

## Features

- Surface Mount SMB package
- Breakdown Voltage: 6.8 to 250 volts
- Power Dissipation: 600 watts
- RoHS compliant\* and halogen free\*\*
- AEC-Q101 compliant\*\*\*

## Applications

- Protection of power buses
- Protection of I/O interfaces
- Overvoltage transient protection
- Telecom, computer, industrial and consumer electronics applications

# P6SMB-Q Transient Voltage Suppressor Diode Series

### General Information

The markets of portable communications, computing and video equipment are challenging the semiconductor industry to develop increasingly smaller electronic components.

Bourns offers Transient Voltage Suppressor Diodes for surge and ESD protection applications, in compact chip package DO-214AA (SMB) size format. The Transient Voltage Suppressor series offers a choice of Breakdown Voltages from 6.8 V up to 250 V. Typical fast response times are less than 1.0 picosecond for unidirectional devices and less than 5.0 picoseconds for bidirectional devices from 0 V to Minimum Breakdown Voltage.

Bourns® Chip Diodes conform to JEDEC standards, are easy to handle with standard pick and place equipment and the flat configuration minimizes roll away.

### Additional Information

Click these links for more information:



### Maximum Characteristics (@ T<sub>A</sub> = 25 °C Unless Otherwise Noted)

Parameter	Symbol	Value	Unit
Peak Pulse Power Dissipation (T <sub>P</sub> = 1 ms) (Note 1,2)	P <sub>PK</sub>	600	Watts
Peak Forward Surge Current 8.3 ms Single Half Sine Wave Superimposed on Rated Load (JEDEC Method) (Note 3)	I <sub>FSM</sub>	100	Amps
Maximum Instantaneous Forward Voltage @ I <sub>PP</sub> = 50 A (For Unidirectional Units Only)	V <sub>F</sub>	3.5	Volts
Operating Temperature Range	T <sub>J</sub>	-55 to +150	°C
Storage Temperature Range	T <sub>STG</sub>	-55 to +150	°C

1. Non-repetitive current pulse, per Pulse Waveform graph and derated above T<sub>A</sub> = 25 °C per Pulse Derating Curve.
2. Thermal Resistance Junction to Lead.
3. 8.3 ms Single Half-Sine Wave duty cycle = 4 pulses maximum per minute (unidirectional units only).

# BOURNS®

#### Asia-Pacific:

Tel: +886-2 2562-4117 • Email: asiacus@bourns.com

#### EMEA:

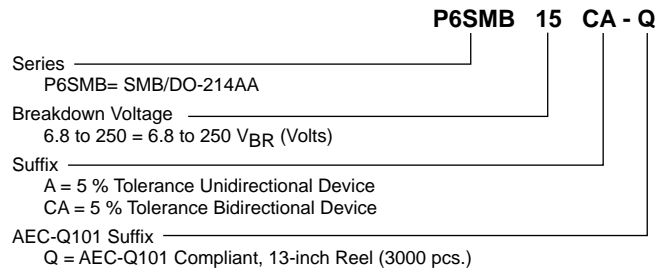
Tel: +36 88 885 877 • Email: eurocus@bourns.com

#### The Americas:

Tel: +1-951 781-5500 • Email: americus@bourns.com

[www.bourns.com](http://www.bourns.com)

### How to Order



**WARNING Cancer and Reproductive Harm - [www.P65Warnings.ca.gov](http://www.P65Warnings.ca.gov)**

\* RoHS Directive 2015/863, Mar 31, 2015 and Annex.

\*\* Bourns considers a product to be "halogen free" if (a) the Bromine (Br) content is 900 ppm or less; (b) the Chlorine (Cl) content is 900 ppm or less; and (c) the total Bromine (Br) and Chlorine (Cl) content is 1500 ppm or less.

\*\*\* Q suffix for applications requiring appropriate AEC-Q101 compliance for electronic limiters.

