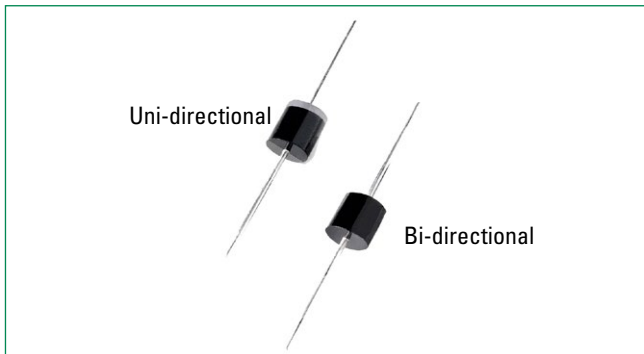



### 30KPA-HR Series



#### Agency Approvals

Agency	Agency File Number
	E230531

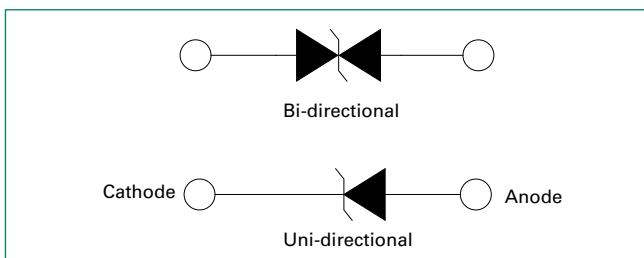
#### Maximum Ratings and Thermal Characteristics (T<sub>A</sub> = 25°C unless otherwise noted)

Parameter	Symbol	Value	Unit
Peak Pulse Power Dissipation by 10/1000µs Test Waveform (Fig.2) (Note1)	P <sub>PPM</sub>	30	kW
Steady State Power Dissipation on Infinite Heat Sink at T <sub>L</sub> = 75°C	P <sub>D</sub>	8.0	W
Peak Forward Surge Current, 8.3ms Single Half Sine Wave Unidirectional Only (Note 2)	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-HR High Reliability Series is designed specifically to protect sensitive electronic equipment from voltage transients induced by lightning and other transient voltage events.

