0RQB-S0M12x Series

Isolated DC-DC Converter

The 0RQB-S0M120/L is an isolated DC/DC converter that operates from a nominal 54 VDC source. This converter is intended to provide isolation and step down to generate an regulated intermediate bus for the purpose of powering non-isolated Point-of-Load (POL) converters. This unit will provide up to 700W of output power from a nominal 54 VDC input. This converter is provided in a 1/4 brick package.

Key Features & Benefits

- 46 VDC - 60 VDC Input
- 12 VDC / 60 A Output
- Isolated
- Input Under-voltage Protection
- High Efficiency
- Output Over-voltage Protection
- Fixed Frequency (250 kHz)
- OCP/SCP
- High Power Density
- Over Temperature Protection
- Low Cost
- Remote ON/OFF
- Class 2, Category 2, Isolated DC/DC Converter (refer to IPC-9592A)

RoHS Compliant

Applications

- Networking
- Computers and Peripherals
- Telecommunications

1. MODEL SELECTION

OUTPUT VOLTAGE	INPUT VOLTAGE	MAX. OUTPUT CURRENT	MAX. OUTPUT POWER	TYPICAL EFFICIENCY	MODEL NUMBER ACTIVE LOW	MODEL NUMBER ACTIVE HIGH
12 VDC	46 - 60 VDC	60 A	720 W	96.5%	0RQB-S0M12L	0RQB-S0M120

NOTE: Add "G" suffix at the end of the model number to indicate Tray Packaging.

PART NUMBER EXPLANATION

0	R	QB	-	S0	M	12	x	y
Mount Type	RoHS Status	Series Name		Output power	Input Range	Output Voltage	Active Logic	Package
Through hole mount	RoHS	1/4th brick		720W	46 - 60 V	12 V	0- Active high with base plate L- Active low with base plate	G-Tray package

2. ABSOLUTE MAXIMUM RATINGS

PARAMETER	DESCRIPTION	MIN	TYP	MAX	UNITS
Continuous Input Voltage		-0.3	-	65	V
Remote On/Off		-0.3	-	10	V
Ambient Temperature		-40	-	85	°C
Storage Temperature		-55	-	125	°C

NOTE: Ratings used beyond the maximum ratings may cause a reliability degradation of the converter or may permanently damage the device.

3. INPUT SPECIFICATIONS

PARAMETER	DESCRIPTION	MIN	TYP	MAX	UNIT
Operating Input Voltage		46	54	60	V
Input Current (full load)		-	-	18	A
Input Current (no load)		-	140	200	mA
Remote Off Input Current		-	4	8	mA
Input Reflected Ripple Current (pk-pk)	With simulated source impedance of 10µH, 5Hz to 20MHz. Use a 100µF/100V electrolytic capacitor with ESR=1 ohm max, at 200KHz@25°C.	-	20	100	mA
Input Reflected Ripple Current (rms)		-	200	600	mA
I^2t Inrush Current Transient		-	-	1.5	A^2s
Turn-on Voltage Threshold		41	43	45	V
Turn-off Voltage Threshold		38	40	42	V

CAUTION: This converter is not internally fused. An input line fuse must be used in application.

Recommend a fast-acting fuse with maximum rating of 20A on system board. Refer to the fuse manufacture's datasheet for further information.

NOTE: All specifications are typical at 25 °C unless otherwise stated.

4. OUTPUT SPECIFICATIONS

PARAMETER	DESCRIPTION		MIN	TYP	MAX
Output Voltage Set Point	Vin=54V, Io=50% load at 25°C ambient.		11.76	12.00	12.24
Output Voltage range	Vin=50~60V	Io=0~100% load at all ambient	11.40	-	12.60
	Vin=46~50V		10.80	-	12.60
Load Regulation	Vin=46~60V	Io=0~100% load at 25°C ambient	-	100	200
Line Regulation	Io=100% load at 25°C ambient	Vin=46~50V	1000	1200	mV
		Vin=50~60V	50	100	mV
Output Ripple and Noise (pk-pk)	Vin=54V, Io=100%load at 25oC ambient, 0-20MHz BW, with a 1μF ceramic capacitor and a 10μF Tantalum cap at output.		-	70	120
Output Ripple and Noise (rms)			-	20	30
Ripple and Noise (pk-pk) under worst case	Over all operating input voltage, load and ambient temperature condition.		-	-	200
Output Current Range	Peak power for max 3ms		0	-	60
Output Power			-	-	850
Output DC Current Limit			70	-	82
Short Circuit Surge Transient			-	-	2
Rise Time			-	-	20
Turn on Time	Enable form Vin		-	30	40
	Enable form ON/OFF		-	30	40
Overshoot at Turn on			-	0	3
Output Capacitance			270	-	10000
Transient Response					
ΔV 50% - 75% of Max Load	Overshoot	di/dt=1A/μs, Vin=54VDC, Ta=25°C, with a 1μF ceramic capacitor and a 270μF AL. cap at output.	-	350	500
	Settling Time		-	100	200
ΔV 75% - 50% of Max Load	Overshoot		-	350	500
	Settling Time		-	100	200

