

DC/DC Converter

E_XT-1WR3(-TR) Series

MORNSUN®

1W Isolated DC-DC converter
Fixed input voltage, unregulated dual output



CE Report EN62368-1 UK CA Report BS EN62368-1 CB RoHS IEC 62368-1 Patent Protection

FEATURES

- Continuous short-circuit protection
- No-load input current as low as 8mA
- Operating ambient temperature range: -40°C to +105°C
- High efficiency up to 85%
- Compact SMD package
- I/O isolation test voltage: 3k VDC
- Industry standard pin-out

E_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.				
-	E0303XT-1WR3	3.3 (2.97-3.63)	±3.3	±152/±15	73/77	1200		
	E0305XT-1WR3		±5	±100/±10	78/82	1200		
	E0309XT-1WR3		±9	±56/±5	78/82	470		
	E0312XT-1WR3		±12	±42/±5	78/82	220		
	E0315XT-1WR3		±15	±34/±4	78/82	220		
	E0324XT-1WR3		±24	±21/±2	80/84	100		
	E0503XT-1WR3		±3.3	±152/±15	70/74	1200		
EN/BS EN/IEC	E0505XT-1WR3	5 (4.5-5.5)	±5	±100/±10	78/82	1200		
	E0509XT-1WR3		±9	±56/±6	79/83	470		
	E0512XT-1WR3		±12	±42/±5	79/83	220		
	E0515XT-1WR3		±15	±34/±4	79/83	220		
	E0524XT-1WR3		±24	±21/±3	81/85	100		
EN/BS EN	E0505XT-1WR3-TR	5 (4.5-5.5)	±5	±100/±10	78/82	1200		
	E0509XT-1WR3-TR		±9	±56/±6	79/83	470		
	E0512XT-1WR3-TR		±12	±42/±5	79/83	220		
	E0515XT-1WR3-TR		±15	±34/±4	79/83	220		
	E0524XT-1WR3-TR		±24	±21/±3	81/85	100		
EN/BS EN/IEC	E1205XT-1WR3	12 (10.8-13.2)	±5	±100/±10	78/82	1200		
-	E12Y7XT-1WR3(-TR)		±7.5	±67/±7	78/82	470		
	EN/BS EN/IEC		E1209XT-1WR3(-TR)	±9	±56/±6	79/83	470	
			E1212XT-1WR3(-TR)	±12	±42/±5	79/83	220	
			E1215XT-1WR3(-TR)	±15	±34/±4	79/83	220	
E1224XT-1WR3(-TR)			±24	±21/±3	81/85	100		
EN/BS EN/IEC	E1515XT-1WR3(-TR)		15 (13.5-16.5)	±15	±34/±4	79/83	220	
	EN/BS EN/IEC		24 (21.6-26.4)	E2405XT-1WR3(-TR)	±5	±100/±10	76/82	1200
				E2409XT-1WR3(-TR)	±9	±56/±6	77/83	470
				E2412XT-1WR3(-TR)	±12	±42/±5	77/83	220
				E2415XT-1WR3(-TR)	±15	±34/±4	77/83	220
	E2424XT-1WR3(-TR)		±24	±21/±3	79/85	100		

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

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Page 1 of 7

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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	--	270/5	286/--	
		5VDC output	--	244/5	257/--	
		9VDC/12VDC output	--	241/12	254/--	
		15VDC/24VDC output	--	241/18	254/--	
	12VDC input	±5VDC/±7.5VDC output	--	102/8	107/--	
		±9VDC/±12VDC/±15VDC output	--	101/8	106/--	
		±24VDC output	--	99/8	103/--	
15VDC input		--	81/8	85/--		
24VDC input	±5VDC/±9VDC/±12VDC/±15VDC output	--	51/8	55/--		
	±24VDC output	--	50/8	53/--		
Reflected Ripple Current*	3.3VDC input		--	30	--	
	5VDC/12VDC/15VDC/24VDC 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 input		3.3VDC output	--	--	±1.5	--
			Other output	--	--	±1.2	
Load Regulation	10%-100% load	3.3VDC input	3.3VDC output	--	15	20	%
			5/9/12/15/24VDC 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	
		12/15/24VDC input	±5/±7.5VDC output	--	5	15	%
			±9/±12/±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	--	%/°C	
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°C, (see Fig. 2)	-40	--	105	°C	
	Other input						Derating when operating temperature ≥ 100°C, (see Fig. 2)
Storage Temperature			-55	--	125		
Case Temperature Rise	Ta=25°C	5VDC input	3.3VDC output	--	25		--
			Others output	--	15		--
		Other input		--	25		--
Storage Humidity	Non-condensing	5VDC input	--	--	95	%RH	
		Other input	5	--	95		
Reflow Soldering Temperature*			Peak temp. ≤ 245°C, maximum duration time ≤ 60s over 217°C				
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°C		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

