Descriptions

1W isolated, DC-DC Converter



RoHS

CE Report EN62368-1

UKCA Report BS EN62368-1

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

Applications

- Digit circuit
- General low frequency analog circuit
- Relay drive circuit
- Voltage isolation conversion

Selection Guide

Certification	Part No.	Input Voltage (VDC)	Output		Full Load Efficiency (%) Min./Typ.	Capacitive Load (μF) Max.①
		Nominal (Range)	Voltage(VDC)	Current (mA) Max./Min.		
EN/BS EN	DFXT1-E0303	3.3 (2.97-3.63)	±3.3	±152/±15	73/77	1200
	DFXT1-E0305		±5	±100/±10	78/82	1200
	DFXT1-E0309		±9	±56/±5	78/82	470
	DFXT1-E0312		±12	±42/±5	78/82	220
	DFXT1-E0315		±15	±34/±4	78/82	220
	DFXT1-E0324		±24	±21/±2	80/84	100
EN/BS EN	DFXT1-E0503	5 (4.5-5.5)	±3.3	±152/±15	70/74	1200
	DFXT1-E0505		±5	±100/±10	78/82	1200
--	DFXT1-E0505-TR					
EN/BS EN	DFXT1-E0509		±9	±56/±6	79/83	470
--	DFXT1-E0509-TR					
EN/BS EN	DFXT1-E0512		±12	±42/±5	79/83	220
--	DFXT1-E0512-TR					
EN/BS EN	DFXT1-E0515		±15	±34/±4	79/83	220
--	DFXT1-E0515-TR					
EN/BS EN	DFXT1-E0524		±24	±21/±3	81/85	100
--	DFXT1-E0524-TR					

EN/BS EN	DFXT1-E1205	12 (10.8-13.2)	±5	±100/±10	78/82	1200
--	DFXT1-E1205-TR					
--	DFXT1-E12Y7		±7.5	±67/±7	78/82	470
EN/BS EN	DFXT1-E1209		±9	±56/±6	79/83	470
--	DFXT1-E1209-TR					
EN/BS EN	DFXT1-E1212		±12	±42/±5	79/83	220
--	DFXT1-E1212-TR					
EN/BS EN	DFXT1-E1215		±15	±34/±4	79/83	220
--	DFXT1-E1215-TR					
EN/BS EN	DFXT1-E1224		±24	±21/±3	81/85	100
--	DFXT1-E1224-TR					
EN/BS EN	DFXT1-E1515	15 (13.5-16.5)	±15	±34/±4	79/83	220
--	DFXT1-E1515-TR					
EN/BS EN	DFXT1-E2405	24 (21.6-26.4)	±5	±100/±10	76/82	1200
--	DFXT1-E2405-TR					
EN/BS EN	DFXT1-E2409		±9	±56/±6	77/83	470
--	DFXT1-E2409-TR					
EN/BS EN	DFXT1-E2412		±12	±42/±5	77/83	220
--	DFXT1-E2412-TR					
EN/BS EN	DFXT1-E2415		±15	±34/±4	77/83	220
--	DFXT1-E2415-TR					
EN/BS EN	DFXT1-E2424		±24	±21/±3	79/85	100
--	DFXT1-E2424-TR					

Note:
①The specified maximum capacitive load for positive and negative output is identical;
②Product images are for reference only; the actual product shall prevail.

Specifications

Product Specifications	Item	Operating Conditions		Min.	Typ.	Max.	Unit
Input Specifications	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/--	
		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			
Output Specifications	Voltage Accuracy				See output regulation curves (Fig. 1)			
	Linear Regulation	Input voltage change: ±1%		3.3VDC output	--	--	1.5	--
				Other output	--	--	1.2	
	Load Regulation	10%-100% load	3.3VDC input	3.3VDC output	--	15	20	%
				Other 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	
			12/15/24VDC input	±5/±7.5VDC output	--	5	15	
				±9/±12/±15VDC output	--	3	10	
				±24VDC output	--	2	10	
	Ripple & Noise①	20MHz bandwidth	3.3VDC input		--	50	100	mVp-p
			Other input	Other output	--	30	75	
				24VDC output	--	50	100	
	Temperature Coefficient	100% load			--	±0.02	--	%/℃
	Short-circuit Protection				Continuous, self-recovery			
General Specifications	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	--	
				Others output	--	15	--	
			Other input		--	25	--	
	Storage Humidity	Non-condensing		5VDC input	--	--	95	%RH
				Other input	5	--	95	
	Reflow Soldering Temperature②				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/24 VDC input	--	260	--	
	MTBF	MIL-HDBK-217F@25℃		3500	--	--	k hours
	Moisture Sensitivity Level (MSL)	IPC/JEDEC J-STD-020D.1		Level 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					

Note:
①The "parallel cable" method is used for ripple and noise test.
②For actual application, please refer to IPC/JEDEC J-STD-020D.1.

