

**3 Watt****24 PIN DIL Package V**

- o Efficiency up to 83%
- o Continuous Short Circuit Protection
- o Add Suffix „A“ for Metal Case

- o Isolation Voltage 1000 VDC up to 6000 VDC (Metal Case up to 3000 VDC)

MODEL NUMBER	INPUT VOLTAGE	OUTPUT VOLTAGE	OUTPUT CURRENT FULL LOAD	INPUT CURRENT		%EFF	CAPACITOR LOAD
				NO LOAD	FULL LOAD		
3VRS5N3.3M	5 VDC	3.3 VDC	600 mA	62 mA	683 mA	58	470 $\mu$ F
3VRS5N5M		5 VDC		65 mA	909 mA	66	
3VRS5N7.2M		7.2 VDC	417 mA		923 mA	65	
3VRS5N9M		9 VDC	333 mA	70 mA	882 mA	68	
3VRS5N12M		12 VDC	250 mA	60 mA	845 mA	71	
3VRS5N15M		15 VDC	200 mA	70 mA	833 mA	72	
3VRS5N18M		18 VDC	167 mA		857 mA	70	
3VRS5N24M		24 VDC	125 mA	100 mA	896 mA	67	
3VRD5N3.3M		$\pm$ 3.3 VDC	$\pm$ 400 mA	15 mA	776 mA	68	$\pm$ 1000 $\mu$ F
3VRD5N5M		$\pm$ 5 VDC	$\pm$ 300 mA	20 mA	845 mA	71	$\pm$ 470 $\mu$ F
3VRD5N7.2M		$\pm$ 7.2 VDC	$\pm$ 417 mA		811 mA	74	
3VRD5N9M		$\pm$ 9 VDC	$\pm$ 167 mA	25 mA	789 mA	76	
3VRD5N12M		$\pm$ 12 VDC	$\pm$ 125 mA	40 mA	822 mA	73	
3VRD5N15M		$\pm$ 15 VDC	$\pm$ 100 mA	30 mA	811 mA	74	
3VRD5N18M		$\pm$ 18 VDC	$\pm$ 167 mA	45 mA	822 mA	73	$\pm$ 220 $\mu$ F
3VRD5N24M		$\pm$ 24 VDC	$\pm$ 62.5 mA		800 mA	75	
3VRS12N3.3M	12 VDC	3.3 VDC	600 mA	30 mA	232 mA	71	470 $\mu$ F
3VRS12N5M		5 VDC		36 mA	253 mA	66	
3VRS12N7.2M		7.2 VDC	417 mA	32 mA	235 mA	71	
3VRS12N9M		9 VDC	333 mA		231 mA	72	
3VRS12N12M		12 VDC	250 mA	37 mA	225 mA	74	
3VRS12N15M		15 VDC	200 mA	35 mA	222 mA	75	
3VRS12N18M		18 VDC	167 mA		235 mA	71	
3VRS12N24M		24 VDC	125 mA	55 mA	235 mA	71	
3VRD12N3.3M		$\pm$ 3.3 VDC	$\pm$ 400 mA	7 mA	306 mA	72	$\pm$ 1000 $\mu$ F
3VRD12N5M		$\pm$ 5 VDC	$\pm$ 300 mA	8 mA	321 mA	78	$\pm$ 470 $\mu$ F
3VRD12N7.2M		$\pm$ 7.2 VDC	$\pm$ 417 mA		313 mA	80	
3VRD12N9M		$\pm$ 9 VDC	$\pm$ 167 mA	10 mA	321 mA	78	
3VRD12N12M		$\pm$ 12 VDC	$\pm$ 125 mA		309 mA	81	
3VRD12N15M		$\pm$ 15 VDC	$\pm$ 100 mA	15 mA	316 mA	79	$\pm$ 220 $\mu$ F
3VRD12N18M		$\pm$ 18 VDC	$\pm$ 167 mA		316 mA	79	
3VRD12N24M		$\pm$ 24 VDC	$\pm$ 62.5 mA	20 mA	316 mA	79	

