


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

The TPA 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 and 3KVDC isolation.

FEATURES

RoHS compliant	Efficiency up to 80%	Power density up to 0.85W/cm ³
Operating temperature : -40°C to 105°C	Single and 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	Output voltage :3.3V,5V,9V,12V,15V,24V / ±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	%	
TPA0303DA	3.3	3.3	303/30.3	72	DIP
TPA0305DA	3.3	5	200/20	74	DIP
TPA0505DA	5	5	200/20	68	DIP
TPA0509DA	5	9	111/11.1	76	DIP
TPA0512DA	5	12	83/8.3	79	DIP
TPA0515DA	5	15	67/6.7	78	DIP
TPA0524DA	5	24	42/4.2	81	DIP
TPA1203DA	12	3.3	303/30.3	73	DIP
TPA1205DA	12	5	200/20	68	DIP
TPA1209DA	12	9	111/11.1	74	DIP
TPA1212DA	12	12	83/8.3	77	DIP
TPA1215DA	12	15	67/6.7	75	DIP
TPA1505DA	15	5	200/20	71	DIP
TPA1512DA	15	12	111/11.1	77	DIP
TPA1515DA	15	15	67/6.7	80	DIP
TPA0505D	5	±5	±100/±10	67	DIP
TPA0509D	5	±9	±56/±5.6	76	DIP
TPA0512D	5	±12	±43/±4.3	79	DIP
TPA0515D	5	±15	±33/±3.3	78	DIP
TPA0524D	5	±24	±21/±2.1	81	DIP
TPA0505S	5	±5	±100/±10	67	SIP
TPA0509S	5	±9	±56/±5.6	76	SIP
TPA0512S	5	±12	±43/±4.3	79	SIP
TPA0515S	5	±15	±33/±3.3	78	SIP
TPA0524S	5	±24	±21/±2.1	81	SIP
TPA1205D	12	±5	±100/±10	68	DIP
TPA1209D	12	±9	±56/±5.6	74	DIP
TPA1212D	12	±12	±43/±4.3	77	DIP
TPA1215D	12	±15	±33/±3.3	75	DIP
TPA1224D	12	±24	±21/±2.1	81	DIP
TPA1205S	12	±5	±100/±10	68	SIP
TPA1209S	12	±9	±56/±5.6	74	SIP
TPA1212S	12	±12	±43/±4.3	77	SIP
TPA1215S	12	±15	±33/±3.3	75	SIP
TPA1505D	15	±5	±100/±10	71	DIP
TPA1509D	15	±9	±56/±5.6	74	DIP
TPA1512D	15	±12	±43/±4.3	77	DIP
TPA1515D	15	±15	±33/±3.3	80	DIP
TPA1524D	15	±24	±21/±2.1	81	DIP
TPA1505S	15	±5	±100/±10	71	SIP
TPA1512S	15	±12	±43/±4.3	77	SIP
TPA1515S	15	±15	±33/±3.3	80	SIP

Add suffix "P" for continuous short circuit protection, for example TPA0505SP.

INPUT CHARACTERISTICS

Parameter	Conditions	Min.	Typ.	Max.	Units
Voltage range	3.3V input variants	2.9	3.3	3.6	V
Voltage range	5V input variants	4.5	5	5.5	V
Voltage range	12V input variants	10.7	12	13.1	V
Voltage range	15V input variants	13.5	15	16.5	V
Reflected ripple current			22	45	mA p-p

ABSOLUTE MAXIMUM RATINGS

Lead temperature 1.5mm from case for 10 seconds	300°C
Internal power dissipation	450mW
Input voltage Vin, TPA03 variants	5.5V
Input voltage Vin, TPA05 variants	7V
Input voltage Vin, TPA12 variants	15V
Input voltage Vin, TPA15 variants	18V

