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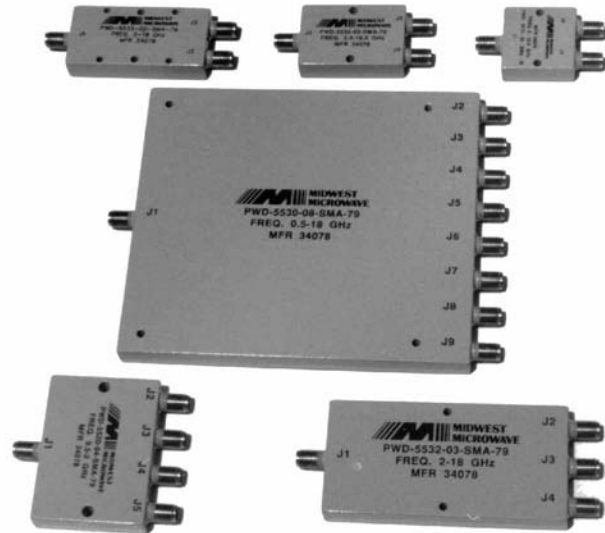
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- DC - 18 GHz High Performance
- Broadband and Ultra-broadband Frequency Coverage
- High Isolation - Low Phase and Amplitude Unbalance
- Small Size, Light Weight, Rugged Construction
- Meets MIL-E-5400 and MIL-16400 Environmental Requirements

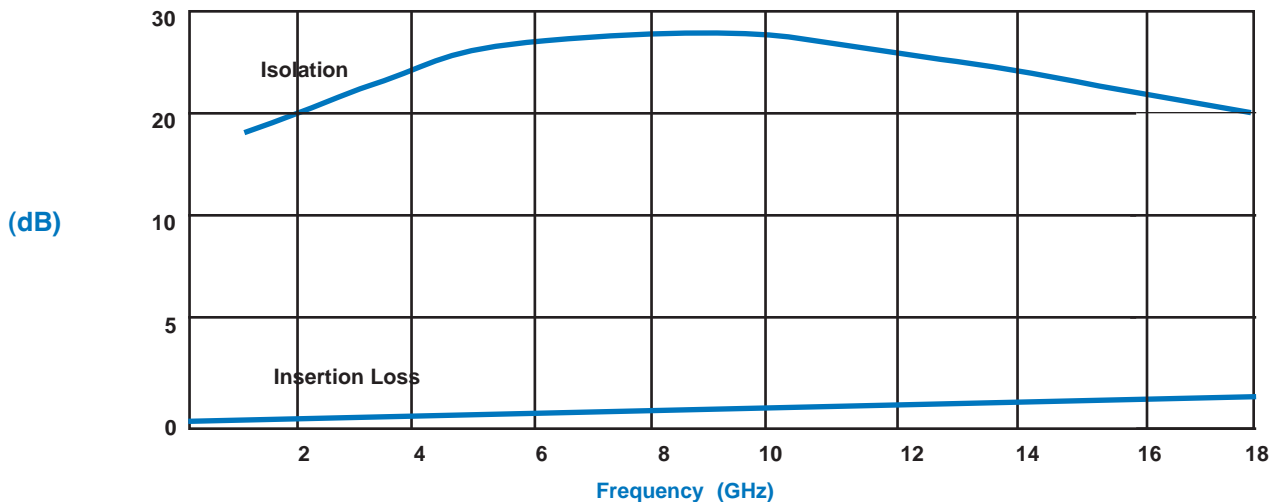
Power Dividers are passive devices that divide an input signal into any number of equal output signals. Conversely Power Combiners are passive devices that combine any number of equal input signals into one output signal. The ability of a power divider to provide identical, phase matched output signals from one input signal is the measure of its design integrity and quality. Attaining these equal output signals is also dependent on the impedance match of the device or microwave system it is being used in conjunction with as well as the level of isolation between output ports.

