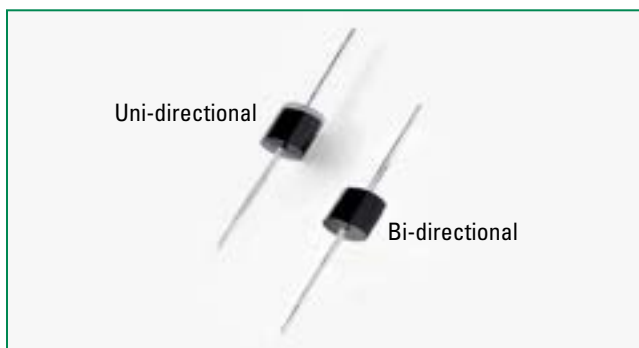



### 20KPA Series



#### Agency Approvals

AGENCY	AGENCY FILE NUMBER
	E230531

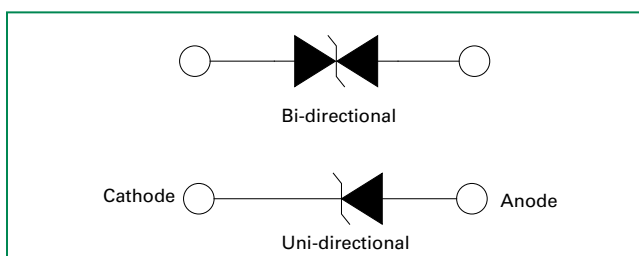
#### Maximum Ratings and Thermal Characteristics ( $T_A=25^\circ\text{C}$ unless otherwise noted)

Parameter	Symbol	Value	Unit
Peak Pulse Power Dissipation by 10/1000 $\mu\text{s}$ Test Waveform (Fig.2) (Note 1)	$P_{PPM}$	20	kW
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 20KPA Series is designed specifically to protect sensitive electronic equipment from voltage transients induced by lightning and other transient voltage events.

#### Features

- 20kW 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
- EFT protection of data lines in accordance with IEC 61000-4-4
- Low incremental surge resistance
- Typical  $I_R$  less than 2 $\mu\text{A}$  when  $V_{BR}$  min>49V
- High temperature to reflow soldering guaranteed: 260 $^\circ\text{C}$ /40sec / 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 %)
- UL Recognized compound meeting flammability rating V-0
- 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 and consumer electronic applications.

#### Additional Information



Datasheet



Resources




Samples

# Transient Voltage Suppression Diodes

Axial Leaded – 20000W > 20KPA series

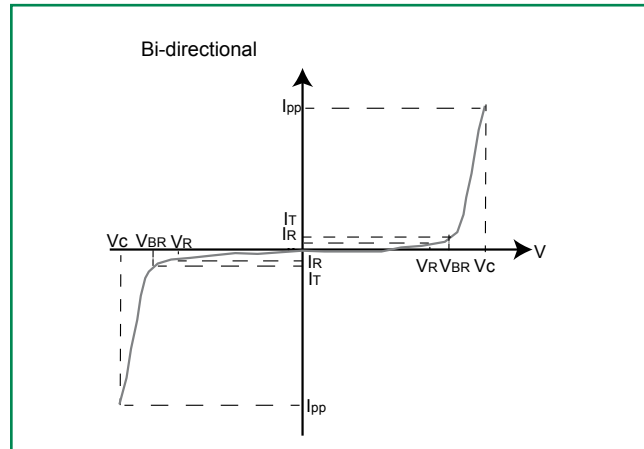
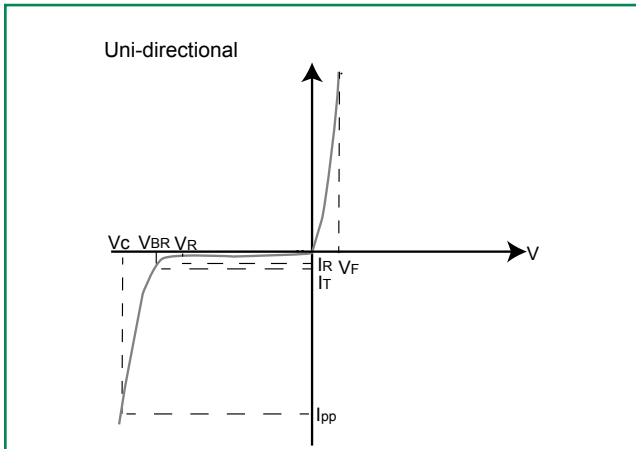
## Electrical Characteristics (T<sub>A</sub>=25°C unless otherwise noted)

