Electrical Characteristics/Pinouts/Standardss

$$ \Delta V_{AB} = \int_{r_a}^{r_b} \mathbf{E}\cdot d\ell $$

CV/Gate/Trigger/Audio Levels

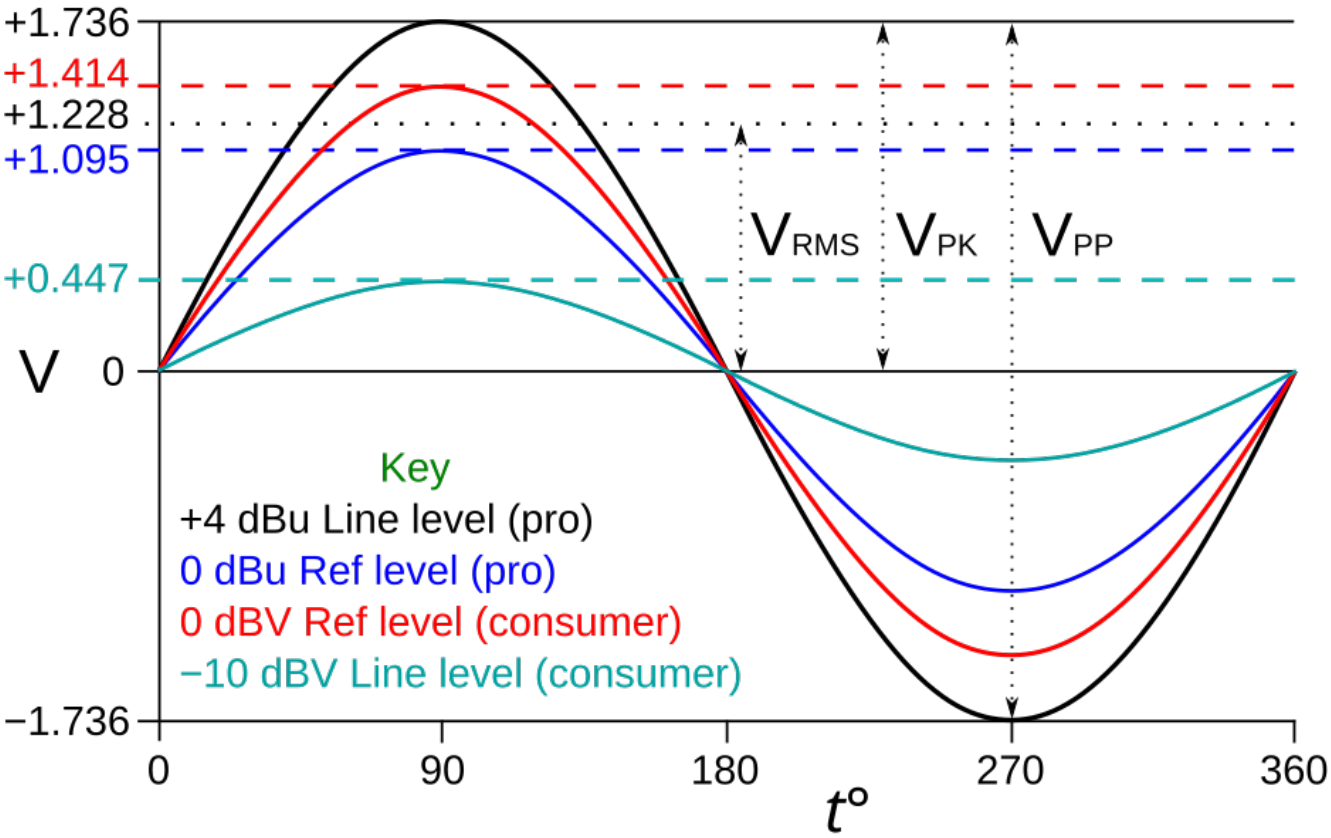
- CV unipolar: 0V to 10V DC
- CV bipolar: -5V to +5V DC
- Gate: 10V for active duration
- Trigger: 10V 10ms pulse

Most signals are typically $\pm5\,V_{pk}$, $10\,V_{pp}$. Audio signals being bipolar (duh) AC, and CV signals usually being unipolar (0V to 10V) or bipolar (-5V to +5V) DC signals. Additionally, CV and Audio signals in theory can mix, but usually don't (unless the wave is a simple waveform).

Output

Inter-synth lines have 10Vpp out with 1k impedance, whilst line level is 3Vpp ish with 600R-800R impedance.

Generally, line-level signals sit in the middle of the hierarchy of signal levels in audio engineering. There are weaker signals, such as those from microphones (Mic Level/Microphone Level) and instrument pickups (Instrument Level), and stronger signals, such as those used to drive headphones and loudspeakers (Speaker Level). The strength of these various signals does not necessarily refer to the output voltage of the source device; it also depends on its output impedance and output power capability.



Voltage vs. time of sine waves at reference and line levels, with VRMS, VPK, and VPP marked for the +4dBu line level.

A line level describes a line's nominal signal level as a ratio, expressed in decibels, against a standard reference voltage. The nominal level and the reference voltage against which it is expressed depend on the line level being used. While the nominal levels themselves vary, only two reference voltages are common: decibel volts (dBV) for consumer applications, and decibels unloaded (dBu) for professional applications.

The decibel volt reference voltage is 1 VRMS = 0 dBV. The decibel unloaded reference voltage, 0 dBu, is the AC voltage required to produce 1 mW of power across a 600 Ω impedance (approximately 0.7746 VRMS). This awkward unit is a holdover from the early telephone standards, which used 600 Ω sources and loads, and measured dissipated power in decibel-milliwatts (dBm). Modern audio equipment does not use 600 Ω matched loads, hence dBm unloaded (dBu).

Use	Nom. Level (dB[x])	Nom. Level (Vrms)	Peak Amplitude (Vpk)	Peak2Peak (Vpp)
Professional	+4 dBu	1.228	1.736	3.472
Consumer	-10 dBV	0.316	0.447	0.894

As cables between line output and line input are generally extremely short compared to the audio signal wavelength in the cable, transmission line effects can be disregarded and impedance matching need not be used. Instead, line level circuits use the impedance bridging principle, in which a low impedance output drives a high impedance input. A typical line out connection has an output impedance from 100 to 600 Ω, with lower values being more common in newer equipment. Line inputs present a much higher impedance, typically 10 kΩ or more.