

# TRANSZORB® Transient Voltage Suppressors


**DO-204AL (DO-41)**

PRIMARY CHARACTERISTICS	
$V_{WM}$	5.8 V to 376 V
$V_{BR}$ (uni-directional)	6.45 V to V 462
$V_{BR}$ (bi-directional)	6.45 V to V 462
$P_{PPM}$	400 W
$P_D$	1.5 W
$I_{FSM}$ (uni-directional only)	40 A
$T_J$ max.	175 °C
Polarity	Uni-directional, bi-directional
Package	DO-204AL (DO-41)

## DEVICES FOR BI-DIRECTION APPLICATIONS

For bi-directional types, use B suffix (e.g. BZW04P-6V4B).

Electrical characteristics apply in both directions.

## FEATURES

- Glass passivated chip junction
- Available in uni-directional and bi-directional
- 400 W peak pulse power capability with a 10/1000  $\mu$ s 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.vishay.com/doc?99912](http://www.vishay.com/doc?99912)


**RoHS**  
COMPLIANT

## 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, and telecommunication.

## MECHANICAL DATA

**Case:** DO-204AL, 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 JESD22-B102

E3 suffix meets JESD 201 class 1A whisker test, HE3 suffix meets JESD 201 class 2 whisker test

### Note

BZW04-213(B) to BZW04-376(B) for commercial grade only

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

MAXIMUM RATINGS AND THERMAL CHARACTERISTICS ( $T_A = 25$ °C unless otherwise noted)			
PARAMETER	SYMBOL	LIMIT	UNIT
Peak pulse power dissipation with a 10/1000 $\mu$ s waveform <sup>(1)</sup> (fig. 1)	$P_{PPM}$	400	W
Peak pulse current with a 10/1000 $\mu$ s waveform <sup>(1)</sup>	$I_{PPM}$	See next table	A
Power dissipation on infinite heatsink at $T_L = 75$ °C (fig. 5)	$P_D$	1.5	W
Peak forward surge current, 8.3 ms single half sine-wave uni-directional only <sup>(2)</sup>	$I_{FSM}$	40	A
Maximum instantaneous forward voltage at 25 A for uni-directional only <sup>(3)</sup>	$V_F$	3.5/5.0	V
Operating junction and storage temperature range	$T_J, T_{STG}$	- 55 to + 175	°C

### Notes

<sup>(1)</sup> Non-repetitive current pulse, per fig. 3 and derated above  $T_A = 25$  °C per fig. 2

<sup>(2)</sup> Measured on 8.3 ms single half sine-wave or equivalent square wave, duty cycle = 4 pulses per minute maximum

<sup>(3)</sup>  $V_F = 3.5$  V for BZW04P(-)188 and below;  $V_F = 5.0$  V for BZW04P(-)213 and above



