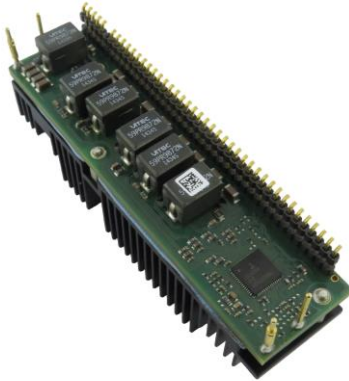


# SRNE-C6ED2E

## Non-Isolated DC-DC Converter

The SRNE-C6ED2E has dual non-isolated step down dc/dc converters providing up to 135 A/20 A of output current and designed to be compatible with the Intel VRM12 requirements. Standard features include remote on/off, over current protection, remote sense and VR\_Hot signal. This product also makes use of adaptive positioning to improve transient response performance. This product may be used almost anywhere low-voltage silicon is being employed and a nominal 12 VDC source is available. Typical applications include file servers, work stations and other computing applications.



### Key Features & Benefits

- Dual Output
- High Efficiency
- High Power Density
- Wide Input Range (6.5 - 13.8 V)
- Output Current Monitor
- Input Under-Voltage Lockout
- Output Over Voltage Protection
- Thermal Warning
- Two-Wire Remote Sense
- OCP/SCP
- Over Temperature Protection
- SVID
- VR12.0 Compliant
- Remote On/Off
- Class II, Category 2, Isolated DC/DC Converter (refer to IPC-9592B)

RoHS  
Compliant

### Applications

- Networking
- Computers and Peripherals
- Telecommunications

## 1. MODEL SELECTION

MODEL NUMBER	OUTPUT VOLTAGE	INPUT VOLTAGE	MAX. OUTPUT CURRENT	MAX. OUTPUT POWER	TYPICAL EFFICIENCY
SRNE-C6ED2EG	0.6 – 1.52 VDC	6.5 - 13.8 VDC	135 A / 20 A	205 W	82%

### PART NUMBER EXPLANATION

S	R	NE	-	C6	E	D2	E	G
Mounting Type	RoHS Status	Series Name		Output Current	Input Range	Output Voltage	Active Logic	Package Type
Surface Mount	RoHS	VRM		135 A / 20 A	6.5 - 13.8 V	0.6 – 1.52 V	Active High	Tray Package

## 2. ABSOLUTE MAXIMUM RATINGS

PARAMETER	DESCRIPTION	MIN	TYP	MAX	UNITS
Continuous non-operating Input Voltage		-0.3	-	13.8	V
Input Transient Voltage	100 ms maximum	-	-	15	V
Remote On/Off		-0.3	-	5.25	V
Ambient Temperature		0	-	70	°C
Storage Temperature		-40	-	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

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

PARAMETER	DESCRIPTION	MIN	TYP	MAX	UNIT
Operating Input Voltage		6.5	12	13.8	V
Input Current (full load)	$V_{in} = 12\text{ V}$ , $V_{core} = 1.0\text{ V}$ , $V_{sa} = 0.9\text{ V}$	-	-	17.0	A
Input Current (no load)	$V_{in} = 12\text{ V}$ , PS = 00h, $V_{core} = 1.0\text{ V}$ , $V_{sa} = 0.9\text{ V}$	-	600	800	mA
	$V_{in} = 12\text{ V}$ , PS = 01h, $V_{core} = 1.0\text{ V}$ , $V_{sa} = 0.9\text{ V}$	-	270	500	mA
	$V_{in} = 12\text{ V}$ , PS = 10h or 11h, $V_{core} = 1.0\text{ V}$ , $V_{sa} = 0.9\text{ V}$	-	180	250	mA
Remote Off Input Current		-	65	100	mA
Turn-on Voltage Threshold	No load	6.2	6.4	6.8	V
	Full load, $V_{core\_set} = 1.0\text{ V}$ , $V_{sa\_set} = 0.9\text{ V}$	6.7	7.1	7.5	V
Turn-off Voltage Threshold	No load	5.2	5.6	6	V
	Full load, $V_{core\_set} = 1.0\text{ V}$ , $V_{sa\_set} = 0.9\text{ V}$	5.9	6.2	6.5	V

