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# Cypress Semiconductor Product Qualification Report

**QTP# 99202 VERSION \*B  
May 2014**

<b>Low Voltage Synchronous/Asynchronous RAM R52D-3 Technology at Fab 4</b>	
<b>CY7C056V CY7C057V</b>	<b>3.3V, 16K/32K x 36 FLEx36™ Asynchronous Dual - Port Static RAM</b>
<b>CY7C09569V CY7C09579V</b>	<b>3.3V, 16K/32K x 36 FLEx36™ Synchronous Dual - Port Static RAM</b>

**FLEx36™ is a Trademark of Cypress Semiconductor Corporation**

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## PRODUCT QUALIFICATION HISTORY

Qual Report	Description of Qualification Purpose	Date Comp
99202	CY7C09569V/CY7C09579V, R52D-3 Technology	Sep 99
040701	CY7C09579V GOOBI/Burn-In Reduction to 12hrs (144 TQFP)	May 04
042301	CY7C09579V Burn-In Reduction to 6hrs (172 BGA)	Nov 04

PRODUCT DESCRIPTION (for qualification)	
Qualification Purpose: Qualify CY7C09569V / CY7C09579V and its FLEx36 family in qualified R52D-3 Technology, Fab4.	
Marketing Part #:	CY7C056V / CY7C057V / CY7C09569V / CY7C09579V
Device Description:	3.3V, Commercial and Industrial offered in 144-P TQFP and 172-B FBGA Package
Cypress Division:	Cypress Semiconductor Corporation – Data Com Division (DCD)
Overall Die (or Mask) REV Level (pre-requisite for qualification):	Rev. A
What ID markings on Die:	7C05793A

TECHNOLOGY/FAB PROCESS DESCRIPTION - R52D-3			
Number of Metal Layers:	2	Metal Composition:	Metal 1: 500 Å TiW/6000 Å Al-.5%Cu/300 Å TiW Metal 2: 300Å CoTi/8000Å Al-.5%Cu/300Å TiW
Passivation Type and Materials:	1000Å Oxide + 9000Å Nitride		
Free Phosphorus contents in top glass layer(%):	0%		
Number of Transistors in Device	29,066,890		
Number of Gates in Device	4.8 million		
Generic Process Technology/Design Rule (□-)	CMOS, Double Metal /0.25 □m		
Gate Oxide Material/Thickness (MOS):	SiO <sub>2</sub> / 50 Å		
Name/Location of Die Fab (prime) Facility:	Cypress Semiconductor - Bloomington, MN		
Die Fab Line ID/Wafer Process ID:	Fab4/R52D-3		

## PACKAGE AVAILABILITY

PACKAGE	ASSEMBLY FACILITY SITE
144-pin TQFP	TAIWN-G
256-ball FBGA (extended qual to 172-ball)	TAIWN-G

**Note:** Package Qualification details upon request

MAJOR PACKAGE INFORMATION USED IN THIS QUALIFICATION	
Package Designation:	A144
Package Outline, Type, or Name:	144-pin Thin Quad Flat Pack (TQFP)
Mold Compound Name/Manufacturer:	Sumitomo EME 7320
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:	8361
Bond Diagram Designation	10-03561
Wire Bond Method:	Thermosonic
Wire Material/Size:	Gold/ 1.3mil
Thermal Resistance Theta JA °C/W:	42C/W
Package Cross Section Yes/No:	N/A
Name/Location of Assembly (prime) facility:	ASE Taiwan (TAIWN-G)

ELECTRICAL TEST / FINISH DESCRIPTION	
Test Location:	ASE Taiwan (TAIWN-G), KYEC
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, 125°C	P
High Temperature Operating Life Latent Failure Rate	Dynamic Operating Condition, Vcc Max = 4.5V, 150°C	P
High Accelerated Saturation Test (HAST)	130°C, 3.63V, 85%RH Precondition: JESD22 Moisture Sensitivity MSL 3 192 Hrs, 30°C / 60%RH, 220C+5, -0C Reflow	P
Temperature Cycle	MIL-STD-883C, Method 1010, Condition C, -65°C to 150°C Precondition: JESD22 Moisture Sensitivity MSL 3 192 Hrs, 30°C / 60%RH, 220C+5, -0C Reflow	P
Pressure Cooker	121°C, 100%RH, 15 Psig Precondition: JESD22 Moisture Sensitivity MSL 3 192 Hrs, 30°C / 60%RH, 220C+5, -0C Reflow	P
Electrostatic Discharge Human Body Model (ESD-HBM)	2,200V, JESD22-A114	P
Electrostatic Discharge Charge Device Model (ESD-CDM)	500V, JESD22-C101	P
High Temperature Steady State Life	Static Operating Condition, Vcc = 3.63V, 150C	P
High Temperature Storage	165C, No bias	P
Age Bond Pull	MIL-STD-883, Method 2011	P
Current Density	Meets the Technology Device Level Reliability Specifications	
Static Latch-up	125°C , ± 200mA, In accordance with JESD78	P
Acoustic Microscopy, MSL 3	J-STD-020	P

## RELIABILITY FAILURE RATE SUMMARY

Stress/Test	Device Tested/ Device Hours	# Fails	Activation Energy	Thermal AF <sup>4</sup>	Failure Rate
High Temperature Operating Life Early Failure Rate <sup>1</sup> @125C	5850	0	N/A	N/A	0 PPM
High Temperature Operating Life <sup>2,3</sup> Long Term Failure Rate	387,780 DHRs	2	0.7	170	30 FIT

<sup>1</sup> A production burn-in of 48 Hrs at 150C, 3.8V is required for the product.

<sup>2</sup> Assuming an ambient temperature of 55C and a junction temperature rise of 15°C.

