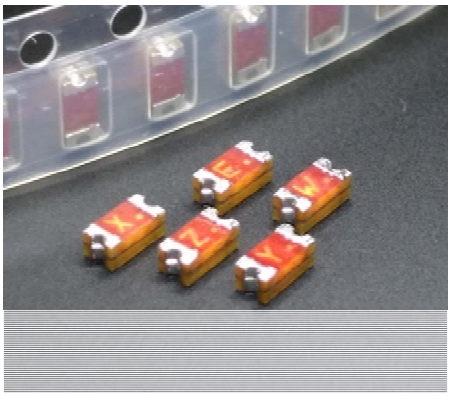
# MICRO FUSE　　Type JAJ　JAK

## FEATURES



1. Rated current of 20A, rated voltage of 60VDC, and rated breaking current of 100A achieved in spite of its compact size of 3.2x1.6x1.4mm by our original structure.
2. Fast-acting type fuse with little variation in fusing characteristics.
3. Performance against rush current is excellent since plate material is used for fuse element.
4. Surface temperature rise is 75°C or less when applying rated current for fusing. This gives less influence to the peripheral units.
5. Resistance to soldering heat: Reflow or flow soldering 10 seconds at 260 °C.
6. Our original terminal construction makes almost no occurrence of Tombstone phenomenon.
7. Suitable for automatic mounting
8. Precise dimensions allows high-density mounting and symmetrical construction of terminals provide “Self-Alignment”.
9. Complete lead-free, bromine-free.

## CLEARING CHARACTERISTICS

| Rated Voltage | Breaking Current |
|---|---|
| 60 VDC | 100 A |

## CERTIFICATION

| Certification Body | File No. | Range of Rated Current |
|---|---|---|
| UL certification planned | Not decided | 10 A ～ 20 A |

## CATEGORY TEMPERATURE RANGE

−40 ℃ ～ +125 ℃

## INSULATION RESISTANCE

1 MΩ （between terminals and case）

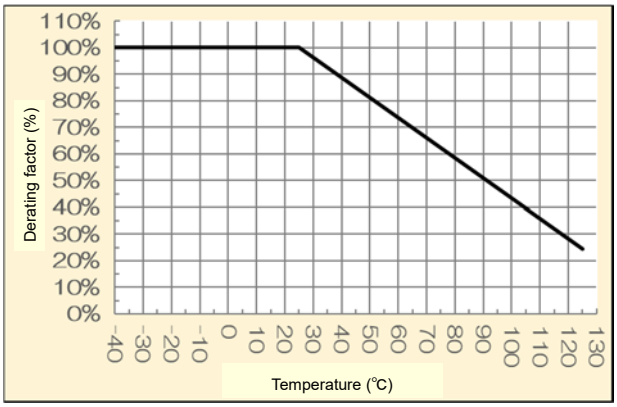
## VOLTAGE DROOP

| Type JAJ | Type JAK |
|---|---|
| 99 mV | 83 mV |

## DERATING（REFERENCE DATA）

Steady current flowing through the fuse must be reduced by the ambient temperature.