Specifications are subject to change without notice.

Users should verify actual device performance in their specific applications.

The products described herein and this document are subject to specific legal disclaimers as set forth on the last page of this document, and at [www.bourns.com/docs/legal/disclaimer.pdf](http://www.bourns.com/docs/legal/disclaimer.pdf).

# P6SMB-Q Transient Voltage Suppressor Diode Series

## Electrical Characteristics (@ T<sub>A</sub> = 25 °C Unless Otherwise Noted)

Unidirectional Device		Bidirectional Device		Breakdown Voltage V <sub>BR</sub> (Volts)			Working Peak Reverse Voltage	Maximum Reverse Leakage @ V <sub>RWM</sub>	Maximum Clamping Voltage @ I <sub>pp</sub> (10/1000 μs)	Maximum Peak Pulse Current (10/1000 μs)	Maximum Clamping Voltage @ I <sub>pp</sub> (8/20 μs)	Maximum Peak Pulse Current (8/20 μs)
Part No.	Marking	Part No.	Marking	Min.	Max.	@ I <sub>T</sub> (mA)	V <sub>RWM</sub> (V)	I <sub>R</sub> (μA)	V <sub>C</sub> (V)	I <sub>pp</sub> (A)	V <sub>C</sub> (V)	I <sub>pp</sub> (A)
P6SMB6.8A-Q	6V8AQ	P6SMB6.8CA-Q	6V8CQ	6.45	7.14	10	5.8	1000	10.5	58.1	13.7	290.5
P6SMB7.5A-Q	7V5AQ	P6SMB7.5CA-Q	7V5CQ	7.13	7.88	10	6.4	500	11.3	54	15	270
P6SMB8.2A-Q	8V2AQ	P6SMB8.2CA-Q	8V2CQ	7.79	8.61	10	7.02	200	12.1	50.4	15.7	252.0
P6SMB9.1A-Q	9V1AQ	P6SMB9.1CA-Q	9V1CQ	8.65	9.55	1	7.78	50	13.4	45.5	17.4	227.5
P6SMB10A-Q	10AQ	P6SMB10CA-Q	10CQ	9.5	10.5	1	8.55	10	14.5	42.1	18.9	210.5
P6SMB11A-Q	11AQ	P6SMB11CA-Q	11CQ	10.5	11.6	1	9.4	5	15.6	39.1	20.3	195.5
P6SMB12A-Q	12AQ	P6SMB12CA-Q	12CQ	11.4	12.6	1	10.2	5	16.7	36.5	21.7	182.5
P6SMB13A-Q	13AQ	P6SMB13CA-Q	13CQ	12.4	13.7	1	11.1	1	18.2	33.5	23.7	167.5
P6SMB15A-Q	15AQ	P6SMB15CA-Q	15CQ	14.3	15.8	1	12.8	1	21.2	28.8	27.6	144.0
P6SMB16A-Q	16AQ	P6SMB16CA-Q	16CQ	15.2	16.8	1	13.6	1	22.5	27.1	29.3	135.5
P6SMB18A-Q	18AQ	P6SMB18CA-Q	18CQ	17.1	18.9	1	15.3	1	25.5	24.2	33.2	121.0
P6SMB20A-Q	20AQ	P6SMB20CA-Q	20CQ	19	21	1	17.1	1	27.7	22	36	110
P6SMB22A-Q	22AQ	P6SMB22CA-Q	22CQ	20.9	23.1	1	18.8	1	30.6	19.9	39.8	99.5
P6SMB24A-Q	24AQ	P6SMB24CA-Q	24CQ	22.8	25.2	1	20.5	1	33.2	18.4	43.2	92.0