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

## 4. OUTPUT SPECIFICATIONS

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

PARAMETER	DESCRIPTION	MIN	TYP	MAX	UNIT
Output Voltage Set Point	Vin = 12 V, Io = 0 A at 25°C ambient.	0.6/0.6	-	1.52/1.52	V
Output Voltage Set Point (without SVID)	Vin = 12 V, Io = 0 A at 25°C ambient. Start-up boot voltage without SVID command.	-	0/0.9	-	V
Load Regulation		-	0.8/-	0.85/-	mΩ
Line Regulation		-	4/4	6/10	mV
Regulation Over Temperature	Working ambient temperature range is from 0°C to 70°C	-	20/60	30/80	mV
Output Ripple and Noise (pk-pk)	Vin = 12 V, PS = 00h, Vcore_set = 1.0 V, Vsa_set = 0.9 V, 0-20 MHz BW, with a 1 μF ceramic capacitor and a 10 μF Tantalum cap at output.	-	20/50	30/70	mV
Output Current	Thermal design	0/0	-	135/20	A
	Peak current rating	0/0	-	165/24	A
Output DC Current Limit		-	170/29	195/35	A
Rise Time		130/220	150/250	-	us
Turn on Time	Enable from Vin	-	4.3/4.3	5/5	ms
	Enable from ON/OFF	-	4.3/4.3	5/5	ms
Output Capacitance	Recommended: for core rail: 7 x 470μF Polymer 7 mΩ + 65 x 22 μF Ceramic X5R for sa rail: 2 x 470 μF Polymer 7 mΩ + 4 x 47 μF Ceramic X5R	-	4720/1128	-	μF

**Note:** The specifications before slash are for core rail and these after slash are for sa rail.

## 5. GENERAL SPECIFICATIONS

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

PARAMETER	DESCRIPTION	MIN	TYP	MAX	UNIT
Efficiency	Vin = 12 V; Io = Io, max	Only the core rail efficiency is measured. The efficiency is measured at Vin = 12 V, Icore = 135 A, Isa = 0 A and Ta=25°C. Vcore_set = 1.0 V.			
		-	79	-	%
Switching Frequency	Single phase frequency for core rail	Only the core rail efficiency is measured. The efficiency is measured at Vin = 12 V, Icore = 135 A, Isa = 0 A and Ta=25°C. Vcore_set = 1.2 V.			
		310/400	350/450	390/500	kHz
Coplanarity		-	-	±0.006	inch
Dimensions (L x W x H)		3.59 x 0.90 x 1.30			inch
		91.19 x 22.86 x 33.05			mm

6. EFFICIENCY DATA

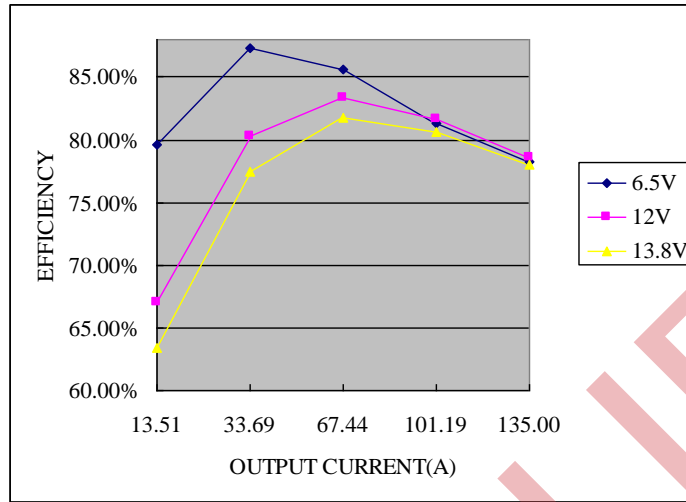


Figure 1. Efficiency data at Vo = 0.6 V

7. REMOTE ON/OFF

PARAMETER	DESCRIPTION	MIN	TYP	MAX	UNIT
Signal Low (Unit Off)	Active High	-0.3	-	0.77	V
Signal High (Unit On)		0.875	-	5	V
Current Sink		0	-	1	mA

Recommended remote on/off circuit for active high:

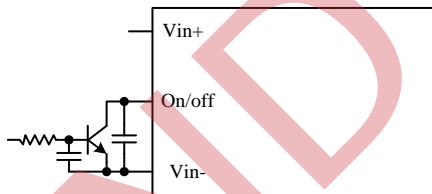


Figure 2. Control with open collector/drain circuit

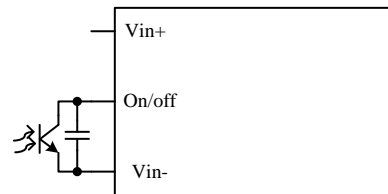


Figure 3. Control with photocoupler circuit

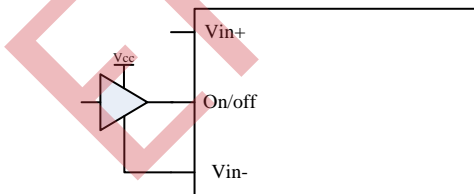


Figure 4. Control with logic circuit

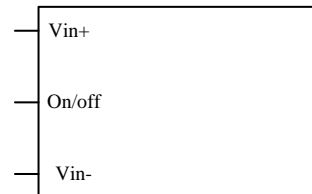


Figure 5. Permanently off

**8. THERMAL DERATING CURVE**

Maximum junction temperature of semiconductors derated to 120°C.

