



Features

- **Related to railways applications**
- Wide 2 : 1 Input Voltage Range(60~160V)
- Remote On/Off
- High Efficiency up to 86%
- Input / Output Isolation Voltage: 3kVDC
- Extended Operating Temperature Range: -40°C to +85°C
- Output Short Circuit Protection:
Hiccup, continuous & Auto Recovery
- Over Voltage Protection: Clamp Mode
- Shielded Metal Case with Insulated Baseplate
- Lead Free Design, RoHS Compliant
- Customer Design Available



Description

The BXE30 Series are isolated 30W DC/DC converters. Designed with highly efficiency, allow the operating temperature range of these units to be -40°C to +85°C in a 50.8×50.8×12.7mm shielded metal case. Further features include wide 2 : 1 input voltage range, remote on/off control, short-circuit protection and over voltage protection.

Applications

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

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

Model Number	Input Voltage Range	Output Voltage (V)	Output Current (mA)		Input Current (mA)		Eff. ⁽²⁾ (%)	Capacitive Load, max. ⁽³⁾ (uF)
			Min. Load ⁽¹⁾	Full. Load	No Load	Full Load		
BXE30-110S1H3	60~160V Nominal:110V	5	0	6000	9	350	82	10000
BXE30-110S2H3		12	0	2500	6	332	86	4700
BXE30-110S3H3		15	0	2000	5	333	86	2200



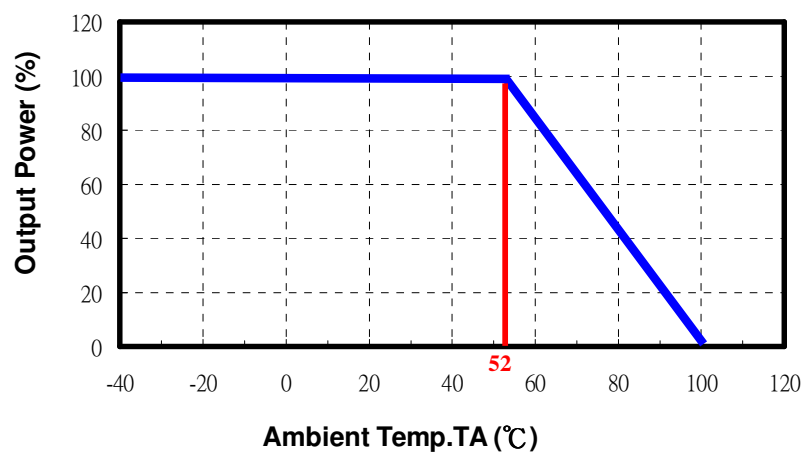
Input Specifications		
Input Voltage	110V nominal input	60-160V
Input filter		Pi Type
Input surge voltage (100ms max.)	110V input	170V
Input reflected ripple current	Nominal Vin and full load	550mAp-p typ.
Start up time	Nominal Vin and constant resistive load	65ms typ.
Remote ON/OFF	Converter: ON	Open or $3.5V < V_r < 12V$
	Converter: OFF	Short ⁽³⁾ or $0V < V_r < 0.7V$
Sourcing current of remote control pin	Nominal Vin	< 0.2 mA
Idle input current (at Remote OFF state)	Nominal Vin	< 10 mA
Environmental Specifications		
Operating ambient temperature		-40°C to +85°C (with derating)
Maximum case temperature		+100°C
Storage temperature range		-55°C to +105°C
Relative humidity		5% to 95% RH
Temperature coefficient		±0.02% / °C max.
Output Specifications		
Output power		30 Watts max.
Voltage accuracy	Full load and nominal Vin	±1%
Minimum load		0
Line regulation	LL to HL at full load	±0.5%
Load Regulation	25% load to full load Single	±0.5%
Ripple and Noise	20MHz bandwidth	85mVp-p max.
Over voltage protection (Zener Diode Clamp)	5Vout models	6.2V
	12Vout models	15V
	15Vout models	18V
Capacitive load		See table
Over load protection	% of full load at nominal input	150% typ.
Short circuit protection		Hiccup, continuous (Auto Recovery)
Transient response settling time	50% load step change	500µs typ.
Transient response over shoot	di/dt=0.8A/µs	≤ ±5% of Vo
General Specifications		
Efficiency	Nominal input	See table
Isolation voltage	Input to output	3000VDC
Isolation resistance	500VDC	10 ⁹ Ohms min.
Isolation capacitance		1000pF typ.
Switching frequency		330kHz typ.
Reliability, calculated MTBF		1.11× 10 ⁶ Hrs



