





# Metal Film Resistors, Axial, Military / Established Reliability, MIL-PRF-39017 Qualified, Type RLR



### FEATURES

- Meets requirements of MIL-PRF-39017
- Failure rate: Verified failure rate (contact factory for current level)
- Epoxy coated construction provides superior moisture protection
- Traceability of materials and processing
- Monthly lot acceptance testing
- Very low noise (-40 dB)
- Extensive stocking program at distributors and factory in  $\pm 1\%$  and  $\pm 2\%$  tolerances
- Vishay Dale has complete capability to develop specific reliability programs designed to customer requirements

| STANDARD ELECTRICAL SPECIFICATIONS |                     |                 |                            |  |                  |                                     |                                  |                            |
|------------------------------------|---------------------|-----------------|----------------------------|--|------------------|-------------------------------------|----------------------------------|----------------------------|
| VISHAY DALE MODEL                  | MIL-PRF-39017 STYLE | MIL SPEC. SHEET | POWER RATING<br>70 °C<br>W | RESISTANCE RANGE (1)<br>Ω                | TOLERANCE<br>± % | TEMPERATURE COEFFICIENT<br>± ppm/°C | MAXIMUM WORKING VOLTAGE (4)<br>V | LIFE FAILURE RATE (2)      |
| ERL05,<br>ERL05..19 (3)            | RLR05               | 05              | 0.125                      | 4.7 to 100K<br>> 100K to 1M              | 1, 2             | 100                                 | 200                              | M, P, R, S<br>M, P, R      |
| ERL07,<br>ERL07..23 (3)            | RLR07               | 01              | 0.25                       | 1 to 9.76<br>10 to 3.01M<br>3.02M to 10M | 1, 2             | 100                                 | 250                              | M<br>M, P, R, S<br>M, P, R |
| ERL20,<br>ERL20..11 (3)            | RLR20               | 02              | 0.50                       | 4.3 to 3.01M                             | 1, 2             | 100                                 | 350                              | M, P, R, S                 |
| ERL32,<br>ERL32..1 (3)             | RLR32               | 03              | 1.0                        | 1 to 2.7M                                | 1, 2             | 100                                 | 500                              | M, P, R                    |

### Notes

(1) Extended resistance range: DSCC has created a series of drawings intended to support extended resistance ranges left otherwise void by the discontinuation of MIL-R-39008 RCR carbon composition resistors. Vishay Dale is listed as a resource on these drawings as follows:

| DSCC DRAWING NUMBER | VISHAY DALE MODEL          | POWER RATING<br>P <sub>70 °C</sub><br>W | RESISTANCE RANGE<br>Ω   | TOLERANCE<br>± % | TEMPERATURE COEFFICIENT<br>± ppm/°C | MAXIMUM WORKING VOLTAGE<br>V (4) |
|---------------------|----------------------------|---|-------------------------|------------------|-------------------------------------|----------------------------------|
| 98020               | ERL05..36, ERL05..37 (3)   | 0.125                                   | 1.1M to 22M             | 2, 5, 10         | 350                                 | 200                              |
| 99011               | ERL07..100, ERL07..101 (3) | 0.25                                    | 11M to 22M              | 2, 5, 10         | 350                                 | 250                              |
| 98021               | ERL20..36, ERL20..37 (3)   | 0.50                                    | 3.3M to 22M             | 2, 5, 10         | 350                                 | 350                              |
| 98022               | ERL32..36, ERL32..37 (3)   | 1.0                                     | 3M to 22M               | 2, 5, 10         | 350                                 | 350                              |
| 97004               | ERL62..1, ERL62..2 (3)     | 2.0                                     | 10 to 2.7M<br>3M to 22M | 1, 2, 5, 10      | 100<br>350                          | 500                              |

• Low inductance: DSCC has created a drawing intended to support a resistor which exhibits low inductance over a frequency range of 1 MHz to 30 MHz. Vishay Dale is listed as a resource on these drawings as follows:

| DSCC DRAWING NUMBER | VISHAY DALE MODEL | POWER RATING<br>P <sub>70 °C</sub><br>W | RESISTANCE RANGE<br>Ω | MAXIMUM INDUCTANCE<br>nH | TOLERANCE<br>± % | TEMPERATURE COEFFICIENT<br>± ppm/°C | MAXIMUM WORKING VOLTAGE<br>V (4) |
|---------------------|-------------------|---|-----------------------|--------------------------|------------------|-------------------------------------|----------------------------------|
| 96002               | ERL07..62         | 0.25                                    | 1 to 10<br>11 to 49.9 | 10<br>8                  | 1, 2             | 100                                 | 250                              |

