

**DESCRIPTION:** 1W 3KVDC Isolated Single & Dual Output DC/DC Converters

The PPV series are miniature, isolated 1W DC/DC converters in a SIP and DIP package. They offer the ideal solution in many space critical applications for board level power distribution. The Internal SMD construction makes it possible to offer a product with high performance at low cost. The series offers smaller size, improved efficiency and 3KVDC isolation.



### FEATURES

|                                    |   |   |
|------------------------------------|---|---|
| RoHS compliant, CE certification   | Efficiency to 80%   | Power density up to 0.85W/cm <sup>3</sup> |
| Single or dual output              | UL 94V-0 package material                                     | Power sharing on dual output              |
| Footprint from 1.17cm <sup>2</sup> | Industry standard pinout                                      | 3KVDC isolation (1 minute)                |
| Input voltage: 24V, 48V            | Output voltage: 3.3V, 5V, 9V, 12V, 15V / ±5V, ±9V, ±12V, ±15V | Operating temperature: -40°C to 105°C     |

### SELECTION GUIDE

| Part Number | Nominal Input Voltage | Output Voltage | Output Current(Max./Min) | Efficiency | Package Style |
|-------------|-----------------------|----------------|--------------------------|------------|---------------|
|             | V                     | V              | mA                       | %          |               |
| PPV2405DA   | 24                    | 5              | 200/20                   | 71         | DIP           |
| PPV2409DA   | 24                    | 9              | 111/11.1                 | 79         | DIP           |
| PPV2412DA   | 24                    | 12             | 84/8.4                   | 80         | DIP           |
| PPV2415DA   | 24                    | 15             | 67/6.7                   | 81         | DIP           |
| PPV2403SA   | 24                    | 3.3            | 303/30.3                 | 70         | SIP           |
| PPV2405SA   | 24                    | 5              | 200/20                   | 71         | SIP           |
| PPV2409SA   | 24                    | 9              | 111/11.1                 | 79         | SIP           |
| PPV2412SA   | 24                    | 12             | 84/8.4                   | 80         | SIP           |
| PPV2415SA   | 24                    | 15             | 67/6.7                   | 81         | SIP           |
| PPV2424SA   | 24                    | 24             | 42/4.2                   | 77         | SIP           |
| PPV4805DA   | 48                    | 5              | 200/20                   | 71         | DIP           |
| PPV4809DA   | 48                    | 9              | 111/11.1                 | 79         | DIP           |
| PPV4812DA   | 48                    | 12             | 84/8.4                   | 80         | DIP           |
| PPV4815DA   | 48                    | 15             | 67/6.7                   | 81         | DIP           |
| PPV4803SA   | 48                    | 3.3            | 303/30.3                 | 71         | SIP           |
| PPV4805SA   | 48                    | 5              | 200/20                   | 71         | SIP           |
| PPV4809SA   | 48                    | 9              | 111/11.1                 | 79         | SIP           |
| PPV4812SA   | 48                    | 12             | 84/8.4                   | 80         | SIP           |
| PPV4815SA   | 48                    | 15             | 67/6.7                   | 81         | SIP           |
| PPV2405D    | 24                    | ±5             | ±100/±10                 | 71         | DIP           |
| PPV2409D    | 24                    | ±9             | ±56/±5.6                 | 79         | DIP           |
| PPV2412D    | 24                    | ±12            | ±41/±4.1                 | 80         | DIP           |
| PPV2415D    | 24                    | ±15            | ±33/±3.3                 | 81         | DIP           |
| PPV2405S    | 24                    | ±5             | ±100/±10                 | 71         | SIP           |
| PPV2409S    | 24                    | ±9             | ±56/±5.6                 | 79         | SIP           |
| PPV2412S    | 24                    | ±12            | ±41/±4.1                 | 80         | SIP           |
| PPV2415S    | 24                    | ±15            | ±33/±3.3                 | 81         | SIP           |
| PPV4805D    | 48                    | ±5             | ±100/±10                 | 71         | DIP           |
| PPV4809D    | 48                    | ±9             | ±56/±5.6                 | 79         | DIP           |
| PPV4812D    | 48                    | ±12            | ±41/±4.1                 | 80         | DIP           |
| PPV4815D    | 48                    | ±15            | ±33/±3.3                 | 81         | DIP           |
| PPV4805S    | 48                    | ±5             | ±100/±10                 | 71         | SIP           |
| PPV4809S    | 48                    | ±9             | ±56/±5.6                 | 79         | SIP           |
| PPV4812S    | 48                    | ±12            | ±41/±4.1                 | 80         | SIP           |
| PPV4815S    | 48                    | ±15            | ±33/±3.3                 | 81         | SIP           |

