

# **RENESAS SEMICONDUCTOR RELIABILITY REPORT**

GROUP : RZ/G2UL  
DEVICE : R9A07G043UXXGBG  
APPLICATION : Consumer / Industry

Quality Assurance Div.  
Renesas Electronics Corporation

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Table.1 Reliability test result

| Test Items                                                          | Reference                 | Test Conditions                      | Results<br>Failure/Size | N.B. |
|---------------------------------------------------------------------|---------------------------|--------------------------------------|-------------------------|------|
| High Temperature Operating Life<br>(HTOL)                           | JESD22-A108               | Tj=125 °C, Vccmax, 1000 hrs          | 0/22                    |      |
| High Temperature Storage Life<br>(HTSL)                             | JESD22-A103               | Ta=150 °C, 1000 hrs                  | 0/22                    |      |
| Highly Accelerated Temperature and<br>Humidity Stress<br>(HAST)(*1) | JESD22-A110               | Ta=110 °C, RH=85 %, Vccmax, 264 hrs  | 0/22                    |      |
| Temperature Cycling<br>(TC)(*1)                                     | JESD22-A104               | Ta=-55 °C to 125 °C , 500 cycles     | 0/22                    |      |
| Latch-Up<br>(LU)                                                    | JESD78                    | Pulse Current Injection, I=+/-100 mA | 0/3                     |      |
| Electrostatic discharge<br>(ESD-HBM)                                | JS-001                    | 1.5 kΩ, 100 pF, +/-1000 V, 1 time    | 0/3                     |      |
| Resistance to Soldering Heat<br>(PC)                                | JESD22-A113,<br>J-STD-020 | MSL3(Moisture Sensitivity Level 3)   | 0/22                    |      |

\*1) With preconditioning per JESD22-A113, MSL

•It is tested to confirm that all the samples are satisfied with an individual product specification.

Note :

Basically qualification tests were performed using a representative product with the same wafer process and the same package structure .

The failure rate of the device in an actual use condition can be estimated by the below procedure.

•Equation for the failure rate estimation ( $\lambda$ )

$$\lambda = \lambda_b \times \pi T \text{ (FIT)}$$

①Unique failure rate ( $\lambda_b$ )

$$\lambda_b = 0.67 \text{ FIT}$$

Unique failure rate at  $T_a=55^\circ\text{C}$  using 60 % confidence level.

②Temperature term ( $\pi T$ )

$$\pi T = \exp\{11600 \times E_a \times (1/(273+55) - 1/(273+T_a))\}$$

$E_a$  : Activation energy (eV)

$T_a$  : Ambient temperature ( $^\circ\text{C}$ )

$\pi T$  simplified chart as  $E_a=0.7 \text{ eV}$

| $T_a$<br>( $^\circ\text{C}$ ) | 40   | 50   | 55 | 60   | 65   | 70   | 75   | 80   | 85   | 90    | 100   | 110   |
|-------------------------------|------|------|----|------|------|------|------|------|------|-------|-------|-------|
| $\pi T$                       | 0.31 | 0.68 | 1  | 1.45 | 2.08 | 2.95 | 4.15 | 5.77 | 7.96 | 10.88 | 19.82 | 34.99 |

•MTTF ( Mean Time To Failure )

$$MTTF = 1/\lambda$$

Table.2 Product list

MCR-22-0804

| No | Group   | Product part number | Package code | No  | Group | Product part number | Package code |
|----|---------|---------------------|--------------|-----|-------|---------------------|--------------|
| 1  | RZ/G2UL | R9A07G043U16GBG     | PLBG0361KB-A | 51  |       |                     |              |
| 2  | RZ/G2UL | R9A07G043U12GBG     | PLBG0361KB-A | 52  |       |                     |              |
| 3  | RZ/G2UL | R9A07G043U15GBG     | PLBG0361KB-A | 53  |       |                     |              |
| 4  | RZ/G2UL | R9A07G043U11GBG     | PLBG0361KB-A | 54  |       |                     |              |
| 5  |         |                     |              | 55  |       |                     |              |
| 6  |         |                     |              | 56  |       |                     |              |
| 7  |         |                     |              | 57  |       |                     |              |
| 8  |         |                     |              | 58  |       |                     |              |
| 9  |         |                     |              | 59  |       |                     |              |
| 10 |         |                     |              | 60  |       |                     |              |
| 11 |         |                     |              | 61  |       |                     |              |
| 12 |         |                     |              | 62  |       |                     |              |
| 13 |         |                     |              | 63  |       |                     |              |
| 14 |         |                     |              | 64  |       |                     |              |
| 15 |         |                     |              | 65  |       |                     |              |
| 16 |         |                     |              | 66  |       |                     |              |
| 17 |         |                     |              | 67  |       |                     |              |
| 18 |         |                     |              | 68  |       |                     |              |
| 19 |         |                     |              | 69  |       |                     |              |
| 20 |         |                     |              | 70  |       |                     |              |
| 21 |         |                     |              | 71  |       |                     |              |
| 22 |         |                     |              | 72  |       |                     |              |
| 23 |         |                     |              | 73  |       |                     |              |
| 24 |         |                     |              | 74  |       |                     |              |
| 25 |         |                     |              | 75  |       |                     |              |
| 26 |         |                     |              | 76  |       |                     |              |
| 27 |         |                     |              | 77  |       |                     |              |
| 28 |         |                     |              | 78  |       |                     |              |
| 29 |         |                     |              | 79  |       |                     |              |
| 30 |         |                     |              | 80  |       |                     |              |
| 31 |         |                     |              | 81  |       |                     |              |
| 32 |         |                     |              | 82  |       |                     |              |
| 33 |         |                     |              | 83  |       |                     |              |
| 34 |         |                     |              | 84  |       |                     |              |
| 35 |         |                     |              | 85  |       |                     |              |
| 36 |         |                     |              | 86  |       |                     |              |
| 37 |         |                     |              | 87  |       |                     |              |
| 38 |         |                     |              | 88  |       |                     |              |
| 39 |         |                     |              | 89  |       |                     |              |
| 40 |         |                     |              | 90  |       |                     |              |
| 41 |         |                     |              | 91  |       |                     |              |
| 42 |         |                     |              | 92  |       |                     |              |
| 43 |         |                     |              | 93  |       |                     |              |
| 44 |         |                     |              | 94  |       |                     |              |
| 45 |         |                     |              | 95  |       |                     |              |
| 46 |         |                     |              | 96  |       |                     |              |
| 47 |         |                     |              | 97  |       |                     |              |
| 48 |         |                     |              | 98  |       |                     |              |
| 49 |         |                     |              | 99  |       |                     |              |
| 50 |         |                     |              | 100 |       |                     |              |