

DrawCom Pty Ltd

Catalogue Issue 9

PASSIVE WAVEGUIDE COMPONENTS

PASSIVE WAVEGUIDE COMPONENTS

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Rectangular Waveguide Straight Sections



Rectangular Waveguide Straight Sections could be ordered for any length up to 144 inches. Short straight sections may also be used as flange adaptors.

M1240 – Waveguide Straight Sections

Part No.	Waveguide Size	Minimum LENGTH (in.)
M1240-01	284	3
M1240-02	229	3
M1240-03	187	3
M1240-04	159	3
M1240-05	137	3
M1240-06	112	2
M1240-07	90	2
M1240-08	75	2
M1240-09	62	1
M1240-10	51	1
M1240-11	42	1
M1240-13	28	1

ORDERING EXAMPLE

PART NO.	LENGTH (INCHES)	FLANGE
M1240-06	144	01-02

PART NUMBER – M1240-06-144-01-02 specifies a straight rectangular WR112 waveguide section having a length of 144 inches with a CPR-G and a CPR-F cover flanges. Unless otherwise specified, material will be copper & painted black.

Refer page30 for flange code.

Rectangular waveguide twist sections can be defined by the size of the waveguide, types of flanges, desired length (subject to the minimum specified in the table), desired amount of twist (0° to 90°) and direction of twist (right or left) from flange A to B.

M1246 – Waveguide Twist Sections

Part No.	Waveguide Size	Minimum LENGTH (in.)
M1246-01	284	9.25
M1246-02	229	8.00
M1246-03	187	7.00
M1246-04	159	6.00
M1246-05	137	4.50
M1246-06	112	3.75
M1246-07	90	2.75
M1246-08	75	2.25
M1246-09	62	2.00
M1246-10	51	1.50
M1246-11	42	1.25
M1246-13	28	1.00

ORDERING EXAMPLE

PART NO.	DIRECTION & ANGLE	LENGTH (INCHES)	FLANGE
M1246-06	R90	8	06-07

PART NUMBER – M1246-06-R90-8-06-07 specifies a rectangular waveguide WR112, right 90° twist, 8 inches long, with flange UG cover and UG choke. Unless otherwise specified, material will be copper & painted black.

Refer page30 for flange code.

Waveguide Bend Assemblies

M1699 - 90° CAST BENDS (INDOOR USE)				M1245 - 90° SWEEP BEND (OUTDOOR USE)			
Part No.	W/G Size	Min. Length		Part No.	W/G Size	Min. Length	
		E Bend	H Bend			E Bend	H Bend
M1699-01	284	3.75	3.25	M1245-01	284	6.00	9.00
M1699-02	229	3.25	2.75	M1245-02	229	4.00	8.00
M1699-03	187	2.75	2.25	M1245-03	187	4.00	7.00
M1699-04	159	2.75	2.25	M1245-04	159	4.00	5.00
M1699-05	137	2.25	2.00	M1245-05	137	3.00	4.00
M1699-06	112	2.00	1.75	M1245-06	112	3.00	3.00
M1699-07	90	1.75	1.25	M1245-07	90	1.25	1.75
M1699-08	75	1.50	1.37	M1245-08	75	0.75	1.00
M1699-09	62	1.37	1.25	M1245-09	62	0.75	1.00
M1699-10	51	1.25	1.12	M1245-10	51	0.75	1.00
M1699-11	42	1.00	1.00	M1245-11	42	0.75	1.00
M1699-13	28	1.00	1.00	M1245-13	28	0.50	0.75

Note: All dimensions are in inches. Unless otherwise specified, material will be copper & painted black.

ORDERING INFORMATION

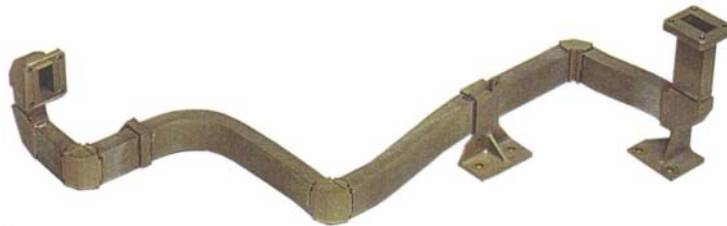
1. Specify model Number.
2. Specify 'E' or 'H' Bend (90°).
3. Specify A and B lengths in inches.
4. Specify flange code (see last page).
5. Specify frequency range.

ORDERING EXAMPLE

PART NO.	BEND TYPE	A DIM	B DIM	FLANGE
M1699-05	E90	10	12.5	04-05

PART NUMBER – M1699-5-E90-10-12.5-04-05

Refer page30 for flange code.



Flexible Waveguide



World class manufacturing certified to ISO9002; Flexible waveguide available from WR28 to WR284 with North American or European Flange configurations.

ELECTRICAL SPECIFICATIONS FOR TWISTABLE M1640 & NON-TWISTABLE M1650

Dash No.	IEC-R ()	E/A Size	Matching Rigid W/G Internal Dimensions	Operation Freq Band	Nominal Test Freq. For Attenuation	Maximum IL Attenuation	Maximum VSWR CPR/CPR/ OR COV./ Cover Flanges	Maximum VSWR Plain/ Choke Flanges CW	Power Rating M1640	Power Rating M1650
		WR	(in.)	(GHz)	(GHz)	(dB/ft.)	<36' >36'	<36" >36"	CW (kW)	CW (kW)
01	32	284	2.840 X 1.340	2.60 - 3.95	3.15	0.03	1.03 1.07	1.07 1.10	6.5	8.5
02	40	229	2.290 X 1.145	3.30 - 4.90	3.85	0.03	1.03 1.07	- -	-	-
03	48	187	1.872 X 0.872	3.95 - 5.85	4.75	0.04	1.04 1.07	1.07 1.10	3.00	3.40
04	58	159	1.590 X 0.795	4.90 - 7.05	5.90	0.05	1.04 1.08	1.08 1.10	2.5	2.50
05	70	137	1.372 X 0.622	5.85 - 8.20	6.45	0.06	1.04 1.09	1.09 1.10	2.00	1.70
06	84	112	1.122 X 0.497	7.05 - 10.00	9.40	0.07	1.06 1.10	1.10 1.13	1.26	0.80
07	100	90	0.900 X 0.400	8.20 - 12.40	9.40	0.09	1.06 1.10	1.10 1.13	0.96	0.62
08	120	75	0.750 X 0.375	10.00 - 15.00	13.70	0.13	1.08 1.10	1.10 1.13	0.75	0.50
09	140	62	0.622 X 0.311	12.40 - 18.00	14.00	0.16	1.09 1.13	1.13 1.16	0.22	0.30
10	180	51	0.510 X 0.255	15.00 - 22.00	18.50	0.35	1.12 1.18	1.17 1.20	0.14	0.23
11	220	42	0.420 X 0.170	18.00 - 26.50	22.00	0.38	1.17 1.23	1.20 1.25	0.10	0.12
13	320	28	0.280 X 0.140	26.50 - 40.00	34.00	0.60	1.19	1.30-36"	0.10	N/A

ORDERING INFORMATION

Part No.	W/G Size	Length (in. or mms)	Jacket	*Flanges & Flange Finish
M1640	07	12	N	06 - 07 - U

PART NUMBER – M1640-07-12-N-06-07-U

The above is a WR90 Flex Twist 12"-long neoprene jacket with cover and choke flanges – flanges unplated irridited & polished.

Specify flanges – flange numeric codes (see page 30)

*Brass unless otherwise requested

JACKET/PAINT	FLANGE FINISH CODES	
	Code	Finish
P = Black Paint (M1650 only)	C	Both flanges cadmium-plated and passivated
S = Silicone	U	Both flanges unplated irridited and polished
N= Neoprene	S	Both flanges sliver-plated
	T	Both flanges tin-plated

Flexible Waveguide (cont.)



