

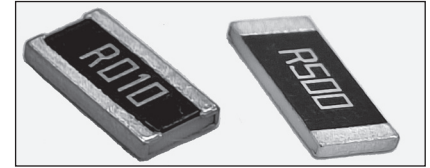
NCSM Series

Automotive Current Sensing Chip Resistor



FEATURES

- LOW INDUCTANCE ($\leq 5\text{nH}$)
- $10\text{m}\Omega \sim 10\Omega$ RESISTANCE RANGE
- RESISTOR TOLERANCES DOWN TO $\pm 0.25\%$
- LOW TCR OPTIONS DOWN TO $\pm 50 \text{ PPM}/^\circ\text{C}$
- HIGH POWER CAPABILITY
- AEC-Q200 QUALIFIED FOR AUTOMOTIVE APPLICATIONS
- OPERATING TEMPERATURE UP TO 155°C
- POWER RATINGS TO 3WATT



SPECIFICATIONS

Type	EIA Size	Power Rating & Code At 70°C	Temperature Range	Max.*1 Current Rating	Max.*2 Overload Current	Resistance Tolerance (Code)	Temperature Coefficient (ppm/°C)	Resistance Range (Ω) (E-24 Values*)
NCSM0201	0201	1/20W	-55 °C ~ +155 °C	1.00A	2.50A	D = 0.5% F = 1.0% G = 2.0% J = 5.0%	±50	100mΩ ≤ R ≤ 10Ω
		1/10W (M)		1.41A	3.16A		±100	50mΩ ≤ R < 100mΩ
		1/5W (H)		2.00A	4.47A			
NCSM0402	0402	1/16W		1.12A	2.80A	D = 0.5% F = 1.0% G = 2.0% J = 5.0%	±50	100mΩ ≤ R ≤ 10Ω
		1/8W (M)		1.58A	3.54A		±100	50mΩ ≤ R < 100mΩ
		1/4W (H)		2.24A	5.00A			
NCSM0603	0603	1/10W		1.41A	3.54A	D = 0.5% F = 1.0% G = 2.0% J = 5.0%	±50	100mΩ ≤ R ≤ 10Ω
		1/5W (M)		2.00A	4.47A		±100	50mΩ ≤ R < 100mΩ
		2/5W (H)		2.83A	6.32A			
NCSM0805	0805	1/8W		1.79A	4.48A	D = 0.5% F = 1.0% G = 2.0% J = 5.0%	±50	100mΩ ≤ R ≤ 10Ω
		1/4W (M)		2.53A	5.66A		±100	50mΩ ≤ R < 100mΩ
		1/2W (H)		3.58A	8.00A		±150	39mΩ ≤ R < 50mΩ
NCSM1206	1206	1/4W		2.53A	6.33A	C = 0.25%	±50	470mΩ ≤ R ≤ 10Ω
		1/2W (M)		3.58A	8.00A	D = 0.5% F = 1.0% G = 2.0% J = 5.0%	±50	100mΩ ≤ R ≤ 10Ω
		3/4W (H)		4.39A	9.81A		±100	50mΩ ≤ R < 100mΩ
		1W (U)		5.06A	11.32A		±150	39mΩ ≤ R < 50mΩ
NCSM1210	1210	1/2W		3.58A	8.95A	C = 0.25%	±50	470mΩ ≤ R ≤ 10Ω
		1W (M)		5.06A	11.32A	D = 0.5% F = 1.0% G = 2.0% J = 5.0%	±50	100mΩ ≤ R ≤ 10Ω
							±100	50mΩ ≤ R < 100mΩ
NCSM2010	2010	3/4W		2.74A	6.85A	C = 0.25%	±50	470mΩ ≤ R ≤ 10Ω
		1.5W (M)		3.87A	8.66A	D = 0.5% F = 1.0% G = 2.0% J = 5.0%	±50	100mΩ ≤ R ≤ 10Ω
NCSM2512	2512	1W		3.16A	7.91A		C = 0.25%	±50
		2W (M)		4.47A	10.00A	D = 0.5% F = 1.0% G = 2.0% J = 5.0%	±50	100mΩ ≤ R ≤ 10Ω
		3W (H)		5.48A	12.25A			

