


### HF P6KE Automotive Series



#### Agency Approvals

AGENCY	AGENCY FILE NUMBER
	E128662/E230531

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

Parameter	Symbol	Value	Unit
Peak Pulse Power Dissipation by 10x1000µs test waveform (Fig.1) (Note 1)	P <sub>PPM</sub>	600	W
Steady State Power Dissipation on infinite heat sink at T <sub>L</sub> =75°C (Fig. 5)	P <sub>D</sub>	5.0	W
Peak Forward Surge Current, 8.3ms Single Half Sine Wave Unidirectional only (Note 2)	I <sub>FSM</sub>	100	A
Maximum Instantaneous Forward Voltage at 50A for Unidirectional only	V <sub>F</sub>	3.5	V
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>	20	°C/W
Typical Thermal Resistance Junction to Ambient	R <sub>θJA</sub>	75	°C/W

#### Notes:

1. Non-repetitive current pulse, per Fig. 3 and derated above T<sub>A</sub> = 25°C per Fig. 2.
2. Measured on 8.3ms single half sine wave or equivalent square wave, duty cycle=4 per minute maximum.

#### Description

The P6KE Automotive Series is designed specifically to protect sensitive electronic equipment from voltage transients induced by lightning and other transient voltage events.


#### Features

- Halogen-Free
- RoHS compliant
- Typical maximum temperature coefficient  
 $\Delta V_{BR} = 0.1\% \times V_{BR} @ 25^{\circ}\text{C} \times \Delta T$
- Glass passivated chip junction in DO-15 Package
- 600W peak pulse capability at 10x1000µs waveform, repetition rate (duty cycles):0.01%
- Fast response time: typically less than 1.0ps from 0 Volts to BV min
- Excellent clamping capability
- Low incremental surge resistance
- Typical I<sub>R</sub> less than 1µA above 13V
- High temperature soldering guaranteed: 260°C/40 seconds / 0.375"(9.5mm) lead length, 5 lbs., (2.3kg) tension
- Plastic package has Underwriters Laboratory Flammability classification 94V-0
- Matte Tin Lead-free plated

#### Applications

TVS devices 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.

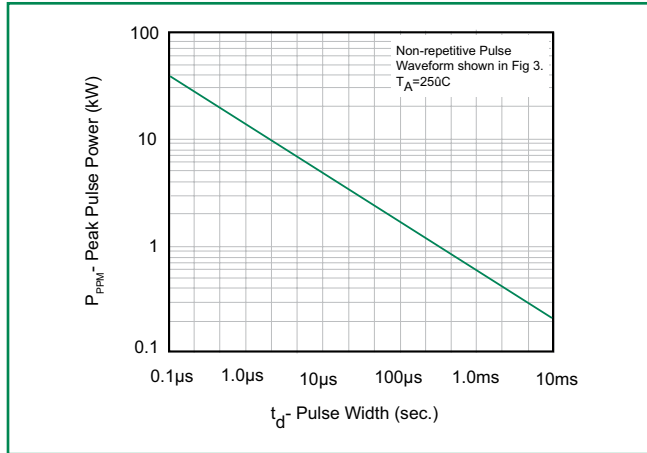
### Electrical Characteristics

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 Clamping Voltage $V_C$ @ $I_{PP}$ (V)	Maximum Peak Pulse Current $I_{PP}$ (A)	Maximum Reverse Leakage $I_R$ @ $V_R$ ( $\mu$ A)	Agency Approval 
			MIN	MAX					
P6KE12AAUTO	P6KE12CAAUTO	10.20	11.40	12.60	1	16.7	36.5	5	X
P6KE13AAUTO	P6KE13CAAUTO	11.10	12.40	13.70	1	18.2	33.5	1	X
P6KE15AAUTO	P6KE15CAAUTO	12.80	14.30	15.80	1	21.2	28.8	1	X
P6KE16AAUTO	P6KE16CAAUTO	13.60	15.20	16.80	1	22.5	27.1	1	X
P6KE18AAUTO	P6KE18CAAUTO	15.30	17.10	18.90	1	25.2	24.2	1	X
P6KE20AAUTO	P6KE20CAAUTO	17.10	19.00	21.00	1	27.7	22.0	1	X
P6KE22AAUTO	P6KE22CAAUTO	18.80	20.90	23.10	1	30.6	19.9	1	X
P6KE24AAUTO	P6KE24CAAUTO	20.50	22.80	25.20	1	33.2	18.4	1	X
P6KE27AAUTO	P6KE27CAAUTO	23.10	25.70	28.40	1	37.5	16.3	1	X
P6KE30AAUTO	P6KE30CAAUTO	25.60	28.50	31.50	1	41.4	14.7	1	X
P6KE33AAUTO	P6KE33CAAUTO	28.20	31.40	34.70	1	45.7	13.3	1	X
P6KE36AAUTO	P6KE36CAAUTO	30.80	34.20	37.80	1	49.9	12.2	1	X
P6KE39AAUTO	P6KE39CAAUTO	33.30	37.10	41.00	1	53.9	11.3	1	X
P6KE43AAUTO	P6KE43CAAUTO	36.80	40.90	45.20	1	59.3	10.3	1	X
P6KE47AAUTO	P6KE47CAAUTO	40.20	44.70	49.40	1	64.8	9.4	1	X