Assuming that rated current value is 100%
Derating

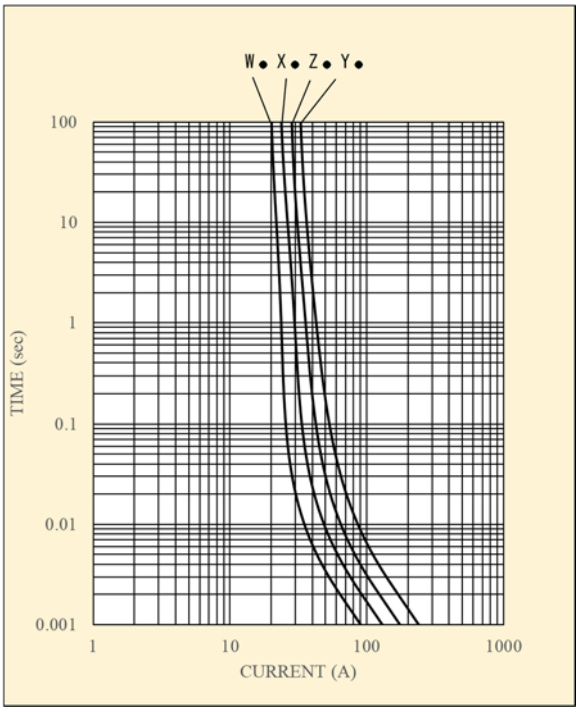



## FUSING CHARACTERISTICS

| Type | Current (rated current standard) | Time |
|---|---|---|
| Type JAJ | 100 % | Not fusing more than 1 hour |
| | 200 % | Fusing within 1 minute |
| Type JAK | 100 % | Not fusing more than 1 hour |
| | 250 % | Fusing within 1 minute |

## FUSING CHARACTERISTICS（REFERENCE DATA）

Fusing Characteristics




## MARKING

| Code | Type JAJ　Rated Current | Type JAK　Rated Current |
|---|---|---|
| W . | 12.5 A | 10 A |
| X . | 16 A | 12.5 A |
| Z . | | 16 A |
| Y . | | 20 A |

## CATALOG NUMBERS AND RATING

Type JAJ （200% fused product）

| Marking Code | Catalog number | Rated current | Resistance （Reference） |
|---|---|---|---|
| W . | JAJ 6002133 NA52 | 12.5 A | 4.59 mΩ |
| X . | JAJ 6002163 NA52 | 16 A | 3.60 mΩ |

Type JAK （250% fused product）

| Marking Code | Catalog number | Rated current | Resistance （Reference） |
|---|---|---|---|
| W . | JAK 6002103 NA52 | 10 A | 4.59 mΩ |
| X . | JAK 6002133 NA52 | 12.5 A | 3.60 mΩ |
| Z . | JAK 6002163 NA52 | 16 A | 2.93 mΩ |
| Y . | JAK 6002203 NA52 | 20 A | 2.40 mΩ |

Type JAJ and type JAK with the same rating marking code have exactly the same dimension, structure, and performance, and the only difference is the rating marking on the label.

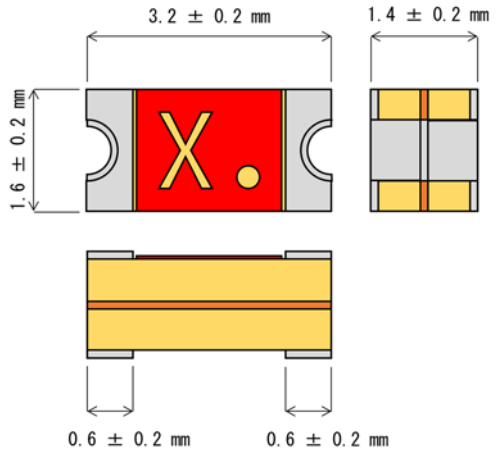
## ORDERING INFORMATION

J A J 6 0 0 2 1 6 3 N A 5 2

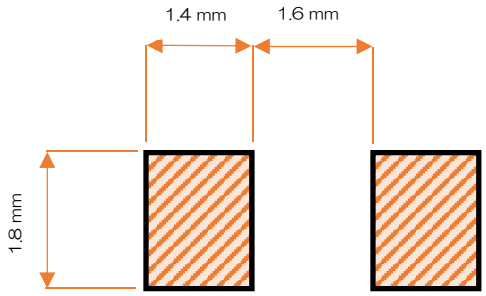
① ② ③ ④ ⑤ ⑥ ⑦

| ①Type | ②Series | ③Rated voltage | ④Rated current | ⑤Blank | ⑥Package Code | ⑦Case Code |
|---|---|---|---|---|---|---|
| Fusin Characteristics：Type<br>200%：JAJ<br>250%：JAK | Blank | 60V：6002 | 10A：103<br>12.5A：133<br>16A：163<br>20A：203 | | NA | 52 |