#### Features

- 30kW 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
- Low incremental surge resistance
- Typical I<sub>R</sub> less than 2µA when V<sub>BR</sub> min > 73V
- High temperature soldering guaranteed: 260C/10 seconds / 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-HR	30KPA28CA-HR	28	31.28	34.41	50	606.0	5000	50.0	X
30KPA30A-HR	30KPA30CA-HR	30	33.51	36.86	50	548.9	5000	55.2	X
30KPA33A-HR	30KPA33CA-HR	33	36.90	40.59	50	517.9	5000	58.5	X
30KPA36A-HR	30KPA36CA-HR	36	40.20	44.22	50	490.3	5000	61.8	X
30KPA39A-HR	30KPA39CA-HR	39	43.60	47.96	20	450.9	2000	67.2	X
30KPA42A-HR	30KPA42CA-HR	42	46.90	51.59	10	420.8	1000	72.0	X
30KPA43A-HR	30KPA43CA-HR	43	48.00	52.80	10	415.1	1000	73.0	X
30KPA45A-HR	30KPA45CA-HR	45	50.30	55.33	5	391.5	250	77.4	X
30KPA48A-HR	30KPA48CA-HR	48	53.60	58.96	5	371.3	150	81.6	X
30KPA51A-HR	30KPA51CA-HR	51	57.00	62.70	5	350.7	50	86.4	X
30KPA54A-HR	30KPA54CA-HR	54	60.30	66.33	5	331.5	20	91.4	X
30KPA58A-HR	30KPA58CA-HR	58	64.80	71.28	5	327.9	20	92.4	X
30KPA60A-HR	30KPA60CA-HR	60	67.00	73.70	5	297.1	15	102.0	X
30KPA64A-HR	30KPA64CA-HR	64	71.50	78.65	5	291.3	10	104.0	X
30KPA66A-HR	30KPA66CA-HR	66	73.70	81.07	5	283.2	2	107.0	X
30KPA70A-HR	30KPA70CA-HR	70	78.20	86.02	5	278.0	2	109.0	X
30KPA71A-HR	30KPA71CA-HR	71	79.30	87.23	5	271.7	2	111.5	X
30KPA72A-HR	30KPA72CA-HR	72	80.40	88.44	5	265.8	2	114.0	X
30KPA75A-HR	30KPA75CA-HR	75	83.80	92.18	5	253.8	2	119.4	X
30KPA78A-HR	30KPA78CA-HR	78	87.10	95.81	5	234.9	2	129.0	X
30KPA84A-HR	30KPA84CA-HR	84	93.80	103.18	5	217.7	2	139.2	X
30KPA90A-HR	30KPA90CA-HR	90	100.50	110.55	5	207.0	2	146.4	X
30KPA96A-HR	30KPA96CA-HR	96	107.20	117.92	5	194.2	2	156.0	X
30KPA102A-HR	30KPA102CA-HR	102	113.90	125.29	5	183.0	2	165.6	X
30KPA108A-HR	30KPA108CA-HR	108	120.60	132.66	5	172.9	2	175.2	X
30KPA120A-HR	30KPA120CA-HR	120	134.00	147.40	5	155.9	2	194.4	X
30KPA132A-HR	30KPA132CA-HR	132	147.40	162.14	5	142.3	2	213.0	X
30KPA144A-HR	30KPA144CA-HR	144	160.80	176.88	5	135.8	2	223.2	X
30KPA150A-HR	30KPA150CA-HR	150	167.60	184.36	5	129.8	2	233.4	X
30KPA156A-HR	30KPA156CA-HR	156	174.30	191.73	5	123.7	2	245.0	X
30KPA160A-HR	30KPA160CA-HR	160	178.70	196.57	5	120.0	2	252.6	X
30KPA168A-HR	30KPA168CA-HR	168	187.70	206.47	5	111.2	2	272.4	X
30KPA170A-HR	30KPA170CA-HR	170	189.90	208.89	5	110.2	2	275.0	X
30KPA180A-HR	30KPA180CA-HR	180	201.10	221.21	5	104.3	2	290.4	X
30KPA198A-HR	30KPA198CA-HR	198	221.20	243.32	5	94.7	2	319.8	X
30KPA216A-HR	30KPA216CA-HR	216	241.30	265.43	5	86.9	2	348.6	X
30KPA240A-HR	30KPA240CA-HR	240	268.10	294.91	5	78.3	2	387.0	X
30KPA258A-HR	30KPA258CA-HR	258	288.20	317.02	5	72.8	2	416.4	X
30KPA260A-HR	30KPA260CA-HR	260	290.40	319.44	5	72.8	2	416.0	X
30KPA270A-HR	30KPA270CA-HR	270	301.60	331.76	5	69.5	2	436.2	X
30KPA280A-HR	30KPA280CA-HR	280	312.80	344.08	5	65.3	2	464.0	X
30KPA288A-HR	30KPA288CA-HR	288	321.70	353.87	5	64.5	2	469.9	X
30KPA300A-HR	30KPA300CA-HR	300	334.00	367.40	5	62.0	2	484.0	X
30KPA345A-HR	30KPA345CA-HR	345	384	423	5	54.4	2	557	-

