# Technical Specification

## EVN2F Series (SIP7)

Fixed Input, 2W DC/DC Converters


## FEATURES

- Low cost
- Efficiency up to 90%
- 3KVDC isolation
- Fixed input : 3.3, 5, 12, 24VDC (±10%)
- Single and bipolar isolated outputs: 3.3, 5, 9, 12, 15, 24, ±3.3, ±5, ±9, ±12, ±15VDC
- Fixed switching frequency
- Industrial standard footprint: SIP7
- Build-in short protection, OTP
- Operating temperature range: -40°C to +105°C
- All material compliance with UL94V-0
- Fully encapsulated, high reliability
- MTBF up to 3.5K hours
- RoHS Compliance

## PRODUCT OVERVIEW

The EVN2F modules are highly reliable, and efficient isolated DC/DC converter with industrial potted module technology. Wide temperature range and encapsulated package is ideal for industrial applications. Intended target markets include industrial control, power electronics, instrumentations, medical systems, transportation where power modules must meet rugged environmental requirements, impact size and isolated output voltages are required.

The EVN2F modules provide voltage isolation from input to output up to 3KVDC. The operation temperature range is from -40 ℃ to +105 ℃ . These modules are ideal for applications that do not require any heat sink or forced air cooling.

The EVN2F series are designed to IEC/EN 62368-1 safety standards.

**Models Selections**

| Basic Models | Input Voltage [VDC] | Input Voltage Range [VDC] | Output Voltage [VDC] | Output Current [mA] | Efficiency Typ. [%] | Capacitive Load Max. [μF] | Package [inch] |
|---|---|---|---|---|---|---|---|
| EVN2F03S03S | 3.3 | 2.97-3.63 | 3.3 | 400 | 82 | 2400 | 0.77"×0.28"×0.40" SIP7 |
| EVN2F03S05S | 3.3 | 2.97-3.63 | 5 | 400 | 83 | 2400 | |
| EVN2F03S09S | 3.3 | 2.97-3.63 | 9 | 222 | 84 | 1000 | |
| EVN2F03S12S | 3.3 | 2.97-3.63 | 12 | 167 | 85 | 820 | |
| EVN2F05S03S | 5 | 4.5-5.5 | 3.3 | 400 | 83 | 2400 | |
| EVN2F05S05S | 5 | 4.5-5.5 | 5 | 400 | 85 | 2400 | |
| EVN2F05S09S | 5 | 4.5-5.5 | 9 | 222 | 85 | 1000 | |
| EVN2F05S12S | 5 | 4.5-5.5 | 12 | 167 | 86 | 820 | |
| EVN2F05S15S | 5 | 4.5-5.5 | 15 | 133 | 87 | 680 | |
| EVN2F05S24S | 5 | 4.5-5.5 | 24 | 83 | 88 | 560 | |
| EVN2F05B03S | 5 | 4.5-5.5 | ±3.3 | ±303 | 83 | ±1000 | |
| EVN2F05B05S | 5 | 4.5-5.5 | ±5 | ±200 | 85 | ±1000 | |
| EVN2F05B09S | 5 | 4.5-5.5 | ±9 | ±111 | 85 | ±560 | |
| EVN2F05B12S | 5 | 4.5-5.5 | ±12 | ±83 | 86 | ±560 | |
| EVN2F05B15S | 5 | 4.5-5.5 | ±15 | ±67 | 87 | ±220 | |

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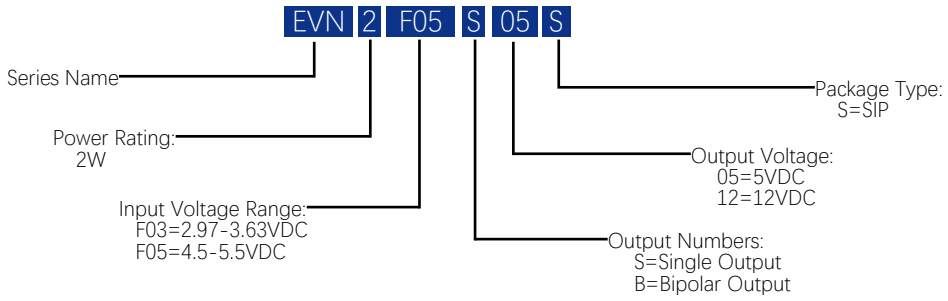
## Models Selections

