Descriptions

2W isolated, DC-DC converter





RoHS

3 Years Warranty

c UL us UL62368-1

CE Report EN62368-1

UKCA Report BS EN62368-1

TÜV SÜD c us

Features

- Continuous short-circuit protection
- No-load input current as low as 8mA
- Operating ambient temperature range: -40℃ to +105℃
- High efficiency up to 86%
- High power density
- I/O isolation test voltage 3k VDC
- Industry standard pin-out

Applications

- Industrial control
- Electricity
- Instrumentation

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.		
EN/BS EN	DFS2-E0503	5 (4.5-5.5)	±3.3	±303/±30	71/75	1200
	DFS2-E0505		±5	±200/±20	80/84	1200
	DFS2-E0509		±9	±111/±11	81/85	470
	DFS2-E0512		±12	±83/±8	81/85	220
	DFS2-E0515		±15	±67/±7	82/86	220
	DFS2-E0524		±24	±42/±4	82/86	100
	DFS2-F0503		3.3	400/40	74/78	2400
UL/EN/BS EN	DFS2-F0505		5	400/40	80/84	2400
--	DFS2-F0507		7.2	278/28	80/84	1000
EN/BS EN	DFS2-F0509		9	222/22	81/85	1000
	DFS2-F0512		12	167/17	81/85	560
	DFS2-F0515		15	133/13	82/86	560
UL/EN/BS EN	DFS2-F0524		24	83/8	82/86	220
EN/BS EN	DFS2-E1203	12 (10.8-13.2)	±3.3	±303/±30	71/75	1200
	DFS2-E1205		±5	±200/±20	76/80	1200
	DFS2-E1207		±7.2	±139/±13	76/80	470
	DFS2-E1209		±9	±111/±11	78/82	470

	DFS2-E1212		±12	±83/±8	79/83	220
	DFS2-E1215		±15	±67/±7	79/83	220
	DFS2-E1224		±24	±42/±4	79/83	100
UL/EN/BS EN	DFS2-F1205		5	400/40	78/82	2400
--	DFS2-F12X6		6.4	312/31	78/82	1000
EN/BS EN	DFS2-F1209		9	222/22	78/82	1000
UL/EN/BS EN	DFS2-F1212		12	167/17	80/84	560
EN/BS EN	DFS2-F1215		15	133/13	81/85	560
UL/EN/BS EN	DFS2-F1224		24	83/8	82/86	220
	DFS2-E1505	15 (13.5-16.5)	±5	±200/±20	76/80	1200
	DFS2-E1515		±15	±67/±7	78/82	220
	DFS2-F1505		5	400/40	76/80	2400
	DFS2-F1509		9	222/22	76/80	1000
	DFS2-F1512		12	167/17	77/81	560
	DFS2-F1515		15	133/13	77/81	560
	DFS2-F1524		24	83/8	77/81	220
EN/BS EN	DFS2-E2403	24 (21.6-26.4)	±3.3	±303/±30	70/76	1200
	DFS2-E2405		±5	±200/±20	74/80	1200
	DFS2-E2407		±7.2	±139/±13	74/80	470
	DFS2-E2409		±9	±111/±11	75/81	470
	DFS2-E2412		±12	±83/±8	77/83	220
	DFS2-E2415		±15	±67/±7	77/83	220
	DFS2-E2424		±24	±42/±4	77/83	100
	DFS2-F2403		3.3	400/40	70/76	2400
UL/EN/BS EN	DFS2-F2405		5	400/40	74/80	2400
--	DFS2-F2407		7.2	278/27	74/80	1000
EN/BS EN	DFS2-F2409		9	222/22	75/81	1000
EN/BS EN/TUV	DFS2-F2412		12	167/17	78/84	560
	DFS2-F2415		15	133/13	80/86	560
	DFS2-F2418		18	111/11	80/86	220
UL/EN/BS EN	DFS2-F2424		24	83/8	80/86	220

Note:
①The specified maximum capacitive load for positive and negative output is 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)	5VDC input	3.3VDC output	--	534/8	564/--	mA
			5VDC/7.2VDC output	--	477/8	500/--	
			9VDC/12VDC output	--	471/8	494/--	
			15VDC/24VDC output	--	466/8	488/--	