ELECTRICAL CHARACTERISTICS (T <sub>A</sub> = 25 °C unless otherwise noted)									
PART NUMBER		BREAKDOWN VOLTAGE V <sub>BR</sub> AT I <sub>T</sub> (1) (V)		TEST CURRENT I <sub>T</sub> (mA)	STAND-OFF VOLTAGE V <sub>WM</sub> (V)	MAXIMUM REVERSE LEAKAGE AT V <sub>WM</sub> I <sub>D</sub> (4) (A)	MAXIMUM PEAK PULSE CURRENT I <sub>PPM</sub> (2) (A)	MAXIMUM CLAMPING VOLTAGE AT I <sub>PPM</sub> V <sub>C</sub> (V)	MAXIMUM TEMPERATURE COEFFICIENT OF V <sub>BR</sub> (%/°C)
UNI-DIRECTIONAL	BI-DIRECTIONAL	MIN.	MAX.						
BZW04-5V8	BZW04-5V8B	6.45	7.14	10.0	5.80	1000	38.0	10.5	0.057
BZW04-6V4	BZW04-6V4B	7.13	7.88	10.0	6.40	500	35.4	11.3	0.061
BZW04-7V0	BZW04-7V0B	7.79	8.61	10.0	7.02	200	33.0	12.1	0.065
BZW04-7V8	BZW04-7V8B	8.65	9.55	1.0	7.78	50	30.0	13.4	0.073
BZW04-8V5	BZW04-8V5B	9.50	10.5	1.0	8.55	10	27.6	14.5	0.075
BZW04-9V4	BZW04-9V4B	10.5	11.6	1.0	9.4	5.0	25.7	15.6	0.075
BZW04-10	BZW04-10B	11.4	12.6	1.0	10.2	1.0	24.0	16.7	0.078
BZW04-11	BZW04-11B	12.4	13.7	1.0	11.1	1.0	22.0	18.2	0.081
BZW04-13	BZW04-13B	14.3	15.8	1.0	12.8	1.0	19.0	21.2	0.084
BZW04-14	BZW04-14B	15.2	16.8	1.0	13.6	1.0	17.8	22.5	0.086
BZW04-15	BZW04-15B	17.1	18.9	1.0	15.3	1.0	16.0	25.2	0.088
BZW04-17	BZW04-17B	19.0	21.0	1.0	17.1	1.0	14.5	27.7	0.090
BZW04-19	BZW04-19B	20.9	23.1	1.0	18.8	1.0	13.0	30.6	0.092
BZW04-20	BZW04-20B	22.8	25.2	1.0	20.5	1.0	12.0	33.2	0.094
BZW04-23	BZW04-23B	25.7	28.4	1.0	23.1	1.0	10.7	37.5	0.096
BZW04-26	BZW04-26B	28.5	31.5	1.0	25.6	1.0	9.6	41.5	0.097
BZW04-28	BZW04-28B	31.4	34.7	1.0	28.2	1.0	8.8	45.7	0.098
BZW04-31	BZW04-31B	34.2	37.8	1.0	30.8	1.0	8.0	49.9	0.099
BZW04-33	BZW04-33B	37.1	41.0	1.0	33.3	1.0	7.4	53.9	0.100
BZW04-37	BZW04-37B	40.9	45.2	1.0	36.8	1.0	6.7	59.3	0.101
BZW04-40	BZW04-40B	44.7	49.4	1.0	40.2	1.0	6.2	64.8	0.101
BZW04-44	BZW04-44B	48.5	53.6	1.0	43.6	1.0	5.7	70.1	0.102
BZW04-48	BZW04-48B	53.2	58.8	1.0	47.8	1.0	5.2	77.0	0.103
BZW04-53	BZW04-53B	58.9	65.1	1.0	53.0	1.0	4.7	85.0	0.104
BZW04-58	BZW04-58B	64.6	71.4	1.0	58.1	1.0	4.3	92.0	0.104
BZW04-64	BZW04-64B	71.3	78.8	1.0	64.1	1.0	3.9	103	0.105
BZW04-70	BZW04-70B	77.9	86.1	1.0	70.1	1.0	3.5	113	0.105
BZW04-78	BZW04-78B	86.5	95.5	1.0	78.0	1.0	3.2	125	0.105
BZW04-85	BZW04-85B	95.0	105	1.0	85.5	1.0	2.9	137	0.106
BZW04-94	BZW04-94B	105	116	1.0	94.0	1.0	2.6	152	0.107
BZW04-102	BZW04-102B	114	126	1.0	102	1.0	2.4	165	0.107
BZW04-110	BZW04-110B	124	137	1.0	111	1.0	2.2	179	0.107
BZW04-128	BZW04-128B	143	158	1.0	128	1.0	2.0	207	0.108
BZW04-136	BZW04-136B	152	168	1.0	136	1.0	1.8	219	0.108
BZW04-145	BZW04-145B	161	179	1.0	145	1.0	1.7	234	0.108
BZW04-154	BZW04-154B	171	189	1.0	154	1.0	1.6	246	0.108
BZW04-171	BZW04-171B	190	210	1.0	171	1.0	1.5	274	0.108
BZW04-188	BZW04-188B	209	231	1.0	188	1.0	1.4	301	0.108
BZW04-213	BZW04-213B	237	263	1.0	213	1.0	1.2	344	0.110
BZW04-239	BZW04-239B	266	294	1.0	239	1.0	1.1	384	0.110
BZW04-256	BZW04-256B	285	315	1.0	256	1.0	1.0	414	0.110
BZW04-273	BZW04-273B	304	336	1.0	273	1.0	0.90	438	0.110
BZW04-299	BZW04-299B	332	368	1.0	299	1.0	0.80	482	0.110
BZW04-342	BZW04-342B	380	420	1.0	342	1.0	0.75	548	0.110
BZW04-376	BZW04-376B	418	462	1.0	376	1.0	0.67	603	0.110

