



SPECIFICATION

(Reference sheet)

· Supplier : Samsung electro-mechanics · Samsung P/N : CL21B333JBANNNC

· Product : Multi-layer Ceramic Capacitor · Description : CAP, 33nF, 50V, ±5%, X7R, 0805

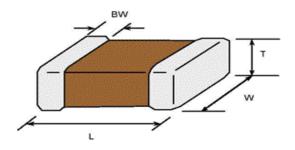
A. Samsung Part Number

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| 1 | Series | Samsung Multi-layer Ceramic Capacitor | | | | | |
|-----|---------------|---------------------------------------|---------|-----------------|----|-------------------------|--|
| 2 | Size | 0805 (inch code) | L: 2.00 | ± 0.10 mm | W: | 1.25 ± 0.10 mm | |
| 3 | Dielectric | X7R | 8 | Inner electrode | | Ni | |
| 4 | Capacitance | 33 nF | | Termination | | Cu | |
| (5) | Capacitance | ±5 % | | Plating | | Sn 100% (Pb Free) | |
| | tolerance | | 9 | Product | | Normal | |
| 6 | Rated Voltage | 50 V | 10 | Special | | Reserved for future use | |
| 7 | Thickness | $0.65 \pm 0.10 \text{ mm}$ | 11 | Packaging | | Cardboard Type, 7" reel | |

B. Structure & Dimension



| Samoung D/N | Dimension(mm) | | | | | |
|-----------------|---------------|-------------|-------------|----------------|--|--|
| Samsung P/N | L | W | Т | BW | | |
| CL21B333JBANNNC | 2.00 ± 0.10 | 1.25 ± 0.10 | 0.65 ± 0.10 | 0.50 +0.2/-0.3 | | |

