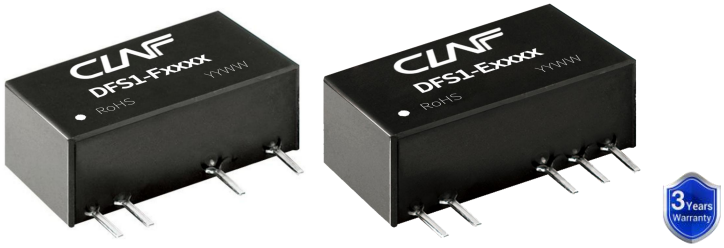
DFS1-E_ & DFS1-F_ series

DESCRIPTIONS

DC-DC Converters, 1W, Flexed input, unregulated dual/single output



c UL us CE Report UK CA Report CB RoHS

UL62368-1 EN62368-1 BS EN62368-1 IEC62368-1

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 3k VDC
- Industry standard pin-out

Applications

- Pure digital circuits
- Low frequency analog circuits
- Relay-driven circuits
- Data switching circuits

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	DFS1-E0503	5 (4.5-5.5)	±3.3	±152/±15	70/74	1200
	DFS1-E0505		±5	±100/±10	78/82	1200
	DFS1-E0509		±9	±56/±6	79/83	470
UL/EN/IEC/BS EN	DFS1-E0512		±12	±42/±5	79/83	220
EN/BS EN	DFS1-E0515		±15	±34/±4	79/83	220
	DFS1-E0524		±24	±21/±3	81/85	100
	DFS1-F0503		3.3	303/30	70/74	2400
UL/EN/IEC/BS EN	DFS1-F0505		5	200/20	78/82	2400
EN/BS EN	DFS1-F0509		9	111/12	79/83	1000
	DFS1-F0512		12	84/9	79/83	560
	DFS1-F0515		15	67/7	79/83	560
UL/EN/IEC/BS EN	DFS1-F0524		24	42/4	81/85	220
EN/BS EN	DFS1-E1203	12 (10.8-13.2)	±3.3	±152/±15	71/75	1200
	DFS1-E1205		±5	±100/±10	76/80	1200
	DFS1-E1209		±9	±56/±5	76/80	470

	DFS1-E1212		±12	±42/±5	77/81	220
	DFS1-E1215		±15	±34/±4	77/81	220
	DFS1-E1224		±24	±21/±2	76/80	100
	DFS1-F1203		3.3	303/30	71/75	2400
	DFS1-F1205		5	200/20	76/80	2400
	DFS1-F1209		9	111/12	76/80	1000
	DFS1-F1212		12	83/9	76/80	560
	DFS1-F1215		15	67/7	77/81	560
	DFS1-F1224		24	42/5	77/81	220
/	DFS1-E2403		±3.3	±150/±15	72/76	1200
	DFS1-E2405		±5	±100/±10	74/80	1200
	DFS1-E2409		±9	±56/±5	74/80	470
	DFS1-E2412		±12	±42/±5	75/81	220
	DFS1-E2415		±15	±34/±4	73/79	220
	DFS1-E2424	24	±24	±21/±2	74/80	100
EN/BS EN	DFS1-F2403	(21.6-26.4)	3.3	303/30	69/75	2400
	DFS1-F2405		5	200/20	73/79	2400
	DFS1-F2409		9	111/12	74/80	1000
	DFS1-F2412		12	83/9	75/81	560
	DFS1-F2415		15	67/7	75/81	560
	DFS1-F2424		24	42/5	75/81	220

Note: * The specified maximum capacitive load for positive and negative output is identical.

Specifications

Product Specifications	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/--	
		12V input	3.3VDC output	--	112/8	118/--	
			5VDC/9VDC output	--	105/8	110/--	
			12VDC/15VDC output	--	103/8	109/--	
		12V input	24VDC output	--	105/8	110/--	
		15V input	5VDC/9VDC/12VDC output	--	84/8	88/--	
			15VDC/24VDC output	--	83/8	87/--	
		24V input	3.3VDC output	--	55/8	58/--	
			5VDC/9VDC/24VDC output	--	53/8	57/--	
			12VDC output	--	53/8	56/--	
			15VDC output	--	53/8	58/--	
	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	--
			Other output	--	--	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	
		12/15/24VDC input 10%-100% load	3.3VDC output	--	15	20	
			5VDC output	--	10	15	
			Other output	--	8	10	
	Ripple & Noise*	20MHz bandwidth	24VDC output	--	50	100	mVp-p
			Other output	--	30	75	
	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	5VDC input	Derating when operating temperature≥85℃ (see Fig. 2)	-40	--	105	℃
		Other 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	3.3/5VDC input	--	--	95	%RH
			Other input	5	--	95	
	Vibration			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

