

## **i7CxxA-C03-EVK-S1; i7AxxA-C01-EVK-S1; i7X-C01-EVK-S0** *Evaluation Kit Manual for i7A, i7C, RGC Non-Isolated DC-DC Series*

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## 1. Introduction

This evaluation kit has been designed to provide an easy way to characterize the product performance and its features. It is intended to aid customers and determine the product suitability for the target application. The evaluation board incorporates the required external components to demonstrate the complete product functionality. It also includes other components (e.g., test points, etc...) to facilitate a successful end user experience. Not all these external components are required if the product features are not needed. Details of the external components, schematics, and PCB layout are provided in this documentation for reference only. Final design and qualification needs to be verified at customer's end system level.

## 2. Ordering Information

TDK-Lambda offers a wide variety of non-isolated dc-dc power modules in the i7X series. Not every product is currently available in an evaluation kit. The table below includes description and ratings which should help in selecting the most applicable evaluation kit.

Evaluation Kit Part Number	Non-Isolated DC-DC Module (Included and Mounted on the Evaluation Board)					
	DC-DC Module Part Number	Type	I/P Range	O/P Range	O/P Current (max)	O/P Power (Max)
<a href="#">i7C08A-C03-EVK-S1</a>	<a href="#">i7C4W008A120V-003-R</a>	Buck-Boost	9 – 53 V	9.6 – 48 V	8 A	300 W
<a href="#">i7C12A-C03-EVK-S1</a>	<a href="#">i7C4W012A050V-003-R</a>	Buck-Boost	9 – 53 V	5.0 – 28 V	12.5 A	300 W
<a href="#">i7C20A-C03-EVK-S1</a>	<a href="#">i7C2W020A120V-003-R</a>	Buck-Boost	9 – 36 V	8.0 – 24 V	20 A	300 W
<a href="#">i7A33A-C01-EVK-S1</a>	<a href="#">i7A4W033A033V-001-R</a>	Buck	18 – 60 V	3.6* – 24 V	33 A	500 W
<a href="#">i7A45A-C01-EVK-S1</a>	<a href="#">i7A24045A033V-001-R</a>	Buck	18 – 32 V	3.6* – 18 V	45 A	750 W
<a href="#">i7A60A-C01-EVK-S1</a>	<a href="#">i7A12060A008V-001-R</a>	Buck	9 – 18 V	1.0** – 8 V	60 A	400 W
<a href="#">I7X-C01-EVK-S1</a>	No Module Installed	Evaluation board can be used for the RGB and <a href="#">RGC</a> Series.				

\*Power module installed is rated for 3.3V. Standard EV kit configuration allows operation to 3.6V. Contact support if lower voltage is needed.

\*\* Power module installed is rated for 0.8V. Standard EV kit configuration allows operation to 1.0V. Contact support if lower voltage is needed.



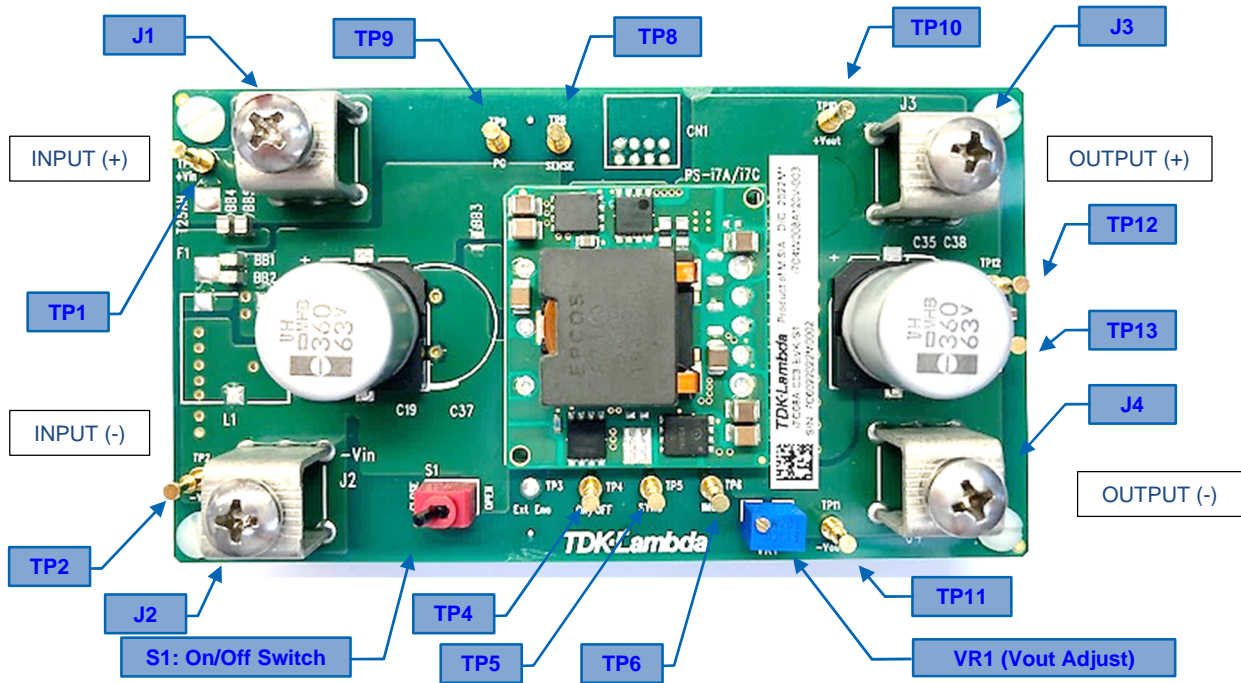
### IMPORTANT INFORMATION

- Observe proper safety and laboratory procedures when testing electronic products. This list serves as general guide only and not a substitute for common sense and best practices.
- Before applying power, double check and ensure all connections to the evaluation board interface are correct (e.g., Input source polarity connections, etc...).
- This evaluation board is not populated with an input fuse. An input fuse can be populated in PCB location F1. Check the product specifications for the input fuse ratings and the evaluation board schematics included this manual. Make sure the existing jumper connections, BB4 and BB5, are removed when adding the fuse.
- Although highly efficient, these high power density modules can dissipate significant amounts of power, especially at heavy load. Care should be taken to ensure adequate cooling is provided and the modules are operated within the thermal specifications outlined in the product data sheets. Heat sink and base plated versions of the i7X family are available for use in demanding environments.
- This evaluation kit is designed for general laboratory use. It is not intended for installation in end customer product or equipment.
- Please check the pertinent product (DC-DC Module) datasheets and specifications for complete information.

