KAMAYA OHM

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|---|---|
| No.: | FMC−K−HTS−0001 /8 |
| Date: | 2023. 1. 25 |

# Data sheet

Title: CHIP FUSE; RECTANGULAR TYPE

Style: FMC10, 16

RoHS COMPLIANCE ITEM
Halogen and Antimony Free

Note: ・Stock conditions
Temperature: +5°C ~ +35°C
Relative humidity: 25% ~ 75%
The period of guarantee: Within 2 year from shipmen t by the company.
Solderability shall be satisfied.
・Product specification contained in this data sheet are subject to change at any time without notice
・If you have any questions or a Purchasing Specification for any quality agreement is necessary, please contact our sales staff.

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1. Scope

1.1 This data sheet covers the detail requirements for chip fuses; rectangular type, style of FMC10, 16.

1.2 Applicable documents

UL248–1–2000 Low–Voltage Fuses–Part1: General Requirements
UL248–14–2000 Low–Voltage Fuses–Part14: Supplemental Fuses
CSA C22.2 No.248.1–2000 Low–Voltage Fuses–Part1: General Requirements
CSA C22.2 No.248.14–2000 Low–Voltage Fuses–Part14: Supplemental Fuses

2. Classification

Type designation shall be the following form.

(Example)

| FMC | 16 | 202 | WB | TP |
|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 |
| Style | | | | |

1 Chip fuses; rectangular type
2 Size — Style
3 Rated current

| | |
|---|---|
| 202 | 202--> 2.0A |

4 Optional code

| Symbol | Optional code |
|---|---|
| AB | Standard |
| WB | |
| WH | |

5 Packaging form

| | |
|---|---|
| B | Bulk (loose package) |
| TH | Paper taping |
| TP | |

3. Safety standard approval

- UL248–1 and UL248–14
- CSA C22.2, No. 248.1–00 and CSA C22.2, No. 248.14–00

The file number to be designated by UL and C–UL shall be as follows: E176847

4. Rating

The ratings shall be in accordance with Table–1.

4.1 Optional code: AB

Table–1(1)

| Style | Rated current | | | Internal resistance value (mΩ max.) | Rated voltage (V) | Breaking capacity (A) | Time / current characteristic | |
|---|---|---|---|---|---|---|---|---|
| | Symbol | (A) | Marking symbol | | | | Current | Pre–arcing time |
| FMC10 | 501 | 0.5 | F | 240 | DC24 | 35 | 100%<br>200%<br>300% | 4 h min.<br>5 s max.<br>0.2 s max. |
| | 751 | 0.75 | A | 140 | | | | |
| | 102 | 1.0 | L | 95 | | | | |
| | 132 | 1.25 | M | 73 | | | | |
| | 152 | 1.5 | H | 60 | | | | |
| | 202 | 2.0 | S | 41 | | | | |
| | 252 | 2.5 | T | 32 | | | | |
| | 302 | 3.0 | R | 25 | | | | |

4.2 Optional code: WB

Table–1(2)

| Style | Rated current | | | Internal resistance value (mΩ max.) | Rated voltage (V) | Breaking capacity (A) | Time / current characteristic | |
|---|---|---|---|---|---|---|---|---|
| | Symbol | (A) | Marking symbol | | | | Current | Pre–arcing time |
| FMC16 | 501 | 0.5 | F | 260 | DC32 | 35 | 100%<br>200%<br>300% | 4 h min.<br>5 s max.<br>0.2 s max. |
| | 751 | 0.75 | A | 140 | | | | |
| | 102 | 1.0 | L | 110 | | | | |
| | 132 | 1.25 | M | 80 | | | | |
| | 152 | 1.5 | H | 65 | | | | |
| | 202 | 2.0 | S | 45 | | | | |
| | 252 | 2.5 | T | 32 | | | | |
| | 302 | 3.0 | R | 26 | | | | |
| | 402 | 4.0 | X | 18 | | | | |
| | 502 | 5.0 | Y | 14 | | | | |