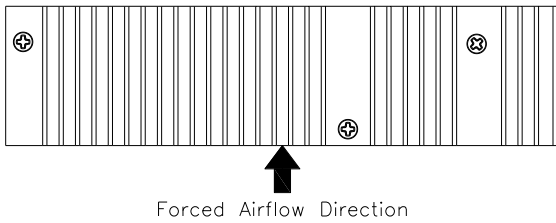


Figure 6. Thermal test airflow direction

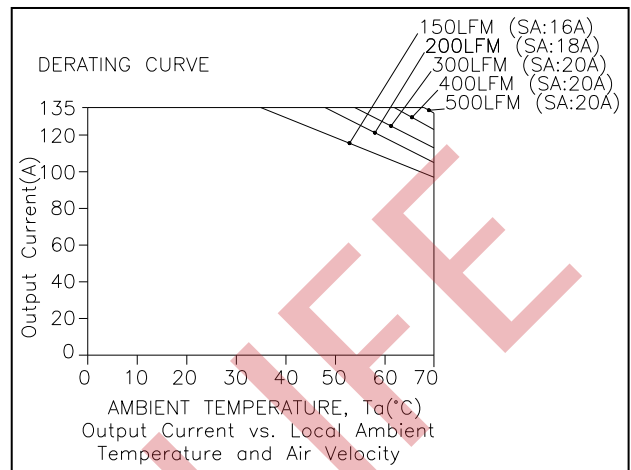


Figure 7. Derating curve under normal input

**9. FUNDAMENTAL CIRCUIT DIAGRAM**

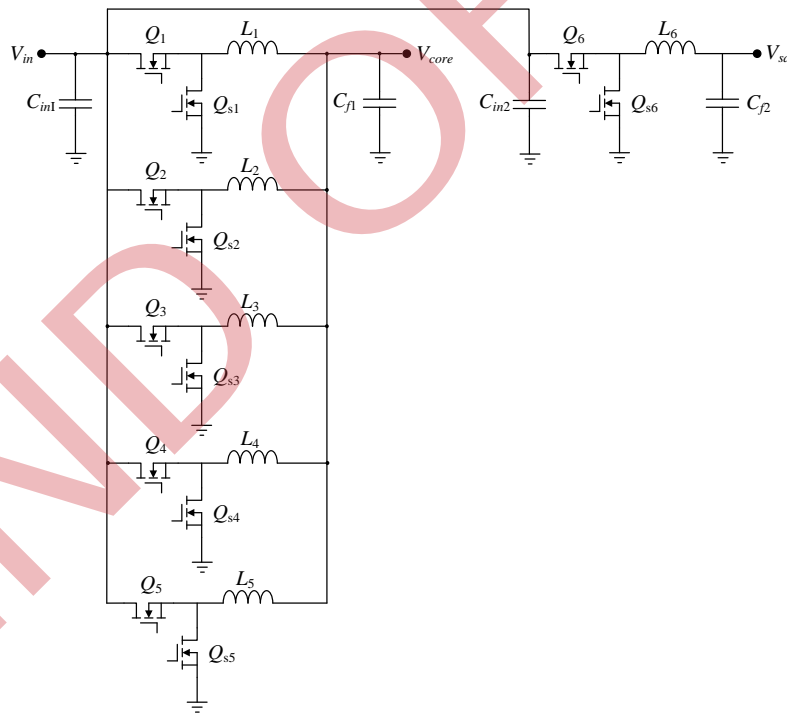


Figure 8. Fundamental circuit diagram

## 10. MECHANICAL DIMENSIONS

### OUTLINE

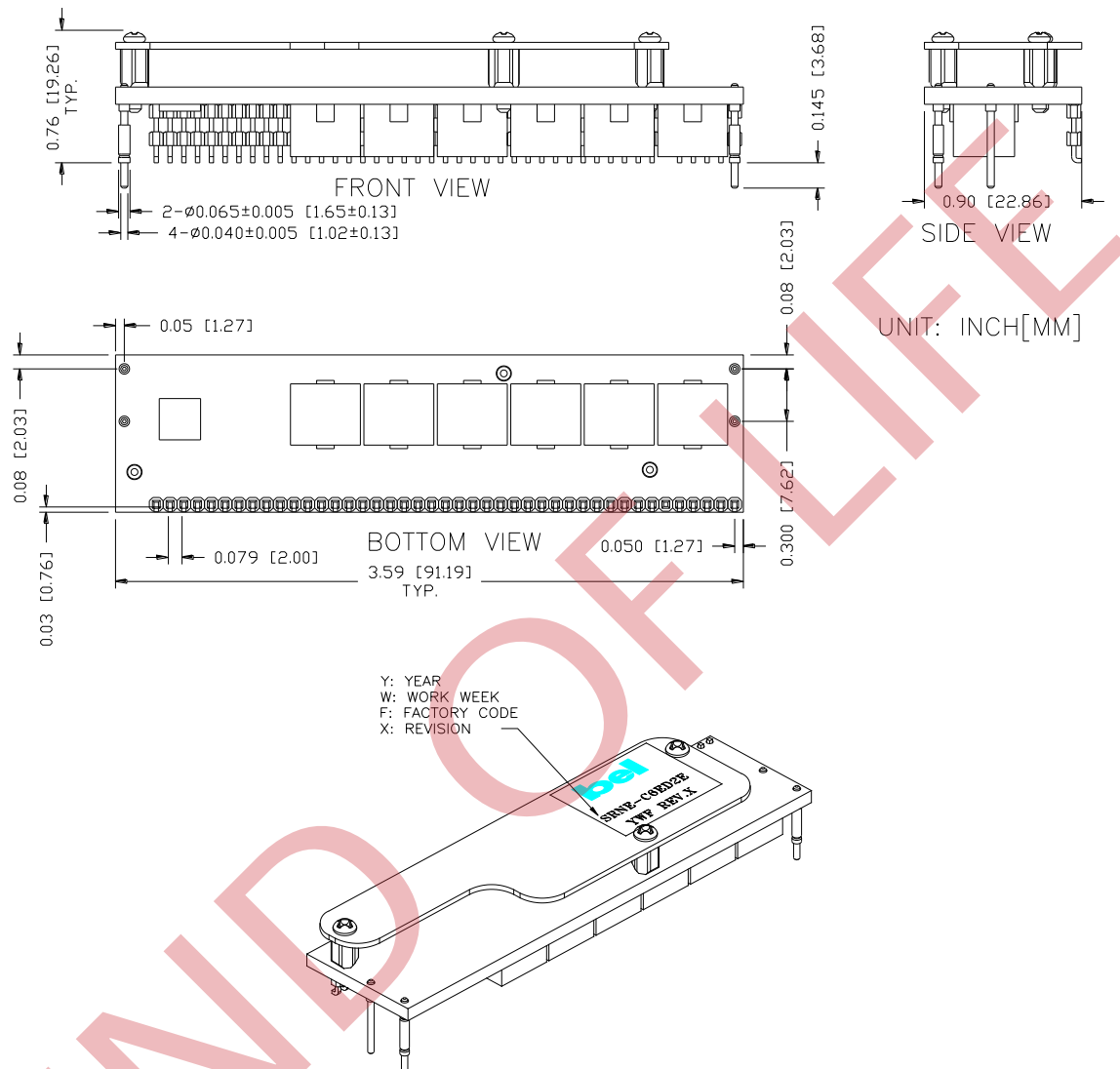


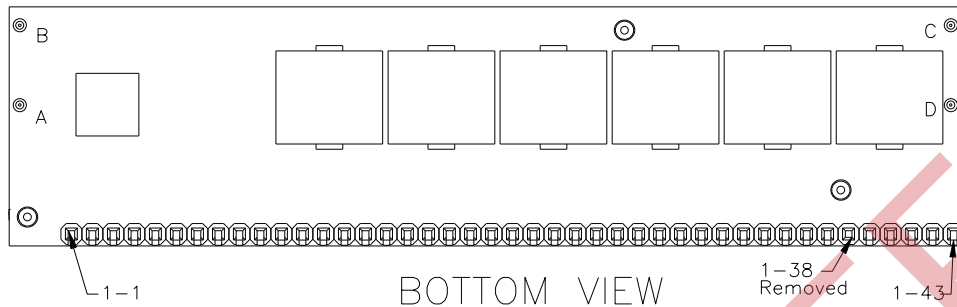
Figure 9. Outline

**Note:** This module is recommended and compatible with Pb-Free Reflow Soldering and must be soldered using a reflow profile with a peak temperature of no more than 260°C for less than 5 seconds.

#### 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].
- 4) The metric measurements should be used for designing the footprint, and that the US equivalent measurements are just for reference only.

