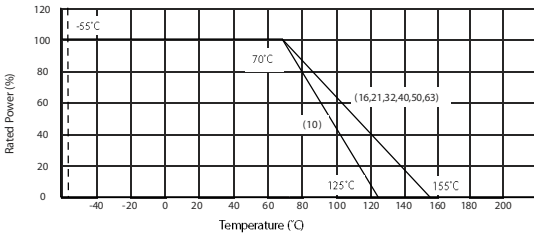
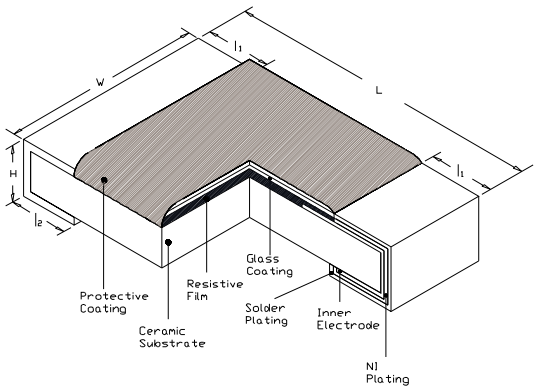




Features

- Resistance Range: 0.1Ω to less than 1Ω
- Highly reliable multi-layer electrode construction
- Compatible with wave and reflow soldering process
- Pb-Free with reflow soldering backward compatibility

Dimensions and Construction



Type	Dimensions				
	Inches (Millimeters)				
	L	W	H	l ₁	l ₂
CR10 0402 (1005)	0.040±0.004 (1.00±0.10)	0.020±0.002 (0.50±0.05)	0.014±0.002 (0.35±0.05)	0.008±0.004 (0.20±0.10)	0.010±0.004 (0.25±0.10)
CR16 0603 (1608)	0.063±0.004 (1.60±0.10)	0.031±0.004 (0.80±0.10)	0.018±0.004 (0.45±0.10)	0.012±0.008 (0.30±0.20)	0.012±0.008 (0.30±0.20)
CR21 0805 (2012)	0.079±0.006 (2.00±0.15)	0.049±0.004 (1.25±0.10)	0.020±0.004 (0.50±0.10)	0.016±0.008 (0.40±0.20)	0.016±0.008 (0.40±0.20)
CR32 1206 (3216)	0.122±0.004 (3.10±0.10)	0.063±0.006 (1.60±0.15)	0.022±0.002 (0.55±0.05)	0.020±0.010 (0.50±0.25)	0.020±0.010 (0.50±0.25)
CR40 1210 (3225)	0.122±0.004 (3.10±0.10)	0.098±0.006 (2.50±0.15)	0.022±0.002 (0.55±0.05)	0.020±0.010 (0.50±0.25)	0.016±0.008 (0.40±0.20)
CR50 2010 (5025)	0.200±0.006 (5.00±0.15)	0.098±0.006 (2.50±0.15)	0.022±0.002 (0.55±0.05)	0.024±0.010 (0.60±0.25)	0.016±0.008 (0.40±0.20)
CR63 2512 (6432)	0.250±0.006 (6.30±0.15)	0.126±0.006 (3.20±0.15)	0.022±0.002 (0.55±0.05)	0.024±0.010 (0.60±0.25)	0.039±0.008 (1.00±0.20)

