

### FEATURES

1. Package Type: 1"X 1"
2. Input voltage range: 2:1
3. Operating temperature range: -40°C - +85°C
4. Isolation voltage: 1500VDC
5. High Efficiency: 88% (Typ.)
6. Output short-circuit protection and overcurrent protection.
7. Fields of application: Power, Industrial control, Communications, Internet of things, Automotive.



3 years  
Warranty

### Selection Guide

Part No.	Input Voltage (VDC)		Output		Full Load Efficiency(%) Min./Typ.	Capacitive Load (μF)Max.
	Nominal (Range)	Max.	Voltage (VDC)	Current(mA) Max./Min.		
MFA0505YMD-10WR3	5 (4.5-9)	12	±5	±1000/0	76/78	1000
MFA0512YMD-10WR3			±12	±417/0	81/83	470
MFA0515YMD-10WR3			±15	±334/0	82/84	330
MFA0524YMD-10WR3			±24	±209/0	81/83	100
MFB0503YMD-10WR3			3.3	2500/0	82/84	470
MFB0505YMD-10WR3			5	2000/0	83/85	470
MFB0512YMD-10WR3			12	834/0	81/83	470
MFB0515YMD-10WR3			15	667/0	82/84	330
MFB0524YMD-10WR3			24	417/0	81/83	100
MFB1205YMD-10WR3	12 (9-18)	20	5	2000/0	79/81	2200
MFB2405YMD-10WR3	24 (18-36)	40	5	2000/0	80/82	2200
MFB2412YMD-10WR3			12	833/0	85/87	470
MFB2415YMD-10WR3			15	667/0	85/87	330
MFB2424YMD-10WR3			24	416/0	86/88	100
MFB4803YMD-10WR3	48 (36-75)	80	3.3	2400/0	77/79	2200
MFB4805YMD-10WR3			5	2000/0	81/83	2200
MFB4812YMD-10WR3			12	833/0	85/87	470
MFB4815YMD-10WR3			15	667/0	85/87	330
MFB4824YMD-10WR3			24	416/0	86/88	100

### Input Specifications

Item	Operating Conditions		Min.	Typ.	Max.	Unit
Input Current (full load/no-load)	24VDC nominal input series	3.3VDC Output	--	423/5	434/12	mA
		Other Output	--	502/5	514/12	
	48VDC nominal input series	3.3VDC Output	--	190/4	215/8	mA
		Other Output	--	251/4	258/11	
Reflected Ripple Current	24VDC nominal input series		--	40	--	mA
	48VDC nominal input series		--	30	--	
Impulse Voltage	24VDC Input		-0.7	--	50	VDC
	48VDC Input		-0.7	--	100	
Starting Voltage	24VDC Input		--	--	9	VDC
	48VDC Input		--	--	18	
Input undervoltage protection	24VDC Input		5.5	6.5	--	VDC
	48VDC Input		12	15.5	--	
Start time	Nominal input and constant resistance load		--	10	--	ms
Ctrl	Turn off module		connected GND or (0-1.2V)			
	Turn on module		No connected or (3.5-12V)			
Input Filter			PI filter			
Hot Plug			Unavailable			

### Output Specifications

Item	Operating Conditions		Min.	Typ.	Max.	Unit
Output Voltage Accuracy	0%-100% load		--	±1	±3	%
Linear Regulation	Input voltage from low limit to high limit, full load	Vo1	--	±0.2	±0.5	%
		Vo2	--	±0.5	±1	
Load Regulation	5%- 100% load	Vo1	--	±0.5	±1	%
		Vo2	--	±0.5	±1.5	
Ripple & Noise	20MHz bandwidth,5%-100% load		--	40	80	mVp-p
Cross adjustment rate	Dual output, with 50% load on the main circuit and 10% - 100% load on the secondary circuit		--	--	±5	%
Transient Recovery Time	25% Load Step Change, nominal input voltage		--	300	500	µs
Transient Response Deviation	25% Load Step Change, nominal input voltage		--	±3	±5	%
Temperature Coefficient	Full Load		--	--	±0.03	%/°C
Over Voltage Protection	Input voltage range		110	--	160	%Vo.
Over Current Protection	Input voltage range		110	140	--	%Io
Short-Circuit Protection	Input voltage range		Continuous, Self-Recovery			

### General Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit
Isolation Voltage	Input-output, test time 1 minute, leakage current less than 1mA	1500	--	--	VDC
Insulation Resistance	Input-output, insulated voltage 500VDC	1000	--	--	MΩ
Isolation Capacitance	Input-output, 100KHz/0.1V	--	2000	--	pF
Operating Temperature	See Fig 1	-40	--	+85	°C
Storage Temperature		-55	--	+125	°C
Storage Humidity	Non-condensing	5	--	95	%RH
Soldering Profile	1.5mm from case for 10 sec	--	--	300	°C
Switching Frequency	PWM	--	300	--	kHz
MTBF	MIL-HDBK-217F@25°C	1000	--	--	K Hours
Vibration		IEC/EN 61373 Vehicle Body 1 Class B			

