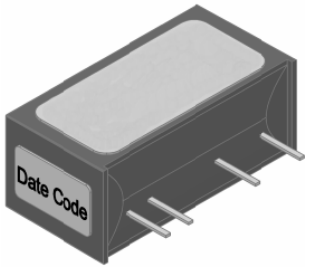
Isolated DC-DC Converters
SHBA1-05S1H8 -- 1 Watt

Features

- 7 pin SIP package
- Input / Output Isolation Voltage: 8KVDC
- High Efficiency
- Lead Free Design, RoHS Compliant
- Operating temperature: -40°C to +85°C
- EMI Standard / Approval: EN55011, Class A
- EMS Standard / Approval: EN60601-1-2
- Safety Standard / Approval: IEC / EN60950-1
  IEC / EN60601-1



Applications

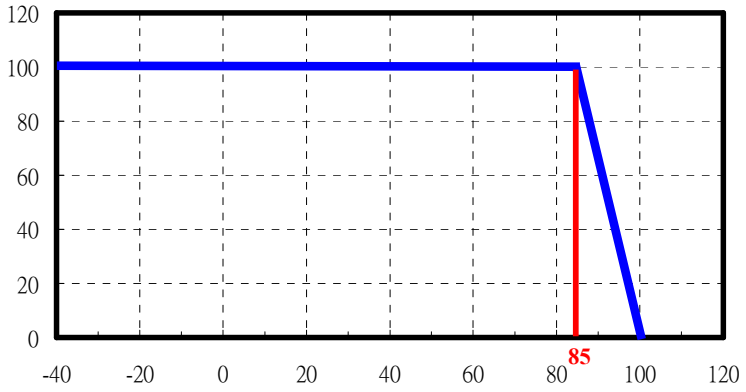
These converters are well suitable for battery operated equipment, measurement equipment, telecom, wireless network, Industry control system, everywhere where isolated, tightly regulated voltages and compact size are required.

Input Specifications		
Input voltage range		4.5~5.5V
Input current	Vin=5V and no Load	35mA (typical)
Input current	Vin=5V and full Load	271mA (typical)
Output Specifications		
Output voltage		5V
Output voltage accuracy	Vout=4.75~5.25V	±5%
Voltage balance	Dual output	±1% (maximum)
Maximum Load		200mA
Minimum Load		0A
Maximum capacitive load		2200uF (maximum)
Efficiency	Vin=5V and full load	78% (typical)
Ripple / Noise	20MHz bandwidth.	150mVp-p (maximum)
Temperature coefficient		±0.02%/℃ (maximum)
Output short circuit protection		1 second
Line regulation	For Vin charge of 1%	±1.5% (maximum)
Load Regulation	10% load to full load	±15% (maximum)
General Specifications		
Isolation voltage	Input to output	8000VDC (1 second)
Isolation resistance	500VDC	10GΩ min.
Isolation capacitance		10pF max.
Switching frequency		80kHz max.
Operating ambient temperature		-40℃~+85℃
Maximum case surface temperature		95℃
Storage temperature range		-55℃~+125 ℃

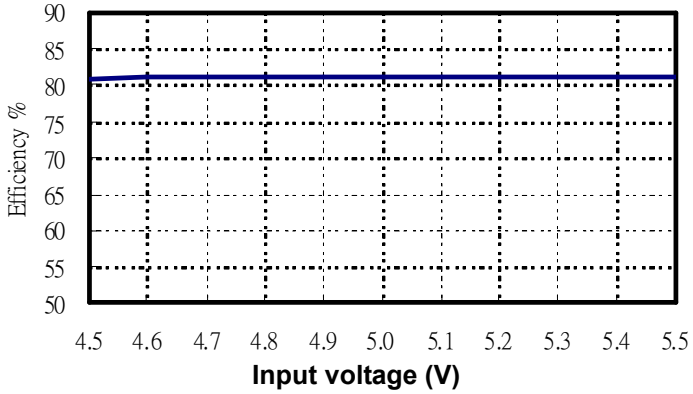
Relative humidity		95% RH (maximum)
Reliability, calculated MTBF		2×10^{6} Hrs
Cooling	Free air convection	
Physical Specifications		
Case material		Plastic (UL94 V-0)
Potting material		Epoxy (UL94 V-0)
Dimensions		0.77 × 0.50 × 0.39 Inch (19.5 ×12.5 × 9.8 mm)
Weight		4.3g (0.15oz) (typical)
Soldering temperature	Lead-free wave soldering	260℃/10Sec (maximum)
EMC Characteristics	**Standard**	
Radiated	EN 55011:2009+A1:2010	Class A
ESD	IEC 61000-4-2:2008	Performance Criterion A
RS	IEC 61000-4-3:2010	Performance Criterion A
EFT(2)	IEC 61000-4-4:2004+A1:2010	Performance Criterion A
CS	IEC 61000-4-6:2008	Performance Criterion A
PFMF	IEC 61000-4-8:2009	Performance Criterion A