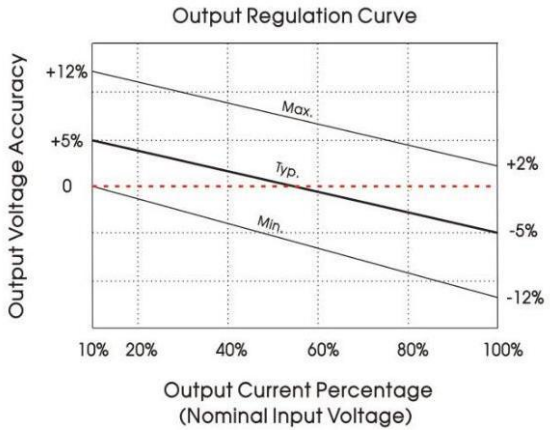
Mechanical Specifications	Case Material	Black plastic, flame-retardant and heat-resistant (UL94V-0)
	Dimension	19.65 x 6.00 x 10.16mm
	Weight	2.1g(Typ.)
	Cooling Method	Free air convection
Note: * The "parallel cable" method is used for Ripple and Noise test.		

Electromagnetic Compatibility (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.		

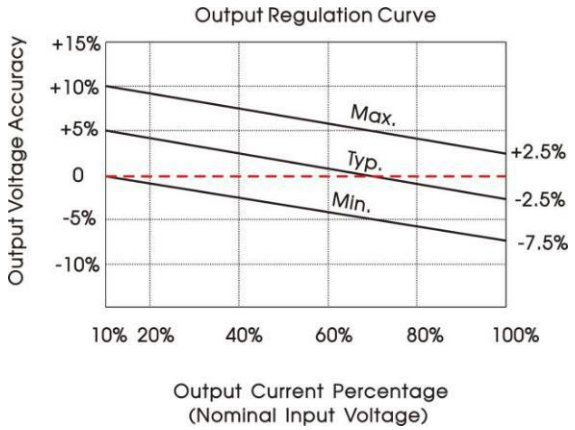
Typical Performance Curves

3.3VDC output



5VDC input

Other output



12/15/24VDC input

Other output

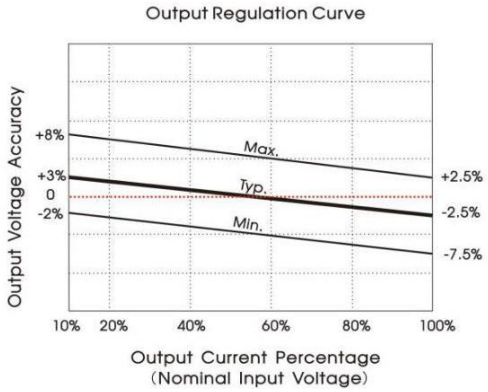
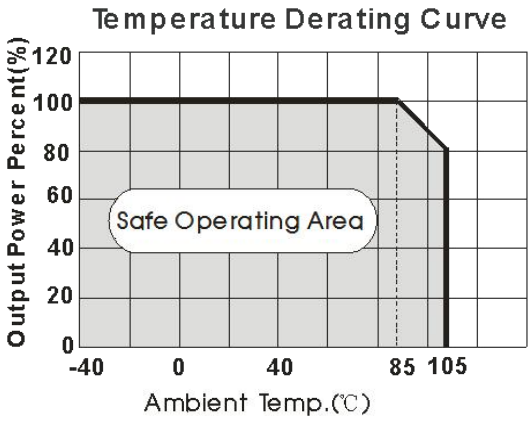


