

DATA HANDBOOK

Circulators and Isolators

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Philips Components



PHILIPS

CIRCULATORS AND ISOLATORS

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SELECTION GUIDE

SELECTION BY FREQUENCY RANGE

frequency- range MHz	max. power W	type	page
68 to 150	40	2722 162 09002	24
72 to 73	20	2722 162 02912	26
73 to 74	20	2722 162 02732	26
74,5 to 75,5	25	2722 162 05151	26
83 to 84	20	2722 162 02722	26
86,5 to 87,5	20	2722 162 02862	26
88 to 108	50	2722 162 05991	28
88 to 108	300	2722 162 07021	28
96 to 146	50	2722 162 03332	28
96 to 146	50	2722 162 03342	28
100 to 101	20	2722 162 02942	26
100 to 163	75	2722 162 05881	28
100 to 163	300	2722 162 05891	28
138 to 141	20	2722 162 02902	26
138 to 141	100	2722 162 05001	26
140 to 260	40	2722 162 09012	24
144,5 to 147,5	20	2722 162 02952	26
146,5 ± 2,5	100	2722 162 05141	26
146 to 165	100	2722 162 05751	26
153,5 to 156,5	20	2722 162 02962	26
153,5 ± 2,6	100	2722 162 05201	26
156 to 157	20	2722 162 06002	26
159,5 ± 2,6	100	2722 162 03831	26
160,5 ± 2,6	100	2722 162 03841	26
160 to 174	100	2722 162 05761	26
160 to 178	500	2722 162 01871	36
160 to 178	500	2722 162 03641	36
160 to 178	1000	2722 162 01901	36
160 to 178	1000	2722 162 03681	36
161 to 162	15	2722 162 02992	26
166 ± 2,6	100	2722 162 05281	26
168 ± 2,6	100	2722 162 03851	26
170 to 200	100	2722 162 07001	36
173 to 204	500	2722 162 01861	36
173 to 204	500	2722 162 03631	36
173 to 204	1000	2722 162 03671	36
173 to 204	1000	2722 162 01891	36
173 to 204	1500	2722 162 05971	36
176,5 to 183,5	20	2722 162 06891	26
190 to 220	100	2722 162 07011	36
195 to 205	1000	2722 162 05031	36
200,5 to 207,5	20	2722 162 06901	26
200 to 230	500	2722 162 01851	36

SELECTION GUIDE

frequency- range MHz	max. power W	type	page
200 to 230	500	2722 162 03621	36
200 to 230	1000	2722 162 05981	36
200 to 230	1000	2722 162 01881	36
200 to 230	1000	2722 162 03661	36
201 to 209	100	2722 162 06291	26
208,5 to 215,5	20	2722 162 06911	26
225 to 400	50	2722 162 03722	28
225 to 400	50	2722 162 03732	28
225 to 270	150	2722 162 01931	30
225 to 270	150	2722 162 01932	30
225 to 400	200	2722 162 05781	28
225 to 270	500	2722 162 03171	36
225 to 270	500	2722 162 03651	36
225 to 270	1000	2722 162 03691	36
225 to 270	1000	2722 162 03181	36
230 to 470	40	2722 162 09022	24
270 to 330	60	2722 162 03421	30
270 to 330	150	2722 162 01941	30
330 to 400	60	2722 162 05091	30
330 to 400	150	2722 162 01951	30
400 to 470	20	2722 162 02712	32
400 to 500	25	2722 162 09041	24
400 to 470	100	2722 162 03411	32
400 to 470	100	2722 162 05101	32
400 to 470	300	2722 162 01572	44
406 to 414	60	2722 162 02931	32
406 to 470	100	2722 162 06161	32
433 to 435	2000	2722 162 03991	48
450 to 458	60	2722 162 02981	32
455 to 459	100	2722 162 06931	32
460 to 468	60	2722 162 02857	32
462 to 468	100	2722 162 01555	32
470 to 600	10	2722 162 02691	40
470 to 600	10	2722 162 02671	40
470 to 600	50	2722 162 03871	40
470 to 600	100	2722 162 03961	40
470 to 600	100	2722 162 01551	40
470 to 600	300	2722 162 01582	44
470 to 600	400	2722 162 01632	44
470 to 600	500	2722 162 01121	46
470 to 600	500	2722 162 03221	46
470 to 600	500	2722 162 03141	46
470 to 600	700	2722 162 05371	46
470 to 600	2000	2722 162 01771	48
470 to 600	2000	2722 162 01261	48
470 to 600	2000	2722 162 03051	50
470 to 600	2000	2722 162 03001	50
510 to 514	60	2722 162 02921	32
550 to 650	100	2722 162 01563	40
590 to 720	300	2722 162 01592	44

frequency-range MHz	max. power W	type	page
590 to 720	400	2722 162 01642	44
590 to 720	500	2722 162 03241	46
590 to 720	500	2722 162 03201	46
590 to 720	500	2722 162 01131	46
590 to 720	700	2722 162 05381	46
590 to 720	2000	2722 162 01781	48
590 to 720	2000	2722 162 01281	48
590 to 720	2000	2722 162 03011	50
590 to 720	2000	2722 162 03061	50
600 to 800	10	2722 162 02701	40
600 to 800	10	2722 162 02681	40
600 to 960	10	2722 162 05321	28
600 to 800	10	2722 162 02751	40
600 to 960	10	2722 162 06111	28
600 to 800	50	2722 162 03821	40
600 to 800	100	2722 162 01561	40
600 to 800	100	2722 162 03971	40
600 to 800	500	2722 162 03151	46
600 to 800	500	2722 162 03231	46
600 to 800	500	2722 162 03191	46
600 to 800	2000	2722 162 01791	48
600 to 800	2000	2722 162 01331	48
710 to 860	300	2722 162 01612	44
710 to 860	400	2722 162 01662	44
710 to 860	500	2722 162 01141	46
710 to 860	500	2722 162 03251	46
710 to 860	500	2722 162 03211	46
710 to 860	700	2722 162 05391	46
710 to 860	2000	2722 162 01801	48
710 to 860	2000	2722 162 01271	48
710 to 860	2000	2722 162 01981	50
710 to 860	2000	2722 162 03071	50
790 to 1000	10	2722 162 02741	40
790 to 1000	10	2722 162 02401	40
790 to 1000	50	2722 162 03811	40
790 to 1000	100	2722 162 03261	40
790 to 1000	100	2722 162 03263	40
790 to 1000	100	2722 162 03981	40
806 to 960	100	2722 162 06671	32
930 to 965	60	2722 162 06841	32
935 to 960	35	2722 162 06962	32
960 to 1225	100	2722 162 03591	52
1350 to 2100	10	2722 162 06701	52
1350 to 1700	10	2722 162 05331	52
1350 to 2100	10	2722 162 05571	52
1427 to 1535	10	2722 162 02492	52
1427 to 1535	10	2722 162 03802	52
1470 to 1620	1	2722 162 02521	54
1470 to 1620	15	2722 162 02631	54
1590 to 1800	1	2722 162 02531	54

SELECTION GUIDE

frequency- range MHz	max. power W	type	page
1590 to 1800	15	2722 162 02641	54
1630 to 1780	1	2722 162 06031	60
1680 to 1920	20	2722 162 03881	58
1680 to 1920	50	2722 162 03911	58
1700 to 2100	10	2722 162 05311	54
1700 to 2100	15	2722 162 02571	54
1700 to 2100	15	2722 162 02581	54
1700 to 2300	20	2722 162 02191	58
1700 to 2300	20	2722 162 02511	58
1700 to 2300	20	2722 162 03951	58
1700 to 2100	30	2722 162 04051	62
1700 to 2100	30	2722 162 05241	54
1700 to 2100	30	2722 162 05231	54
1700 to 2100	30	2722 162 04091	62
1700 to 2100	30	2722 162 05251	54
1700 to 2300	50	2722 162 03941	58
1760 to 1940	1	2722 162 02541	54
1760 to 1940	15	2722 162 02651	54
1815 to 1925	1	2722 162 06321	60
1880 to 2120	20	2722 162 03891	58
1880 to 2120	50	2722 162 03921	58
1890 to 2110	1	2722 162 02551	54
1890 to 1990	1	2722 162 06041	60
1890 to 2110	15	2722 162 02661	54
1900 to 2300	10	2722 162 05341	54
1900 to 2300	15	2722 162 02591	54
1900 to 2300	15	2722 162 02601	54
1900 to 2300	15	2722 162 05471	54
1900 to 2300	30	2722 162 04101	62
1900 to 2300	30	2722 162 05261	54
1900 to 2300	30	2722 162 05271	54
1900 to 2300	30	2722 162 04061	62
2000 to 2700	10	2722 162 05411	54
2000 to 4000	50	2722 162 01501	68
2000 to 4000	50	2722 162 02091	68
2000 to 4000	50	2722 162 02101	68
2000 to 4000	50	2722 162 01491	68
2038,5 to 2108,5	1	2722 162 06051	60
2074 to 2184	1	2722 162 06331	60
2080 to 2320	20	2722 162 03901	58
2080 to 2320	50	2722 162 03931	58
2100 to 2500	10	2722 162 05351	54
2297,5 to 2367,5	1	2722 162 06061	60
2300 to 2700	10	2722 162 05361	54
2350 to 2400	3000	2722 163 02091	76
2350 to 2400	3000	2722 163 02081	76
2350 to 2400	6500	2722 163 02024	78
2350 to 2400	6500	2722 163 02025	78
2425 to 2475	3000	2722 163 02061	76
2425 to 2475	3000	2722 163 02071	76

frequency- range MHz	max. power W	type	page
2425 to 2475	6500	2722 163 02005	78
2425 to 2475	6500	2722 163 01021	80
2425 to 2475	6500	2722 163 02004	78
2450 to 2850	10	2722 162 05401	54
3000 to 6000	20	2722 162 02071	68
3000 to 6000	20	2722 162 01511	68
3800 to 4200	10	2722 162 04031	64
3800 to 4200	10	2722 162 03431	64
4000 to 8000	10	2722 162 01811	68
4000 to 8000	10	2722 162 02111	68
4200 to 4400	10	2722 162 02471	64
4400 to 5000	10	2722 162 04041	64
4400 to 5000	10	2722 162 03441	64
5925 to 6425	200	2722 161 04003	66
5925 to 6425	200	2722 161 02212	66
6425 to 7125	200	2722 161 02312	66
6425 to 7125	200	2722 161 04052	66
7000 to 12400	10	2722 162 02122	68
7000 to 12400	10	2722 162 01822	68
7125 to 7750	200	2722 161 04062	66
7125 to 7750	200	2722 161 02322	66
7900 to 10400	5	2722 162 02231	68
8200 to 11200	50	2722 161 02071	68
8500 to 9600	1	2722 161 01221	74
8500 to 9600	1	2722 161 01222	74
8500 to 9600	5	2722 161 01361	74
8500 to 9600	10	2722 161 01211	74
8500 to 9600	10	2722 161 01261	74
8900 to 9600	5	2722 162 02501	68
10025 to 10325	1	2722 161 01531	74
12000 to 18000	5	2722 162 02221	68
12000 to 18000	5	2722 162 03301	68

GENERAL

CIRCULATORS AND ISOLATORS

INTRODUCTION

This Data Handbook gives only a selection of circulators and isolators from our production line which, we think, are of common interest and which shows our capability. Should you require other executions, different connectors, different frequencies or any other data, please contact us.

Circulators and isolators are key elements in modern v.h.f., u.h.f. and microwave engineering. Their fundamental property of non-reciprocity is capable of simplifying the construction and improving the stability, efficiency and accuracy of radar, communication and testing systems.

The devices contain a core of ferrite material biased by a static magnetic field. This field orients the electron spins within the ferrite to produce a gyromagnetic effect. The non-reciprocal behaviour occurs when a r.f. signal, applied perpendicular to the biasing field, interacts with the precessing electrons to set up a standing-wave pattern within the core.

CIRCULATORS

A circulator is a passive non-reciprocal device with three or more ports. Energy introduced into one port is transferred to an adjacent port, the other ports being isolated. Although circulators can be made with any number of ports, the most commonly used are 3-port and 4-port ones, the symbols for which are given in Figs 1 and 2.

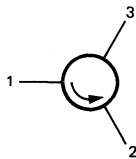


Fig. 1 Symbol for 3-port circulator.

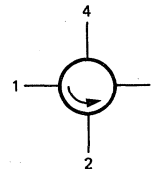


Fig. 2 Symbol for 4-port circulator.

Energy entering into port 1 emerges from port 2; energy entering into port 2 emerges from port 3, and so on in cyclic order.

ISOLATORS

An isolator is a passive non-reciprocal 2-port device which permits r.f. energy to pass through it in one direction whilst absorbing energy in the reverse direction.

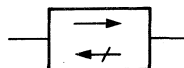


Fig. 3 Symbol for an isolator.

TERMS AND DEFINITIONS

Frequency range

This is the range within which the circulator or isolator meets the guaranteed specification.

Isolation

In a circulator, isolation is the ratio, expressed in dB, of the power entering a port to the power scattered into the adjacent port on the side opposed to the normal circulation (matched source and the other ports correctly terminated).

In an isolator, isolation is the ratio, expressed in dB, of the input power to the output power for signal injection in the reverse direction (matched source and load).

Insertion loss

The attenuation that results from including the device in the transmission system. It is given as a power ratio, expressed in dB, which compares the situation before and after the insertion of a circulator/ isolator (matched source and the other ports correctly terminated).

Maximum power

In a circulator, the maximum power is the largest power it can handle at sea level and at maximum ambient temperature when one port is terminated with a mismatch giving a VSWR of 2, whilst the next port is matched with a VSWR of 1,2 or less, unless otherwise stated. This power value must not be exceeded. If the mismatch of the load is expected to exceed a VSWR of 2, a circulator of higher power handling capacity should be used.

The maximum power is the maximum continuous-wave power unless a maximum peak power is separately stated. If this value is exceeded the circulator can be damaged by arcing in its internal transmission structure. Power values are valid for one signal passage only. If more than one signal passes through the circulator, the peak power of the combined signal should not exceed the indicated maximum peak power.

In an isolator, the maximum power is the largest power that may be passed through it in the forward direction into a load with a VSWR of 2, unless otherwise stated. This power value must not be exceeded.

Temperature range

The ambient temperature range within which circulators and isolators function to specification. (When necessary, special temperature compensation is built in for circulators.) Circulators still function outside the temperature range but their electrical behaviour may then be far outside the guaranteed specifications. However, no permanent damage can be expected unless a large temperature rise is caused by excessive power handling.

CAUTIONARY NOTES

Circulators and isolators have internal fields that are carefully adjusted for optimum operation; they should not, therefore, be subjected to strong external magnetic fields. During storage and transport a minimum distance of 10 mm to other circulators/isolators and ferromagnetic material is recommended. During operation this distance should be at least 20 mm.

Care must be taken that condensation of humidity, especially in water-cooled items, does not occur.

QUALITY GUARANTEE

Subject to the Conditions of Guarantee the Manufacturer guarantees that circulators and isolators supplied to the purchaser meet the specifications published in the Manufacturer's Data Handbook and are free from defects in material and workmanship.

STANDARD TEST SPECIFICATIONS**Initial measurements**

These measurements have been carried out at room temperature and at the extreme temperatures, with a power level not exceeding 10 mW.

Tropical test

This test has been carried out completely in accordance with IEC 68 test D, accelerated damp heat. This test begins with the temperature at 55 ± 2 °C and R.H. at 95 to 100% for a period of 16 hours, followed by a period of 8 hours with the temperature at $+25$ °C and R.H. 80 to 100% to complete the 24-hour cycle: the test consists of 6 uninterrupted cycles.

Vibration test

This test has been carried out completely in accordance with MIL-STD-202D, method 201A: frequency range 10 to 55 to 10 Hz for 2 hours in each of the X, Y and Z directions, with a total excursion of 1,5 mm.

Thermal shock test

This test has been carried out completely in accordance with MIL-STD-202D, method 107C under condition A: 5 cycles with extreme temperatures of -55 °C and $+85$ °C; each cycle of 1 hour's duration.

Mechanical shock test

This test has been carried out in accordance with MIL-STD-202D, method 213A under condition G: peak value 100 g, duration 6 ms, and also with extreme peak values up to 800 g, duration approximately 1 ms for each device, referring to the results of the drop test.

Drop test

This test has been carried out in accordance with ISO 2248, part IV: packaging complete, filled transport packages, vertical impact.

R.F. power test

The devices have been tested in accordance with the definition of maximum power in the Data Handbook (VSWR = 2). The ambient temperature of 25 °C was increased to the maximum operating temperature and the duration of the test was 1 hour for each device.

