SRBH-06H1A1

Non-Isolated DC-DC Converter

The SRBH-06H1A1 is part of the low-cost non-isolated DC-DC power converter series providing up to 6 A output current.

The output is closely regulated and the efficiency of 3.3 VDC output is typically 89% at full load.

Typical features include remote on/off, input under-voltage lockout, over current protection and short circuit protection.

Key Features & Benefits

- 8 - 36 VDC Input
- 3.3 - 5 VDC @ 6 A Output
- Non-Isolated Output
- High Efficiency
- High Power Density
- Excellent Thermal Performance
- OCP/SCP
- Remote On/Off
- Input Under-Voltage Lockout
- Low Cost
- Class II, Category 2, Non-Isolated DC/DC Converter (refer to IPC-9592B)

RoHS Compliant

Applications

- Distributed Power Architectures
- Data Networking Equipment
- Telecommunications Applications

1. MODEL SELECTION

MODEL NUMBER	OUTPUT VOLTAGE	INPUT VOLTAGE	MAX. OUTPUT CURRENT	MAX. OUTPUT POWER	TYPICAL EFFICIENCY
SRBH-06H1A1G SRBH-06H1A1R	3.3 - 5 V	8 - 36 V	6 A	30 W	89% (Vo = 3.3 V, Io = 6 A)

PART NUMBER EXPLANATION

S	R	BH	-	06	H	1A	1	x
Mounting Type	RoHS Status	Series Name		Output Current	Input Range	Output Voltage	Active Logic	Package Type
SMD	RoHS	Arrow Head		6 A	8 – 36 V	3.3 - 5.0 V	Active High	R – Tape & Reel Package G – Tray Package

2. ABSOLUTE MAXIMUM RATINGS

PARAMETER	DESCRIPTION	MIN	TYP	MAX	UNITS
Continuous Non-operating Input Voltage		-0.3	-	38	V
Remote On/Off		-0.3	-	12	V
Ambient Temperature		-40	-	85	°C
Storage Temperature		-40	-	125	°C
Altitude		-	-	2000	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

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

PARAMETER	DESCRIPTION	MIN	TYP	MAX	UNITS
Operating Input Voltage		8	-	36	V
Input Current (full load)	Vin = 12 V, Vo = 3.3 V, Io = 6 A	-	1.9	-	A
Input Current (no load)		-	30	-	mA
Remote Off Input Current		-	1.7	-	mA
Input Reflected Ripple Current (rms)	1 µH, 2*100 µF/50 V electrolytic capacitors, 3*4.7 µF/50 V ceramic capacitor at the input.	-	50	100	mA
Input Reflected Ripple Current (pk-pk)		-	70	150	mA
I^2t Inrush Current Transient		-	-	1	A^2s
Turn on Voltage Threshold	Input under voltage lockout (UVLO).	-	7	7.5	V
Turn off Voltage Threshold		3.5	4	-	V

CAUTION: All specifications are typical at nominal input, full load at 25°C unless noted.

4. OUTPUT SPECIFICATIONS

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

PARAMETER	DESCRIPTION	MIN	TYP	MAX	UNITS
Output Voltage Set Point	Vin = 12 V, Io = 50% full load	3.234	3.300	3.366	V
Load Regulation		-	±10	±20	mV
Line Regulation		-	±10	±20	mV
Regulation Over Temperature	-40 °C to 85 °C	-	30	50	mV
Ripple and Noise (pk-pk)	Vout = 3.3 V	-	60	100	mV
Ripple and Noise (rms)		-	25	50	mV
Output Current Range		0	-	6	A
Output DC Current Limit	Hiccup mode	7	10	13	A
Turn on Time (from Vin)		-	6	10	ms
Turn on Time (from Enable)		-	1	-	ms
Output Capacitance		220	-	1200	µF
Transient Response					
△V 50%~100% of Max Load	di/dt = 0.5 A/µs; Vin = 12 V; Vout = 3.3 V; with a 220 µF Oscan capacitor at the output	-	100	200	mV
Settling Time		-	300	500	µs
△V 100%~50% of Max Load		-	100	200	mV
Settling Time		-	300	500	µs

5. GENERAL SPECIFICATION

PARAMETER	DESCRIPTION	MIN	TYP	MAX	UNITS
Efficiency	Vin = 12 V, Vo = 3.3 V, full load	87	89	-	%
Switching Frequency		-	300	-	kHz
Output Trim Range		3.3	-	5	V
Weight		-	4.3	-	g
MTBF		-	426,574,0	-	hours
Dimensions (L × W × H)			0.885 x 0.512 x 0.320		inch
			22.48 x 13.00 x 8.13		mm

