PT SERIES SIP Package

2 Watt Isolated DC-DC Converter

PRODUCT OVERVIEW

This PT series offers 2 watt of isolated output power in an 8 pin SIP standard package. These converters have a 2:1 wide input voltage range of 4.5 to 9, 9 to 18, 18 to 36 or 36 to 75 Volts. This series of converters provides precise regulated output voltage ranging from 3.3 to 15 volts. The output voltage can be single or dual depending on the model. Other output voltages are also available and please contact DATEL if your application requires such modification.

This series features high efficiency up to 84%; 1500Volts of DC of isolation and can operate over the ambient temperature range of –40°C to +70°C without derating. These modules are fully protected against output short circuit and under overvoltage conditions.

FEATURES

- Industry Standard SIP 8 Package
- 2 Watts Isolated Output
- 2:1 Input Range
- Regulated Outputs
- Up to 84 % Efficiency
- -40°C to +85°C operating temperature range
- Remote On/Off logic control
- Continuous Short Circuit Protection
- Under Voltage protection
- Meets 2004/108/EC
- Safety designed to meet UL60950-1, EN60950-1, and IEC60950-1

APPLICATIONS:

- Distributed Power Architectures
- Mobile telecommunication
- Industrial applications
- Battery operated equipment

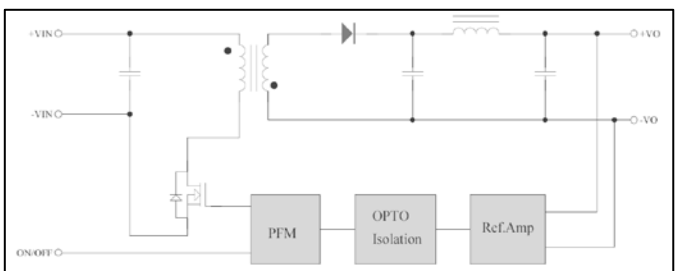
AVAILABLE OPTIONS

- Customizable Input/ Output voltages
- UL/CSA60950-1, TUV per IEC/ EN60950-1, 2nd Edition

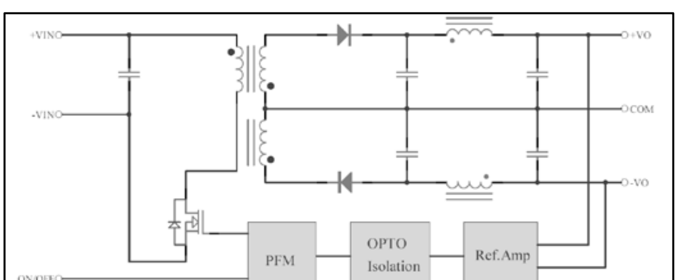
Contact DATEL for other series in SIP Package

- 4:1 Input Ranges
- Cost saving, lower / higher power, other output voltages etc.

BLOCK DIAGRAM



Block Diagram of single output module



Block Diagram of dual output module

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MODEL DESIGNATIONS

MODEL NUMBER	INPUT VOLTAGE	OUTPUT VOLTAGE	OUTPUT CURRENT MAX	EFFICIENCY %	LOAD REGULATION	OPTION
PT5S3.3-0.5	4.5-9V	3.3VDC	500 mA	73	± 0.5 %	U
PT5S5-0.4	4.5-9V	5.0 VDC	400 mA	76	± 0.5 %	U
PT5S12-0.16	4.5-9V	12 VDC	167 mA	80	± 0.5 %	U
PT5S15-0.13	4.5-9V	15 VDC	134 mA	80	± 0.5 %	U
PT5D5-0.2	4.5-9V	±5.0 VDC	±200 mA	77	± 1 %	U
PT5D12-0.08	4.5-9V	±12 VDC	±83 mA	79	± 1 %	U
PT5D15-0.06	4.5-9V	±15 VDC	±67 mA	80	± 1 %	U
PT12S3.3-0.5	9-18V	3.3VDC	500 mA	76	± 0.5 %	U
PT12S5-0.4	9-18V	5.0 VDC	400 mA	79	± 0.5 %	U
PT12S12-0.16	9-18V	12 VDC	167 mA	82	± 0.5 %	U
PT12S15-0.13	9-18V	15 VDC	134 mA	83	± 0.5 %	U
PT12D5-0.2	9-18V	±5.0 VDC	±200 mA	79	± 1 %	U
PT12D12-0.08	9-18V	±12 VDC	±83 mA	82	± 1 %	U
PT12D15-0.06	9-18V	±15 VDC	±67 mA	83	± 1 %	U
PT24S3.3-0.5	18-36V	3.3VDC	500 mA	76	± 0.5 %	U
PT24S5-0.4	18-36V	5.0 VDC	400 mA	79	± 0.5 %	U
PT24S12-0.16	18-36V	12 VDC	167 mA	82	± 0.5 %	U
PT24S15-0.13	18-36V	15 VDC	134 mA	83	± 0.5 %	U
PT24D5-0.2	18-36V	±5.0 VDC	±200 mA	79	± 1 %	U
PT24D12-0.08	18-36V	±12 VDC	±83 mA	81	± 1 %	U
PT24D15-0.06	18-36V	±15 VDC	±67 mA	84	± 1 %	U
PT48S3.3-0.5	36-75V	3.3VDC	500 mA	74	± 0.5 %	U
PT48S5-0.4	36-75V	5.0 VDC	400 mA	79	± 0.5 %	U
PT48S12-0.16	36-75V	12 VDC	167 mA	82	± 0.5 %	U
PT48S15-0.13	36-75V	15 VDC	134 mA	84	± 0.5 %	U
PT48D5-0.2	36-75V	±5.0 VDC	±200 mA	78	± 1 %	U
PT48D12-0.08	36-75V	±12 VDC	±83 mA	82	± 1 %	U
PT48D15-0.06	36-75V	±15 VDC	±67 mA	84	± 1 %	U

ABSOLUTE MAXIMUM RATINGS

PARAMETER	CONDITIONS	MODEL	Min.	Typical	Max.	Units
Input Voltage						
Continuous	DC	$5V_{in}$ $12V_{in}$ $24V_{in}$ $48V_{in}$	0 0 0 0		9 18 36 75	Volts
Transient	100ms, DC	5Vin 12Vin $24V_{in}$ $48V_{in}$			15 25 50 100	Volts
Operating Ambient Temperature	Derating, Above 70°C	All	-40		+85	°C
Case Temperature		All			+100	°C
Storage Temperature		All	-55		+125	°C
Input / Output Isolation Voltage	1 minute	All	1500			Volts

INPUT CHARACTERISTICS

Note: All specifications are typical at nominal input, full load at 25°C unless otherwise noted

