Synchronous Flyback Controller with Integrated Feedback & Digital Isolator

Brief Description

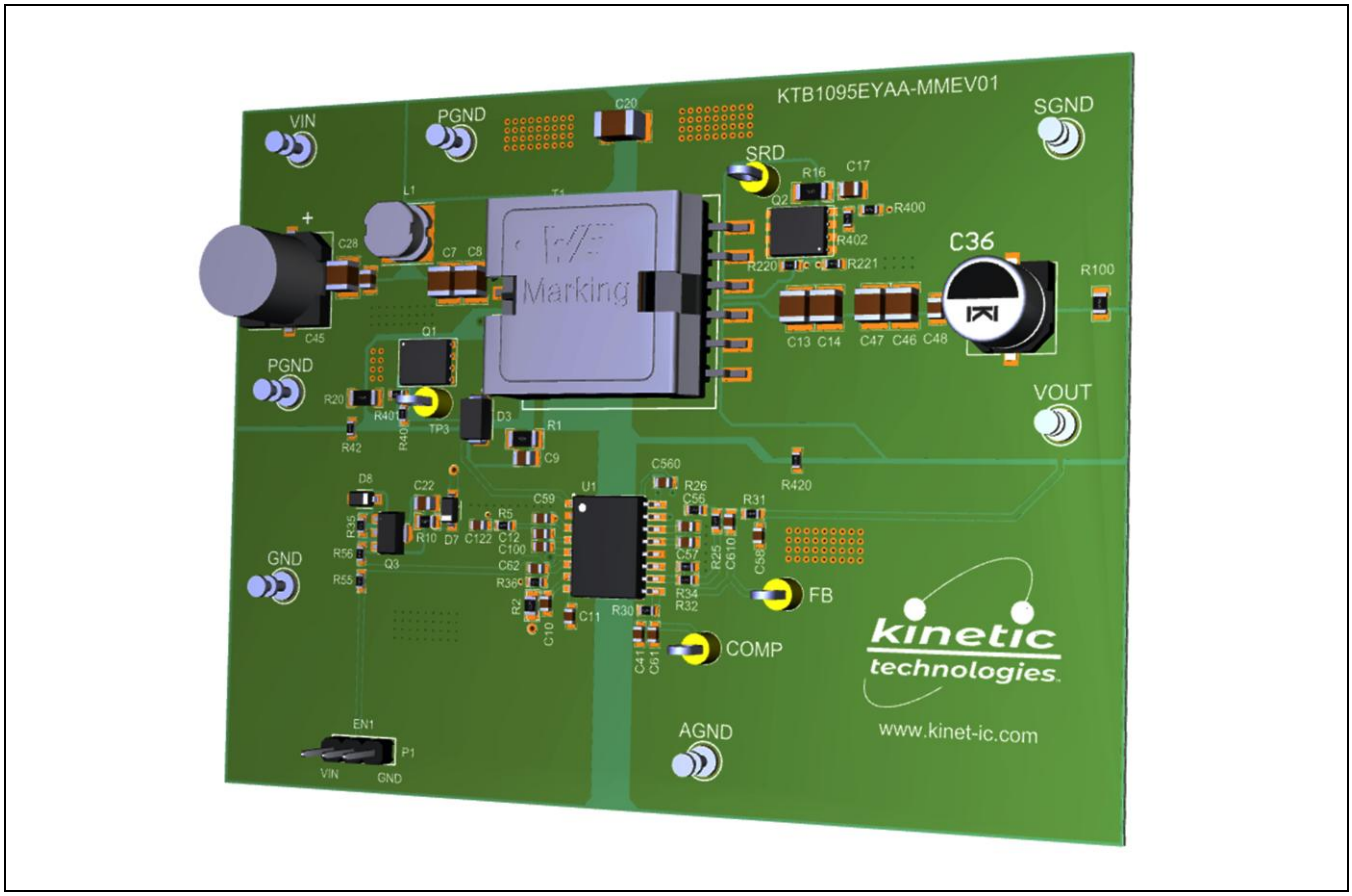
The KTB1095 Evaluation (EVAL) Kit is used to demonstrate and evaluate the KTB1095 functionality, performance, and PCB layout. This evaluation board utilizes 12V, 60W output with flyback topology, having power and signal I/O connections with an array of test points for signal observation.

