF 4000B/4500B/40100B series
V_I	Input voltage	=	0 to V_{DD}.

CMOS B SERIES DEVICES

HCC/HCF 4000B/4500B/40100B STANDARD SERIES

Gates

NOR/NAND

*	4000B	Dual 3-input NOR gate plus inverter
*	4001B	Quad 2-input NOR gate
*	4002B	Dual 4-input NOR gate
*	4011B	Quad 2-input NAND gate
*	4012B	Dual 4-input NAND gate
*	4023B	Triple 3-input NAND gate
*	4025B	Triple 3-input NOR gate
*	4068B	8-input NAND/AND gate
*	4078B	8-input NOR/OR gate
*	40107B	Dual 2-input NAND buffer/driver

OR/AND

*	4068B	8-input AND/NAND gate
*	4071B	Quad 2-input OR gate
*	4072B	Dual 4-input OR gate
*	4073B	Triple 3-input AND gate
*	4075B	Triple 3-input OR gate
*	4078B	8-input OR/NOR gate
*	4081B	Quad 2-input AND gate
*	4082B	Dual 4-input AND gate

Interface Circuit

*	40109B	Quad low-to-high voltage level shifter

Buffers and Inverters

*	4007UB	Dual complementary pair plus inverter
*	4041UB	Quad true/complement buffer
*	4049UB	Hex buffer/converter (inverting)
*	4050B	Hex buffer/converter (non-inverting)
*	4069UB	Hex inverter
*	4502B	Strobed hex inverter/buffer
*	4503B	Hex Buffer (3-state non-inverting)
*	40107B	Dual 2-input NAND buffer/driver

Multilevel/Functional

*	4019B	Quad AND/OR select gate
*	4030B	Quad exclusive OR gate
*	4048B	Expandable 8-input gate (3-state out.)
*	4070B	Quad exclusive OR gate
*	4077B	Quad exclusive NOR gate
*	4085B	Dual 2-wide, 2-input AND/OR inverter (AOI)
*	4086B	Expandable 4-wide, 2-input AND/OR inverter (AOI)

Decoders/Encoders

*	4028B	BCD-to-decimal decoder
	4514B	4-bit latch/4-to-16 line decoder (outputs high)
	4515B	4-bit latch/4-to-16 line decoder (outputs low)
*	4532B	8-input priority encoder
*	4555B	Dual 1-of-4 decod./demult. (out/high)
*	4556B	Dual 1-of-4 decod./demult. (out low)

Schmitt Trigger

*	4093B	Quad 2-input NAND Schmitt trigger
*	40106B	Hex schmitt triggers

Multivibrators

*	4047B	Monostable/astable multivibrator
*	4098B	Dual monostable multivibrator
	4538B	Dual precision monost. multivib.(MSI)

Flip-Flops

*	4013B	Dual "D" with set/reset capability
*	4027B	Dual "J-K" master-slave with set/reset capability
*	4076B	4-bit "D" with 3-state outputs
	4095B	Gated "J-K" master-slave (non invert.)
*	4096B	Gated "J-K" master-slave (inverting and non-inverting)
*	40174B	Hex "D"

Latches

*	4042B	Quad clocked "D" latch
*	4043B	Quad NOR R/S (3-state outputs)
*	4044B	Quad NAND R/S (3-state outputs)
	4099B	8-bit addressable latch
	4508B	Dual 4-bit latch (3-state outputs)

Registers

Shift Registers Static

	4006B	18-stage static shift register
	4014B	8-stage with sync. parallel or serial input/serial output
	4015B	Dual 4-stage with serial input/parallel output
*	4021B	8-stage with async. parallel input or sync. serial input/serial otuput
	4031B	64-stage static shift register
	4034B	8-stage bidirectional parallel or serial input/parallel output
*	4035B	4-stage parallel-in/parallel-out with "J-K" input and true/compl. out.
*	4094B	8-stage shift and-store bus register
	4517B	Dual 64-stage static shift register
	40100B	32-stage static left/right shift register
	40104B	4-bit bidirecti. universal shift register
	40194B	4-bit bidirect. universal shift register

Storage Registers

*	4076B	4-bit "D" with 3-state outputs
	4099B	8-bit addressable latch
	40108B	4x4 multiport register
	40208B	4x4 multiport register

Fifo Registers

	40105B	4-bit x 16 word

CMOS B SERIES DEVICES

HCC/HCF 4000B/4500B/40100B STANDARD SERIES

Counters

Clock Timer

4045B 21-stage counter for clock timer appl.
4536B Programmable timer

Binary Ripple

* 4020B 14-stage binary/ripple counter
* 4024B 7-stage binary/ripple counter
* 4040B 12-stage binary/ripple counter
* 4060B 14-stage counter/divider and oscillator

Synchronous

* 4017B Decade counter/divider plus 10 decoded decimal outputs
* 4018B Presettable divide-by-"N" counter, fixed or programmable
* 4022B Divide-by-8 counter/divider with 8 decimal outputs
4029B Presettable Up/Down counter, binary or BCD-decade
4510B Preset. 4-bit BCD up/down counter
4516B Preset. 4-bit binary up/down counter
* 4518B Dual BCD up counter
* 4520B Dual binary up counter
40102B Preset. 2-decade BCD down counter
40103B Preset. 8-bit binary down counter
* 40160B Decade counter/asynchronous clear
* 40161B Binary counter/asynchronous clear
* 40162B Decade counter/synchronous clear
* 40163B Binary counter/synchronous clear
40192B Preset. 4-bit BCD up/down counter
40193B Preset. 4-bit binary up/down counter

Display Drivers

With counter

* 4026B Decade counter/divider with 7-segment display out. and display enable
* 4033B Decade counter/divider with 7-segment display out. and ripple blanking
40110B Decade up down counter/decoder/latch/driver

For liquid - crystal - display drive

* 4054B 4-line
* 4055B BCD-to-7 segment decoder/driver with "display-frequency" output
* 4056B BCD-to-7 segment decoder/driver with strobed latch function

For light - emitting - diode drive

4511B BCD-to-7 seg. latch-decoder/driver

Multiplexers/demultiplexers

Analog/Digital

* 4016B Quad bilateral switch
* 4019B Quad AND/OR select
* 4051B Single 8-channel
* 4052B Differential 4-channel
* 4053B Triple 2-channel
* 4066B Quad bilateral switch
4067B Single 16-channel
4097B Differential 8-channel
* 4555B Dual 1-of-4 decoder/demultiplexer (outputs high)
* 4556B Dual 1-of-4 decoder/demultiplexer (outputs low)

Data Selector

* 4512B 8-channel data selector with 3-state output
* 40257B Quad 2-line-to-1-line data selector/multiplexer

Phase Locked Loop

4046B Micropower phase locked loop

Arithmetic Circuits

Adders/Comparators

* 4008B 4-bit full adder with parallel carry out
* 4030B Quad exclusive-OR gate
4032B Triple serial adder, positive logic
4038B Triple serial adder, negative logic
* 4063B 4-bit magnitude comparator
* 4070B Quad exclusive-OR gate
* 4077B Quad exclusive-NOR gate
4585B 4-bit magnitude comparator
* 40101B 9-bit parity generator/checker

ALU/Rate Multipliers

4089B Binary rate multiplier
4527B BCD rate multiplier
40181B 4-bit arithmetic logic unit
* 40182B Look-ahead carry generator

* Available in micropackage (Ordering No. HCF 4XXX BM).

NEW HS-C²MOS™

M74HC SERIES – LSTTL SPEED WITH CMOS LOW POWER

Use of the latest micro-lithography techniques employed in VLSI memory and microprocessor has resulted in the silicon-gate CMOS M74HC Series with an operating speed ten times higher than the existing CMOS B logic family.
The combination of LSTTL speed and the advantages of CMOS which are extremely low power dissipation and wide operating supply voltage range will not only realize remarkably low total power dissipation of high speed digital systems, but also develop new application fields such as high speed portable instruments which could not be achieved with current LSTTL or CMOS devices.

M74HC SERIES OFFERS

– High speed operation	LSTTL speed f_{MAX}= 60 MHz (typ.)
– Low power dissipation	Micro Watt dissipation of standard CMOS B
– High output current	Fan-out of 10 LSTTL loads
– Symmetrical output buffer	Equal I_{OH} and I_{OL}
– High noise immunity	29% V_{DD} at high and low level
– Wide operating voltage range	V_{DD} = 2 to 6V

– Pin and Function compatible with equivalent LSTTL and some popular types of HCF 4000 series.
– Wide range of products. Over 100 types planned.
– Second source available.

ABSOLUTE MAXIMUM RATINGS

V_{CC}	Supply voltage	–0.5 to 7 V
V_{IN}	Input voltage	–3.0 to V_{CC} + 3.0V
V_{OUT}	Output voltage	–0.5 to V_{CC} + 0.5V
I_{OUT}	Output current	± 25 mA
I_{OUT}	Output current (Buffer)	± 35 mA
P_D	Total power dissipation	500 mW
T_{stg}	Storage temperature	–65 to 150 °C

RECOMMENDED OPERATING CONDITIONS

V_{CC}	Supply voltage	2 to 6 V
V_{IN}	Input voltage	0 to V_{CC} V
T_{op}	Operating temperature	–40 to 85 °C
t_r/t_f	Input Rise/Fall Time	0 to 500 ns

M74HC SERIES

Type	Description	PACKAGE
NAND GATES		
M74HC00B1	Quad 2-input NAND gate	DIP14
M74HC10B1	Triple 3-input NAND gate	DIP14
M74HC20B1	Dual 4-input NAND gate	DIP14
M74HC30B1	8-input NAND gate	DIP14
NOR GATES		
M74HC02B1	Quad 2-input NOR gate	DIP14
M74HC27B1	Triple 3-input NOR gate	DIP14
M74HC4002B1	Dual 4-input NOR gate	DIP14
M74HC4078B1	8-input NOR gate	DIP14
AND GATES		
M74HC08B1	Quad 2-input AND gate	DIP14
M74HC11B1	Triple 3-input AND gate	DIP14
OR GATES		
M74HC32B1	Quad 2-input OR gate	DIP14
M74HC4075B1	Triple 3-input OR gate	DIP14
INVERTER		
M74HCU04B1	Hex inverter	DIP14
BUFFERS		
M74HC4049B1	Hex buffer (Inv.)	DIP16
M74HC4050B1	Hex buffer	DIP16
M74HC240B1	Octal bus buffer (Inv.)	DIP20
M74HC241B1	Octal bus buffer	DIP20
M74HC244B1	Octal bus buffer	DIP20
M74HC365B1	Hex bus buffer	DIP16
M74HC366B1	Hex bus buffer (Inv.)	DIP16
M74HC367B1	Hex bus buffer	DIP16
M74HC368B1	Hex bus buffer (Inv.)	DIP16
M74HC242B1	Quad bidirectional bus buffer (Inv.)	DIP14
M74HC243B1	Quad bidirectional bus buffer	DIP14
M74HC245B1	Octal bidirectional bus buffer	DIP20
M74HC640B1	Octal bidirectional bus buffer	DIP20
M74HC643B1	Octal bidirectional bus buffer	DIP20
TTL RECEIVERS		
M74HCT240B1	Octal buffer (Inv.)/TTL receiver	DIP20
M74HCT244B1	Octal buffer/TTL receiver	DIP20
M74HCT576B1	Octal D-F/F (Inv.)/TTL receiver	DIP20
M74HCT574B1	Octal D-F/F/TTL receiver	DIP20
M74HCT580B1	Octal D-latch (Inv.)/TTL receiver	DIP20
M74HCT573B1	Octal D-latch/TTL receiver	DIP20

