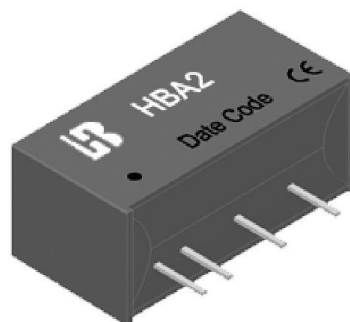


Features

- 7 pin SIP package
- Input / Output Isolation Voltage: 6.4kVDC
- High Efficiency
- Lead Free Design, RoHS Compliant
- Operating temperature: -40°C to +85°C
- Optional Reinforced Isolation 8kVDC
- 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, wherever high isolation voltage and compact size are required.

Technical Specification

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

Model Number	Reinforced Isolation 8kVDC	Input Voltage Range(V)	Output Voltage (V)	Output Current (mA)	Input Current (mA)		Eff. (%) ⁽²⁾	Capacitive Load, max. ⁽³⁾ (uF)		
				Full Load	No Load	Full Load				
HBA2-05S0H6	HBA2-05S0H8	4.5 ~ 5.5 Nominal: 5	3.3	600	70	550	76	3300		
HBA2-05S1H6	HBA2-05S1H8		5	400		541	78	1200		
HBA2-05SBH6	HBA2-05SBH8		7.2	278		526	80	1200		
HBA2-05SAH6	HBA2-05SAH8		9	222		513	82	1200		
HBA2-05S2H6	HBA2-05S2H8		12	167		513	82	680		
HBA2-05S3H6	HBA2-05S3H8		15	132		513	82	680		
HBA2-05D0H6	HBA2-05D0H8		±3.3	±300		535	78	±1500		
HBA2-05D1H6	HBA2-05D1H8		±5	±200		526	80	±470		
HBA2-05DBH6	HBA2-05DBH8		±7.2	±139		526	80	±470		
HBA2-05DAH6	HBA2-05DAH8		±9	±111		519	81	±470		
HBA2-05D2H6	HBA2-05D2H8		±12	±85		519	81	±330		
HBA2-05D3H6	HBA2-05D3H8		±15	±66		513	82	±330		
HBA2-12S0H6	HBA2-12S0H8		10.8 ~ 13.2 Nominal: 12	3.3		600	30	223	78	3300
HBA2-12S1H6	HBA2-12S1H8			5		400		219	80	1200
HBA2-12SBH6	HBA2-12SBH8			7.2		278		213	82	1200
HBA2-12SAH6	HBA2-12SAH8	9		222	211	83		1200		
HBA2-12S2H6	HBA2-12S2H8	12		167	211	83		680		
HBA2-12S3H6	HBA2-12S3H8	15		132	211	83		680		
HBA2-12D0H6	HBA2-12D0H8	±3.3		±300	217	80		±1500		
HBA2-12D1H6	HBA2-12D1H8	±5		±200	213	82		±470		
HBA2-12DBH6	HBA2-12DBH8	±7.2		±139	211	83		±470		
HBA2-12DAH6	HBA2-12DAH8	±9		±111	208	84		±470		
HBA2-12D2H6	HBA2-12D2H8	±12		±85	208	84		±330		
HBA2-12D3H6	HBA2-12D3H8	±15		±66	206	85		±330		