MECHANICAL SPECIFICATIONS FOR TWISTABLE M1640 & NON- TWISTABLE M1650

Dash NO	IEC-R ()	EIA Size	Twist & Non- Twist (M1640 & M1650)				Twist Only (M1640)			Maximum Operating Pressure			
			Bending Rating				Twisting Rating			M1640 psig	M1650 psig		
			Static		Repeated		Static	Repeated	Length				
			E-plane Rad (in.)	H-plane Rad (in.)	E-plane Rad (in.)	H-plane Rad (in.)	Tolerance (±deg./ft.)	Twist (±deg./ft.)	Non- twist (±in./ft.)				
01	32	284	7.0	14.0	28.0	56.0	32	8	1/8	20	40		
02	40	229	6.5	13.0	26.0	52.0	40	10	1/8	30	40		
03	48	187	6.5	13.0	26.0	52.0	48	12	1/8	30	40		
04	58	1579	5.0	10.0	20.0	40.0	56	14	1/8	30	40		
05	70	137	4.0	8.0	16.0	32.0	64	16	1/8	30	40		
06	84	112	3.0	6.0	12.0	24.0	80	20	1/8	35	50		
07	100	90	2.5	5.0	10.0	20.0	96	24	1/8	45	50		
08	120	75	2.5	4.5	10.0	20.0	112	28	1/8	45	50		
09	140	62	2.0	4.0	8.0	16.0	136	34	1/8	45	50		
10	180	51	2.0	4.0	8.0	16.0	136	34	1/8	45	60		
11	220	42	1.5	3.0	6.0	12.0	155	45	1/8	45	60		
13	320	28	T.B.A										

CONSTRUCTION

The basic construction of the guide is similar for both twistable and non-twistable versions and, irrespective of size or individual specification, consists of an inner core, two connecting flanges soft-soldered into position, and a protective outer jacket.

THE CORE

The core is manufactured from pre-convoluted brass strip helically wound to extremely close tolerances around a rectangular mandrel.

Twistable cores (M1640) are silver-clad and are locked by a plated copper sealing wire inserted into their seam during winding.

At this stage pressurization is not possible. In order to hold pressure the flexible twistable waveguide must be encased in a rubber jacket.

Non-twistable cores (M1650) are also silver-clad and are locked by solder wire which is then melted to form a continuous solder fillet running the entire length of the seam. (M1650) can be pressurized without a rubber jacket.

NEOPRENE

- Shore hardness: 45° -50°
- Operating temp.: -50°C to + 100°C

SILICONE

- Shore hardness: 50° -55°
- Operating temp.: -55°C to + 135°C

Terminations



DrawCom medium power short terminations can be used in various applications. The absorbing element, made of silicone carbide, is mechanically secured to the waveguide section and can withstand elevated temperatures. Full band VSWR 1.40 for any W/G size.

Medium Power Terminations

Part No.	Waveguide Size	Length (in.)	Maximum VSWR Any 10% of Bandwidth	Power Rating (W)
M0929-01	284	9.25	1.10	275
M0929-02	229	8.75	1.10	225
M0929-03	187	8.25	1.10	175
M0929-04	159	7.00	1.10	125
M0929-05	137	6.00	1.10	75
M0929-06	112	5.00	1.10	75
M0929-07	90	5.00	1.10	75
M0929-08	75	3.25	1.10	75
M0929-09	62	4.00	1.10	75
M0929-10	51	3.75	1.10	40
M0929-11	42	3.50	1.10	40

These are single element terminations with a power dissipation ranging from 3000 Watts for WR284 to 220 Watts for WR42, using convection cooling. Use of forced air cooling will increase the power dissipation capacity by about 50%. Maximum VSWR 1.10 optimized over any 10% of bandwidth.

High Power Terminations

Part No. *	Waveguide Size	Power Rating (W)		Dimension A (in.)	Dimension B (in.)
		Convection Cooling	Forced Air Cooling		
M1233-01	284	3000	4500	20.50	8.00
M1233-03	187	1800	2600	15.00	5.75
M1233-04	159	1500	2200	13.00	5.00
M1233-05	137	1200	1800	12.00	4.50
M1233-06	112	900	1300	10.00	4.00
M1233-07	90	700	1000	7.50	3.50
M1233-08	75	400	600	6.50	3.00
M1233-09	62	300	400	5.00	2.50
M1233-10	51	200	300	4.25	2.00
M1233-11	42	150	220	4.00	1.75

ORDERING INFORMATION

1. Specify model number.
 2. Specify center frequency.
 3. Specify flange code (see page 30).
- *M1233 – Flat flange style only.

ORDERING EXAMPLE

PART NO.	FREQUENCY	FLANGE
M0929-05	6.14	02

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Page 6

Low Power, Low VSWR Terminations (Sliding and Fixed)

DrawCom Sliding and Fixed Terminations are used for accurate return loss measurements. These units are intended for low power applications only.

The termination element is a specially tapered dissipating dielectric. The sliding model has a travel greater than one-half wavelength at the lowest operating frequency.

The VSWR values shown on the tables below for Model numbers M0931 and M0912 correspond to full waveguide bandwidth.



M0931 Sliding Termination



M0912 Fixed Termination

M0931 – Sliding Termination					M0912 – Fixed Termination				
Part No.	WR Type	Length (in.)	Maximum VSWR	Power Rating (W)	Part No.	WR Type	Length (in.)	Maximum VSWR	Power Rating (W)
M0931 – 1	284	17.5	1.020	5.0	M0912 – 1	284	10.5	1.020	6.0
M0931 – 2	229	13.5	1.020	3.0	M0912 – 2	229	7.5	1.020	4.0
M0931 – 3	187	12.5	1.020	3.0	M0912 – 3	187	6.5	1.020	4.0
M0931 – 4	159	10.6	1.020	3.0	M0912 – 4	159	6.0	1.020	4.0
M0931 – 5	137	9.6	1.020	2.0	M0912 – 5	137	5.5	1.020	3.0
M0931 – 6	112	8.6	1.020	2.0	M0912 – 6	112	5.5	1.020	3.0
M0931 – 7	90	8.6	1.025	2.0	M0912 – 7	90	5.5	1.025	3.0
M0931 – 8	75	7.6	1.025	2.0	M0912 – 8	75	4.5	1.025	2.0
M0931 – 9	62	6.6	1.030	1.0	M0912 – 9	62	4.0	1.025	1.0
M0931 – 10	51	5.6	1.040	0.5	M0912 – 10	51	3.5	1.030	0.5
M0931 – 11	42	4.6	1.040	0.5	M0912 – 11	42	3.5	1.030	0.5
M0931 – 13	28	6.0	1.040	0.5	M0912 – 13	28	2.5	1.035	0.5

ORDERING INFORMATION

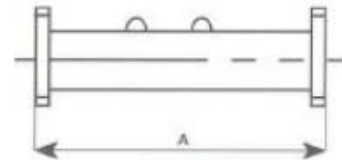
1. Specify base model number.
2. Specify flange type required (See Flange Numeric Codes on page 30).

Low Power Fixed Attenuators

Low Power Fixed Attenuators use a resistance card through the broadwall of the precision waveguide. The attenuation value in dB, at the calibration frequency specified below, is indicated by a suffix to the model number. The attenuation flatness, over the full waveguide frequency range, is within 10% of the value of the total attenuation. The VSWR is less than 1.4 for the maximum attenuation shown in the table below.

M2554 Low Power Fixed Attenuator

Part No.	WE Type	Maximum Attenuation (dB)	Max VSWR*	Cal. Freq. (GHz)	Power Rating (W)	DIM A (in.)
M2554-1	284	50	1.15	3.3	1.5	16.00
M2554- 2	229	50	1.15	4.1	1.5	15.00
M2554- 3	187	50	1.15	4.9	1.5	13.00
M2554- 4	159	50	1.15	6.0	1.5	12.00
M2554- 5	137	50	1.15	7.0	1.0	10.00
M2554- 6	112	50	1.15	8.5	1.0	8.00
M2554- 7	90	50	1.15	10.3	1.0	6.00
M2554- 8	75	50	1.15	12.5	1.0	5.00
M2554- 9	62	50	1.15	15.2	1.0	4.50
M2554- 10	51	50	1.15	18.5	1.0	4.00
M2554- 11	42	50	1.15	22.5	0.5	3.50
M2554- 12	34	35	1.20	27.5	0.5	3.00
M2554- 13	28	35	1.20	33.2	0.5	3.00
M2554- 14	22	35	1.20	41.5	0.5	3.00



ORDERING INFORMATION

1. Specify base model number and waveguide size from table above.
2. Specify attenuation required; e.g. -3 = 3 dB, -20 = 20 dB, -40 = 40 dB.
3. Specify flanges required (see Flange Numeric Codes page 30).
4. For special request add -S and specify; e.g. calibration frequency, calibration chart...

