DESCRIPTION: **2W 3KVDC Isolated Single & Dual Output DC/DC Converters**

The TPH series are miniature, isolated 2W 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 and 3KVDC isolation.

FEATURES

RoHS compliant	Efficiency up to 86%	Power density up to 1.44W/cm^3
Operating temperature: -40ºC to 105ºC	Dual output from a single input rail	UL 94V-0 package material
Power sharing on output	3KVDC isolation	Industry standard pinout
Input voltage:3.3V,5V,12V,15V, 24V, 48V	Output voltage: ±5V,±9V,±12V, ±15V,±24V / 3.3V,5V,9V,12V,15V, 24V	CE certification

SELECTION GUIDE

Part Number	Nominal Input Voltage	Output Voltage	Output Current (Max./Min)	Efficiency	Package Style
	V	V	mA	%	
TPH0505D	5	±5	±200/±20	80	DIP
TPH0509D	5	±9	±110/±11	80	DIP
TPH0512D	5	±12	±84/±8.4	81	DIP
TPH0515D	5	±15	±68/±6.8	84	DIP
TPH0505S	5	±5	±200/±20	80	SIP
TPH0509S	5	±9	±110/±11	80	SIP
TPH0512S	5	±12	±84/±8.4	82	SIP
TPH0515S	5	±15	±68/±6.8	83	SIP
TPH0524S	5	±24	±42/±4.2	84	SIP
TPH1205D	12	±5	±200/±20	80	DIP
TPH1209D	12	±9	±110/±11	83	DIP
TPH1212D	12	±12	±84/±8.4	84	DIP
TPH1215D	12	±15	±68/±6.8	86	DIP
TPH1224D	12	±24	±42/±4.2	85	SIP
TPH1205S	12	±5	±200/±20	80	SIP
TPH1209S	12	±9	±110/±11	83	SIP
TPH1212S	12	±12	±84/±8.4	84	SIP
TPH1215S	12	±15	±68/±6.8	86	SIP
TPH1224S	12	±24	±42/±4.2	85	SIP
TPH1505D	15	±5	±200/±20	80	DIP
TPH1505S	15	±5	±200/±20	80	SIP
TPH1515S	15	±15	±68/±6.8	86	SIP
TPH2405D	24	±5	±200/±20	80	DIP
TPH2409D	24	±9	±110/±11	85	DIP
TPH2412D	24	±12	±84/±8.4	86	DIP
TPH2415D	24	±15	±68/±6.8	86	DIP
TPH2424D	24	±24	±42/±4.2	85	DIP
TPH2405S	24	±5	±200/±20	82	SIP
TPH2409S	24	±9	±110/±11	85	SIP
TPH2412S	24	±12	±84/±8.4	85	SIP
TPH2415S	24	±15	±68/±6.8	85	SIP
TPH2424S	24	±24	±42/±4.2	85	SIP
TPH4805D	48	±5	±200/±20	82	DIP
TPH4809D	48	±9	±110/±11	82	DIP
TPH4812D	48	±12	±84/±8.4	85	DIP
TPH4815D	48	±15	±68/±6.8	85	DIP
TPH4805S	48	±5	±200/±20	82	SIP
TPH4809S	48	±9	±110/±11	83	SIP
TPH4812S	48	±12	±84/±8.4	85	SIP
TPH4815S	48	±15	±68/±6.8	84	SIP

SELECTION GUIDE

Part Number	Nominal Input Voltage	Output Voltage	Output Current(Max./Min)	Efficiency	Package Style
	V	V	mA	%	
TPH0303DA	3.3	3.3	606/60.6	73	DIP
TPH0305DA	3.3	5	400/40	79	DIP
TPH0503DA	5	3.3	606/60.6	74	DIP
TPH0505DA	5	5	400/40	80	DIP
TPH0509DA	5	9	220/22	80	DIP
TPH0512DA	5	12	168/16.8	81	DIP
TPH0515DA	5	15	136/13.6	84	DIP
TPH1205DA	12	5	400/40	80	DIP
TPH1209DA	12	9	220/22	83	DIP
TPH1212DA	12	12	168/16.8	84	DIP
TPH1215DA	12	15	136/13.6	86	DIP
TPH1224DA	12	24	83/8.3	87	DIP
TPH2405DA	24	5	400/40	80	DIP
TPH2409DA	24	9	220/22	85	DIP
TPH2412DA	24	12	168/16.8	86	DIP
TPH2415DA	24	15	136/13.6	86	DIP
TPH2424DA	24	24	84/8.4	85	DIP
TPH4805DA	48	5	400/40	82	DIP
TPH4809DA	48	9	220/22	82	DIP
TPH4812DA	48	12	168/16.8	85	DIP
TPH4815DA	48	15	136/13.6	85	DIP

Add suffix “P” for continuous short circuit protection, for example TPH0505SP.

