DESCRIPTIONS

1W，isolated fixed input DC-DC Converter, unregulated dual output

RoHS

CE Report EN62368-1

UKCA Report BS EN62368-1

FEATURES

- Continuous short-circuit protection
- No-load input current as low as 8mA
- Operating ambient temperature range: -40 ℃ to +105℃
- High efficiency up to 85%
- I/O isolation test voltage: 1.5k VDC
- Industry standard pin-out

APPLICATIONS

- Industrial control
- Power
- Instrumentation

Selection Guide

Certification	Part No.	Input Voltage (VDC)	Output		Full Load Efficiency (%)	Capacitive Load*(μF)
		Nominal (Range)	Voltage (VDC)	Current (mA) Max./Min.	Min./Typ.	Max.
EN/BS EN	DFS1-A0303	3.3 (2.97-3.63)	±3.3	±152/±15	74/78	1200
	DFS1-A0305		±5	±100/±10	78/82	1200
	DFS1-A0309		±9	±56/±6	81/85	470
	DFS1-A0312		±12	±42/±5	78/82	220
	DFS1-A0315		±15	±34/±4	78/82	220
	DFS1-A0324		±24	±21/±2	80/84	100
	DFS1-A0503	5 (4.5-5.5)	±3.3	±152/±15	70/74	1200
	DFS1-A0505		±5	±100/±10	78/82	1200
	DFS1-A0509		±9	±56/±6	79/83	470
	DFS1-A0512		±12	±42/±5	79/83	220
	DFS1-A0515		±15	±34/±4	79/83	220
	DFS1-A0524		±24	±21/±3	81/85	100
	DFS1-A1203	12 (10.8-13.2)	±3.3	±152/±15	71/75	1200
	DFS1-A1205		±5	±100/±10	76/80	1200
	DFS1-A1209		±9	±56/±5	76/80	470
	DFS1-A1212		±12	±42/±5	77/81	220
	DFS1-A1215		±15	±34/±4	77/81	220
	DFS1-A1224		±24	±21/±3	76/80	100
	DFS1-A1505		±5	±100/±10	76/80	1200

	DFS1-A1509	15 (13.5-16.5)	±9	±56/±5	76/80	470
	DFS1-A1512		±12	±42/±5	76/80	220

EN/BS EN	DFS1-A1515	15 (13.5-16.5)	±15	±34/±4	77/81	220
	DFS1-A1524		±24	±21/±2	77/81	100
	DFS1-A2405	24 (21.6-26.4)	±5	±100/±10	74/80	1200
	DFS1-A2409		±9	±56/±5	74/80	470
	DFS1-A2412		±12	±42/±5	75/81	220
	DFS1-A2415		±15	±34/±4	73/79	220
	DFS1-A2424		±24	±21/±3	74/80	100
Note: * The specified maximum capacitive load for positive and negative output is identical.						

Specifications

characteristic	Item	Operating Conditions		Min.	Typ.	Max.	Unit
Input Specifications	Input Current (full load / no-load)	3.3VDC input	3.3VDC output	--	384/10	405/--	mA
			Other output	--	370/18	389/--	
		5VDC input	3.3VDC/5VDC output	--	270/8	286/--	
			9VDC/12VDC output	--	241/12	254/--	
			15VDC/24VDC output	--	241/18	254/--	
		12VDC input		--	105/8	110/--	
		15VDC input		--	84/8	88/--	
		24VDC input		--	56/8	61/--	
	Reflected Ripple Current			--	15	--	
	Surge Voltage (1sec. max.)	3.3VDC input		-0.7	--	5	VDC
		5VDC input		-0.7	--	9	
		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	3.3VDC input 10% -100% load	3.3VDC output	--	12	18	%
			Other output	--	8	15	
		5VDC input 10% -100% load	3.3VDC output	--	15	20	
			5VDC output	--	10	15	
			9VDC output	--	8	10	
			12VDC output	--	7	10	
			15VDC output	--	6	10	
			24VDC output	--	5	10	

