



**THE DATASHEET OF
SD02D2415A**





FEATURES

- Efficiency up to 81%
- 2:1 Wide Input Range
- Fully regulated Output
- Operating Temperature Range -40°C to +85°C
- Moisture sensitivity level (MSL) 2
- Isolation Voltage 1500 VDC
- Complies with EN55022, class A
- Lead free, RoHs Compliant
- Short circuit protection
- 3 Years Product Warranty



The SD02S/D series are miniature, SMD Package, isolated 2W DC/DC converters with 1,500VDC isolation. The SD02S/D series features fully regulated output and wide 2:1 input voltage ranges. The most convenient advantage is the modules with a small footprint and low package height of 8.0 mm (0.31 inch) on the PCB. These isolated DC/DC converters are the latest offering from a world leader in power systems technology and manufacturing — Delta Electronics, Inc.

Model List

| Model Number | Input Voltage (Range) VDC | Output Voltage VDC | Output Current | | Input Current | | Reflected Ripple Current mA(typ.) | Max. capacitive Load uF | Efficiency (typ.) |
|--------------|------------------------------|-----------------------|----------------|---------|---------------------|-------------------|--------------------------------------|----------------------------|-------------------|
| | | | Max. mA | Min. mA | @Max. Load mA(typ.) | @No Load mA(typ.) | | | @Max. Load % |
| SD02S0503A | 5 (4.5 ~ 9) | 3.3 | 500 | 125 | 471 | 40 | 100 | 2200 | 70 |
| SD02S0505A | | 5 | 400 | 100 | 548 | | | 1000 | 73 |
| SD02S0512A | | 12 | 167 | 42 | 534 | | | 170 | 75 |
| SD02S0515A | | 15 | 134 | 33 | 582 | | | 110 | 73 |
| SD02D0505A | | ±5 | ±200 | ±50 | 667 | | | 470* | 64 |
| SD02D0512A | | ±12 | ±83 | ±21 | 615 | | | 100* | 69 |
| SD02D0515A | | ±15 | ±67 | ±17 | 598 | | | 47* | 71 |
| SD02S1203A | | 12 (9 ~ 18) | 3.3 | 500 | 125 | | | 184 | 20 |
| SD02S1205A | 5 | | 400 | 100 | 217 | 1000 | 77 | | |
| SD02S1212A | 12 | | 167 | 42 | 209 | 170 | 80 | | |
| SD02S1215A | 15 | | 134 | 33 | 220 | 110 | 80 | | |
| SD02D1205A | ±5 | | ±200 | ±50 | 242 | 470* | 73 | | |
| SD02D1212A | ±12 | | ±83 | ±21 | 224 | 100* | 78 | | |
| SD02D1215A | ±15 | | ±67 | ±17 | 226 | 47* | 78 | | |
| SD02S2403A | 24 (18 ~ 36) | | 3.3 | 500 | 125 | 96 | 10 | 15 | |
| SD02S2405A | | 5 | 400 | 100 | 109 | 1000 | | | 77 |
| SD02S2412A | | 12 | 167 | 42 | 109 | 170 | | | 80 |
| SD02S2415A | | 15 | 134 | 33 | 108 | 110 | | | 81 |
| SD02D2405A | | ±5 | ±200 | ±50 | 119 | 470* | | | 74 |
| SD02D2412A | | ±12 | ±83 | ±21 | 112 | 100* | | | 78 |
| SD02D2415A | | ±15 | ±67 | ±17 | 110 | 47* | | | 80 |
| SD02S4803A | | 48 (36 ~ 75) | 3.3 | 500 | 125 | 49 | | | 8 |
| SD02S4805A | 5 | | 400 | 100 | 57 | 1000 | 73 | | |
| SD02S4812A | 12 | | 167 | 42 | 53 | 170 | 79 | | |
| SD02S4815A | 15 | | 134 | 33 | 55 | 110 | 79 | | |
| SD02D4805A | ±5 | | ±200 | ±50 | 62 | 470* | 71 | | |
| SD02D4812A | ±12 | | ±83 | ±21 | 57 | 100* | 77 | | |
| SD02D4815A | ±15 | | ±67 | ±17 | 57 | 47* | 77 | | |

