

## 1T8A1\_3UP series

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

### 3/5/12/15/24Vin DC-DC Converter 1 Watt

- ⊕ Continuous short-circuit protection
- ⊕ No-load input current as low as 5mA
- ⊕ Operating ambient temp. range: -40°C to +105°C
- ⊕ High efficiency up to 85%
- ⊕ Compact SMD package
- ⊕ I/O isolation test voltage: 3kVDC
- ⊕ Industry standard pin-out
- ⊕ IEC62368, UL62368, EN62368 approved

The 1T8A1\_3UP 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.



UL-62368-1 (E347551)

#### Common specifications

Short circuit protection:	Continuous, self-recovery
Operation temperature range:	-40°C~+105°C
Storage temperature range:	-55°C ~+125°C
Case Temperature Rise (Ta = 25°C)	• 3.3/5/12/15/24VDC output 25°C TYP • Others: 15°C TYP
Pin welding resistance temperature:	300°C MAX, 1.5mm from case for 10 sec
Storage humidity range:	• 3.3/5VDC <95% RH • Others: 5 ~ 95% RH
Reflow Soldering Temperature:	Peak temp. ≤245°C, maximum duration time ≤60s at 217°C.
Vibration:	10-150Hz, 5G, 0.75mm, along X, Y and Z
MTBF (MIL-HDBK-217F@25°C):	>3,500,000 hours
MSL (Moisture sensitivity level): (IPC/JEDEC J-STD-020D.1)	• 5VDC Level 2 • others Level 1
Casing material:	Black plastic; flame-retardant and heat-resistant (UL94 V-0)
Cooling:	Free air convection
Dimensions:	13.20 x 11.40 x 7.25 mm
Weight:	1.4g TYP

Note:\*For actual application, please refer to IPC/JEDEC J-STD-020D.1.

#### Input specifications

Item	Test condition	Min	Typ	Max	Units
Input current (full load / no load)	3.3VDC input				
	• 3.3VDC output		405/8	427/-	mA
	• 5/9/12/15/24VDC output		379/8	399/-	mA
	5VDC input				
	• 3.3/5VDC output		270/5	286/10	mA
	• 9/12VDC output		241/12	254/20	mA
	• 15/24VDC output		241/18	254/30	mA
	12V input				
	• 5VDC output		102/8	107/-	mA
	• 9/12/15VDC output		101/8	106/-	mA
	• 24VDC output		99/8	103/-	mA
	15V input				
	• 5/9VDC output		82/8	86/-	mA
	• 15VDC output		81/8	85/-	mA
24V input					
• 3.3/5VDC output		53/8	57/-	mA	
• 5/9/12/15/VDC output		51/8	55/-	mA	
• 24VDC output		53/8	57/-	mA	
Reflected ripple Current*				15	mA
Input surge voltage (1 sec. max.)	• 3.3/5VDC 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	Capacitance filter				
Hot Plug	Unavailable				

\* Reflected ripple current testing method please see DC-DC Converter Application Notes for specific operation.

#### Output specifications

Item	Test condition	Min	Typ	Max	Units
Voltage accuracy	See output regulation curves (Fig. 1)				
Line regulation (For Vin change of 1%)	• 3.3V output			1.5	%
	• Others			1.2	%
	Others input			1.2	%
Load regulation (3VDC input)	10% to 100% load				
	• 3.3V output			25	%
	• 5V output			15	%
	• 9V output			15	%
	• 12V output			15	%
	• 15V output			15	%
	• 24V output			15	%
Load regulation (5VDC input)	10% to 100% load				
	• 3.3V output	15		20	%
	• 5V output	10		15	%
	• 9V output	8		10	%
	• 12V output	7		10	%
	• 15V output	6		10	%
• 24V output	5		10	%	
Load regulation	10% to 100% load				
	• 5V output	5		15	%
	• 9V output	3		10	%
	• 12V output	3		10	%
	• 15V output	3		10	%
• 24V output	2		10	%	
Ripple & Noise*	20MHz Bandwidth				
	• 5/9/12/15VDC output	30		75	mVp-p
	• 24VDC output	50		100	mVp-p
Switching frequency	Full load, nominal input				
	• 3.3/5VDC		270		KHz
	• Others		260		KHz
Temperature Coefficient	Full load		±0.02		%/°C

\* The "parallel cable" method is used for ripple and noise test, please refer to DC-DC Converter Application Notes for specific information.

