



## Schedule of Scope to Certificate of Approval

### Independent Testing Laboratory

IECQ Certificate No.: IECQ-L JQAJP 13.0002

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### TESTD PARTS

Fixed capacitor, Fixed resistor, Potentiometer, Varistor, Thermistor, Connector, Relay, Switch, Printed circuit board, Semiconductor Devices, Semiconductor Integrated Circuit and Optical Component

### ENVIRONMENTAL TEST

|                       |   |
|-----------------------|---|
| IEC 60068-2-1:2007    | Cold  |
| IEC 60068-2-2:2007    | Dry heat  |
| IEC 60068-2-11:1981   | Salt mist   |
| IEC 60068-2-14:2009   | Change of temperature   |
| IEC 60068-2-20:2008   | Test methods for solderability and resistance to soldering heat of devices with leads                   |
| IEC 60068-2-30:2005   | Damp heat, cyclic (12+12-hour cycle)  |
| IEC 60068-2-38:2009   | Composite temperature/humidity cyclic test  |
| JIS C 60068-2-42:1993 | Sulphur dioxide test for contacts and connections   |
| JIS C 60068-2-43:1993 | Hydrogen sulphide test for contacts and connections   |
| IEC 60068-2-45:1980   | Immersion in cleaning solvents  |
| JIS C 60068-2-52:2000 | Salt mist, cyclic (sodium chloride solution)  |
| IEC 60068-2-54:2006   | Soldering. Solderability testing by the wetting balance method  |
| JIS C 60068-2-58:2016 | Test methods for solderability, resistance to dissolution of metallization and to soldering heat of SMD |
| IEC 60068-2-60:2015   | Flowing mixed gas corrosion test  |
| IEC 60068-2-66:1994   | Damp heat, steady state (unsaturated pressurized vapour)  |
| IEC 60068-2-78:2012   | Damp heat, steady state   |
| MIL STD 202H          | Test method standard electronic and electrical component parts  |
| MIL STD 883K          | Test method standard microcircuits  |

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### **MECHANICAL TEST**

|                     |   |
|---------------------|---|
| IEC 60068-2-6:2007  | Vibration (sinusoidal)  |
| IEC 60068-2-21:2006 | Robustness of terminations and<br>integral mounting devices   |
| IEC 60068-2-27:2008 | Shock   |
| IEC 60068-2-31:2008 | Rough handling shocks, primarily for<br>equipment-type specimens                                    |
| IEC 60068-2-53:2010 | Tests and Guidance: Combined climatic (temperature/humidity)<br>and dynamic (vibration/shock) tests |

### **STRESS TEST**

JEITA ED-4701/302:2013

Environmental and endurance test methods for semiconductor devices  
(Stress test I-2)

|                  |  |
|------------------|--|
| Test method 304A | Human body model electrostatic discharge (HBM/ESD)     |
| Test method 305C | Charged device model electrostatic discharge (CDM/ESD) |
| Test method 306B | Latch-up   |

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### **LED OPTICAL CHARACTERISTIC TEST**

|                   |  |
|-------------------|--|
| JIS C 7801:2009   | Measuring methods of lamps for general lighting  |
| JIS C 8152-1:2012 | Photometry of white light emitting diode for<br>general lighting — Part 1: LED packages                      |
| JIS C 8152-2:2012 | Photometry of white light emitting diode for general lighting<br>— Part 2: LED modules and LED light engines |
| JIS C 8105-5:2011 | Luminaires — Part 5: Gonio-photometric method  |

### **OTHER TEST**

Failure Analysis, Construction Analysis, Elemental Analysis, Thermal Analysis and Internal Gas Analysis of Electronic component, including Electrical Analysis, NDE (Non-destructive Engineering), Physical Analysis, Chemical Analysis and Sample Preparation (Decap, X-section, etc),

