

ORRE-32S10S

Isolated DC-DC Converter

The ORRE-32S10S is an isolated DC/DC converter that operates from a nominal 42 VDC / 50 VDC source. This converter is intended to provide isolation and step down to generate a regulated intermediate bus for the purpose of powering non-isolated Point-of-Load (POL) converters.

This unit will provide up to 240 W of output power from a nominal 42 VDC / 50 VDC input. The output of the converter has the droop function which allow the modules operating in parallel with high output current sharing precision. This converter is provided in a 1/8th brick package.



Key Features & Benefits

- 38 - 55 VDC Input
- 8.2 VDC /30 A Output
- Isolated
- High Efficiency
- Fixed Frequency (300 kHz)
- High Power Density
- Low Cost
- Parallel Operation
- Input Under-Voltage Protection
- Input Over-Voltage Protection
- Output Over-Voltage Protection
- OCP/SCP
- Over Temperature Protection
- Remote ON/OFF
- Approved to IEC/EN 62368-1
- Approved to UL/CSA 62368-1
- Class II, Category 2, Isolated DC/DC Converter (refer to IPC-9592B)

Applications

- Networking
- Computers and Peripherals
- Telecommunication

1. MODEL SELECTION

MODEL NUMBER ACTIVE LOW	OUTPUT VOLTAGE	INPUT VOLTAGE	MAX. OUTPUT CURRENT	MAX. OUTPUT POWER	TYPICAL EFFICIENCY
ORRE-32S10SG	8.2 VDC	38 – 55 VDC	30 A	240 W	96%

PART NUMBER EXPLANATION

0	R	RE	-	32	S	10	S	G
Mounting Type	RoHS Status	Series Name		Output Power	Input Range	Output Voltage	Logic Status	Package
Through Hole Mount	RoHS	1/8 th Brick		240 W	38 – 55 V	8.2 V	Active Low, Open Frame	Tray Package

2. ABSOLUTE MAXIMUM RATINGS

PARAMETER	DESCRIPTION	MIN	TYP	MAX	UNITS
Continuous non-operating Input Voltage		-0.3	-	60	V
Remote On/Off		-0.3	-	10	V
Ambient Temperature		-20	-	70	°C
Storage Temperature		-40	-	100	°C
Altitude		-	-	5000	m

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		38	50	55	V
Input Current		-	-	10	A
Input Current (no load)		-	120	180	mA
Remote Off Input Current		-	4	8	mA
Input Reflected Ripple Current (pk-pk)		-	350	450	mA
Input Reflected Ripple Current (rms)		-	100	150	mA
Turn on Voltage Threshold		35	36.5	38	V
Turn off Voltage Threshold		33	34.5	36	V
I ² t Inrush Current Transient		-	-	1	A ² s

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 15 A 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	UNIT
Output Voltage Set Point	Vin = 38-55 V, Io = 0 load	8.77	8.8	8.83	V
	Vin = 38-55 V, Io = 100% load	8.175	8.2	8.225	
	Vin < 38 V, Io = 0 load	8.0	8.1	8.2	
	Vin < 38 V, Io = 100% load	7.4	7.5	7.6	
Line Regulation	Vin = 38-55 V, Io = 100% load	-	25	40	mV
Load Regulation	Vin = 50 V, Io = 0~100% load (The output droop voltage from no load to full load is about 0.6 V)	-	0.6	0.65	V
Output Current Range		0	-	30	A
Output Ripple and Noise (pk-pk)	Vin = 50 V, Io = 100 %load, 0-20 MHz BW, with 1 μ F ceramic capacitor and a 10 μ F Tantalum cap at output	-	50	150	mV
Output Ripple and Noise (rms)		-	10	25	mV
Ripple and Noise (pk-pk) under worst case	Over entire operating input voltage range, load and ambient temperature condition	-	-	200	mV
Output DC Current Limit		33	38	43	A
Output Current Range		0	-	36	A
Current Share Accuracy	Vin = 50 V, Io = full load, two units parallel operation	-	-	\pm 5	%
Turn on Time	Enable from Vin	-	30	35	ms
	Enable from ON/OFF	-	30	35	
Rise Time		-	-	15	ms
Overshoot at Turn on		-	0	3	%
Short Circuit Surge Transient		-	-	2	A ² s
Output Capacitance		0	-	5000	μ F
Transient Response					
Δ v 50% ~ 75% of Max Load	Overshoot	-	350	500	mV
	Settling Time	di/dt = 1 A/ μ s, Vin = 50 VDC, with a 1 μ F ceramic capacitor and a 10 μ F Tantalum cap at output	-	100	200
Δ V 75% ~ 50% of Max Load	Overshoot	-	350	500	mV
	Settling Time	-	100	200	μ s

