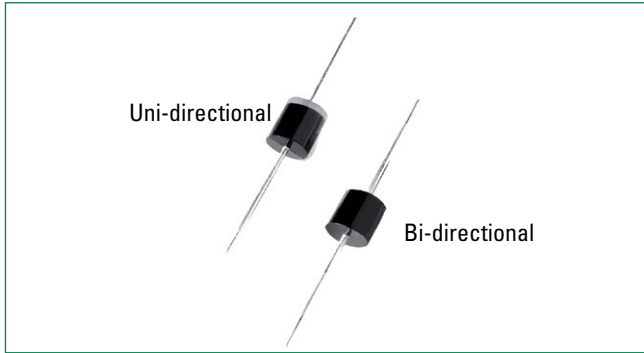




# THE DATASHEET OF 30KPA33A



### 30KPA-HRA Series



#### Agency Approvals

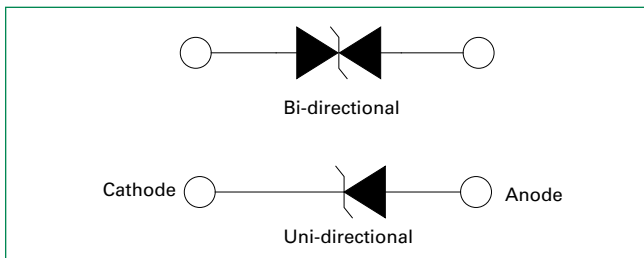
Agency	Agency File Number
	E230531

#### Maximum Ratings and Thermal Characteristics (T<sub>A</sub>=25°C unless otherwise noted)

Parameter	Symbol	Value	Unit
Peak Pulse Power Dissipation by 10/1000µs Test Waveform (Fig.2) <sup>(Note1)</sup>	P <sub>PPM</sub>	30	kW
Steady State Power Dissipation on Infinite Heat Sink at T <sub>c</sub> =75°C	P <sub>D</sub>	8.0	W
Peak Forward Surge Current, 8.3ms Single Half Sine Wave Unidirectional Only <sup>(Note 2)</sup>	I <sub>FSM</sub>	400	A
Operating Junction and Storage Temperature Range	T <sub>J</sub> , T <sub>STG</sub>	-55 to 175	°C
Typical Thermal Resistance Junction to Lead	R <sub>θJL</sub>	8.0	°C/W
Typical Thermal Resistance Junction to Ambient	R <sub>θJA</sub>	40	°C/W

- Notes:**
1. Non-repetitive current pulse per Fig. 4 and derated above T<sub>J</sub> (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



#### 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

- 30 kW peak pulse 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<sub>BR</sub> 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 (IEC801-4)
- Low incremental surge resistance
- Typical I<sub>R</sub> less than 2µA when V<sub>BR</sub> min>73V
- High temperature to reflow soldering guaranteed: 260°C/10sec / 0.375", (9.5mm) lead length, 5 lbs., (2.3kg) tension
- V<sub>BR</sub> @ T<sub>J</sub> = V<sub>BR</sub> @25°C x (1+ α T x (T<sub>J</sub> - 25)) (α T: Temperature Coefficient, typical value is 0.1%)
- UL Recognized compound meeting flammability rating V-0
- 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 Components are ideal for the protection of I/O interfaces, V<sub>CC</sub> 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)

