

# DM03S/D Series

## 3W DC/DC CONVERTER, DIP-Package , High Isolation



### FEATURES

- Efficiency up to 84%
- MTBF > 1M Hours
- Reinforced Insulation rated for 300VAC Working Voltage
- UL/EN60601-1&EN60950-1 Safety Approval
- Operating Temperature Range -40°C to +85 °C
- High Isolation Voltage 4000VACrms
- Wide 2:1 Input Range
- Complies with EN5022 Class A
- Overload Protection
- Low Leakage Current
- 3 Years Product Warranty

The DM03S/D series are miniature, DIP Package, isolated 3W DC/DC converters with 4,000VACrms isolation. It offers short circuit protection and allows a wide operating temperature range of -40°C to +85°C. These isolated DC/DC converters are the latest offering from a world leader in power systems technology and manufacturing — Delta Electronics, Inc. With creative design technology and optimization of component placement, these converters possess outstanding electrical and thermal performance, as well as extremely high reliability under highly stressful operating conditions..

### Model List

| Model Number | Input Voltage (Range)<br>VDC | Output Voltage<br>VDC | Output Current |            | Input Current          |                      | Reflected Ripple Current<br>mA (typ.) | Max. capacitive Load<br>uF | Efficiency (typ.)<br>@Max. Load % |
|--------------|------------------------------|-----------------------|----------------|------------|------------------------|----------------------|---------------------------------------|----------------------------|-----------------------------------|
|              |                              |                       | Max.<br>mA     | Min.<br>mA | @Max. Load<br>mA(typ.) | @No Load<br>mA(typ.) |                                       |                            |                                   |
| DM03S0505A   | 5<br>(4.5 ~ 9)               | 5                     | 600            | 90         | 857                    | 40                   | 60                                    | 1000                       | 70                                |
| DM03S0512A   |                              | 12                    | 250            | 37.5       | 800                    |                      |                                       | 470                        | 75                                |
| DM03S0524A   |                              | 24                    | 125            | 18.8       | 800                    |                      |                                       | 470                        | 76                                |
| DM03D0512A   |                              | ±12                   | ±125           | ±18.8      | 800                    |                      |                                       | 220*                       | 75                                |
| DM03D0515A   |                              | ±15                   | ±100           | ±15        | 800                    |                      |                                       | 220*                       | 75                                |
| DM03S1205A   | 12<br>(9 ~ 18)               | 5                     | 600            | 90         | 338                    | 30                   | 30                                    | 1000                       | 74                                |
| DM03S1212A   |                              | 12                    | 250            | 37.5       | 313                    |                      |                                       | 470                        | 80                                |
| DM03S1224A   |                              | 24                    | 125            | 18.8       | 313                    |                      |                                       | 470                        | 81                                |
| DM03D1212A   |                              | ±12                   | ±125           | ±18.8      | 313                    |                      |                                       | 220*                       | 80                                |
| DM03D1215A   |                              | ±15                   | ±100           | ±15        | 313                    |                      |                                       | 220*                       | 80                                |
| DM03S2405A   | 24<br>(18 ~ 36)              | 5                     | 600            | 90         | 160                    | 20                   | 15                                    | 1000                       | 78                                |
| DM03S2412A   |                              | 12                    | 250            | 37.5       | 151                    |                      |                                       | 470                        | 83                                |
| DM03S2424A   |                              | 24                    | 125            | 18.8       | 151                    |                      |                                       | 470                        | 84                                |
| DM03D2412A   |                              | ±12                   | ±125           | ±18.8      | 151                    |                      |                                       | 220*                       | 83                                |
| DM03D2415A   |                              | ±15                   | ±100           | ±15        | 151                    |                      |                                       | 220*                       | 83                                |
| DM03S4805A   | 48<br>(36 ~ 75)              | 5                     | 600            | 90         | 80                     | 10                   | 10                                    | 1000                       | 78                                |
| DM03S4812A   |                              | 12                    | 250            | 37.5       | 75                     |                      |                                       | 470                        | 83                                |
| DM03S4824A   |                              | 24                    | 125            | 18.8       | 75                     |                      |                                       | 470                        | 84                                |
| DM03D4812A   |                              | ±12                   | ±125           | ±18.8      | 75                     |                      |                                       | 220*                       | 83                                |
| DM03D4815A   |                              | ±15                   | ±100           | ±15        | 75                     |                      |                                       | 220*                       | 83                                |

