

**SERIES:** VSK-S15 | **DESCRIPTION:** AC-DC POWER SUPPLY

**FEATURES**

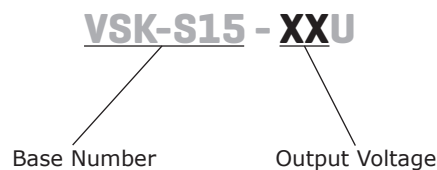
- up to 15W continuous power
- compact board mount design
- universal input (85~264 Vac / 100~370 Vdc)
- single output from 3.3~48 Vdc
- over voltage, over current, and short circuit protections
- UL/cUL safety approvals
- efficiency up to 85%



| MODEL        | output voltage | output current | output power | ripple and noise <sup>1</sup> | efficiency |
|--------------|----------------|----------------|--------------|-------------------------------|------------|
|              | (Vdc)          | max (A)        | max (W)      | typ (mVp-p)                   | typ (%)    |
| VSK-S15-3R3U | 3.3            | 3              | 9.9          | 50                            | 73         |
| VSK-S15-5U   | 5              | 2.8            | 14           | 50                            | 76         |
| VSK-S15-9U   | 9              | 1.6            | 14.4         | 50                            | 78         |
| VSK-S15-12U  | 12             | 1.25           | 15           | 50                            | 80         |
| VSK-S15-15U  | 15             | 1.0            | 15           | 50                            | 80         |
| VSK-S15-24U  | 24             | 0.625          | 15           | 50                            | 84         |
| VSK-S15-48U  | 48             | 0.32           | 15           | 50                            | 85         |

Notes: 1. Ripple and noise are measured at 20 MHz BW by "parallel cable" method with 1 uF ceramic and 10 uF electrolytic capacitors on the output.

**PART NUMBER KEY**



**INPUT**

| parameter       | conditions/description               | min | typ | max | units |
|-----------------|--------------------------------------|-----|-----|-----|-------|
| voltage         |                                      | 85  |     | 264 | Vac   |
|                 |                                      | 100 |     | 370 | Vdc   |
| frequency       |                                      | 47  |     | 63  | Hz    |
| current         | at 115 Vac                           |     |     | 370 | mA    |
|                 | at 230 Vac                           |     |     | 220 | mA    |
| inrush current  | at 115 Vac                           |     | 10  |     | A     |
|                 | at 230 Vac                           |     | 20  |     | A     |
| leakage current | at 230 Vac, 50 Hz (RMS)              |     | 0.1 |     | mA    |
| input fuse      | 2 A/250 V, slow-blow type (external) |     |     |     |       |

**OUTPUT**

| parameter               | conditions/description | min | typ   | max    | units |
|-------------------------|------------------------|-----|-------|--------|-------|
| capacitive load         | 3.3 Vdc output model   |     |       | 36,000 | μF    |
|                         | 5 Vdc output model     |     |       | 20,000 | μF    |
|                         | 9 Vdc output model     |     |       | 6,000  | μF    |
|                         | 12 Vdc output model    |     |       | 3,000  | μF    |
|                         | 15 Vdc output model    |     |       | 3,000  | μF    |
|                         | 24 Vdc output model    |     |       | 900    | μF    |
|                         | 48 Vdc output model    |     |       | 370    | μF    |
| line regulation         | at full load           |     | ±0.5  |        | %     |
| load regulation         | at 10~100% load        |     | ±1    |        | %     |
| voltage set accuracy    |                        |     | ±2    |        | %     |
| hold-up time            | at 115 Vac             |     | 15    |        | ms    |
|                         | at 230 Vac             |     | 80    |        | ms    |
| switching frequency     |                        |     | 65    |        | kHz   |
| temperature coefficient |                        |     | ±0.02 |        | %/°C  |

**PROTECTIONS**

| parameter                | conditions/description   | min | typ | max | units |
|--------------------------|--------------------------|-----|-----|-----|-------|
| over current protection  | auto restart             | 110 |     |     | %     |
| short circuit protection | continuous, auto restart |     |     |     |       |
| over voltage protection  | 3.3 Vdc output model     |     |     | 7.5 | Vdc   |
|                          | 5 Vdc output model       |     |     | 7.5 | Vdc   |
|                          | 9 Vdc output model       |     |     | 12  | Vdc   |
|                          | 12 Vdc output model      |     |     | 20  | Vdc   |
|                          | 15 Vdc output model      |     |     | 20  | Vdc   |
|                          | 24 Vdc output model      |     |     | 30  | Vdc   |
|                          | 48 Vdc output model      |     |     | 60  | Vdc   |

