

T1 Series

1W High temperature Single & Dual output

Features

- SIP7 Package
- 1500 VDC Isolation
- Up to 3000 VDC Isolation
- Continuous Short Circuit Protection
- Efficiency up to 82%
- Operation Temperature Range -40 ~ 105°C max.
- Non-Conductive Black Plastic Case



PART NUMBER STRUCTURE

T1 - **12** **05** **SS** **H**
(1) (2) (3) (4) (5)

(1) Series

(2) Input Voltage Range

05 - 4.5-5.5 V
12 - 10.8-13.2 V
24 - 21.6-26.4 V

(4) Case & Output Type

S - SIP Case, Dual Output
SS - SIP Case, Single Output

(3) Output Voltage

05 - 5.0 V
12 - 12 V
15 - 15 V

(5) Isolation Voltage (Optional)

Blank - 1.5 KVDC
H - 3 KVDC

ALL SPECIFICATIONS ARE TYPICAL AT 25°C, NOMINAL INPUT AND FULL LOAD UNLESS OTHERWISE NOTED

Model Number	Input Voltage Range (VDC)	Input Current		Output Voltage (VDC)	Output Current Full Load (mA)	Efficiency @FL (% , typ.)	Capacitive Load @ FL (μ F, max.)
		No-Load (mA, max.)	Full Load (mA, typ.)				
T1-0505SS	4.5-5.5	40	247	5	200	81	220
T1-0512SS	4.5-5.5	40	247	12	83.3	81	100
T1-0515SS	4.5-5.5	40	247	15	66.7	81	100
T1-1205SS	10.8-13.2	18	104	5	200	80	220
T1-1212SS	10.8-13.2	18	102	12	83.3	82	100
T1-1215SS	10.8-13.2	18	103	15	66.7	81	100
T1-2405SS	21.6-26.4	9	51	5	200	81	220
T1-2412SS	21.6-26.4	9	52	12	83.3	80	100
T1-2415SS	21.6-26.4	9	52	15	66.7	80	100
T1-0505S	4.5-5.5	40	247	± 5	± 100	81	± 100
T1-0512S	4.5-5.5	40	247	± 12	± 41.67	81	± 47
T1-0515S	4.5-5.5	40	244	± 15	± 33.33	82	± 47
T1-1205S	10.8-13.2	18	104	± 5	± 100	80	± 100
T1-1212S	10.8-13.2	18	102	± 12	± 41.67	82	± 47
T1-1215S	10.8-13.2	18	102	± 15	± 33.33	82	± 47
T1-2405S	21.6-26.4	9	53	± 5	± 100	79	± 100
T1-2412S	21.6-26.4	9	51	± 12	± 41.67	81	± 47
T1-2415S	21.6-26.4	9	51	± 15	± 33.33	81	± 47

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INPUT SPECIFICATIONS					
Parameter	Conditions	Min.	Typ.	Max.	Unit
Input Voltage Range	5 V Input	4.5	5	5.5	VDC
	12 V Input	10.8	12	13.2	
	24 V Input	21.6	24	26.4	
Input Filter		Capacitor			
Input Reflected Ripple Current (1)			15		mApk-pk
Start up Time	Nominal Vin and constant resistive load		20		ms
Recommended input fuse (slow blow)	5 V Input	0.75			A
	12 V Input	0.3			
	24 V Input	0.15			
Note :					
1. Measured with a simulated source inductance of 12 μ H and a source capacitor Cin (47 μ F, ESR<1.0 Ω at 100kHz).					

OUTPUT SPECIFICATIONS					
Parameter	Conditions	Min.	Typ.	Max.	Unit
Output Voltage Accuracy		See tolerance envelope curve			
Line Regulation	For 1% Vin Change	-1.2		+1.2	%
Load Regulation	From 10% to 100% Load	5 V Input		10	%
		Other Input		7.5	
Cross Regulation	Asymmetrical Load 25% / 100% for Dual Output	-4		+4	
Ripple & Noise (1)	20MHz bandwidth			75	mVpk-pk
Short Circuit Protection		Continuous,auto recovery			
Temperature Coefficient		-0.02		+0.02	%/°C
Maximum Capacitive Load	Minimum Vin and constant resistive load	See Table			
Note :					
1. Measured with a 0.1 μ F MLCC and 10 μ F Electrolytic capacitor.					

ABSOLUTE MAXIMUM RATINGS					
Parameter	Conditions	Min.	Typ.	Max.	Unit
Input Surge Voltage (1 sec)	5 V Input			9	VDC
	12 V Input			18	
	24 V Input			30	
Soldering Temperature	1.5mm from case 10sec max.			260	°C
Note : These are stress ratings. Exposure of devices to any of these conditions may adversely affect long-term reliability.					