PARAMETER	CONDITIONS	MODEL	Min.	Typical	Max.	Units
Operating Input Voltage		5Vin 12Vin 24Vin 48Vin	4.5 9 18 36	5 12 24 48	9 18 36 75	Volts
Input Under Voltage Lockout						
Turn-On Voltage Threshold		5Vin 12Vin 24Vin 48Vin	3.3 6.8 13 26	4.0 7.0 14.7 28.5	4.2 7.3 15.5 31	Volts
Turn-Off Voltage Threshold		5Vin 12Vin 24Vin 48Vin	3 5.8 12 24	3.5 6 13 30	3.9 6.3 14.5 29	Volts
Lockout Hysteresis Voltage		5Vin 12Vin 24Vin 48Vin		0.3 0.5 1 2		Volts
Maximum Input Current	100% Load, Vin =4.5V	5Vin			580	mA
	100% Load, Vin = 9V	12Vin			280	
	100% Load, Vin =18V	24Vin			140	
	100% Load, Vin =36V	48Vin			170	
No-Load Input Current	Vin =Nominal input	PT5S3.3-0.5 PT5S5-0.4 PT5S12-0.16 PT5S15-0.13 PT5D5-0.2 PT5D12-0.08 PT5D15-0.06 PT12S3.3-0.5 PT12S5-0.4 PT12S12-0.16 PT12S15-0.13 PT12D5-0.2 PT12D12-0.08 PT12D15-0.06 PT24S3.3-0.5 PT24S5-0.4 PT24S12-0.16 PT24S15-0.13 PT24D5-0.2 PT24D12-0.08 PT24D15-0.06 PT48S3.3-0.5 PT48S5-0.4 PT48S12-0.16 PT48S15-0.13 PT48D5-0.2 PT48D12-0.08 PT48D15-0.06		60 60 60 60 60 60 60 30 30 30 30 30 30 30 18 18 18 18 18 18 18 9 9 9 9 9 9 9		mA
Inrush Current (I^2t)	As per ETS300 132-2	All			0.01	A^2s
Off Converter Input Current	Shutdown input idle current	All			1	mA
Input Reflected-Ripple Current	P-P thru 12µH inductor, 5Hz to 20MHz	All		30		mA

OUTPUT CHARACTERISTIC

PARAMETER	CONDITIONS	MODEL	Min.	Typical	Max.	Units
Output Voltage Set Point	V_{in} =Nominal V_{in} , I_o = I_{o_max}, Tc=25°C	Vo=3.3 Vo=5.0 Vo=12 Vo=15 Vo=±5.0 Vo=±12 Vo=±15	3.2505 4.925 11.82 14.775 4.925 11.82 14.775	3.3 5 12 15 5 12 15	3.3495 5.075 12.18 15.225 5.075 12.18 15.225	Volts
Output Voltage Regulation						
Line Regulation	V_{in} =High line to Low line Full Load	Single Dual			±0.5 ±0.5	% %
Load Regulation	I_o = Full Load to min. Load	Single Dual			±0.5 ±1	% %
Cross Regulation	Load cross variation 10%/100%	Dual			±5	%
Temperature Coefficient	TC=-40°C to + 85°C				±0.03	%/°C
Output Voltage balance	Vin =Nominal Vin , Io = Io_max, Tc=25℃	Dual			±1	%
Output Voltage Ripple and Noise						
Peak-to-Peak	Full Load, 20 MHz	Single Dual			75 75	mV
Operating Output Current Range		Vo=3.3V Vo=5V Vo=12V Vo=15V Vo=±5V Vo=±12V Vo=±15V	0 0 0 0 0 0 0		500 400 167 134 ±200 ±83 ±67	mA
Output DC Current-Limit Inception	Output Voltage=90% $V_{O,\ nominal}$			120		%
Maximum Output Capacitance	Full load, Resistance	Vo=3.3V Vo=5V Vo=12V Vo=15V Vo=±5V Vo=±12V Vo=±15V			500 400 167 134 200 83 67	μF

DYNAMIC CHARACTERISTICS

PARAMETER	CONDITIONS	MODEL	Min.	Typical	Max.	Units
Output Voltage Current Transient						
Step Change in Output Current	75% to 100% of I_{o_max} di/dt=0.1A/us	All			±6	%
Setting Time (within 1% Vo $_{nominal}$)		All			500	μs
Turn-On Delay and Rise Time						
Turn-On Delay Time, From On/Off Control	$V_{on/off}$ to 10%V_{o_set}	All		1		ms
Turn-On Delay Time, From Input	$V_{in\ \_min}$ to 10%V_{o_set}	All		1		ms
Output Voltage Rise Time	10% V_{o_set} to 90% V_{o_set}	All		2.5		ms

FEATURE CHARACTERISTICS

PARAMETER	CONDITIONS	Device	Min.	Typical	Max.	Units

Efficiency 100% Load	Vin =5 Volts, Io = Io_max, Tc=25℃	PT5S3.3-0.5		73		%
		PT5S5-0.4		76		
		PT5S12-0.16		80		
		PT5S15-0.13		80		
		PT5D5-.2		77		
		PT5D12-0.08		79		
		PT5D15-0.06		80		
	Vin =12 Volts, Io = Io_max, Tc=25℃	PT12S3.3-0.5		76		
		PT12S5-0.4		79		
		PT12S12-0.16		82		
		PT12S15-0.13		83		
		PT12D5-0.2		79		
		PT12D12-0.08		82		
		PT12D15-0.06		83		
	V_{in} =24 Vdc, I_o = I_{o_max}, Tc=25°C	PT24S3.3-0.5		76		
		PT24S5-0.4		79		
		PT24S12-0.16		82		
		PT24S15-0.13		83		
		PT24D5-0.2		79		
		PT24D12-0.08		81		
		PT24D15-0.06		84		
	V_{in} =48 Vdc, I_o = I_{o_max}, Tc=25°C	PT48S3.3-0.5		74		
		PT48S5-0.4		79		
		PT48S12-0.16		82		
		PT48S15-0.13		84		
		PT48D5-0.2		78		
		PT48D12-0.08		82		
		PT48D15-0.06		84		
ISOLATION CHARACTERISTICS						
Input to Output	1 minutes	All			1500	Volts
Isolation Resistance		All			1000	MΩ
Isolation Capacitance		All		500		pF
Switching Frequency				100		KHz
On/Off Control, Positive Remote On/Off logic						
Module On	$V_{on/off}$ at $I_{on/off}$=0.1uA	All	0	0	1.2 or Open Circuit	Volts
Module Off	$V_{on/off}$ Pin	All	5.5		+15	Volts
On/Off Control, Option Under Voltage Control (add U to model)		All		0.3	1	mA
Module On	Open, High impedance		0		0.8 or open circuit	Volts
Module Off	V Remote On/Off Pin		4		+15	Volts
Off Converter Input Current	Shutdown input idle current				1	mA
MTBF	I_o =100%of I_{o_max};Ta=25°C per MIL-HDBK-217F	All		2.5		M hours
Weight		All		4.8		grams

Operating Temperature Range

The PT series converters operate over the wide ambient temperature range from -40℃ to +85℃ without derating. For normal operation, the case temperature should not go over +100℃.

Remote On/Off

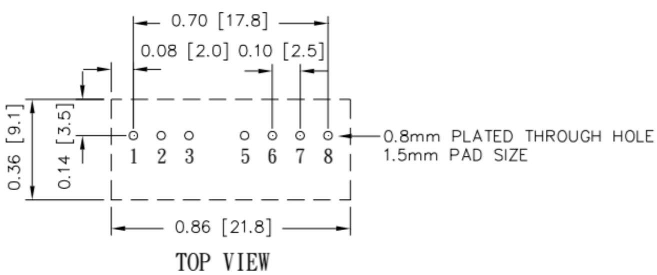
The remote ON/OFF input feature of the converter allows external circuitry to turn the converter ON or OFF. Active-high Remote ON/OFF is available as standard. The converter is turned on if the Remote ON/OFF pin is high impedance or open circuit. Converter with added Suffix "U" to the model number are on with voltage below 0.8 volts at Remote ON/OFF pin and are off when the voltage at Remote ON/OFF pin is from 4 to 15 Volts. All other standard models turn the converter off when the signal at Remote ON/OFF is from 5.5 to 15Vdc. The signal level of the on/off pin is defined with respect to ground. If not using the on/off pin, leave the pin open (module will be on).

