

NCLS Series

Metal Foil Current Sensing Resistors



FEATURES

- SURFACE MOUNT 0603, 0805, 1206 AND 2512 CASE SIZES & REVERSE TERMINATION SIZES 0508 AND 0612
- RESISTANCE VALUES UP TO 40mΩ
- METAL FOIL ON CERAMIC CONSTRUCTION
- PRECISION TOLERANCE (±1%)
- REFLOW COMPATIBLE

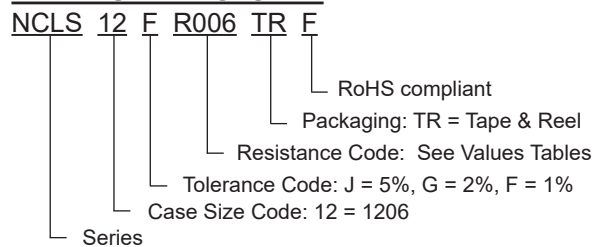


SPECIFICATIONS

Type	EIA Size	Power Rating at 70°C	Resistance Tolerance (Code)	Temperature Coefficient (ppm/°C, +25°C ~ +125°C)	Resistance Range*	Operating Temperature Range (°C)
NCLS06	0603	0.50W	±1% (F) ±2% (G) ±5% (J)	±50ppm	5mΩ ~ 20mΩ	-55°C ~ +155°C
NCLS10	0805	0.75W		±50ppm	5mΩ ~ 30mΩ	
NCLS11	0508	0.50W		±100ppm	5mΩ ~ 20mΩ	
NCLS12	1206	1.0W		±50ppm	5mΩ ~ 40mΩ	
NCLS13	0612	1.0W		±100ppm	5mΩ ~ 30mΩ	
NCLS25	2512	2.0W		±50ppm	5mΩ ~ 10mΩ	

*Contact NIC regarding availability of values not shown

PART NUMBER SYSTEM



Voltage and Current Ratings: Voltage and current ratings can be calculated for each part number by using the formulas below:

Operating Voltage: $\sqrt{\text{Power rating (Watts)} \times \text{Resistance (Ohms)}}$

Short Time Overload Voltage: $5 \times \sqrt{\text{Power rating (Watts)} \times \text{Resistance (Ohms)}}$

Operating Current: $\sqrt{\text{Power rating (Watts)} / \text{Resistance (Ohms)}}$

THERMAL EMF CHARACTERISTICS:

Thermal EMF = -1μV/°C

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COMPONENT DIMENSIONS AND MARKING

Case Size		L	W	T	P	Figure
0603	All Values	1.60 ± 0.20	0.80 ± 0.20	0.60 ± 0.20	0.40 ± 0.20	1
0805	All Values	2.00 ± 0.20	1.25 ± 0.20	0.70 ± 0.20	0.40 ± 0.20	
1206	All Values	3.20 ± 0.20	1.60 ± 0.20	0.70 ± 0.20	0.50 ± 0.30	
2512	All Values	6.40 ± 0.20	3.20 ± 0.20	0.70 ± 0.20	0.90 ± 0.20	
0508	All Values	1.25 ± 0.20	2.00 ± 0.20	0.70 ± 0.20	0.30 ± 0.20	2
0612	All Values	1.60 ± 0.20	3.20 ± 0.20	0.70 ± 0.20	0.40 ± 0.20	

MARKING EXAMPLES

$5\text{m}\Omega = 005$

$10\text{m}\Omega = 010$

$6.5\text{m}\Omega = 6.5$

Figure 1

(0603 parts are not marked)

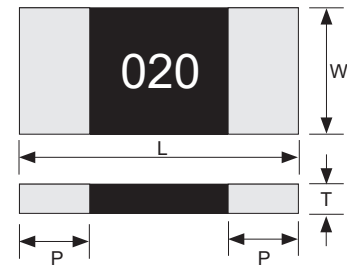
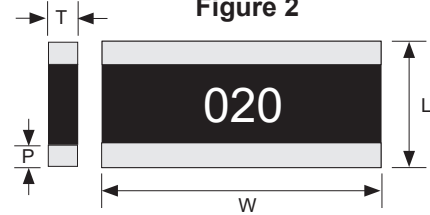