Final measurements

On completion of the above tests final measurements were carried out at a temperature of $+25$ °C and with a power level not exceeding 10 mW. The results of these tests should be within the guaranteed values.

Dimensions and visual appearance

These have been checked in accordance with the published data.

Note

On request, different tests and/or additional tests to those above can be carried out.

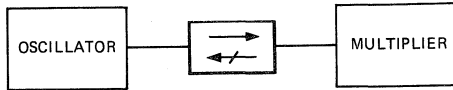
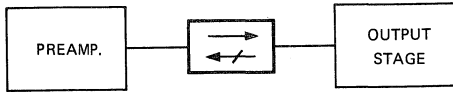
12-digit type number

Each device is uniquely identified by a 12-digit type number, the last three digits being specific device identifiers. The diagram below shows you how, from the first nine digits, to find the circulator, isolator or isoductor you need. Remember that devices with alternative connectors and operating at other frequencies may be available on request.

digits 1 - 4	digits 5 - 7	digits 8 and 9		
	161 (waveguide)	0	1	= field displacement or slimline isolator
		0	2	= circulator
		0	3	= X-configuration, 4-port circulator
		0	4	= isolator
2722	162 (coaxial)	0	1, 3, 5, 7	= circulator
		0	2, 6, 8	= isolator
		0	4	= 4-port circulator
		0	9	= isoductor
	163 (industrial)	0	1	= circulator
		0	2	= isolator

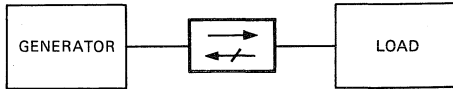
APPLICATIONS

Decoupling of circuit stages



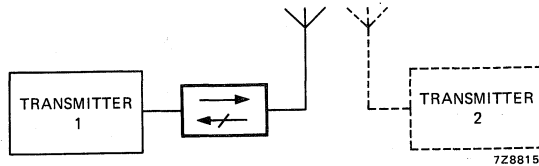
7Z88154

Reflection suppression



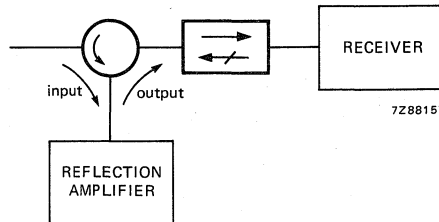
7Z88155

Suppression of reflections from
 - long line to aerial
 - mismatch by aerial damage
 - feedback from nearby transmitters



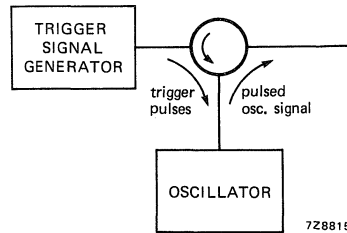
7Z88156

Separate input and output of a reflection amplifier, such as parametric amplifiers; tunnel, Gunn or Impatt diode amplifiers



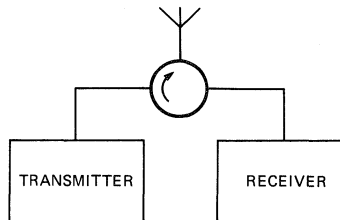
7Z88157

Feed trigger signals into an oscillator



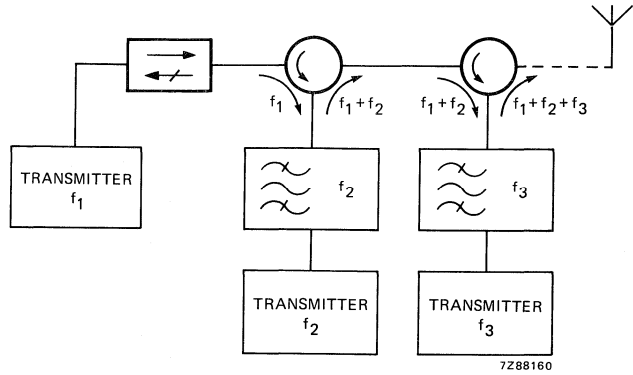
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Avoid separate aerial for transmitter and receiver

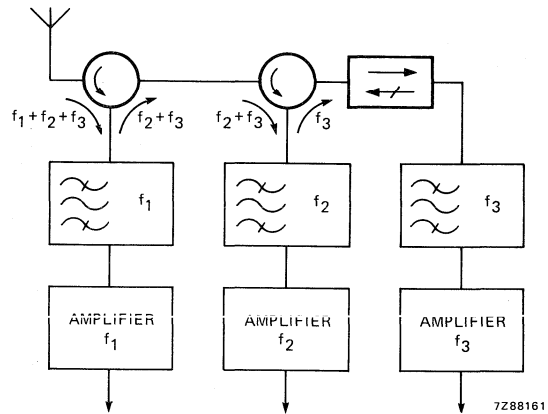


7Z88159

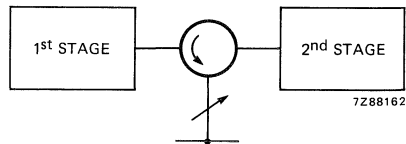
Connect different transmitters to a common aerial



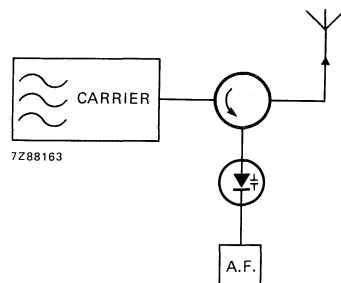
Separate a range of frequencies received by a common aerial

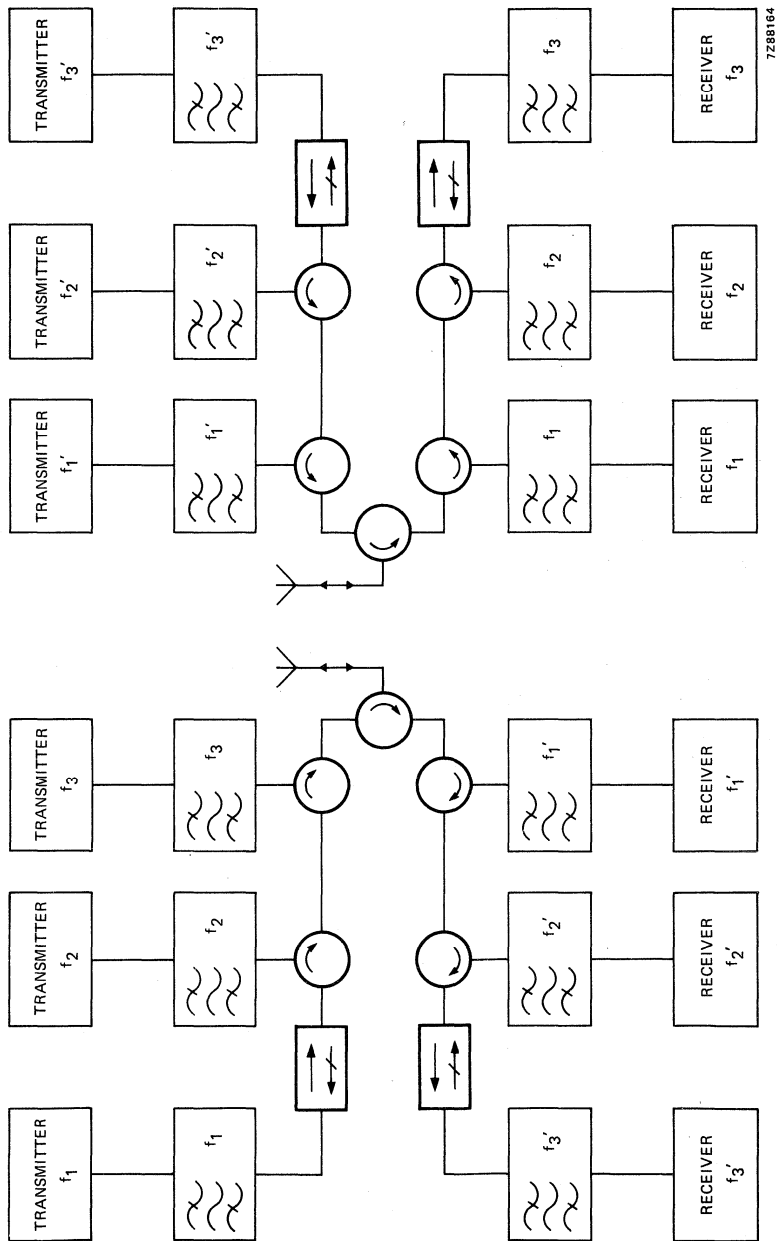


Variable phase shifters with a variable short-circuit



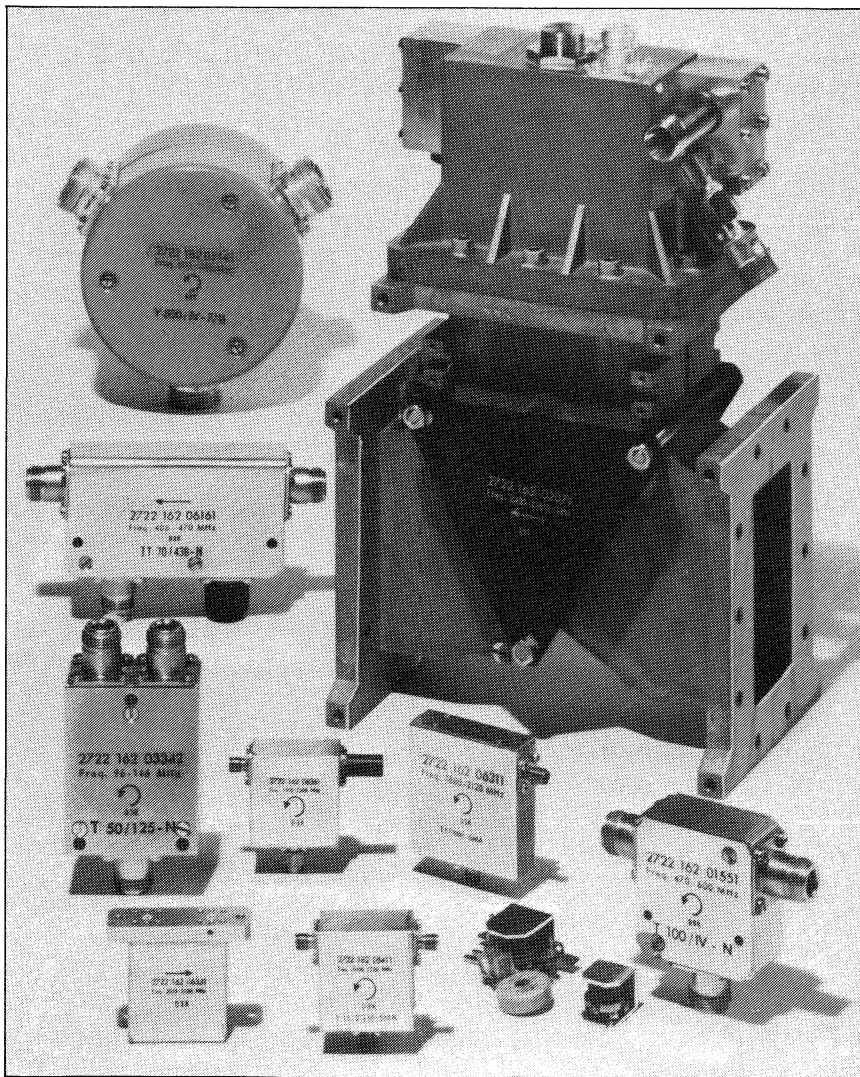
Phase modulation with a variable capacitance diode as a variable reactance





Signal combination and separation used together in a frequency-multiplexed, multichannel transceiver system

CIRCULATORS AND ISOLATORS



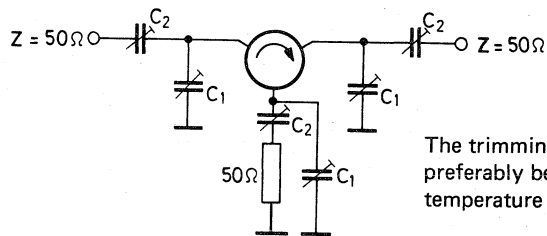
ISODUCTORS

Preferred application: fixed and mobile communication.

type	dimensions Fig.	frequency range* MHz	maximum power	
			forward W	reflected W
2722 162 09041	1	400 to 500	25	} total reflection permitted
2722 162 09002	2	68 to 150	40	
2722 162 09012	2	140 to 260	40	
2722 162 09022	2	230 to 470	40	

* For instantaneous bandwidth see diagram.

The technical characteristics have been measured in the following circuit:



The trimming capacitors should preferably be of a type with low temperature coefficient.

VX712212EA

type	C1 (pF)	C2 (pF)
2722 162 09041	2 to 15	2 to 10
2722 162 09002	25 to 200	20 to 150
2722 162 09012	5,5 to 65	5,5 to 65
2722 162 09022	2 to 16,5	2 to 16,5

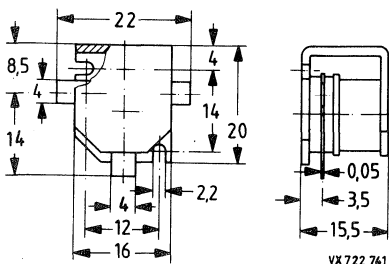


Fig. 1.

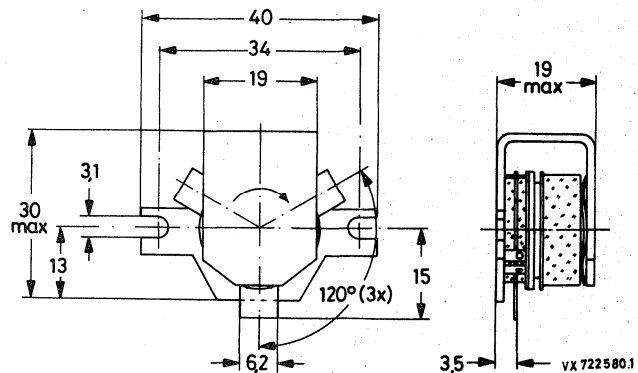
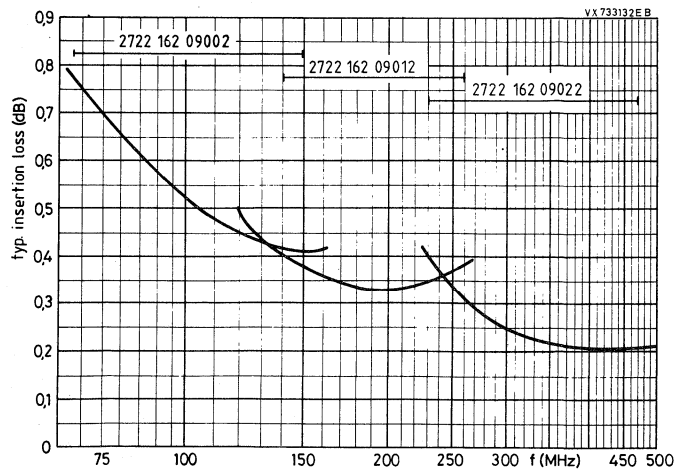
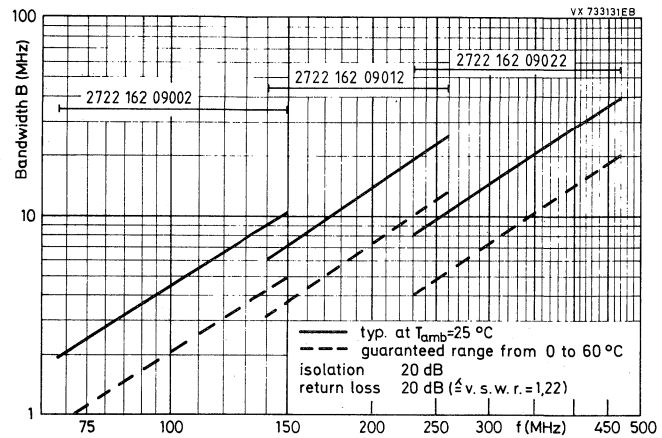


Fig. 2.

