



DESCRIPTION: 1W 1.5KVDC and 3KVDC Isolated Single Output DC/DC Converters

The TPE series are miniature, isolated 1W DC/DC converters in a SIP and DIP package. They offer the ideal solution in many space critical applications for board level power distribution. The internal SMD construction makes it possible to offer a product with high performance at low cost. The series offers smaller size, improved efficiency, lower output ripple noise.

FEATURES

RoHS compliant, CE certification	Single isolated output	SIP: 1.5KVDC isolation/3KVDC isolation DIP: 3KVDC isolation
Efficiency up to 81%	Operating temperature : -40℃ to 105℃	Industry standard pinout ,Footprint from 0.69cm ²
UL 94V-0 package material	no heat sink required	Output voltage: 3.3V, 5V, 7.2V, 9V, 12V, 15V 18V & 24V
Input voltage: 3.3V, 5V, 12V, 15V, 24V, 48V	Power density 1.53W/cm ³	The creepage distance and electrical gap of the filling device is 2mm

SELECTION GUIDE

Part Number	Rated Input	Output Voltage	Output Current (Max./Min)	Efficiency (full load) %		Max. capacity	Package Style
	V	V	mA	Min	Typ.	load/uF	
TPE0303DP	3.3	3.3	303/30.3	67	71	2400	DIP
TPE0305DP	3.3	5	200/20	69	74	2400	DIP
TPE0309DP	3.3	9	110/11	68	72	1000	DIP
TPE0312DP	3.3	12	83/8.3	73	78	560	DIP
TPE0315DP	3.3	15	66/6.6	75	80	560	DIP
TPE0324DP	3.3	24	42/4.2	74	79	220	DIP
TPE0303SP	3.3	3.3	303/30.3	67	72	2400	SIP
TPE0305SP	3.3	5	200/20	71	74	2400	SIP
TPE0309SP	3.3	9	110/11	68	73	1000	SIP
TPE0312SP	3.3	12	83/8.3	73	78	560	SIP
TPE0315SP	3.3	15	66/6.6	71	76	560	SIP
TPE0324SP	3.3	24	42/4.2	74	79	220	SIP
TPE0503DP	5	3.3	303/30.3	67	72	2400	DIP
TPE0505DP	5	5	200/20	65	70	2400	DIP
TPE0507DP	5	7.2	138/13.8	65	70	2400	DIP
TPE0509DP	5	9	110/11	73	78	1000	DIP
TPE0512DP	5	12	83/8.3	72	77	560	DIP
TPE0515DP	5	15	66/6.6	76	81	560	DIP
TPE0524DP	5	24	42/4.2	74	79	220	DIP
TPE0503SP	5	3.3	303/30.3	67	72	2400	SIP
TPE0505SP	5	5	200/20	65	70	2400	SIP
TPE0507SP	5	7.2	138/13.8	65	70	2400	SIP
TPE0509SP	5	9	110/11	73	78	1000	SIP
TPE0512SP	5	12	83/8.3	73	78	560	SIP
TPE0515SP	5	15	66/6.6	75	80	560	SIP
TPE0524SP	5	24	42/4.2	73	78	220	SIP
TPE1203DP	12	3.3	303/30.3	67	72	2400	DIP
TPE1205DP	12	5	200/20	70	75	2400	DIP
TPE1209DP	12	9	110/11	69	74	1000	DIP
TPE1212DP	12	12	83/8.3	72	77	560	DIP
TPE1215DP	12	15	66/6.6	70	75	560	DIP
TPE1224DP	12	24	42/4.2	74	79	220	DIP
TPE1203SP	12	3.3	303/30.3	68	73	2400	SIP
TPE1205SP	12	5	200/20	66	74	2400	SIP
TPE1207SP	12	7.2	138/13.8	65	70	2400	SIP
TPE1209SP	12	9	110/11	73	78	1000	SIP
TPE1212SP	12	12	83/8.3	76	81	560	SIP
TPE1215SP	12	15	66/6.6	73	78	560	SIP
TPE1224SP	12	24	42/4.2	75	79	220	SIP
TPE1503DP	15	3.3	303/30.3	66	71	2400	DIP
TPE1505DP	15	5	200/20	66	71	2400	DIP
TPE1509DP	15	9	111/11.1	70	75	1000	DIP
TPE1512DP	15	12	83/8.3	70	75	560	DIP
TPE1515DP	15	15	66/6.6	71	76	560	DIP
TPE1524DP	15	24	41.5/4.15	70	75	220	DIP
TPE1503SP	15	3.3	303/30.3	66	71	2400	SIP
TPE1505SP	15	5	200/20	66	71	2400	SIP
TPE1509SP	15	9	111/11.1	69	74	1000	SIP

