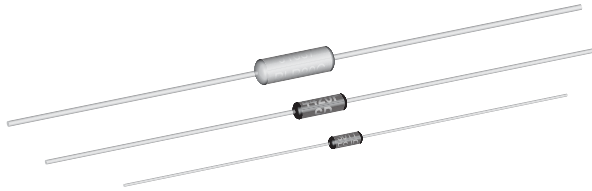




## Metal Film Resistors, Military/Established Reliability, MIL-PRF-39017 Qualified, Type RLR



### 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 70 °C W	RESISTANCE RANGE <sup>(1)</sup> Ω	TOLERANCE ± %	TEMPERATURE COEFFICIENT ± ppm/°C	MAXIMUM WORKING VOLTAGE <sup>(4)</sup> V	LIFE FAILURE RATE <sup>(2)</sup>
ERL05, ERL05..19 <sup>(3)</sup>	RLR05	05	0.125	4.7 to 301K 302K to 1M	1, 2	100	200	M, P, R, S M, P, R
ERL07, ERL07..23 <sup>(3)</sup>	RLR07	01	0.25	1 to 9.76 10 to 3.01M 3.02M to 10M	1, 2	100	250	M M, P, R, S M, P, R
ERL20, ERL20..11 <sup>(3)</sup>	RLR20	02	0.50	4.3 to 3.01M	1, 2	100	350	M, P, R, S
ERL32, ERL32..1 <sup>(3)</sup>	RLR32	03	1.0	1 to 2.7M	1, 2	100	500	M, P, R

### Notes

<sup>(1)</sup> 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 $P_{70\text{ °C}}$ W	RESISTANCE RANGE Ω	TOLERANCE ± %	TEMPERATURE COEFFICIENT ± ppm/°C	MAXIMUM WORKING VOLTAGE V <sup>(4)</sup>
98020	ERL05..36, ERL05..37 <sup>(3)</sup>	0.125	1.1M to 22M	2, 5, 10	350	200
99011	ERL07..100, ERL07..101 <sup>(3)</sup>	0.25	11M to 22M	2, 5, 10	350	250
98021	ERL20..36, ERL20..37 <sup>(3)</sup>	0.50	3.3M to 22M	2, 5, 10	350	350
98022	ERL32..36, ERL32..37 <sup>(3)</sup>	1.0	3M to 22M	2, 5, 10	350	350
97004	ERL62..1, ERL62..2 <sup>(3)</sup>	2.0	10 to 2.7M 3M to 22M	1, 2, 5, 10	100 350	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 $P_{70\text{ °C}}$ W	RESISTANCE RANGE Ω	MAXIMUM INDUCTANCE nH	TOLERANCE ± %	TEMPERATURE COEFFICIENT ± ppm/°C	MAXIMUM WORKING VOLTAGE V <sup>(4)</sup>
96002	ERL07..62	0.25	1 to 10 11 to 49.9	10 8	1, 2	100	250

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

<sup>(2)</sup> Consult factory for current QPL failure rates

<sup>(3)</sup> Hot solder dipped leads

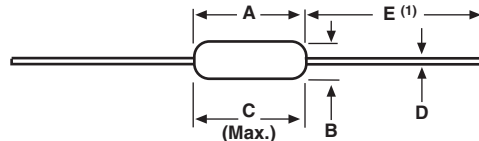
<sup>(4)</sup> Continuous working voltage shall be  $\sqrt{P \times R}$  or maximum working voltage, whichever is less.

