


HF  1.5KE Automotive Series

Agency Approvals

AGENCY	AGENCY FILE NUMBER
	E128662/E230531

**Maximum Ratings and Thermal Characteristics
(T_A=25°C unless otherwise noted)**

Parameter	Symbol	Value	Unit
Peak Pulse Power Dissipation by 10x1000µs test waveform (Fig.1) (Note 1)	P _{PPM}	1500	W
Steady State Power Dissipation on infinite heat sink at T _L =75°C (Fig. 5)	P _D	6.5	W
Peak Forward Surge Current, 8.3ms Single Half Sine Wave Unidirectional only (Note 2)	I _{FSM}	200	A
Maximum Instantaneous Forward Voltage at 100A for Unidirectional only	V _F	3.5	V
Operating Junction and Storage Temperature Range	T _J , T _{STG}	-55 to 175	°C
Typical Thermal Resistance Junction to Lead	R _{wJL}	15	°C/W
Typical Thermal Resistance Junction to Ambient	R _{wJA}	75	°C/W

Notes:

1. Non-repetitive current pulse, per Fig. 3 and derated above T_A = 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_R 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_{CC} 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 (μ 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

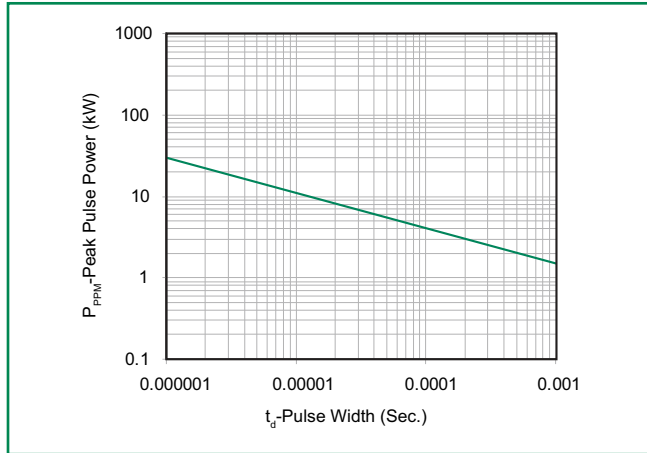


Figure 2 - Pulse Derating Curve

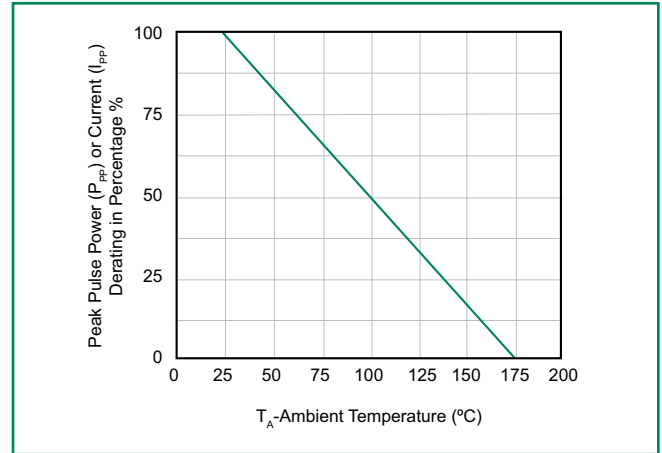


Figure 3 - Pulse Waveform

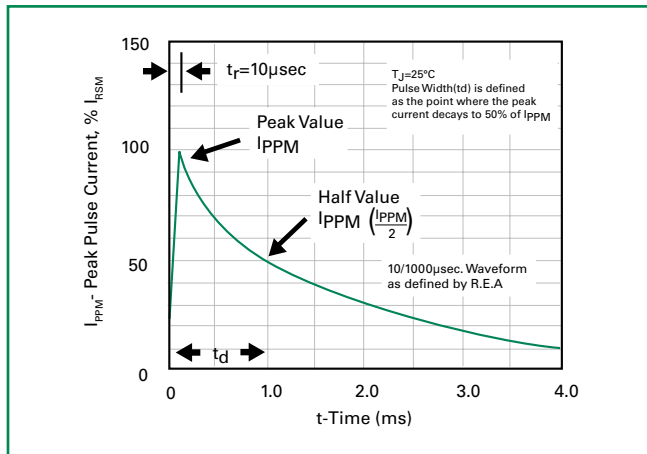