| Basic Models | Input Voltage [VDC] | Input Voltage Range [VDC] | Output Voltage [VDC] | Output Current [mA] | Efficiency Typ. [%] | Capacitive Load Max. [μF] | Package [inch] |
|---|---|---|---|---|---|---|---|
| EVN2F12S03S | 12 | 10.8-13.2 | 3.3 | 400 | 84 | 2400 | 0.77"×0.28"×0.40" SIP7 |
| EVN2F12S05S | 12 | 10.8-13.2 | 5 | 400 | 85 | 2400 | |
| EVN2F12S09S | 12 | 10.8-13.2 | 9 | 222 | 86 | 1000 | |
| EVN2F12S12S | 12 | 10.8-13.2 | 12 | 167 | 87 | 820 | |
| EVN2F12S15S | 12 | 10.8-13.2 | 15 | 133 | 88 | 680 | |
| EVN2F12S24S | 12 | 10.8-13.2 | 24 | 83 | 89 | 560 | |
| EVN2F12B03S | 12 | 10.8-13.2 | ±3.3 | ±303 | 84 | ±1000 | |
| EVN2F12B05S | 12 | 10.8-13.2 | ±5 | ±200 | 85 | ±1000 | |
| EVN2F12B09S | 12 | 10.8-13.2 | ±9 | ±111 | 86 | ±560 | |
| EVN2F12B12S | 12 | 10.8-13.2 | ±12 | ±83 | 87 | ±560 | |
| EVN2F12B15S | 12 | 10.8-13.2 | ±15 | ±67 | 88 | ±220 | |
| EVN2F24S03S | 24 | 22-26.5 | 3.3 | 400 | 84 | 2400 | |
| EVN2F24S05S | 24 | 22-26.5 | 5 | 400 | 86 | 2400 | |
| EVN2F24S09S | 24 | 22-26.5 | 9 | 222 | 87 | 1000 | |
| EVN2F24S12S | 24 | 22-26.5 | 12 | 167 | 88 | 820 | |
| EVN2F24S15S | 24 | 22-26.5 | 15 | 133 | 89 | 680 | |
| EVN2F24S24S | 24 | 22-26.5 | 24 | 83 | 90 | 560 | |
| EVN2F24B03S | 24 | 22-26.5 | ±3.3 | ±303 | 84 | ±1000 | |
| EVN2F24B05S | 24 | 22-26.5 | ±5 | ±200 | 86 | ±1000 | |
| EVN2F24B09S | 24 | 22-26.5 | ±9 | ±111 | 87 | ±560 | |
| EVN2F24B12S | 24 | 22-26.5 | ±12 | ±83 | 88 | ±560 | |
| EVN2F24B15S | 24 | 22-26.5 | ±15 | ±67 | 89 | ±220 | |

## Model Numbering



| Absolute Maximum Ratings | | | | | |
|---|---|---|---|---|---|
| Parameters | Conditions | Min. | Typ. | Max. | Units |
| Input Voltage | 3.3Vin type | -0.7 | | 5 | VDC |
| | 5Vin type | -0.7 | | 9 | VDC |
| | 12Vin type | -0.7 | | 18 | VDC |
| | 24Vin type | -0.7 | | 30 | VDC |
| Operating Environment Temperature | ⩾ 85℃ with derating | -40 | | 105 | °C |
| Storage Temperature Range | | -55 | | 125 | °C |
| Soldering Temperature | Lead temperature, 1.5mm from case for 10 seconds | | | 300 | °C |

| General Specifications | | | | | |
|---|---|---|---|---|---|
| Parameters | Conditions | Min. | Typ. | Max. | Units |
| Isolation Voltage | Test for 1 minute | 3000 | | | VDC |
| Isolation Resistance | Viso=1000VDC | 1000 | | | MΩ |
| Isolation Capacitance | Input to output | | 20 | | pF |
| Case Temperature Above Ambient | | | 25 | | ℃ |
| Switching Frequency | | | 220 | | KHz |
| Relative Humidity | | | | 95 | % |
| Cooling | Free air convection | | | | |

| Input Specifications | | | | | |
|---|---|---|---|---|---|
| Parameters | Conditions | Min. | Typ. | Max. | Units |
| Input Voltage Range | See the Model Selection on page 1-2. | | | | |
| Input Current @ No Load | 3.3 Vin | | 15 | | mA |
| | 5Vin | | 17 | | mA |
| | 12Vin | | 20 | | mA |
| | 24Vin | | 23 | | mA |
| Input Current @ Min. Line | 3.3 Vin | | 900 | | mA |
| | 5Vin | | 600 | | mA |
| | 12Vin | | 250 | | mA |
| | 24Vin | | 130 | | mA |
| Reflected Ripple Current | | | 15 | | mA p-p |

