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Cypress Semiconductor
Product Qualification Report

QTP# 071402 VERSION*A
September 2014

PSoC™ Lithium Device Family S4AD-5 Technology, Fab5 GSMC	
CY8C24123A CY8C24223A CY8C24423A	Mixed Signal Array with On-Chip Controller

FOR ANY QUESTIONS ON THIS REPORT, PLEAE CONTACT
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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
071402		Qualify PSOC 8C24000B Lithium Device on S4AD-5 Technology, Fab5 (GSMC)		Feb 08

PRODUCT DESCRIPTION (for qualification)	
Qualification Purpose: Qualify PSOC 8C24000B Lithium Device on S4AD-5 Technology, Fab5 (GSMC)	
Marketing Part #:	CY8C24123A, CY8C24223A, CY8C24423A
Device Description:	3.3V and 5V Industrial 24Mhz Programmable System on Chip
Cypress Division:	Cypress Semiconductor - Consumer and Computation Division

TECHNOLOGY/FAB PROCESS DESCRIPTION S4AD-5			
Number of Metal Layers:	2	Metal Composition:	Metal 1: 250A TiN/5,800A Al/700A TiN Metal 2: 500A TiN/8,000A
Passivation Type and Materials:		7,000A TeOs /6,000A Si_3N_4	
Generic Process Technology/Design Rule (µ-drawn):		Single Poly, Double Metal, 0.35 µm	
Gate Oxide Material/Thickness (MOS):		SiO_2 / 110A	
Name/Location of Die Fab (prime) Facility:		GSMC/Shanghai-China	
Die Fab Line ID/Wafer Process ID:		S4AD-5 GSMC Sonos	

PACKAGE AVAILABILITY

PACKAGE	ASSEMBLY SITE FACILITY
8-Lead SOIC	**PHIL-M**
20/28-Lead SOIC	**CML-R**
20/28-Lead SSOP	**TAIWN-T, PHIL-M, CML-RA**
56-Lead SSOP	**CML-R**
8/20/28-Lead PDIP	**INDNS-O**
32-Lead MLF	**SEOUL-L, CML-RA**

Note: Package Qualification details upon request.

MAJOR PACKAGE INFORMATION FOR THIS QUALIFICATION	
Package Designation:	SP28
Package Outline, Type, or Name:	28-Lead Shrunk Small Outline Package (SSOP)
Mold Compound Name/Manufacturer:	CEL 9220HF
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:	8340
Die Attach Method:	Epoxy Dispense
Bond Diagram Designation:	10-05890
Wire Bond Method:	Thermosonic
Wire Material/Size:	Au. 1.0mil
Thermal Resistance Theta JA °C/W:	90 °C/W
Package Cross Section Yes/No:	N/A
Assembly Process Flow:	49-35032
Name/Location of Assembly (prime) facility:	OSE-Taiwan
MSL Level	3
Reflow Profile	260C

ELECTRICAL TEST / FINISH DESCRIPTION	
Test Location:	CML-R

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

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-E	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
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 Rate[1]	1000 Devices	1	N/A	N/A	0 PPM
High Temperature Operating Life[1, 2] Long Term Failure Rate	900,000DHRs	0	0 .7	55	18 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 = 8.62×10^{-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 #: 071402

Device	Fab Lot #	Assy Lot #	Assy Loc	Duration	Samp	Rej	Failure Mechanism
STRESS: DATA RETENTION, PLASTIC, 150C							
CY8C244235A (8C244235B)	4736737	610760878	TAIWAN-T	500	77	0	
STRESS: ENDURANCE							
CY8C244235A (8C244235B)	4736737	610760878	TAIWAN-T	COMP	77	0	
STRESS: ESD-CHARGE DEVICE MODEL, (500V)							
CY8C244235A (8C244235B)	4736737	610760878	TAIWAN-T	COMP	9	0	
STRESS: ESD-HUMAN BODY CIRCUIT PER JESD22, METHOD A114-E, (2,200V)							
CY8C244235A (8C244235B)	4736737	610760878	TAIWAN-T	COMP	8	0	
STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-EARLY FAILURE RATE (125C, 5.5V, Vcc Max)							
CY8C244235A (8C244235B)	4736737	610760878	TAIWAN-T	96	1000	0	
STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-LATENT FAILURE RATE (125C, 5.5V, Vcc Max)							
CY8C244235A (8C244235B)	4736737	610760878	TAIWAN-T	168	180	0	
CY8C244235A (8C244235B)	4736737	610760878	TAIWAN-T	1000	180	0	
STRESS: STATIC LATCH-UP TESTING (125C, 7.87V, +/-200mA)							
CY8C244235A (8C244235B)	4736737	610760878	TAIWAN-T	COMP	6	0	

Document History Page

Document Title: QTP#071402: PSoC Lithium Device Family "CY8C24123A/24223A/24423A" S4AD-5 Technology, Fab5 GSMC
Document Number: 001-89310

Rev.	ECN No.	Orig. of Change	Description of Change
**	4133296	HSTO	Initial Spec Release Initiate report as per memo HGA-335.
*A	4517702	HSTO	Align qualification report based on the new template in the front page

Distribution: WEB

Posting: None