P6SMB27A-Q	27AQ	P6SMB27CA-Q	27CQ	25.7	28.4	1	23.1	1	37.5	16.3	48.8	81.5
P6SMB30A-Q	30AQ	P6SMB30CA-Q	30CQ	28.5	31.5	1	25.6	1	41.4	14.7	53.8	73.5
P6SMB33A-Q	33AQ	P6SMB33CA-Q	33CQ	31.4	34.7	1	28.2	1	45.7	13.3	59.4	66.5
P6SMB36A-Q	36AQ	P6SMB36CA-Q	36CQ	34.2	37.8	1	30.8	1	49.9	12.2	64.9	61.0
P6SMB39A-Q	39AQ	P6SMB39CA-Q	39CQ	37.1	41	1	33.3	1	53.9	11.3	70.1	56.5
P6SMB43A-Q	43AQ	P6SMB43CA-Q	43CQ	40.9	45.2	1	36.8	1	59.3	10.3	77.1	51.5
P6SMB47A-Q	47AQ	P6SMB47CA-Q	47CQ	44.7	49.4	1	40.2	1	64.8	9.4	84.2	47.0
P6SMB51A-Q	51AQ	P6SMB51CA-Q	51CQ	48.5	53.6	1	43.6	1	70.1	8.7	91.1	43.5
P6SMB56A-Q	56AQ	P6SMB56CA-Q	56CQ	53.2	58.8	1	47.8	1	77	7.9	100.1	39.5
P6SMB62A-Q	62AQ	P6SMB62CA-Q	62CQ	58.9	65.1	1	53	1	85	7.2	110.5	36.0
P6SMB68A-Q	68AQ	P6SMB68CA-Q	68CQ	64.6	71.4	1	58.1	1	92	6.6	119.6	33.0
P6SMB75A-Q	75AQ	P6SMB75CA-Q	75CQ	71.3	78.8	1	64.1	1	103	5.9	133.9	29.5
P6SMB82A-Q	82AQ	P6SMB82CA-Q	82CQ	77.9	86.1	1	70.1	1	113	5.4	146.9	27.0
P6SMB91A-Q	91AQ	P6SMB91CA-Q	91CQ	86.5	95.5	1	77.8	1	125	4.9	162.5	24.5
P6SMB100A-Q	100AQ	P6SMB100CA-Q	100CQ	95	105	1	85.5	1	137	4.5	178.1	22.5
P6SMB110A-Q	110AQ	P6SMB110CA-Q	110CQ	105	116	1	94	1	152	4	198	20
P6SMB120A-Q	120AQ	P6SMB120CA-Q	120CQ	114	126	1	102	1	165	3.7	214.5	18.5
P6SMB130A-Q	130AQ	P6SMB130CA-Q	130CQ	124	137	1	111	1	179	3.4	232.7	17.0
P6SMB150A-Q	150AQ	P6SMB150CA-Q	150CQ	143	158	1	128	1	207	2.9	269.1	14.5
P6SMB160A-Q	160AQ	P6SMB160CA-Q	160CQ	152	168	1	136	1	219	2.8	284.7	14.0
P6SMB170A-Q	170AQ	P6SMB170CA-Q	170CQ	162	179	1	145	1	234	2.6	304.2	13.0
P6SMB180A-Q	180AQ	P6SMB180CA-Q	180CQ	171	189	1	154	1	246	2.5	319.8	12.5
P6SMB200A-Q	200AQ	P6SMB200CA-Q	200CQ	190	210	1	171	1	274	2.2	356.2	11.0
P6SMB220A-Q	220AQ	P6SMB220CA-Q	220CQ	209	231	1	185	1	328	1.9	426.4	9.5
P6SMB250A-Q	250AQ	P6SMB250CA-Q	250CQ	237	263	1	214	1	344	1.8	447.2	9.0

Notes:

1. Suffix 'A' denotes a 5 % tolerance unidirectional device.
2. Suffix 'CA' denotes a 5 % tolerance bidirectional device.

Specifications are subject to change without notice.

Users should verify actual device performance in their specific applications.

