FM Receiver Sensitivity

dB

- dB (decibel) is a ratio of two power levels, expressed as ten times the the logarithm of that ratio.

- $$dB = 10 \log_{10} (P_1 / P_2)$$

- $$(P_1 / P_2) = 10^{(dB/10)}$$

dB

P_1	P_2	P_1 / P_2	$Log_{10}(P_1/P_2)$	dB
1	1,000	0.001	-3	-30
10	1,000	0.01	-2	-20
100	1,000	0.1	-1	-10
1,000	1,000	1	0	0
10,000	1,000	10	1	10
100,000	1,000	100	2	20
1,000,000	1,000	1000	3	30

dBm

- dBm is a measure of power relative to one milliwatt (mW)

dBm	Power	dBm	Power
40	10 W	-10	100 µW
30	1 W	-20	10 µW
20	100 mW	-30	1 µW
10	10 mW	-40	100 nW
0	1 mW	-50	10 nW

Ohm's Law

- $E = I \bullet R$ $\qquad\qquad$ $W = E \bullet I = E^2 / R$

- $E = \text{sq.rt.}\ (R \bullet W)$

  where E is RMS voltage = peak/ √2

- $E = \text{sq rt.}\ (1000 \bullet R \bullet 10^{(dBm\ /\ 10)})$

  where E is in mV and R is in Ohms

dBm for Radio Signals

Radio Signal	dBm	µ Volts
One microwatt	-30	7071
20 over S9	-54	448
S9	-73	50
ICOM S1	-97	3.2
Man-made noise at a quiet receiving site	-109	0.8
Typical receiver sensitivity, BW 3 KHz	-123	0.18
Electron noise @ 17^0 C, BW 3 KHz	-139	0.03