

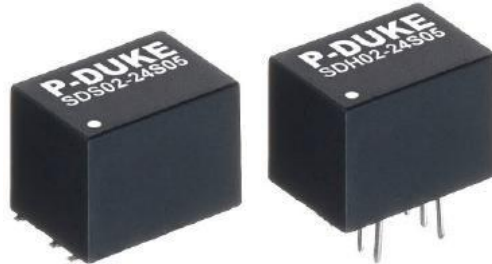


# 3

YEARS  
WARRANTY

ROHS  
COMPLIANT

REACH  
COMPLIANT



Automation



Datacom



IPC



Industry



Measurement



Telecom



Automobile



Boat



Charger



Medical



PV



Railway



3000  
VDC  
Isolation  
Voltage

1600  
VDC  
Isolation  
Voltage

2 : 1  
Input  
Range

NO  
Min. Load  
Required

REMOTE  
ON  
OFF

SCP

## PART NUMBER STRUCTURE

SDS02 - 48 S 05 H

| Series Name                    | Input Voltage (VDC)                         | Output Quantity                                 | Output Voltage (VDC)                                                                | Isolation Options                                             |
|--------------------------------|---------------------------------------------|-------------------------------------------------|-------------------------------------------------------------------------------------|---------------------------------------------------------------|
| SDS: SMD type<br>SDH: DIP type | 05:4.5~9<br>12:9~18<br>24:18~36<br>48:36~75 | S:Single<br><br><br><br><br><br><br><br>D: Dual | 3P3:3.3<br>05:5<br>09:9<br>12:12<br>15:15<br>24:24<br><br>05:±5<br>12:±12<br>15:±15 | □: Standard type<br>1600VDC isolation<br>H: 3000VDC isolation |

**TECHNICAL SPECIFICATION** All specifications are typical at nominal input, full load and 25°C unless otherwise noted

| Model Number    | Input Range | Output Voltage | Output Current @Full Load | Input Current @ No Load | Efficiency | Maximum Capacitor Load |
|-----------------|-------------|----------------|---------------------------|-------------------------|------------|------------------------|
|                 | VDC         | VDC            | mA                        | mA                      | %          | μF                     |
| SDS(H)02-05S3P3 | 4.5 ~ 9     | 3.3            | 500                       | 34                      | 77         | 2200                   |
| SDS(H)02-05S05  | 4.5 ~ 9     | 5              | 400                       | 34                      | 81         | 1000                   |
| SDS(H)02-05S09  | 4.5 ~ 9     | 9              | 222                       | 42                      | 82         | 660                    |
| SDS(H)02-05S12  | 4.5 ~ 9     | 12             | 167                       | 42                      | 84         | 550                    |
| SDS(H)02-05S15  | 4.5 ~ 9     | 15             | 134                       | 42                      | 85         | 440                    |
| SDS(H)02-05S24  | 4.5 ~ 9     | 24             | 83                        | 42                      | 85         | 200                    |
| SDS(H)02-05D05  | 4.5 ~ 9     | ±5             | ±200                      | 42                      | 81         | ±660                   |
| SDS(H)02-05D12  | 4.5 ~ 9     | ±12            | ±83                       | 42                      | 85         | ±330                   |
| SDS(H)02-05D15  | 4.5 ~ 9     | ±15            | ±67                       | 42                      | 85         | ±220                   |
| SDS(H)02-12S3P3 | 9 ~ 18      | 3.3            | 500                       | 24                      | 78         | 2200                   |
| SDS(H)02-12S05  | 9 ~ 18      | 5              | 400                       | 24                      | 81         | 1000                   |
| SDS(H)02-12S09  | 9 ~ 18      | 9              | 222                       | 28                      | 82         | 660                    |
| SDS(H)02-12S12  | 9 ~ 18      | 12             | 167                       | 28                      | 84         | 550                    |
| SDS(H)02-12S15  | 9 ~ 18      | 15             | 134                       | 28                      | 85         | 440                    |
| SDS(H)02-12S24  | 9 ~ 18      | 24             | 83                        | 28                      | 85         | 200                    |
| SDS(H)02-12D05  | 9 ~ 18      | ±5             | ±200                      | 28                      | 81         | ±660                   |
| SDS(H)02-12D12  | 9 ~ 18      | ±12            | ±83                       | 28                      | 85         | ±330                   |
| SDS(H)02-12D15  | 9 ~ 18      | ±15            | ±67                       | 28                      | 86         | ±220                   |
| SDS(H)02-24S3P3 | 18 ~ 36     | 3.3            | 500                       | 10                      | 78         | 2200                   |
| SDS(H)02-24S05  | 18 ~ 36     | 5              | 400                       | 10                      | 81         | 1000                   |
| SDS(H)02-24S09  | 18 ~ 36     | 9              | 222                       | 14                      | 82         | 660                    |
| SDS(H)02-24S12  | 18 ~ 36     | 12             | 167                       | 14                      | 84         | 550                    |
| SDS(H)02-24S15  | 18 ~ 36     | 15             | 134                       | 14                      | 85         | 440                    |
| SDS(H)02-24S24  | 18 ~ 36     | 24             | 83                        | 14                      | 85         | 200                    |
| SDS(H)02-24D05  | 18 ~ 36     | ±5             | ±200                      | 14                      | 81         | ±660                   |
| SDS(H)02-24D12  | 18 ~ 36     | ±12            | ±83                       | 14                      | 85         | ±330                   |
| SDS(H)02-24D15  | 18 ~ 36     | ±15            | ±67                       | 14                      | 86         | ±220                   |
| SDS(H)02-48S3P3 | 36 ~ 75     | 3.3            | 500                       | 7                       | 77         | 2200                   |
| SDS(H)02-48S05  | 36 ~ 75     | 5              | 400                       | 7                       | 81         | 1000                   |
| SDS(H)02-48S09  | 36 ~ 75     | 9              | 222                       | 8                       | 82         | 660                    |
| SDS(H)02-48S12  | 36 ~ 75     | 12             | 167                       | 8                       | 84         | 550                    |
| SDS(H)02-48S15  | 36 ~ 75     | 15             | 134                       | 8                       | 85         | 440                    |
| SDS(H)02-48S24  | 36 ~ 75     | 24             | 83                        | 8                       | 85         | 200                    |
| SDS(H)02-48D05  | 36 ~ 75     | ±5             | ±200                      | 8                       | 81         | ±660                   |
| SDS(H)02-48D12  | 36 ~ 75     | ±12            | ±83                       | 8                       | 85         | ±330                   |
| SDS(H)02-48D15  | 36 ~ 75     | ±15            | ±67                       | 8                       | 85         | ±220                   |

