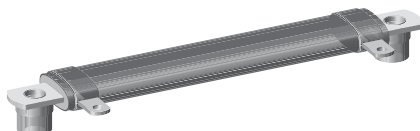


# Wirewound Resistors, Industrial Power, Miniature Flat (HLM)



## FEATURES

- High temperature silicon coating
- Mounting accommodations ideally suited to high density packaging
- Self-stacking hardware for horizontal or vertical placement
- Withstands high vibrations without loosening
- Mounting hardware functions as a heat sink allowing greater heat dissipation and less derating of stacked units
- Available in non-inductive styles (type NHLM) with Aryton-Perry winding
- Material categorization: For definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)



Available


**RoHS\***  
Available

**HALOGEN**  
**FREE**  
Available

**GREEN**  
**(5-2008)**  
Available

## Note

\* This datasheet provides information about parts that are RoHS-compliant and/or parts that are non-RoHS-compliant. For example, parts with lead (Pb) terminations are not RoHS-compliant. Please see the information/tables in this datasheet for details.

## STANDARD ELECTRICAL SPECIFICATIONS

| GLOBAL MODEL      | HISTORICAL MODEL  | POWER RATING<br>$P_{25^{\circ}\text{C}}$<br>W | RESISTANCE RANGE $\Omega$<br>$\pm 5\%$ | RESISTANCE RANGE $\Omega$<br>$\pm 10\%$ | WEIGHT<br>(typical)<br>g |
|-------------------|-------------------|-----------------------------------------------|----------------------------------------|-----------------------------------------|--------------------------|
| HLM010<br>NHLM010 | HLM-10<br>NHLM-10 | 10                                            | 1.0 to 15K<br>1.0 to 1.8K              | 0.10 to 15K<br>1.0 to 1.8K              | 0.41                     |
| HLM015<br>NHLM015 | HLM-15<br>NHLM-15 | 15                                            | 1.0 to 26K<br>1.0 to 3.6K              | 0.10 to 26K<br>1.0 to 3.6K              | 0.47                     |
| HLM020<br>NHLM020 | HLM-20<br>NHLM-20 | 20                                            | 1.0 to 71K<br>1.0 to 9.8K              | 0.10 to 71K<br>1.0 to 9.8K              | 0.74                     |

## TECHNICAL SPECIFICATIONS

| PARAMETER                       | UNIT                    | HLM, NHLM RESISTOR CHARACTERISTICS                                                                                        |
|---------------------------------|-------------------------|---------------------------------------------------------------------------------------------------------------------------|
| Temperature Coefficient         | ppm/ $^{\circ}\text{C}$ | $\pm 90$ for 0.1 $\Omega$ to 0.99 $\Omega$ ; $\pm 50$ for 1 $\Omega$ to 9.9 $\Omega$ ; $\pm 30$ for 10 $\Omega$ and above |
| Dielectric Withstanding Voltage | $V_{AC}$                | 1000, from terminal to mounting hardware                                                                                  |
| Short Time Overload             | -                       | 10 x rated power for 5 s                                                                                                  |
| Maximum Working Voltage         | V                       | $(P \times R)^{1/2}$                                                                                                      |
| Insulation Resistance           | $\Omega$                | 1000 M $\Omega$ minimum dry, 100 M $\Omega$ minimum after moisture test                                                   |
| Operating Temperature Range     | $^{\circ}\text{C}$      | - 55 to + 350                                                                                                             |