**SPECIFICATIONS**

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

MODEL NUMBER	INPUT VOLTAGE	OUTPUT VOLTAGE	OUTPUT CURRENT FULL LOAD	INPUT CURRENT		%EFF	CAPACITOR LOAD
				NO LOAD	FULL LOAD		
3VRS24N3.3M	24 VDC	3.3 VDC	700 mA	10 mA	158 mA	61	470 $\mu$ F
3VRS24N5M		5 VDC	600 mA	23 mA	187 mA	67	
3VRS24N7.2M		7.2 VDC	417 mA	25 mA	189 mA	66	
3VRS24N9M		9 VDC	333 mA	27 mA	184 mA	68	
3VRS24N12M		12 VDC	250 mA	30 mA	181 mA	69	
3VRS24N15M		15 VDC	200 mA	28 mA	179 mA	70	
3VRS24N18M		18 VDC	167 mA	16 mA	169 mA	74	
3VRS24N24M		24 VDC	125 mA	20 mA	167 mA	75	
3VRD24N3.3M		$\pm$ 3.3 VDC	$\pm$ 455 mA	5 mA	174 mA	72	$\pm$ 1000 $\mu$ F
3VRD24N5M		$\pm$ 5 VDC	$\pm$ 300 mA	6 mA	158 mA	79	$\pm$ 470 $\mu$ F
3VRD24N7.2M		$\pm$ 7.2 VDC	$\pm$ 417 mA	5 mA			
3VRD24N9M		$\pm$ 9 VDC	$\pm$ 167 mA	7 mA	152 mA	82	
3VRD24N12M		$\pm$ 12 VDC	$\pm$ 125 mA	8 mA	151 mA	83	
3VRD24N15M		$\pm$ 15 VDC	$\pm$ 100 mA	10 mA	154 mA	81	
3VRD24N18M		$\pm$ 18 VDC	$\pm$ 167 mA	15 mA	156 mA	80	$\pm$ 220 $\mu$ F
3VRD24N24M		$\pm$ 24 VDC	$\pm$ 62.5 mA	15 mA	154 mA	81	

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**INPUT SPECIFICATIONS**

Input Voltage Range	±10%
Input Filter	Pi type
Input Current (No-Load)	see table
Max. Input Current (Full-Load)	see table
Input Reflected Ripple Current <sup>1)</sup>	35 mA p-p

**OUTPUT SPECIFICATIONS**

Voltage Accuracy	±2%						
Temperature Coefficient	±0.02%/°C						
Capacitive Load <sup>2)</sup>	see table						
Ripple & Noise 20MHz BW <sup>3)</sup>	75 mV p-p max.						
Short Circuit Protection	Indefinite (Automatic Recovery)						
Line Regulation	±0.5% max.						
Load Regulation	<table border="0"> <tr> <td>Single (0% to 100%)</td> <td>±1.0% max.</td> </tr> <tr> <td>Dual (0% to 100%)</td> <td>±0.5% max. (balanced load)</td> </tr> <tr> <td>Single &amp; Dual (Output 3.3 VDC Model)</td> <td>±2.0% max.</td> </tr> </table>	Single (0% to 100%)	±1.0% max.	Dual (0% to 100%)	±0.5% max. (balanced load)	Single & Dual (Output 3.3 VDC Model)	±2.0% max.
Single (0% to 100%)	±1.0% max.						
Dual (0% to 100%)	±0.5% max. (balanced load)						
Single & Dual (Output 3.3 VDC Model)	±2.0% max.						
Transient Recovery Time <sup>4)</sup>	250 µs						
Transient Response Deviation <sup>4)</sup>	<table border="0"> <tr> <td>3.3 VDC Single Output</td> <td>±3% max.</td> </tr> <tr> <td></td> <td>±5% max.</td> </tr> </table>	3.3 VDC Single Output	±3% max.		±5% max.		
3.3 VDC Single Output	±3% max.						
	±5% max.						

**NOTE:**

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

**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)	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.  
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