## 3. General Features

- Screw Terminals for secured input and output connections
- Toggle switch for Remote ON/OFF
- Test points / Scope probe hook-ups for ease of measurement
- Trim Potentiometer for adjusting the output voltage setting
- Component PCB pad provisions for: Input fuse, input inductor, additional input and output capacitance\*, output header connector for optional features and signals.

\* Note the output capacitor value may need to be adjusted to meet transient response or ripple requirements of the final application. Refer to product data sheet for a range of acceptable values.

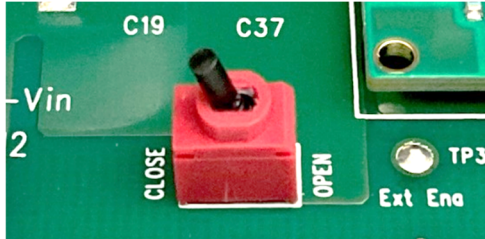


Test Point	Description	Test Point	Description
TP1	Vin (+)	TP8	SENSE +
TP2	Vin (-) / GND	TP9	PGOOD : Only for i7C
TP3	<i>Not Populated</i>	TP10	Vout (+)
TP4	ON / OFF	TP11	Vout (-) / GND
TP5	SYNC: Only for i7C (Frequency Synchronization)	TP12	Vout (+) - for Output Ripple Measurement
TP6	I_MON: Only for i7C (Output Current Monitor)	TP13	Vout (-) / GND – for Output Ripple Measurement

\* Note: Depending on the model series (e.g., i7C, i7A), not all Test Points (TP) are applicable. Please double check the individual product series datasheets for the features that it supports.

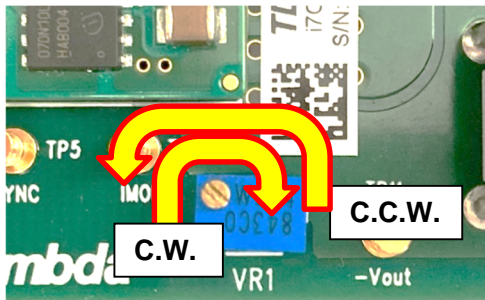
Screw Terminal	Description	Screw Terminal	Description
J1	Vin (+)	J3	Vout (+)
J2	Vin (-) / GND	J4	Vout (-) / GND

## 4. Turn-on / Turn-off module by switch



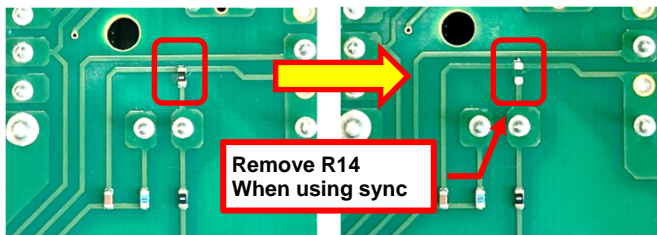
Change position of toggle switch "S1" to "CLOSE" turns-on the power supply unit.

## 5. Change Output Voltage



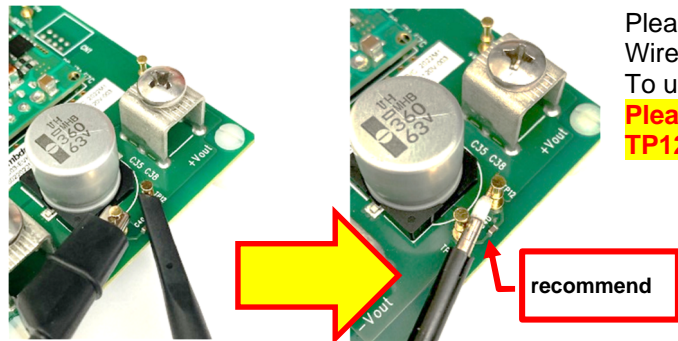
Turn screw on trimmer pot "VR1" to change the output voltage.  
Turn clockwise to decrease output voltage.  
Turn counter clockwise to increase output voltage.

## 6. When using external clock (SYNC function only for i7C)



SYNC function default setting is disabled. Please remove resistor "R14" on bottom side of the board to enable the SYNC function.

