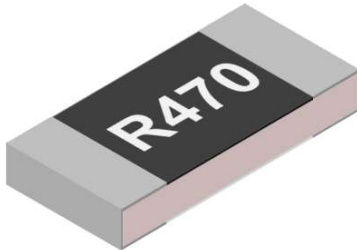




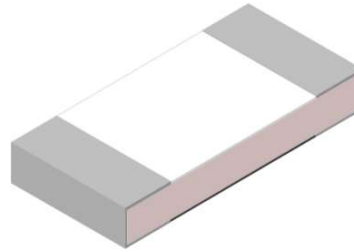
TGL Series Metal Film Anti-Surge Low-Resistance Chip Resistor Product Specifications

| | |
|---------------|---------------|
| Document No. | S-10-12-35-08 |
| Released Date | 2020/8/17 |
| Page No. | 1/10 |

■ Metal Film Anti-Surge Low-Resistance Chip Resistor — TGL Series



Top view



Bottom view

■ Application

- Consumer electronics
- Computer & relative products
- Communication devices
- Measuring instrument
- Industrial / Power supply
- Battery management system

■ Features

- Low Resistance / TCR / Inductance($\leq 5nH$)
- Excellent long-term stability
- High precision current sensing
- High rated power capability and excellent Anti-Surge
- Halogen free and lead free
- RoHs compliant

■ Parts Number Explanation

■ Example:

| | | | | | | | |
|---|------------------------------|--|--|--|---|------------------------|-------------------------------|
| TGL | 1206 | 10 | F | R470 | P | 05 | Z |
| Product Type | Size (Inch) | Rated Power | Tolerance | Resistance | Package | Quantity (PCS) | Optional |
| Metal Film Anti-Surge Low-Resistance Chip Resistors | 1206 1210 2010 2512 | 10 : 1.0W 15 : 1.5W 20 : 2.0W 35 : 3.5W | D : $\pm 0.5\%$ F : $\pm 1\%$ G : $\pm 2\%$ J : $\pm 5\%$ | EX. R050 = 0.05Ω R470 = 0.47Ω 4R70 = 4.7Ω 33R0 = 33Ω | P : Paper Taping E : Embossed Taping | 04 : 4000 05 : 5000 | Z : Normal U : Ultra Power |



TGL Series Metal Film Anti-Surge Low-Resistance Chip Resistor Product Specifications

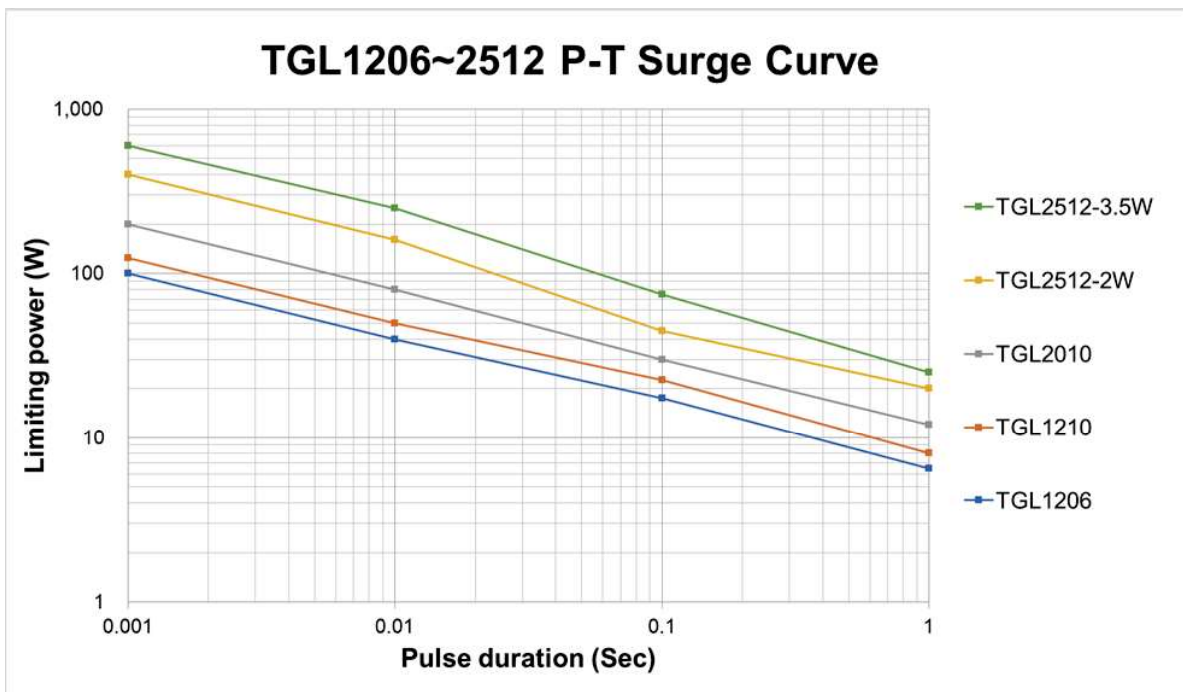
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| Document No. | S-10-12-35-08 |
| Released Date | 2020/8/17 |
| Page No. | 2/10 |

