

# Current Sensing Chip Resistors

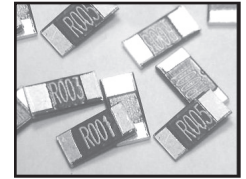
NCSR Series

## FEATURES

- SURFACE MOUNTABLE 1206, 2010 AND 2512 CASE SIZE
- LOW RESISTANCE & LOW INDUCTANCE METAL STRIP CONSTRUCTION
- PRECISION TOLERANCE ( $\pm 1\%$ ) AND TCR ( $\pm 50$ PPM) TO  $+170^\circ\text{C}$
- TAPED & REEL PACKAGING FOR EASY PICK AND PLACE
- REFLOW COMPATIBLE

**RoHS  
Compliant**

includes all homogeneous materials



See Part Number System for Details

## SPECIFICATIONS

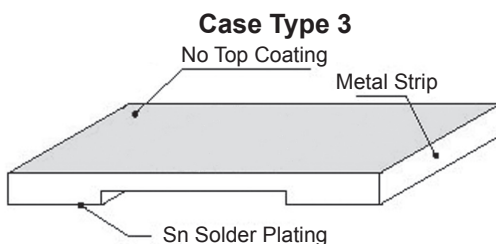
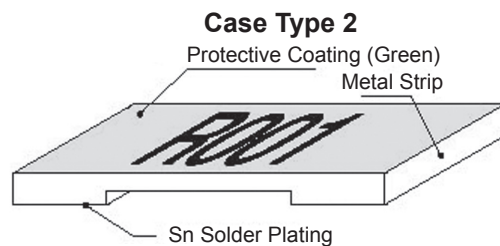
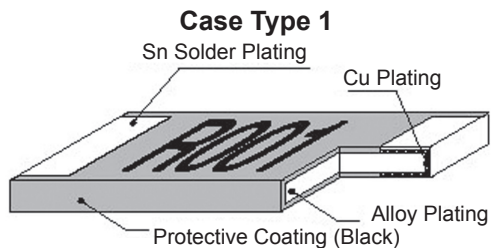
Type	EIA Size	Power Rating at 80°C	Case Type**	Resistance Tolerance (Code)	Temperature Coefficient (ppm/°C)	Resistance Range	Operating Temperature Range (°C)
NCSR100S	1206	1 Watt	3	$\pm 1\%$ (F) $\pm 3\%$ (H) $\pm 5\%$ (J)	$\pm 50$ (D)* $\pm 75$ (W)* $\pm 100$ (E)* $\pm 150$ (K)* $\pm 200$ (F)*	0.5m $\Omega$ ~ 10m $\Omega$	-55°C ~ +170°C
NCSR150	2010	1.5 Watt	3			0.5m $\Omega$ ~ 10m $\Omega$	
NCSR100	2512	1 Watt	1 & 2			0.5m $\Omega$ ~ 15m $\Omega$	
NCSR200		2 Watt	1 & 2			0.5m $\Omega$ ~ 10m $\Omega$	
NCSR250		2.5 Watt	2			4.0m $\Omega$ ~ 6.0m $\Omega$	
NCSR300		3 Watt	1 & 2			0.5m $\Omega$ ~ 3.0m $\Omega$	

\*See Part Number Tables for Available Value/ TCR, \*\* See Part Number Tables for Case Type

