



# P-DUKE POWER

## TSD40 Single Series

2 X 3 Inch AC-DC POWER SUPPLIES  
Up to 40 Watts

**3**  
YEARS  
WARRANTY

ROHS  
COMPLIANT

REACH  
COMPLIANT

+85°C  
-40°C  
AMBIENT TEMP.



Automation



Datacom



IPC



Industry



Measurement



Telecom



Medical



Automobile



Boat



Charger



PV



Railway



**3000 VAC**  
Reinforced Insulation

**ADJ.**  
Output Voltage

Internal EN55032 Class **B** Filter

**LOW**  
Leakage Current

**LOW**  
Standby Power

Operating Altitude **5000** meter

**POWER GOOD** Indicator

Protection Class I Class II

**OCP**

**OVP**

**SCP**

### PART NUMBER STRUCTURE

T	S	D	40	U	S	12		-			
Application	Dimension Code	Output Power (W)	Input Voltage (VAC)	Output Quantity	Output Voltage (VDC)	Protection Type	Connector Option	Package Code	Application Option		
Industry Application			U: Universal 85 ~ 264	S: Single	05:5 7P5:7.5 09:9 12:12 15:15 18:18 24:24 241:24 28:28 281:28 36:36 48:48 53:53	<input type="checkbox"/> : CLASS I <input type="checkbox"/> : CLASS II	<input type="checkbox"/> : JST D: Pin Type M: Molex T: Terminal Block	<input type="checkbox"/> : None D1: Din rail type	<input type="checkbox"/> : None C: OVCI A: DC IN		

**TECHNICAL SPECIFICATION** All specifications are typical at 230VAC input, full load and 25°C unless otherwise noted

Model Number	Input Range VAC	Output Voltage VDC	Output Current Natural convection A	Max. Output Power W	Input Power @ No Load W	Efficiency %	Maximum Capacitor Load µF
TSD40US05-D TSD40US05-T	85 ~ 264	5	8	40	0.11	90	16000
TSD40US7P5-D TSD40US7P5-T	85 ~ 264	7.5	5.34	40	0.11	90	7120
TSD40US09-D TSD40US09-T	85 ~ 264	9	4.45	40	0.11	91	4945
TSD40US12-D TSD40US12-T	85 ~ 264	12	3.34	40	0.11	92	2785
TSD40US15-D TSD40US15-T	85 ~ 264	12	3.34	40	0.11	90	2785
TSD40US18-D TSD40US18-T	85 ~ 264	15	2.67	40	0.11	92	1780
TSD40US24-D TSD40US24-T	85 ~ 264	15	2.67	40	0.11	90	1780
TSD40US241-D TSD40US241-T	85 ~ 264	18	2.23	40	0.11	91	1250
TSD40US28-D TSD40US28-T	85 ~ 264	24	1.67	40	0.11	92	700
TSD40US281-D TSD40US281-T	85 ~ 264	28	1.43	40	0.11	91	510
TSD40US36-D TSD40US36-T	85 ~ 264	36	1.12	40	0.11	92	310
TSD40US48-D TSD40US48-T	85 ~ 264	48	0.84	40	0.11	93	175
TSD40US53-D TSD40US53-T	85 ~ 264	53	0.77	40	0.11	92.5	140

INPUT SPECIFICATIONS						
Parameter	Conditions		Min.	Typ.	Max.	Unit
Operating input voltage range	AC input		85		264	VAC
	DC input		120		370	VDC
Input frequency	AC input		47		63	Hz
Input current	100VAC and Full Load				1.0	A
	240VAC and Full Load				0.5	
No load input power	230VAC	Connector type		0.15		Watts
		Pin type		0.11		
Leakage current	264VAC			75		μA
Start up time					1000	ms
Rise time				20		ms
Hold up time	115VAC and Full Load			25		ms
Input inrush current	230VAC			60		A
Input protection	Internal fuse in line and neutral				T3.15A/250VAC	