Over Current Protection

All models have internal over current and continuous short circuit protection. The unit operates normally once the fault condition is removed. At the point of current limit inception, the converter will go into hiccup mode protection.

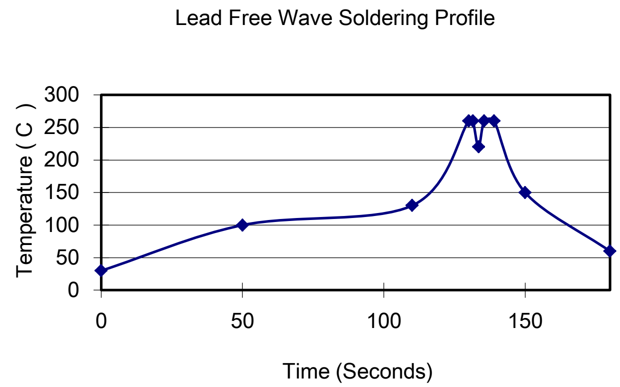
Recommended PCB Layout/Footprints and Soldering Information

The user must ensure that other components and metal in the vicinity of the converter meet the spacing requirements to which the system is approved. Low resistance and low inductance PCB layout should be used where possible. Proper attention must also be given to low impedance tracks between power module, input and output grounds. The recommended footprints and soldering profiles are shown in the next two figures.



Recommended PCB Layout Footprints

Note: Dimensions are in inches (millimeters)

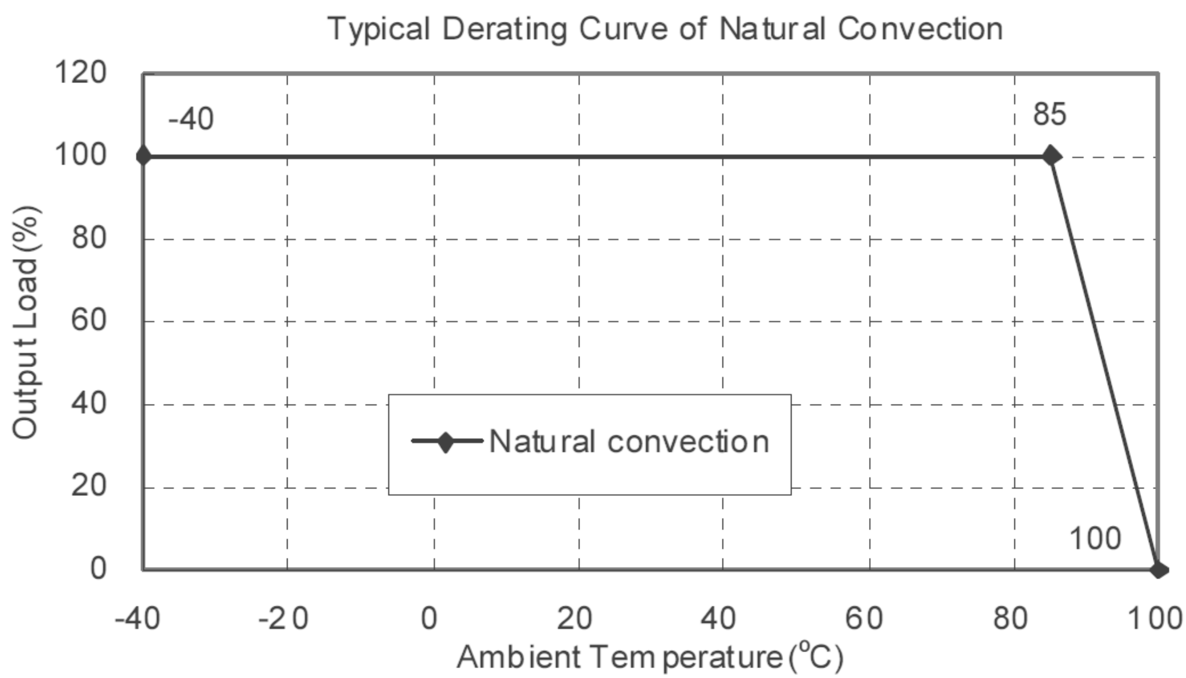


Recommended Wave Soldering Profiles

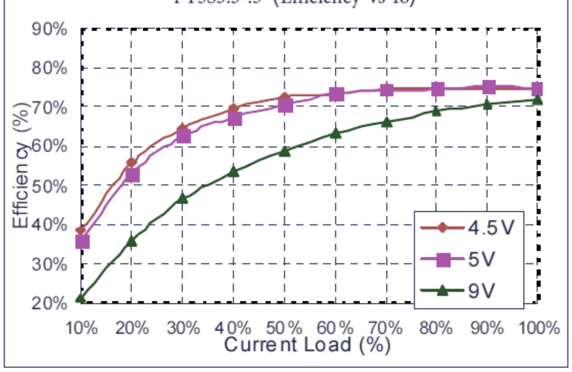
Note：
1. Soldering Materials: Sn/Cu/Ni
2. Ramp up rate during preheating: 1.4 °C/Sec (From +50°C to +100°C)
3. Soaking temperature: 0.5 °C/Sec (From +100°C to +130°C), 60 ± 20 seconds
4. Peak temperature: +260°C, above +250°C 3~6 Seconds
5. Ramp up rate during cooling: -10.0 °C/Sec (+260°C to +150°C)

Power De-Rating Curves for PT Series

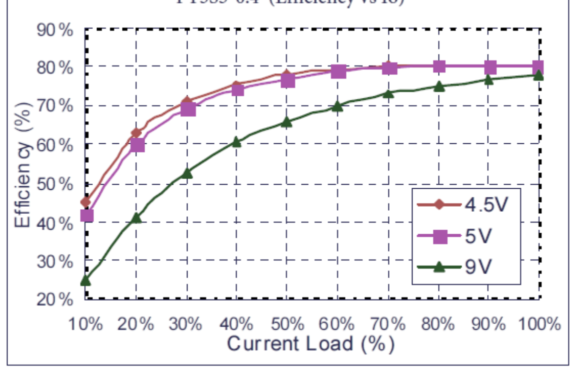
Note that operating ambient temperature range is -40°C to + 85°C without derating. Also, the maximum case temperature under any operating condition should not exceed +100°C.



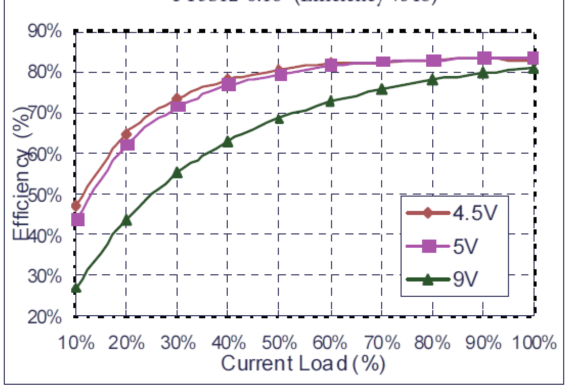
Efficiency vs. Load Curves



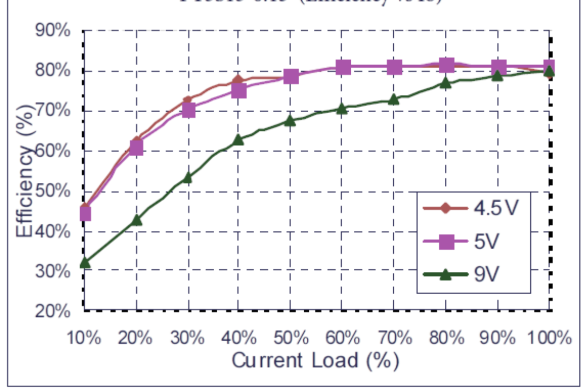
PT5S3.3-.5 (Efficiency vs Io)