**SAFETY & COMPLIANCE**

| parameter           | conditions/description   | min   | typ | max | units |
|---------------------|--|-------|-----|-----|-------|
| isolation voltage   | input to output for 1 minute   | 3,000 |     |     | Vac   |
| safety approvals    | UL60950-1, CE  |       |     |     |       |
| safety class        | class II   |       |     |     |       |
| conducted emissions | CISPR22/EN55022, Class B   |       |     |     |       |
| radiated emissions  | CISPR22/EN55022, Class B   |       |     |     |       |
| ESD                 | IEC/EN61000-4-2 Class B, contact ±6 kV/air ±8 kV                         |       |     |     |       |
| radiated immunity   | IEC/EN61000-4-3 Class A, 10V/m   |       |     |     |       |
| EFT/burst           | IEC/EN61000-4-4 Class B, ±2 kV   |       |     |     |       |
|                     | IEC/EN61000-4-4 Class B, ±4 kV (external circuit required, see figure 2) |       |     |     |       |

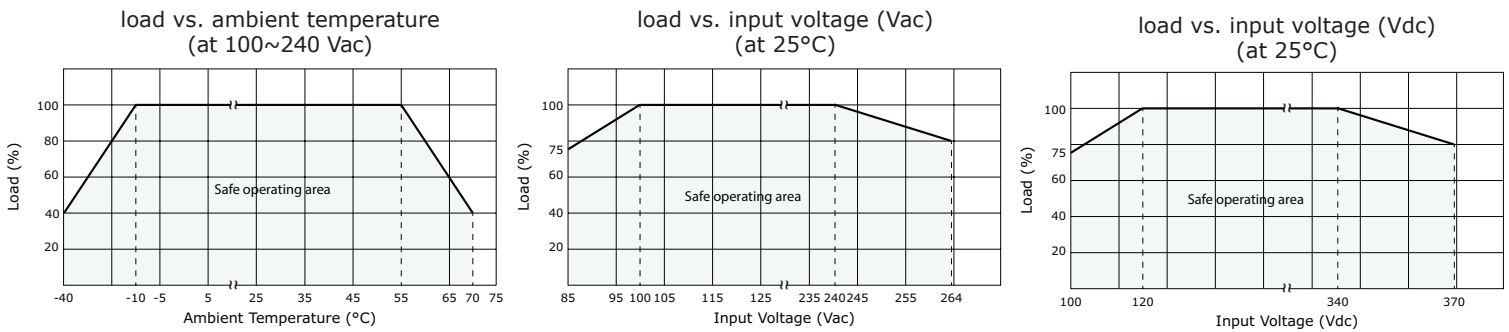
## SAFETY & COMPLIANCE (CONTINUED)

| parameter                    | conditions/description   | min     | typ | max | units |
|------------------------------|--|---------|-----|-----|-------|
| surge                        | IEC/EN61000-4-5 Class B, $\pm 1$ kV/ $\pm 2$ kV<br>IEC/EN61000-4-5 Class B, $\pm 2$ kV/ $\pm 4$ kV (external circuit required, see figure 2) |         |     |     |       |
| conducted immunity           | IEC/EN61000-4-6 Class A, 10 Vr.m.s   |         |     |     |       |
| PFM                          | IEC/EN61000-4-8 Class A, 10 A/m  |         |     |     |       |
| voltage dips & interruptions | IEC/EN61000-4-11 Class B, 0%-70%   |         |     |     |       |
| MTBF                         | as per MIL-HDBK-217F at 25 °C  | 300,000 |     |     | hrs   |
| RoHS                         | 2011/65/EU   |         |     |     |       |

## ENVIRONMENTAL

| parameter             | conditions/description | min | typ | max | units |
|-----------------------|------------------------|-----|-----|-----|-------|
| operating temperature | see derating curves    | -40 |     | 70  | °C    |
| storage temperature   |                        | -40 |     | 105 | °C    |
| storage humidity      | non-condensing         |     |     | 95  | %     |

## DERATING CURVES



## SOLDERABILITY

| parameter      | conditions/description                        | min | typ | max | units |
|----------------|---|-----|-----|-----|-------|
| hand soldering | for 3~5 seconds                               | 350 | 360 | 370 | °C    |
| wave soldering | for 5~10 seconds (see wave soldering profile) | 255 | 260 | 265 | °C    |