## PIN DEFINITIONS



BOTTOM VIEW

Figure 10. Pins

PIN	FUNCTION	PIN	FUNCTION	PIN	FUNCTION	PIN	FUNCTION	PIN	FUNCTION
1-1	SVID_CLOCK	1-12	Vout1(+)	1-23	Vout1(+)	1-34	Vin (+)	A	SGND
1-2	SVID_DATA	1-13	Vout1(+)	1-24	Vout1(+)	1-35	Vin (-)	B	SGND
1-3	SVID_ALERT#	1-14	Vout1(+)	1-25	Vout1(+)	1-36	Vin (-)	C	SGND
1-4	VR_HOT#	1-15	Vout1(-)	1-26	Vout1(-)	1-37	Vin (+)	D	SGND
1-5	VR12_OUTEN	1-16	Vout1(-)	1-27	Vout1(-)	1-38	Depopulate		
1-6	SGND	1-17	Vout1(+)	1-28	Vout1(-)	1-39	Vout2(-)		
1-7	SGND	1-18	Vout1(+)	1-29	Vout1(+)	1-40	Vout2(-)		
1-8	RS1(+)	1-19	Vout1(+)	1-30	Vout1(+)	1-41	Vout2(+)		
1-9	RS1(-)	1-20	Vout1(-)	1-31	Vout1(-)	1-42	Vout2(+)		
1-10	RS2(+)	1-21	Vout1(-)	1-32	Vout1(-)	1-43	Vout2(-)		
1-11	RS2(-)	1-22	Vout1(-)	1-33	Vin (+)				