M74HC SERIES (continued)

Type	Description	PACKAGE
JK FLIP-FLOP		
M74HC76B1	Dual J-K flip-flop	DIP16
M74HC107B1	Dual J-K flip-flop	DIP14
M74HC112B1	Dual J-K flip-flop	DIP16
D FLIP-FLOP		
M74HC74B1	Dual D-type flip-flop	DIP14
M74HC174B1	Hex D-type flip-flop	DIP16
M74HC175B1	Quad D-type flip-flop	DIP16
M74HC273B1	Octal D-type flip-flop	DIP20
M74HC374B1	Octal D-type flip-flop	DIP20
M74HC534B1	Octal D-type flip-flop (Inv.)	DIP20
M74HC574B1	Octal D-type flip-flop (3-state)	DIP20
M74HC576B1	Octal D-type flip-flop (Inv./3-state)	DIP20
LATCHES		
M74HC259B1	8-bit addressable latch	DIP16
M74HC373B1	Octal D-type latch	DIP20
M74HC375B1	Quad D-type latch	DIP16
M74HC533B1	Octal D-type latch (Inv.)	DIP20
M74HC580B1	Octal D-type latch (Inv./3-state)	DIP20
M74HC573B1	Octal D-type latch (3-state)	DIP20
MULTIVIBRATORS		
M74HC221B1	Dual monostable multivibrator	DIP16
M74HC4538B1	Dual monostable multivibrator	DIP16
DECODERS		
M74HC42B1	BCD to decimal decoder	DIP16
M74HC138B1	3 to 8 line decoder	DIP16
M74HC139B1	Dual 2 to 4 line decoder	DIP16
M74HC4511B1	BCD to 7-segment L/D/D (LED)	DIP16
M74HC4543B1	BCD to 7-segment L/D/D (LED)	DIP16
ENCODERS		
M74HC147B1	10 to 4 line priority encoder	DIP16
M74HC148B1	8 to 3 line priority encoder	DIP16
REGISTERS		
M74HC670B1	4 word x 4 bit register file	DIP16
M74HC164B1	8 bit SIPO shift register	DIP14
M74HC165B1	8 bit PISO shift register	DIP16
M74HC173B1	Quad D-type register (3-state)	DIP16
M74HC194B1	4 bit PIPO shift register	DIP16
M74HC195B1	4 bit PIPO shift register	DIP16

M74HC SERIE (continued)

Type	Description	PACKAGE
BINARY COUNTERS		
M74HC161B1	Sync. binary counter	DIP16
M74HC163B1	Sync. binary counter	DIP16
M74HC193B1	Sync. up/down binary counter	DIP16
M74HC393B1	Dual binary counter	DIP16
M74HC4020B1	14-stage binary counter	DIP16
M74HC4022B1	Octal counter/divider	DIP16
M74HC4024B1	7-stage binary counter	DIP14
M74HC4040B1	12-stage binary counter	DIP16
M74HC4060B1	14-stage binary counter/osc.	DIP16
DECADE COUNTERS		
M74HC160B1	Sync. decade counter	DIP16
M74HC162B1	Sync. decade counter	DIP16
M74HC192B1	Sync. up/down decade counter	DIP16
M74HC390B1	Dual decade counter	DIP16
M74HC4017B1	Decade counter/divider	DIP16
ANALOG MULTIPLEXERS		
M74HC4051B1	8-channel analog multiplexer	DIP16
M74HC4052B1	Dual 4-channel analog multiplexer	DIP16
M74HC4053B1	Triple 2-channel analog multiplexer	DIP16
M74HC4066B1	Quad bilateral switch	DIP14
DIGITAL MULTIPLEXERS		
M74HC151B1	8 to 1 line multiplexer	DIP16
M74HC153B1	Dual 4 to 1 line multiplexer	DIP16
M74HC157B1	Quad 2 to 1 line multiplexer	DIP16
M74HC158B1	Quad 2 to 1 line multiplexer (Inv.)	DIP16
M74HC354B1	8-input multiplexer	DIP20
M74HC251B1	8 to 1 line multiplexer (3-state)	DIP16
M74HC253B1	Dual 4 to 1 line multiplexer (3-state)	DIP16
M74HC257B1	Quad 2 to 1 line multiplexer (3-state)	DIP16
M74HC258B1	Quad 2 to 1 line multiplexer (3-state/Inv.)	DIP16
M74HC356B1	8-input multiplexer	DIP20
COMPARATORS		
M74HC85B1	4-bit magnitude comparator	DIP16
M74HC688B1	8-bit equality comparator	DIP20
SCHMITT TRIGGER		
M74HC14B1	Hex schmitt inverter	DIP14
M74HC132B1	Quad 2-input schmitt NAND	DIP14
MULTIFUNCTIONAL		
M74HC51B1	Dual 2W-2 I AND/OR inverter gate	DIP14
M74HC86B1	Quad exclusive OR gate	DIP14
M74HC266B1	Quad exclusive NOR gate	DIP14

LOW POWER SCHOTTKY TTL

SGS Low Power Schottky devices cover all the popular functions available in standard TTL. They offer a good compromise between cost, speed, power consumption and ease of use. Low Power Schottky devices are available in 14, 16, 20 and 24-lead ceramic or plastic dip packages.

CONTENTS

LOW POWER SCHOTTKY TTL

TTL-T 74/T 54 LS SERIES

Type	Description	t_{pd} (typ) (ns)	P_D (typ) (mW)	Fanout
NAND GATES				
T 74/54 LS 00	Quad 2-input	5	12	20
T 74/54 LS 03	Quad 2-input open-collector	10	12	20
T 74/54 LS 04	Hex inverter	5	18	20
T 74/54 LS 05	Hex inverter open-collector	10	18	20
T 74/54 LS 10	Triple 3-input	6	9	20
T 74/54 LS 13	Dual 4-input schmitt trigger	20	60	20
T 74/54 LS 14	Hex schmitt trigger	20	60	20
T 74/54 LS 20	Dual 4-input	5	6	20
T 74/54 LS 22	Dual 4-input open-collector	10	6	20
T 74/54 LS 26	Quad 2-input high voltage	10	12	20
T 74/54 LS 30	8-input	7	3	20
T 74/54 LS 37	Quad 2-input buffer	20	30	20
T 74/54 LS 38	Quad 2-input buffer open-collector	20	30	20
T 74/54 LS 40	Dual 4-input buffer	10	15	20
T 74/54 LS 132	Quad 2-input schmitt trigger	20	41	20
T 74/54 LS 133	13-input	20	3	20
NOR GATES				
T 74/54 LS 02	Quad 2-input	5	12	20
T 74/54 LS 27	Triple 3-input	8	17	20
T 74/54 LS 28	Quad 2-input buffer	9	55	20
T 74/54 LS 33	Quad 2-input open-collector	7	50	20
T 74/54 LS 260	Dual 5-input	12	10	20
AND GATES				
T 74/54 LS 08	Quad 2-input AND gate	7.5	22	20
T 74/54 LS 09	Quad 2-input AND gate open-collector	10	22	20
T 74/54 LS 11	Triple 3-input AND gate	7.5	16	20
T 74/54 LS 15	Triple 3-input AND gate open-collector	10	16	20
T 74/54 LS 21	Dual 4-input AND gate	8	11	20
OR GATE				
T 74/54 LS 32	Quad 2-input	7	24	20
AND-OR INVERTER GATES				
T 74/54 LS 51	Dual	8	7	20
T 74/54 LS 54	2-3-3-2 input	10	5	20
T 74/54 LS 55	2 wide 4-input	10	5	20
EXCLUSIVE-OR GATES				
T 74/54 LS 86	Quad	12	30	20
T 74/54 LS 136	Quad open collector	23	30	20
EXCLUSIVE-NOR GATE				
T 74/54 LS 266	Quad 2-input open-collector	23	20	20

TTL-T 74/T 54 LS SERIES (continued)

Type	Description	t_{pd} (typ) (ns)	P_D (typ) (mW)	Fanout
BUFFERS, GATES AND DRIVERS				
T 74/54 LS 125	Quad 3-state buffer (low enable)	15	50	20
T 74/54 LS 126	Quad 3-state buffer (high enable)	15	75	20
T 74/54 LS 365	Hex buffer, 3-state, common enable	10	67	20
T 74/54 LS 366	Hex inverter, 3-state, common enable	10	60	20
T 74/54 LS 367	Hex buffer, 3-state, 4-bit and 2-bit	10	67	20
T 74/54 LS 368	Hex inverter, 3-state, 4-bit and 2-bit	10	60	20
DUAL FLIP-FLOPS				
T 74/54 LS 74	Dual D	10	20	20
T 74/54 LS 109	Dual J K	10	20	20
T 74/54 LS 112	Dual J K edge-trigger	10	20	20
T 74/54 LS 113	Dual J K edge-trigger	10	20	20
T 74/54 LS 114	Dual J K edge-trigger	10	20	20
MULTIPLE FLIP-FLOPS				
T 74/54 LS 174	Hex D with clear	12	80	20
T 74/54 LS 175	Quad with clear	8	55	20
T 74/54 LS 273	Octal D-type	20	85	20
T 74/54 LS 298	Quad 2 multiplexer with output register	16	65	20
T 74/54 LS 374	Octal D type flip-flop	45	135	20
T 74/54 LS 378	Hex D-type	20	80	20
T 74/54 LS 379	4-bit	20	80	20
LATCHES				
T 74/54 LS 170	4x4 register file	45	125	20
T 74/54 LS 197	4 bit D	8	60	20
T 74/54 LS 256	Dual 4-bit addressable	11	70	20
T 74/54 LS 259	8 bit addressable	15	60	15
T 74/54 LS 279	Quad set-reset	20	18	20
T 74/54 LS 373	Octal transparent	25	120	20
T 74/54 LS 670	4x4 register file with 3-state outputs	25	150	20
REGISTERS				
T 74/54 LS 95	PIPO	20	65	20
T 74/54 LS 164	8-bit serial-in parallel-out	15	180	20
T 74/54 LS 170	4x4 register file	45	125	20
T 74/54 LS 174	Hex D flip-flop with clear	12	65	20
T 74/54 LS 175	Quad flip-flop with clear	8	45	20
T 74/54 LS 194	4-bit bidirectional	13	75	20
T 74/54 LS 195	4-bit shift register	8	70	20
T 74/54 LS 273	8-bit register	28	85	20
T 74/54 LS 295	4-bit shift register, 3-stage	17	75	20
T 74/54 LS 298	Quad 2-input multiplexer with output register	16	65	20
T 74/54 LS 374	Octal D-type flip-flop	45	135	20
T 74/54 LS 377	Octal D flip-flop	27	85	20
T 74/54 LS 378	Parallel D register	27	65	20
T 74/54 LS 379	Quad parallel register	20	75	20
T 74/54 LS 395	4-bit shift register with 3-state outputs	20	95	20
T 74/54 LS 670	4x4 register file with 3-state outputs	29	150	20

TTL-T 74/T 54 LS SERIES (continued)

