MusicReason RESOURCE

Gain, Decibels, EQ, and Dynamics

https://musicreason.com/resources/gain-decibels-eq-and-dynamics/ · Last updated 2026-09-06

A decibel value, a Q setting, and an envelope time constant each express one specific, well-defined relationship. None of them is a complete mixing instruction on its own, and treating one as if it were tends to produce cargo-cult settings copied between mixes that do not actually share the same problem.

Amplitude dB and power dB are not the same scale

A 2x amplitude ratio is +6.02 dB. A 2x power ratio is +3.01 dB.
Doubling amplitude is equivalent to quadrupling power, which is exactly why the same "2x" ratio produces two different dB values depending on which convention applies.dB Gain Calculator asks which mode you mean rather than assuming one.

Q describes shape, not quality

A higher Q narrows the band an EQ filter affects relative to its center frequency; a lower Q widens it. Neither is inherently "better." EQ Bandwidth and Q Calculator converts between Q and bandwidth without recommending which one suits your material, since that depends entirely on what you are trying to shape.

Peak and RMS answer different questions about the same signal

Peak tracks the single highest instantaneous sample; RMS averages energy over a short window. A signal with sharp transients, a drum hit, for example, can show a peak reading well above its RMS reading at the same moment, which is exactly what Peak and RMS Meter displays side by side rather than collapsing into one number.

A time constant illustrates envelope shape, not a preset

Compressor Time Constant Explorer and Sidechain Release Calculator illustrate a one-pole envelope's attack and release behavior mathematically; the actual perceived punch or transparency of a real compressor depends on the material and the full signal chain, not the time constant in isolation.

Phase delay depends on frequency, not just time

Phase Delay Calculator reports how a fixed time delay translates into a phase shift that differs by frequency, which is why aligning two signals in time does not automatically mean they are phase-aligned at every frequency.

Frequently asked questions

Why does doubling amplitude equal +6.02 dB but doubling power equal +3.01 dB?

Decibels are defined differently for the two: an amplitude (voltage-like) ratio uses 20*log10(ratio), while a power ratio uses 10*log10(ratio). Doubling amplitude means quadrupling power, so the two conventions produce different dB values for what is physically the same doubling.

Does a peak meter and an RMS meter reading the same signal always agree?

No, by design. Peak tracks the single highest instantaneous sample; RMS averages energy over a short window, so a signal with sharp transients (like a drum hit) can show a peak reading well above its RMS reading at the same moment.

Does a higher Q always mean a "better" EQ cut?

No claim like that is made here. Q describes how narrow or wide a filter's affected band is relative to its center frequency; narrower (higher Q) suits a surgical cut, wider (lower Q) suits a broad tonal shift, and which is appropriate depends entirely on the material.

Where this shows up

PRODUCTION AND AUDIO MATH
dB Gain Calculator

PRODUCTION AND AUDIO MATH
EQ Bandwidth and Q Calculator

AUDIO ANALYSIS
Peak and RMS Meter

PRODUCTION AND AUDIO MATH
Compressor Time Constant Explorer

PRODUCTION AND AUDIO MATH
Sidechain Release Calculator

PRODUCTION AND AUDIO MATH
Phase Delay Calculator