

Cypress Semiconductor Product Qualification Report

QTP# 98112 VERSION 1.0
April, 2001

SRAM MoBL™	
CY62148V	512K x 8 Static RAM

MoBL™ is trademark of Cypress Semiconductor

CYPRESS TECHNICAL CONTACT FOR QUALIFICATION DATA:

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PRODUCT QUALIFICATION HISTORY

Qual Report	Description of Qualification Purpose	Date Comp
97496	New Technology R42 / New 1Meg, CY62256V, Static RAM	Mar 98
98112	New 4Meg, CY62148V, SRAM MoBL™, R42 Technology with Hot Al.	Aug 98

PRODUCT DESCRIPTION (for qualification)	
Qualification Purpose: Qualifies CY62148V, in R42 with Hot AL Technology , Fab 4.	
Marketing Part #:	CY62148V
Device Description:	2.7V – 3.6V, Commercial/Industrial available in 32-lead SOIC / TSOPII and 36-ball FBGA package.
Cypress Division:	Cypress Semiconductor Corporation – Memory Product Division (MPD)
Overall Die (or Mask) REV Level (pre-requisite for qualification):	Rev. A
What ID markings on Die:	7C11482A/62148V

TECHNOLOGY/FAB PROCESS DESCRIPTION - R42	
Number of Metal Layers:	1
Metal Composition:	Metal 1: TiW, AlCu, TiW/500Å, 6000Å, 300Å
Passivation Type and Materials:	3K Å Oxide + 6,000 Å Nitride (both with PECVD)
Free Phosphorus contents in top glass layer(%):	N/A
Die Coating(s), if used:	N/A
Generic Process Technology/Design Rule (μ-drawn):	CMOS ,Single Metal, 0.35μm
Gate Oxide Material/Thickness (MOS):	SiO ₂ / 70 Å
Name/Location of Die Fab (prime) Facility:	Cypress Semiconductor - Bloomington, MN
Die Fab Line ID/Wafer Process ID:	Fab4/R42 with Hot Aluminum

PACKAGE AVAILABILITY

PACKAGE	ASSEMBLY SITE FACILITY
36-ball Fine Pitch BGA	ASE Taiwan
32-lead TSOP II	Hyundai Korea
32 lead SOiC	ASE Taiwan

Note: Package Qualification details upon request

MAJOR PACKAGE INFORMATION USED IN THIS QUALIFICATION	
Package Designation:	S32453
Package Outline, Type, or Name:	32-lead Plastic Small Outline IC Package (SOIC)
Mold Compound Name/Manufacturer:	NITTO EME 8000C
Mold Compound Flammability Rating:	V-O per UL94
Oxygen Rating Index:	> 28 %
Lead Frame Material:	Copper
Lead Finish, Composition / Thickness:	Solder Plate, 85 %Sn, 15 %Pb
Die Backside Preparation Method/Metallization:	N/A
Die Separation Method:	Wafer Saw
Die Attach Supplier:	Ablestik
Die Attach Material:	Ablestik 8361H
Bond Diagram Designation	10-03244
Wire Bond Method:	Thermosonic
Wire Material/Size:	Au, 1.3um
Thermal Resistance Theta JA °C/W:	55°C/W
Package Cross Section Yes/No:	N/A
Assembly Process Flow:	49-41003M
Name/Location of Assembly (prime) facility:	ASE Taiwan (TAIWN-G)