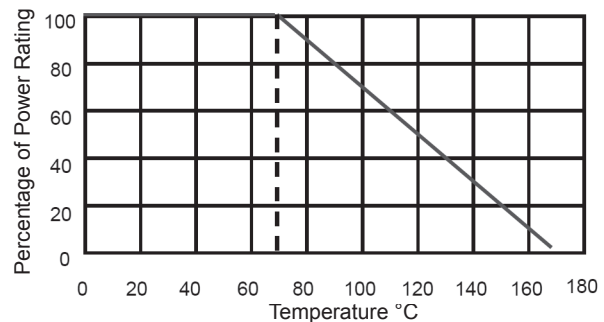
## ENVIRONMENTAL CHARACTERISTICS

Item	Specification			Test Method
	Type 1	Type 2	Type 3	
Temperature Coefficient of Resistance	As Specified			MIL-STD-202, Method 304 +25/-55/+25/+125/+25°C
Thermal Shock	$\pm 0.5\%$	$\pm 1\%$	$\pm 1\%$	MIL-STD-202, Method 107G -55°C ~ +150°C, 100 cycles
Short Time Overload	$\pm 0.5\%$	$\pm 1\%$	$\pm 1\%$	JIS-C-5202-5.5 5x rated power for 5 seconds
Resistance to dry heat	$\pm 1\%$	$\pm 1\%$	$\pm 1\%$	JIS-C-5202-7.2 96 hrs @ 155°C without load
Load Life	$\pm 1\%$	$\pm 1\%$	$\pm 1\%$	MIL-STD-202 Method 108 RCWV @ 70°C, cycles of 1.5 hours on, 0.5 hrs off for 1,000 ~ 1,048 hrs
Resistance to Soldering Heat	$\pm 0.5\%$	$\pm 1\%$	$\pm 1\%$	MIL-STD-202F Method 210E 260°C $\pm 5^\circ\text{C}$ for 10 sec. $\pm 1$ sec.
Solderability	95% min. coverage			MIL-STD-202F Method 208H 245°C $\pm 5^\circ\text{C}$ for 5 sec. $\pm 0.5$ sec.

**MAXIMUM OPERATING CURRENT:**  $I$  (Amps)  $\sqrt{P$  (Watts)/ $R$  (Ohms)



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



## THERMAL EMF

Type	EIA Size	Power Rating	Case Type	Resistance Value	Thermal EMF
NCSR100S	1206	1 Watt	3	0.5m $\Omega$ ~ 3m $\Omega$	-1 $\mu\text{V}/^\circ\text{C}$
				3.5m $\Omega$ ~ 10m $\Omega$	-6 $\mu\text{V}/^\circ\text{C}$
NCSR150	2010	1.5 Watt	3	0.5m $\Omega$ ~ 3m $\Omega$	-1 $\mu\text{V}/^\circ\text{C}$
				3.5m $\Omega$ ~ 10m $\Omega$	-6 $\mu\text{V}/^\circ\text{C}$
NCSR100	2512	1 Watt	1	0.5m $\Omega$ ~ 2m $\Omega$	-1 $\mu\text{V}/^\circ\text{C}$
			2	10m $\Omega$ ~ 15m $\Omega$	+1 $\mu\text{V}/^\circ\text{C}$
NCSR200		2 Watt	1	0.5m $\Omega$ ~ 2m $\Omega$	-1 $\mu\text{V}/^\circ\text{C}$
			2	6.5m $\Omega$ ~ 10m $\Omega$	-6 $\mu\text{V}/^\circ\text{C}$
NCSR250	2.5 Watt	2	4m $\Omega$ ~ 6m $\Omega$	-6 $\mu\text{V}/^\circ\text{C}$	
NCSR300		3 Watt	1	0.5m $\Omega$ ~ 2m $\Omega$	-1 $\mu\text{V}/^\circ\text{C}$
			2	0.5m $\Omega$ ~ 3m $\Omega$	-1 $\mu\text{V}/^\circ\text{C}$
			2	3.5m $\Omega$ ~ 10m $\Omega$	-6 $\mu\text{V}/^\circ\text{C}$



## NCSR100S (1 WATT, 1206 CASE SIZE) AVAILABLE VALUES

Part Number	Resistance Value (mΩ)	Available Tolerance	Available TCR	Length (L)	Width (W)	Thickness (T)	Termination Width (P)	Case Type
NCSR100S*M50FTRT3F	0.5	±1% (F) ±3% (H) ±5% (J)	±200ppm (F)	3.20 ±0.25	1.60 ±0.10	0.60 ± 0.20	1.35 ±0.25	3
NCSR100S*M75DTRT3F	0.75		±50ppm (D)				1.23 ± 0.25	
NCSR100S*R001DTRT3F	1.0		1.10 ±0.25					
NCSR100S*R002DTRT3F	2.0		0.60 ±0.25					
NCSR100S*R003DTRT3F	3.0		0.60 ±0.25					
NCSR100S*R004DTRT3F	4.0		1.10 ±0.25					
NCSR100S*R005DTRT3F	5.0		1.10 ±0.25					
NCSR100S*R006DTRT3F	6.0		1.10 ±0.25					
NCSR100S*R007DTRT3F	7.0		0.90 ±0.25					
NCSR100S*R008DTRT3F	8.0		0.90 ±0.25					
NCSR100S*R009DTRT3F	9.0		0.90 ±0.25					
NCSR100S*R010DTRT3F	10		0.60 ±0.25					

