

# 3 Watt

# 4Pin SIL-Package K



- o Unregulated Output
- o 3000 VDC I/O-Isolation
- o Low Ripple and Noise
- o Efficiency up to 91%
- o EMI Complies With EN55032 Class B



| MODEL NUMBER | INPUT VOLTAGE | OUTPUT VOLTAGE | INPUT CURRENT |            | OUTPUT CURRENT | %EFF   | CAPACITIVE LOAD (MAX.) |
|--------------|---------------|----------------|---------------|------------|----------------|--------|------------------------|
|              |               |                | NO LOAD       | FULL LOAD  | FULL LOAD      |        |                        |
| 3KUS5N5M     | 5 VDC         | 5 VDC          | 50 mA max.    | 723 mA     | 600 mA         | 83     | 3300 $\mu$ F           |
| 3KUS5N9M     |               | 9 VDC          | 60 mA max.    | 690 mA     | 333 mA         | 87     | 1200 $\mu$ F           |
| 3KUS5N12M    |               | 12 VDC         | 55 mA max.    | 682 mA     | 250 mA         | 88     | 1000 $\mu$ F           |
| 3KUS5N15M    |               | 15 VDC         | 60 mA max.    |            | 200 mA         |        | 820 $\mu$ F            |
| 3KUS12N5M    | 12 VDC        | 5 VDC          | 25 mA max.    | 294 mA     | 600 mA         | 85     | 3300 $\mu$ F           |
| 3KUS12N9M    |               | 9 VDC          | 30 mA max.    | 281 mA     | 333 mA         | 89     | 1200 $\mu$ F           |
| 3KUS12N12M   |               | 12 VDC         |               | 278 mA     | 250 mA         | 90     | 1000 $\mu$ F           |
| 3KUS12N15M   |               | 15 VDC         |               | 275 mA     | 200 mA         | 91     | 820 $\mu$ F            |
| 3KUS24N5M    | 24 VDC        | 5 VDC          |               | 15 mA max. | 147 mA         | 600 mA | 85                     |
| 3KUS24N9M    |               | 9 VDC          | 141 mA        |            | 333 mA         | 89     | 1200 $\mu$ F           |
| 3KUS24N12M   |               | 12 VDC         | 139 mA        |            | 250 mA         | 90     | 1000 $\mu$ F           |
| 3KUS24N15M   |               | 15 VDC         | 138 mA        |            | 200 mA         | 91     | 820 $\mu$ F            |

**SPECIFICATIONS**

All Specifications Typical At Nominal Line, Full Load, and 25°C Unless Otherwise Noted

**INPUT SPECIFICATIONS**

|                                              |                                           |            |
|----------------------------------------------|-------------------------------------------|------------|
| Input Voltage Range                          |                                           | ±10% max.  |
| Input Current (No Load)                      |                                           | see table  |
| Input Current (Full Load)                    |                                           | see table  |
| Input Reflected Ripple Current <sup>1)</sup> |                                           | 20 mA p-p  |
| Start Up Time                                | (Nominal Vin and constant resistive load) | 20 mS      |
| Input Filter                                 |                                           | Capacitors |

**OUTPUT SPECIFICATIONS**

|                                             |  |                          |
|---------------------------------------------|--|--------------------------|
| Voltage Accuracy                            |  | ±3% max.                 |
| Ripple and Noise at 20 MHz BW <sup>2)</sup> |  | 100 mV p-p max.          |
| Temperature Coefficient                     |  | ±0.02%/°C                |
| Capacitor Load <sup>3)</sup>                |  | see table                |
| Line Regulation                             |  | ±1.2%/1% Vin Change max. |
| Load Regulation (from 10% to 100% Load)     |  | ±10% max.                |

**NOTE:**

1. Measured Input reflected ripple current with a simulated source inductance of 12 µH and a source capacitor Cin (10 µF, ESR <1.0 Ohm at 100 kHz).
2. Ripple/Noise measured with a 10 µF electrolytic capacitor and 0.1 µF ceramic capacitor.

**ABSOLUTE SPECIFICATIONS**

These are stress ratings. Exposure of devices to any of these conditions may adversely affect long-term reliability.

|                                                       |      |             |
|-------------------------------------------------------|------|-------------|
| Input Surge Voltage (100 mS max.)                     | 5 V  | 7 VDC max.  |
|                                                       | 12 V | 15 VDC max. |
|                                                       | 24 V | 28 VDC max. |
| Soldering Temperature (1.5 mm from case 10 sec. max.) |      | +260°C max. |

**NOTE:**

Exceeding the absolute ratings of the unit could cause damage. It is not allowed for continuous operating ratings.