Standard Electrical Specifications

| Type | Rated Power at 70°C | Max. Rated Current | Max. Overload Current | T.C.R. (ppm/°C) | Resistance Range |
|---------|---------------------|--------------------|-----------------------|-----------------|------------------------------------|
| | | | | | D(0.5%), F(1.0%), G(2.0%), J(5.0%) |
| TGL1206 | 1W | 4.47A | 10.00A | ±100 | 50 mΩ ≤ R < 100 mΩ |
| TGL1210 | 1W | 4.47A | 10.00A | ±50 | 100 mΩ ≤ R ≤ 33 Ω |
| TGL2010 | 1.5W | 5.48A | 12.25A | ±50 | 50 mΩ ≤ R ≤ 50 Ω |
| TGL2512 | 2W | 6.32A | 14.14A | | |
| | 3.5W(U) | 8.37A | 18.71A | | |

- For non-standard parts, please contact our sales dept.
- Operating Temperature Range : -55°C ~ +170°C.

Anti-Surge Ability:

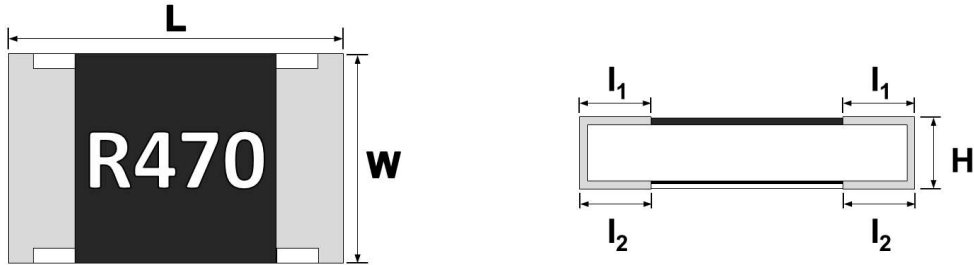




TGL Series Metal Film Anti-Surge Low-Resistance Chip Resistor Product Specifications

| | |
|---------------|---------------|
| Document No. | S-10-12-35-08 |
| Released Date | 2020/8/17 |
| Page No. | 3/10 |