OUTPUT SPECIFICATIONS						
Parameter	Conditions		Min.	Typ.	Max.	Unit
Output power					40	Watts
Initial set voltage accuracy	230VAC and Full Load		-1.0		+1.0	%
Line regulation	Low Line to High Line at Full Load		-0.2		+0.2	%
Load regulation	No Load to Full Load	5Vout	-0.7		+0.7	%
		Others	-0.5		+0.5	
	10% Load to 90% Load	5Vout	-0.6		+0.6	
		Others	-0.4		+0.4	
Voltage adjustability	Connector type	53Vout	-20		+10	%
		Others	-10		+10	
	Pin type	-10		+10		
Minimum load				0		%
Ripple and noise	Measured by 20MHz bandwidth					mVp-p
	With a 10μF/25V 1206 X7R MLCC	5Vout, 7.5Vout, 9Vout 12Vout, 15Vout, 18Vout		75		
	With a 1μF/50V 1206 X7R MLCC	24Vout, 28Vout, 36Vout		75		
	With a 0.1μF/100V 1206 X7R MLCC	48Vout, 53Vout		150		
Temperature coefficient			-0.02		+0.02	%/°C
Transient response	Load step from 50 ~ 75% change at 2.5A/μs	Peak deviation		600	3	% Vout
		Recovery time				μs
Over voltage protection	% of Vout(nom); Latch mode		125		140	%
Over load protection	% of Iout rated; Hiccup mode			145		%
Short circuit protection						Continuous, automatic recovery

GENERAL SPECIFICATIONS						
Parameter	Conditions		Min.	Typ.	Max.	Unit
Isolation voltage	1 minute (Reinforced insulation)	Input to Output	3000			VAC
		Input (Output) to F.G.	2500			
Isolation resistance	500VDC		0.1			GΩ
Switching frequency	230VAC	5Vout		70		kHz
		Others		120		
Safety approvals (Pending)					IEC/ EN/ UL 62368-1	
Weight		Connector type			295g (10.41oz)	
		Pin type			265g (9.35oz)	
MTBF	MIL-HDBK-217F, Full load				1.257 x 10 <sup>6</sup>	hrs

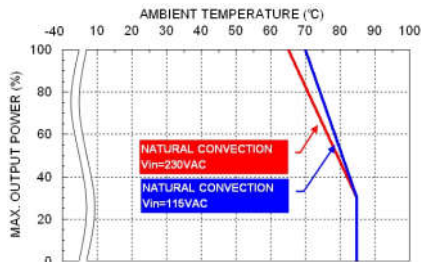
## ENVIRONMENTAL SPECIFICATIONS

Parameter	Conditions	Min.	Typ.	Max.	Unit
Operating ambient temperature	Natural convection With derating	-40		+85	°C
Storage temperature range		-40		+85	°C
Operating altitude				5000	m
Shock					IEC60068-2-27
Vibration					IEC60068-2-6
Relative humidity	Non-condensing				5% to 95% RH

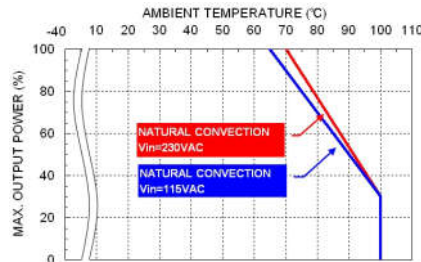
## EMC SPECIFICATIONS

Parameter	Conditions	Level
EMI	EN55032 and FCC Part 15 External components may be required for class I application.	Conducted Radiated Class B Class B
Harmonic currents	EN61000-3-2 Full Load	Class A
Voltage flicker	EN61000-3-3	
EMS	EN55024	
ESD	EN61000-4-2 Air ± 15kV and Contact ± 6kV	Perf. Criteria A
Radiated immunity	EN61000-4-3 20 V/m	Perf. Criteria A
Fast transient	EN61000-4-4 ± 4kV	Perf. Criteria A
Surge	EN61000-4-5 DM ± 2kV and CM ± 4kV	Perf. Criteria A
Conducted immunity	EN61000-4-6 20 Vr.m.s	Perf. Criteria A
Power frequency magnetic field	EN61000-4-8 100 A/m	Perf. Criteria A
Dip and interruptions	EN61000-4-11	

