

# Automotive Current Sensing Resistors

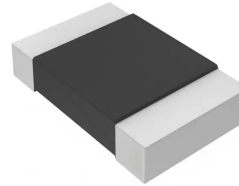
## ALMN25 Series

PROSEMI offers AEC-Q200 qualified current Sensing Resistor

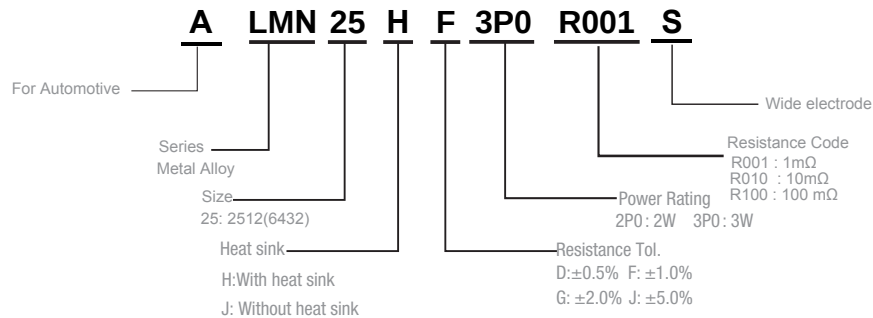


### Features

- Proprietary processing technique produces extremely low resistance values
- Very low inductance
- Low thermal EMF
- Metallic Material
- AEC-Q200 qualified available



### Part Numbering System



| Parameter                               | Standard             |
|-----------------------------------------|----------------------|
| Power Rating                            | 1~100mΩ : 2~3W       |
| Resistance Value                        | 1~100mΩ              |
| Operating Temperature Range             | -55 to +170°C        |
| Component Temperature Coefficient (TCR) | ± 50 ppm/°C          |
| Maximum Working Voltage (V)             | $(P \times R)^{1/2}$ |
| Rating Current (A)                      | $(P / R)^{1/2}$      |