Notes

- (1) Pulse test: t<sub>p</sub> ≥ 50 ms
- (2) Surge current waveform per fig. 3 and derated per fig. 2
- (3) All terms and symbols are consistent with ANSI/IEEE C62.35
- (4) For bi-directional types having V<sub>WM</sub> of 10 V and less, the I<sub>D</sub> limit is doubled

ORDERING INFORMATION (Example)				
PREFERRED P/N	UNIT WEIGHT (g)	PREFERRED PACKAGE CODE	BASE QUANTITY	DELIVERY MODE
BZW0410-E3/54	0.350	54	550	13" diameter paper tape and reel
BZW0410HE3/54 <sup>(1)</sup>	0.350	54	550	13" diameter paper tape and reel

**Note**

<sup>(1)</sup> AEC Q101 qualified

**RATINGS AND CHARACTERISTICS CURVES** ( $T_A = 25^\circ\text{C}$  unless otherwise noted)

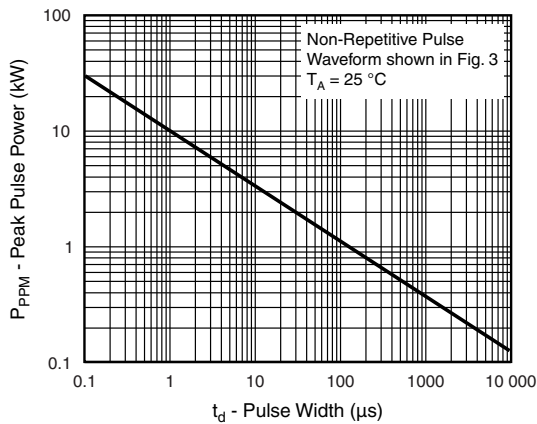


Fig. 1 - Peak Pulse Power Rating Curve

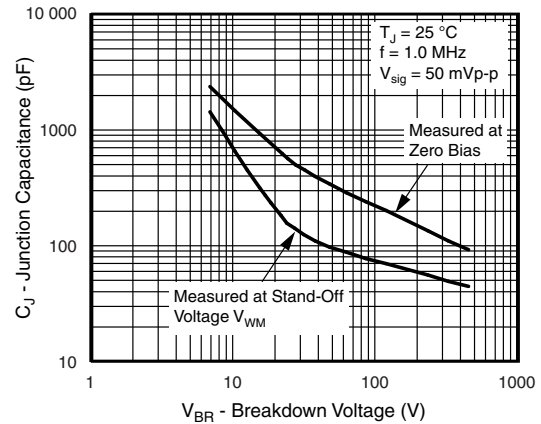


Fig. 4 - Typical Junction Capacitance

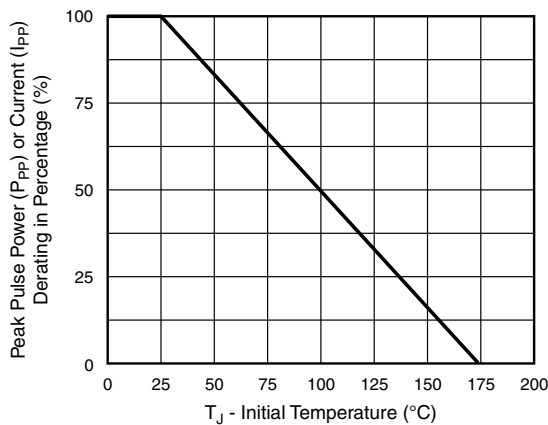


