Descriptions

1W isolated，DC-DC converter





RoHS

3 Years Warranty

CE Report EN62368-1

UKCA Report BS EN62368-1

Features

- High efficiency up to 83%
- 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
- Meet IEC60601 standard

Applications

- Medical
- Electricity
- IGBT driver

Selection Guide

Certification	Part No.	Input Voltage (VDC)	Output		Full Load Efficiency (%) Min./Typ.	Capacitive Load(μF)① Max.
		Nominal (Range)	Voltage(VDC)	Current (mA) Max./Min.		
--	DFS1-G0503	5 (4.5-5.5)	±3.3	±152/±15	71/75	1000
	DFS1-G0505		±5	±100/±10	76/80	1000
	DFS1-G0509		±9	±56/±6	76/80	470
	DFS1-G0512		±12	±42/±5	77/81	220
	DFS1-G0515		±15	±34/±4	77/81	220
	DFS1-H0503		3.3	303/30	71/75	2200
	DFS1-H0505		5	200/20	76/80	2200
	DFS1-H0509		9	111/11	76/80	1000
	DFS1-H0512		12	84/9	77/81	470
	DFS1-H0515		15	67/7	77/81	470
	DFS1-H0524		24	42/4	77/81	220
EN/BS EN	DFS1-G1203	12 (10.8-13.2)	±3.3	±152/±15	73/77	1000
	DFS1-G1205		±5	±100/±10	75/79	1000
	DFS1-G1209		±9	±56/±6	75/79	470
	DFS1-G1212		±12	±42/±5	77/81	200
	DFS1-G1215		±15	±34/±4	77/81	200

--	DFS1-G1224		±24	±21/±3	73/77	220
EN/BS EN	DFS1-H1203		3.3	303/30	72/76	2200
	DFS1-H1205		5	200/20	75/79	2200
	DFS1-H1209		9	111/12	77/81	680
	DFS1-H1212		12	84/9	79/83	470
	DFS1-H1215		15	67/7	79/83	470
	DFS1-H1224		24	42/4	78/82	220
	DFS1-G1505	15 (13.5-16.5)	±5	±100/±10	73/77	1000
	DFS1-G1512		±12	±42/±5	75/79	220
	DFS1-G1515		±15	±33/±4	75/79	220
--	DFS1-G2403	24 (21.6-26.4)	±3.3	±152/±15	69/73	1000
EN/BS EN	DFS1-G2405		±5	±100/±10	71/75	1000
	DFS1-G2409		±9	±56/±6	71/75	470
	DFS1-G2412		±12	±42/±5	72/76	220
	DFS1-G2415		±15	±34/±4	72/76	220
--	DFS1-G2424		±24	±21/±3	66/70	220
EN/BS EN	DFS1-H2405		5	200/20	72/76	2200
	DFS1-H2409		9	111/12	72/76	680
	DFS1-H2412		12	84/9	72/76	470
	DFS1-H2415		15	67/7	72/76	470
	DFS1-H2424		24	42/5	72/76	220

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

Specifications

Product Specifications	Item	Operating Conditions		Min.	Typ.	Max.	Unit
Input Specifications	Input Current (full load / no-load)	5V input		--	250/14	282/--	mA
		12V input		--	106/10	116/--	
		15V input		--	90/10	100/--	
		24V input		--	60/12	63/--	
	Reflected Ripple Current			--	200	--	
	Surge Voltage (1sec. max.)	5V input		-0.7	--	9	VDC
		12V input		-0.7	--	18	
		15V input		-0.7	--	21	
		24V input		-0.7	--	30	
	Input Filter			Capacitance filter			
	Hot Plug			Unavailable			
Output Specifications	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/5V output	--	--	20	%
			Other output	--	--	15	
	Ripple & Noise①	20MHz bandwidth	3.3V output	--	100	150	mVp-p

