

Type RL73 Series

Key Features

Up to 2W @ 70°C

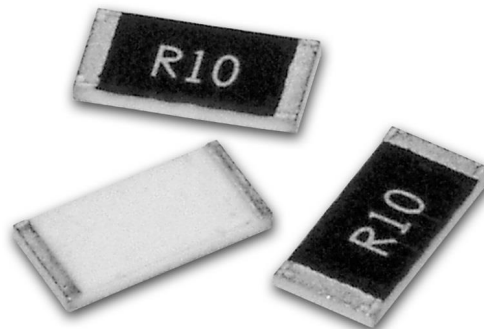
8 chip sizes

Ideal for current detection

Noble Metal Terminations

Terminal finish – electroplated 100% matte Sn

Moisture sensitivity level - MSL 1



Applications

Communications

Audio

Automotive

Low voltage power supplies

Power management applications

TE Connectivity are pleased to offer this thick film chip resistor for current sensing positions. It has a special metal glaze resistive element, noble metal terminals and a nickel barrier layer beneath the matte Sn finish to prolong terminal life. Following the developments by semiconductor manufacturers in the production of a range of IC's for battery charge management and low voltage power supplies, the RL73 Series satisfies the demand for a low ohmic shunt resistor to act as a current sensor.

Note: SMD (Surface mount devices) resistors and inductors should be kept in their original packaging to protect them from ESD (Electrostatic Discharge). The full reels can be broken into smaller quantities, without exposing them to ESD, as long as the components are still in the plastic or paper tape. These resistors and inductors should not be removed from the plastic or paper tape unless they are in an ESD protected environment.

Electrical Characteristics Standard Power

| Size | Size | TCR (PPM/°C) | Power rating @ 70°C | Resistance Range (Ω) | Max Operating Current | Packaging | | | | |
|---------|------|--------------|---------------------|----------------------|-----------------------|-----------|------|----|-----|-------|
| | | | | | | TDF | TD | TE | TDG | Tape |
| RL73X1H | 0201 | ±1000 | 0.05W | R10 – R13 | 0.70A | 1000 | 5000 | | | Paper |
| RL73V1H | | ±600 | | R15 – R47 | | | | | | |
| RL73N1H | | ±300 | | R51 – R91 | | | | | | |
| RL73M1E | 0402 | ±400 | 0.0625W | R05 – R091 | 1.11A | 1000 | 5000 | | | Paper |
| RL73N1E | | ±300 | | R10 – R47 | | | | | | |
| RL73K1E | | ±200 | | R51 – R91 | | | | | | |
| RL73V1J | 0603 | ±600 | 0.1W | R020 – R047 | 2.23A | 1000 | 5000 | | | Paper |
| RL73M1J | | ±400 | | R051 – R091 | | | | | | |
| RL73N1J | | ±300 | | R10 – R50 | | | | | | |
| RL73K1J | | ±200 | | R51 – R91 | | | | | | |
| RL73V2A | 0805 | ±600 | 0.125W | R020 – R047 | 2.50A | 1000 | 5000 | | | Paper |
| RL73M2A | | ±400 | | R051 – R10 | | | | | | |
| RL73N2A | | ±300 | | R11 – R18 | | | | | | |
| RL73K2A | | ±200 | | R20 – R91 | | | | | | |
| RL73H2A | | ±100 | | R10 – R91 | | | | | | |

Electrical Characteristics Standard Power (continued)

