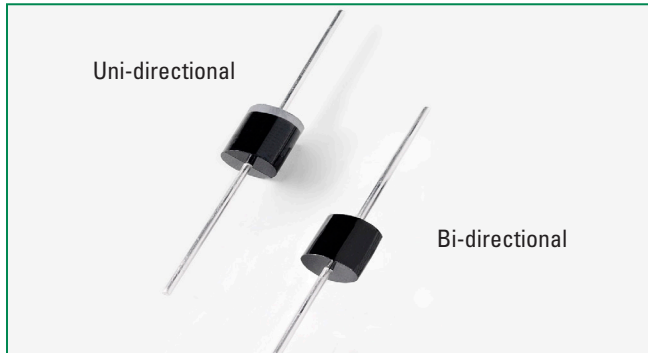


## 30KPA-HRA Series



### Agency Approvals

AGENCY	AGENCY FILE NUMBER
	E230531

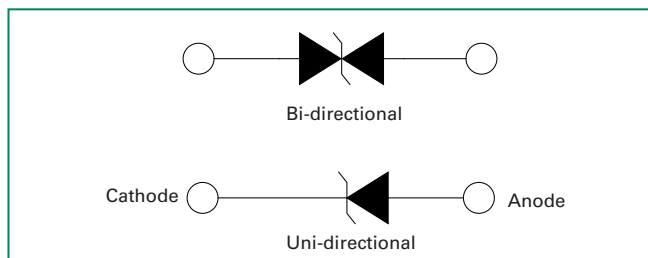
### Maximum Ratings and Thermal Characteristics ( $T_A=25^\circ\text{C}$ unless otherwise noted)

Parameter	Symbol	Value	Unit
Peak Pulse Power Dissipation by 10/1000 $\mu\text{s}$ Test Waveform (Fig.2) (Note 1)	$P_{PPM}$	30000	W
Steady State Power Dissipation on Infinite Heat Sink at $T_L=75^\circ\text{C}$	$P_D$	8.0	W
Peak Forward Surge Current, 8.3ms Single Half Sine Wave Unidirectional Only (Note 2)	$I_{FSM}$	400	A
Operating Junction and Storage Temperature Range	$T_J, T_{STG}$	-55 to 175	$^\circ\text{C}$
Typical Thermal Resistance Junction to Lead	$R_{\theta JL}$	8.0	$^\circ\text{C/W}$
Typical Thermal Resistance Junction to Ambient	$R_{\theta JA}$	40	$^\circ\text{C/W}$

**Notes:**

1. Non-repetitive current pulse, per Fig. 4 and derated above  $T_J$  (initial) =  $25^\circ\text{C}$  per Fig 3.
2. Measured on 8.3ms single half sine wave or equivalent square wave, duty cycle=4 per minute maximum.

### Functional Diagram



### Descriptions

The 30KPA-HRA High Reliability Series is designed specifically to protect sensitive electronic equipment from voltage transients induced by lightning and other transient voltage events.

### Features

- 30000W peak pulse capability at 10/1000 $\mu\text{s}$  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 BV 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)
- ESD protection of data lines in accordance with IEC 61000-4-2 (IEC801-2)
- EFT protection of data lines in accordance with IEC 61000-4-4 (IEC801-4)
- Low incremental surge resistance
- Typical  $I_R$  less than 2 $\mu\text{A}$  when  $V_{BR \text{ min}} > 73\text{V}$
- High temperature to reflow soldering guaranteed: 260 $^\circ\text{C}/10\text{sec}$  / 0.375", (9.5mm) lead length, 5 lbs., (2.3kg) tension
- $V_{BR} @ T_J = V_{BR} @ 25^\circ\text{C} \times (1 + \alpha T \times (T_J - 25))$  ( $\alpha T$ :Temperature Coefficient, typical value is 0.1%)
- Plastic package is flammability rated V-0 per Underwriters Laboratories
- Lead-free matte tin plated package
- 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)


**Notes:**

1. For RTCA/DO-160G testing results, please see tables in the last section of this datasheet

### Applications

TVS devices 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<sub>A</sub>=25°C unless otherwise noted)

