

SRBL-60A1A0

Non-Isolated DC-DC Converter

The Bel SRBL-60A1A0 is a non-isolated DC-DC converter. The module uses a SMD package. This converter is available in a range of output voltage from 0.7 VDC to 3.3 VDC over a wide range of input voltage.



Key Features & Benefits

- 13.2 VDC Max Input
- 0.7 – 3.3 VDC / 60 A Output
- Non-Isolated
- Low Cost
- High Efficiency
- High Power Density
- Approved to UL/CSA 60950-1, 2nd edition
- Class II, Category 2, Isolated DC/DC Converter (refer to IPC-9592B)



Applications

- Computers and Peripherals
- Networking
- Telecommunications

1. MODEL SELECTION

MODEL NUMBER	OUTPUT VOLTAGE	MAX. INPUT VOLTAGE	MAX. OUTPUT CURRENT	TYPICAL EFFICIENCY
SRBL-60A1A0G SRBL-60A1A0R	0.7 – 3.3 VDC	13.2 VDC	60 A	92% (Vo = 1.8 V)

PART NUMBER EXPLANATION

S	R	BL	-	60	A	1A	0	x
Mounting Type	RoHS Status	Series Name		Output Current	Input Range	Output Voltage	Customer Option	Package
Surface Mount	RoHS	SRBL Series		60 A	13.2 V Max	0.7 - 3.3 V	Standard	G – Tray Package R – Tape and Reel Package

2. ABSOLUTE MAXIMUM RATINGS

PARAMETER	DESCRIPTION	MIN	TYP	MAX	UNITS
Continuous Input Voltage		-0.3	-	15	V
Voltage at Pin4 (+7 V)		-0.3	-	15	V
Voltage at Pin12 (PWM1) and Pin10 (PWM2)		-0.3	-	7	V
Operating Temperature		-5	-	55	°C
Storage Temperature		-40	-	125	°C
Altitude		-500	-	10000	Feet
Relative Humidity, Operating, Non-Condensing		10	-	90	%

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

3. INPUT SPECIFICATIONS

PARAMETER	DESCRIPTION	MIN	TYP	MAX	UNIT
Operating Input Voltage		-	-	13.2	V
Input Current	At Vin = 7 V, Vo = 3.3 V, Io = 50 A	-	-	25.4	A
Input Current (no load)		-	-	300	mA
Input Capacitance	1. 10x 10 µF/16 V on power block. 2. Additional input capacitors are to be added externally as part of the buck regulator design.	-	100	-	µF
	Operating	6.7	7	7.5	V
+7 V (Pin5)	Under-voltage lockout, rising	6.1	6.4	6.7	V
	Under-voltage lockout, falling	4.7	5.2	5.6	V
	Hysteresis	-	1.4	-	V
	Current (switching at 450 kHz)	-	-	150	mA
PWM1 (Pin12) PWM2 (Pin10)	High	-	1.7	-	V
	Low	-	1.3	-	V
	Tri-state current (10x 10 µF/16 V on power block.)	-10	-	10	µA

4. OUTPUT SPECIFICATIONS

PARAMETER	DESCRIPTION	MIN	TYP	MAX	UNIT
Output Current Range ¹	Vout = 0.7 V to 1.8 V	0	-	60	A
Output Current Range ¹	Vout = 2.5 V	0	-	55	A
Output Current Range ¹	Vout = 3.3 V	0	-	50	A
Output Capacitance ^{2,3}		-	20	-	μF
Output-to-GND Resistor ⁴		-	200	-	Ω
	inductance	-	210	-	nH
Inductor	DCR (25°C) ⁵	-	0.26	-	mΩ
	Isat (125°C)	-	44	-	A
Current sense resistor		-	0.3	-	mΩ

- NOTES:**
1. Vin from 7 V to 12 V input, switching at 450 kHz.
 2. 10 μF/0805/6.3 V/X7R + 1x 0402/0.1 μF/16 V/X7R per phase on power block.
 3. Additional output capacitors are to be added externally as part of the buck regulator design.
 4. 400 Ω 0402 resistor per phase on power block.
 5. See Block Diagram for output current sense requirements.
 6. All specifications are typical at nominal input, 25°C unless otherwise stated.

