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# RELIABILITY TEST DATA

**Product Name : TG2016SKA Conform to AEC-Q100** No. QA-AD20-011

| No. | Test item | Test condition | Measured temp | Criteria ($F_{OSC}$) | Reference standard | Lot1 | Lot2 | Lot3 |
|---|---|---|---|---|---|---|---|---|
| | | | | | | [Fail Qty/Test Qty] | [Fail Qty/Test Qty] | [Fail Qty/Test Qty] |
| 1 | High Temperature Storage Life | Ta=+125ºC, 1000h | 25℃<br>105℃ | ±2.0ppm<br>±2.0ppm | AEC Q100-A6<br>JESD22 A103 | [0/45] | | |
| 2 | High Temperature Operating Life | Ta=+125ºC, 3.63V, 1000h | -40℃<br>25℃<br>105℃ | ±2.0ppm<br>±2.0ppm<br>±2.0ppm | AEC Q100-B1 | [0/77] | [0/77] | [0/77] |
| 3 | Temperature-Humidity-Bias or Biased HAST | 85ºC, 85%RH, 3.63V, 1000h | 25℃<br>105℃ | ±2.0ppm<br>±2.0ppm | AEC Q100-A2<br>JESD22 A101 | [0/77] | [0/77] | [0/77] |
| 4 | Temperature Cycling | -55ºC ～ +125ºC, 1000cyc<br>10 min. at each temperature | 25℃<br>105℃ | ±2.0ppm<br>±2.0ppm | AEC Q100-A4<br>JESD22 A104 | [0/77] | [0/77] | [0/77] |
| 5 | Autoclave or Unbiased HAST or Temperature-Humidity(without Bias)<br>プレッシャークッカー試験 | Ta=+121ºC, 0.2MPa, 96h | 25℃ | ±2.0ppm | AEC Q100-A3<br>JESD22 A102 | [0/77] | [0/77] | [0/77] |
| 6 | Mechanical Shock | 1 500 Gpeak, 0.5 ms, x, y, z directions,<br>5 times for each direction | 25℃ | ±2.0ppm | AEC Q100-G1<br>JESD22 B104 | [0/15] | | |
| 7 | Variable Frequency Vibration | 20 Hz to 2 KHz to 20 Hz (logarithmic variation) in >4 minutes, 4X in each orientation, 50 G peak acceleration. | 25℃ | ±2.0ppm | AEC Q100-G2<br>JESD22 B103 | | [0/5] | |
| 8 | Package Drop | Drop part on each of 6 axes once from a height of 1 200 mm onto a concrete surface. | 25℃ | ±2.0ppm | AEC-Q100-G5 | [0/5] | | |
| 9 | Preconditioning | Preparation(MSL1) →Air reflow 3 times | 25℃ | ±2.0ppm | AEC Q100-A1<br>J-STD-020<br>JESD22-A113 | [0/77] | [0/77] | [0/77] |
| 10 | Electrostatic Discharge Machine Model | 250 V, 200 pF, 0 Ω, applied 1 time | 25℃<br>105℃ | ±2.0ppm<br>±2.0ppm | AEC Q100 E2<br>AEC Q100-003 | | | |
| 11 | Electrostatic Discharge Human Model | 2 000 V, 100 pF, 1.5 kΩ, applied 3 times | 25℃<br>105℃ | ±2.0ppm<br>±2.0ppm | AEC Q100 E2<br>AEC Q100-002 | | | |
| 12 | Electrostatic Discharge Charged Device Model | DCDM<br>Corner pin 750 V, others 500 V, applied 3 times | 25℃<br>105℃ | ±2.0ppm<br>±2.0ppm | AEC Q100 E3<br>AEC Q100-011 | | | |
| 13 | Latch-Up | VDD = 3.6 V, applied 1 time, Ta = +125ºC<br>Condition*1: Positive pulse current (VDD standard), +200 mA<br>Condition*2: Negative pulse current (VSS standard), -200 mA | | No Latch-Up | AEC Q100 E4<br>AEC Q100-004 | [0/3] | | |
| 14 | Electrical Distributions | USER SPEC<br>Electrical characteristics of LT,RT,HT | -40℃<br>25℃<br>105℃ | Per Spec. | AEC Q100-009 | [0/30] | [0/30] | [0/30] |
| 15 | Wire Bond Shear | AEC Q100-C1<br>AEC Q100-001 | | $P_{PK}$ >1.67 | AEC Q100-C1<br>AEC Q100-001 | Passed | | |
| 16 | Wire Bond Pull | AEC Q100-C2<br>MIL-STD883 Method 2011 | | $P_{PK}$ >1.67 | AEC Q100-C2<br>MIL-STD883<br>Method 2011 | Passed | | |
| 17 | Solderability | AEC Q100-C3<br>JESD22-B102 | | >95% lead coverage | AEC Q100-C3<br>JESD22-B102 | [0/15] | | |
| 18 | Physical Dimensions | AEC Q100-C4<br>JESD22-B100 and B108 | | $P_{PK}$ >1.67 | AEC Q100-C4<br>JESD22-B100<br>and B108 | [0/10] | [0/10] | [0/10] |

