



1T10A1_1.5UP series

1W - Dual Output DC-DC Converter - Fixed Input - Isolated & Unregulated

DC-DC Converter

1 Watt

- ⊕ Short circuit protection (SCP)
- ⊕ Compact SMD package
- ⊕ 1.5kVDC Isolation
- ⊕ High efficiency up to 85%
- ⊕ Temperature range: -40°C ~ +105°C
- ⊕ No-load input current as low as 8mA
- ⊕ International standard pinout
- ⊕ RoHS Compliance

The 1T10A1_1.5UP 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.



Common specifications	
Short circuit protection:	Continuous, self-recovery
Case Temperature Rise:	25°C TYP (Ta=25°C)
Operation temperature range:	-40°C~+105°C; Derating when operating temperature ≥ 100°C
Storage temperature range:	-55°C ~+125°C
Pin welding resistance temperature:	300°C MAX, 1.5mm from case for 10 sec
Storage humidity range:	5 ~ 95%RH, non-condensing
Reflow soldering temperature:	Peak temp. ≤245°C, max. duration time ≤60s over 217°C. For actual application, please refer to IPC/JEDEC J-STD-020D.1.
MTBF (MIL-HDFK-217F@25°C):	>3,500,000 hours
Moisture Sensitivity Level (MSL):	IPC/JEDEC J-STD-020D.1, Level 1
Casing material:	Black flame-retardant and heat-resistant plastic [UL94-V0]
Dimensions:	15.24*11.40*7.25 mm
Weight:	1.4g
Cooling:	Free air convection

Input specifications					
Item	Test condition (output)	Min	Typ	Max	Units
Input current (full load/no load) 5Vin	• 5V VDC		244/5	257/10	mA
	• 9/12V VDC		241/12	254/20	mA
	• 15V VDC		241/18	254/30	mA
12Vin	• ±5 VDC		102/8	107/---	mA
	• ±9/±12/±15VDC		101/8	106/---	mA
	• ±24 VDC		99/8	103/---	mA
15Vin		81/8	85/---	mA	
24Vin	• ±5/±9/±12/±15 VDC • ±24 VDC		51/8 50/8	55/--- 53/---	mA mA
Reflected ripple current	• 5VDC input		15		mA
	• Others		30		mA
Surge voltage (1sec. max.)	• 5VDC input	-0.7	9		VDC
	• 12VDC input	-0.7	18		VDC
	• 15VDC input	-0.7	21		VDC
	• 24VDC input	-0.7	30		VDC
Input filter	Filter capacitor				
Hot plug	unavailable				

Output specifications					
Item	Test condition	Min	Typ	Max	Units
Output voltage accuracy	See Typical characteristics: tolerance envelope curve				
Line regulation	Input voltage change: ±1%			±1.2	%
Load regulation	10% to 100% load: • ±5VDC output • ±9VDC output • ±12VDC output • ±15VDC output • ±24VDC output		10	15	%
			8	10	%
			7	10	%
			6	10	%
			5	10	%
Temperature drift	Full load			±0.02	%/°C
Ripple & noise*	20MHz Bandwidth • ±5/±9/±12/±15VDC output • ±24VDC output		30	75	mVp-p
			50	100	
Switching frequency	Full load, nominal input • 5VDC input • other		270		KHz
			260		KHz

EMC specifications					
Emissions	CE	CISPR32/EN55032	CLASS B	(see EMC solution-recommended circuit)	
Emissions	RE	CISPR32/EN55032	CLASS B	(see EMC solution-recommended circuit)	
Immunity	ESD	IEC/EN61000-4-2	Air ±8KV, Contact ±4KV	perf. Criteria B	

Example: 1T10A1_0505D1.5UP

1 = 1Watt; T10 = SMT10; A1 = Pinning; 05 = 5Vin; 05 = 5Vout;
D = Dual Output; 1.5 = 1.5kVDC; U = Unregulated Output;
P = Short Circuit Protection (SCP)

Note:

- 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;
- The max. capacitive load offered were tested at input voltage range and full load;
- Unless otherwise specified, parameters in this datasheet were measured under the conditions of Ta = 25°C, humidity <75%RH with nominal input voltage and rated output load;
- All index testing methods in this datasheet are based on our Company's corporate standards;
- We can provide product customization service, please contact our technicians directly for specific information;
- Products are related to laws and regulations: see „Features“ and „EMC“;
- Our products shall be classified according to ISO14001 and related environmental laws and regulations, and shall be handled by qualified units.

