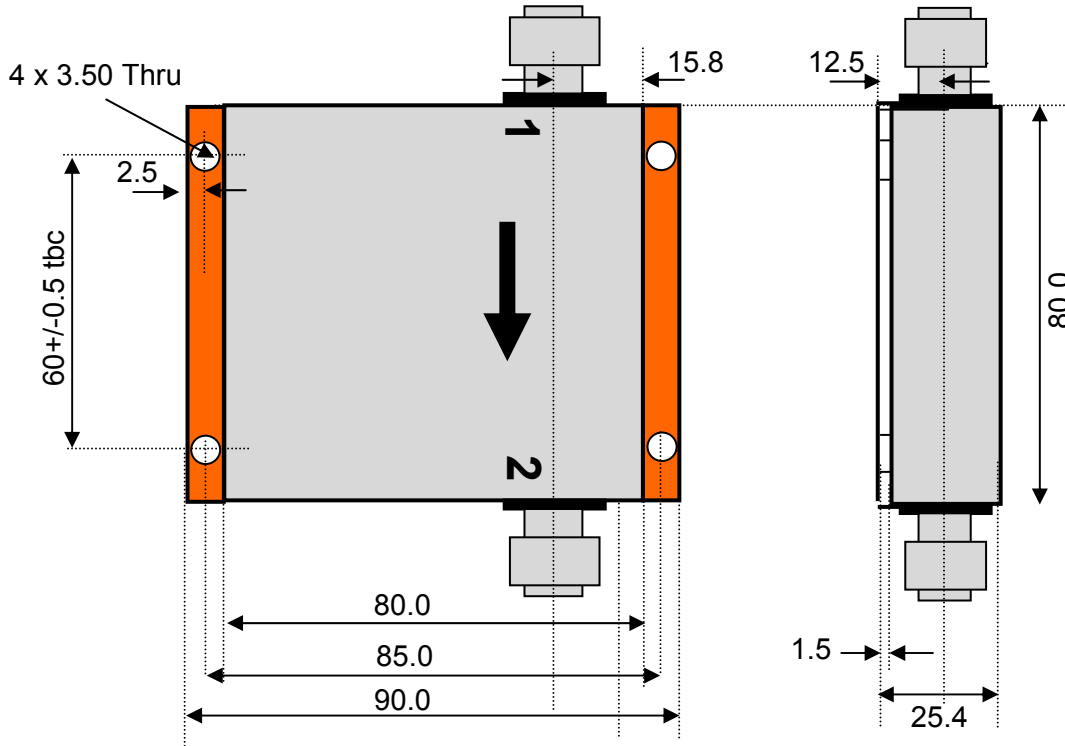


RADITEK Isolators and Circulators

ISOLATOR LL1 for VHF TV Band 1

49 to 88 MHz, SMA Connectors,
100 Watts 6 MHz Bandwidth



For TV Channels 2-6		
TV Channel	Freq MHz	% Bwidth
	49-57	15%
2	54-60	11%
3	60-66	10%
4	66-72	9%
5	76-82	8%
6	82-88	7%

N / SMA Connector options (X)		
Isolator		
Port 1	Port 2	
Female	Male	-1
Male	Female	-2
Female	Female	-3
Male	Male	-4

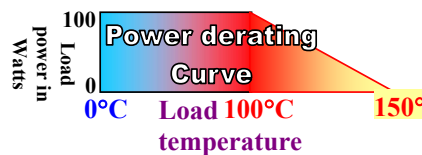
Load cooling via Conduction through housing, must be bolted to a heat sink

Not to scale, Units:mm

Order Examples: RI-54-60M-LL1-S3-100WR

Description: (Isolator, Coaxial, 54-60 MHz, SMA Female Connectors, 100 Watts, Clockwise Rotation, 6 MHz Bandwidth)

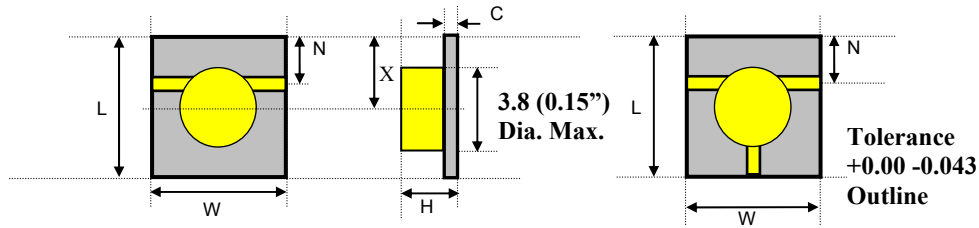
Specifications:				Units
Frequency	49-57	54-88		MHz
Bandwidth	full	6		MHz
Insertion loss	0.8	0.8 *	0.5dB target	dB
Isolation	18	17.5	18.0 target	dB
VSWR	1.3	1.28		:1
Power handling Peak	120	120		Watt.
Power handling	100	100		Watt fwd.
Power handling	100	100	500mSec max	Watt rev.
Temperature range	10-55	0 to 70		°C
Connector	SMA	SMA		



RADITEK Isolators and Circulators

MSS: Isolators or Circulators Microstrip Substrate only, to 55GHz.

