

Ring Mod 1U

Ring Modulator

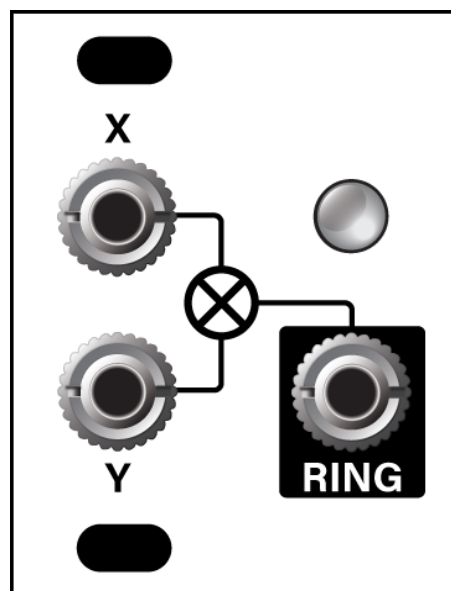


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COMPLIANCE



This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Changes or modifications not expressly approved by Intellijel Designs, Inc. could void the user's authority to operate the equipment.

Any digital equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications.



This device meets the requirements of the following standards and directives:

EMC: 2014/30/EU

EN55032:2015 ; EN55103-2:2009 (EN55024) ; EN61000-3-2 ; EN61000-3-3

Low Voltage: 2014/35/EU

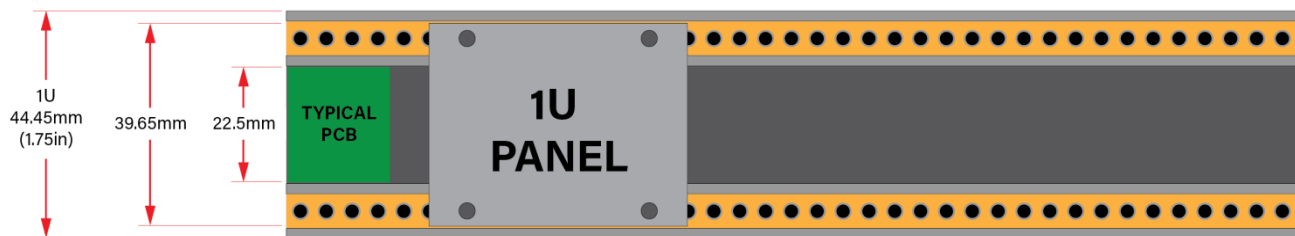
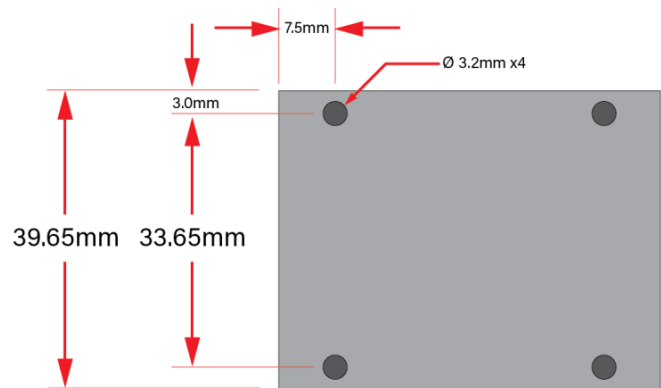
EN 60065:2002+A1:2006+A11:2008+A2:2010+A12:2011

RoHS2: 2011/65/EU

WEEE: 2012/19/EU

INSTALLATION

This module is designed for use within an Intellijel-standard 1U row, such as contained within the Intellijel Palette cases, or 7U Performance cases. Intellijel's 1U specification is derived from the Eurorack mechanical specification set by Doepfer that is designed to support the use of lipped rails within industry standard rack heights.



Before You Start

Before installing a new module in your case, you must ensure your power supply has a free power header and sufficient available capacity to power the module:

- Sum up the specified +12V current draw for all modules, including the new one. Do the same for the -12 V and +5V current draw. The current draw will be specified in the manufacturer's technical specifications for each module.
- Compare each of the sums to specifications for your case's power supply.
- Only proceed with installation if none of the values exceeds the power supply's specifications. Otherwise you must remove modules to free up capacity or upgrade your power supply.

You will also need to ensure your case has enough free space (hp) to fit the new module. To prevent screws or other debris from falling into the case and shorting any electrical contacts, do not leave gaps between adjacent modules, and cover all unused areas with blank panels. Similarly, do not use open frames or any other enclosure that exposes the backside of any module or the power distribution board.

You can use a tool like [ModularGrid](#) to assist in your planning. Failure to adequately power your modules may result in damage to your modules or power supply. If you are unsure, please [contact us](#) before proceeding.

