

Cosmic Calculator

Version 0.1.5 User Manual

BPM Timing Reference, Note Duration Calculator and Equal-Temperament Frequency Chart



Host-Synced BPM

Read the current DAW tempo automatically or switch to a manual BPM.

Timing Table

See normal, dotted and triplet values as both milliseconds and Hertz.

Note Frequency Chart

Reference chromatic note frequencies across multiple octaves with A4 = 440 Hz.

Copy Table

Copy the currently displayed reference table for notes, patch documentation or external calculations.

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Cosmic Fact

Light from the Sun takes about 8 minutes 20 seconds to reach Earth. At audio timescales, that is an extraordinarily long delay line.

Introduction

Cosmic Calculator is a compact timing and frequency utility for musicians, producers and sound designers. It converts BPM into practical note lengths and modulation frequencies, and also provides a chromatic note-frequency chart for tuning oscillators, resonators, filters and other frequency-based processes.

The plugin has two primary views. The first is a tempo-derived table showing **Normal**, **Dotted** and **Triplet** timing values. The second is a **Note Frequency Chart** with note frequencies across multiple octaves. Clicking the banner/logo toggles between the two views.

Main Features

HOST TEMPO

Read the DAW tempo directly when Use Host BPM is enabled.

MANUAL TEMPO

Disable host sync and choose a BPM manually when you need an independent reference.

MILLISECONDS + HERTZ

Every rhythmic division shows both its duration and equivalent cycle frequency.

NORMAL / DOTTED / TRIPLET

Three common rhythmic interpretations are shown side by side.

FREQUENCY CHART

Reference note frequencies across octaves with A4 fixed at 440 Hz.

COPY TABLE

Move the displayed values into notes, documentation or another workflow.

Timing Fact

At 120 BPM, one quarter note lasts exactly 500 ms. Doubling the BPM halves every note duration.

Quick Start

1. Insert Cosmic Calculator in a host that supports the plugin.
2. Leave **Use Host BPM** enabled to follow the DAW tempo automatically.
3. Read the timing table for the rhythmic division you need.
4. Use the **Normal**, **Dotted** or **Triplet** column depending on the musical feel.
5. Read either the millisecond value for time-based parameters or the Hertz value for rate-based parameters.
6. Click **Copy Table** when you want the visible table in another application.
7. Click the Cosmic Calculator banner/logo to open the **Note Frequency Chart**; click it again to return.

NOTE VALUE	NORMAL	DOTTED	TRIplet
1/1 (1 Bar)	1090.91 ms / 0.92 Hz	1636.36 ms / 0.61 Hz	727.27 ms / 1.38 Hz
1/2 (2 Beats)	545.45 ms / 1.83 Hz	818.18 ms / 1.22 Hz	363.64 ms / 2.75 Hz
1/4 (1 Beat)	272.73 ms / 3.67 Hz	409.09 ms / 2.44 Hz	181.82 ms / 5.50 Hz
1/8	136.36 ms / 7.33 Hz	204.55 ms / 4.89 Hz	90.91 ms / 11.00 Hz
1/16	68.18 ms / 14.67 Hz	102.27 ms / 9.78 Hz	45.45 ms / 22.00 Hz
1/32	34.09 ms / 29.33 Hz	51.14 ms / 19.56 Hz	22.73 ms / 44.00 Hz
1/64	17.05 ms / 58.67 Hz	25.57 ms / 39.11 Hz	11.36 ms / 88.00 Hz
1/128	8.52 ms / 117.33 Hz	12.78 ms / 78.22 Hz	5.68 ms / 176.00 Hz

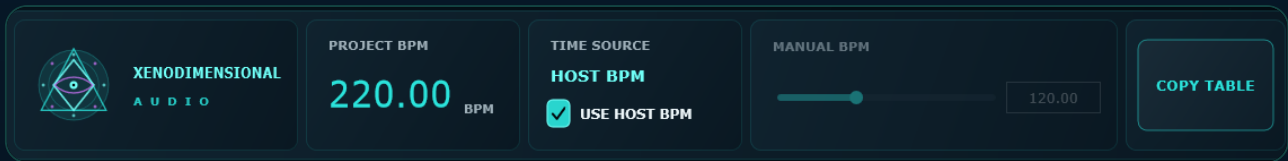
XENODIMENSIONAL AUDIO Straight | dotted | triplet values from 220.00 BPM | click banner/logo for Note Chart v0.1.5

The timing view shown at 220 BPM.

