DFN1-F Series

DESCRIPTIONS

Isolated DC-DC converter, 1W, Fixed input , unregulated single output

RoHS

UL62368-1 EN62368-1 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 3KVDC
- Industry standard pin-out

APPLICATIONS

- Industrial control
- Electric power
- Instrumentation

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	DFN1-F0503	5 (4.5-5.5)	3.3	303/30	70/74	2400
UL/EN/IEC/BS EN	DFN1-F0505		5	200/20	78/82	2400
EN/BS EN	DFN1-F0509		9	111/12	79/83	1000
	DFN1-F0512		12	84/9	79/83	560
	DFN1-F0515		15	67/7	79/83	560
	DFN1-F0524		24	42/4	81/85	220
	DFN1-F1203	12 (10.8-13.2)	3.3	303/30	71/75	2400
	DFN1-F1205		5	200/20	76/80	2400
	DFN1-F1212		12	83/9	76/80	560
	DFN1-F1215		15	67/7	77/81	560
	DFN1-F1224		24	42/5	77/81	220
	DFN1-F2403	24 (21.6-26.4)	3.3	303/30	69/75	2400
	DFN1-F2405		5	200/20	73/79	2400
	DFN1-F2409		9	111/12	74/80	1200
	DFN1-F2412		12	83/9	75/81	560
	DFN1-F2415		15	67/7	75/81	560
	DFN1-F2424		24	42/5	75/81	220

Specifications

Product Specifications	Item	Operating Conditions			Min.	Typ.	Max.	Unit
Input Specifications	Input Current (full load / no-load)	5VDC input	3.3VDC/5VDC output		--	270/8	286/--	mA
			Other output		--	241/8	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 output		--	83/8	88/--	
			15VDC output		--	82/8	87/--	
		24V input	3.3VDC output		--	56/8	61/--	
			5VDC output		--	53/8	58/--	
			9VDC output		--	52/8	57/--	
			12VDC/15VDC/24VDC output		--	52/8	56/--	
	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 intput	3.3VDC output	--	15	20	%
				5VDC	--	10	15	
				9VDC output	--	8	10	
				12VDC output	--	7	10	
				15VDC output	--	6	10	
				24VDC output	--	5	10	
			Other intput	3.3VDC output	--	8	20	
				5VDC output	--	5	15	
				9VDC/12VDC/15VDC output	--	3	10	
				24VDC output	--	2	10	
	Ripple & Noise*	20MHz bandwidth		3.3VDC intput	--	50	100	mVp-p
			Other intput	24VDC output	--	50	100	
				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	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
	Vibration		10-150Hz, 5G, 0.75mm. along X, Y and Z			
	Switching Frequency	Full load, 5VDC intput	--	270	--	kHz
		Full load, other intput	--	260	--	
	MTBF	MIL-HDBK-217F @ 25℃	3500	--	--	k hours
Mechanical Specifications	Case Material	Black plastic, flame-retardant and heat-resistant (UL94V-0)				
	Dimension	12.70 x 10.16 x 8.20 mm				
	Weight	1.8g (Typ.)				
	Cooling Method	Free air convection				

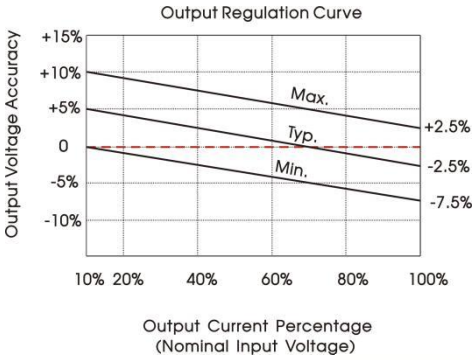
Note: * The "parallel cable" method is used for Ripple and Noise test.

