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.

Cypress Semiconductor
Product Qualification Report

QTP# 021507 VERSION*A
December 2015

Failsafe Device Family & Options S4AD-5 SONOS Technology, Fab 2	
CY26049-1/3/4/5	**Failsafe™ Communications Clock Generator**
CY26049-36	**Failsafe™ PacketClock™ Global Communications Clocks**
CY23FP12	**200-MHz Field Programmable Zero Delay Buffer**
CY23FS04 **CY23FS08**	**Failsafe™ 2.5V/3.3V Zero Delay Buffer**

FOR ANY QUESTIONS ON THIS REPORT, PLEASE CONTACT
reliability@cypress.com or via a CYLINK CRM CASE

Prepared By:
Josephine Pineda (JYF)
Reliability Engineer

Reviewed By:
Zhaomin Ji (ZIJ)
Reliability Manager

Approved By:
Don Darling (DCDA)
Reliability Director

PRODUCT QUALIFICATION HISTORY

QTP Number		Description of Qualification Purpose		Date Comp
010702		New Technology S4AD-5 / New Product, Programmable Clock Generator, CY2414ZC, and its product family.		April 01
021506		New product CY2308A*, CY2309A*, CY23FP12* Programmable Zero Delay Buffer		Sept 02
021507		Failsafe Device family and options Qual using S4AD-5 (SONOS), Fab2		Jan 03

PRODUCT DESCRIPTION (for qualification)			
Qualification Purpose: Qualify new products CY26049*, CY23FS* using Technology S4AD-5, Fab 2			
Marketing Part #:	CY26049*, CY23FS*		
Device Description:	2.5V/3.3V, Commercial, available in 16-lead TSSOP and 28-lead SSOP package respectively		
Cypress Division:	Cypress Semiconductor Corporation – Memory Products Division (MPD)		
Overall Die (or Mask) REV Level (pre-requisite for qualification):		Rev. A	
What ID markings on Die:	7C80501A		

TECHNOLOGY/FAB PROCESS DESCRIPTION S4AD-5			
Number of Metal Layers:	2	Metal Composition:	Metal 1: 500Å Ti/6,000Å Al 0.5% Cu /1,200Å TiW Metal 2: 500Å Ti/8,000Å Al 0.5% Cu/300Å TiW
Passivation Type and Materials:		3,000Å TeOs / 6,000Å Si_3N_4	
Free Phosphorus contents in top glass layer(%):		0%	
Number of Transistors in Device:		93,000	
Number of Gates in Device		23,000	
Generic Process Technology/Design Rule (μ-drawn):		CMOS, Single Poly, Double Metal, 0.5 μm	
Gate Oxide Material/Thickness (MOS):		SiO_2 / 110Å	
Name/Location of Die Fab (prime) Facility:		Cypress Semiconductor – CTI Round Rock, TX	
Die Fab Line ID/Wafer Process ID:		Fab2, S4AD-5 (SONOS), R42D-5 derivative w/ 6 additional mask	

PACKAGE AVAILABILITY

PACKAGE	ASSEMBLY SITE FACILITY
28-lead SSOP	**OSE Taiwan (TAIWN-T)**
16-lead TSSOP	**OSE Taiwan (TAIWN-T)**

ELECTRICAL TEST / FINISH DESCRIPTION	
Test Location:	OSE-Taiwan (28-ld SSOP), Cypress PHIL (16-ld TSSOP)
Fault Coverage:	100%