Model Number	Reinforced Isolation 8kVDC	Input Voltage Range(V)	Output Voltage (V)	Output Current (mA)	Input Current (mA)		Eff. ⁽²⁾ (%)	Capacitive Load, max. ⁽³⁾ (uF)
				Full Load	No Load	Full Load		
HBA2-15S0H6	HBA2-15S0H8	13.5 ~ 16.5 Nominal: 15	3.3	600	25	178	78	3300
HBA2-15S1H6	HBA2-15S1H8		5	400		175	80	1200
HBA2-15SBH6	HBA2-15SBH8		7.2	278		171	82	1200
HBA2-15SAH6	HBA2-15SAH8		9	222		169	83	1200
HBA2-15S2H6	HBA2-15S2H8		12	167		167	84	680
HBA2-15S3H6	HBA2-15S3H8		15	132		165	85	680
HBA2-15D0H6	HBA2-15D0H8		±3.3	±300		174	80	±1500
HBA2-15D1H6	HBA2-15D1H8		±5	±200		171	82	±470
HBA2-15DBH6	HBA2-15DBH8		±7.2	±139		169	83	±470
HBA2-15DAH6	HBA2-15DAH8		±9	±111		167	84	±470
HBA2-15D2H6	HBA2-15D2H8		±12	±85		167	84	±330
HBA2-15D3H6	HBA2-15D3H8		±15	±66		165	85	±330
HBA2-24S0H6	HBA2-24S0H8		21.6 ~ 26.4 Nominal: 24	3.3		600	20	111
HBA2-24S1H6	HBA2-24S1H8	5		400	110	80		1200
HBA2-24SBH6	HBA2-24SBH8	7.2		278	113	78		1200
HBA2-24SAH6	HBA2-24SAH8	9		222	113	78		1200
HBA2-24S2H6	HBA2-24S2H8	12		167	113	78		680
HBA2-24S3H6	HBA2-24S3H8	15		132	111	79		680
HBA2-24D0H6	HBA2-24D0H8	±3.3		±300	113	77		±1500
HBA2-24D1H6	HBA2-24D1H8	±5		±200	110	80		±470
HBA2-24DBH6	HBA2-24DBH8	±7.2		±139	114	77		±470
HBA2-24DAH6	HBA2-24DAH8	±9		±111	113	78		±470
HBA2-24D2H6	HBA2-24D2H8	±12		±85	110	80		±330
HBA2-24D3H6	HBA2-24D3H8	±15		±66	111	79		±330

Input Specifications		
Input voltage	5V nominal input	4.5~5.5V
	12V nominal input	10.8~13.2V
	15V nominal input	13.5~16.5V
	24V nominal input	21.6~26.4V
Input filter		Capacitor
Environmental Specifications		
Operating ambient temperature		-40°C to +85°C
Maximum case temperature		+105°C
Storage temperature range		-55°C to +125°C
Relative humidity		95% RH max.
Output Specifications		
Output power		2 Watts max.
Voltage accuracy	Nominal Vin and full load	±5% max.
Voltage balance	Dual output	±1% max.
Minimum load		0A

Line regulation	For Vin change of 1%	±1.5% max. 10% max.
Load Regulation	10% load to full load	15% max. (5Vout models) 20% max. (3.3Vout models)

Ripple and Noise (20MHz Bandwidth)		200mVp-p max.
Maximum capacitive load		See table
Output short circuit protection		1 second

General Specifications

Efficiency	Nominal input and full load	See table
Isolation voltage	Input to output	6400VDC (1 second)
Isolation resistance	500VDC	10GΩ min.
Isolation capacitance		10pF max.
Switching frequency		80kHz max.
Reliability, calculated MTBF		2×10 ⁶ Hrs

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) typ.

EMC Characteristics

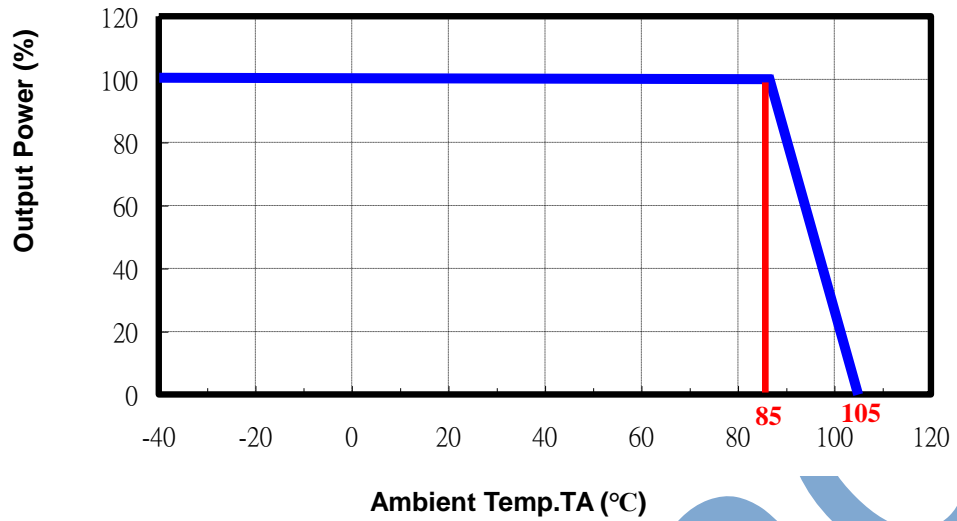
Standard

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 ⁽⁴⁾	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