Type	Description	t_{pd} (typ) (ns)	P_D (typ) (mW)	Fanout
ARITHMETIC OPERATORS				
T 74/54 LS 83	4-bit full adder	17	95	20
T 74/54 LS 181	4-bit ALU	20	105	20
T 74/54 LS 283	4-bit full adder	15	95	20
MULTIPLEXERS				
T 74/54 LS 151	8-input	11	30	20
T 74/54 LS 152	8-input	11	28	20
T 74/54 LS 153	Dual 4-input	10	31	20
T 74/54 LS 157	Quad 2-input	22	49	20
T 74/54 LS 158	Quad 2-input	20	24	20
T 74/54 LS 251	8-input, 3-state	11	35	20
T 74/54 LS 253	Dual 4-input	10	43	20
T 74/54 LS 257	Quad 2-input, 3-state (non inverting)	15	50	20
T 74/54 LS 258	Quad 2-input, 3-state (inverting)	15	35	20
T 74/54 LS 298	Quad 2 with output register	16	65	20
T 74/54 LS 352	Dual 4-input	20	30	20
T 74/54 LS 353	Dual 4-input	18	43	20
DECODERS/DEMULTIPLEXERS				
T 74/54 LS 42	1 of 10 decoder	11	35	20
T 74/54 LS 138	1 of 8	11	34	20
T 74/54 LS 139	Dual 1-of-4	15	34	20
T 74/54 LS 155	Dual 1-of-4	15	31	20
T 74/54 LS 156	Dual 1-of-4 decoder open-collector	15	31	20
T 74/54 LS 256	Dual 1-of-4	20	60	20
T 74/54 LS 259	8 bit addressable	15	60	15
COUNTERS				
T 74/54 LS 90	Decade	25	45	20
T 74/54 LS 92	Divide-by-twelve	25	45	20
T 74/54 LS 93	Divide-by-sixteen counter	25	45	20
T 74/54 LS 160	BCD decoder async. reset	9	95	20
T 74/54 LS 161	4-bit binary async.	9	95	20
T 74/54 LS 162	BCD decade sync. reset	9	95	20
T 74/54 LS 163	4-bit binary sync. reset	9	95	20
T 74/54 LS 168	Synchronous bidirectional BCD decade	25	100	20
T 74/54 LS 169	Synchronous bidirectional modulo-16 binary	25	100	20
T 74/54 LS 190	Up/down decade	20	95	20
T 74/54 LS 191	Up/down binary	20	95	20
T 74/54 LS 192	Presettable 4-bit binary up/down	20	85	20
T 74/54 LS 193	Up/down binary	20	85	20
T 74/54 LS 196	Decade	26	60	20
T 74/54 LS 197	4-bit binary	26	60	20
T 74/54 LS 290	BCD decade	25	45	20
T 74/54 LS 293	Modulo-16 binary	25	45	20
T 74/54 LS 390	Dual decade	30	100	20
T 74/54 LS 393	Dual 4-stage binary	30	100	20
T 74/54 LS 490	Dual decade	6	95	20

MOS & SPECIAL CMOS ICs

MOS and Special CMOS devices listed in the following pages include semiconductor memories, clocks and timers, shift registers multiplexers and special assembles for musical instruments, TV, radio and telecommunications.

CONTENTS

SGS MOS PROCESSES

1. Low threshold N-channel enhancement/depletion mode with an N-type polycrystalline silicon gate
   - Threshold voltage: 0.6 to 1.2V
   - Supply voltage: V_{CC}= +5V
   - Used in static and dynamic systems (Z80/M3870/M36000)
   - Compatible with bipolar circuits

2. N-channel enhancement/depletion mode with an N-type polycrystalline silicon gate
   - Threshold voltage: 0.8 to 1.2V
   - Supply voltages: V_{DD}= +12V, V_{CC}= 5V
   - Used in static and dynamic systems
   - Compatible with bipolar circuits

3. N-channel enhancement/depletion mode with double N-type polycrystalline silicon gate
   - Threshold voltage: 0.8 to 1.2V with V_{BB}= -5V
   - Supply voltages: V_{DD}= +12V, V_{BB}= -5V, V_{CC}= 5V
   - Used for dynamic RAMs
   - Compatible with bipolar circuits

4. N-channel enhancement/depletion mode with double N-type polycrystalline silicon gate
   - Threshold voltage: 0.8 to 1.2V
   - Supply voltage: V_{CC}= 5V
   - Used for UV erasable and electrically programmable ROMs (M2716)
   - Compatible with bipolar circuits

5. N-channel enhancement/depletion mode with double N-type polycrystalline silicon gate
   - Threshold voltage: 0.8V to 1.2V
   - Supply voltages: V_{DD}= +12V, V_{CC}= +5V
   - Used for non-volatile RAMs (M120/M193/M293)
   - Compatible with bipolar circuits

6. CMOS Aluminium Gate A & B process
   - Threshold voltage: 1 to 2V
   - Supply voltage: V_{DD}= +3 to +18V

7. CMOS Aluminium Gate - low threshold voltage
   - Threshold voltage: 0.5V to 1V
   - Supply voltage: V_{DD}= 1.5 to 5V

8. CMOS Silicon Gate High Density
   - Threshold voltage: 0.8V to 1.2V
   - Supply voltages: V_{DD}= +3 to 12V

MOS & SPECIAL CMOS ICs

TELECOMMUNICATIONS

Type	Function	Technology	Supply voltage max (V)	Current cons. max (mA)	Temperature range (°C)	PACKAGE
M088	Digital switching matrix	(1) N-ch	5	100	0 to 70	DIP40CM
M079	2 x 2 x 2 crosspoint	(2) N-ch	18	3	0 to 70	DIP14
M089/M099	2 x 8 crosspoint matrix	(2) N-ch	16	7	0 to 70	DIP16, DIP16F DIP16C
M093	12 x 8 crosspoint	(2) N-ch	18	20	0 to 70	DIP40, DIP40CM
M751	Dual tone multifreq. generator with 2 contacts per key	(7) CMOS Low volt.	2.5 to 15	1.5	-25 to 70	DIP16, DIP16F
M760/A	Loop disconnect dialler	(7) CMOS Low volt.	2.5 to 5	0.5	-25 to 70	DIP18, DIP18F DIP24, DIP24F
M761/A	Dual tone multifreq. with 1 contact per key	(7) CMOS Low volt.	2.5 to 5	1.5	-25 to 70	DIP16, DIP18 DIP16F, DIP18F
M764/A	Tone ringer	(6)CMOS	6 to 18	0.5	-25 to 80	DIP18, DIP16 DIP16F, DIP18F
M774	Tone ringer	(6)CMOS	7 to 15	0.5	-25 to 70	DIP14
M2560A	Pulse dialler	(8)CMOS	5	0.5	-25 to 70	DIP18Co, DIP18F
M5116	μ-Law companding Codec	(8)CMOS	± 5	6/6	0 to 70	DIP16C, DIP16F
M5156	A-law companding Codec	(8) CMOS	± 5	10/6	0 to 70	DIP16C, DIP16F
M5912*	PCM Tx/Rx filters	(8) CMOS	± 5	6/6	0 to 70	DIP16C, DIP16F
M22100	4 x 4 crosspoint switch with control memory	(6) CMOS	18	1	-40 to 85	DIP16F, DIP16
M22101/102	4 x 4 x 2 crosspoint switch with control memory	(6) CMOS	18	1	-40 to 85	DIP24, DIP24F

* Coming soon.

MOS & SPECIAL CMOS ICs

MUSIC

Type	Function	Technology	Supply voltage typ. (V)	Current consumption max (mA)	Temperature range (°C)	PACKAGE
M082/A	Tone generator	(2) N-ch	12	35	0 to 50	DIP16
M083/A	Tone generator	(2) N-ch	12	35	0 to 50	DIP16
M086/A	Tone generator	(2) N-ch	12	35	0 to 50	DIP16
M108	Single chip organ	(2) N-ch	12	30	0 to 70	DIP40
M109	Digital accompaniment interface	(1) N-ch	5	30	0 to 50	DIP40
M110	Monophonic synthes.	(2) N-ch	12	30	0 to 50	DIP40
M112	Polyphonic sound generator	(2) N-ch	12	50	0 to 70	DIP40
M151	Accompaniment generator	(2) N-ch	12	50	0 to 50	DIP40
M208	Single chip organ	(2) N-ch	12	30	0 to 50	DIP40
M258*	Rhythm generator	(4) N-ch	5	30	0 to 50	DIP28
M259*	Rhythm generator	(4) N-ch	5	30	0 to 50	DIP40
M268*	Rhythm generator	(4) N-ch	5	30	0 to 50	DIP24
M269	Rhythm generator	(1) N-ch	5	30	0 to 50	DIP24
M740	7-stage divider	(6)CMOS	12	0.05	0 to 70	DIP14
M747	7-stage divider	(6)CMOS	12	0.05	0 to 70	DIP14

* Available with plastic and frit-seal with lens

TV & RADIO

Type	Function	Technology	Supply voltage typ. (V)	Current consumption max (mA)	Temperature range (°C)	PACKAGE
M104	PCM remote contr. Rx	(1) N-ch	5	50	0 to 70	DIP28
M106	TV μp interface	(1) N-ch	5/12	60/0.3	0 to 70	DIP40
M190	16-key keyboard encoder and latch	(2) N-ch	12	18	0 to 70	DIP18
M191	On-screen tuning scale and band display	(2) N-ch	12	25	0 to 70	DIP16
M192	4-bit binary 7-segment	(6)CMOS	12	2	0 to 70	DIP16
M193A/B/C	Electronic program memory (16 stations)	(5) N-ch	12/18/29	45/3/–	0 to 70	DIP28
M206	PLL TV μP interface	(5) N-ch	5/25	65	0 to 70	DIP28
M293	Electronic program memory (32 stations)	(5) N-ch	5/25	50	0 to 70	DIP28
M490*	16 station memory + RC receiver + Display driver (single dot)	(5) N-ch	5/25	100/–	0 to 70	DIP40
M491*	16 station memory + RC receiver + Display driver (7 segment)	(5) N-ch	5/25	100/–	0 to 70	DIP40
M705	15/16 divider for PLL	(8)CMOS	5	3	0 to 70	Minidip
M708/A	PCM remote contr. Txr (30 commands x 4 add.)	(8)CMOS	4.5/3 to 10.5	–	0 to 70	DIP20 Co
M709/A	PCM remote contr. Txr (40 commands x 16 add.)	(8)CMOS	4.5/3 to 10.5	–	0 to 70	DIP24
M710/A	PCM remote contr. Txr (64 commands x 16 add.)	(8)CMOS	4.5/3 to 10.5	–	0 to 70	DIP28
M1124	30-ch remote contr. Txr	(8)CMOS	9	10	0 to 70	DIP16

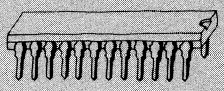
* Coming soon.