		Other output	--	80	120	
	Temperature Coefficient	Full load	--	±0.02	--	%/℃
	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	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	5	--	95	%RH
	Switching Frequency	5V input, 100% load	--	300	--	kHz
		12/15/24V input, 100% load	--	200	--	
	MTBF	MIL-HDBK-217F@25℃	19360	--	--	k hours
	Creepage & Clearance Distance		5	--	--	mm
Mechanical Specifications	Case Material	Black plastic; flame-retardant and heat-resistant (UL94 V-0)				
	Dimension	19.50 x 9.80 x 12.50 mm				
	Weight	4.0g(Typ.)				
	Cooling Method	Free air convection				

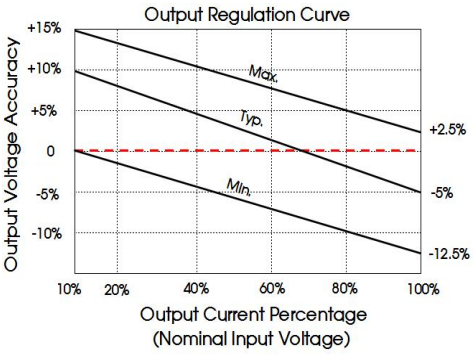
Note:
①The "parallel cable" method is used for Ripple and Noise test;
②Leakage current and reinforced insulation is based on 250 VAC, 50/60 Hz system input voltage;
③The pin soldering temperature tolerance is not the actual temperature set by the soldering iron but the temperature required for proper 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)

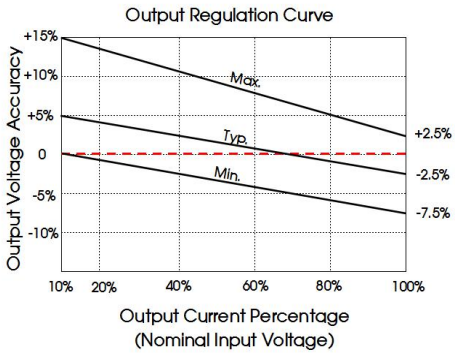
Emissions (EMI)	CE	DFS1-H0515 DFS1-H0524 DFS1-G0515 DFS1-G0524	CISPR32/EN55032 CLASS A (see Fig. 4 for recommended circuit) EN60601-1-2/CISPR 11 GROUP1 CLASS A (see Fig. 4 for recommended circuit)
		Other Part No.	CISPR32/EN55032 CLASS B (see Fig. 4 for recommended circuit) EN60601-1-2/CISPR 11 GROUP1 CLASS B (see Fig. 4 for recommended circuit)
	RE	DFS1-H0515 DFS1-H0524 DFS1-G0515 DFS1-G0524	CISPR32/EN55032 CLASS A (see Fig. 4 for recommended circuit) EN60601-1-2/CISPR 11 GROUP1 CLASS A (see Fig. 4 for recommended circuit)
		Other Part No.	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 (EMS)	ESD		EN60601-1-2 (IEC/EN61000-4-2) Air ±15kV, Contact ±8kV perf. Criteria B

Characteristic Curve

3.3VDC output



5VDC output



Other output

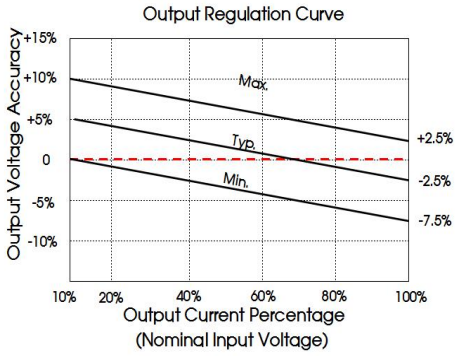


Fig. 1

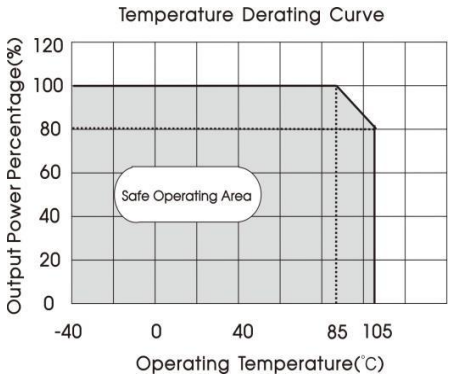


Fig. 2

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.

