

## Type RL73 Series

### Key Features

Up to 2W @ 70°C

8 chip sizes

Ideal for current detection

Terminal finish –  
electroplated 100% matte  
Sn

### 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 and a nickel barrier layer beneath the solder 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.

## Electrical Characteristics Standard Power

| Size    | Size | TCR<br>(PPM/°C) | Power<br>rating @<br>70°C | Resistance<br>Range (Ω) | Max<br>Operating<br>Current | Packaging |      |    |       |
|---------|------|-----------------|---------------------------|-------------------------|-----------------------------|-----------|------|----|-------|
|         |      |                 |                           |                         |                             | TDF       | TD   | TE | 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               | 1.11A                       |           |      |    |       |

## Electrical Characteristics Standard Power (continued)

| Size    | Size | TCR (PPM/°C) | Power rating @ 70°C | Resistance Range (Ω) | Max Operating Current | Packaging |      |      |                  |
|---------|------|--------------|---------------------|----------------------|-----------------------|-----------|------|------|------------------|
|         |      |              |                     |                      |                       | TDF       | TD   | TE   | 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 | 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)

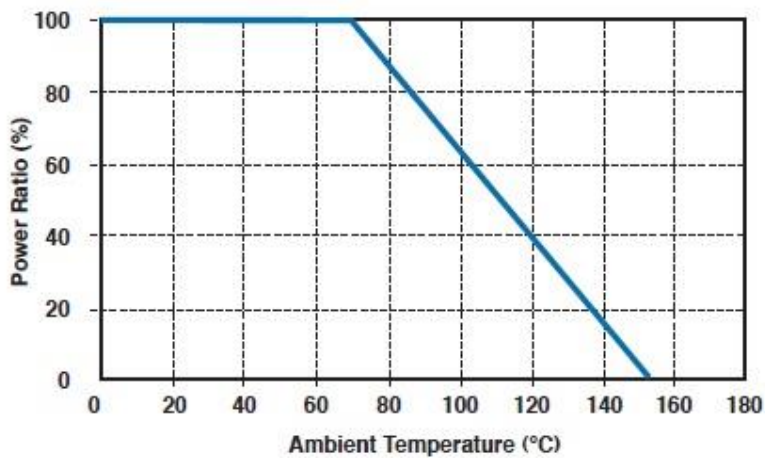
| Type     | Size | TCR (PPM/°C) | Power rating | Resistance Range | Max. Operating current | Packaging |      |      |                  |
|----------|------|--------------|--------------|------------------|------------------------|-----------|------|------|------------------|
|          |      |              |              |                  |                        | TDF       | TD   | TE   | 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                    | 1000      |      | 4000 | Embossed Plastic |
| RLP73M2H |      | ±400         |              | R022 – R047      |                        |           |      |      |                  |
| RLP73N2H |      | ±300         |              | R051 – R091      |                        |           |      |      |                  |
| RLP73K2H |      | ±200         |              | R10 – R91        |                        |           |      |      |                  |
| RLP73V3A | 2512 | ±600         | 2W           | R010 – R020      | 14.1A                  | 1000      |      | 4000 | Embossed Plastic |
| RLP73M3A |      | ±400         |              | R022 – R047      |                        |           |      |      |                  |
| RLP73N3A |      | ±300         |              | R051 – R091      |                        |           |      |      |                  |
| RLP73K3A |      | ±200         |              | R10 – R91        |                        |           |      |      |                  |

Operating Voltage= $\sqrt{P \cdot R}$  ; Overload Voltage= $2.5 \cdot \sqrt{P \cdot R}$  ; Operating Current= $\sqrt{P/R}$

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

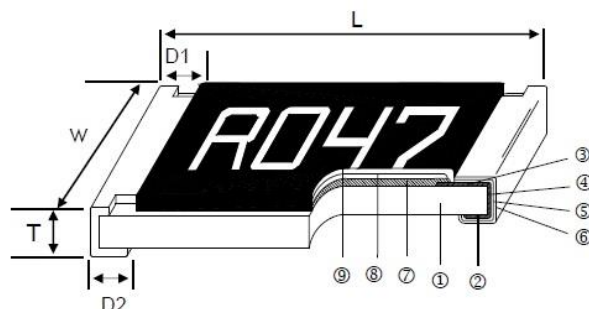
Storage Temperature 25±3°C; Humidity < 80%RH

### 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)<br>(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)<br>(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)<br>(R10 -R91)  | 6.35±0.20 | 3.15±0.15 | 0.74±0.10 | 0.60±0.30 | 2.10±0.10 | 53.08                     |

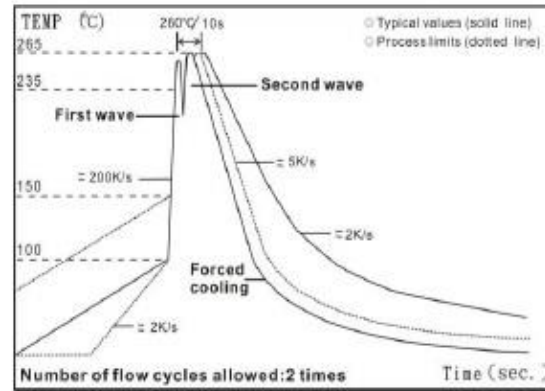
### Suggested PCB Layout Plan

| 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



IR Reflow Soldering



Wave Soldering (Flow Soldering)

- (1) Time of IR reflow soldering at maximum temperature point 260°C : 10s
- (2) Time of wave soldering at maximum temperature point 260°C : 10s
- (3) Time of soldering iron at maximum temperature point 410°C : 5s

## Marking Specification

For 0201 and 0402 size resistor – No Marking

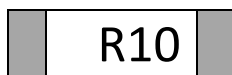
1% & 5% 0805/1206/1210/2010/2512 size Resistors – 4 Digit Marking.

