Descriptions

DC/DC Converter



RoHS

Features

- The leakage current < 2μA
- Isolation Capacitance as low as 4pF
- Creepage & Clearance Distance > 5mm
- Reinforced insulation, Isolation voltage: 5000VAC or 6000VDC
- Operating ambient temperature range: -40℃ to+105℃
- Continuous short-circuit protection

Applications

- Medical collection isolation
- High voltage collection circuit
- IGBT drive circuit

Selection Guide

Certification	Part No.	Input Voltage (VDC)	Output		Full Load Efficiency (%) Min./Typ.	Capacitive Load(μF) Max.
		Nominal (Range)	Voltage (VDC)	Current (mA) Max./Min.		
--	DFS1-H1203S	12 (10.8-13.2)	3.3	303/31	67/71	2200
	DFS1-H1205S		5	200/20	73/77	2200
	DFS1-H1209S		9	111/11	76/80	1000
	DFS1-H1212S		12	84/9	74/78	470
	DFS1-H1215S		15	67/7	75/79	470
	DFS1-H2405S	24 (21.6-26.4)	5	200/20	69/73	2200
	DFS1-H2409S		9	111/11	73/77	1000
	DFS1-H2412S		12	84/9	75/79	470
	DFS1-H2415S		15	67/7	75/79	470

Note:The product image is for reference only, please refer to the actual product for details.

Specifications

Product Specifications	Item	Operating Conditions		Min.	Typ.	Max.	Unit
Input Specifications	Input Current (full load/no-load)	12V input		--	108/8	125/--	mA
		24V input		--	57/7	61/--	
	Surge Voltage (1sec. max.)	12V input		-0.7	--	18	VDC
		24V input		-0.7	--	30	
	Reflected Ripple Current			--	200	--	mA
	Input Filter			Capacitance filter			
	Hot Plug			**Unavailable**			
Output Specifications	Output Voltage Accuracy			See output regulation curve(Fig. 1)			
	Linear Regulation	Input voltage change: ±1%	3.3V output	--	--	1.5	--
			Other output	--	--	1.2	
	Load Regulation	10%-100% load	3.3V output	--	--	20	%
			Other output	--	--	15	
	Ripple & Noise①	20MHz bandwidth	3.3V output	--	100	150	mVp-p
			Other output	--	80	120	
	Temperature Coefficient	100% full load		--	±0.02	--	%/℃
	Output Short Circuit Protection			Continuous, self-recovery			
General Specifications	Isolation	Input-output, with the test time of 1 minute, the leakage current < 1mA		5000	--	--	VAC
				6000	--	--	VDC
	Patient Leakage Current②	250VAC, 50/60Hz		--	--	2	μA
	Insulation Resistance	Input-output, isolation voltage 500VDC		1000	--	--	MΩ
	Isolation Capacitance	Input-output, 100kHz/0.1V		--	4	--	pF
	Operating Temperature	Derating when operating temperature ≥85℃ (see Fig. 2)		-40	--	105	℃
	Storage Temperature			-55	--	125	
	Case Temperature Rise	Ta=25℃		--	25	--	
	Pin Soldering Resistance Temperature③	Manual soldering, with solder joints 1.5mm from the shell, for 10 seconds		--	--	+300	
		Wave soldering, maximum 10 seconds		255	260	265	
	Storage Humidity	Non-condensing		5	--	95	%RH
	Switching Frequency	12V input, 100% load		--	260	--	kHz
	MTBF	MIL-HDBK-217F@25℃		19360	--	--	k hours
	Creepage & Clearance Distance			5	--	--	mm
Mechanical Specifications	Case Material	Black plastic; flame-retardant and heat-resistant (UL94V-0)					
	Dimensions	19.65 x 7.90x 10.16mm					
	Weight	2.4g(Typ.)					
	Cooling Method	Free air convection					

Notes:

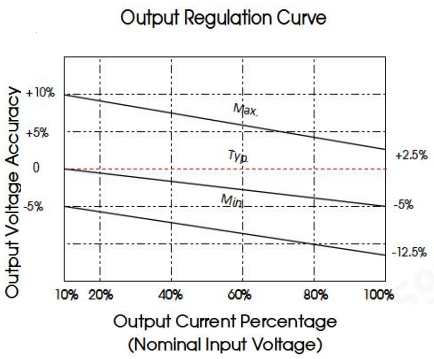
①The "parallel cable" method is used for ripple and noise test;
②Leakage current and reinforced insulation is based on 250 VAC, 50/60 Hz system input voltage;
③The pin soldering temperature tolerance is not the actual temperature set by the soldering iron but the temperature required for proper solder joints. The actual temperature set by the customer should be determined comprehensively based on factors such as PCB thickness, copper coverage, soldering iron power, and soldering iron tip selection.