Electromagnetic Compatibility (EMC)

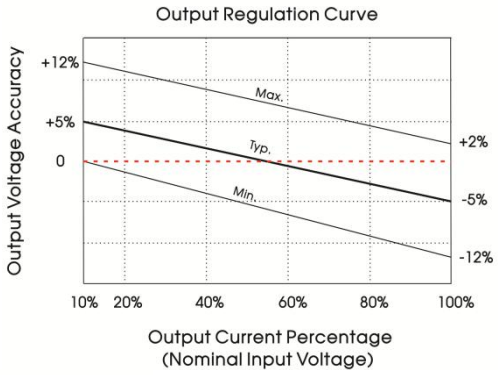
Electromagnetic Compatibility (EMC)	Emissions(EMI)	CE	CISPR32/EN55032 CLASS B	
		RE	CISPR32/EN55032 CLASS B	
	Immunity(EMS)	ESD (5VDC intput)	IEC/EN61000-4-2 Air ±8kV, Contact ±4kV	perf. Criteria B
		ESD (Other intput)	IEC/EN61000-4-2 Air ±8kV, Contact ±6kV	perf. Criteria B

Characteristic Curve

DFN1-F05_(Except DFN1-F0503)



DFN1-F0503/DFN1-F1203/DFN1-F2403



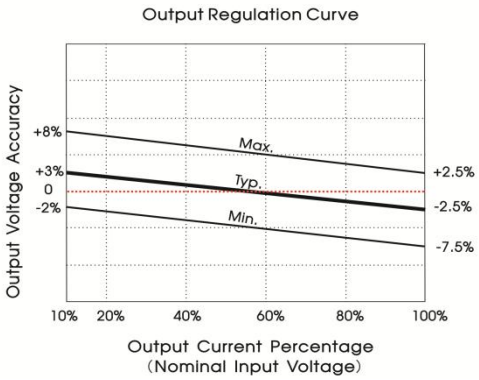


Fig. 1

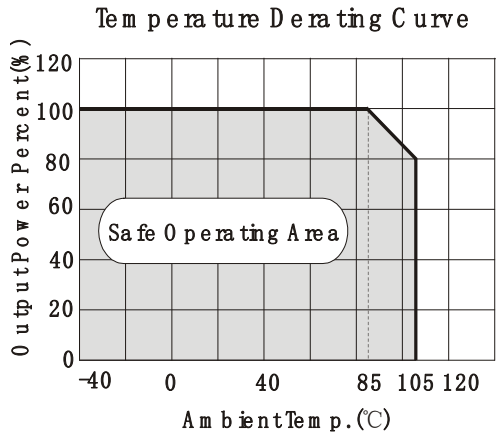
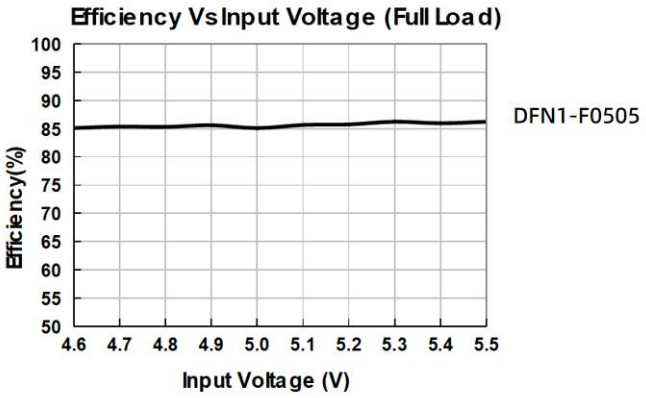
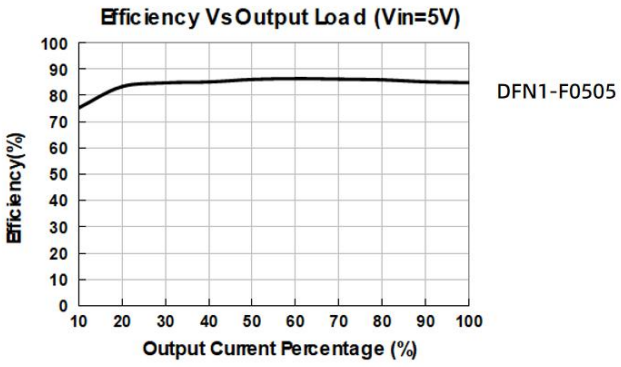
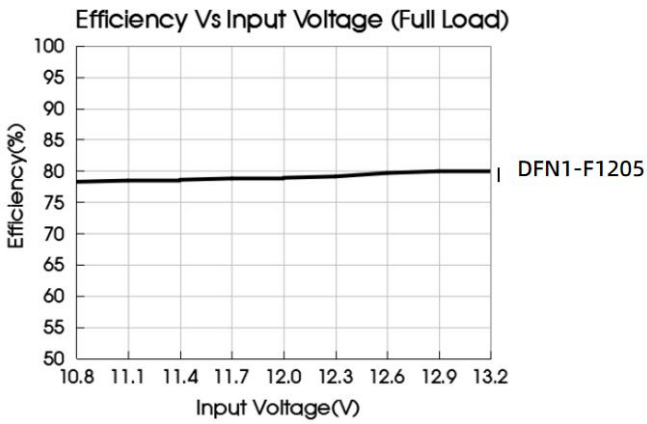
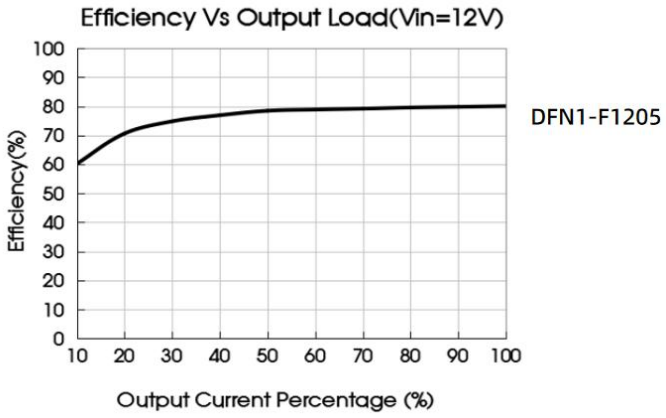