Part Number (Uni)	Part Number (Bi)	Reverse Stand off Voltage V <sub>R</sub> (Volts)	Breakdown Voltage V <sub>BR</sub> (Volts) @ I <sub>T</sub>		Test Current I <sub>T</sub> (mA)	Maximum Peak Pulse Current I <sub>PP</sub> (A)	Maximum Reverse Leakage I <sub>R</sub> @ V <sub>R</sub> (μA)	Maximum Clamping Voltage V <sub>C</sub> @ I <sub>PP</sub> (V)	Agency Approval 
			MIN	MAX					
30KPA28A-HRA	30KPA28CA-HRA	28	31.28	34.41	50	606.0	5000	50.0	X
30KPA30A-HRA	30KPA30CA-HRA	30	33.51	36.86	50	548.9	5000	55.2	X
30KPA33A-HRA	30KPA33CA-HRA	33	36.90	40.59	50	517.9	5000	58.5	X
30KPA36A-HRA	30KPA36CA-HRA	36	40.20	44.22	50	490.3	5000	61.8	X
30KPA39A-HRA	30KPA39CA-HRA	39	43.60	47.96	20	450.9	2000	67.2	X
30KPA42A-HRA	30KPA42CA-HRA	42	46.90	51.59	10	420.8	1000	72.0	X
30KPA43A-HRA	30KPA43CA-HRA	43	48.00	52.80	10	415.1	1000	73.0	X
30KPA45A-HRA	30KPA45CA-HRA	45	50.30	55.33	5	391.5	250	77.4	X
30KPA48A-HRA	30KPA48CA-HRA	48	53.60	58.96	5	371.3	150	81.6	X
30KPA51A-HRA	30KPA51CA-HRA	51	57.00	62.70	5	350.7	50	86.4	X
30KPA54A-HRA	30KPA54CA-HRA	54	60.30	66.33	5	331.5	20	91.4	X
30KPA58A-HRA	30KPA58CA-HRA	58	64.80	71.28	5	327.9	20	92.4	X
30KPA60A-HRA	30KPA60CA-HRA	60	67.00	73.70	5	297.1	15	102.0	X
30KPA64A-HRA	30KPA64CA-HRA	64	71.50	78.65	5	291.3	10	104.0	X
30KPA66A-HRA	30KPA66CA-HRA	66	73.70	81.07	5	283.2	2	107.0	X
30KPA70A-HRA	30KPA70CA-HRA	70	78.20	86.02	5	278.0	2	109.0	X
30KPA71A-HRA	30KPA71CA-HRA	71	79.30	87.23	5	271.7	2	111.5	X
30KPA72A-HRA	30KPA72CA-HRA	72	80.40	88.44	5	265.8	2	114.0	X
30KPA75A-HRA	30KPA75CA-HRA	75	83.80	92.18	5	253.8	2	119.4	X
30KPA78A-HRA	30KPA78CA-HRA	78	87.10	95.81	5	234.9	2	129.0	X
30KPA84A-HRA	30KPA84CA-HRA	84	93.80	103.18	5	217.7	2	139.2	X
30KPA90A-HRA	30KPA90CA-HRA	90	100.50	110.55	5	207.0	2	146.4	X
30KPA96A-HRA	30KPA96CA-HRA	96	107.20	117.92	5	194.2	2	156.0	X
30KPA102A-HRA	30KPA102CA-HRA	102	113.90	125.29	5	183.0	2	165.6	X
30KPA108A-HRA	30KPA108CA-HRA	108	120.60	132.66	5	172.9	2	175.2	X
30KPA120A-HRA	30KPA120CA-HRA	120	134.00	147.40	5	155.9	2	194.4	X
30KPA132A-HRA	30KPA132CA-HRA	132	147.40	162.14	5	142.3	2	213.0	X
30KPA144A-HRA	30KPA144CA-HRA	144	160.80	176.88	5	135.8	2	223.2	X
30KPA150A-HRA	30KPA150CA-HRA	150	167.60	184.36	5	129.8	2	233.4	X
30KPA156A-HRA	30KPA156CA-HRA	156	174.30	191.73	5	123.7	2	245.0	X
30KPA160A-HRA	30KPA160CA-HRA	160	178.70	196.57	5	120.0	2	252.6	X
30KPA168A-HRA	30KPA168CA-HRA	168	187.70	206.47	5	111.2	2	272.4	X
30KPA170A-HRA	30KPA170CA-HRA	170	189.90	208.89	5	110.2	2	275.0	X
30KPA180A-HRA	30KPA180CA-HRA	180	201.10	221.21	5	104.3	2	290.4	X
30KPA198A-HRA	30KPA198CA-HRA	198	221.20	243.32	5	94.7	2	319.8	X
30KPA216A-HRA	30KPA216CA-HRA	216	241.30	265.43	5	86.9	2	348.6	X
30KPA240A-HRA	30KPA240CA-HRA	240	268.10	294.91	5	78.3	2	387.0	X
30KPA258A-HRA	30KPA258CA-HRA	258	288.20	317.02	5	72.8	2	416.4	X
30KPA260A-HRA	30KPA260CA-HRA	260	290.40	319.44	5	72.8	2	416.0	X
30KPA270A-HRA	30KPA270CA-HRA	270	301.60	331.76	5	69.5	2	436.2	X
30KPA280A-HRA	30KPA280CA-HRA	280	312.80	344.08	5	65.3	2	464.0	X
30KPA288A-HRA	30KPA288CA-HRA	288	321.70	353.87	5	64.5	2	469.9	X
30KPA300A-HRA	30KPA300CA-HRA	300	334.00	367.40	5	62.0	2	484.0	X

