



### FEATURES

- Efficiency up to 81%
- DIP Package with Industry Standard Pinout
- Wide 2:1 Input Range
- Operating Temperature Range  $-40^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$
- Isolation Voltage 1500 VDC
- Short Circuit Protection
- Complies with EN55022, Class A
- Lead free, RoHS Compliant
- 3 Years Product Warranty



The DD03S/D series are miniature, DIP Package, isolated 3W DC/DC converters with 1,500VDC isolation. The DD03S/D series features fully regulated output and wide 2:1 input voltage ranges. It offers short circuit protection and allows a wide operating temperature range of  $-40^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$ . 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 Selection Guide

| Model Number | Input Voltage (Range) | Output Voltage | Output Current |            | Input Current |          | Reflected Ripple Current | Max. capacitive Load | Efficiency (typ.) |
|--------------|-----------------------|----------------|----------------|------------|---------------|----------|--------------------------|----------------------|-------------------|
|              |                       |                | Max.           | Min.       | @Max. Load    | @No Load |                          |                      | @Max. Load        |
|              | VDC                   | VDC            | mA             | mA         | mA(typ.)      | mA(typ.) | mA(typ.)                 | uF                   | %                 |
| DD03S0505A   | 5<br>(4.5 ~ 9)        | 5              | 600            | 60         | 857           | 40       | 100                      | 2000                 | 70                |
| DD03S0512A   |                       | 12             | 250            | 25         | 811           |          |                          |                      | 74                |
| DD03S0515A   |                       | 15             | 200            | 20         | 811           |          |                          |                      | 74                |
| DD03D0512A   |                       | $\pm 12$       | $\pm 125$      | $\pm 12.5$ | 811           |          |                          | 1000*                | 74                |
| DD03D0515A   |                       | $\pm 15$       | $\pm 100$      | $\pm 10$   | 811           |          |                          |                      | 74                |
| DD03S1205A   | 12<br>(9 ~ 18)        | 5              | 600            | 60         | 329           | 20       | 30                       | 2000                 | 76                |
| DD03S1212A   |                       | 12             | 250            | 25         | 313           |          |                          |                      | 80                |
| DD03S1215A   |                       | 15             | 200            | 20         | 313           |          |                          |                      | 80                |
| DD03D1212A   |                       | $\pm 12$       | $\pm 125$      | $\pm 12.5$ | 313           |          |                          | 1000*                | 80                |
| DD03D1215A   |                       | $\pm 15$       | $\pm 100$      | $\pm 10$   | 313           |          |                          |                      | 80                |
| DD03S2405A   | 24<br>(18 ~ 36)       | 5              | 600            | 60         | 162           | 5        | 15                       | 2000                 | 77                |
| DD03S2412A   |                       | 12             | 250            | 25         | 154           |          |                          |                      | 81                |
| DD03S2415A   |                       | 15             | 200            | 20         | 154           |          |                          |                      | 81                |
| DD03D2412A   |                       | $\pm 12$       | $\pm 125$      | $\pm 12.5$ | 154           |          |                          | 1000*                | 81                |
| DD03D2415A   |                       | $\pm 15$       | $\pm 100$      | $\pm 10$   | 154           |          |                          |                      | 81                |
| DD03S4805A   | 48<br>(36 ~ 75)       | 5              | 600            | 60         | 81            | 3        | 10                       | 2000                 | 77                |
| DD03S4812A   |                       | 12             | 250            | 25         | 77            |          |                          |                      | 81                |
| DD03S4815A   |                       | 15             | 200            | 20         | 77            |          |                          |                      | 81                |
| DD03D4812A   |                       | $\pm 12$       | $\pm 125$      | $\pm 12.5$ | 77            |          |                          | 1000*                | 81                |
| DD03D4815A   |                       | $\pm 15$       | $\pm 100$      | $\pm 10$   | 77            |          |                          |                      | 81                |

\* 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  | 3.5                                                      | 4    | 4.5  |      |
|                                   | 12V Input Models | 4.5                                                      | 7    | 9    |      |
|                                   | 24V Input Models | 8                                                        | 12   | 18   |      |
|                                   | 48V Input Models | 16                                                       | 24   | 36   |      |
| Under Voltage Shutdown            | 5V Input Models  | ---                                                      | 3.5  | 4    |      |
|                                   | 12V Input Models | ---                                                      | 6.5  | 8.5  |      |
|                                   | 24V Input Models | ---                                                      | 11   | 17   |      |
|                                   | 48V Input Models | ---                                                      | 22   | 34   |      |
| Reverse Polarity Input Current    | All Models       | ---                                                      | ---  | 1    | A    |
| Short Circuit Input Power         |                  | ---                                                      | 1000 | 1500 | 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      | Dual Output, Balanced Loads | ---        | ±0.5  | ±2.0  | %                 |
| Output Voltage Balance       |                             | ---        | ±0.5  | ±2.0  | %                 |
| Line Regulation              |                             | ---        | ±0.2  | ±0.5  | %                 |
| Load Regulation              | Io=10% to 100%              | ---        | ±0.2  | ±0.5  | %                 |
| Ripple & Noise (20MHz)       | Over Line, Load & Temp.     | ---        | 45    | 60    | mV <sub>P-P</sub> |
| Ripple & Noise (20MHz)       |                             | ---        | ---   | 100   | mV <sub>P-P</sub> |
| Ripple & Noise (20MHz)       |                             | ---        | ---   | 15    | mV rms            |
| Transient Recovery Time      | 25% Load Step Change        | ---        | 300   | 500   | μs                |
| Transient Response Deviation |                             | ---        | ±3    | ±5    | %                 |
| Temperature Coefficient      | Foldback                    | ---        | ±0.01 | ±0.02 | %/°C              |
| Over Load Protection         |                             | 120        | TBD   | ---   | %                 |
| Short Circuit Protection     |                             | Continuous |       |       |                   |

