Descriptions

1W isolated, DC/DC Converter



RoHS

3 Years Warranty

cULus Report UL62368-1

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

- 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-B0303	3.3 (2.97-3.63)	3.3	303/30	75/79	2400
UL/EN/BS EN	DFS1-B0305		5	200/20	78/82	2400
EN/BS EN	DFS1-B0309		9	111/11	81/85	1000
	DFS1-B0312		12	83/8	78/82	560
	DFS1-B0315		15	67/7	78/82	560
	DFS1-B0324		24	42/4	80/84	220
	DFS1-B0503	5 (4.5-5.5)	3.3	303/30	70/74	2400
UL/EN/BS EN	DFS1-B0505		5	200/20	78/82	2400
EN/BS EN	DFS1-B0509		9	111/12	79/83	1000
	DFS1-B0512		12	84/9	79/83	560
	DFS1-B0515		15	67/7	79/83	560
	DFS1-B0524		24	42/4	81/85	220
	DFS1-B1203	12 (10.8-13.2)	3.3	303/30	71/75	2400
UL/EN/BS EN	DFS1-B1205		5	200/20	76/80	2400
EN/BS EN	DFS1-B1209		9	111/12	76/80	1000
UL/EN/BS EN	DFS1-B1212		12	83/9	76/80	560
EN/BS EN	DFS1-B1215		15	67/7	77/81	560
	DFS1-B1224		24	42/5	77/81	220

	DFS1-B1505	15 (13.5-16.5)	5	200/20	76/80	2400
	DFS1-B1509		9	111/12	76/80	1000
	DFS1-B1512		12	83/9	76/80	560
	DFS1-B1515		15	67/7	77/81	560
	DFS1-B1524		24	42/5	77/81	220
	DFS1-B2403	24 (21.6-26.4)	3.3	303/30	69/75	2400
UL/EN/BS EN	DFS1-B2405		5	200/20	73/79	2400
	DFS1-B2409		9	111/12	74/80	1000
EN/BS EN	DFS1-B2412		12	83/9	75/81	560
	DFS1-B2415		15	67/7	75/81	560
UL/EN/BS EN	DFS1-B2424		24	42/5	75/81	220

Notes: *Product images are for reference only; the actual product shall prevail.

Specifications

Specifications	Item	Operating Conditions		Min.	Typ.	Max.	Unit
Input Specifications	Input Current (full load / no-load)	3.3V input	3.3VDC output	--	384/10	405/--	mA
			Other output	--	370/18	389/--	
		5V input	3.3VDC output	--	271/8	286/--	
			5VDC output	--	244/8	257/--	
			9VDC/12VDC/15VDC output	--	241/12	254/--	
			24VDC output	--	241/18	254/--	
		12V input	3.3VDC output	--	112/8	118/--	
			5VDC/9VDC/12VDC output	--	105/8	110/--	
			15VDC/24VDC output	--	103/8	109 /--	
		15V input	5VDC/9VDC/12VDC output	--	84/8	88/--	
			15VDC/24VDC output	--	83/8	87/--	
		24V input	3.3VDC output	--	56/8	61/--	
			5VDC output	--	53/8	58/--	
			9VDC output	--	53/8	57/--	
			12VDC/15VDC/24VDC output	--	52/8	56/--	
	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 curves (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	
		12VDC/15VDC/24V DC 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 & Noise①	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	3.3V input	Derating when operating temperature≥ 100℃, (see Fig. 2)	-40	--	105	℃
		Other input	Derating when operating temperature≥ 85℃, (see Fig. 2)				
	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	3.3V input, full load, nominal input voltage		--	220	--	kHz
		5V input, full load, nominal input voltage		--	270	--	
		12V/15V/24V input, full load, nominal input voltage		--	260	--	
	MTBF	MIL-HDBK-217F @ 25℃		3500	--	--	k hours
Mechanical Specifications	Case Material	Black plastic; flame-retardant and heat-resistant (UL94 V-0)					
	Dimensions	11.60 x 6.00 x 10.16 mm					
	Weight	1.3g (Typ.)					
	Cooling Method	Free air convection					