#### Isolation specifications

Item	Test condition	Min	Typ	Max	Units
Isolation voltage	Tested for 1 minute and 1mA max	3000			VDC
Isolation resistance	Test at 500VDC	1000			MΩ
Isolation capacitance	Input/Output 100KHz/0.1V		20		pF

#### Example:

##### 1T8A1\_0305S3UP

1 = 1Watt; T8 = SMT8; A1 = Pinning; 03 = 3Vin; 05 = 5Vout; S = Single output; 3 = 3kVDC isolation; U = Unregulated output; P = Short circuit protection

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EMC specifications		
Emissions	CE	CISPR32/EN55032 CLASS B
Emissions	RE	CISPR32/EN55032 CLASS B
Immunity	ESD	<ul style="list-style-type: none"> <li>• 3.3V input IEC/EN61000-4-2 Air ±8kV, Contact ±6kV perf. Criteria B</li> <li>• Others input IEC/EN61000-4-2 Air ±8kV, Contact ±4kV perf. Criteria B</li> </ul>

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

**Note:**

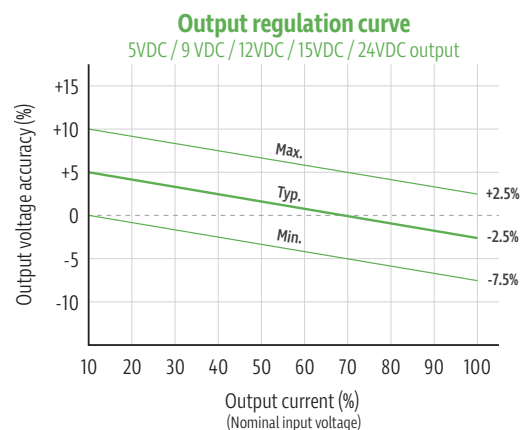
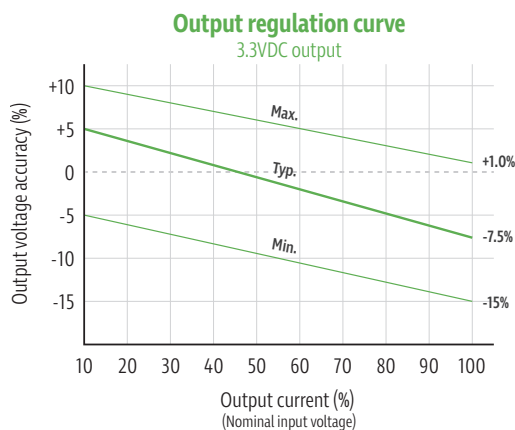
1. If the product is not operated within the required load range, the product performance cannot be guaranteed to comply with all parameters in the data-sheet;
2. Max. capacitive load offered were tested at input voltage range and full load;
3. Unless otherwise specified, parameters in this datasheet were measured under the conditions of Ta = 25°C, humidity<75%RH with nominal input voltage and rated output load;
4. All index testing methods in this datasheet are based on our Company's corporate standards;
5. We can provide product customization service, please contact our technicians directly for specific information;
6. Products are related to laws and regulations: see „Features“ and „EMC“;

