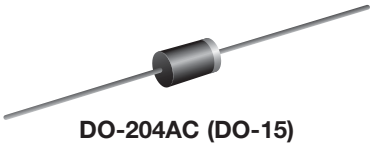
VISHAY MAS GENERAL SEMICONDUCTOR

TRANS Transient Voltage Suppressors

P6KE6.8A thru P6KE550A

Vishaymas General Semiconductor



DO-204AC (DO-15)

FEATURES

- Glass passivated chip junction
- Available in uni-directional and bi-directional
- 600 W peak pulse power capability with a 10/1000 µs waveform, repetitive rate (duty cycle): 0.01 %
- Excellent clamping capability
- Very fast response time
- Low incremental surge resistance
- Solder dip 275 °C max. 10 s, per JESD 22-B106
- AEC-Q101 qualified
- Material categorization: For definitions of compliance please see www.vishaymas.com

RoHS COMPLIANT

PRIMARY CHARACTERISTICS	
V_{WM}	5.8 V to 459 V
V_{BR} uni-directional	6.8 V to 540 V
V_{BR} bi-directional	6.8 V to 440 V
P_{PPM}	600 W
P_D	5.0 W
I_{FSM} (uni-directional only)	100 A
T_J max.	175 °C
Polarity	Uni-directional, bi-directional
Package	DO-204AC (DO-15)

DEVICES FOR BI-DIRECTION APPLICATIONS

For bi-directional types, use CA suffix (e.g. P6KE440CA).
Electrical characteristics apply in both directions.

TYPICAL APPLICATIONS

Use in sensitive electronics protection against voltage transients induced by inductive load switching and lighting on ICs, MOSFET, signal lines of sensor units for consumer, computer, industrial, automotive, and telecommunication.

MECHANICAL DATA

Case: DO-204AC, molded epoxy over passivated chip
Molding compound meets UL 94 V-0 flammability rating
Base P/N-E3 - RoHS compliant, commercial grade
Base P/NHE3 - RoHS compliant, AEC-Q101 qualified

Terminals: Matte tin plated leads, solderable per J-STD-002 and JESD 22-B102
E3 suffix meets JESD 201 class 1A whisker test, HE3 suffix meets JESD 201 class 2 whisker test

Note

- P6KE250A to P6KE540A and P6KE250CA to P6KE440CA for commercial grade only

Polarity: For uni-directional types the color band denotes cathode end, no marking on bi-directional types

MAXIMUM RATINGS (T_A = 25 °C unless otherwise noted)			
PARAMETER	**SYMBOL**	**VALUE**	**UNIT**
Peak pulse power dissipation with a 10/1000 µs waveform (1) (fig. 1)	P_{PPM}	600	W
Peak pulse current with a 10/1000 µs waveform (1)	I_{PPM}	See next table	A
Power dissipation on infinite heatsink at T_L = 75 °C (fig. 5)	P_D	5.0	W
Peak forward surge current 8.3 ms single half sine-wave (2)	I_{FSM}	100	A
Maximum instantaneous forward voltage at 50 A for uni-directional only (3)	V_F	3.5/5.0	V
Operating junction and storage temperature range	T_J, T_{STG}	- 55 to + 175	°C

Notes

(1) Non-repetitive current pulse, per fig. 3 and derated above T_A = 25 °C per fig. 2
(2) Measured on 8.3 ms single half sine-wave or equivalent square wave, duty cycle = 4 pulses per minute maximum
(3) V_F = 3.5 V for P6KE220A and below; V_F = 5.0 V for P6KE250A and above

ELECTRICAL CHARACTERISTICS (T_A = 25 °C unless otherwise noted)

