Features

- Industrial standard 1/8 brick package and footprint:
  57.9×22.8×9.8mm(2.28*0.90*0.38inch)
- Operating temperature:-40~85°C
- input voltage range: 2:1
- Output voltage adjustment:－10％~＋10％
- Isolation voltage: 1500Vdc (input-output)
- High efficiency at least 91%
- High power density
- Low output voltage ripple and noise
- Remote On/Off
- Under-voltage protection
- Over-voltage protection
- Thermal shutdown protection
- RoHS5 or RoHS6 recognized

Industrial standard 1/8 brick:

48 Vin 12 Vout 4A

Options:

- Control logic
- Conformal coating
- Length of the pins

Numbering Convention

ESR 04 – 48 S 12 – L –C G5
① ② ③ ④ ⑤ ⑥ ⑦ ⑧

No	Features	Descriptions
①	Product Series	ESR-1/8brick
②	Output current	4-Max. output current 4A
③	Typical input voltage	Input voltage is 48V
④	Number of Outputs	S-single Output
		D-double Output
⑤	Output voltage	12-output voltage is 12V
⑥	Control logic	L-Negative
		H or Default-positive
⑦	Sprayed Conformal coating	C- Sprayed Conformal coating
		Default: no Sprayed Conformal coating
⑧	RoHS feature	G5 – RoHS5
		G – lead-free products, RoHS6
		Default -lead

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1 Description

The converters are in an industry 1/8 brick packaging and footprint, open-frame design, and provide up to12.0V output voltage and 4A output current. All components of the converter are surface mounted, which results a high power density. The converters feature remote on/off, over-temperature protection and current limit, etc.

2 Specifications (All specifications are typical at nominal input, full load at 25°C and 200LFM（1m/S）unless otherwise stated.)

Parameter		Test Condition	Min	Typ	Max	Unit
2.1 Absolute Maximum Ratings						
Input Voltage (Vi)		at no operating, continuous	0	—	80	Vdc
Transient input voltage（Vit）		100ms	—	—	100	Vdc
Max Output Power (Pomax)		allowable operating conditions	—	—	48	W
2.2 Input Specifications						
Typical Input Voltage (Vinom)		—	—	48	—	Vdc
Input Voltage Range		—	36	—	75	Vdc
Input Under-voltage protection		Ionom	30	—	34	Vdc
Input Under-voltage Recovery Point		Ionom	31	—	35	Vdc
Maximum Input current（Iimax）		Vimin, Vonom,Ionom	—	—	1.48	A
No-load Input Current（Iio）		Vinom, Io＝0A	—	—	100	mA
Static Input Current（Iiof）		Vinom, remote output shutdown	—	—	10	mA
Remote	On	Low level(0~0.8Vdc, reference to –Vin) or connect to –Vin				
	Off	High level(2.4~48Vdc , reference to -Vin) or open circuit				
2.3 Output Specifications						
Output voltage set-point (Vonom)		Vinom, Ionom	11.88	12.0	12.12	Vdc
Typical Load (Ionom)		—	—	—	4	A
Output Current Range (Io)		Po≤48W	0	—	4	A
Line Regulation (Vov)		Vimin-Vimax, Ionom	—	—	±0.2	%Vo
Load Regulation (Vol)		0-100%Ionom, Vinom	—	—	±0.5	%Vo
Output voltage Range (Voadj)		Io≤Ionom, Po≤48W	-10	—	+10	%Vo
Output over voltage protection		Po<Pomax	13.8		15	Vdc
Output current limit	Protection Mode	——	Hiccup, automatic recovery			—
	Protection Range	Vinmin~Vinmax ， Tc （ PCB temp.）=-40~100°C Vinom	105		150	%Ionom
Output Short-circuit protection	Protection Mode	——	Hiccup, automatic recovery			—
dynamic Load Response	Peak Deviation	25%-50%-25%Ionom 50%-75%-50%Ionom Slope 0.1A/μS, Vinom	—	200	300	mV
	Settling Time		—	100	200	μs

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Parameter		Test Condition	Min	Typ	Max	Unit
Output Ripple and Noise		0-20MHz BW A ceramic capacitor 1μF and a tantalum capacitor 10μF should be connected to the output terminal	—	—	100	mV
External Output Capacitance（Co）		Add a 100μF/100V electrolytic capacitor to input	0	—	1000	μF
Turn-on/off Peak Deviation		Vinom, Ionom	—	—	±10	%Vo
Turn-on Delay Time		90%Vinnom-- 10%Vonom	—	20	30	mS
Output rise time		10%Vonom---90%Vonom	—	7	10	mS
2.4 Safety Specifications						
Isolation voltage	Input to output	Leak Current≤1mA, 1min	1500	—	—	Vdc
Isolation Resistance（RISO）		Test voltage: 500Vdc, normal temperature	50	—	—	MΩ
Safety Certificate		EN 60950－1: 2001 Recognized				
2.5 Reliability						
Vibration Test(sine)		Frequency: 10~55Hz Amplitude: 0.35mm Acceleration: 50m/s^2 Cycle: X,Y,Z 30min each axis	After being tested, no damage to the converter and its components, the appearance, output voltage and output ripple and noise (p-p) meet the data sheet requirements.			
Impact Test (half-sine)		Peak Acceleration: 300m/s^2 Duration: 6ms 6 times for three perpendicular directions	After being tested, no damage to the converter and its components, the appearance, output voltage and output ripple and noise (p-p) meet the data sheet requirements.			
MTBF		≥2×10^6 h Bellcore TR-332（Ta=25℃）				
2.6 Environmental Specifications						
Relative Humidity		（40±2）℃，No dew	—	—	90	%RH
Cooling		——	Forced air cooling			
Operating Baseplate Temperature (Tc)		See thermal derating curves	-40	—	+100	℃
Over-temperature protection		——	+115℃(Auto-recovery，see the diagram for test points)			
Storage temperature (Tst)		No Operating	-55	—	+125	℃
2.7 General Specifications						
Switching Frequency		——	—	300	—	k Hz
Temperature Coefficient (Tcoeff)		——	—	—	±0.02	%/℃