MOS & SPECIAL CMOS ICs

MEMORIES

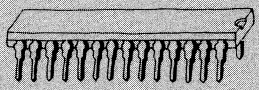
Type	Mode	Organization	Technology	Supply voltage typ. (V)	Current cons. max (mA)	t_{acc} (ns)	PACKAGE
M120D	NVRAM	256x4 bit	(5) N-ch	12	35	950	DIP18Co,DIP18F
M2016	RAM	2048x8 bit static	(1) N-ch	5	120	150	DIP24
M2147/-3	RAM	4096x1 bit static	(1) N-ch	5	160/180	70/55	DIP18F
M2316H	ROM	2048x8 bit	(1) N-ch	5	100	300	DIP24,DIP24CM
M2332/3	ROM	4096x8 bit	(1) N-ch	5	100	300	DIP24,DIP24CM
M2348	ROM	4096x10 bit	(1) N-ch	5	70	350	DIP28
M2364	ROM	8192x8 bit	(1) N-ch	5	100	300	DIP24,DIP24CM
M2388	ROM	8192x10 bit	(1) N-ch	5	80	350	DIP28
M2532/-1	EPROM	4096x8 bit	(4) N-ch	5*	160	450/350	DIP24CL
M2716/-1	EPROM	2048x8 bit	(4) N-ch	5*	100	450/350	DIP24CL
M2764/-4	EPROM	8192x8 bit	(4) N-ch	5**	100	250/450	DIP28CL
M2811	NVRAM	16x16 serial	(5) N-ch	5*	30	—	DIP14
M5504AP2/L2	RAM	4096x1 bit static	(7) CMOS	5	10	200	DIP18Co
M5504AP3/L3	RAM	4096x1 bit static	(7) CMOS	5	10	300	DIP18Co
M5514AP2/L2	RAM	1024x4 bit static	(7) CMOS	5	10	200	DIP18Co
M5514AP3/L3	RAM	1024x4 bit static	(7) CMOS	5	10	300	DIP18Co
M5516AP/L	RAM	2048x8 bit static	(7) CMOS	5	70	250	DIP24
M5516AP2/L2	RAM	2048x8 bit static	(7) CMOS	5	70	200	DIP24
M5517AP/L	RAM	2048x8 bit static	(7) CMOS	5	70	250	DIP24
M5517AP2/L2	RAM	2048x8 bit static	(7) CMOS	5	70	200	DIP24
M23128	ROM	16384x8 bit	(1) N-ch	5	80	250	DIP28
M36000	ROM	8192x8 bit	(1) N-ch	5	40	450	DIP24, DIP24CM
M37000	ROM	8192x8 bit	(1) N-ch	5	40	300	DIP28

* Programming voltage = 25V ** Programming voltage = 21V

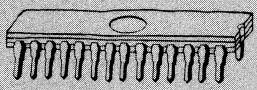


DIP24 (Plastic)

DIP24 CM
(Multi-layer Ceramic)



DIP28 (Plastic)



DIP28 CL
(Ceramic frit-seal cap glass lens)

MOS & SPECIAL CMOS ICs

CLOCK & TIMERS

Type	Function	Technology	Supply voltage (V)	Current consumption (mA)	Temperature range (°C)	PACKAGE
M706	16-stage counter car clock	(6) CMOS	3 to 16	0.1	–40 to 85	Minidip
M716*	Clock with I^2C bus	CMOS	2 to 6	1	0 to 70	Minidip
M755	Clock/display intf. for μP (24 hr)	(7) CMOS	2 to 5	0.03	0 to 70	DIP24
M756	Clock/display intf. for μP (12 hr)	(7) CMOS	2 to 5	0.03	0 to 70	DIP24

* Coming soon

OTHER FUNCTIONS

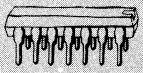
Type	Function	Technology	Supply voltage typ. (V)	Current cons. max (mA)	Temperature range (°C)	PACKAGE
M142 **M142A**	Quad static shift register (80 bit)	(1) N-ch	5	50	0 to 70	DIP16 DIP16CS
M274	Prog. memory (17x8bit)	(4) N-ch	11**	5	–30 to 60	DIP14Co
M5450*	LED driver (34 segment)	(2) N-ch	5 to 12	7	–40 to 85	DIP40
M5451*	LED Driver (35 segment)	(2) N-ch	5 to 12	7	–40 to 85	DIP40
M5480*	LED Driver (23 segment)	(2) N-ch	5 to 12	7	–40 to 85	DIP28
M5481*	LED Driver (14 segment)	(2) N-ch	5 to 12	7	–40 to 85	DIP20Co
M5482*	LED Driver (15 segment)	(2) N-ch	5 to 12	7	–40 to 85	DIP20Co
M5486*	LED Driver (15 segment) (with cascade cap)	(2) N-ch	5 to 12	7	–40 to 85	DIP40

** Programming voltage = 25V

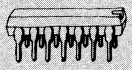
* Coming soon

MOS & SPECIAL CMOS ICs

Minidip



DIP14 (Plastic)



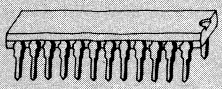
DIP14 Co
(Plastic Copper fr.0.3)

DIP16 (Plastic)

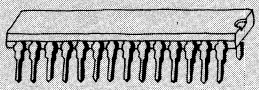
DIP18 (Plastic)

DIP18 Co
(Plastic Copper fr.0.4)

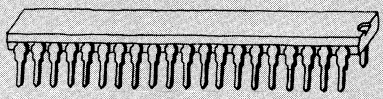
DIP20 (Plastic)



DIP24 (Plastic)



DIP28 (Plastic)



DIP 40 (Plastic)

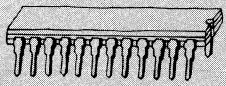
DIP14C (Ceramic)

DIP16F
(Ceramic frit-seal)

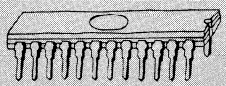
DIP16 CS
(Side brazed Ceramic)

DIP18F
(Ceramic frit-seal)

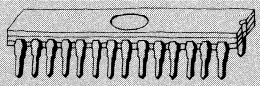
DIP24 CM
(Multi-layer Ceramic)



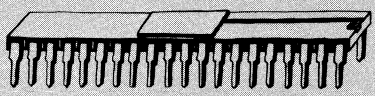
DIP24 F
(Ceramic frit-seal)



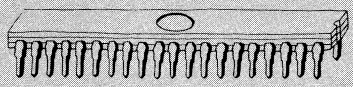
DIP 24CL
(Ceramic frit-seal cap glass lens)



DIP28 CL
(Ceramic frit-seal cap glass lens)



DIP40 CM (Multi-layer Ceramic)



DIP 40CL (Ceramic frit-seal cap glass lens)

MICROCOMPUTER AND MICROPROCESSORS

Using advanced MOS processing steps SGS manufactures a world leading range of single chip microcomputers and multichip microprocessor families. Many types in these families are packaged in plastic and ceramic packages and specified for temperature ranges from 0/70°C up to the full military range of -55/+125°C. Products are manufactured in conformance to MIL-STD-883. Customer support is provided by full documentation, training courses and development systems.

CONTENTS

MICROCOMPUTERS AND MICROPROCESSORS

M3870 MICROCOMPUTER UNIT (MCU) FAMILY

The M3870 family are economical 8 bit single chip microcomputers with ROM capacity of 2K to 6K bytes, 64 bytes of scratchpad RAM and 0 to 64 bytes of general purpose RAM. The M3875 features a battery back–up "power down" mode that preserves the RAM memory content when the supply fails. The new M38730 series, will feature serial I/O.
All types cover 0/70°C and -40/+85°C temperature ranges.
The M3870 family have 4x8 bit I/O ports (3 bits are used for serial I/O on the M38730 series and two bits for battery back-up on the M3875).
Super speed 'A' versions are available with 6 MHz clock frequency rating.
M2870 family will provide the same powerfull architecture and memory capacity as the M3870 family but with the I/O reduced to enable the product to be packaged in a 28 pin package.
Piggyback Development Products (PDP), are available in limited quantities.
For further information please contact local sales office.

Type	Description	Power supply (V)	Clock Freq. (MHz)	ROM Bytes	RAM Bytes	I/O Bits	PACKAGE
M3870	Microcomputer Unit	+5	4	2K	64	32	DIP40F DIP40CM DIP40
M3870A	Microcomputer Unit	+5	6	2K	64	32	
M3872	Microcomputer Unit	+5	4	4K	64 + 64	32	
M3872A	Microcomputer Unit	+5	6	4K	64 + 64	32	
M3875	Microcomputer Unit	+5*	4	4K	64 + 64*	30	
M3875A	Microcomputer Unit	+5*	6	4K	64 + 64*	30	
M3876	Microcomputer Unit	+5	4	6K	64 + 64	32	
M3876A	Microcomputer Unit	+5	6	6K	64 + 64	32	
M38730	Serial I/O MCU	+5	4	2K	64	29 + S	DIP40F DIP40CM DIP40
M38730A	Serial I/O MCU	+5	6	2K	64	29 + S	
M38733	Serial I/O MCU	+5	4	4K	64 + 64	29 + S	
M38733A	Serial I/O MCU	+5	6	4K	64 + 64	29 + S	
M2870	Microcomputer Unit	+5	4	2K	64	20	DIP28
M2870A	Microcomputer Unit	+5	6	2K	64	20	
M2872	Microcomputer Unit	+5	4	4K	64 + 64	20	
M2872A	Microcomputer Unit	+5	6	4K	64 + 64	20	
M2875	Microcomputer Unit	+5*	4	4K	64 + 64*	18	
M2875A	Microcomputer Unit	+5*	6	4K	64 + 64*	18	
M2876	Microcomputer Unit	+5	4	6K	64 + 64	20	
M2876A	Microcomputer Unit	+5	6	6K	64 + 64	20	
M28730	Serial I/O MCU	+5	4	2K	64	17 + S	DIP28
M28730A	Serial I/O MCU	+5	6	2K	64	17 + S	
M28733	Serial I/O MCU	+5	4	4K	64 + 64	17 + S	
M28733A	Serial I/O MCU	+5	6	4K	64 + 64	17 + S	

* Battery back up 3.2V min. for 64 byte RAM

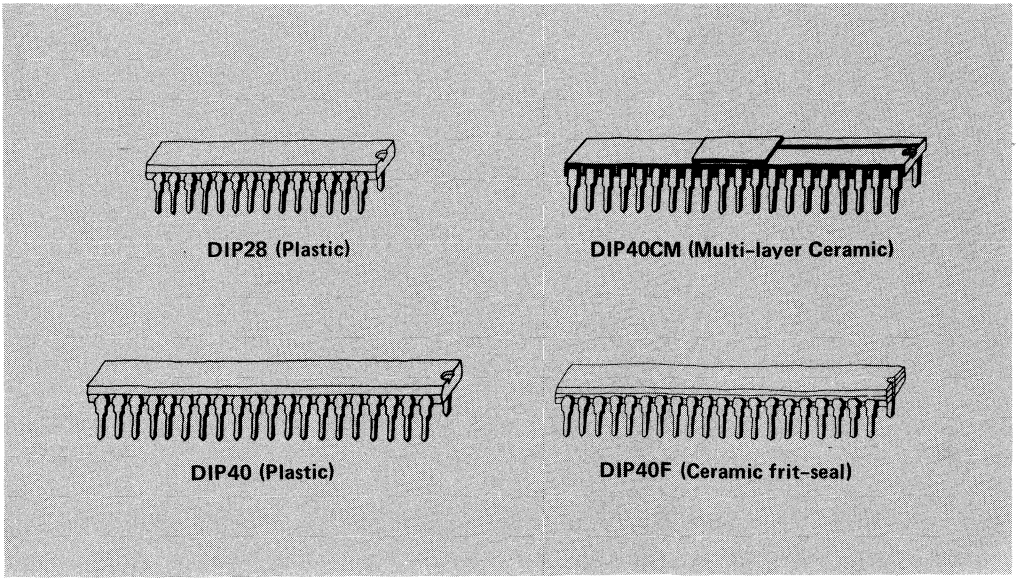
S indicates serial I/O.

MICROCOMPUTERS AND MICROPROCESSORS

DEDICATED M3870 MICROCOMPUTER

Further new product to be introduced are.

