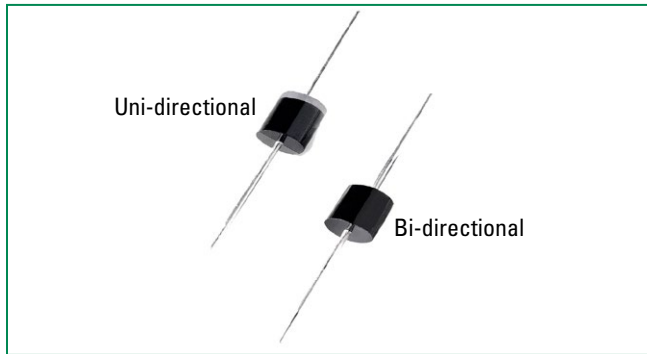




THE DATASHEET OF TP5KP33CA



TP5KP Series



Agency Approvals

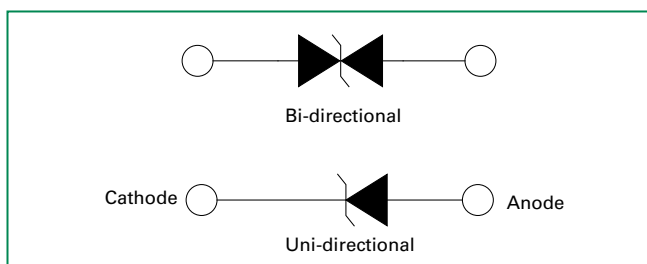
AGENCY	AGENCY FILE NUMBER
	E230531

Maximum Ratings and Thermal Characteristics (T_A=25°C unless otherwise noted)

Parameter	Symbol	Value	Unit
Peak Pulse Power Dissipation by 10/1000µs Test Waveform (Fig.2) (Note 1)	P _{PPM}	5	kW
Steady State Power Dissipation on Infinite Heat Sink at T _L =75°C	P _D	8.0	W
Peak Forward Surge Current, 8.3ms Single Half Sine Wave Unidirectional Only (Note 2)	I _{FSM}	400	A
Maximum Instantaneous Forward Voltage at 100A for Unidirectional Only (Note 3)	V _F	3.5	V
Operating Junction Temperature Range	T _J	-55 to 150	°C
Storage Temperature Range	T _{STG}	-55 to 175	°C
Typical Thermal Resistance Junction to Lead	R _{θJL}	8.0	°C/W
Typical Thermal Resistance Junction to Ambient	R _{θJA}	40	°C/W

- Notes:**
1. Non-repetitive current pulse per Fig. 4 and derated above T_J (initial) =25°C per Fig. 3.
 2. Measured on 8.3ms single half sine wave or equivalent square wave, duty cycle=4 per minute maximum.

Functional Diagram



Description

The TP5KP Series is designed specifically to protect sensitive electronic equipment from voltage transients induced by lightning and other transient voltage events.


Features

- Hi reliability application and automotive grade AEC Q101 qualified
- Glass passivated chip junction in P600 package
- 5 kW peak pulse capability at 10/1000µs waveform, repetition rate (duty cycles):0.01%
- Fast response time: typically less than 1.0ps from 0 Volts to V_{BR} min
- Excellent clamping capability
- Typical failure mode is short from over-specified voltage or current
- Whisker test is conducted based on JEDEC JESD201A per its table 4a and 4c
- IEC-61000-4-2 ESD 30kV(Air), 30kV (Contact)
- EFT protection of data lines in accordance with IEC 61000-4-4
- Low incremental surge resistance
- Typical I_R less than 2µA when V_{BR} min>12V
- High temperature to reflow soldering guaranteed: 260°C/10sec / 0.375" (9.5mm) lead length, 5 lbs., (2.3kg) tension
- V_{BR} @ T_J = V_{BR} @ 25°C x (1 + α T x (T_J - 25)) (α T: Temperature Coefficient, typical value is 0.1%)
- UL Recognized compound meeting flammability rating V-0
- Matte tin lead-free plated
- Halogen free and RoHS compliant
- Pb-free E3 means 2nd level interconnect is Pb-free and the terminal finish material is tin(Sn) (IPC/ JEDEC J-STD-609A.01)