＜ Preprocessing ＞

＊）Preprocessing (3 reflow cycles) is conducted before testing, and an initial value shall be measured after 24 h storage at room temperature.

＊）For test No. 1 to 5, pretreatment is performed before the test.

**TD･CS Quality Assurance Dept.**

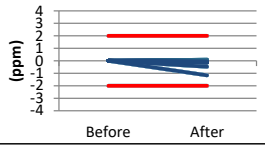
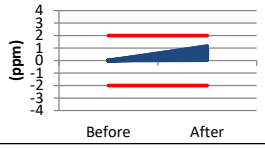
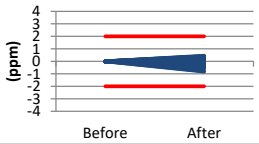
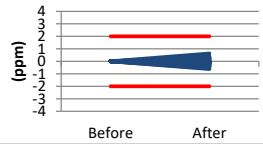
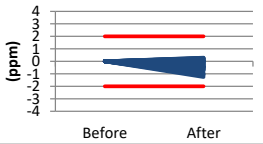
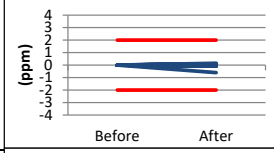
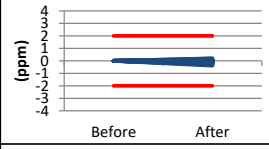
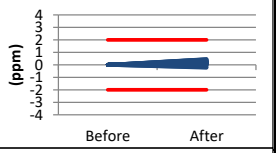
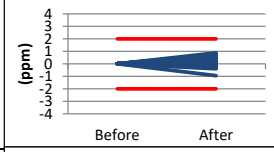
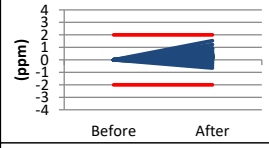
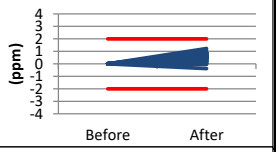
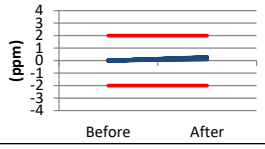
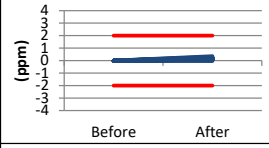
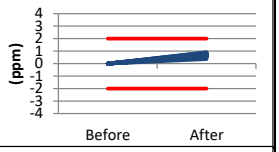
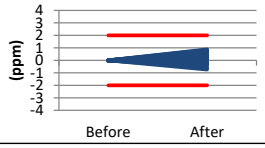
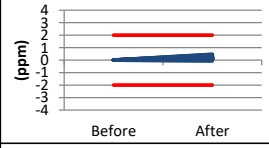
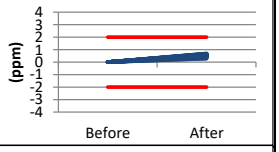
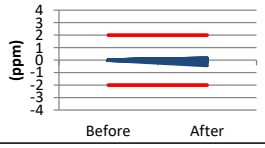
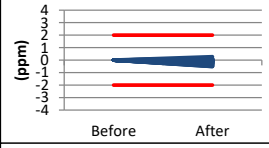
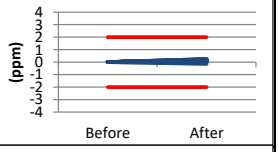
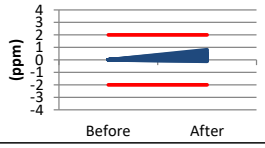
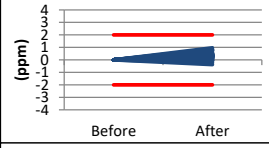
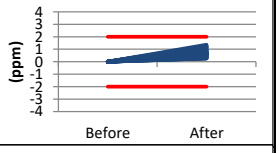
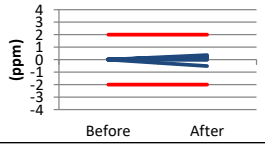
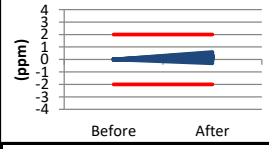
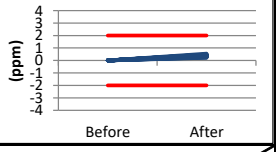
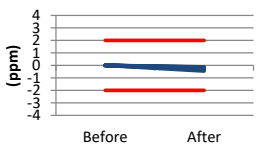
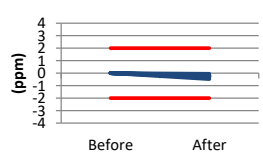
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## RELIABILITY TEST DATA

