

## FEATURES

- STACKED METALLIZED POLYPHENYLENE SULFIDE (PPS) FILM
- STANDARD EIA 0603, 0805, 1206, 1210, 1913 AND 2416 SIZES
- WIDE TEMPERATURE RANGE UP TO +125°C (100pF ~ 0.1μF)
- HIGH HEAT AND MOISTURE RESISTANT
- VERY STABLE TEMPERATURE, FREQUENCY, VOLTAGE, BIAS AND DIELECTRIC ABSORPTION CHARACTERISTICS
- SUITABLE FOR REFLOW SOLDERING
- TAPE AND REEL PACKAGING

**NSHC IS  
RECOMMENDED  
FOR NEW DESIGNS**



**RoHS  
Compliant**  
includes all homogeneous materials

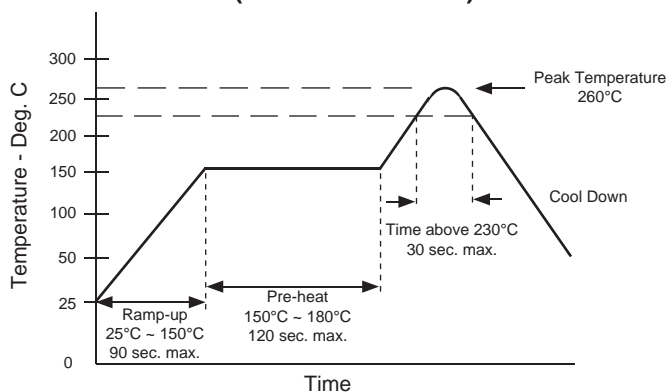
\*See Part Number System for Details

| SPECIFICATIONS                  | Case Sizes   |               |                 |               |               |               |
|---------------------------------|--|---------------|-----------------|---------------|---------------|---------------|
|                                 | 0603   | 0805          | 1206            | 1210          | 1913          | 2416          |
| Capacitance Range               | 100pF ~ 0.0027μF   | 100pF ~ .01μF | 3300pF ~ .047μF | .012μF ~ .1μF | .047μF ~ .1μF | .12μF ~ .22μF |
| Voltage Ratings                 | 16Vdc (12Vrms), 50Vdc (40Vrms)   |               |                 |               |               |               |
| Capacitance Tolerance           | ±5% Std, ±2% Opt.  |               |                 |               |               |               |
| Temperature Range               | -55°C ~ +125°C (0.12μF ~ 0.22μF voltage derated above +105°C)  |               |                 |               |               |               |
| Dissipation Factor (20°C)       | 0.6% max. @ 1KHz   |               |                 |               |               |               |
| Insulation Resistance (20°C)    | 3 Gigohms Minimum  |               |                 |               |               |               |
| Dielectric Withstanding Voltage | 150% of Rated Voltage 60 Seconds or<br>175% of Rated Voltage for 5 Seconds (except 1913 and 2416 case sizes) |               |                 |               |               |               |
| Temperature Characteristic      | ±3% ΔC Maximum Over Temperature Range  |               |                 |               |               |               |
| Dielectric Absorption           | 0.05 ~ 0.10% Typical   |               |                 |               |               |               |

## ENVIRONMENTAL CHARACTERISTICS

|  |   |  |
|--|---|--|
| Life Test At +125°C<br>1,000 Hours at 125% of<br>Rated Voltage                                     | Capacitance Change  | Within ±2% of Initial Value  |
|  | Dissipation Factor  | 0.68% Maximum  |
|  | Insulation Resistance   | 1 Gigohm Minimum   |
| Resistance to Soldering Heat<br>+260°C Peak  | Capacitance Change  | Within ±3% of Initial Value  |
|  | Dissipation Factor  | 0.66% Maximum  |
|  | Insulation Resistance   | 1 Gigohm Minimum   |
| Humidity Load Life:<br>(1) 1000 Hours, +40°C<br>(2) 500 Hours, +60°C<br>(3) 500 Hours +85°C/85% RH | Capacitance Change  | (1) & (2) Within ±2% of Initial value (3) Within ±10% of initial value |
|  | Dissipation Factor  | (1) & (2) 0.90% Maximum (3) 1.2% maximum                               |
|  | Insulation Resistance   | (1) 1 Gigohm Minimum (2) 0.5 Gigohm Minimum (3) 0.01 Gigohm min.       |
| Solderability with<br>25% Wt Rosin-Methanol Flux   | 90% Minimum Coverage After 2.5 Second Dip into 255°C Solder Pot |  |