Add suffix "P" for continuous short circuit protection, for example PPV2405SAP.

### INPUT CHARACTERISTICS

| Parameter     | Conditions         | Min. | Typ. | Max. | Units |
|---------------|--------------------|------|------|------|-------|
| Voltage range | 24V input variants | 22   | 24   | 26.5 | V     |
| Voltage range | 48V input variants | 43   | 48   | 53   | V     |

### ABSOLUTE MAXIMUM RATINGS

|   |          |
|---|----------|
| Short-circuit protection                        | 1 second |
| Lead temperature 1.5mm from case for 10 seconds | 300°C    |
| Input voltage $V_{in}$ , PPV24 variants         | 28V      |
| Input voltage $V_{in}$ , PPV48 variants         | 54V      |

### OUTPUT CHARACTERISTICS

| Parameter                  | Conditions  | Min. | Typ. | Max. | Units |
|----------------------------|---|------|------|------|-------|
| Rated Power                | $T_A = -40^\circ\text{C}$ to $85^\circ\text{C}$         |      |      | 1    | W     |
| Voltage Set Point Accuracy | See tolerance envelope                                  |      |      |      |       |
| Line regulation            | High $V_{IN}$ to low $V_{IN}$ (voltage variation +/-5%) |      |      | 1.32 | %/%   |
| Ripple & Noise             | 20MHz bandwidth   |      |      | 80   | mVp-p |

### ISOLATION CHARACTERISTICS

| Parameter              | Conditions                 | Min. | Typ. | Max. | Units     |
|------------------------|----------------------------|------|------|------|-----------|
| Isolation test voltage | Tested for 1 minute        | 3000 |      |      | VDC       |
| Resistance             | $V_{iso} = 1000\text{VDC}$ | 1    |      |      | $G\Omega$ |

### GENERAL CHARACTERISTICS

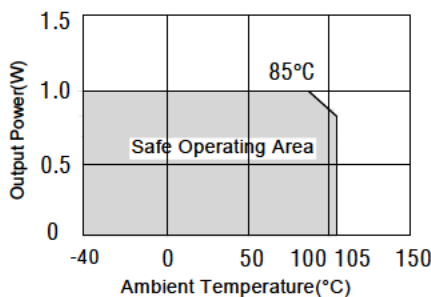
| Parameter           | Conditions         | Min. | Typ. | Max. | Units   |
|---------------------|--------------------|------|------|------|---------|
| Switching frequency | All input variants |      | 110  |      | kHz     |
| MTBF                | MIL-HDBK-217F@25°C |      | 3500 |      | K hours |

### TEMPERATURE CHARACTERISTICS

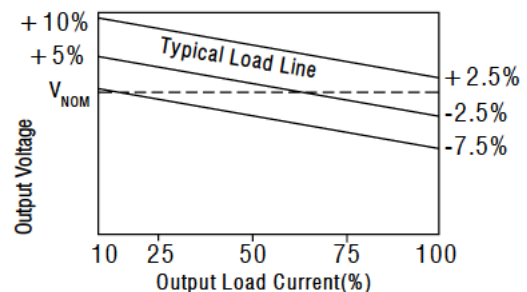
| Parameter     | Conditions  | Min. | Typ. | Max. | Units            |
|---------------|---|------|------|------|------------------|
| Specification | Derating if the temperature $\geq 85^\circ\text{C}$ | -40  |      | 105  | $^\circ\text{C}$ |
| Storage       |   | -55  |      | 130  | $^\circ\text{C}$ |
| Cooling       | Free air convection                                 |      |      |      |                  |

All specifications typical at  $T_A = 25^\circ\text{C}$ , nominal input voltage and rated output current unless otherwise specified.

