

Am29DL162D

CS 4054, 4056

Qualification of: Am29DL162D, 16 Megabit (2 Mbit x 8-bit/1 M x 16-bit),
3 Volt-only, Simultaneous Read/Write Flash Memory



Reliability Qualification Summary

CONFIDENTIAL

NOTICE: The material in this report is confidential. It is prepared to assist in the qualification of our product. It is declassified for the internal use of our customers only, and may be modified to meet the needs of specific customers. It also serves as a record of full qualification according to JESD47 and AEC-Q100 Grade 1 requirements.

Additionally, the package details (material set, assembly location, etc.) are specific to the qual vehicle used for the qualification. Alternate material sets and assembly locations may be qualified for the product. Production material can be assembled with any qualified material set and at any qualified assembly location. Tests are performed in accordance with AEC-Q100 and relevant JEDEC specifications.

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I.A. Product Information

Product Description: Am29DL162D

16 Megabit (2 Mbit x 8-bit/1 M x 16-bit), 3 Volt-only, Simultaneous Read/Write Flash Memory

Package: TS048

Qualification: 4054

Description: (18.4 x 12.0 x 1.1mm) 48 Lead, Thin Small Outline Package (TSOP)

Theta Ja: 40 °C/W

Psi Jt: °C/W

Assembly Location: Spansion KL, Spansion BKK

Molding Compound: RoHS Compliant Epoxy Resin

Substrate/Leadframe: Laminate Substrate

Die Attachment: Paste

Lead Finish: SnPb Plating

Bond Wire: Gold

Comments: The material set has been updated to reflect current production material.

Est. Field Temperature: 55 °C

Life Test Temperature: 150 °C

Est. DC Field Current: 21 mA

Life Test Dynamic Current: 9 mA

Est. Field Voltage: 3.0 V

Life Test Voltage: 3.6 V

Est. Field Power Dissipation: 63 mWatts

Est. Stress Power Dissipation: 32.4 mWatts

Est. Field Tj: 57.5 °C

Est. Stress Tj: 151.2 °C

Die: 98K12AT

Die Size: 4.78 x 6.10 mm

Process: CS49S (230nm)

Fab: FSET

Type: Floating Gate

Density: 16M

I.B. Product Information

Product Description: Am29DL162D

16 Megabit (2 Mbit x 8-bit/1 M x 16-bit), 3 Volt-only, Simultaneous Read/Write Flash Memory

Package: FBC048

Qualification: 4056

Description: (9.0 x 8.0 x 1.2mm) 48 Ball, Fine Pitch Ball Grid Array Package (FBGA)

Theta Ja: 39 °C/W

Psi Jt: °C/W

Assembly Location: Spansion Penang

Molding Compound: RoHS Compliant Epoxy Resin

Substrate/Leadframe: Laminate Substrate

Die Attachment: Paste

Lead Finish: 63Sn37Pb Spheres

Bond Wire: Gold

Comments: The material set has been updated to reflect current production material.

Est. Field Temperature: 55 °C

Life Test Temperature: 150 °C

Est. DC Field Current: 21 mA

Life Test Dynamic Current: 9 mA

Est. Field Voltage: 3.0 V

Life Test Voltage: 3.6 V

Est. Field Power Dissipation: 63 mWatts

Est. Stress Power Dissipation: 32.4 mWatts

Est. Field Tj: 57.4 °C

Est. Stress Tj: 151.2 °C

Die: 98K12AT

Die Size: 4.78 x 6.10 mm

Process: CS49S (230nm)

Fab: FSET

Type: Floating Gate

Density: 16M

II. CS49S/LS Life Test Failure Rate Calculation

HTOL Stress Temperature - 150 °C

| Failure Mechanism | Read Points / Test Results | | | Modeling Parameters @ 55°C | | | | | Avg. Failure Rate FITS @ 55°C, 60% Conf. | |
|-----------------------------|----------------------------|---------|----------|----------------------------|-----|-----|-----|------------|--|---------------|
| | 24 hrs | 168 hrs | 1000 hrs | Ea eV | TAF | VAF | OAF | MTTF (yrs) | Early Life | Inherent Life |
| PLASTIC | | | | | | | | | | |
| Sample Size | 3412 | 3129 | 504 | | | | | | | |
| Zero fails, Process ave. Ea | 0 * | 0 | 0 | 0.66 | 152 | 1 | 152 | | 68 | 6 |
| Totals | 0 | 0 | 0 | | | | | 19026 | 68 | 6 |

