1W isolated DC-DC converter
Fixed input voltage, unregulated single output

Continuous Short Circuit Protection

RoHS Patent Protection

CE Report EN62368-1

UKCA Report BS EN62368-1

CB IEC 62368-1

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%
- Compact SMD package
- I/O isolation test voltage: 3k VDC
- Industry standard pin-out

F_XT-1WR3(-TR) series are specially designed for applications where an isolated voltage is required in a distributed power supply system. They are suitable for: pure digital circuits, low frequency analog circuits, relay-driven circuits and 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.		
--	F0303XT-1WR3	3.3 (2.97-3.63)	3.3	303/30	73/77	2400
	F0305XT-1WR3		5	200/20	78/82	2400
	F0309XT-1WR3		9	111/11	80/84	1000
	F0312XT-1WR3		12	83/8	80/84	560
	F0315XT-1WR3		15	67/7	80/84	560
	F0324XT-1WR3		24	42/4	80/84	220
EN/BS EN/IEC	F0503XT-1WR3	5 (4.5-5.5)	3.3	303/30	70/74	2400
	F0505XT-1WR3		5	200/20	78/82	2400
	F0509XT-1WR3		9	111/12	79/83	1000
	F0512XT-1WR3		12	84/9	79/83	560
	F0515XT-1WR3		15	67/7	79/83	560
	F0524XT-1WR3		24	42/4	81/85	220
EN/BS EN	F0503XT-1WR3-TR	5 (4.5-5.5)	3.3	303/30	70/74	2400
	F0505XT-1WR3-TR		5	200/20	78/82	2400
	F0509XT-1WR3-TR		9	111/12	79/83	1000
	F0512XT-1WR3-TR		12	84/9	79/83	560
	F0515XT-1WR3-TR		15	67/7	79/83	560
	F0524XT-1WR3-TR		24	42/4	81/85	220
EN/BS EN	F1203XT-1WR3	12 (10.8-13.2)	3.3	303/30	72/76	2400
EN/BS EN/IEC	F1205XT-1WR3 (-TR)		5	200/20	78/82	2400
	F1209XT-1WR3 (-TR)		9	111/12	79/83	1000
	F1212XT-1WR3 (-TR)		12	84/9	79/83	560
	F1215XT-1WR3 (-TR)		15	67/7	79/83	560
	F1224XT-1WR3 (-TR)		24	42/4	81/85	220
	F1505XT-1WR3 (-TR)	15 (13.5-16.5)	5	200/20	78/82	2400
--	F1509XT-1WR3		9	111/12	78/82	1000
EN/BS EN/IEC	F1515XT-1WR3 (-TR)		15	67/7	79/83	560
EN/BS EN	F2403XT-1WR3	24 (21.6-26.4)	3.3	303/30	72/76	2400
EN/BS EN/IEC	F2405XT-1WR3 (-TR)		5	200/20	74/80	2400
	F2409XT-1WR3 (-TR)		9	111/12	74/80	1000

	F2412XT-1WR3 (-TR)		12	84/9	74/80	560
	F2415XT-1WR3 (-TR)		15	67/7	74/80	560
	F2424XT-1WR3 (-TR)		24	42/4	74/80	220

Input Specifications

Item	Operating 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/--	
		15VDC/24VDC output	--	241/18	254/--	
	12VDC input	3.3VDC	--	110/8	116/--	
		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 output	--	81/8	85/--	
	24VDC input	3.3VDC output	--	55/8	58/--	
		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	--	
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			
Note: * Refer to DC-DC Converter Application Notes for detailed description of reflected ripple current test method.						

Output Specifications

Item	Operating Conditions			Min.	Typ.	Max.	Unit
Voltage Accuracy				See output regulation curves (Fig. 1)			
Linear Regulation	Input voltage change: ±1%		3.3VDC output	--	--	±1.5	--
			Others	--	--	±1.2	
Load Regulation	10%-100% load	3.3VDC input	3.3VDC output	--	15	20	%
			5VDC output	--	10	15	
			9VDC/12VDC/15VDC output	--	8	15	
			24VDC output	--	6	15	
		5VDC input	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	
Load Regulation	10%-100% load	12VDC/15VDC/ 24VDC input	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 & Noise*	20MHz bandwidth	3.3VDC input		--	50	100	mVp-p
		5VDC/12VDC/15VDC/24VDC input	Other output	--	30	75	
			24VDC output	--	50	100	
Temperature Coefficient	Full load			--	±0.02	--	%/℃
Short-Circuit Protection				Continuous, self-recovery			
Note:* The "parallel cable" method is used for Ripple and Noise test, please refer to DC-DC Converter Application Notes for specific information.							