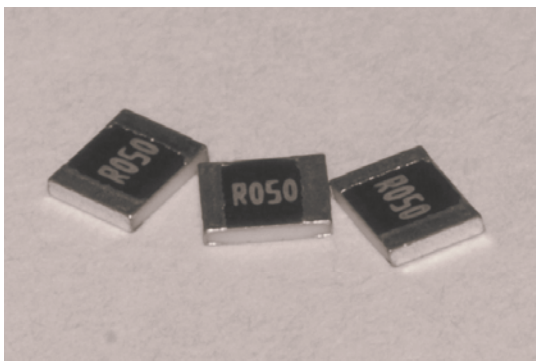
Ordering Code / Information

CR	10	-	RXXX	-	F	K
Type	Size (Inch / mm)	Nominal Resistance		Resistance Tolerance	Packaging	
Milli Ohm Thick Film Chip Resistors	10 (0402/1005) 16 (0603/1608) 21 (0805/2012) 32 (1206/3216) 40 (1210/3225) 50 (2010/5025) 63 (2512/6432)	Resistors	4-Digit E96 & E24 Series 0.47Ω = R470 0.499Ω = R499	F = ± 1% G = ± 2% J = ± 5%	E = 4,000 pcs Lead Free L = 5,000 pcs Lead Free K = 10,000 pcs Lead Free Y = 20,000 pcs Lead Free	

Application and Ratings

Product Type	Power Rating @ 70°C	T.C.R (ppm/°C) Max	Resistance Range E-96, E-24 F(±1%)	Resistance Range E-24 G(±2%), J(±5%)	Max Working Voltage	Max Overload Voltage	Operating Temperature Range
CR10 0402 (1005)	1/16W	±200	$0.1\Omega \leq R < 1\Omega$	$0.1\Omega \leq R < 1\Omega$	50V	100V	-55°C to +125°C
CR16 0603 (1608)	1/10W	±200	$0.1\Omega \leq R < 1\Omega$	$0.1\Omega \leq R < 1\Omega$			
CR21 0805 (2012)	1/8W	±100	$0.1\Omega \leq R < 1\Omega$	-	150V	300V	-55°C to +155°C
		±200	-	$0.1\Omega \leq R < 1\Omega$			
CR32 1206 (3216)	1/4W	±100	$0.1\Omega \leq R < 1\Omega$	-	200	400V	
		±200	-	$0.1\Omega \leq R < 1\Omega$			
CR40 1210 (3225)	1/3W	±100	$0.1\Omega \leq R < 1\Omega$	-			
		±200	-	$0.1\Omega \leq R < 1\Omega$			
CR50 2010 (5025)	3/4W	±100	$0.1\Omega \leq R < 1\Omega$	-			
		±200	-	$0.1\Omega \leq R < 1\Omega$			
CR63 2512 (6432)	1W	±100	$0.1\Omega \leq R < 1\Omega$	-			
		±200	-	$0.1\Omega \leq R < 1\Omega$			

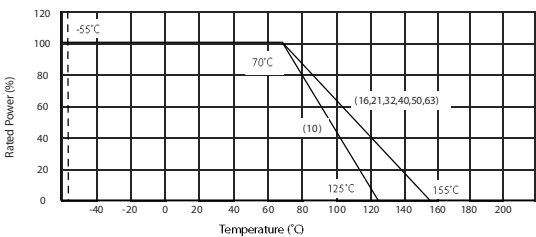
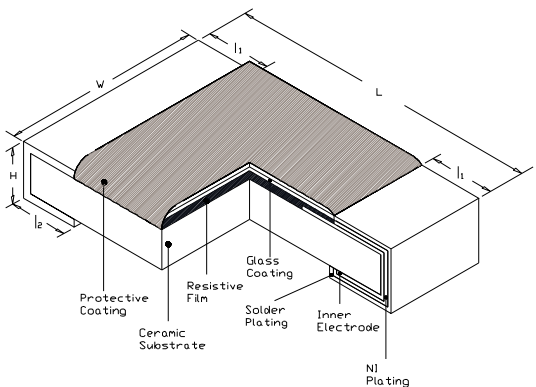
Test	Specification		Test Method
Resistance Value	Within Resistors specification		To be measure at 25°C
Resistance Temperature Coefficient	Within Specification of TCR		25°C/ +125°C
Short Time Overload	±1.0%	For 2% & 5% tolerance	Apply 2.5 times of rated voltage or maximum overload voltage for 5secs which is lower
Resistance to Soldering Heat	±(0.5%+0.05Ω)	For 1% tolerance	260°C ± 5°C, 10 seconds ± 1 second
	±(1.0%+0.05Ω)	For 2% & 5% tolerance	
Moisture Resistance	±(1%+0.1Ω) for 1%, 2% & 5% tolerance resistor		40°C ± 2°C, 90% - 95% RH, 1000 hours
Load Life	±(1.0%+0.05Ω)	For 1% tolerance	70°C ± 2°C ,1000 hours, 1.5 hours On,0.5 hours Off cycle
	±(2.0%+0.1Ω)	For 2% & 5% tolerance	
High Temperature Exposure	±(0.5%+0.05Ω)	For 1% tolerance	125°C , 1000 hours. Unpowered. Measurement at 24 ± 2 hours after test conclusion.
	±(1.0%+0.05Ω)	For 2% & 5% tolerance	



