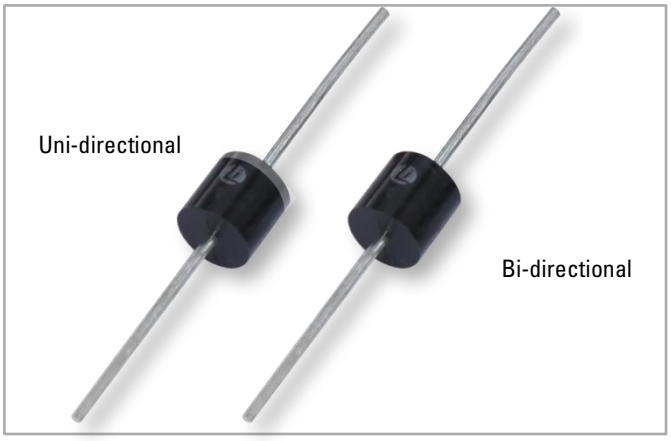
10KP-Q Series
Axial Leaded – 10000W

AUTOMOTIVE GRADE HF RoHS Pb e3



Additional Information

Resources | Accessories | Samples

Maximum Ratings and Thermal Characteristics

(T_A=25℃ unless otherwise noted)

Parameter	Symbol	Value	Unit
Peak Pulse Power Dissipation by 10/1000μs Waveform(Fig.1) (Note 1)-Single Die Parts	P_{PPM}	10000	W
Power Dissipation on Infinite Heat Sink at T_L=75℃	P_D	8	W
Peak Forward Surge Current, 8.3ms Single Half Sine Wave (Note 2)	I_{FSM}	400	A
Maximum Instantaneous Forward Voltage at 100A for Unidirectional Only	V_F	5.0	V
Operating Temperature Range	T_J	-55 to 150	℃
Storage Temperature Range	T_{STG}	-55 to 150	℃
Typical Thermal Resistance Junction to Lead	$R_{\theta JL}$	8	℃/W
Typical Thermal Resistance Junction to Ambient	$R_{\theta JA}$	40	℃/W

Notes:

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

Description

The 10KP-Q series is designed specifically to protect sensitive electronic equipment from voltage transients induced by lightning and other transient voltage events.

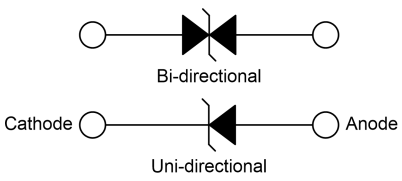
Features

- High reliability application and automotive grade AEC-Q101 qualified
- 10000W peak pulse power capability at 10/1000μs waveform, repetition rate (duty cycles):0.01%
- Glass passivated chip junction in P600 package
- Fast response time:typically less than 1.0ps from 0 Volts to V_B min
- Excellent clamping capability
- Typical failure mode is a short circuit
- Whisker test is conducted based on JEDEC JESD201A per its table 4a and 4c
- ESD protection of data lines in accordance with IEC 61000-4-2, 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_R >24V
- High temperature to reflow soldering guaranteed: 260℃/ 20~40sec./ 0.375",(9.5mm) lead length, 5 lbs., (2.3kg) tension
- V_B @ T_J= V_B@25℃x (1+ α T x (T_J - 25))(α T:Temperature Coefficient, typical value is 0.1%)
- 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 ICT equipment and consumer electronic applications.

Functional Diagram



10KP-Q Series
Axial Leaded – 10000W

Electrical Characteristics (T_A=25℃ unless otherwise noted)

Part Number		Type	Reverse Stand-Off Voltage	Breakdown Voltage @I_T		Test Current	Maximum Clamping Voltage @I_{PP}	Peak Pulse Current	Reverse Leakage @V_R
Uni.	Bi.		V_R(V)	$V_{B\ Min.}$(V)	$V_{B\ Max.}$(V)	I_T(mA)	V_C(V)	I_{PP}(A)	I_R(μA)
10KP11A	10KP11CA	Q	11.0	12.2	13.5	50	18.2	549.5	3000
10KP12A	10KP12CA	Q	12.0	13.3	14.7	50	19.9	502.5	2000
10KP13A	10KP13CA	Q	13.0	14.4	15.9	50	21.5	465.1	1000
10KP14A	10KP14CA	Q	14.0	15.6	17.2	50	23.2	431.0	800
10KP15A	10KP15CA	Q	15.0	16.7	18.5	5	24.4	409.8	500
10KP16A	10KP16CA	Q	16.0	17.8	19.7	5	26.0	384.6	100
10KP17A	10KP17CA	Q	17.0	18.9	20.9	5	27.6	362.3	45
10KP18A	10KP18CA	Q	18.0	20.0	22.1	5	29.2	342.5	20
10KP20A	10KP20CA	Q	20.0	22.2	24.5	5	32.4	308.6	5
10KP22A	10KP22CA	Q	22.0	24.4	26.9	5	35.5	281.7	3
10KP24A	10KP24CA	Q	24.0	26.7	29.5	5	38.9	257.1	2
10KP26A	10KP26CA	Q	26.0	28.9	31.9	5	42.1	237.5	2
10KP28A	10KP28CA	Q	28.0	31.1	34.4	5	45.4	220.3	2
10KP30A	10KP30CA	Q	30.0	33.3	36.8	5	48.4	206.6	2
10KP33A	10KP33CA	Q	33.0	36.7	40.6	5	53.3	187.6	2
10KP36A	10KP36CA	Q	36.0	40.0	44.2	5	58.1	172.1	2
10KP40A	10KP40CA	Q	40.0	44.4	49.1	5	64.5	155	2

