

技術資料2

F M送受信機シリーズ

1. dBm-dB μ -Watts-Volts 換算
2. dB-Power 換算
3. Returnloss-VSWR換算
4. Bandwidth-Thermal noise
5. Pre-emphasis, De-emphasis
6. Pilot signal Modulation
7. Bessel function-Modulation

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dBm—dB μ —Watts—Volts Conversion

dBm	dB μ (50 Ω)	POWER	VOLT.(50 Ω)	VOLT.(50 Ω)	dBm	dB μ (50 Ω)	POWER	VOLT.(50 Ω)	VOLT.(50 Ω)
-120 dBm	-13.0 dB μ	1.000 fW	223.6 nVrms	632.5 nVp-p	-45 dBm	62.0 dB μ	31.62 nW	1.257 mVrms	3.557 mVp-p
-119 dBm	-12.0 dB μ	1.259 fW	250.9 nVrms	709.6 nVp-p	-44 dBm	63.0 dB μ	39.81 nW	1.411 mVrms	3.991 mVp-p
-118 dBm	-11.0 dB μ	1.585 fW	281.5 nVrms	796.2 nVp-p	-43 dBm	64.0 dB μ	50.12 nW	1.583 mVrms	4.477 mVp-p
-117 dBm	-10.0 dB μ	1.995 fW	315.9 nVrms	893.4 nVp-p	-42 dBm	65.0 dB μ	63.10 nW	1.776 mVrms	5.024 mVp-p
-116 dBm	-9.0 dB μ	2.512 fW	354.4 nVrms	1002 nVp-p	-41 dBm	66.0 dB μ	79.43 nW	1.993 mVrms	5.637 mVp-p
-115 dBm	-8.0 dB μ	3.162 fW	397.6 nVrms	1125 nVp-p	-40 dBm	67.0 dB μ	100.0 nW	2.236 mVrms	6.325 mVp-p
-114 dBm	-7.0 dB μ	3.981 fW	446.2 nVrms	1262 nVp-p	-39 dBm	68.0 dB μ	125.9 nW	2.509 mVrms	7.096 mVp-p
-113 dBm	-6.0 dB μ	5.012 fW	500.6 nVrms	1416 nVp-p	-38 dBm	69.0 dB μ	158.5 nW	2.815 mVrms	7.962 mVp-p
-112 dBm	-5.0 dB μ	6.310 fW	561.7 nVrms	1589 nVp-p	-37 dBm	70.0 dB μ	199.5 nW	3.159 mVrms	8.934 mVp-p
-111 dBm	-4.0 dB μ	7.943 fW	630.2 nVrms	1783 nVp-p	-36 dBm	71.0 dB μ	251.2 nW	3.544 mVrms	10.02 mVp-p
-110 dBm	-3.0 dB μ	10.00 fW	707.1 nVrms	2000 nVp-p	-35 dBm	72.0 dB μ	316.2 nW	3.976 mVrms	11.25 mVp-p
-109 dBm	-2.0 dB μ	12.59 fW	793.4 nVrms	2244 nVp-p	-34 dBm	73.0 dB μ	398.1 nW	4.462 mVrms	12.62 mVp-p
-108 dBm	-1.0 dB μ	15.85 fW	890.2 nVrms	2518 nVp-p	-33 dBm	74.0 dB μ	501.2 nW	5.006 mVrms	14.16 mVp-p
-107 dBm	0.0 dB μ	19.95 fW	998.8 nVrms	2825 nVp-p	-32 dBm	75.0 dB μ	631.0 nW	5.617 mVrms	15.89 mVp-p
-106 dBm	1.0 dB μ	25.12 fW	1.121 μ Vrms	3.170 μ Vp-p	-31 dBm	76.0 dB μ	794.3 nW	6.302 mVrms	17.83 mVp-p
-105 dBm	2.0 dB μ	31.62 fW	1.257 μ Vrms	3.557 μ Vp-p	-30 dBm	77.0 dB μ	1.000 μ W	7.071 mVrms	20.00 mVp-p
-104 dBm	3.0 dB μ	39.81 fW	1.411 μ Vrms	3.991 μ Vp-p	-29 dBm	78.0 dB μ	1.259 μ W	7.934 mVrms	22.44 mVp-p
-103 dBm	4.0 dB μ	50.12 fW	1.583 μ Vrms	4.477 μ Vp-p	-28 dBm	79.0 dB μ	1.585 μ W	8.902 mVrms	25.18 mVp-p
-102 dBm	5.0 dB μ	63.10 fW	1.776 μ Vrms	5.024 μ Vp-p	-27 dBm	80.0 dB μ	1.995 μ W	9.988 mVrms	28.25 mVp-p
-101 dBm	6.0 dB μ	79.43 fW	1.993 μ Vrms	5.637 μ Vp-p	-26 dBm	81.0 dB μ	2.512 μ W	11.21 mVrms	31.70 mVp-p
-100 dBm	7.0 dB μ	100.0 fW	2.236 μ Vrms	6.325 μ Vp-p	-25 dBm	82.0 dB μ	3.162 μ W	12.57 mVrms	35.57 mVp-p
-99 dBm	8.0 dB μ	125.9 fW	2.509 μ Vrms	7.096 μ Vp-p	-24 dBm	83.0 dB μ	3.981 μ W	14.11 mVrms	39.91 mVp-p
-98 dBm	9.0 dB μ	158.5 fW	2.815 μ Vrms	7.962 μ Vp-p	-23 dBm	84.0 dB μ	5.012 μ W	15.83 mVrms	44.77 mVp-p
-97 dBm	10.0 dB μ	199.5 fW	3.159 μ Vrms	8.934 μ Vp-p	-22 dBm	85.0 dB μ	6.310 μ W	17.76 mVrms	50.24 mVp-p
-96 dBm	11.0 dB μ	251.2 fW	3.544 μ Vrms	10.02 μ Vp-p	-21 dBm	86.0 dB μ	7.943 μ W	19.93 mVrms	56.37 mVp-p
-95 dBm	12.0 dB μ	316.2 fW	3.976 μ Vrms	11.25 μ Vp-p	-20 dBm	87.0 dB μ	10.00 μ W	22.36 mVrms	63.25 mVp-p
-94 dBm	13.0 dB μ	398.1 fW	4.462 μ Vrms	12.62 μ Vp-p	-19 dBm	88.0 dB μ	12.59 μ W	25.09 mVrms	70.96 mVp-p
-93 dBm	14.0 dB μ	501.2 fW	5.006 μ Vrms	14.16 μ Vp-p	-18 dBm	89.0 dB μ	15.85 μ W	28.15 mVrms	79.62 mVp-p
-92 dBm	15.0 dB μ	631.0 fW	5.617 μ Vrms	15.89 μ Vp-p	-17 dBm	90.0 dB μ	19.95 μ W	31.59 mVrms	89.34 mVp-p
-91 dBm	16.0 dB μ	794.3 fW	6.302 μ Vrms	17.83 μ Vp-p	-16 dBm	91.0 dB μ	25.12 μ W	35.44 mVrms	100.2 mVp-p
-90 dBm	17.0 dB μ	1.000 pW	7.071 μ Vrms	20.00 μ Vp-p	-15 dBm	92.0 dB μ	31.62 μ W	39.76 mVrms	112.5 mVp-p
-89 dBm	18.0 dB μ	1.259 pW	7.934 μ Vrms	22.44 μ Vp-p	-14 dBm	93.0 dB μ	39.81 μ W	44.62 mVrms	126.2 mVp-p
-88 dBm	19.0 dB μ	1.585 pW	8.902 μ Vrms	25.18 μ Vp-p	-13 dBm	94.0 dB μ	50.12 μ W	50.06 mVrms	141.6 mVp-p
-87 dBm	20.0 dB μ	1.995 pW	9.988 μ Vrms	28.25 μ Vp-p	-12 dBm	95.0 dB μ	63.10 μ W	56.17 mVrms	158.9 mVp-p
-86 dBm	21.0 dB μ	2.512 pW	11.21 μ Vrms	31.70 μ Vp-p	-11 dBm	96.0 dB μ	79.43 μ W	63.02 mVrms	178.3 mVp-p