## General Characteristics

| Parameter                     | Conditions                        | Min.                                                        | Typ. | Max. | Unit  |
|-------------------------------|-----------------------------------|-------------------------------------------------------------|------|------|-------|
| I/O Isolation Voltage (rated) | 60 Seconds                        | 1500                                                        | ---  | ---  | VDC   |
| I/O Isolation Resistance      | 500 VDC                           | 1000                                                        | ---  | ---  | MΩ    |
| I/O Isolation Capacitance     | 100KHz, 1V                        | ---                                                         | ---  | 150  | pF    |
| Switching Frequency           | MIL-HDBK-217F@25°C, Ground Benign | ---                                                         | 330  | ---  | KHz   |
| MTBF (calculated)             |                                   | 1,000,000                                                   | ---  | ---  | Hours |
| Safety Approvals              |                                   | UL/cUL 60950-1 recognition(CSA certificate), IEC/EN 60950-1 |      |      |       |

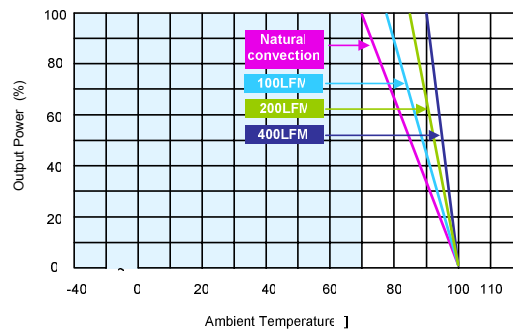
## Recommended Input Fuse

| 5V Input Models       | 12V Input Models     | 24V Input Models     | 48V Input Models     |
|-----------------------|----------------------|----------------------|----------------------|
| 1500mA Slow-Blow Type | 700mA Slow-Blow Type | 350mA Slow-Blow Type | 135mA Slow-Blow Type |

## Environmental Characteristics

| Parameter                                     | Conditions          | Min. | Max. | Unit     |
|-----------------------------------------------|---------------------|------|------|----------|
| Operating Temperature Range (with Derating)   | Ambient             | -40  | +85  | °C       |
| Case Temperature                              | Free-Air convection | ---  | +90  | °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

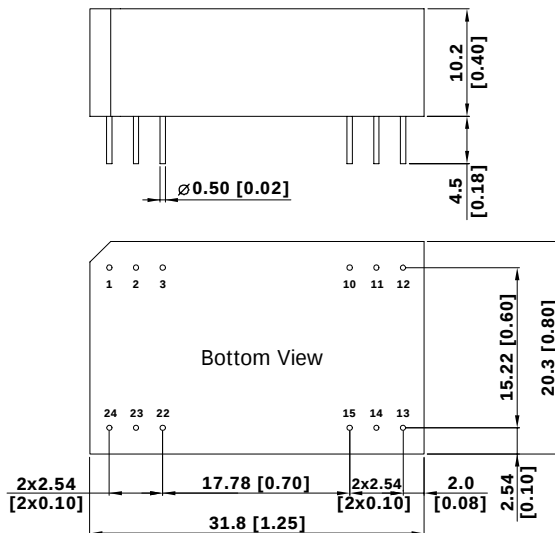


## Notes

- 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 0-20MHz.
- 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



### Pin Connections

| Pin | Single Output | Dual Output |
|-----|---------------|-------------|
| 1   | +Vin          | +Vin        |
| 2   | NC            | -Vout       |
| 3   | NC            | Common      |
| 10  | -Vout         | Common      |
| 11  | +Vout         | +Vout       |
| 12  | -Vin          | -Vin        |
| 13  | -Vin          | -Vin        |
| 14  | +Vout         | +Vout       |
| 15  | -Vout         | Common      |
| 22  | NC            | Common      |
| 23  | NC            | -Vout       |
| 24  | +Vin          | +Vin        |

NC: No Connection

- ▶ All dimensions in mm (inches)
- ▶ Tolerance:  $X.X \pm 0.25$  ( $X.XX \pm 0.01$ )  
 $X.XX \pm 0.13$  ( $X.XXX \pm 0.005$ )
- ▶ Pin diameter  $\varnothing 0.5 \pm 0.05$  ( $0.02 \pm 0.002$ )

## Physical Outline

Case Size : 31.8x20.3x10.2mm (1.25x0.80x0.40 Inches)

Case Material : Non-Conductive Black Plastic (flammability to UL 94V-0 rated)

Weight : 12.4g



## Part Numbering System

| D           | D             | 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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