

Metal Foil Current Sensing Chip Resistors

NCLS Series

FEATURES

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

**RoHS
Compliant**
includes all homogeneous materials

See Part Number System for Details

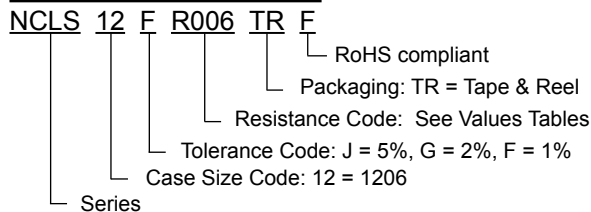


SPECIFICATIONS

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	0.25W	±1% (F) ±2% (G) ±5% (J)	±100ppm	5mΩ ~ 20mΩ	-55°C ~ +155°C
NCLS10	0805	0.50W			6mΩ ~ 30mΩ	
NCLS12	1206	1.0W			6mΩ ~ 40mΩ	

*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:

Current Rating Formula: $I = \sqrt{P/R}$

Example: NCLS12FR006TRF

P = 0.25W

R = 0.006mΩ (6 milli-ohm)

$I = \sqrt{P/R} = \sqrt{0.25 / 0.006} = 6.454A$

Voltage Rating Formula: $V = \sqrt{P \times R}$

Example: NCLS12FR006TRF

P = 0.25W

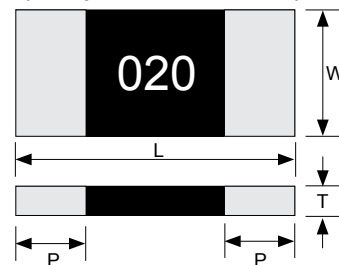
R = 0.006mΩ (6 milli-ohm)

$V = \sqrt{P \times R} = \sqrt{0.25 \times 0.006} = 0.0387V$

COMPONENT DIMENSIONS AND MARKING

Case Size		L	W	T	P
0603	All Values	1.60 ± 0.20	0.80 ± 0.20	0.60 ± 0.20	0.40 ± 0.20
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

(0603 parts are not marked)



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%	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%	+85°C, 85% RH, 1000 hours	IEC60115-1 4.24.2 1a JIS-C5201 4.24.2 1a
Temperature Cycling	<±1%	-55°C & +155°C, 300 cycles, 15 minutes at each temperature	IEC60115-1 4.19 JIS-C5201 4.19
Resistance to Soldering Heat	<±0.5%	+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%	+155°C for 1,000 hours	IEC60115-1 4.23.2 JIS-C5201 4.23.2
Low Temperature Storage	<±1%	-55°C for 1,000 hours	IEC60115-1 4.23.4 JIS-C5201 4.23.4
Substrate Bending	<±0.5%	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

NCLS06 (0603 CASE SIZE 0.25W) AVAILABLE VALUES

Part Number	Resistance Value (mΩ)	Power Rating	Available Tolerance	Available TCR
NCLS06_R005TRNF	5.0	0.25W	±1% (F), ±2% (G), ±5% (J)	±100ppm
NCLS06_R006TRNF	6.0	0.25W	±1% (F), ±2% (G), ±5% (J)	±100ppm
NCLS06_R007TRNF	7.0	0.25W	±1% (F), ±2% (G), ±5% (J)	±100ppm
NCLS06_R008TRNF	8.0	0.25W	±1% (F), ±2% (G), ±5% (J)	±100ppm
NCLS06_R009TRNF	9.0	0.25W	±1% (F), ±2% (G), ±5% (J)	±100ppm
NCLS06_R010TRNF	10	0.25W	±1% (F), ±2% (G), ±5% (J)	±100ppm
NCLS06_R011TRNF	11	0.25W	±1% (F), ±2% (G), ±5% (J)	±100ppm
NCLS06_R012TRNF	12	0.25W	±1% (F), ±2% (G), ±5% (J)	±100ppm
NCLS06_R013TRNF	13	0.25W	±1% (F), ±2% (G), ±5% (J)	±100ppm
NCLS06_R014TRNF	14	0.25W	±1% (F), ±2% (G), ±5% (J)	±100ppm
NCLS06_R015TRNF	15	0.25W	±1% (F), ±2% (G), ±5% (J)	±100ppm
NCLS06_R016TRNF	16	0.25W	±1% (F), ±2% (G), ±5% (J)	±100ppm
NCLS06_R017TRNF	17	0.25W	±1% (F), ±2% (G), ±5% (J)	±100ppm
NCLS06_R018TRNF	18	0.25W	±1% (F), ±2% (G), ±5% (J)	±100ppm
NCLS06_R019TRNF	19	0.25W	±1% (F), ±2% (G), ±5% (J)	±100ppm
NCLS06_R020TRNF	20	0.25W	±1% (F), ±2% (G), ±5% (J)	±100ppm