RADI/C-FLOW-FHIGH-MSS-XW-L/R-NM/M



All thin film isolator circuits are gold on copper, suitable for soldering.
(Very easy with regular solder, (silver solder preferred), or gold thermo-compression bonding.

Units: mm (inch). Not to scale. Specifications over full operating temperature (-30 to +70 °C)

Examples (there are many not included here)

<i>RADI/C:- (GHz)-MSS</i>	<i>W mm</i>	<i>L mm</i>	<i>H mm max</i>	<i>N mm</i>	<i>X mm</i>	<i>C mm</i>	<i>In. loss dB</i>	<i>Isol dB</i>	<i>VSWR</i>	<i>Pwr W</i>	<i>Pwr W</i>
Tolerance	±.03	±.03	±.03	±.03	±.03	±.01				fwd	Rev
2.1-2.4	20	12	5	2.54		1	0.5	20	1.3	2	0.2
3.05-3.5	15	16	5	3.5		1	0.7	17	1.6	2.5	0.6
3.9-4.4	12	12	5				0.5	20	1.25		1
4.3-5.1	12	12	5	2.54		1	0.5	20	1.3	2	0.2
5.0-5.9	10.6	9	5	2.54		1	0.5	20	1.3	2	0.2
5.6-6.4	9.97	9	4.02				0.5	20	1.22	2	0.2
5.6-7.4	10	9	5	2.54		0.635	0.5	20	1.3	2	0.2
7.7-8.5	9.9	9	5	2.49		0.635	0.4	20	1.2	2	0.2
8.0-8.6	10	9	5	2.54		0.635	0.45	20	1.30	2	0.2
9.0-10.0	6.35	6.35	4	1.5	3	0.635	0.5	19	1.25	2	0.2
10.0-12.0	7	7	4	1.5	3	0.5	0.6	17	1.35	2	0.2
11.4-11.75	7	7	4	1.5	3	0.5	0.4	22	1.0	5	5
12-13.5	7	7	4	1.5	3	0.5	0.6	17	1.35	2	0.2
13-15	7	7	5	1.5		0.5	0.7	18	1.35	1	0.25
13.9-14.55	7	7	4	1.5	3	0.5	0.4	22	1.0	5	5
14.5-15.6	7	7	4	1.5	3	0.5	0.6	17	1.35	2	0.2
15.5-17.5	7	7	4.5	1.5		0.5	0.6	20	1.3	2	0.25
16.5-17.5	7	7	4	1.5	3	0.5	0.5	18	1.25	2	0.25
17.7-19.7	6	6	4	1.0	2	0.38	0.8	20	1.25	2	0.2*
18.0-19.0	6	6	4	1.0	2	0.38	0.8	20	1.25	2	0.2*
19.5-19.8	6	6	4.38	1.0		0.38	0.8	20	1.35	1	0.25*
20.0-22.5	5	5	3.8	1.5		0.38	0.8	18	1.3	0.2	0.2
22.0-25.0	6	6	2.5	1.0		0.38	1.0	17.5	1.30	0.2	0.2
28.0-32.0	5	5	2.5	1.0		0.25	1.0	20	1.35	2	0.2*
29.5-31.5	5	5	4.00	1.0		0.25	0.9	20	1.35	2	0.5
30-37.0	4.5	9	3.5	1.0		0.20	0.8	17	1.25	1	0.2*
30-40.0	4.5	4.5	3.5	1.0		0.38	0.8	17	1.25	1	0.2*
37.0-40.0	3.33	6.5	4	1.0		0.20	0.9	20	1.35	2	1
46.5-47.5	5.0	5.0	2.5	1.1		0.20	1-1.2	18	1.3	1	0.5*
54.25-55.25	2.0	5.5	2.0			0.15	1.2	20	1.5	1	0.25

Options:.. Ferromagnetic (add **M**) and non ferromagnetic mounting structure (add **NM**) options

Isolators and Circulators Short Form Catalog **Specifications may be subject to change**