C. Samsung Reliablility Test and Judgement Condition

| Insulation 10,000Mohm or 500Mohm× Resistance Whichever is smaller Whichever is smaller No abnormal exterior appearance Withstanding No dielectric breakdown or Workinge Mechanical breakdown Temperature Characteristics Affective Strength of Termination Bending Strength Capacitance change: within ±12.5% Resistance to Solderability Wibration Test Capacitance change: within ±5% Tan δ, IR: initial spec. Within ±12.5% Moisture Resistance Capacitance change: within ±12.5% Moisture Capacitance change: | | Judgement | Test condition | | |
|---|--|---|---|--|--|
| Tan δ (DF) 0.025 max. treated at 150℃+0/-10℃ for 1 hour and maintained in ambient air for 24±2 hours. Insulation 10.000Mohm or 500Mohm×μF Rated Voltage 60~120 sec. Resistance Whichever is smaller Appearance No abnormal exterior appearance Microscope (×10) Withstanding No dielectric breakdown or wechanical breakdown 250% of the rated voltage Voltage mechanical breakdown Temperature X7R Characteristics (From-55℃ to 125℃, Capacitance change should be within ±15%) Adhesive Strength No peeling shall be occur on the of Termination terminal electrode Bending Strength Capacitance change : within ±12.5% Bending to the limit (1mm) with 1.0mm/sec. Solderability More than 75% of terminal surface is to be soldered newly SnAg3.0Cu0.5 solder 245±5℃, 32-0.3sec. (preheating : 80~120℃ for 10~30sec.) Resistance to Capacitance change : within ±7.5% Solder pot : 270±5℃, 10±1sec. Soldering Heat Tan δ, IR : initial spec. Amplitude : 1.5mm From 10Hz to 55Hz (return : 1min.) 2hours × 3 direction (x, y, z) Wibration Test Capacitance change : within ±12.5% With rated voltage 40±2℃, 90~95%RH, 500+12/-0hrs Resistance Tan δ : 0.05 max IR : initial spec. Within ±12.5% | Capacitance Within specified tolerance | | 1 ^{kHz} ±10% / 1.0±0.2Vrms | | |
| Resistance Whichever is smaller Appearance No abnormal exterior appearance Microscope (×10) | Tan δ (DF) | 0.025 max. | treated at 150 ℃+0/-10 ℃ for 1 hour and maintained in | | |
| Appearance No abnormal exterior appearance Microscope (×10) Withstanding No dielectric breakdown or mechanical breakdown 250% of the rated voltage Temperature X7R Characteristics (From-55℃ to 125℃, Capacitance change should be within ±15%) Adhesive Strength No peeling shall be occur on the terminal electrode 500g·f, for 10±1 sec. Bending Strength Capacitance change: within ±12.5% Bending to the limit (1mm) with 1.0mm/sec. Solderability More than 75% of terminal surface is to be soldered newly SnAg3.0cu0.5 solder 245±5℃, 3±0.3sec. (preheating: 80~120℃ for 10~30sec.) Resistance to Capacitance change: within ±7.5% Solder pot: 270±5℃, 10±1sec. Soldering Heat Tan δ, IR: initial spec. Amplitude: 1.5mm From 10Hz to 55Hz (return: 1min.) 2hours × 3 direction (x, y, z) Wibration Test Capacitance change: within ±12.5% With rated voltage 40±2℃, 90~95%RH, 500+12/-0hrs Resistance Tan δ: 0.05 max IR: 500Mohm × μF Whichever is smaller With 200% of the rated voltage Max. operating temperature High Temperature Capacitance change: within ±12.5% With 200% of the rated voltage Max. operating temperature Max. operating temperature Temperature Capacitance change: within ±7.5% 1 cycle c | Insulation | 10,000Mohm or 500Mohm× <i>μ</i> F | Rated Voltage 60~120 sec. | | |
| Withstanding No dielectric breakdown or mechanical breakdown 250% of the rated voltage Temperature X7R Characteristics (From-55 ℃ to 125 ℃, Capacitance change should be within ±15%) Adhesive Strength No peeling shall be occur on the terminal electrode 500g·f, for 10±1 sec. Bending Strength Capacitance change : within ±12.5% Bending to the limit (1mm) with 1.0mm/sec. Solderability More than 75% of terminal surface is to be soldered newly SnAg3.0Cu0.5 solder 245±5°C, 3±0.3sec. (preheating : 80~120°C for 10~30sec.) Resistance to Capacitance change : within ±7.5% Solder pot : 270±5°C, 10±1sec. Soldering Heat Tan δ, IR : initial spec. Amplitude : 1.5mm From 10½ to 55Hz (return : 1min.) 2hours × 3 direction (x, y, z) Wibration Test Capacitance change : within ±12.5% Amplitude : 1.5mm From 10½ to 55Hz (return : 1min.) 2hours × 3 direction (x, y, z) Moisture Capacitance change : within ±12.5% With rated voltage Resistance Tan δ : 0.05 max Within ±12.5% Within ±12.5% With 200% of the rated voltage Max. operating temperature Max. operating temperature Max. operating temperature Temperature Capacitance change : within ±7.5% 1 cycle conditio | Resistance | Whichever is smaller | | | |
