

FEATURES

- Ultra high efficiency up to 87%
- Super capacitive load capability, up to 2700uF
- Fixed input : 5, 12, 15, 24VDC ($\pm 10\%$)
- Single isolated output: 3.3, 5, 9, 12, 15VDC
- 3KVDC Isolation
- Industrial standard footprint: SMD
- Continuous output short protection and OTP, auto restart
- Operating temperature range: -55°C to 105°C without derating
- All material compliance with UL94V-0
- MTBF up to 4M hours
- Available in tape & reel package
- RoHS Compliance



PRODUCT OVERVIEW

The DVM1F series are high reliability and efficiency surface mount type isolated DC/DC converters. Wide temperature range and enclosed open frame package is optimized for reflow soldering process per J-STD-020 and J-STD-075. This DVM1F series intend typical applications for industrial control, power electronics, instrumentations, transportations where are required a distribution power system with isolated low power.

The DVM1F series feature an extended ambient temperature operating range of -55°C to $+105^{\circ}\text{C}$ without derating under free air convection and up to 3KVDC isolation from input to output. This module is supplied in standard tape and reel package, which is ideal for automated surface mount production process.

The DVM1F 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. [%]	Ripple & Noise [mVp-p] ①	Package [inch]
DVM1F05S03M	5	4.5-5.5	3.3	303	75	38	0.50"×0.44"×0.27" SMD
DVM1F05S05M	5	4.5-5.5	5	200	84	28	
DVM1F05S09M	5	4.5-5.5	9	111	86.5	35	
DVM1F05S12M	5	4.5-5.5	12	84	87	45	
DVM1F05S15M	5	4.5-5.5	15	67	87	50	
DVM1F12S05M	12	10.8-13.2	5	200	84	30	
DVM1F12S09M	12	10.8-13.2	9	111	85	35	
DVM1F12S12M	12	10.8-13.2	12	84	86	45	
DVM1F12S15M	12	10.8-13.2	15	67	86	50	

Note:

- ① For output ripple & noise test conditions, please see output ripple & noise in technical notes on page 7 for details.

Technical Specification

DVM1F Series (SMD)

Fixed Input, 3KVDC Isolated 1W DC/DC Converters

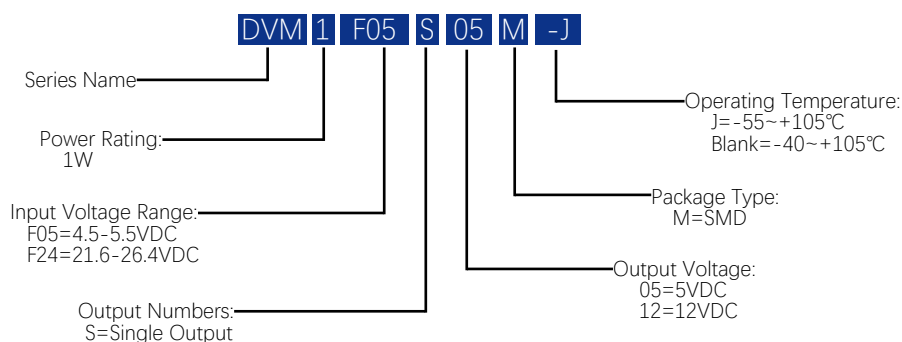
Models Selections

Basic Models	Input Voltage [VDC]	Input Voltage Range [VDC]	Output Voltage [VDC]	Output Current [mA]	Efficiency Typ. [%]	Ripple & Noise [mVp-p] ^①	Package [inch]
DVM1F12S24M	12	10.8-13.2	24	42	85	60	0.50"×0.44"×0.27" SMD
DVM1F15S05M	15	13.5-16.5	5	200	84	30	
DVM1F15S09M	15	13.5-16.5	9	111	84	35	
DVM1F15S12M	15	13.5-16.5	12	84	85	45	
DVM1F15S15M	15	13.5-16.5	15	67	85	50	
DVM1F15S24M	15	13.5-16.5	24	42	85	60	
DVM1F24S05M	24	21.6-26.4	5	200	84	30	
DVM1F24S09M	24	21.6-26.4	9	111	85	35	
DVM1F24S12M	24	21.6-26.4	12	84	86	45	
DVM1F24S15M	24	21.6-26.4	15	67	86	50	
DVM1F24S24M	24	21.6-26.4	24	42	86	60	

Note:

- ① For output ripple & noise test conditions, please see output ripple & noise in technical notes on page 7 for details.