Features

- Resistance Range: 0.01Ω - 0.1Ω
- Highly reliable multi-layer electrode construction
- Compatible with wave and reflow soldering process
- Pb-Free with reflow soldering backward compatibility

Dimensions and Construction



Type	Dimensions				
	Inches (Millimeters)				
	L	W	H	l ₁	l ₂
CR10 0402 (1005)	0.040±0.004 (1.00±0.10)	0.020±0.002 (0.50±0.05)	0.014±0.002 (0.35±0.05)	0.008±0.004 (0.20±0.10)	0.010±0.004 (0.25±0.10)
CR16 0603 (1608)	0.063±0.004 (1.60±0.10)	0.031±0.004 (0.80±0.10)	0.018±0.004 (0.45±0.10)	0.012±0.008 (0.30±0.20)	0.012±0.008 (0.30±0.20)
CR21 0805 (2012)	0.079±0.006 (2.00±0.15)	0.049±0.004 (1.25±0.10)	0.020±0.004 (0.50±0.10)	0.016±0.008 (0.40±0.20)	0.016±0.008 (0.40±0.20)
CR32 1206 (3216)	0.122±0.004 (3.10±0.10)	0.063±0.006 (1.60±0.15)	0.022±0.002 (0.55±0.05)	0.020±0.010 (0.50±0.25)	0.020±0.010 (0.50±0.25)
CR40 1210 (3225)	0.122±0.004 (3.10±0.10)	0.098±0.006 (2.50±0.15)	0.022±0.002 (0.55±0.05)	0.020±0.010 (0.50±0.25)	0.016±0.008 (0.40±0.20)
CR50 2010 (5025)	0.200±0.006 (5.00±0.15)	0.098±0.006 (2.50±0.15)	0.022±0.002 (0.55±0.05)	0.024±0.010 (0.60±0.25)	0.016±0.008 (0.40±0.20)
CR63 2512 (6432)	0.250±0.006 (6.30±0.15)	0.126±0.006 (3.20±0.15)	0.022±0.002 (0.55±0.05)	0.024±0.010 (0.60±0.25)	0.039±0.008 (1.00±0.20) 0.024±0.008 (0.60±0.20) for R < 0.03Ω

Ordering Code / Information

CR	32	-	RXXX	-	HTC	-	F	L
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Type	Size (Inch / mm)	Nominal Resistance		Option	Resistance Tolerance	Packaging	
Ultra Low Ohmic Thick Film Chip Resistors	10 (0402/1005) 16 (0603/1608) 21 (0805/2012) 32 (1206/3216) 40 (1210/3225) 50 (2010/5025) 63 (2512/6432)	Resistors	4-Digit	E96 & E24 Series 0.091Ω = R091 0.03Ω = R030	HTC = High Temperature Coefficient (Only applicable for selection of resistance range between 0.01Ω ≤ x 0.03Ω with T.C.R of ±1,500ppm)	F = ±1% G = ±2% J = ±5%	E = 4,000 pcs Lead Free L = 5,000 pcs Lead Free K = 10,000 pcs Lead Free Y = 20,000 pcs Lead Free