Figure 2



ENVIRONMENTAL CHARACTERISTICS

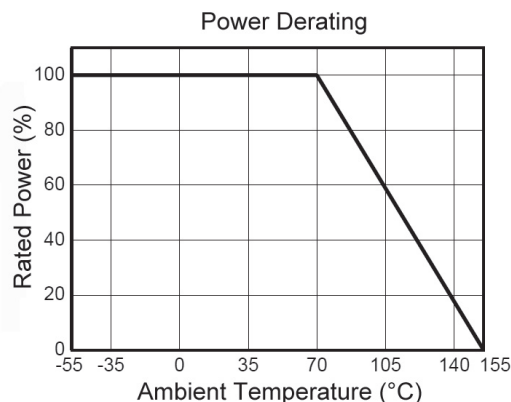
Item	Specification	Test Method	Reference Standard
Temperature Coefficient of Resistance	Within specified value	$+25^{\circ}\text{C} \sim +125^{\circ}\text{C}$	IEC60115-1 4.8 JIS-C5201 4.8
Load Life	$<\pm 1\%$ ($<\pm 2\%$ 0508 & 0612)	1,000 hours at rated power, $+70^{\circ}\text{C}$, 1.5 hours ON, 0.5 hours OFF	IEC60115-1 4.25.1 JIS-C5201 4.25.1
Short Time Overload	$<\pm 1\%$	5 x rated power for 5 seconds	IEC60115-1 4.13 JIS-C5201 4.13
Moisture Resistance (no load)	$<\pm 1\%$ ($<\pm 2\%$ 0508 & 0612)	$+85^{\circ}\text{C}$, 85% RH, 1000 hours	IEC60115-1 4.24.2 1a JIS-C5201 4.24.2 1a
Temperature Cycling	$<\pm 1\%$	-55°C & $+125^{\circ}\text{C}$, 300 cycles, 15 minutes at each temperature	IEC60115-1 4.19 JIS-C5201 4.19
Resistance to Soldering Heat	$<\pm 0.5\%$ ($<\pm 1\%$ 0508 & 0612)	$+260^{\circ}\text{C} \pm 5^{\circ}\text{C}$ for 10 sec. ± 1 sec., Two cycles	IEC60115-1 4.18 JIS-C5201 4.18
Solderability	At least 95% coverage of electrode surface	$+245^{\circ}\text{C} \pm 5^{\circ}\text{C}$, 2 sec. ± 0.5 sec.	IEC60115-1 4.17 JIS-C5201 4.17
High Temperature Exposure	$<\pm 1\%$ ($<\pm 2\%$ 0508 & 0612)	$+155^{\circ}\text{C}$ for 1,000 hours	IEC60115-1 4.23.2 JIS-C5201 4.23.2
Low Temperature Storage	$<\pm 1\%$ ($<\pm 2\%$ 0508 & 0612)	-55°C for 1,000 hours	IEC60115-1 4.23.4 JIS-C5201 4.23.4
Substrate Bending	$<\pm 0.5\%$ ($<\pm 1\%$ 0508 & 0612)	Bending within 2mm	IEC60115-1 4.33 JIS-C5201 4.33
Insulation Resistance	$>100\text{M}\Omega$	100VDC for 1 minute	IEC60115-1 4.6 JIS-C5201 4.6

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Power Derating Curve: For operation above 70°C, power rating must be derated according to the following chart:



