## SERIES: VASD2-DIP | DESCRIPTION: DC-DC CONVERTER

### FEATURES

- 2 W isolated output
- industry standard 14 pin DIP package
- dual unregulated outputs
- 1,000 V isolation
- short circuit protection
- wide temperature (-40~85°C)
- efficiency up to 87%

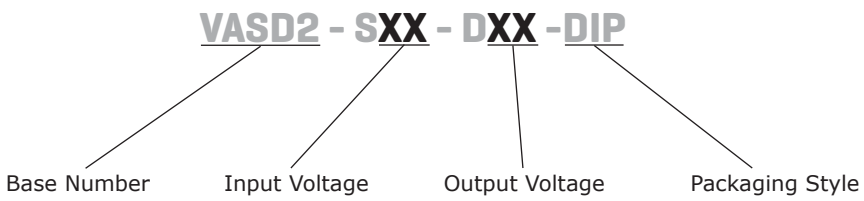



DISCONTINUED

| MODEL | input voltage | | output voltage | output current | | output power | ripple and noise[1] | efficiency |
|---|---|---|---|---|---|---|---|---|
| | typ (Vdc) | range (Vdc) | (Vdc) | min (mA) | max (mA) | max (W) | max (mVp-p) | typ (%) |
| VASD2-S5-D5-DIP | 5 | 4.5~5.5 | ±5 | ±20 | ±200 | 2 | 150 | 82 |
| VASD2-S5-D9-DIP | 5 | 4.5~5.5 | ±9 | ±12 | ±111 | 2 | 150 | 83 |
| VASD2-S5-D12-DIP | 5 | 4.5~5.5 | ±12 | ±5 | ±83 | 2 | 150 | 85 |
| VASD2-S5-D15-DIP | 5 | 4.5~5.5 | ±15 | ±7 | ±67 | 2 | 150 | 85 |
| VASD2-S12-D5-DIP | 12 | 10.8~13.2 | ±5 | ±20 | ±200 | 2 | 150 | 83 |
| VASD2-S12-D9-DIP | 12 | 10.8~13.2 | ±9 | ±12 | ±111 | 2 | 150 | 84 |
| VASD2-S12-D12-DIP | 12 | 10.8~13.2 | ±12 | ±5 | ±83 | 2 | 150 | 86 |
| VASD2-S12-D15-DIP | 12 | 10.8~13.2 | ±15 | ±7 | ±67 | 2 | 150 | 86 |
| VASD2-S24-D5-DIP | 24 | 21.6~26.4 | ±5 | ±20 | ±200 | 2 | 150 | 84 |
| VASD2-S24-D9-DIP | 24 | 21.6~26.4 | ±9 | ±12 | ±111 | 2 | 150 | 85 |
| VASD2-S24-D12-DIP | 24 | 21.6~26.4 | ±12 | ±5 | ±83 | 2 | 150 | 87 |
| VASD2-S24-D15-DIP | 24 | 21.6~26.4 | ±15 | ±7 | ±67 | 2 | 150 | 87 |

Notes: 1. ripple and noise are measured at 20 MHz BW

## PART NUMBER KEY






Please read our datasheet & drawing disclaimer here.

## INPUT

| parameter | conditions/description | | min | typ | max | units |
|---|---|---|---|---|---|---|
| operating input voltage | 5 V model | | 4.5 | 5 | 5.5 | Vdc |
| | 12 V model | | 10.8 | 12 | 13.2 | Vdc |
| | 24 V model | | 21.6 | 24 | 26.4 | Vdc |
| surge voltage | 1 second max. | 3.3V model | -0.7 | | 5 | Vdc |
| | | 5 V model | -0.7 | | 9 | Vdc |
| | | 12 V model | -0.7 | | 18 | Vdc |
| | | 15V model | -0.7 | | 21 | Vdc |
| | | 24 V model | -0.7 | | 30 | Vdc |
| reverse polarity input current[1] | | | | | 0.4 | A |
| input filter | C filter | | | | | |

Notes: 1. If the product reverse did not seek to limit current, may result in injury or permanent damage, testing is not recommended