Electromagnetic Compatibility (EMC)

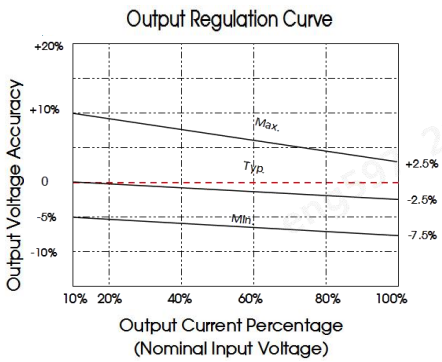
Emissions	CE	CISPR32/EN55032 CLASS B (see Fig. 4 for recommended circuit) EN60601-1-2/CISPR 11 GROUP1 CLASS B (see Fig. 4 for recommended circuit)
	RE	CISPR32/EN55032 CLASS B (see Fig. 4 for recommended circuit) EN60601-1-2/CISPR 11 GROUP1 CLASS B (see Fig. 4 for recommended circuit)
Immunity	ESD	EN60601-1-2 (IEC/EN61000-4-2) Air ±15kV, Contact ±8kV perf. Criteria B

Characteristic Curve

3.3VDC output



5VDC output



Other output

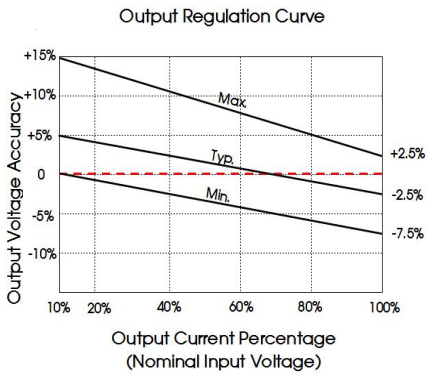


Fig. 1

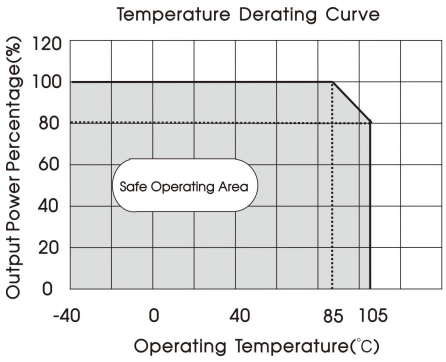


Fig. 2

Design Reference

1. Typical application

①If it is required to further reduce input and output ripple, a filter capacitor can be connected to the input and output terminals, see Fig.3.
②Moreover, choosing suitable filter capacitor is very important, start-up problems may be caused by too large capacitance. To ensured the modules running well, the recommended capacitive load values as shown in Table 1.

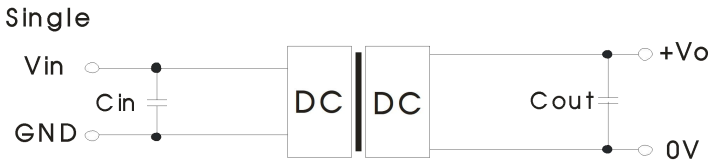


Fig. 3

Table 1: Recommended input and output capacitor values

Vin	Cin	Vout	Cout
12VDC	10μF/25V	3.3/5VDC	10μF/16V
24VDC	2.2μF/50V	9VDC	10μF/16V
--	--	12VDC	2.2μF/25V
--	--	15VDC	1μF/25V