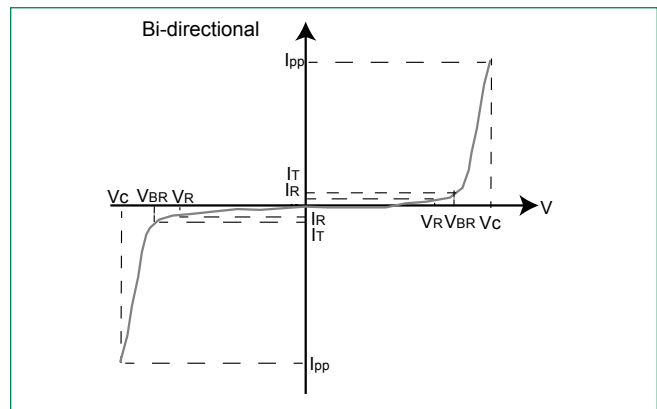
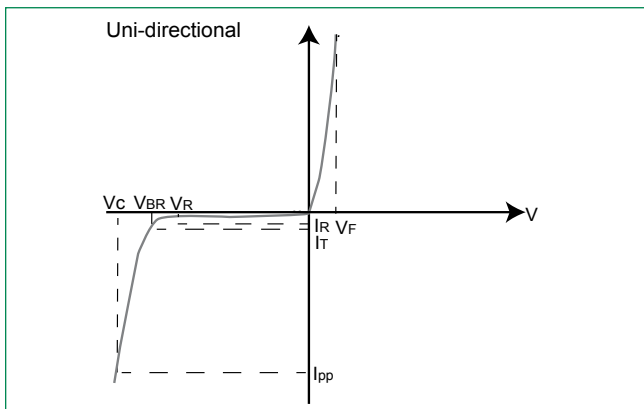
Part Number (Uni)	Part Number (Bi)	Reverse Stand off Voltage $V_R$ (Volts)	Breakdown Voltage $V_{BR}$ (Volts) @ $I_T$		Test Current $I_T$ (mA)	Maximum Peak Pulse Current $I_{PP}$ (A)	Maximum Reverse Leakage $I_R @ V_R$ ( $\mu\text{A}$ )	Maximum Clamping Voltage $V_C @ I_{PP}$ (V)	Agency Recognition 
			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
30KPA345A-HRA	30KPA345CA-HRA	345	384	423	5	54.4	2	557	-

### 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 96hrs 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

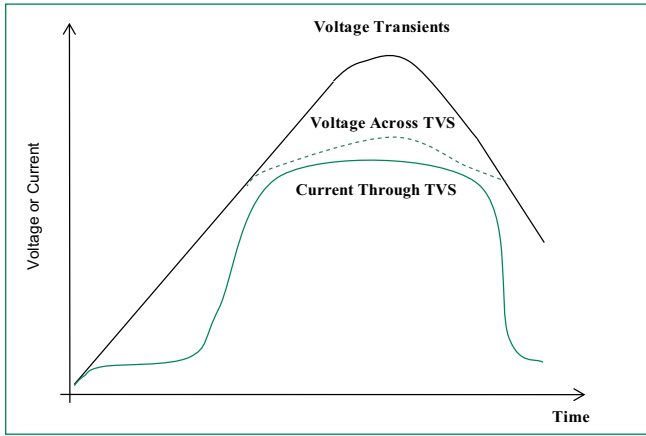
### I-V Curve Characteristics



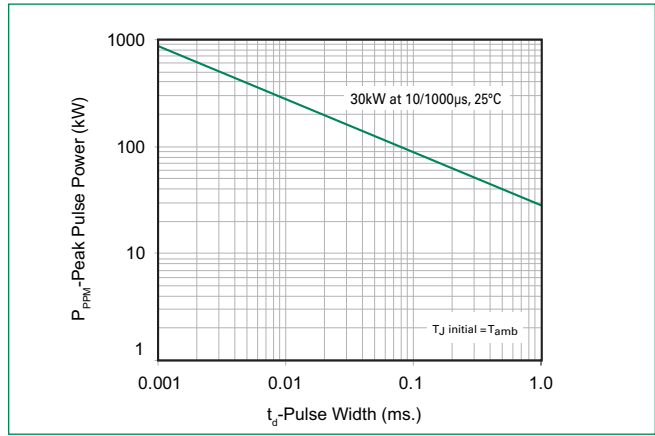
- P<sub>PPM</sub> Peak Pulse Power Dissipation** -- Max power dissipation
- V<sub>R</sub> Stand-off Voltage** -- Maximum voltage that can be applied to the TVS without operation
- V<sub>BR</sub> Breakdown Voltage** -- Maximum voltage that flows though the TVS at a specified test current (I<sub>T</sub>)
- V<sub>C</sub> Clamping Voltage** -- Peak voltage measured across the TVS at a specified I<sub>ppm</sub> (peak impulse current)
- I<sub>R</sub> Reverse Leakage Current** -- Current measured at V<sub>R</sub>
- V<sub>F</sub> Forward Voltage Drop for Uni-directional**