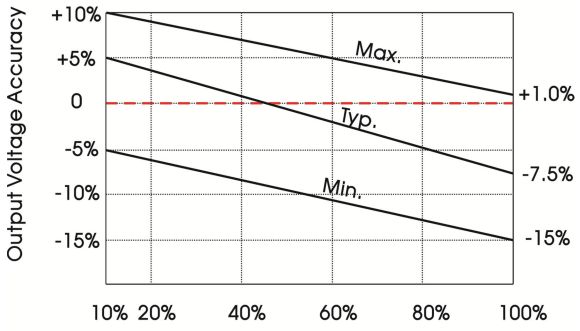
Electromagnetic Compatibility (EMC)

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

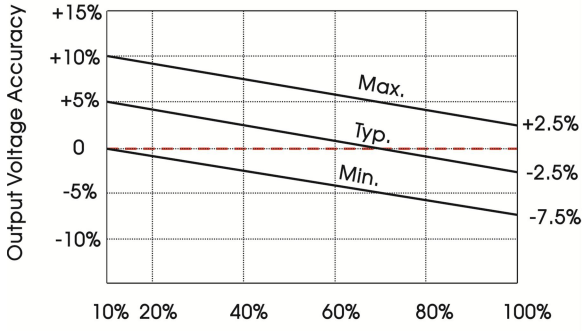
Note: 5V nominal input product refers to Figure 6 recommended circuit test; Other nominal input products refer to Figure 5 for recommended circuit testing.

Characteristic Curve

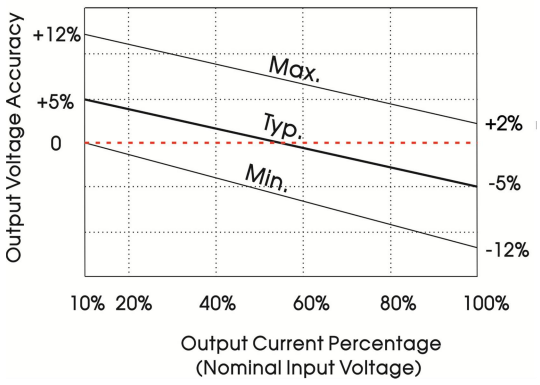
3.3VDC input 3.3VDC output
Output Regulation Curve



3.3VDC/5VDC input other output
Output Regulation Curve



5VDC input 3.3VDC output
Output Regulation Curve



12VDC/15VDC/24VDC input
Output Regulation Curve

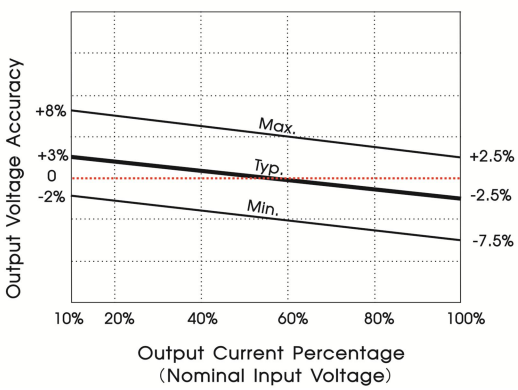
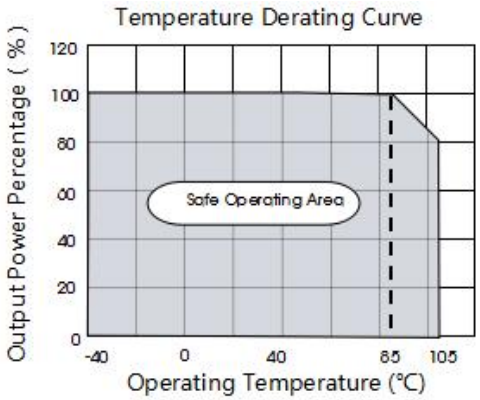


