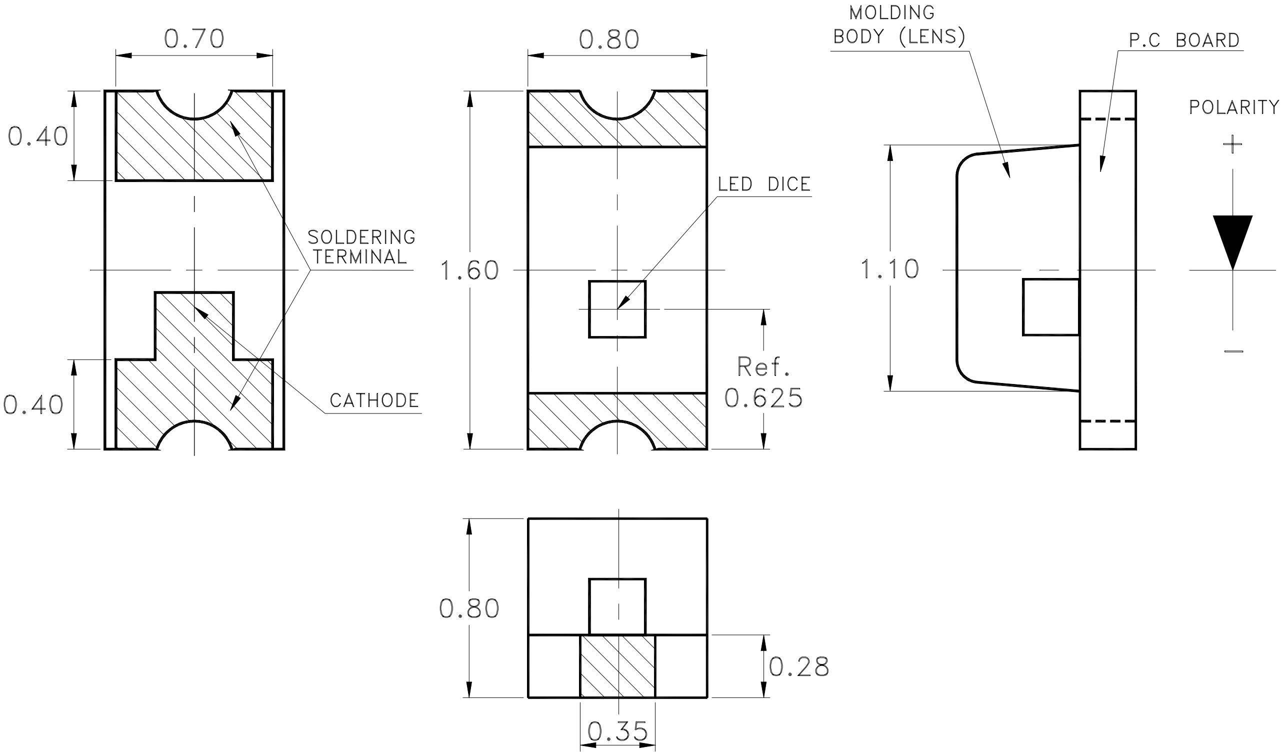
**Features**

- * Package in 8mm tape on 7" diameter reels.
- * Compatible with automatic placement equipment.
- * Compatible with infrared and vapor phase reflow solder process.
- * EIA STD package.
- * I.C. compatible.

**Package Dimensions**



| Part no. | Lens | Source Color |
|---|---|---|
| LTST-C190TBKT | Water Clear | InGaN Blue |

Notes:

1. All dimensions are in millimeters (inches).
2. Tolerance is ±0.10 mm (.004") unless otherwise noted.

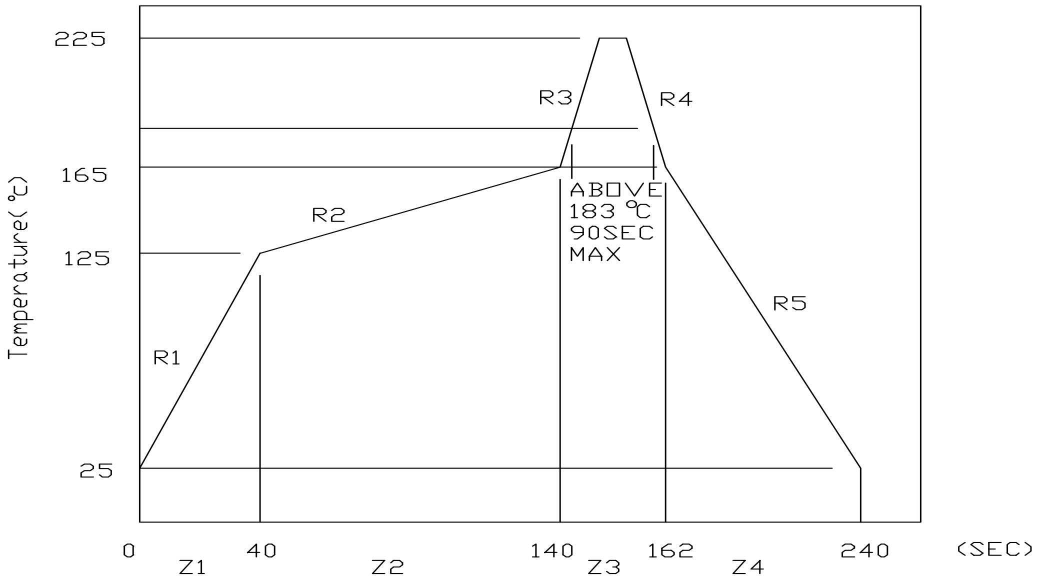
## Absolute Maximum Ratings At Ta=25℃

| Parameter | LTST-C190TBKT | Unit |
|---|---|---|
| Power Dissipation | 120 | mW |
| Peak Forward Current<br>(1/10 Duty Cycle, 0.1ms Pulse Width) | 100 | mA |
| Continuous Forward Current | 20 | mA |
| Derating Linear From 25℃ | 0.25 | mA/℃ |
| Reverse Voltage | 5 | V |
| Electrostatic Discharge Threshold(HBM)$^{\text{Note A}}$ | 300 | V |
| Operating Temperature Range | -20°C to + 80°C | |
| Storage Temperature Range | -30°C to + 100°C | |
| Wave Soldering Condition | 260°C For 5 Seconds | |
| Infrared Soldering Condition | 260°C For 5 Seconds | |
| Vapor Phase Soldering Condition | 215°C For 3 Minutes | |

Note A :

HBM : Human Body Model. Seller gives no other assurances regarding the ability of to withstand ESD.

Suggest IR Reflow Condition :



## Electrical Optical Characteristics At Ta=25℃

| Parameter | Symbol | Part No. LTST- | Min. | Typ. | Max. | Unit | Test Condition |
|---|---|---|---|---|---|---|---|
| Luminous Intensity | IV | C190TBKT | 28.0 | - | 112.0 | mcd | IF = 20mA<br>Note 1 |
| Viewing Angle | $2\theta 1/2$ | C190TBKT |  | 130 |  | deg | Note 2 (Fig.6) |
| Peak Emission Wavelength | λ Peak | C190TBKT |  | 468 |  | nm | Measurement @Peak (Fig.1) |
| Dominant Wavelength | λ d | C190TBKT | 465 | - | 475 | nm | IF = 20mA<br>Note 3 |
| Spectral Line Half-Width | Δ λ | C190TBKT |  | 25 |  | nm |  |
| Forward Voltage | VF | C190TBKT | 2.8 | - | 3.8 | V | IF = 20mA |
| Reverse Current | IR | C190TBKT |  |  | 100 | μA | VR = 5V |

Notes: 1. Luminous intensity is measured with a light sensor and filter combination that approximates the CIE eye-response curve.

2. $\theta 1/2$ is the off-axis angle at which the luminous intensity is half the axial luminous intensity.