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 Recognition 
			MIN	MAX					
20KPA20A	20KPA20CA	20	22.34	24.57	50	548.9	5000	36.8	X
20KPA24A	20KPA24CA	24	26.81	29.49	50	490.3	5000	41.2	X
20KPA26A	20KPA26CA	26	29.04	31.94	50	451.9	2000	44.7	X
20KPA28A	20KPA28CA	28	31.28	34.41	50	420.8	1000	48.0	X
20KPA30A	20KPA30CA	30	33.51	36.86	5	392.2	250	51.5	X
20KPA32A	20KPA32CA	32	35.74	39.31	5	372.0	150	54.3	X
20KPA34A	20KPA34CA	34	38.00	41.80	5	351.3	50	57.5	X
20KPA36A	20KPA36CA	36	40.20	44.22	5	328.5	20	61.5	X
20KPA40A	20KPA40CA	40	44.70	49.17	5	297.9	15	67.8	X
20KPA44A	20KPA44CA	44	49.10	54.01	5	277.9	2	72.7	X
20KPA48A	20KPA48CA	48	53.60	58.96	5	254.4	2	79.4	X
20KPA52A	20KPA52CA	52	58.10	63.91	5	235.4	2	85.8	X
20KPA56A	20KPA56CA	56	62.60	68.86	5	218.1	2	92.6	X
20KPA60A	20KPA60CA	60	67.00	73.70	5	207.0	2	97.6	X
20KPA64A	20KPA64CA	64	71.50	78.65	5	194.2	2	104.0	X
20KPA68A	20KPA68CA	68	76.00	83.60	5	183.6	2	110.0	X
20KPA72A	20KPA72CA	72	80.40	88.44	5	174.1	2	116.0	X
20KPA80A	20KPA80CA	80	89.40	98.34	5	155.4	2	130.0	X
20KPA88A	20KPA88CA	88	98.30	108.13	5	142.3	2	142.0	X
20KPA96A	20KPA96CA	96	107.20	117.92	5	130.3	2	155.0	X
20KPA104A	20KPA104CA	104	116.20	127.82	5	120.2	2	168.0	X
20KPA112A	20KPA112CA	112	125.10	137.61	5	111.0	2	182.0	X
20KPA120A	20KPA120CA	120	134.00	147.40	5	104.1	2	194.0	X
20KPA132A	20KPA132CA	132	147.40	162.14	5	94.8	2	213.0	X
20KPA144A	20KPA144CA	144	160.80	176.88	5	87.1	2	232.0	X
20KPA160A	20KPA160CA	160	178.70	196.57	5	78.3	2	258.0	X
20KPA172A	20KPA172CA	172	192.10	211.31	5	72.9	2	277.0	X
20KPA180A	20KPA180CA	180	201.10	221.21	5	69.4	2	291.0	X
20KPA192A	20KPA192CA	192	214.50	235.95	5	65.4	2	309.0	X
20KPA204A	20KPA204CA	204	227.90	250.69	5	61.4	2	329.0	X
20KPA216A	20KPA216CA	216	241.30	265.43	5	58.0	2	348.0	X
20KPA232A	20KPA232CA	232	259.10	285.01	5	54.0	2	374.0	X
20KPA240A	20KPA240CA	240	268.10	294.91	5	52.2	2	387.0	X
20KPA256A	20KPA256CA	256	286.00	314.60	5	49.0	2	412.0	X
20KPA280A	20KPA280CA	280	312.80	344.08	5	44.8	2	451.0	X
20KPA300A	20KPA300CA	300	335.10	368.61	5	41.8	2	483.0	X

For bidirectional type having V<sub>RWM</sub> of 40 volts and less, the I<sub>R</sub> limit is double.

For parts without A, the V<sub>BR</sub> is ± 10% and V<sub>C</sub> is 5% higher than with A parts.

