

Transceiver S-Meter Reading	Signal Generator Level		Transceiver S-Meter Reading	Signal Generator Level	
	dBm	uV		dBm	uV
S0	-127	0.100	S8	-79	25.200
S1	-121	0.200	S9	-73	50.100
S2	-115	0.399	S9 + 10dB	-63	159
S3	-109	0.795	S9 + 20dB	-53	501
S4	-103	1.590	S9 + 30dB	-43	1,590
S5	-97	3.170	S9 + 40dB	-33	5,010
S6	-91	6.330	S9 + 50dB	-23	15,900
S7	-85	12.600	S9 + 60dB	-13	50,100

IARU Region 1 Technical Recommendation R.1

BRIGHTON 1981, TORREMOLINOS 1990

STANDARDISATION OF S-METER READINGS

1. One S-unit corresponds to a signal level difference of 6 dB.
2. On the bands below 30 MHz a meter deviation of S-9 corresponds to an available power of -73 dBm (50.1 uV) from a continuous wave signal generator connected to the receiver input terminals.
3. On the bands above 144 MHz this available power shall be -93 dBm (6.3uV).
4. The metering system shall be based on quasi-peak detection with an attack time of 10 msec ± 2 msec and a decay time constant of at least 500 msec.

1	"IF" A RECEIVING STATION HAS AN S-METER READING OF 'S-6.0' WITH THE TRANSMITTING STATION USING 100 WATTS
2	THE RECEIVING STATIONS S-METER READING WOULD BE 'S-6.5' (+3dB) IF THE TRANSMITTING STATIONS POWER IS INCREASED TO 200 WATTS
3	THE RECEIVING STATIONS S-METER READING WOULD BE 'S-7.0' (+3dB) IF THE TRANSMITTING STATIONS POWER IS INCREASED TO 400 WATTS
4	THE RECEIVING STATIONS S-METER READING WOULD BE 'S-7.5' (+3dB) IF THE TRANSMITTING STATIONS POWER IS INCREASED TO 800 WATTS
5	THE RECEIVING STATIONS S-METER READING WOULD BE 'S-8.0' (+3dB) IF THE TRANSMITTING STATIONS POWER IS INCREASED TO 1600
6	THE RECEIVING STATIONS S-METER READING WOULD BE 'S-8.5' (+3dB) IF THE TRANSMITTING STATIONS POWER IS INCREASED TO 3200
7	THE RECEIVING STATIONS S-METER READING WOULD BE 'S-9.0' (+3dB) IF THE TRANSMITTING STATIONS POWER IS INCREASED TO 6400

POWER			
GAIN = (x Pf) OR LOSS = (/ Pf)			
dB GAIN	=	x/	POWER FACTOR (Pf)
1	=	x/	1.26
2	=	x/	1.60
3	=	x/	2.00
4	=	x/	2.50
5	=	x/	3.00
6	=	x/	4.00
7	=	x/	5.00
8	=	x/	6.30
9	=	x/	8.00
10	=	x/	10.00

POWER			
GAIN = (x Pf) OR LOSS = (/ Pf)			
dB GAIN	=	x/	POWER FACTOR (Pf)
11	=	x/	12.60
12	=	x/	15.80
13	=	x/	20.00
14	=	x/	25.10
15	=	x/	31.60
16	=	x/	40.00
17	=	x/	50.10
18	=	x/	64.00
19	=	x/	80.00
20	=	x/	100.40

dB CONVERSION

The most common measurement of RF signal levels is in 'dBm' where '0 - dBm' equals '224 - millivolt' or '1 - milliwatt' across '50 W'. The following table provides conversion from dB to other measurements.

$$P \text{ (Wattage)} = E^2 \text{ (Voltage Squared)} / \text{Resistance (50W)}$$