The KTB1095 is a highly integrated isolated synchronous flyback controller with internal feedback and integrated digital isolator. The internal digital isolator eliminates the need to use an external optocoupler and enables small total solution size.

Ordering Information

Part Number	Description	IC Package
KTB1095EYAA-TE	KTB1095 EVAL Kit	SOP-16

3D CAD Image



EVAL Kit Physical Contents

Item #	Description	Quantity
1	KTB1095 Evaluation board fully assembled PCB	1
2	Anti-static bag	1
3	KTB1095 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/ktb1095/	https://www.kinet-ic.com/ktb1095eyaa-mmev01/

User-Supplied Equipment

Required Equipment

1. Power Sourcing Equipment Such a supply should provide 36V-75V up to 3A as needed for the intended application.
2. Digital Multimeters, two required – used to measure input/output voltages and currents.
3. Load – any of the following may be used:
    a. Electronic load capable of sinking 12V at 5A (60W)
    b. Power Resistor – 2.4Ω / 60W or greater value is required
    c. Actual system load that does not exceed 60W at 12V
4. Test leads:
    a. One pair of banana-to-clip test leads connect a voltmeter to the eval board VIN
    b. Two pairs of banana-jack test leads connect VOUT/SGND to an electronic load and voltmeter

Optional Equipment

1. Oscilloscope with 10x probes to monitor switching regulator waveforms

Recommended Operating Conditions

Parameter	Description	Value	Units
Input Voltage	Bench Supply applied to the VIN and PGND Pins	36-75	V
Output Voltage	VOUT to SGND	12	V
Output Current	Max Load = 60W (12V at 5A)	5	A

Quick Start Procedures

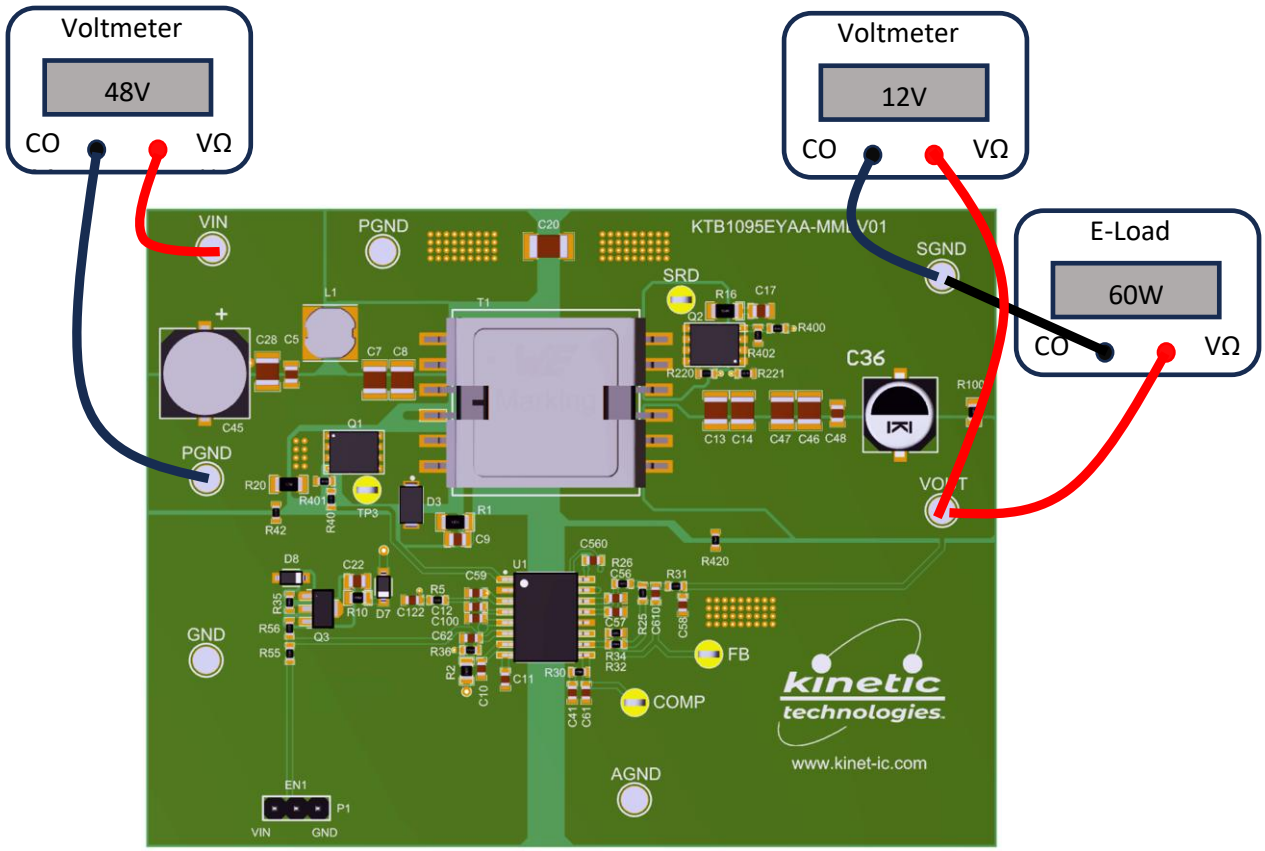
The output voltage of this board is set to 12V by the Kinetic Technologies KTB1095 controller. Below is the method to power KTB1095 evaluation board:

Method: Connect to VIN Power Supply

1. Connect one pair of power cables to the Test pins (VIN and PGND) of EVAL Kit.
2. Before connecting the EVAL Kit to the bench 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/ PGND power cables' ends to the bench supply.
3. Connect a voltage meter to the VOUT and SGND output jacks.
4. Connect the load to the output VOUT and SGND output jacks.
5. Turn on the bench supply and very slowly ramp its voltage to an appropriate voltage, such as 48V (36V ~ 75V). While ramping bench supply slowly, use the bench supply's output current indication (or a digital multimeter) to monitor the bench supply current. If the current becomes high, reduce the bench supply voltage quickly to prevent damage. Then inspect the setup for any wiring errors.
6. Verify 12 Volts on the VOUT / SGND output jacks.

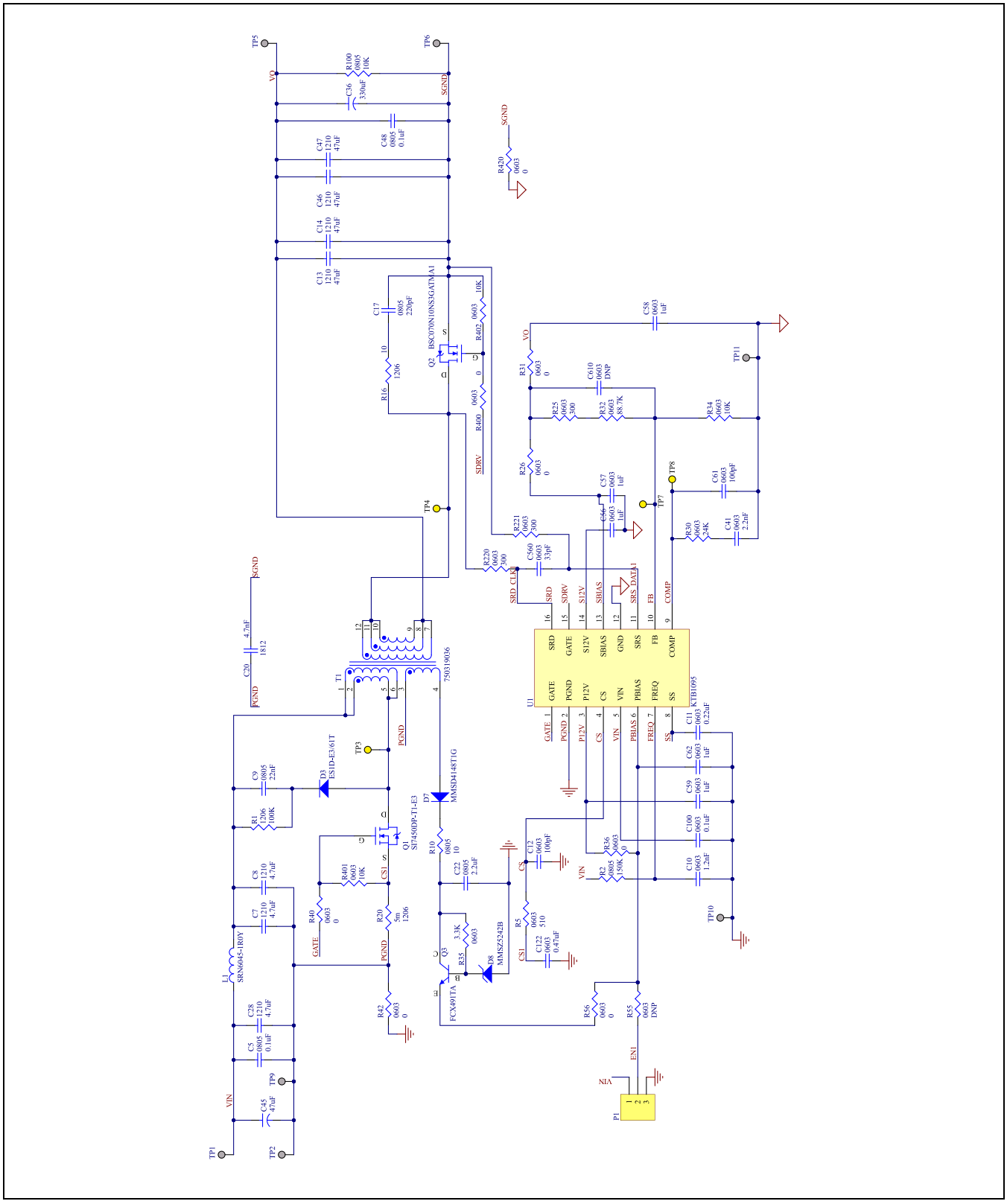
Typical Test Setup

The figure below shows a typical setup for KTB1095 EVB. Input voltage can be applied as described in the Connector Functionality table above.



