## FEATURES

- MINIATURE SIZE (6.5mm X 5.2mm)
- LOW PROFILE (1.05mm ~ 2.55mm MAXIMUM HEIGHT)
- SURFACE MOUNTABLE CONSTRUCTION
- TAPED AND REELED FOR AUTOMATIC INSERTION

**RoHS Compliant**
includes all homogeneous materials

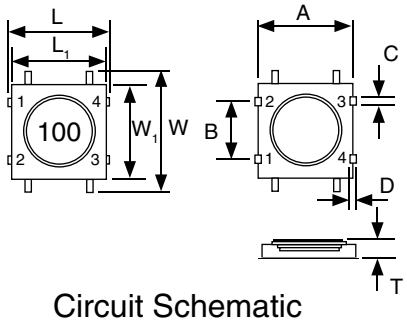
*See Part Number System for Details

## CHARACTERISTICS

| Case Size | NPI21S | NPI22S | NPI23S | NPI24S |
|---|---|---|---|---|
| Inductance Range | 2.2µH ~ 47µH | | 100µH ~ 1,000µH | 100µH ~ 3,300µH |
| Inductance Tolerance | ±20% (M) | | | |
| Operating Temperature Range | -25°C ~ +85°C | | | |
| Inductance Change at Isat | -10% max. | | | |
| Temperature Rise at Isat | +40°C max. | | | |
| Resistance to Solder Heat | 260°C for 10 seconds (Inductance change ±10% max.) | | | |

## CASE DIMENSIONS (mm)

| Series | A | B | C | D | L | $L_1$ | W | $W_1$ | T |
|---|---|---|---|---|---|---|---|---|---|
| NPI21S | 4.8±0.1 | 3.0 ±0.1 | 0.5 ±0.1 | 0.4 ±0.1 | 5.2 ±0.1 | 5.0 ±0.1 | 6.5 max. | 5.0 ±0.1 | 1.05 max. |
| NPI22S | | | | | | | | | 1.25 max. |
| NPI23S | | | | | | | | | 1.55 max. |
| NPI24S | | | | | | | | | 2.55 max. |




Circuit Schematic

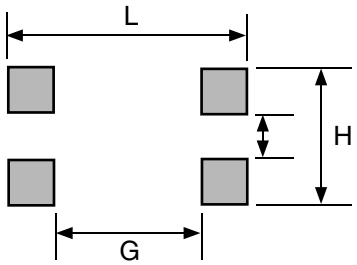

## PART NUMBER SYSTEM

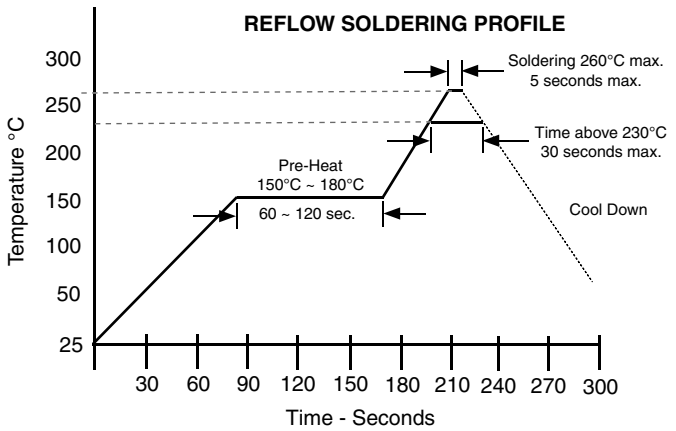
NPI 21 S 220 M TR F

- F: Termination Finish: F = RoHS Compliant Pb-free (100%Sn), B = Sn-Pb (Optional)
- TR: Packaging: TR = Tape & Reel
- M: Inductance Tolerance Code: M=±20%
- 220: Inductance Code (µH): 1st two digits are significant, 3rd digit is multiplier for values from 10µH and up.
- S: Construction Code (see drawing for details)
- 21: Size Code (see table for details)
- NPI: Series

## LAND PATTERN DIMENSIONS (mm)

| Series | L | G | $G_1$ | H |
|---|---|---|---|---|
| NPI_S | 5.4 | 4.2 | 2.2 | 3.8 |



| Part Number | STANDARD VALUES - 21 CASE SIZE (6.5 x 5.2 x 1.05mm) | | | | |
|---|---|---|---|---|---|
| | Inductance Value (µH) | DC Resistance (Ω) | DC Current (Irms) | DC Current (Isat) | Test Frequency |
| NPI21S2R2MTRF | 2.2±20% | 0.18 | 0.51 | 1.70 | 100KHz |
| NPI21S3R3MTRF | 3.3±20% | 0.22 | 0.46 | 1.50 | |
| NPI21S4R7MTRF | 4.7±20% | 0.28 | 0.41 | 1.32 | |
| NPI21S6R8MTRF | 6.8±20% | 0.38 | 0.35 | 1.12 | |
| NPI21S100MTRF | 10±20% | 0.61 | 0.27 | 0.90 | |
| NPI21S150MTRF | 15±20% | 0.82 | 0.24 | 0.73 | |
| NPI21S220MTRF | 22±20% | 1.10 | 0.20 | 0.62 | |
| NPI21S330MTRF | 33±20% | 1.88 | 0.15 | 0.52 | |
| NPI21S470MTRF | 47±20% | 2.34 | 0.14 | 0.42 | |