5. GENERAL SPECIFICATIONS

PARAMETER	DESCRIPTION	MIN	TYP	MAX	UNIT
Efficiency ^{1,2}	Vo = 1.0 V Io = 60 A	-	88	-	%
	Vo = 1.8 V Io = 60 A	-	92	-	
	Vo = 2.5 V Io = 55 A	-	94	-	
	Vo = 3.3 V Io = 50 A	-	95	-	
Output Voltage range		0.7	-	3.3	V
Weight		-	12	-	g
FIT ³	FIT=10 ⁹ /MTBF		41.81		-
Dimensions (L × W × H)			1.00 × 0.50 × 0.48		inch
			25.40 × 12.70 × 12.20		mm

- NOTE:**
1. Vin from 7V to 12V input, full load output current, switching at 450 kHz with 200 LFM at 55°C.
 2. Gate drive is included. For the purpose of this calculation, gate drive loss is assumed to be 0.63 W.
 3. Calculated according to Bellcore or Telcordia TR-NTW-000332 at 40°C full-load.



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6. EFFICIENCY DATA

7 V to 12 V input, switching at 450 kHz, with 200 LFM at 25 °C.

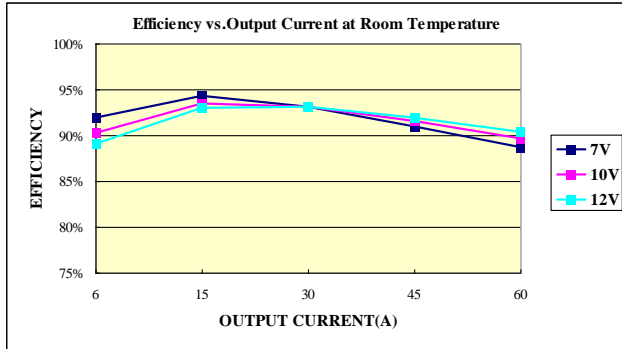


Figure 1. Vo = 1.0 V

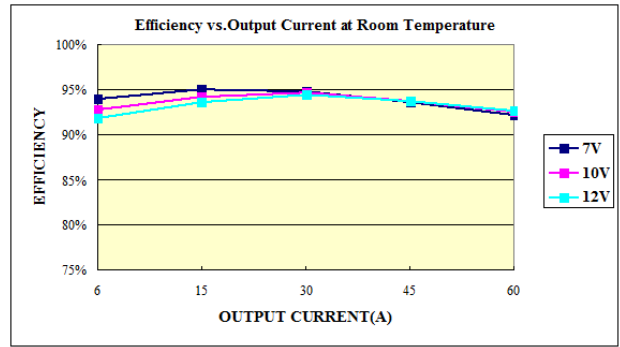


