Cypress Semiconductor
Product Qualification Report

QTP# 054302 VERSION*D
February 2019

4 Meg MoBL SRAM Family R95LD-3R, Skywater	
CY62136EV18 MoBL2™ CY62137EV18 MoBL2™	2-Mbit (128K x 16) Static RAM
CY62136EV30 MoBL® CY62137EV30 MoBL™	2-Mbit (128K x 16) Static RAM
CY62138EV30 MoBL®	2-Mbit (256K x 8) Static RAM
CY62146EV18 MoBL2™ CY62147EV18 MoBL2™	4-Mbit (256K x 16) Static RAM
CY62146E MoBL® CY62146EV30 MoBL® CY62147EV30 MoBL®	4-Mbit (256K x 16) Static RAM
CY62148E MoBL® CY62148EV30 MoBL®	4-Mbit (512K x 8) Static RAM
CY62145E MoBL®	4-Mbit Static RAM Die

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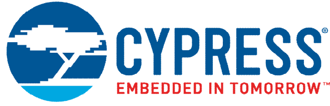
PRODUCT QUALIFICATION HISTORY

QTP Number	Description of Qualification Purpose	Date
054302	R95LD-3R, Fab 4 and New Device CY7C62xxx (4Meg) MoBL Product Family	Dec 05
134512	Qualify polyimide mask to qualified Industrial 4 Meg MoBL SRAM, R95LD-3R Technology at Skywater	Nov 13



PRODUCT DESCRIPTION (for qualification)	
Qualification Purpose: Qualify CY7C6xxx MoBL product family in qualified technology R95LD-3R, Skywater	
Marketing Part #:	CY62136/7EV18, CY62146/7EV18, CY62136/7/8EV30, CY62146/7/8EV30, CY62145/6/8E
Device Description:	1.8V, 3V, 5V 2Meg/4Meg MoBL SRAM
Cypress Division:	Cypress Semiconductor Corporation –Memory Products Division (MPD)

TECHNOLOGY/FAB PROCESS DESCRIPTION			
Number of Metal Layers:	Proprietary	Metal Composition:	Proprietary
Passivation Type and Thickness:		Proprietary	
Generic Process Technology/Design Rule (μ-drawn):		Proprietary	
Gate Oxide Material/Thickness (MOS):		Proprietary	
Name/Location of Die Fab (prime) Facility:		Skywater-- Bloomington, MN	
Die Fab Line ID/Wafer Process ID:		R95LD-3RP	

PACKAGE AVAILABILITY

PACKAGE	ASSEMBLY FACILITY SITE
36-Ball VFBGA	CML-RA
48-Ball VFBGA	CML-RA, TAIWAN ASE-ASEK
32-Lead TSOP II/RTSOP II	OSE-TAIWAN
32-Lead SOIC	JCET-China (JT)
44-Lead TSOP II	JCET-China (JT)

MAJOR PACKAGE INFORMATION USED IN THIS QUALIFICATION	
Package Designation:	ZW44
Package Outline, Type, or Name:	44-Pin Thin Small Outlined Packages (Type II)
Mold Compound Name/Manufacturer:	Hitachi CEL9200
Mold Compound Flammability Rating:	V-O per UL94
Mold Compound Alpha Emission Rate:	0.001c/cm2-h
Oxygen Rating Index:	N/A
Substrate Material:	Copper
Lead Finish, Composition / Thickness:	NiPdAu
Die Backside Preparation Method/Metallization:	Backgrind
Die Separation Method:	100% Saw Through
Die Attach Supplier:	Dexter
Die Attach Material:	QMI-509
Die Attach Method:	Epoxy
Bond Diagram Designation:	10-06259
Wire Bond Method:	Thermosonic
Wire Material/Size:	Au. 1.0mil (25um)
Package Cross Section Yes/No:	N/A
Name/Location of Assembly (prime) facility:	Cypress Philppines (CML-R)
MSL Level	3
Reflow Profile	260C

ELECTRICAL TEST / FINISH DESCRIPTION	
Test Location:	Cypress Philippines (CML-R)

Note: Please contact a Cypress Representative for other package availability.

