

## Data Sheet

Customer: \_\_\_\_\_

Product: Automotive Grade Thick Film Array Chip Resistor –  
CN..A Series

Size: 0402x4 / 0603x4 / 0201x2(Flat) / 0201x4(Flat)

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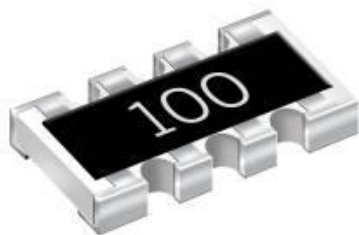
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|---------------------|--------------------|---------------------|------------------------|---------------------------|
| 08-Jul-24           | 08-Jul-24          | 08-Jul-24           |                        |                           |
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## Automotive Grade Thick Film Array Chip Resistor

### Scope

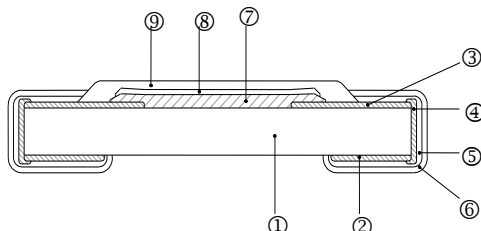
- This specification applies to all sizes of rectangular-type fixed chip resistors with Ruthenium-base as material.



### Features

- AEC-Q200 Qualified
- Small size and light weight
- Reduction of assembly costs and matching with placement machines
- Reliability, high quality
- Special construction to prevent sulfuration in a sulfur containing environment
- Suitable for IR reflow soldering
- 100% CCD inspection

### Construction

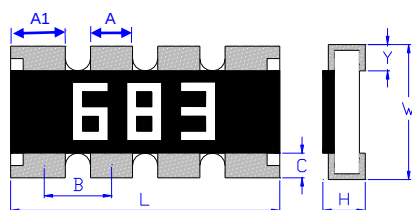


### Applications

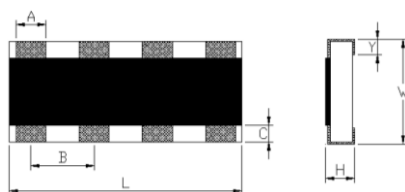
- Entertainment
- Computer & Related Products
- Communication Equipment
- Power Equipment
- Measuring Instrument

|                     |                      |                      |
|---------------------|----------------------|----------------------|
| ① Alumina Substrate | ④ Edge Electrode     | ⑦ Resistor Layer     |
| ② Bottom Electrode  | ⑤ Barrier Layer      | ⑧ Primary Overcoat   |
| ③ Top Electrode     | ⑥ External Electrode | ⑨ Secondary Overcoat |

