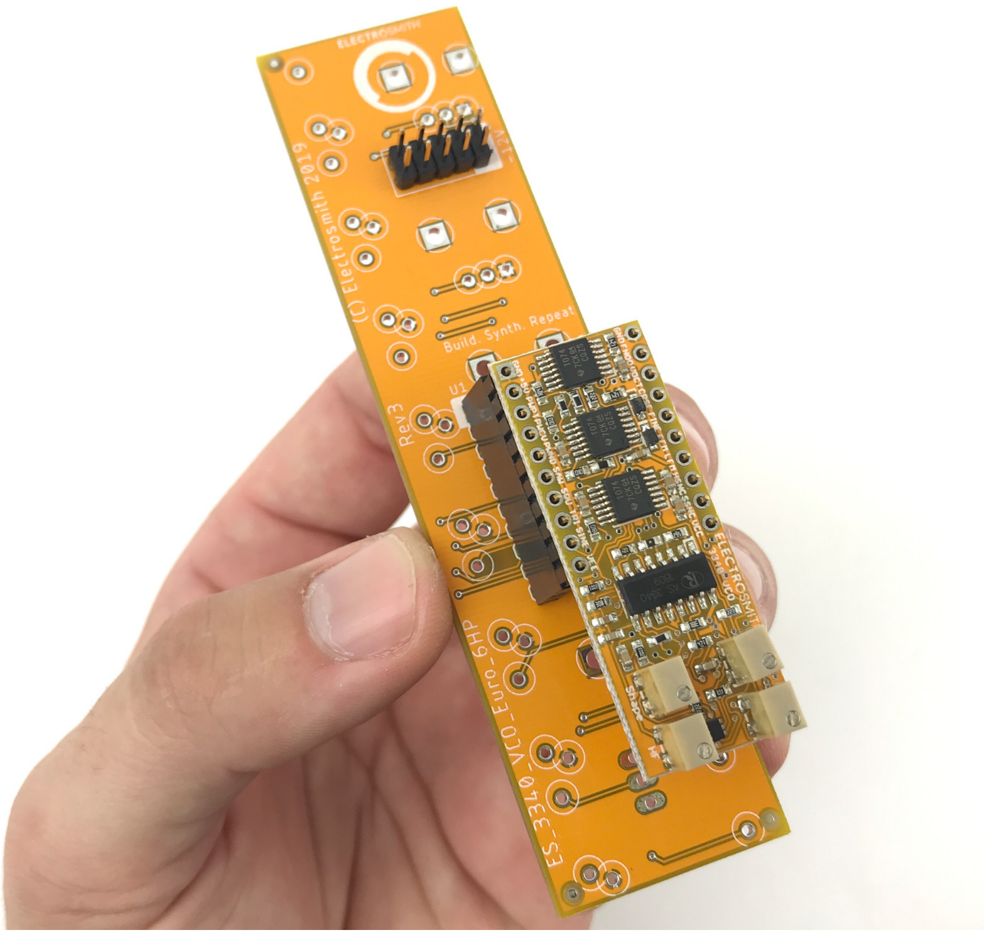
Electrosmith 3340 Submodule



Contents

ES 3340

Analog Voltage Controlled Oscillator

Electrical Characteristics

The board is designed for:

Parameter	min	typical	max
VCC	+10V	+12V	+18V
VEE	-4.5V	-12V	-18V
Frequency	45mHz (22.22 seconds)	N/A	100kHz
Duty Cycle	1%	N/A	98%
Coarse Freq Pot Input Range	0V	N/A	+12V
Fine Freq Pot Input Range	0V	N/A	+12V
V/Oct Input Range	-7.5V	N/A	+12V
PWM Pot Input Range	-12V	0 - 5 V	+12V
PWM CV Input Range	-12V	N/A	+12V
Soft Sync Trigger Input Amplitude	0.6V	N/A	N/A
Hard Sync Trigger Input Amplitude	3V	N/A	N/A

Pin Descriptions

1. GND

Ground Connection.

2. +5V Output

Regulated +5V output.

3. PWM Pot

Controls duty cycle of square wave output.

Connect wiper of a potentiometer to this connection.

Wire pot between GND and +5V.

4. PWM CV

Controls duty cycle of square wave output.

Adds to current pot position.

Expects a range of -12V to +12V.

5. PWM Node

Summing node connection for additional PWM controls.