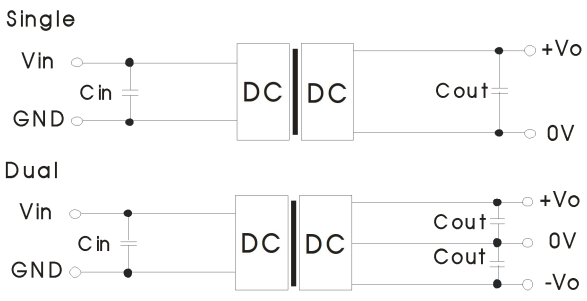


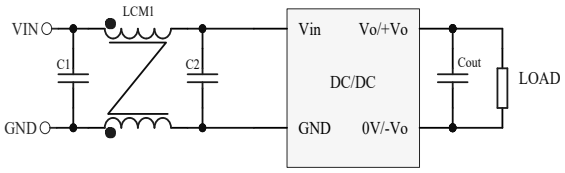
Fig. 3

Table 1: Recommended input and output capacitor values

Vin	Cin	Single Vout	Cout	Dual Vout	Cout
5VDC	10μF/10V	3.3/5VDC	10μF/16V	±3.3VDC	4.7μF/16V
12VDC	10μF/25V	9VDC	10μF/16V	±5/±9VDC	4.7μF/16V
15VDC	1μF/25V	12VDC	2.2μF/25V	±12/±15VDC	1μF/25V
24VDC	2.2μF/50V	15VDC	1μF/25V	±24VDC	0.47μF/50V
--	--	24VDC	0.47μF/50V	--	--

2. EMC Typical Recommended Circuit

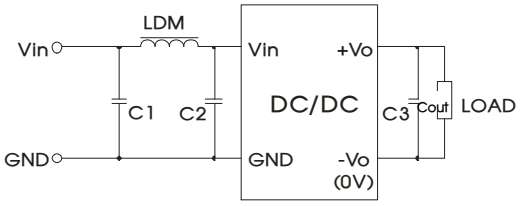
DFS1-H05xx/DFS1-G05xx/DFS1-G2424（CLASS A）



EMC recommended circuit value table (Table 2)

Series		DFS1-H05xx	DFS1-G05xx	DFS1-G2424
Emissions	C1/C2	4.7μF /50V	22μF /16V	4.7μF /50V
	Cout	Refer to the Cout in table 1		
	LCM1	22μH（Nickel zinc inductance）		EFL2D-0.5-140

DFS1-H12xx/DFS1-G12xx/DFS1-G15xx（CLASS B）
(except DFS1-G1203/DFS1-G1224)



Series		DFS1-H12xx	DFS1-G12xx	DFS1-G15xx
Emissions	C1/C2	4.7μF /25V		
	Cout	Refer to the Cout in table 1		
	LDM	22μH（Nickel zinc inductance）		

DFS1-H24xx/DFS1-G24xx/ DFS1-G1203/DFS1-G1224
(CLASS B)
(except DFS1-G2424)