### Mechanical Specifications

Case Material	Aluminum alloy, black anodized coating
Package Dimensions	25.4 X 25.40 X 12.00 mm
Weight	15.00g (Typ.)
Cooling Method	Free air convection

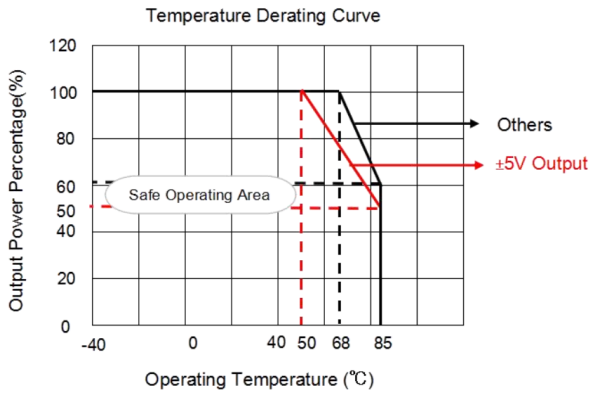
### EMC Specifications

EMI	CE	CISPR32/EN55032 CLASS A (without extra components)/ CLASS B (Recommended circuit diagram 3-②)			
	RE	CISPR32/EN55032 CLASS A (without extra components)/ CLASS B (Recommended circuit diagram 3-②)			
EMS	ESD	IEC/EN61000-4-2	Contact±4KV/Air ±6KV	Perf.Criteria	B
	RS	IEC/EN61000-4-3	10V/m	Perf.Criteria	A
	EFT	IEC/EN61000-4-4	±2KV (Recommended circuit diagram 3-①)	Perf.Criteria	B
	Surge	IEC/EN61000-4-5	line to line±2KV(Recommended circuit diagram 3-①)	Perf.Criteria	B
	CS	IEC/EN61000-4-6	3Vr.m.s	Perf.Criteria	A

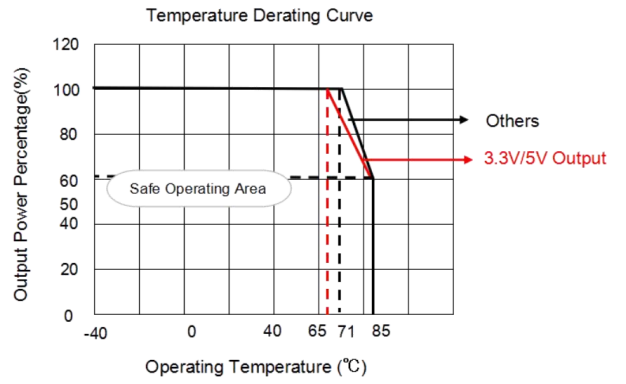
### Typical Characteristic Curves

#### Temperature Derating Curve (Figure

5VDC input series, except 3.3VDC output



Others



5VDC input series, 3.3VDC output

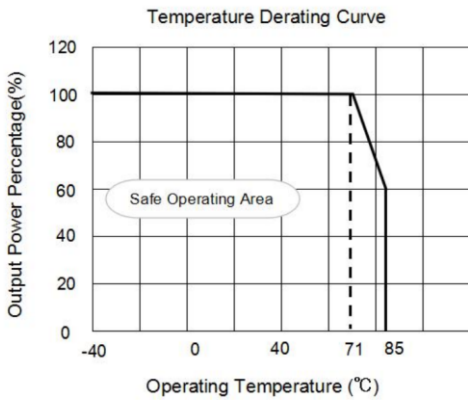
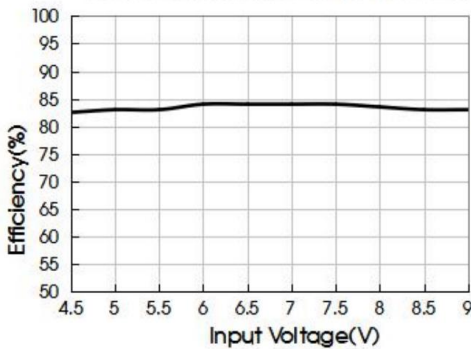


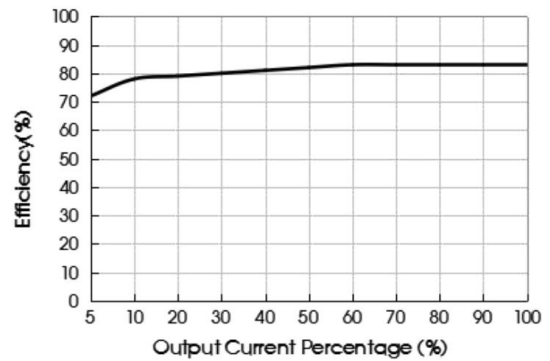
Fig. 1

Efficiency Vs Input Voltage (Full Load)



