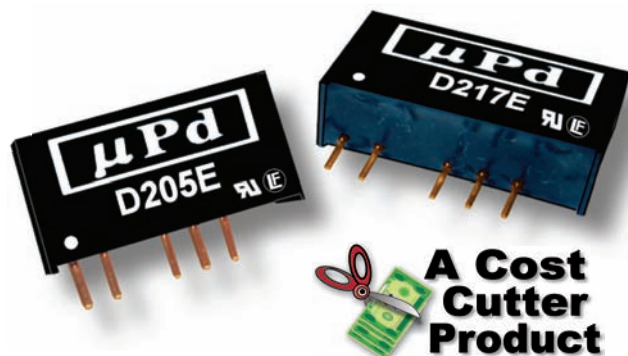


# D200E Series

## Low Cost, 2W SIP Single & Dual Output DC/DC Converters



### Key Features:

- 2W Output Power
- Miniature SIP Case
- UL Approved (File E245422)
- Single & Dual Outputs
- 1,000 VDC Isolation
- >3.5 MHour MTBF
- 24 Standard Models
- **LOWEST COST!!**



**RoHS Compliant**



### MicroPower Direct

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### Electrical Specifications

Specifications typical @ +25°C, nominal input voltage & rated output current, unless otherwise noted. Specifications subject to change without notice.

#### Input

| Parameter                      | Conditions         | Min. | Typ. | Max. | Units |
|--------------------------------|--------------------|------|------|------|-------|
| Input Voltage Range            | 5 VDC Input        | 4.5  | 5.0  | 5.5  | VDC   |
|                                | 12 VDC Input       | 10.8 | 12.0 | 13.2 |       |
|                                | 24 VDC Input       | 21.6 | 24.0 | 26.4 |       |
| Input Filter                   | Internal Capacitor |      |      |      |       |
| Reverse Polarity Input Current |                    |      |      | 0.3  | A     |

#### Output

| Parameter               | Conditions                   | Min. | Typ.  | Max.  | Units    |
|-------------------------|------------------------------|------|-------|-------|----------|
| Output Voltage Accuracy |                              |      | ±1.0  | ±3.0  | %        |
| Output Voltage Balance  | Dual Output , Balanced Loads |      | ±0.1  | ±1.0  | %        |
| Line Regulation         | For Vin Change of 1%         |      | ±1.2  |       | %        |
| Load Regulation         | See Model Selection Guide    |      |       |       |          |
| Ripple & Noise (20 MHz) |                              |      | 100   | 150   | mV P - P |
| Output Power Protection |                              | 120  |       |       | %        |
| Temperature Coefficient |                              |      | ±0.02 | ±0.03 | %/°C     |
| Output Short Circuit    | Momentary (1.0 Sec.)         |      |       |       |          |

#### General

| Parameter             | Conditions  | Min.  | Typ. | Max. | Units |
|-----------------------|-------------|-------|------|------|-------|
| Isolation Voltage     | 60 Seconds  | 1,000 |      |      | VDC   |
| Isolation Resistance  | 500 VDC     | 1,000 |      |      | MΩ    |
| Isolation Capacitance | 100 kHz, 1V |       | 60   |      | pF    |
| Switching Frequency   |             |       | 75   |      | kHz   |

#### Environmental

| Parameter                   | Conditions          | Min. | Typ. | Max. | Units |
|-----------------------------|---------------------|------|------|------|-------|
| Operating Temperature Range | Ambient             | -40  | +25  | +85  | °C    |
| Storage Temperature Range   |                     | -55  |      | +125 | °C    |
| Cooling                     | Free Air Convection |      |      |      |       |
| Humidity                    | RH, Non-condensing  |      |      | 95   | %     |

#### Physical

|                                       |                                                  |
|---------------------------------------|--------------------------------------------------|
| Case Size (5V 12V & 24V Input Models) | 0.77 x 0.28 x 0.40 Inches (19.6 x 7.0 x 10.2 mm) |
| Case Material                         | Non-Conductive Black Plastic (UL94-V0)           |
| Weight                                | 0.07 Oz (2.1g)                                   |

#### Reliability Specifications

| Parameter        | Conditions                      | Min. | Typ. | Max. | Units  |
|------------------|---------------------------------|------|------|------|--------|
| MTBF             | MIL HDBK 217F, 25°C, Gnd Benign | 3.5  |      |      | MHours |
| Safety Standards | UL 1950, EN 60950, IEC 60950    |      |      |      |        |
| Safety Approvals | UL, cUL; File No. E245422       |      |      |      |        |