Midwest Microwave manufactures Wilkinson type isolated power dividers covering octave and multi-octave frequency bandwidths as well as ultra-wide frequency bandwidth types. The Wilkinson design types are particularly useful in systems where the divided signals are required to remain in phase with each other and their amplitudes relatively equal. Resistive power dividers are also available that offer very broadband performance. This type is small and very broadband and maintains an equal and consistent VSWR and insertion loss. Standard catalogue units are

available with SMA connectors with other connector types available upon special request. Some items are available off the shelf for immediate delivery or special units can be custom designed by Midwest Microwave's experienced engineering staff to accommodate unique system needs. All Midwest Power Dividers are completely manufactured in house and are 100% tested to insure only the highest quality performance whether for military or space use or for commercial cellular or personal communications applications.



Typical Power Divider Characteristics



Power Dividers

Definition of Parameters

Power Division / Combining - In-Phase power division is accomplished through a network with one signal input and "n" outputs whose phase difference is 0° and resulting signal amplitudes are equal at each output. When combining signals, the relationship between each input signal must also be equal in phase and amplitude so that the combination can be accomplished with the lowest amount of power loss.

VSWR - The input VSWR performance of a power divider is defined as the maximum value measured over the entire specified frequency band when a signal input at the common input port and all output ports are terminated in 50 Ohms.

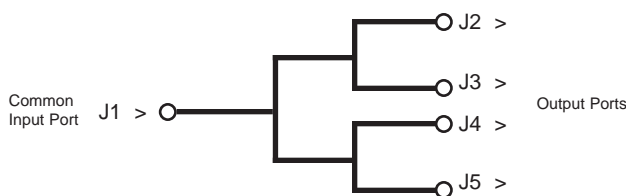


Figure 1

Frequency - Power Dividers, if designed properly, will perform satisfactorily over wide frequency bands. The lower the operating frequency the longer the wavelength and hence the longer the physical length of the power divider must be. Design goals are continually aimed toward broadening the frequency bandwidth as much as possible while simultaneously maintaining as short and small a unit as possible to satisfy system size and weight requirements.

Insertion Loss - In Power Dividers, insertion loss is defined as the loss measured through the power divider excluding the power division factor. More specifically, it is the ratio of the power output to the power input, with the assumption that the source of power is matched as well as the terminated ports when the measurement was taken. Since transmission line loss increases with frequency, the values shown are minimal at the lowest frequency and increase linearly as the length of the power divider increases.

$$\text{Insertion Loss (dB)} = 10 \log \frac{P_2 + P_3 + P_4 + \dots + P_n}{P_{\text{input}}}$$

Loss due to dissipation in the circuit will increase the insertion loss by the amount of power dissipation in dB.



Isolation - Isolation in Power Dividers is defined as the isolation between any two output ports. Expressed in dB, it is the ratio of the output power of one output port to the input power of any other output port, when measured with matched terminations on all other ports. High isolation between ports is a very desirable feature in most power divider applications especially between adjacent ports because it is there that signal interaction is most likely to take place.

Amplitude Balance - The amplitude balance, expressed in dB, is the difference between the amplitude of the signal at each of the output ports. It is the ratio of the level of maximum signal at any output port to the level of the minimum signal at any other output port. Usually this unbalance is quite low in isolated (Wilkinson) two way power dividers and increases as the number of output ports increases.

Phase Balance - The phase unbalance is the difference between the phase of the signals that arrive at each output port. It is expressed in degrees. It is the maximum deviation that is measured between any one output port and any other output port. The average phase unbalance is substantially lower particularly at the lower frequencies.

Power, Average - The maximum power that may be applied to the common or input port with all other output ports terminated in 50 Ohm loads that have inherent VSWR's that do not exceed 2.0:1.

Power Dividers

Broadband Resistive Type

Two Way Broadband Power Division

- DC-12.4 and DC-18.0 GHz bandwidth units
- Symmetrical Loss and Phase Balance
- Rugged Construction
- Meets Mil-E-5400 and Mil-E16400 Environment

Midwest Microwave's series of Resistive Two Way Power Dividers are very broadband devices that are small, lightweight, ruggedly constructed units that possess consistent VSWR and insertion loss. They also exhibit excellent phase and amplitude tracking. Units are available in wideband frequency bandwidths covering the range of DC-12.4 GHz and DC-18.0 GHz. The units meet the environmental specifications of MIL-E-5400 and MIL-E-16400.



