

Visible Signals

## RGB Matrix – Direct In

DIY Video Synthesizer module for eurorack

Manual V0.3d



The RGB Matrix is an expandable three channel, dual-bus video-rate matrix mixer for colourising and mixing pattern and video sources in full colour RGB, allowing manipulations previously only possible through the combination of a large number of other separate modules. It also includes three-channel RGB crossfader/keying functionality, for complex image compositing and effects.

The RGB Matrix Direct In module takes three single video-rate CVs (one for each of the Red, Green and Blue output channels) and provides separate attenuation controls for each, along with a switch to send the signals to either or neither of the two output busses.

All Visible Signals manuals include a version number, which corresponds to the version number printed on the PCBs, plus a revision letter. Please make sure the manual you use has the same version number as your PCBs! Contact [info@visiblesignals.net](mailto:info@visiblesignals.net) if you can't find the right manual.

## Suggested Build Order

### RESISTORS

<u>Part</u>	<u>Value</u>	<u>Part</u>	<u>Value</u>
<input type="checkbox"/> R16	100K	<input type="checkbox"/> R9	1K
<input type="checkbox"/> R18	100K	<input type="checkbox"/> R11	1K
<input type="checkbox"/> R20	100K	<input type="checkbox"/> R12	1K
<input type="checkbox"/> R1	10K	<input type="checkbox"/> R13	1K
<input type="checkbox"/> R2	10K	<input type="checkbox"/> R17	<b>1M</b>
<input type="checkbox"/> R3	10K	<input type="checkbox"/> R14	499R
<input type="checkbox"/> R4	1K	<input type="checkbox"/> R15	499R
<input type="checkbox"/> R5	1K	<input type="checkbox"/> R19	499R
<input type="checkbox"/> R6	1K	<input type="checkbox"/> R10	75R
<input type="checkbox"/> R7	1K	<input type="checkbox"/> R21	75R
<input type="checkbox"/> R8	1K		

### SEMICONDUCTORS

<u>Part</u>	<u>Value</u>	<u>Part</u>	<u>Value</u>
<input type="checkbox"/> IC1	LM6172	<input type="checkbox"/> IC3	LM6172
<input type="checkbox"/> IC2	LM6172		

### MLCC CAPACITORS

*All unlabelled capacitors on the PCB silkscreen are 100nF MLCC types.*

<u>Part</u>	<u>Value</u>	<u>Part</u>	<u>Value</u>
<input type="checkbox"/> C3	100n	<input type="checkbox"/> C6	100n
<input type="checkbox"/> C4	100n	<input type="checkbox"/> C7	100n
<input type="checkbox"/> C5	100n	<input type="checkbox"/> C8	100n

### SOCKETS & POTS

*Make sure the sockets and pots fit properly into the front panel as you solder them.*

<u>Part</u>	<u>Value</u>	<u>Part</u>	<u>Value</u>
<input type="checkbox"/> BLUE	PJ302M	<input type="checkbox"/> VR1	10K
<input type="checkbox"/> GREEN	PJ302M	<input type="checkbox"/> VR2	10K
<input type="checkbox"/> RED	PJ302M	<input type="checkbox"/> VR3	10K

### SWITCH SHIM PCBs & PIN HEADERS

*Make sure the shim PCB has the **Bottom** side facing out, away from the switch, or else the DEST switch will work backwards! Solder the switch shim PCB to the main PCB first, then attach the switch to the panel, then put the socket and pot nuts on to hold the panel in place and finally solder the switch to the shim PCB.*

<u>Part</u>	<u>Value</u>	<u>Part</u>	<u>Value</u>
<input type="checkbox"/> PCB1	3PDT	<input type="checkbox"/> J1	J1

