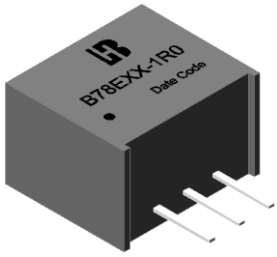
Features



RoHS compliant

- Efficiency up to 97%, no heatsinks required
- Pin-out compatible with LM78XX linears
- Low profile (L/W/H=11.6 x 10.4 x 7.6mm)
- Short circuit protection, thermal shutdown
- Operating ambient temperature range: -40℃to +85℃
- EN/IEC 60950-1, 2nd Edition, EN55032 safety meets

Description

The BH78EXX-1R0-Series are high efficiency switching regulators and ideal substitutes for LM78xx series three-terminal linear regulators. The converters feature high efficiency, low loss, short circuit protection, and there is no need for a heat sink.
These products are widely used in applications such as industrial control, instrumentation and electric power.

Technical Specification

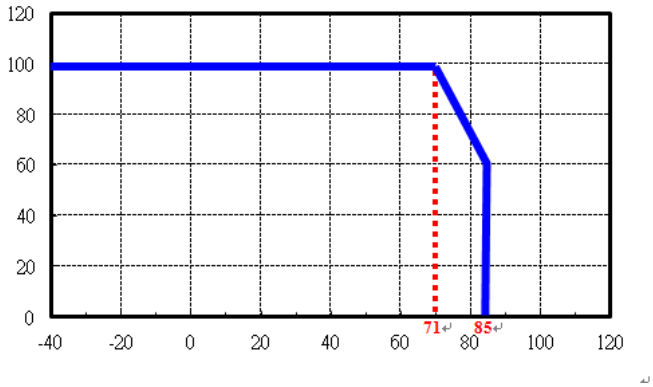
All specifications are typical at nominal input, full load and 25°C unless otherwise stated.

Model Number	Input Voltage Range	Output Voltage (V)	Output Current (mA)		Full Load Efficiency(%) Typ. Vin Min./ Vin Max.	Capacitive Load(uF) Max.
			Min. Load (1)	Full. Load		
B78E03-1R0	4.75-36V(*1) Nominal: 24V	3.3	0	1000	94/84	1000
B78E05-1R0	6.5-36V Nominal: 24V	5	0	1000	96/88	1000
B78E12-1R0	15-36V Nominal: 24V	12	0	1000	97/93	330
B78E15-1R0	18-36V Nominal: 24V	15	0	1000	97/94	330

Note: *1: Input voltage up to 36V max,but it is recommended not to operate at this voltage for a long time