Fig. 1

3.3VDC input



Other input

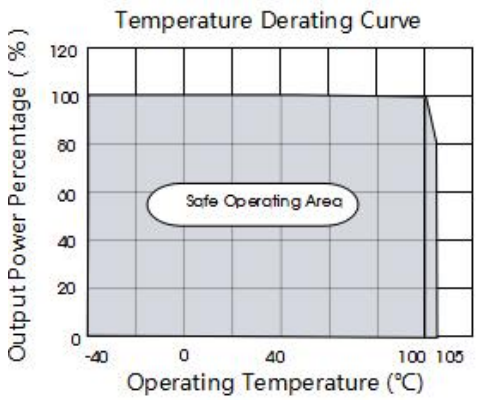
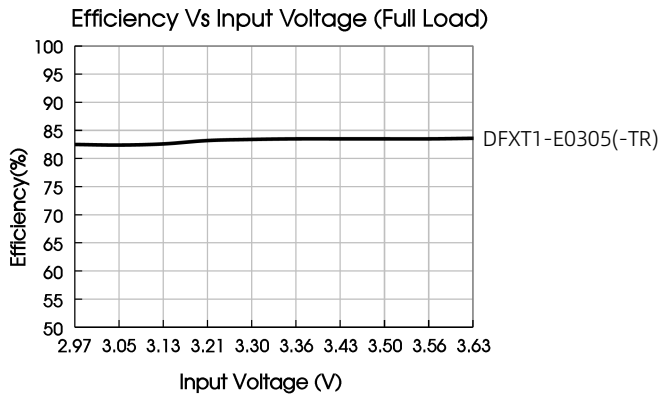
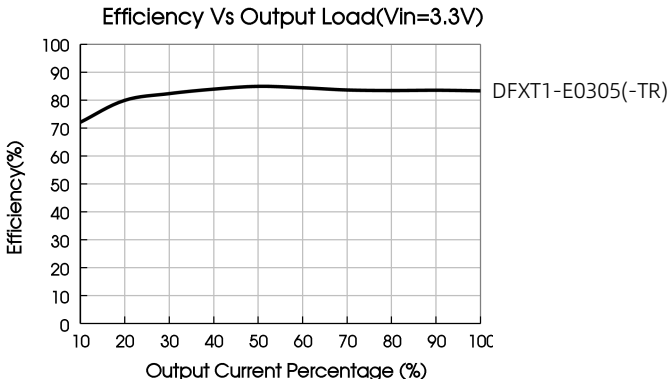
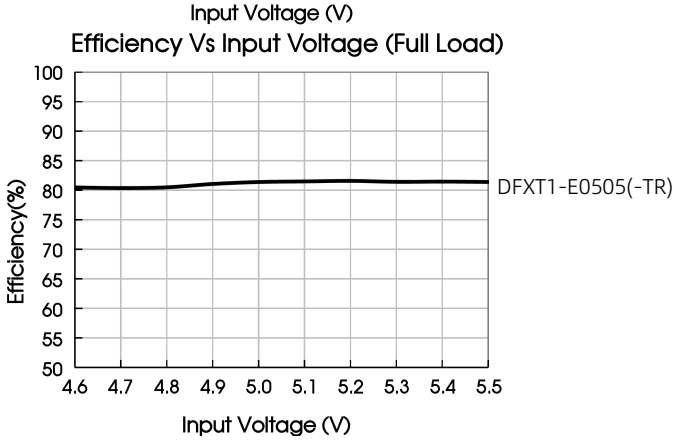
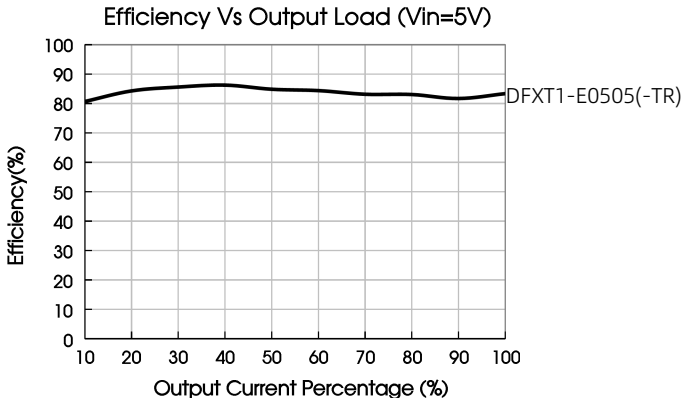