Note:

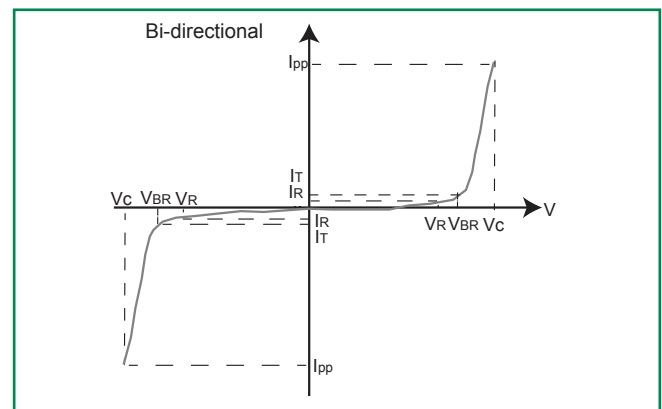
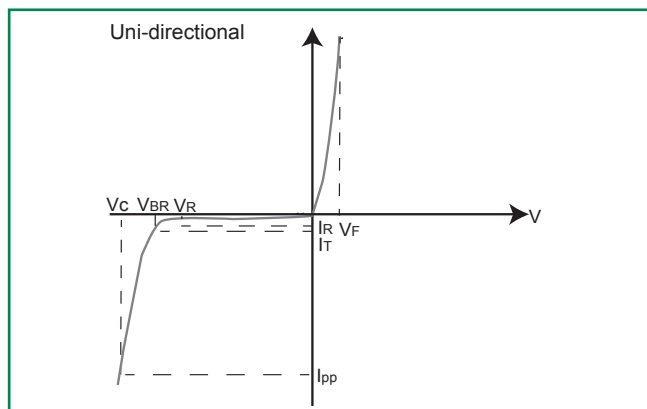
1. For bidirectional type having V<sub>R</sub> of 60 volts and less, the I<sub>R</sub> limit is double.

**Screen Process**

<b>100% Vision Inspection</b>	MIL-STD-750 method 2074
<b>100% High Temperature Storage Life (168hrs,175°C)</b>	MIL-STD-750 method 1031
<b>100% Temperature Cycle Test (-55 to150°C, 20 cycles, dwell time 15 min)</b>	MIL-STD-750 method 1051
<b>100% Surge Test (2x)</b>	MIL-STD-750 method 4066
<b>100% HTRB 150°C Bias=VR(80% breakdown voltage, 96hrs, and each direction at 96 hrs for Bi-directional products)</b>	MIL-STD-750 method 1038
<b>Final Electrical Test( 100% 3 sigma limit, 100% dynamic test and PAT limit)</b>	MIL-STD-750 method 4016.4021.4011

Note: Up-screen program can be specified by customer's request via contacting Littelfuse service

**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 ( $I_T$ )

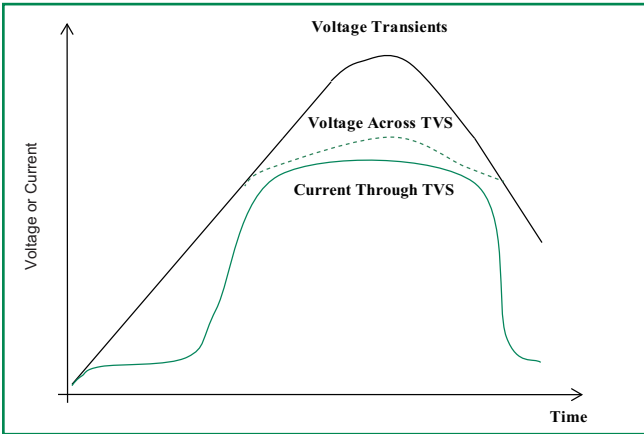
**$V_C$  Clamping Voltage** – Peak voltage measured across the TVS at a specified  $I_{ppm}$  (peak impulse current)

