Descriptions

2W isolated, DC/DC Converter

RoHS

3 Years Warranty

CE Report EN62368-1

UKCA Report BS EN62368-1

Features

- High efficiency up to 84%
- 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
- Electricity
- IGBT driver

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.		
EN/BS EN	DFS2-H1205	12 (10.8-13.2)	5	400/40	76/80	1000
	DFS2-H1209		9	222/22	78/82	680
	DFS2-H1212		12	167/17	80/84	470
	DFS2-H1215		15	133/14	80/84	470
	DFS2-G1205		±5	±200/±20	76/80	1000
	DFS2-G1209		±9	±111/±11	78/82	470
	DFS2-G1212		±12	±83/±9	79/83	220
	DFS2-G1215		±15	±67/±7	80/84	220
EN/BS EN	DFS2-G1505	15 (13.5-16.5)	±5	±200/±20	74/78	1000
	DFS2-G1509		±9	±111/±11	76/80	470
	DFS2-G1515		±15	±67/±7	76/80	220
EN/BS EN	DFS2-H2405	24 (21.6-26.4)	5	400/40	75/79	2200
	DFS2-H2409		9	222/22	77/81	680
	DFS2-H2412		12	167/17	78/82	470
	DFS2-H2415		15	133/14	80/84	470
	DFS2-H2424		24	83/9	80/84	220
	DFS2-G2405		±5	±200/±20	75/79	1000
	DFS2-G2409		±9	±111/±11	77/81	470

	DFS2-G2412		±12	±83/±9	78/82	220
	DFS2-G2415		±15	±67/±7	77/81	220

Specifications

Product Specifications	Item	Operating Conditions		Min.	Typ.	Max.	Unit
Input Specifications	Input Current (full load/no-load)	12V input		--	210/15	220/--	mA
		15V input		--	167/15	176/--	
		24V input		--	106/15	111/--	
	Surge Voltage (1sec. max.)	12V input		-0.7	--	18	VDC
		15V input		-0.7	--	21	
		24V input		-0.7	--	30	
	Reflected Ripple Current			--	200	--	mA
	Input Filter			Capacitance filter			
	Hot Plug			Unavailable			
Output Specifications	Voltage Accuracy			See output regulation curve(Fig. 1)			
	Linear Regulation	Input voltage change: ±1%		--	--	1.2	--
	Load Regulation	10%-100% load	5V output	--	--	20	%
			Other output	--	--	15	
	Ripple & Noise①	20MHz bandwidth	5V output	--	100	150	mVp-p
			Other output	--	80	120	
	Temperature Coefficient	100% full load		--	±0.02	--	%/℃
	Short Circuit Protection			Continuous, self-recovery			
General Specifications	Isolation	Input-output, Test for 1 minute, the leakage current < 1mA		5000	--	--	VAC
				6000	--	--	VDC
	Patient Leakage Current②	250VAC, 50/60Hz		--	--	2	μA
	Insulation Resistance	Input-output resistance at 500VDC		1000	--	--	MΩ
	Isolation Capacitance	Input-output capacitance at 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 Temperature	Soldering spot is 1.5mm away from case for 10 seconds		--	--	300	℃
	Storage Humidity	Non-condensing		5	--	95	%RH
	Switching Frequency	100% load, nominal input voltage		--	200	--	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	19.50 x 9.80 x 12.50 mm					
	Weight	4.0g(Typ.)					
	Cooling Method	Free air convection					

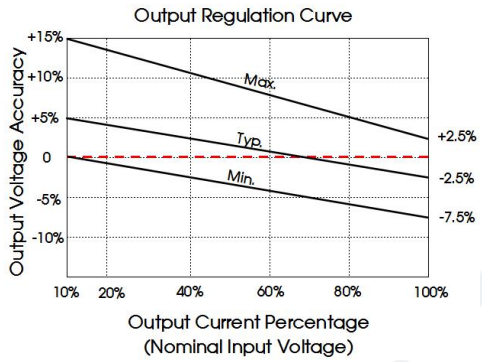
Note:
①The "parallel cable" method is used for Ripple and Noise test.
②Leakage current and reinforced insulation is based on 250 VAC, 50/60 Hz system input voltage.