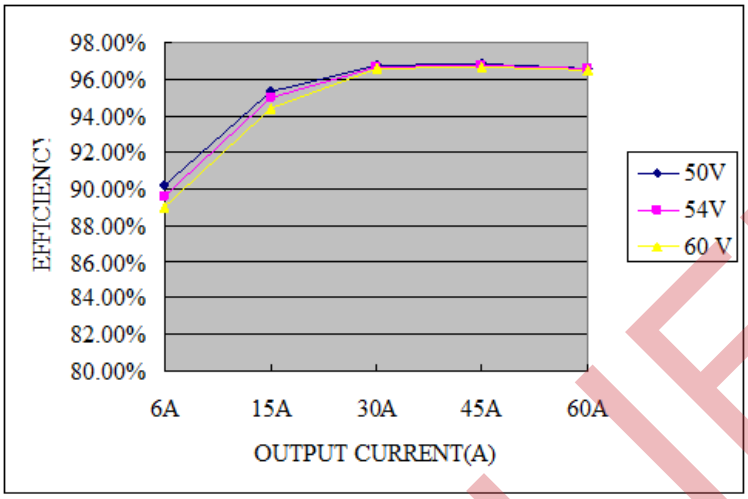
NOTE: All specifications are typical at nominal input, full load at 25°C unless otherwise stated.

5. GENERAL SPECIFICATIONS

PARAMETER	DESCRIPTION	MIN	TYP	MAX
Efficiency	Vin=54V, Io=100% load	94.6	96.5	-
Switching Frequency		230	250	270
FIT	Calculated Per Bell Core SR-332 (Vin=54V, Vo=12 V, Io=48A, Ta = 25°C, FIT=10^9/MTBF)		161	
Over Temperature Protection		-	125	-
Over Voltage Protection		-	-	15
Isolation Characteristics				
Isolation Capacitance		-	2700	-
Isolation Resistance		10M	-	-
Input to Output		500	-	-
Weight		-	70	-
Dimensions (L × W ×H)			2.28 x 1.45 x 0.53 57.91 x 36.83 x 13.4	

NOTE: All specifications are typical at 25 °C unless otherwise stated.

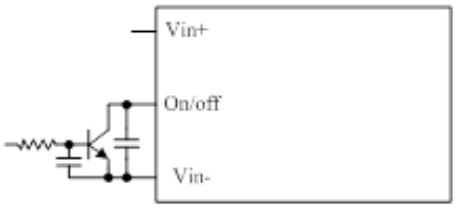
6. EFFICIENCY DATA



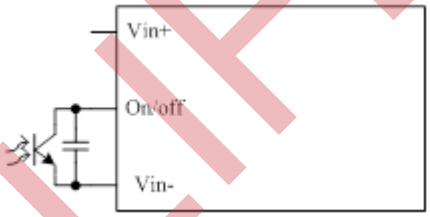
7. REMOVE ON/OFF

PARAMETER		DESCRIPTION	MIN	TYP	MAX	UNIT
REMOTE ON/OFF						
Signal Low (Unit On) Signal High (Unit Off)	Active Low	0RQB-S0M12L The remote on/off pin open, Unit off.	-0.3 2.4	- -	0.8 10	V
Signal Low (Unit Off) Signal High (Unit On)	Active High	0RQB-S0M120 The remote on/off pin open, Unit on.	-0.3 2.4	- -	0.8 10	V
Current Sink		-	0	-	0.5	mA