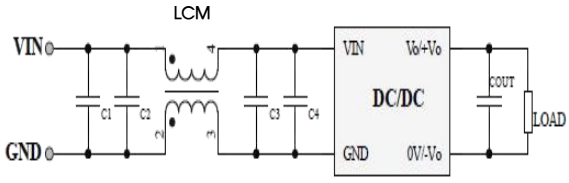


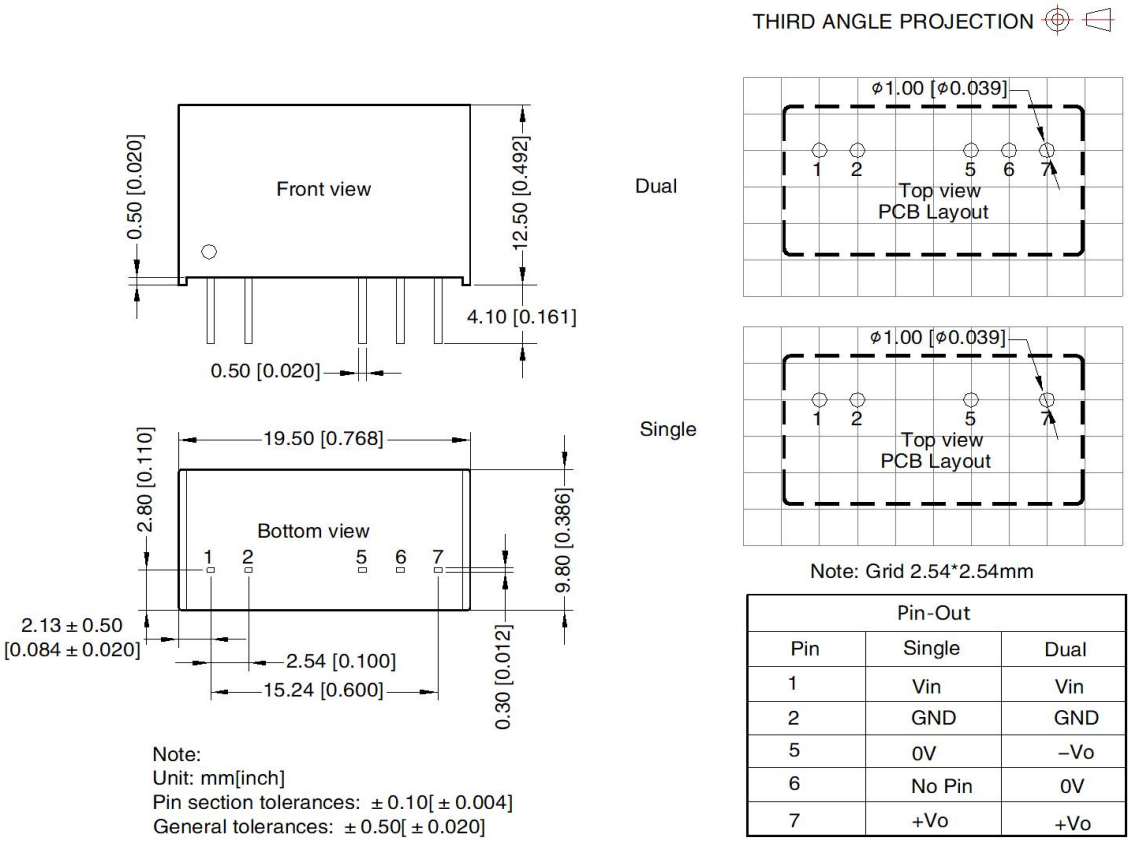
Fig. 4

Series		DFS1-H24xx	DFS1-G24xx (except DS1-G2403)	DFS1-G2403	DFS1-G1203	DFS1-G1224
Emissions	C0/C0A	--	--	4.7μF /16V	4.7μF /16V	4.7μF /16V
	C1/C2	4.7μF /50V	4.7μF /50V	4.7μF /16V	4.7μF /16V	4.7μF /50V
	C3	--	100μF /50V	--	--	--
	C4	4.7μF /50V	--	4.7μF /16V	4.7μF /16V	4.7μF /50V
	COUT	Refer to the Cout in table 1				
	LCM	22μH（Nickel zinc inductance）		EFL2D-0.5-140		

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



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

Note: Grid 2.54*2.54mm

Pin-Out		
Pin	Single	Dual
1	Vin	Vin
2	GND	GND
5	0V	–Vo
6	No Pin	0V
7	+Vo	+Vo

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;
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.