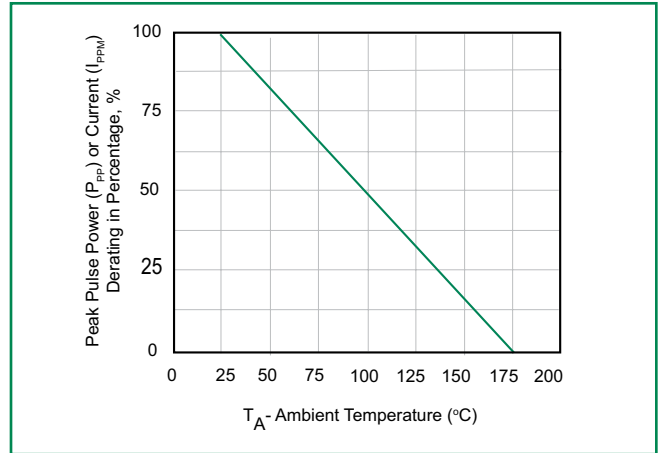
For parts without A, the  $V_{BR}$  is  $\pm$  10% and  $V_C$  is 5% higher than with A parts

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

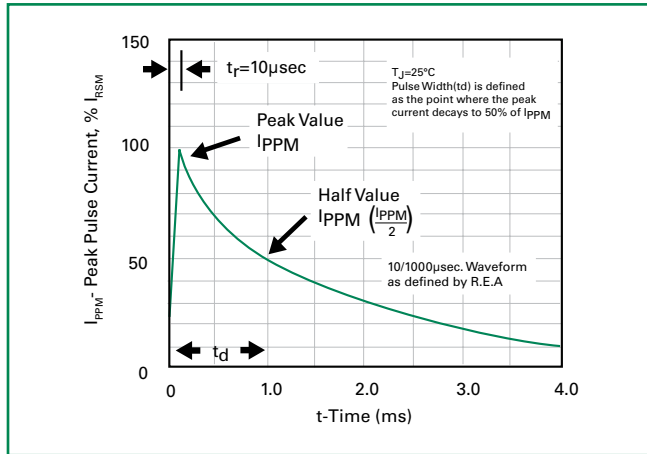
**Figure 1 - Peak Pulse Power Rating**



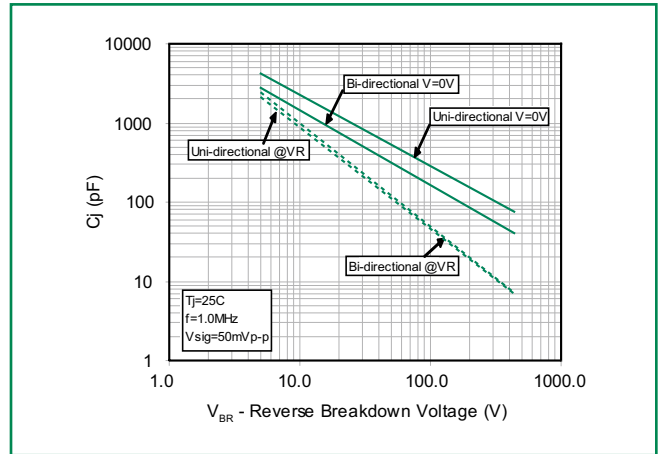
**Figure 2 - Pulse Derating Curve**



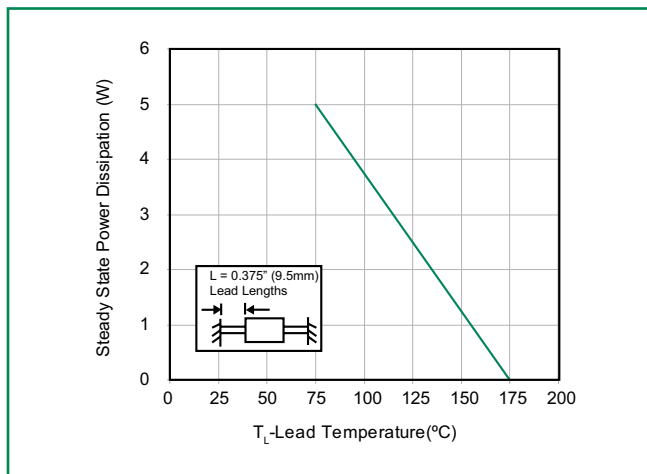
**Figure 3 - Pulse Waveform**



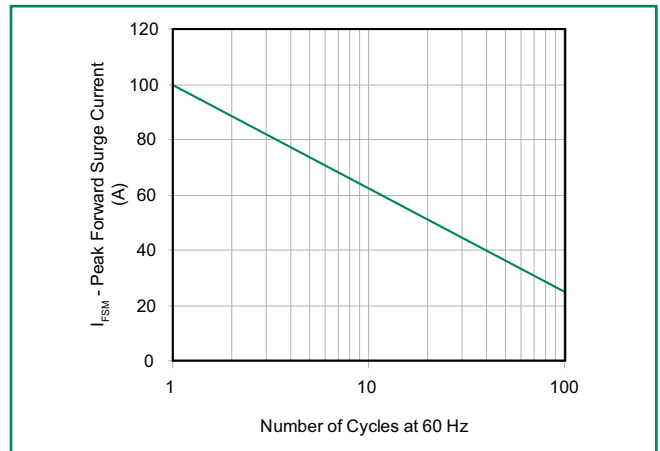
**Figure 4 - Typical Junction Capacitance Uni-Directional**



**Figure 5 - Steady State Power Derating Curve**



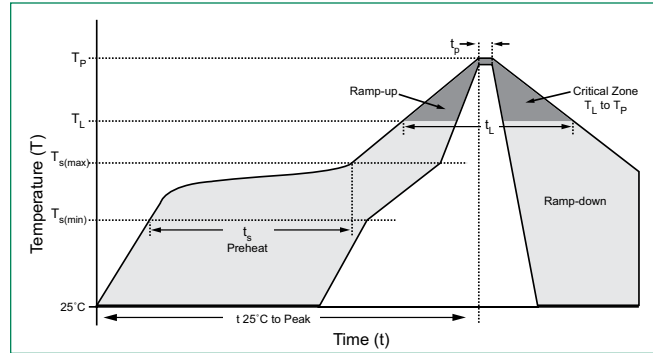
**Figure 6 - Maximum Non-Repetitive Forward Surge Current**



P6KE Automotive Series

### Soldering Parameters

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 ( $T_L$ ) to peak)		3°C/second max
$T_{s(max)}$ to $T_L$ - Ramp-up Rate		3°C/second max
Reflow	- Temperature ( $T_L$ ) (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		280°C