Performance Curves

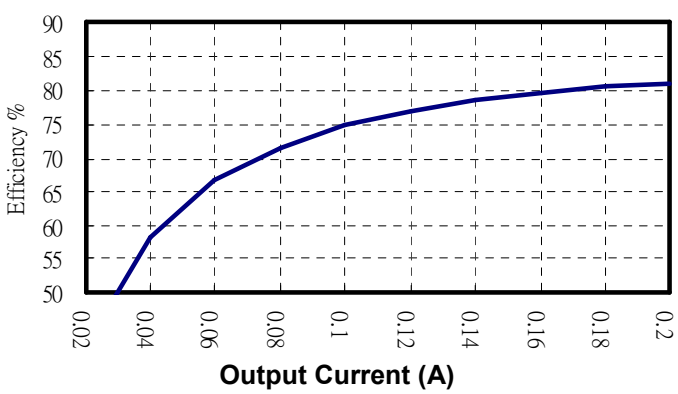
Power Derating Curve



Input voltage vs. Efficiency



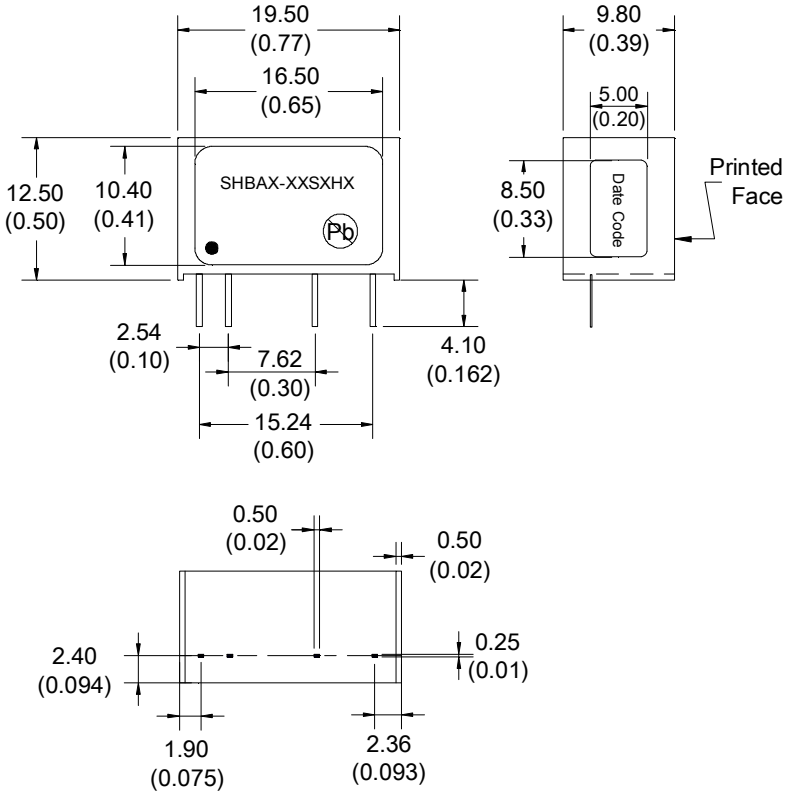
Output Current vs. Efficiency



Note

1. Typical value, tested at nominal input and full load.
2. An external filter capacitor is required if the module has to meet EN61000-4-4.
   The filter capacitor suggest: Nippon chemi-con KY series, 330uF/100V.