RELIABILITY TESTS PERFORMED PER SPECIFICATION REQUIREMENTS

Stress/Test	Test Condition (Temp/Bias)	Result P/F
High Temperature Operating Life Early Failure Rate	JESD22-A108: Dynamic Operating Condition, Vcc Max = 1.85V, 125°C	P
High Temperature Operating Life Latent Failure Rate	JESD22-A108: Dynamic Operating Condition, Vcc Max = 1.85V, 125°C/150°C	P
Long Life Verification	JESD22-A108: Dynamic Operating Condition, Vcc = 1.85V, 150°C	P
High Temperature Steady State Life	JESD22-A108: Static Operating Condition, Vcc Max = 1.75V, 125°C	P
Low Temperature Operating Life	JESD22-A108: Dynamic Operating Condition, Vcc = 2.0V, -30°C	P
High Accelerated Saturation Test (HAST)	JEDEC STD 22-A110: 130°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 MIL-STD-883, Method 3015.7	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
Current Density	Meets the Technology Device Level Reliability Specifications	P
Age Bond Strength	200°C, 4HRS MIL-STD-883, Method 883-2011	P
Acoustic Microscopy	J-STD-020	P
Dynamic Latchup	JESD78	P
Static Latchup	125C, ± 140/200/300mA 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	7,338 Devices	1	N/A	N/A	136 PPM
High Temperature Operating Life[1,2] Long Term Failure Rate	676,000 DHRs	1	0.7	170	19 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

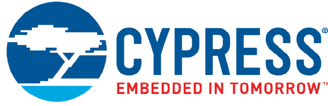
$$AF = \exp\left[\frac{E_A}{k}\left[\frac{1}{T_2} - \frac{1}{T_1}\right]\right]$$

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.

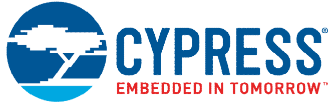
Reliability Test Data
QTP #:054302

Device	Fab Lot #	Assy Lot #	Assy Loc	Duration	Samp	Rej	Failure Mechanism
STRESS: ACOUSTIC-MSL3							
CY62147EV30LL (7C62147F)	4438656	*610461414*	CML-RA	COMP	15	0	
CY62147EV30LL (7C62147F)	4519690	*610533058*	CML-RA	COMP	15	0	
CY62147EV30LL (7C62147F)	4447261	*610506302N*	CML-R	COMP	15	0	
STRESS: AGE BOND STRENGTH							
CY62147EV30LL (7C62147F)	4514985	*610527600*	CML-R	COMP	10	0	
CY62136EV30LL (7C62136F)	4516742	*610537839*	CML-R	COMP	10	0	
CY62147EV30LL (7C62147F)	4516646	*610527599*	CML-R	COMP	10	0	
STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-EARLY FAILURE RATE, 125C, 1.85V, Vcc Max (Core)							
CY62147EV30LL (7C62147F)	4438656	*610461414*	CML-RA	96	679	0	
CY62147EV30LL (7C62147F)	4527847	*610558767*	CML-R	96	4031	0	
CY62147EV30LL (7C62147F)	4519690	*610533058*	CML-RA	96	1711	0	
CY62147EV30LL (7C62147F)	4447261	*610506302N*	CML-R	96	917	1	Single Bit (Non-visual)
STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-LATENT FAILURE RATE, 150C, 1.85V, Vcc Max (Core)							
CY62147EV30LL (7C62147F)	4438656	*610461414*	CML-RA	80	400	0	
CY62147EV30LL (7C62147F)	4438656	*610461414*	CML-RA	500	400	1	Blocked contact at Poly
CY62147EV30LL (7C62147F)	4519690	*610533058*	CML-RA	80	400	0	
CY62147EV30LL (7C62147F)	4519690	*610533058*	CML-RA	500	400	0	
CY62147EV30LL (7C62147F)	4447261	*610506302N*	CML-R	80	400	0	
CY62147EV30LL (7C62147F)	4447261	*610506302N*	CML-R	500	400	0	
STRESS: LONG LIFE VERIFICATION, 150C, 1.85V, Vcc Max (Core)							
CY62147EV30LL (7C62147F)	4519690	*610533058*	CML-RA	1000	393	0	
STRESS: HIGH TEMPERATURE STEADY STATE LIFE, 125C, 1.75V, Vcc Max							
CY62147EV30LL (7C62147F)	4438656	*610461414*	CML-RA	168	76	0	
CY62147EV30LL (7C62147F)	4438656	*610461414*	CML-RA	336	75	0	
STRESS: LOW TEMP DYNAMIC OPERATING LIFE-LATENT FAILURE RATE, -30C, 2.0V, Vcc							
CY62147EV30LL (7C62147F)	4447261	*610506302N*	CML-R	500	45	0	
STRESS: HIGH TEMPERATURE STORAGE							
CY62147EV30LL (7C62147F)	4438656	*610461414*	CML-RA	500	45	0	
CY62147EV30LL (7C62147F)	4438656	*610461414*	CML-RA	1000	45	0	



