

Together We Make It Safe!



Transient Voltage Suppressor (TVS)





Transient Voltage Suppressor (TVS) 12KP

- P600
- 12000W

Features

- Glass Passivated Chip
- Uni and Bidirectional Unit
- Low Leakage
- Excellent clamping capability
- Fast response time
- AEC-Q101 qualified
- Plastic material U/L 94V-0 recognized
- Reverse Voltage - 12 to 220 V
- Power Dissipation - 12000 W

Applications

- Automotive Electronics
- Telecom
- Lightning Protection Module
- Security
- Switching Power Supply
- Industrial Controller
- Inverter
- Renewable Energy Solar/Wind

Maximum Ratings and Thermal Characteristics

Parameter	Symbol	Value	Unit
Peak Power Dissipation At $T_A = 25^\circ\text{C}$ $T_p=10/1000\mu\text{s}$ Waveform ³	P_{PK}	12000	W
Power Dissipation on Infinite Heat Sink at $T_A=50^\circ\text{C}$ ⁴	$P_{M(AV)}$	8	W
Peak Forward Surge Current, 8.3ms Single Half Sine Wave ⁵	I_F	400	A
Maximum Instantaneous forward voltage at 25A for unidirectional devices only ⁶	V_F	3.5/6.5	V
Storage Temperature Range	T_{STG}	-50~150	$^\circ\text{C}$
Operating Junction Temperature Range	T_J	-50~150	$^\circ\text{C}$

1. Ratings at 25°C ambient temperature unless otherwise specified.
2. Single phase, half wave, 60Hz, resistive or inductive load.
3. Non-repetitive current pulse@10/1000 μs and derated above $T_A=25^\circ\text{C}$
4. Measured on 8.3ms single half sine wave or equivalent square wave for unidirectional device only.
5. $V_F < 3.5\text{V}$ for $V_{BR} \leq 200\text{V}$ and $V_F < 6.5\text{V}$ for $V_{BR} \geq 201\text{V}$.

Product Identification

12KP XXX A or CA
 (1) (2) (3) (4)

(1) Product Code (2) Reverse Standoff Voltage V_{RM} (3) Unidirectional (4) Bidirectional

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Electrical Characteristics

Part Number		$V_{BR}^{(1)}$ @ I_T		$I_T^{(2)}$	$V_{RM}^{(3)}$	$Max I_R^{(4)}$ @ V_{RM}	$Max V_C^{(5)}$	$Max I_{PP}^{(6)}$
Uni	Bi	MIN(V)	MAX(V)	mA	V	μA	V	A
12KP12A	12KP12CA	13.3	14.7	5	12	2	19.9	502.5
12KP13A	12KP13CA	14.4	15.9	5	13	2	21.5	465.1
12KP14A	12KP14CA	15.6	17.2	5	14	2	23.2	431
12KP15A	12KP15CA	16.7	18.5	5	15	2	24.4	409.8
12KP16A	12KP16CA	17.8	19.7	5	16	2	26	384.6
12KP17A	12KP17CA	18.9	20.9	5	17	2	27.6	362.3
12KP18A	12KP18CA	20	22.1	5	18	2	29.2	342.5
12KP20A	12KP20CA	22.2	24.5	5	20	2	32.4	308.6
12KP22A	12KP22CA	24	26.9	5	22	2	35.5	281.7
12KP24A	12KP24CA	26.7	29.5	5	24	2	38.9	257.1
12KP26A	12KP26CA	28.9	31.9	5	26	2	42.1	237.5
12KP28A	12KP28CA	31.1	34.4	5	28	2	45.4	220.3
12KP30A	12KP30CA	33.3	36.8	5	30	2	48.4	206.6
12KP33A	12KP33CA	36.7	40.6	5	33	2	53.3	187.6
12KP36A	12KP36CA	40	44.2	5	36	2	58.1	172.1
12KP40A	12KP40CA	44.4	49.1	5	40	2	64.5	155
12KP43A	12KP43CA	47.8	52.8	5	43	2	69.4	144.1
12KP45A	12KP45CA	50	55.3	5	45	2	72.7	137.6
12KP48A	12KP48CA	53.3	58.9	5	48	2	77.4	129.2
12KP51A	12KP51CA	56.7	62.7	5	51	2	82.4	121.4
12KP54A	12KP54CA	60	66.3	5	54	2	87.1	114.8
12KP58A	12KP58CA	64.4	71.2	5	58	2	93.6	106.8
12KP60A	12KP60CA	66.7	73.7	5	60	2	96.8	103.3
12KP64A	12KP64CA	71.1	78.6	5	64	2	103	97.1
12KP70A	12KP70CA	77.8	86	5	70	2	113	88.5
12KP72A	12KP72CA	80	88.4	5	72	2	116.2	103.3
12KP75A	12KP75CA	83.3	92.1	5	75	2	121	99.2
12KP78A	12KP78CA	86.7	95.8	5	78	2	126	95.2
12KP85A	12KP85CA	94.4	104	5	85	2	137	87.6
12KP90A	12KP90CA	100	111	5	90	2	146	82.2
12KP100A	12KP100CA	110	123	5	100	2	162	74.1
12KP110A	12KP110CA	122	135	5	110	2	177	67.8
12KP120A	12KP120CA	133	147	5	120	2	193	62.2
12KP130A	12KP130CA	144	159	5	130	2	209	57.4