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

5. OUTPUT PLOT VS INPUT

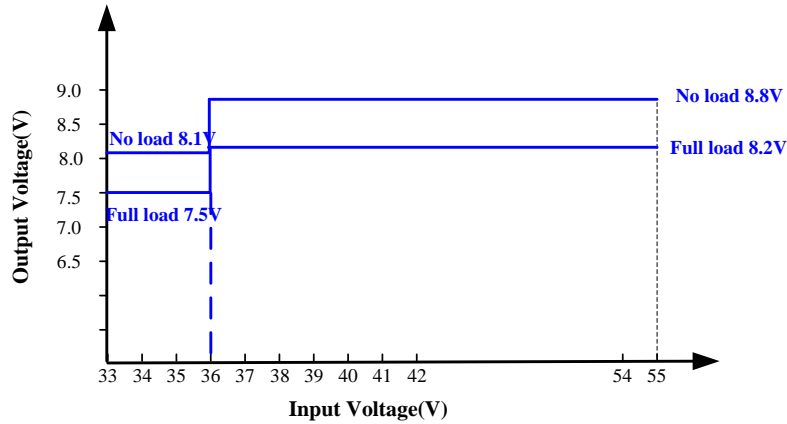


Figure 1. Output plot vs input

PARAMETER	MIN	TYP	MAX	UNITS
Turn-on Voltage Threshold	35	36.5	38	V
Turn-off Voltage Threshold	33	34.5	36	V

6. GENERAL SPECIFICATIONS

PARAMETER	DESCRIPTION	MIN	TYP	MAX	UNIT
Efficiency	Vin = 50 V, full load	94	96	-	%
Switching Frequency		280	300	320	kHz
FIT*	Calculated Per Bell Core SR-272 (Vin = 50 V, Vo = 9.2 V, Io = 26 A, FIT = 10 ⁹ /MTBF)	-	190	-	-
Over Temperature Protection		-	125	-	°C
Over Voltage Protection		-	-	15	V
Weight		-	42	-	g
Dimensions (L × W × H)			2.30 × 0.90 × 0.43		inch
			58.42 × 22.86 × 11.00		mm
Isolation Characteristics					
Isolation Capacitance		-	2700	-	pF
Isolation Resistance		10M	-	-	ohm
Input to Output		500	-	-	V

7. EFFICIENCY DATA

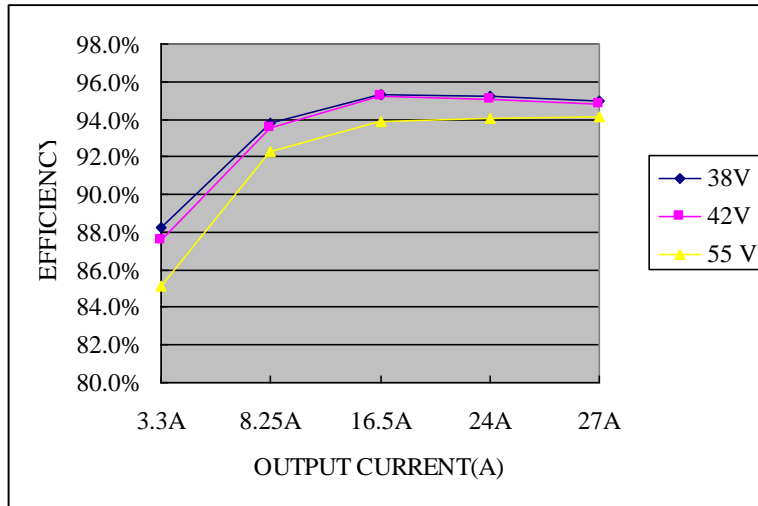


Figure 2. Efficiency data

8. REMOTE ON/OFF

PARAMETER	DESCRIPTION	MIN	TYP	MAX	UNIT
Signal Low (Unit On)	Active Low 0RRE-32S10S The remote on/off pin open, Unit off	-0.3	-	0.8	V
Signal High (Unit Off)		2.4	-	10	
Current Sink		0	-	0.5	mA

