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 ± 1 % and ± 2 % tolerances
- Vishay Dale has complete capability to develop specific reliability programs designed to customer requirements

STANDARD ELECTRICAL SPECIFICATIONS

<table>
<thead>
<tr>
<th>VISHAY DALE MODEL</th>
<th>MIL-PRF-39017 STYLE</th>
<th>MIL SPEC. SHEET</th>
<th>POWER RATING 70 °C W</th>
<th>RESISTANCE RANGE 1</th>
<th>TOLERANCE ± %</th>
<th>TEMPERATURE COEFFICIENT ± ppm/°C</th>
<th>MAXIMUM WORKING VOLTAGE (4) V</th>
<th>LIFE FAILURE RATE (2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ERL05, ERL05..19  (3)</td>
<td>RLR05</td>
<td>05</td>
<td>0.125</td>
<td>4.7 to 100K</td>
<td>1, 2</td>
<td>100</td>
<td>200 M, P, R, S</td>
<td>M, P, R</td>
</tr>
<tr>
<td>ERL07, ERL07..23  (3)</td>
<td>RLR07</td>
<td>01</td>
<td>0.25</td>
<td>1 to 9.76</td>
<td>1, 2</td>
<td>100</td>
<td>250 M, P, R, S</td>
<td>M, P, R</td>
</tr>
<tr>
<td></td>
<td>RLR20</td>
<td>02</td>
<td>0.50</td>
<td>4.3 to 30.1M</td>
<td>1, 2</td>
<td>100</td>
<td>350 M, P, R, S</td>
<td>M, P, R</td>
</tr>
<tr>
<td>ERL32, ERL32..1    (3)</td>
<td>RLR32 03</td>
<td>1.0</td>
<td>1.0</td>
<td>1 to 2.7M</td>
<td>1, 2</td>
<td>100</td>
<td>500 M, P, R</td>
<td></td>
</tr>
</tbody>
</table>

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:

   - 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:

   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 3M to 22M 1, 2, 5, 10 100 350

   These drawings can be viewed at: http://www.landandmaritime.dla.mil/Programs/MilSpec/ListDwgs.aspx?DocTYPE=DSCCdwg

   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

<table>
<thead>
<tr>
<th>PARAMETER</th>
<th>UNIT</th>
<th>CONDITION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Voltage Coefficient, max.</td>
<td>ppm/V</td>
<td>5/V when measured between 10 % and full rated voltage</td>
</tr>
<tr>
<td>Dielectric Strength $V_{AC}$</td>
<td></td>
<td>RLR05 = 300; RLR07 and RLR20 = 500; RLR32 = 1000</td>
</tr>
<tr>
<td>Insulations Resistance $\Omega$</td>
<td></td>
<td>$\geq 10^6$ min. dry; $\geq 10^{11}$ min. after moisture test</td>
</tr>
<tr>
<td>Operating Temperature Range °C</td>
<td></td>
<td>-65 to +150</td>
</tr>
<tr>
<td>Terminal Strength lb</td>
<td></td>
<td>2 lb pull test on RLR05; 5 lb pull test on all other sizes</td>
</tr>
<tr>
<td>Solderability</td>
<td></td>
<td>Continuous satisfactory coverage when tested in accordance with MIL-STD-202, method 208</td>
</tr>
<tr>
<td>Weight g</td>
<td></td>
<td>RLR05 = 0.11; RLR07 = 0.35; RLR20 = 0.75; RLR32 = 1.05</td>
</tr>
</tbody>
</table>
**GLOBAL PART NUMBER INFORMATION**

New Global Part Numbering: RLR07C3001FRR36 (preferred part numbering format)

<table>
<thead>
<tr>
<th>RLR05</th>
<th>RLR07</th>
<th>RLR20</th>
<th>RLR32</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>C</td>
<td>C</td>
<td>C</td>
</tr>
</tbody>
</table>

**RESISTANCE VALUE**

- 3 digit significant figure, followed by a multiplier
- Use "R" for values < 100 Ω
- 1R00 = 1 Ω
- 3302 = 33 kΩ
- 100S = 10 MΩ

**TOLERANCE CODE**

- F = ± 1%
- G = ± 2%

**FAILURE RATE**

- M = 1.0 %/1000 h
- P = 0.1 %/1000 h
- R = 0.01 %/1000 h
- S = 0.001 %/1000 h

**PACKAGING**

- B14 = tin / lead, bulk
- BSL = tin / lead, bulk, single lot date code
- R36 = tin/lead, T/R (full, except 32’s)
- R64 = tin / lead, T/R (full, 32’s only)
- R6E = tin / lead, T/R (1000 pieces)
- RSL = tin / lead, T/R, single lot date code

**SPECIAL**

- Blank = standard (dash number)
- (up to 3 digits)
- From 1 to 999 as applicable
- 1 = hot solder dip (32’s)
- 11 = hot solder dip (20’s)
- 19 = hot solder dip (05’s)
- 23 = hot solder dip (07’s)

**DIMENSIONS** in inches (millimeters)

Note

- 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**

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>C (Max.)</th>
<th>D</th>
<th>E</th>
</tr>
</thead>
<tbody>
<tr>
<td>ERL05</td>
<td>0.150 ± 0.020</td>
<td>0.066 ± 0.008</td>
<td>0.187</td>
<td>0.016 ± 0.002</td>
</tr>
<tr>
<td></td>
<td>(3.81 ± 0.51)</td>
<td>(1.68 ± 0.21)</td>
<td>(4.75)</td>
<td>(0.41 ± 0.05)</td>
</tr>
<tr>
<td>ERL07</td>
<td>0.250 ± 0.046</td>
<td>0.090 ± 0.008</td>
<td>0.300</td>
<td>0.025 ± 0.002</td>
</tr>
<tr>
<td></td>
<td>(6.35 ± 0.79 - 1.17)</td>
<td>(2.29 ± 0.21)</td>
<td>(7.62)</td>
<td>(0.64 ± 0.05)</td>
</tr>
<tr>
<td>ERL20</td>
<td>0.375 ± 0.041</td>
<td>0.138 ± 0.023</td>
<td>0.450</td>
<td>0.032 ± 0.002</td>
</tr>
<tr>
<td></td>
<td>(9.53 ± 1.04)</td>
<td>(3.51 ± 0.58)</td>
<td>(11.43)</td>
<td>(0.81 ± 0.05)</td>
</tr>
<tr>
<td>ERL32</td>
<td>0.562 ± 0.031</td>
<td>0.190 ± 0.015</td>
<td>0.625</td>
<td>0.032 ± 0.002 - 0.001</td>
</tr>
<tr>
<td></td>
<td>(14.27 ± 0.79)</td>
<td>(4.83 ± 0.39)</td>
<td>(15.87)</td>
<td>(0.81 ± 0.05 - 0.03)</td>
</tr>
<tr>
<td>ERL62</td>
<td>0.562 ± 0.042</td>
<td>0.230 ± 0.015</td>
<td>0.650</td>
<td>0.032 ± 0.002 - 0.001</td>
</tr>
<tr>
<td></td>
<td>(14.27 ± 0.79 - 1.07)</td>
<td>(5.84 ± 0.38)</td>
<td>(16.51)</td>
<td>(0.81 ± 0.05 - 0.03)</td>
</tr>
</tbody>
</table>

**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:
1. ± 2.0 % maximum ∆R in 2000 h load life
2. +150 °C maximum operating temperature

**APPLICATIONS 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 supercedes 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**
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
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