Temperature Derating Curve
Output Power Percent(%)
120
100
80
60
40
20
0
Safe Operating Area
-40
0
40
85
105
120
Ambient Temp.(℃)

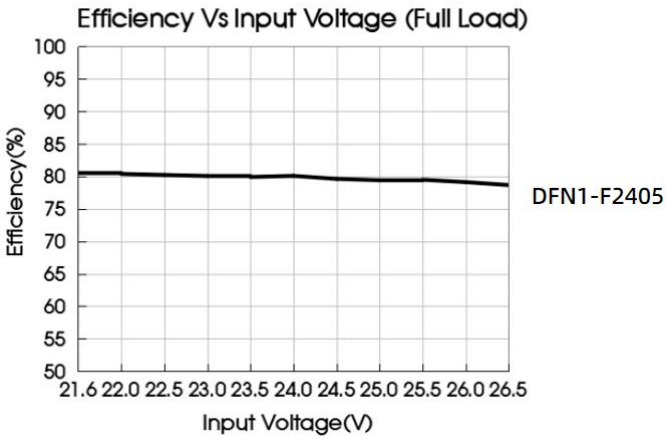
Fig. 2

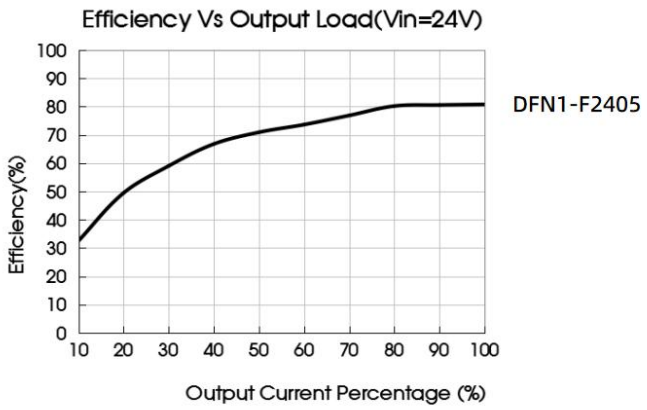

Efficiency Vs Input Voltage (Full Load)
Efficiency(%)
100
95
90
85
80
75
70
65
60
55
50
4.6
4.7
4.8
4.9
5.0
5.1
5.2
5.3
5.4
5.5
Input Voltage (V)
DFN1-F0505


