Please note that Cypress is an Infineon Technologies Company.
The document following this cover page is marked as “Cypress” document as this is the company that originally developed the product. Please note that Infineon will continue to offer the product to new and existing customers as part of the Infineon product portfolio.

Continuity of document content
The fact that Infineon offers the following product as part of the Infineon product portfolio does not lead to any changes to this document. Future revisions will occur when appropriate, and any changes will be set out on the document history page.

Continuity of ordering part numbers
Infineon continues to support existing part numbers. Please continue to use the ordering part numbers listed in the datasheet for ordering.

www.infineon.com

Cypress Semiconductor
Product Qualification Report

QTP# 071104 VERSION*A
September 2014

PSoC Mixed Signal Array Product Family S4AD-5 Technology, Fab5	
CY8C21123 CY8C21223 CY8C21323	PSoC™ Mixed Signal Array with On-Chip Controller

FOR ANY QUESTIONS ON THIS REPORT, PLEAE CONTACT 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

Qual Report		Description of Qualification Purpose		Date Comp
060605		Qualify GSMC using PSoC Device Product Family on S4AD-5 Technology		Aug 06
071104		Qualify PSoC 8C21000A Device on S4AD-5 Technology, Fab5		Nov 07

PRODUCT DESCRIPTION (for qualification)	
Qualification Purpose: Qualify PSoC 8C21000A Device on S4AD-5 Technology, Fab5	
Marketing Part #:	CY8C21123, CY8C21223, CY8C21323, CY8C21000
Device Description	3.3V and 5V Industrial 24Mhz Programmable System on Chip
Cypress Division:	Cypress Semiconductor - Consumer and Computation Division

TECHNOLOGY/FAB PROCESS DESCRIPTION –R28			
Number of Metal Layers	2	Metal Composition:	Metal 1: 250A TiN/5,800A Al/700A TiN Metal 2: 500A TiN/8,000A Al/250A TiN
Passivation Type and Materials:			7,000A TeOs /6,000A Si3N4
Generic Process Technology /Design Rule (-drawn):			Single Poly, Double Metal, 0.35 µm
Gate Oxide Material/Thickness (MOS):in			SiO2 / 110A
Name/Location of Die Fab (prime) Facility:			GSMC/China
Die Fab Line ID/Wafer Process ID:			S4AD-5 GSMC SONOS

PACKAGE AVAILABILITY

PACKAGE	ASSEMBLY FACILITY SITE
8/16-Lead SOIC	CML-RA, PHIL-M, TAIWAN-T
20- Lead SSOP	CML-RA, TAIWAN-T
24-Lead MLF	AMKOR-L (KOREA)

.

PLASTIC PACKAGE / ASSEMBLY DESCRIPTION	
Package Designation	SZ16
Package Outline, Type, or Name:	16-Lead Small Outline Integrated Circuit (SOIC)
Mold Compound Name/Manufacturer:	EME 6600/Sumitomo
Mold Compound Flammability Rating:	V-0 PER UL-94
Oxygen Rating Index:	None
Lead Frame Material:	Copper
Lead Finish, Composition / Thickness:	Pure Sn
Die Backside Preparation Method/Metallization:	Backgrind
Die Separation Method:	100% Saw
Die Attach Supplier:	Ablestik
Die Attach Material:	8290
Die Attach Method:	Epoxy
Bond Diagram Designation:	001-11906
Wire Bond Method:	Thermosonic
Wire Material/Size:	Au. 1.0mil
Thermal Resistance Theta JA °C/W:	125C
Package Cross Section Yes/No:	N/A
Assembly Process Flow:	49-24026
Name/Location of Assembly (prime) facility	Amkor-Phil
MSL Level	1
Reflow Profile	260C

Note: Please contact a Cypress Representative for other packages availability.