These drawings can be viewed at: <https://landandmaritimeapps.dla.mil/Downloads/MilSpec/DscC/Dwg/96002.pdf>

(2) Consult factory for current QPL failure rates

(3) Hot solder dipped leads

(4) Continuous working voltage shall be  $\sqrt{P \times R}$  or maximum working voltage, whichever is less

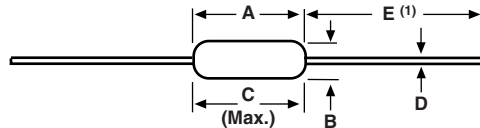
| TECHNICAL SPECIFICATIONS    |                 |   |
|-----------------------------|-----------------|---|
| PARAMETER                   | UNIT            | CONDITION   |
| Voltage Coefficient, max.   | ppm/V           | 5/V when measured between 10 % and full rated voltage                                   |
| Dielectric Strength         | V <sub>AC</sub> | RLR05 = 300; RLR07 and RLR20 = 500; RLR32 = 1000  |
| Insulation Resistance       | Ω               | ≥ 10 <sup>9</sup> min. dry; ≥ 10 <sup>11</sup> min. after moisture test                 |
| Operating Temperature Range | °C              | -65 to +150   |
| Terminal Strength           | lb              | 2 lb pull test on RLR05; 5 lb pull test on all other sizes                              |
| Solderability               |                 | Continuous satisfactory coverage when tested in accordance with MIL-STD-202, method 208 |
| Weight                      | g               | RLR05 = 0.11; RLR07 = 0.35; RLR20 = 0.75; RLR32 = 1.05                                  |

| GLOBAL PART NUMBER INFORMATION   |                           |  |   |   |                        |   |   |  |           |   |   |   |   |   |  |  |  |
|--|---------------------------|--|---|---|------------------------|---|---|--|-----------|---|---|---|---|---|--|--|--|
| New Global Part Numbering: RLR07C3001FRR36 (preferred part numbering format) |                           |  |   |   |                        |   |   |  |           |   |   |   |   |   |  |  |  |
| R  | L                         | R  | 0 | 7 | C                      | 3   | 0 | 0  | 1         | F | R   | R | 3 | 6 |  |  |  |
| MIL STYLE  | LEAD MATERIAL             | RESISTANCE VALUE   |   |   | TOLERANCE CODE         | FAILURE RATE  |   | PACKAGING  |           |   | SPECIAL   |   |   |   |  |  |  |
| RLR05<br>RLR07<br>RLR20<br>RLR32   | C = solderable / weldable | 3 digit significant figure, followed by a multiplier. Use "R" for values < 100 Ω<br>1R00 = 1 Ω<br>3302 = 33 kΩ<br>1005 = 10 MΩ |   |   | F = ± 1 %<br>G = ± 2 % | M = 1.0 %/1000 h<br>P = 0.1 %/1000 h<br>R = 0.01 %/1000 h<br>S = 0.001 %/1000 h |   | B14 = tin / lead, bulk<br>BSL = tin / lead, bulk, single lot date code<br>R36 = tin/lead, T/R (full, except 32's)<br>R64 = tin / lead, T/R (full; 32's only)<br>RE6 = tin / lead, T/R (1000 pieces)<br>RSL = tin / lead, T/R, single lot date code |           |   | Blank = standard (dash number) (up to 3 digits)<br>From 1 to 999 as applicable<br>1 = hot solder dip (32's)<br>11 = hot solder dip (20's)<br>19 = hot solder dip (05's)<br>23 = hot solder dip (07's) |   |   |   |  |  |  |
| Historical Part Number Example: RLR07C3001FR (will continue to be accepted)  |                           |  |   |   |                        |   |   |  |           |   |   |   |   |   |  |  |  |
| RLR07  | C                         | 3001   |   |   | F                      | R   |   | R36  |           |   |   |   |   |   |  |  |  |
| MIL STYLE  | LEAD MATERIAL             | RESISTANCE VALUE   |   |   | TOLERANCE CODE         | FAILURE RATE  |   |  | PACKAGING |   |   |   |   |   |  |  |  |

