

**DESCRIPTION :** 2W 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 <sup>3</sup>
Operating temperature: -40°C to 85°C	Dual output from a single input rail	UL 94V-0 package material
Power sharing on output	3KVDC isolation	Industry standard pinout
Input voltage: 5V, 12V, 24V, 48V	Output voltage: ±5V,±9V,±12V, ±15V,±24V / 5V,9V,12V,15V, 24V	/

**SELECTION GUIDE**

Part Number	Nominal Input Voltage	Output Voltage	Output Current	Efficiency	Package Style
	V	V	mA	%	
TPH0505D	5	±5	±200	80	DIP
TPH0509D	5	±9	±110	80	DIP
TPH0512D	5	±12	±84	81	DIP
TPH0515D	5	±15	±68	84	DIP
TPH0505S	5	±5	±200	80	SIP
TPH0509S	5	±9	±110	80	SIP
TPH0512S	5	±12	±84	82	SIP
TPH0515S	5	±15	±68	83	SIP
TPH1205D	12	±5	±200	80	DIP
TPH1209D	12	±9	±110	83	DIP
TPH1212D	12	±12	±84	84	DIP
TPH1215D	12	±15	±68	86	DIP
TPH1205S	12	±5	±200	80	SIP
TPH1209S	12	±9	±110	83	SIP
TPH1212S	12	±12	±84	84	SIP
TPH1215S	12	±15	±68	86	SIP
TPH2405D	24	±5	±200	80	DIP
TPH2409D	24	±9	±110	85	DIP
TPH2412D	24	±12	±84	86	DIP
TPH2415D	24	±15	±68	86	DIP
TPH2424D	24	±24	±42	85	DIP
TPH2405S	24	±5	±200	82	SIP
TPH2409S	24	±9	±110	85	SIP
TPH2412S	24	±12	±84	85	SIP
TPH2415S	24	±15	±68	85	SIP
TPH2424S	24	±24	±42	85	SIP
TPH4805D	48	±5	±200	82	DIP
TPH4809D	48	±9	±110	82	DIP
TPH4812D	48	±12	±84	85	DIP
TPH4815D	48	±15	±68	85	DIP
TPH4805S	48	±5	±200	82	SIP
TPH4809S	48	±9	±110	83	SIP
TPH4812S	48	±12	±84	85	SIP
TPH4815S	48	±15	±68	84	SIP

**SELECTION GUIDE**

Part Number	Nominal Input Voltage	Output Voltage	Output Current	Efficiency	Package Style
	V	V	mA	%	
TPH0505DA	5	5	400	80	DIP
TPH0509DA	5	9	220	80	DIP
TPH0512DA	5	12	168	81	DIP
TPH0515DA	5	15	136	84	DIP
TPH1205DA	12	5	400	80	DIP
TPH1209DA	12	9	220	83	DIP
TPH1212DA	12	12	168	84	DIP
TPH1215DA	12	15	136	86	DIP
TPH2405DA	24	5	400	80	DIP
TPH2409DA	24	9	220	85	DIP
TPH2412DA	24	12	168	86	DIP
TPH2415DA	24	15	136	86	DIP
TPH2424DA	24	24	84	85	DIP
TPH4805DA	48	5	400	82	DIP
TPH4809DA	48	9	220	82	DIP
TPH4812DA	48	12	168	85	DIP
TPH4815DA	48	15	136	85	DIP

**GENERAL CHARACTERISTICS**

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

**INPUT CHARACTERISTICS**

Parameter	Conditions	Min.	Typ.	Max.	Units
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**

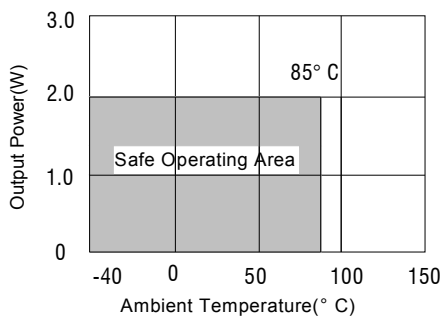
Short-circuit protection	1 second
Lead temperature 1.5mm from case for 10 seconds	300°C
Internal power dissipation	300mW
Input voltage $V_{in}$ , TPH05	7V
Input voltage $V_{in}$ , TPH12	15V
Input voltage $V_{in}$ , TPH24	28V
Input voltage $V_{in}$ , TPH48	54V

**TEMPERATURE CHARACTERISTICS**

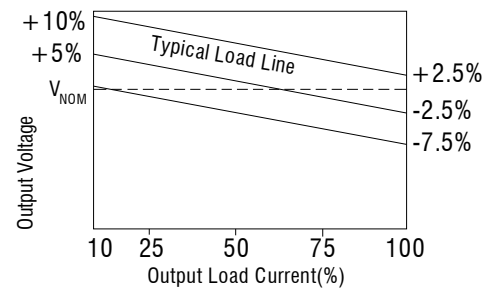
Parameter	Conditions	Min.	Typ.	Max.	Units
Specification	All output	-40		85	°C
Storage		-50		130	°C
Case Temperature above	5V output		33		°C
Case Temperature above	12V output		27		°C
Cooling	Free air convection				

All specifications typical at  $T_A=25^\circ\text{C}$ , nominal input voltage and rated output current unless otherwise