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

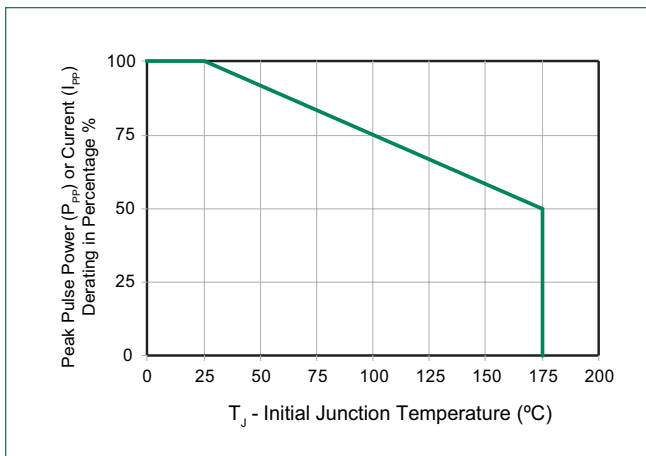
**Figure 1 - TVS Transients Clamping Waveform**



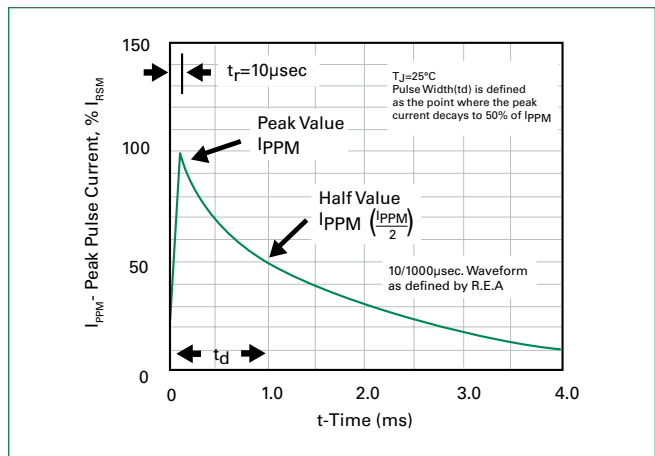
**Figure 2 - Peak Pulse Power Rating Curve**



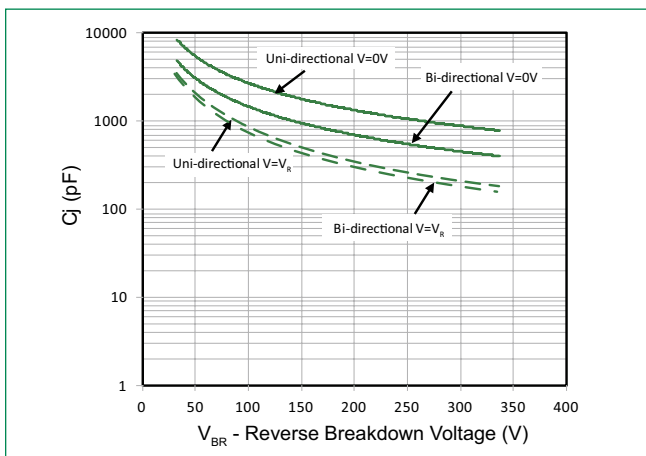
**Figure 3 - Peak Pulse Power Derating Curve**