3. The dominant wavelength, λ d is derived from the CIE chromaticity diagram and represents the single wavelength which defines the color of the device.

4. Caution in ESD:
Static Electricity and surge damages the LED. It is recommend to use a wrist band or anti-electrostatic glove when handling the LED. All devices, equipment and machinery must be properly grounded.

## Bin Code List

| Forward Voltage | Unit: V @20mA | |
|---|---|---|
| Bin Code | Min. | Max. |
| D7 | 2.80 | 3.00 |
| D8 | 3.00 | 3.20 |
| D9 | 3.20 | 3.40 |
| D10 | 3.40 | 3.60 |
| D11 | 3.60 | 3.80 |

Tolerance on each Forward Voltage bin is +/-0.1 volt

| Luminous Intensity | Unit : mcd @20mA | |
|---|---|---|
| Bin Code | Min. | Max. |
| N | 28.0 | 45.0 |
| P | 45.0 | 71.0 |
| Q | 71.0 | 112.0 |

Tolerance on each Intensity bin is +/-15%

| Dominant Wavelength | Unit : nm @20mA | |
|---|---|---|
| Bin Code | Min. | Max. |
| AC | 465.0 | 470.0 |
| AD | 470.0 | 475.0 |

Tolerance for each Dominate Wavelength bin is +/- 1nm

## Typical Electrical / Optical Characteristics Curves

(25℃ Ambient Temperature Unless Otherwise Noted)