Typical KTB1095 Test Setup

Electrical Schematic



Bill of Materials

Designator	Description	Quantity	Value	Manufacturer	Manufacturer Part Number
C5, C48	CAP 0.1µF 100V X7R 0805	2	0.1µF	Yageo	CC0805KKX7R0BB104
C7, C8, C28	CAP CER 4.7µF 100V X7S 1210	3	4.7µF	Taiyo Yuden	HMK325C7475KN-TE
C9	CAP CER 0.022µF 200V X7R 0805	1	22nF	Yageo	CC0805KKX7RABB223
C10	CAP CER 1200pF 100V C0G 0603	1	1.2nF	TDK	CGA3E2C0G2A122JT0Y0N
C11	CAP CER 0.22µF 25V X7R 0603	1	0.22µF	YAGEO	CC0603KRX7R8BB224
C12, C61	CAP CER 100pF 50V C0G/NP0 0603	2	100pF	Samsung	CL10C101JB8NNNC
C13, C14, C46, C47	CAP CER 47µF 16V X6S 1210	4	47µF	Murata	GRM32EC81C476KE15L
C17	CAP CER 220pF 200V X7R 0805	1	220pF	Yageo	CC0805KRX7RABB221
C20	CAP CER 4700pF 2KV X7R 1812	1	4.7nF	Yageo	CC1812KKX7RDBB472
C22	CAP CER 2.2µF 50V X7R 0805	1	2.2µF	YAGEO	CC0805KKX7R9BB225
C36	CAP ALUM 330µF 20% 25V SMD	1	330µF	KEMET	EEV337M025A9MAA
C41	CAP CER 2200pF 50V X7R 0603	1	2.2nF	Samsung	CL10B222KB8NNNC
C45	CAP ALUM 47µF 20% 100V SMD	1	47µF	Panasonic	EEE-FN2A470UP
C56, C57, C58, C59, C62	CAP CER 1.0µF 50V X7R 0603	5	1µF	YAGEO	CC0603KRX7R9BB105
C100	CAP CER 0.1µF 100V X7R 0603	1	0.1µF	Samsung	CL10B104KC8NNNC
C122	CAP CER 0.47µF 50V X7R 0603	1	0.47µF	TAIYO YUDEN	UMK107B7474KA-TR
C560	CAP 33pF 100V X7R 0603	1	33pF	YAGEO	CC0603FRNPO0BN330
C610	CAP 0603 DNP	1	DNP		
D3	DIODE GEN PURP 200V 1A DO214AC	1		Vishay	ES1D-E3/61T
D7	DIODE GEN PURP 100V 200MA SOD123	1		Onsemi	MMSD4148T1G
D8	ZENER SOD-123F 12V 0.5W 5%	1		Diotec Semiconductor	MMSZ5242B
L1	FIXED IND 1µH 4.2A 13.9 MOHM SMD	1	1uH	Bourns Inc.	SRN6045-1R0Y
P1	CONN HEADER VERT 3POS 2.54MM	1		Sullins	PREC003SAAN-RC
Q1	N-Channel 200 V 3.2A (Ta) 1.9W (Ta) Surface Mount PowerPAK® SO-8	1		VISHAY	SI7450DP-T1-E3
Q2	MOSFET N-CH 100V 90A TDSON-8	1		Infineon Technologies	BSC070N10NS3GATMA1
Q3	TRANS NPN 60V 1A SOT89-3	1		Diodes Incorporated	FCX491TA
R1	RES 100KΩ 1% 1/4W1206	1	100K	Yageo	RC1206FR-07100KL
R2	RES 150KΩ 1% 1/8W 0805	1	150K	Yageo	RC0805FR-07150KL
R5	RES 510Ω 1% 1/10W 0603	1	510	Yageo	RC0603FR-07510RL
R10	RES 10Ω 1% 1/8W 0805	1	10	YAGE	AC0805FR-0710RL
R16	RES 10Ω 1% 1/4W 1206	1	10	Yageo	RC1206FR-0710RL
R20	RES 0.005Ω 1% 1/4W 1206	1	5m	Yageo	PA1206FRF470R005L
R25, R220, R221	RES 300Ω 1% 1/10W 0603	3	300	Yageo	RC0603FR-07300RL