-85 dBm	22.0 dB μ	3.162 pW	12.57 μ Vrms	35.57 μ Vp-p	-10 dBm	97.0 dB μ	100.0 μ W	70.71 mVrms	200.0 mVp-p
-84 dBm	23.0 dB μ	3.981 pW	14.11 μ Vrms	39.91 μ Vp-p	-9 dBm	98.0 dB μ	125.9 μ W	79.34 mVrms	224.4 mVp-p
-83 dBm	24.0 dB μ	5.012 pW	15.83 μ Vrms	44.77 μ Vp-p	-8 dBm	99.0 dB μ	158.5 μ W	89.02 mVrms	251.8 mVp-p
-82 dBm	25.0 dB μ	6.310 pW	17.76 μ Vrms	50.24 μ Vp-p	-7 dBm	100 dB μ	199.5 μ W	0.100 Vrms	0.283 Vp-p
-81 dBm	26.0 dB μ	7.943 pW	19.93 μ Vrms	56.37 μ Vp-p	-6 dBm	101 dB μ	251.2 μ W	0.112 Vrms	0.317 Vp-p
-80 dBm	27.0 dB μ	10.00 pW	22.36 μ Vrms	63.25 μ Vp-p	-5 dBm	102 dB μ	316.2 μ W	0.126 Vrms	0.356 Vp-p
-79 dBm	28.0 dB μ	12.59 pW	25.09 μ Vrms	70.96 μ Vp-p	-4 dBm	103 dB μ	398.1 μ W	0.141 Vrms	0.399 Vp-p
-78 dBm	29.0 dB μ	15.85 pW	28.15 μ Vrms	79.62 μ Vp-p	-3 dBm	104 dB μ	501.2 μ W	0.158 Vrms	0.448 Vp-p
-77 dBm	30.0 dB μ	19.95 pW	31.59 μ Vrms	89.34 μ Vp-p	-2 dBm	105 dB μ	631.0 μ W	0.178 Vrms	0.502 Vp-p
-76 dBm	31.0 dB μ	25.12 pW	35.44 μ Vrms	100.2 μ Vp-p	-1 dBm	106 dB μ	794.3 μ W	0.199 Vrms	0.564 Vp-p
-75 dBm	32.0 dB μ	31.62 pW	39.76 μ Vrms	112.5 μ Vp-p	0 dBm	107 dB μ	1.000 mW	0.224 Vrms	0.632 Vp-p
-74 dBm	33.0 dB μ	39.81 pW	44.62 μ Vrms	126.2 μ Vp-p	1 dBm	108 dB μ	1.259 mW	0.251 Vrms	0.710 Vp-p
-73 dBm	34.0 dB μ	50.12 pW	50.06 μ Vrms	141.6 μ Vp-p	2 dBm	109 dB μ	1.585 mW	0.282 Vrms	0.796 Vp-p
-72 dBm	35.0 dB μ	63.10 pW	56.17 μ Vrms	158.9 μ Vp-p	3 dBm	110 dB μ	1.995 mW	0.316 Vrms	0.893 Vp-p
-71 dBm	36.0 dB μ	79.43 pW	63.02 μ Vrms	178.3 μ Vp-p	4 dBm	111 dB μ	2.512 mW	0.354 Vrms	1.002 Vp-p
-70 dBm	37.0 dB μ	100.0 pW	70.71 μ Vrms	200.0 μ Vp-p	5 dBm	112 dB μ	3.162 mW	0.398 Vrms	1.125 Vp-p
-69 dBm	38.0 dB μ	125.9 pW	79.34 μ Vrms	224.4 μ Vp-p	6 dBm	113 dB μ	3.981 mW	0.446 Vrms	1.262 Vp-p
-68 dBm	39.0 dB μ	158.5 pW	89.02 μ Vrms	251.8 μ Vp-p	7 dBm	114 dB μ	5.012 mW	0.501 Vrms	1.416 Vp-p
-67 dBm	40.0 dB μ	199.5 pW	99.88 μ Vrms	282.5 μ Vp-p	8 dBm	115 dB μ	6.310 mW	0.562 Vrms	1.589 Vp-p
-66 dBm	41.0 dB μ	251.2 pW	112.1 μ Vrms	317.0 μ Vp-p	9 dBm	116 dB μ	7.943 mW	0.630 Vrms	1.783 Vp-p
-65 dBm	42.0 dB μ	316.2 pW	125.7 μ Vrms	355.7 μ Vp-p	10 dBm	117 dB μ	10.00 mW	0.707 Vrms	2.000 Vp-p
-64 dBm	43.0 dB μ	398.1 pW	141.1 μ Vrms	399.1 μ Vp-p	11 dBm	118 dB μ	12.59 mW	0.793 Vrms	2.244 Vp-p
-63 dBm	44.0 dB μ	501.2 pW	158.3 μ Vrms	447.7 μ Vp-p	12 dBm	119 dB μ	15.85 mW	0.890 Vrms	2.518 Vp-p
-62 dBm	45.0 dB μ	631.0 pW	177.6 μ Vrms	502.4 μ Vp-p	13 dBm	120 dB μ	19.95 mW	0.999 Vrms	2.825 Vp-p
-61 dBm	46.0 dB μ	794.3 pW	199.3 μ Vrms	563.7 μ Vp-p	14 dBm	121 dB μ	25.12 mW	1.121 Vrms	3.170 Vp-p
-60 dBm	47.0 dB μ	1.000 nW	223.6 μ Vrms	632.5 μ Vp-p	15 dBm	122 dB μ	31.62 mW	1.257 Vrms	3.557 Vp-p
-59 dBm	48.0 dB μ	1.259 nW	250.9 μ Vrms	709.6 μ Vp-p	16 dBm	123 dB μ	39.81 mW	1.411 Vrms	3.991 Vp-p
-58 dBm	49.0 dB μ	1.585 nW	281.5 μ Vrms	796.2 μ Vp-p	17 dBm	124 dB μ	50.12 mW	1.583 Vrms	4.477 Vp-p
-57 dBm	50.0 dB μ	1.995 nW	315.9 μ Vrms	893.4 μ Vp-p	18 dBm	125 dB μ	63.10 mW	1.776 Vrms	5.024 Vp-p
-56 dBm	51.0 dB μ	2.512 nW	354.4 μ Vrms	1002 μ Vp-p	19 dBm	126 dB μ	79.43 mW	1.993 Vrms	5.637 Vp-p
-55 dBm	52.0 dB μ	3.162 nW	397.6 μ Vrms	1125 μ Vp-p	20 dBm	127 dB μ	100.0 mW	2.236 Vrms	6.325 Vp-p
-54 dBm	53.0 dB μ	3.981 nW	446.2 μ Vrms	1262 μ Vp-p	21 dBm	128 dB μ	125.9 mW	2.509 Vrms	7.096 Vp-p
-53 dBm	54.0 dB μ	5.012 nW	500.6 μ Vrms	1416 μ Vp-p	22 dBm	129 dB μ	158.5 mW	2.815 Vrms	7.962 Vp-p
-52 dBm	55.0 dB μ	6.310 nW	561.7 μ Vrms	1589 μ Vp-p	23 dBm	130 dB μ	199.5 mW	3.159 Vrms	8.934 Vp-p
-51 dBm	56.0 dB μ	7.943 nW	630.2 μ Vrms	1783 μ Vp-p	24 dBm	131 dB μ	251.2 mW	3.544 Vrms	10.02 Vp-p
-50 dBm	57.0 dB μ	10.00 nW	707.1 μ Vrms	2000 μ Vp-p	25 dBm	132 dB μ	316.2 mW	3.976 Vrms	11.25 Vp-p
-49 dBm	58.0 dB μ	12.59 nW	793.4 μ Vrms	2244 μ Vp-p	26 dBm	133 dB μ	398.1 mW	4.462 Vrms	12.62 Vp-p
-48 dBm	59.0 dB μ	15.85 nW	890.2 μ Vrms	2518 μ Vp-p	27 dBm	134 dB μ	501.2 mW	5.006 Vrms	14.16 Vp-p
-47 dBm	60.0 dB μ	19.95 nW	998.8 μ Vrms	2825 μ Vp-p	28 dBm	135 dB μ	631.0 mW	5.617 Vrms	15.89 Vp-p
-46 dBm	61.0 dB μ	25.12 nW	1.121 mVrms	3.170 mVp-p	29 dBm	136 dB μ	794.3 mW	6.302 Vrms	17.83 Vp-p
-45 dBm	62.0 dB μ	31.62 nW	1.257 mVrms	3.557 mVp-p	30 dBm	137 dB μ	1.000 W	7.071 Vrms	20.00 Vp-p