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| <b>GENERAL SPECIFICATION</b>                |                                                                        |
|---------------------------------------------|------------------------------------------------------------------------|
| Efficiency                                  | see table                                                              |
| I/O Isolation Voltage (60 sec)              | 3000 VDC                                                               |
| I/O Isolation Resistance                    | 1000 MOhms                                                             |
| I/O Isolation Capacitance                   | 65 pF max.                                                             |
| Switching Frequency                         | 40-70 kHz                                                              |
| Operating Temperature Range                 | -40°C to +100°C (see Derating Curve)<br>-40°C to +90°C (For 100% Load) |
| Storage Temperature Range                   | -55°C to +125°C                                                        |
| Case Temperature                            | +115°C max.                                                            |
| Cooling <sup>1)</sup>                       | Nature Convection                                                      |
| Humidity                                    | 95% rel H                                                              |
| Reliability Calculated MTBF (MIL-HDBK-217F) | >6.7 Mhrs @ 25°C                                                       |
| Safety Standard (designed to meet)          | IEC/UL/EN 60950-1<br>IEC/UL/EN 62368-1                                 |
| Radiated Emissions                          | EN55032 CLASS B                                                        |
| Conducted Emissions <sup>2)</sup>           | EN55032 CLASS B                                                        |
| ESD                                         | IEC 61000-4-2 Perf. Criteria A                                         |
| RS                                          | IEC 61000-4-3 Perf. Criteria A                                         |
| EFT <sup>3)</sup>                           | IEC 61000-4-4 Perf. Criteria A                                         |
| Surge <sup>3)</sup>                         | IEC 61000-4-5 Perf. Criteria A                                         |
| CS                                          | IEC 61000-4-6 Perf. Criteria A                                         |
| PFMF                                        | IEC 61000-4-8 Perf. Criteria A                                         |
| Dimensions                                  | 11.68 x 7.70 x 10.16 mm (0.46 x 0.30 x 0.40 Inches)                    |
| Case Material                               | Non-conductive Black Plastic (UL94V-0 rated)                           |
| Pin Material                                | C5191R-H Solder-coated                                                 |
| Potting Material                            | Silicon (UL94V-0 rated)                                                |
| Weight                                      | 2.2 g                                                                  |

## Note

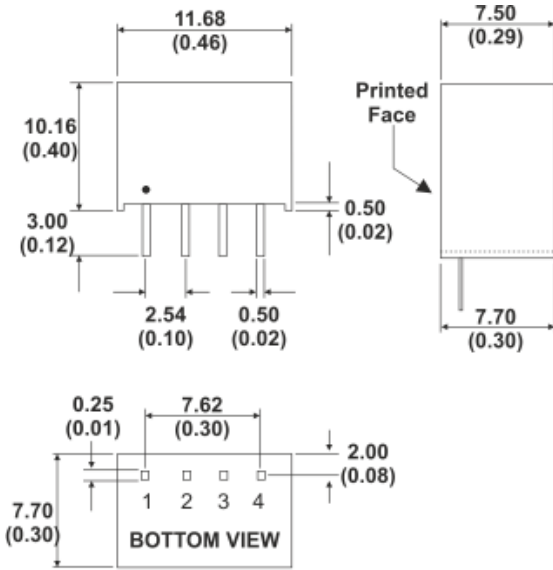
- "Nature Convection" is usually about 30-65 LFM but is not equal to still air (0 LFM).
- Input filter components are required to help meet conducted emission class B, which application refer to the EMI Filter of design & feature configuration.
- An external filter capacitor is required if the module has to meet IEC61000-4-4 and IEC61000-4-5.  
The filter capacitor M+R suggest: two electrolytic capacitors (Ruby-con BXF series, 100 µF/250 V) in parallel.
- Operating under no-load conditions will not damage these devices, however they may not meet all listed specifications.

