

Typical Characteristics

- Fixed voltage input, isolated unregulated output, power: 1W
- Isolation voltage: 3000VDC
- Working ambient temperature: -40℃~+105℃
- Efficiency: up to 85%
- Output short-circuit protection: continuous short-circuit protection, automatic recovery
- Industry standard pin-out
- Compact SMD package
- Low ripple/noise (20MHz bandwidth): 50mVp-p (typ.)
- MTBF≥3.5 million hours (3500000Hrs)

1W, fixed-voltage input, isolated unregulated, single-output DC/DC power module



RoHS

Over-temperature protection and continuous output short-circuit protection

F_XT-1WR3 Series—is a compact, high-efficiency, low-power, fixed-input-voltage, isolated, unregulated single-output DC/DC module power supply designed by Huizhi Electronics for its customers;

This product series is specifically designed for applications in board-level power supply systems that require the generation of a voltage isolated from the input power source.

This product is suitable for:

- Applications where the input power supply voltage is relatively stable (voltage variation range: $\pm 10\%$ V_{in});
- Applications requiring isolation between input and output (isolation voltage ≤ 3000 VDC);
- Applications with low requirements for output voltage stability;
- Typical applications: purely digital circuits, general-purpose low-frequency analog circuits, relay driver

circuits, data switching circuits, etc.

Model Number Description

F	xx	xx	XT-1W	R3	
					Suffix (3rd-generation product)
					Rated output power (1W)
					Package type (SMD Package)
					Output voltage (rated)
					Input voltage (rated)
					Product series (3000V isolated single output)

Product selection table

Cer tif ica tio n	Model number	Input voltage range (Vdc)	Output Voltage/Current		Ripple and Noise	Efficiency@ Full load	Max. capaci tive load
		Rated value ^② (Range)	Output V (Vdc)	Output I (mA) (Max. Min.)	Full Load (mVp-p) Typ. /Max.	% (Min. / Typ.)	μ F
	F0303XT-1WR3	3.3	3.3	303/30	50/100	73/77	2400
	F0305XT-1WR3	(2.97-3.63)	5	200/20	50/100	78/82	2400

	F0309XT-1WR3		9	111/11	50/100	80/84	1000
	F0312XT-1WR3		12	83/8	50/100	80/84	560
	F0315XT-1WR3		15	67/7	50/100	80/84	560
	F0324XT-1WR3		24	42/4	50/100	80/84	220
	F0503XT-1WR3	5 (4.5-5.5)	3.3	303/30	50/100	70/74	2400
	F0505XT-1WR3		5	200/20	50/100	78/82	2400
	F0509XT-1WR3		9	111/11	50/100	79/83	1000
	F0512XT-1WR3		12	83/8	50/100	79/83	560
	F0515XT-1WR3		15	67/7	50/100	79/83	560
	F0524XT-1WR3		24	42/4	50/100	81/85	220
	F1203XT-1WR3	12 (10.8-13.2)	3.3	303/30	50/100	70/74	2400
	F1205XT-1WR3		5	200/20	50/100	78/82	2400
	F1209XT-1WR3		9	111/11	50/100	79/83	1000
	F1212XT-1WR3		12	83/8	50/100	79/83	560
	F1215XT-1WR3		15	67/7	50/100	79/83	560
	F1224XT-1WR3		24	42/4	50/100	81/85	220
	F1503XT-1WR3	15 (13.5-16.5)	3.3	303/30	50/100	70/74	2400
	F1505XT-1WR3		5	200/20	50/100	78/82	2400
	F1509XT-1WR3		9	111/11	50/100	79/83	1000
	F1512XT-1WR3		12	83/8	50/100	79/83	560
	F1515XT-1WR3		15	67/7	50/100	79/83	560
	F1524XT-1WR3		24	42/4	50/100	81/85	220
	F2403XT-1WR3	24 (21.6-26.4)	3.3	303/30	50/100	72/76	2400
	F2405XT-1WR3		5	200/20	50/100	78/82	2400
	F2409XT-1WR3		9	111/11	50/100	79/83	1000
	F2412XT-1WR3		12	83/8	50/100	79/83	560
	F2415XT-1WR3		15	67/7	50/100	79/83	560
	F2424XT-1WR3		24	42/4	50/100	81/85	220

Note: 1. Due to space limitations, the above is only a list of representative products. For products not included in this list, please contact our Sales Department.