\* Insert appropriate tolerance code, Contact NIC regarding availability of other values

## NCSR100 (1 WATT, 2512 CASE SIZE) AVAILABLE VALUES

Part Number	Resistance Value (mΩ)	Available Tolerance	Available TCR	Length (L)	Width (W)	Thickness (T)	Termination Width (P)	Case Type
NCSR100*M50DTRF	0.50	±1% (F) ±3% (H) ±5% (J)	±50ppm (D)	6.35±0.254	3.18 ±0.254	1.25 ± 0.20	1.30 ±0.38	1
NCSR100*M75DTRF	0.75					0.75 ± 0.20		
NCSR100*R001DTRF	1.0					0.65 ± 0.20		
NCSR100*1M50DTRF	1.5					0.45 ± 0.20		
NCSR100*R002DTRF	2.0		0.35 ± 0.20					
NCSR100*2M50KTRF	2.5		±150ppm (K)			0.65 ± 0.20		
NCSR100*R003KTRF	3.0		±100ppm (E)			0.55 ± 0.20		
NCSR100*R004ETRF	4.0		0.45 ± 0.20					
NCSR100*R005ETRF	5.0		0.35 ± 0.20					
NCSR100*R006WTRF	6.0		0.32 ± 0.20					
NCSR100*6M50WTRF	6.5		±75ppm (W)			0.30 ± 0.20		
NCSR100*R007WTRF	7.0		0.27 ± 0.20					
NCSR100*R010ETRF	10		±100ppm (E)			0.25 ± 0.20		

\* Insert appropriate tolerance code

## NCSR150 (1.5 WATT, 2010 CASE SIZE) AVAILABLE VALUES

Part Number	Resistance Value (mΩ)	Available Tolerance	Available TCR	Length (L)	Width (W)	Thickness (T)	Termination Width (P)	Case Type
NCSR150*M50ETRT3F	0.50	±1% (F) ±3% (H) ±5% (J)	±100ppm (E)	5.08 ±0.25	2.54 ±0.15	0.6 ±0.20	2.17 ± 0.25	3
NCSR150*M75DTRT3F	0.75		±50ppm (D)				2.04 ± 0.25	
NCSR150*R001DTRT3F	1.0		1.84 ± 0.25					
NCSR150*R002DTRT3F	2.0		1.54 ± 0.25					
NCSR150*R003DTRT3F	3.0		1.04 ± 0.25					
NCSR150*R004DTRT3F	4.0		1.84 ± 0.25					
NCSR150*R005DTRT3F	5.0		1.84 ± 0.25					
NCSR150*R006DTRT3F	6.0		1.54 ± 0.25					
NCSR150*R007DTRT3F	7.0		1.54 ± 0.25					
NCSR150*R008DTRT3F	8.0		1.54 ± 0.25					
NCSR150*R009DTRT3F	9.0		1.29 ± 0.25					
NCSR150*R010DTRT3F	10		1.29 ± 0.25					

\* Insert appropriate tolerance code

## NCSR200 (2 WATT, 2512 CASE SIZE) AVAILABLE VALUES

Part Number	Resistance Value (mΩ)	Available Tolerance	Available TCR	Length (L)	Width (W)	Thickness (T)	Termination Width (P)	Case Type	
NCSR200*M50DTRF	0.50	±1% (F) ±3% (H) ±5% (J)	±50ppm (D)	6.35 ±0.254	3.18 ±0.254	1.25 ± 0.20	1.30 ± 0.38	1	
NCSR200*M75DTRF	0.75					0.75 ± 0.20			
NCSR200*R001DTRF	1.0					0.65 ± 0.20			
NCSR200*1M50DTRF	1.5					0.45 ± 0.20			
NCSR200*R002DTRF	2.0					0.35 ± 0.20			
NCSR200*6M50DTRGF	6.5			6.35 ± 0.25	3.00 ± 0.20	0.60 ± 0.20	1.43 ± 0.25	1.18 ± 0.25	2
NCSR200*R007DTRGF	7.0								
NCSR200*R008DTRGF	8.0								
NCSR200*R009DTRGF	9.0								
NCSR200*R010DTRGF	10								