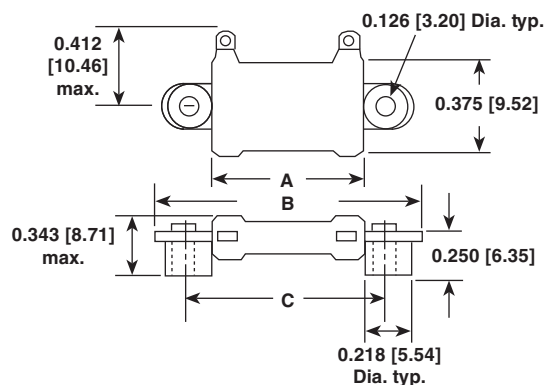
## GLOBAL PART NUMBER INFORMATION

Global Part Numbering example: NHLM01010Z10R00JJ

|                                                                                        |                      |                                                  |                                                               |                             |                                                                    |   |                                                                    |   |   |   |   |   |   |   |   |   |  |  |
|----------------------------------------------------------------------------------------|----------------------|--------------------------------------------------|---------------------------------------------------------------|-----------------------------|--------------------------------------------------------------------|---|--------------------------------------------------------------------|---|---|---|---|---|---|---|---|---|--|--|
| N                                                                                      | H                    | L                                                | M                                                             | 0                           | 1                                                                  | 0 | 1                                                                  | 0 | Z | 1 | 0 | R | 0 | 0 | J | J |  |  |
| GLOBAL MODEL                                                                           | TERMINAL DESIGNATION | TERMINAL FINISH                                  | RESISTANCE VALUE                                              | TOLERANCE                   | PACKAGING CODE                                                     |   | SPECIAL                                                            |   |   |   |   |   |   |   |   |   |  |  |
| NHLM010<br>(See "Standard Electrical Specifications" table above for additional P/N's) | 10                   | E = Lead (Pb)-free<br>Z = Tin/lead<br>N = Nickel | R = Decimal<br>K = Thousand<br>10R00 = 10.0 Ω<br>1K000 = 1 kΩ | J = ± 5.0 %<br>K = ± 10.0 % | E = Lead (Pb)-free skin pack<br>J <sup>(1)</sup> = Skin pack (J01) |   | (Dash Number)<br>(up to 2 digits)<br>From 1 to 99<br>as applicable |   |   |   |   |   |   |   |   |   |  |  |
| Note<br>(1) Tin/lead for type "Z", lead (Pb)-free for type "N"                         |                      |                                                  |                                                               |                             |                                                                    |   |                                                                    |   |   |   |   |   |   |   |   |   |  |  |
| Historical Part Number example: NHLM-10-10Z 10 Ω 5 % J01                               |                      |                                                  |                                                               |                             |                                                                    |   |                                                                    |   |   |   |   |   |   |   |   |   |  |  |
| NHLM-10                                                                                | 10Z                  | 10 Ω                                             | 5 %                                                           | J01                         |                                                                    |   |                                                                    |   |   |   |   |   |   |   |   |   |  |  |
| HISTORICAL MODEL                                                                       | TERMINAL/FINISH      | RESISTANCE VALUE                                 | TOLERANCE                                                     | PACKAGING                   |                                                                    |   |                                                                    |   |   |   |   |   |   |   |   |   |  |  |



## TYPE HLM MINIATURE FLAT STYLE



| MODEL   | DIMENSIONS in inches [millimeters] |                        |                        |                                                      |  | STANDARD<br>TERMINAL<br>DESIGNATION |
|---------|------------------------------------|------------------------|------------------------|------------------------------------------------------|--|-------------------------------------|
|         | A<br>± 0.063<br>[1.59]             | B<br>± 0.063<br>[1.59] | C<br>± 0.031<br>[0.79] | DISTANCE<br>E<br>BETWEEN<br>N<br>TERMINALS<br>(ref.) |  |                                     |
| HLM010  | 0.750                              | 1.312                  | 1.000                  | 0.406                                                |  | 10Z                                 |
| NHLM010 | [19.05]                            | [33.32]                | [25.40]                | [10.31]                                              |  |                                     |
| HLM015  | 1.000                              | 1.562                  | 1.250                  | 0.656                                                |  | 10Z                                 |
| NHLM015 | [25.40]                            | [39.67]                | [31.75]                | [16.66]                                              |  |                                     |
| HLM020  | 2.062                              | 2.625                  | 2.313                  | 1.718                                                |  | 10Z                                 |
| NHLM020 | [52.37]                            | [66.68]                | [58.75]                | [43.64]                                              |  |                                     |

## POWER RATING

Vishay HL flat resistor wattage ratings are based on mounting horizontally to 10" x 10" x 0.04" [254.0 mm x 254.0 mm x 1.02 mm] steel plate in 25 °C ambient with no air flow.