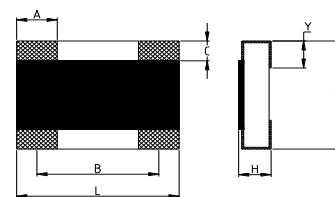
### Dimensions



CN-42/43



CN-41



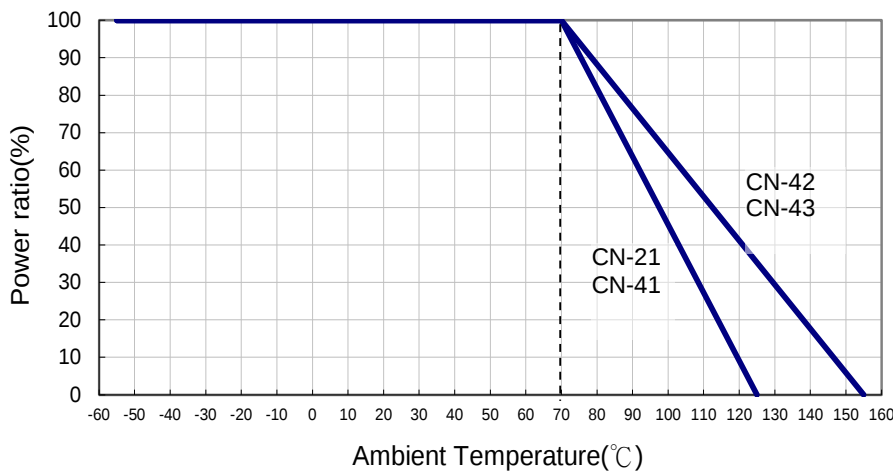
CN-21

| Type  | Number of Resistors | L (mm)    | W (mm)    | H (mm)    | A (mm)    | A1 (mm)   | B (mm)    | C (mm)    | Y (mm)    | Weight (g) (1000pcs) |
|-------|---------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|----------------------|
| CN-21 | 2                   | 0.80±0.10 | 0.60±0.10 | 0.35±0.10 | 0.30±0.10 | -         | 0.50±0.10 | 0.15±0.10 | 0.15±0.10 | 0.500                |
| CN-41 | 4                   | 1.40±0.10 | 0.60±0.10 | 0.35±0.10 | 0.20±0.10 | -         | 0.40±0.10 | 0.10±0.07 | 0.15±0.05 | 0.833                |
| CN-42 | 4                   | 2.00±0.10 | 1.00±0.10 | 0.45±0.10 | 0.30±0.10 | 0.40±0.10 | 0.50±0.05 | 0.22±0.15 | 0.22±0.15 | 2.817                |
| CN-43 | 4                   | 3.20±0.15 | 1.60±0.15 | 0.55±0.10 | 0.50±0.15 | 0.65±0.10 | 0.80±0.05 | 0.30±0.15 | 0.30±0.15 | 8.288                |

## Part Numbering

| CN-          | 43                                                   | J                    | A                   | 7                                                                                                                             | - - - 1 0 R                                                                                          |
|--------------|------------------------------------------------------|----------------------|---------------------|-------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------|
| Product Type | Dimensions                                           | Resistance Tolerance | Function Code       | Packaging Code                                                                                                                | Resistance                                                                                           |
| CN- (Array)  | 21: 0201x2<br>41: 0201x4<br>42: 0402x4<br>43: 0603x4 | F: ±1%<br>J: ±5%     | A: Automotive Grade | 6: 7" Reel 10Kpcs<br>7: 7" Reel 5Kpcs<br>A: 10" Reel 10Kpcs<br>B: 10" Reel 20Kpcs<br>C: 13" Reel 40Kpcs<br>D: 13" Reel 20Kpcs | - - - 1R2: 1.2Ω<br>- - - 3K3: 3.3KΩ<br>- - - 10K: 10KΩ<br>- - 100K: 100KΩ<br>“-” to fill up 6 spaces |

## Derating Curve



## Standard Electrical Specifications

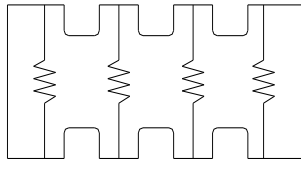
| Item<br>Type | Power Rating<br>at 70°C<br>Jumper<br>Rated Current | Operating<br>Temp. Range | Max.<br>Operating<br>Voltage | Max.<br>Overload<br>Voltage | Number<br>of<br>Resistors | Resistance Range   |              | TCR<br>(PPM/°C) |
|--------------|----------------------------------------------------|--------------------------|------------------------------|-----------------------------|---------------------------|--------------------|--------------|-----------------|
|              |                                                    |                          |                              |                             |                           | ±1%<br>(E24 - E96) | ±5%<br>(E24) |                 |
| CN-21        | 1/32W                                              | -55 ~ +125°C             | 12.5V                        | 25V                         | 2                         | -                  | 3Ω - 9.1Ω    | ±300            |
|              | Jumper: 0.5A                                       |                          |                              |                             |                           | 10Ω - 1MΩ          |              | ±200            |
|              |                                                    |                          |                              |                             |                           | -                  | 0Ω (<50mΩ)   | -               |
| CN-41        | 1/32W                                              | -55 ~ +125°C             | 12.5V                        | 25V                         | 2                         | 10Ω - 1MΩ          |              | ±200            |
|              | Jumper: 0.5A                                       |                          |                              |                             |                           | -                  | 0Ω (<50mΩ)   | -               |
|              |                                                    |                          |                              |                             |                           | 10Ω - 1MΩ          |              | ±200            |
| CN-42        | 1/16W                                              | -55 ~ +155°C             | 25V                          | 50V                         | 4                         | 10Ω - 1MΩ          | 1Ω - 1MΩ     | ±200            |
|              | Jumper: 1A                                         |                          |                              |                             |                           | -                  | 0Ω (<50mΩ)   | -               |
|              |                                                    |                          |                              |                             |                           | 10Ω - 1MΩ          |              | ±200            |
| CN-43        | 1/10W                                              | -55 ~ +155°C             | 50V                          | 100V                        | 4                         | 10Ω - 1MΩ          | 1Ω - 1MΩ     | ±200            |
|              | Jumper: 1A                                         |                          |                              |                             |                           | -                  | 0Ω (<50mΩ)   | -               |
|              |                                                    |                          |                              |                             |                           | 10Ω - 1MΩ          |              | ±200            |

Operating Voltage= $\sqrt{P \cdot R}$  or Max. operating voltage listed above, whichever is lower.