Model Numbering

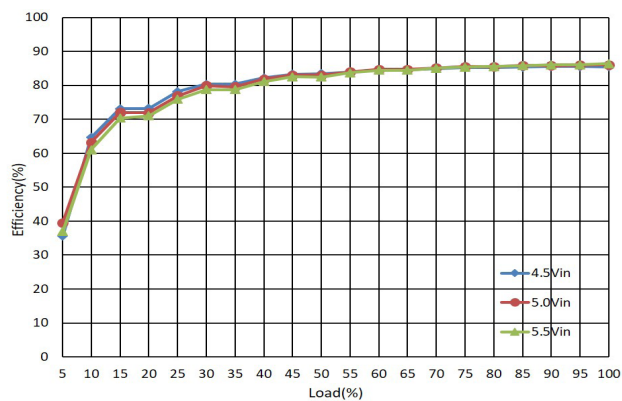


Absolute Maximum Ratings					
Parameters	Conditions	Min.	Typ.	Max.	Units
Input Voltage	5 Vin type			12	VDC
	12 Vin type			20	VDC
	15 Vin type			25	VDC
	24 Vin type			36	VDC
Operating Environment Temperature	Standard	-40		105	°C
	J grade	-55		105	°C
Storage Temperature Range		-55		125	°C
Reflow Temperature	As per J-STD-020D.1			245	°C
General Specifications					
Parameters	Conditions	Min.	Typ.	Max.	Units
Isolation Voltage	Test for 1 minute.	3000			VDC
Isolation Resistance	Viso=1000VDC	10			GΩ
Case Temperature Above Ambient				20	°C
Thermal Protection			150		°C
Thermal Protection Recover			130		°C
Switching Frequency	5 Vin type		282		KHz
	Other types		537		KHz
Relative Humidity		5		95	%
Cooling	Free air convection				
Input Specifications					
Parameters	Conditions	Min.	Typ.	Max.	Units
Input Voltage Range	As shown in the "Models Selection"				
Reflected Ripple Current			11	20	mA p-p
Output Specifications					
Parameters	Conditions	Min.	Typ.	Max.	Units
Output Power				1	W
Vout Accuracy	See voltage accuracy envelope on page 3.				
Line Regulation			1.05	1.1	%/%
Minimum Load ^①		0			%
Output Short Protection	Continuous short protection.				
Note: ① 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.					

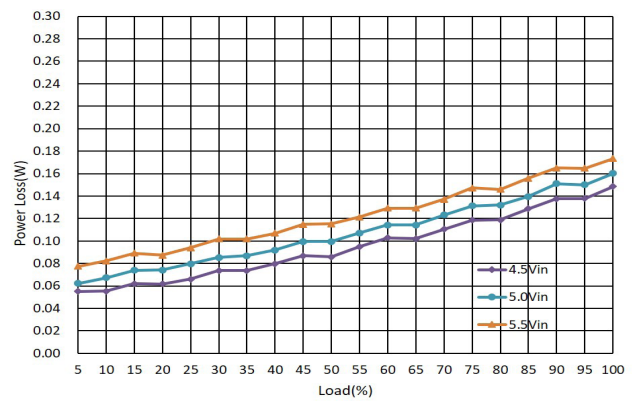
All specifications are tested at 25 °C ambient temperature, nominal input voltage, rated output current conditions unless otherwise specified.