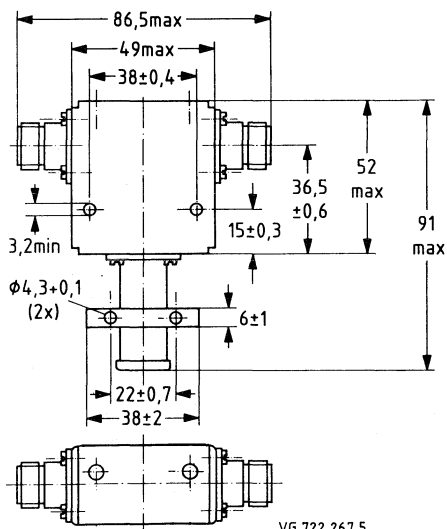
insertion loss dB	isolation dB	VSWR	temp. range °C	connector	mass g
≤ 0,5	≥ 20	≤ 1,25	0 to 60	solder pins	20
≤ 0,9 (≤ 100 MHz)	≥ 20	≤ 1,22	0 to 60		40
≤ 0,7 (> 100 MHz)	≥ 20	≤ 1,22	0 to 60		40
≤ 0,6	≥ 20	≤ 1,22	0 to 60		40
≤ 0,5	≥ 20	≤ 1,22	0 to 60		40



Preferred application: fixed and mobile communication

type	dimensions Fig.	frequency range* MHz	maximum power	
			CW W	reflected W
2722 162 02912	3	72 to 73	20	20
02732		73 to 74	20	20
02722		83 to 84	20	20
02862		86,5 to 87,5	20	20
02942		100 to 101	20	20
02902		138 to 141	25	20
02952		144,5 to 147,5	20	20
02962		153,5 to 156,5	20	20
06002		156 to 157	20	20
02992		161 to 162	15	15
06891		176,5 to 183,5	20	20
06901		200,5 to 207,5	20	20
06911		208,5 to 215,5	20	20
2722 162 05151	4	74,5 to 75,5	25	20
05001		138 to 141	110	110
05141		146,5 ± 2,5	110	110
05201		153,5 ± 2,6	110	110
03831		159,5 ± 2,6	110	110
03841		160,5 ± 2,6	110	110
05281		166,0 ± 2,6	110	110
03851		168,0 ± 2,6	110	110
05751		146 to 165**	110	110
05761		160 to 174**	110	110
06291	201 to 209	100	100	

Fig. 3.



* Other frequencies on request.

** Tunable instantaneous bandwidth for isolation 20 dB min. 5 MHz.

isolation		insertion loss		VSWR		temp. range °C	connector	mass g
min. dB	typ. dB	max. dB	typ. dB	max.	typ.			
20		0,7		1,25		0 to 50	N female	220
		0,8				0 to 55		
		0,7				0 to 55		
		0,7				0 to 50		
		0,7				0 to 50		
		0,4				0 to 55		
		0,6				0 to 50		
		0,6				0 to 50		
		0,6				0 to 50		
		0,6				0 to 50		
		0,6				0 to 55		
		0,6				0 to 55		
		20						
0,4	0 to 55							
0,4	0 to 55							
0,4	0 to 55							
0,4	0 to 55							
0,4	0 to 55							
0,4	0 to 55							
0,4	0 to 55							
0,4	0 to 55							
0,4	0 to 55							
0,5	0 to 55							

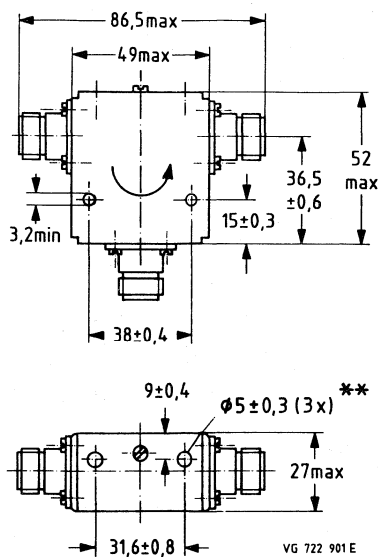


Fig. 4.

Preferred application: fixed and mobile communication

type	dimensions Fig.	frequency range MHz	maximum power	
			CW W	reflected W
2722 162 05991 07021	5 7	88 to 108	50 300	
2722 162 03342 03332	5 6	96 to 146	50	
2722 162 05881 05891	5 7	100 to 163	75 300	
2722 162 03732 03722 05781	5 6 5	225 to 400	60 60 200	
2722 162 06111 05321	8 9	600 to 960	10	

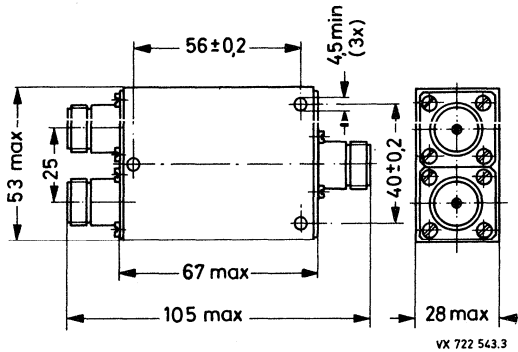


Fig. 5.

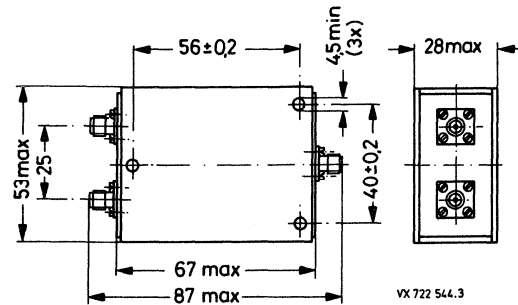


Fig. 6.

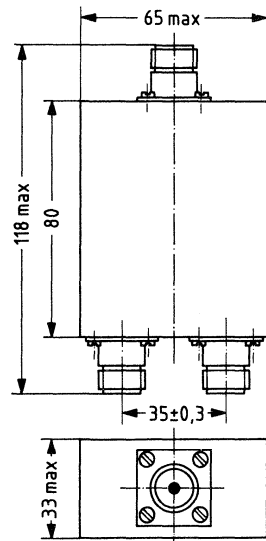


Fig. 7.

isolation		insertion loss		VSWR		temp. range °C	connector	mass g
min. dB	typ. dB	max. dB	typ. dB	max.	typ			
18 16		0,8 0,8		1,3 1,4		-10 to +50 0 to +60	N female N female	
18		1,3		1,3		-10 to +60	N female SMA female	400 380
14		1,5		1,5		-20 to +55	N female	
16 16 17		1,3 1,3 0,75		1,4 1,0 1,35	1,4 1,4 1,4	-40 to +80 -40 to +80 0 to +55	N female SMA female N female	400 380 400
13	15	0,9	0,6	1,65	1,4	-25 to +65	SMA female	400

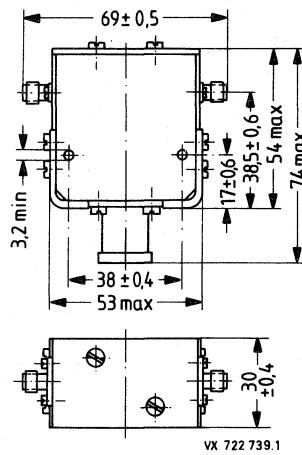


Fig. 8.

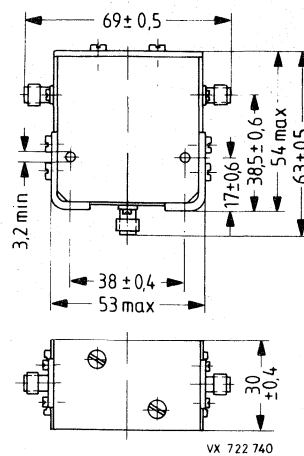


Fig. 9.

CIRCULATORS
225 TO 400 MHz

Preferred application: fixed and mobile communication

type	dimensions Fig.	frequency range MHz	maximum power	
			CW W	reflected W
2722 162 01931 01932 01941 01951	10	225 to 270 225 to 270 270 to 330 330 to 330	150	
2722 162 03421 05091	11	270 to 330 330 to 400	60	

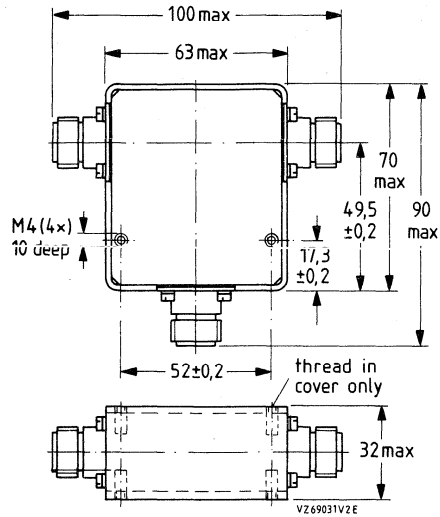


Fig. 10.

isolation		insertion loss		VSWR		temp. range °C	connector	mass g
min. dB	typ. dB	max. dB	typ. dB	max.	typ.			
18	21	0,35	0,2	1,35	1,25	0 to +70	N female	725
		0,5	0,35					
		0,35	0,2					
		0,35	0,3					
18	21	0,35	0,2	1,35	1,25	0 to +70	SMA female	725

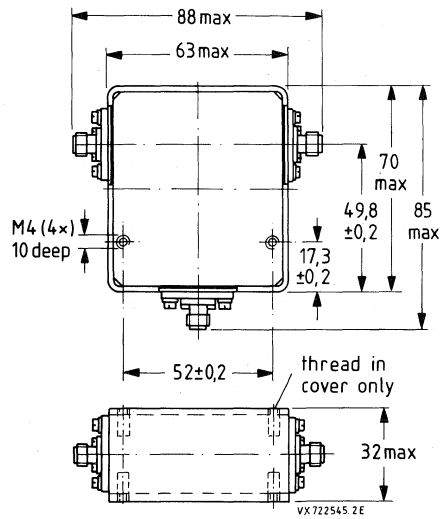


Fig. 11.

Preferred application: fixed and mobile communication

type	dimensions Fig.	frequency range MHz	maximum power	
			CW W	reflected W
2722 162 02712	12	400 to 470	20	
2722 162 06962	14	935 to 960	35	
2722 162 02931 02981 02921	13	406 to 414 450 to 458 510 to 514	70	70
2722 162 06161 06931 02857	13	406 to 470 455 to 459 460 to 468	100	
2722 162 03411 05101	16 17	400 to 470	100	100
2722 162 01555	16	462 to 468	100	
2722 162 06671 06841	13 15	806 to 960 930 to 965	100 60	

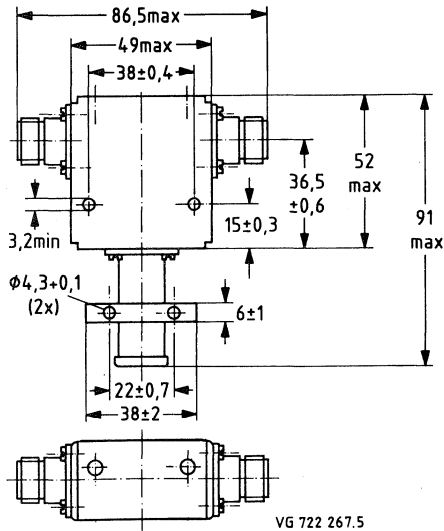


Fig. 12.

isolation		insertion loss		VSWR		temp. range °C	connector	mass g
min. dB	typ. dB	max. dB	typ. dB	max.	typ.			
20		0,5		1,25		-10 to +60	N female	400
45		0,7		1,25		-10 to +60	N	
45	55	1,0 0,8 0,8	0,7 0,6 0,6	1,25	1,15	-10 to +60	N female	700
50	55 - -	0,8 0,6 0,6	0,7 - -	1,25	1,15 - -	-20 to +60 -10 to +60 -10 to +60	N female	700
20	25	0,5	0,35	1,25	1,15	-10 to +60	N female SMA female	400
25		0,5		1,20		-10 to +60	N female	400
45	55	0,8	0,5	1,25	1,15 1,20	-10 to +60	N female	700 350

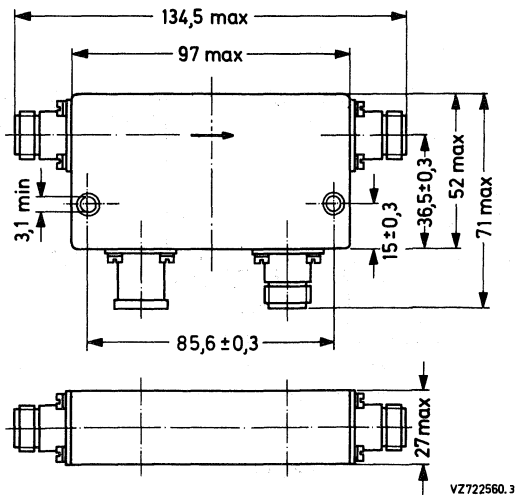


Fig. 13.

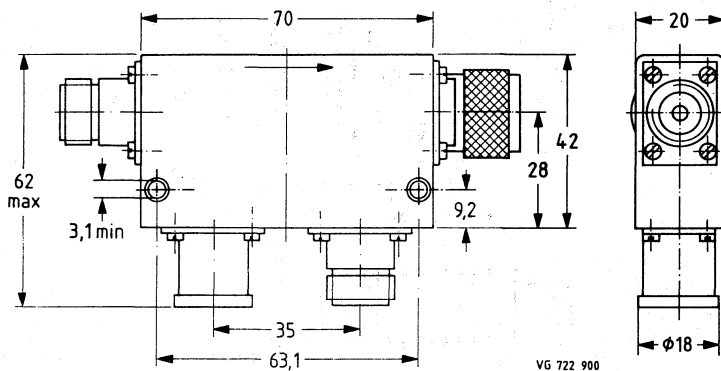


Fig. 14.

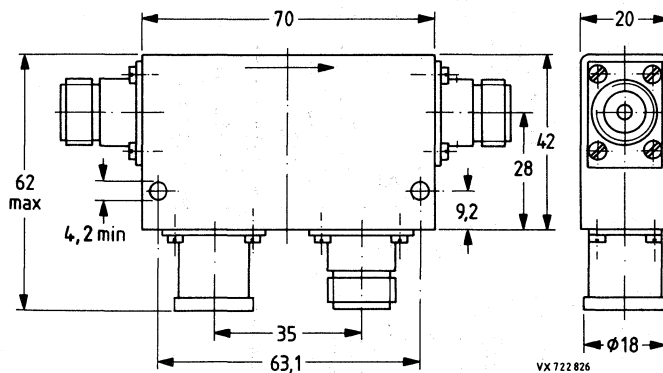


Fig. 15.

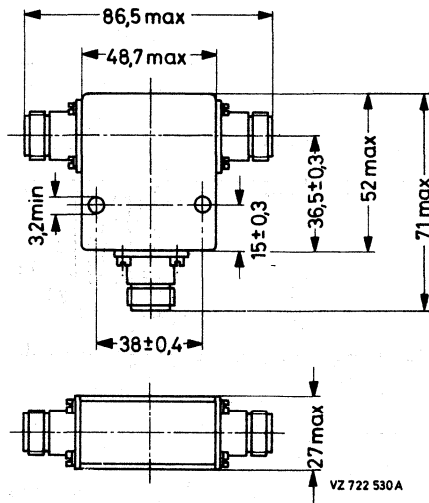


Fig. 16.

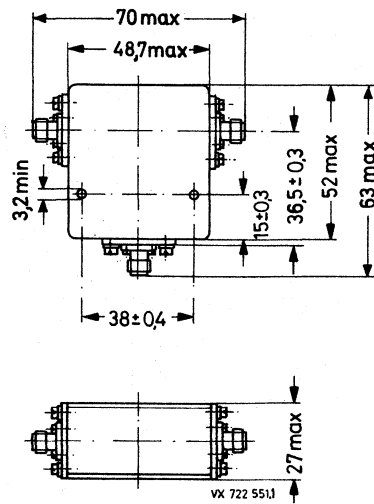


Fig. 17.

Preferred application: VHF television

type	dimensions Fig.	frequency range MHz	maximum power	
			CW W	peak W
2722 162 07001 07011	18	170 to 200 * 190 to 220 *	100	
2722 162 01871 01861 01851 03171	19	160 to 178 173 to 204 200 to 230 225 to 270	500	850
2722 162 03641 03631 03621 03651	20	160 to 178 173 to 204 200 to 230 225 to 270	500	850
2722 162 05031	22	195 to 205	1000	1800
2722 162 03681 03671 03661 03691	21	160 to 178 173 to 204 200 to 230 225 to 270	1000	1800
2722 162 01901 01891 01881 03181	22	160 to 178 173 to 204 200 to 230 225 to 270	1000	1800
2722 162 05971 05981	23	173 to 204 200 to 230	1500	1800

* Tunable instantaneous bandwidth for isolation 20 dB min. 6 MHz.

