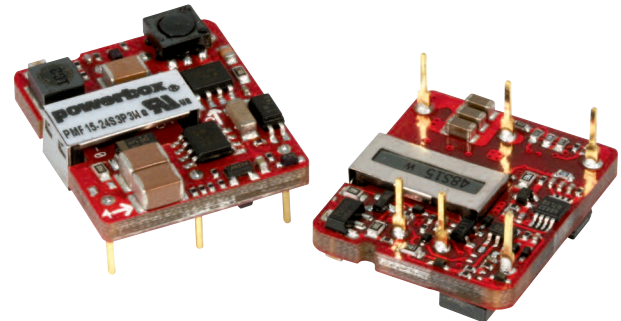


# Industrial Line – T150FW Series

15W 4:1 SINGLE OUTPUT HIGH PERFORMANCE DC/DC CONVERTER

## Features

- Single output up to 4A
- Small size and low profile
- High efficiency up to 87%
- 4:1 ultra wide input voltage range
- Fixed switching frequency
- Input to output isolation (basic insulation)
- Surface-mount or through-hole
- Cost efficient open frame design
- International safety standard approval
- RoHS compliant



## Specifications

### INPUT

Voltage range	24V nominal input	9-36VDC
	48V nominal input	18-75VDC
Voltage variation dv/dt	5V/ms, max (complies with EST300 132 part 4.4).	
Input surge voltage	24V input	50VDC
	100mS max	48V input
Reflected ripple current	30mA p-p, nominal Vin and full load.	
Start up time	Power up 30mS max. Remote ON/OFF 30mS max. Nominal Vin and constant resistive load.	
Start-up voltage	24V input	9VDC
	48V input	18VDC
Shutdown voltage	24V input	8VDC
	48VDC	16VDC
Remote ON/OFF <sup>7</sup>	Positive logic (option): DC/DC ON: Open or $3V < V_r < 15V$ DC/DC OFF: Short or $0V < V_r < 1.2V$ Negative logic (standard): DC/DC ON: Short or $0V < V_r < 1.2V$ DC/DC OFF: Open or $3V < V_r < 15V$ Input current of remote control pin: $-0.5mA$ to $+1mA$ , nominal Vin. Remote off state input current: $20mA$ , nominal Vin.	

### OUTPUT

Power	15W max.	
Voltage accuracy	$\pm 1\%$ .	
Min load	0%.	
Voltage adjustability <sup>6</sup>	$\pm 10\%$ .	
Line regulation	$\pm 0.2\%$ , LL to HL at full load.	
Load regulation	$\pm 0.2\%$ , no load to full load.	
Ripple and noise <sup>20MHz BW</sup>	See table. (Measured with a $1\mu F$ M/C and a $10\mu F$ T/C)	
Temperature coefficient	$\pm 0.02\%/^{\circ}C$ max.	
Transient response	250 $\mu S$ , 25% load step change.	
Over voltage protection (voltage clamped)	3.3V output	3.7-5.4V
	5V output	5.6-7.0V
	12V output	13.8-17.5V
	15V output	16.8-20.5V
Overload protection	150% typ, % of FL at nominal input.	
Short circuit protection	Hiccup, automatics recovery.	

### ENVIRONMENTAL

Operating temperature	-40°C to +85°C (with derating).
Storage temperature	-55°C to +125°C.
Thermal shock	MIL-STD-810F.
Vibration	10-55Hz, 10G, 30 minutes along x, y and z.
Relative humidity	5-95% RH.

### GENERAL

Efficiency	See table.	
Isolation voltage	2250VDC min, input to output.	
Isolation resistance	10 <sup>9</sup> ohms, min.	
Isolation capacitance	1500pF, max.	
Switching frequency	5V, 3.3V:	350KHz typ.
	15V, 12V:	400KHz typ.
Dimensions	27.94 x 23.88 x 8.5 mm.	
Weight	10.5g.	
MTBF <sup>1</sup>	Bellcore TR-NWT-000332: $1.322 \times 10^6$ hrs. MIL-HDBK-217F: $5.147 \times 10^5$ hrs	

### STANDARDS

Safety standards	IEC60950-1, UL60950-1, EN60950-1.	
EMC		
EMI <sup>8</sup>	EN55022, Class A.	
Radiated immunity	EN61000-4-2, Criteria A	10V/m.
Fast transient	EN61000-4-4, Criteria B	$\pm 2kV$ .
Surge <sup>9</sup>	EN61000-4-5, Criteria A	$\pm 1kV$ .
Conducted immunity	EN61000-4-6, Criteria A	10 Vr.m.s.