Recommended remote on/off circuit for active low

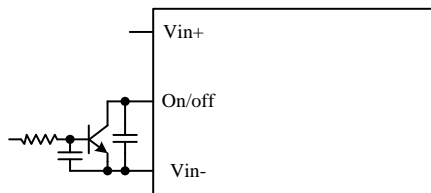


Figure 3. Control with open collector/drain circuit

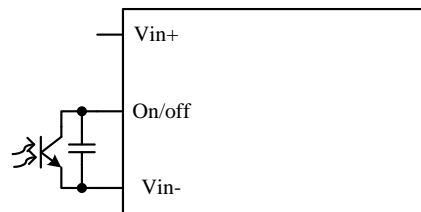


Figure 4. Control with photocoupler circuit

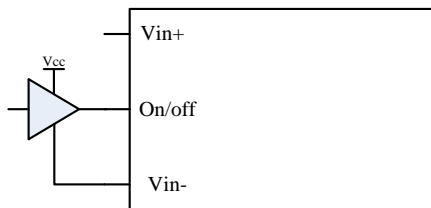


Figure 5. Control with logic circuit

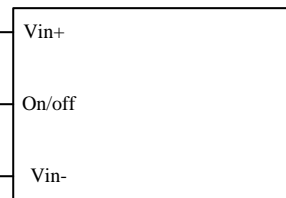


Figure 6. Permanently on

9. RIPPLE AND NOISE WAVEFORM

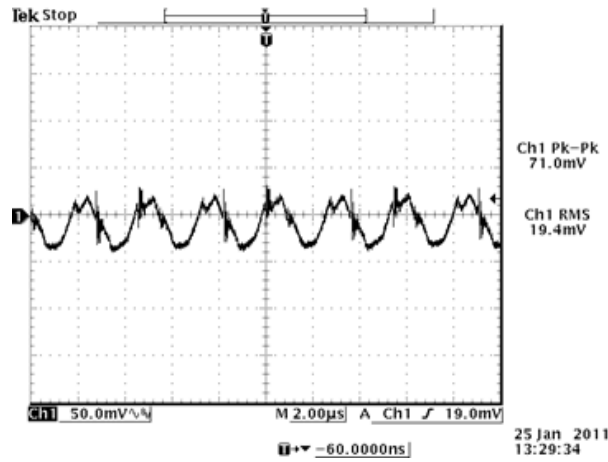


Figure 7. 50 VDC input, 8.2 VDC / 36 A output

NOTE: Ripple and noise at full load, 48 V input, with a 1 µF ceramic capacitor and a 10 µF tantalum capacitor at the output, Ta = 25°C.

10. TRANSIENT RESPONSE

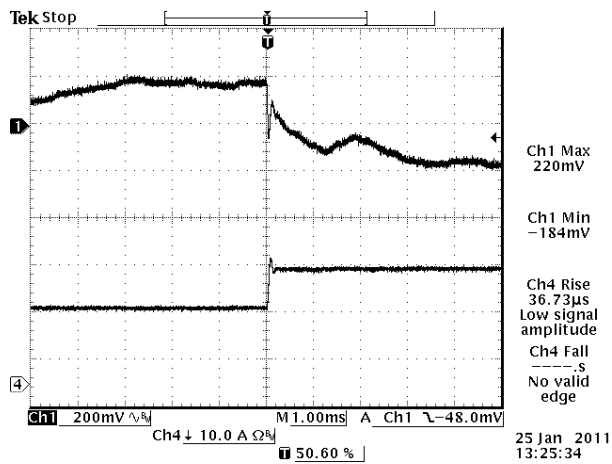


Figure 8. Vin = 50 V, 50%-75% Load Transients

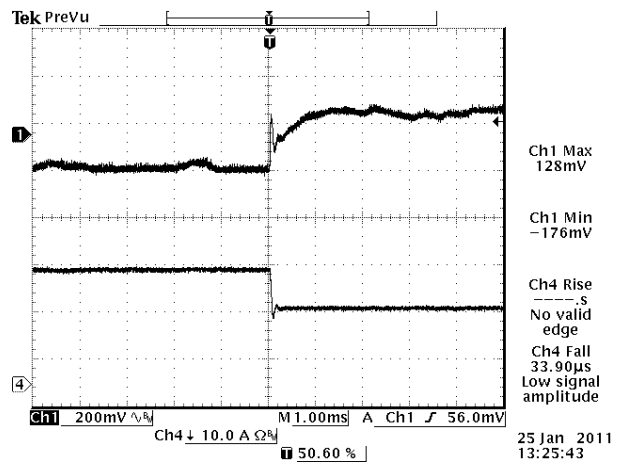


Figure 9. Vin = 50 V, 75%-50% Load Transients

NOTE: Transient Response at di/dt = 1 A/µs, with 8x22 µF ceramic capacitor, Ta = 25 °C.

