



# THE DATASHEET OF SF05S4805A



### FEATURES

- Efficiency up to 85%
- SMD Package with Industry Standard Pinout
- 2:1 Wide Input Range
- Isolation Volage 1500VDC
- Remote on/off Control
- Short Circuit Protection
- Complies with EN55022 Class A
- > 1MHours MTBF
- Moisture sensitivity level (MSL) 2
- Lead free, RoHs Compliant
- 3 Years Product Warranty

The SF05S/D series are miniature, SMD Package, isolated 5W DC/DC converters with 1,500VDC isolation. The SF05S/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  $-40^{\circ}\text{C}$  to  $+71^{\circ}\text{C}$ . 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 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.<br>mA     | Min.<br>mA | @Max. Load<br>mA(typ.) | @No Load<br>mA(typ.) |                                      |                            | @Max. Load<br>%   |
| SF05S1203A   | 12<br>(9 ~ 18)               | 3.3                   | 1200           | 120        | 434                    | 45                   | 25                                   | 680                        | 76                |
| SF05S1205A   |                              | 5                     | 1000           | 100        | 521                    |                      |                                      |                            | 80                |
| SF05S1212A   |                              | 12                    | 417            | 41.7       | 502                    |                      |                                      |                            | 83                |
| SF05S1215A   |                              | 15                    | 333            | 33.3       | 502                    |                      |                                      |                            | 83                |
| SF05D1205A   |                              | $\pm 5$               | $\pm 500$      | $\pm 500$  | 521                    |                      |                                      | 100*                       | 80                |
| SF05D1212A   |                              | $\pm 12$              | $\pm 208$      | $\pm 20.8$ | 501                    |                      |                                      |                            | 83                |
| SF05D1215A   |                              | $\pm 15$              | $\pm 167$      | $\pm 16.7$ | 503                    |                      |                                      |                            | 83                |
| SF05S2403A   | 24<br>(18 ~ 36)              | 3.3                   | 1200           | 120        | 212                    | 15                   | 15                                   | 680                        | 78                |
| SF05S2405A   |                              | 5                     | 1000           | 100        | 254                    |                      |                                      |                            | 82                |
| SF05S2412A   |                              | 12                    | 417            | 41.7       | 245                    |                      |                                      |                            | 85                |
| SF05S2415A   |                              | 15                    | 333            | 33.3       | 245                    |                      |                                      |                            | 85                |
| SF05D2405A   |                              | $\pm 5$               | $\pm 500$      | $\pm 500$  | 254                    |                      |                                      | 100*                       | 82                |
| SF05D2412A   |                              | $\pm 12$              | $\pm 208$      | $\pm 20.8$ | 245                    |                      |                                      |                            | 85                |
| SF05D2415A   |                              | $\pm 15$              | $\pm 167$      | $\pm 16.7$ | 246                    |                      |                                      |                            | 85                |
| SF05S4803A   | 48<br>(36 ~ 75)              | 3.3                   | 1200           | 120        | 106                    | 6                    | 10                                   | 680                        | 78                |
| SF05S4805A   |                              | 5                     | 1000           | 100        | 127                    |                      |                                      |                            | 82                |
| SF05S4812A   |                              | 12                    | 417            | 41.7       | 123                    |                      |                                      |                            | 85                |
| SF05S4815A   |                              | 15                    | 333            | 33.3       | 122                    |                      |                                      |                            | 85                |
| SF05D4805A   |                              | $\pm 5$               | $\pm 500$      | $\pm 500$  | 127                    |                      |                                      | 100*                       | 82                |
| SF05D4812A   |                              | $\pm 12$              | $\pm 208$      | $\pm 20.8$ | 122                    |                      |                                      |                            | 85                |
| SF05D4815A   |                              | $\pm 15$              | $\pm 167$      | $\pm 16.7$ | 123                    |                      |                                      |                            | 85                |

\* 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 | 7.5                                                      | 8    | 9    |      |
|                                   | 24V Input Models | 14                                                       | 16   | 18   |      |
|                                   | 48V Input Models | 30                                                       | 33   | 36   |      |
| Under Voltage Shutdown            | 12V Input Models | 6.5                                                      | 7    | 8    |      |
|                                   | 24V Input Models | 13                                                       | 15   | 17   |      |
|                                   | 48V Input Models | 28                                                       | 31   | 34   |      |
| Reverse Polarity Input Current    | All Models       | ---                                                      | ---  | 1    | A    |
| Short Circuit Input Power         |                  | ---                                                      | 1000 | 3000 | 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  | ±1.0  | %                 |
| Output Voltage Balance       |                             | ---        | ±0.5  | ±2.0  | %                 |
| Line Regulation              | Vin=Min. to Max.            | ---        | ±0.1  | ±0.3  | %                 |
| Load Regulation              | Io=20% to 100%              | ---        | ±0.3  | ±1.0  | %                 |
| Ripple & Noise (20MHz)       | Over Line, Load & Temp.     | ---        | 50    | 85    | mV <sub>P-P</sub> |
| Ripple & Noise (20MHz)       |                             | ---        | ---   | 100   | mV <sub>P-P</sub> |
| Ripple & Noise (20MHz)       |                             | ---        | ---   | 15    | mV <sub>rms</sub> |
| Transient Recovery Time      | 25% Load Step Change        | ---        | 250   | 500   | μs                |
| Transient Response Deviation |                             | ---        | ±2    | ±6    | %                 |
| Temperature Coefficient      | Foldback                    | ---        | ±0.01 | ±0.02 | %/°C              |
| Over Load Protection         |                             | 115        | 140   | 165   | %                 |
| 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                        | ---                          | 650  | 750  | pF    |
| Switching Frequency              | MIL-HDBK-217F@25°C, Ground Benign | 200                          | 260  | 350  | KHz   |
| MTBF (calculated)                |                                   | 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     |
|-----------------------|----------------------|----------------------|
| 1500mA Slow-Blow Type | 700mA Slow-Blow Type | 350mA Slow-Blow Type |