Product Name : TG2016SKA Conform to AEC-Q100

No. QA-AD20-011

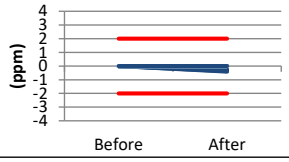
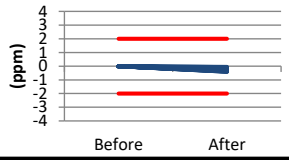
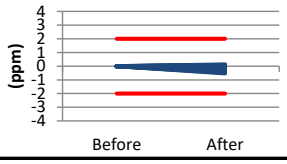
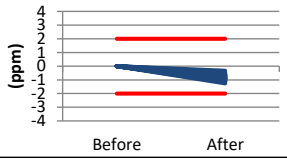
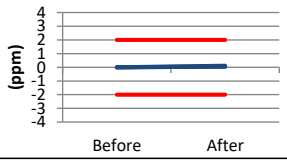
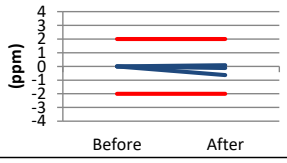
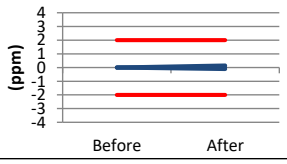
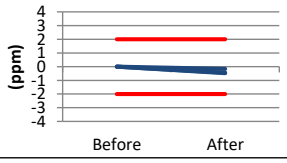
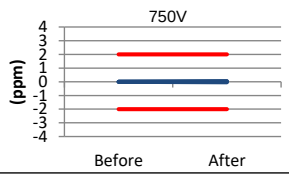
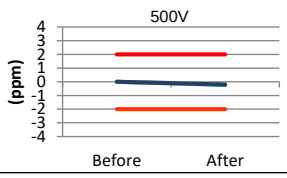
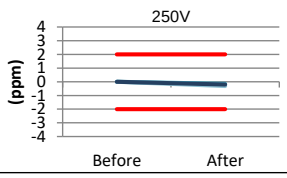
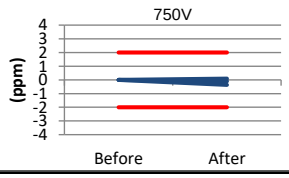
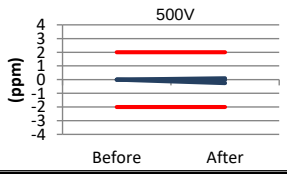
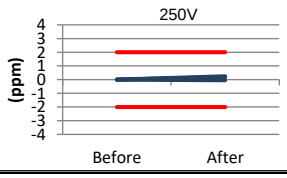
| Test item | Measured temp／Qty | LOT 1 | LOT 2 | LOT 3 |
|---|---|---|---|---|
| High Temperature Storage Life<br>Ta=+125ºC, 1000h | 25℃<br>N=45pcs |  | | |
| | 105℃<br>N=45pcs |  | | |
| High Temperature Operating Life<br>Ta=+125ºC, 3.63V, 1000h | -40℃<br>N=77pcs |  |  |  |
| | 25℃<br>N=77pcs |  |  |  |
| | 105℃<br>N=77pcs |  |  |  |
| Temperature-Humidity-Bias or Biased HAST<br>85ºC, 85%RH, 3.63V, 1000h | 25℃<br>N=77pcs |  |  |  |
| | 105℃<br>N=77pcs |  |  |  |
| Temperature Cycling<br>'-55ºC ～ +125ºC, 1000cyc<br>10 min. at each temperature | 25℃<br>N=77pcs |  |  |  |
| | 105℃<br>N=77pcs |  |  |  |