### Flow/Wave Soldering (Solder Dipping)

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

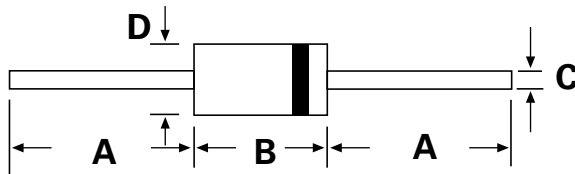
### Physical Specifications

<b>Weight</b>	0.015oz., 0.4g
<b>Case</b>	JEDEC DO-204AC (DO-15) 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-B102D.

### Environmental Specifications

<b>Temperature Cycle</b>	JESD22-A104
<b>Pressure Cooker</b>	JESD 22-A102
<b>High Temp. Storage</b>	JESD22-A103
<b>HTRB</b>	JESD22-A108
<b>Thermal Shock</b>	JESD22-A106

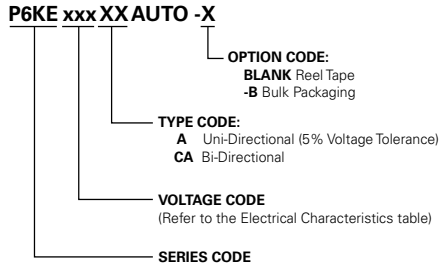
### Dimensions



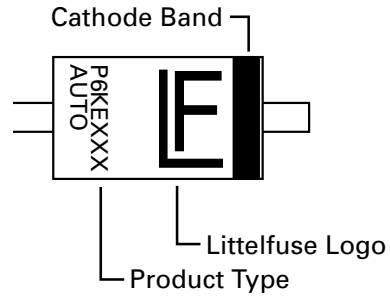
DO-204AC (DO-15)

Dimensions	Inches		Millimeters	
	Min	Max	Min	Max
A	1.000	-	25.40	-
B	0.230	0.300	5.80	7.60
C	0.028	0.034	0.71	0.86
D	0.104	0.140	2.60	3.60

### Part Numbering System



### Part Marking System



### Packaging

Part Number	Component Package	Quantity	Packaging Option	Packaging Specification
P6KExxxXXAUTO	DO-204AC	4000	Tape & Reel	EIA STD RS-296E
P6KExxxXXAUTO-B	DO-204AC	1000	BULK	Littelfuse Concord Packing Spec. DM-0016

