Cypress Semiconductor
Product Qualification Report

QTP# 091206 VERSION*B
January, 2015

16 Meg MoBL SRAM Family Technology R95LD-3R, HHGrace Fab 3	
CY62167EV18 MoBL®	16-Mb (1M x 16) Static RAM
CY62167EV30 MoBL®	16-Mb (1M x 16) Static RAM
CY62168EV30 MoBL®	16-Mbit (2M x 8) Static RAM
CY62167E MoBL®	16-Mb (1M x 16) Static RAM
CY62165E MoBL®	16-Mbit (1M x 16/2Mx8) Static RAM Die

FOR ANY QUESTIONS ON THIS REPORT, PLEASE CONTACT
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QUALIFICATION HISTORY

QTP Number	Description of Qualification Purpose	Date Comp
091206	R95LD-3R Technology and 16M Micro Power Asynchronous SRAM Family Product Transfer from CMI to GSMC Qualification	Dec 2010

PRODUCT DESCRIPTION (for qualification)		
Qualification Purpose:	R95LD-3R Technology and 16M Micro Power Asynchronous SRAM Family Product Qualification at HHGrace Fab 3	
Marketing Part #:	CY62165E, CY62167ELL, CY62167EV30LL, CY62168EV30LL, CY62167EV18LL	
Device Description:	1.8V, 3V, 5V 16 Meg MoBL SRAM	
Cypress Division:	Cypress Semiconductor Corporation –Memory Product Division	
Overall Die (or Mask) REV Level (pre-requisite for qualification):		Rev. A
What ID markings on Die:	7C62165F	

TECHNOLOGY/FAB PROCESS DESCRIPTION – LL65P-18R			
Number of Metal Layers:	2	Metal Composition:	Metal 1: Ti/TiN/Al/Ti/TiN: 150/250/3200/90/500 Å Metal2: TiN/Al/TiN: 500/6500/250Å
Passivation Type and Materials:			1000A TEOS/ 9000A Nitride
Free Phosphorus contents in top glass layer(%):			9%
Number of Transistors in Device			~98 million
Number of Logic Gates in Device			~19 million
Generic Process Technology/Design Rule (-drawn):			CMOS, Double Metal, 0.09µm
Gate Oxide Material/Thickness (MOS):			SiO2 /28A
Name/Location of Die Fab (prime) Facility:			HHGrace Fab 3, Shanghai, China
Die Fab Line ID/Wafer Process ID:			HHGrace Fab 3/R95LD-3R

PACKAGE AVAILABILITY

PACKAGE	ASSEMBLY SITE FACILITY
48 lead TSOP1 **48 Ball FBGA**	**OSE – Taiwan** **CML – RA**

Note: Package Qualification details upon request

MAJOR PACKAGE INFORMATION USED IN THIS QUALIFICATION	
Package Designation:	BZ48A
Package Outline, Type, or Name:	48 Ball FBGA
Mold Compound Name/Manufacturer:	KEG-2270 / Kyocera
Mold Compound Flammability Rating:	UL-94 V-0
Substrate Material:	SUB2482B
Lead Finish, Composition / Thickness:	SnAgCu
Die Backside Preparation Method/Metallization:	Grinding
Die Separation Method:	Saw
Die Attach Supplier:	Henkel
Die Attach Material:	QMI-506
Die Attach Method:	Epoxy
Bond Diagram Designation:	001-46698
Wire Bond Method:	Thermosonic
Wire Material/Size:	Au, 0.8 mil
Thermal Resistance Theta JA °C/W:	26.49 ^{0}C/W
Package Cross Section Yes/No:	N/A
Assembly Process Flow:	11-20034
Name/Location of Assembly (prime) facility:	CML-RA

