Cypress Semiconductor
Product Qualification Report

QTP# 051005 VERSION 2.0
March 2007

<table>
<tr><th colspan="2">Automotive PSoC™ Mixed Signal Array Family
S4AD-5CTI Technology, Fab 2</th></tr>
<tr><td>CY8C21334
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CYPRESS TECHNICAL CONTACT FOR QUALIFICATION DATA:

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PRODUCT QUALIFICATION HISTORY

Qual Report	Description of Qualification Purpose	Date Comp
042702	Automotive PSoC 8C27243/443/643 Rev B Device Product Family on S4AD-5CTI Technology, Fab2	Nov 04
042809	Automotive PSoC 8C24xxx Rev B Device Product Family on S4AD-5CTI Technology, Fab2	Nov 04
051005	PSoC 8C21xxx, Pb-Free Automotive Device Qual using 28 SSOP with 100% SnFinish	Aug 05

PRODUCT DESCRIPTION (for qualification)	
Qualification Purpose: Qualify CY8C21x34 Product Family in S4D-5CTI Technology in Fab 2 for Automotive Application	
Marketing Part #:	CY8C21334, CY8C21534
Device Description:	5V, Automotive, 12MHz Programmable System on Chip available on 20/28-Lead SSOP Packages
Cypress Division:	Consumer and Computation Division (CCD)

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	
Generic Process Technology/Design Rule (-drawn):		Single Poly, Double Metal, 0.35 um	
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-5CTI SONOS	

PACKAGE AVAILABILITY

PACKAGE	ASSEMBLY SITE FACILITY
20/28-Lead SSOP	**OSE-Taiwan**

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 Packages (SSOP)
Mold Compound Name/Manufacturer:	Hitachi CEL9220HF
Mold Compound Flammability Rating:	V-O per UL94
Oxygen Rating Index:	>28%
Lead Frame Material:	Copper
Lead Finish, Composition / Thickness:	100% Sn Matte
Die Backside Preparation Method/Metallization:	Grinding
Die Separation Method:	Sawing 100%
Die Attach Supplier:	Ablestik
Die Attach Material:	Ablebond 8340
Die Attach Method:	Dispensing
Bond Diagram Designation:	10-06220
Wire Bond Method:	Thermosonic
Wire Material/Size:	Au. 1.0mil
Thermal Resistance Theta JA °C/W:	**101**° C/W
Package Cross Section Yes/No:	N/A
Assembly Process Flow:	49-35032
Name/Location of Assembly (prime) facility:	OSE-Taiwan
MSL Level	1
Reflow Profile	260C

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=5.5V, 125°C	P
High Temperature Operating Life Latent Failure Rate	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, 260°C+0, -5°C	P
Pressure Cooker	121°C, 100%RH. 15 Psig Precondition: JESD22 Moisture Sensitivity MSL 1 168 Hrs, 85C/85%RH+3IR-Reflow, 260°C+0, -5°C	P
High Accelerated Saturation Test (HAST)	130°C, 5.5V, 85%RH Precondition: JESD22 Moisture Sensitivity MSL 1 168 Hrs, 85C/85%RH+3IR-Reflow, 260°C+0, -5°C	P
Data Retention	150°C ± 5°C no bias	P
Electrostatic Discharge Human Body Model (ESD-HBM)	500V/1000V/1500V/2000V JESD22, Method A114-B	P
Electrostatic Discharge Charge Device Model (ESD-CDM)	250V/500V/750V (corner pins only) Cypress Spec. 25-00020	P
Acoustic Microscopy	Cypress Spec. 25-00104	P
Endurance Test	AEC-Q100-005	P
Static Latchup Sensitivity	125°C, 8.25V/9V, ± 300mA Cypress Spec. 01-00081	P
Ball Shear	Cypress Spec 24-00018	P
Bond Pull	Cypress Spec 24-00002	P
Electrical Distribution	AEC-Q100-009	P
External Visual	Cypress Spec 25-00038	P
Physical Dimensions	Cypress Spec. 25-00031	P
High Temperature Storage	150°C ± 5°C, no bias	P
Solderability	Cypress Spec. 25-00018	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 @125C	3,372 Devices	0	N/A	N/A	0 PPM
High Temperature Operating Life[1,2] Long Term Failure Rate	232,000 DHRs	0	0 .7	55	71 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.