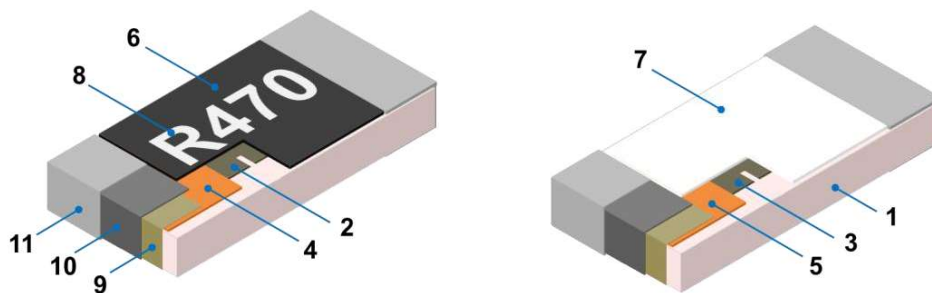
■ Type Dimension



Unit : mm

| TYPE | L | W | H | l ₁ | l ₂ |
|------------|-----------|-----------|-----------|----------------|----------------|
| TGL1206 | 3.10±0.10 | 1.60±0.10 | 0.55±0.10 | 0.40±0.20 | 0.45±0.20 |
| TGL1210 | 3.10±0.10 | 2.50±0.15 | 0.55±0.10 | 0.50±0.20 | 0.50±0.20 |
| TGL2010 | 5.00±0.20 | 2.50±0.15 | 0.55±0.10 | 0.60±0.25 | 0.60±0.25 |
| TGL2512 | 6.30±0.20 | 3.20±0.20 | 0.55±0.10 | 0.65±0.25 | 0.65±0.25 |
| TGL2512(U) | 6.30±0.20 | 3.20±0.20 | 0.70±0.15 | 0.65±0.25 | 0.65±0.25 |

■ Construction



| | | | |
|---|-----------------------------|----|----------------------------|
| 1 | Alumina Substrate | 7 | Bottom Protective Overcoat |
| 2 | Top Resistive Layer | 8 | Marking |
| 3 | Bottom Resistive Layer | 9 | Side Inner Electrode |
| 4 | Top Inner Electrode (Cu) | 10 | Barrier Layer (Ni) |
| 5 | Bottom Inner Electrode (Cu) | 11 | Solder coating (Sn) |
| 6 | Top Protective Overcoat | | |



TGL Series Metal Film Anti-Surge Low-Resistance Chip Resistor Product Specifications

| | |
|---------------|---------------|
| Document No. | S-10-12-35-08 |
| Released Date | 2020/8/17 |
| Page No. | 4/10 |

Performance Characteristics

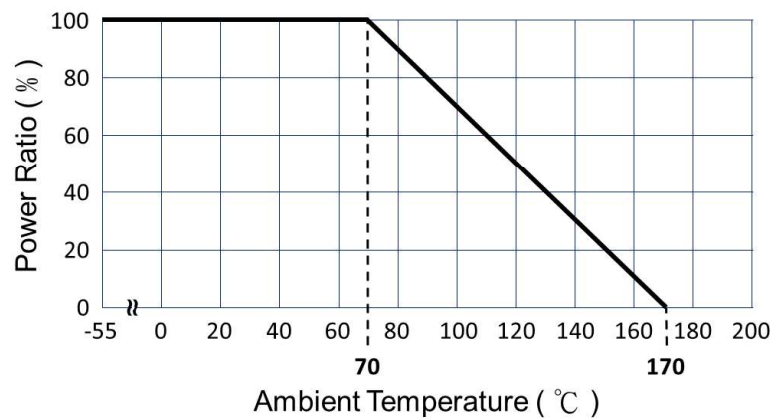
Power Derating Curve

The Operating Temperature Range: $-55^{\circ}\text{C} \sim +170^{\circ}\text{C}$.

Power rating or current rating is in the case based on 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 figure of derating Curve.

Derating Curve



Rated Current

Resistance Range: $< 1\Omega$

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:

$$I = \sqrt{P/R}$$

I = Rated current (A)

P = Rated power (W)

R = Nominal resistance (Ω)

Rated Voltage

Resistance Range: $\geq 1\Omega$

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:

$$V = \sqrt{P \times R}$$

V = Rated voltage (V)

P = Rated power (W)

R = Nominal resistance (Ω)



TGL Series Metal Film Anti-Surge Low-Resistance Chip Resistor Product Specifications

| | |
|----------------------|---------------|
| Document No. | S-10-12-35-08 |
| Released Date | 2020/8/17 |
| Page No. | 5/10 |