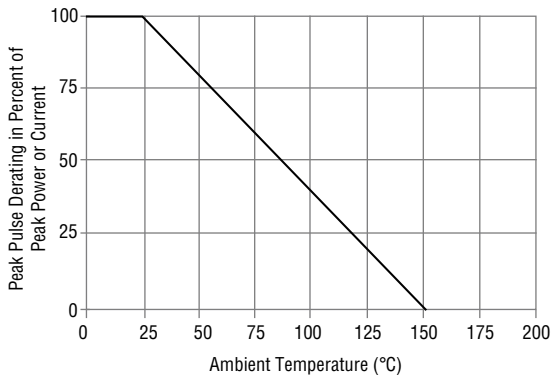
The products described herein and this document are subject to specific legal disclaimers as set forth on the last page of this document, and at [www.bourns.com/docs/legal/disclaimer.pdf](http://www.bourns.com/docs/legal/disclaimer.pdf).

# P6SMB-Q Transient Voltage Suppressor Diode Series

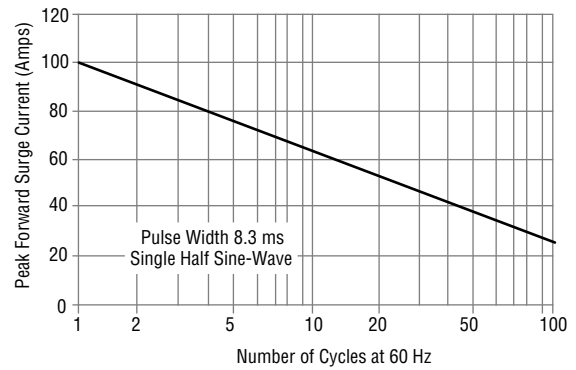


## Rating & Characteristic Curves

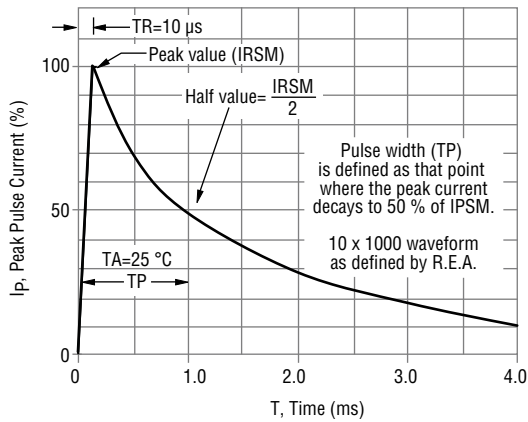
### Pulse Derating Curve



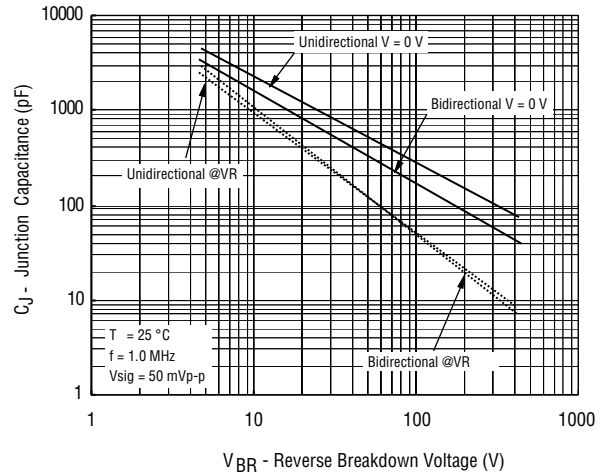
### Maximum Non-Repetitive Surge Current



