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# Cypress Semiconductor Product Qualification Report

**QTP# 081401**  
**June 2013**

<b>S4CAP Technology, Fab5</b>	
<b>CY5057</b>	<b>High-Frequency Flash Programmable PLL Die with Spread Spectrum</b>
<b>CY2510x</b>	<b>Field and Factory-Programmable Spread Spectrum Clock Generator for EMI Reduction</b>
<b>CY2570x</b>	<b>Programmable High Frequency Crystal Oscillator with Spread Spectrum (SSXO) and No Spread Spectrum (XO) Option</b>
<b>CY2490x</b>	<b>Spread Spectrum Clock Generator</b>

## **CYPRESS TECHNICAL CONTACT FOR QUALIFICATION DATA:**

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**PRODUCT QUALIFICATION HISTORY**

<b>Qual Report</b>	<b>Description of Qualification Purpose</b>	<b>Date Comp</b>
060605	Qualify GSMC using PSoC Device Product Family on S4AD-5 Technology	Aug 06
071801	Qualify Programmable Clock Generator 7C80900B device on S4CAP Technology, Fab5 (GSMC)	Apr 08
081401	CY5057 (7C80600A) S4CAP Fab transfer from CTI to GSMC	Nov 08

PRODUCT DESCRIPTION (for qualification)	
Qualification Purpose: Qualify 7C80600B S4CAP Technology, Fab5	
Marketing Part #:	CY25100K, CY5057K, CY25701K
Device Description:	3.3V, Single PLL Programmable Clock Generator
Cypress Division:	Cypress Semiconductor Corporation – Data Communication Division (DCD)

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 Al/250A TiN
Passivation Type and Materials:	7,000A TEOS /6,000A Si <sub>3</sub> N <sub>4</sub>		
Number of Transistors in device:	44812		
Number of Gates in device:	4500		
Generic Process Technology/Design Rule (μ-	0.35μ		
Gate Oxide Material/Thickness (MOS):	SiO <sub>2</sub> / 110A		
Name/Location of Die Fab (prime) Facility:	GSMC/Shanghai-China		
Die Fab Line ID/Wafer Process ID:	GSMC / S4CAP		

#### PACKAGE AVAILABILITY

PACKAGE	ASSEMBLY SITE FACILITY
8-Lead SOIC	CML-RA, PHIL-M,
8-Lead TSSOP	PHIL-M, TAIWAN-T
4-Pin LCC	TAIWAN-ER

**Note:** Package Qualification details upon request.

MAJOR PACKAGE INFORMATION FOR THIS QUALIFICATION	
Package Designation:	SZ815
Package Outline, Type, or Name:	8 -Lead Small Outline Integrated Circuit (SOIC)
Mold Compound Name/Manufacturer:	MP8500/ NITTO
Mold Compound Flammability Rating:	UL94 – V0
Mold Compound Alpha Emission Rate:	0.001
Oxygen Rating Index:	None
Lead Frame Material:	Copper
Lead Finish, Composition / Thickness:	NiPdAu
Die Backside Preparation Method/Metallization:	Backgrind
Die Separation Method:	100% Saw
Die Attach Supplier:	Dexter
Die Attach Material:	QMI 509
Die Attach Method:	Epoxy Dispense
Bond Diagram Designation:	10-05457
Wire Bond Method:	Thermosonic
Wire Material/Size:	Au. 1.0mil
Thermal Resistance Theta JA °C/W:	189 °C/W
Package Cross Section Yes/No:	N/A
Assembly Process Flow:	11-20025
Name/Location of Assembly (prime) facility:	CML-RA
MSL Level	3
Reflow Profile	260C

ELECTRICAL TEST / FINISH DESCRIPTION	
Test Location:	CML

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

MAJOR PACKAGE INFORMATION FOR THIS QUALIFICATION	
Package Designation:	LZ04
Package Outline, Type, or Name:	4 –Pin Leadless Chip Carrier (LCC)
Mold Compound Name/Manufacturer:	N/A
Mold Compound Flammability Rating:	N/A
Mold Compound Alpha Emission Rate:	N/A
Oxygen Rating Index:	N/A
Lead Frame Material:	N/A
Lead Finish, Composition / Thickness:	NiAu
Die Backside Preparation Method/Metallization:	Backgrind
Die Separation Method:	100% Saw
Die Attach Supplier:	ThreeBond
Die Attach Material:	3301F
Die Attach Method:	Epoxy Dispense
Bond Diagram Designation:	001-04422
Wire Bond Method:	Thermosonic
Wire Material/Size:	Au. 1.25mil
Thermal Resistance Theta JA °C/W:	No Data
Package Cross Section Yes/No:	N/A
Assembly Process Flow:	001-07965
Name/Location of Assembly (prime) facility:	ECERA
MSL Level	1
Reflow Profile	260C