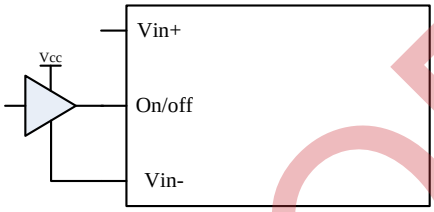
Recommended remote on/off circuit for active low



Control with open collector/drain circuit



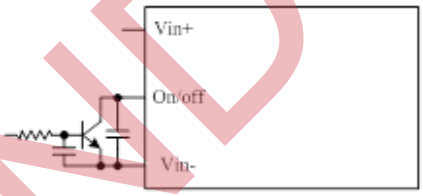
Control with photocoupler circuit



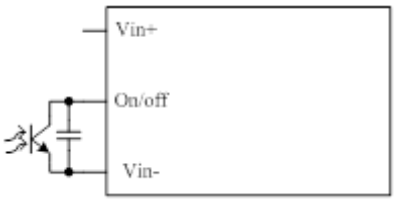
Control with logic circuit

Permanently on

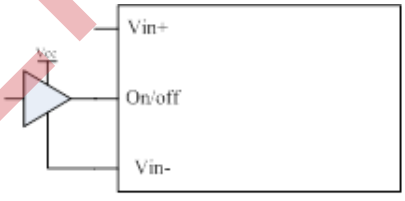
Recommended remote on/off circuit for active high



Control with open collector/drain circuit



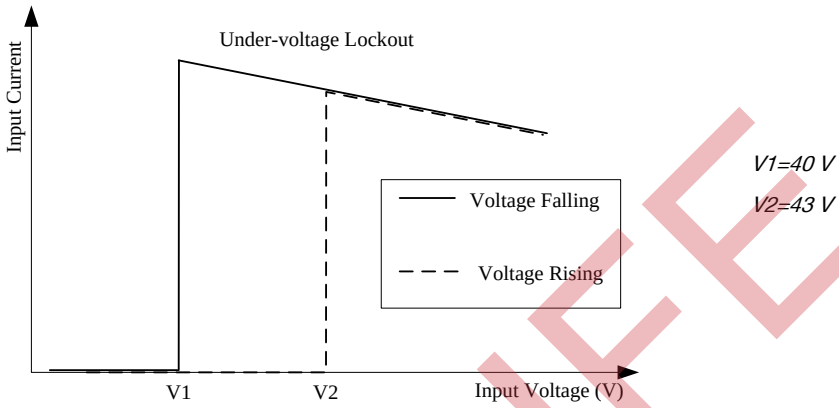
Control with photocoupler circuit



Control with logic circuit

Permanently on

8. INPUT UNDER-VOLTAGE LOCKOUT



9. RIPPLE AND NOISE WAVEFORM

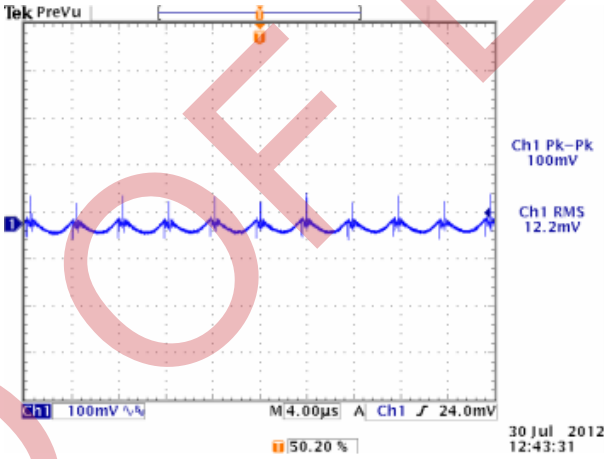
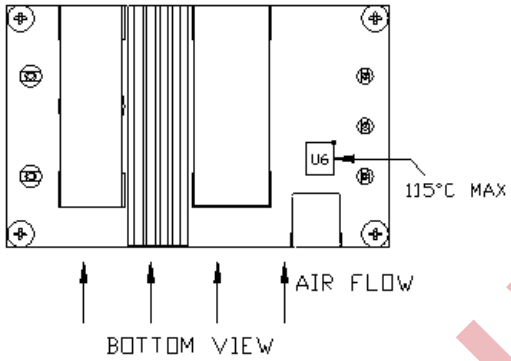


Figure 1. 54VDC input, 12VDC/60A output

NOTE: Ripple and noise at full load, with a 1µF ceramic cap and a 10µF Tan cap at output, Ta=25 ˚ C.