dB-POWER Ratio

dB	POWER	dB	POWER	dB	POWER	dB	POWER
0.0	1.000	-2.5	0.562	-5.0	0.316	-7.5	0.178
-0.1	0.977	-2.6	0.550	-5.1	0.309	-7.6	0.174
-0.2	0.955	-2.7	0.537	-5.2	0.302	-7.7	0.170
-0.3	0.933	-2.8	0.525	-5.3	0.295	-7.8	0.166
-0.4	0.912	-2.9	0.513	-5.4	0.288	-7.9	0.162
-0.5	0.891	-3.0	0.501	-5.5	0.282	-8.0	0.158
-0.6	0.871	-3.1	0.490	-5.6	0.275	-8.1	0.155
-0.7	0.851	-3.2	0.479	-5.7	0.269	-8.2	0.151
-0.8	0.832	-3.3	0.468	-5.8	0.263	-8.3	0.148
-0.9	0.813	-3.4	0.457	-5.9	0.257	-8.4	0.145
-1.0	0.794	-3.5	0.447	-6.0	0.251	-8.5	0.141
-1.1	0.776	-3.6	0.437	-6.1	0.245	-8.6	0.138
-1.2	0.759	-3.7	0.427	-6.2	0.240	-8.7	0.135
-1.3	0.741	-3.8	0.417	-6.3	0.234	-8.8	0.132
-1.4	0.724	-3.9	0.407	-6.4	0.229	-8.9	0.129
-1.5	0.708	-4.0	0.398	-6.5	0.224	-9.0	0.126
-1.6	0.692	-4.1	0.389	-6.6	0.219	-9.1	0.123
-1.7	0.676	-4.2	0.380	-6.7	0.214	-9.2	0.120
-1.8	0.661	-4.3	0.372	-6.8	0.209	-9.3	0.117
-1.9	0.646	-4.4	0.363	-6.9	0.204	-9.4	0.115
-2.0	0.631	-4.5	0.355	-7.0	0.200	-9.5	0.112
-2.1	0.617	-4.6	0.347	-7.1	0.195	-9.6	0.110
-2.2	0.603	-4.7	0.339	-7.2	0.191	-9.7	0.107
-2.3	0.589	-4.8	0.331	-7.3	0.186	-9.8	0.105
-2.4	0.575	-4.9	0.32	-7.4	0.182	-9.9	0.102
						-10.0	0.100

dB	POWER	dB	POWER	dB	POWER	dB	POWER
0.0	1.000	2.5	1.778	5.0	3.162	7.5	5.623
0.1	1.023	2.6	1.820	5.1	3.236	7.6	5.754
0.2	1.047	2.7	1.862	5.2	3.311	7.7	5.888
0.3	1.072	2.8	1.905	5.3	3.388	7.8	6.026
0.4	1.096	2.9	1.950	5.4	3.467	7.9	6.166
0.5	1.122	3.0	1.995	5.5	3.548	8.0	6.310
0.6	1.148	3.1	2.042	5.6	3.631	8.1	6.457
0.7	1.175	3.2	2.089	5.7	3.715	8.2	6.607
0.8	1.202	3.3	2.138	5.8	3.802	8.3	6.761
0.9	1.230	3.4	2.188	5.9	3.890	8.4	6.918
1.0	1.259	3.5	2.239	6.0	3.981	8.5	7.079
1.1	1.288	3.6	2.291	6.1	4.074	8.6	7.244
1.2	1.318	3.7	2.344	6.2	4.169	8.7	7.413
1.3	1.349	3.8	2.399	6.3	4.266	8.8	7.586
1.4	1.380	3.9	2.455	6.4	4.365	8.9	7.762
1.5	1.413	4.0	2.512	6.5	4.467	9.0	7.943
1.6	1.445	4.1	2.570	6.6	4.571	9.1	8.128
1.7	1.479	4.2	2.630	6.7	4.677	9.2	8.318
1.8	1.514	4.3	2.692	6.8	4.786	9.3	8.511
1.9	1.549	4.4	2.754	6.9	4.898	9.4	8.710
2.0	1.585	4.5	2.818	7.0	5.012	9.5	8.913
2.1	1.622	4.6	2.884	7.1	5.129	9.6	9.120
2.2	1.660	4.7	2.951	7.2	5.248	9.7	9.333
2.3	1.698	4.8	3.020	7.3	5.370	9.8	9.550
2.4	1.738	4.9	3.090	7.4	5.495	9.9	9.772
						10.0	10.00

