




**SPECIFICATION SHEET**

|                                |  |
|--------------------------------|--|
| <b>SPECIFICATION SHEET NO.</b> | N0621- CR0402FC20RS01  |
| <b>DATE</b>                    | June 21, 2021  |
| <b>REVISION</b>                | A0   |
| <b>DESCRIPTION</b>             | <p>Thick Film Chip Resistors, 0402 (1005 Metric) Series,<br/>L1.00*W0.50*H0.35mm,<br/><i>Tolerance: +/-1%, Resistance 20 ohm, Dissipation 1/16W Max.</i></p> <p>Operating Temp. Range -55°C ~+155°C<br/>Package in Tape/Reel, 10,000pcs/Reel<br/>RoHS/RoHS III compliant</p> |
| <b>CUSTOMER</b>                |  |
| <b>CUSTOMER PART NUMBER</b>    |  |
| <b>CROSS REF. PART NUMBER</b>  |  |
| <b>ORIGINAL PART NUMBER</b>    | Aillen CR02FC20R   |
| <b>PART CODE</b>               | CR0402FC20RS01   |

|                         |   |  |   |
|-------------------------|---|--|---|
| <b>VENDOR APPROVE</b>   |   |  |   |
| Issued/Checked/Approved |  |  |  |
| DATE: June 21, 2021     |   |  |   |

|                         |  |
|-------------------------|--|
| <b>CUSTOMER APPROVE</b> |  |
|                         |  |
| DATE:                   |  |

**THICK FILM CHIP RESISTORS 0402 SERIES**

**MAIN FEATURE**

- High Reliability And Stability
- Reduced Size Of Final Equipment
- Lower Assembly Costs
- Higher Component And Equipment Reliability
- RoHS III Compliant And Halogen Free Products

**APPLICATION**

- Consumer Electrical Equipment
- EDP, Computer Application
- Telecom Application

**RFQ**  
Request For Quotation

**PART CODE GUIDE**

| CR | 0402 | F | C | 20R | S | 01 |
|----|------|---|---|-----|---|----|
| 1  | 2    | 3 | 4 | 5   | 6 | 7  |

- 1) **CR**: Product code for Thick Film Chip Resistors
- 2) **0402**: Series Code, 0402 (1005 Metric) Series, Dimensions L1.00\*W0.50\*H0.35mm
- 3) **F**: Resistance Range Tolerance Code, P: Jumper; B: +/-0.1%; D: +/-0.5%; F: +/-1%; J: +/-5%
- 4) **C**: Package Code, A: 4Kpcs/Reel; B: 5kpcs/Reel; C: 10kpcs/Reel; M: 15kpcs/Reel; D: 10kpcs/10" Reel; E: 20kpcs/10" Reel
- 5) **20R**: Resistance value code. 0R: 0ohm; 1R2: 1.2ohm; 20R: 20 ohm; 10K: 10Kohm; 15K: 15 Kohm; 10K5: 10.5Kohm; 100K: 100Kohm; 1M2: 1.2Mohm
- 6) **S**: SMD type code
- 7) **01**: Internal control code, 1~3 digits or letter; Blank: N/A