6. CONTROL/SUPERVISORY SPECIFICATIONS

PARAMETER	DESCRIPTION	MIN	TYP	MAX	UNITS
Enable					
Signal Low (Unit Off)	ENABLE pin open, unit on	-0.3	-	1	V
Signal High(Unit On)		2.8	-	12	V
Sourcing current		-	-	10	µA

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7. EFFICIENCY DATA

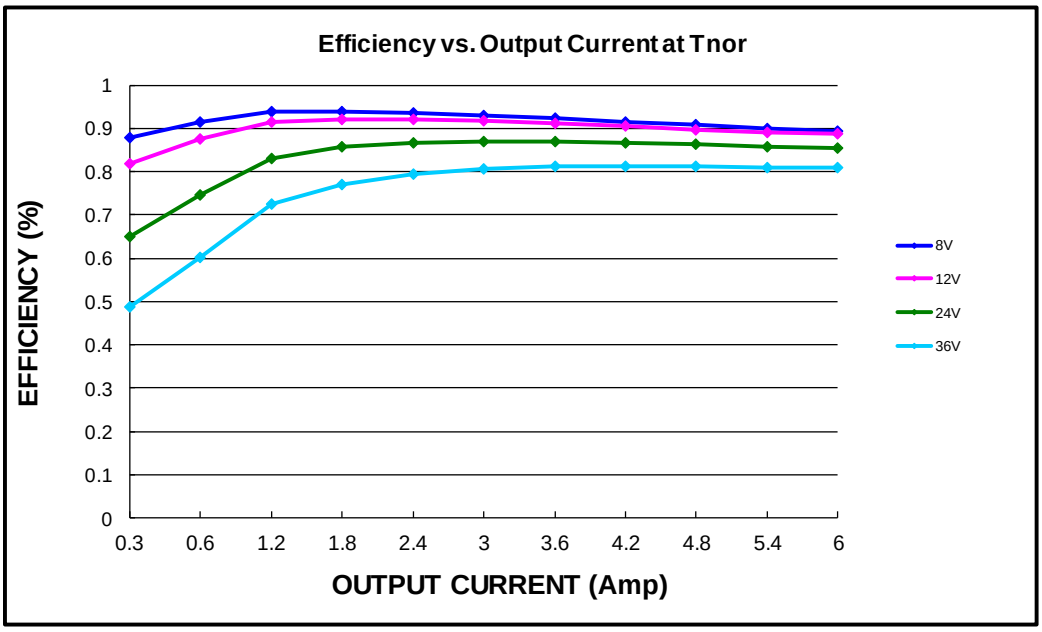

Figure 1. Efficiency data

8. THERMAL DERATING CURVE

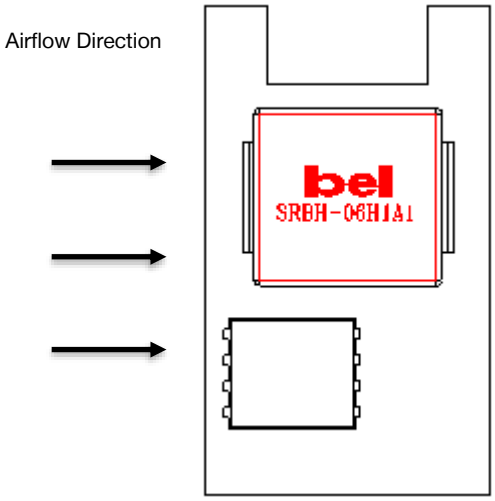

Figure 2. Airflow direction

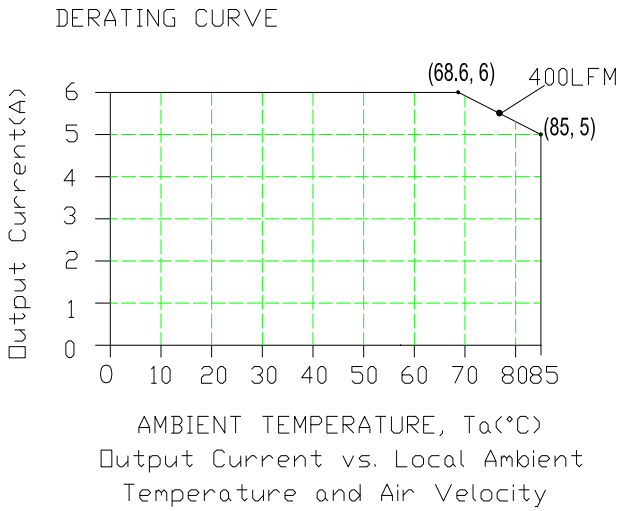

