

2 Watt

24 Pin DIL Package V



- o Pi Input Filter
- o Regulated Output
- o Single & Dual Output
- o Continuous Short Circuit Protection
- o 1000 VDC I/O-Isolation
3000 VDC I/O-Isolation add Suffix „H3“
4000 VDC I/O-Isolation add Suffix „H4“
5200 VDC I/O-Isolation add Suffix „H5“
6000 VDC I/O-Isolation add Suffix „H6“
- o Metal Case Available (up to 3000 VDC Isolation)
- o Efficiency up to 81%



| MODEL NUMBER | INPUT VOLTAGE | OUTPUT VOLTAGE | OUTPUT CURRENT | INPUT CURRENT | | Eff. % | Capacitor Load (µF) |
|--------------|---------------|----------------|----------------|---------------|-----------|--------|---------------------|
| | | | | NO LOAD | FULL LOAD | | |
| 2VRS5N3.3M | 5 VDC | 3.3 VDC | 500 mA | 65 mA | 569 mA | 58 | 330 |
| 2VRS5N5M | | 5 VDC | 400 mA | 42 mA | 588 mA | 68 | |
| 2VRS5N7.2M | | 7.2 VDC | 278 mA | 50 mA | | | |
| 2VRS5N9M | | 9 VDC | 222 mA | 55 mA | 571 mA | 70 | |
| 2VRS5N12M | | 12 VDC | 167 mA | 52 mA | 563 mA | 71 | |
| 2VRS5N15M | | 15 VDC | 133 mA | 55 mA | 588 mA | 68 | |
| 2VRS5N18M | | 18 VDC | 111 mA | | 597 mA | 67 | |
| 2VRS5N24M | | 24 VDC | 83.3 mA | 95 mA | 606 mA | 66 | |
| 2VRD5N3.3M | | ±3.3 VDC | ±300 mA | 13 mA | 606 mA | 66 | ±1000 |
| 2VRD5N5M | | ±5 VDC | ±200 mA | 15 mA | 548 mA | 73 | |
| 2VRD5N7.2M | | ±7.2 VDC | ±278 mA | 20 mA | | | |
| 2VRD5N9M | | ±9 VDC | ±111 mA | 60 mA | 526 mA | 76 | ±470 |
| 2VRD5N12M | | ±12 VDC | ±83.3 mA | 20 mA | 563 mA | 71 | |
| 2VRD5N15M | | ±15 VDC | ±67 mA | 25 mA | 556 mA | 72 | |
| 2VRD5N18M | | ±18 VDC | ±111 mA | 42 mA | | | |
| 2VRD5N24M | | ±24 VDC | ±42 mA | 40 mA | | | ±220 |