### ELECTROLYTIC CAPACITORS

*The long legs of C1 and C2 go in the hole marked '+'.*

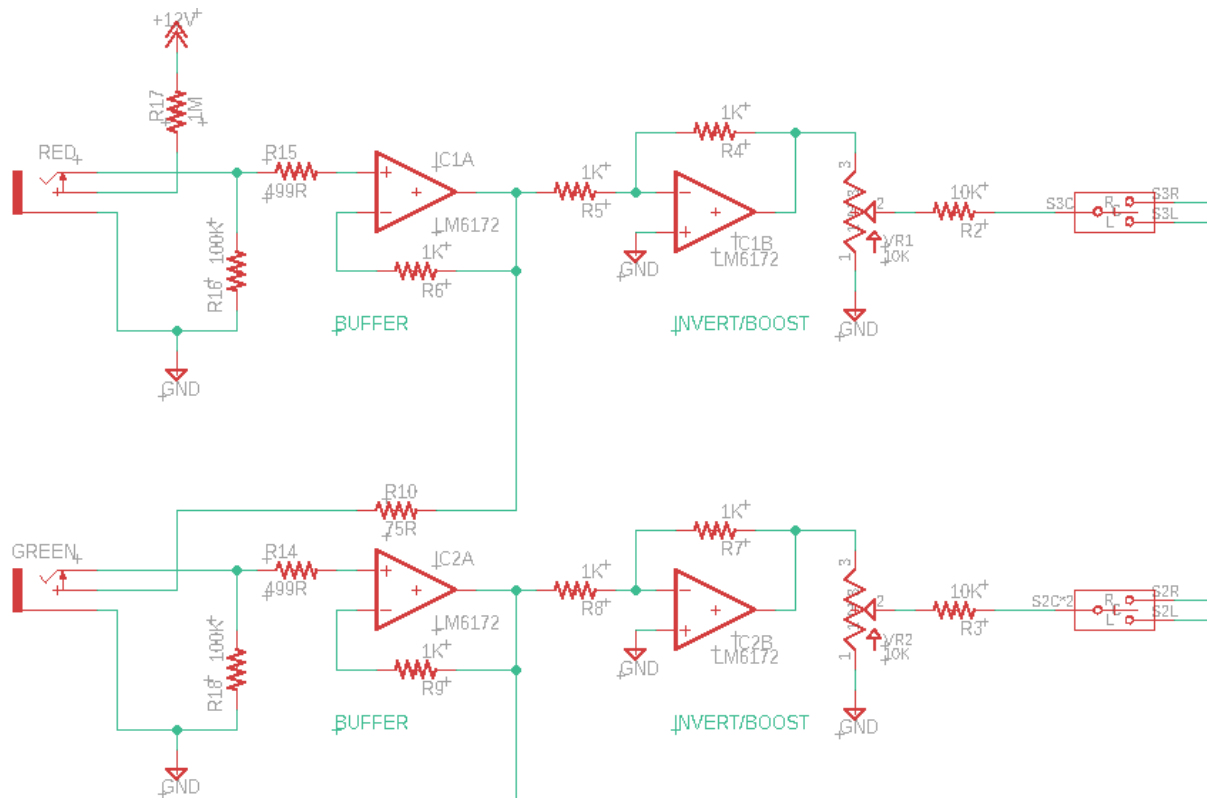
<u>Part</u>	<u>Value</u>	<u>Part</u>	<u>Value</u>
<input type="checkbox"/> C1	10uF	<input type="checkbox"/> C2	10uF

## Circuit Details

The RGB Matrix Direct In module consists of three similar circuits. First the input signals are buffered and inverted (since the interconnect bus expects an inverted signal for mixing). Each signal is then sent through a voltage dividing attenuation pot to a three-pole switch which connects the signals to either the A or B bus, or to neither to 'mute' it when centred.

The Red channel is normalised to a fixed voltage of roughly +1V (i.e. +12V from the power supply, minus the voltage drop across the 1N400x protection diode, divided by 11 which is the ratio of R16 to R16+R17). Note that since this voltage is not regulated there may be artefacts in the signal if the power supply isn't very clean.

The Green channel is normalised to the Red channel and the Blue channel to the Green channel, so each input chains into the next one below it if that one is left unconnected. The normalising cross-connections use 75-ohm resistors simply because they're small enough to minimise signal loss via the voltage divider R10/R18, not for any video impedance reason.



(the Blue channel is essentially the same as the Green channel)

## Bill of Materials

Parts marked with an asterisk are frequently used in Visible Signals modules, so consider stocking up if there's a quantity discount available.

<u>Type</u>	<u>Value/Description</u>	<u>Qty</u>	<u>Vendor</u>	<u>Part Number</u>	<u>*</u>	<u>Notes</u>
Resistor	100K	3	Mouser	603-MFR-25FBF52-100K	*	
Resistor	10K	3	Mouser	603-MFR-25FTF52-10K	*	
Resistor	1K	9	Mouser	603-MFR-25FBF52-1K	*	
Resistor	1M	1	Mouser	603-MFR-25FRE52-1M		
Resistor	499R	3	Mouser	603-MFR-25FBF52-499R	*	
Resistor	75R	2	Mouser	603-MFR-25FTE52-75R	*	
IC	LM6172	3	Mouser	926-LM6172IN/NOPB	*	
Capacitor	100n	6	Mouser	594-K104K15X7RF53K2	*	
Socket	PJ302M	3	Thonk	PJ302M	*	
PCB	RGB Matrix Direct In PCB set	1	Visible Signals	MM-DI		
Panel	RGB Matrix Direct In PCB set	1	Visible Signals	MM-DI		
Pin Header	Pin Header 2x7 right angle	1	Mouser	649-1012938291402BLF		Or get a 2x40 and snap off what you need
Electro Capacitor	10uF	2	Mouser	80-ESL106M050AC3AA	*	
Switch	3PDT (centre off) toggle	1	Mouser	108-0006-EVX or 7303SYZQE		
Potentiometer	10KB	3	Thonk	Alpha 9mm Right Angle	*	T18 or Round shaft to match knobs
Knobs	Red, Green and Blue	3	Thonk	Davies 1900H	*	T18 or Round shaft to match pots
IDC Connector	14 pin (2x7) 0.1"	1	Mouser	653-XG4M-1430		For the RGB Matrix bus ribbon cable