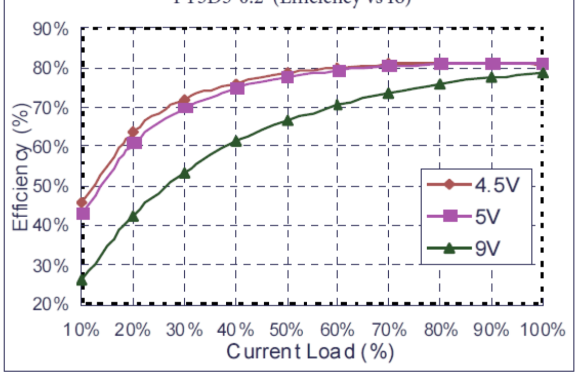
PT5S5-0.4 (Efficiency vs Io)



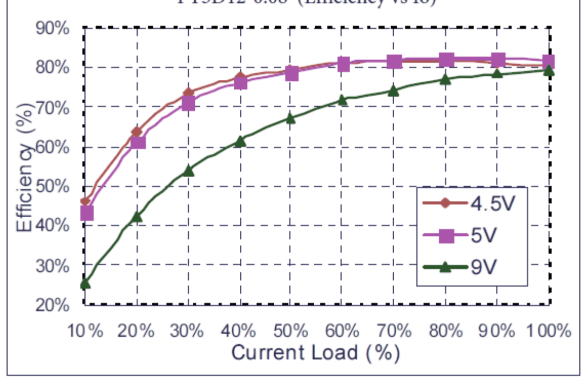
PT5S12-0.16 (Efficiency vs Io)



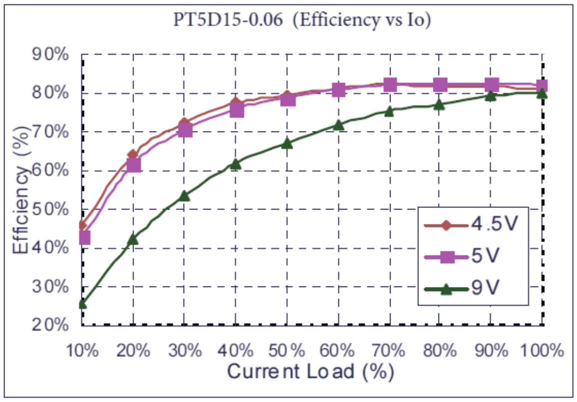
PT5S15-0.13 (Efficiency vs Io)



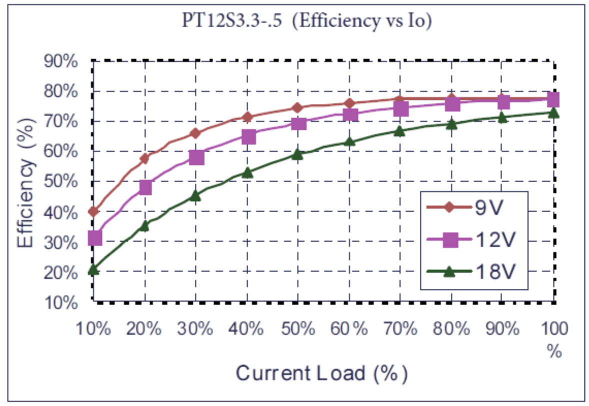
PT5D5-0.2 (Efficiency vs Io)



PT5D12-0.08 (Efficiency vs Io)

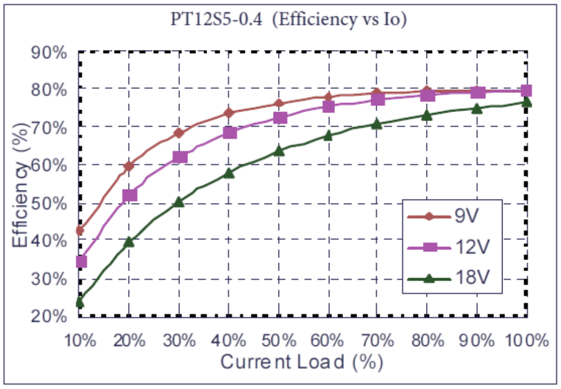


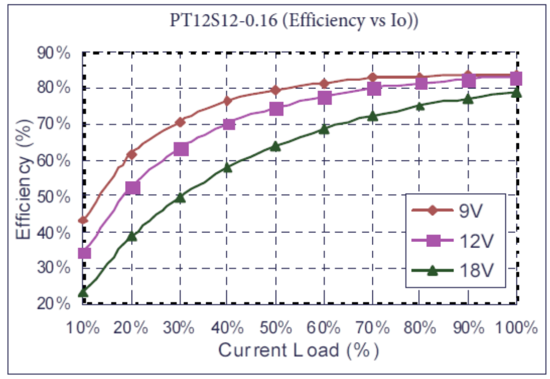
PT5D15-0.06 (Efficiency vs Io)

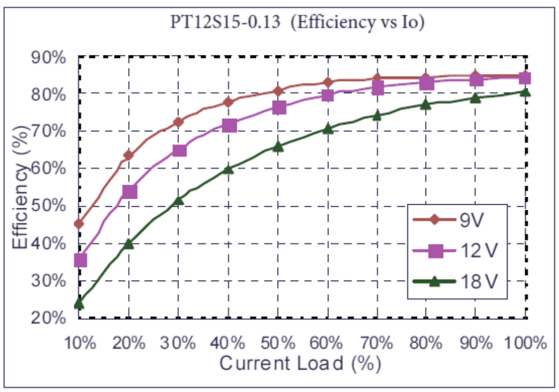


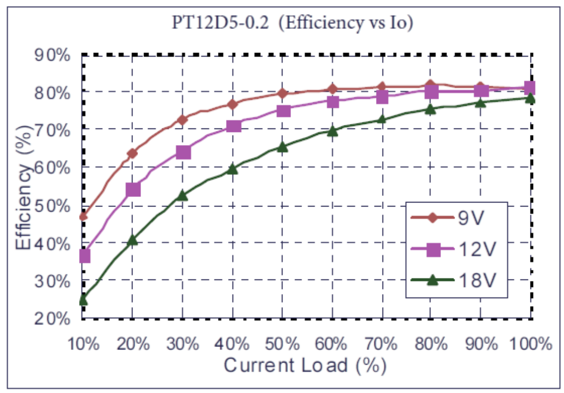
PT12S3.3-.5 (Efficiency vs Io)

