DC/DC Converter

A_XT-1WR3-(TR) Series

MORNSUN®

1W isolated DC-DC converter

Fixed input voltage, unregulated dual output

Continuous Short Circuit Protection

CE Report EN 62368-1

UKCA Report BS EN 62368-1

CB IEC 62368-1

RoHS

Patent Protection

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: 1.5k VDC
- Industry standard pin-out

A_XT-1WR3(-TR) series are specially designed for applications where two 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.		
EN/BS EN	A0303XT-1WR3	3.3 (2.97-3.63)	±3.3	±152/±15	73/77	1200
	A0305XT-1WR3		±5	±100/±10	78/82	1200
	A0309XT-1WR3		±9	±56/±5	78/82	470
	A0312XT-1WR3		±12	±42/±5	78/82	220
	A0315XT-1WR3		±15	±34/±4	78/82	220
	A0324XT-1WR3		±24	±21/±2	80/84	100
--	A0503XT-1WR3	5 (4.5-5.5)	±3.3	±152/±15	70/74	1200
EN/BS EN/IEC	A0505XT-1WR3		±5	±100/±10	78/82	1200
	A0509XT-1WR3		±9	±56/±6	79/83	470
	A0512XT-1WR3		±12	±42/±5	79/83	220
	A0515XT-1WR3		±15	±34/±4	79/83	220
	A0524XT-1WR3		±24	±21/±3	81/85	100
EN/BS EN	A0505XT-1WR3-TR		±5	±100/±10	78/82	1200
	A0509XT-1WR3-TR		±9	±56/±6	79/83	470
	A0512XT-1WR3-TR		±12	±42/±5	79/83	220
	A0515XT-1WR3-TR		±15	±34/±4	79/83	220
	A0524XT-1WR3-TR		±24	±21/±3	81/85	100
EN/BS EN/IEC	A1205XT-1WR3(-TR)	12 (10.8-13.2)	±5	±100/±10	78/82	1200
--	A12Y7XT-1WR3		±7.5	±67/±7	78/82	470
EN/BS EN/IEC	A1209XT-1WR3(-TR)		±9	±56/±6	79/83	470
	A1212XT-1WR3(-TR)		±12	±42/±5	79/83	220
	A1215XT-1WR3(-TR)		±15	±34/±4	79/83	220
	A1224XT-1WR3(-TR)		±24	±21/±3	81/85	100
	A1515XT-1WR3(-TR)	15 (13.5-16.5)	±15	±34/±4	79/83	220
	A2405XT-1WR3(-TR)	24 (21.6-26.4)	±5	±100/±10	76/82	1200
	A2409XT-1WR3(-TR)		±9	±56/±6	77/83	470
	A2412XT-1WR3(-TR)		±12	±42/±5	77/83	220
	A2415XT-1WR3(-TR)		±15	±34/±4	77/83	220
	A2424XT-1WR3(-TR)		±24	±21/±3	79/85	100

Note: * The specified maximum capacitive load for positive and negative output is identical.

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/9VDC/12VDC/15VDC output	--	370/12	389/--	
		24VDC output	--	361/12	379/--	
	5VDC input	3.3VDC output	--	270/8	286/--	
		5VDC output	--	244/8	257/--	
		9VDC/12VDC output	--	241/12	254/--	
		15VDC/24VDC output	--	241/18	254/--	
	12V input	5VDC/7.5VDC output	--	102/8	107/--	
		9VDC/12VDC/15VDC output	--	101/8	106/--	
		24VDC output	--	99/8	103/--	
	15V input		--	81/8	85/--	
	24V input	5VDC/9VDC/12VDC/15VDC output	--	51/8	55/--	
		24VDC output	--	50/8	53/--	
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%	3.3/5VDC input	3.3VDC output	--	--	±1.5	--
			Other output	--	--	±1.2	
		Other input		--	--	±1.2	
Load Regulation	10%-100% load	3.3VDC input	3.3VDC output	--	15	20	%
			5VDC/9VDC/12VDC/15VDC/24VDC output	--	10	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	
		12/15/24 VDC input	5VDC output	--	5	15	
			7.5VDC 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
		Other 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.			1500	--	--	VDC
Insulation Resistance	Input-output resistance at 500VDC			1000	--	--	MΩ
Isolation Capacitance	Input-output capacitance at 100kHz/0.1V			--	20	--	pF
Operating Temperature	3.3VDC input	Derating when operating temperature≥85℃, (see Fig. 2)		-40	--	105	℃
	Other input	Derating when operating temperature≥100℃, (see Fig. 2)		-40	--	105	
Storage Temperature				-55	--	125	
Case Temperature Rise	Ta=25℃	5VDC input	3.3VDC input	--	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				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	--	
		12/15/24VDC input		--	260	--	
MTBF	MIL-HDBK-217F@25℃			3500	--	--	k hours
Moisture Sensitivity Level (MSL)	IPC/JEDEC J-STD-020D.1			Level 1			
Note: * For actual application, please refer to IPC/JEDEC J-STD-020D.1.							