10. THERMAL DERATING CURVES

Maximum junction temperature of semiconductors derated to 120 ℃.



The OTP is achieved by temperature sensor U10 and it is in non-latch mode when the hottest component U6 reaches 115°C with 200LFM air flow correspondingly. It will restart automatically when the temperature falls down to 105°C. The protecting point will be varied a little under different conditions (air flow, ambient temperature, input voltage, load…).

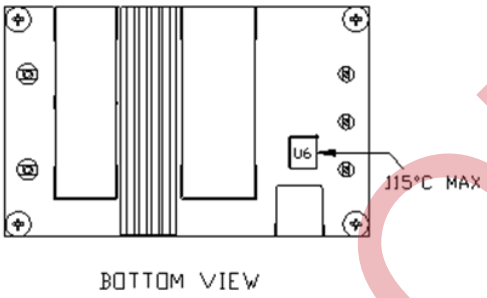


Figure 2. Temperature reference points on bottom side

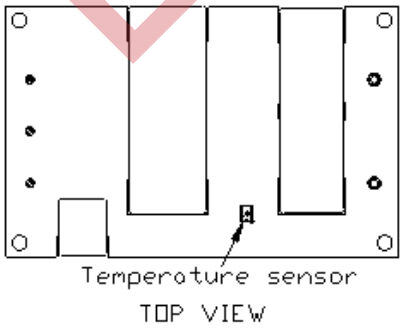


Figure 3..Temperature reference points on top side

11. STARTUP & SHUTDOWN

Turn on rise time

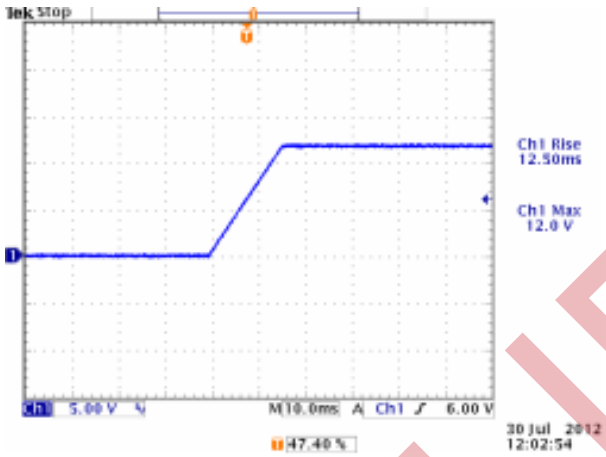


Figure 4. ***Test Condition:*** *Vin=54V, Io=60A, V_o=12V*

Turn on delay time

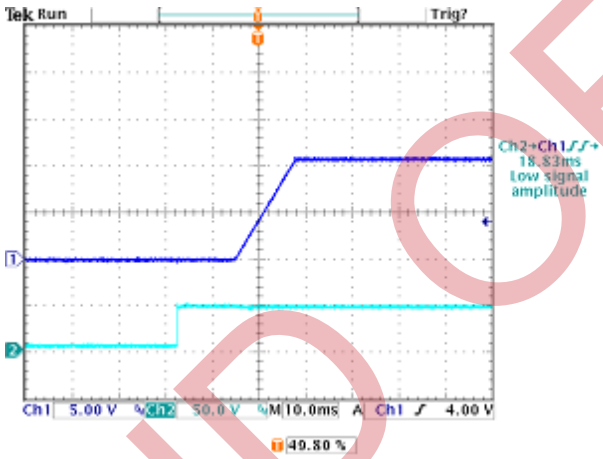


Figure 5. Startup from Vin
Ch1: Vo
Ch2: Vin
Test Condition: *Vin=54V, Vo=12V, Io=60A*

