

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

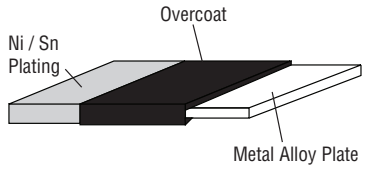
Operating Temperature	-55 °C to +170 °C
Storage Conditions	
Temperature	+5 °C to +35 °C
Humidity	40 % to 75 %
Moisture Sensitivity Level	1
ESD Classification (per AEC-Q200-2, HBM)	1B

Additional Information

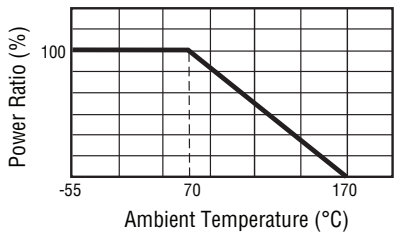
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Construction



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)

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

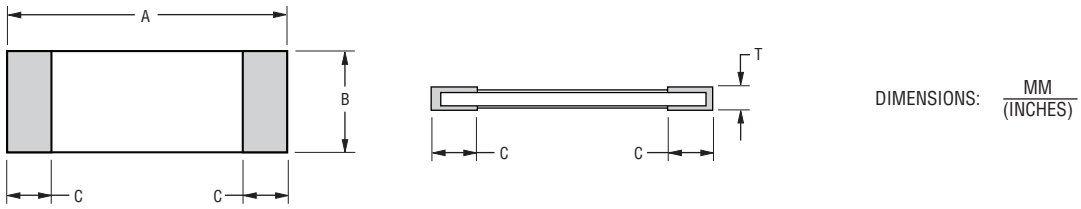
This table lists common resistance values. For resistance values not shown, please contact Bourns Customer Service/Inside Sales.

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Product Dimensions

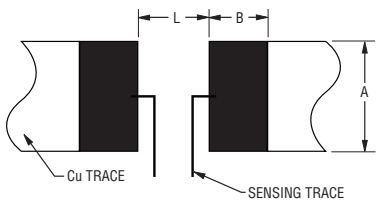
Dim.	CRF0805	CRF1206	CRF2010	CRF2512		
				0.0003 Ω	0.0005 ~ 0.003 Ω	>0.003 ~ 0.050 Ω
A	2.0 ± 0.10 (0.079 ± 0.004)	3.20 ± 0.20 (0.126 ± 0.008)	5.00 ± 0.20 (0.197 ± 0.008)	6.40 ± 0.20 (0.252 ± 0.008)		
B	1.25 ± 0.10 (0.049 ± 0.004)	1.65 ± 0.20 (0.064 ± 0.008)	2.50 ± 0.20 (0.098 ± 0.008)	3.20 ± 0.20 (0.126 ± 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)

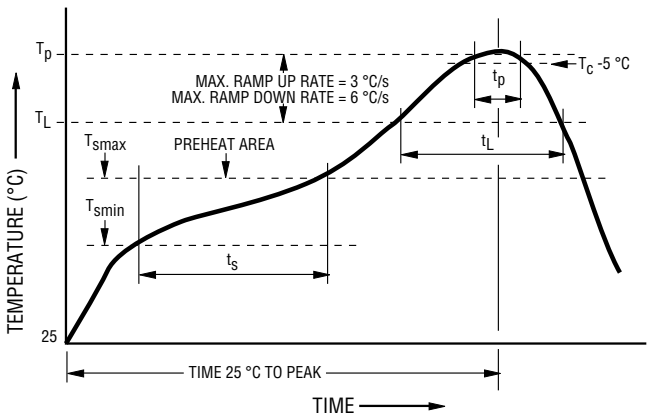


DIMENSIONS: MM / (INCHES)

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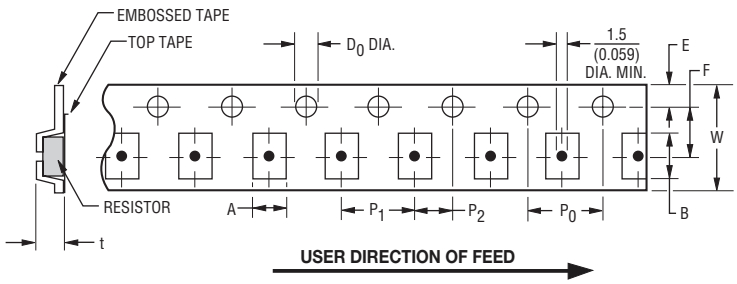
Soldering Profile

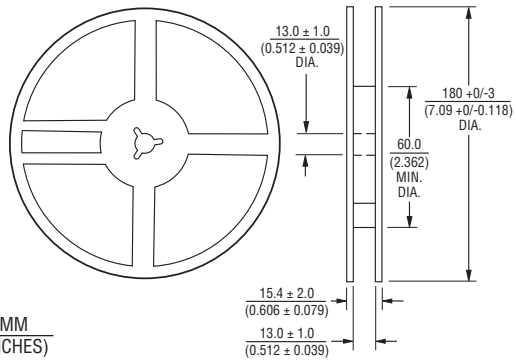


Profile Feature	Pb-Free Assembly
Preheat / Soak: Temperature Min. (T_{smin}) Temperature Max. (T_{smax}) Time (t_s) from (T_{smin} to T_{smax})	 150 °C 200 °C 60~120 seconds
Ramp Up Rate (T_L to T_p)	3 °C / second max.
Liquidus Temperature (T_L) Time (t_L) maintained above T_L	217 °C 60~150 seconds
Peak 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)

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