11. STARTUP & SHUTDOWN

Turn on Rise Time

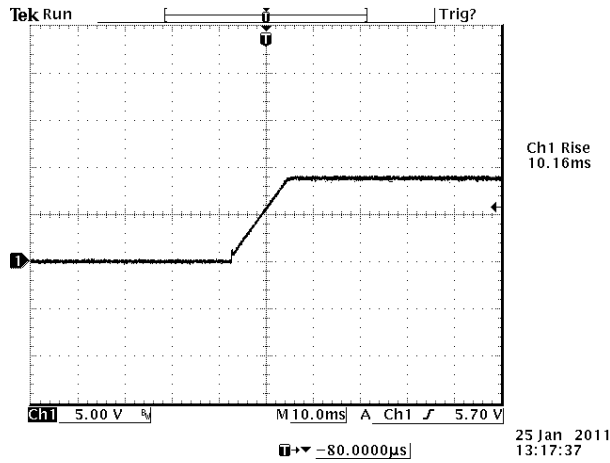


Figure 10. $V_{in} = 50\text{ V}$, $V_o = 8.2\text{ V}$, $I_o = 30\text{ A}$

Turn on Delay Time

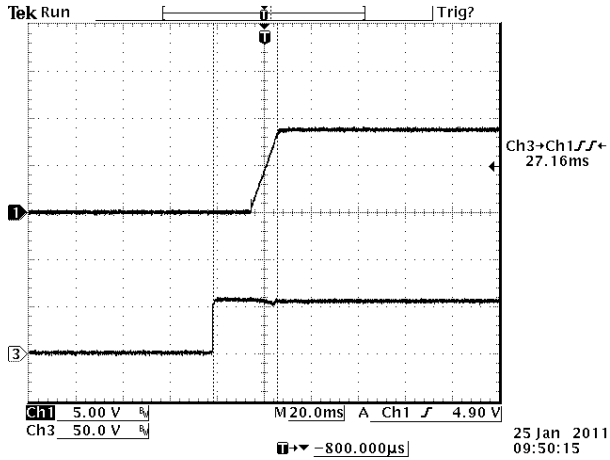


Figure 11. Startup from V_{in}
 Ch1: V_o
 Ch3: V_{in}
 $V_{in} = 50\text{ V}$, $V_o = 8.2\text{ V}$, $I_o = 36\text{ A}$

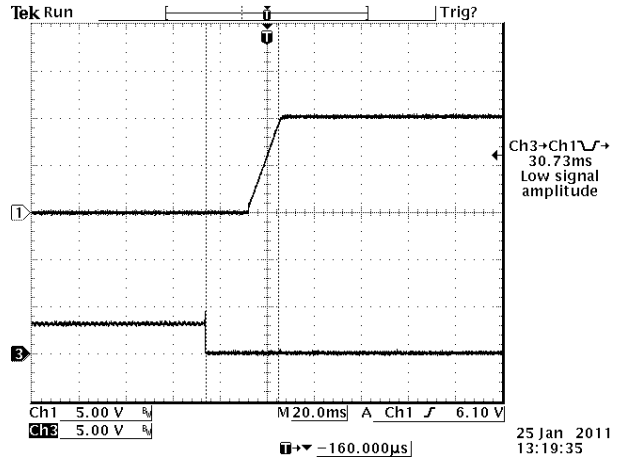


Figure 12. Startup from on/off
 Ch1: V_o
 Ch3: on/off
 $V_{in} = 50\text{ V}$, $V_o = 8.2\text{ V}$, $I_o = 36\text{ A}$

Shutdown

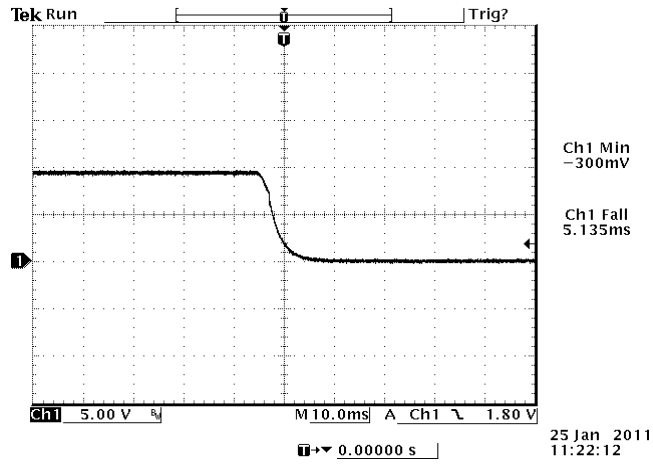


Figure 13. $V_{in} = 50 V$, $V_o = 8.2 V$, $I_o = 30 A$

12. OVER CURRENT PROTECTION

To provide protection in a fault output overload condition, the module is equipped with internal current-limiting circuitry which 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 400 ms. The module operates normally when the output current goes into specified range. The typical average output current is 2 A during hiccup.