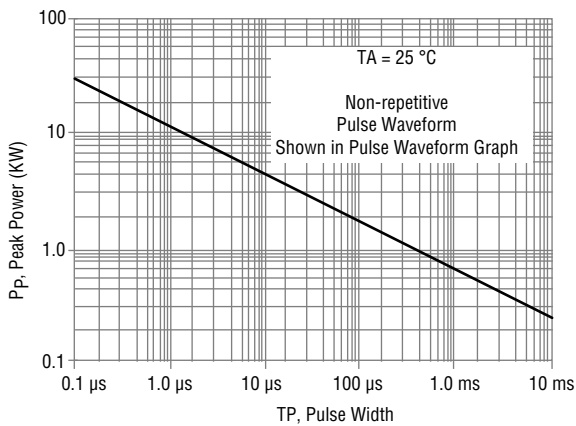
### Pulse Waveform



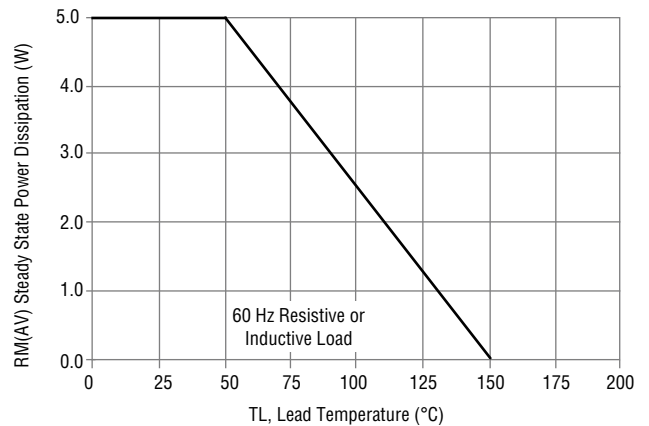
### Typical Junction Capacitance



### Pulse Rating Curve



### Steady State Power Derating Curve



Specifications are subject to change without notice.

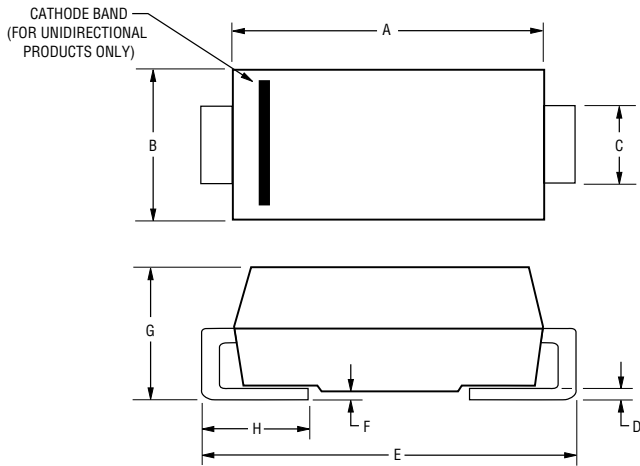
Users should verify actual device performance in their specific applications.

The products described herein and this document are subject to specific legal disclaimers as set forth on the last page of this document, and at [www.bourns.com/docs/legal/disclaimer.pdf](http://www.bourns.com/docs/legal/disclaimer.pdf).

# P6SMB-Q Transient Voltage Suppressor Diode Series

**BOURNS®**

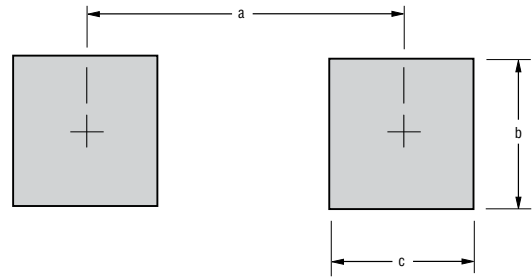
## Product Dimensions



Dimension	SMB (DO-214AA)
A	4.06 - 4.57 (0.160 - 0.180)
B	3.30 - 3.94 (0.130 - 0.155)
C	1.95 - 2.20 (0.077 - 0.087)
D	0.15 - 0.31 (0.006 - 0.012)
E	5.21 - 5.59 (0.205 - 0.220)
F	0.203 (0.008) MAX.
G	2.13 - 2.44 (0.084 - 0.096)
H	0.76 - 1.52 (0.030 - 0.060)