### 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)

Figure 1 - TVS Transients Clamping Waveform

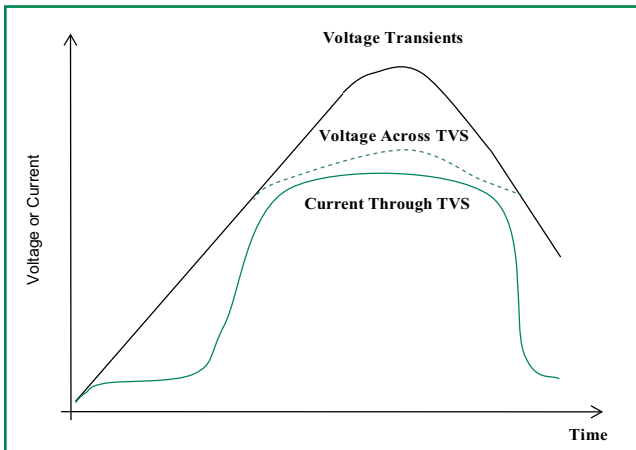
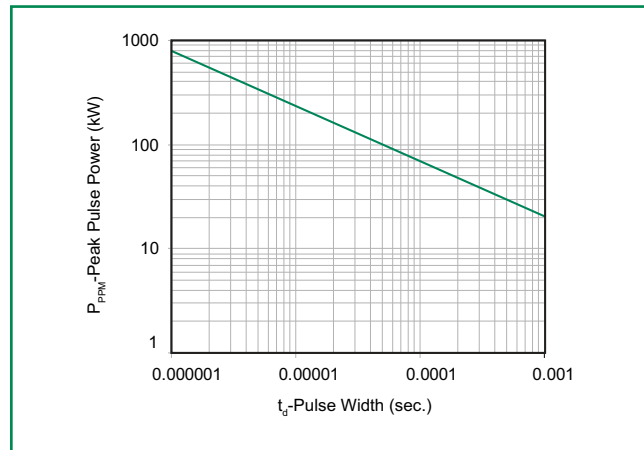


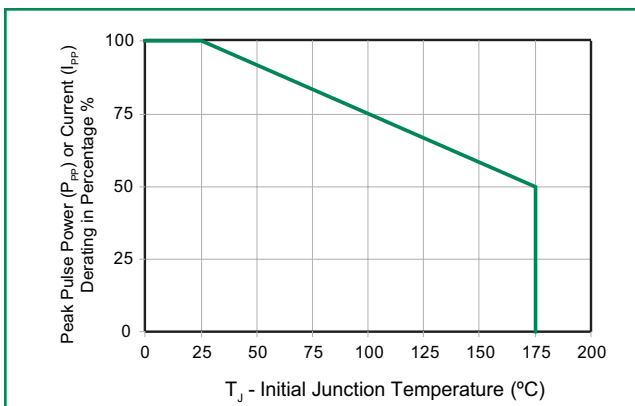
Figure 2 - Peak Pulse Power Rating Curve



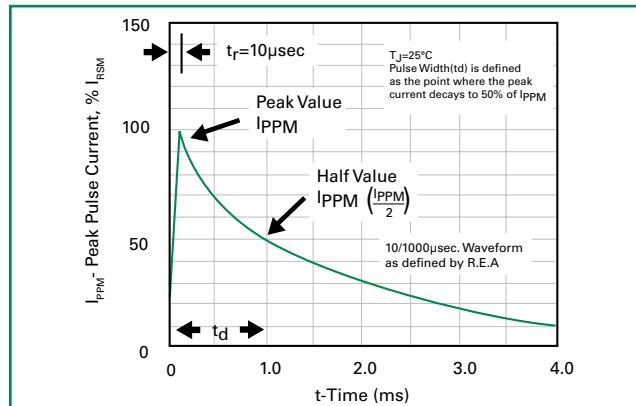
continues on next page.