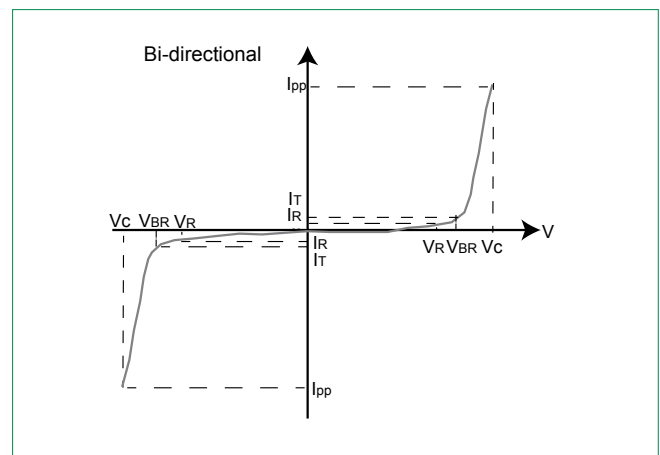
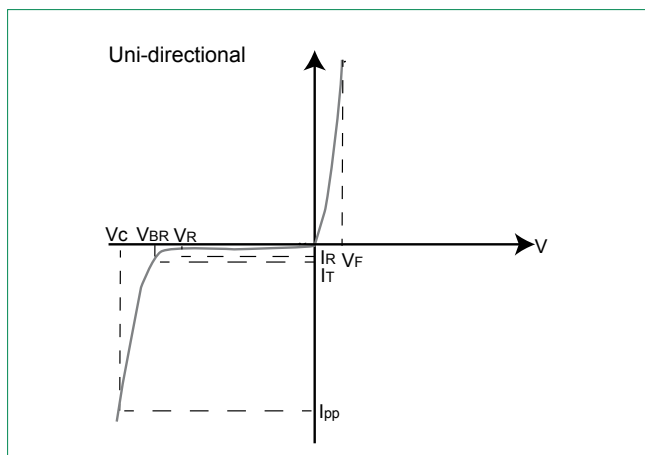
Applications

TVS Components are ideal for the protection of I/O interfaces, V_{CC} bus and other vulnerable circuits used in telecom, computer, industrial and consumer electronic applications.

Electrical Characteristics ($T_A=25^{\circ}\text{C}$ unless otherwise noted)

Part Number (Uni)	Part Number (Bi)	Reverse Stand off Voltage V_R (Volts)	Breakdown Voltage V_{BR} (Volts) @ I_T		Test Current I_T (mA)	Maximum Clamping Voltage $V_C @ I_{PP}$ (V)	Maximum Peak Pulse Current I_{PP} (A)	Maximum Reverse Leakage $I_R @ V_R$ (μA)	Agency Recognition 
			MIN	MAX					
TP5KP11A	TP5KP11CA	11.0	12.20	13.50	5	18.2	280.2	2	X
TP5KP12A	TP5KP12CA	12.0	13.30	14.70	5	19.9	256.3	2	X
TP5KP13A	TP5KP13CA	13.0	14.40	15.90	5	21.5	237.2	2	X
TP5KP14A	TP5KP14CA	14.0	15.60	17.20	5	23.2	219.8	2	X
TP5KP15A	TP5KP15CA	15.0	16.70	18.50	5	24.4	209.0	2	X
TP5KP16A	TP5KP16CA	16.0	17.80	19.70	5	26.0	196.2	2	X
TP5KP17A	TP5KP17CA	17.0	18.90	20.90	5	27.6	184.8	2	X
TP5KP18A	TP5KP18CA	18.0	20.00	22.10	5	29.2	174.7	2	X
TP5KP20A	TP5KP20CA	20.0	22.20	24.50	5	32.4	157.4	2	X
TP5KP22A	TP5KP22CA	22.0	24.00	26.90	5	35.5	143.7	2	X
TP5KP24A	TP5KP24CA	24.0	26.70	29.50	5	38.9	131.1	2	X
TP5KP26A	TP5KP26CA	26.0	28.90	31.90	5	42.1	121.1	2	X
TP5KP28A	TP5KP28CA	28.0	31.10	34.40	5	45.4	112.3	2	X
TP5KP30A	TP5KP30CA	30.0	33.30	36.80	5	48.4	105.4	2	X
TP5KP33A	TP5KP33CA	33.0	36.70	40.60	5	53.3	95.7	2	X
TP5KP36A	TP5KP36CA	36.0	40.00	44.20	5	58.1	87.8	2	X
TP5KP40A	TP5KP40CA	40.0	44.40	49.10	5	64.5	79.1	2	X
TP5KP43A	TP5KP43CA	43.0	47.80	52.80	5	69.4	73.5	2	X
TP5KP45A	TP5KP45CA	45.0	50.00	55.30	5	72.7	70.2	2	X
TP5KP48A	TP5KP48CA	48.0	53.30	58.90	5	77.4	65.9	2	X
TP5KP51A	TP5KP51CA	51.0	56.70	62.70	5	82.4	61.9	2	X
TP5KP54A	TP5KP54CA	54.0	60.00	66.30	5	87.1	58.6	2	X
TP5KP58A	TP5KP58CA	58.0	64.40	71.20	5	93.6	54.5	2	X
TP5KP60A	TP5KP60CA	60.0	66.70	73.70	5	96.8	52.7	2	X