Reliability Test and Requirement

| Test Item | Test Method | Procedure | Requirements |
|---|---|---|---|
| Temperature Coefficient of Resistance (T.C.R) | JIS-C-5201-1 4.8 IEC-60115-1 4.8 | At 25°C / +125°C, 25°C is the reference temperature | Refer to Standard Electrical Specifications |
| Short Time Overload | JIS-C-5201-1 4.13 IEC-60115-1 4.13 | 5 times rated power whichever is less for 5 seconds. | ±(1.0%+0.001Ω) |
| Insulation Resistance | JIS-C-5201-1 4.6 IEC-60115-1 4.6 | Applied 100VDC for 1 minute. | ≥10GΩ |
| Dielectric Withstanding Voltage | JIS-C5201-1 4.7 | Applied 500VAC for 1 minute. | No short or burned on the appearance. |
| Core Body Strength | JIS-C5201-1 4.15 | Central part pressurizing force : 10N , 10 seconds | No broken |
| Solderability | JIS-C-5201-1 4.17 IEC-60115-1 4.17 | 245±5°C for 3 seconds. | >95% Coverage No Visual damage |
| Resistance to Soldering Heat | JIS-C-5201-1 4.18 IEC-60115-1 4.18 | 260±5°C for 10 seconds. | ±(1.0%+0.001Ω) No Visual damage |
| Leaching | JIS-C-5201-1 4.18 IEC-60068-2-58 8.2.1 | 260±5°C for 30 seconds. | >95% Coverage No Visual damage |
| Rapid Change of Temperature | JIS-C-5201-1 4.19 IEC-60115-1 4.19 | -55°C to +155°C, 300 cycles | ±(1.0%+0.001Ω) No Visual damage |
| Damp Heat with Load | 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" | ±(1.0%+0.001Ω) |
| Biased Humidity | MIL-STD-202 Method 103 | 1,000 hours; 85°C / 85% RH, 10% of operating power. Measurement at 24±4 hours after test conclusion. | ±(1.0%+0.05Ω) |
| Load Life (Endurance) | 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" . | ±(1.0%+0.001Ω) |
| High Temperature Exposure | JIS-C-5201-1 4.23.2 IEC 60068-2-2 | At +170±5°C for 1000 +48/-0 hours. | ±(1.0%+0.001Ω) |
| Resistance to Solvent | 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. | ±(1.0%+0.001Ω) No Visual damage |
| Terminal Strength (SMD) | JIS-C5201-1 4.32 AEC Q200-006 | Pressurizing force for 60 seconds 1206 and above : 17.7N | No broken |
| Bending Strength | JIS-C-5201-1 4.33 IEC-60115-1 4.33 | Bending once for 5 seconds D : 1206 、 1210 = 3mm 2010 、 2512 = 2mm | ±(1.0%+0.001Ω) No Visual damage |

- Temperature Coefficient of Resistance test to - 55 °C is available on request
- We can also provide AEC-Q200 test reports if required by customers.



TGL Series Metal Film Anti-Surge Low-Resistance Chip Resistor Product Specifications

| | |
|---------------|---------------|
| Document No. | S-10-12-35-08 |
| Released Date | 2020/8/17 |
| Page No. | 6/10 |

■ Marking

■ TGL1206 ~ TGL2512 : 4 digit marking

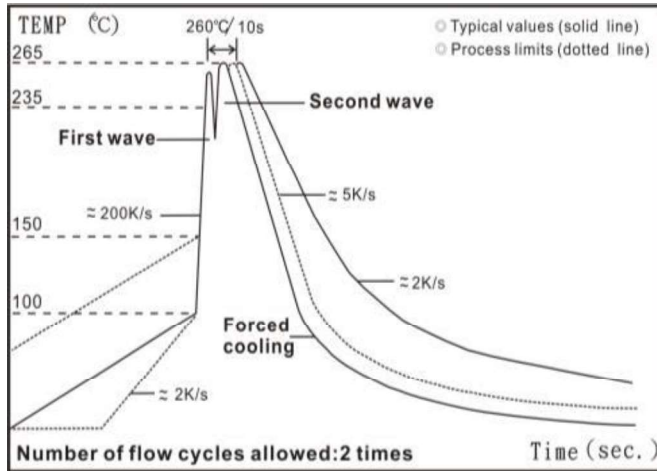
First 3 digits are the significant figures, the 4th digit is the multiplier. "R"= decimal point.