SELECTION GUIDE

Part Number	Rated Input	Output Voltage	Output Current	Efficiency (full load) %		Max. capacity load μ F	Package Style V
	V	V	mA	Min	Typ.		
TPE1512SP	15	12	83/8.3	72	77	560	SIP
TPE1515SP	15	15	66/6.6	72	77	560	SIP
TPE1524SP	15	24	41.5/4.15	69	74	220	SIP
TPE2403DP	24	3.3	303/30.3	66	71	2400	DIP
TPE2405DP	24	5	200/20	65	70	2400	DIP
TPE2409DP	24	9	111/11.1	72	77	1000	DIP
TPE2412DP	24	12	83/8.3	73	78	560	DIP
TPE2415DP	24	15	66/6.6	72	80	560	DIP
TPE2424DP	24	24	41.5/4.15	69	74	220	DIP
TPE2403SP	24	3.3	303/30.3	63	69	2400	SIP
TPE2405SP	24	5	200/20	65	70	2400	SIP
TPE2409SP	24	9	111/11.1	70	75	1000	SIP
TPE2412SP	24	12	83/8.3	72	78	560	SIP
TPE2415SP	24	15	66/6.6	74	79	560	SIP
TPE2424SP	24	24	41.5/4.15	69	74	220	SIP
TPE4803SP	48	3.3	303/30.3	66	71	2400	SIP
TPE4805SP	48	5	200/20	65	70	2400	SIP
TPE4809SP	48	9	111/11.1	70	75	1000	SIP
TPE4812SP	48	12	83/8.3	70	75	560	SIP
TPE4815SP	48	15	66/6.6	70	75	560	SIP
TPE4824SP	48	24	41.5/4.15	70	75	220	SIP
TPE0518SP	5	18	55.5/5.5	70	75	220	SIP

Add suffix "/3H" for 3KVDC isolated for SIP type only, for example TPE0505SP/3H.

INPUT CHARACTERISTICS

Parameter	Conditions	Min.	Typ.	Max.	Units
Voltage range	3.3V input	2.9	3.3	3.6	V
Voltage range	5V input	4.5	5.0	5.5	V
Voltage range	12V input	10.8	12.0	13.2	V
Voltage range	15V input	13.4	15	16.4	V
Voltage range	24V input	21.6	24	26.4	V
Voltage range	48V input	43.2	48	52.8	V
Reflected ripple current			26	48	mA p-p

ABSOLUTE MAXIMUM RATINGS

Short-circuit protection	Continuous, auto-recovery
Lead temperature 1.5mm from case for 10 seconds	<300℃
3.3V input	5. 5V
5V input	6. 6V
12V input	14. 5V
15V input	18V
24V input	28V
48V input	54V

OUTPUT CHARACTERISTICS

Parameter	Conditions	Min.	Typ.	Max.	Units
Rated Power	TA=-45℃ to 85℃			1.0	W
Voltage Set Point Accuracy	See tolerance envelope				
Line regulation	High Vin to low Vin $\pm$ 5%		1.0	1.2	%/%
Load regulation(10% load to rated load)	3. 3Vout		14	15	%
Load regulation(10% load to rated load)	5Vout		12	15	%
Load regulation(10% load to rated load)	9Vout		9	10	%
Load regulation(10% load to rated load)	12Vout		7.5	10	%
Load regulation(10% load to rated load)	15Vout 18V		7.0	10	%
Load regulation(10% load to rated load)	24Vout		5.0	10	%
Ripple & Noise	20MHz bandwidth		70	100	mVp-p

All specifications typical at TA=25℃, nominal input voltage and rated output current unless otherwise specified.