## DIMENSIONS

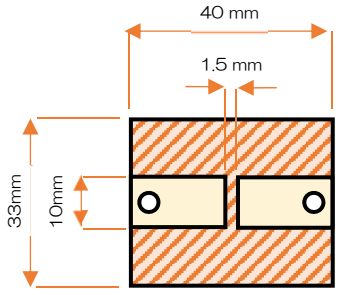



## RECOMMENDED PAD DIMENSIONS



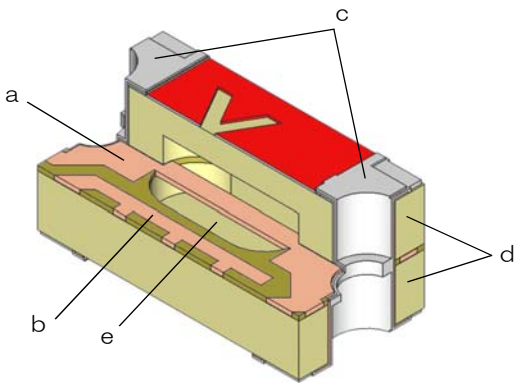

Please refer to the performance below for the temperature conditions of soldering.

## STANDARD TEST BODY




Glass epoxy body on one side
Board thickness 1.6mm
Copper layer 70μm

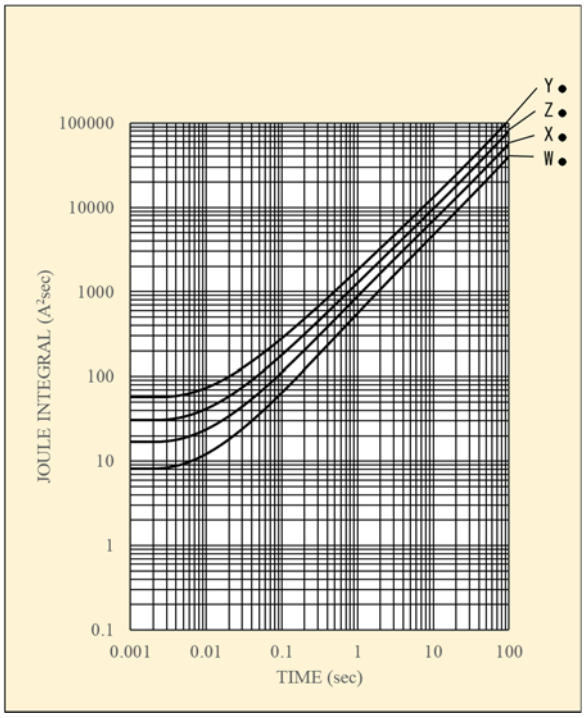
## CONSTRUCTION




| Code | Parts | Material |
|---|---|---|
| a | Fuse frame | Copper |
| b | Tiebar | Copper |
| c | Terminal | Copper foil, copper / nickel / tin plating |
| d | Exterior | Glass epoxy |
| e | Space | - |

## $I^2t$ – t CHARACTERISTICS（REFERENCE DATA）

$I^2t$ – t Characteristics




## APPLICATION CLASSIFICATION BY USE

The application classification by use which divided the market and use into four is set up supposing our products being used for a broad use.
Please confirm the application classification by use of each product that you intend to use.
Moreover, please be sure to inform to our Sales Department in advance in examination of the use of those other than the indicated use.