## Product Selection Guide

Certification	Part Number	Input Voltage [V, Nominal (Range)]	Output Voltage [VDC]	Output Current [mA, max/min]	Full Load Efficiency [%, min/typ]	Capacitive Load [uF, max]
--	1T8A1_0303S3UP	3.3 (2.97-3.63)	3.3	303/30	71/75	2400
--	1T8A1_0305S3UP	3.3 (2.97-3.63)	5	200/20	76/80	2400
--	1T8A1_0309S3UP	3.3 (2.97-3.63)	9	111/11	76/80	1000
--	1T8A1_0312S3UP	3.3 (2.97-3.63)	12	83/8	76/80	560
--	1T8A1_0315S3UP	3.3 (2.97-3.63)	15	67/7	76/80	560
--	1T8A1_0324S3UP	3.3 (2.97-3.63)	24	42/4	76/80	220
UL (Pending)	1T8A1_0503S3UP	5 (4.5-5.5)	3.3	303/30	70/74	2400
UL (Pending)	1T8A1_0505S3UP	5 (4.5-5.5)	5	200/20	78/82	2400
UL (Pending)	1T8A1_0509S3UP	5 (4.5-5.5)	9	111/12	79/83	1000
UL (Pending)	1T8A1_0512S3UP	5 (4.5-5.5)	12	83/9	79/83	560
UL (Pending)	1T8A1_0515S3UP	5 (4.5-5.5)	15	67/7	79/83	560
UL (Pending)	1T8A1_0524S3UP	5 (4.5-5.5)	24	42/4	81/85	220
UL	1T8A1_1203S3UP	12 (10.8-13.2)	3.3	303/30	72/76	2400
UL	1T8A1_1205S3UP	12 (10.8-13.2)	5	200/20	78/82	2400
UL	1T8A1_1209S3UP	12 (10.8-13.2)	9	111/12	79/83	1000
UL	1T8A1_1212S3UP	12 (10.8-13.2)	12	84/9	79/83	560
UL	1T8A1_1215S3UP	12 (10.8-13.2)	15	67/7	79/83	560
UL	1T8A1_1224S3UP	12 (10.8-13.2)	24	42/4	81/85	220
UL	1T8A1_1505S3UP	15 (13.5-16.5)	5	200/20	78/82	2400
--	1T8A1_1509S3UP	15 (13.5-16.5)	9	111/12	78/82	1000
UL	1T8A1_1515S3UP	15 (13.5-16.5)	15	67/7	79/83	560
UL	1T8A1_2403S3UP	24 (21.6-26.4)	3.3	303/30	72/76	2400
UL	1T8A1_2405S3UP	24 (21.6-26.4)	5	200/20	74/80	2400
UL	1T8A1_2409S3UP	24 (21.6-26.4)	9	111/12	74/80	1000
UL	1T8A1_2412S3UP	24 (21.6-26.4)	12	84/9	74/80	560

## Typical characteristics

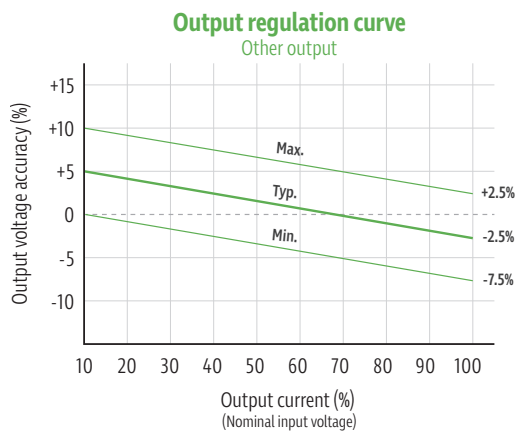
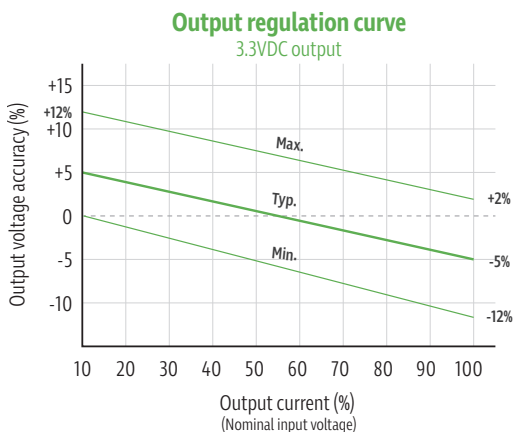
### 3.3VDC Input Voltage