NCLS06 (0603 CASE SIZE 0.25W) AVAILABLE VALUES

Part Number	Resistance Value (mΩ)	Power Rating	Available Tolerance	Available TCR
NCLS06_R005TRF	5.0	0.50W	±1% (F), ±2% (G), ±5% (J)	±50ppm
NCLS06_R006TRF	6.0	0.50W	±1% (F), ±2% (G), ±5% (J)	±50ppm
NCLS06_R007TRF	7.0	0.50W	±1% (F), ±2% (G), ±5% (J)	±50ppm
NCLS06_R008TRF	8.0	0.50W	±1% (F), ±2% (G), ±5% (J)	±50ppm
NCLS06_R009TRF	9.0	0.50W	±1% (F), ±2% (G), ±5% (J)	±50ppm
NCLS06_R010TRF	10	0.50W	±1% (F), ±2% (G), ±5% (J)	±50ppm
NCLS06_R011TRF	11	0.50W	±1% (F), ±2% (G), ±5% (J)	±50ppm
NCLS06_R012TRF	12	0.50W	±1% (F), ±2% (G), ±5% (J)	±50ppm
NCLS06_R013TRF	13	0.50W	±1% (F), ±2% (G), ±5% (J)	±50ppm
NCLS06_R014TRF	14	0.50W	±1% (F), ±2% (G), ±5% (J)	±50ppm
NCLS06_R015TRF	15	0.50W	±1% (F), ±2% (G), ±5% (J)	±50ppm
NCLS06_R016TRF	16	0.50W	±1% (F), ±2% (G), ±5% (J)	±50ppm
NCLS06_R017TRF	17	0.50W	±1% (F), ±2% (G), ±5% (J)	±50ppm
NCLS06_R018TRF	18	0.50W	±1% (F), ±2% (G), ±5% (J)	±50ppm
NCLS06_R019TRF	19	0.50W	±1% (F), ±2% (G), ±5% (J)	±50ppm
NCLS06_R020TRF	20	0.50W	±1% (F), ±2% (G), ±5% (J)	±50ppm

Shaded cells indicate parts in mass production. Contact NIC regarding availability of values.

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NCLS10 (0805 CASE SIZE 0.50W) AVAILABLE VALUES

Part Number	Resistance Value (mΩ)	Power Rating	Available Tolerance	Available TCR
NCLS10_ R005TRF	5.0	0.75W	±1% (F), ±2% (G), ±5% (J)	±50ppm
NCLS10_ R006TRF	6.0	0.75W	±1% (F), ±2% (G), ±5% (J)	±50ppm
NCLS10_ R007TRF	7.0	0.75W	±1% (F), ±2% (G), ±5% (J)	±50ppm
NCLS10_ R008TRF	8.0	0.75W	±1% (F), ±2% (G), ±5% (J)	±50ppm
NCLS10_ R009TRF	9.0	0.75W	±1% (F), ±2% (G), ±5% (J)	±50ppm
NCLS10_ R010TRF	10	0.75W	±1% (F), ±2% (G), ±5% (J)	±50ppm
NCLS10_ R011TRF	11	0.75W	±1% (F), ±2% (G), ±5% (J)	±50ppm
NCLS10_ R012TRF	12	0.75W	±1% (F), ±2% (G), ±5% (J)	±50ppm
NCLS10_ R013TRF	13	0.75W	±1% (F), ±2% (G), ±5% (J)	±50ppm
NCLS10_ R014TRF	14	0.75W	±1% (F), ±2% (G), ±5% (J)	±50ppm
NCLS10_ R015TRF	15	0.75W	±1% (F), ±2% (G), ±5% (J)	±50ppm
NCLS10_ R016TRF	16	0.75W	±1% (F), ±2% (G), ±5% (J)	±50ppm
NCLS10_ R017TRF	17	0.75W	±1% (F), ±2% (G), ±5% (J)	±50ppm
NCLS10_ R018TRF	18	0.75W	±1% (F), ±2% (G), ±5% (J)	±50ppm
NCLS10_ R019TRF	19	0.75W	±1% (F), ±2% (G), ±5% (J)	±50ppm
NCLS10_ R020TRF	20	0.75W	±1% (F), ±2% (G), ±5% (J)	±50ppm
NCLS10_ R021TRF	21	0.75W	±1% (F), ±2% (G), ±5% (J)	±50ppm
NCLS10_ R022TRF	22	0.75W	±1% (F), ±2% (G), ±5% (J)	±50ppm
NCLS10_ R023TRF	23	0.75W	±1% (F), ±2% (G), ±5% (J)	±50ppm
NCLS10_ R024TRF	24	0.75W	±1% (F), ±2% (G), ±5% (J)	±50ppm
NCLS10_ R025TRF	25	0.75W	±1% (F), ±2% (G), ±5% (J)	±50ppm
NCLS10_ R026TRF	26	0.75W	±1% (F), ±2% (G), ±5% (J)	±50ppm
NCLS10_ R027TRF	27	0.75W	±1% (F), ±2% (G), ±5% (J)	±50ppm
NCLS10_ R028TRF	28	0.75W	±1% (F), ±2% (G), ±5% (J)	±50ppm
NCLS10_ R029TRF	29	0.75W	±1% (F), ±2% (G), ±5% (J)	±50ppm
NCLS10_ R030TRF	30	0.75W	±1% (F), ±2% (G), ±5% (J)	±50ppm