dBm	μV/mV	dBmV	dBμV	dBm	μV/mV	dBmV	dBμV	dBm	μV/mV	dBmV	dBμV
13	1000 mV	60	120	-34	4467 μV	13	73	-81	20.0 μV	-34	26
12	891 mV	59	119	-35	3981 μV	12	72	-82	17.8 μV	-35	25
11	794 mV	58	118	-36	3548 μV	11	71	-83	15.8 μV	-36	24
10	707 mV	57	117	-37	3162 μV	10	70	-84	14.1 μV	-37	23
9	631 mV	56	116	-38	2818 μV	9	69	-85	12.6 μV	-38	22
8	562 mV	55	115	-39	2512 μV	8	68	-86	11.2 μV	-39	21
7	501 mV	54	114	-40	2239 μV	7	67	-87	10.0 μV	-40	20
6	447 mV	53	113	-41	1995 μV	6	66	-88	8.91 μV	-41	19
5	398 mV	52	112	-42	1778 μV	5	65	-89	7.94 μV	-42	18
4	355 mV	51	111	-43	1585 μV	4	64	-90	7.07 μV	-43	17
3	316 mV	50	110	-44	1413 μV	3	63	-91	6.31 μV	-44	16
2	282 mV	49	109	-45	1259 μV	2	62	-92	5.62 μV	-45	15
1	251 mV	48	108	-46	1122 μV	1	61	-93	5.01 μV	-46	14
0	224 mV	47	107	-47	1000 μV	0	60	-94	4.47 μV	-47	13
-1	200 mV	46	106	-48	891 μV	-1	59	-95	3.98 μV	-48	12
-2	178 mV	45	105	-49	794 μV	-2	58	-96	3.55 μV	-49	11
-3	158 mV	44	104	-50	707 μV	-3	57	-97	3.16 μV	-50	10
-4	141 mV	43	103	-51	631 μV	-4	56	-98	2.82 μV	-51	9
-5	126 mV	42	102	-52	562 μV	-5	55	-99	2.51 μV	-52	8
-6	112 mV	41	101	-53	501 μV	-6	54	-100	2.24 μV	-53	7
-7	100 mV	40	100	-54	447 μV	-7	53	-101		-54	6
-8	89.1 mV	39	99	-55	398 μV	-8	52	-102		-55	5
-9	79.4 mV	38	98	-56	355 μV	-9	51	-103	1.59 μV	-56	4
-10	70.7 mV	37	97	-57	316 μV	-10	50	-104		-57	3
-11	63.1 mV	36	96	-58	282 μV	-11	49	-106		-58	2
-12	56.2 mV	35	95	-59	251 μV	-12	48	-107		-59	1
-13	50.1 mV	34	94	-60	224 μV	-13	47	-108		-60	0
-14	44.7 mV	33	93	-61	200 μV	-14	46	-109	.759 μV	-61	-1
-15	39.8 mV	32	92	-62	178 μV	-15	45	-110		-62	-2
-16	35.5 mV	31	91	-63	158 μV	-16	44	-111		-63	-3
-17	31.6 mV	30	90	-64	141 μV	-17	43	-112		-64	-4
-18	28.2 mV	29	89	-65	126 μV	-18	42	-113		-65	-5
-19	25.1 mV	28	88	-66	112 μV	-19	41	-114		-66	-6
-20	22.4 mV	27	87	-67	100 μV	-20	40	-115	.399 μV	-67	-7
-21	20.0 mV	26	86	-68	89.1 μV	-21	39	-116		-68	-8
-22	17.8 mV	25	85	-69	79.4 μV	-22	38	-117		-69	-9
-23	15.8 mV	24	84	-70	70.7 μV	-23	37	-118		-70	-10
-24	14.1 mV	23	83	-71	63.1 μV	-24	36	-119		-71	-11
-25	12.6 mV	22	82	-72	56.2 μV	-25	35	-120		-72	-12
-26	11.2 mV	21	81	-73	50.1 μV	-26	34	-121	.200 μV	-73	-13
-27	10.0 mV	20	80	-74	44.7 μV	-27	33	-122		-74	-14
-28	8.91 mV	19	79	-75	39.8 μV	-28	32	-123		-75	-15
-29	7.94 mV	18	78	-76	35.5 μV	-29	31	-124		-76	-16
-30	7079 μV	17	77	-77	31.6 μV	-30	30	-125		-77	-17
-31	6310 μV	16	76	-78	28.2 μV	-31	29	-126		-78	-18
-32	5623 μV	15	75	-79	25.1 μV	-32	28	-127	.100 μV	-79	-19
-33	5012 μV	14	74	-80	22.4 μV	-33	27				

AMERICAN		JAPANESE	TRANSCEIVER
Sig Gen in 'uV'	Sig Gen in 'dBm'	Sig Gen in 'dB'	S-METER Signal Strength
0.100uV	-127dBm	-12dB	S0
0.200uV	-121dBm	-6dB	S1
0.399uV	-115dBm	0dB	S2
0.795uV	-109dBm	6dB	S3
1.59uV	-103dBm	12dB	S4
3.17uV	-97dBm	18dB	S5
6.33uV	-91dBm	24dB	S6
12.6uV	-85dBm	30dB	S7
25.2uV	-79dBm	36dB	S8
50.1uV	-73dBm	40dB	S9
159uV	-63dBm	50dB	S9 + 10dB
501uV	-53dBm	60dB	S9 + 20dB
1590uV	-43dBm	70dB	S9 + 30dB
5010uV	-33dBm	80dB	S9 + 40dB
15900uV	-23dBm	90dB	S9 + 50dB
50100uV	-13dBm	100dB	S9 + 60dB
159000uV	-3dBm	110dB	S9 + 70dB

TRANSMITTING STATIONS 'CW' OR 'PEP' POWER OUTPUT IN WATTS	TRANSMITTING STATIONS COAXIAL CABLE VSWR IS	TRANSMITTING STATIONS COAXIAL CABLE RESISTANCE IN OHMS	TRANSMITTING STATIONS COAXIAL CABLE - AC RMS VOLTAGE ($E = \text{SQRT} [P \times R]$)	TRANSMITTING STATIONS COAXIAL CABLE - AC RMS CURRENT IN AMPS ($I = \text{SQRT} [E / R]$)
100	1.0:1	50	70.7	1.4
200	1.0:1	50	100.0	2.0
300	1.0:1	50	122.5	2.4
400	1.0:1	50	141.4	2.8
500	1.0:1	50	158.1	3.2
600	1.0:1	50	173.2	3.5
700	1.0:1	50	187.1	3.7
800	1.0:1	50	200.0	4.0
900	1.0:1	50	212.1	4.2
1000	1.0:1	50	223.6	4.5
1100	1.0:1	50	234.5	4.7
1200	1.0:1	50	244.9	4.9
1300	1.0:1	50	255.0	5.1
1400	1.0:1	50	264.6	5.3
1500	1.0:1	50	273.9	5.5
1600	1.0:1	50	282.8	5.7
3200	1.0:1	50	400.0	8.0
6400	1.0:1	50	565.7	11.3