Efficiency Vs Output Load (Vin=5V)
Efficiency(%)
100
90
80
70
60
50
40
30
20
10
0
10
20
30
40
50
60
70
80
90
100
Output Current Percentage (%)
DFN1-F0505


Efficiency Vs Input Voltage (Full Load)
Efficiency(%)
100
95
90
85
80
75
70
65
60
55
50
10.8
11.1
11.4
11.7
12.0
12.3
12.6
12.9
13.2
Input Voltage(V)
DFN1-F1205


Efficiency Vs Output Load(Vin=12V)
Efficiency(%)
100
90
80
70
60
50
40
30
20
10
0
10
20
30
40
50
60
70
80
90
100
Output Current Percentage (%)
DFN1-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.

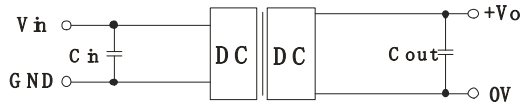


Fig. 3: Typical circuit diagram

Table 1: Recommended input and output capacitor values

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

2. EMC compliance recommended circuit

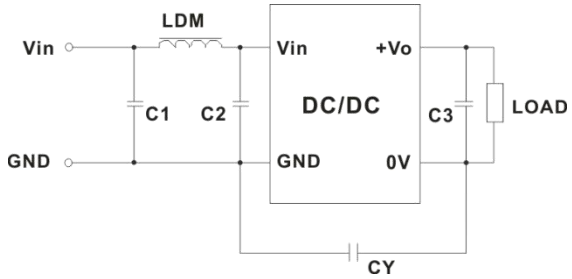
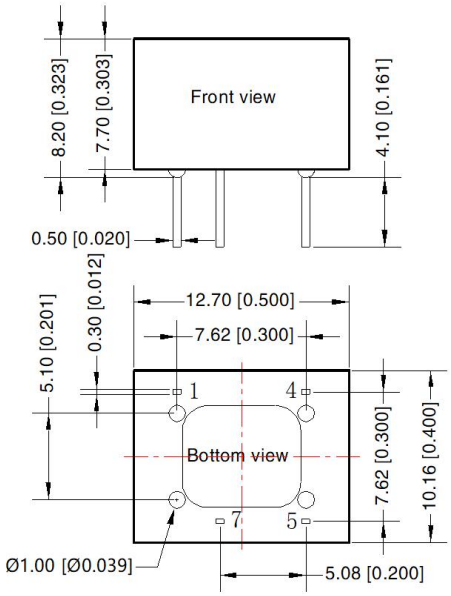


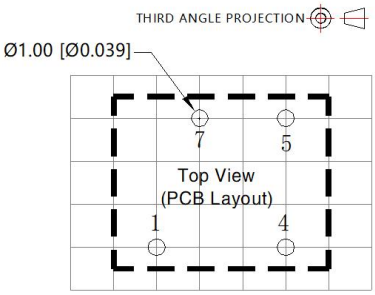
Table 2: Recommended EMC filter values

Input voltage		5VDC		Others
Output voltage		3.3/5/9VDC	12/15/24VDC	--
Emissions	C1/C2	4.7μF /25V	4.7μF /25V	4.7μF /50V
	CY	100pF/4kVDC	1nF /4kVDC	270pF /4kVDC
	C3	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–Out	
Pin	Mark
1	GND
4	Vin
5	+Vo
7	0V

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.