

Ideal Diode and Load Switch Controller with Reverse Input Protection

Brief Description

The KTS1900Q load switch Evaluation (EVAL) Kit is used to demonstrate and evaluate the KTS1900Q functionality, performance, and PCB layout. This evaluation board utilizes a typical load switch application with 12V Input, 5A output, having power and signal I/O connections with an array of test points for signal observation.

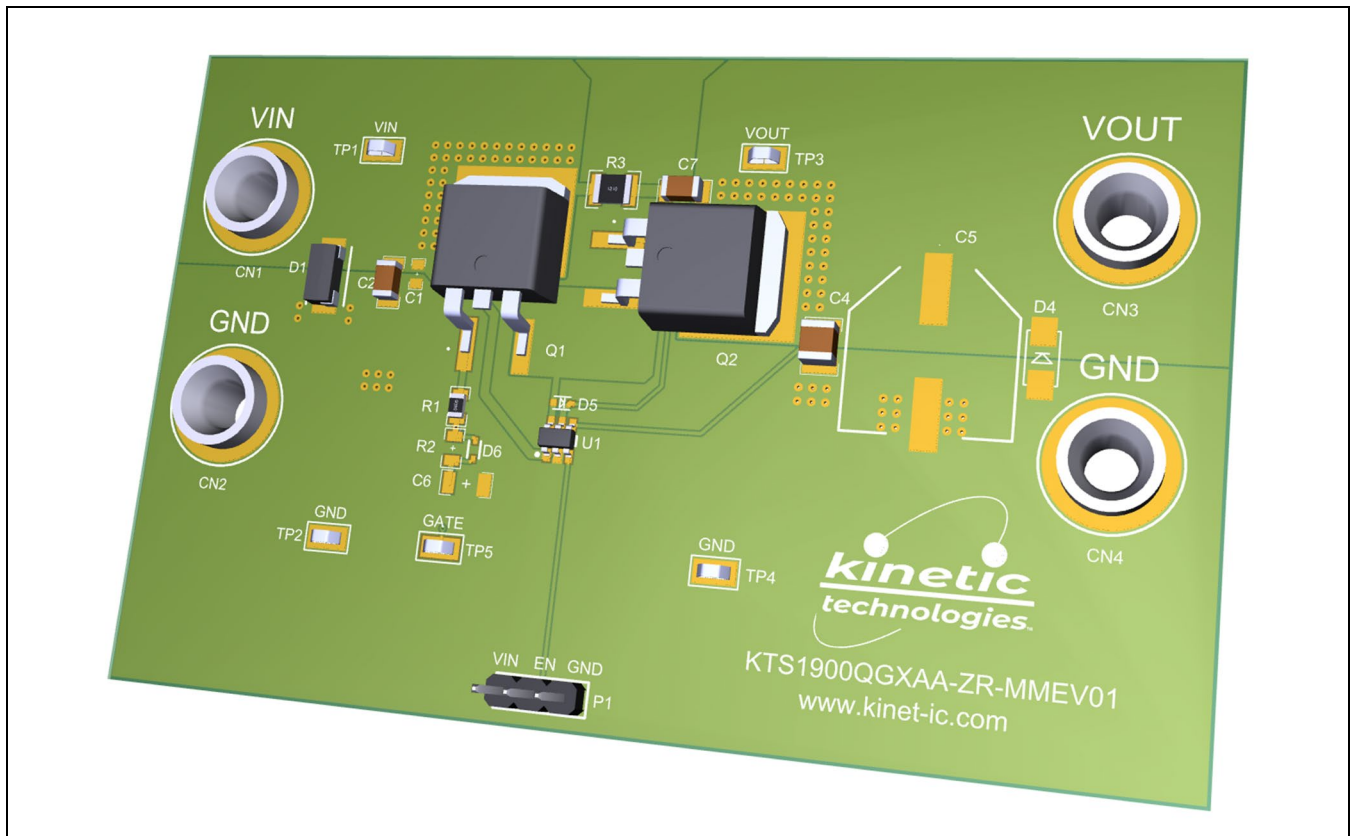
The KTS1900Q is an AEC-Q100 qualified ideal diode and load switch controller with reverse input protection.

It is optimized for both Ideal Diode and Load Switch applications. Please note that there is an alternative KTS1900Q kit created for the Ideal Diode Application at 12V Input, 5A output. Contact a Kinetic Technologies sales representative for further details.

