

P R B X

POWERBOX Automotive Line ENA60 Series 60W 2:1 Single Output DC/DC Converter

Features

No minimum load required
1600VDC input to output isolation
Application of chassis-mount DC/DC converter
Screw terminals for input and output connections
Internal input fuse protection
Internal output LED indicator
Undervoltage, over current, short circuit, and over voltage protection
Reverse polarity protection
Fuse included
Inrush limit
Remote control
Meet EN55022 Class B
Safety meets UL60950-1, EN60950-1 and IEC60950-1
CE marked
Compliant to RoHS II and REACH

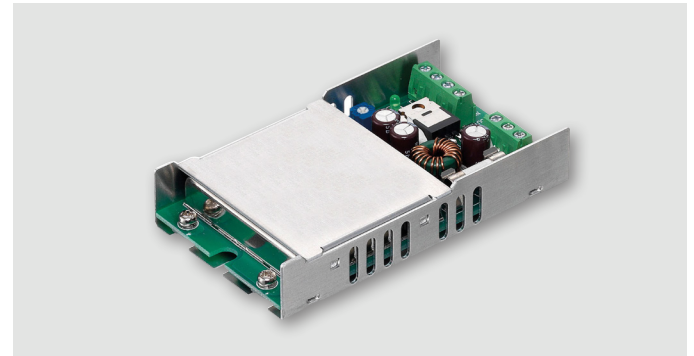
Input

Voltage range	24Vin(nom)	18~36VDC
	48Vin(nom)	36~75VDC
Input fuse (slow blow)	24Vin(nom)	8A typ
	48Vin(nom)	4A typ
Inrush current	15A typ.	
Reflected ripple current	Nominal input, full load	15mA p-p typ
Start-up voltage	24Vin(nom)	17.5VDC max
	48Vin(nom)	34.5VDC max
Shutdown voltage	24Vin(nom)	15VDC typ
	48Vin(nom)	32VDC typ
Start up time	Power up	100ms typ
	Remote On/Off	20ms typ
	Constant resistive load.	
Input surge voltage	24Vin(nom)	50VDC, 100ms max
	48Vin(nom)	100VDC, 100ms max
Remote ON/OFF (option)	Referred to -Vin pin	
	Positive logic (standard)	
	DC-DC ON Open or 3~12V	
	DC-DC OFF Short or 0~1.2V	
	Negative logic (option)	
	DC-DC ON Short or 0~1.2V	
	DC-DC OFF Open or 3~12V	
	Input current of Ctrl pin	-0.5mA +1.0 mA
	Remote off input current	4mA typ

Output

Voltage accuracy	3.3Vout	±1.5%
	Others	±1.0%
Line regulation	LL to HL at full load	±0.2%
Load regulation	3.3Vout	±2.0%
	Others	±1.5%
	No load to full load	
Voltage adjustability	Single output 24Vout	-10 +20%

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	Others	±10%
Ripple and noise	Single 3.3Vout, 5Vout	75mV p-p typ
	12Vout, 15Vout	100mV p-p typ
	24Vout	130mV p-p typ
	Measured by 20MHz bandwidth.	
Temperature coefficient	±0.02%/°C.	
Transient response	250µs typ, 25% load step change.	
Over voltage protection	3.3Vout	3.7VDC min 5.4VDC max
	5Vout	5.6VDC min 7.0VDC max
	12Vout	13.8VDC min 17.5VDC max
	15Vout	16.8VDC min 20.5VDC max
	24Vout	30.0VDC min 33.0VDC max
	Zener diode clamp.	
Output indicator	Green LED.	
Overload protection	150% of Iout rated; hiccup.	
Short circuit protection	Continuous, automatic recovery.	

Environmental

Operating ambient temp.	-40°C ~ +54°C without derating.
	+54°C ~ +85°C with derating.
Over temp. protection	DC/DC converter case 120°C.
Storage temperature	-40°C to +105°C.
Thermal shock	MIL-STD-810F.
Vibration	MIL-STD-810F.
Relative humidity	5-95% RH.

General

Isolation voltage	Input to output 1 minute	1600VDC min
	Input (output) to case 1 minute	1600VDC min
Isolation resistance	500VDC	1GΩ
Isolation capacitance	4000pF, max.	
Switching frequency	300KHz typ.	
Chassis material	Aluminum.	
Weight	122g.	
MTBF	MIL-STD-217F, full load	3.307 x 10 ⁵ hrs

Standards

Safety approvals	UL60950-1, EN60950-1, IEC60950-1.	
EMI	EN55022 Class B.	
ESD	EN61000-4-2, air ±8KV, contact ±6KV, Criteria A.	
Radiated immunity	EN61000-4-3, 10V/m, Criteria A.	
Fast transient	EN61000-4-4, ±2KV, Criteria A.	
Surge	EN61000-4-5, ±1KV, Criteria A.	
Conducted immunity	EN61000-4-6, 10 Vr.m.s., Criteria A.	