## EXCLUSIVE BRACKET DESIGN

Mounting strap fits snugly through resistor core and is bound against unit by two eccentric spacers. The bracket eliminates expensive cements and improves heat transfer and power handling capabilities.

## MATERIAL SPECIFICATIONS

**Element:** Copper-nickel alloy of nickel-chrome alloy, depending on resistance value

**Core:** Ceramic, steatite

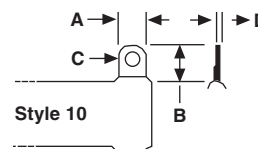
**Coating:** Special high temperature silicone

**Standard Terminals:** Model "E" terminals are tinned steel

**Terminal Bands:** Steel

**Part Marking:** DALE, model, wattage, value, tolerance, date code

## TERMINAL DIMENSIONS



| DIMENSION | DIMENSIONS in inches [millimeters] |
|-----------|------------------------------------|
|           | STYLE 10                           |
| A         | 0.125<br>[3.18]                    |
| B         | 0.188<br>[4.76]                    |
| C         | 0.063<br>[1.60]                    |
| D         | 0.020<br>[0.51]                    |

## TERMINAL FINISH

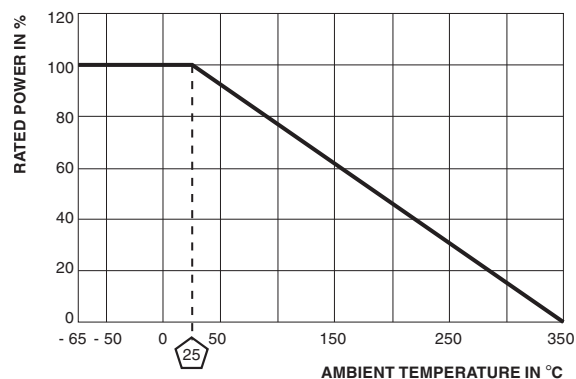
"E" Finish - 100 % Sn coated steel. "Z" Finish - 60/40 Sn/Pb coated steel. "N" Finish - Nickel coated steel. Finish for terminal style 16 is limited to nickel plated steel (N).

## NHLM NON-INDUCTIVE

Models of equivalent physical and electrical specifications are available with non-inductive (Aryton-Perry) winding. They are identified by adding the letter N to the front of the HL type designation (NHL024, for example). For NHL models maximum resistance values are lower, see STANDARD ELECTRICAL SPECIFICATIONS table.

Derating is required for ambient temperatures above 25 °C per the following graph.

## DERATING



| PERFORMANCE                     |                                                                                 |                       |
|---------------------------------|---------------------------------------------------------------------------------|-----------------------|
| TEST                            | CONDITIONS OF TEST                                                              | TEST LIMITS           |
| Thermal Shock                   | Rated power applied until thermally stable, then a minimum of 15 min at - 55 °C | ± (2.0 % + 0.05 Ω) ΔR |
| Short Time Overload             | 10 x rated power for 5 s                                                        | ± (2.0 % + 0.05 Ω) ΔR |
| Dielectric Withstanding Voltage | 1000 V <sub>RMS</sub> , 1 min                                                   | ± (0.1 % + 0.05 Ω) ΔR |
| Low Temperature Storage         | - 55 °C for 24 h                                                                | ± (2.0 % + 0.05 Ω) ΔR |
| High Temperature Exposure       | 250 h at + 350 °C                                                               | ± (2.0 % + 0.05 Ω) ΔR |
| Moisture Resistance             | MIL-STD-202 Method 106, 7b not applicable                                       | ± (2.0 % + 0.05 Ω) ΔR |
| Shock, Specified Pulse          | MIL-STD-202 Method 213, 100 g's for 6 ms, 10 shocks                             | ± (0.2 % + 0.05 Ω) ΔR |
| Vibration, High Frequency       | Frequency varied 10 Hz to 2000 Hz, 20 g peak, 2 directions 6 h each             | ± (0.2 % + 0.05 Ω) ΔR |
| Load Life                       | 1000 h at rated power, + 25 °C, 1.5 h "ON", 0.5 h "OFF"                         | ± (3.0 % + 0.05 Ω) ΔR |



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