ELECTRICAL TEST / FINISH DESCRIPTION	
Test Location	**CML-R**

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=5.5V, 125°C	P
High Temperature Operating Life Latent Failure Rate	Dynamic Operating Condition, Vcc Max=5.5V, 125°C	P
High Temperature Steady State life	125°C, 5.5V, Vcc Max	P
Low Temperature Operating Life	-30°C, 5.5V	P
High Accelerated Saturation Test (HAST)	130°C, 5.25V, 85%RH Precondition: JESD22 Moisture Sensitivity Level 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 Level 1 168 Hrs, 85C/85%RH+3IR-Reflow, 260°C+0, -5°C	P
Pressure Cooker	121°C, 100%RH, 15 Psig Precondition: JESD22 Moisture Sensitivity Level 1 168 Hrs, 85C/85%RH+3IR-Reflow, 260°C+0, -5°C	P
Acoustic Microscopy	J-STD-020	P
Age Bond Strength	200C, 4hrs MIL-STD-883, Method 883-2011	P
Data Retention	150°C ± 5°C No Bias	P
Dynamic Latch-up	125C, 8.5V	P
Electrostatic Discharge Human Body Model (ESD-HBM)	2,200V JESD22, Method A114-B JESD22, Method A114-E	P
Electrostatic Discharge Human Body Model (ESD-HBM)	2,200V MIL-STD-883, Method 3015.	P
Electrostatic Discharge Charge Device Model (ESD-CDM)	500V JESD22-C101	P
Endurance Test	MIL-STD-883, Method 883-1033	P
Static Latch-up	125C, ± 200mA JESD78B	P

RELIABILITY FAILURE RATE SUMMARY

Stress/Test	Device Tested/ Device Hours	# Fails	Activation Energy	Thermal[3] A.F	Failure Rate
High Temperature Operating Life Early Failure Rate3	1,010 Devices	0	N/A	N/A	0 PPM
High Temperature Operating Life1,2 Long Term Failure Rate	720,000 DHRs	0	0 .7	55	23 FIT

[1] Assuming an ambient temperature of 55C and a junction temperature rise of 15C.
[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 = 8.62×10^{-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 #: 060605

Device	Fab Lot #	Assy Lot #	Assy Loc	Duration	Samp	Rej	Failure Mechanism
STRESS: ACOUSTIC, MSL1							
CY8C24494 (8C24494A)	9621713	*610632687*	PHIL-M	COMP	15	0	
CY8C24494 (8C24494A)	9623715	*610635580*	PHIL-M	COMP	15	0	
CY8C24494 (8C24494A)	9623716	*610639767*	PHIL-M	COMP	15	0	
STRESS: AGE BOND STRENGTH							
CY8C24494 (8C24494A)	9621713	*610632687*	PHIL-M	COMP	10	0	
CY8C24494 (8C24494A)	9623715	*610635580*	PHIL-M	COMP	10	0	
CY8C24494 (8C24494A)	9623716	*610639767*	PHIL-M	COMP	10	0	
STRESS: DATA RETENTION, PLASTIC, 150C							
CY8C24494 (8C24494A)	9621713	*610632687*	PHIL-M	336	256	0	
CY8C24494 (8C24494A)	9621713	*610632687*	PHIL-M	1000	256	0	
CY8C24494 (8C24494A)	9621713	*610632687*	PHIL-M	1500	256	0	
CY8C24494 (8C24494A)	9623715	*610635580*	PHIL-M	336	256	0	
CY8C24494 (8C24494A)	9623715	*610635580*	PHIL-M	1000	256	0	
CY8C24494 (8C24494A)	9623716	*610639767*	PHIL-M	336	256	0	
STRESS: ENDURANCE							
CY8C24494 (8C24494A)	9621713	*610632687A*	PHIL-M	COMP	47	0	
STRESS: ESD-CHARGE DEVICE MODEL, (500V)							
CY8C24494 (8C24494A)	9621713	*610632687*	PHIL-M	COMP	9	0	
CY8C24494 (8C24494A)	9623715	*610635580*	PHIL-M	COMP	9	0	
CY8C24494 (8C24494A)	9623716	*610639767*	PHIL-M	COMP	9	0	
CY8C24494 (8C24494A)	9623715	*610635880*	PHIL-M	COMP	9	0	
CY8C24494 (8C24795A)	9623716	*610639349*	SEOL-L	COMP	9	0	
CY8C24494 (8C24995A)	9623716	*610639350*	SEOL-L	COMP	9	0	
STRESS: ESD-HUMAN BODY CIRCUIT PER JESD22, METHOD A114-B, (2,200V)							
CY8C24494 (8C24494A)	9621713	*610632687*	PHIL-M	COMP	9	0	
CY8C24494 (8C24494A)	9623716	*610639767*	PHIL-M	COMP	9	0	
CY8C24494 (8C24494A)	9623715	*610635880*	PHIL-M	COMP	9	0	
CY8C24494 (8C24995A)	9623716	*610639350*	SEOL-L	COMP	9	0	