| Size | Size | TCR (PPM/°C) | Power rating @ 70°C | Resistance Range (Ω) | Max Operating Current | Packaging | | | | |
|---------|------|-----------------|---------------------------|-------------------------|-----------------------------|-----------|------|------|-----|---------------------|
| | | | | | | TDF | TD | TE | TDG | Tape |
| RL73V2B | 1206 | ±600 | 0.25W | R010 – R020 | 5.00A | 1000 | 5000 | | | Paper |
| RL73M2B | | ±400 | | R022 – R047 | | | | | | |
| RL73N2B | | ±300 | | R051 – R091 | | | | | | |
| RL73K2B | | ±200 | | R10 – R91 | | | | | | |
| RL73H2B | | ±100 | | R10 – R91 | | | | | | |
| RL73V2E | 1210 | ±600 | 0.5W | R010 – R020 | 7.07A | 1000 | 5000 | | | Paper |
| RL73M2E | | ±400 | | R022 – R047 | | | | | | |
| RL73N2E | | ±300 | | R051 – R091 | | | | | | |
| RL73K2E | | ±200 | | R10 – R91 | | | | | | |
| RL73H2E | | ±100 | | R075 – R91 | | | | | | |
| RL73V2H | 2010 | ±600 | 0.75W | R010 – R020 | 8.66A | | | 4000 | | Embossed Plastic |
| RL73M2H | | ±400 | | R022 – R047 | | | | | | |
| RL73N2H | | ±300 | | R051 – R091 | | | | | | |
| RL73K2H | | ±200 | | R10 – R91 | | | | | | |
| RL73H2H | | ±100 | | R050 – R91 | | | | | | |
| RL73V3A | 2512 | ±600 | 1W | R010 – R020 | 10.0A | | | 4000 | | Embossed Plastic |
| RL73M3A | | ±400 | | R022 – R047 | | | | | | |
| RL73N3A | | ±300 | | R051 – R091 | | | | | | |
| RL73K3A | | ±200 | | R10 – R91 | | | | | | |
| RL73H3A | | ±100 | | R020 – R91 | | | | | | |

Characteristics Electrical – High Power Version - RLP73

| Type | Size | TCR (PPM/°C) | Power rating | Resistance Range | Max. Operating current | Packaging | | | | |
|----------|------|-----------------|-----------------|---------------------|------------------------------|-----------|------|----|-----|-------|
| | | | | | | TDF | TD | TE | TDG | Tape |
| RLP73M1E | 0402 | ±400 | 0.125W | R051 – R091 | 1.56A | 1000 | 5000 | | | Paper |
| RLP73N1E | | ±300 | | R10 – R47 | | | | | | |
| RLP73K1E | | ±200 | | R51 – R91 | | | | | | |
| RLP73M1J | 0603 | ±400 | 0.125W | R051 – R091 | 1.98A | 1000 | 5000 | | | Paper |
| RLP73N1J | | ±300 | | R10 – R47 | | | | | | |
| RLP73K1J | | ±200 | | R51 – R91 | | | | | | |
| RLP73M2A | 0805 | ±400 | 0.25W | R051 – R091 | 2.21A | 1000 | 5000 | | | Paper |
| RLP73N2A | | ±300 | | R10 – R47 | | | | | | |
| RLP73K2A | | ±200 | | R51 – R91 | | | | | | |
| RLP73V2B | 1206 | ±600 | 0.5W | R010 – R020 | 7.07 | 1000 | 5000 | | | Paper |
| RLP73M2B | | ±400 | | R022 – R047 | | | | | | |
| RLP73N2B | | ±300 | | R051 – R091 | | | | | | |
| RLP73K2B | | ±200 | | R10 – R91 | | | | | | |

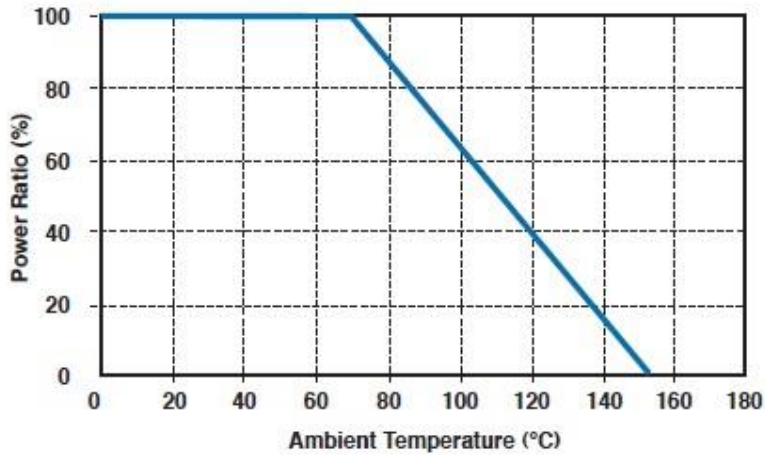
Characteristics Electrical – High Power Version - RLP73 (continued)

