



### FEATURES

- Efficiency up to 75%
- SMD Package with Industry Standard Pinout
- UL/EN60601-1&EN60950-1 Safety Approval
- Isolation Voltage 4000 VDC
- Operating Temperature Range -25°C to +80°C
- Reflow Solder Temperature up to 245°C
- Reinforced Insulation rated for 300VAC Working Voltage
- Lead free, RoHs Compliant
- 3 Years Product Warranty

The SG02S/D series is miniature, SMD Package, isolated 2W DC/DC converters with 4,000VDC isolation. The SG02S/D series has industrial and medical safety approval. 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 |          | Load Regulation<br>% (max.) | Max. capacitive Load<br>uF | Efficiency (typ.) |
|--------------|------------------------------|-----------------------|----------------|------|---------------|----------|-----------------------------|----------------------------|-------------------|
|              |                              |                       | Max.           | Min. | @Max. Load    | @No Load |                             |                            | @Max. Load        |
|              |                              |                       | mA             | mA   | mA(typ.)      | mA(typ.) |                             |                            | %                 |
| SG02S0505A   | 5<br>(4.5 ~ 5.5)             | 5                     | 400            | 8    | 606           | 90       | 12                          | 330                        | 66                |
| SG02S0512A   |                              | 12                    | 165            | 3    | 600           |          | 10                          |                            | 66                |
| SG02S0515A   |                              | 15                    | 133            | 2.5  | 605           |          | 10                          |                            | 66                |
| SG02D0512A   |                              | ±12                   | ±83            | ±1.5 | 553           |          | 10                          | 100*                       | 72                |
| SG02D0515A   |                              | ±15                   | ±66            | ±1   | 542           |          | 10                          | 100*                       | 73                |
| SG02S1205A   | 12<br>(10.8 ~ 13.2)          | 5                     | 400            | 8    | 253           | 40       | 12                          | 330                        | 66                |
| SG02S1212A   |                              | 12                    | 165            | 3    | 250           |          | 10                          |                            | 66                |
| SG02S1215A   |                              | 15                    | 133            | 2.5  | 252           |          | 10                          |                            | 66                |
| SG02D1212A   |                              | ±12                   | ±83            | ±1.5 | 224           |          | 10                          | 100*                       | 74                |
| SG02D1215A   |                              | ±15                   | ±66            | ±1   | 220           |          | 10                          | 100*                       | 75                |
| SG02S2405A   | 24<br>(21.6 ~ 26.4)          | 5                     | 400            | 8    | 126           | 30       | 12                          | 330                        | 66                |
| SG02S2412A   |                              | 12                    | 165            | 3    | 125           |          | 10                          |                            | 66                |
| SG02S2415A   |                              | 15                    | 133            | 2.5  | 126           |          | 10                          |                            | 66                |
| SG02D2412A   |                              | ±12                   | ±83            | ±1.5 | 112           |          | 10                          | 100*                       | 74                |
| SG02D2415A   |                              | ±15                   | ±66            | ±1   | 110           |          | 10                          | 100*                       | 75                |

\* For each output

### Input Characteristics

| Parameter                         | Model            | Min.               | Typ. | Max. | Unit |
|-----------------------------------|------------------|--------------------|------|------|------|
| Input Voltage Range               | 5V Input Models  | 4.5                | 5    | 5.5  | VDC  |
|                                   | 12V Input Models | 10.8               | 12   | 13.2 |      |
|                                   | 24V Input Models | 21.6               | 24   | 26.4 |      |
| Input Surge Voltage (1 sec. max.) | 5V Input Models  | -0.7               | ---  | 9    | VDC  |
|                                   | 12V Input Models | -0.7               | ---  | 18   |      |
|                                   | 24V Input Models | -0.7               | ---  | 30   |      |
| Reverse Polarity Input Current    | All Models       | ---                | ---  | 0.3  | A    |
| Input Filter                      |                  | Internal Capacitor |      |      |      |
| Internal Power Dissipation        |                  | ---                | ---  | 650  | mW   |



## Output Characteristics

| Parameter                | Conditions                  | Min.                      | Typ.  | Max.  | Unit              |
|--------------------------|-----------------------------|---------------------------|-------|-------|-------------------|
| Output Voltage Accuracy  |                             | ---                       | ±2.0  | ±4.0  | %                 |
| Output Voltage Balance   | Dual Output, Balanced Loads | ---                       | ±0.1  | ±1.0  | %                 |
| Line Regulation          | Vin=Min. to Max.            | ---                       | ±1.2  | ±1.5  | %                 |
| Load Regulation          | Io=20% to 100%              | See Model Selection Guide |       |       |                   |
| Ripple & Noise (20MHz)   |                             | ---                       | 100   | 150   | mV <sub>P-P</sub> |
| Ripple & Noise (20MHz)   | Over Line, Load & Temp.     | ---                       | ---   | 200   | mV <sub>P-P</sub> |
| Ripple & Noise (20MHz)   |                             | ---                       | ---   | 15    | mV <sub>rms</sub> |
| Temperature Coefficient  |                             | ---                       | ±0.01 | ±0.02 | %/°C              |
| Short Circuit Protection |                             | 0.5 Second Max.           |       |       |                   |