SPECIFICATIONS

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

| MODEL NUMBER | INPUT VOLTAGE | OUTPUT VOLTAGE | OUTPUT CURRENT | INPUT CURRENT | | Eff. % | Capacitor Load (µF) | |
|--------------|---------------|----------------|----------------|---------------|-----------|--------|---------------------|-------|
| | | | | NO LOAD | FULL LOAD | | | |
| 2VRS12N3.3M | 12 VDC | 3.3 VDC | 500 mA | 35 mA | 225 mA | 61 | 330 | |
| 2VRS12N5M | | 5 VDC | 400 mA | 20 mA | 256 mA | 65 | | |
| 2VRS12N7.2M | | 7.2 VDC | 278 mA | 25 mA | | | | |
| 2VRS12N9M | | 9 VDC | 222 mA | 31 mA | 238 mA | 70 | | |
| 2VRS12N12M | | 12 VDC | 167 mA | 30 mA | 231 mA | 72 | | |
| 2VRS12N15M | | 15 VDC | 133 mA | 35 mA | 238 mA | 70 | | |
| 2VRS12N18M | | 18 VDC | 111 mA | 40 mA | | | | |
| 2VRS12N24M | | 24 VDC | 83.3 mA | | 235 mA | 71 | | |
| 2VRD12N3.3M | | ±3.3 VDC | ±300 mA | 6 mA | 231 mA | 72 | | ±1000 |
| 2VRD12N5M | | ±5 VDC | ±200 mA | 7 mA | 219 mA | 76 | | |
| 2VRD12N7.2M | | ±7.2 VDC | ±278 mA | 10 mA | 222 mA | 75 | ±470 | |
| 2VRD12N9M | | ±9 VDC | ±111 mA | | | | | |
| 2VRD12N12M | | ±12 VDC | ±83.3 mA | 12 mA | 208 mA | 80 | | |
| 2VRD12N15M | | ±15 VDC | ±67 mA | 15 mA | | | | |
| 2VRD12N18M | | ±18 VDC | ±111 mA | 20 mA | 222 mA | 75 | ±220 | |
| 2VRD12N24M | | ±24 VDC | ±42 mA | | 216 mA | 77 | | |
| 2VRS24N3.3M | | 24 VDC | 3.3 VDC | 600 mA | 15 mA | 139 mA | 60 | 330 |
| 2VRS24N5M | | | 5 VDC | 400 mA | | 121 mA | 69 | |
| 2VRS24N7.2M | 7.2 VDC | | 278 mA | 20 mA | 126 mA | 66 | | |
| 2VRS24N9M | 9 VDC | | 222 mA | 25 mA | 128 mA | 65 | | |
| 2VRS24N12M | 12 VDC | | 167 mA | 20 mA | 121 mA | 69 | | |
| 2VRS24N15M | 15 VDC | | 133 mA | | | | | |
| 2VRS24N18M | 18 VDC | | 111 mA | | | | | |
| 2VRS24N24M | 24 VDC | | 83.3 mA | 116 mA | 72 | | | |
| 2VRD24N3.3M | ±3.3 VDC | | ±300 mA | 5 mA | 114 mA | 73 | ±1000 | |
| 2VRD24N5M | ±5 VDC | | ±200 mA | | 107 mA | 78 | | |
| 2VRD24N7.2M | ±7.2 VDC | | ±278 mA | 6 mA | 104 mA | 80 | ±470 | |
| 2VRD24N9M | ±9 VDC | | ±111 mA | | 103 mA | 81 | | |
| 2VRD24N12M | ±12 VDC | | ±83.3 mA | | | | | |
| 2VRD24N15M | ±15 VDC | | ±67 mA | 10 mA | 107 mA | 78 | | |
| 2VRD24N18M | ±18 VDC | | ±111 mA | | 110 mA | 76 | | |
| 2VRD24N24M | ±24 VDC | | ±42 mA | | 15 mA | 107 mA | 78 | ±220 |

SPECIFICATIONS

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

INPUT SPECIFICATIONS

| | |
|--|-----------|
| Input Voltage Range | ±10% |
| Input Filter | Pi Type |
| Input Reflected Ripple Current ¹⁾ | 35 mA p-p |

OUTPUT SPECIFICATIONS

| | | | | | | | |
|--|--|-------------------------------|------------|-----------------------------|----------------------------|------------------------------------|------------|
| Voltage Accuracy | ±2% | | | | | | |
| Temperature Coefficient | ±0.02%/°C | | | | | | |
| Ripple and Noise, 20MHz BW ²⁾ | 75 mV p-p max. | | | | | | |
| Short Circuit Protection | Indefinite (Automatic Recovery) | | | | | | |
| Capacitor Load ³⁾ | see table | | | | | | |
| Transient Recovery Time ⁴⁾ | ±3% max. | | | | | | |
| Transient Response Deviation ⁴⁾ | (3.3 V Output ±5% max.) | | | | | | |
| Line Regulation | ±0.5% max. | | | | | | |
| Load Regulation | <table border="0"> <tr> <td>Single (From 0% to 100% Load)</td> <td>±1.0% max.</td> </tr> <tr> <td>Dual (From 0% to 100% Load)</td> <td>±0.5% max. (balanced Load)</td> </tr> <tr> <td>Single & Dual (Output 3.3 V Model)</td> <td>±2.0% max.</td> </tr> </table> | Single (From 0% to 100% Load) | ±1.0% max. | Dual (From 0% to 100% Load) | ±0.5% max. (balanced Load) | Single & Dual (Output 3.3 V Model) | ±2.0% max. |
| Single (From 0% to 100% Load) | ±1.0% max. | | | | | | |
| Dual (From 0% to 100% Load) | ±0.5% max. (balanced Load) | | | | | | |
| Single & Dual (Output 3.3 V Model) | ±2.0% max. | | | | | | |

