

# P6DU-xxxxE/Z LF (1kV) P6MU-xxxxE/Z (Hxx)LF (3-6kV)

## PM1-SERIES

Rev. 07-2015

- ✓ 1 Watt
- ✓ Unregulated
- ✓ **Single and Dual Output**
- ✓ **DIP14 Case**
- ✓ **1-6 kV DC I/O Isolation**
- ✓ Low Ripple and Noise

**Ready for UL\***

The PM1 series is a family of cost effective 0.5 – 1W single output DC/DC converters. They are encapsulated in an ultra miniature SIP7 (PxCU/LU...) or DIP14 (PxDU/MU...) case. High performance features: 1000-6000Vdc input/output isolation, high efficiency operation, output voltage accuracy of  $\pm 3\%$  maximum, input range of  $\pm 10\%$  and low output ripple and noise. \* **PM1 Series is 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	$\pm 10\%$
Current max.	27 – 459mA (See table)
Current No-Load	5 – 35mA (See table)
Filter	Capacitors
Reflected Ripple Current (@12uH)	20mA pk-pk

### General Specifications

Efficiency	63% - 86% (See table)	
	1000VDC (P6DU-xxxxELF)	
Isolation I/O (60 sec)	3000VDC (P6MU-xxxxELF)	
	4000-6000VDC (P6MU-xxxxEHxxLF)	
Isolation I/O Capacitance	60 pF	
Isolation I/O Resistance	1000 M $\Omega$	
Switching Frequency	80 kHz (variable)	
Humidity (rel.)	95%	
MTBF (Calculated MIL-HDBK-217F)	>1.121 Mhrs	
Safety Standard (designed to meet)	IEC/EN 60950-1	
	UL/cUL60950-1	

### EMC Specifications

Radiated Emissions	EN55022	Class B
Conducted Emissions*	EN55022	Class B
ESD	IEC-61000-4-2	Pref. Criteria A
RS	IEC-61000-4-3	Pref. Criteria A
EFT*	IEC-61000-4-4	Pref. Criteria A
Surge*	IEC-61000-4-5	Pref. Criteria A
CS	IEC-61000-4-6	Pref. Criteria A
PFMF	IEC-61000-4-8	Pref. Criteria A

\*Input filter components are required to meet conducted emission class B (see App Note). An external filter capacitor (e.g. 470uF/100V) is required if the module has to meet IEC61000-4-4 and IEC61000-4-5.

### Output Specifications

Voltage accuracy	$\pm 3\%$
Line regulation (per 1% Vin change)	$\pm 1.2\%$
Load regulation (20% to 100%)	$\pm 10\%$ , max.
	(for 3.3Vout) $\pm 20\%$ , max.
Ripple & noise (20 MHz bandwidth)	75 mV pk-pk
Temperature coefficient	$\pm 0.02\%/^{\circ}\text{C}$
Capacitor load (Test: min. Vin + const. load)	220uF (Single out)
	$\pm 100\mu\text{F}$ (Dual out)

### Environment / Physical Specifications

Operation Temp. (Derating)	-40°C to 85°C
Case max.	100°C
Storage	-40°C to 125°C
Cooling	Nature / Free Air
Case Material	Plastic (UL94V-0 rated)
Potting	Epoxy (UL94V-0 rated)
Pin Material	Alloy42 (Solder coated)
Weight	2.3 g / 2.6 g