| Voltage mechanical breakdown Temperature X7R Characteristics (From-55℃ to 125℃, Capacitance change should be within ±15%) Adhesive Strength of Termination No peeling shall be occur on the terminal electrode 500g·f, for 10±1 sec. Bending Strength Capacitance change: within ±12.5% Bending to the limit (1mm) with 1.0mm/sec. Solderability More than 75% of terminal surface is to be soldered newly SnAg3.0Cu0.5 solder 245±5°C, 3±0.3sec. (preheating: 80~120°C for 10~30sec.) Resistance to Capacitance change: within ±7.5% Solder pot: 270±5°C, 10±1sec. Soldering Heat Tan δ, IR: initial spec. Amplitude: 1.5mm From 10Hz to 55Hz (return: 1min.) 2hours × 3 direction (x, y, z) Wibration Test Capacitance change: within ±12.5% With rated voltage Moisture Capacitance change: within ±12.5% With rated voltage Resistance Tan δ: 0.05 max With 200% of the rated voltage High Temperature Capacitance change: within ±12.5% Wax. operating temperature Resistance Tan δ: 0.05 max Max. operating temperature Whichever is smaller Monotherer is s | Appearance | No abnormal exterior appearance | Microscope (×10) | | |
| Temperature Characteristics (From-55°C to 125°C, Capacitance change should be within ±15%) Adhesive Strength of Termination Bending Strength Capacitance change: within ±12.5% Bending to the limit (1mm) with 1.0mm/sec. Solderability More than 75% of terminal surface is to be soldered newly Capacitance change: within ±7.5% Solder pot: 270±5°C, 10±1sec. Soldering Heat Vibration Test Capacitance change: within ±5% Tan δ, IR: initial spec. Capacitance change: within ±12.5% Tan δ : 0.05 max IR: 500Mohm or 25Mohm × Whichever is smaller High Temperature Resistance Tan δ : 0.05 max IR: 1,000Mohm or 50Mohm × Whichever is smaller Temperature Capacitance change: within ±7.5% With 200% of the rated voltage Max. operating temperature Max. operating temperature Max. operating temperature Tan δ, IR: initial spec. Tan δ, IR: initial spec. Tan δ, IR: initial spec. Tan δ : 0.05 max IR: 1,000Mohm or 50Mohm × Whichever is smaller Temperature Capacitance change: within ±7.5% With 200% of the rated voltage Max. operating temperature 1000+48/-0hrs Max. operating temperature 1000+48/-0hrs Tan δ, IR: initial spec. | Withstanding | No dielectric breakdown or | 250% of the rated voltage | | |
| Temperature Characteristics (From-55°C to 125°C, Capacitance change should be within ±15%) Adhesive Strength of Termination Bending Strength Capacitance change: within ±12.5% Bending to the limit (1mm) with 1.0mm/sec. Solderability More than 75% of terminal surface is to be soldered newly Capacitance change: within ±7.5% Solder pot: 270±5°C, 10±1 sec. (preheating: 80~120°C for 10~30sec.) Resistance to Capacitance change: within ±7.5% Solder pot: 270±5°C, 10±1 sec. Soldering Heat Tan δ, IR: initial spec. Vibration Test Capacitance change: within ±5% Tan δ, IR: initial spec. Capacitance change: within ±12.5% Tan δ : 0.05 max IR: 500Mohm or 25Mohm × Whichever is smaller High Temperature Resistance Tan δ: 0.05 max IR: 1,000Mohm or 50Mohm × Whichever is smaller Temperature Capacitance change: within ±7.5% With 200% of the rated voltage Max. operating temperature Max. operating temperature 1000+48/-0hrs Whichever is smaller Temperature Capacitance change: within ±7.5% Tan δ, IR: initial spec. Vibration Test Tan δ : 0.05 max IR: 1,000Mohm or 50Mohm × Whichever is smaller Temperature Capacitance change: within ±7.5% With 200% of the rated voltage Max. operating temperature 1000+48/-0hrs Max. operating temperature 1000+48/-0hrs Whichever is smaller Temperature Capacitance change: within ±7.5% Tan δ, IR: initial spec. Tan δ in 125°C | Voltage | mechanical breakdown | | | |