Isolation specifications					
Item	Test condition	Min	Typ	Max	Units
Isolation voltage	Input-output, tested for 1 minute and 1mA max	1500			VDC
Isolation resistance	Input-output, isolation voltage 500VDC	1000			MΩ
Isolation capacitance	Input-output, 100KHz/0.1V		20		pF

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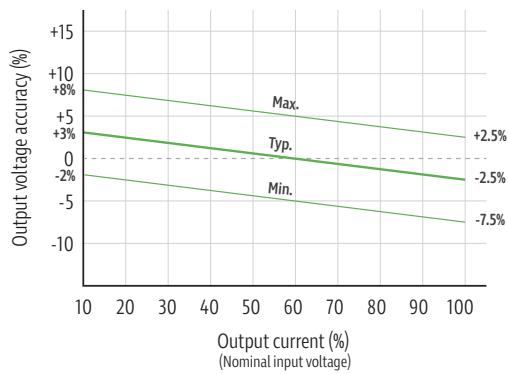
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Part Number	Input Voltage [VDC] Nominal (Range)	Output Voltage [VDC]	Output Current [mA; min/max]	Efficiency [%; min/typ]	Max. capacitive load* [μF]
1T10A1_0505D1.5UP	5 (4.5-5.5)	±5	±10/±100	78/82	1200
1T10A1_0509D1.5UP	5 (4.5-5.5)	±9	±6/±56	79/83	470
1T10A1_0512D1.5UP	5 (4.5-5.5)	±12	±5/±42	79/83	220
1T10A1_0515D1.5UP	5 (4.5-5.5)	±15	±4/±34	79/83	220
1T10A1_1205D1.5UP	12 (10.8-13.2)	±5	±10/±100	78/82	1200
1T10A1_1209D1.5UP	12 (10.8-13.2)	±9	±6/±56	79/83	470
1T10A1_1212D1.5UP	12 (10.8-13.2)	±12	±5/±42	79/83	220
1T10A1_1215D1.5UP	12 (10.8-13.2)	±15	±4/±34	79/83	220
1T10A1_1224D1.5UP	12 (10.8-13.2)	±24	±3/±21	81/85	100
1T10A1_1515D1.5UP	15 (13.5-16.5)	±15	±4/±34	79/83	220
1T10A1_2405D1.5UP	24 (21.6-26.4)	±5	±10/±100	76/82	1200
1T10A1_2409D1.5UP	24 (21.6-26.4)	±9	±6/±56	77/83	470
1T10A1_2412D1.5UP	24 (21.6-26.4)	±12	±5/±42	77/83	220
1T10A1_2415D1.5UP	24 (21.6-26.4)	±15	±4/±34	77/83	220
1T10A1_2424D1.5UP	24 (21.6-26.4)	±24	±3/±21	79/85	100

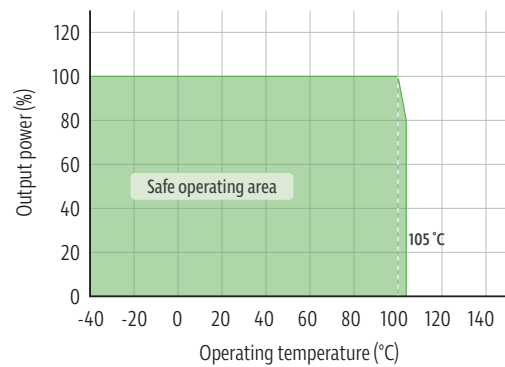
* The capacitive loads of positive and negative outputs are identical.