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NCLS11 (0508 CASE SIZE 0.5W) AVAILABLE VALUES

Part Number	Resistance Value (mΩ)	Power Rating	Available Tolerance	Available TCR
NCLS11_ R005TRF	5.0	0.5W	±1% (F), ±2% (G), ±5% (J)	±100ppm
NCLS11_ R006TRF	6.0	0.5W	±1% (F), ±2% (G), ±5% (J)	±100ppm
NCLS11_ R007TRF	7.0	0.5W	±1% (F), ±2% (G), ±5% (J)	±100ppm
NCLS11_ R008TRF	8.0	0.5W	±1% (F), ±2% (G), ±5% (J)	±100ppm
NCLS11_ R009TRF	9.0	0.5W	±1% (F), ±2% (G), ±5% (J)	±100ppm
NCLS11_ R010TRF	10	0.5W	±1% (F), ±2% (G), ±5% (J)	±100ppm
NCLS11_ R011TRF	11	0.5W	±1% (F), ±2% (G), ±5% (J)	±100ppm
NCLS11_ R012TRF	12	0.5W	±1% (F), ±2% (G), ±5% (J)	±100ppm
NCLS11_ R013TRF	13	0.5W	±1% (F), ±2% (G), ±5% (J)	±100ppm
NCLS11_ R014TRF	14	0.5W	±1% (F), ±2% (G), ±5% (J)	±100ppm
NCLS11_ R015TRF	15	0.5W	±1% (F), ±2% (G), ±5% (J)	±100ppm
NCLS11_ R016TRF	16	0.5W	±1% (F), ±2% (G), ±5% (J)	±100ppm
NCLS11_ R017TRF	17	0.5W	±1% (F), ±2% (G), ±5% (J)	±100ppm
NCLS11_ R018TRF	18	0.5W	±1% (F), ±2% (G), ±5% (J)	±100ppm
NCLS11_ R019TRF	19	0.5W	±1% (F), ±2% (G), ±5% (J)	±100ppm
NCLS11_ R020TRF	20	0.5W	±1% (F), ±2% (G), ±5% (J)	±100ppm

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NCLS12 (1206 CASE SIZE 1.0W) AVAILABLE VALUES