NOTE:

1. Measured Input reflected ripple current with a simulated source inductance of 12 µH.
2. Ripple & Noise measured with 20 MHz bandwidth.
3. Tested by minimal Vin and constant resistive load.
4. Tested by normal Vin and 25% Load Step Change (75%-50%-25% of Io).

ABSOLUTE MAXIMUM RATINGS

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

| | | |
|--|------|-------------|
| Input Surge Voltage (100 mS) | 5 V | 7 VDC max. |
| | 12 V | 15 VDC max. |
| | 24 V | 28 VDC max. |
| Lead 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.
Operation under no-load conditions will not damage these devices, however they may not meet all listed specifications.

SPECIFICATIONS

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

| GENERAL SPECIFICATION | | |
|---|----------------------------|---|
| Efficiency | | see table |
| I/O Isolation Voltage (60 sec.) ¹⁾ | | 1000 VDC min. |
| Suffix "H3" | | 3000 VDC min. |
| Suffix "H4" | | 4000 VDC min. |
| Suffix "H5" | | 5200 VDC min. |
| Suffix "H6" | | 6000 VDC min. |
| Isolation Resistance | | 1000 Mohms |
| Isolation Capacitance | | 60 pF |
| Switching Frequency | Single Dual | 40 kHz 250 kHz |
| Operating Temperature Range | | -40°C to +85°C (see derating curve) |
| Case Temperature | | +100°C max. |
| Storage Temperature Range | | -40°C to +125°C |
| Humidity | | 95% rel H |
| Cooling | | Nature Convection |
| Reliability Calculated MTBF (MIL-HDBK-217F) | | >1 Mhrs |
| Case Material Standard Model | | Non-Conductive Black Plastic (UL94V-0 rated) |
| Case Material Suffix "A" Model | | Nickel-Coated Copper |
| Base Material | | Non-conductive Black Plastic (UL94V-0 rated) |
| Pin Material | | 0.5 mm Alloy42 Solder-coated ø0.5 mm Brass Solder-coated |
| Potting Material | | Epoxy (UL94V-0 rated) |
| Weight | Plastic Case Metal Case | 12.5 g 15.0 g |
| Dimensions | | 31.75 x 20.32 x 10.16 mm (1.25 x 0.8 x 0.4 Inches) |
| Safety Standard (designed to meet) | | IEC 60950-1 |
| Radiated Emissions | | EN55022 Class A |
| Conducted Emissions ²⁾ | | EN55022 Class A |
| ESD | | IEC61000-4-2 Perf. Criteria A |
| RS | | IEC61000-4-3 Perf. Criteria A |
| EFT ³⁾ | | IEC61000-4-4 Perf. Criteria A |
| Surge ³⁾ | | IEC61000-4-5 Perf. Criteria A |
| CS | | IEC61000-4-6 Perf. Criteria A |
| PFMF | | IEC61000-4-8 Perf. Criteria A |

NOTE:

1. Isolation Voltage Input & Output for metal case up to 3000 VDC min. only available.
2. Input Filter Components are be required to help meet conducted emission class A, which application refer to the EMI Filter of design & feature configuration.
3. 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: Nippon - chemi - con KY series, 220 µF/ 100 V.