Model Number: **PWD-2532-02-SMA-79**

DC-12.4 GHz
Model Number: **PWD-2533-02-SMA-79**

SPECIFICATIONS

Frequency: DC-12.4 GHz and DC - 18.0 GHz

Impedance: 50 Ohms

VSWR: 1.25 @ DC-10 GHz and 1.35 @ 10.0-18.0 GHz

Amplitude Balance: 0.2 dB @ DC-4.0 GHz
0.4 dB @ 4.0-10.0 GHz
0.5 dB @ 10.0-18.0 GHz

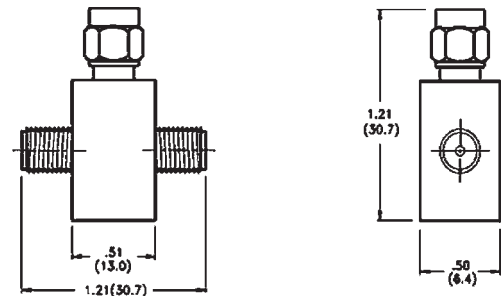
Phase Balance: 10 degrees max

Insertion Loss: 6 dB nom +1.2/-0.2 dB @ DC-10 GHz
6 dB nom +1.5/-0.2 dB @ 10-18 GHz

Power (In) : 1 Watt avg

Operating Temperature: -55 °C - +125 °C

Connectors: Passivated Stainless Steel SMA*



R.F. Signal Monitor

- Bite System Application
- Small Size, Light Weight
- Rugged Construction
- Meets Mil-E-5400 and Mil-E16400 Environment

Midwest Microwave offers a wide variety of Signal Monitor components. The unit described here is a passive device that monitors the signal that is flowing in a transmission line. It is a linear device that extracts a very small portion of the energy in the primary line in order to monitor the presence of a signal on that line. The units meet the environmental specifications of MIL-E-5400 and MIL-E-16400.



Model Number: **RFM-7020-26-SMA-79**

SPECIFICATIONS

Frequency: DC-2.5 GHz

Impedance: 50 Ohms

VSWR: 1.20:1 max

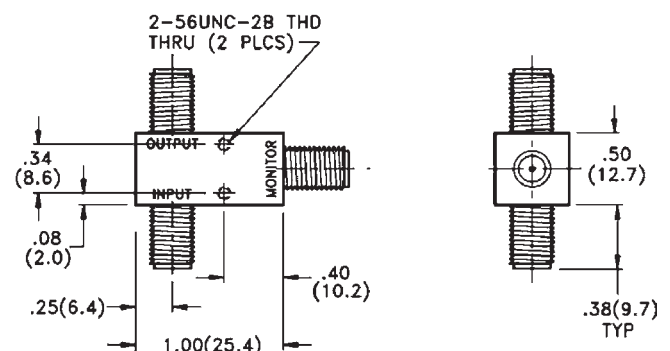
Main RF Path Attenuation: 0.5 ± 0.15 dB

Sampled Port Coupling: 26 ± 1.2 dB

Power (In): 1 Watt avg

Operating Temperature: -55 °C - +125 °C

Connectors: Passivated Stainless Steel SMA*



Note 1. TNC, BNC, or Type N output connectors are available by substituting "TNC", "BNC", or "NNN" for "SMA" in the Model Number.
2. Overall dimensions will increase because of larger connectors.

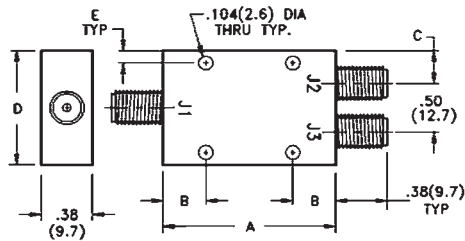
Power Dividers

Two Way Isolated

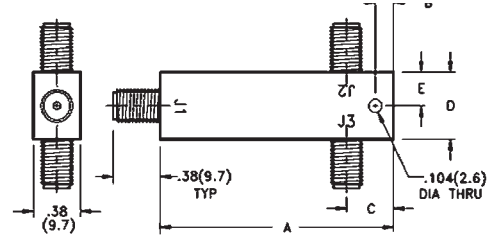
500 MHz - 18.0 GHz High Performance

- Full Octave, Multi-Octave, and Ultra-Wideband Performance
- Excellent Phase and Amplitude Tracking
- Small Lightweight Rugged Stripline Construction
- Meets Mil-E-5400 and Mil-E16400