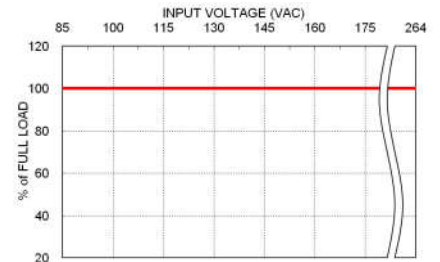
## CHARACTERISTIC CURVE



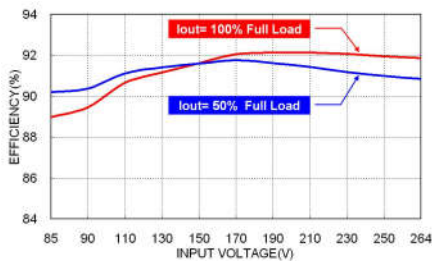
Derating Curve vs. Ambient Temperature  
Connector Option : (□) : JST



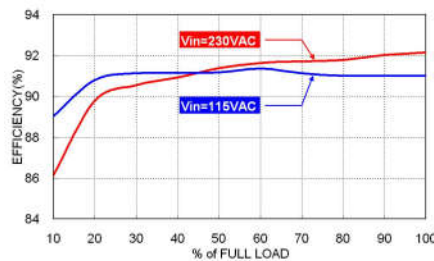
Derating Curve vs. Ambient Temperature  
Connector Option : (-M / -T / -D)



TSD40 Derating Curve vs. Input Voltage



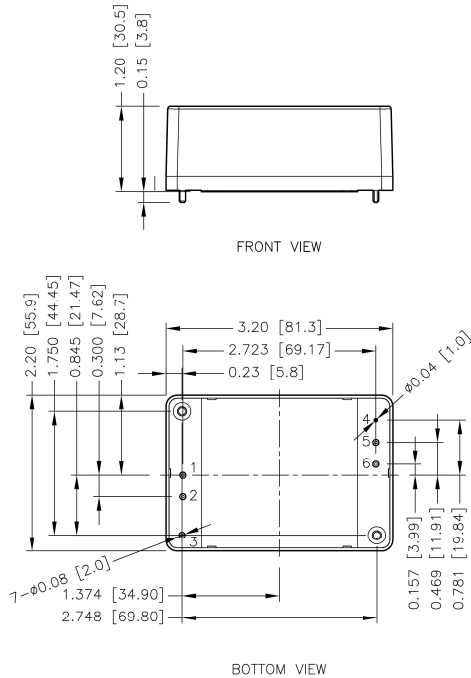
TSD40US24 Efficiency VS Input Voltage



TSD40US24 Efficiency VS Output Load

## MECHANICAL DRAWING

TSD -D Pin Type



### PIN CONNECTION FOR CLASS I : (TSD40USXX-D)

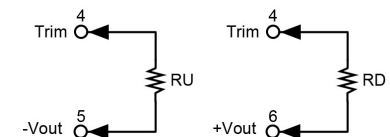
PIN	SINGLE	DIAMETER
1	Neutral	0.08 Inch
2	Line	0.08 Inch
3	PE	0.08 Inch
4	Trim	0.04 Inch
5	-Vout	0.08 Inch
6	+Vout	0.08 Inch

### FOR CLASS II: (TSD40USXXB-D)

PIN	SINGLE	DIAMETER
1	Neutral	0.08 Inch
2	Line	0.08 Inch
3	No Pin	No Pin
4	Trim	0.04 Inch
5	-Vout	0.08 Inch
6	+Vout	0.08 Inch

### EXTERNAL OUTPUT TRIMMING

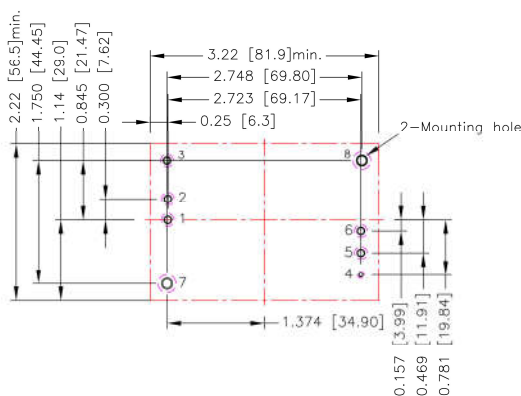
Output can be externally trimmed by using the method shown below.



