

## 400W, 5.8V - 376V Transient Voltage Suppressor

### FEATURES

- AEC-Q101 qualified available
- Excellent clamping capability
- Low impedance surge resistance
- 400W surge capability at 10/1000 $\mu$ s waveform
- Very fast response time
- Typical  $I_R$  less than 1 $\mu$ A above 10V
- RoHS Compliant
- Halogen-free according to IEC 61249-2-21

### APPLICATIONS

- Protect sensitive circuit from damage by high voltage transients
- Lighting, ESD transient voltage protection of IC, system
- Inductive switching load protection of IC, system
- Electrical Fast Transient Immunity protection of IC, system

### MECHANICAL DATA

- Case: DO-204AL (DO-41)
- Molding compound meets UL 94V-0 flammability rating
- Terminal: Pure tin plated leads, solderable per J-STD-002
- Meet JESD 201 class 2 whisker test
- Polarity: As marked
- Weight: 0.300g (approximately)

KEY PARAMETERS		
PARAMETER	VALUE	UNIT
$V_{WM}$	5.8 - 376	V
$V_{BR}$ (uni - directional)	6.45 - 462	V
$V_{BR}$ (bi - directional)	6.45 - 462	V
$P_{PK}$	400	W
$T_{JMAX}$	175	$^{\circ}$ C
Package	DO-204AL (DO-41)	



DO-204AL (DO-41)

ABSOLUTE MAXIMUM RATINGS ( $T_A = 25^{\circ}$ C unless otherwise noted)			
PARAMETER	SYMBOL	VALUE	UNIT
Peak power dissipation at $T_A = 25^{\circ}$ C, $T_p = 1ms^{(1)}$	$P_{PK}$	400	W
Steady state power dissipation at $T_L = 75^{\circ}$ C lead lengths .375", 9.5mm <sup>(2)</sup>	$P_D$	1	W
Peak forward surge current, 8.3 ms single half sine-wave superimposed on rated load <sup>(3)</sup>	$I_{FSM}$	40	A
Operating junction temperature range	$T_J$	-55 to +175	$^{\circ}$ C
Storage temperature range	$T_{STG}$	-55 to +175	$^{\circ}$ C

#### Note:

1. Non-repetitive current pulse per Fig.3 and Derated above  $T_A = 25^{\circ}$ C per Fig.2
2. Mounted on 5 x 5 mm copper pads to each terminal
3. 8.3ms single half sine-wave or equivalent square wave, duty cycle = 4 pulses per minute maximum

THERMAL PERFORMANCE			
PARAMETER	SYMBOL	TYP	UNIT
Junction-to-lead thermal resistance	$R_{\theta JL}$	60	$^{\circ}$ C/W
Junction-to-ambient thermal resistance on printed circuit, L lead=10mm	$R_{\theta JA}$	100	$^{\circ}$ C/W