Fig. 2 - Pulse Power or Current vs. Initial Junction Temperature

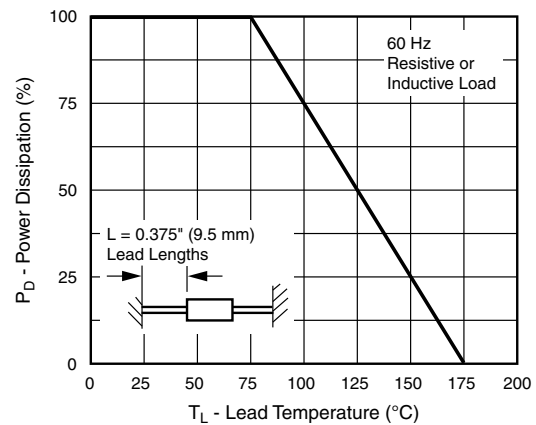


Fig. 5 - Power Derating Curve

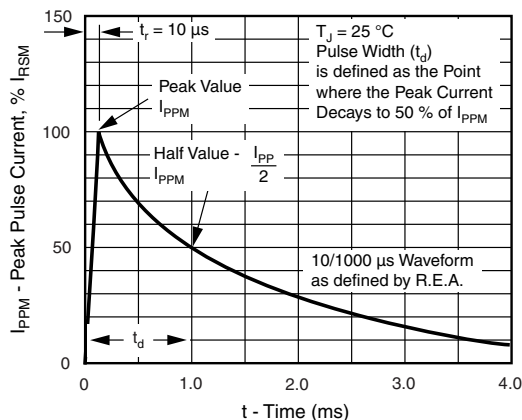


Fig. 3 - Pulse Waveform

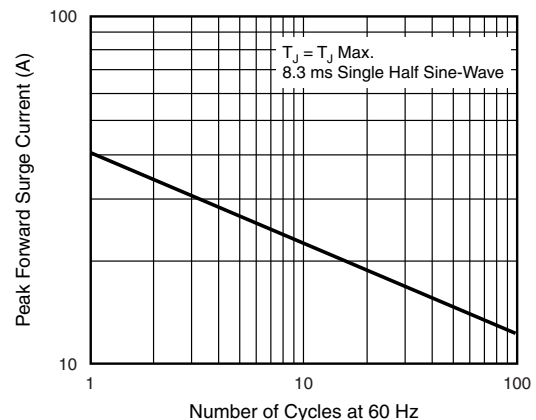
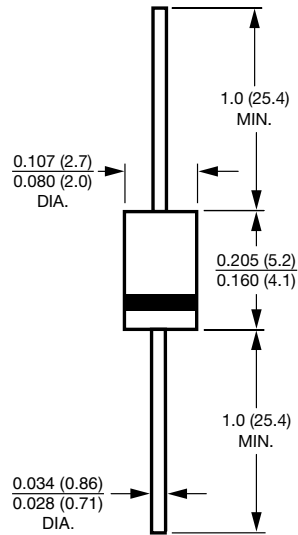


Fig. 6 - Max. Non-Repetitive Forward Surge Current Uni-Directional Only



**PACKAGE OUTLINE DIMENSIONS** in inches (millimeters)

DO-204AL (DO-41)





## Disclaimer

ALL PRODUCT, PRODUCT SPECIFICATIONS AND DATA ARE SUBJECT TO CHANGE WITHOUT NOTICE TO IMPROVE RELIABILITY, FUNCTION OR DESIGN OR OTHERWISE.

Vishay Intertechnology, Inc., its affiliates, agents, and employees, and all persons acting on its or their behalf (collectively, "Vishay"), disclaim any and all liability for any errors, inaccuracies or incompleteness contained in any datasheet or in any other disclosure relating to any product.