| Autoclave or Unbiased HAST or Temperature-Humidity(without Bias)<br>Ta=+121ºC, 0.2MPa, 96h | 25℃<br>N=77pcs |  |  |  |
| Mechanical Shock<br>1500 Gpeak, 0.5 ms, x, y, z directions,<br>5 times for each direction | 25℃<br>N=15pcs |  | | |
| Variable Frequency Vibration<br>20 Hz to 2 KHz to 20 Hz (logarithmic variation) in >4 minutes, 4X in each orientation, 50 G peak acceleration. | 25℃<br>N=15pcs | |  | |

Qualification Data

## RELIABILITY TEST DATA

Product Name : TG2016SKA Conform to AEC-Q100

No. QA-AD20-011

| Test item | Measured temp／Qty | LOT 1 | LOT 2 | LOT 3 |
|---|---|---|---|---|
| Package Drop<br><br>Drop part on each of 6 axes once from a height of 1200 mm onto a concrete surface. | 25℃<br>N=5pcs |  | | |
| Preconditioning<br><br>Preparation(MSL1) →<br>Air reflow 3 times | 25℃<br>N=77pcs |  |  |  |
| Electrostatic Discharge Machine Model<br><br>250 V, 200 pF, 0 Ω, applied 1 time | 25℃<br>N=3pcs | | |  |
| | 125℃<br>N=3pcs | | |  |
| Electrostatic Discharge Human Mode<br><br>2 000 V, 100 pF, 1.5 kΩ, applied 3 times | 25℃<br>N=3pcs | | |  |
| | 105℃<br>N=3pcs | | |  |
| Electrostatic Discharge Charged Device Model<br><br>DCDM<br>Corner pin 750 V, others 500 V, applied 3 times | 25℃<br>N=3pcs |  |  |  |
| | 105℃<br>N=3pcs |  |  |  |

