THE DATASHEET OF

CRM2512AFX-R100ELF

Features

- Thick film technology
- Power rating up to 2 watts at 70 °C
- High power surge withstanding
- Sulfur-resistant design, R ≥1 Ω (ASTM B-809)
- RoHS compliant* and halogen free**
- AEC-Q200 compliant

Additional Information

Click these links for more information:

PRODUCT SELECTOR | TECHNICAL LIBRARY | INVENTORY | SAMPLES | CONTACT

CRM-A Series High Power Thick Film Resistor

Electrical Characteristics

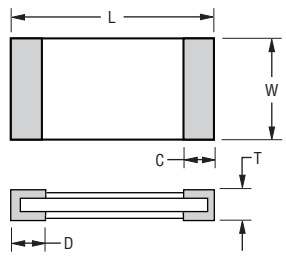
Characteristic	Model					
	CRM0603A	CRM0805A	CRM1206A	CRM1210A	CRM2010A	CRM2512A
Power Rating @ 70 °C	0.125 W	0.25 W	0.5 W	0.5 W	1 W	2 W
Operating Temperature Range	-55 °C to +155 °C					
Derated to Zero Load at	+155 °C					
Maximum Working Voltage						
50 milliohms to 910 milliohms	477 mV	551 mV	675 mV	675 mV	954 mV	1349 mV
1 ohm to 1 megohm	50 V	150 V	200 V	200 V	200 V	300 V
Maximum Overload Voltage						
50 milliohms to 910 milliohms	1066 mV	1232 mV	1508 mV	1508 mV	2133 mV	3017 mV
1 ohm to 1 megohm	100 V	300 V	400 V	400 V	400 V	600 V
Resistance Tolerance	±0.5 %, ±1 %, ±5 %					
Temperature Coefficient						
50 milliohms to 91 milliohms (±0.5 %, ±1 %, ±5 %, E24 Series)	±250 ppm	±200 ppm	±100 ppm	±100 ppm	±100 ppm	±100 ppm
100 milliohms to 910 milliohms (±0.5 %, ±1 %, ±5 %, E24 Series)	±150 ppm*	±100 ppm	±100 ppm	±100 ppm	±100 ppm	±100 ppm
1 ohm to 9.76 ohms (±0.5 %, ±1 %, E24 & E96 Series)	±200 ppm	±150 ppm*	±100 ppm	±100 ppm	±100 ppm	±100 ppm
10 ohms to 1 megohm (±0.5 %, ±1 %, E24 & E96 Series)	±100 ppm	±100 ppm	±100 ppm	±100 ppm	±100 ppm	±100 ppm
1 ohm to 1 megohm (±5 %, E24 Series)	±200 ppm	±200 ppm	±200 ppm	±200 ppm	±200 ppm	±200 ppm

* TCR code assigned as "X"; see How to Order.

For Standard Values Used in Capacitors, Inductors and Resistors, click here.

Product Dimensions

Model	L	W	C	D	T
CRM0603A	1.60 ± 0.10 (0.063 ± 0.004)	0.80 ± 0.10 (0.031 ± 0.004)	0.30 ± 0.20 (0.012 ± 0.008)	0.30 ± 0.20 (0.012 ± 0.008)	0.45 ± 0.10 (0.018 ± 0.04)
CRM0805A	2.00 ± 0.10 (0.079 ± 0.004)	1.25 ± 0.10 (0.049 ± 0.004)	0.40 ± 0.20 (0.016 ± 0.008)	0.40 ± 0.20 (0.016 ± 0.008)	0.50 ± 0.10 (0.020 ± 0.04)
CRM1206A	3.10 ± 0.10 (0.122 ± 0.004)	1.60 ± 0.10 (0.063 ± 0.004)	0.50 ± 0.25 (0.020 ± 0.010)	0.50 ± 0.25 (0.020 ± 0.010)	0.55 ± 0.10 (0.022 ± 0.004)
CRM1210A	3.10 ± 0.10 (0.122 ± 0.004)	2.60 ± 0.10 (0.102 ± 0.004)	0.50 ± 0.25 (0.020 ± 0.010)	0.50 ± 0.25 (0.020 ± 0.010)	0.55 ± 0.10 (0.022 ± 0.004)
CRM2010A	5.00 ± 0.20 (0.197 ± 0.008)	2.50 ± 0.20 (0.098 ± 0.008)	0.65 ± 0.25 (0.026 ± 0.010)	0.60 ± 0.25 (0.024 ± 0.010)	0.60 ± 0.10 (0.024 ± 0.004)
CRM2512A	6.40 ± 0.20 (0.252 ± 0.008)	3.10 ± 0.20 (0.122 ± 0.008)	0.60 ± 0.25 (0.024 ± 0.010)	1.80 ± 0.25 (0.071 ± 0.010)	0.60 ± 0.15 (0.024 ± 0.006)