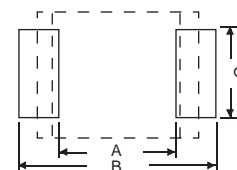
## RECOMMENDED REFLOW PROFILE (maximum 2 times)



Solder within 1 year. Storage at +30°C and 60% RH

## RECOMMENDED LAND PATTERN (mm)

| EIA Size | A   | B   | C   |
|----------|-----|-----|-----|
| 0603     | 0.6 | 2.0 | 0.7 |
| 0805     | 0.8 | 2.4 | 1.1 |
| 1206     | 1.8 | 3.6 | 1.4 |
| 1210     | 1.8 | 3.6 | 2.3 |
| 1913     | 3.0 | 5.6 | 3.0 |
| 2416     | 4.0 | 7.0 | 3.8 |



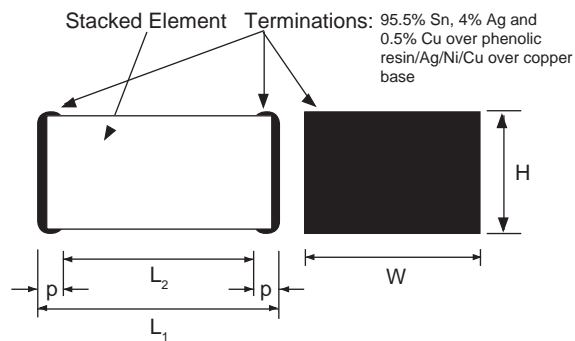
## STANDARD PRODUCTS AND SIZE CODE

| Cap.   | Code | Working Voltage (Vdc) |    |
|--------|------|-----------------------|----|
|        |      | 16                    | 50 |
| 100pF  | 101  | J1                    | A1 |
| 120    | 121  | J1                    | A1 |
| 150    | 151  | J1                    | A1 |
| 180    | 181  | J1                    | A1 |
| 220    | 221  | J1                    | A1 |
| 270    | 271  | J1                    | A1 |
| 330    | 331  | J1                    | A1 |
| 390    | 391  | J1                    | A1 |
| 470    | 471  | J1                    | A1 |
| 560    | 561  | J1                    | A1 |
| 680    | 681  | J1                    | A1 |
| 820    | 821  | J1                    | A1 |
| 0.001  | 102  | J1                    | A1 |
| 0.0012 | 122  | J1                    | A1 |
| 0.0015 | 152  | J1                    | A1 |
| 0.0018 | 182  | J1                    | A1 |
| 0.0022 | 222  | J1                    | A1 |
| 0.0027 | 272  | J1                    | A1 |
| 0.0033 | 332  | A1                    | B1 |
| 0.0039 | 392  | A1                    | B1 |
| 0.0047 | 472  | A1                    | B1 |
| 0.0056 | 562  | A1                    | B1 |
| 0.0068 | 682  | A1                    | B1 |
| 0.0082 | 822  | A2                    | B2 |
| 0.010  | 103  | A2                    | B2 |
| 0.012  | 123  | B1                    | C1 |
| 0.015  | 153  | B1                    | C1 |
| 0.018  | 183  | B1                    | C2 |
| 0.022  | 223  | B1                    | C2 |
| 0.027  | 273  | B2                    | C2 |
| 0.033  | 333  | B2                    | C3 |
| 0.039  | 393  | B3                    | C3 |
| 0.047  | 473  | B3                    | D5 |
| 0.056  | 563  | C2                    | D5 |
| 0.068  | 683  | C2                    | D5 |
| 0.082  | 823  | C3                    | D6 |
| 0.10   | 104  | C3                    | D6 |
| 0.12   | 124  | -                     | E6 |
| 0.15   | 154  | -                     | E6 |
| 0.18   | 184  | -                     | E7 |
| 0.22   | 224  | -                     | E8 |

