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# Cypress Semiconductor Product Qualification Report

**QTP# 043801 VERSION\*A**  
**October 2014**

<b>CY2305C</b> <b>CY2309C</b>	Low-cost 3.3V Zero Delay Buffer
<b>CY23EP05</b>	2.5V or 3.3V, 10-220 MHz, Low Jitter, 5 - Output Zero Delay Buffer
<b>CY23EP09</b>	2.5V or 3.3V, 10-220 MHz, Low Jitter, 9 - Output Zero Delay Buffer
R52T-3 Technology, Fab4	

**FOR ANY QUESTIONS ON THIS REPORT, PLEASE CONTACT**  
**[reliability@cypress.com](mailto:reliability@cypress.com) or via a CYLINK CRM CASE**

**Prepared By:**  
Honesto Sintos  
Reliability Engineer

**Reviewed By:**  
Zhaomin Ji  
Reliability Manager

**Approved By:**  
Richard Oshiro  
Reliability Director

**PRODUCT QUALIFICATION HISTORY**

<b>QTP Number</b>	<b>Description of Qualification Purpose</b>	<b>Date</b>
024604	R52T-3 Technology Process Derivative Qual	May 03
043801	New Device CY2305C/CY2309C/CY23EP05/CY23EP09 C30M Base Die in R52T-3 Technology	Jul 05

PRODUCT DESCRIPTION (for qualification)	
Qualification Purpose: New Device CY2305C/CY2309C/CY23EP05/CY23EP09 C30M Base Die in R52T-3 Technology	
Marketing Part #:	CY2305C, CY2309C, CY23EP05, CY23EP09
Device Description:	Low-cost 3.3V Zero Delay Buffer available 8/16-Lead SOIC/TSSOP
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:	CY7C8C002A

TECHNOLOGY/FAB PROCESS DESCRIPTION – R52T-3			
Number of Metal Layers:	3	Metal Composition:	Metal 1: 500Å TiW / 6000Å Al / 500Å TiW Metal 2: 500Å TiW / 6000Å Al / 500Å TiW Metal 3: 300Å Ti / 8000Å Al / 300Å TiW
Passivation Type and Materials:	1000Å SiO <sub>2</sub> / 9000Å Si <sub>3</sub> N <sub>4</sub>		
Free Phosphorus contents in top glass layer (%):	0%		
Number of Transistors in Device	13,741		
Number of Gates in Device	3,435		
Generic Process Technology/Design Rule (μ-drawn):	CMOS - Triple Metal, 0.25μm		
Gate Oxide Material/Thickness (MOS):	SiO <sub>2</sub> , 55Å		
Name/Location of Die Fab (prime) Facility:	Cypress Semiconductor -- Bloomington, MN		
Die Fab Line ID/Wafer Process ID:	Fab4/R52T-3		

## PACKAGE AVAILABILITY

PACKAGE	ASSEMBLY SITE FACILITY
8/16-Lead SOIC 16-Lead TSSOP	CMLRA, PHIL-M, TAIWN-T

Note: Package Qualification details upon request.

<b>MAJOR PACKAGE INFORMATION USED IN THIS QUALIFICATION</b>	
<b>Package Designation:</b>	SZ16
<b>Package Outline, Type, or Name:</b>	16-Lead Plastic Small Outline IC's
<b>Mold Compound Name/Manufacturer:</b>	MP8500
<b>Mold Compound Flammability Rating:</b>	V-O per UL94
<b>Oxygen Rating Index:</b>	>28%
<b>Lead Frame Material:</b>	Copper Alloy
<b>Lead Finish, Composition / Thickness:</b>	Pure Sn
<b>Die Backside Preparation Method/Metallization:</b>	Backgrinding
<b>Die Separation Method:</b>	100% Saw
<b>Die Attach Supplier:</b>	Ablestik
<b>Die Attach Material:</b>	Ablebond 8304
<b>Die Attach Method:</b>	Epoxy
<b>Bond Diagram Designation:</b>	10-06958
<b>Wire Bond Method:</b>	Thermosonic
<b>Wire Material/Size:</b>	Au, 0.8mil
<b>Thermal Resistance Theta JA °C/W:</b>	125.2°C/W
<b>Package Cross Section Yes/No:</b>	N/A
<b>Assembly Process Flow:</b>	11-20025M
<b>Name/Location of Assembly (prime) facility:</b>	AMKOR-PHIL (PHIL-M)