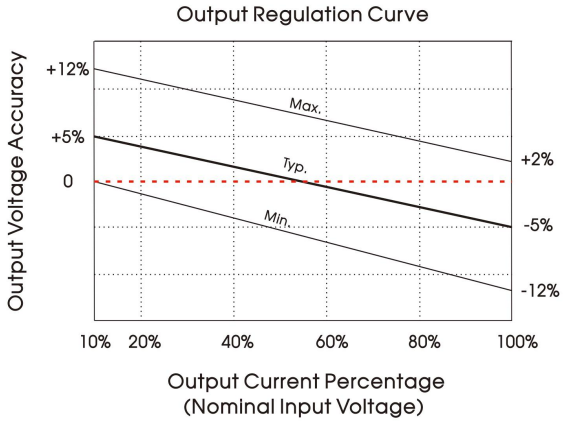
Note:
①The "parallel cable" method is used for Ripple and Noise test;
②The pin soldering temperature tolerance is not the actual temperature set by the soldering iron but the temperature required for proper solder joints. The actual temperature set by the customer should be determined comprehensively based on factors such as PCB thickness, copper coverage, soldering iron power, and soldering iron tip selection.

Electromagnetic Compatibility (EMC)

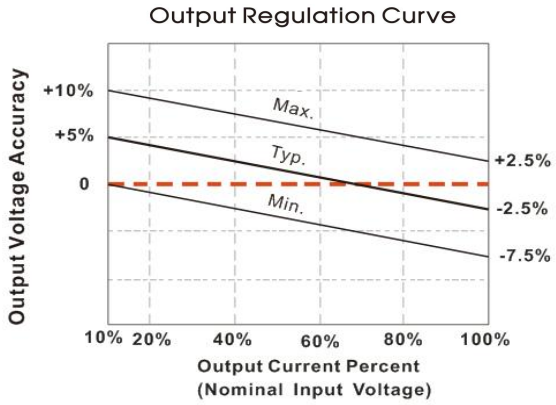
Emissions	CE	CISPR32/EN55032 CLASS B
	RE	CISPR32/EN55032 CLASS B
Immunity	ESD	IEC/EN61000-4-2 Air ±8kV, Contact ±6kV perf. Criteria B
Note: Refer to Fig. 4 for recommended circuit test.		

Typical Performance Curves

3.3VDC output



3.3/5VDC input
Other output



12VDC/15VDC/24VDC input
Other output

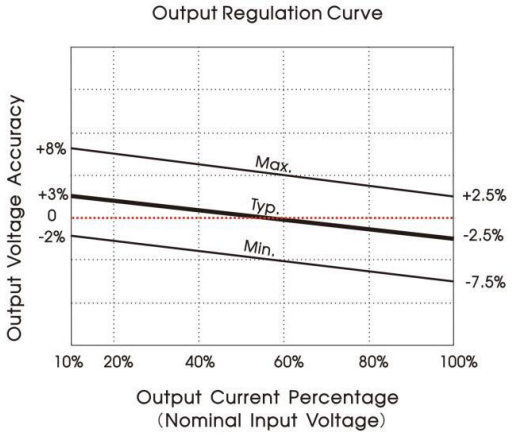
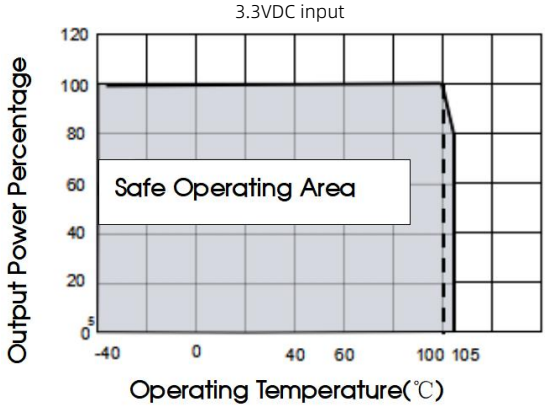