Returnloss \leftrightarrow VSWR Conversion

VSWR	Returnloss(dB)	VSWR	Returnloss(dB)
1.002	60.009 dB	1.32	17.207 dB
1.004	53.997 dB	1.33	16.977 dB
1.006	50.484 dB	1.34	16.755 dB
1.008	47.993 dB	1.35	16.540 dB
1.010	46.064 dB	1.36	16.332 dB
1.012	44.489 dB	1.37	16.131 dB
1.014	43.159 dB	1.38	15.936 dB
1.016	42.007 dB	1.39	15.747 dB
1.018	40.993 dB	1.40	15.563 dB
1.020	40.086 dB	1.41	15.385 dB
1.022	39.267 dB	1.42	15.211 dB
1.024	38.520 dB	1.43	15.043 dB
1.026	37.833 dB	1.44	14.879 dB
1.028	37.198 dB	1.45	14.719 dB
1.030	36.607 dB	1.46	14.564 dB
1.032	36.055 dB	1.47	14.412 dB
1.034	35.537 dB	1.48	14.264 dB
1.036	35.050 dB	1.49	14.120 dB
1.038	34.588 dB	1.50	13.979 dB
1.040	34.151 dB	1.52	13.708 dB
1.042	33.736 dB	1.54	13.449 dB
1.044	33.341 dB	1.56	13.201 dB
1.046	32.963 dB	1.58	12.964 dB
1.048	32.60 dB	1.60	12.736 dB
1.050	32.26 dB	1.62	12.518 dB
1.052	31.92 dB	1.64	12.308 dB
1.054	31.60 dB	1.66	12.107 dB
1.056	31.30 dB	1.68	11.913 dB
1.058	31.00 dB	1.70	11.725 dB
1.060	30.71 dB	1.72	11.545 dB
1.062	30.44 dB	1.74	11.370 dB
1.064	30.17 dB	1.76	11.202 dB
1.066	29.91 dB	1.78	11.039 dB
1.068	29.66 dB	1.80	10.881 dB
1.070	29.42 dB	1.82	10.729 dB
1.072	29.18 dB	1.84	10.581 dB
1.074	28.95 dB	1.86	10.437 dB
1.076	28.73 dB	1.88	10.298 dB
1.078	28.51 dB	1.90	10.163 dB
1.080	28.30 dB	1.92	10.032 dB
1.082	28.09 dB	1.94	9.904 dB
1.084	27.89 dB	1.96	9.780 dB
1.086	27.70 dB	1.98	9.660 dB
1.088	27.50 dB	2.00	9.542 dB
1.090	27.32 dB	2.05	9.262 dB
1.092	27.14 dB	2.10	8.999 dB
1.094	26.96 dB	2.15	8.752 dB
1.096	26.78 dB	2.20	8.519 dB
1.098	26.61 dB	2.25	8.299 dB
1.100	26.44 dB	2.30	8.091 dB
1.102	26.28 dB	2.35	7.894 dB
1.104	26.12 dB	2.40	7.707 dB
1.106	25.96 dB	2.45	7.529 dB
1.108	25.81 dB	2.50	7.360 dB
1.110	25.66 dB	2.55	7.198 dB
1.115	25.29 dB	2.60	7.044 dB
1.120	24.94 dB	2.65	6.896 dB
1.125	24.61 dB	2.70	6.755 dB
1.130	24.29 dB	2.75	6.620 dB
1.135	23.98 dB	2.80	6.490 dB
1.140	23.69 dB	2.85	6.366 dB
1.145	23.40 dB	2.90	6.246 dB
1.150	23.13 dB	2.95	6.131 dB
1.155	22.86 dB	3.00	6.021 dB
1.160	22.61 dB	3.05	5.914 dB
1.165	22.36 dB	3.10	5.811 dB
1.170	22.12 dB	3.15	5.712 dB
1.175	21.89 dB	3.20	5.617 dB
1.180	21.66 dB	3.25	5.524 dB
1.185	21.45 dB	3.30	5.435 dB
1.190	21.23 dB	3.35	5.348 dB
1.195	21.03 dB	3.40	5.265 dB
1.200	20.83 dB	3.45	5.184 dB
1.210	20.44 dB	3.50	5.105 dB
1.220	20.08 dB	3.55	5.029 dB
1.230	19.73 dB	3.60	4.956 dB
1.240	19.40 dB	3.65	4.884 dB
1.250	19.08 dB	3.70	4.815 dB
1.260	18.78 dB	3.75	4.747 dB
1.270	18.49 dB	3.80	4.682 dB
1.280	18.22 dB	3.85	4.618 dB
1.290	17.95 dB	3.90	4.556 dB
1.300	17.69 dB	3.95	4.496 dB
1.310	17.45 dB	4.00	4.437 dB

Returnloss(dB)	VSWR	Returnloss(dB)	VSWR
60.0 dB	1.002	21.2 dB	1.191
59.0 dB	1.002	21.0 dB	1.196
58.0 dB	1.003	20.8 dB	1.201
57.0 dB	1.003	20.6 dB	1.206
56.0 dB	1.003	20.4 dB	1.211
55.0 dB	1.004	20.2 dB	1.217
54.0 dB	1.004	20.0 dB	1.222
53.0 dB	1.004	19.8 dB	1.228
52.0 dB	1.005	19.6 dB	1.234
51.0 dB	1.006	19.4 dB	1.240
50.0 dB	1.006	19.2 dB	1.246
49.0 dB	1.007	19.0 dB	1.253
48.0 dB	1.008	18.8 dB	1.259
47.0 dB	1.009	18.6 dB	1.266
46.0 dB	1.010	18.4 dB	1.273
45.0 dB	1.011	18.2 dB	1.281
44.0 dB	1.013	18.0 dB	1.288
43.0 dB	1.014	17.8 dB	1.296
42.0 dB	1.016	17.6 dB	1.304
41.0 dB	1.018	17.4 dB	1.312
40.0 dB	1.020	17.2 dB	1.320
39.5 dB	1.021	17.0 dB	1.329
39.0 dB	1.023	16.8 dB	1.338
38.5 dB	1.024	16.6 dB	1.347
38.0 dB	1.025	16.4 dB	1.357
37.5 dB	1.027	16.2 dB	1.367
37.0 dB	1.029	16.0 dB	1.377
36.5 dB	1.030	15.8 dB	1.387
36.0 dB	1.032	15.6 dB	1.398
35.5 dB	1.034	15.4 dB	1.409
35.0 dB	1.036	15.2 dB	1.421
34.5 dB	1.038	15.0 dB	1.433
34.0 dB	1.041	14.8 dB	1.445
33.5 dB	1.043	14.6 dB	1.458
33.0 dB	1.046	14.4 dB	1.471
32.5 dB	1.049	14.2 dB	1.484
32.0 dB	1.052	14.0 dB	1.499
31.5 dB	1.055	13.8 dB	1.513
31.0 dB	1.058	13.6 dB	1.528
30.5 dB	1.062	13.4 dB	1.544
30.0 dB	1.065	13.2 dB	1.560
29.8 dB	1.067	13.0 dB	1.577
29.6 dB	1.068	12.8 dB	1.594
29.4 dB	1.070	12.6 dB	1.612
29.2 dB	1.072	12.4 dB	1.631
29.0 dB	1.074	12.2 dB	1.651
28.8 dB	1.075	12.0 dB	1.671
28.6 dB	1.077	11.8 dB	1.692
28.4 dB	1.079	11.6 dB	1.714
28.2 dB	1.081	11.4 dB	1.737
28.0 dB	1.083	11.2 dB	1.760
27.8 dB	1.085	11.0 dB	1.785
27.6 dB	1.087	10.8 dB	1.811
27.4 dB	1.089	10.6 dB	1.837
27.2 dB	1.091	10.4 dB	1.865
27.0 dB	1.094	10.2 dB	1.894
26.8 dB	1.096	10.0 dB	1.925
26.6 dB	1.098	9.8 dB	1.957
26.4 dB	1.101	9.6 dB	1.990
26.2 dB	1.103	9.4 dB	2.025
26.0 dB	1.106	9.2 dB	2.062
25.8 dB	1.108	9.0 dB	2.100
25.6 dB	1.111	8.8 dB	2.140
25.4 dB	1.114	8.6 dB	2.182
25.2 dB	1.116	8.4 dB	2.227
25.0 dB	1.119	8.2 dB	2.274
24.8 dB	1.122	8.0 dB	2.323
24.6 dB	1.125	7.8 dB	2.375
24.4 dB	1.128	7.6 dB	2.430
24.2 dB	1.131	7.4 dB	2.488
24.0 dB	1.135	7.2 dB	2.549
23.8 dB	1.138	7.0 dB	2.615
23.6 dB	1.141	6.8 dB	2.684
23.4 dB	1.145	6.6 dB	2.758
23.2 dB	1.149	6.4 dB	2.836
23.0 dB	1.152	6.2 dB	2.920
22.8 dB	1.156	6.0 dB	3.010
22.6 dB	1.160	5.8 dB	3.106
22.4 dB	1.164	5.6 dB	3.209
22.2 dB	1.168	5.4 dB	3.320
22.0 dB	1.173	5.2 dB	3.440
21.8 dB	1.177	5.0 dB	3.570
21.6 dB	1.181	4.8 dB	3.711
21.4 dB	1.186	4.6 dB	3.864