| Type | Size | TCR (PPM/°C) | Power rating | Resistance Range | Max. Operating current | Packaging | | | | |
|----------|------|--------------|--------------|------------------|------------------------|-----------|------|------|------|------------------|
| | | | | | | TDF | TD | TE | TDG | Tape |
| RLP73V2E | 1210 | ±600 | 0.75W | R010 – R020 | 8.66A | 1000 | 5000 | | | Paper |
| RLP73M2E | | ±400 | | R022 – R047 | | | | | | |
| RLP73N2E | | ±300 | | R051 – R091 | | | | | | |
| RLP73K2E | | ±200 | | R10 – R91 | | | | | | |
| RLP73V2H | 2010 | ±600 | 1W | R010 – R020 | 10A | | | 4000 | | Embossed Plastic |
| RLP73M2H | | ±400 | | R022 – R047 | | | | | | |
| RLP73N2H | | ±300 | | R051 – R091 | | | | | | |
| RLP73K2H | | ±200 | | R10 – R91 | | | | | | |
| RLP73V3A | 2512 | ±600 | 2W | R010 – R020 | 14.1A | | | | 2000 | Embossed Plastic |
| RLP73M3A | | ±400 | | R022 – R047 | | | | | | |
| RLP73N3A | | ±300 | | R051 – R091 | | | | | | |
| RLP73K3A | | ±200 | | R10 – R91 | | | | | | |
| RLP73H3A | | ±100 | | R051 – R348 | 6.32A | | | | | |

Operating Voltage= $v(P \cdot R)$; Overload Voltage= $2.5 \cdot v(P \cdot R)$; Operating Current= $v(P/R)$

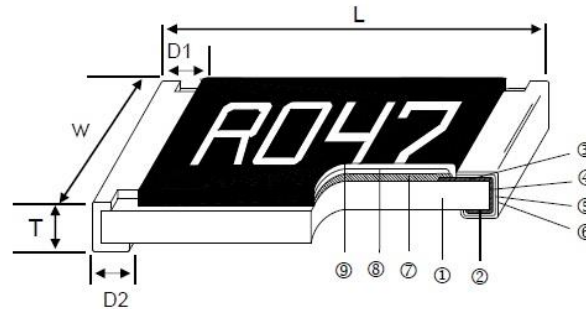
Maximum operating temperature -55°C to +155°C

Power Derating curve



For resistors operated in ambient temperatures above 70°C, power rating must be derated in accordance with this curve.

Construction and dimensions



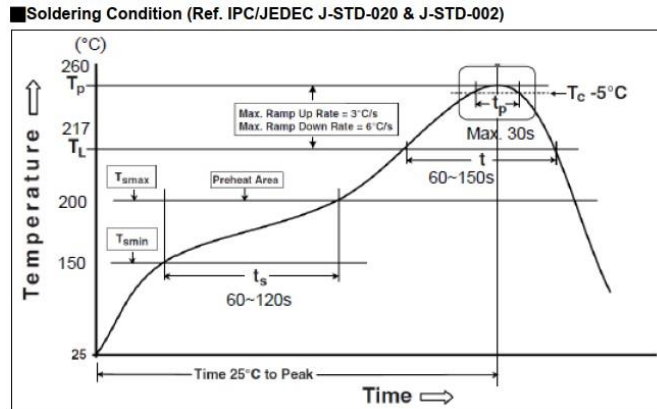
| | | |
|-------------------------|---------------------------|------------------------------|
| ① Alumina Substrate | ④ Edge Electrode (NiCr) | ⑦ Resistor Layer (Ag/Pd) |
| ② Bottom Electrode (Ag) | ⑤ Barrier Layer (Ni) | ⑧ Primary Overcoat (Glass) |
| ③ Top Electrode (Ag-Pd) | ⑥ External Electrode (Sn) | ⑨ Secondary Overcoat (Epoxy) |