Figure 3. Thermal derating curve @ Vin = 12 V, Vo = 3.3 V

9. RIPPLE AND NOISE WAVEFORM

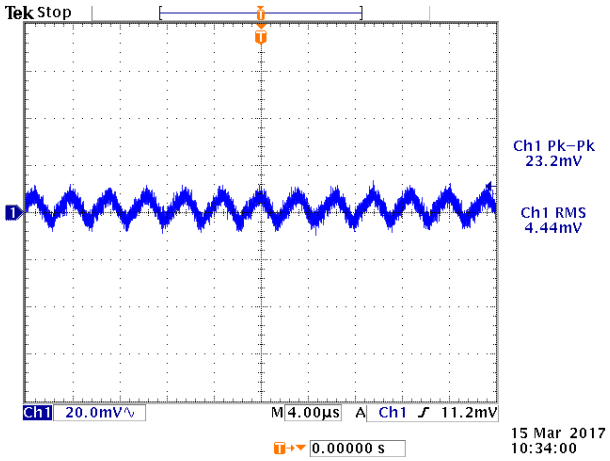

Figure 4. Ripple and noise at no load, Vin = 12 V

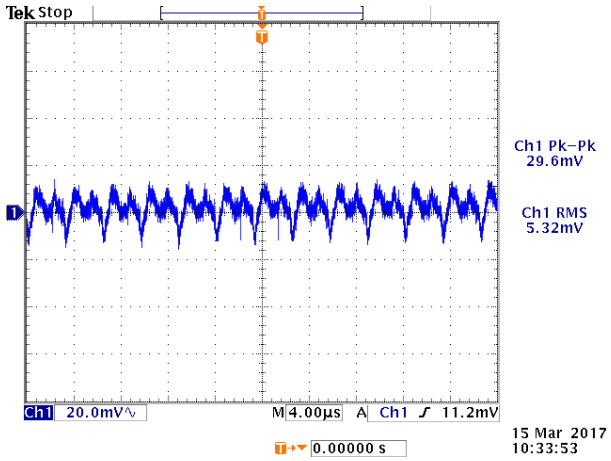

Figure 5. Ripple and noise at full load, Vin = 12 V

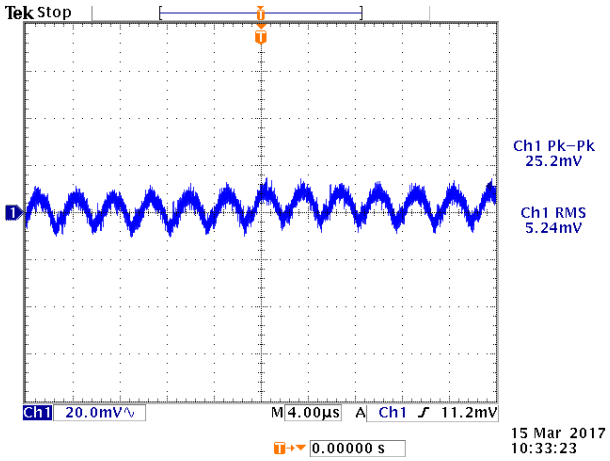

Figure 6. Ripple and noise at no load, Vin = 24 V

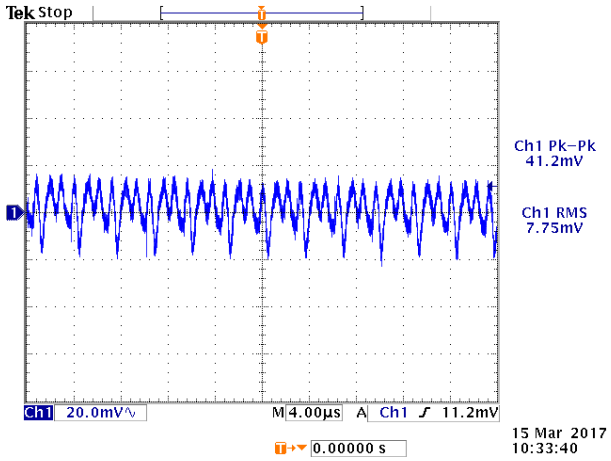

Figure 7. Ripple and noise at full load, Vin = 24 V

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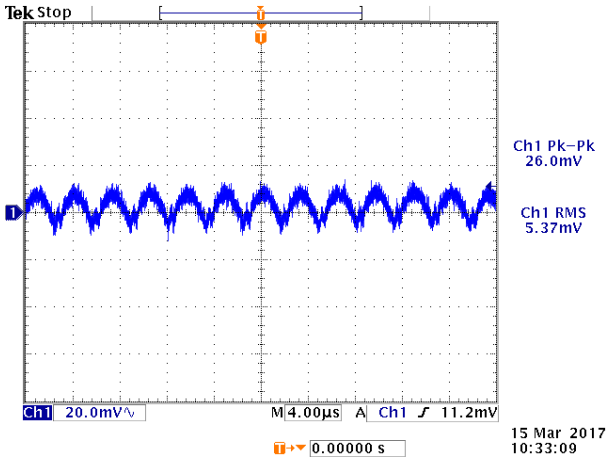