**Note:**

2. Each lot of parts will pass group B test requirement.

**Screen Process**

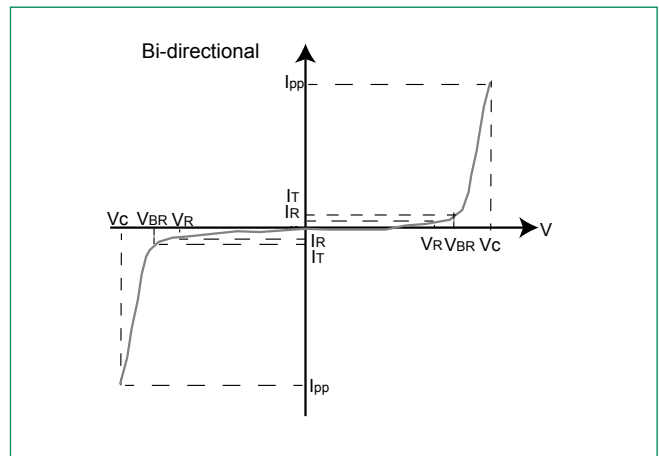
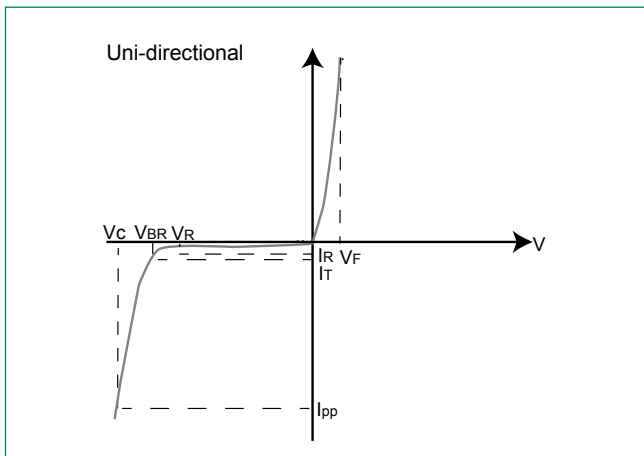
<b>100% Vision Inspection</b>	MIL-STD-750 method 2074
<b>100% High Temperature Storage Life (168hrs,175°C)</b>	MIL-STD-750 method 1031
<b>100% Temperature Cycle Test (-55 to150°C, 20 cycles, dwell time 15 min)</b>	MIL-STD-750 method 1051
<b>100% Surge Test (2x)</b>	MIL-STD-750 method 4066
<b>100% HTRB 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

**Group B Test Requirement**

Screen	Method	Condition	Requirement
Surge test	10/1000 $\mu$ s Peak Pulse Waveform	Maximum clamping Voltage ( $V_c$ ) @ Peak Pulse Current ( $I_{pp}$ )	Sample Size 45 perform 10x Accept 0 failures
Burn - In (HTRB)	MIL -STD-750, Method 1038.5	Applied voltage 100% $V_R$ @150°C	Sample size 45 340 hours (680 hours for bi-direction products, each direction 340 hours) Accept 0 failures
Electrical test	–	$I_R$ @ $V_R$ , $V_{(BR)}$ @ $I_T$	Sample size 45 Accept 0 failures