Performance Data

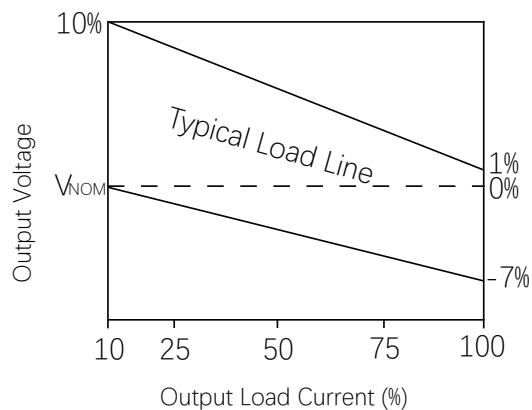
EFFICIENCY VS LOAD (DVM1F05S05M MODEL)



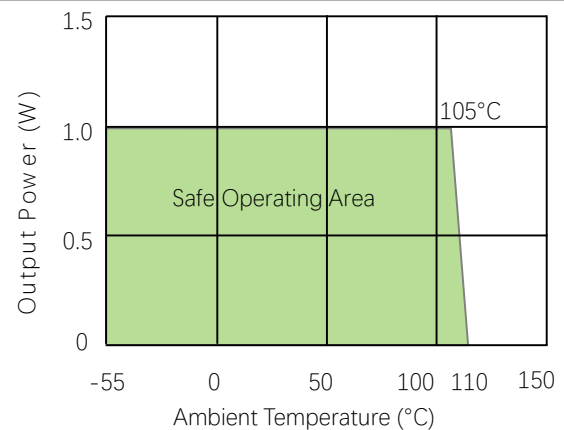
POWER LOSS VS LOAD (DVM1F05S05M MODEL)



VOUT ACCURACY ENVELOPE

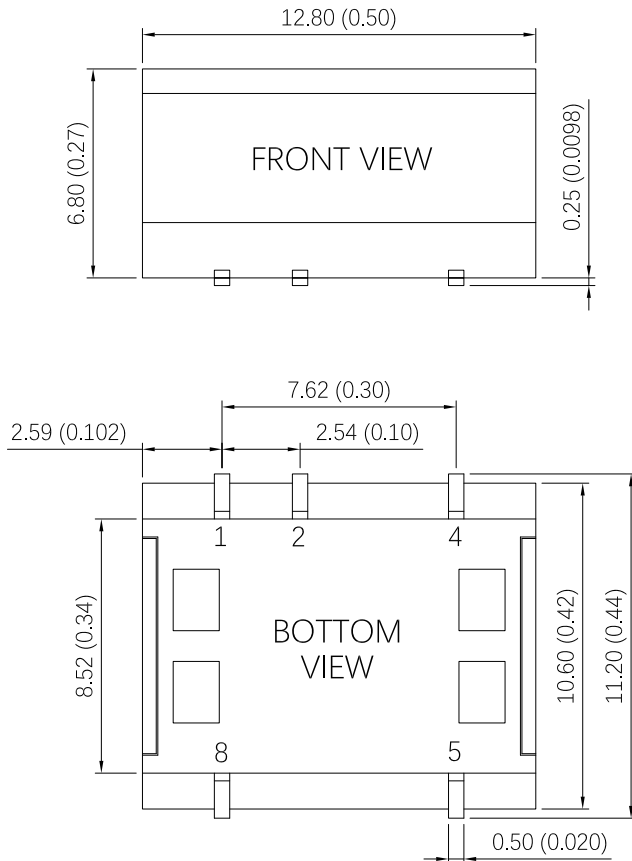


TEMPERATURE DERATING



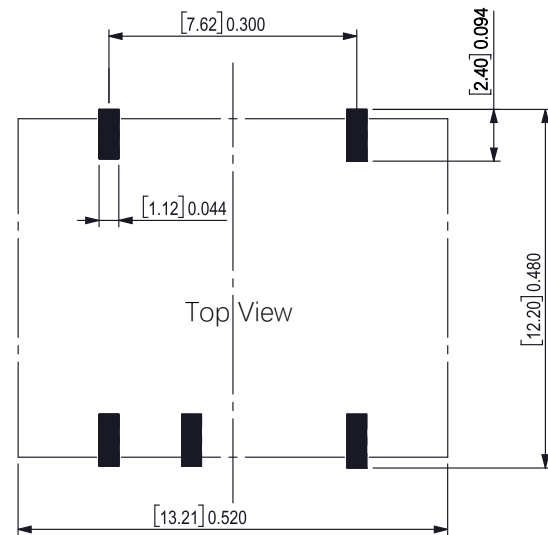
Mechanical Specifications

MECHANICAL DIMENSIONS



*Pin can not connect with any external circuit.
Unless otherwise specified, all dimensions are in mm \pm 0.25 (inches \pm 0.01).