** With (filtered) air cooling at 250 Pa pressure drop; max. inlet temperature 40 °C; max. permissible temperature of the connectors +55 °C.

isolation		insertion loss		VSWR		temp. range °C	connector	mass g
min. dB	typ. dB	max. dB	typ. dB	max.	typ			
20		0,5		1,25		0 to +50	N female	
20	24	0,35	0,3	1,25	1,15	-10 to +60	N female	2100
20	24	0,35	0,3	1,25	1,15	-10 to +60	EIA 7/8"	2700
20		0,4		1,25		-10 to +40 **	N female	2100
20	24	0,35	0,3	1,25	1,15	-10 to +40 **	EIA 7/8"	2700
20	24	0,35	0,3	1,25	1,15	-10 to +40 **	HF 7/16 female	2150
20		0,35		1,25		-10 to +40 **	EIA 1 5/8"	

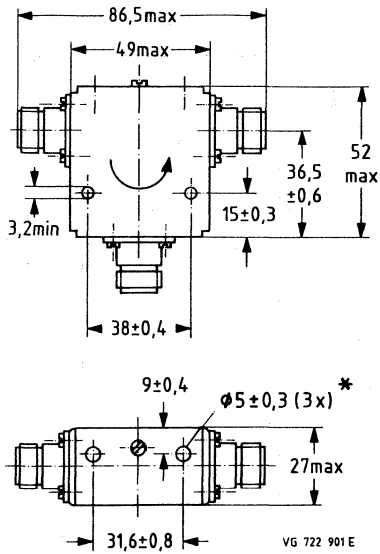


Fig. 18.

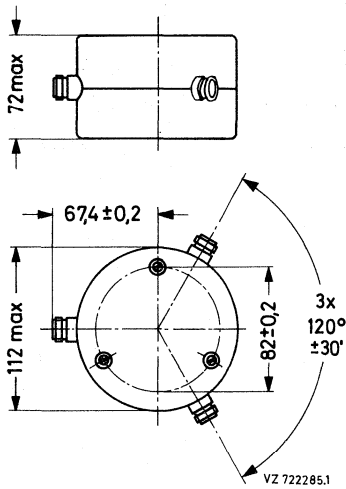


Fig. 19.

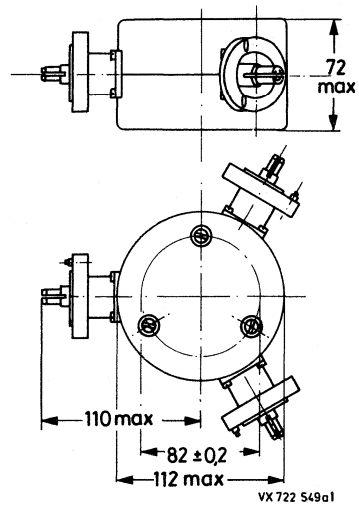


Fig. 20.

* note see page before

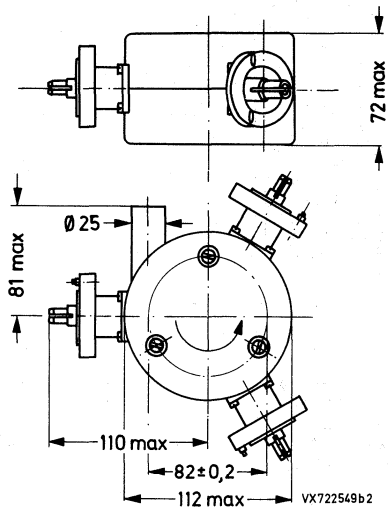


Fig. 21.

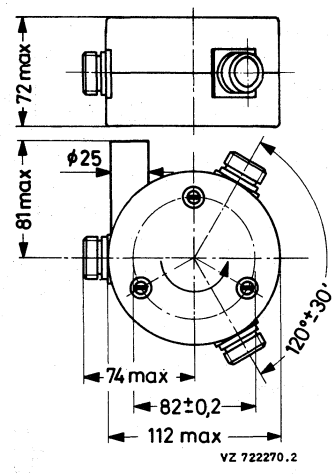


Fig. 22.

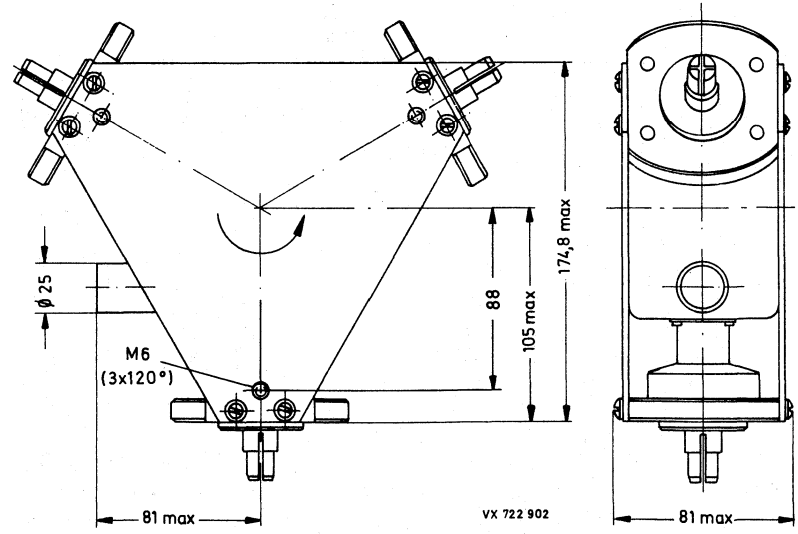


Fig. 23.

Preferred application: UHF television

type	dimensions Fig.	frequency range MHz	maximum power	
			CW W	peak W
2722 162 02691 02701 02401	24	470 to 600 600 to 800 790 to 1000	10	100
2722 162 02751 02741	25	600 to 800 790 to 1000	10	100
2722 162 02671 02681	26	470 to 600 600 to 800	10	100
2722 162 03871 03821 03811	27	470 to 600 600 to 800 790 to 1000	50	200
2722 162 01551 01563 01561 03261 03263*	28	470 to 600 550 to 650 600 to 800 790 to 1000 790 to 1000	100	200
2722 162 03961 03971 03981	29	470 to 600 600 to 800 790 to 1000	100	200

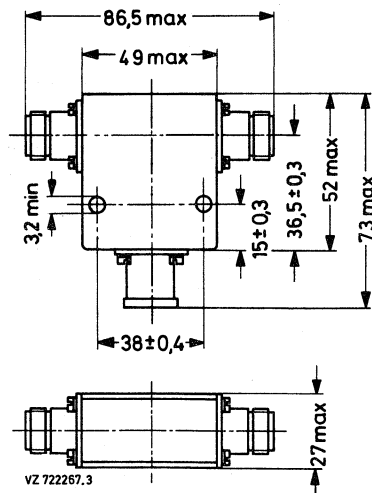


Fig. 24.

* Low noise.

isolation		insertion loss		VSWR		temp. range °C	connector **	mass g
min. dB	typ. dB	max. dB	typ. dB	max.	typ.			
20	25	0,5	0,35	1,25	1,15	-10 to + 60	N female	400
20	25	0,5	0,35	1,25	1,15	-10 to + 60	SMA female	400
20	25	0,5	0,35	1,25	1,15	-10 to + 60	4,1/9,5 female	400
20	25	0,5	0,35 0,35 0,3	1,25	1,15 1,15 1,14	-10 to + 60	SMA female	400
20	25	0,5	0,35 0,35 0,35 0,3 0,3	1,25	1,15 1,15 1,15 1,14 1,14	-10 to + 60	N female	400
20	25	0,5	0,35 0,35 0,3	1,25	1,15 1,15 1,14	-10 to + 60	N male	400

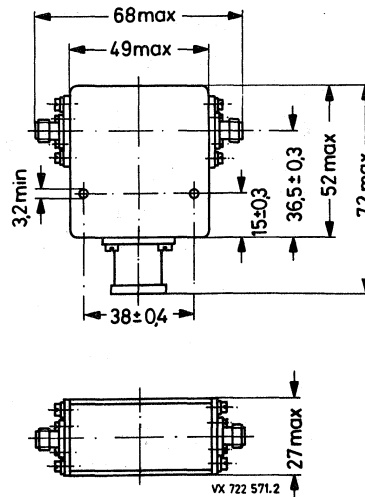


Fig. 25.

** Other connectors on request.

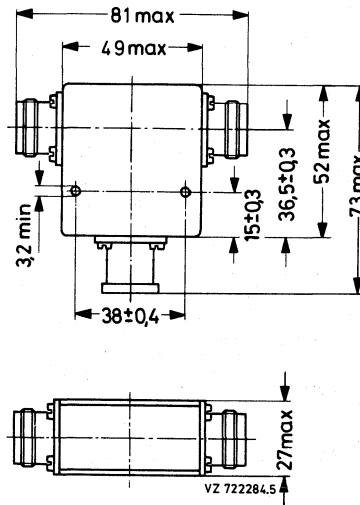


Fig. 26.

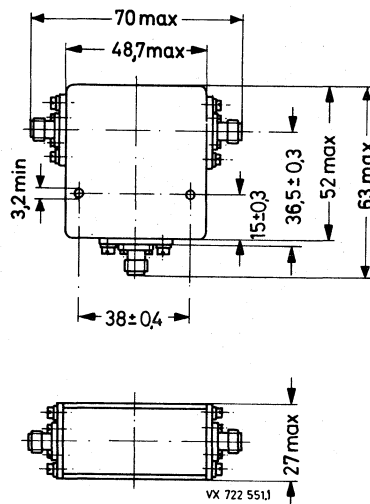


Fig. 28.

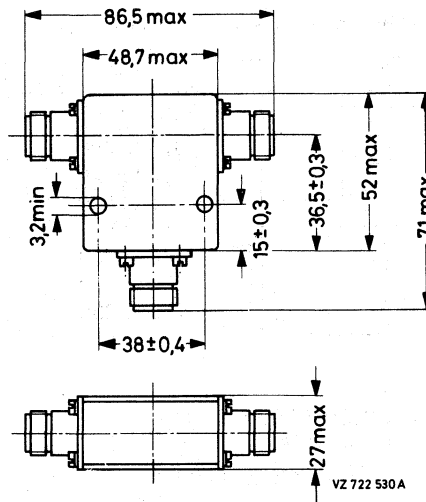


Fig. 27.

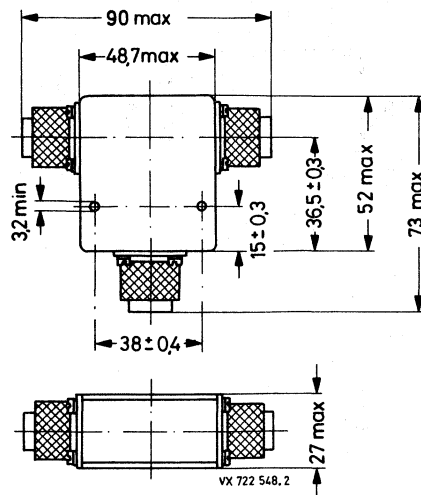


Fig. 29.

Preferred application: UHF television

type	dimensions Fig.	frequency range MHz	maximum power	
			CW W	peak W
2722 162 01572 01582 01592 01612	30	400 to 470 470 to 600 590 to 720 710 to 860	300	500
2722 162 01632 01642 01662	31	470 to 600 590 to 720 710 to 860	300	500

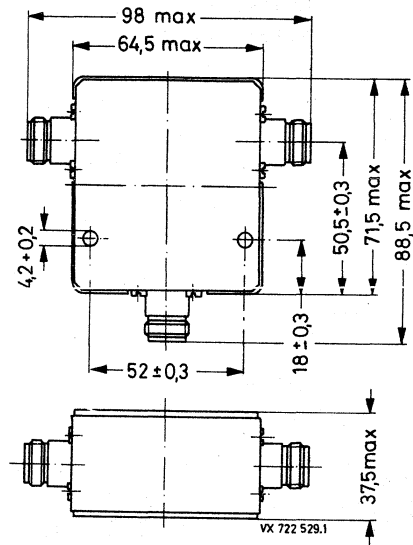


Fig. 30.

isolation		insertion loss		VSWR		temp. range °C	connector	mass
min. dB	typ. dB	max. dB	typ. dB	max.	typ.			
20	25	0,35	0,20	1,25	1,15	-10 to + 60	N female	1200
20	25	0,35	0,20	1,25	1,15	-10 to + 60	HF 7/16 female	1200

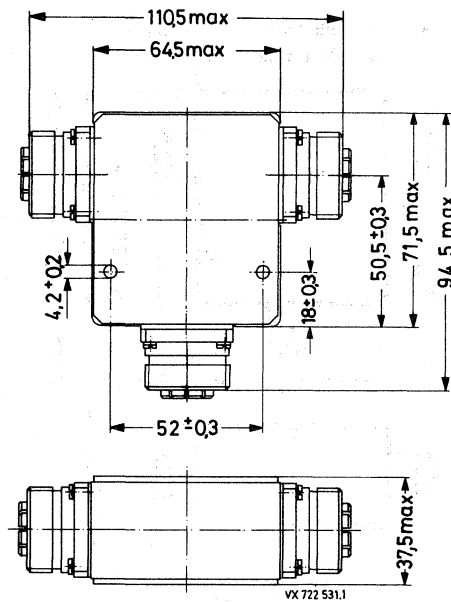


Fig. 31.

Preferred application: UHF television

type	dimensions Fig.	frequency range MHz	maximum power	
			CW W	peak W
2722 162 01121 03191 01131 01141	32	470 to 600 600 to 800 590 to 720 710 to 860	500	900
2722 162 03221 03231 03241 03251	33	470 to 600 600 to 800 590 to 720 710 to 860	500	900
2722 162 03141 03151 03201 03211	34	470 to 600 600 to 800 590 to 720 710 to 860	500	900
2722 162 05371 05381 05391	34	470 to 600 590 to 720 710 to 860	700	8000

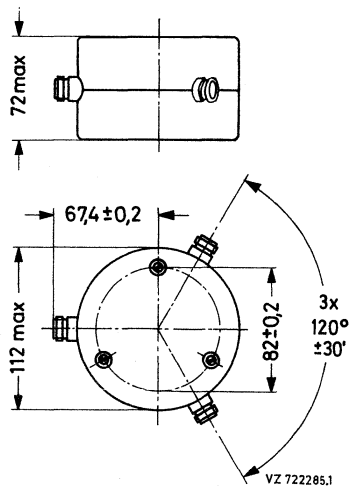


Fig. 32.

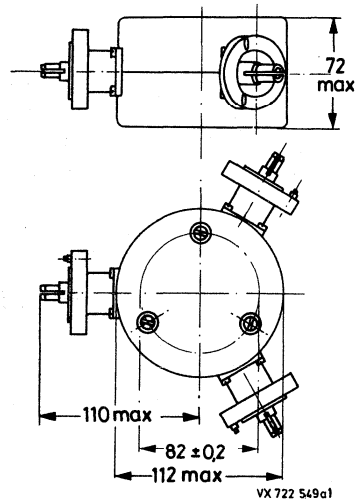


Fig. 33.

isolation		insertion loss		VSWR		temp. range °C	connector	mass
min. dB	typ. dB	max. dB	typ. dB	max.	typ.			
22	24	0,35	0,25	1,2	1,15	-10 to + 70	N female	2080
20	24	0,35	0,25	1,25	1,15	-10 to + 70	EIA 7/8"	2700
20	24	0,35	0,25	1,25	1,15	-10 to + 70	HF 7/16 female	2200
20		0,4		1,25		+ 5 to + 65	HF 7/16 female	2200

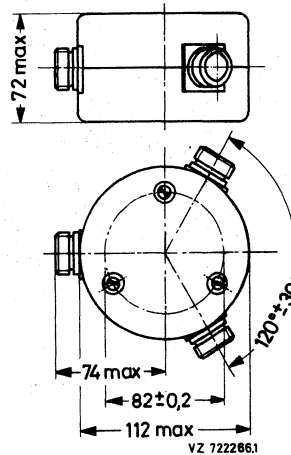


Fig. 34.