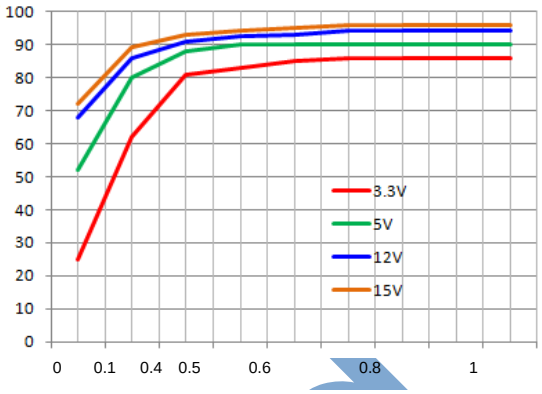
Input Specifications		
Input voltage	24V nominal input	4.75V Min. 36V max.
Input filter		Capacitor
Input Reverse Polarity	See Positive to Negative Converter,	
No Load Input Current		30mA max.
Hot swap is not supported		
Environmental Specifications		
Operating ambient temperature	with derating	-40°C to +85°C
Storage temperature range		-55°C to +125°C
Maximum case temperature		+100°C
Operating humidity	Non-condensing	95% RH max.
Temperature coefficient		±0.015% / °C Typ.
RoHS Compliant		RoHS 2.0
Output Specifications		
Voltage accuracy	At 100% load	±2.0% Typ ±4.0% max.
Line regulation	Vin=min. to max. Vout=100% load	±0.2% Typ ±0.4% max.
Load Regulation	Vin=nom. Vout=10 -100% load	±0.4% Typ ±0.8% max.
Ripple and Noise (20MHz Bandwidth)(4)	Vin=nom. Vout=100% load	50mVp-p Typ. 100mVp-p max.
Over Current Protection(OCP)	100%=1.0A	300~500%
Short Circuit Protection (SCP)		Continuous, autorecovery
General Specifications		
Efficiency		See table
Switching frequency	Pulse width modulation(PWM), Vin=nom.	410KHz
Dynamic load response	75-100-75% load step	<250uS Typ
MTBF	According to MIL-HDBK-217F,G.B. +25°C	2.0×10^7Hrs
Safety(5)	IEC/EN60950-1,2nd Edition,EN55032	meet
Physical Specifications		
Dimensions		0.45 × 0.41 × 0.3 Inch (11.6 × 10.4 × 7.6 mm)
Weight		2.0g (0.07oz) typ.
EMC Compliance	**Condition**	**Standard/Criterion**
Electromagnetic compatibility of multimedia equipment-Emission requirements	with external components	EN55032,Class A EN55032,Class B
ESD Electrostatic discharge immunity test	Air ±8kV,Contact ±4kV	EN61000-4-2,Criteria B
Radiated,radio-frequency,electromagnetic field immunity test	10V/m	EN61000-4-3,Criteria A

Power Derating Curve



Ambient Temperature (℃)

Efficiency Curve

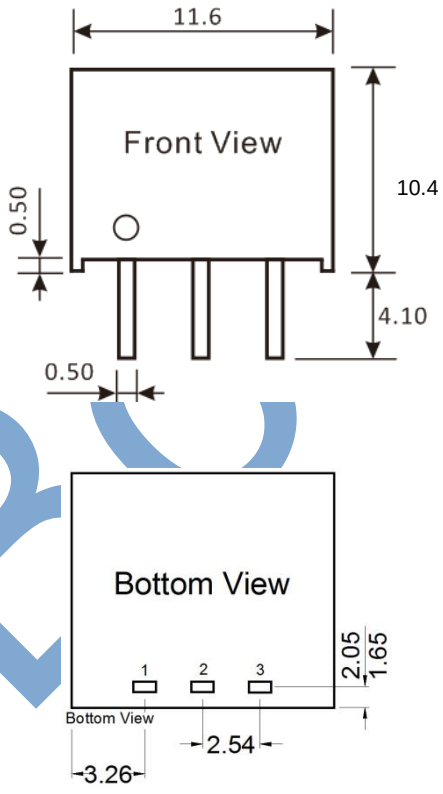


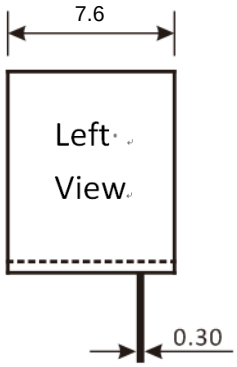
Output Load

Note

1. Io 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. Operation under no load will not harm the converter,
   but specifications may not be met A minimum load of 10mA is recommended
4. With light loads at or below 10%, Ripple & Noise for 3.3V/5V output parts increases to 150mVp-p max, and for Other output parts to 2%Vo max.
5. Input Back Ripple Current is tested and specified over a 5 Hz to 20 MHz bandwidth.
   Input filtering is Cin=100 uF*2, Cbus=1000 uF, Lbus=1 uH. All caps are low ESR.(see page 6 EMI Filter)