Note: Please contact a Cypress Representative for other packages 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=3.8V, 150°C JESD22-A108	P
High Temperature Operating Life Latent Failure Rate	Dynamic Operating Condition, Vcc Max=3.8V, 150°C JESD22-A108	P
High Accelerated Saturation Test (HAST)	JEDEC STD 22-A110: 130°C, 3.63V,85%RH Precondition: JESD22 Moisture Sensitivity MSL 1 168 Hrs, 85°C/85%RH+3IR-Reflow, 235°C+5, 0°C	P
Temperature Cycle	MIL-STD-883, Method 1010, Condition C, -65°C to 150°C Precondition: JESD22 Moisture Sensitivity MSL 1 168 Hrs, 85°C/85%RH+3IR-Reflow, 235°C+5, 0°C	P
Pressure Cooker	JESD22-A102: 121°C, 100%RH Precondition: JESD22 Moisture Sensitivity MSL 1 168 Hrs, 85°C/85%RH+3IR-Reflow, 235°C+5, 0°C	P
Data Retention	150°C ± 5°C no bias	P
High Temperature Steady State life	JESD22-A108: 150°C, 3.63V, Vcc Max	P
Electrostatic Discharge Human Body Model (ESD-HBM)	2,200V 2,000V MIL-STD-883, Method 3015.7	P
Electrostatic Discharge Charge Device Model (ESD-CDM)	500V JESD22-C101	P
Age Bond Strength	200°C, 4hrs MIL-STD-883, Method 883-2011	P
Low Temperature Operating Life	-30°C, 4.3V, 8MHZ	P
Current Density	Meets the Technology Device Level Reliability Specifications	P
Endurance Test	MIL-STD-883, Method 883-1033	P
SEM Analysis	MIL-STD-883, Method 883-2018-2	P
Acoustic Microscopy, MSL 1	J-STD-020	P
Latchup Sensitivity	125°C, 10V, ± 300mA In accordance with JEDEC 17	P

RELIABILITY FAILURE RATE SUMMARY

Stress/Test	Device Tested/ Device Hours	# Fails	Activation Energy	Thermal[3] A.F	Failure Rate[4]
High Temperature Operating Life Early Failure Rate	2,011	1	N/A	N/A	497 PPM
High Temperature Operating Life Early Failure Rate	3,014	1	N/A	N/A	332 PPM
High Temperature Operating Life[1,2] Long Term Failure Rate	250,500 DHRs	0	0 .7	170	22 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.

[4] **FIT Rate based on QTP #021506 and QTP #010702.**

Reliability Test Data

QTP #: 010702

Device	Fab Lot #	Assy Lot #	Assy Loc	Duration	Samp	Rej	Failure Mechanism
STRESS: ACOUSTIC-MSL1							
CY2414ZC (7C841400A)	2101502	*610106170/1/2*	TAIWN-T	COMP	15	0	
CY2414ZC (7C841400A)	2052404	*610106173/4/5*	TAIWN-T	COMP	15	0	
CY2414ZC (7C841400A)	2103764	*610106176/7/8*	TAIWN-T	COMP	15	0	
STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-EARLY FAILURE RATE, 150C, 3.8V, Vcc Max							
CY2414ZC (7C841400A)	2101502	*610106170/1/2*	TAIWN-T	48	1005	0	
CY2414ZC (7C841400A)	2052404	*610106173/4/5*	TAIWN-T	48	1004	1	NON VISUAL
CY2414ZC (7C841400A)	2103764	*610106176/7/8*	TAIWN-T	48	1005	0	
STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-LATENT FAILURE RATE, 150C, 3.8V, Vcc Max							
CY2414ZC (7C841400A)	2101502	*610106170/1/2*	TAIWN-T	80	120	0	
CY2414ZC (7C841400A)	2101502	*610106170/1/2*	TAIWN-T	500	120	0	
CY2414ZC (7C841400A)	2052404	*610106173/4/5*	TAIWN-T	80	120	0	
CY2414ZC (7C841400A)	2052404	*610106173/4/5*	TAIWN-T	500	120	0	
CY2414ZC (7C841400A)	2103764	*610106176/7/8*	TAIWN-T	80	120	0	
CY2414ZC (7C841400A)	2103764	*610106176/7/8*	TAIWN-T	500	120	0	
STRESS: AGE BOND STRENGTH							
CY2414ZC (7C841400A)	2101502	*610106170/1/2*	TAIWN-T	COMP	15	0	
CY2414ZC (7C841400A)	2052404	*610106173/4/5*	TAIWN-T	COMP	15	0	
CY2414ZC (7C841400A)	2103764	*610106176/7/8*	TAIWN-T	COMP	15	0	
STRESS: DYNAMIC LATCH-UP TESTING, 11.5V							
CY2414ZC (7C841400A)	2101502	*610106170/1/2*	TAIWN-T	COMP	3	0	
STRESS: LOW TEMPERATURE OPERATING LIFE, -30C, 4.3V							
CY2414ZC (7C841400A)	2101502	*610106170/1/2*	TAIWN-T	500	48	0	