## INPUT SPECIFICATIONS

| Parameter                                                                           | Conditions                                                                                                                                | Min.                          | Typ.                 | Max.                  | Unit     |
|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|----------------------|-----------------------|----------|
| Operating input voltage range                                                       | 5Vin(nom)<br>12Vin(nom)<br>24Vin(nom)<br>48Vin(nom)                                                                                       | 4.5<br>9<br>18<br>36          | 5<br>12<br>24<br>48  | 9<br>18<br>36<br>75   | VDC      |
| Start up time                                                                       | Constant resistive load<br>Power up<br>Remote ON/OFF                                                                                      |                               | 10<br>10             | 20<br>20              | ms       |
| Input surge voltage                                                                 | 1 second, max.<br>5Vin(nom)<br>12Vin(nom)<br>24Vin(nom)<br>48Vin(nom)                                                                     |                               |                      | 15<br>25<br>50<br>100 | VDC      |
| Input reflected ripple current                                                      | With external components.<br>5Vin(nom)<br>12Vin(nom)<br>24Vin(nom)<br>48Vin(nom)                                                          |                               | 30<br>30<br>30<br>30 |                       | mAp-p    |
| Input filter                                                                        |                                                                                                                                           | Capacitor type                |                      |                       |          |
| Remote ON/OFF                                                                       | Ctrl pin applied current via 1kΩ<br>DC-DC ON<br>DC-DC OFF<br>Remote off input current<br><br>Application circuit<br>DC-DC ON<br>DC-DC OFF | Open or high impedance<br>2.0 | 3.0                  | 4.0<br>2.5            | mA<br>mA |
|  |                                                                                                                                           |                               |                      |                       |          |