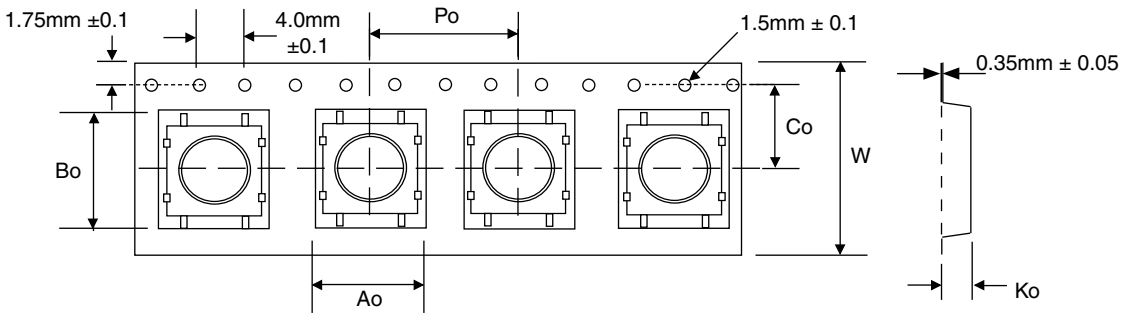
| Part Number | STANDARD VALUES - 22 CASE SIZE (6.5 x 5.2 x 1.25mm) | | | | |
|---|---|---|---|---|---|
| | Inductance Value (µH) | DC Resistance (Ω) | DC Current (Irms) | DC Current (Isat) | Test Frequency |
| NPI22S2R2MTRF | 2.2±20% | 0.18 | 0.55 | 1.97 | 100KHz |
| NPI22S3R3MTRF | 3.3±20% | 0.22 | 0.50 | 1.82 | |
| NPI22S4R7MTRF | 4.7±20% | 0.27 | 0.45 | 1.54 | |
| NPI22S6R8MTRF | 6.8±20% | 0.37 | 0.38 | 1.30 | |
| NPI22S100MTRF | 10±20% | 0.48 | 0.33 | 1.10 | |
| NPI22S150MTRF | 15±20% | 0.62 | 0.29 | 0.95 | |
| NPI22S220MTRF | 22±20% | 1.00 | 0.23 | 0.77 | |
| NPI22S330MTRF | 33±20% | 1.40 | 0.19 | 0.6 | |
| NPI22S470MTRF | 47±20% | 2.16 | 0.15 | 0.51 | |

| Part Number | STANDARD VALUES - 23 CASE SIZE (6.5 x 5.2 x 1.55mm) | | | | |
|---|---|---|---|---|---|
| | Inductance Value (µH) | DC Resistance (Ω) | DC Current (Irms) | DC Current (Isat) | Test Frequency |
| NPI23S101MTRF | 100±20% | 3.2 | 0.160 | 0.50 | 100KHz |
| NPI23S151MTRF | 150±20% | 5.0 | 0.130 | 0.35 | |
| NPI23S221MTRF | 220±20% | 6.5 | 0.115 | 0.30 | |
| NPI23S331MTRF | 330±20% | 12 | 0.085 | 0.22 | |
| NPI23S471MTRF | 470±20% | 22 | 0.060 | 0.17 | |
| NPI23S631MTRF | 630±20% | 27 | 0.055 | 0.15 | |
| NPI23S102MTRF | 1000±20% | 33 | 0.050 | 0.13 | |