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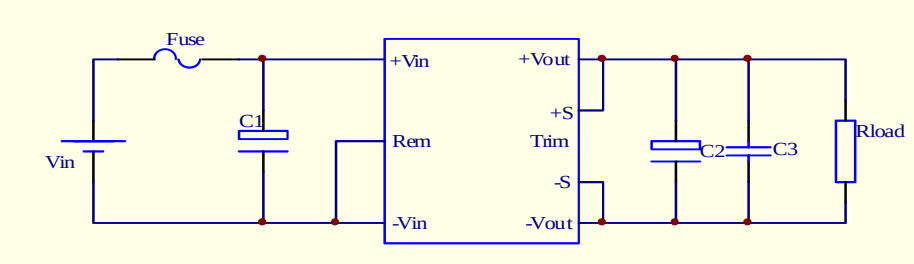
Efficiency (η)	Vinom,Ionom	90	91	—	%
RoHS	According to 2002/95/EC directive				
Anti-sulfuration feature	Sprayed conformal coating				

3. Basic Application Circuit and Considerations

3.1 Typical Application



Fuse: 5A C1≥100μF/100V （capacitor） C2： 22μF/25V (Tantalum capacitor)

C3：1μF /25V (Monolithic capacitor)

3.2 Input Voltage up to 80Vdc for long time or reverse input polarity would cause the module damaged.

3.3 Output will be off when the Rem is at high level or when the Rem keeps open circuit referenced to –Vin.

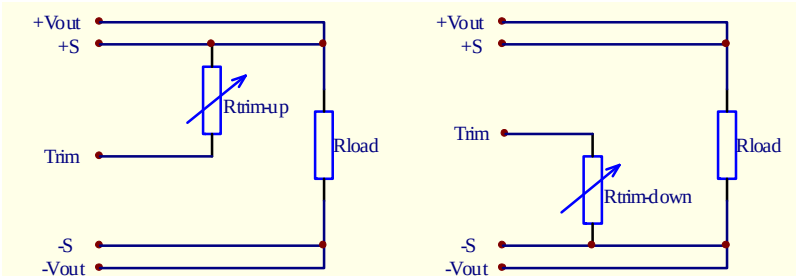
3.4 Output short-current protection mode is hiccup, automatic recovery.

3.5 Output Trim: Exceed the maximum output power (trim up) or the maximum output current (trim down) may cause the converter operates abnormally. The output voltage shall not exceed 13.2V (trim up) or be lower than 10.8V (trim down), or the converter can't work well. See "4. Output Voltage Adjustment (Trim)" for details.

3.6 Connect a 100μF/100V electrolytic capacitor to the input terminal when a capacitor connected to the output terminal.

4 Output Voltage Adjustment (Trim)

4.1 Output Voltage Trim Circuit



Trim up Trim down

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4.2 Output Trim Equations

To increase the output voltage, the value of the external resistor should be

$$R_{Trim-up} = \left(\frac{5.11 \times Vo(100(\%) + \Delta(\%))}{1.225 \times \Delta(\%)} - \frac{5.11 \times 100(\%)}{\Delta(\%)} - 10.22 \right) (k\Omega)$$

To decrease the output voltage, the value of the external resistor should be

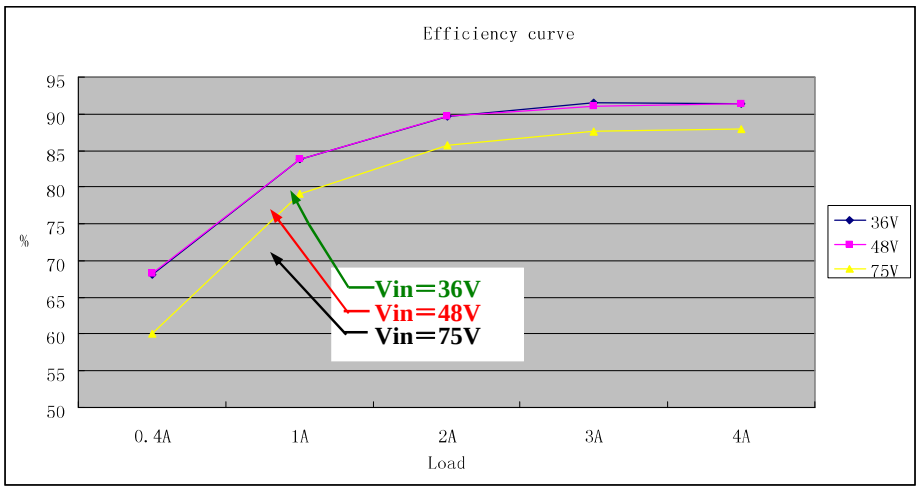
$$R_{Trim-down} = \left(\frac{5.11 \times 100(\%)}{\Delta(\%)} - 10.22 \right) (k\Omega)$$