Mechanical Specifications

Case Material	Black plastic; flame-retardant and heat-resistant (UL94V-0)
Dimensions	15.24 x 11.40 x 7.25 mm
Weight	1.4g(Typ.)
Cooling Method	Free air convection

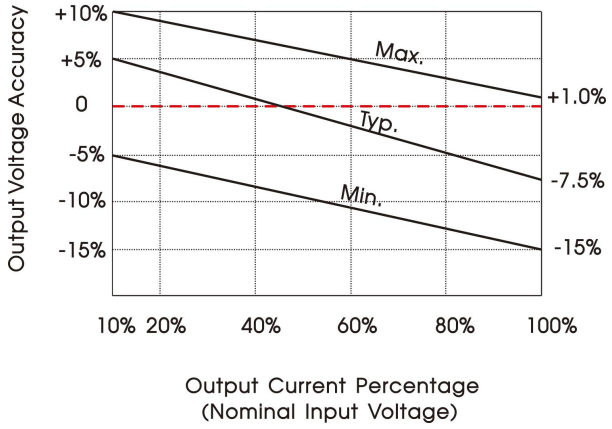
Electromagnetic Compatibility (EMC)

Emissions	CE		CISPR32/EN55032	CLASS B
Emissions	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.5 for recommended circuit test.				