Figure 2. Vo = 1.8 V

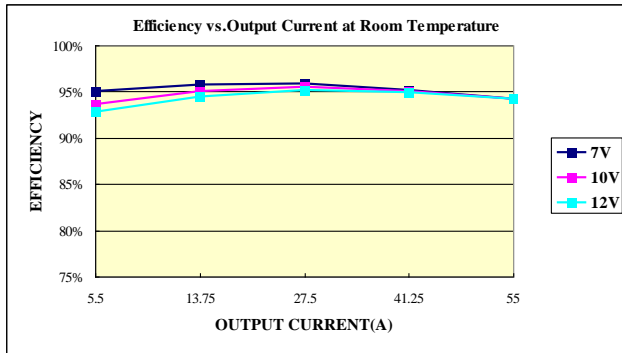


Figure 3. Vo = 2.5 V

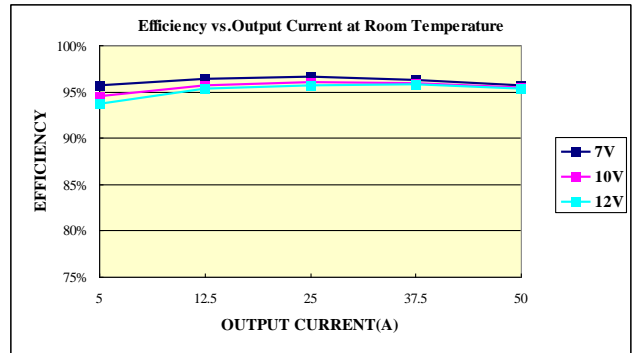


Figure 4. Vo = 3.3 V

7. THERMAL DERATING CURVES

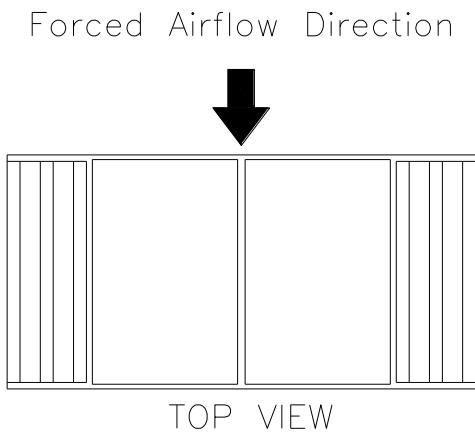


Figure 5. Airflow direction

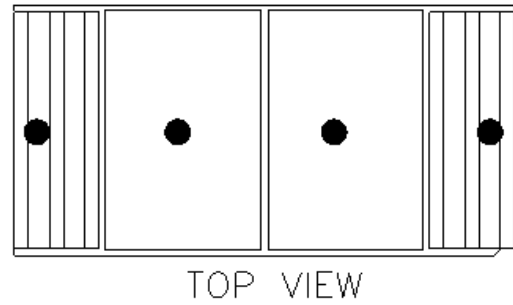


Figure 6. Temperature reference point, maximum temperature is derated to 120 °C

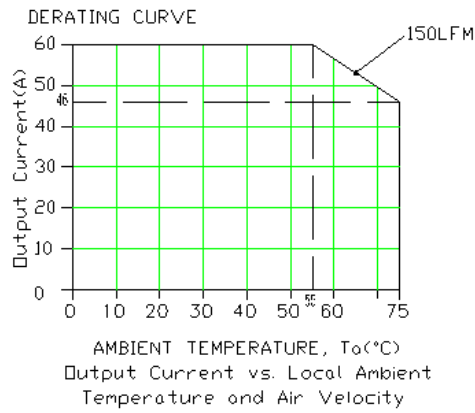


Figure 7. Thermal derating curve

NOTE: Output Current VS. Local Ambient Temperature and Air Velocity @ $V_{in} = 12\text{ V}$, $V_o = 1\text{ V}$.

8. BLOCK DIAGRAM

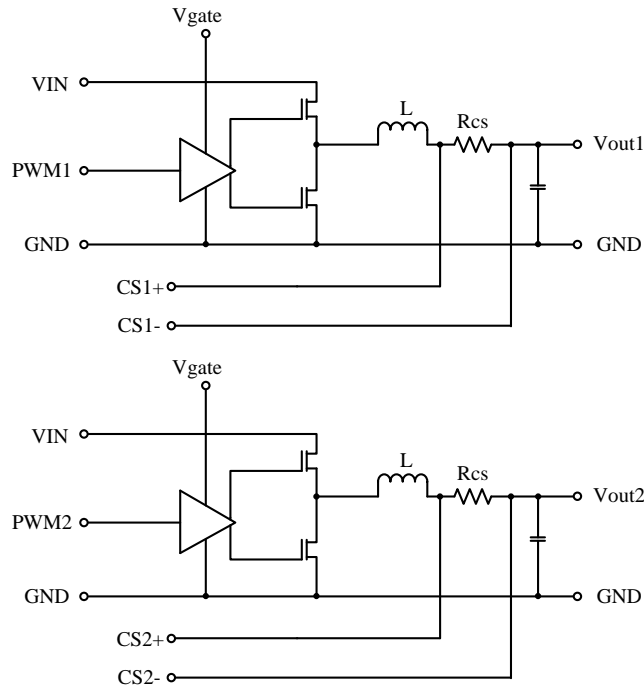


Figure 8. Block diagram

9. SOLDERING INFORMATION

The SRBL-60A1A0 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.

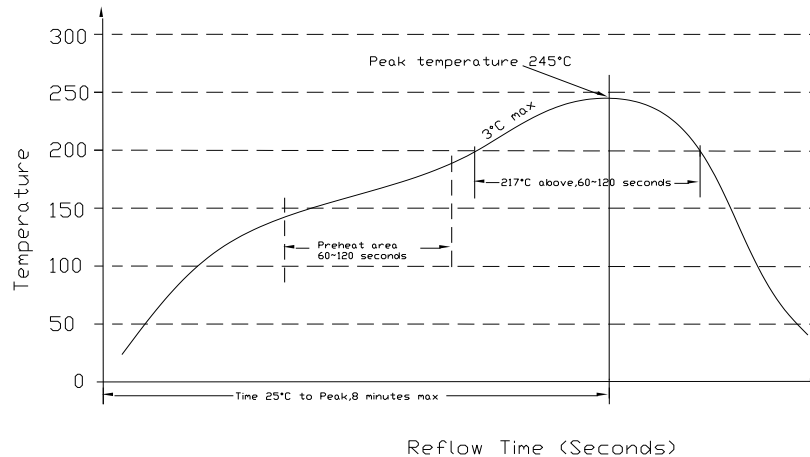


Figure 9. Soldering information

10. MSL RATING

The SRBL-60A1A0 modules have a MSL rating of 3.