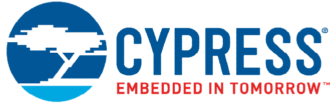
Reliability Test Data
QTP #:054302

Device	Fab Lot #	Assy Lot #	Assy Loc	Duration	Samp	Rej	Failure Mechanism
STRESS: ESD-CHARGE DEVICE MODEL, 500V							
CY62147EV30LL (7C62147F)	4527847	*610548767*	CML-R	COMP	9	0	
CY62148EV30LL (7C62148F)	4527847	*610548491*	TAIWN-G	COMP	9	0	
CY62148EV30LL (7C62148F)	4527847	*610550592*	CML-RA	COMP	9	0	
CY62147EV30LL (7C62147F)	4516646	*610527599*	CML-R	COMP	9	0	
CY62147EV30LL (7C62147F)	4514985	*610527600*	CML-R	COMP	9	0	
CY62147EV30LL (7C62147F)	4519690	*610533058*	CML-RA	COMP	9	0	
STRESS: ESD-HUMAN BODY CIRCUIT PER JEDEC EIA/JESD22-A114-B, 2,200V							
CY62147EV30LL (7C62147F)	4527847	*610548767*	CML-R	COMP	9	0	
CY62148EV30LL (7C62148F)	4527847	*610548491*	TAIWN-G	COMP	9	0	
CY62148EV30LL (7C62148F)	4527847	*610551587*	CML-R	COMP	9	0	
CY62148EV30LL (7C62148F)	4527847	*610550592*	CML-RA	COMP	9	0	
CY62147EV30LL (7C62147F)	4516646	*610527599*	CML-R	COMP	9	0	
CY62147EV30LL (7C62147F)	4514985	*610527600*	CML-R	COMP	9	0	
CY62147EV30LL (7C62147F)	4519690	*610533058*	CML-RA	COMP	9	0	
STRESS: ESD-HUMAN BODY CIRCUIT PER MIL STD 883, METHOD 3015, 2,200V							
CY62147EV30LL (7C62147F)	4527847	*610548767*	CML-R	COMP	3	0	
CY62148EV30LL (7C62148F)	4527847	*610548491*	TAIWN-G	COMP	3	0	
CY62148EV30LL (7C62148F)	4527847	*610551587*	CML-R	COMP	3	0	
CY62148EV30LL (7C62148F)	4527847	*610550592*	CML-RA	COMP	3	0	
CY62147EV30LL (7C62147F)	4516646	*610527599*	CML-R	COMP	3	0	
CY62147EV30LL (7C62147F)	4514985	*610527600*	CML-R	COMP	3	0	
CY62147EV30LL (7C62147F)	4519690	*610533058*	CML-RA	COMP	3	0	
STRESS: HI-ACCEL SATURATION TEST, 130C, 85%RH, 3.63V, PRE COND 192 HR 30C/60%RH, MSL3							
CY62137EV30LL (7C62137F)	4516742	*610539321*	CML-R	128	45	0	
CY62137EV30LL (7C62137F)	4516742	*610539321*	CML-R	256	45	0	
CY62137EV30LL (7C62137F)	4516742	*610539321*	CML-R	128	54	0	
STRESS: HI-ACCEL SATURATION TEST, 130C, 85%RH, 5.5V, PRE COND 192 HR 30C/60%RH, MSL3							
CY62147EV30LL (7C62147F)	4527847	*610558767*	CML-R	128	45	0	
CY62147EV30LL (7C62147F)	4527847	*610558767*	CML-R	264	45	0	