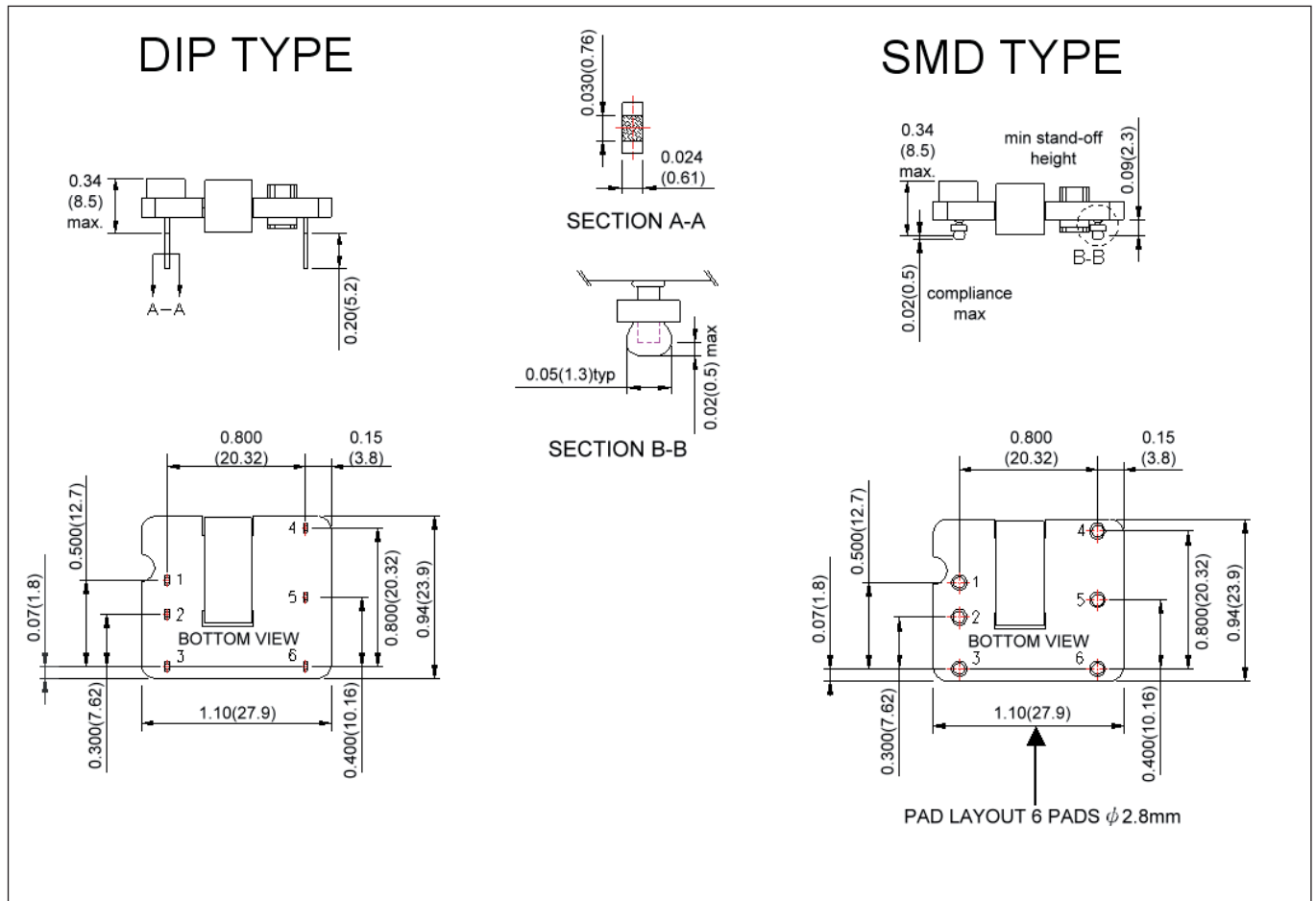
# Industrial Line – T150FW Series

15W 4:1 SINGLE OUTPUT HIGH PERFORMANCE DC/DC CONVERTER

MODEL NUMBER	INPUT RANGE	OUTPUT VOLTAGE	OUPUT CURRENT		OUTPUT <sup>4</sup> RIPPLE & NOISE	INPUT CURRENT		EFF <sup>4</sup>	CAPACITOR <sup>5</sup> LOAD MAX
			MIN LOAD	FULL LOAD		NO LOAD <sup>2</sup>	FULL LOAD <sup>2</sup>		
PMF15-24S3P3W	9 - 36 VDC	3.3 VDC	0mA	4000mA	100mVp-p	50mA	688mA	84	1000µF
PMF15-24S05W	9 - 36 VDC	5 VDC	0mA	3000mA	100mVp-p	60mA	763mA	86	1000µF
PMF15-24S12W	9 - 36 VDC	12 VDC	0mA	1300mA	100mVp-p	15mA	803mA	85	330µF
PMF15-24S15W	9 - 36 VDC	15 VDC	0mA	1000mA	100mVp-p	15mA	772mA	85	220µF
PMF15-48S3P3W	18 - 75 VDC	3.3 VDC	0mA	4000mA	100mVp-p	40mA	340mA	85	1000µF
PMF15-48S05W	18 - 75 VDC	5 VDC	0mA	3000mA	100mVp-p	40mA	377mA	87	1000µF
PMF15-48S12W	18 - 75 VDC	12 VDC	0mA	1300mA	100mVp-p	15mA	392mA	87	330µF
PMF15-48S15W	18 - 75 VDC	15 VDC	0mA	1000mA	100mVp-p	15mA	377mA	87	220µF

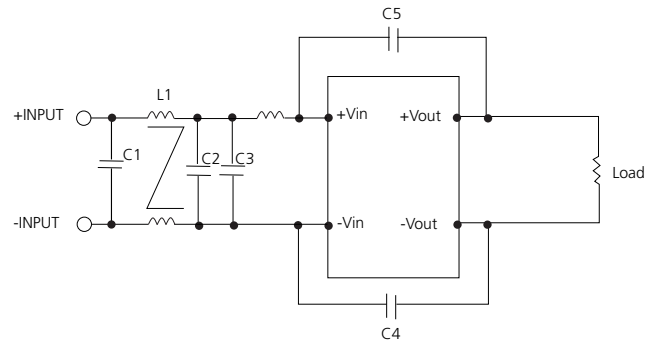
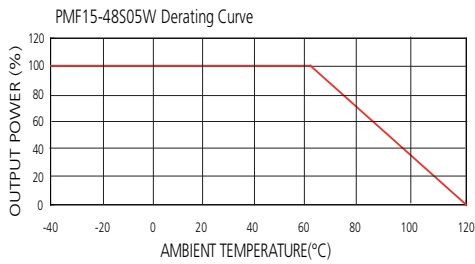
**Notes:**

1. BELLCORE TR-NWTF-000332. Case 1: 50% Stress, Temperature at 40°C. MIL-HDBK-217F Notice2 @Ta=25 °C, Full load(Ground, Benign, controlled environment)
2. Maximum value at nominal input voltage and full load.
3. Typical value at nominal input voltage and no load.
4. Typical value at nominal input voltage and full load.
5. Test by minimum Vin and constant resistive load.
6. Trimming allows the user to increase or decrease the output voltage set point of the module. This is accomplished by connecting an external resistor between the TRIM pin and either the +VOUT pin or the -VOUT pin.
7. The ON/OFF control pin voltage is reference to -Vin. The order number please see product standard table.
8. The power module operate in a variety of thermal environments; however, sufficient cooling should be provided to help ensure reliable operation.
9. The T150F meets EN55022 class A and class B only with external components connected before the input pin to the converter.
10. An external filter capacitor is required if the module has to meet EN61000-4-5. The filter capacitor Powerbox suggest: Nippon chemi-con KY series, 220µF/100V, ESR 48mΩ.