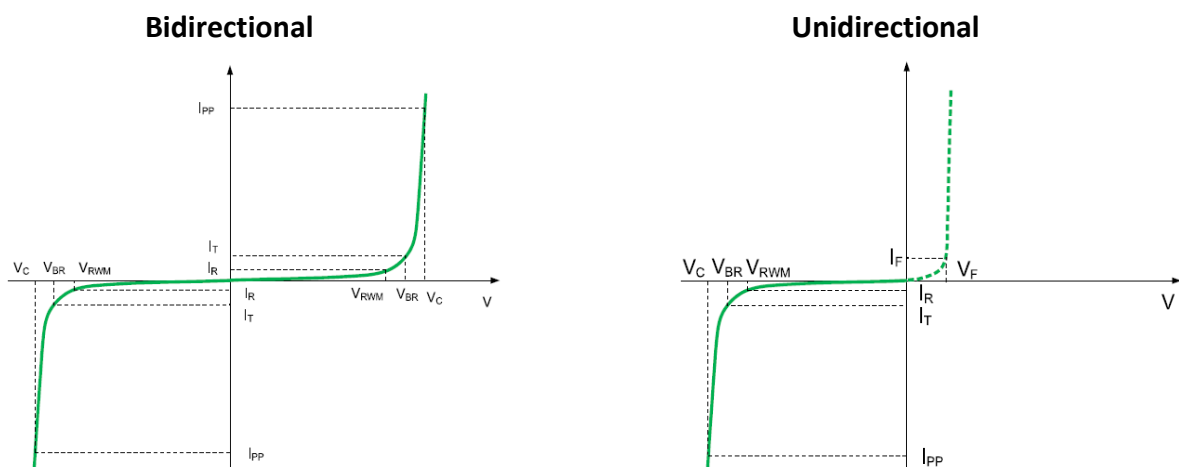
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Part Number		$V_{BR}^{(1)} @ I_T$		$I_T^{(2)}$	$V_{RM}^{(3)}$	$Max I_R^{(4)} @ V_{RM}$	$Max V_C^{(5)}$	$Max I_{PP}^{(6)}$
Uni	Bi	MIN(V)	MAX(V)	mA	V	μA	V	A
12KP150A	12KP150CA	167	185	5	150	2	243	49.4
12KP160A	12KP160CA	178	197	5	160	2	259	46.3
12KP170A	12KP170CA	189	209	5	170	2	275	43.6
12KP180A	12KP180CA	200	221	5	180	2	292	41.1
12KP190A	12KP190CA	211	233	5	190	2	310	38.7
12KP200A	12KP200CA	222	246	5	200	2	329.2	36.5
12KP210A	12KP210CA	233	258	5	210	2	349.5	34.3
12KP220A	12KP220CA	244	270	5	220	2	371.1	32.3

For bidirectional type having V_R of 10 volts and less, the I_R limit is double.

I-V Curve Characteristics



Symbol	Parameter	Explanation
(1) V_{BR}	Breakdown voltage	The Voltage that flows though the TVS at a specified test current (I_T)
(2) I_T	Test current	A specified test current that flows though the TVS
(3) V_{RM}	Stand-off voltage	Maximum voltage that can be applied to the TVS without operation
(4) I_R	Leakage current @ V_R	Current measured at V_R
(5) V_C	Clamping voltage	Peak voltage measured across the suppressor at a specified I_{PP} (peak impulse current)
(6) I_{PP}	Peak pulse current	The maximum surge current that flows though the TVS