## OUTPUT

| parameter | conditions/description | | min | typ | max | units |
|---|---|---|---|---|---|---|
| line regulation | for Vin change of 1% | | | | 1.2 | % |
| load regulation | measured from 10% load to full load | 3.3V model | | 12 | 20 | % |
| | | 5 V model | | 12.8 | 15 | % |
| | | 12 V model | | 8.3 | 15 | % |
| | | 15V model | | 6.8 | 15 | % |
| | | 24 V model | | 6.3 | 15 | % |
| voltage accuracy | see derating curves | | | | | |
| switching frequency | 100% load, input voltage range | | | 75 | | kHz |
| temperature coefficient | | | | ±0.03 | | %/°C |

## PROTECTIONS

| parameter | conditions/description | min | typ | max | units |
|---|---|---|---|---|---|
| short circuit protection | | | | 1 | s |

## SAFETY AND COMPLIANCE

| parameter | conditions/description | min | typ | max | units |
|---|---|---|---|---|---|
| isolation voltage | for 1 minute at 1 mA max. | 1,000 | | | Vdc |
| isolation resistance | at 500 Vdc | 1,000 | | | MΩ |
| safety approvals | UL | | | | |
| MTBF | | 3,500,000 | | | hours |
| RoHS compliant | yes | | | | |

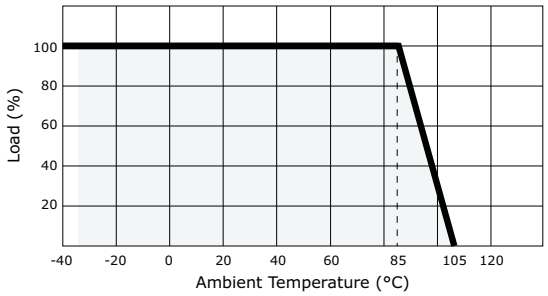
## ENVIRONMENTAL

| parameter | conditions/description | min | typ | max | units |
|---|---|---|---|---|---|
| operating temperature | | -40 | | 85 | °C |
| storage temperature | | -55 | | 125 | °C |
| storage humidity | non-condensing | | | 95 | % |
| temperature rise | at full load | | 15 | 25 | °C |
| lead temperature | 1.5 mm from case for 10 seconds | | | 300 | °C |

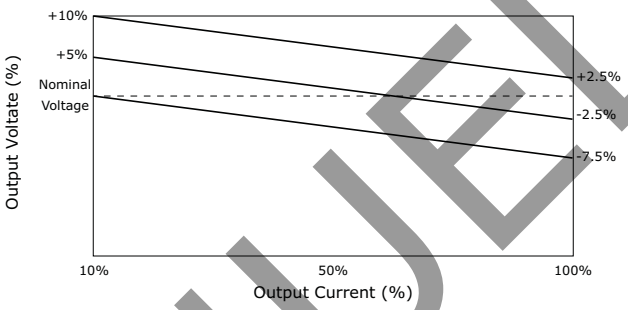
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## DERATING CURVES

1. output power vs. ambient temperature




2. output voltage vs. output current

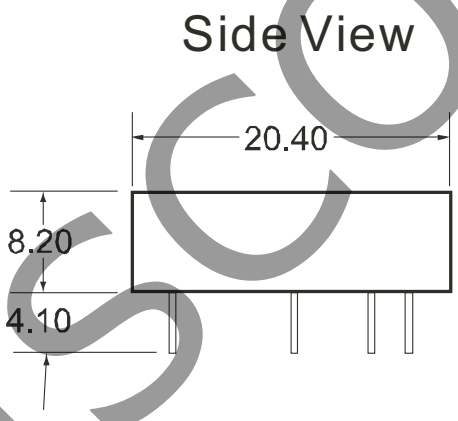



## MECHANICAL

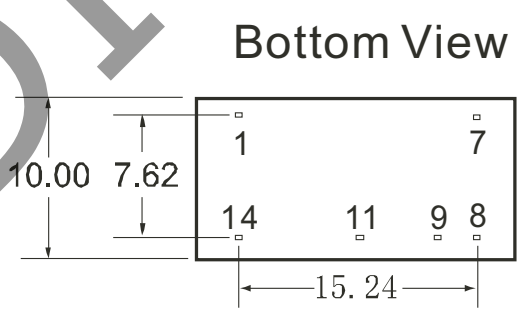
| parameter | conditions/description | min | typ | max | units |
|---|---|---|---|---|---|
| dimensions | 0.803 x 0.394 x 0.323 (20.40 x 10.00 x 8.20 mm) | | | | inch |
| case material | plastic (UL94-V0) | | | | |
| weight | | | 2.8 | | g |