| Type | Size | L (mm) | W (mm) | T (mm) | D1 (mm) | D2 (mm) | Weight (g) (1000 Pcs.) |
|--------------|--------------------------|-----------|-----------|-----------|-----------|-----------|---------------------------|
| RL73 | 0201 (1H) | 0.60±0.03 | 0.30±0.03 | 0.23±0.05 | 0.12±0.05 | 0.15±0.05 | 0.18 |
| RL73 / RLP73 | 0402 (1E) | 1.00±0.05 | 0.50±0.05 | 0.32±0.10 | 0.25±0.10 | 0.20±0.10 | 0.7 |
| RL73 / RLP73 | 0603 (1J) | 1.60±0.10 | 0.80±0.10 | 0.45±0.10 | 0.30±0.20 | 0.30±0.20 | 1.99 |
| RL73 / RLP73 | 0805 (2A) | 2.00±0.10 | 1.25±0.10 | 0.55±0.10 | 0.30±0.20 | 0.40±0.25 | 5.3 |
| RL73 / RLP73 | 1206 (2B) | 3.10±0.10 | 1.55±0.10 | 0.55±0.10 | 0.50±0.30 | 0.40±0.25 | 8.82 |
| RL73 / RLP73 | 1210 (2E) | 3.10±0.10 | 2.60±0.15 | 0.55±0.10 | 0.50±0.30 | 0.50±0.25 | 15.5 |
| RL73 / RLP73 | 2010 (2H) | 5.00±0.10 | 2.50±0.15 | 0.60±0.15 | 0.60±0.30 | 0.50±0.25 | 27.03 |
| RL73 | 2512 (3A) | 6.35±0.10 | 3.10±0.15 | 0.60±0.10 | 0.60±0.30 | 0.55±0.25 | 43.08 |
| RLP73 | 2512 (3A) (R010-R099) | 6.35±0.20 | 3.15±0.15 | 0.74±0.10 | 0.60±0.30 | 0.55±0.25 | 53.08 |
| RLP73 | 2512 (3A) (R10 -R91) | 6.35±0.20 | 3.15±0.15 | 0.74±0.10 | 0.60±0.30 | 2.10±0.10 | 53.08 |

Suggested PCB Layout Plan

| Type | A (mm) | B (mm) | C ±0.2mm |
|------------------|--------|--------|----------|
| 0201 | 0.25 | 0.30 | 0.40 |
| 0402 | 0.50 | 0.50 | 0.60 |
| 0603 | 0.80 | 1.00 | 0.90 |
| 0805 | 1.00 | 1.00 | 1.35 |
| 1206 | 2.00 | 1.15 | 1.70 |
| 1210 | 2.00 | 1.15 | 2.50 |
| 2010 | 3.60 | 1.40 | 2.50 |
| 2512 (1W) | 4.90 | 1.60 | 3.20 |
| 2512 (2W) ≤99mΩ | 4.90 | 1.60 | 3.20 |
| 2512 (2W) ≥100mΩ | 1.0 | 3.55 | 3.20 |

Solder Profile



| Reflow Profiles | |
|---|------------------|
| Profile Feature | Pb-Free Assembly |
| Preheat | |
| Min. Temperature (T _{min}) | 150 °C |
| Max Temperature (T _{max}) | 200 °C |
| Preheating time (t _s) from (T _{min} to T _{max}) | 60-120 seconds |
| Ramp-up rate (TL to Tp) | 3 °C/second max. |
| Liquidous temperature (TL) | 217 °C |
| Time (t _L) maintained above TL | 60-150 seconds |
| Min. Peak temperature (Tp min) | 235°C |
| Max. Peak temperature (Tp max) | 260°C |
| Time (t _p) within 5 °C of the specified classification temperature (Tc) | 30 seconds max. |
| Ramp-down rate (Tp to TL) | 6 °C/second max |
| Time 25 °C to peak temperature | 8 minutes max. |

Marking Specification

For 0201 and 0402 size resistor – No Marking

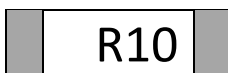
1% & 5% 0805/1206/1210/2010/2512 size Resistors – 4 Digit Marking.

Example:

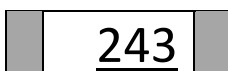
| | | | | | |
|------------|------|------|------|-------|-------|
| Resistance | 47mΩ | 75mΩ | 15mΩ | 750mΩ | 820mΩ |
| Marking | R047 | R075 | R015 | R750 | R820 |

5% for 0603: 3 digits marking in E24

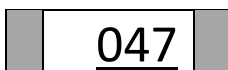
1% for 0603: 3 digits marking with under-line in E96 (if value appears in both E96 and E24 refer to E24)



3 digits marking for E24 or R value suffix is zero in E96: R10=100mΩ; R28=280mΩ



3 digits marking for E96: 243=243mΩ; 511=511mΩ



3 digit marking for E24 where value is less than 100mΩ and R value suffix is NOT 0; E.G. R047=47mΩ