02/04/17

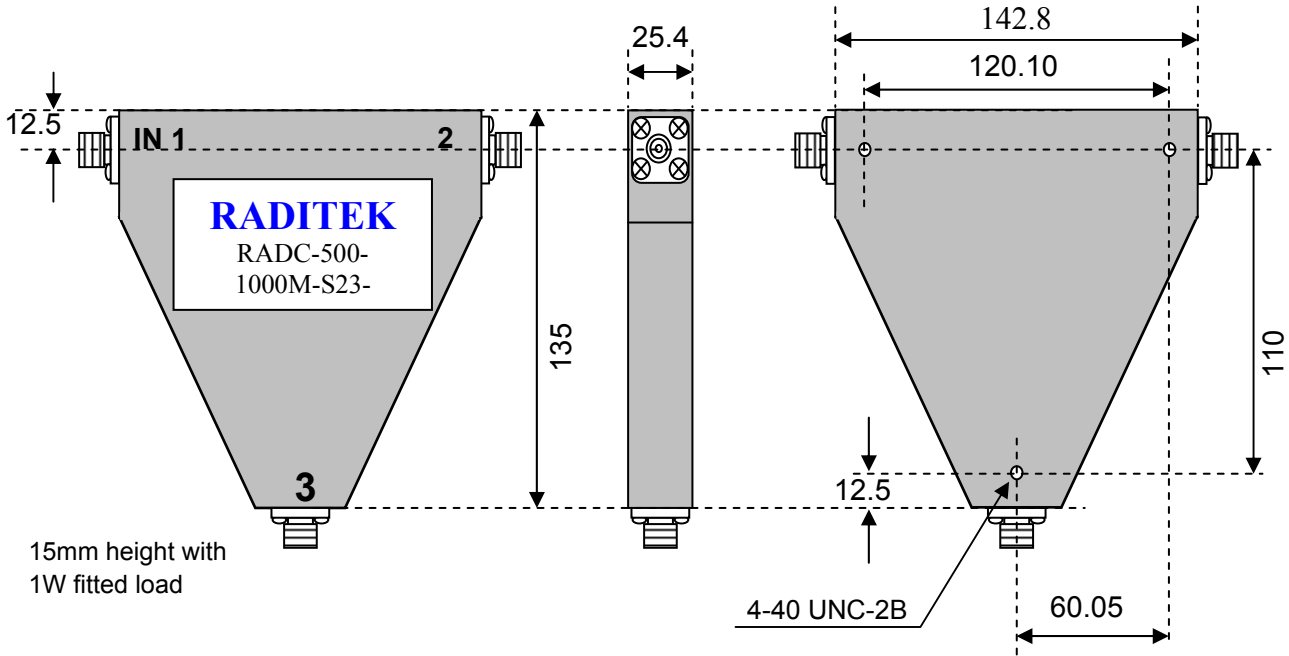
WORLD HQ: 1702H Meridian Ave. Suite 127, San Jose, Ca 95125, U.S.A.

Telephone: (408) 266-7404 FAX: (408) 266-4483

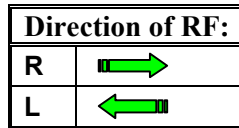
WEB: www.raditek.com , E-mail: sales@raditek.com

RADITEK Isolators and Circulators

Coaxial Isolator (RADI-) or Circulator (RADC-) 500-1000MHz SMA Connector



SMA Connector options (X)				
Isolator			Circulator	
Port 1	Port 2		Port 3 Male	Port 3 Female
Female	Male	-1	-11	-21
Male	Female	-2	-12	-22
Female	Female	-3	-13	-23
Male	Male	-4	-14	-24



Specifications: MHz	Insertion loss dB (max)	Isolation dB (min)	VSWR :1 (input and output)	Rated Power (Fwd) Watts (avg)	Rated Power (Rev) Watts (avg)	Operating Temp°C
500-1000 (C)	0.6	17	1.35	50	10	+15 to +35
500-1000 (I)	0.6	17	1.35	50	1, 5, 10	+15 to +35
450-900 (C)	0.8	15	1.5	1	1	+15 to +35

Forward operating Power for RADC-500-1000MHz is ≤ 50W.

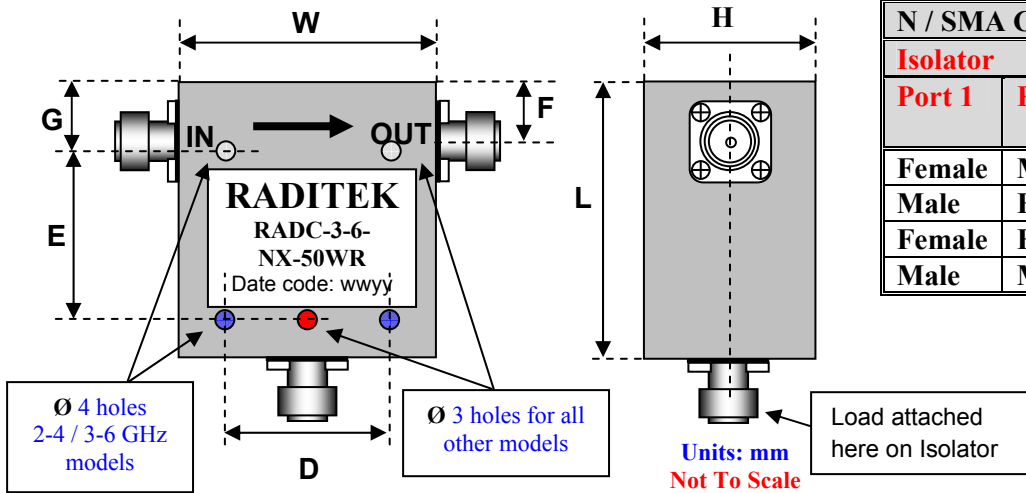
⊗ Order Examples: **RADC-500-1000M-S23-10WR** (or -50WR)
I=ISOLATOR / C=CIRCULATOR

See web site for more information www.raditek.com

RADITEK Isolators and Circulators

Octave Band, Coaxial SMA/N, Low power

RADC-Flow-Fhigh-SX-50W / RADI Flow-Fhigh-SX-1W



N / SMA Connector options (X)				
Isolator		Circulator		
Port 1	Port 2		Port 3 Male	Port 3 Female
Female	Male	-1	-11	-21
Male	Female	-2	-12	-22
Female	Female	-3	-13	-23
Male	Male	-4	-14	-24