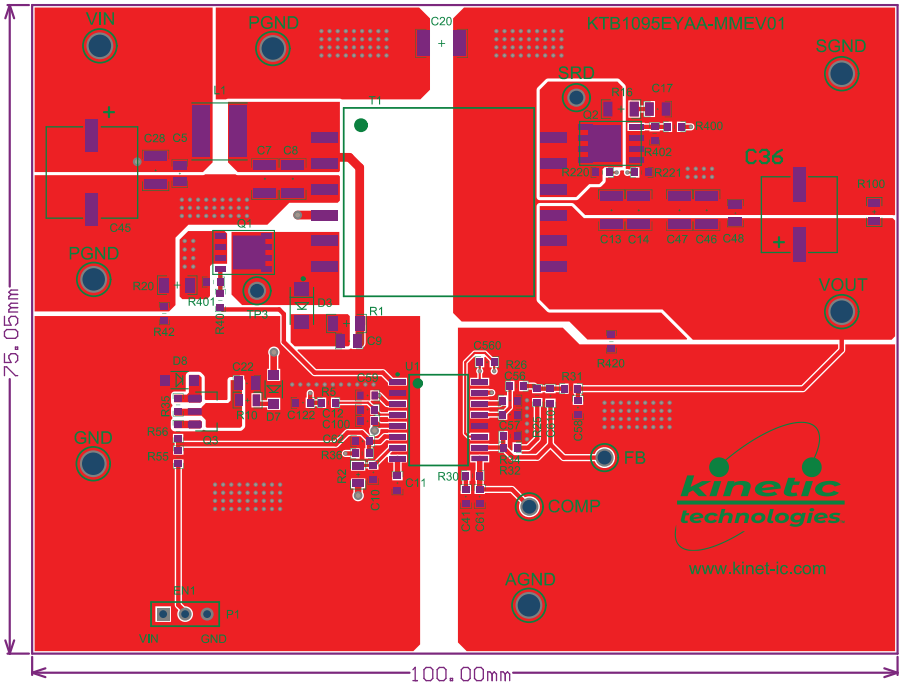
Designator	Description	Quantity	Value	Manufacturer	Manufacturer Part Number
R26, R31, R36, R40, R42, R56, R400, R420	RES 0Ω JUMPER 1/10W 0603	8	0	Yageo	RC0603FR-070RL
R30	RES 24kΩ 1% 1/10W 0603	1	24K	Yageo	RC0603FR-0724KL
R32	RES 88.7kΩ 1% 1/10W 0603	1	88.7K	Yageo	RC0603FR-0788K7L
R34, R401, R402	RES 10kΩ 1% 1/10W 0603	3	10K	Yageo	RC0603FR-0710KL
R35	RES 3.3KΩ 1% 1/10W 0603	1	3.3K	Yageo	RC0603FR-073K3L
R55	RES 0603 DNP	1	DNP		
R100	RES 10KΩ 1% 1/8W 0805	1	10K	Yageo	RC0805FR-0710KL