4.3 Optional code: WH

Table−1(3)

| Style | Rated current | | | Internal resistance value (mΩ max.) | Rated voltage (V) | Breaking capacity (A) | Time / current characteristic | |
|---|---|---|---|---|---|---|---|---|
| | Symbol | (A) | Marking symbol | | | | Current | Pre−arcing time |
| FMC10 | 501 | 0.5 | F | 250 | DC24 | 35 | 100%<br>200%<br>300% | 4 h min.<br>5 s max.<br>0.2 s max. |
| | 751 | 0.75 | A | 150 | | | | |
| | 102 | 1.0 | L | 100 | | | | |
| | 132 | 1.25 | M | 70 | | | | |
| | 152 | 1.5 | H | 60 | | | | |
| | 202 | 2.0 | S | 40 | | | | |
| | 252 | 2.5 | T | 30 | | | | |
| | 302 | 3.0 | R | 25 | | | | |
| | 322 | 3.15 | U | 24 | | | | |
| | 402 | 4.0 | X | 18 | | | | |
| | 502 | 5.0 | Y | 14 | | | | |
| FMC16 | 501 | 0.5 | OF | 400 | DC32 | 35 | 100%<br>200%<br>300% | 4 h min.<br>5 s max.<br>0.2 s max. |
| | 631 | 0.63 | OI | 300 | | | | |
| | 751 | 0.75 | OA | 210 | | | | |
| | 801 | 0.8 | OK | 180 | | | | |
| | 102 | 1.0 | OL | 115 | | | | |
| | 132 | 1.25 | OM | 90 | | | | |
| | 152 | 1.5 | OH | 70 | | | | |
| | 162 | 1.6 | ON | 60 | | | | |
| | 202 | 2.0 | OS | 50 | | | | |
| | 252 | 2.5 | OT | 37 | | | | |
| | 302 | 3.0 | OR | 28 | | | | |
| | 322 | 3.15 | OU | 26 | | | | |
| | 402 | 4.0 | OX | 18 | | | | |
| | 502 | 5.0 | OY | 14 | | | | |

4.4 Working temperature range: −55 to +125(°C)

5. Packaging form

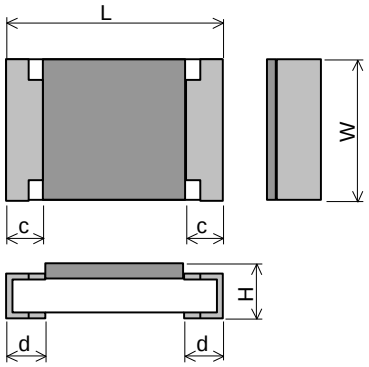
The standard packaging form shall be in accordance with Table−2.

Table−2

| Symbol | Packaging form | | Standard packaging quantity / units | Application |
|---|---|---|---|---|
| B | Bulk (loose package) | | 1,000 pcs. | FMC10, 16 |
| TH | Paper taping | 8mm width, 2mm pitches | 10,000 pcs. | FMC10 |
| TP | Paper taping | 8mm width, 4mm pitches | 5,000 pcs. | FMC16 |

6. Dimensions

6.1 The resistor shall be of the design and physical dimensions in accordance with Figure−1 and Table−3.




Figure−1

Table−3 Unit : mm

| Style | Optional code | L | W | H | c | d |
|---|---|---|---|---|---|---|
| FMC10 | WH | 1.0±0.05 | 0.5±0.05 | 0.35±0.05 | 0.2±0.10 | 0.25±0.10 |
| | AB | | | 0.38±0.05 | | |
| FMC16 | WB,WH | 1.6±0.1 | 0.8 $^{+0.15}_{-0.05}$ | 0.45±0.10 | 0.3±0.15 | 0.3±0.1 |

6.2 Net weight (Reference)

| Style | Net weight(mg) |
|---|---|
| FMC10 | 0.6 |
| FMC16 | 2 |

7. Marking

The Marking symbol of Sub− clause 4.1 shall be marked on over coat side.