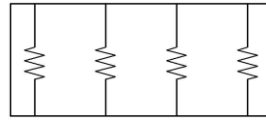
Overload Voltage= $2.5 \cdot \sqrt{P \cdot R}$  or Max. overload voltage listed above, whichever is lower.

■ Viking is capable of manufacturing the optional spec based on customer's requirement.

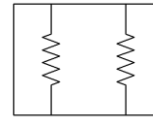
## Equivalent Circuit Diagram



CN-42/43

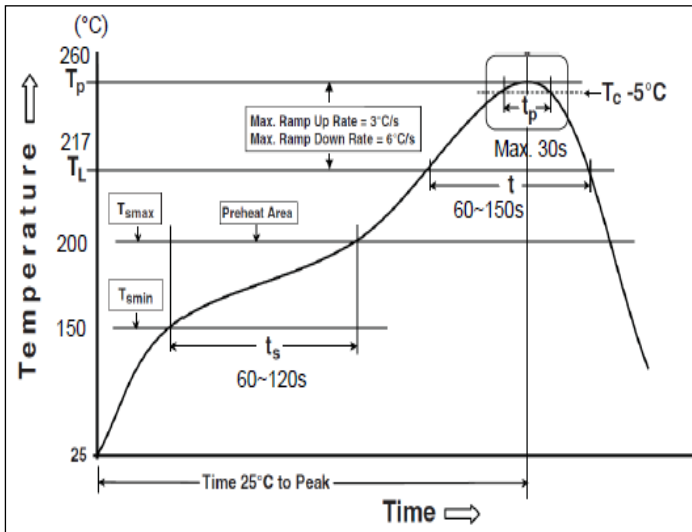


CN-41



CN-21

## Soldering Condition (Ref. IPC/JEDEC J-STD-020 & J-STD-002)



| Reflow Profiles                                                                                  |                  |
|--------------------------------------------------------------------------------------------------|------------------|
| Profile Feature                                                                                  | Pb-Free Assembly |
| <b>Preheat</b>                                                                                   |                  |
| Min. Temperature (T <sub>min</sub> )                                                             | 150 °C           |
| Max Temperature (T <sub>max</sub> )                                                              | 200 °C           |
| Preheating time (t <sub>s</sub> ) from (T <sub>min</sub> to T <sub>max</sub> )                   | 60-120 seconds   |
| Ramp-up rate (T <sub>L</sub> to T <sub>p</sub> )                                                 | 3 °C/second max. |
| Liquidous temperature (T <sub>L</sub> )                                                          | 217 °C           |
| Time (t <sub>L</sub> ) maintained above T <sub>L</sub>                                           | 60-150 seconds   |
| Min. Peak temperature (T <sub>p</sub> min)                                                       | 235°C            |
| Max. Peak temperature (T <sub>p</sub> max)                                                       | 260°C            |
| Time (t <sub>p</sub> ) within 5 °C of the specified classification temperature (T <sub>c</sub> ) | 30 seconds max.  |
| Ramp-down rate (T <sub>p</sub> to T <sub>L</sub> )                                               | 6 °C/second max. |
| Time 25 °C to peak temperature                                                                   | 8 minutes max.   |

## Environmental Characteristics

| Item                                           | Requirement   |               |        | Test Method                                                                                                                              |
|------------------------------------------------|---------------|---------------|--------|------------------------------------------------------------------------------------------------------------------------------------------|
|                                                | ±1%           | ±5%           | Jumper |                                                                                                                                          |
| Temperature Coefficient of Resistance (T.C.R.) | As Spec.      |               |        | <b>JIS-C-5201-1 4.8</b><br><b>IEC-60115-1 4.8</b><br>At 25°C/-55°C and 25°C/+125°C, 25°C is the reference temperature                    |
| Short Time Overload                            | ±(1.0%+0.05Ω) | ±(2.0%+0.05Ω) | <50mΩ  | <b>JIS-C-5201-1 4.13</b><br><b>IEC-60115-1 4.13</b><br>RCWV*2.5 or Max. Overload Voltage whichever is lower for 5 seconds                |
| Insulation Resistance                          | ≥10G          |               |        | <b>JIS-C-5201-1 4.6</b><br><b>IEC-60115-1 4.6</b><br>Max. Overload Voltage for 1 minute                                                  |
| Operational Life                               | ±(2.0%+0.10Ω) | ±(3.0%+0.10Ω) | <100mΩ | <b>MIL-STD-202 Method 108</b><br>Condition D Steady State TA=125°C at derated power.<br>Measurement at 24±4 hours after test conclusion. |
| Biased Humidity                                | ±(2.0%+0.10Ω) | ±(3.0%+0.10Ω) | <100mΩ | <b>MIL-STD-202 Method 103</b><br>1000 hrs 85°C/85%RH 10% of operating power (≤100V)                                                      |