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

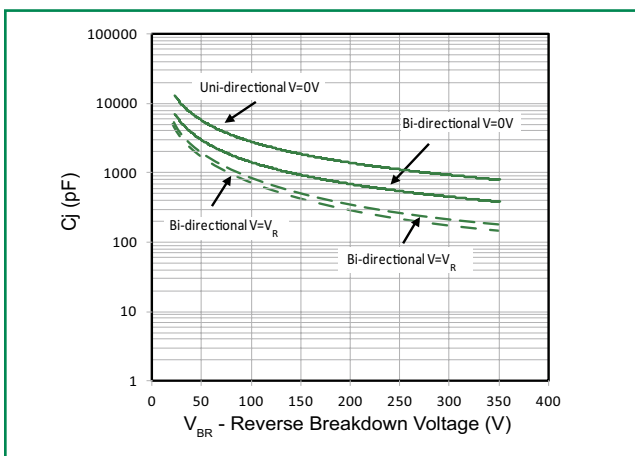
**Figure 3 - Peak Pulse Power Derating Curve**



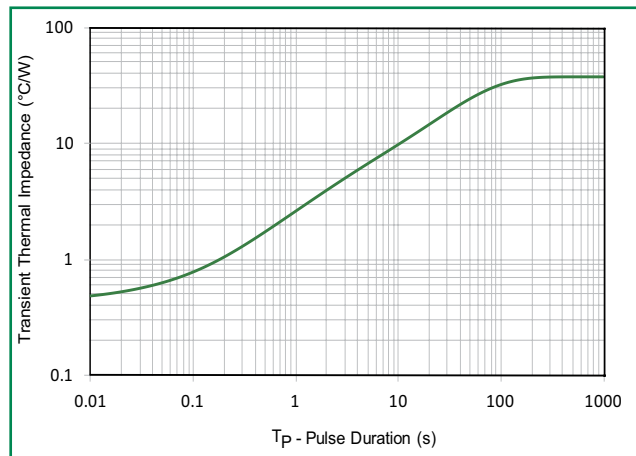
**Figure 4 - Pulse Waveform**



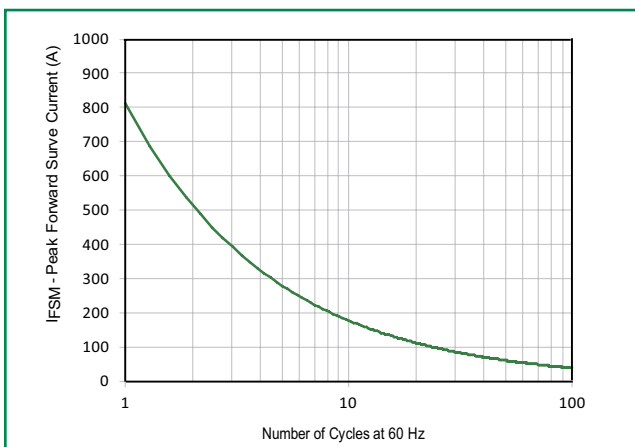
**Figure 5 - Typical Junction Capacitance**



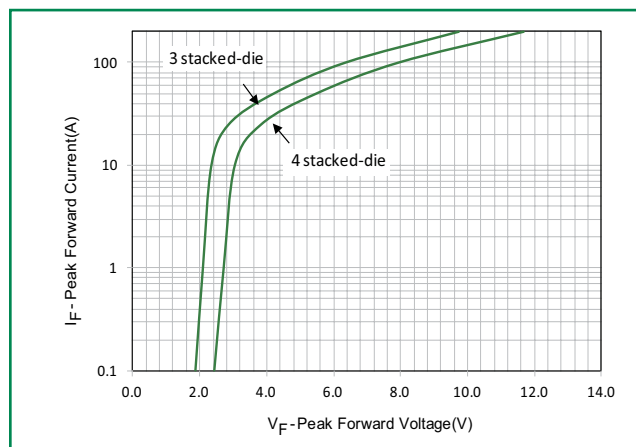
**Figure 6 - Typical Transient Thermal Impedance**