Part Number	Resistance Value (mΩ)	Power Rating	Available Tolerance	Available TCR
NCLS12_ R005TRF	5.0	1.0W	±1% (F), ±2% (G), ±5% (J)	±50ppm
NCLS12_ R006TRF	6.0	1.0W	±1% (F), ±2% (G), ±5% (J)	±50ppm
NCLS12_ R007TRF	7.0	1.0W	±1% (F), ±2% (G), ±5% (J)	±50ppm
NCLS12_ R008TRF	8.0	1.0W	±1% (F), ±2% (G), ±5% (J)	±50ppm
NCLS12_ R009TRF	9.0	1.0W	±1% (F), ±2% (G), ±5% (J)	±50ppm
NCLS12_ R010TRF	10	1.0W	±1% (F), ±2% (G), ±5% (J)	±50ppm
NCLS12_ R011TRF	11	1.0W	±1% (F), ±2% (G), ±5% (J)	±50ppm
NCLS12_ R012TRF	12	1.0W	±1% (F), ±2% (G), ±5% (J)	±50ppm
NCLS12_ R013TRF	13	1.0W	±1% (F), ±2% (G), ±5% (J)	±50ppm
NCLS12_ R014TRF	14	1.0W	±1% (F), ±2% (G), ±5% (J)	±50ppm
NCLS12_ R015TRF	15	1.0W	±1% (F), ±2% (G), ±5% (J)	±50ppm
NCLS12_ R016TRF	16	1.0W	±1% (F), ±2% (G), ±5% (J)	±50ppm
NCLS12_ R017TRF	17	1.0W	±1% (F), ±2% (G), ±5% (J)	±50ppm
NCLS12_ R018TRF	18	1.0W	±1% (F), ±2% (G), ±5% (J)	±50ppm
NCLS12_ R019TRF	19	1.0W	±1% (F), ±2% (G), ±5% (J)	±50ppm
NCLS12_ R020TRF	20	1.0W	±1% (F), ±2% (G), ±5% (J)	±50ppm
NCLS12_ R021TRF	21	1.0W	±1% (F), ±2% (G), ±5% (J)	±50ppm
NCLS12_ R022TRF	22	1.0W	±1% (F), ±2% (G), ±5% (J)	±50ppm
NCLS12_ R023TRF	23	1.0W	±1% (F), ±2% (G), ±5% (J)	±50ppm
NCLS12_ R024TRF	24	1.0W	±1% (F), ±2% (G), ±5% (J)	±50ppm
NCLS12_ R025TRF	25	1.0W	±1% (F), ±2% (G), ±5% (J)	±50ppm
NCLS12_ R026TRF	26	1.0W	±1% (F), ±2% (G), ±5% (J)	±50ppm
NCLS12_ R027TRF	27	1.0W	±1% (F), ±2% (G), ±5% (J)	±50ppm
NCLS12_ R028TRF	28	1.0W	±1% (F), ±2% (G), ±5% (J)	±50ppm
NCLS12_ R029TRF	29	1.0W	±1% (F), ±2% (G), ±5% (J)	±50ppm
NCLS12_ R030TRF	30	1.0W	±1% (F), ±2% (G), ±5% (J)	±50ppm
NCLS12_ R031TRF	31	1.0W	±1% (F), ±2% (G), ±5% (J)	±50ppm
NCLS12_ R032TRF	32	1.0W	±1% (F), ±2% (G), ±5% (J)	±50ppm
NCLS12_ R033TRF	33	1.0W	±1% (F), ±2% (G), ±5% (J)	±50ppm
NCLS12_ R034TRF	34	1.0W	±1% (F), ±2% (G), ±5% (J)	±50ppm
NCLS12_ R035TRF	35	1.0W	±1% (F), ±2% (G), ±5% (J)	±50ppm
NCLS12_ R036TRF	36	1.0W	±1% (F), ±2% (G), ±5% (J)	±50ppm
NCLS12_ R037TRF	37	1.0W	±1% (F), ±2% (G), ±5% (J)	±50ppm
NCLS12_ R038TRF	38	1.0W	±1% (F), ±2% (G), ±5% (J)	±50ppm
NCLS12_ R039TRF	39	1.0W	±1% (F), ±2% (G), ±5% (J)	±50ppm
NCLS12_ R040TRF	40	1.0W	±1% (F), ±2% (G), ±5% (J)	±50ppm

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NCLS13 (0612 CASE SIZE 1.0W) AVAILABLE VALUES