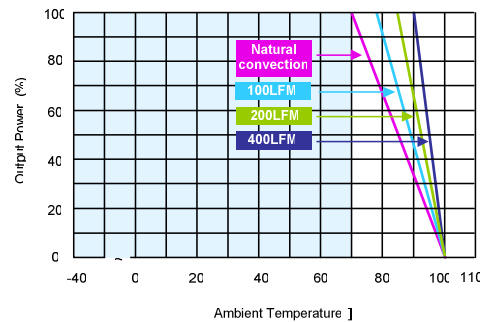
## Remote On / Off Control

| Parameter                   | Conditions                   | Min. | Typ. | Max. | Unit |
|-----------------------------|------------------------------|------|------|------|------|
| Converter On                | 2.5V ~ 5.5V or Open Circuit  |      |      |      |      |
| Converter Off               | -0.7V ~ 0.8V                 |      |      |      |      |
| Control Input Current (on)  | Vctrl = Min. to Max.         | ---  | ---  | -200 | μA   |
| Control Input Current (off) | Vctrl = Min. to Max.         | ---  | ---  | -300 | μA   |
| Control Common              | Referenced to Negative Input |      |      |      |      |
| Standby Input Current       |                              | ---  | ---  | 10   | mA   |

## 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

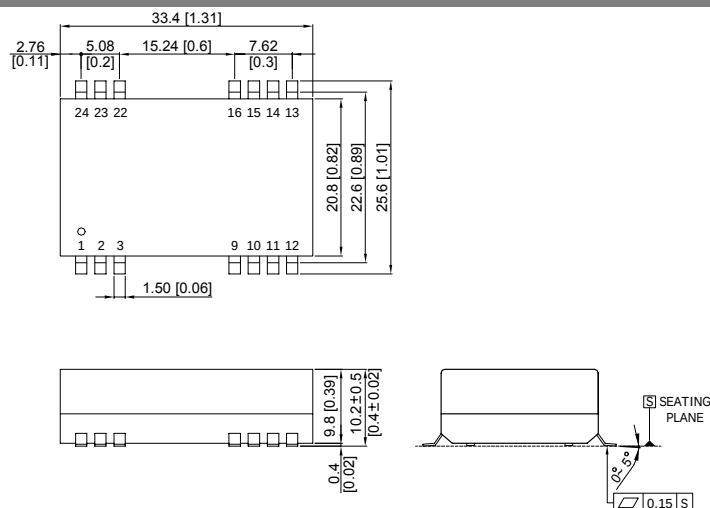


## Notes

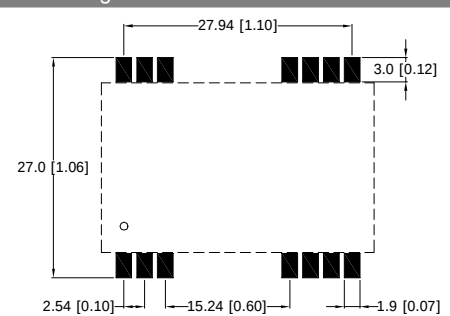
- 1 Specifications typical at  $T_a = +25^{\circ}\text{C}$ , resistive load, nominal input voltage and rated output current unless otherwise noted.
- 2 Transient recovery time is measured to within 1% error band for a step change in output load of 75% to 100%
- 3 Ripple & Noise measurement bandwidth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

## 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               | Remote On/Off | Remote On/Off |
| 2               | -Vin          | -Vin          |
| 3               | -Vin          | -Vin          |
| 9               | NC            | Common        |
| 10              | NC            | NC            |
| 11              | NC            | -Vout         |
| 12              | NC            | NC            |
| 13              | NC            | NC            |
| 14              | +Vout         | +Vout         |
| 15              | NC            | NC            |
| 16              | -Vout         | Common        |
| 22              | +Vin          | +Vin          |
| 23              | +Vin          | +Vin          |
| 24              | NC            | NC            |

NC : No Connection

| Physical Characteristics |                                           |
|--------------------------|-------------------------------------------|
| Case Size                | : 33.4x20.8x10.2mm (1.31x0.82x0.4 Inches) |
| Case Material            | Non-Conductive Black Plastic              |
|                          | : (flammability to UL 94V-0 rated)        |
| Weight                   | : 14g                                     |



## Part Numbering System

| S           | F             | 05    | 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         |                    |
| 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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