



## Features

- RoHS compliant\* and halogen free\*\*
- Surface Mount SMC package
- Breakdown Voltage: 6.8 to 550 volts
- Peak Pulse Power: 1500 watts
- Typical temperature coefficient:  
 $\Delta V_{BR} = 0.1 \% \times V_{BR} @ 25\text{ }^{\circ}\text{C} \times \Delta T$

## Applications

- IEC 61000-4-2 ESD (Min. Level 4)
- IEC 61000-4-4 EFT
- IEC 61000-4-5 Surge

# 1.5SMC 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-214AB (SMC) size format. The Transient Voltage Suppressor series offers a choice of Breakdown Voltages from 6.8 V up to 550 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 their flat configuration minimizes roll away.

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

Parameter	Symbol	Value	Unit
Minimum Peak Pulse Power Dissipation (T <sub>P</sub> = 1 ms) (Note 1,2)	P <sub>PK</sub>	1500	Watts
Peak Forward Surge Current 8.3 ms Single Half Sine Wave Superimposed on Rated Load (JEDEC Method) (Note 3)	I <sub>FSM</sub>	200	Amps
Maximum Instantaneous Forward Voltage @ I <sub>PP</sub> = 100 A (For Unidirectional Units Only)	V <sub>F</sub>	1.5SMC6.8A ~ 1.5SMC200A 1.5SMC220A ~ 1.5SMC550A 3.5 5.0	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

### Europe:

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

**1.5SMC 6.8 CA - H**

Series \_\_\_\_\_  
 1.5SMC = SMC/DO-214AB

Breakdown Voltage \_\_\_\_\_  
 6.8 to 550 = 6.8 to 550 V<sub>BD</sub>

Suffix \_\_\_\_\_  
 A = 5 % Tolerance Unidirectional Device  
 CA = 5 % Tolerance Bidirectional Device

Reel \_\_\_\_\_  
 (blank) = 13 inch reel  
 -H = 7 inch reel



**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.

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).