ORDERING EXAMPLE

Part No.	W/G Size	Attenuation	Flange
M2554	8	30	1 - 1

Part Number – M2554-8-30-1-1

The example describes a WR75 Fixed Attenuator with 30 dB attenuation and CPR G flanges on both ends.

Medium and High Power Fixed Attenuators

These attenuators are designed using broadwall directional couplers terminated at one end with a medium or high power termination.

Attenuation range is between 6 - 50 dB. The power handling is dependent on the termination used. The frequency range is the full waveguide band and typical flatness is ± 1 dB across the band. The return loss at input is 26 dB minimum. Overall dimensions may vary according to power rating and attenuation required.



M1306 Medium Power Attenuator		
Part No.	WR Type	Power Rating (W)
M1306- 1	284	1000
M1306- 4	159	400
M1306- 5	137	350
M1306- 6	112	250
M1306- 7	90	200
M1306- 8	75	100

M1307 High Power Attenuator		
Part No.	WR Type	Power Rating (W)
M1307 – 1	284	3000
M1307 – 4	159	1500
M1307 – 5	137	1200
M1307 – 6	112	750
M1307 – 7	90	600
M1307 – 8	75	400

ORDERING INFORMATION

1. Specify base model number on the basis of power dissipation and waveguide size.
2. Specify attenuation required; e.g. -13 = 13 dB.
3. Specify flanges required (see Flanged Numeric Codes on page 30).

ORDERING EXAMPLE

Part No.	W/G Size	Attenuation	Flange
M1307	8	20	1 - 1

Part Number – M1307-8-20-1-1

Refer page30 for flange code.

The example describes a WR75 High Power Fixed Attenuator with 20 dB attenuation and CPR G flanges on both ends.

FLANGE NUMERIC CODES

Code	Flange*
1	CPR-G
2	CPR-F
3	CMR Standard
4	CMR 8 Clear Holes
5	CMR 8 Tapped Holes
6	UG Cover
7	UG Choke
8	Special: specify
9	PDR
10	UDR

*Brass unless otherwise requested

Low Power Variable Attenuators

The variable attenuator uses an adjustable resistance card through the precision broadwall of the waveguide. To achieve variable attenuation, the moving card is actuated by a precision micrometer. Calibration charts (5 points) for micrometer setting vs dB is provided with each attenuator. The calibration frequency is specified below. The attenuation flatness, over the full waveguide band and at maximum attenuation setting, is within 5 dB and the VSWR is better than 1.4.

M2370 Low Power Variable Attenuators

Part No.	WR Type	Maximum Attenu. Range (dB)	Max. VSWR*	Cal. Freq. (GHz)	Power Rating (W)	DIM A (in.)
M2370 – 1	284	0.2 – 50	1.15	3.3	1.5	16.00
M2370 – 2	229	0.2 – 50	1.15	4.1	1.5	15.00
M2370 – 3	187	0.2 – 50	1.15	4.9	1.5	13.00
M2370 – 4	159	0.2 – 50	1.15	6.0	1.5	12.00
M2370 – 5	137	0.2 – 50	1.15	7.0	1.5	10.00
M2370 – 6	112	0.2 – 50	1.15	8.5	1.0	8.00
M2370 – 7	90	0.2 – 50	1.15	10.3	1.0	6.00
M2370 – 8	75	0.2 – 50	1.15	12.5	1.0	5.00
M2370 – 9	62	0.2 – 50	1.15	15.2	1.0	4.50
M2370 – 10	51	0.2 – 50	1.15	18.5	1.0	4.00
M2370 – 11	42	0.2 – 35	1.15	22.5	0.5	3.50
M2370 – 12	34	0.2 – 35	1.20	27.5	0.5	3.00
M2370 – 13	28	0.2 – 35	1.20	33.2	0.5	3.00
M2370 – 14	22	0.2 – 35	1.20	41.5	0.5	3.00

ORDERING INFORMATION

1. Specify base model number and waveguide size from table above.
2. Specify flanges required (see Flange Numeric Codes page 30 of this section).
3. For special request add –S and specify; e.g. calibration frequency, calibration range, etc...

ORDERING EXAMPLE

Part No.	W/G	Flanges
M2370	2	5 - 5

Part Number – M2370-2-5-5

The example describes a WR229 Low Power Variable Attenuator with CMR flanges, 8 Tapped Holes on both sides.

Waveguide to Coax Transitions



DrawCom's waveguide to coax transitions are a means of adapting from coaxial to waveguide transmission line or vice versa. All models operate over the full waveguide frequency range. However, better VSWR performance is available over 10% of the waveguide band.

Waveguide to Type "N" Female Adaptor

Part No.	W/G Size	Frequency Range (GHz)	Maximum VSWR	Dimensions (in.)		
				A	B	C
M0926-01	284	2.60 - 3.95	1.15	2.50	1.61	1.20
M0926-02	229	3.30 - 4.90	1.10	2.25	1.50	0.90
M0926-03	187	3.95 - 5.85	1.20	2.25	1.36	0.70
M0926-04	159	4.90 - 7.05	1.15	2.25	1.32	0.60
M0926-05	137	5.85 - 8.20	1.15	2.00	1.23	0.60
M0926-06	112	7.05 - 10.10	1.20	1.88	1.17	0.50
M0926-07	90	8.20 - 12.40	1.20	1.63	1.11	0.50
M0926-08	75	10.00 - 15.00	1.20	1.63	1.10	0.50
M0926-09	62	12.40 - 18.00	1.18	1.63	1.10	0.50
M0926-10	51	15.00 - 22.00	1.30	1.63	1.00	0.50

Waveguide to Type "SMA" Female Adaptor

Part No.	W/G Size	Frequency Range (GHz)	Maximum VSWR	Dimensions (in.)		
				A	B	C
M0927-02	229	3.30 - 4.90	1.15	2.25	1.13	0.90
M0927-03	187	3.95 - 5.85	1.20	2.00	1.00	0.70
M0927-04	159	4.90 - 7.05	1.15	1.75	0.96	0.70
M0927-05	137	5.85 - 8.20	1.15	1.50	0.87	0.60
M0927-06	112	7.05 - 10.10	1.20	1.35	0.81	0.410
M0927-07	90	8.20 - 12.40	1.20	1.25	0.75	0.40
M0927-08	75	10.00 - 15.00	1.25	1.00	0.74	0.356
M0927-09	62	12.40 - 18.00	1.25	1.00	0.69	0.30
M0927-10	51	15.00 - 22.00	1.30	1.00	0.67	0.30
M0927-11	42	18.00 - 26.50	1.35	1.00	0.62	0.30

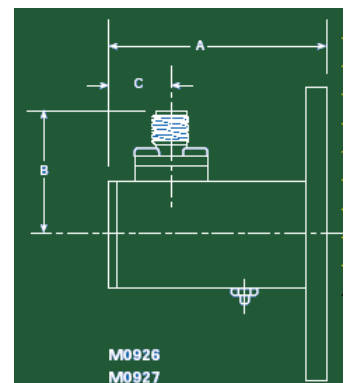
SMA also available with male connector.

ORDERING INFORMATION

1. Specify model number.
2. Specify flange code (see page 30).
3. Specify frequency range.

ORDERING EXAMPLE

PART NO.	FLANGE
M0927-07	02



Waveguide to Waveguide Adaptors

DrawCom has two types of waveguide to waveguide adaptors for transforming from one waveguide size to another: Tapered and Step.

The Tapered Waveguide Adaptors are electroformed, have a better VSWR performance, and are good for wide frequency bandwidths. Step Adaptors are designed for specific bandwidths and are shorter in length. The length of the adaptor depends upon the operating frequency bandwidth.