Examples:

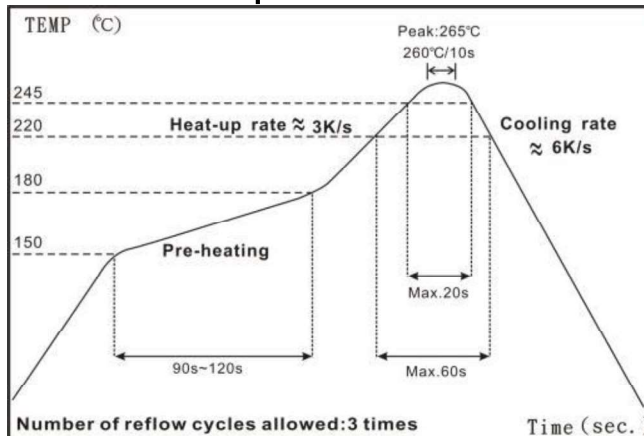
| Resistance value | Code | Example |
|------------------|------|---------------|
| 50 mΩ ~ 99 mΩ | R0XX | R050 = 0.05 Ω |
| 100 mΩ ~ 999 mΩ | RXXX | R470 = 0.47 Ω |
| 1 Ω ~ 9.9 Ω | XRXX | 4R70 = 4.7 Ω |
| 10 Ω ~ 50 Ω | XXRX | 50R0 = 50 Ω |

■ Recommended Customer Soldering Parameters

■ Wave solder Temperature condition



■ Solder reflow Temperature condition





TGL Series Metal Film Anti-Surge Low-Resistance Chip Resistor Product Specifications

| | |
|---------------|---------------|
| Document No. | S-10-12-35-08 |
| Released Date | 2020/8/17 |
| Page No. | 7/10 |

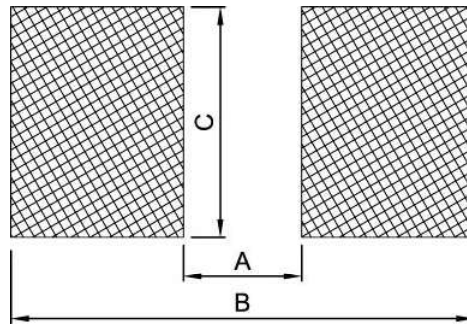
■ Rework temperature (hot air equipment) : 350°C, 3~5seconds

■ Recommended reflow methods

IR, vapor phase oven, hot air oven

If reflow temperatures exceed the recommended profile, devices may not meet the performance requirements.

■ Recommend Land Pattern Design



Unit: mm

| TYPE | A | B | C |
|---------|------|------|------|
| TGL1206 | 2.20 | 4.20 | 1.80 |
| TGL1210 | 2.00 | 4.40 | 2.70 |
| TGL2010 | 3.80 | 6.60 | 2.70 |
| TGL2512 | 4.90 | 8.10 | 3.40 |

■ Plating Thickness

Ni: $\geq 3\mu\text{m}$

Sn(Tin): $\geq 3\mu\text{m}$



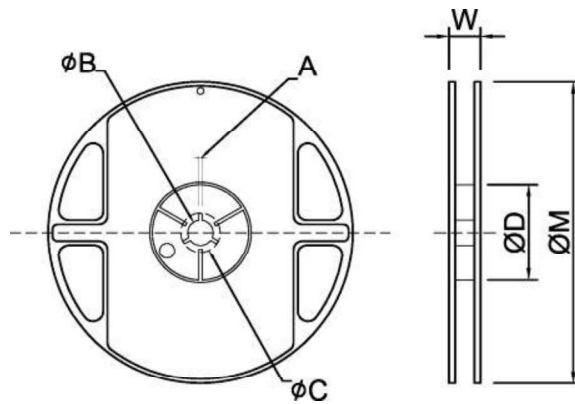
TGL Series Metal Film Anti-Surge Low-Resistance Chip Resistor Product Specifications

| | |
|----------------------|---------------|
| Document No. | S-10-12-35-08 |
| Released Date | 2020/8/17 |
| Page No. | 8/10 |