Fig. 1

3.3VDC input



5VDC/12VDC/15VDC/24VDC input

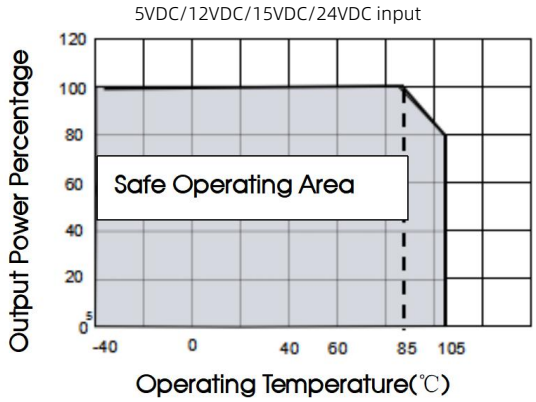
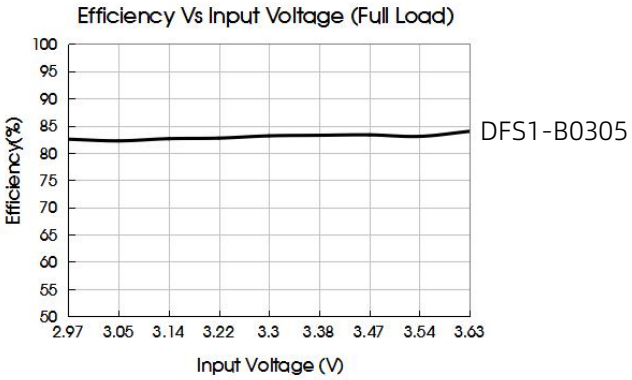
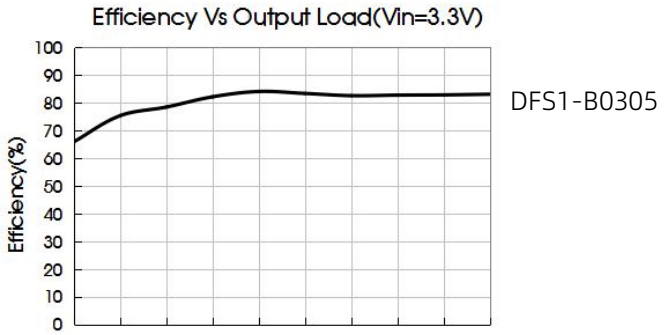