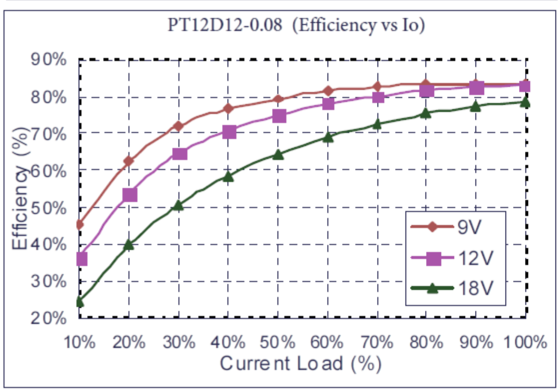
Efficiency vs. Load Curves

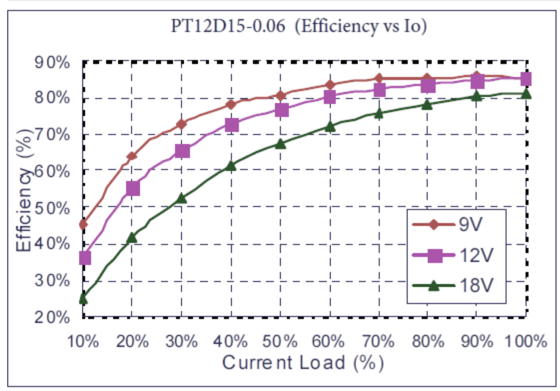


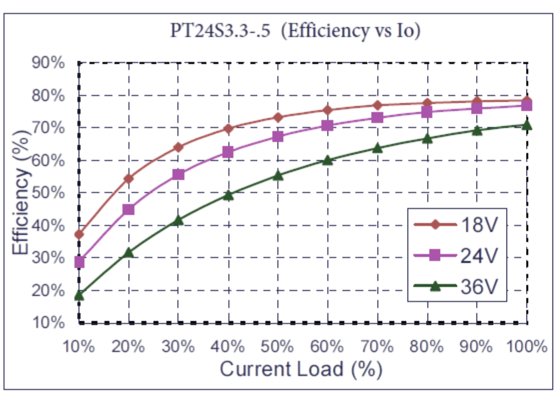


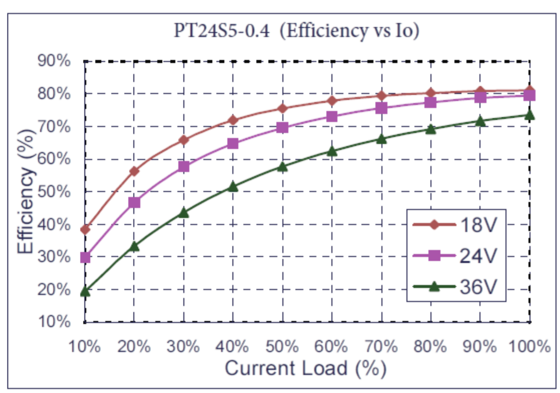




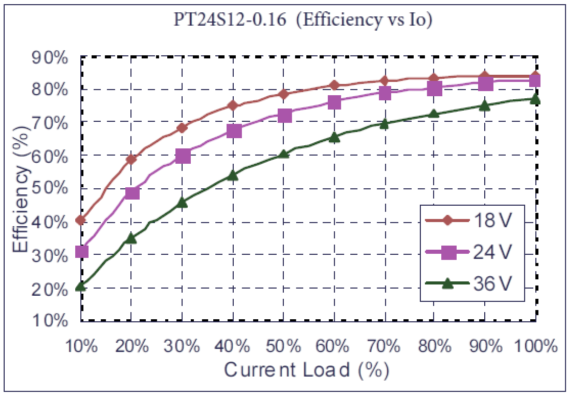


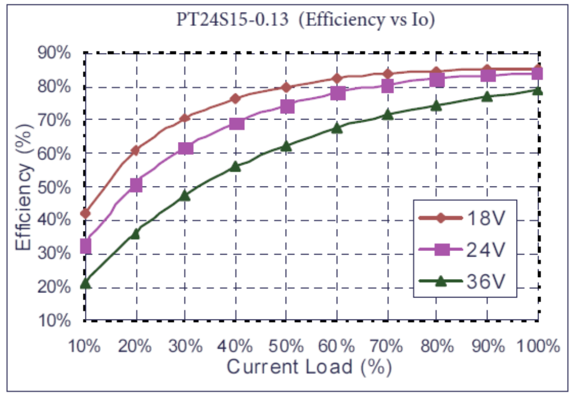


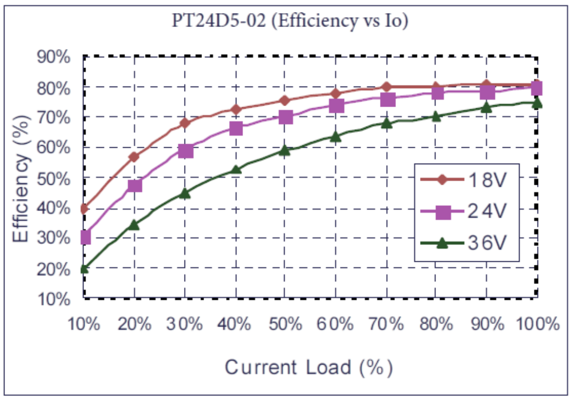


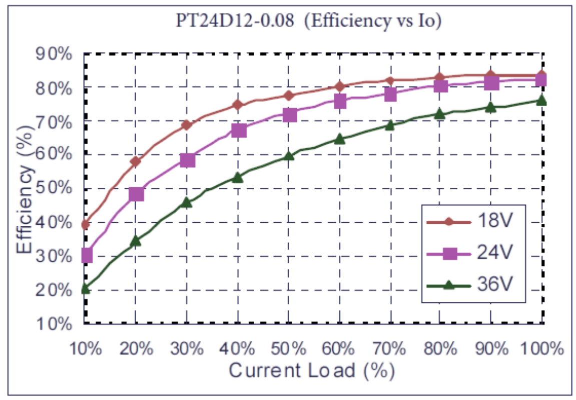


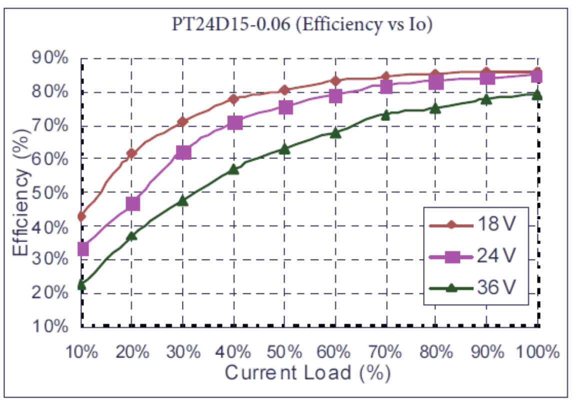
Efficiency

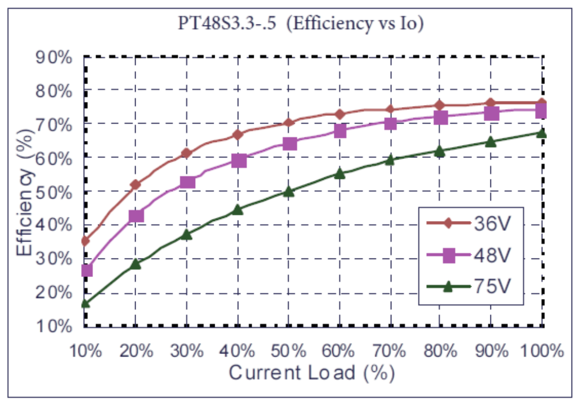

PT24S12-0.16 (Efficiency vs Io)
Efficiency (%)
Current Load (%)
18 V
24 V
36 V

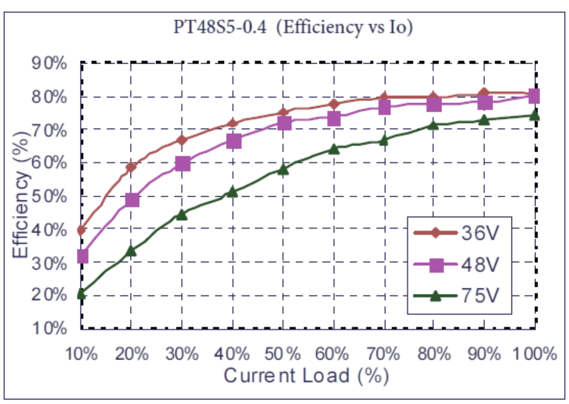

PT24S15-0.13 (Efficiency vs Io)
Efficiency (%)
Current Load (%)
18V
24V
36V

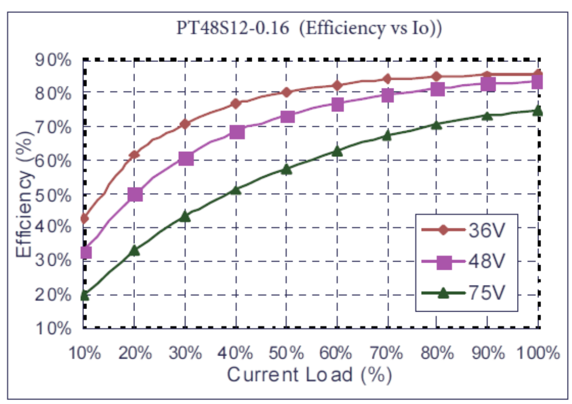

PT24D5-02 (Efficiency vs Io)
Efficiency (%)
Current Load (%)
18V
24V
36V


PT24D12-0.08 (Efficiency vs Io)
Efficiency (%)
Current Load (%)
18V
24V
36V

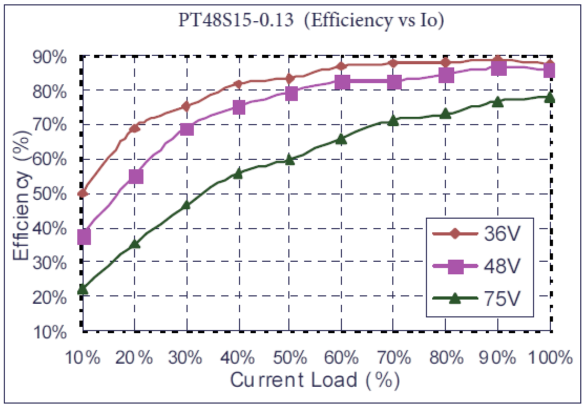

PT24D15-0.06 (Efficiency vs Io)
Efficiency (%)
Current Load (%)
18 V
24 V
36 V

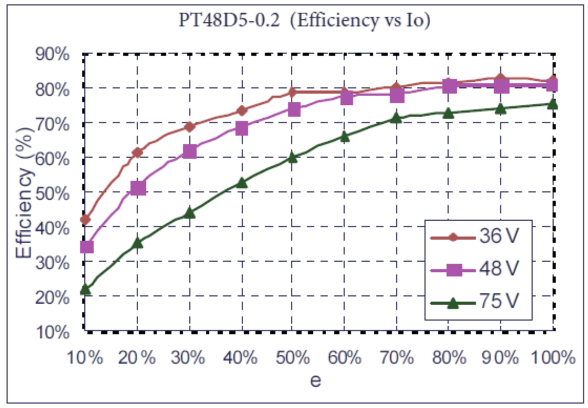

PT48S3.3-.5 (Efficiency vs Io)
Efficiency (%)
Current Load (%)
36V
48V
75V

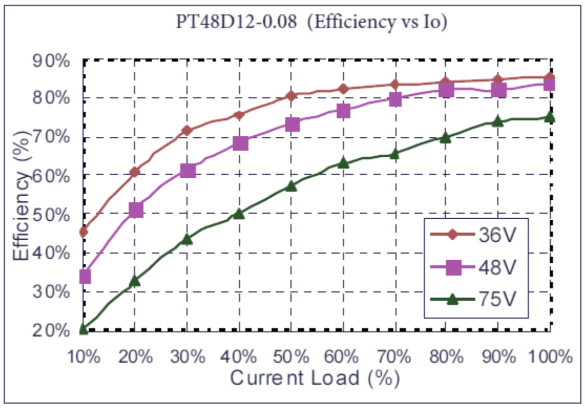

PT48S5-0.4 (Efficiency vs Io)
Efficiency (%)
Current Load (%)
36V
48V
75V

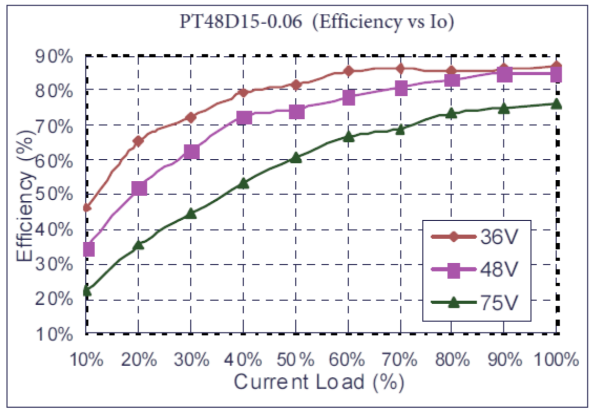

PT48S12-0.16 (Efficiency vs Io))
Efficiency (%)
Current Load (%)
36V
48V
75V

Efficiency vs. Load Curves



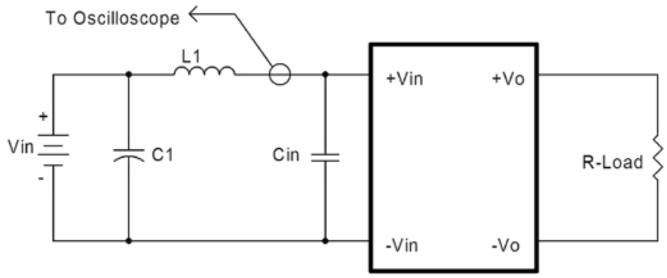






Input Capacitance at the Power Module

In order to avoid problems with loop stability, the converter must be connected to a low impedance AC source and a low inductance source.