Type	Description	Power supply (V)	Clock Freq. (MHz)	ROM Bytes	RAM Bytes	I/O Bits	PACKAGE
M38SH72	Non Volatile Shadow RAM MCU	+ 5	4	2K - 4K	64 + 64 + 64 Non Volatile	31	DIP40F DIP40CM DIP40
M28AD70	8 Bits Analog to Digital Converter Input MCU	+ 5	4	2K	64	12 + 8 High Current	DIP28
M28PW70	High Current Output MCU	+ 5	4	2K	64	12 + 8 High Current	DIP28
M38EE70	EEPROM MCU	+ 5	4	2K	64	32	DIP40



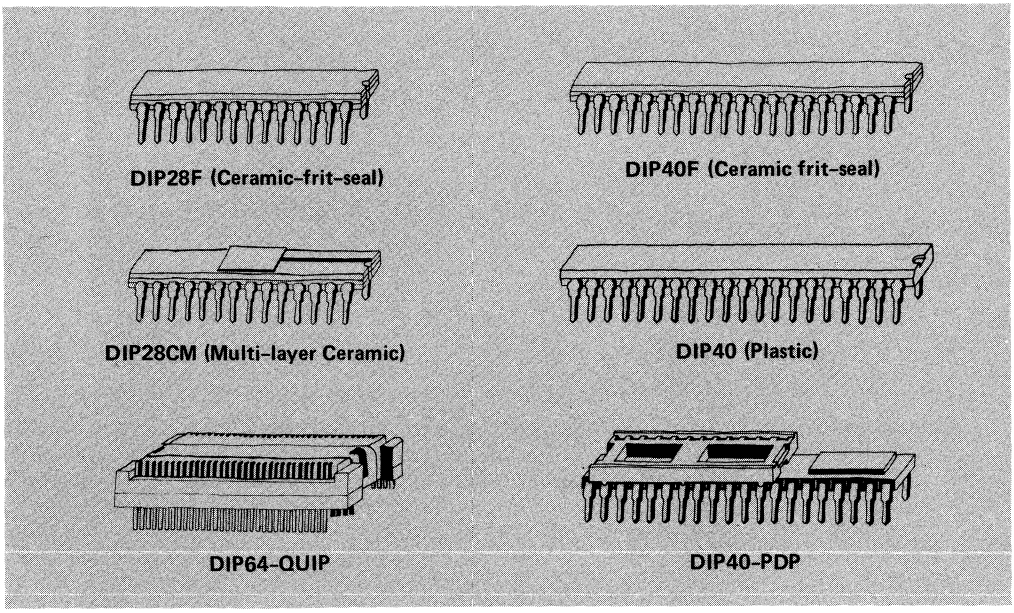
MICROCOMPUTERS AND MICROPROCESSORS

Z8™ MICROCOMPUTER UNIT (MCU) FAMILY

The Z8 family are flexible 8 bit single chip microcomputers with ROM capacity of 2K to 4K bytes and 144 bytes of RAM register file. I/O facilities are software programmable. The Z8 includes six levels of vectored interrupt, an on-chip UART, and two 8 bit counter/timers with 6 bit prescalers. Development types – a 64 pin version with address/data lines brought out to package pins and a Piggy-Back Development Products using external EPROM – are available to speed design and prototyping phases.
The Z8 will be introduced in 1982 and will be available in 0/+70°C and -40/+85°C temperature ranges.

Type	Description	Power supply (V)	Clock Freq. (MHz)	ROM Bytes	RAM File Bytes	I/O Bits*	PACKAGE
Z8601	Microcomputer Unit	+5	8	2K	144	32	DIP 40CM
Z8611	Microcomputer Unit	+5	8	4K	144	32	DIP 40
Z8602	Development product	+5	8	EXT. 2K	144	32	DIP 64(QUIP)
Z8603	Development product	+5	8	xEPROM	144	32	DIP 40(PDP)
Z8612	Develoment product	+5	8	EXT. 4K	144	32	DIP 64(QUIP)
Z8613	Development product	+5	8	xEPROM	144	32	DIP 40(PDP)
Z8681	ROMless version of the Z8601	+5	8	EXT. 64K	144 + EXT. 64K	32	DIP 40CM DIP 40

* Function of I/O bits is programmable and includes address/data lines, external interrupts, I/O handshake and serial I/O.



MICROCOMPUTERS AND MICROPROCESSORS

Z80® MICROPROCESSOR UNIT (MPU) FAMILY

The Z80 microprocessor family is the world's leasing 8 bit chip set. The high speed Z80B features 6 MHz clock operation.
The family is composed of the Central Processing Unit and five highly integrated peripheral devices, which include all of the circuitry necessary to build high-performance microcomputer systems with virtually no other logic and a minimum of low cost memory elements.
The range covers consumer to military temperature ranges and is available in three package options.

Type	Description		Power supply (V)	Clock Freq. (MHz)	PACKAGE
Z8400	Z80CPU	Central Processing Unit	+5	2,5	DIP40F
Z8400A	Z80ACPU	Central Processing Unit	+5	4	DIP40CM
Z8400B	Z80BCPU	Central Processing Unit	+5	6	DIP40
Z8400L1	Z80L1	Low Power CPU	+5	1	DIP40F
Z8400L2	Z80L2	Low Power CPU	+5	1,5	DIP40CM
Z8400L3	Z80L3	Low Power CPU	+5	2,5	DIP40
Z8410	Z80DMA	Direct Memory Access	+5	2,5	DIP40F
Z8410A	Z80ADMA	Direct Memory Access	+5	4	DIP40CM DIP40
Z8420	Z80PIO	Peripheral Input Output	+5	2,5	DIP40F
Z8420A	Z80APIO	Peripheral Input Output	+5	4	DIP40CM
Z8420B	Z80BPIO	Peripheral Input Output	+5	6	DIP40
Z8430	Z80CTC	Counter Timer Circuit	+5	2,5	DIP28F
Z8430A	Z80ACTC	Counter Timer Circuit	+5	4	DIP28CM
Z8430B	Z80BCTC	Counter Timer Circuit	+5	6	DIP28
Z8440/1/2	Z80SIO	Serial Input Output (Dual)	+5	2,5	DIP40F
Z8440/1A/2A	Z80ASIO	Serial Input Output (Dual)	+5	4	DIP40CM
Z8440/1B/2B	Z80BSIO	Serial Input Output (Dual)	+5	6	DIP40
Z8449	Z80SIO-9	Serial Input Output (Single)	+5	2,5	DIP40F
Z8449A	Z80ASIO-9	Serial Input Output (Single)	+5	4	DIP40CM
Z8449B	Z80BSIO-9	Serial Input Output (Single)	+5	6	DIP40
Z8470	Z80DART	Dual Async. Receiver/Transmitter	+5	2,5	DIP40F
Z8470A	Z80ADART	Dual Asunc. Receiver/Transmitter	+5	4	DIP40CM
Z8470B	Z80BDART	Dual Async. Receiver/Transmitter	+5	6	DIP40

MICROCOMPUTERS AND MICROPROCESSORS

Z8000™ MICROPROCESSOR UNIT (MPU) FAMILY

The Z8000 microprocessor family is a new, powerfull 16 bit chip set. The family has a unique, new architecture, the main features of which are Operating System software support, Compiler support and memory management.
The chip set is highly integrated, each LSI peripheral device performing an intelligent function; in addition a Universal Peripheral Controller microcomputer and multimicro facilities on the Z8000 CPU chip, enable multi microprocessor system to be realised. All devices interface via a common, well defined, Z-BUS™ bus structure.
Two versions of the CPU are available to match the family to a wide range of target applications from fast process control to large microcomputers.

Type	Description	Clock Freq. (MHz)	PACKAGE
Z8001 **Z8001A** **Z8001B**	Segmented CPU, 48 pin, 8M byte address range Segmented CPU, 48 pin, 8M byte address range Segmented CPU, 48 pin, 8M byte address range	4 6 10	DIP48CM
Z8002 **Z8002A** **Z8002B**	Non Segmented CPU, 40 pin, 64K byte address range Non Segmented CPU, 40 pin, 64K byte address range Non Segmented CPU, 40 pin, 64K byte address range	4 6 10	DIP40CM
Z8003 **Z8003A**	Segmented, virtual memory CPU, 48 pin Segmented, virtual memory CPU, 48 pin	4 6	DIP48CM
Z8004 **Z8004A**	Non Segmented, virtual memory CPU, 40 pin Non Segmented, virtual memory CPU, 40 pin	4 6	DIP40CM
Z8010 **Z8010A**	Memory Management Unit for Z8001 SEGCPU Memory Management Unit for Z8001 SRGCPU	4 6	DIP48CM
Z8015 **Z8015A**	Paged Memory Management Unit Paged Memory Management Unit	4 6	–
Z8030 **Z8030A**	Serial Communication Controller (Dual) Serial Communication Controller (Dual)	4 6	DIP40CM
Z8036 **Z8036A**	Counter/Timer and Parallel Input/Output Counter/Timer and Parallel Input/Output	4 6	DIP40CM
Z8038 **Z8038A**	FIFO Input/Output Interface FIFO Input/Output Interface	4 6	DIP40CM
Z8060 **Z8060A**	FIFO Buffer Unit and Z8038 Expander FIFO Buffer Unit and Z8038 Expander	4 6	DIP28CM
Z8070 **Z8070A**	Arithmetic Processing Unit Arithmetic Processing Unit	4 6	–
Z8090	Universal Peripheral Controller MCU	4	DIP40CM

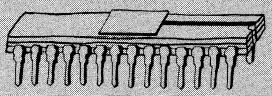
For availability please contact local sales office.

MICROCOMPUTERS AND MICROPROCESSORS

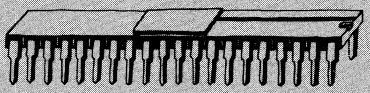
Z8500 UNIVERSAL PERIPHERALS

Selected Z8000 LSI peripheral components feature alternative versions with modified bus interfacing suitable for use with other CPU's such as the Z80.

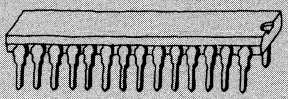
Type	Description	Clock Freq. (MHz)	PACKAGE
Z8530 Z8530A	Serial Communications Controller (Dual) Serial Communications Controller (Dual)	4 6	DIP 40CM
Z8536 Z8536A	Counter/Timer and Parallel Input/Output Counter/Timer and Parallel Input/Output	4 6	DIP 40CM
Z8538 Z8538A	FIFO Input/Output Interface FIFO Input/Output Interface	4 6	DIP 40CM
Z8590	Universal Peripheral Controller MCU	4	DIP 40CM



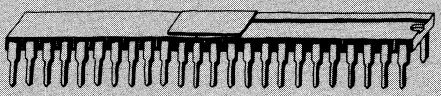
DIP 28CM (Multi-layer-Ceramic)



DIP 40CM (Multi-layer-Ceramic)



DIP 28 (Plastic)



DIP 48CM (Multi-layer-Ceramic)

MICROCOMPUTER AND MICROPROCESSORS

DOCUMENTATION

SGS supports the ranges of microprocessors with training courses, development systems and documentation. For availability of documentation contact local sales network. In addition to the material listed below SGS publishes Brochures and Product Support Notes.