Music Math

A dotted note is 1.5 times the duration of the normal note. A triplet note is two-thirds of the corresponding normal duration.

Main Interface



The upper control strip selects tempo source and provides table-copying access.

Area	Function
Project BPM	Displays the BPM currently being used by the calculator.
Time Source	Shows whether the calculation is currently based on Host BPM or manual tempo.
Use Host BPM	When enabled, the plugin follows the host tempo and the Manual BPM section is inactive.
Manual BPM	Becomes available when host BPM is disabled and provides an independent tempo reference.
Copy Table	Copies the current reference table for use elsewhere.
Banner / Logo	Toggles between the rhythmic timing table and the Note Frequency Chart.

Frequency Fact

A4 is standardized here at 440 Hz. In equal temperament, each semitone multiplies frequency by the twelfth root of two.

Host BPM and Manual BPM

Use Host BPM

With **Use Host BPM** enabled, Cosmic Calculator follows the tempo reported by the DAW. If the project tempo changes, the displayed note durations and equivalent frequencies update to match.

This is the fastest workflow when matching delay times, modulation rates or sequencer values to an existing session.

Manual BPM

Disable **Use Host BPM** when you want to calculate from a tempo that is independent of the project. The Manual BPM control then becomes active.

HOST BPM IS USEFUL FOR

Delay matching, synchronized modulation, current-project documentation and live tempo changes.

MANUAL BPM IS USEFUL FOR

Planning another track, checking a reference tempo, calculating before opening a session, or comparing multiple BPM values.

Cosmic Fact

The Moon is roughly 1.28 light-seconds from Earth on average - far longer than ordinary musical echo times, but tiny on an astronomical scale.

Note Duration Table

NOTE VALUE	NORMAL	DOTTED	TRIPLET	
1/1 (1 Bar)	1090.91 ms / 0.92 Hz	1636.36 ms / 0.61 Hz	727.27 ms / 1.38 Hz	
1/2 (2 Beats)	545.45 ms / 1.83 Hz	818.18 ms / 1.22 Hz	363.64 ms / 2.75 Hz	
1/4 (1 Beat)	272.73 ms / 3.67 Hz	409.09 ms / 2.44 Hz	181.82 ms / 5.50 Hz	
1/8	136.36 ms / 7.33 Hz	204.55 ms / 4.89 Hz	90.91 ms / 11.00 Hz	
1/16	68.18 ms / 14.67 Hz	102.27 ms / 9.78 Hz	45.45 ms / 22.00 Hz	
1/32	34.09 ms / 29.33 Hz	51.14 ms / 19.56 Hz	22.73 ms / 44.00 Hz	
1/64	17.05 ms / 58.67 Hz	25.57 ms / 39.11 Hz	11.36 ms / 88.00 Hz	
1/128	8.52 ms / 117.33 Hz	12.78 ms / 78.22 Hz	5.68 ms / 176.00 Hz	
1/256	4.26 ms / 234.67 Hz	6.39 ms / 156.44 Hz	2.84 ms / 352.00 Hz	

Each row is a musical note value; each timing cell shows milliseconds followed by equivalent Hertz.

The left column identifies the musical duration: for example **1/1 (1 Bar)**, **1/2 (2 Beats)**, **1/4 (1 Beat)**, 1/8, 1/16 and progressively shorter divisions.

Normal

The straight rhythmic duration. At 220 BPM, a quarter note is 272.73 ms, equivalent to a 3.67 Hz repetition rate.

Dotted

A dotted value lasts one-and-a-half times as long as its normal equivalent. At 220 BPM, a dotted quarter is 409.09 ms.

Triplet

The triplet value is two-thirds the duration of its corresponding normal note. At 220 BPM, the quarter-note triplet is 181.82 ms.

Scroll the table to access additional shorter note divisions beyond those currently visible.

Timing Fact

Duration and frequency are reciprocal. A period of 100 ms repeats 10 times per second, so it corresponds to 10 Hz.

Timing Mathematics

Cosmic Calculator is designed so you do not have to do this arithmetic during a session, but the underlying relationships are useful to understand.

Quarter-note duration

$$\text{quarter note in milliseconds} = 60,000 / \text{BPM}$$

At 120 BPM: $60,000 / 120 = 500$ ms.