DEVICE TYPE 型号	BREAKDOWN VOLTAGE V_{BR} AT I_T (1) (V) 崩溃电压		TEST CURRENT I_T (mA) 测试电流	STAND-OFF VOLTAGE V_{WM} (V) 对峙电压	MAXIMUM REVERSE LEAKAGE AT V_{WM} (3) I_D (μA) 最大反向漏电	MAXIMUM PEAK PULSE CURRENT I_{PPM} (2) (A) 最大峰值脉冲电流	MAXIMUM CLAMPING VOLTAGE AT I_{PPM} V_C (V) 最大嵌位电压	MAXIMUM TEMPERATURE COEFFICENT AT V_{BR} (%/°C) 最大温度系数
	MIN.	MAX.						
(+)P6KE6.8A / CA	6.45	7.14	10	5.80	1000	57.1	10.5	0.057
(+)P6KE7.5A / CA	7.13	7.88	10	6.40	500	53.1	11.3	0.061
(+)P6KE8.2A / CA	7.79	8.61	10	7.02	200	49.6	12.1	0.065
(+)P6KE9.1A / CA	8.65	9.55	1.0	7.78	50	44.8	13.4	0.068
(+)P6KE10A / CA	9.50	10.5	1.0	8.55	10	41.4	14.5	0.073
(+)P6KE11A / CA	10.5	11.6	1.0	9.40	5.0	38.5	15.6	0.075
(+)P6KE12A / CA	11.4	12.6	1.0	10.2	5.0	35.9	16.7	0.078
(+)P6KE13A / CA	12.4	13.7	1.0	11.1	5.0	33.0	18.2	0.081
(+)P6KE15A / CA	14.3	15.8	1.0	12.8	1.0	28.3	21.2	0.084
(+)P6KE16A / CA	15.2	16.8	1.0	13.6	1.0	26.7	22.5	0.086
(+)P6KE18A / CA	17.1	18.9	1.0	15.3	1.0	23.8	25.2	0.088
(+)P6KE20A / CA	19.0	21.0	1.0	17.1	1.0	21.7	27.7	0.090
(+)P6KE22A / CA	20.9	23.1	1.0	18.8	1.0	19.6	30.6	0.092
(+)P6KE24A / CA	22.8	25.2	1.0	20.5	1.0	18.1	33.2	0.094
(+)P6KE27A / CA	25.7	28.4	1.0	23.1	1.0	16.0	37.5	0.096
(+)P6KE30A / CA	28.5	31.5	1.0	25.6	1.0	14.5	41.4	0.097
(+)P6KE33A / CA	31.4	34.7	1.0	28.2	1.0	13.1	45.7	0.098
(+)P6KE36A / CA	34.2	37.8	1.0	30.8	1.0	12.0	49.9	0.099
(+)P6KE39A / CA	37.1	41.0	1.0	33.3	1.0	11.1	53.9	0.100
(+)P6KE43A / CA	40.9	45.2	1.0	36.8	1.0	10.1	59.3	0.101
(+)P6KE47A / CA	44.7	49.4	1.0	40.2	1.0	9.3	64.8	0.101
(+)P6KE51A / CA	48.5	53.6	1.0	43.6	1.0	8.6	70.1	0.102
(+)P6KE56A / CA	53.2	58.8	1.0	47.8	1.0	7.8	77.0	0.103
(+)P6KE62A / CA	58.9	65.1	1.0	53.0	1.0	7.1	85.0	0.104
(+)P6KE68A / CA	64.6	71.4	1.0	58.1	1.0	6.5	92.0	0.104
(+)P6KE75A / CA	71.3	78.8	1.0	64.1	1.0	5.8	103	0.105
(+)P6KE82A / CA	77.9	86.1	1.0	70.1	1.0	5.3	113	0.105
(+)P6KE91A / CA	86.5	95.5	1.0	77.8	1.0	4.8	125	0.106
(+)P6KE100A / CA	95.0	105	1.0	85.5	1.0	4.4	137	0.106
(+)P6KE110A / CA	105	116	1.0	94.0	1.0	3.9	152	0.107
(+)P6KE120A / CA	114	126	1.0	102	1.0	3.6	165	0.107
(+)P6KE130A / CA	124	137	1.0	111	1.0	3.4	179	0.107
(+)P6KE150A / CA	143	158	1.0	128	1.0	2.9	207	0.108
(+)P6KE160A / CA	152	168	1.0	136	1.0	2.7	219	0.108
(+)P6KE170A / CA	162	179	1.0	145	1.0	2.6	234	0.108
(+)P6KE180A / CA	171	189	1.0	154	1.0	2.4	246	0.108
(+)P6KE200A / CA	190	210	1.0	171	1.0	2.2	274	0.108
(+)P6KE220A / CA	209	231	1.0	185	1.0	1.8	328	0.108
(+)P6KE250A / CA	237	263	1.0	214	1.0	1.7	344	0.110
(+)P6KE300A / CA	285	315	1.0	256	1.0	1.4	414	0.110
(+)P6KE350A / CA	333	368	1.0	300	1.0	1.2	482	0.110
(+)P6KE400A / CA	380	420	1.0	342	1.0	1.1	548	0.110
(+)P6KE440A / CA	418	462	1.0	376	1.0	1.00	602	0.110
P6KE480A / CA	456	504	1.0	408	1.0	0.91	658	0.110
P6KE510A / CA	485	535	1.0	434	1.0	0.86	698	0.110
P6KE540A / CA	513	567	1.0	459	1.0	0.81	740	0.110
P6KE550A / CA	522.5	577.5	1.0	468	1.0	0.81	760	0.110