Bandwidth \leftrightarrow Thermal noise Conversion

Bandwidth B(Hz)	Thermal noise (dBm) R=50 Ω				
	-50°C	0°C	25°C	50°C	100°C
100	-162.11	-161.23	-160.85	-160.50	-159.87
200	-159.10	-158.22	-157.84	-157.49	-156.86
300	-157.34	-156.46	-156.08	-155.73	-155.10
400	-156.09	-155.21	-154.83	-154.48	-153.85
500	-155.12	-154.24	-153.86	-153.51	-152.88
600	-154.33	-153.45	-153.07	-152.72	-152.09
700	-153.66	-152.78	-152.40	-152.05	-151.42
800	-153.08	-152.20	-151.82	-151.47	-150.84
900	-152.57	-151.69	-151.31	-150.96	-150.33
1,000	-152.11	-151.23	-150.85	-150.50	-149.87
2,000	-149.10	-148.22	-147.84	-147.49	-146.86
3,000	-147.34	-146.46	-146.08	-145.73	-145.10
4,000	-146.09	-145.21	-144.83	-144.48	-143.85
5,000	-145.12	-144.24	-143.86	-143.51	-142.88
6,000	-144.33	-143.45	-143.07	-142.72	-142.09
7,000	-143.66	-142.78	-142.40	-142.05	-141.42
8,000	-143.08	-142.20	-141.82	-141.47	-140.84
9,000	-142.57	-141.69	-141.31	-140.96	-140.33
10,000	-142.11	-141.23	-140.85	-140.50	-139.87
20,000	-139.10	-138.22	-137.84	-137.49	-136.86
30,000	-137.34	-136.46	-136.08	-135.73	-135.10
40,000	-136.09	-135.21	-134.83	-134.48	-133.85
50,000	-135.12	-134.24	-133.86	-133.51	-132.88
60,000	-134.33	-133.45	-133.07	-132.72	-132.09
70,000	-133.66	-132.78	-132.40	-132.05	-131.42
80,000	-133.08	-132.20	-131.82	-131.47	-130.84
90,000	-132.57	-131.69	-131.31	-130.96	-130.33
100,000	-132.11	-131.23	-130.85	-130.50	-129.87
200,000	-129.10	-128.22	-127.84	-127.49	-126.86
300,000	-127.34	-126.46	-126.08	-125.73	-125.10
400,000	-126.09	-125.21	-124.83	-124.48	-123.85
500,000	-125.12	-124.24	-123.86	-123.51	-122.88
600,000	-124.33	-123.45	-123.07	-122.72	-122.09
700,000	-123.66	-122.78	-122.40	-122.05	-121.42
800,000	-123.08	-122.20	-121.82	-121.47	-120.84
900,000	-122.57	-121.69	-121.31	-120.96	-120.33
1,000,000	-122.11	-121.23	-120.85	-120.50	-119.87

Bandwidth B(Hz)	Thermal noise (nVrms) R=50 Ω				
	-50°C	0°C	25°C	50°C	100°C
100	7.845	8.680	9.069	9.442	10.15
200	11.09	12.28	12.83	13.35	14.35
300	13.59	15.03	15.71	16.35	17.57
400	15.69	17.36	18.14	18.88	20.29
500	17.54	19.41	20.28	21.11	22.69
600	19.22	21.26	22.21	23.13	24.85
700	20.76	22.97	23.99	24.98	26.84
800	22.19	24.55	25.65	26.71	28.70
900	23.54	26.04	27.21	28.33	30.44
1,000	24.81	27.45	28.68	29.86	32.09
2,000	35.09	38.82	40.56	42.23	45.38
3,000	42.97	47.54	49.67	51.71	55.57
4,000	49.62	54.90	57.36	59.72	64.17
5,000	55.47	61.38	64.13	66.76	71.75
6,000	60.77	67.24	70.25	73.14	78.59
7,000	65.64	72.62	75.88	79.00	84.89
8,000	70.17	77.64	81.12	84.45	90.75
9,000	74.43	82.35	86.04	89.57	96.26
10,000	78.45	86.80	90.69	94.42	101.5
20,000	110.9	122.8	128.3	133.5	143.5
30,000	135.9	150.3	157.1	163.5	175.7
40,000	156.9	173.6	181.4	188.8	202.9
50,000	175.4	194.1	202.8	211.1	226.9
60,000	192.2	212.6	222.1	231.3	248.5
70,000	207.6	229.7	239.9	249.8	268.4
80,000	221.9	245.5	256.5	267.1	287.0
90,000	235.4	260.4	272.1	283.3	304.4
100,000	248.1	274.5	286.8	298.6	320.9
200,000	350.9	388.2	405.6	422.3	453.8
300,000	429.7	475.4	496.7	517.1	555.7
400,000	496.2	549.0	573.6	597.2	641.7
500,000	554.7	613.8	641.3	667.6	717.5
600,000	607.7	672.4	702.5	731.4	785.9
700,000	656.4	726.2	758.8	790.0	848.9
800,000	701.7	776.4	811.2	844.5	907.5
900,000	744.3	823.5	860.4	895.7	962.6
1,000,000	784.5	868.0	906.9	944.2	1014.6