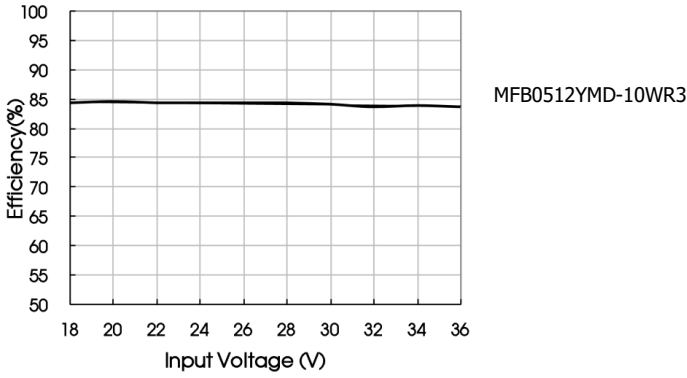
MFA0512YMD-10WR3

Efficiency Vs Output Load (Vin=5V)

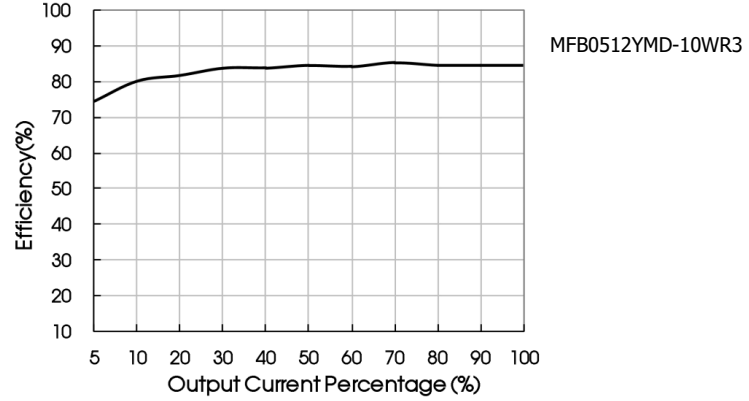


MFA0512YMD-10WR3

Efficiency Vs Input Voltage (Full Load)



Efficiency Vs Output Load (Vin=24V)



### Typical Circuit Design And Application

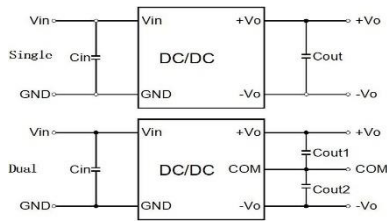


Fig 23

Vout(VDC)	Cin(uF)	Cout(uF)
5	100µF/16V	Vo(3.3/5/±5):10µF/16V
12	100µF/25V	Vo(12/±12/15/±15V):10µF/25V
24	100µF/50V	Vo(24/±24V):10µF/50V
48	100µF/100V	

24VDC/48VDC nominal input series

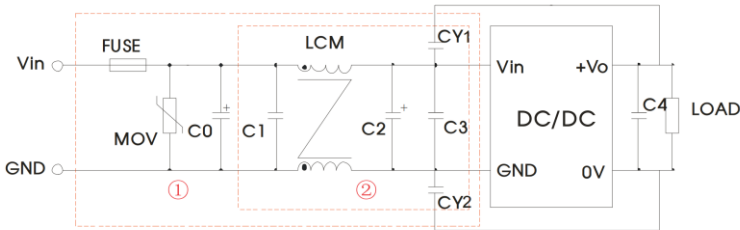


Fig 3.

Note: Part ① of Figure 3 is used for EMS testing; Part 2 is used for EMI filtering and can be selected according to requirements.

Model	Vin:24VDC	Vin:48VDC
FUSE	Select fuse value according to actual input current	
MOV	S20K30	S14K60
C0	680µF/50V	680uF/100V
C1	1µF/50V	1uF/100V
C2	330µF/50V	330µF/100V
C3	4.7µF/50V	4.7uF/100V
C4	Refer to the Cout in Fig.2	
LCM	4.7mH	
CY1,CY2	1nF/2kV	

12VDC nominal input series

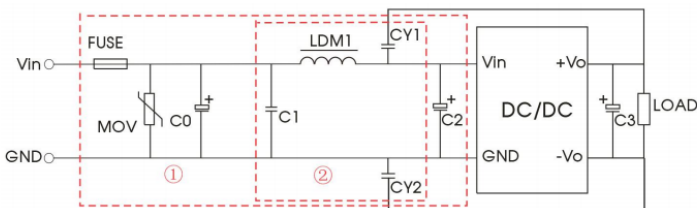


Fig. 4

Notes: For EMC tests we use Part ① in Fig. 4 for immunity and part ② for emissions test. Selecting based on needs.

