



# PPMxx-X-xxELF

## PPM-SERIES

Rev. 08-2015

- ✓ 4 - 25 Watt
  - ✓ Regulated
  - ✓ **Single Output**
  - ✓ Over Current / Over Voltage Protection
  - ✓ Continuous Short Circuit Protection
  - ✓ **3 kV I/O Isolation**
- Ready for UL\***

The PPM-Series are high efficiency green power moduls with various packaging provided by Peak. The features of this series are: wide input voltage, DC and AC all in one, high efficiency, high reliability, low loss, safety isolation etc. They are widely used in industrial, office and civil equipment. EMC and safety standards meet international standards.

**\* Most converters of PPM Series are ready for UL. Please ask for MOQ if you need certification.**

All specifications typical at Ta=25°C, nominal input voltage and full load unless otherwise specified

### Input Specifications

Voltage Range	85 – 264 VAC or 120 – 370 VDC	
Frequency	47 – 63 Hz	
Input (Inrush) Current	<u>115VAC</u>	<u>230VAC</u>
	PPM05 models: 125mA (10A), max.	80mA (20A), max.
	PPM10 models: 260mA (10A), max.	160mA (20A), max.
	PPM15 models: 370mA (10A), max.	220mA (20A), max.
	PPM20 models: 600mA (16A), max.	340mA (30A), max.
	PPM25 models: 600mA (16A), max.	340mA (30A), max.
	PPM05: 1A / 250V	
External Fuse (recommended)	PPM10/15: 2A / 250V	
	PPM20/25: 3A / 250V	
Leakage current	0.3mA RMS, typ. (230VAC 50Hz)	

### General Specifications

Isolation I/O (60 sec)	3000V
Switching Frequency	65 - 140 kHz, max.
Power Derating	2% / °C (-25 – 10°C)
	3.75% / °C (55 – 70°C)
Humidity (rel.)	95%
MTBF (Calculated MIL-HDBK-217F)	>300.000 hrs
Safety Standard (designed to meet)	IEC/EN 60950
	UL 60950

### Environment / Physical Specifications

Operation Temp.	-25°C to 70°C
Storage	-25°C to 105°C
Cooling	Nature / Free Air
Case Material	Plastic (UL94V-0 rated)
Potting	Epoxy (UL94V-0 rated)
Weight	~50 - 170 g

### Output Specifications

Voltage accuracy (main)	±2%
Line regulation (main)	±0.5%
Load regulation (0% to 100%)	±1%
Ripple & noise (20 MHz bandwidth)	150 mV pk-pk, max.
Temperature coefficient	±0.02%/°C
Short Circuit Protection	Continuous, self recovery
Over Current Protection	≥110% Io, self recovery
	3.3/5Vout: ≤7.5VDC
	9Vout: ≤13VDC
Over Voltage Protection	12/15Vout: ≤20 VDC
	24Vout: ≤30 VDC
	48Vout: ≤60 VDC
Hold up Time	15ms (115VAC) / 80ms (230VAC)

### EMC Specifications

Radiated Emissions	EN55022	Class B
Conducted Emissions*	EN55022	Class B
ESD (±6kV/±8kV)	IEC/EN-61000-4-2	Pref. Criteria B
RS (10V/m)	IEC/EN-61000-4-3	Pref. Criteria A
EFT (±4kV)*	IEC/EN-61000-4-4	Pref. Criteria B
Surge (±2kV/4kV)*	IEC/EN-61000-4-5	Pref. Criteria B
CS (10V r.m.s)	IEC/EN-61000-4-6	Pref. Criteria A
PFM (10A/m)	IEC/EN-61000-4-8	Pref. Criteria A
Immunities of voltage dip. Drop and short interruption (0-70%)	IEC/EN-61000-4-11	Pref. Criteria B

\*Input filter components are required to meet conducted emission class B (see App Note). An external filter capacitor is required if the module has to meet IEC61000-4-4 and IEC61000-4-5. Please see App Note.