Figure 4 - Typical Junction Capacitance

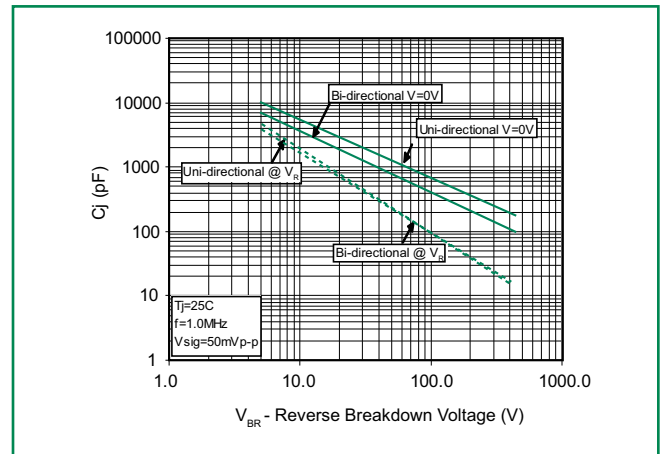


Figure 5 - Steady State Power Derating Curve

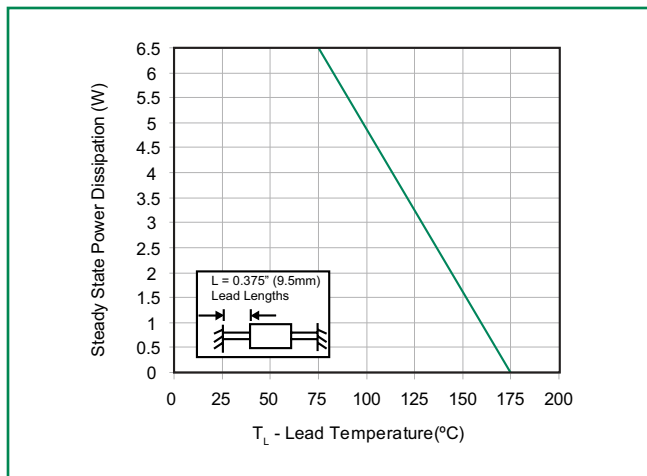
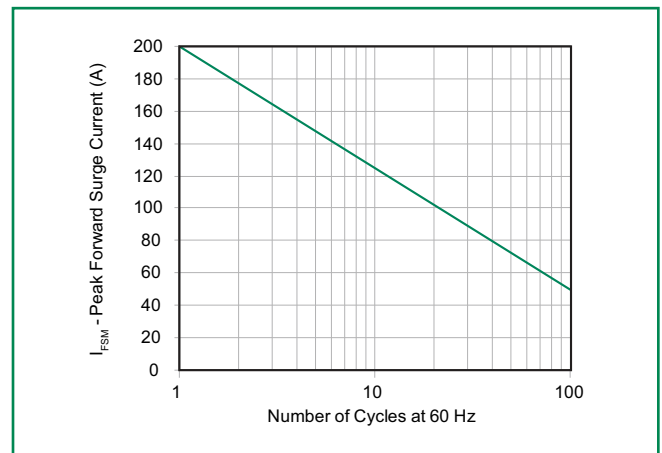


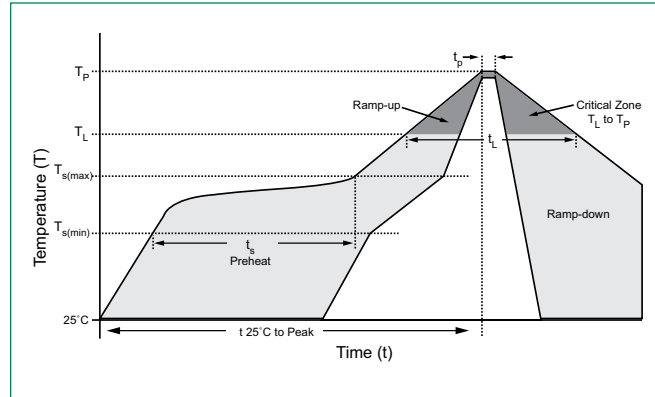
Figure 6 - Maximum Non-Repetitive Peak Forward Surge Current Uni-Directional Only



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 ^{+0/-5} °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)

Peak Temperature :	265°C
Dipping Time :	10 seconds
Soldering :	1 time

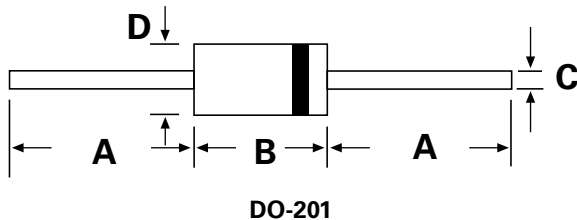
Physical Specifications

Weight	0.045oz., 1.2g
Case	JEDEC DO-201 molded plastic body over passivated junction.
Polarity	Color band denotes the cathode except Bipolar.
Terminal	Matte Tin axial leads, solderable per JESD22-B102D.

Environmental Specifications

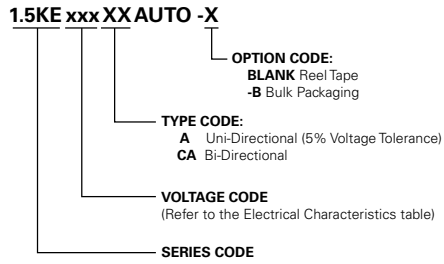
Temperature Cycle	JESD22-A104
Pressure Cooker	JESD 22-A102
High Temp. Storage	JESD22-A103
HTRB	JESD22-A108
Thermal Shock	JESD22-A106

Dimensions

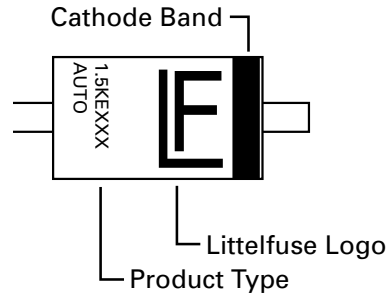


Dimensions	Inches		Millimeters	
	Min	Max	Min	Max
A	1.000	-	25.40	-
B	0.285	0.375	7.20	9.50
C	0.038	0.042	0.96	1.07
D	0.190	0.210	4.80	5.30

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

