

# RENESAS SEMICONDUCTOR RELIABILITY REPORT

GROUP : USB 2.0 Hub Controller  
DEVICE : UPD720115K8-XXX-BAK-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 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  $T_a = 55 \text{ }^\circ\text{C}$  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 $E_a = 0.6 \text{ eV}$												
$T_a$ ( $^\circ\text{C}$ )	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

No	Group	Product part number	Package code	No	Group	Product part number	Package code
1	USB 2.0 Hub Controller	UPD720115K8-611-BAK-M1-A	PVQN0040KG-A	51			
2	USB 2.0 Hub Controller	UPD720115K8-711-BAK-M1-A	PVQN0040KG-A	52			
3				53			
4				54			
5				55			
6				56			
7				57			
8				58			
9				59			
10				60			
11				61			
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15				65			
16				66			
17				67			
18				68			
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40				90			
41				91			
42				92			
43				93			
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45				95			
46				96			
47				97			
48				98			
49				99			
50				100			