Typical Performance Curves

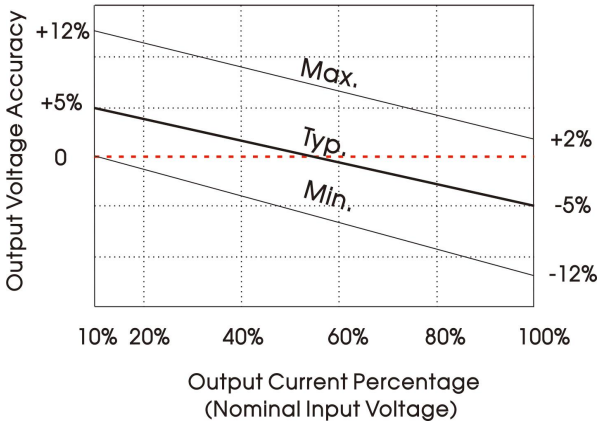
3.3VDC input 3.3VDC output

Output Regulation Curve



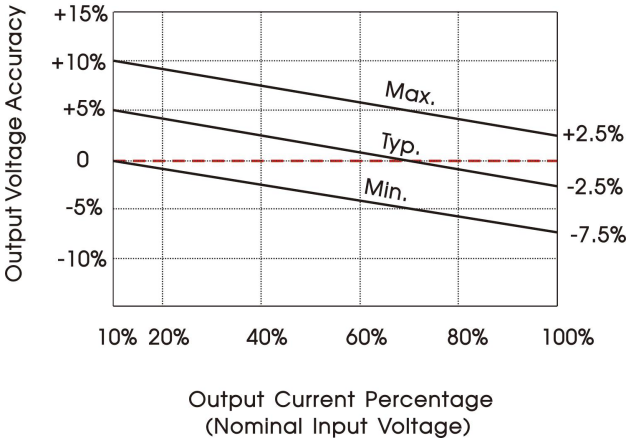
5VDC input 3.3VDC output

Output Regulation Curve



3.3/5VDC input 5VDC/9VDC/12VDC/15VDC/24VDC output

Output Regulation Curve



12/15/24VDC input

Output Regulation Curve

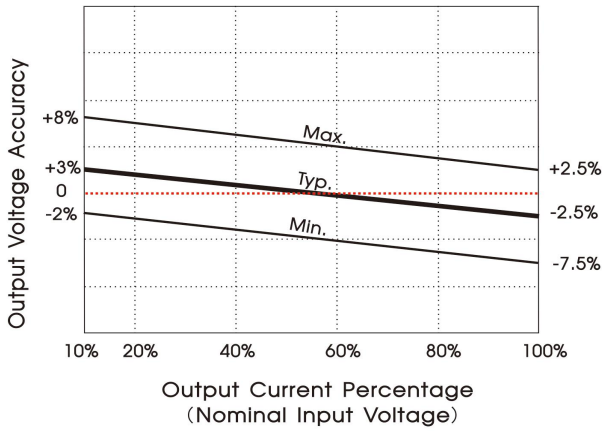
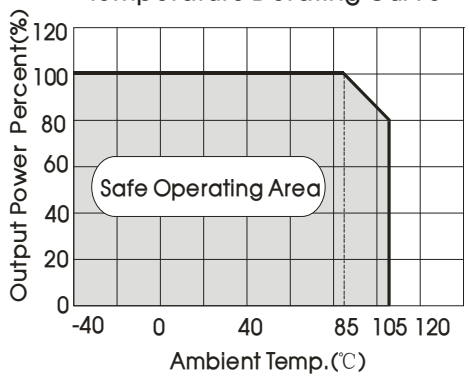


Fig. 1

3.3VDC input

Temperature Derating Curve



5/12/15/24VDC input

Temperature Derating Curve

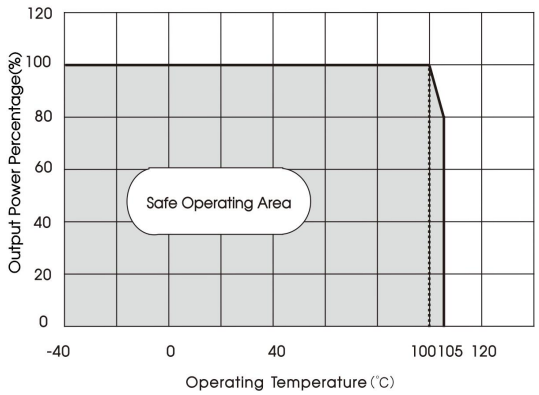
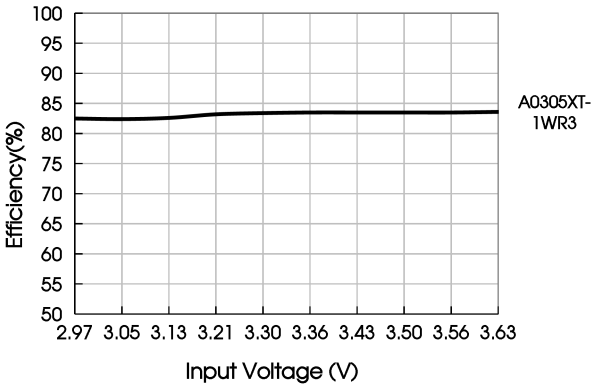
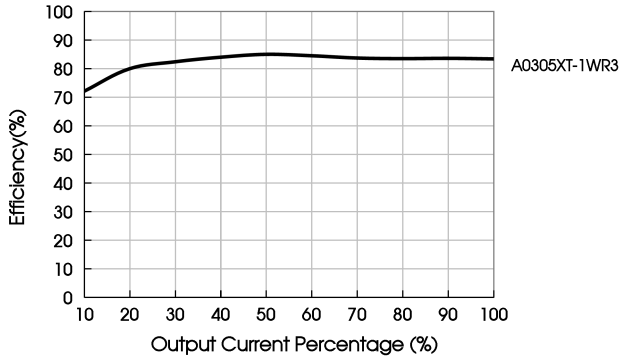


