



## SERIES: VSK-S5-T | DESCRIPTION: AC-DC POWER SUPPLY

### FEATURES

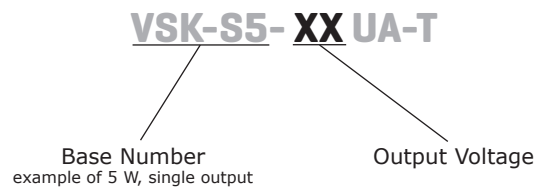
- up to 5.5 W continuous output
- encapsulated compact case
- universal input (85~264 Vac/110~370 Vdc)
- single regulated output from 3.3~24 Vdc
- over voltage, over temperature, and short circuit protections
- UL/cUL safety approvals
- efficiency up to 83%



| MODEL          | output voltage | output current | output power | ripple and noise <sup>1</sup> | efficiency |
|----------------|----------------|----------------|--------------|-------------------------------|------------|
|                | (Vdc)          | max (mA)       | max (W)      | max (mVp-p)                   | max (%)    |
| VSK-S5-3R3UA-T | 3.3            | 1250           | 4.125        | 120                           | 74         |
| VSK-S5-5UA-T   | 5              | 1000           | 5            | 120                           | 78         |
| VSK-S5-9UA-T   | 9              | 550            | 5            | 100                           | 78         |
| VSK-S5-12UA-T  | 12             | 420            | 5            | 100                           | 80         |
| VSK-S5-15UA-T  | 15             | 333            | 5            | 100                           | 82         |
| VSK-S5-24UA-T  | 24             | 230            | 5.5          | 100                           | 83         |

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

### PART NUMBER KEY



## INPUT

| parameter               | conditions/description                         | min | typ   | max | units |
|-------------------------|--|-----|-------|-----|-------|
| voltage                 |  | 85  |       | 264 | Vac   |
|                         |  | 110 |       | 370 | Vdc   |
| frequency               |  | 47  |       | 63  | Hz    |
| current                 | at 110 Vac                                     |     | 110   |     | mA    |
|                         | at 230 Vac                                     |     | 70    |     | mA    |
| inrush current          | at 110 Vac                                     |     | 10    |     | A     |
|                         | at 230 Vac                                     |     | 20    |     | A     |
| input fuse              | 1 A/250 V, slow-blow type (internal, included) |     |       |     |       |
| temperature coefficient |  |     | ±0.02 |     | %/°C  |

## OUTPUT

| parameter                   | conditions/description | min | typ  | max  | units |
|-----------------------------|------------------------|-----|------|------|-------|
| capcitive load <sup>1</sup> | 3.3 Vdc model          |     |      | 4000 | μF    |
|                             | 5 Vdc model            |     |      | 4000 | μF    |
|                             | 9 Vdc model            |     |      | 1000 | μF    |
|                             | 12 Vdc model           |     |      | 820  | μF    |
|                             | 15 Vdc model           |     |      | 820  | μF    |
|                             | 24 Vdc model           |     |      | 330  | μF    |
| line regulation             |                        |     | ±0.5 |      | %     |
| load regulation             | at 10~100% load        |     | ±1   |      | %     |
| voltage set accuracy        | 3.3 Vdc model          |     | ±3   |      | %     |
|                             | all other models       |     | ±2   |      | %     |
| hold-up time                | at 110 Vac             |     | 12   |      | ms    |
|                             | at 230 Vac             |     | 80   |      | ms    |
| switching frequency         |                        |     |      | 140  | kHz   |

Notes: 1. Test without external circuit

## PROTECTIONS

| parameter                | conditions/description | min | typ | max | units |
|--------------------------|------------------------|-----|-----|-----|-------|
| over voltage protection  | shutdown               |     |     |     |       |
| over current protection  | auto recovery          | 110 |     |     | %     |
| short circuit protection | hiccup, auto recovery  |     |     |     |       |

## SAFETY & COMPLIANCE

| parameter           | conditions/description   | min   | typ | max | units |
|---------------------|--|-------|-----|-----|-------|
| isolation voltage   | for 1 minute   | 4,000 |     |     | Vac   |
| safety approvals    | UL60950-1  |       |     |     |       |
| 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)         |       |     |     |       |
| surge               | IEC/EN61000-4-5 Class B, ±1 kV / ±2 kV   |       |     |     |       |
|                     | IEC/EN61000-4-5 Class B, ±2 kV / ±4 kV (external circuit required, see figure 2) |       |     |     |       |
| conducted immunity  | IEC/EN61000-4-6 Class A, 10 Vr.m.s   |       |     |     |       |