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Fig1. Pulse Waveform

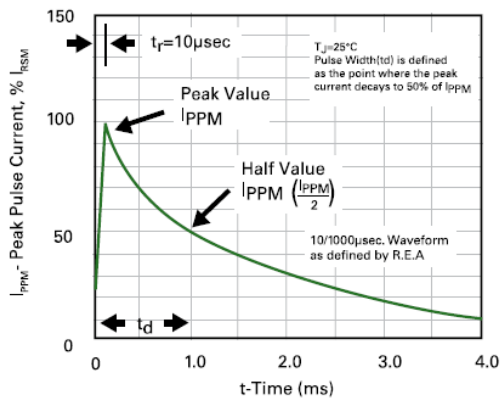


Fig2. Pulse Derating Curve

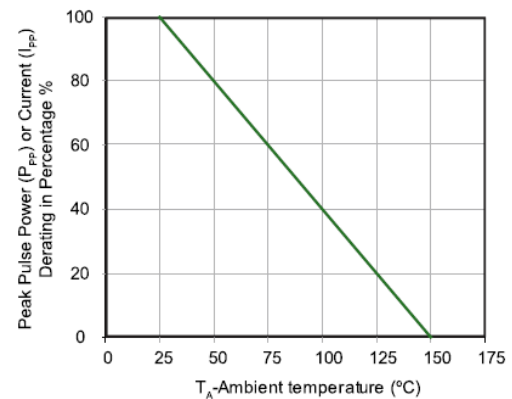


Figure 3. Steady Power Dissipation Derating Curve

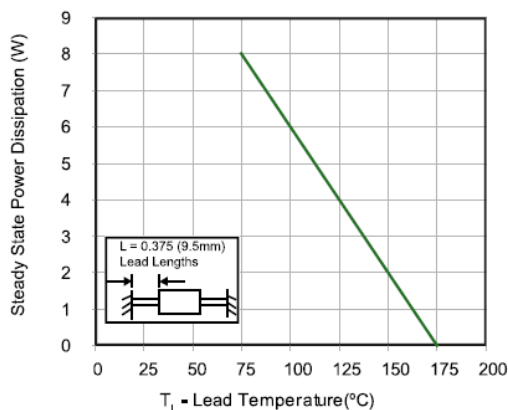


Figure 4. Peak Pulse Power Rating Curve

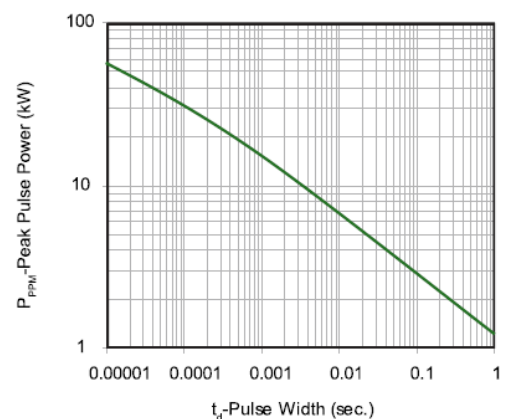
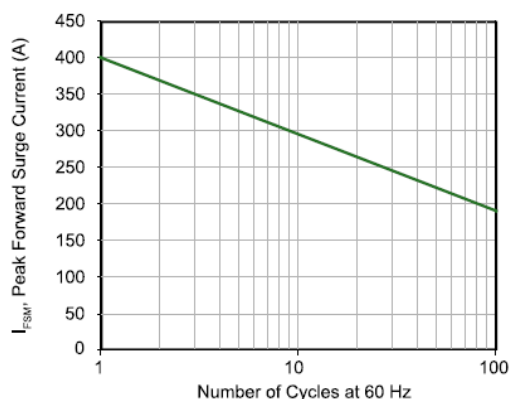