Figure 8. Ripple and noise at no load, Vin = 36 V

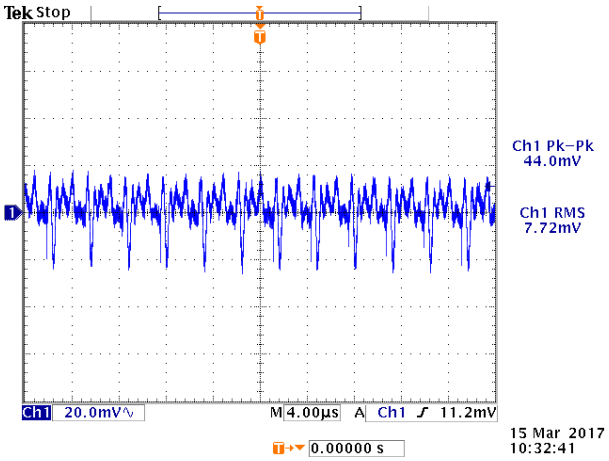

Figure 9. Ripple and noise at full load, Vin = 36 V

Note: Ripple and Noise at 3.3 VDC output, with a 220 µF oscan capacitor cap at the output, Ta = 25°C

10. STARTUP & SHUTDOWN

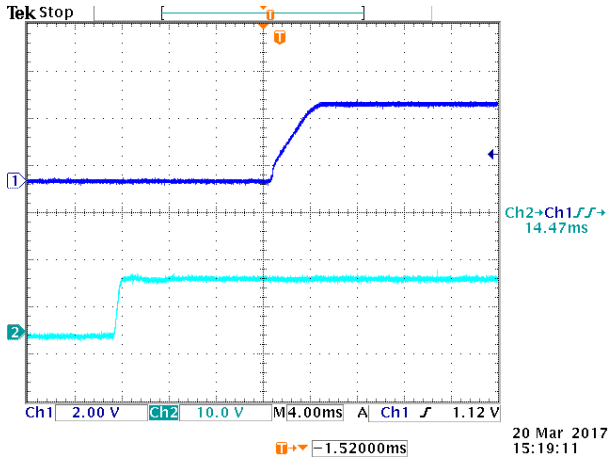

Figure 10. Startup

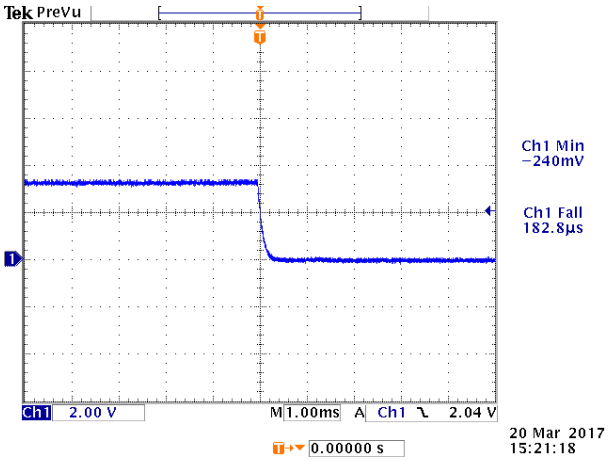

Figure 11. Shutdown

Test Condition: Vin = 12 V, Iout = 6 A, with a 220 µF oscan capacitor at the output.

