

### 0.5 Amp

- Regulated single outputs from 3.3 to 15VDC
- Wide input range
- SMD-10 package
- Non-isolated
- Output voltage trim  $\pm 10\%$
- High efficiency up to 92%
- Class B conducted & radiated emissions with external components
- Short-circuit protection
- No heatsink required
- Remote On/Off
- Tape & reel package available
- $-40^{\circ}\text{C}$  to  $+100^{\circ}\text{C}$  operation
- Full load to  $+60^{\circ}\text{C}$
- 3 year warranty



#### Dimensions:

#### STH05:

0.77 x 0.47 x 0.39" (19.5 x 11.8 x 5.0 mm)

The STH05 is a new series of innovative low cost DC-DC buck regulators. Based on SMD technology and high levels of automation the series offers many features including voltage trimming, remote on/off, continuous short circuit protection, regulation and high efficiency.

### Models & Ratings

| Nominal Input Voltage (VDC) | Output voltage (VDC) | Output Current (A) | Input Current (mA) |           |       | Maximum Capacitive Load | Efficiency at Full Load % |            | Model Number <sup>(1)</sup> |
|-----------------------------|----------------------|--------------------|--------------------|-----------|-------|-------------------------|---------------------------|------------|-----------------------------|
|                             |                      |                    | No Load (max.)     | Full Load |       |                         | Vin (min.)                | Vin (max.) |                             |
| 48 V (9-72 V)               | 3.3 V                | 0.5 A              | 3.0 mA             | 232 mA    | 33 mA | 100 $\mu\text{F}$       | 79.0%                     | 70.0%      | STH0548S3V3                 |
| 48 V (9-72 V)               | 5.0 V                |                    |                    | 323 mA    | 47 mA |                         | 86.0%                     | 74.0%      | STH0548S05                  |
| 48 V (9-72 V)               | 6.5 V                |                    |                    | 406 mA    | 58 mA |                         | 89.0%                     | 78.0%      | STH0548S6V5                 |
| 48 V (14-72 V)              | 7.2 V                |                    |                    | 289 mA    | 62 mA |                         | 89.0%                     | 81.0%      | STH0548S7V2                 |
| 48 V (14-72 V)              | 9.0 V                |                    |                    | 357 mA    | 74 mA |                         | 90.0%                     | 84.0%      | STH0548S09                  |
| 48 V (17-72 V)              | 12.0 V               |                    |                    | 384 mA    | 97 mA |                         | 92.0%                     | 86.0%      | STH0548S12                  |
| 48 V (21-72 V)              | 15.0 V               | 0.4 A              |                    | 311 mA    | 99 mA |                         | 92.0%                     | 84.0%      | STH0548S15                  |

### Notes

1. For tape & reel add "-TR", e.g. STH0548S05-TR. 500 pcs per reel.

### Input

| Characteristic             | Minimum   | Typical | Maximum | Units          | Notes & Conditions              |
|----------------------------|---|---------|---------|----------------|---------------------------------|
| Input Voltage Range        | 9   | 48      | 72      | VDC            | See Models and Ratings          |
| Input Surge                |   |         | 75      | VDC for 100 ms |                                 |
| Input Current              |   |         | 3       | mA             | No load. See Models and Ratings |
| Inhibit Mode Input Current |   |         | 1       | mA             | When module is in standby mode  |
| Remote On/Off              | Pin 10 open circuit, logic high, module is on.<br>Connect pin 10 to ground, logic low, module is off. |         |         |                |                                 |

### Output

| Characteristic           | Minimum | Typical | Maximum | Units    | Notes & Conditions  |
|--------------------------|---------|---------|---------|----------|---|
| Output Voltage           | 3.3     |         | 15      | VDC      | See Models and Ratings table  |
| Trim Range               |         | ±10     |         | %        | See Application Notes   |
| Initial Set Accuracy     |         |         | ±2.0    | %        |   |
| Minimum Load             |         |         |         | A        | No minimum load required  |
| Line Regulation          |         |         | ±1.0    | %        |   |
| Load Regulation          |         |         | ±1.0    | %        | To 100% load from 10%   |
| Transient Response       |         |         | ±3      | %        | Maximum deviation recovery within 250 µs at normal Vin for 25% step load change from 25% to 100% load |
| Ripple & Noise           |         | 75      |         | mV pk-pk | 20 MHz bandwidth, measured with 0.1 µF ceramic and 10 µF electrolytic capacitors                      |
| Short Circuit Protection |         |         |         |          | Continuous, with auto recovery  |
| Temperature Coefficient  |         |         | ±0.02   | %/°C     |   |