ELECTRICAL TEST / FINISH DESCRIPTION	
Test Location:	ASE Taiwan (TAIWN-G)
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 #98112 Dynamic Operating Condition, Vcc = 3.8V, 150°C	P
High Temperature Operating Life Latent Failure Rate	1) QTP #97496 Dynamic Operating Condition, Vcc = 3.9V, 150°C	P
Read and Record Life Test	1) QTP #97496 Dynamic Operating Condition, Vcc = 3.9V, 150°C	P
High Accelerated Saturation Test (HAST)	1) QTP #97496 140°C, 85%RH, 3.63V Precondition: JESD22 Moisture Sensitivity MSL 1 168 Hrs. 85°C/85%RH	P
Temperature Cycle	1) QTP #98112 MIL-STD-883C, Method 1010, Condition C, -65°C to 150° Precondition: JESD22 Moisture Sensitivity MSL 3 Precondition: 192 Hrs., 30°C/60%RH+3IR-Reflow, 220°C+5, - 0°C 2) QTP #97496 MIL-STD-883C, Method 1010, Condition C, -65°C to 150°C Precondition: JESD22 Moisture Sensitivity MSL 1 168 Hrs. 85°C/85%RH	P
Pressure Cooker	1) QTP #98112 MIL-STD-883C, Method 1010, Condition C, -65°C to 150° Precondition: JESD22 Moisture Sensitivity MSL 3 Precondition: 192 Hrs., 30°C/60%RH+3IR-Reflow, 220°C+5, - 0°C	P
Age Bond Pull	2) QTP #97496 MIL-STD-883, Method 2011	P
Current Density	1) QTP #97496 Cypress Spec 22-00029	P
SEM Analysis	1) QTP #97496 MIL-STD-883, Method 2018	P
Electrostatic Discharge Human Body Model (ESD-HBM)	1) QTP #98112, QTP #97496 2,200V MIL-STD-883, Method 3015.7	P

RELIABILITY TESTS PERFORMED PER SPECIFICATION REQUIREMENT (continuation)

Stress/Test	Test Condition (Temp/Bias)	Result P/F
Electrostatic Discharge Charge Device Model (ESD-CDM)	1) QTP #98112, QTP #97496 500V Cypress Spec. 25-00020	P
High Temperature Storage	1) QTP #97496 165°C	P
Low Temperature Operating Life	2) QTP #97496 -30C, 4.3V, 8 MHz	P
Latchup Sensitivity - Static	1) QTP #97496 10V, +/- 200 mA 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 ³	Failure Rate ⁴
High Temperature Operating Life Early Failure Rate	1,525	0	N/A	N/A	0 PPM
High Temperature Operating Life ^{1,2} Long Term Failure Rate	2,078,500 DHRs	1	0.7	170	6 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 = 8.62x10⁻⁵ eV/Kelvin.

T₁ is the junction temperature of the device under stress and T₂ is the junction temperature of the device at use conditions.

⁴ EFR Failure Rate based on QTP #98112

⁴ LFR Failure Rate based on QTP 97496

Reliability Test Data

QTP #: 98112

Device Mechanism	Fab Lot #	Assy Lot #	Ass Loc	Duration	Samp	Rej	Failure
STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-EARLY FAILURE RATE (150C, 3.8V, Vcc Max)							
CY762148V-SC(7C621483A)	4816743	619806743	TAIWN-G	48	1525	0	
STRESS: ESD-CHARGE DEVICE MODEL (500V)							
CY762148V-SC(7C621483A)	4816743	619806743	TAIWN-G	COMP	3	0	
STRESS: ESD-HUMAN BODY CIRCUIT PER MIL STD 883, METHOD 3015 (2,200V)							
CY762148V-SC(7C621483A)	4816743	619806743	TAIWN-G	COMP	3	0	
STRESS: STATIC LATCH-UP TESTING (125C, 10V)							
CY762148V-SC(7C621483A)	4816743	619806743	TAIWN-G	COMP	3	0	
STRESS: PRESSURE COOKER TEST (121C, 100%RH), PRE COND 192 HR 30C/60%RH							
CY762148V-SC(7C621483A)	4816743	619806743	TAIWN-G	168	46	0	
STRESS: TC COND. C -65C TO 150C, PRECONDITION 192 HRS 30C/60%RH (MSL3)							
CY762148V-SC(7C621483A)	4816743	619806743	TAIWN-G	300	48	0	

