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Cypress Semiconductor
Product Qualification Report

QTP# 98462 VERSION*B
March 2019

FAST ASYNCHRONOUS SRAM FAMILY R5D-5R TECHNOLOGY, Skywater	
CY7C106B/CY7C1006B	256K x 4 Static RAM
CY7C109B/ CY7C1009B	128K x 8 Static RAM
CY7C194B/ CY7C195B	32K x 8 Static RAM
CY7C199C	32K x 8 Static RAM

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

Qual Report	Description of Qualification Purpose	Date Comp
000301	New Technology Derivative R52D-5R / New CY7C149B, 4Meg Async SRAM Product.	Apr 00
98462	New CY7C109B, 1Meg Asynchronous SRAM Product and its product family.	Apr 00

PRODUCT DESCRIPTION (for qualification)	
Qualification Purpose: Qualifies CY7C109B and its product family in qualified R52D-5R Technology , Skywater	
Marketing Part #:	CY7C106B/CY7C1006B/CY7C109B/CY7C1009B/CY7C194/5/7B/CY7C199C
Device Description:	5V, Commercial, Industrial, available in 28/32-lead SOJ and28/ 32-lead TSOP, 28-lead DIP package
Cypress Division:	Cypress Semiconductor Corporation – Memory Product Division (MPD)

TECHNOLOGY/FAB PROCESS DESCRIPTION - R52D-5R			
Number of Metal Layers:	Proprietary	Metal Composition:	Proprietary
Passivation Type and Materials:	Proprietary		
Free Phosphorus contents in top glass layer(%):	Proprietary		
Number of Transistors in Device	Proprietary		
Number of Gates in Device	Proprietary		
Generic Process Technology/Design Rule (-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:	Skywater/R52D-5R		

PACKAGE AVAILABILITY

PACKAGE	ASSEMBLY SITE FACILITY
32-lead TSOP	**TAI WN-T**
28- 32 lead SOJ	**AMKOR –PHIL, JCET- CHINA**

Note: Package Qualification details upon request

MAJOR PACKAGE INFORMATION USED IN THIS QUALIFICATION	
Package Designation:	V32311
Package Outline, Type, or Name:	32-lead Plastic Small Outline J-Bend Package (SOJ)
Mold Compound Name/Manufacturer:	Hitachi CEL9200
Mold Compound Flammability Rating:	V-O per UL94
Oxygen Rating Index:	>28%
Lead Frame Material:	Copper
Lead Finish, Composition / Thickness:	Solder Plated 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
Wire Bond Method:	Thermosonic
Wire Material/Size:	Au, 1.0um (25um)
Package Cross Section Yes/No:	N/A
Name/Location of Assembly (prime) facility:	CML (R)

ELECTRICAL TEST / FINISH DESCRIPTION	
Test Location:	KYEC, TAIWAN
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	Dynamic Operating Condition, Vcc Max = 3.8V, 150C Dynamic Operating Condition, Vcc Max = 5.75V, 150C	P
High Temperature Operating Life Latent Failure Rate	Dynamic Operating Condition, Vcc Max = 3.8V, 150C Dynamic Operating Condition, Vcc Max = 5.75V, 150C	P
High Accelerated Saturation Test (HAST)	130C, 5.5V,85%RH Precondition: JESD22 Moisture Sensitivity MSL3 192 Hrs, 30C/60%RH+3IR-Reflow, 220C+5, 0C	P
Temperature Cycle	MIL-STD-883C, Method 1010, Condition C, -65C to 150C Precondition: JESD22 Moisture Sensitivity MSL3 192 Hrs, 30C/60%RH+3IR-Reflow, 220C+5, 0C	P
Pressure Cooker	121C, 100%RH Precondition:JESD22 Moisture Sensitivity MSL3 192 Hrs, 30C/60%RH+3IR-Reflow, 220C+5, 0C	P
High Temperature Storage	150C, No Bias	P
High Temperature Steady State life	150C, 5.5V, Vcc Max	P
Electrostatic Discharge Human Body Model (ESD-HBM)	2,200V JESD22, Method A114-B	P
Electrostatic Discharge Charge Device Model (ESD-CDM)	500V JESD22-C101	P
Age Bond Pull	MIL-STD-883, Method 883-2011 – 200C, 4hrs	P
Current Density	Meets the Technology Device Level Reliability Specifications	P
Low Temperature Operating Life	-30C, 6.5V, 8MHZ	P
Acoustic Microscopy, Level 3	J-STD-020	P
SEM	MIL-STD-883, Method 883-2018-2	P
Static Latchup Sensitivity	In accordance with JEDEC 17 (300mA)	P
Dynamic Latchup Sensitivity	In accordance with JEDEC 17. (8.5V)	P