| Item                         | Requirement                                                        |                                             |                              | Test Method                                                                                                                         |
|------------------------------|--------------------------------------------------------------------|---------------------------------------------|------------------------------|-------------------------------------------------------------------------------------------------------------------------------------|
|                              | ±1%                                                                | ±5%                                         | Jumper                       |                                                                                                                                     |
| High Temperature Exposure    | ±(1.0%+0.05Ω)                                                      | ±(1.5%+0.10Ω)<br>CN-21/41:<br>±(3.0%+0.10Ω) | <50mΩ<br>CN-21/41:<br><100mΩ | <b>MIL-STD-202 Method 108</b><br>at +125/+155°C for 1000 hrs                                                                        |
| Board Flex                   | ±(1.0%+0.05Ω)                                                      | ±(1.0%+0.05Ω)                               | <50mΩ                        | <b>AEC-Q200-005</b><br>Bending once for 60 seconds with 3mm                                                                         |
| Solderability                | 95% min. coverage                                                  |                                             |                              | <b>JIS-C-5201-1 4.17</b><br><b>IEC-60115-1 4.17</b><br><b>J-STD-002</b><br>245±5°C for 3 seconds                                    |
| Resistance to Soldering Heat | ±(0.5%+0.05Ω)                                                      | ±(1.0%+0.05Ω)                               | <50mΩ                        | <b>MIL-STD-202 Method 210</b><br>260±5°C for 10 seconds                                                                             |
| Voltage Proof                | No breakdown or flashover                                          |                                             |                              | <b>JIS-C-5201-1 4.7</b><br><b>IEC-60115-1 4.7</b><br>1.42 times Max. Operating Voltage for 1 minute                                 |
| Leaching                     | Individual leaching area ≤5%<br>Total leaching area ≤ 10%          |                                             |                              | <b>JIS-C-5201-1 4.18</b><br><b>IEC-60068-2-58 8.2.1</b><br>260±5°C for 30 seconds                                                   |
| Temperature Cycling          | ±(0.5%+0.05Ω)                                                      | ±(1.5%+0.05Ω)                               | <50mΩ                        | <b>JESD22 Method JA-104</b><br>-55°C to +125°C, 1000 cycles                                                                         |
| Mechanical Shock             | ±(0.25%+0.05Ω)                                                     | ±(1.0%+0.05Ω)                               | <50mΩ                        | <b>MIL-STD-202 Method 213</b><br>Wave Form: Tolerance for half sine shock pulse.<br>Peak value is 100g's. Normal duration (D) is 6. |
| Vibration                    | ±(0.5%+0.05Ω)                                                      | ±(1.0%+0.05Ω)                               | <50mΩ                        | <b>MIL-STD-202 Method 204</b><br>5 g's for 20 min., 12 cycles each of 3 orientations,<br>10-2000 Hz                                 |
| ESD                          | ±(1%+0.05Ω)                                                        |                                             |                              | <b>AEC-Q200-002</b><br>Human body, 2KV                                                                                              |
| Resistance to Solvents       | No visible damage on appearance and marking.                       |                                             |                              | <b>MIL-STD-202 Method 215</b><br>Add Aqueous wash chemical - OKEM Clean or equivalent. Do not use banned solvents.                  |
| Terminal Strength            | No broken                                                          |                                             |                              | <b>AEC-Q200-006</b><br>Force of 1.8kg for 60 seconds.                                                                               |
| Flammability                 | No ignition of the tissue paper or scorching or the pinewood board |                                             |                              | <b>UL-94</b><br>V-0 or V-1 are acceptable. Electrical test not required.                                                            |
| Sulfur Test                  | △R±1%                                                              | △R±5%                                       | <100mΩ                       | <b>EIA-977 (Condition A)</b><br>60±2°C, no power rating for 500 hrs.                                                                |

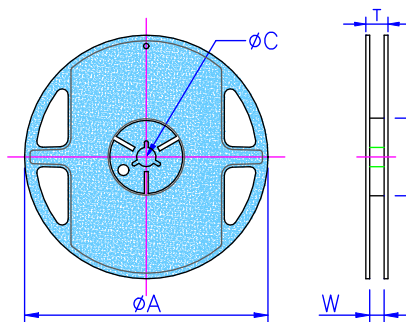
RCWV(Rated Continuous Working Voltage)= $\sqrt{P \cdot R}$  or Max. Operating Voltage whichever is lower.