Vishay makes no warranty, representation or guarantee regarding the suitability of the products for any particular purpose or the continuing production of any product. To the maximum extent permitted by applicable law, Vishay disclaims (i) any and all liability arising out of the application or use of any product, (ii) any and all liability, including without limitation special, consequential or incidental damages, and (iii) any and all implied warranties, including warranties of fitness for particular purpose, non-infringement and merchantability.

Statements regarding the suitability of products for certain types of applications are based on Vishay's knowledge of typical requirements that are often placed on Vishay products in generic applications. Such statements are not binding statements about the suitability of products for a particular application. It is the customer's responsibility to validate that a particular product with the properties described in the product specification is suitable for use in a particular application. Parameters provided in datasheets and/or specifications may vary in different applications and performance may vary over time. All operating parameters, including typical parameters, must be validated for each customer application by the customer's technical experts. Product specifications do not expand or otherwise modify Vishay's terms and conditions of purchase, including but not limited to the warranty expressed therein.

Except as expressly indicated in writing, Vishay products are not designed for use in medical, life-saving, or life-sustaining applications or for any other application in which the failure of the Vishay product could result in personal injury or death. Customers using or selling Vishay products not expressly indicated for use in such applications do so at their own risk. Please contact authorized Vishay personnel to obtain written terms and conditions regarding products designed for such applications.

No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted by this document or by any conduct of Vishay. Product names and markings noted herein may be trademarks of their respective owners.

## Material Category Policy

**Vishay Intertechnology, Inc. hereby certifies that all its products that are identified as RoHS-Compliant fulfill the definitions and restrictions defined under Directive 2011/65/EU of The European Parliament and of the Council of June 8, 2011 on the restriction of the use of certain hazardous substances in electrical and electronic equipment (EEE) - recast, unless otherwise specified as non-compliant.**

**Please note that some Vishay documentation may still make reference to RoHS Directive 2002/95/EC. We confirm that all the products identified as being compliant to Directive 2002/95/EC conform to Directive 2011/65/EU.**

**Vishay Intertechnology, Inc. hereby certifies that all its products that are identified as Halogen-Free follow Halogen-Free requirements as per JEDEC JS709A standards. Please note that some Vishay documentation may still make reference to the IEC 61249-2-21 definition. We confirm that all the products identified as being compliant to IEC 61249-2-21 conform to JEDEC JS709A standards.**

## Данный компонент на территории Российской Федерации

### Вы можете приобрести в компании MosChip.

Для оперативного оформления запроса Вам необходимо перейти по данной ссылке:

<http://moschip.ru/get-element>

Вы можете разместить у нас заказ для любого Вашего проекта, будь то серийное производство или разработка единичного прибора.

В нашем ассортименте представлены ведущие мировые производители активных и пассивных электронных компонентов.

Нашей специализацией является поставка электронной компонентной базы двойного назначения, продукции таких производителей как XILINX, Intel (ex.ALTERA), Vicor, Microchip, Texas Instruments, Analog Devices, Mini-Circuits, Amphenol, Glenair.

Сотрудничество с глобальными дистрибьюторами электронных компонентов, предоставляет возможность заказывать и получать с международных складов практически любой перечень компонентов в оптимальные для Вас сроки.

На всех этапах разработки и производства наши партнеры могут получить квалифицированную поддержку опытных инженеров.

Система менеджмента качества компании отвечает требованиям в соответствии с ГОСТ Р ИСО 9001, ГОСТ РВ 0015-002 и ЭС РД 009

### Офис по работе с юридическими лицами:

105318, г.Москва, ул.Щербаковская д.3, офис 1107, 1118, ДЦ «Щербаковский»

Телефон: +7 495 668-12-70 (многоканальный)

Факс: +7 495 668-12-70 (доб.304)

E-mail: [info@moschip.ru](mailto:info@moschip.ru)

Skype отдела продаж:

moschip.ru

moschip.ru\_4

moschip.ru\_6

moschip.ru\_9