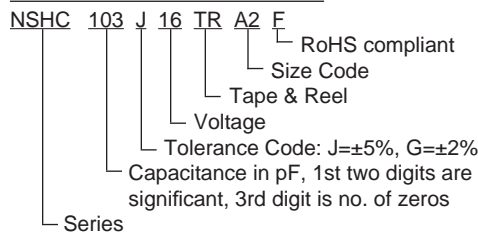
## DIMENSION (mm) AND CASE CODE

| Case Code | Length L ±0.2 | Width W    | Height H ±0.2 | p           | EIA  |
|-----------|---------------|------------|---------------|-------------|------|
| J1        | 1.6           | 0.8 ± 0.15 | 0.7 ± 0.15    | 0.35 ± 0.20 | 0603 |
| A1        | 2.0           | 1.25 ± 0.2 | 0.9           | 0.45 ± 0.25 | 0805 |
| A2        |               |            | 1.1           |             |      |
| B1        | 3.2           | 1.6 ± 0.2  | 0.9           | 0.65 ± 0.35 | 1206 |
| B2        |               |            | 1.1           |             |      |
| B3        |               |            | 1.5           |             |      |
| C1        | 3.2           | 2.5 ± 0.2  | 1.1           | 0.80 ± 0.30 | 1210 |
| C2        |               |            | 1.5           |             |      |
| C3        |               |            | 2.1           |             |      |
| D5        | 4.8           | 3.3 ± 0.3  | 1.5           | 0.80 ± 0.30 | 1913 |
| D6        |               |            | 2.1           |             |      |
| E6        | 6.0           | 4.1 ± 0.3  | 1.9           | 0.80 ± 0.30 | 2416 |
| E7        |               |            | 2.5           |             |      |
| E8        |               |            | 2.8           |             |      |

## OUTLINE DRAWING



## PART NUMBER SYSTEM



## FEATURES

- STACKED METALLIZED POLYPHENYLENE SULFIDE (PPS) FILM
- STANDARD EIA 1913, 2416, 2820 AND 2825 SIZES
- WIDE TEMPERATURE RANGE UP TO +105°C
- HIGH HEAT AND MOISTURE RESISTANT
- VERY STABLE TEMPERATURE, FREQUENCY, VOLTAGE, BIAS AND DIELECTRIC ABSORPTION CHARACTERISTICS
- SUITABLE FOR REFLOW SOLDERING
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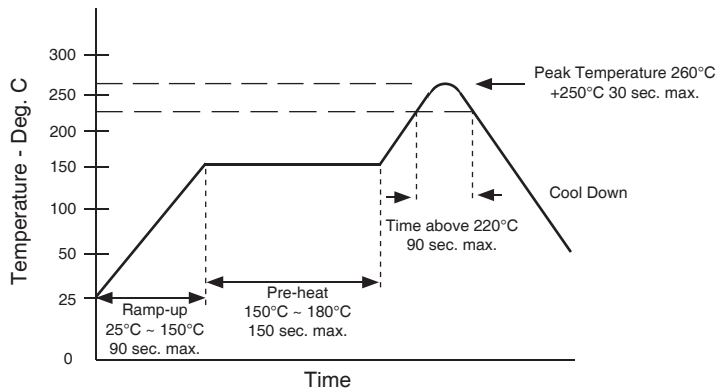
\*See Part Number System for Details