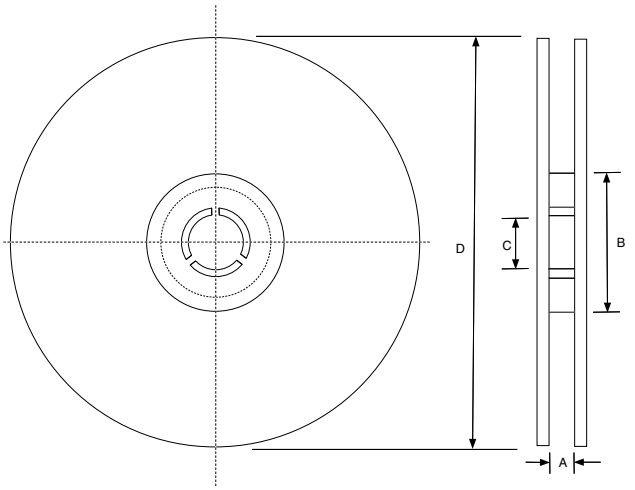
| Part Number | STANDARD VALUES - 24 CASE SIZE (6.5 x 5.2 x 2.55mm) | | | | |
|---|---|---|---|---|---|
| | Inductance Value (µH) | DC Resistance (Ω) | DC Current (Irms) | DC Current (Isat) | Test Frequency |
| NPI24S101MTRF | 100±20% | 1.6 | 0.240 | 0.45 | 100KHz |
| NPI24S151MTRF | 150±20% | 2.5 | 0.190 | 0.35 | |
| NPI24S221MTRF | 220±20% | 3.8 | 0.160 | 0.30 | |
| NPI24S331MTRF | 330±20% | 5.9 | 0.130 | 0.25 | |
| NPI24S471MTRF | 470±20% | 7.5 | 0.110 | 0.22 | |
| NPI24S681MTRF | 680±20% | 12 | 0.090 | 0.18 | |
| NPI24S102MTRF | 1000±20% | 20 | 0.070 | 0.14 | |
| NPI24S152MTRF | 1500±20% | 25 | 0.060 | 0.12 | |
| NPI24S222MTRF | 2200±20% | 45 | 0.045 | 0.09 | |
| NPI24S332MTRF | 3300±20% | 60 | 0.040 | 0.08 | |

Maximum +40°C temperature rise at Irms. Maximum -10% inductance change at Isat.

| Case Size | TAPING DIMENSIONS (mm) | | | | | | |
|---|---|---|---|---|---|---|---|
| | Ao | Bo | Ko | Co | W | Po | Qty/Reel |
| NPI21S | 5.45 ±0.1 | 6.75 ±0.1 | 1.40 ±0.1 | 7.50 ±0.1 | 16.0 | 8.0 | 3,000 |
| NPI22S | | | | | | | |
| NPI23S | | | 1.75 ±0.1 | | | | |
| NPI24S | | | 2.80 ±0.1 | | | | 2,000 |




| Tape Width | REEL DIMENSIONS (mm) | | | |
|---|---|---|---|---|
| | A(mm) | B(mm) | C(mm) | D(mm) |
| 16mm | 18.0 +0 | 50 -0 | 13 ±0.5 | 330 |

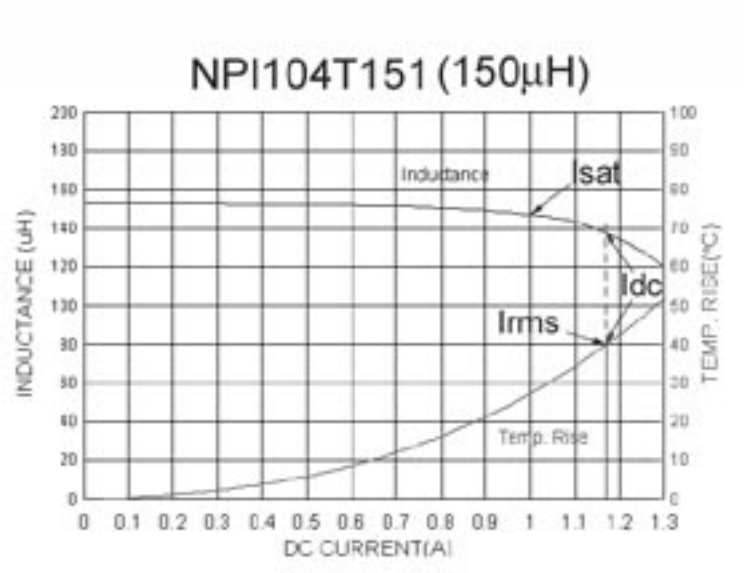


# NPI & NPIS Series

**Isat** (**Saturation Current)** - is the current required to **decrease the inductance** value by the specified maximum amount (given as a percentage of the nominal inductance value).

**Irms** - is the current required to **increase the temperature** of the part a maximum specificed amount (given as a temperature rise in °C).

In some instances Isat and Irms are shown separately with a maximum decrease in inductance specified at one current rating (Isat) and a maximum temperature rise specificed at another current rating (Irms). In other cases one current value is given for both (specified as Idc) and represents the current at which a specified maximum inductance decrease and a maximum specified temperature rise can occur. The graph below illustrates change in inductance and temperature as current increases.




Based on the above graph Isat and Irms could be expressed as follows:

1. Isat and Irms can be shown as separate current values. The Isat current is a value of current that could potentially produce a specified maximum inductance change (-5%, -10%, -20%, etc. of the nominal value). In this case a 1.0A current has produced a -5% inductance change so 1.0A could be specified as the inductor's Isat current rating. The Irms could be expressed as the current that produces a +40°C temperature rise which in this case is about 1.18A.

2. Both Isat and Irms can be expressed using one current value (Idc). In the above graph 1.18A could be specified as the Idc for the part noting that at 1.18A a potential +40°C temperature rise (equivalent to Irms) and a -10% change in inductance (equivalent to Isat) could occur.