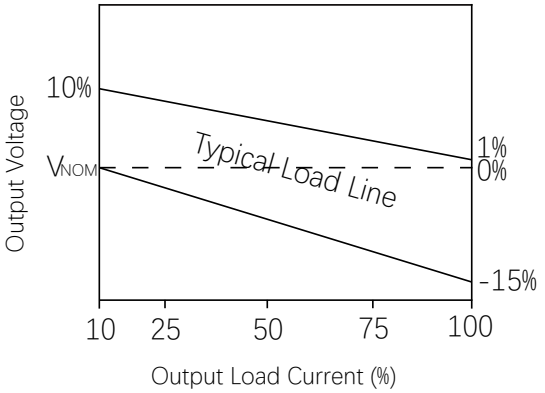
| Output Specifications | | | | | |
|---|---|---|---|---|---|
| Parameters | Conditions | Min. | Typ. | Max. | Units |
| Vout Accuracy | See voltage accuracy envelope on page 5. | | | | |
| Line Regulation | 3.3 Vout type | | | 1.5 | %/% |
| | Other types | | | 1.2 | %/% |
| Load Regulation | 3.3 Vout type | | 14 | | % |
| | 5 Vout type | | 10 | | % |
| | 9 Vout type | | 9 | | % |
| | 12 Vout type | | 8 | | % |
| | 15 Vout type | | 7 | | % |
| | 24 Vout type | | 6 | | % |
| Ripple & Noise ① | | | 60 | 150 | mV |
| Minimum Load ② | | 0 | | | % |
| Output Short Protection | Continuous short protection, auto-recover | | | | |

Notes:
① For output ripple & noise test conditions, please see output ripple & noise in technical notes on page 8 for details.
② Operating below 10% load will not harm the converter, but specifications may not be met, such as the output voltage may be higher than rated output voltage.

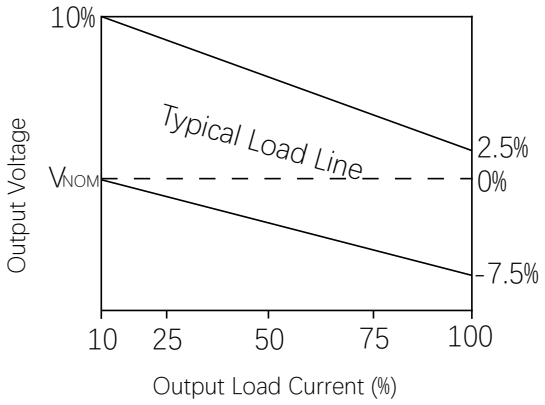
All specifications are tested at 25 °C ambient temperature, nominal input voltage, rated output current conditions unless otherwise specified.

## Performance Data

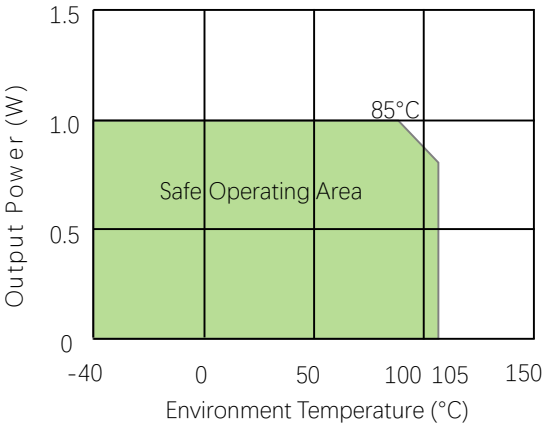
### VOUT ACCURACY ENVELOPE (3.3 VOUT TYPE)