### TEMPERATURE DERATING GRAPHS



### TOLERANCE ENVELOPES



### SOLDERING INFORMATION

This series is compatible with RoHS soldering systems with a peak wave solder temperature of  $300^\circ\text{C}$  for 10 seconds. Both SIP and DIP types in this series are backward compatible with Sn/Pb soldering systems.

| MECHANICAL DIMENSIONS   | PIN CONNECTIONS  |                      |  |            |  |     |          |   |      |   |    |   |       |   |    |    |       |    |      |           |  |     |          |   |      |   |      |   |       |   |    |   |       |                        |  |            |  |     |          |   |      |   |    |   |       |    |       |    |      |           |  |     |          |   |      |   |      |   |       |   |       |
|---|--|----------------------|--|------------|--|-----|----------|---|------|---|----|---|-------|---|----|----|-------|----|------|-----------|--|-----|----------|---|------|---|------|---|-------|---|----|---|-------|------------------------|--|------------|--|-----|----------|---|------|---|----|---|-------|----|-------|----|------|-----------|--|-----|----------|---|------|---|------|---|-------|---|-------|
| <p><b>DIP Package</b></p> <p><b>SIP Package</b></p> <p>Pin not fitted on single output variants. All dimensions in mm <math>\pm 0.25</math>mm.<br/> *7.70 for 48V variants                      **7.50 for 48V variants<br/> All pins on a 2.54mm pitch and within <math>\pm 0.25</math>mm of true position.<br/> Weight: 2.11g (DIP and SIP)</p> | <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr style="background-color: #cccccc;"> <th colspan="2">Dual output variants</th> </tr> <tr style="background-color: #cccccc;"> <th colspan="2">14 PIN DIP</th> </tr> <tr> <th>Pin</th> <th>Function</th> </tr> </thead> <tbody> <tr><td>1</td><td>-Vin</td></tr> <tr><td>7</td><td>NC</td></tr> <tr><td>8</td><td>+Vout</td></tr> <tr><td>9</td><td>0V</td></tr> <tr><td>10</td><td>-Vout</td></tr> <tr><td>14</td><td>+Vin</td></tr> </tbody> </table><br><table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr style="background-color: #cccccc;"> <th colspan="2">7 PIN SIP</th> </tr> <tr> <th>Pin</th> <th>Function</th> </tr> </thead> <tbody> <tr><td>1</td><td>+Vin</td></tr> <tr><td>2</td><td>-Vin</td></tr> <tr><td>5</td><td>-Vout</td></tr> <tr><td>6</td><td>0V</td></tr> <tr><td>7</td><td>+Vout</td></tr> </tbody> </table><br><table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr style="background-color: #cccccc;"> <th colspan="2">Single output variants</th> </tr> <tr style="background-color: #cccccc;"> <th colspan="2">14 PIN DIP</th> </tr> <tr> <th>Pin</th> <th>Function</th> </tr> </thead> <tbody> <tr><td>1</td><td>-Vin</td></tr> <tr><td>7</td><td>NC</td></tr> <tr><td>8</td><td>+Vout</td></tr> <tr><td>10</td><td>-Vout</td></tr> <tr><td>14</td><td>+Vin</td></tr> </tbody> </table><br><table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr style="background-color: #cccccc;"> <th colspan="2">7 PIN SIP</th> </tr> <tr> <th>Pin</th> <th>Function</th> </tr> </thead> <tbody> <tr><td>1</td><td>+Vin</td></tr> <tr><td>2</td><td>-Vin</td></tr> <tr><td>5</td><td>-Vout</td></tr> <tr><td>7</td><td>+Vout</td></tr> </tbody> </table> | Dual output variants |  | 14 PIN DIP |  | Pin | Function | 1 | -Vin | 7 | NC | 8 | +Vout | 9 | 0V | 10 | -Vout | 14 | +Vin | 7 PIN SIP |  | Pin | Function | 1 | +Vin | 2 | -Vin | 5 | -Vout | 6 | 0V | 7 | +Vout | Single output variants |  | 14 PIN DIP |  | Pin | Function | 1 | -Vin | 7 | NC | 8 | +Vout | 10 | -Vout | 14 | +Vin | 7 PIN SIP |  | Pin | Function | 1 | +Vin | 2 | -Vin | 5 | -Vout | 7 | +Vout |
| Dual output variants  |  |                      |  |            |  |     |          |   |      |   |    |   |       |   |    |    |       |    |      |           |  |     |          |   |      |   |      |   |       |   |    |   |       |                        |  |            |  |     |          |   |      |   |    |   |       |    |       |    |      |           |  |     |          |   |      |   |      |   |       |   |       |
| 14 PIN DIP  |  |                      |  |            |  |     |          |   |      |   |    |   |       |   |    |    |       |    |      |           |  |     |          |   |      |   |      |   |       |   |    |   |       |                        |  |            |  |     |          |   |      |   |    |   |       |    |       |    |      |           |  |     |          |   |      |   |      |   |       |   |       |