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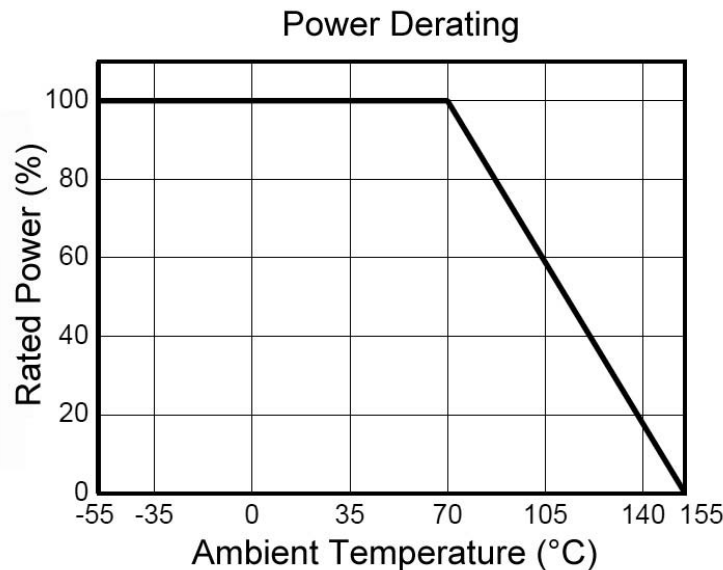


NCLS10 (0805 CASE SIZE 0.50W) AVAILABLE VALUES

Part Number	Resistance Value (mΩ)	Power Rating	Available Tolerance	Available TCR
NCLS10_R006TRNF	6.0	0.50W	±1% (F), ±2% (G), ±5% (J)	±100ppm
NCLS10_R007TRNF	7.0	0.50W	±1% (F), ±2% (G), ±5% (J)	±100ppm
NCLS10_R008TRNF	8.0	0.50W	±1% (F), ±2% (G), ±5% (J)	±100ppm
NCLS10_R009TRNF	9.0	0.50W	±1% (F), ±2% (G), ±5% (J)	±100ppm
NCLS10_R010TRNF	10	0.50W	±1% (F), ±2% (G), ±5% (J)	±100ppm
NCLS10_R011TRNF	11	0.50W	±1% (F), ±2% (G), ±5% (J)	±100ppm
NCLS10_R012TRNF	12	0.50W	±1% (F), ±2% (G), ±5% (J)	±100ppm
NCLS10_R013TRNF	13	0.50W	±1% (F), ±2% (G), ±5% (J)	±100ppm
NCLS10_R014TRNF	14	0.50W	±1% (F), ±2% (G), ±5% (J)	±100ppm
NCLS10_R015TRNF	15	0.50W	±1% (F), ±2% (G), ±5% (J)	±100ppm
NCLS10_R016TRNF	16	0.50W	±1% (F), ±2% (G), ±5% (J)	±100ppm
NCLS10_R017TRNF	17	0.50W	±1% (F), ±2% (G), ±5% (J)	±100ppm
NCLS10_R018TRNF	18	0.50W	±1% (F), ±2% (G), ±5% (J)	±100ppm
NCLS10_R019TRNF	19	0.50W	±1% (F), ±2% (G), ±5% (J)	±100ppm
NCLS10_R020TRNF	20	0.50W	±1% (F), ±2% (G), ±5% (J)	±100ppm
NCLS10_R021TRNF	21	0.50W	±1% (F), ±2% (G), ±5% (J)	±100ppm
NCLS10_R022TRNF	22	0.50W	±1% (F), ±2% (G), ±5% (J)	±100ppm
NCLS10_R023TRNF	23	0.50W	±1% (F), ±2% (G), ±5% (J)	±100ppm
NCLS10_R024TRNF	24	0.50W	±1% (F), ±2% (G), ±5% (J)	±100ppm
NCLS10_R025TRNF	25	0.50W	±1% (F), ±2% (G), ±5% (J)	±100ppm
NCLS10_R026TRNF	26	0.50W	±1% (F), ±2% (G), ±5% (J)	±100ppm
NCLS10_R027TRNF	27	0.50W	±1% (F), ±2% (G), ±5% (J)	±100ppm
NCLS10_R028TRNF	28	0.50W	±1% (F), ±2% (G), ±5% (J)	±100ppm
NCLS10_R029TRNF	29	0.50W	±1% (F), ±2% (G), ±5% (J)	±100ppm
NCLS10_R030TRNF	30	0.50W	±1% (F), ±2% (G), ±5% (J)	±100ppm

