REPORT NO. MCR-22-0808
December 16, 2022

RENAKAS SEMICONDUCROT
RELIABILITY REPORT

GROUP : RZ/N2L
DEVICE : R9A07G084MXGXB
APPLICATION : Consumer / Industry

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

*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 (λ)**

\[
λ = \lambda_b \times πT \ (FIT)
\]

1. **Unique failure rate (λb)**
   \[\lambda_b = 0.67 \ \text{FIT}\]
   Unique failure rate at Ta=55 ℃ using 60 % confidence level.

2. **Temperature term (πT)**
   \[πT = \exp\{11600 \times Ea \times \frac{1}{273+55} - \frac{1}{273+Ta}\}\]
   
   *Ea*: Activation energy (eV)
   *Ta*: Ambient temperature (℃)

| πT simplified chart as Ea=0.7 eV |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Ta (℃) | 40  | 50  | 55  | 60  | 65  | 70  | 75  | 80  | 85  | 90  | 100 | 110 |
| πT     | 0.31| 0.68| 1.00| 1.45| 2.08| 2.95| 4.15| 5.77| 7.96|10.88|19.82|34.99|

**MTTF (Mean Time To Failure)**

\[MTTF = \frac{1}{λ}\]
<table>
<thead>
<tr>
<th>No</th>
<th>Group</th>
<th>Product part number</th>
<th>Package code</th>
<th>No</th>
<th>Group</th>
<th>Product part number</th>
<th>Package code</th>
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<tbody>
<tr>
<td>1</td>
<td>RZ/N2L</td>
<td>R9A07G084M04GBG</td>
<td>PLBG0225GB-A</td>
<td>51</td>
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<td>RZ/N2L</td>
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<td>RZ/N2L</td>
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