General Specifications

Item	Operating Conditions			Min.	Typ.	Max.	Unit
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	3.3VDC 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℃	5VDC input	3.3VDC output	--	25	--	
			Other output	--	15	--	
		Other input		--	25	--	
Storage Humidity	Non-condensing	5VDC input		--	--	95	%RH
		Other input		5	--	95	
Reflow Soldering Temperature*				Peak temp.≤245℃, maximum duration time≤60s over 217℃			
Vibration	3.3VDC/12VDC/15VDC/24VDC input			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	--	
		12VDC/15VDC/24VDC input		--	260	--	
MTBF	MIL-HDBK-217F@25℃			3500	--	--	k hours
Moisture Sensitivity Level (MSL)	IPC/JEDEC J-STD-020D.1			Level 1			
Note: *Please refer to IPC/JEDEC J-STD-020D.1.							

Mechanical Specifications

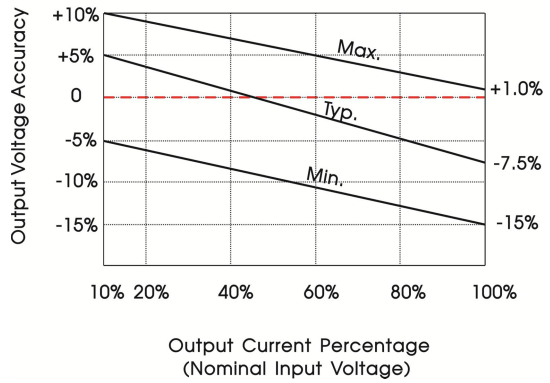
Case Material	Black plastic; flame-retardant and heat-resistant (UL94V-0)
Dimensions	13.20 x 11.40 x 7.25 mm
Weight	1.4g(Typ.)
Cooling Method	Free air convection

Electromagnetic Compatibility

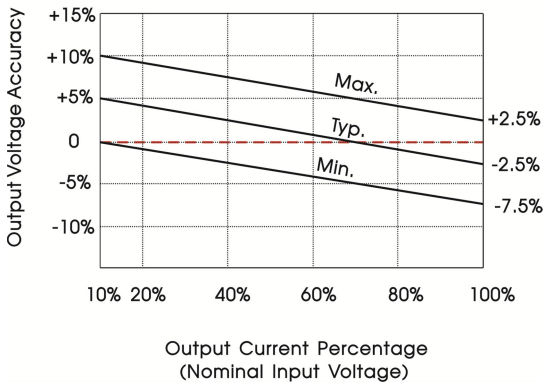
Emissions	CE		CISPR32/EN55032	CLASS B	
	RE		CISPR32/EN55032	CLASS B	
Immunity	ESD	5VDC input	IEC/EN61000-4-2	Air ±8kV, Contact ±4kV	perf. Criteria B
		other input	IEC/EN61000-4-2	Air ±8kV, Contact ±6kV	perf. Criteria B
Note: Refer to Fig. 4 for recommended circuit test.					

Typical Performance Curves

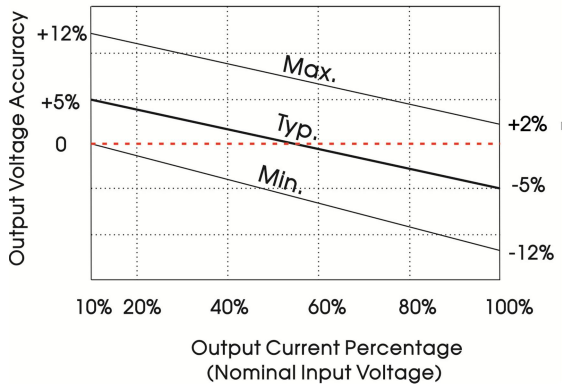
3.3V input 3.3V output
Output Regulation Curve