Reliability Test Data

QTP #: 010702

Device	Fab Lot #	Assy Lot #	Assy Loc	Duration	Samp	Rej	Failure Mechanism
STRESS: ESD-CHARGE DEVICE MODEL, 500V							
CY2414ZC (7C841400A)	2101502	*610106170/1/2*	TAIWN-T	COMP	9	0	
CY2414ZC (7C841400A)	2052404	*610106173/4/5*	TAIWN-T	COMP	9	0	
CY2414ZC (7C841400A)	2103764	*610106176/7/8*	TAIWN-T	COMP	9	0	
STRESS: ESD-HUMAN BODY CIRCUIT PER MIL STD 883, METHOD 3015, 2,000V							
CY2414ZC (7C841400A)	2101502	*610106170/1/2*	TAIWN-T	COMP	9	0	
CY2414ZC (7C841400A)	2052404	*610106173/4/5*	TAIWN-T	COMP	9	0	
CY2414ZC (7C841400A)	2103764	*610106177*	TAIWN-T	COMP	10	0	
STRESS: STATIC LATCH-UP TESTING, 125C, 10V, ±300mA							
CY2414ZC (7C841400A)	2101502	*610106170/1/2*	TAIWN-T	COMP	3	0	
CY2414ZC (7C841400A)	2052404	*610106173/4/5*	TAIWN-T	COMP	3	0	
CY2414ZC (7C841400A)	2103764	*610106176/7/8*	TAIWN-T	COMP	3	0	
STRESS: HI-ACCEL SATURATION TEST, 130C, 85%RH, 3.63V, PRE COND 168 HR 85C/85%RH, MSL1							
CY2414ZC (7C841400A)	2101502	*610106170/1/2*	TAIWN-T	128	50	0	
CY2414ZC (7C841400A)	2101502	*610106170/1/2*	TAIWN-T	256	50	0	
CY2414ZC (7C841400A)	2052404	*610106173/4/5*	TAIWN-T	128	48	0	
CY2414ZC (7C841400A)	2103764	*610106176/7/8*	TAIWN-T	128	48	0	
STRESS: HIGH TEMP STEADY STATE LIFE TEST, 150C, 3.63V							
CY2414ZC (7C841400A)	2101502	*610106170/1/2*	TAIWN-T	80	80	0	
CY2414ZC (7C841400A)	2101502	*610106170/1/2*	TAIWN-T	168	80	0	
STRESS: ENDURANCE TEST							
CY2414ZC (7C841400A)	2101502	*610106170/1/2*	TAIWN-T	COMP	45	0	

Reliability Test Data

QTP #: 010702

Device	Fab Lot #	Assy Lot #	Assy Loc	Duration	Samp	Rej	Failure Mechanism
STRESS: DATA RETENTION, PLASTIC, 150C							
CY2414ZC (7C841400A)	2101502	*610106170/1/2*	TAIWN-T	168	80	0	
CY2414ZC (7C841400A)	2101502	*610106170/1/2*	TAIWN-T	552	80	0	
CY2414ZC (7C841400A)	2052404	*610106173/4/5*	TAIWN-T	168	80	0	
CY2414ZC (7C841400A)	2052404	*610106173/4/5*	TAIWN-T	552	80	0	
CY2414ZC (7C841400A)	2103764	*610106176/7/8*	TAIWN-T	168	80	0	
CY2414ZC (7C841400A)	2103764	*610106176/7/8*	TAIWN-T	552	80	0	
STRESS: PRESSURE COOKER TEST (121C, 100%RH), PRE COND 168 HR 85C/85%RH, MSL1							
CY2414ZC (7C841400A)	2101502	*610106170/1/2*	TAIWN-T	168	50	0	
CY2414ZC (7C841400A)	2052404	*610106173/4/5*	TAIWN-T	168	49	0	
CY2414ZC (7C841400A)	2103764	*610106176/7/8*	TAIWN-T	168	51	0	
STRESS: TC COND. C -65C TO 150C, PRECONDITION 168 HRS 85C/85%RH, MSL1							
CY2414ZC (7C841400A)	2101502	*610106170/1/2*	TAIWN-T	300	50	0	
CY2414ZC (7C841400A)	2101502	*610106170/1/2*	TAIWN-T	500	50	0	
CY2414ZC (7C841400A)	2101502	*610106170/1/2*	TAIWN-T	1000	50	0	
CY2414ZC (7C841400A)	2052404	*610106173/4/5*	TAIWN-T	300	50	0	
CY2414ZC (7C841400A)	2052404	*610106173/4/5*	TAIWN-T	500	50	0	
CY2414ZC (7C841400A)	2052404	*610106173/4/5*	TAIWN-T	1000	50	0	
CY2414ZC (7C841400A)	2103764	*610106176/7/8*	TAIWN-T	300	50	0	
CY2414ZC (7C841400A)	2103764	*610106176/7/8*	TAIWN-T	500	50	0	
CY2414ZC (7C841400A)	2103764	*610106176/7/8*	TAIWN-T	1000	49	0	