		12VDC input	3.3VDC output	--	222/8	235/--	
			5VDC/7.2VDC output	--	208/8	219/--	
			9VDC output	--	203/8	214/--	
			12VDC/15VDC/24VDC output	--	201/8	211/--	
		15VDC input	5VDC/9VDC output	--	167/8	176/--	
			12VDC/15VDC/24VDC output	--	165/8	173/--	
		24VDC input	3.3VDC output	--	110/8	119/--	
			5VDC/7.2VDC output	--	104/8	112/--	
			9VDC output	--	103/8	111/--	
			12VDC output	--	99/8	107/--	
			15VDC/18VDC/24VDC output	--	97/8	104/--	
	Reflected Ripple Current			--	15	--	
	Surge Voltage (1sec. max.)	5VDC input		-0.7	--	9	VDC
		12VDC input		-0.7	--	18	
		15VDC input		-0.7	--	21	
		24VDC 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%	3.3VDC output	--	--	±1.5	--
			Others	--	--	±1.2	
	Load Regulation	10%-100% load	5VDC input	3.3VDC output	--	10	20	%
				5/7.2VDC output	--	8	15	
				9/12/15 output	--	7	10	
				24VDC output	--	5	10	
			12/15/24V DC input	3.3VDC output	--	15	20	
				5VDC output	--	7	15	
				6.4VDC output	--	10	15	
				7.2VDC output	--	6	15	
				9/12VDC output	--	5	10	
				15VDC output	--	4	10	
				18/24VDC output	--	3	10	
	Ripple & Noise①	20MHz bandwidth	5V input	--	75	200	mVp-p
			12/15/24V input	--	75	180	
	Temperature Coefficient	Full load		--	±0.02	--	%/℃
	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		--	20	--	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 Temperature②	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
	Vibration			10-150Hz, 5G, 0.75mm. along X, Y and Z			
	Switching Frequency	Full load, nominal input voltage	5V input	--	220	--	kHz
			12/15/24V input	--	260	--	
	MTBF	MIL-HDBK-217F @ 25℃		3500	--	--	k hours
Mechanical Specifications	Case Material	Black plastic, flame-retardant and heat-resistant (UL94V-0)					
	Dimension	19.65 x 7.05 x 10.16 mm					
	Weight	2.4g(Typ.)					
	Cooling Method	Free air convection					

Note:
①The "parallel cable" method is used for Ripple and Noise test;
②The 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.

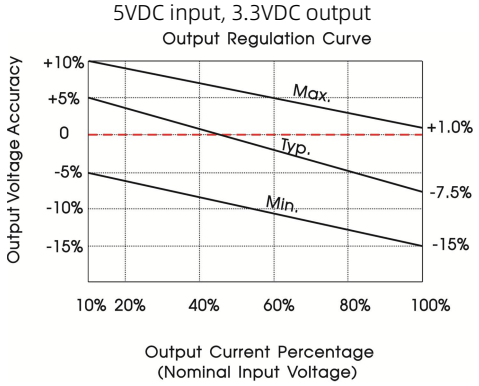
Electromagnetic Compatibility (EMC)

Emissions (EMI)	CE	CISPR32/EN55032 CLASS B	
	RE	CISPR32/EN55032 CLASS B	
Immunity (EMS)	ESD	IEC/EN61000-4-2 Air ±8kV, Contact ±6kV	perf. Criteria B

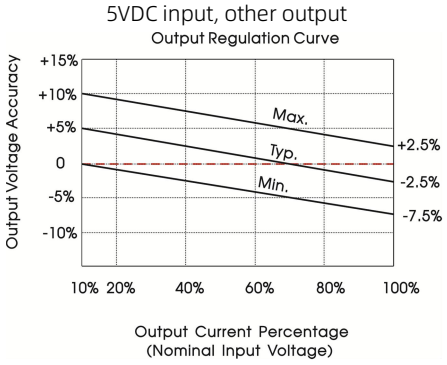
Note: Refer to Figure 4 for the recommended circuit test.