CODE	Description
DA3870DB/1	M3870 Family Data Book
DA3870PM/1	M3870 Family Programming Manual
DA3870TM/1	M3870 Family Technical Manual
DA3870PR/1	M3870 Programming Reference
DAZ8DB/1	Z8 Family Data Book
DAZ8PM/1	Z8 Programming Manual
DAZ8TM/1	Z8 Technical Manual
DAZ8PR/1	Z8 Programming Reference
DAZ80DB/3	Z80 Family Data Book
DAZ80PM/2	Z80 Programming Manual
DAZ80TM/2	Z80 Family Technical Manual
DAZ80PR/1	Z80 Programming Reference
DAZ8000DB/1	Z8000 Family Data Book
DAZ8500DB/1	Z8500 Family Data Book
DAZ8000TM/1	Z8001,2 CPU Technical Manual
DAZ8000PM/2	Z8001,2 CPU Programming Manual
DAZ8000PR/1	Z8000 Programming Reference
DAZ8010TM/1	Z8010 MMU Technical Manual

SYSTEMS

NANOCOMPUTER® FAMILY

The Nanocomputer Family is a set of Training Systems developed for learning microcomputer programming and interfacing techniques and high level languages such as BASIC. The modular structure makes it possible to start from any of the levels of the Nanocomputer Family then work up to the most complete systems simply and progressively. The Nanocomputer Family is completed with a full range of specially written textbooks (available in different languages) and learning aids useful in different levels of learning steps.

CLZ80 FAMILY

The CLZ80 Family is a complete Z80 microprocessor based family of OEM boards, accessories, peripherals and software which allow the customer to easily implement trouble-free, application-oriented microcomputer systems.
The wide range of products can cost-effectively cover most user's needs from simple to most sophisticated, from industrial to data processing.
All boards are in double Eurocard format allowing a large number of available mechanical parts to be used for system assembly. The common board-level bus is the SGS proprietary gamma-BUS. Best exploiting the power of the Z80 microprocessor, this bus guarantees complete compatibility between all the boards of the CLZ80 Family, therefore allowing the user to easily design and connect dedicated application boards.

UX8 FAMILY

The UX8-22 is a Compact Computer giving users a complete range of facilities for high productivity, both in development laboratories and in general-purpose applications.
Built using advanced technology, the system features a compact, rugged hardware structure with two slim line 8" floppy disks, each with 1 M bytes capacity, high quality 12" CRT with 25 lines of 80 characters and detachable full ASCII keyboard. The well known CP/M® Operating System, especially adapted by SGS for UX8-22 hardware environment, gives access to a great number of software packages available off the shelf.
A number of optional packages, including integral EPROM Programmer, for the most common types of EPROMS, Z80 and 3870 emulators with real-time trace facilities, allow the user to tailor the basic structure to his own needs.
The UX8-22 can also be integrated into the SGS UX-16 Advanced Multiuser Computers as an intelligent hardware-software work station.

UX16 FAMILY

The UX16-20 mainframes are state of the art microcomputers, with a performance comparable to the most sophisticated minicomputers.
All the models feature a Z8000 CPU, a Z80 based intelligent peripheral controller with 64K cache memory, integrated Winchester type hard disk and high performance cassette tape backup. Up to eight RS232C terminals, a parallel printer and a serial printer can be connected simultaneously. Modem connection and high speed RS422 link are supported as well.
The UX16 System has been designed to run SUNIX™, the most powerful and flexible operating system available now, and likely to become the industry standard for high performance 16 bit microcomputers. SUNIX on the UX16 is fully compatible with UNIX™ version 7 released by Bell Telephone, with several enhancements like a Z8001,2 assembler, a Z8000 emulator interface, a new screen oriented text editor, a more powerful comand language (shell) and a full complement of high level languages, including COBOL and BASIC compiler and a number of optional utilities.
Designers will be trained to use the full power of the operating system by a unique self teaching feature; the documentation process of the software and hardware design is made easy by a powerful set of text processing programs.

NANOCOMPUTER FAMILY

SYSTEMS AND UPGRADING KITS

TYPE	DESCRIPTION
NBZ80-WW	Low cost NBZ80 Nanocomputer System for software training. Z80 based Microcomputer Board with: – 4K bytes of RAM (expandable) – 2K bytes of ROM (expandable) with Monitor – Audio cassette and serial interfaces – 16 programmable I/O lines – gamma-BUS compatibility for external expansion. Keyboard/Display Unit and connection cable with: – 30 hexadecimal and control keys – 8 seven segment digits – 14 indicator LEDs. It includes Nanocomputer Technical Manual and Textbook 1, Programming. Textbook and Technical Manual are in English.
NBZ80-F	Same as NBZ80-WW but with Textbook in French.
NBZ80-G	Same as NBZ80-WW but with Technical Manual and Textbook in German.
NBZ80-I	Same as NBZ80-WW but with Technical Manual and Textbook in Italian.
NBZ80-S-WW	Complete self-contained NBZ80-S Nanocomputer System for hardware and software Training. As NBZ80 plus metal cabinet, power supply and plastic cover containing Experiment Board with: – Solderless breadboard – 8 toggle switches with antibounce logic – 2 momentary toggle switches – 8 LEDs with drivers – Provision for gamma-BUS expansion. Includes also K1Z80 Wire Kit and Textbook 3, Interfacing. Textbooks and Technical Manual are in English. Power supply is 220V ± 10%, 50 Hz.
NBZ80-S-F	Same as NBZ80-S-WW but with Textbooks in French.
NBZ80-S-G	Same as NBZ80-S-WW but with Textbooks and Technical Manual in German.
NBZ80-S-I	Same as NBZ80-S-WW but with Textbooks and Technical Manual in Italian.
NBZ80-S-UK	Same as NBZ80-S-WW but with Power Supply 240V ± 10%, 50 Hz.
NBZ80-S-US	Same as NBZ80-S-WW but with Power Supply 110V ± 10%, 60 Hz.

SYSTEMS AND UPGRADING KITS (continued)

TYPE	DESCRIPTION
NBZ80-HL-WW	NBZ80-HL Nanocomputer System for hardware, software and high level language training. As NBZ80-S but with 16K bytes of RAM on Microcomputer Board, gamma-BUS expansion already installed in Experiment Board plus: – REZ80 EP/ROM Expansion Board – 8K bytes of ROM with BAS-Z/N BASIC Interpreter – Alphanumeric Keyboard and Video Interface Board for B/W TV Monitor or VHF TV set (Horizontal Frequency: 15625 Hz; Vertical Frequency: 50 Hz). Contained in separate box with power supply. It includes also the W8Z80 connection cable for TVZ80 Video Monitor, the Nanocomputer NBZ80-HL Technical Manual, the BASIC Language User's Manual and the Book "BASIC Programming Primer". All Textbooks and Technical Manuals are in English. Power Supply is 220V ± 10%, 50 Hz.
NBZ80-HL-F	Same as NBZ80-HL-WW but with two Textbooks in French.
NBZ80-HL-G	Same as NBZ80-HL-WW but with two Textbooks and one Technical Manual in German.
NBZ80-HL-I	Same as NBZ80-HL-WW but with two Textbooks and one Technical Manual in Italian.
NBZ80-HL-UK	Same as NBZ80-HL-WW but with Power Supply 240V ± 10%, 50 Hz.
NBZ80-HL-US	Same as NBZ80-HL-WW but with Power Supply 110V ± 10%, 60 Hz.
UPZ80-S-WW	Parts to upgrade NBZ80-WW to NBZ80-S-WW. Assembly instructions are included.
UPZ80-S-F	Parts to upgrade NBZ80-F to NBZ80-S-F.
UPZ80-S-G	Parts to upgrade NBZ80-G to NBZ80-S-G.
UPZ80-S-I	Parts to upgrade NBZ80-I to NBZ80-S-I.
UPZ80-S-UK	Parts to upgrade NBZ80-WW to NBZ80-S-UK.
UPZ80-S-US	Parts to upgrade NBZ80-WW to NBZ80-S-US.
UPZ80-HL-WW	Parts to upgrade NBZ80-S-WW to NBZ80-HL-WW. Assembly instructions are included.
UPZ80-HL-F	Parts to upgrade NBZ80-S-F to NBZ80-HL-F.
UPZ80-HL-G	Parts to upgrade NBZ80-S-G to NBZ80-HL-G.
UPZ80-HL-I	Parts to upgrade NBZ80-S-I to NBZ80-HL-I.
UPZ80-HL-UK	Parts to upgrade NBZ80-S-UK to NBZ80-HL-UK.
UPZ80-HL-US	Parts to upgrade NBZ80-S-US to NBZ80-HL-US.

NANOCOMPUTER FAMILY

SOFTWARE

TYPE	DESCRIPTION
ASED	Assembler/Editor program for Z80 program development and Assembly language training with any Nanocomputer NBZ80-HL. It requires the use of W2Z80 Connection Cable for Dual Audio Cassette Recorders. 8K bytes mapped from C000, supplied on 4xM2716 EPROMs or M2316 ROMs. ASED User's Manual is included.
NE-Z	Software for any Nanocomputer NBZ80-S, -HL, supporting experiments described in Textbook 3, Interfacing. 2K bytes mapped from F000. Supplied on 1xM2716 EPROM or M2316 ROM. User's documentation is included.

ACCESSORIES

TYPE	DESCRIPTION
EPZ80-B	EPROM Programmer for use with Nanocomputer NBZ80-S (kit K4Z80 is required), or -HL. It contains: – Programming software. 2K bytes mapped from E800. Supplied on 1xM2716 EPROM or M2316 ROM. – PPZ80-EB EPROM Programmer Board with two programming sockets, mounted on separate box. It includes also a separate power supply (220V ± 10%, 50 Hz) with connection cable and EPZ80 Technical Manual.
RCZ80/P	Audio Cassette Recorder. For use with all Nanocomputer Training Systems. Power Supply is 220V ± 10%, 50 Hz.
RCZ80/P-US	Same as RCZ80/P but with Power Supply 110V ± 10%, 60 Hz.
TVZ80	Black and White CCIR Video Monitor. For use with Nanocomputer NBZ80-HL. Power Supply is 220/240V ± 10%, 50 Hz.
NBZ-EKIT	Complete Components Kit for hardware experiments. Includes: – Wire kit for connecting devices on breadboard. – Active and passive components for experiments described in textbook 3, Interfacing – Spare sockets for Experiment Board.
K4Z80	Kit for gamma-BUS expansion on the Experiment Board of the Nanocomputer NBZ80-S and -HL.

INTERCONNECTION CABLES

TYPE	DESCRIPTION
W2Z80/P	Connection cable between Nanocomputer NBZ80-HL with ASED Assembler/ Editor software installed and two audio cassette recorders RCZ80/P.
W10Z80/P	Connection cable between all Nanocomputer Training Systems and one audio cassette recorder RCZ80/P.
W12Z80/P	Connection cable between any Centronics-compatible Printer and Nanocomputer NBZ80-HL.