## SAFETY & COMPLIANCE (CONTINUED)

| parameter                    | conditions/description           | min     | typ | max | units |
|------------------------------|----------------------------------|---------|-----|-----|-------|
| 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 |     |     | hours |
| RoHS                         | 2011/65/EU                       |         |     |     |       |

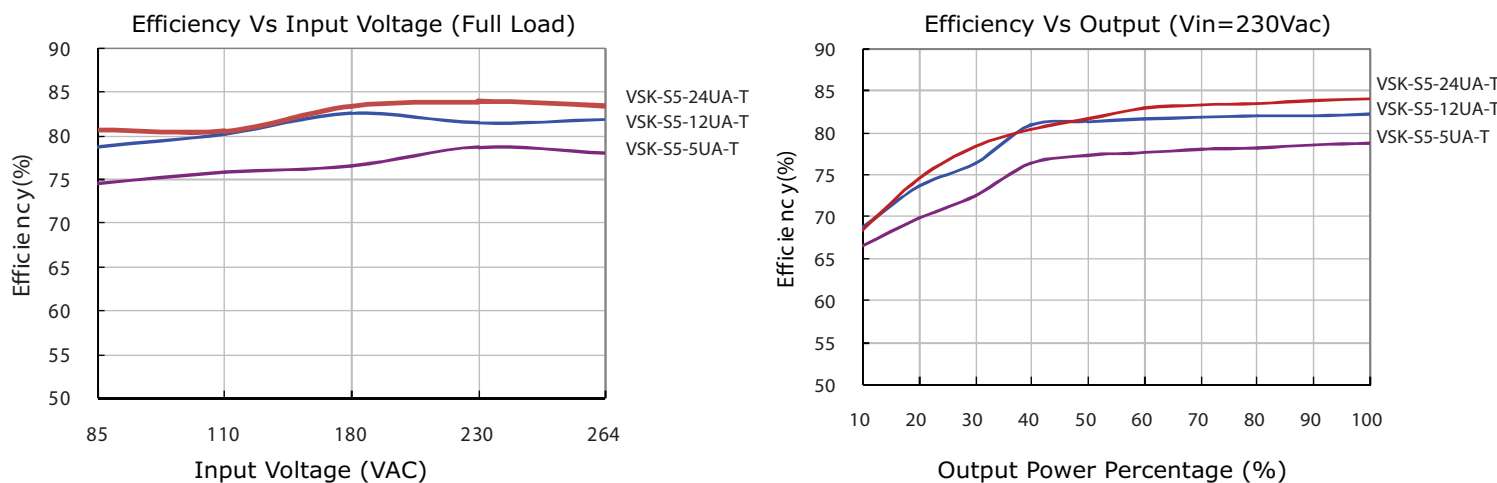
## ENVIRONMENTAL

| parameter             | conditions/description | min | typ | max | units |
|-----------------------|------------------------|-----|-----|-----|-------|
| operating temperature | see derating curves    | -25 |     | 70  | °C    |
| storage temperature   |                        | -25 |     | 105 | °C    |
| storage humidity      | non-condensing         |     |     | 95  | %     |

## DERATING CURVES



## EFFICIENCY CURVES



## MECHANICAL

| parameter  | conditions/description                            | min | typ | max | units |
|------------|---|-----|-----|-----|-------|
| dimensions | 76.0 x 31.50 x 23.96 (2.992 x 1.240 x 0.943 inch) |     |     |     | mm    |
| material   | UL94V-0   |     |     |     |       |
| weight     |   |     | 52  |     | g     |