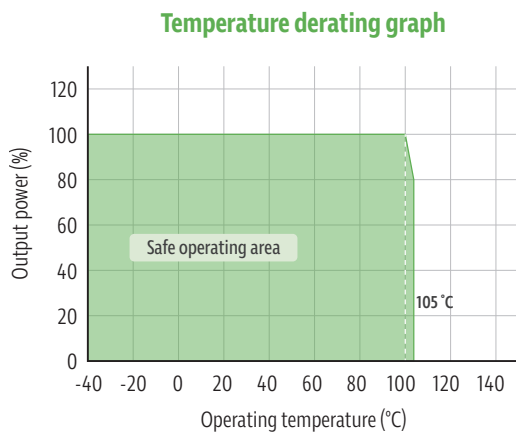
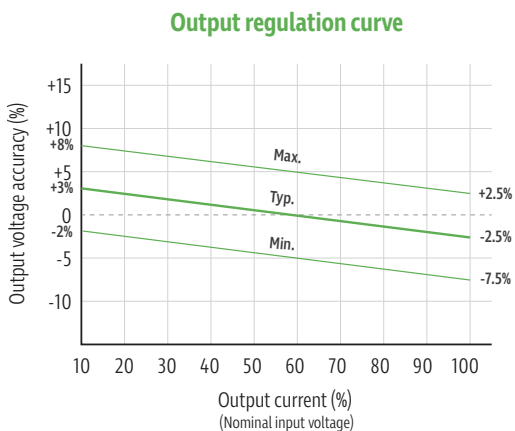
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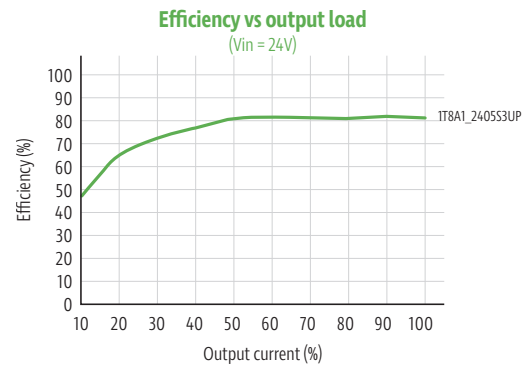
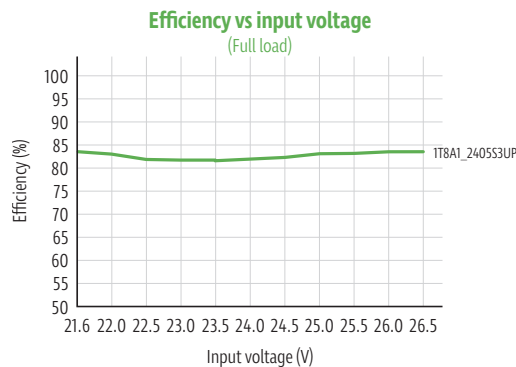
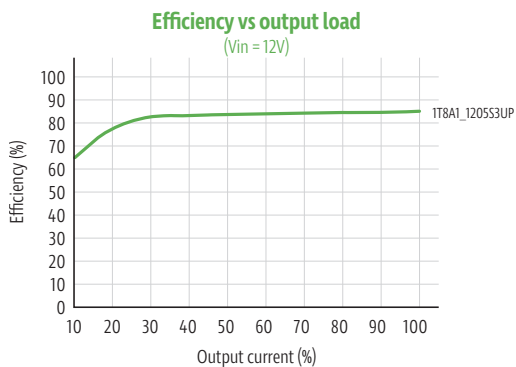
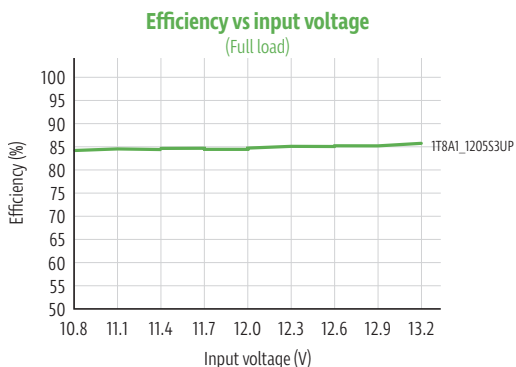
## 5VDC Input Voltage