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

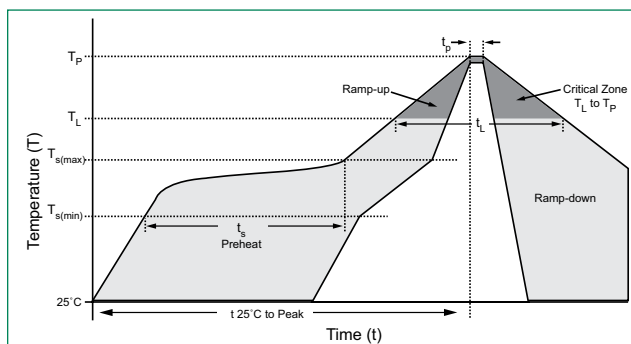


**Figure 8 - Peak Forward Voltage Drop vs Peak Forward Current (Typical Values)**



### Soldering Parameter

Reflow Condition		Lead-free assembly
Pre Heat	- Temperature Min ( $T_{s(min)}$ )	150°C
	- Temperature Max ( $T_{s(max)}$ )	200°C
	- Time (min to max) ( $t_s$ )	60 – 180 secs
Average ramp up rate (Liquidus Temp ( $T_A$ ) to peak)		3°C/second max
$T_{s(max)}$ to $T_A$ - Ramp-up Rate		3°C/second max
Reflow	- Temperature ( $T_A$ ) (Liquidus)	217°C
	- Time (min to max) ( $t_s$ )	60 – 150 seconds
Peak Temperature ( $T_p$ )		260 <sup>+0/-5</sup> °C
Time within 5°C of actual peak Temperature ( $t_p$ )		20 – 40 seconds
Ramp-down Rate		6°C/second max
Time 25°C to peak Temperature ( $T_p$ )		8 minutes Max.
Do not exceed		260°C



### Flow/Wave Soldering (Solder Dipping)

<b>Peak Temperature :</b>	265°C
<b>Dipping Time :</b>	10 seconds
<b>Soldering :</b>	1 time

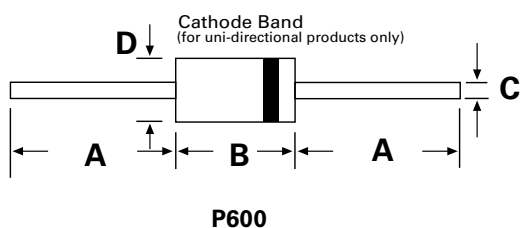
### Physical Specifications

<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

### 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	0.054	1.22	1.36
D	0.340	0.360	8.60	9.10

### Part Numbering System

**20KPA xxxXXX**

**OPTION CODE:**

**BLANK** Reel Tape

**-B** Bulk Packaging

**TYPE CODE:**

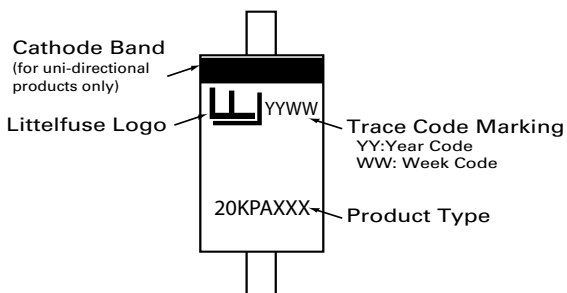
**A** Uni-Directional (5%  $V_{BR}$  Voltage Tolerance)

