Cypress Semiconductor
Product Qualification Report

QTP# 040901 VERSION 2.1
March 2008

PSoC™ Mixed Signal Array Family S4AD-5CTI Technology, Fab 2	
CY8C29466 CY8C29566 CY8C29666 CY8C29866	**Mixed Signal Array with On-Chip Controller**

CYPRESS TECHNICAL CONTACT FOR QUALIFICATION DATA:

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PRODUCT QUALIFICATION HISTORY

Qual Report		Description of Qualification Purpose		Date Comp
010702		New Technology S4AD-5, New Product Programmable Clock Generator, CY2414ZC product family and bond option.		Apr 01
040901		PSoC 8C29xxxA New Device Product Family on S4AD-5CTI Technology, Fab2		Oct 04
073302		Minor Changes to Metal 2 (MM2) masks on Hydra Device (8C29000AT) on S4AD-5 Technology, Fab 2		Jan 08

PRODUCT DESCRIPTION (for qualification)	
Qualification Purpose: Qualify New device CY8C29xxx product family in Technology S4D-5CTI in Fab 2	
Marketing Part #:	CY8C29466, CY8C29566, CY8C29666, CY8C29866
Device Description:	3.3V and 5.5V, Industrial, available in 28 lead PDIP, 28-lead SOIC, 28/48-lead SSOP and 44/100-pin TQFP, 48-lead MLF package respectively.
Cypress Division:	Cypress Semiconductor - Consumer and Computation Division

TECHNOLOGY/FAB PROCESS DESCRIPTION S4AD-5CTI			
Number of Metal Layers:	2	Metal Composition:	Metal 1: 500A Ti/6000A Al 0.5% Cu /1200A TiW Metal 2: 500A Ti/8000A Al 0.5% Cu/300A TiW
Passivation Type and Materials:	3,000A TeOs / 6000A Si_3N_4		
Free Phosphorus contents in top glass layer(%):	0%		
Number of Transistors in Device:	600,000		
Number of Gates in Device	100,000		
Generic Process Technology/Design Rule (-drawn):	Single Poly, Double Metal, 0.35 m		
Gate Oxide Material/Thickness (MOS):	SiO_2 / 110A		
Name/Location of Die Fab (prime) Facility:	Cypress Semiconductor - Round Rock, TX		
Die Fab Line ID/Wafer Process ID:	Fab2, S4AD-5 CTI		

PACKAGE AVAILABILITY

PACKAGE	ASSEMBLY SITE FACILITY
28-lead PDIP	**INDNS-O**
28/48-lead SSOP	**TAIWN-T, CML-R, PHIL-M**
48-lead MLF	**SEOUL-L**
44/100-pin TQFP	**CML-R**

Note: Package Qualification details upon request.

MAJOR PACKAGE INFORMATION USED IN THIS QUALIFICATION	
Package Designation:	SP28
Package Outline, Type, or Name:	28-Lead Shrunk Small Outline Package (SSOP)
Mold Compound Name/Manufacturer:	G600
Mold Compound Flammability Rating:	V-O per UL94
Oxygen Rating Index:	N/A
Lead Frame Material:	Copper
Lead Finish, Composition / Thickness:	NiPdAu
Die Backside Preparation Method/Metallization:	Backgrind
Die Separation Method:	Sawing 100%
Die Attach Supplier:	Ablestik
Die Attach Material:	8290
Die Attach Method:	Epoxy
Bond Diagram Designation:	001-16740
Wire Bond Method:	Thermosonic
Wire Material/Size:	Au, 1.0mil
Thermal Resistance Theta JA °C/W:	96°C/W
Package Cross Section Yes/No:	N/A
Assembly Process Flow:	49-14999
Name/Location of Assembly (prime) facility:	AMKOR-PHIL (M)

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=3.8V, 150°C Dynamic Operating Condition, Vcc Max=5.5V, 125°C	P
High Temperature Operating Life Latent Failure Rate	Dynamic Operating Condition, Vcc Max=3.8V, 150°C Dynamic Operating Condition, Vcc Max=5.5V, 125°C	P
Temperature Cycle	MIL-STD-883C, Method 1010, Condition C, -65°C to 150°C Precondition: JESD22 Moisture Sensitivity MSL 1 168 Hrs, 85C/85%RH+3IR-Reflow, 235°C+5, 0°C	P
Pressure Cooker	121°C, 100%RH MIL-STD-883C, Method 1010, Condition C, -65°C to 150°C Precondition: JESD22 Moisture Sensitivity MSL 1 168 Hrs, 85C/85%RH+3IR-Reflow, 235°C+5, 0°C	P
High Accelerated Saturation Test (HAST)	130°C, 5.5V, 85%RH, 130°C, 3.63V, 85%RH Precondition: JESD22 Moisture Sensitivity MSL 1 168 Hrs, 85C/85%RH+3IR-Reflow, 235°C+5, 0°C	P
Data Retention	150°C ± 5°C no bias	P
High Temperature Steady State Life	150°C, 363V, Vcc Max	P
Electrostatic Discharge Human Body Model (ESD-HBM)	2,200V JESD22, Method A114-B	P
Electrostatic Discharge Human Body Model (ESD-HMB)	2,200V, 2,000V MIL-STD-883, Method 3015.7	P
Electrostatic Discharge Charge Device Model (ESD-CDM)	500V Cypress Spec. 25-00020	P
Age Bond Strength	MIL-STD-883C, Method 2011	P
Acoustic Microscopy	Cypress Spec. 25-00104	P
Low Temperature Operating Life	-30C, 4.3V, 8MHZ	P
Endurance Test	MIL-STD-883C, Method 1033	P
Dynamic Latchup Sensitivity	Cypress Spec. 01-00081	P
Static Latchup Sensitivity	125°C, ± 300mA In accordance with JEDEC 17. Cypress Spec. 01-00081	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 @125C	2007 Devices	0	N/A	N/A	0 PPM
High Temperature Operating Life[1,2] Long Term Failure Rate	375,867 DHRs	0	0 .7	170	14 FITs