# 1.5SMC Transient Voltage Suppressor Diode Series

**BOURNS®**

## 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)
1.5SMC6.8A	6V8A	1.5SMC6.8CA	6V8C	6.45	7.14	10	5.8	1000	10.5	144.8	13.7	724.0
1.5SMC7.5A	7V5A	1.5SMC7.5CA	7V5C	7.13	7.88	10	6.4	500	11.3	134.5	14.7	672.5
1.5SMC8.2A	8V2A	1.5SMC8.2CA	8V2C	7.79	8.61	10	7.02	200	12.1	125.6	15.7	628.0
1.5SMC9.1A	9V1A	1.5SMC9.1CA	9V1C	8.65	9.5	1	7.78	50	13.4	113.4	17.4	567.0
1.5SMC10A	10A	1.5SMC10CA	10C	9.5	10.5	1	8.55	10	14.5	104.8	18.9	524.0
1.5SMC11A	11A	1.5SMC11CA	11C	10.5	11.6	1	9.4	5	15.6	97.4	20.3	487.0
1.5SMC12A	12A	1.5SMC12CA	12C	11.4	12.6	1	10.2	5	16.7	91	22	455
1.5SMC13A	13A	1.5SMC13CA	13C	12.4	13.7	1	11.1	1	18.2	83.5	23.7	417.5
1.5SMC15A	15A	1.5SMC15CA	15C	14.3	15.8	1	12.8	1	21.2	71.7	27.6	358.5
1.5SMC16A	16A	1.5SMC16CA	16C	15.2	16.8	1	13.6	1	22.5	67.6	29.3	338.0
1.5SMC18A	18A	1.5SMC18CA	18C	17.1	18.9	1	15.3	1	25.2	60.3	32.8	301.5
1.5SMC20A	20A	1.5SMC20CA	20C	19	21	1	17.1	1	27.7	54.9	36.0	274.5
1.5SMC22A	22A	1.5SMC22CA	22C	20.9	23.1	1	18.8	1	30.6	49.7	39.8	248.5
1.5SMC24A	24A	1.5SMC24CA	24C	22.8	25.2	1	20.5	1	33.2	45.8	43.2	229.0
1.5SMC27A	27A	1.5SMC27CA	27C	25.7	28.4	1	23.1	1	37.5	40.5	48.8	202.5
1.5SMC30A	30A	1.5SMC30CA	30C	28.5	31.5	1	25.6	1	41.4	36.7	53.8	183.5
1.5SMC33A	33A	1.5SMC33CA	33C	31.4	34.7	1	28.2	1	45.7	33.3	59.4	166.5
1.5SMC36A	36A	1.5SMC36CA	36C	34.2	37.8	1	30.8	1	49.9	30.5	64.9	152.5
1.5SMC39A	39A	1.5SMC39CA	39C	37.1	41	1	33.3	1	53.9	28.2	70.1	141.0
1.5SMC43A	43A	1.5SMC43CA	43C	40.9	45.2	1	36.8	1	59.3	25.6	77.1	128.0
1.5SMC47A	47A	1.5SMC47CA	47C	44.7	49.4	1	40.2	1	64.8	23.5	84.2	117.5
1.5SMC51A	51A	1.5SMC51CA	51C	48.5	53.6	1	43.6	1	70.1	21.7	91.1	108.5
1.5SMC56A	56A	1.5SMC56CA	56C	53.2	58.8	1	47.8	1	77	19.7	100.1	98.5
1.5SMC62A	62A	1.5SMC62CA	62C	58.9	65.1	1	53	1	85	17.9	110.5	89.5
1.5SMC68A	68A	1.5SMC68CA	68C	64.6	71.4	1	58.1	1	92	16.5	119.6	82.5
1.5SMC75A	75A	1.5SMC75CA	75C	71.3	78.8	1	64.1	1	103	14.8	133.9	74.0
1.5SMC82A	82A	1.5SMC82CA	82C	77.9	86.1	1	70.1	1	113	13.5	146.9	67.5
1.5SMC91A	91A	1.5SMC91CA	91C	86.5	95.5	1	77.8	1	125	12.2	162.5	61.0
1.5SMC100A	100A	1.5SMC100CA	100C	95	105	1	85.5	1	137	11.1	178.1	55.5
1.5SMC110A	110A	1.5SMC110CA	110C	105	116	1	94	1	152	10	198	50
1.5SMC120A	120A	1.5SMC120CA	120C	114	126	1	102	1	165	9.2	214.5	46.0
1.5SMC130A	130A	1.5SMC130CA	130C	124	137	1	111	1	179	8.5	232.7	42.5
1.5SMC150A	150A	1.5SMC150CA	150C	143	158	1	128	1	207	7.3	269.1	36.5
1.5SMC160A	160A	1.5SMC160CA	160C	152	168	1	136	1	219	6.9	284.7	34.5
1.5SMC170A	170A	1.5SMC170CA	170C	162	179	1	145	1	234	6.5	304.2	32.5
1.5SMC180A	180A	1.5SMC180CA	180C	171	189	1	154	1	246	6.2	319.8	31.0
1.5SMC200A	200A	1.5SMC200CA	200C	190	210	1	171	1	274	5.5	356.2	27.5
1.5SMC220A	220A	1.5SMC220CA	220C	209	231	1	185	1	328	4.6	426.4	23.0
1.5SMC250A	250A	1.5SMC250CA	250C	237	263	1	214	1	344	4.4	447.2	22.0
1.5SMC300A	300A	1.5SMC300CA	300C	285	315	1	256	1	414	3.7	538.2	18.5
1.5SMC350A	350A	1.5SMC350CA	350C	332	368	1	300	1	482	3.2	626.6	16.0
1.5SMC400A	400A	1.5SMC400CA	400C	380	420	1	342	1	548	2.8	712.4	14.0
1.5SMC440A	440A	1.5SMC440CA	440C	418	462	1	376	1	602	2.5	782.6	12.5
1.5SMC480A	480A	1.5SMC480CA	480C	456	504	1	408	1	658	2.3	855.4	11.4
1.5SMC510A	510A	1.5SMC510CA	510C	485	535	1	434	1	698	2.1	907.4	10.7
1.5SMC530A	530A	1.5SMC530CA	530C	503.5	556.5	1	477	1	725	2.1	942.5	10.3
1.5SMC540A	540A	1.5SMC540CA	540C	513	567	1	486	1	740	2	962	10
1.5SMC550A	550A	1.5SMC550CA	550C	522.5	577.5	1	495	1	760	2	988	10