Note

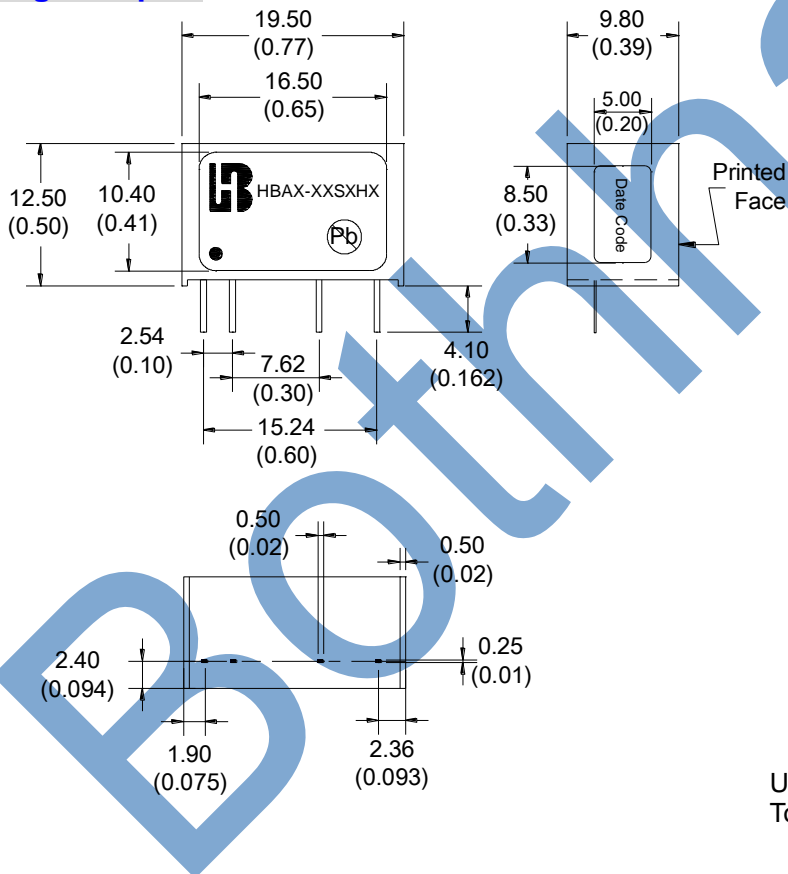
1. Lo below this value will not damage these converters, however, they may not meet all listed specifications.
2. Typical value, tested at nominal input and full load.
3. For each output.
4. An external filter capacitor is required if the module has to meet EN61000-4-4.
The filter capacitor suggest: Nippon chemi-con KY series, 330uF/100V.
5. Specifications subject to change without notice.

Power Derating Curve



Mechanical Dimensions

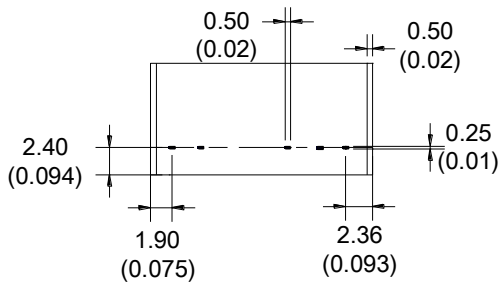
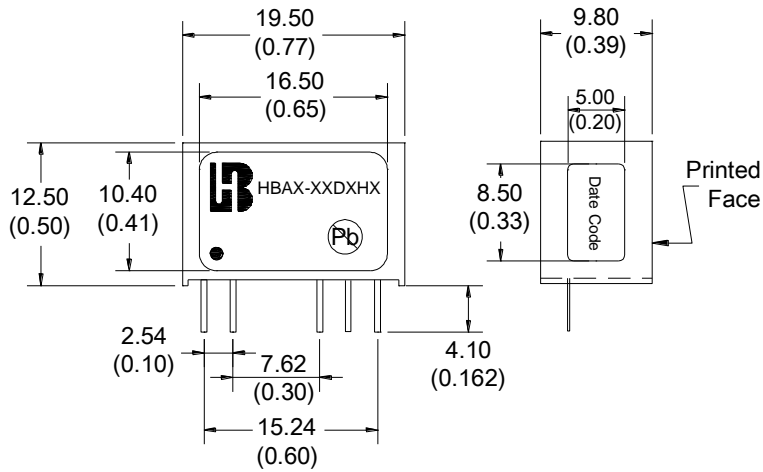
Single output



