



MICROWAVE COMPONENTS

R404/R41X



TERMINATIONS

Introduction.....23-2

Low Power Terminations, up to 3 Watts 23-3 to 23-5

Medium Power Terminations, up to 30 Watts..... 23-6 to 23-7

High Power Terminations, up to 1000 Watts..... 23-7 to 23-8

Platinum Terminations, up to 1 Watt.....23-9

ATTENUATORS

Introduction.....23-10

Low Power Attenuators, up to 2 Watts 23-11 to 23-12

Medium Power Attenuators, up to 30 Watts.....23-13 to 23-14

High Power Attenuators, up to 100 Watts23-14 to 23-15

Platinum Attenuators, up to 2 Watts.....23-16

COUPLERS & SPECIAL DEVICES

Introduction.....23-17

Couplers.....23-18 to 23-19

Special Devices.....23-19 to 23-21

CRYOGENIC MICROWAVE COMPONENTS

Introduction.....23-22

Attenuators.....23-22

Infrared Filters23-22



INTRODUCTION

Radiall coaxial terminations offer excellent reliability and repeatability from DC to 67 GHz. The offer includes low, medium, high power terminations, and a platinum range for instrumentation applications which provide the lowest VSWR.

MAIN FEATURES OF RADIALL'S TERMINATIONS

- Power range from 0.5 W to 1000 W
- Frequency from DC up to 67 GHz
- 50 Ω and 75 Ω Impedance
- High repeatability
- Compatible with all standard connector interfaces
- Connector interface according to applicable MIL, DIN, NF and CEI
- Dedicated platinum range for Test & Measurement providing lowest VSWR

LOW POWER TERMINATIONS



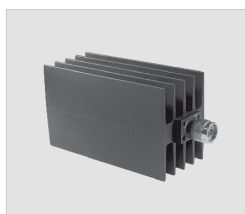
POWER	0.5 to 3 Watts
CONNECTORS	BMA, BNC, QMA, QN, N, SMA, SMA2.9, SMB, SMP, SSMA, TNC, 1.0/2.3
FREQUENCY RANGE	DC to 67 GHz

MEDIUM POWER TERMINATIONS



POWER	6 to 30 Watts
CONNECTORS	4.3-10, 7-16, BNC, N, SMA, TNC
FREQUENCY RANGE	DC to 18 GHz

HIGH POWER TERMINATIONS



POWER	50 to 1000 Watts
CONNECTORS	4.3-10, 7-16, N, SMA, TNC
FREQUENCY RANGE	DC to 6 GHz

PLATINUM TERMINATIONS

Radiall's low power terminations offer is dedicated for Test & Measurement and provides the lowest VSWR.



POWER	1 Watt
CONNECTORS	SMA2.9, SMA3.5, SMA, N, BNC, TNC
FREQUENCY RANGE	DC to 40 GHz

Terminations



LOW POWER TERMINATIONS, UP TO 3 WATTS

1.0/2.3 - 50 OHMS

FREQUENCY DC TO (GHZ)	VSWR MAX.	RETURN LOSS MIN. (DB)	POWER RATING (W)		IMPEDANCE (Ω)	GENDER	PART NUMBER
			AVG. (W)	PEAK (W)			
2.5	1.15	23.1	1	100	50 ± 5%	Male	R404 144 000

1.85 mm - 50 OHMS

FREQUENCY DC TO (GHZ)	VSWR MAX.	RETURN LOSS MIN. (DB)	POWER RATING (W)		IMPEDANCE (Ω)	GENDER	PART NUMBER
			AVG. (W)	PEAK (W)			
67	1.65	12.2	0.5	100	50 ± 5%	Male	R404 2V0 000
67	1.70	11.7	0.5	100	50 ± 5%	Female	R404 2V5 000

2.4 mm - 50 OHMS

FREQUENCY DC TO (GHZ)	VSWR MAX.	RETURN LOSS MIN. (DB)	POWER RATING (W)		IMPEDANCE (Ω)	GENDER	PART NUMBER
			AVG. (W)	PEAK (W)			
50	1.30	17.7	0.5	100	50 ± 5%	Male	R404 2N0 000
50	1.30	17.7	0.5	100	50 ± 5%	Female	R404 2N5 000

4.3/10 - 50 OHMS

FREQUENCY DC TO (GHZ)	VSWR MAX.	RETURN LOSS MIN. (DB)	POWER RATING (W)		IMPEDANCE (Ω)	GENDER	PART NUMBER
			AVG. (W)	PEAK (W)			
6	1.25	19.1	2	500	50 ± 5%	Male Screw	R404 1D1 000
6	1.25	19.1	2	500	50 ± 5%	Male Screw	R404 1D1 121 ^[2]
6	1.25	19.1	2	500	50 ± 5%	Male Push-Pull	R404 1D2 000
6	1.25	19.1	2	500	50 ± 5%	Male Push-Pull	R404 1D2 121 ^[2]
6	1.25	19.1	2	500	50 ± 5%	Female	R404 1D5 000

7/16 - 50 OHMS

FREQUENCY DC TO (GHZ)	VSWR MAX.	RETURN LOSS MIN. (DB)	POWER RATING (W)		IMPEDANCE (Ω)	GENDER	PART NUMBER
			AVG. (W)	PEAK (W)			
4	1.15	23.1	2	500	50 ± 5%	Male	R404 170 111
4	1.15	23.1	2	500	50 ± 5%	Female	R404 175 111

BMA - 50 OHMS

FREQUENCY DC TO (GHZ)	VSWR MAX.	RETURN LOSS MIN. (DB)	POWER RATING (W)		IMPEDANCE (Ω)	GENDER	PART NUMBER
			AVG. (W)	PEAK (W)			
18	1.2	20.8	1	100	50 ± 5%	Male	R404 270 000
18	1.3	17.7	1	100	50 ± 5%	Female	R404 275 000

BNC - 50 AND 75 OHMS

FREQUENCY DC TO (GHZ)	VSWR MAX.	RETURN LOSS MIN. (DB)	POWER RATING (W)		IMPEDANCE (Ω)	GENDER	PART NUMBER
			AVG. (W)	PEAK (W)			
1	1.2	20.8	1	500	50 ± 1%	Male	R404 441 000 ^[3]
1	1.2	20.8	1	500	50 ± 1%	Male	R404 441 120 ^{[1] [3]}
1	1.2	20.8	1	500	50 ± 1%	Male	R404 441 121 ^{[2] [3]}
4	1.2	20.8	1	100	50 ± 2%	Male	R404 111 000
4	1.2	20.8	1	100	50 ± 2%	Male	R404 111 120 ^[1]
4	1.2	20.8	1	100	50 ± 2%	Female	R404 112 000
8	1.25	19.1	1	1,000	50 ± 5%	Male	R404 110 000
8	1.25	19.1	1	1,000	50 ± 5%	Male	R404 110 120 ^[1]
1	1.15	23.1	1	500	75 ± 5%	Male	R404 012 000
1	1.15	23.1	1	500	75 ± 5%	Male	R404 012 120
1	1.15	23.1	1	500	75 ± 5%	Female	R404 014 000
1	1.15	23.1	1	500	75 ± 0.1%	Male	R404 412 000 ^[3]
1	1.15	23.1	1	500	75 ± 1%	Male	R404 442 000 ^[3]
1	1.15	23.1	1	500	75 ± 1%	Male	R404 442 120 ^{[1] [3]}

Notes

1. Bead Chain
2. Cord
3. Resistive Pad

Terminations



N - 50 OHMS

FREQUENCY DC TO (GHZ)	VSWR MAX.	RETURN LOSS MIN. (DB)	POWER RATING (W)		IMPEDANCE (Ω)	GENDER	PART NUMBER
			AVG. (W)	PEAK (W)			
1.5	1.1	26.4	1	500	75 ± 2%	Male	R404 055 000
1.5	1.1	26.4	1	500	75 ± 2%	Female	R404 056 000 ^[1]
4	1.2	20.8	1	500	50 ± 2%	Male	R404 131 000
4	1.2	20.8	1	500	50 ± 2%	Male	R404 131 120 ^[1]
4	1.2	20.8	1	500	50 ± 2%	Female	R404 132 000
4	1.2	20.8	1	500	50 ± 2%	Female	R404 132 120 ^[1]
12.4	1.15	23.1	1	500	50 ± 2%	Male	R404 240 000
12.4	1.15	23.1	1	500	50 ± 2%	Male	R404 240 120 ^[1]
12.4	1.15	23.1	1	500	50 ± 2%	Male	R404 240 121 ^[2]
12.4	1.15	23.1	1	500	50 ± 2%	Female	R404 245 000
18	1.2	20.8	2	100	50 ± 2%	Male	R404 340 000
18	1.2	20.8	2	100	50 ± 2%	Male	R404 340 120 ^[1]
18	1.2	20.8	2	100	50 ± 2%	Female	R404 355 000

NEX10 - 50 OHMS

FREQUENCY DC TO (GHZ)	VSWR MAX.	RETURN LOSS MIN. (DB)	POWER RATING (W)		IMPEDANCE (Ω)	GENDER	PART NUMBER
			AVG. (W)	PEAK (W)			
4	1.15	23.1	1	100	50 ± 5%	Male	R404 1E1 000
4	1.15	23.1	1	100	50 ± 5%	Male	R404 1E1 121 ^[2]
4	1.15	23.1	1	100	50 ± 5%	Male	R404 1E2 000
6	1.15	23.1	2	100	50 ± 5%	Male	R404 2E1 000
6	1.15	23.1	2	100	50 ± 5%	Male	R404 2E2 000
6	1.15	23.1	2	100	50 ± 5%	Female	R404 2E5 000

QMA - 50 OHMS

FREQUENCY DC TO (GHZ)	VSWR MAX.	RETURN LOSS MIN. (DB)	POWER RATING (W)		IMPEDANCE (Ω)	GENDER	PART NUMBER
			AVG. (W)	PEAK (W)			
3	1.1	26.4	2	200	50 ± 5%	Male	R404 114 111
4	1.2	20.8	1	100	50 ± 5%	Male	R404 114 000
4	1.2	20.8	1	100	50 ± 5%	Male	R404 114 120 ^[1]

QN - 50 OHMS

FREQUENCY DC TO (GHZ)	VSWR MAX.	RETURN LOSS MIN. (DB)	POWER RATING (W)		IMPEDANCE (Ω)	GENDER	PART NUMBER
			AVG. (W)	PEAK (W)			
4	1.2	20.8	1	100	50 ± 5%	Male	R404 116 000