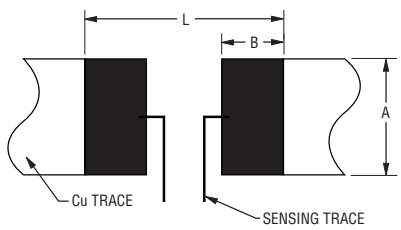


DIMENSIONS: MM / (INCHES)

Recommended Solder Pad Layout

Model	A	B	L
CRM0603A	0.90 (0.035)	1.00 (0.039)	3.00 (0.118)
CRM0805A	1.30 (0.051)	1.15 (0.045)	3.50 (0.138)
CRM1206A	1.80 (0.071)	1.30 (0.051)	4.70 (0.185)

Model	A	B	L
CRM1210A	3.00 (0.118)	1.30 (0.051)	4.70 (0.185)
CRM2010A	3.00 (0.118)	1.50 (0.059)	6.80 (0.268)
CRM2512A	3.70 (0.032)	2.45 (0.096)	7.60 (0.299)



WARNING Cancer and Reproductive Harm
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.

Applications

- Power supplies
- Stepper motor drives

CRM-A Series High Power Thick Film Resistor

BOURNS®

How to Order

CRM 0603 A F W - 1002 E LF

Model
(CRM = High Power Thick Film Resistor)

Size
0603 = 0603 Size
0805 = 0805 Size
1206 = 1206 Size
1210 = 1210 Size
2010 = 2010 Size
2512 = 2512 Size

Feature
A = AEC-Q200 Compliant

Resistance Tolerance
D = ±0.5 %
F = ±1 %
J = ±5 %

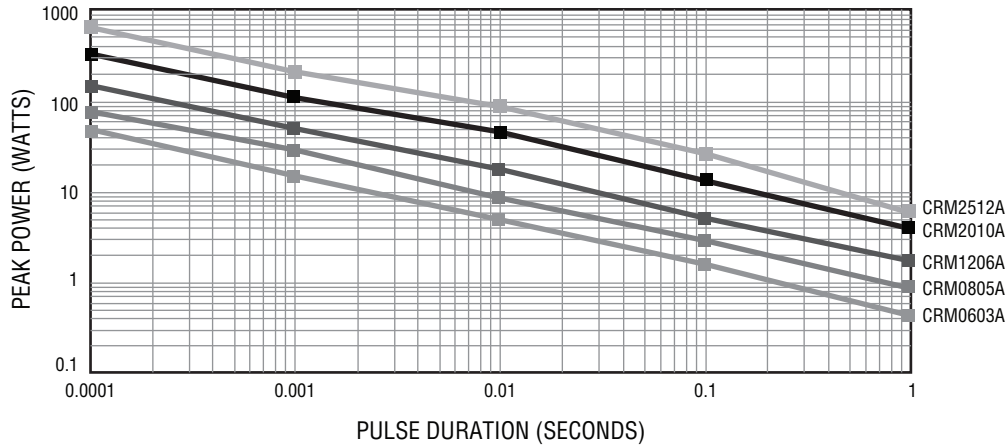
TCR (See Electrical Characteristics chart)
- V = ±250 PPM/°C
- W = ±200 PPM/°C
- X = ±100 PPM/°C NOTE: CRM0805A 0.5%, 1 %, 1 ohm to 9.76 ohms: 150 PPM/°C
  CRM0603A 0.5 %, 1 %, 5 %, 100 milliohms to 910 milliohms: 150 PPM/°C

