



**THE DATASHEET OF  
SE03S2403A**



### FEATURES

- Efficiency up to 83%
- SMD Package with Industry Standard Pinout
- Isolation 1500VDC
- 2:1 Wide Input Range
- Low ripple and noise
- Short Circuit Protection
- Temperature Performance -40°C to +71°C
- CSA60950-1 Safety Approval
- MTBF > 1,000,000 Hours
- Lead free, RoHs Compliant
- 3 Years Product Warranty



Photo is for reference only



The SE03S/D series are miniature, SMD Package, isolated 3W DC/DC converters with 1,500VDC isolation. The SE03S/D series features fully regulated output and ultra wide 2:1 input voltage ranges. It offers short circuit protection and allows a wide operating temperature range of -40°C to +71°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.) |
|--------------|------------------------------|-----------------------|----------------|-------|---------------|----------|--------------------------------------|----------------------------|-------------------|
|              |                              |                       | Max.           | Min.  | @Max. Load    | @No Load |                                      |                            | @Max. Load        |
|              |                              |                       | mA             | mA    | mA(typ.)      | mA(typ.) |                                      |                            | %                 |
| SE03S1203A   | 12<br>(9 ~ 18)               | 3.3                   | 700            | 70    | 257           | 20       | 25                                   | 4700                       | 75                |
| SE03S1205A   |                              | 5                     | 600            | 60    | 316           |          |                                      |                            | 79                |
| SE03S1212A   |                              | 12                    | 250            | 25    | 305           |          |                                      |                            | 82                |
| SE03S1215A   |                              | 15                    | 200            | 20    | 305           |          |                                      |                            | 82                |
| SE03D1205A   |                              | ±5                    | ±300           | ±30   | 321           |          |                                      | 180*                       | 78                |
| SE03D1212A   |                              | ±12                   | ±125           | ±12.5 | 309           |          |                                      |                            | 81                |
| SE03D1215A   |                              | ±15                   | ±100           | ±10   | 309           |          |                                      |                            | 81                |
| SE03S2403A   |                              | 3.3                   | 700            | 70    | 127           |          |                                      |                            | 5                 |
| SE03S2405A   | 5                            | 600                   | 60             | 156   | 80            |          |                                      |                            |                   |
| SE03S2412A   | 12                           | 250                   | 25             | 151   | 83            |          |                                      |                            |                   |
| SE03S2415A   | 15                           | 200                   | 20             | 151   | 83            |          |                                      |                            |                   |
| SE03D2405A   | ±5                           | ±300                  | ±30            | 158   | 180*          | 79       |                                      |                            |                   |
| SE03D2412A   | ±12                          | ±125                  | ±12.5          | 152   |               | 82       |                                      |                            |                   |
| SE03D2415A   | ±15                          | ±100                  | ±10            | 152   |               | 82       |                                      |                            |                   |
| SE03S4803A   | 3.3                          | 700                   | 70             | 63    |               | 3        | 10                                   | 4700                       |                   |
| SE03S4805A   | 5                            | 600                   | 60             | 78    | 80            |          |                                      |                            |                   |
| SE03S4812A   | 12                           | 250                   | 25             | 75    | 83            |          |                                      |                            |                   |
| SE03S4815A   | 15                           | 200                   | 20             | 75    | 83            |          |                                      |                            |                   |
| SE03D4805A   | ±5                           | ±300                  | ±30            | 79    | 180*          |          |                                      | 79                         |                   |
| SE03D4812A   | ±12                          | ±125                  | ±12.5          | 76    |               |          |                                      | 82                         |                   |
| SE03D4815A   | ±15                          | ±100                  | ±10            | 76    |               |          |                                      | 82                         |                   |

\* For each output



## Input Characteristics

| Parameter                         | Model            | Min.      | Typ. | Max. | Unit |
|-----------------------------------|------------------|-----------|------|------|------|
| Input Surge Voltage (1 sec. max.) | 12V Input Models | -0.7      | ---  | 25   | VDC  |
|                                   | 24V Input Models | -0.7      | ---  | 50   |      |
|                                   | 48V Input Models | -0.7      | ---  | 100  |      |
| Start-Up Voltage                  | 12V Input Models | 4.5       | 6    | 8    |      |
|                                   | 24V Input Models | 8         | 12   | 18   |      |
|                                   | 48V Input Models | 16        | 24   | 36   |      |
| Under Voltage Shutdown            | 12V Input Models | ---       | ---  | 8    |      |
|                                   | 24V Input Models | ---       | ---  | 16   |      |
|                                   | 48V Input Models | ---       | ---  | 32   |      |
| Reverse Polarity Input Current    | All Models       | ---       | ---  | 0.5  | A    |
| Short Circuit Input Power         |                  | ---       | ---  | 1500 | mW   |
| Input Filter                      |                  | Pi Filter |      |      |      |
| Internal Power Dissipation        |                  | ---       | ---  | 2500 | mW   |