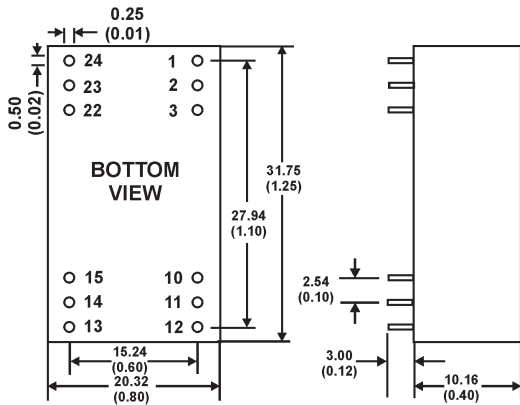
SPECIFICATIONS

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

MECHANICAL SPECIFICATIONS

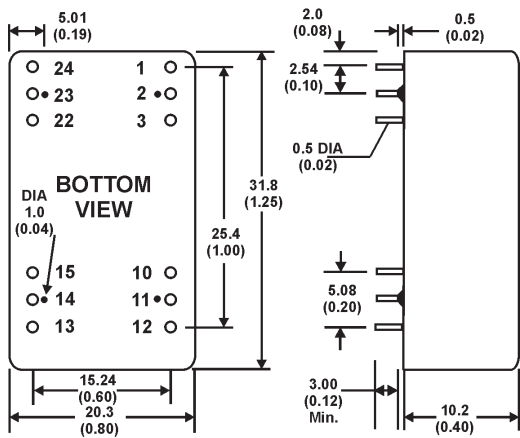
CASE "V"

Non Conductive Black Plastic



All Dimensions in mm (Inches).
 1. Pin diameter: 0.5 ± 0.05 (0.02 ± 0.002)
 2. Pin pitch tolerance: ± 0.35 (± 0.014)
 3. Case tolerance: ± 0.5 (± 0.02)

Nickel-Coated Copper



All Dimensions in mm (Inches)
 Tolerances:
 1. Pin diameter: 0.5 ± 0.05 (0.02 ± 0.002)
 2. Pin pitch and length tolerance: ± 0.35 (± 0.014)
 3. Case tolerance: ± 0.5 (± 0.02)
 4. Stand-off tolerance: ± 0.1 (± 0.004)

| PIN CONNECTIONS 1000 VDC | | |
|--------------------------|---------------|---------|
| PIN | SINGLE | DUAL |
| 1 & 24 | +INPUT | +INPUT |
| 2 & 23 | NOT CONNECTED | -OUTPUT |
| 3 & 22 | NOT CONNECTED | COMMON |
| 9 & 16 | NO PIN | NO PIN |
| 10 & 15 | -OUTPUT | COMMON |
| 11 & 14 | +OUTPUT | +OUTPUT |
| 12 & 13 | -INPUT | -INPUT |

* Option "No Pin" at Single Output add Suffix "NP" to Part No.

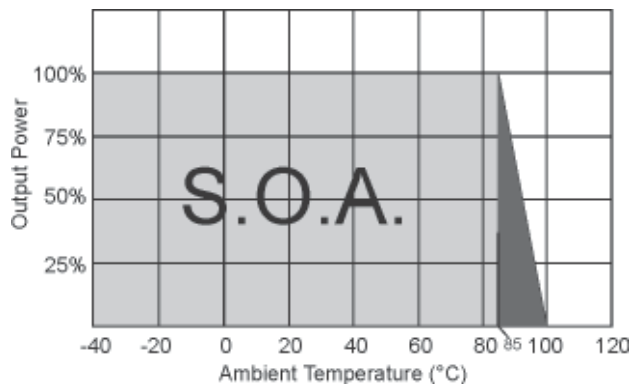
| PIN CONNECTIONS 3000 to 6000 VDC | | |
|----------------------------------|---------|---------|
| PIN | SINGLE | DUAL |
| 1 & 2 | +INPUT | +INPUT |
| 3 & 22 | NO PIN | NO PIN |
| 9 & 16 | NO PIN | NO PIN |
| 10 & 11 | NO PIN | COMMON |
| 12 | -OUTPUT | NO PIN |
| 13 | +OUTPUT | -OUTPUT |
| 14 | NO PIN | NO PIN |
| 15 | NO PIN | +OUTPUT |
| 23 & 24 | -INPUT | -INPUT |