Octave Bands GHz	Additional Sub-Set Frequencies GHz	W	L	H	D	E	F	G	Ø
2.0-4.0	1.7-3.7, 2-3, 2.5-5.0 bands	41.8	44.1	19.0	33.0	32.0	7.7	7.7	M3
2.0-4.0	2.0-4.0 FULL BAND (20 Watt model)	41.8	60	19.0					
3.0-6.0	3.4-6.5, 3.4-7.2, 3.6-7.1, 3.625-6.500	41.8	44.1	19.0	33.0	32.0	7.7	7.7	M3
4.0-8.0	4.5-6, 4.6-8.8, 5-10, 6-8	28.6	33.2	16.5	21.0	20.8	7.5	7.4	M3
4.0-8.0	4.0-8.0 (20 Watt model)	28.6	50	16.5					
6.0-12.0	6.6-10.6, 6.6-12.5, 7-12.4, 7-12.5	21.3	24.7	15.3	15.0	14.5	7.5	7.4	M3
8.0-18.0	8.0-18.0 (20 Watt model)	34.6	120	30					
9.0-18.0	8-12, 8-16, 8-16.5, 9-12, 9-13, 10-12, 10-18, 10.5-15, 11-18, 12-18, 12-18.3, 12.0-18.5, 12-19, 13-16 BANDS	17.1	19.7	14.6	12.5	10.2	6.7	6.8	M3

∅ Order Examples: RADC-2.0-4.0-N23-50WR

I=ISOLATOR / C=CIRCULATOR

Direction of RF:	
R	Default ►
L	◄

Specifications:	2.0-4.0	3.0-6.0	4.0-8.0	6.0-12.0	9.0-18.0	GHz
Room Temp/Over Temp	RT/OT	RT/OT	RT/OT	RT/OT	RT/OT	
Insertion loss	0.4/0.6	0.4/0.6	0.4/0.6	0.4/0.6	0.6/0.8	dB (maximum)
Isolation	20*/16	20/16	20/16	20/16	16/15	dB (minimum)
VSWR (input and output)	1.25/1.4:1	1.25/1.4:1	1.25/1.4:1	1.25/1.4:1	1.45/1.5:1	
Rated power (forward) {reverse also if circulator}	50	35	60	25	25	Watts (average)
Rated power (reverse) {power in load Isolator Only }	1, 2, 5, 10, 20	1, 2, 10, 15, 20	1, 5, 10, 15, 20	1, 5, 10, 15, 20	1, 5, 10, 15, 20	Watts (average)
Peak Power	150		500			Watts (average)
Operating temperature	0 to+70	0 to+70	0 to+70	0 to+70	0 to+70	°C

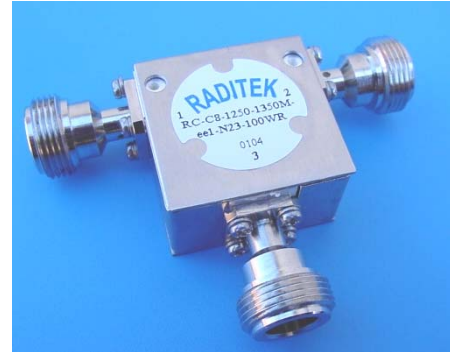
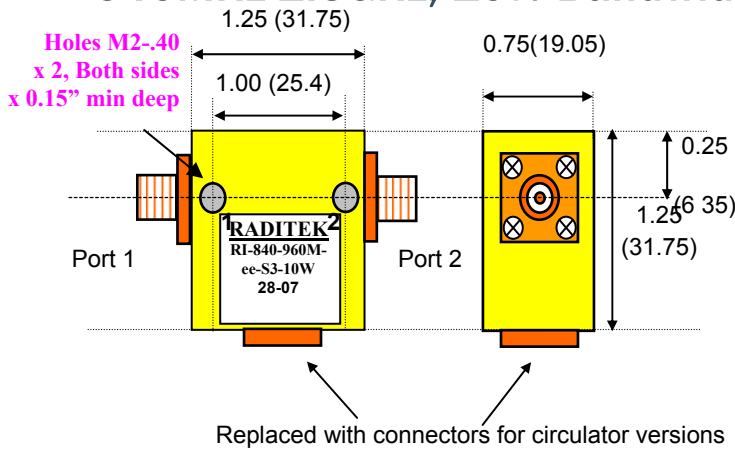
*For 2-4 GHz unit, we can provide 20 dB in temperature range +15°C to +35°C

RADITEK Isolators and Circulators

RI-EE1 ISOLATOR 120W FORWARD AND 35W REVERSE POWER*(500W PEAK POWER)

RC-EE1 CIRCULATOR 120W FORWARD AND 120W REVERSE POWER (500W PEAK POWER)

640MHz-2.5GHz, 10% Bandwidth, SMA or N-Type Connectors



Units: Inch (mm)

Tolerance:

x.xx ±0.02

x.xxx ±0.01

Machined surfaces ⁶³√

Bend radius 1/32 inch

N / SMA Connector options (X)				
Isolator		Circulator		
Port 1	Port 2	Port 3 Male	Port 3 Female	
Female	Male	-1	-11	-21
Male	Female	-2	-12	-22
Female	Female	-3	-13	-23
Male	Male	-4	-14	-24

Most types and gender connectors are available.