## 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.            | ---        | ±0.1  | ±0.3  | %                 |
| Load Regulation              | Io=10% to 100%              | ---        | ±0.3  | ±1.0  | %                 |
| Ripple & Noise (20MHz)       |                             | ---        | 50    | 75    | mV <sub>P-P</sub> |
| Ripple & Noise (20MHz)       | Over Line, Load & Temp.     | ---        | ---   | 100   | mV <sub>P-P</sub> |
| Ripple & Noise (20MHz)       |                             | ---        | ---   | 10    | mV rms            |
| Transient Recovery Time      | 25% Load Step Change        | ---        | 200   | 500   | µs                |
| Transient Response Deviation |                             | ---        | ±2    | ±6    | %                 |
| 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                        | ---       | 65   | 100  | 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   |      |      |       |

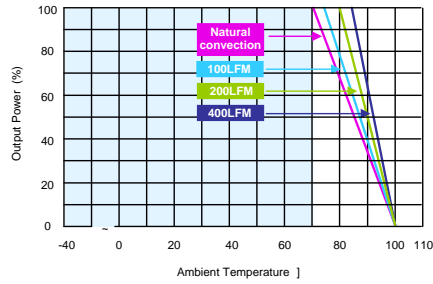
## Recommended Input Fuse

| 12V Input Models     | 24V Input Models     | 48V Input Models     |
|----------------------|----------------------|----------------------|
| 750mA Slow-Blow Type | 350mA Slow-Blow Type | 200mA 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

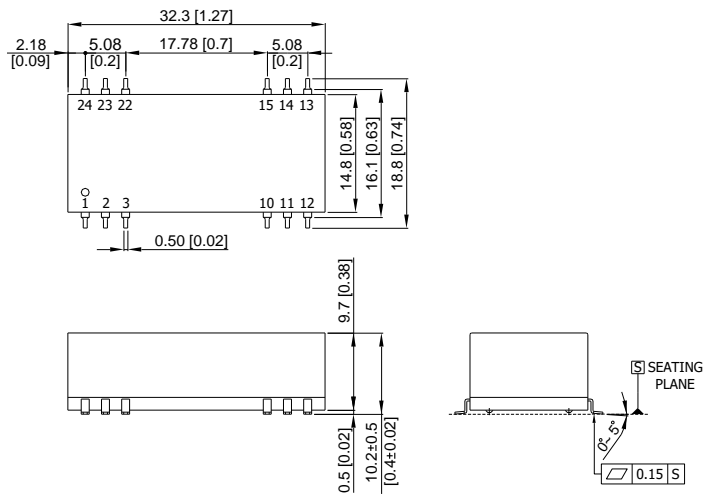


## Notes

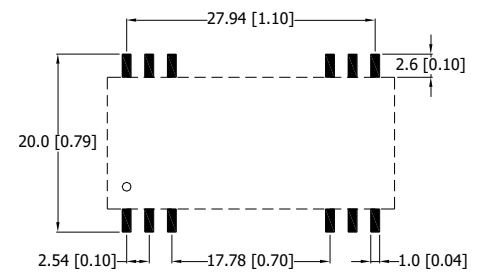
- 1 Specifications typical at  $T_a = +25^{\circ}\text{C}$ , resistive load, nominal input voltage and rated output current unless otherwise noted.
- 2 Transient recovery time is measured to within 1% error band for a step change in output load of 75% to 100%
- 3 Ripple & Noise measurement bandwidth 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  $\pm 0.05$  ( $\pm 0.002$ )

### Pin Connections

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

NC : No Connection

### Physical Characteristics

|               |   |
|---------------|---|
| Case Size     | : 32.3x14.8x10.2mm (1.27x0.58x0.4 Inches) |
| Case Material | : Non-Conductive Black Plastic            |
|               | : (flammability to UL 94V-0 rated)        |
| Weight        | : 8.8g                                    |



| Part Numbering System |               |       |                   |               |                |                               |
|-----------------------|---------------|-------|-------------------|---------------|----------------|-------------------------------|
| S                     | E             | 03    | S                 | 12            | 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         | ATR -Tape/reel package option |
| S-SMD                 |               | 03:3W |                   | 12:12V        | 12:12V         |                               |
|                       |               | 04:4W |                   | 24: 24V       | 15: 15V        |                               |
|                       |               | 06:6W |                   | 48:48V        | 24: 24V        |                               |



#### WARRANTY

Delta offers a two (2) years limited warranty. Complete warranty information is listed on our web site or is available upon request from Delta.

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