Notes:
For bidirectional type having V_R of 20 volts and less, the I_R limit is double.

10KP-Q Series
Axial Leaded – 10000W

Ratings and Characteristic Curves (T_A=25℃ unless otherwise noted)

Figure 1:
Peak Pulse Power Rating Curve

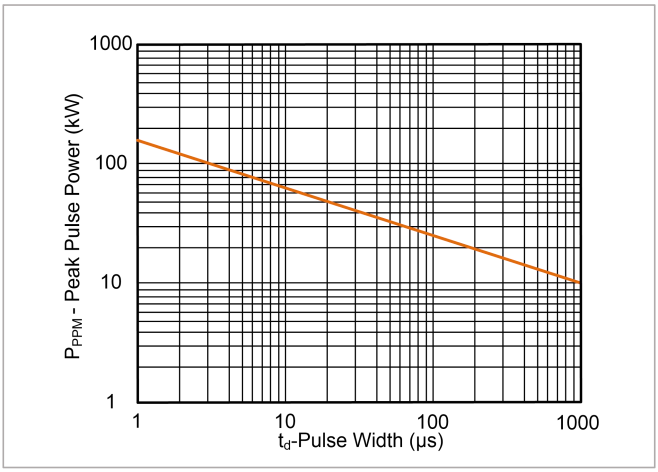


Figure 2:
Pulse Derating Curve

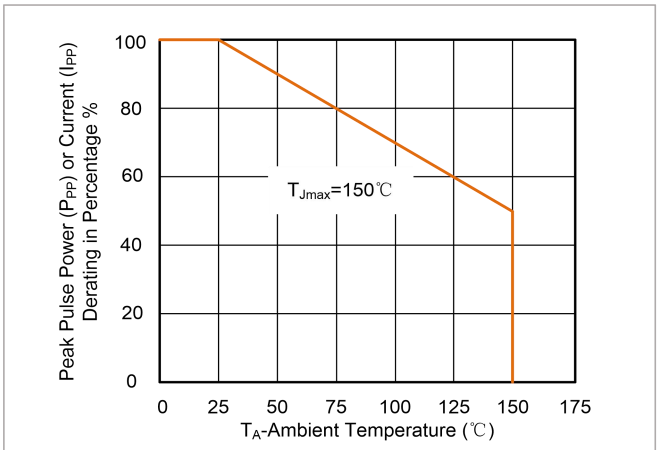


Figure 3:
Pulse Waveform