3.3V/5V input Other output
Output Regulation Curve



5V/12V/24V input 3.3V output
Output Regulation Curve



12V/15V/24V input Other output
Output Regulation Curve

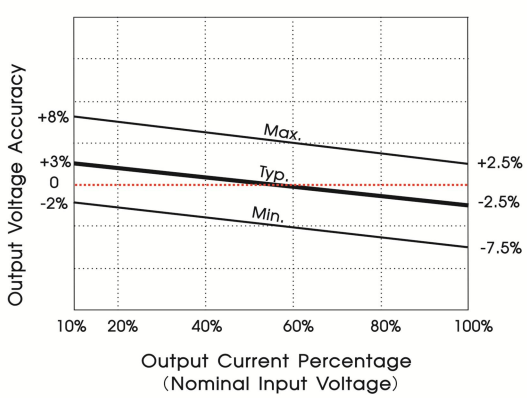
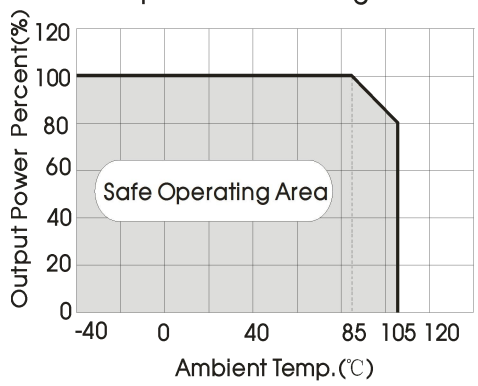


Fig. 1

3.3V input
Temperature Derating Curve



Other input
Temperature Derating Curve

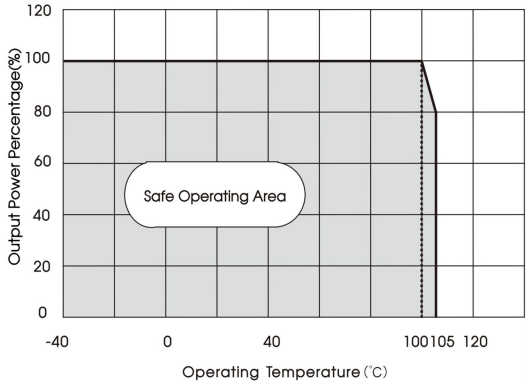
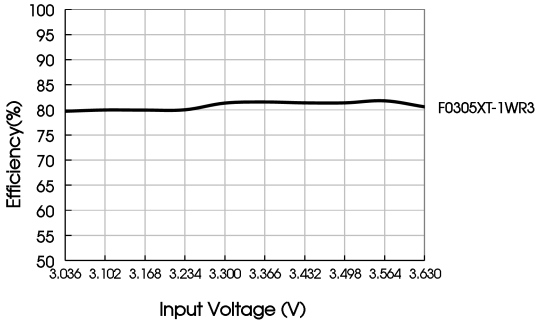
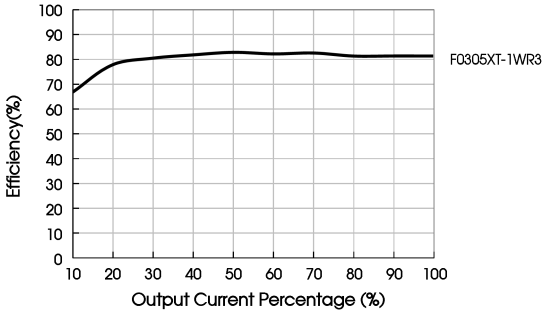


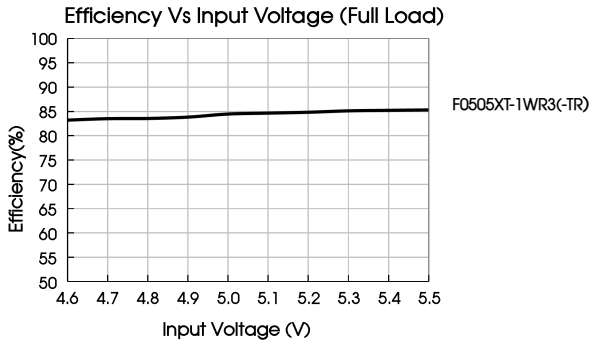
Fig. 2

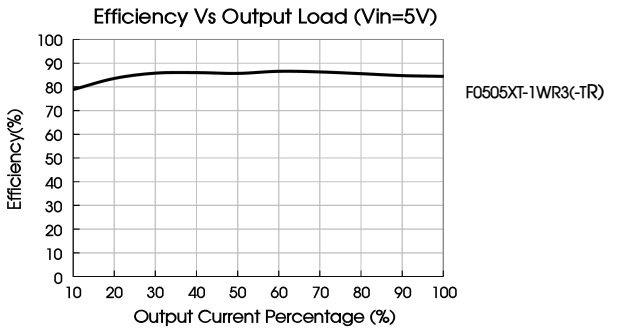
Efficiency Vs Input Voltage (Full Load)