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**MECHANICAL SPECIFICATIONS**

Case "K"

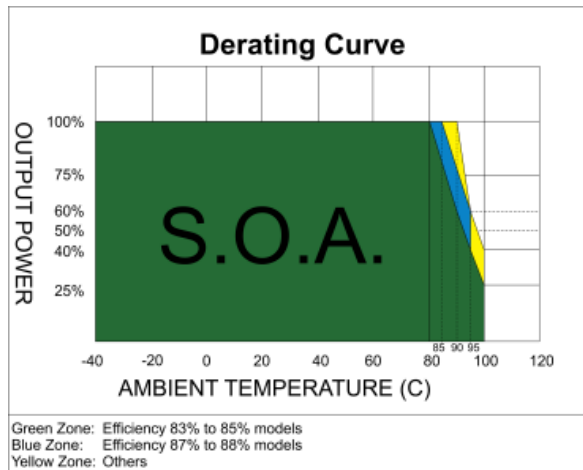


| PIN CONNECTIONS |         |
|-----------------|---------|
|                 | Single  |
| 1               | -INPUT  |
| 2               | +INPUT  |
| 3               | -OUTPUT |
| 4               | +OUTPUT |

All Dimensions in mm (Inches).

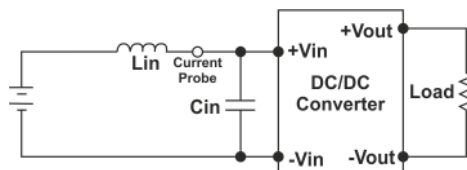
- Tolerances: 1. Pin Diameter  $0.5 \pm 0.05$  ( $0.02 \pm 0.002$ )
- 2. Pin Pitch Tolerance  $\pm 0.35$  ( $\pm 0.014$ )
- 3. Pin to Case Tolerance  $\pm 0.5$  ( $\pm 0.02$ )
- 4. Case Tolerance  $\pm 0.5$  ( $\pm 0.02$ )

**DIAGRAMS & APPLICATIONS**



**Input Reflected Ripple Current Test Step**

Input reflected ripple current is measured through a source inductor  $L_{in}$  (12  $\mu$ H) and a source capacitor  $C_{in}$  (10  $\mu$ F, ESR<1.0 Ohms at 100 kHz) at nominal input and full load.

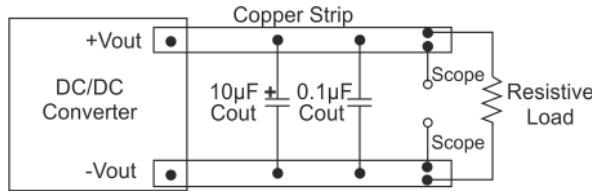


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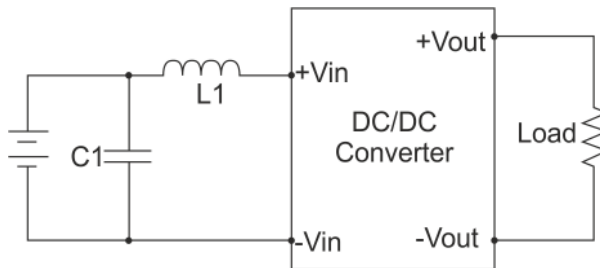
**Output Ripple & Noise Measurement Test**

Use a 10 µF electrolytic capacitor and 0.1 µF ceramic capacitor.  
The Scope measurement bandwidth is 20 MHz.



**EMI Filter (Conducted Emissions)**

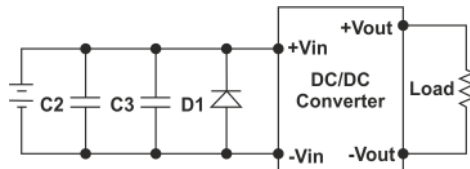
Input filter components (C1, L1) are used to help meet conducted emissions requirement for the module. These components should be mounted as close as possible to the module; and all leads should be minimized to decrease radiated noise.



| EMI FILTER               |                   |        |
|--------------------------|-------------------|--------|
|                          | C1                | L1     |
| 3KUS5NxxM                | 1206, 2.2 µF/50 V | 2.2 µH |
| 3KUS12NxxM<br>3KUS24NxxM | 1206, 4.7 µF/50 V | 4.7 µH |

**EFT/Surge Filter**

Input components (C2, C3, D1) are used to help meet IEC61000-4-4 and IEC61000-4-5.



| EFT/SURGE FILTER |               |               |          |
|------------------|---------------|---------------|----------|
|                  | C2            | C3            | D1       |
| 3KUS5NxxM        | 100 µF, 250 V | 100 µF, 250 V | SMDJ8.0A |
| 3KUS12NxxM       | 100 µF, 250 V | 100 µF, 250 V | SMDJ16A  |
| 3KUS24NxxM       | 100 µF, 250 V | 100 µF, 250 V | SMDJ30A  |

**NOTICE:**  
The information in this document has been carefully checked. However, no responsibility is assumed for inaccuracies! Specifications can be changed without notice. The latest and most complete information can be found on our website.