

Features

- Resistance value as low as 0.0003 ohm
- High power density
- Inductance less than 5 nH
- Low thermal EMF: <3 µV/°C (0805~2010); <40 µV/°C (2512)
- RoHS compliant*
- AEC-Q200 compliant

Applications

- Power supplies
- Stepper motor drives
- Input amplifiers

CRF Series - High Power Current Sense Chip Resistor

Electrical Characteristics

Model	Power Rating @70 °C (W)	Resistance Range (Ω)	TCR	Tolerance	Insulation Resistance	Max. Working Voltage
CRF0805	0.5	0.001~0.025	±50 ppm°C	±1 % ±5 %	>100 MΩ	V = √(PxR)
CRF1206	1.5	0.0005~0.001				
	1	0.002~0.050				
CRF2010	1.5	0.002~0.050				
	2	0.001~0.005				
CRF2512	1	0.011~0.050				
	2	0.001~0.010				
	3	0.0003~0.00075				

Environmental Characteristics

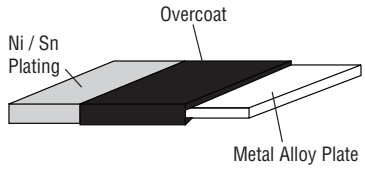
Operating Temperature	-55 °C to +170 °C
Storage Conditions	
Temperature	+5 °C to +35 °C
Humidity	40 % to 75 %
Moisture Sensitivity Level	1
ESD Classification (per AEC-Q200-2, HBM)	1B

Additional Information

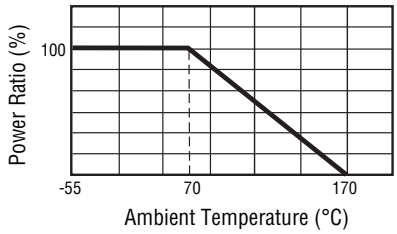
Click these links for more information:

PRODUCT SELECTOR | TECHNICAL LIBRARY | INVENTORY | SAMPLES | CONTACT

Construction



Current Rating Thermal Derating



How to Order

CRF 0805 - F Z - R020 E LF

Model
(CRF = Precision Chip Resistor)

Size
0805 = 0805 (2012)
1206 = 1206 (3216)
2010 = 2010 (5025)
2512 = 2512 (6432)

Resistance Tolerance
- F = ±1 %
- J = ±5 %

TCR (PPM/°C)
- Z = ±50 ppm/°C

Resistance Value Code
(See Resistance Value Table)
- 0.001 to 0.050 Ω: "R" Represents Decimal Point in Ω (Example: R005 = 0.005 Ω)
- 0.0003 to 0.00075 Ω: "L" Represents Decimal Point in mΩ (Example: L500 = 0.0005 Ω)

Packaging
- E = 5,000 pcs./180 mm (7-inch) reel (CRF0805 & CRF1206) or 4,000 pcs./180 mm (7-inch) reel (CRF2010 & CRF2512)

Termination
- LF = Tin-plated (RoHS compliant)

BOURNS®

Asia-Pacific: Tel: +886-2 2562-4117 • Email: asiacus@bourns.com
Europe: Tel: +36 88 885 877 • Email: eurocus@bourns.com
Mexico: Tel: +52 614 478 0400 • Email: mexicus@bourns.com
The Americas: Tel: +1-951 781-5500 • Email: americus@bourns.com
www.bourns.com

CALIFORNIA WARNING: Can expose you to lead, a carcinogen and reproductive toxicant. See www.P65Warnings.ca.gov

