Descriptions

1W isolated, DC/DC Converter



RoHS

CE Report EN62368-1

UKCA Report BS EN62368-1

Features

- Ultra compact SIP package
- Wide 2:1 input voltage range
- Operating ambient temperature range: -40℃ to +85℃
- I/O isolation test voltage 3k VDC
- High power density
- Short circuit protection (self-recovery)
- Remote On/Off

Applications

- Communication
- Instrumentation
- Industrial control

Selection Guide

Certification	Part No.	Input Voltage (VDC)		Output		Full Load Efficiency (%) Min./Typ.	Capacitive Load② (μF)Max.
		Nominal (Range)	Max.①	Voltage(VDC)	Current (mA) Max./Min.		
EN/BS EN	DES1-F1205	12 (9-18)	20	5	200/10	75/77	2200
	DES1-F1209			9	111/6	77/79	1800
	DES1-F1212			12	83/4	76/78	1000
	DES1-F1215			15	67/3	78/80	680
	DES1-F2403	24 (18-36)	40	3.3	303/15	73/75	2700
	DES1-F2405			5	200/10	75/77	2200
	DES1-F2412			12	83/4	76/78	1000
	DES1-F2415			15	67/3	76/78	680
	DES1-F2424			24	42/2	75/77	470

Notes:

①Exceeding the maximum input voltage may cause permanent damage;

②The specified maximum capacitive load for positive and negative output is identical.

Specifications

Specifications	Item	Operating Conditions		Min.	Typ.	Max.	Unit
Input Specifications	Input Current (full load/no-load)	12VDC Input		--	107/15	110/30	mA
		24VDC Input		--	54/6	55/10	
	Reflected Ripple Current	12VDC Input		--	40	--	
		24VDC Input		--	55	--	
	Surge Voltage (1sec. max.)	12VDC Input		-0.7	--	25	VDC
		24VDC Input		-0.7	--	50	
	Start-up Voltage	12VDC Input		4.5	8	9	
		24VDC Input		11	16	18	
	Input Filter			Capacitance filter			
	Hot Plug			Unavailable			
	Ctrl①	Module on		Ctrl pin open (high resistance)			
		Module off		Ctrl pin pulled high (current 5-10mA typ. into Ctrl.)			
Output Specifications	Voltage Accuracy	5%-100% load	3.3V/5V output	--	±3	±5	%
			Others	--	±1	±3	
	Linear Regulation	Input voltage variation from low to high at full load		--	±0.2	±0.5	
	Load Regulation	5%-100% load		--	±0.4	±0.75	
	Transient Recovery Time	25% load step change		--	0.5	2	ms
	Transient Response Deviation			--	±2.5	±5	%
	Temperature Coefficient	Full load		--	±0.02	±0.03	%/℃
	Ripple & Noise ②	20MHz bandwidth	DES1-F24xx	--	70	100	mVp-p
			DES1-F12xx	--	100	150	
	Short-circuit Protection			Continuous, self-recovery			
General Specifications	Isolation	Input-output Electric Strength Test for 1 minute with a leakage current of 1mA max.		3000	--	--	VDC
	Insulation Resistance	Input-output resistance at 500VDC		1000	--	--	MΩ
	Isolation Capacitance	Input-output capacitance at 100kHz/0.1V		--	30	50	pF
	Operating Temperature	see Fig. 1		-40	--	+85	℃
	Storage Temperature			-55	--	+125	
	Case Temperature Rise	Ta=25℃, nominal input, full load		--	+25	--	
	Pin Soldering Resistance Temperature	Soldering spot is 1.5mm away from case for 10 seconds		--	--	+300	
	Storage Humidity	Non-condensing		--	--	95	%RH
	Switching Frequency (PFM Mode)	Full load, nominal input voltage		--	200	--	kHz
	MTBF	MIL-HDBK-217F@25℃		1000	--	--	k hours