Environmental Characteristics

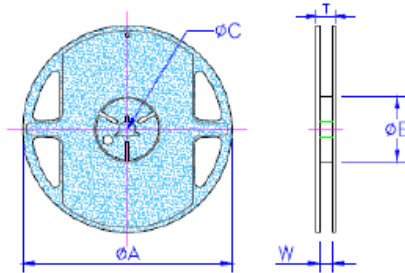
| Item | Requirement | Test Method |
|---|--|--|
| Temperature Coefficient of Resistance (TCR) | As Spec. | JIS-C-5201-1 4.8 IEC-60115-1 4.8 -55°C ~+125°C, 25°C is the reference temperature |
| Short Time Overload | $\pm(0.5\%+0.05\Omega)$ | JIS C 5201-1 4.13 IEC 60115-1 4.13 RCWV*2.5 or Max. Overload Voltage whichever is lower for 5 seconds |
| | $\pm(1.0\%+0.05\Omega)$ For High power rating | |
| Insulation Resistance | $\geq 10G$ | JIS-C-5201-1 4.6 IEC-60115-1 4.6 Max. Overload Voltage for 1 minute |
| Endurance | $\pm(1.0\%+0.05\Omega)$ | JIS-C-5201-1 4.25 IEC-60115-1 4.25.1 70 \pm 2°C, RCWV for 1000 hrs with 1.5 hrs "ON" and 0.5 hr off |
| Damp Heat with Load | $\pm(0.5\%+0.05\Omega)$ | JIS-C-5201-1 4.24 IEC-60115-1 4.24 40 \pm 2°C, 90~95% R.H., RCWV for 1000 hrs with 1.5 hrs "ON" and 0.5 hr "OFF" |
| Dry Heat | $\pm(0.5\%+0.05\Omega)$ | JIS-C-5201-1 4.23 IEC-60115-1 4.23.2 at +155°C for 1000 hrs |
| Bending Strength | $\pm(1.0\%+0.05\Omega)$ | JIS-C-5201-1 4.33 IEC-60115-1 4.33 Bending once for 60 seconds with 3mm 2010, 2512 sizes: 2mm |
| Solderability | 95% min. coverage | JIS-C-5201-1 4.17 IEC-60115-1 4.17 245 \pm 5°C for 3 seconds |
| Resistance to Soldering Heat | $\pm(0.5\%+0.05\Omega)$ | S-C-5201-1 4.18 IEC-60115-1 4.18 260 \pm 5°C for 10 seconds |
| Voltage Proof | No breakdown or flashover | JIS-C-5201-1 4.7 IEC-60115-1 4.7 1.42 times Max. Operating Voltage for 1 minute |
| Leaching | Individual leaching area $\leq 5\%$ Total leaching area $\leq 10\%$ | JIS-C-5201-1 4.18 IEC-60068-2-58 8.2.1 260 \pm 5°C for 30 seconds |
| Rapid Change of Temperature | $\pm(0.5\%+0.05\Omega)$ | JIS-C-5201-1 4.19 IEC-60115-1 4.19 -55°C to +155°C, 5 cycles |

RCWV (Rated Continuous Working Voltage) = $v(P \cdot R)$ or Max. Operating Voltage whichever is lower.

Storage Temperature: 15~28°C; Humidity < 80%RH
Shelf Life: 2 years from production date.