RELIABILITY FAILURE RATE SUMMARY

Stress/Test	Device Tested/ Device Hours	# Fails	Activation Energy	Thermal AF[4]	Failure Rate
High Temperature Operating Life Early Failure Rate[1]	4,502	1	N/A	N/A	222 PPM
High Temperature Operating Life[2,3] Long Term Failure Rate	1,057,400 DHRs	0	0.7	170	5 FIT

[1] A production burn-in of 24 Hrs at 150C, 4.5V is required for the product.
[2] Assuming an ambient temperature of 55C and a junction temperature rise of 15C.
[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.

Reliability Test Data

QTP #:000301

Device	Fab Lot #	Assy Lot #	Assy Loc	Duration	Samp	Rej	Failure Mechanism
STRESS: ESD-CHARGE DEVICE MODEL (1,000V)							
CY7C1049B (7C1549C)	4919497	*619925326*	CSPI-R	COMP	3	0	
STRESS: ESD-HUMAN BODY CIRCUIT PER MIL STD 883, METHOD 3015 (4,400V)							
CY7C1049B (7C1549C)	4919497	*619925326*	CSPI-R	COMP	3	0	
STRESS: STATIC LATCH-UP TESTING (125C, 11.5V, ± 300mA***)***							
CY7C1049B-VC (7C1549C)	4946002	610004242	CSPI-R	COMP	3	0	
STRESS: DYNAMIC LATCH-UP TESTING (8.2V)							
CY7C1049B-VC (7C1549C)	4946002	610004242	CSPI-R	COMP	3	0	
STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-EARLY FAILURE RATE (150C, 5.75V)							
CY7C1049B-VC (7C1549C)	4944781	610003706	CSPI-R	48	1000	1	Particle
CY7C1049B-VC (7C1549C)	4946002	610004242	CSPI-R	48	1000	0	
CY7C1049B-VC (7C1549C)	4941240	619938804	CSPI-R	48	1000	0	
STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-LATENT FAILURE RATE (150C, 5.75V)							
CY7C1049B-VC (7C1549C)	4944781	610003706	CSPI-R	80	530	0	
CY7C1049B-VC (7C1549C)	4944781	610003706	CSPI-R	500	529	0	
CY7C1049B-VC (7C1549C)	4946002	610004242	CSPI-R	80	530	0	
CY7C1049B-VC (7C1549C)	4946002	610004242	CSPI-R	500	529	0	
CY7C1049B-VC (7C1549C)	4941240	619938804	CSPI-R	80	530	0	
CY7C1049B-VC (7C1549C)	4941240	619938804	CSPI-R	500	527	0	
STRESS: HIGH TEMP STEADY STATE LIFE TEST (150C, 5.5V, Vcc MAX)							
CY7C1049B (7C1549C)	4919497	*619925326*	CSPI-R	80	80	0	
CY7C1049B (7C1549C)	4919497	*619925326*	CSPI-R	168	80	0	
STRESS:LOW TEMPERATURE OPERATING LIFE (-30C, 6.50V)							
CY7C1049B (7C1549C)	4919497	*619925326*	CSPI-R	500	46	0	
STRESS: HIGH TEMPERATURE STORAGE, (150C)							
CY7C1049B (7C1549C)	4919497	*619925326*	CSPI-R	336	48	0	
CY7C1049B (7C1549C)	4919497	*619925326*	CSPI-R	500	48	0	
CY7C1049B (7C1549C)	4919497	*619925326*	CSPI-R	1000	48	0	

Reliability Test Data

QTP #:000301

Device	Fab Lot #	Assy Lot #	Assy Loc	Duration	Samp	Rej	Failure Mechanism
STRESS: HI-ACCEL SATURATION TEST (130C, 85%RH, 5.5V), PRE COND 192 HR 30C/60%RH							
CY7C1049B (7C1549C)	4919497	*619925326*	CSPI-R	128	47	0	
CY7C1049B (7C1549C)	4944781	*610003706*	CSPI-R	128	49	0	
STRESS: PRESSURE COOKER TEST (121C, 100%RH), PRE COND 192 HR 30C/60%RH							
CY7C1049B (7C1549C)	4919497	*619925326*	CSPI-R	168	48	0	
CY7C1049B (7C1549C)	4920692	*619933105*	CSPI-R	168	47	0	
STRESS: TC COND. C -65C TO 150C, PRECONDITION 192 HRS 30C/60%RH (MSL3)							
CY7C1049B (7C1549C)	4919497	*619925326*	CSPI-R	300	48	0	
CY7C1049B (7C1549C)	4919497	*619925326*	CSPI-R	500	48	0	
CY7C1049B (7C1549C)	4920692	*619933105*	CSPI-R	300	47	0	

