

## USB Type-C Protector for CC Pins

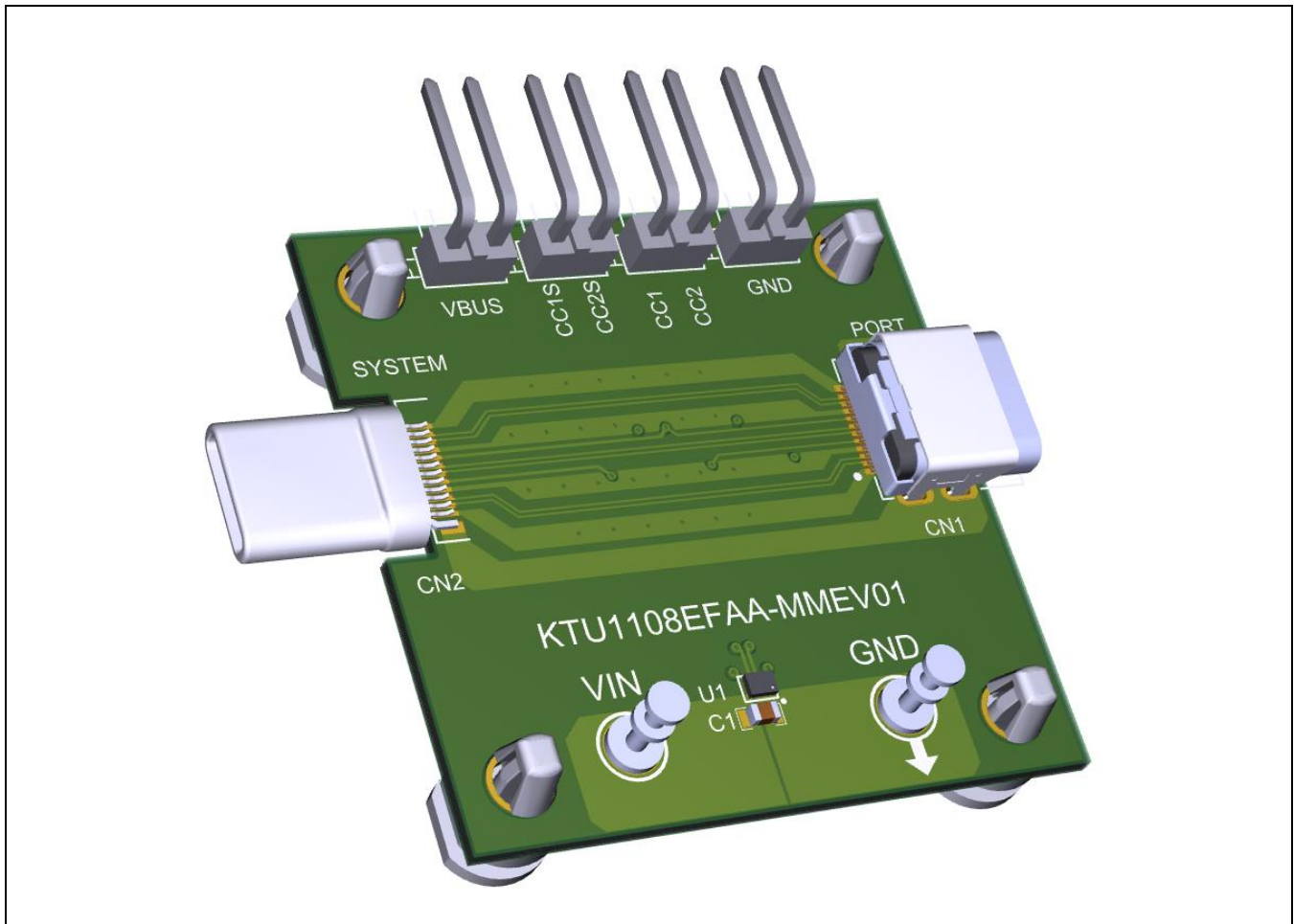
### Brief Description

The KTU1108 Evaluation (EVAL) Kit is used to demonstrate and evaluate the KTU1108 USB Type-C CC pin protection switch functionality, performance, and PCB layout. The kit includes a fully assembled and tested PCB with the KTU1108 IC installed and a printed copy of the Quick Start Guide (also contained within this document).