| Pin   | Function   |                      |  |            |  |     |          |   |      |   |    |   |       |   |    |    |       |    |      |           |  |     |          |   |      |   |      |   |       |   |    |   |       |                        |  |            |  |     |          |   |      |   |    |   |       |    |       |    |      |           |  |     |          |   |      |   |      |   |       |   |       |
| 1   | -Vin   |                      |  |            |  |     |          |   |      |   |    |   |       |   |    |    |       |    |      |           |  |     |          |   |      |   |      |   |       |   |    |   |       |                        |  |            |  |     |          |   |      |   |    |   |       |    |       |    |      |           |  |     |          |   |      |   |      |   |       |   |       |
| 7   | NC   |                      |  |            |  |     |          |   |      |   |    |   |       |   |    |    |       |    |      |           |  |     |          |   |      |   |      |   |       |   |    |   |       |                        |  |            |  |     |          |   |      |   |    |   |       |    |       |    |      |           |  |     |          |   |      |   |      |   |       |   |       |
| 8   | +Vout  |                      |  |            |  |     |          |   |      |   |    |   |       |   |    |    |       |    |      |           |  |     |          |   |      |   |      |   |       |   |    |   |       |                        |  |            |  |     |          |   |      |   |    |   |       |    |       |    |      |           |  |     |          |   |      |   |      |   |       |   |       |
| 9   | 0V   |                      |  |            |  |     |          |   |      |   |    |   |       |   |    |    |       |    |      |           |  |     |          |   |      |   |      |   |       |   |    |   |       |                        |  |            |  |     |          |   |      |   |    |   |       |    |       |    |      |           |  |     |          |   |      |   |      |   |       |   |       |
| 10  | -Vout  |                      |  |            |  |     |          |   |      |   |    |   |       |   |    |    |       |    |      |           |  |     |          |   |      |   |      |   |       |   |    |   |       |                        |  |            |  |     |          |   |      |   |    |   |       |    |       |    |      |           |  |     |          |   |      |   |      |   |       |   |       |
| 14  | +Vin   |                      |  |            |  |     |          |   |      |   |    |   |       |   |    |    |       |    |      |           |  |     |          |   |      |   |      |   |       |   |    |   |       |                        |  |            |  |     |          |   |      |   |    |   |       |    |       |    |      |           |  |     |          |   |      |   |      |   |       |   |       |
| 7 PIN SIP   |  |                      |  |            |  |     |          |   |      |   |    |   |       |   |    |    |       |    |      |           |  |     |          |   |      |   |      |   |       |   |    |   |       |                        |  |            |  |     |          |   |      |   |    |   |       |    |       |    |      |           |  |     |          |   |      |   |      |   |       |   |       |
| Pin   | Function   |                      |  |            |  |     |          |   |      |   |    |   |       |   |    |    |       |    |      |           |  |     |          |   |      |   |      |   |       |   |    |   |       |                        |  |            |  |     |          |   |      |   |    |   |       |    |       |    |      |           |  |     |          |   |      |   |      |   |       |   |       |
| 1   | +Vin   |                      |  |            |  |     |          |   |      |   |    |   |       |   |    |    |       |    |      |           |  |     |          |   |      |   |      |   |       |   |    |   |       |                        |  |            |  |     |          |   |      |   |    |   |       |    |       |    |      |           |  |     |          |   |      |   |      |   |       |   |       |