Preferred application: UHF television

type	dimensions Fig.	frequency range MHz	maximum power	
			CW W	peak W
2722 162 03991	35	433 to 435	2000	2000
2722 162 01771 01791 01781 01801	35	470 to 600 600 to 800 590 to 720 710 to 860	2000	2000
2722 162 01261 01331 01281 01271	36	470 to 600 600 to 800 590 to 720 710 to 860	2000	2000

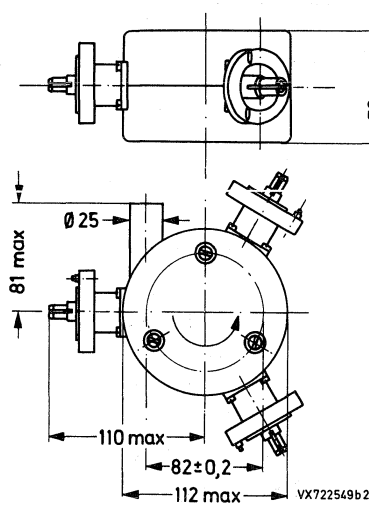


Fig. 35.

isolation		insertion loss		VSWR		temp. range °C	connector	mass
min. dB	typ. dB	max. dB	typ. dB	max.	typ.			
20	24	0,4	0,3	1,25	1,15	0 to 40*	EIA 7/8"	2700
20	24	0,35	0,25	1,25	1,15	-10 to + 40*	EIA 7/8"	2700
20 20 22 22	24 24 26 26	0,35	0,75	1,25	1,15	-10 to + 40*	HF 7/16 female	2200
				1,25				
				1,2				
				1,2				

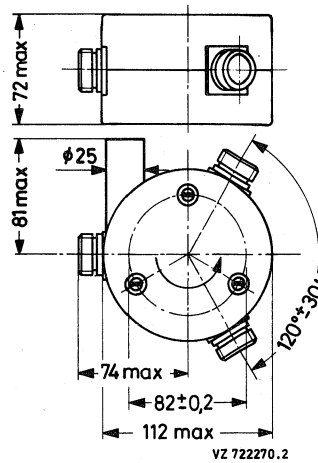


Fig. 36.

* With (filtered) air cooling, at 250 Pa pressure drop; 40 °C inlet temperature, max. permissible temperature of the connectors + 55 °C.

Preferred application: UHF television

type	dimensions Fig.	frequency range MHz	maximum power	
			CW W	peak W
2722 162 03051 03061 03071	37	470 to 600 590 to 720 710 to 860	2000	8000
2722 162 03001 03011 01981	38	470 to 600 590 to 720 710 to 860	2000	8000

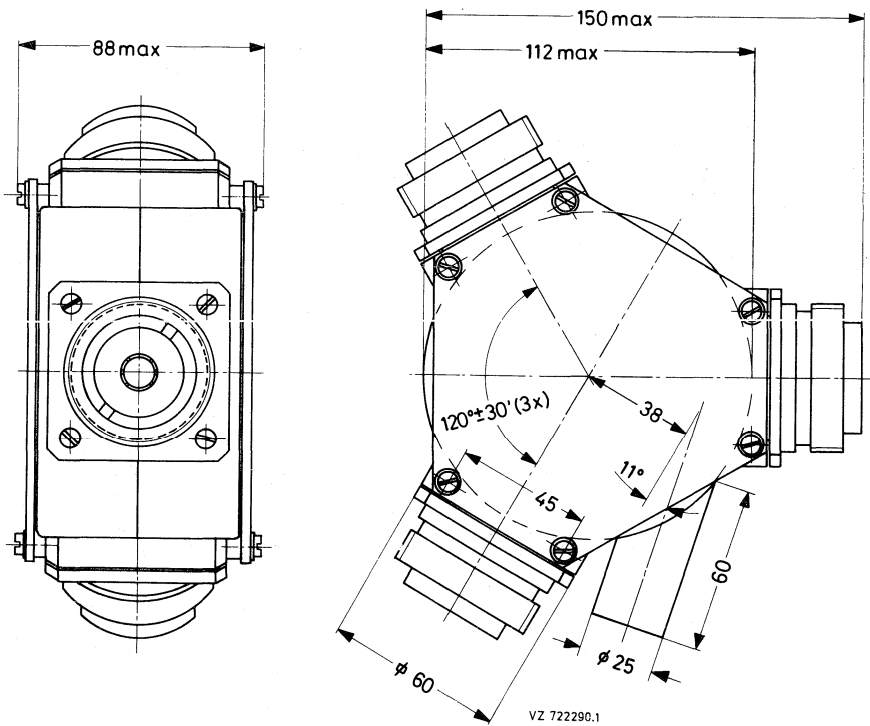
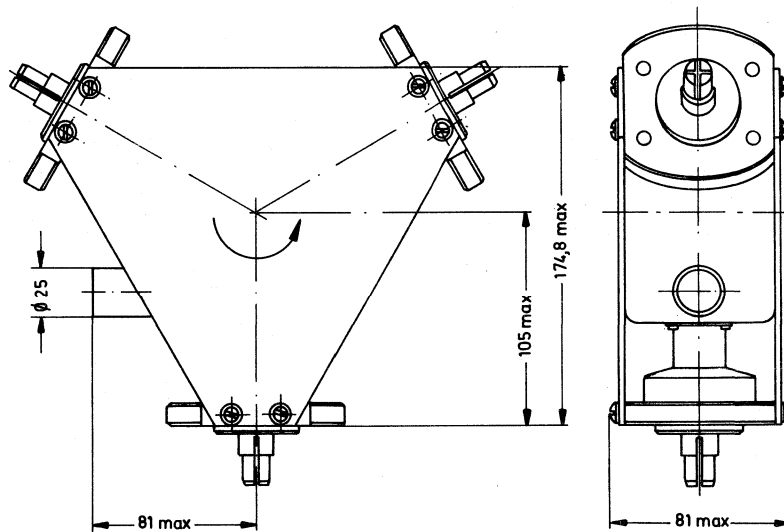


Fig. 37.

isolation		insertion loss		VSWR		temp. range °C	connector	mass
min. dB	typ. dB	max. dB	typ. dB	max.	typ.			
20		0,4		1,25		+ 5 to + 40*	HF 13/30 female	
20		0,4		1,25		+ 5 to + 40*	EIA 1 $\frac{5}{8}$ "	3900



VX 722 550.1

Fig. 38.

* With (filtered) air cooling at 250 Pa pressure drop; 40 °C inlet temperature, max. permissible temperature of the connectors + 55 °C.

Preferred application: radio links and navigation

type	dimensions Fig.	frequency range MHz	maximum power	
			CW W	reflected W
2722 162 02492 03802	39 40	1427 to 1535	10	
2722 162 05331	41	1350 to 1700	10	
2722 162 05571 06701	41 42	1350 to 2100	10	
2722 162 03591	40	960 to 1225	100	

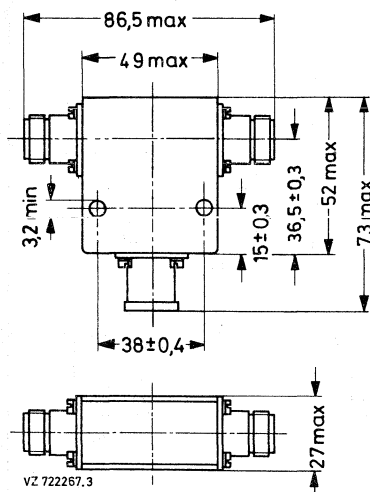


Fig. 39.

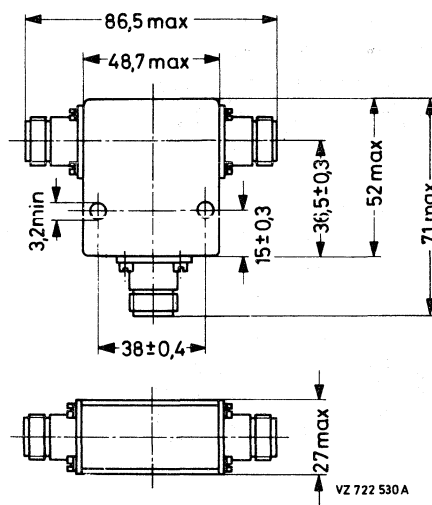


Fig. 40.

isolation		insertion loss		VSWR		temp. range °C	connector	mass
min. dB	typ. dB	max. dB	typ. dB	max.	typ.			
20	24	0,4	0,3	1,15	1,12	0 to 55	N female	400
20	23	0,4	0,3	1,2	1,15	0 to 45	SMA female	120
17		0,5		1,35		-15 to + 65	SMA female	120
20	22	0,5	0,35	1,25	1,20	-10 to + 60	N female	460

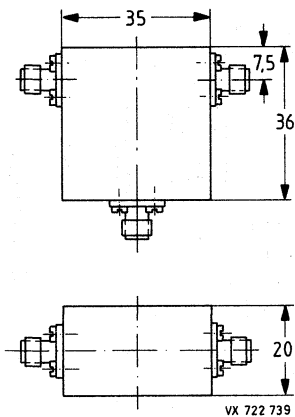


Fig. 41.

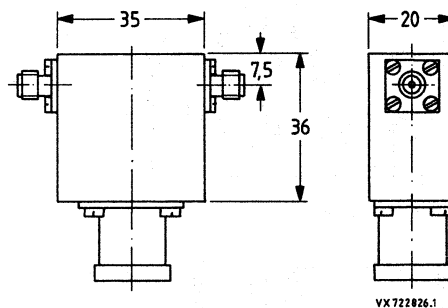


Fig. 42.

Preferred application: radio links

type	dimensions Fig.	frequency range MHz	maximum power	
			CW W	reflected W
2722 162 02521 02531 02541 02551	45	1470 to 1620 1590 to 1800 1760 to 1940 1890 to 2110	1	1
2722 162 02631 02641 02651 02661	46	1470 to 1620 1590 to 1800 1760 to 1940 1890 to 2110	15	15
2722 162 05241 05251 05231	47	1700 to 2100	30	
2722 162 05261 05271	47	1900 to 2300	30	
2722 162 02571 02581 02591 02601	43	1700 to 2100 1700 to 2100 1900 to 2300 1900 to 2300	15	15
2722 162 05311 05341 05351 05361 05401 05411	43	1700 to 2100 1900 to 2300 2100 to 2500 2300 to 2700 2450 to 2850 2000 to 2700	10	
2722 162 05471	44	1900 to 2300	15	

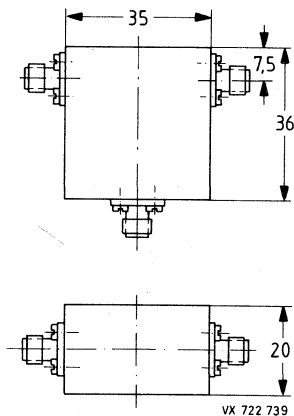


Fig. 43.

isolation		insertion loss		VSWR		temp. range °C	connector	mass
min. dB	typ. dB	max. dB	typ. dB	max.	typ.			
20	23	0,4	0,3	1,22	1,15	0 to 55	solder pins	100
20	23	0,4	0,3	1,22	1,15	0 to 55	SMA female	150
26 26 20		0,3		1,11 1,11 1,25		0 to 55	SMA 2 x female 1 x male	120
26		0,3		1,11		0 to 55	SMA 2 x female 1 x male	
26		0,25		1,11		0 to 55	SMA 2 x female 1 x male	140
20		0,4		1,2		-20 to + 55	SMA female	120
23		0,3		1,1		- 10 to + 70	1 x N female 2 x SMA female	150

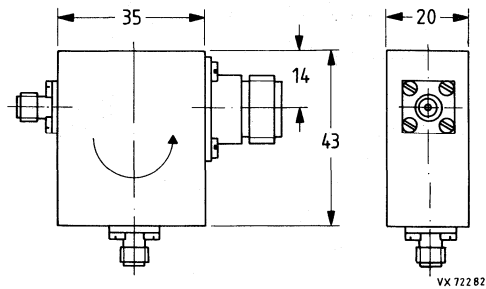


Fig. 44.

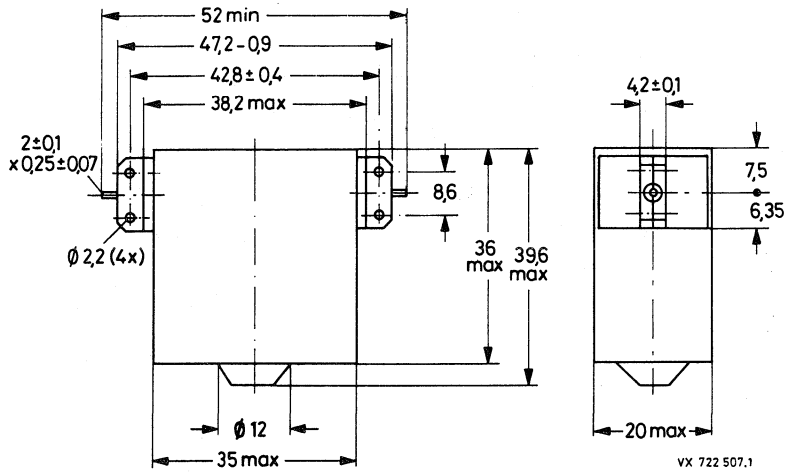


Fig. 45.

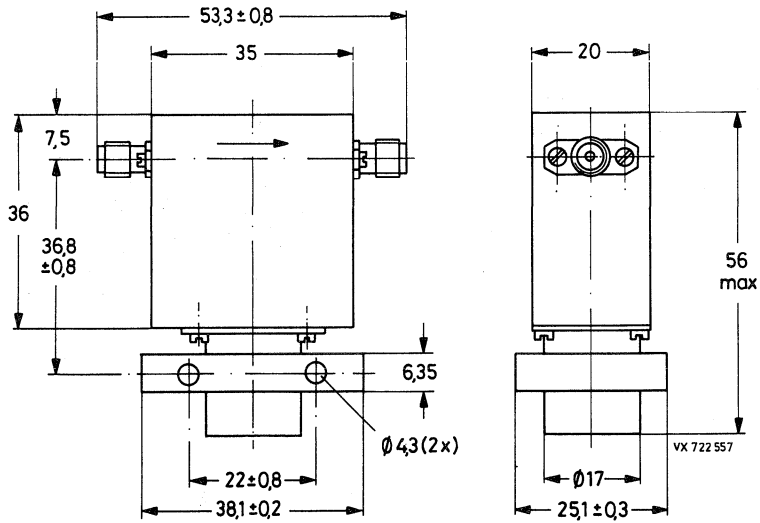


Fig. 46.

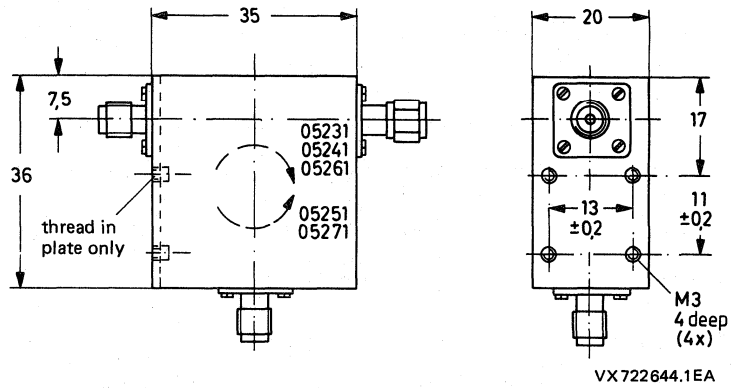


Fig. 47.

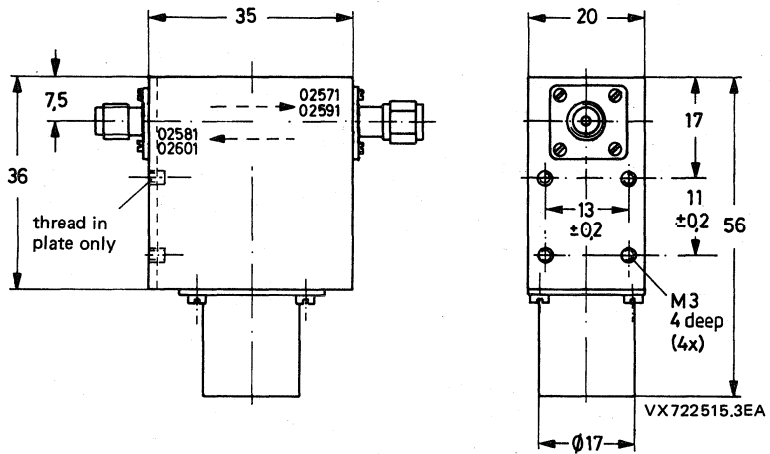


Fig. 48.