Midwest Microwave's series of high performance isolated Power Dividers are small, lightweight, ruggedly constructed stripline units that possess inherently low insertion loss and VSWR with high isolation and excellent phase and amplitude tracking. Units are available in octave, multi-octave, and ultra-wideband frequency bandwidths covering the entire range of 0.5 - 18.0 GHz.



CASE STYLE 1, 2, 3 & 4



CASE STYLE 5, 6, 7, 8 & 9

ELECTRICAL SPECIFICATIONS

FREQUENCY RANGE (GHz)	CASE STYLE		MODEL NUMBER	AMPLITUDE BALANCE (dB)	PHASE BALANCE (degrees)	INSERTION LOSS (dB) max	ISOLATION (dB) min	VSWR max	INPUT POWER max (W)
IN-LINE TEE**				OCTAVE BANDWIDTH TYPES					
1.0-2.0	2	6	PWD-5511-02-SMA-79	0.2	2	0.4	20	1.25	3
2.0-4.0	2	7	PWD-5512-02-SMA-79	0.2	2	0.4	20	1.35	3
4.0-8.0	1	5	PWD-5514-02-SMA-79	0.2	3	0.5	20	1.35	3
8.0-12.4	1	5	PWD-5515-02-SMA-79	0.3	5	0.5	20	1.5	3
12.4-18.0	1	5	PWD-5517-02-SMA-79	0.3	5	0.5	20	1.5	3
MULTI-OCTAVE BANDWIDTH TYPES									
.5-2.0	2	8	PWD-5520-02-SMA-79	0.2	4	0.5	20	1.25	3
2.0-8.0	2	7	PWD-5522-02-SMA-79	0.3	4	0.5	20	1.35	5
6.0-18.0	1	5	PWD-5526-02-SMA-79	0.3	5	0.5	18	1.50	3
2.0-18.0	3	N/A	PWD-5532-02-SMA-79	0.25	8	1.0	17	1.60	10
2.0-18.0	2	7	PWD-5533-02-SMA-79	0.3	5	0.8	15	1.50	10
0.5-18.0	4	9	PWD-5530-02-SMA-79	0.3	5	0.3+0.1f	18	1.50	10

** Note: for TEE Type Case Style, substitute "T2" for "02" in Model Number

MECHANICAL SPECIFICATIONS - INCHES (mm)

CASE STYLE	A	B	C	D	E	WEIGHT Oz	Gr
1	1.00 (25.4)	0.50 (12.7)	0.250(6.35)	1.00 (25.4)	0.08 (1.91)	1.00	27
2	2.00 (50.8)	0.50 (12.7)	0.250 (6.35)	1.00 (25.4)	0.08 (1.91)	1.60	44
3	2.25 (57.1)	0.50 (12.7)	0.250 (6.35)	1.00 (25.4)	0.08 (1.91)	1.70	46
4	5.50 (139.7)	0.75 (19.1)	0.250 (6.35)	1.00 (25.4)	0.20 (5.08)	3.50	96
5	1.00 (25.4)	0.50 (12.7)	0.22 (5.58)	0.050 (12.7)	0.08 (1.91)	0.60	16
6	2.00 (50.8)	0.50 (12.7)	0.22 (5.58)	0.070 (17.8)	0.08 (1.91)	1.20	33
7	2.00 (50.8)	0.50 (12.7)	0.22 (5.58)	0.050 (12.7)	0.08 (1.91)	1.10	30
8	2.00 (50.8)	0.50 (12.7)	0.22 (5.58)	1.00 (25.4)	0.08 (1.91)	1.40	38
9	5.50 (139.7)	0.75 (19.1)	0.40 (10.16)	0.050 (12.7)	0.08 (1.91)	1.80	49

Note: 1. Specifications assume that all of the outputs are terminated with a load that has a VSWR not greater than 2.0:1.
2. TNC or NType output connectors are available by substituting "TNC" or "NNN" for "SMA" in the Model Number.