SMA - 50 OHMS

FREQUENCY DC TO (GHZ)	VSWR MAX.	RETURN LOSS MIN. (DB)	POWER RATING (W)		IMPEDANCE (Ω)	GENDER	PART NUMBER
			AVG. (W)	PEAK (W)			
4	1.2	20.8	1	100	50 ± 5%	Male	R404 101 000
4	1.2	20.8	1	100		Male	R404 101 019
4	1.2	20.8	1	100		Male	R404 101 120 ^[1]
4	1.25	19.1	1	100		Female	R404 102 000
8	1.15	23.1	3	250		Male	R404 600 000
18	1.2	20.8	1	100		Male	R404 N05 000
18	1.2	20.8	1	100		Male	R404 N05 120 ^[1]
18	1.2	20.8	1	100		Male	R404 N05 121 ^[2]
18	1.2	20.8	1	100		Female	R404 N06 000
18	1.25	19.1	2	100		Male	R404 210 161
18	1.2	20.8	2	100	50 ± 5%	Male	R404 N01 000
18	1.2	20.8	2	100		Male	R404 N01 120 ^[1]
18	1.2	20.8	2	100		Male	R404 N01 121 ^[2]
18	1.2	20.8	2	100		Female	R404 N02 000
18	1.34	16.8	3	250		Male	R404 605 000
26.5	1.3	17.7	1	100		Male	R404 N07 000
26.5	1.3	17.7	1	100		Female	R404 N08 000
26.5	1.3	17.7	2	100		Male	R404 N03 000
26.5	1.3	17.7	2	100		Female	R404 N04 000

Notes

1. Bead Chain
2. Cord

Terminations



SMA2.9 - 50 OHMS

FREQUENCY DC TO (GHZ)	VSWR MAX.	RETURN LOSS MIN. (DB)	POWER RATING (W)		IMPEDANCE (Ω)	GENDER	PART NUMBER
			AVG. (W)	PEAK (W)			
40	1.35	16.5	1	100	50 ± 5%	Male	R404 280 000
40	1.35	16.5	1	100	50 ± 5%	Female	R404 285 000

SMB - 50 OHMS

FREQUENCY DC TO (GHZ)	VSWR MAX.	RETURN LOSS MIN. (DB)	POWER RATING (W)		IMPEDANCE (Ω)	GENDER	PART NUMBER
			AVG. (W)	PEAK (W)			
4	1.2	20.8	1	100	50 ± 5%	Male	R404 104 000
4	1.2	20.8	1	100	50 ± 5%	Female	R404 105 000
8	1.25	19.1	0.5	100	50 ± 5%	Female	R404 155 000 ^[2]
8	1.25	19.1	0.5	100	50 ± 5%	Female	R404 165 000

SMC - 50 OHMS

FREQUENCY DC TO (GHZ)	VSWR MAX.	RETURN LOSS MIN. (DB)	POWER RATING (W)		IMPEDANCE (Ω)	GENDER	PART NUMBER
			AVG. (W)	PEAK (W)			
8	1.25	19.1	0.5	100	50 ± 5%	Female	R404 160 000

SMP - 50 OHMS

FREQUENCY DC TO (GHZ)	VSWR MAX.	RETURN LOSS MIN. (DB)	POWER RATING (W)		IMPEDANCE (Ω)	GENDER	PART NUMBER
			AVG. (W)	PEAK (W)			
18	1.2	17.7	1	100	50 ± 5%	Male	R404 N61 000
18	1.2	17.7	1	100	50 ± 5%	Female	R404 N62 000
40	1.7	11.7	0.5	100	50 ± 5%	Male	R404 260 000
40	1.7	11.7	0.5	100	50 ± 5%	Female	R404 262 000

SMPM - 50 OHMS

FREQUENCY DC TO (GHZ)	VSWR MAX.	RETURN LOSS MIN. (DB)	POWER RATING (W)		IMPEDANCE (Ω)	GENDER	PART NUMBER
			AVG. (W)	PEAK (W)			
18	1.2	20.8	1	100	50 ± 5%	Male	R404 NM1 000
18	1.2	20.8	1	100	50 ± 5%	Female	R404 NM2 000
18	1.2	20.8	1	100	50 ± 5%	Male	R404 NM3 000

SSMA - 50 OHMS

FREQUENCY DC TO (GHZ)	VSWR MAX.	RETURN LOSS MIN. (DB)	POWER RATING (W)		IMPEDANCE (Ω)	GENDER	PART NUMBER
			AVG. (W)	PEAK (W)			
18	1.35	16.5	0.5	100	50 ± 5%	Male	R404 380 000

TNC - 50 OHMS

FREQUENCY DC TO (GHZ)	VSWR MAX.	RETURN LOSS MIN. (DB)	POWER RATING (W)		IMPEDANCE (Ω)	GENDER	PART NUMBER
			AVG. (W)	PEAK (W)			
4	1.2	20.8	1	100	50 ± 2%	Male	R404 121 000
4	1.2	20.8	1	100	50 ± 5%	Male	R404 121 120 ^[1]
4	1.2	20.8	1	100	50 ± 5%	Female	R404 122 000
12.4	1.25	19.1	1	500	50 ± 5%	Male	R404 225 000
12.4	1.25	19.1	1	500	50 ± 5%	Male	R404 225 120 ^[1]
18	1.2	20.8	2	100	50 ± 5%	Male	R404 370 000
18	1.2	20.8	2	100	50 ± 5%	Male	R404 370 120 ^[1]
18	1.2	20.8	2	100	50 ± 5%	Female	R404 375 000

Notes

1. Bead Chain
2. Cord

Terminations



MEDIUM POWER TERMINATIONS, UP TO 30 WATTS

4.3/10 - 50 OHMS

FREQUENCY DC TO (GHZ)	VSWR MAX.	RETURN LOSS MIN. (DB)	POWER RATING (W)		IMPEDANCE (Ω)	GENDER	PART NUMBER
			AVG. (W)	PEAK (W)			
6	1.3	17.7	30	2,000	50 ± 5%	Male Screw	R404 758 000
6	1.3	17.7	30	2,000	50 ± 5%	Female	R404 759 000

7/16 - 50 OHMS

FREQUENCY DC TO (GHZ)	VSWR MAX.	RETURN LOSS MIN. (DB)	POWER RATING (W)		IMPEDANCE (Ω)	GENDER	PART NUMBER
			AVG. (W)	PEAK (W)			
6	1.4	17.7	30	2,000	50 ± 5%	Male	R404 756 000
6	1.4	17.7	30	2,000	50 ± 5%	Female	R404 757 000
4	1.2	20.8	6	1,500	50 ± 5%	Male	R404 514 000
4	1.2	20.8	12	1,500	50 ± 5%	Male	R404 564 000

BNC - 50 OHMS

FREQUENCY DC TO (GHZ)	VSWR MAX.	RETURN LOSS MIN. (DB)	POWER RATING (W)		IMPEDANCE (Ω)	GENDER	PART NUMBER
			AVG. (W)	PEAK (W)			
2	1.1	26.4	6	1,500	50 ± 5%	Male	R404 505 000
2	1.1	26.4	12	1,500	50 ± 5%	Male	R404 555 000
8	1.25	19.1	6	1,500	50 ± 5%	Male	R404 510 000
8	1.25	19.1	12	1,500	50 ± 5%	Male	R404 560 000

N - 50 OHMS

FREQUENCY DC TO (GHZ)	VSWR MAX.	RETURN LOSS MIN. (DB)	POWER RATING (W)		IMPEDANCE (Ω)	GENDER	PART NUMBER
			AVG. (W)	PEAK (W)			
2	1.1	26.4	6	1,500	50 ± 5%	Male	R404 507 000
2	1.1	26.4	12	1,500	50 ± 5%	Male	R404 557 000
6	1.4	17.7	30	2,000	50 ± 5%	Male	R404 750 000
6	1.4	17.7	30	2,000	50 ± 5%	Female	R404 751 000
8	1.25	19.1	6	4,000	50 ± 5%	Male	R404 512 000
12.4	1.3	17.7	6	1,500	50 ± 5%	Male	R404 517 000
12.4	1.3	17.7	12	1,500	50 ± 5%	Male	R404 567 000
12.4	1.25	19.1	20	300	50 ± 5%	Male	R404 587 000
12.4	1.25	19.1	20	300	50 ± 5%	Female	R404 587 500
18	1.3	17.7	6	300	50 ± 5%	Male	R404 522 000
18	1.3	17.7	6	300	50 ± 5%	Female	R404 522 500
18	1.3	17.7	12	300	50 ± 5%	Male	R404 572 000
18	1.3	17.7	12	300	50 ± 5%	Female	R404 572 500
18	1.35	16.5	20	300	50 ± 5%	Male	R404 588 000
18	1.35	16.5	20	300	50 ± 5%	Female	R404 588 500

SMA - 50 OHMS

FREQUENCY DC TO (GHZ)	VSWR MAX.	RETURN LOSS MIN. (DB)	POWER RATING (W)		IMPEDANCE (Ω)	GENDER	PART NUMBER
			AVG. (W)	PEAK (W)			
12.4	1.3	17.7	6	1,500	50 ± 5%	Male	R404 518 000
18	1.3	17.7	6	300	50 ± 5%	Male	R404 523 000
18	1.3	17.7	6	300	50 ± 5%	Female	R404 523 500
12.4	1.3	17.7	12	1,500	50 ± 5%	Male	R404 568 000
18	1.3	17.7	12	300	50 ± 5%	Male	R404 573 000
18	1.3	17.7	12	300	50 ± 5%	Female	R404 573 500
12.4	1.25	19.1	20	300	50 ± 5%	Male	R404 584 000
12.4	1.25	19.1	20	300	50 ± 5%	Female	R404 584 500
18	1.35	16.5	20	300	50 ± 5%	Male	R404 589 000
18	1.35	16.5	20	300	50 ± 5%	Female	R404 589 500
6	1.4	15.6	30	2,000	50 ± 5%	Male	R404 754 000
6	1.4	15.6	30	2,000	50 ± 5%	Female	R404 755 000