Preferred application: radio links

type	dimensions Fig.	frequency range MHz	maximum power	
			CW W	reflected W
2722 162 03881 03891 03901	49	1680 to 1920 1880 to 2120 2080 to 2320	20	
2722 162 03911 03921 03931	50	1680 to 1920 1880 to 2120 2080 to 2320	50	
2722 162 03951 03941	49 50	1700 to 2300	20 50	
2722 162 02191 02511	51 52	1700 to 2300	20	5

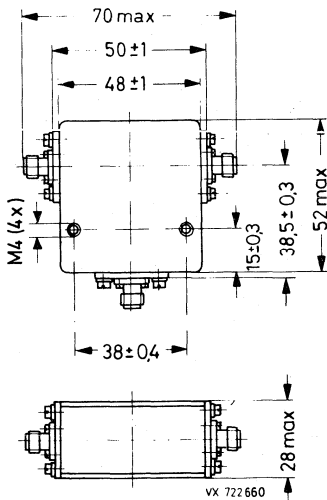


Fig. 49.

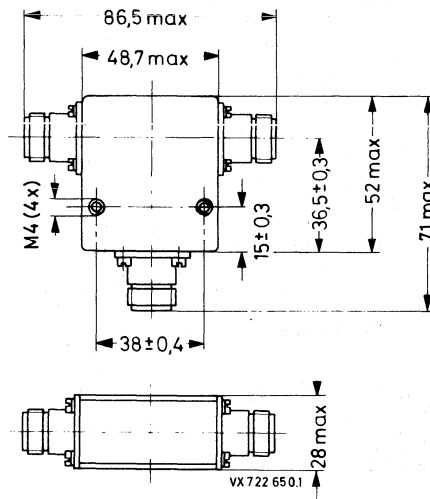


Fig. 50.

isolation		insertion loss		VSWR		temp. range °C	connector	mass
min. dB	typ. dB	max. dB	typ. dB	max.	typ.			
25		0,35		1,12		0 to + 50	SMA female	400
23		0,40		1,15		-20 to + 60	N female	400
20		0,3		1,25		0 to + 55	SMA female N female	400
20		0,3		1,25		0 to + 55	N m + f SMA m + f	400

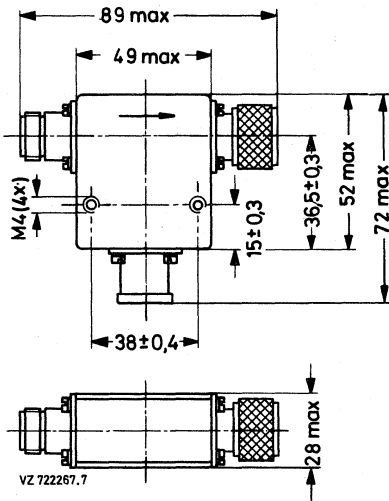


Fig. 51.

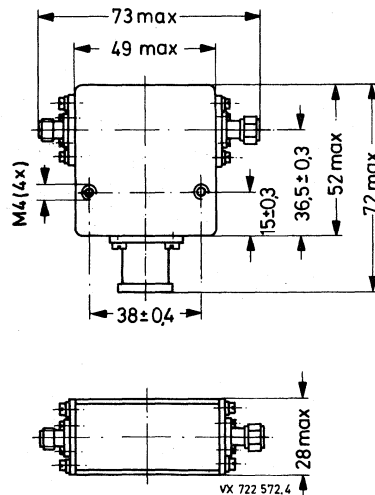


Fig. 52.

ISOLATORS 2 GHz
FOR
P.C. BOARD MOUNTING

Preferred application: radio links

type	dimensions Fig.	frequency range MHz	maximum power	
			CW W	reflected W
2722 162 06031 06321 06041 06051 06331 06061	53	1630 to 1780 1815 to 1925 1890 to 1990 2038,5 to 2108,5 2074 to 2184 2297,5 to 2367,5	1	1

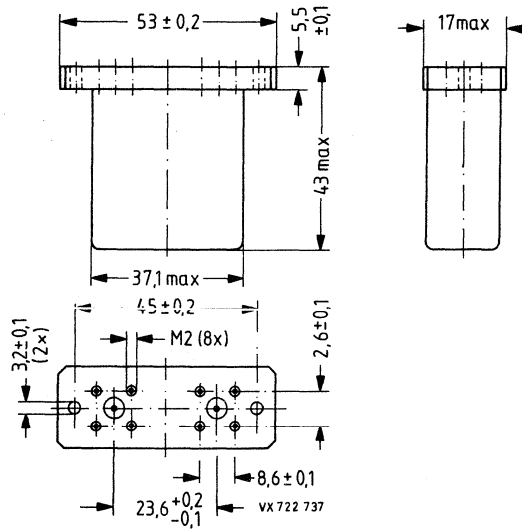


Fig. 53.

**ISOLATORS 2 GHz
FOR
P.C. BOARD MOUNTING**

isolation		insertion loss		VSWR		temp. range °C	connector	mass
min. dB	typ. dB	max. dB	typ. dB	max.	typ.			
20		0,4		1,25		-20 to + 60	SMA female, modified	110

4-PORT
CIRCULATORS
2 GHz

Preferred application: television

type	dimensions Fig.	frequency range MHz	maximum power	
			CW W	reflected W
2722 162 04051 04061	54	1700 to 2100 1900 to 2300	30	15
2722 162 04091 04101	54	1700 to 2100 1900 to 2300	30	

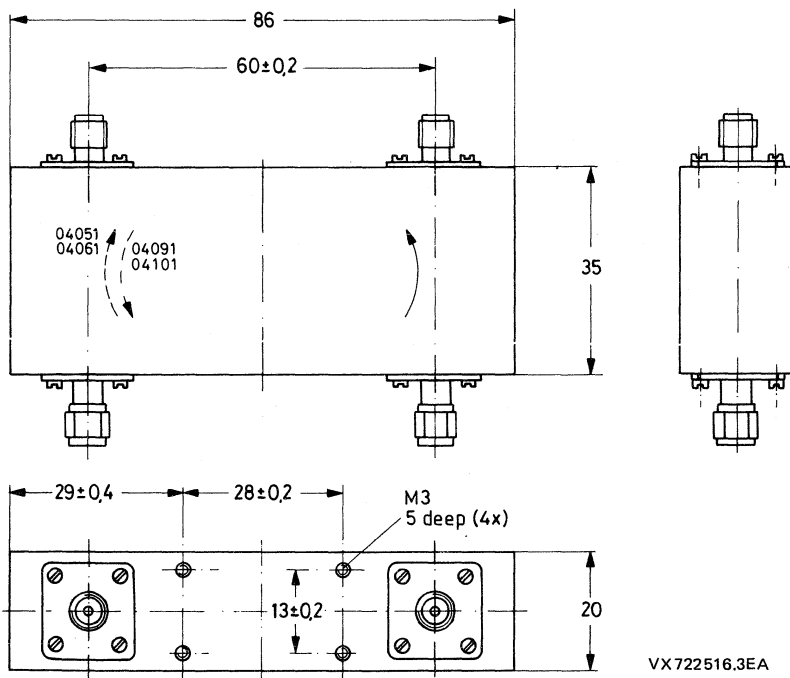


Fig. 54.

4-PORT
CIRCULATORS
2 GHz

isolation		insertion loss		VSWR		temp. range °C	connector	mass
min. dB	typ. dB	max. dB	typ. dB	max.	typ.			
26		0,25		1,11		0 to + 55	SMA male 2 x female 2 x	220
26		0,25		1,11		0 to + 55	SMA male 2 x female 2 x	220

Preferred application: radio links and navigation

type	dimensions Fig.	frequency range MHz	maximum power	
			CW W	reflected W
2722 162 02471	55	4200 to 4400	10	1,5
2722 162 03431 03441	56	3800 to 4200 4400 to 5000	10	
2722 162 04031 04041	57	3800 to 4200 4400 to 5000	10	

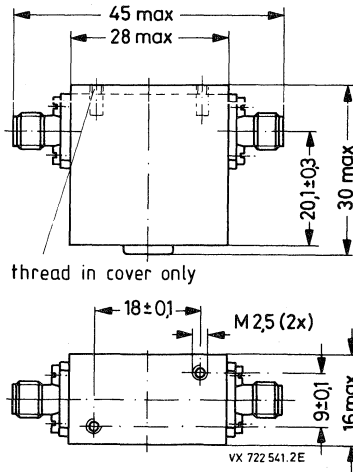


Fig. 55.

isolation		insertion loss		VSWR		temp. range °C	connector	mass
min. dB	typ. dB	max. dB	typ. dB	max.	typ.			
23	25	0,3	0,25	1,2	1,12	-55 to + 90	SMA female	60
25	27	0,25	0,2	1,12	1,10	-10 to + 70	SMA female	110
25	27	0,25	0,2	1,12	1,10	-10 to + 70	SMA female	220

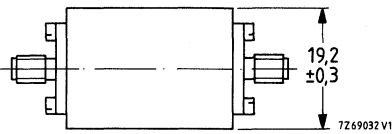
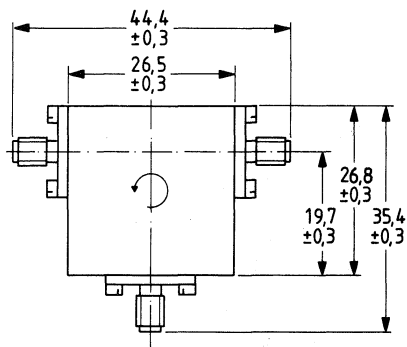


Fig. 56.

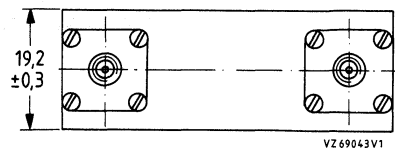
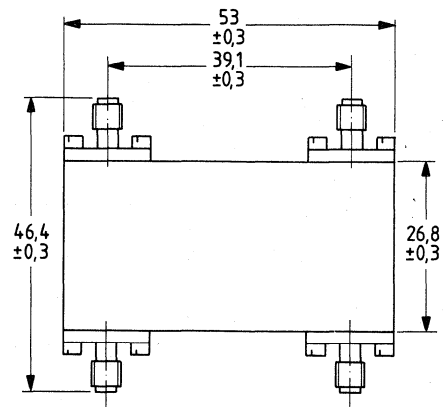


Fig. 57.

Preferred application: radio links

type	dimensions Fig.	frequency range MHz	maximum power	
			CW W	reflected W
2722 161 04003 04052 04062	58	5925 to 6425 6425 to 7125 7125 to 7750	200	3
2722 161 02212 02312 02322	59	5925 to 6425 6425 to 7125 7125 to 7750	200	

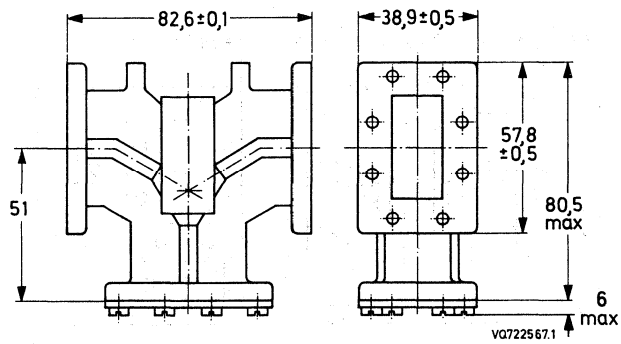


Fig. 58.

isolation		insertion loss		VSWR		temp. range °C	connector	mass
min. dB	typ. dB	max. dB	typ. dB	max.	typ.			
28		0,2		1,08		0 to + 50	IEC-UER 70	230
28		0,2		1,08		0 to + 50	IEC-UER 70	230

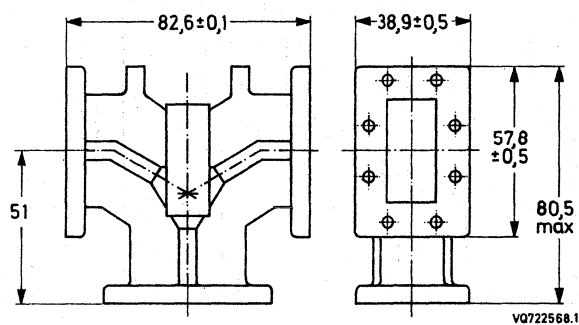


Fig. 59.

OCTAVE BANDWIDTH
CIRCULATORS/
ISOLATORS

Preferred application: microwave measurements

type	dimensions Fig.	frequency range MHz	maximum power	
			CW W	reflected W
2722 162 02091 01491	60 61	2000 to 4000	50	
2722 162 02101 01501	62 63	2000 to 4000	50	
2722 162 02071 01511	64 65	3000 to 6000	20	
2722 162 02111 01811	66 67	4000 to 8000	10	
2722 162 02122 01822	68 69	7000 to 12400	10	
2722 162 02221 03301	70 71	12000 to 18000	5	
2722 162 02231 02501	72 73	7900 to 10400 8900 to 9600	5	
2722 161 02071	74	8200 to 11200	50	

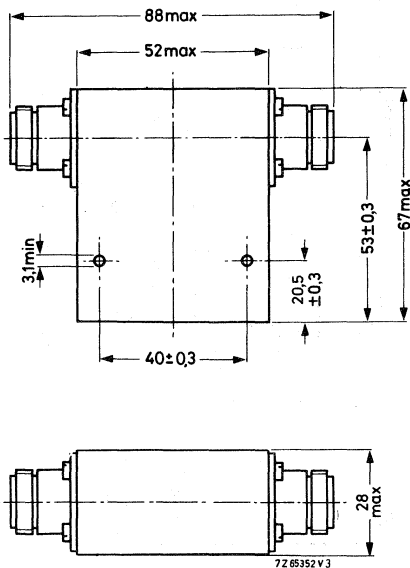


Fig. 60.

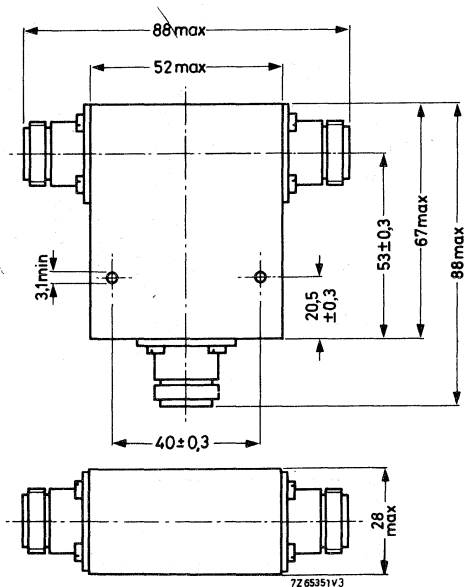


Fig. 61.

isolation		insertion loss		VSWR		temp. range °C	connector	mass
min. dB	typ. dB	max. dB	typ. dB	max.	typ.			
20	24	0,5	0,35	1,25	1,15	-10 to + 70	N female	300
20	24	0,5	0,35	1,25	1,15	-10 to + 70	SMA female	300
20	24	0,5	0,3	1,25	1,15	-10 to + 70	SMA female	120
20	24	0,5	0,3	1,25	1,15	-10 to + 70	SMA female	100
20	24	0,6	0,35 0,4	1,25	1,15	-10 to + 70	SMA female	60
20 18	22	0,6	0,35	1,3	1,2	-10 to + 70	SMA female	20
20	22	0,4	0,35	1,25	1,23	-10 to + 70	SMA female	30
22	30	0,5	0,3	1,18	1,15	+ 10 to + 40	IEC-UBR 100	500

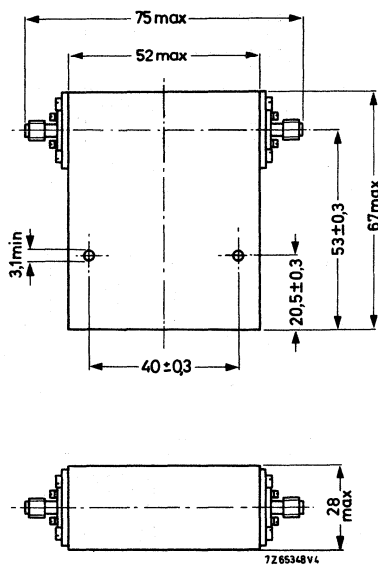


Fig. 62.

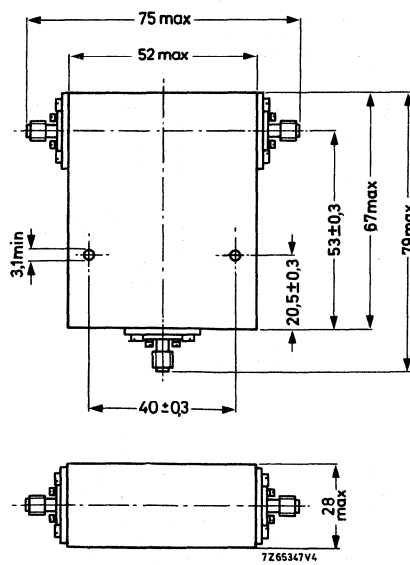


Fig. 63.

