

## Thyristor Surge Suppressors (TSS) Data Sheet

### Description

**DO-15/DO-201 Thyristor** solid state protection thyristor protect telecommunications equipment such as modems, line cards, fax machines, and other CPE.

P Series devices are used to enable equipment to meet various regulatory requirements including GR 1089, ITU K.20, K.21 and K.45, IEC 60950, UL 60950, and TIA-968 (formerly known as FCC Part 68).



### Features

Compared to surge suppression using other technologies, P Series devices offer absolute surge protection regardless of the surge current available and the rate of applied voltage (dv/dt). P Series devices:

- Cannot be damaged by voltage
- Eliminate hysteresis and heat dissipation typically found with clamping devices
- Eliminate voltage overshoot caused by fast-rising transients
- Are non-degenerative
- Will not fatigue
- Have low capacitance, making them ideal for high-speed transmission equipment
- Meets MSL level 1, per J-STD-020
- Safety certification: UL: E244458

### Electrical Parameters

Parameter	Definition
$V_{DRM}$	<b>Peak Off-state Voltage</b> – maximum voltage that can be applied while maintaining off state
$V_S$	<b>Switching Voltage</b> – maximum voltage prior to switching to on state
$V_T$	<b>On-state Voltage</b> – maximum voltage measured at rated on-state current
$I_{DRM}$	<b>Leakage Current</b> – maximum peak off-state current measured at $V_{DRM}$
$I_S$	<b>Switching Current</b> – maximum current required to switch to on state
$I_T$	<b>On-state Current</b> – maximum rated continuous on-state current
$I_H$	<b>Holding Current</b> – minimum current required to maintain on state
$C_O$	<b>Off-state Capacitance</b> – typical capacitance measured in off state
$I_{PP}$	<b>Peak Pulse Current</b> – maximum rated peak impulse current
$I_{TSM}$	<b>Peak One-cycle Surge Current</b> – maximum rated one-cycle AC current
$di/dt$	<b>Rate of Rise of Current</b> – maximum rated value of the acceptable rate of rise in current over time

**Electrical Characteristics**

Part Number	V <sub>DRM</sub> (V)	V <sub>S</sub> (V)	V <sub>T</sub> (V)	I <sub>DRM</sub> (μA)	I <sub>S</sub> (mA)	I <sub>T</sub> (A)	I <sub>H</sub> (mA)	C <sub>O</sub> (pF)	Marking
P0080LA	6	25	4	5	800	2.2	50	50	P008LA
P0080LB	6	25	4	5	800	2.2	50	85	P008LB
P0080LC	6	25	4	5	800	2.2	50	110	P008LC
P0300LA	25	40	4	5	800	2.2	50	70	P03LA
P0300LB	25	40	4	5	800	2.2	50	85	P03LB
P0300LC	25	40	4	5	800	2.2	50	110	P03LC
P0640LA	58	77	4	5	800	2.2	150	50	P06LA
P0640LB	58	77	4	5	800	2.2	150	60	P06LB
P0640LC	58	77	4	5	800	2.2	150	100	P06LC
P0720LA	65	88	4	5	800	2.2	150	50	P07LA
P0720LB	65	88	4	5	800	2.2	150	60	P07LB
P0720LC	65	88	4	5	800	2.2	150	100	P07LC
P0900LA	75	98	4	5	800	2.2	150	45	P09LA
P0900LB	75	98	4	5	800	2.2	150	55	P09LB
P0900LC	75	98	4	5	800	2.2	150	90	P09LC
P1100LA	90	130	4	5	800	2.2	150	45	P11LA
P1100LB	90	130	4	5	800	2.2	150	55	P11LB
P1100LC	90	130	4	5	800	2.2	150	90	P11LC
P1300LA	120	160	4	5	800	2.2	150	45	P13LA
P1300LB	120	160	4	5	800	2.2	150	55	P13LB
P1300LC	120	160	4	5	800	2.2	150	90	P13LC
P1500LA	140	180	4	5	800	2.2	150	40	P15LA
P1500LB	140	180	4	5	800	2.2	150	60	P15LB
P1500LC	140	180	4	5	800	2.2	150	85	P15LC
P1800LA	170	220	4	5	800	2.2	150	40	P18LA
P1800LB	170	220	4	5	800	2.2	150	60	P18LB
P1800LC	170	220	4	5	800	2.2	150	85	P18LC
P2300LA	190	260	4	5	800	2.2	150	35	P23LA
P2300LB	190	260	4	5	800	2.2	150	55	P23LB
P2300LC	190	260	4	5	800	2.2	150	80	P23LC