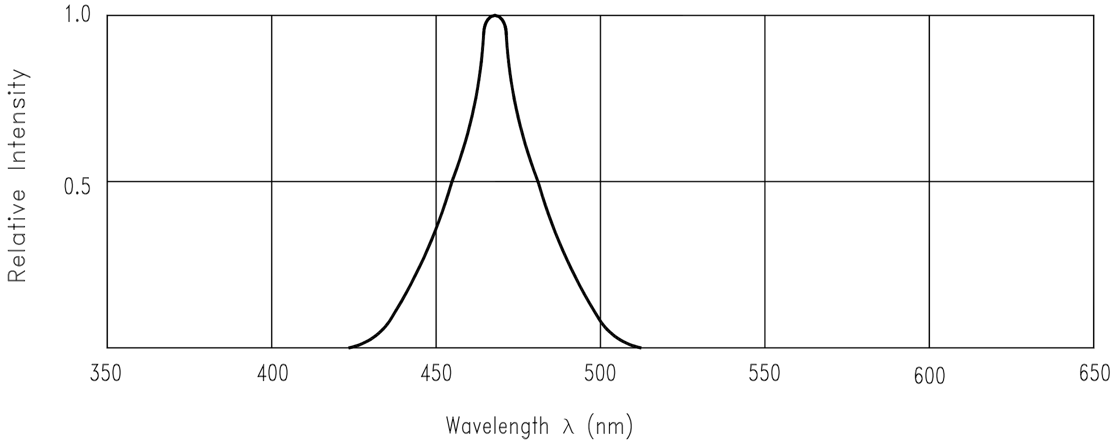


Fig.1 Relative Intensity vs. Wavelength

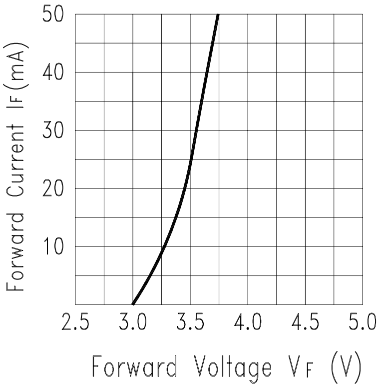


Fig.2 Forward Current vs. Forward Voltage

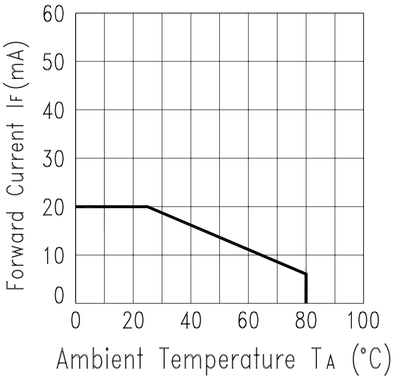


Fig.3 Forward Current Derating Curve

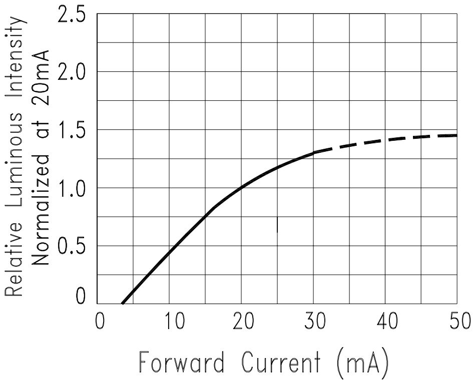


Fig.4 Relative Luminous Intensity vs. Forward Current

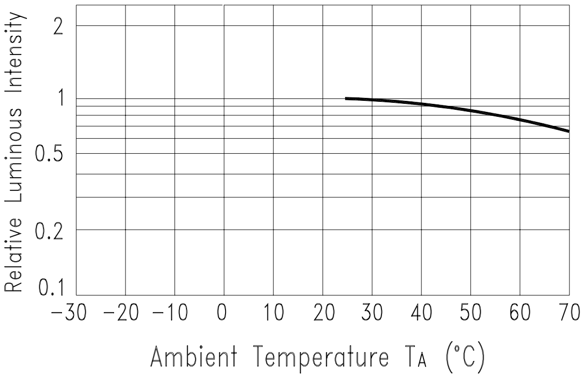


Fig.5 Luminous Intensity vs. Ambient Temperature

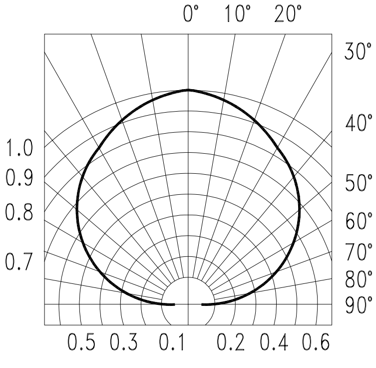
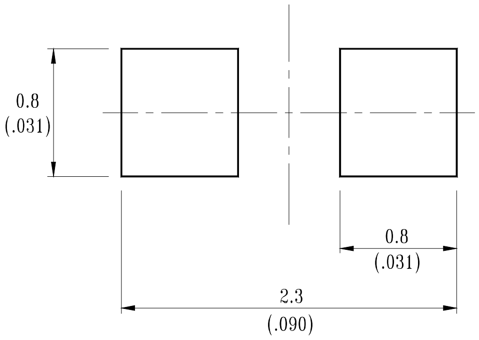