Where $\Delta(\%)$=(Vo—Ve)/Vo

Vo is the rated output voltage; Ve is the adjusted voltage

$R_{Trim-up}, R_{Trim-down}$: External adjusting resistance

5 Efficiency Data (Ta＝＋25℃, airflow is 1m/S (200ft./min.))



6 Thermal Derating Curves

When the converter works at high temperature, the following derating curves shall be used:

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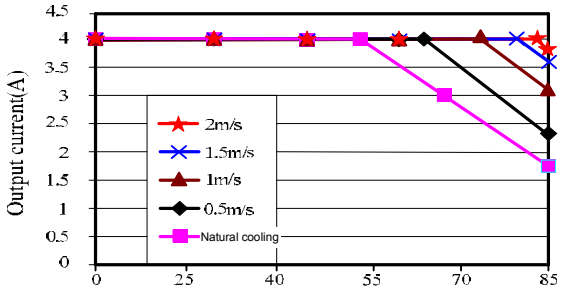


Vin=48.0V Derating Curves

Note：NC refers that the airflow is between 0.05m/ S and 0.1m/S

Test conditions：

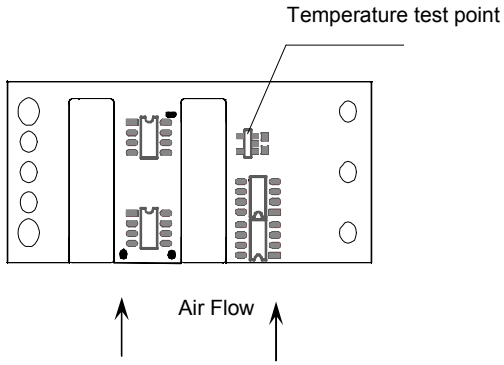
① The module shall be soldered on a 2.0mm standard 4-layer test board, of which the middle two layers are two-ounce copper foils.

② Certain clearance is required between the module and test board. Keep the test board perpendicular to the horizontal direction and the long edge parallel with the horizontal plane.

③ Put the module into a thermal test box, and test the module using infrared thermal imaging equipment and thermocouple test equipment. See the diagram below for airflow directions.

④ When the module reaches thermal equilibrium state, the devices on the module can meet thermal derating requirements.

7 Temperature Test Point and Airflow Direction



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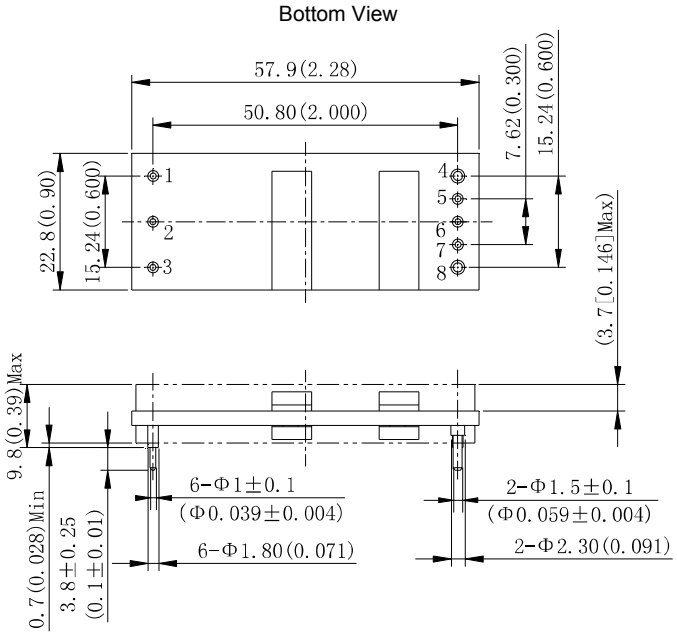
8 Mechanical Diagrams

8.1 Dimensions



（1）Unit: mm(inch)　　Tolerances:　.X±0.5 ; .XX±0.25(.X X±0.02; .X X X ±0.010)

（2）Non-pin device has a maximum height of the highest surface 3.7 (0.146), the highest pin surface installation of the device and the pins were the minimum spacing of 0.7 (0.028)。

8.2 Pin Definition

No	1	2	3	4	5	6	7	8
Symbol	-Vin	Rem	+Vin	-Vout	-S	Trim	+S	+Vout
Definition	Negative input	Remote	Positive input	Negative output	Negative Remote Sense	Trim	Positive Remote Sense	Positive output

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