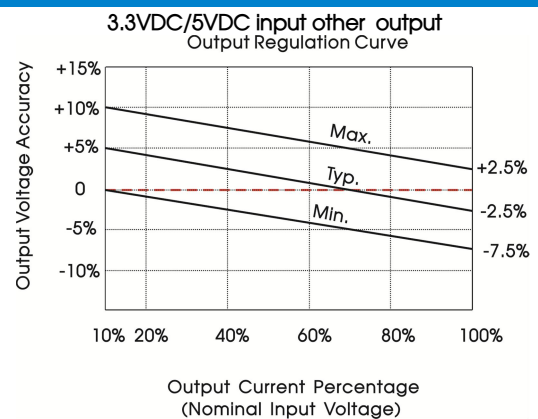
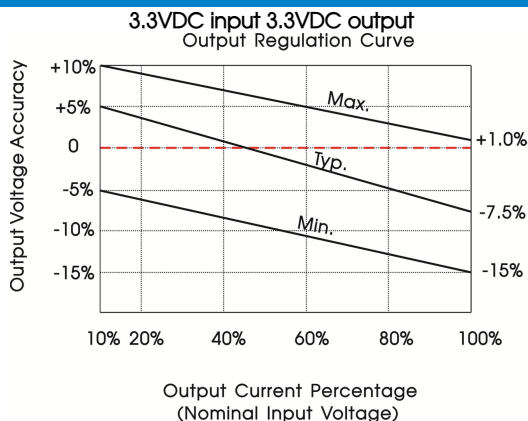
Case Material	Black plastic; flame-retardant and heat-resistant (UL94V-0)
Dimensions	15.24 x 11.40 x 7.25 mm
Weight	1.4g(Typ.)
Cooling Method	Free air convection

Electromagnetic Compatibility

Emissions	CE	CISPR32/EN55032 CLASS B
	RE	CISPR32/EN55032 CLASS B
Immunity	ESD	IEC/EN61000-4-2 Air ±8kV, Contact ±6kV perf. Criteria B

Note: Refer to Fig. 4 for recommended circuit test.

Typical Performance Curves



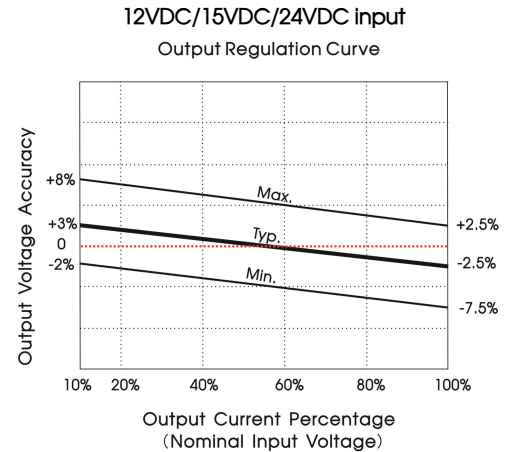
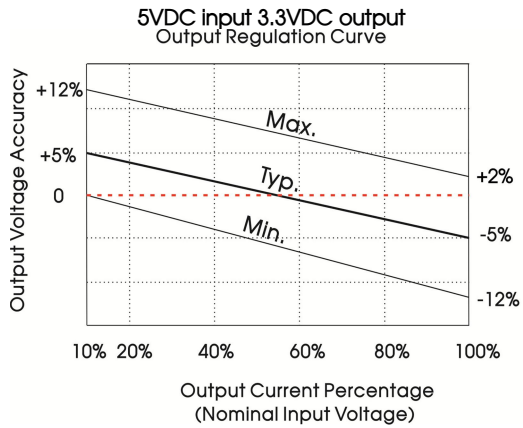