\* Insert appropriate tolerance code

## NCSR250 (2.5 WATT, 2512 CASE SIZE) AVAILABLE VALUES

Part Number	Resistance Value (mΩ)	Available Tolerance	Available TCR	Length (L)	Width (W)	Thickness (T)	Termination Width (P)	Case Type
NCSR250*R004DTRGF	4.0	±1% (F) ±3% (H) ±5% (J)	±50ppm (D)	6.35 ±0.25	3.00 ±0.20	0.60 ±0.20	2.18 ±0.25	2
NCSR250*4M50DTRGF	4.5							
NCSR250*R005DTRGF	5.0						1.93 ±0.25	
NCSR250*R006DTRGF	6.0							

\* Insert appropriate tolerance code

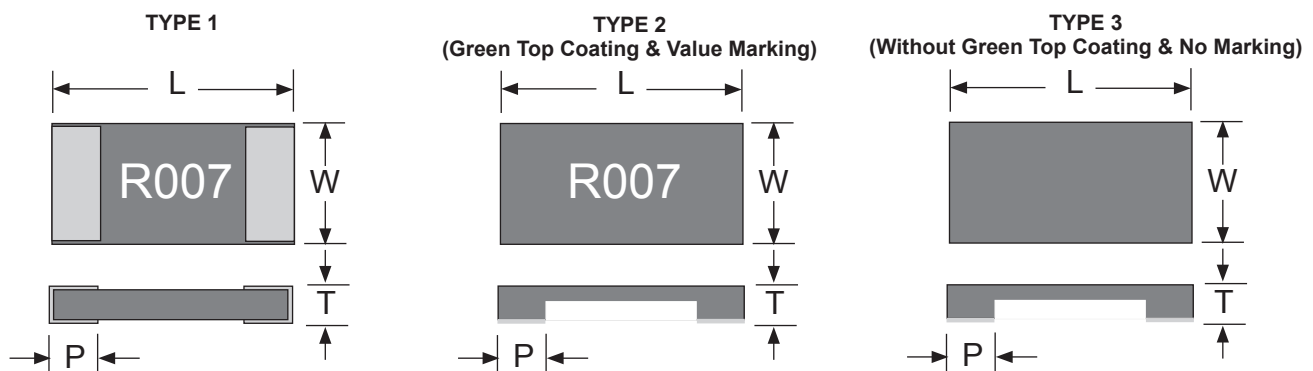
## NCSR300 (3 WATT, 2512 CASE SIZE) TYPE 1 BLACK COATING AVAILABLE VALUES

Part Number	Resistance Value (mΩ)	Available Tolerance	Available TCR	Length (L)	Width (W)	Thickness (T)	Termination Width (P)	Case Type
NCSR300*M50DTRF	0.50	±1% (F) ±3% (H) ±5% (J)	±50ppm (D)	6.35 ±0.254	3.18 ±0.254	1.25 ±0.20	1.30 ±0.38	1
NCSR300*M75DTRF	0.75					0.75 ±0.20	1.30 ±0.38	
NCSR300*R001DTRF	1.0					0.65 ±0.20	1.30 ±0.38	
NCSR300*1M50DTRF	1.5					0.45 ±0.20	1.30 ±0.38	
NCSR300*R002DTRF	2.0					0.35 ±0.20	1.30 ±0.38	

