Descriptions

1W isolated，DC-DC Converter



RoHS

3 Years Warranty

UL60601 EN62368-1 BS EN62368-1

Features

- SIP package
- High efficiency up to 81%
- Reinforced insulation
- The patient leakage current: Max 2μA
- Isolation voltage: 4200VAC or 6000VDC
- Operating temperature range:-40℃ to +85℃
- Internal surface mounted design
- International standard pin-out
- Meets IEC60950,IEC62368, EN60601-1,ANSI/AAMI ES60601-1 approval（1xMOPP/2xMOOP）

Applications

- Medical collection and isolation
- High voltage acquisition circuit
- IGBT driver

Selection Guide

Certification	Part No	Input Voltage (VDC)	Output		Full Load Efficiency (%) Min./Typ.	Capacitive Load①(μF) Max.
		Nominal(Range)	Voltage(VDC)	Current (mA) (Max./Min.)		
--	DFS1-H0305V0	3.3 (2.97-3.63)	5	200/20	67/71	1000
EN/BS EN	DFS1-H0503V0	5 (4.5-5.5)	3.3	303/31	69/73	1000
UL/EN/BS EN	DFS1-H0505V0		5	200/20	74/78	1000
EN/BS EN	DFS1-H0512V0		12	84/9	72/76	470
	DFS1-H0515V0		15	67/7	72/76	470
	DFS1-H1205V0	12 (10.8-13.2)	5	200/20	73/77	1000
	DFS1-H1212V0		12	84/9	77/81	470
	DFS1-H1215V0		15	67/7	77/81	470
	DFS1-H2405V0	24 (21.6-26.4)	5	200/20	72/76	1000
	DFS1-H2412V0		12	84/9	74/78	470
	DFS1-H2415V0		15	67/7	74/78	470

Note:
①The positive and negative output capacitive loads are the same;
②Product images are for reference only; the actual product shall prevail.

Specifications

Specifications	Item	Operating Conditions		Min.	Typ.	Max.	Unit
Input Specifications	Input Current (no-load/full load)	3.3V input		--	45/426	70/--	mA
		5V input		--	35/274	60/--	
		12V input		--	15/114	40/--	
		24V input		--	10/56	25/--	
	Reflected Ripple Current			--	0.2	--	
	Input impulse voltage (1sec. max.)	3.3V input		-0.7	--	7	VDC
		5V input		-0.7	--	9	
		12V input		-0.7	--	18	
		24V input		-0.7	--	30	
	Input Filter			Capacitor filter			
	Hot Plug			Unavailable			
Output Specifications	Output Voltage Accuracy			See tolerance envelope curve (Fig. 1)			
	Line Regulation	Input voltage change: ±1%	3.3V output	--	--	±1.5	--
			Others	--	--	±1.2	
	Load Regulation	10%-100% load	3.3V/5V output	--	--	20	%
			Others	--	--	15	
	Ripple & Noise①	20MHz bandwidth	3.3V output	--	80	150	mVp-p
			Others	--	70	120	
	Temperature Coefficient	100% full load		--	±0.02	--	%/℃
	Output Short Circuit Protection②			--	--	3	s
General Specifications	Insulation Voltage	Input-output, with the test time of 1 minute		4200	--	--	VAC
				6000	--	--	VDC
	Patient Leakage Current③	250VAC，50/60Hz		--	--	2	μA
	Insulation Resistance	Input-output, isolation voltage 500VDC		1000	--	--	MΩ
	Isolation Capacitance	Input-output, 100KHz/0.1V		--	5	--	pF
	Operating Temperature			-40	--	85	℃
	Storage Temperature			-55	--	125	
	Casing Temperature Rise	Ta=25℃		--	25	--	
	Pin Welding Resistance Temperature④	Soldering spot is 1.5mm away from the case, 10 seconds max.		--	--	+300	
		Wave soldering, maximum 10 seconds		255	260	265	
	Storage Humidity	Non-condensing		--	--	95	%RH
	Switching Frequency	100% load, nominal input voltage		--	100	--	kHz
	MTBF	MIL-HDBK-217F@25℃		3500	--	--	k hours
	Transformer Creepage			5	--	--	mm
	Transformer Clearance			5	--	--	
	PCB Creepage & Clearance			5.5	--	--	
Mechanical Specifications	Casing Material	Black flame-retardant and heat-resistant plastic (UL94 V-0)					
	Package Dimensions	19.50*9.80*12.50 mm					