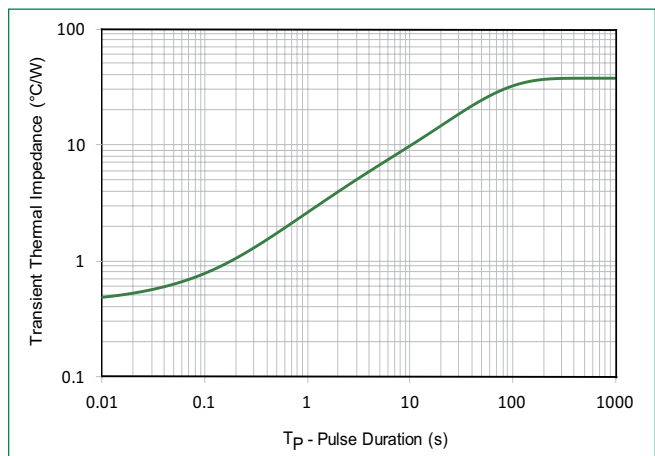
**Figure 4 - Pulse Waveform**



**Figure 5 - Typical Junction Capacitance**

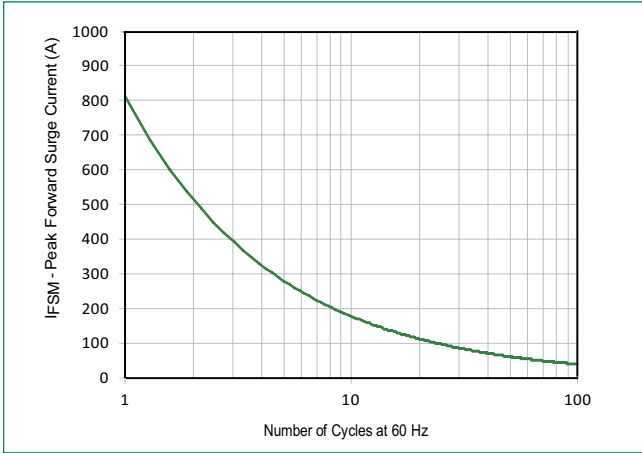


**Figure 6 - Typical Transient Thermal Impedance**

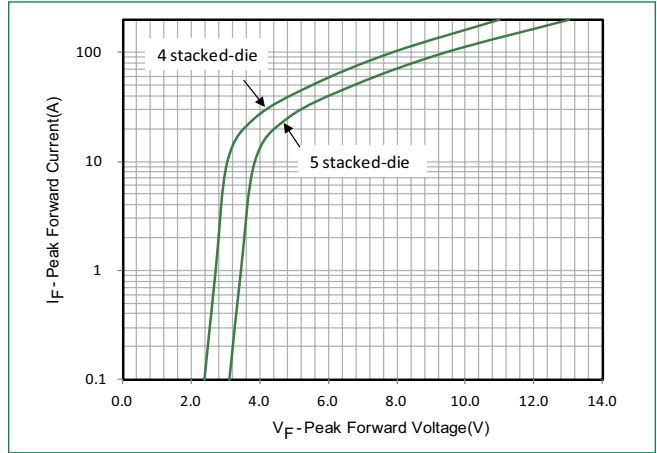


**Ratings and Characteristic Curves** ( $T_A=25^{\circ}\text{C}$  unless otherwise noted)

**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.

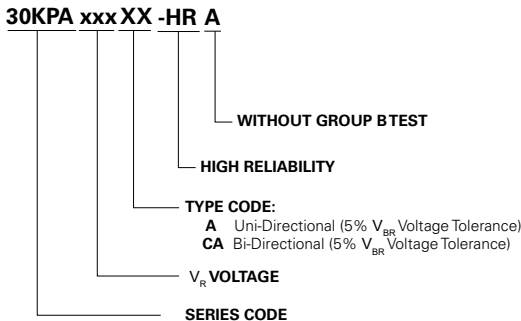
