

# 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

<b>PRODUCT DESCRIPTION (for qualification)</b>	
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)

<b>TECHNOLOGY/FAB PROCESS DESCRIPTION S4AD-5</b>			
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

<b>PACKAGE</b>	<b>ASSEMBLY SITE FACILITY</b>
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.

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

<b>ELECTRICAL TEST / FINISH DESCRIPTION</b>	
<b>Test Location:</b>	CML

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

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

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

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

**RELIABILITY TESTS PERFORMED PER SPECIFICATION REQUIREMENT**

<b>Stress/Test</b>	<b>Test Condition</b>	<b>Result P/F</b>
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**

<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: 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**

<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: 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**

<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: 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**

<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: 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