### Ordering Information

Part Number	Description	IC Package
KTU1108EFAA-MMEV01	KTU1108 EVAL Kit	WLCSP34-12



### 3D CAD Image



### EVAL Kit Physical Contents

Item #	Description	Quantity
1	KTU1108 EVAL fully assembled PCB	1
3	Anti-static bag	1
4	Quick Start Guide, printed 1 page (A4 or US Letter)	1
5	EVAL Kit box	1

### QR Links for Documents

IC Datasheet	EVAL Kit Landing Page
 <a href="https://www.kinet-ic.com/KTU1108/">https://www.kinet-ic.com/KTU1108/</a>	 <a href="https://www.kinet-ic.com/ktu1108efaa-mmev01/">https://www.kinet-ic.com/ktu1108efaa-mmev01/</a>

### User-Supplied Equipment

#### Required Equipment

1. Bench Power Supplies for VIN and VCC1/2, 0 to 5.0V variable with a 1A or more capability, as needed for the intended application.
2. Digital Multimeters – one or more, used to measure input/output voltages and currents.

#### Optional Equipment

1. Waveform signal generator to create simulated pulse for OVP shutdown timing experiments or CC data line signal source.
2. Oscilloscope – To observe CC1/CC2 and CC1S/CC2S signals.

### Recommended Operating Conditions

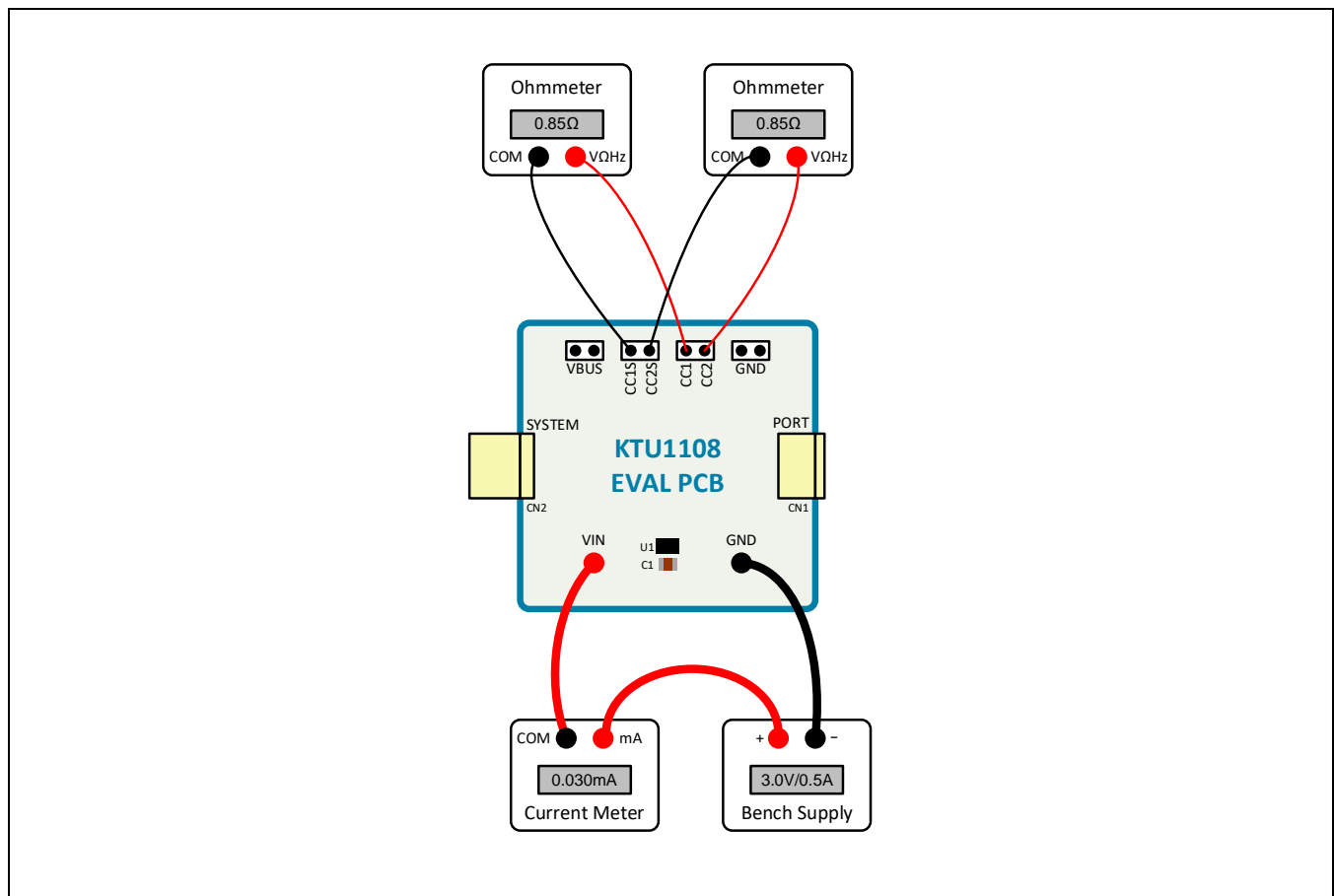
Symbol	Description	Value	Units
V <sub>CC</sub>	Input Operating Voltage	2.5 to 5.5	V
V <sub>CC1/2</sub>	CC1/2 Switch Operating Voltage	-0.3 to 5.5	V
V <sub>IO</sub>	Output Withstand Voltage	-0.3 to 24	V
V <sub>CC1/2S_MAX</sub>	OVP Rising Maximum System Voltage	5.9	V