ISOLATION CHARACTERISTICS

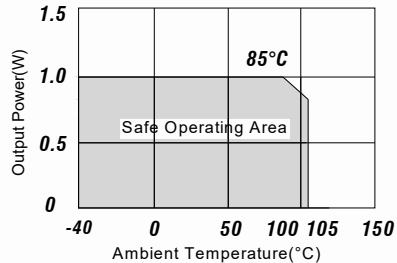
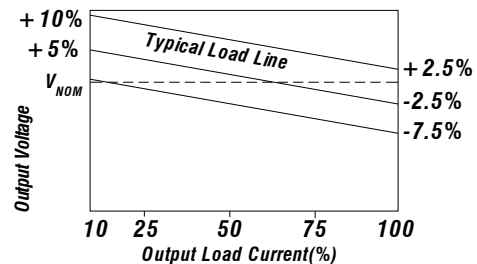
Parameter	Conditions	Min.	Typ.	Max.	Units
Isolation test voltage	Tested for 1 min,leakage current <1mA	1500			VDC
Isolation test voltage	Tested for 1 min (breakdown voltage between pin1 and pin3&4 short)	3000			VDC
SIP package					
Isolation test voltage	Tested for 1 min,leakage current <1mA	3000			VDC
Resistance	Viso= 1000VDC	1			GΩ

GENERAL CHARACTERISTICS

Parameter	Conditions	Min.	Typ.	Max.	Units
Switching frequency	3.3V input		95		kHz
Switching frequency	5V input		110		kHz
Switching frequency	12V input		145		kHz
Switching frequency	Others input		100		kHz
MTBF	MIL-HDBK-217F@25℃		350		10Khrs

TEMPERATURE CHARACTERISTICS

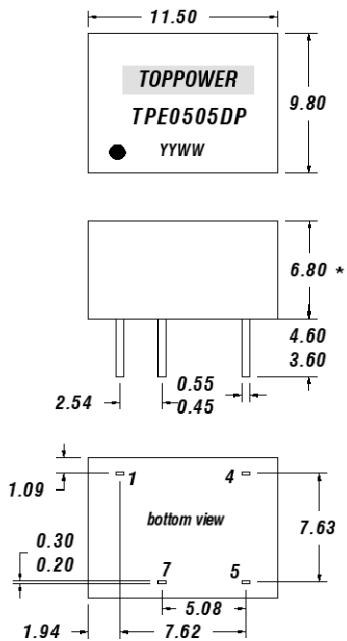
Parameter	Conditions	Min.	Typ.	Max.	Units
Operating Temperature	Derating if the temperature ≥85℃	-40		105	℃
Storage Temperature		-55		130	℃
Temperature Rising	5V output			41	℃
Temperature Rising	All other output			32	℃
Cooling	Free air convection				

TEMPERATURE DERATING GRAPHS

TOLERANCE ENVELOPES

SOLDERING INFORMATION

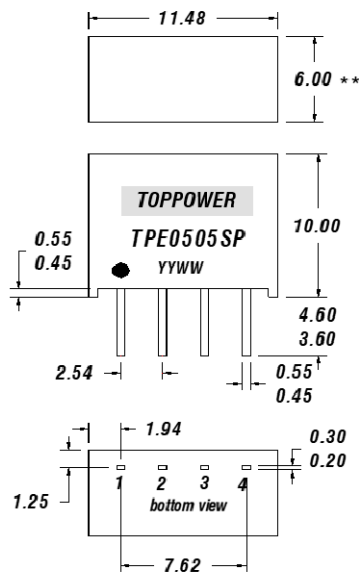
1. This series is compatible with RoHS soldering systems with a peak wave solder temperature of 300℃ for 10 seconds. Both SIP and DIP types in this series are backward compatible with Sn/Pb soldering systems.
2. The minimum output load cannot be less than 10% of the rated load. If the actual output power of the load in your circuit is indeed small, please parallel a resistor with an appropriate resistance value at the output end to increase the load, or choose our company's product with a smaller rated output power.