Resistance Value
- 0.5 % or 1 % Tolerance:
  <100 ohms.....“R” represents decimal point *(example: 24R3 = 24.3 ohms)*
  ≥100 ohms.....First three digits are significant, fourth digit represents number of zeros to follow *(example: 8252 = 82.5K ohms)*
- 5 % Tolerance:
  <10 ohms.....“R” represents decimal point *(example: 4R7 = 4.7 ohms)*
  ≥10 ohms.....First two digits are significant, third digit represents number of zeros to follow *(example: 474 = 470K ohms)*

Packaging
- E = 5,000 pieces on 180 mm (7 inch) reel, paper tape - CRM0603A, CRM0805A, CRM1206A, CRM1210A
  4,000 pieces on 180 mm (7 inch) reel, plastic tape - CRM2010A, CRM2512A

Termination
- LF = Tin-plated (RoHS Compliant)

Surge Performance



Typical Part Marking

CRM0603A, CRM0805A, CRM1206A, CRM1210A, CRM2010A, CRM2512A

E96 ±5 %

3 digits identify the resistance value

301 = 30 x 10^1 = 300 ohms

CRM0805A, CRM1206A, CRM1210A, CRM2010A, CRM2512A

E24 / E96 ±1 %

4 digits identify the resistance value

1542 = 154 x 10^2 = 15.4K ohms

CRM0603A

E24 ±1 %

3 digits identify the resistance value

222 = 22 x 10^2 = 2.2K ohms

CRM0603A

E96 ±1 %

3 digits identify the resistance value

01B = 1K ohms
(Refer to Marking Table below)

E96 Marking for CRM0603A, 1 %

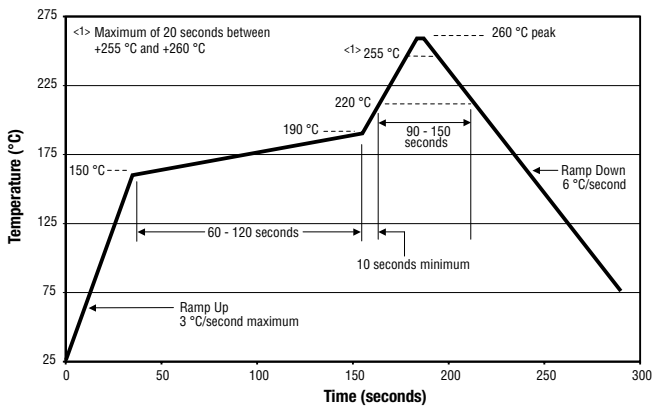
Code	R Value	Code	R Value	Code	R Value	Code	R Value	Code	R Value	Code	R Value	Code	R Value	Code	R Value
01	100	13	133	25	178	37	237	49	316	61	422	73	562	85	750
02	102	14	137	26	182	38	243	50	324	62	432	74	576	86	768
03	105	15	140	27	187	39	249	51	332	63	442	75	590	87	787
04	107	16	143	28	191	40	255	52	340	64	453	76	604	88	806
05	110	17	147	29	196	41	261	53	348	65	464	77	619	89	825
06	113	18	150	30	200	42	267	54	357	66	475	78	634	90	845
07	115	19	154	31	205	43	274	55	365	67	487	79	649	91	866
08	118	20	158	32	210	44	280	56	374	68	499	80	665	92	887
09	121	21	162	33	215	45	287	57	383	69	511	81	681	93	909
10	124	22	165	34	221	46	294	58	392	70	523	82	698	94	931
11	127	23	169	35	226	47	301	59	402	71	536	83	715	95	953
12	130	24	174	36	232	48	309	60	412	72	549	84	732	96	976

This table shows the first two digits for the three-digit E96 part marking scheme. The third character is a letter multiplier:
A=10^0 B=10^1 C=10^2 D=10^3 E=10^4 F=10^5 G=10^{-6} H=10^{-7} X=10^{-1} Y=10^{-2} Z=10^{-3}

Performance Characteristics (AEC-Q200)