T1	Power Over Ethernet (PoE) For DC/DC Converters SMPS Transformer 1500Vrms Isolation 250kHz Surface Mount	1		Wurth Elektronik	750319036
TP1, TP2, TP5, TP6, TP9, TP10, TP11	TERM TURRET SINGLE L=5.56MM TIN	7		Keystone	1502-2
TP3, TP4, TP7, TP8	PC TEST POINT MULTIPURPOSE YELLOW	4		Keystone	5014
U1	Synchronous Flyback Controller with Integrated Feedback & Digital Isolator	1		Kinetic Technologies	KTB1095EYAA-TE

Physical Access

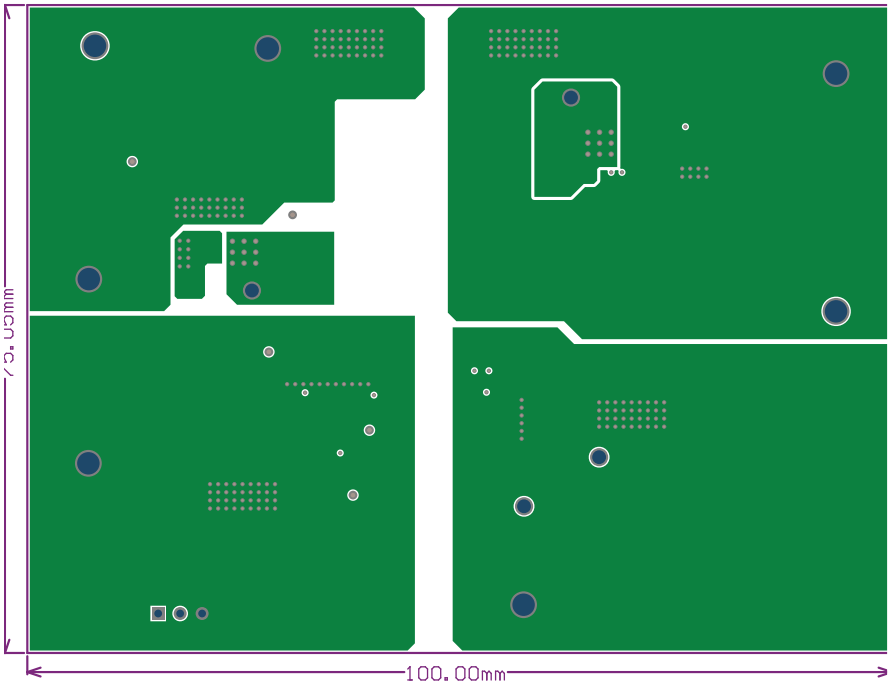
Connector	Description
VIN	Positive DC power supply input
PGND	Negative DC power supply input
GND	Primary signal ground
VOUT	Positive output
SGND	Negative output
AGND	Secondary signal ground