### Quick Start Procedures

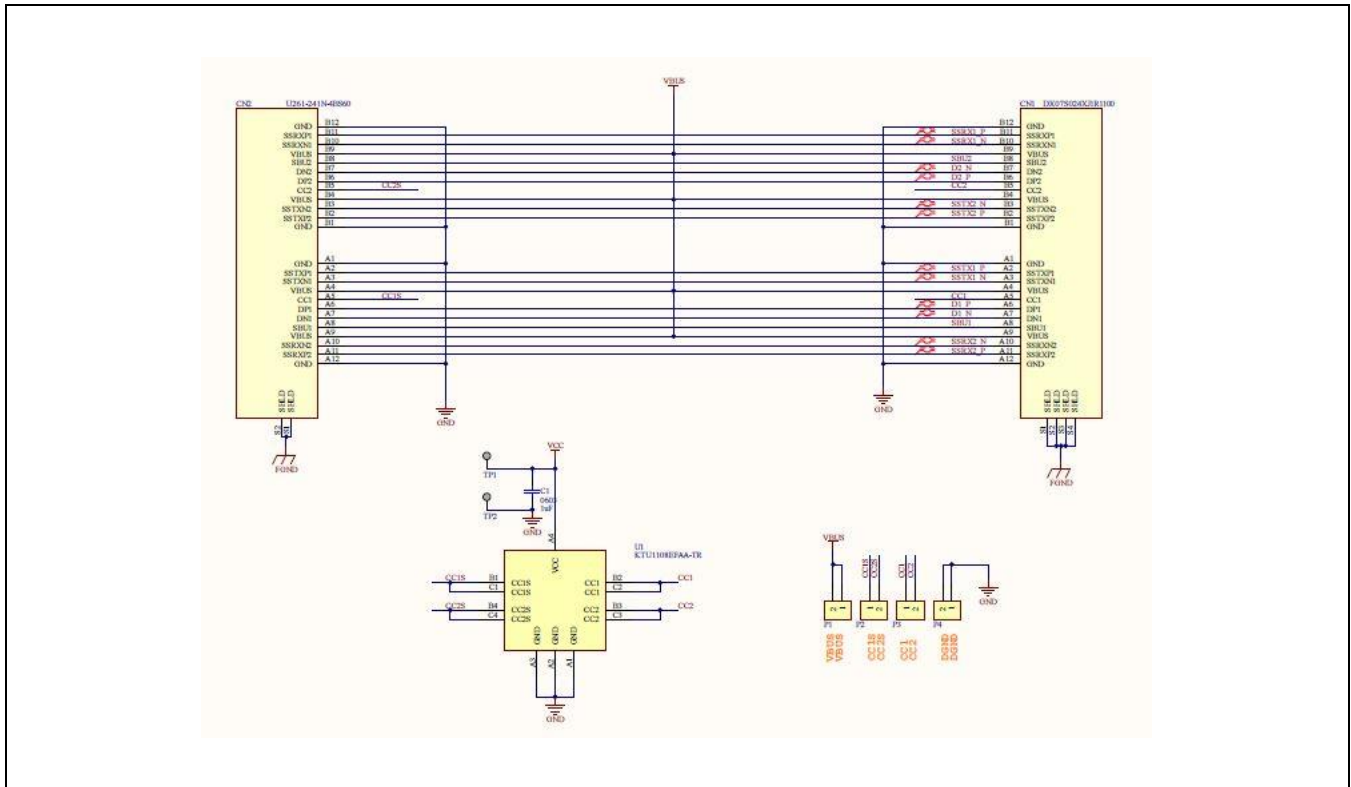
1. Before connecting the EVAL Kit board to the VIN bench supply, turn on the supply and adjust the voltage as close to 0V as possible. Then turn off or disable the supply output. While off, connect power supply test leads to the power supply output.
2. Connect the power supply positive test lead to the eval board VIN terminal and the negative or ground lead to the GND terminal.
3. Turn on the VIN bench supply and very slowly ramp the output voltage to an appropriate level for the intended system, typically between 3.0V and 5.0V. While ramping VIN slowly, use the bench supply's output current indication (or a digital multimeter) to monitor the VIN current. If the current becomes high, reduce the VIN voltage quickly to prevent damage, then inspect the setup for any wiring errors.
4. With a valid VIN voltage to enable the KTU1108 IC, use a digital multimeter to check the resistance between the CC1 to CC1S pins or the CC2 to CC2S pins. When powered, the resistance from CC1 to CC1S or CC2 to CC2S should be less than 1Ω.
5. With the VIN power supply disabled or turned off, the CC switches should be open or high impedance. Measured resistance between CC1 to CC1S or CC2 to CC2S should be greater than 1MΩ.