Standard circulation: In at 1, Out at 2 (-R), for In at 2, Out at 1 (-L).

Frequency	Low IMD Models -U option	dBc (max.)	
	Parameters	-H	-U
800-960M	Model 2X 50W tones 1MHz Apart	-70	-75
1.9-2.2G	Model 2X 30W tones 1MHz Apart	-70	-75

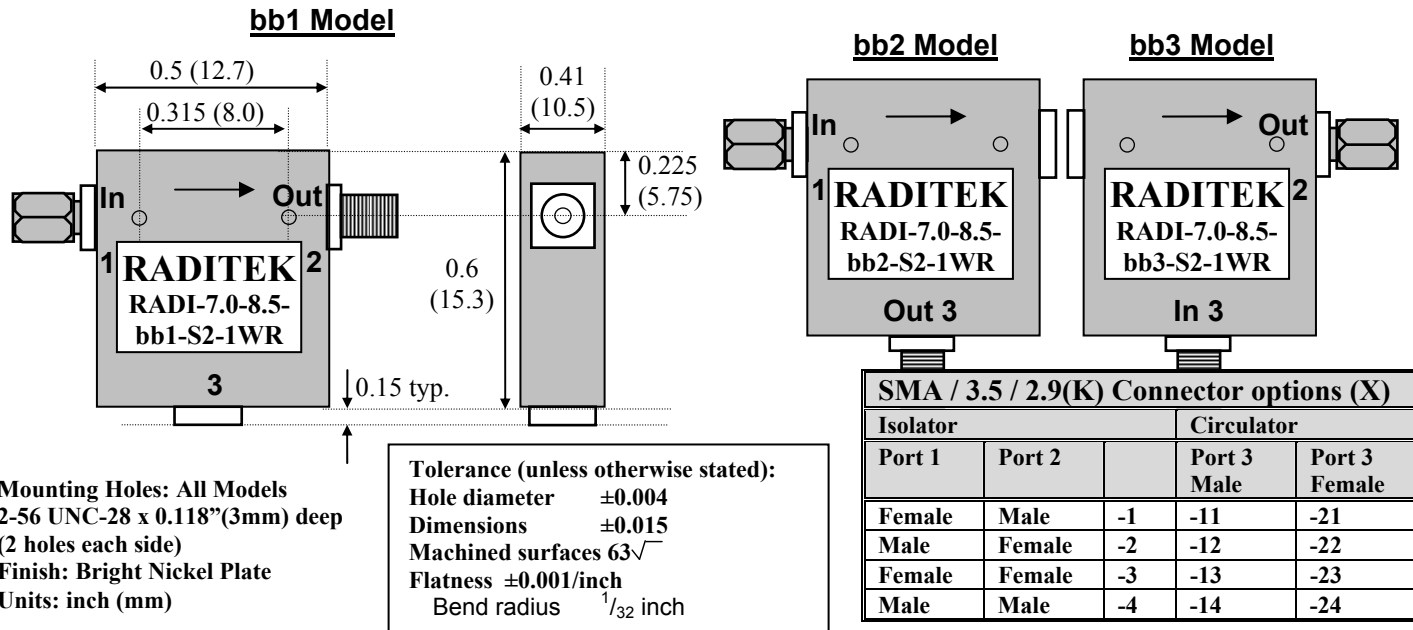
Operating Temperature: -20 to 85°C
***Load and Base plate temperature to be kept below 85°C**
Weight = 0.0980 Kg or 0.216Lbs

Option: -PM3 (Phase Matching ±3 degrees)

Frequency MHz	Insertion Loss dB Max.	Isolation Min. dB	Ret Loss dB	VSWR Max.	Notes	Direction of RF:	
						R	L
824-849	0.3	24	23	1.15	Cellular	R	Default ►
869-894	0.3	24	23	1.15	Cellular	L	◄
900-960	0.4	20	21	1.20	Cellular		
1805-1880	0.3	23	23	1.15	DCS		
1930-1990	0.4	22	22	1.17	PCS 8/30/06		
2110-2170	0.3	23	23	1.15	UMTS		
2200-2500	0.5	23	22	1.17			
2250-2450	0.3	23	23	1.15			
2300-2400	0.3	23	23	1.15			

RADITEK Isolators and Circulators

RADI BB1: Coaxial Broadband Series



WP=Waterproof, the connectors Flange joint is totally sealed, and the housing is finished in a tough epoxy paint finish.

