

**Key Features**

Resistance  
values from  
10mΩ

Low TCR  
version  
available for  
many values

High purity  
alumina  
substrate for  
high power  
dissipation

RoHS  
Compliance

MSL Level 1

**Applications**

Power  
management  
applications

Switching  
power supply

Over current  
protection in  
audio  
applications

Voltage  
regulation  
module (VRM)

DC-DC  
converter,  
battery pack,  
charger,  
adaptor

Disk driver

**Type RLC73 Series**

TE Connectivity (TE) introduces a new range of current sense resistors to be offered as a low-cost alternative to legacy solutions characterised by noble metal construction (Ag/Pd / RU) and terminations. RLC73 series has the additional benefit of being fully RoHS compliant, and features power ratings up to 2W and TCRs down to 50ppm/°C in the high-power version. Furthermore, these resistors satisfy the demand for low ohmic shunt resistors to act as current sensors towards ICs for battery charge management and low voltage power supplies produced by global semiconductor manufacturers.

**Characteristics – Electrical - Standard**

| Type  | Size | Power Rating (W) | Operating Temp. Range | Max Operating Current (A) | Resistance Range (mΩ)                          |                                                |         | TCR (PPM/°C)                 |
|-------|------|------------------|-----------------------|---------------------------|------------------------------------------------|------------------------------------------------|---------|------------------------------|
|       |      |                  |                       |                           | ±1% E24 & E96*                                 | ±2% E24                                        | ±5% E24 |                              |
| RLC73 | 0805 | 0.125            | -55 ~ 155°C           | 2.5                       | 20 – 50<br>51 – 100<br>102 – 196<br>200 – 1000 | 20 – 50<br>51 – 100<br>110 – 180<br>200 – 1000 |         | ±600<br>±400<br>±300<br>±200 |
| RLC73 | 1206 | 0.25             |                       | 5.0                       | 10 – 20<br>22 – 50<br>51 – 91<br>100 – 1000    | 10 – 20<br>22 – 50<br>51 – 91<br>100 – 1000    |         | ±600<br>±400<br>±300<br>±200 |
| RLC73 | 1210 | 0.5              |                       | 7.07                      | 10 – 20<br>22 – 50<br>51 – 91<br>100 – 1000    | 10 – 20<br>22 – 50<br>51 – 91<br>100 – 1000    |         | ±600<br>±400<br>±300<br>±200 |
| RLC73 | 2010 | 0.75             |                       | 8.66                      | 10 – 20<br>22 – 50<br>51 – 91<br>100 – 1000    | 10 – 20<br>22 – 50<br>51 – 91<br>100 – 1000    |         | ±600<br>±400<br>±300<br>±200 |
| RLC73 | 2512 | 1                |                       | 10.0                      | 10 – 20<br>22 – 50<br>51 – 91<br>100 – 1000    | 10 – 20<br>22 – 50<br>51 – 91<br>100 – 1000    |         | ±600<br>±400<br>±300<br>±200 |

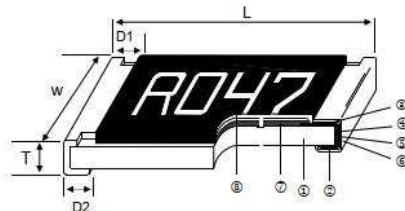
\*The nominal resistance value range for less than 100mΩ is in E24 series