**Note**

- For additional information on packaging, refer to the Through Hole Resistor Packaging document ([www.vishay.com/doc?31544](http://www.vishay.com/doc?31544))

**DIMENSIONS** in inches (millimeters)



**Note**

- (1) Lead length for product in bulk pack. For product supplied in tape and reel, the actual lead length would be based on the body size, tape spacing and lead trim

| VISHAY DALE MODEL | A  | B                              | C (Max.)         | D   | E                              |
|-------------------|--|--------------------------------|------------------|---|--------------------------------|
| ERL05             | 0.150 ± 0.020<br>(3.81 ± 0.51)                 | 0.066 ± 0.008<br>(1.68 ± 0.21) | 0.187<br>(4.75)  | 0.016 ± 0.002<br>(0.41 ± 0.05)                | 1.25 ± 0.266<br>(31.75 ± 6.76) |
| ERL07             | 0.250 + 0.031 - 0.046<br>(6.35 + 0.79 - 1.17)  | 0.090 ± 0.008<br>(2.29 ± 0.21) | 0.300<br>(7.62)  | 0.025 ± 0.002<br>(0.64 ± 0.05)                | 1.50 ± 0.125<br>(38.10 ± 3.18) |
| ERL20             | 0.375 ± 0.041<br>(9.53 ± 1.04)                 | 0.138 ± 0.023<br>(3.51 ± 0.58) | 0.450<br>(11.43) | 0.032 ± 0.002<br>(0.81 ± 0.05)                | 1.50 ± 0.125<br>(38.10 ± 3.18) |
| ERL32             | 0.562 ± 0.031<br>(14.27 ± 0.79)                | 0.190 ± 0.015<br>(4.83 ± 0.38) | 0.625<br>(15.87) | 0.032 + 0.002 - 0.001<br>(0.81 + 0.05 - 0.03) | 1.50 ± 0.125<br>(38.10 ± 3.18) |
| ERL62             | 0.562 + 0.031 - 0.042<br>(14.27 + 0.79 - 1.07) | 0.230 ± 0.015<br>(5.84 ± 0.38) | 0.650<br>(16.51) | 0.032 + 0.002 - 0.001<br>(0.81 + 0.05 - 0.03) | 1.50 ± 0.125<br>(38.10 ± 3.18) |

| MATERIAL SPECIFICATIONS |   |
|-------------------------|---|
| Element                 | Vacuum-deposited nickel-chrome alloy  |
| Core                    | Fire-cleaned high purity ceramic  |
| Encapsulation           | Specially formulated epoxy compound   |
| Termination             | Standard lead material is solder-coated copper. Solderable and weldable per MIL-STD-1276, Type C. |

**POWER RATING**

Power ratings are based on the following two conditions:

- ± 2.0 % maximum ΔR in 2000 h load life
- +150 °C maximum operating temperature

**APPLICABLE MIL-SPECIFICATIONS**

**MIL-PRF-39017:**

The ERL series meets the electrical, environmental and dimensional requirements of MIL-PRF-39017.

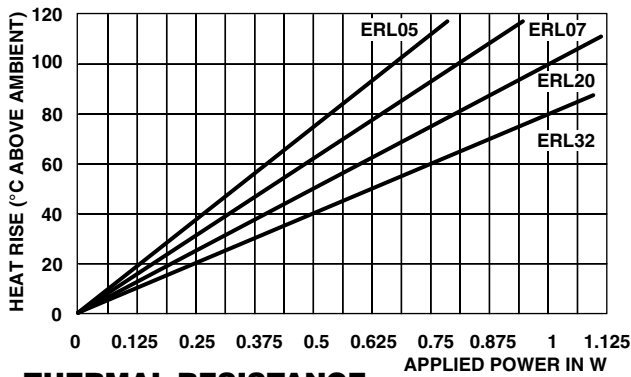
**MIL-PRF-22684:**

MIL-PRF-39017 supersedes MIL-PRF-22684 on new designs. The ERL series meet or exceed MIL-PRF-22684 requirements.