P=Power Rating; R=Resistance Value

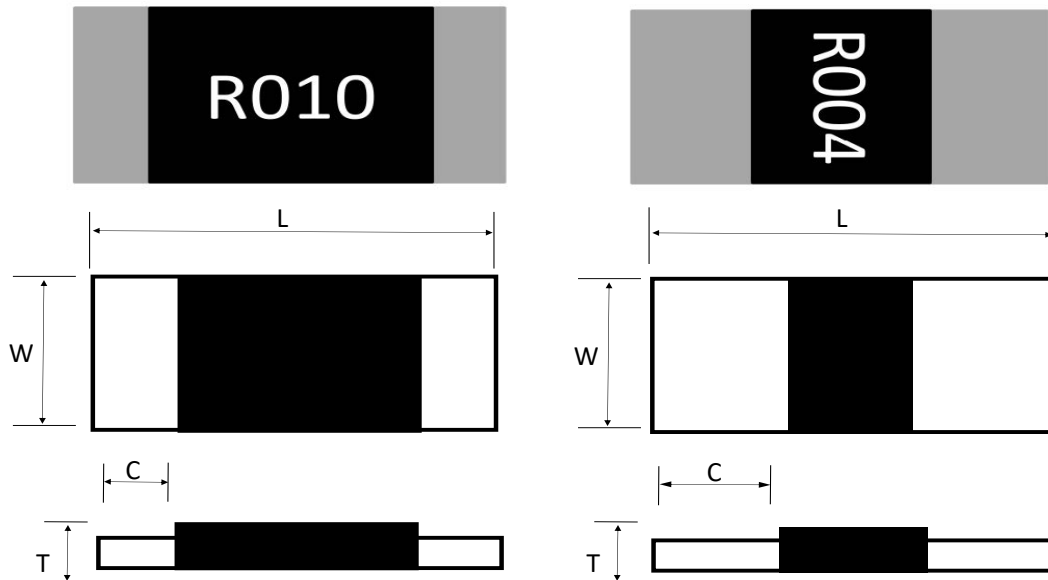
### Standard Electrical Specifications

| Type    | Rating<br>Power at<br>70℃ | T.C.R.<br>(ppm/℃) | Resistance<br>Range(mΩ)<br>±0.5% (D)<br>±1.0% (F)<br>±2.0% (G)<br>±5.0% (J) | Material | Electrode        | Operating<br>Temperature(℃) |
|---------|---------------------------|-------------------|-----------------------------------------------------------------------------|----------|------------------|-----------------------------|
| ALMN25J | 2W                        | 50                | 1-4                                                                         | CuMn     | R001-R004:Wide   | -55~+170℃                   |
|         |                           |                   | 2-10                                                                        |          | R002-R100:Narrow |                             |
| ALMN25H | 2W&3W                     |                   | 1-4                                                                         |          | R001-R004:Wide   |                             |
|         |                           |                   | 2-100                                                                       |          | R002-R100:Narrow |                             |

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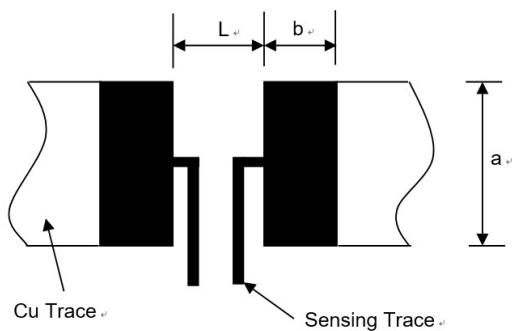
### Construction



Unit: Millimeters

| Type   | Power | L             | W             | C                        | t             |
|--------|-------|---------------|---------------|--------------------------|---------------|
| ALMN25 | 2W    | $6.4 \pm 0.2$ | $3.2 \pm 0.2$ | $0.95 \pm 0.25$ (Narrow) | $0.9 \pm 0.2$ |
|        | 3W    | $6.4 \pm 0.2$ | $3.2 \pm 0.2$ | $0.95 \pm 0.25$ (Narrow) | $0.9 \pm 0.2$ |
|        |       |               |               | $2.1 \pm 0.25$ (Wide)    |               |

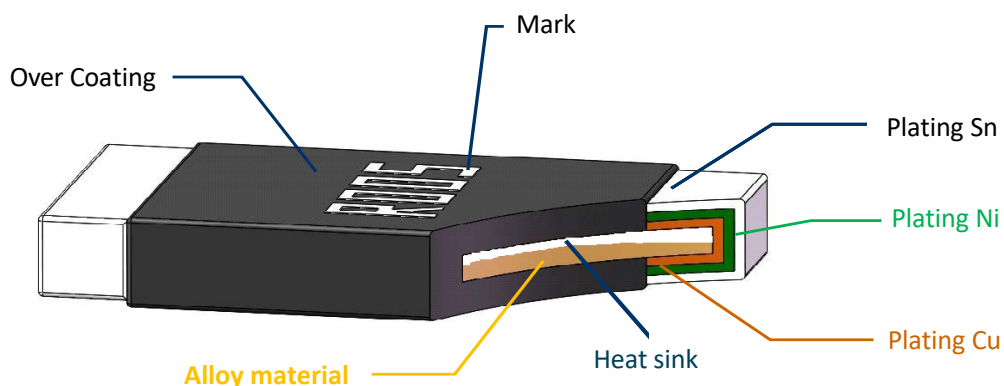
### Recommend land pattern



Unit: Millimeters

| Resistance Range ( $\Omega$ ) | a             | b             | L             |
|-------------------------------|---------------|---------------|---------------|
| 0.001-0.004(Wide)             | $4.0 \pm 0.1$ | $3.1 \pm 0.1$ | $1.3 \pm 0.1$ |
| 0.002~0.100(Narrow)           | $4.0 \pm 0.1$ | $2.1 \pm 0.1$ | $4.1 \pm 0.1$ |