<b>MAXIMUM RATINGS AND ELECTRICAL CHARACTERISTICS</b> (TA=25°C unless otherwise noted)									
Device <sup>(1)</sup>		Breakdown voltage V <sub>BR</sub> @I <sub>T</sub> (V)		Test current I <sub>T</sub> (mA)	Working stand-off voltage V <sub>WM</sub> (V)	Reverse leakage current @ V <sub>WM</sub> I <sub>D</sub> (uA) <sup>(3)</sup>	Maximum peak impulse current I <sub>PP</sub> (A)	Maximum clamping voltage V <sub>C</sub> @I <sub>PP</sub> (V)	Maximum temperature coefficient
		V <sub>BR</sub>		I <sub>T</sub>	V <sub>WM</sub>	I <sub>D</sub>	I <sub>PPM</sub>	V <sub>C</sub>	V <sub>BR</sub>
		V		mA	V	µA	A	V	%/°C
Unidirectional	Bidirectional	Min	Max						
BZW04-5V8	BZW04-5V8B	6.45	7.14	10	5.80	1000	38.0	10.5	0.057
BZW04-6V4	BZW04-6V4B	7.13	7.88	10	6.40	500	35.4	11.3	0.061
BZW04-7V0	BZW04-7V0B	7.79	8.61	10	7.02	200	33.0	12.1	0.065
BZW04-7V8	BZW04-7V8B	8.65	9.55	1	7.78	50	30.0	13.4	0.068
BZW04-8V5	BZW04-8V5B	9.50	10.5	1	8.55	10	27.6	14.5	0.073
BZW04-9V4	BZW04-9V4B	10.5	11.6	1	9.40	5	25.7	15.6	0.075
BZW04-10	BZW04-10B	11.4	12.6	1	10.2	5	24.0	16.7	0.078
BZW04-11	BZW04-11B	12.4	13.7	1	11.1	5	22.0	18.2	0.081
BZW04-13	BZW04-13B	14.3	15.8	1	12.8	5	19.0	21.2	0.084
BZW04-14	BZW04-14B	15.2	16.8	1	13.6	1	17.8	22.5	0.083
BZW04-15	BZW04-15B	17.1	18.9	1	15.3	1	16.0	25.2	0.088
BZW04-17	BZW04-17B	19.0	21.0	1	17.1	1	14.5	27.7	0.090
BZW04-19	BZW04-19B	20.9	23.1	1	18.8	1	13.0	30.6	0.092
BZW04-20	BZW04-20B	22.8	25.2	1	20.5	1	12.0	33.2	0.094
BZW04-23	BZW04-23B	25.7	28.4	1	23.1	1	10.7	37.5	0.096
BZW04-26	BZW04-26B	28.5	31.5	1	25.6	1	9.6	41.5	0.097
BZW04-28	BZW04-28B	31.4	34.7	1	28.2	1	8.8	45.7	0.098
BZW04-31	BZW04-31B	34.2	37.8	1	30.8	1	8.0	49.9	0.099
BZW04-33	BZW04-33B	37.1	41.0	1	33.3	1	7.4	53.9	0.100
BZW04-37	BZW04-37B	40.9	45.2	1	36.8	1	6.7	59.3	0.101
BZW04-40	BZW04-40B	44.7	49.4	1	40.2	1	6.2	64.8	0.101
BZW04-44	BZW04-44B	48.5	53.6	1	43.6	1	5.7	70.1	0.102
BZW04-48	BZW04-48B	53.2	58.8	1	47.8	1	5.2	77.0	0.103
BZW04-53	BZW04-53B	58.9	65.1	1	53.0	1	4.7	85.0	0.104
BZW04-58	BZW04-58B	64.6	71.4	1	58.1	1	4.3	92.0	0.104
BZW04-64	BZW04-64B	71.3	78.8	1	64.1	1	3.9	103	0.105
BZW04-70	BZW04-70B	77.9	86.1	1	70.1	1	3.5	113	0.105
BZW04-78	BZW04-78B	86.5	95.5	1	78.0	1	3.2	125	0.105
BZW04-85	BZW04-85B	95	105	1	85.5	1	2.9	137	0.106
BZW04-94	BZW04-94B	105	116	1	94.0	1	2.6	152	0.107
BZW04-102	BZW04-102B	114	126	1	102	1	2.4	165	0.107
BZW04-110	BZW04-110B	124	137	1	111	1	2.2	179	0.107
BZW04-128	BZW04-128B	143	158	1	128	1	2.0	207	0.108
BZW04-136	BZW04-136B	152	168	1	136	1	1.8	219	0.108