* Based on Automotive qual samples size not Commercial qual sample size.

Reliability Test Data

QTP #: 042702

Device	Fab Lot #	Assy Lot #	Assy Loc	Duration	Samp	Rej	Failure Mechanism
STRESS: ACOUSTIC-MSL1							
CY8C27443 (8C27443B)	2414285	*610438918*	TAIWN-T	COMP	15	0	
CY8C27443 (8C27443B)	2405478	*610438920*	TAIWN-T	COMP	15	0	
CY8C27443 (8C27443B)	2403330	*610438921*	TAIWN-T	COMP	15	0	
STRESS: BALL SHEAR							
CY8C27443 (8C27443B)	2403330	*610438921*	TAIWN-T	COMP	5	0	
STRESS: BOND PULL							
CY8C27443 (8C27443B)	2403330	*610438921*	TAIWN-T	COMP	5	0	
STRESS: DATA RETENTION							
CY8C27443 (8C27443B)	2414285	*610438918*	TAIWN-T	1000	94	0	
CY8C27443 (8C27443B)	2405478	*610438920*	TAIWN-T	1000	94	0	
CY8C27443 (8C27443B)	2403330	*610438921*	TAIWN-T	1000	92	0	
STRESS: ELECTRICAL DISTRIBUTION							
CY8C27443 (8C27443B)	2414285	*610438918*	TAIWN-T	COMP	30	0	
CY8C27443 (8C27443B)	2405478	*610438920*	TAIWN-T	COMP	30	0	
CY8C27443 (8C27443B)	2403330	*610438921*	TAIWN-T	COMP	30	0	
STRESS: ENDURANCE							
CY8C27443 (8C27443B)	2414285	*610438918*	TAIWN-T	COMP	81	0	
CY8C27443 (8C27443B)	2405478	*610438920*	TAIWN-T	COMP	84	0	
CY8C27443 (8C27443B)	2403330	*610438921*	TAIWN-T	COMP	84	0	
STRESS: ESD-CHARGE DEVICE MODEL, 250V							
CY8C27443 (8C27443B)	2403330	*610438921*	TAIWN-T	COMP	3	0	
STRESS: ESD-CHARGE DEVICE MODEL, 500V							
CY8C27443 (8C27443B)	2403330	*610438921*	TAIWN-T	COMP	3	0	
STRESS: ESD-CHARGE DEVICE MODEL, 750V (Corner pins only)							
CY8C27443 (8C27443B)	2403330	*610438921*	TAIWN-T	COMP	6	0	
STRESS: STATIC LATCH-UP TESTING, 125C, 9V, ±200mA							
CY8C27443 (8C27443B)	2403330	*610438921*	TAIWN-T	COMP	3	0	