## OUTPUT SPECIFICATIONS

| Parameter                        | Conditions                             | Min.                           | Typ. | Max.         | Unit  |
|----------------------------------|----------------------------------------|--------------------------------|------|--------------|-------|
| Voltage accuracy                 |                                        | -1.0                           |      | +1.0         | %     |
| Line regulation                  | Low Line to High Line at Full Load     | -0.2                           |      | +0.2         | %     |
| Load regulation                  | No Load to Full Load<br>Single<br>Dual | -1.0<br>-1.0                   |      | +1.0<br>+1.0 | %     |
|                                  | 10% Load to 90% Load<br>Single<br>Dual | -0.5<br>-0.8                   |      | +0.5<br>+0.8 |       |
| Cross regulation                 | Asymmetrical load 25%/100% FL<br>Dual  | -5.0                           |      | +5.0         | %     |
| Ripple and noise                 | Measured by 20MHz bandwidth            |                                | 50   |              | mVp-p |
| Temperature coefficient          |                                        | -0.02                          |      | +0.02        | %/°C  |
| Transient response recovery time | 25% load step change                   |                                | 250  |              | μs    |
| Short circuit protection         |                                        | Continuous, automatic recovery |      |              |       |

## GENERAL SPECIFICATIONS

| Parameter             | Conditions                         | Min.         | Typ. | Max.                         | Unit |
|-----------------------|------------------------------------|--------------|------|------------------------------|------|
| Isolation voltage     | 1 minute<br>Standard<br>Suffix "H" | 1600<br>3000 |      |                              | VDC  |
| Isolation resistance  | 500VDC                             | 1            |      |                              | GΩ   |
| Isolation capacitance | Standard<br>Suffix "H"             |              |      | 50<br>50                     | pF   |
| Switching frequency   |                                    | 100          |      |                              | kHz  |
| Safety meets          |                                    |              |      | IEC/ EN/ UL62368-1           |      |
| Case material         |                                    |              |      | Non-conductive black plastic |      |
| Base material         |                                    |              |      | Non-conductive black plastic |      |
| Potting material      |                                    |              |      | Silicone (UL94 V-0)          |      |
| Weight                |                                    |              |      | 2.7g (0.10oz)                |      |
| MTBF                  | MIL-HDBK-217F, Full load           |              |      | 6.670 x 10 <sup>6</sup>      | hrs  |

## ENVIRONMENTAL SPECIFICATIONS

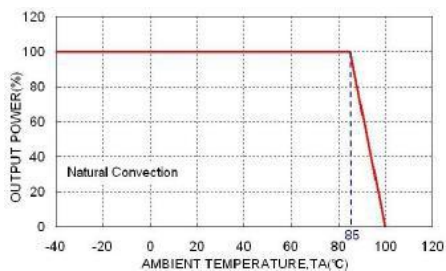
| Parameter                       | Conditions        | Min. | Typ. | Max.                      | Unit |
|---------------------------------|-------------------|------|------|---------------------------|------|
| Operating ambient temperature   | Without derating  | -40  |      | +85                       | °C   |
| Maximum case temperature        |                   |      |      | 105                       | °C   |
| Storage temperature range       |                   | -55  |      | +125                      | °C   |
| Thermal shock                   |                   |      |      | MIL-STD-810F              |      |
| Vibration                       |                   |      |      | MIL-STD-810F              |      |
| Relative humidity               |                   |      |      | 5% to 95% RH              |      |
| Lead-free reflow solder process | Only for SMD type |      |      | IPC J-STD-020E            |      |
| Moisture sensitivity level(MSL) | Only for SMD type |      |      | IPC J-STD-033C<br>Level 2 |      |

## EMC SPECIFICATIONS

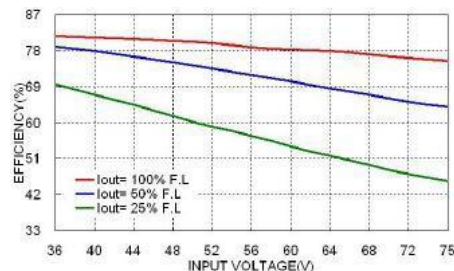
| Parameter                      | Conditions  | Level                                                                                          |
|--------------------------------|-------------|------------------------------------------------------------------------------------------------|
| EMI                            | EN55032     | Class A, Class B                                                                               |
| EMS                            | EN55024     |                                                                                                |
| ESD                            | EN61000-4-2 | Air ± 8kV and Contact ± 6kV                                                                    |
| Radiated immunity              | EN61000-4-3 | 10 V/m                                                                                         |
| Fast transient                 | EN61000-4-4 | ± 2kV                                                                                          |
| Surge                          | EN61000-4-5 | With an external input filter capacitor<br>(Nippon chemi-con KY series, 220 µF/100V.)<br>± 1kV |
| Conducted immunity             | EN61000-4-6 | 10 Vr.m.s                                                                                      |
| Power frequency magnetic field | EN61000-4-8 | 100A/m continuous; 1000A/m 1 second                                                            |

