

# RELIABILITY TEST RESULT

Product name : S-1231DxxH-V5T2U7

Package type : TO-252-5S(A)

| No. | Test item                                               | Test Condition                                                                | Test Time   | r/n  | Criterion                                                                                                                 |
|-----|---------------------------------------------------------|-------------------------------------------------------------------------------|-------------|------|---------------------------------------------------------------------------------------------------------------------------|
| 1   | High-temperature operation                              | Ta=150 °C, V=Vopr max.                                                        | 1000 h      | 0/22 | Satisfies the product standard                                                                                            |
| 2   | Temperature humidity bias #1                            | Ta=85 °C, RH=85 %, V=Vopr max.                                                | 1000 h      | 0/22 | Satisfies the product standard                                                                                            |
| 3   | Pressure cooker bias #1                                 | Ta=130 °C, RH=85 %, P=2.3×10 <sup>5</sup> Pa<br>V=Vopr max.                   | 96 h        | 0/22 | Satisfies the product standard                                                                                            |
| 4   | Storage in high temperature                             | Ta=150 °C                                                                     | 1000 h      | 0/22 | Satisfies the product standard                                                                                            |
| 5   | Storage in low temperature                              | Ta=-65 °C                                                                     | 1000 h      | 0/22 | Satisfies the product standard                                                                                            |
| 6   | Temperature Cycle (Gas phase) #1                        | Ta=150 °C ⇔ -65 °C<br>15 minutes for each                                     | 500 cycles  | 0/22 | Satisfies the product standard                                                                                            |
| 7   | Resistance to soldering heat-1<br>(reflow soldering) #2 | T=260 °C , 10 s                                                               | 3 times     | 0/22 | Satisfies the product standard<br>No abnormality by appearances                                                           |
| 8   | Resistance to soldering heat-2<br>(Soldering Iron) #2   | T=380 °C , 5 s<br>(Soldering iron tip temperature)<br>Object : terminal parts | 2 times     | 0/22 | Satisfies the product standard<br>No abnormality by appearances                                                           |
| 9   | Resistance to soldering heat - 3<br>(Flow soldering) #2 | T=260 °C , 10 s                                                               | 1 time      | 0/22 | Satisfies the product standard<br>No abnormality by appearances                                                           |
| 10  | Solderability #3                                        | T=245 °C<br>Solder material : Sn-3.0Ag-0.5Cu                                  | 5 s         | 0/11 | Zero cross time should be less than 3 seconds.<br>Solder should be applied at 95% or more of solderability judgment area. |
| 11  | Whisker - 1<br>(Temperature / Humidity Storage)         | Ta=30 °C, RH=60%                                                              | 4000 h      | 0/6  | Whisker should be less than 40μm                                                                                          |
| 12  | Whisker - 2<br>(Temperature Cycling)                    | Ta=85 °C ⇔ -40 °C                                                             | 1500 cycles | 0/6  | Whisker should be less than 45μm                                                                                          |
| 13  | Whisker - 3<br>(High Temperature / Humidity Storage)    | Ta=55 °C, RH=85 %                                                             | 4000 h      | 0/6  | Whisker should be less than 40μm                                                                                          |
| 14  | Solder Joint Reliability<br>(Shear test) #3             | Ta=125 °C ⇔ -40 °C<br>Solder material : Sn-3.0Ag-0.5Cu                        | 2000 cycles | 0/22 | After temperature cycle test, keep strength for shear stress more than the 50 % of initial mean value.                    |
| 15  | Terminal Strength (Pull test)                           | Pull force : 5.0 N                                                            | 30 s        | 0/11 | Terminal is not taken off                                                                                                 |
| 16  | Terminal Strength (Bending test)                        | Load : 2.5 N, 45 degree Bend a lead                                           | 2 times     | 0/11 | Terminal is not taken off                                                                                                 |
| 17  | ESD - 1 (Human Body Model)                              | V=±2000 V, C=100 pF, R=1.5 kΩ<br>Ground : VIN / Vss                           | 5 pulses    | 0/5  | Satisfies the product standard                                                                                            |
| 18  | ESD - 2 (Charged Device Model)                          | V=±500V charged, discharged                                                   | 1 pulse     | 0/5  | Satisfies the product standard                                                                                            |
| 19  | Latch up 1<br>(Pulsed current injection test)           | ±100 mA, V =Vopr max.                                                         | 1 pulse     | 0/5  | No latch up                                                                                                               |
| 20  | Latch up 2<br>(Vsupply overvoltage test)                | The overvoltage specified when<br>V = Vopr max.                               | 1 pulse     | 0/5  | No latch up                                                                                                               |

Remark : Vopr max. =Maximum operation voltage

#1,2,3 : Each test designated # is performed after Pre-Treatment finished.

Pre-Treatment consists of High Temperature Storage , Temperature Humidity Storage and Soldering Heat. (See the table below.)

| Pre Treatment (#1)    |                                 |                                      |
|-----------------------|---------------------------------|--------------------------------------|
| High Temp.<br>Storage | Temperature<br>Humidity Storage | Soldering Heat                       |
| Ta=125 °C<br>t=24 h   | Ta=85 °C<br>RH=85 %<br>t=168 h  | Reflow 3 times<br>T=260 °C<br>t=10 s |

| Pre Treatment (#2)    |                                 |                |
|-----------------------|---------------------------------|----------------|
| High Temp.<br>Storage | Temperature<br>Humidity Storage | Soldering Heat |
| Ta=125 °C<br>t=24 h   | Ta=85 °C<br>RH=85 %<br>t=168 h  | —              |

| Pre Treatment (#3)    |                                 |                |
|-----------------------|---------------------------------|----------------|
| High Temp.<br>Storage | Temperature<br>Humidity Storage | Soldering Heat |
| —                     | Ta=105 °C<br>RH=100 %<br>t=8 h  | —              |