### Product structure diagram

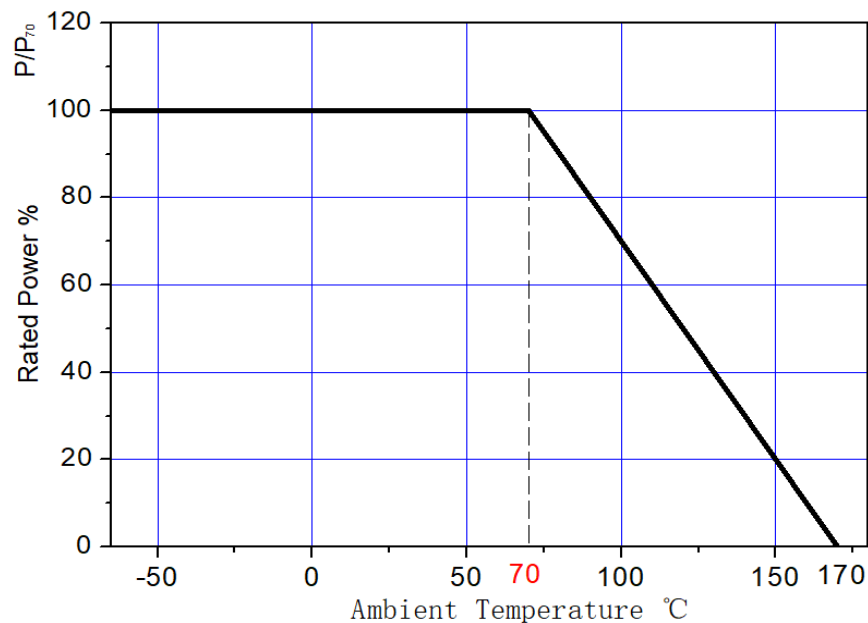


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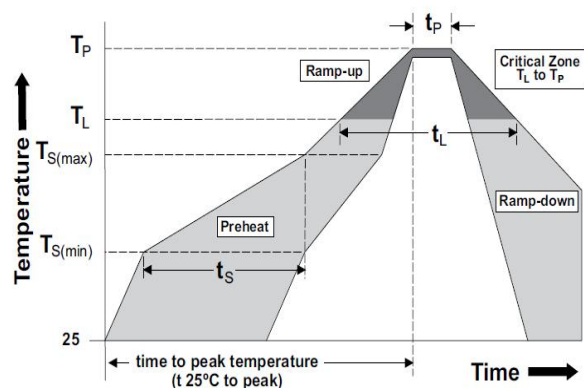
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### Power Derating Curve

For resistors operated in ambient temperatures 70°C, power rating shall be derated in accordance with the curve below:



### Recommended Solder Curve



| Reflow Condition                                       |                                    | Pb – Free assembly     |
|--------------------------------------------------------|------------------------------------|------------------------|
| Pre heat                                               | - Temperature Min ( $T_{S(min)}$ ) | 150°C                  |
|                                                        | - Temperature Max ( $T_{S(max)}$ ) | 200°C                  |
|                                                        | - Time (Min to Max) ( $t_s$ )      | 60 – 120 secs          |
| Average ramp up rate (Liquidus Temp ( $T_L$ ) to peak) |                                    | 5°C/second max         |
| $T_{S(max)}$ to $T_L$ - Ramp-up Rate                   |                                    | 5°C/second max         |
| Reflow                                                 | - Temperature ( $T_L$ ) (Liquidus) | 217°C                  |
|                                                        | - Time ( $t_L$ )                   | 60 – 150 seconds       |
| Peak Temperature ( $T_P$ )                             |                                    | 260°C                  |
| Time within 5°C of actual peak Temperature ( $t_P$ )   |                                    | 20 – 40 seconds        |
| Ramp-down Rate                                         |                                    | 5°C/second max         |
| Time 25°C to peak Temperature ( $T_P$ )                |                                    | 8 minutes Max.         |
| Wave Soldering                                         |                                    | 260°C, 10 seconds max. |
| Hand Soldering                                         |                                    | 350°C, 5 seconds max.  |