■ **Appendix For SMD Chip Resistor**

■ **Packaging Information**

■ **Reel Dimensions**



Unit: mm

| TYPE | SIZE | | A | φB | φC | φD | W | φM |
|---------|------|---------|---------|----------|--------|--------|----------|---------|
| TGL1206 | 7" | 5K/Reel | 2.0±0.5 | 13.5±1.0 | 21±1.0 | 60±1.0 | 11.5±2.0 | 178±2.0 |
| TGL1210 | 7" | 5K/Reel | 2.0±0.5 | 13.5±1.0 | 21±1.0 | 60±1.0 | 16.0±2.0 | 178±2.0 |
| TGL2010 | 7" | 4K/Reel | 2.0±0.5 | 13.5±1.0 | 21±1.0 | 60±1.0 | 16.0±2.0 | 178±2.0 |
| TGL2512 | 7" | 4K/Reel | 2.0±0.5 | 13.5±1.0 | 21±1.0 | 60±1.0 | 16.0±2.0 | 178±2.0 |

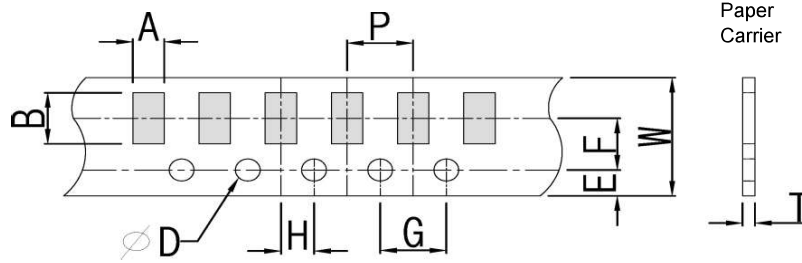


TGL Series Metal Film Anti-Surge Low-Resistance Chip Resistor Product Specifications

| | |
|----------------------|---------------|
| Document No. | S-10-12-35-08 |
| Released Date | 2020/8/17 |
| Page No. | 9/10 |

■ **Packaging Information**

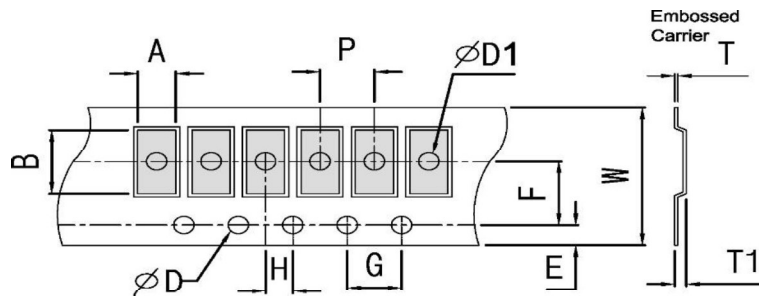
■ **Tapping Specifications**



Unit: mm

| Packaging | Type | A | B | W | E | F | G | H | T | ΦD | P |
|------------|------|----------|----------|---------|----------|----------|---------|----------|----------|-----------------------------------|---------|
| Paper Type | 1206 | 1.90±0.2 | 3.05±0.2 | 8.0±0.2 | 1.75±0.1 | 3.5±0.05 | 4.0±0.1 | 2.0±0.05 | 0.75±0.1 | 1.50 ^{+0.1} ₀ | 4.0±0.1 |
| | 1210 | 2.85±0.2 | 3.05±0.2 | 8.0±0.2 | 1.75±0.1 | 3.5±0.05 | 4.0±0.1 | 2.0±0.05 | 0.75±0.1 | | 4.0±0.1 |