**Electrical Characteristics**

Part Number	V <sub>DRM</sub> (V)	V <sub>S</sub> (V)	V <sub>T</sub> (V)	I <sub>DRM</sub> (μA)	I <sub>S</sub> (mA)	I <sub>T</sub> (A)	I <sub>H</sub> (mA)	C <sub>O</sub> (pF)	Marking
P2600LA	220	300	4	5	800	2.2	150	35	P26LA
P2600LB	220	300	4	5	800	2.2	150	50	P26LB
P2600LC	220	300	4	5	800	2.2	150	80	P26LC
P3100LA	275	350	4	5	800	2.2	150	30	P31LA
P3100LB	275	350	4	5	800	2.2	150	45	P31LB
P3100LC	275	350	4	5	800	2.2	150	65	P31LC
P3500LA	320	400	4	5	800	2.2	150	30	P35LA
P3500LB	320	400	4	5	800	2.2	150	40	P35LB
P3500LC	320	400	4	5	800	2.2	150	65	P35LC

**Notes:**

- All measurements are made at an ambient temperature of 25°C. I<sub>PP</sub> applies to -40°C through +85°C temperature range.
- Off-state capacitance(C<sub>O</sub>) is measured at 1 MHz with a 2V bias and is typical value.
- For individual “LA”, “LB” and “LC” surge ratings, see table below.

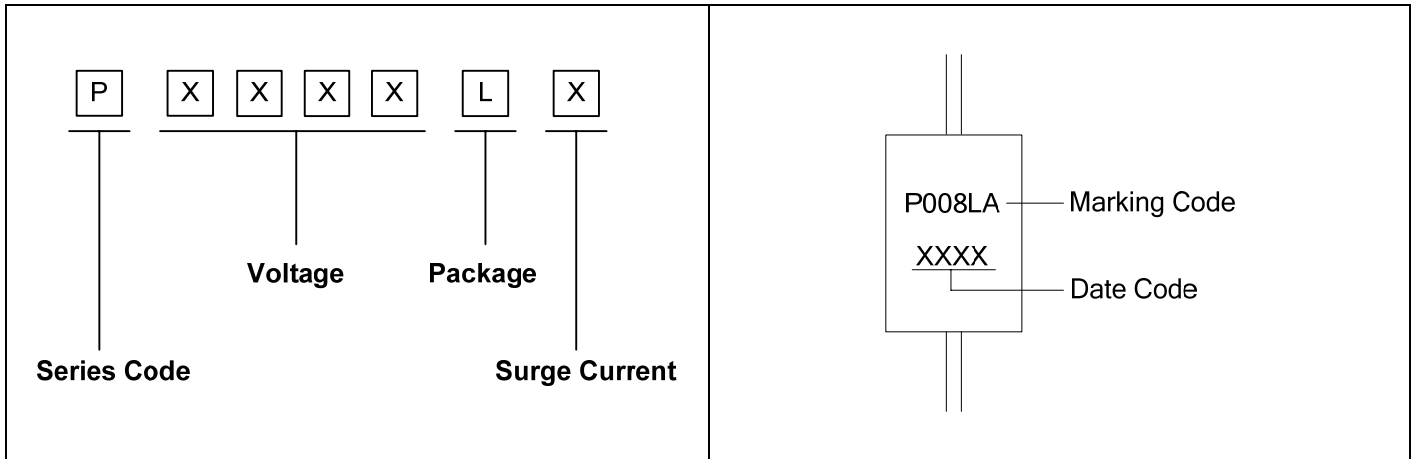
**Surge Ratings**

Series	I <sub>PP</sub> 2×10μs (A)	I <sub>PP</sub> 8×20μs (A)	I <sub>PP</sub> 10×160μs (A)	I <sub>PP</sub> 10×560μs (A)	I <sub>PP</sub> 10×1000μs (A)	I <sub>TSM</sub> 60Hz (A)	di/dt (A/μs)
A	150	150	90	50	45	20	500
B	250	250	150	100	80	30	500
C	500	400	200	150	100	50	500

**Thermal Considerations**

Symbol	Parameter	Value		Unit
		DO-15 (A/B Series)	DO-201 (C Series)	
T <sub>J</sub>	Operating Junction Temperature	-40 to +150	-40 to +150	°C
T <sub>S</sub>	Storage Temperature Range	-40 to +150	-40 to +150	°C
R <sub>θJA</sub>	Junction to Ambient on printed circuit	90	70	°C/W