2. The maximum capacitive load indicates the maximum capacitive load that can be connected to +Vo or -Vo. If this value is exceeded, the product will not start properly.

Test Conditions: Unless otherwise specified, all parameter measurements were taken at the rated input voltage, with a purely resistive rated load, and at an ambient temperature of 25° C.

Input characteristics

Items		Working conditions		Min.	Typ.	Max.	Unit
Input Current (Full Load/No Load)	3.3VDC input	3.3VDC output		--	394/12	416/--	mA
		5VDC output		--	370/12	389/--	
		9VDC/12VDC/15VDC/24VDC output		--	361/12	379/--	
	5VDC input	3.3VDC/5VDC output		--	270/8	286/--	
		9VDC/12VDC output		--	241/12	254/--	

	12VDC input	15VDC/24VDC output	--	241/18	254/--	
		3.3V/5VDC output	--	102/8	107/--	
		9VDC/12VDC/15VDC output	--	101/8	106/--	
		24VDC output	--	99/8	103/--	
	15VDC input	5VDC/9VDC output	--	82/8	86/--	
		15VDC 输出	--	81/8	85/--	
	24VDC input	3.3V/5VDC output	--	53/8	57/--	
		9VDC/12VDC/15VDC output	--	51/8	55/--	
		24VDC output	--	53/8	57/--	
Reflected ripple current	3.3VDC input		--	30	--	
	Other input		--	15	--	
Impulse voltage (1 sec. max)	3.3VDC input series		-0.7	--	5	VDC
	5VDC input series		-0.7	--	9	
	12VDC input series		-0.7	--	18	
	15VDC input series		-0.7	--	21	
	24VDC input series		-0.7	--	30	
Input filter type	Capacitor filtering					
Hot swap	Not supported					

Output characteristics

Items	Working and test conditions		Min.	Typ.	Max.	Unit
Output load	Load percentage		10	--	100	%
Output voltage accuracy	See the error envelope curve					
Line Regulation	Input voltage variation: ±1%	3.3V output	--	--	±1.5	%
		Others	--	--	±1.2	%
Load Regulation	10%~100% load	3.3VDC output	--	10	20	%
		5VDC output	--	10	15	%
		9VDC output	--	8	10	%
		12VDC output	--	8	15	%
		15VDC output	--	6	10	%
		24VDC output	--	5	10	%
Ripple & Noise	Pure resistive load, 20 MHz bandwidth, peak-to-peak value		--	50	100	mVp-p
Temperature drift coefficient	Full load		--	--	±0.02	%/° C
Output short-circuit protection	Sustainable short-circuit protection, automatic recovery					

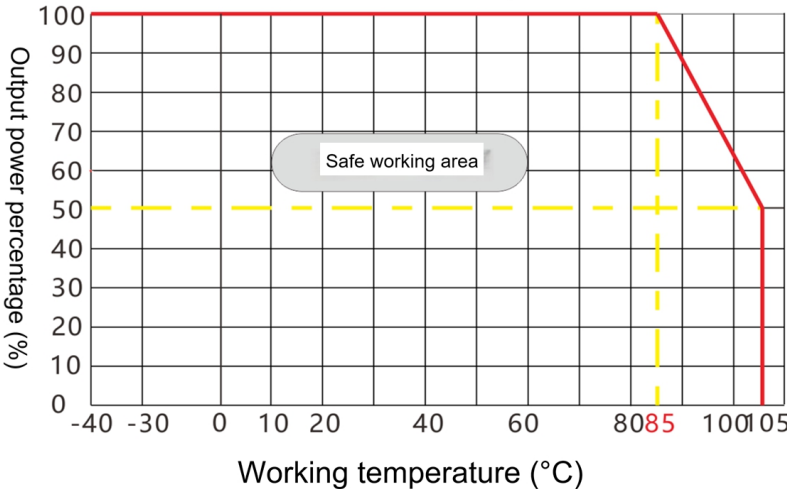
Note: ① Test method for ripple and noise: twisted-pair test method.

