


**HF  1.5KE 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>	1500	W
Steady State Power Dissipation on infinite heat sink at T <sub>L</sub> =75°C (Fig. 5)	P <sub>D</sub>	6.5	W
Peak Forward Surge Current, 8.3ms Single Half Sine Wave Unidirectional only (Note 2)	I <sub>FSM</sub>	200	A
Maximum Instantaneous Forward Voltage at 100A 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>WJL</sub>	15	°C/W
Typical Thermal Resistance Junction to Ambient	R <sub>WJA</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 1.5KE 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-201 Package
- 1500W 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.

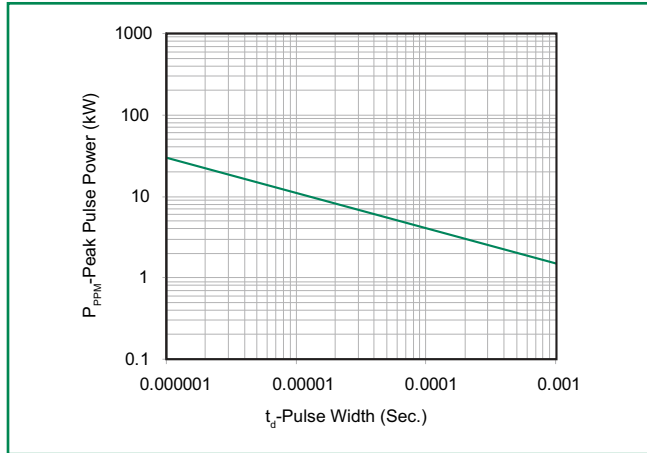
### Electrical Characteristics

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 $V_C$ @ $I_{PP}$ (Volts)	Maximum Peak Pulse Current $I_{PP}$ (A)	Maximum Reverse Leakage $I_R$ @ $V_R$ ( $\mu$ A)	Agency Approval 
			MIN	MAX					
1.5KE12AAUTO	1.5KE12CAAUTO	10.20	11.40	12.60	1	16.7	91.0	5	X
1.5KE13AAUTO	1.5KE13CAAUTO	11.10	12.40	13.70	1	18.2	83.5	1	X
1.5KE15AAUTO	1.5KE15CAAUTO	12.80	14.30	15.80	1	21.2	71.7	1	X
1.5KE16AAUTO	1.5KE16CAAUTO	13.60	15.20	16.80	1	22.5	67.6	1	X
1.5KE18AAUTO	1.5KE18CAAUTO	15.30	17.10	18.90	1	25.2	60.3	1	X
1.5KE20AAUTO	1.5KE20CAAUTO	17.10	19.00	21.00	1	27.7	54.9	1	X
1.5KE22AAUTO	1.5KE22CAAUTO	18.80	20.90	23.10	1	30.6	49.7	1	X
1.5KE24AAUTO	1.5KE24CAAUTO	20.50	22.80	25.20	1	33.2	45.8	1	X
1.5KE27AAUTO	1.5KE27CAAUTO	23.10	25.70	28.40	1	37.5	40.5	1	X
1.5KE30AAUTO	1.5KE30CAAUTO	25.60	28.50	31.50	1	41.4	36.7	1	X
1.5KE33AAUTO	1.5KE33CAAUTO	28.20	31.40	34.70	1	45.7	33.3	1	X
1.5KE36AAUTO	1.5KE36CAAUTO	30.80	34.20	37.80	1	49.9	30.5	1	X
1.5KE39AAUTO	1.5KE39CAAUTO	33.30	37.10	41.00	1	53.9	28.2	1	X
1.5KE43AAUTO	1.5KE43CAAUTO	36.80	40.90	45.20	1	59.3	25.6	1	X
1.5KE47AAUTO	1.5KE47CAAUTO	40.20	44.70	49.40	1	64.8	23.5	1	X

