S29AL016M

CS 4811, 4812, 4813

Qualification of: S29AL016M, 16 Megabit (2 M x 8-Bit/1 M x 16-Bit) MirrorBit® 3.0 Volt-only Boot Sector 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: S29AL016M
16 Megabit (2 M x 8-Bit/1 M x 16-Bit) MirrorBit® 3.0 Volt-only Boot Sector Flash Memory

Package:	TS048	**Qualification:**	4811
Description:	(18.4 x 12.0 x 1.0mm) 48 Lead, Thin Small Outline Package (TSOP)		
Theta Ja:	84 °C/W	**Psi Jt:**	17 °C/W
Assembly Location:	Spansion Thailand	**Molding Compound:**	RoHS Compliant Epoxy Resin
Substrate/Leadframe:	Laminate Substrate	**Die Attachment:**	Paste
Lead Finish:	SnPb Plating	**Bond Wire:**	Gold
Comments:			

Est. Field Temperature:	55 °C	**Life Test Temperature:**	150 °C
Est. DC Field Current:	40 mA	**Life Test Dynamic Current:**	5 mA
Est. Field Voltage:	3.0 V	**Life Test Voltage:**	3.6 V
Est. Field Power Dissipation:	120 mWatts	**Est. Stress Power Dissipation:**	18 mWatts
Est. Field Tj:	65.0 °C	**Est. Stress Tj:**	151.5 °C

Die:	98K31A	**Die Size:**	5.37 x 3.74 mm
Process:	CS99DB (230nm)	**Fab:**	Spansion Monden
Type:	MirrorBit	**Density:**	16M

I.B. Product Information

Product Description: S29AL016M
16 Megabit (2 M x 8-Bit/1 M x 16-Bit) MirrorBit® 3.0 Volt-only Boot Sector Flash Memory

Package:	LAA064	**Qualification:**	4812
Description:	(13.0 x 11.0 x 1.4mm) 64 Ball, Fortified Ball Grid Array Package (FBGA)		
Theta Ja:	91 °C/W	**Psi Jt:**	17 °C/W
Assembly Location:	Spansion Thailand	**Molding Compound:**	RoHS Compliant Epoxy Resin
Substrate/Leadframe:	Laminate Substrate	**Die Attachment:**	Paste
Lead Finish:	63Sn37Pb Spheres	**Bond Wire:**	Gold
Comments:			

Est. Field Temperature:	55 °C	**Life Test Temperature:**	150 °C
Est. DC Field Current:	40 mA	**Life Test Dynamic Current:**	5 mA
Est. Field Voltage:	3.0 V	**Life Test Voltage:**	3.6 V
Est. Field Power Dissipation:	120 mWatts	**Est. Stress Power Dissipation:**	18 mWatts
Est. Field Tj:	65.9 °C	**Est. Stress Tj:**	151.6 °C

Die:	98K31A	**Die Size:**	5.37 x 3.74 mm
Process:	CS99DB (230nm)	**Fab:**	Spansion Monden
Type:	MirrorBit	**Density:**	16M

I.C. Product Information

Product Description: S29AL016M
16 Megabit (2 M x 8-Bit/1 M x 16-Bit) MirrorBit® 3.0 Volt-only Boot Sector Flash Memory

Package:	FBA048	**Qualification:**	4813
Description:	(8.15 x 6.15 x 1.2mm) 48 Ball, Fine Pitch Ball Grid Array Package (FBGA)		
Theta Ja:	39 °C/W	**Psi Jt:**	11 °C/W
Assembly Location:	Spansion Thailand	**Molding Compound:**	RoHS Compliant Epoxy Resin
Substrate/Leadframe:	Laminate Substrate	**Die Attachment:**	Paste
Lead Finish:	63Sn37Pb Spheres	**Bond Wire:**	Gold
Comments:			