Part Number	Resistance Value (mΩ)	Power Rating	Available Tolerance	Available TCR
NCLS13_R005TRF	5.0	1.0W	±1% (F), ±2% (G), ±5% (J)	±100ppm
NCLS13_R006TRF	6.0	1.0W	±1% (F), ±2% (G), ±5% (J)	±100ppm
NCLS13_R007TRF	7.0	1.0W	±1% (F), ±2% (G), ±5% (J)	±100ppm
NCLS13_R008TRF	8.0	1.0W	±1% (F), ±2% (G), ±5% (J)	±100ppm
NCLS13_R009TRF	9.0	1.0W	±1% (F), ±2% (G), ±5% (J)	±100ppm
NCLS13_R010TRF	10	1.0W	±1% (F), ±2% (G), ±5% (J)	±100ppm
NCLS13_R011TRF	11	1.0W	±1% (F), ±2% (G), ±5% (J)	±100ppm
NCLS13_R012TRF	12	1.0W	±1% (F), ±2% (G), ±5% (J)	±100ppm
NCLS13_R013TRF	13	1.0W	±1% (F), ±2% (G), ±5% (J)	±100ppm
NCLS13_R014TRF	14	1.0W	±1% (F), ±2% (G), ±5% (J)	±100ppm
NCLS13_R015TRF	15	1.0W	±1% (F), ±2% (G), ±5% (J)	±100ppm
NCLS13_R016TRF	16	1.0W	±1% (F), ±2% (G), ±5% (J)	±100ppm
NCLS13_R017TRF	17	1.0W	±1% (F), ±2% (G), ±5% (J)	±100ppm
NCLS13_R018TRF	18	1.0W	±1% (F), ±2% (G), ±5% (J)	±100ppm
NCLS13_R019TRF	19	1.0W	±1% (F), ±2% (G), ±5% (J)	±100ppm
NCLS13_R020TRF	20	1.0W	±1% (F), ±2% (G), ±5% (J)	±100ppm
NCLS13_R021TRF	21	1.0W	±1% (F), ±2% (G), ±5% (J)	±100ppm
NCLS13_R022TRF	22	1.0W	±1% (F), ±2% (G), ±5% (J)	±100ppm
NCLS13_R023TRF	23	1.0W	±1% (F), ±2% (G), ±5% (J)	±100ppm
NCLS13_R024TRF	24	1.0W	±1% (F), ±2% (G), ±5% (J)	±100ppm
NCLS13_R025TRF	25	1.0W	±1% (F), ±2% (G), ±5% (J)	±100ppm
NCLS13_R026TRF	26	1.0W	±1% (F), ±2% (G), ±5% (J)	±100ppm
NCLS13_R027TRF	27	1.0W	±1% (F), ±2% (G), ±5% (J)	±100ppm
NCLS13_R028TRF	28	1.0W	±1% (F), ±2% (G), ±5% (J)	±100ppm
NCLS13_R029TRF	29	1.0W	±1% (F), ±2% (G), ±5% (J)	±100ppm
NCLS13_R030TRF	30	1.0W	±1% (F), ±2% (G), ±5% (J)	±100ppm

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NCLS25 (2512 CASE SIZE 2.0W) AVAILABLE VALUES

Part Number	Resistance Value (mΩ)	Power Rating	Available Tolerance	Available TCR
NCLS25_R005TRF	5.0	2.0W	±1% (F), ±2% (G), ±5% (J)	±50ppm
NCLS25_R006TRF	6.0	2.0W	±1% (F), ±2% (G), ±5% (J)	±50ppm
NCLS25_R007TRF	7.0	2.0W	±1% (F), ±2% (G), ±5% (J)	±50ppm
NCLS25_R008TRF	8.0	2.0W	±1% (F), ±2% (G), ±5% (J)	±50ppm
NCLS25_R009TRF	9.0	2.0W	±1% (F), ±2% (G), ±5% (J)	±50ppm
NCLS25_R010TRF	10	2.0W	±1% (F), ±2% (G), ±5% (J)	±50ppm

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NCLS Series

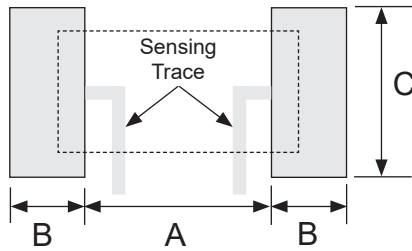
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RECOMMENDED LAND PATTERN DIM. (mm)