MAXIMUM RATINGS AND ELECTRICAL CHARACTERISTICS (TA=25°C unless otherwise noted)									
Device <sup>(1)</sup>		Breakdown voltage V <sub>BR</sub> @I <sub>T</sub> (V)		Test current I <sub>T</sub> (mA)	Working stand-off voltage V <sub>WM</sub> (V)	Reverse leakage current @ V <sub>WM</sub> I <sub>D</sub> ( $\mu$ A) <sup>(3)</sup>	Maximum peak impulse current I <sub>PP</sub> (A)	Maximum clamping voltage V <sub>C</sub> @I <sub>PP</sub> (V)	Maximum temperature coefficient
		V <sub>BR</sub>		I <sub>T</sub>	V <sub>WM</sub>	I <sub>D</sub>	I <sub>PPM</sub>	V <sub>C</sub>	V <sub>BR</sub>
		V		mA	V	$\mu$ A	A	V	%/°C
Unidirectional	Bidirectional	Min	Max						
BZW04-145	BZW04-145B	161	179	1	145	1	1.7	234	0.108
BZW04-154	BZW04-154B	171	189	1	154	1	1.6	246	0.108
BZW04-171	BZW04-171B	190	210	1	171	1	1.5	274	0.108
BZW04-188	BZW04-188B	209	231	1	188	1	1.4	301	0.108
BZW04-213	BZW04-213B	237	263	1	213	1	1.2	344	0.110
BZW04-239	BZW04-239B	266	294	1	239	1	1.1	384	0.110
BZW04-256	BZW04-256B	285	315	1	256	1	1.0	414	0.110
BZW04-273	BZW04-273B	304	336	1	273	1	0.9	438	0.110
BZW04-299	BZW04-299B	332	368	1	299	1	0.8	482	0.110
BZW04-342	BZW04-342B	380	420	1	342	1	0.75	548	0.110
BZW04-376	BZW04-376B	418	462	1	376	1	0.67	603	0.110

**Notes:**

1. Pulse test : tp<50ms
2. All terms and symbols are consistent with ANSI/IEEE C62.35
3. For bipolar types having V<sub>WM</sub> of 10 volts and less, the I<sub>D</sub> limit is doubled.

ORDERING INFORMATION		
ORDERING CODE <sup>(1)(2)</sup>	PACKAGE	PACKING
BZW04-x	DO-204AL (DO-41)	5,000 / Tape & Reel
BZW04-x A0G	DO-204AL (DO-41)	3,000 / Ammo box
BZW04-xH	DO-204AL (DO-41)	5,000 / Tape & Reel
BZW04-xHA0G	DO-204AL (DO-41)	3,000 / Ammo box

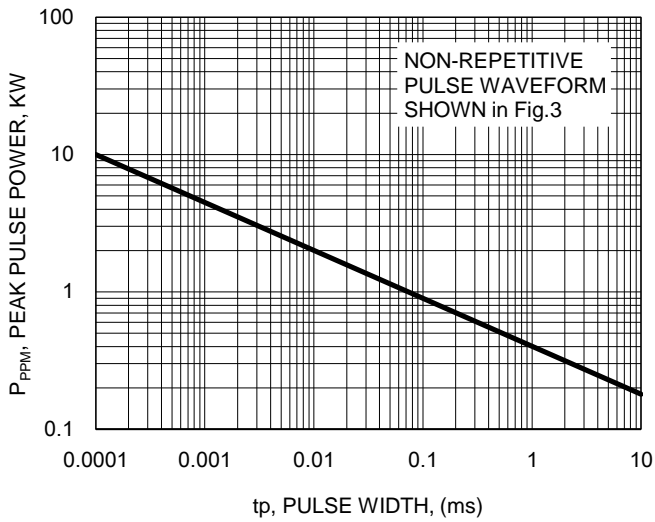
**Notes:**

1. "x" defines voltage from 5.8V (BZW04-5V8) to 376V (BZW04-376)
2. "H" means AEC-Q101 qualified

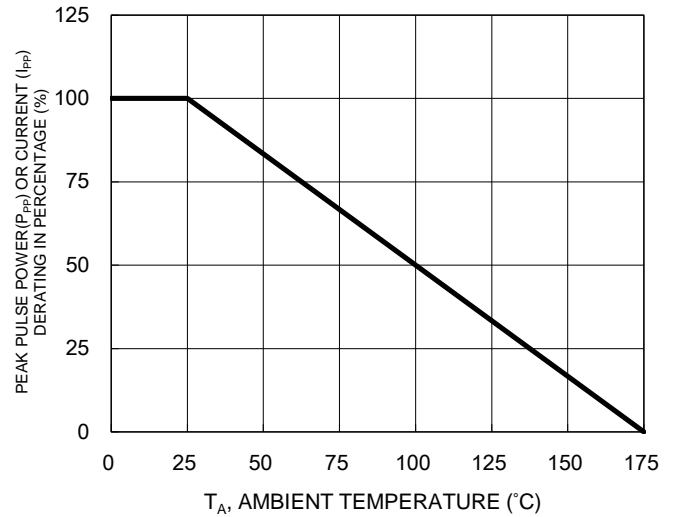
**CHARACTERISTICS CURVES**

( $T_A = 25^\circ\text{C}$  unless otherwise noted)