Characteristic Curve

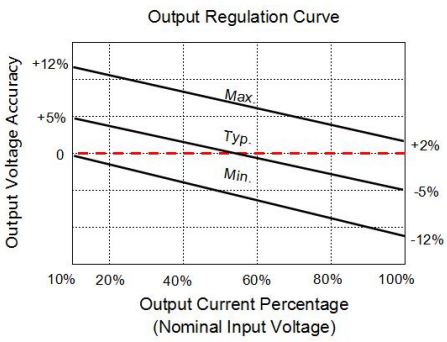
5VDC input, 3.3VDC output



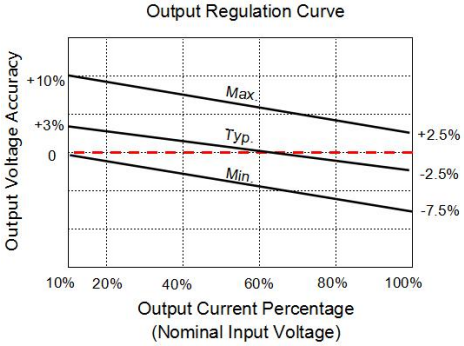
5VDC input, other output



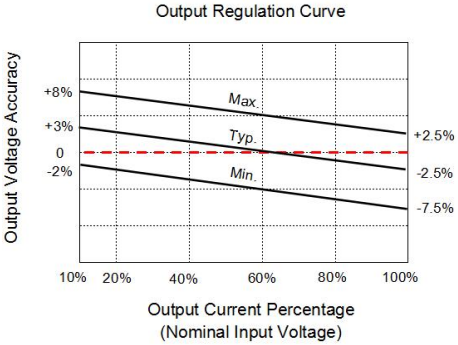
12/15/24VDC input, 3.3VDC output



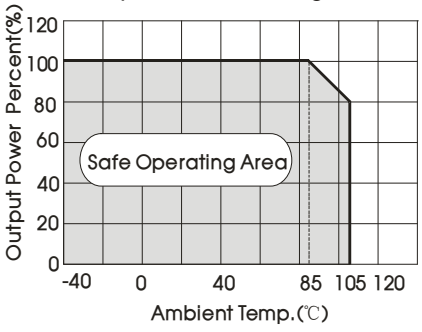
12/15/24VDC input, 5/6.4/7.2VDC output



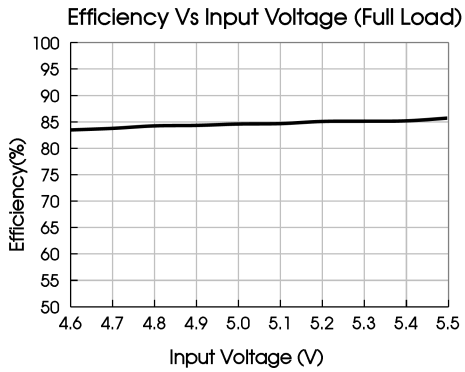
12/15/24VDC input, other output



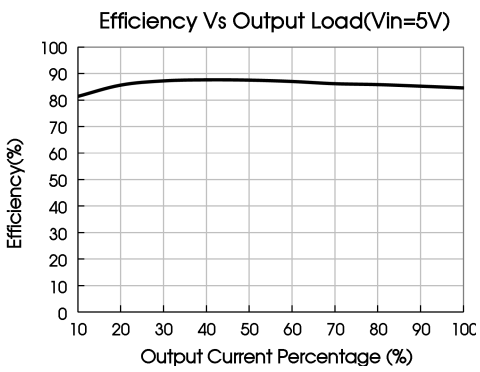
Temperature Derating Curve



DFS2-F0505



DFS2-F0505



Design Reference

1. Typical application

①Input 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.

②Choosing 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.

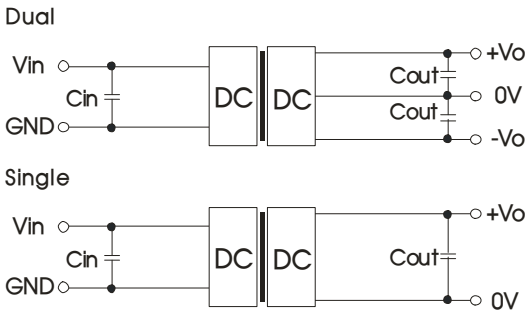


Fig. 3: Typical circuit diagram

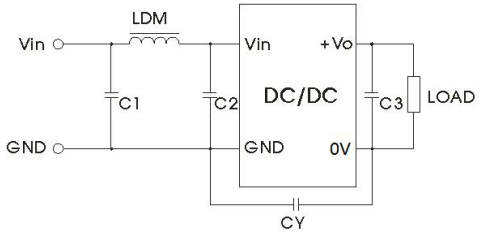
Table 1: Recommended input and output capacitor values