## MECHANICAL

| parameter     | conditions/description                       | min | typ | max | units |
|---------------|--|-----|-----|-----|-------|
| dimensions    | 62.0 x 45.0 x 22.5 (2.44 x 1.77 x 0.88 inch) |     |     |     | mm    |
| case material | UL94V-0                                      |     |     |     |       |
| weight        |  |     | 85  |     | g     |
| cooling       | convection cooling                           |     |     |     |       |

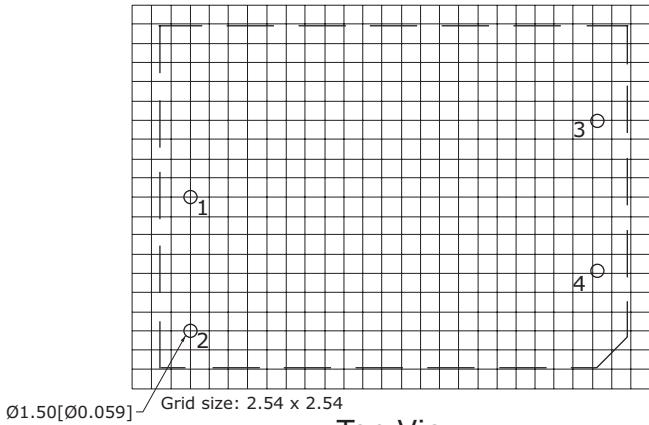
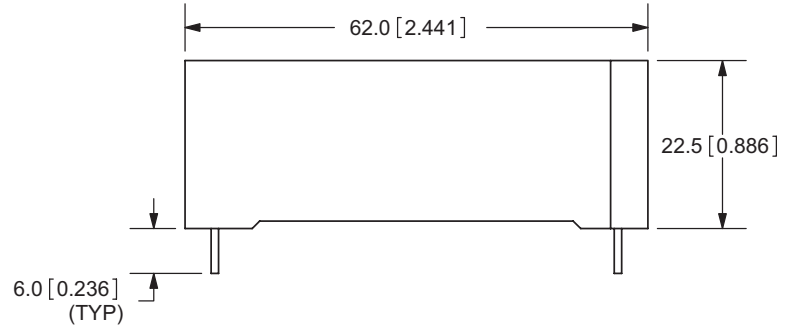
## MECHANICAL DRAWING

units: mm[inches]

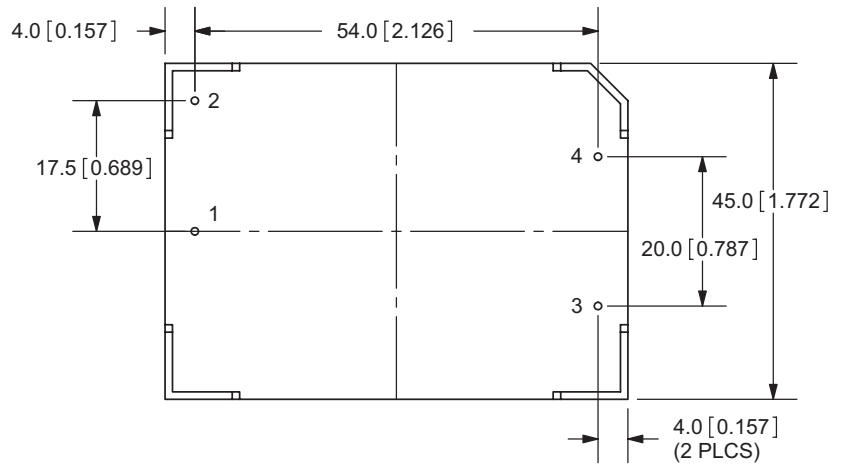
tolerance:  $\pm 0.50[\pm 0.020]$

pin diameter:  $\varnothing 1.00[0.039] \pm 0.10[\pm 0.004]$

| PIN CONNECTIONS |          |
|-----------------|----------|
| PIN             | FUNCTION |
| 1               | AC(N)    |
| 2               | AC(L)    |
| 3               | -Vo      |
| 4               | +Vo      |