**$I_R$  Reverse Leakage Current** – Current measured at  $V_R$

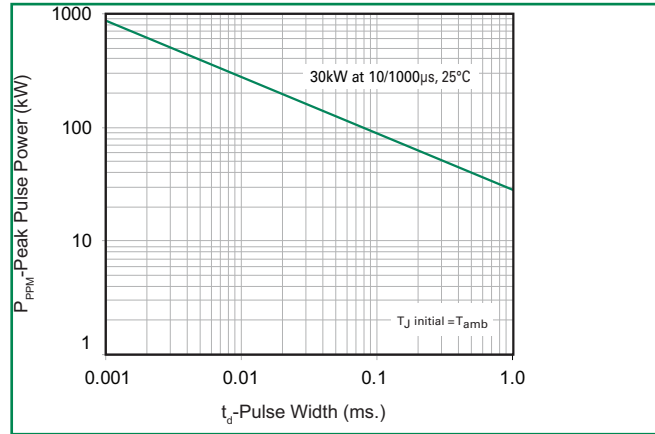
**$V_F$  Forward Voltage Drop for Uni-directional**

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

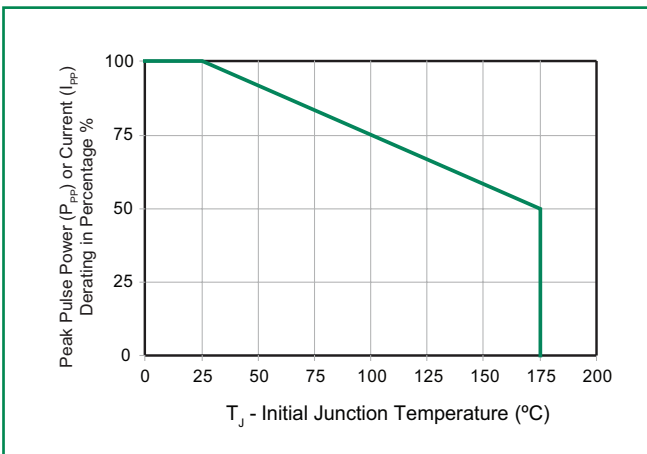
**Figure 1 - TVS Transients Clamping Waveform**



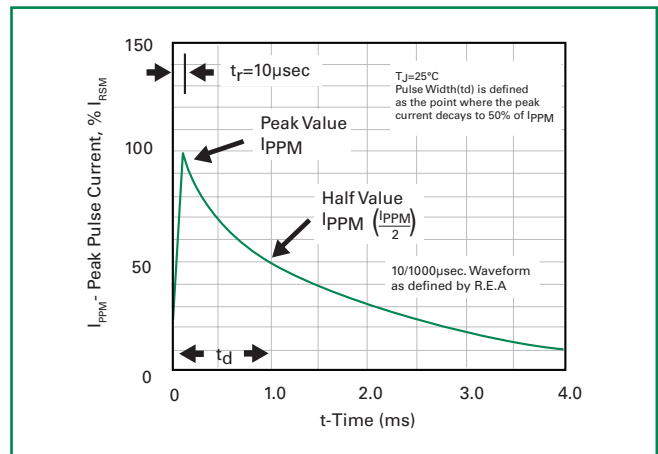
**Figure 2 - Peak Pulse Power Rating Curve**



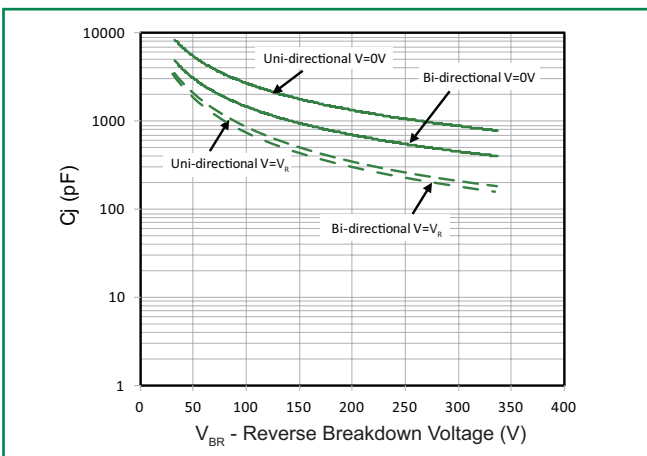
**Figure 3 - Peak Pulse Power Derating Curve**