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



NCLS12 (1206 CASE SIZE 1.0W) AVAILABLE VALUES

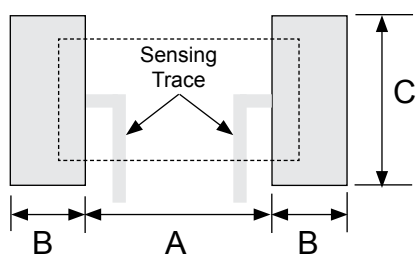
Part Number	Resistance Value (mΩ)	Power Rating	Available Tolerance	Available TCR
NCLS12_R006TRNF	6.0	1.0W	±1% (F), ±2% (G), ±5% (J)	±100ppm
NCLS12_R007TRNF	7.0	1.0W	±1% (F), ±2% (G), ±5% (J)	±100ppm
NCLS12_R008TRNF	8.0	1.0W	±1% (F), ±2% (G), ±5% (J)	±100ppm
NCLS12_R009TRNF	9.0	1.0W	±1% (F), ±2% (G), ±5% (J)	±100ppm
NCLS12_R010TRNF	10	1.0W	±1% (F), ±2% (G), ±5% (J)	±100ppm
NCLS12_R011TRNF	11	1.0W	±1% (F), ±2% (G), ±5% (J)	±100ppm
NCLS12_R012TRNF	12	1.0W	±1% (F), ±2% (G), ±5% (J)	±100ppm
NCLS12_R013TRNF	13	1.0W	±1% (F), ±2% (G), ±5% (J)	±100ppm
NCLS12_R014TRNF	14	1.0W	±1% (F), ±2% (G), ±5% (J)	±100ppm
NCLS12_R015TRNF	15	1.0W	±1% (F), ±2% (G), ±5% (J)	±100ppm
NCLS12_R016TRNF	16	1.0W	±1% (F), ±2% (G), ±5% (J)	±100ppm
NCLS12_R017TRNF	17	1.0W	±1% (F), ±2% (G), ±5% (J)	±100ppm
NCLS12_R018TRNF	18	1.0W	±1% (F), ±2% (G), ±5% (J)	±100ppm
NCLS12_R019TRNF	19	1.0W	±1% (F), ±2% (G), ±5% (J)	±100ppm
NCLS12_R020TRNF	20	1.0W	±1% (F), ±2% (G), ±5% (J)	±100ppm
NCLS12_R021TRNF	21	1.0W	±1% (F), ±2% (G), ±5% (J)	±100ppm
NCLS12_R022TRNF	22	1.0W	±1% (F), ±2% (G), ±5% (J)	±100ppm
NCLS12_R023TRNF	23	1.0W	±1% (F), ±2% (G), ±5% (J)	±100ppm
NCLS12_R024TRNF	24	1.0W	±1% (F), ±2% (G), ±5% (J)	±100ppm
NCLS12_R025TRNF	25	1.0W	±1% (F), ±2% (G), ±5% (J)	±100ppm
NCLS12_R026TRNF	26	1.0W	±1% (F), ±2% (G), ±5% (J)	±100ppm
NCLS12_R027TRNF	27	1.0W	±1% (F), ±2% (G), ±5% (J)	±100ppm
NCLS12_R028TRNF	28	1.0W	±1% (F), ±2% (G), ±5% (J)	±100ppm
NCLS12_R029TRNF	29	1.0W	±1% (F), ±2% (G), ±5% (J)	±100ppm
NCLS12_R030TRNF	30	1.0W	±1% (F), ±2% (G), ±5% (J)	±100ppm
NCLS12_R031TRNF	31	1.0W	±1% (F), ±2% (G), ±5% (J)	±100ppm
NCLS12_R032TRNF	32	1.0W	±1% (F), ±2% (G), ±5% (J)	±100ppm
NCLS12_R033TRNF	33	1.0W	±1% (F), ±2% (G), ±5% (J)	±100ppm
NCLS12_R034TRNF	34	1.0W	±1% (F), ±2% (G), ±5% (J)	±100ppm
NCLS12_R035TRNF	35	1.0W	±1% (F), ±2% (G), ±5% (J)	±100ppm
NCLS12_R036TRNF	36	1.0W	±1% (F), ±2% (G), ±5% (J)	±100ppm
NCLS12_R037TRNF	37	1.0W	±1% (F), ±2% (G), ±5% (J)	±100ppm
NCLS12_R038TRNF	38	1.0W	±1% (F), ±2% (G), ±5% (J)	±100ppm
NCLS12_R039TRNF	39	1.0W	±1% (F), ±2% (G), ±5% (J)	±100ppm
NCLS12_R040TRNF	40	1.0W	±1% (F), ±2% (G), ±5% (J)	±100ppm