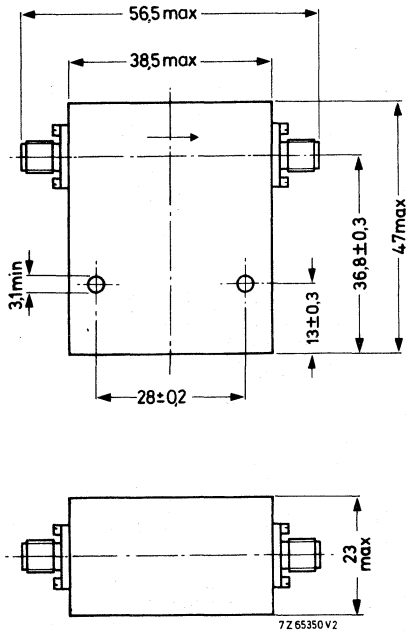


Fig. 64.

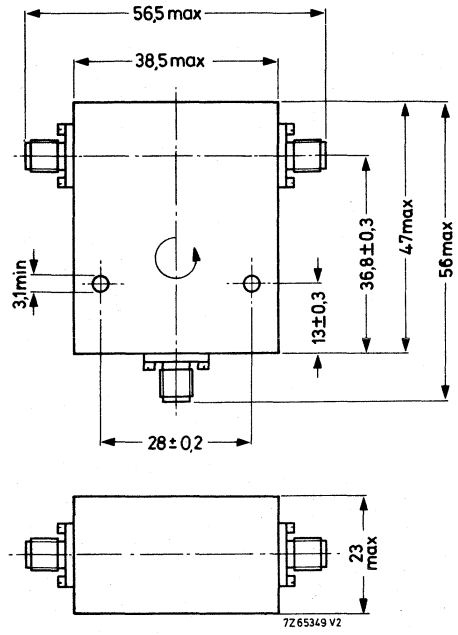


Fig. 65.

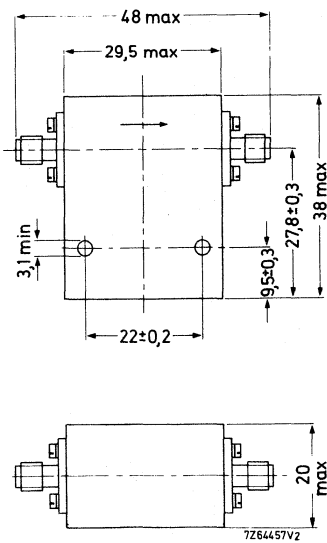


Fig. 66.

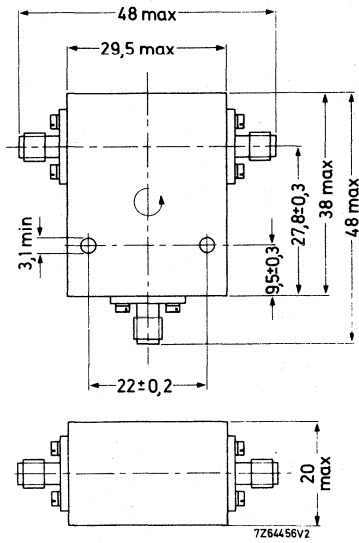


Fig. 67.

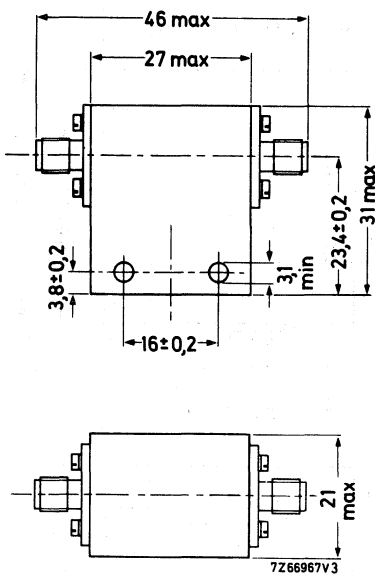


Fig. 68.

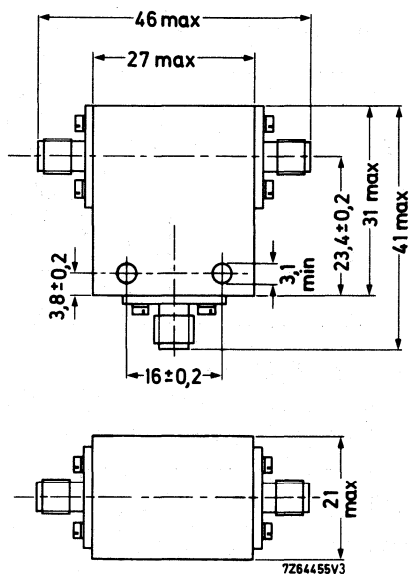


Fig. 69.

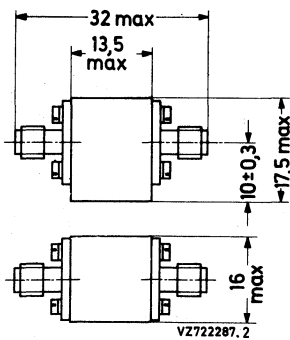


Fig. 70.

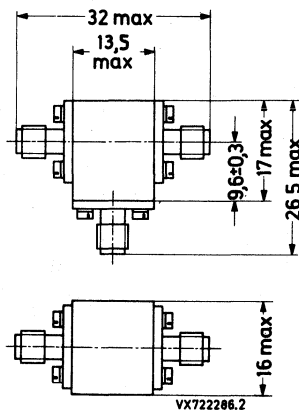


Fig. 71.

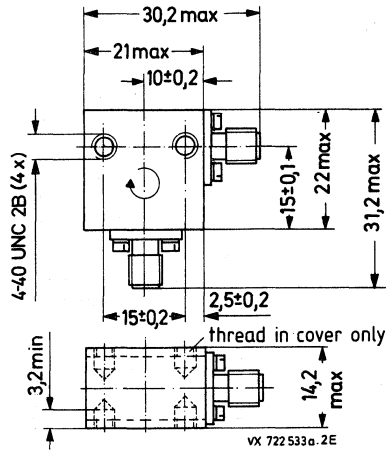


Fig. 72.

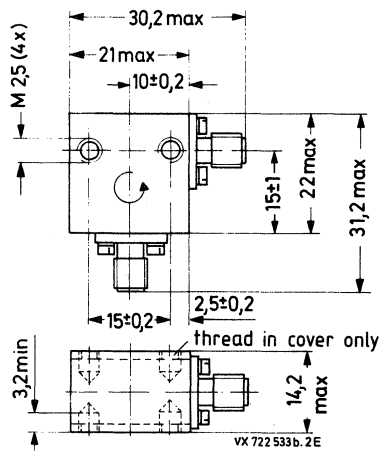


Fig. 73.

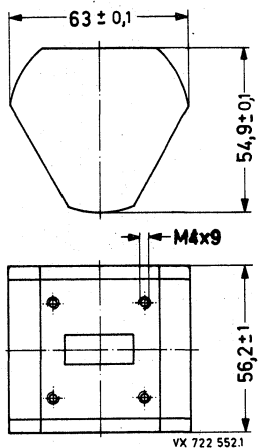


Fig. 74.

Preferred application: radar

type	dimensions Fig.	frequency range MHz	maximum power	
			CW W	reflected W
2722 161 01221 01222*	75	8500 to 9600	1	
2722 161 01361	76	8500 to 9600	5	
2722 161 01211 01261	77 78	8500 to 9600	10	
2722 161 01531	79	10025 to 10325	1	

* With M4-Helicoil.

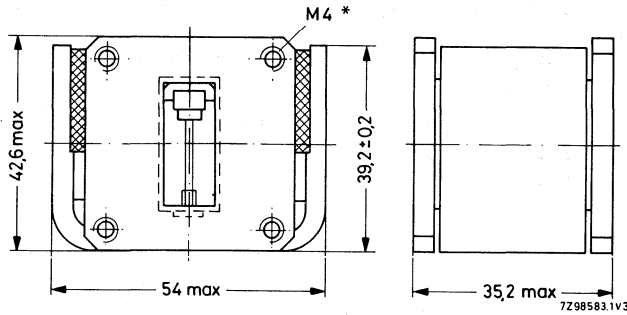


Fig. 75.

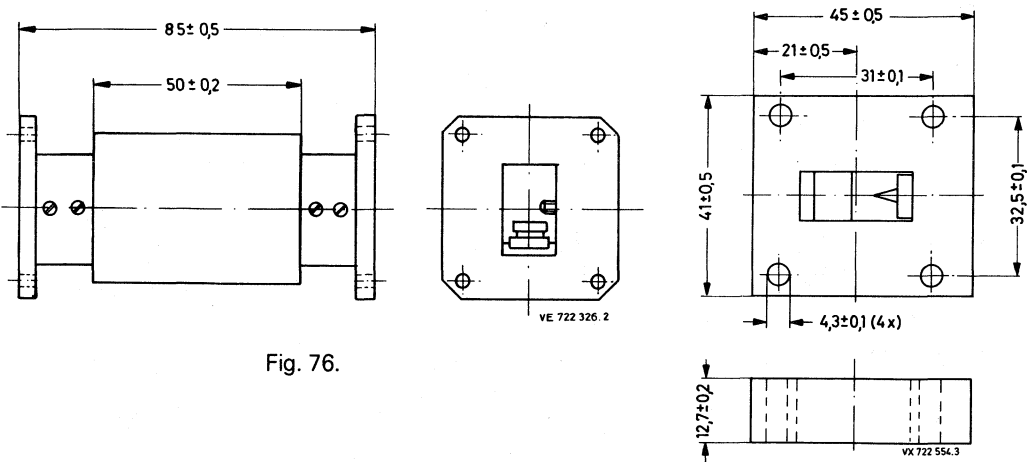


Fig. 76.

Fig. 79.

isolation		insertion loss		VSWR		temp. range °C	connector	mass
min. dB	typ. dB	max. dB	typ. dB	max.	typ.			
15		0,6		1,15		+ 10 to + 70	IEC-UBR 100	400
30		0,5		1,05		-10 to + 70	IEC-UBR 100	600
30 55		0,5 1,2		1,05 1,20		-10 to + 70	IEC-UBR 100	420 600
20		0,4		1,25		-40 to + 85	IEC-UBR 100	50

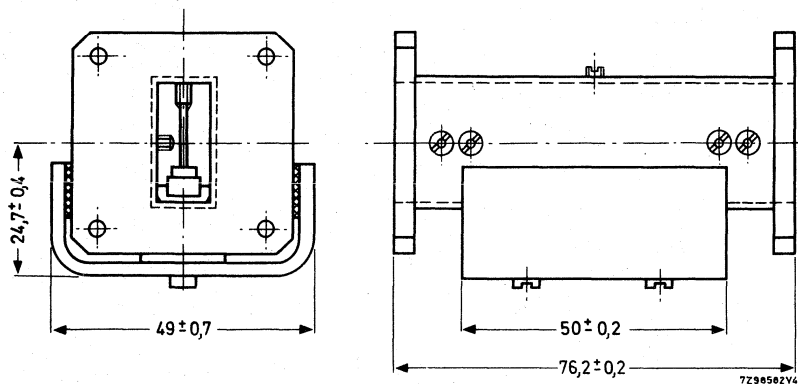


Fig. 77.

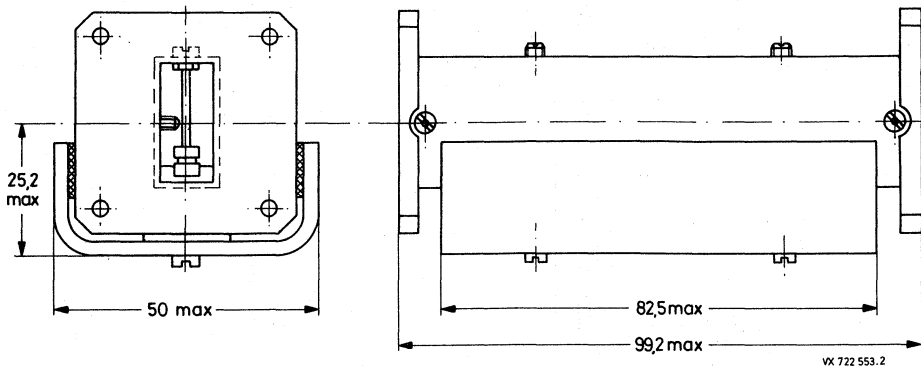


Fig. 78.

Preferred application: microwave heating

type	dimensions Fig.	frequency range MHz	maximum power	
			CW W	reflected W
2722 163 02091 02081	80 81	2350 to 2400	3000	3000
2722 163 02071 02061	80 81	2425 to 2475	3000	3000

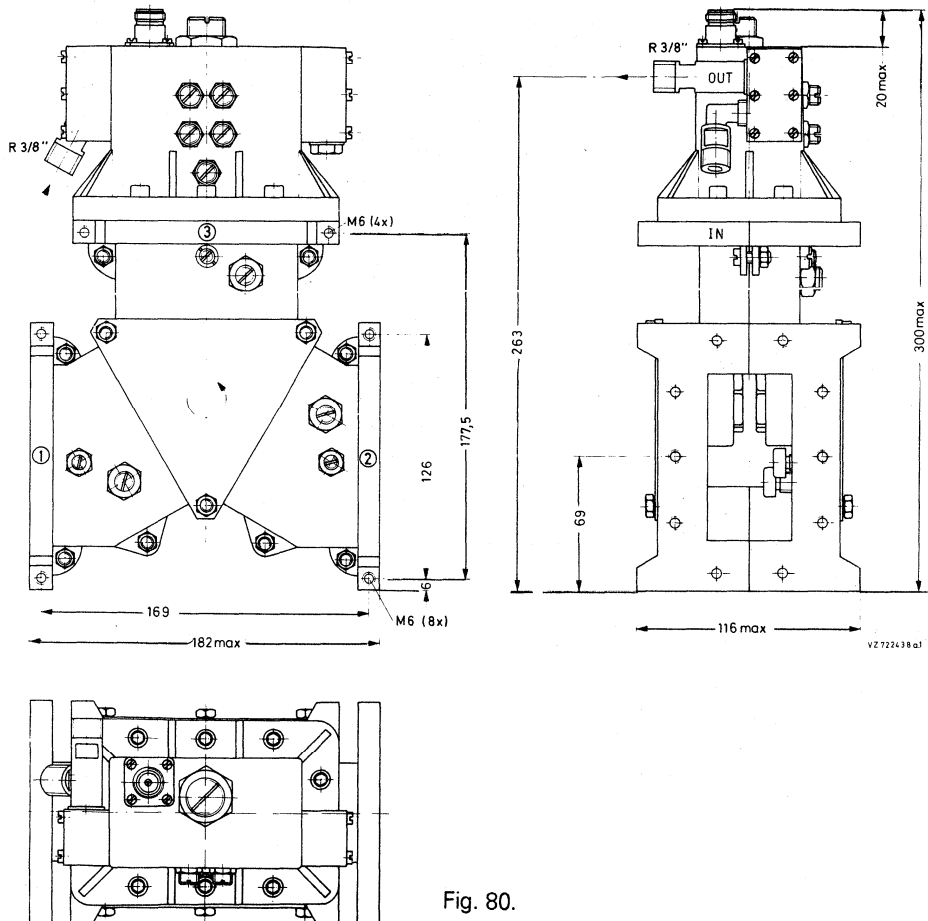


Fig. 80.

isolation		insertion loss		VSWR		temp. range °C	connector	mass
min. dB	typ. dB	max. dB	typ. dB	max.	typ.			
20	26	0,3	0,2	1,25*		θ_1 : max. + 40 θ_2 : max. + 50	IEC-PDR 26, monitor- output: N female	4500
20	26	0,3	0,2	1,25*		θ_1 : max. + 40 θ_2 : max. + 50		4500

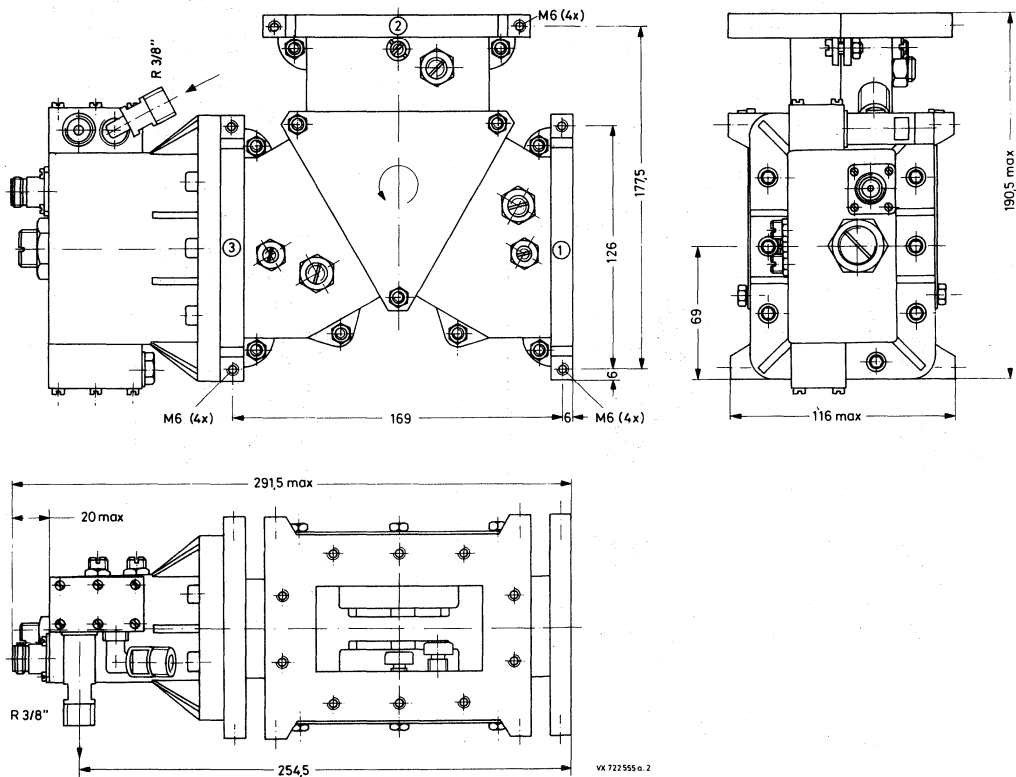


Fig. 81.