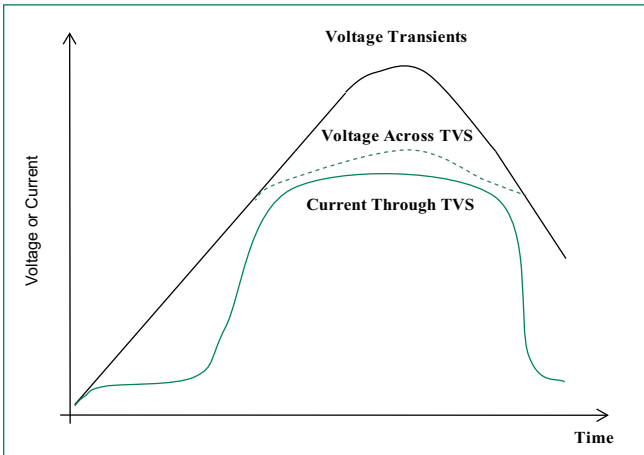
**I-V Curve Characteristics**



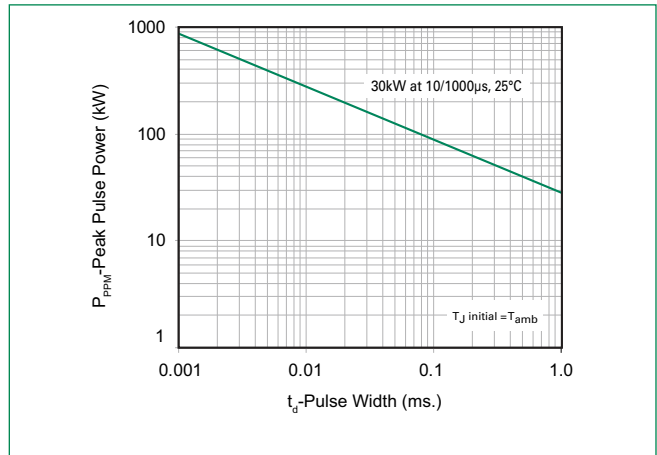
- $P_{PPM}$  Peak Pulse Power Dissipation** – Max power dissipation
- $V_R$  Stand-off Voltage** – Maximum voltage that can be applied to the TVS without operation
- $V_{BR}$  Breakdown Voltage** – Maximum voltage that flows though the TVS at a specified test current ( $I_T$ )
- $V_C$  Clamping Voltage** – 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)

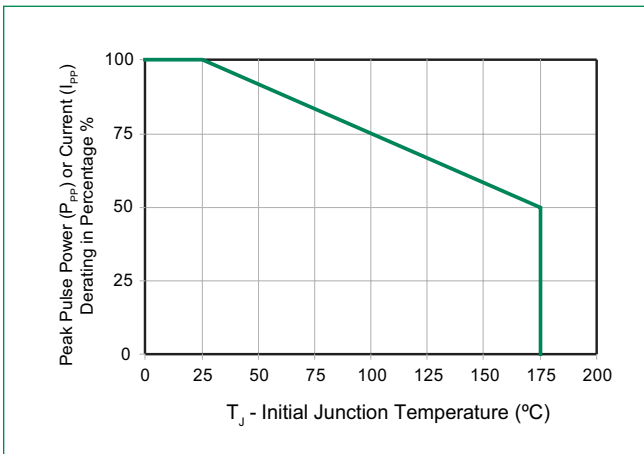
**Figure 1 - TVS Transients Clamping Waveform**



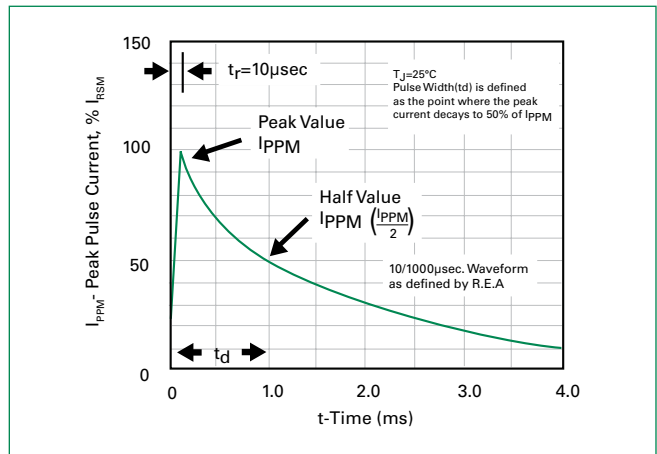
**Figure 2 - Peak Pulse Power Rating Curve**



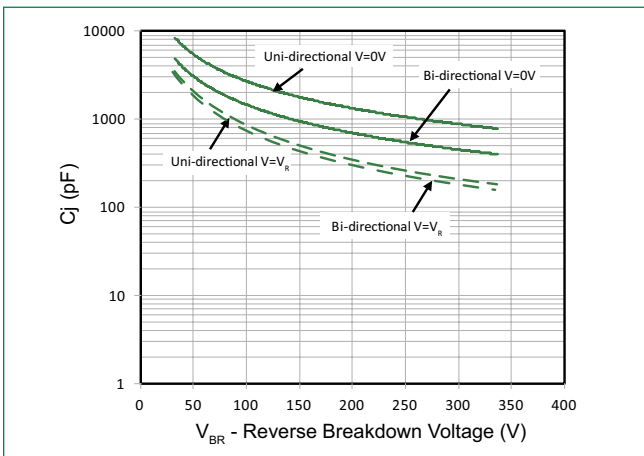
**Figure 3 - Peak Pulse Power Derating Curve**