The input capacitors (Cin) should be placed close to the converter input pins to de-couple distribution inductance. The external input capacitors should have low ESR in order to quiet any ripple. Circuit as shown in the figure below represents typical measurement methods for reflected ripple current. The capacitor C1 and inductor L1 simulate the typical DC source impedance. The input reflected-ripple current is measured by a current probe oscilloscope with a simulated source Inductance (L1).



L1: 1uH
C1: None
Cin: 22uF ESR<0.7ohm @100KHz

Input Reflected-Ripple Test Setup

Test Set-Up

The basic test set-up to measure efficiency, load regulation, line regulation and other parameters is shown in the next figure. When testing the converter under any transient conditions, the user should ensure that the transient response of the source is sufficient to power the equipment under test. Below is the calculation of:

1- Efficiency
2- Load regulation
3- Line regulation

The value of efficiency is defined as:

$$\eta = \frac{V_O \times I_O}{V_{IN} \times I_{IN}} \times 100\%$$

Where

V_O is output voltage,
I_O is output current,
V_{IN} is input voltage,
I_{IN} is input current.

The value of load regulation is defined as:

$$Load.reg = \frac{V_{FL} - V_{NL}}{V_{NL}} \times 100\%$$

Where

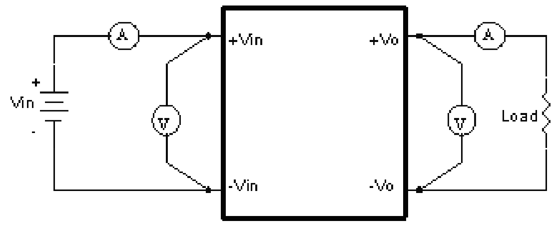
V_{FL} is the output voltage at full load
V_{NL} is the output voltage at 10% load

The value of line regulation is defined as:

$$Line.reg = \frac{V_{HL} - V_{LL}}{V_{LL}} \times 100\%$$

Where

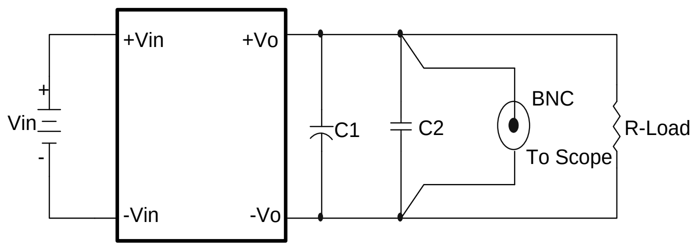
V_{HL} is the output voltage of maximum input voltage at full load.
V_{LL} is the output voltage of minimum input voltage at full load.