Fig. 2

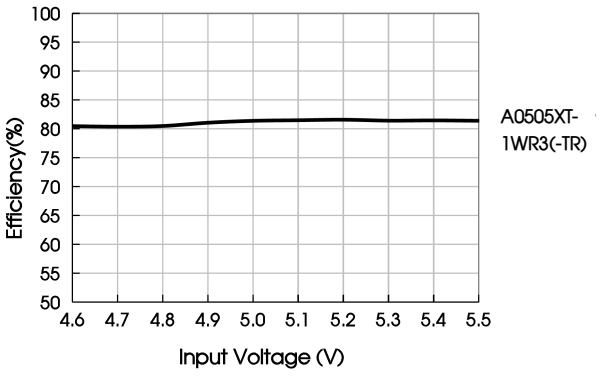
Efficiency Vs Input Voltage (Full Load)



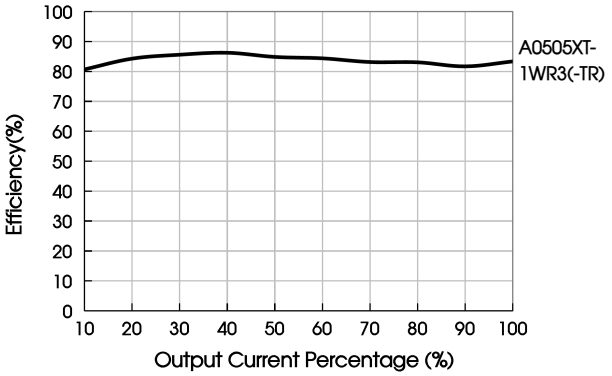
Efficiency Vs Output Load(Vin=3.3V)



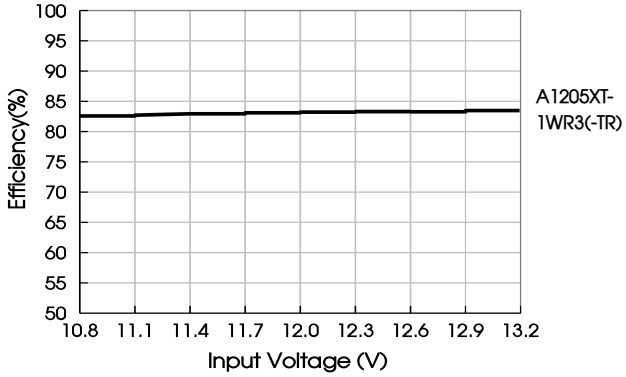
Efficiency Vs Input Voltage (Full Load)



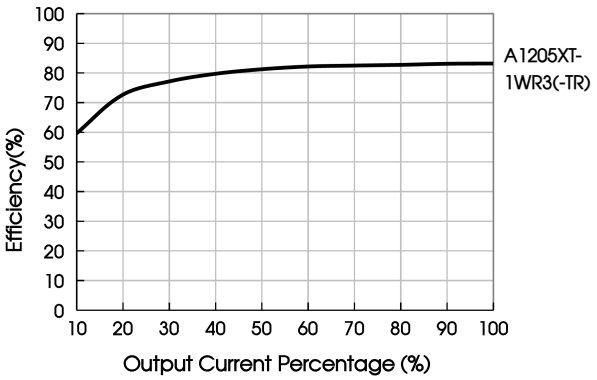
Efficiency Vs Output Load (Vin=5V)



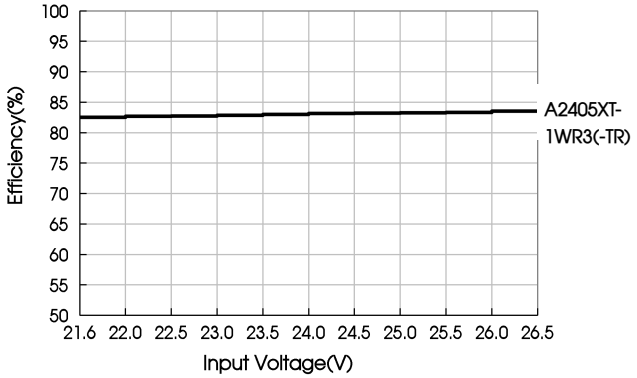
Efficiency Vs Input Voltage (Full Load)