Fig. 1

5VDC input

12/15/24VDC input



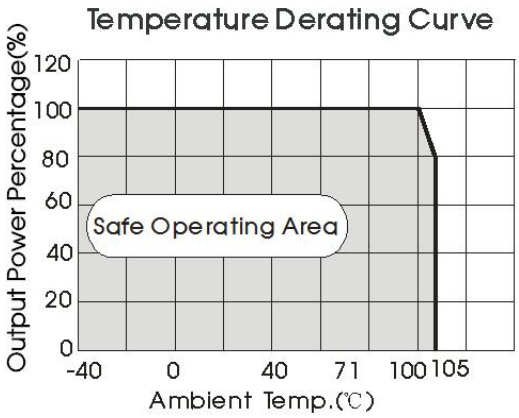
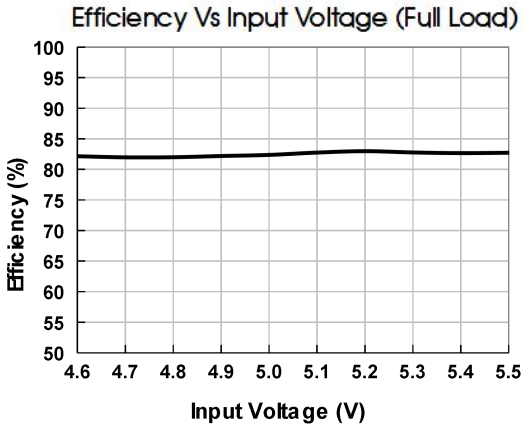
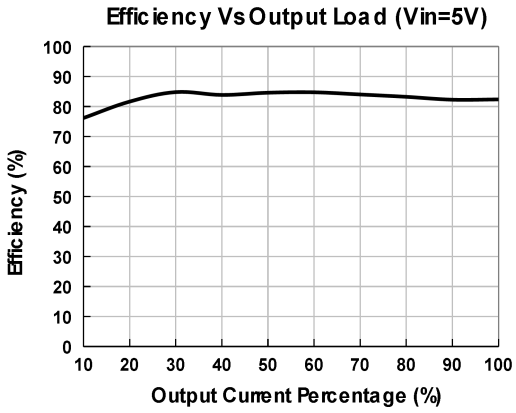


Fig. 2

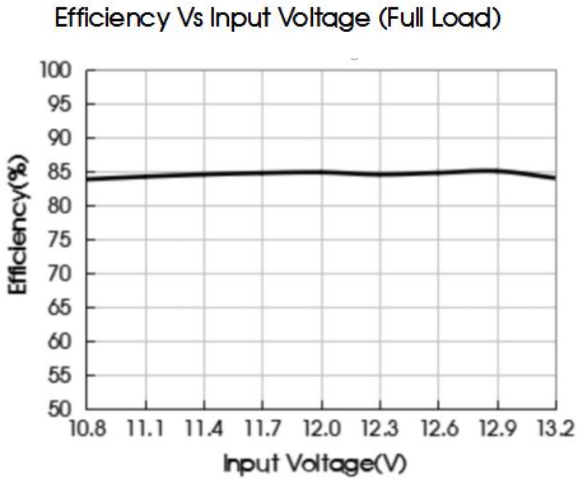
DFS1-E0505



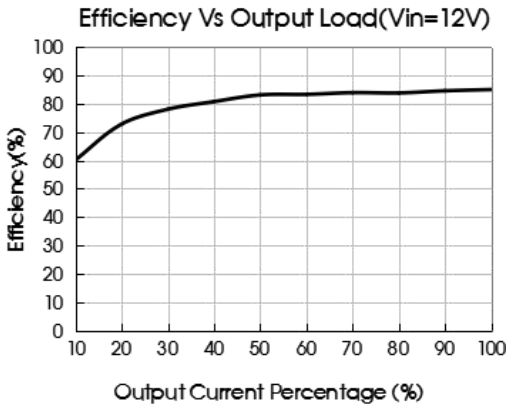
DFS1-E0505



DFS1-F1205



DFS1-F1205



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.