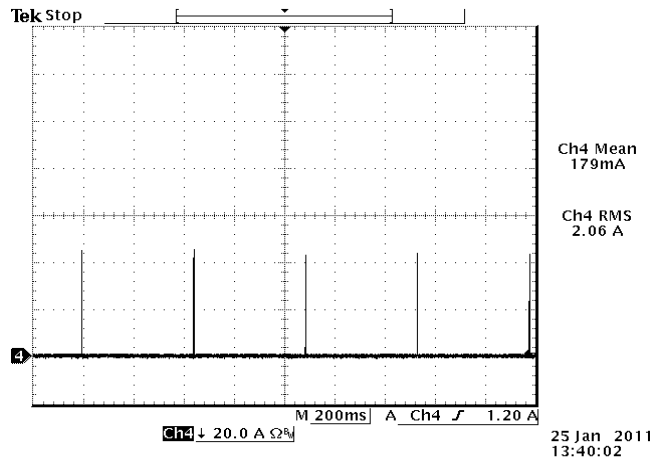


Figure 14. CH4: Output Current Waveform $V_{in} = 50 V$

13. INPUT UNDER-VOLTAGE LOCKOUT

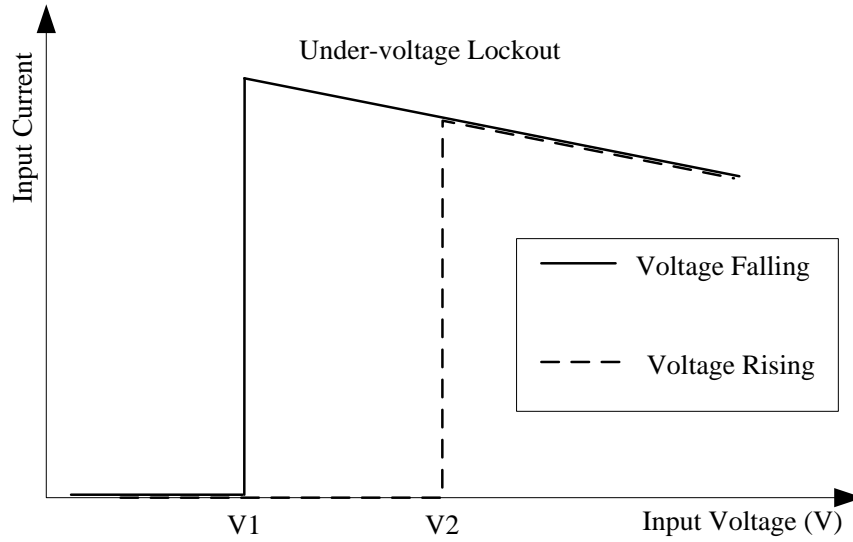


Figure 15. Input under-voltage lockout
V1 = 34.5 V
V2 = 36.5 V

14. THERMAL DERATING CURVES

Maximum junction temperature of semiconductors derated to 120 °C.