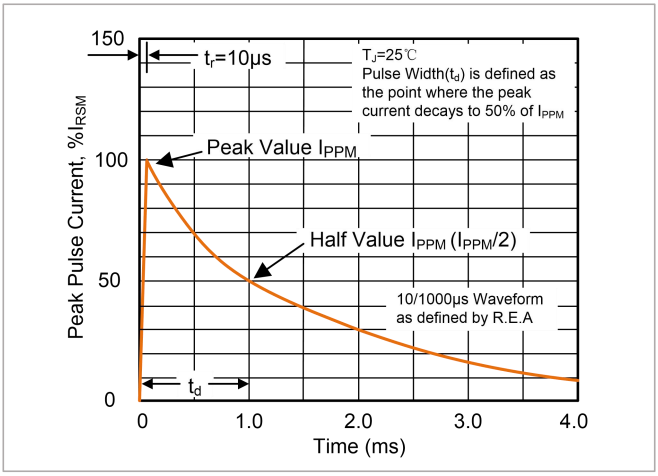


Figure 4:
Typical Junction Capacitance

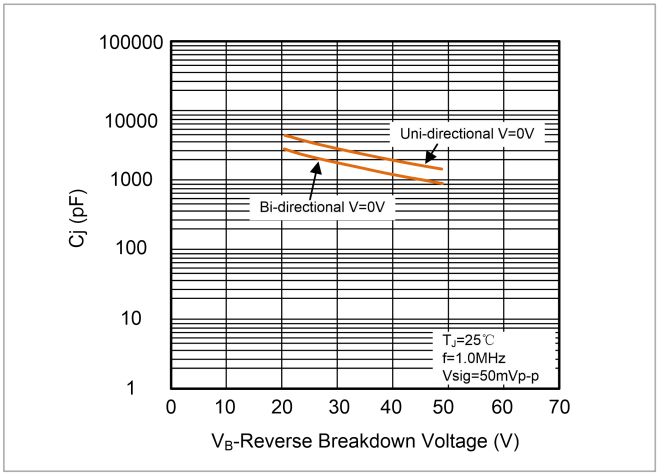


Figure 5:
Steady State Power Dissipation Derating Curve

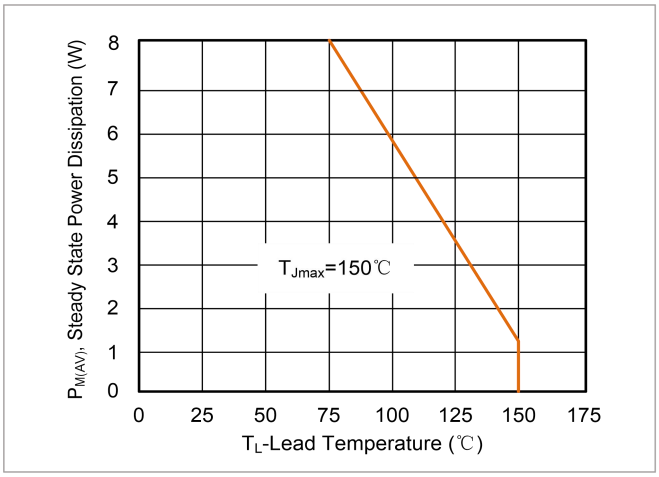
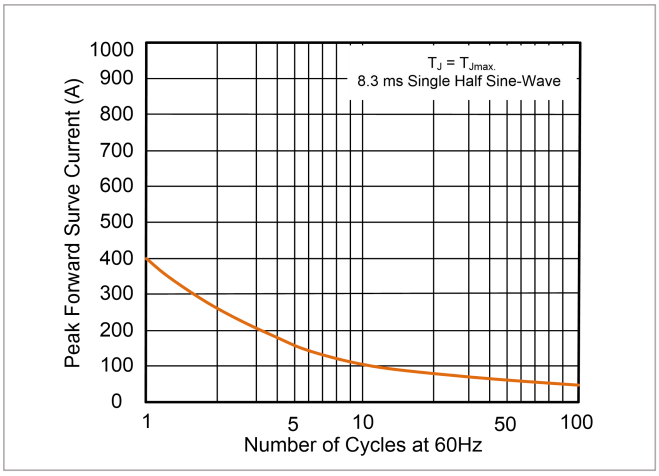


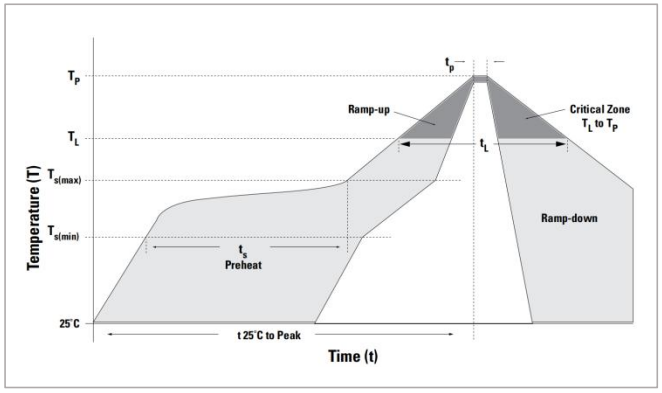
Figure 6:
Maximum Non-Repetitive Forward Surge Current Uni-Directional