Notes

(1) Pulse test: $t_p \leq 50$ ms

(2) Surge current waveform per fig. 3 and derate per fig. 2

(3) For bi-directional types with V_{WM} of 10 V and less the I_D limit is doubled

(4) All terms and symbols are consistent with ANSI/EEE CA62.35

(+) Underwriters laboratory recognition for the classification of protectors (QVGQ2) under the UL standard for safety 497B and file number E136766 for both uni-directional and bi-directional devices

THERMAL CHARACTERISTICS (T_A = 25 °C unless otherwise noted)			
PARAMETER	**SYMBOL**	**VALUE**	**UNIT**
Typical thermal resistance, junction to lead	$R_{\theta JL}$	20	°C/ W
Typical thermal resistance, junction to ambient	$R_{\theta JA}$	75	

ORDERING INFORMATION (Example)				
PREFERRED PIN	**UNIT WEIGHT (g)**	**PREFERRED PACKAGE CODE**	**BASE QUANTITY**	**DELIVERY MODE**
P6KE6.8A-E3/54	0.432	54	4000	13" diameter paper tape and reel
P6KE6.8AHE3/54 (1)	0.432	54	4000	13" diameter paper tape and reel

Note

(1) AEC-Q101 qualified

RATINGS AND CHARACTERISTICS CURVES (T_A = 25 °C unless otherwise noted)

