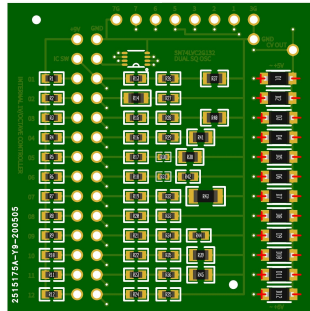


Twelvey, v.1



1V/Oct CV Unit

Overview

Twelvey provides a compact control voltage interface for one “octave” of musical notes.¹ Twelve voltage divider circuits send distinct voltages through a common output port.

Technical Details

This device contains twelve parallel voltage divider circuits, each providing between +5V and +6V of “control voltage” for a CV-based sound synthesizer. By adding “keys” (e.g., momentary button switches), this circuit will approximate the 1V/Oct implementation common on several analog synthesizer platforms, as follows:

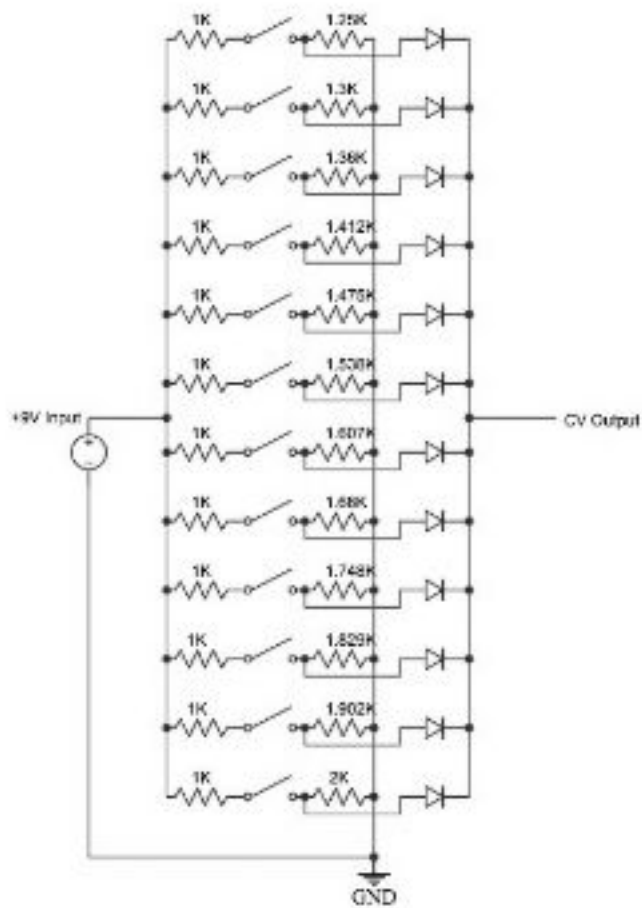
Keys	Input Voltage (V)	Output Voltage (V)
1	9	5.00
2	9	5.09
3	9	5.18
4	9	5.27
5	9	5.36
6	9	5.45
7	9	5.55
8	9	5.64

¹ Audio output may or may not equate to a true musical “octave;” this device can be connected to any number of possible synthesizers under any number of possible conditions. The output should, however, constitute twelve distinct voltages, increasing regularly from lowest to highest, which may approximate an octave-like scale.

9	9	5.73
10	9	5.82
11	9	5.91
12	9	6.00

Schematic

As shown below, this device requires a grounded +9V voltage source and an output port.