(Example)

| Style | Optional code | Marking symbol | Content |
|---|---|---|---|
| FMC10 | AB | S | FMC10 202 AB |
| FMC10 | WH | S | FMC10 202 WH |
| FMC16 | WB | S | FMC16 202 WB |
| FMC16 | WH | OS | FMC16 202 WH |

8. Performance

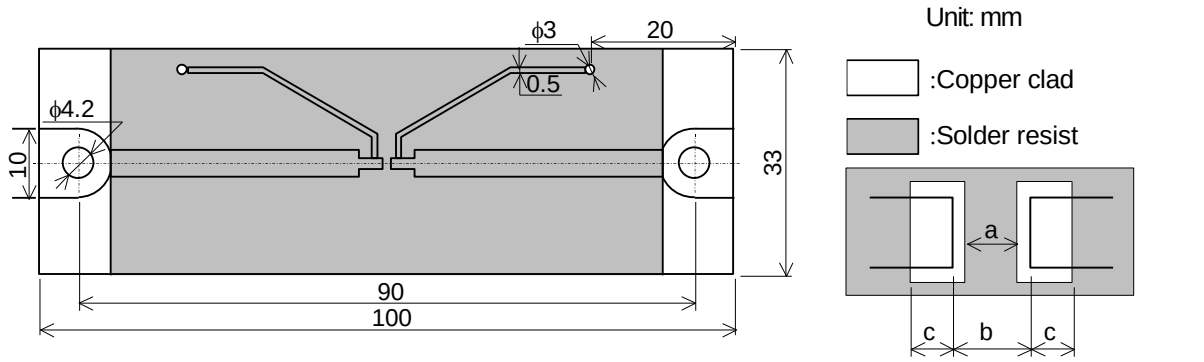
8.1 Unless otherwise specified, the standard range of atmospheric conditions for tests is as follows;
Ambient temperature: 5 °C to 35 °C, Relative humidity: 45 % to 85 %, Air presser: 86 kPa to 106 kPa
If there is any doubt the results, measurements shall be made within the following:
Ambient temperature: 20 °C ± 2 °C, Relative humidity: 60 % to 70 %, Air presser: 86 kPa to 106 kPa

8.2 The performance shall be satisfied in Table–4.

Table–4(1)

| No. | Test items | Condition of test | Performance requirements | |
|---|---|---|---|---|
| 1 | Temperature rise | The fuse shall be mounted on the test substrate as shown in Figure–2.<br>Measurement temp.: 10 °C to 30 °C<br>Test current: Rated current<br>The temperature at the hottest point on the surface of the fuse shall be measured after temperature equilibrium has been attained. | 75 °C max. | |
| 2 | Time / current characteristic | The fuse shall be mounted on the test substrate as shown in Figure–2.<br>Test current shall be applied for continuously. | Current | Pre–arcing time |
| | | | 100% | 4 h min. |
| | | | 200% | 5 s. max. |
| | | | 300% | 0.2 s max. |
| 3 | Terminal bond strength of the face plating | JIS C 60068-2-21 Ue1<br>The fuse shall be mounted on the test substrate as shown in Figure–2.<br>Bending value: 3 mm(Among the fulcrums: 90 mm)<br>Duration: 10 s ± 1 s | Change of internal resistance: ±10%<br>No evidence of mechanical damage. | |
| 4 | Resistance to soldering heat | Test by a piece.<br>Temp. of solder bath: 260 °C ± 5 °C<br>Immersion time: 10 s ± 1 s<br>After immersion into solder, leaving the room temp. for 1h or more, and then measure the internal resistance. | Change of internal resistance: ±10%<br>No evidence of appearance damage | |
| | | • Reflow soldering<br>Pre–heating: 150 °C ~ 180 °C, 120 s max.<br>Peak: 260 °C ± 5 °C, 10 s max.<br>Reflow cycle: 2 times<br>After immersion into solder, leaving the room temp. for 1h or more, and then measure the internal resistance. | | |
| 5 | Solderability | JIS C 60068-2-58<br>Test by a piece<br>Flux: Rosin–Methanol<br>Temp. of solder: bath: 235 °C ± 5 °C<br>Immersion time: 2 s ± 0.5 s | The surface of terminal immersed shall be min. of 95 % covered with a new coating of solder. | |
| 6 | Rapid change temperature | JIS C 60068-2-14 Na<br>The fuse shall be mounted on the test substrate as shown in Figure–2.<br>Lower temperature: –55 °C<br>Upper temperature: +125 °C<br>Duration of exposure at each temperature: 30 min.<br>Number of cycles: 5 cycles | Change of internal resistance: ±10%<br>No evidence of appearance damage | |