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

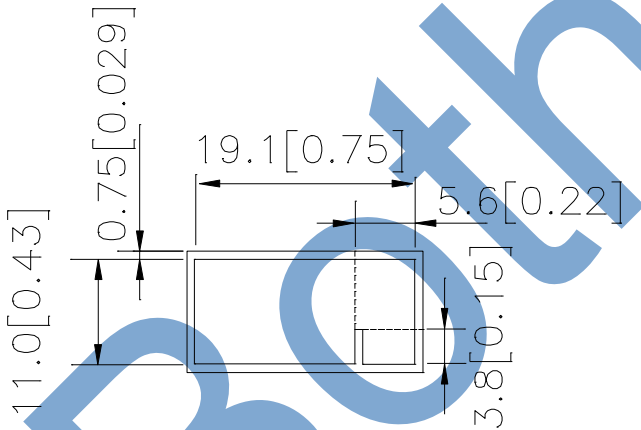
Unit: mm (inch)
Tolerance: XX.XX ±0.25 (±0.01)

Dual output



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

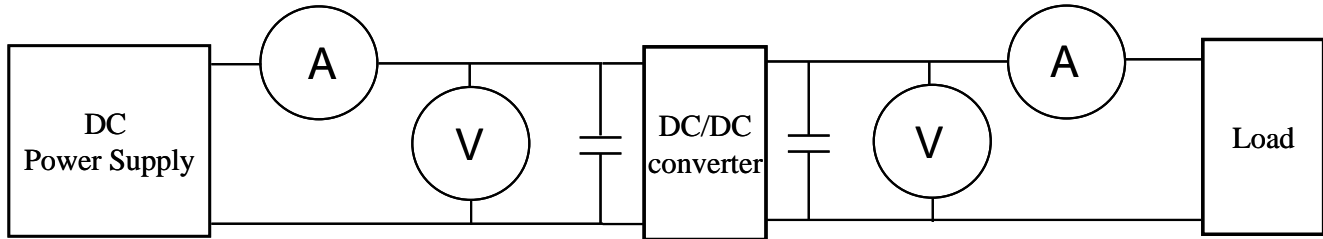
Package Information



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 $\pm(0.2\% \text{ rdg} + 2 \text{ digits})$
 2000mA ~ 20A 2 ranges $\pm(0.3\% \text{ rdg} + 2 \text{ digits})$.

⊙Voltage meter (V): Accuracy → $\pm(0.03\% \text{ rdg} + 4 \text{ digits})$.

⊙Load: At full load.

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

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

EX: Narrow input voltage range ($\pm 10\%$)

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 :

$$P_{in} = V_{in} \times I_{in}$$

V_{in} : Input voltage
 I_{in} : Input current

3. Output power :

$$P_{out} = V_{out} \times I_{out}$$

V_{out} : Output voltage
 I_{out} : Output current

4. Efficiency :

$$\text{Efficiency} = \frac{P_{out}}{P_{in}} \times 100\%$$

P_{out} : Output power
 P_{in} : Input power

5. Voltage accuracy:

$$\frac{|V_{out} - V_{out(nominal)}|}{V_{out}} \times 100\%$$

V_{out} : Output voltage
 $V_{out(nominal)}$: Nominal output voltage

6. Line regulation:

Narrow input voltage range ($\pm 10\%$) and unregulated output voltage series.