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

OUTPUT CHARACTERISTICS

Parameter	Conditions	Min.	Typ.	Max.	Units
Rated Power	TA=-40°C to 85°C			1	W
Voltage Set Point Accuracy	See tolerance envelope				
Line regulation	High VIN to low VIN (voltage variation +/-5%)		1.0	1.2	%/%
Load Regulation 10% load to rated load	5V & 12V input 5V output		10	13	%
Load Regulation 10% load to rated load	5V & 12V input 9V output		9	10	%
Load Regulation 10% load to rated load	5V & 12V input 12V output		7	8	%
Load Regulation 10% load to rated load	5V & 12V input 15V output		6	7.0	%
Load Regulation 10% load to rated load	15V input 5V output		6	10	%
Load Regulation 10% load to rated load	15V input 12V output		3	4	%
Load Regulation 10% load to rated load	15V input 15V output		3	4	%
Ripple & Noise	20MHz bandwidth		50	150	mvp-p

ISOLATION CHARACTERISTICS

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

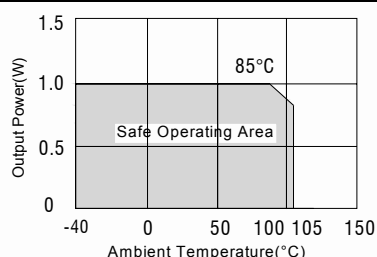
GENERAL CHARACTERISTICS

Parameter	Conditions	Min.	Typ.	Max.	Units
Switching frequency	3.3V input		95		kHz
Switching frequency	5V input		110		kHz
Switching frequency	12V input		130		kHz
Switching frequency	15V input		90		kHz
case material	black DUPONT PRT-SK643FR UL94V-0				

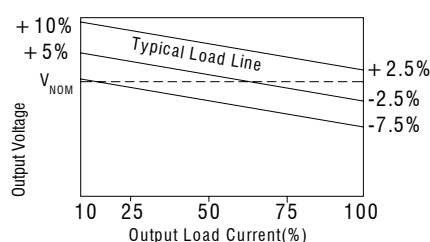
TEMPERATURE CHARACTERISTICS

Parameter	Conditions	Min.	Typ.	Max.	Units
Specification	Derating if the temperature ≥85°C	-40		105	°C
Storage		-50		130	°C
Cooling	Free air convection				

TEMPERATURE DERATING GRAPHS



TOLERANCE ENVELOPES



ELECTROMAGNETIC COMPATIBILITY (EMC)

Emissions	CE	CISPR32/EN55032 CLASS B (see Fig. 2 for recommended circuit)
Emissions	RE	CISPR32/EN55032 CLASS B (see Fig. 2 for recommended circuit)
Immunity	ESD	IEC/EN61000-4-2 Contact $\pm 6\text{KV}$ perf. Criteria B

DESIGN REFERENCE

Typical application

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.1. 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 Table 1.◦

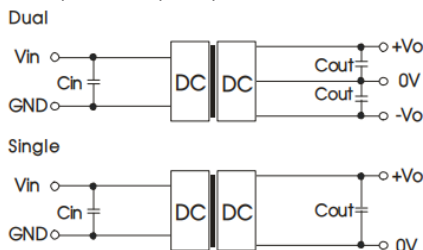


Fig 1

Table 1: Recommended input and output capacitor values

Vin (VDC)	Cin (μF)	Single Vout (VDC)	Cout (μF)	Dual Vout (VDC)	Cout (μF)
3.3/5	4.7	3.3/5	10	±3.3/±5	4.7
9/12	2.2	9/12	2.2	±9/±12	1
15	2.2	15/24	1	±15/±24	0.47
24	1	—	—	—	—

Minimum Output Load Requirement

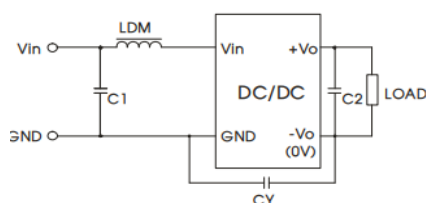


Fig 2

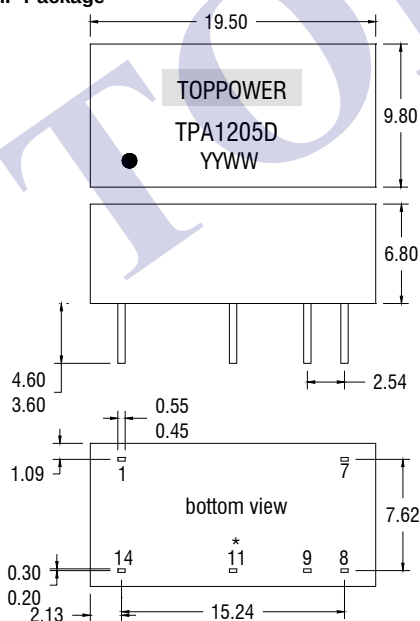
Input voltage (VDC)		3.3/5/9/12	15/24
EMI	C1	4.7 μ F /50V	
	C2	Refer to Cout in Fig 1	
	CY	—	1nF/2kV
	LDM	6.8 μ H	

Note: For 15V/24V input models use a Y-capacitor CY of 1nF/2kV.