DIMENSIONS:  $\frac{\text{MM}}{\text{(INCHES)}}$

## Recommended Footprint



Dimension	SMB (DO-214AA)
a (Max.)	2.69 (0.106)
b (Min.)	2.10 (0.083)
c (Min.)	1.27 (0.050)

DIMENSIONS:  $\frac{\text{MM}}{\text{(INCHES)}}$

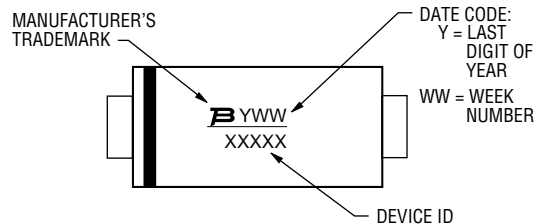
## Physical Specifications

Case ..... Molded plastic per UL Class 94V-0  
 Polarity.....Cathode band indicates unidirectional device  
 No cathode band indicates bidirectional device

## Environmental Specifications

Moisture Sensitivity Level ..... 1  
 ESD Classification (HBM)..... 3B

## Typical Part Marking



Specifications are subject to change without notice.

Users should verify actual device performance in their specific applications.

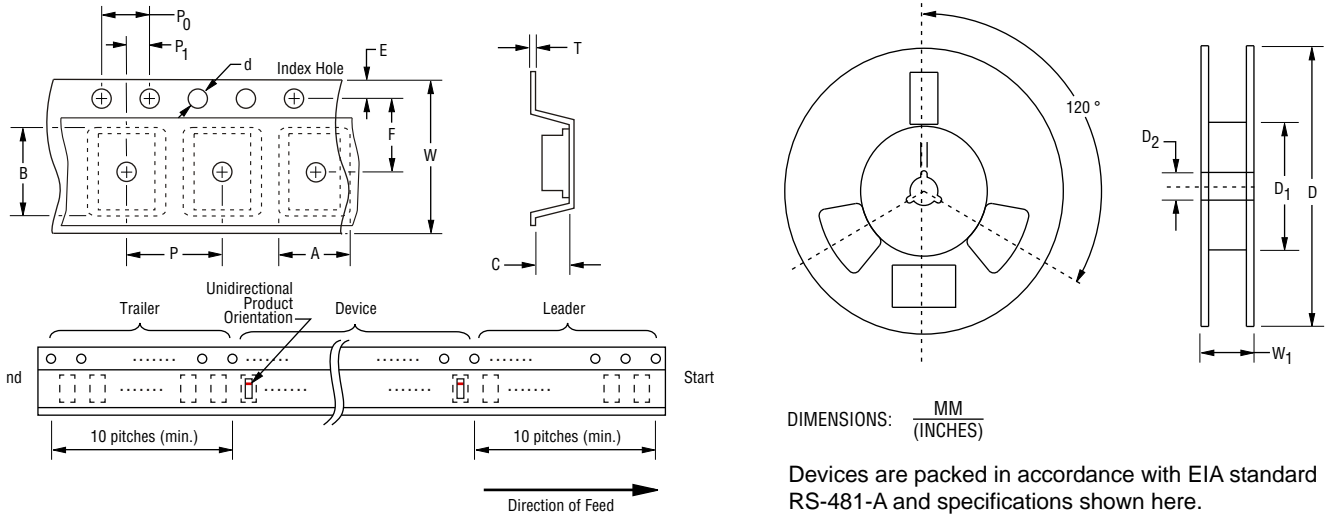
The products described herein and this document are subject to specific legal disclaimers as set forth on the last page of this document, and at [www.bourns.com/docs/legal/disclaimer.pdf](http://www.bourns.com/docs/legal/disclaimer.pdf).