| Adhesive Strength of Termination Bending Strength Capacitance change: within ±12.5% Bending to the limit (1mm) with 1.0mm/sec. Solderability More than 75% of terminal surface is to be soldered newly Capacitance change: within ±7.5% Soldering Heat Vibration Test Capacitance change: within ±12.5% Moisture Resistance Capacitance change: within ±12.5% Tan δ: 0.05 max IR: 500Mohm or 25Mohm × μF Whichever is smaller High Temperature Capacitance change: within ±7.5% Whichever is smaller Temperature Capacitance change: within ±7.5% Tan δ, IR: initial spec. With 200% of the rated voltage Max. operating temperature Capacitance change: within ±7.5% With 200% of the rated voltage Max. operating temperature Capacitance change: within ±7.5% Whichever is smaller Temperature Capacitance change: within ±7.5% Capacitance change: within ±12.5% Tan δ: 0.05 max IR: 1,000Mohm or 50Mohm × μF Whichever is smaller Temperature Capacitance change: within ±7.5% Capacitance change: within ±7.5% Whichever is smaller Temperature Capacitance change: within ±7.5% Tan δ, IR: initial spec. Amplitude: 1.5mm From 10Hz to 55Hz (return: 1min.) 2hours × 3 direction (x, y, z) With rated voltage 40±2°C, 90~95%RH, 500+12/-0hrs With 200% of the rated voltage Max. operating temperature 1000+48/-0hrs Whichever is smaller Temperature Capacitance change: within ±7.5% Tan δ, IR: initial spec. Amplitude: 1.5mm From 10Hz to 55Hz (return: 1min.) 2hours × 3 direction (x, y, z) With rated voltage With rated voltage With 200% of the rated voltage Max. operating temperature 1000+48/-0hrs With 200% of the rated voltage Max. operating temperature 1000+48/-0hrs | | X7R | | | |
| Adhesive Strength of Termination No peeling shall be occur on the terminal electrode 500g·f, for 10±1 sec. Bending Strength Capacitance change: within ±12.5% Bending to the limit (1mm) with 1.0mm/sec. Solderability More than 75% of terminal surface is to be soldered newly SnAg3.0Cu0.5 solder 245±5°C, 3±0.3sec. (preheating: 80~120°C for 10~30sec.) Resistance to Capacitance change: within ±7.5% Solder pot: 270±5°C, 10±1sec. Soldering Heat Tan δ, IR: initial spec. Amplitude: 1.5mm From 10Hz to 55Hz (return: 1min.) 2hours × 3 direction (x, y, z) Wibration Test Capacitance change: within ±12.5% With rated voltage 40±2°C, 90~95%RH, 500+12/-0hrs Moisture Capacitance change: within ±12.5% Whichever is smaller With 200% of the rated voltage 40±2°C, 90~95%RH, 500+12/-0hrs High Temperature Capacitance change: within ±12.5% Whichever is smaller Max. operating temperature 1000+48/-0hrs Temperature Capacitance change: within ±7.5% Whichever is smaller 1 cycle condition Min. operating temperature → 25°C | Characteristics | (From-55℃ to 125℃, Capacitance change s | should be within ±15%) | | |
| Bending Strength Capacitance change : within ±12.5% Bending to the limit (1mm) with 1.0mm/sec. Solderability More than 75% of terminal surface is to be soldered newly SnAg3.0Cu0.5 solder 245±5°C, 3±0.3sec. (preheating : 80~120°C for 10~30sec.) Resistance to Capacitance change : within ±7.5% Solder pot : 270±5°C, 10±1sec. Soldering Heat Tan δ, IR : initial spec. Amplitude : 1.5mm Vibration Test Capacitance change : within ±5% Amplitude : 1.5mm From 10Hz to 55Hz (return : 1min.) 2hours × 3 direction (x, y, z) Moisture Capacitance change : within ±12.5% With rated voltage Resistance Tan δ : 0.05 max IR : 500Mohm or 25Mohm × μF Whichever is smaller With 200% of the rated voltage High Temperature Capacitance change : within ±12.5% Whichever is smaller With 200% of the rated voltage Tan δ : 0.05 max IR : 1,000Mohm or 50Mohm × μF Whichever is smaller 1000+48/-0hrs Temperature Capacitance change : within ±7.5% Whichever is smaller 1 cycle condition Temperature Capacitance change : within ±7.5% Min. operating temperature → 25°C | Adhesive Strength | | | | |
| with 1.0mm/sec. Solderability More than 75% of terminal surface is to be soldered newly SnAg3.0Cu0.5 solder 245±5°C, 3±0.3sec. (preheating : 80~120°C for 10~30sec.) Resistance to Capacitance change : within ±7.5% Solder pot : 270±5°C, 10±1sec. Soldering Heat Tan δ, IR : initial spec. Amplitude : 1.5mm From 10Hz to 55Hz (return : 1min.) 2hours × 3 direction (x, y, z) Moisture Capacitance change : within ±12.5% With rated voltage 40±2°C, 90~95%RH, 500+12/-0hrs Resistance Tan δ : 0.05 max IR : 500Mohm or 25Mohm × /μ² Whichever is smaller With 200% of the rated voltage Max. operating temperature 1000+48/-0hrs High Temperature Capacitance change : within ±12.5% Whichever is smaller With 200% of the rated voltage Max. operating temperature 1000+48/-0hrs Temperature Capacitance change : within ±7.5% Whichever is smaller To cycle condition Min. operating temperature → 25°C | of Termination | terminal electrode | | | |