11. STORAGE AND HANDLING

The SRBL-60A1A0 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.

12. 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. However, if the J-STD-033 guidelines are not followed by the assembler, Bel recommends that the modules should be pre-baked @ 120~125°C for a minimum of 4 hours (preferably 24 hours) before reflow soldering.

13. MECHANICAL OUTLINE
OUTLINE

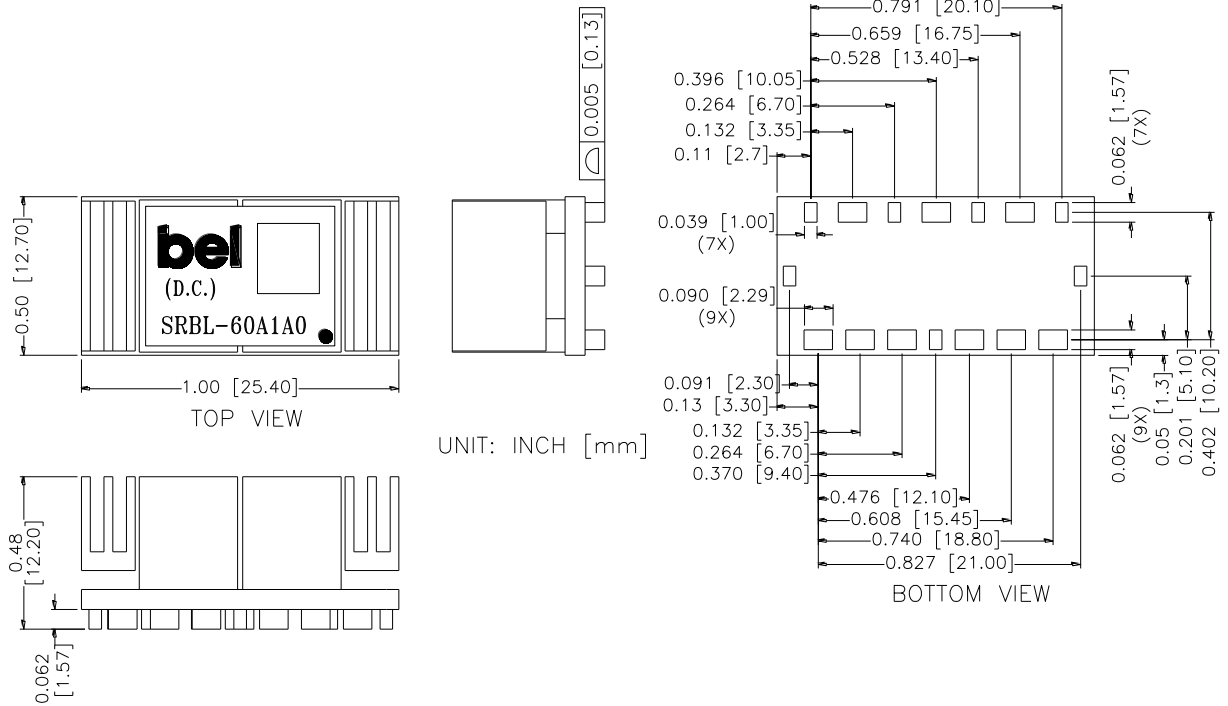


Figure 10. Outline

- NOTE:** 1) All Pins: Material - Copper Alloy;
Finish - Tin 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

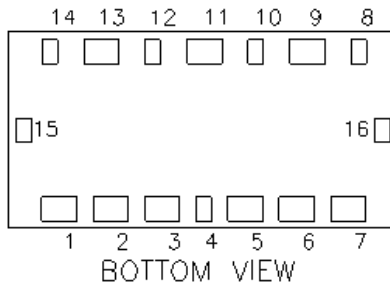


Figure 11. Pins

PIN	FUNCTION	PIN	FUNCTION
1	GND	9	Vin2
2	Vout1	10	PWM2
3	Vout1	11	GND
4	+7Vin	12	PWM1
5	Vout2	13	Vin1
6	Vout2	14	+CS1
7	GND	15	-CS1
8	+CS2	16	-CS2