General characteristics

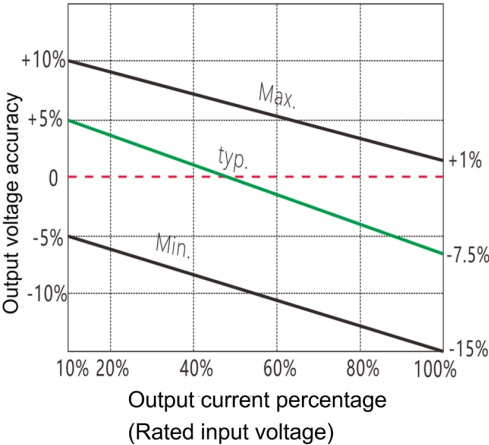
Items	Working conditions	Min.	Typ.	Max.	Unit
Insulation voltage	Input-output, test duration: 1 minute, leakage current less than 1 mA.	3000	--	--	VDC
Insulation resistance	Input-output, insulation voltage 500 VDC.	1000	--	--	MΩ
Isolation capacitor	Input-Output, 100 kHz/0.1 V	--	20	--	pF
Operating temperature	Use the reference temperature derating curve	-40	--	+105	℃
Storage temperature		-55	--	+125	
Maximum operating case temperature		--	25	--	
Storage humidity	No condensation	5	--	95	%RH
Pin soldering temperature resistance	Peak temperature $T_c \leq 245^{\circ}\text{C}$, The maximum duration at temperatures above 217°C is 60 seconds -- -- +300℃				
Switching frequency	Full load, rated voltage input	--	100	--	KHz
Vibration		10-55Hz, 10G, 30 Min. along X, Y and Z			
Housing material		Black flame-retardant, heat-resistant plastic (UL94 V-0)			
Minimum mean time between failures	MIL-HDBK-217F@25℃	3.5×10^6	--	--	Hrs
Moisture Sensitivity Level (MSL)	IPC/JEDEC J-STD-020D.1	Level 1			

Product Performance Curve

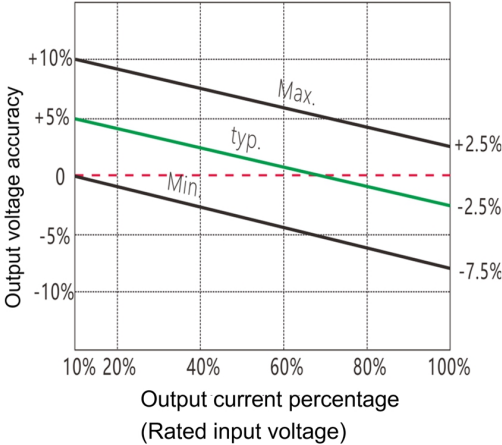
Temperature derating curve



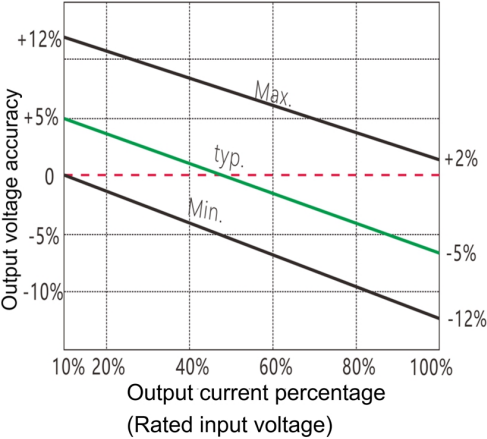
3.3VDC input / 3.3VDC output
Error envelope curve



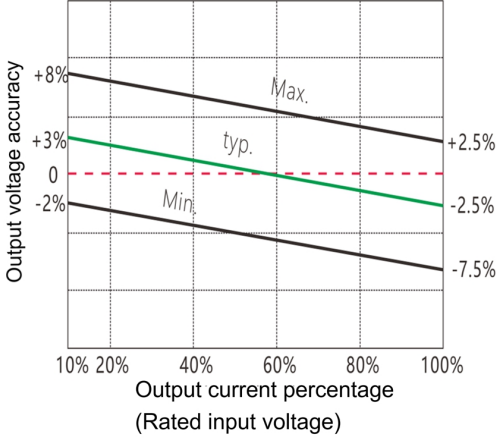
3.3VDC/5VDC input/other output
Error envelope curve



5VDC/12VDC/24VDC input/3.3VDC output
Error envelope curve

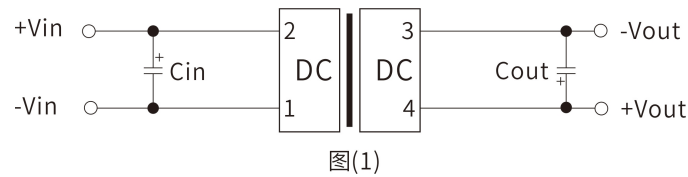


12VDC/15VDC/24VDC input/other output
Error envelope curve



Typical Application Reference Circuit (Recommended Parameters)