Mechanical Dimensions

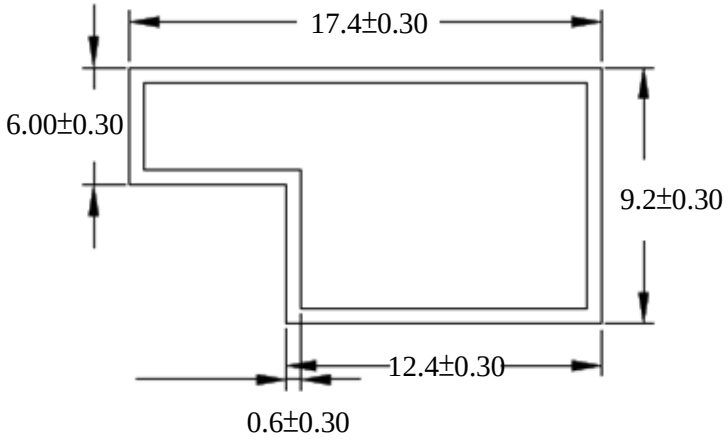




Pin Assignment	
Pin	Define
1	Vin
2	GND
3	Vout

Unit: mm
Tolerance: XX.X=±0.5, XX.XX=±0.25

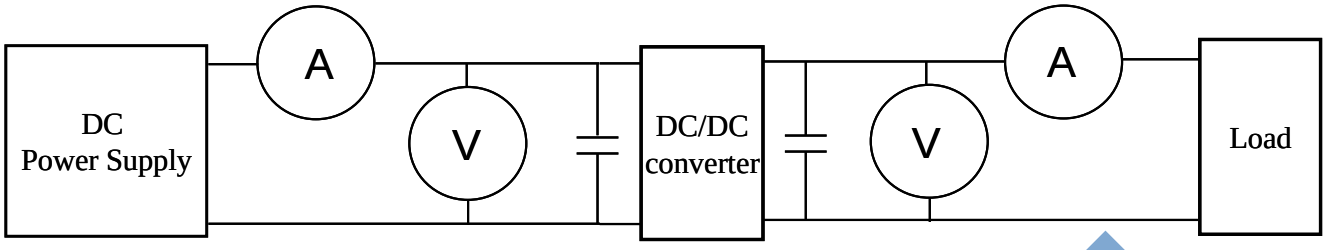
Package Information



PS:
Unit: mm [inch]
L= 520 mm[20.47 inch] ; ONE TUBE = 42 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)

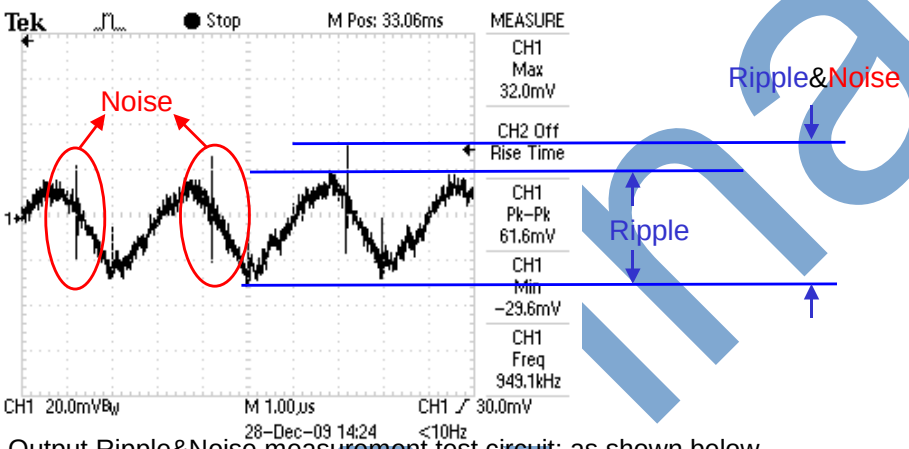
2000mA ~ 20A 2 ranges±(0.3% rdg + 2 digits).

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

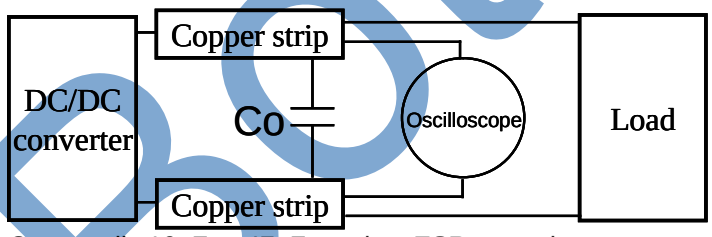
◎Load: At full load.