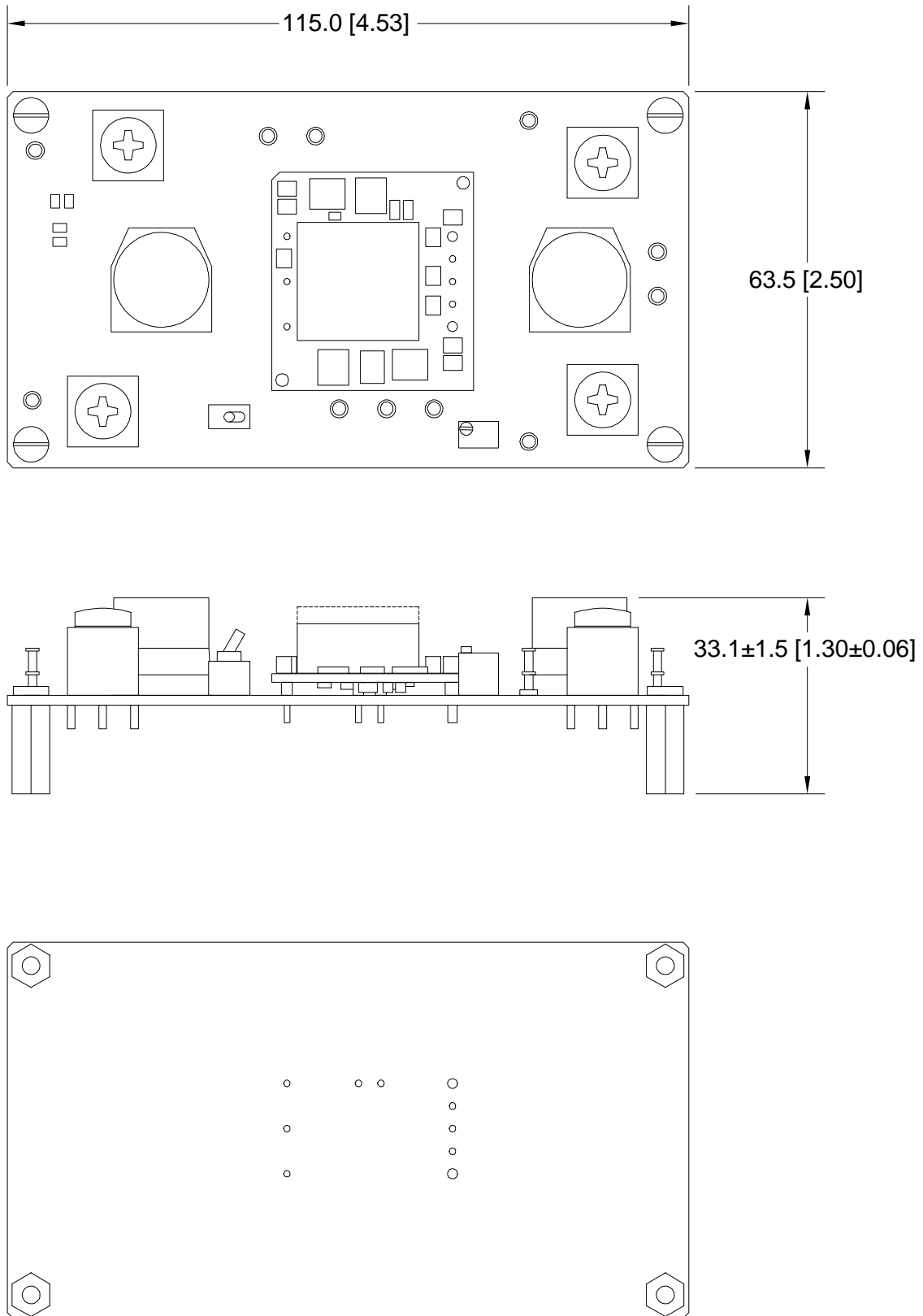
## 7. Capture output ripple/noise waveform



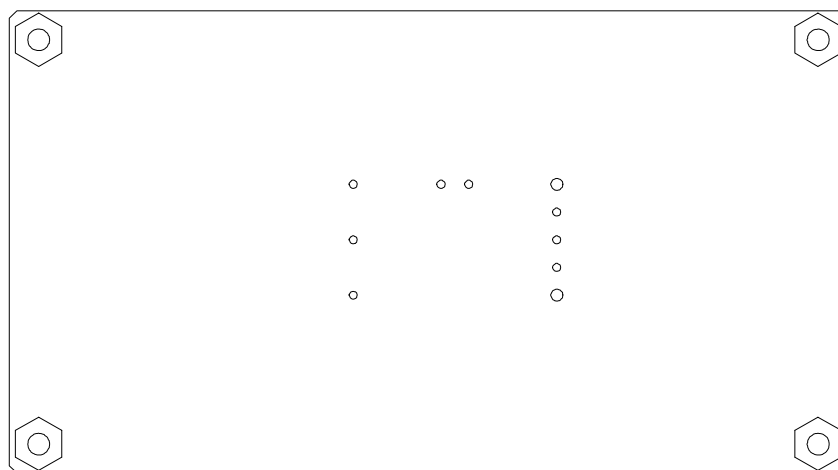
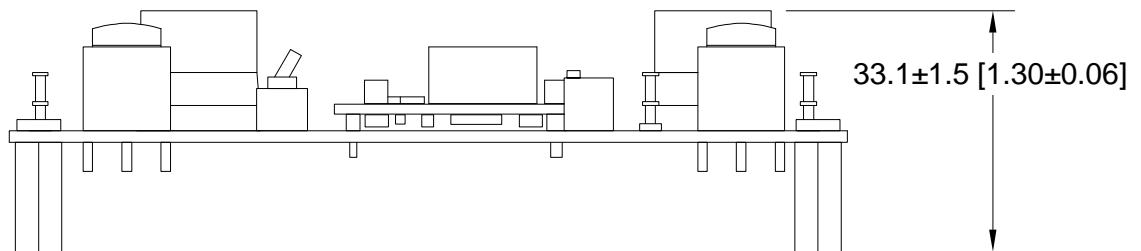
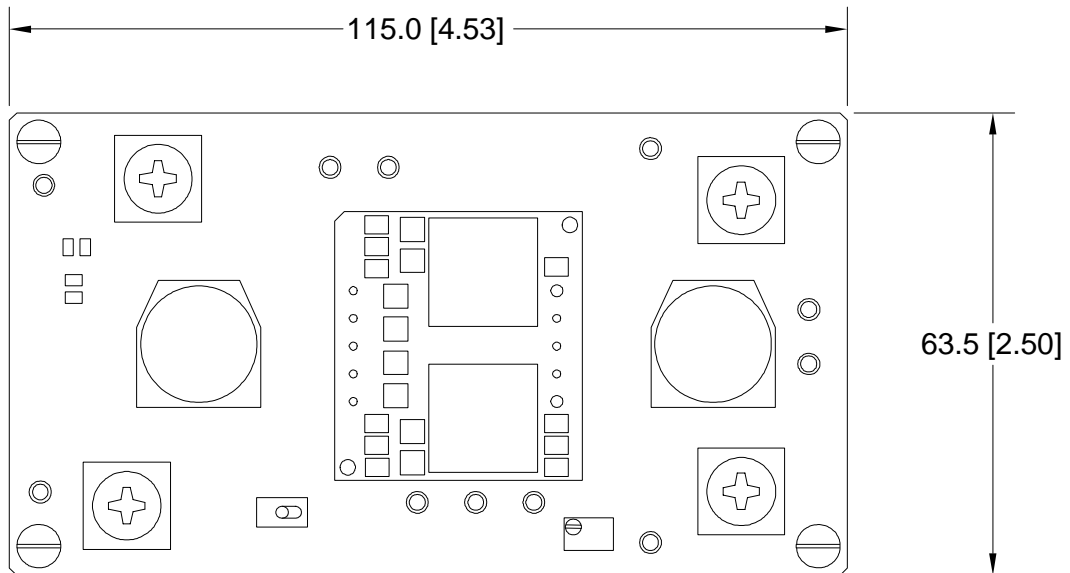
Please use TP12, TP13 to measure output ripple/spike.  
Wired GND clip may pick up higher spike noise.  
To use bare probe minimize spike noise.