Schematic for DIYSJ0520-1 1V/Oct CV Unit

Components

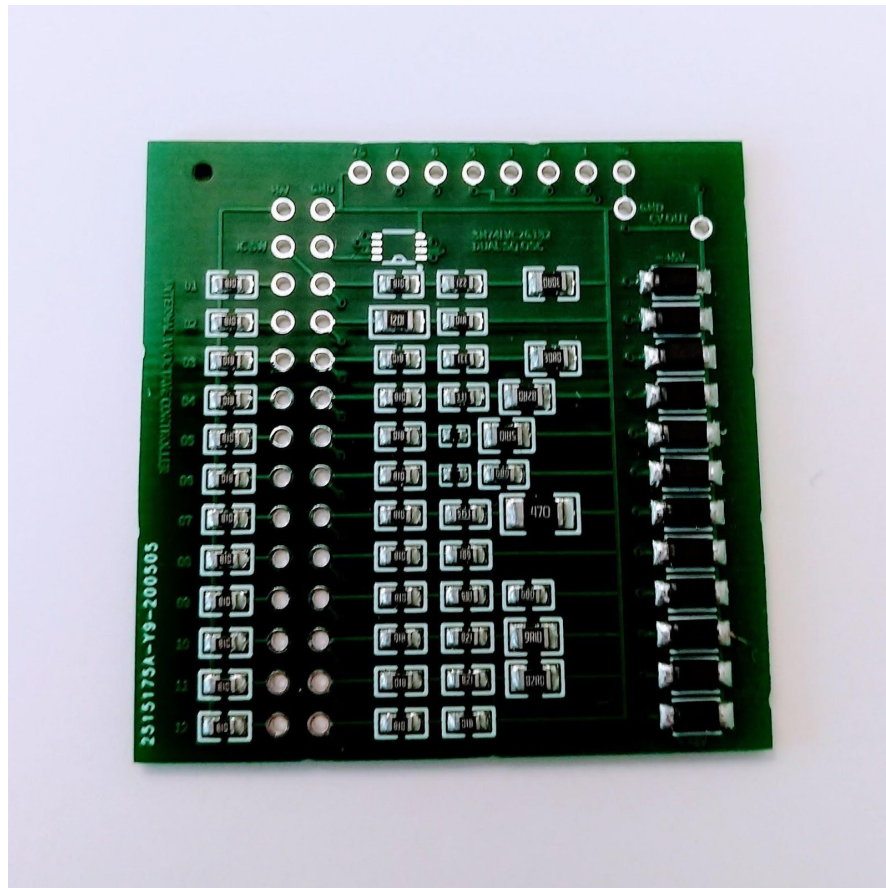
Twelvey includes the following surface-mount components:

Rating	Designator	Footprint	LCSC Part Number
40V 3A 550mV @ 3A Schottky Barrier Diodes	D1, D2, D3, D4, D5, D6, D7, D8, D9, D10, D11, D12	SOD-123FL	C142342
1KΩ Resistor	R1, R2, R3, R4, R5, R6, R7, R8, R9, R10, R11, R12, R13, R15, R16, R17, R18, R19, R20, R21, R22, R23, R24, R25	R0603	C118155
1.2KΩ Resistor	R14	R0805	C269531
220Ω Resistor	R26	R0603	C203410
1000Ω Resistor	R27	R0603	C269683
330Ω Resistor	R28, R29	R0603	C325681
470Ω Resistor	R30, R31	R0402	C325387
560Ω Resistor	R32	R0603	C325729
680Ω Resistor	R33, R34	R0603	C325626
820Ω Resistor	R35, R36	R0603	C325631
30Ω Resistor	R37, R40	R0805	C325808
5.1Ω Resistor	R38	R0805	C325852
9.1Ω Resistor	R39	R0805	C245438
82Ω Resistor	R41, R45	R0805	C325829
68Ω Resistor	R42, R44	R0603	C325751
47Ω Resistor	R43	R1206	C325924

