

# **RENESAS SEMICONDUCTOR RELIABILITY REPORT**

GROUP : USB3.0 Hub Controller  
DEVICE : UPD720210K8-BAF-M1-A  
APPLICATION : Consumer

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 (HTOL) | JESD22-A108            | Ta=125 °C, Vccmax, 1000 hrs          | 0/22                    |      |
| High Temperature Storage Life (HTSL)   | JESD22-A103            | Ta=150 °C, 1000 hrs                  | 0/22                    |      |
| Temperature Humidity bias (THB)(*1)    | JESD22-A101            | Ta=85 °C, RH=85 %, Vccmax, 1000 hrs  | 0/22                    |      |
| Temperature Cycling (TC)(*1)           | JESD22-A104            | Ta=-65 °C to 150 °C , 300 cycles     | 0/22                    |      |
| Latch-Up (LU)                          | JESD78                 | Pulse Current Injection, I=+/-100 mA | 0/3                     |      |
| Electrostatic discharge (ESD-HBM)      | JS-001                 | 1.5 kΩ, 100 pF, +/-1000 V, 1 time    | 0/3                     |      |
| Solderability (SD)                     | J-STD-002              | 245 °C, 5 s, Solder coverage ≥95 %   | 0/5                     |      |
| Resistance to Soldering Heat (PC)      | JESD22-A113, 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 ( $\lambda_b$ )

$$\lambda_b = 10.34 \text{ FIT}$$

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  $E_a = 0.6 \text{ eV}$

| $T_a$<br>( $^\circ\text{C}$ ) | 40   | 50   | 55 | 60   | 65   | 70   | 75   | 80   | 85   | 90   | 100   | 110   |
|-------------------------------|------|------|----|------|------|------|------|------|------|------|-------|-------|
| $\pi T$                       | 0.36 | 0.72 | 1  | 1.38 | 1.87 | 2.53 | 3.39 | 4.49 | 5.92 | 7.74 | 12.94 | 21.06 |

•MTTF ( Mean Time To Failure )

$$MTTF = 1/\lambda$$

Table.2 Product list

MCR-23-0423

| No | Group                 | Product part number  | Package code | No  | Group | Product part number | Package code |
|----|-----------------------|----------------------|--------------|-----|-------|---------------------|--------------|
| 1  | USB3.0 Hub Controller | UPD720210K8-BAF-M1-A | PVQN0076LB-A | 51  |       |                     |              |
| 2  |                       |                      |              | 52  |       |                     |              |
| 3  |                       |                      |              | 53  |       |                     |              |
| 4  |                       |                      |              | 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 |       |                     |              |