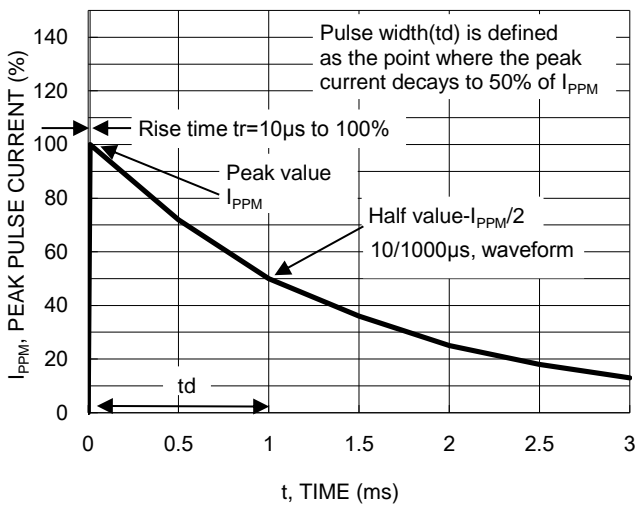
**Fig.1 Peak Pulse Power Rating Curve**



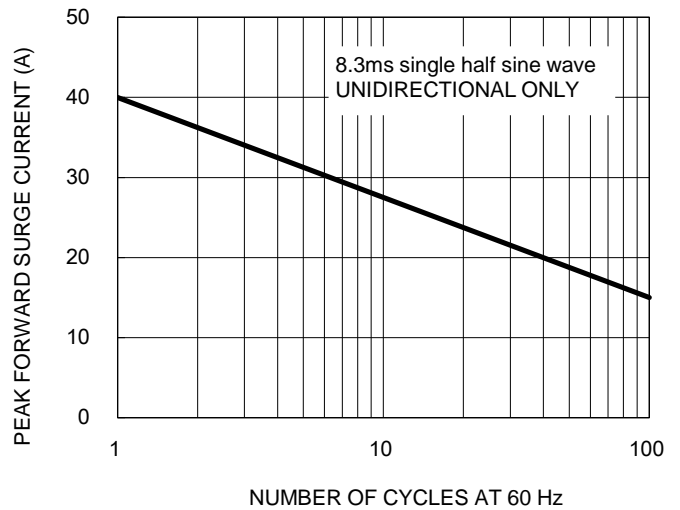
**Fig.2 Pulse Derating Curve**



**Fig.3 Clamping Power Pulse Waveform**



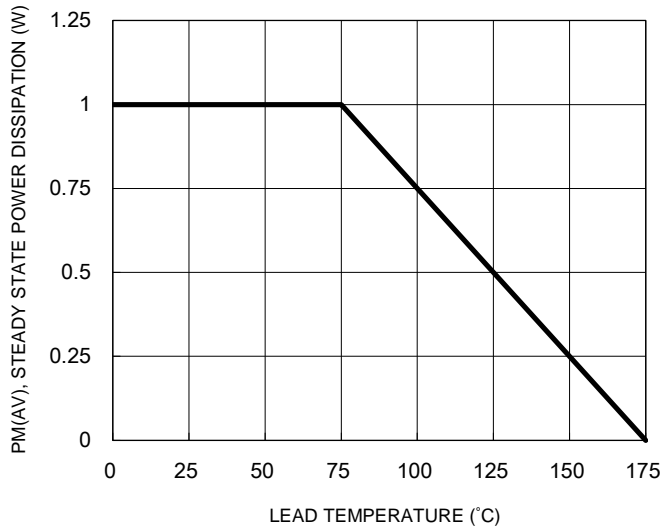
**Fig.4 Maximum Non-Repetitive Forward Surge Current**