Fig. 1

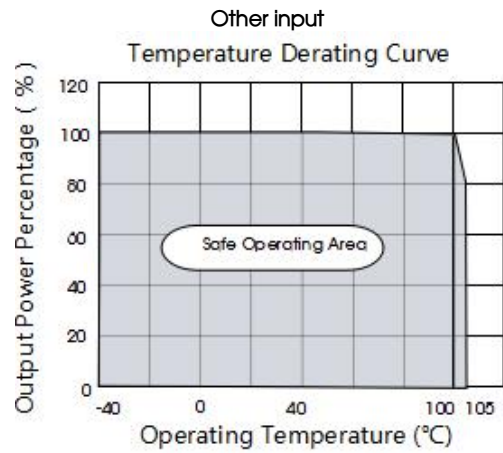
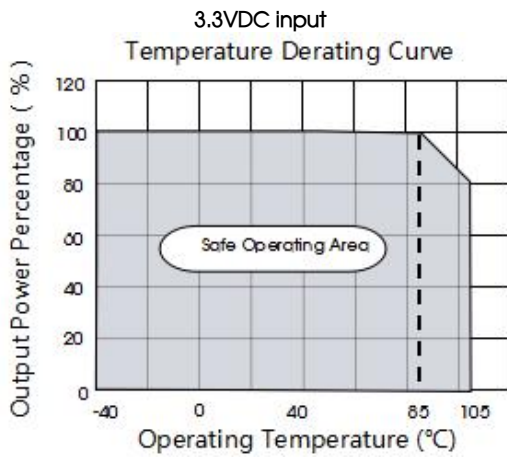
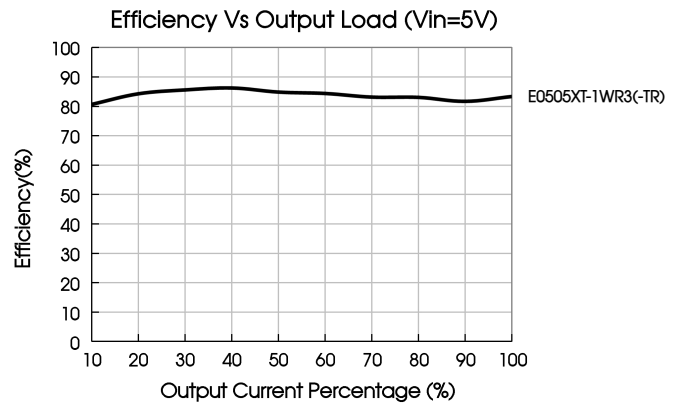
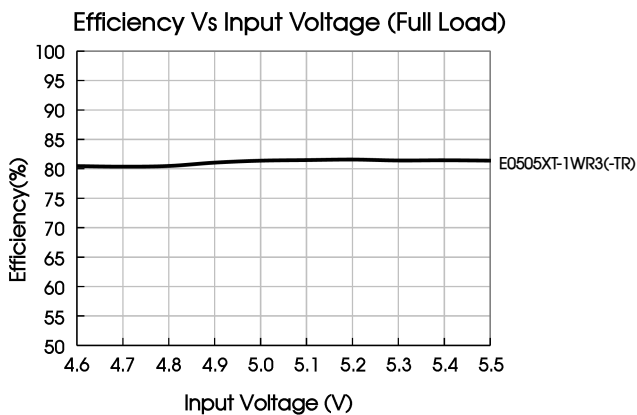
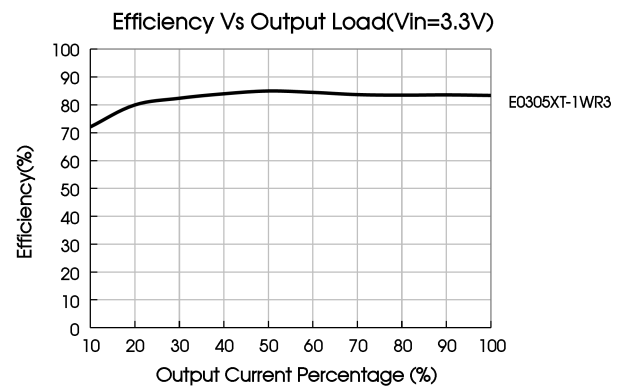