**THICK FILM CHIP RESISTORS 0402 SERIES**

**DIMENSION (Unit: mm)**

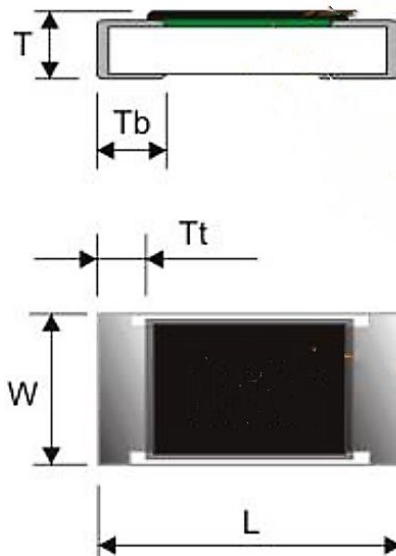


Image for reference



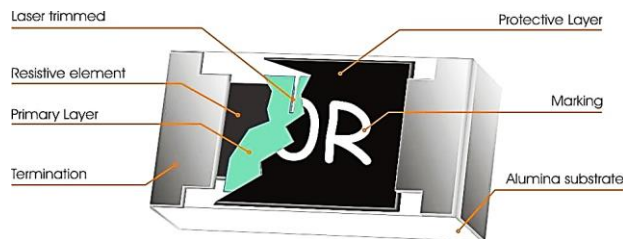
**Marking:**  
Blank

0402

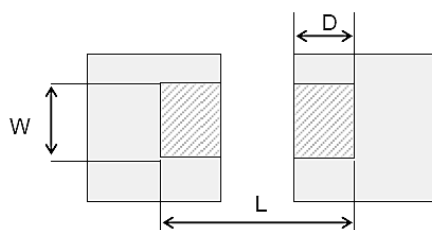


| Item | Dimension |
|------|-----------|
| L    | 1.00±0.05 |
| W    | 0.50±0.05 |
| T    | 0.35±0.05 |
| T b  | 0.25±0.10 |
| T t  | 0.20±0.10 |

**Resistors Construction For Reference**



**Recommended Solder Pad**



| Item | Dimension |
|------|-----------|
| W    | 0.50~0.60 |
| L    | 1.40~1.60 |
| D    | 0.40~0.60 |

**THICK FILM CHIP RESISTORS 0402 SERIES**
**GENERAL ELECTRONICAL CHARACTERISTICS**

| Item                   | Unit         | Symbol | Characteristic  | Condition   |
|------------------------|--------------|--------|---|-------------|
| Product Name           |              | CR     | Thick Film Chip Resistors                                       |             |
| Size                   |              | 0402   | 0402 (1005 Metric) Series,<br>Dimensions<br>L1.00*W0.50*H0.35mm |             |
| Resistance Range       | Ω            |        | 20  |             |
| Resistance Tolerance   |              | F      | +/-1%   |             |
| TCR                    | 10MΩ≥R > 10Ω | ppm/°C | ≤±100   |             |
|                        | R≤10Ω        |        | -200~+400   |             |
| Max. Dissipation       | W            |        | 1/16  | @ Tamb=70°C |
| Operating Temperature  | °C           |        | -55 ~+155   |             |
| Max. Operation Voltage | V            |        | 50  | @DC or RMS  |
| Max. Overload Voltage  | V            |        | 100   | @DC or RMS  |

**TEST CONDITION FOR JUMPER (0 Ω)**

| Item                  | Unit | Symbol | Characteristic | Condition |
|-----------------------|------|--------|----------------|-----------|
| Power Rating At 70°C  | W    |        | 1/16           |           |
| Max. Resistance       | mΩ   |        | 50             |           |
| Rated Current         | A    |        | 1.0            |           |
| Peak Current          | A    |        | 2.0            |           |
| Operating Temperature | °C   |        | -55 ~+155      |           |

**Note**

- 1) This is the maximum voltage that may be continuously supplied to the resistor element, see "IEC publication 60115-8"
- 2) Max. Operation Voltage : So called RCWV (Rated Continuous Working Voltage) is determined by  

$$RCWV = \sqrt{\text{Rated Power} \times \text{Resistance Value}}$$
or Max. RCWV listed above, whichever is lower.

**THICK FILM CHIP RESISTORS 0402 SERIES**

**GENERAL CHARACTERIZATION**

Standard values of nominal resistance are taken from the E24 & E96 series for resistors with a tolerance Of +/-0.1%, +/-0.50, +/-1%, +/-5%, The values of the E24/E96 series are in accordance with “IEC publication 60063”

Derating: The power that the resistor can dissipate depends on the operating temperature; see Fig.1

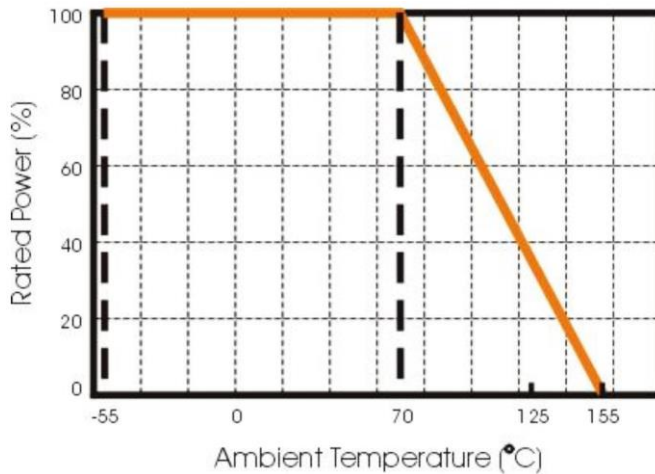


Fig 1 Maximum dissipation in percentage of rated power as a function of the ambient temperature for CR0402

**STORAGE AND HANDLING CONDITIONS**

1) Products are recommended to be used up within two years since operation date as ensured shelf life.

