

# P6CU-xxxxE/Z LF



## PM1-SERIES

Rev.02-2009

- ✓ 1 Watt
- ✓ Unregulated
- ✓ **Single** and **Dual** Output
- ✓ **SIP7** Case
- ✓ **1 kV** DC I/O Isolation
- ✓ Low Ripple and Noise

The PM1 series P6CU-xxxxE/ZLF is a family of cost effective 1 W single & dual output DC-DC converters. These converters are in an ultra miniature SIP7 case. Devices are encapsulated. High performance features: 1000VDC input/output isolation, high efficiency operation, output voltage accuracy of  $\pm 3\%$  maximum, input range of  $\pm 10\%$  tolerance and low output ripple and noise.

All specifications typical at  $T_a=25^\circ\text{C}$ , nominal input voltage and full load unless otherwise specified

### Input Specifications

|                                             |             |
|---------------------------------------------|-------------|
| Voltage Range                               | $\pm 10\%$  |
| Input Filter                                | Capacitor   |
| Input Reflected Ripple Current <sup>1</sup> | 20 mA pk-pk |

### Output Specifications

|                                    |                                           |
|------------------------------------|-------------------------------------------|
| Voltage Accuracy                   | $\pm 3\%$                                 |
| Short Circuit Protection           | Short Term                                |
| Line Regulation                    | $\pm 1.2\% / 1\% V_{in}$ Change           |
| Load Regulation (20% - 100%)       | $\pm 10\%$ (3.3 Vout Models: $\pm 20\%$ ) |
| Ripple and Noise (20Mhz bandwidth) | 75 mV pk-pk                               |
| Temperature Coefficient            | $\pm 0.02\% / ^\circ\text{C}$             |

### General Specifications

|                                             |                   |
|---------------------------------------------|-------------------|
| Efficiency                                  | See Table         |
| I/O Isolation Voltage (3 sec.)              | 1000 VDC          |
| I/O Isolation Capacity                      | 60 pF, typ.       |
| I/O Isolation Resistance                    | 1000 M Ohm        |
| Switching Frequency                         | 80 kHz (Variable) |
| Humidity                                    | 95% rel H         |
| Reliability Calculated MTBF (MIL-HDBK-217F) | > 1.121 Mhrs      |

### Physical Specifications

|                  |                                              |
|------------------|----------------------------------------------|
| Case Material    | Non Conductive Black Plastic (UL94V-0 rated) |
| Potting Material | Epoxy (UL94V-0 rated)                        |
| Weight           | ~ 2.3g, typ.                                 |

### Environment Specifications

|                          |                                                               |
|--------------------------|---------------------------------------------------------------|
| Operating Temperature    | -40 to +85 $^\circ\text{C}$ (ambient)                         |
| Maximum Case Temperature | 100 $^\circ\text{C}$                                          |
| Storage Temperature      | -40 to +125 $^\circ\text{C}$                                  |
| Cooling                  | Free Air Convection (10 mm distance required)                 |
| RoHS Conform             | Soldering 260 $^\circ\text{C}$ , max. (1.5 mm from case 10s.) |