| SPECIFICATIONS                  | Case Sizes   |                      |                      |                      |
|---------------------------------|--|----------------------|----------------------|----------------------|
|                                 | 1913   | 2416                 | 2820                 | 2825                 |
| Capacitance Range               | 0.01 ~ 0.027 $\mu$ F                                       | 0.033 ~ .068 $\mu$ F | 0.082 ~ 0.12 $\mu$ F | 0.015 ~ 0.22 $\mu$ F |
| Voltage Ratings                 | 100Vdc (40Vrms) max.                                       |                      |                      |                      |
| Capacitance Tolerance           | $\pm$ 5% Std, $\pm$ 2% Opt.                                |                      |                      |                      |
| Temperature Range               | -55°C ~ +105°C   |                      |                      |                      |
| Dissipation Factor (20°C)       | 0.6% max. @ 1KHz   |                      |                      |                      |
| Insulation Resistance (20°C)    | 3 Gigohms Minimum  |                      |                      |                      |
| Dielectric Withstanding Voltage | 150% of Rated Voltage 60 Seconds                           |                      |                      |                      |
| Temperature Characteristic      | $\pm$ 1% $\Delta$ C Maximum Over Temperature Range Typical |                      |                      |                      |
| Dielectric Absorption           | 0.05 ~ 0.10% Typical                                       |                      |                      |                      |

## ENVIRONMENTAL CHARACTERISTICS

|  |   |                                      |
|--|---|--------------------------------------|
| Life Test At +105°C<br>1,000 Hours at 125% of<br>Rated Voltage | Capacitance Change  | Within $\pm$ 2% of Initial Value     |
|  | Dissipation Factor  | 0.66% Maximum                        |
|  | Insulation Resistance   | 1 Gigohm Minimum                     |
| Resistance to Soldering Heat<br>+260°C Peak                    | Capacitance Change  | Within $\pm$ 3% of Initial Value     |
|  | Dissipation Factor  | 0.66% Maximum                        |
|  | Insulation Resistance   | 1 Gigohm Minimum                     |
| Humidity Load Life:<br>1000 Hours, +40°C/95% RH                | Capacitance Change  | Within $\pm$ 3% of initial value     |
|  | Dissipation Factor  | 0.90% maximum @ 1KHz                 |
|  | Insulation Resistance   | 1 Gigohm minimum                     |
|  | Dielectric Withstanding   | 130% of rated voltage for 60 seconds |
| Solderability with<br>25% Wt Rosin-Methanol Flux               | 90% Minimum Coverage After 2.5 Second Dip into 255°C Solder Pot |                                      |

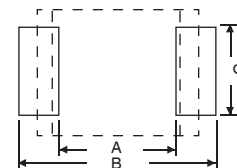
## RECOMMENDED REFLOW PROFILE (maximum 2 times)



Solder within 6 year. Storage at +35°C and 85% RH

## RECOMMENDED LAND PATTERN (mm)

| EIA Size | A   | B   | C   |
|----------|-----|-----|-----|
| 1913     | 2.6 | 6.6 | 3.0 |
| 2416     | 3.8 | 7.8 | 3.8 |
| 2820     | 4.5 | 9.0 | 4.6 |
| 2825     | 4.5 | 9.0 | 5.7 |