Fig.6 Spatial Distribution

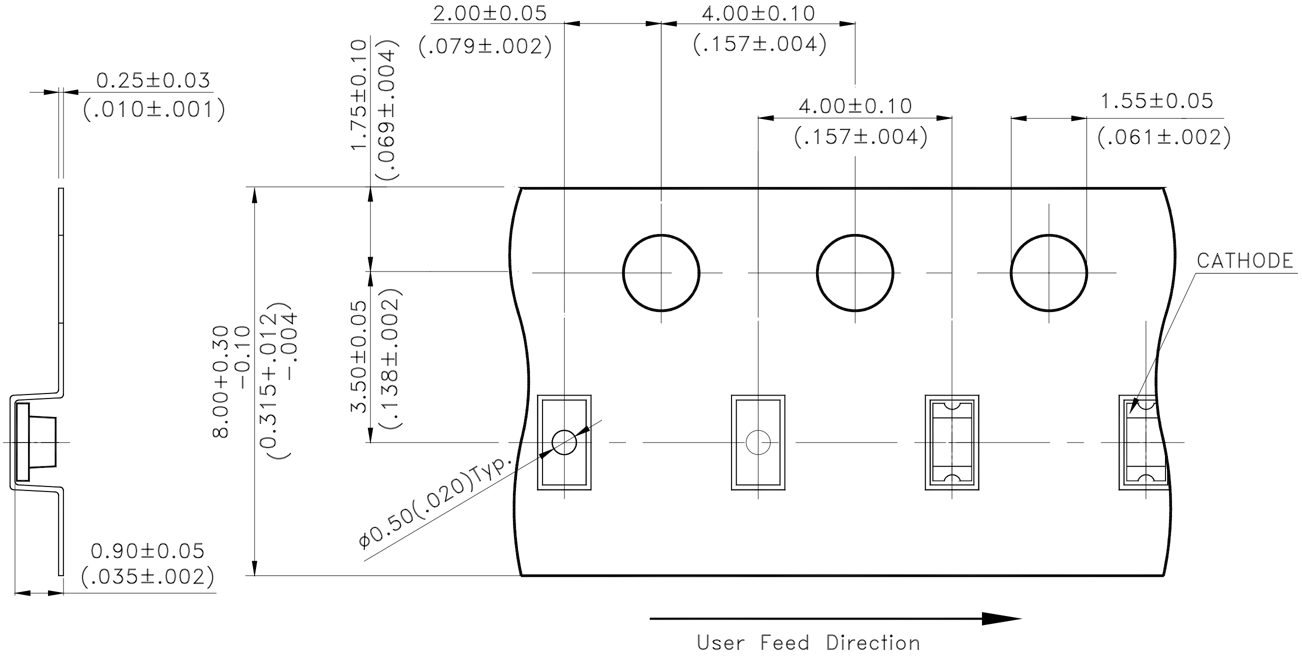
## Cleaning

Do not use unspecified chemical liquid to clean LED they could harm the package.
If clean is necessary, immerse the LED in ethyl alcohol or in isopropyl alcohol at normal temperature for less one minute.

