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Cypress Semiconductor
Product Qualification Report

QTP# 100802 VERSION*D
October, 2014

32 Meg MoBL Devices	
RAM8NLD-1.8V, GSMC (Fab 5)	
CY62177DV30 MoBL®	**32-M (2M X 16) STATIC RAM**

FOR ANY QUESTIONS ON THIS REPORT, PLEASE CONTACT
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PRODUCT QUALIFICATION HISTORY

Qual Report	Description of Qualification Purpose	Date Comp
063901	Qualify 16Meg, MoBL Static RAM CY62167DV* device and family on RAM8NLD-1.8 Technology at GSMC Foundry (Fab 5)	Mar 07
070903	Burn-in Study using 16M MoBL SRAM, R8NLD-18 Technology at GSMC Foundry	Aug 07
100802	Qualification of 32M stacked die device 7G62171DK (two R8NLD-18 16M die) at GSMC foundry.	Oct 10

PRODUCT DESCRIPTION (for qualification)	
Qualification Purpose: Qualify 32M Stacked die 7G62171DK device, RAM8NLD-1.8 Technology at GSMC (Fab 5)	
Marketing Part #:	CY62177DV30
Device Description:	3V, Industrial available in 48-ball FBGA
Cypress Division:	Cypress Semiconductor Corporation – Memory Product Division (MPD)

TECHNOLOGY/FAB PROCESS DESCRIPTION – S4AD-5			
Number of Metal Layers:	2	Metal Composition:	Metal 1: 150 Å Ti/250 Å TiN/3500 Å Al Metal 2: 300 Å Ti/200 Å TiN/4500 Å Al/500 Å TiN
Passivation Type and Materials:			1000Å TEOS / 9000Å Si3N4
Generic Process Technology/Design Rule (µ-drawn):			0.13 µm
Gate Oxide Material/Thickness (MOS):			32Å
Name/Location of Die Fab (prime) Facility:			Grace Semiconductor-China
Die Fab Line ID/Wafer Process ID:			Fab5/RAM8NLD-1.8V

PACKAGE AVAILABILITY

PACKAGE	ASSEMBLY FACILITY SITE
48-Ball FBGA	**TAIWAN-G**

MAJOR PACKAGE INFORMATION USED IN THIS QUALIFICATION	
Package Designation:	BK48
Package Outline, Type, or Name:	48-Ball Fine Pitch Ball Grid Array (FBGA) Stacked Die
Mold Compound Name/Manufacturer:	KE-G2270
Mold Compound Flammability Rating:	V-O per UL94
Oxygen Rating Index:	NA
Substrate Material:	BT Resin
Lead Finish, Composition / Thickness:	SnAgCu
Die Backside Preparation Method/Metallization:	Backgrind
Die Separation Method:	100%
Die Attach Supplier:	Ablestik
Die Attach Material:	Die Attach 1: Ablestik 2025D Die Attach 2: QMI-536
Die Attach Method:	Epoxy
Bond Diagram Designation:	001-04056
Wire Bond Method:	Thermosonic
Wire Material/Size:	Au. 1.0mil
Thermal Resistance Theta JA °C/W:	57.53 °C/W
Package Cross Section Yes/No:	N/A
Assembly Process Flow:	001-04289
Name/Location of Assembly (prime) facility:	Taiwan-G
MSL Level	3
Reflow Profile	260C