Terminations



TNC - 50 OHMS

FREQUENCY DC TO (GHZ)	VSWR MAX.	RETURN LOSS MIN. (DB)	POWER RATING (W)		IMPEDANCE (Ω)	GENDER	PART NUMBER
			AVG. (W)	PEAK (W)			
2	1.1	26.4	6	1,500	50 ± 5%	Male	R404 506 000
2	1.1	26.4	12	1,500	50 ± 5%	Male	R404 556 000
6	1.4	17.7	30	2,000	50 ± 5%	Male	R404 752 000
6	1.4	17.7	30	2,000	50 ± 5%	Female	R404 753 000
12.4	1.3	17.7	6	1,500	50 ± 5%	Male	R404 516 000
12.4	1.3	17.7	12	1,500	50 ± 5%	Male	R404 566 000
12.4	1.25	19.1	20	300	50 ± 5%	Male	R404 585 000
12.4	1.25	19.1	20	300	50 ± 5%	Female	R404 585 500
18	1.3	17.7	12	300	50 ± 5%	Male	R404 571 000
18	1.35	16.5	20	300	50 ± 5%	Male	R404 586 000
18	1.35	16.5	20	300	50 ± 5%	Male	R404 586 500

HIGH POWER TERMINATIONS, UP TO 1000 WATTS

4.3/10 - 50 OHMS

FREQUENCY DC TO (GHZ)	VSWR MAX.	RETURN LOSS MIN. (DB)	POWER RATING (W)		IMPEDANCE (Ω)	GENDER	PART NUMBER	WEIGHT (G)
			AVG. (W)	PEAK (W)				
6	1.4	17.7	50	2,000	50 ± 5%	Male	R404 768 000	300
6	1.4	17.7	50	2,000	50 ± 5%	Female	R404 769 000	320
6	1.4	17.7	100	2,000	50 ± 5%	Male	R404 778 000	1,200
6	1.4	17.7	100	2,000	50 ± 5%	Female	R404 779 000	1,200

7/16 - 50 OHMS

FREQUENCY DC TO (GHZ)	VSWR MAX.	RETURN LOSS MIN. (DB)	POWER RATING (W)		IMPEDANCE (Ω)	GENDER	PART NUMBER	WEIGHT (G)
			AVG. (W)	PEAK (W)				
1	1.1	26.4	1000	40,000	50 ± 5%	Female	R404 867 000	15,000
2.5	1.3	17.7	600	40,000	50 ± 5%	Female	R404 865 000	8,200
6	1.4	17.7	50	2,000	50 ± 5%	Male	R404 766 000	350
6	1.4	17.7	50	2,000	50 ± 5%	Female	R404 767 000	340
6	1.4	17.7	100	2,000	50 ± 5%	Male	R404 776 000	1,260
6	1.4	17.7	100	2,000	50 ± 5%	Female	R404 777 000	1,250
6	1.4	17.7	150	2,000	50 ± 5%	Male	R404 786 000	1,960
6	1.4	17.7	150	2,000	50 ± 5%	Female	R404 787 000	1,950
6	1.4	17.7	200	2,000	50 ± 5%	Male	R404 786 020	1,960
6	1.4	17.7	200	2,000	50 ± 5%	Female	R404 787 020	1,950

7/16 - 50 OHMS CONDUCTION COOLING

FREQUENCY DC TO (GHZ)	VSWR MAX.	RETURN LOSS MIN. (DB)	POWER RATING (W)		IMPEDANCE (Ω)	GENDER	PART NUMBER	WEIGHT (G)
			AVG. (W)	PEAK (W)				
6	1.4	17.7	200	2,000	50 ± 5%	Male	R404 786 120	200
6	1.4	17.7	200	2,000	50 ± 5%	Female	R404 787 120	180

N - 50 OHMS

FREQUENCY DC TO (GHZ)	VSWR MAX.	RETURN LOSS MIN. (DB)	POWER RATING (W)		IMPEDANCE (Ω)	GENDER	PART NUMBER	WEIGHT (G)
			AVG. (W)	PEAK (W)				
2.5	1.3	17.7	400	40,000	50 ± 5%	Female	R404 863 000	4,050
6	1.4	17.7	50	2,000	50 ± 5%	Male	R404 760 000	295
6	1.4	17.7	50	2,000	50 ± 5%	Female	R404 761 000	289
6	1.4	17.7	100	2,000	50 ± 5%	Male	R404 770 000	1,200
6	1.4	17.7	100	2,000	50 ± 5%	Female	R404 771 000	1,200
6	1.4	17.7	150	2,000	50 ± 5%	Male	R404 780 000	1,900
6	1.4	17.7	150	2,000	50 ± 5%	Female	R404 781 000	1,900
6	1.4	17.7	200	2,000	50 ± 5%	Male	R404 780 020	2,000
6	1.4	17.7	200	2,000	50 ± 5%	Female	R404 781 020	1,900
6	1.2	20.8	250	25,000	50 ± 5%	Female	R404 861 000	3,000

Terminations



N - 50 OHMS CONDUCTION COOLING

FREQUENCY DC TO (GHZ)	VSWR MAX.	RETURN LOSS MIN. (DB)	POWER RATING (W)		IMPEDANCE (Ω)	GENDER	PART NUMBER	WEIGHT (G)
			AVG. (W)	PEAK (W)				
6	1.4	17.7	200	2,000	50 ± 5%	Male	R404 780 120	140
6	1.4	17.7	200	2,000	50 ± 5%	Female	R404 781 120	140
6	1.4	15.6	150	2,000	50 ± 5%	Male	R404 780 100	140
6	1.4	15.6	150	2,000	50 ± 5%	Female	R404 781 100	140

SMA - 50 OHMS

FREQUENCY DC TO (GHZ)	VSWR MAX.	RETURN LOSS MIN. (DB)	POWER RATING (W)		IMPEDANCE (Ω)	GENDER	PART NUMBER	WEIGHT (G)
			AVG. (W)	PEAK (W)				
6	1.4	17.7	50	2,000	50 ± 5%	Male	R404 764 000	290
6	1.4	17.7	50	2,000	50 ± 5%	Female	R404 765 000	290
6	1.4	17.7	100	2,000	50 ± 5%	Male	R404 774 000	1,200
6	1.4	17.7	100	2,000	50 ± 5%	Female	R404 775 000	1,200

SMA - 50 OHMS CONDUCTION COOLING

FREQUENCY DC TO (GHZ)	VSWR MAX.	RETURN LOSS MIN. (DB)	POWER RATING (W)		IMPEDANCE (Ω)	GENDER	PART NUMBER	WEIGHT (G)
			AVG. (W)	PEAK (W)				
6	1.4	15.6	100	2,000	50 ± 5%	Male	R404 774 100	130
6	1.4	15.6	100	2,000	50 ± 5%	Female	R404 775 100	130

TNC - 50 OHMS

FREQUENCY DC TO (GHZ)	VSWR MAX.	RETURN LOSS MIN. (DB)	POWER RATING (W)		IMPEDANCE (Ω)	GENDER	PART NUMBER	WEIGHT (G)
			AVG. (W)	PEAK (W)				
6	1.4	17.7	50	2,000	50 ± 5%	Male	R404 762 000	290
6	1.4	17.7	50	2,000	50 ± 5%	Female	R404 763 000	290
6	1.4	17.7	100	2,000	50 ± 5%	Male	R404 772 000	1,200
6	1.4	17.7	100	2,000	50 ± 5%	Female	R404 773 000	1,200
6	1.4	17.7	150	2,000	50 ± 5%	Male	R404 782 000	1,900
6	1.4	17.7	150	2,000	50 ± 5%	Female	R404 783 000	1,900
6	1.4	17.7	200	2,000	50 ± 5%	Male	R404 782 020	1,900
6	1.4	17.7	200	2,000	50 ± 5%	Female	R404 783 020	1,900

TNC - 50 OHMS CONDUCTION COOLING

FREQUENCY DC TO (GHZ)	VSWR MAX.	RETURN LOSS MIN. (DB)	POWER RATING (W)		IMPEDANCE (Ω)	GENDER	PART NUMBER	WEIGHT (G)
			AVG. (W)	PEAK (W)				
6	1.4	17.7	200	2,000	50 ± 5%	Male	R404 782 120	130
6	1.4	17.7	200	2,000	50 ± 5%	Female	R404 783 120	130

Terminations

**PLATINUM TERMINATIONS, UP TO 1 WATT**

Radiall's platinum series of terminations is designed for Test & Measurement applications. This range can be easily integrated in communication matrices, test benches and laboratories where high RF performance and reliability are essential.

MAIN FEATURES OF RADIALL'S PLATINUM SERIES OF TERMINATIONS

- 1 W power rating
- Frequency from DC up to 40 GHz
- Lowest VSWR
- 50 Ω Impedance
- Compatible with all standard Test & Measurement interfaces
- Full integration in Radiall Test & Measurement offer: electromechanical switches and TestPro cable assemblies

**SMA2.9 - 50 OHMS**

FREQUENCY DC TO (GHZ)	VSWR MAX.	RETURN LOSS MIN. (DB)	POWER RATING (W)		IMPEDANCE (Ω)	GENDER	PART NUMBER
			AVG. (W)	PEAK (W)			
40	1.18	21.7	1	50	50 $\pm$ 5%	Male	R404 280 150
40	1.22	20.1	1	50	50 $\pm$ 5%	Female	R404 285 150

SMA3.5 - 50 OHMS

FREQUENCY DC TO (GHZ)	VSWR MAX.	RETURN LOSS MIN. (DB)	POWER RATING (W)		IMPEDANCE (Ω)	GENDER	PART NUMBER
			AVG. (W)	PEAK (W)			
26.5	1.1	26.4	1	50	50 $\pm$ 5%	Male	R404 211 150
26.5	1.12	24.9	1	50	50 $\pm$ 5%	Female	R404 216 150

SMA - 50 OHMS

FREQUENCY DC TO (GHZ)	VSWR MAX.	RETURN LOSS MIN. (DB)	POWER RATING (W)		IMPEDANCE (Ω)	GENDER	PART NUMBER
			AVG. (W)	PEAK (W)			
22	1.15	26.4	1	50	50 $\pm$ 5%	Male	R404 210 150
22	1.15	24.9	1	50	50 $\pm$ 5%	Female	R404 215 150

N - 50 OHMS

FREQUENCY DC TO (GHZ)	VSWR MAX.	RETURN LOSS MIN. (DB)	POWER RATING (W)		IMPEDANCE (Ω)	GENDER	PART NUMBER
			AVG. (W)	PEAK (W)			
18	1.1	26.4	1	50	50 $\pm$ 5%	Male	R404 350 150
18	1.12	24.9	1	50	50 $\pm$ 5%	Female	R404 355 150

TNC - 50 OHMS

FREQUENCY DC TO (GHZ)	VSWR MAX.	RETURN LOSS MIN. (DB)	POWER RATING (W)		IMPEDANCE (Ω)	GENDER	PART NUMBER
			AVG. (W)	PEAK (W)			
12.4	1.15	23.1	1	50	50 $\pm$ 5%	Male	R404 370 150
12.4	1.15	23.1	1	50	50 $\pm$ 5%	Female	R404 375 150

BNC - 50 OHMS

FREQUENCY DC TO (GHZ)	VSWR MAX.	RETURN LOSS MIN. (DB)	POWER RATING (W)		IMPEDANCE (Ω)	GENDER	PART NUMBER
			AVG. (W)	PEAK (W)			
4	1.12	24.9	1	50	50 $\pm$ 5%	Male	R404 110 150
4	1.12	24.9	1	50	50 $\pm$ 5%	Female	R404 115 150



INTRODUCTION

Radiall coaxial fixed attenuators offer excellent reliability and repeatability from DC to 67 GHz. The offer includes low, medium, high power attenuators and a platinum range for instrumentation applications which provide the lowest VSWR.