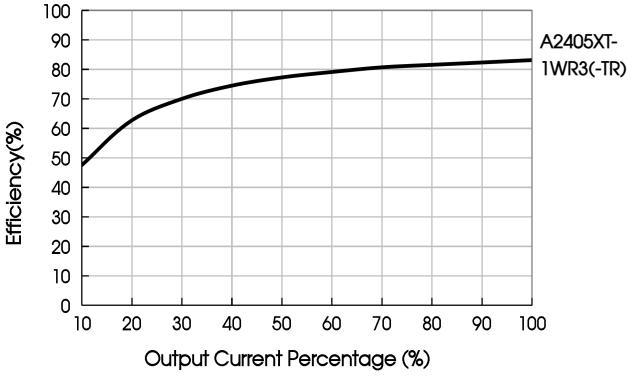
Efficiency Vs Output Load (Vin=12V)



Efficiency Vs Input Voltage (Full Load)



Efficiency Vs Output Load (Vin=24V)



Design Reference

1. Typical application circuit

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.

The simplest device for output voltage regulation, over-voltage and over-current protection is a linear voltage regulator with overheat protection that is connected to the input or output end in series (see Fig. 4).

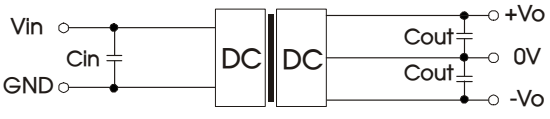


Fig. 3

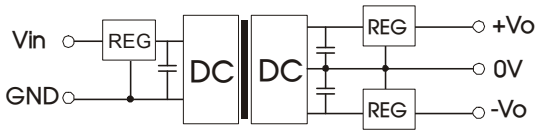
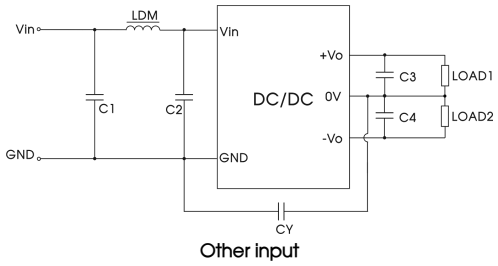


Fig.4

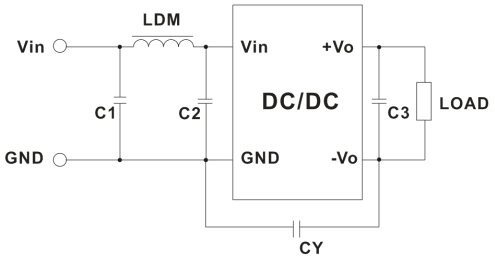
Table 1: Recommended input and output capacitor values

Vin	Cin	Vo	Cout
3.3VDC	10μF/16V	±3.3VDC	10μF/16V
5VDC	4.7μF/16V	±5VDC	4.7μF/16V
12VDC	2.2μF/25V	±7.5VDC	1μF/16V
15VDC	2.2μF/25V	±9VDC	1μF/16V
24VDC	1μF/50V	±12VDC	1μF/25V
--	--	±15VDC	0.47μF/25V
--	--	±24VDC	0.47μF/50V

2. EMC compliance circuit



Other input



5V input

Fig. 5

Table 2: EMC recommended circuit value table

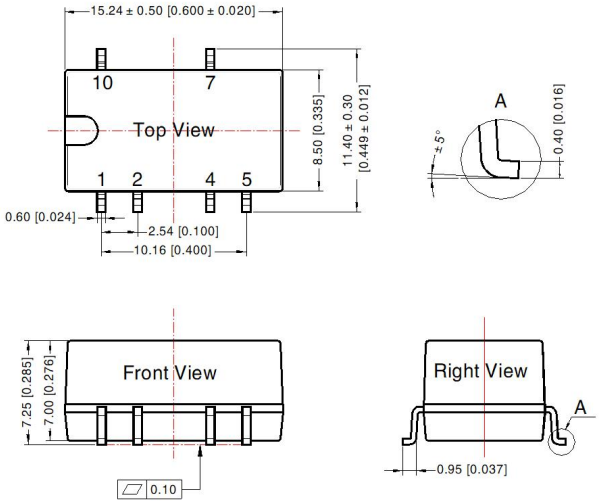
Input voltage		3.3VDC input	5VDC input		12/15/24VDC input
output voltage		--	3.3/5/9VDC	12/15/24VDC	--
Emissions	C1/C2	4.7μF/16V	4.7μF /25V	4.7μF /25V	4.7μF /50V
	CY	270pF/2kV	47pF/2kV	1nF /2kVDC	270pF /2kV
	C3/C4	Refer to the Cout in table 1			
	LDM	6.8μH			