Est. Field Temperature:	55 °C	**Life Test Temperature:**	150 °C
Est. DC Field Current:	40 mA	**Life Test Dynamic Current:**	5 mA
Est. Field Voltage:	3.0 V	**Life Test Voltage:**	3.6 V
Est. Field Power Dissipation:	120 mWatts	**Est. Stress Power Dissipation:**	18 mWatts
Est. Field Tj:	59.6 °C	**Est. Stress Tj:**	150.7 °C

Die:	98K31A	**Die Size:**	5.37 x 3.74 mm
Process:	CS99DB (230nm)	**Fab:**	Spansion Monden
Type:	MirrorBit	**Density:**	16M

II. CS99DB 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.	
	168 hrs	1000 hrs	2000 hrs	Ea eV	TAF	VAF	OAF	MTTF (yrs)	Early Life	Inherent Life
PLASTIC										
Sample Size	974	160	96							
Zero fails, Process ave. Ea	0 *	0	0	0.66	116	1	116		56	21
Totals	**0**	**0**	**0**					**5436**	**56**	**21**

* Contributes to early life FITS

Data Retention Bake - 150 °C

Reliability Stress	Number of Rejects	Sample Size	Failure Rate %	Failure Mechanism
500 hrs	0	0		
1000 hrs	0	250	0.00	No Failures
2000 hrs	0	480	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
Data From Qualification 4811, 4812, 4813:							
ESD CDM	N/A	TS048 [1]	12	1	Passed 1.0kV		
	N/A	LAA064 [2]	12	1	Passed 1.0kV		
	N/A	FBA048 [3]	12	1	Passed 1.0kV		
ESD HBM	(100pF, 1500 Ohms)	TS048 [1]	60	1	Passed 2.0kV		
	(100pF, 1500 Ohms)	LAA064 [2]	60	1	Passed 2.0kV		
	(100pF, 1500 Ohms)	FBA048 [3]	60	1	Passed 2.0kV		
Latch Up	(125°C, +/- 100mA)	TS048 [1]	5	1	Passed		
	(125°C, +/- 100mA)	LAA064 [2]	5	1	Passed		
	(125°C, +/- 100mA)	FBA048 [3]	5	1	Passed		
Endurance (10k)	(90°C, 3.6V)	TS048 [1]	61	1	0	0.00	10k cycles
Endurance (100k)	(90°C, 3.6V)	TS048 [1]	63	1	0	0.00	100k cycles
Preconditioning	(PC2/250°C, +0°C/-5°C)	TS048 [1]	50	1	Passed Jedec L3		
	(PC2/260°C, +0°C/-5°C)	LAA064 [2]	50	1	Passed Jedec L3		
	(PC2/260°C, +0°C/-5°C)	FBA048 [3]	50	1	Passed Jedec L3		
Precon+Temp Cycle	(PC2/250°C, -40°C/150°C)	TS048 [1]	50	1	0	0.00	1000 cycles
	(PC2/260°C, -40°C/150°C)	LAA064 [2]	50	1	0	0.00	500 cycles
	(PC2/260°C, -40°C/150°C)	FBA048 [3]	50	1	0	0.00	500 cycles
Precon+TC (2.0k)	(PC2/250°C, -40°C/150°C)	TS048 [1]	50	1	0	0.00	2000 cycles

Notes / Justification:
1) Results from Qual 4811, S29AL016M, 16M CS99DB (230nm) MirrorBit in 48 Lead TSOP (18.4 x 12 x 1mm)
2) Results from Qual 4812, S29AL016M, 16M CS99DB (230nm) MirrorBit in 64 Ball fFBGA (13 x 11 x 1.4mm)
3) Results from Qual 4813, S29AL016M, 16M CS99DB (230nm) MirrorBit in 48 Ball FBGA (8.15 x 6.15 x 1.2mm)

Preconditioning Flows: PC2 (JEDEC L3): Bake 125°C, 24hr => Soak @ 30°C/60%RH, 192hr => 3x Reflow

IV. Revision History

Section	Description
Revision A - 3/9/2004	
	Initial Release.

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