# Selection Guide

## Single Output

| 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) <sup>2</sup> |
|----------------------|---------------------|----|----------------------------|-----|------------------------------|----|----------------------|--|-------------------------------|--|----------------|----------------------------------|
| <b>SINGLE OUTPUT</b> |                     |    |                            |     |                              |    |                      |  |                               |  |                |                                  |
| P6CU-3R33R3ELF       | 3.3                 | 22 | 409                        | 3.3 | 303                          | 74 | 220                  |  |                               |  |                |                                  |
| P6CU-3R305ELF        | 3.3                 | 28 | 398                        | 5   | 200                          | 76 | 220                  |  |                               |  |                |                                  |
| P6CU-053R3ELF        | 5                   | 30 | 267                        | 3.3 | 303                          | 75 | 220                  |  |                               |  |                |                                  |
| P6CU-0505ELF         | 5                   | 30 | 256                        | 5   | 200                          | 78 | 220                  |  |                               |  |                |                                  |
| P6CU-057R2ELF        | 5                   | 30 | 270                        | 7.2 | 138.9                        | 74 | 220                  |  |                               |  |                |                                  |
| P6CU-0509ELF         | 5                   | 30 | 267                        | 9   | 111.1                        | 75 | 220                  |  |                               |  |                |                                  |
| P6CU-0512ELF         | 5                   | 30 | 263                        | 12  | 83.3                         | 76 | 220                  |  |                               |  |                |                                  |
| P6CU-0515ELF         | 5                   | 30 | 263                        | 15  | 66.7                         | 76 | 220                  |  |                               |  |                |                                  |
| P6CU-0518ELF         | 5                   | 30 | 267                        | 18  | 55.6                         | 75 | 220                  |  |                               |  |                |                                  |
| P6CU-0524ELF         | 5                   | 30 | 278                        | 24  | 41.7                         | 72 | 220                  |  |                               |  |                |                                  |
| P6CU-123R3ELF        | 12                  | 20 | 113                        | 3.3 | 303                          | 74 | 220                  |  |                               |  |                |                                  |
| P6CU-1205ELF         | 12                  | 20 | 113                        | 5   | 200                          | 74 | 220                  |  |                               |  |                |                                  |
| P6CU-127R2ELF        | 12                  | 20 | 113                        | 7.2 | 138.9                        | 74 | 220                  |  |                               |  |                |                                  |
| P6CU-1209ELF         | 12                  | 20 | 111                        | 9   | 111.1                        | 75 | 220                  |  |                               |  |                |                                  |
| P6CU-1212ELF         | 12                  | 20 | 108                        | 12  | 83.3                         | 77 | 220                  |  |                               |  |                |                                  |
| P6CU-1215ELF         | 12                  | 20 | 106                        | 15  | 66.7                         | 78 | 220                  |  |                               |  |                |                                  |
| P6CU-1218ELF         | 12                  | 20 | 106                        | 18  | 55.6                         | 78 | 220                  |  |                               |  |                |                                  |
| P6CU-1224ELF         | 12                  | 20 | 113                        | 24  | 41.7                         | 75 | 220                  |  |                               |  |                |                                  |
| P6CU-243R3ELF        | 24                  | 10 | 56                         | 3.3 | 303                          | 75 | 220                  |  |                               |  |                |                                  |
| P6CU-2405ELF         | 24                  | 10 | 54                         | 5   | 200                          | 77 | 220                  |  |                               |  |                |                                  |
| P6CU-247R2ELF        | 24                  | 10 | 56                         | 7.2 | 138.9                        | 75 | 220                  |  |                               |  |                |                                  |
| P6CU-2409ELF         | 24                  | 10 | 56                         | 9   | 111.1                        | 75 | 220                  |  |                               |  |                |                                  |
| P6CU-2412ELF         | 24                  | 10 | 53                         | 12  | 83.3                         | 78 | 220                  |  |                               |  |                |                                  |
| P6CU-2415ELF         | 24                  | 10 | 53                         | 15  | 66.7                         | 78 | 220                  |  |                               |  |                |                                  |
| P6CU-2418ELF         | 24                  | 10 | 53                         | 18  | 55.6                         | 78 | 220                  |  |                               |  |                |                                  |
| P6CU-2424ELF         | 24                  | 10 | 53                         | 24  | 41.7                         | 78 | 220                  |  |                               |  |                |                                  |
| P6CU-483R3ELF        | 48                  | 6  | 29                         | 3.3 | 303                          | 72 | 220                  |  |                               |  |                |                                  |
| P6CU-4805ELF         | 48                  | 6  | 29                         | 5   | 200                          | 72 | 220                  |  |                               |  |                |                                  |
| P6CU-487R2ELF        | 48                  | 6  | 29                         | 7.2 | 138.9                        | 72 | 220                  |  |                               |  |                |                                  |
| P6CU-4809ELF         | 48                  | 6  | 28                         | 9   | 111.1                        | 74 | 220                  |  |                               |  |                |                                  |
| P6CU-4812ELF         | 48                  | 6  | 28                         | 12  | 83.3                         | 74 | 220                  |  |                               |  |                |                                  |
| P6CU-4815ELF         | 48                  | 6  | 28                         | 15  | 66.7                         | 75 | 220                  |  |                               |  |                |                                  |
| P6CU-4818ELF         | 48                  | 6  | 29                         | 18  | 55.6                         | 72 | 220                  |  |                               |  |                |                                  |
| P6CU-4824ELF         | 48                  | 6  | 30                         | 24  | 41.7                         | 70 | 220                  |  |                               |  |                |                                  |

If you need other specifications, please enquire.