ELECTRICAL TEST / FINISH DESCRIPTION	
Test Location:	CML-R

RELIABILITY TESTS PERFORMED PER SPECIFICATION REQUIREMENT

Stress/Test	Test Condition (Temp/Bias)	Result P/F
High Temperature Operating Life Early Failure Rate	Dynamic Operating Condition, Vcc Max = 2.35V, 125 ºC Dynamic Operating Condition, Vcc Max = 2.4V, 125 ºC JESD22-A108	P
High Temperature Operating Life Latent Failure Rate	Dynamic Operating Condition, Vcc Max = 2.35V, 150 ºC JESD22-A108	P
High Temperature Steady State Life Test	Static Operating Condition, Vcc Max = 2.35V, 150 ºC JESD22-A108	P
Low Temperature Operating Life Test	Dynamic Operating Condition, Vcc Max = 2.35V, -30 ºC, f=4MHz JESD22-A108	P
High Accelerated Saturation Test (HAST)	JEDEC STD 22-A110: 130 ºC, 3.63V, 85%RH Precondition: JESD22 Moisture Sensitivity MSL 3 192 Hrs, 30 ºC /60%RH, 220 ºC Reflow	P
Temperature Cycle	MIL-STD-883, Method 1010, Condition C, -65 ºC to 150 ºC Precondition: JESD22 Moisture Sensitivity MSL 3 192 Hrs, 30 ºC /60%RH, 220 ºC Reflow	P
Pressure Cooker	JESD22-A102: 121 ºC , 100%RH, 15 Psig Precondition: JESD22 Moisture Sensitivity MSL 3 192 Hrs, 30 ºC /60%RH, 220 ºC Reflow	P
Acoustic Microscopy	J-STD-020 Precondition: JESD22 Moisture Sensitivity MSL 3 192 Hrs, 30 ºC /60%RH, 220 ºC Reflow	P
Age Bond	MIL-STD 883, Method 2011	P
Current Density	Meets the Technology Device Level Reliability Specifications	P
Electrostatic Discharge Human Body Model (ESD-HBM)	2,200V JEDEC EIA/JESD22-A114	P
Electrostatic Discharge Charge Device Model (ESD-CDM)	500V JESD22-C101	P
High Temperature Storage	JESD22-A103, 150 ºC, no bias	P
Static Latch-up	125 ºC, ± 200Ma/ ± 140Ma JESD78	P

RELIABILITY FAILURE RATE SUMMARY

Stress/Test	Device Tested/ Device Hours	# Fails	Activation Energy	Thermal AF [1,3]	Failure Rate[4]
High Temperature Operating Life Early Failure Rate	10,614 Devices	2	N/A	N/A	188 PPM
High Temperature Operating Life[1,2,] Long Term Failure Rate	360,820 DHRs	0	0.7	170	15 FITs

[1] Assuming an ambient temperature of 55 ºC and a junction temperature rise of 15 ºC.
[2] Chi-squared 60% estimations used to calculate the failure rate.
[3] Thermal Acceleration Factor is calculated from the Arrhenius equation
[4] Fit rate calculation based on limited sample size and device hours

$$AF = \exp\left[\frac{E_A}{k}\left[\frac{1}{T_2} - \frac{1}{T_1}\right]\right]$$

where:

E_A =The Activation Energy of the defect mechanism.
K = Boltzmann's constant = 8.62×10^{-5} Ev/Kelvin.
T_1 is the junction temperature of the device under stress and T_2 is the junction temperature of the device at use conditions.

Reliability Test Data

QTP #: 063901

Device	Fab Lot #	Assy Lot #	Assy Loc	Duration	Samp	Rej	Failure Mechanism
STRESS: ACOUSTIC-MSL3							
CY62167DV30LL (7G62162DK)	9649742	*610673573*	*TAIWN-G*	COMP	15	0	
CY62167DV30LL (7G62162DK)	9650743	*610675172*	*TAIWN-G*	COMP	15	0	
CY62167DV30LL (7G62162DK)	9703749	*610704375*	*TAIWN-G*	COMP	15	0	
STRESS: AGE BOND							
CY62167DV30LL (7G62162DK)	9649742	*610673573*	*TAIWN-G*	COMP	10	0	
CY62167DV30LL (7G62162DK)	9650743	*610675172*	*TAIWN-G*	COMP	10	0	
CY62167DV30LL (7G62162DK)	9703749	*610704375*	*TAIWN-G*	COMP	10	0	
STRESS: ESD-CHARGE DEVICE MODEL, 500V							
CY62167DV30LL (7G62162DK)	9649742	*610673573*	*TAIWN-G*	COMP	9	0	
CY62167DV30LL (7G62162DK)	9650743	*610675172*	*TAIWN-G*	COMP	9	0	
CY62167DV30LL (7G62162DK)	9703749	*610704375*	*TAIWN-G*	COMP	9	0	
STRESS: ESD-HUMAN BODY CIRCUIT PER JEDEC EIA/JESD22-A114, 2,200V							
CY62167DV30LL (7G62162DK)	9649742	*610673573*	*TAIWN-G*	COMP	8	0	
CY62167DV30LL (7G62162DK)	9650743	*610675172*	*TAIWN-G*	COMP	8	0	
CY62167DV30LL (7G62162DK)	9703749	*610704375*	*TAIWN-G*	COMP	8	0	
STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-EARLY FAILURE RATE, 125C, 2.35V, Vcc Max							
CY62167DV30LL (7G62162DK)	9649742	*610673573*	*TAIWN-G*	96	1540	1	LICON-Poly Narrow Spacing[1]
CY62167DV30LL (7G62162DK)	9650743	*610675172*	*TAIWN-G*	96	961	0	
CY62167DV30LL (7G62162DK)	9650743	*610675324*	*TAIWN-G*	96	257	0	
CY62167DV30LL (7G62162DK)	9650743	*610703289*	*TAIWN-G*	96	252	0	
CY62167DV30LL (7G62162DK)	9703749	*610704375*	*TAIWN-G*	96	996	0	
CY62167DV30LL (7G62162DK)	9703749	*610704375*	*TAIWN-G*	96	812	1	Particle Defect[2]

