

# Water Insoluble Nitride Thin Film Precision Chip Resistors

## WIN Series

- TaN thin film technology
- Inherent moisture protection superior to that of passivated nichrome chip resistors
- High stability in humid and polluted environments
- Typical 85°C, 85%RH biased humidity 2000 hour stability <0.1%
- Typical moisture resistance stability  $\pm 100$ ppm
- Precision  $\pm 0.05\%$  tolerance and  $\pm 10$ ppm/°C
- Anti-sulfur terminations
- 100% screened by automated optical inspection



All Pb-free parts comply with EU Directive 2011/65/EU amended by (EU) 2015/863 (RoHS3)

## Electrical Data

|                                            |            | T0402          | T0603              | T0805      | T1206     |
|--------------------------------------------|------------|----------------|--------------------|------------|-----------|
| Power rating @ 70°C                        | watts      | 0.05           | 0.1                | 0.25       | 0.33      |
| Resistance range                           | ohms       | 7R5 to 30K     | 5R to 100K         | 5R to 267K | 5R to 1M0 |
| Limiting element voltage (maximum voltage) | Vdc or rms | 75             | 75                 | 100        | 200       |
| Resistance tolerance                       | %          | ±0.1 ±0.5 ±1   | ±0.05 ±0.1 ±0.5 ±1 |            |           |
| TCR                                        | ppm/°C     | ±50 ±25        | ±10 ±15 ±25 ±50    |            |           |
| Standard values                            |            | E24, E96, E192 |                    |            |           |
| Ambient temperature range                  | °C         | -65 to +150    |                    |            |           |

## Physical Data

| Dimensions in mm & (inch) and weight in mg |                                        |                                        |                                        |                                        |                 |                                        |         |
|--------------------------------------------|----------------------------------------|----------------------------------------|----------------------------------------|----------------------------------------|-----------------|----------------------------------------|---------|
|                                            | L                                      | W                                      | T                                      | C                                      | B min           | A                                      | Wt. nom |
| T0402                                      | 1.02 $\pm$ 0.05<br>(0.04 $\pm$ 0.002)  | 0.53 $\pm$ 0.05<br>(0.021 $\pm$ 0.002) | 0.3 $\pm$ 0.08<br>(0.012 $\pm$ 0.003)  | 0.2 $\pm$ 0.05<br>(0.008 $\pm$ 0.002)  | 0.44<br>(0.017) | 0.25 $\pm$ 0.05<br>(0.01 $\pm$ 0.002)  | 0.9     |
| T0603                                      | 1.58 $\pm$ 0.15<br>(0.062 $\pm$ 0.006) | 0.80 $\pm$ 0.10<br>(0.031 $\pm$ 0.004) | 0.45 $\pm$ 0.10<br>(0.018 $\pm$ 0.004) | 0.27 $\pm$ 0.20<br>(0.011 $\pm$ 0.008) | 0.82<br>(0.032) | 0.34 $\pm$ 0.20<br>(0.013 $\pm$ 0.008) | 2.0     |
| T0805                                      | 2.02 $\pm$ 0.15<br>(0.080 $\pm$ 0.006) | 1.28 $\pm$ 0.15<br>(0.050 $\pm$ 0.006) | 0.45 $\pm$ 0.10<br>(0.018 $\pm$ 0.004) | 0.31 $\pm$ 0.20<br>(0.012 $\pm$ 0.008) | 1.1<br>(0.043)  | 0.40 $\pm$ 0.20<br>(0.016 $\pm$ 0.008) | 4.3     |
| T1206                                      | 3.15 $\pm$ 0.15<br>(0.124 $\pm$ 0.006) | 1.57 $\pm$ 0.15<br>(0.062 $\pm$ 0.006) | 0.50 $\pm$ 0.15<br>(0.020 $\pm$ 0.006) | 0.45 $\pm$ 0.25<br>(0.018 $\pm$ 0.010) | 2.03<br>(0.08)  | 0.52 $\pm$ 0.25<br>(0.020 $\pm$ 0.010) | 9.6     |



## Construction

Conductors, thin film resistive element and epoxy outer protection are applied to an alumina substrate. The chips are supplied with wrap-around terminations suitable for soldering. The terminations have an electroplated nickel barrier and either 100% matt tin or 60/40 SnPb finish.

## Marking & Solvent Resistance

WIN resistors have no marking on the component body. The body protection is resistant to all normal cleaning solvents suitable for printed circuits

## Screening

WIN resistors can be screened to any tests identified in MIL-PRF-55342 and AEC-Q200 to provide components suitable as a COTS equivalent to MIL products or screened product subject to harsh operating environments.