1. All dimensions in inch [mm]
2. Tolerance :x.xx±0.02 [x.x±0.5]  
x.xxx±0.010 [x.xx±0.25]

## RECOMMENDED PAD LAYOUT

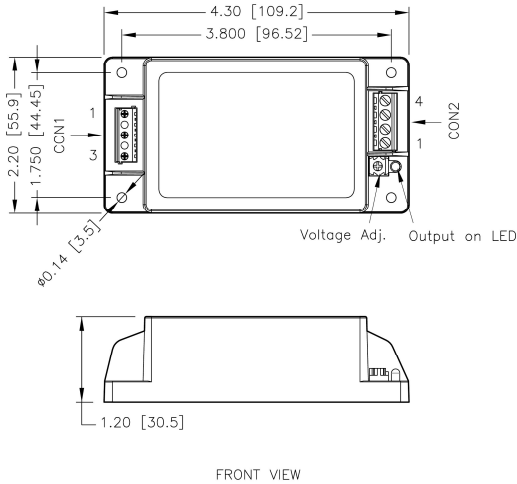
TSD -D Pin type



1. All dimensions in inch [mm]
- Pad size (lead free recommended)
- Through hole 4:  $\phi$ 0.051 [1.30]
- Through hole 1.2.3.5.6:  $\phi$ 0.091 [2.30]
- Through hole of mounting:  $\phi$ 0.126 [3.20]
- Top view pad 4:  $\phi$ 0.064 [1.63]
- Top view pad 1.2.3.5.6:  $\phi$ 0.113 [2.88]
- Top view pad of mounting:  $\phi$ 0.157 [4.00]
- Bottom view pad 4:  $\phi$ 0.102 [2.60]
- Bottom view pad 1.2.3.5.6:  $\phi$ 0.181 [4.60]
- Bottom view pad of mounting:  $\phi$ 0.252 [6.40]
2. The screw locked torque: MAX 3.5Kgf.cm/0.34N.m

## MECHANICAL DRAWING

TSD-**T** Connector type



### CONNECTORS CONNECTION

#### FOR CLASS I: (TSD40USXX-T)

CON1 – Input Connector	
Pin 1	PE
Pin 2	Line
Pin 3	Neutral
CON2 – Output Connector	
Pin 1,2	-Vout
Pin 3,4	+Vout

#### FOR CLASS II: (TSD40USXXB-T)

CON1 – Input Connector	
Pin 2	Line
Pin 3	Neutral
CON2 – Output Connector	
Pin 1,2	-Vout
Pin 3,4	+Vout

1. All dimensions in inch [mm]  
 Tolerance : x.xx±0.02 [x.x±0.5]  
 x.xxx±0.010 [x.xx±0.25]

## CONNECTOR OPTIONS

### FOR CLASS I

Blank: JST Type

Mates with housing  
 CON1: **VHR-5N**  
 CON2: **VHR-4N**



Crimp terminals  
 CON1: **SVH-21T-P1.1**  
 CON2: **SVH-21T-P1.1**

**-M**

Molex Type

Mates with housing  
 CON1: **09-50-8051**  
 CON2: **09-50-8041**



Crimp terminals  
 CON1: **SD-2478**  
 CON2: **SD-2478**

**-T**

Terminal Block

Mates with  
**Screw locked torque**  
**MAX 2Kgf.cm/0.2N.m**



**Wire dimension range**  
**26 ~ 16AWG**

### FOR CLASS II

Blank: JST Type

Mates with housing  
 CON1: **VHR-3N**  
 CON2: **VHR-4N**



Crimp terminals  
 CON1: **SVH-21T-P1.1**  
 CON2: **SVH-21T-P1.1**

**-M**

Molex Type

Mates with housing  
 CON1: **09-50-8031**  
 CON2: **09-50-8041**



Crimp terminals  
 CON1: **SD-2478**  
 CON2: **SD-2478**

**-T**

Terminal Block

Mates with  
**Screw locked torque**  
**MAX 2Kgf.cm/0.2N.m**



**Wire dimension range**  
**26 ~ 16AWG**