Test	Method	Procedure	Test Limits ΔR
High Temperature Exposure Storage	AEC-Q200 Table 7.3	1,000 hours @ +125 °C; no power loading	0.5 %, 1 % tolerance: ≤±1 % 5 % tolerance: ≤±3 %
Temperature Cycling	AEC-Q200 Table 7.4	-55 °C to +125 °C, 1,000 cycles	0.5 %, 1 % tolerance: ≤±1 % 5 % tolerance: ≤±3 %
Moisture Resistance	AEC-Q200 Table 7.6	+65 °C / 80~100 % RH / 10 cycles	0.5 %, 1 % tolerance: ≤±0.5 % 5 % tolerance: ≤±1 %
Biased Humidity	AEC-Q200 Table 7.7	1,000 hours @ +85 °C / 85 % RH, 10 % operating power	0.5 %, 1 % tolerance: ≤±1 % 5 % tolerance: ≤±3 %
Operational Life	AEC-Q200 Table 7.8	1,000 hours @ +125 °C, at specified rated power	0.5 %, 1 % tolerance: ≤±1 % 5 % tolerance: ≤±3 %
Mechanical Shock	AEC-Q200 Table 7.13	100 g, half-sine, 6 ms, velocity: 12.3 ft./sec.	Within product specification tolerance; no visible damage
Vibration	AEC-Q200 Table 7.14	5 g for 20 minutes, 12 cycles each of 3 durations; 10~200 Hz	0.5 %, 1 % tolerance: ≤±0.5 % 5 % tolerance: ≤±1 %
Resistance to Solder Heat	AEC-Q200 Table 7.15	+270 °C ±5 °C, 10 ±1 seconds	0.5 %, 1 % tolerance: ≤±0.5 % 5 % tolerance: ≤±1 %
Thermal Shock	AEC-Q200 Table 7.16	-55 °C to +155 °C, dwell time 15 minutes, max. transfer time 20 seconds/300 cycles	0.5 %, 1 % tolerance: ≤±0.5 % 5 % tolerance: ≤±1 %
ESD	AEC-Q200-002	1 kV min.	≤±1 %
Solderability	AEC-Q200 Table 7.18	a) Backing +155 °C, 4 hours, dipping +235 °C, 5 seconds b) Steam 8 hours, dipping +215 °C, 5 seconds c) Steam 8 hours, dipping +260 °C, 7 seconds	Over 95 % of the termination must be covered with solder
Flammability	AEC-Q200 Table 7.20	UL 94 V-0 or V-1 are acceptable	Refer to UL 94
Board Flex	AEC-Q200 Table 7.21	Bending 2 mm (CRM1206A, 1210A, 2010A, 2512A) Bending 3 mm (CRM0603A, 0805A)	0.5 %, 1 % tolerance: ≤±0.5 % 5 % tolerance: ≤±1 %
Terminal Strength	AEC-Q200 Table 7.22	Force 1.8 Kg for 60 seconds	No mechanical damage
Sulfur-resistant (Applies only when R ≥1 ohm)	ASTM B-809	+50 °C ±2 °C, 1,000 hours	≤±1 %

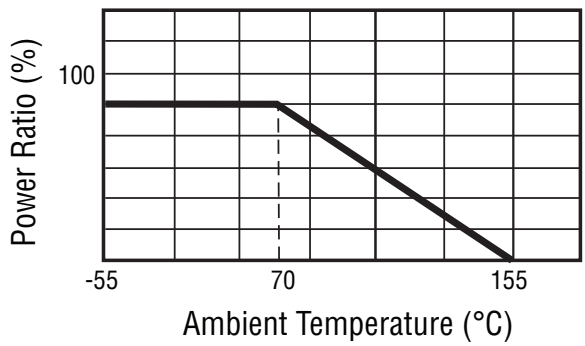
Soldering Profile



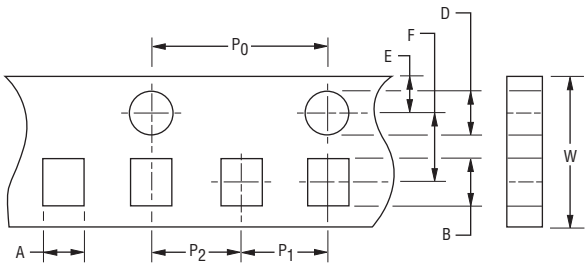
Environmental Characteristics

Moisture Sensitivity Level.....1

Derating Curve



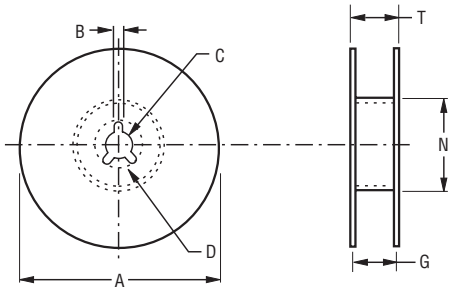
Packaging Dimensions (Conforms to EIA RS-481A)