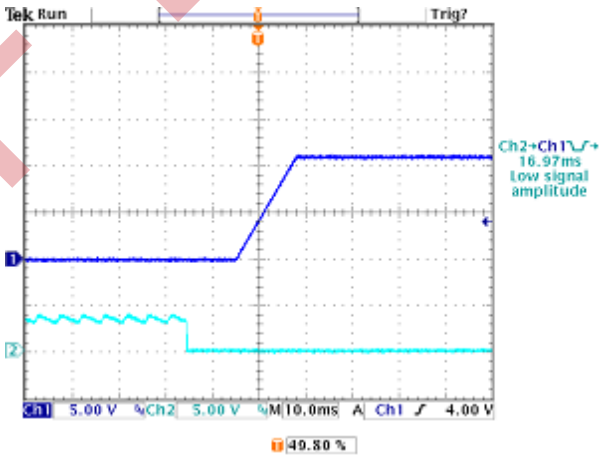


Figure 6. Startup from on/off
Ch1: Vo
Ch3: on/off
Test Condition: *Vin=54V, Vo=12V, Io=60A*

STARTUP & SHUTDOWN(CONTINUED)

Shutdown

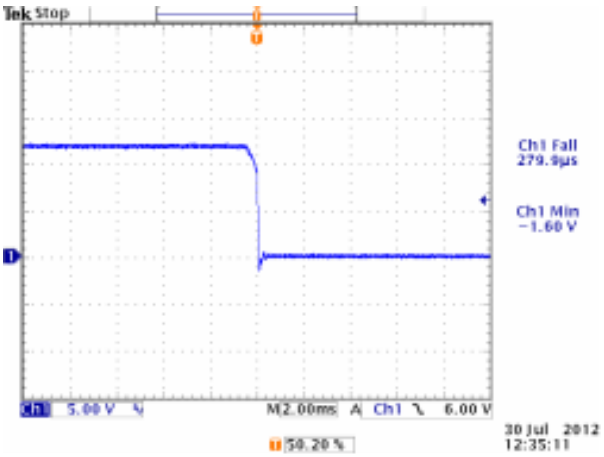


Figure 7. Shutdown from Vin
Test Condition: *Vin=54V, Vo=12V, Io=60A*

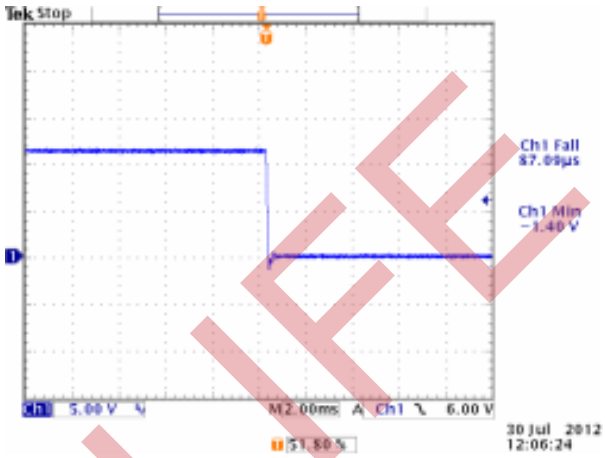


Figure 8. Shutdown from on/off
Test Condition: *Vin=54V, Vo=12V, Io=60A*

12. TRANSIENT RESPONSE WAVEFORMS

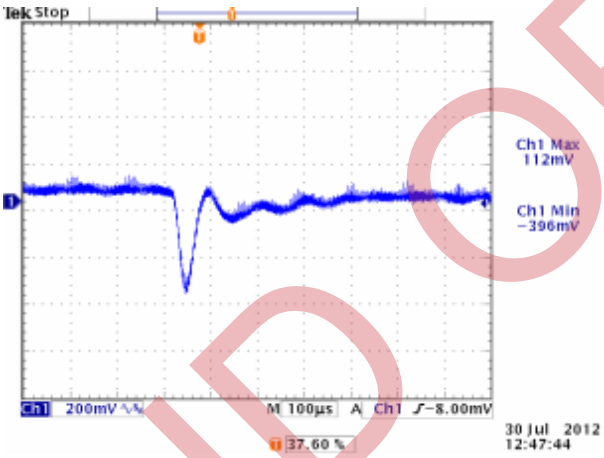


Figure 9. Vin= 54V 50%-75% Load Transients

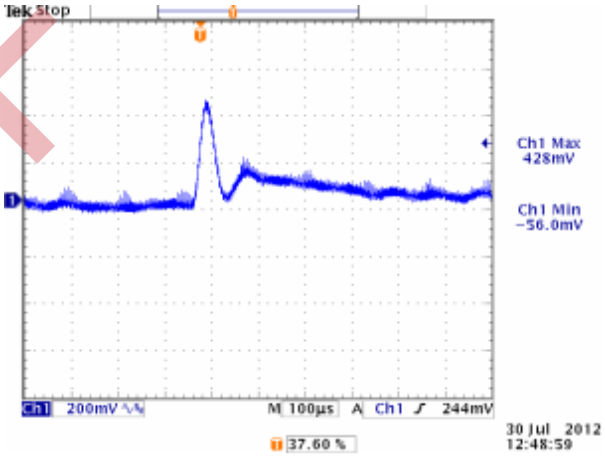


Figure 10. Vin= 54V 75%-50% Load Transients

NOTE: Transient Response at di/dt=0.1A/µs, with a 1µF ceramic cap and a 270µF aluminum cap at the output, Ta=25 ˚C.