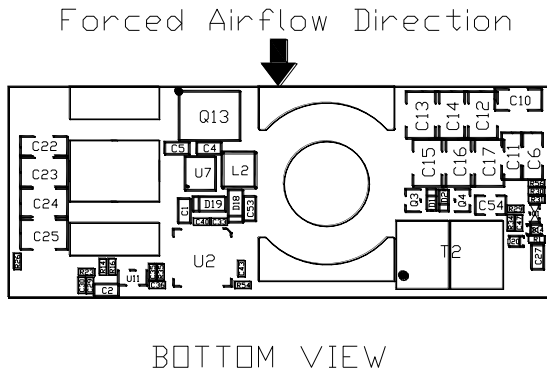


Figure 16. Airflow direction

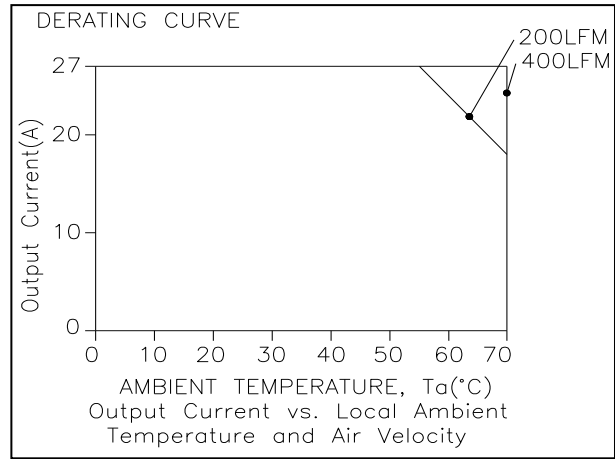


Figure 17. Derating curve under 50V input

The OTP is achieved by temperature sensor U10 and it's in non-latch mode when the hottest component U7 reaches 125°C with 200 LFM air flow correspondingly. It will restart automatically when the temperature falls to 105°C. The protecting point will be varied a little under different conditions (air flow, ambient temperature, input voltage, load...).

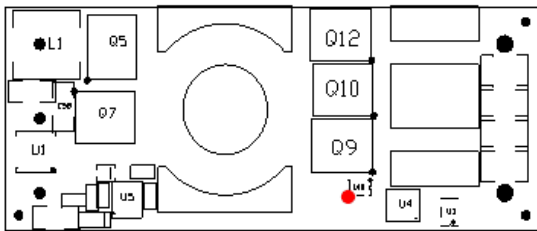


Figure 18. Temperature reference points on top side

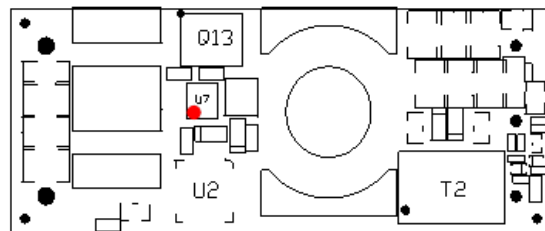


Figure 19. Temperature reference points on bottom side

15. SAFETY & EMC

Safety:

- 1. Material flammability UL94V-0
- 2. Approved to IEC/EN 62368-1
- 3. Approved to UL/CSA 62368-1

EMC:

- 1. Conductive EMI: EN 55032 class A

Compliance to EN 55032 class A (both peak and average) with the following inductive and capacitive filter

Test Setup:

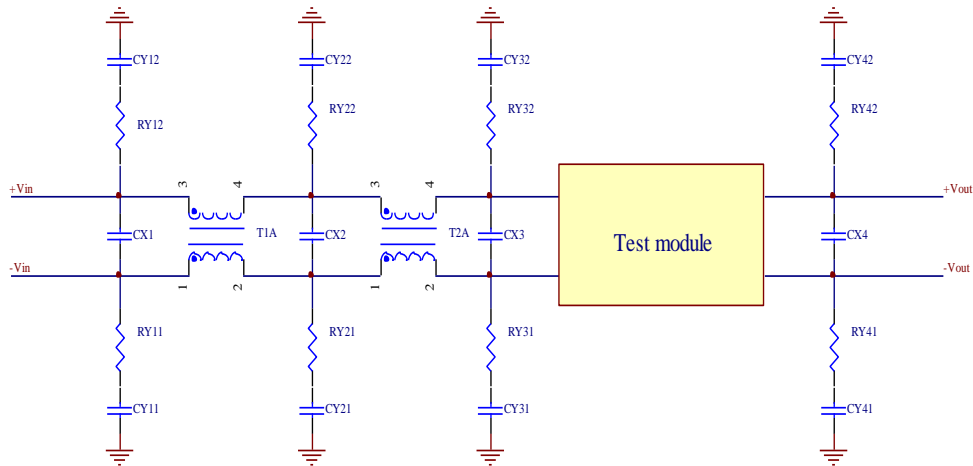


Figure 20.