Ordering Information

Part Number	Description	IC Package
KTS1900QGXA-ZR-MMEV01	KTS1900Q load switch EVAL Kit	SOT23-6

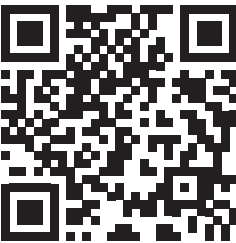

3D CAD Image



EVAL Kit Physical Contents

Item #	Description	Quantity
1	KTS1900Q load switch Evaluation board fully assembled PCB	1
2	Anti-static bag	1
3	KTS1900Q load switch Quick Start Guide, printed 1 page (A4 or US Letter)	1
4	EVAL Kit box	1

QR Links for Documents

IC Datasheet	EVAL Kit Landing Page
 https://www.kinet-ic.com/kts1900q/	 https://www.kinet-ic.com/kts1900qgxaa-zr-mmev01/

User-Supplied Equipment

Required Equipment

1. DC Power Supply Equipment that can source at least 12V voltage and 5A current.
2. Digital Multimeters, two required – used to measure input/output voltages.
3. Load – any of the following may be used:
 - a. Electronic load capable of sinking 12V at 5A (60W).
 - b. Power Resistor – 2.4Ω /12V/60W or greater value is required.
4. Test leads:
 - a. One pair of banana-to-clip test leads connect a voltmeter to the VIN and GND test points.
 - b. One pair of banana-to-clip test leads connect a voltmeter to the VIN and VOUT test points.
 - c. One pair of banana-jack test leads connect VOUT/GND to an electronic load.

Optional Equipment

1. Oscilloscope with 4x probes to monitor waveforms

Recommended Operating Conditions

Symbol	Description	Conditions	Min	Typ	Max	Units
VIN	DC Input	VIN to GND	4.2	12	30	V
IO	Loaded Output Current	VOUT to GND	0	5	15	A
VOUT	Output Voltage	VIN = 12V, VOUT to GND, IO = 5A	11.93	11.955	11.975	V

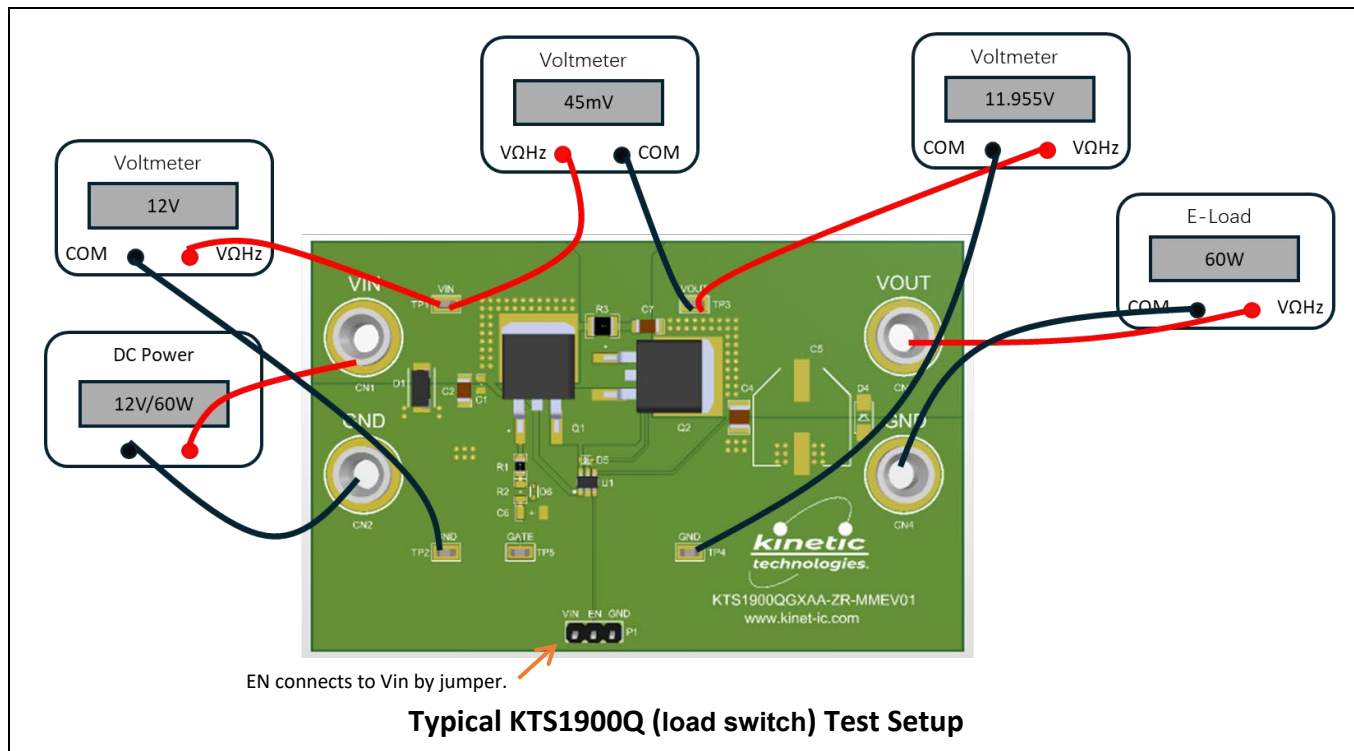
Quick Start Procedures

The typical input voltage of this board is set to 12V. The voltage drop from VIN to VOUT is regulated to around 45mV by Kinetic Technologies KTS1900Q.