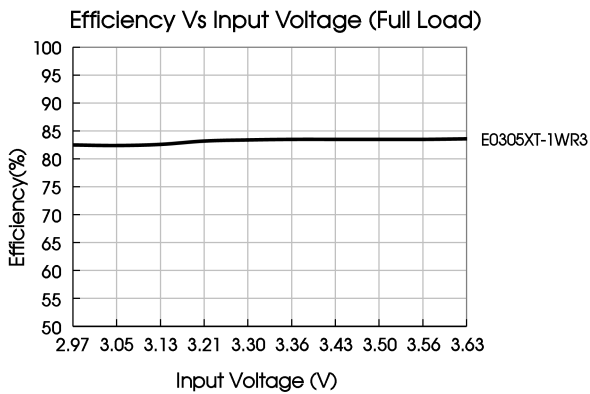
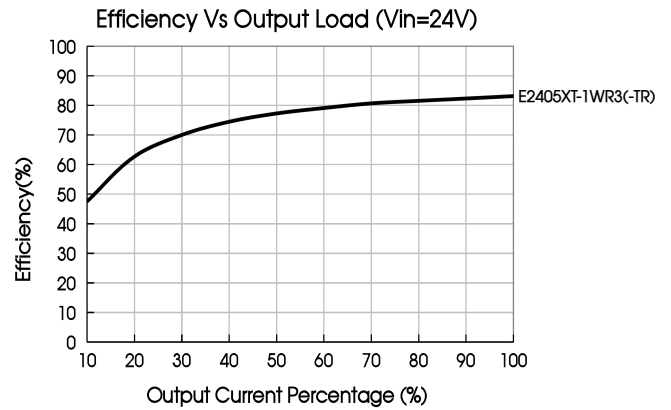
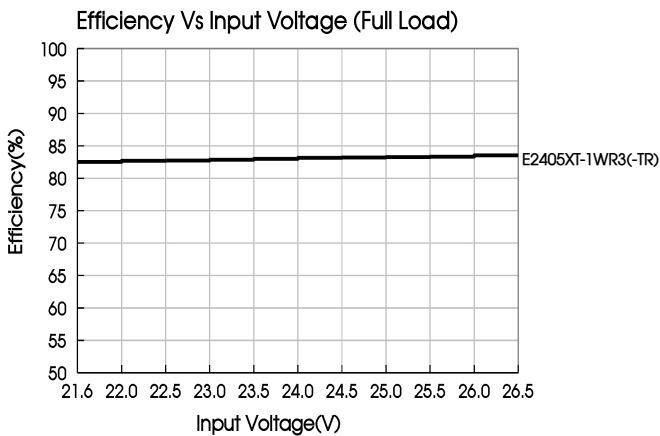
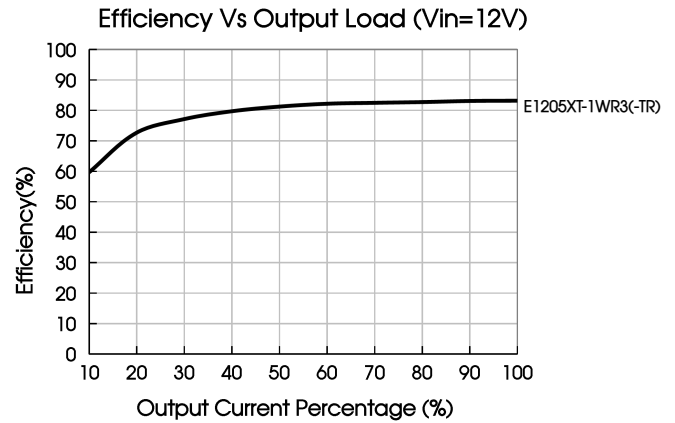
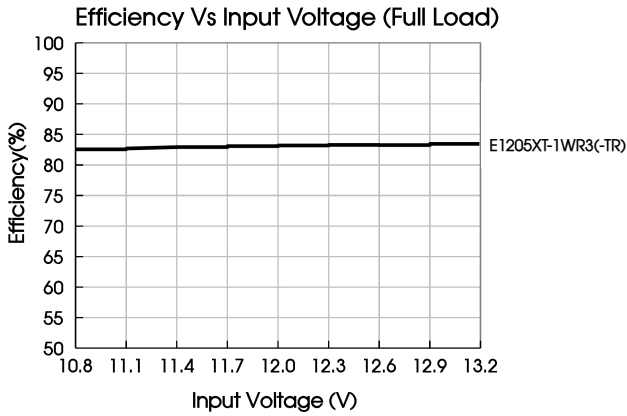