*Contact NIC for other values

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HIGH CURRENT SPECIFICATIONS

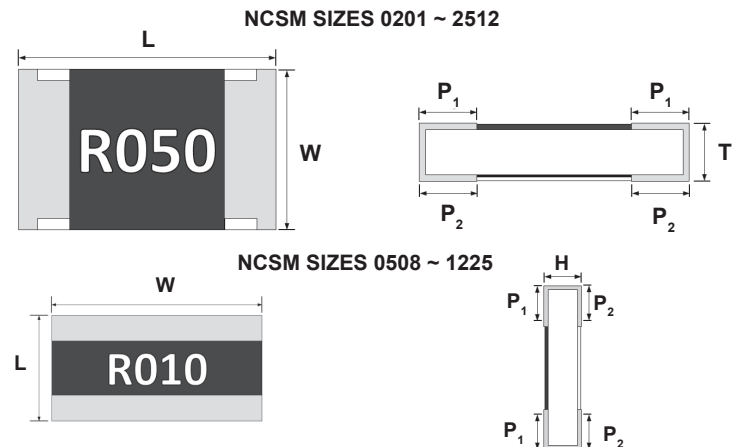
Type	EIA Size	Power Rating & Code At 70°C	Temperature Range	Max.*1 Current Rating	Max.*2 Overload Current	Resistance Tolerance (Code)	Temperature Coefficient (ppm/°C)	Resistance Range (Ω)
NCSM1206	1206	1/4W	-55 °C ~ +155 °C	5.00A	12.50A	F = 1.0% G = 2.0% J = 5.0%	±200	10mΩ ≤ R < 39mΩ
		1/2W (M)		7.07A	15.81A			

REVERSE TERMINATION SPECIFICATIONS

Type	EIA Size	Power Rating & Code At 70°C	Temperature Range	Max.*1 Current Rating	Max.*2 Overload Current	Resistance Tolerance (Code)	Temperature Coefficient (ppm/°C)	Resistance Range (Ω)
NCSM0508	0508	1W	-55 °C ~ +155 °C	10.00A	22.36A	D = 0.5%	±100	100mΩ ≤ R ≤ 2Ω
						F = 1.0% G = 2.0% J = 5.0%		10mΩ ≤ R ≤ 2Ω
NCSM0612	0612	1W		10.00A	22.36A	D = 0.5%		100mΩ ≤ R ≤ 2Ω
						F = 1.0% G = 2.0% J = 5.0%		10mΩ ≤ R ≤ 2Ω
NCSM1020	1020	2W		14.14A	31.62A	D = 0.5%		100mΩ ≤ R ≤ 2Ω
						F = 1.0% G = 2.0% J = 5.0%		10mΩ ≤ R ≤ 2Ω
NCSM1225	1225	3W		17.32A	38.73A	D = 0.5%		100mΩ ≤ R ≤ 2Ω
						F = 1.0% G = 2.0% J = 5.0%		10mΩ ≤ R ≤ 2Ω

DIMENSION (mm)

Size Code	L	W	T	P1	P2
NCSM0201	0.60±0.03	0.30±0.03	0.26±0.05	0.15±0.05	0.15±0.05
NCSM0402	1.00±0.10	0.50±0.05	0.35±0.05	0.20±0.10	0.25±0.10
NCSM0603	1.60±0.10	0.80±0.10	0.45±0.10	0.25±0.15	0.30±0.15
NCSM0805	2.00±0.10	1.25±0.10	0.55±0.10	0.35±0.20	0.40±0.20
NCSM1206	3.10±0.10	1.60±0.10	0.55±0.10	0.40±0.20	0.45±0.20
NCSM1206 10mΩ~<39mΩ	3.30±0.20	1.70±0.20	0.65±0.20	0.20±0.15	0.68±0.20
NCSM1210	3.10±0.10	2.50±0.15	0.55±0.10	0.50±0.20	0.50±0.20
NCSM2010	5.00±0.20	2.50±0.15	0.55±0.10	0.60±0.25	0.60±0.25
NCSM2512	6.30±0.20	3.20±0.20	0.55±0.10	0.65±0.25	0.65±0.25
NCSM2512H	6.30±0.20	3.20±0.20	0.70±0.15	0.65±0.25	0.65±0.25
NCSM0508	1.25±0.10	2.00±0.10	0.55±0.15	0.25±0.15	0.35±0.15
NCSM0612	1.60±0.15	3.20±0.20	0.55±0.15	0.30±0.20	0.50±0.20
NCSM1020	2.50±0.15	5.00±0.15	0.55±0.15	0.40±0.20	0.50±0.20
NCSM1225	3.20±0.20	6.30±0.20	0.55±0.15	0.60±0.25	0.80±0.25



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E-24
Value
100
110
120
130
150
160
180
200
220
240
270
300
330
360
390
430
470
510
560
620
680
750
820
910

PART NUMBER SYSTEM

NCSM 0805 H F R100 TR Q Y E

RoHS compliant

AEC-Q200 Qualified

Tape & Reel Packaging: TR = Standard Tape & Reel

Resistance Code: First 3 digits are significant figures (E-24 values*), 4th digit is the multiplier, "R" indicates a decimal point.

