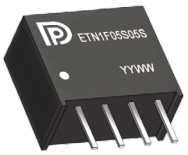
Technical Specification

ETN1F Series (SIP4)

Fixed Input, 1W DC/DC Converters

FEATURES

- Cost-effective
- Efficiency up to 82%
- Fixed input : 3.3, 5, 12, 15, 24VDC (±10%)
- Single isolated output: 3.3, 5, 9, 12, 15, 24VDC
- Fixed switching frequency
- Industrial standard footprint: SIP4
- Built-in short protection, OTP
- 1.5KVDC isolation
- Wide operating temperature range: -40°C to +105°C
- All material compliance with UL94V-0
- Fully encapsulated, high reliability
- MTBF up to 4M hours
- RoHS Compliance



PRODUCT OVERVIEW

The ETN1F series is high performance 1W isolated DC/DC converter with industrial standard SIP 4 footprint. Adopting state-of-the-art power management IC provide high efficiency, reliability, stable and cost effectiveness of a mature power converter. Wide operating temperature range and fully encapsulated package is ideally suited 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 operation temperature range is -40℃ to +105℃ , these modules are ideal for applications that do not require any heat sink or forced air cooling.

The ETN1F 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]
ETN1F03S03	3.3	2.97-3.6	3.3	303	78	220	0.46"×0.24"×0.4" SIP4
ETN1F03S05	3.3	2.97-3.6	5	200	80	220	
ETN1F03S09	3.3	2.97-3.6	9	111	80	220	
ETN1F03S12	3.3	2.97-3.6	12	84	80	220	
ETN1F05S03	5	4.5-5.5	3.3	303	80	220	
ETN1F05S05	5	4.5-5.5	5	200	80	220	
ETN1F05S09	5	4.5-5.5	9	111	80	220	
ETN1F05S12	5	4.5-5.5	12	84	80	220	
ETN1F05S15	5	4.5-5.5	15	67	80	220	
ETN1F05S24	5	4.5-5.5	24	42	80	220	
ETN1F12S03	12	10.8-13.2	3.3	303	78	220	
ETN1F12S05	12	10.8-13.2	5	200	80	220	

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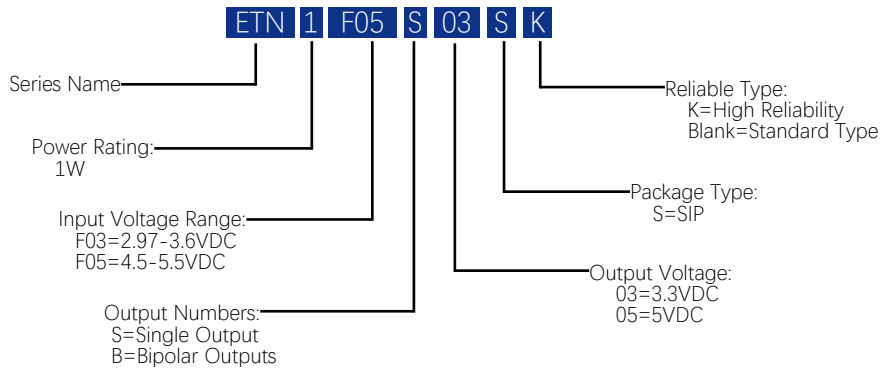
Fixed Input, 1W DC/DC Converters

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]
ETN1F12S09	12	10.8-13.2	9	111	80	220	0.46"×0.24"×0.4" SIP4
ETN1F12S12	12	10.8-13.2	12	84	80	220	
ETN1F12S15	12	10.8-13.2	15	67	80	220	
ETN1F12S24	12	10.8-13.2	24	42	80	220	
ETN1F15S05	15	13.5-16.5	5	200	82	220	
ETN1F15S12	15	13.5-16.5	12	84	82	220	
ETN1F15S15	15	13.5-16.5	15	67	82	220	
ETN1F24S03	24	21.6-26.4	3.3	303	78	220	
ETN1F24S05	24	21.6-26.4	5	200	80	220	
ETN1F24S09	24	21.6-26.4	9	111	80	220	
ETN1F24S12	24	21.6-26.4	12	84	80	220	
ETN1F24S15	24	21.6-26.4	15	67	80	220	
ETN1F24S24	24	21.6-26.4	24	42	80	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
	15Vin type	-0.7		21	VDC
	24Vin type	-0.7		30	VDC
Operating Environment Temperature	⩾ 85℃ with derating	-40		105	°C
Storage Temperature Range		-50		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	1500			VDC
Isolation Resistance	Viso=500VDC	1000			MΩ
Isolation Capacitance	Input to output		20		pF
Case Temperature Above Ambient			15		℃
Switching Frequency			220		KHz
Relative Humidity				95	%
Cooling	Free air convection				