### General

| Characteristic                  | Minimum  | Typical      | Maximum | Units  | Notes & Conditions           |
|---------------------------------|--|--------------|---------|--------|------------------------------|
| Efficiency                      |  |              | 92      | %      | See Models and Ratings table |
| Isolation: Input to Output      |  |              |         |        | No isolation                 |
| Switching Frequency             | 150  |              | 550     | KHz    | See application notes        |
| Mean Time Between Failure       | 4.8  |              |         | MHrs   | MIL-HDBK-217F, +25 °C GB     |
| Weight                          |  | 0.0039 (1.8) |         | lb (g) |                              |
| Moisture Sensitivity Level      | Level 1  |              |         |        | IPC/JEDEC J-STD-020D.1       |
| PCB Pad Material                | Copper   |              |         |        |                              |
| PCB Pad Solder Coating          | Lead-free HASL   |              |         |        |                              |
| Lead-Free Reflow Solder Process | 245 °C max, 1.5 mm from case, 10 s max. IPC/JEDEC J-STD-020D.1 |              |         |        |                              |

### Environmental

| Characteristic        | Minimum | Typical | Maximum | Units | Notes & Conditions           |
|-----------------------|---------|---------|---------|-------|------------------------------|
| Operating Temperature | -40     |         | +105    | °C    | See Derating Curve.          |
| Storage Temperature   | -55     |         | +125    | °C    |                              |
| Humidity              |         |         | 95      | %RH   | Non-condensing               |
| Cooling               |         |         |         |       | Natural convection (>30 LFM) |

### EMC: Emissions

| Phenomenon | Standard | Test Level | Notes & Conditions                             |
|------------|----------|------------|--|
| Conducted  | EN55032  | Class B    | With external components, see application note |
| Radiated   | EN55032  | Class B    | With external components, see application note |

### EMC: Immunity

| Phenomenon      | Standard    | Test Level          | Criteria | Notes & Conditions   |
|-----------------|-------------|---------------------|----------|----------------------|
| ESD             | EN61000-4-2 | ±8 kV air discharge | A        |                      |
| Radiated        | EN61000-4-3 | 3 V/m               | A        |                      |
| EFT/Burst       | EN61000-4-4 | ±0.5 kV             | A        | See application note |
| Surge           | EN61000-4-5 | ±1 kV               | A        | See application note |
| Conducted       | EN61000-4-6 | 3 V rms             | A        |                      |
| Magnetic Fields | EN61000-4-8 | 3 A/m               | A        |                      |

### Mechanical Details

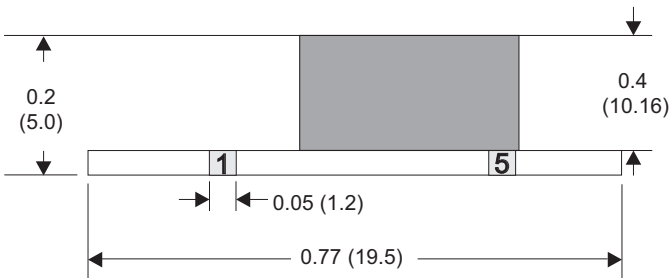
Top View



Bottom View



Side View



Solder Pad Dimension



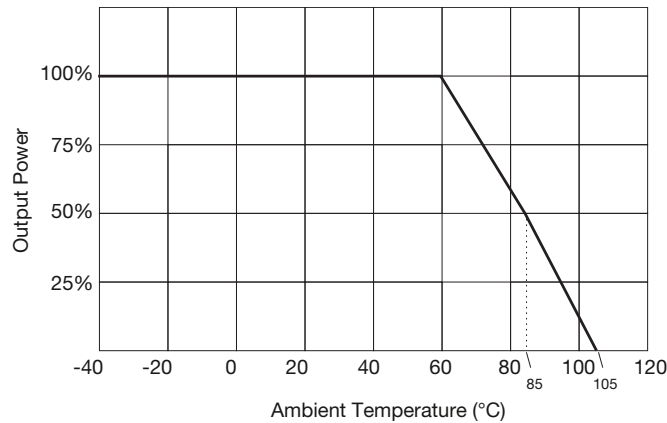
| Pin Connections |               |
|-----------------|---------------|
| Pin             | Function      |
| 1               | +Vin          |
| 5               | +Vout         |
| 6               | Trim          |
| 7               | Ground        |
| 9               | Ground        |
| 10              | Remote On/Off |

### Notes

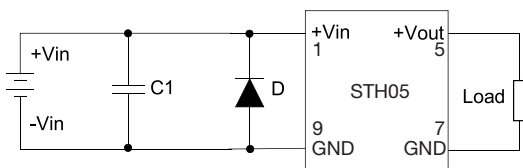
- All dimensions are in inches (mm)
- Weight: 0.0039 lbs (1.4 g) approx.
- Pin Profile Tolerance:  $\pm 0.004$  ( $\pm 0.1$ )
- Pin Pitch Tolerance:  $\pm 0.01$  ( $\pm 0.25$ )
- Other Tolerances:  $\pm 0.02$  ( $\pm 0.5$ )
- PCB tracks should not run under the STH05 to avoid interference and the risk of short circuit.