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### MEASUREMENT RANGE

#### Passive component

| Type / Part name  | Measurable property value   | Measuring range                                       |
|---|---|---|
| Fixed capacitor   | (1)Voltage endurance (DC)   | : AC,DC 0 ~ 5kV                                       |
|   | (2)Insulation resistance  | : $5 \times 10^5 \Omega \sim 10^{14} \Omega$          |
|   | (3)leakage current  | : $1 \times 10^{-3} \sim 10^{-11} \text{ A}$          |
|   | (4)Capacitance  | : 18pF ~ 1F *   |
|   | (5)Dielectric loss tangent(D factor)                                  | : 10* min   |
|   | (6)Impedance  | : $1 \Omega \sim 10^6 \text{ M}\Omega$                |
|   | (7)Temperature properties and gap of the capacitance.                 | : Temperature range -40°C ~ +150°C                    |
| Attention : * The mark varies according to measurement frequency. |   |   |
| Fixed resistor  | (1)Resistance value   | : $1 \Omega \sim 100 \text{ M}\Omega$                 |
|   | (2)Resistance temperature properties and gap of the resistance level. | : Temperature range -55°C ~ +150°C                    |
|   | (3)Voltage factor   | : $\pm 0.02\% / \text{V}$                             |
|   | (4)Insulation resistance  | : $5 \times 10^5 \Omega \sim 2 \times 10^{14} \Omega$ |
|   | (5)Voltage endurance  | : AC,DC 0 ~ 5kV                                       |
| Variable resistor<br>*potentiometer                               | (1)Resistance value   | : $1 \Omega \sim 100 \text{ M}\Omega$                 |
|   | (2)Mutual deviations  | : $\pm 3\%$   |
|   | (3)Resistance temperature properties and gap of the resistance level. | : Temperature range -40°C ~ +150°C                    |
|   | (4)Insulation resistance  | : $5 \times 10^5 \Omega \sim 10^{14} \Omega$          |
|   | (5)Voltage endurance  | : AC,DC 0 ~ 5kV                                       |
|   | (6)Rotational noise   | : Noise voltage 1mV                                   |
|   | (7)Intensive contact resistance                                       | : 1 mΩ  |
| Varistor  | Voltage at reference current  | : 1500V(1mA min)                                      |
| Thermistor  | (1)resistance value   | : $1 \Omega \sim 1000 \text{ k}\Omega$                |
|   | (2)The thermistor fixed number  | : Temperature range -50°C ~ +300°C                    |

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### MEASUREMENT RANGE

Active component part [Individual semiconductor part]

| Type / Part name  | Measurable property value   | Measuring range  |
|---|---|--|
| Transistor<br>*Bipolar  | (1)Collector-base breakdown voltage<br>(2)Collector-emitter breakdown voltage<br>(3)Emitter base breakdown voltage<br>(4)Collector base interception electric current<br>(5)Collector emitter interception electric current<br>(6)Emitter base interception electric current<br>(7)The collector emitter saturation voltage<br>(8)DC current gain | :1V ~ 1.5kV<br>:1V ~ 1.5kV<br>:100V min<br>:1nA ~ 100mA<br>:1nA ~ 100mA<br>:1nA ~ 100mA<br>:7V min ( $I_C < 17A$ )<br>:25 ~ 25,000 ( $I_C < 17A$ ) |
| Transistor<br>*Field effect form  | (1)Gate source breakdown voltage<br>(2)Gate leak electric current<br>(3)Drain current<br>(4)The gate cut-off voltage<br>(5)The drain source saturation voltage  | :1V ~ 1.5kV<br>:1pA ~ 100mA<br>:1nA ~ 1A<br>: ~ 100V<br>:7V min ( $I_D < 17A$ )  |
| Diode<br>*Small signal<br>*I rectify a small electric current<br>*Constant voltage<br>*Small electric current switching | (1)Forward voltage<br>(2)Reverse current<br>(3)Breakdown voltage<br>(4)Zener voltage<br>(5)Dynamic resistance<br>(6)Temperature coefficient   | :7V min ( $I_F < 17A$ )<br>:1na ~ 100mA ( $V_R < 100V$ )<br>:1V ~ 1.5kV<br>:100V min<br>:50Ω max<br>:Temperature range -55°C ~ +150°C              |
| Thyristor<br>*3 reverse-blocking terminals<br>*Small electric current   | (1)Off electric current<br>(2)Reverse current<br>(3)ON-state voltage<br>(4)Gate trigger<br>(5)Holding current   | :1mA ( $V_L < 1kV$ )<br>:1na ~ 1mA ( $V_L < 1kV$ )<br>:7V ( $I_{TM} < 10A$ )<br>:1000V min<br>:10A ( $V_{TM} < 7V$ )                               |

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## MEASUREMENT RANGE

Active component part Semiconductor Devices [Integrated circuit]