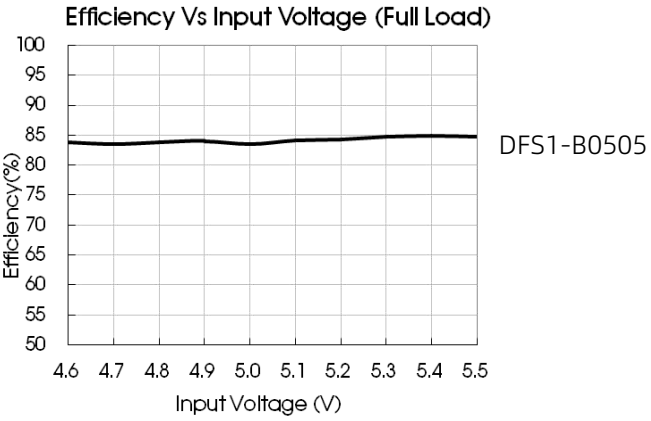
Fig. 2



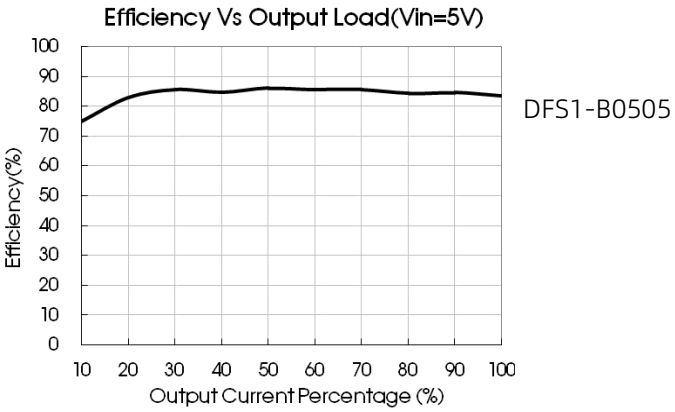
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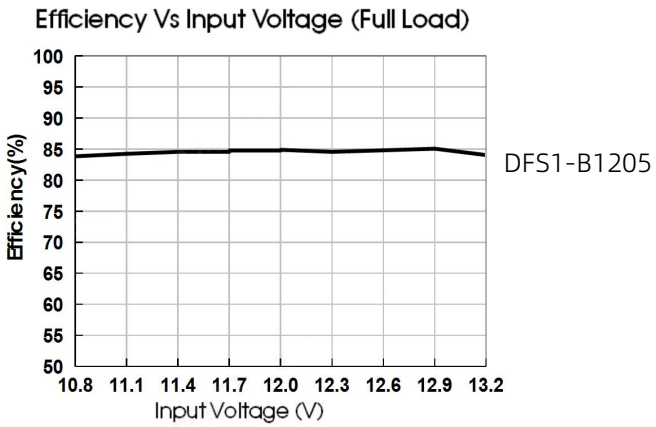
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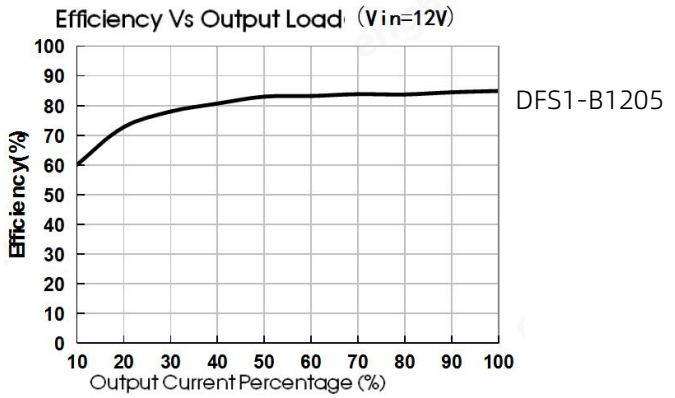
DFS1-B0505



DFS1-B0505



DFS1-B1205



DFS1-B1205

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.

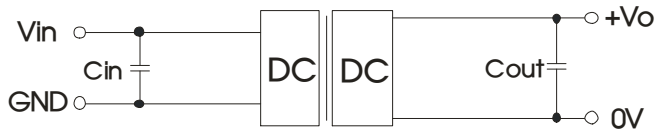


Fig.3

Table 1: Recommended input and output capacitor values

Vin	Cin	Vo	Cout
3.3VDC	10μF/25V	3.3VDC	10μF/16V
5VDC	4.7μF/16V	5VDC	10μF/16V
12VDC	2.2μF/25V	9VDC	2.2μF/16V
15VDC	2.2μF/25V	12VDC	2.2μF/25V
24VDC	1μF/50V	15VDC	1μF/25V
--	--	24VDC	1μF/50V