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

Performance Characteristics

Test	Conditions	Specification	
		Reference	Limit
Temperature Coefficient of Resistance	+25 ~ 125 °C	IEC 60115-1 4.8	Refer to TCR
Short Time Overload	5x Rated Power for 5 Seconds	IEC 60115-1 4.13	ΔR < ±0.5 %
Low Temperature Storage	-55 °C for 1000 Hours	IEC 60115-1-4.23.4 JIS-C5201-4.23.4	ΔR < ±1 %
High Temperature Exposure	1000 Hours @ +170 ˚C	AEC-Q200-REV E-Test 3 MIL-STD202 Method 108	ΔR < ±1 %
Temperature Cycling	1000 Cycles (-55 °C to +155 °C)	AEC-Q200-REV E-Test 4 JESD22 Method JA-104	ΔR < ±0.5 %
Bias Humidity	+ 85 °C, 85 % RH, 10 % Bias, 1000 Hours	AEC-Q200-REV E-Test 7 MIL-STD-202 Method 103	ΔR < ±1 %
Mechanical Shock	100 g for 6 ms, Half Sine Shock Pulse	AEC-Q200-REV E-Test 13 MIL-STD-202 Method 213	ΔR < ±0.5 %
Vibration	5 g for 20 Min, 10-2 kHz 12 Cycles	AEC-Q200-REV E-Test 14 MIL-STD-202 Method 204	ΔR < ±0.5 %
Load Life	1000 Hours at Rated Power at +70 ˚C, 1.5 Hours On, 0.5 Hours Off	AEC-Q200-REV E-Test 8 MIL-STD-202 Method 108	ΔR < ±1 %
Resistance to Solder Heat	+260 ±5 ˚C, 10±1 Second Dwell	AEC-Q200-REV E-Test 15 MIL-STD-202 Method 210	ΔR < ±0.5 %
ESD	Human body model, 500 V	AEC-Q200-REV E-Test 17 AEC-Q200-002 ISO/DIS 10605	ΔR < ±0.5 %
Solderability	235 ±3 °C Dipping Time: 3±0.5 Seconds	AEC-Q200-REV E-Test 18 J-STD-002	>95 % Tin Coverage
Board Flex (SMD)	2 mm deflection for 60 Sec.	AEC-Q200-REV E-Test 21 AEC-Q200-005	ΔR < ±0.5 %
Shear (SMD)	Force of 1.8 kg for 60 Sec.	AEC-Q200-REV E-Test 22 AEC-Q200-006	ΔR < ±0.5 %

Resistance Value Codes

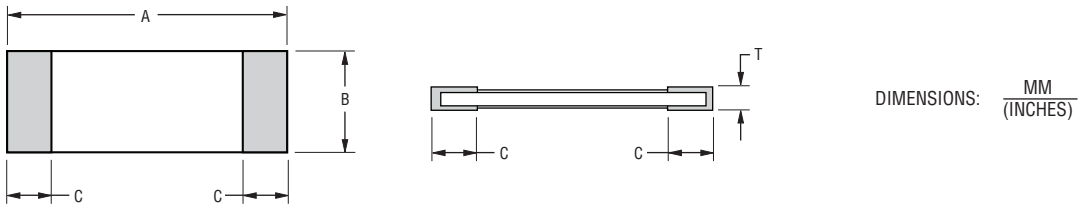
Code	R Value (Ω)	Code	R Value (Ω)	Code	R Value (Ω)	Code	R Value (Ω)
L500	0.0005	R004	0.004	R011	0.011	R022	0.022
L750	0.0008	R005	0.005	R012	0.012	R025	0.025
R001	0.001	R006	0.006	R014	0.014	R030	0.03
1L50	0.0015	R007	0.007	R015	0.015	R033	0.033
R002	0.002	R008	0.008	R016	0.016	R035	0.035
R003	0.003	R009	0.009	R018	0.018	R040	0.04
3L50	0.0035	R010	0.01	R020	0.02	R050	0.05

This table lists common resistance values. For resistance values not shown, please contact Bourns Customer Service/Inside Sales.

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.

Product Dimensions

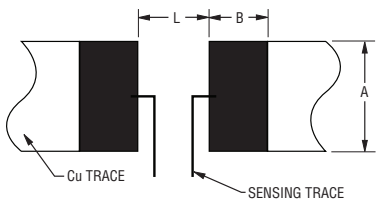
Dim.	CRF0805	CRF1206	CRF2010	CRF2512		
				0.0003 Ω	0.0005 ~ 0.003 Ω	>0.003 ~ 0.050 Ω
A	2.0 ± 0.10 (0.079 ± 0.004)	3.20 ± 0.20 (0.126 ± 0.008)	5.00 ± 0.20 (0.197 ± 0.008)	6.40 ± 0.20 (0.252 ± 0.008)		
B	1.25 ± 0.10 (0.049 ± 0.004)	1.65 ± 0.20 (0.064 ± 0.008)	2.50 ± 0.20 (0.098 ± 0.008)	3.20 ± 0.20 (0.126 ± 0.008)		
C	0.65 ± 0.20 (0.026 ± 0.008) R = 1 & 1.5 mΩ 0.40 ± 0.20 (0.016 ± 0.008) 2 mΩ<=R<=25 mΩ	1.10 ± 0.30 (0.043 ± 0.012) 0.5 mΩ<=R<2 mΩ 0.50 ± 0.30 (0.0197 ± 0.012) 2 mΩ<=R<=50 mΩ	1.50 ± 0.30 (0.060 ± 0.012) R<=0.003 Ω 0.60 ± 0.30 (0.024 ± 0.012 R>=0.003 Ω	2.60 ± 0.30 (0.102 ± 0.012)	2.20 ± 0.30 (0.087 ± 0.012)	0.95 ± 0.30 (0.037 ± 0.012)
T	0.60 ± 0.20 (0.024 ± 0.008)	1.10 ± 0.20 (0.043 ± 0.008) 0.5 mΩ<=R<1 mΩ 0.75 ± 0.20 (0.030 ± 0.008) 1 mΩ<=R<=2 mΩ 0.60 ± 0.20 (0.024 ± 0.008) 2 mΩ<=R<=50 mΩ	0.60 ± 0.20 (0.024 ± 0.008)	1.10 ± 0.20 (0.043 ± 0.008)	0.60 ± 0.20 (0.024 ± 0.008)	