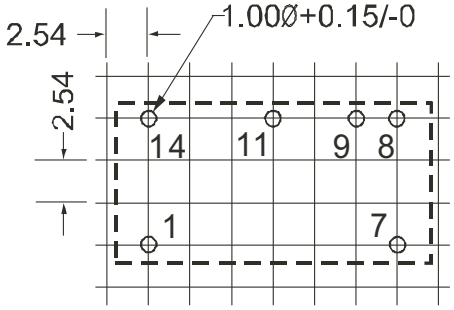
## MECHANICAL DRAWING

units: mm
tolerance: ±0.25mm
pin section tolerance: ±0.10mm




| PIN CONNECTIONS | |
|---|---|
| PIN | FUNCTION |
| 1 | -Vin |
| 7 | NC |
| 8 | COM |
| 9 | +Vo |
| 11 | -Vo |
| 14 | +Vin |




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## APPLICATION NOTES

1. **Input filtering**
To reduce the reflected ripple current and minimize EMI, especially when the converter input is more than 2" away from the DC source, it is recommended to connect a low ESR electrolytic capacitor between Vin and Gnd. The values suggested are as shown in Table 1. If additional filtering is required, the capacitance may be increased, or expanded to an LC network as shown in Figure 1.

**Table 1**

| Input Voltage | External Input Capacitance |
|---|---|
| 5 V | 4.7 µF |
| 12 V | 2.2 µF |
| 24 V | 1.0 µF |

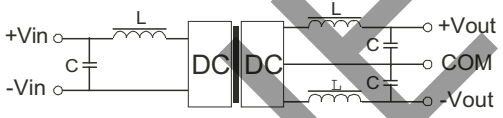



**Figure 1**

2. **Output filtering**
An output capacitor is needed to meet output ripple requirements as shown in Table 2. Output capacitance may be increased for additional filtering, but should not exeed 10µF or expanded to an LC network as in Figure 1.

**Table 2**

| Output Voltage | External Input Capacitance |
|---|---|
| 5 V | 4.7 µF |
| 9 V | 2.2 µF |
| 12 V | 1.0 µF |

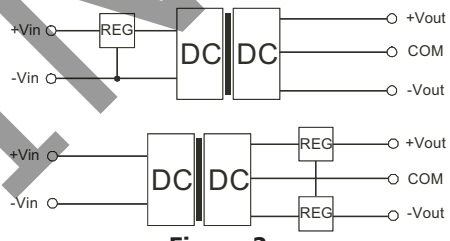



**Figure 2**

3. **Minimum loading**
The converter needs a minimum of 10% loading to maintain output regulation. Operation under no-load conditions will not cause immediate damages but may reduce reliability, and cause performance not to meet specifications.

4. **Regulation**
With a semi-regulated design, the converter's output voltage varies with load current and will change proportionally to the input voltage. If regulated output is needed, an external regulator can be used as shown in Figure 2.

5. **Protection**
The converter has minimal protection against input over-voltage or output over-load, and may be permanently damaged if exposed to these conditions. An input clamping device can be used for input voltage limiting. An input fuse or an output fuse can also be used to protect against over-loading.

6. **Dual outputs used as a single output**
The +Vout and -Vout can be used to obtain a single output that is the sum of the two outputs. In this case, the COM pin shouldn't be used.

7. **External Regulator**
An external 3-terminal regulator can be connected to the output of the converter to achieve full regulation. Make sure the converter's output voltage provides sufficient head room for the regulator. An additional benefit is that the built-in protection features in the regulator, such as OCP, OTP, etc, will protect the converter also. In a complimentory supply, a negative output regulator must be used to achieve the negative regulated output.

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## REVISION HISTORY

| rev. | description | date |
|---|---|---|
| 1.0 | initial release | 12/11/2007 |
| 1.01 | new template applied | 09/04/2009 |
| 1.02 | new template applied, V-Infinity branding removed | 09/04/2012 |

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

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