EN 60601 Approved
4:1 Input, 3W DIP,
DC/DC Converters

Key Features:
• EN 60601 3RD Ed. Approved
• 3W Output Power
• 4.0 kVrms Isolation
• Reinforced Insulation
• 1 x MOPP & 2xMOOP per
EN 60601-1 3RD Edition &
ANSI/AAMI ES 60601-1
• 2 µA Leakage Current Max
• Wide 4:1 Input Range
• Compact 24 Pin DIP Case
• 110 VDC Input Models
• 1.0 MH MTBF

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 Start Voltage | 24 VDC Input | 8.0 | 8.5 | 9.0 | VDC
| 48 VDC Input | 13.0 | 15.0 | 17.0 |
| 110 VDC Input | 26.0 | 30.0 | 34.0 |
| 24 VDC Input | | | 8.5 |
| 48 VDC Input | | | 16.0 |
| 110 VDC Input | | | 32.0 |
Under Voltage Shutdown | π (Pi) Filter | | 2.000 | mW |
Input Filter
Short Circuit Input Power
Output Parameter | Conditions | Min. | Typ. | Max. | Units
---|---|---|---|---|---
Output Voltage Accuracy | Dual Output, Balanced Loads | ±0.5 | ±2.0 |
| Min to Max | ±0.3 | ±0.5 |
Load Regulation | Iout = 25% to 100% | ±0.5 | ±1.0 |
Ripple & Noise (20 MHz), See Note 2 | 5V Output Models | 75 | 100 | mV P-P |
| All Other Models | 100 | 150 |
Output Power Protection | 120 | 150 |
Transient Recovery Time, See Note 3 | 25% Load Step Change | 150 | 500 | µSec |
Transient Response Deviation | ±3.0 | ±6.0 |
Temperature Coefficient | ±0.02 | ±0.05 |
Output Short Circuit | Continuous (Autorecovery) |
General Parameter | Conditions | Min. | Typ. | Max. | Units
---|---|---|---|---|---
Isolation Voltage | 60 Seconds | 4,000 | Vrms |
Reinforced Insulation Working Voltage | 1,000 | Vrms |
Leakage Current | 240 VAC, 60 Hz | 2 | µA |
Isoalation Resistance | 500 VDC | 10 | GΩ |
Isolation Capacitance | 100 kHz, 1V | 7 | 13 | pF |
Switching Frequency | 150 | kHz |
EMI Characteristics Parameter | Standard Criteria Level
---|---|---
EMC | Complies With EN 55011 4TH Edition |
EMS | Complies With EN 60601-1-2 |
Environmental Parameter | Conditions | Min. | Typ. | Max. | Units
---|---|---|---|---|---
Operating Temperature Range | Ambient | -40 | +25 | +85 | °C |
| Case | | | +100 |
Storage Temperature Range | | | -50 | +125 |
Cooling | Free Air Convection |
Humidity | RH, Non-condensing | 95 |
Physical Parameter | Case Size | See Mechanical Diagram (Page 3) |
| Case Material | Non-Conductive Black Plastic (UL94-V0) |
| Weight | 0.58 Oz (16.6g) |
Reliability Specifications Parameter | Conditions | Min. | Typ. | Max. | Units
---|---|---|---|---|---
MTBF | MIL HDBK 217F, 25°C, Grd Benign | 1.0 | MHours |
Safety Standards | ANSI/AAMI ES 60601-1 1xMOPP & 2xMOOP Recognition (UL Certificate) |
| ANSI/AAMI ES 60601-1, CAN/CSA-C22.2 No.60601-1 |
Absolute Maximum Ratings Parameter | Conditions | Min. | Typ. | Max. | Units
---|---|---|---|---|---
Input Voltage Surge (1.0 Sec) | 24 VDC Input | 50.0 | VDC |
| 48 VDC Input | 100.0 |
| 110 VDC Input | 180.0 |
Lead Temperature | 1.5 mm From Case For 10 Sec | 260 | °C |

Caution: Exceeding Absolute Maximum Ratings may damage the module. These are not continuous operating ratings.
<table>
<thead>
<tr>
<th>Model Number</th>
<th>Input</th>
<th>Output</th>
<th>Efficiency (%)</th>
<th>Capacitive Load (µF Max)</th>
<th>Fuse Rating Slow-Blow (mA)</th>
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<td>Current (mA)</td>
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<td>Current (mA, Max)</td>
<td>Current (mA, Min)</td>
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<td>No-Load</td>
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<td>9.0 - 40.0</td>
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Notes:
1. The specified maximum capacitive load is for each output.
2. When measuring output ripple, it is recommended that an external 0.47 µF 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.
3. Transient recovery is measured to within a 1% error band for a load step change of 75% to 100%.
4. Dual output units may be connected to provide a 24 VDC or 30 VDC output. To do this, connect the load across the positive (+VOUT) and negative (-VOUT) outputs and float the output common.
5. The converter should be connected to a low ac-impedance source. An input source with a highly inductive impedance may affect the stability of the converter. In applications where the converter output loading is high and input power is supplied over long lines, it may be necessary to use a capacitor on the input to ensure start-up. The size of the recommended capacitor is given below.
6. It is recommended that a fuse be used on the input of a power supply for protection. See the table above for the correct rating.

Typical Connection/ Single Output

Typical Connection/ Dual Output

These converters are specified for operation without external components. However, in some applications the addition of input/output capacitors, as shown in the typical connection diagram above, will enhance stability and reduce output ripple. This simple connection includes a low ESR (<1 Ω at 100 kHz) capacitor connected across the input (C1). It is recommended that a 4.7 µF be used for 24V input models, a 2.2 µF for 48V models and 1.0 µF for 100V input units. To improve the output ripple performance, a 3.3 µF is connected across the output. For dual output units, a 3.3 µF capacitor should be connected from each output to common.
Medical Approved Power Products

Thousands of standard power products ranging from 0.5W to 500W are available from MPD in a wide variety of packages and pin-outs. This includes many more DC/DC and AC/DC product families with EN 60601 medical approval. Go to micropowerdirect.com for full information.