I-V Curve Characteristics



- P_{PPM} Peak Pulse Power Dissipation** – Max power dissipation
- V_R Stand-off Voltage** – Maximum voltage that can be applied to the TVS without operation
- V_{BR} Breakdown Voltage** – Maximum voltage that flows through the TVS at a specified test current (I_T)
- V_C Clamping Voltage** – Peak voltage measured across the TVS at a specified I_{ppm} (peak impulse current)
- I_R Reverse Leakage Current** – Current measured at V_R
- V_F Forward Voltage Drop for Uni-directional**

Ratings and Characteristic Curves ($T_A=25^\circ\text{C}$ unless otherwise noted)

Figure 1 - TVS Transients Clamping Waveform

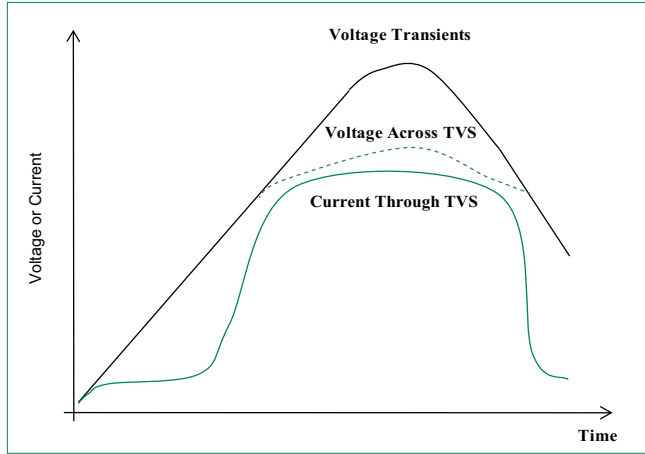


Figure 2 - Peak Pulse Power Rating Curve

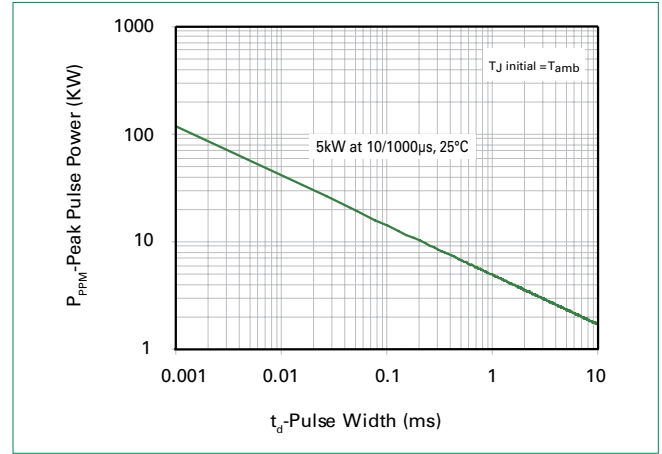


Figure 3 - Peak Pulse Power Derating Curve

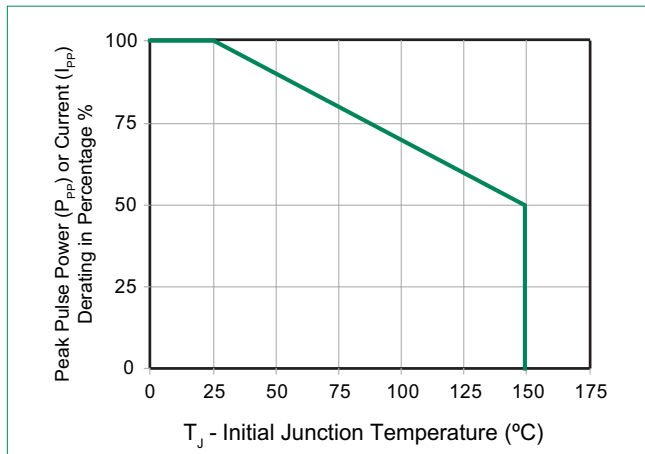


Figure 4 - Pulse Waveform

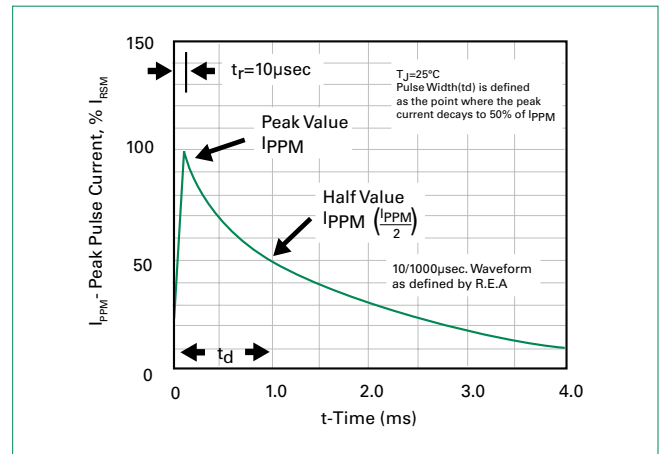


Figure 5 - Typical Junction Capacitance

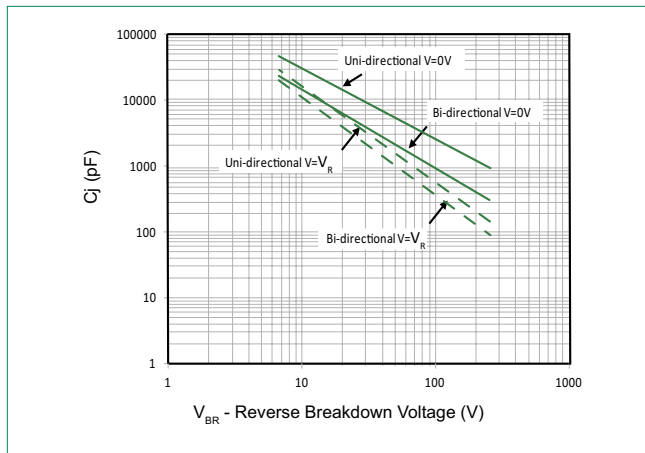


Figure 6 - Typical Transient Thermal Impedance

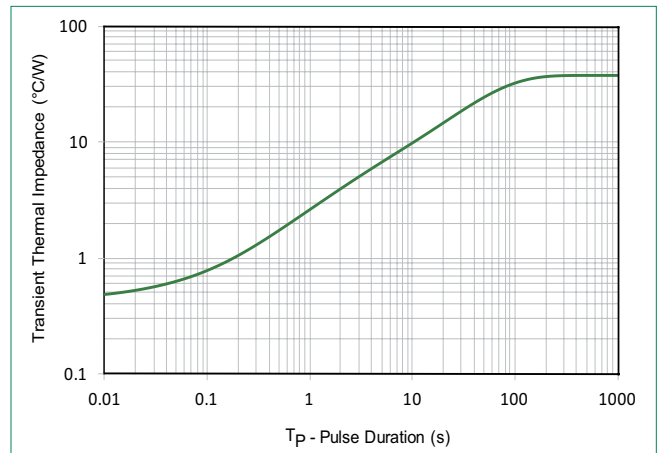


Figure 7 - Maximum Non-Repetitive Peak Forward Surge Current Uni-Directional Only