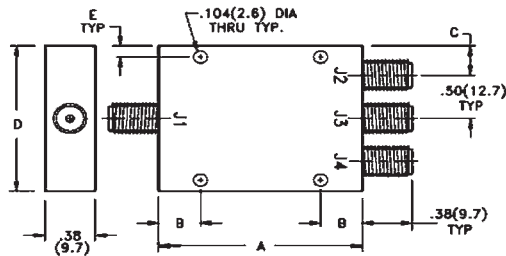
Power Dividers

Three Way Isolated

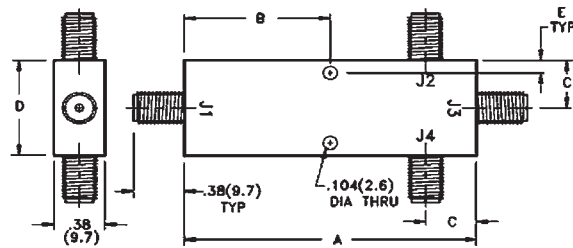
True Three Way Power Division

- Full 2.0 - 18.0 GHz bandwidth units
- Low VSWR - High Isolation
- Rugged Stripline Construction
- Meets Mil-E-5400 and Mil-E16400 Environment

Midwest Microwave's series of high performance isolated Three Way Power Dividers are true three way dividers. They are small, lightweight, ruggedly constructed stripline units that possess inherently low insertion loss and VSWR with high isolation and excellent phase and amplitude tracking. Units are available in ultra-wideband frequency bandwidths covering the entire range of 2.0 - 18.0 GHz. The units meet the environmental specifications of MIL-E-5400 and MIL-E-16400.



CASE STYLE 1



CASE STYLE 2

ELECTRICAL SPECIFICATIONS

FREQUENCY RANGE (GHz)	CASE STYLE	MODEL NUMBER	AMPLITUDE BALANCE (dB)	PHASE BALANCE (degrees)	INSERTION LOSS (dB) max	ISOLATION (dB) min	VSWR max	INPUT POWER max(W)
0.5-2.0	1	PWD-5520-03-SMA-79	0.5	5	1.0	15	1.50	30
2.0-18.0	2	PWD-5532-03-SMA-79	0.5	5	1.0	20	1.50	30
2.0-18.0	1	PWD-5533-03-SMA-79	0.5	10	1.2	15	1.80	30

MECHANICAL SPECIFICATIONS - INCHES (mm)

CASE STYLE	A	B	C	D	E	WEIGHT Oz Gr	
1	3.00 (76.2)	0.63 (16.0)	0.250 (6.35)	1.50 (38.1)	0.080 (2.0)	3.15	89
2	2.50 (63.5)	1.25 (31.8)	0.375 (9.5)	0.75 (19.0)	0.080 (2.0)	1.80	51

Note: 1. Specifications assume that all of the outputs are terminated with a load that has a VSWR not greater than 2.0:1.
2. TNC or NType output connectors are available by substituting "TNC" or "NNN" for "SMA" in the Model Number.

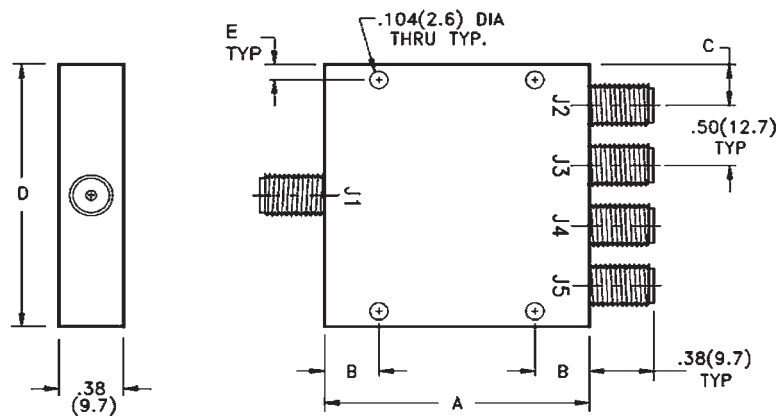
Power Dividers

Four Way Isolated

500 MHz - 18.0 GHz High Performance

- Full 2.0 - 18.0 GHz bandwidth units
- Low VSWR - High Isolation
- Rugged Stripline Construction
- Meets Mil-E-5400 and Mil-E16400 Environment