Reliability Test Data

QTP #: 021506

Device	Fab Lot #	Assy Lot #	Assy Loc	Duration	Samp	Rej	Failure Mechanism
STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-EARLY FAILURE RATE, 150C, 3.8V, Vcc Max							
CY23FP12* (7C80504A)	2219256	*610226430*	TAIWN-T	48	2013	1	UNKNOWN
STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-LATENT FAILURE RATE, 150C, 3.8V, Vcc Max							
CY23FP12* (7C80504A)	2219256	*610226430*	TAIWN-T	80	141	0	
CY23FP12* (7C80504A)	2219256	*610226430*	TAIWN-T	500	141	0	
STRESS: ESD-CHARGE DEVICE MODEL, 500V							
CY2308A* (7C80502A)	2219256	*610223702*	TAIWN-T	COMP	9	0	
STRESS: ESD-HUMAN BODY CIRCUIT PER MIL STD 883, METHOD 3015, 2,200V							
CY23FP12* (7C80504A)	2219256	*610229615*	TAIWN-T	COMP	9	0	
STRESS: STATIC LATCH-UP TESTING, 125C, 10V, ±300mA							
CY2308A* (7C80502A)	2219256	*610228189*	TAIWN-T	COMP	3	0	
STRESS: PRESSURE COOKER TEST, 121C, 100%RH, PRE COND 168 HR 85C/85%RH, MSL1							
CY23FP12* (7C80504A)	2219256	*610226430*	TAIWN-T	168	48	0	
STRESS: TC COND. C -65C TO 150C, PRECONDITION 168 HRS 85C/85%RH, MSL1							
CY23FP12* (7C80504A)	2219256	*610226430*	TAIWN-T	300	48	0	
CY23FP12* (7C80504A)	2219256	*610226430*	TAIWN-T	500	48	0	
CY23FP12* (7C80504A)	2219256	*610226430*	TAIWN-T	1000	48	0	

Reliability Test Data

QTP #: 021507

Device	Fab Lot #	Assy Lot #	Assy Loc	Duration	Samp	Rej	Failure Mechanism
STRESS: ESD-CHARGE DEVICE MODEL, 500V							
CY26049ZC (7C826049A)	2219256	*610243674/6102*	TAIWN-T	COMP	9	0	
STRESS: ESD-HUMAN BODY CIRCUIT PER MIL STD 883, METHOD 3015, 2,200V							
CY26049ZC (7C826049A)	2219256	*610243674/6102*	TAIWN-T	COMP	9	0	
STRESS: STATIC LATCH-UP TESTING, 125C, 10V, ±300mA							
CY26049ZC (7C826049A)	2219256	*610243674/6102*	TAIWN-T	COMP	3	0	

Document History Page

Document Title: QTP 021507: FAILSAFE DEVICE FAMILY & OPTIONS, S4AD-5 SONOS TECHNOLOGY, FAB 2
Document Number: 001-84621

Rev.	ECN No.	Orig. of Change	Description of Change
**	3810582	NSR	Initial Spec Release.
*A	5033738	JYF MEL	Sunset review: Updated QTP title page for template alignment. Removed “Distribution: WEB” and “Posting: NONE” from the document history page.