DIMENSIONS: MM / (INCHES)

Recommended Solder Pad Layout

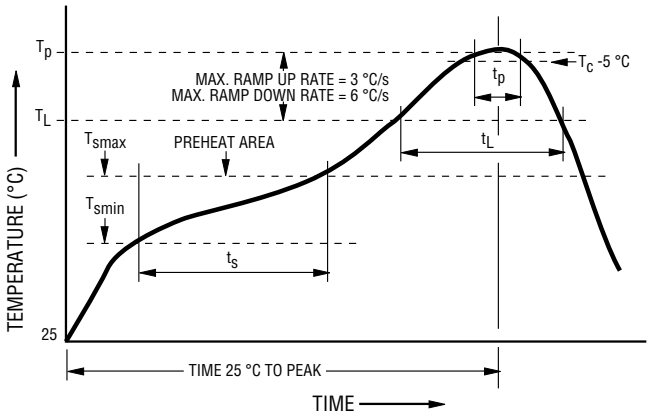
Dim.	CRF0805	CRF1206		CRF2010		CRF2512		
	0.003 ~ 0.020 Ω	0.001 Ω	0.002 ~ 0.030 Ω	0.001 ~ 0.003 Ω	0.004 ~ 0.050 Ω	0.0003 ~ 0.00075 Ω	0.001 ~ 0.003 Ω	0.004 ~ 0.050 Ω
A	1.4 ± 0.10 (0.055 ± 0.004)	1.8 ± 0.10 (0.070 ± 0.004)	1.8 ± 0.10 (0.070 ± 0.004)	0.4 ± 0.20 (0.134 ± 0.008)		4.0 ± 0.10 (0.157 ± 0.004)		
B	1.15 ± 0.10 (0.045 ± 0.004)	2.3 ± 0.10 (0.090 ± 0.004)	1.7 ± 0.10 (0.066 ± 0.004)	3.5 ± 0.20 (0.138 ± 0.008)	1.5 ± 0.20 (0.060 ± 0.008)	3.1 ± 0.10 (0.122 ± 0.004)		2.1 ± 0.10 (0.083 ± 0.004)
L	0.7 ± 0.10 (0.028 ± 0.004) R = 1 & 1.5 mΩ 1.2 ± 0.10 (0.047 ± 0.004) 2 mΩ<=R<=25 mΩ	1.0 ± 0.10 (0.039 ± 0.004)	1.6 ± 0.10 (0.062 ± 0.004)	2.0 ± 0.20 (0.080 ± 0.008)	3.5 ± 0.20 (0.138 ± 0.008)	1.3 ± 0.10 (0.051 ± 0.004)		4.1 ± 0.10 (0.161 ± 0.004)



DIMENSIONS: MM / (INCHES)

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.