GENERAL CHARACTERISTICS

Parameter	Conditions	Min.	Typ.	Max.	Units
Switching frequency	3.3V & 5V input		90		kHz
Switching frequency	12V input		90		kHz
Switching frequency	15V input		90		kHz
Switching frequency	24V & 48V input		90		kHz

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	5.5	V
Voltage range	12V input	11	12	13	V
Voltage range	24V input	22	24	26	V
Voltage range	48V input	43	48	53	V

OUTPUT CHARACTERISTICS

Parameter	Conditions	Min.	Max.	Units
Rated Power	TA=-40°C to 85°C		2	W
Voltage Set Point Accuracy	TPH0505D/S	-5	7.5	%
Voltage Set Point Accuracy	All other types	-5	5	%
Line regulation	High VIN to low VIN		1.2	%
Load Regulation(10% load to rated load)	5V output		10	%
Load Regulation(10% load to rated load)	9V output		10	%
Load Regulation(10% load to rated load)	12V output		10	%
Load Regulation(10% load to rated load)	15V output		10	%

ISOLATION CHARACTERISTICS

Parameter	Conditions	Min.	Typ.	Max.	Units
Isolation test voltage	Flash tested for 1 second	3000			VDC
Resistance	Viso= 1000V	1			GΩ

ABSOLUTE MAXIMUM RATINGS

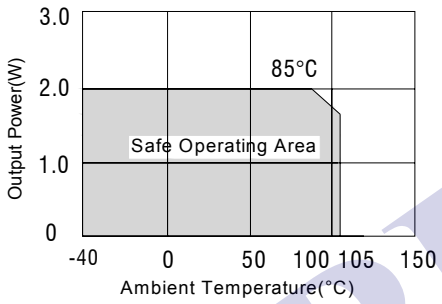
Short-circuit protection	1 second
Lead temperature 1.5mm from case for 10 seconds	300℃
Internal power dissipation	300mW
Input voltage Vin, TPH03	5.5V
Input voltage Vin, TPH05	7V
Input voltage Vin, TPH12	15V
Input voltage Vin, TPH15	18V
Input voltage Vin, TPH24	28V
Input voltage Vin, TPH48	54V

TEMPER ATURE CHARACTERISTICS

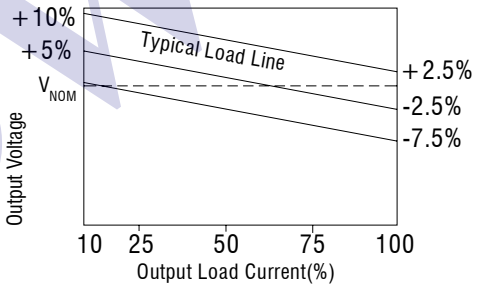
Parameter	Conditions	Min.	Typ.	Max.	Units
Specification	Derating if the temperature ≥85°C	-40		105	℃
Storage		-50		130	℃
Case Temperature above	5V output		33		℃
Case Temperature above	12V output		27		℃
Cooling	Free air convection				