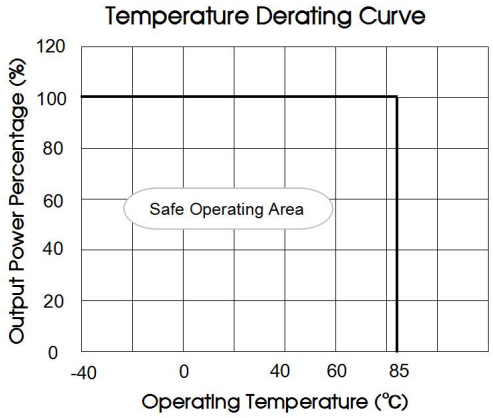
Mechanical Specifications	Case Material	Black plastic; flame-retardant and heat-resistant (UL94-V0)
	Dimensions	22.00 x 9.50 x 12.00 mm
	Weight	4.9g(Typ.)
	Cooling Method	Free ari convection

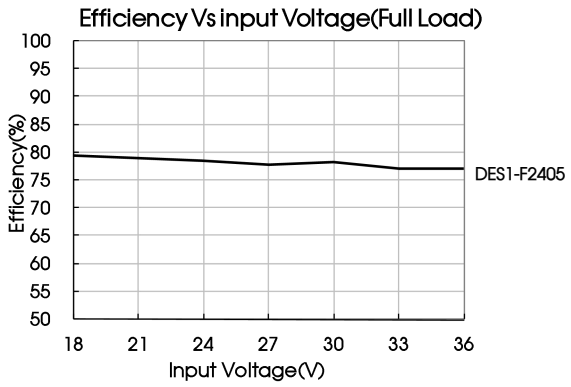
Note:
①For use of Ctrl, please refer to the "design reference" in this manual.
②Note: *The "parallel cable" method is used for ripple and noise test.

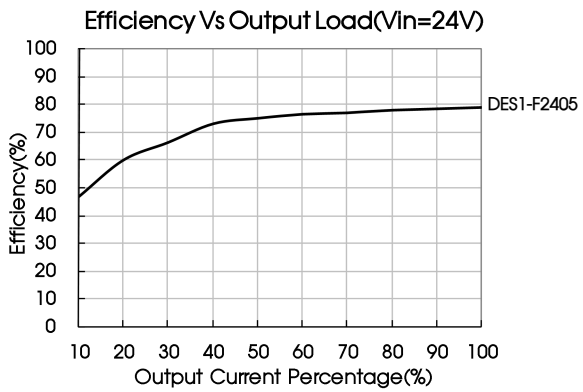
Electromagnetic Compatibility (EMC)

Emissions	CE	CISPR32/EN55032 CLASS B (see Fig. 3-② for recommended circuit)	
	RE	CISPR32/EN55032 CLASS B (see Fig. 3-② for recommended circuit)	
Immunity	ESD	IEC/EN61000-4-2 Contact ±4kV	perf. Criteria B
	RS	IEC/EN61000-4-3 10V/m	perf. Criteria A
	EFT	IEC/EN61000-4-4 ±2kV (see Fig. 3-① for recommended circuit)	perf. Criteria B
	Surge	IEC/EN61000-4-5 line to line ±2kV (see Fig. 3-① for recommended	perf. Criteria B
	CS	IEC/EN61000-4-6 3 Vr.m.s	perf. Criteria A
	Voltage dips, short interruptions and voltage variations immunity	IEC/EN61000-4-29 0%, 70%	perf. Criteria B

Characteristic Curve







Design Reference

1.Typical application

All the DC/DC converters of this series are tested before delivery using the recommended circuit shown in Fig. 2.

Input and/or output ripple can be further reduced by appropriately increasing the input & output capacitor values Cin1, Cin2, Cs and Cout and/or by selecting capacitors with a low ESR (equivalent series resistance). Cs is used to reduce ripple. No need to add Cs, if ripple meets the demand. Appropriate filter capacitance shall be chosen, start-up problems may be caused if the capacitance is too large. For each output circuit, under the condition of safe and reliable operation, the max. capacity of its filter capacitor should be lower than the max. capacitive load.