**Environmental Specifications**

<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

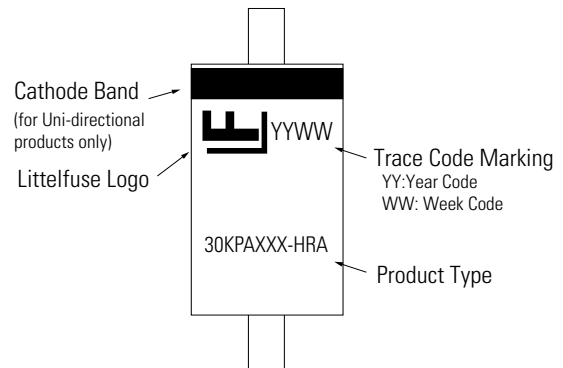
**Packing Options**

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

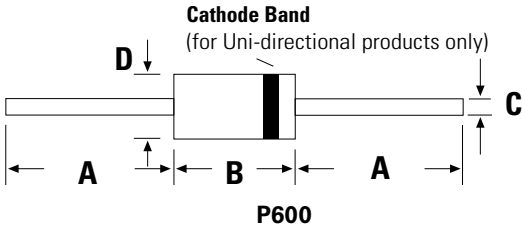
**Part Numbering System**



**Part Marking System**

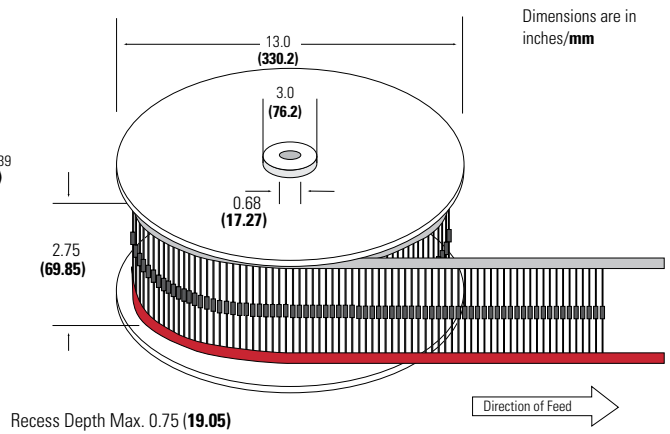
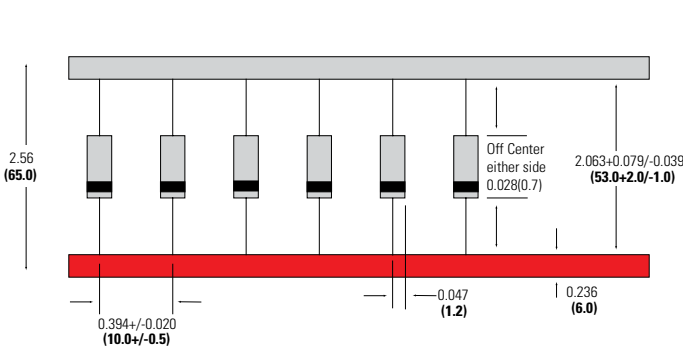