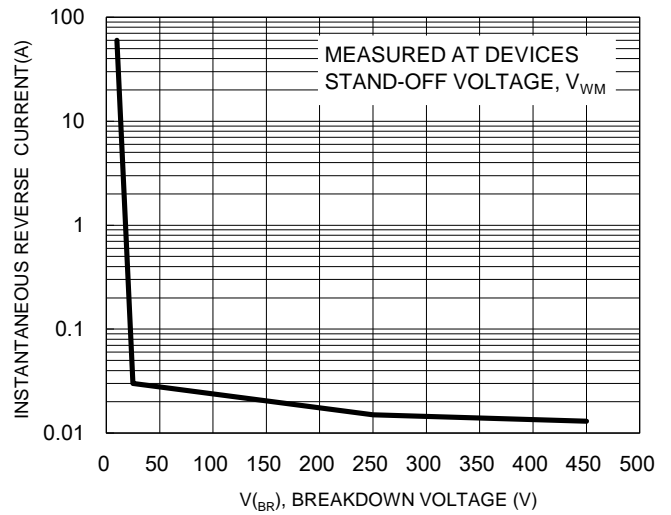
**CHARACTERISTICS CURVES**

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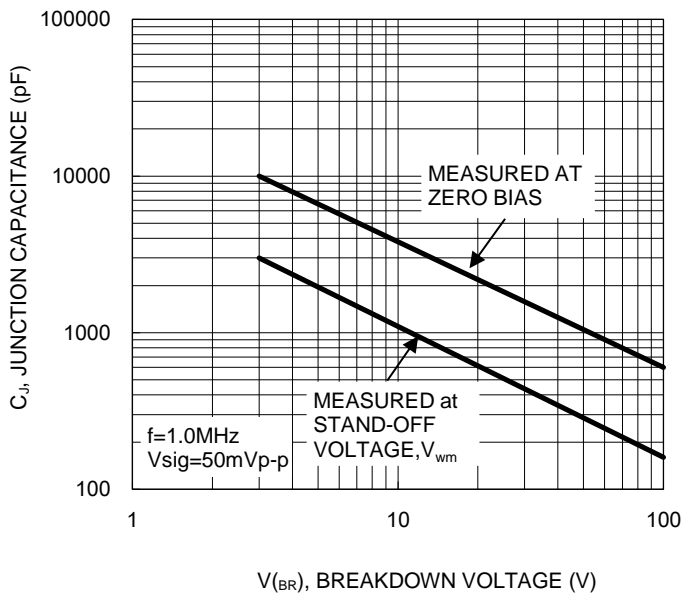
**Fig.5 Steady State Power Derating Curve**



**Fig.6 Typical Reverse Characteristics**

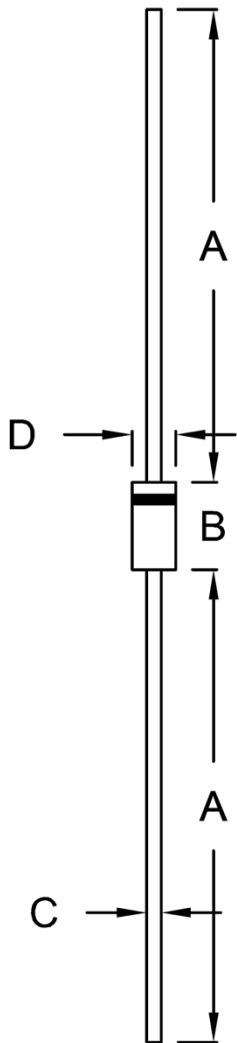


**Fig.7 Typical Junction Capacitance**



**PACKAGE OUTLINE DIMENSIONS**

DO-204AL (DO-41)



DIM.	Unit (mm)		Unit (inch)	
	Min.	Max.	Min.	Max.
A	25.40	-	1.000	-
B	4.20	5.20	0.165	0.205
C	0.71	0.86	0.028	0.034
D	2.00	2.70	0.079	0.106

**MARKING DIAGRAM**

Cathode band for uni-directional products only



- P/N = Marking Code
- G = Green Compound
- YWW = Date Code
- F = Factory Code