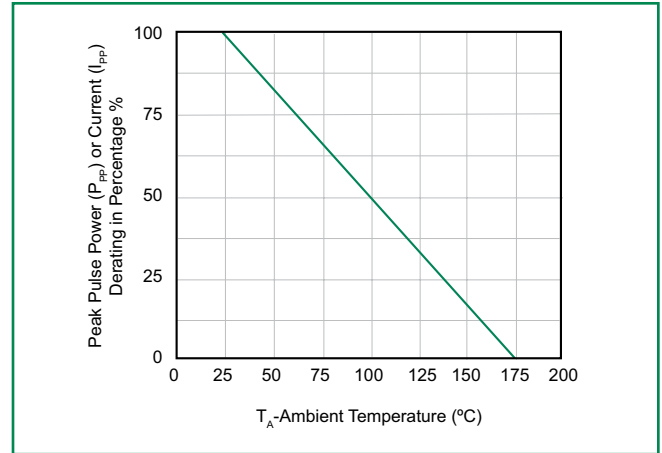
For parts without A, the  $V_{BR}$  is  $\pm 10\%$  and  $V_C$  is 5% higher than with A parts.

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

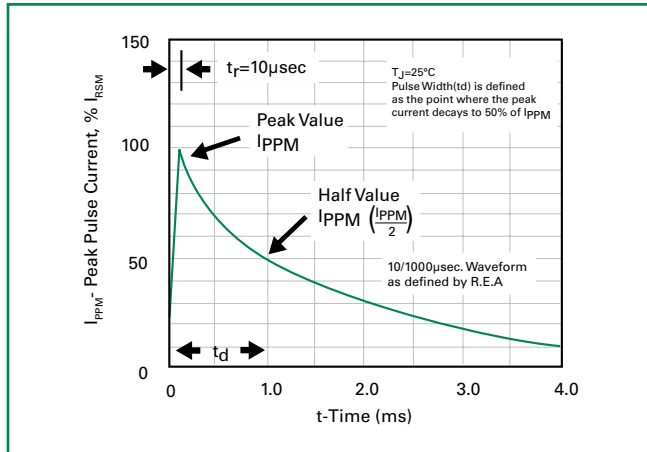
**Figure 1 - Peak Pulse Power Rating Curve**