SPECIFICATIONS

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

DIAGRAMS

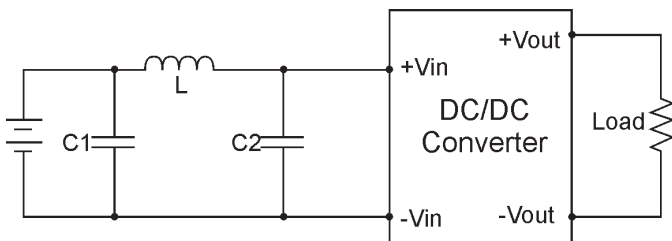
Derating Curve



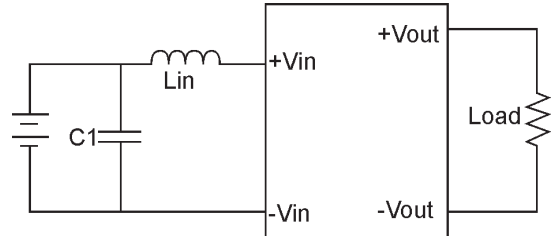
EMI Filter

Input filter components (C1, C2, L) 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.

Single Output



Dual Output



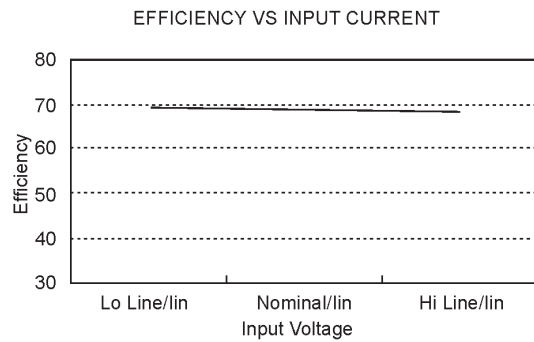
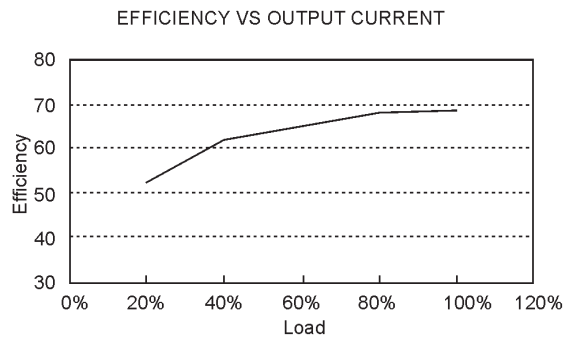
| EMI FILTER | | | |
|--------------|--------------|-------|--------------|
| | C1 | L | C2 |
| 2VRS/D5NxxM | 220 µF/100 V | 12 µH | 220 µF/100 V |
| 2VRS/D12NxxM | 220 µF/100 V | | 220 µF/100 V |
| 2VRS/D24NxxM | 220 µF/100 V | | 220 µF/100 V |

| EMI FILTER | | |
|--------------|--------------|-------|
| | C1 | L |
| 2VRS/D5NxxM | 220 µF/100 V | 12 µH |
| 2VRS/D12NxxM | 220 µF/100 V | |
| 2VRS/D24NxxM | 220 µF/100 V | |