Part Number Code and Marking



Characteristics Curves

Figure 1. V-I Characteristics

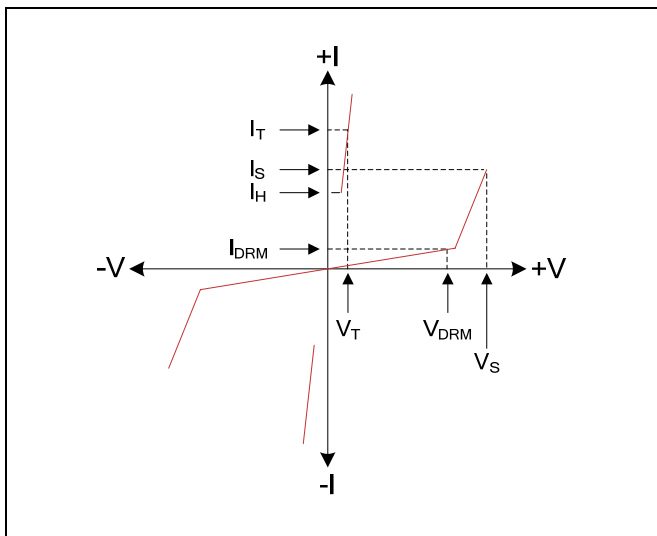


Figure 2.  $t_r \times t_d$  Pulse Wave-form

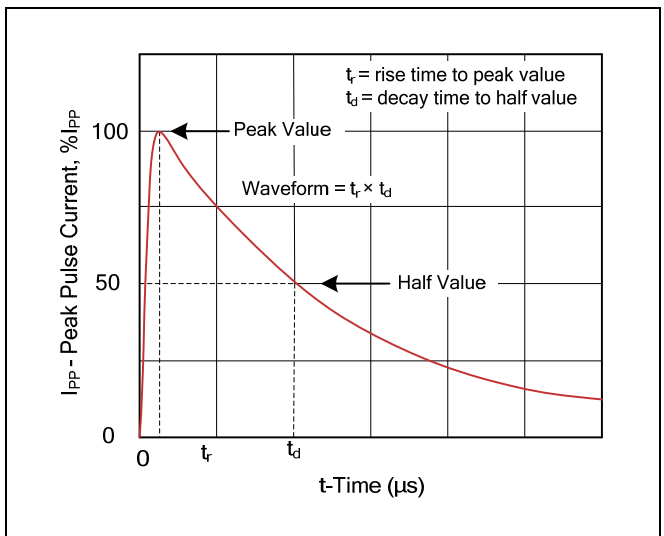


Figure 3. Normalized  $V_S$  Change versus Junction Temperature

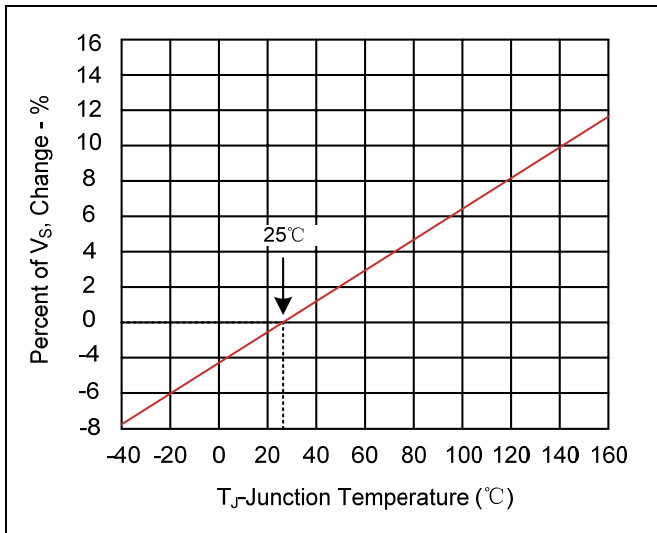
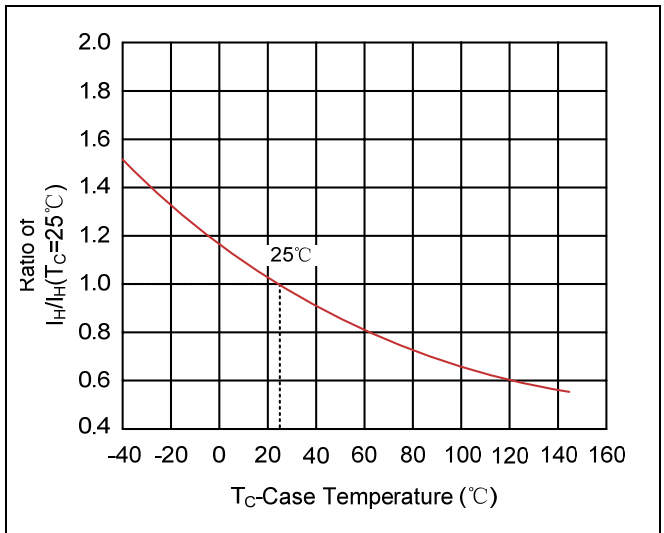
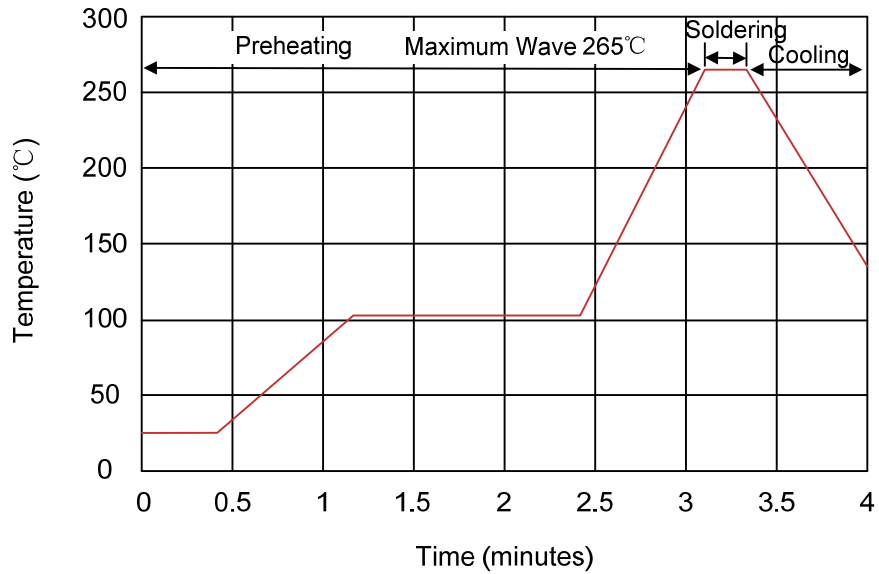