RECOMMENDED FOOTPRINT DETAILS

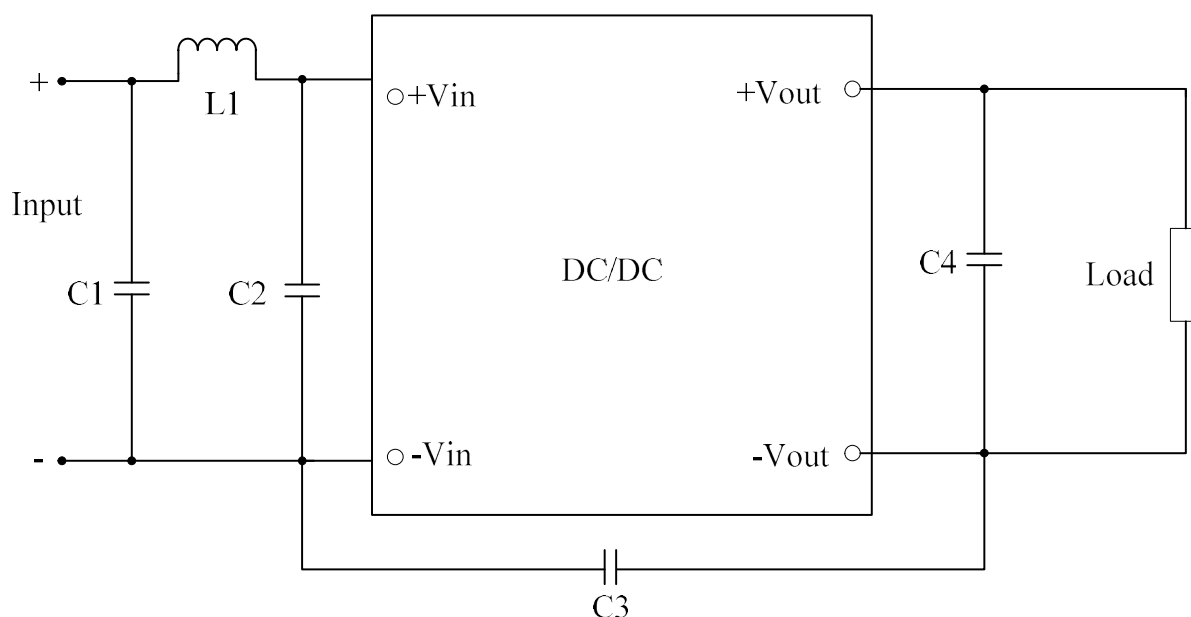


Unless otherwise specified, all dimensions are in mm \pm 0.5 (inches \pm 0.02).

PIN Connections			
Pin	Function	Pin	Function
1	-Vin	5	+Vout
2	+Vin	8*	NC
4	-Vout		

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	10 μ F	C3	2.2nF
C2	4.7 μ F	C4	According to capacitive loading in technical notes on page 6
L1	6.8 μ H		

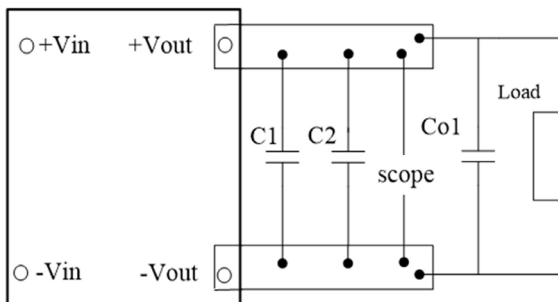
Technical Notes

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 DVM1F modules are not internally fused. We strongly recommend a fast 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 DVM1F 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 DVM1F 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 DVM1F series are optimized for robust output capacitance load capability. It can start up with 2700uF capacitance @ 100% rated output current within 20mS.

THERMAL SHUTDOWN

These DVM1F converters are equipped with thermal shutdown function. If environmental conditions cause the internal temperature of the converter to rise above the designed operating temperature, a precision temperature sensor will power down the unit. When the internal temperature decreases below the threshold of the temperature sensor, the unit will auto restart.



This product is subject to the following operating requirements and the Life and Safety Critical Application Sales Policy:

Refer to: <http://www.densitypower.com>

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