■ **Embossed Dimensions**



Unit: mm

| Packaging | Type | A | B | W | E | F | G | H | T | ΦD | ΦD1 | T1 | P |
|---------------|------|----------|----------|--------|----------|----------|---------|----------|----------|-----------------------------------|----------|-----------|---------|
| Embossed Type | 2010 | 2.80±0.2 | 5.60±0.2 | 12±0.1 | 1.75±0.1 | 5.5±0.05 | 4.0±0.1 | 2.0±0.05 | 0.23±0.1 | 1.50 ^{+0.1} ₀ | 1.50±0.1 | 0.85±0.15 | 4.0±0.1 |
| | 2512 | 3.40±0.2 | 6.70±0.2 | 12±0.1 | 1.75±0.1 | 5.5±0.05 | 4.0±0.1 | 2.0±0.05 | 0.23±0.1 | | 1.50±0.1 | 0.85±0.15 | 4.0±0.1 |

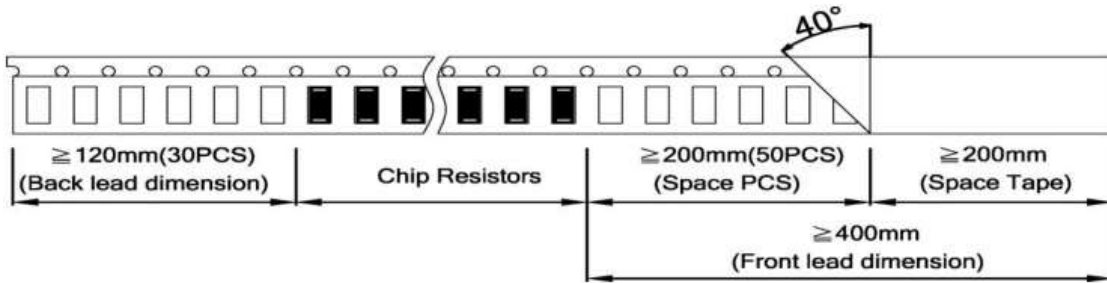


TGL Series Metal Film Anti-Surge Low-Resistance Chip Resistor Product Specifications

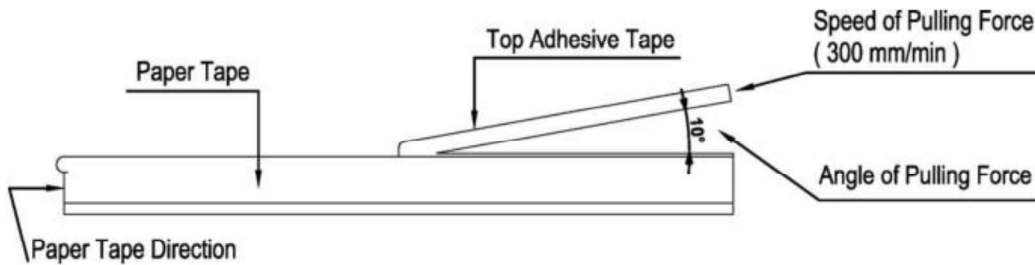
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| Document No. | S-10-12-35-08 |
| Released Date | 2020/8/17 |
| Page No. | 10/10 |

■ **Packing Material Data / Storage Data**

■ **Front & Back Lead Dimensions**

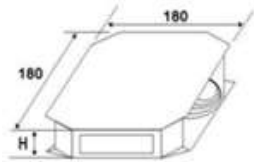


■ **Top Adhesive Peel Off Strength : 10~70g**

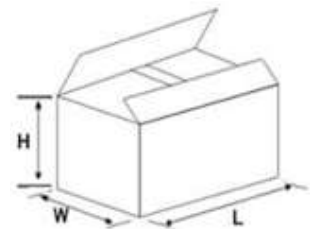


■ **Package**

| Inner Box Size | |
|----------------|------------|
| Reel | Size H(mm) |
| 1 | 13 |
| 2 | 24 |
| 3 | 36 |
| 5 | 60 |
| 10 | 113 |



| External Box Size | | | |
|-------------------|-------------|------------|------------|
| Contain (Kpcs) | Length (mm) | Width (mm) | Width (mm) |
| 25K | 180 | 180 | 60 |
| 50K | 180 | 180 | 110 |
| 150K | 430 | 200 | 200 |
| 300K | 400 | 400 | 200 |



■ **Storage Data :**

Storage time at the environment temp: 25±5°C & humidity: 60±20% is valid for one year from the date of delivery.

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