9. Test substrate




| Style | a | b | c |
|---|---|---|---|
| FMC10 | 0.3 | 0.6 | 0.65 |
| FMC16 | 0.6 | 1.0 | 0.5 |

Figure–2 FMC TEST SUBSTRATE

Remark 1). Material: Epoxide woven glass
Thickness: 1. 6mm Thickness of copper clad: 0. 035mm

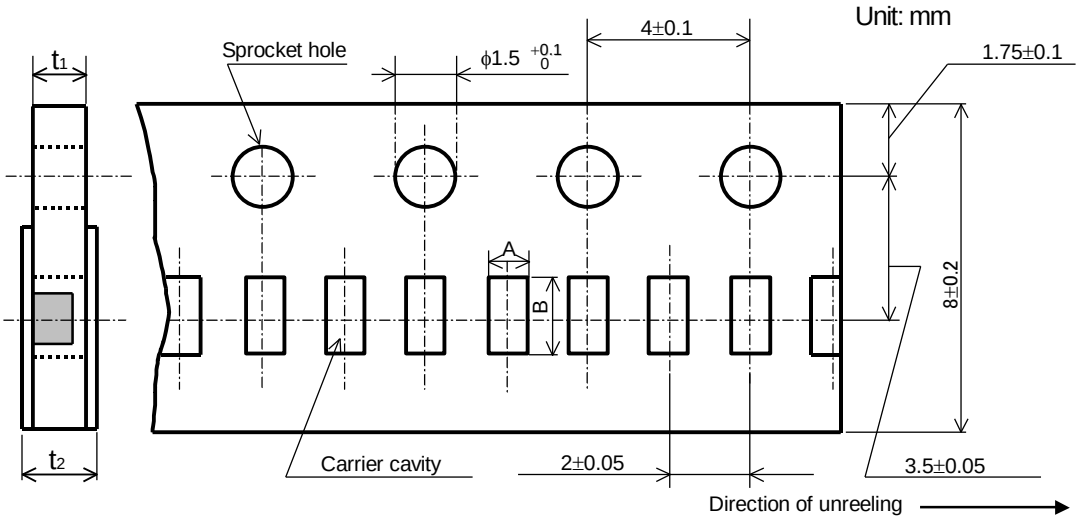
10. Taping

10.1 Applicable documents JIS C 0806–3: 2014, EIAJ ET–7200C: 2010

10.2 Taping dimensions

10.2.1 Paper taping (8mm width, 2mm pitches)

Taping dimensions shall be in accordance with Figure–3 and Table–5.