**CAUTION:** This power module is not internally fused. An input line fuse must always be used.

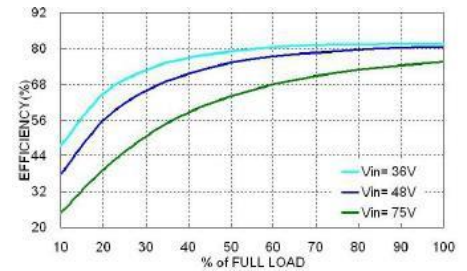
## CHARACTERISTIC CURVE



SDS(H)02-48S05 Derating Curve



SDS(H)02-48S05 Efficiency vs. Input Voltage



SDS(H)02-48S05 Efficiency vs. Output Current

## FUSE CONSIDERATION

This power module is not internally fused. An input line fuse must always be used.

This encapsulated power module can be used in a wide variety of applications, ranging from simple stand-alone operation to an integrated part of sophisticated power architecture.

To maximum flexibility, internal fusing is not included; however, to achieve maximum safety and system protection, always use an input line fuse.

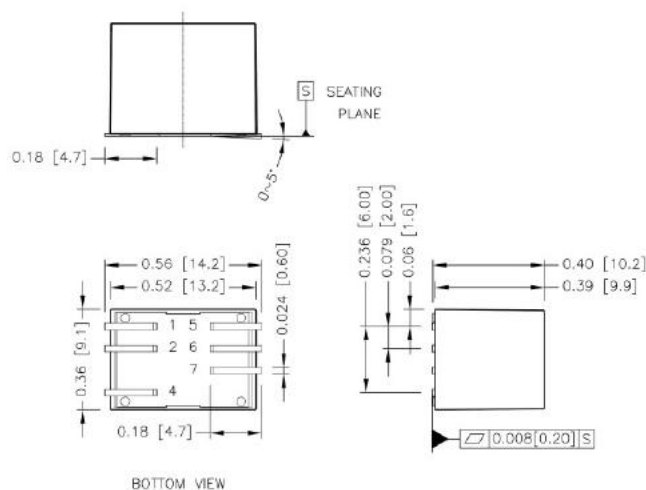
The input line fuse suggest as below :

| Model                         | Fuse Rating<br>(A) | Fuse Type |
|-------------------------------|--------------------|-----------|
| SDS(H)02-05S□□、SDS(H)02-05D□□ | 1                  | Slow-Blow |
| SDS(H)02-12S□□、SDS(H)02-12D□□ | 0.5                | Slow-Blow |
| SDS(H)02-24S□□、SDS(H)02-24D□□ | 0.315              | Slow-Blow |
| SDS(H)02-48S□□、SDS(H)02-48D□□ | 0.16               | Slow-Blow |

The table based on the information provided in this data sheet on inrush energy and maximum DC input current at low Vin...

## MECHANICAL DRAWING

## SDS02: SMD TYPE

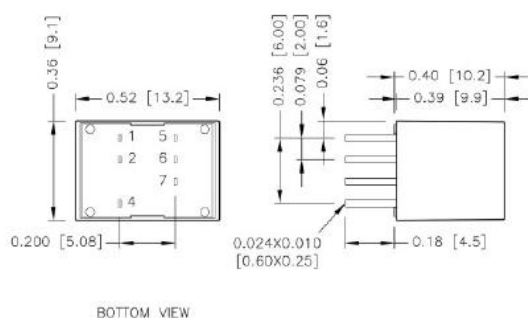


## PIN CONNECTION

| PIN | SINGLE | DUAL   |
|-----|--------|--------|
| 1   | +Vin   | +Vin   |
| 2   | -Vin   | -Vin   |
| 4   | Ctrl   | Ctrl   |
| 5   | NC     | -Vout  |
| 6   | -Vout  | Common |
| 7   | +Vout  | +Vout  |

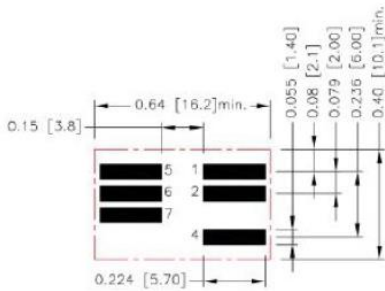
1. All dimensions in inch [mm]
2. Tolerance :x.xx±0.02 [x.x±0.5]  
x.xxx±0.010 [x.xx±0.25]
3. Pin dimension tolerance ±0.004[0.10]