Tolerance Code: C = $\pm 0.25\%$, D = $\pm 0.5\%$, F = $\pm 1\%$ and J = $\pm 5\%$

Power Rating: Blank = Standard, M = Medium, H = High, U = Ultra High

Size Code: 0201 = 0201, 0402 = 0402, 0603 = 0603, etc.

Series

***Contact NIC for other values**

"Y" denotes suitable for automotive equipment, sourced to special production and inspection at IATF-16949 certified production site

Rated Current: The resistor shall have a DC continuous working current or a AC (rms) continuous working current at commercial-line frequency and wave form corresponding to the power rating, as determined formula as following:

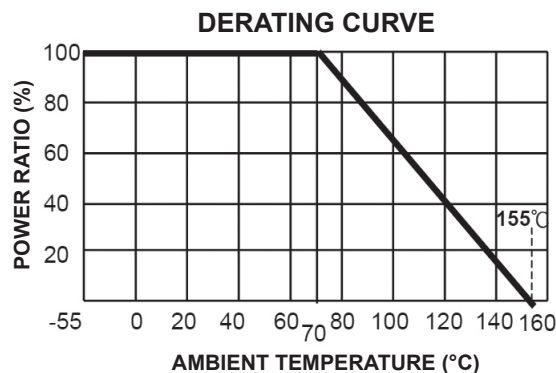
$$\text{Rated Current} < 1\Omega: \sqrt{\text{Power rating (Watts)} / \text{Resistance (Ohms)}}$$

Rated Voltage: The resistor shall have a DC continuous working voltage or a RMS AC continuous working voltage at commercial-line frequency and wave form corresponding to the power rating, as determined formula as following:

$$\text{Rated Voltage} \geq 1\Omega: \sqrt{\text{Power rating (Watts)} \times \text{Resistance (Ohms)}}$$

Power Derating Curve: Operating Temperature Range -55°C ~+155°C)

Power rating or current rating is based on the continuous full-load at ambient temperature of 70°C. For operation at ambient temperature in excess of 70°C, the load should be derated in accordance with the power derating curve below.



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ENVIRONMENTAL CHARACTERISTICS

Item	Requirement	Test Method*
Temperature Coefficient of Resistance	As specified	JIS-C-5201-1 4.8, IEC-60115-1 4.8 +25/+125 +25°C is the reference temperature
Short Time Overload	$\Delta R \pm (1.0\% + 0.001\Omega)$	JIS-C-5201-1 4.13, IEC-60115-1 4.13 Standard power: 6.25 times rated power whichever is less for 5 seconds. High power (2X/4X) and wide terminal type: 5 times rated power whichever is less for 5 seconds.
Insulation Resistance	$\geq 10G\Omega$	JIS-C-5201-1 4.6, IEC-60115-1 4.6 Apply 100VDC for 1 minute.
Dielectric Withstanding Voltage	No short or burned on the appearance.	JIS-C5201-1 4.7 0201 / 0402 / 0603 apply 300VAC for 1 minute. 0805 / 0508 and above apply 500VAC for 1 minute.
Solderability	>95% Coverage. No visual damage	JIS-C-5201-1 4.17, IEC-60115-1 4.17 245±5°C for 3 seconds.
Resistance to Soldering Heat	$\Delta R \pm (1.0\% + 0.001\Omega)$. No visual damage	JIS-C-5201-1 4.18, IEC-60115-1 4.18 260±5°C for 10 seconds.
Leaching	>95% Coverage. No visual damage	JIS-C-5201-1 4.18, IEC-60068-2-58 8.2.1 260±5°C for 30 seconds.
Rapid Change of Temperature	$\Delta R \pm (1.0\% + 0.001\Omega)$. No visual damage	JIS-C-5201-1 4.19, IEC-60115-1 4.19 -55°C to +155°C, 300 cycles
Damp Heat with Load	$\Delta R \pm (1.0\% + 0.001\Omega)$	JIS-C-5201-1 4.24, IEC-60115-1 4.24 40±2°C, 90~95% R.H. RCWV or Max. working current whichever is less for 1000 hrs with 1.5 hrs "ON" and 0.5 hr "OFF"
Biased Humidity	$\Delta R \pm (0.5\% + 0.05\Omega)$	MIL-STD-202 Method 103 1,000 hours; 85°C/85% RH, 10% of operating power. Measurement at 24±4 hours after test conclusion.
Load Life	$\Delta R \pm (0.5\% + 0.05\Omega)$	JIS-C-5201-1 4.25, IEC-60115-1 4.25.1 70±2°C, Rated power, or Max. working current whichever is less for 1000 hrs with 1.5 hrs "ON" and 0.5 hr "OFF"
High Temperature Exposure	$\Delta R \pm (1.0\% + 0.001\Omega)$	JIS-C-5201-1 4.25, IEC-60068-2-2 At 155±5°C for 1000 hours.
Resistance to Solvents	$\Delta R \pm (1.0\% + 0.001\Omega)$. No visual damage	JIS-C-5201-1 4.29 The tested resistor be immersed into isopropyl alcohol of 20~25°C for 60 secs. Then the resistor is left in the room for 48 hrs.
Terminal Strength	None Broken	JIS-C5201-1 4.32, AEC Q200-006 Pressurizing force for 10 seconds 0201:3.4N, 0402/0603:8N, 0805/0508 and above: 17.7N
Bending Strength	$\Delta R \pm (1.0\% + 0.001\Omega)$. No visual damage	JIS-C-5201-1 4.33, IEC-60115-1 4.33 Bending once for 5 seconds D: 0201 / 0402 / 0603 / 0805 = 5mm 1206 / 1210 / 0508 / 0612 = 3mm 2010 / 2512 / 1020 / 1225 = 2mm