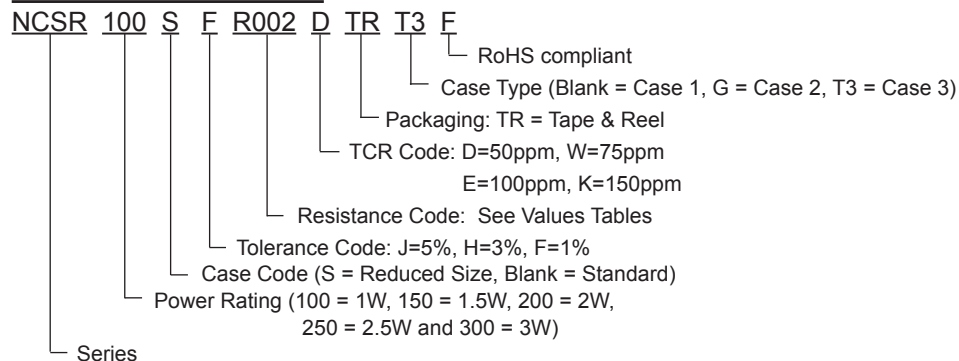
## NCSR300 (3 WATT, 2512 CASE SIZE) TYPE 2 GREEN COATING AVAILABLE VALUES

Part Number	Resistance Value (mΩ)	Available Tolerance	Available TCR	Length (L)	Width (W)	Thickness (T)	Termination Width (P)	Case Type
NCSR300*M50ETRGF	0.50	±1% (F) ±3% (H) ±5% (J)	±100ppm (E)	6.35 ±0.25	3.00 ±0.20	0.60 ±0.20	2.68 ±0.25	2
NCSR300*M75ETRGF	0.75						2.48 ±0.25	
NCSR300*R001DTRGF	1.0						1.93 ±0.25	
NCSR300*1M50DTRGF	1.5		±50ppm (D)				1.43 ±0.25	
NCSR300*R002DTRGF	2.0						1.18 ± 0.25	
NCSR300*2M50DTRGF	2.5							
NCSR300*R003DTRGF	3.0							

\* Insert appropriate tolerance code



### PART NUMBER SYSTEM



**1206 TYPE 3 WITH NO COATING**  
**NCSR100S 2-WIRE LAND PATTERN DIM. (mm)**  
 (no traces between pads to avoid short circuit)

Case Size	A	B	C
0M50	1.80	0.55	1.90
0M75	1.68	0.55	1.90
R001	1.55	0.55	1.89
R002~R003	1.05	1.55	1.89
R004~R006	1.55	0.55	1.89
R007~R009	1.35	0.95	1.89
R010	1.05	1.55	1.89

**2010 TYPE 3 WITH NO COATING**  
**NCSR150 2-WIRE LAND PATTERN DIM. (mm)**  
 (no traces between pads to avoid short circuit)

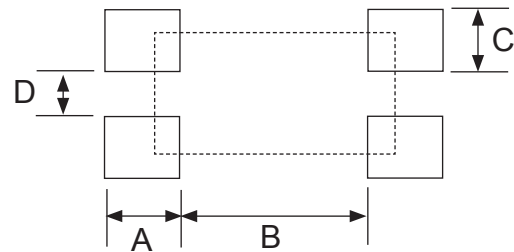
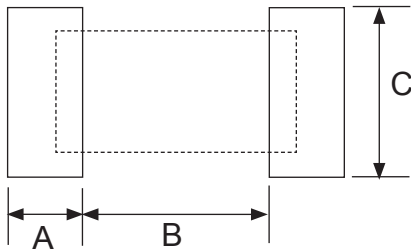
Case Size	A	B	C
0M50	2.61	0.60	2.89
0M75	2.49	0.80	2.89
R001	2.29	0.95	2.89
R002	1.99	1.55	2.89
R003	1.49	2.55	2.89
R004~R005	2.29	0.95	2.89
R006~R008	1.99	1.55	2.89
R009~R010	1.74	2.05	2.89

**1206 TYPE 3 WITH NO COATING**  
**NCSR100S 4-WIRE LAND PATTERN DIM. (mm)**  
 (no traces between pads to avoid short circuit)

Case Size	A	B	C	D
0M50	1.80	0.55	0.7	0.5
0M75	1.68	0.55	0.7	0.5
R001	1.55	0.55	0.7	0.5
R002~R003	1.05	1.55	0.7	0.5
R004~R006	1.55	0.55	0.7	0.5
R007~R009	1.35	0.95	0.7	0.5
R010	1.05	1.55	0.7	0.5