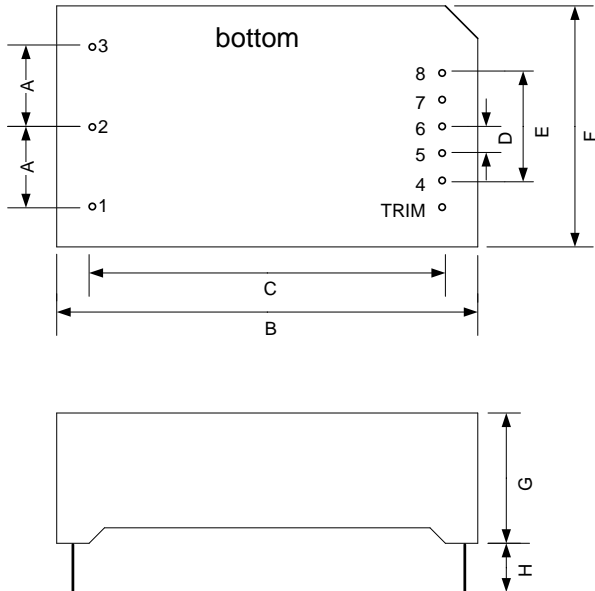


Order #	Output Power	Output Voltage (V)	Output Current (mA), max.	Efficiency (%)	Capacitive Load (uF)
<b>SINGLE OUTPUT</b>					
PPM05-A-3R3ELF	4	3.3	1250	70	8100
PPM05-A-05ELF	5	5	1000	75	6800
PPM05-A-09ELF	5	9	550	77	1200
PPM05-A-12ELF	5	12	420	79	1000
PPM05-A-15ELF	5	15	330	80	680
PPM05-A-24ELF	5	24	230	82	270
PPM10-B-3R3ELF	6.6	3.3	2000	70	26400
PPM10-B-05ELF	10	5	2000	76	9440
PPM10-B-09ELF	10	9	1100	78	3600
PPM10-B-12ELF	10	12	900	80	2400
PPM10-B-15ELF	10	15	700	81	1170
PPM10-B-24ELF	10	24	450	82	370
PPM15-C-3R3ELF	9.9	3.3	3000	73	7200
PPM15-C-05ELF	15	5	2800	76	44800
PPM15-C-09ELF	15	9	1600	78	13760
PPM15-C-12ELF	15	12	1250	80	5200
PPM15-C-15ELF	15	15	1000	80	5120
PPM15-C-24ELF	15	24	625	84	880
PPM15-C-48ELF	15	48	320	85	370
PPM20-D-3R3ELF	13.5	3.3	4100	73	48000
PPM20-D-05ELF	20	5	3500	75	12240
PPM20-D-09ELF	20	9	2100	77	720
PPM20-D-12ELF	20	12	1600	81	5400
PPM20-D-15ELF	20	15	1300	83	2720
PPM20-D-24ELF	20	24	850	85	1840
PPM20-D-48ELF	20	48	420	85	500
PPM25-D-3R3ELF	13.5	3.3	4100	73	4800
PPM25-D-05ELF	25	5	4100	74	12240
PPM25-D-09ELF	25	9	2500	78	5600
PPM25-D-12ELF	25	12	2100	82	5400
PPM25-D-15ELF	25	15	1600	83	2400
PPM25-D-24ELF	25	24	1100	85	1440
PPM25-D-48ELF	25	48	500	87	500

If you need other specifications, please enquire.



## Package / Pinning / Derating

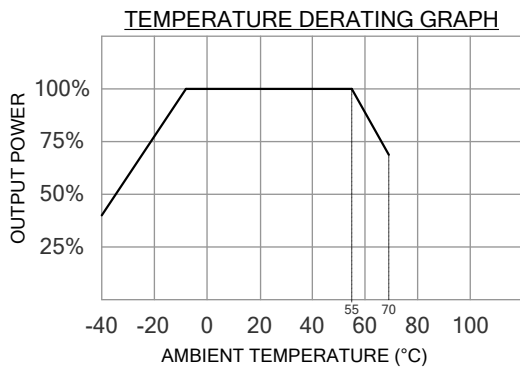


No.	PPM05-A
A	12.5
B	48.5
C	40.5
D	4.0
E	16.0
F	36.0
G	20.5
H	min. 6.0

No.	PPM10-B
A	17.5
B	55.0
C	47.0
D	5.0
E	20.0
F	45.0
G	20.5
H	min. 6.0

No.	PPM15-C
A	17.5
B	62.0
C	54.0
D	5.0
E	20.0
F	48.0
G	22.5
H	min. 6.0

No.	PPM20/25-D
A	20.0
B	70.0
C	62.0
D	5.75
E	23.0
F	48.0
G	23.5
H	min. 6.0



PIN CONNECTIONS	
#	SINGLE
1	Ground*
2	AC (N)
3	AC (L)
4	- Vout
5	No Pin
6	No Pin
7	No Pin
8	+Vout
TRIM	TRIM**