Application and Ratings

Product Type	Power Rating @ 70°C	T.C.R (ppm/°C) Max	Resistance Range E-96, E-24 F(±1%)	Resistance Range E-24 G(±2%), J(±5%)	Max Working Voltage	Max Overload Voltage	Operating Temperature Range
CR10 0402 (1005)	1/16W	±200	$0.04\Omega \leq R < 0.1\Omega$		50V	100V	-55°C to +125°C
CR16 0603 (1608)	1/10W						
CR21 0805 (2012)	1/8W	±200	$0.03\Omega \leq R < 0.1\Omega$		150V	300V	-55°C to +155°C
CR32 1206 (3216)	1/4W	±200	$0.03\Omega \leq R < 0.1\Omega$		200V	400V	
		±100	$0.01\Omega \leq R < 0.03\Omega$				
		±1500	$0.01\Omega \leq R < 0.03\Omega$				
CR40 1210 (3225)	1/3W	±100	$0.03\Omega \leq R < 0.1\Omega$	-			
		±200	-	$0.03\Omega \leq R < 0.1\Omega$			
		±1500	$0.01\Omega \leq R < 0.03\Omega$				
CR50 2010 (5025)	3/4W	±100	$0.01\Omega \leq R < 0.1\Omega$	-			
		±200	-	$0.01\Omega \leq R < 0.1\Omega$			
		±1500	$0.01\Omega \leq R < 0.03\Omega$				
CR63 2512 (6432)	1W	±100	$0.03\Omega \leq R < 0.1\Omega$	-			
		±200	-	$0.03\Omega \leq R < 0.1\Omega$			
		±1500	$0.01\Omega \leq R < 0.03\Omega$				

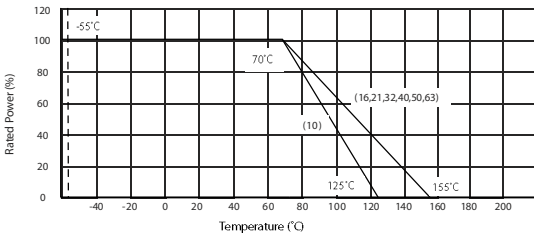
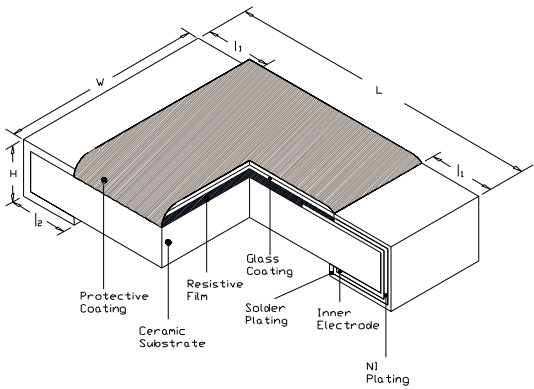
Test	Specification		Test Method
Resistance Value	Within Resistors specification		To be measure at 25°C
Resistance Temperature Coefficient	Within Specification of TCR		25°C/ +125°C
Short Time Overload	± 0.5%	For 1% tolerance	Apply 2.5 times of rated voltage or maximum overload voltage for 5secs which is lower
	±1.0%	For 2% & 5% tolerance	
Resistance to Soldering Heat	±(0.5%+0.05Ω)	For 1% tolerance	260°C ± 5°C, 10 seconds ± 1 second
	±(1.0%+0.05Ω)	For 2% & 5% tolerance	
Moisture Resistance	±(1%+0.1Ω) for 1% , 2% & 5% tolerance resistor		40°C ± 2°C, 90% - 95% RH, 1000 hours
Load Life	±(1.0%+0.05Ω)	For 1% tolerance	70°C ± 2°C ,1000 hours, 1.5 hours On,0.5 hours Off cycle
	±(2.0%+0.1Ω)	For 2% & 5% tolerance	
High Temperature Exposure	±(0.5%+0.05Ω)	For 1% tolerance	125°C , 1000 hours. Unpowered. Measurement at 24 ± 2 hours after test conclusion.
	±(1.0%+0.05Ω)	For 2% & 5% tolerance	



Features

- Resistance Range: 0.01Ω to less than 1Ω
- Highly reliable multi-layer electrode construction
- Compatible with wave and reflow soldering process
- Pb-Free with reflow soldering backward compatibility