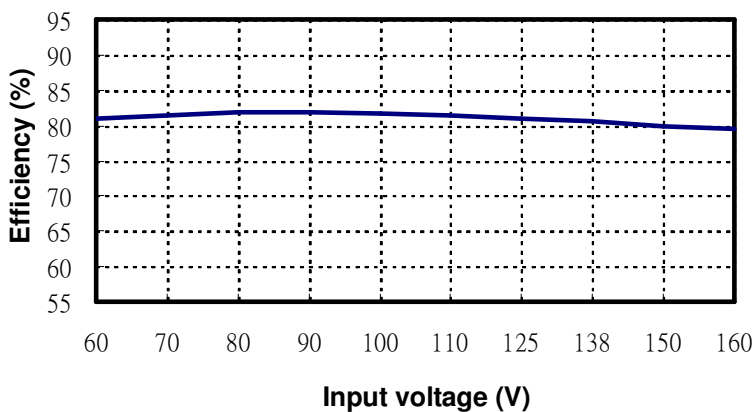
Physical Specifications

Case material	Nickel-coated copper
Base material	FR4 PCB
Potting material	Silicon rubber (UL94V-0)
Dimensions	2.00 × 2.00 × 0.50 Inch (50.8 × 50.8 × 12.7 mm)
Weight	84g (2.96oz) (typical)

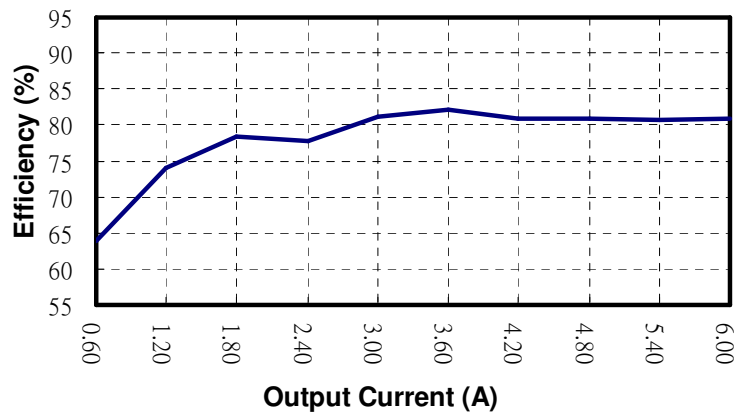
**BXE30 Series
Power Derating Curve⁽⁴⁾**



**BXE30-110S1
Input voltage vs. Efficiency**



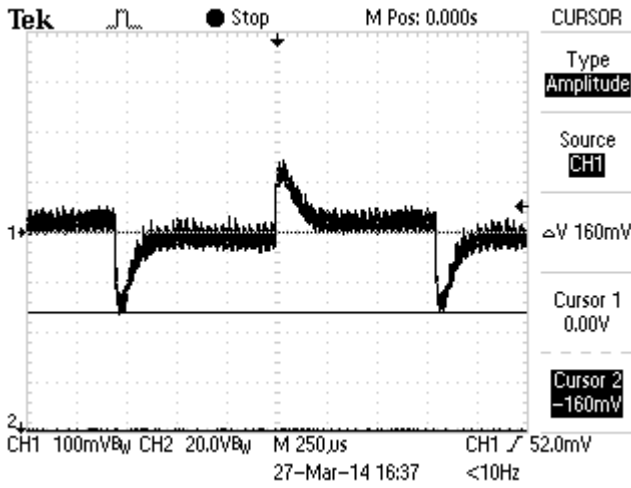
**BXE30-110S1
Output Current vs. Efficiency**