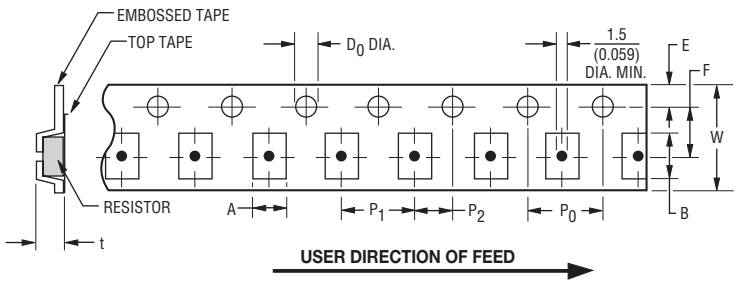
Soldering Profile

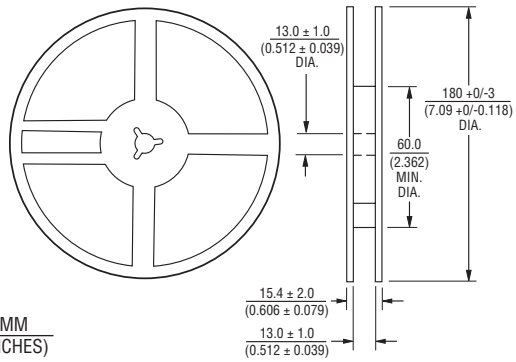


Profile Feature	Pb-Free Assembly
Preheat / Soak: Temperature Min. (T_{smin}) Temperature Max. (T_{smax}) Time (t_s) from (T_{smin} to T_{smax})	 150 °C 200 °C 60~120 seconds
Ramp Up Rate (T_L to T_p)	3 °C / second max.
Liquidus Temperature (T_L) Time (t_L) maintained above T_L	217 °C 60~150 seconds
Peak Package Body Temperature (T_p)	260 °C
Time within 5 °C of actual peak temperature (T_p)	20~30 seconds*
Ramp Down Rate (T_p to T_L)	6 °C / second max.
Time 25 °C to Peak Temperature	8 minutes max.

* Tolerance for peak profile temperature (Tp) is defined as a supplier minimum and a user maximum.

Packaging Dimensions (Conforms to EIA RS-481A)





DIMENSIONS: MM / (INCHES)

Packing	Model	A	B	W	F	E	P1	P2	P0	D0	t
Paper Tape	CRF0805	1.6 ± 0.15 (0.063 ± 0.006)	2.4 ± 0.20 (0.094 ± 0.008)	8.0 ± 0.20 (0.315 ± 0.008)	3.5 ± 0.05 (0.138 ± 0.002)	1.75 ± 0.10 (0.069 ± 0.004)	4.0 ± 0.10 (0.157 ± 0.004)	2.0 ± 0.1 (0.079 ± 0.004)	4.0 ± 0.1 (0.157 ± 0.004)	1.5+0.1/-0 (0.059+0.004/-0)	0.84 ± 0.10 (0.033 ± 0.004)
Paper Tape	CRF1206	2.0 ± 0.15 (0.079 ± 0.006)	3.6 ± 0.20 (0.142 ± 0.008)	8.0 ± 0.20 (0.315 ± 0.008)	3.5 ± 0.05 (0.138 ± 0.002)	1.75 ± 0.10 (0.069 ± 0.004)	4.0 ± 0.10 (0.157 ± 0.004)	2.0 ± 0.05 (0.079 ± 0.002)	4.0 ± 0.05 (0.157 ± 0.002)	1.5+0.1/-0 (0.059+0.004/-0)	0.85 ± 0.15 (0.033 ± 0.006)
Embossed Tape	CR2010	2.80 ± 0.20 (0.110 ± 0.008)	5.3 ± 0.20 (0.209 ± 0.008)	12.0 ± 0.20 (0.472 ± 0.008)	5.5 ± 0.05 (0.217 ± 0.002)	1.75 ± 0.10 (0.069 ± 0.004)	4.0 ± 0.10 (0.157 ± 0.004)	2.0 ± 0.05 (0.079 ± 0.002)	4.0 ± 0.05 (0.157 ± 0.002)	1.5+0.1/-0 (0.059+0.004/-0)	0.85 ± 0.15 (0.033 ± 0.006)
Embossed Tape	CRF2512	3.60 ± 0.20 (0.142 ± 0.008)	6.9 ± 0.20 (0.272 ± 0.008)	12.0 ± 0.20 (0.472 ± 0.008)	5.5 ± 0.05 (0.217 ± 0.002)	1.75 ± 0.10 (0.069 ± 0.004)	4.0 ± 0.10 (0.157 ± 0.004)	2.0 ± 0.05 (0.079 ± 0.002)	4.0 ± 0.05 (0.157 ± 0.002)	1.5+0.1/-0 (0.059+0.004/-0)	1.20 ± 0.15 (0.047 ± 0.006)

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.

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 "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 Automotive 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 a 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