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RENESAS SEMICONDUCTOR RELIABILITY REPORT

DEVICE: UPD166031AT1U-AY

APPLICATION: Automotive

Quality Assurance Div.
Renesas Electronics Corporation

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Reliability Test Results

DEVICE UPD166031AT1U-AY

1.RELIABILITY TEST

ITEM	TEST CONDITION	NUMBER OF SAMPLES	NUMBER OF FAILURE
Solderability	245°C, 5sec., ≥95% coverage	22	0
Soldering Heat	MSL1, 260°C max, 255°C, 30sec., 3 times	22	0
Temperature Cycling *1	-65°C～150°C, 500cycles	22	0
Autoclave *1	121°C, 100%RH, 96hours	22	0
High Temperature Operating Life	Ta=150°C, max operating voltage, 1000hours	22	0
High Temperature Storage Life	Ta=150°C, 1000hours	22	0
Temperature Humidity Bias *1	Ta=85°C, 85%RH, max operating voltage, 1000hours	22	0
Electrostatic Discharge (HBM)	C=100pF, R=1.5kΩ, 1 time, ±2000V	5	0
Electrostatic Discharge (CDM)	±500V (Corner pins : ±750V)	5	0
Latch-Up	I=±100mA	5	0

*1 Pre-Conditioning：125°C/24h → 85°C/85%RH/168h → (Air) Reflow (260°C max, 255°C, 30sec., 3times)

・Calculation method of standard failure rate

Operating reliability is decided by inherent reliability of device and environment condition of use (See below).

・Calculation method of standard failure reta (λ)

$$\lambda = \lambda b \times \pi T \quad \text{(fit)}$$

②Temperature parameter

①Basic failure rate

①Basic failure rate(λb)

DEVICE: UPD166031AT1U-AY λb: 0.7 (fit)

②Temperature parameter(πT)

$$\pi T = \exp\left(11600 \times Ea \times \left(\frac{1}{273+55} - \frac{1}{273+Ta}\right)\right)$$

Ea：0.7eV (Activation energy)
Ta：ambient temperature

πT simplified chart										
Ta(j)	40	55	60	65	70	75	80	90	100	110
πT	0.31	1.00	1.45	2.08	2.95	4.15	5.77	10.88	19.82	35.00

③MTTF（Mean Time to Failure）

$$MTTF = \frac{1}{\lambda}$$

・Confidence level 60% ・Standard temperature Ta = 55°C for LSI devices