## Others Input Voltage



## Efficiency



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## 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 Tables.



Fig.3

Table: Recommended input and output capacitor values (3.3VDC Vin)

Vin (VDC)	Cin (µF)	Vout (VDC)	Cout (µF)
3.3	4.7	3.3/5	10/16V
3.3	4.7	9	4.7/16V
3.3	4.7	12	2.2/25V
3.3	4.7	15	1/25V
3.3	4.7	24	0.47/50V

Table: Recommended input and output capacitor values (5VDC Vin)

Vin (VDC)	Cin (µF)	Vout (VDC)	Cout (µF)
3.3VDC	4.7µF/16V	3.3/5VDC	10µF/16V
		9VDC	4.7µF/16V
		12VDC	2.2µF/25V
		15VDC	1µF/25V
		24VDC	0.47µF/50V

Table: Recommended input and output capacitor values (others Vin)

Vin (VDC)	Cin (µF)	Vout (VDC)	Cout (µF)
12VDC	2.2µF/25V	3.3VDC/5VDC	10µF/16V
15VDC	2.2µF/25V	9VDC	2.2µF/16V
24VDC	1µF/50V	12VDC	2.2µF/25V
		15VDC	1µF/25V
		24VDC	1µF/50V

## EMC solution-recommended circuit

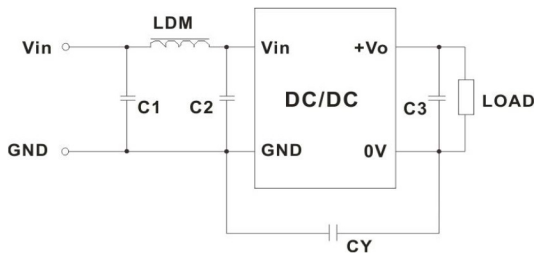


Fig.4

EMC recommended circuit value table / input voltage 3.3VDC

Input voltage 3.3VDC	Ouput voltage		3.3/5/9	12/15/24
	Emissions	C1/C2	4.7µF /50V	
CY		270µF /3kV	270µF /3kV	
C3		Refer to the Cout in table 3		
LDM		6.8µH		

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

EMC recommended circuit value table / input voltage 5VDC

Input voltage 5VDC	Ouput voltage		3.3/5/9	12/15/24
	Emissions	C1/C2	4.7µF /50V	
CY		270µF /3kV	270µF /3kV	
C3		Refer to the Cout in table 3		
LDM		6.8µH		