### VOUT ACCURACY ENVELOPE (OTHER TYPES)

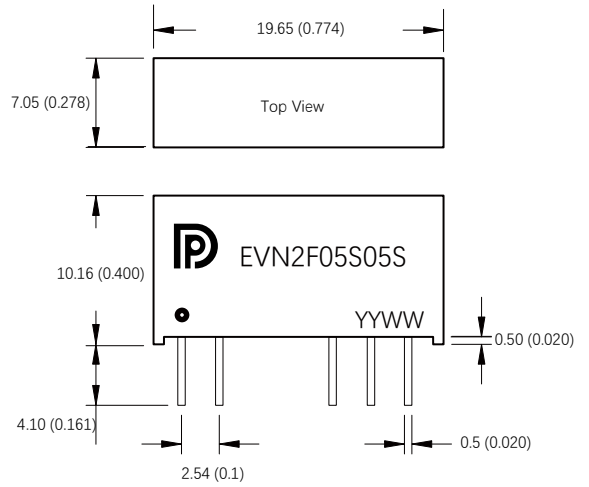


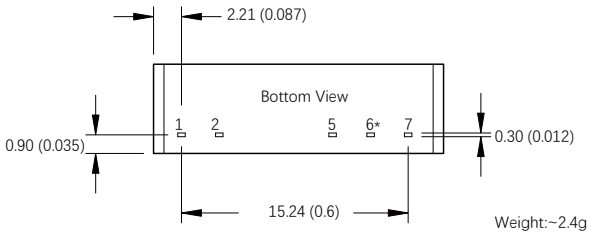

### TEMPERATURE DERATING



## Mechanical Specifications

### MECHANICAL DIMENSIONS

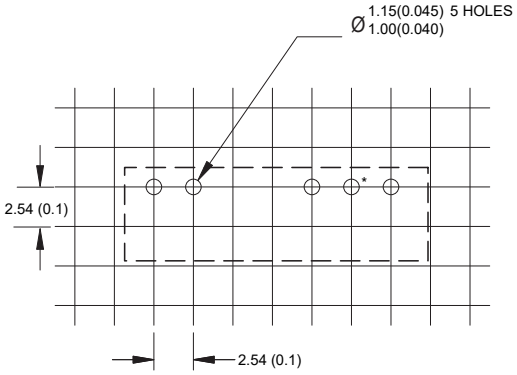



*Pin is not fitted on single output modules.
Unless otherwise specified, all dimensions are in mm±0.25 (inches ±0.01).

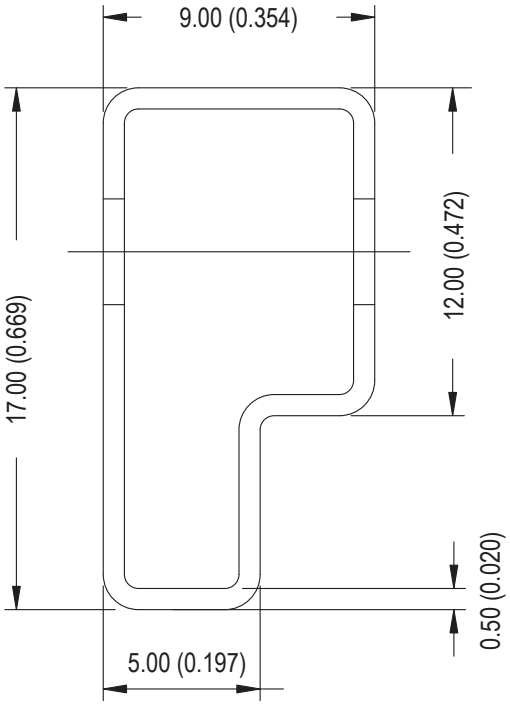
| PIN Connections | | | |
|---|---|---|---|
| Single Output | | Bipolar Output | |
| Pin | Function | Pin | Function |
| 1 | +Vin | 1 | +Vin |
| 2 | -Vin | 2 | -Vin |
| 5 | -Vout | 5 | -Vout |
| 7 | +Vout | 6 | GND |
| | | 7 | +Vout |

### RECOMMENDED FOOTPRINT DETAILS




*Hole is not required for single output modules.
Unless otherwise specified, all dimensions are in mm ±0.5 (inches±0.02).