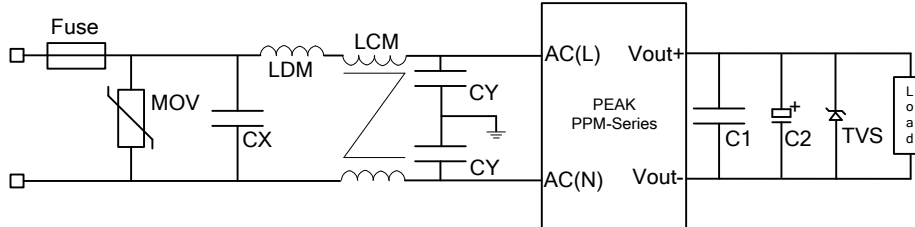
\* No Ground for PPM15-C-xxELF

\*\* Only for PPM20/25-D-xxELF



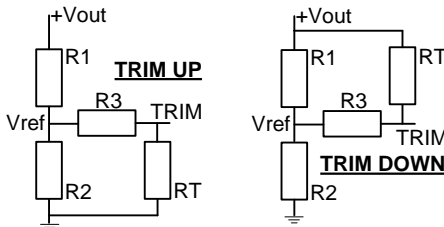
## App Notes:

### EMC Typical Recommended Circuit



Element	Value
MOV	S14K350
CY	1000pF/400VAC
CX	0.1uF/275VAC
LDM	4.7uH/2A
LCM	10mH

### TRIM



	3.3V	5V	9V	12V	15V	24V	48V
R1(KΩ)	3.3	3.3	7.5	3.8	7.5	8.7	68
R2(KΩ)	2	3.3	2.87	1	1.5	1	3.7
R3(KΩ)	1	1	1	1	1	1	1
Vref(V)	1.24	2.5	2.5	2.5	2.5	2.5	2.5
Vot(V)	Output voltage of Trim, variation ≤ ±10%						

Element	C1 (uF)	C2 (uF)
PPM05-A-3R3ELF	1	330
PPM05-A-05ELF	1	330
PPM05-A-09ELF	1	120
PPM05-A-12ELF	1	120
PPM05-A-15ELF	1	68
PPM05-A-24ELF	1	68
PPM10-B-3R3ELF	1	470
PPM10-B-05ELF	1	330
PPM10-B-09ELF	1	120
PPM10-B-12ELF	1	120
PPM10-B-15ELF	1	120
PPM10-B-24ELF	1	68
PPM15-C-3R3ELF	1	680
PPM15-C-05ELF	1	680
PPM15-C-09ELF	1	470
PPM15-C-12ELF	1	220
PPM15-C-15ELF	1	220
PPM15-C-24ELF	1	68
PPM15-C-48ELF	1	33
PPM20-D-3R3ELF	1	330
PPM20-D-05ELF	1	330
PPM20-D-09ELF	1	220
PPM20-D-12ELF	1	220
PPM20-D-15ELF	1	220
PPM20-D-24ELF	1	220
PPM20-D-48ELF	1	68
PPM25-D-3R3ELF	1	330
PPM25-D-05ELF	1	330
PPM25-D-09ELF	1	330
PPM25-D-12ELF	1	330
PPM25-D-15ELF	1	330
PPM25-D-24ELF	1	120
PPM25-D-48ELF	1	68

TRIM UP :

$$RT = \frac{a \cdot R2}{R2 - a} - R3$$

$$a = \frac{Vref}{Vout - Vref} \cdot R1$$

TRIM DOWN:

$$RT = \frac{b \cdot R1}{R1 - b} - R3$$

$$b = \frac{Vout - Vref}{Vref} \cdot R2$$