MECHANICAL DIMENSIONS

DIP



SIP



PIN CONNECTIONS

8 PIN DIP	
PIN	function
1	-Vin
4	+Vin
5	+Vout
7	-Vout

4 PIN SIP	
PIN	function
1	-Vin
2	+Vin
3	-Vout
4	+Vout

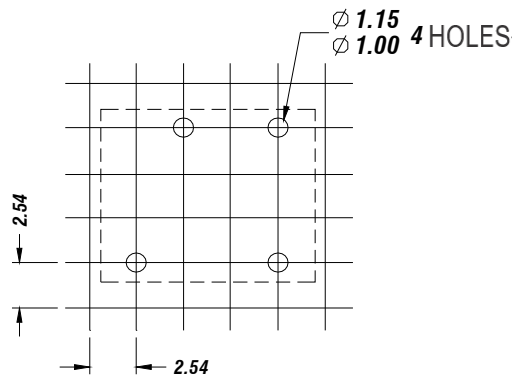
*7.70 for 48V variants

**7.50 for 48V variants

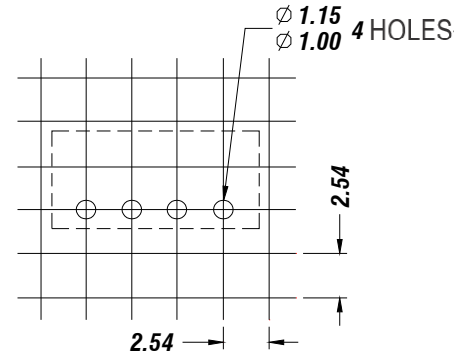
All dimensions in mm ± 0.25 mm. All pins on a 2.54 mm pitch and within ± 0.25 mm of true position
Weight: 1.30g (SIP) 1.48g (DIP)

RECOMMENDED FOOTPRINT DETAILS

8Pin DIP

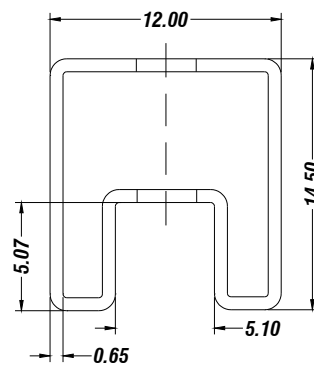


4Pin SIP

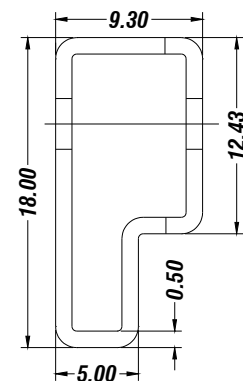


TUBE OUTLINE DIMENSIONS

8Pin DIP



4Pin SIP



Unless otherwise stated all dimensions in mm ± 0.5 mm.

Tube length (14 Pin DIP) : 520mm ± 2 mm.

Tube length (7 Pin DIP) : 520mm ± 2 mm.

Tube Quantity : 17-35PCS

TYPICAL APPLIACTION CIRCUIT

If it is required to further reduce input and output ripple, a filter capacitor can be connected to the input and output terminals, see Fig.1. Moreover, choosing suitable filter capacitor is very important, start-up problems may be caused by too large capacitance.

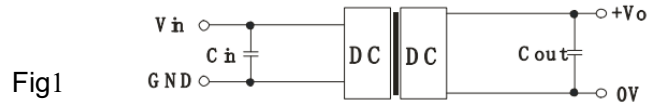


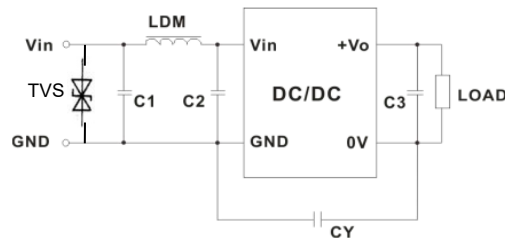
table1: recommended capacitive load value table

Vin	Cin	Vo	Cout
3.3VDC	10 μ F/25V	3.3VDC	10 μ F/16V
5VDC	4.7 μ F/16V	5VDC	10 μ F/16V
12VDC	2.2 μ F/25V	9VDC	2.2 μ F/16V
15VDC	2.2 μ F/25V	12VDC	2.2 μ F/25V
24VDC	1 μ F/50V	15VDC	1 μ F/25V
--	--	24VDC	1 μ F/50V

EMC CHARACTERISTICS

EMI	Conduction Emission	CISPR32/EN55032 CLASS
	Radiation Emission	CISPR32/EN55032 CLASS
EMS	Electrostatic Discharge	IEC/EN61000-4-2 Air $\pm$ 8kV, Contact $\pm$ 6kV per. Criteria B

EMC recommend circuit



Input		3.3VDC		5VDC		OTHERS
output		3.3/5VDC	9/12/15/24VDC	3.3/5/7.2/9VDC	12/15/24VDC	---
EMI	C1/C2	4.7 μ F /16V	4.7 μ F /16V	4.7 μ F /25V	4.7 μ F /25V	4.7 μ F /50V
	CY		270pF /4kVDC VISHAY HGZ102MBP	100pF/4kV	1000pF/4kV	270pF/2kV
	C3	Refer to Cout in table 1				
	LDM	6.8 μ H				
	TVS	10V	10V	10V	10V	20V