Input Impedance for equivalent Pot/CV input connection: 100K.

6. Saw Output

Sawtooth waveform output.

9.6Vpp Amplitude.

7. Square Output

Square wave output.

10.4Vpp Amplitude.

8. Triangle Output

Triangle Wave Output.

9.6Vpp Amplitude.

9. Sine Output

Sine Wave Output.

11.7Vpp Amplitude.

Shape and Symmetry trimpots on submodule allow for fine tuning of waveform.

10. VEE

Negative Supply Input.

Designed for -12V.

Minimum: -4.5V

Maximum: -18V

11. VCC

Positive Supply Input.

Designed for +12V.

Minimum: +10V

Maximum: +18V

12. Soft Sync

Gate trigger input for soft sync.

Expects rising or falling edge of at least 0.6V amplitude.

Connect to leg of toggle to allow for selection between soft or hard sync.

13. Hard Sync

Gate trigger input for hard sync.

Expects falling edge of at least 3V amplitude.

Connect to leg of toggle to allow for selection between soft or hard sync.

14. Linear FM

Control input for Linear Frequency Modulation of output waveforms.

Expects a range of -10V to +10V.

If amplitude control over CV is desired:

Connect wiper of a potentiometer to this connection.

Wire pot between GND and Linear FM CV Input.

15. Exponential FM

Control input for Exponential Frequency Modulation of output waveforms.

Expects a range of -10V to +10V.

If amplitude control over CV is desired:

Connect wiper of a potentiometer to this connection.

Wire pot between GND and Linear FM CV Input.

16. Fine Frequency Pot

Controls the frequency of output waveforms more precisely.

Connect wiper of a potentiometer to this connection.

Wire pot between GND and +12V.

17. Coarse Frequency Pot

Controls the frequency of output waveforms with wider range.

Connect wiper of a potentiometer to this connection.

Wire pot between GND and +12V.

18. V/Oct

Control input for frequency of output waveforms.

Expects a range of -7.5V to +12V.

19. Frequency Node

Summing node connection for additional Frequency controls.

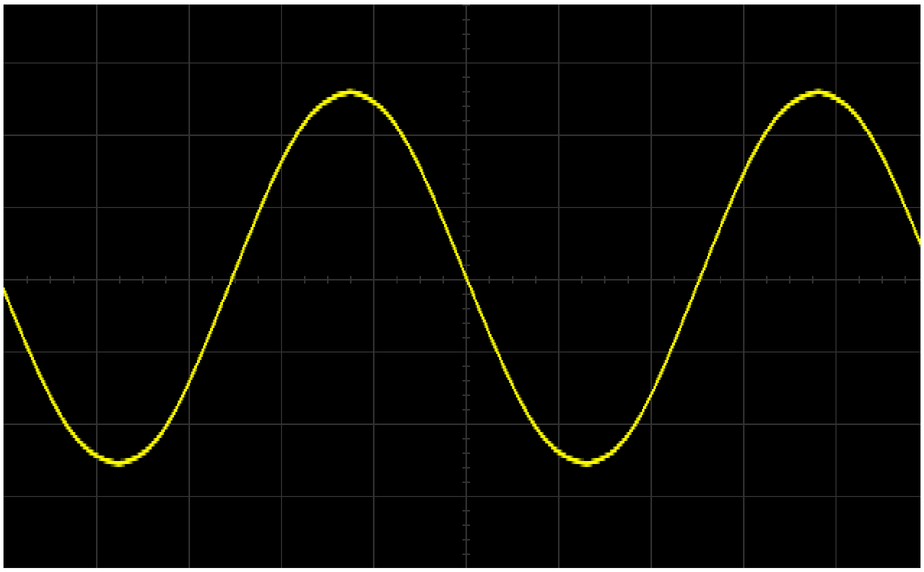
Input Impedance for equivalent Pot/CV input connection: 100K.