10KP-Q Series
Axial Leaded – 10000W

Soldering Parameters

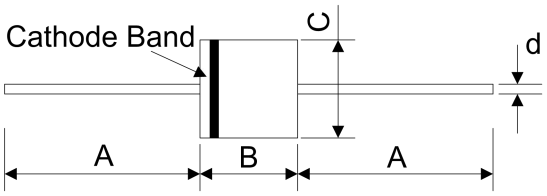
Reflow Condition		Lead–free assembly
Pre Heat	**-Temperature Min ($T_{S\ min}$)**	150℃
	-Temperature Max ($T_{S\ max}$)	200℃
	-Time (min to max) (t_S)	60 – 180 secs
Average ramp-up rate(Liquidus Temp (T_L) to peak		3℃/second max.
$T_{S\ (max)}$ to T_L-Ramp-up Rate		3℃/second max.
Reflow	**-Temperature (T_L) (Liquidus)**	217℃
	-Time (min to max) (t_L)	60-150 seconds
Peak Temperature (T_P)		260℃
Time within 5℃ of actual Peak Temperature (t_P)		20-40 seconds
Ramp-down Rate		6℃/second max.
Time 25℃ to Peak Temperature		8 minutes max.
Do not exceed		260℃



Flow/Wave Soldering (Solder Dipping)	
Peak Temperature :	265℃
Dipping Time :	10 seconds (max.)
Soldering :	1 time

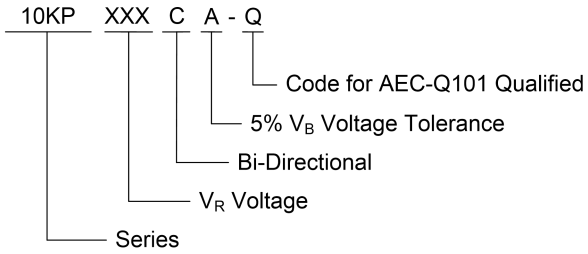
Dimensions

P600

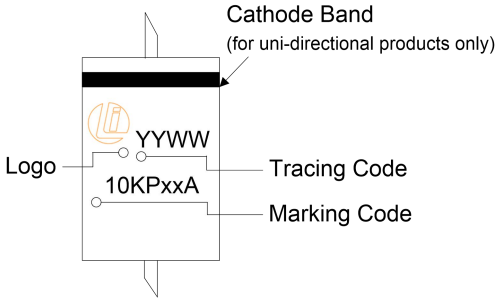


Symbol	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	25.40	-	1.000	-
B	8.60	9.10	0.340	0.360
C	8.60	9.10	0.340	0.360
d	1.19	1.35	0.047	0.053

Part Numbering System



Part Marking System



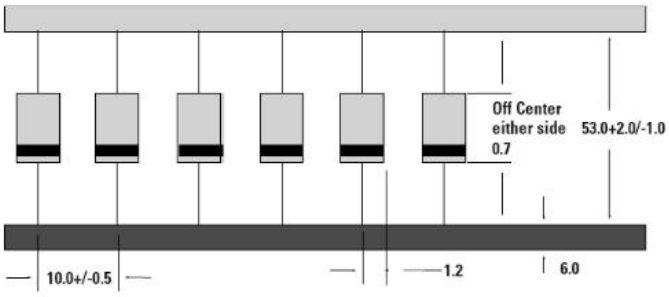
10KP-Q Series
Axial Leaded – 10000W

Packaging

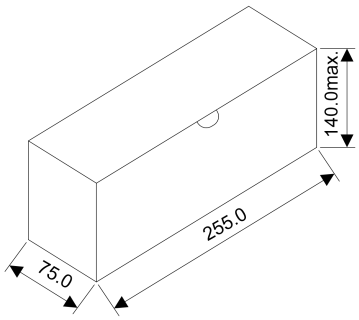
Part number	Component Package	Quantity	Packaging Option	Packaging Specification
10KPxxxXX-Q/L/BOX	P600	300	Tape & Box	EIA STD RS-296
10KPxxxXX-Q/L/TR13	P600	800	Tape & Reel	EIA STD RS-296

Tape/Box/Reel Specification

Tape（Unit: mm）

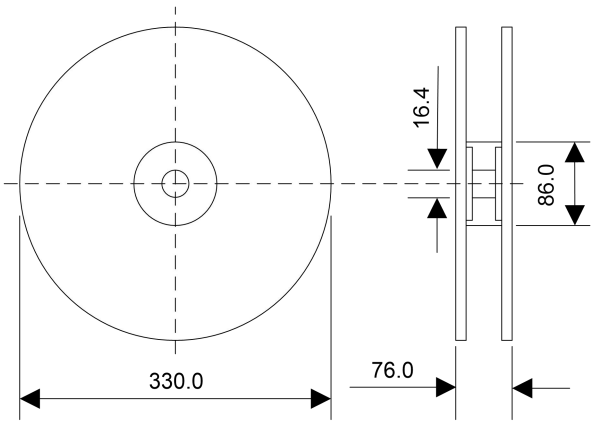


Box（Unit: mm）



Quantity：300pcs/box

Reel（Unit: mm）



Quantity：800pcs/reel