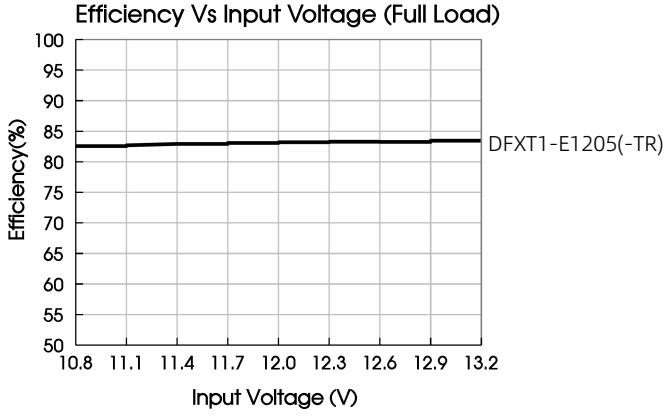
Fig. 2

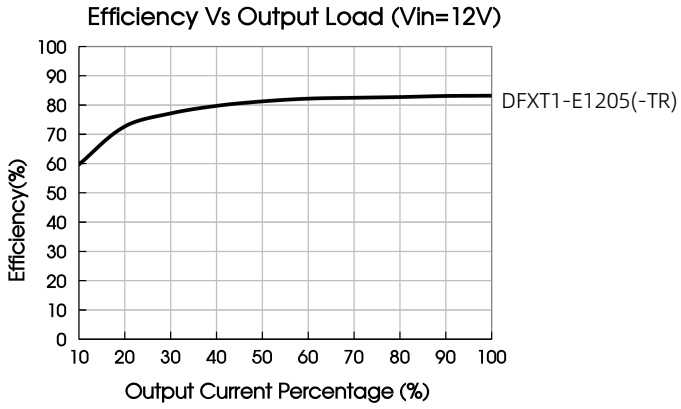


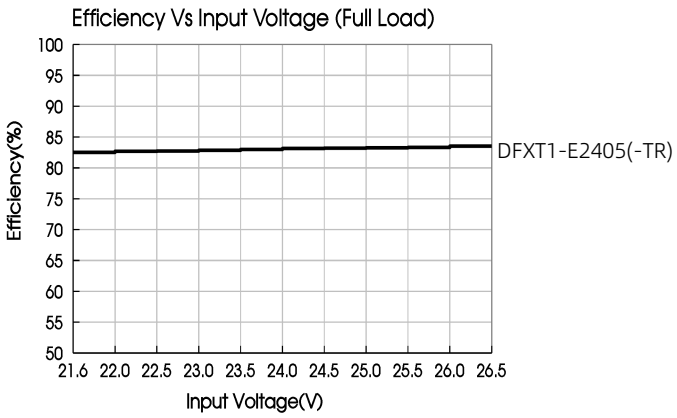


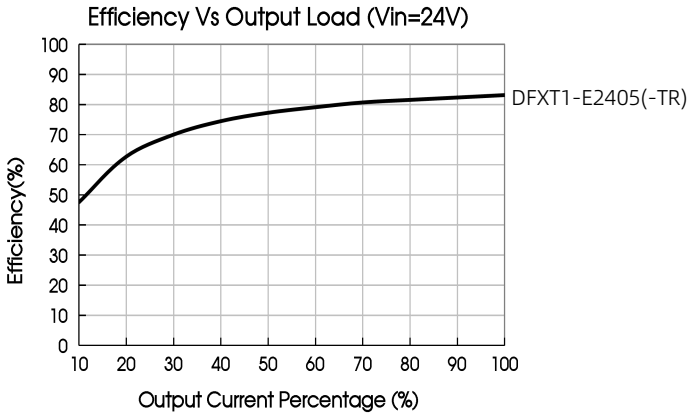












Design Reference

1. Typical application circuit

①Input 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 Fig3.

②Choosing 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.

③The 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).