CLZ80 FAMILY

BOARDS

TYPE	DESCRIPTION
CLZ80-4	Z80 Microcomputer Board. Z80 CPU; 4 bites of RAM; 4 sockets for up to 8K bytes of EP/ROM; 32 programmable I/O lines; 1 synchronous/asynchronous serial channel; single/dual cassette interface.
CLZ80-16	Same as CLZ80-4 but with 16K bytes of RAM.
CLZ80S	Z80 Microcomputer Board with 64K bytes of RAM. Z80 CPU; 64K of RAM; 2 sockets for up to 16K EP/ROM; 24 programmable I/O lines; 2 synchronous/asynchronous serial channels; one real time clock; extended addressing capability (256K byte) with memory management.
FSZ80	Versatile Disk and Printer Interface Board. Up to 4 single/double density, single/double side 5"1/4 or 8" floppy disk drivers with soft sectored format; interfaces with WD 1000 Intelligent Hard Disk Controller Board; parallel Centronics-compatible printer interface; two fully programmable counter/timers; socket for Arithmetic Processing Unit; DMA operation; extended addressing capability (256K).
RAZ80-48	RAM and EPROM Expansion Board. 48K bytes of dynamic RAM; 4 sockets for up to 8K bytes of EP/ROM.
REZ80	ROM and EPROM Expansion Board. 5 sockets for up to 8K bytes of EPROM or up to 40K bytes of ROM.
PIZ80	Digital Input/Output Expansion Board. 64 programmable I/O lines, 2 synchronous/asynchronous serial channels; 5 programmable counters/timers.
VDZ80/B	B/W Video and Keyboard Interface Board. 1000 characters display; 6-bit alphanumeric keyboard interface (KBZ80 recommended); serial channel for use as remote terminal. Video output for both standard CCIR monitors and VHF Television; for use with 50 Hz mains frequency.
VDZ80/B-US	Same as VDZ80/B but for use with 60 Hz mains frequency.
VCZ80/B	High quality Color and B/W Video and Keyboard Interface Board. 2000 characters memory-mapped display with different programmable attributes; full ASCII plus user's defined semigraphic character sets; 8 bit alphanumeric keyboard interface (KCZ80 recommended); 1 synchronous/asynchronous serial channel. 50/60 Hz software programmable operation frequency.

BOARDS (continued)

TYPE	DESCRIPTION
FLZ80	Floppy Disk and Printer Interface Board. Up to 4 single density, single/double Side Floppy Disk Drivers (2.5 Mbytes total) with hard-sectored data format; parallel Centronics-compatible printer interface; two programmable counters/timers; socket for APU (Am 9511) Arithmetical Processing Unit.
PPZ80-EB	EPROM Programmer Board. Allowing programming of 2704, 2708, 2716, 2732, 2758, 2516, 2532 EPROM types; 2 programming sockets for single/multiple supply devices mounted on separate Box 4 sockets for up to 8K bytes EP/ROM. Programming software included in SGS Operating Systems.

ACCESSORIES

TYPE	DESCRIPTION
WWZ80	Wire-Wrap Board.
SPZ80	Extension Board.
ALZ80	Power Supply (220V ± 10% , 50 Hz) supplying +5V, 10A, with connecting cables to mains and CPZ80/CTZ80 Card Cages.
CPZ80	Card Cage for 4 boards.
CTZ80	Card Cage for 8 boards.
TBZ80	Bus Termination Board for CTZ80 card cage.
KBZ80	Alphanumeric keyboard for VDZ80/B. Complete with box and connection cable.
KCZ80	Full ASCII alphanumeric keyboard for VCZ80/B. Complete with connection cable.
C1Z80	5 female connectors for CLZ80-4 and -16 Boards. Mating with all I/O connectors on the CLZ80 boards; 120 pins included.
SGSDISKETTE	Hard-sectored Floppy Disks.

INTERCONNECTION CABLES

TYPE	DESCRIPTION
W1Z80	Control Panel with connection cable for initialization of the CLZ80 Microcomputer Boards.
W2Z80/P	Connection cable between 2 audio cassette recorders (RCZ80/P) and the CLZ80 Microcomputer Boards.
W3Z80	Two flat cables for connection of the gamma-BUS between two CTZ80/CPZ80 Card Cages.
W5Z80	Connection cable between the serial channel of the VDZ80/B Board and the CLZ80 Boards.
W8Z80	Connection cable between the video output of the VDZ80/B or VCZ80/B and the input of a B/W CCIR Monitor (TVZ80 recommended). Can be directly modified to connect a VHF Television.
W12Z80/P	Buffering and connection cable between a Centronics-compatible Printer and a parallel port of the CLZ80 Microcomputer Boards.
W13Z80	Connection cable between a Centronics-compatible Printer and the FLZ80 board.

PERIPHERALS

TYPE	DESCRIPTION
RCZ80/P	Audio cassette recorder. Power supply is 220V ± 10%, 50 Hz.
RCZ80/P-US	Same as RCZ80/P but with Power Supply 110V ± 10%, 60 Hz.
TVZ80	Black and White CCIR Video Monitor. Power Supply is 220/240V ± 10%, 50 Hz.
DFZ80/2	Dual Floppy Disk Subsystem. Two 8" single density, dual side hard-sectored drives with 1.2 Mbytes capacity; metal cabinet and Power Supply (220/-240V ± 10%, 50 Hz); connection cable to FLZ80 Board.

SOFTWARE

TYPE	DESCRIPTION
FR-Z-2	Resident Operating System. Including Monitor/Debug, Editor and Assembler (8K bytes) for direct installation on CLZ80 Microcomputer Boards. Containing also EPROM Programming software to be installed on PPZ80-EB Board. Supplied on five EPROMs or ROMs M2316.
SDOS-2/CL	SDOS-2 Floppy Disk based, Real-Time, Multitask Operating System. Including Sex Real-Time Multitasking Kernel, Z80Macroassembler, On-Screen Debuggers, On-Screen Editor, File Handling Routines, EPROM Programming Software, etc.. For direct use with Std. CLZ80 Family Boards. Supplied partly on EPROM and partly on floppy disk. For use with 50 Hz mains frequency.
SDOS-2/CL-US	Same as SDOS-2/CL but for use with 60 Hz mains frequency.
BAS-Z	Stand-alone BASIC Interpreter, 8K bytes of ROM mapped from address E000. Supplied on 4 EPROMs M2716.
BAS-Z/1	As BAS-Z but mapped from address B000, for use together with FR-Z-2 operating System.
MDBAS-CL	Extended Disk BASIC working under SDOS-2/CL Operating System. Supplied on floppy disk.

UX8 FAMILY

SYSTEMS

TYPE	DESCRIPTION
UX8-22	UX8-22 Compact Computer – Z80 CPU, 60K bytes RAM – Green phosphorous 12" CRT, detachable full ASCII Keyboard – 8" double side, double density Floppy Disk Drives with 2,4M bytes total capacity – 2 serial channels and one parallel Centronics-compatible printer interface – CP/M Operating System with significant development-oriented enhancements including advanced editor Z80 symbolic debugger, and communication package for networking with UX16 Multiuser Computer. Power Supply is 220/240V ± 10%, 50 Hz.
UX8-22-US	Same as UX8-22 but with Power Supply 110V ± 10%, 60 Hz.
UX8-20	UX8-20 Compact Development System with SDOS-2 Multitask Real-Time Operating System. Power Supply is 220/240V ± 10%, 50 Hz.

EMULATORS AND ACCESSORIES

TYPE	DESCRIPTION
UX8-EMZ80-2	Z80 Real-Time Emulation Package for UX8-22 Computer. Allows emulation and symbolic debug of Z80, Z80A and Z80B with real-time, full transparent operation up to 6M Hz.
UX8-EMZ80	EMZ80 Z80 Emulation Package for UX8-20 System.
UX8-RTZ80	RTZ80 Z80 Real-Time Trace. For UX8-EMZ80 and UX8-EMZ80/2 Emulators.
UX8-EM387X/2	3870 Family Emulation and Development Package for UX8-22. Allows realme emulation and tracing of 3870, 3872 and 3875 single chip microprocessors. 3870 Family Macroassembler and Linker are also included. Power Supply is 220/240V ± 10%, 50 Hz.

EMULATORS AND ACCESSORIES (continued)

TYPE	DESCRIPTION
UX8-EM387X/2-US	Same as UX8-EM387X/2 but with Power Supply 110V ± 10%, 60 Hz.
UX8-EM387X	EM387X M3870 Family Emulation and Assembler Support Package for UX8-20 Systems. Power Supply is 220/240V ± 10%, 50 Hz.
UX8-EP32/2	EPROM Programming Package for UX8-22. Allows programming of various types of EPROMs single and multiple voltages with up to 32K byte capacity.
UX8-FD600	FD600 Floppy Disk Expansion for UX8-20 Systems. Power Supply is 220V ± 10%, 50 Hz.
UX8-EP32	EP32 EPROM Programming Package for UX8-20 Systems.

SOFTWARE

TYPE	DESCRIPTION
UX8-MDBAS	Extended Disk BASIC for SDOS-2.
UX8-CONZIL	Software Utilities for file format conversion between SDOS-2 and Zilog's RIO O.S.
UX8-COMM16	Communication package for integration of UX8-20 in UX16 Multiuser Development System (included ad standard in UX8-22 System).

MISCELLANEOUS

TYPE	DESCRIPTION
PRTCABLE	Centronics Printer Parallel Connection Cable.
CRTCABLE	RS232C Serial Connection Cable.
SGSDISKETTE	Hard-sectored Floppy Disks.

UX16 FAMILY

SYSTEMS

TYPE	DESCRIPTION
UX16-21/2	UX16-20 System including SUNIX Operating System for up to 8 users. 512K RAM, 18M disk. 220/240V ± 10%, 50 Hz.
UX16-21/2-US	Same as UX16-21/2 but 110V ± 10%, 60 Hz.
UX16-23/2	UX16-20 System including SUNIX Operating System for up to 8 users. 1024K RAM, 18M disk. 220/240V ± 10%, 50 Hz.
UX16-23/2-US	Same as UX16-23/2 but 110V ± 10%, 60 Hz.

PERIPHERALS AND ADD-ONs

TYPE	DESCRIPTION
UX16-ADSK/2	Additional 18 M disk for UX16-20 System. Includes box, power supply (220/240V ± 10%, 50 Hz) and cables.
UX16-ADSK/2-US	Same as UX16-ADSK/2 but with Power Supply 110V ± 10%, 60 Hz.
UX16-256KB	256K Additional Memory Board.
UX16-PC100-512K	512K Additional Memory Board.
UX16-PC100-1M	1M Additional Memory Board.

SOFTWARE

TYPE	DESCRIPTION
UX16-RMCOBOL	Ryan Mc-Farland Cobol compiler UX16-20 System.
UX16-CBASIC	Basic compiler for UX16-20 System.
UX16-CCOMP	C compiler for UX16-20 System.
UX16-Z80XASM	Z80 Cross Assembler for UX16-20.
UX16-DBM	Data Base Management System.
UX16-WP	Screen-oriented Word Processor.

MISCELLANEOUS

TYPE	DESCRIPTION
UX16-CRTCABLE	RS232C Terminal Cable.
UX16-PRTCABLE	Centronics printer cable.
UX16-300ATAPE	Tape cassette, standard length.
UX16-300XLTAPE	Tape cassette, extra lenght.

EMULATORS AND DEVELOPMENT MODULES

TYPE	DESCRIPTION
Z8-DM	Z8 Single Board Computer for evaluation and development of hardware and software Z8 based products. Dual serial link to terminal and host.
Z8000-DM	Z8002 Single Board Computer for evaluation and development of hardware and software Z8002 based products. Dual serial link to terminal and host (UX16-20).
Z8001-DM	Same as Z8000-DM but for Z8001 segmented CPU.
ZSCAN-8000	Z8000 advanced in-Circuit Emulator designed for hardware and software debug of Z8001 and Z8002 based prototypes. To be connected via serial link to host computer like the UX16-20 Development Systems. With Power Supply 220/240V ± 10%, 50 Hz.
ZSCAN-8000-US	Same as ZSCAN-8000 but with Power Supply 110V ± 10%, 60 Hz.