ELECTRICAL TEST / FINISH DESCRIPTION	
Test Location:	CML-R, TAIWAN-ER

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

### RELIABILITY TESTS PERFORMED PER SPECIFICATION REQUIREMENT

Stress/Test	Test Condition	Result P/F
High Temperature Operating Life Early Failure Rate	Dynamic Operating Condition, Vcc Max=5.5V, 125°C Dynamic Operating Condition, Vcc Max=3.8V, 150°C	P
High Temperature Operating Life Latent Failure Rate	Dynamic Operating Condition, Vcc Max=5.5V, 125°C Dynamic Operating Condition, Vcc Max=3.8V, 150°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, , 260°C+0, -5°C Reflow	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, , 260°C+0, -5°C Reflow	P
Pressure Cooker	121°C, 100%RH, 15 Psig Precondition: JESD22 Moisture Sensitivity Level 1 168 Hrs, 85C/85%RH, , 260°C+0, -5°C Reflow	P
Acoustic Microscopy	J-STD-020 Precondition: JESD22 Moisture Sensitivity Level 1 168 Hrs, 85C/85%RH, , 260°C+0, -5°C Reflow	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-C101C	P
Endurance Test	MIL-STD-883, Method 883-1033	P
Static Latch-up	125C, ± 200mA JEDEC 17,JESD78A	P

### RELIABILITY FAILURE RATE SUMMARY

Stress/Test	Device Tested/ Device Hours	# Fails	Activation Energy	Thermal <sup>3</sup> A.F	Failure Rate
High Temperature Operating Life Early Failure Rate <sup>1</sup>	1565 Devices	0	N/A	N/A	0 PPM
High Temperature Operating Life <sup>1,2</sup> Long Term Failure Rate	916,060 DHRs	0	0.7	170	13 FIT

<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 #:060605**

<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, MSL1</b>							
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	
<b>STRESS: AGE BOND STRENGTH</b>							
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	
<b>STRESS: DATA RETENTION, PLASTIC, 150C</b>							
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	
<b>STRESS: ENDURANCE</b>							
CY8C24494 (8C24494A)	9621713	610632687A	PHIL-M	COMP	47	0	
<b>STRESS: ESD-CHARGE DEVICE MODEL, (500V)</b>							
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	
<b>STRESS: ESD-HUMAN BODY CIRCUIT PER JESD22, METHOD A114-B, (2,200V)</b>							
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
<b>STRESS: ESD-HUMAN BODY CIRCUIT PER MIL STD 883, METHOD 3015, (2,200V)</b>							
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	
<b>STRESS: STATIC LATCH-UP TESTING (125C, 8.5V, +/-200mA)</b>							
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	
<b>STRESS: DYNAMIC LATCH-UP (125C, 8.5V)</b>							
CY8C24494 (8C24494A)	9621713	610632687	PHIL-M	COMP	2	0	
<b>STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-EARLY FAILURE RATE (125C, 5.5V, Vcc Max)</b>							
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
<b>STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-LATENT FAILURE RATE (125C, 5.5V, Vcc Max)</b>							
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	
<b>STRESS: HIGH TEMP STEADY STATE LIFE TEST (125C, 5.5V)</b>							
CY8C24494 (8C24494A)	9621713	610632687	PHIL-M	168	80	0	
CY8C24494 (8C24494A)	9621713	610632687	PHIL-M	336	80	0	
<b>STRESS: LOW TEMPERATURE DYNAMIC OPERATING LIFE, -30C, 5.5V</b>							
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
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**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 #:071801**