11. TRANSIENT RESPONSE WAVEFORMS

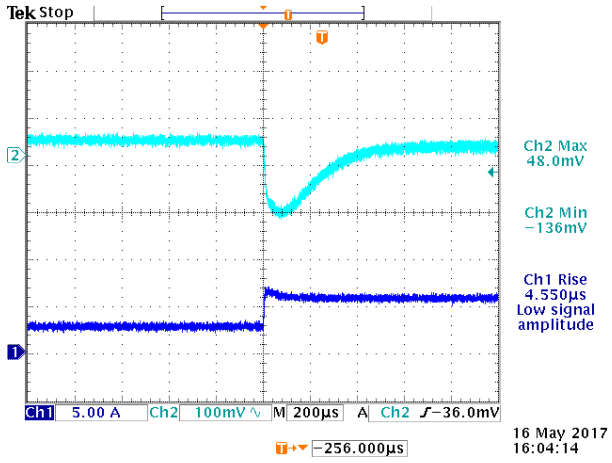

Figure 12. 50% to 100% load transient at 12 Vdc input 5 Vdc output and Ta = 25°C

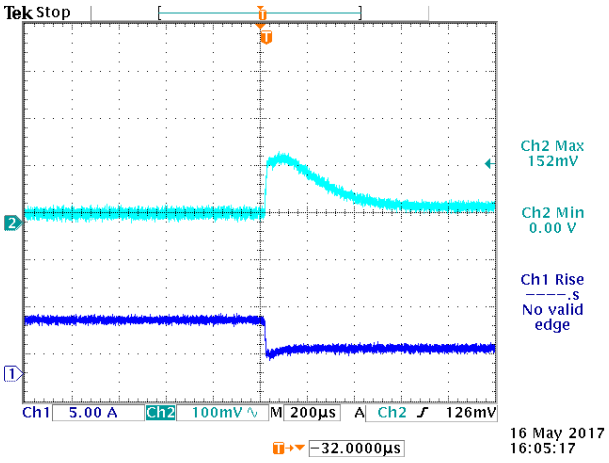

Figure 13. 100% to 50% load transient at 12 Vdc input, 5 Vdc output and Ta = 25°C

Test Condition: di/dt = 0.5 A/µs, Vin = 12 V, with a 220 µF oscan capacitor at the output.

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12. INPUT UNDER-VOLTAGE LOCKOUT

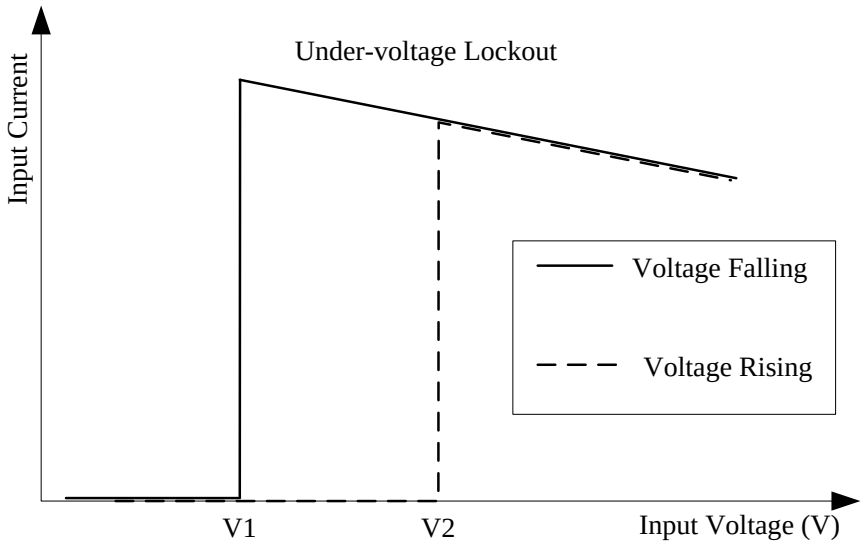

Figure 14. Input under-voltage lockout

V1 = 4 V

V2 = 7 V

13. OUTPUT VOLTAGE TRIM

Equations for calculating the trim resistor (in kΩ) given the desired adjusted voltage (Vadj) and the nominal output voltage of the converter (Vnom = 3.3 V) are shown below. The Trim Down resistor should be connected between the Trim pin and Vout. The Trim Up resistor should be connected between the Trim pin and Ground. Only one of the resistors should be used for any given application.

