Cypress Semiconductor
Product Qualification Report

QTP# 021016 VERSION 1.2
November, 2002

MoBL™ and Micrpower SRAM Family Technology Derivative R7LD-3, Fab4	
CY62135CV-2XWI CY62136CV30LL CY62137CV25LL CY62137CV30LL CY62137CV33LL	128K x 16 Static SRAM
CY62138CV25LL CY62138CV30LL CY62138CV33LL	256K x 8 Static SRAM

MoBL and More Battery Life are trademark of Cypress Semiconductor

CYPRESS TECHNICAL CONTACT FOR QUALIFICATION DATA:

Ed Russell
Reliability Director
(408) 432-7069

Al Laxman
Quality Engineering
(408) 545-7120

PRODUCT QUALIFICATION HISTORY

Qual Report	Description of Qualification Purpose	Date Comp
014502	New Technology Derivative R7LD-3 / New Low power Asynchronous SRAM CY62147CV33LL and its bond option	Dec 01
021016	New 2Meg MoBL Micropower CY62137CV33LL	Jul 02

PRODUCT DESCRIPTION (for qualification)		
Qualification Purpose: Qualify new 2Meg CY62137CV33LL device and its bond option in Technology Derivative R7LD-3, Fab 4		
Marketing Part #:	CY62135CV-2XWI, CY62136CV30LL, CY62137CV*, CY62138CV*	
Device Description:	2.2V – 3.6V, Industrial available in Wafer Die Sales and in 36-ball and 48-ball FBGA/VFBGA package.	
Cypress Division:	Cypress Semiconductor Corporation –Memory Product Division (MPD)	
Overall Die (or Mask) REV Level (pre-requisite for qualification):		Rev. C
What ID markings on Die:	7C621C5C	

TECHNOLOGY/FAB PROCESS DESCRIPTION – R7LD-3			
Number of Metal Layers:	2	Metal Composition:	Metal 1: 100Å Ti / 300Å TiN / 6,000Å Al / 300Å TiW Metal 2: 8,000Å TiAl / 300Å TiN
Passivation Type and Materials:	1000Å TEOS / 9000Å Nitride		
Free Phosphorus contents in top glass layer(%):	0%		
Number of Transistors in Device	12million		
Number of Gates in Device	4million		
Generic Process Technology/Design Rule (μ-drawn):	CMOS, Double Metal /0.16 μm		
Gate Oxide Material/Thickness (MOS):	SiO_2, 32Å / 70Å		
Name/Location of Die Fab (prime) Facility:	Cypress Semiconductor -- Bloomington, MN		
Die Fab Line ID/Wafer Process ID:	Fab4/R7LD-3R		

PACKAGE AVAILABILITY

PACKAGE	ASSEMBLY SITE FACILITY
48-ball FBGA	**Cypress Philippines (CSPI-R) QTP #000201**
48-ball VFBGA	**ASE Taiwan (TAIWN-G) QTP #011003**

Note: Package Qualification details upon request

MAJOR PACKAGE INFORMATION USED IN THIS QUALIFICATION	
Package Designation:	BV48
Package Outline, Type, or Name:	48-ball Fine Pitch Ball Grid Array (VFBGA)
Mold Compound Name/Manufacturer:	PLASKON SMT-B-1
Mold Compound Flammability Rating:	V-O per UL94
Oxygen Rating Index:	＞28%
Substrate Material:	BT Resin
Lead Finish, Composition / Thickness:	Solder ball, 63%Sn, 37%Pb
Die Backside Preparation Method/Metallization:	N/A
Die Separation Method:	Wafer Saw
Die Attach Supplier:	Ablestik
Die Attach Material:	Ablestik 8355F
Die Attach Method:	Epoxy
Bond Diagram Designation:	10-04775
Wire Bond Method:	Thermosonic
Wire Material/Size:	Au, 1.0um
Thermal Resistance Theta JA °C/W:	55.8°C/W
Package Cross Section Yes/No:	N/A
Assembly Process Flow:	49-41023
Name/Location of Assembly (prime) facility:	ASE Taiwan

ELECTRICAL TEST / FINISH DESCRIPTION	
Test Location:	Cypress Philippines (CSPI-R) and Cypress San Jose (USA-C)
Fault Coverage:	100%