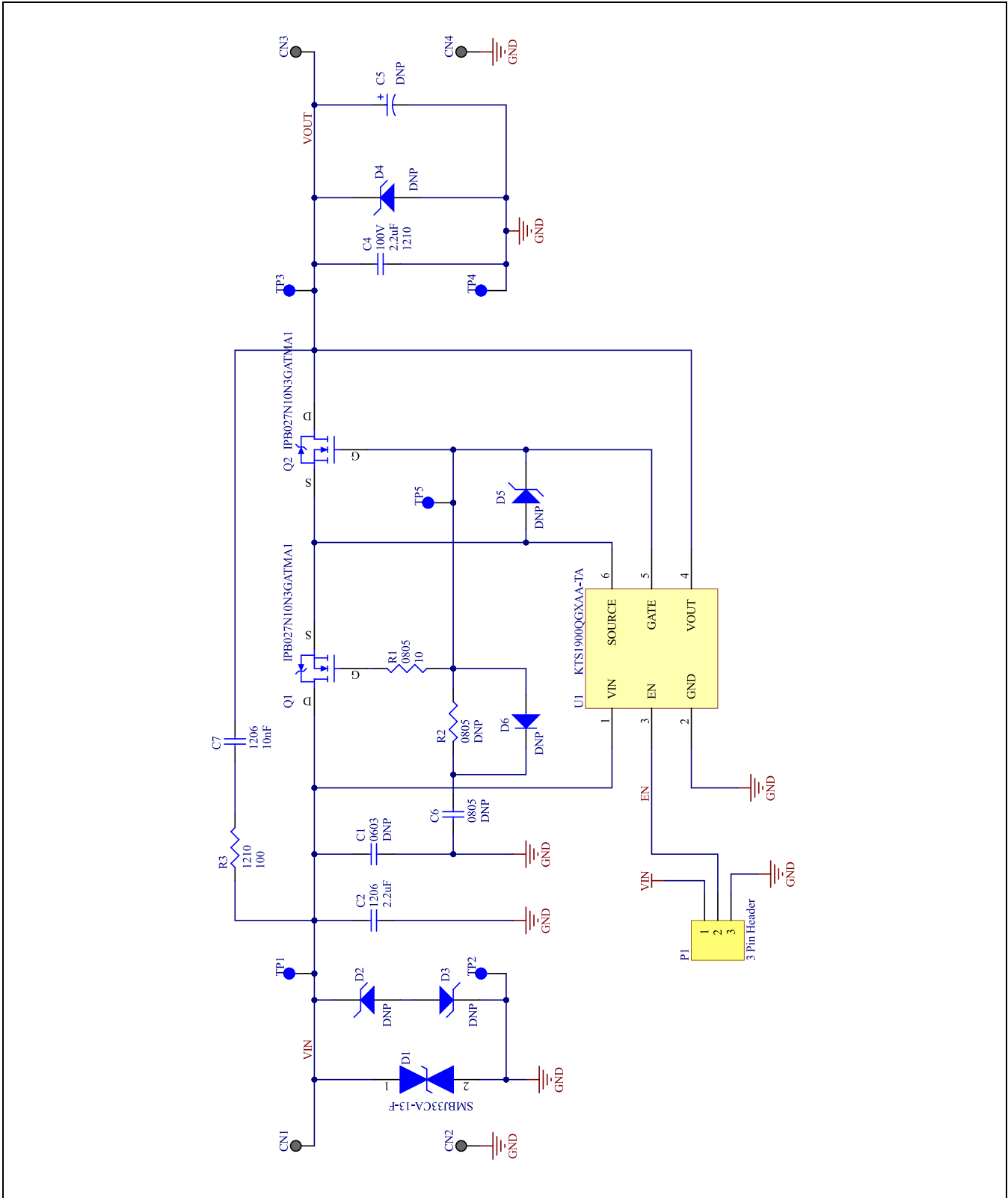
1. Connect one pair of power cables to the VIN connectors (VIN and GND) of EVAL Kit.
2. Before connecting the EVAL Kit to the DC power supply, turn on the supply and adjust the voltage as close to 0V as possible. Then disable the power supply output or turn the supply off. While disabled or off, connect the VIN power cables' ends to the power supply.
3. Connect one voltage meter to the VIN and GND test pins, one voltage meter to the VOUT and GND test pins.
4. Connect the load to the output connectors (VOUT and GND). Set the load to 5A.
5. Turn on the DC Power Supply and very slowly ramp its voltage to an appropriate voltage, such as 12V. While ramping VIN slowly, use the power 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.
6. Verify VOUT and the voltage drop from the VIN to VOUT.
VOUT is regulated to a typical 11.955V at 12V Input, the typical voltage drop is 45mV (the range is 25mV to 70mV).