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

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

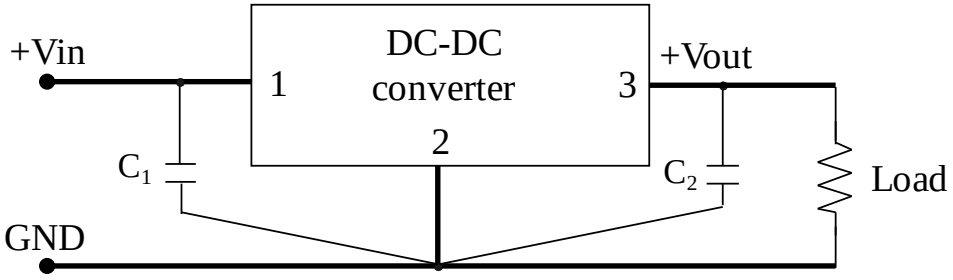


Output Ripple&Noise measurement test circuit: as shown below.



Co: usually 10uF to 47uF use low-ESR ceramic.

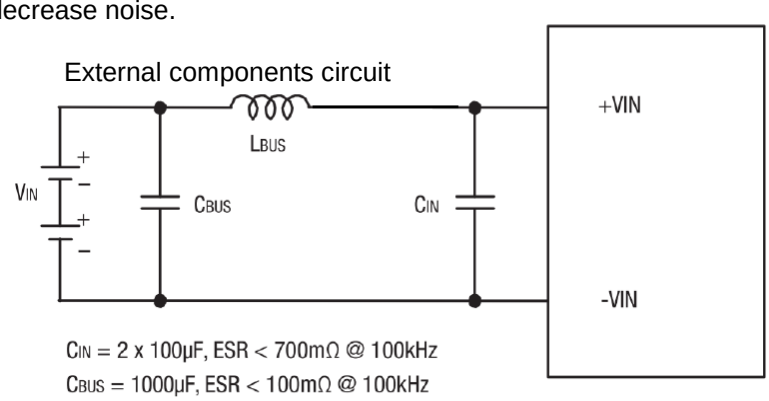
2. Application circuit: as shown below. C1=22uF/50V, C2 =47uF/16V Low ESR.



EMI Filter

Input filter components are used to meet emissions requirement for the module.
These components should be mounted as close as possible to the module; and all leads should be minimized to decrease noise.

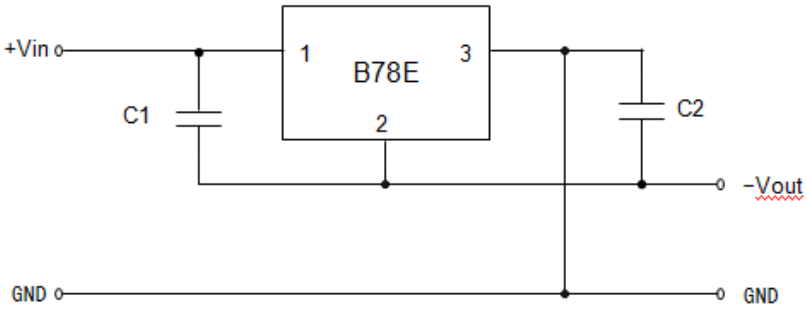
External components circuit



CIN = 2 x 100µF, ESR < 700mΩ @ 100kHz
CBUS = 1000µF, ESR < 100mΩ @ 100kHz
LBUS = 1µH

CIN = 2x100 uF, ESR<700mΩ @ 100kHz
CBUS =1000 uF, ESR<100mΩ @ 100kHz
CBUS =1uF

Positive to Negative Converter



C1 and C2 are required and should be fitted close to the converter pins.

Maximom capacitive load including C2 is 100uF