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

TEMPERATURE DERATING GRAPHS

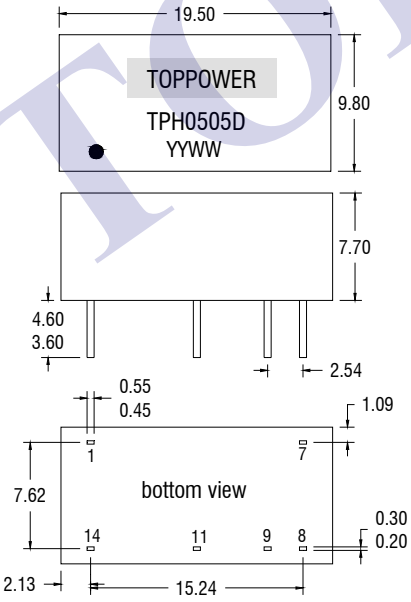


TOLERANCE ENVELOPES

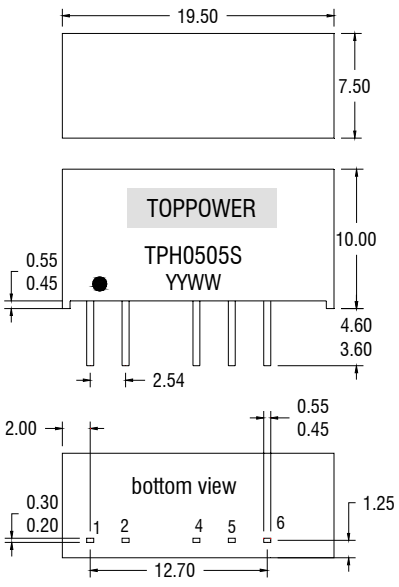


MECHANICAL DIMENSIONS

DIP Package



SIP Package



All dimensions in mm ±0.25mm. All pins on a 2.54 mm pitch and within ±0.25mm of true position.
Weight: 2.85g (DIP) 2.76g (SIP) * Pin not fitted on single output variants.

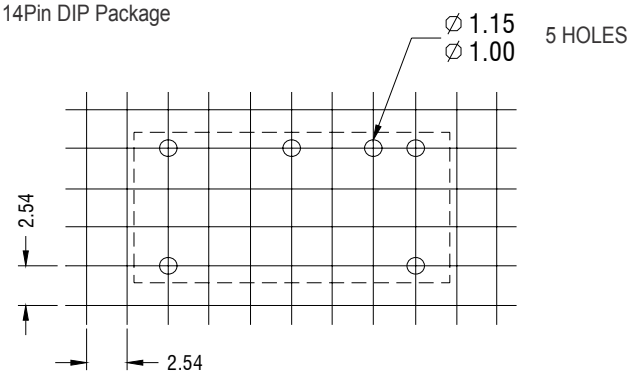
PIN CONNECTIONS

14 PIN DIP	
Pin	Function
1	-Vin
7	NC
8	OV
9	+Vout
11	-Vout
14	+Vin

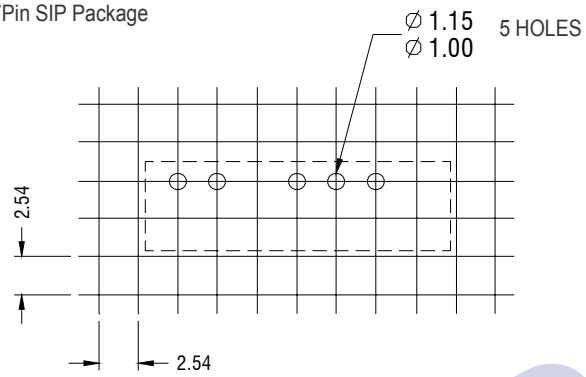
7 PIN SIP	
Pin	Function
1	+Vin
2	-Vin
4	-Vout
5	OV
6	+Vout

RECOMMENDED FOOTPRINT DETAILS

14Pin DIP Package

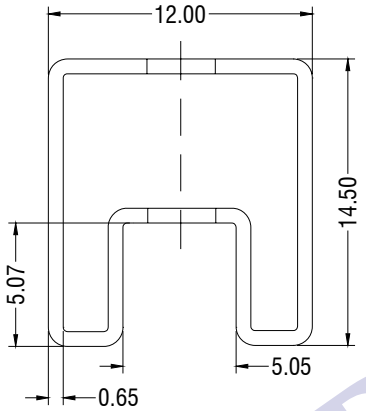


7Pin SIP Package

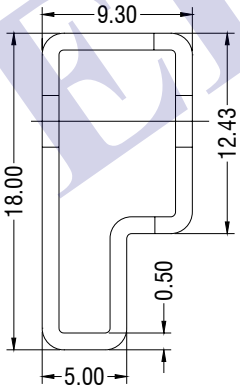


TUBE OUTLINE DIMENSIONS

14Pin DIP Tube



7Pin SIPTube



Unless otherwise stated all dimensions in mm ±0.5mm.

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

Tube length (7 Pin SIP) : 520mm ±2mm.

Tube Quantity:25PCS

SOLDERING INFORMATION

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.