Order as **RADI(or C)-F1-F2-bb(1,2,or 3)-S(##)-1WR (or L)**

Specifications: Freq GHz	BW %	Insertion loss dB (max)	Isolation dB (min)	VSWR	Power Fwd Watts(Avg.)	Power Rev Watts(Avg.)	Power Peak Watts (10µsec)	Op.Temp °C	Seorage Temp °C
5.8-16	10	0.4 0.5	20 19	1.20:1 1.25:1	10	1-2	50	-30 to +70 -40 to +95	-42 to +85
5.8-16	20	0.6 0.7	17 16	1.35:1 1.40:1	10	1-2	50	-30 to +70 -40 to +95	-42 to +85
16-19	10	0.5 0.4	20 20	1.25:1 1.25:1	10	1	50	-30 to +70 -30 to +50	-42 to +85
16-19	20	0.8 1.0	16 15	1.40:1 1.45:1	10	1	50	-30 to +70 -40 to +95	-42 to +85
19-26	10	0.6	20	1.30:1	10	1	50	-30 to +70	-42 to +85
Specifications: Freq GHz	BW %	Insertion loss dB (max)	Isolation dB (min)	VSWR :1(max)	Power Fwd Watts(Avg.)	Power Rev Watts(Avg.)	Power Peak Watts (10µsec)	Op. Temp °C	
5.8-6.5	Full	0.4	20	1.25	10	1	50	-30 to +50	
6-18	Full	1.2	12	1.67	5	5	10-20	-40 to +100	
7.1-7.9	Full	0.35	23	1.15	10	1	50	-30 to +70	
7.25-8.4	Full	0.8	20	1.25	10	1	50	-30 to +50	
8.0-8.6	Full	0.5	20	1.25	10	1	50	-30 to +70	
8-20	Full	1.2	14	1.6	10	1	50	0 to +60	
8.9-10.5	Full	0.5	20	1.25	10	1	50	-40 to +85	
12.7-15.4	Full	0.4	20	1.20	10	1	50	-30 to +70	
12-18	Full	0.5	20	1.25	10	1	50	-30 to +70	
13-16	Full	0.5	20	1.25	10	1	50	-30 to +70	
14.0-14.5	Full				10	1, 2	50	-30 to +70	
14-15	Full	0.4	20	1.20	5	2	50	-30 to +70	
15-18	Full	0.6	18	1.30	10	1	50	-40 to +95	
		0.5	20	1.25				-30 to +70	
16-17	Full	0.6	20	1.25	1	1	50	-30 to +70	
17.15-18.25 iso	Full	0.6	20	1.30	1	1	50	-30 to +70	

RADITEK Isolators and Circulators

Wide band Peripheral Mode isolators

RADI- 1-3 1-4.3 2-6 2-8.2 2-18 3.2-8.3 8-18GHz-P-S3-1W-02

Note: isolator version only, no circulator option



SMA Connector options (X)		
Isolator		
Port 1	Port 2	
Female	Male	-1
Male	Female	-2
Female	Female	-3
Male	Male	-4

Hole Option	
-01	No-Holes
-02	Default w/Holes

Direction of RF:	
R	Default ►
L	◄

Order Examples: RADI-2.0-18.0-P-N23-1WR-02

The **Peripheral mode BROADBAND isolator** is one of the most difficult to make, as it has high performance over a broad frequency range. Raditek is one of the very few companies in the world to offer this advanced product line. **Standard Bands (more are available)**

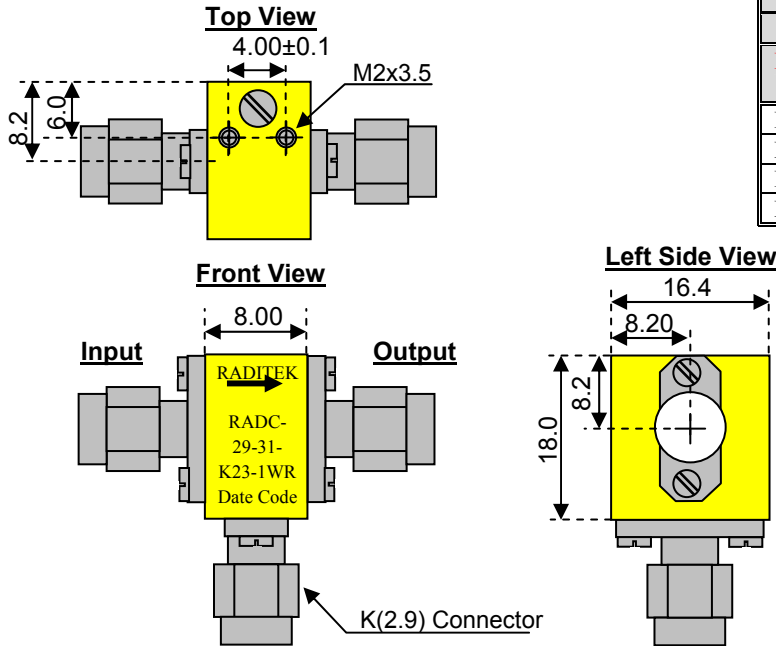
Frequency	Insertion loss dB (max)		Isolation dB (min)		VSWR (Maximum)		Peak Power	Rated Power (Fwd)	Rated Power (Rev)	Operating Temperature
	GHz	+25°C	Over Temp	+25°C	Over Temp	+25°C				
1 to 4.3	2.0	2.2 ³	20	15 ⁴	1.50:1	1.60:1	10	1	1	-10 to 60
2 to 8.2	1.5 ¹⁰	1.5	20	17	1.50:1	1.50:1 ¹	10	1	1 or 2	-10 to 60
2 to 18	3.5	4	14-15 ⁸	10	1.77:1	1.80:1	10	1	1	-10 to 60
3.2-8.3	0.9	1.0 ²	20	20	1.50:1	1.50:1	10	1	1	-10 to 60
8 to 18	1.0	1.1	20	20	1.50:1	1.50:1	10	1	1	-10 to 60