ELECTRICAL TEST / FINISH DESCRIPTION	
Test Location:	CML-R

Note: Please contact a Cypress Representative for other packages availability

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 = 1.85V, 125℃ JESD22-A108	P
High Temperature Operating Life Latent Failure Rate	Dynamic Operating Condition, Vcc Max = 1.85V, 125℃ JESD22-A108	P
Pre/Post LFR AC/DC Char	AC/DC Critical Parameter Char at LFR 168hrs & 1000hrs	P
High Temperature Steady State Life	Static Operating Condition, Vcc Max= 1.75V, 125℃ JESD22-A108	P
Low Temperature Operating Life	Dynamic Operating Condition, Vcc = 2.0V, -30℃ JESD22-A108	P
High Accelerated Saturation Test (HAST)	JEDEC STD 22-A110: 110°C, 3.63V, 85%RH Precondition: JESD22 Moisture Sensitivity MSL 3 192 Hrs, 30°C/60%RH+ Reflow, 260°C+0, -5°C	P
Temperature Cycle	MIL-STD-883, Method 1010, Condition C, -65°C to 150°C Precondition: JESD22 Moisture Sensitivity MSL 3 192 Hrs, 30°C/60%RH+ Reflow, 260°C+0, -5°C	P
Pressure Cooker	JESD22-A102: 121°C, 100%RH, 15 Psig Precondition: JESD22 Moisture Sensitivity MSL 3 192 Hrs, 30°C/60%RH+ Reflow, 260°C+0, -5°C	P
High Temperature Storage	JESD22-A103: 150°C, no bias	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
Soft Error (Alpha Particle)	JESD89	P
Age Bond Strength	200°C, 4HRS MIL-STD-883, Method 883-2011	P
Acoustic Microscopy	J-STD-020 Precondition: JESD22 Moisture Sensitivity MSL 3 192 Hrs, 30°C/60%RH+ Reflow, 260°C+0, -5°C	P
Dynamic Latchup	JESD78	P
Static Latch Up	125C, ± 140Ma JESD78	P

RELIABILITY FAILURE RATE SUMMARY

Stress/Test	Device Tested/ Device Hours	# Fails	Activation Energy	Thermal AF[3]	Failure Rate
High Temperature Operating Life Early Failure Rate	6,651 Devices	1	N/A	N/A	150 PPM
High Temperature Operating Life[1,2] Long Term Failure Rate (125 C)	1,196,000 DHRs	1	0.7	55	31 FIT

[1] Assuming an ambient temperature of 55 C and a junction temperature rise of 15 C.
[2] Chi-squared 60% estimations used to calculate the failure rate..
[3] Thermal Acceleration Factor is calculated from the Arrhenius equation

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

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 #: 091206

Device	Fab Lot #	Assy Lot #	Ass Loc	Duration	Samp	Rej	Failure Mechanism
STRESS: ACOUSTIC, MSL3							
CY621675EV18 (7C621675F)	4019849/ 4019629	611031802	CML-RA	COMP	15	0	
CY621675EV18 (7C621675F)	4026715	611034391	CML-RA	COMP	15	0	
CY621675EV18 (7C621675F)	4031243/ 4035508	611047064	CML-RA	COMP	15	0	
STRESS: AGE BOND STRENGTH							
CY621675EV18 (7C621675F)	4019849/ 4019629	611031802	CML-RA	COMP	3	0	
CY621675EV18 (7C621675F)	4026715	611034391	CML-RA	COMP	3	0	
CY621675EV18 (7C621675F)	4031243/ 4035508	611047064	CML-RA	COMP	3	0	
STRESS: DYNAMIC LATCH-UP, 8.6V							
CY621675EV18 (7C621675F)	4019849/ 4019629	611031802	CML-RA	COMP	3	0	
STRESS: ESD-HUMAN BODY CIRCUIT PER JEDEC EIA/JESD22-A114-B, 2,200V							
CY621675EV18 (7C621675F)	4019849/ 4019629	611031802	CML-RA	COMP	8	0	
CY621675EV18 (7C621675F)	4026715	611034391	CML-RA	COMP	8	0	
CY621675EV18 (7C621675F)	4031243/ 4035508	611047064	CML-RA	COMP	8	0	
STRESS: ESD-CHARGE DEVICE MODEL, 500V							
CY621675EV18 (7C621675F)	4019849/ 4019629	611031802	CML-RA	COMP	9	0	
CY621675EV18 (7C621675F)	4026715	611034391	CML-RA	COMP	9	0	
CY621675EV18 (7C621675F)	4031243/ 4035508	611047064	CML-RA	COMP	9	0	