Typical Test Setup Input condition.

The figure below shows a typical setup for KTS1900Q load switch EVB. Input voltage can be applied in the connectors of VIN and GND.



Electrical Schematic



Bill of Materials

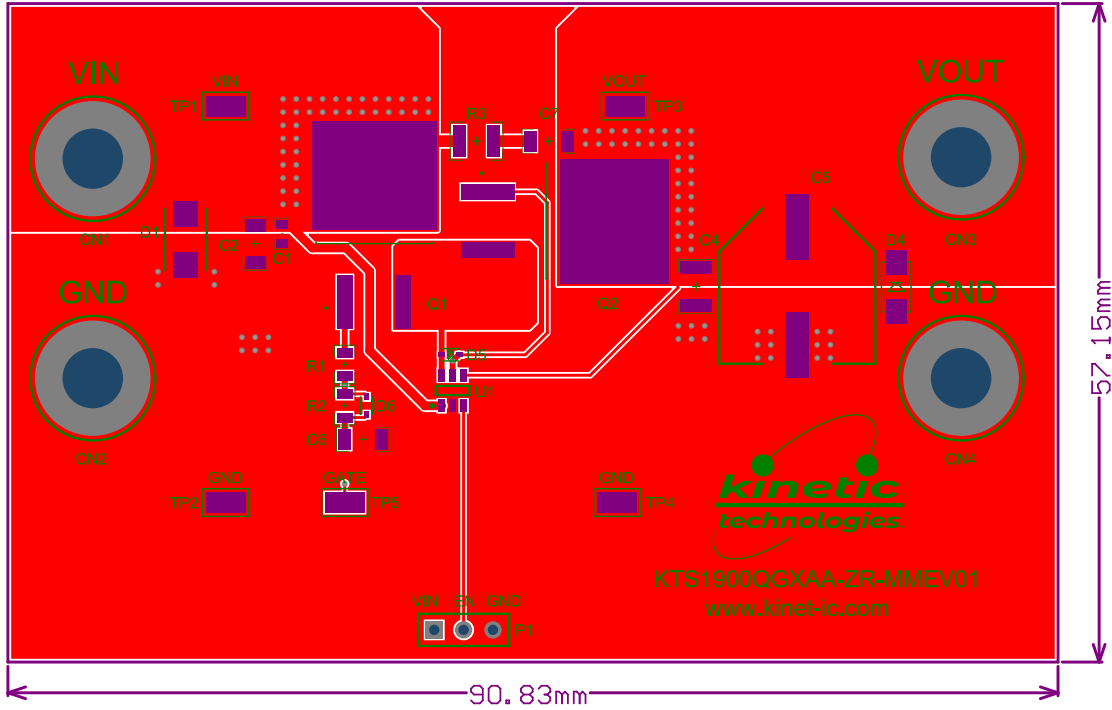
Designator	Description	Quantity	Value	Manufacturer	Manufacturer Part Number
C1	CAP CER 0.1 μ F 100V X7R 0603 DNP	1	DNP		
C2, C4	CAP CER 2.2 μ F 100V X7R 1210	2	2.2 μ F	Samsung	CL32B225KCJSNNE
C5	CAP ALUM 22 μ F 20% 63V SMD DNP	1	DNP		
C6	CAP CER 10000PF 100V X7R 0805 DNP	1	DNP		
C7	CAP CER 10000PF 500V X7R 1206	1	10nF	Yageo	CC1206JKX7RBBB103
CN1, CN2, CN3, CN4	CONN BANANA JACK SOLDER	4		Keystone Electronics	575-4
D1	ESD Bi-Directional Suppressors / TVS Diodes 600W 33V	1	SMBJ33CA-13-F	Diodes Incorporated	SMBJ33CA-13-F
D2	TVS DIODE 58VWM 93.6VC SMB DNP	1	DNP		
D3	TVS DIODE 24VWM 38.9VC SMB DNP	1	DNP		
D4	TVS DIODE 58VWM 93.6VC DO214AC DNP	1	DNP		
D5	DIODE ZENER 12V 150MW SOD523 DNP	1	DNP		
D6	DIODE GEN PURP 300V 250MA SOD523 DNP	1	DNP		
P1	CONN HEADER VERT 3POS 2.54MM	1		Sullins	PREC003SAAN-RC
Q1, Q2	MOSFET N-CH 100V 120A D2PAK	2		Infineon Technologies	IPB027N10N3GATMA1
R1	RES 10 Ω 1% 1/8W 0805	1	10	Yageo	RC0805FR-0710RL
R2	RES 100 Ω 1% 1/8W 0805 DNP	1	DNP		
R3	RES 100 Ω 1% 1/2W 1210	1	100	Yageo	RC1210FR-07100RL
TP1, TP2, TP3, TP4, TP5	PC TEST POINT MINIATURE	5		Keystone Electronics	5015
U1	Ideal Diode and Load Switch Controller with Reverse Input Protection	1		Kinetic Technologies	KTS1900QGXA-TA