Installing Your Module

When installing or removing a module from your case always turn off the power to the case and disconnect the power cable. Failure to do so may result in serious injury or equipment damage.

Ensure the 10-pin connector on the power cable is connected correctly to the module before proceeding. The red stripe on the cable must line up with the -12V pins on the module's power connector. Different modules use different ways to indicate the -12V pins. Some may be labeled with "-12V," a white stripe next to the -12V pins; the words "red stripe;" or some combination of these. Additionally, some modules may have shrouded headers, thus preventing backward connections.

Most modules will come with the cable already connected but it is good to double check the orientation. Be aware that some modules may have headers that serve other purposes so ensure the power cable is connected to the right one.

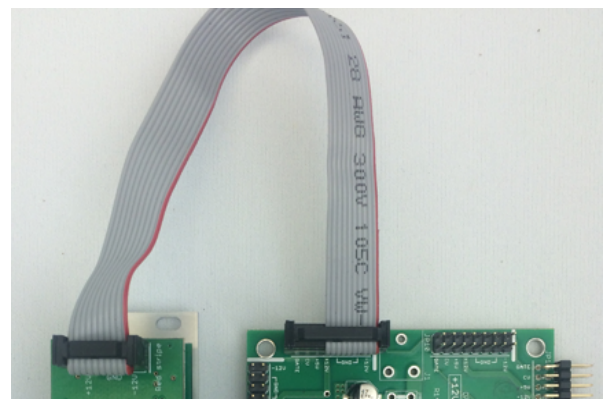
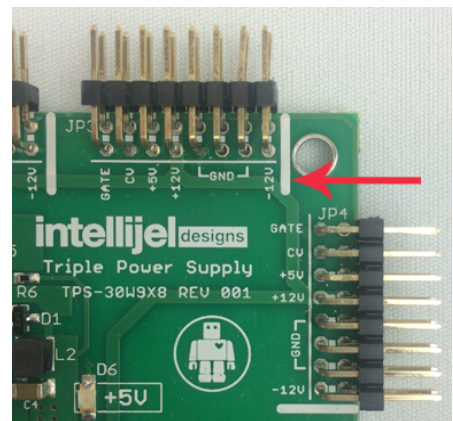
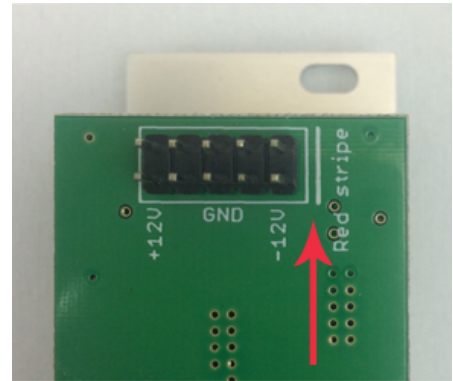
The other end of the cable, with a 16-pin connector, connects to the power bus board of your Eurorack case. Ensure the red stripe on the cable lines up with the -12V pins on the bus board. On Intellijel power supplies the pins are labeled with the label "-12V" and a thick white stripe.

If you are using another manufacturer's power supply, check their documentation for instructions.

Once connected, the cabling between the module and power supply should resemble the picture to the right:

Before reconnecting power and turning on your modular system, double check that the ribbon cable is fully seated on both ends and that all the pins are correctly aligned. If the pins are misaligned in any direction or the ribbon is backwards you can cause damage to your module, power supply, or other modules.

After you have confirmed all the connections, you can reconnect the power cable and turn on your modular system. You should immediately check that all your modules have powered on and are functioning correctly. If you notice any anomalies, turn your system off right away and check your cabling again for mistakes.



FRONT PANEL

Ring Modulation is a classic synthesis technique that takes two source waveforms and generates a third waveform, which contains the sum and difference frequencies of the two inputs.