## RECOMMENDED PAD LAYOUT

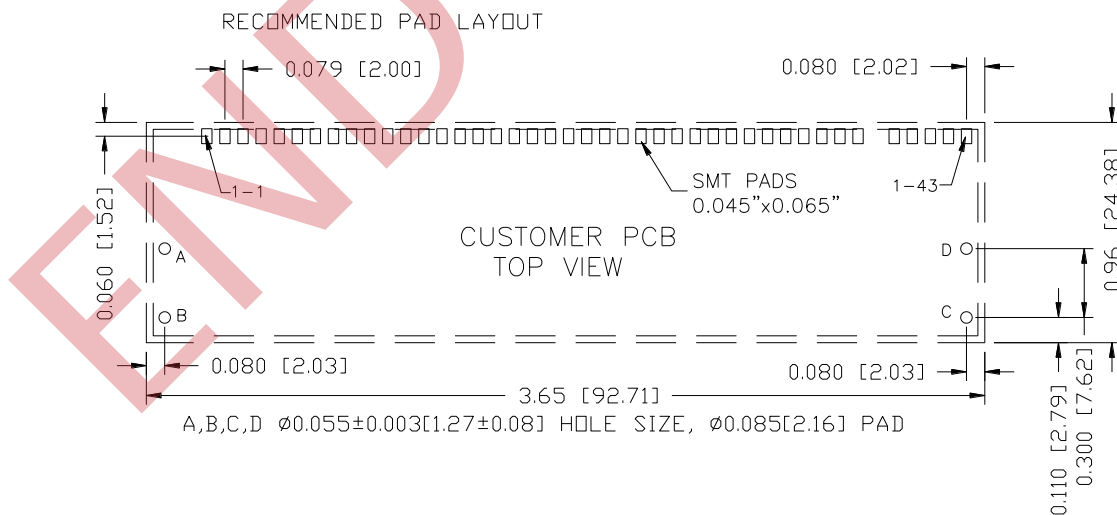


Figure 11. Recommended pad layout

## 11. PACKAGING

VRM will come in pieces: PCB base with P&P patch for pick and place, screws and heatsink with thermal material pre-applied. VRM and heatsink parts will be shipped in the same overall box.