### Application Notes

#### Derating Curve



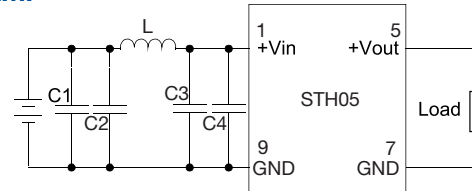
#### EFT & Surge



Suggested Filter : 5Vin models : Nippon - chemi - con KY series, 2200  $\mu$ F/50 V and a TVS, 3 KW

| C1                 | D1         |
|--------------------|------------|
| 330 $\mu$ F, 100 V | SMDJ 7.0 A |

#### EMI



Input filter components (Cin, C1, L1) are used to help meet EMI requirement for the module. These components should be mounted as close as possible to the module; and all leads should be minimized to decrease radiated noise.

| C1, C2                  | L1         | C3, C4                   |
|-------------------------|------------|--------------------------|
| 1206, 2.2 $\mu$ F, 100V | 56 $\mu$ H | 1206, 2.2 $\mu$ F, 100 V |

#### Switching Frequency

| Input Voltage | Switching Frequency | Notes   |
|---------------|---------------------|---|
| 15 V          | 540 KHz             | Typical values at 20% load.<br>Typically 50 KHz at 10% load for all variants. |
| 12 V          | 480 KHz             |   |
| 9 V           | 390 KHz             |   |
| 7.2 V         | 300 KHz             |   |
| 6.5 V         | 290 KHz             |   |
| 5.0 V         | 220 KHz             |   |
| 3V3           | 180 KHz             |   |

### Application Notes

#### Output Voltage Adjustment

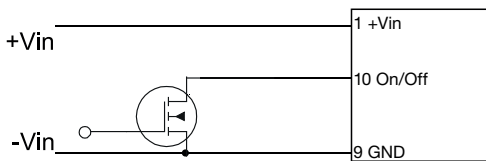


Pin 6 via a resistor to Pin 5 (+Vout), Vo trim down (Rd)  
 Pin 6 via a resistor to Pin 7(GND),Vo trim up (Ru)

| STH0548S3V3 (3V3) |        | STH0548S05 (5) |        | STH0548S6V5 (6V5) |         | STH0548S7V2 (7V2) |        | STH0548S09 (9) |        | STH0548S12 (12) |         | STH0548S15 (15) |        |
|-------------------|--------|----------------|--------|-------------------|---------|-------------------|--------|----------------|--------|-----------------|---------|-----------------|--------|
| Rd                | Ru     | Rd             | Ru     | Rd                | Ru      | Rd                | Ru     | Rd             | Ru     | Rd              | Ru      | Rd              | Ru     |
| 50.85             | 43.59  | 35.9           | 112.4  | 7.637             | 206.567 | 14.781            | 53.792 | 69.411         | 88.789 | 51.633          | 106.567 | 18.967          | 89.733 |
| 13.089            | 26.956 | 17.15          | 56.15  | 4.619             | 38.65   | 7.133             | 26.37  | 33.856         | 44.344 | 24.967          | 53.233  | 8.883           | 44.817 |
| 7.148             | 19.496 | 10.9           | 37.4   | 3.202             | 21.279  | 4.525             | 17.443 | 22.004         | 29.53  | 16.078          | 35.456  | 5.5522          | 29.844 |
| 4.730             | 15.26  | 7.775          | 28.025 | 2.38              | 14.622  | 3.21              | 13.019 | 16.078         | 22.122 | 11.633          | 26.567  | 3.842           | 22.358 |
| 3.417             | 12.53  | 5.9            | 22.4   | 1.843             | 11.173  | 2.417             | 10.377 | 12.522         | 17.678 | 8.967           | 21.233  | 2.833           | 17.867 |
| 2.593             | 10.624 | 4.65           | 18.65  | 1.464             | 9.018   | 1.887             | 8.621  | 10.15          | 14.715 | 7.189           | 17.678  | 2.161           | 14.872 |
| 2.028             | 9.218  | 3.757          | 15.971 | 1.183             | 7.554   | 1.508             | 7.369  | 8.459          | 12.598 | 5.919           | 15.138  | 1.681           | 12.733 |
| 1.616             | 8.138  | 3.088          | 13.963 | 0.966             | 6.496   | 1.223             | 6.431  | 7.189          | 11.011 | 4.967           | 13.233  | 1.321           | 11.129 |
| 1.302             | 7.282  | 2.567          | 12.4   | 0.793             | 5.694   | 1.001             | 5.702  | 6.201          | 9.777  | 4.226           | 11.752  | 1.041           | 9.881  |
| 1.056             | 6.588  | 2.15           | 11.15  | 0.653             | 5.067   | 0.824             | 5.12   | 5.411          | 8.789  | 3.633           | 10.567  | 0.817           | 8.883  |

Note: Rd: Trim down. Ru: Trim up. Resistor values in kΩ  
 \* 1V2 model only trim up

#### Remote On/Off



2-5 VDC or Open DC-DC ON  
 0-0.4 VDC or Short DC-DC OFF

#### Standard Application Circuit



Cin 10 μF must be fitted near DC-DC pins.  
 Optional Cout 10 μF

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