■ **Storage Temperature: 15~28°C; Humidity < 80%RH**

■ **Shelf Life: 2 years from production date.**

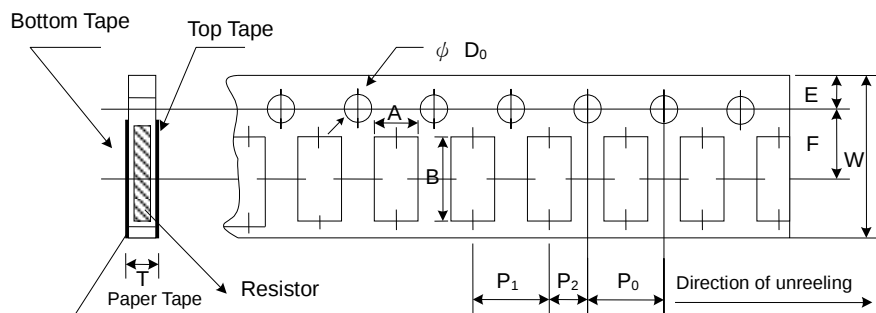
## ■ Packaging

### Reel Specifications & Packaging Quantity



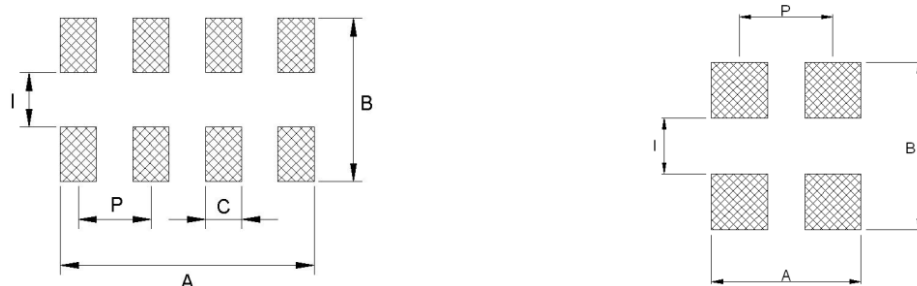
| Type           | Packaging Quantity |     | Tape Width | Reel Diameter | ΦA (mm)   | ΦB (mm)             | ΦC (mm)  | W (mm)  | T (mm)   |
|----------------|--------------------|-----|------------|---------------|-----------|---------------------|----------|---------|----------|
| CN-21<br>CN-41 | Paper              | 10K | 8mm        | 7 inch        | 178.5±1.5 | 60 <sup>+1/-0</sup> | 13.0±0.2 | 9.0±0.5 | 12.5±0.5 |
| CN-42          | Paper              | 10K | 8mm        | 7 inch        | 178.5±1.5 | 60 <sup>+1/-0</sup> | 13.0±0.2 | 9.0±0.5 | 12.5±0.5 |
|                |                    | 20K | 8mm        | 10 inch       | 254±1.0   | 100±0.5             | 13.0±0.2 | 9.5±0.5 | 13.5±0.5 |
|                |                    | 40K | 8mm        | 13 inch       | 330±1.0   | 100±0.5             | 13.0±0.2 | 9.5±0.5 | 13.5±0.5 |
| CN-43          | Paper              | 5K  | 8mm        | 7 inch        | 178.5±1.5 | 60 <sup>+1/-0</sup> | 13.0±0.2 | 9.0±0.5 | 12.5±0.5 |
|                |                    | 10K | 8mm        | 10 inch       | 254±1.0   | 100±0.5             | 13.0±0.2 | 9.5±0.5 | 13.5±0.5 |
|                |                    | 20K | 8mm        | 13 inch       | 330±1.0   | 100±0.5             | 13.0±0.2 | 9.5±0.5 | 13.5±0.5 |