13. OVER CURRENT PROTECTION

To provide protection in a fault output overload condition, the module is equipped with internal current-limiting circuitry and can endure current limiting for a few milliseconds. If the over current condition persists beyond a few milliseconds, the module will shut down into hiccup mode and restart once every 400ms. The module operates normally when the output current goes into specified range. The typical average output current is 4.91A during hiccup.

Output current waveform

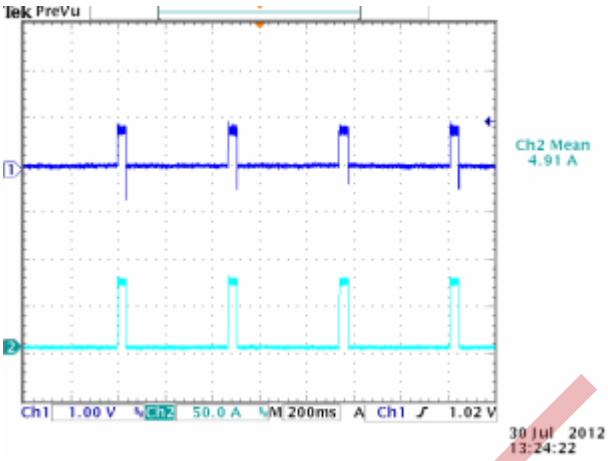


Figure 11. CH1: Output Voltage
CH2: Output Current Waveform
Test condition: *Vin=54V*