<sup>3</sup> Chi-squared 60% estimations used to calculate the failure rate.

<sup>4</sup> 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 =  $8.62 \times 10^{-5}$  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 # : 99202**

Device	Fab Lot #	Assy Lot #	Assy Loc	Duration	Samp	Rej	Failure Mechanism
<b>STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-EARLY FAILURE RATE, 150C, 4V, Vcc Max</b>							
CY7C09579V-AC	4909273	619912249	TAIWN-G	48	773	0	
CY7C09579V-AC	4922904	619920052	TAIWN-G	48	784	0	
<b>STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-LATENT FAILURE RATE, 150C, 3.8V, Vcc Max</b>							
CY7C09579V-AC	4909273	619912249	TAIWN-G	80	396	0	
CY7C09579V-AC	4909273	619912249	TAIWN-G	500	386	1	Particle Defect
CY7C09579V-AC	4922904	619920052	TAIWN-G	80	393	0	
CY7C09579V-AC	4922904	619920052	TAIWN-G	500	387	1	Gate Oxide Defect
<b>STRESS: HI-ACCEL SATURATION TEST, 130C, 85%RH, 3.63V), PRE COND 192 HR 30C/60%RH, MSL3</b>							
CY7C09579V-AC	4909273	619912249	TAIWN-G	128	48	0	
CY7C09579V-AC	4922904	619920052	TAIWN-G	128	48	0	
<b>STRESS: PRESSURE COOKER TEST, 121C, 100%RH, MSL3</b>							
CY7C09579V-AC	4909273	619912249	TAIWN-G	168	48	0	
CY7C09579V-AC	4922904	619920052	TAIWN-G	168	50	0	
<b>STRESS: ESD-CHARGE DEVICE MODEL, 500V</b>							
CY7C09579V-AC	4909273	619912249	TAIWN-G	COMP	3	0	
<b>STRESS: ESD-HUMAN BODY CIRCUIT PER MIL STD 883, METHOD 3015, 2,800V</b>							
CY7C09579V-AC	4909273	619912249	TAIWN-G	COMP	3	0	
CY7C09579V-AC	4909273	619912249	TAIWN-G	COMP	3	0	
<b>STRESS: DYNAMIC LATCH-UP TESTING</b>							
CY7C057V-AC	4909273	619912249	TAIWAN-G	COMP	3	0	
<b>STRESS: STATIC LATCH-UP TESTING, 125C, 9.5V, +/- 200mA</b>							
CY7C09579V-AC	4909273	619912249	TAIWN-G	COMP	3	0	
<b>STRESS: TC COND. C -65C TO 150C, PRECONDITION 192 HRS 30C/60%RH, MSL3</b>							
CY7C09579V-AC	4909273	619912249	TAIWN-G	300	47	1	Failed ISB3
CY7C09579V-AC	4909273	619912249	TAIWN-G	500	46	1	Particle Defect
CY7C09579V-AC	4909273	619912249	TAIWN-G	1000	46	0	



## Reliability Test Data

**QTP #: 040701**

<b>Device</b>	<b>Fab Lot #</b>	<b>Assy Lot #</b>	<b>Assy Loc</b>	<b>Duration</b>	<b>Samp</b>	<b>Rej</b>	<b>Failure Mechanism</b>
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**STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-EARLY FAILURE RATE, 150C, 3.8V, Vcc Max**

CY7C09579V (7C05793A)	4351632	610408280	TAIWN-G	48	1001	0	
CY7C09579V (7C05793A)	4351632	610408280N	TAIWN-G	48	974	0	
CY7C09579V (7C05793A)	4351704	610408279	TAIWN-G	48	1860	0	
CY7C09579V (7C05793A)	4352920	610412218N	TAIWN-G	48	1028	0	

## Reliability Test Data

QTP #: 042301

Device	Fab Lot #	Assy Lot #	Assy Loc	Duration	Samp	Rej	Failure Mechanism
<b>STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-EARLY FAILURE RATE, 125C, 3.8V, Vcc Max</b>							
CY7C09579V (7C05793A)	422508	610438476	TAIWN-G	96	492	0	
CY7C09579V (7C05793A)	423864	610434477	TAIWN-G	96	160	0	
CY7C09579V (7C05793A)	423864	610434477N1	TAIWN-G	96	159	0	
CY7C09579V (7C05793A)	423864	610434477N1	TAIWN-G	96	177	0	

## Document History Page

Document Title: QTP # 99202: LOW VOLTAGE SYNCHRONOUS/ASYNCHRONOUS RAM R52D-3  
TECHNOLOGY AT FAB 4  
Document Number: 001-87678

Rev.	ECN No.	Orig. of Change	Description of Change
**	4007788	ILZ	Initial Spec Release Qualification report published on Cypress.com is documented on memo LGQ-144 and not in spec format. Initiated spec for QTP 99202 and data from LGQ-144 was transferred to qualification report spec template.
*A	4392970	ILZ	Sunset Review Updated front page to reflect new qualification report template per Spec 001-57716 Page 3 – Major package information table - Deleted Assembly process flow - obsolete spec Reliability tests performed per specification requirements Deleted revision of the following standards: Temperature Cycle, X-ray, Thermal Shock: Deleted Rev C, MIL-STD-883 ESD-HBM, Deleted Rev A., JESD22-A114 ESD-CDM : Deleted Rev C, JESD22-C101 Ball Shear: Ball shear, JESD22-B116 Thermal Shock: Deleted JESD22-A106
*B	4394116	ILZ	Correction on Page 1 Added this information “ FOR ANY QUESTIONS ON THIS REPORT, PLEASE CONTACT <a href="mailto:reliability@cypress.com">reliability@cypress.com</a> or via a CYLINK CRM CASE

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