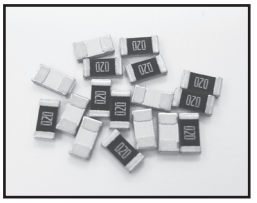
Metal Foil Current Sensing Chip Resistors

NCLS Series



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
- PRECISON TOLERANCE (±1%)
- REFLOW COMPATIBLE

RoHS Compliant
includes all homogeneous materials

See Part Number System for Details

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

NCLS 12 F R006 TR F

- F: RoHS compliant
- TR: Packaging: TR = Tape & Reel
- R006: Resistance Code: See Values Tables
- F: Tolerance Code: J = 5%, G = 2%, F = 1%
- 12: Case Size Code: 12 = 1206
- NCLS: Series

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

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

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

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

THERMAL EMF CHARACTERISTICS:

Thermal EMF = -1μV/°C

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	

Figure 1
(0603 parts are not marked)

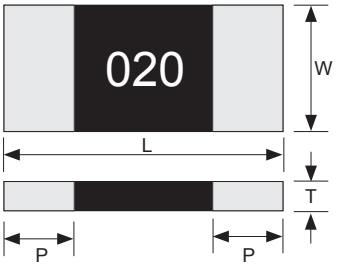
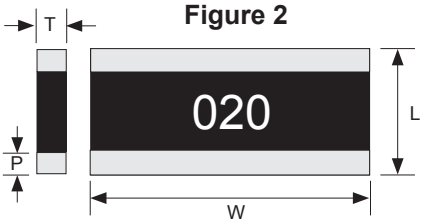


Figure 2



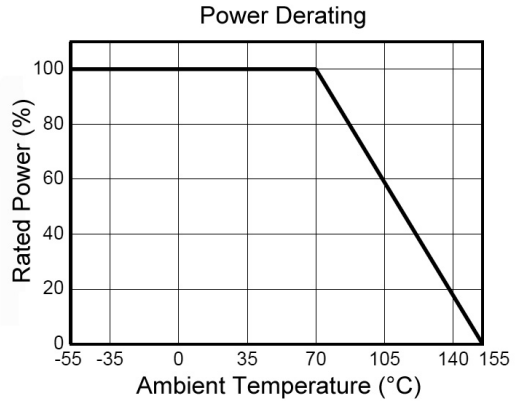
MARKING EXAMPLES

5mΩ = 005
10mΩ = 010
6.5mΩ = 6.5

ENVIRONMENTAL CHARACTERISTICS

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

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.

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

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

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

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

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

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

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

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

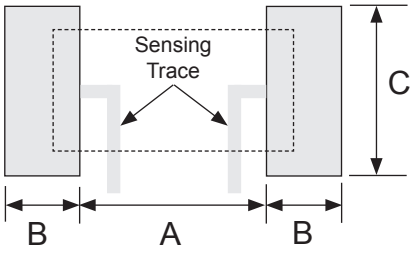
NCLS25 (2512 CASE SIZE 2.0W) AVAILABLE VALUES

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

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

RECOMMENDED LAND PATTERN DIM. (mm)

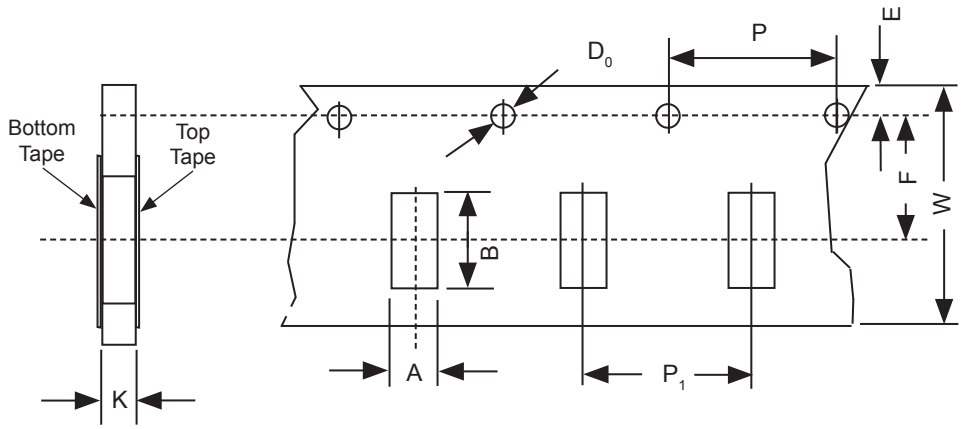
Case Size		A	B	C
0603	5mΩ & 20mΩ	0.60	1.10	1.0
	6mΩ ~ 19.5mΩ	0.85	0.975	
0805	6mΩ ~ 9.5mΩ	0.80	1.20	1.4
	10mΩ ~ 30mΩ	1.20	1.00	
0508	5mΩ ~ 20mΩ	0.45	0.875	2.4
1206	6mΩ ~ 9.5mΩ	1.20	1.75	1.8
	10mΩ ~ 19.5mΩ	1.80	1.45	
	20mΩ ~ 40mΩ	2.20	1.25	
0612	5mΩ ~ 20mΩ	0.70	0.70	3.8
	21mΩ ~ 30mΩ	0.85	0.625	3.8
2512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



Reflow Soldering Heat Profile and Limits
→ www.niccomp.com/resource/files/resistive/NIC-ChipR-Reflow-Sept2020-Rev2.pdf
Wave soldering? – Please review your wave soldering process profile with NIC: tpmg@niccomp.com

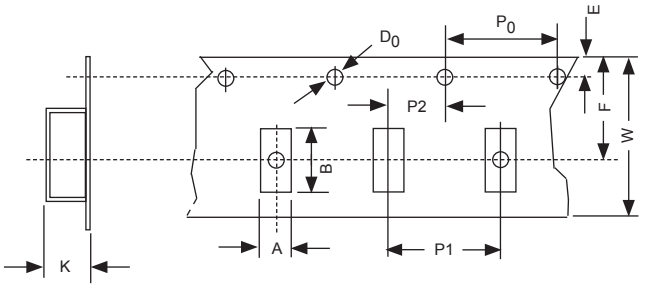
PAPER TAPE DIMENSIONS (mm)

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								



EMBOSSED PLASTIC CARRIER DIMENSIONS (mm)

Type	A	B	W	F	K	E	P_1	P_2	P_0	ϕD_o
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 DIMENIONS (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