Printed Circuit Board (PCB)

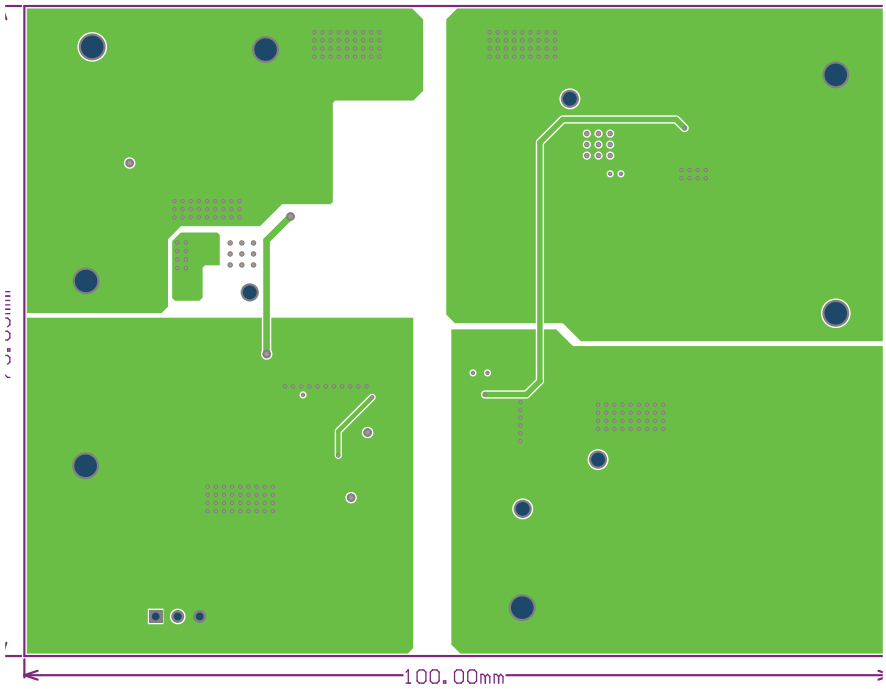
Top Side Layout/Routing



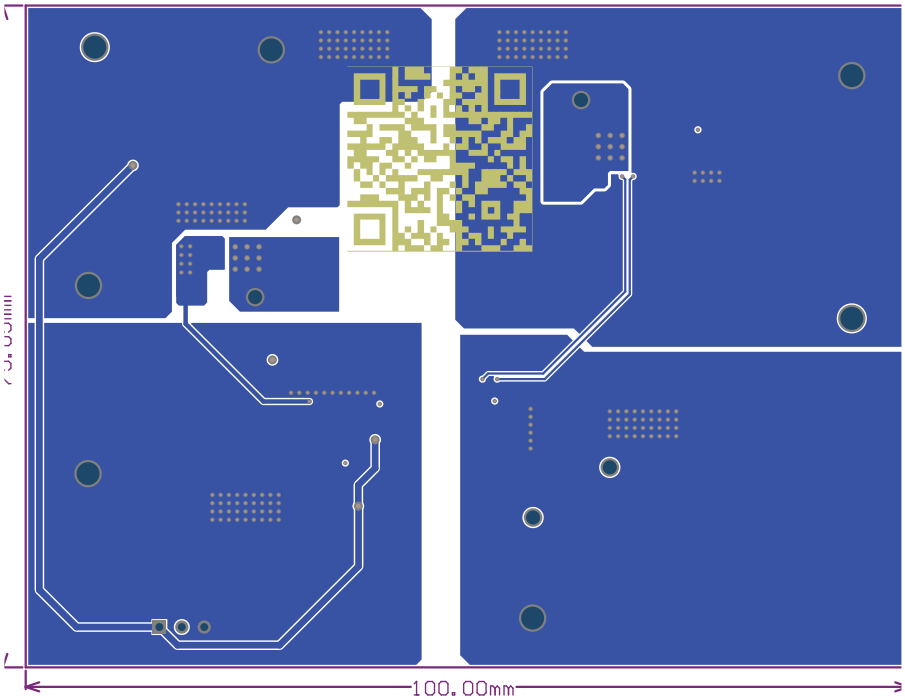
Layer Two Routing



Layer Three Routing



Bottom Layer Routing



Test Setup

1. The “Typical Test Setup Diagram” shows a typical setup for the KTB1095 EVAL board. Input voltage can be applied as described in the “Recommended Operating Conditions” Table
2. If an external bench power supply is used to source power to the VIN and PGND input pins, the KTB1095 EVAL board will automatically start up and 12V may be observed on the output VO+/VO- pins
3. Digital multimeters may be used to monitor the input voltage level (VIN and PGND test points) and output voltage levels at VOUT/SGND
4. A load may be applied to the output at VOUT/SGND. The load should not exceed 60W (5A at 12V)

Important Notices

Legal notice

Kinetic Technologies assumes no responsibility or liability for information contained in this document. Kinetic Technologies reserves the right to make corrections, modifications, enhancements, improvements, and other changes to its products and services at any time and to discontinue any product or services without notice. The information contained herein is believed to be accurate and reliable at the time of printing.

Reference design policy

This document is provided as a design reference and Kinetic Technologies assumes no responsibility or liability for the information contained in this document. Kinetic Technologies reserves the right to make corrections, modifications, enhancements, improvements, and other changes to this reference design documentation without notice.

Reference designs are created using Kinetic Technologies' published specifications as well as the published specifications of other device manufacturers. This information may not be current at the time the reference design is built. Kinetic Technologies and/or its licensors do not warrant the accuracy or completeness of the specifications, or any information contained therein.