RELIABILITY TEST DATA

QTP#: 97496

DEVICE	ASSY-LOC	FABLOT#	ASSYLOT#	DURATION	S/S	REJ	FAIL MODE
STRESS: ESD-CHARGE DEVICE MODEL, 1000V							
CY62256V-VC (7C622574D)	CSPI-R	4709955	619702695/2810	COMP	3	0	
STRESS: ESD-HUMAN BODY CIRCUIT PER MIL STD 883, METHOD 3015, 2200V							
CY62256V-VC (7C622574D)	CSPI-R	4709955	619702695/2810	COMP	3	0	
STRESS: HI-ACCEL SATURATION TEST (140C, 85%RH, 3.63V), PRECOND. 168 HRS 85C/85%RH							
CY62256V-VC (7C622574D)	CSPI-R	4729067	619708056	128	45	0	
CY62256V-VC (7C622574D)	CSPI-R	4729067	619708056	256	45	0	
CY62256V-VC (7C622574D)	CSPI-R	4735419	619709132/3/4	128	45	0	
STRESS: HIGH TEMPERATURE STORAGE (165C, NO BIAS)							
CY62256V-VC (7C622574D)	CSPI-R	4709955	619702695/2810	336	48	0	
CY62256V-VC (7C622574D)	CSPI-R	4709955	619702695/2810	1000	48	0	
STRESS: HIGH TEMP STEADY STATE LIFE TEST (150C, 3.9V)							
CY62256V-VC (7C622574D)	CSPI-R	4709955	619702695/2810	80	157	0	
CY62256V-VC (7C622574D)	CSPI-R	4709955	619702695/2810	168	157	0	
CY62256V-VC (7C622574D)	CSPI-R	4711083	619703951/2/3	80	165	0	
CY62256V-VC (7C622574D)	CSPI-R	4711083	619703951/2/3	168	165	0	
CY62256V-VC (7C622574D)	CSPI-R	4711083	619703951/2/3	248	165	0	
CY62256V-VC (7C622574D)	CSPI-R	4715220	619703998/9/40	80	165	0	
CY62256V-VC (7C622574D)	CSPI-R	4715220	619703998/9/40	168	165	0	
STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-LATENT FAILURE RATE (150C, 3.9V)							
CY62256V-VC (7C622574D)	CSPI-R	4709955	619702695/2810	80	533	0	
CY62256V-VC (7C622574D)	CSPI-R	4709955	619702695/2810	500	533	0	
CY62256V-VC (7C622574D)	CSPI-R	4711083	619703951/2/3	80	530	0	
CY62256V-VC (7C622574D)	CSPI-R	4711083	619703951/2/3	500	530	0	
CY62256V-VC (7C622574D)	CSPI-R	4715220	619703998/9/40	80	530	1	1 UNKNOWN CAUSE
CY62256V-VC (7C622574D)	CSPI-R	4715220	619703998/9/40	500	529	0	
CY62256V-VC (7C622574D)	CSPI-R	4735419	619709132/3/4	2000	508	0	
STRESS: EXTENDED DYNAMIC BURN-IN (150C, 3.9V)							
CY62256V-VC (7C622574D)	CSPI-R	4709955	619702695/2810	1000	533	0	
STRESS: LOW TEMPERATURE OPERATING LIFE (-30C, 4.3V, 8 MHz)							
CY62256V-VC (7C622574D)	CSPI-R	4709955	619702695/2810	500	45	0	
STRESS: READ & RECORD LIFE TEST (150C, 3.9V)							
CY62256V-VC (7C622574D)	CSPI-R	4709955	619702695/2810	500	12	0	

RELIABILITY TEST DATA

QTP#: 97496

DEVICE	ASSY-LOC	FABLOT#	ASSYLOT#	DURATION	S/S	REJ	FAIL MODE
STRESS: TC COND. C, -65 TO 150C, PRECOND. 168 HRS 85C/85%RH							
CY62256V-VC (7C622574D)	CSPI-R	4709955	619702695/2810	300	91	0	
CY62256V-VC (7C622574D)	CSPI-R	4709955	619702695/2810	1000	91	0	
CY62256V-VC (7C622574D)	CSPI-R	4711083	619703951/2/3	300	90	0	
CY62256V-VC (7C622574D)	CSPI-R	4711083	619703951/2/3	1000	90	0	
CY62256V-VC (7C622574D)	CSPI-R	4715220	619703998/9/40	300	90	0	
CY62256V-VC (7C622574D)	CSPI-R	4715220	619703998/9/40	1000	90	0	