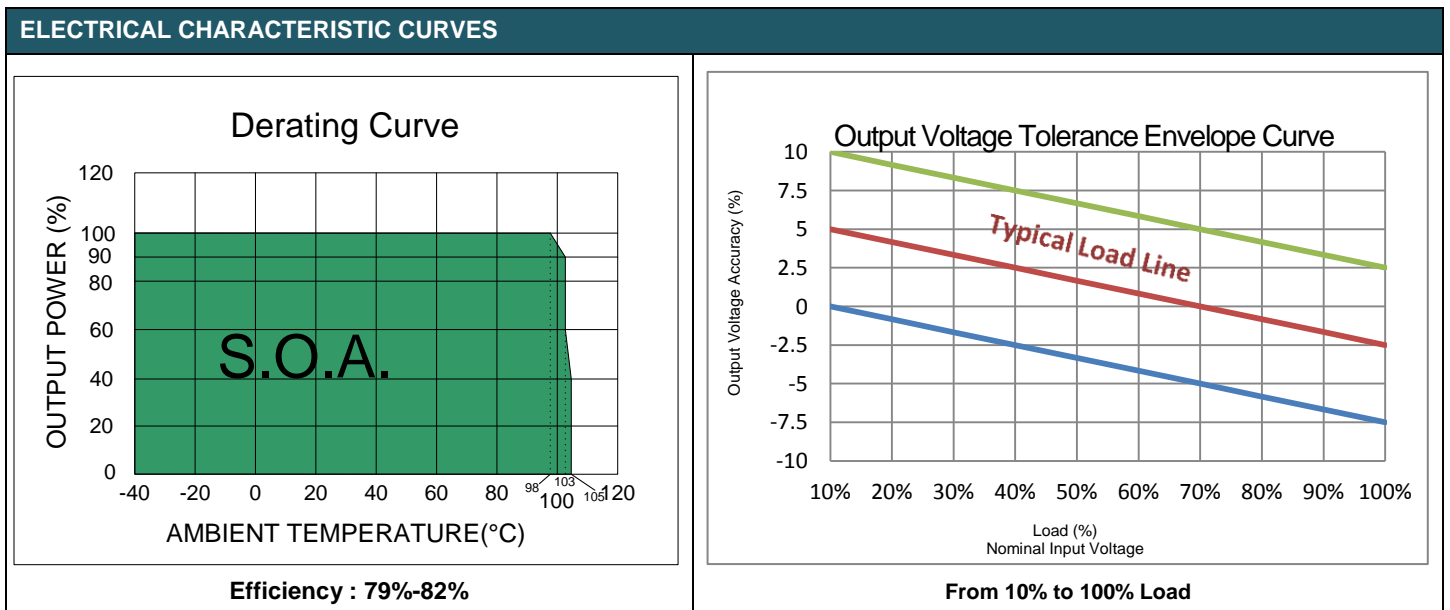
GENERAL SPECIFICATIONS					
Parameter	Conditions	Min.	Typ.	Max.	Unit
Isolation Voltage	Input-output, and rated for 60sec	Standard Type	1500		VDC
		Suffix "H"	3000		
Isolation Resistance	Input-output	1000			M Ω
Isolation Capacitance	Input-output		50		pF
Switching Frequency			50		kHz
MTBF	MIL-HDBK-217 F @ 25°C	3.6			M hours
Safety Standard	IEC / EN / UL 62368-1	Designed to meet			
Environmental compliance		RoHS			

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ENVIRONMENT SPECIFICATIONS					
Parameter	Conditions	Min.	Typ.	Max.	Unit
Operating Ambient Temperature	See the Derating Curve	-40		105	°C
Maximum Case Temperature				115	°C
Thermal Impedance		46.22			°C/W
Storage Humidity				95	% rel. H
Storage Temperature		-55		125	°C
Cooling	Natural Convection	30-65 LFM			

EMC SPECIFICATIONS			
Parameter	Standard	Condition	Criterion
Conducted Emissions	EN55032	with external components	B
Radiated Emissions	EN55032		B
ESD	IEC 61000-4-2	Air ±15kV / Indirect: ±8kV	A
RS	IEC 61000-4-3	10V/m	A
EFT	IEC 61000-4-4	±2.0kV	A
Surge	IEC 61000-4-5	±1.0kV with external components	A
CS	IEC 61000-4-6	10Vrms	A
PFMF	IEC 61000-4-8	30A/m	A

PHYSICAL SPECIFICATIONS	
Parameter	Value
Case Material	Nonconductive Black Plastic (UL94V-0 rated)
Pin Material	Tinned copper
Potting Material	Epoxy (UL94V-0 rated)
Weight	2.4 g, typ.
Dimensions	0.76" x 0.24" x 0.39"

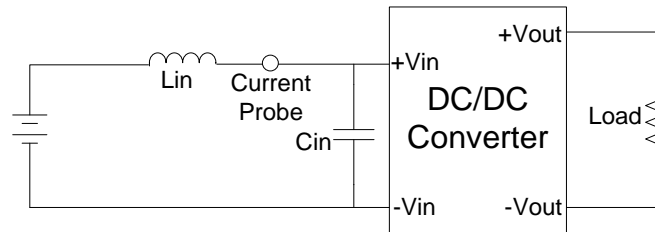


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TEST CONFIGURATIONS

Input Reflected Ripple Current Test Step

Input reflected ripple current is measured with a source inductor L_{in} ($12\mu\text{H}$) and a source capacitor C_{in} ($47\mu\text{F}$, $\text{ESR} < 1.0\Omega$ at 100kHz) at nominal input and full load.