Input Specifications					
Parameters	Conditions	Min.	Typ.	Max.	Units
Input Voltage Range	See "Models Selections".				
Input Current @ No Load	3.3 Vin		10	20	mA
	5 Vin		12	24	mA
	12 Vin		15	25	mA
	15 Vin		16	28	mA
	24 Vin		18	30	mA
Input Current @ Min. Line	3.3 Vin		370		mA
	5 Vin		235		mA
	12 Vin		99		mA
	15 Vin		78		mA
	24 Vin		51		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		+1.5	%/%
	Other types	-1.2		+1.2	%/%
Load Regulation	3.3 Vout type		15		%
	5 Vout type		10		%
	9 Vout type		8		%
	12 Vout type		7		%
	15 Vout type		6		%
	24 Vout type		5		%
Ripple & Noise Max. ①			45	100	mV Pk-Pk
Minimum Load ②		0			A
Output Short Protection	Continuous short protection.				

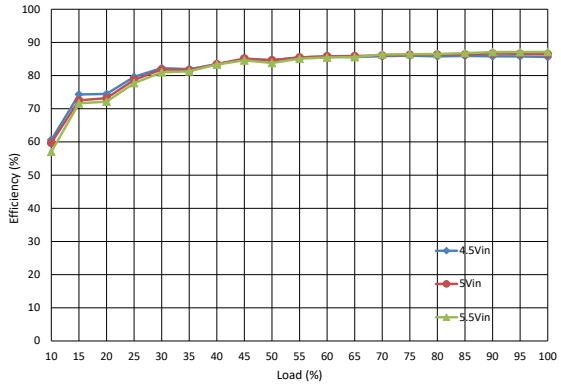
Note:
① For output ripple & noise test conditions, please see output ripple & noise in technical notes on page 8 for details.
② Operating below 10% load will not harm the converter, but specifications may not be met, such as the output voltage may be higher than rated output voltage.