Kinetic Technologies does not warrant that the designs are production worthy. Customer should completely validate and test the design implementation to confirm the system functionality for the end use application.

Kinetic Technologies provides its customers with limited product warranties, according to the standard Kinetic Technologies terms and conditions.

For the most current product information visit us at www.kinet-ic.com

Life support policy

LIFE SUPPORT: KINETIC TECHNOLOGIES' PRODUCTS ARE NOT DESIGNED, INTENDED, OR AUTHORIZED FOR USE AS COMPONENTS IN LIFE SUPPORT DEVICES OR SYSTEMS. NO WARRANTY, EXPRESS OR IMPLIED, IS MADE FOR THIS USE. AUTHORIZATION FOR SUCH USE SHALL NOT BE GIVEN BY KINETIC TECHNOLOGIES, AND THE PRODUCTS SHALL NOT BE USED IN SUCH DEVICES OR SYSTEMS, EXCEPT UPON THE WRITTEN APPROVAL OF THE PRESIDENT OF KINETIC TECHNOLOGIES FOLLOWING A DETERMINATION BY KINETIC TECHNOLOGIES THAT SUCH USE IS FEASIBLE. SUCH APPROVAL MAY BE WITHHELD FOR ANY OR NO REASON.

“Life support devices or systems” are devices or systems which (1) are intended for surgical implant into the human body, (2) support or sustain human life, or (3) monitor critical bodily functions including, but not limited to, cardiac, respirator, and neurological functions, and whose failure to perform can be reasonably expected to result in a significant bodily injury to the user. A “critical component” is any component of a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.

SUBSTANCE COMPLIANCE

Kinetic Technologies IC products are compliant with RoHS, formally known as Directive 2002/95/EC of the European Parliament and of the Council of 27 January 2003 on the restriction of the use of certain hazardous substances in electrical and electronic equipment. However, this evaluation kit does not fall within the scope of the EU directives regarding electromagnetic compatibility, restricted substances (RoHS), recycling (WEEE), FCC, CE or UL, and may not meet the requirements of these or related directives. To the best of our knowledge the information is true and correct as of the date of the original publication of the information. Kinetic Technologies bears no responsibility to update such statement.