Reliability Test Data

QTP #: 091206

Device	Fab Lot #	Assy Lot #	Ass Loc	Duration	Samp	Rej	Failure Mechanism
STRESS: HI-ACCEL SATURATION TEST, 110C, 85%RH, 3.63V, PRE COND 192 HR 30C/60%RH, MSL3							
CY621675EV18 (7C621675F)	4019849/ 4019629	611031802	CML-RA	264	75	0	
CY621675EV18 (7C621675F)	4026715	611034391	CML-RA	264	80	0	
CY621675EV18 (7C621675F)	4026715	611034391	CML-RA	528	79	0	
CY621675EV18 (7C621675F)	4031243/ 4035508	611047064	CML-RA	264	79	0	
STRESS: HIGH TEMPERATURE STORAGE, PLASTIC, 150C							
CY621675EV18 (7C621675F)	4019849/ 4019629	611031802	CML-RA	500	80	0	
CY621675EV18 (7C621675F)	4019849/ 4019629	611031802	CML-RA	1000	80	0	
STRESS: HIGH TEMP STEADY STATE LIFE TEST, 125C, 1.75V, Vcc Max							
CY621675EV18 (7C621675F)	4019849/ 4019629	611031803	CML-RA	168	80	0	
CY621675EV18 (7C621675F)	4019849/ 4019629	611031803	CML-RA	336	80	0	
STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-EARLY FAILURE RATE, 125ºC, 1.85V, Vcc Max							
CY621675EV18 (7C621675F)	4019849/ 4019629	611031802	CML-RA	96	3000	0	
CY621675EV18 (7C621675F)	4026715	611034391	CML-RA	96	1455	1	ISB leakage 43Ua, TEM sample lost, FA#091206-2E1
CY621675EV18 (7C621675F)	4031243/ 4035508	611047064	CML-RA	96	2196	0	
STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-LATENT FAILURE RATE, 125ºC, 1.85V, Vcc Max							
CY621675EV18 (7C621675F)	4019849/ 4019629	611031802	CML-RA	1000	406	0	
CY621675EV18 (7C621675F)	4026715	611034391	CML-RA	1000	394	1	Metal1 defect, FA# 091206-2L2, CAR#201051002
CY621675EV18 (7C621675F)	4031243/ 4035508	611047064	CML-RA	1000	396	0	

Reliability Test Data

QTP #: 091206

Device	Fab Lot #	Assy Lot #	Ass Loc	Duration	Samp	Rej	Failure Mechanism
STRESS: LOW TEMP DYNAMIC OPERATING LIFE-LATENT FAILURE RATE, -30C, 2.0V Vcc							
CY621675EV18 (7C621675F)	4019849/ 4019629	611031803	CML-RA	500	77	0	
STRESS: PRESSURE COOKER TEST, 121C, 100%RH, 15 Psig, PRE COND 192 HR 30C/60%RH, MSL3							
CY621675EV18 (7C621675F)	4019849/ 4019629	611031802	CML-RA	168	80	0	
CY621675EV18 (7C621675F)	4026715	611034391	CML-RA	168	80	0	
CY621675EV18 (7C621675F)	4031243/ 4035508	611047064	CML-RA	168	79	0	
STRESS: Pre-/ Post HIGH TEMP DYNAMIC OPERATING LIFE-LATENT FAILURE RATE CHAR							
CY621675EV18 (7C621675F)	4019849/ 4019629	611031802	CML-RA	COMP	10	0	
CY621675EV18 (7C621675F)	4026715	611034391	CML-RA	COMP	10	0	
CY621675EV18 (7C621675F)	4031243/ 4035508	611047064	CML-RA	COMP	10	0	
STRESS: STATIC LATCH-UP TESTING, 125C, 5.94V, +/-180Ma							
CY621675EV18 (7C621675F)	4019849/ 4019629	611031802	CML-RA	COMP	9	0	
CY621675EV18 (7C621675F)	4026715	611034391	CML-RA	COMP	9	0	
CY621675EV18 (7C621675F)	4031243/ 4035508	611047064	CML-RA	COMP	9	0	
STRESS: TEMPERATURE CYCLE COND. C -65C TO 150C, PRE COND 192 HRS 30C/60%RH, MSL3							
CY621675EV18 (7C621675F)	4019849/ 4019629	611031802	CML-RA	500	80	0	
CY621675EV18 (7C621675F)	4019849/ 4019629	611031802	CML-RA	1000	80	0	
CY621675EV18 (7C621675F)	4026715	611034391	CML-RA	500	78	0	
CY621675EV18 (7C621675F)	4026715	611034391	CML-RA	1000	78	0	
CY621675EV18 (7C621675F)	4031243/ 4035508	611047064	CML-RA	500	77	0	

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QTP #: 091206

STRESS: SER – ALPHA PARTICLE, 3-TEPM, 3-VOLTAGE, @ 85C, Vcc Nom

CY621675EV18 (7C621675F)	4019849/ 4019629	611031802	CML-RA	COMP	3	0

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PERFORM

Document History Page

Document Title: QTP 091206: 16 MEG MOBL SRAM FAMILY, R95LD-3R AT FAB5 GSMC QUALIFICATION REPORT
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Rev.	ECN No.	Orig. of Change	Description of Change
**	3115592	NSR	Initial spec release.
*A	4241840	JYF	Sunset Review: Deleted Version 1.0 and updated title of QA Engineering Director to Reliability Director in QTP title page; Updated division of the device from MID to MPD;Complete re-write of Reliability Tests Performed table for template alignment.
*B	4621614	JYF	Sunset review: Updated QTP title page for template alignment; Updated fab site name (from GSMC to HHGrace Fab 3) in page 1, Product Description and Technology/Fab Process Description tables.

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