1. CAR#200710021.1- process fix to increase LICON-Poly space, QTP# 071203 passed EFR and objective spec audit.

2. CAR# 200710033.1 – test program improvement to screen out random particle defect.

Reliability Test Data

QTP #: 063901

Device	Fab Lot #	Assy Lot #	Ass Loc	Duration	Samp	Rej	Failure Mechanism
STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-LATENT FAILURE RATE, 150C, 2.35V, Vcc Max							
CY62167DV30LL (7G62162DK)	9649742	*610673573*	*TAIWN-G*	80	500	0	
CY62167DV30LL (7G62162DK)	9649742	*610673573*	*TAIWN-G*	500	500	0	
CY62167DV30LL (7G62162DK)	9650743	*610675172*	*TAIWN-G*	80	495	0	
CY62167DV30LL (7G62162DK)	9650743	*610675172*	*TAIWN-G*	500	491	0	
CY62167DV30LL (7G62162DK)	9703749	*610704375*	*TAIWN-G*	500	150	0	
STRESS: HIGH TEMP STEADY STATE LIFE TEST, 150C, 2.35V, Vcc Max							
CY62167DV30LL (7G62162DK)	9649742	*610673573*	*TAIWN-G*	80	80	0	
CY62167DV30LL (7G62162DK)	9649742	*610673573*	*TAIWN-G*	168	80	0	
STRESS: LOW TEMPERATURE OPERATING LIFE TEST, -30C, 2.35V, Vcc Max							
CY62167DV30LL (7G62162DK)	9649742	*610673573*	*TAIWN-G*	500	45	0	
STRESS: HIGH TEMPERATURE STORAGE, 150C, no bias							
CY62167DV30LL (7G62162DK)	9649742	*610673573*	*TAIWN-G*	500	50	0	
CY62167DV30LL (7G62162DK)	9649742	*610673573*	*TAIWN-G*	1000	50	0	
STRESS: HI-ACCEL SATURATION TEST, 130C, 85%RH, 3.6V, PRE COND 192 HR 30C/60%RH, MSL3							
CY62167DV30LL (7G62162DK)	9649742	*610673573*	*TAIWN-G*	128	44	0	
CY62167DV30LL (7G62162DK)	9650743	*610675172*	*TAIWN-G*	128	44	0	
CY62167DV30LL (7G62162DK)	9703749	*610704375*	*TAIWN-G*	128	45	0	
STRESS: PRESSURE COOKER TEST, 121C, 100%RH, 15 Psig, PRE COND 192 HR 30C/60%RH, MSL3							
CY62167DV30LL (7G62162DK)	9649742	*610673573*	*TAIWN-G*	168	44	0	
CY62167DV30LL (7G62162DK)	9650743	*610675172*	*TAIWN-G*	168	45	0	
CY62167DV30LL (7G62162DK)	9650743	*610675172*	*TAIWN-G*	288	45	0	
CY62167DV30LL (7G62162DK)	9703749	*610704375*	*TAIWN-G*	168	48	0	