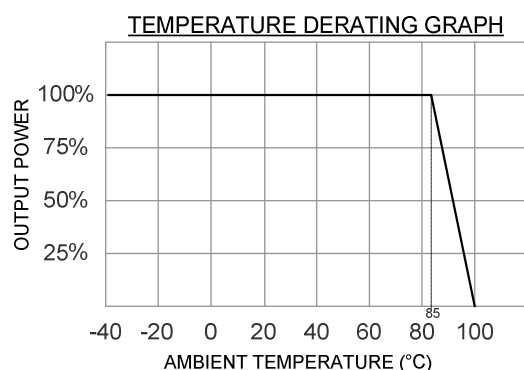
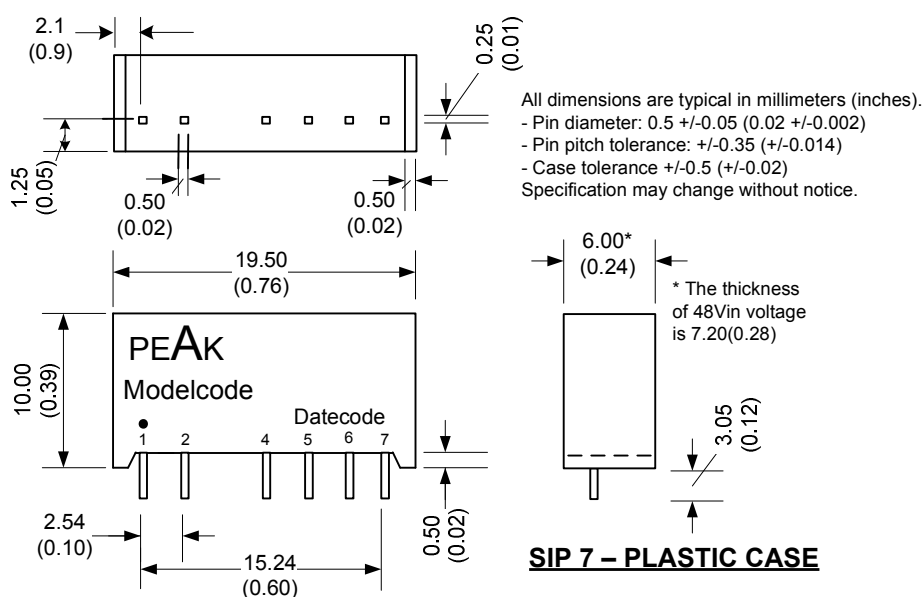
# Selection Guide