RELIABILITY TESTS PERFORMED PER SPECIFICATION REQUIREMENT

Stress/Test	Test Condition (Temp/Bias)	Result P/F
High Temperature Operating Life Early Failure Rate	1) QTP #021016, QTP #014502 Dynamic Operating Condition, Vcc Max = 4.9V, 125°C	P
High Temperature Operating Life Latent Failure Rate	1) QTP #014502 Dynamic Operating Condition, Vcc Max=4.9V, 150°C	P
High Temperature Steady State Life	1) QTP #014502 Static Operating Condition, Vcc Max=3.63V, 150°C	P
High Accelerated Saturation Test (HAST)	1) QTP #014502 130°C, 3.63V,85%RH Precondition: JESD22 Moisture Sensitivity MSL 3 192 Hrs, 30C/60%RH+3IR-Reflow, 220°C+5, 0°C	P
Temperature Cycle	1) QTP #021016, QTP #014502 MIL-STD-883C, Method 1010, Condition C, -65°C to 150°C Precondition: JESD22 Moisture Sensitivity MSL 3 192 Hrs, 30C/60%RH+3IR-Reflow, 220°C+5, 0°C	P
Pressure Cooker	1) QTP #021016, QTP #014502 121°C, 100%RH Precondition: JESD22 Moisture Sensitivity MSL 3 192 Hrs, 30C/60%RH+3IR-Reflow, 220°C+5, 0°C	P
High Temperature Storage	1) QTP #014502 150°C ± 5°C no bias	P
Electrostatic Discharge Human Body Model (ESD-HBM)	1) QTP #021016, QTP #014502 2,200V MIL-STD-883, Method 3015.7	P
Electrostatic Discharge Charge Device Model (ESD-CDM)	1) QTP #021016, QTP #014502 500V Cypress Spec. 25-00020	P
Age Bond Strength	1) QTP #014502 200C, 4HRS MIL-STD-883, Method 883-2011	P
SEM X-Section	1) QTP #014502 MIL-STD-883, Method 883-2018-2 / Cypress Spec. 22-00009	P

RELIABILITY TESTS PERFORMED PER SPECIFICATION REQUIREMENT (continuation)

Stress/Test	Test Condition (Temp/Bias)	Result P/F
Current Density	1) QTP #014502 Cypress Spec 22-00029	P
Acoustic Microscopy, MSL 3	1) QTP #014502 Cypress Spec. 25-00104	P
Dynamic Latchup	1) QTP #014502 6.2V In accordance with JEDEC 17. Cypress Spec. 01-00081	P
Static Latchup	1) QTP #021016, QTP #014502 125C, 10V / 6.5V, ± 300mA In accordance with JEDEC 17. Cypress Spec. 01-00081	P

RELIABILITY FAILURE RATE SUMMARY

Stress/Test	Device Tested/ Device Hours	# Fails	Activation Energy	Thermal AF[4]	Failure Rate[5]
High Temperature Operating Life Early Failure Rate[1]	2,619	0	N/A	N/A	0 PPM
High Temperature Operating Life[1,2] Long Term Failure Rate	420,620 DHRs	0	0.7	170	13 FIT

[1] A production burn-in of 12 Hrs at 125°C, 4.9V is required for the product.
[2] Assuming an ambient temperature of 55°C and a junction temperature rise of 15°C.
[3] Chi-squared 60% estimations used to calculate the failure rate..
[4] 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.

[5] **EFR Failure Rate based on QTP #021016.**
[5] **LFR FIT Rate based on QTP # 014502.**

Reliability Test Data

QTP #: 021016

Device	Fab Lot #	Assy Lot #	Ass Loc	Duration	Samp	Rej	Failure Mechanism
STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-EARLY FAILURE RATE, 125C, 3.8V, Vcc Max							
CY62137CV33LL-BAI (7C62137C)	4213149	*610217590N*	TAIWN-G	96	1155	0	
CY62137CV33LL-BAI (7C62137C)	4213193	*610218012N*	TAIWN-G	96	766	0	
CY62137CV33LL-BAI (7C62137C)	4213193	*610218012N*	TAIWN-G	96	698	0	
STRESS: ESD-CHARGE DEVICE MODEL, 500V							
CY62137CV33LL-BAI (7C62137C)	4213149	*620217590*	TAIWN-G	COMP	9	0	
STRESS: ESD-HUMAN BODY CIRCUIT PER MIL STD 883, METHOD 3015, 2,200V							
CY62137CV33LL-BAI (7C62137C)	4213149	*620217590*	TAIWN-G	COMP	9	0	
STRESS: STATIC LATCH-UP TESTING, 125C, 10V, +/300mA							
CY62137CV33LL-BAI (7C62137C)	4213149	*620217590*	TAIWN-G	COMP	3	0	
STRESS: PRESSURE COOKER TEST (121C, 100%RH), PRE COND 192 HR 30C/60%RH, MSL3							
CY62137CV33LL-BAI (7C62137C)	4213193	*610218012N*	TAIWN-G	168	50	0	
STRESS: TC COND. C -65C TO 150C, PRECONDITION 192 HRS 30C/60%RH, MSL3							
CY62137CV33LL-BAI (7C62137C)	4213193	*610218012N*	TAIWN-G	300	50	0	