Reliability Test Data

QTP #: 063901

Device	Fab Lot #	Assy Lot #	Ass Loc	Duration	Samp	Rej	Failure Mechanism
STRESS: TC COND. C -65C TO 150C, PRE COND 192 HRS 30C/60%RH, MSL3							
CY62167DV30LL (7G62162DK)	9649742	*610673573*	*TAIWN-G*	300	43	0	
CY62167DV30LL (7G62162DK)	9649742	*610673573*	*TAIWN-G*	500	43	0	
CY62167DV30LL (7G62162DK)	9649742	*610673573*	*TAIWN-G*	1000	43	0	
CY62167DV30LL (7G62162DK)	9650743	*610675172*	*TAIWN-G*	300	43	0	
CY62167DV30LL (7G62162DK)	9650743	*610675172*	*TAIWN-G*	500	43	0	
CY62167DV30LL (7G62162DK)	9650743	*610675172*	*TAIWN-G*	1000	43	0	
CY62167DV30LL (7G62162DK)	9703749	*610704375*	*TAIWN-G*	300	44	0	
CY62167DV30LL (7G62162DK)	9703749	*610704375*	*TAIWN-G*	500	44	0	
STRESS: STATIC LATCH-UP TESTING, 125C, 6.5V, ±200Ma							
CY62167DV30LL (7G62162DK)	9649742	*610673573*	*TAIWN-G*	COMP	3	0	
CY62167DV30LL (7G62162DK)	9650743	*610675172*	*TAIWN-G*	COMP	3	0	
CY62167DV30LL (7G62162DK)	9703749	*610704375*	*TAIWN-G*	COMP	3	0	

Reliability Test Data

QTP #: 070903

Device	Fab Lot #	Assy Lot #	Ass Loc	Duration	Samp	Rej	Failure Mechanism
STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-EARLY FAILURE RATE, 125C, 2.4V, Vcc Max							
CY62167DV30LL (7G62162DK)	5650002	*610720292*	*TAIWN-G*	96	2669	0	
CY62167DV30LL (7G62162DK)	5649006	*610721982*	*TAIWN-G*	96	2459	0	
CY62167DV30LL (7G62162DK)	5711005	*610730585*	*TAIWN-G*	96	668	0	

Reliability Test Data

QTP #: 100802

Device	Fab Lot #	Assy Lot #	Assy Loc	Duration	Samp	Rej	Failure Mechanism
STRESS: ESD-CHARGE DEVICE MODEL, 500V							
CY62177D (7G62172DK)	4014607	*611031925*	*TAIWN-G*	COMP	9	0	
STRESS: ESD-HUMAN BODY CIRCUIT PER JEDEC EIA/JESD22-A114, 2,200V							
CY62177D (7G62172DK)	4014607	*611031925*	*TAIWN-G*	COMP	8	0	
STRESS: STATIC LATCH-UP TESTING, 125C, 504V, ±140Ma							
CY62177D (7G62172DK)	4014607	*611031925*	*TAIWN-G*	COMP	6	0	
STRESS: E-TEST YIELD							
CY62177D (7G62172DK)	4014607	*N/A*	*TAIWN-G*	COMPARABLE			
STRESS: SORT YIELD							
CY62177D (7G62172DK)	4014607	*N/A*	*TAIWN-G*	COMPARABLE			
STRESS: CLASS YIELD							
CY62177D (7G62172DK)	4014607	*N/A*	*TAIWN-G*	COMPARABLE			

Document History Page

Document Title: QTP# 100802: 32 MEG MOBL STACKED DIE (CY62177DV), RAM8NLD, GSMC (FAB 5) QUALIFICATION REPORT
Document Number: 001-63709

Rev.	ECN No.	Orig. of Change	Description of Change
**	3032233	NSR	Initial Spec Release Added QTP#100802 data in qualification report of QTP063901 (Ref. Memo HGA-647)
*A	3057361	NSR	Changed the QTP# from 063901 to 100802 on the cover page and the qual report version from 5 to 1. Changed the spec Title Deleted CY62165DV, CY62167DV, CY62167DG and CY62168DV on the cover page Remove QTP data of 070203, 071203 and 083301 Added QTP data of 070903 Modified product description on page 3 to limit for 7G62171DK only. Modified package availability on page 3. Modified package information on page 4. Modified the PPM and FIT rate data.
*B	3761768	NSR	Removed Version 1.0 in the title page. Removed Cypress reference specs in the reliability tests performed table.
*C	3986168	ILZ	Technology/Fab Process Description – Page 3 Corrected Generic Process Technology/Design Rule (µ-drawn) data from 0.15µm to 0.13µm
*D	4537251	JYF	Updated QTP title page and Reliability Tests Performed table (EFR/LFR, HTSSL, LTOL, Acoustic) for template alignment.

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