PT Series Test Setup

Output Ripple and Noise Measurement

The test set-up for noise and ripple measurements is shown in the figure below. A coaxial cable was used to prevent impedance mismatch reflections disturbing the noise readings at higher frequencies. Measurements are taken with the output appropriately loaded and all ripple/noise specifications are from D.C. to 20MHz Bandwidth.



Note: C1: None
C2: None

Output Voltage Ripple and Noise Measurement Set-Up

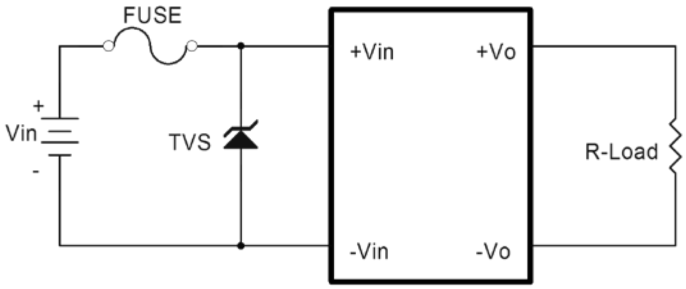
Output Capacitance

The PT series converters provide unconditional stability with or without external capacitors. For good transient response, low ESR output capacitors should be located closer to the point of load.

SAFETY and EMC

Input Fusing and Safety Considerations

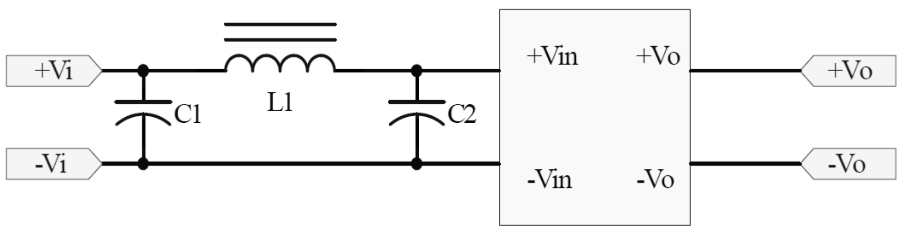
The PT series of converters do not have an internal fuse. However, to achieve maximum safety and system protection, always use an input line fuse. We recommended a time delay fuse 2A for 24Vin, 1A for 12Vin, and 500mA for 24Vin and 48Vin models. The circuit in the figure below is recommended and it uses by a Transient Voltage Suppressor diode across the input terminal to protect the unit against surge or spike voltage and input reverse voltage.



Input Protection

EMC Considerations

EMI Test standard: EN55022 Class A and Class B Conducted Emission
Test Condition: Input Voltage: Nominal, Output Load: Full Load

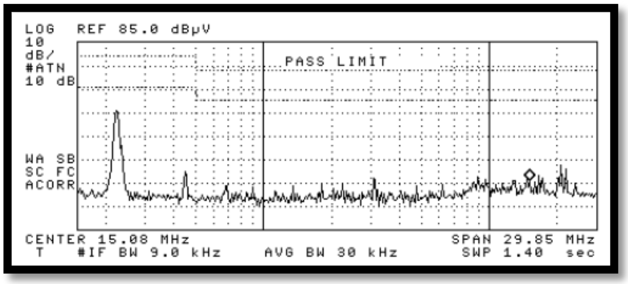


Connection circuit for conducted EMI testing

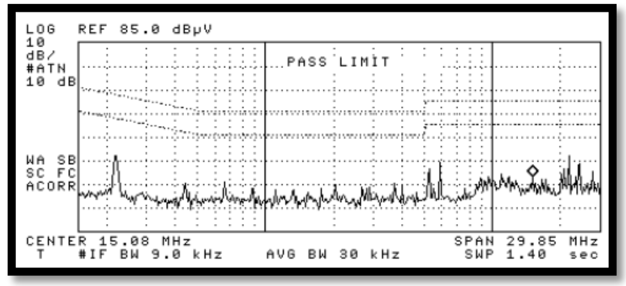
EN55022 class A			EN55022 class B			EN55022 class A			EN55022 class B		
Model No.	C1	L1	Model No.	C1	L1	Model No.	C1	L1	Model No.	C1	L1
PT5S3.3-0.5	10µF/16V 1206	2.2µH	PT5S3.3-0.5	10µF/25V 1210	12µH	PT24S3.3-0.5	4.7µF/50V 1812	10µH	PT24S3.3-0.5	6.8µF/50V 1812	33µF
PT5S5-0.4	10µF/16V 1206	2.2µH	PT5S5-0.4	10µF/25V 1210	12µH	PT24S5-0.4	4.7µF/50V 1812	10µH	PT24S5-0.4	6.8µF/50V 1812	33µF
PT5S12-0.16	10µF/16V 1206	2.2µH	PT5S12-0.16	10µF/25V 1210	12µH	PT24S12-0.16	4.7µF/50V 1812	10µH	PT24S12-0.16	6.8µF/50V 1812	33µF
PT5S15-0.13	10µF/16V 1206	2.2µH	PT5S15-0.13	10µF/25V 1210	12µH	PT24S15-0.13	4.7µF/50V 1812	10µH	PT24S15-0.13	6.8µF/50V 1812	33µF
PT5D5-.2	10µF/16V 1206	2.2µH	PT5D5-.2	10µF/25V 1210	12µH	PT24D5-0.2	4.7µF/50V 1812	10µH	PT24D5-0.2	6.8µF/50V 1812	33µF
PT5D12-0.08	10µF/16V 1206	2.2µH	PT5D12-0.08	10µF/25V 1210	12µH	PT24D12-0.08	4.7µF/50V 1812	10µH	PT24D12-0.08	6.8µF/50V 1812	33µF
PT5D15-0.06	10µF/16V 1206	2.2µH	PT5D15-0.06	10µF/25V 1210	12µH	PT24D15-0.06	4.7µF/50V 1812	10µH	PT24D15-0.06	6.8µF/50V 1812	33µF
PT12S3.3-0.5	2.2µF/25V 1206	12µH	PT12S3.3-0.5	2.2µF/25V 1210	68µH	PT48S3.3-0.5	1µF/100V 1812	33µF	PT48S3.3-0.5	2.2µF/100V 1812	150µF
PT12S5-0.4	2.2µF/25V 1206	12µH	PT12S5-0.4	2.2µF/25V 1210	68µH	PT48S5-0.4	1µF/100V 1812	33µF	PT48S5-0.4	2.2µF/100V 1812	150µF
PT12S12-0.16	2.2µF/25V 1206	12µH	PT12S12-0.16	2.2µF/25V 1210	68µH	PT48S12-0.16	1µF/100V 1812	33µF	PT48S12-0.16	2.2µF/100V 1812	150µF
PT12S15-0.13	2.2µF/25V 1206	12µH	PT12S15-0.13	2.2µF/25V 1210	68µH	PT48S15-0.13	1µF/100V 1812	33µF	PT48S15-0.13	2.2µF/100V 1812	150µF
PT12D5-0.2	2.2µF/25V 1206	12µH	PT12D5-0.2	2.2µF/25V 1210	68µH	PT48D5-0.2	1µF/100V 1812	33µF	PT48D5-0.2	2.2µF/100V 1812	150µF
PT12D12-0.08	2.2µF/25V 1206	12µH	PT12D12-0.08	2.2µF/25V 1210	68µH	PT48D12-0.08	1µF/100V 1812	33µF	PT48D12-0.08	2.2µF/100V 1812	150µF
PT12D15-0.06	2.2µF/25V 1206	12µH	PT12D15-0.06	2.2µF/25V 1210	68µH	PT48D15-0.06	1µF/100V 1812	33µF	PT48D15-0.06	2.2µF/100V 1812	150µF