MAIN ATTENUATOR FEATURES

- Power range from 0.5 W to 150 W
- Frequency from DC up to 67 GHz
- Attenuation values from 0 up to 60 dB
- High repeatability
- 50 Ω Impedance
- Compatible with all standard connector interfaces: BNC, QN, N, 7/16, SMA, TNC, SMA2.9
- Dedicated platinum range for Test & Measurement providing lowest VSWR

LOW POWER ATTENUATORS



POWER	1 to 2 Watts
CONNECTORS	1.85 mm, 2.4 mm, 7-16, BNC, N, QMA, QN, SMA, SMA 2.9, SMA3.5, SMB, SMC, TNC
FREQUENCY RANGE	DC to 67 GHz
ATTENUATION RANGE	0 to 60 dB

MEDIUM POWER ATTENUATORS



POWER	10 to 30 Watts
CONNECTORS	4.3-10, 7-16, BNC, N, NEX10, SMA, TNC
FREQUENCY RANGE	DC to 18 GHz
ATTENUATION RANGE	3 to 30 dB

HIGH POWER ATTENUATORS



POWER	30 to 150 Watts
CONNECTORS	N, SMA, TNC, 7/16
FREQUENCY RANGE	DC to 6 GHz
ATTENUATION RANGE	3 to 30 dB

PLATINUM ATTENUATORS

Radiall's low power attenuator offer is dedicated for Test & Measurement and provides the lowest VSWR.



POWER	2 Watts
CONNECTORS	SMA2.9, SMA3.5, SMA, N, BNC, TNC
FREQUENCY RANGE	DC to 40 GHz
ATTENUATION RANGE	0 to 30 dB

Attenuators



LOW POWER ATTENUATORS, UP TO 2 WATTS

7/16 - 50 OHMS, MALE TO FEMALE

FREQUENCY DC TO (GHZ)	VSWR MAX.	RETURN LOSS MIN. (DB)	POWER RATING (W)		NOM. ATTENUATION (DB)	MAX DEV.	PART NUMBER
			AVG. (W)	PEAK (W)			
3	1.3	17.7	1	100	xx	± 0.5 ^[1]	R412 8xx 000
Available Attenuation Value: xx = 03, 06, 10 and 20 dB							

BNC - 50 OHMS, MALE TO FEMALE

FREQUENCY DC TO (GHZ)	VSWR MAX.	RETURN LOSS MIN. (DB)	POWER RATING (W)		NOM. ATTENUATION (DB)	MAX DEV.	PART NUMBER
			AVG. (W)	PEAK (W)			
2	1.2	20.8	2	100	xx	± 0.35 ^[2]	R412 4xx 000
Available Attenuation Value: xx = 00 to 20 step 1, 30, 40 and 50 dB							
3	1.3	17.7	1	100	xx	± 0.5 ^[3]	R412 4xx 124
Available Attenuation Value: xx = 00 to 20 step 1 dB							
8	1.25	19.1	2	100	xx	± 0.5 ^[4]	R414 4xx 000
Available Attenuation Value: xx = 00 to 15 step 1, 20, 25, 30, 40 - 50 and 60 dB							

N - 50 OHMS, MALE TO FEMALE

FREQUENCY DC TO (GHZ)	VSWR MAX.	RETURN LOSS MIN. (DB)	POWER RATING (W)		NOM. ATTENUATION (DB)	MAX DEV.	PART NUMBER
			AVG. (W)	PEAK (W)			
2	1.15	23.1	2	100	xx	± 0.35 ^[3]	R412 7xx 000
Available Attenuation Value: xx = 00 to 15 step 1, 20, 30, 40 and 50 dB							
6	1.4	15.6	1	100	xx	± 0.5 ^[3]	R412 700 124
Available Attenuation Value: xx = 00 to 20 dB step 1							
12.4	1.4	15.6	2	100	xx	± 0.7 ^[5]	R414 7xx 000
Available Attenuation Value: xx = 00 to 15 step 1, 20, 25, 30, 40 - 50 and 60 dB							
18	1.35	16.5	2	100	xx	± 0.4 ^[6]	R414 7xx 161
Available Attenuation Value: xx = 00 to 20 dB step 1							

QMA - 50 OHMS, MALE TO FEMALE

FREQUENCY DC TO (GHZ)	VSWR MAX.	RETURN LOSS MIN. (DB)	POWER RATING (W)		NOM. ATTENUATION (DB)	MAX DEV.	PART NUMBER
			AVG. (W)	PEAK (W)			
6	1.3	17.7	1	100	xx	± 0.5 ^[3]	R411 7xx 124
Available Attenuation Value: xx = 00 to 20 dB step 1							

QN - 50 OHMS, MALE TO FEMALE

FREQUENCY DC TO (GHZ)	VSWR MAX.	RETURN LOSS MIN. (DB)	POWER RATING (W)		NOM. ATTENUATION (DB)	MAX DEV.	PART NUMBER
			AVG. (W)	PEAK (W)			
3	1.3	17.7	1	100	xx	± 0.5 ^[3]	R412 3xx 124
Available Attenuation Value: xx = 00 to 20 dB step 1							

SMA - 50 OHMS, MALE TO FEMALE, .75 IN.

FREQUENCY DC TO (GHZ)	VSWR MAX.	RETURN LOSS MIN. (DB)	POWER RATING (W)		NOM. ATTENUATION (DB)	MAX DEV.	PART NUMBER
			AVG. (W)	PEAK (W)			
6	1.4	15.6	1	100	xx	± 0.5 ^[3]	R411 8xx 124
Available Attenuation Value: xx = 00 to 20 dB step 1							
12.4	1.3	17.7	2	100	xx	± 0.5 ^[7]	R411 8xx 119
Available Attenuation Value: xx = 00 to 20 step 1 and 30 dB							
18	1.35	16.5	2	100	xx	± 0.7 ^[8]	R411 8xx 121
Available Attenuation Value: xx = 00 to 20 step 1 and 30 dB							

Notes

1. ± 1 for xx = 20
2. Up to xx = 14
3. Up to xx = 15
4. Up to xx = 25
5. Up to xx = 20
6. Up to xx = 6
7. Up to xx = 10
8. Up to xx = 7

Attenuators

**SMA - 50 OHMS, MALE TO FEMALE, .86 IN.**

FREQUENCY DC TO (GHZ)	VSWR MAX.	RETURN LOSS MIN. (DB)	POWER RATING (W)		NOM. ATTENUATION (DB)	MAX DEV.	PART NUMBER
			AVG. (W)	PEAK (W)			
4	1.15	23.1	2	100	xx	± 0.3 ^[1]	R413 8xx 115
Available Attenuation Value: xx = 00 to 20 step 1, 30, 40 - 50 and 60 dB							
18	1.35	16.5	2	100	xx	± 0.3 ^[1]	R413 8xx 000
Available Attenuation Value: xx = 00 to 20 step 1, 25, 30, 35, 40, 45 - 50, 55 and 60 dB							
26.5	1.5	14.0	2	100	xx	± 0.5 ^[1]	R413 8xx 121
Available Attenuation Value: xx = 00 to 20 step 1, 25 and 30 dB							

SMA2.9 - 50 OHMS, MALE TO FEMALE

FREQUENCY DC TO (GHZ)	VSWR MAX.	RETURN LOSS MIN. (DB)	POWER RATING (W)		NOM. ATTENUATION (DB)	MAX DEV.	PART NUMBER
			AVG. (W)	PEAK (W)			
40	1.6	12.7	2	100	xx	± 0.8	R413 3xx 000
Available Attenuation Value: xx = 00 to 10 step 1 and 20 dB							

1.85 mm - 50 OHMS

FREQUENCY DC TO (GHZ)	VSWR MAX.	RETURN LOSS MIN. (DB)	POWER RATING (W)		NOM. ATTENUATION (DB)	MAX DEV.	PART NUMBER
			AVG. (W)	PEAK (W)			
67	1.75	11.3	1	50	xx	± 1 ^[4]	R413 Vxx 000
Available Attenuation Value: xx = 03, 06, 10 and 20 dB							

2.4 mm - 50 OHMS

FREQUENCY DC TO (GHZ)	VSWR MAX.	RETURN LOSS MIN. (DB)	POWER RATING (W)		NOM. ATTENUATION (DB)	MAX DEV.	PART NUMBER
			AVG. (W)	PEAK (W)			
53	1.75	11.3	1	50	xx	± 1 ^[5]	R413 Nxx 000
Available Attenuation Value: xx = 01, 02, 03, 04, 05, 06, 07, 08, 09, 10, 12, 15, 20 and 30 dB							

SMB - 50 OHMS, MALE TO FEMALE

FREQUENCY DC TO (GHZ)	VSWR MAX.	RETURN LOSS MIN. (DB)	POWER RATING (W)		NOM. ATTENUATION (DB)	MAX DEV.	PART NUMBER
			AVG. (W)	PEAK (W)			
8	1.3	17.7	2	100	xx	± 0.5	R410 2xx 121
Available Attenuation Value: xx = 03, 06, 10 and 20 dB							