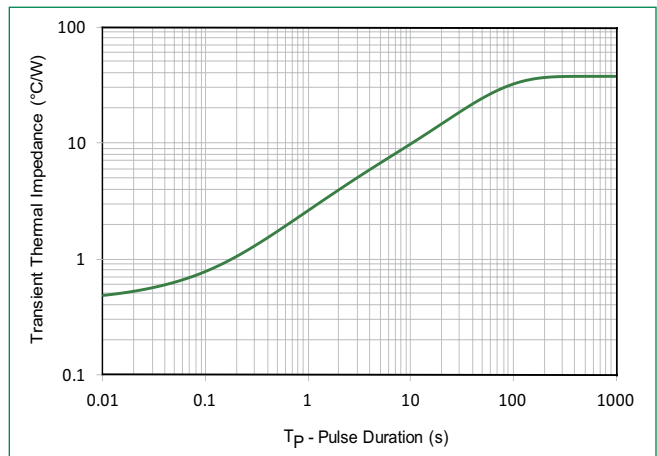
**Figure 4 - Pulse Waveform**



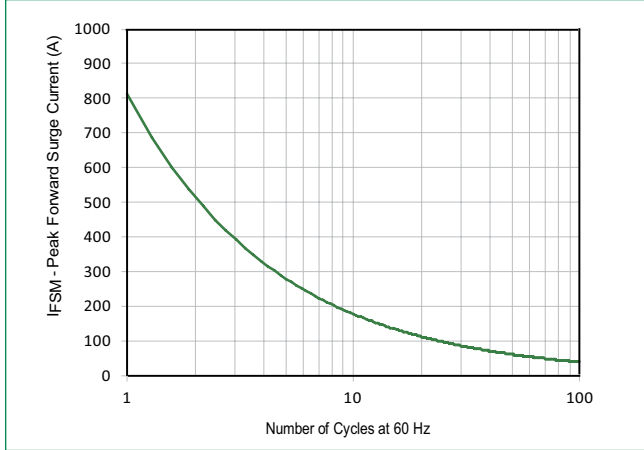
**Figure 5 - Typical Junction Capacitance**



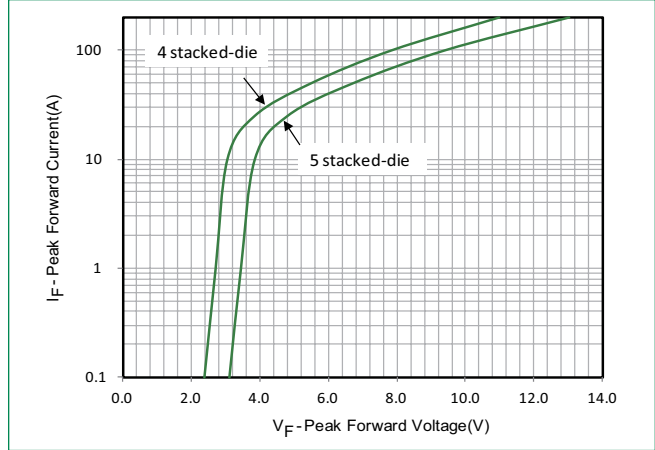
**Figure 6 - Typical Transient Thermal Impedance**



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



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



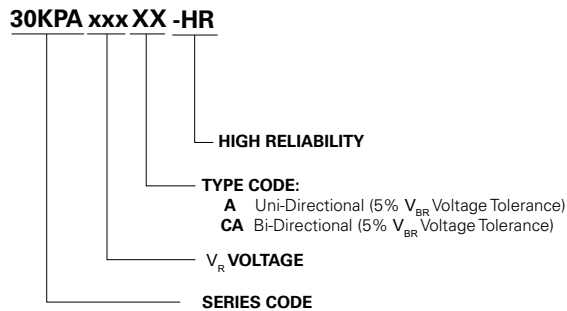
**Physical Specifications**

<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.