**Please pay attention for connect right polarity.  
TP12 is Vout (+) / TP13 is GND.**

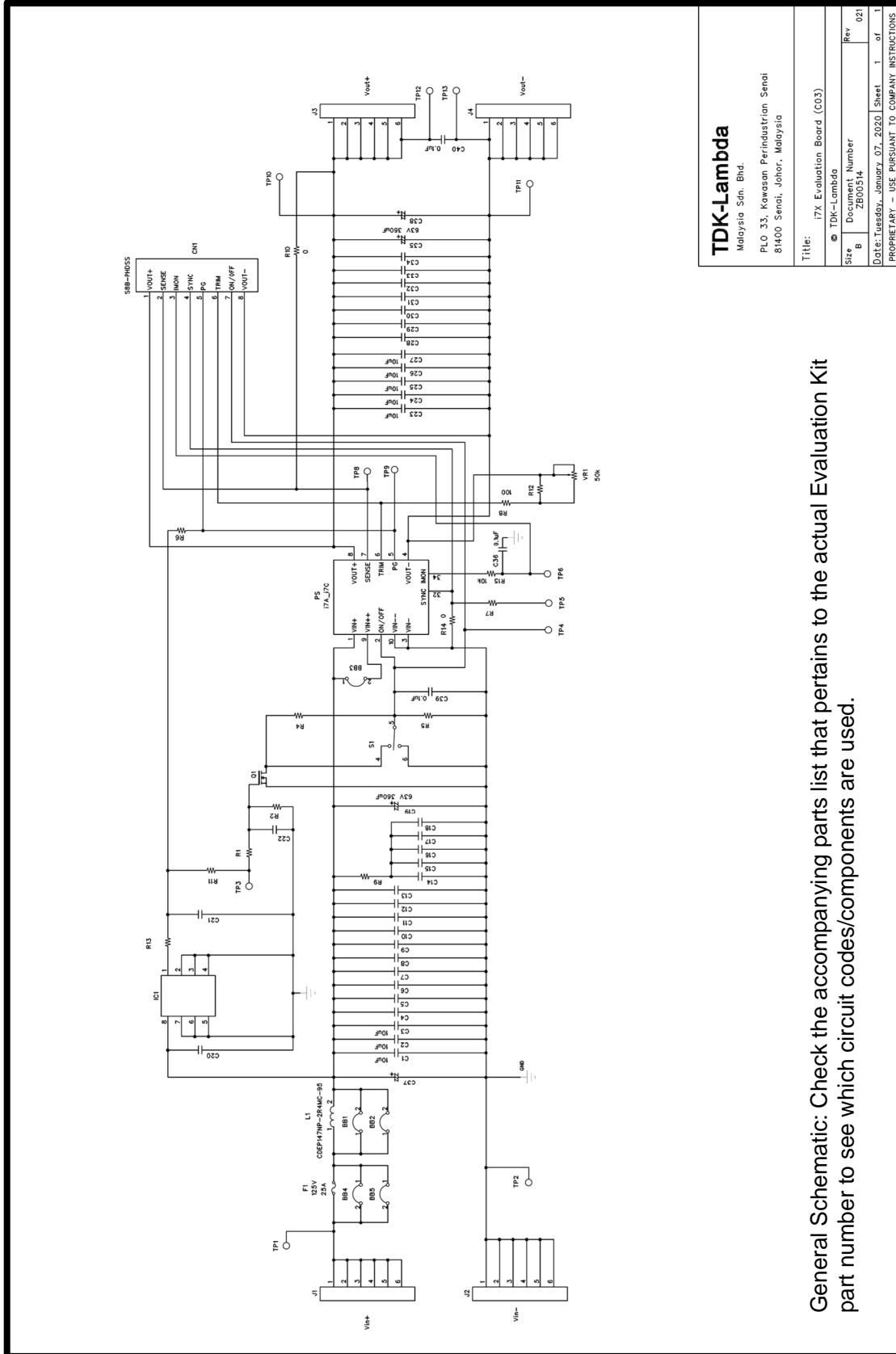
## 8. Mechanical Outline - i7CxxA-C03-EVK-S1



## 9. Mechanical Outline - i7AxxA-C01-EVK-S1



## 10. Schematic



**TDK-Lambda**

Malaysia Sdn. Bhd.  
 PLO 33, Kawasan Perindustrian Senadi  
 81400 Senadi, Johor, Malaysia

Title: i7X Evaluation Board (C03)