Vin	Cin	Single Vout	Cout	Dual Vout	Cout*
5VDC	10μF/16V	3.3VDC	10μF/16V	±3.3VDC	4.7μF/16V
12VDC	2.2μF/25V	5VDC	10μF/16V	±5VDC	4.7μF/16V
15VDC	2.2μF/25V	6.4VDC	4.7μF/16V	±7.2VDC	2.2μF/25V
24VDC	1μF/50V	7.2VDC	2.2μF/25V	±9VDC	2.2μF/25V
--	--	9VDC	2.2μF/25V	±12VDC	1μF/25V
--	--	12VDC	2.2μF/25V	±15VDC	1μF/25V
--	--	15VDC	1μF/25V	±24VDC	0.47μF/50V
--	--	18VDC	1μF/50V	--	--
--	--	24VDC	1μF/50V	--	--

Note: *The capacitor value of the positive and the negative output is identical.

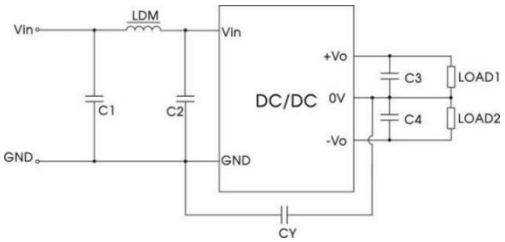
2. EMC compliance recommended circuit

Single Output



Input voltage		5VDC	12/15/24VDC
Emissions	C1/C2	4.7μF /16V	4.7μF /50V
	CY	270pF/4kV	
	C3	Refer to Cout in Fig. 3	
	LDM	6.8μH	

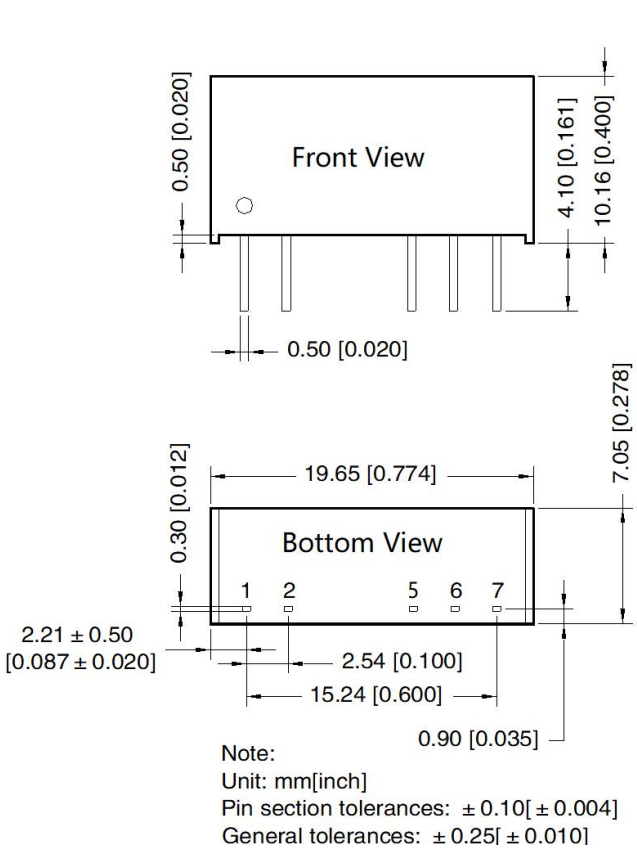
Dual Output

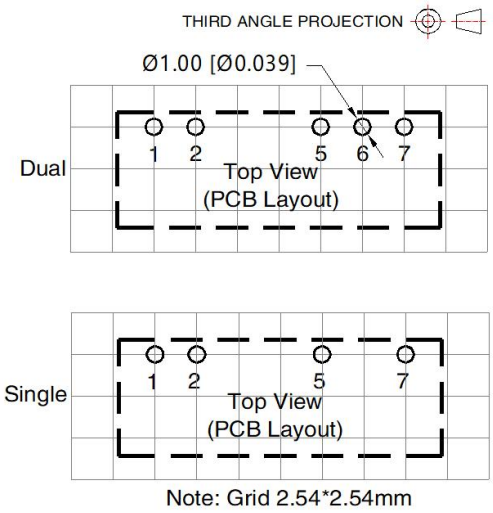


Input voltage		5VDC	12/15/24VDC
Emissions	C1/C2	4.7μF /16V	4.7μF /50V
	CY	270pF/4kV	
	C3/C4	Refer to Cout in Fig. 3	
	LDM	6.8μH	

Fig. 4

Dimensions and Recommended





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.