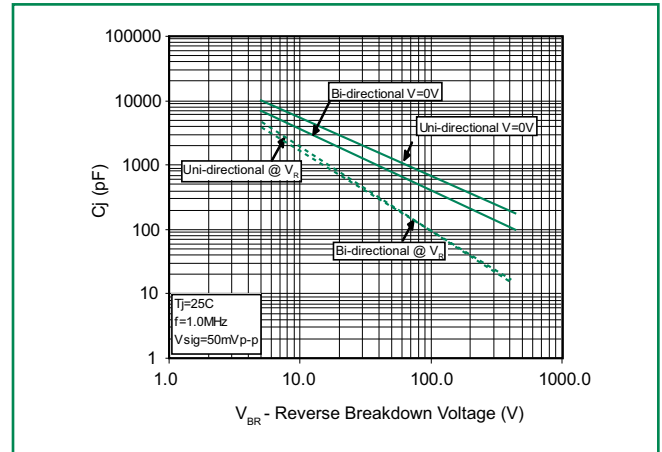
**Figure 2 - Pulse Derating Curve**



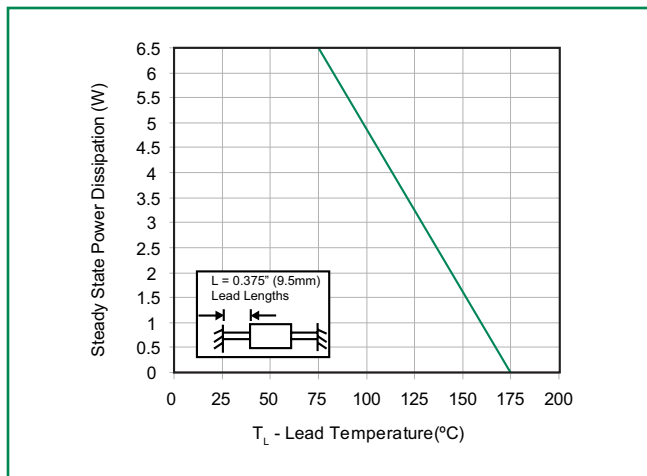
**Figure 3 - Pulse Waveform**



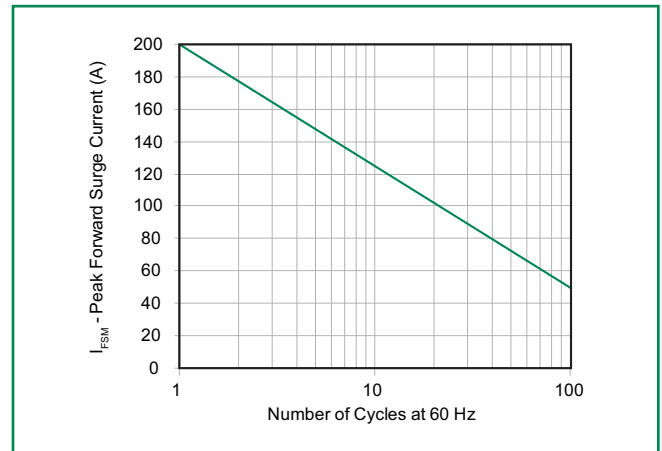
**Figure 4 - Typical Junction Capacitance**



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



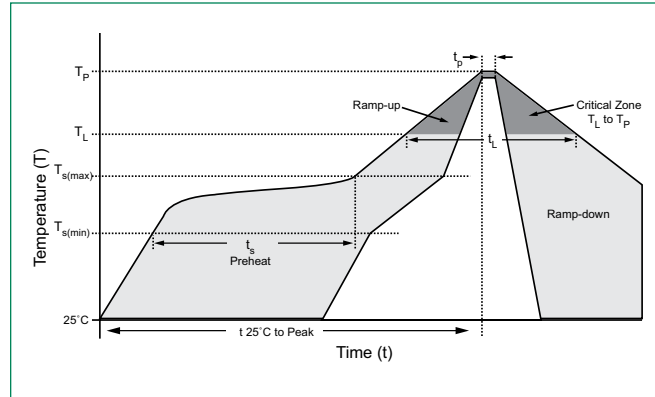
**Figure 6 - Maximum Non-Repetitive Peak Forward Surge Current Uni-Directional Only**



1.5KE 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

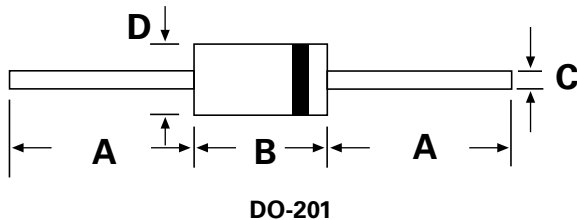
### Physical Specifications

<b>Weight</b>	0.045oz., 1.2g
<b>Case</b>	JEDEC DO-201 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

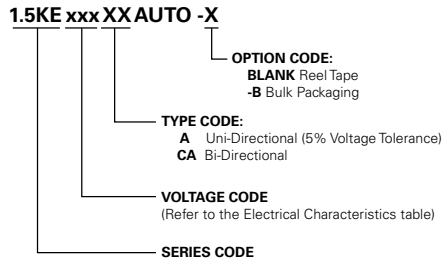
<b>Temperature Cycle</b>	JESD22-A104
<b>Pressure Cooker</b>	JESD 22-A102
<b>High Temp. Storage</b>	JESD22-A103
<b>HTRB</b>	JESD22-A108
<b>Thermal Shock</b>	JESD22-A106

### Dimensions

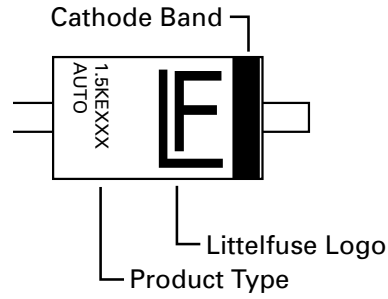


Dimensions	Inches		Millimeters	
	Min	Max	Min	Max
A	1.000	-	25.40	-
B	0.285	0.375	7.20	9.50
C	0.038	0.042	0.96	1.07
D	0.190	0.210	4.80	5.30

### Part Numbering System



### Part Marking System



### Packaging

Part Number	Component Package	Quantity	Packaging Option	Packaging Specification
1.5KExxxXXAUTO	DO-201	1200	Tape & Reel	EIA STD RS-296E
1.5KExxxXXAUTO-B	DO-201	500	BULK	Littelfuse Concord Packing Spec. DM-0016

