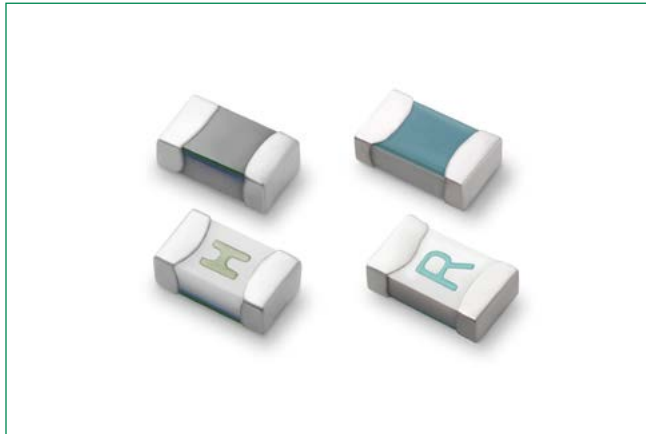


438A Series

AEC-Q200 Qualified > Ceramic Fuse



Description

The 438A series AEC-Q200 Qualified fuses are specifically tested to cater secondary circuit protection needs of compact auto electronics application.

The general design ensures excellent temperature stability and performance reliability.

The high I²t values which is typical in the Littelfuse ceramic fuse family ensure high inrush current withstand capability.

Features & Benefits

- Operating Temperature from -55°C to +150°C
- 100% Lead-free, RoHS compliant and Halogen-free
- Suitable for both leaded and lead-free reflow/wave soldering
- Recognized to UL/CSA/NMX 248-1 and UL/CSA/NMX 248-14
- Conforms to EN 60127-1 and EN 60127-7
- CE Mark indicates suitability for the European Market
- UKCA Mark indicates suitability for the UK Market
- AEC-Q200 Qualified

Web Resources



Download ECAD models, order samples, and find technical resources at www.littelfuse.com

Agency Approvals

| Agency | Agency File Number | Ampere Range |
|--------|--------------------|--------------|
| | E10480 | 0.25A – 6A |
| | 29862 | 0.25A – 6A |
| | J50489122 | 0.25A – 6A |
| | N/A | 0.25A – 6A |
| | N/A | 0.25A – 6A |

Applications

- Li-ion Battery
- LED Head-Lights
- Automotive Navigation System
- TFT Display
- Battery Management System (BMS)
- Clusters

Electrical Characteristics for Series

| % of Ampere Rating | Ampere Rating | Opening Time at 25°C |
|--------------------|---------------|----------------------|
| 100% | 0.250A – 6A | 4 Hours, Minimum |
| 250% | 0.250A – 6A | 5 Seconds, Maximum |