**2010 TYPE 3 WITH NO COATING**  
**NCSR150 4-WIRE LAND PATTERN DIM. (mm)**  
 (no traces between pads to avoid short circuit)

Case Size	A	B	C	D
0M50	2.61	0.60	1.045	0.8
0M75	2.49	0.80	1.045	0.8
R001	2.29	0.95	1.045	0.8
R002	1.99	1.55	1.045	0.8
R003	1.49	2.55	1.045	0.8
R004~R005	2.29	0.95	1.045	0.8
R006~R008	1.99	1.55	1.045	0.8
R009~R010	1.74	2.05	1.045	0.8



**2512 TYPE 1 WITH BLACK COATING**  
**2-WIRE LAND PATTERN DIM. (mm)**  
 (no traces between pads to avoid short circuit)

Case Size	A	B	C
2512	2.70	2.95	3.6

**2512 TYPE 2 WITH GREEN COATING**  
**2-WIRE LAND PATTERN DIM. (mm)**  
 (no traces between pads to avoid short circuit)

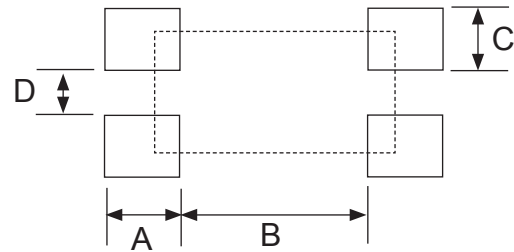
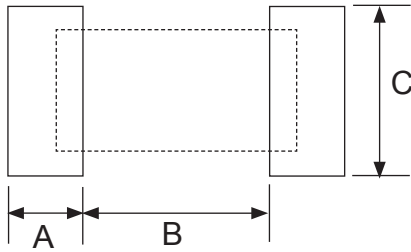
Case Size	A	B	C
0M50	3.13	0.52	3.4
0M75	2.93	0.94	3.4
R001	2.38	2.04	3.4
1M5	1.88	3.04	3.4
R002~R003	1.63	3.54	3.4
R004~4M50	2.63	1.54	3.4
R005~R006	2.38	2.04	3.4
6M50~R007	1.88	3.04	3.4
R008~R015	1.63	3.54	3.4

**2512 TYPE 1 WITH BLACK COATING**  
**4-WIRE LAND PATTERN DIM. (mm)**  
 Recommended for precision current sensing  
 (no traces between pads to avoid short circuit)

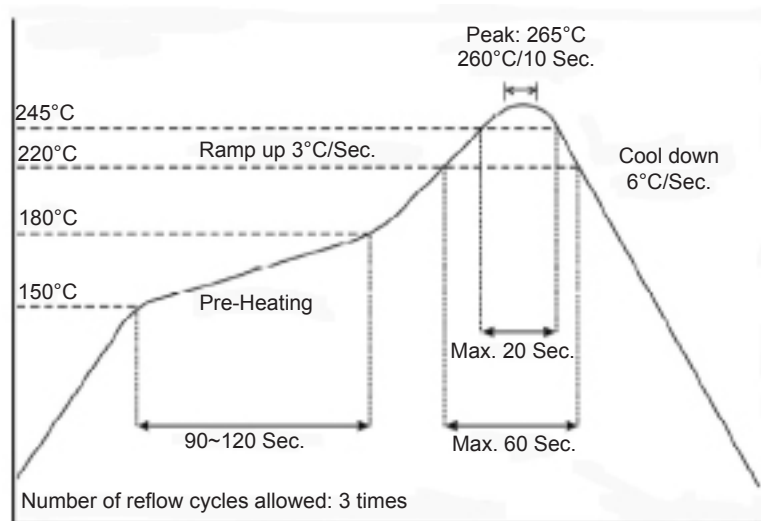
Case Size	A	B	C	D
2512	2.70	2.95	1.45	1.00

**2512 TYPE 2 WITH GREEN COATING**  
**4-WIRE LAND PATTERN DIM. (mm)**  
 Recommended for precision current sensing  
 (no traces between pads to avoid short circuit)