\* For each output

## Input Characteristics

| Parameter                         | Model            | Min.                                                     | Typ. | Max. | Unit |
|-----------------------------------|------------------|----------------------------------------------------------|------|------|------|
| Input Surge Voltage (1 sec. max.) | 5V Input Models  | -0.7                                                     | ---  | 11   | VDC  |
|                                   | 12V Input Models | -0.7                                                     | ---  | 25   |      |
|                                   | 24V Input Models | -0.7                                                     | ---  | 50   |      |
|                                   | 48V Input Models | -0.7                                                     | ---  | 100  |      |
| Start-Up Voltage                  | 5V Input Models  | 3.7                                                      | 4    | 4.5  |      |
|                                   | 12V Input Models | 8                                                        | 8.5  | 9    |      |
|                                   | 24V Input Models | 15                                                       | 17   | 18   |      |
|                                   | 48V Input Models | 30                                                       | 33   | 36   |      |
| Under Voltage Shutdown            | 5V Input Models  | ---                                                      | ---  | 4    |      |
|                                   | 12V Input Models | ---                                                      | ---  | 8.5  |      |
|                                   | 24V Input Models | ---                                                      | ---  | 17   |      |
|                                   | 48V Input Models | ---                                                      | ---  | 34   |      |
| Reverse Polarity Input Current    | All Models       | ---                                                      | ---  | 0.3  | A    |
| Short Circuit Input Power         |                  | ---                                                      | ---  | 2000 | mW   |
| Internal Power Dissipation        |                  | ---                                                      | ---  | 2500 | mW   |
| Conducted EMI                     |                  | Compliance to EN 55022, class A and FCC part 15, class A |      |      |      |

## Output Characteristics

| Parameter                    | Conditions                  | Min. | Typ.  | Max.  | Unit              |
|------------------------------|-----------------------------|------|-------|-------|-------------------|
| Output Voltage Accuracy      |                             | ---  | ±0.5  | ±1.0  | %                 |
| Output Voltage Balance       | Dual Output, Balanced Loads | ---  | ±0.5  | ±2.0  | %                 |
| Line Regulation              | Vin=Min. to Max.            | ---  | ±0.3  | ±0.5  | %                 |
| Load Regulation              | Io=25% to 100%              | ---  | ±0.5  | ±1.0  | %                 |
| Ripple & Noise (20MHz)       | 5V Output Models            | ---  | 75    | 100   | mV <sub>P-P</sub> |
|                              | Other Output Models         | ---  | 100   | 150   | mV <sub>P-P</sub> |
| Ripple & Noise (20MHz)       | Over Line, Load & Temp.     | ---  | ---   | 180   | mV <sub>P-P</sub> |
| Ripple & Noise (20MHz)       |                             | ---  | ---   | 15    | mV rms            |
| Transient Recovery Time      | 25% Load Step Change        | ---  | 150   | 500   | μs                |
| Transient Response Deviation |                             | ---  | ±3    | ±6    | %                 |
| Temperature Coefficient      |                             |      | ±0.02 | ±0.05 | %/°C              |
| Over Load Protection         | Foldback                    | 120  | 150   | ---   | %                 |
| Short Circuit Protection     | Continuous                  |      |       |       |                   |

## Isolation, Safety Approvals

| Parameter                     | Conditions                                       | Min. | Typ. | Max. | Unit            |
|-------------------------------|--------------------------------------------------|------|------|------|-----------------|
| I/O Isolation Voltage (rated) | 60 Seconds                                       | 4000 | ---  | ---  | VACrms          |
| I/O Isolation Test Voltage    | Flash tested for 1 Second                        | 6000 | ---  | ---  | V <sub>PK</sub> |
| Leakage Current               | 240VAC, 60Hz                                     | ---  | ---  | 2    | μA              |
| I/O Isolation Resistance      | 500 VDC                                          | 10   | ---  | ---  | GΩ              |
| I/O Isolation Capacitance     | 100KHz, 1V                                       | ---  | 7    | 13   | pF              |
| Safety Standards              | cUL/UL60950-1, CSA C22.2 No. 60950-1-03          |      |      |      |                 |
|                               | UL60601-1, CSA C22.2 No.601-1                    |      |      |      |                 |
|                               | IEC/EN 60950-1, IEC/EN 60601-1                   |      |      |      |                 |
| Safety Approvals              | IEC60950-1 CB report, cUL/UL 60950-1 certificate |      |      |      |                 |
|                               | UL60601-1 UL certificate                         |      |      |      |                 |

## General Characteristics

| Parameter           | Conditions                        | Min.      | Typ. | Max. | Unit  |
|---------------------|-----------------------------------|-----------|------|------|-------|
| Switching Frequency |                                   | ---       | 150  | ---  | KHz   |
| MTBF(calculated)    | MIL-HDBK-217F@25°C, Ground Benign | 1,000,000 | ---  | ---  | Hours |