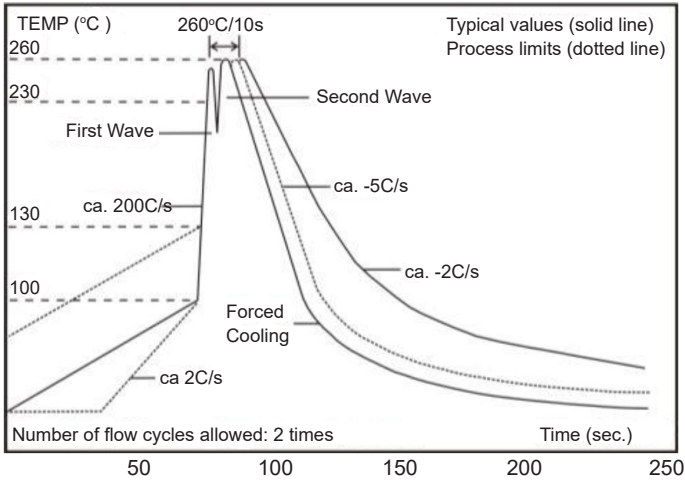
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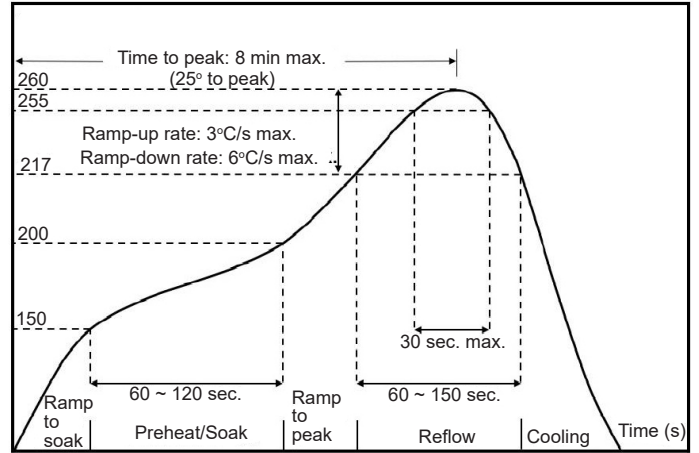


RECOMMENDED SOLDERING PROFILES

WAVE SOLDERING PROFILE

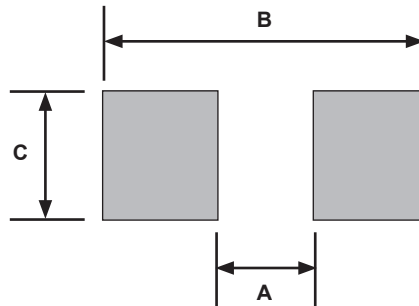


REFLOW SOLDERING PROFILE



LAND PATTERN DIMENSION (mm)

Size Code	A	B	C
NCSM0201	0.25	0.85	0.35
NCSM0402	0.50	1.60	0.70
NCSM0603	0.80	2.40	1.00
NCSM0805	1.30	2.90	1.45
NCSM1206	2.20	4.20	1.80
NCSM1206 10mΩ~<39mΩ	1.20	4.80	1.84
NCSM1210	2.00	4.40	2.70
NCSM2010	3.80	6.60	2.70
NCSM2512	4.90	8.10	3.40
NCSM2512H	4.90	8.10	3.40
NCSM0508	0.40	1.80	2.00
NCSM0612	0.50	2.60	3.20
NCSM1020	1.00	4.05	5.50
NCSM1225	1.20	5.20	7.00