2. EMC compliance circuit

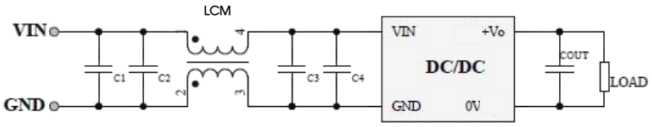


Fig. 4

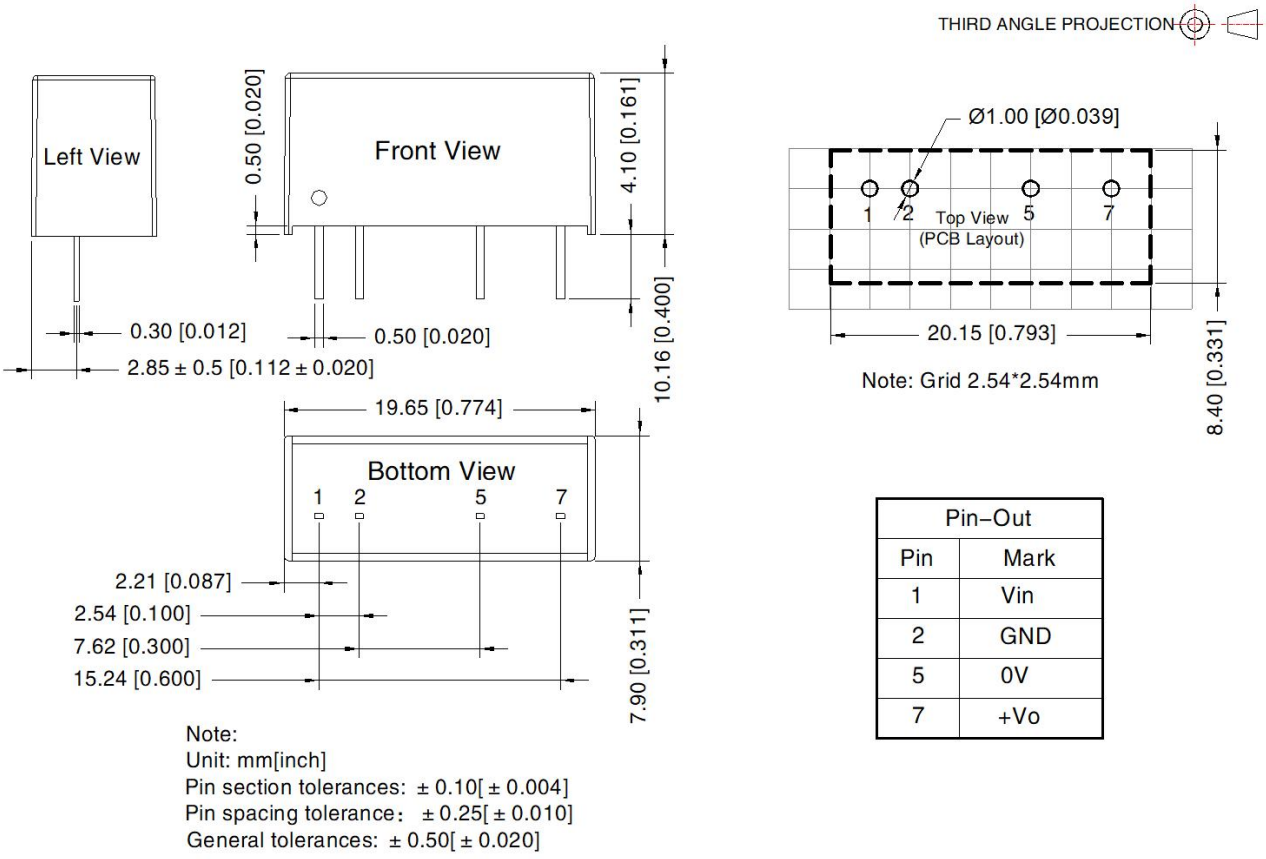
EMC recommended circuit value table (Table 2)

Input voltage		12V Input	24V Input
EMI	C1/C2/C3/C4	4.7μF /16V	4.7μF /50V
	Cout	Refer to the Cout in table 1	
	LCM1	EFL2D-3-472	

3. Minimum Output Load Requirement

For a reliable and efficient operation of the converter, the minimum load should never be less than 10% of the rated output load. If the total required output power is below 10%, a parallel bleeding resistor is required on the output, ensuring that the sum of the power consumption is always maintained at 10% minimum.

Dimensions and Recommended Layout



Pin–Out	
Pin	Mark
1	Vin
2	GND
5	0V
7	+Vo

Note:
Unit: mm[inch]
Pin section tolerances: ± 0.10[± 0.004]
Pin spacing tolerance： ± 0.25[± 0.010]
General tolerances: ± 0.50[± 0.020]

Notes:

1. If the product is not operated within the required load range, the product performance cannot be guaranteed to comply with all parameters in the datasheet;
2. The maximum capacitive load offered were tested at input voltage range and full load;
3. 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;
4. All index testing methods in this datasheet are based on our company corporate standards;
5. Products are related to laws and regulations: see "Features" and "EMC";
6. Our products shall be classified according to ISO14001 and related environmental laws and regulations, and shall be handled by qualified units.