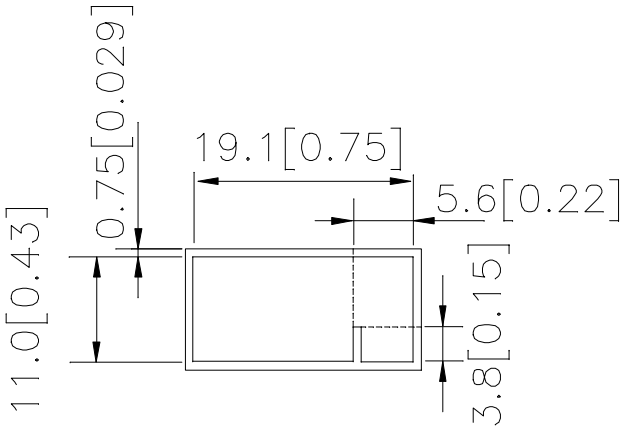
Mechanical Dimensions



Pin Assignment	
Pin	Single
1	+Vin
2	-Vin
5	-Vout
6	No pin
7	+Vout

Unit: mm (inch)
Tolerance: XX.XX ±0.25 (±0.01)

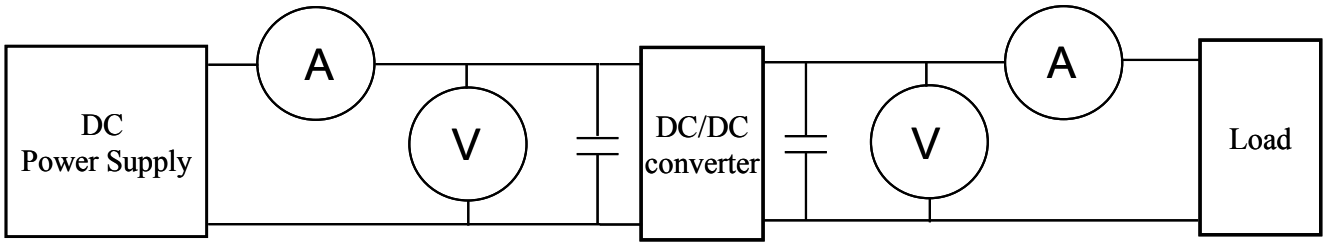
Package Information



PS:
Unit: mm [inch]
L= 350 mm[13.78 inch] ; ONE TUBE = 15 PCS

Test Configurations

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



◎DC Power Supply: It offers a wide voltage and current range precisely.

◎Current meter (A): Accuracy➔ 200μA ~ 200mA 4 ranges±(0.2% rdg + 2 digits)

2000mA ~ 20A 2 ranges±(0.3% rdg + 2 digits).

◎Voltage meter (V): Accuracy➔ ±(0.03% rdg + 4 digits).

◎Load: At full load.

◎Wires: The resistance of the wires must be small.

1. Input voltage range: Narrow input voltage range（±10%）、wide input voltage range (2:1 and 4:1)。

EX: Narrow input voltage range（±10%）

5V nominal input	➔	4.5~5.5V
12V nominal input	➔	10.8~13.2V
24V nominal input	➔	21.6~26.4V

Wide input voltage range 2:1

5V nominal input	➔	4.5~9V
12V nominal input	➔	9~18V
24V nominal input	➔	18~36V
48V nominal input	➔	36~75V

Wide input voltage range 4:1 (W)

24V nominal input	➔	9~36V
48V nominal input	➔	18~75V

2. Input power :

Pin = Vin x Iin

Vin：Input voltage
Iin：Input current

3. Output power :

Pout = Vout x Iout

Vout：Output voltage
Iout：Output current

4. Efficiency :

$$\text{Efficiency} = \frac{\text{Pout}}{\text{Pin}} \times 100\%$$

Pout: Output power
Pin: Input power

5. Voltage accuracy:

$$\frac{|\text{Vout-Vout(nominal)}|}{\text{Vout}} \times 100\%$$

Vout：Output voltage
Vout(nominal)：Nominal output voltage

6. Line regulation: (1) Wide input voltage range and regulated output voltage series.

$$\frac{|\,Vout(LL)-Vout(HL)\,|}{Vout(LL)} \times 100\%$$

LL: Low Line input voltage
HL: High Line input voltage

(2) Narrow input voltage range（±10%）and unregulated output voltage series.