TAPERED

Part No.	W/G Type	Operating Freq. Range (GHz)	Length (in.)	Maximum VSWR
M1212	WR284-WR229	3.30 – 3.95	8.00	1.020
M1211	WR229-WR187	3.95 – 4.90	7.00	1.020
M1804	WR187-WR159	4.90 – 5.85	6.95	1.040
M1082	WR159-WR137	5.85 – 7.05	6.25	1.025
M1188	WR137-WR112	7.05 – 8.20	6.00	1.025
M1130	WR112-WR90	8.20 – 10.00	6.00	1.025
M1073	WR90-WR75	10.00 – 12.40	4.50	1.030
M1131	WR75-WR62	12.40 – 15.00	4.00	1.030
M1218	WR62-WR51	15.00 – 18.00	3.50	1.030
M1219	WR51-WR42	18.00 – 22.00	3.25	1.030
M2105	WR28-WR22	33.00 – 40.50	2.00	-

STEP

Part No.	W/G Type	Operating Freq. Range (GHz)	Length (in.)	Maximum VSWR
M1208	WR159 -WR137	5.85 – 7.05	4.00	1.050
M1213	WR137 - WR112	7.05 – 8.20	2.75	1.050
M1015	WR112 – WR90	8.20 – 10.00	2.50	1.050
M1214	WR90 – WR75	10.00 – 12.40	1.80	1.050
M1215	WR75 – WR62	12.40 – 15.00	2.00	1.060
M1216	WR62 – WR51	15.00 – 18.00	1.25	1.060
M1217	WR51 - WR42	18.00 – 22.00	1.25	1.060

Note: Better performances are available for narrow bandwidths.

ORDERING INFORMATION

1. Specify model number and flange type required
2. Specify maximum length required on Step Adaptors.

Consult us for more details regarding your particular requirements.

DrawCom Pty Ltd

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Low Power - Mylar Pressure Windows



Part No.	Flange Type	Waveguide Size	Freq. Range (GHz)	Maximum VSWR	Max Pressure (psig)
M1326	CPR	229	3.50 - 4.20	1.03	5
M1388	CPR	187	3.95 - 5.85	1.03	5
M1370	UG	187	3.95 - 5.85	1.03	5
M1328	CPR	159	4.90 - 7.08	1.03	5
M1325	CPR	137	5.90 - 8.20	1.03	10
M1282	UG	137	5.90 - 8.20	1.03	5
M1231	CPR	112	7.05 - 10.00	1.04	10
M1207	UG	112	7.05 - 10.00	1.04	10
M1701	CPR	90	8.20 - 12.40	1.03	5
M1371-1	UG	90	8.20 - 12.40	1.03	5
M1327	CPR	75	10.00 - 15.00	1.04	5
M1372	UG	75	10.00 - 15.00	1.04	5
M1373	UG	62	12.40 - 18.00	1.04	5
M2365	UG	51	15.0 - 22.00	1.12	5
M2029	UG	42	18.0 - 26.00	1.12	5
M2319	UG	28	26.5 - 40.00	1.12	5

Note: Power 10W, c.w. max.

ORDERING INFORMATION

1. Specify model number.
2. Specify center frequency of operating frequency required.*

*Note: Bandwidth is 10% of center frequency with a minimum of 700 MHz.

PART NO.	CENTER FREQUENCY (GHz)
M1327	12

High Power - Ceramic Pressure Windows

Part No.	Flange Type	Waveguide Size	Freq. Range (GHz)	Maximum VSWR	Power Handling (kW)
M2317	UG	187	5.400 - 5.700	1.12	1.0
M1563	CPR	159	5.900 - 6.500	1.10	5.0
M3183	UG	137	5.925 - 6.425	1.10	3.0
M1628	CPR	137	5.925 - 6.65	1.10	3.0
M1560	UG	75	14.00 - 14.50	1.15	1.5
M2372	CPR	75	14.00 - 14.50	1.15	1.5

Waveguide Circulators & Isolators

DrawCom's Waveguide Circulators and Isolators are specifically designed to meet the requirements of high capacity and high performance microwave systems. The product line covers the frequency range from 2.7 GHz to 40 GHz.

Stringent performance parameters imposed during design and production phase of these devices, make them ideally suited for applications in communication, radar and terrestrial radio applications. Special attention is given to critical operating parameters such as isolation, return loss, insertion loss and intermodulation products.

Applications include channel combination and separation, antenna multiplexing, cross-channel and load isolation.

For waveguide isolators, electrical and mechanical characteristics are dependent on the specifications of the load used. The choice for the port to terminated is selectable.

Other options such as operating bandwidth, isolation, operating temperature range and type of flanges are available on require. Out in-house design and production capabilities, allow us to quote on almost any requirement.



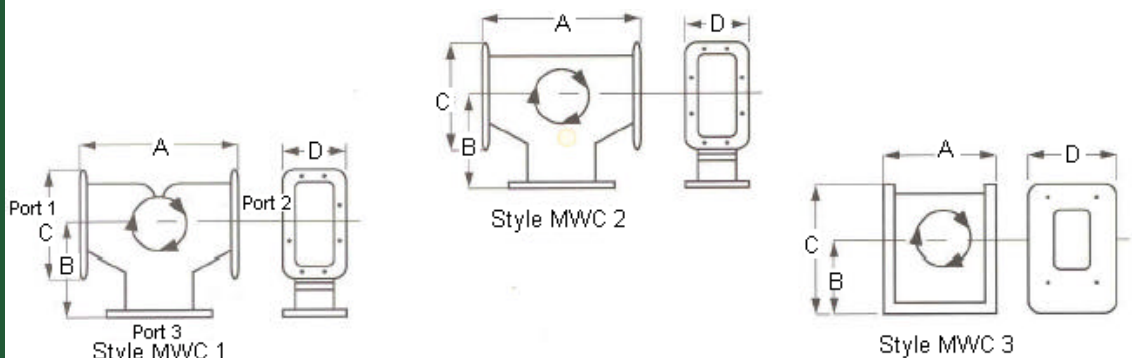
Waveguide Circulators & Isolators (cont.)

Waveguide Circulators

Part No.	Frequency (GHz)	Waveguide Type	Minimum Isolation (dB)	Maximum Insertion Loss (dB)	Max VSWR	Maximum Forward Power (W - cw)	Style	Flange Type
M0977-1	3.50 - 4.20	WR229	26	0.20	1.10	400	MWC1	CMR
M0977-2	3.50 - 4.20	WR229	26	0.20	1.10	400	MWC1	CPR
M1399	3.50 - 4.20	WR229	26	0.20	1.10	400	MWC1	CPR
M2597	4.40 - 5.00	WR187	30	0.10	1.065	350	MWC2	CMR
M0952-1	5.85 - 6.45	WR137	26	0.20	1.10	300	MWC1	CPR
M0952-2	5.85 - 6.45	WR137	26	0.20	1.10	300	MWC1	CMR
M1400-1	5.85 - 6.45	WR137	30	0.10	1.065	2000	MWC3	Note 1
M1400-2	5.8 - 7.125	WR137	26	0.15	1.12	2000	MWC3	Note 1
M1100-1	6.40 - 7.20	WR137	26	0.25	1.10	300	MWC1	CPR
M1100-2	6.40 - 7.20	WR137	26	0.25	1.10	300	MWC1	CMR
M0975	7.10 - 8.50	WR112	26	0.15	1.10	300	MWC3	COVER
M1138	7.90 - 8.40	WR112	30	0.15	1.065	1800	MWC3	Note 2
M0957	9.30 - 9.80	WR90	25	0.20	1.12	100	MWC3	COVER
M2434-2	10.70 - 11.70	WR90	28	0.15	1.08	100	MWC1	Note 1
M2381	10.70 - 11.70	WR90	30	0.15	1.065	200	MWC3	Note 2
M1466	10.70 - 11.70	WR75	23	0.20	1.15	100	MWC3	COVER
M1898	11.00 - 12.70	WR75	21	0.15	1.20	500	MWC3	COVER
M1067-1	11.70 - 12.20	WR75	28	0.20	1.08	100	MWC3	COVER
M1067-2	12.50 - 12.75	WR75	28	0.20	1.08	100	MWC3	COVER
M1506	12.00 - 12.70	WR75	23	0.20	1.15	400	MWC3	COVER
M2062	14.00 - 14.50	WR75	26	0.10	1.10	900	MWC3	COVER
M1167	14.40 - 15.35	WR62	26	0.30	1.10	200	MWC3	COVER
M2594	18.60 - 19.90	WR42	20	0.30	1.22	20	MWC3	COVER
M2595	17.50 - 19.50	WR42	18	0.35	1.23	20	MWC3	COVER
M2596	19.00 - 20.60	WR42	18	0.35	1.26	20	MWC3	COVER
M2298	27.00 - 30.50	WR28	20	0.25	1.22	110	MWC3	Note 2
M2021	33.00 - 37.00	WR28	17	0.40	1.30	10	MWC3	Note 2

Note 1: Flange per customer require, (see Flange Numeric Codes on page 30) some restrictions may apply.