**Notes:**

- Suffix 'A' denotes a 5 % tolerance unidirectional device.
- Suffix 'CA' denotes a 5 % tolerance bidirectional device.
- For bidirectional devices with a V<sub>R</sub> of 10 volts or less, the I<sub>R</sub> limit is double.

Specifications are subject to change without notice.

Users should verify actual device performance in their specific applications.

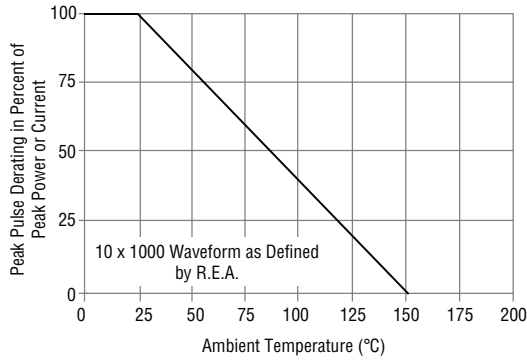
The products described herein and this document are subject to specific legal disclaimers as set forth on the last page of this document, and at [www.bourns.com/docs/legal/disclaimer.pdf](http://www.bourns.com/docs/legal/disclaimer.pdf).

# 1.5SMC Transient Voltage Suppressor Diode Series

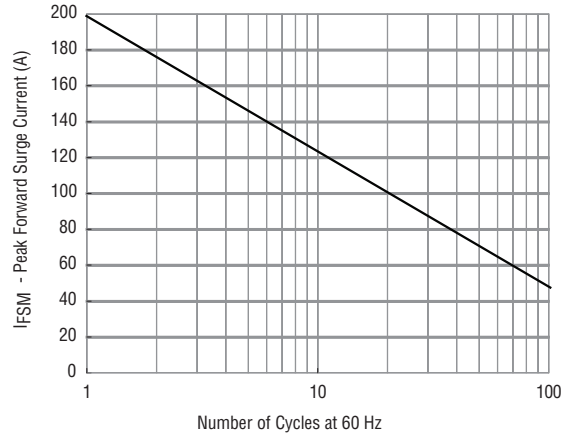
**BOURNS®**

## Rating & Characteristic Curves

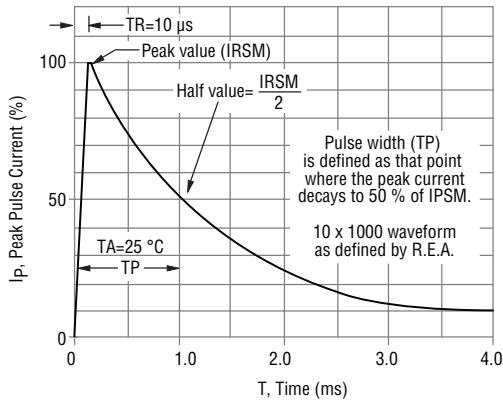
### Pulse Derating Curve



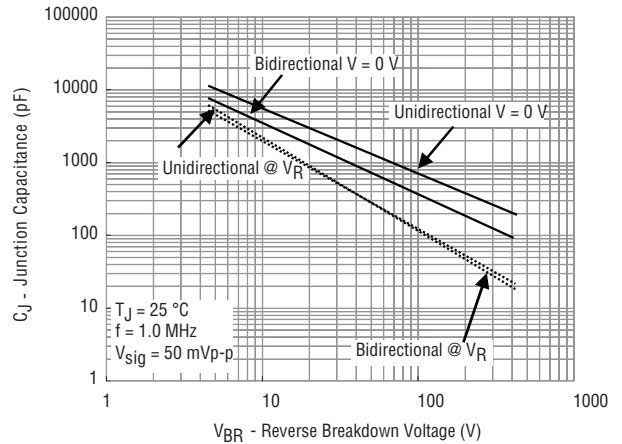
### Maximum Non-Repetitive Surge Current