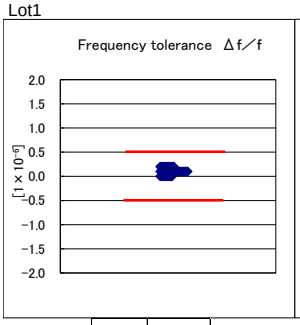
# RELIABILITY TEST DATA

Product Name : TG2016SKA

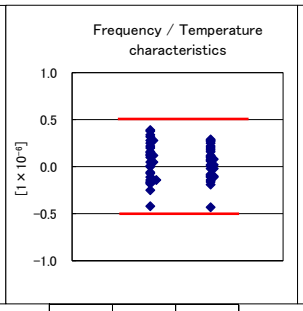
No. QA-AD20-011

## Electrical Distributions

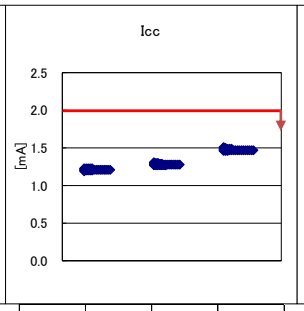
Lot1



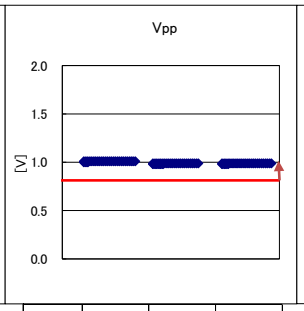

| temp. | +25℃ |
|---|---|
| Average | 0.10 |
| Stdev | 0.06 |



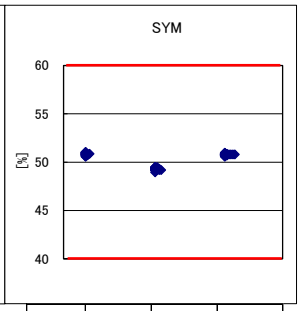

| temp. | -40℃ | +105°C |
|---|---|---|
| Average | 0.06 | 0.03 |
| Stdev | 0.21 | 0.17 |




| temp. | -40℃ | +25℃ | +105°C |
|---|---|---|---|
| Average | 1.21 | 1.28 | 1.48 |
| Stdev | 0.01 | 0.01 | 0.01 |

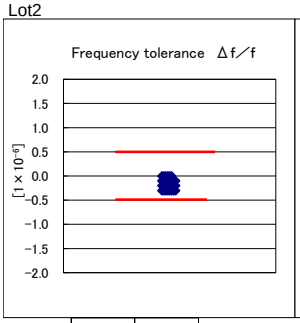



| temp. | -40℃ | +25℃ | +105°C |
|---|---|---|---|
| Average | 1.01 | 0.99 | 0.99 |
| Stdev | 0.00 | 0.00 | 0.00 |

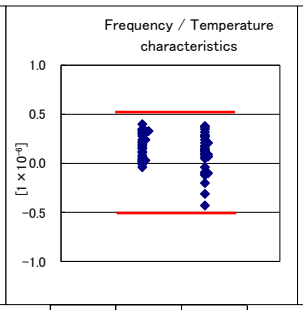



| temp. | -40℃ | +25℃ | +105°C |
|---|---|---|---|
| Average | 50.85 | 49.31 | 50.80 |
| Stdev | 0.12 | 0.12 | 0.09 |