SMC - 50 OHMS, MALE TO FEMALE

FREQUENCY DC TO (GHZ)	VSWR MAX.	RETURN LOSS MIN. (DB)	POWER RATING (W)		NOM. ATTENUATION (DB)	MAX DEV.	PART NUMBER
			AVG. (W)	PEAK (W)			
8	1.3	17.7	2	100	xx	± 0.5	R410 1xx 121
Available Attenuation Value: xx = 03, 06, 10 and 20 dB							

TNC - 50 OHMS, MALE TO FEMALE

FREQUENCY DC TO (GHZ)	VSWR MAX.	RETURN LOSS MIN. (DB)	POWER RATING (W)		NOM. ATTENUATION (DB)	MAX DEV.	PART NUMBER
			AVG. (W)	PEAK (W)			
2	1.15	23.1	2	100	xx	± 0.35 ^[2]	R412 5xx 000
Available Attenuation Value: xx = 00 to 15 step 1, 20, 30, 40 and 50 dB							
3	1.3	17.7	1	100	xx	± 0.5 ^[2]	R412 5xx 124
Available Attenuation Value: xx = 00 to 20 dB step 1							
12.4	1.3	17.7	2	100	xx	± 0.7 ^[3]	R414 5xx 000
Available Attenuation Value: xx = 00 to 15 step 1, 20, 25, 30, 40 - 50 and 60 dB							
18	1.35	16.5	2	100	xx	± 0.4 ^[1]	R414 5xx 161
Available Attenuation Value: xx = 00 to 20 dB step 1							

Notes

1. Up to xx = 6
2. Up to xx = 15
3. Up to xx = 14
4. ± 1.5 for xx = 20
5. ± 1.5 for xx = 12, 15, 20 and 30 dB

Attenuators



MEDIUM POWER ATTENUATORS, UP TO 30 WATTS

7/16 - 50 OHMS, MALE TO FEMALE

FREQUENCY DC TO (GHZ)	VSWR MAX.	RETURN LOSS MIN. (DB)	POWER RATING (W)		NOM. ATTENUATION (DB)	MAX DEV.	PART NUMBER
			AVG. (W)	PEAK (W)			
4	1.35	16.5	25	5,000	xx	± 0.6 ^[1]	R420 3xx 110
Available Attenuation Value: xx = 03, 06, 10 and 20 dB							

4.3/10 - 50 OHMS, MALE TO FEMALE

FREQUENCY DC TO (GHZ)	VSWR MAX.	RETURN LOSS MIN. (DB)	POWER RATING (W)		NOM. ATTENUATION (DB)	MAX DEV.	PART NUMBER
			AVG. (W)	PEAK (W)			
6	1.15	23.1	15	250	xx	± 0.3 ^[1]	R415 6xx 000
Available Attenuation Value: xx = 03, 06, 10 and 20 dB							

BNC - 50 OHMS, MALE TO FEMALE

FREQUENCY DC TO (GHZ)	VSWR MAX.	RETURN LOSS MIN. (DB)	POWER RATING (W)		NOM. ATTENUATION (DB)	MAX DEV.	PART NUMBER
			AVG. (W)	PEAK (W)			
4	1.3	17.7	15 ^[2]	250	xx	± 0.5	R415 4xx 000
Available Attenuation Value: xx = 03, 06, 10 and 20 dB							

N - 50 OHMS, MALE TO FEMALE

FREQUENCY DC TO (GHZ)	VSWR MAX.	RETURN LOSS MIN. (DB)	POWER RATING (W)		NOM. ATTENUATION (DB)	MAX DEV.	PART NUMBER
			AVG. (W)	PEAK (W)			
4	1.35	16.5	25	5,000	xx	± 0.6 ^[3]	R417 3xx 110
Available Attenuation Value: xx = 03, 06, 10, 20 and 30 dB							
6	1.25	-	30	2,000	xx	± 0.75 ^[3]	R422 0xx 010
4	1.35	16.5	30 ^[4]	5,000	xx	± 0.6 ^[3]	R417 3xx 130
Available Attenuation Value: xx = 03, 06, 10, 20 and 30 dB							
8	1.25	19.1	15 ^[2]	250	xx	± 0.3	R415 7xx 000
Available Attenuation Value: xx = 03, 06, 10 and 20 dB							
18	1.4	15.6	15 ^[2]	300	xx	± 0.5	R416 0xx 000
Available Attenuation Value: xx = 03, 06, 10 and 20 dB							

NEX10 - 50 OHMS, MALE TO FEMALE

FREQUENCY DC TO (GHZ)	VSWR MAX.	RETURN LOSS MIN. (DB)	POWER RATING (W)		NOM. ATTENUATION (DB)	MAX DEV.	PART NUMBER
			AVG. (W)	PEAK (W)			
6	1.15	23.1	15	250	xx	± 0.3 ^[1]	R415 8xx 000
Available Attenuation Value: xx = 03, 06, 10 and 20 dB							

SMA - 50 OHMS, MALE TO FEMALE

FREQUENCY DC TO (GHZ)	VSWR MAX.	RETURN LOSS MIN. (DB)	POWER RATING (W)		NOM. ATTENUATION (DB)	MAX DEV.	PART NUMBER
			AVG. (W)	PEAK (W)			
4	1.35	16.5	25	5,000	xx	± 0.6 ^[3]	R417 5xx 110
Available Attenuation Value: xx = 03, 06, 10, 20 and 30 dB							
4	1.35	16.5	30 ^[4]	5,000	xx	± 0.6 ^[3]	R417 5xx 130
Available Attenuation Value: xx = 03, 06, 10, 20 and 30 dB							
8	1.25	19.1	15 ^[2]	250	xx	± 0.3	R415 3xx 000
Available Attenuation Value: xx = 03, 06, 10 and 20 dB							
18	1.4	15.6	15 ^[2]	300	xx	± 0.5	R416 1xx 000
Available Attenuation Value: xx = 03, 06, 10 and 20 dB							

Notes

1. ± 0.6 for xx = 20
2. 12 for xx = 06, 10 for xx = 10 and 20
3. Up to xx = 10
4. Conduction cooling type

Attenuators



TNC - 50 OHMS, MALE TO FEMALE

FREQUENCY DC TO (GHZ)	VSWR MAX.	RETURN LOSS MIN. (DB)	POWER RATING (W)		NOM. ATTENUATION (DB)	MAX DEV.	PART NUMBER
			AVG. (W)	PEAK (W)			
4	1.35	16.5	25	5,000	xx	± 0.6 ^[1]	R417 6xx 110
Available Attenuation Value: xx = 03, 06, 10, 20 and 30 dB							
6	1.25	19.1	30	2,000	xx	± 0.75 ^[1]	R422 0xx 010
4	1.35	16.5	30 ^[3]	5,000	xx	± 0.6 ^[1]	R417 6xx 130
Available Attenuation Value: xx = 03, 06, 10, 20 and 30 dB							
8	1.25	19.1	15 ^[2]	250	xx	± 0.3 ^[1]	R415 5xx 000
Available Attenuation Value: xx = 03, 06, 10 and 20 dB							
18	1.4	15.6	15 ^[2]	300	xx	± 0.5	R416 8xx 000
Available Attenuation Value: xx = 03, 06, 10 and 20 dB							

HIGH POWER ATTENUATORS, UP TO 100 WATTS

7/16 - 50 OHMS, MALE TO FEMALE

FREQUENCY DC TO (GHZ)	VSWR MAX.	RETURN LOSS MIN. (DB)	POWER RATING (W)		NOM. ATTENUATION (DB)	MAX DEV.	PART NUMBER
			AVG. (W)	PEAK (W)			
3	1.35	16.5	50	5,000	xx	± 0.7 ^[1]	R420 0xx 110
Available Attenuation Value: xx = 03, 06, 10 and 20 dB							
3	1.3	17.7	100	5,000	xx	± 1 ^[1]	R420 7xx 110
Available Attenuation Value: xx = 03, 06, 10 and 20 dB							

N - 50 OHMS, MALE TO FEMALE

FREQUENCY DC TO (GHZ)	VSWR MAX.	RETURN LOSS MIN. (DB)	POWER RATING (W)		NOM. ATTENUATION (DB)	MAX DEV.	PART NUMBER
			AVG. (W)	PEAK (W)			
3	1.35	16.5	50	5,000	xx	± 0.7 ^[1]	R417 0xx 110
Available Attenuation Value: xx = 03, 06, 10, 20 and 30 dB							
2	1.25	19.1	80 / 100	5,000	xx	± 1	R417 7xx 118
Available Attenuation Value: xx = 03, 06, 10 and 20 dB							

N - 50 OHMS, MALE TO FEMALE, CONDUCTION AND CONVECTION COOLING

FREQUENCY DC TO (GHZ)	VSWR MAX.	RETURN LOSS MIN. (DB)	POWER RATING (W)		NOM. ATTENUATION (DB)	MAX DEV.	PART NUMBER
			AVG. (W)	PEAK (W)			
3	1.35	16.5	40 / 50	5,000	xx	± 0.7 ^[1]	R417 0xx 120
Available Attenuation Value: xx = 03, 06, 10, 20 and 30 dB							
2	1.25	19.1	80 / 100	5,000	xx	± 1	R417 7xx 128
Available Attenuation Value: xx = 03, 06, 10 and 20 dB							

N - 50 OHMS, MALE TO FEMALE, CONDUCTION COOLING

FREQUENCY DC TO (GHZ)	VSWR MAX.	RETURN LOSS MIN. (DB)	POWER RATING (W)		NOM. ATTENUATION (DB)	MAX DEV.	PART NUMBER
			AVG. (W)	PEAK (W)			
3	1.35	16.5	50	5,000	xx	± 0.7 ^[1]	R417 0xx 130
Available Attenuation Value: xx = 03, 06, 10, 20 and 30 dB							
2	1.25	19.1	80 / 100	5,000	xx	± 1	R417 7xx 138
Available Attenuation Value: xx = 03, 06, 10 and 20 dB							

SMA - 50 OHMS, MALE TO FEMALE

FREQUENCY DC TO (GHZ)	VSWR MAX.	RETURN LOSS MIN. (DB)	POWER RATING (W)		NOM. ATTENUATION (DB)	MAX DEV.	PART NUMBER
			AVG. (W)	PEAK (W)			
3	1.35	16.5	50	5,000	xx	± 0.7 ^[1]	R417 1xx 110
Available Attenuation Value: xx = 03, 06, 10, 20 and 30 dB							
2	1.25	19.1	80 / 100	5,000	xx	± 1	R417 8xx 118
Available Attenuation Value: xx = 03, 06, 10 and 20 dB							
6	1.25	19.1	30	2,000	xx	± 0.75 ^[1]	R422 0xx 010
Available Attenuation Value: xx = 03, 06, 10 and 20 dB							
6	1.25	19.1	50	2,000	xx	± 0.75 ^[1]	R422 2xx 020
Available Attenuation Value: xx = 03, 06, 10 and 20 dB							
6	1.25	19.1	100	2,000	xx	± 0.75 ^[1]	R422 2xx 030
Available Attenuation Value: xx = 03, 06, 10, 20 and 30 dB							