| Type / Part name  | Measurable property value                   | Measuring range    |
|---|---|--------------------|
| TTL IC  | (1)The high-level output voltage            | :±30V              |
|   | (2)The low-level output voltage             | :±30V              |
|   | (3)The input clamp voltage                  | :±30V              |
|   | (4)High-level input electric current        | :±300mA            |
|   | (5)Low-level input electric current         | :±300mA            |
|   | (6)Output short circuit current             | :±300mA            |
|   | (7)High-level power supply electric current | :±300mA            |
|   | (8)Low-level power supply electric current  | :±300mA            |
| CMOS IC   | (1)The high-level output voltage            | :±30V              |
|   | (2)The low-level output voltage             | :±30V              |
|   | (3)The high-level input voltage             | :±20V              |
|   | (4)Low-level input electric current         | :±20V              |
|   | (5)High-level output electric current       | :±300mA            |
|   | (6)Low-level output electric current        | :±300mA            |
|   | (7)Static consumption electric current      | :±300mA            |
|   | (8)Input current                            | :±300mA            |
| Analog semiconductor integrated circuit<br>*Monolithic op-amp | (1)Input-offset voltage                     | :10μV ~ 128mV      |
|   | (2)Input offset current                     | :20pA ~ 16μA       |
|   | (3)Input bias current                       | :20pA ~ 16μA       |
|   | (4)Open loop voltage gain                   | :0.1V/mV ~ 1.2V/μV |
|   | (5)The max power voltage                    | :10mV ~ 50V        |
|   | (6)Power consumption                        | :5mW ~ 6.4W        |
|   | (7)Common mode rejection ratio              | :38 ~ 116dB        |
|   | (8)Supply voltage rejection ratio           | :38 ~ 116dB        |
|   | (9)Aspect input voltage range               | :100mV ~ 25V       |
|   | (10)Slew rate                               | :0.1 ~ 125V/μS     |

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#### Mechanical device

| Type / Part name                        | Measurable property value   | Measuring range  |
|---|---|--|
| Connector<br>(Electronic equipment use) | (1)Insulationresistanc<br>(2)Withstand voltage<br>(3)Contact resistance under low voltage,<br>the low electric current<br>(4)Chattering of the contact.   | : $5 \times 10^5 \Omega \sim 2 \times 10^{14} \Omega$<br>:AC,DC 0 ~ 5kV<br>:1m $\Omega$ ~ 100 $\Omega$<br>:1 $\mu$ sec max   |
| Relay<br>(Small form for control)       | (1)Withstand voltage<br>(2)Insulation resistance<br>(3)Direct current resistance of the coil<br>(4)Contact resistance<br>(5)Operating voltage<br>(6)Must-release voltage<br>(7)Operation time<br>(8)Recovery time<br>(9)Bounces of the point of contact<br>(10)Chattering of the point of contact | :AC,DC 0 ~ 5kV<br>: $5 \times 10^5 \Omega \sim 2 \times 10^{14} \Omega$<br>:1 $\Omega$ ~ 10k $\Omega$<br>:1m $\Omega$ ~ 100 $\Omega$<br>:1V max<br>:1V max<br>:1msec max<br>:1msec max<br>:1 $\mu$ sec max<br>:1 $\mu$ sec max |
| Switch<br>(Electronic equipment use)    | (1)Contact resistance<br>(2)Insulation resistance<br>(3)Withstand voltage<br>(4)Electrostatic capacity<br>(5)Change of the contact resistance   | :1m $\Omega$ ~ 100 $\Omega$<br>: $5 \times 10^5 \Omega \sim 2 \times 10^{14} \Omega$<br>: AC,DC 0 ~ 5kV<br>:18pF ~ 1F<br>:1m $\Omega$ max  |
| Printed circuit board                   | (1)Resistance of the plating part of<br>the conductor and through hall part.<br>(2)Withstand voltage<br>(3)Insulation resistance  | :1m $\Omega$ ~ 1000 $\Omega$<br>: AC,DC 0 ~ 5kV<br>: $5 \times 10^5 \Omega \sim 10^{14} \Omega$  |

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### Optical component

| Type / Part name                             | Measurable property value  | Measuring range  |
|--|--|--|
| Luminescent diode<br>(It is for indication.) | (1)Forward voltage<br>(2)Reverse current<br>(3)Luminous intensity(Relative value)  | :7V min<br>:1mA min<br>:----   |
| LED<br>(It is for illumination.)             | 1.Integrating sphere<br>(1)Total luminous flux[lm]<br><br>(2)Color temperature[K]<br>(3)Chromaticity coordinate<br>(4)The number of the color rendering evaluations<br><br>2.The light distribution measurement.<br>(1)Light distribution curve<br><br>(2)Light intensity(Reference)<br><br><br>(3)Color temperature<br>(4)Chromaticity coordinate<br>(5)The number of the color rendering evaluations | :Measurable wavelength range<br>350nm ~ 1000nm<br>In sunshine: min 32lm ~<br>:----<br>:----<br>:Ra,R1 ~ R14<br><br>:Measurable wavelength range<br>360nm ~ 830nm<br>:Photometric distance 2m ~ 12m,<br>:Photometric distance Luminous intensity<br>:2.0m: 9 ~ 3,680,000[cd]<br>:3.0m: 20 ~ 8,200,000[cd]<br>:6.0m: 83 ~ 33,000,000[cd]<br>:12m : 330 ~ 132,000,000[cd]<br>: ----<br>:----<br>: Ra,R1 ~ R14 |

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