| 2   | -Vin   |                      |  |            |  |     |          |   |      |   |    |   |       |   |    |    |       |    |      |           |  |     |          |   |      |   |      |   |       |   |    |   |       |                        |  |            |  |     |          |   |      |   |    |   |       |    |       |    |      |           |  |     |          |   |      |   |      |   |       |   |       |
| 5   | -Vout  |                      |  |            |  |     |          |   |      |   |    |   |       |   |    |    |       |    |      |           |  |     |          |   |      |   |      |   |       |   |    |   |       |                        |  |            |  |     |          |   |      |   |    |   |       |    |       |    |      |           |  |     |          |   |      |   |      |   |       |   |       |
| 6   | 0V   |                      |  |            |  |     |          |   |      |   |    |   |       |   |    |    |       |    |      |           |  |     |          |   |      |   |      |   |       |   |    |   |       |                        |  |            |  |     |          |   |      |   |    |   |       |    |       |    |      |           |  |     |          |   |      |   |      |   |       |   |       |
| 7   | +Vout  |                      |  |            |  |     |          |   |      |   |    |   |       |   |    |    |       |    |      |           |  |     |          |   |      |   |      |   |       |   |    |   |       |                        |  |            |  |     |          |   |      |   |    |   |       |    |       |    |      |           |  |     |          |   |      |   |      |   |       |   |       |
| Single output variants  |  |                      |  |            |  |     |          |   |      |   |    |   |       |   |    |    |       |    |      |           |  |     |          |   |      |   |      |   |       |   |    |   |       |                        |  |            |  |     |          |   |      |   |    |   |       |    |       |    |      |           |  |     |          |   |      |   |      |   |       |   |       |
| 14 PIN DIP  |  |                      |  |            |  |     |          |   |      |   |    |   |       |   |    |    |       |    |      |           |  |     |          |   |      |   |      |   |       |   |    |   |       |                        |  |            |  |     |          |   |      |   |    |   |       |    |       |    |      |           |  |     |          |   |      |   |      |   |       |   |       |
| Pin   | Function   |                      |  |            |  |     |          |   |      |   |    |   |       |   |    |    |       |    |      |           |  |     |          |   |      |   |      |   |       |   |    |   |       |                        |  |            |  |     |          |   |      |   |    |   |       |    |       |    |      |           |  |     |          |   |      |   |      |   |       |   |       |
| 1   | -Vin   |                      |  |            |  |     |          |   |      |   |    |   |       |   |    |    |       |    |      |           |  |     |          |   |      |   |      |   |       |   |    |   |       |                        |  |            |  |     |          |   |      |   |    |   |       |    |       |    |      |           |  |     |          |   |      |   |      |   |       |   |       |
| 7   | NC   |                      |  |            |  |     |          |   |      |   |    |   |       |   |    |    |       |    |      |           |  |     |          |   |      |   |      |   |       |   |    |   |       |                        |  |            |  |     |          |   |      |   |    |   |       |    |       |    |      |           |  |     |          |   |      |   |      |   |       |   |       |
| 8   | +Vout  |                      |  |            |  |     |          |   |      |   |    |   |       |   |    |    |       |    |      |           |  |     |          |   |      |   |      |   |       |   |    |   |       |                        |  |            |  |     |          |   |      |   |    |   |       |    |       |    |      |           |  |     |          |   |      |   |      |   |       |   |       |