$$R_{trimdown} = \frac{151.6}{V_{nom} - V_{adj}} - 70.2$$

$$R_{trimup} = \frac{33.7}{V_{adj} - V_{nom}} - 14$$

14. SOLDERING INFORMATION

The SRBH-06H1A1 modules are designed to be compatible with reflow soldering process. The suggested Pb-free solder paste is Sn/Ag/Cu(SAC). The recommended reflow profile using Sn/Ag/Cu solder is shown in the following. Recommended reflow peak temperature is 245°C while the part can withstand peak temperature of 260°C maximum for 10seconds. This profile should be used only as a guideline. Many other factors influence the success of SMT reflow soldering. Since your production environment may differ, please thoroughly review these guidelines with your process engineers.

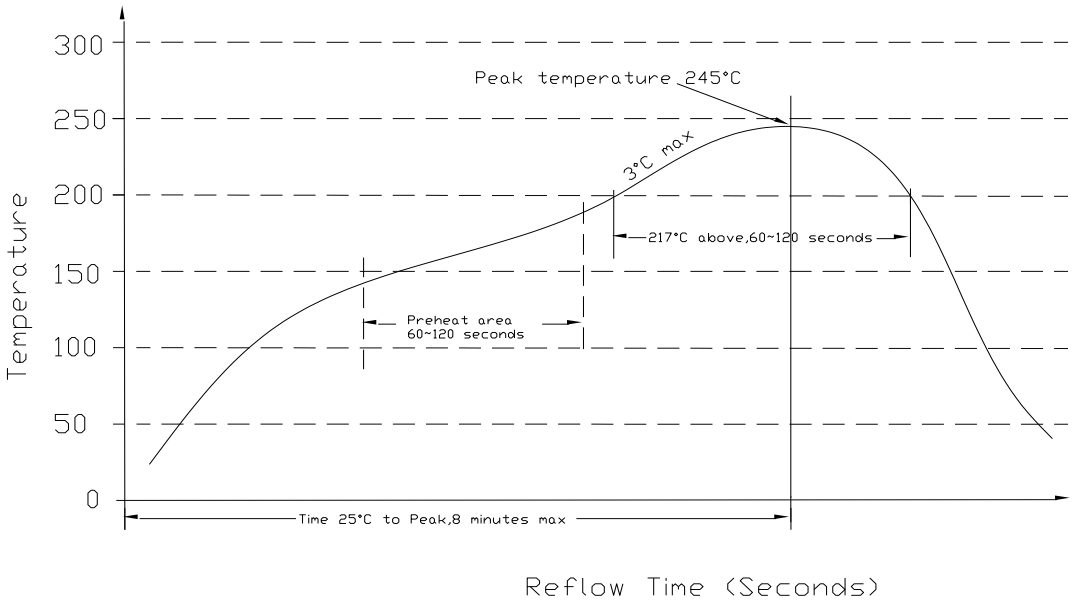

Figure 15. Soldering information

15. MSL RATING

The SRBH-06H1A1 modules have a MSL rating of 3.

16. STORAGE AND HANDING

The SRBH-06H1A1 modules are designed to be compatible with J-STD-033 Rev:A (Handling, Packing, Shipping and Use of Moisture /Reflow Sensitive surface Mount devices). Moisture barrier bags (MBB) with desiccant are applied. The recommended storage environment and handling procedure is detailed in J-STD-033.

17. PRE-BAKING

This component has been designed, handled, and packaged ready for Pb-free reflow soldering. If the assembly shop follows J-STD-033 guidelines, no pre-bake of this component is required before being reflowed to a PCB. Our packaging tray can only withstand temperature of 70°C max.