Example:

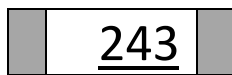
|            |      |      |      |       |       |
|------------|------|------|------|-------|-------|
| Resistance | 47mΩ | 75mΩ | 15mΩ | 750mΩ | 820mΩ |
| Marking    | R047 | R075 | R015 | R750  | R820  |

5% for 0603: 3 digits marking in E24

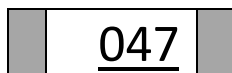
1% for 0603: 3 digits marking with under-line in E96 (if value appears in both E96 and E24 refer to E24)



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.   | <b>JIS-C-5201-1 4.8</b><br><b>IEC-60115-1 4.8</b><br>-55°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 High power rating                     |  |
| Insulation Resistance                       | $\geq 10G$   | <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              |
| 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" |
| Dry Heat                                    | $\pm(0.5\%+0.05\Omega)$  | <b>JIS-C-5201-1 4.23</b><br><b>IEC-60115-1 4.23.2</b><br>at +155°C for 1000 hrs  |
| 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 5 seconds with 3mm<br>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>S-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                                    |
| 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) = $\sqrt{P \cdot R}$  or Max. Operating Voltage whichever is lower.

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

## Packaging

### Packing Quantity and Reel Specification



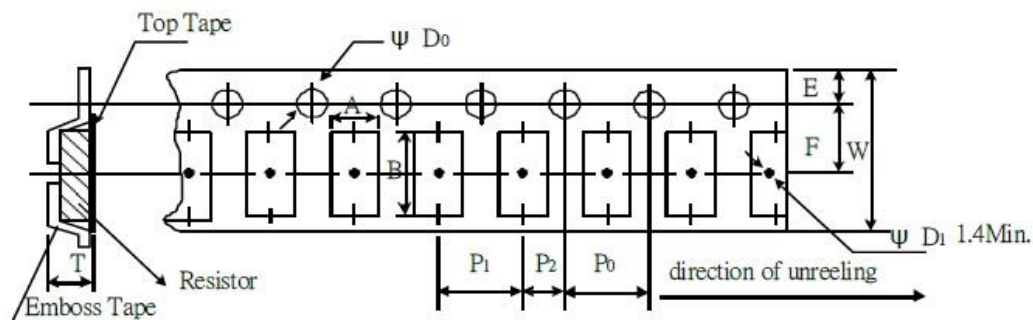
| Size      | ØA ±1.0 | ØB ±1.0 | ØC ±0.7 | W ±1.0 | T ±1.0 | Paper Tape   | Embossed Plastic Tape |             |
|-----------|---------|---------|---------|--------|--------|--------------|-----------------------|-------------|
| 0201      | 178.0   | 60.0    | 13.5    | 9.5    | 11.5   | 1000 / 10000 | N/A                   |             |
| 0402      |         |         |         |        |        |              |                       |             |
| 0603      |         |         |         |        |        |              |                       |             |
| 0805      |         |         |         |        |        |              |                       |             |
| 1206      |         |         |         | 13.5   | 15.5   | N/A          |                       | 1000 / 5000 |
| 1210      |         |         |         |        |        |              |                       | 4000        |
| 2010      |         |         |         |        |        |              |                       | 2000        |
| 2512      |         |         |         |        |        |              |                       |             |
| 2512 (2W) |         |         |         |        |        |              |                       |             |

### Paper tape Specification



| Size | A         | B ±0.05   | W ±0.20 | E ±0.10 | F ±0.05 | P <sub>0</sub> ±0.10 | P <sub>1</sub> ±0.05 | P <sub>2</sub> ±0.05 | ØD <sub>0</sub> +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±0.10 | W±0.30 | E±0.10 | F        | P <sub>0</sub> | P <sub>1</sub> | P <sub>2</sub> | ØD <sub>0</sub> | T         |
|-----------|--------|--------|--------|--------|----------|----------------|----------------|----------------|-----------------|-----------|
| 2010      | 2.80   | 5.50   | 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   |        |        |          |                |                |                |                 |           |
| 2512 (2W) | 3.38   | 6.68   |        |        | 5.5±0.10 | 4.00±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<br>V - 600PPM<br>N - 300PPM<br>H - 100PPM    | 1H -0201<br>1E -0402<br>1J -0603<br>2A -0805 | 0.1 Ohm<br>(100milliOhm)<br>R10  | F - ±1%<br>J - ±5% | TDF -1000 REEL<br>TDG – 2000 REEL<br>(2512 2W only)<br>TE - 4000 REEL<br>(2010,2512 only)    |
| RLP73 – Current Sense Resistor – High Power    | K - 200PPM<br>M - 400PPM<br>See above for applicability | 2B -1206<br>2E -1210<br>2H -2010<br>3A -2512 | 0.91 Ohm<br>(910milliOhm)<br>R91 |                    | TD -5000 REEL<br>(0603~1210)<br>TD- 10000 REEL<br>(0201,0402)<br>See above for applicability |