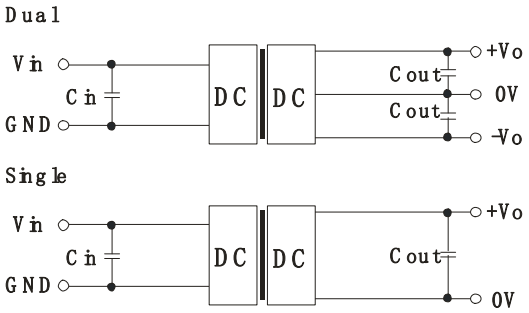


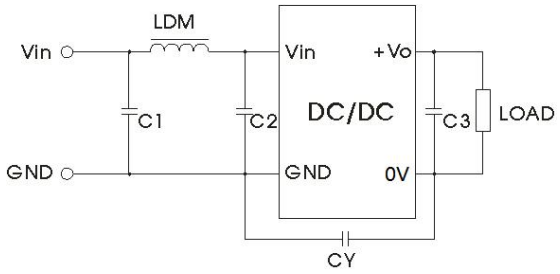
Fig. 3: Typical circuit diagram

Table 1: Recommended input and output capacitor values

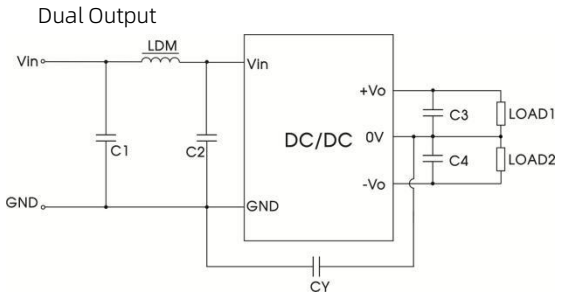
Vin	Cin	Single Vout	Cout	Dual Vout	Cout*
3.3VDC	10μF/16V	3.3VDC	10μF/16V	±3.3VDC	4.7μF/16V
5VDC	4.7μF/16V	5VDC	10μF16V	±5VDC	4.7μF/16V
12VDC	2.2μF/25V	9VDC	2.2μF/16V	±12VDC	1μF/25V
15VDC	2.2μF/25V	12VDC	2.2μF/25V	±15VDC	0.47μF/25V
24VDC	1μF/50V	15VDC	1μF/25V	±24VDC	0.47μF/50V
--	--	24VDC	1μF/50V	--	--

2. EMC compliance recommended circuit

Single Output

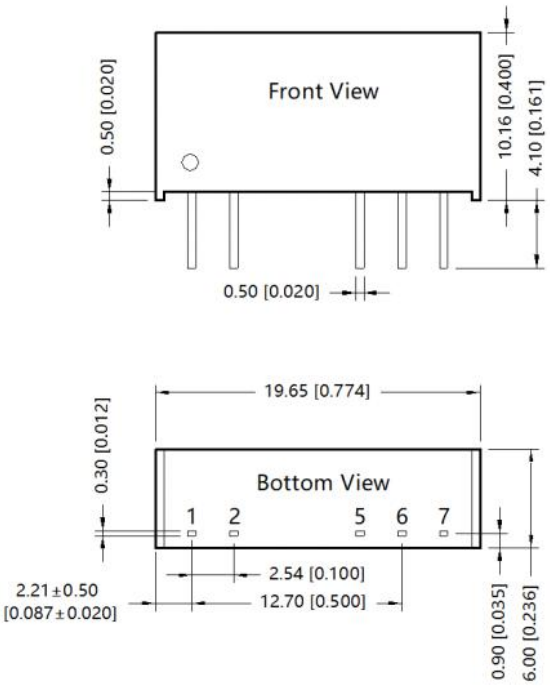


Dual Output

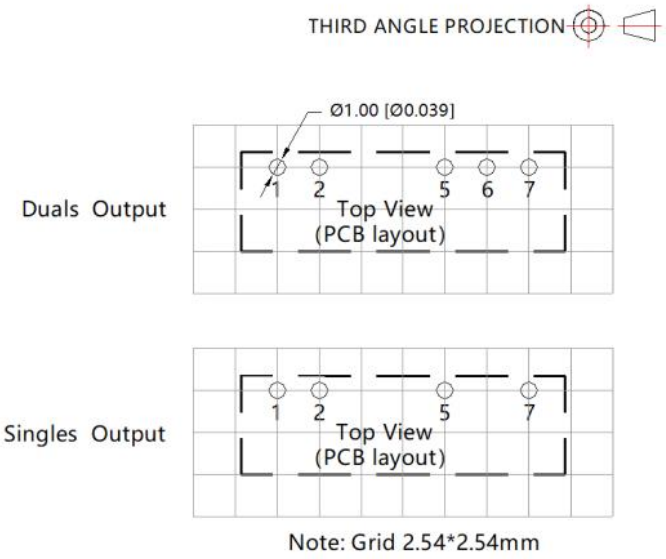


Input voltage		3.3VDC		5VDC		Other input
Output voltage		3.3/5VDC	9/12/15/24VDC	3.3/5/9VDC	12/15/24VDC	--
EMI	C1/C2	4.7uF/16V	4.7uF/16V	4.7uF/25V	4.7uF/25V	4.7uF/50V
	CY	--	270pF /4kVDC VISHAY HGZ102MBP TDK CD45-E2GA102M-GKA	100pF/4kV	1000pF/4kV	270pF /3kVDC
	C3/C4	Refer to the Cout in table 1				
	LDM	6.8μH				

Dimensions and Recommended Layout



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



Note: Grid 2.54*2.54mm

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.