RADITEK Isolators and Circulators

Coaxial Circulator, 25-40 GHz, Split Bands, 5% Bandwidth Standard

(>5% Bandwidth Special), K(2.9)mm Connector, 1-2 Watts

RADC-f1-f2-Kx-1WR



K(2.9) Connector options (X)			
Circulator			
Port 1	Port 2	Port 3 Male	Port 3 Female
Female	Male	-11	-21
Male	Female	-12	-22
Female	Female	-13	-23
Male	Male	-14	-24



Specifications:	RADC-29-31-K23-1WR (circulator)					Units
Frequency	25-27	27-31	31-34	34-37	37-40	GHz
Bandwidth	5%	5%	5%	5%	5%	%
Connector	K	K	K	K	K	
Insertion loss	1.1	1.3	1.3	1.4	1.6	dB
Isolation	20	20	18	18	18	dB
VSWR	1.40:1	1.40:1	1.40:1	1.40:1	1.50:1	
Power handling Forward	2	2	2	2	2	Watt
Power handling Reverse	2	2	2	2	2	Watt
Temperature range	-30 to +65	-30 to +65	-30 to +65	-30 to +65	-30 to +65	°C



Coaxial mm isolators with K-connectors also available

Specifications:	RADC-f1-f2-2.4x-1WR			Units
Frequency	40-45	41-43	43-45	GHz
Bandwidth	5%	Full	Full	%
Connector	2.4	2.4	2.4	
Insertion loss	1.6	1.6	1.6	dB
Isolation	18	18	18	dB
VSWR	1.50:1	1.50:1	1.50:1	
Power handling Forward	2	2	2	Watt
Power handling Reverse	2	2	2	Watt
Temperature range	-30 to +65	-30 to +65	-30 to +65	°C

RADITEK Isolators and Circulators

Waveguide isolators

The vastness of RADITEK's range of waveguide isolators would warrant its own catalog. All the bands to over 100GHz are covered, in all kinds of form factors, flanges and bandwidths. Waveguide gives the lowest insertion loss, and are popular for the Point to Point/Multipoint, VSAT and Radar applications, for example. Both commercial and Military applications are covered by Raditek. A very small sample of products is shown here.

Specifications:			
Frequency	8.2-12.4	9.36-9.84	GHz
Insertion loss	0.2 /0.3	0.2	dB (Typical/Max)
Isolation	20	24	dB
VSWR	1.22	1.15	:1 max
Power Forward	1Watts	1Watts	Watts
Operating Temperature	+15 to + 35	+15 to + 35	° C
Flange	WR90 (UBR-100)	WR90 (UBR-100)	

Order Example: RADI-8.2-12.4-WR90-1WR (or L for counter clockwise)

Frequency GHz WR28	Insertion loss dB (max)	Isolation dB (min)	Return loss dB (min)	VSWR	Power Fwd Watts	Power Rev Watts	Temp. °C
27.5-29.5	0.4 0.5	20 17	19.1	1.25:1	<5	<5	+25 -30 to +70
31.8-33.4	0.4 0.5	20 17	19.1	1.25:1	<5	<5	+25 -30 to +70
33.5-36.0	0.4	20	20	1.22:1	5	5	0 to +60
37-39	0.4 0.5	20 17	19.1	1.25:1	<5	<5	+25 -30 to +70
38.6-40	0.4 0.5	20 17	19.1	1.25:1	<5	<5	+25 -30 to +70

Order Example: RADI-27.5-29.5-WR28-1WR

Frequency	93-95	GHz
Bandwidth	2	GHz
Insertion loss	0.4	dB (maximum)
Isolation	20	dB (minimum)
VSWR	1.25:1	All ports
Waveguide interface (flange)	WR-10	(UG387/U)
Operating Forward Power	8.125	Watts
Operating Reverse Power	2.5	Watts
Operating Peak Power	125	Watts
	@ 6.5	µsec pulse
Operating temperature	-40 to 70	°C
Non operating	-55 to 80	°C
Humidity	%	95
Operation Shock		6G, 11mS, saw tooth

BAND (GHz)	WAVEGUIDE SIZE	BAND LETTERS
1.12 - 1.7	WR-650	D, L
1.7 - 2.6	WR-430	D, LS, M, R
2.6 - 3.95	WR-284	S
3.95 - 5.85	WR-187	C, G, H
5.4 - 8.2	WR-137	A, C, G, J, XB, XN
7.05 - 10	WR-112	B, H, W, XB, XL
8.2 - 12.4	WR-90	X, XS
12.4 - 18	WR-62	G, Ku, P, U, Y
18 - 26.5	WR-42	K
26.5-40	WR-28	A, Ka, R, T, U, Y