Electrical Specifications by Item

| Ampere Rating (A) | Amp Code | Max. Voltage Rating (V) | Interrupting Rating (AC/DC) ¹ | Nominal Resistance (Ohms) ² | Nominal Melting I ² t (A ² Sec.) ³ | Nominal Voltage Drop At Rated Current (V) ⁴ | Nominal Power Dissipation At Rated Current (W) | Agency Approvals | | | |
|-------------------|----------|-------------------------|--|--|---|--|--|------------------|---|---|---|
| | | | | | | | | | | | |
| 0.25 | .250 | 63VDC | 50A @ 63VDC 50A @ 32VAC | 2.218 | 0.0017 | 0.550 | 0.138 | x | x | x | x |
| 0.375 | .375 | 63VDC | | 1.247 | 0.0041 | 0.488 | 0.183 | x | x | x | x |
| 0.5 | .500 | 63VDC | | 0.829 | 0.0100 | 0.486 | 0.243 | x | x | x | x |
| 0.75 | .750 | 63VDC | | 0.466 | 0.0281 | 0.378 | 0.284 | x | x | x | x |
| 1 | 001. | 63VDC | | 0.310 | 0.0593 | 0.351 | 0.351 | x | x | x | x |
| 1.25 | 1.25 | 63VDC | | 0.200 | 0.0510 | 0.365 | 0.456 | x | x | x | x |
| 1.5 | 1.50 | 48VDC | 50A @ 48VDC/32VAC | 0.090 | 0.0903 | 0.175 | 0.260 | x | x | x | x |
| 1.75 | 1.75 | 32VDC | 50A@32VAC/32VDC | 0.1405 | 0.1440 | 0.360 | 0.540 | x | x | x | x |
| 2 | 002. | 32 | 50A @ 32VDC/12VAC | 0.0490 | 0.181 | 0.107 | 0.214 | x | x | x | x |
| 2.5 | 02.5 | 32 | | 0.0364 | 0.240 | 0.095 | 0.238 | x | x | x | x |
| 3 | 003. | 32 | | 0.0264 | 0.439 | 0.093 | 0.279 | x | x | x | x |
| 3.5 | 03.5 | 32 | | 0.0210 | 0.647 | 0.082 | 0.287 | x | x | x | x |
| 4 | 004. | 32 | | 0.0177 | 0.730 | 0.079 | 0.316 | x | x | x | x |
| 5 | 005. | 32 | | 0.0127 | 0.747 | 0.074 | 0.370 | x | x | x | x |
| 6 | 006. | 24 | 50A @ 24VDC/12VAC | 0.0086 | 1.444 | 0.072 | 0.432 | x | x | x | x |

Notes:

1. AC Interrupting Rating tested at rated voltage with unity power factor. DC Interrupting Rating tested at rated voltage with time constant < 0.8 msec.
2. Nominal Resistance measured with < 10% rated current.
3. Nominal Melting I²t measured at 1 msec. opening time.

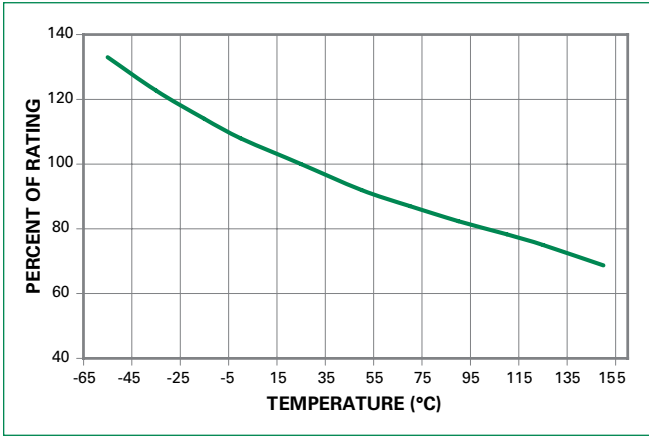
4. Nominal Voltage Drop measured at rated current after temperature has stabilized.

Devices designed to carry rated current for 4 hours minimum. It is recommended that devices be operated continuously at no more than 80% rated current. See "Temperature Re-rating Curve" for additional re-rating information.
Devices designed to be mounted with marking code facing up.