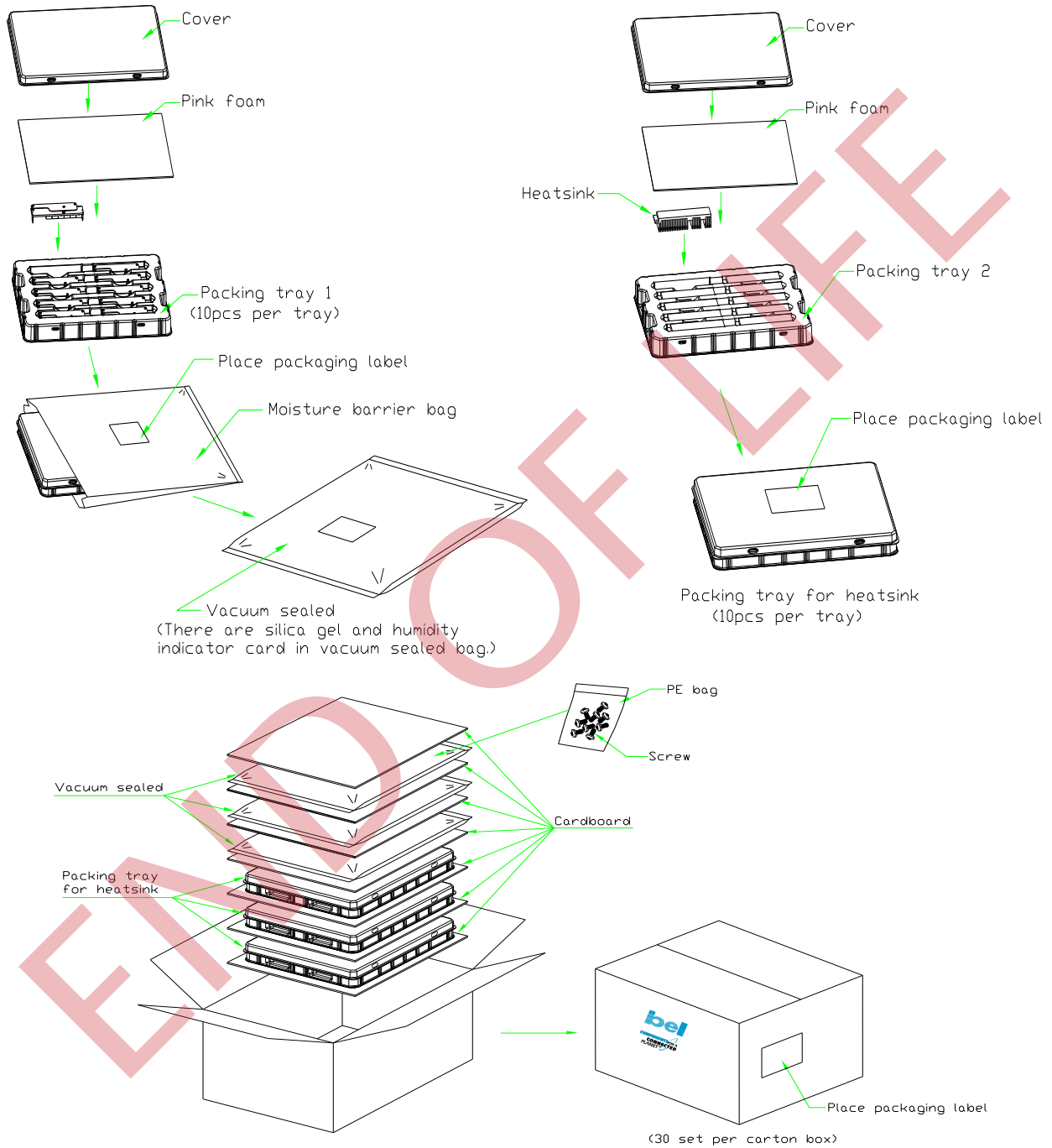


Figure 12. Packaging-1



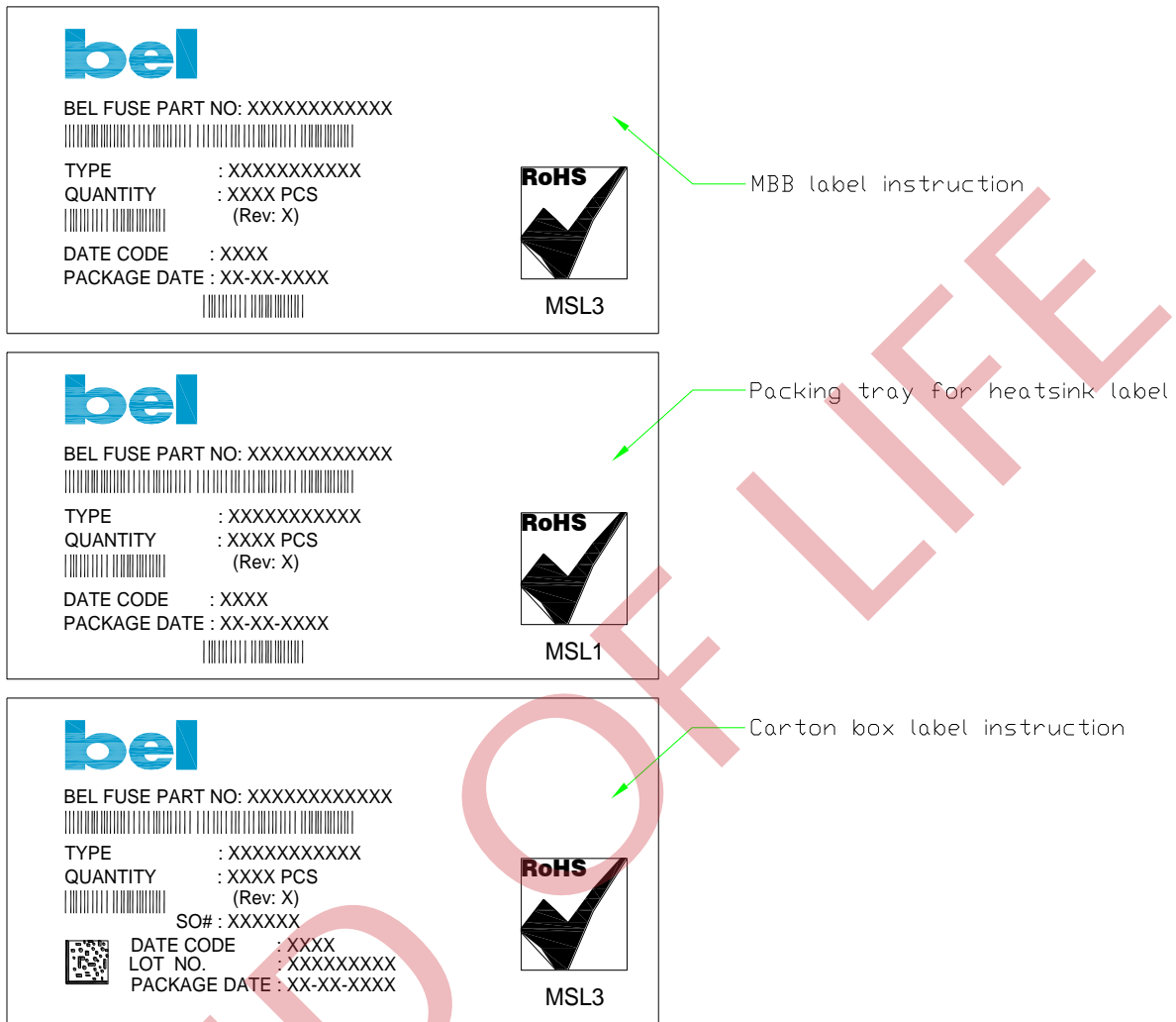


Figure 13. Packaging-2

### 12. ASSEMBLY

1. Pick and place the base with P&P patch.

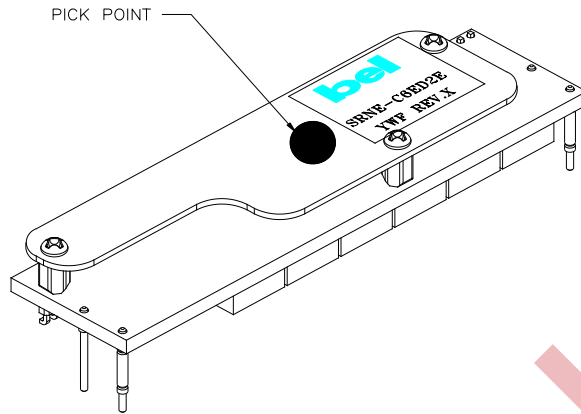


Figure 14.

2. Solder the open part onto motherboard.  
solder specifications: Sn96.5Ag3Cu0.5.

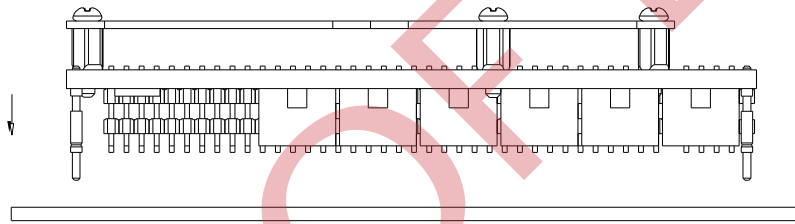


Figure 15.

3. Remove the P&P patch use screwdriver and then discard patch and screws. Do not try to remove the hex standoffs from the PCB.