## Characteristics – Electrical – High Power

| Type   | Size | Power Rating (W) | Operating Temp. Range | Max Operating Current (A) | Resistance Range (mΩ)                |                                      |                      | TCR (PPM/C°) |
|--------|------|------------------|-----------------------|---------------------------|--------------------------------------|--------------------------------------|----------------------|--------------|
|        |      |                  |                       |                           | ±1% E24 & E96*                       | ±2% E24                              | ±5% E24              |              |
| RLC73P | 0805 | 0.25             | -55 ~ 155°C           | 2.21                      | 20 – 50<br>51 – 91                   | 20 – 50<br>51 – 91                   | ±600<br>±400         |              |
|        |      |                  |                       | 1.58                      | 100 – 196<br>200 – 499<br>500 - 1000 | 100 – 180<br>200 – 470<br>500 – 1000 | ±100<br>±75<br>±50   |              |
| RLC73P | 1206 | 0.5              |                       | 7.07                      | 10 – 20<br>22 – 50<br>51 – 68        | 10 – 20<br>22 – 50<br>51 – 68        | ±600<br>±400<br>±300 |              |
| RLC73P | 1206 | 1                |                       | 3.65                      | 75 – 100<br>102 – 147<br>150 - 1000  | 75 – 100<br>110 – 140<br>150 - 1000  | ±100<br>±75<br>±50   |              |
| RLC73P | 1210 | 0.75             |                       | 8.66                      | 10 – 20<br>22 - 47                   | 10 – 20<br>22 - 47                   | ±600<br>±400         |              |
|        |      |                  |                       | 3.87                      | 50 – 147<br>150 -1000                | 50 – 140<br>150 - 1000               | ±75<br>±50           |              |
| RL73CP | 2010 | 1                |                       | 10.0                      | 10 – 20<br>22 - 47                   | 10 – 20<br>22 - 47                   | ±600<br>±400         |              |
|        |      |                  |                       | 4.47                      | 50 – 147<br>150 - 1000               | 50 – 140<br>150 - 1000               | ±75<br>±50           |              |
| RL73CP | 2512 | 2                |                       | 14.1                      | 10 – 18                              | 10 - 18                              | ±600                 |              |
|        |      |                  |                       | 10.0                      | 20 – 47                              | 20 - 47                              | ±100                 |              |
|        |      |                  |                       | 6.32                      | 50 – 147<br>150 - 1000               | 50 – 140<br>150 - 1000               | ±75<br>±50           |              |

\*The nominal resistance value range for less than 100mΩ is in E24 series

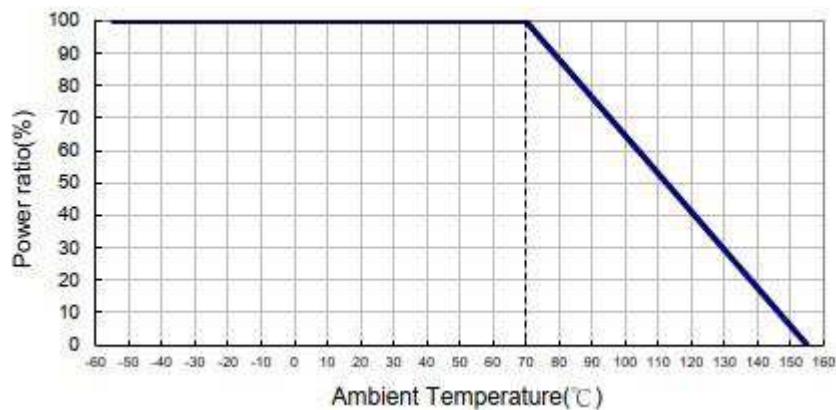
## Construction and Dimensions



- ① Alumina Substrate      ⑤ Barrier Layer
- ② Bottom Electrode      ⑥ External Electrode
- ③ Top Electrode        ⑦ Resistor Layer
- ④ Edge Electrode       ⑧ Overcoat