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Model Number	Input Range	Output Voltage	Output Current @Full Load	Input Current @No Load	Efficiency	Max Capacitor Load ¹⁾
ENA60-24S3P3	18 ~ 36 VDC	3.3 VDC	14 A	102 mA	87%	36000 μ F
ENA60-24S05	18 ~ 36 VDC	5 VDC	12 A	132 mA	88%	20400 μ F
ENA60-24S12	18 ~ 36 VDC	12 VDC	5 A	57 mA	89%	3550 μ F
ENA60-24S15	18 ~ 36 VDC	15 VDC	4 A	72 mA	89%	2300 μ F
ENA60-24S24	18 ~ 36 VDC	24 VDC	2.5 A	85 mA	88%	885 μ F
ENA60-48S3P3	36 ~ 75 VDC	3.3 VDC	14 A	100 mA	87%	36000 μ F
ENA60-48S05	36 ~ 75 VDC	5 VDC	12 A	92 mA	88%	20400 μ F
ENA60-48S12	36 ~ 75 VDC	12 VDC	5 A	35 mA	89%	3550 μ F
ENA60-48S15	36 ~ 75 VDC	15 VDC	4 A	40 mA	89%	2300 μ F
ENA60-48S24	36 ~ 75 VDC	24 VDC	2.5 A	60 mA	88%	885 μ F

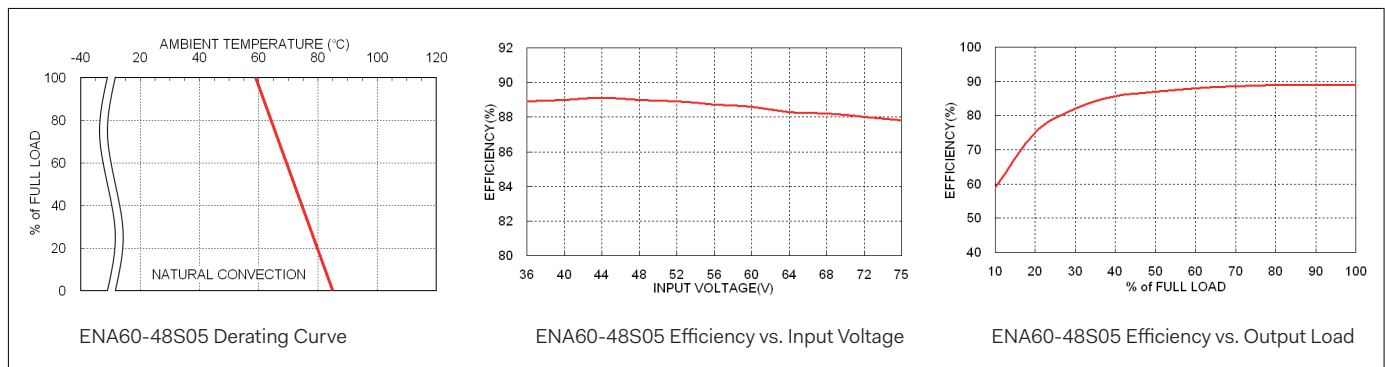
Note:

1. Test by minimum input and constant resistive load.

Part Number Structure

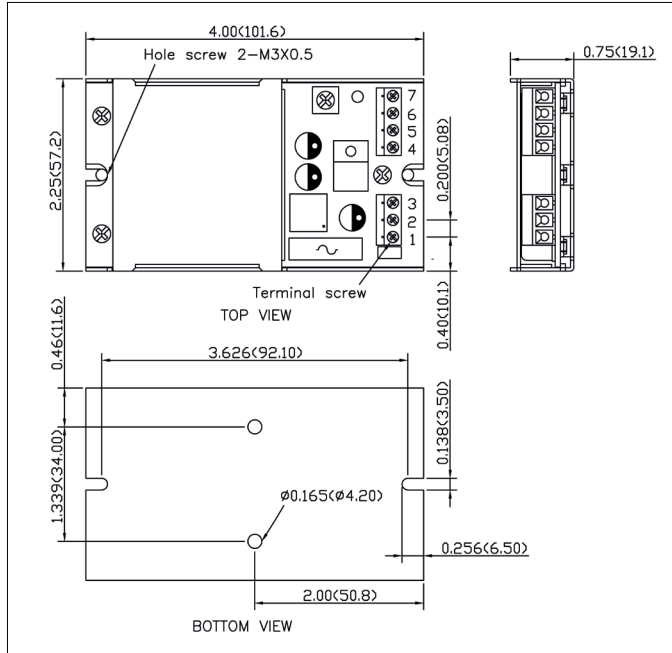
ENA60	-	48	S	05	-	N	EC
Series Name	Input Voltage	Output Quantity	Output Voltage	Remote Control Option	Assembly Option		
	24: 18-36VDC	S: Single	3P3: 3.3VDC	<input type="checkbox"/> : Positive logic	<input type="checkbox"/> : No Assembly option		
	48: 36-75VDC		05: 5VDC	N: Negative logic	EC: Enclosed Mounting Type		
			12: 12VDC		DR: Din Rail Mounting Type		
			15: 15VDC		ED: Enclosed & Din Rail Mounting Type		
			24: 24VDC				