### Typical Test Setup Diagram

As an example, use the following test setup to measure items 4 and 5 in the Quick Start Procedures.



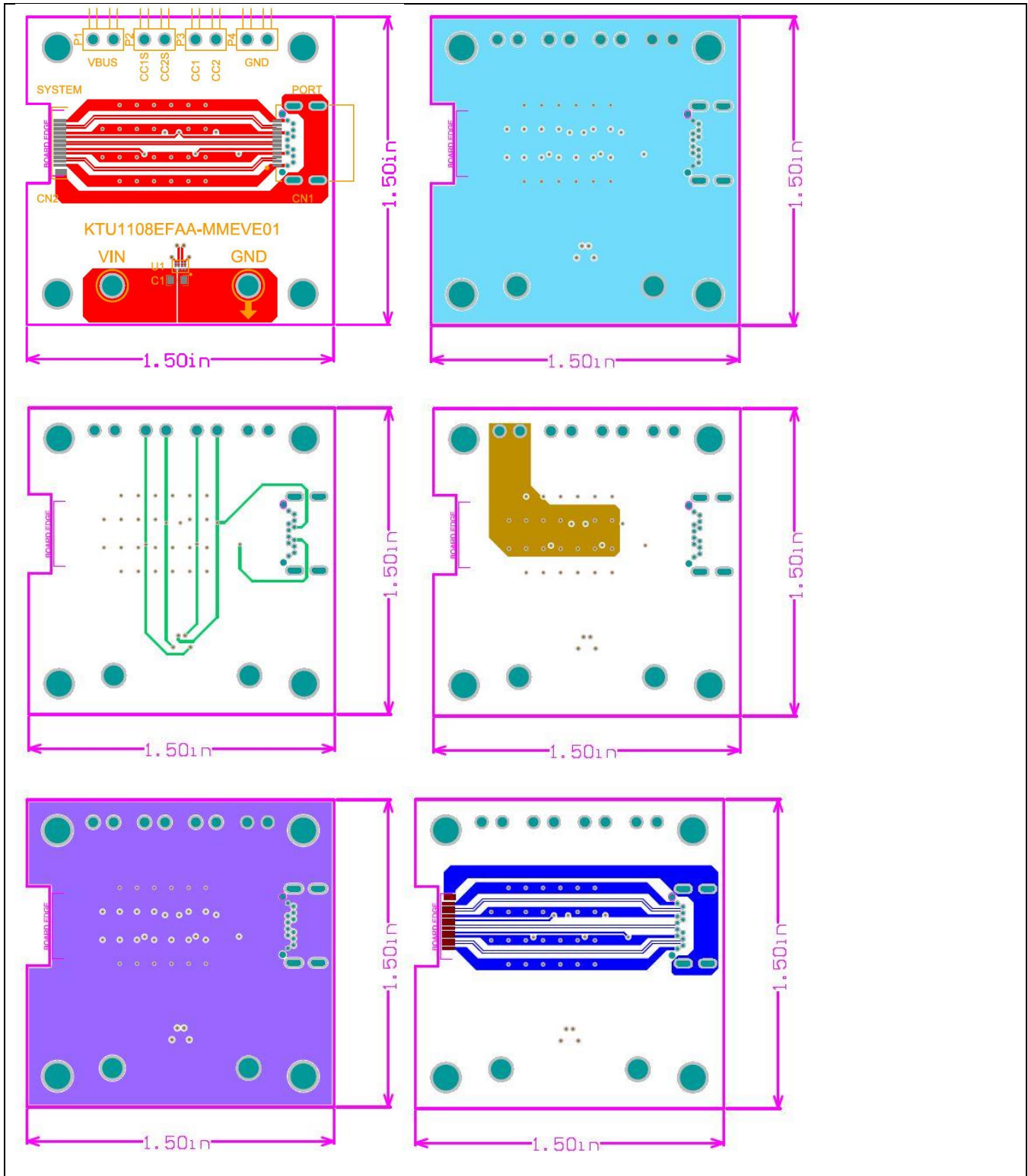
### Electrical Schematic



### Bill of Materials (BOM)

Item #	Designator	Description	Value	Package	Manufacturer	Manufacturer Part Number	Digikey Part Number	Mouser Part Number
1	C1	CAP 1.0uF 16V X5R 0603	1uF	603	Samsung	CL10A105KO8NNNC	1276-1034-1-ND	187-CL10A105KO8NNNC
2	CN1	CONN RCP USB3.1 TYPEC 24P SMD RA			JA Electronics	DX07S024X1R1100	670-2848-1-ND	656-DX07S024S1R1100
3	CN2	5A USB 3.1 1 260°C Board Edge, Straddle Mount 24 Male - 40°C~+85°C Gold Copper Alloy Type-C SMD USB Connectors ROHS			XKB Connectivity	U261-241N-4BS60		
4	H1, H2, H3, H4	BRD SPT SNAP LOCK REST MNT 4MM			Essentra Components	PSD-4M-19	PSD-4M-19-ND	144-PSD-4M-19
5	P1, P2, P3, P4	CONN HEADER R/A 2POS 2.54MM		TH	Molex	22122021	23-0022122021-ND	NA
6	TP1, TP2	TERM TURRET SINGLE L=5.56MM TIN		TH	Keystone	1502-2	36-1502-2-ND	534-1502-2
7	U1	USB Type-C Protector for CC Pins		WLCSP34-12	Kinetic Technologies	KTU1108EFAA-TR		389-KTU1108EFAA-TR

### Printed Circuit Board (PCB)



## Additional Test Procedures

1. CC Switch Turn on time:
  - a. The KTU1108 CC switch turn on time requires two power supplies and the use of a 2-Channel oscilloscope.
  - b. Set one bench power supply to the desired VIN level between 3.0V and 5.0V (typical), then disable the supply output. Connected the bench power supply positive test lead to VIN and the negative test lead to GND.
  - c. Set a second bench power supply to output any desired voltage level greater than 0V, but less than or equal to 5.0V to simulate the CC line logic high voltage level. Disable the supply and connect the positive test lead to either the CC1 or CC2 terminal on the EVB and the negative test lead to GND.
  - d. Connect Channel 1 of the oscilloscope to the VIN terminal to trigger on the applied input power event. Connect Channel 2 to the respective CC1S to CC2S terminal for the switch under test.