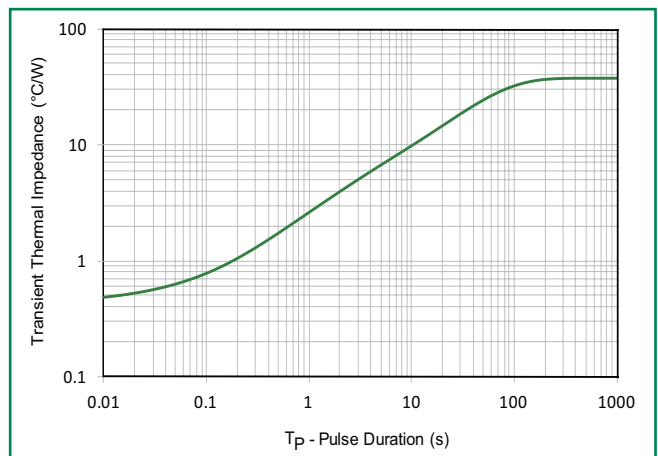
**Figure 4 - Pulse Waveform**



**Figure 5 - Typical Junction Capacitance**

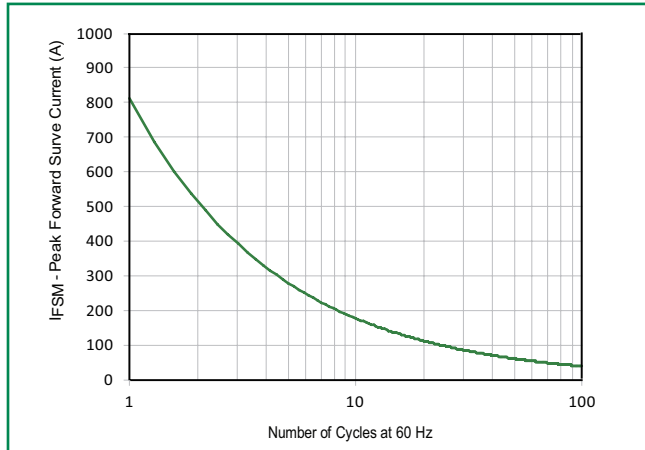


**Figure 6 - Typical Transient Thermal Impedance**

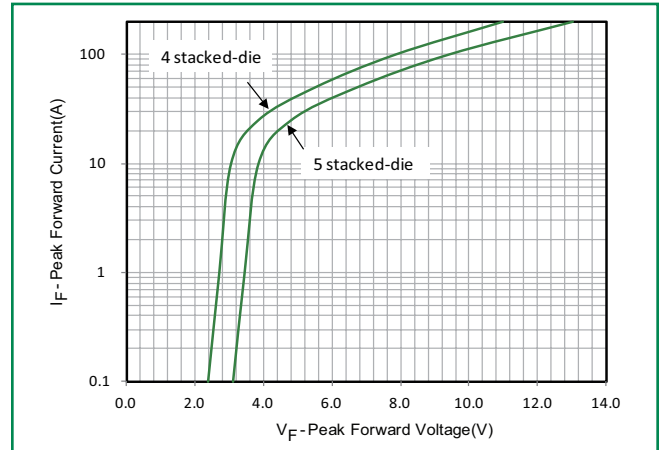


## Ratings and Characteristic Curves ( $T_A=25^{\circ}\text{C}$ unless otherwise noted)

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



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



## Physical Specifications

<b>Weight</b>	0.07oz., 2.5g
<b>Case</b>	P600 molded plastic body over passivated junction.
<b>Polarity</b>	Color band denotes the cathode except Bipolar.
<b>Terminal</b>	Matte Tin axial leads, solderable per JESD22-B102.

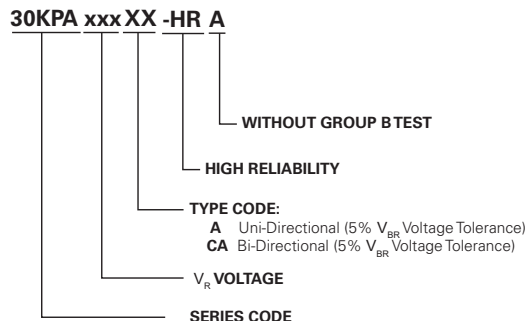
## Environmental Specifications

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

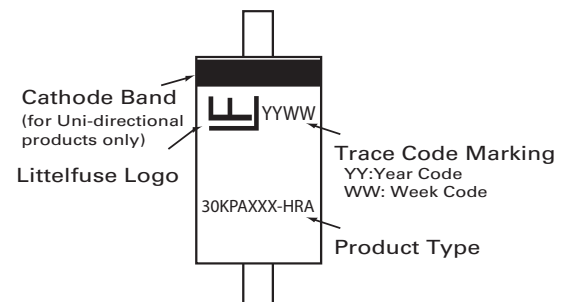
## Packing Options

Part Number	Component Package	Quantity	Packaging Option	Packaging Specification
30KPAxxxXX-HRA	P600	800	Tape & Reel	EIA STD RS-296