#### Absolute Maximum Ratings

| Parameter                   | Conditions                  | Min. | Typ. | Max. | Units |
|-----------------------------|-----------------------------|------|------|------|-------|
| Input Voltage Surge (1 Sec) | 5 VDC Input                 | -0.7 |      | 9.0  | VDC   |
|                             | 12 VDC Input                | -0.7 |      | 18.0 |       |
|                             | 24 VDC Input                | -0.7 |      | 30.0 |       |
| Lead Temperature            | 1.5 mm From Case For 10 Sec |      |      | 300  | °C    |
| Internal Power Dissipation  | All Models                  |      |      | 450  | mW    |

**Caution:** Exceeding Absolute Maximum Ratings may damage the module. These are not continuous operating ratings.

## Model Selection Guide

| Model Number | Input         |             |              |         | Output           |                      |                      | Load Regulation<br>(%, Max) | Efficiency<br>(%, Typ) | Fuse Rating<br>Slow-Blow<br>(mA) |
|--------------|---------------|-------------|--------------|---------|------------------|----------------------|----------------------|-----------------------------|------------------------|----------------------------------|
|              | Voltage (VDC) |             | Current (mA) |         | Voltage<br>(VDC) | Current<br>(mA, Max) | Current<br>(mA, Min) |                             |                        |                                  |
|              | Nominal       | Range       | Full-Load    | No-Load |                  |                      |                      |                             |                        |                                  |
| D201E        | 5             | 4.5 - 5.5   | 494          | 30      | 5.0              | 400.0                | 40.0                 | 15                          | 81                     | 1,000                            |
| D202E        | 5             | 4.5 - 5.5   | 488          | 30      | 9.0              | 222.0                | 23.0                 | 15                          | 82                     | 1,000                            |
| D203E        | 5             | 4.5 - 5.5   | 476          | 30      | 12.0             | 167.0                | 17.0                 | 15                          | 84                     | 1,000                            |
| D204E        | 5             | 4.5 - 5.5   | 476          | 30      | 15.0             | 133.0                | 14.0                 | 15                          | 84                     | 1,000                            |
| D205E        | 5             | 4.5 - 5.5   | 488          | 30      | ±5.0             | ±200.0               | ±20.0                | 15                          | 82                     | 1,000                            |
| D206E        | 5             | 4.5 - 5.5   | 482          | 30      | ±9.0             | ±111.0               | ±12.0                | 15                          | 83                     | 1,000                            |
| D207E        | 5             | 4.5 - 5.5   | 470          | 30      | ±12.0            | ±83.0                | ±9.0                 | 15                          | 85                     | 1,000                            |
| D208E        | 5             | 4.5 - 5.5   | 470          | 30      | ±15.0            | ±67.0                | ±7.0                 | 15                          | 85                     | 1,000                            |
| D211E        | 12            | 10.8 - 13.2 | 203          | 15      | 5.0              | 400.0                | 40.0                 | 15                          | 82                     | 500                              |
| D212E        | 12            | 10.8 - 13.2 | 201          | 15      | 9.0              | 222.0                | 23.0                 | 15                          | 83                     | 500                              |
| D213E        | 12            | 10.8 - 13.2 | 196          | 15      | 12.0             | 167.0                | 17.0                 | 15                          | 85                     | 500                              |
| D214E        | 12            | 10.8 - 13.2 | 196          | 15      | 15.0             | 133.0                | 14.0                 | 15                          | 85                     | 500                              |
| D215E        | 12            | 10.8 - 13.2 | 201          | 15      | ±5.0             | ±200.0               | ±20.0                | 15                          | 83                     | 500                              |
| D216E        | 12            | 10.8 - 13.2 | 198          | 15      | ±9.0             | ±111.0               | ±12.0                | 15                          | 84                     | 500                              |
| D217E        | 12            | 10.8 - 13.2 | 194          | 15      | ±12.0            | ±83.0                | ±9.0                 | 15                          | 86                     | 500                              |
| D218E        | 12            | 10.8 - 13.2 | 194          | 15      | ±15.0            | ±67.0                | ±7.0                 | 15                          | 86                     | 500                              |
| D221E        | 24            | 21.6 - 26.4 | 100          | 8       | 5.0              | 400.0                | 40.0                 | 15                          | 83                     | 200                              |
| D222E        | 24            | 21.6 - 26.4 | 99           | 8       | 9.0              | 222.0                | 23.0                 | 15                          | 84                     | 200                              |
| D223E        | 24            | 21.6 - 26.4 | 97           | 8       | 12.0             | 167.0                | 17.0                 | 15                          | 86                     | 200                              |
| D224E        | 24            | 21.6 - 26.4 | 97           | 8       | 15.0             | 133.0                | 14.0                 | 15                          | 86                     | 200                              |
| D225E        | 24            | 21.6 - 26.4 | 99           | 8       | ±5.0             | ±200.0               | ±20.0                | 15                          | 84                     | 200                              |
| D226E        | 24            | 21.6 - 26.4 | 98           | 8       | ±9.0             | ±111.0               | ±12.0                | 15                          | 85                     | 200                              |
| D227E        | 24            | 21.6 - 26.4 | 96           | 8       | ±12.0            | ±83.0                | ±9.0                 | 15                          | 87                     | 200                              |
| D228E        | 24            | 21.6 - 26.4 | 96           | 8       | ±15.0            | ±67.0                | ±7.0                 | 15                          | 87                     | 200                              |