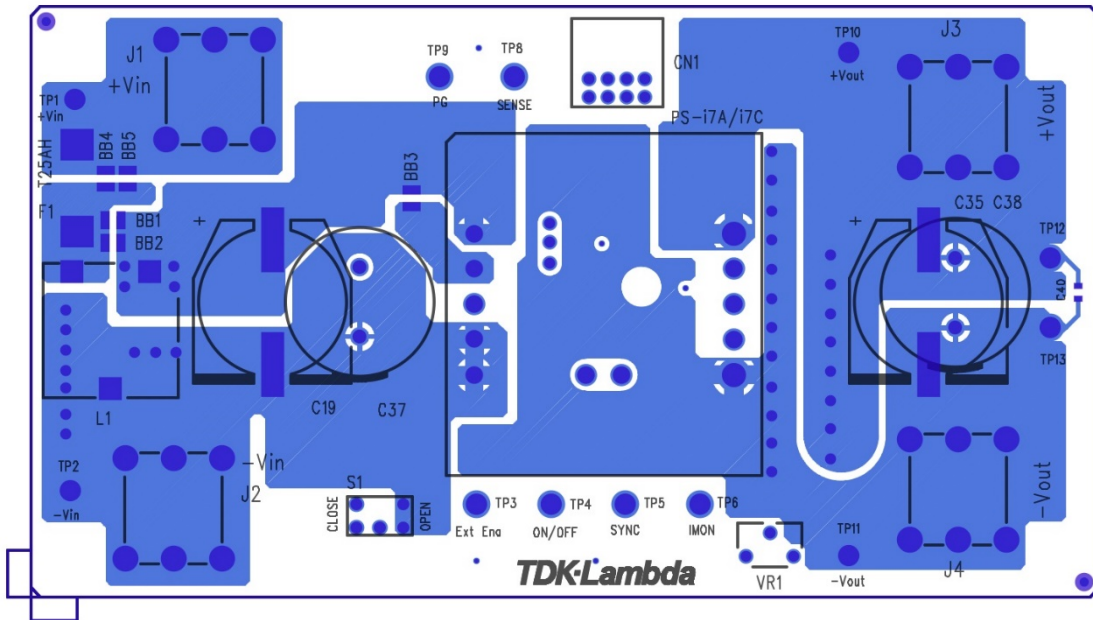
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Date: Tuesday, January 07, 2020 Sheet 1 of 1  
 PROPRIETARY — USE PURSUANT TO COMPANY INSTRUCTIONS

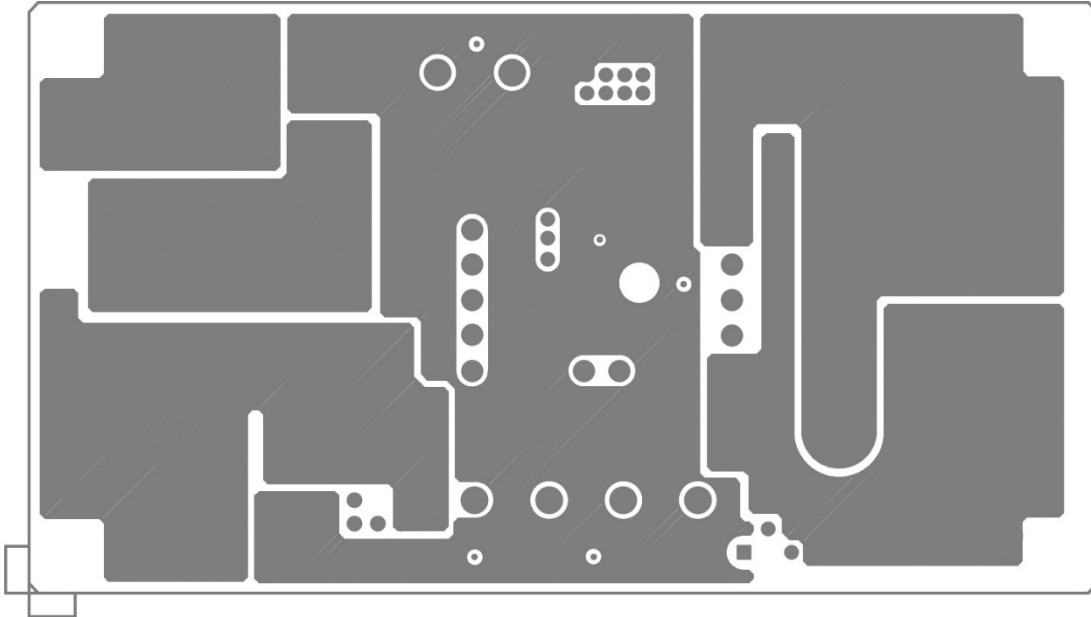
General Schematic: Check the accompanying parts list that pertains to the actual Evaluation Kit part number to see which circuit codes/components are used.