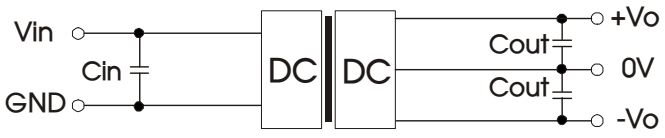


Fig. 3

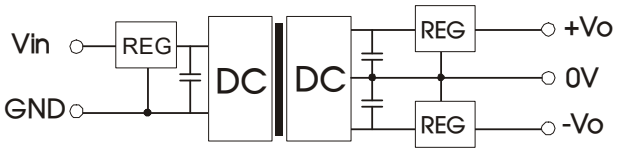


Fig. 4

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

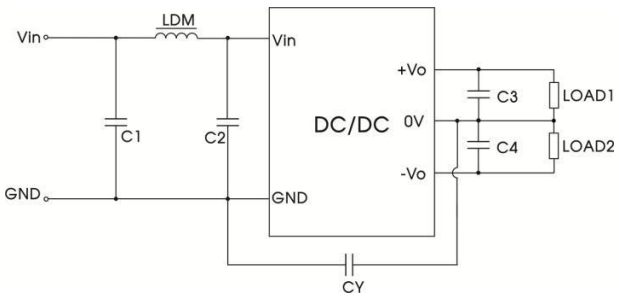


Fig. 5

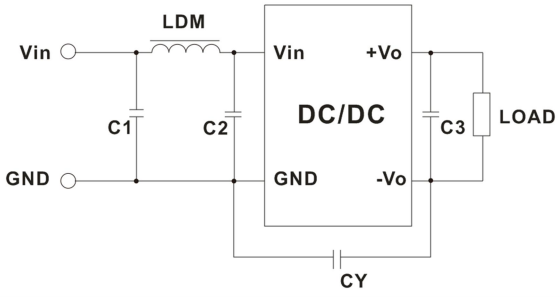


Fig. 6

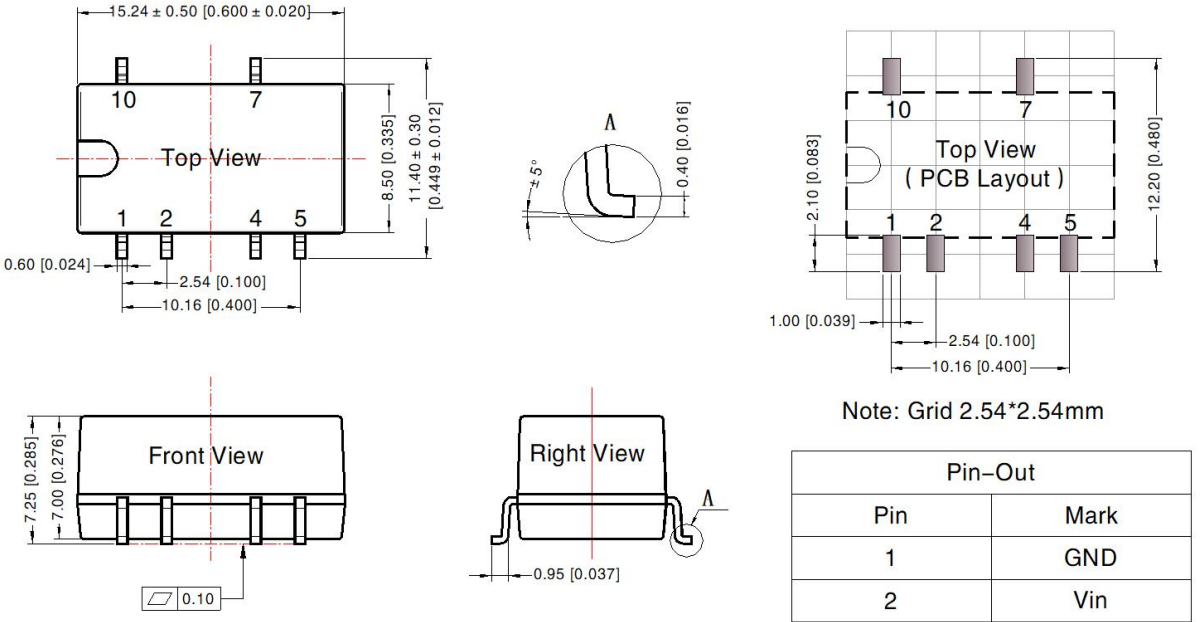
Table 2: EMC recommended circuit value table

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/16V	4.7μF/50V		4.7μF/50V
	CY	270pF/4kV	100pF/4kV	1000pF/4kV	270pF/3kV
	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.