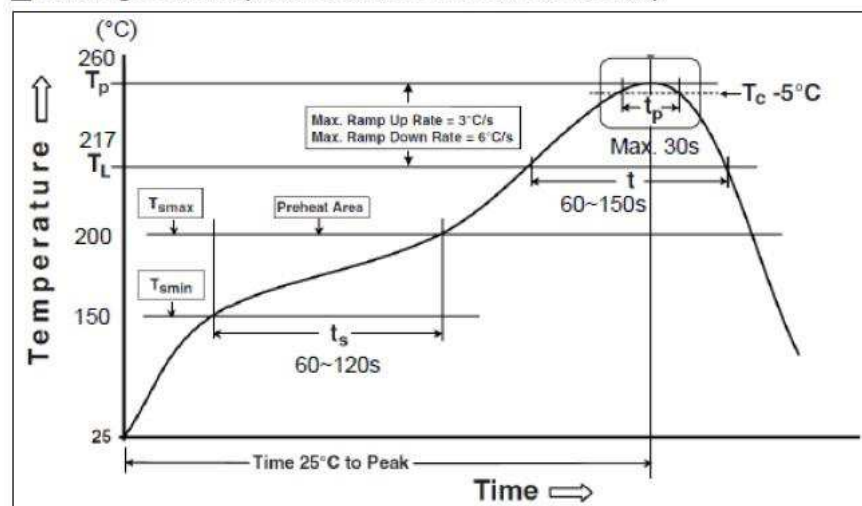
| Type           | Size            | L (mm)<br>±0.10 | W (mm)     | T (mm)     | D1 (mm)    | D2 (mm)    | Weight (g)<br>/ K pcs |  |
|----------------|-----------------|-----------------|------------|------------|------------|------------|-----------------------|--|
| RLC73 / RLC73P | 0805            | 2.00            | 1.25 ±0.10 | 0.55 ±0.10 | 0.30 ±0.20 | 0.40 ±0.25 | 4.6                   |  |
| RLC73 / RLC73P | 1206            | 3.10            | 1.55 ±0.10 | 0.55 ±0.10 | 0.50 ±0.30 | 0.40 ±0.25 | 8.7                   |  |
| RLC73 / RLC73P | 1210            | 3.10            | 2.60 ±0.15 | 0.55 ±0.10 | 0.50 ±0.30 | 0.50 ±0.25 | 16.0                  |  |
| RLC73 / RLC73P | 2010            | 5.00            | 2.50 ±0.15 | 0.60 ±0.15 | 0.60 ±0.30 | 0.50 ±0.25 | 23.7                  |  |
| RLC73          | 2512            | 6.35            | 3.10 ±0.15 | 0.60 ±0.10 | 0.60 ±0.30 | 0.55 ±0.25 | 40.0                  |  |
| RLC73P         | 2512<br>10-18mΩ |                 |            | 0.74 ±0.10 |            | 2.10 ±0.10 | 53.6                  |  |
|                | 20 – 43mΩ       | 6.45            | 3.25 ±0.15 | 0.85 ±0.10 |            | 0.60 ±0.30 | 65.3                  |  |
|                | 47mΩ            | 6.35            | 3.10 ±0.15 | 0.74 ±0.10 |            | 210 ±0.10  | 53.6                  |  |
|                | 51 – 1000mΩ     |                 |            |            |            |            |                       |  |

## Derating Curve



## Soldering Profile

■ Soldering Condition (Ref. IPC/JEDEC J-STD-020 & J-STD-002)



| Profile Feature                                                        | Pb-Free Assembly |
|------------------------------------------------------------------------|------------------|
| Preheat                                                                |                  |
| Min. Temperature (T <sub>min</sub> )                                   | 150 °C           |
| Max Temperature (T <sub>max</sub> )                                    | 200 °C           |
| Preheating time (ts) from (T <sub>min</sub> to T <sub>max</sub> )      | 60-120 seconds   |
| Ramp-up rate (TL to Tp)                                                | 3°C/second max.  |
| Liquidous temperature (TL)                                             | 217 °C           |
| Time (tL) maintained above TL                                          | 60-150 seconds   |
| Min. Peak temperature (Tp min)                                         | 235°C            |
| Max. Peak temperature (Tp max)                                         | 260°C            |
| Time (tp) 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.   |