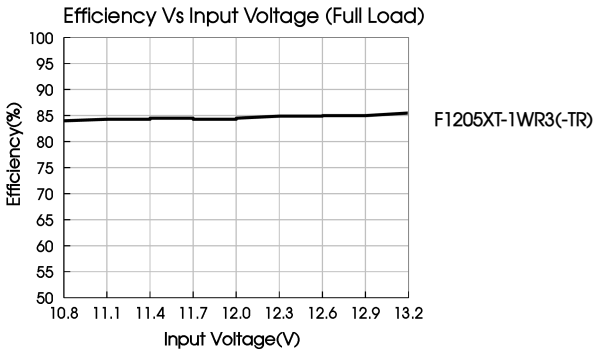


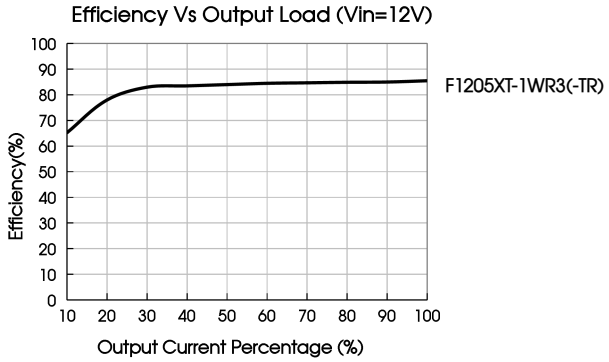
Efficiency Vs Output Load(Vin=3.3V)

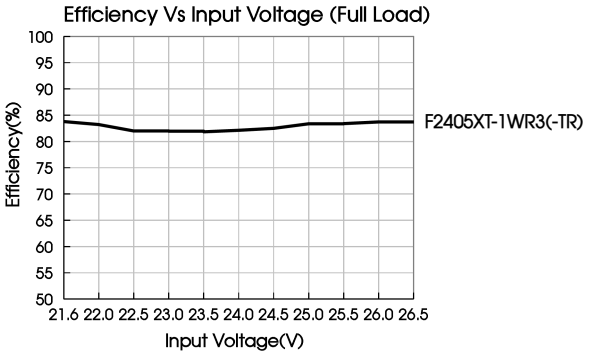


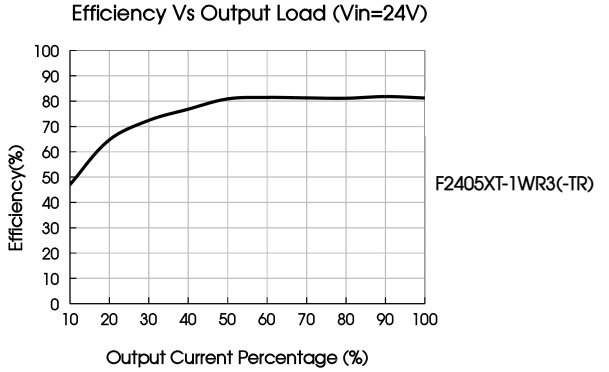












Design Reference

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.

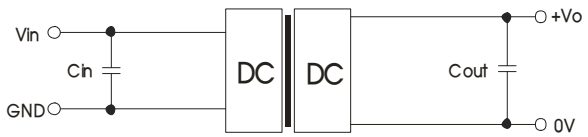


Fig. 3

Table2:Recommended input and output capacitor values

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

2. EMC compliance circuit

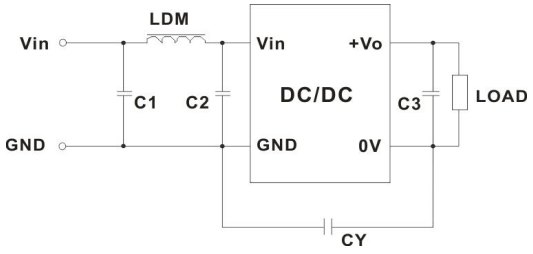


Fig. 4

Table2: EMC recommended circuit value table

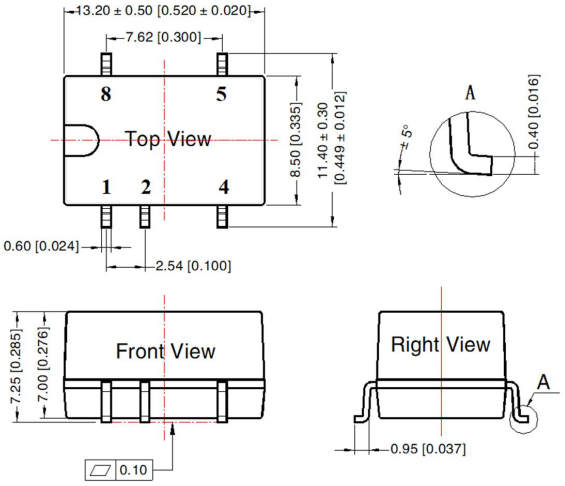
Input voltage		3.3VDC Input	5VDC Input		12/15/24VDC Input
Output voltage		--	3.3/5/9VDC	12/15/24VDC	--
EMI	C1, C2	4.7μF/16V	4.7μF/25V		4.7μF/50V
	CY	270pF/4kV	100pF/4kV	1000pF/4kV	270pF/4kV
	C3	Refer to the Cout in table 1			
	LDM	6.8μH			