Check solderability in case shelf life extension is needed.

2) To store products with following condition: Temperature : 5 to 40°C Humidity: 20 to 70% relative humidity

3) Don't store products in a corrosive environment such as sulfide, chloride gas, or acid. It may cause oxidization of electrode, which easily be resulted in poor soldering b.To store products on the shelf and avoid exposure to moisture. Don't expose products to excessive shock, vibration, direct sunlight and so on.

**THICK FILM CHIP RESISTORS 0402 SERIES**

**REFLOW SOLDERING CONDITION**

The robust construction of chip resistors allows them to be completely immersed in a solder bath of 260 °C for 10 seconds. Therefore, it is possible to mount Surface Mount Resistors on one side of a PCB and other discrete components on the reverse (mixed PCBs). Surface Mount Resistors are tested for solderability at 235 °C during 2 seconds. The test condition for no leaching is 260°C for 30 seconds. Typical examples of soldering processes that provide reliable joints without any damage are given in Fig 2.

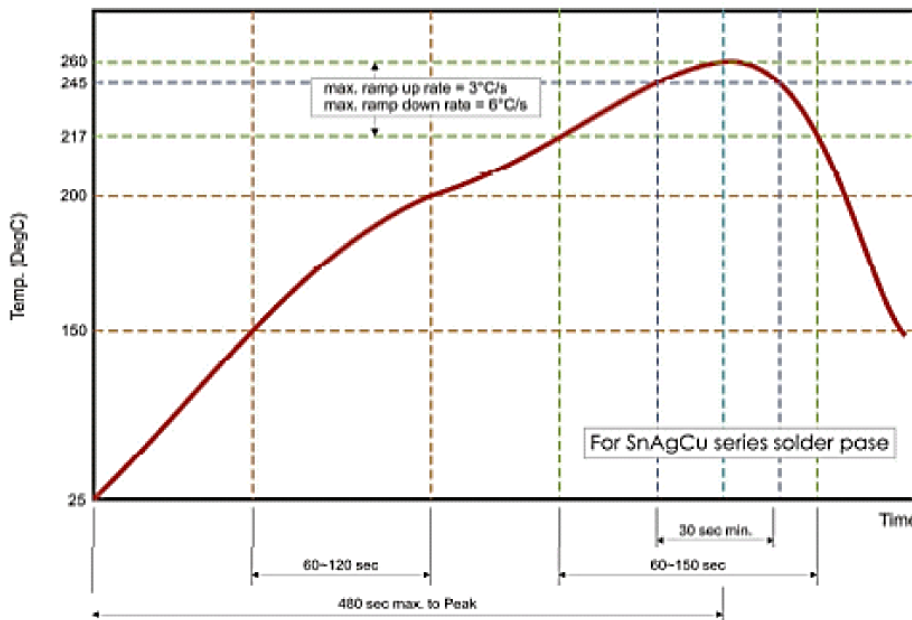


Fig 2. Infrared soldering profile for Chip Resistors

**TEST AND REQUIREMENTS**

Essentially all tests are carried out according to the schedule of IEC publication 115-8, category **LCT/UCT/56**(rated temperature range: Lower Category Temperature, Upper Category Temperature; damp heat, long term, 56 days). The testing also meets the requirements specified by EIA, EIAJ and JIS. The tests are carried out in accordance with IEC publication 68, "Recommended basic climatic and mechanical robustness testing procedure for electronic components" and under standard atmospheric conditions according to IEC 60068-1, subclause 5.3. Unless otherwise specified, the following value supplied

Temperature: 15 °C to 35 °C. Relative humidity: 45% to 75%.

Air pressure: 86kPa to 106 kPa (860 mbar to 1060 mbar).

All soldering tests are performed with mildly activated flux.