## STANDARD PRODUCTS, SIZE CODE AND DIMENSIONS (mm)

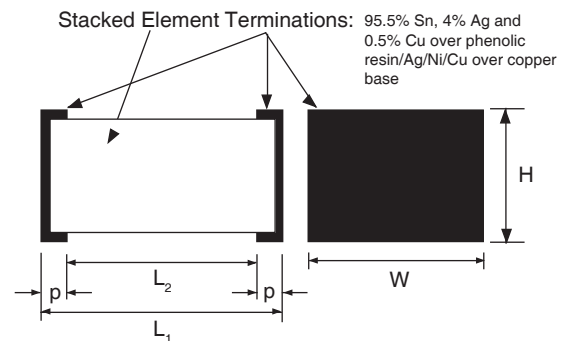
| Cap.  | Code | Working Voltage (VDC) | Length L  | Width W   | Height H  | p          | EIA Size Code | Reel Quantity |
|-------|------|-----------------------|-----------|-----------|-----------|------------|---------------|---------------|
| 0.010 | 103  | 100V                  | 4.8 ± 0.2 | 3.3 ± 0.3 | 1.4 ± 0.2 | 0.35 ± 0.2 | 1913          | 3000          |
| 0.012 | 123  | D1                    |           |           | 2.0 ± 0.2 |            |               |               |
| 0.015 | 153  | D2                    |           |           | 2.4 ± 0.2 |            |               |               |
| 0.018 | 183  | D2                    |           |           | 2.8 ± 0.2 |            |               |               |
| 0.022 | 223  | D3                    |           |           | 1.8 ± 0.2 |            |               |               |
| 0.027 | 273  | D4                    | 2.0 ± 0.2 | 2416      | 3000      |            |               |               |
| 0.033 | 333  | E1                    | 2.4 ± 0.2 |           |           |            |               |               |
| 0.039 | 393  | E2                    | 2.8 ± 0.2 |           |           |            |               |               |
| 0.047 | 473  | E3                    | 3.2 ± 0.2 |           |           |            |               |               |
| 0.056 | 563  | E4                    | 2.8 ± 0.3 |           |           |            | 2820          | 1500          |
| 0.068 | 683  | E5                    | 3.0 ± 0.3 |           |           |            |               |               |
| 0.082 | 823  | G2                    | 3.4 ± 0.3 |           |           |            |               |               |
| 0.10  | 104  | G3                    | 4.0 ± 0.3 |           |           |            |               |               |
| 0.12  | 124  | G5                    | 4.8 ± 0.3 |           |           |            |               |               |
| 0.15  | 154  | H2                    | 7.1 ± 0.4 | 6.3 ± 0.4 | 3.4 ± 0.3 | 2825       | 1000          |               |
| 0.18  | 184  | H4                    |           |           | 4.0 ± 0.3 |            |               |               |
| 0.22  | 224  | H6                    |           |           | 4.8 ± 0.3 |            |               |               |

## OUTLINE DRAWING

### PART NUMBER SYSTEM

NSHC 103 J 100 TR D1 F

- Series
- Capacitance in pF, 1st two digits are significant, 3rd digit is no. of zeros
- Tolerance Code: J=±5%, G=±2%
- Voltage
- Tape & Reel
- Size Code
- RoHS compliant



## TAPE DIMENSIONS (mm)

| Case Code | A±0.1 | B±0.1 | C±0.2 | t             | W±0.3 | F          | P±0.1 | D+0.2/-0 | Qty/Reel |
|-----------|-------|-------|-------|---------------|-------|------------|-------|----------|----------|
| D1        | 3.8   | 5.1   | 2.0   | 0.3 ± 0.05    | 12.0  | 5.5 ± 0.05 | 8.0   | 1.5      | 3,000    |
| D2        |       |       | 2.6   |               |       |            |       |          | 3,000    |
| D3, D4    |       |       | 3.4   |               |       |            |       |          | 2,000    |
| E1, E2    | 2.7   | 3,000 |       |               |       |            |       |          |          |
| E3, E4    | 3.5   | 2,000 |       |               |       |            |       |          |          |
| E5        | 4.6   | 6.3   | 4.6   | 2,000         |       |            |       |          |          |
| G2 ~ G5   | 5.5   | 7.5   | 4.7   | 1,500         |       |            |       |          |          |
| H2 ~ H6   | 6.91  | 8.43  | 5.686 | 0.343 ± 0.013 | 16    | 7.5 ± 0.1  | 12    | 1.5      | 1,000    |

## EMBOSSED PLASTIC CARRIER