Note 2: Cover tapped



Waveguide Circulators & Isolators (cont.)

Waveguide Isolators

Part No.	Frequency (GHz)	Waveguide Type	Minimum Isolation (dB)	Maximum Insertion Loss (dB)	Max VSWR	Maximum Forward Power (W - cw)	Maximum Reverse Power (W - cw)	Circulator Model (Cross Reference)
M1093	3.50 - 4.20	WR229	26	0.15	1.10	400	10	M0977
M0980	5.90 - 6.45	WR137	26	0.20	1.10	300	5	M0952
M1391-1	6.45 - 6.45	WR137	30	0.10	1.065	2000	150	M1400-1
M2056	5.85 - 6.45	WR137	26	0.20	1.12	300	10	M0952
M1391-2	5.80 - 7.125	WR137	25	0.15	1.12	2000	150	M1400-2
M1077	6.40 - 7.20	WR137	26	0.20	1.10	300	5	M1100
M1285	7.70 - 8.30	WR112	26	0.15	1.10	300	10	M0975
M1174	7.90 - 8.40	WR112	23	0.15	1.15	1800	75	M1138
M2115	9.20 - 10.20	WR90	23	0.20	1.15	100	75	M0957
M1287	10.70 - 11.70	WR90	28	0.15	1.08	100	2	M2434-2
M1467	10.70 - 11.70	WR75	23	0.20	1.15	100	5	M1466
M2074	11.00 - 13.00	WR75	23	0.20	1.15	100	10	M1466
M0992	11.70 - 12.20	WR75	28	0.20	1.10	100	5	M1067-1
M1857	11.70 - 12.20	WR75	26	0.15	1.10	100	75	M1067-1
M1743	14.00 - 14.50	WR75	26	0.15	1.10	900	15	M2062
M2173	18.60 - 19.90	WR42	20	0.30	1.22	20	2	M2594
M2359	17.50 - 19.50	WR42	18	0.35	1.28	20	2	M2595
M2360	19.00 - 20.60	WR42	18	0.35	1.28	20	2	M2596
M2149	27.00 - 30.00	WR28	20	0.25	1.22	100	1	M2298
M2163	28.50 - 30.50	WR28	20	0.25	1.22	100	1	M2298
M2373	34.00 - 36.00	WR28	23	0.40	1.15	10	1	M2021



Waveguide Circulators & Isolators (cont.)

ORDERING INFORMATION

Circulators

1. select model from table.
2. Specify direction of circulation, for clockwise circulation (standard), add **C**. for counter-clockwise circulation, add **A** following base model number.
3. Select flange if applicable (see Flange Numeric Codes on page 30).
4. Add suffix **P** if pressurization is required (3 pslg is standard).

ORDERING EXAMPLE

Part No.	Circulation	Flange	Pressure
M1400-1	A	1	P

Part Number - M1400-1-A1--P

The example describes a WR137 circulator (5.85 - 6.45 GHz with counter-clockwise circulation and CPR-G flanges with pressurization)

FLANGE NUMERIC CODES

Code	Flange*
1	CPR-G
2	CPR-F
3	CMR Standard
4	CMR 8 Clear Holes
5	CMR 8 Tapped Holes
6	UG Cover
7	UG Choke
8	Special: specify
9	PDR
10	UDR

**Brass unless otherwise requested*

Isolators

1. select model from table.
2. Specify direction of circulation, for clockwise circulation (standard), add **C**. for counter-clockwise circulation, add **A** following base model number.
3. Specify termination port.
4. Select flange if applicable (see Flange Numeric Codes on page 30).
5. Add suffix **P** if pressurization is required (3 pslg is standard).

ORDERING EXAMPLE

Part No.	Circulation	Termination	Flange	Pressure
M2115	C	3	5	-

Part Number - M2115-C-3-5

The example describes a WR90 Isolator with clockwise circulation terminated on Port 3 with CMR tapped flanges

ORDERING EXAMPLE

Part No.	Circulation	Termination	Flange	Pressure
M1391-1	A	1	5	-

Part Number - M1391-1-A-1-5

The example describes a WR137 Isolator (5.85 - 6.425) with counter-clockwise circulation, terminated on Port 1 with CMR tapped flanges.

If the above tables and ordering information do not fulfil your needs, please let us quote against your specification.

Cross-Guide Couplers



General specifications

- Coupling value is 25 dB min. and 60 dB max.
- Coupling accuracy and flatness depend on frequency and bandwidth, typical values are ± 0.5 dB over 500 MHz.
- Minimum directivity is 20 dB.
- Return loss in main arm typically exceeds 26 dB.
- Return loss in secondary arm typically exceeds 19 dB (coupling-dependent).

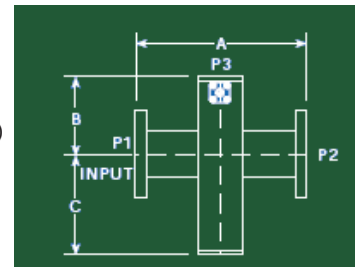
Single Arm Cross-Guide Couplers

Part No.	Waveguide Size	Dimension (in.)		
		A	B	C
M*** - 01	284	7.50	3.75	5.00
M*** - 02	229	7.00	3.50	4.75
M*** - 03	187	6.50	3.25	4.50
M*** - 04	159	6.00	3.00	4.00
M*** - 05	137	5.25	3.00	4.00
M*** - 06	112	4.20	2.10	3.00
M*** - 07	90	4.00	2.00	2.75
M*** - 08	75	3.75	1.87	2.50
M*** - 09	62	3.50	1.75	2.37
M*** - 10	51	3.10	1.50	2.25
M*** - 11	42	2.20	1.10	1.50

MODELS

M0906 – 2 waveguide ports
1 coaxial type SMA port
1 terminated port. (WR284 n/a)

M0907 – 2 waveguide ports,
1 coaxial type N port,
1 terminated port. (WR62
WR51 & WR42 n/a)



M0906
M0907

Double and Triple Arm Cross-Guide Couplers

Part No.	Waveguide Size	Dimension (in.)		
		A	B	C
M*** - 01	284	7.50	3.75	5.00
M*** - 02	229	7.00	3.50	4.75
M*** - 03	187	6.50	3.25	4.50
M*** - 04	159	6.00	3.00	4.00
M*** - 05	137	5.25	3.00	4.00
M*** - 06	112	4.20	2.10	3.00
M*** - 07	90	4.00	2.00	2.75
M*** - 08	75	3.75	1.87	2.50
M*** - 09	62	3.50	1.75	2.37
M*** - 10	51	3.10	1.50	2.25
M*** - 11	42	2.20	1.10	1.50

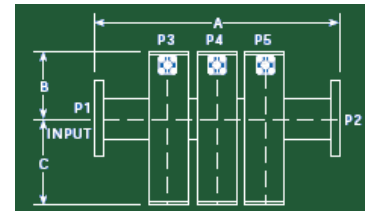
MODELS

M1671 – Type N Double Arm
Coupler.
(WR42, WR51 & WR62 n/a)

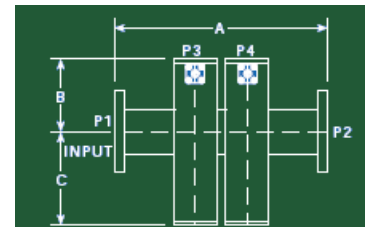
M1672 – Type SMA Double Arm
Coupler. (WR284 n/a)

M1673 – Type N Triple Arm
Coupler. (WR42, WR51 WR62 n/a)

M1674 – Type SMA Triple Arm
Coupler.