Order #	Input Voltage (VDC)	Input Current No Load (mA)	Input Current Full Load (mA)	Output Voltage (VDC)	Output Current Full Load (mA)	Efficiency (%)	Capacitor Load (µF)
<b>SINGLE OUTPUT</b>							
P6DU/MU-3R33R3ELF	3.3	35	427	3.3	303	71	220
P6DU/MU-3R305ELF	3.3	35	404	5	200	75	220
P6DU/MU-3R309ELF	3.3	30	394	9	111	77	220
P6DU/MU-3R315ELF	3.3	30	399	15	67	76	220
P6DU/MU-3R318ELF	3.3	35	415	18	56	73	220
P6DU/MU-3R324ELF	3.3	35	415	24	42	73	220
P6DU/MU-053R3ELF	5	20	260	3.3	303	77	220
P6DU/MU-0505ELF	5	20	244	5	200	82	220
P6DU/MU-057R2ELF	5	20	244	7.2	139	82	220
P6DU/MU-0509ELF	5	20	250	9	111	80	220
P6DU/MU-0512ELF	5	16	247	12	83	81	220
P6DU/MU-0515ELF	5	20	250	15	67	80	220
P6DU/MU-0518ELF	5	25	250	18	56	80	220
P6DU/MU-0524ELF	5	22	244	24	42	82	220
P6DU/MU-123R3ELF	12	20	111	3.3	303	75	220
P6DU/MU-1205ELF	12	14	104	5	200	80	220
P6DU/MU-127R2ELF	12	15	110	7.2	139	76	220
P6DU/MU-1209ELF	12	10	104	9	111	80	220
P6DU/MU-1212ELF	12	13	108	12	83	77	220
P6DU/MU-1215ELF	12	15	110	15	67	76	220
P6DU/MU-1218ELF	12	20	114	18	56	73	220
P6DU/MU-1224ELF	12	25	114	24	42	73	220
P6DU/MU-153R3ELF	15	10	89	3.3	303	75	220
P6DU/MU-1505ELF	15	7	82	5	200	81	220
P6DU/MU-157R2ELF	15	10	89	7.2	139	75	220
P6DU/MU-1509ELF	15	10	89	9	111	75	220
P6DU/MU-1512ELF	15	10	83	12	83	80	220
P6DU/MU-1515ELF	15	10	84	15	67	79	220
P6DU/MU-1518ELF	15	10	83	18	56	80	220
P6DU/MU-1524ELF	15	10	83	24	42	80	220
P6DU/MU-243R3ELF	24	7	55	3.3	303	76	220
P6DU/MU-2405ELF	24	7	52	5	200	80	220
P6DU/MU-247R2ELF	24	8	57	7.2	139	73	220
P6DU/MU-2409ELF	24	7	56	9	111	75	220
P6DU/MU-2412ELF	24	6	53	12	83	78	220
P6DU/MU-2415ELF	24	6	52	15	67	80	220



Order #	Input Voltage (VDC)	Input Current No Load (mA)	Input Current Full Load (mA)	Output Voltage (VDC)	Output Current Full Load (mA)	Efficiency (%)	Capacitor Load (uF)
P6DU/MU-2418ELF	24	5	52	18	56	80	220
P6DU/MU-2424ELF	24	5	51	24	42	81	220
P6DU/MU-483R3ELF	48	10	30	3.3	303	70	220
P6DU/MU-4805ELF	48	6	29	5	200	73	220
P6DU/MU-487R2ELF	48	6	28	7.2	139	74	220
P6DU/MU-4809ELF	48	6	28	9	111	75	220
P6DU/MU-4812ELF	48	5	27	12	83	76	220
P6DU/MU-4815ELF	48	4	26	15	67	79	220
P6DU/MU-4818ELF	48	5	28	18	56	75	220
P6DU/MU-4824ELF	48	6	29	24	42	72	220