Typical characteristics

Output regulation curve

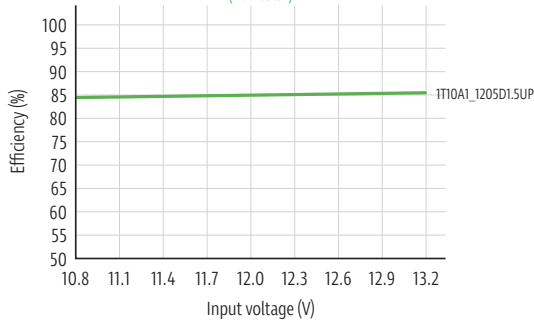


Temperature derating graph

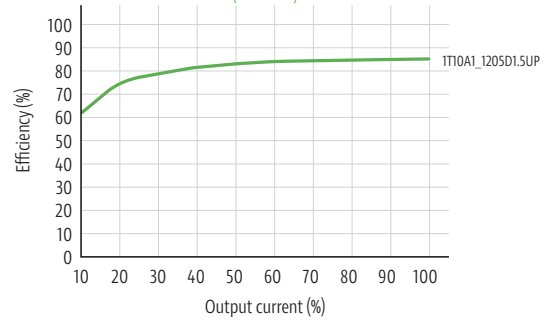


Efficiency

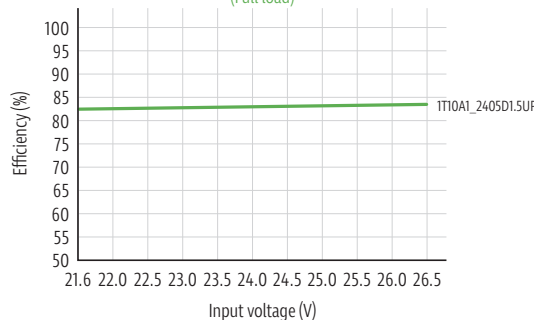
Efficiency vs input voltage (Full load)



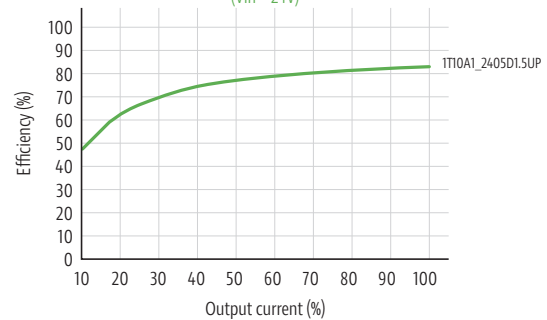
Efficiency vs output load (Vin = 12V)



Efficiency vs input voltage (Full load)



Efficiency vs output load (Vin = 24V)



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Typical application circuit

If it is required to further reduce input and output ripple, a filter capacitor may be connected to the input and output terminals, see Fig.1.

Moreover, choosing a suitable filter capacitor is very important, start-up problems may be caused if the capacitance is too large. Under the condition of safe and reliable operation, the recommended capacitance load values are shown in 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. 2).



Table 1: Recommended input and output capacitor values

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

EMC solution-recommended circuit

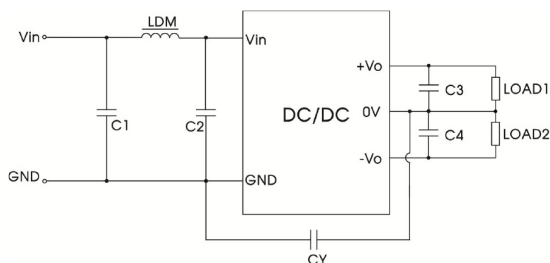


Table 2: EMC recommended circuit value table

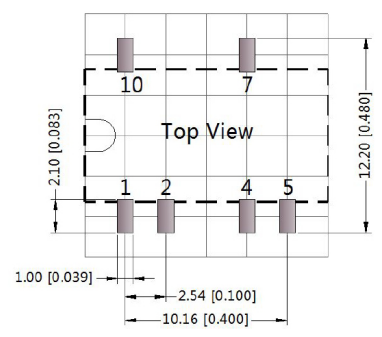
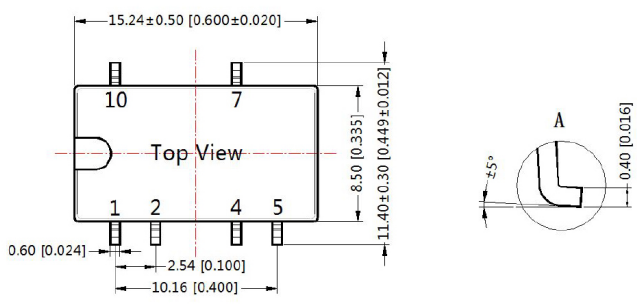
Emissions	C1	4.7μF/50V
	C2	4.7μF/50V
	CY	270pF/2kV
	C3	Refer to the Cout in table 1
	C4	Refer to the Cout in table 1
	LDM	6.8μH

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Mechanical dimensions

THIRD ANGLE PROJECTION 



Note: Grid 2.54*2.54mm

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

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

NC: Pin to be isolated from circuitry