Notes

1. Up to xx = 10

2. 12 for xx = 06, 10 for xx = 10 and 20

3. Conduction cooling type

Attenuators



SMA - 50 OHMS, MALE TO FEMALE, CONDUCTION AND CONVECTION COOLING

FREQUENCY DC TO (GHZ)	VSWR MAX.	RETURN LOSS MIN. (DB)	POWER RATING (W)		NOM. ATTENUATION (DB)	MAX DEV.	PART NUMBER
			AVG. (W)	PEAK (W)			
3	1.35	16.5	50	5,000	xx	± 0.7 ^[1]	R417 1xx 120
Available Attenuation Value: xx = 03, 06, 10, 20 and 30 dB							
2	1.25	19.1	80 / 100	5,000	xx	± 1	R417 8xx 128
Available Attenuation Value: xx = 03, 06, 10 and 20 dB							

SMA - 50 OHMS, MALE TO FEMALE, CONDUCTION COOLING

FREQUENCY DC TO (GHZ)	VSWR MAX.	RETURN LOSS MIN. (DB)	POWER RATING (W)		NOM. ATTENUATION (DB)	MAX DEV.	PART NUMBER
			AVG. (W)	PEAK (W)			
3	1.35	16.5	50	5,000	xx	± 0.7 ^[1]	R417 1xx 130
Available Attenuation Value: xx = 03, 06, 10, 20 and 30 dB							
2	1.25	19.1	80 / 100	5,000	xx	± 1	R417 8xx 138
Available Attenuation Value: xx = 03, 06, 10 and 20 dB							

TNC - 50 OHMS, MALE TO FEMALE

FREQUENCY DC TO (GHZ)	VSWR MAX.	RETURN LOSS MIN. (DB)	POWER RATING (W)		NOM. ATTENUATION (DB)	MAX DEV.	PART NUMBER
			AVG. (W)	PEAK (W)			
3	1.35	16.5	50	5,000	xx	± 0.7 ^[1]	R417 2xx 110
Available Attenuation Value: xx = 03, 06, 10, 20 and 30 dB							
2	1.25	19.1	80 / 100	5,000	xx	± 1	R417 9xx 118
Available Attenuation Value: xx = 03, 06, 10 and 20 dB							
6	1.25	19.1	30	2,000	xx	± 0.75 ^[1]	R422 1xx 010
Available Attenuation Value: xx = 03, 06, 10 and 20 dB							
6	1.25	19.1	50	2,000	xx	± 0.75 ^[1]	R422 1xx 020
Available Attenuation Value: xx = 03, 06, 10 and 20 dB							
6	1.25	19.1	100	2,000	xx	± 0.75 ^[1]	R422 2xx 030
Available Attenuation Value: xx = 03, 06, 10, 20 and 30 dB							
6	1.25	19.1	150	2,000	xx	± 1 ^[1]	R422 1xx 040
Available Attenuation Value: xx = 03, 06, 10, 20 and 30 dB							

TNC - 50 OHMS, MALE TO FEMALE, CONDUCTION AND CONVECTION COOLING

FREQUENCY DC TO (GHZ)	VSWR MAX.	RETURN LOSS MIN. (DB)	POWER RATING (W)		NOM. ATTENUATION (DB)	MAX DEV.	PART NUMBER
			AVG. (W)	PEAK (W)			
3	1.35	16.5	40 / 50	5,000	xx	± 0.7 ^[1]	R417 2xx 120
Available Attenuation Value: xx = 03, 06, 10, 20 and 30 dB							
2	1.25	19.1	80 / 100	5,000	xx	± 1	R417 9xx 128
Available Attenuation Value: xx = 03, 06, 10 and 20 dB							

TNC - 50 OHMS, MALE TO FEMALE, CONDUCTION COOLING

FREQUENCY DC TO (GHZ)	VSWR MAX.	RETURN LOSS MIN. (DB)	POWER RATING (W)		NOM. ATTENUATION (DB)	MAX DEV.	PART NUMBER
			AVG. (W)	PEAK (W)			
3	1.35	16.5	50	5,000	xx	± 0.7 ^[1]	R417 2xx 130
Available Attenuation Value: xx = 03, 06, 10, 20 and 30 dB							
2	1.25	19.1	100	5,000	xx	± 1	R417 9xx 138
Available Attenuation Value: xx = 03, 06, 10 and 20 dB							
4	1.35	15.5	30	5,000	xx	± 0.6	R417 6xx 130
Available Attenuation Value: xx = 03, 06, 10, 20 and 30 dB							

Notes

1. Up to xx = 10



PLATINUM ATTENUATORS, UP TO 2 WATTS

Radiall's platinum series of attenuators are designed for Test & Measurement applications. This range can be easily integrated in communication matrices, test benches and laboratories where high RF performance and reliability are essential.

MAIN FEATURES OF RADIALL'S PLATINUM SERIES OF ATTENUATORS

- 2 W power rating
- Frequency from DC up to 40 GHz
- 50 Ω Impedance
- Attenuation value from 0 to 30 dB
- Lowest VSWR for test applications
- Compatible with all standard Test & Measurement interfaces
- Connector interface according to applicable MIL, DIN, NF and CEI
- Full integration in Radiall Test & Measurement offer: electromechanical switches and TestPro cable assemblies



SMA2.9 - 50 OHMS, MALE TO FEMALE

FREQUENCY DC TO (GHZ)	VSWR MAX.	RETURN LOSS MIN. (DB)	POWER RATING (W)	IMPEDANCE (Ω)	NOM. ATTENUATION	MAX DEV.	PART NUMBER
40	1.45	14.71907141	2	50	xx	± 0.5 dB	R413 3xx 150
Available Attenuation Value: xx = 03, 06, 10, 20, 30 dB							

SMA3.5 - 50 OHMS, MALE TO FEMALE

FREQUENCY DC TO (GHZ)	VSWR MAX.	RETURN LOSS MIN. (DB)	POWER RATING (W)	IMPEDANCE (Ω)	NOM. ATTENUATION	MAX DEV.	PART NUMBER
26.5	1.35	16.53999636	2	50	xx	± 0.4 dB	R413 2xx 150
Available Attenuation Value: xx = 03, 06, 10, 20, 30 dB							

SMA - 50 OHMS, MALE TO FEMALE

FREQUENCY DC TO (GHZ)	VSWR MAX.	RETURN LOSS MIN. (DB)	POWER RATING (W)	IMPEDANCE (Ω)	NOM. ATTENUATION	MAX DEV.	PART NUMBER
18	1.3	17.69213163	2	50	xx	± 0.4 dB	R413 8xx 150
Available Attenuation Value: xx = 03, 06, 10, 20, 30 dB							

N - 50 OHMS, MALE TO FEMALE

FREQUENCY DC TO (GHZ)	VSWR MAX.	RETURN LOSS MIN. (DB)	POWER RATING (W)	IMPEDANCE (Ω)	NOM. ATTENUATION	MAX DEV.	PART NUMBER
18	1.12	24.9430923	2	50	xx	± 0.4 dB	R414 7xx 150
Available Attenuation Value: xx = 03, 06, 10, 20, 30 dB							

TNC - 50 OHMS, MALE TO FEMALE

FREQUENCY DC TO (GHZ)	VSWR MAX.	RETURN LOSS MIN. (DB)	POWER RATING (W)	IMPEDANCE (Ω)	NOM. ATTENUATION	MAX DEV.	PART NUMBER
12.4	1.1	26.44438589	2	50	xx	± 0.4 dB	R414 5xx 150
Available Attenuation Value: xx = 03, 06, 10, 20, 30 dB							

BNC - 50 OHMS, MALE TO FEMALE

FREQUENCY DC TO (GHZ)	VSWR MAX.	RETURN LOSS MIN. (DB)	POWER RATING (W)	IMPEDANCE (Ω)	NOM. ATTENUATION	MAX DEV.	PART NUMBER
4	1.1	26.44438589	2	50	xx	± 0.4 dB	R414 4xx 150
Available Attenuation Value: xx = 03, 06, 10, 20, 30 dB							



INTRODUCTION

COAXIAL COUPLERS

3 dB hybrid couplers and directional couplers are passive devices used in the microwave field. A directional coupler is a reciprocal four port device. When a signal is applied to its input port, it provides two amplitude ports, coupling is the ratio in dB of the incident power fed into the input port of the main line of the directional coupler to the coupled port of the secondary line when all ports are terminated on matched load. A 3 dB hybrid coupler is a special class of directional couplers in which signals at the two outputs are equal to split RF signal in two equal parts or to combine two RF signals on one port.

Directional couplers and power dividers have many applications, including; providing a signal sample for measurement or monitoring, feedback, combining feeds to and from antennas, antenna beam forming.

SPECIAL DEVICES

Feed Through Terminations

These components are used to properly terminate a transmission line while testing with a high impedance measuring system such as an oscilloscope input.

Detectors

A detector is a two port device capable of supplying a low frequency signal on its output port (video), of a level proportional of the RF power applied to its input port. This proportionality is achieved by means of non linearity property of the diodes used which at low level supply a detected voltage proportional to the RF voltage.

Rotary Joints

These components provide the transition between two coaxial transmission lines rotating with respect to each other while retaining acceptable RF characteristics.

DC Blocks

DC blocks are composed of a capacitor inserted to the central conductor of the coaxial line. They block any DC or low frequency current present on the line.

Signal Samplers

These devices are used to sample part of an RF signal from a coaxial line. They are not directive, and sample incident and reflected energy.

Phase Shifters

These components create a mechanically adjustable phase shift by variation in the physical length of the transmission line.