Frequency from duration

$$\text{frequency in Hz} = 1,000 / \text{duration in milliseconds}$$

A 250 ms event repeats four times per second, so its equivalent frequency is 4 Hz.

Dotted and triplet relationships

$$\begin{aligned} \text{dotted duration} &= \text{normal duration} \times 1.5 \\ \text{triplet duration} &= \text{normal duration} \times 2/3 \end{aligned}$$

Why Hertz is useful

Many audio parameters are expressed as rate rather than time. The Hertz column therefore makes it easy to set free-running LFOs, tremolos, autopanners, modulators and other periodic processors to a tempo-related rate even when the processor itself does not offer host synchronization.

Music Math

Every octave doubles frequency. A3 is 220 Hz, A4 is 440 Hz, A5 is 880 Hz, and so on.

Note Frequency Chart



Click the Cosmic Calculator banner/logo from the timing table to open this chart. Click it again to return.

The Note Frequency Chart lists chromatic pitch frequencies by octave. The current implementation uses the common reference of **A4 = 440 Hz**.

Concept	Meaning
Rows	Chromatic note names: C, C#, D, D#, E, F, F#, G, G#, A and the remaining notes further down the scrollable chart.
Columns	Octaves 0 through 8.
Cell values	Frequency in Hertz for the note at that octave.
A4	440 Hz reference pitch.

The chart is useful for tuning resonators, comb filters, band-pass peaks, oscillators, ring-modulator carriers, frequency shifters and any other processor where a meaningful musical frequency is easier to work with than a note name.

Frequency Relationships

Octaves

Moving up one octave doubles the frequency. Moving down one octave halves it.

A3 = 220 Hz
A4 = 440 Hz
A5 = 880 Hz

Equal Temperament

In twelve-tone equal temperament, the octave is divided into twelve equal logarithmic steps. Each semitone multiplies frequency by the same ratio.

$$\text{frequency} = 440 \times 2^{((\text{MIDI note} - 69) / 12)}$$

You do not need this equation to use the chart; it simply explains why the values do not increase by a fixed number of Hertz from one note to the next.

Practical Audio Use

COMB / RESONATOR

Choose a note frequency to reinforce a musically related resonance.

FILTER

Use the chart as a starting point for narrow resonant peaks or notches.

MODULATION

Audio-rate modulation frequencies can be aligned to exact pitches.

TEST TONES

Match generated sine waves or oscillators to known note pitches.

Workflow Tip

Copying the table is useful when documenting delay times, modulation rates, sequencer divisions or technical patch notes outside the plugin.

Copy Table and Workflow Uses

Copy Table is intended for moving the current reference data outside the plugin. This is particularly useful when documenting a patch or collecting timing values for multiple processors.

Useful destinations

- DAW track notes or project documentation
- Plugin development notes
- Delay and modulation reference sheets
- Preset documentation
- Spreadsheets and technical planning tables
- Support notes or manuals

Example workflow

1. Set or follow the target BPM.
2. Locate the required note division.
3. Choose Normal, Dotted or Triplet.
4. Use milliseconds for time parameters or Hertz for free-rate modulation.
5. Copy the table when you need to preserve the whole reference set.

Cosmic Fact

Light from the Sun takes about 8 minutes 20 seconds to reach Earth. At audio timescales, that is an extraordinarily long delay line.

Tips, Examples and Quick Reference

Goal	Cosmic Calculator workflow
Tempo-synced delay	Read the desired note value in milliseconds from Normal, Dotted or Triplet.
Free-running LFO	Read the corresponding Hertz value instead of milliseconds.
Triplet modulation	Use the Triplet column for the selected note division.
Dotted echo	Use the Dotted column; a dotted value is 1.5x the normal duration.
Tune a resonator	Open the Note Frequency Chart and choose the frequency of the desired pitch.
Compare project vs another tempo	Disable Use Host BPM and enter the alternate BPM manually.

Interface Shortcuts

- **Use Host BPM checked:** follow the DAW tempo.
- **Use Host BPM unchecked:** work from Manual BPM.
- **Click banner/logo:** switch between timing table and Note Frequency Chart.
- **Copy Table:** copy the currently displayed reference data.

Version

This manual documents the interface shown as **Cosmic Calculator v0.1.5**.

Timing Fact

At 120 BPM, one quarter note lasts exactly 500 ms. Doubling the BPM halves every note duration.