Dimensions and Construction



Type	Dimensions				
	Inches (Millimeters)				
	L	W	H	l ₁	l ₂
CLP10 0402 (1005)	0.040±0.004 (1.00±0.10)	0.020±0.002 (0.50±0.05)	0.014±0.002 (0.35±0.05)	0.008±0.004 (0.20±0.10)	0.010±0.004 (0.25±0.10)
CLP16 0603 (1608)	0.063±0.004 (1.60±0.10)	0.031±0.004 (0.80±0.10)	0.018±0.004 (0.45±0.10)	0.012±0.008 (0.30±0.20)	0.012±0.008 (0.30±0.20)
CLP21 0805 (2012)	0.079±0.006 (2.00±0.15)	0.049±0.004 (1.25±0.10)	0.020±0.004 (0.50±0.10)	0.016±0.008 (0.40±0.20)	0.016±0.008 (0.40±0.20)
CLP32 1206 (3216)	0.122±0.004 (3.10±0.10)	0.063±0.006 (1.60±0.15)	0.022±0.002 (0.55±0.05)	0.020±0.010 (0.50±0.25)	0.020±0.010 (0.50±0.25)
CLP40 1210 (3225)	0.122±0.004 (3.10±0.10)	0.098±0.006 (2.50±0.15)	0.022±0.002 (0.55±0.05)	0.020±0.010 (0.50±0.25)	0.016±0.008 (0.40±0.20)
CLP50 2010 (5025)	0.200±0.006 (5.00±0.15)	0.098±0.006 (2.50±0.15)	0.022±0.002 (0.55±0.05)	0.024±0.010 (0.60±0.25)	0.016±0.008 (0.40±0.20)
CLP63 2512 (6432)	0.250±0.006 (6.30±0.15)	0.126±0.006 (3.20±0.15)	0.022±0.002 (0.55±0.05)	0.024±0.010 (0.60±0.25)	0.039±0.008 (1.00±0.20)

Ordering Code / Information

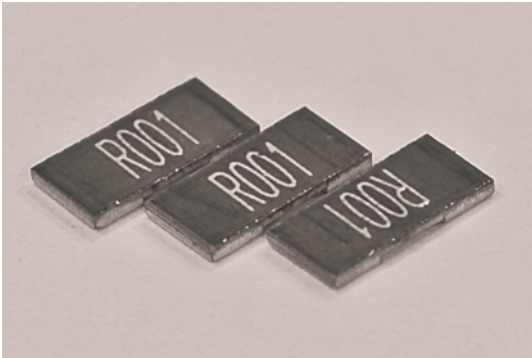
CLP	10	-	RXXX	-	HTC	-	F	K
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Type	Size (Inch / mm)	Nominal Resistance		Option	Resistance Tolerance	Packaging	
Low Ohmic High Power Current Sensing Chip Resistors	10 (0402/1005) 16 (0603/1608) 21 (0805/2012) 32 (1206/3216) 40 (1210/3225) 50 (2010/5025) 63 (2512/6432)	Resistors	4-Digit	E24 & E96 Series 0.47Ω = R470 0.499Ω = R499	HTC = High Temperature Coefficient (Only applicable for selection of resistance range between 0.01Ω ≤ x 0.03Ω with T.C.R of ±1,500ppm)	F = ±1% G = ±2% J = ±5%	E = 4,000 pcs Lead Free L = 5,000 pcs Lead Free K = 10,000 pcs Lead Free Y = 20,000 pcs Lead Free