Single

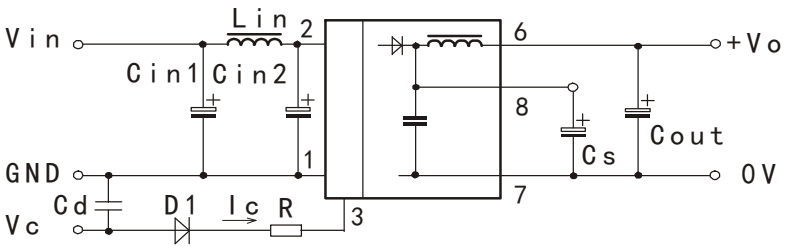


Fig. 2

Vin	12VDC	24VDC
Cin1	100μF/25VDC	10μF/100VDC
Cin2	47μF/25VDC	1μF/100VDC
Lin	4.7μH-12μH	
Cs	10μF-22μF/50VDC	
Cout	100μF/50VDC(Typ.)	
Cd	47nF/100V	

2. EMC compliance recommended circuit

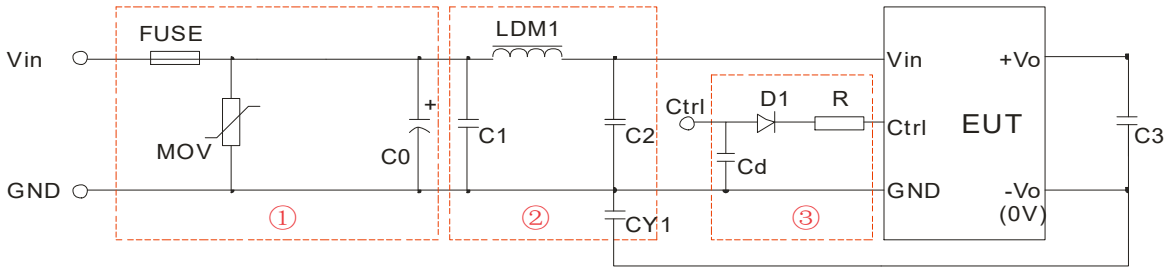


Fig 3

Parameter description:

Model	Vin: 12VDC	Vin: 24VDC
FUSE	Slow-blow, selecting based on needs	
MOV	--	14D560K
LDM1	--	56μH
C0	680μF/25V	330μF/50V
C1	4.7μF/50V	
C2	4.7μF/50V	
C3	Refer to the Cout in Fig.2	
CY1	1nF/3kV	
D1	RB160M-60V/1A	
R	In accordance with the formula: $R = \frac{V_C - V_D - 1.0}{I_C} - 300$	
Cd	47nF/100V	

Notes:

① For EMC tests we use Part ① in Fig. 3 for immunity and part ② for emissions test. Selecting based on needs.

② VC is the voltage of the Ctrl end relative to the GND of the input grounding; VD is the positive-going conduction pressure drop of D1; IC is the current flows into the Ctrl end and its value is generally 5-10mA, see Fig. 3-③ for the peripheral circuit of Ctrl end;

③ If there is no recommended parameters, no external component is required.

3.Ctrl end

The modules are of normal output when the Ctrl end is suspended or of high resistance; the modules turn off when connecting with high level (relative to the input grounding); notice that the current flows into the pin shall be 5 - 10mA, the modules will be permanently damaged if the current exceeds its max. value (20mA in general). The value of R can be derived as follows:

$$R = \frac{V_C - V_D - 1.0}{I_C} - 300$$

For Detailed parameter, please refer to EMC compliance circuit in this manual.

4.Input current

When the electricity is provided by the unstable power supply, please make sure that the range of the output voltage fluctuation and the ripple voltage of the power supply do not exceed the indicators of the modules. Input current of power supply should afford the flash startup current of this kind of DC/DC module(see Fig. 5).