## Dual Output

| 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) |
|--------------------|---------------------|----------------------------|------------------------------|----------------------|-------------------------------|----------------|---------------------|
| <b>DUAL OUTPUT</b> |                     |                            |                              |                      |                               |                |                     |
| P6CU-053R3ZLF      | 5                   | 30                         | 307                          | ± 3.3                | ± 151.5                       | 65             | ± 100               |
| P6CU-0505ZLF       | 5                   | 30                         | 270                          | ± 5                  | ± 100                         | 74             | ± 100               |
| P6CU-057R2ZLF      | 5                   | 30                         | 259                          | ± 7.2                | ± 69.44                       | 77             | ± 100               |
| P6CU-0509ZLF       | 5                   | 30                         | 256                          | ± 9                  | ± 55.55                       | 78             | ± 100               |
| P6CU-0512ZLF       | 5                   | 30                         | 256                          | ± 12                 | ± 41.67                       | 78             | ± 100               |
| P6CU-0515ZLF       | 5                   | 30                         | 250                          | ± 15                 | ± 33.33                       | 80             | ± 100               |
| P6CU-0518ZLF       | 5                   | 30                         | 253                          | ± 18                 | ± 27.77                       | 79             | ± 100               |
| P6CU-0524ZLF       | 5                   | 30                         | 250                          | ± 24                 | ± 20.83                       | 80             | ± 100               |
| P6CU-123R3ZLF      | 12                  | 20                         | 126                          | ± 3.3                | ± 151.5                       | 66             | ± 100               |
| P6CU-1205ZLF       | 12                  | 20                         | 111                          | ± 5                  | ± 100                         | 75             | ± 100               |
| P6CU-127R2ZLF      | 12                  | 20                         | 109                          | ± 7.2                | ± 69.44                       | 76             | ± 100               |
| P6CU-1209ZLF       | 12                  | 20                         | 109                          | ± 9                  | ± 55.55                       | 76             | ± 100               |
| P6CU-1212ZLF       | 12                  | 20                         | 106                          | ± 12                 | ± 41.67                       | 78             | ± 100               |
| P6CU-1215ZLF       | 12                  | 20                         | 104                          | ± 15                 | ± 33.33                       | 80             | ± 100               |
| P6CU-1218ZLF       | 12                  | 20                         | 104                          | ± 18                 | ± 27.77                       | 80             | ± 100               |
| P6CU-1224ZLF       | 12                  | 20                         | 109                          | ± 24                 | ± 20.83                       | 76             | ± 100               |
| P6CU-243R3ZLF      | 24                  | 10                         | 61                           | ± 3.3                | ± 151.5                       | 68             | ± 100               |
| P6CU-2405ZLF       | 24                  | 10                         | 56                           | ± 5                  | ± 100                         | 74             | ± 100               |
| P6CU-247R2ZLF      | 24                  | 10                         | 54                           | ± 7.2                | ± 69.44                       | 76             | ± 100               |
| P6CU-2409ZLF       | 24                  | 10                         | 54                           | ± 9                  | ± 55.55                       | 76             | ± 100               |
| P6CU-2412ZLF       | 24                  | 10                         | 53                           | ± 12                 | ± 41.67                       | 78             | ± 100               |
| P6CU-2415ZLF       | 24                  | 10                         | 53                           | ± 15                 | ± 33.33                       | 78             | ± 100               |
| P6CU-2418ZLF       | 24                  | 10                         | 53                           | ± 18                 | ± 27.77                       | 78             | ± 100               |
| P6CU-2424ZLF       | 24                  | 10                         | 53                           | ± 24                 | ± 20.83                       | 78             | ± 100               |
| P6CU-483R3ZLF      | 48                  | 6                          | 34                           | ± 3.3                | ± 151.5                       | 60             | ± 100               |
| P6CU-4805ZLF       | 48                  | 6                          | 30                           | ± 5                  | ± 100                         | 70             | ± 100               |
| P6CU-487R2ZLF      | 48                  | 6                          | 30                           | ± 7.2                | ± 69.44                       | 70             | ± 100               |
| P6CU-4809ZLF       | 48                  | 6                          | 29                           | ± 9                  | ± 55.55                       | 72             | ± 100               |
| P6CU-4812ZLF       | 48                  | 6                          | 28                           | ± 12                 | ± 41.67                       | 74             | ± 100               |
| P6CU-4815ZLF       | 48                  | 6                          | 28                           | ± 15                 | ± 33.33                       | 74             | ± 100               |
| P6CU-4818ZLF       | 48                  | 6                          | 29                           | ± 18                 | ± 27.77                       | 72             | ± 100               |
| P6CU-4824ZLF       | 48                  | 6                          | 30                           | ± 24                 | ± 20.83                       | 70             | ± 100               |

If you need other specifications, please enquire.

# Package / Pinning / Derating



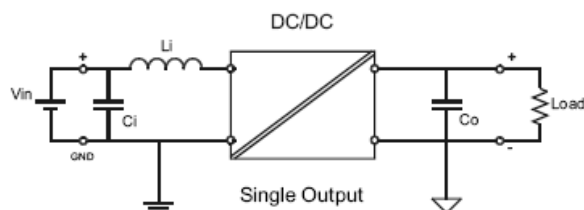
| PIN CONNECTIONS |         |         |
|-----------------|---------|---------|
| #               | SINGLE  | DUAL    |
| 1               | +Vin    | +Vin    |
| 2               | - Vin   | - Vin   |
| 4               | - Vout  | - Vout  |
| 5               | Omitted | Common  |
| 6               | +Vout   | +Vout   |
| 7               | Omitted | Omitted |

## App Notes:

<sup>1</sup> = Measured Input reflected ripple current with a simulated source inductance of 12uH.

<sup>2</sup> = Tested by minimal Vin and constant resistive load.

- Operation under no-load conditions will not damage these devices, but they will not observe the listed specifications.
- For reduce converter's ripple & noise, it is recommended to add a  $4.7\mu\text{F} \sim 100\mu\text{F}$  ( $\pm 4.7\mu\text{F} \sim \pm 68\mu\text{F}$  for dual output) capacitor in output end. For EMI performance improvement, it is recommended to add a  $12\mu\text{H}$  inductor and a  $10\mu\text{F} \sim 100\mu\text{F}$  capacitor in input end.



Radiated  
Emissions  
ESD  
RS

## EMC SPECIFICATIONS

EN 55022  
FCC 47CFR Part 15/A  
IEC 61000-4-2  
IEC 61000-4-3

CLASS B  
CLASS B  
Perf. Criteria B  
Perf. Criteria A