Reliability Test Data
QTP #:054302

Device	Fab Lot #	Assy Lot #	Assy Loc	Duration	Samp	Rej	Failure Mechanism
STRESS: DYNAMIC LATCH-UP TESTING, 9.0V							
CY62147EV30LL (7C62147F)	4438656	*610461414*	TAIWN-G	COMP	3	0	
STRESS: STATIC LATCH-UP TESTING, 125C, 6.5V, +/-300mA							
CY62147EV30LL (7C62147F)	4514985	*610527600*	CML-R	COMP	3	0	
STRESS: STATIC LATCH-UP TESTING, 125C, 10V, +/-300mA							
CY62147EV30LL (7C62147F)	4527847	*610548767*	CML-R	COMP	3	0	
STRESS: STATIC LATCH-UP TESTING, 125C, 9.5V, +/-300mA							
CY62147EV30LL (7C62147F)	4516646	*610527599*	CML-R	COMP	3	0	
CY62147EV30LL (7C62147F)	4519690	*610533058*	CML-RA	COMP	3	0	
STRESS: STATIC LATCH-UP TESTING, 125C, 8.5V, +/-200mA							
CY62148EV30LL (7C62148F)	4527847	*610548491*	TAIWN-G	COMP	3	0	
CY62148EV30LL (7C62148F)	4527847	*610551587*	CML-R	COMP	3	0	
CY62148EV30LL (7C62148F)	4527847	*610550592*	CML-RA	COMP	3	0	
STRESS: PRESSURE COOKER TEST, 121C, 100%RH, 15 Psig, PRE COND 192 HR 30C/60%RH, MSL3							
CY62147EV30LL (7C62147F)	4516742	*610537714*	CML-R	168	50	0	
CY62147EV30LL (7C62147F)	4516742	*610537714*	CML-R	288	50	0	
CY62147EV30LL (7C62147F)	4516646	*610537739*	CML-R	168	50	0	
CY62147EV30LL (7C62147F)	4516646	*610537739*	CML-R	288	50	0	
CY62147EV30LL (7C62147F)	4519690	*610533058*	CML-RA	168	50	0	
STRESS: TC COND. C -65C TO 150C, PRE COND 192 HRS 30C/60%RH, MSL3							
CY62147EV30LL (7C62147F)	4438656	*610461414*	CML-RA	300	42	0	
CY62147EV30LL (7C62147F)	4519690	*610533058*	CML-RA	300	49	0	
CY62147EV30LL (7C62147F)	4519690	*610533058*	CML-RA	500	48	0	
CY62147EV30LL (7C62147F)	4519690	*610533058*	CML-RA	1000	46	0	
CY62147EV30LL (7C62147F)	4447261	*610506302N*	CML-R	300	45	0	
CY62147EV30LL (7C62147F)	4447261	*610506302N*	CML-R	500	44	0	
CY62147EV30LL (7C62147F)	4447261	*610506302N*	CML-R	1000	44	0	



Reliability Test Data
QTP #: 134512

Device	Fab Lot #	Assy Lot #	Assy Loc	Duration	Samp	Rej	Failure Mechanism
STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-LATENT FAILURE RATE, 125C, 1.85V, Vcc Max (Core)							
CY62157EV30LL (7C62157F)	4229219	611238363	CML-RA	168	76	0	
CY62157EV30LL (7C62157F)	4229219	611238363	CML-RA	1000	76	0	
STRESS: TC COND. C -65C TO 150C, PRE COND 192 HRS 30C/60%RH, MSL3							
CY62157EV30LL (7C62157F)	4229219	611238363	CML-RA	500	77	0	
CY62157EV30LL (7C62157F)	4229219	611238363	CML-RA	1000	76	0	
STRESS: PRESSURE COOKER TEST, 121C, 100%RH, 15 Psig, PRE COND 192 HR 30C/60%RH, MSL3							
CY62157EV30LL (7C62157F)	4229219	611238363	CML-RA	96	76	0	
CY62157EV30LL (7C62157F)	4229219	611238363	CML-RA	168	65	0	
STRESS: HI-ACCEL SATURATION TEST, 110C, 85%RH, 1.85V, PRE COND 192 HR 30C/60%RH, MSL3							
CY62157EV30LL (7C62157F)	4229219	611238363	CML-RA	128	77	0	
CY62157EV30LL (7C62157F)	4229219	611238363	CML-RA	264	77	0	
STRESS: HIGH TEMPERATURE STORAGE							
CY62157EV30LL (7C62157F)	4229219	611238363	CML-RA	1000	77	0	
STRESS: INTERNAL VISUAL							
CY62157EV30LL (7C62157F)	4229219	611238363	CML-RA	COMP	5	0	
STRESS: SORT YIELD							
7C62155FC	VARIOUS	NA	NA	COMP	EQUIVALENT		
STRESS: E-TEST YIELD							
7C62155FC	VARIOUS	NA	NA	COMP	EQUIVALENT		

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Document History Page

Document Title:QTP 054302: 4 MEG MOBL SRAM FAMILY, R95LD-3R, SKYWATER
Document Number: 001-73924

Rev.	ECN No.	Orig. of Change	Description of Change
**	3432406	NSR	Initial Spec Release (Previous Rev 3.1 Qual report reference in memo HGA-861). Removed QTP# 062202 and 063304 from the History page and QTP data since these are mask changes only without PCN.
*A	3809205	NSR	Removed VERSION 4.0 in the title page. Updated the assembly facility site table. Removed Assembly process flow Cypress spec11-20047. Removed the reference Cypress specs in reliability tests performed table and replace with reference Industry standards.
*B	4185775	JYF	Template alignment and addition of polyimide qualification data.
*C	4596444	HSTO	Align qualification report based on the new template in the front page
*D	6481539	HSTO FRA	Alignment of Qualification report template Update Cypress logo Update “TECHNOLOGY/FAB PROCESS DESCRIPTION” table Update “MAJOR PACKAGE INFORMATION USED IN THIS QUALIFICATION” table Replaced “Fab4/CMI” with Skywater Removed Distribution and Posting in document history page.