  - e. Enable the supply to CC1/CC2, then enable the supply to VIN
  - f. Observe the turn-on switch waveform on the oscilloscope to measure the CC switch turn-on time vs the VIN supply turn-on event.
2. CC Switch OVP Response
  - a. The KTU1108 CC switch OVP response time and threshold may be observed using an oscilloscope and power supply or pulse generator applied to the CC1 or CC2 input.
  - b. Set one bench power supply to the desired VIN level between 3.0V and 5.0V (typical), then disable the supply output. Connected the bench power supply positive test lead to VIN and the negative test lead to GND.
  - c. Use a pulse generator or bench power supply to provide simulated CC line voltage to the CC1 or CC2 input. If using a bench power supply, set an initial output level to apply to the CC pin in the range of 0.5V. If using a pulse generator, set a pulse for 0.5V amplitude with an on-time greater than 10 $\mu$ s.
  - d. Connect an oscilloscope channel 1 to the respective CC1 or CC2 input under test. Connect Channel 2 to the respective CC1S or CC2S switch output.
  - e. Enable the KTU1108 CC switches by turning on the VIN supply.
  - f. Slowly increase the applied CC input signal amplitude and observe the CC1S/CC2S voltage level tracking CC1/2 input level. The KTU1108 typical OVP threshold is 5.9V, when the applied input signal amplitude meets or exceeds the switch OVP threshold, the CC protection switches will open and the signal observed at CC1S or CC2S should drop to 0V. The CC switch input pins can withstand signal levels up to 24V without damage to the device. Refer to the KTU1108 device datasheet Absolute Maximum Ratings and Electrical Characteristics tables for the complete set of limits and specifications for the CC protections switches.

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