Cypress Semiconductor
Reliability Qualification Report

QTP# Q100820, 162110 Version *B

S27KL0641

Qualification of: S27KL0641, 64M HyperRAM, 3.0 Volt-Only in VAA024 (8 x 6 x 1mm) 24 Ball, Fine Pitch Ball Grid Array Package (FBGA)

FOR ANY QUESTIONS ON THIS REPORT, PLEASE CONTACT
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I.A. Product and Package Information

Product Description:	S27KL0641 64M HyperRAM, 3.0 Volt-Only	Cypress Division:	Memory Product Division

Package:	VAA024	QTP:	Q100820		
Description:	(8 x 6 x 1mm) 24 Ball, Fine Pitch Ball Grid Array Package (FBGA)			Flammability:	O2 Index:
Assembly:	Cypress Thailand	Molding Compound:	ShinEtsu KMC 3580LVA	UL-V0	>28
Electrical Test:	Cypress Thailand	Theta Ja / Psi Jt:	51 °C/W / 5 °C/W		
Substrate/Leadframe:	Laminate Substrate	Die Attachment:	Sumitomo CRM-1577DB		
Lead Finish:	96.5Sn3.0Ag0.5Cu Spheres	Bond Wire:	Copper		
Comments:					

Est. Field Temperature:	55 °C	Life Test Temperature:	125 °C
Est. DC Field Current:	20 mA	Life Test Dynamic Current:	35 mA
Est. Field Voltage:	3.0 V	Life Test Voltage:	3.7 V
Est. Field Power Dissipation:	60 mWatts	Est. Stress Power Dissipation:	129.5 mWatts
Est. Field Tj:	58.0 °C	Est. Stress Tj:	131.6 °C

Die:	11036A	Die Size:	2.02 x 2.91 mm
Process:	63nm	Fab:	PSC (ISSI)
Type:	HYPERRAM	Density:	64M

I.B. Product and Package Information

Product Description:	S27KL0641 64M HyperRAM, 3.0 Volt-Only	Cypress Division:	Memory Product Division

Package:	VAA024	QTP:	162110		
Description:	(8 x 6 x 1mm) 24 Ball, Fine Pitch Ball Grid Array Package (FBGA)			Flammability:	O2 Index:
Assembly:	Cypress Thailand	Molding Compound:	ShinEtsu KMC 3580LVA	UL-V0	>28
Electrical Test:	Cypress Thailand	Theta Ja / Psi Jt:	51 °C/W / 5 °C/W		
Substrate/Leadframe:	Laminate Substrate	Die Attachment:	Sumitomo CRM-1577DB		
Lead Finish:	96.5Sn3.0Ag0.5Cu Spheres	Bond Wire:	Gold		
Comments:					

Est. Field Temperature:	55 °C	Life Test Temperature:	125 °C
Est. DC Field Current:	20 mA	Life Test Dynamic Current:	35 mA
Est. Field Voltage:	3.0 V	Life Test Voltage:	3.7 V
Est. Field Power Dissipation:	60 mWatts	Est. Stress Power Dissipation:	129.5 mWatts
Est. Field Tj:	58.0 °C	Est. Stress Tj:	131.6 °C

Die:	11036A	Die Size:	2.02 x 2.91 mm
Process:	63nm	Fab:	PSC (ISSI)
Type:	HYPERRAM	Density:	64M

II. 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 Q100820, 162110:							
ESD CDM	N/A	VAA024 [1]	15	1	Passed 1.0kV		
	N/A	VAA024 [2]	15	1	Passed 1.0kV		
ESD HBM	(100pF, 1500 Ohms)	VAA024 [1]	108	1	Passed 2.0kV		
Preconditioning	(PC2/260°C, +0°C/-5°C)	VAA024 [1]	154	1	Passed Jedec L3		
	(PC2/260°C, +0°C/-5°C)	VAA024 [2]	154	1	Passed Jedec L3		
Precon+Temp Cycle	(PC2/260°C, -40°C/150°C)	VAA024 [1]	75	1	0	0.00	1000 cycles
	(PC2/260°C, -40°C/150°C)	VAA024 [2]	77	1	0	0.00	500 cycles
Precon+HAST	(PC2/260°C, Biased, 110°C/85% RH)	VAA024 [1]	77	1	0	0.00	264 hours
	(PC2/260°C, Biased, 110°C/85% RH)	VAA024 [2]	77	1	0	0.00	96 hours

Generic Reference Data:

ELFR	(3.7V, 125°C)	[3]	3750	3	0	0.00	48 hours
HTOL (EL)	(3.7V, 125°C)	[3]	77	1	0	0.00	168 hours
HTOL (IL)	(3.7V, 125°C)	[3]	231	3	0	0.00	1000 hours
High Temp Bake	(150°C)	[3]	135	3	0	0.00	1000 hours
	(200°C)	FAE025 [4]	231	3	0	0.00	500 hours
	(150°C)	FAE025 [4]	230	3	0	0.00	1000 hours
ESD CDM	N/A	[3]	3	1	Passed 750V		
	N/A	FAE025 [4]	45	3	Passed 1.0kV		
	N/A	VAA024 [5]	15	1	Passed 1.0kV		
ESD HBM	(100pF, 1500 Ohms)	[3]	5	1	Passed 2.0kV		
	(100pF, 1500 Ohms)	VAA024 [5]	14	1	Passed 2.0kV		
Latch Up	(+/- 100mA)	[3]	12	2	Passed		
	(+/- 140mA)	VAA024 [5]	9	1	Passed		
Preconditioning	(PC2/260°C, +0°C/-5°C)	FAE025 [4]	1001	7	Passed Jedec L3		
Precon+Temp Cycle	(PC2/260°C, -40°C/150°C)	FAE025 [4]	231	3	0	0.00	1000 cycles
Precon+Temp Cycle (Ext.)	(PC2/260°C, -40°C/150°C)	FAE025 [4]	216	3	0	0.00	2000 cycles
Precon+HAST	(PC2/260°C, Biased, 110°C/85% RH)	FAE025 [4]	537	7	0	0.00	264 hours
Precon+HAST (Ext.)	(PC2/260°C, Biased, 110°C/85% RH)	FAE025 [4]	494	7	0	0.00	528 hours
Precon+uHAST	(PC2/260°C, Unbiased, 130°C/85% RH)	FAE025 [4]	231	3	0	0.00	96 hours
	(PC2/260°C, Unbiased, 130°C/85% RH)	FAE025 [4]	231	3	0	0.00	192 hours

Notes / Justification:
1) Results from Qual Q100820, S27KL0641, 63nm HYPERRAM in 24 Ball FBGA (8 x 6 x 1mm)
2) Results from Qual 162110, S27KL0641, 63nm HYPERRAM in 24 Ball FBGA (8 x 6 x 1mm)
3) Results from Qual ISSI HYPERRAM 11036A Supplier Data, S27KL0641 in 0 (0 x 0 x 0mm) - 11036A ISSI Supplier Data
4) Results from Qual Q100747, S27KL0641 in 25 Ball FBGA (8 x 6 x 1.15mm) - Same Product in FAE025
5) Results from Qual 160808, S27KL0641 in 24 Ball FBGA (8 x 6 x 1mm) - Same Product with Mask Set B in VAA024 package

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

Reliability Tests Performed per Specification Requirements

Stress	Condition	Specification Reference
ELFR	(3.7V, 125°C)	JESD22-A108 / AEC-Q100-008
ESD CDM	N/A	JS002 / AEC-Q100-011
ESD HBM	(100pF, 1500 Ohms)	JS001 / AEC-Q100-002
High Temp Bake	(150°C)	JESD22-A103
High Temp Bake	(200°C)	JESD22-A103
HTOL (EL)	(3.7V, 125°C)	JESD22-A108
HTOL (IL)	(3.7V, 125°C)	JESD22-A108
Latch Up	(+/- 100mA)	JESD78 / AEC Q100-004
Latch Up	(+/- 140mA)	JESD78 / AEC Q100-004
Precon+HAST	(PC2/260°C, Biased, 110°C/85% RH)	JESD22-A110
Precon+HAST (Ext.)	(PC2/260°C, Biased, 110°C/85% RH)	JESD22-A110
Precon+Temp Cycle	(PC2/260°C, -40°C/150°C)	JESD22-A104
Precon+Temp Cycle (Ext.)	(PC2/260°C, -40°C/150°C)	JESD22-A104
Precon+uHAST	(PC2/260°C, Unbiased, 130°C/85% RH)	JESD22-A118
Preconditioning	(PC2/260°C, +0°C/-5°C)	J-STD-020

III. Revision History

Document Number: 002-15850

Document Title: Q100820 & QTP#162110 : Qualification of S27KL0641 in VAA024 Package (Both Copper and Au Wire)

Rev.	Issue Date	ECN#	Originator	Description
**	8/4/2016	5391620	EKNG	Initial Release.
*A	12/28/2016	5567859	EKNG	Updated the Thermal Parameter
*B	5/2/2017	5723431	EKNG	Corrected the FAE025 reference data