* 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 | | --- | --- | 1500 | mW |
| Internal Power Dissipation | | --- | --- | 1800 | 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 | | --- | ±1.0 | ±2.0 | % |
| Output Voltage Balance | Dual Output, Balanced Loads | --- | ±1.0 | ±2.0 | % |
| Line Regulation | Vin=Min. to Max. | --- | ±0.3 | ±0.5 | % |
| Load Regulation | Io=25% to 100% | --- | ±0.5 | ±0.75 | % |
| Ripple & Noise (20MHz) | | --- | 30 | 50 | mV _{P-P} |
| Ripple & Noise (20MHz) | Over Line, Load & Temp. | --- | --- | 75 | mV _{P-P} |
| Ripple & Noise (20MHz) | | --- | --- | 15 | mV _{rms} |
| Transient Recovery Time | 25% Load Step Change | --- | 100 | 300 | µS |
| Transient Response Deviation | | --- | ±3 | ±5 | % |
| Temperature Coefficient | | --- | ±0.01 | ±0.02 | %/°C |
| 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 | --- | 250 | 420 | pF |
| Switching Frequency | | --- | 300 | --- | KHz |
| MTBF (calculated) | MIL-HDBK-217F@25°C, Ground Benign | 1,000,000 | --- | --- | Hours |
| Moisture Sensitivity Level (MSL) | IPC/JEDEC J-STD-020D | Level 2 | | | |

Recommended Input Fuse

| 5V Input Models | 12V Input Models | 24V Input Models | 48V Input Models |
|-----------------------|----------------------|----------------------|----------------------|
| 1000mA Slow-Blow Type | 500mA Slow-Blow Type | 250mA Slow-Blow Type | 120mA Slow-Blow Type |

Environmental Specifications

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

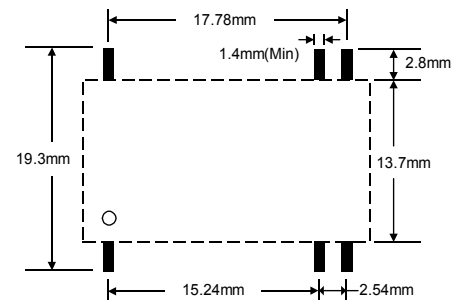
- 1 Specifications typical at $T_a=+25^{\circ}\text{C}$, resistive load, nominal input voltage and rated output current unless otherwise noted.
- 2 Transient recovery time is measured to within 1% error band for a step change in output load of 75% to 100%
- 3 Ripple & Noise measurement bandwidth is 0-20MHz.
- 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.
- 7 It is not recommended to use water-washing process on SMT units.

Mechanical Drawing

Mechanical Dimensions



Connecting Pin Patterns



- ▶ All dimensions in mm (inches)
- ▶ Tolerance: $X.X \pm 0.25$ ($X.XX \pm 0.01$)
 $X.XX \pm 0.13$ ($X.XXX \pm 0.005$)
- ▶ Pins ± 0.05 (± 0.002)

Pin Connections

| Pin | Single Output | Dual Output |
|-----|---------------|-------------|
| 1 | -Vin | -Vin |
| 7 | NC | NC |
| 8 | NC | Common |
| 9 | +Vout | +Vout |
| 10 | -Vout | -Vout |
| 16 | +Vin | +Vin |

NC : No Connection

Physical Outline

| | |
|---------------|--|
| Case Size | : 24.0x13.7x8.0mm (0.94x0.54x0.31 Inches) |
| Case Material | : Non-Conductive Black Plastic (flammability to UL 94V-0 rated) |
| Weight | : 5.1g |



| Part Numbering System | | | | | | |
|-----------------------|---------------|-------|-------------------|---------------|----------------|--------------------|
| S | D | 02 | 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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