Note: All of capacitors are ceramic capacitors, C2 is no Connection

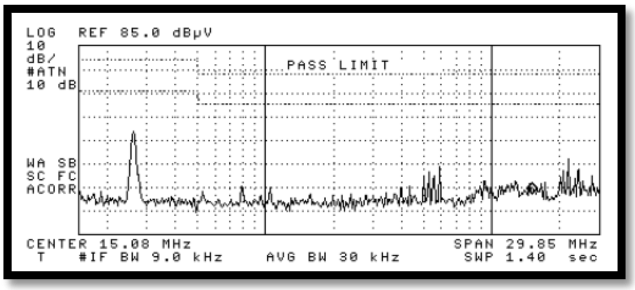
EMI and conducted noise meet EN55022 Class A



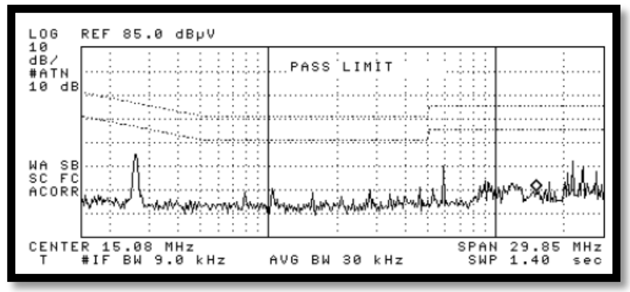
Class A Test conducted for PT5S5-0.4



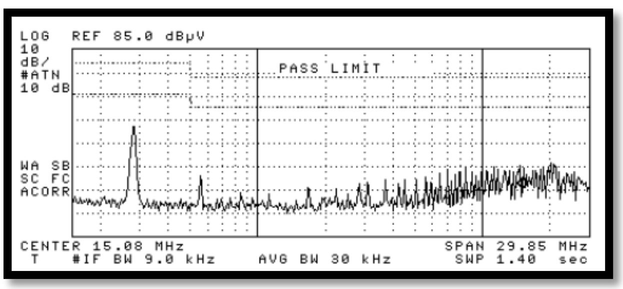
Class B Test conducted for PT5S5-0.4



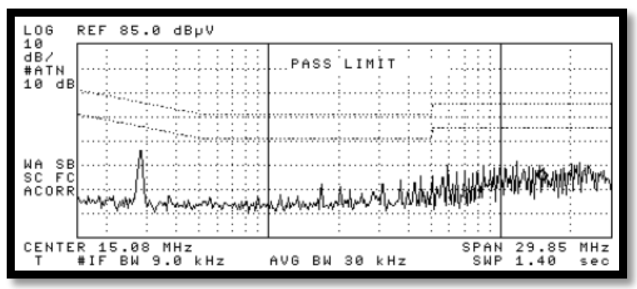
Class A Test conducted for PT12S15-1.3



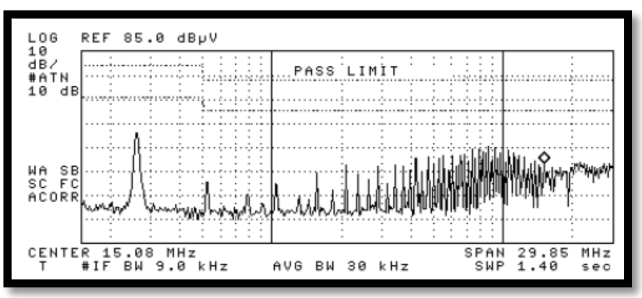
Class B Test conducted for PT12S15-0.13



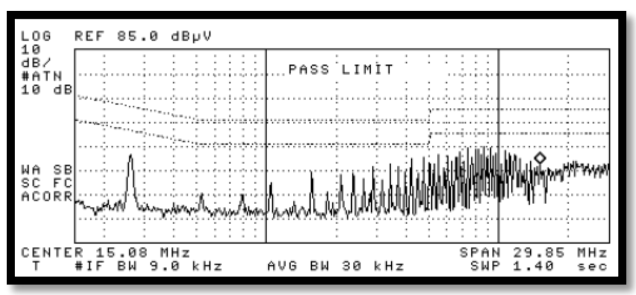
Class A Test conducted for PT24D12-0.08



Class B Test conducted for PT24D12-0.08



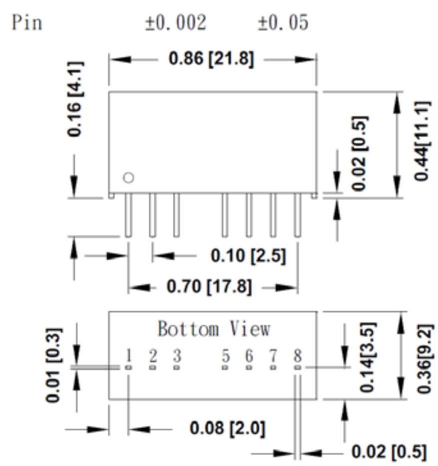
Class A Test conducted for PT48D15-0.06



Class B Test conducted for PT48D15-0.06

MECHANICAL SPECIFICATIONS

Note: All dimensions are in Inches (millimeters). Tolerance: x.xx ±0.02 in. (0.5mm), x.xxx ±0.010 in. (0.25 mm) unless otherwise noted



PIN CONNECTIONS

PIN CONNECTIONS		
PIN	**SINGLE OUTPUT**	**DUAL OUTPUTS**
1	- V Input	- V Input
2	+V Input	+V Input
3	On / Off	On / Off
5	No Connection	No Connection
6	+V Output	+V Output
7	-V Output	Common
8	No Connection	-V output

PART NUMBER ORDERING INFORMATION

Family, Form Factor Package	Nominal Input voltage	Number of Outputs	Voltage Output Volts	Current Output (A)	Options
PT	24	S	5	0.4	U

Nominal Input voltage:
- (4.5-9) 5 Volts
- (9-18) 12 Volts
- (18-36) 24 Volts
- (36-75) 48 Volts

Number of Outputs:
- S- Single
- D- Dual

Voltage Output Volts:
- 3.3 Volts – 3.3
- 5 Volts – 5
- 12 Volts – 12
- 15 Volts – 15
- ±5 Volts - 5
- ±12 Volts - 12
- ±15 Volts - 15

Current Output (A):
- 3.3 Volts – 0.5
- 5 Volts – 0.4
- 12 Volts – 0.16
- 15 Volts – 0.13
- ±5 Volts - 0.2
- ±12 Volts - 0.08
- ±15 Volts - 0.06

Options:
- None – No Under Voltage Protection
- U- Under Voltage Protection
- (See Remote On/Off description)

Note: For proper part ordering, enter option suffixes in order listed in table above