COUPLERS

3 DB 90° HYBRID COUPLERS

FREQUENCY (GHZ)	AMPLITUDE BALANCE (DB)	PHASE BALANCE	INPUT POWER (W)		MAX INSERTION LOSS (DB) ATTENUATION (DB)	MIN ISOLATION (DB)	VSWR MAX.	CONNECTORS MAIN / COUPLED	PART NUMBER
			AVG. ^[1]	PEAK ^[2]					
0.15 - 0.3	± 0.5	90° ± 0.5°	500	5,000	0.3	30	1.15	N f / N f	R432 171 000
0.25 - 0.5	± 0.5	90° ± 5°	500	5,000	0.3	30	1.15	N f / N f	R432 271 000
0.5 - 1	± 0.5	90° ± 5°	300	5,000	0.3	25	1.15	N f / N f	R432 371 000
1 - 2	± 0.5	90° ± 5°	100	3,000	0.3	25	1.2	SMA f / SMA f	R432 431 000
1 - 2	± 0.5	90° ± 5°	200	5,000	0.3	25	1.2	N f / N f	R432 471 000
2 - 4	± 0.5	90° ± 5°	80	3,000	0.3	23	1.2	SMA f / SMA f	R432 531 000
2 - 4	± 0.5	90° ± 5°	80	3,000	0.3	20	1.2	N f / N f	R432 571 000
4 - 8	± 0.5	90° ± 5°	50	3,000	0.3	19	1.25	SMA f / SMA f	R432 631 000
6 - 18	± 0.6	90° ± 6°	30	3,000	0.6	16	1.35	SMA f / SMA f	R433 611 000
7 - 12.4	± 0.5	90° ± 6°	30	3,000	0.4	18	1.35	SMA f / SMA f	R433 721 000
7 - 12.4	± 0.5	90° ± 6°	30	3,000	0.4	18	1.35	SMA f / SMA f	R433 721 700
6 - 18	± 0.6	90° ± 6°	30	3,000	0.75	15	1.5	SMA f / SMA f	R433 611 700
12.4 - 18	± 0.7	90° ± 6°	30	3,000	0.6	16	1.4	SMA f / SMA f	R433 831 000
12.4 - 18	± 0.7	90° ± 6°	30	3,000	0.6	16	1.4	SMA f / SMA f	R433 831 700

DIRECTIONAL COUPLERS

(ALL DIRECTIONAL COUPLERS ARE LOADED WITH SMA 50 OHMS TERMINATION)

FREQUENCY (GHZ)	AMPLITUDE BALANCE (DB)	PHASE BALANCE	INPUT POWER (W)		MAX INSERTION LOSS ^[3] (DB) ATTENUATION (DB)	DIRECTIVITY (DB)	VSWR MAX. ^[4]	CONNECTORS MAIN / COUPLED	PART NUMBER
			AVG. ^[1]	PEAK ^[2]					
0.15 - 0.3	6 ± 0.3	± 0.8	500	5,000	2	30	1.10 / 1.10	N f / N f	R432 172 000
0.15 - 0.3	10 ± 0.3	± 0.8	500	5,000	1	30	1.10 / 1.10	N f / N f	R432 173 000
0.15 - 0.3	20 ± 0.3	± 0.8	500	5,000	0.4	23	1.10 / 1.10	N f / N f	R432 174 000
0.15 - 0.3	30 ± 0.3	± 0.8	500	5,000	0.4	15	1.10 / 1.10	N f / N f	R432 175 000
0.25 - 0.5	10 ± 0.3	± 0.8	500	5,000	1	30	1.12 / 1.12	N f / N f	R432 273 000
0.25 - 0.5	20 ± 0.3	± 0.8	500	5,000	0.4	23	1.12 / 1.12	N f / N f	R432 274 000
0.25 - 0.5	30 ± 0.3	± 0.8	500	5,000	0.4	15	1.12 / 1.12	N f / N f	R432 275 000
0.5 - 1	6 ± 0.3	± 0.8	300	5,000	2	25	1.15 / 1.15	N f / N f	R432 372 000
0.5 - 1	10 ± 0.3	± 0.8	300	5,000	1	27	1.15 / 1.15	N f / N f	R432 373 000
0.5 - 1	20 ± 0.3	± 0.8	300	5,000	0.4	23	1.15 / 1.15	N f / N f	R432 374 000
0.5 - 1	30 ± 0.3	± 0.8	300	5,000	0.4	15	1.15 / 1.15	N f / N f	R432 375 000
1 - 2	6 ± 1.1	± 0.8	100	3,000	1.8	23	1.20 / 1.20	SMA f / SMA f	R432 432 000
1 - 2	10 ± 0.3	± 0.8	100	3,000	1	23	1.15 / 1.15	SMA f / SMA f	R432 433 000
1 - 2	30 ± 0.3	± 0.8	100	3,000	0.4	23	1.15 / 1.15	SMA f / SMA f	R432 434 000
1 - 2	30 ± 0.3	± 0.8	100	3,000	0.4	15	1.15 / 1.15	SMA f / SMA f	R432 435 000
1 - 2	6 ± 0.3	± 0.6	200	5,000	2.25 ^[1]	23	1.15 / 1.15	N f / N f	R432 472 000
1 - 2	10 ± 0.3	± 0.8	200	5,000	1	23	1.15 / 1.15	N f / N f	R432 473 000
1 - 2	20 ± 0.3	± 0.8	200	5,000	0.4	23	1.15 / 1.15	N f / N f	R432 474 000
1 - 2	30 ± 1.1	± 0.8	200	5,000	0.4	23 (15)	1.15 / 1.15	N f / N f	R432 475 000
1 - 1.1	30 ± 0.3	± 0.8	200	5,000	0.4	15	1.15 / 1.15	N f / N f	R432 475 160
1 - 2	25 ± 0.3	± 0.8	200	5,000	0.4	23	1.15 / 1.15	N f / N f	R432 476 160
2 - 4	10 ± 0.3	± 0.8	80	3,000	1	20	1.15 / 1.15	SMA f / SMA f	R432 533 000
2 - 4	20 ± 0.3	± 0.8	80	3,000	0.4	20	1.15 / 1.15	SMA f / SMA f	R432 534 000
2 - 4	20 ± 0.3	± 0.8	100 (80)	3,000	0.4	20	1.15 / 1.15	N f / N f	R432 574 000
2 - 4	30 ± 1.1	± 0.8	80	3,000	0.4	20	1.15 / 1.15	SMA f / SMA f	R432 535 000
4 - 8	10 ± 0.3	± 0.8	50	3,000	1	17	1.20 / 1.20	SMA f / SMA f	R432 633 000
4 - 8	20 ± 0.3	± 0.8	50	3,000	0.4	17	1.20 / 1.20	SMA f / SMA f	R432 634 000

Notes

1. At 25 °C
2. At 25 °C (1us - duty cycle 1%)
3. Coupling loss included
4. Main line / coupled line



FLAT FREQUENCY RESPONSE DIRECTIONAL COUPLERS

(ALL DIRECTIONAL COUPLERS ARE LOADED WITH SMA 50 OHMS TERMINATION)

FREQUENCY (GHZ)	COUPLING (DB)	FREQUENCY SENSITIVITY ^[4] ± (DB)	INPUT POWER (W)		MAX INSERTION LOSS ^[5] (DB) ATTENUATION (DB)	DIRECTIVITY (DB)	VSWR MAX. ^[3]	CONNECTORS MAIN / COUPLED	PART NUMBER
			AVG. ^[1]	PEAK ^[2]					
0.9 - 2.1	10 ± 0.8	± 0.3	50	3,000	1	22	1.15 / 1.15	SMA f / SMA f	R433 423 000
0.9 - 2.1	10 ± 0.8	± 0.3	50	3,000	1	22	1.15 / 1.15	SMA m / SMA f	R433 423 202
0.9 - 2.1	10 ± 0.5	± 0.3	50	3,000	1	22	1.20 / 1.20	N f / N f	R433 463 000
0.9 - 2.1	20 ± 0.8	± 0.3	50	3,000	0.4	22	1.15 / 1.15	SMA f / SMA f	R433 424 000
0.9 - 2.1	10 ± 0.5	± 0.3	50	3,000	0.4	22	1.20 / 1.20	N f / N f	R433 464 000
1.7 - 4.2	10 ± 0.8	± 0.3	50	3,000	1	20	1.20 / 1.20	SMA f / SMA f	R433 523 000
1.7 - 4.2	10 ± 0.5	± 0.3	50	3,000	1	20	1.25 / 1.25	N f / N f	R433 563 000
1.7 - 4.2	20 ± 0.8	± 0.3	50	3,000	0.4	20	1.20 / 1.20	SMA f / SMA f	R433 524 000
1.7 - 4.2	20 ± 0.8	± 0.4	50	3,000	0.4	20	1.25 / 1.25	N f / N f	R433 564 000
3.7 - 8.3	10 ± 0.5	± 0.3	50	3,000	1	18	1.25 / 1.25	SMA f / SMA f	R433 623 000
3.7 - 8.3	10 ± 0.5	± 0.3	50	3,000	1	18	1.30 / 1.30	N f / N f	R433 663 000
3.7 - 8.3	20 ± 0.5	± 0.3	50	3,000	0.4	18	1.25 / 1.25	SMA f / SMA f	R433 624 000
3.7 - 8.3	20 ± 0.5	± 0.3	50	3,000	0.4	18	1.30 / 1.30	N f / N f	R433 664 000
2 - 8	10 ± 1	± 0.4	50	3,000	1	20	1.25 / 1.25	SMA f / SMA f	R433 513 700
2 - 8	20 ± 1	± 0.4	50	3,000	0.4	20	1.25 / 1.25	SMA f / SMA f	R433 514 700
8.5 - 10	10 ± 0.5	± 0.2	25	1,500	1.5	20	1.35 / 1.35	SMA f / TNC f	R433 706 000
7 - 12.4	10 ± 0.8	± 0.3	50	3,000	1	16	1.30 / 1.30	SMA f / SMA f	R433 723 000
7 - 12.4	10 ± 1	± 0.5	50	3,000	1	16	1.30 / 1.30	SMA f / SMA f	R433 723 700
7 - 12.4	20 ± 0.8	± 0.3	50	3,000	0	16	1.30 / 1.30	SMA f / SMA f	R433 724 000
7 - 12.4	20 ± 1	± 0.5	50	3,000	0.4	16	1.30 / 1.30	SMA f / SMA f	R433 724 700
7 - 12.4	30 ± 0.8	± 0.3	50	3,000	0.4	17	1.30 / 1.30	SMA f / SMA f	R433 725 000
2 - 18	10 ± 1	± 0.6	20	3,000	1.4	12	1.35 / 1.50	SMA f / SMA f	R433 503 000
6 - 18	6 ± 1	± 0.5	50	3,000	2.2	15	1.40 / 1.40	SMA f / SMA f	R433 612 700
6 - 18	10 ± 0.5	± 0.5	50	3,000	1	17	1.35 / 1.35	SMA f / SMA f	R433 613 000
6 - 18	10 ± 1	± 0.5	50	3,000	1.1	16	1.40 / 1.40	SMA f / SMA f	R433 613 700
6 - 18	20 ± 1	± 0.5	50	3,000	0.6	15	1.40 / 1.40	SMA f / SMA f	R433 614 700
10 - 15	10 ± 1	± 0.5	50	3,000	1	15	1.35 / 1.35	SMA f / SMA f	R433 823 000
10 - 15	20 ± 1	± 0.5	50	3,000	0.4	20	1.35 / 1.35	SMA f / SMA f	R433 824 000
12.4 - 18	6 ± 1	± 0.5	50	3,000	2.2	15	1.40 / 1.40	SMA f / SMA f	R433 832 000
12.4 - 18	6 ± 1	± 0.5	50	3,000	2.2	15	1.40 / 1.40	SMA f / SMA f	R433 832 700
12.5 - 18	10 ± 0.8	± 0.3	50	3,000	1	18	1.30 / 1.30	SMA f / SMA f	R433 833 000
12.4 - 18	10 ± 1	± 0.5	50	3,000	1.1	15	1.35 / 1.35	SMA f / SMA f	R433 833 700
12.4 - 18	20 ± 1	± 0.5	50	3,000	0.55	15	1.35 / 1.35	SMA f / SMA f	R433 834 700
12.4 - 18	30 ± 0.1	± 0.5	50	3,000	0.5	15	1.35 / 1.45	SMA f / SMA f	R433 835 000