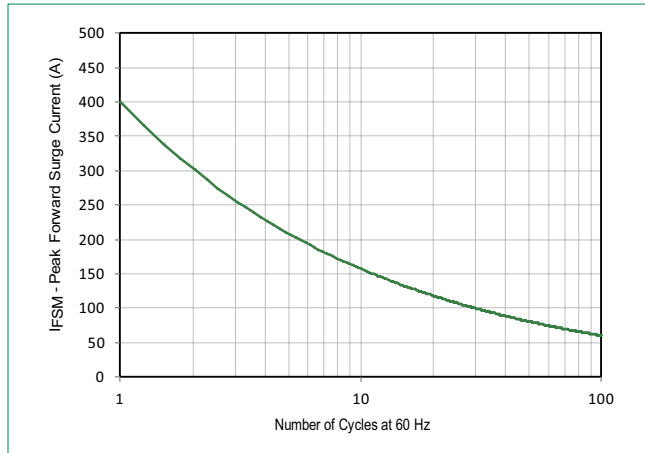
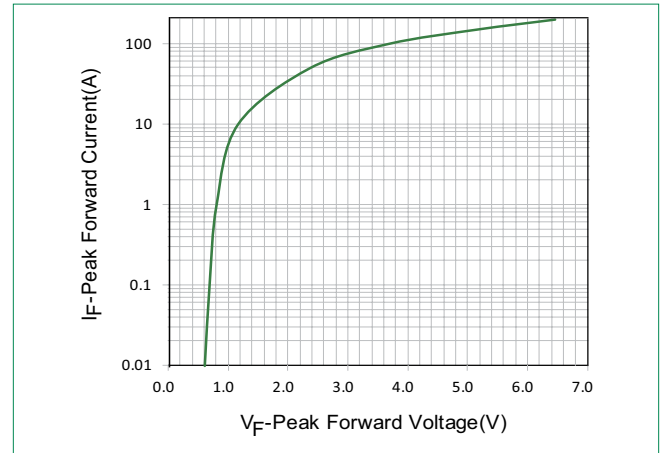
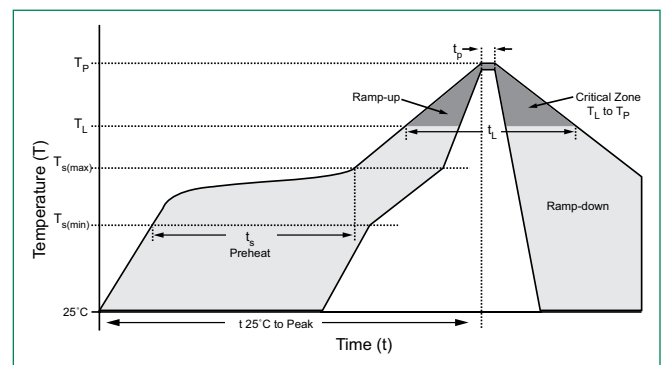


Figure 8 - Peak Forward Voltage Drop vs Peak Forward Current (Typical Values)



Soldering Parameters

Reflow Condition	Lead-free assembly	
Pre Heat	- Temperature Min ($T_{s(min)}$)	150°C
	- Temperature Max ($T_{s(max)}$)	200°C
	- Time (min to max) (t_s)	60 – 180 secs
Average ramp up rate (Liquidus Temp (T_A) to peak)	3°C/second max	
$T_{s(max)}$ to T_A - Ramp-up Rate	3°C/second max	
Reflow	- Temperature (T_A) (Liquidus)	217°C
	- Time (min to max) (t_s)	60 – 150 seconds
Peak Temperature (T_p)	260 ^{+0/-5} °C	
Time within 5°C of actual peak Temperature (t_p)	20 – 40 seconds	
Ramp-down Rate	6°C/second max	
Time 25°C to peak Temperature (T_p)	8 minutes Max.	
Do not exceed	260°C	



Flow/Wave Soldering (Solder Dipping)