20. GND

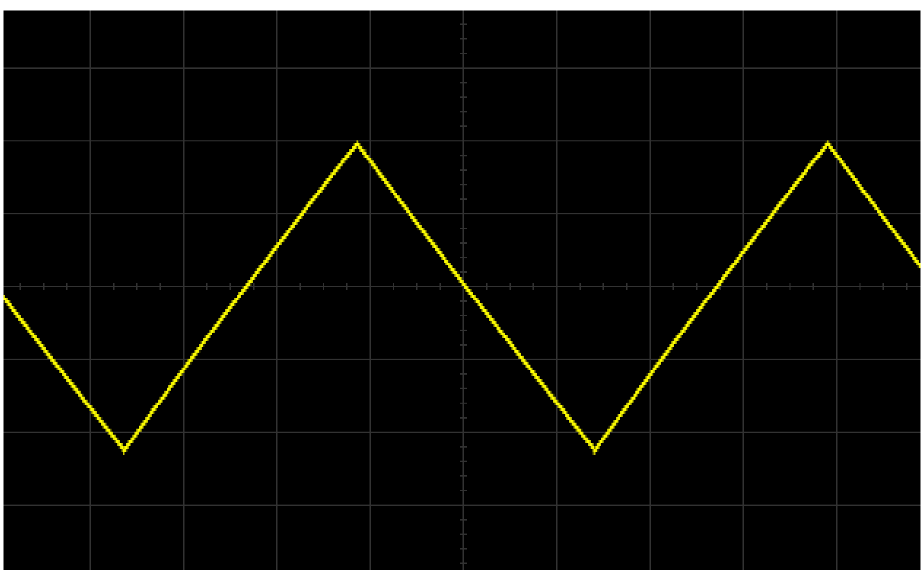
Ground Connection.