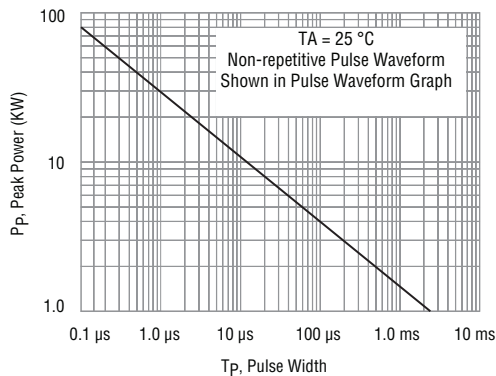
### Pulse Waveform



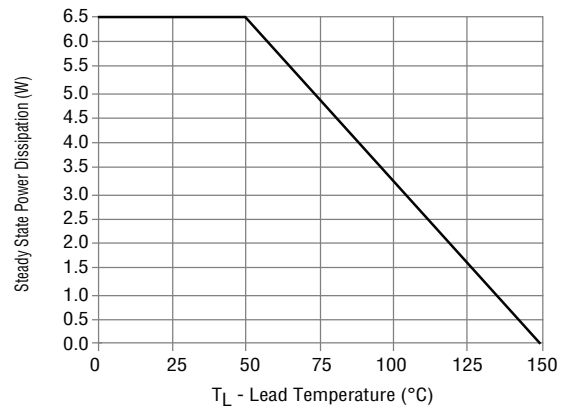
### Typical Junction Capacitance



### Pulse Rating Curve



### Steady State Power Derating Curve

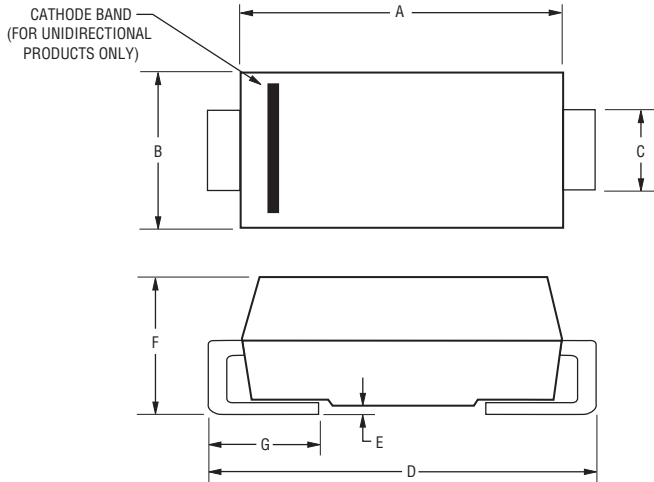


Specifications are subject to change without notice.  
Users should verify actual device performance in their specific applications.  
The products described herein and this document are subject to specific legal disclaimers as set forth on the last page of this document, and at [www.bourns.com/docs/legal/disclaimer.pdf](http://www.bourns.com/docs/legal/disclaimer.pdf).