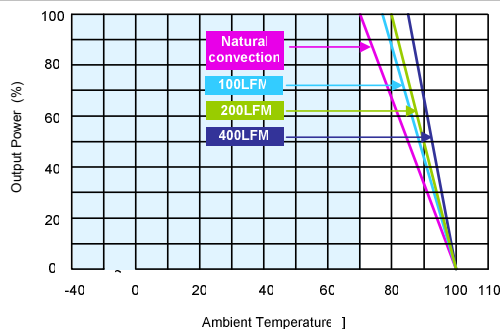
## Recommended Input Fuse

| 5V Input Models       | 12V Input Models      | 24V Input Models     | 48V Input Models     |
|-----------------------|-----------------------|----------------------|----------------------|
| 2000mA Slow-Blow Type | 1000mA Slow-Blow Type | 500mA Slow-Blow Type | 250mA Slow-Blow Type |

## Environmental Specifications

| Parameter                                     | Conditions          | Min. | Max. | Unit     |
|-----------------------------------------------|---------------------|------|------|----------|
| Operating Temperature Range (with Derating)   | Ambient             | -40  | +85  | °C       |
| Case Temperature                              |                     | ---  | +95  | °C       |
| Storage Temperature Range                     |                     | -50  | +125 | °C       |
| Humidity (non condensing)                     |                     | ---  | 95   | % rel. H |
| Cooling                                       | Free-Air convection |      |      |          |
| Lead Temperature (1.5mm from case for 10Sec.) |                     | ---  | 260  | °C       |

## Power Derating Curve



## Notes

- 1 Specifications typical at  $T_a = +25^{\circ}\text{C}$ , resistive load, nominal input voltage and rated output current unless otherwise noted.
- 2 Transient recovery time is measured to within 1% error band for a step change in output load of 75% to 100%.
- 3 Ripple & Noise measurement bandwidth is 0-20 MHz.
- 4 These power converters require a minimum output loading to maintain specified regulation, operation under no-load conditions will not damage these modules; however, they may not meet all specifications listed.
- 5 All DC/DC converters should be externally fused at the front end for protection.
- 6 Specifications subject to change without notice.

## Mechanical Drawing

Mechanical Dimensions

The figure shows two views of a rectangular electronic component. The top view is a simple rectangle with dimensions 31.8 mm [1.25] in width and 20.3 mm [0.80] in height. The bottom view shows the pin layout. Pin 1 is at the top-left corner. Pins 11 and 12 are at the top-right corner. Pins 24, 23, 15, and 13 are at the bottom edge. Dimensions for the bottom view include: 2.54 mm [0.10] from the left edge to pin 24; 20.32 mm [0.80] between pins 24 and 15; 5.08 mm [0.20] between pins 15 and 13; 2.0 mm [0.08] between pins 13 and 12; 2.54 mm [0.10] from pin 12 to the right edge; 15.22 mm [0.60] from the top edge to pin 13; and 2.0 mm [0.08] from the top edge to pin 12. A circular feature with a diameter of 0.60 mm [0.024] is located on the left side. A small rectangular feature with dimensions 0.2 mm [0.008] and 3.9 mm [0.15] is located on the right side.

Pin Connections

| Pin | Single Output | Dual Output |
|-----|---------------|-------------|
| 1   | +Vin          | +Vin        |
| 11  | No Pin        | Common      |
| 12  | -Vout         | No Pin      |
| 13  | +Vout         | -Vout       |
| 15  | No Pin        | +Vout       |
| 23  | -Vin          | -Vin        |
| 24  | -Vin          | -Vin        |

- ▶ All dimensions in mm (inches)
- ▶ Tolerance: X.X±0.25 (X.XX±0.01)  
X.XXX±0.13 (X.XXX±0.005)
- ▶ Pin diameter ⇔ 0.6 ±0.05 (0.024±0.002)

| Part Numbering System |               |       |                   |               |                |                    |
|-----------------------|---------------|-------|-------------------|---------------|----------------|--------------------|
| D                     | M             | 03    | S                 | 05            | 05             | A                  |
| Form factor           | Family series | Watt  | Number of Outputs | Input Voltage | Output Voltage | Option Code        |
| D-DIP                 | A~Z           | 01:1W | S - Single        | 03:3.3V       | 03:3.3V        | A - Std. Functions |
| P-SIP                 |               | 02:2W | D- Dual           | 05: 5V        | 05: 5V         |                    |
| S-SMD                 |               | 03:3W |                   | 12:12V        | 12:12V         |                    |
|                       |               | 04:4W |                   | 24: 24V       | 15: 15V        |                    |
|                       |               | 06:6W |                   | 48:48V        | 24: 24V        |                    |

## WARRANTY

Delta offers a three(3) years limited warranty. Complete warranty information is listed on our web site or is available upon request from Delta.

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