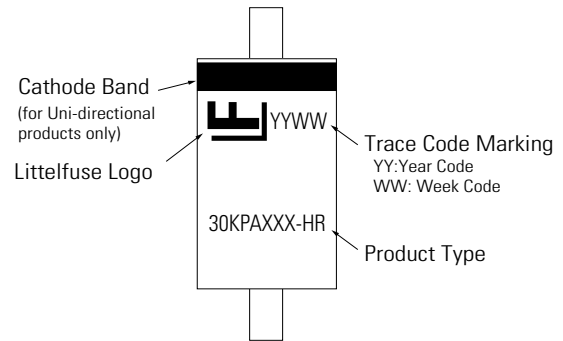
**Environmental Specifications**

<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

**Part Numbering System**



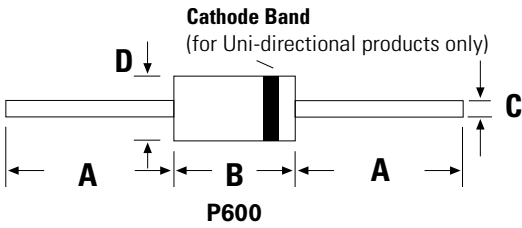
**Part Marking System**



**Packing Options**

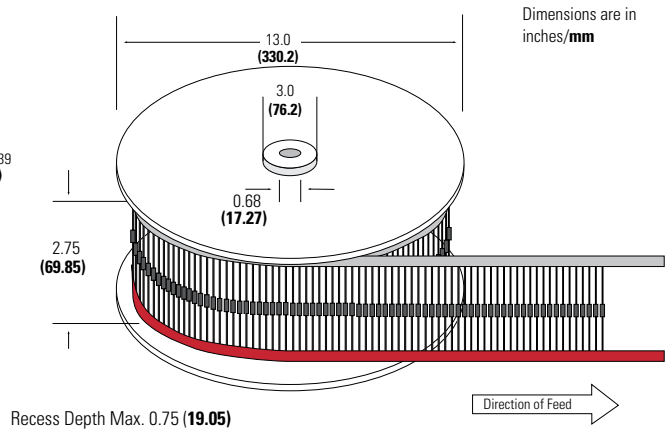
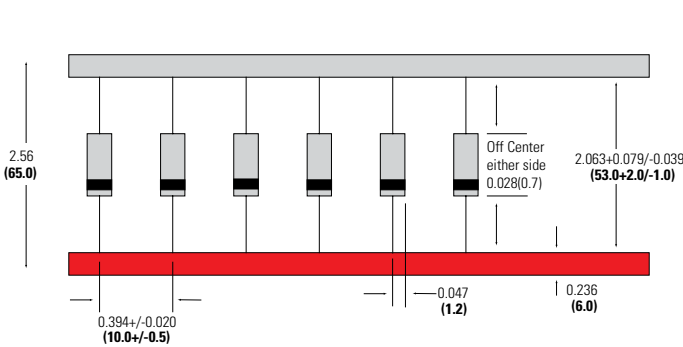
Part Number	Component Package	Quantity	Packaging Option	Packaging Specification
30KPAxxxXX-HR	P600	800	Tape & Reel	EIA STD RS-296

**Dimensions**

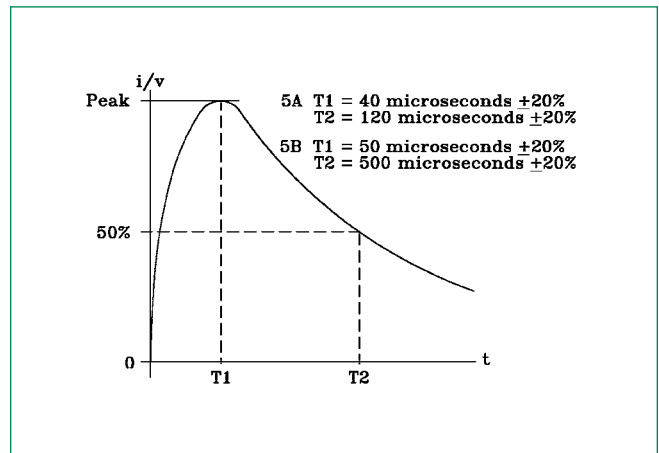
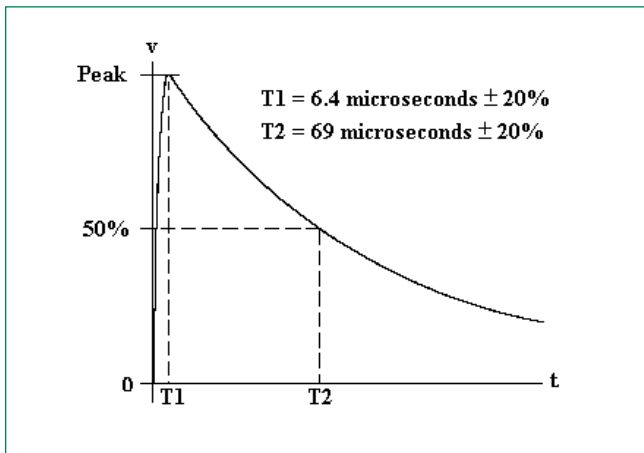