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18. MECHANICAL DIMENSIONS

OUTLINE

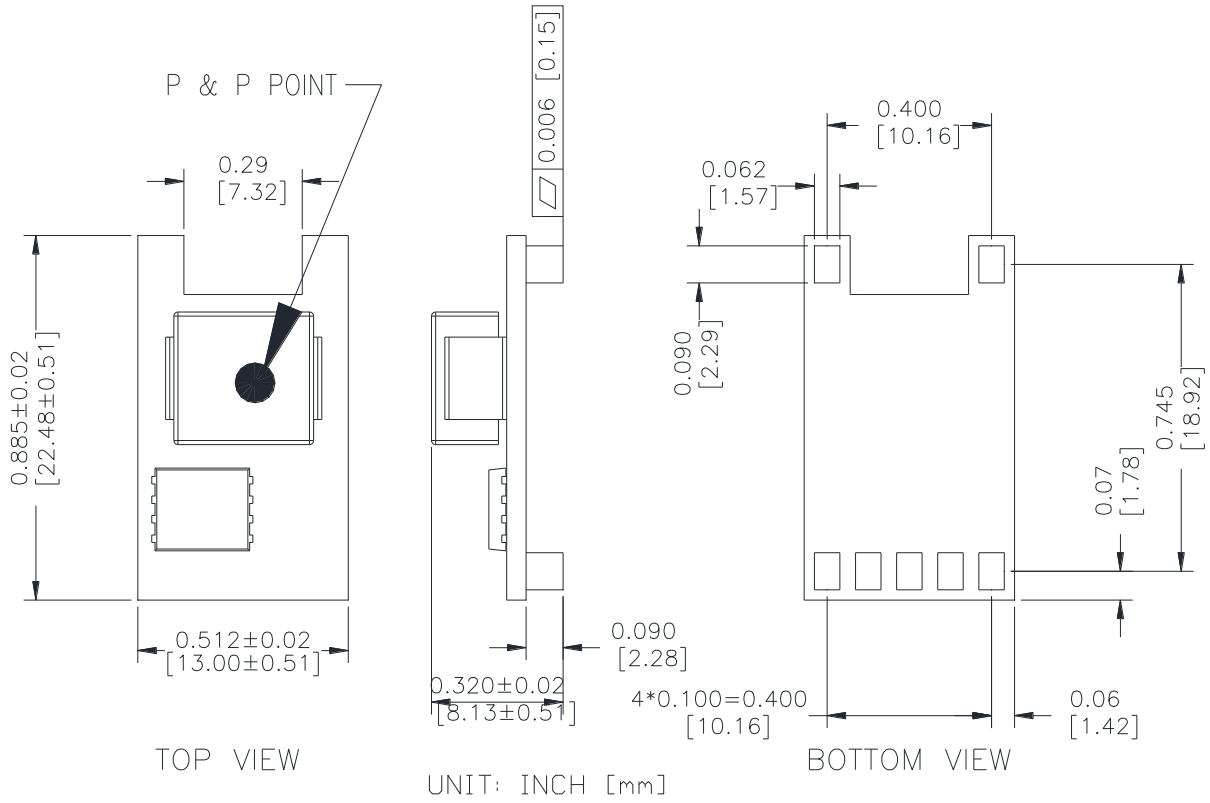

Figure 16. Outline

NOTES:

1) All Pins: Material - Copper Alloy;
   Finish – Gold plated
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