### DUAL OUTPUT

P6DU/MU-3R33R3ZLF	3.3	35	481	±3.3	±152	63	±100
P6DU/MU-3R305ZLF	3.3	25	452	±5.0	±100	67	±100
P6DU/MU-3R37R2ZLF	3.3	30	432	±7.2	±69	70	±100
P6DU/MU-3R309ZLF	3.3	30	415	±9.0	±56	73	±100
P6DU/MU-3R312ZLF	3.3	30	415	±12	±42	73	±100
P6DU/MU-3R315ZLF	3.3	30	399	±15	±33	76	±100
P6DU/MU-3R318ZLF	3.3	30	404	±18	±28	75	±100
P6DU/MU-3R324ZLF	3.3	30	404	±24	±21	75	±100
P6DU/MU-053R3ZLF	5	20	308	±3.3	±152	65	±100
P6DU/MU-0505ZLF	5	20	259	±5.0	±100	70	±100
P6DU/MU-057R2ZLF	5	20	274	±7.2	±69	73	±100
P6DU/MU-0509ZLF	5	16	253	±9.0	±56	79	±100
P6DU/MU-0512ZLF	5	20	250	±12	±42	80	±100
P6DU/MU-0515ZLF	5	20	247	±15	±33	81	±100
P6DU/MU-0518ZLF	5	18	244	±18	±28	82	±100
P6DU/MU-0524ZLF	5	20	244	±24	±21	82	±100
P6DU/MU-123R3ZLF	12	15	128	±3.3	±152	65	±100
P6DU/MU-1205ZLF	12	7	113	±5.0	±100	74	±100
P6DU/MU-127R2ZLF	12	13	111	±7.2	±69	75	±100
P6DU/MU-1209ZLF	12	15	104	±9.0	±56	80	±100
P6DU/MU-1212ZLF	12	14	103	±12	±42	81	±100
P6DU/MU-1215ZLF	12	11	102	±15	±33	82	±100
P6DU/MU-1218ZLF	12	15	111	±18	±28	75	±100
P6DU/MU-1224ZLF	12	20	110	±24	±21	76	±100
P6DU/MU-153R3ZLF	15	20	89	±3.3	±152	75	±100



Order #	Input Voltage (VDC)	Input Current No Load (mA)	Input Current Full Load (mA)	Output Voltage (VDC)	Output Current Full Load (mA)	Efficiency (%)	Capacitor Load (µF)
P6DU/MU-1505ZLF	15	20	89	±5.0	±100	75	±100
P6DU/MU-157R2ZLF	15	18	89	±7.2	±69	75	±100
P6DU/MU-1509ZLF	15	18	87	±9.0	±56	77	±100
P6DU/MU-1512ZLF	15	20	87	±12	±42	77	±100
P6DU/MU-1515ZLF	15	20	87	±15	±33	77	±100
P6DU/MU-1518ZLF	15	15	89	±18	±28	75	±100
P6DU/MU-1524ZLF	15	15	89	±24	±21	75	±100
P6DU/MU-243R3ZLF	24	10	65	±3.3	±152	64	±100
P6DU/MU-2405ZLF	24	5	56	±5.0	±100	75	±100
P6DU/MU-247R2ZLF	24	7	56	±7.2	±69	75	±100
P6DU/MU-2409ZLF	24	5	52	±9.0	±56	80	±100
P6DU/MU-2412ZLF	24	6	53	±12	±42	79	±100
P6DU/MU-2415ZLF	24	8	51	±15	±33	81	±100
P6DU/MU-2418ZLF	24	10	53	±18	±28	78	±100
P6DU/MU-2424ZLF	24	9	53	±24	±21	78	±100
P6DU/MU-483R3ZLF	48	8	32	±3.3	±152	65	±100
P6DU/MU-4805ZLF	48	6	32	±5.0	±100	65	±100
P6DU/MU-487R2ZLF	48	5	31	±7.2	±69	68	±100
P6DU/MU-4809ZLF	48	5	30	±9.0	±56	70	±100
P6DU/MU-4812ZLF	48	6	29	±12	±42	71	±100
P6DU/MU-4815ZLF	48	6	29	±15	±33	72	±100
P6DU/MU-4818ZLF	48	8	30	±18	±28	70	±100
P6DU/MU-4824ZLF	48	8	29	±24	±21	72	±100

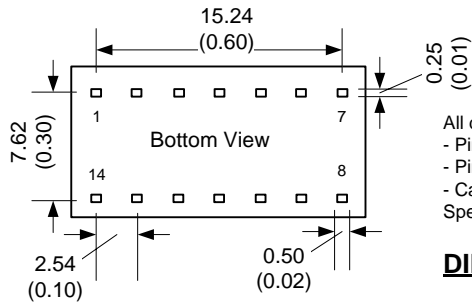
If you need other specifications, please enquire.