### Notes:

- Output load regulation is specified for a load change of 10% to 100%.
- These units should not be operated with a load under 10% of full load. Operation at no-load may cause damage to the unit.
- These converters will operate without external components. However, when measuring output ripple, it is recommended that an external ceramic capacitor be placed from the +Vout pin to the -Vout pin for single output units and from each output to common for dual output units. An input capacitor will enhance stability over temperature and input line variations. Recommended capacitor values are given in the table below. For applications requiring very low output noise levels, a simple LC filter should be effective.

| Vin    | Input Capacitor | Vout   | Output Capacitor |              |
|--------|-----------------|--------|------------------|--------------|
|        |                 |        | Single           | Dual         |
| 5 VDC  | 4.7 $\mu$ F     | 5 VDC  | 10.0 $\mu$ F     | 4.7 $\mu$ F  |
| 12 VDC | 2.2 $\mu$ F     | 9 VDC  | 4.7 $\mu$ F      | 2.2 $\mu$ F  |
| 24 VDC | 1.0 $\mu$ F     | 12 VDC | 2.2 $\mu$ F      | 1.0 $\mu$ F  |
|        |                 | 15 VDC | 1.0 $\mu$ F      | 0.47 $\mu$ F |

- Dual output units may be connected to provide a 10V, 18V, 24V or 30 VDC output. To do this, connect the load across the positive (+Vout) and negative (-Vout) outputs and float the output common.
- It is recommended that a fuse be used on the input of a power supply for protection. See the Model Selection table above for the correct rating.

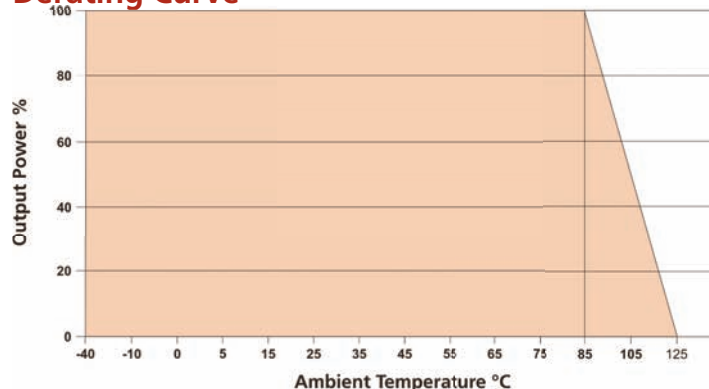
### Pin Connections

| Pin | Single | Dual  | Pin | Single | Dual   |
|-----|--------|-------|-----|--------|--------|
| 1   | +Vin   | +Vin  | 5   | No Pin | Common |
| 2   | -Vin   | -Vin  | 6   | +Vout  | +Vout  |
| 4   | -Vout  | -Vout |     |        |        |

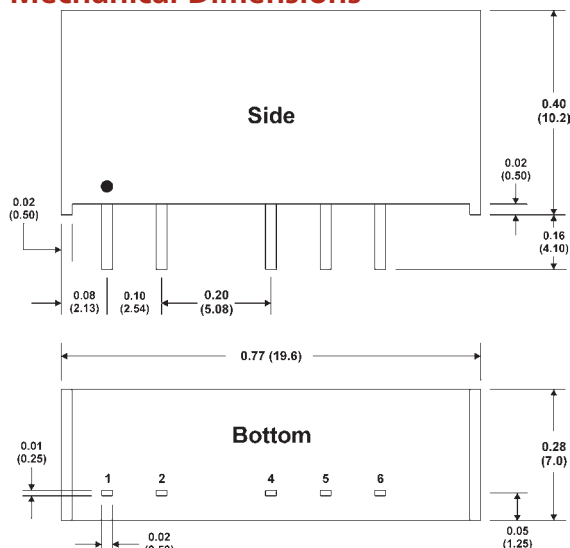
### Notes:

- All dimensions are typical in inches (mm)
- Tolerance x.xx =  $\pm 0.01$  ( $\pm 0.25$ )
- Pin 1 is marked by a "dot" or indentation on the side of the unit

### Derating Curve



### Mechanical Dimensions



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