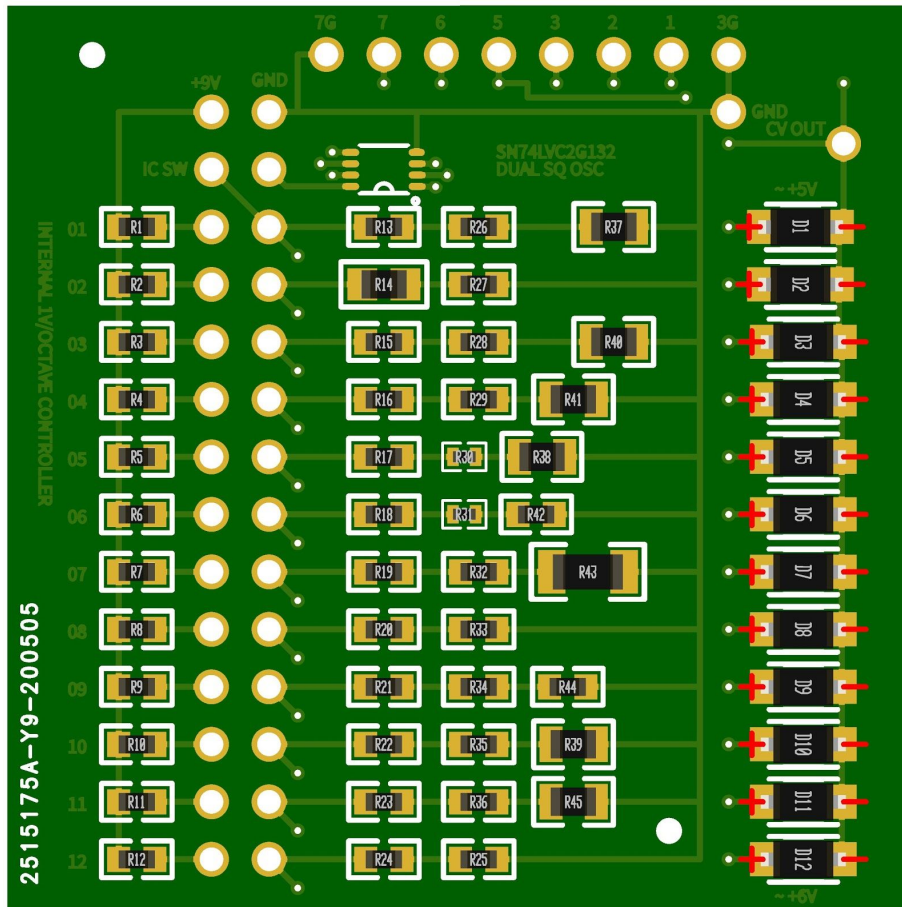
Arrangement

The table below illustrates how “R1” and “R2” of a common voltage divider circuit are achieved using practical hardware.

Keys	R1		R2 (series)									
	Part No.	Rating (Ω)	I/III			II/III			III/III			
			Part No.	Rating		Part No.	Rating		Part No.	Designator	Rating	
1	C118155	R1	1000	C118155	R13	1000	C203410	R26	220	C325808	R37	30
2	C118155	R2	1000	C269531	R14	1200	C269683	R27	100			0
3	C118155	R3	1000	C118155	R15	1000	C325681	R28	330	C325808	R40	30
4	C118155	R4	1000	C118155	R16	1000	C325681	R29	330	C325829	R41	82
5	C118155	R5	1000	C118155	R17	1000	C325387	R30	470	C325852	R38	5.1
6	C118155	R6	1000	C118155	R18	1000	C325387	R31	470	C325751	R42	68
7	C118155	R7	1000	C118155	R19	1000	C325729	R32	560	C325924	R43	47
8	C118155	R8	1000	C118155	R20	1000	C325626	R33	680			0
9	C118155	R9	1000	C118155	R21	1000	C325626	R34	680	C325751	R44	68
10	C118155	R10	1000	C118155	R22	1000	C325631	R35	820	C245438	R39	9.1
11	C118155	R11	1000	C118155	R23	1000	C325631	R36	820	C325829	R45	82
12	C118155	R12	1000	C118155	R24	1000	C118155	R25	1000			0



The fabrication image below illustrates the above arrangement as it appears on the device:



PCB for DIYSJ0520-1 1V/Oct CV Unit

Applications and Use

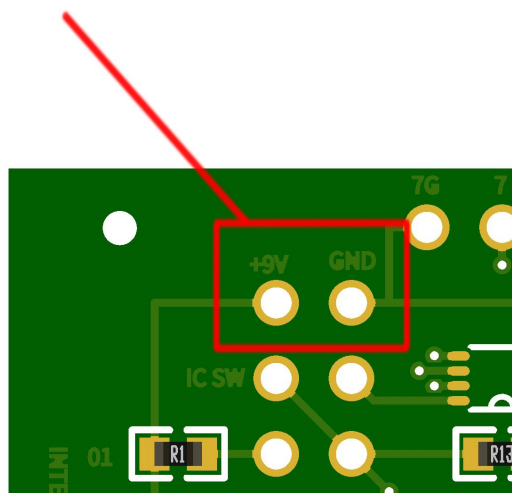
General Usage

To use this device as a CV controller, connect the following:

1. A power supply
2. Buttons or switches
3. An output jack

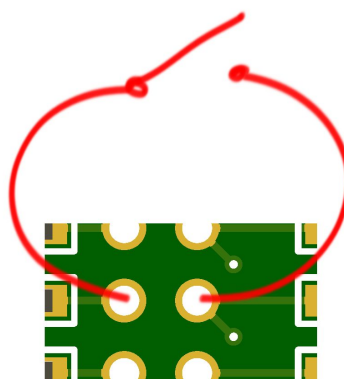
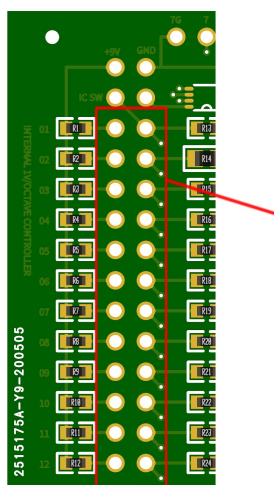
Connect a Power Supply

Connect +9V DC power source and ground in the upper left corner.



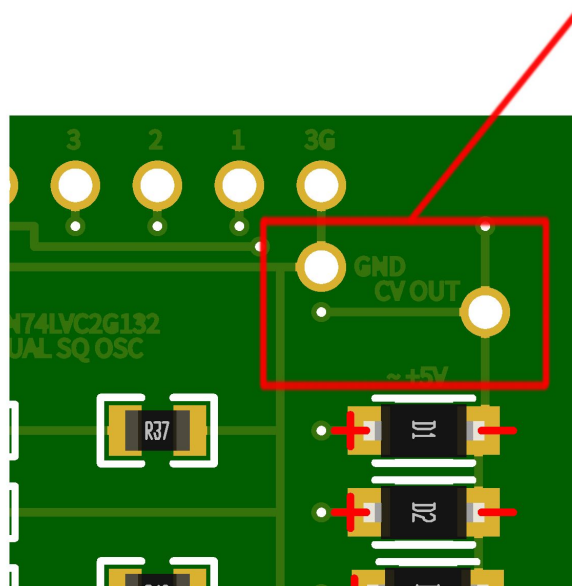
Connect Buttons or Switches

Connect up to twelve switches or buttons on these connection pairs:



Connect an Output Jack

Send output out through the port labeled, “CV OUT,” located in the upper right corner. If using something like an audio jack, there’s a handy ground connector nearby, too.



Note: Some ports (see *Additional Options*, below) are currently left unconnected during general use of this device.

Additional Options

This design features a space (currently unused) for a built-in dual oscillator based on Texas Instruments’ *Dual 2-Input NAND Gate With Schmitt-Trigger Inputs* ([SN74LVC2G132](https://www.ti.com/product/SN74LVC2G132)). Certain locations on the PCB (Ports 1-7, 3G, 7G, and IC SW) are designed to work with this planned feature.

Links

DIY Synth Junk: Main site: <https://www.diysynthjunk.dev/> | [Junklopedia](https://www.diysynthjunk.dev/)

EasyEDA project page: <https://easyeda.com/charlesherbertjerred/1v-oct-cv-unit>