| Solderability More than 75% of terminal surface is to be soldered newly SnAg3.0Cu0.5 solder 245±5°C, 3±0.3sec. (preheating : 80~120°C for 10~30sec.) Resistance to Capacitance change : within ±7.5% Solder pot : 270±5°C, 10±1sec. Soldering Heat Tan δ, IR : initial spec. Amplitude : 1.5mm From 10Hz to 55Hz (return : 1min.) 2hours × 3 direction (x, y, z) Moisture Capacitance change : within ±12.5% With rated voltage Resistance Tan δ : 0.05 max IR : 500Mohm or 25Mohm × μF With rated voltage Whichever is smaller With 200% of the rated voltage High Temperature Capacitance change : within ±12.5% With 200% of the rated voltage Resistance Tan δ : 0.05 max IR : 1,000Mohm or 50Mohm × μF With 200% of the rated voltage Max. operating temperature 1000+48/-0hrs Whichever is smaller 1 cycle condition Temperature Capacitance change : within ±7.5% 1 cycle condition Cycling Tan δ, IR : initial spec. 1 cycle condition Min. operating temperature → 25°C | Bending Strength | Capacitance change: within ±12.5% | Bending to the limit (1mm) | | |
| is to be soldered newly 245±5°C, 3±0.3sec. (preheating: 80~120°C for 10~30sec.) | | | with 1.0mm/sec. | | |
| is to be soldered newly 245±5°C, 3±0.3sec. (preheating: 80~120°C for 10~30sec.) | Solderability | More than 75% of terminal surface | SnAg3.0Cu0.5 solder | | |
| Resistance to Capacitance change : within $\pm 7.5\%$ Solder pot : $270\pm 5^{\circ}$ C, 10 ± 1 sec. Soldering Heat Tan δ , IR : initial spec. Vibration Test Capacitance change : within $\pm 5\%$ Amplitude : 1.5 mm From 10 Hz to 55 Hz (return : 1 min.) 2hours $\times 3$ direction (x, y, z) Moisture Capacitance change : within $\pm 12.5\%$ With rated voltage ± 1.5 With rated volta | | is to be soldered newly | 245±5°C, 3±0.3sec. | | |
| Soldering HeatTan δ, IR : initial spec.Amplitude : 1.5mm From 10Hz to 55Hz (return : 1min.) 2hours × 3 direction (x, y, z)MoistureCapacitance change : Tan δ : 0.05 maxwithin ±12.5% 40±2°C, 90~95%RH, 500+12/-0hrsHigh TemperatureCapacitance change : Whichever is smallerwithin ±12.5% 40±2°C, 90~95%RH, 500+12/-0hrsHigh TemperatureCapacitance change : With ±12.5%With 200% of the rated voltage Max. operating temperatureResistanceTan δ : Uncompared to 0.05 max IR : Whichever is smallerMax. operating temperature 1000+48/-0hrsTemperatureCapacitance change : Whichever is smaller1 cycle condition Min. operating temperatureTemperatureCapacitance change : Whithial spec.1 cycle condition Min. operating temperature | | | (preheating : 80~120°C for 10~30sec.) | | |
| Vibration TestCapacitance change : within ± 5% Tan δ, IR : initial spec.Amplitude : 1.5mm From 10Hz to 55Hz (return : 1min.) 2hours × 3 direction (x, y, z)MoistureCapacitance change : within ±12.5% Tan δ : 0.05 max IR : 500Mohm or 25Mohm × μ F Whichever is smallerWith rated voltage 40±2°C, 90~95%RH, 500+12/-0hrsHigh TemperatureCapacitance change : within ±12.5% Whichever is smallerWith 200% of the rated voltage Max. operating temperature 1000+48/-0hrsResistanceTan δ : 0.05 max Whichever is smallerMax. operating temperature 1000+48/-0hrsTemperatureCapacitance change : within ±7.5% Whichever is smaller1 cycle condition Min. operating temperatureTemperatureCapacitance change : within ±7.5% Min. operating temperature1 cycle condition Min. operating temperature | Resistance to | Capacitance change : within ±7.5% | Solder pot : 270±5°C, 10±1sec. | | |
| Tan δ , IR: initial spec. From 10Hz to 55Hz (return: 1min.) 2hours × 3 direction (x, y, z) Moisture Resistance Tan δ : 0.05 max IR: 500Mohm or 25Mohm × μ F Whichever is smaller High Temperature Resistance Tan δ : 0.05 max IR: 500Mohm or 25Mohm × μ F Whichever is smaller High Temperature Resistance Tan δ : 0.05 max IR: 1,000Mohm or 50Mohm × μ F Whichever is smaller Temperature Capacitance change: within $\pm 12.5\%$ With 200% of the rated voltage Max. operating temperature 1000+48/-0hrs Temperature Capacitance change: within $\pm 7.5\%$ Temperature Capacitance change: within $\pm 7.5\%$ Toycle condition Min. operating temperature \rightarrow 25°C | Soldering Heat | | | | |
| Resistance Tan δ : 0.05 max $40\pm2^{\circ}$ C, $90\sim95\%$ RH, $500\pm12/-0$ hrs IR : 500Mohm or 25Mohm × μF Whichever is smaller High Temperature Capacitance change : within ±12.5% With 200% of the rated voltage Resistance Tan δ : 0.05 max Max. operating temperature IR : 1,000Mohm or 50Mohm × μF 1000+48/-0hrs Whichever is smaller 1 cycle condition Temperature Capacitance change : within ±7.5% 1 cycle condition Cycling Tan δ, IR : initial spec. Min. operating temperature → 25°C | Vibration Test | , , | From 10Hz to 55Hz (return : 1min.) | | |