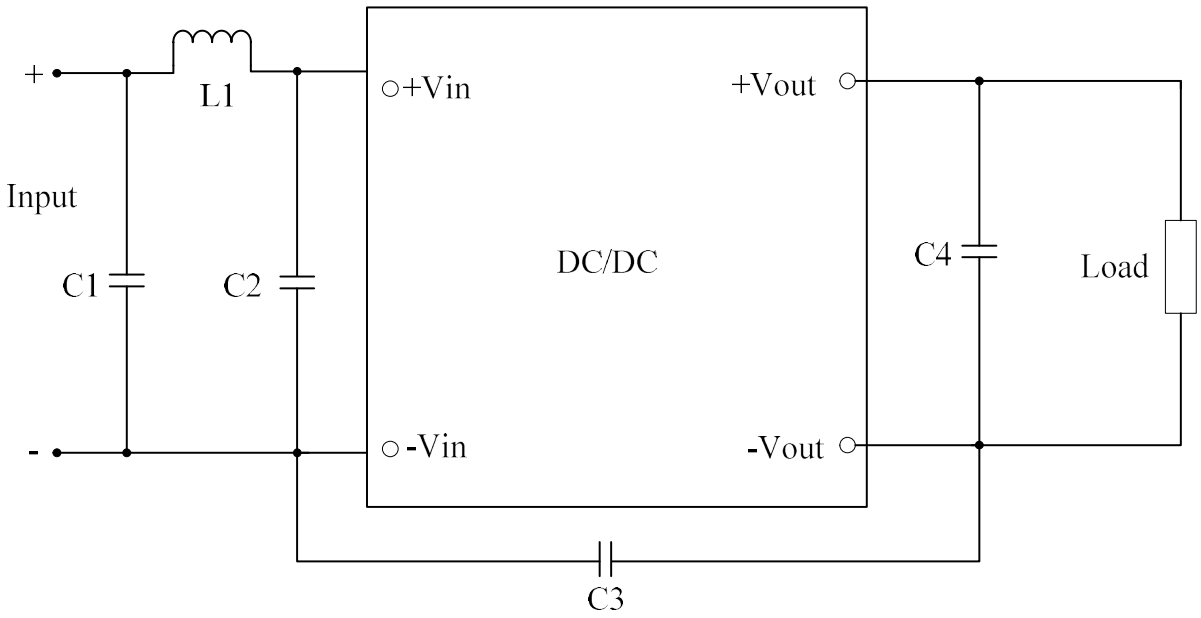
### TUBE OUTLINE DIMENSIONS




Unless otherwise specified, all dimensions are in mm ±0.5 (inches±0.02).
Tube length : 520mm ±2mm (20.87)
Tube quantity : 25pcs

## Emissions Performance

Density Power measures its products for emissions against the CISPR32/EN55032 standards. The maximum output power of the module is 2W and the conduction limits can meet class B.




Conducted Emissions Test Circuit

Conducted Emissions Parts List

| REFERENCE | DESCRIPTION | REFERENCE | DESCRIPTION |
|---|---|---|---|
| C1 | 10μF | C3 | 2.2nF |
| C2 | 4.7μF | C4 | According to capacitive loading in table on page 1 |
| L1 | 6.8μH | | |

## Technical Notes

### INPUT FUSING

Certain applications may require fuse at the inputs of power conversion components. Fuses should also be used when there is possibility of sustained input voltage reversal which is not current limited. The EVN2F modules are not internally fused. We strongly recommend a slow blow fuse to be used in the ungrounded input supply line.

For safety agency approvals, the installer must install the converter in compliance with the end user safety standard.

### OUTPUT RIPPLE & NOISE

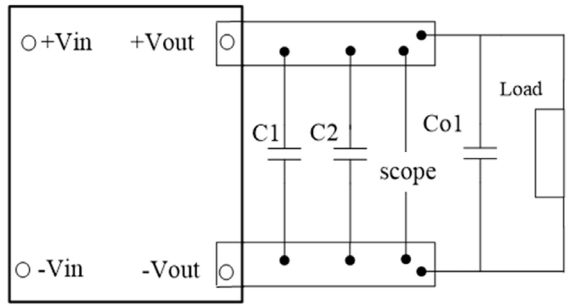



Figure 1 Output Ripple & Noise for Single Output

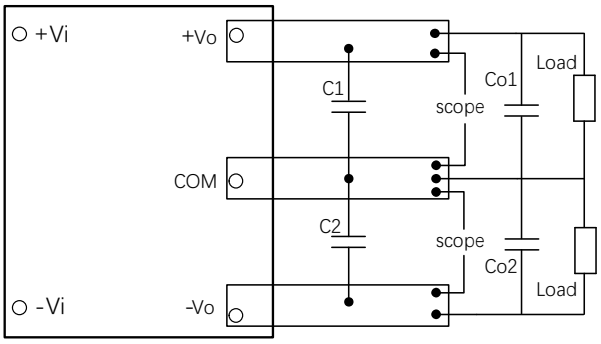



Figure 2 Output Ripple & Noise for Bipolar Outputs

These EVN2F series' output ripple and noise is measured at the rated input voltage and output current, along with 10uF and 0.1uF MLCC are used in parallel with appropriate voltage ratings. The oscilloscope bandwidth is set to 20MHz.

External output capacitors are required to reduce the ripple & noise. The output capacitors should be low ESR and appropriate frequency response with appropriate voltage ratings, and must be located as close to the converters as possible, also particular load and layout must be taken into consideration.

### ISOLATION VOLTAGE

The EVN2F series are 100% production tested at their specified isolation voltage. Parts can be expected to withstand the specified test voltage several times. But it is well known that repeated high-voltage isolation testing will degrade isolation capability which is depending on materials, construction and environment. Thus, the number of tests should be strictly limited and we strongly advise against repeated high voltage isolation testing.

This product is subject to the following operating requirements and the Life and Safety Critical Application Sales Policy:
Refer to: http://www.densitypower.com