# Industrial Line – T150FW Series

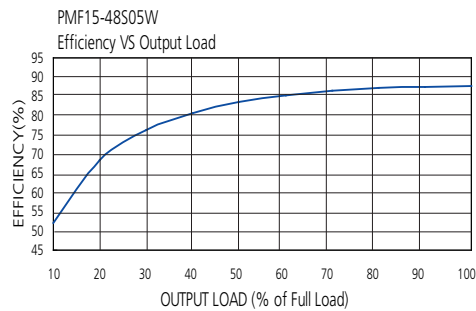
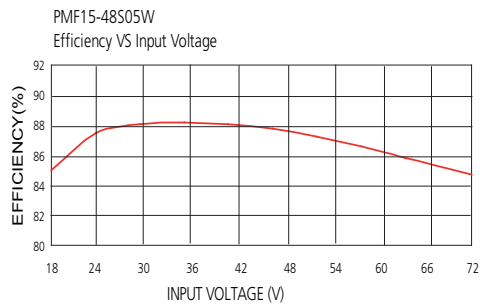
15W 4:1 SINGLE OUTPUT HIGH PERFORMANCE DC/DC CONVERTER



### Recommended Filter for EN55022 Class B Compliance

The components used in the above figure, together with the manufacturers' part numbers for these components, are as follows:

	C1 & C2	C3	C4 & C5	L1	L2
PMF15-15xxx	6.8μF/50V 1812 MLCC	6.8μF/50V 1812 MLCC	470pF/3KV 1808 MLCC	145μH Common Choke PMT-051	10μH SMD Inductor PMT-047
PMF15-48xxx	2.2μF/100V 1812 MLCC	2.2μF/100V 1812 MLCC	470pF/3KV 1808 MLCC	145μH Common Choke PMT-051	18μH SMD Inductor PMT-046



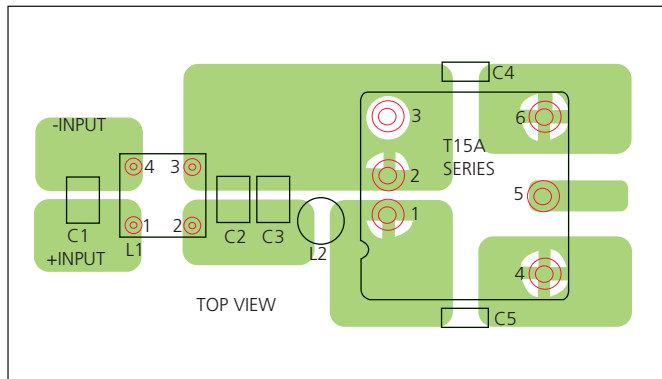
PIN CONNECTION	
1	+INPUT
2	-INPUT
3	ON/OFF
4	+VOUT
5	TRIM
6	-VOUT

**EXTERNAL OUTPUT TRIMMING**

Output can be externally trimmed by using the method shown below.

TRIM UP: A resistor R<sub>U</sub> is connected between pins 5 and 6.

TRIM DOWN: A resistor R<sub>D</sub> is connected between pins 4 and 5.



Recommended EN55022 Class B Filter Circuit Layout

PRODUCT STANDARD TABLE OPTION	SUFFIX
Negative remote ON/OFF with DIP (standard)	
Negative remote ON/OFF with SMT	-A
Positive remote ON/OFF with DIP	-B
Positive remote ON/OFF with SMT	-C
DIP type without ON/OFF pin	-D
SMT type without ON/OFF pin	-E
DIP type, negative remote ON/OFF without TRIM pin	-F
SMT type, negative remote ON/OFF without TRIM pin	-G
DIP type without ON/OFF & TRIM pin	-H
SMT type without ON/OFF & TRIM pin	-I
DIP type, positive remote ON/OFF without TRIM pin	-J
SMT type, positive remote ON/OFF without TRIM pin	-K

Specifications are subject to change without notice.