M1673
M1674



M1671
M1672

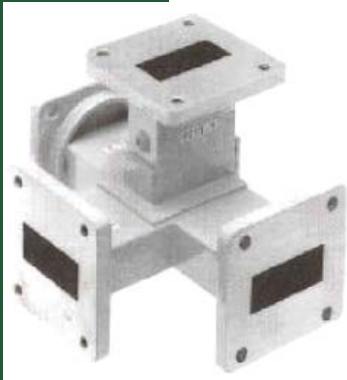
ORDERING INFORMATION

1. Specify model number by including*** appropriate model number.
2. Specify coupling value, e.g., -25 for 25 dB min.
3. Specify coupling direction, e.g., reverse or forward, by adding R or F to coupling value.
4. Specify flange code (see page 30).
5. Specify if pressurization is required.
6. Specify frequency range.

ORDERING EXAMPLE

PART NO.	COUPLING 1st ARM	COUPLING 2nd ARM	FLANGES P1-P2
M1671-08	25F	35R	06 - 06

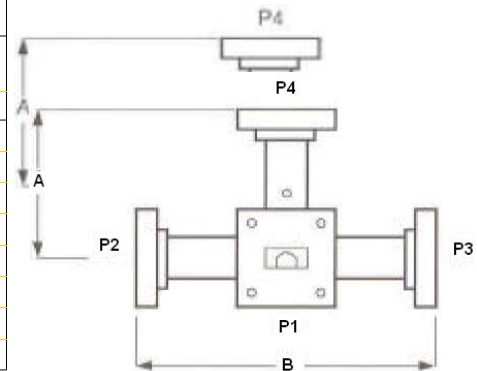
Magic Tee's



Magic Tees, as the name implies are tee junctions constructed in the form of a **T**. the power at an input arm is equally divided between two properly matched output arms, i.e. they are 3 dB power dividers. Magic Tees are used in balance mixers, automatic frequency control circuits and comparison circuits.

Electrical specifications	
Typical bandwidth:	500 MHz in most common frequency bands
Power split:	± 0.1 dB
Max. VSWR:	1.2:1
Isolation between non co-linear ports:	30 dB min

MAGIC TEES					
Part No.	WR Type	Frequency Range (GHz)	Power Rating (W)	Dimensions (in.)	
				A	B
M1352	229	3.540 – 4.200	900	4.0	8.0
M0919	137	5.925 – 6.425	750	2.6	5.2
M0949	112	7.720 – 8.270	500	2.0	4.0
M1353	90	10.700 – 11.700	400	1.9	3.8
M1354	75	12.500 – 13.200	300	1.5	3.0
M1284	75	11.700 – 12.200	300	1.5	3.0
M1710	75	14.000 – 14.500	300	1.5	3.0
M1355	62	12.400 – 18.000	300	1.1	2.2



ORDERING INFORMATION
 1. Specify flanges required by adding flange code after model number.

Ordering Example				
Part No.	Flange P1	Flange P2	Flange P3	Flange P4
M0919	1	2	2	1

Part Number – M0919-1-2-2-1

The example describes a WR 137 Magic Tee with a CPR-G flange on Ports 1 & 4, and CPR-F flange on Ports 2 & 3.

FLANGE NUMERIC CODES	
Code	Flange*
1	CPR-G
2	CPR-F
3	CMR Standard
4	CMR 8 Clear Holes
5	CMR 8 Tapped Holes
6	UG Cover
7	UG Choke
8	Special: specify
9	PDR
10	UDR

*Brass unless otherwise requested

Consult us for more details regarding your particular requirements.

All information contained in the present data sheet is subject to confirmation at time of ordering. Print Date: 29/05/2009

Bandpass Filters



These filters have been specifically designed for Satellite Earth Stations and VSAT applications.

The Transmit Reject Filters are used in the receivers and reject any spurious signals at the transmit frequency. The Receive Reject Filters are used in the transmitter and reflect any spurious signals at the receive frequencies. The tables give an indication of capability with these filters. We also have a significant number of other designs and DrawCom can happily accommodate customer specified filters.

Transmit Reject (Low Loss) Bandpass Filters

Part No.	Waveguide Size	Passband Operating Frequency (GHz)	Min. Passband Return Loss (dB)	Max. Passband Insertion Loss (dB)	Reject Band (GHz)	Minimum Rejection (dB)	Length (in.)
M1052-1	WR229	3.700 - 4.200	26	0.035	5.925 - 6.425	60	6.35
M1052-2	WR229	3.700 - 4.200	28	0.035	5.925 - 6.425	60	6.50
M1052-3	WR229	3.625 - 4.200	25	0.40	5.850 - 6.425	60	6.50
M1052-4	WR229	3.700 - 4.200	28	0.035	5.785 - 6.425	60	6.50
M1052-5	WR229	3.625 - 4.200	25	0.035	5.850 - 6.425	55	6.35
M3870	WR229	3.625 - 4.800	19	0.080	5.800 - 7.100	50	6.50
M1154-1	WR75	10.950 - 11.70	26	0.150	14.000 - 14.500	60	5.50
M1154-2	WR75	11.700 - 12.200	26	0.150	14.000 - 14.500	60	5.00
M1154-3	WR75	11.700 - 12.200	26	0.150	14.000 - 14.500	60	5.50
M1549	WR75	12.250 - 12.750	23	0.270	14.000 - 14.500	65	6.12
M1618	WR75	11.700 - 12.200	26	0.120	14.000 - 14.500	35	5.00
M1983	WR75	11.700 - 12.700	26	0.250	14.000 - 14.500	70	6.50
M2043	WR75	10.950 - 12.200	25	0.250	14.000 - 14.500	70	8.00
M2157	WR75	12.250 - 12.750	26	0.180	14.000 - 14.500	70	5.79
M2958	WR75	10.950 - 12.750	20	0.250	14.000 - 14.500	60	4.15

Receive Reject (High Power) Bandpass Filters

Part No.	Waveguide Size	Passband Operating Frequency (GHz)	Min. Passband Return Loss (dB)	Max. Passband Insertion Loss (dB)	Reject Band (GHz)	Minimum Rejection (dB)	Length (in.)	Power (kW)
M1126	WR137	5.840 - 7.100	23	0.100	3.400 - 4.800	70	7.62	3.0
M3152	WR75	13.900 - 14.800	24	0.200	10.950 - 12.750	80	6.20	2.0

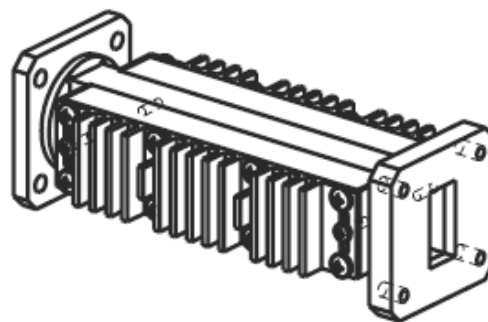
ORDERING INFORMATION

1. Specify model number.
2. Flange Types available for above filters WR229 & WR137 CPR-G or CPR-F, WR75 CPR-G, CPR-F, Cover or Cover Groove (M3152 cover flange style only).

Harmonic Absorption Filters

DrawCom's Harmonic Absorption Filters exhibit extremely low harmonic power reflection but high harmonic power absorption. The table gives an indication of our capability in harmonic absorption filters. The tables give an indication of capability with these filters. We also have a significant number of other designs and DrawCom can happily accommodate customer specified filters.

Harmonic Absorption Filters						
Part No.	Waveguide Size	Passband Operating Frequency (GHz)	Minimum Return Loss (dB)	Maximum Insertion Loss (dB)	Minimum 2 nd Harmonic Rejection (dB)	Power Handling (W)
M2559	WR159	5.850 – 6.425	24	0.15	40	9000
M1832-0	WR137	5.925 – 6.425	23	0.20	20	2500
M1143-0	WR75	14.000 – 14.500	23	0.25	26	1000
M1420-0	WR75	14.000 – 14.500	23	0.20	33	2000
M1551-0	WR75	14.000 – 14.500	23	0.35	50	2000
M1510-0	WR75	14.000 – 14.500	26	0.30	48	2500
M2638	WR62	14.000 – 14.500	23	0.25	45	-



Harmonic Rejection Filters



DrawCom's Harmonic Rejection Filters are generally of the "Waffle-Iron" type. Their prime application is for transmitter harmonic suppression in Satellite Earth Stations or terrestrial microwave links and for harmonic suppression in broadband measuring test equipment.