## Environmental Characteristics

| Item                                           | Requirement                                                             | Test Method                                                                                                                                                                         |
|------------------------------------------------|-------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Temperature Coefficient of resistance (T.C.R.) | As Spec.                                                                | <b>JIS-C-5201-1 4.8</b><br><b>IEC-60115-1 4.8</b><br>At 25°C/-55°C and 25°C/+125°C, 25°C is the reference temperature<br>Low TCR: At 25°C/+125°C, 25°C is the reference temperature |
| Short Time Overload                            | $\pm(0.5\%+0.05\Omega)$                                                 | <b>JIS C 5201-1 4.13</b><br><b>IEC 60115-1 4.13</b><br>RCWV*2.5 or Max. Overload Voltage whichever is lower for 5 seconds                                                           |
|                                                | $\pm(1.0\%+0.05\Omega)$<br>For $\leq 50\text{mR}$ & all High power      |                                                                                                                                                                                     |
| Insulation Resistance                          | $\geq 10\text{G}$                                                       | <b>JIS-C-5201-1 4.6</b><br><b>IEC-60115-1 4.6</b><br>Max. Overload Voltage for 1 minute                                                                                             |
| Endurance                                      | $\pm(1.0\%+0.05\Omega)$                                                 | <b>JIS-C-5201-1 4.25</b><br><b>IEC-60115-1 4.25.1</b><br>70 $\pm$ 2°C, RCWV for 1000 hrs with 1.5 hrs "ON" and 0.5 hr "OFF"                                                         |
|                                                | $\pm(2.0\%+0.05\Omega)$<br>For $\leq 50\text{m}\Omega$ & all High power |                                                                                                                                                                                     |
| Damp Heat with Load                            | $\pm(0.5\%+0.05\Omega)$                                                 | <b>JIS-C-5201-1 4.24</b><br><b>IEC-60115-1 4.24</b><br>40 $\pm$ 2°C, 90~95% R.H., RCWV for 1000 hrs with 1.5 hrs "ON" and 0.5 hr "OFF"                                              |
|                                                | $\pm(1.0\%+0.05\Omega)$<br>For $\leq 50\text{m}\Omega$ & all High power |                                                                                                                                                                                     |
| Dry Heat                                       | $\pm(1.0\%+0.05\Omega)$                                                 | <b>JIS-C-5201-1 4.23</b><br><b>IEC-60115-1 4.23.2</b><br>at +155°C for 1000 hrs                                                                                                     |
|                                                | $\pm(2.0\%+0.05\Omega)$<br>For $\leq 50\text{m}\Omega$ & all High power |                                                                                                                                                                                     |
| Bending Strength                               | $\pm(1.0\%+0.05\Omega)$                                                 | <b>JIS-C-5201-1 4.33</b><br><b>IEC-60115-1 4.33</b><br>Bending once for 60 seconds with 3mm 2010, 2512 sizes: 2mm                                                                   |
| Solderability                                  | 95% min. coverage                                                       | <b>JIS-C-5201-1 4.17</b><br><b>IEC-60115-1 4.17</b><br>245 $\pm$ 5°C for 3 seconds                                                                                                  |
| Resistance to Soldering Heat                   | $\pm(0.5\%+0.05\Omega)$                                                 | <b>JIS-C-5201-1 4.18</b><br><b>IEC-60115-1 4.18</b><br>260 $\pm$ 5°C for 10 seconds                                                                                                 |
| Voltage Proof                                  | No breakdown or flashover                                               | <b>JIS-C-5201-1 4.7</b><br><b>IEC-60115-1 4.7</b><br>1.42 times Max. Operating Voltage for 1 minute CSN05:300V CSN06/13/10:400V; CSN12:500V                                         |
| Leaching                                       | Individual leaching area $\leq 5\%$<br>Total leaching area $\leq 10\%$  | <b>JIS-C-5201-1 4.18</b><br><b>IEC-60068-2-58 8.2.1</b><br>260 $\pm$ 5°C for 30 seconds                                                                                             |
| Rapid Change of Temperature                    | $\pm(0.5\%+0.05\Omega)$                                                 | <b>JIS-C-5201-1 4.19</b><br><b>IEC-60115-1 4.19</b><br>-55°C to +155°C, 5 cycles                                                                                                    |

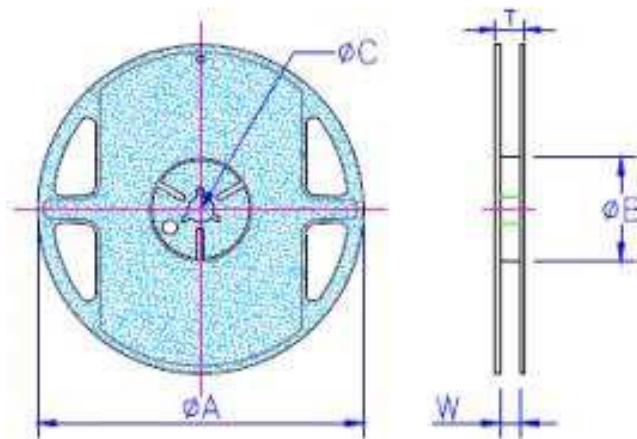
RCWV(Rated Continuous Working Voltage)= $V(P \cdot R)$  or Max. Operating Voltage whichever is lower.