## 11. PCB Layout

### Top Layer

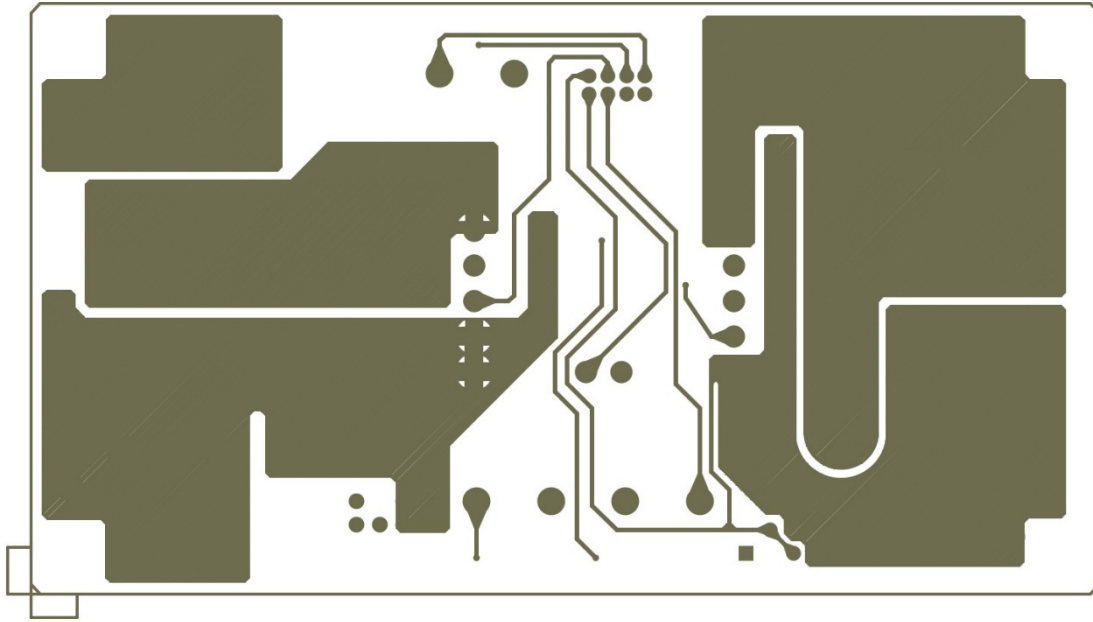


### Layer 2

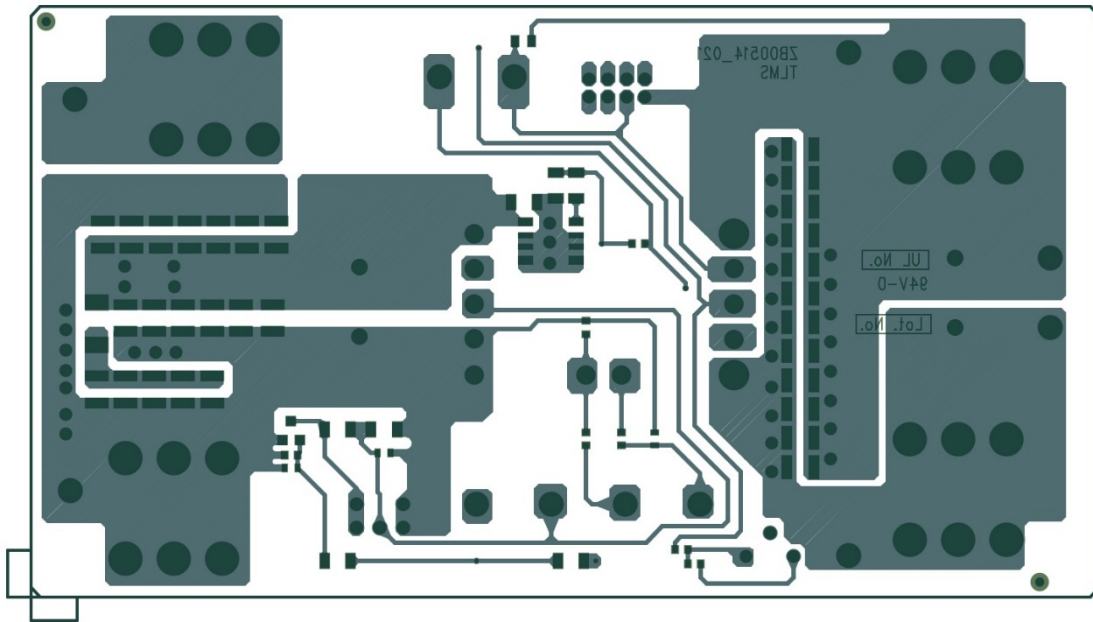




## PCB Layout (continued) Layer 3



## Bottom



## 12. Parts List: i7CxxA-C03-EVK-S1

Evaluation Kit Part Number		i7C08A-C03-EVK-S1		i7C12A-C03-EVK-S1		i7C20A-C03-EVK-S1	
Schematic Circuit Code	Part Type	Manufacturer (Mfr)	Mfr Part No.	Manufacturer (Mfr)	Mfr Part No.	Manufacturer (Mfr)	Mfr Part No.
i7A_i7C	DC-DC Module	TDK Lambda	i7C4W008A120V-003-R	TDK Lambda	i7C4W012A050V-003-R	TDK Lambda	i7C2W020A120V-003-R
Q1	Transister	OMIT		OMIT		OMIT	
C1	Capacitor	MURATA	GRM32ER71J106MA12L	MURATA	GRM32ER71J106MA12L	MURATA	GRM32ER71J106MA12L
C2	Capacitor	MURATA	GRM32ER71J106MA12L	MURATA	GRM32ER71J106MA12L	MURATA	GRM32ER71J106MA12L
C3	Capacitor	MURATA	GRM32ER71J106MA12L	MURATA	GRM32ER71J106MA12L	MURATA	GRM32ER71J106MA12L
C4-C13	Capacitor	OMIT		OMIT		MURATA	GRM32ER71J106MA12L
C14-C18	Capacitor	OMIT		OMIT		OMIT	
C19	Capacitor	NI-CHEMI	EMHB630ARA361MLH0S	NI-CHEMI	EMHB630ARA361MLH0S	Panasonic	EEEFK1H102AM
C20-C22	Capacitor	OMIT		OMIT		OMIT	
C23	Capacitor	MURATA	GRM32ER71J106MA12L	MURATA	GRM32ER71J106MA12L	MURATA	GRM32ER71J106MA12L
C24	Capacitor	MURATA	GRM32ER71J106MA12L	MURATA	GRM32ER71J106MA12L	MURATA	GRM32ER71J106MA12L
C25	Capacitor	MURATA	GRM32ER71J106MA12L	MURATA	GRM32ER71J106MA12L	MURATA	GRM32ER71J106MA12L
C26	Capacitor	MURATA	GRM32ER71J106MA12L	MURATA	GRM32ER71J106MA12L	MURATA	GRM32ER71J106MA12L
C27	Capacitor	MURATA	GRM32ER71J106MA12L	MURATA	GRM32ER71J106MA12L	MURATA	GRM32ER71J106MA12L
C28-C34	Capacitor	OMIT		OMIT		MURATA	GRM32ER71J106MA12L
C35	Capacitor	NI-CHEMI	EMHB630ARA361MLH0S	NI-CHEMI	EMHB630ARA361MLH0S	Panasonic	EEEFK1H102AM
C36	Capacitor	TDK	C1608X7S2A104KT	TDK	C1608X7S2A104KT	TDK	C1608X7S2A104KT
C37-C38	Capacitor	OMIT		OMIT		OMIT	
C39	Capacitor	TDK	C1608X7S2A104KT	TDK	C1608X7S2A104KT	TDK	C1608X7S2A104KT
C40	Capacitor	TDK	C1608X7S2A104KT	TDK	C1608X7S2A104KT	TDK	C1608X7S2A104KT
F1	Fuse	OMIT		OMIT		OMIT	
BB1	Copper Pin	ROWLEY SPRING	ZP00185_01	ROWLEY SPRING	ZP00185_01	ROWLEY SPRING	ZP00185_01
BB2	Copper Pin	ROWLEY SPRING	ZP00185_01	ROWLEY SPRING	ZP00185_01	ROWLEY SPRING	ZP00185_01
BB3	Copper Pin	OMIT		OMIT		OMIT	