	Weight	4.2g(Typ.)
	Cooling Method	Free air convection

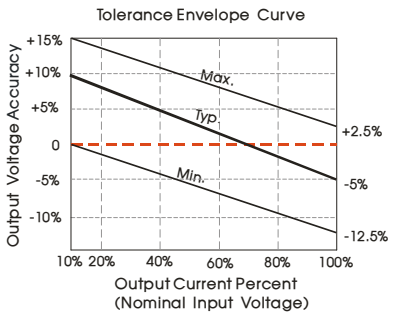
Note:
①Ripple and noise tested with "parallel cable" method;
②Supply voltage must be discontinued at the end of short circuit duration which less than 3s;
③Patient leakage current and enhanced insulation are based on a 250VAC, 50/60Hz system input voltage. The DFS1-HxxxxV0 series meets 1xMOPP/2xMOOP requirements at 250VAC, 50/60Hz system voltage;
④The 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)

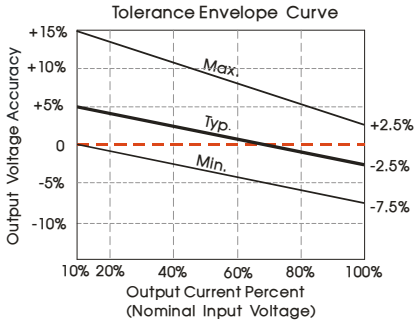
EMI	CE	EN60601-1-2/CISPR 11 GROUP1 CLASS B (see Fig. 5 for recommended circuit)
	RE	EN60601-1-2/CISPR 11 GROUP1 CLASS B (see Fig. 5 for recommended circuit)
EMS	ESD	EN60601-1-2(IEC/EN61000-4-2 Contact ±8KV perf. Criteria B)

Typical Performance Curves

3.3VDC output



5VDC output



Other output

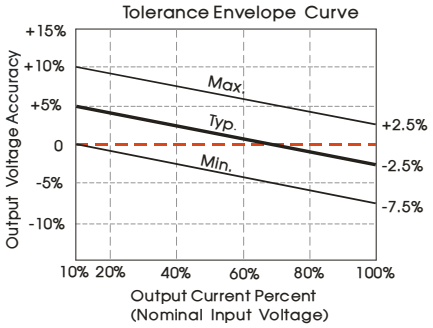


Fig. 1

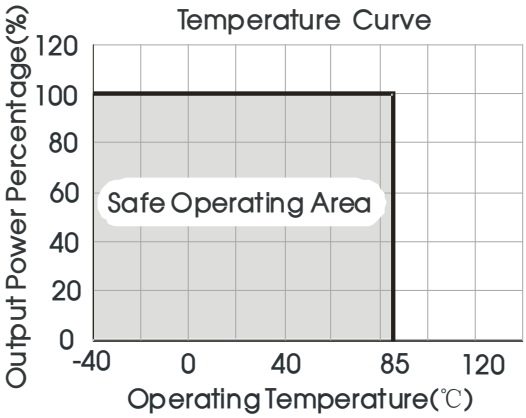
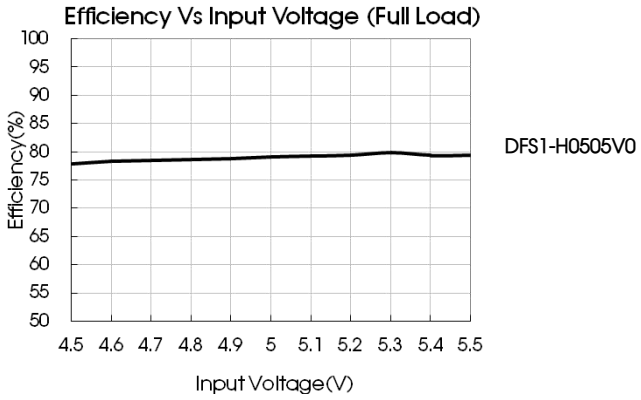
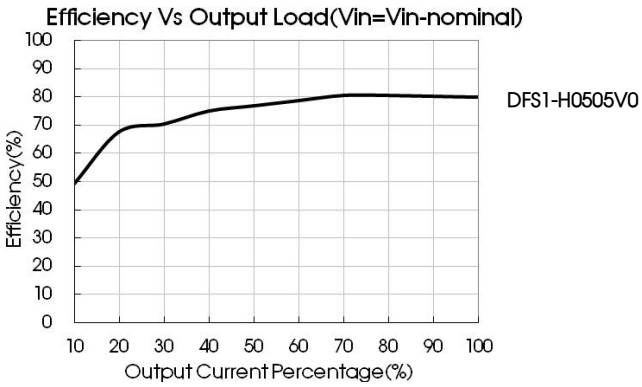