## MECHANICAL DRAWING

units: mm [inch]  
 tolerance: ±0.50 [±0.020]

wire range: 24~12 AWG

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



Top View



Front View

## TYPICAL APPLICATION CIRCUIT

Figure 1

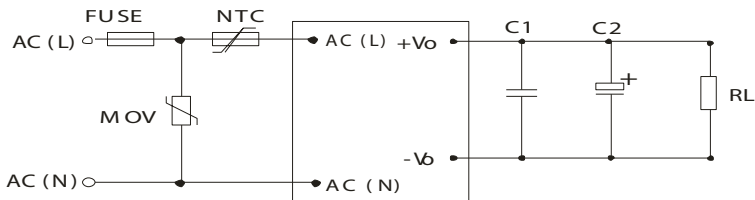


Table 1

| Recommended External Circuit Components |                               |                               |           |       |         |
|---|-------------------------------|-------------------------------|-----------|-------|---------|
| MODEL                                   | C1 <sup>1</sup><br>( $\mu$ F) | C2 <sup>1</sup><br>( $\mu$ F) | FUSE      | NTC   | MOV     |
| VSK-S5-3R3UA-T                          | 1                             | 220                           | 1 A/250 V | 12D-5 | S14K350 |
| VSK-S5-5UA-T                            | 1                             | 220                           | 1 A/250 V | 12D-5 | S14K350 |
| VSK-S5-9UA-T                            | 1                             | 100                           | 1 A/250 V | 12D-5 | S14K350 |
| VSK-S5-12UA-T                           | 1                             | 100                           | 1 A/250 V | 12D-5 | S14K350 |
| VSK-S5-15UA-T                           | 1                             | 100                           | 1 A/250 V | 12D-5 | S14K350 |
| VSK-S5-24UA-T                           | 1                             | 47                            | 1 A/250 V | 12D-5 | S14K350 |

Note: 1. Output filtering capacitor C1 is a ceramic capacitor that is used to filter high frequency noise. 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 the manufacturer's datasheet. Voltage derating of capacitor should be 80% or above.

## EMC RECOMMENDED CIRCUIT

Figure 2

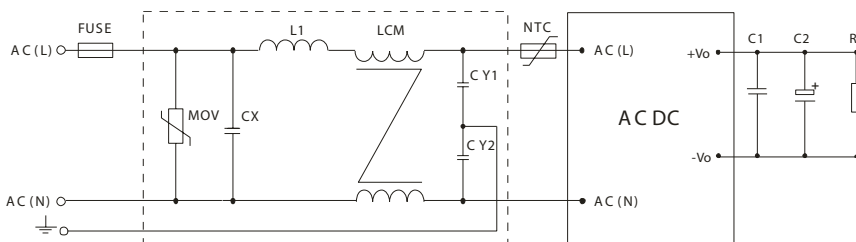


Table 2

| Recommended External Circuit Components |                                 |
|---|---------------------------------|
| FUSE                                    | 1A/250V, slow fusing, necessary |
| MOV                                     | S14K350                         |
| CY1, CY2                                | 1nF/400VAC                      |
| CX                                      | 0.1 $\mu$ F/275VAC              |
| LCM                                     | 2.2mH                           |
| L1                                      | 4.7 $\mu$ H/2.0A                |
| C1, C2                                  | see Table 1                     |

Note: 1. All specifications measured at Ta=25°C, humidity <75%, nominal input voltage, and rated output load, unless otherwise specified.

## REVISION HISTORY

| rev. | description                                  | date       |
|------|--|------------|
| 1.0  | initial release                              | 09/06/2012 |
| 1.01 | updated mechanical drawing and product photo | 11/28/2012 |
| 1.02 | updated spec                                 | 03/08/2013 |
| 1.03 | updated spec                                 | 08/23/2013 |
| 1.04 | updated spec                                 | 01/08/2014 |
| 1.05 | changed internal IC, updated datasheet       | 06/05/2015 |

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



**Headquarters**  
20050 SW 112th Ave.  
Tualatin, OR 97062  
**800.275.4899**

Fax 503.612.2383  
**cui.com**  
techsupport@cui.com

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### Офис по работе с юридическими лицами:

105318, г.Москва, ул.Щербаковская д.3, офис 1107, 1118, ДЦ «Щербаковский»

Телефон: +7 495 668-12-70 (многоканальный)

Факс: +7 495 668-12-70 (доб.304)

E-mail: [info@moschip.ru](mailto:info@moschip.ru)

Skype отдела продаж:

moschip.ru

moschip.ru\_4

moschip.ru\_6

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