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
Insulations 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 RLR07 RLR20 RLR32	C = solderable/ weldable	3 digit significant figure, followed by a multiplier Use "R" for values < 100 Ω 1R00 = 1 Ω 3302 = 33 kΩ 1005 = 10 MΩ	F = ± 1 % G = ± 2 %	M = 1.0 %/1000 h P = 0.1 %/1000 h R = 0.01 %/1000 h S = 0.001 %/1000 h	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) RE6 = tin/lead, T/R (1000 pieces) RSL = tin/lead, T/R, single lot date code	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)											
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 (3.81 ± 0.51)	0.066 ± 0.008 (1.68 ± 0.21)	0.187 (4.75)	0.016 ± 0.002 (0.41 ± 0.05)	1.25 ± 0.266 (31.75 ± 6.76)
ERL07	0.250 + 0.031 - 0.046 (6.35 + 0.79 - 1.17)	0.090 ± 0.008 (2.29 ± 0.21)	0.300 (7.62)	0.025 ± 0.002 (0.64 ± 0.05)	1.50 ± 0.125 (38.10 ± 3.18)
ERL20	0.375 ± 0.041 (9.53 ± 1.04)	0.138 ± 0.023 (3.51 ± 0.58)	0.450 (11.43)	0.032 ± 0.002 (0.81 ± 0.05)	1.50 ± 0.125 (38.10 ± 3.18)
ERL32	0.562 ± 0.031 (14.27 ± 0.79)	0.190 ± 0.015 (4.83 ± 0.38)	0.625 (15.87)	0.032 + 0.002 - 0.001 (0.81 + 0.05 - 0.03)	1.50 ± 0.125 (38.10 ± 3.18)
ERL62	0.562 + 0.031 - 0.042 (14.27 + 0.79 - 1.07)	0.230 ± 0.015 (5.84 ± 0.38)	0.650 (16.51)	0.032 + 0.002 - 0.001 (0.81 + 0.05 - 0.03)	1.50 ± 0.125 (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.

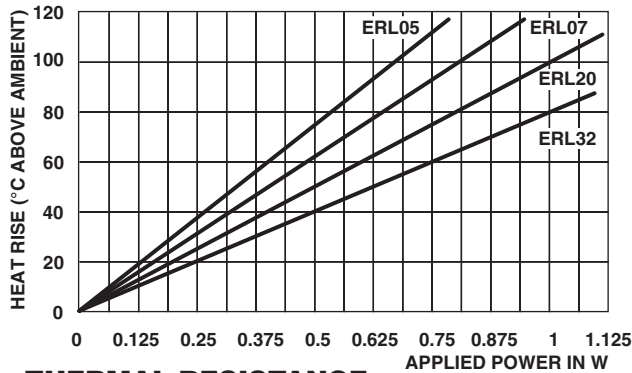
**MIL-PRF-22684:**

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

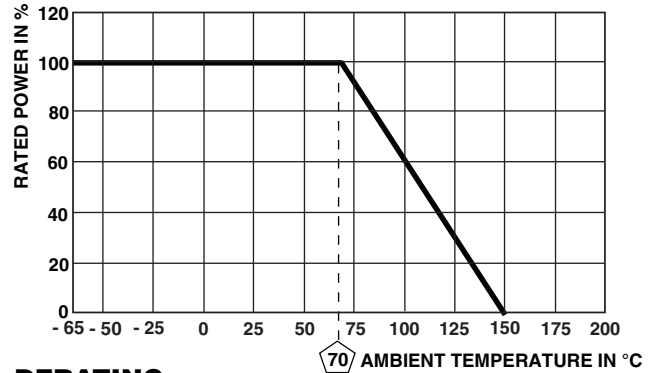
**Documentation:**

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**



**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.

Except as expressly indicated in writing, Vishay products are not designed for use in medical, life-saving, or life-sustaining applications or for any other application in which the failure of the Vishay product could result in personal injury or death. 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.

## Material Category Policy

**Vishay Intertechnology, Inc. hereby certifies that all its products that are identified as RoHS-Compliant fulfill the definitions and restrictions defined under Directive 2011/65/EU of The European Parliament and of the Council of June 8, 2011 on the restriction of the use of certain hazardous substances in electrical and electronic equipment (EEE) - recast, unless otherwise specified as non-compliant.**

**Please note that some Vishay documentation may still make reference to RoHS Directive 2002/95/EC. We confirm that all the products identified as being compliant to Directive 2002/95/EC conform to Directive 2011/65/EU.**

**Vishay Intertechnology, Inc. hereby certifies that all its products that are identified as Halogen-Free follow Halogen-Free requirements as per JEDEC JS709A standards. Please note that some Vishay documentation may still make reference to the IEC 61249-2-21 definition. We confirm that all the products identified as being compliant to IEC 61249-2-21 conform to JEDEC JS709A standards.**