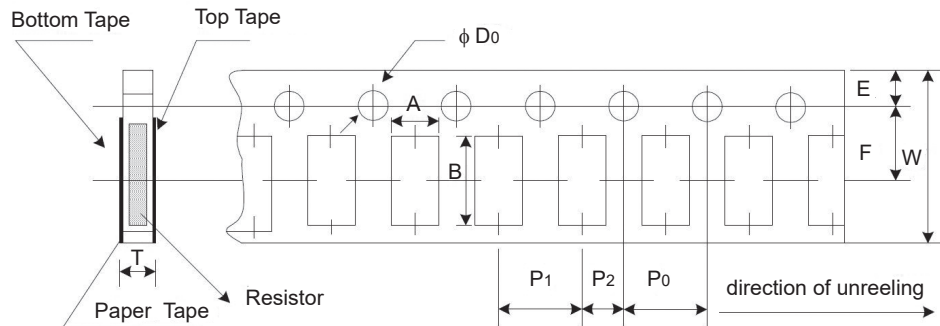
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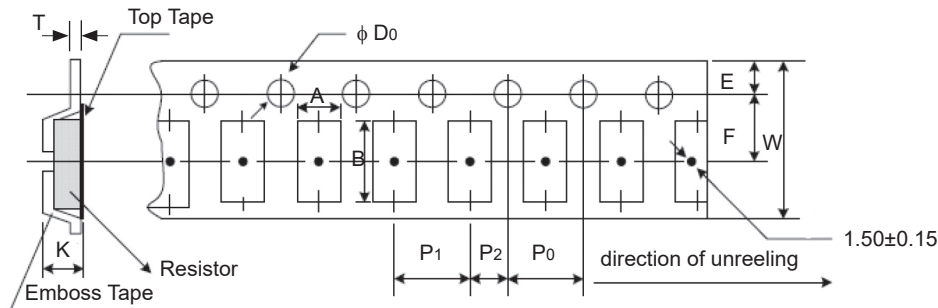
PAPER CARRIER TAPE SPECIFICATIONS (mm)

Size Code	A	B	E	F	P0	P1	P2	T	W
NCSM0201	0.45±0.1	0.75±0.1	1.75±0.1	3.5±0.05	4.0±0.1	2.0±0.1	2.0±0.05	0.35±0.1	8.0±0.2
NCSM0402	0.70±0.1	1.20±0.1				0.45±0.1			
NCSM0603	1.05±0.2	1.80±0.2				0.60±0.1			
NCSM0805	1.55±0.2	2.30±0.2				4.0±0.1		0.75±0.1	
NCSM1206	1.90±0.2	3.05±0.2							
NCSM1210	2.85±0.2	3.05±0.2							
NCSM0508	1.55±0.2	2.30±0.2							
NCSM0612	1.90±0.2	3.05±0.2							



EMBOSSED PLASTIC CARRIER TAPE SPECIFICATIONS (mm)

Size Code	A	B	E	F	P0	P1	P2	T	K	φ D0	W
NCSM2010	2.80±0.2	5.60±0.2	1.75±0.1	5.5±0.05	4.0±0.1	2.0±0.1	2.0±0.05	0.23±0.1	0.85±0.15	1.50+0.1/-0.0	12.0±0.1
NCSM2512	3.40±0.2	6.70±0.2									
NCSM1020	2.80±0.2	5.60±0.2				4.0±0.1					
NCSM1225	3.40±0.2	6.70±0.2									



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TAPING SPECIFICATIONS

Type	A	B	C	T	Paper Tape (EA)
NCSM0201	178 ±2.0	60.0±1.0	13.5 ±1.0	11.5 ±2.0	10,000
NCSM0402				11.5 ±2.0	10,000
NCSM0603				11.5 ±2.0	5,000
NCSM0805				11.5 ±2.0	5,000
NCSM1206				11.5 ±2.0	5,000
NCSM1210				11.5 ±2.0	5,000
NCSM2010				16.0 ±2.0	4,000
NCSM2512				16.0 ±2.0	4,000
NCSM0508				11.5 ±2.0	5,000
NCSM0612				11.5 ±2.0	5,000
NCSM1020				16.0 ±2.0	4,000
NCSM1225				16.0 ±2.0	4,000

REEL DIMENSIONS (mm)