### Paper Tape Specifications



| Type  | A (mm)    | B (mm)    | W (mm)  | E (mm)   | F (mm)   | P <sub>0</sub> (mm) | P <sub>1</sub> (mm) | P <sub>2</sub> (mm) | ΦD <sub>0</sub> (mm) | T (mm)   |
|-------|-----------|-----------|---------|----------|----------|---------------------|---------------------|---------------------|----------------------|----------|
| CN-21 | 0.77±0.05 | 0.97±0.05 | 8.0±0.2 | 1.75±0.1 | 3.5±0.05 | 4.0±0.1             | 2.0±0.05            | 2.0±0.05            | 1.50+0.1,-0          | 0.50±0.1 |
| CN-41 | 0.77±0.05 | 1.57±0.05 | 8.0±0.2 | 1.75±0.1 | 3.5±0.05 | 4.0±0.1             | 2.0±0.05            | 2.0±0.05            | 1.50+0.1,-0          | 0.50±0.1 |
| CN-42 | 1.20±0.1  | 2.20±0.1  | 8.0±0.2 | 1.75±0.1 | 3.5±0.05 | 4.0±0.1             | 2.0±0.05            | 2.0±0.05            | 1.50+0.1,-0          | 0.70±0.1 |
| CN-43 | 1.95±0.1  | 3.50±0.1  | 8.0±0.2 | 1.75±0.1 | 3.5±0.05 | 4.0±0.1             | 4.0±0.05            | 2.0±0.05            | 1.50+0.1,-0          | 0.85±0.1 |

## Recommend Land Pattern



| Type  | A (mm) | B (mm) | C (mm) | I (mm) | P (mm) |
|-------|--------|--------|--------|--------|--------|
| CN-21 | 0.80   | 0.90   | --     | 0.30   | 0.50   |
| CN-41 | 1.40   | 0.90   | 0.20   | 0.30   | 0.40   |
| CN-42 | 2.10   | 1.80   | 0.30   | 0.50   | 0.50   |
| CN-43 | 3.10   | 2.85   | 0.45   | 0.80   | 0.80   |

## Marking

No Marking for CN-21/CN-41

Jumper for all: Letter "0"

1% for CN-42/CN-43: 4 digits marking (non-including E24 series)

Example:

| Resistance | 102Ω | 2.49KΩ | 30K1Ω | 49.9KΩ | 121KΩ |
|------------|------|--------|-------|--------|-------|
| marking    | 1020 | 2491   | 3012  | 4992   | 1213  |

1% & 5% for CN-42/CN-43: 3 digits marking in E24

Example: 101=100Ω 102=1KΩ (1<sup>st</sup> and 2<sup>nd</sup> are E24 code and 3<sup>rd</sup> code is multiplier)

| E24 code | 10 | 11 | 12 | 13 | 15 | 16 | 18 | 20 | 22 | 24 | 27 | 30 | 33 | 36 | 39 | 43 | 47 | 51 | 56 | 62 | 68 | 75 | 82 | 91 |
|----------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
|----------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|

**REVISION HISTORY**

| REVISION   | DATE         | CHANGE NOTIFICATION | DESCRIPTION                                                                                            |
|------------|--------------|---------------------|--------------------------------------------------------------------------------------------------------|
| Version A2 | Apr 11, 2014 |                     | - Recommend Land Pattern updated                                                                       |
| Version A3 | Apr 30, 2015 | -                   | - Environmental Characteristics updated                                                                |
| Version A4 | Jun 15, 2016 | -                   | - Remove Material Description<br>- Modify Storage Temperature<br>- Increase Product Size CN-21 & CN-41 |
| Version A5 | Jan 12, 2018 | -                   | - Modify Electrical Specifications (0R)                                                                |
| Version A6 | May 20, 2019 | -                   | - Modify TCR Test description<br>- Features added 100% CCD inspection                                  |
| Version A7 | Oct 21, 2019 | -                   | - Increase Sulfur Test                                                                                 |
| Version A8 | Jan 31, 2020 | -                   | - Features added Anti-sulfur characteristics                                                           |
| Version A9 | Sep 24, 2020 | -                   | - Add CN-42/CN-43 Dimension A1                                                                         |
| Version B  | Mar 10, 2021 | -                   | - Modify Soldering Condition                                                                           |
| Version B1 | Nov 15, 2021 | -                   | - Increase the shelf life description                                                                  |
| Version B2 | Feb 15, 2022 | -                   | - Derating Curve changes the temperature range                                                         |
| Version B3 | Jun 15, 2022 | -                   | - Modify Soldering Condition                                                                           |
| Version B4 | Jul 08, 2024 | -                   | - Modify the descriptions in the Features                                                              |