Electromagnetic Compatibility (EMC)

Electromagnetic Compatibility (EMC)	Emissions	CE	Others	CISPR32/EN55032 CLASS B (see Fig. 4 for recommended circuit) EN60601-1-2/CISPR 11 GROUP1 CLASS B (see Fig. 4 for recommended circuit)
			DFS2-G15xx DFS2-G24xx	CISPR32/EN55032 CLASS A (see Fig. 4 for recommended circuit) EN60601-1-2/CISPR 11 GROUP1 CLASS A (see Fig. 4 for recommended circuit)
		RE	Others	CISPR32/EN55032 CLASS B (see Fig. 4 for recommended circuit) EN60601-1-2/CISPR 11 GROUP1 CLASS B (see Fig. 4 for recommended circuit)
			DFS2-G15xx DFS2-G24xx	CISPR32/EN55032 CLASS A (see Fig. 4 for recommended circuit) EN60601-1-2/CISPR 11 GROUP1 CLASS A (see Fig. 4 for recommended circuit)
	Immunity	ESD		EN60601-1-2 (IEC/EN61000-4-2) Air ±15kV, Contact ±8kV perf. Criteria B

Characteristic Curve

5VDC output



Other output

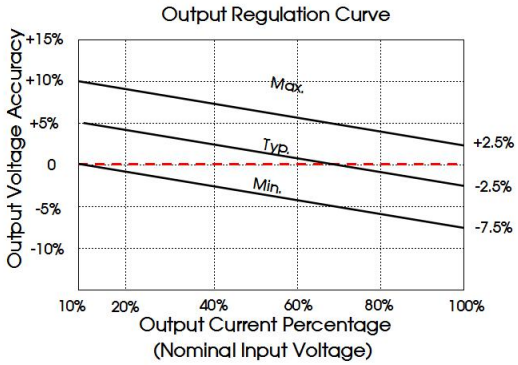


Fig. 1

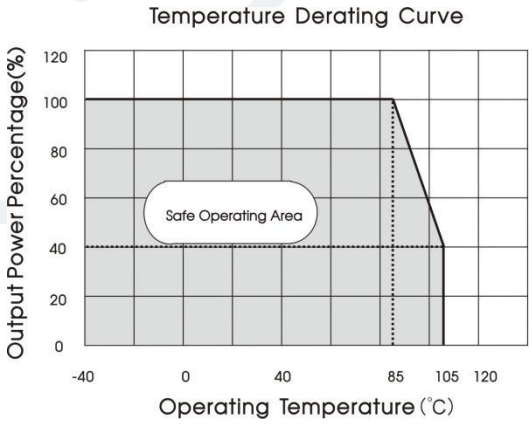


Fig.2

Design Reference

1. Typical application

Input and/or output ripple can be further reduced, by connecting a filter capacitor from the input and/or output terminals to ground as shown in Fig. 3.

Choosing suitable filter capacitor values is very important for a smooth operation of the modules, particularly to avoid start-up problems caused by capacitor values that are too high. For recommended input and output capacitor values refer to Table 1.