<b>GENERAL SPECIFICATION</b>		
Efficiency		see table
I/O Isolation Voltage (60 sec)	Input/Output	1000 VDC
	Input/Output (add Suffix "H3")	3000 VDC
	Input/Output (add Suffix "H4")	4000 VDC
	Input/Output (add Suffix "H5.2")	5200 VDC
	Input/Output (add Suffix "H6")	6000 VDC
Input & Output (only Metal Case)	1000 VDC	
I/O Isolation Resistance		1000 MOhms
I/O Isolation Capacitance		60 pF
Switching Frequency	Single	40 kHz
	Dual	250 kHz
Operating Temperature	-40°C to +85°C (see Derating Diagram)	
Case Temperature	+100°C max.	
Storage Temperature	-40°C to +125°C	
Cooling	Nature Convection	
Humidity	95% rel H	
Reliability Calculated MTBF (MIL-HDBK-217F)	>1 Mhrs	
Safety Standard (design to meet)	IEC60950-1	
Radiated Emissions	EN55022 Class A	
Conducted Emissions <sup>5)</sup>	EN55022 Class A	
ESD	IEC61000-4-2 Perf. Criteria A	
RS	IEC61000-4-3 Perf. Criteria A	
EFT <sup>6)</sup>	IEC61000-4-4 Perf. Criteria A	
Surge <sup>6)</sup>	IEC61000-4-5 Perf. Criteria A	
CS	IEC61000-4-6 Perf. Criteria A	
PFMF	IEC61000-4-8 Perf. Criteria A	
Case Material add Suffix "A" (only for I/O Isolation 1000 and 3000 VDC)	Non-conductive Black Plastic (UL94V-0 rated) 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)	
Dimensions	31.75 x 20.32 x 10.16 mm (1.25 x 0.80 x 0.40 Inches)	
Weight	Plastic Case	12.5 g
	Metal Case	15.0 g

## NOTE

5. Input filter components are required to help meet conducted emission class A, which application refer to the EMI Filter of design & feature configuration.

6. An external filter capacitor is required if the module has to meet IEC61000-4-4 and IEC61000-4-5.

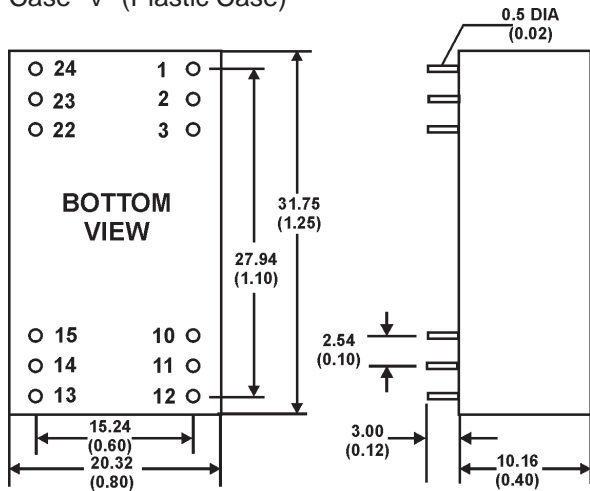
The filter capacitor M+R suggest: Nippon chemi-con KY series, 220 µF/100 V.

**SPECIFICATIONS**

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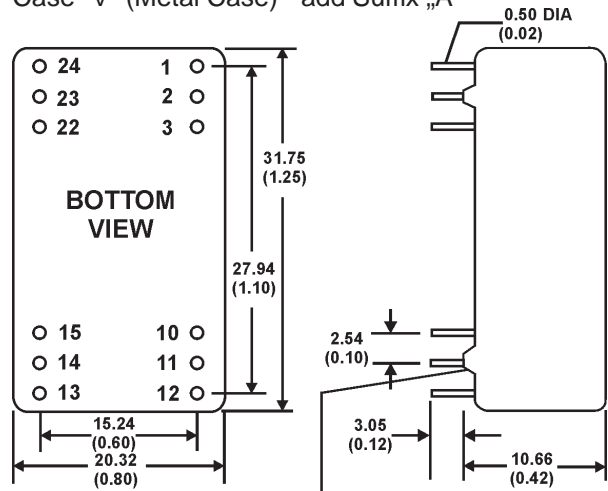
**MECHANICAL SPECIFICATIONS**

Case "V" (Plastic Case)



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)

Case "V" (Metal Case) - add Suffix „A“



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)  
 4. Stand-off tolerance: ±0.1 (±0.004)