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

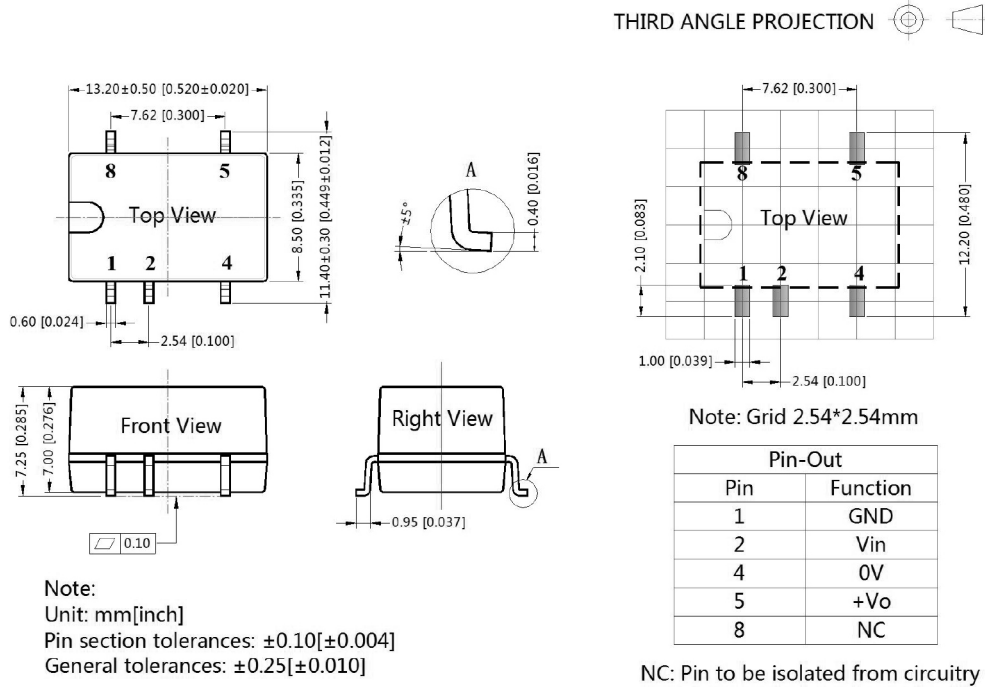
EMC recommended circuit value table / Others input voltage

Others input	Emissions	C1	4.7µF /50V
		C2	4.7µF /50V
	CY	270pF/3kV	
	C3	Refer to the Cout in table	
	LDM	6.8µH	

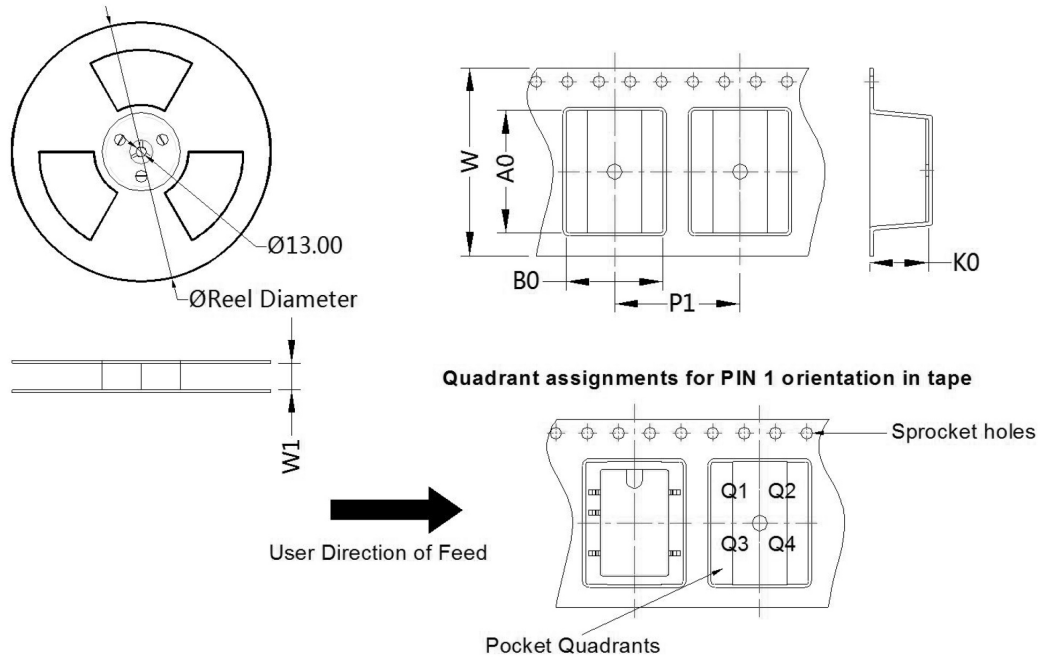
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### Mechanical dimensions



### Tape & Reel



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