Fig. 2





Design Reference

1. Typical application

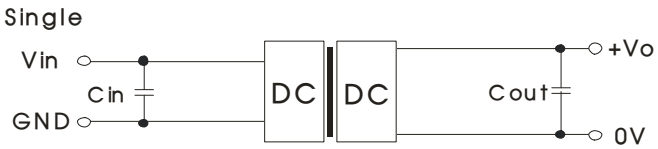


Fig. 3

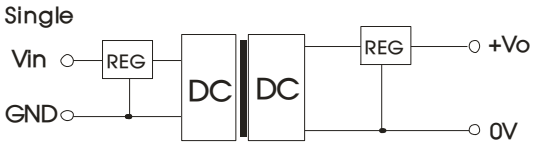


Fig. 4

Recommended capacitive load value table (Table 1)

Vin(VDC)	Cin(μF)	Single Vout(VDC)	Cout(μF)
3.3/5	10	3.3/5	10
12	4.7	12	2.2
24	2.2	15	1

Notes:

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.

③The simplest device for output voltage regulation, over-voltage and over-current protection is a linear voltage regulator with overheat protection that is connected to the input or output end in series (see Fig. 4).

2. EMC (CLASS B) compliance circuit

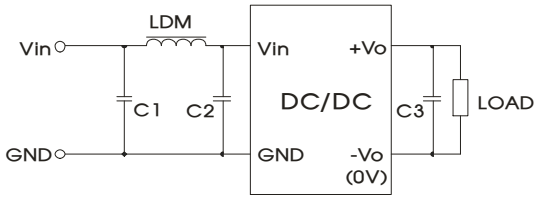


Fig. 5

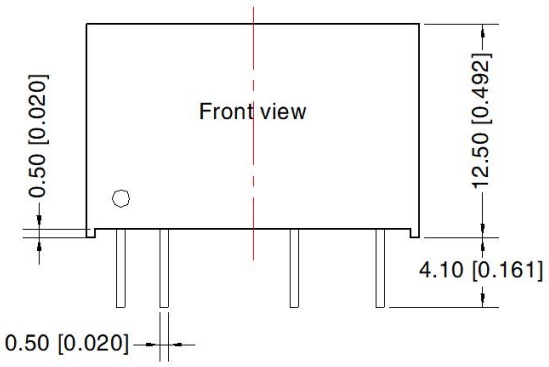
Recommended typical circuit parameters:

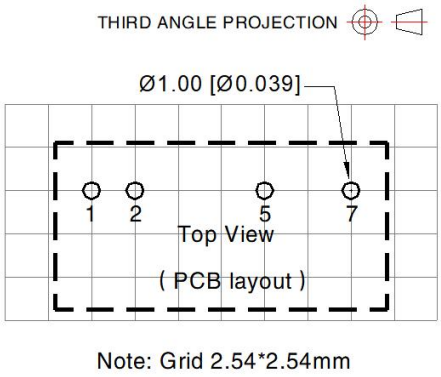
Input voltage (V)		3.3/5/12/24
EMI	C1,C2	4.7μF /50V
	C3	Refer to the Cout in Fig.3
	LDM	6.8μH

3. Output load requirements

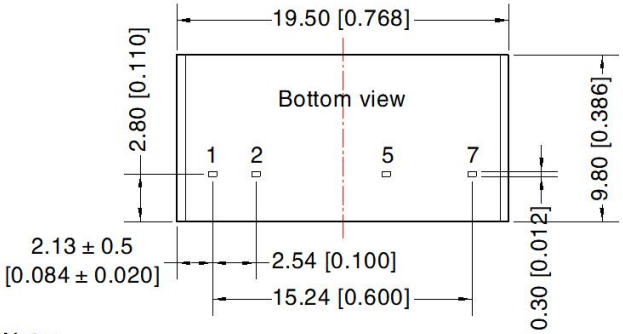
In order to ensure the converter can work reliably with high efficiency, the minimum load should not less than 10% rated load when it is used. If the needed power is indeed small, please parallel a resistor on the output side (The sum of the efficient power and resistor consumption power is not less than 10%).

Dimensions and Recommended Layout





Note: Grid 2.54*2.54mm



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

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

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's 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;
7. The image certification marks are for reference only; please refer to the selection table for actual specifications. Certification is based on the physical mark or packaging label.