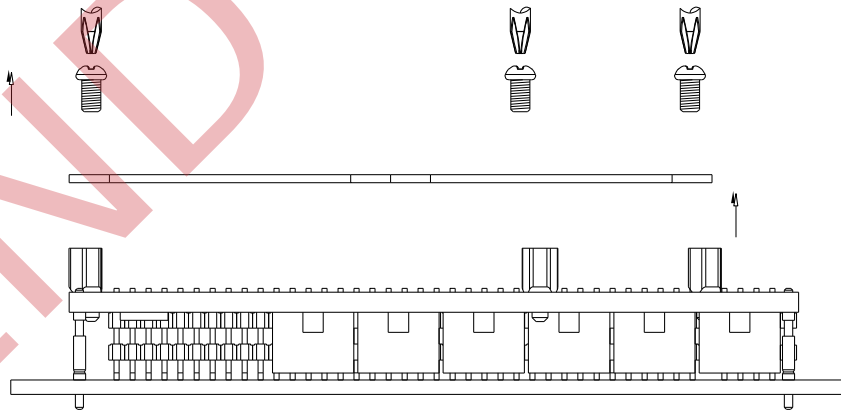
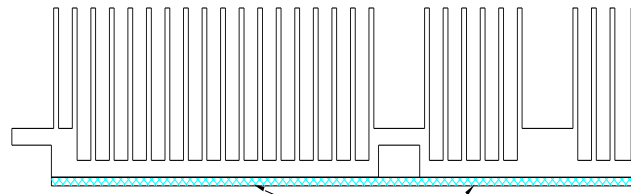


Figure 16.

- Remove the protective tape from thermal pad on heatsink.



Remove the protective tap

Figure 17.

- Use screws to attach heatsink onto the open part.  
The screws to use for heatsink assembly are the ones that were shipped with the heatsinks.  
Torque range: 3.2 - 3.6 kgf-cm (2.78 - 3.12 in-lbs). Heatsink screws will come with glue (e.g., LOCTITE 242) pre-applied.

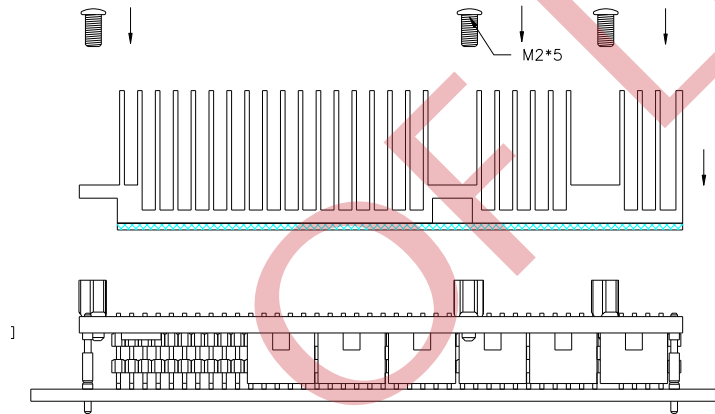


Figure 18.

- Finished goods.