BB4	Copper Pin	ROWLEY SPRING	ZP00185_01	ROWLEY SPRING	ZP00185_01	ROWLEY SPRING	ZP00185_01
BB5	Copper Pin	ROWLEY SPRING	ZP00185_01	ROWLEY SPRING	ZP00185_01	ROWLEY SPRING	ZP00185_01
IC1	LDO	OMIT		OMIT		OMIT	
VR1	Resistor	BOURNS	3266W-1-204LF	BOURNS	3266W-1-503LF	BOURNS	3266W-1-503LF
L1	Inductor	OMIT		OMIT		OMIT	
R1-R6	Resistor	OMIT		OMIT		OMIT	
R7	Resistor	KOA	RK73Z1JTDD	KOA	RK73Z1JTDD	KOA	RK73Z1JTDD
R8	Resistor	KOA	RK73H1JTDD21R5F	KOA	RK73H1JTDD3010F	KOA	RK73H1JTDD51R0F
R9	Resistor	OMIT		OMIT		OMIT	
R10	Resistor	KOA	RK73Z2ATDD	KOA	RK73Z2ATDD	KOA	RK73Z2ATDD
R11	Resistor	OMIT		OMIT		OMIT	
R12	Resistor	KOA	RK73H1JTDD3323F	OMIT		KOA	RK73H1JTDD1002D
R13	Resistor	OMIT		OMIT		OMIT	
R14	Resistor	KOA	RK73Z1JTDD	KOA	RK73Z1JTDD	KOA	RK73Z1JTDD
R15	Resistor	KOA	RK73H1JTDD1002D	KOA	RK73H1JTDD1002D	KOA	RK73H1JTDD1002D
CN1	Connector	OMIT		OMIT		OMIT	
S1	Switch	LIGHT COUNTRY	2US1T1A1M2RES	LIGHT COUNTRY	2US1T1A1M2RES	LIGHT COUNTRY	2US1T1A1M2RES
J1	Terminal	KEYSTONE	8196	KEYSTONE	8196	KEYSTONE	8196
J2	Terminal	KEYSTONE	8196	KEYSTONE	8196	KEYSTONE	8196
J3	Terminal	KEYSTONE	8196	KEYSTONE	8196	KEYSTONE	8196
J4	Terminal	KEYSTONE	8196	KEYSTONE	8196	KEYSTONE	8196
TP1	Test Point	MAC8	WT-2-2	MAC8	WT-2-2	MAC8	WT-2-2
TP2	Test Point	MAC8	WT-2-2	MAC8	WT-2-2	MAC8	WT-2-2
TP3	Test Point	OMIT		OMIT		OMIT	
TP4	Test Point	MAC8	WT-2-2	MAC8	WT-2-2	MAC8	WT-2-2
TP5	Test Point	MAC8	WT-2-2	MAC8	WT-2-2	MAC8	WT-2-2
TP6	Test Point	MAC8	WT-2-2	MAC8	WT-2-2	MAC8	WT-2-2
TP8	Test Point	MAC8	WT-2-2	MAC8	WT-2-2	MAC8	WT-2-2
TP9	Test Point	MAC8	WT-2-2	MAC8	WT-2-2	MAC8	WT-2-2
TP10	Test Point	MAC8	WT-2-2	MAC8	WT-2-2	MAC8	WT-2-2
TP11	Test Point	MAC8	WT-2-2	MAC8	WT-2-2	MAC8	WT-2-2
TP12	Test Point	MAC8	WT-2-2	MAC8	WT-2-2	MAC8	WT-2-2
TP13	Test Point	MAC8	WT-2-2	MAC8	WT-2-2	MAC8	WT-2-2
SCR1	Screw	KEYSTONE	9427	KEYSTONE	9427	KEYSTONE	9427
SCR2	Screw	KEYSTONE	9427	KEYSTONE	9427	KEYSTONE	9427
SCR3	Screw	KEYSTONE	9427	KEYSTONE	9427	KEYSTONE	9427
SCR4	Screw	KEYSTONE	9427	KEYSTONE	9427	KEYSTONE	9427
SO1	Spacer	KEYSTONE	1902C	KEYSTONE	1902C	KEYSTONE	1902C
SO2	Spacer	KEYSTONE	1902C	KEYSTONE	1902C	KEYSTONE	1902C
SO3	Spacer	KEYSTONE	1902C	KEYSTONE	1902C	KEYSTONE	1902C
SO4	Spacer	KEYSTONE	1902C	KEYSTONE	1902C	KEYSTONE	1902C