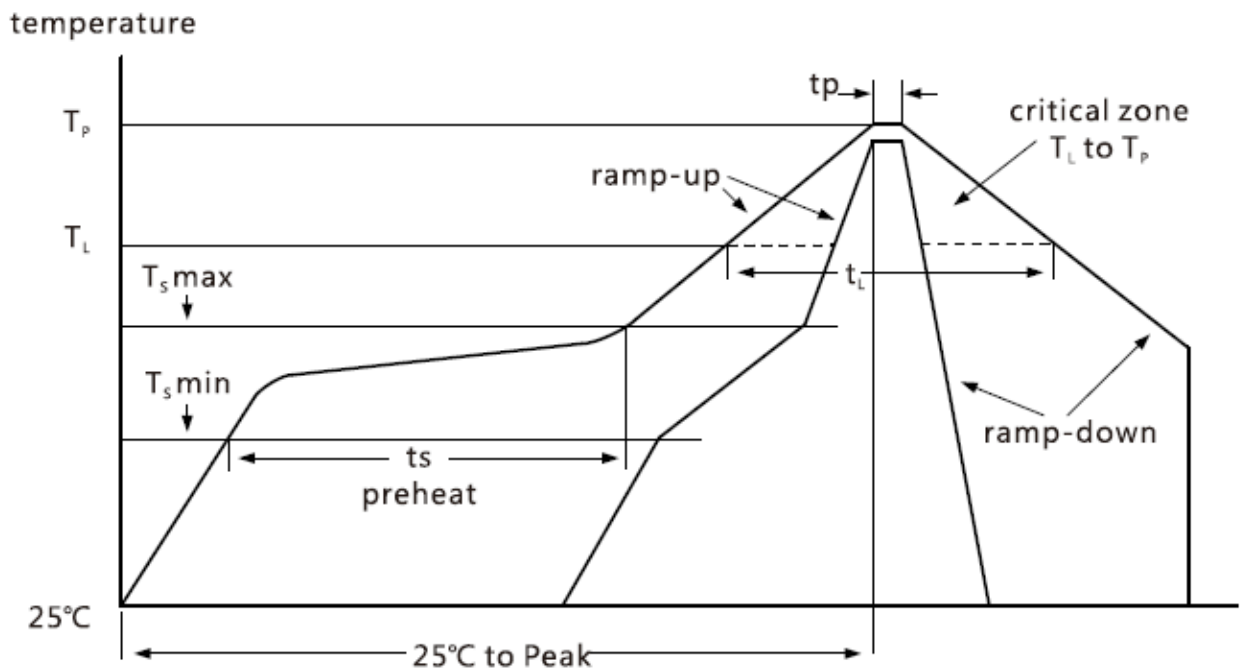
Figure 5. Maximum Non-Repetitive Surge Current



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Reflow Soldering Profile



Reflow Profile Feature	SnPb eutectic assembly	Pb-free assembly
Average ramp-up rate ($T_{s\max}$ to T_p)	3°C/s maximum	3°C/s maximum
Preheat		
Temperature minimum ($T_{s\min}$)	100°C	150°C
Temperature maximum ($T_{s\max}$)	150°C	200°C
Time ($T_{s\min}$ to $T_{s\max}$)	60 s to 120 s	60 s to 180 s
Time maintained above		
Temperature (T_L)	183°C	217°C
Time (t_L)	60 s to 150 s	60 s to 150 s
Peak/classification temperature (T_p)	235°C	260°C
Number of allowed reflow cycles	3	3
Time within 5 °C of actual peak temperature (t_p)	10 s to 30 s	10 s to 30 s
Ramp-down rate	6°C/s maximum	6°C/s maximum
Time 25 °C to peak temperature	6 minutes maximum	8 minutes maximum

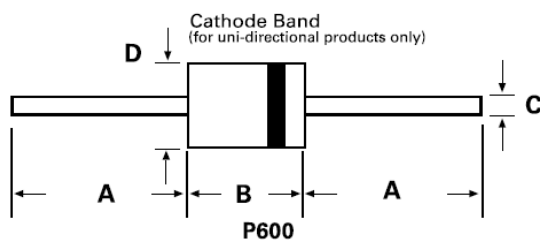
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Flow / Wave Soldering (Solder Dipping)

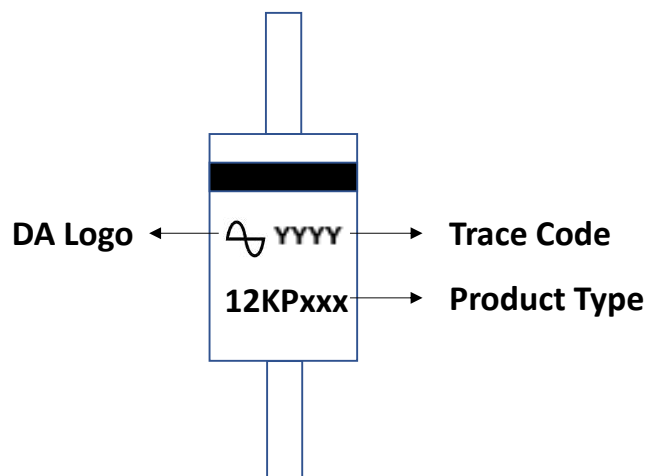
Peak Temperature	265°C
Dipping Time	10 seconds
Soldering	1 time

Package Dimensions (P600)



Dimension	Inches		Millimeters	
	Min	Max	Min	Max
A	1	-	25.4	-
B	0.34	0.36	8.6	9.1
C	0.047	0.052	1.19	1.32
D	0.34	0.36	8.6	9.1

Product Marking



Packaging

Part	Component Package	Quantity	Packaging Option
12KP-XXX-A/CA	P600	300pcs	Box