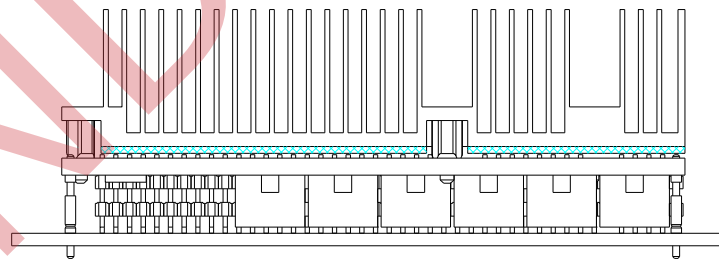


Figure 19.

13. FINISHED DIMENSIONS

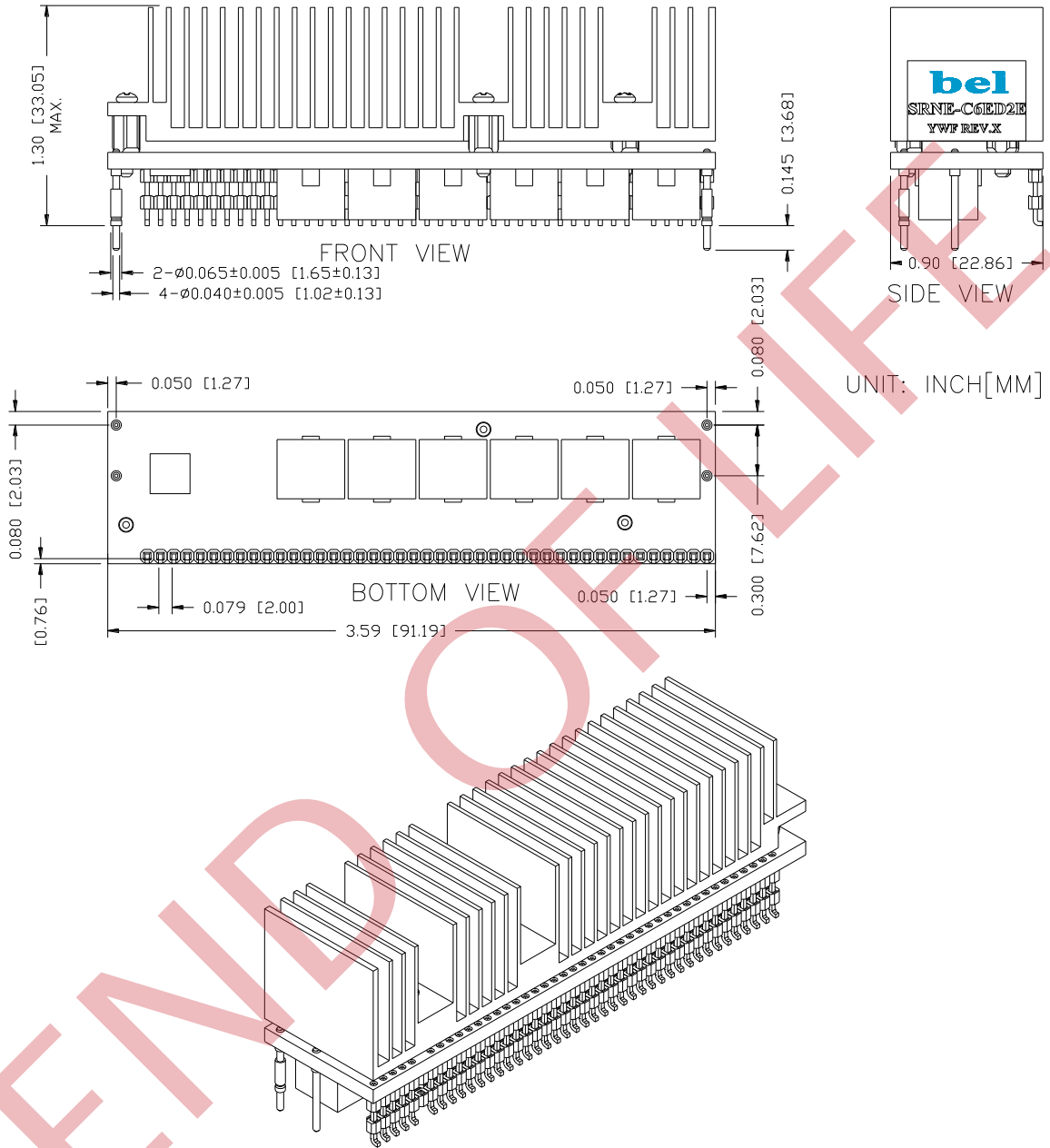


Figure 20. Finished dimensions

## 14. REVISION HISTORY

DATE	REVISION	CHANGES DETAIL	APPROVAL
2012-04-25	A	First release	J.Yan
2012-05-07	B	Updated MD.	J.Yan
2013-11-29	C	Updated MD.	J.Yan
2021-08-06	AD	Add object ID, module photo and thermal test airflow direction. Update to new format.	XF.Jiang

END OF LIFE

For more information on these products consult: [tech.support@psbel.com](mailto: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.

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