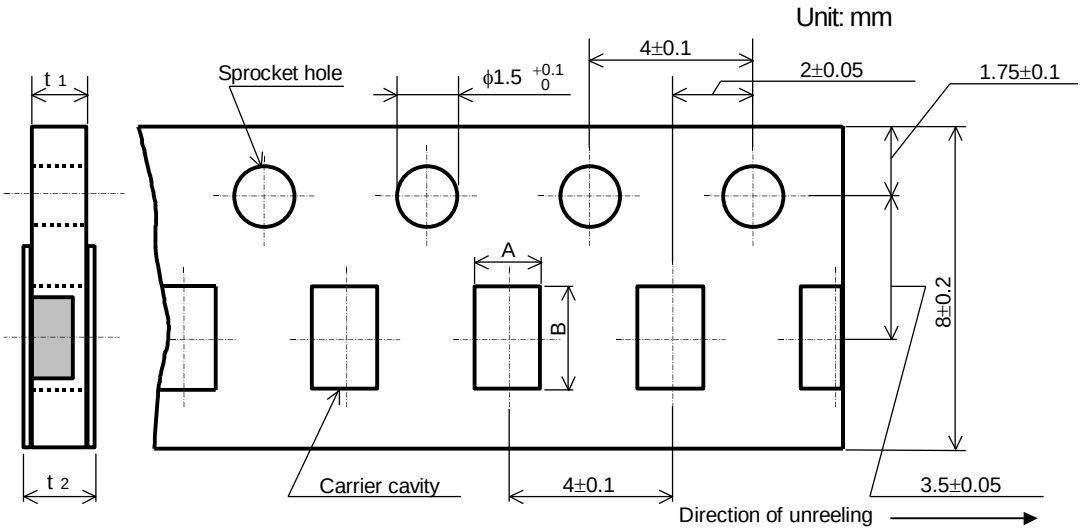

Figure–3

Table–5 Unit: mm

| Style | A | B | $t_1$ | $t_2$ |
|---|---|---|---|---|
| FMC10 | $0.65^{+0.05}_{-0.10}$ | $1.15^{+0.05}_{-0.10}$ | 0.4 ± 0.05 | 0.5max. |

10.2.2 Paper taping (8mm width, 4mm pitches)

Taping dimensions shall be in accordance with Figure−4 and Table−6.

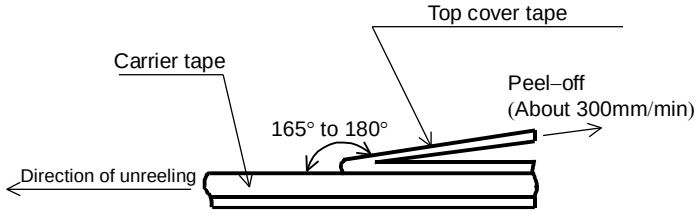



Figure−4

Table−6 Unit : mm

| Style | A | B | $t_1$ | $t_2$ |
|---|---|---|---|---|
| FMC16 | 1.15±0.15 | 1.9±0.2 | 0.6±0.1 | 0.8 max. |

1). The cover tapes shall not cover the sprocket holes.
2). Tapes in adjacent layers shall not stick together in the packing.
3). Components shall not stick to the carrier tape or to the cover tape.
4). Pitch tolerance over any 10 pitches ±0.2mm.
5). The peel strength of the top cover tape shall be with in 0.1N to 0.5N on the test method as shown in the following Figure−5.
6). When the tape is bent with the minimum radius for 25 mm, the tape shall not be damaged and the components shall maintain their position and orientation in the tape.
7). In no case shall there be two or more consecutive components missing.
The maximum number of missing components shall be one or 0.1%, whichever is greater.
8). The fuses shall be faced to upward at the over coating side in the carrier cavity.