Fig. 2





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.

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

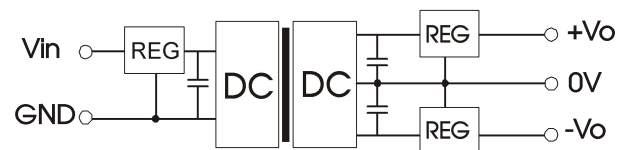


Fig. 4

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

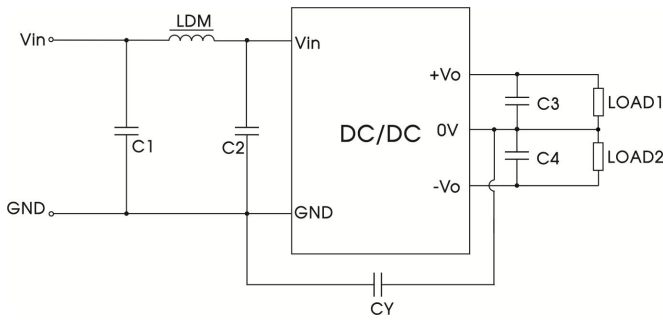


Fig. 5

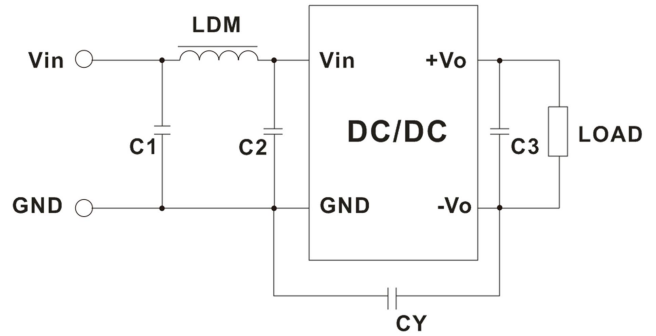


Fig. 6

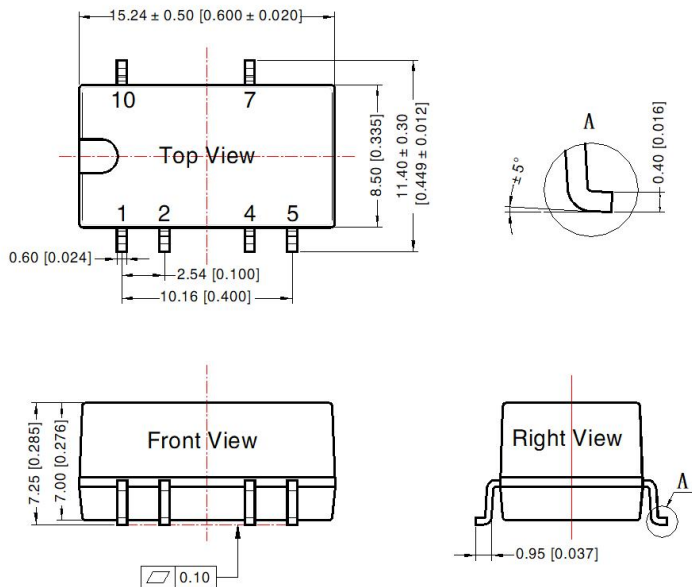
Table 2: EMC recommended circuit value table