Dimensions and Recommended

THIRD ANGLE PROJECTION



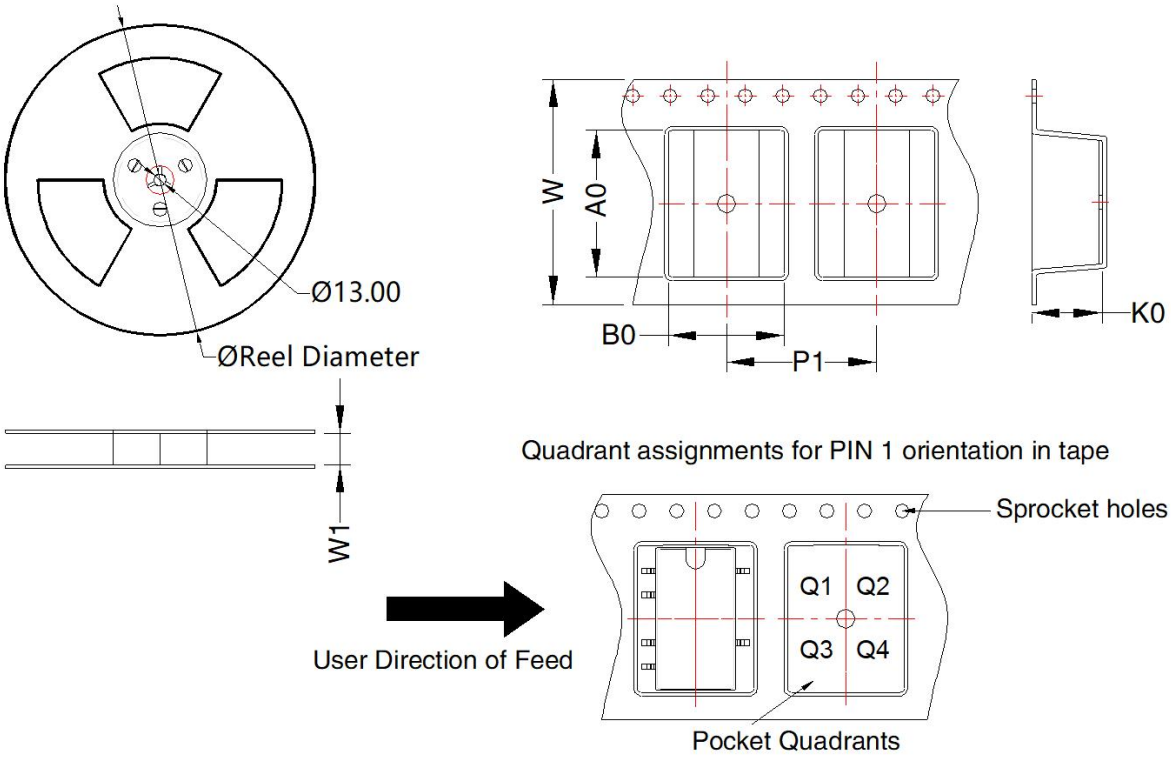
Note: Grid 2.54*2.54mm

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

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

NC: Pin to be isolated from circuitry

Schematic diagram of carrier packaging



Package Type	Pin	MPQ	Reel Diameter (mm)	Reel Width W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P1 (mm)	W (mm)	Pin1 Quadrant
SMD	6	500	330.0	24.5	15.64	12.4	7.45	16.0	24.0	Q1

Notes:

1. 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;
2. The maximum capacitive load offered were tested at input voltage range and full load;
3. 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;
4. All index testing methods in this datasheet are based on our company corporate standards;
5. Products are related to laws and regulations: see "Features" and "EMC";
6. Our products shall be classified according to ISO14001 and related environmental laws and regulations, and shall be handled by qualified units;
7. The image certification marks are for reference only; please refer to the selection table for actual specifications. Certification is based on the physical mark or packaging label.