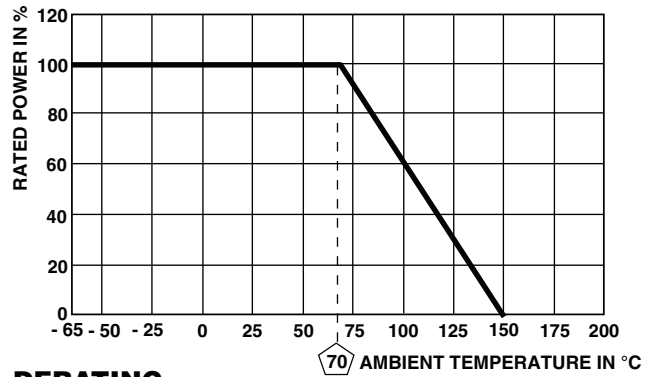
**Documentation:**

Qualification and failure rate verification test data is maintained by Vishay Dale and is available upon request. Lot traceability and identification data is maintained by Vishay Dale for five years.

**CAGE CODE: 91637**



**THERMAL RESISTANCE**



**DERATING**

**MARKING** (per MIL-PRF-39017)

Tolerance: F = 1 %, G = 2 %

Value = three significant figures and multiplier

J = JAN (Joint Army - Navy) brand

**RLR05: (3 lines)**

- 210A 3-digit date code and lot code
- 1002 Value
- FSJD Tolerance, failure rate, JAN and manufacturer's code

**RLR07: (4 lines)**

- 214AJ 3-digit date code, lot code and JAN
- RLR7C Style ("0" omitted) and lead material
- 1300G Value and tolerance
- RD Failure rate and manufacturer's code

**RLR20, RLR32: (4 lines)**

- 91637 CAGE code
- RLR20C Style and lead material
- 4993FR Value, tolerance and failure rate
- 1225AJ 4-digit date code, lot code and JAN



## **Disclaimer**

ALL PRODUCT, PRODUCT SPECIFICATIONS AND DATA ARE SUBJECT TO CHANGE WITHOUT NOTICE TO IMPROVE RELIABILITY, FUNCTION OR DESIGN OR OTHERWISE.

Vishay Intertechnology, Inc., its affiliates, agents, and employees, and all persons acting on its or their behalf (collectively, "Vishay"), disclaim any and all liability for any errors, inaccuracies or incompleteness contained in any datasheet or in any other disclosure relating to any product.

Vishay makes no warranty, representation or guarantee regarding the suitability of the products for any particular purpose or the continuing production of any product. To the maximum extent permitted by applicable law, Vishay disclaims (i) any and all liability arising out of the application or use of any product, (ii) any and all liability, including without limitation special, consequential or incidental damages, and (iii) any and all implied warranties, including warranties of fitness for particular purpose, non-infringement and merchantability.

Statements regarding the suitability of products for certain types of applications are based on Vishay's knowledge of typical requirements that are often placed on Vishay products in generic applications. Such statements are not binding statements about the suitability of products for a particular application. It is the customer's responsibility to validate that a particular product with the properties described in the product specification is suitable for use in a particular application. Parameters provided in datasheets and / or specifications may vary in different applications and performance may vary over time. All operating parameters, including typical parameters, must be validated for each customer application by the customer's technical experts. Product specifications do not expand or otherwise modify Vishay's terms and conditions of purchase, including but not limited to the warranty expressed therein.

Hyperlinks included in this datasheet may direct users to third-party websites. These links are provided as a convenience and for informational purposes only. Inclusion of these hyperlinks does not constitute an endorsement or an approval by Vishay of any of the products, services or opinions of the corporation, organization or individual associated with the third-party website. Vishay disclaims any and all liability and bears no responsibility for the accuracy, legality or content of the third-party website or for that of subsequent links.

Vishay products are not designed for use in life-saving or life-sustaining applications or any application in which the failure of the Vishay product could result in personal injury or death unless specifically qualified in writing by Vishay. Customers using or selling Vishay products not expressly indicated for use in such applications do so at their own risk. Please contact authorized Vishay personnel to obtain written terms and conditions regarding products designed for such applications.

No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted by this document or by any conduct of Vishay. Product names and markings noted herein may be trademarks of their respective owners.




## Looking for pricing, stock, or lifecycle information?

Click below to explore more details on WIN SOURCE:

 [View RLR07C1211FSBSL on WIN SOURCE](#)

 [Vishay Information](#)

## Optimize Your Supply Chain with WIN SOURCE Solutions

-  Global Sourcing Solution
-  Obsolete Management
-  Cost Control Management
-  Shortage Management
-  Alternative Solution
-  Excess Inventory Management