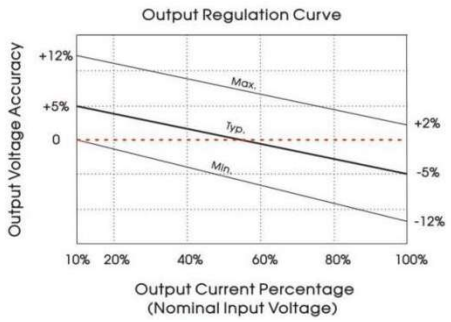
	Load Regulation	12/15/24VDC input 10% -100% load	3.3VDC output	--	8	20	%
			5VDC output	--	5	15	
			9VDC output	--	3	10	
			12VDC output	--	3	10	
			15VDC output	--	3	10	
			24VDC output	--	2	10	
	Ripple & Noise*	20MHz bandwidth	Other output	--	30	75	mVp-p
			24VDC output	--	50	100	
	Temperature Coefficient	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.		1500	--	--	VDC
	Insulation Resistance	Input-output resistance at 500VDC		1000	--	--	MΩ
	Isolation Capacitance	Input-output capacitance at 100kHz/0.1V		--	20	--	pF
	Operating Temperature	5VDC input	Derating when operating temperature≥ 85℃, (see Fig. 2)	-40	--	105	℃
		3.3/12/15/24VDC input	Derating when operating temperature≥ 100℃, (see Fig. 2)				
	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	3.3/12/15/24VDC input	5	--	95	%RH
			5VDC input	--	--	95	
	Vibration	12/15/24VDC input		10-150Hz, 5G, 0.75mm. along X, Y and Z			
	Switching Frequency	Full load, nominal input voltage	3.3VDC input	--	220	--	kHz
			5VDC input	--	270	--	
			12/15/24VDC input	--	260	--	
	MTBF	MIL-HDBK-217F @ 25℃		3500	--	--	k hours
Mechanical Specifications	Case Material	Black plastic; flame-retardant and heat-resistant (UL94V-0)					
	Dimensions	19.65 x 6.00 x 10.16mm					
	Weight	2.1g(Typ.)					
	Cooling Method	Free air convection					
Note:*The "parallel cable" method is used for Ripple and Noise test.							

Electromagnetic Compatibility

Electromagnetic Compatibility (EMC)	Emissions	CE	CISPR32/EN55032 CLASS B
		RE	CISPR32/EN55032 CLASS B
	Immunity	ESD	IEC/EN61000-4-2 Air ±8kV, Contact ±6kV perf. Criteria B
Note: Refer to Fig. 4 for recommended circuit test.			

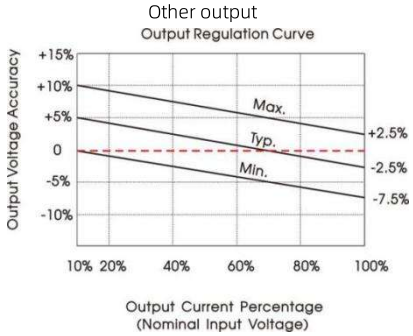
Typical Performance Curves

3.3VDC output



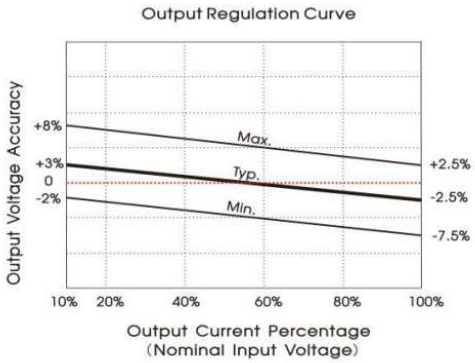
3.3/5VDC input

Other output

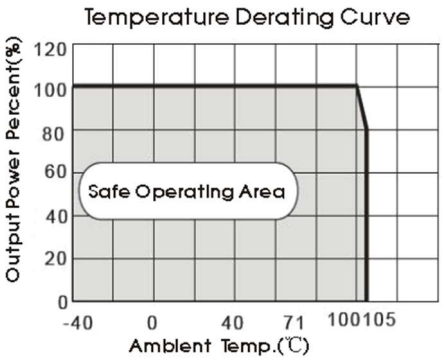


12VDC/15VDC/24VDC input

Other output



3.3/12/15/24VDC input



5VDC input

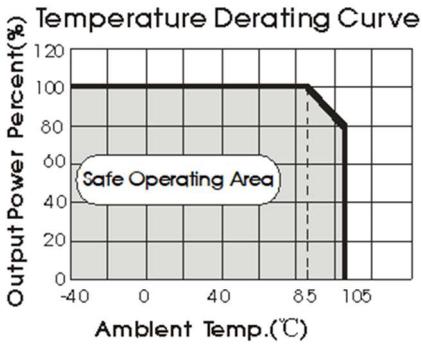
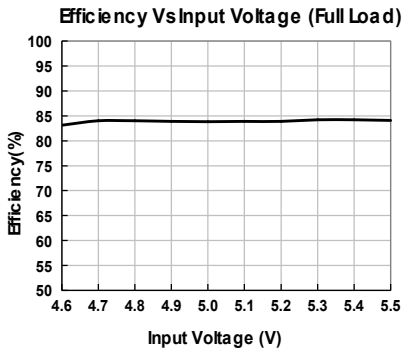
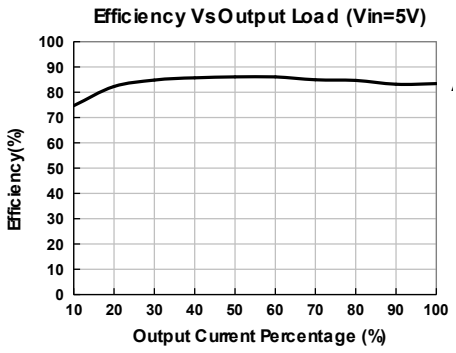


Fig. 2

DFS1-A0505



DFS1-A0505



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.