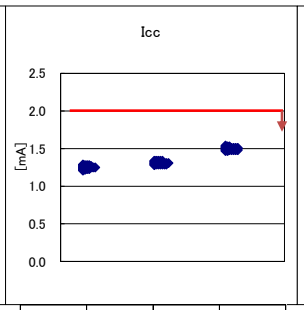
Lot2



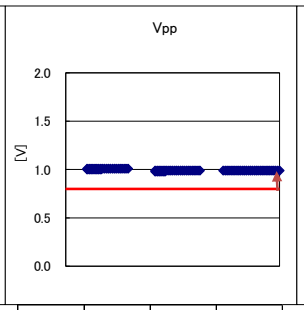

| temp. | +25℃ |
|---|---|
| Average | -0.16 |
| Stdev | 0.11 |



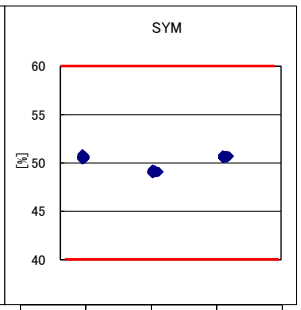

| temp. | -40℃ | +105°C |
|---|---|---|
| Average | 0.18 | 0.09 |
| Stdev | 0.13 | 0.20 |




| temp. | -40℃ | +25℃ | +105°C |
|---|---|---|---|
| Average | 1.25 | 1.31 | 1.50 |
| Stdev | 0.02 | 0.02 | 0.02 |

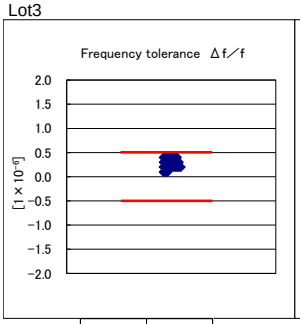



| temp. | -40℃ | +25℃ | +105°C |
|---|---|---|---|
| Average | 1.01 | 0.99 | 0.99 |
| Stdev | 0.00 | 0.00 | 0.00 |

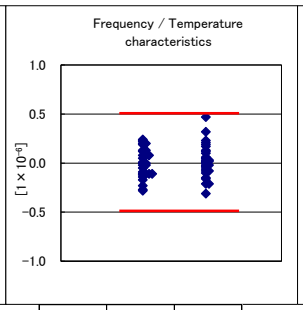



| temp. | -40℃ | +25℃ | +105°C |
|---|---|---|---|
| Average | 50.61 | 49.10 | 50.66 |
| Stdev | 0.13 | 0.09 | 0.08 |

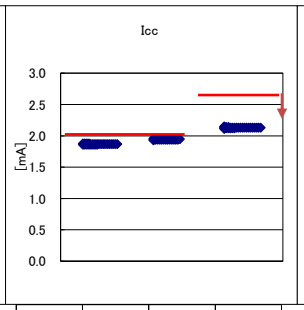
Lot3



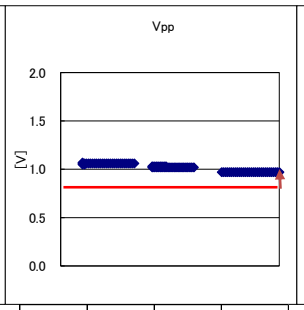

| temp. | +25℃ |
|---|---|
| Average | 0.27 |
| Stdev | 0.09 |



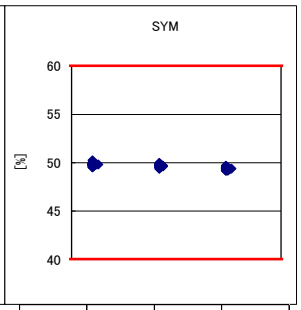

| temp. | -40℃ | +105°C |
|---|---|---|
| Average | 0.00 | 0.02 |
| Stdev | 0.15 | 0.17 |




| temp. | -40℃ | +25℃ | +105°C |
|---|---|---|---|
| Average | 1.87 | 1.94 | 2.13 |
| Stdev | 0.01 | 0.01 | 0.01 |




| temp. | -40℃ | +25℃ | +105°C |
|---|---|---|---|
| Average | 1.06 | 1.02 | 0.97 |
| Stdev | 0.00 | 0.00 | 0.00 |




| temp. | -40℃ | +25℃ | +105°C |
|---|---|---|---|
| Average | 49.82 | 49.69 | 49.41 |
| Stdev | 0.15 | 0.13 | 0.14 |

Qualification Data