The High Power Harmonic Reject Filters combine high power handling with low insertion loss and high harmonic rejection.

The tables give an indication of capability with these filters. We also have a significant number of other designs and DrawCom can happily accommodate customer specified filters.

Harmonic Rejection Filters (Low and Medium Power)

Part No.	Waveguide Size	Passband Operating Frequency (GHz)	Minimum Return Loss (dB)	Maximum Insertion Loss (dB)	Minimum 2 nd Harmonic Rejection (dB)
M0942-0	WR229	3.700 – 4.200	32	0.25	60
M1611-1	WR159	5.925 – 6.425	32	0.15	70
M1078-0	WR137	5.850 – 6.500	23	0.20	60
M1150-1	WR112	7.900 – 8.400	26	0.12	60
M1097-1	WR75	14.000 – 14.500	23	0.15	55
M1097-2	WR75	12.200 – 12.700	23	0.15	55
M1097-3	WR75	10.700 – 12.250	23	0.15	55
M1097-4	WR75	11.700 – 13.250	23	0.15	55
M1097-5	WR75	12.000 – 12.500	23	0.15	55
M1097-6	WR75	11.000 – 12.700	23	0.15	55
M2234-0	WR42	18.500 – 21.500	20	0.50	40
M2335-0	WR28	28.000 – 32.000	17	0.80	40
M2266-0	WR28	27.900 – 30.000	20	0.40	50

Harmonic Rejection Filters (High Power)

Part No.	Waveguide Size	Passband Operating Frequency (GHz)	Passband Return Loss (min dB)	Passband Insertion Loss (max dB)	2 nd Harmonic Rejection (min dB)	Power Handling (W)
M2558	WR430	1.700 – 1.900	23	0.15	50	3000
M1611-2	WR159	5.925 – 6.425	32	0.15	70	3500
M1078-2	WR137	5.850 – 6.50	23	0.20	60	3500
M1150-2	WR112	7.900 – 8.400	26	0.12	60	3500

Switching and Combining Networks



DrawCom can supply a complete range of uplink and downlink networks for earth station applications. We can handle network complexity ranging from simple passive diplexing of two signals to the switching and combining of up to twelve outputs from high power amplifiers.

These systems are fully complemented by DrawCom redundancy switching controllers that interface the microwave networks with the system control computers and system operators.

We can deliver automatic redundancy switching of high power amplifier subsystem from 1:1 to M:N configurations. Our low loss designs meet stringent uplink requirements.

Key features

- Automatic redundancy switching of High Power Amplifier (HPA) sub-system from 1:1 to M:N configurations
- Low loss designs to meet stringent satellite uplink requirements
- Various broadband and channel combining devices available such as diplexers, variable power combiners and 3dB hybrid couplers
- Automatic power levelling and channel tuning control of HPA
- Available in most uplink frequency bands
- Free standing, rack, ceiling or wall mounted modular construction
- 3D Computer Aided Design (CAD) software ensures precise compliance to mechanical requirements



Variable Power Combiner



DrawCom's Variable Power Combiners are used in Satellite Earth Stations & operate in the C, X, K & Ku-Bands. Within the Ku-Band, models for both lower and upper communications frequency ranges are available.

The Variable Power Combiners are primarily used to:

1. Switch a transmitter to one of two output ports for redundancy, or to divide the transmitter between two ports.
2. Combine two transmitters to either one of two ports and to provide variable output combinations.

Electrical Spec.	Ku-Band	C-Band	X-Band
Frequency Range	14.0 – 14.5 GHz	5.850 – 6.425 GHz	7.9 – 8.4 GHz
VSWR (at any port)	1.15:1 max	1.15:1 max	1.15:1 max
Insertion Loss	0.2 dB max	0.2 dB max	0.2 dB max
Isolation (minimum)			
A-B (all position)	30 dB	30 dB	30 dB
A-D (A to C position)	40 dB	40 dB	40 dB
B-D (B to C position)	40 dB	40 dB	40 dB
C-D (all positions)	30 dB	30 dB	30 dB
Power Handling	2kW (1kW per port)	6kW (1kW per port)	3kW (1kW per port)
(1) Pressure	15 PSIG	15 PSIG	15 PSIG
Operating Voltage	18 – 28 V DC	18 – 28 V DC	18 – 28 V DC
Dry Contact Closure	SPDT	SPDT	SPDT
Control Contact (dry)	Momentary SPDT	Momentary SPDT	Momentary SPDT
Control Voltage	24/28 V DC	28 V DC	28 V DC
Switching Time	Typical 25 ms between adjacent steps (at 24V)	Typical 100 ms between adjacent steps (at 24V)	Typical 30 ms between adjacent steps (at 24V)
Power Spilt	3 dB ± 0.1 dB	3 dB ± 0.1 dB	3 dB ± 0.1 dB
Manual Override	Included	Included	Included

(1) Leakage Rate of 15cc / minute typical

Part No.

M1655	C-Band, Electrically operated with manual override
M1644	x-Band, Electrically operated with manual override
M2706	Ku-Band, Electrically operated with manual override
M1707	K-Band, Electrically operated with manual override

Note: Each of the above units has a "manually operated" model.

Variable Power Combiner (cont.)

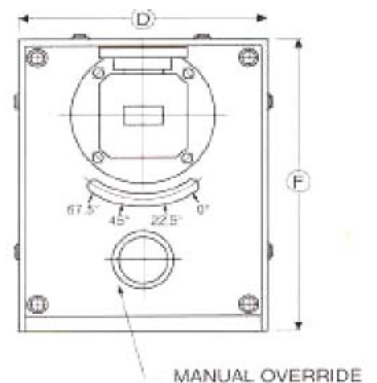
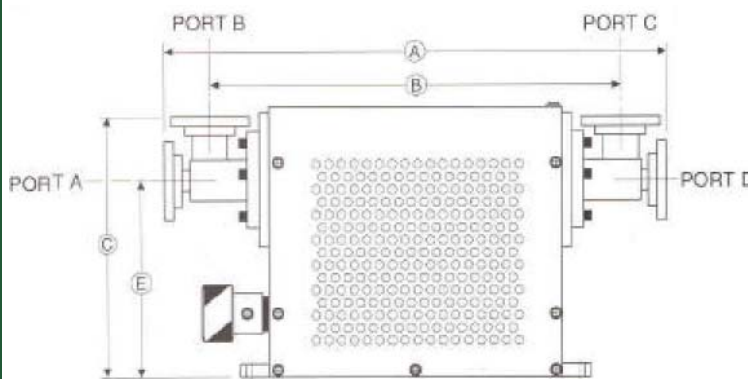
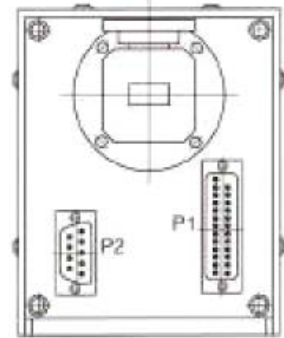
Connectors for K, KU & X-Bands Models				
P "1" Pin Configuration 25 Pin D-Sub-miniature, Male		P "2" Pin Configuration 9 Pin D-Sub-miniature, Male		
1	VPC Position 0°	Ind. Output	1	24 VDC
2	VPC Position 22.5°	Ind. Output	2	24 VDC
3	VPC Position 45°	Ind. Output	3	24 VDC
4	VPC Position 67.5°	Ind. Output	4	24 VDC
5	VPC Ind. Output Common		5	Chassis Ground
6	Manual Reset Input		6	24 VDC Ground
7	Not Used		7	24 VDC Ground
8	Not Used		8	24 VDC Ground
9	Not Used		9	24 VDC Ground
10	Tx A			
11	Tx B			
12	Not Used			
13	Not Used			
14	VPC Position 0°	Com. Input		
15	VPC Position 22.5°	Com. Input		
16	VPC Position 45°	Com. Input		
17	VPC Position 67.5°	Com. Input		
18	VPC Position Command Input Common			
19	Manual Reset Input Common			
20	Not Used			
21	Not Used			
22	Not Used			
23	Rx A			
24	Rx B			
25	Signal Ground			

Connectors for C-Bands Models				
P "1" Pin Configuration 15 Pin D-Sub-miniature, Male		P "2" Pin Configuration 4 Pin D-Sub-miniature, Male		
1	A to D & B to C		1	24 VDC @ 10A
2	A + B to D		2	GND
3	A to C & B to D		3	GND
4	A + D to C		4	N/C
5	Reset Input			
6	N/C			
7	GND			
8	GND			
9	A to D & B to C			
10	A + B to D			
11	A to C & B to D			
12	A + B to C			
13	HPA A Fault Input (opt)			
14	HPA B Fault Input (opt)			
15	Auto Command Input (opt)			

Variable Power Combiner (cont.)