438A Series

AEC-Q200 Qualified > Ceramic Fuse

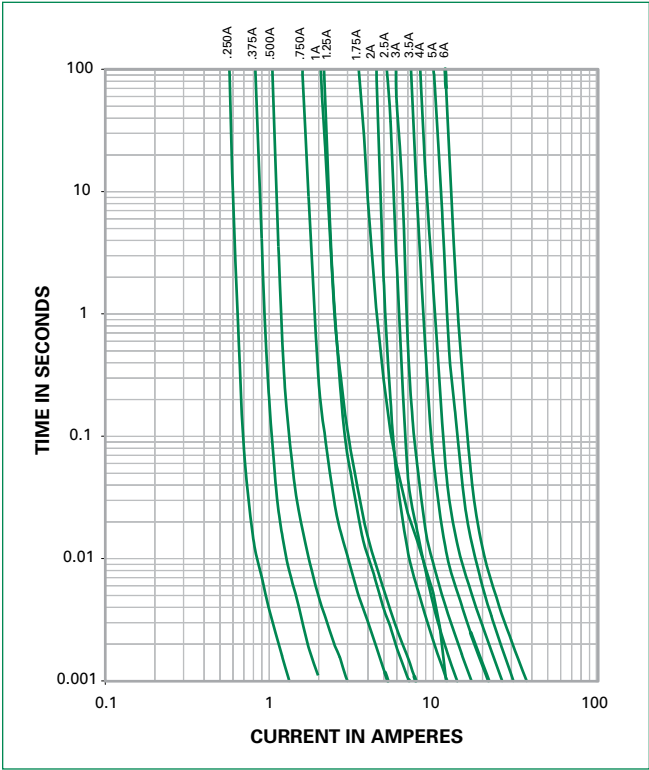
Temperature Re-rating Curve



Note:
 1. Re-rating depicted in this curve is in addition to the standard re-rating of 20% for continuous operation.

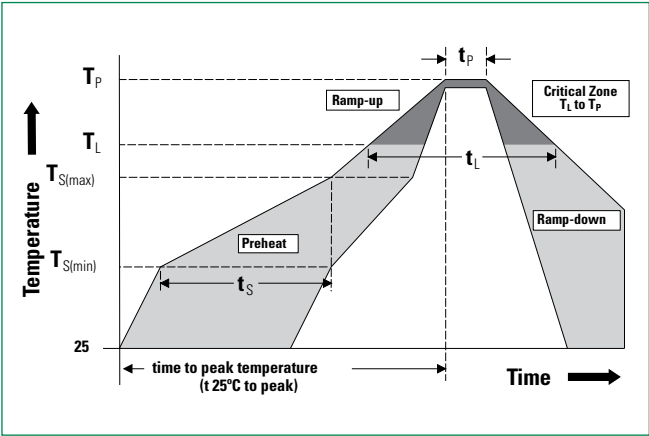
Example:
 For continuous operation at 75 degrees celsius, the fuse should be rerated as follows:
 $I = (0.80)(0.85)I_n = (0.68)I_n$

Average Time Current Curves



Soldering Parameters

| | | |
|--|------------------------------------|-------------------------|
| 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 – 180 seconds |
| Average Ramp-up Rate (Liquidus Temp (T_L) to peak) | | 3°C/second max. |
| $T_{s(max)}$ to T_L - Ramp-up Rate | | 5°C/second max. |
| Reflow | - Temperature (T_L) (Liquidus) | 217°C |
| | - Temperature (t_t) | 60 – 150 seconds |
| Peak Temperature (T_p) | | 260 ^{+0/-5} °C |
| Time within 5°C of actual peak Temperature (t_p) | | 10 – 30 seconds |
| Ramp-down Rate | | 6°C/second max. |
| Time 25°C to peak Temperature (T_p) | | 8 minutes max. |
| Do not exceed | | 260°C |
| Wave Soldering | 260°C, 10 seconds max. | |