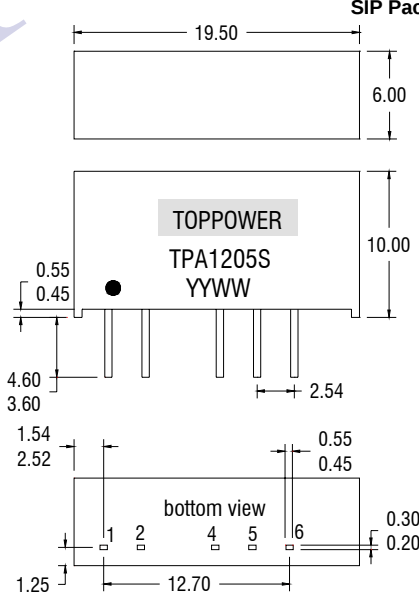
. Minimum Output Load Requirement For a reliable and efficient operation of the converter, the minimum load should never be less than 10% of the rated output load. If the total required output power is below 10%, a parallel bleeding resistor is required on the output, ensuring that the sum of the power consumption is always maintained at 10% minimum.

MECHANICAL DIMENSIONS

DIP Package



SIP Package



All dimensions in mm±0.25mm. All pins on a 2.54mm pitch and within ±0.25mm of true position.

Weight: 2.4g (DIP) 2.1g (SIP)

*Pin not fitted on single output variants

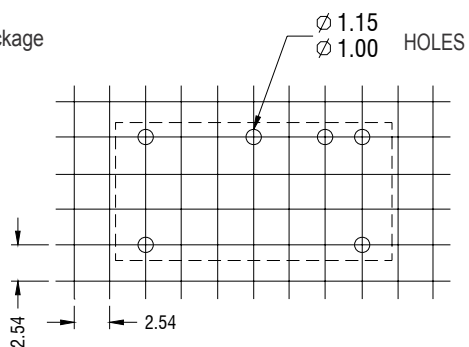
PIN CONNECTIONS

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

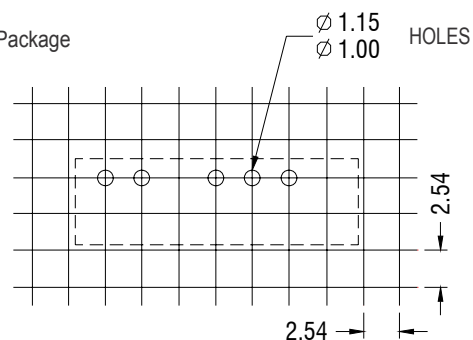
7 PIN SIP	
Pin	Function
1	+Vin
2	-Vin
4	-Vout
5	OV
6	+Vout

REMMENDED FOOTPRINT DETAILS

14 Pin DIP Package

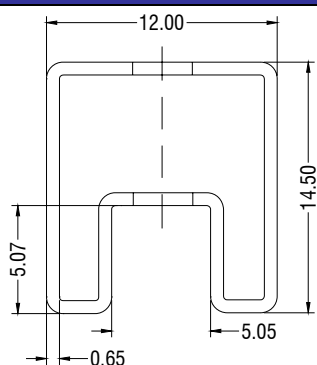


7 Pin SIP Package

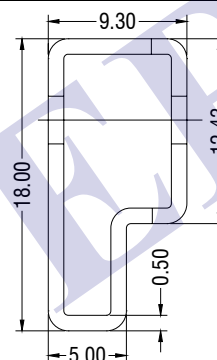


TUBE OUTLINE DIMENSIONS

14Pin DIP Tube



7Pin SIP Tube



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

Tube Quantity : 25PCS

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.