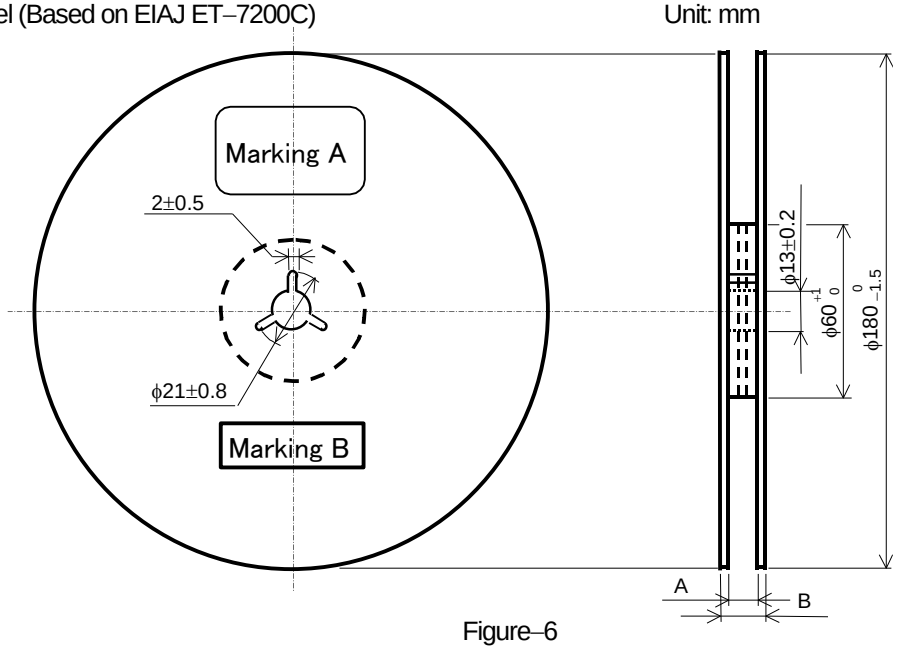



Figure−5

10.3 Reel dimension

Reel dimensions shall be in accordance with the following Figure−6 and Table−7.

Plastic reel (Based on EIAJ ET−7200C) Unit: mm




Figure−6

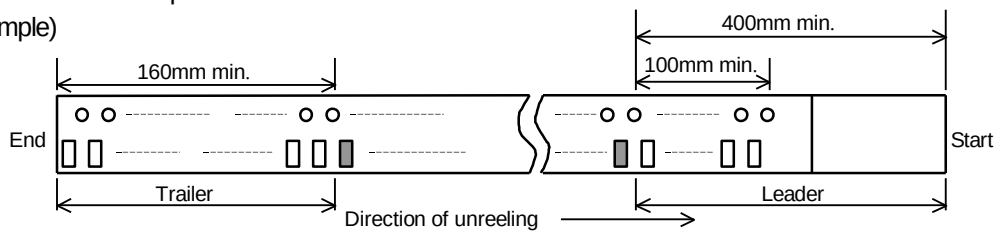
Table−7 Unit: mm

| Style | A | B | Note |
|---|---|---|---|
| FMC10, 16 | 9 +1.0 0 | 11.4±1.0 | Injection molding |
| | | 13±1.0 | Vacuum forming |

Note: Marking label shall be marked on a place of Marking A or two place of marking A and B.

10.4 Leader and trailer tape.

Example)




Figure−7

11. Marking on package

The label of a minimum package shall be legibly marked with follows.

11.1 Marking A

(1) Classification (Style, Rated current, Optional code, Packaging form) (2) Quantity (3) Lot number

(4) Manufacturer's name or trade mark (5) UL and /or C−UL recognized component mark (6) Others

11.2 Marking B (KAMAYA Control label)

12. Recommended Derating for Rated Current

This fuse will recommend use by the current reduction value according to the following derating curve.

- Nominal Derating

  Nominal Derating ≤ 75% of Rated Current

  *FMC10 Optional code: WH, Rated current ≥ 3.15A : Nominal Derating ≤ 70% of Rated Current

- Temperature Derating

  Please refer to the following graph regarding the current derating value for ambient temperature.

  Ex.) If FMC16 202WH (Rated Current 2.0A) is used under ambient temperature 70°C,

  Kamaya recommends, less than the current value derated as below,

  Rated Current : 2.0A × (Nominal Derating : 75% × Temperature Derating : 80%) = 1.2A

**Derating curve**