1. General applications:



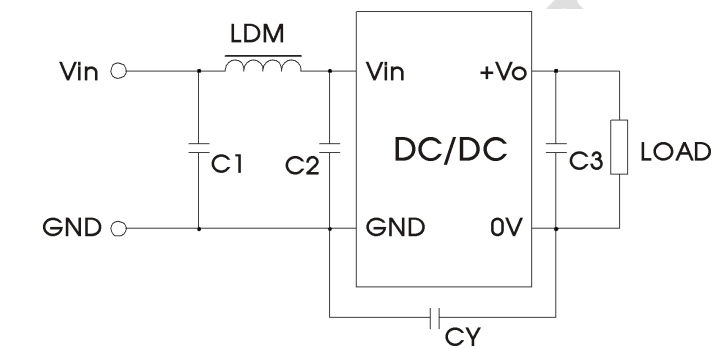
If further reduction of input and output ripple is required, a capacitor filter network can be connected across the input and output terminals; the circuit is shown in Figure 1.

However, care must be taken to select an appropriate filter capacitor. If the capacitor is too large, it is likely to cause startup issues. For each output channel, the recommended capacitive load values—which ensure safe and reliable operation—are listed in Table 1.

Recommended capacitive load values (Table 1)

Vin (Vdc)	Cin(u	Vo (Vdc)	Cout(u F)
3.3	4.7μF/	3.3V/5VD	10μF/16V
5	4.7μF/	9VDC	2.2μF/16
12	2.2μF/	12VDC	2.2μF/25
15	2.2μF/	15VDC	1μF/25V
24	1μF/50V	24VDC	1μF/50V

2. Typical EMI application circuits



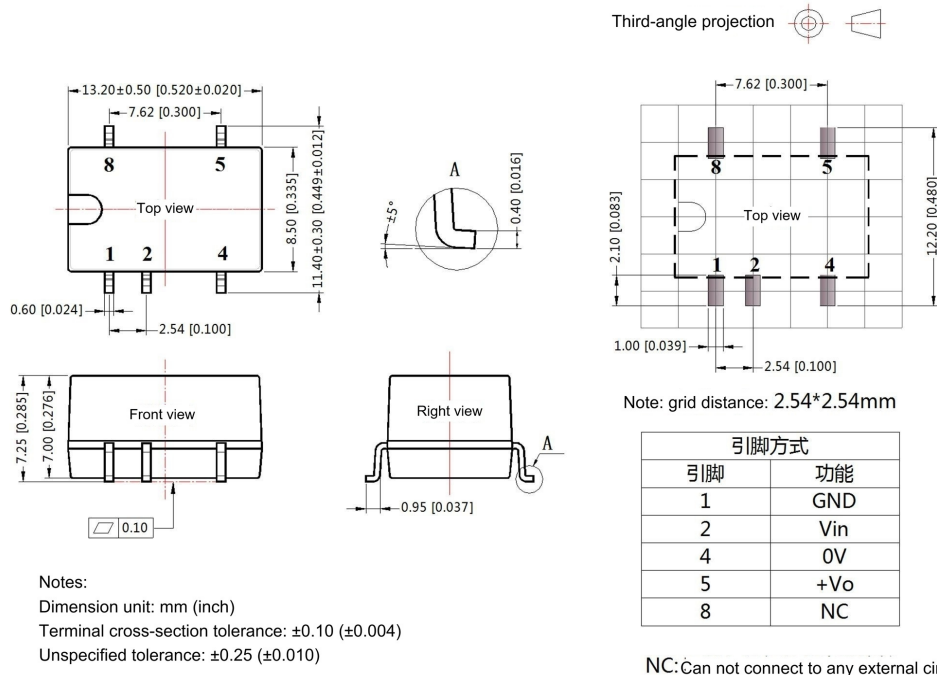
Recommended EMI reference circuit values (Table 2)

Vin (Vdc)	3.3VDC	5VDC		12/15/24 VDC
Output voltage	--	3.3/5/9VDC	12/15/24VDC	--
C1, C2	4.7μF/16V	4.7μF/25V		4.7μF/50V
CY	270pF/4kV	100pF/4kV	1000pF/4	270pF/2kV
C3	See Cout Parameters in Table 1			
LDM	6.8μH			

3. Output Load Requirements

To ensure that this module operates efficiently and reliably, the minimum output load must not be less than 10% of the rated load. If your actual power requirement is indeed lower, please connect a resistor in parallel across the positive and negative terminals of the output. The total power rating of the resistor must be greater than or equal to 10% of the rated power, and the selected resistor's power rating must be at least 5 times greater than the actual power drawn; otherwise, the resistor may overheat.