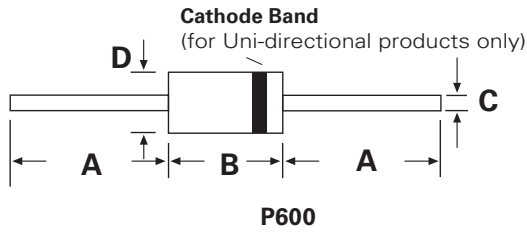
## Part Numbering System



## Part Marking System

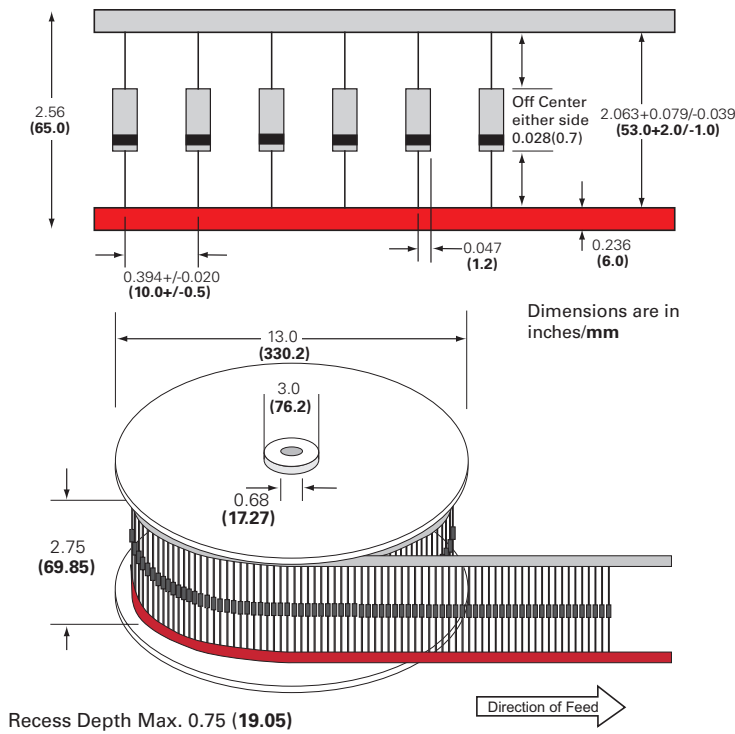


**Dimensions**

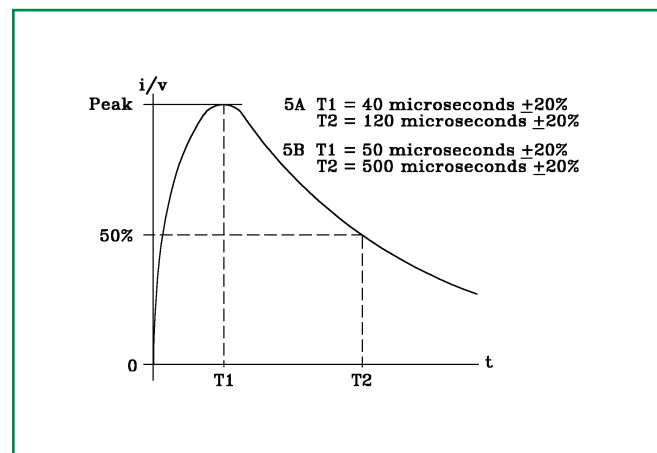
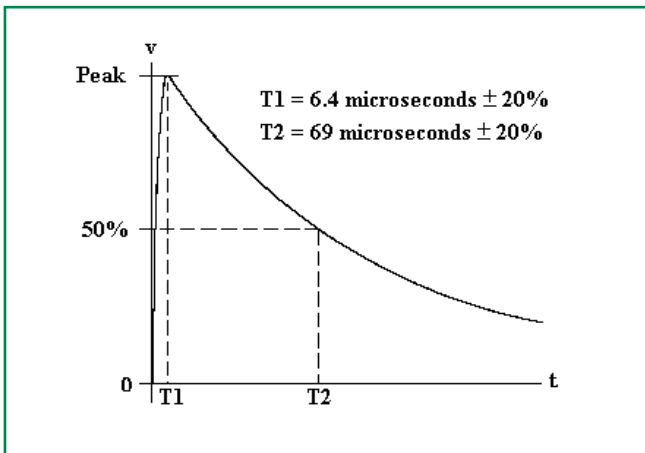