**TEMPERATURE DERATING GRAPHS**

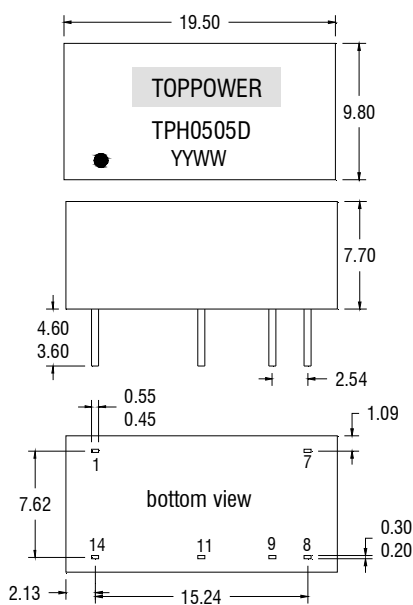


**TOLERANCE ENVELOPES**

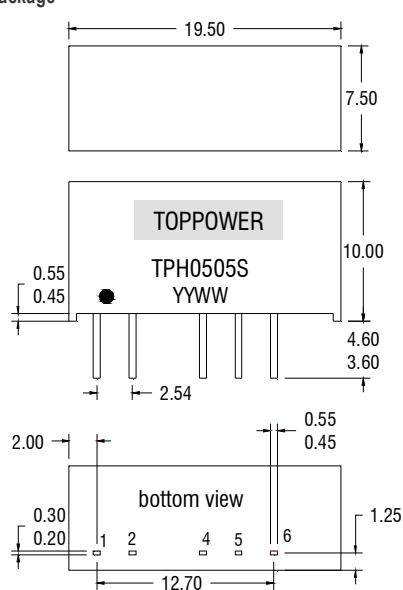


**MECHANICAL DIMENSIONS**

**DIP Package**



**SIP Package**



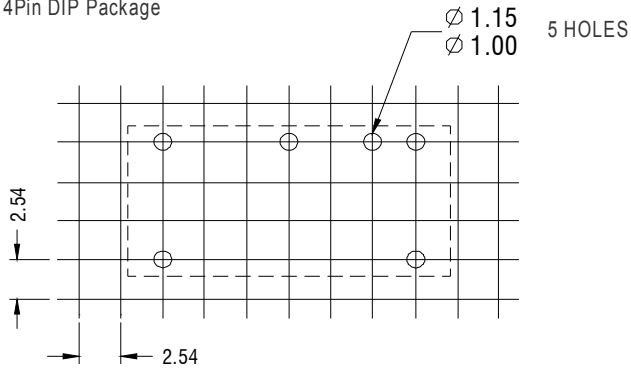
Pin	Function
1	-Vin
7	NC
8	OV
9	+Vout
11	-Vout
14	+Vin

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

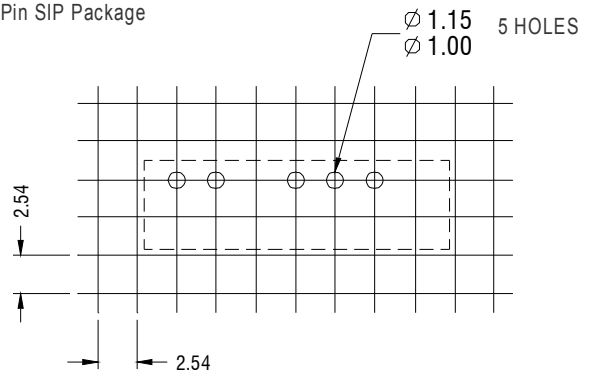
All dimensions in mm  $\pm 0.25\text{mm}$ . All pins on a 2.54 mm pitch and within  $\pm 0.25\text{mm}$  of true position.  
 Weight: 2.85g (DIP) 2.76g (SIP) \* Pin not fitted on single output variants.

**RECOMMENDED FOOTPRINT DETAILS**

14Pin DIP Package

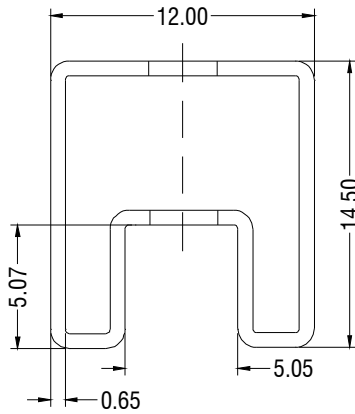


7Pin SIP Package

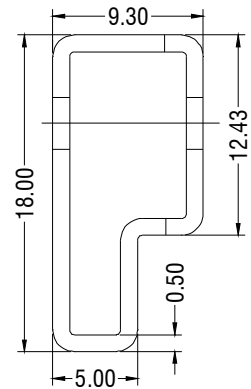


**TUBE OUTLINE DIMENSIONS**

14Pin DIP Tube



7Pin SIPTube



Unless otherwise stated all dimensions in mm  $\pm 0.5$ mm.

Tube length (14 Pin DIP) : 520mm  $\pm 2$ mm.

Tube length (7 Pin SIP) : 520mm  $\pm 2$ mm.

Tube Quantity:25

**SOLDERING INFORMATION**

This series is compatible with RoHS soldering systems with a peak wave solder temperature of 300°C for 10 seconds. Both SIP and DIP types in this series are backward compatible with Sn/Pb soldering systems.