Input voltage	Input voltage 3.3VDC	Input voltage 5VDC		Input voltage 12/15/24VDC
Output voltage	3.3/5/9/12/15/24VDC	3.3/5/9VDC	12/15/24VDC	5/7.5/9/12/15/24VDC
Emissions	C1, C2	4.7μF/25V		4.7μF/50V
	CY	270pF/4kV	100pF/4kV	1000pF/4kV
	C3	Refer to the Cout in table 1		
	LDM	6.8μH		

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

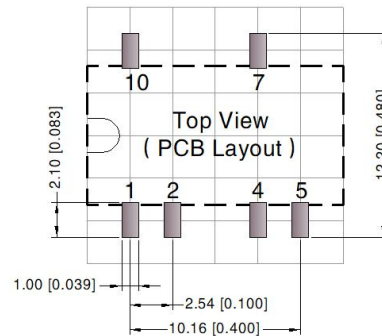
3. For additional information please refer to DC-DC converter application notes on www.mornsun-power.com

Dimensions and Recommended Layout



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

THIRD ANGLE PROJECTION

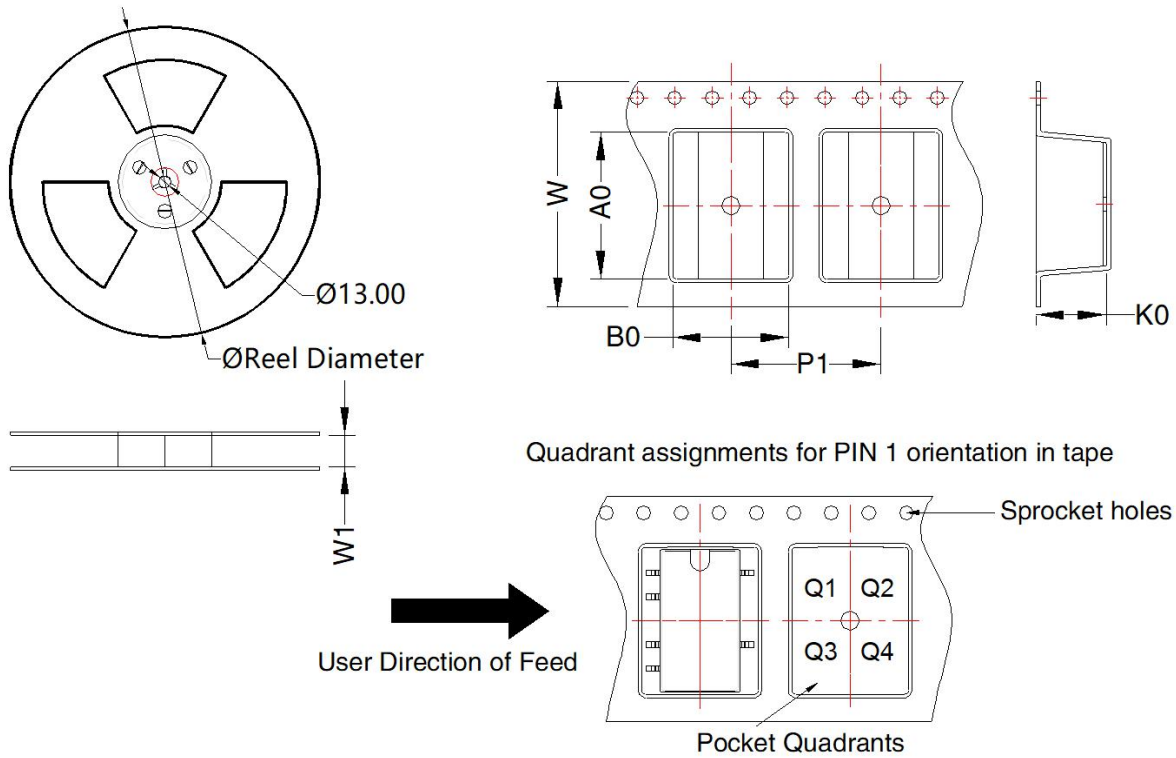


Note: Grid 2.54*2.54mm

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

NC: Pin to be isolated from circuitry

Tape and Reel Info



Device	Package Type	Pin	MPQ	Reel Diameter (mm)	Reel Width W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P1 (mm)	W (mm)	Pin1 Quadrant
E_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 $T_a=25^{\circ}\text{C}$, 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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