Reliability Test Data
QTP #:98462

Device	Fab Lot #	Assy Lot #	Assy Loc	Duration	Samp	Rej	Failure Mechanism
STRESS: ACOUSTIC-MSL3							
CY7C109B-VC (7C109M)	4943568	*619936792*	CSPI-R	COMP	15	0	
STRESS: AGE BOND PULL TEST							
CY7C109B-VCB (7C109M)	4943568	*619936792*	CSPI-R	COMP	5	0	
STRESS: DYNAMIC LATCH-UP TESTING (8.5V)							
CY7C109B-VCB (7C109M)	4943568	*619936792*	CSPI-R	COMP	3	0	
STRESS: STATIC LATCH-UP TESTING (125C, 11.5V, ± 300mA***)***							
CY7C109B-VCB (7C109M)	4943568	*619936792*	CSPI-R	COMP	3	0	
STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-EARLY FAILURE RATE (150C, 3.8V, Vcc Max)							
CY7C109B-VC (7C109M)	4943568	*619936792*	CSPI-R	48	1502	0	
STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-LATENT FAILURE RATE (150C, 3.8V, Vcc Max)							
CY7C1009B-VC (7C1009M)	4943568	*619936792*	CSPI-R	80	529	0	
CY7C1009B-VC (7C1009M)	4943568	*619936792*	CSPI-R	500	529	0	
STRESS: HIGH TEMP STEADY STATE LIFE TEST (150C, 5.5V, Vcc MAX)							
CY7C1009B-VC (7C1009M)	4943568	*619936792*	CSPI-R	80	80	0	
CY7C1009B-VC (7C1009M)	4943568	*619936792*	CSPI-R	168	80	0	
STRESS: ESD-CHARGE DEVICE MODEL (1,000V)							
CY7C109B-VCB (7C109M)	4943568	*619936792*	CSPI-R	COMP	3	0	
STRESS: ESD-HUMAN BODY CIRCUIT PER MIL STD 883, METHOD 3015 (2,200V)							
CY7C109B-VCB (7C109M)	4943568	*619936792*	CSPI-R	COMP	8	0	
STRESS: HI-ACCEL SATURATION TEST (130C, 85%RH, 5.5V), PRE COND 192 HR 30C/60%RH							
CY7C1009B-VC (7C1009M)	4943568	*619936792*	CSPI-R	128	50	0	
STRESS: HIGH TEMPERATURE STORAGE, PLASTIC, 150C							
CY7C1009B-VC (7C1009M)	4943568	*619936792*	CSPI-R	500	50	0	
CY7C1009B-VC (7C1009M)	4943568	*619936792*	CSPI-R	1000	50	0	
STRESS: PRESSURE COOKER TEST (121C, 100%RH), PRE COND 192 HR 30C/60%RH							
CY7C1009B-VC (7C1009M)	4943568	*619936792*	CSPI-R	168	51	0	
STRESS: TC COND. C -65C TO 150C, PRECONDITION 192 HRS 30C/60%RH (MSL3)							
CY7C1009B-VC (7C1009M)	4943568	*619936792*	CSPI-R	300	50	0	

Document History Page

Document Title: QTP # 98462 : FAST ASYNCHRONOUS SRAM FAMILY (CY7C106B/CY7C1006B, CY7C194B/ CY7C195B, CY7C199C) R52D-5R TECHNOLOGY, Skywater
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Rev.	ECN No.	Orig. of Change	Description of Change
**	4026944	ILZ	Initial Spec Release Qualification report published on Cypress.com is not in spec format. Initiated spec for QTP 94862 and removed all Cypress reference spec and replaced with Industry standard. Updated package availability based on current qualified assembly
*A	4039000	ILZ	Corrected QTP Spec title from QTP 94862 to 98462
*B	6504177	HSTO DCON	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 information from Document history page.