Creltek Limit Sensor 343RT v1.0 Recommended Operating Parameters

Parameter	Min.	Typ.	Max.	Unit
Supply Voltage VCC	3.0	3.3	5	V
Supply Current @ 5V		16	30	mA
Supply Current @ 3.3V		8	20	mA
Output Current Source Capability	1.3	1.5	2.2	mA
Output Current Sink Capability	7.0	11.5	12.2	mA
Output Voltage (Released)	VCC-0.7	VCC	VCC+0.7	V
Output Voltage (Triggered)	-0.7	0.0	0.5	V
Output Rise Time		1.5		μs
Output Fall Time		1.5		μs
Operating Temperature	-40		100	ºC
Magnetic Field (Trigger)	45	135	205	Gauss
Magnetic Field (Release)	40	85	180	Gauss
Magnetic Field Hysteresis	5	50	120	Gauss

WIRING:

Please note that the wiring pinout is printed on the limit sensor PCB. With the contacts along the bottom, from left to right, they are Ground (GND), Positive Supply (VCC), Output (Out), and Ground (GND). The pads are designed for surface-soldering to flat RJ11 telephone cord which has been stripped approx 0.1 inches and tinned. I recommend that you use a generous amount of rosin-based flux when soldering. The flux can be removed afterward with a soft toothbrush and isopropyl (rubbing) alcohol.

If you use RJ11 telephone cord, which is usually color coded, I recommend orienting it to the following:

BLACK - GND
RED - VCC
GREEN - Output
YELLOW - GND

When connecting the RJ11 cord to the RJ11 Breakout Board, make *SURE* that the RJ11 plugs are crimped on with BLACK in PIN 1 position and YELLOW in PIN 4 position. The is looking at the top of the plug, with the cord going toward your body. See the Creltek RJ11 Sensor Breakout Board Drawing for more details.

POWER:

The switches are designed for 3.3V power, but should work up to 5V. If you need to use a higher voltage, the resistor in the lower-left hand corner should be replaced with a larger value to limit current to the LED. For the ground connection, either one or both of the ground pads can be connected.

OUTPUT:

These switches have an “active low” output, which pulls an external voltage to Ground (GND) when the switch is triggered, and float high to the positive supply voltage (VCC), when released. The maximum recommended load is 10 mA. If you need to switch a larger load, please use an appropriate buffer stage or contact me for assistance. Most inputs to motion control systems will only present a few mA of load, so it should not be a problem.

MAGNETIC CHARACTERISTICS:

These sensors are unipolar hall-effect magnetic sensors, which means they respond to a single magnetic pole only. These switches respond to the proximity of the North (N) pole of a suitable magnet or electromagnet. The sensitivity is 135 Gauss nominal. In everyday terms, this means that a typical N45 Neodymium magnet should be able to trigger the sensor within a range of 1-10 mm, depending on the size and orientation of the magnet. I recommend experimenting with the placement of both the sensor(s) and the magnet(s) to determine the best locations and orientations before permanently mounting either.

Very precise position sensing can be achieved by passing the *edge* of a flat magnet across the sensor. If the face approaching the sensor is the South (S) pole of the magnet, the sensor will not be triggered by mere proximity. As the magnet *passes* the sensor, the North (N) pole face will be exposed to the hall-effect component and the sensor will be triggered in a very short range of motion. The narrowness of this range is proportional to the distance of the edge of the magnet from the surface of the sensor. Component U1 is the active sensing element on the board.

MOUNTING:

The sensor boards provide a mounting hole suitable for an M3 screw. When screwing into aluminum or other metals, I strongly recommend drilling and tapping the hole with the appropriately sized tap beforehand. There are no electrically active components or traces on the back side of the sensor board, which means the back side of the board can be mounted flat against any metal surface.

Magnets can be mounted against ferrous metals by normal magnetic attraction, and permanently fixed in place with a drop of cyanoacrylate glue (super glue) allowed to

seep in between the magnet and the metal surface. Magnets can be attached to most other surfaces with an epoxy putty such as “Quick Steel”, available at most hardware and automotive parts stores.

ENVIRONMENTAL PROTECTION:

The surface-mount components on the limit sensor boards can be easily and inexpensively protected from environmental contaminants such as dust and small metal particles which may be encountered in a milling or machining environment. I recommend covering the components with a thin (~1mm) layer of hot glue (a.k.a. hot melt). It is relatively inert and clear enough to see the LEDs through, and the application temperatures involved will not damage the board or components. If you desire to remove the protective layer of hot glue in the future for some reason, it can be peeled of fairly easily if you apply, with a Q-tip, a small amount of isopropyl (rubbing) alcohol to the edge where you start peeling, and continue to apply underneath the peeled layer. This facilities the release of the hot glue adhesive and will not damage the components or board.