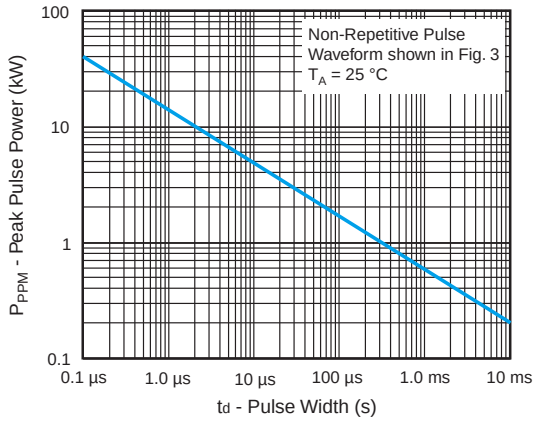


Fig. 1 - Peak Pulse Power Rating Curve

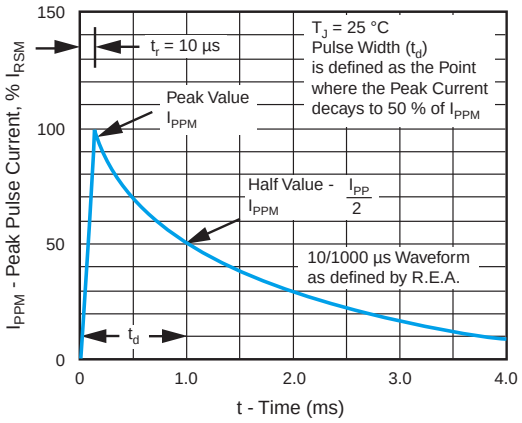


Fig. 3 - Pulse Waveform

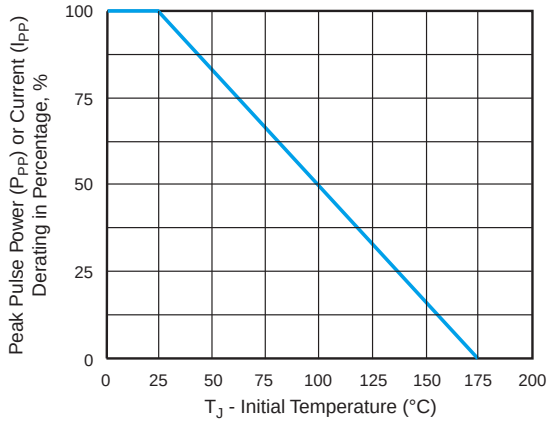


Fig. 2 - Pulse Power or Current vs. Initial Junction Temperature

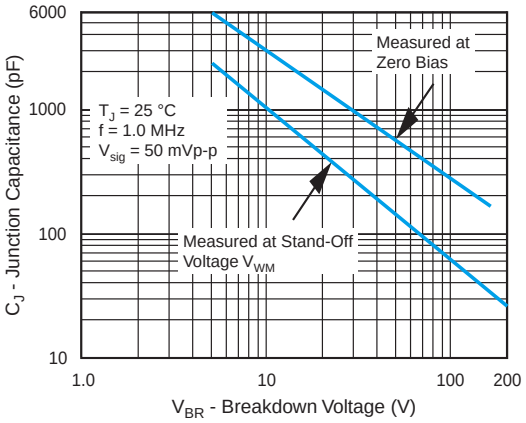


Fig. 4 - Typical Junction Capacitance Uni-Directional

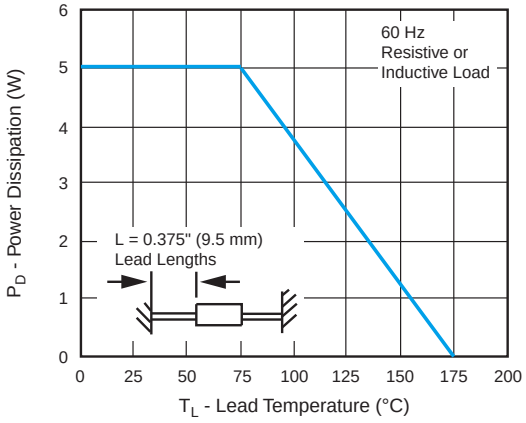


Fig. 5 - Power Derating Curve

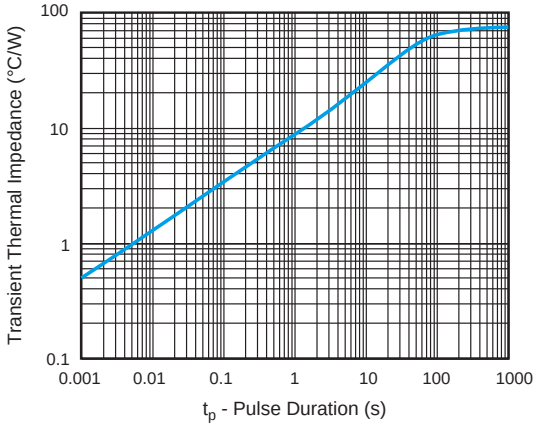


Fig. 7 - Typical Transient Thermal Impedance

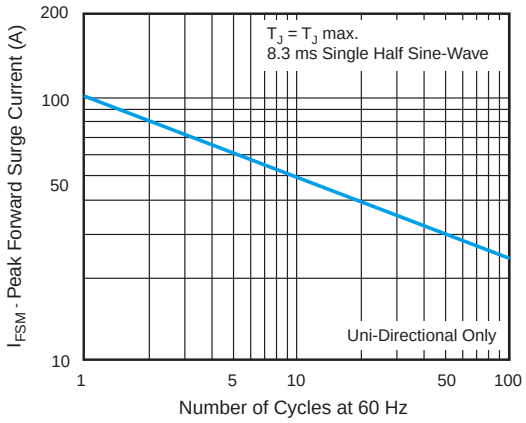
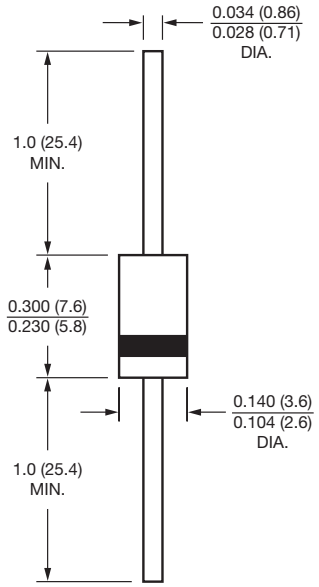


Fig. 6 - Maximum Non-Repetitive Forward Surge Current

PACKAGE OUTLINE DIMENSIONS in inches (millimeters)

DO-204AC (DO-15)



APPLICATION NOTES

- This P6KE TVS series is a low cost commercial product for use in applications where large voltage transients can permanently damage voltage-sensitive components.
- The P6KE series device types are designed in a small package size where power and space is a consideration. They are characterized by their high surge capability, extremely fast response time, and low impedance, (R_{on}). Because of the unpredictable nature of transients, and the variation of the impedance with respect to these transients, impedance, per se, is not specified as a parametric value. However, a minimum voltage at low current conditions (BV) and a maximum clamping voltage (V_c) at a maximum peak pulse current is specified.
- In some instances, the thermal effect (see V_c Clamping Voltage) may be responsible for 50 % to 70 % of the observed voltage differential when subjected to high current pulses for several duty cycles, thus making a maximum impedance specification insignificant.
- In case of a severe current overload or abnormal transient beyond the maximum ratings, the Transient Voltage Suppressor will initially fail ‘short’ thus tripping the system’s circuit breaker or fuse while protecting the entire circuit. Curves depicting clamping voltage vs. various current pulses are available from the factory. Extended power curves vs. pulse time are also available.