438A Series

AEC-Q200 Qualified > Ceramic Fuse

Product Characteristics

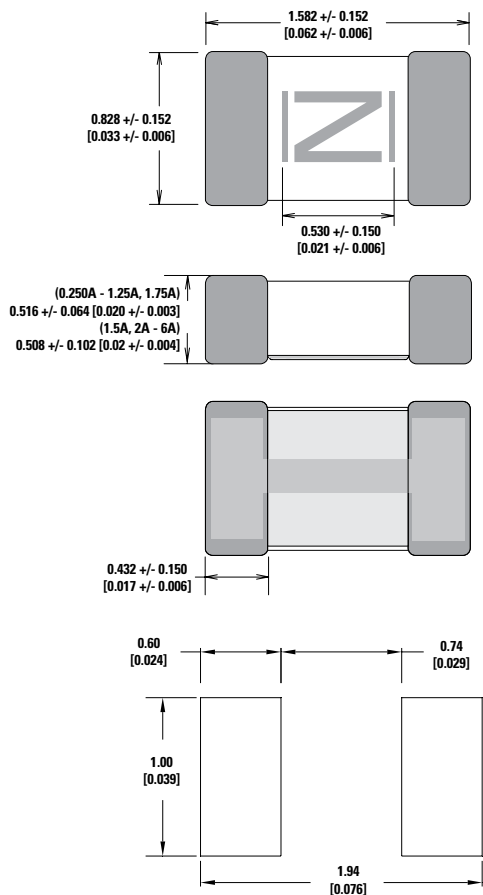
| | |
|-----------------------------------|--|
| Materials | Body: Advanced Ceramic Terminations: Ag/Ni/Sn (100% Lead-free) Element Cover Coating: Lead-free Glass |
| Moisture Sensitivity Level | IPC/JEDEC J-STD-020, Level 1 |
| Solderability | IPC/EIC/JEDEC J-STD-002, Condition C |
| Humidity Test | MIL-STD-202, Method 103, Conditions D |
| Resistance to Solder Heat | MIL-STD-202, Method 210, Condition B |
| Moisture Resistance | MIL-STD-202, Method 106 |

| | |
|-------------------------------------|--------------------------------------|
| Thermal Shock | MIL-STD-202, Method 107, Condition B |
| Mechanical Shock | MIL-STD-202, Method 213, Condition A |
| Vibration | MIL-STD-202, Method 201 |
| Vibration, High Frequency | MIL-STD-202, Method 204, Condition D |
| Dissolution of Metallization | IPC/EIC/JEDEC J-STD-002, Condition D |

| | |
|---------------------------------|---|
| High Temperature Storage | MIL-STD-202 Method 108 with exemptions |
| Thermal Shock Test | JESD22 Method JA-104, Test Conditions B and N |
| Biased Humidity | MIL-STD-202 Method 103, 85°C/85% RH with 10% operating power for 1000 hrs |
| Operational Life | MIL-STD-202 Method 108, Test Condition D |
| Resistance To Solvents | MIL-STD-202 Method 215 |
| Mechanical Shock | MIL-STD-202 Method 213, Test Condition C |

| | |
|-------------------------------------|---|
| High Frequency Vibration | MIL-STD-202, Method 204 |
| Resistance To Soldering Heat | MIL-STD-202 Method 210, Test Condition B |
| Solderability | JESD22-B102E Method 1 |
| Terminal Strength For SMD | AEC-Q200-006 |
| Board Flex | AEC-Q200-005 |
| Electrical Characterization | Conducted at minimum, ambient, and maximum temperatures |

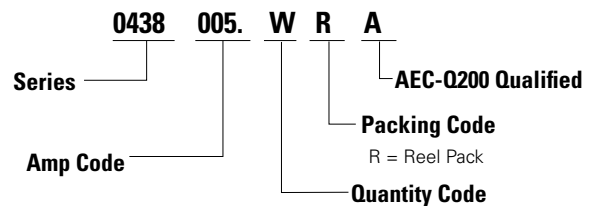
Dimensions mm [in]



Part Marking System

| Amp Code | Marking Code |
|----------|--------------|
| .250 | D |
| .375 | E |
| .500 | F |
| .750 | G |
| 001. | H |
| 1.25 | J |
| 1.75 | L |
| 002. | N |
| 02.5 | Q |
| 003. | P |
| 03.5 | R |
| 004. | S |
| 005. | T |
| 006. | U |

Part Numbering System



Packaging

| Packaging Option | Packaging Specification | Quantity | Quantity & Packaging Code |
|-------------------|-------------------------|----------|---------------------------|
| 8mm Tape and Reel | EIA-481, IEC 60286-3 | 3000 | WR |

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