| 10  | -Vout  |                      |  |            |  |     |          |   |      |   |    |   |       |   |    |    |       |    |      |           |  |     |          |   |      |   |      |   |       |   |    |   |       |                        |  |            |  |     |          |   |      |   |    |   |       |    |       |    |      |           |  |     |          |   |      |   |      |   |       |   |       |
| 14  | +Vin   |                      |  |            |  |     |          |   |      |   |    |   |       |   |    |    |       |    |      |           |  |     |          |   |      |   |      |   |       |   |    |   |       |                        |  |            |  |     |          |   |      |   |    |   |       |    |       |    |      |           |  |     |          |   |      |   |      |   |       |   |       |
| 7 PIN SIP   |  |                      |  |            |  |     |          |   |      |   |    |   |       |   |    |    |       |    |      |           |  |     |          |   |      |   |      |   |       |   |    |   |       |                        |  |            |  |     |          |   |      |   |    |   |       |    |       |    |      |           |  |     |          |   |      |   |      |   |       |   |       |
| Pin   | Function   |                      |  |            |  |     |          |   |      |   |    |   |       |   |    |    |       |    |      |           |  |     |          |   |      |   |      |   |       |   |    |   |       |                        |  |            |  |     |          |   |      |   |    |   |       |    |       |    |      |           |  |     |          |   |      |   |      |   |       |   |       |
| 1   | +Vin   |                      |  |            |  |     |          |   |      |   |    |   |       |   |    |    |       |    |      |           |  |     |          |   |      |   |      |   |       |   |    |   |       |                        |  |            |  |     |          |   |      |   |    |   |       |    |       |    |      |           |  |     |          |   |      |   |      |   |       |   |       |
| 2   | -Vin   |                      |  |            |  |     |          |   |      |   |    |   |       |   |    |    |       |    |      |           |  |     |          |   |      |   |      |   |       |   |    |   |       |                        |  |            |  |     |          |   |      |   |    |   |       |    |       |    |      |           |  |     |          |   |      |   |      |   |       |   |       |
| 5   | -Vout  |                      |  |            |  |     |          |   |      |   |    |   |       |   |    |    |       |    |      |           |  |     |          |   |      |   |      |   |       |   |    |   |       |                        |  |            |  |     |          |   |      |   |    |   |       |    |       |    |      |           |  |     |          |   |      |   |      |   |       |   |       |
| 7   | +Vout  |                      |  |            |  |     |          |   |      |   |    |   |       |   |    |    |       |    |      |           |  |     |          |   |      |   |      |   |       |   |    |   |       |                        |  |            |  |     |          |   |      |   |    |   |       |    |       |    |      |           |  |     |          |   |      |   |      |   |       |   |       |

| RECOMMENDED FOOTPRINT DETAILS  |   |
|--|---|
| <p><b>14Pin DIP Package</b></p> <p><math>\varnothing 1.15</math> 6 HOLES<br/><math>\varnothing 1.00</math></p> | <p><b>7Pin SIP Package</b></p> <p><math>\varnothing 1.15</math> 5 HOLES<br/><math>\varnothing 1.00</math></p> |

| TUBE OUTLINE DIMENSIONS  |                             |
|--|-----------------------------|
| <p><b>14Pin DIP Tube</b></p>   | <p><b>7Pin SIP Tube</b></p> |
| <p>Unless otherwise stated all dimensions in mm <math>\pm 0.5</math>mm.</p> <p>Tube length (14 Pin DIP) : 520mm <math>\pm 2</math>mm.</p> <p>Tube length (7 Pin DIP) : 520mm <math>\pm 2</math>mm.</p> <p style="text-align: right;">Tube Quantity : 25PCS</p> |                             |