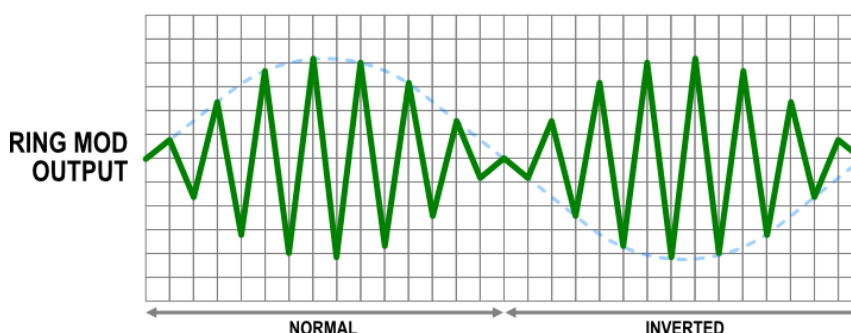
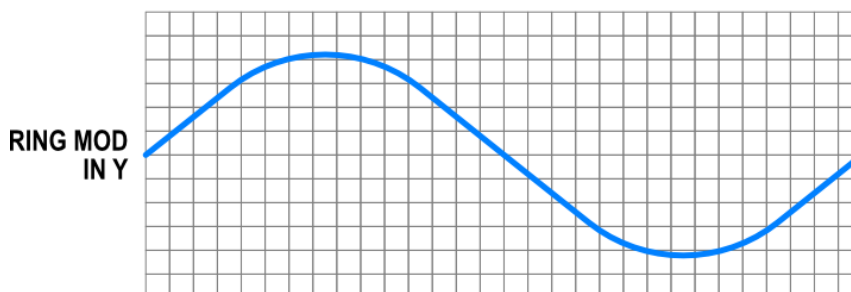
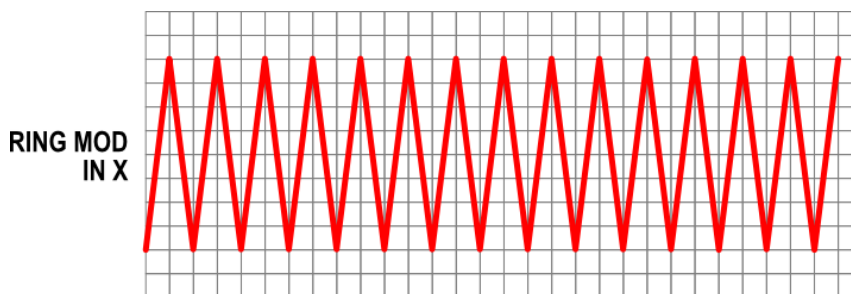
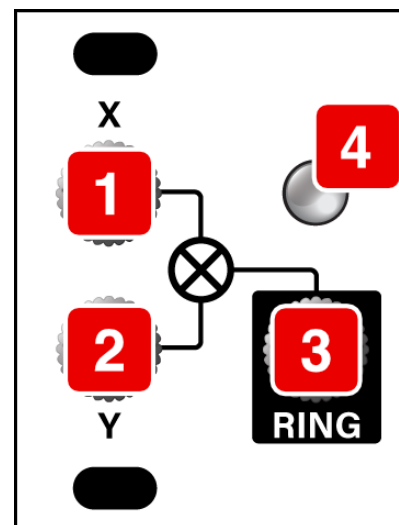
At audio rates, ring modulation creates a fairly inharmonic and 'metallic' sound. At LFO rates, ring modulation can generate interesting, complex modulation shapes.

[1] IN X - First of two Ring Modulator inputs. The input is DC coupled, so you can ring mod slower sources (like LFOs), as well as audio rate signals.

[2] IN Y - Second of two Ring Mod inputs. This, too, is DC coupled.

[3] RING OUT - Output of the Ring Modulator, which is a waveform containing only the sum and difference frequencies of the two input waveforms, as shown in the illustration to the right.

[4] OUTPUT LED - Color indicates the polarity (green = pos; red = neg) of the RING output, while intensity indicates amplitude. At audio rates, the cycle is too high to see the individual peaks and troughs (meaning it acts mostly as an output indicator). But at LFO rates, the LED provides a visual representation of the complex LFO shape being generated by the ring mod.



Using Ring Mod 1U as a VCA

Not every patch needs a ring mod, but most patches could benefit from another VCA. For this reason, Ring Mod 1U can be pressed into service as a simple VCA when not performing ring modulation duties.

1. Connect your audio signal to **IN Y [2]**.
2. Connect your modulation source (such as the output of an envelope or LFO) to **IN X [1]**.
3. Connect the **RING OUT [3]** jack to your audio mixer.

The CV signal patched into **IN X** controls the volume of the signal patched into **IN Y** — the output of which appears at the **RING OUT** jack.

Calibrating the Ring Mod 1U

Ring Mod 1U is calibrated at the factory before shipping, so it's unlikely you'll ever need to perform this procedure. However, if necessary, you can easily do it using only an oscillator (capable of generating a simple, static waveform like a square wave) and an oscilloscope.

Here is the process:

1. Connect the output of an oscillator to **IN X [1]**. Square waves of approximately 1kHz work best.
You should also patch the oscillator through an oscilloscope in order to see the waveform that you're sending into the Ring Mod 1U.
2. Patch the **RINGMOD OUT [3]** jack into an oscilloscope so you can also view the output waveform.
3. While monitoring the output on the oscilloscope, turn the trimmer on the back panel of the Ring Mod 1U.

Ideally, the output should be as close to a flat line at 0V as possible. There may be some transient spikes at the square wave crossing points, but the goal is to get as close as possible to having no up/down stepping of the output voltage.

TECHNICAL SPECIFICATIONS

Width	6 hp
Maximum Depth	32 mm
Current Draw	25 mA @ +12 V 20 mA @ -12 V