Accumulated dimensional tolerance 40 ± 0.2 / (1.575 ± .008)

DIMENSIONS: MM / (INCHES)

Model	Tape Type	A	B	W	F	E	P_1	P_2	P_0	D
CRM0603A	Paper	1.10 ± 0.20 (.043 ± .008)	1.90 ± 0.20 (.075 ± .008)	8.00 ± 0.30 (.315 ± .012)	3.50 ± 0.05 (.138 ± .002)	1.75 ± 0.10 (.069 ± .004)	4.00 ± 0.10 (.158 ± .004)	2.00 ± 0.05 (.079 ± .002)	4.00 ± 0.10 (.158 ± .004)	1.50 +0.10/-0 (.006 +.004/-0)
CRM0805A	Paper	1.65 ± 0.20 (.065 ± .008)	2.40 ± 0.20 (.094 ± .008)	8.00 ± 0.30 (.315 ± .012)	3.50 ± 0.05 (.138 ± .002)	1.75 ± 0.10 (.069 ± .004)	4.00 ± 0.10 (.158 ± .004)	2.00 ± 0.05 (.079 ± .002)	4.00 ± 0.10 (.158 ± .004)	1.50 +0.10/-0 (.006 +.004/-0)
CRM1206A	Paper	2.00 ± 0.20 (.079 ± .008)	3.60 ± 0.20 (.142 ± .008)	8.00 ± 0.30 (.315 ± .012)	3.50 ± 0.05 (.138 ± .002)	1.75 ± 0.10 (.069 ± .004)	4.00 ± 0.10 (.158 ± .004)	2.00 ± 0.05 (.079 ± .002)	4.00 ± 0.10 (.158 ± .004)	1.50 +0.10/-0 (.006 +.004/-0)
CRM1210A	Paper	3.00 ± 0.20 (.118 ± .008)	3.60 ± 0.20 (.142 ± .008)	8.00 ± 0.30 (.315 ± .012)	3.50 ± 0.05 (.138 ± .002)	1.75 ± 0.10 (.069 ± .004)	4.00 ± 0.10 (.158 ± .004)	2.00 ± 0.05 (.079 ± .002)	4.00 ± 0.10 (.158 ± .004)	1.50 +0.10/-0 (.006 +.004/-0)
CRM2010A	Plastic	2.80 ± 0.20 (.110 ± .008)	5.50 ± 0.20 (.217 ± .008)	12.00 ± 0.30 (.472 ± .012)	3.50 ± 0.05 (.138 ± .002)	1.75 ± 0.10 (.069 ± .004)	4.00 ± 0.10 (.158 ± .004)	2.00 ± 0.05 (.079 ± .002)	4.00 ± 0.10 (.158 ± .004)	1.50 +0.10/-0 (.006 +.004/-0)
CRM2512A	Plastic	3.50 ± 0.20 (.138 ± .008)	6.70 ± 0.20 (.264 ± .008)	12.00 ± 0.30 (.472 ± .012)	3.50 ± 0.05 (.138 ± .002)	1.75 ± 0.10 (.069 ± .004)	4.00 ± 0.10 (.158 ± .004)	2.00 ± 0.05 (.079 ± .002)	4.00 ± 0.10 (.158 ± .004)	1.50 +0.10/-0 (.006 +.004/-0)



DIMENSIONS: MM / (INCHES)

Model	Packaging Quantity	A	N	C	D Min.	B	G	T Max.
CRM0603A	5,000 pcs. per reel	1.78 ± 2.00 (.070 ± .079)	60 ± 0.50 (2.362 ± .020)	13.0 ± 0.50 (.512 ± .020)	20.0 (8.661)	2.00 ± 0.50 (.079 ± .020)	10.00 ± 1.50 (.394 ± .006)	14.9 (.587)
CRM0805A								
CRM1206A								
CRM1210A								
CRM2010A	4,000 pcs. per reel						13.80 ± 1.50 (.543 ± .006)	16.7 (.657)
CRM2512A								

REV. 05/29/20

Legal Disclaimer Notice

BOURNS®

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