Dimensions	Inches		Millimeters	
	Min	Max	Min	Max
A	1.000	-	25.40	-
B	0.340	0.360	8.60	9.10
C	0.048	0.052	1.22	1.32
D	0.340	0.360	8.60	9.10

**Tape and Reel Specification**



**RTCA/DO-160G Wave 4 and Wave 5**



**Pin Injection Protection Per RTCA/DO-160G**

Part Number (Uni)	Part Number (Bi)	25C						70C						120C					
		Wave 4 (6.4/69us)			Wave 5a (40/120us)			Wave 4 (6.4/69us)			Wave 5a (40/120us)			Wave 4 (6.4/69us)			Wave 5a (40/120us)		
		L3	L4	L5	L3	L4	L5	L3	L4	L5	L3	L4	L5	L3	L4	L5	L3	L4	L5
		60A	150A	320A	300A	750A	1600A	60A	150A	320A	300A	750A	1600A	60A	150A	320A	300A	750A	1600A
30KPA28A-HRA	30KPA28CA-HRA	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	-	pass	pass	pass	pass	pass	-
30KPA30A-HRA	30KPA30CA-HRA	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	-	pass	pass	pass	pass	pass	-
30KPA33A-HRA	30KPA33CA-HRA	pass	pass	pass	pass	pass	-	pass	pass	pass	pass	pass	-	pass	pass	pass	pass	pass	-
30KPA36A-HRA	30KPA36CA-HRA	pass	pass	pass	pass	pass	-	pass	pass	pass	pass	pass	-	pass	pass	pass	pass	pass	-
30KPA39A-HRA	30KPA39CA-HRA	pass	pass	pass	pass	pass	-	pass	pass	pass	pass	pass	-	pass	pass	pass	pass	pass	-
30KPA42A-HRA	30KPA42CA-HRA	pass	pass	pass	pass	pass	-	pass	pass	pass	pass	pass	-	pass	pass	pass	pass	pass	-
30KPA43A-HRA	30KPA43CA-HRA	pass	pass	pass	pass	pass	-	pass	pass	pass	pass	pass	-	pass	pass	pass	pass	pass	-
30KPA45A-HRA	30KPA45CA-HRA	pass	pass	pass	pass	pass	-	pass	pass	pass	pass	pass	-	pass	pass	pass	pass	pass	-
30KPA48A-HRA	30KPA48CA-HRA	pass	pass	pass	pass	pass	-	pass	pass	pass	pass	pass	-	pass	pass	pass	pass	pass	-
30KPA51A-HRA	30KPA51CA-HRA	pass	pass	pass	pass	pass	-	pass	pass	pass	pass	pass	-	pass	pass	pass	pass	pass	-
30KPA54A-HRA	30KPA54CA-HRA	pass	pass	pass	pass	pass	-	pass	pass	pass	pass	pass	-	pass	pass	pass	pass	pass	-
30KPA58A-HRA	30KPA58CA-HRA	pass	pass	pass	pass	pass	-	pass	pass	pass	pass	pass	-	pass	pass	pass	pass	pass	-
30KPA60A-HRA	30KPA60CA-HRA	pass	pass	pass	pass	pass	-	pass	pass	pass	pass	pass	-	pass	pass	pass	pass	pass	-
30KPA64A-HRA	30KPA64CA-HRA	pass	pass	pass	pass	pass	-	pass	pass	pass	pass	pass	-	pass	pass	pass	pass	pass	-
30KPA66A-HRA	30KPA66CA-HRA	pass	pass	pass	pass	pass	-	pass	pass	pass	pass	pass	-	pass	pass	pass	pass	pass	-
30KPA70A-HRA	30KPA70CA-HRA	pass	pass	pass	pass	pass	-	pass	pass	pass	pass	pass	-	pass	pass	pass	pass	pass	-
30KPA71A-HRA	30KPA71CA-HRA	pass	pass	pass	pass	pass	-	pass	pass	pass	pass	pass	-	pass	pass	pass	pass	pass	-
30KPA72A-HRA	30KPA72CA-HRA	pass	pass	pass	pass	pass	-	pass	pass	pass	pass	pass	-	pass	pass	pass	pass	pass	-