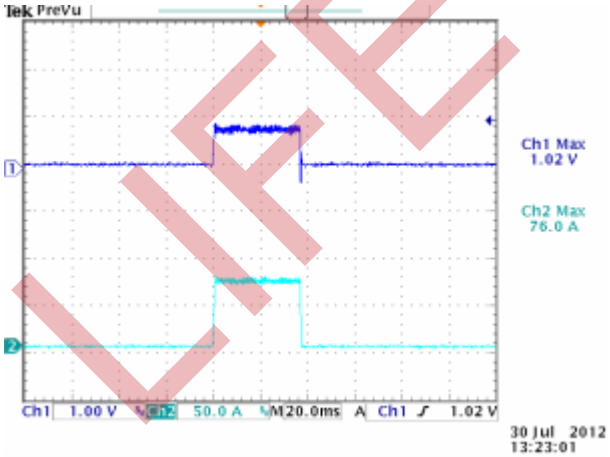
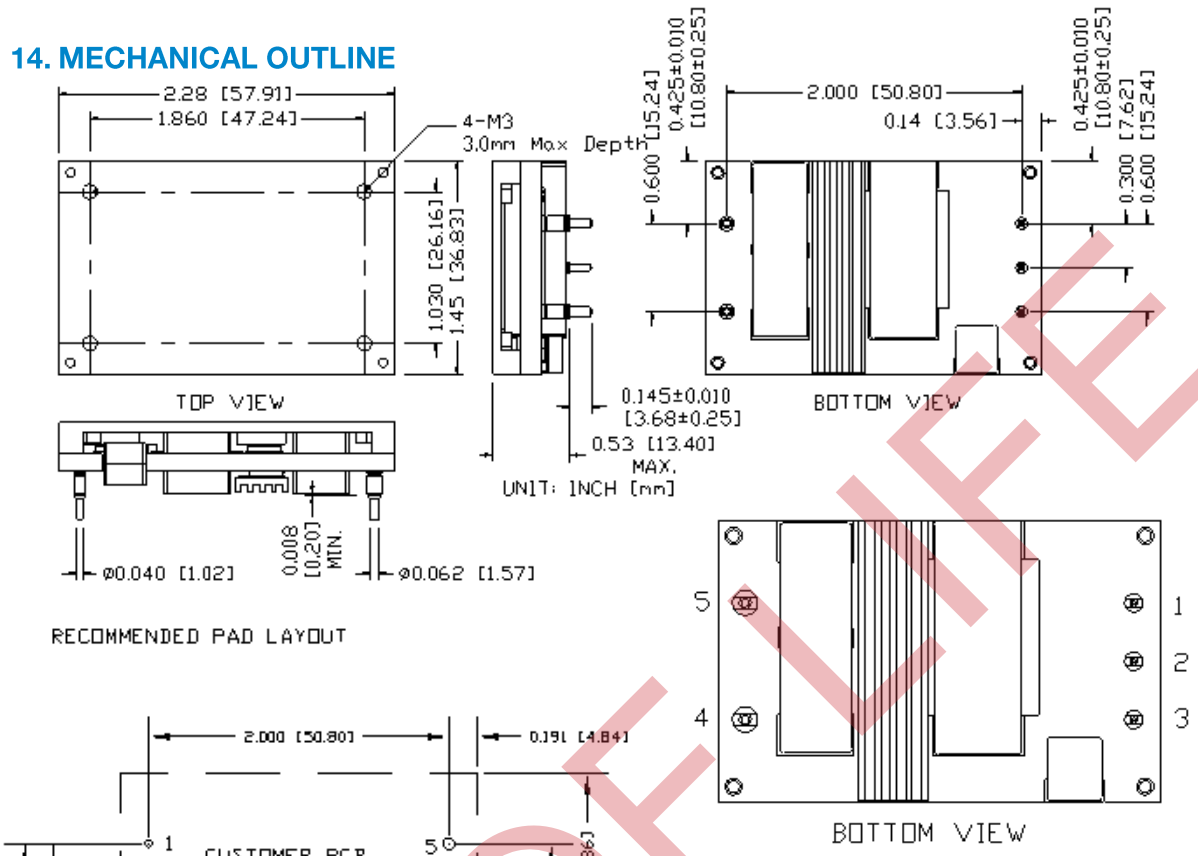


Figure 12.CH1: Output Voltage
CH2: Output Current Waveform
Expansion of on time portion of above figure

14. MECHANICAL OUTLINE



PIN CONNECTIONS

PIN	FUNCTION	DIA.	LENGTH
1	Vin(+)	0.040''	0.145''
2	Enable	0.040''	0.145''
3	Vin(-)	0.040''	0.145''
4	Vout(-)	0.062''	0.145''
5	Vout(+)	0.062''	0.145''

NOTE: This module is recommended and compatible with Pb-Free Wave Soldering and must be soldered using a peak solder temperature of no more than 260 °C for less than 5 seconds.

NOTE:

1) All Pins: Material - Copper Alloy;

Finish – 3 micro inches minimum Gold over 50 micro inches minimum Nickel plate.

2) Undimensioned components are shown for visual reference only.

3) All dimensions in inches (mm); Tolerances: x.xx +/-0.02 in. (x.x +/-0.5mm) x.xxx +/-0.010 in. (x.xx +/-0.25mm).

15. REVISION HISTORY

DATE	REVISION	CHANGES DETAIL	APPROVAL
2012-08-15	A	First release	Zhao Tang
2013-02-26	B	Update Operating Input Voltage, Turn on Voltage Threshold, Turn off Voltage Threshold, Output Voltage, Load Regulation, Line Regulation, Output DC Current Limit, Output Capacitance, UVLO, Temperature reference points. Add Output Power	Zhao Tang
2013-04-26	C	Update Output Voltage, Load Regulation, Peak Power, Dimensions and MD.	Zhao Tang
2018-05-16	AD	Update Part Number, Abs MAX and Output specs	Zhao Tang

For more information on these products consult: tech.support@psbel.com

NUCLEAR AND MEDICAL APPLICATIONS - Products are not designed or intended for use as critical components in life support systems, equipment used in hazardous environments, or nuclear control systems.
TECHNICAL REVISIONS - The appearance of products, including safety agency certifications pictured on labels, may change depending on the date manufactured. Specifications are subject to change without notice.