<b>ELECTRICAL TEST / FINISH DESCRIPTION</b>	
<b>Test Location:</b>	Cypress Philippines (CML-R)
<b>Fault Coverage:</b>	100%

**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	Dynamic Operating Condition, Vcc Max = 3.8V, 125°C Dynamic Operating Condition, Vcc Max = 3.8V, 150°C JESD22-A108	P
High Temperature Operating Life Latent Failure Rate	Dynamic Operating Condition, Vcc Max = 3.8V, 125°C Dynamic Operating Condition, Vcc Max = 3.8V, 150°C JESD22-A108	P
High Accelerated Saturation Test (HAST)	JEDEC STD 22-A110: 130°C, 3.6V, 85%RH Precondition: JESD22 Moisture Sensitivity MSL 1  168 Hrs, 85C/85%RH+3IR-Reflow, 260°C+0, -5°C	P
Temperature Cycle	MIL-STD-883C, Method 1010, Condition C, -65°C to 150°C Precondition: JESD22 Moisture Sensitivity MSL 1  168 Hrs, 85C/85%RH+3IR-Reflow, 260°C+0, -5°C	P
Pressure Cooker	JESD22-A102: 121°C, 100%RH Precondition: JESD22 Moisture Sensitivity MSL 1  168 Hrs, 85C/85%RH+3IR-Reflow, 260°C+0, -5°C	P
Electrostatic Discharge Human Body Model (ESD-HBM)	2,200V JESD22, Method A114-B	P
Electrostatic Discharge Human Body Model (ESD-HBM)	2,200V MIL-STD-883, Method 3015.7	P
Electrostatic Discharge Charge Device Model (ESD-CDM)	500V JESD22-C101	P
Acoustic Microscopy	J-STD-020	P
Static Latch-up	125C, 8.0V/9.0V/10.0V, ± 300mA  In accordance with JEDEC 17	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	1,000 Devices	0	N/A	N/A	0 PPM
High Temperature Operating Life <sup>1,2</sup> Long Term Failure Rate	566,356 DHRs	0	0.7	55	29 FITs

<sup>1</sup> Assuming an ambient temperature of 55°C and a junction temperature rise of 15°C.

<sup>2</sup> Chi-squared 60% estimations used to calculate the failure rate.