Order as: RADI-93-95-WR10-2.5WR (125W Peak, 8.125W Fwd)

RADITEK Isolators and Circulators

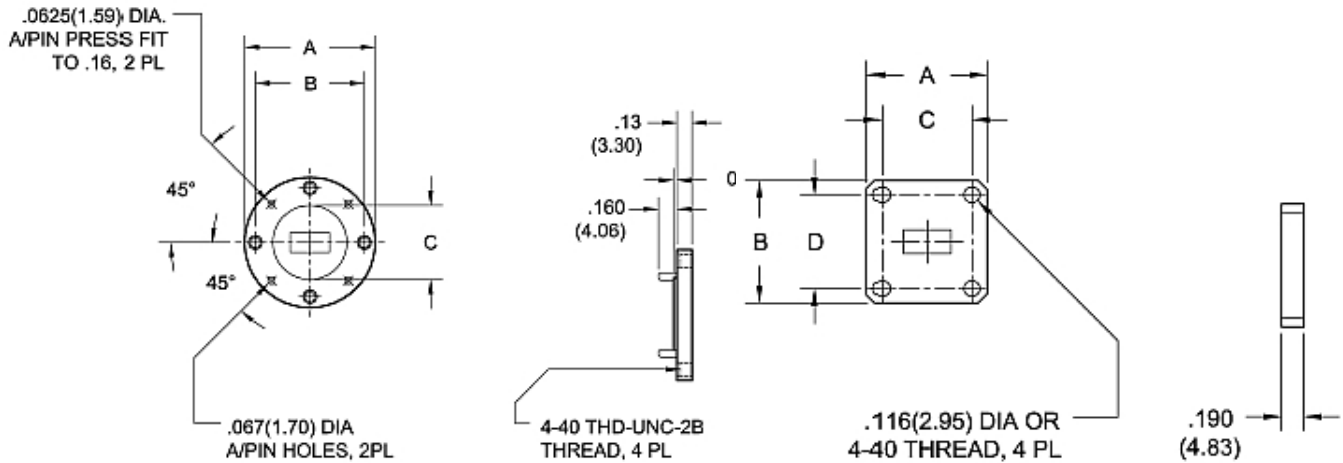
History of Waveguides

The first waveguide was proposed by J. J. Thomson in 1893 and experimentally verified by O. J. Lodge in 1894; the mathematical analysis of the propagating modes within a hollow metal cylinder was first performed by Lord Rayleigh in 1897. (McLachan, 1947.)

Electromagnetic waveguides are analyzed by solving Maxwell's equations, or their reduced form, the electromagnetic wave equation, with boundary conditions determined by the properties of the materials and their interfaces. These equations have multiple solutions, or modes, which are eigenfunctions of the equation system. Each mode is therefore characterized by an eigenvalue, which corresponds to the axial propagation velocity of the wave in the guide.

Waveguide propagation modes depend on the operating wavelength and polarization and the shape and size of the guide. The longitudinal mode of a waveguide is a particular standing wave pattern formed by waves confined in the cavity. The transverse modes are classified into different types:

- TE modes (Transverse Electric) have no electric field in the direction of propagation.
- TM modes (Transverse Magnetic) have no magnetic field in the direction of propagation.
- TEM modes (Transverse Electro Magnetic) have no electric nor magnetic field in the direction of propagation.
- Hybrid modes are those which have both electric and magnetic field components in the direction of propagation



ROUND FLANGE TABLE, inches/mm		
FREQUENCY BAND	WR-22 and WR-42 through WR-19	WR-15 through WR-5
A	1.125/28.6	0.750/19.0
B	0.937/23.8	0.562/14.3
C	0.500/12.7	0.375/9.5

SQUARE FLANGE TABLE, inches/mm		
FREQUENCY BAND	WR-42	WR-28
A, B	0.875/22.2	0.750/16.6
C	0.640/16.2	0.500/12.7
D	0.670/17.0	0.530/13.5

Frequency, GHz	Band	WR #	Inside Dimensions, inches/mm	Cover Flange Reference*	Flange Type
18-26.5	K	42	.420 x .170/4.32 x 4.32	UG-595/U	Square
22-33	WR-34	34	.340 x .170/8.64 x 4.32	UG-595/U	Square
26.5-40	Ka	28	.280 x .140/7.11 x 3.55	UG-599/U	Square
33-50	Q	22	.112 x .224/2.84 x 5.68	UG-383/U	Round
40-60	U	19	.188 x .094/4.77 x 2.38	UG-383/U-M	Round
50-75	V	15	.148 x 0.74/3.75 x 18.8	UG-385/U	Round
60-90	E	12	.122 x .061/3.09 x 1.54	UG-387/U	Round
75-110	W	10	.100 x .050/2.54 x 1.27	UG-387/U-M	Round
90-140	F	8	.080 x .040/2.03 x 1.01	UG-387/U-M	Round
110-170	D	6	.065 x .0325/1.65 x 0.825	UG-387/U-M	Round
140-220	G	5	.051 x .0255/1.29 x 0.65	UG-387/U-M	Round