Reliability Test Data

QTP #: 060605

Device	Fab Lot #	Assy Lot #	Assy Loc	Duration	Samp	Rej	Failure Mechanism
STRESS: ESD-HUMAN BODY CIRCUIT PER MIL STD 883, METHOD 3015, (2,200V)							
CY8C24494 (8C24494A)	9621713	*610632687*	PHIL-M	COMP	3	0	
CY8C24494 (8C24494A)	9623716	*610639767*	PHIL-M	COMP	3	0	
CY8C24494 (8C24494A)	9623715	*610635880*	PHIL-M	COMP	3	0	
CY8C24494 (8C24995A)	9623716	*610639350*	SEOL-L	COMP	3	0	
STRESS: STATIC LATCH-UP TESTING (125C, 8.5V, +/-200mA)							
CY8C24494 (8C24494A)	9623716	610639767	PHIL-M	COMP	3	0	
CY8C24494 (8C24994A)	9621713		C-USA	COMP	3	0	
CY8C24494 (8C24494A)	9623715	610638054	SEOL-L	COMP	3	0	
CY8C24494 (8C24995A)	9623716	610639350	SEOL-L	COMP	3	0	
STRESS: DYNAMIC LATCH-UP (125C, 8.5V)							
CY8C24494 (8C24494A)	9621713	610632687	PHIL-M	COMP	2	0	
STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-EARLY FAILURE RATE (125C, 5.5V, Vcc Max)							
CY8C24494 (8C24494A)	9621713	610632687	PHIL-M	96	1005	0	
CY8C24494 (8C24494A)	9623715	610635580	PHIL-M	96	1144	0	
CY8C24494 (8C24494A)	9623716	610639767	PHIL-M	96	908	1	CAPACITOR DEFECT
STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-LATENT FAILURE RATE (125C, 5.5V, Vcc Max)							
CY8C24494 (8C24494A)	9621713	610632687	PHIL-M	168	180	0	
CY8C24494 (8C24494A)	9621713	610632687	PHIL-M	1000	180		0
CY8C24494 (8C24494A)	9623715	610635580	PHIL-M	168	180	0	
CY8C24494 (8C24494A)	9623715	610635580	PHIL-M	1000	180	0	
CY8C24494 (8C24494A)	9623716	610639767	PHIL-M	168	180	0	
CY8C24494 (8C24494A)	9623716	610639767	PHIL-M	1000	180	0	
CY8C24494 (8C24494A)	9623716	610639767A	PHIL-M	1000	180	0	
STRESS: HIGH TEMP STEADY STATE LIFE TEST (125C, 5.5V)							
CY8C24494 (8C24494A)	9621713	610632687	PHIL-M	168	80	0	
CY8C24494 (8C24494A)	9621713	610632687	PHIL-M	336	80	0	
STRESS: LOW TEMPERATURE DYNAMIC OPERATING LIFE, -30C, 5.5V							
CY8C24494 (8C24494A)	9621713	610632687	PHIL-M	500	45	0	