# 1.5SMC Transient Voltage Suppressor Diode Series

**BOURNS®**

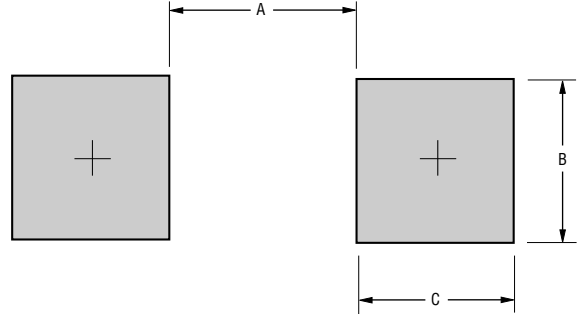
## Product Dimensions



Dimension	SMC (DO-214AB)
A	$\frac{6.60 - 7.11}{(0.260 - 0.280)}$
B	$\frac{5.59 - 6.22}{(0.220 - 0.245)}$
C	$\frac{2.90 - 3.20}{(0.115 - 0.125)}$
D	$\frac{7.75 - 8.13}{(0.305 - 0.320)}$
E	$\frac{0.05 - 0.202}{(0.002 - 0.008)}$
F	$\frac{2.00 - 2.62}{(0.079 - 0.103)}$
G	$\frac{0.76 - 1.52}{(0.030 - 0.060)}$

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

## Recommended Footprint



Dimension	SMC (DO-214AB)
a (Max.)	$\frac{4.69}{(0.185)}$
b (Min.)	$\frac{3.07}{(0.121)}$
c (Min.)	$\frac{1.52}{(0.060)}$

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

Specifications are subject to change without notice.

Users should verify actual device performance in their specific applications.

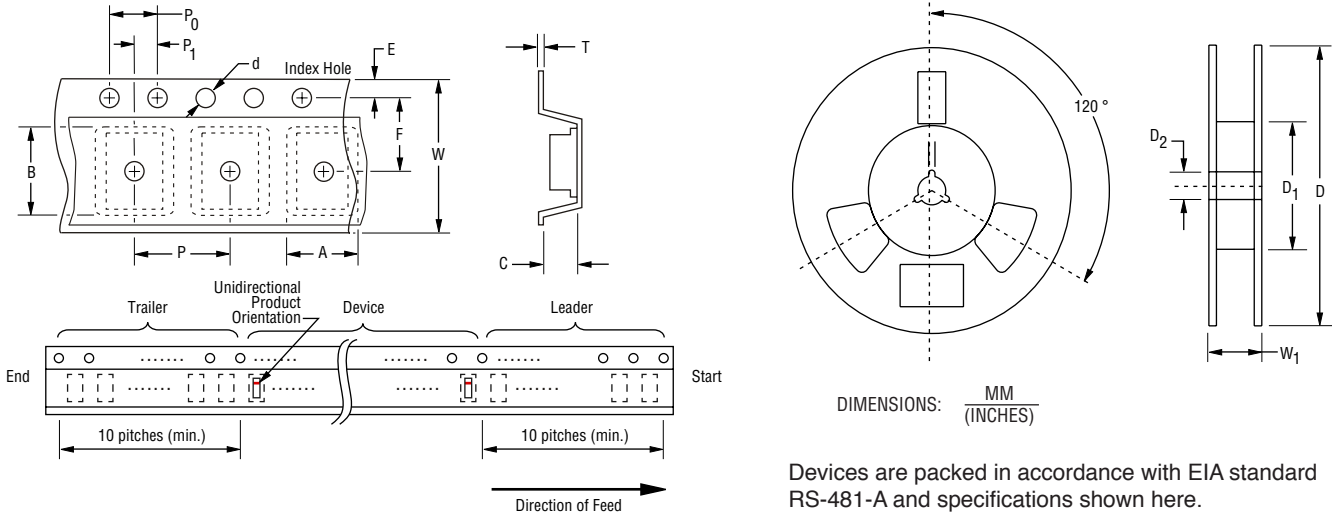
The products described herein and this document are subject to specific legal disclaimers as set forth on the last page of this document, and at [www.bourns.com/docs/legal/disclaimer.pdf](http://www.bourns.com/docs/legal/disclaimer.pdf).

# 1.5SMC Transient Voltage Suppressor Diode Series

**BOURNS®**

## Packaging Information

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



Devices are packed in accordance with EIA standard RS-481-A and specifications shown here.