Dimensions	Inches		Millimeters	
	Min	Max	Min	Max
<b>A</b>	1.000	-	25.40	-
<b>B</b>	0.340	0.360	8.60	9.10
<b>C</b>	0.048	0.054	1.22	1.36
<b>D</b>	0.340	0.360	8.60	9.10

**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-HR	30KPA28CA-HR	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass
30KPA30A-HR	30KPA30CA-HR	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass
30KPA33A-HR	30KPA33CA-HR	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass
30KPA36A-HR	30KPA36CA-HR	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass
30KPA39A-HR	30KPA39CA-HR	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass
30KPA42A-HR	30KPA42CA-HR	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass
30KPA43A-HR	30KPA43CA-HR	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass
30KPA45A-HR	30KPA45CA-HR	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass
30KPA48A-HR	30KPA48CA-HR	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass
30KPA51A-HR	30KPA51CA-HR	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass
30KPA54A-HR	30KPA54CA-HR	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass
30KPA58A-HR	30KPA58CA-HR	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass
30KPA60A-HR	30KPA60CA-HR	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass
30KPA64A-HR	30KPA64CA-HR	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass
30KPA66A-HR	30KPA66CA-HR	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass
30KPA70A-HR	30KPA70CA-HR	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass
30KPA71A-HR	30KPA71CA-HR	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass
30KPA72A-HR	30KPA72CA-HR	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass
30KPA75A-HR	30KPA75CA-HR	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass
30KPA78A-HR	30KPA78CA-HR	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass
30KPA84A-HR	30KPA84CA-HR	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass
30KPA90A-HR	30KPA90CA-HR	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass
30KPA96A-HR	30KPA96CA-HR	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass
30KPA102A-HR	30KPA102CA-HR	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass
30KPA108A-HR	30KPA108CA-HR	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass
30KPA120A-HR	30KPA120CA-HR	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass
30KPA132A-HR	30KPA132CA-HR	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass
30KPA144A-HR	30KPA144CA-HR	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass
30KPA150A-HR	30KPA150CA-HR	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass
30KPA156A-HR	30KPA156CA-HR	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass
30KPA160A-HR	30KPA160CA-HR	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass
30KPA168A-HR	30KPA168CA-HR	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass
30KPA170A-HR	30KPA170CA-HR	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass
30KPA180A-HR	30KPA180CA-HR	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass
30KPA198A-HR	30KPA198CA-HR	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass
30KPA216A-HR	30KPA216CA-HR	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass
30KPA240A-HR	30KPA240CA-HR	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass
30KPA258A-HR	30KPA258CA-HR	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass
30KPA260A-HR	30KPA260CA-HR	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass
30KPA270A-HR	30KPA270CA-HR	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass
30KPA280A-HR	30KPA280CA-HR	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass
30KPA288A-HR	30KPA288CA-HR	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass
30KPA300A-HR	30KPA300CA-HR	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass
30KPA300A-HR	30KPA300CA-HR	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass
30KPA345A-HR	30KPA345CA-HR	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass	pass

**Note:**

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