

RF/Microwave Conversion Tables and Formulas

VSWR vs Return Loss										
VSWR	1.05:1	1.10:1	1.15:1	1.20:1	1.25:1	1.30:1	1.35:1	1.40:1	1.50:1	2.00:1
Return Loss (-dB)	32.256	26.444	23.127	20.828	19.085	17.692	16.540	15.563	13.979	9.542
Volt. Reflection Coeff.	0.024	0.048	0.070	0.091	0.111	0.130	0.149	0.167	0.200	0.333
Match Efficiency (%)	99.94	99.97	99.51	99.17	98.77	98.30	97.78	97.22	96.00	88.89
Mismatch Loss (-dB)	0.003	0.010	0.021	0.036	0.054	0.075	0.097	0.122	0.177	0.512

VSWR to return loss: $RL(dB) = 20 \log_{10} \left(\frac{VSWR + 1}{VSWR - 1} \right)$

% Input Power Attenuated			
dB	%	dB	%
1	20.57	12	93.70
2	36.90	13	94.98
3	49.88	14	96.02
4	60.19	15	96.84
5	68.38	16	97.58
6	74.88	17	98.00
7	80.05	18	98.42
8	84.15	19	98.74
9	87.41	20	99.00
10	90.00	30	99.90
11	92.06	40	99.99

Power Conversion									
dBm	Watts	dBm	Watts	dBm	Watts	dBm	Watts	dBm	Watts
0	1.0 mW	13	20 mW	26	398 mW	39	8.0 W	52	158 W
1	1.3 mW	14	25 mW	27	500 mW	40	10 W	53	200 W
2	1.6 mW	15	32mW	28	630 mW	41	13 W	54	251 W
3	2.0 mW	16	40 mW	29	800 mW	42	16 W	55	316 W
4	2.5 mW	17	50 mW	30	1.0 W	43	20 W	56	398 W
5	3.2 mW	18	63 mW	31	1.3 W	44	25 W	57	501 W
6	4 mW	19	79 mW	32	1.6 W	45	32 W	58	631 W
7	5 mW	20	100 mW	33	2.0 W	46	40 W	59	794 W
8	6 mW	21	126 mW	34	2.5 W	47	50 W	60	1000 W
9	8 mW	22	158 mW	35	3.2 W	48	63.1 W	61	1260 W
10	10 mW	23	200 mW	36	4.0 W	49	79.4 W	62	1580 W
11	13 mW	24	250 mW	37	5.0 W	50	100 W	63	2000 W
12	16mW	25	316 mW	38	6.3 W	51	126 W	64	2510 W

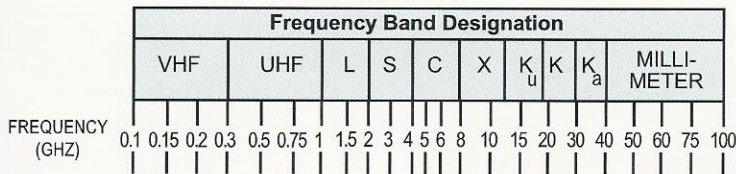
dBm to watts: $dBm = 10 \log_{10} mW$

Common Coupling Ratios	
Coupling Value	Ratio (%)
3 dB	50/50
6 dB	75/25
8 dB	85/15
10 dB	90/10
15 dB	97/3
20 dB	99/1

The first number of the ratio is the % of power that passes through the device to the output port. The second is the % of power at the coupled port.

% Input Power Attenuated = $100\% (1 - 10^{-\frac{dB}{10}})$
(where attenuation is expressed in -dB)

Attenuation (db) = $10 \log_{10} \frac{P_{Input}}{P_{Output}}$



Theoretical Mainline Power Split Due to Coupling Factor (dB)						
Coupling Factor	40 dB	30 dB	20 dB	10 dB	6 dB	3 dB
Single	0.0004	0.0043	0.0436	0.4560	1.2560	3.01
Dual	0.0008	0.0086	0.0872	0.9120	2.5120	~

Theoretical Power Split (dB) for "n-way" Power Divider							
2-Way	3-Way	4-Way	6-Way	8-Way	9-Way	12-Way	16-Way
3.01	4.77	6.02	7.78	9.03	9.54	10.79	12.04