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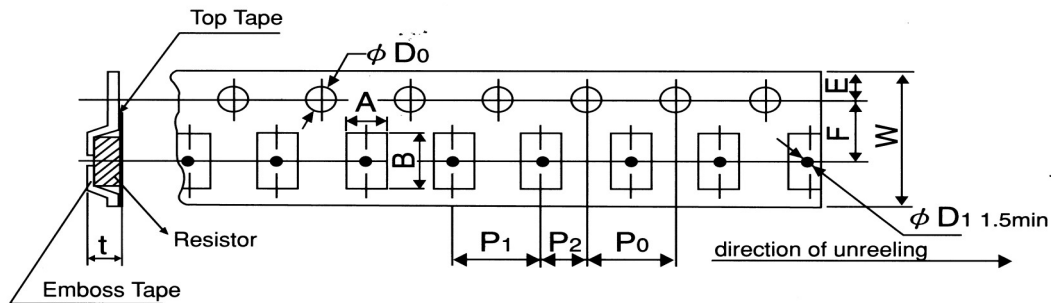
### Product Characteristics

| Item                                  | Test condition/ Methods                                                                                                                                                                                    | Limited                                             | Standard                  |
|---------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------|---------------------------|
| Resistance                            | Measuring resistance value at room temperature<br>25°C±5°C                                                                                                                                                 | Refer to Spec                                       | IEC60115-1 4.5            |
| Temperature coefficient of resistance | $TCR = (R - R_0) / R_0 (T_2 - T_1) \times 10^6$<br>R <sub>0</sub> : resistance of room temperature<br>R: resistance of 125°C<br>T <sub>1</sub> : Room temperature<br>T <sub>2</sub> : Temperature at 125°C | Refer to Spec                                       | MIL-STD-202<br>Method 304 |
| Short time Overload                   | Apply overload for 5 seconds and measure the resistance change rate after standing for 24 hours.<br>5 times the rated power for 5 seconds                                                                  | ≤±0.5%                                              | MIL-R-26E                 |
| Resistance to Soldering Heat          | 260°C±5°C time: 12sec±0.5sec                                                                                                                                                                               | ≤±0.5%                                              | MIL-STD-202<br>Method 210 |
| Solderability                         | Immerse in the furnace at 245 ± 5 °C for 3 ± 1 seconds, then take it out and put it under a magnifying glass to observe the solder area                                                                    | The electrode shall cover more than 95% of new tin. | MIL-STD-202<br>Method 210 |
| Temperature Cycling                   | -55°C (30min)/+125°C(30min), 1000 cycles                                                                                                                                                                   | ≤±0.5%                                              | MIL-STD-202<br>Method107G |
| Low temperature Storage               | -55°C for 1000hours, No power                                                                                                                                                                              | ≤±0.5%                                              | MIL-STD-26E               |
| High Temperature Storage              | 125°C for 1000hours, No power                                                                                                                                                                              | ≤±1%                                                | IEC6011501-4.25           |
| Bias Humidity                         | +85°C, 85% RH, 10%bias, 1000hours                                                                                                                                                                          | ≤±0.5%                                              | MIL-STD-202<br>Method103  |
| Mechanical shock                      | Condition C ,100 g's ,6 msec, 3 mutually perpendicular axes, in 6 directions, three impacts each for a total of 18 times 18 shocks.                                                                        | ≤±0.5%                                              | MIL-STD-202<br>Method 213 |
| Vibration                             | The frequency varies from 10HZ to 55HZ and return to 10HZ, shall be transferred in 1 min. Amplitude : 1.5mm, 3 directions, and 12 hours                                                                    | ≤±0.5%                                              | MIL-STD-202<br>Method 201 |
| Operational life                      | 70°C ± 2 °C, 1000 hours, at rated power 1.5 hours "ON", 0.5 hours "OFF"                                                                                                                                    | ≤±1%                                                | MIL-STD-202<br>Method 108 |

