

S29AL032D

CS 80640, Q99400, 7755

Qualification of: S29AL032D, 32 Megabit 3.0 Volt-only (4 M x 8-Bit/2 M x 16-Bit) Uniform Sector Flash Memory in TS040, TSO048 and VBN048 packages.



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: S29AL032D
32 Megabit 3.0 Volt-only (4 M x 8-Bit/2 M x 16-Bit) Uniform Sector Flash Memory

Package:	TS040	Qualification:	80640
Description:	(18.4 x 10.0 x 1.1mm) 40 Lead, Thin Small Outline Package (TSOP)		
Theta Ja:	40 °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:	100% Matte Sn Plating	Bond Wire:	Gold
Comments:			

Est. Field Temperature:	55 °C	Life Test Temperature:	150 °C
Est. DC Field Current:	30 mA	Life Test Dynamic Current:	4 mA
Est. Field Voltage:	3.0 V	Life Test Voltage:	3.6 V
Est. Field Power Dissipation:	90 mWatts	Est. Stress Power Dissipation:	14.4 mWatts
Est. Field Tj:	58.6 °C	Est. Stress Tj:	150.5 °C

Die:	98L20A	Die Size:	3.90 x 8.08 mm
Process:	CS49SS (200nm)	Fab:	Spansion Monden
Type:	Floating Gate	Density:	32M



I.B. Product Information

Product Description: S29AL032D
32 Megabit 3.0 Volt-only (4 M x 8-Bit/2 M x 16-Bit) Boot Sector Flash Memory

Package:	TS048	Qualification:	Q99400
Description:	(18.4 x 12.0 x 1.1mm) 48 Lead, Thin Small Outline Package (TSOP)		
Theta Ja:	40 °C/W	Psi Jt:	17 °C/W
Assembly Location:	Spansion Kuala Lumpur	Molding Compound:	RoHS Compliant Epoxy Resin
Substrate/Leadframe:	Laminate Substrate	Die Attachment:	Paste
Lead Finish:	100% Matte Sn Plating	Bond Wire:	Gold
Comments:			

Est. Field Temperature:	55 °C	Life Test Temperature:	150 °C
Est. DC Field Current:	30 mA	Life Test Dynamic Current:	4 mA
Est. Field Voltage:	3.0 V	Life Test Voltage:	3.6 V
Est. Field Power Dissipation:	90 mWatts	Est. Stress Power Dissipation:	14.4 mWatts
Est. Field Tj:	58.6 °C	Est. Stress Tj:	150.5 °C

Die:	98M57B	Die Size:	3.90 x 8.08 mm
Process:	CS119S (110nm)	Fab:	
Type:	Floating Gate	Density:	32M

I.C. Product Information

Product Description: S29AL032D
 32 Megabit 3.0 Volt-only (4 M x 8-Bit/2 M x 16-Bit) Boot Sector Flash Memory

Package:	VBN048	Qualification:	7755
Description:	(10.0 x 6.0 x 1.0mm) 48 Ball, Very Thin Fine Pitch Ball Grid Array Package (FBGA)		
Theta Ja:	39 °C/W	Psi Jt:	°C/W
Assembly Location:	Spansion Thailand	Molding Compound:	RoHS Compliant Epoxy Resin
Substrate/Leadframe:	Laminate Substrate	Die Attachment:	Paste
Lead Finish:	96.5Sn3.0Ag0.5Cu Spheres	Bond Wire:	Gold
Comments:			

Est. Field Temperature:	55 °C	Life Test Temperature:	150 °C
Est. DC Field Current:	30 mA	Life Test Dynamic Current:	4 mA
Est. Field Voltage:	3.0 V	Life Test Voltage:	3.6 V
Est. Field Power Dissipation:	90 mWatts	Est. Stress Power Dissipation:	14.4 mWatts
Est. Field Tj:	58.5 °C	Est. Stress Tj:	150.5 °C

Die:	98M57A	Die Size:	3.90 x 8.08 mm
Process:	CS49SS (200nm)	Fab:	Spansion Monden
Type:	Floating Gate	Density:	32M

II. CS49SS 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	2000 hrs	Ea eV	TAF	VAF	OAF	MTTF (yrs)	Early Life	Inherent Life
PLASTIC											
Sample Size	6300	10582	600	160							
Zero fails, Process ave. Ea	0 *	0	0	0	0.66	134	1	134		32	3
Totals	0	0	0	0					38052	32	3

* Contributes to early life FITS

Data Retention Bake - 150 °C

Reliability Stress	Number of Rejects	Sample Size	Failure Rate %	Failure Mechanism
500 hrs	0	3039	0.00	No Failures
1000 hrs	0	3056	0.00	No Failures
2000 hrs	0	1712	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 80640, Q99400, 7755:							
HTOL (EL)	(3.6V, 150°C)	TS048 ²	450	1	0	0.00	48 hours
	(3.6V, 150°C)	TS048 ²	450	1	0	0.00	168 hours
ESD CDM	N/A	TS040 ¹	15	1	Passed 1.0kV		
	N/A	TS048 ²	15	1	Passed 1.0kV		
	N/A	VCN048 ³	15	1	Passed 1.0kV		
ESD HBM	(100pF, 1500 Ohms)	TS048 ²	60	1	Passed 2.0kV		
Latch Up	(125°C, +/- 100mA)	TS048 ²	6	1	Passed		
Endurance (10k)	(25°C, 3.6V)	TS048 ²	128	1	0	0.00	10k cycles
	(90°C, 3.6V)	TS048 ²	64	1	0	0.00	10k cycles
Preconditioning	(PC2/260°C, +0°C/-5°C)	TS040 ¹	77	1	Passed Jedec L3 / Jeita Rank E		
	(PC2/260°C, +0°C/-5°C)	TS048 ²	231	1	Passed Jedec L3 / Jeita Rank E		
	(PC2/240°C, +0°C/-5°C)	VCN048 ³	153	1	Passed Jedec L3 / Jeita Rank E		
Precon+Temp Cycle	(PC1/260°C, -40°C/150°C)	TS040 ¹	77	1	0	0.00	1000 cycles
	(PC1/260°C, -40°C/150°C)	TS048 ²	77	1	0	0.00	1000 cycles
	(PC1/260°C, -40°C/150°C)	VCN048 ³	77	1	0	0.00	1000 cycles
Precon+HAST	(PC1/260°C, Biased, 130°C/85% RH)	TS048 ²	77	1	0	0.00	264 hours
Precon+Steam Pressure	(PC1/260°C, 121°C/100%RH/15PSIG)	VCN048 ³	76	1	0	0.00	168 hours
Precon+uHAST	(PC1/260°C, Unbiased, 130°C/85% RH)	TS048 ²	77	1	0	0.00	96 hours

Notes / Justification: 1) Results from Qual 80640, S29AL032D, 32M CS49SS (200nm) Floating Gate in 40 Lead TSOP (18.4 x 10 x 1.1mm)
 2) Results from Qual Q99400, S29AL032D, 32M CS119S (110nm) Floating Gate in 48 Lead TSOP (18.4 x 12 x 1mm)
 3) Results from Qual 7755, S29AL032D, 32M CS49SS (200nm) Floating Gate in 48 Ball vFBGA (10 x 6 x 1mm)

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

IV. Revision History

Section	Description
Revision A - 12/20/2010	Initial Release.

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