**How to Order:**

Standard <b>1 kV</b> Isolation	P6 <u>D</u> U-xxxxELF or ZLF
Standard <b>3 kV</b> Isolation	P6 <u>M</u> U-xxxxELF or ZLF
Optional <b>4 kV</b> Isolation	P6 <u>M</u> U-xxxxE <u>H40</u> LF or ...Z <u>H40</u> LF
Optional <b>5.2 kV</b> Isolation	P6 <u>M</u> U-xxxxE <u>H52</u> LF or ...Z <u>H52</u> LF
Optional <b>6 kV</b> Isolation	P6 <u>M</u> U-xxxxE <u>H60</u> LF or ...Z <u>H60</u> LF

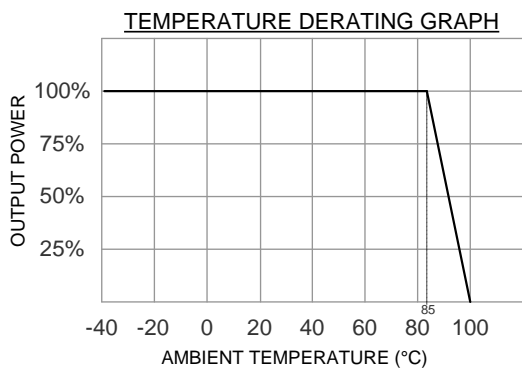
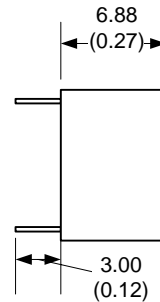
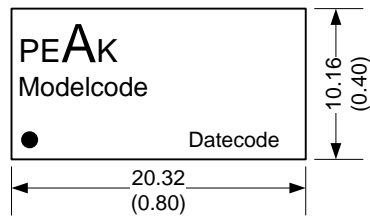


## Package / Pinning / Derating



All dimensions are typical in millimeters (inches).  
 - Pin diameter: 0.5 +/-0.05 (0.02 +/-0.002)  
 - Pin pitch tolerance: +/-0.35 (+/-0.014)  
 - Case tolerance +/-0.5 (+/-0.02)  
 Specification may change without notice.

### DIP14 – PLASTIC CASE



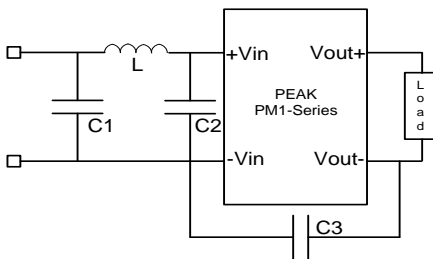
PIN CONNECTIONS				
Model	P6DU (1kV)		P6MU (3-6kV)	
#	SINGLE	DUAL	SINGLE	DUAL
1	-Vin	-Vin	-Vin	-Vin
7	NC	NC	NC	NC
8	no Pin	Common	+Vout	+Vout
9	+Vout	+Vout	no Pin	Common
10	no Pin	no Pin	-Vout	-Vout
11	-Vout	-Vout	no Pin	no Pin
14	+Vin	+Vin	+Vin	+Vin



### App Notes:

- Operation under no-load conditions will not damage these devices, but they will not observe the listed specifications.
- All models should be externally fused for protection.
  - 300mA for 12, 24, 48Vin,
  - 500mA for 5Vin and
  - 800mA for 3.3Vin

### EMC Typical Recommended Circuit (CLASS B)



Vout	C1	C2	C3	L
3.3	2.2uF/100V	-	-	18uH
5	2.2uF/100V	-	-	18uH
12	2.2uF/100V	-	-	18uH
15	2.2uF/100V	-	-	18uH
24	2.2uF/100V	2.2uF/100V	470pF/2kV	18uH
48	10uF/100V Electrolytic	2.2uF/100V	470pF/2kV	18uH