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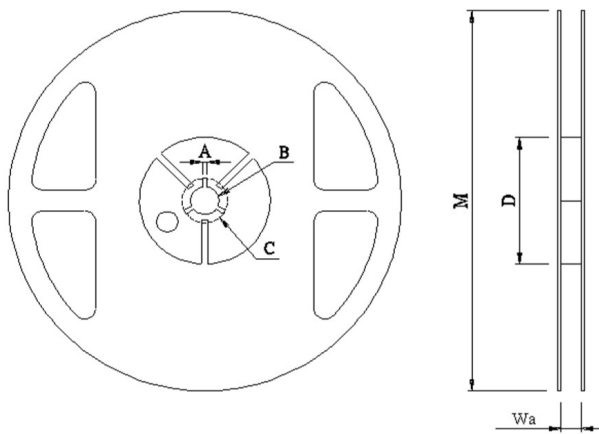
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### Tapping & Package



| Type | Pack   | A<br>±0.2 | B<br>±0.2 | D0<br>+0.5-0 | E<br>±0.1 | F<br>±0.05 | P0<br>±0.1 | P1<br>±0.1 | P2<br>±0.1 | W<br>±0.2 | D1<br>±0.05 | T<br>±0.15 |
|------|--------|-----------|-----------|--------------|-----------|------------|------------|------------|------------|-----------|-------------|------------|
| 2512 | Emboss | 3.60      | 6.90      | 1.50         | 1.75      | 5.50       | 4.00       | 4.00       | 2.00       | 12.00     | 1.50        | 1.20       |

### Reel Specification



| Type | A        | B         | C         | D         | M          | W         |
|------|----------|-----------|-----------|-----------|------------|-----------|
| 2512 | 2.00±0.5 | 13.50±0.5 | 21.00±0.5 | 80.00±1.0 | 178.00±2.0 | 13.80±0.5 |

### Packaging

Quantity: 4, 000pcs

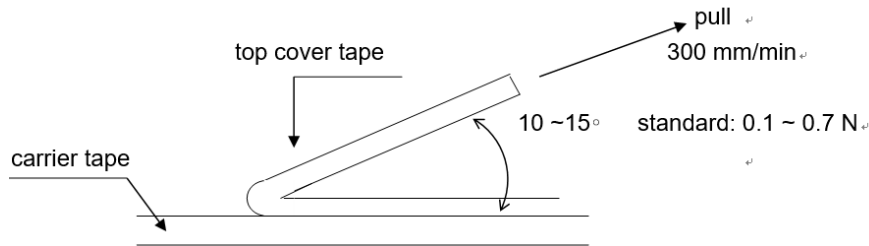
12mm wide tape on 178mm(7  
inch) diameter reel -specification  
EIA Standard 481.

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### Peel strength of upper belt

Stripping speed: 300 mm / min; The peel force is between 0.1N and 0.7N.



### Storage conditions & shelf life

It can be stored for 2 years under closed conditions with temperature of 5 ° C ~ 35 ° C and relative humidity of 40 ~ 75

Please avoid the following harsh environment during storage to avoid affecting the product performance and solder connectivity: the places with corrosive gases such as sea breeze, Cl<sub>2</sub>, H<sub>2</sub>S, NH<sub>3</sub>, SO<sub>2</sub> and NO<sub>2</sub> shall be stored without direct sunlight.

### Precautions for product use

When measuring the resistance value before welding, a special resistance meter with high precision shall be used. When measuring, a 4-wire probe or fixture must be used. 4. When measuring parts with a wire measuring needle, the 4 measuring needles must indeed contact the parts.

Avoid damaging the protective layer during manual welding or clamping with tweezers.

When the PCB is divided or fixed on the support, be careful to avoid excessive bending causing mechanical stress to the resistor.

It shall be used within the rated power range within the specification, especially when the power exceeds the rated value, which may affect the reliability of the product