**THICK FILM CHIP RESISTORS 0402 SERIES**
**TEST METHOD AND REQUIREMENT**

| TEST   | PROCEDURE / TEST METHOD  | REQUIREMENT   |       |
|--|--|---|-------|
|  |  | Resistor  | Ω     |
| <b>Electrical Characteristics</b><br><b>JISC5201-1: 1998</b><br><b>Clause 4.8</b>          | - DC resistance values measurement<br>- Temperature Coefficient of Resistance (T.C.R)<br>Natural resistance change per change in degree centigrade.<br><br>$\frac{R_2 - R_1}{R_1(t_2 - t_1)} \times 10^6 \text{ (ppm/}^\circ\text{C)}$ $t_1 : 20^\circ\text{C}+5^\circ\text{C}-1^\circ\text{C}; t_2 : -55^\circ\text{C or } +155^\circ\text{C}$<br><br>R1 : Resistance at reference temperature (20°C+5°C/-1°C)<br>R2 : Resistance at test temperature (-55°C or +155°C) | Within the specified tolerance.<br><br>Refer to "QUICK REFERENCE DATA"      | <50mΩ |
| <b>Resistance to soldering heat(R.S.H)</b><br><b>JISC5201-1:1998</b><br><b>Clause 4.18</b> | Un-mounted chips completely immersed for 10±1 second in a SAC solder bath at 260°C±5°C   | 5%: ΔR/Rmax. ±(1%+0.05Ω)<br>1%: ΔR/Rmax. ±(0.5%+0.05Ω)<br>no visible damage | <50mΩ |
| <b>Solderability</b><br><b>JISC5201-1: 1998</b><br><b>Clause 4.17</b>                      | Un-mounted chips completely immersed for 2±0.5 second in a SAC solder bath at 235°C±5°C  | 95% coverage min., good tinning and no visible damage                       |       |
| <b>Temperature cycling</b><br><b>JISC5201-1: 1998</b><br><b>Clause 4.19</b>                | 30 minutes at -55°C±3°C, 2~3 minutes at 20°C+5°C-1°C, 30 minutes at +155°C±3°C, 2~3 minutes at 20°C+5°C-1°C, total 5 continuous cycles   | 5%: ΔR/Rmax. ±(1%+0.05Ω)<br>1%: ΔR/Rmax. ±(0.5%+0.05Ω)<br>no visible damage | <50mΩ |
| <b>High Temperature Exposure</b><br><b>MIL-STD-202</b><br><b>method 108</b>                | 1000+48/-0 hours; without load in a temperature chamber controlled 155±3°C   | 5%: ΔR/Rmax. ±(2%+0.1Ω)<br>1%: ΔR/Rmax. ±(1%+0.1Ω)<br>no visible damage     | <50mΩ |
| <b>Bending strength</b><br><b>JISC5201-1: 1998</b><br><b>Clause 4.33</b>                   | Resistors mounted on a 90mm glass epoxy resin PCB(FR4), bending once 3mm for 10sec, 5mm for CR02   | 5%: ΔR/Rmax. ±(1%+0.05Ω)<br>1%: ΔR/Rmax. ±(1%+0.05Ω)<br>no visible damage   | <50mΩ |