## 13. Parts List: i7AxxA-C01-EVK-S1

Evaluation Kit Part Number		i7A33A-C01-EVK-S1		i7A45A-C01-EVK-S1		i7A60A-C01-EVK-S1	
Schematic Circuit Code	Part Type	Manufacturer (Mfr)	Mfr Part No.	Manufacturer (Mfr)	Mfr Part No.	Manufacturer (Mfr)	Mfr Part No.
i7A_i7C	DC-DC Module	TDK Lambda	i7A4W033A033V-001-R	TDK Lambda	i7A24045A033V-001-R	TDK Lambda	i7A12060A008V-001-R
Q1	Transistor	<b>OMIT</b>		<b>OMIT</b>		<b>OMIT</b>	
C1	Capacitor	TDK	C3225X7R1N106M250AC	TDK	C3225X7R1N106M250AC	TDK	C3225X7R1N106M250AC
C2	Capacitor	TDK	C3225X7R1N106M250AC	TDK	C3225X7R1N106M250AC	TDK	C3225X7R1N106M250AC
C3	Capacitor	TDK	C3225X7R1N106M250AC	TDK	C3225X7R1N106M250AC	TDK	C3225X7R1N106M250AC
C4	Capacitor	TDK	C3225X7R1N106M250AC	TDK	C3225X7R1N106M250AC	TDK	C3225X7R1N106M250AC
C5	Capacitor	TDK	C3225X7R1N106M250AC	TDK	C3225X7R1N106M250AC	TDK	C3225X7R1N106M250AC
C6	Capacitor	TDK	C3225X7R1N106M250AC	TDK	C3225X7R1N106M250AC	TDK	C3225X7R1N106M250AC
C7	Capacitor	TDK	C3225X7R1N106M250AC	TDK	C3225X7R1N106M250AC	TDK	C3225X7R1N106M250AC
C8	Capacitor	TDK	C3225X7R1N106M250AC	TDK	C3225X7R1N106M250AC	TDK	C3225X7R1N106M250AC
C9	Capacitor	TDK	C3225X7R1N106M250AC	TDK	C3225X7R1N106M250AC	TDK	C3225X7R1N106M250AC
C10-C12	Capacitor	<b>OMIT</b>		<b>OMIT</b>		<b>OMIT</b>	
C13	Capacitor	TDK	C3225X7R1N106M250AC	TDK	C3225X7R1N106M250AC	TDK	C3225X7R1N106M250AC
C14-C18	Capacitor	<b>OMIT</b>		<b>OMIT</b>		<b>OMIT</b>	
C19	Capacitor	NI-CHEMI	EMHS800ARA271MLHOS	NI-CHEMI	EMHS800ARA271MLHOS	NI-CHEMI	EMHB630ARA361MLHOS
C20-C22	Capacitor	<b>OMIT</b>		<b>OMIT</b>		<b>OMIT</b>	
C23	Capacitor	MURATA	GRM32ER7J1J106MA12L	MURATA	GRM32ER7J1J106MA12L	MURATA	GRM32ER7J1J106MA12L
C24	Capacitor	MURATA	GRM32ER7J1J106MA12L	MURATA	GRM32ER7J1J106MA12L	MURATA	GRM32ER7J1J106MA12L
C25	Capacitor	MURATA	GRM32ER7J1J106MA12L	MURATA	GRM32ER7J1J106MA12L	MURATA	GRM32ER7J1J106MA12L
C26	Capacitor	MURATA	GRM32ER7J1J106MA12L	MURATA	GRM32ER7J1J106MA12L	MURATA	GRM32ER7J1J106MA12L
C27	Capacitor	MURATA	GRM32ER7J1J106MA12L	MURATA	GRM32ER7J1J106MA12L	MURATA	GRM32ER7J1J106MA12L
C28	Capacitor	<b>OMIT</b>		<b>OMIT</b>		MURATA	GRM32ER7J1J106MA12L
C29	Capacitor	<b>OMIT</b>		<b>OMIT</b>		MURATA	GRM32ER7J1J106MA12L
C30-C34	Capacitor	<b>OMIT</b>		<b>OMIT</b>		<b>OMIT</b>	
C35	Capacitor	NI-CHEMI	EMHB630ARA361MLHOS	NI-CHEMI	EMHB630ARA361MLHOS	NI-CHEMI	EMHB630ARA361MLHOS
C36	Capacitor	<b>OMIT</b>		<b>OMIT</b>		<b>OMIT</b>	
C37-C38	Capacitor	<b>OMIT</b>		<b>OMIT</b>		<b>OMIT</b>	
C39	Capacitor	<b>OMIT</b>		<b>OMIT</b>		<b>OMIT</b>	
C40	Capacitor	TDK	C1608X7S2A104KT	TDK	C1608X7S2A104KT	TDK	C1608X7S2A104KT
F1	<b>OMIT</b>						
BB1	Copper Pin	ROWLEY SPRING	ZP00185_01	ROWLEY SPRING	ZP00185_01	ROWLEY SPRING	ZP00185_01
BB2	Copper Pin	ROWLEY SPRING	ZP00185_01	ROWLEY SPRING	ZP00185_01	ROWLEY SPRING	ZP00185_01
BB3	Copper Pin	<b>OMIT</b>		ROWLEY SPRING	ZP00185_01	ROWLEY SPRING	ZP00185_01
BB4	Copper Pin	ROWLEY SPRING	ZP00185_01	ROWLEY SPRING	ZP00185_01	ROWLEY SPRING	ZP00185_01
BB5	Copper Pin	ROWLEY SPRING	ZP00185_01	ROWLEY SPRING	ZP00185_01	ROWLEY SPRING	ZP00185_01
IC1	<b>OMIT</b>						
VR1	Resistor	BOURNS	3266W-1-503LF	BOURNS	3266W-1-503LF	BOURNS	3266W-1-503LF
L1	<b>OMIT</b>						
R1-R7	<b>OMIT</b>						
R8	Resistor	KOA	RK73H1JTTD40R2F	KOA	RK73H1JTTD2490F	KOA	RK73H1JTTD1400F
R9	<b>OMIT</b>						
R10	Resistor	KOA	RK73H1JTTD1R00F	KOA	RK73H1JTTD1R00F	KOA	RK73H1JTTD1R00F
R11-R15	<b>OMIT</b>						
CN1	<b>OMIT</b>						
S1	Switch	LIGHT COUNTRY	2US1T1A1M2RES	LIGHT COUNTRY	2US1T1A1M2RES	LIGHT COUNTRY	2US1T1A1M2RES
J1-J4	Screws & Terminals	KEYSTONE	8196	KEYSTONE	8196	KEYSTONE	8196
TP1	Test Point: Vin(+)	MAC8	WT-2-2	MAC8	WT-2-2	MAC8	WT-2-2
TP2	Test Point: Vin(-)	MAC8	WT-2-2	MAC8	WT-2-2	MAC8	WT-2-2
TP3	<b>OMIT</b>						
TP4	Test Point: On/Off	MAC8	WT-2-2	MAC8	WT-2-2	MAC8	WT-2-2
TP5	<b>OMIT</b>						
TP6	<b>OMIT</b>						
TP8	Test Point: SENSE+	MAC8	WT-2-2	MAC8	WT-2-2	MAC8	WT-2-2
TP9	<b>OMIT</b>						
TP10	Test Point: Vout(+)	MAC8	WT-2-2	MAC8	WT-2-2	MAC8	WT-2-2
TP11	Test Point: Vout(-)	MAC8	WT-2-2	MAC8	WT-2-2	MAC8	WT-2-2
TP12	Test Point: Vout(+)	MAC8	WT-2-2	MAC8	WT-2-2	MAC8	WT-2-2
TP13	Test Point: Vout(-)	MAC8	WT-2-2	MAC8	WT-2-2	MAC8	WT-2-2
SCR1-SCR4	Screws for Standoffs	KEYSTONE	9427	KEYSTONE	9427	KEYSTONE	9427
SO1-SO4	Standoffs	KEYSTONE	1902C	KEYSTONE	1902C	KEYSTONE	1902C