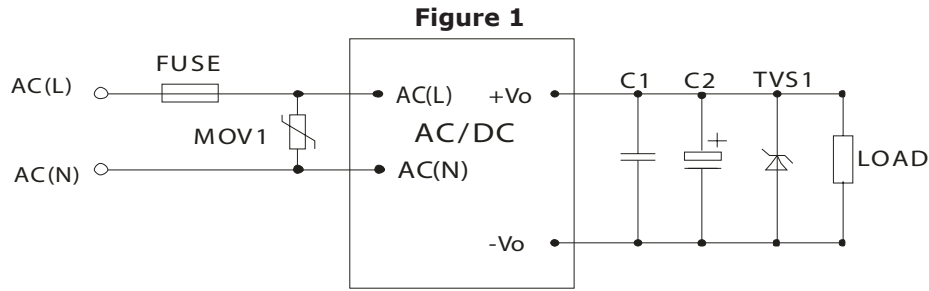


Top View  
PCB Layout



BOTTOM VIEW

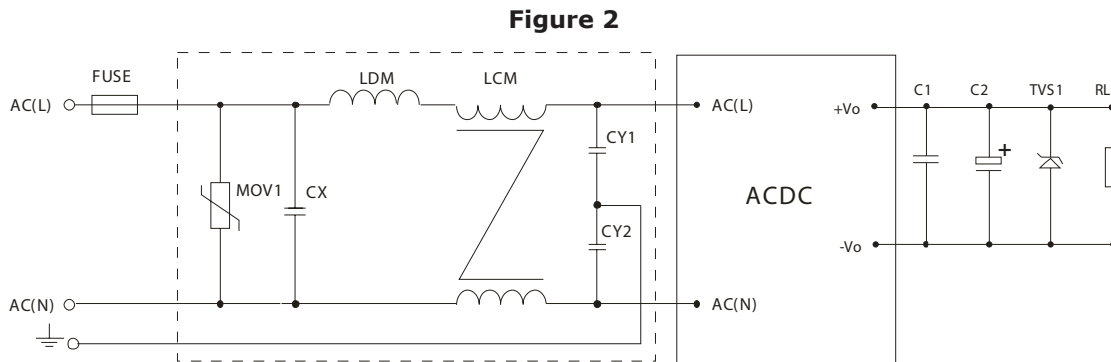
## TYPICAL APPLICATION CIRCUIT



**Table 1**

| Recommended External Circuit Components |         |         |           |             |          |
|---|---------|---------|-----------|-------------|----------|
| MODEL                                   | FUSE    | MOV1    | C1        | C2          | TVS      |
| VSK-S15-3R3U                            | 2A/250V | S14K350 | 1 $\mu$ F | 680 $\mu$ F | SMBJ7.0A |
| VSK-S15-5U                              | 2A/250V | S14K350 | 1 $\mu$ F | 680 $\mu$ F | SMBJ7.0A |
| VSK-S15-9U                              | 2A/250V | S14K350 | 1 $\mu$ F | 470 $\mu$ F | SMBJ12A  |
| VSK-S15-12U                             | 2A/250V | S14K350 | 1 $\mu$ F | 220 $\mu$ F | SMBJ20A  |
| VSK-S15-15U                             | 2A/250V | S14K350 | 1 $\mu$ F | 220 $\mu$ F | SMBJ20A  |
| VSK-S15-24U                             | 2A/250V | S14K350 | 1 $\mu$ F | 68 $\mu$ F  | SMBJ30A  |
| VSK-S15-48U                             | 2A/250V | S14K350 | 1 $\mu$ F | 33 $\mu$ F  | SMBJ64A  |

## EMC RECOMMENDED CIRCUIT



**Table 2**

| Recommended External Circuit Components |                    |
|---|--------------------|
| MOV1                                    | S14K350            |
| CY1, CY2                                | 1000pF/400Vac      |
| CX                                      | 0.1 $\mu$ F/275Vac |
| LCM                                     | 10mH               |
| LDM                                     | 4.7 $\mu$ H/2A     |

Note: Also refer to Table 1

- Notes:
1. Output filtering capacitor C2 is an electrolytic capacitor. It is recommended to use high frequency and low impedance electrolytic capacitors. For capacitance and current of capacitor please refer to manufacturer's datasheet. Voltage derating of capacitor should be 80% or above. C1 is used to filter high frequency noise. TVS is recommended component to protect post-circuits (when converter fails).
  2. All specifications measured at Ta=25C, humidity <75%, nominal input voltage, and rated output load, unless otherwise specified.

## REVISION HISTORY

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| rev. | description                                | date       |
|------|--|------------|
| 1.0  | initial release                            | 07/26/2011 |
| 1.01 | V-Infinity branding removed                | 08/16/2012 |
| 1.02 | added dual and triple output models        | 11/16/2012 |
| 1.03 | updated derating curves                    | 01/29/2013 |
| 1.04 | updated spec and removed models            | 07/22/2014 |
| 1.05 | updated operating and storage temperatures | 06/10/2015 |

The revision history provided is for informational purposes only and is believed to be accurate.



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