dB math

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dB math

- to convert mW to dBm:
  - P(dBm)= 10 log P(mW)
- to convert dBm to mW:
  - P(mW)= $\log^{-1}$ (P(dBm)/10)
- the advantage of using dB is that **gains and losses are ADDITIVE**

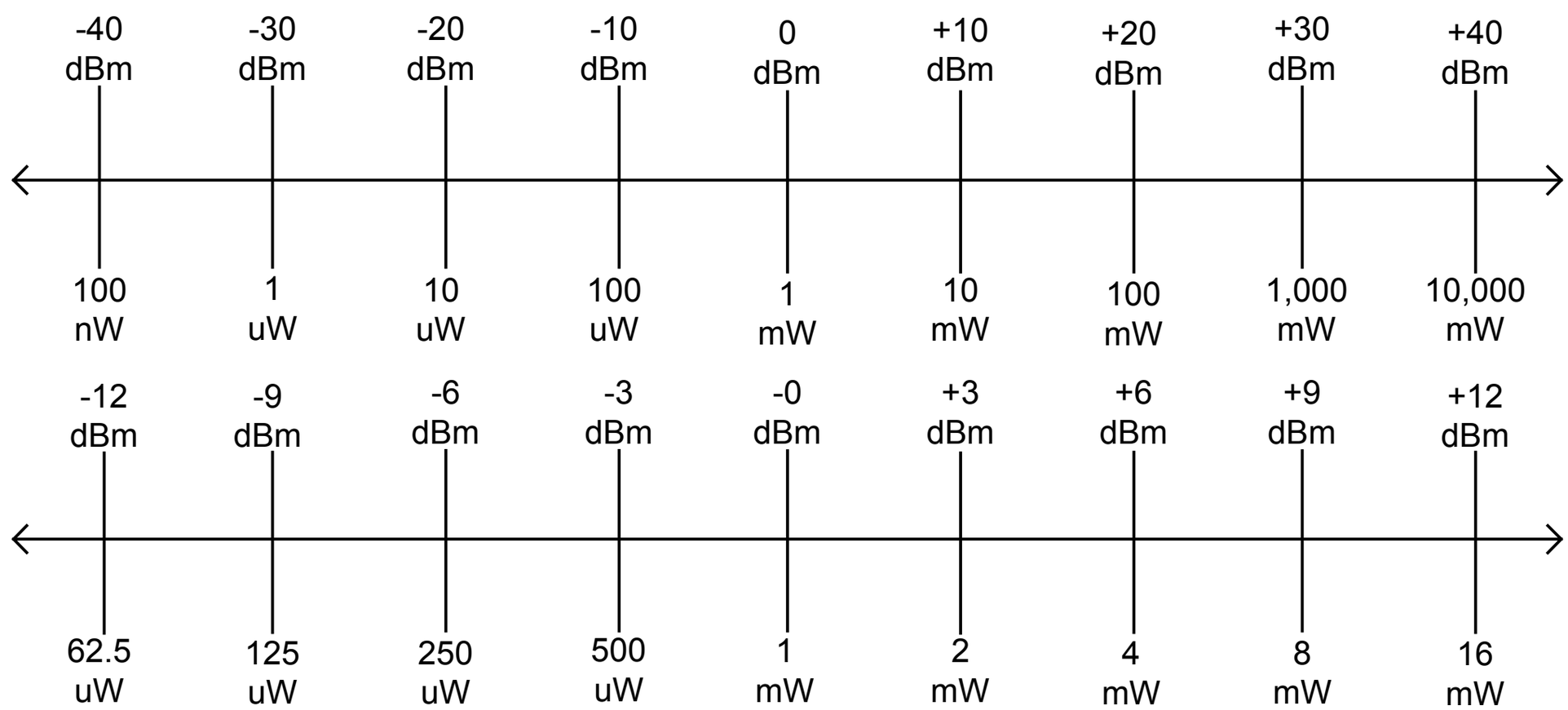
dB math

- gain or loss in an RF system may be referred to by absolute power measurement (10W of power) or by a relative power measurement (half of its power)
- -3dB = half the power in mW
- **+3dB = double the power in mW**
- -10dB = one tenth the power in mW
- **+10dB = ten times the power in mW**

dB math

- for example:
  - 10 mW + 3 dB = 20 mW
  - 100 mW - 3dB = 50 mW
  - 10 mW + 10 dB = 100 mW
  - 300 mW - 10 dB = 30 mW

dB math


-40 dBm
-30 dBm
-20 dBm
-10 dBm
0 dBm
+10 dBm
+20 dBm
+30 dBm
+40 dBm
100 nW
1 uW
10 uW
100 uW
1 mW
10 mW
100 mW
1,000 mW
10,000 mW
-12 dBm
-9 dBm
-6 dBm
-3 dBm
-0 dBm
+3 dBm
+6 dBm
+9 dBm
+12 dBm
62.5 uW
125 uW
250 uW
500 uW
1 mW
2 mW
4 mW
8 mW
16 mW

dB math

- for example:
  - +43 dBm
  - 43dB = 10dB + 10dB + 10dB + 10dB + 3dB
  - 1 mW x 10 = 10 mW
  - 10 mW x 10 = 100 mW
  - 100 mW x 10 = 1000 mW
  - 1000 mW x 10 = 10000 mW
  - 10000 mW x 2 = 20000 mW = 20 W

dB math

- exercise:
  - express -26 dBm in Watts
  - -26dB = - 10dB - 10dB - 3dB - 3dB
  - 1 mW / 10 = 100 μW
  - 100 μW / 10 = 10 μW
  - 10 μW / 2 = 5 μW
  - 5 μW / 2 = 2.5 μW