[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 calculation based on combined device hours from QTP# 010702 & 040901

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	
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	

Reliability Test Data

QTP #: 010702

Device	Fab Lot #	Assy Lot #	Assy Loc	Duration	Samp	Rej	Failure Mechanism
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	
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	

Reliability Test Data

QTP #: 010702

Device	Fab Lot #	Assy Lot #	Assy Loc	Duration	Samp	Rej	Failure Mechanism
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 #: 040901

Device	Fab Lot #	Assy Lot #	Assy Loc	Duration	Samp	Rej	Failure Mechanism
STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-EARLY FAILURE RATE, 125C, 5.5V, Vcc Max							
CY8C29466 (8C29466A)	2415417	*510405532*	INDNS-O	96	1005	0	
CY8C29466 (8C29466A)	2416473	*510406227*	INDNS-O	96	1002	0	
STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-LATENT FAILURE RATE, 125C, 5.5V, Vcc Max							
CY8C29466 (8C29466A)	2415417	*510405532*	INDNS-O	168	600	0	
CY8C29466 (8C29466A)	2415417	*510405532*	INDNS-O	500	600	0	
CY8C29466 (8C29466A)	2416473	*510406227*	INDNS-O	168	615	0	
CY8C29466 (8C29466A)	2416473	*510406227*	INDNS-O	500	614	0	
STRESS: DATA RETENTION, PLASTIC, 150C							
CY8C29466 (8C29466A)	2415417	*510405532*	INDNS-O	168	160	0	
CY8C29466 (8C29466A)	2415417	*510405532*	INDNS-O	552	160	0	
CY8C29466 (8C29466A)	2416473	*510406227*	INDNS-O	168	160	0	
CY8C29466 (8C29466A)	24156473	*510406227*	INDNS-O	552	160	0	
STRESS: ESD-HUMAN BODY CIRCUIT PER MIL STD 883, METHOD 3015, 2,200V							
CY8C29466 (8C29466A)	2415417	*510405532*	INDNS-O	COMP	3	0	
STRESS: ESD-HUMAN BODY CIRCUIT PER JESD22, METHOD A114-B, 2,200V							
CY8C29466 (8C29466A)	2415417	*510405532*	INDNS-O	COMP	9	0	
STRESS: ESD-CHARGE DEVICE MODEL, 500V							
CY8C29466 (8C29466A)	2415417	*510405532*	INDNS-O	COMP	9	0	
STRESS: STATIC LATCH-UP TESTING, 125C, 10V, ±300mA							
CY8C29466 (8C29466A)	2415417	*510405532*	INDNS-O	COMP	3	0	
STRESS: HI-ACCEL SATURATION TEST, 130C, 85%RH, 5.5V							
CY8C29466 (8C29466A)	2415417	*510405532*	INDNS-O	128	50	0	
STRESS: PRESSURE COOKER TEST, 121C, 100%RH							
CY8C29466 (8C29466A)	2415417	*510405532*	INDNS-O	168	50	0	

Reliability Test Data

QTP #: 040901

Device	*Fab Lot #*	*Assy Lot #*	*Assy Loc*	*Duration*	*Samp*	*Rej*	*Failure Mechanism*
STRESS: TC COND. C -65C TO 150C							
CY8C29466 (8C29466A)	2415417	*510405532*	INDNS-O	300	50	0	
CY8C29466 (8C29466A)	2415417	*510405532*	INDNS-O	500	50	0	
CY8C29466 (8C29466A)	2415417	*510405532*	INDNS-O	1000	50	0	
CY8C29466 (8C29466A)	2416473	*510406227*	INDNS-O	300	50	0	
CY8C29466 (8C29466A)	2416473	*510406227*	INDNS-O	500	50	0	
CY8C29466 (8C29466A)	2416473	*510406227*	INDNS-O	1000	50	0	

Reliability Test Data

QTP #: 073302

Device	Fab Lot #	Assy Lot #	Assy Loc	Duration	Samp	Rej	Failure Mechanism
STRESS: SORT YIELD							
CY8C29466 (8C29466A)	2727919			COMP			COMPARABLE
STRESS: DATA RETENTION, PLASTIC, 150C							
CY8C29466 (8C29466A)	2727919	610748117	PHIL-M	500	30	0	
CY8C29466 (8C29466A)	2727919	610748117	PHIL-M	1000	30	0	
CY8C29466 (8C29466A)	2727919	610748118	PHIL-M	500	25	0	
CY8C29466 (8C29466A)	2727919	610748118	PHIL-M	1000	25	0	
CY8C29466 (8C29466A)	2727919	610748119	PHIL-M	500	30	0	
CY8C29466 (8C29466A)	2727919	610748119	PHIL-M	1000	30	0	
STRESS: ENDURANCE							
CY8C29466 (8C29466A)	2727919	610748117	PHIL-M	COMP	30	0	
CY8C29466 (8C29466A)	2727919	610748118	PHIL-M	COMP	30	0	
CY8C29466 (8C29466A)	2727919	610748119	PHIL-M	COMP	25	0	
STRESS: ETEST YIELD							
CY8C29466 (8C29466A)	2727919			COMP			COMPARABLE