Physical Access

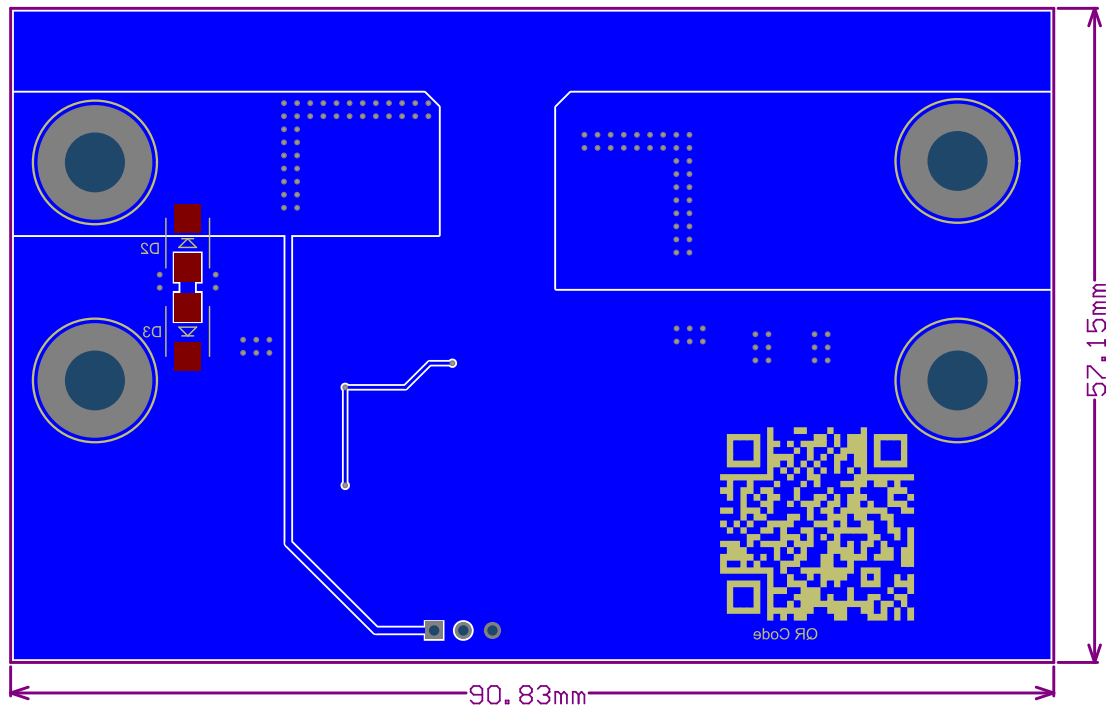
Connector	Description
VIN	Positive DC power supply input
GND	Negative DC power supply input
VOUT	Positive output
GND	Negative output

Printed Circuit Board (PCB)

Top Side Layout/Routing



Bottom Layer Routing



Test Setup

1. The “Typical Test Setup Diagram” shows a typical setup for the KTS1900Q EVAL board. Input voltage can be applied as described in the “Recommended Operating Conditions” Table
2. When a DC power supply is used to source power, the KTS1900Q EVAL board will start up at typical 12V Input. The typical 45mV regulated voltage may be observed on VIN and VOUT test pins
3. Digital multimeters may be used to monitor the input voltage level (VIN and GND test points) and the regulated voltage level (VIN and VOUT test points)
4. A load may be applied to the output at VOUT and GND connectors. The typical load is 5A .

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SUBSTANCE COMPLIANCE

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