$$\text{Line regulation} = \frac{\Delta V_{out}}{\Delta V_{in}}$$

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

$V_{out(+10\%)}$: Output voltage at $V_{in} = 1.1 \times V_{in}(\text{nominal})$ & full load

$V_{out(-10\%)}$: Output voltage at $V_{in} = 0.9 \times V_{in}(\text{nominal})$ & full load

V_{out} : Output voltage at $V_{in} = V_{in}(\text{nominal})$ & full load

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

$V_{in(+10\%)}$: Input voltage = $1.1 \times V_{in}(\text{nominal})$

$V_{in(-10\%)}$: Input voltage = $0.9 \times V_{in}(\text{nominal})$

$V_{in}(\text{nominal})$: Nominal Input voltage

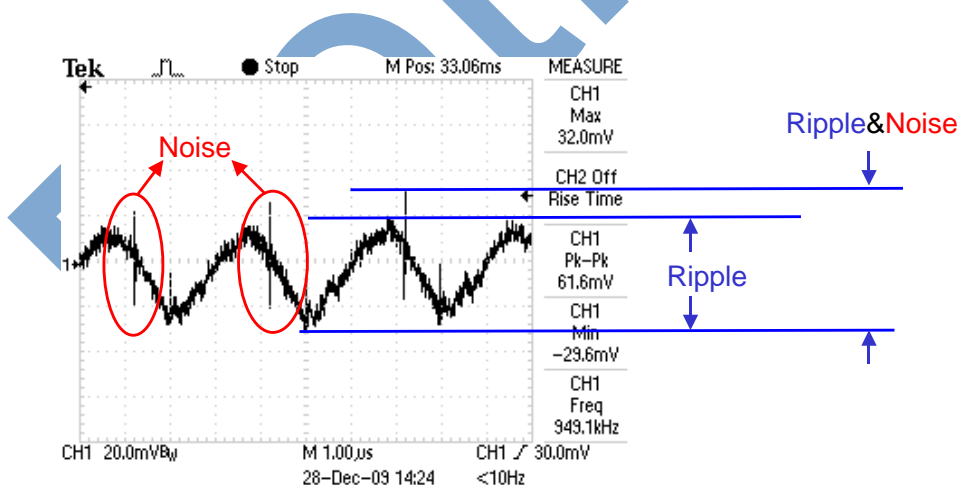
7. Load regulation :

$$\frac{|V_{out(FL)} - V_{out(NL)}|}{V_{out(FL)}} \times 100\%$$

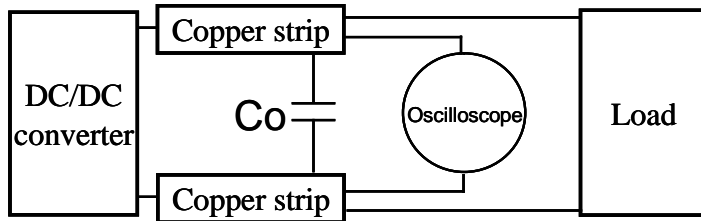
$V_{out(FL)}$: Output voltage at full load

$V_{out(NL)}$: Output voltage at 25% full load or 10% full load

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

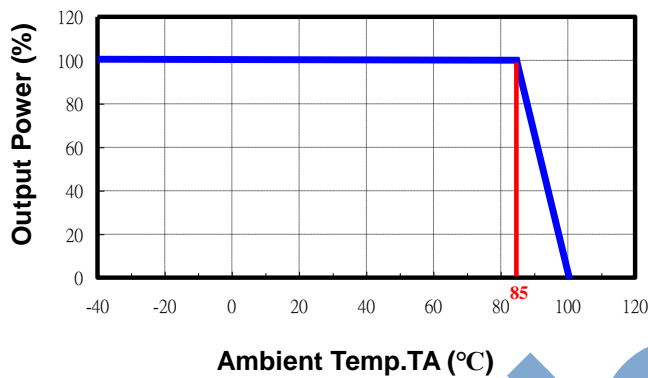


Output Ripple&Noise measurement test circuit: as shown below.



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.