Derating Curve

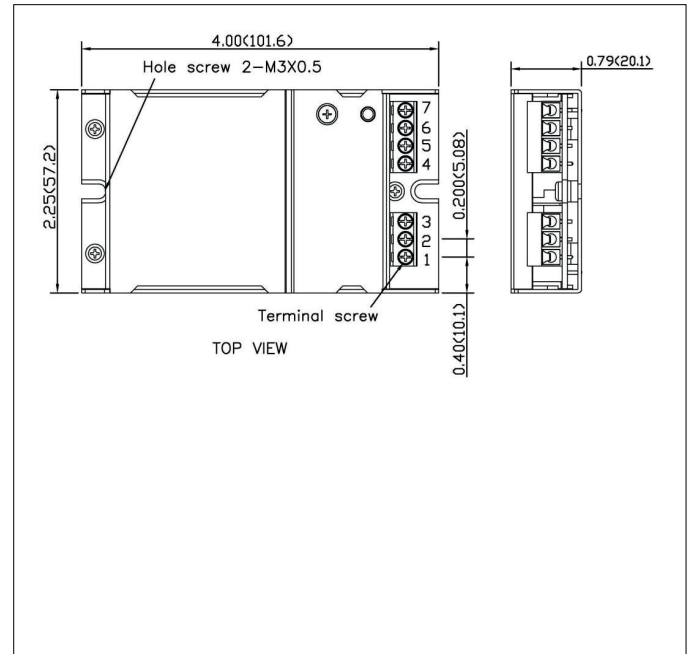


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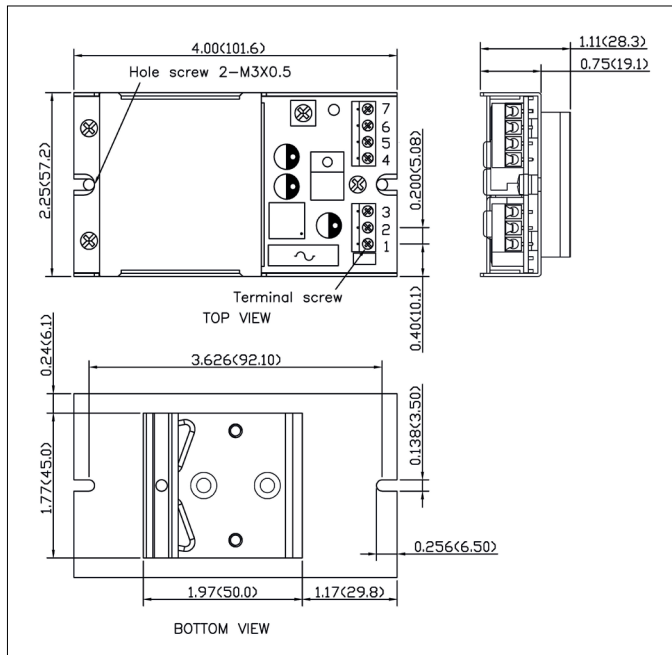
Mechanical Chassis Mounting Type



Mechanical Enclosed Mounting Type



Mechanical Din Rail Mounting Type



Pin Connection

Pin	Single
1	+Vin
2	-Vin
3	Ctrl
4	NC
5	-Vout
6	+Vout
7	NC

* NC: No Connection

* Screw terminals – wire range from 14 to 18 AWG

1. All dimensions in Inch (mm)
2. Tolerance : X.XX \pm 0.02 (X.X \pm 0.5)
3. Hole screw locked torque : MAX 5.0kgf-cm (0.49N-m)
4. Terminal screw locked torque : MAX 2.5kgf-cm (0.25N-m)

Specifications are subject to change without notice.