PIN CONNECTIONS				
PIN	SINGLE	DUAL	Single "Hx"	Dual "Hx"
1	+INPUT	+INPUT	+INPUT	+INPUT
2	NOT CONNECTED	-OUTPUT	+INPUT	+INPUT
3	NOT CONNECTED	COMMON	NO PIN	NO PIN
10	-OUTPUT	COMMON	NO PIN	COMMON
11	+OUTPUT	+OUTPUT	NO PIN	COMMON
12	-INPUT	-INPUT	-OUTPUT	NO PIN
13	-INPUT	-INPUT	+OUTPUT	-OUTPUT
14	+OUTPUT	+OUTPUT	NO PIN	NO PIN
15	-OUTPUT	COMMON	NO PIN	+OUTPUT
22	NOT CONNECTED	COMMON	NO PIN	NO PIN
23	NOT CONNECTED	-OUTPUT	-INPUT	-INPUT
24	+INPUT	+INPUT	-INPUT	-INPUT

**SPECIFICATIONS**

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

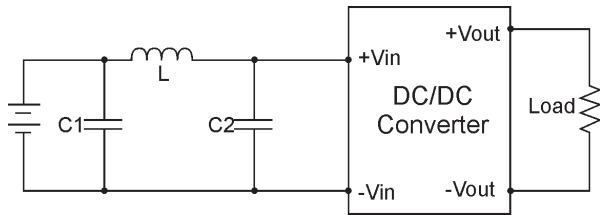
**TEST CONFIGURATIONS**

**EMI Filter**

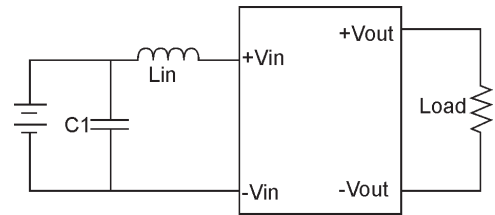
Input filter components (C1, C2, L) are used to help meet conducted emissions requirement for the module.

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**

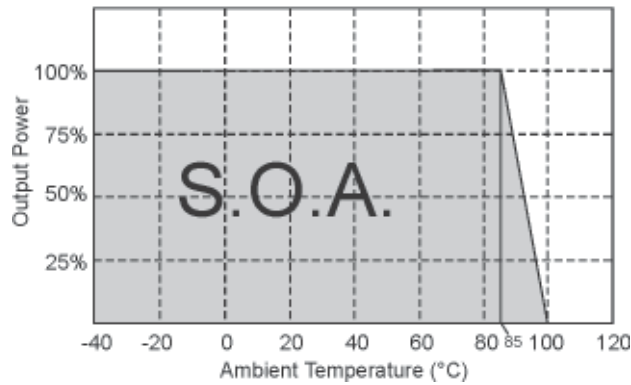


EMI FILTER			
	C1	L	C2
3VRS/D5NxxM	220 µF/100 V	12 µH	220 µF/100 V
3VRS/D12NxxM	220 µF/100 V		220 µF/100 V
3VRS/D24NxxM	220 µF/100 V		220 µF/100 V

EMI FILTER		
	C1	L
3VRS/D5NxxM	220 µF/100 V	12 µH
3VRS/D12NxxM	220 µF/100 V	
3VRS/D24NxxM	220 µF/100 V	

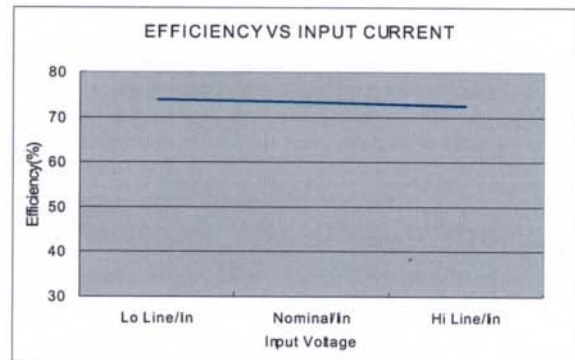
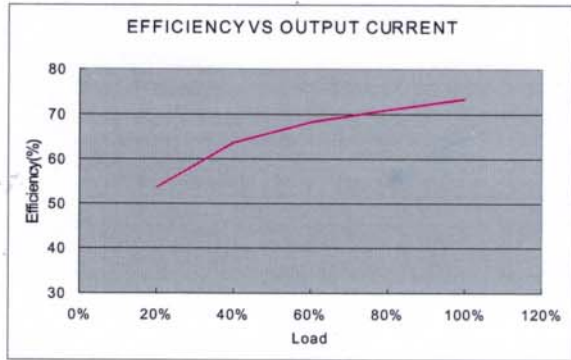
**APPLICATION NOTES & DIAGRAMS**