$$P_n(\text{dBm}) = 20 \log \sqrt{4KTBR}$$

$$V_n(\text{nV}) = 1E9 \times \sqrt{4KTBR}$$

50 μ S Pre-emphasis

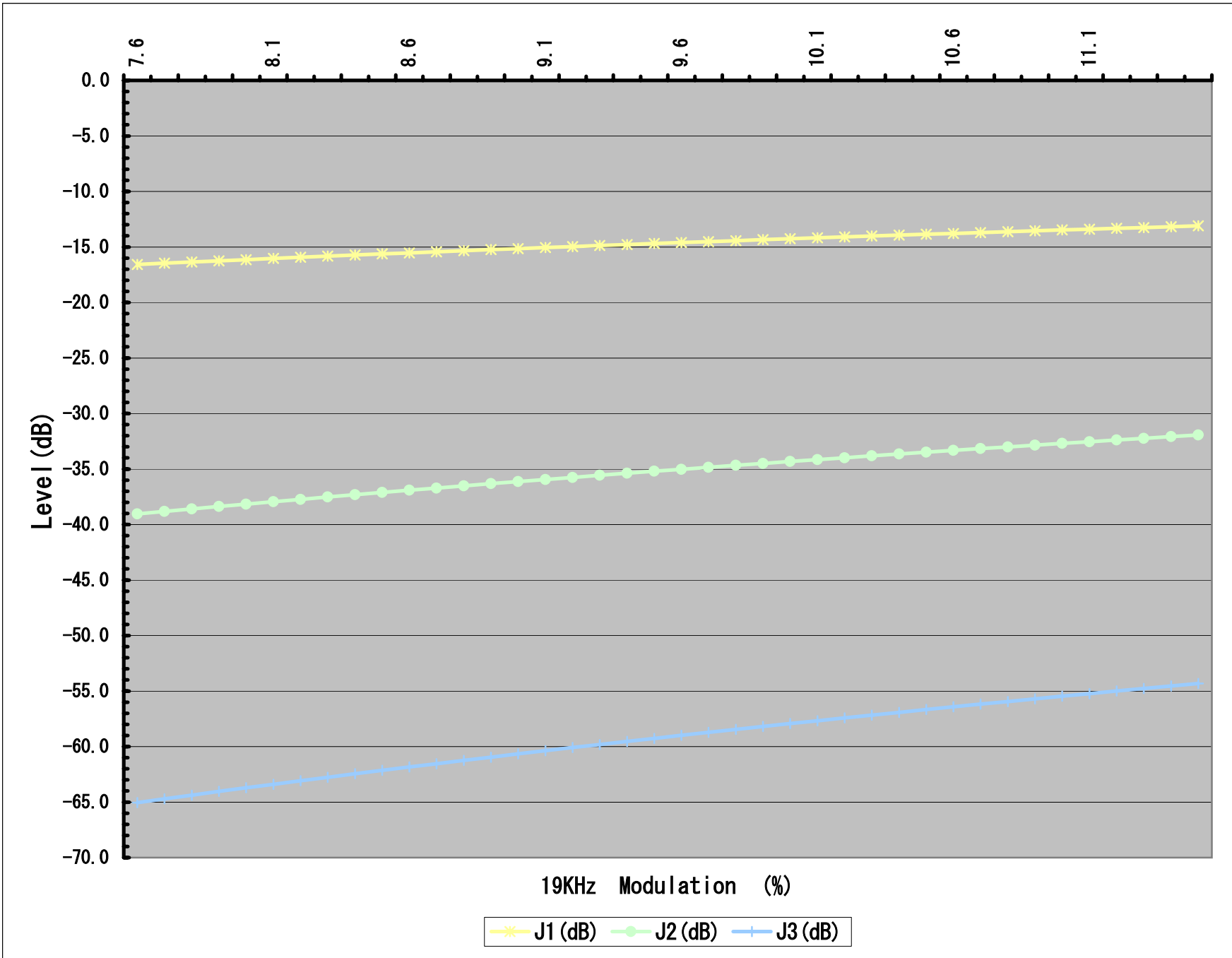
Frequency(k)			400Hz Ref		1KHz Ref	
	V1/V2	dB	V1/V2	dB	V1/V2	dB
30	1.000	0.00	0.992	-0.07	0.954	-0.41
50	1.000	0.00	0.992	-0.07	0.954	-0.41
100	1.000	0.00	0.993	-0.06	0.954	-0.40
200	1.002	0.02	0.994	-0.05	0.956	-0.39
300	1.004	0.04	0.997	-0.03	0.958	-0.37
400	1.008	0.07	1.000	0.00	0.962	-0.34
500	1.012	0.11	1.004	0.04	0.966	-0.30
600	1.018	0.15	1.010	0.08	0.971	-0.26
700	1.024	0.21	1.016	0.14	0.977	-0.20
800	1.031	0.27	1.023	0.20	0.984	-0.14
900	1.039	0.33	1.031	0.27	0.991	-0.07
1,000	1.048	0.41	1.040	0.34	1.000	0.00
1,500	1.105	0.87	1.097	0.80	1.055	0.46
2,000	1.181	1.45	1.172	1.38	1.127	1.04
2,500	1.272	2.09	1.262	2.02	1.213	1.68
3,000	1.374	2.76	1.363	2.69	1.311	2.35
3,500	1.486	3.44	1.475	3.37	1.418	3.03
4,000	1.606	4.11	1.593	4.05	1.532	3.71
4,500	1.732	4.77	1.718	4.70	1.652	4.36
5,000	1.862	5.40	1.848	5.33	1.776	4.99
5,500	1.996	6.00	1.981	5.94	1.905	5.60
6,000	2.134	6.58	2.117	6.51	2.036	6.17
6,500	2.274	7.13	2.256	7.07	2.169	6.73
7,000	2.416	7.66	2.397	7.59	2.305	7.25
7,500	2.560	8.16	2.540	8.10	2.442	7.75
8,000	2.705	8.64	2.684	8.58	2.581	8.23
8,500	2.851	9.10	2.829	9.03	2.720	8.69
9,000	2.999	9.54	2.976	9.47	2.861	9.13
9,500	3.148	9.96	3.123	9.89	3.003	9.55
10,000	3.297	10.36	3.271	10.29	3.145	9.95
10,500	3.447	10.75	3.420	10.68	3.288	10.34
11,000	3.598	11.12	3.569	11.05	3.432	10.71
11,500	3.749	11.48	3.719	11.41	3.576	11.07
12,000	3.900	11.82	3.870	11.75	3.721	11.41
12,500	4.052	12.15	4.021	12.09	3.866	11.75
13,000	4.205	12.47	4.172	12.41	4.011	12.07
13,500	4.357	12.78	4.323	12.72	4.157	12.38
14,000	4.510	13.08	4.475	13.02	4.303	12.68
14,500	4.664	13.37	4.627	13.31	4.449	12.97
15,000	4.817	13.66	4.780	13.59	4.596	13.25

50 μ S De-emphasis

Frequency(k)			400Hz Ref		1KHz Ref	
	V1/V2	dB	V1/V2	dB	V1/V2	dB
30	1.000	0.00	1.008	0.07	1.048	0.41
50	1.000	0.00	1.008	0.07	1.048	0.41
100	1.000	0.00	1.007	0.06	1.048	0.40
200	0.998	-0.02	1.006	0.05	1.046	0.39
300	0.996	-0.04	1.003	0.03	1.044	0.37
400	0.992	-0.07	1.000	0.00	1.040	0.34
500	0.988	-0.11	0.996	-0.04	1.035	0.30
600	0.983	-0.15	0.990	-0.08	1.030	0.26
700	0.977	-0.21	0.984	-0.14	1.024	0.20
800	0.970	-0.27	0.977	-0.20	1.017	0.14
900	0.962	-0.33	0.970	-0.27	1.009	0.07
1,000	0.954	-0.41	0.962	-0.34	1.000	0.00
1,500	0.905	-0.87	0.912	-0.80	0.948	-0.46
2,000	0.847	-1.45	0.853	-1.38	0.888	-1.04
2,500	0.786	-2.09	0.793	-2.02	0.824	-1.68
3,000	0.728	-2.76	0.733	-2.69	0.763	-2.35
3,500	0.673	-3.44	0.678	-3.37	0.705	-3.03
4,000	0.623	-4.11	0.628	-4.05	0.653	-3.71
4,500	0.577	-4.77	0.582	-4.70	0.605	-4.36
5,000	0.537	-5.40	0.541	-5.33	0.563	-4.99
5,500	0.501	-6.00	0.505	-5.94	0.525	-5.60
6,000	0.469	-6.58	0.472	-6.51	0.491	-6.17
6,500	0.440	-7.13	0.443	-7.07	0.461	-6.73
7,000	0.414	-7.66	0.417	-7.59	0.434	-7.25
7,500	0.391	-8.16	0.394	-8.10	0.410	-7.75
8,000	0.370	-8.64	0.373	-8.58	0.388	-8.23
8,500	0.351	-9.10	0.353	-9.03	0.368	-8.69
9,000	0.333	-9.54	0.336	-9.47	0.350	-9.13
9,500	0.318	-9.96	0.320	-9.89	0.333	-9.55
10,000	0.303	-10.36	0.306	-10.29	0.318	-9.95
10,500	0.290	-10.75	0.292	-10.68	0.304	-10.34
11,000	0.278	-11.12	0.280	-11.05	0.291	-10.71
11,500	0.267	-11.48	0.269	-11.41	0.280	-11.07
12,000	0.256	-11.82	0.258	-11.75	0.269	-11.41
12,500	0.247	-12.15	0.249	-12.09	0.259	-11.75
13,000	0.238	-12.47	0.240	-12.41	0.249	-12.07
13,500	0.229	-12.78	0.231	-12.72	0.241	-12.38
14,000	0.222	-13.08	0.223	-13.02	0.232	-12.68
14,500	0.214	-13.37	0.216	-13.31	0.225	-12.97
15,000	0.208	-13.66	0.209	-13.59	0.218	-13.25