30KPA75A-HRA	30KPA75CA-HRA	pass	pass	pass	pass	pass	-	pass	pass	pass	pass	pass	-	pass	pass	pass	pass	pass	-
30KPA78A-HRA	30KPA78CA-HRA	pass	pass	pass	pass	pass	-	pass	pass	pass	pass	pass	-	pass	pass	pass	pass	pass	-
30KPA84A-HRA	30KPA84CA-HRA	pass	pass	pass	pass	-	-	pass	pass	pass	pass	-	-	pass	pass	pass	pass	pass	-
30KPA90A-HRA	30KPA90CA-HRA	pass	pass	pass	pass	-	-	pass	pass	pass	pass	-	-	pass	pass	pass	pass	pass	-
30KPA96A-HRA	30KPA96CA-HRA	pass	pass	pass	pass	-	-	pass	pass	pass	pass	-	-	pass	pass	pass	pass	pass	-
30KPA102A-HRA	30KPA102CA-HRA	pass	pass	pass	pass	-	-	pass	pass	pass	pass	-	-	pass	pass	pass	pass	pass	-
30KPA108A-HRA	30KPA108CA-HRA	pass	pass	pass	pass	-	-	pass	pass	pass	pass	-	-	pass	pass	pass	pass	pass	-
30KPA120A-HRA	30KPA120CA-HRA	pass	pass	pass	pass	-	-	pass	pass	pass	pass	-	-	pass	pass	pass	pass	pass	-
30KPA132A-HRA	30KPA132CA-HRA	pass	pass	pass	pass	-	-	pass	pass	pass	pass	-	-	pass	pass	pass	pass	pass	-
30KPA144A-HRA	30KPA144CA-HRA	pass	pass	pass	pass	-	-	pass	pass	pass	pass	-	-	pass	pass	pass	pass	pass	-
30KPA150A-HRA	30KPA150CA-HRA	pass	pass	pass	pass	-	-	pass	pass	pass	pass	-	-	pass	pass	pass	pass	pass	-
30KPA156A-HRA	30KPA156CA-HRA	pass	pass	pass	-	-	-	pass	pass	pass	-	-	-	pass	pass	pass	pass	pass	-
30KPA160A-HRA	30KPA160CA-HRA	pass	pass	pass	-	-	-	pass	pass	pass	-	-	-	pass	pass	pass	pass	pass	-
30KPA168A-HRA	30KPA168CA-HRA	pass	pass	pass	-	-	-	pass	pass	pass	-	-	-	pass	pass	pass	pass	pass	-
30KPA170A-HRA	30KPA170CA-HRA	pass	pass	pass	-	-	-	pass	pass	pass	-	-	-	pass	pass	pass	pass	pass	-
30KPA180A-HRA	30KPA180CA-HRA	pass	pass	pass	-	-	-	pass	pass	pass	-	-	-	pass	pass	pass	pass	pass	-
30KPA198A-HRA	30KPA198CA-HRA	pass	pass	pass	-	-	-	pass	pass	pass	-	-	-	pass	pass	pass	pass	pass	-
30KPA216A-HRA	30KPA216CA-HRA	pass	pass	pass	-	-	-	pass	pass	pass	-	-	-	pass	pass	-	-	-	-
30KPA240A-HRA	30KPA240CA-HRA	pass	pass	pass	-	-	-	pass	pass	-	-	-	-	pass	pass	-	-	-	-
30KPA258A-HRA	30KPA258CA-HRA	pass	pass	pass	-	-	-	pass	pass	-	-	-	-	pass	pass	-	-	-	-
30KPA260A-HRA	30KPA260CA-HRA	pass	pass	pass	-	-	-	pass	pass	-	-	-	-	pass	pass	-	-	-	-
30KPA270A-HRA	30KPA270CA-HRA	pass	pass	pass	-	-	-	pass	pass	-	-	-	-	pass	pass	-	-	-	-
30KPA280A-HRA	30KPA280CA-HRA	pass	pass	pass	-	-	-	pass	pass	-	-	-	-	pass	pass	-	-	-	-
30KPA288A-HRA	30KPA288CA-HRA	pass	pass	pass	-	-	-	pass	pass	-	-	-	-	pass	pass	-	-	-	-
30KPA300A-HRA	30KPA300CA-HRA	pass	pass	pass	-	-	-	pass	pass	-	-	-	-	pass	pass	-	-	-	-

Note:

1. L1 = Level1, L2 = Level 2, L3 = Level 3, L4 = Level 4, L5 = Level 5