Reliability Test Data

QTP #: 042702

Device	Fab Lot #	Assy Lot #	Assy Loc	Duration	Samp	Rej	Failure Mechanism
STRESS: ESD-HUMAN BODY CIRCUIT PER JESD22, METHOD A114-B, 500V							
CY8C27443 (8C27443B)	2403330	*610438921*	TAIWN-T	COMP	3	0	
STRESS: ESD-HUMAN BODY CIRCUIT PER JESD22, METHOD A114-B, 1,000V							
CY8C27443 (8C27443B)	2403330	*610438921*	TAIWN-T	COMP	3	0	
STRESS: ESD-HUMAN BODY CIRCUIT PER JESD22, METHOD A114-B, 1,500V							
CY8C27443 (8C27443B)	2403330	*610438921*	TAIWN-T	COMP	3	0	
STRESS: ESD-HUMAN BODY CIRCUIT PER JESD22, METHOD A114-B, 2,000V							
CY8C27443 (8C27443B)	2403330	*610438921*	TAIWN-T	COMP	3	0	
STRESS: EXTERNAL VISUAL							
CY8C27443 (8C27443B)	2414285	*610438918*	TAIWN-T	COMP	1317	0	
CY8C27443 (8C27443B)	2405478	*610438920*	TAIWN-T	COMP	1223	0	
CY8C27443 (8C27443B)	2403330	*610438921*	TAIWN-T	COMP	1400	0	
STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-EARLY FAILURE RATE, 125C, 5.5V, Vcc Max							
CY8C27443 (8C27443B)	2414285	*610438918*	TAIWN-T	48	848	0	
CY8C27443 (8C27443B)	2405478	*610438920*	TAIWN-T	48	848	0	
CY8C27443 (8C27443B)	2403330	*610438921*	TAIWN-T	48	847	0	
STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-LATENT FAILURE RATE, 125C, 5.5V, Vcc Max							
CY8C27443 (8C27443B)	2414285	*610438918*	TAIWN-T	1000	78	0	
CY8C27443 (8C27443B)	2405478	*610438920*	TAIWN-T	1000	81	0	
CY8C27443 (8C27443B)	2403330	*610438921*	TAIWN-T	1000	73	0	
STRESS: HIGH TEMPERATURE STORAGE, 150C							
CY8C27443 (8C27443B)	2403330	*610438921*	TAIWN-T	1000	50	0	
STRESS: HI-ACCEL SATURATION TEST, 130C, 85%RH, 5.5V, PRE COND 168 HR 85C/85%RH, MSL1							
CY8C27443 (8C27443B)	2414285	*610438918*	TAIWN-T	96	85	0	
CY8C27443 (8C27443B)	2405478	*610438920*	TAIWN-T	96	84	0	
CY8C27443 (8C27443B)	2403330	*610438921*	TAIWN-T	96	85	0	
STRESS: PHYSICAL DIMENSIONS							
CY8C27443 (8C27443B)	2414285	*610438918*	TAIWN-T	COMP	10	0	
CY8C27443 (8C27443B)	2405478	*610438920*	TAIWN-T	COMP	10	0	
CY8C27443 (8C27443B)	2403330	*610438921*	TAIWN-T	COMP	10	0	

Reliability Test Data

QTP #: 042702

Device	*Fab Lot #*	*Assy Lot #*	*Assy Loc*	*Duration*	*Samp*	*Rej*	*Failure Mechanism*
STRESS: PRESSURE COOKER TEST, 121C, 100%RH, 15 Psig, PRE COND 168 HR 85C/85%RH, MSL1							
CY8C27443 (8C27443B)	2414285	*610438918*	TAIWN-T	96	85	0	
CY8C27443 (8C27443B)	2414285	*610438918*	TAIWN-T	168	85	0	
CY8C27443 (8C27443B)	2405478	*610438920*	TAIWN-T	96	85	0	
CY8C27443 (8C27443B)	2405478	*610438920*	TAIWN-T	168	85	0	
CY8C27443 (8C27443B)	2403330	*610438921*	TAIWN-T	96	85	0	
CY8C27443 (8C27443B)	2403330	*610438921*	TAIWN-T	168	85	0	
STRESS: SOLDERABILITY							
CY8C27443 (8C27443B)	2414285	*610438918*	TAIWN-T	COMP	15	0	
CY8C27443 (8C27443B)	2405478	*610438920*	TAIWN-T	COMP	15	0	
CY8C27443 (8C27443B)	2403330	*610438921*	TAIWN-T	COMP	15	0	
STRESS: TC COND. C -65C TO 150C, PRE COND 168 HRS 85C/85%RH, MSL1							
CY8C27443 (8C27443B)	2414285	*610438918*	TAIWN-T	500	85	0	
CY8C27443 (8C27443B)	2414285	*610438918*	TAIWN-T	1000	84	0	
CY8C27443 (8C27443B)	2405478	*610438920*	TAIWN-T	500	85	0	
CY8C27443 (8C27443B)	2405478	*610438920*	TAIWN-T	1000	82	0	
CY8C27443 (8C27443B)	2403330	*610438921*	TAIWN-T	500	85	0	
CY8C27443 (8C27443B)	2403330	*610438921*	TAIWN-T	1000	80	0	