**Dimensions**

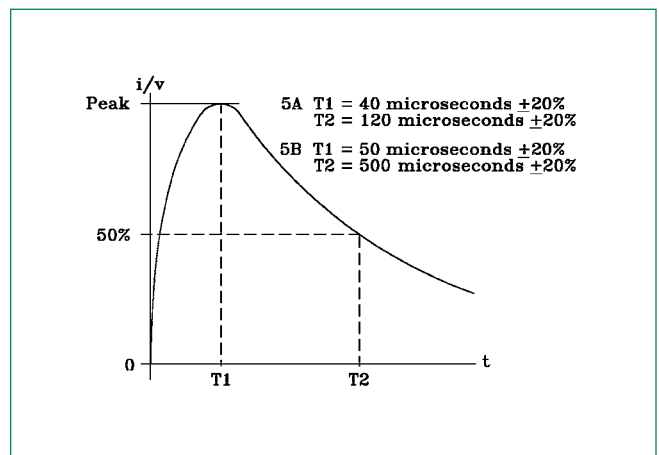
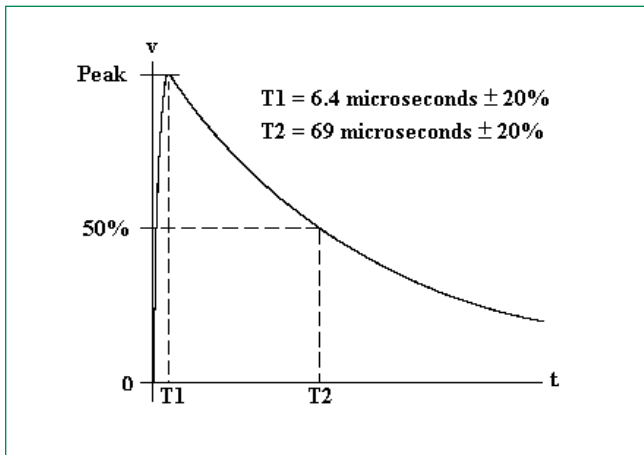


Dimensions	Inches		Millimeters	
	Min	Max	Min	Max
<b>A</b>	1.000	-	25.40	-
<b>B</b>	0.340	0.360	8.60	9.10
<b>C</b>	0.048	0.054	1.22	1.36
<b>D</b>	0.340	0.360	8.60	9.10

**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	-	-
30KPA42A-HRA	30KPA42CA-HRA	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	-	-
30KPA45A-HRA	30KPA45CA-HRA	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	-	-
30KPA51A-HRA	30KPA51CA-HRA	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	-	-
30KPA58A-HRA	30KPA58CA-HRA	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	-	-
30KPA64A-HRA	30KPA64CA-HRA	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	-	-
30KPA70A-HRA	30KPA70CA-HRA	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	-	-
30KPA72A-HRA	30KPA72CA-HRA	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	-	-
30KPA78A-HRA	30KPA78CA-HRA	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	-	-
30KPA90A-HRA	30KPA90CA-HRA	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	-	-
30KPA102A-HRA	30KPA102CA-HRA	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	-	-	-
30KPA120A-HRA	30KPA120CA-HRA	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	-	-	-
30KPA144A-HRA	30KPA144CA-HRA	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	-	-	-
30KPA156A-HRA	30KPA156CA-HRA	pass	pass	pass	-	-	-	pass	pass	pass	-	-	-	pass	pass	pass	-	-	-
30KPA160A-HRA	30KPA160CA-HRA	pass	pass	pass	-	-	-	pass	pass	pass	-	-	-	pass	pass	pass	-	-	-
30KPA168A-HRA	30KPA168CA-HRA	pass	pass	pass	-	-	-	pass	pass	pass	-	-	-	pass	pass	pass	-	-	-
30KPA170A-HRA	30KPA170CA-HRA	pass	pass	pass	-	-	-	pass	pass	pass	-	-	-	pass	pass	pass	-	-	-
30KPA180A-HRA	30KPA180CA-HRA	pass	pass	pass	-	-	-	pass	pass	pass	-	-	-	pass	pass	pass	-	-	-
30KPA198A-HRA	30KPA198CA-HRA	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	-	-	-	-
30KPA300A-HRA	30KPA300CA-HRA	pass	pass	pass	-	-	-	pass	pass	-	-	-	-	pass	pass	-	-	-	-
30KPA345A-HRA	30KPA345CA-HRA	pass	pass	pass	-	-	-	pass	pass	-	-	-	-	pass	pass	-	-	-	-

**Note:**  
 1. L1 = Level 1, L2 = Level 2, L3 = Level 3, L4 = Level 4, L5 = Level 5

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-  Cost Control Management
-  Shortage Management
-  Alternative Solution
-  Excess Inventory Management