* Contributes to early life FITS

Data Retention Bake - 150 °C

| Reliability Stress | Number of Rejects | Sample Size | Failure Rate % | Failure Mechanism |
|--------------------|-------------------|-------------|----------------|-------------------|
| 500 hrs | 0 | 1309 | 0.00 | No Failures |
| 1000 hrs | 0 | 1309 | 0.00 | No Failures |
| 2000 hrs | 0 | 1232 | 0.00 | No Failures |

III. Summary of Stress Test Results

| Stress Test | Stress Condition | Package Type | Sample Size | Num. of Lots | Num. of Fails | Failure Rate % | Comments |
|-------------------------|-----------------------------------|---------------------|-------------|--------------|---------------|-------------------------|-------------|
| Generic Reference Data: | | | | | | | |
| HTOL (EL) | (3.6V, 150°C) | TS048 ¹ | 150 | 3 | 0 | 0.00 | 168 hours |
| HTOL (IL) | (3.6V, 150°C) | TS048 ¹ | 150 | 3 | 0 | 0.00 | 500 hours |
| HTOL (XL) | (3.6V, 150°C) | TS048 ¹ | 150 | 3 | 0 | 0.00 | 1000 hours |
| ESD HBM | (100pF, 1500 Ohms) | TS048 ¹ | 48 | 1 | Passed | 2.0kV | |
| Latch Up | (125°C, +/- 200mA) | TS048 ¹ | 5 | 1 | Passed | | |
| Endurance (10k) | (130°C, 3.6V) | TS048 ¹ | 64 | 1 | 0 | 0.00 | 10k cycles |
| Preconditioning | (PC2/240°C, +0°C/-5°C) | TS048 ¹ | 150 | 3 | Passed | Jedec L3 | |
| | (PC1/260°C, +0°C/-5°C) | TS048 ⁵ | 693 | 3 | Passed | Jedec L3 / Jeita Rank E | |
| | (PC1/260°C, +0°C/-5°C) | FBC048 ⁶ | 231 | 1 | Passed | Jedec L3 / Jeita Rank E | |
| Precon+Temp Cycle | (PC2/240°C, -40°C/150°C) | TS048 ¹ | 150 | 3 | 0 | 0.00 | 1000 cycles |
| | (PC1/260°C, -40°C/150°C) | TS048 ⁵ | 231 | 3 | 0 | 0.00 | 1000 cycles |
| | (PC1/260°C, -40°C/150°C) | FBC048 ⁶ | 77 | 1 | 0 | 0.00 | 1000 cycles |
| Precon+HAST | (PC1/260°C, Biased, 130°C/85% RH) | TS048 ⁵ | 231 | 3 | 0 | 0.00 | 96 hours |
| | (PC1/260°C, Biased, 110°C/85% RH) | FBC048 ⁶ | 77 | 1 | 0 | 0.00 | 264 hours |
| HAST | (Biased, 110°C/85% RH) | FBC048 ⁴ | 163 | 3 | 0 | 0.00 | 264 hours |
| Precon+Steam Pressure | (PC1/260°C, 121°C/100%RH/15PSIG) | TS048 ⁵ | 231 | 3 | 0 | 0.00 | 168 hours |
| | (PC1/260°C, 121°C/100%RH/15PSIG) | FBC048 ⁶ | 77 | 1 | 0 | 0.00 | 168 hours |
| Steam Pressure Pot | (121°C/100%RH / 15PSIG) | TS048 ² | 165 | 3 | 0 | 0.00 | 168 hours |
| Temp Humidity Bias | (Biased, 85°C/85% RH) | TS048 ³ | 220 | 3 | 0 | 0.00 | 1000 hours |

Notes / Justification: 1) Results from Qual 4053, Am29DL163D in 48 Lead TSOP (20 x 12 x 1mm) - Same Die, Same TSOP Package, Same Process Technology
 2) Results from Qual 4005, Am29DL161D in 0 (0 x 0 x 0mm) - Same TSOP Package, Same Process Technology
 5) Results from Qual Q06686b, S29AL008D in 48 Lead TSOP (18.4 x 12 x 1.1mm) - Same TSOP package, Updated Material Set
 6) Results from Qual 80667E, Am29LV160D in 48 Ball FBGA (9 x 8 x 1.2mm) - Same FBGA package, Updated Material Set

Preconditioning Flows: PC1 (Exceeds JEDEC L3 and JEITA Rank E): Bake 125°C, 24hr => Soak @ 30°C/70%RH, 216hr => 3x Reflow
 PC2 (JEDEC L3): Bake 125°C, 24hr => Soak @ 30°C/60%RH, 192hr => 3x Reflow

IV. Revision History

| Section | Description |
|-------------------------|------------------|
| Revision A - 11/18/2008 | Initial Release. |

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