T1A	CX1	RY11	RY12	CY11	CY12
T2A	CX2	RY21	RY22	CY21	CY22
0.75mH	100uF AL				
	CX3	RY31	RY32	CY31	CY32
	220uF AL	0R	0R	6.8nF	6.8nF
	CX4	RY41	RY42	CY41	CY42
		0R	0R	6.8nF × 2	6.8nF × 2

Positive

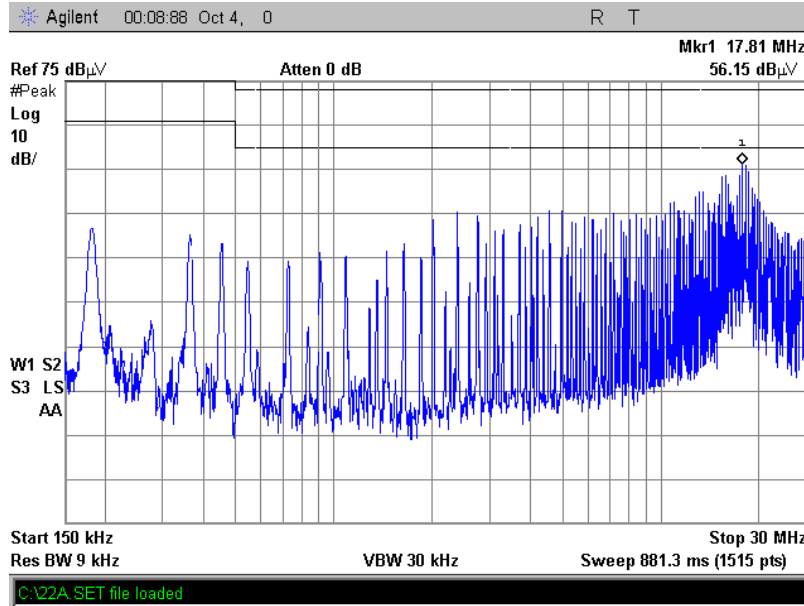


Figure 21.

Negative

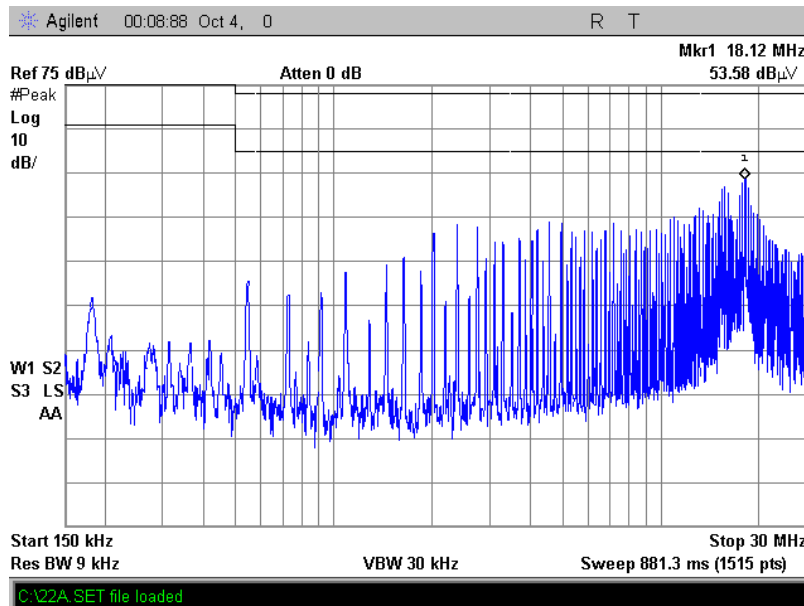


Figure 22.