* With output short-circuited: $S \leq 1,5$.

Preferred application: microwave heating

type	dimensions Fig.	frequency range MHz	maximum power	
			CW W	reflected W
2722 163 02024 02025	82 83	2350 to 2400	6500	6500
2722 163 02004 02005	82 83	2425 to 2475	6500	6500

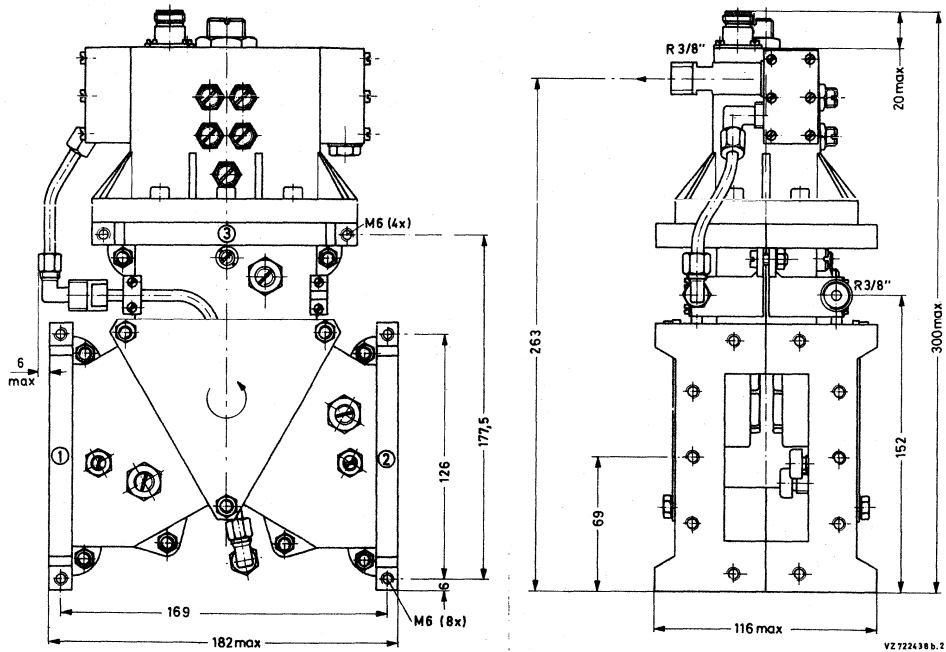


Fig. 82.

isolation		insertion loss		VSWR		temp. range °C	connector	mass
min. dB	typ. dB	max. dB	typ. dB	max.	typ.			
20	26	0,3	0,2	1,25 *	1,1	θ_1 : max. + 40 θ_2 : max. + 50	IEC-PDR 26, monitor- output: N female	4700
20	26	0,3	0,2	1,25 *	1,1	θ_1 : max. + 40 θ_2 : max. + 50		4700

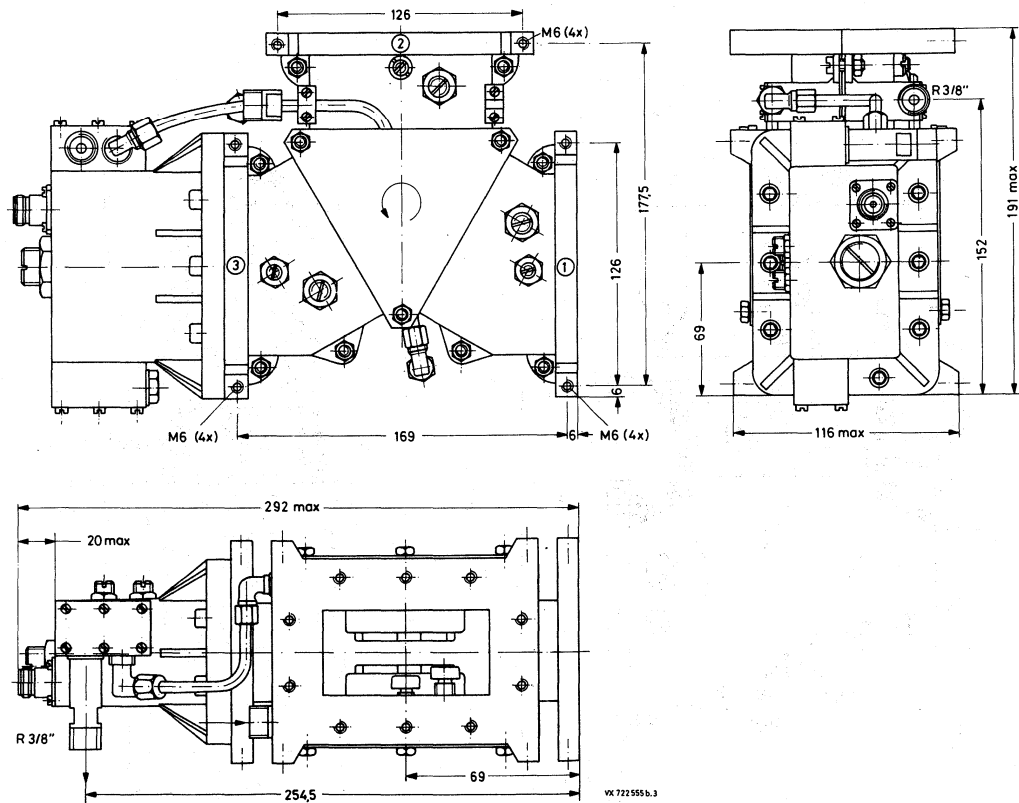


Fig. 83.

* With output short-circuited: $S \leq 1,5$.

**POWER CIRCULATOR
AND WATER LOAD**

Preferred application: microwave heating

type	dimensions Fig.	frequency range MHz	maximum power	
			CW W	W
2722 163 01021	84	2425 to 2475	6500	

Water load; type 2722 163 02051; dimensions Fig.85; θ_1 : max. + 40 °C; θ_2 : max. 50 °C;
connector: IEC-PDR26, monitor output: N female.

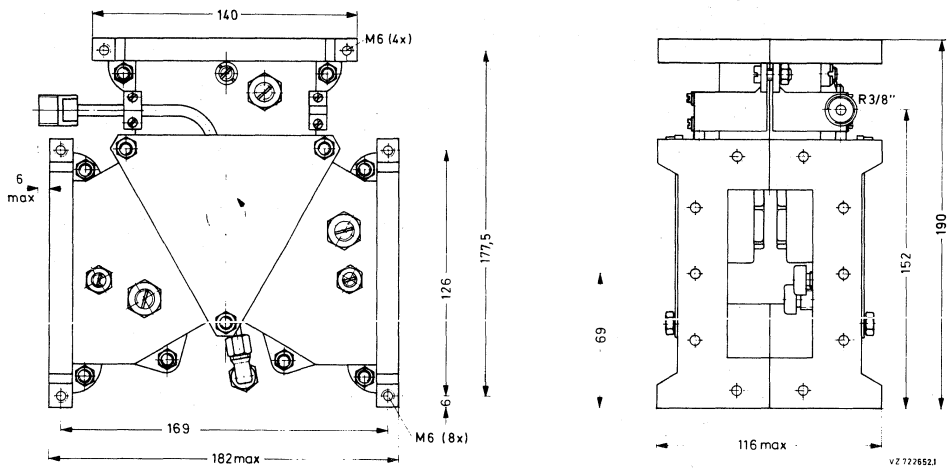


Fig. 84.

isolation		insertion loss		VSWR		temp. range °C	connector	mass
min. dB	typ. dB	max. dB	typ. dB	max.	typ.			
20		0,3		1,25 *		θ_1 : max. + 40 θ_2 : max. + 50	IEC-PDR 26	

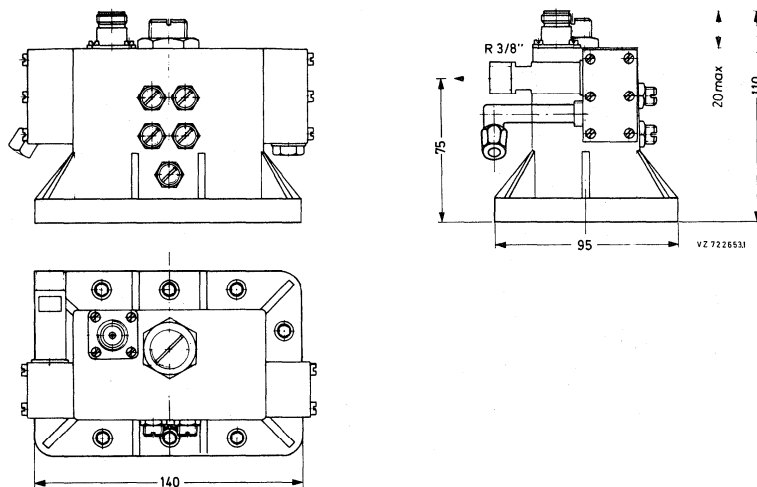


Fig. 85.

* With output short-circuited: $S \leq 1,5$.

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2722 162 01861	36	2722 162 02857	32	2722 162 03691	36
2722 162 01871	36	2722 162 02862	26	2722 162 03722	28
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2722 162 03831	26	2722 162 05261	54	2722 162 06321	60
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NOTES

NOTES

DATA HANDBOOK SYSTEM

DATA HANDBOOK SYSTEM

Our Data Handbook System comprises more than 60 books with specifications on electronic components, subassemblies and materials. It is made up of six series of handbooks:

INTEGRATED CIRCUITS

DISCRETE SEMICONDUCTORS

DISPLAY COMPONENTS

PASSIVE COMPONENTS*

PROFESSIONAL COMPONENTS**

MATERIALS*

The contents of each series are listed on pages iii to viii.

The data handbooks contain all pertinent data available at the time of publication, and each is revised and reissued periodically.

When ratings or specifications differ from those published in the preceding edition they are indicated with arrows in the page margin. Where application is given it is advisory and does not form part of the product specification.

Condensed data on the preferred products of Philips Components is given in our Preferred Type Range catalogue (issued annually).

Information on current Data Handbooks and how to obtain a subscription for future issues is available from any of the Organizations listed on the back cover.

Product specialists are at your service and enquiries will be answered promptly.

* Will replace the Components and materials (green) series of handbooks.

** Will replace the Electron tubes (blue) series of handbooks.

INTEGRATED CIRCUITS

This series of handbooks comprises:

code	handbook title
IC01	Radio, audio and associated systems Bipolar, MOS
IC02a/b	Video and associated systems Bipolar, MOS
IC03	ICs for Telecom Bipolar, MOS Subscriber sets, Cordless Telephones
IC04	HE4000B logic family CMOS
IC05	not yet issued
IC06	High-speed CMOS; PC74HC/HCT/HCU Logic family
IC07	Advanced CMOS logic (ACL)
IC08	ECL 10K and 100K logic families
IC09N	TTL logic series
IC10	Memories MOS, TTL, ECL
IC11	Linear Products
Supplement to IC11	Linear Products
IC12	I²C-bus compatible ICs
IC13	Semi-custom Programmable Logic Devices (PLD)
IC14	Microcontrollers NMOS, CMOS
IC15	FAST TTL logic series
IC16	CMOS integrated circuits for clocks and watches
IC17	ICs for Telecom Bipolar, MOS Radio pagers Mobile telephones ISDN
IC18	Microprocessors and peripherals
IC19	Data communication products

DISCRETE SEMICONDUCTORS

This series of data handbooks comprises:

current code	new code	handbook title
S1	SC01	Diodes High-voltage tripler units
S2a	SC02*	Power diodes
S2b	SC03*	Thyristors and triacs
S3	SC04*	Small-signal transistors
S4a	SC05*	Low-frequency power transistors and hybrid IC power modules
S4b	SC06	High-voltage and switching power transistors
S5	SC07*	Small-signal field-effect transistors
S6	SC08*	RF power transistors
	SC09*	RF power modules
S7	SC10	Surface mounted semiconductors
S8a	SC11*	Light emitting diodes
S8b	SC12*	Optocouplers
S9	SC13*	PowerMOS transistors
S10	SC14*	Wideband transistors and wideband hybrid IC modules
S11	SC15	Microwave transistors
S15**	SC16	Laser diodes
S13	SC17	Semiconductor sensors
S14	SC18*	Liquid crystal displays and driver ICs for LCDs

* Not yet issued with the new code in this series of handbooks.

** New handbook in this series; will be issued shortly.

DISPLAY COMPONENTS

This series of data handbooks comprises:

current code	new code	handbook title
T8	DC01	Colour display systems
T16	DC02*	Monochrome tubes and deflection units
C2	DC03*	Television tuners, coaxial aerial input assemblies
C3	DC04*	Loudspeakers
C20	DC05*	Wire-wound components for TVs and monitors

* These handbooks are currently issued in another series; they are not yet issued in the Display Components series of handbooks.

PASSIVE COMPONENTS

This series of data handbooks comprises:

current code	new code	handbook title
C14	PA01	Electrolytic capacitors; solid and non-solid
C11	PA02*	Varistors, thermistors and sensors
C12	PA03*	Potentiometers, encoders and switches
C7	PA04*	Variable capacitors
C22	PA05*	Film capacitors
C15	PA06*	Ceramic capacitors
C9	PA07*	Piezoelectric quartz devices
C13	PA08*	Fixed resistors

* Not yet issued with the new code in this series of handbooks.

PROFESSIONAL COMPONENTS

This series of data handbooks comprises:

current code	new code	handbook title
T1	*	Power tubes for RF heating and communications
T2a	*	Transmitting tubes for communications, glass types
T2b	*	Transmitting tubes for communications, ceramic types
T3	PC01**	High-power klystrons
T4	*	Magnetrons for microwave heating
T5	PC02**	Cathode-ray tubes
T6	PC03**	Geiger-Müller tubes
T9	PC04**	Photo and electron multipliers
T10	PC05**	Plumbicon camera tubes and accessories
T11	PC06	Microwave diodes and sub-assemblies
T12	PC07	Vidicon and Newvicon camera tubes and deflection units
T13	PC08	Image intensifiers
T15	PC09**	Dry reed switches
C8	PC10	Variable mains transformers; annular fixed transformers
	PC11	Solid state image sensors and peripheral integrated circuits

* These handbooks will not be reissued.

** Not yet issued with the new code in this series of handbooks.

MATERIALS

This series of data handbooks comprises:

current code	new code	handbook title
C4 } C5 }	MA01*	Soft Ferrites
C16	MA02**	Permanent magnet materials
C19	MA03**	Piezoelectric ceramics

* Handbooks C4 and C5 will be reissued as one handbook having the new code MA01.

** Not yet issued with the new code in this series of handbooks.

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