RECOMMENDED PAD LAYOUT

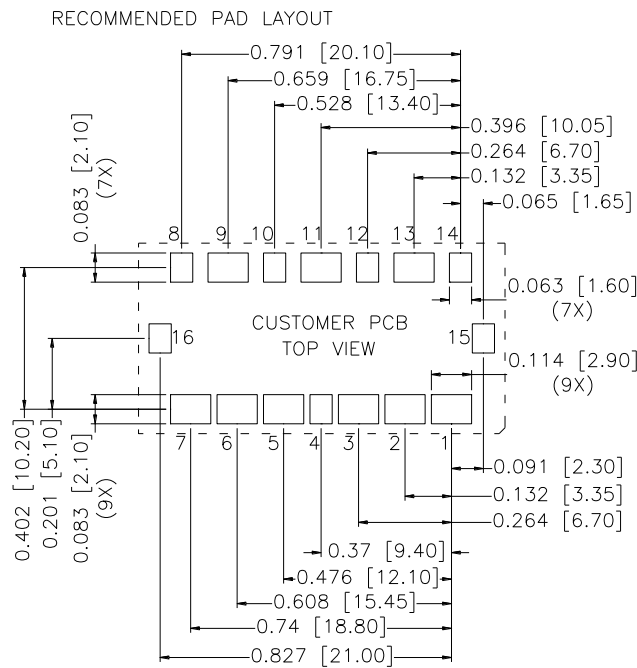
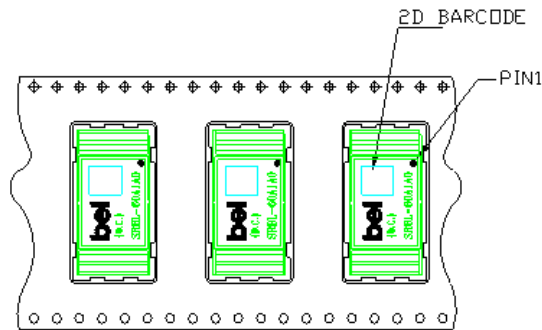
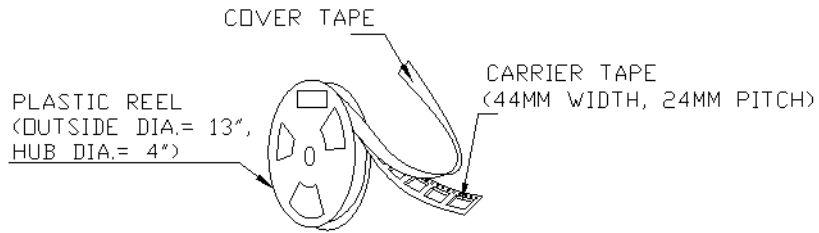


Figure 12. Recommended pad layout

14. PACKAGING DETAILS



➔ USER FEED DIRECTION

ORIENTATION OF COMPONENT INSIDE POCKET

TAPE WIDTH	44MM
POCKET PITCH	24MM
QUANTITY OF COMPONENTS PER REEL	160
PLASTIC REEL OUTER DIAMETER	13 INCHES
PLASTIC REEL HUB DIAMETER	4 INCHES
COMPLY WITH EIA 481-2-A	

Figure 13. Packaging information

15. REVISION HISTORY

DATE	REVISION	CHANGES DETAIL	APPROVAL
2013-05-07	A	First Release.	XF.Jiang
2014-01-23	B	1.Efficiency; TD	XF.Jiang
2014-03-18	C	Update Storage Temperature, Altitude, Efficiency, TD; BD Add Relative Humidity;	XF.Jiang
2014-07-02	D	Add resistor.	XF.Jiang
2015-01-30	E	Update TD, MD, Add Package Information, Soldering Information, MSL Rating, Storage and Handling, Pre-baking.	XF.Jiang
2018-05-17	AF	Update general specs and MD.	XF.Jiang
2021-01-11	AG	Update outline notes to tin plated.	XF.Jiang
2021-06-25	AH	Add object ID.	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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