Figure 4. Normalized DC Holding Current versus Case Temperature



**Recommended Soldering Conditions**

Wave Soldering

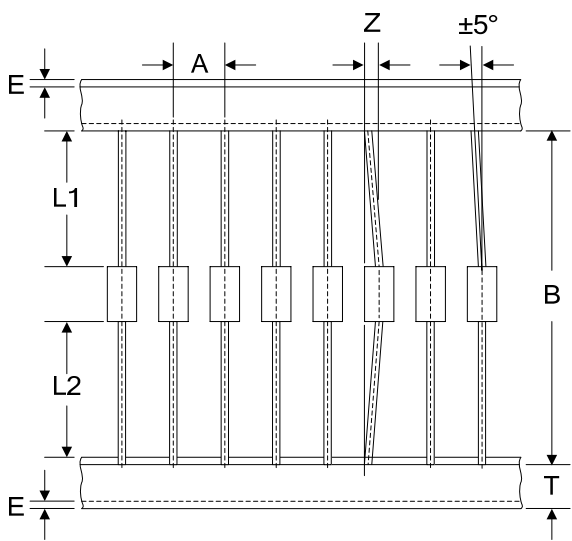
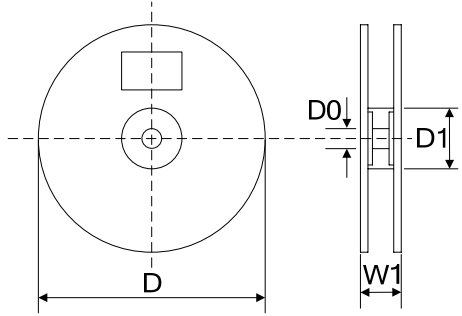


Item	Conditions
Peak Temperature	265°C
Dipping Time	10 seconds
Soldering	1 time

**Dimensions (DO-15/DO-201)**

DO-15 (LA & LB Series)	Symbol	Millimeters		Inches		
		Min.	Max.	Min.	Max.	
	L	25.40	-	1.000	-	
	T	5.80	7.60	0.230	0.300	
	$\Phi D$	2.60	3.60	0.104	0.140	
	$\Phi d$	0.70	0.90	0.028	0.035	
DO-201 (LC Series)	Symbol	Millimeters		Inches		
		Min.	Max.	Min.	Max.	
		L	25.40	-	1.000	-
		T	7.20	9.50	0.283	0.374
	$\Phi D$	4.80	5.30	0.189	0.209	
$\Phi d$	0.96	1.07	0.038	0.042		

**Packaging**

Tape	Symbol	Dimension (mm)	
		DO-15	DO-201
	A	5.0±0.5	10.0±0.5
	B	53.0±1.0	53.0±1.0
	Z	1.2Max.	1.2Max.
	T	6.0±0.4	6.0±0.4
	E	0.8Max.	0.8Max.
	L1-L2	1.0Max.	1.0Max.
	Reel	D	330.0±3.0
	D0	16.4±2.0	16.4±2.0
	D1	86.0±2.0	86.0±2.0
	W1	76.0±3.0	76.0±3.0
	Quantity	4000PCS	1200PCS