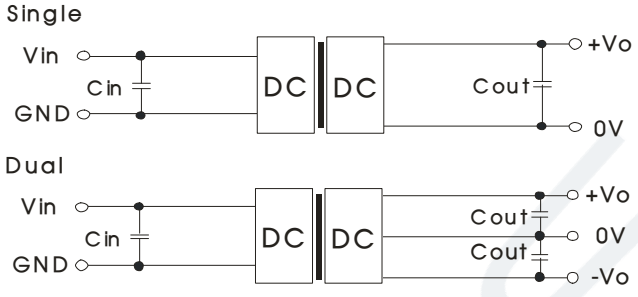


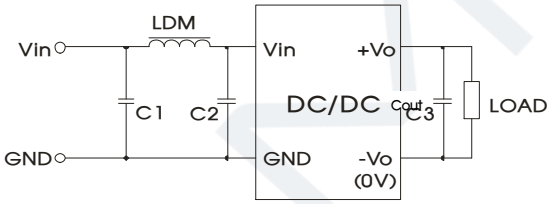
Fig. 3

Table 1: Recommended input and output capacitor values

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

2. EMC compliance circuit

DFS2-G15xx, DFS2-G24xx



12/15/24V input

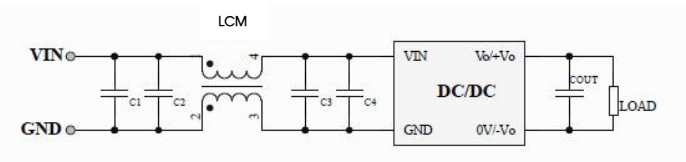


Fig. 4

EMC recommended circuit value table (Table 2)

Input voltage		DFS2-G15xx, DFS2-G24xx
Emissions	C1/C2	4.7μF /50V
	Cout	Refer to the Cout in table 1
	LDM	22μH

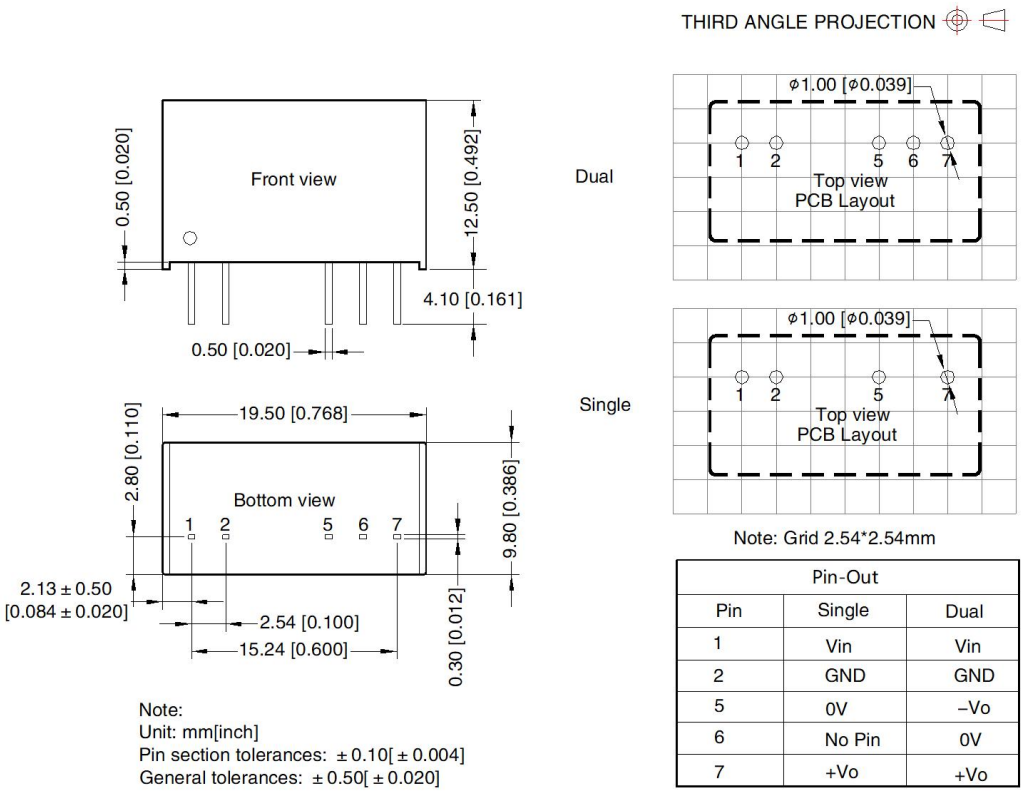
Input voltage			12/15/24VDC
Emissions	C1/C2		4.7μF /50V
	C3	DFS2-H2424	100μF /50V
		Other output	4.7μF /50V
	C4	DFS2-H2424	--
		Other output	4.7μF /50V
	COUT		Refer to the Cout in table 1
	LCM		22μH(Nickel zinc inductance)

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

Note:

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% 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.