Reliability Test Data

QTP #: 014502

Device	Fab Lot #	Assy Lot #	Ass Loc	Duration	Samp	Rej	Failure Mechanism
STRESS: ACOUSTIC-MSL3							
CY62147CV33LL-BAI(7C62047D)	4113951	*610116644*	TAIWN-G	COMP	15	0	
CY62147CV33LL-BAI(7C62047D)	4121877	*610126418*	TAIWN-G	COMP	15	0	
STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-EARLY FAILURE RATE, 125C, 4.9V, Vcc Max							
CY62147CV33LL-BAI(7C62047D)	4121877	*610126418*	TAIWN-G	84	1486	0	
CY62147CV33LL-BAI(7C62047D)	4120575	*610128355*	TAIWN-G	84	1457	1	BIT FAILURE
STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-LATENT FAILURE RATE, 150C, 4.9V, Vcc Max							
CY62147CV33LL-BAI(7C62047D)	4121877	*610126418*	TAIWN-G	80	449	0	
CY62147CV33LL-BAI(7C62047D)	4121877	*610126418*	TAIWN-G	500	447	0	
CY62147CV33LL-BAI(7C62047D)	4120575	*610128355*	TAIWN-G	80	398	0	
CY62147CV33LL-BAI(7C62047D)	4120575	*610128355*	TAIWN-G	500	394	0	
STRESS: ESD-CHARGE DEVICE MODEL, 500V							
CY62147CV33LL-BAI(7C62047D)	4139353	*610142830*	TAIWN-G	COMP	9	0	
STRESS: ESD-HUMAN BODY CIRCUIT PER MIL STD 883, METHOD 3015, 2,200V							
CY62147CV33LL-BAI(7C62047D)	4139353	*610142830*	TAIWN-G	COMP	9	0	
STRESS: STATIC LATCH-UP TESTING, 125C, 10V, +/300mA							
CY62147CV33LL-BAI(7C62047D)	4113951	*610116644*	TAIWN-G	COMP	3	0	
CY62147CV33LL-BAI(7C62047D)	4121877	*610126418*	TAIWN-G	COMP	3	0	
CY62147CV33LL-BAI(7C62047D)	4120575	*610128355*	TAIWN-G	COMP	3	0	
STRESS: DYNAMIC LATCH-UP TESTING, 6.2V							
CY62147CV33LL-BAI(7C62047D)	4113951	*610116644*	TAIWN-G	COMP	3	0	
STRESS: AGE BOND STRENGTH							
CY62147CV33LL-BAI(7C62047D)	4113951	*610116644*	TAIWN-G	COMP	5	0	
CY62147CV33LL-BAI(7C62047D)	4121877	*610126418*	TAIWN-G	COMP	14	0	
STRESS: HIGH TEMPERATURE STORAGE, PLASTIC, 150C							
CY62147CV33LL-BAI(7C62047D)	4113951	*610116644*	TAIWN-G	500	47	0	
CY62147CV33LL-BAI(7C62047D)	4113951	*610116644*	TAIWN-G	1000	47	0	
STRESS: HIGH TEMP STEADY STATE LIFE TEST, 150C, 1.98V, Vcc MAX							
CY62147CV33LL-BAI(7C62047D)	4113951	*610116644*	TAIWN-G	80	80	0	
CY62147CV33LL-BAI(7C62047D)	4113951	*610116644*	TAIWN-G	168	80	0	

Reliability Test Data

QTP #: 014502

Device	Fab Lot #	Assy Lot #	Ass Loc	Duration	Samp	Rej	Failure Mechanism
STRESS: PRESSURE COOKER TEST (121C, 100%RH), PRE COND 192 HR 30C/60%RH, MSL3							
CY62147CV33LL-BAI(7C62047D)	4121877	*610126418*	TAIWN-G	168	50	0	
CY62147CV33LL-BAI(7C62047D)	4120575	*610128355*	TAIWN-G	168	48	0	
STRESS: HI-ACCEL SATURATION TEST (130C, 85%RH, 3.63V), PRE COND 192 HR 30C/60%RH, MSL3							
CY62147CV33LL-BAI(7C62047D)	4121877	*610126418*	TAIWN-G	128	50	0	
CY62147CV33LL-BAI(7C62047D)	4120575	*610128355*	TAIWN-G	128	50	0	
STRESS: TC COND. C -65C TO 150C, PRECONDITION 192 HRS 30C/60%R, MSL3							
CY62147CV33LL-BAI(7C62047D)	4113951	*610116644*	TAIWN-G	300	48	0	
CY62147CV33LL-BAI(7C62047D)	4113951	*610116644*	TAIWN-G	500	48	0	
CY62147CV33LL-BAI(7C62047D)	4121877	*610126418*	TAIWN-G	300	48	0	