## Suggest Soldering Pad Dimensions

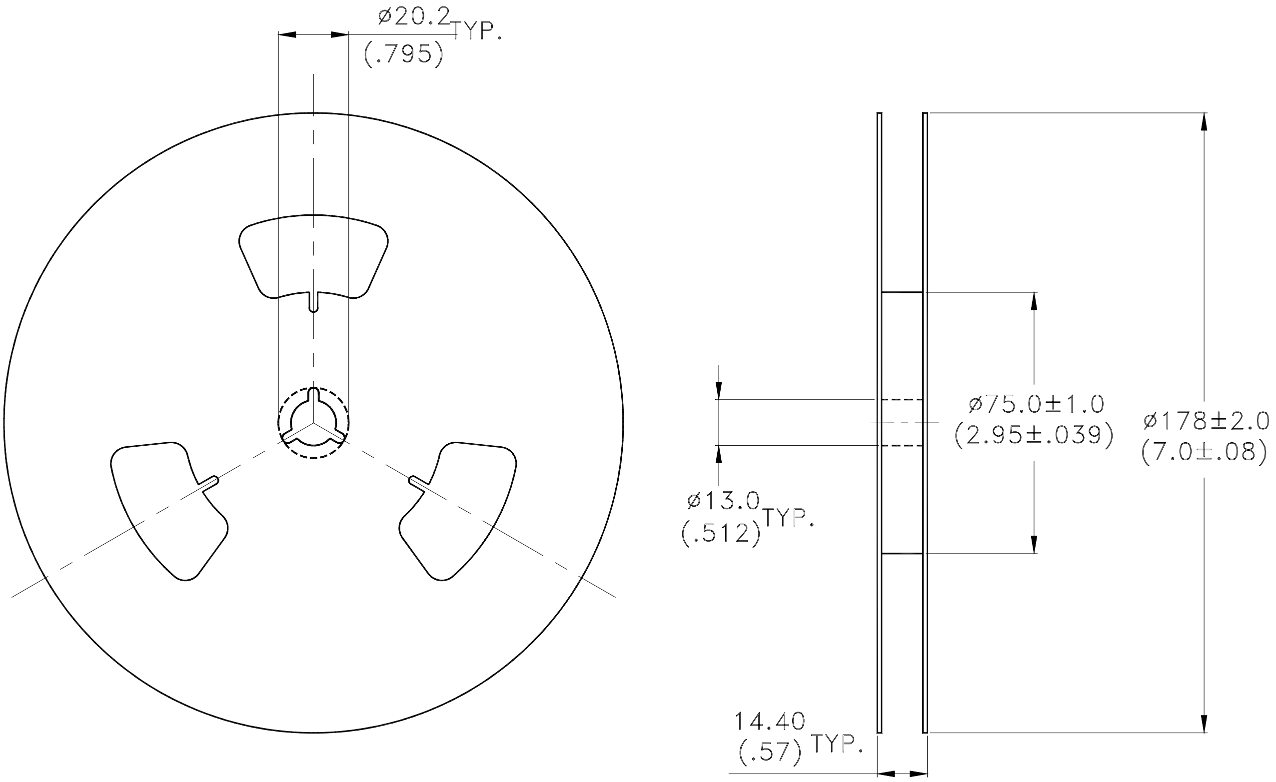


## Package Dimensions Of Tape And Reel



Notes:

1. All dimensions are in millimeters (inches).



Notes:

1. Empty component pockets sealed with top cover tape.
2. 7 inch reel-3000 pieces per reel.
3. Minimum packing quantity is 500 pcs for remainders.
4. The maximum number of consecutive missing lamps is two.
5. In accordance with ANSI/EIA 481-1-A-1994 specifications.

# CAUTIONS

## 1. Application

The LEDs described here are intended to be used for ordinary electronic equipment (such as office equipment, communication equipment and household applications).Consult Liteon's Sales in advance for information on applications in which exceptional reliability is required, particularly when the failure or malfunction of the LEDs may directly jeopardize life or health (such as in aviation, transportation, traffic control equipment, medical and life support systems and safety devices).

## 2. Storage

The storage ambient for the LEDs should not exceed 30°C temperature or 70% relative humidity.
It is recommended that LEDs out of their original packaging are IR-reflowed within one week.
For extended storage out of their original packaging, it is recommended that the LEDs be stored in a sealed container with appropriate desiccant, or in a dessicator with nitrogen ambient.
LEDs stored out of their original packaging for more than a week should be baked at about 60 deg C for at least 24 hours before solder assembly.

## 3. Cleaning

Use alcohol-based cleaning solvents such as isopropyl alcohol to clean the LED if necessary.

## 4. Soldering

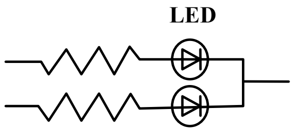
Recommended soldering conditions :

| Reflow soldering | | Wave Soldering | | Soldering iron | |
|---|---|---|---|---|---|
| Pre-heat | 120~150°C | Pre-heat | 100°C Max. | Temperature | 300°C Max. |
| Pre-heat time | 120 sec. Max. | Pre-heat time | 60 sec. Max. | Soldering time | 3 sec. Max. |
| Peak temperature | 240°C Max. | Solder wave | 260°C Max. | | (one time only) |
| Soldering time | 10 sec. Max. | Soldering time | 10 sec. Max. | | |

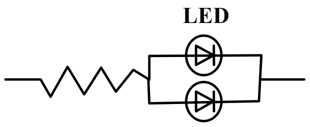
## 5. Drive Method

An LED is a current-operated device. In order to ensure intensity uniformity on multiple LEDs connected in parallel in an application, it is recommended that a current limiting resistor be incorporated in the drive circuit, in series with each LED as shown in Circuit A below.

**Circuit model A**



**Circuit model B**



(A) Recommended circuit.
(B) The brightness of each LED might appear diffierent due to the differences in the I-V charateristics of those LEDs.