Appearance Dimensions and Pin Descriptions, Recommended PCB Layout



*Note: If the pin descriptions of the power module differ from those in the selection guide, refer to the labels on the actual unit.

Package Description

Package code	L x W x H	
XT	13.20 x 8.50 x 7.25mm	0.519 × 0.334 × 0.285inch

Test Application Reference

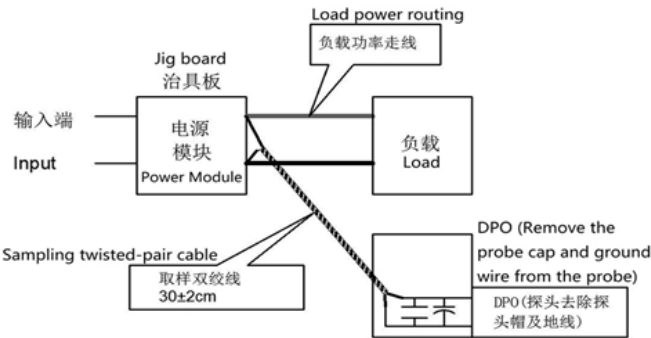
Ripple & Noise Testing: (Twisted-pair method, 20 MHz bandwidth)

Test Method:

1. For ripple and noise testing, use a Category 12 twisted-pair cable. Set the oscilloscope bandwidth to 20 MHz and use a 100 MHz bandwidth probe. Connect a 0.1 μ F polypropylene capacitor and a 4.7 μ F high-frequency, low-impedance electrolytic capacitor in parallel at the probe tip. Set the oscilloscope to “Sample” mode.

2. Schematic diagram for output ripple and noise testing:

Connect the power supply input to the power source. Connect the power supply output to the electronic load via the fixture board. For testing, use a 30 cm $\pm$ 2 cm sampling lead to take a direct sample from the power supply output port. Select insulated wires with appropriate gauge based on the magnitude of the output current.



Application Precautions

1. Input Requirements: Ensure that the output voltage fluctuation range of the power supply does not exceed the input requirements of the DC/DC module itself; the output power of the input power supply must be greater than the output power of the DC/DC module.
2. Recommended Circuit 1: For applications with general ripple and noise requirements, a filter capacitor can be connected in parallel at both the input and output terminals. The external circuit is shown in Figure (1) below; refer to Table (1). Output Load Requirements: Avoid operating under no-load conditions whenever possible. When the actual power consumption of the load is less than 10% of the module's rated output power or no-load conditions occur, it is recommended to connect a dummy load to the output. The dummy load (resistor) can be calculated based on 5 - 10% of the module's rated power, where the resistance value = $U_{out} / (1W \times R3 \times 10\%)$;
3. Overload Protection: Under normal operating conditions, the product's output circuit does not provide overload protection. Prolonged overload will trigger over-temperature protection, causing the output to shut down;
4. The output features continuous short-circuit protection with automatic recovery.
5. The capacitance of the external capacitor connected to the output should not be too large, as this may cause overcurrent or poor startup during module startup;
6. If the product operates below the minimum required load, performance compliance with all specifications in this manual cannot be guaranteed;
7. Maximum capacitive loads are tested within the input voltage range and under full-load conditions;
8. Unless otherwise specified, all specifications in this manual are measured at $T_a=25^{\circ}C$, humidity <75% RH, nominal input voltage, and rated output load;
9. All test methods for the specifications in this manual are based on our company's standards;
10. We offer product customization; please contact our technical staff directly for details;
11. Product specifications are subject to change without notice.

Contact

GDHUIZHI®

广东汇智电子技术有限公司

Guangdong Huizhi Electronic Technology Co., Ltd.

地址: 广东省肇庆市端州区 11 区肇庆大道北侧厂房、办公楼(二期)3 楼

Add.: 3rd floor, factory and office building (phase II) on the north side of Zhaoqing Avenue,
District 11, Duanzhou District, Zhaoqing City, Guangdong Province, China

Homepage: www.huizhi-elec.com/www.chinaebizal.com

Tel: +86 - 758 - 2566 585

E-mail: sales@huizhi-elec.com

GDHUIZHI