# P6SMB-Q Transient Voltage Suppressor Diode Series

**BOURNS®**

## Packaging Information

The product will be dispensed in tape and reel format (see diagram below).



Item	Symbol	SMB (DO-214AA)
		13-Inch Reel
Carrier Width	A	$\frac{3.67 \pm 0.20}{(0.144 \pm 0.008)}$
Carrier Length	B	$\frac{5.60 \pm 0.20}{(0.220 \pm 0.008)}$
Carrier Depth	C	$\frac{2.57 \pm 0.20}{(0.101 \pm 0.008)}$
Sprocket Hole	d	$\frac{1.50 \pm 0.10}{(0.059 \pm 0.004)}$
Reel Outside Diameter	D	$\frac{330}{(12.992)}$
Reel Inner Diameter	D <sub>1</sub>	$\frac{50.0}{(1.969)}$ MIN.
Feed Hole Diameter	D <sub>2</sub>	$\frac{13.0 \pm 0.20}{(0.512 \pm 0.008)}$
Sprocket Hole Position	E	$\frac{1.75 \pm 0.10}{(0.069 \pm 0.004)}$
Punch Hole Position	F	$\frac{5.50 \pm 0.05}{(0.217 \pm 0.002)}$
Punch Hole Pitch	P	$\frac{8.00 \pm 0.10}{(0.315 \pm 0.004)}$
Sprocket Hole Pitch	P <sub>0</sub>	$\frac{4.00 \pm 0.10}{(0.157 \pm 0.004)}$
Embossment Center	P <sub>1</sub>	$\frac{2.00 \pm 0.05}{(0.079 \pm 0.002)}$
Overall Tape Thickness	T	$\frac{0.30 \pm 0.10}{(0.012 \pm 0.004)}$
Tape Width	W	$\frac{12.00 \pm 0.30}{(0.472 \pm 0.012)}$
Reel Width	W <sub>1</sub>	$\frac{18.4}{(0.724)}$ MAX.
Quantity per Reel	--	3000

REV. 10/20

Specifications are subject to change without notice.

Users should verify actual device performance in their specific applications.

The products described herein and this document are subject to specific legal disclaimers as set forth on the last page of this document, and at [www.bourns.com/docs/legal/disclaimer.pdf](http://www.bourns.com/docs/legal/disclaimer.pdf).

This legal disclaimer applies to purchasers and users of Bourns® products manufactured by or on behalf of Bourns, Inc. and its affiliates (collectively, "Bourns").

Unless otherwise expressly indicated in writing, Bourns® products and data sheets relating thereto are subject to change without notice. Users should check for and obtain the latest relevant information and verify that such information is current and complete before placing orders for Bourns® products.

The characteristics and parameters of a Bourns® product set forth in its data sheet are based on laboratory conditions, and statements regarding the suitability of products for certain "typical" applications are based on Bourns' knowledge of typical requirements in generic applications. Bourns assumes that "typical" applications include failsafe/backup features to address critical risks to users and are designed to allow rework of Bourns® product to avoid scrap of a device solely due to malfunctioning Bourns® product. The characteristics and parameters of a Bourns® product in a user application may vary from the data sheet characteristics and parameters due to (i) the combination of the Bourns® product with other components in the user's application, or (ii) the environment of the user application itself. The characteristics and parameters of a Bourns® product also can and do vary in different applications and actual performance may vary over time. Thus, users should always verify the actual performance of the Bourns® product in their specific devices and applications and make their own independent judgments regarding the suitability of Bourns® product and the amount of additional test margin to design into their device or application to compensate for differences between laboratory and real-world conditions.

Unless Bourns has explicitly designated an individual Bourns® product as meeting the requirements of a particular industry standard (e.g., IATF 16949) or a particular qualification (e.g., UL listed or recognized), Bourns is not responsible for any failure of an individual Bourns® product to meet the requirements of such industry standard or particular qualification even if such industry standard or qualification is a "state of art". Users of Bourns® products are responsible for ensuring compliance with safety-related requirements and standards applicable to their devices or applications.