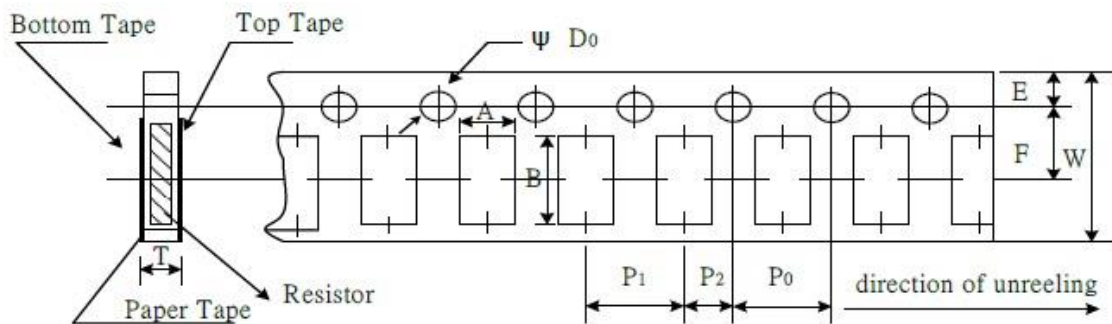
Packaging

Packing Quantity and Reel Specification



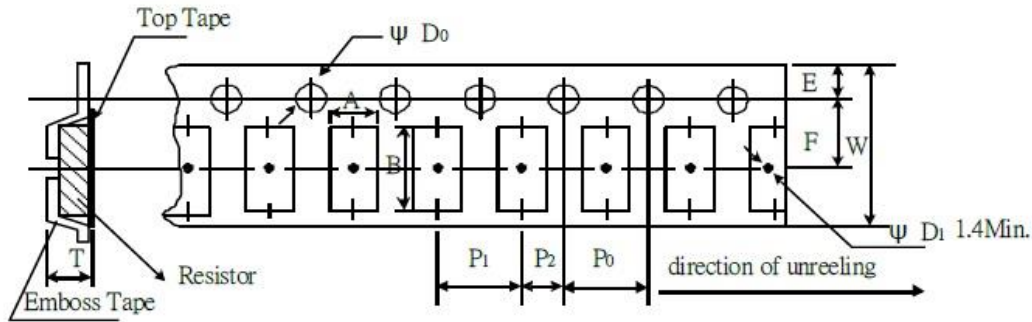
| Size | ØA ±1.0 | ØB ±1.0 | ØC ±0.7 | W ±1.0 | T ±1.0 | Paper Tape | Embossed Plastic Tape |
|-----------|---------|---------|---------|--------|--------|-------------|-----------------------|
| 0201 | 178.0 | 60.0 | 13.5 | 9.5 | 11.5 | 1000 / 5000 | N/A |
| 0402 | | | | | | 1000 / 5000 | |
| 0603 | | | | | | | |
| 0805 | | | | N/A | 4000 | | |
| 1206 | | | | | | | |
| 1210 | | | | | | | |
| 2010 | 13.5 | 15.5 | N/A | 2000 | | | |
| 2512 | | | | | | | |
| 2512 (2W) | | | | | | | |

Paper tape Specification



| Size | A | B | W ±0.20 | E ±0.10 | F ±0.05 | P ₀ ±0.10 | P ₁ ±0.05 | P ₂ ±0.05 | ØD ₀ ±0.1-0 | T |
|------|-----------|-----------|---------|---------|---------|----------------------|----------------------|----------------------|------------------------|-----------|
| 0201 | 0.38±0.05 | 0.68±0.05 | 8.00 | 1.75 | 3.5 | 4.00 | 2.00 | 2.00 | 1.50 | 0.42±0.20 |
| 0402 | 0.65±0.10 | 1.15±0.10 | | | | | | | | 0.45±0.10 |
| 0603 | 1.10±0.10 | 1.90±0.10 | | | | | | | | 0.70±0.10 |
| 0805 | 1.60±0.10 | 2.40±0.20 | | | | | 4.00 | | | 0.85±0.10 |
| 1206 | 1.90±0.10 | 3.50±0.20 | | | | | | | | |
| 1210 | 2.90±0.10 | 3.50±0.20 | | | | | | | | |

Embossed Plastic Tape Specifications



| Type | A±0.10 | B | W±0.30 | E±0.10 | F | P ₀ | P ₁ | P ₂ | ØD ₀ | T |
|-----------|--------|-----------|--------|--------|----------|----------------|----------------|----------------|-----------------|-----------|
| 2010 | 2.80 | 5.50±0.20 | 12.0 | 1.75 | 5.5±0.05 | 4.00±0.05 | 4.00±0.10 | 2.00±0.05 | 1.50±0.10 | 1.00±0.20 |
| 2512 | 3.50 | 6.70±0.10 | | | 5.5±0.10 | 4.00±0.10 | | | | |
| 2512 (2W) | 3.38 | 6.68±0.10 | | | | | | | | |

How To Order

| RL73 | H | 2A | R10 | F | TD |
|--|---|---|-------------------------------|--------------------|--|
| Common Part | TCR | Size | Value | Tolerance | Packaging |
| RL73 – Current Sense Resistor – Standard Power | X - 1000PPM V - 600PPM N - 300PPM H - 100PPM K - 200PPM | 1H - 0201 1E - 0402 1J - 0603 2A - 0805 2B - 1206 | 0.1 Ohm (100milliOhm) R10 | F - ±1% J - ±5% | TDF - 1000 REEL TDG – 2000 REEL (2512 2W only) TE - 4000 REEL (2010,2512 only) |
| RLP73 – Current Sense Resistor – High Power | M - 400PPM See above for applicability | 2E - 1210 2H - 2010 3A - 2512 | 0.91 Ohm (910milliOhm) R91 | | TD - 5000 REEL (0201 ~1210) |

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