19KHz pilot signal modulation (75KHz deviation =100%)

Mod.(%)	β	J0	J0(dB)	J1	J1(dB)	J1-J0(dB)	J2	J2(dB)	J2-J0(dB)	J3	J3(dB)	J3-J0(dB)
7.6	0.300	0.9776	-0.20	0.1483	-16.58	-16.38	0.0112	-39.04	-38.85	0.0006	-65.05	-64.85
7.7	0.304	0.9770	-0.20	0.1502	-16.47	-16.26	0.0115	-38.82	-38.62	0.0006	-64.71	-64.51
7.8	0.308	0.9764	-0.21	0.1521	-16.36	-16.15	0.0118	-38.59	-38.39	0.0006	-64.37	-64.17
7.9	0.312	0.9758	-0.21	0.1540	-16.25	-16.04	0.0121	-38.37	-38.16	0.0006	-64.04	-63.83
8.0	0.316	0.9752	-0.22	0.1559	-16.14	-15.92	0.0124	-38.16	-37.94	0.0007	-63.72	-63.50
8.1	0.320	0.9746	-0.22	0.1578	-16.04	-15.81	0.0127	-37.94	-37.72	0.0007	-63.39	-63.17
8.2	0.324	0.9740	-0.23	0.1597	-15.93	-15.70	0.0130	-37.73	-37.50	0.0007	-63.07	-62.85
8.3	0.328	0.9733	-0.23	0.1616	-15.83	-15.60	0.0133	-37.52	-37.29	0.0007	-62.76	-62.53
8.4	0.332	0.9727	-0.24	0.1635	-15.73	-15.49	0.0136	-37.32	-37.08	0.0008	-62.45	-62.21
8.5	0.336	0.9721	-0.25	0.1654	-15.63	-15.38	0.0139	-37.11	-36.87	0.0008	-62.14	-61.90
8.6	0.339	0.9714	-0.25	0.1673	-15.53	-15.28	0.0143	-36.91	-36.66	0.0008	-61.84	-61.59
8.7	0.343	0.9707	-0.26	0.1692	-15.43	-15.17	0.0146	-36.71	-36.46	0.0008	-61.54	-61.28
8.8	0.347	0.9701	-0.26	0.1711	-15.34	-15.07	0.0149	-36.52	-36.25	0.0009	-61.24	-60.98
8.9	0.351	0.9694	-0.27	0.1730	-15.24	-14.97	0.0153	-36.32	-36.05	0.0009	-60.95	-60.68
9.0	0.355	0.9687	-0.28	0.1748	-15.15	-14.87	0.0156	-36.13	-35.86	0.0009	-60.66	-60.38
9.1	0.359	0.9680	-0.28	0.1767	-15.05	-14.77	0.0160	-35.94	-35.66	0.0010	-60.37	-60.09
9.2	0.363	0.9673	-0.29	0.1786	-14.96	-14.67	0.0163	-35.75	-35.46	0.0010	-60.09	-59.80
9.3	0.367	0.9666	-0.30	0.1805	-14.87	-14.58	0.0167	-35.57	-35.27	0.0010	-59.81	-59.52
9.4	0.371	0.9659	-0.30	0.1824	-14.78	-14.48	0.0170	-35.38	-35.08	0.0011	-59.53	-59.23
9.5	0.375	0.9652	-0.31	0.1842	-14.69	-14.39	0.0174	-35.20	-34.89	0.0011	-59.26	-58.95
9.6	0.379	0.9644	-0.31	0.1861	-14.61	-14.29	0.0177	-35.02	-34.71	0.0011	-58.99	-58.67
9.7	0.383	0.9637	-0.32	0.1880	-14.52	-14.20	0.0181	-34.84	-34.52	0.0012	-58.72	-58.40
9.8	0.387	0.9629	-0.33	0.1898	-14.43	-14.10	0.0185	-34.67	-34.34	0.0012	-58.45	-58.13
9.9	0.391	0.9622	-0.33	0.1917	-14.35	-14.01	0.0188	-34.49	-34.16	0.0012	-58.19	-57.86
10.0	0.395	0.9614	-0.34	0.1935	-14.26	-13.92	0.0192	-34.32	-33.98	0.0013	-57.93	-57.59
10.1	0.399	0.9607	-0.35	0.1954	-14.18	-13.83	0.0196	-34.15	-33.80	0.0013	-57.67	-57.32
10.2	0.403	0.9599	-0.36	0.1973	-14.10	-13.74	0.0200	-33.98	-33.63	0.0013	-57.42	-57.06
10.3	0.407	0.9591	-0.36	0.1991	-14.02	-13.66	0.0204	-33.82	-33.45	0.0014	-57.17	-56.80
10.4	0.411	0.9583	-0.37	0.2010	-13.94	-13.57	0.0208	-33.65	-33.28	0.0014	-56.92	-56.55
10.5	0.414	0.9575	-0.38	0.2028	-13.86	-13.48	0.0212	-33.49	-33.11	0.0015	-56.67	-56.29
10.6	0.418	0.9567	-0.38	0.2047	-13.78	-13.39	0.0216	-33.32	-32.94	0.0015	-56.42	-56.04
10.7	0.422	0.9559	-0.39	0.2065	-13.70	-13.31	0.0220	-33.16	-32.77	0.0016	-56.18	-55.79
10.8	0.426	0.9551	-0.40	0.2084	-13.62	-13.22	0.0224	-33.00	-32.61	0.0016	-55.94	-55.54
10.9	0.430	0.9543	-0.41	0.2102	-13.55	-13.14	0.0228	-32.85	-32.44	0.0016	-55.70	-55.29
11.0	0.434	0.9534	-0.41	0.2120	-13.47	-13.06	0.0232	-32.69	-32.28	0.0017	-55.47	-55.05
11.1	0.438	0.9526	-0.42	0.2139	-13.40	-12.98	0.0236	-32.54	-32.11	0.0017	-55.23	-54.81
11.2	0.442	0.9517	-0.43	0.2157	-13.32	-12.89	0.0240	-32.38	-31.95	0.0018	-55.00	-54.57
11.3	0.446	0.9509	-0.44	0.2175	-13.25	-12.81	0.0245	-32.23	-31.79	0.0018	-54.77	-54.33
11.4	0.450	0.9500	-0.45	0.2194	-13.18	-12.73	0.0249	-32.08	-31.63	0.0019	-54.54	-54.10
11.5	0.454	0.9491	-0.45	0.2212	-13.11	-12.65	0.0253	-31.93	-31.48	0.0019	-54.32	-53.86