#### Parameter description:

Model	Vin: 12VDC
FUSE	Select fuse value according to actual input current
MOV	S20K30
C0, C2	330µF/50V
C1	1µF/50V
C3	Refer to the Cout in Fig.2
LDM1	4.7µH
CY1, CY2	1nF/2kV

5VDC nominal input series

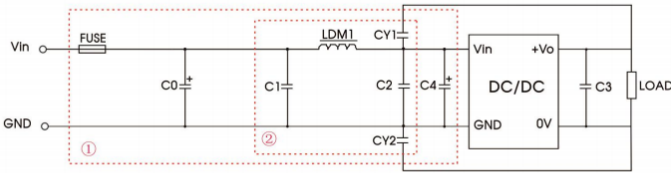


Fig. 5

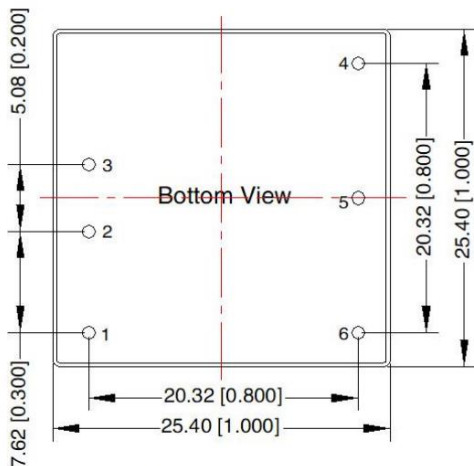
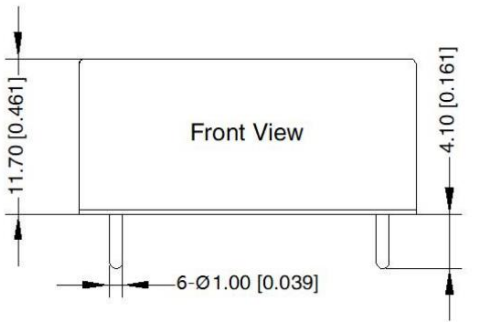
Notes: For EMC tests we use Part ① in Fig. 5 for immunity and part ② for emissions test. Selecting based on needs.

Parameter description:

Model	Vin: 5VDC
FUSE	Select fuse value according to actual input current
C0	2200µF/35V
C1, C2	4.7µF/50V
C3	Refer to the Cout in Fig.2
C4	1000µF/35V
LDM1	4.7µH
CY1, CY2	1nF/2kV

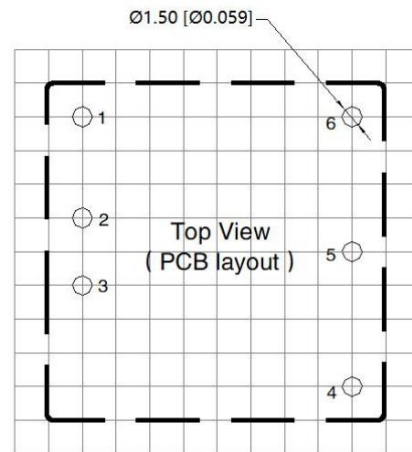
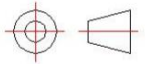
All DC-DC converters of this series are tested before delivery using the recommended circuit shown in Fig. 2. Input and/or output ripple can be further reduced by appropriately increasing the input & output capacitor values Cin and Cout and/or by selecting capacitors with a low ESR (equivalent series resistance). Also make sure that the capacitance is not exceeding the specified max. capacitive load value of the product

## Dimensions and Recommended Layout



Note:  
 Unit: mm[inch]  
 Pin diameter tolerances:  $\pm 0.10$  [ $\pm 0.004$ ]  
 General tolerances:  $\pm 0.50$  [ $\pm 0.020$ ]  
 PIN1/2/3/4/5/6:  $\phi 1.0$ mm

THIRD ANGLE PROJECTION



Note: Grid 2.54\*2.54mm

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

## Notes & Instructions

1. If the product works under the minimum required load, it cannot guarantee that the performance of the product complies with all the performance indicators in this manual;
2. The maximum capacitive load is tested under the input voltage range and full load condition;
3. Unless otherwise stated, all indexes in this manual are measured at  $T_a=25^{\circ}\text{C}$ , humidity  $<75\%RH$ , nominal input voltage and rated output load;
4. All index testing methods in this manual are based on the enterprise standards of the company;
5. Our company can provide product customization, specific needs can directly contact our technical staff;