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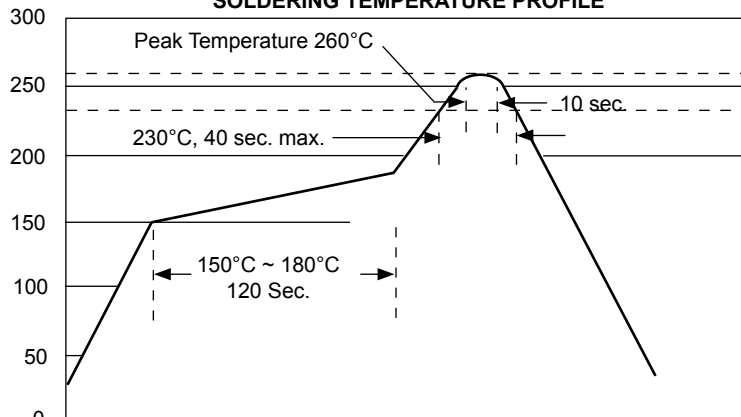


RECOMMENDED LAND PATTERN DIM. (mm)

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	
1206	6mΩ ~ 9.5mΩ	1.20	1.75	1.8
	10mΩ ~ 19.5mΩ	1.80	1.45	
	20mΩ ~ 40mΩ	2.20	1.05	

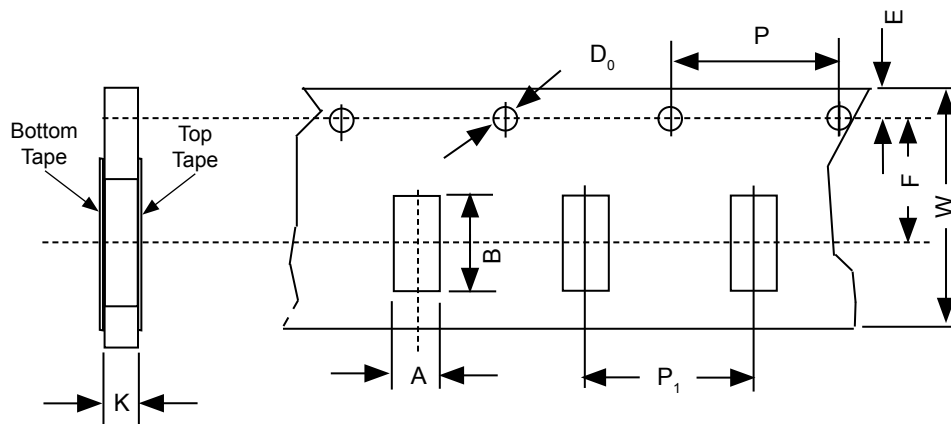


RECOMMENDED REFLOW SOLDERING TEMPERATURE PROFILE



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	2.0 ± 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		4.0 ± 0.1					4,000
1206	2.00 ± 0.15	3.60 ± 0.2								



REEL DIMENSIONS (mm) AND QUANTITY

Type	A	B	C	W	Quantity
NCLS06					5,000
NCLS10	178 ±2.0	60 ±1.0	13 ±1.0	9.0 ±1.0	4,000
NCLS12					