Bessel function – Modulation

β	J0	J0(dB)	J1	J1(dB)	J2	J2(dB)	J3	J3(dB)	J4	J4(dB)
0.0	1.000	0.000	0.000	#NUM!	0.000	#NUM!	0.000	#NUM!	0.000	#NUM!
0.2	0.990	-0.087	0.100	-20.043	0.005	-46.050	0.000	-75.585	0.000	-107.622
0.4	0.960	-0.351	0.196	-14.154	0.020	-34.095	0.001	-57.588	0.000	-83.591
0.6	0.912	-0.800	0.287	-10.851	0.044	-27.197	0.004	-47.132	0.000	-69.591
0.8	0.846	-1.450	0.369	-8.663	0.076	-22.405	0.010	-39.788	0.001	-59.718
1.0	0.765	-2.325	0.440	-7.130	0.115	-18.793	0.020	-34.171	0.002	-52.123
1.2	0.671	-3.464	0.498	-6.050	0.159	-15.953	0.033	-29.663	0.005	-45.981
1.4	0.567	-4.931	0.542	-5.321	0.207	-13.666	0.050	-25.935	0.009	-40.855
1.6	0.455	-6.832	0.570	-4.884	0.257	-11.802	0.073	-22.790	0.015	-36.481
1.8	0.340	-9.371	0.582	-4.709	0.306	-10.281	0.099	-20.105	0.023	-32.692
2.0	0.224	-12.999	0.577	-4.781	0.353	-9.049	0.129	-17.792	0.034	-29.372
2.2	0.110	-19.144	0.556	-5.099	0.395	-8.067	0.162	-15.792	0.048	-26.439
2.4	0.003	-52.015	0.520	-5.677	0.431	-7.311	0.198	-14.062	0.064	-23.835
2.6	-0.097	-20.282	0.471	-6.543	0.459	-6.764	0.235	-12.568	0.084	-21.513
2.8	-0.185	-14.655	0.410	-7.750	0.478	-6.417	0.273	-11.286	0.107	-19.439
3.0	-0.260	-11.699	0.339	-9.394	0.486	-6.266	0.309	-10.199	0.132	-17.586
3.2	-0.320	-9.892	0.261	-11.656	0.484	-6.312	0.343	-9.292	0.160	-15.933
3.4	-0.364	-8.771	0.179	-14.932	0.470	-6.563	0.373	-8.557	0.189	-14.462
3.6	-0.392	-8.139	0.095	-20.403	0.445	-7.037	0.399	-7.986	0.220	-13.159
3.8	-0.403	-7.903	0.013	-37.842	0.409	-7.759	0.418	-7.576	0.251	-12.016
4.0	-0.397	-8.021	-0.066	-23.603	0.364	-8.775	0.430	-7.327	0.281	-11.022
4.2	-0.377	-8.483	-0.139	-17.162	0.311	-10.158	0.434	-7.242	0.310	-10.172
4.4	-0.342	-9.313	-0.203	-13.860	0.250	-12.038	0.430	-7.328	0.336	-9.462
4.6	-0.296	-10.570	-0.257	-11.816	0.185	-14.676	0.417	-7.596	0.359	-8.888
4.8	-0.240	-12.380	-0.298	-10.501	0.116	-18.707	0.395	-8.063	0.378	-8.451
5.0	-0.178	-15.011	-0.328	-9.694	0.047	-26.639	0.365	-8.758	0.391	-8.151
5.2	-0.110	-19.149	-0.343	-9.288	-0.022	-33.263	0.327	-9.722	0.398	-7.992
5.4	-0.041	-27.700	-0.345	-9.235	-0.087	-21.240	0.281	-11.022	0.399	-7.979
5.6	0.027	-31.382	-0.334	-9.516	-0.146	-16.691	0.230	-12.774	0.393	-8.122
5.8	0.092	-20.752	-0.311	-10.144	-0.199	-14.025	0.174	-15.198	0.379	-8.433
6.0	0.151	-16.441	-0.277	-11.160	-0.243	-12.292	0.115	-18.804	0.358	-8.931
6.2	0.202	-13.904	-0.233	-12.656	-0.277	-11.154	0.054	-25.307	0.329	-9.645
6.4	0.243	-12.277	-0.182	-14.816	-0.300	-10.455	-0.006	-44.572	0.295	-10.617
6.6	0.274	-11.244	-0.125	-18.063	-0.312	-10.119	-0.064	-23.868	0.254	-11.914
6.8	0.293	-10.660	-0.065	-23.713	-0.312	-10.109	-0.118	-18.528	0.208	-13.650
7.0	0.300	-10.455	-0.005	-46.590	-0.301	-10.417	-0.168	-15.517	0.158	-16.038
7.2	0.295	-10.601	0.054	-25.300	-0.280	-11.057	-0.210	-13.561	0.105	-19.569
7.4	0.279	-11.100	0.110	-19.202	-0.249	-12.077	-0.244	-12.245	0.051	-25.854
7.6	0.252	-11.986	0.159	-15.960	-0.210	-13.568	-0.270	-11.386	-0.003	-50.100
7.8	0.215	-13.335	0.201	-13.921	-0.164	-15.715	-0.285	-10.893	-0.056	-25.080
8.0	0.172	-15.307	0.235	-12.592	-0.113	-18.939	-0.291	-10.718	-0.105	-19.547
8.2	0.122	-18.257	0.258	-11.768	-0.059	-24.541	-0.287	-10.845	-0.151	-16.440
8.4	0.069	-23.203	0.271	-11.347	-0.005	-46.587	-0.273	-11.276	-0.190	-14.410
8.6	0.015	-36.699	0.273	-11.285	0.049	-26.230	-0.250	-12.039	-0.223	-13.024
8.8	-0.039	-28.127	0.264	-11.565	0.099	-20.065	-0.219	-13.193	-0.249	-12.092
9.0	-0.090	-20.883	0.245	-12.206	0.145	-16.782	-0.181	-14.850	-0.265	-11.520
9.2	-0.137	-17.282	0.217	-13.254	0.184	-14.703	-0.137	-17.240	-0.274	-11.257
9.4	-0.177	-15.052	0.182	-14.816	0.215	-13.334	-0.090	-20.918	-0.273	-11.282
9.6	-0.209	-13.598	0.140	-17.107	0.238	-12.467	-0.040	-27.886	-0.263	-11.592
9.8	-0.232	-12.680	0.093	-20.645	0.251	-11.999	0.010	-40.265	-0.245	-12.207
10.0	-0.246	-12.184	0.043	-27.236	0.255	-11.882	0.058	-24.675	-0.220	-13.167
10.2	-0.250	-12.055	-0.007	-43.588	0.248	-12.100	0.104	-19.660	-0.187	-14.556
10.4	-0.243	-12.275	-0.055	-25.118	0.233	-12.664	0.145	-16.774	-0.149	-16.532
10.6	-0.228	-12.855	-0.101	-19.894	0.209	-13.616	0.180	-14.898	-0.107	-19.437
10.8	-0.203	-13.841	-0.142	-16.944	0.177	-15.047	0.208	-13.652	-0.061	-24.223
11.0	-0.171	-15.330	-0.177	-15.051	0.139	-17.137	0.227	-12.866	-0.015	-36.455
11.2	-0.133	-17.523	-0.204	-13.814	0.097	-20.301	0.238	-12.456	0.031	-30.145
11.4	-0.090	-20.894	-0.222	-13.055	0.051	-25.817	0.240	-12.381	0.075	-22.459
11.6	-0.045	-27.010	-0.232	-12.690	0.005	-46.715	0.234	-12.631	0.116	-18.695
11.8	0.002	-54.123	-0.232	-12.680	-0.041	-27.673	0.218	-13.220	0.152	-16.345
12.0	0.048	-26.432	-0.223	-13.017	-0.085	-21.419	0.195	-14.193	0.182	-14.775