<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: DATA RETENTION, PLASTIC, 150C</b>							
CY22050K (7C841400B)	A999278.1	610754649	CML-RA	500	80	0	
CY22050K (7C841400B)	A999278.1	610754649	CML-RA	1000	80	0	
CY22050K (7C841400B)	A999278.3	610766457	CML-RA	500	80	0	
CY22050K (7C841400B)	A999278.3	610766457	CML-RA	1000	80	0	
<b>STRESS: ENDURANCE</b>							
CY22050K (7C841400B)	A999278.1			COMP	165	0	
CY22050K (7C841400B)	A999262.1			COMP	165	0	
<b>STRESS: ESD-CHARGE DEVICE MODEL, (500V)</b>							
CY22050K (7C841400B)	A999278.1	610754649	CML-RA	COMP	9	0	
<b>STRESS: ESD-HUMAN BODY CIRCUIT PER JESD22, METHOD A114-E, (2,200V)</b>							
CY22050K (7C841400B)	A999278.1	610754649	CML-RA	COMP	8	0	
<b>STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-EARLY FAILURE RATE (150C, 3.8V, Vcc Max)</b>							
CY22050K (7C841400B)	A999278.1	610754649	CML-RA	48	1520	0	
CY22050K (7C841400B)	A999262.1	610766458	CML-RA	48	500	0	
CY22050K (7C841400B)	A999278.3	610766457	CML-RA	48	500	0	
<b>STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-LATENT FAILURE RATE (150C, 3.8V, Vcc Max)</b>							
CY22050K (7C841400B)	A999278.1	610754649	CML-RA	80	1101	0	
CY22050K (7C841400B)	A999278.1	610754649	CML-RA	500	120	0	
<b>STRESS: PRESSURE COOKER TEST (121C, 100%RH), 15 Psig, PRE COND 168 HR 85C/85%RH (MSL1)</b>							
CY22050K (7C841400B)	A999278.1	610754649	CML-RA	168	80	0	
<b>STRESS: STATIC LATCH-UP TESTING (125C, 5.4V, +/-200mA)</b>							
CY22050K (7C841400B)	A999278.1	610754649	CML-RA	COMP	6	0	

## Reliability Test Data

**QTP #:071801**

<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: TC COND. C -65C TO 150C, PRE COND 168 HRS 85C/85%RH (MSL1)</b>							
CY22050K (7C841400B)	A999278.1	610754649	CML-RA	500	80	0	
CY22050K (7C841400B)	A999278.1	610754649	CML-RA	1000	80	0	
CY22050K (7C841400B)	A999262.1	610766458	CML-RA	500	80	0	
CY22050K (7C841400B)	A999262.1	610766458	CML-RA	1000	80	0	

## Reliability Test Data

**QTP #:081401**

<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: HIGH TEMP DYNAMIC OPERATING LIFE-EARLY FAILURE RATE (150C, 3.8V, Vcc Max)</b>							
CY25100 (7C80601B)	4823997	610830669/670/671	CML-RA	48	1565	0	
<b>STRESS: ESD-CHARGE DEVICE MODEL, (500V)</b>							
CY25100 (7C80601B)	4823997	610830669/670/671	CML-RA	COMP	9	0	
CY25701 (7C80600B)	4823997	610830528/529/530	ECERA	COMP	9	0	
<b>STRESS: ESD-HUMAN BODY CIRCUIT PER JESD22, METHOD A114-E, (2,200V)</b>							
CY25100 (7C80601B)	4823997	610830669/670/671	CML-RA	COMP	8	0	
CY25701 (7C80600B)	4823997	610830528/529/530	ECERA	COMP	8	0	
<b>STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-LATENT FAILURE RATE (150C, 3.8V, Vcc Max)</b>							
CY25100 (7C80601B)	4823997	610830669/670/671	CML-RA	80	115	0	
CY25100 (7C80601B)	4823997	610830669/670/671	CML-RA	500	115	0	
<b>STRESS: STATIC LATCH-UP TESTING (125C, 5.4V, +/-200mA)</b>							
CY25100 (7C80601B)	4823997	610830669/670/671	CML-RA	COMP	6	0	
CY25701 (7C80600B)	4823997	610830528/529/530	CML-RA	COMP	6	0	
<b>STRESS: E-TEST DATA</b>							
CY25100 (7C80601B)	4823997	610830669/670/671	CML-RA	COMPARABLE			
<b>STRESS: SORT YIELD</b>							
CY25100 (7C80601B)	4823997	610830669/670/671	CML-RA	COMPARABLE			

## Document History Page

Document Title: QTP # 081401: S4CAP TECHNOLOGY (CY5057/ CY2510X/ CY2570X/ CY2490X),  
FAB5

Document Number: 001-87789

Rev.	ECN No.	Orig. of Change	Description of Change
**	4017829	ILZ	Initial Spec Release Qualification report published on Cypress.com is documented on memo HGA-653 and not in spec format. Initiated spec for QTP 081401 and data from HGA-653 was transferred to qualification report spec template. Deleted Cypress reference Spec and replaced with Industry Standards

Distribution: WEB

Posting: None