DESIGN & FEATURE CONFIGURATIONS

Isolation Voltage

This series is designed to meet the functional insulation of UL, both input and output should be maintained within SELV limits (less than 42.4V peak, or 60VDC).

The isolation test voltage represents a measure of immunity to transient voltages and the part should never be used as an element of a safety isolation system. The part could be expected to function correctly with hundreds of volts offset applied continuously across the isolation barrier; but then the circuitry on both sides of the barrier must be regarded as operating at an unsafe voltage and further isolation/insulation systems must form a barrier between these circuits and any user-accessible circuitry according to safety standard requirements.

Repeated High-Voltage Isolation Testing

Repeated high-voltage isolation testing of a barrier component can actually degrade isolation capability, to a lesser or greater degree depending on materials, construction and environment.

This series has isolation transformers without additional insulation between primary and secondary windings of enameled wire.

While parts can be expected to withstand several times the stated test voltage, the isolation capability does depend on the wire insulation.

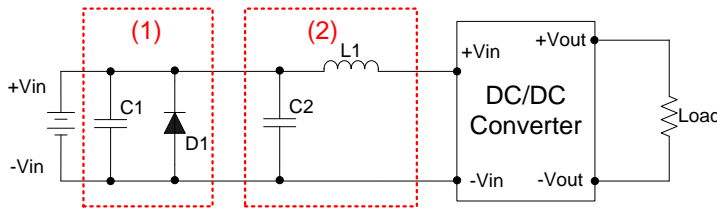
Any material including the enamel (typically polyurethane) is susceptible to eventual chemical degradation when subject to very high applied voltage, thus implying that the number of tests should be strictly limited.

We strongly advise against repeated high voltage isolation testing, but if it is absolutely required, the isolation test voltage should be reduced by 20% from specified test voltage.

DESIGN & FEATURE CONFIGURATIONS

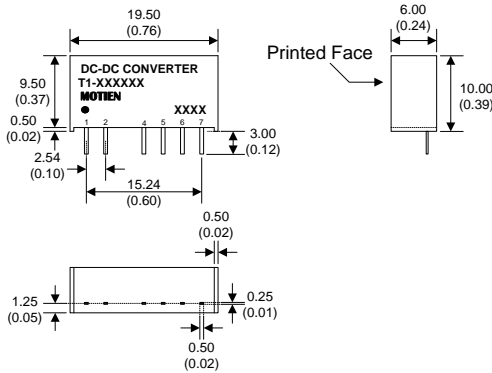
EMC Filter

The part (1) Circuit is used to meet Surge & EFT test, and the part (2) Circuit is used to meet EMI test.



	C1	D1	C2	L
T1-05XXXX	NIPPON Chemi-con KY Series 1000µF, 35V	3.0SMCJ9.0AG	MLCC 4.7µF, 50V	6.8µH
T1-12XXXX		3.0SMCJ18AG		
T1-24XXXX	NIPPON Chemi-con KY Series 330µF, 50V	3.0SMCJ28AG		

MECHANICAL SPECIFICATIONS

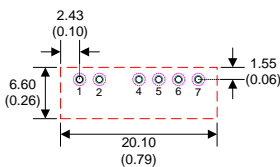


PIN CONNECTIONS				
PIN NUMBER	SINGLE	DUAL	SINGLE-H	DUAL-H
1	+Vin	+Vin	+Vin	+Vin
2	-Vin	-Vin	-Vin	-Vin
4	-Vout	-Vout	N.P.	N.P.
5	N.P.	COM	-Vout	-Vout
6	+Vout	+Vout	N.P.	COM
7	N.P.	N.P.	+Vout	+Vout

N.P. : No PIN

- Notes : All dimensions are typical in millimeters (inches).
1. Pin dimension tolerance: ± 0.05 (± 0.002)
 2. Pin pitch and length tolerance: ± 0.35 (± 0.014)
 3. Pin to case tolerance: ± 0.5 (± 0.02)
 4. Case Tolerance: ± 0.5 (± 0.02)

RECOMMENDED FOOTPRINT DETAILS



- Notes : 1. All dimensions are typical in millimeters (inches).
- Through hole (black) 1~7: $\varnothing 0.80$ (0.031)
 - Top view pad (green) 1~7: $\varnothing 1.00$ (0.039)
 - Bottom view pad (pink) 1~7: $\varnothing 1.60$ (0.063)