

Product Reliability Report

For

RT9728B

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HTOL Test Report

Purpose

The purpose of this specification is to demonstrate the quality or reliability of device RT9728B subjects to the specified conditions over an extended time period and determines this device is capable of passing the specified stress tests to meet Richtek quality criteria.

Scope

The test report is applicable for qualification products of RT9728B.

Product Information

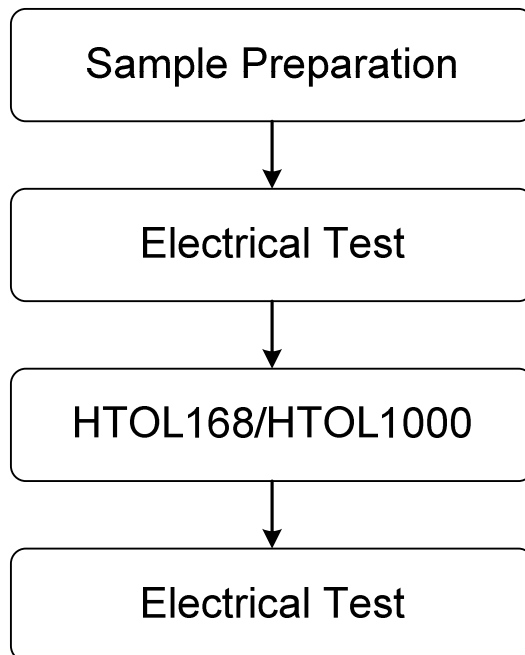
- Part No : RT9728B
- Date Code : CCF2Z
- Package Type : SOT-23-6

Test Items and Conditions

High Temperature Operation Life Test (HTOL)

- Reference Standard : JESD22-A108
- Test Condition : $T_a=125^{\circ}\text{C}$, $V_{IN}=6.5\text{V}$
- Test Time : 1000 hours
- Sample Size : 77 ea

Test Flow



Test Result

Test Item	Test Time	Sample Size	Fail	Failure Rate (λ) FITs, CL 60%	Failure Rate (λ) FITs, CL 90%
HTOL	1000 hrs	77	0	14.14	35.54

FIT and MTTF

Test condition: $T_a=125^{\circ}\text{C}$, $V_{IN}=6.5\text{V}$

Field application temperature (T_{field}): 50°C

Field application voltage (V_{field}): $V_{IN}=5.5\text{V}$

$$AF_T = \exp[(E_a/K) * (1/T_{\text{field}} - 1/T_{\text{stress}})]$$

$$= 113.89 \text{ (} E_a \text{ is conservative value)}$$

$$AF_V = \exp[C * (V_{\text{stress}} - V_{\text{field}})] = 7.39$$

$$AF = AF_T * AF_V = 841.51$$

Failure Rate (λ)

$$= [X^2 / (2 * N * D * A)] * 10^9 \text{ FITs}$$

$$= 35.54 \text{ FITs at 90\% confidence level}$$

$$= 14.14 \text{ FITs at 60\% confidence level}$$

$$MTTF = 1/\lambda = 2.81 * 10^7 \text{ hours} = 3,208 \text{ years (at 90\% confidence level)}$$

$$MTTF = 1/\lambda = 7.07 * 10^7 \text{ hours} = 8,071 \text{ years (at 60\% confidence level)}$$

- AF = Acceleration Factor
- E_a = Activation Energy (eV)
- K = Boltzman's Constant ($8.62 \times 10^{-5} \text{ eV/K}$)
- T = Temperature (K)
- V = Voltage (V)
- T_{field} = Temperature Field Conditions
- T_{stress} = Temperature Stress Conditions
- C = Constant of Voltage Acceleration Factor
- V_{field} = Voltage Field Conditions
- V_{stress} = Voltage Stress Conditions
- X^2 = Chi-square Distribution Function
- N = Sample Size
- D = Device Hours

HTOL Summary

The test results can be applied to all of the products that include RT9728B.

ESD Test Report

Purpose

The ESD tests are used to classify the electrostatic discharge of microcircuits.

Scope

The test report is applicable for qualification products of RT9728B.

Product Information

- Part No : RT9728B
- Date Code : CCF2Z
- Package Type : SOT-23-6

Test Items and Conditions

- Reference Standard : JESD22-A114 (HBM)
: JESD22-A115 (MM)
: JESD22-C101 (CDM)
- Sample Size : 3ea/voltage
- Failure Criteria : All test samples must pass both diode I-V and function test.