## SDH02: DIP TYPE



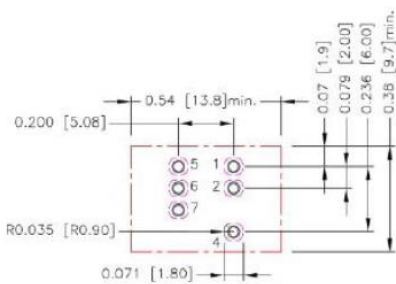
RECOMMENDED PAD LAYOUT

SMD TYPE



All dimensions in inch[mm]  
Pad size(lead free recommended)  
Top view pad:0.224x0.055[5.70x1.40]

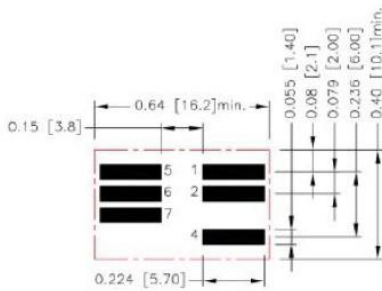
DIP TYPE



All dimensions in inch[mm]  
Pad size(lead free recommended)  
Through hole 1.2.4.5.6.7:  $\varnothing 0.035$ [0.90]  
Top view pad 1.2.4.5.6.7:  $\varnothing 0.044$ [1.13]  
Bottom view pad 1.2.4.5.6.7:  
Groove R0.035[0.90]L-0.071[1.80]

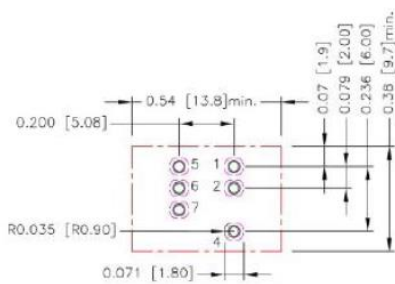
RECOMMENDED PAD LAYOUT

SMD TYPE



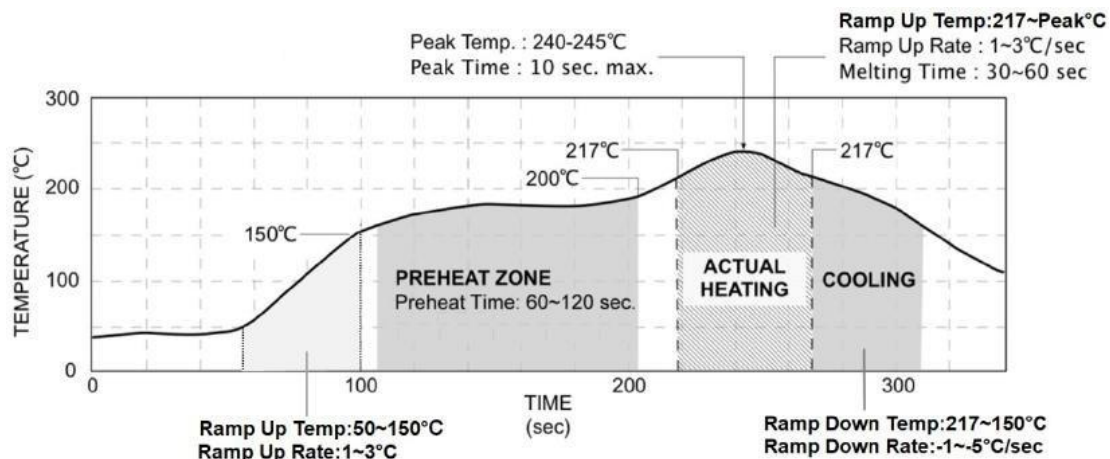
All dimensions in inch[mm]  
Pad size(lead free recommended)  
Top view pad:0.224x0.055[5.70x1.40]

DIP TYPE



All dimensions in inch[mm]  
Pad size(lead free recommended)  
Through hole 1.2.4.5.6.7:  $\varnothing 0.035$ [0.90]  
Top view pad 1.2.4.5.6.7:  $\varnothing 0.044$ [1.13]  
Bottom view pad 1.2.4.5.6.7:  
Groove R0.035[0.90]L-0.071[1.80]

## LEAD FREE REFLOW PROFILE For SMD Type



\*The curves define the maximum peak reflow temperature permissible measured on pin1 or Vin pin.