Bourns® products are not recommended, authorized or intended for use in applications where failure or malfunction may result in personal injury, death, or severe property or environmental damage, such as without limitation nuclear, life-critical medical and certain automotive and aviation applications. Except as set forth in the bullet points below or unless expressly and specifically approved in writing on a case-by-case basis by an authorized Bourns' representative, use of any Bourns® products in such unauthorized high-risk applications is at the user's sole risk.

- Bourns considers implantable/invasive devices and devices/procedures designed as life-supporting or life-sustaining by the U.S. Food and Drug Administration or equivalent organizations outside of the United States as "life-critical" medical applications. Bourns expressly identifies those Bourns® standard products that are suitable for use in typical medical applications that are not life-critical in its publication entitled "Bourns Medical Grade Component Guide."
- Bourns expressly identifies those Bourns® standard products that are suitable for use in typical automotive applications associated with any Automate Safety Integrity Level (ASIL) in its publication entitled "Bourns Automotive Grade Component Guide." Bourns' designation of Bourns® product as compliant with the AEC-Q standard does not by itself mean that Bourns has approved such product for use in an automotive application.
- Bourns expressly identifies Bourns® standard products that are suitable for use in the typical aviation applications/systems requiring System Design Assurance Level (RTCA DO-254 DAL) of C, D or E in its publication entitled "Bourns Civilian Aerospace/Aviation Grade Component Guide." Bourns does not test its products for compliance with United States Federal Aviation Administration standards or any other generally equivalent governmental organization standard applicable to products designed or manufactured for use in aviation applications. Use of Bourns® standard components in aviation applications associated with RTCA DO-254 DAL A or B without proper approval noted above shall be at the user's sole risk.
- Bourns will review and authorize on a case-by-case basis the use of Bourns® standard products which are at least AEC-Q compliant in space-related civil applications (rockets, satellites) with a negotiated cross-waiver and indemnity agreement.

The use and level of testing applicable to Bourns® custom products shall be negotiated on a case-by-case basis by Bourns and the user for which such Bourns® custom products are specially designed. Absent a written agreement between Bourns and the user regarding the use and level of such testing, the above provisions applicable to Bourns® standard products shall also apply to such Bourns® custom products.

Use of Bourns® products or Bourns' technology in military/defense applications must be reviewed with Bourns for compliance with applicable export control laws and embargoes. Users shall not sell, transfer, export or re-export (which includes transfers within a country) any Bourns® products or technology or technical data for use in activities which involve the design, development, production, use or stockpiling of nuclear, chemical or biological weapons or missiles, nor shall they use Bourns® products or technology or technical data in any facility which engages in activities relating to such devices. Further, Bourns® products and Bourns' technology and technical data may not under any circumstance be exported or re-exported to countries subject to international sanctions or embargoes. Bourns® products and technology may not, without prior authorization from Bourns and/or the Government of a country where such product/technology is designed and/or manufactured, be resold, transferred, or re-exported (including within the same country) to any party not eligible to receive commodities, software, and technical data originating in such country.

To the maximum extent permitted by applicable law, Bourns disclaims (i) any and all liability for special, punitive, consequential, incidental or indirect damages or lost revenues or lost profits, and (ii) any and all implied warranties (those not based on parameters specified in Bourns' data sheets and/or specifications), including implied warranties of fitness for particular purpose, non-infringement and merchantability.

For your convenience, copies of this Legal Disclaimer Notice with German, Spanish, Japanese, Traditional Chinese and Simplified Chinese bilingual versions are available at:

Web Page: <https://www.bourns.com/legal/disclaimers-terms-and-policies>

PDF: <https://www.bourns.com/docs/Legal/disclaimer.pdf>