<sup>3</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 #: 024604

<i>Device</i>	<i>Fab Lot #</i>	<i>Assy Lot #</i>	<i>Assy Loc</i>	<i>Duration</i>	<i>Samp</i>	<i>Rej</i>	<i>Failure Mechanism</i>
<b>STRESS: ACOUSTIC-MSL3</b>							
CY6981-BA (7C6981A)	4223346	610243127/3004	TAIWN-G	COMP	18	0	
<b>STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-EARLY FAILURE RATE (125C, 3.8V, Vcc Max)</b>							
CY6981-BA (7C6981A)	4147861	610221501/2/27521	TAIWN-G	96	1342	0	
CY6981-BA (7C6981A)	4238026	610250542	TAIWN-G	96	1020	0	
CY6981-BA (7C6981A)	4223346	610243127/3004/7	TAIWN-G	96	1015	0	
<b>STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-LATENT FAILURE RATE ( 125C, 3.8V, Vcc Max)</b>							
CY6981-BA (7C6981A)	4147861	610221501/2	TAIWN-G	168	182	0	
CY6981-BA (7C6981A)	4147861	610221501/2	TAIWN-G	500	182	0	
CY6981-BA (7C6981A)	4147861	610221501/2	TAIWN-G	1000	182	0	
CY6981-BA (7C6981A)	4223346	610243127/3004	TAIWN-G	168	182	0	
CY6981-BA (7C6981A)	4223346	610243127/3004	TAIWN-G	500	182	0	
CY6981-BA (7C6981A)	4223346	610243127/3004	TAIWN-G	1000	180	0	
CY6981-BA (7C6981A)	4238026	610250542	TAIWN-G	168	368	0	
CY6981-BA (7C6981A)	4238026	610250542	TAIWN-G	500	368	0	
<b>STRESS: ESD-CHARGE DEVICE MODEL (500V)</b>							
CY6981-BA (7C6981A)	4147861	610221501/2/2752	TAIWN-G	COMP	9	0	
CY6981-BA (7C6981A)	4223346	610243127/3004	TAIWN-G	COMP	9	0	
<b>ESD-HUMAN BODY CIRCUIT PER MIL STD 883, METHOD 3015 (2,200V)</b>							
CY6981-BA (7C6981A)	4147861	610221501/2/2752	TAIWN-G	COMP	9	0	
CY6981-BA (7C6981A)	4223346	610243127/3004	TAIWN-G	COMP	9	0	
<b>STRESS: STATIC LATCH-UP TESTING (125C, 10V, +/-300mA)</b>							
CY6981-BA (7C6981A)	4147861	610221501/2/2752	TAIWN-G	COMP	3	0	
CY6981-BA (7C6981A)	4238026	610250542	TAIWN-G	COMP	3	0	
<b>STRESS: HI-ACCEL SATURATION TEST (130C, 85%RH, 3.6V), PRE COND 192 HR 30C/60%RH, MSL3</b>							
CY6981-BA (7C6981A)	4147861	610221501/2/2752	TAIWN-G	128	50	0	
CY6981-BA (7C6981A)	4223346	610243127/3004	TAIWN-G	128	47	0	





## Reliability Test Data

**QTP #: 024604**

<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>
<b>STRESS: PRESSURE COOKER TEST, (121C, 100%RH), PRE COND 192 HR 30C/60%RH, MSL3</b>							
CY6981-BA (7C6981A)	4147861	610221501/2/2752	TAIWN-G	168	50	0	
CY6981-BA (7C6981A)	4223346	610243127/3004	TAIWN-G	168	48	0	
CY6981-BA (7C6981A)	4223346	610243127/3004	TAIWN-G	288	48	0	
CY6981-BA (7C6981A)	4238026	610250542	TAIWN-G	168	48	0	
CY6981-BA (7C6981A)	4238026	610250542	TAIWN-G	288	48	0	
<b>STRESS: TC COND. C -65C TO 150C, PRE COND 192 HRS 30C/60%RH, MSL3</b>							
CY6981-BA (7C6981A)	4147861	610221501/2/2752	TAIWN-G	300	50	0	
CY6981-BA (7C6981A)	4147861	610221501/2/2752	TAIWN-G	500	50	0	
CY6981-BA (7C6981A)	4147861	610221501/2/2752	TAIWN-G	1000	50	0	
CY6981-BA (7C6981A)	4223346	610243127/3004	TAIWN-G	300	48	0	
CY6981-BA (7C6981A)	4223346	610243127/3004	TAIWN-G	500	48	0	
CY6981-BA (7C6981A)	4223346	610243127/3004	TAIWN-G	1000	48	0	
CY6981-BA (7C6981A)	4238026	610250542	TAIWN-G	300	48	0	
CY6981-BA (7C6981A)	4238026	610250542	TAIWN-G	500	48	0	
CY6981-BA (7C6981A)	4238026	610250542	TAIWN-G	1000	48	0	