Midwest Microwave's series of high performance isolated Power Dividers are small, lightweight, ruggedly constructed stripline units that possess inherently low insertion loss and VSWR with high isolation and excellent phase and amplitude tracking. Units are available in multi-octave, and ultra-wideband frequency bandwidths covering the entire range of 0.5 - 18.0 GHz.



ELECTRICAL SPECIFICATIONS

FREQUENCY RANGE (GHZ)	CASE STYLE	MODEL NUMBER	AMPLITUDE BALANCE (dB)	PHASE BALANCE (Deg)	INSERTION LOSS (dB) max	ISOLATION (dB) min	VSWR max	INPUT POWER max (W)
0.5-2.0	1	PWD-5520-04-SMA-79	0.5	10	1.0	18	1.50	30
2.0-8.0	1	PWD-5522-04-SMA-79	0.5	10	1.0	18	1.50	30
6.0-18.0	2	PWD-5526-04-SMA-79	0.5	10	1.0	18	1.50	30
2.0-18.0	1	PWD-5532-04-SMA-79	0.5	10	1.5	18	1.50	30
0.5-18.0	3	PWD-5530-04-SMA-79	0.5	10	.0.5+0.20f	16	1.50	30

MECHANICAL SPECIFICATIONS - INCHES (mm)

CASE STYLE	A	B	C	D	E	WEIGHT	
						Oz	Gr
1	3.00 (76.2)	0.63 (16.0)	0.250(6.35)	2.00 (50.8)	0.080 (2.00)	4.00	115
2	1.46 (37.1)	0.73 (18.5)	0.250(6.35)	2.00 (50.8)	0.080 (2.00)	2.05	58
3	5.20 (132.1)	1.00 (25.4)	0.250(6.35)	2.00 (50.8)	0.080 (2.00)	7.30	207

Note: 1. Specifications assume that all of the outputs are terminated with a load that has a VSWR not greater than 2.0:1.
2. TNC or N Type output connectors are available by substituting "TNC" or "NNN" for "SMA" in the Model Number.
Housings thickness will increase to 0.75 to accommodate these larger diameter connectors.

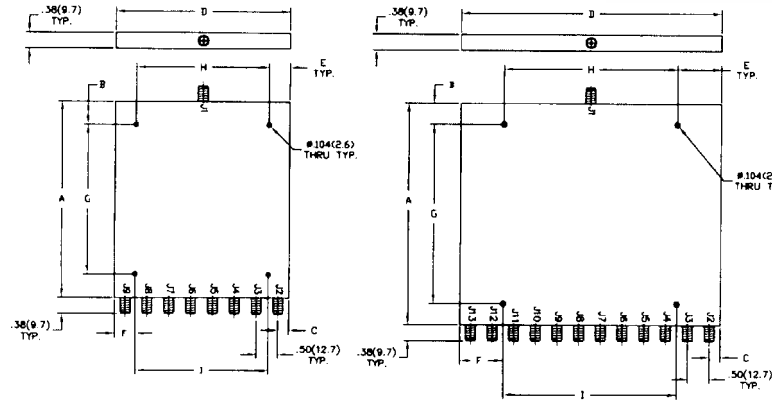
Power Dividers

Eight Way • Twelve Way

500 MHz - 18.0 GHz High Performance

- Full 2.0 - 18.0 GHz bandwidth units
- Low VSWR - High Isolation
- Rugged Stripline Construction
- Meets Mil-E-5400 and Mil-E16400 Environment

Midwest Microwave's series of high performance isolated Power Dividers are small, lightweight, ruggedly constructed stripline units that possess inherently low insertion loss and VSWR with high isolation and excellent phase and amplitude tracking. Units are available in multi-octave, and ultra-wideband frequency bandwidths covering the entire range of 0.5 - 18.0 GHz.