Diode I-V Test Criteria

Criteria	Pass	Fail (Leak)	Fail (Short)
I-V behavior ΔV_{ref} at 1uA	$\Delta V_{ref} < 30\%$	$\Delta V_{ref} > 30\%$	No diode curve (I-V turns linear)

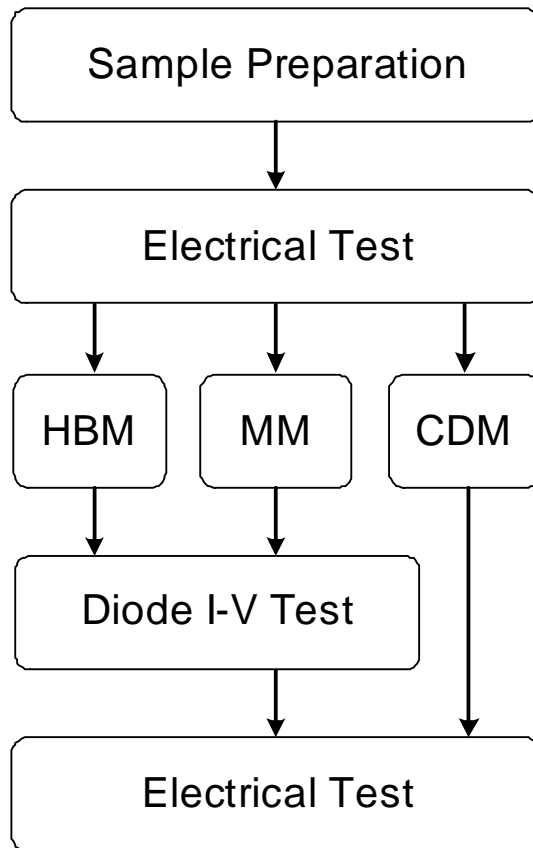
● Classification Criteria

Classification	Class 0	Class 1			Class 2	Class 3	
		A	B	C		A	B
HBM	< 250V	250V~ 500V	500V~ 1000V	1000V~ 2000V	2000V~ 4000V	4000~ 8000V	>8000V

Classification	Class A	Class B	Class C
MM	< 200V	200V~ 400V	> 400V

Classification	Class I	Class II	Class III	Class IV
CDM	< 200V	200V~ 500V	500V~ 1000V	$\geq 1000V$

Test Flow



Test Results

HBM: 4000 V MM: 200 V CDM: 2000 V

ESD Summary

- Classification: HBM: Class 2 MM: Class B CDM: Class IV
- The test results can be applied to all of the products that include RT9728B.

Latch-up Test Report

Purpose

The latch-up test is used to check IC latch-up characteristics.

Scope

The test report is applicable for qualification products of RT9728B.

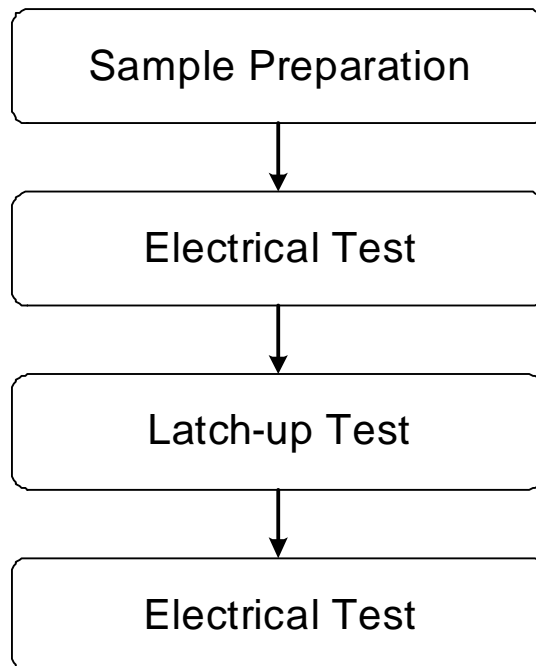
Product Information

- Part No : RT9728B
- Date Code : CCF2Z
- Package Type : SOT-23-6

Test Items and Conditions

- Reference Standard : JESD78D
- Test Conditions : $\pm 100\text{mA}$ current trigger
1.5 X max. V_{supply} or MSV whichever is less
- Sample Size : 9 ea
- Failure Criteria : If absolute I_{nom} is $\leq 25\text{ mA}$, absolute $I_{\text{nom}} + 10\text{mA}$ is applied.
: If absolute I_{nom} is $> 25\text{mA}$, $> 1.4\text{ X}$ absolute I_{nom} is applied.

Test Flow



Test Result

Test Type	Test Pins	Sample Size	Pass/Fail Result	Failure Criteria
(+) IT	EN(/EN) /FAULT ILIM VOUT	3	Pass	1.4 X Inom or Inom +10mA whichever is greater
(-) IT	EN(/EN) /FAULT ILIM VOUT	3	Pass	
Vsupply Overvoltage Test	VIN	3	Pass	

Latch-up Summary

- The test results can be applied to all of the products that include RT9728B.
- Any questions or inquiries for regarding related products or service of Richtek, you may contact us through our technical support center.
(<http://www.richtek.com/contact10.1.jsp>)