Example Waveforms

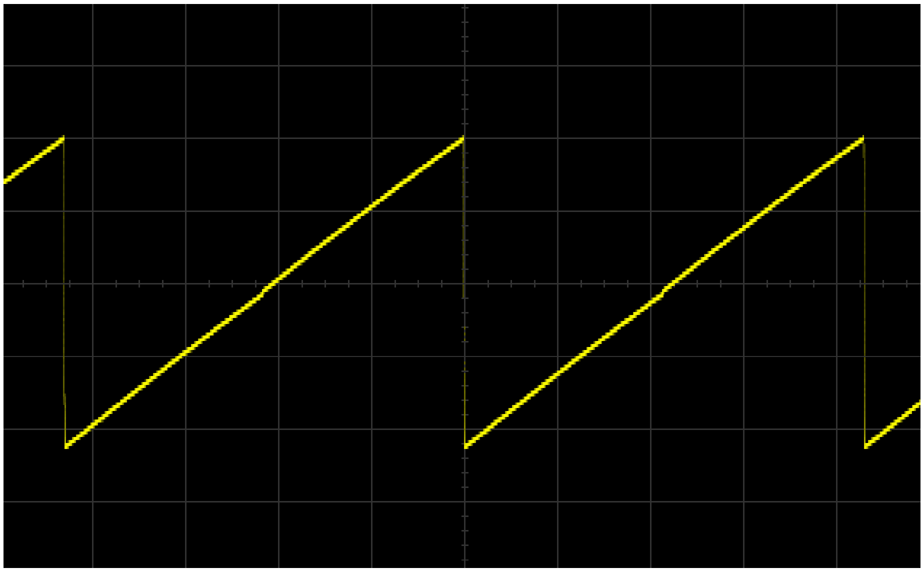
Sine



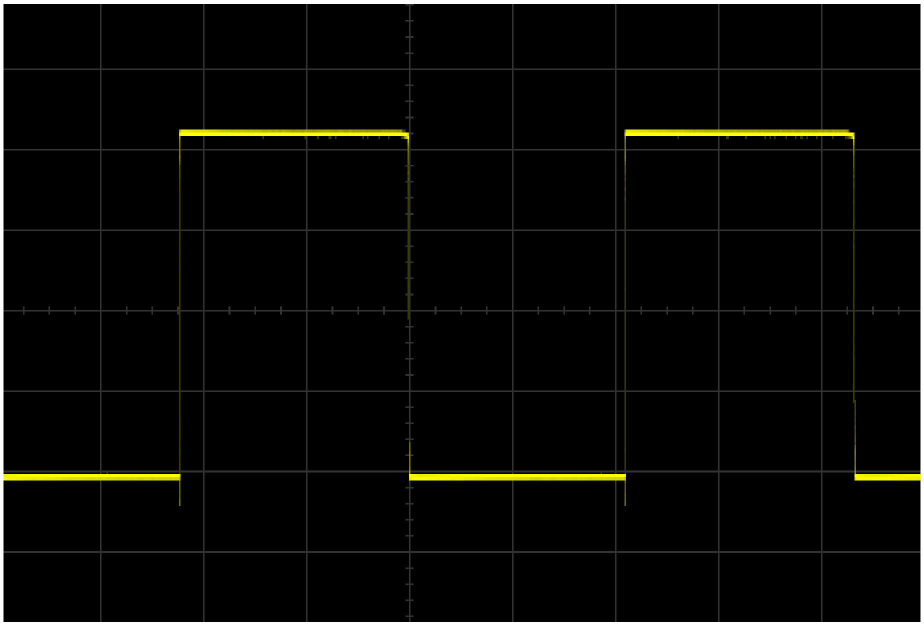
Triangle



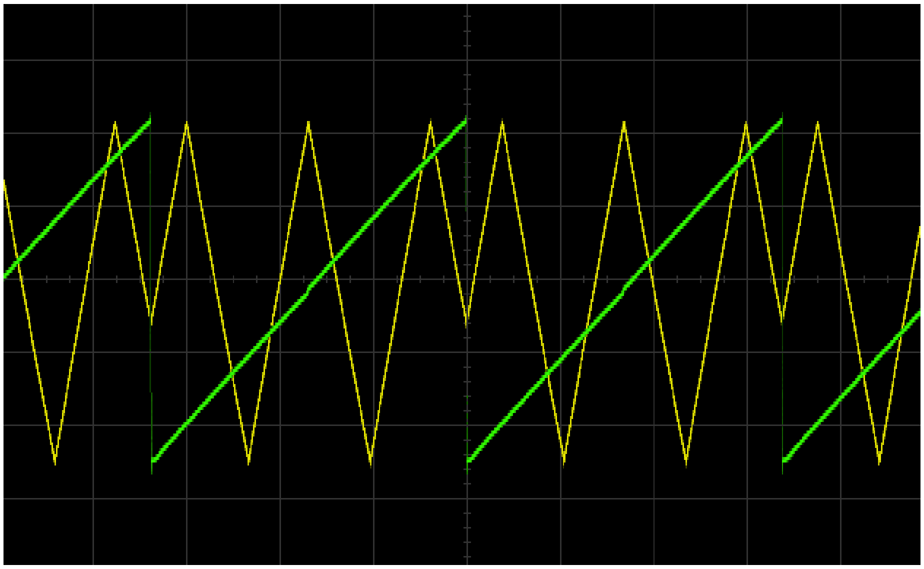
Saw

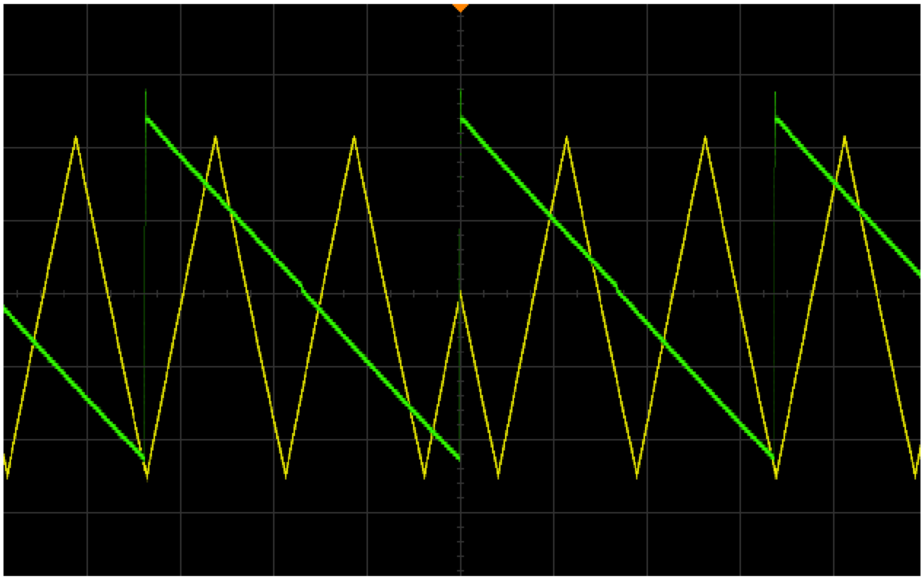


Square

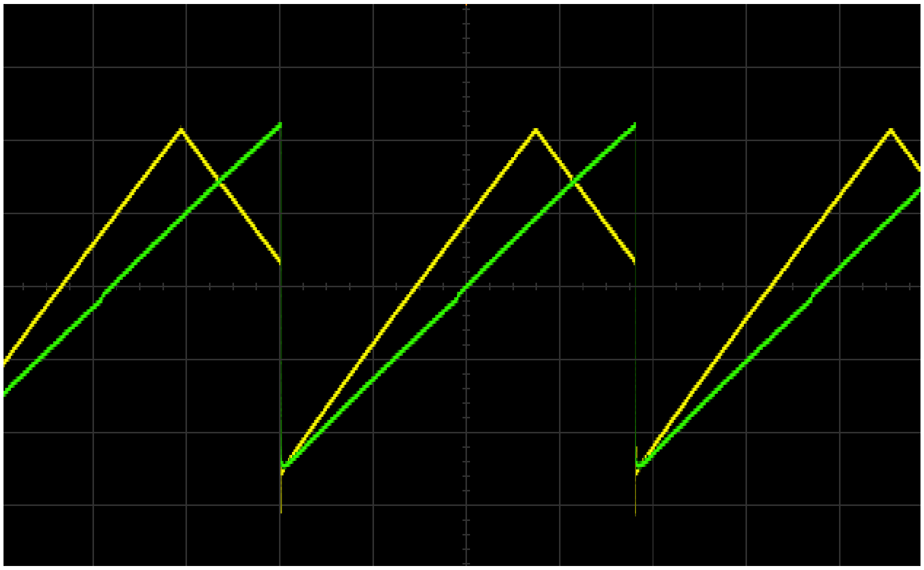


Soft Sync





Hard Sync



Calibration Procedure

V/OCT Trim

1. Tune to a fundamental frequency that can be easily verified several octaves up (e.g. 20Hz, 50Hz or 100 Hz). This can also be a musical note, if a chromatic or stroboscopic tuner is being used.
2. Apply 1V to V/oct pin
3. Adjust trimmer to 2x the initial frequency.
4. Apply 0V to V/oct pin
5. Readjust tuning to match initial frequency.
6. Repeat steps 1-5 until 1V is 2x the original frequency.
7. Repeat steps 1-6 for each subsequent octave until the first 6-8 octaves are calibrated, or until satisfied with the range that is calibrated.

HF Trim

This will only affect tracking at high frequencies where there can be a slight drop in current within the exponential generator inside of the 3340 IC.

1. Calibrate the V/oct trimmer first
2. Tune to a very high frequency (e.g. 4kHz, 8kHz)
3. Apply 1V to V/oct pin
4. adjust trimmer to fine tune the high frequency tracking
5. Apply 0V to V/oct pin
6. Retune the fundamental you started with.
7. Repeat 3-6 until that octave is calibrated
8. Repeat 3-7 for each successive Voltage/octave, and/or until satisfied.

Symmetry Trim

This adjusts the dc offset applied to the sine waveshaper.

Rotating the trimmer will push the waveform more toward the positive or negative rail.

Ideally you will rotate this until the curve on the top of the waveform looks the same as the curve on the bottom of the waveform.