Generally:

Vin=12V series lave =205mA

Vin=24V series lave =104mA

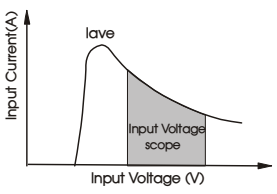
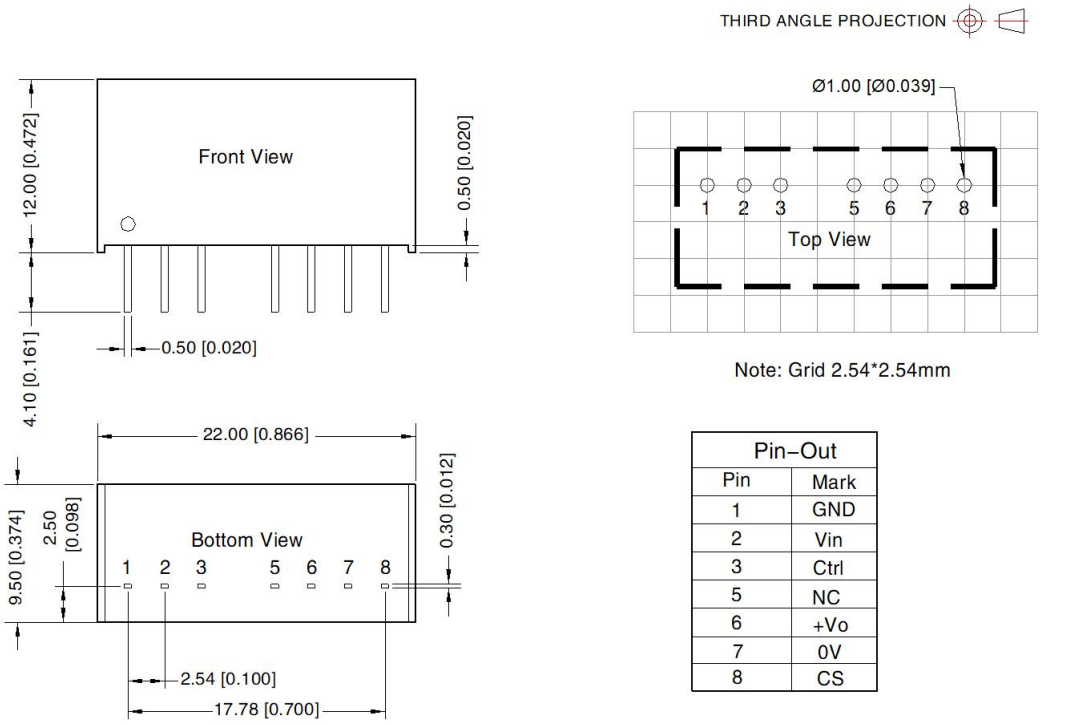


Fig. 5

5.Output load requirements

When using, the minimum load of the module output should not be less than 5% of the nominal load. In order to meet the performance parameters of this datasheet, please connect a 5% dummy load in parallel at the output end, the dummy load is generally a resistor, please note that the resistor needs to be used in derating.

Dimensions and Recommended



Note: Grid 2.54*2.54mm

Pin–Out	
Pin	Mark
1	GND
2	Vin
3	Ctrl
5	NC
6	+Vo
7	0V
8	CS

NC: Not available for electrical connection

Note:
Unit: mm[inch]
Pin section tolerances: ± 0.10[± 0.004]
General tolerances: ± 0.25[± 0.010]

Notes:

1. Recommend to use module with more than 5% load, if not, the ripple of the product may exceeds the specification, but does not affect the reliability of the product;
2. The recommended unbalance degree of the dual output module load is ≤±5%; if the degree exceeds ±5%, than the product performance cannot be guaranteed to comply with all parameters in the datasheet. Please contact our technicians directly for specific information;
3. The maximum capacitive load offered were tested at input voltage range and full load;
4. Unless otherwise specified, parameters in this datasheet were measured under the conditions of Ta=25℃, humidity<75%RH with nominal input voltage and rated output load;
5. All index testing methods in this datasheet are based on company corporate standards;
6. Products are related to laws and regulations: see "Features" and "EMC";
7. Our products shall be classified according to ISO14001 and related environmental laws and regulations, and shall be handled by qualified units.