| IR: 500Mohm or 25Mohm × μ F Whichever is smaller High Temperature Resistance Tan δ: 0.05 max IR: 1,000Mohm or 50Mohm × μ F Whichever is smaller Temperature Capacitance change: within ±7.5% With 200% of the rated voltage Max. operating temperature 1000+48/-0hrs Temperature Capacitance change: within ±7.5% Tan δ, IR: initial spec. 1 cycle condition Min. operating temperature \rightarrow 25°C | Moisture | Capacitance change: within ±12.5% | With rated voltage | | |
| Whichever is smallerHigh Temperature ResistanceCapacitance change : within $\pm 12.5\%$ Tan δ : 0.05 max IR : 1,000Mohm or 50Mohm × μ F Whichever is smallerWith 200% of the rated voltage Max. operating temperature 1000+48/-0hrsTemperature CyclingCapacitance change : within $\pm 7.5\%$ Tan δ , IR : initial spec.1 cycle condition Min. operating temperature | Resistance | Tan δ: 0.05 max | 40±2°C, 90~95%RH, 500+12/-0hrs | | |
| High Temperature ResistanceCapacitance change : within $\pm 12.5\%$ Tan δ : 0.05 max IR : 1,000Mohm or 50Mohm × μ F Whichever is smallerWith 200% of the rated voltage Max. operating temperature 1000+48/-0hrsTemperature CyclingCapacitance change : within $\pm 7.5\%$ Tan δ , IR : initial spec.1 cycle condition Min. operating temperature | | IR: 500Mohm or 25Mohm × μ F | | | |
| Resistance Tan δ : 0.05 max Max. operating temperature IR : 1,000Mohm or 50Mohm × μ F 1000+48/-0hrs Whichever is smaller 1 cycle condition Cycling Tan δ, IR : initial spec. Min. operating temperature Max. operating temperature 1000+48/-0hrs 1 cycle condition 1 cycle condition Min. operating temperature → 25°C | | Whichever is smaller | | | |
| IR: 1,000Mohm or 50Mohm × μ F Whichever is smaller Temperature Capacitance change: within ±7.5% 1 cycle condition Tan δ, IR: initial spec. 1 cycle condition Min. operating temperature \rightarrow 25°C | High Temperature | Capacitance change: within ±12.5% | With 200% of the rated voltage | | |
| | Resistance | Tan δ: 0.05 max | Max. operating temperature | | |
| Temperature Capacitance change : within $\pm 7.5\%$ 1 cycle condition Cycling Tan δ, IR : initial spec. Min. operating temperature \rightarrow 25°C | | IR: 1,000Mohm or 50Mohm × μ F | 1000+48/-0hrs | | |
| Cycling Tan δ, IR : initial spec. Min. operating temperature → 25°C | | Whichever is smaller | | | |
| | Temperature | Capacitance change: within ±7.5% | 1 cycle condition | | |
| → Max. operating temperature → 25°C | Cycling | Tan δ, IR : initial spec. | Min. operating temperature → 25°C | | |
| | | | → Max. operating temperature → 25°C | | |
| 5 cycle test | | | 5 cycle test | | |

X The reliability test condition can be replaced by the corresponding accelerated test condition.

D. Recommended Soldering method:

Reflow (Reflow Peak Temperature : 260+0/-5°C, 10sec. Max)



A Product specifications included in the specifications are effective as of March 1, 2013.

Please be advised that they are standard product specifications for reference only.

We may change, modify or discontinue the product specifications without notice at any time.

So, you need to approve the product specifications before placing an order.

Should you have any question regarding the product specifications,

please contact our sales personnel or application engineers.

- Disclaimer & Limitation of Use and Application -

The products listed in this Specification sheet are **NOT** designed and manufactured for any use and applications set forth below.

Please note that any misuse of the products deviating from products specifications or information provided in this Spec sheet may cause serious property damages or personal injury.

We will **NOT** be liable for any damages resulting from any misuse of the products, specifically including using the products for high reliability applications as listed below.

If you have any questions regarding this 'Limitation of Use and Application', you should first contact our sales personnel or application engineers.

- ① Aerospace/Aviation equipment
- ② Automotive or Transportation equipment (vehicles, trains, ships, etc)
- 3 Medical equipment
- Military equipment
- 5 Disaster prevention/crime prevention equipment
- Any other applications with the same as or similar complexity or reliability to the applications set forth above.