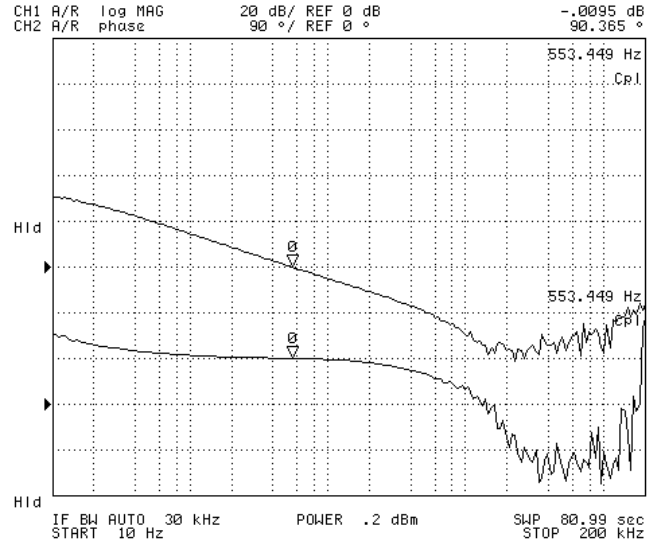
BXE30-110S1

Transient Response at 50%~100% Max Load



BXE30-110S1

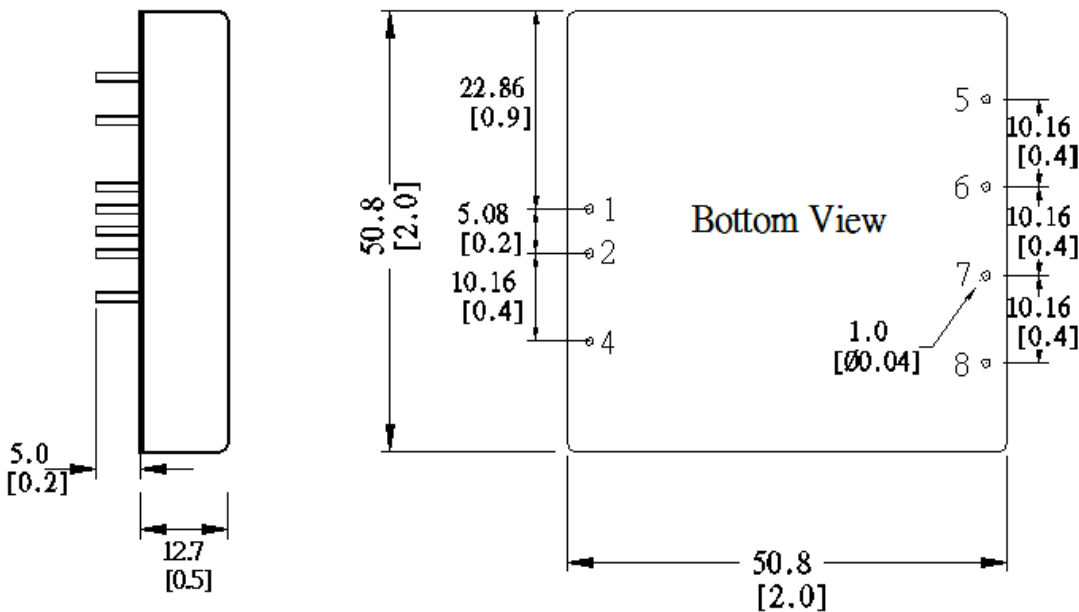
Loop Gain & Phase at Vi=110V, Full Load



Note

1. Typical value, tested at nominal input and full load.
2. For each output.
3. Short to -Vin (Pin 2,3).
4. Based on BXE30-110S1.