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

Performance Data

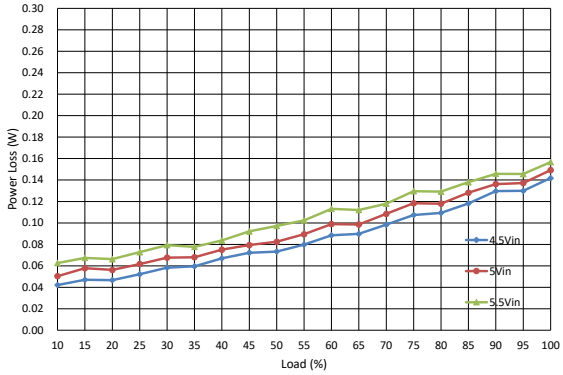
EFFICIENCY VS LOAD

ETN1F05S05S Module

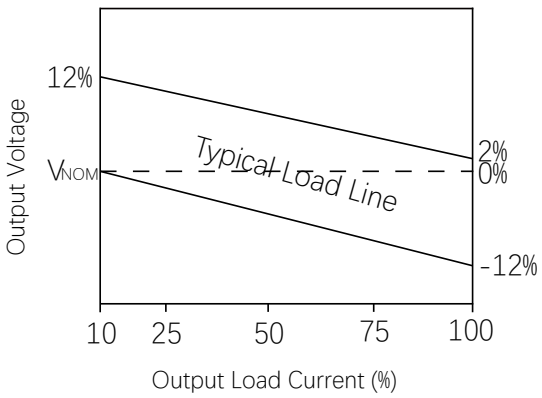


POWER LOSS VS LOAD

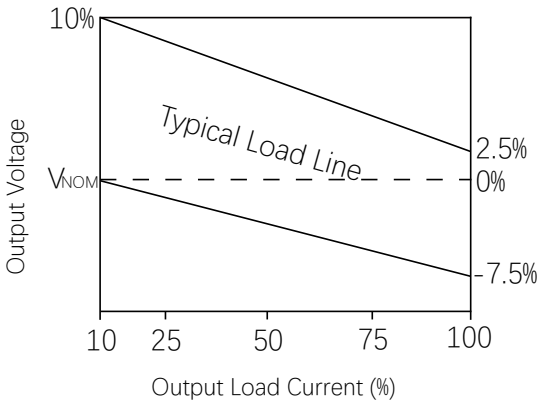
ETN1F05S05S Module



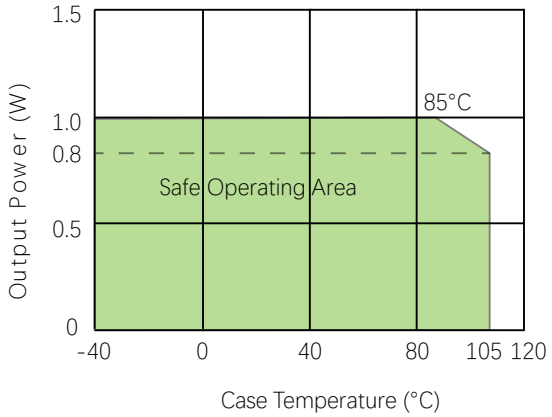
VOUT ACCURACY ENVELOPE (3.3 Vout)



VOUT ACCURACY ENVELOPE (OTHER Vout)

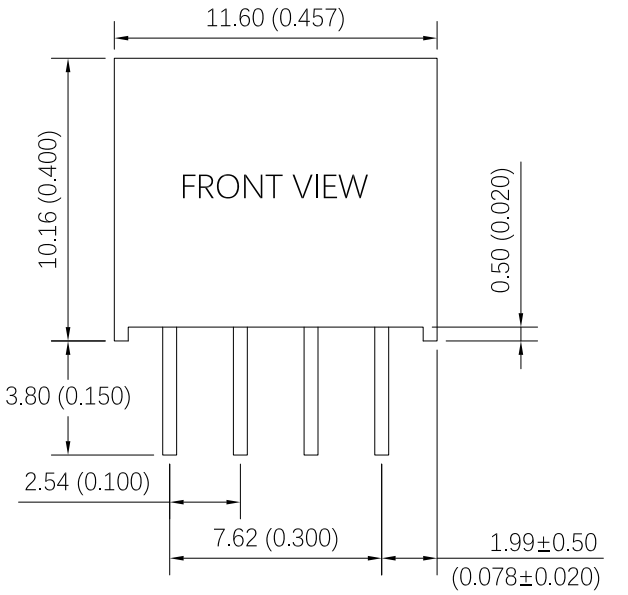


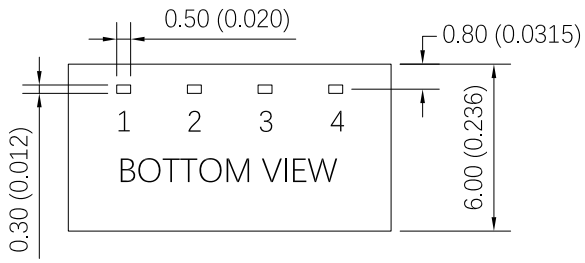
TEMPERATURE DERATING



Mechanical Specifications

MECHANICAL DIMENSIONS

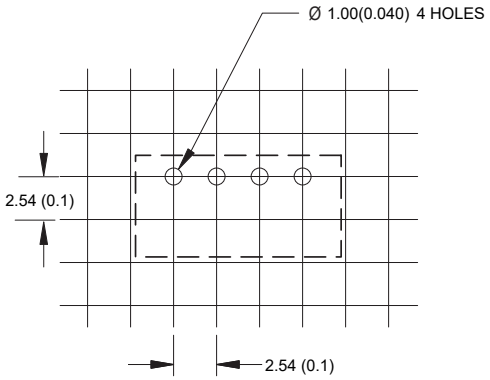




Unless otherwise specified, all dimensions are in mm±0.25 (inches ±0.01).

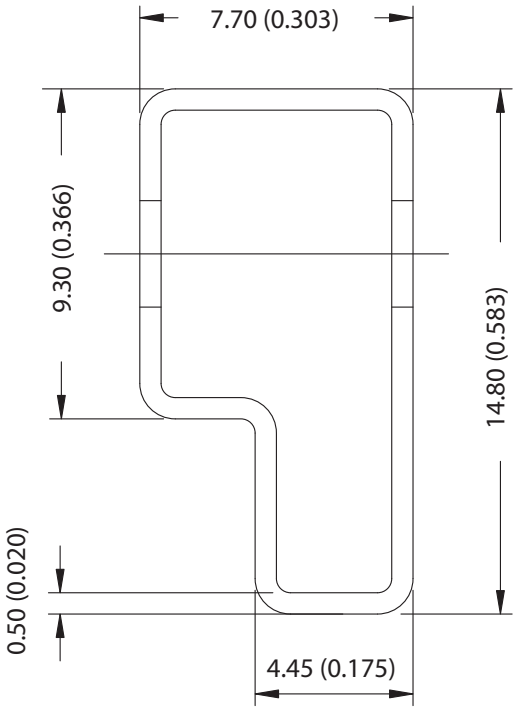
PIN Connections	
Pin	Function
1	-Vin
2	+Vin
3	-Vout
4	+Vout

RECOMMENDED FOOTPRINT DETAILS



Unless otherwise specified, all dimensions are in mm ±0.5 (inches±0.02).