Case Size	A	B	C	D
0M50	3.13	0.52	1.2	1.0
0M75	2.93	0.94	1.2	1.0
R001	2.38	2.04	1.2	1.0
1M5	1.88	3.04	1.2	1.0
R002~R003	1.63	3.54	1.2	1.0
R004~4M50	2.63	1.54	1.2	1.0
R005~R006	2.38	2.04	1.2	1.0
6M50~R007	1.88	3.04	1.2	1.0
R008~R015	1.63	3.54	1.2	1.0

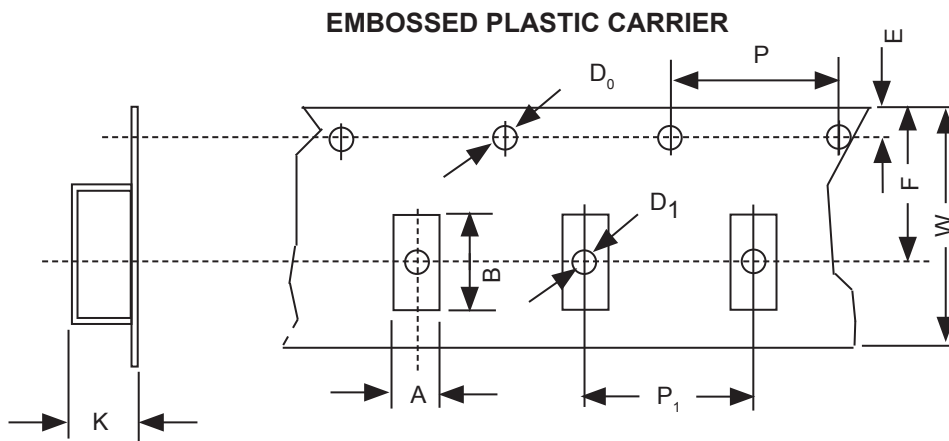


**RECOMMENDED REFLOW  
 SOLDERING TEMPERATURE PROFILE**



## TAPE DIMENSIONS (mm)

Case Size	Resistance Values	A	B	K		P	P <sub>1</sub>	E	F	D <sub>0</sub>	W	Quantity per Reel
				Case 1	Case 2							
1206	All	2.0 ±0.15	3.60 ±0.2	0.87 ±0.1	n/a	4.0 ±0.1	4.0 ±0.1	1.75 ±0.1	3.50 ±0.05	1.55 <sup>+1/-0</sup>	8.0 ±0.2	2,000
2010	All	2.85 ±0.1	5.55 ±0.1	n/a	0.85 ±0.2	4.0 ±0.1	4.0 ±0.1	1.75 ±0.1	5.50 ±0.05	1.55 ±0.05	12.0 ±0.3	
2512	0.50	3.40 ±0.1	6.70 ±0.1	1.45 ±0.2	0.87 ±0.2	4.0 ±0.1	4.0 ±0.1	1.75 ±0.1	5.50 ±0.05	1.55 ±0.05	12.0 ±0.3	
	0.75	3.50 ±0.1	6.80 ±0.1	0.87 ±0.2		4.0 ±0.1	4.0 ±0.1	1.75 ±0.1	5.50 ±0.05	1.55 ±0.05	12.0 ±0.3	
	1 ~ 22	3.40 ±0.1	6.70 ±0.1	0.87 ±0.2		4.0 ±0.1	4.0 ±0.1	1.75 ±0.1	5.50 ±0.05	1.55 ±0.05	12.0 ±0.3	



**Notice:**

1. The cumulative tolerance of 10 sprocket hole pitch is ±0.2mm.
2. Carrier camber shall be not more than 1mm per 100mm through a length of 250mm.
3. A & B measured 0.3mm from the bottom of the packet
4. K measured at a point on the inside bottom of the packet to the top surface of the carrier.
5. Pocket position relative to sprocket hole is measured as the true position of the pocket and not the pocket hole.

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[NPIM74C3R3MTRF](#) [NPI104C100MTRF](#) [NRLM102M100V25X25F](#) [NRLM223M50V 35X50F](#)