Mechanical Dimensions



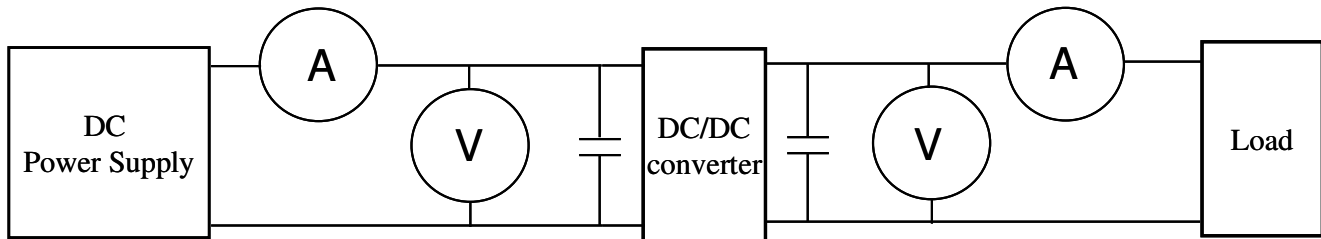
Unit: mm [inch]
Tolerance: ±0.5[0.02]

Pin Assignment	
Pin	Single
1	+Vin
2	-Vin
4	Remote On/Off
5	No Pin
6	+Vout
7	-Vout
8	Trim



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
110V nominal input	→	60~160V

Wide input voltage range 4:1 (W)

24V nominal input	→	9~36V
48V nominal input	→	18~75V
110V nominal input	→	43~160V

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

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

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

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

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

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

$V_{out(+10\%)}$: 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

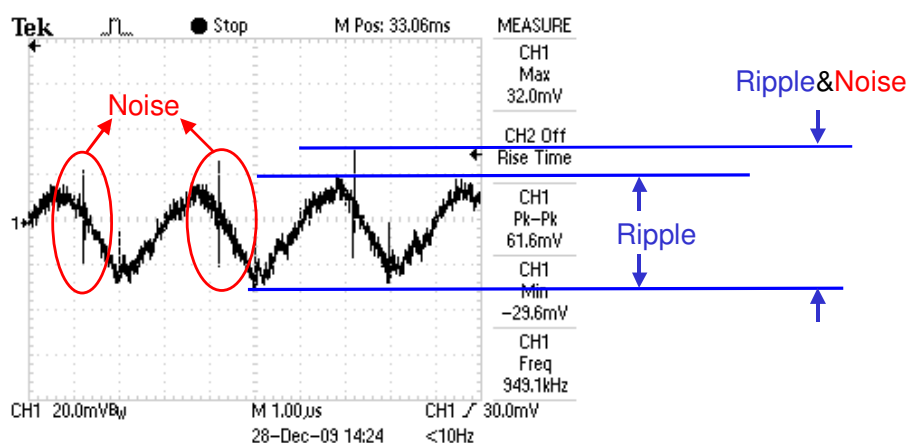
7. Load regulation :

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

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

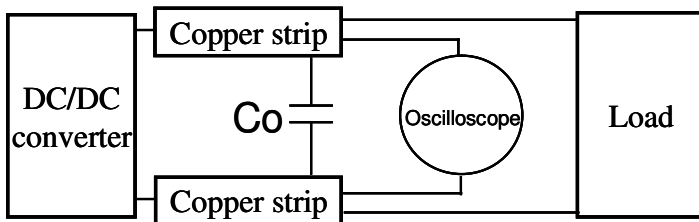
$V_{out(NL)}$: Output voltage at 25% full load or 10% full load

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



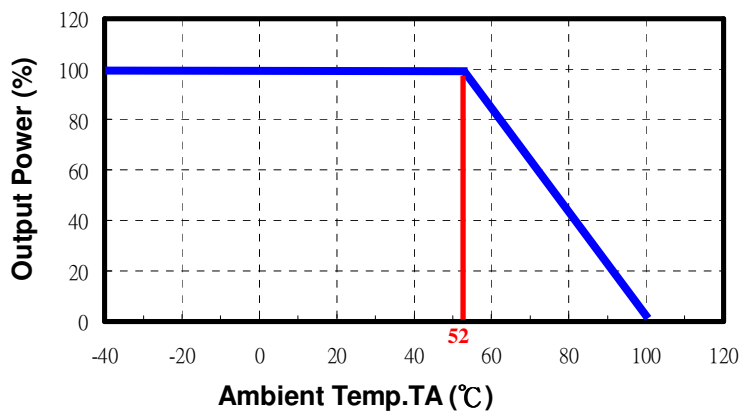


Output Ripple&Noise measurement test circuit: as shown below.



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.