Derating Curve

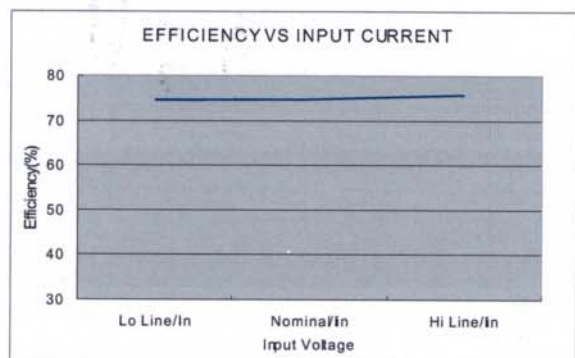
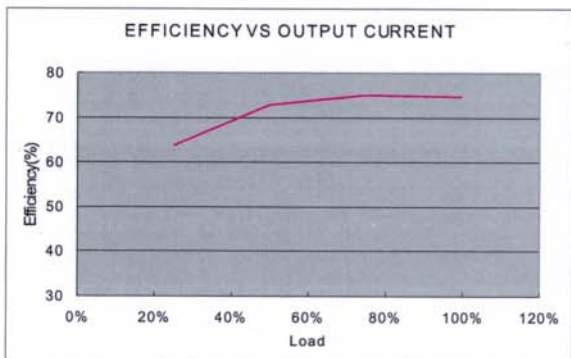


**SPECIFICATIONS**

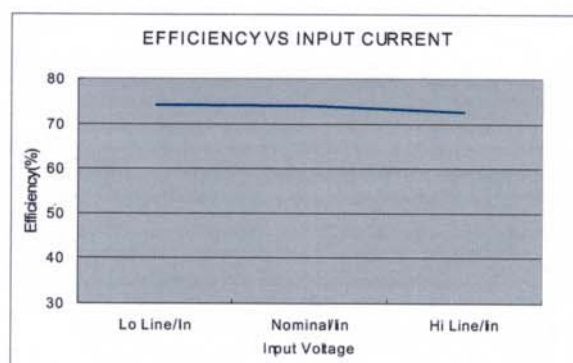
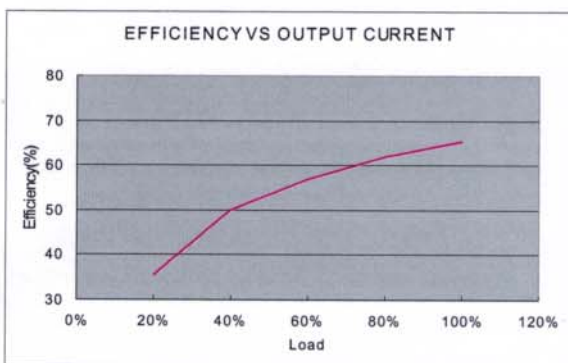
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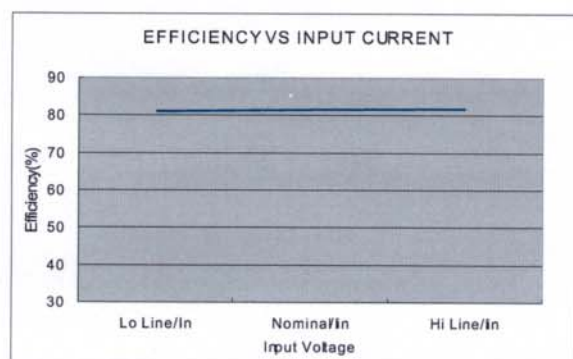
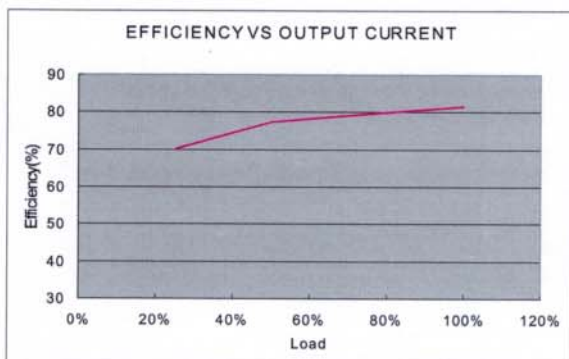
05 Single Output Models



05 Dual Output Models



24 Single Output Models



24 Dual Output 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.