Item	Symbol	SMC (DO-214AB)	
		7 Inch Reel	13 Inch Reel
Carrier Width	A	$\frac{6.0 \pm 2.0}{(0.236 - 0.079)}$	
Carrier Length	B	$\frac{8.3 \pm 0.20}{(0.327 \pm 0.008)}$	
Carrier Depth	C	$\frac{2.5 \pm 0.20}{(0.098 \pm 0.008)}$	
Sprocket Hole	d	$\frac{1.50 \pm 0.10}{(0.059 \pm 0.004)}$	
Reel Outside Diameter	D	$\frac{178}{(7.008)}$	$\frac{330}{(12.992)}$
Reel Inner Diameter	D <sub>1</sub>	$\frac{50.0}{(1.969)}$ MIN.	
Feed Hole Diameter	D <sub>2</sub>	$\frac{13.0 + 0.50/-0.20}{(0.512 + 0.020/-0.008)}$	
Sprocket Hole Position	E	$\frac{1.75 \pm 0.10}{(0.069 \pm 0.004)}$	
Punch Hole Position	F	$\frac{7.50 \pm 0.10}{(0.295 \pm 0.004)}$	
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>	$\frac{2.00 \pm 0.10}{(0.079 \pm 0.004)}$	
Overall Tape Thickness	T	$\frac{0.30 \pm 0.10}{(0.012 \pm 0.004)}$	
Tape Width	W	$\frac{16.00 \pm 0.30}{(0.630 \pm 0.012)}$	
Reel Width	W <sub>1</sub>	$\frac{22.4}{(0.882)}$ MAX.	
Quantity per Reel	--	500	3,000

REV. 03/20

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 types of applications are based on Bourns' knowledge of typical requirements in generic applications. 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. 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 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., ISO/TS 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. 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 nuclear, lifesaving, life-critical or life-sustaining applications, nor in any other applications where failure or malfunction may result in personal injury, death, or severe property or environmental damage. Unless expressly and specifically approved in writing by two authorized Bourns representatives on a case-by-case basis, use of any Bourns® products in such unauthorized applications might not be safe and thus is at the user's sole risk. Life-critical applications include devices identified by the U.S. Food and Drug Administration as Class III devices and generally equivalent classifications outside of the United States.

Bourns expressly identifies those Bourns® standard products that are suitable for use in automotive applications on such products' data sheets in the section entitled "Applications." Unless expressly and specifically approved in writing by two authorized Bourns representatives on a case-by-case basis, use of any other Bourns® standard products in an automotive application might not be safe and thus is not recommended, authorized or intended and is at the user's sole risk. If Bourns expressly identifies a sub-category of automotive application in the data sheet for its standard products (such as infotainment or lighting), such identification means that Bourns has reviewed its standard product and has determined that if such Bourns® standard product is considered for potential use in automotive applications, it should only be used in such sub-category of automotive applications. Any reference to Bourns® standard product in the data sheet as compliant with the AEC-Q standard or "automotive grade" does not by itself mean that Bourns has approved such product for use in an automotive application.

Bourns® standard products are not tested to comply with United States Federal Aviation Administration standards generally or any other generally equivalent governmental organization standard applicable to products designed or manufactured for use in aircraft or space applications. Bourns expressly identifies Bourns® standard products that are suitable for use in aircraft or space applications on such products' data sheets in the section entitled "Applications." Unless expressly and specifically approved in writing by two authorized Bourns representatives on a case-by-case basis, use of any other Bourns® standard product in an aircraft or space application might not be safe and thus is not recommended, authorized or intended and is at the user's sole risk.

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.

Users shall not sell, transfer, export or re-export any Bourns® products or technology 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 in any facility which engages in activities relating to such devices. The foregoing restrictions apply to all uses and applications that violate national or international prohibitions, including embargos or international regulations. 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 may not, without prior authorization from Bourns and/or the U.S. Government, be resold, transferred, or re-exported to any party not eligible to receive U.S. commodities, software, and technical data.

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, 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: <http://www.bourns.com/legal/disclaimers-terms-and-policies>

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