SYSTEMS LITERATURE

NANOCOMPUTER FAMILY LITERATURE

CODE	DESCRIPTION	LANGUAGE
	Manuals	
DANBZTM/2	Nanocomputer Technical Manual	English
DANBZTH/1	Nanocomputer Technisches Handbook	German
DANBZMT/2	Nanocomputer Manuale Tecnico	Italian
DANC-ZLIST/1	NC-Z Listing	English
DANBZHLTM/1	Nanocomputer NBZ80-HL Technical Manual	English
DABASLUM/1	BASIC language, MDBAS, BAS-Z and BAS-Z/N User's Manual	English
DAASEDUM/1	ASED User's Manual	English
DAEPZTM/1	EPZ80 Technical Manual	English
DAUPZ80HLAIM/1	UPZ80-HL Assembly Instructions	English
DAPPZTM/1	PPZ80 Technical Manual	English
DAREZTM/1	REZ80 Technical Manual	English
DARCZTM/1	RCZ80 Technical Manual	English
	Textbooks	
DAZ80NPROG/1	Z80 Microprocessor Book 1 - Programming	English
DAZ80NPROGF/1	Microprocesseur Z80 Livre 1 - Programmation	French
DAZ80NTFKON/1	Z80 Einfuehrung und programmierung Buch. 1	German
DAZ80NANOBK/1	Il Nanobook Z80 Vol. 1 - Tecniche di programmazione	Italian
DAZ80NPROGS/1	Programacion del Microprocessor Z80	Spanish
DAZ80NINTF/1	Z80 Microprocessor Book 3 - Interfacing	English
DAZ80NINTFF/1	Microprocesseur Z80 Livre 3 - Interfacage	French
DAZ80NINTFG/1	Z80 Interface Technik und Anwendug Buch. 3	German
DAZ80NANOBK3/1	Il Nanobook Z80 Vol. 3 - Tecniche di Interfacciamento	Italian
DABASPP/1	BASIC Programming Primer	English

CLZ80 FAMILY LITERATURE

CODE	DESCRIPTION	LANGUAGE
DACLZ80STM/1	CLZ80S Technical Manual	English
DAFSZ80TM/1	FSZ80 Technical Manual	English
DACLZ80TM/1	CLZ80-4 and -16 Technical Manual	English
DAFRZUM/1	FR-Z-2 Operating System User's Manual	English
DARAZ80TM/1	RAZ80-48 Technical Manual	English
DAPIZ80TM/1	PIZ80 Technical Manual	English
DAVDZ80TM/1	VDZ80/B Technical Manual	English

SYSTEMS LITERATURE

CLZ80 FAMILY LITERATURE (continued)

CODE	DESCRIPTION	LANGUAGE
DAVCZ80TM/1	VCZ80/B Technical Manual	English
DAFLZTM/1	FLZ80 Technical Manual	English
DAPPZTM/1	PPZ80-EB Technical Manual	English
DARCZTM/1	RCZ80 Technical Manual	English
DASEXMAN/1	SEX SGS Real Time Executive Manual	English
DASDOS2UM/1	SDOS-2 Operating System User's Manual	English
DASDOS2RF/1	SDOS-2 Operating System Reference Manual	English
DABASLUM/1	BASIC Language MSBAS, BAS-Z, BAS-Z/N User's Manual	English

UX8 FAMILY LITERATURE

CODE	DESCRIPTION	LANGUAGE
DACPMUM/1	CP/M Operating System User's Manual	English
DASGSCPMUM/1	SGS CP/M User's Manual	English
DAUX822SD/1	Schematic drawing of UX8-22	English
DAUX822IG/1	Installation Guide of UX8-22	English
DAEMZ802USM/1	UX8-EMZ80/2 User and Software Manual	English
DAEMZ802IHM/1	UX8-EMZ80/2 Installation and Hardware Manual	English
DAEM387X2USM/1	UX8-EM387X/2 User and Software Manual	English
DAEM387X2IHM/1	UX8-EM387X/2 Installation and Hardware Manual	English
DAEP322USM/1	UX8-EP32/2 User and Software Manual	English
DAEP322IHM/1	UX8-EP32/2 Installation and Hardware Manual	English
DASEXMAN/1	SEX SGS Real-Time Executive Kernel Reference Manual	English
DASDOS2UM/1	SDOS-2 Operating System User's Manual	English
DASDOS2RF/1	SDOS-2 Operating System Reference Manual	English
DAUX820IG/1	UX8-20 System Installation Guide	English
DAUX820SD/1	UX8-20 System Schematic Drawing	English
DAEP32SM/1	EP32 EPROM Programmer Software Manual	English
DAEP32IG/1	EP32 EPROM Programmer Installation Guide	English
DAEM387XUM/1	EM387X M3870 Family Emulation and Assembler Support Package User's Manual	English
DAEM387XIG/1	EM387X 3870 Family Emulation Package Installation Guide	English
DAEMZ80UM/1	EMZ80 Z80 Emulation Package User's Manual	English
DAEMZ80IG/1	EMZ80 Z80 Emulation Package Installarion Guide	English
DARTZ80IHM/1	UX8-RTZ80 Installation and Hardware Manual	English
DARTZ80USM/1	UX8-RTZ80 User and Software Manual	English
DABASLUM/1	BASIC Language MDBAS, BAS-Z, BAS-Z/N User's Manual	English

SYSTEMS LITERATURE

UX16 FAMILY LITERATURE

CODE	DESCRIPTION	LANGUAGE
DABELMAN/1	Set of UNIX Manuals Voll. 1a and 1b (DAUNIX16PM/1), Vol. 2a (DABELMAN2A/1) and Vol. 2b (DABELMAN2B/1) and Vol. 2c (DAUNIX16PM2C/1)	English
DABELMAN2A/1	Bell Telephone UNIX Manual (vol. 2a)	English
DABELMAN2B/1	Bell Telephone UNIX Manual (vol. 2b)	English
DAUNIX16PM/1	SUNIX Programming Manual (voll. 1a, 1b)	English
DAUNIX16PM2C/1	UX16 UNIX Programmers' Manual (vol. 2c)	English
DACOB16UG/1	Cobol User's Guide	English
DACOB16LM/1	Cobol Language Manual	English
DABAS16RM/1	C Basic Reference Manual	English
DACCOM16PL/1	C Programming Language	English
DAUX1620UG/1	UX16-20 User's Guide	English
DAUX1620AG/1	UX16-20 System SUNIX Administrator's Guide	English
DAZ80XASMS/1	Z80 Cross Assembler Manual	English
DADBM16RM/1	UX16-DBM Data Base Management System Reference Manual	English
DAWP16RM/1	UX16-WP Processor Reference Manual	English

SGS-ATES GROUP OF COMPANIES

Italy – France – Germany – Malta – Malaysia – Singapore – Sweden – Switzerland – United Kingdom – U.S.A.

SGS-ATES GROUP OF COMPANIES

INTERNATIONAL HEADQUARTERS
SGS-ATES Componenti Elettronici SpA
Via C. Olivetti 2 - 20041 Agrate Brianza - Italy
Tel.: 039 - 65551
Telex: 330131-330141

BENELUX
SGS-ATES Componenti Elettronici SpA
Benelux Sales Office
B- 1180 Bruxelles
Winston Churchill Avenue, 122
Tel.: 02 - 3432439
Telex: 24149 B

BRAZIL
Sales Office:
05413 Sao Paulo
Av. Henrique Schaumann Z86-CJ33
Tel.: (11) 647245
Telex: 11 - 21650

DENMARK
SGS-ATES Scandinavia AB
Sales Office
2730 Herlev
Herlex Torv, 4
Tel.: 02 - 948533
Telex: 35411

EASTERN EUROPE
SGS-ATES Componenti Elettronici SpA
Export Sales Office
20041 Agrate Brianza - Italy
Via C. Olivetti, 2
Tel.: 039 - 6555287/6555207
Telex: 330131-330141

FRANCE
SGS-ATES France S.A.
75643 Paris Cedex 13
Résidence "Le Palatino"
17, Avenue de Choisy
Tel.: 01 - 5842730
Telex: 042 - 250938

HONG KONG
SGS-ATES Singapore (Pte) Ltd.
9th Floor, Block N,
Kaiser Estate, Phase III,
11 Hok Yuen St.,
Hung Hom, Kowloon
Tel.: 3-644251/5
Telex: 63906 ESGIE HX

ITALY
SGS-ATES Componenti Elettronici SpA
Direzione Commerciale Italia
20149 Milano
Via Correggio, 1/3
Tel.: 02 - 4695651

Sales Offices:
40128 Bologna
Via Corticella, 231
Tel.: 051 - 326684
00199 Roma
Piazza Gondar, 11
Tel.: 06 - 8392848/8312777

SINGAPORE
SGS-ATES Singapore (Pte) Ltd.
Singapore 1231
Lorong 4 & 6 - Toa Payoh
Tel.: 2531411
Telex: ESGIES RS 21412

SWEDEN
SGS-ATES Scandinavia AB
19500 Märsta
Bristagatan 16
Tel.: 0760 - 40120
Telex: 042 - 10932

SWITZERLAND
SGS-ATES AG
Swiss Sales Offices
6340 Baar
Oberneuhofstrasse, 2
Tel.: 042 - 315955
Telex: 864915
1218 Grand-Saconnex (Geneve)
Chemin François-Lehmann 22
Tel.: 022 - 986462/3
Telex: 28895

UNITED KINGDOM
SGS-ATES (United Kingdom) Ltd.
Aylesbury, Bucks
Planar House, Walton Street
Tel.: 0296 - 5977
Telex: 041 - 83245

U.S.A.
SGS-ATES Semiconductor Corporation
Phoenix, AZ 85022
1000 East Bell Road
Tel.: (602) 867-6100
Telex: SGS PH UR 249976

Sales Offices:
Austin, TX 78757
7113 Burnet Road
Suite 201
Tel.: (512) 458-9182
Dallas, TX 75248
16970 Dallas North Parkway
Suite 702
Tel.: (214) 733-1515
Telex: SGS-ATES DAL 79-5509
Hauppauge, NY 11788
330 Motor Parkway
Suite 100
Tel.: (516) 435-1050
Indianapolis, IND 46141
2346 S. Lynhurst Drive
Suite E-207
Tel.: (317) 241-1116
Santa Clara, CA 95051
2700 Augustine Drive
Suite 209
Tel.: (408) 727 - 3404
Telex: SGS-ATES SNTA 34-6402
Schaunburg, IL 60196
600 North Meacham Road
Tel.: (312) 490-1890
Telex: SGS CGP DSP 28-2547
Waltham, MA 02154
240 Bear Hill Road
Tel.: (617) 890-6688
Telex: SGS-ATES WHA 92-3495
Woodland Hills, CA 91367
6355 Topanga Canyon Boulevard
Suite 220
Tel.: (213) 716-6600
Telex: SGS-WDHL 18-2863

WEST GERMANY
SGS-ATES Deutschland Halbleiter
Bauelemente GmbH
8018 Grafing bei München
Haidling, 17
Tel.: 08092-690
Telex: 05 27378
Sales Offices:
3012 Langenhagen
Hubertusstrasse, 7
Tel.: 0511 - 772075/7
Telex: 09 23195
8000 München 90
Tegernseer Landstr., 146
Tel.: 089 - 6925100
Telex: 05 215784
8500 Nürnberg 30
Ostendstr., 204
Tel.: 0911-572977/78/79
Telex: 0626243
7000 Stuttgart 80
Kalifenweg, 45
Tel.: 0711 - 713091/2
Telex: 07 255545