**Storage Temperature: 15~28°C; Humidity < 80%RH**

**Shelf Life: 2 years from production date**

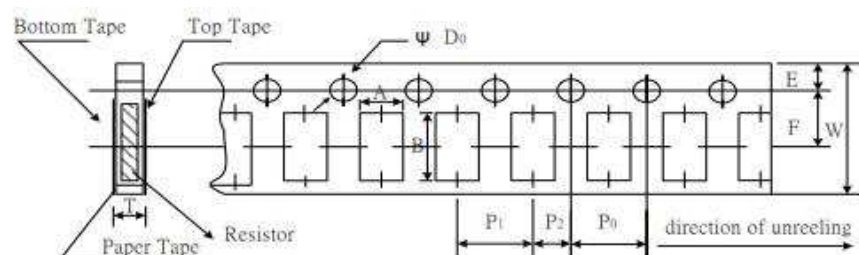
## Packaging

### Reel Dimensions (mm)



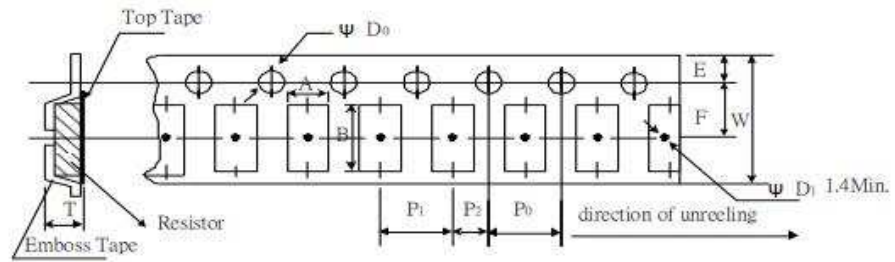
| Size                 | Type     | Qty        | Tape Width | Reel Diameter | ØA (mm)       | ØB (mm)     | ØC (mm)      | W (mm)       | T (mm)       |
|----------------------|----------|------------|------------|---------------|---------------|-------------|--------------|--------------|--------------|
| 0805<br>1206<br>1210 | Paper    | 5K /<br>1K | 8mm        | 7 inch        | 178.5<br>±1.5 | 60<br>+0/-1 | 13.0<br>±0.2 | 9.0<br>±0.5  | 12.5<br>±0.5 |
| 2010<br>2512         | Embossed | 4K /<br>1K | 12mm       | 7 inch        | 178.5<br>±1.5 | 60<br>+0/-1 | 13.0<br>±0.5 | 13.0<br>±0.5 | 15.5<br>±0.5 |
| 2512<br>2W           | Embossed | 2K/<br>1K  | 12mm       | 7 inch        | 178.5<br>±1.5 | 60<br>+0/-1 | 13.0<br>±0.5 | 13.0<br>±0.5 | 15.5<br>±0.5 |

### Paper Tape Specifications



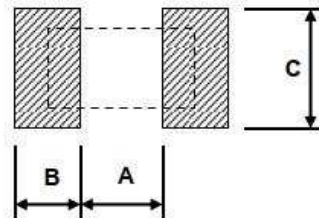
| Size | A (mm)<br>±0.10 | B (mm)<br>±0.20 | W (mm)<br>±0.20 | E (mm)<br>±0.10 | F (mm)<br>±0.05 | P <sub>0</sub> (mm)<br>±0.10 | P <sub>1</sub> (mm)<br>±0.05 | P <sub>2</sub> (mm)<br>±0.05 | ØD <sub>0</sub> (mm)<br>+0.1<br>-0 | T (mm)<br>±0.1 |
|------|-----------------|-----------------|-----------------|-----------------|-----------------|------------------------------|------------------------------|------------------------------|------------------------------------|----------------|
| 0805 | 1.60            | 2.40            | 8.0             | 1.75            | 3.50            | 4.00                         | 4.00                         | 2.00                         | 1.50                               | 0.85           |
| 1206 | 1.90            | 3.50            | 8.0             | 1.75            | 3.50            | 4.00                         | 4.00                         | 2.00                         | 1.50                               | 0.85           |
| 1210 | 2.90            | 3.50            | 8.0             | 1.75            | 3.50            | 4.00                         | 4.00                         | 2.00                         | 1.50                               | 0.85           |