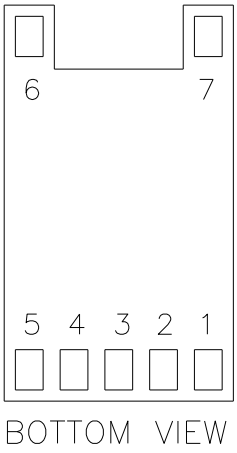

Figure 17. Pins

PIN	FUNCTION	PIN	FUNCTION
1	Remote On/Off	5	Trim
2	Vin	6	N/A
3	GND	7	N/A
4	Vout		

RECOMMENDED PAD LAYOUT

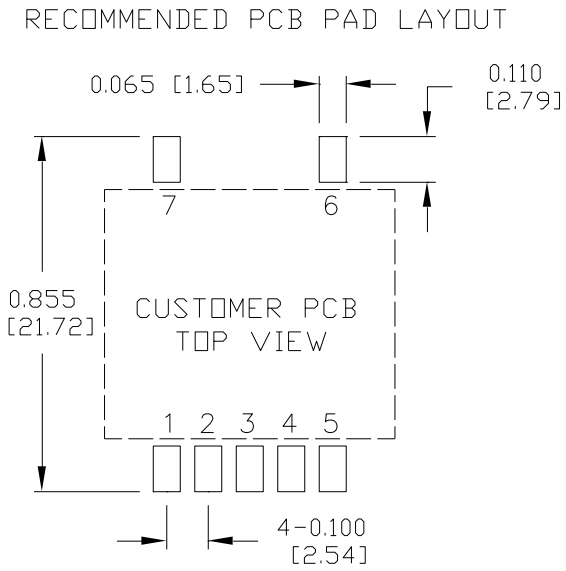

Figure 18. Recommended pad layout

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19. PACKAGING INFORMATION

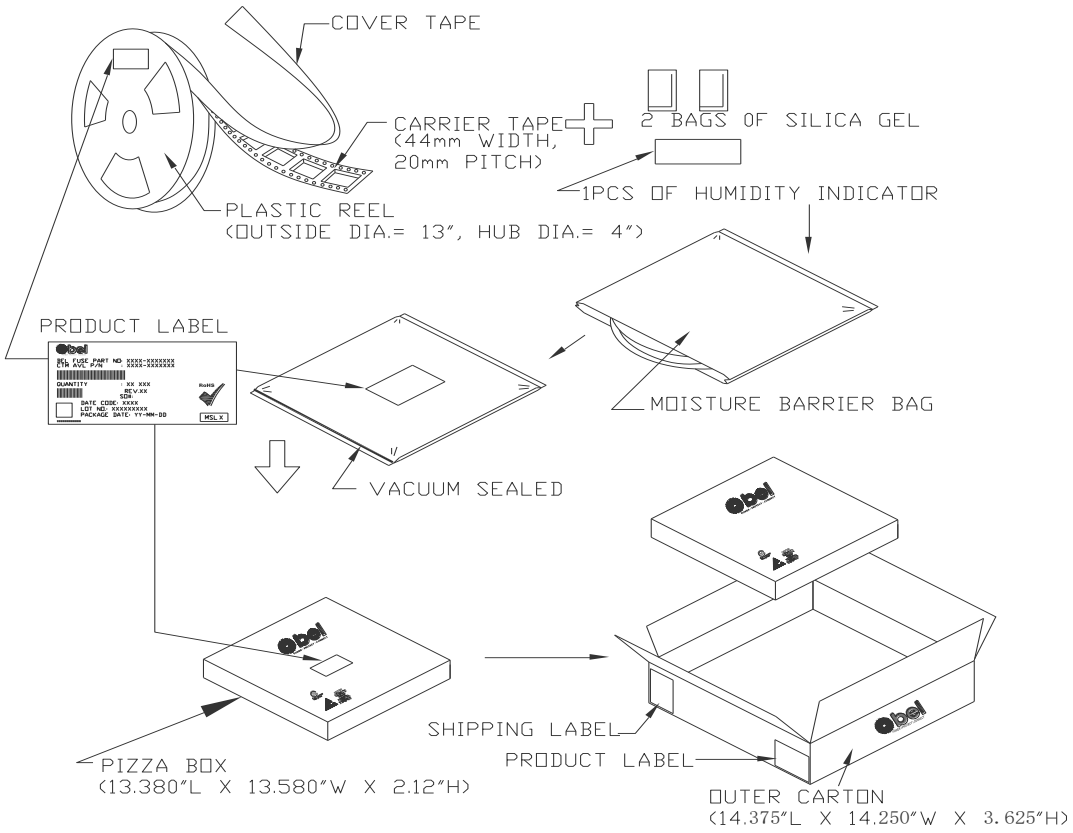
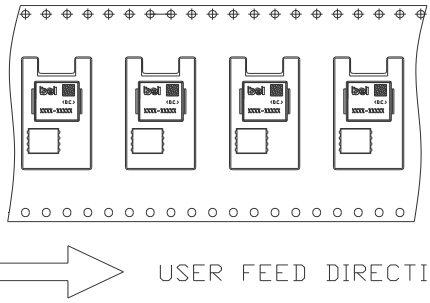


Figure 19. Packaging information-1



ORIENTATION OF COMPONENT INSIDE POCKET

TAPE WIDTH	44mm
POCKET PITCH	20mm
QUANTITY OF COMPONENTS PER REEL	320
PLASTIC REEL OUTER DIAMETER	13 INCHES
PLASTIC REEL HUB DIAMETER	4 INCHES
COMPLY WITH EIA 481-2-A	

Figure 20. Packaging information-2

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20. REVISION HISTORY

DATE	REVISION	CHANGES DETAIL	APPROVAL
2017-03-23	AA	First release.	S.Wang
2017-05-16	AB	Change MTBF UVLO, Add packaging information.	S.Wang
2017-08-29	AC	Update Line and load Regulation, Output Current Limit, Transient response, Input Reflected Ripple Current.	S.Wang
2018-04-26	AD	Update PRE-BAKING.	S.Wang
2018-05-24	AE	Add G – Tray package, Update MD.	S.Wang
2021-01-11	AF	Update outline notes to gold plated.	XF.Jiang
2021-07-05	AG	Add object ID. Add thermal test airflow direction.	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.