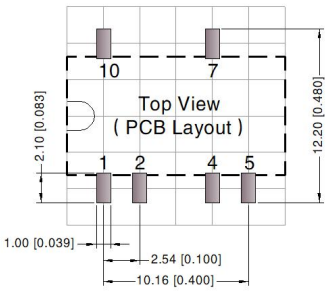
Note: In the case of actual use, the requirements for EMI are high, it is subject to CY.

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

Dimensions and Recommended Layout

THIRD ANGLE PROJECTION





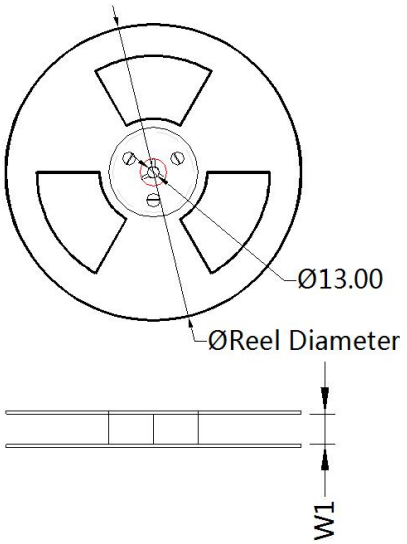
Note: Grid 2.54*2.54mm

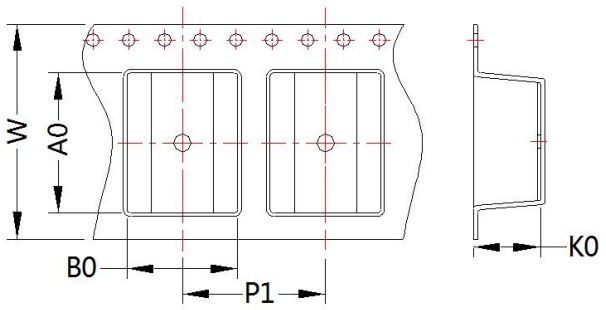
Pin–Out	
Pin	Mark
1	GND
2	Vin
4	0V
5	–Vo
7	+Vo
10	NC

NC: Pin to be isolated from circuitry

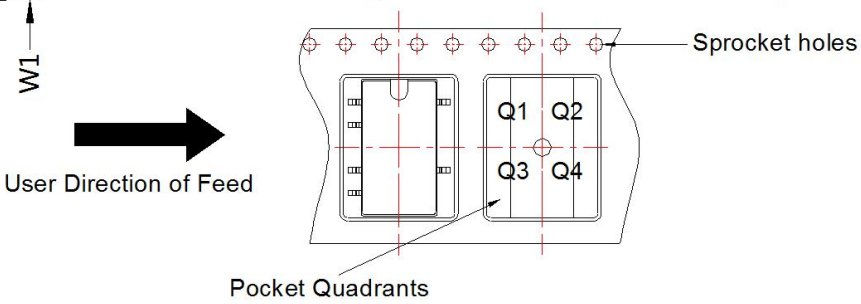
Note:
Unit: mm[inch]
Pin section tolerances: ± 0.10[± 0.004]
General tolerances: ± 0.25[± 0.010]

Tape and Reel Info





Quadrant assignments for PIN 1 orientation in tape



Device	Package Type	Pin	SPQ	Reel Diameter (mm)	Reel Width W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P1 (mm)	W (mm)	Pin1 Quadrant
A_XT-1WR3(-TR)	SMD	6	500	330.0	24.5	15.64	12.4	7.45	16.0	24.0	Q1

Notes:

1. For additional information on Product Packaging please refer to www.mornsun-power.com. Tube Packaging bag number: 58210023, Roll Packaging bag number: 58210034;
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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