Application and Ratings

Product Type	Power Rating @ 70°C	T.C.R (ppm/°C) Max	Resistance Range E-96, E-24 F(±1%)	Resistance Range E-24 G(±2%), J(±5%)	Max Working Voltage	Max Overload Voltage	Operating Temperature Range
CLP10 0402 (1005)	1/8W	±200	$0.04\Omega \leq R < 0.1\Omega$		50V	100V	-55°C to +125°C
CLP16 0603 (1608)	1/5W						
CLP21 0805 (2012)	1/4W	±200	$0.03\Omega \leq R < 0.1\Omega$		150V	300V	
CLP32 1206 (3216)	1/2W	±200	$0.03\Omega \leq R < 0.1\Omega$		200V	400V	-55°C to +155°C
		±100	$0.01\Omega \leq R < 0.03\Omega$				
		±1500	$0.01\Omega \leq R < 0.03\Omega$				
CLP40 1210 (3225)	3/4W	±100	$0.03\Omega \leq R < 0.1\Omega$	-			
		±200	-	$0.03\Omega \leq R < 0.1\Omega$			
		±1500	$0.01\Omega \leq R < 0.03\Omega$				
CLP50 2010 (5025)	1W	±100	$0.01\Omega \leq R < 0.1\Omega$	-			
		±200	-	$0.01\Omega \leq R < 0.1\Omega$			
		±1500	$0.01\Omega \leq R < 0.03\Omega$				
CLP63 2512 (6432)	2W	±100	$0.03\Omega \leq R < 0.1\Omega$	-			
		±200	-	$0.03\Omega \leq R < 0.1\Omega$			
		±1500	$0.01\Omega \leq R < 0.03\Omega$				

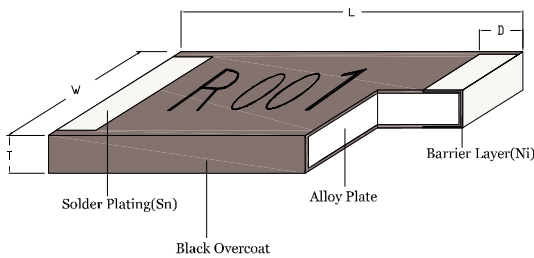
Test	Specification		Test Method
Resistance Value	Within Resistors specification		To be measure at 25°C
Resistance Temperature Coefficient	Within Specification of TCR		25°C/ +125°C
Short Time Overload	±0.5%	For 1% tolerance	Apply 2.5 times of rated voltage or maximum overload voltage for 5secs which is lower
	±1.0%	For 2% & 5% tolerance	
Resistance to Soldering Heat	±(0.5%+0.05Ω)	For 1% tolerance	260°C ± 5°C, 10 seconds ± 1 second
	±(1.0%+0.05Ω)	For 2% & 5% tolerance	
Moisture Resistance	±(1%+0.1Ω) for 1% , 2% & 5% tolerance resistor		40°C ± 2°C, 90% - 95% RH, 1000 hours
Load Life	±(1.0%+0.05Ω)	For 1% tolerance	70°C ± 2°C ,1000 hours, 1.5 hours On,0.5 hours Off cycle
	±(2.0%+0.1Ω)	For 2% & 5% tolerance	
High Temperature Exposure	±(0.5%+0.05Ω)	For 1% tolerance	125°C , 1000 hours. Unpowered. Measurement at 24 ± 2 hours after test conclusion.
	±(1.0%+0.05Ω)	For 2% & 5% tolerance	



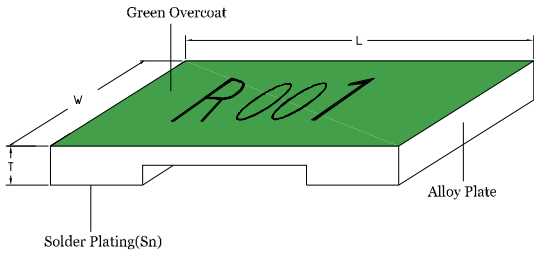
Features

- Robust metal strip able to withstand high temperature and high current
- Low TCR and Inductance
- Resistance range from 0.5mΩ to 15mΩ
- Designed for current sense circuits in power electronic systems