**CA** Bi-Directional (5%  $V_{BR}$  Voltage Tolerance)

$V_R$  **VOLTAGE**

**SERIES CODE**

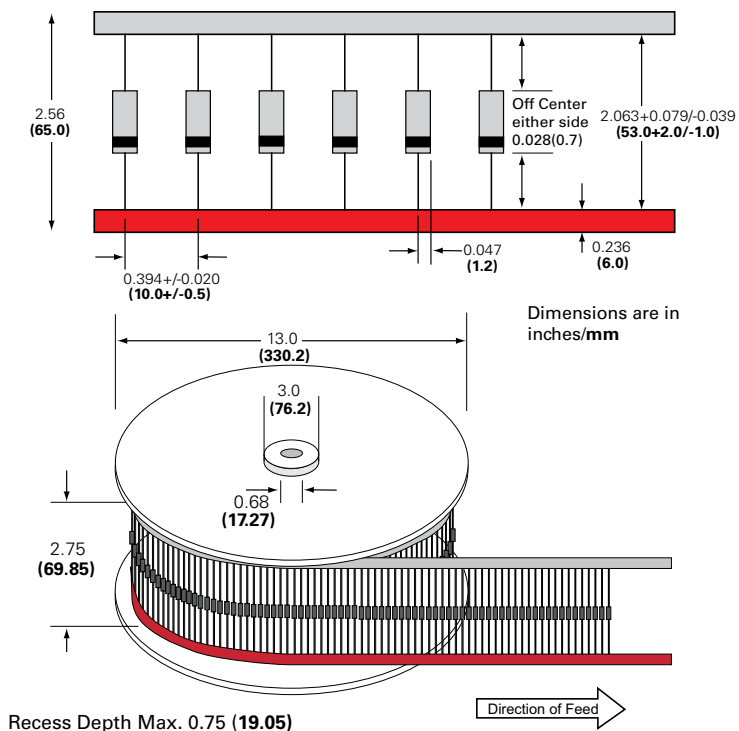
### Part Marking System



### Packing Options

Part Number	Component Package	Quantity	Packaging Option	Packaging Specification
20KPAxxxXX	P600	800	Tape & Reel	EIA STD RS-296
20KPAxxxXX-B	P600	100	Bulk	Littelfuse Spec.

### Tape and Reel Specification



**Disclaimer Notice** - Information furnished is believed to be accurate and reliable. However, users should independently evaluate the suitability of and test each product selected for their own applications. Littelfuse products are not designed for, and may not be used in, all applications. Read complete Disclaimer Notice at [www.littelfuse.com/disclaimer-electronics](http://www.littelfuse.com/disclaimer-electronics).

# Mouser Electronics

Authorized Distributor

Click to View Pricing, Inventory, Delivery & Lifecycle Information:

## Littelfuse:

[20KPA256](#) [20KPA44CA](#) [20KPA68C](#) [20KPA132](#) [20KPA160C](#) [20KPA80A](#) [20KPA64CA](#) [20KPA30CA](#) [20KPA192](#)  
[20KPA26CA](#) [20KPA88](#) [20KPA24](#) [20KPA60CA](#) [20KPA232A](#) [20KPA32C](#) [20KPA88CA](#) [20KPA240](#) [20KPA48C](#)  
[20KPA132CA](#) [20KPA68CA](#) [20KPA204](#) [20KPA32CA](#) [20KPA36C](#) [20KPA104CA](#) [20KPA192A](#) [20KPA280A](#)  
[20KPA48CA](#) [20KPA160CA](#) [20KPA216C](#) [20KPA36A](#) [20KPA28](#) [20KPA20A](#) [20KPA96CA](#) [20KPA104C](#) [20KPA52C](#)  
[20KPA56A](#) [20KPA40](#) [20KPA144CA](#) [20KPA96](#) [20KPA112A](#) [20KPA28C](#) [20KPA26](#) [20KPA280CA](#) [20KPA52A](#)  
[20KPA240A](#) [20KPA144](#) [20KPA60](#) [20KPA192CA](#) [20KPA172A](#) [20KPA34C](#) [20KPA28A](#) [20KPA72A](#) [20KPA300C](#)  
[20KPA204C](#) [20KPA256CA](#) [20KPA60C](#) [20KPA204A](#) [20KPA172CA](#) [20KPA28CA](#) [20KPA132A](#) [20KPA72CA](#)  
[20KPA280C](#) [20KPA60A](#) [20KPA40C](#) [20KPA32](#) [20KPA72](#) [20KPA112CA](#) [20KPA172C](#) [20KPA20C](#) [20KPA256A](#)  
[20KPA52CA](#) [20KPA232C](#) [20KPA88A](#) [20KPA40A](#) [20KPA160](#) [20KPA112C](#) [20KPA180A](#) [20KPA300](#) [20KPA24A](#)  
[20KPA216](#) [20KPA34CA](#) [20KPA300A](#) [20KPA44](#) [20KPA56C](#) [20KPA120A](#) [20KPA72C](#) [20KPA104](#) [20KPA300CA](#)  
[20KPA44C](#) [20KPA180](#) [20KPA24CA](#) [20KPA64](#) [20KPA204CA](#) [20KPA80](#) [20KPA34](#) [20KPA40CA](#) [20KPA64C](#)  
[20KPA216A](#) [20KPA180CA](#) [20KPA120](#)