| Market | Application classification by use | Use | | Recommendation Type |
|---|---|---|---|---|
| | | Outline | Typical example of application | Circuit Protection Components |
| High reliability apparatus | 1 | - Apparatus in which advanced safety and reliability are demanded.<br>- Whether failure of the apparatus which cannot maintenance exchange products, and a product is direct for a human life, apparatus which changes or may cause a fatal system failure. | - Space development apparatus relation (Satellite, Rocket, Artificial Satellite)<br>- Aviation and a defensive system<br>- Atomic power, fire power, and a water-power generation system | With no relevance |
| In-vehicle – Industrial apparatus | 2 | - Apparatus in which reliability is important.<br>- The apparatus in which maintenance exchange of a product is very difficult, and failure of a product influence a human life, or the range of failure is wide range. | - Vehicles control of transport machines, such as a car, and a railroad, a vessel (Engine control, drive control, brake control)<br>- The operation control system of the Shinkansen and a main artery | Type KAB N series<br>Type JAG N series<br>Type KVA N series |
| | 3 | -Apparatus which can maintenance exchange products, and apparatus in which the loss of the system failure is large although failure of a product does not influence a human life, and maintenance engineering is demanded | - Vehicle indoor loading parts, such as an air-conditioner and car navigation, and in-vehicle communication facility<br>- Security management system for home/buildings etc.<br>- Control apparatus, such as Industrial use robots and a machine tool etc. | Type KAB M series |
| Apparatus in general | 4 | - The small size and the thin article which applies leading-edge technology positively<br>- The product supposing being used widely in the market for the apparatus which can maintenance exchange products, and apparatus with a partial system failure by failure of product. | -Smart phone, Mobile phone, Mobile PC (tablet), Electronic dictionary<br>- Desktop PC, Notebook PC, Home network<br>- Amusement apparatus (Pachinko,Game machine) | Type KAB<br>Type KAB T series<br>Type KAH<br>Type JAE, Type JAG<br>Type JAH, Type JAH L series<br>Type JAJ, Type JAK<br>Type JHC<br>Type KVA |