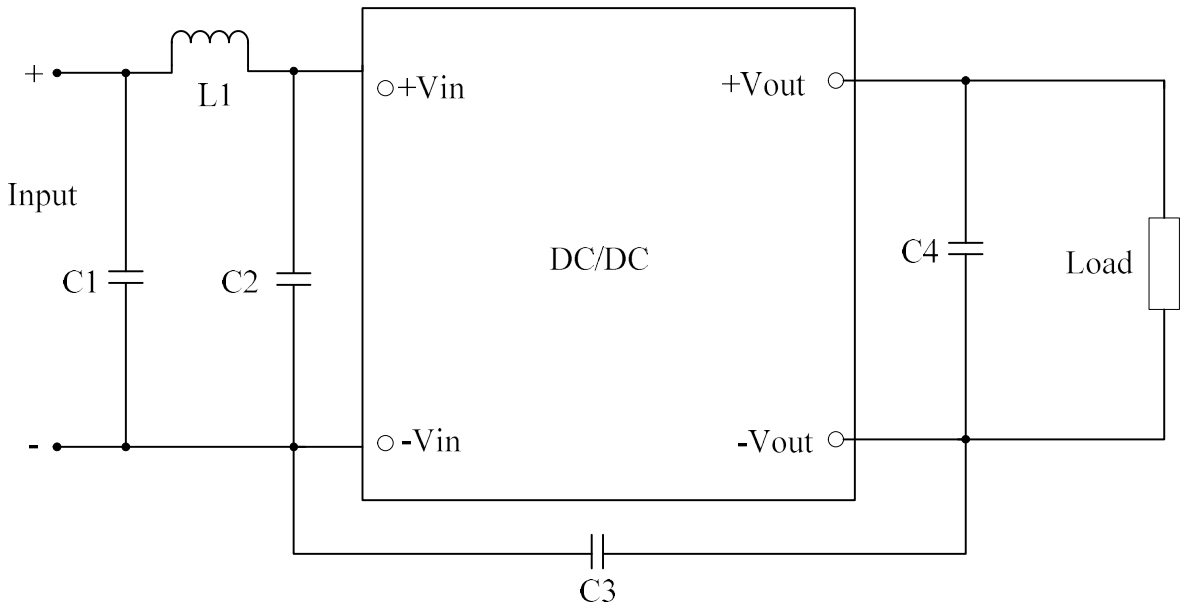
TUBE OUTLINE DIMENSIONS



Unless otherwise specified, all dimensions are in mm ±0.5 (inches±0.02).
Tube length : 530mm ±2mm (20.87)
Tube quantity : 40pcs

Emissions Performance

Density Power measures its products for emissions against the CISPR32/EN55032 standards. The maximum output power of the module is 1W and the conduction limits can meet class B.



Conducted Emissions Test Circuit

Conducted Emissions Parts List

REFERENCE	DESCRIPTION	REFERENCE	DESCRIPTION
C1	4.7μF	C3	2.2nF
C2	4.7μF	C4	According to capacitive loading in "Models Selections" on page 1-2.
L1	6.8μH		

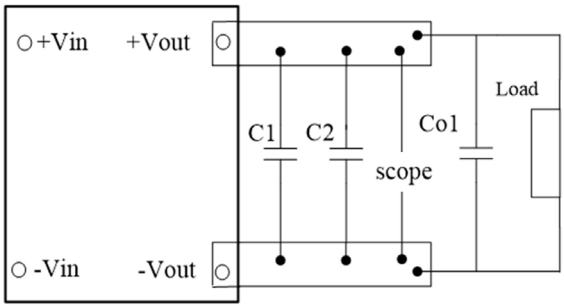
Technical Notes

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 ETN1F 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



These ETN1F 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 ETN1F 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.

CAPACITIVE LOADING

The ETN1F series are optimized for robust output capacitance load capability. It can start up with the maximum capacitance which is listed in the "Models Selections" on page 1-2 @ 100% rated output current within 20mS.

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