**THICK FILM CHIP RESISTORS 0402 SERIES**
**TEST METHOD AND REQUIREMENT**

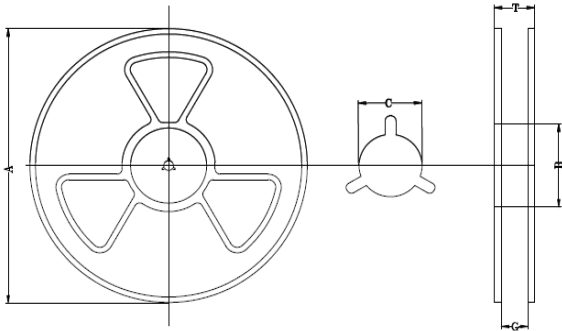
| TEST  | PROCEDURE / TEST METHOD  | REQUIREMENT   |       |
|---|--|---|-------|
|   |  | Resistor  | 0Ω    |
| <b>Adhesion JISC5201-1: 1998</b><br><b>Clause 4.32</b>                              | Pressurizing force: 5N, Test time: 10±1sec.  | No remarkable damage or removal of the terminations   |       |
| <b>Short Time Overload (STOL)</b><br><b>JISC5201-1: 1998</b><br><b>Clause 4.13</b>  | 2.5 times RCWV or max. overload voltage, for 5seconds  | 5%: $\Delta R/R_{max.} \pm (2\%+0.05\Omega)$<br>1%: $\Delta R/R_{max.} \pm (1\%+0.05\Omega)$<br>no visible damage | <50mΩ |
| <b>Load life in Humidity</b><br><b>JISC5201-1: 1998</b><br><b>Clause 4.24</b>       | 1000 +48/-0 hours, loaded with RCWV or Vmax in humidity chamber controller at 40°C ± 2°C and 90~95% relative humidity, 1.5hours on and 0.5 hours off | 5%: $\Delta R/R_{max.} \pm (2\%+0.1\Omega)$<br>1%: $\Delta R/R_{max.} \pm (1\%+0.1\Omega)$<br>no visible damage   | <50mΩ |
| <b>Load life (endurance)</b><br><b>JISC5201-1: 1998</b><br><b>Clause 4.25</b>       | 1000 +48/-0 hours, loaded with RCWV or Vmax in chamber controller 70±2°C, 1.5 hours on and 0.5 hours off   | 5%: $\Delta R/R_{max.} \pm (3\%+0.1\Omega)$<br>1%: $\Delta R/R_{max.} \pm (1\%+0.1\Omega)$<br>no visible damage   | <50mΩ |
| <b>Insulation Resistance</b><br><b>JISC5201-1: 1998</b><br><b>Clause 4.6</b>        | Apply the maximum overload voltage (DC) for 1minute  | $R \geq 10G\Omega$  |       |
| <b>Dielectric Withstand Voltage</b><br><b>JISC5201-1: 1998</b><br><b>Clause 4.7</b> | Apply the maximum overload voltage (AC) for 1 minute   | No breakdown or flashover   |       |



**THICK FILM CHIP RESISTORS 0402 SERIES**

**REEL DIMENSION (Unit: mm)**

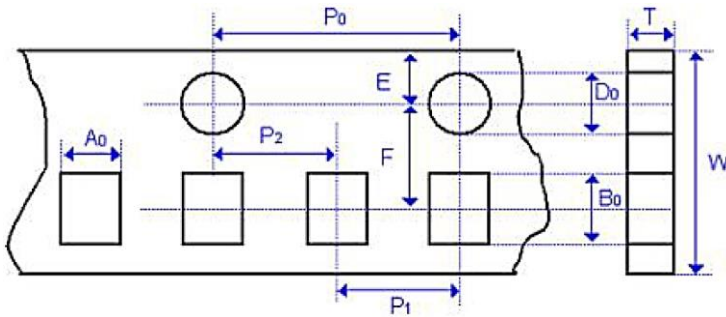
7": 10,000Ppcs/Reel; 10": 20,000pcs/Reel; 13": 40,000pcs/Reel



| Code | Dimension 7"       | Dimension 10" | Dimension 13" |
|------|--------------------|---------------|---------------|
| A    | <b>178.0+/-2.0</b> | 254.0+/-2.0   | 330.0+/-2.0   |
| B    | <b>60.0 +/-1.0</b> | 100 +/-1.0    | 100+/-1.0     |
| C    | <b>13.0+/-0.20</b> | 13.0+/-0.20   | 13.0+/-0.20   |
| T    | <b>9.0+/-0.50</b>  | 9.0+/-0.5     | 9.0+/-0.5     |

**TAPE DIMENSION (Unit: mm)**

Paper Tape, 2 mm Pitch



| Code   | Dimension   |
|--------|-------------|
| A 0    | 0.70+/-0.10 |
| B 0    | 1.20+/-0.10 |
| T      | 0.40+/-0.05 |
| K 0    | -           |
| W      | 8.00+/-0.30 |
| P 0    | 4.00+/-0.10 |
| 10xP 0 | 40.0+/-0.20 |
| P 1    | 2.00+/-0.10 |
| P 2    | -           |
| D 0    | 1.50+/-0.10 |
| D 1    | -           |
| E      | 1.75+/-0.10 |
| F      | 3.50+/-0.20 |

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