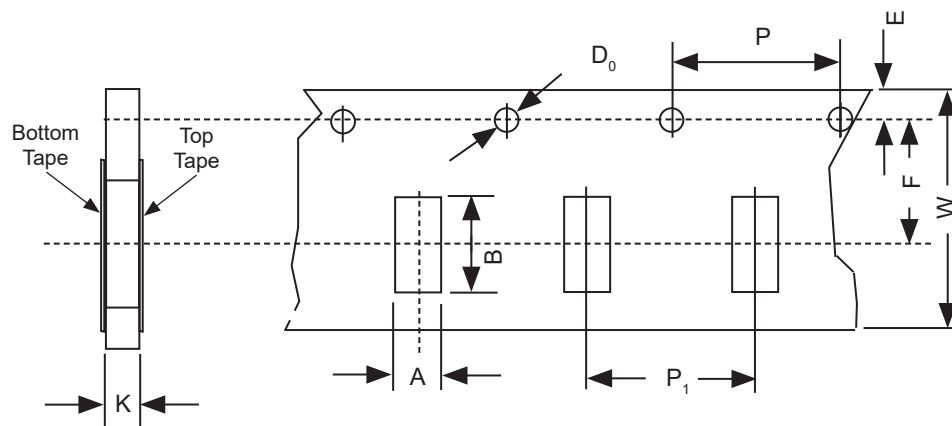
Case Size		A	B	C
0603	5mΩ & 20mΩ	0.60	1.10	1.0
	6mΩ ~ 19.5mΩ	0.85	0.975	
0805	6mΩ ~ 9.5mΩ	0.80	1.20	1.4
	10mΩ ~ 30mΩ	1.20	1.00	
0508	5mΩ ~ 20mΩ	0.45	0.875	2.4
1206	6mΩ ~ 9.5mΩ	1.20	1.75	1.8
	10mΩ ~ 19.5mΩ	1.80	1.45	
	20mΩ ~ 40mΩ	2.20	1.25	
0612	5mΩ ~ 20mΩ	0.70	0.70	3.8
	21mΩ ~ 30mΩ	0.85	0.625	3.8
2512	5mΩ ~ 10mΩ	4.60	1.65	3.6

Reflow Soldering Heat Profile and Limits
 → <https://www.niccomp.com/wp-content/uploads/files/resistive/ReflowSolderingHeat-Profile-IPCJEDEC-NIC-ChipR-Reflow-May2022-Rev3.pdf>
 Wave soldering? – Please review your wave soldering process profile with NIC: tpmg@niccomp.com



PAPER TAPE DIMENSIONS (mm)

Case Size	A	B	K	P	P ₁	E	F	D ₀	W	Quantity per Reel
0603	1.10 ± 0.15	1.90 ± 0.2	0.85 ± 0.1	4.0 ± 0.1	4.0 ± 0.1	1.75 ± 0.1	3.5 ± 0.05	1.55 ± 0.1	8.0 ± 0.2	5,000
0805	1.60 ± 0.15	2.40 ± 0.2	1.05 ± 0.1							4,000
0508	1.60 ± 0.15	2.40 ± 0.2								
1206	2.00 ± 0.15	3.60 ± 0.2								
0612	2.00 ± 0.15	3.60 ± 0.2								



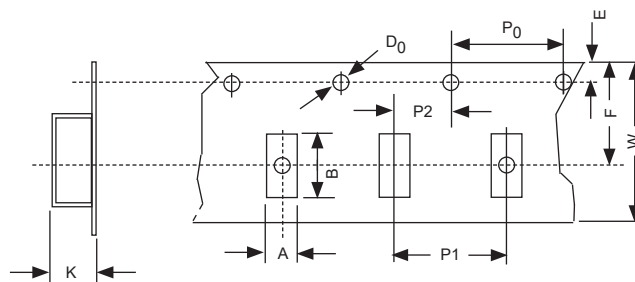
NCLS Series

Metal Foil Current Sensing Resistors



EMBOSSED PLASTIC CARRIER DIMENSIONS (mm)

Type	A	B	W	F	K	E	P ₁	P ₂	P ₀	φD ₀
2512	3.60 ±0.15	6.90 ±0.10	12.0 ±0.20	5.50 ±0.05	0.85 ±0.10	1.75 ±0.10	4.00 ±0.10	2.00 ±0.10	4.00 ±0.05	1.55 ±0.10



REEL DIMENSIONS (mm) AND QUANTITY

Type	A	B	C	W	Quantity
NCLS06	178 ±2.0	60 ±1.0	13 ±1.0	9.0 ±1.0	5,000
NCLS10				11.4 ±0.1	4,000
NCLS11					
NCLS12					
NCLS13					
NCLS25				13.0 ±1.0	