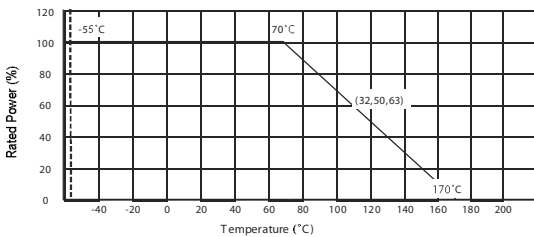
Dimensions and Construction



Black- Wave or IR reflow soldering



Green- IR reflow soldering only



Type	Dimensions				
	Resistance Value	Inches (Millimeters)			
		L	W	T	D
CLS32 1206 (3216)	0.001Ω - 0.01Ω	0.126 ± 0.010 (3.20 ± 0.254)	0.063 ± 0.004 (1.60 ± 0.104)	0.024 ± 0.008 (0.60 ± 0.20)	0.039 ± 0.015 (0.98 ± 0.38)
CLS50 2010 (5025)	0.001Ω - 0.01Ω	0.200 ± 0.010 (5.08 ± 0.254)	0.100 ± 0.006 (2.54 ± 0.15)	0.024 ± 0.008 (0.60 ± 0.20)	0.066 ± 0.025 (1.665 ± 0.625)
CLS63 2512 (6432)	0.0005Ω	0.250 ± 0.010 (6.35 ± 0.254)	0.125 ± 0.014 (3.18 ± 0.35)	0.024 ± 0.008 (0.60 ± 0.20)	0.105 ± 0.010 (2.675 ± 0.254)
	0.00075Ω				0.097 ± 0.010 (2.475 ± 0.254)
	0.001Ω - 0.0015Ω				0.056 ± 0.010 (1.425 ± 0.254)
	0.002Ω - 0.003Ω				0.046 ± 0.010 (1.175 ± 0.254)
	0.004Ω				0.086 ± 0.010 (2.175 ± 0.254)
	0.005Ω - 0.006Ω				0.076 ± 0.010 (1.925 ± 0.254)
	0.007Ω				0.056 ± 0.010 (1.425 ± 0.254)
	0.008Ω - 0.02Ω				0.046 ± 0.010 (1.175 ± 0.254)

Ordering Code / Information

CLS	6325	-	RXXX	-	F	P
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Type	Size (Inch / mm)(Power Rating)	Nominal Resistance		Resistance Tolerance	Packaging	
Metal Element Current Sensing Chip Resistors	32 (1206/3216)(1W) 50 (2010/5025)(1.5W) 631 (2512/6432)(1W) 632 (2512/6432)(2W) 6325 (2512/6432)(2.5W) 633 (2512/6432)(3W)	Resistors	4-Digit	E24 & E96 Series 0.0005Ω = R0005 0.001Ω = R001	F = ±1% J = ±5%	P = 2,000 pcs

Application and Ratings

Product Type	Coating	Power Rating @ 80°C	T.C.R (ppm/°C) Max	Resistance Range E-96, E-24 F(±1%), J(±5%)	Max Working Voltage	Max Overload Voltage	Operating Temperature Range
CLS32 1206 (3216)	Black	1W	±50	0.001Ω - 0.01Ω	√(P*R)	2.5*√(P*R)	-55°C to +170°C
CLS50 2010 (5025)	Black	1.5W	±50	0.001Ω - 0.01Ω			
CLS631 CLS632 CLS6325 CLS633 2512 (6432)	Green	1W	±50	0.011Ω - 0.015Ω			
		2W	±50	0.0035Ω, 0.0065Ω - 0.01Ω			
		2.5W	±50	0.004Ω, 0.005Ω, 0.006Ω			
		3W	±50	0.001Ω - 0.003Ω			
±100	0.0005Ω, 0.00075Ω						

* Green Coating is only suitable for IR reflow soldering only

Test	Specification		Test Method
Resistance Value	Within Resistors specification		To be measure at 25°C
Resistance Temperature Coefficient	Within Specification of TCR		25°C/ +125°C
Short Time Overload	±0.5%	Black coating	Apply 2.5 times of rated voltage or maximum overload voltage for 5secs which is lower
	±1.0%	Green coating	
Resistance to Soldering Heat	±0.5%	Black coating	260°C ± 5°C, 10 seconds ± 1 second
	±1.0%	Green coating	
Load Life	±1.0%	Black coating	70°C ± 2°C , 1000 hours, 1.5 hours On, 0.5 hours Off cycle
	±1.0%	Green coating	
Thermal shock	±0.5%	Black coating	-55°C ~ 150°C, 100 cycles
	±1.0%	Green coating	