## PERFORMANCE

| Item | Performance | Test method |
|---|---|---|
| Temperature rise | Temperature rise shall not exceed 75°C. | Apply rated current. |
| Current-carrying capacity | Shall not open within 1 hour. | Apply rated current. |
| Clearing characteristics | Marking shall be legible.<br>Shall not ignite, shall not explode the exterior | 60VDC, 100A |
| Voltage drop | Type JAJ：99mV, Type JAK：83mV | Apply rated current. |
| Fusing characteristics | Fusing within 1 min. | Ambient temperature : 10 ~ 30°C<br>Type JAJ：Apply 200% of rated current.<br>Type JAK：Apply 250% of rated current. |
| Insulation resistance | 1 MΩ or more | Insulation resistance between terminals and case |
| Electrode strength (Bending) | No mechanical damage.<br>Resistance change after the test shall be within ± 20%. | Board supporting width : 90 mm<br>Bending : 3 mm<br>Bending speed : Approx. 0.5 mm/sec.<br>Duration : 60±5 sec. |
| Electrode strength （Shear test） | There is no peeling between the terminal and the substrate.<br>Resistance change after the test shall be within ± 20%. | Applied force : 17.7 N<br>Duration : 10 sec.<br>Tool : R0.5<br>Pressurize from the side of the product |
| Substrate bending test | No mechanical damage.<br>Resistance change after the test shall be within ± 20%. | Supporting dimension : 1.6 mm<br>Applied force : 20 N<br>Duration : 10 sec.<br>Tool : R0.5<br>Direction of the press : thickness direction of product |
| Solderability (Solder Wetting time) | Solder Wetting time : within 3sec. | Solder : Sn—3Ag—0.5Cu<br>Temperature : 245±3℃<br>meniscograph method |
| | | Solder : JISZ3282 H60A,H60S,H63A<br>Temperature : 230±2℃<br>meniscograph method |
| Solderability (new uniform coating of solder) | The dipping surface of the terminals shall be covered more than 95% with new solder. | Solder : Sn—3Ag—0.5Cu<br>Temperature : 245±3℃<br>Dipping : 3 sec. |
| | | Solder : JISZ3282 H60A,H60S,H63A<br>Temperature : 230±2℃<br>Dipping : 3 sec. |
| Resistance to soldering heat | Marking shall be legible.<br>No mechanical damage.<br>Resistance change after the test shall be within ± 20%. | Measure after 1 hour left under room temperature and humidity.<br>After soldering, leave it in normal temperature and humidity for 1 hour or more, and measure the resistance value.<br>＜Soldering conditions＞<br>Dipping (1 cycle)<br>Preconditioning : 100～150℃／60±5s<br>Temperature : 265±3℃／6～7s .<br>Reflow soldering (2 cycles)<br>Preconditioning : 1～2min 180℃ or less<br>Peak : max 250±5℃ 5s<br>Holding : 230～250℃ 30～40s<br>Cooling : more than 2min<br>Manual soldering<br>Temperature : 350±10℃<br>Duration : 3～4s |
| Vibration | No mechanical damage.<br>Resistance change after the test shall be within ± 20%. | Vibration amplitude：5G（49m/s²）, Vibration time：20min<br>Frequency range：10～2000Hz<br>Number of cycles: 12 cycles each in 3 directions of XYZ (36 in total) |
| Shock | No mechanical damage.<br>Resistance change after the test shall be within ± 20%. | Peak acceleration：1500G（14700m/s²）<br>Duration：0.5ms, Wave form：Half-sine, Speed change：4.7m/s<br>6 sides x 3 times (18 times in total) |
| Temperature cycle | No mechanical damage.<br>Resistance change after the test shall be within ± 20%. | Perform 10 cycles, with steps 1 and 2 below as one cycle. The transition time between stage 1 and stage 2 shall be within 3 min.<br>Step1：-55℃±3℃/30±3min<br>Step2：125±2℃/30±3min |
| Moisture resistance | No mechanical damage.<br>Resistance change after the test shall be within ± 20%. | Temperature : 85±3℃<br>Humidity : 85±5%RH<br>Duration : 1000 h |
| Load life | N No mechanical damage.<br>Resistance change after the test shall be within ± 20%. | Temperature : 85±2℃<br>Current : rated current × 70%<br>Duration : 1000 h |
| Moisture resistance load | No mechanical damage.<br>Resistance change after the test shall be within ± 20%. | Temperature : 85±3℃<br>Humidity : 85±5%RH<br>Current : rated current × 70%<br>Duration : 1000 h |
| High temperature exposure （Stability） | No mechanical damage.<br>Resistance change after the test shall be within ± 20%. | Temperature : 125±2℃<br>No electricity,<br>Duration : 1000 h |
| Solvent resistance | Marking shall be legible.<br>No damage to the appearance.<br>The resistance value after the test must be within ± 20% of the resistance value before the test. | Dipping rinse<br>Solvent : Isopropyl alcohol<br>Duration : 90 sec. |

# Application Notes for Micro Fuse

### 1. Circuit Design

Micro Fuse should be designated only after confirming operating conditions and Micro Fuse performance characteristics.
When determining the rated current, be sure to observe the following items :
(1) Micro Fuse should always be operated below the rated current (the value considered in the temperature derating rate) and voltage specifications.
(2) Micro Fuse should always be operated below the rated voltage.
(3) Micro Fuse should be selected with correct rated value to be fused at overload current.
(4) When Micro Fuse are used in inrush current applications, please confirm sufficiently inrush resistance of Micro Fuse.
(5) Please do not apply the current exceeding the breaking current to Micro Fuse.
(6) Use Micro Fuse under the condition of category temperature.
(7) Micro Fuse should not be used in the primary power source.

Micro Fuse should be selected by determining the operating conditions that will occur after final assembly, or estimating potential abnormalities through cycle testing.