## 6. ESD (Electrostatic Discharge)

Static Electricity or power surge will damage the LED.
Suggestions to prevent ESD damage:

- Use of a conductive wrist band or anti-electrostatic glove when handling these LEDs.
- All devices, equipment, and machinery must be properly grounded.
- Work tables, storage racks, etc. should be properly grounded.
- Use ion blower to neutralize the static charge which might have built up on surface of the LED's plastic lens as a result of friction between LEDs during storage and handling.

ESD-damaged LEDs will exhibit abnormal characteristics such as high reverse leakage current, low forward voltage, or “ no lightup ” at low currents.
To verify for ESD damage, check for “ lightup ” and Vf of the suspect LEDs at low currents.
The Vf of “ good ” LEDs should be >2.0V@0.1mA for InGaN product and >1.4V@0.1mA for AlInGaP product.

| **Chip ESD level** | **Machine Mode** | **Human Body Mode** |
|---|---|---|
| **InGaN / Sapphire** | 100 V | 300 V |
| **AlInGaP** | 200 V | 500 V |
| **InGaN / SiC** | 600 V | 1000 V |

## 7. Reliability Test

| Classification | Test Item | Test Condition | Referance Standard |
|---|---|---|---|
| Endurance Test | Operation Life | Ta= Under Room Temperature As Per Data Sheet Maximum Rating<br>*Test Time= 1000HRS (-24HRS,+72HRS)*@20mA. | MIL-STD-750D:1026 (1995)<br>MIL-STD-883D:1005 (1991)<br>JIS C 7021:B-1 (1982) |
| | High Temperature High Humidity Storage | IR-Reflow In-Board, 2 Times<br>Ta= 65±5℃,RH= 90～95%<br>*Test Time= 240HRS±2HRS | MIL-STD-202F:103B(1980)<br>JIS C 7021:B-11(1982) |
| | High Temperature Storage | Ta= 105±5℃<br>*Test Time= 1000HRS (-24HRS,+72HRS) | MIL-STD-883D:1008 (1991)<br>JIS C 7021:B-10 (1982) |
| | Low Temperature Storage | Ta= -55±5℃<br>*Test Time=1000HRS (-24HRS,+72H RS) | JIS C 7021:B-12 (1982) |
| Environmental Test | Temperature Cycling | 105℃ ～ 25℃ ～ -55℃ ～ 25℃<br>30mins 5mins 30mins 5mins<br>10 Cycles | MIL-STD-202F:107D (1980)<br>MIL-STD-750D:1051(1995)<br>MIL-STD-883D:1010 (1991)<br>JIS C 7021:A-4(1982) |
| | Thermal Shock | IR-Reflow In-Board, 2 Times<br>85 ± 5℃ ～ -40℃ ± 5℃<br>10mins 10mins 10 Cycles | MIL-STD-202F:107D(1980)<br>MIL-STD-750D:1051(1995)<br>MIL-STD-883D:1011 (1991) |
| | Solder Resistance | T.sol= 260 ± 5℃<br>Dwell Time= 10 ± 1secs | MIL-STD-202F:210A(1980)<br>MIL-STD-750D:2031(1995)<br>JIS C 7021:A-1(1982) |
| | IR-Reflow | Ramp-up rate(183℃ to Peak) +3℃ second max<br>Temp. maintain at 125(±25)℃ 120 seconds max<br>Temp. maintain above 183℃ 60-150 seconds<br>Peak temperature range 235℃+5/-0℃<br>Time within 5°C of actual Peak Temperature (tp) 10-30 seconds<br>Ramp-down rate +6℃/second max | MIL-STD-750D:2031.2(1995)<br>J-STD-020(1999) |
| | Solderability | T.sol= 235 ± 5℃<br>Immersion time 2±0.5 sec<br>Immersion rate 25±2.5 mm/sec<br>Immersion rate 25±2.5 mm/sec<br>Coverage ≧95% of the dipped surface | MIL-STD-202F:208D(1980)<br>MIL-STD-750D:2026(1995)<br>MIL-STD-883D:2003(1991)<br>IEC 68 Part 2-20<br>JIS C 7021:A-2(1982) |

## 8. Others

The appearance and specifications of the product may be modified for improvement without prior notice.