Dim.*	K & Ku-Band	X-Band	C-Band
A	10.15	13.87	19.00
B	7.88	11.50	15.90
C	4.90	5.43	7.76
D	4.60	4.98	6.12
E	3.70	3.70	5.95
F	5.05	6.00	8.00

*Dimensions in inches



Polarizer Position	Angle (°)	Applied Power	Power Observed at Port C Less I. L. (0.2)dB	Power Observed at Port D Less I. L. (0.2)dB
A to D	0°	A & B	Full Power of B	Full Power of A
A + B to D	22.5°	A only	Half Power of A	Half Power of A
		B only	Half Power of B	Half Power of B
A + B to D	22.5°	A & B not phase adjusted	Partial Power of A & B	Partial Power of A & B
		A & B phase adjusted*	Negligible Power	Full Combined Power of A & B
B to D	45°	A & B	Full Power of A	Full Power of B
A + B to C	67.5°	A only	Half Power of B	Half Power of A
		B only	Half Power of A	Half Power of B
A + B to C	67.5°	A & B not phase adjusted	Partial Power of A & B	Partial Power of A & B
		A & B phase adjusted*	Full Combined Power of A & B	Negligible Power

* A & B must have equal carrier magnitude & frequency

Compact Redundancy Combiner Assembly



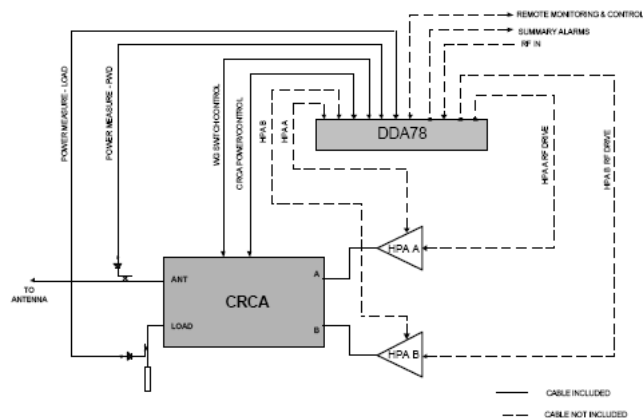
DrawCom Compact Redundancy Combiner Assembly is a simple cost effective alternative to the more traditional VPC system.

The CRCA, together with the DDA78 controller, facilitate automatic redundancy in a two amplifier phase combining system. Should one of the amplifiers fail, the CRCA is configured to allow the functional amplifier to deliver its output power to the antenna port with minimal loss whilst the failed amplifier is routed to a dump load. CRCA assemblies can be configured to suit custom requirements.

- Fully integrated wide-band phase combiner for SNGs
- Low transmit path loss in both single amplifier and phase combining modes
- Local or Remote control
- Custom packaging design service
- Weatherproofed RF unit
- Integral combiner, couplers, detectors and load

DDA78 CONTROLLER SPECIFICATIONS

Size	19" rack, 2U high, 360mm deep (excluding connectors)
Operating Voltage	100 to 240V a.c.
Host Serial Interface	4-wire RS-422/RS-485 supports "Printable ASCII" and "STX/ETX" protocols
Automatic Switching	Configurable delay before switching (200msec and 2 second de-bounce)
Features	LOCAL/REMOTE mode MANUAL/AUTO mode Laminated front mimic panel Integral coaxial power splitter, isolators and phase shifter HPA muting Antenna/Load relative power indicator



CRCA & DDA78 SYSTEM CONFIGURATION

Compact Redundancy Combiner Assembly (cont.)



CRCA SPECIFICATIONS (WITHOUT INTERCONNECTING WAVEGUIDE)

Part No.	137CRCA	75CRCA	62CRCA
Frequency	5.85 - 6.45 GHz	12.75 - 14.50 GHz	17.30 -18.40 GHz
Input Return Loss	23dB min.	23dB min.	23dB min.
Insertion Loss	0.20dB max.	0.35dB max.	0.35dB max.
Input Isolation - Combining Mode - Redundant Mode	25dB min 40dB min.	25dB min 40dB min.	25dB min 40dB min.
Combined Input Power	2.0kW max.	1.5kW max.	1.5kW max.
Combining to Redundant Mode Switching Time	8 seconds max.	4 seconds max.	4 seconds max.
Operating Temperature Range	-30 to +70°C	30 to +70°C	30 to +70°C



Slim –Line V.P.C Redundant System



DrawCom's complete solution to High Power Amplifier (HPA), Redundancy Switching, HPA Phase Combining & Power Sampling.

DrawCom's V.P.C (Variable Power Combiner) Redundancy Switching System are deployed in either mobile or fixed applications.

Slim line Package includes:

- Controller,
- V.P.C.,
- Termination,
- Cross-guide Coupler
- Interconnect V.P.C. cables & Operation Manual,
- Interconnect Waveguide & coaxial cables are provided as per customer's configuration.

Current models available include:

Part No.	Frequency (GHz)	Power
M3530	C – BAND 5.85 – 6.45	6 kW (3kW per port)
M3531	X – BAND 7.90 -8.40	3 kW (1.5 kW per port)
M3532	ASTRA BAND 12.75 -13.25	2 kW (1 kW per port)
M3533	Ku – BAND 14.0 – 14.5	2 kW (1 kW per port)
M3534	DBS – BAND 17.3 – 18.1	2 kW (1 kW per port)

Controller Specifications

Electrical	Mechanical
Operating Voltage: 120/240VAC, 50/60Hz	Dimensions (inches): 3.5 x 19 x 13
Power Consumption: 10W max.	Dimensions (cm): 8.9 x 48.3 x 33.0
Low Power Section	Weight: 22lbs (10kg) max. Incl. V.P.C.
Input/Output VSWR: 1.20:1	Front Panel: Weather resistant membrane
Insertion Loss: 5.5dB max.	Mounting: 19" Rack, EIA RS-310
	Connectors: Serial RS 232 or RS 422/485

V.P.C Specifications

VSWR	1.15:1 max.
Insertion Loss	0.2 dB max.
Isolation	25-40 dB
Pressure	15 p.s.i
Switching time	Typical 50ms between adjacent steps

Flange Numeric Codes

- | | | |
|---|----|------------------------------------|
| • | 01 | CPR style grooved (CPRG) |
| • | 02 | CPR style flat (CPRF) |
| • | 03 | CMR style standard hole pattern |
| • | 04 | CMR style all clear holes |
| • | 05 | CMR style all tapped holes |
| • | 06 | Cover style |
| • | 07 | Choke style |
| • | 08 | Special customer specified type |
| • | 09 | PDR style (European CPRG) |
| • | 10 | UDR style (European CPRF) |
| • | 11 | UBR style (European cover) |
| • | 12 | PBR style (European cover groove) |
| • | 13 | CBR style (European choke) |
| • | 14 | CAR style (European) |
| • | 15 | PAR style (European) |
| • | 16 | UAR style (European) |
| • | 17 | UER style (European CMR all clear) |
| • | 18 | Cover style with o-ring groove |

Consult our sales team for more details regarding your particular requirements.