### 2. Assembly and Mounting

During the entire assembly process, observe Micro Fuse body temperature and the heating time specified in the performance table. In addition, observe the following items :
(1) Mounting and adjusting with soldering irons are not recommended since temperature and time control is difficult.
In case of emergency for using soldering irons, be sure to observe the conditions specified in the performance table.
(2) Micro Fuse body should not contact a soldering iron directly.
(3) Once Micro Fuse mounted on the board, they should never be remounted on boards or substrates.
(4) During mounting, be careful not to apply any excessive mechanical stresses to the Micro Fuse.

### 3. Solvents

For cleaning of Micro Fuse, immersion in isopropyl alcohol for 90 seconds (at 20 ~ 30°C liquid temp.) will not be damaged.
If organic solvents will be used to Micro Fuse, be sure to preliminarily check that the solvent will not damage Micro Fuse .

### 4. Ultrasonic Cleaning

Ultrasonic cleaning is not recommended for Micro Fuse. This may cause damage to Micro Fuse such as broken terminals which results in electrical characteristics effects, etc. depending on the conditions.
If Ultrasonic cleaning process must be used, please evaluate the effects sufficiently before use.

### 5. Caution During Usage

(1) Micro Fuse with electricity should never be touched. Micro Fuse with electricity may cause burning due to Micro Fuse high temperature.
Also, in case of touching Micro Fuse without electricity, please check the safety temperature of Micro Fuse.
(2) Protective eyeglasses should always be worn when performing fusing tests. However, there is a fear that Micro Fuse will explode during test.
During fusing tests, please cover particles not to fly outward from the board or testing fixture. Caution is necessary during usage at all times.

### 6. Environmental Conditions

(1) Micro Fuse should not be stored or operated in the presence of acids, or alkalis, or corrosive atmosphere.
(2) Micro Fuse should not be vibrated, shocked, or pressed excessively.
(3) Micro Fuse should not be operated in a flammable or explosive atmosphere.
(4) Please do not use Micro fuse in the environment where dew condensation occurs.
In case Micro fuse has to be used under the dew condensation condition, please apply moisture-proof coating over Micro fuse.
Covering Micro fuse with moisture-proof coating may affect electrical characteristics, please evaluate the effects sufficiently before use.

### 7. Emergency

In case of fire, smoking, or offensive odor during operation, please cut off the power in the circuit or pull the plug out.

### 8. Storage

(1) Micro Fuse should not be stored in an environment with high temperature, low temperature, high humidity, condensation and dust and avoid direct sunlight or corrosive atmosphere such as $H_2S$(hydrogen sulfide) or $SO_2$(sulfur dioxide).
Direct sunlight may cause decolorization and deformation of the exterior and taping.
Also, solderability will be remarkably lower in high humidity.
(2) If the products are stored for an extended period of time, please contact Matsuo Sales Department for recommendation. The longer storage term causes packages and tapings to worsen. If the products will be stored for longer term, please contact us for advice.
(3) The products in taping, package, or box should not be given any kind of physical pressure. Deformation of taping or package may affect automatic mounting.

### 9. Disposal

When Micro Fuse are disposed of as waste or “scrap”, they should be treated as “industrial waste”. Micro Fuse contain various kinds of metals and resins.

### 10. Samples

Micro Fuse received as samples should not be used in any products or devices in the market. Samples are provided for a particular purpose such as configuration, confirmation of electrical characteristics, etc.


**MATSUO ELECTRIC CO., LTD.**

**Please feel free to ask our Sales Department for more information on Micro Fuse.**

Overseas Sales 5-3,3-Chome,Sennari-cho,Toyonaka-shi,Osaka 561-8558,Japan Tel:06-6332-0883 Fax:06-6332-0920
Head office 5-3,3-Chome,Sennari-cho,Toyonaka-shi,Osaka 561-8558,Japan Tel:06-6332-0871 Fax:06-6331-1386
URL https://www.ncc-matsuo.co.jp/