### General Note

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## Manufacturing Capabilities Data

| TCR<br>ppm/°C | Tolerance % |           |           |            |           |            |         |
|---------------|-------------|-----------|-----------|------------|-----------|------------|---------|
|               | T0402       | T0603     |           | T0805      |           | T1206      |         |
|               | 0.1-1       | 0.05      | 0.1-1     | 0.05       | 0.1-1     | 0.05       | 0.1-1   |
| 10            |             | 5kΩ-10kΩ  |           | 5kΩ-40kΩ   |           | 5kΩ-80kΩ   |         |
| 15            |             | 100Ω-50kΩ |           | 100Ω-100kΩ |           | 100Ω-400kΩ |         |
| 25            | 10Ω-30kΩ    | 50Ω-50kΩ  | 10Ω-100kΩ | 50Ω-100kΩ  | 10Ω-267kΩ | 50Ω-400kΩ  | 10Ω-1MΩ |
| 50            | 7.5Ω-30kΩ   |           | 5Ω-100kΩ  |            | 5Ω-267kΩ  |            | 5Ω-1MΩ  |

## Performance Data

| Test                         | Method                                                                        | ΔR                            |                                 |
|------------------------------|-------------------------------------------------------------------------------|-------------------------------|---------------------------------|
|                              |                                                                               | MIL-PRF-55342<br>Limits (max) | WIN actual<br>performance (typ) |
| Thermal Shock                | MIL-PRF-55342 4.8.3 (MIL-STD-202 107G cond. F: 5 cycles in air, +150 / -65°C) | ± 0.1%                        | ± 0.01%                         |
| Thermal Shock - Extended     | MIL-STD-202 107G cond. F-3: 100 cycles in air, +150 / -65°C                   | ± 0.1%                        | ± 0.02%                         |
| Low Temp. Operation          | MIL-PRF-55342 4.8.5 (-65°C)                                                   | ± 0.1%                        | ± 0.02%                         |
| Short Time Overload          | MIL-PRF-55342 4.8.6 (lesser of 6.25 x Pr or 2 x LEV for 5 seconds)            | ± 0.1%                        | ± 0.02%                         |
| High Temp. Exposure          | MIL-PRF-55342 4.8.7 (+150°C for 100 hours)                                    | ± 0.1%                        | ± 0.02%                         |
| High Temp. Exposure Extended | +150°C for 1000 hours                                                         | N/A                           | ±0.1%                           |
| Resistance to Solder Heat    | MIL-PRF-55342 4.8.8                                                           | ± 0.2%                        | ± 0.02%                         |
| Moisture Resistance          | MIL-PRF-55342 4.8.9 (MIL-STD-202 106G: 10 cycles, 65±2°C, 95±5% RH)           | ± 0.2%                        | ± 0.01%                         |
| Load Life                    | MIL-PRF-55342 4.8.11 (MIL-STD-202 108A: Pr at 70°C for 2000 hours)            | ± 0.5%                        | ± 0.08%                         |
| Biased Damp Heat             | 85°C, 85%RH, 10% Pr bias, for 2000 hours                                      | N/A                           | ± 0.08%                         |
| Flower of Sulfur             | ASTM B-809 (modified) 105°C Dry, 1000 Hours                                   | Pass                          |                                 |

Temperature Derating



Load Life Stability

Typical Load Life per MIL-STD-202 108A



Biased Damp Heat Stability

Typical @ 85°C, 85%RH, 10% Pr bias



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Pulse performance for 0402 to be advised.

Ordering Procedure

This product has two valid part numbers:  
European (Welwyn) Part Number: WINT1206LF031001B3 (1206, ±25ppm/°C, 1 kilohm ±0.1%, Pb-free)

|   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| W | I | N | T | 1 | 2 | 0 | 6 | L | F | 0 | 3 | 1 | 0 | 0 | 1 | B | 3 |
| 1 | 2 |   | 3 | 4 | 5 |   | 6 | 7 |   |   |   |   |   |   |   |   |   |

| 1<br>Series | 2<br>Type | 3<br>Termination | 4<br>TCR       | 5<br>Value                                                | 6<br>Tolerance | 7<br>Packing         |
|-------------|-----------|------------------|----------------|-----------------------------------------------------------|----------------|----------------------|
| WIN         | T0402     | PB = SnPb        | 12 = ±10ppm/°C | 3 digits + multiplier<br>R = ohms for<br>values <100 ohms | A = ±0.05%     | Tape & reel          |
|             | T0603     | LF = Pb free     | 11 = ±15ppm/°C |                                                           | B = ±0.1%      | 3 3000/reel Standard |
|             | T0805     |                  | 03 = ±25ppm/°C |                                                           | D = ±0.5%      | Blank 1000/reel      |
|             | T1206     |                  | 02 = ±50ppm/°C |                                                           | F = 1%         |                      |

USA (IRC) Part Number: WIN -T1206LF-03-1001-B3 (1206, ±25ppm/°C, 1 kilohm ±0.1%, Pb-free)

|   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| W | I | N | - | T | 1 | 2 | 0 | 6 | L | F | - | 0 | 3 | - | 1 | 0 | 0 | 1 | - | B | 3 |
| 1 |   | 2 |   |   | 3 |   | 4 |   | 5 |   |   | 6 |   | 7 |   |   |   |   |   |   |   |

| 1<br>Series | 2<br>Type | 3<br>Termination | 4<br>TCR       | 5<br>Value                                                | 6<br>Tolerance | 7<br>Packing         |
|-------------|-----------|------------------|----------------|-----------------------------------------------------------|----------------|----------------------|
| WIN         | T0402     | PB = SnPb        | 12 = ±10ppm/°C | 3 digits + multiplier<br>R = ohms for<br>values <100 ohms | A = ±0.05%     | Tape & reel          |
|             | T0603     | LF = Pb free     | 11 = ±15ppm/°C |                                                           | B = ±0.1%      | 3 3000/reel Standard |
|             | T0805     |                  | 03 = ±25ppm/°C |                                                           | D = ±0.5%      | Blank 1000/reel      |
|             | T1206     |                  | 02 = ±50ppm/°C |                                                           | F = 1%         |                      |

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