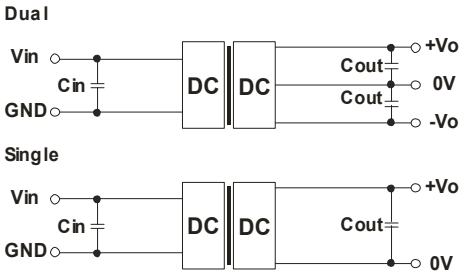


Fig. 3

Table 1: Recommended input and output capacitor values

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

2. EMC compliance circuit

Dual

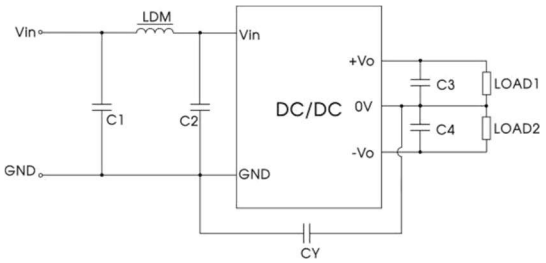
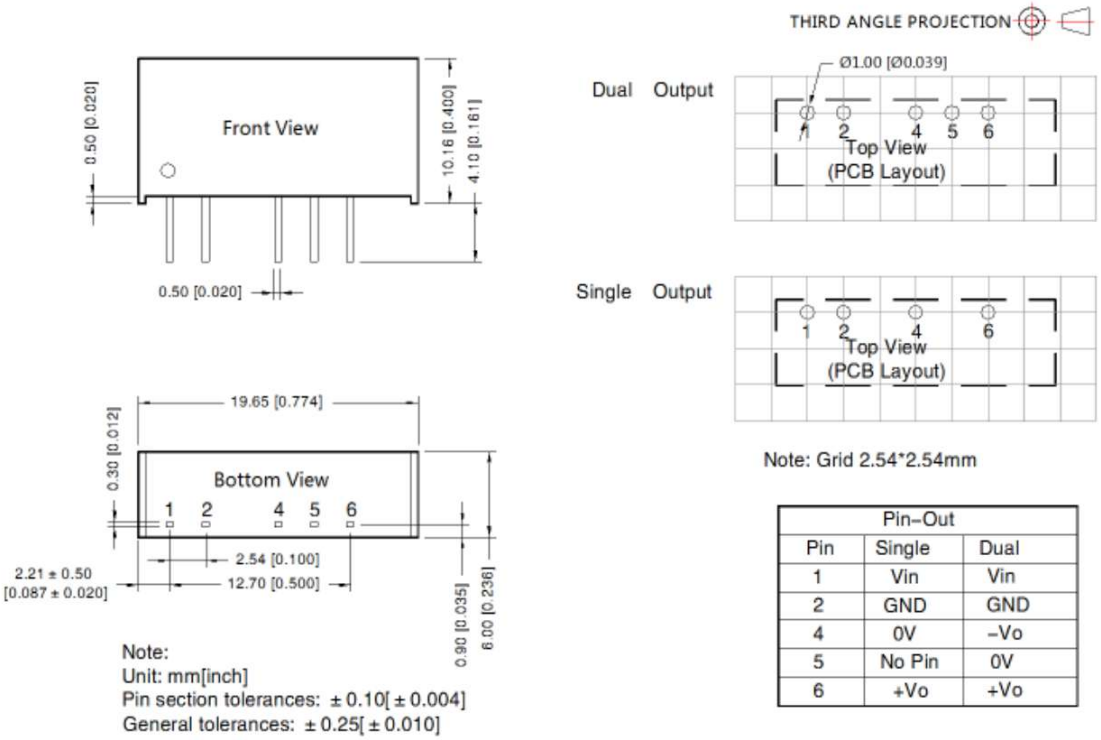


Fig. 4

Table 2: EMC recommended circuit value table

Input Voltage		3.3VDC		5VDC		Other input
Output Voltage		3.3/5VDC	3.3/5VDC	3.3/5/9VDC	12/15/24VDC	--
Emissions	C1/C2	4.7μF/16V	4.7μF/16V	4.7μF/25V	4.7μF/25V	4.7μF/50V
	CY	--	270pF/4kVDC	100pF/2kV	1000pF/2kV	270pF/2kV
	C3/C4	Refer to the Cout in table 1				
	LDM	6.8μH				

Dimensions and Recommended Layout



Note: Grid 2.54*2.54mm

Pin-Out		
Pin	Single	Dual
1	Vin	Vin
2	GND	GND
4	0V	-Vo
5	No Pin	0V
6	+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.