16. MECHANICAL DIMENSIONS

OUTLINE

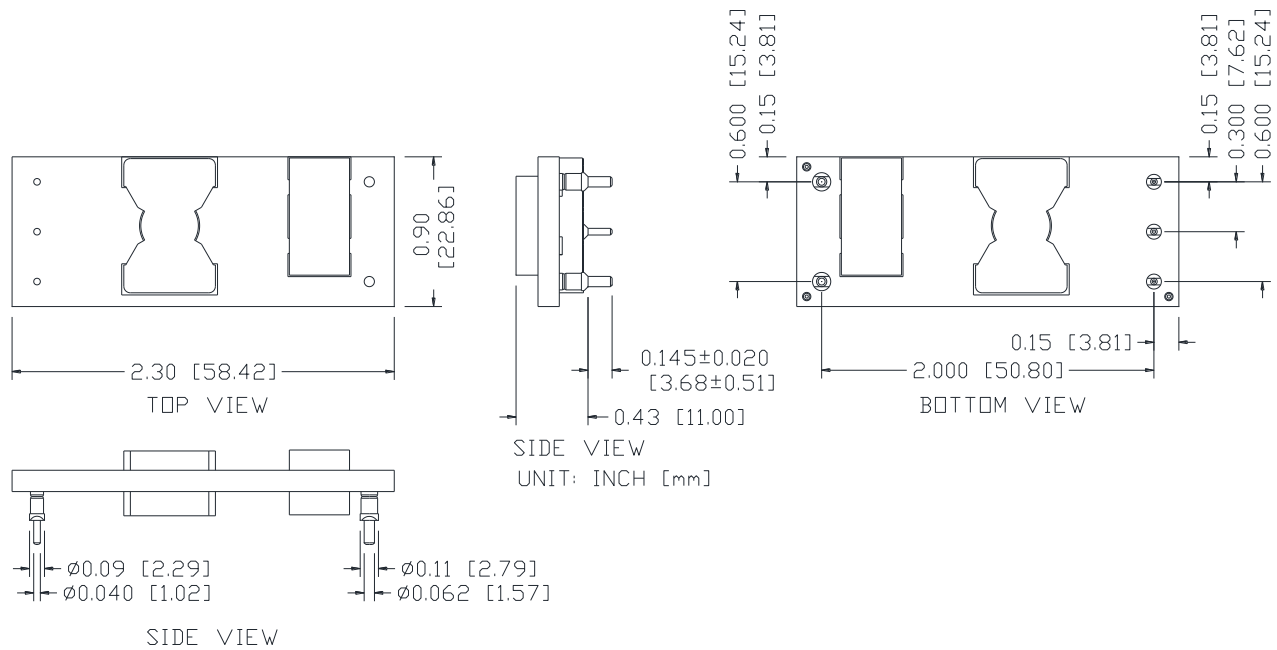


Figure 23. Outline

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.

NOTES:

- 1) All Pins: Material - Copper Alloy;
Finish - 3 micro inches minimum Gold over 50 micro inches minimum Nickel plate.
- 2) Un-dimensioned components are shown for visual reference only.
- 3) All dimensions in inch [mm]; Tolerances: x.xx +/-0.02 inch [0.51 mm];
x.xxx +/-0.010 inch [0.25 mm].

PIN DEFINITIONS

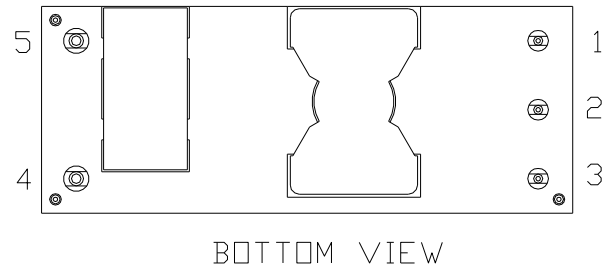


Figure 24. Pins

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

RECOMMENDED PAD LAYOUT

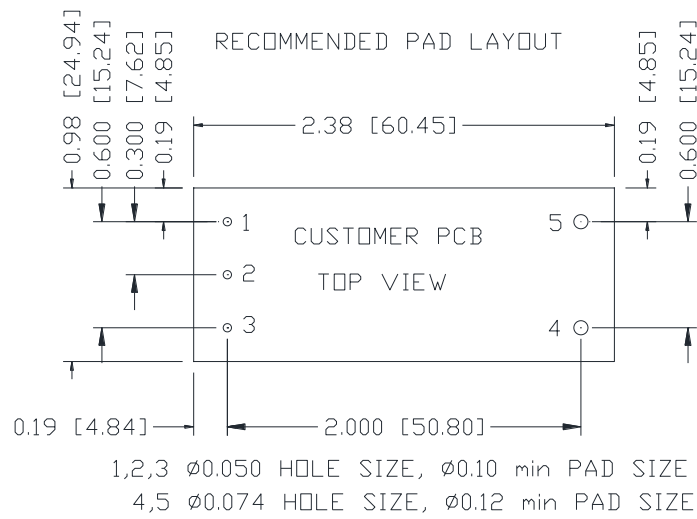


Figure 25. Recommended pad layout

17. REVISION HISTORY

DATE	REVISION	CHANGES DETAIL	APPROVAL
2013-08-01	A	First release	Z.Tang
2013-08-21	B	Add a figure about Vo set point in output specs	Z.Tang
2018-06-26	AC	Update Part Number Explanation	Z.Tang
2019-06-18	AD	Update safety certification	F.Tao
2021-05-26	AE	Add object ID. Update safety&EMC and pins diameter.	XF.Jiang
2022-05-06	AF	Add safety certificate UL/CSA 62368-1 and altitude.	XF.Jiang

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.



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