Reliability Test Data

QTP #: 060605

Device	Fab Lot #	Assy Lot #	Assy Loc	Duration	Samp	Rej	Failure Mechanism
STRESS: HI-ACCEL SATURATION TEST (130C, 85%RH, 5.25V), PRE COND 168 HR 85C/85%RH (MSL1)							
CY8C24494 (8C24494A)	9621713	610632687	PHIL-M	128	49	0	
CY8C24494 (8C24494A)	9623715	610635580	PHIL-M	128	49	0	
CY8C24494 (8C24494A)	9623716	610639767	PHIL-M	128	49	0	
STRESS: PRESSURE COOKER TEST (121C, 100%RH), 15 Psig, PRE COND 168 HR 85C/85%RH (MSL1)							
CY8C24494 (8C24494A)	9621713	610632687	PHIL-M	168	50	0	
CY8C24494 (8C24494A)	9621713	610632687	PHIL-M	288	50	0	
CY8C24494 (8C24494A)	9621713	610632687	PHIL-M	500	47	0	
CY8C24494 (8C24494A)	9623715	610635580	PHIL-M	168	50	0	
CY8C24494 (8C24494A)	9623716	610639767	PHIL-M	168	50	0	
CY8C24494 (8C24494A)	9623716	610639767	PHIL-M	288	50	0	
STRESS: TC COND. C -65C TO 150C, PRE COND 168 HRS 85C/85%RH (MSL1)							
CY8C24494 (8C24494A)	9621713	610632687	PHIL-M	300	50	0	
CY8C24494 (8C24494A)	9621713	610632687	PHIL-M	500	50	0	
CY8C24494 (8C24494A)	9621713	610632687	PHIL-M	1000	50	0	
CY8C24494 (8C24494A)	9623715	610635580	PHIL-M	300	50	0	
CY8C24494 (8C24494A)	9623715	610635580	PHIL-M	500	49	0	
CY8C24494 (8C24494A)	9623715	610635580	PHIL-M	1000	49	0	
CY8C24494 (8C24494A)	9623716	610639767	PHIL-M	300	50	0	
CY8C24494 (8C24494A)	9623716	610639767	PHIL-M	500	49	0	

Reliability Test Data

QTP #: 071104

Device	Fab Lot #	Assy Lot #	Assy Loc	Duration	Samp	Rej	Failure Mechanism
STRESS: DATA RETENTION, PLASTIC, 150C							
CY8C21223 (8C212235AK)	5716010	610751198	PHIL-M	500	40	0	
CY8C21223 (8C212235AK)	5716010	610751202	PHIL-M	500	40	0	
STRESS: ENDURANCE							
CY8C21223 (8C212235AK)	5716010	610751198	PHIL-M	COMP	39	0	
CY8C21223 (8C212235AK)	5716010	610751202	PHIL-M	COMP	39	0	
STRESS: ESD-CHARGE DEVICE MODEL, (500V)							
CY8C212323 (8C213235AK)	5716010	610747058	TWN-T	COMP	9	0	
STRESS: ESD-HUMAN BODY CIRCUIT PER JESD22, METHOD A114-E, (2,200V)							
CY8C212323 (8C213235AK)	5716010	610747058	TWN-T	COMP	8	0	
STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-EARLY FAILURE RATE (125C, 5.5V, Vcc Max)							
CY8C21223 (8C212235AK)	5716010	610751198	PHIL-M	96	505	0	
CY8C21223 (8C212235AK)	5716010	610751202	PHIL-M	96	505	0	
STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-LATENT FAILURE RATE (125C, 5.5V, Vcc Max)							
CY8C21223 (8C212235AK)	5716010	610751198	PHIL-M	168	90	0	
CY8C21223 (8C212235AK)	5716010	610751202	PHIL-M	168	90	0	
STRESS: STATIC LATCH-UP TESTING (125C, +/-200mA)							
CY8C212323 (8C213235AK)	5716010	610747058	TWN-T	COMP	6	0	

Document History Page

Document Title: QTP#071104: PSoC Mixed Signal Array Product Family "CY8C21123/21223/21323" S4AD-5 Technology, Fab5
Document Number: 001-89221

Rev.	ECN No.	Orig. of Change	Description of Change
**	4125299	HSTO	Initial Spec Release Initiate report as per memo HGA-252.
*A	4517702	HSTO	Align qualification report based on the new template in the front page

Distribution: WEB

Posting: None