ELECTRICAL SPECIFICATIONS

FREQUENCY RANGE (GHZ)	CASE STYLE	MODEL NUMBER	AMPLITUDE BALANCE (dB)	PHASE BALANCE (degrees)	INSERTION LOSS (dB) max	ISOLATION (dB) min	VSWR max	INPUT POWER max (W)
EIGHT WAY MULTI-OCTAVE TYPES								
.50-2.0	1	PWD-5520-08-SMA-79	0.5	5	1.0	15	1.50	10
2.0-8.0	2	PWD-5522-08-SMA-79	0.8	10	1.2	15	1.50*	10
5.0-19.0	3	PWD-5526-08-SMA-79	.03f	0.4f	0.4+.08f	20	1.50	10
2.0-18.0	2	PWD-5532-08-SMA-79	0.6	10	0.7+.10f	15	1.50	50
0.5-18.0	4	PWD-5530-08-SMA-79	1.0	15	1.0+.25f	15	1.50	30
TWELVE WAY MULTI-OCTAVE TYPES								
.50-2.0	8	PWD-5520-12-SMA-79	0.6	10	1.2	15	1.50	10
2.0-18.0	6	PWD-5522-12-SMA-79	0.8	10	1.0+.14f	15	1.50	10
6.0-18.0	5	PWD-5526-12-SMA-79	0.8	10	0.4+.10f	15	1.50	10
2.0-19.0	6	PWD-5532-12-SMA-79	1.0	15	1.0+.14f	15	1.50	30
0.5-18.0	7	PWD-5530-12-SMA-79	1.2	20	1.2+.30f	15	1.50	30

* Output port, 1.35:1 max

MECHANICAL SPECIFICATIONS - INCHES (mm)

CASE STYLE	A	B	C	D	E	F	G	H	I	WEIGHT	
										Oz	Gr
1	3.00 (76.2)	0.15 (3.8)	0.25 (6.4)	4.00 (101.6)	0.50 (12.7)	1.00 (25.4)	2.60 (66.0)	3.00 (76.2)	2.00 (50.8)	8.4	239
2	4.60 (116.8)	0.55 (14.0)	0.25 (6.4)	4.00 (101.6)	0.25 (6.4)	0.25 (6.4)	3.50 (88.9)	3.50 (88.9)	3.50 (88.9)	10.5	298
3	3.50 (88.9)	0.50 (12.7)	0.25 (6.4)	4.00 (101.6)	0.20 (5.1)	0.20 (5.1)	2.50 (63.5)	3.60 (91.4)	3.60 (91.4)	9.0	273
4	5.20 (132.1)	1.00 (25.4)	0.25 (6.4)	4.00 (101.6)	0.20 (5.1)	0.20 (5.1)	3.20 (81.3)	3.60 (91.4)	3.60 (91.4)	13.9	390
5	4.60 (116.8)	0.25 (6.4)	0.25 (6.4)	6.00 (152.4)	0.25 (6.4)	0.25 (6.4)	3.50 (88.9)	2.60 (66.0)	2.60 (66.0)	24.0	680
6	5.20 (132.1)	1.13 (28.7)	0.25 (6.4)	6.00 (152.4)	0.25 (6.4)	0.25 (6.4)	2.94 (74.7)	5.50 (139.7)	5.50 (139.7)	21.2	600
7	7.50 (190.5)	1.50 (38.1)	0.25 (6.4)	6.00 (152.4)	0.25 (6.4)	0.25 (6.4)	4.50 (114.3)	5.50 (139.7)	5.50 (139.7)	24.5	700
8	5.20 (132.1)	0.50 (12.7)	0.25 (6.4)	6.00 (152.4)	1.00 (25.4)	1.00 (25.4)	4.20 (106.7)	4.00 (101.6)	4.00 (101.6)	21.2	600

Note: 1. Specifications assume that all of the outputs are terminated with a load that has a VSWR not greater than 2.0:1.
2. TNC or NType output connectors are available by substituting "TNC" or "NNN" for "SMA" in the Model Number.