If you do not have an oscilloscope to view the signal, you can compare the sound to a digital sine wave, and try to adjust these two trimmers to match that sound.

Shape Trim

This adjusts the overall amount of shaping being applied to the sine wave. This affects both the top and bottom of the waveform simultaneously.

At its extremes you will end up pointy like a triangle wave, or something flat like a square wave.

Ideally you will rotate this until the curve is sinusoidal. This can be hard to do with out a reference, but the goal is to have a nice rounded edge on either side of the waveform.

Example Schematic

Typical application for the ES 3340 submodule is for use within a Eurorack module. As can be seen in the reference Eurorack schematic above, standard 3.5mm jacks, 10K linear pots, and an ON-ON Toggle comprise the input and output interface. A 5X2 Eurorack power header is used in the reference schematic. Using a 5X2 power header, while standard among Eurorack designs, is not critical so long as the proper voltages, listed in the Electrical Characteristics section, are provided to the VCC and VEE pins. Thanks to the ES 3340's male header pins, the user can easily breadboard their design before moving on to a custom PCB.

The submodule is designed for Eurorack standard modular level outputs: approximately 10Vpp. However, it is certainly not limited to only Eurorack applications as the frequency output can exceed audible ranges and the output levels can be lowered to line level with the use of attenuators or output voltage dividers.

A PDF and Eagle files for the ES 3340 VCO can be found here: https://www.electro-smith.com/eurorack/3340-vco-assembledfull-diy-kit