### Embossed plastic tape specifications



| Size                                | A (mm)        | B (mm)        | W (mm)        | E (mm)        | F (mm)       | P <sub>0</sub> (mm) | P <sub>1</sub> (mm) | P <sub>2</sub> (mm) | ØD <sub>0</sub> (mm) | T (mm)        |
|-------------------------------------|---------------|---------------|---------------|---------------|--------------|---------------------|---------------------|---------------------|----------------------|---------------|
| 2010                                | 2.80<br>±0.10 | 5.40<br>±0.20 | 12.0<br>±0.30 | 1.75<br>±0.10 | 5.5<br>±0.05 | 4.00<br>±0.05       | 4.00<br>±0.10       | 2.00<br>±0.05       | 1.50<br>±0.10        | 1.00<br>±0.20 |
| 2512                                | 3.50<br>±0.10 | 6.70<br>±0.10 | 12.0<br>±0.30 | 1.75<br>±0.10 | 5.5<br>±0.05 | 4.00<br>±0.05       | 4.00<br>±0.10       | 2.00<br>±0.05       | 1.50<br>±0.10        | 1.00<br>±0.20 |
| 2512<br>2W<br>20 -<br>49mΩ          | 3.50<br>±0.10 | 6.70<br>±0.10 | 12.0<br>±0.30 | 1.75<br>±0.10 | 5.5<br>±0.05 | 4.00<br>±0.10       | 4.00<br>±0.10       | 2.00<br>±0.05       | 1.50<br>±0.10        | 1.45<br>±0.20 |
| 2512<br>2W<br>10 -<br>18mΩ<br>>49mΩ | 3.38<br>±0.10 | 6.68<br>±0.10 | 12.0<br>±0.30 | 1.75<br>±0.10 | 5.5<br>±0.10 | 4.00<br>±0.10       | 4.00<br>±0.10       | 2.00<br>±0.05       | 1.55<br>±0.05        | 1.45<br>±0.20 |

### Recommended Land Pattern



| Size                          | A (mm) | B (mm) | C (mm)<br>±0.2 |
|-------------------------------|--------|--------|----------------|
| 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                          | 4.90   | 1.60   | 3.20           |
| 2512 2W<br>20 - 43mΩ          | 4.90   | 1.60   | 3.20           |
| 2512 2W<br>10 - 18mΩ<br>≥47mΩ | 1.00   | 3.55   | 3.20           |

## Marking

4 digit marking for all models

|         |            |      |      |       |       |
|---------|------------|------|------|-------|-------|
| Example | Resistance | 10mΩ | 51mΩ | 100mΩ | 549mΩ |
|         | Marking    | R010 | R051 | R100  | R549  |

## How To Order

| RLC73                  | K                                                  | 2H                                                            | R357                                       | F                          | TE                                                                                                            |
|------------------------|----------------------------------------------------|---------------------------------------------------------------|--------------------------------------------|----------------------------|---------------------------------------------------------------------------------------------------------------|
| Common Part            | T.C.R                                              | Size                                                          | Resistance Value                           | Tolerance                  | Packaging                                                                                                     |
| RLC73 – Standard Power | D - 50ppm<br>W - 75ppm<br>H - 100ppm<br>K - 200ppm | 2A - 0805<br>2B - 1206<br>2E - 1210<br>2H - 2010<br>3A - 2512 | R010 – 10mΩ<br>R051 – 51mΩ<br>R100 – 100mΩ | F – 1%<br>G – 2%<br>J – 5% | TDF - 1K RL (all models)<br>TD - 5K RL (0805, 1206, 1210)<br>TE - 4K RL (2010, 2512)<br>TDG - 2K RL (2512 2W) |
| RLC73P – High Power    | N - 300ppm<br>M - 400ppm<br>V - 600ppm             |                                                               |                                            |                            |                                                                                                               |

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