$$\text{Line regulation} = \left| \frac{\Delta Vout}{\Delta Vin} \right|$$

$$\Delta Vout = \frac{Vout(+10\%)-Vout(-10\%)}{Vout} \times 100\%$$

Vout(+10%)：Output voltage at Vin = 1.1xVin(nominal)&full load

Vout(-10%)：Output voltage at Vin = 0.9xVin(nominal)&full load

Vout：Output voltage at Vin = Vin(nominal)&full load

$$\Delta Vin = \frac{Vin(+10\%)-Vin(-10\%)}{Vin(nominal)} \times 100\%$$

Vin(+10%)：Input voltage = 1.1xVin(nominal)

Vin(-10%)：Input voltage = 0.9xVin(nominal)

Vin(nominal)：Nominal Input voltage

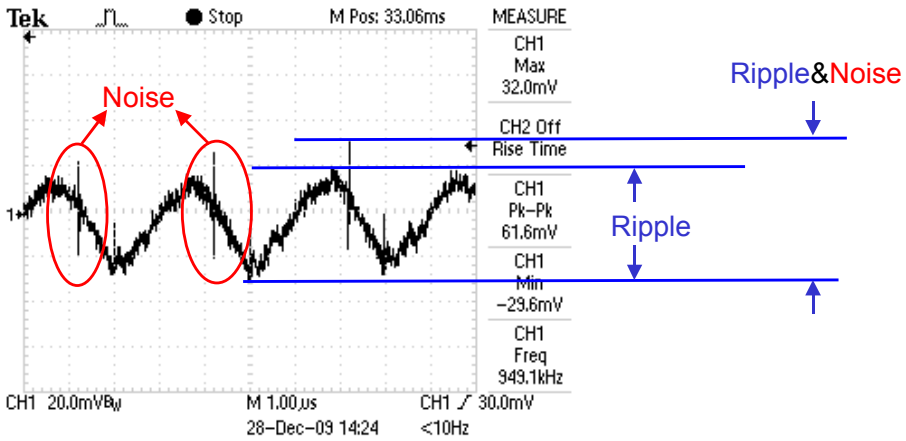
7. Load regulation :

$$\frac{|\,Vout(FL)-Vout(NL)\,|}{Vout(FL)} \times 100\%$$

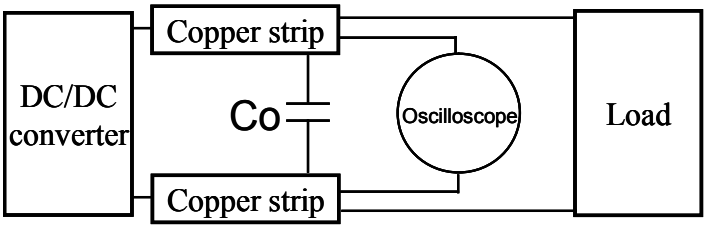
Vout(FL): Output voltage at full load

Vout(NL): Output voltage at 25% full load or 10% full load

8. Ripple and Noise: as shown below. The bandwidth is 0-20MHz.

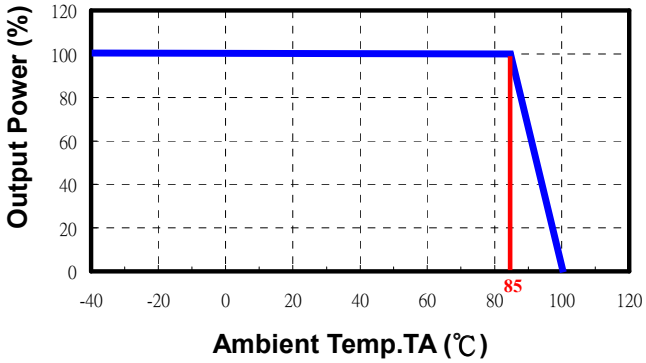


Output Ripple&Noise measurement test circuit: as shown below.



Co: usually 0.47uF.

9. Temperature derating curve: The DC-DC converter will operate over a wider temperature range if less power is drawn from the output and the device is already running. The temperature derating curve shows the operating power-temperature range. As shown below.



10. Switching frequency: The nominal operating frequency of the DC-DC converters.

11. Input to output isolation: The dielectric breakdown strength test between input and output circuits. This is the isolation voltage the device is capable of withstanding for a specified time, usually 1 second or 1 minute.