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

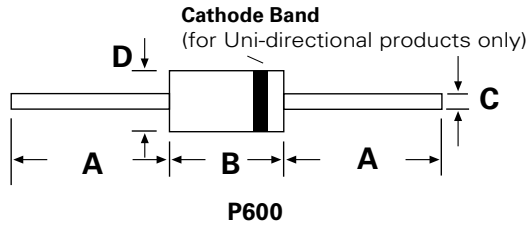
Physical Specifications

Weight	0.07oz., 2.1g
Case	P600 molded plastic body over passivated junction.
Polarity	Color band denotes the cathode except Bipolar.
Terminal	Matte Tin axial leads, solderable per JESD22-B102.

Environmental Specifications

High Temp. Storage	JESD22-A103
HTRB	JESD22-A108
Temperature Cycling	JESD22-A104
H3TRB	JESD22-A101
RSH	JESD22-B106

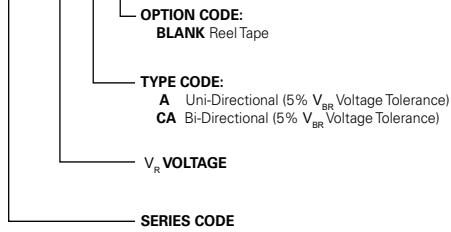
Dimensions



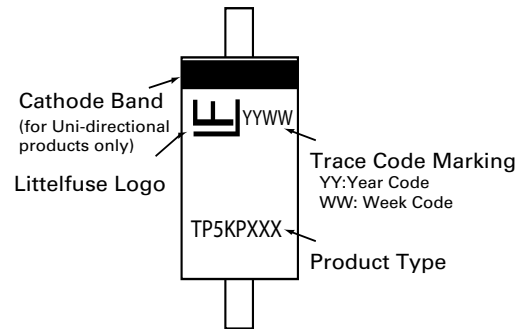
Dimensions	Inches		Millimeters	
	Min	Max	Min	Max
A	1.000	-	25.40	-
B	0.340	0.360	8.60	9.10
C	0.048	0.054	1.22	1.36
D	0.340	0.360	8.60	9.10

Part Numbering System

TP5KPxxxXXX



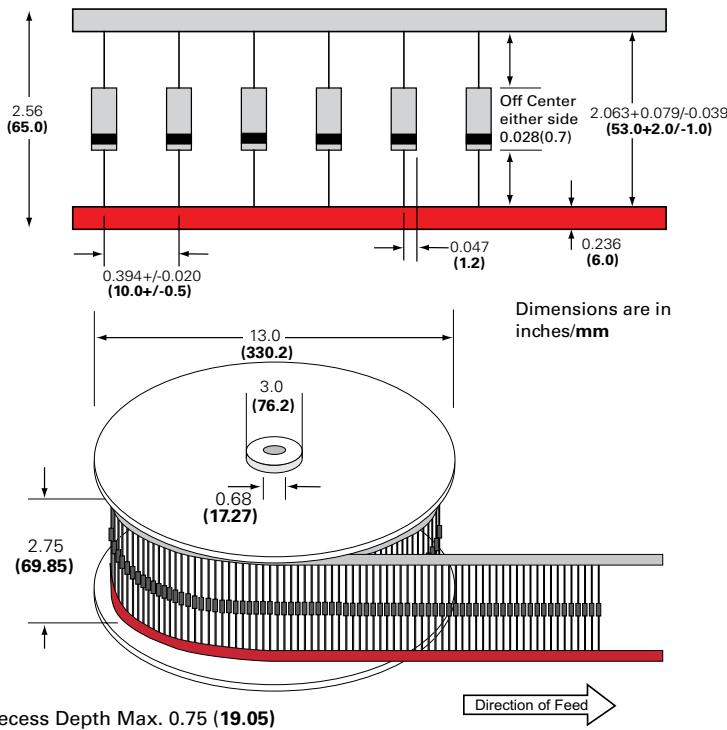
Part Marking System



Packing Options

Part Number	Component Package	Quantity	Packaging Option	Packaging Specification
TP5KPxxxXX	P600	800	Tape & Reel	EIA STD RS-296

Tape and Reel Specification



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