SPECIAL DEVICES

FEED THROUGH TERMINATION BNC - 50 AND 75 OHMS

FREQUENCY DC TO (GHZ)	VSWR MAX.	RETURN LOSS MIN. (DB)	POWER		IMPEDANCE (Ω)	CONNECTORS MAIN / COUPLED	PART NUMBER
			AVG. (W)	PEAK (W)			
1	1.35	16.5	2	1,000	50 ± 5%	m / f Straight	R405 005 000
1	1.5	16.5	2	1,000	50 ± 5%	m / f Right Angle	R405 035 000
1	1.35	16.5	2	1,000	75 ± 5%	m / f Straight	R405 006 000

WIDE BAND DETECTORS (ALL DETECTORS USE SCHOTTKY ZERO BIAS DIODE - THEY ARE 50 OHMS -12DBM. CW = 200 MW, PEAK POWER 2 W)

FREQUENCY (GHZ)	CONNECTORS		PART NUMBER	
	INPUT HF	OUTPUT VIDEO	NEGATIVE	POSITIVE
0.01 - 18	SMA m	SMB m	R451 533 000	R451 533 500
0.01 - 18	SMA m	SMC m	R451 534 000	R451 534 500
0.01 - 18	SMA m	SMA f	R451 542 000	R451 542 500
0.01 - 18	SMA m	Pin	R451 543 000	R451 543 500
0.01 - 18	SMA m	BNC f	R451 544 000	R451 544 500
0.01 - 12.4	N m	BNC f	R451 574 000	R451 574 500
0.01 - 18	N m	BNC f	R451 576 000	R451 576 500
2.45	N m	BNC f	R451 572 120	-

Notes

1. At 25°C

2. At 25°C (1us - duty cycle 1%)

3. Main line / coupled line

4. Frequency sensitivity is included in coupling

5. Coupling loss included



**HIGH SENSIBILITY DETECTORS (ALL DETECTORS USE SCHOTTKY ZERO BIAS DIODE -
THEY ARE 50 OHMS -12DBM. CW = 200 MW, PEAK POWER 2 W)**

FREQUENCY (GHZ)	CONNECTORS		PART NUMBER	
	INPUT HF	OUTPUT VIDEO	NEGATIVE	POSITIVE
1 - 18	SMA m	SMB m	R451 030 000	R451 030 500
1 - 18	SMA m	SMC m	R451 031 000	R451 031 500
1 - 18	SMA m	SMA f	R451 032 000	R451 032 500
1 - 18	SMA m	Pin	R451 033 000	R451 033 500
1 - 18	SMA m	BNC f	R451 034 000	R451 034 500

DIODE HOLDER DETECTORS

FREQUENCY (GHZ)	CONNECTORS		PART NUMBER	
	INPUT HF	OUTPUT VIDEO	NEGATIVE	POSITIVE
0.01 - 4	N m	BNC f	R451 570 000	R451 570 500
0.01 - 10	N m	BNC f	R451 075 000	-

ROTARY JOINTS

FREQUENCY DC TO (GHZ)	VSWR MAX.	MAX V.S.W.R. VARIATION PER TURN	INSERTION LOSS (DB) MAX.	POWER MAX (W)	PART NUMBER
18	1.5	1.02	0.60	50	R447 120 000
18	1.5	1.02	0.80	40	R447 171 000

DC BLOCKS: INNER CONDUCTOR BLOCK TYPE

FREQUENCY (GHZ)	CAPACITANCE (PF)	VSWR MAX.	INSERTION LOSS (DB) MAX.	CONNECTORS	MAIN LINE MAX DC VOLTAGE (VOLTS)	PART NUMBER
0.01 - 6	4700	1.40	0.60	SMA m/f	60	R443 131 000
0.01 - 2	4700	1.15	0.20	SMA m/f	100	R443 132 000
1 - 12.4	100	1.25	0.50	SMA m/f	250	R443 134 000
0.01 - 6	4700	1.40	0.60	BNC m/f	60	R443 141 000
3 - 5	-	1.30	0.20	TNC m/f	250	R443 150 000
0.01 - 6	4700	1.40	0.60	TNC m/f	60	R443 151 000
0.01 - 6	4700	1.40	0.60	N m/f	60	R443 171 000
0.01 - 6	4700	1.40	0.60	QMA m/f	60	R443 191 000
0.5 - 22	180	1.25	0.50	SMA m/f	100	R443 137 000
0.1 - 40	180	1.35	0.60	SMA2.9	100	R443 162 000

MONITOR TEES

FREQUENCY (GHZ)	NOMINAL CAPACITY (PF)	VSWR MAX.	INSERTION LOSS (DB) MAX.	MAX AVERAGE POWER (W)	CONNECTORS	PART NUMBER
0.1 - 1.5	4700	1.30	0.25	10	SMA	R443 530 000
0.9 - 3	10	1.25	0.25	10	SMA	R443 533 480
1.5 - 6	10	1.20	0.40	40	SMA	R443 533 000
6 - 12.4	3.5	1.35	0.50	25	SMA	R443 536 000



SIGNAL SAMPLERS

FREQUENCY DC TO (GHz)	COUPLING VARIATION (W)	VSWR MAX.	INSERTION LOSS (dB) MAX.	CONNECTORS MAIN LINE	CONNECTOR COUPLED LINE	PART NUMBER
12	6 / Octave	1.50	0.20	N Male/Female	BNC	R435 270 000 ^[1]
12	6 / Octave	1.50	0.20	N Male/Female	BNC	R435 170 000 ^[2]
12	6 / Octave	1.50	0.20	N Male/Female	BNC	R435 470 000 ^[3]

PHASE SHIFTERS

FREQUENCY DC TO (GHz)	TOTAL PHASE VARIATION	VSWR MAX.	CONNECTORS	PART NUMBER
18	180° (18 GHz)	1.30	SMA Male / Female	R499 103 000
18	180° (18 GHz)	1.30	SMA Male to S.R. .141 Cable	R499 101 000
1 - 1.1	-	1.25	N Male / Female	R499 102 410
18	-	$1.05 + 0.014 \times F(\text{GHz})$	SMA Male / Female	R499 100 000

Notes

1. Loop probe
2. Resistive loop probe
3. Capacitive probe



INTRODUCTION

To support the growing demands of quantum technologies, Radiall is working with R&D, laboratories, start-ups and others to create new interconnect solutions that are tested in-house and qualified in accredited labs. Radiall's interconnect offering combines a solution for microwave components, RF connectors, cable assemblies, switches and fiber optics with emerging technology to solve application challenges like densification, thermalization to some tens of milliKelvin, networking and integration, miniaturization and non-magnetism.

Radiall's cryogenic components use proprietary/specific technologies to withstand lower temperatures up to tens of milliKelvin. These technologies have been proven in the laboratory and in the field.



CRYO ATTENUATORS

In quantum computing, cryogenic microwave attenuators are used in different stages of the thermal dilution refrigerator to reduce noise in the signal. The RF lines within each layer increases the signal-to-noise ratio (SNR), causing the attenuator for the thermalized layer to protect the signal level.

INFRARED FILTERS

The primary objective of these filters is to block infrared radiation (undesired frequency range) between two stages of the cryostat, which is the containment enclosure of a quantum computer. Typically, there are five stages at different temperatures. Starting from the top and descending to the bottom stage, which approaches absolute zero (-273 °C), where the Qubits are located. These filters need to allow the RF signal to pass from one stage to another while preventing the propagation of infrared radiation. This is crucial for the proper functioning and extended lifespan of the Qubits.

SMA CRYOGENIC ATTENUATORS

FREQUENCY	VSWR MAX	POWER RATING (W)		NOM. ATTENUATION (dB)	MAX DEV	OPERATING TEMPERATURE (K)	PART NUMBER
		AVG. (W)	PEAK (W)				
18	1.35	2	100	0	0.3	0.01/400	R429 800 000
18	1.35	2	100	3	0.6	0.01/400	R429 803 000
18	1.35	2	100	6	0.6	0.01/400	R429 806 000
18	1.35	2	100	10	0.6	0.01/400	R429 810 000
18	1.35	2	100	20	0.6	0.01/400	R429 820 000

SMA CRYOGENIC INFRARED FILTERS

FREQUENCY	RETURN LOSS	INSERTION LOSS	OPERATING TEMPERATURE (K)	PART NUMBER
15	0 - 8 GHz: 18 dB min 8 - 15 GHz: 15 dB min	DC - 5 GHz: 0.6 dB max Linear increase after 5 GHz	0.01/350	R438 538 101
15	0 - 8 GHz: 18 dB min 8 - 15 GHz: 15 dB min	DC - 5 GHz: 2 dB max Linear increase after 5 GHz	0.01/350	R438 538 100