2. EMC compliance circuit

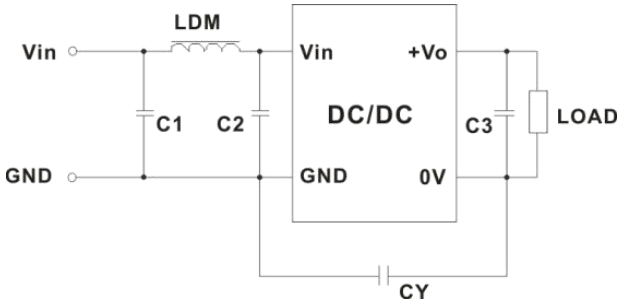
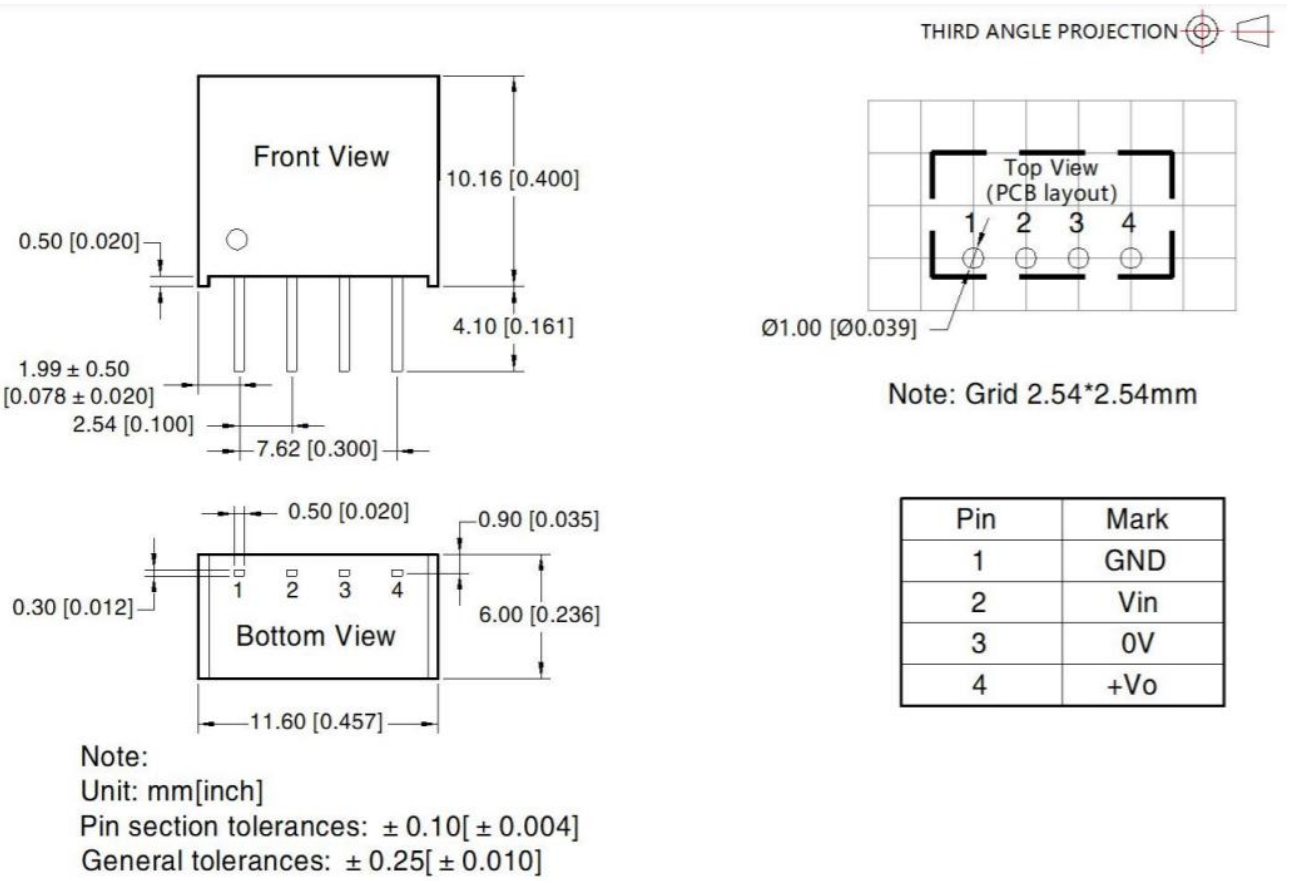


Fig. 4

Table 2: Recommended EMC filter values

Input voltage		3.3DVC		5DVC		12/15/24DVC
Output voltage		3.3/5VDC	9/12/15/24VDC	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 VISHAY HGZ102MBP	100pF/4kV	1000pF/4kV	270pF/2kV
	C3	Refer to the Cout in table 1				
	LDM	6.8μH				

Dimensions and Recommended Layout



Pin	Mark
1	GND
2	Vin
3	0V
4	+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 t he physical mark or packaging label.