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Cypress Semiconductor
Product Qualification Report

QTP# 071801 VERSION*A
January 2015

EPROM Programmable Clock Family S4CAP Technology, HHGrace Fab3	
CY22050K / CY22150K **CY22250K / CY22800K** **CY241V8AK / CY2411K** **CY24115K / CY24116K** **CY24119K / CY2414K** **CY24141K /CY2413K** **CY24130K / CY24204K** **CY24206K/ CY24713K** **CY25200K / CY25002K** **CY25022K/ CY25026K** **CY26114K/ CY26121K** **CY26200K / CY26580K** **CY28507K**	**One PLL General Purpose Programmable Clock Generator**

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

QTP Number	Description of Qualification Purpose	Date
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
081602	Qualify Programmable Clock Generator 7C80900 Bond Options on S4CAP Technology, Fab5 (GSMC)	Aug 08

PRODUCT DESCRIPTION (for qualification)	
Qualification Purpose: Qualify Programmable Clock Generator Device on S4CAP Technology, Fab5 (HHGrace Fab3)	
Marketing Part #:	CY22050K, CY22150K, CY22250K, CY22800K, CY241V8AK, CY2411K, CY24115K, CY24116K, CY24119K, CY2414K, CY24141K, CY2413K, CY24130K, CY24204K, CY24206K, CY24713K, CY25200K, CY25002K, CY25022K, CY25026K, CY26114K, CY26121K, CY26200K, CY26580K ,CY28507K
Device Description:	3.3V, Single PLL Programmable Clock Generator
Cypress Division:	Cypress Semiconductor Corporation – Memory Product Division (MPD)

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_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:		HHGrace Fab3/Shanghai-China	
Die Fab Line ID/Wafer Process ID:		HHGrace Fab3 / S4CAP	

PACKAGE AVAILABILITY

PACKAGE	ASSEMBLY SITE FACILITY
8-Lead SOIC	**CML-RA, INDS-O, PHIL-M, TAIWAN-T**
16-Lead TSSOP	**CML-RA, PHIL-M, TAIWAN-T**
20-Lead SSOP	**CML-R**

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

MAJOR PACKAGE INFORMATION FOR THIS QUALIFICATION	
Package Designation:	ZZ16
Package Outline, Type, or Name:	16-Lead Thin Shrunk Small Outline Package (TSSOP)
Mold Compound Name/Manufacturer:	CEL 9200CYR / Hitachi
Mold Compound Flammability Rating:	UL94 – V0
Mold Compound Alpha Emission Rate:	N/A
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:	10-05212
Wire Bond Method:	Thermosonic
Wire Material/Size:	Au. 1.0mil
Thermal Resistance Theta JA °C/W:	75 °C/W
Package Cross Section Yes/No:	N/A
Assembly Process Flow:	11-20028
Name/Location of Assembly (prime) facility:	CML-RA
MSL Level	1
Reflow Profile	260C

ELECTRICAL TEST / FINISH DESCRIPTION	
Test Location:	CML

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=5.5V, 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=5.5V, 125°C Dynamic Operating Condition, Vcc Max=3.8V, 150°C JESD22-A108	P
High Temperature Steady State life	125°C, 5.5V, Vcc Max JESD22-A108	P
Low Temperature Operating Life	-30°C, 5.5V JESD22-A108	P
High Accelerated Saturation Test (HAST)	JESD22-A110: 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	JESD22-A102: 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 JEDEC 17 JESD78A	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]	2520 Devices	0	N/A	N/A	0 PPM
High Temperature Operating Life[1, 2] Long Term Failure Rate	858, 480 DHRs	0	0 .7	170	14 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 #: 071801

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

Reliability Test Data

QTP #: 071801

Device	Fab Lot #	Assy Lot #	Assy Loc	Duration	Samp	Rej	Failure Mechanism
STRESS:	**TC COND. C -65C TO 150C, PRE COND 168 HRS 85C/85%RH (MSL1)**						
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 #: 081602

Device	Fab Lot #	Assy Lot #	Assy Loc	Duration	Samp	Rej	Failure Mechanism
STRESS: ESD-CHARGE DEVICE MODEL, (500V)							
CY22250K (7C841430B)	4743584	610817608	TWN-T	COMP	9	0	
CY24713K (7C841202B)	4743584	610817095	CML-RA	COMP	9	0	
CY26580K (7C826580B)	4743584	610816632	CML-R	COMP	9	0	
CY24141K (7C841420B)	4743574	610821631	CML-RA	COMP	8	0	
CY2413K (7C841300B)	4743584	610822033	TWN-T	COMP	9	0	
STRESS: ESD-HUMAN BODY CIRCUIT PER JESD22, METHOD A114-E, (2,200V)							
CY22250K (7C841430B)	4743584	610817608	TWN-T	COMP	8	0	
CY24713K (7C841202B)	4743584	610817095	CML-RA	COMP	8	0	
CY26580K (7C826580B)	4743584	610816632	CML-R	COMP	8	0	
CY24141K (7C841420B)	4743574	610821631	CML-RA	COMP	8	0	
CY2413K (7C841300B)	4743584	610822033	TWN-T	COMP	8	0	
STRESS: STATIC LATCH-UP TESTING PER JESD78A (125C, 5.2V, +/-200mA)							
CY22250K (7C841430B)	4743584	610817608	TWN-T	COMP	6	0	
CY26580K (7C826580B)	4743584	610816632	CML-R	COMP	6	0	
STRESS: STATIC LATCH-UP TESTING PER JEDEC 17 (125C, 5.2V, +/-200mA)							
CY24713K (7C841202B)	4743584	610817095	CML-RA	COMP	6	0	
STRESS: STATIC LATCH-UP TESTING PER JESD78A (125C, 5.4V, +/-200mA)							
CY24141K (7C841420B)	4743574	610821631	CML-RA	COMP	6	0	
CY2413K (7C841300B)	4743584	610822033	TWN-T	COMP	6	0	

Document History Page

Document Title: QTP 071801: EPROM PROGRAMMABLE CLOCK FAMILY S4CAP TECHNOLOGY, GSMC
Document Number: 001-85729

Rev.	ECN No.	Orig. of Change	Description of Change
**	3873742	NSR	Initial Spec Release.
*A	4645770	HSTO	Align qualification report based on the new template in the front page Changed Fab site from GSMC to HHGrace Fab3

Distribution: WEB

Posting: None