## 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    | uA              |
| I/O Isolation Resistance      | 500 VDC  | 10   | ---  | ---  | GΩ              |
| I/O Isolation Capacitance     | 100KHz, 1V                                       | ---  | 15   | 20   | 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              |                                   | 50        | 80   | 100  | KHz   |
| MTBF (calculated)                | MIL-HDBK-217F@25°C, Ground Benign | 2,000,000 | ---  | ---  | Hours |
| Moisture Sensitivity Level (MSL) | IPC/JEDEC J-STD-020D              | Level 2   |      |      |       |

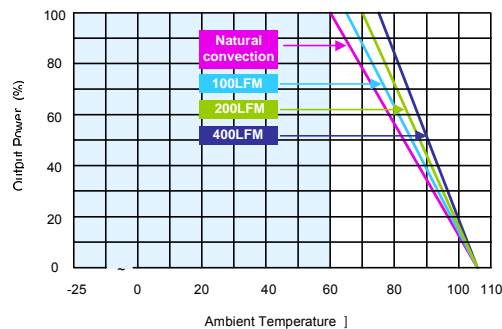
## Recommended Input Fuse

| 5V Input Models       | 12V Input Models     | 24V Input Models     |
|-----------------------|----------------------|----------------------|
| 1000mA Slow-Blow Type | 500mA Slow-Blow Type | 200mA Slow-Blow Type |

## Environmental Characteristics

| Parameter                                     | Conditions          | Min. | Max. | Unit     |
|---|---------------------|------|------|----------|
| Operating Temperature Range (with Derating)   | Ambient             | -25  | +80  | °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

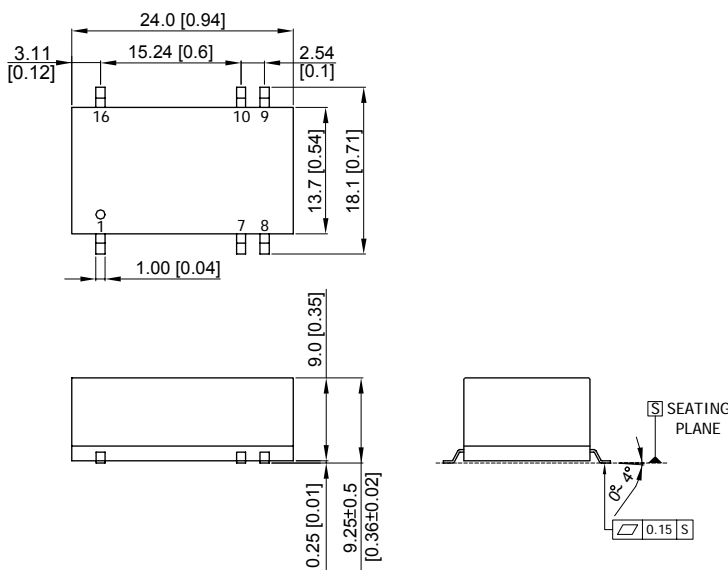


## Notes

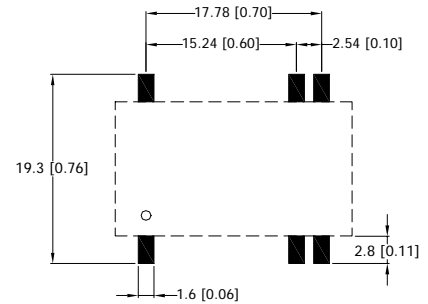
- 1 Specifications typical at Ta=+25°C, resistive load, nominal input voltage and rated output current unless otherwise noted.
- 2 Ripple & Noise measurement bandwidth is 0-20MHz.
- 3 These power converters require a minimum output loading to maintain specified regulation, operation under no-load conditions will not damage these modules; however they may not meet all specifications listed.
- 4 All DC/DC converters should be externally fused at the front end for protection.
- 5 That "natural convection" is about 20LFM but is not equal to still air (0 LFM).
- 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±0.25 (X.XX±0.01)  
X.XX±0.13 (X.XXX±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     | : 24.0x13.7x9.0mm (0.94x0.54x0.35 Inches)                       |
| Case Material | : Non-Conductive Black Plastic (flammability to UL 94V-0 rated) |
| Weight        | : 3.75g   |



| Part Numbering System |               |       |                   |               |                |                    |
|-----------------------|---------------|-------|-------------------|---------------|----------------|--------------------|
| S                     | G             | 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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