Note: In the case of actual use, the requirements for EMI are high, it is subject to CY.

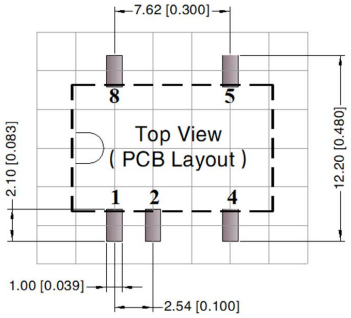
3. For additional information please refer to DC-DC converter application notes on www.mornsun-power.com

Dimensions and Recommended Layout

THIRD ANGLE PROJECTION



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

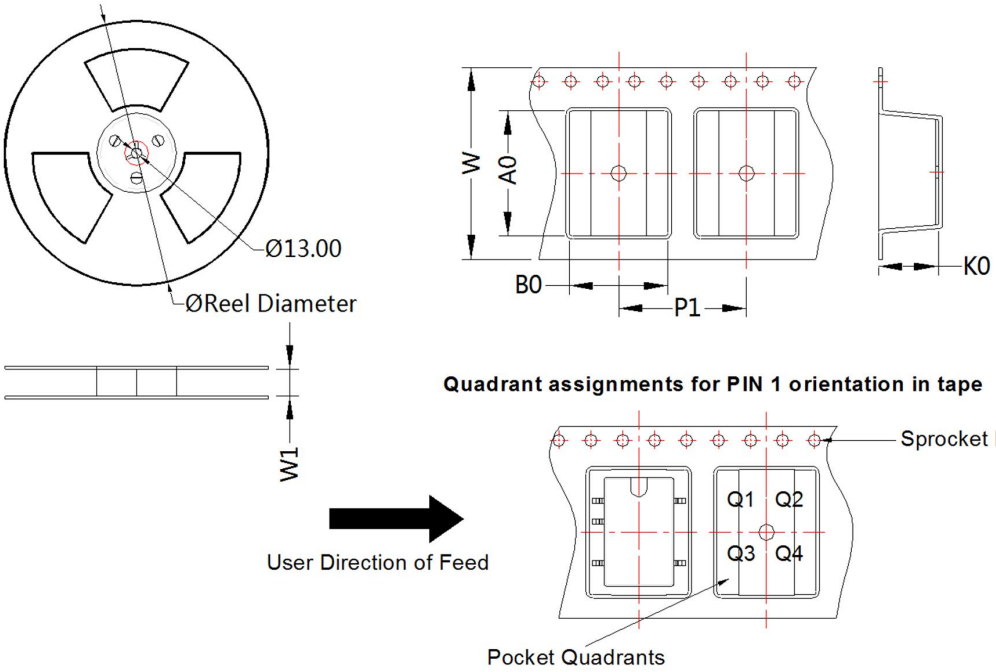


Note: Grid 2.54*2.54mm

Pin–Out	
Pin	Mark
1	GND
2	Vin
4	0V
5	+Vo
8	NC

NC: Pin to be isolated from circuitry

Tape and Reel Info



Device	Package Type	Pin	SPQ	Reel Diameter (mm)	Reel Width W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P1 (mm)	W (mm)	Pin1 Quadrant
F_XT-1WR3(-TR)	SMD	5	500	330.0	24.5	13.4	11.7	7.5	16.0	24.0	Q1

Notes:

1. For additional information on Product Packaging please refer to www.mornsun-power.com. Tube Packaging bag number: 58210024, Roll Packaging bag number: 58200054;
2. 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;
3. The maximum capacitive load offered were tested at input voltage range and full load;
4. 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;
5. All index testing methods in this datasheet are based on our company corporate standards;
6. We can provide product customization service, please contact our technicians directly for specific information;
7. Products are related to laws and regulations: see "Features" and "EMC";
8. Our products shall be classified according to ISO14001 and related environmental laws and regulations, and shall be handled by qualified units.

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