## Reliability Test Data

**QTP #: 043801**

Device	Fab Lot #	Assy Lot #	Assy Loc	Duration	Samp	Rej	Failure Mechanism
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**STRESS: ESD-CHARGE DEVICE MODEL (500V)**

CY2309CSXC-1 (7C823C09A)	4439900	610456357	PHIL-M	COMP	9	0	
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CY2305CSXC-1 (7C823C05A)	4439900	610502297	PHIL-M	COMP	9	0	
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**STRESS: ESD-HUMAN BODY CIRCUIT PER JESD22, METHOD A114-B, (2,200V)**

CY2309CSXC-1 (7C823C09A)	4439900	610456357	PHIL-M	COMP	9	0	
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CY2305CSXC-1 (7C823C05A)	4439900	610502297	PHIL-M	COMP	9	0	
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**ESD-HUMAN BODY CIRCUIT PER MIL STD 883, METHOD 3015, (2,200V)**

CY2309CSXC-1 (7C823C09A)	4439900	610456357	PHIL-M	COMP	3	0	
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CY2305CSXC-1 (7C823C05A)	4439900	610502297	PHIL-M	COMP	3	0	
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**STRESS: STATIC LATCH-UP TESTING (125C, 9.5V, +/-300mA)**

CY2309CSXC-1 (7C823C09A)	4439900	610456357	PHIL-M	COMP	3	0	
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**STRESS: STATIC LATCH-UP TESTING (125C, 8.0V, +/-300mA)**

CY2305CSXC-1 (7C823C05A)	4439900	610502297	PHIL-M	COMP	3	0	
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**STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-EARLY FAILURE RATE (150C, 3.8V, Vcc Max)**

CY2309CSXC-1 (7C823C09A)	4439900	610456357	PHIL-M	48	1000	0	
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**STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-LATENT FAILURE RATE ( 150C, 3.8V, Vcc Max)**

CY2309CSXC-1 (7C823C09A)	4439900	610456357	PHIL-M	80	120	0	
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CY2309CSXC-1 (7C823C09A)	4439900	610456357	PHIL-M	500	120	0	
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**STRESS: PRESSURE COOKER TEST, (121C, 100%RH), PRE COND 168HR 85C/85%RH, MSL1**

CY2309CSXC-1 (7C823C09A)	4439900	610456357	PHIL-M	168	48	0	
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CY2309CSXC-1 (7C823C09A)	4439900	610456357	PHIL-M	288	48	0	
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**STRESS: TC COND. C -65C TO 150C, PRE COND 168 HRS 85C/85%RH, MSL1**

CY2309CSXC-1 (7C823C09A)	4439900	610456357	PHIL-M	300	48	0	
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CY2309CSXC-1 (7C823C09A)	4439900	610456357	PHIL-M	500	48	0	
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## Reliability Test Data

**QTP #: 043801**

<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: PRESSURE COOKER TEST, (121C, 100%RH), PRE COND 192 HR 30C/60%RH, MSL3**

CY2309CSXC-1 (7C823C09A)	4439900	610456357	PHIL-M	168	48	0	
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CY2309CSXC-1 (7C823C09A)	4439900	610456357	PHIL-M	288	48	0	
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**STRESS: TC COND. C -65C TO 150C, PRE COND 192 HRS 30C/60%RH, MSL3**

CY2309CSXC-1 (7C823C09A)	4439900	610456357	PHIL-M	270	48	0	
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CY2309CSXC-1 (7C823C09A)	4439900	610456357	PHIL-M	500	48	0	
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CY2309CSXC-1 (7C823C09A)	4439900	610456357	PHIL-M	1000	48	0	
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## Document History Page

Document Title: QTP 043801: (CY2305/9C, CY23EP05/9), R52T-3 TECHNOLOGY, FAB4  
Document Number: 001-84206

Rev.	ECN No.	Orig. of Change	Description of Change
**	3791446	NSR	Initial Spec Release.
*A	4550009	HSTO	Align qualification report based on the new template in the front page

Distribution: WEB

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