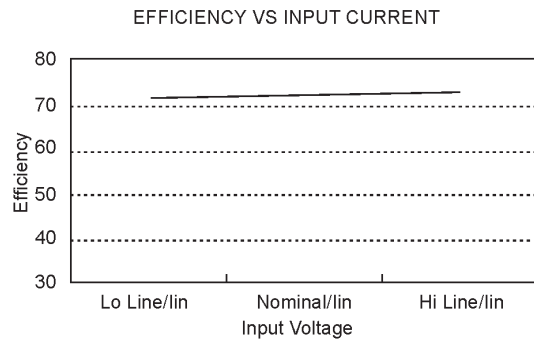
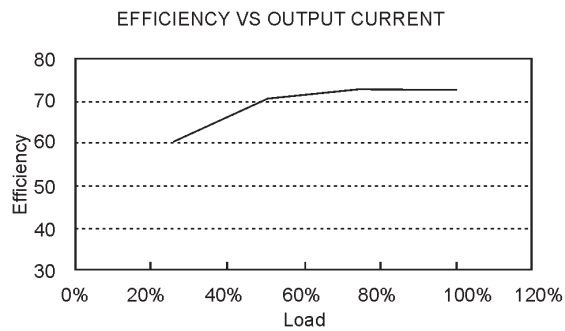
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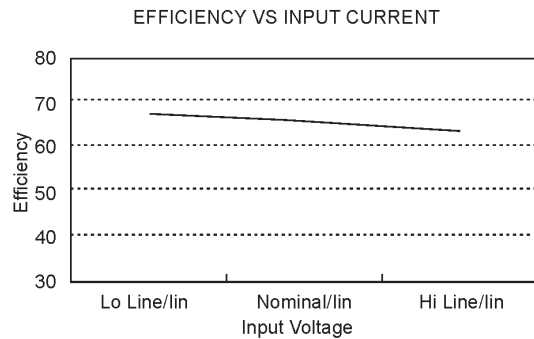
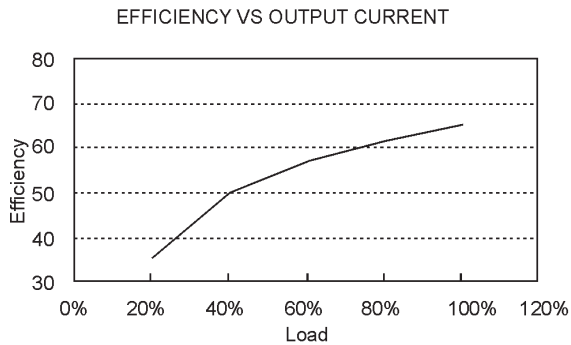
5 Vout Single Models



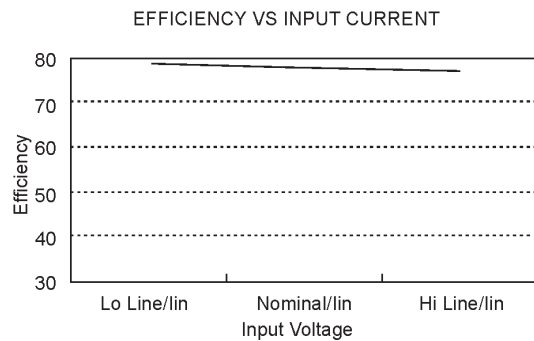
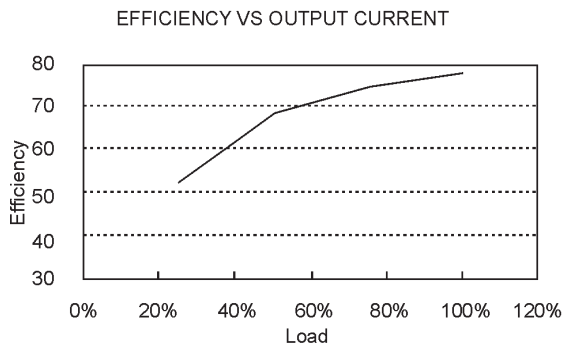
5 Vout Dual Models



24 Vout Single Models



24 Vout Dual Models



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.