Reliability Test Data

QTP #: 042809

Device	Fab Lot #	Assy Lot #	Assy Loc	Duration	Samp	Rej	Failure Mechanism
STRESS: ELECTRICAL DISTRIBUTION							
CY8C24423A (8C24423B)	2419761	*610439360*	TAIWN-T	COMP	30	0	
CY8C24423A (8C24423B)	2421934	*610439704*	TAIWN-T	COMP	30	0	
CY8C24423A (8C24423B)	2422007	*610439705*	TAIWN-T	COMP	30	0	
STRESS: ESD-CHARGE DEVICE MODEL, 250V							
CY8C24423A (8C24423B)	2419761	*610439360*	TAIWN-T	COMP	3	0	
STRESS: ESD-CHARGE DEVICE MODEL, 500V							
CY8C24423A (8C24423B)	2419761	*610439360*	TAIWN-T	COMP	3	0	
STRESS: ESD-CHARGE DEVICE MODEL, 750V (Corner pins only)							
CY8C24423A (8C24423B)	2419761	*610439360*	TAIWN-T	COMP	6	0	
STRESS: ESD-HUMAN BODY CIRCUIT PER JESD22, METHOD A114-B, 500V							
CY8C24423A (8C24423B)	2419761	*610439360*	TAIWN-T	COMP	3	0	
STRESS: ESD-HUMAN BODY CIRCUIT PER JESD22, METHOD A114-B, 1,000V							
CY8C24423A (8C24423B)	2419761	*610439360*	TAIWN-T	COMP	3	0	
STRESS: ESD-HUMAN BODY CIRCUIT PER JESD22, METHOD A114-B, 1,500V							
CY8C24423A (8C24423B)	2419761	*610439360*	TAIWN-T	COMP	3	0	
STRESS: ESD-HUMAN BODY CIRCUIT PER JESD22, METHOD A114-B, 2,000V							
CY8C24423A (8C24423B)	2419761	*610439360*	TAIWN-T	COMP	3	0	
STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-EARLY FAILURE RATE, 125C, 5.5V, Vcc Max							
CY8C24423A (8C24423B)	2419761	*610439360*	TAIWN-T	48	829	0	
STRESS: STATIC LATCH-UP TESTING, 125C, 9V, ±300mA							
CY8C24423A (8C24423B)	2419761	*610439360*	TAIWN-T	COMP	6	0	

Reliability Test Data

QTP #: 051005

Device	Fab Lot #	Assy Lot #	Assy Loc	Duration	Samp	Rej	Failure Mechanism
STRESS: ELECTRICAL DISTRIBUTION							
CY8C21534 (8C21534A)	2507173	*610521613*	TAIWN-T	COMP	30	0	
CY8C21534 (8C21534A)	2508261		TAIWN-T	COMP	30	0	
CY8C21534 (8C21534A)	2509349		TAIWN-T	COMP	30	0	
STRESS: ESD-CHARGE DEVICE MODEL, 250V							
CY8C21534 (8C21534A)	2507173	*610521613*	TAIWN-T	COMP	3	0	
STRESS: ESD-CHARGE DEVICE MODEL, 500V							
CY8C21534 (8C21534A)	2507173	*610521613*	TAIWN-T	COMP	3	0	
STRESS: ESD-CHARGE DEVICE MODEL, 750V (Corner pins only)							
CY8C21534 (8C21534A)	2507173	*610521613*	TAIWN-T	COMP	6	0	
STRESS: ESD-HUMAN BODY CIRCUIT PER JESD22, METHOD A114-B, 500V							
CY8C21534 (8C21534A)	2507173	*610521613*	TAIWN-T	COMP	3	0	
STRESS: ESD-HUMAN BODY CIRCUIT PER JESD22, METHOD A114-B, 1,000V							
CY8C21534 (8C21534A)	2507173	*610521613*	TAIWN-T	COMP	3	0	
STRESS: ESD-HUMAN BODY CIRCUIT PER JESD22, METHOD A114-B, 1,500V							
CY8C24423A (8C24423B)	2419761	*610439360*	TAIWN-T	COMP	3	0	
STRESS: ESD-HUMAN BODY CIRCUIT PER JESD22, METHOD A114-B, 2,000V							
CY8C21534 (8C21534A)	2507173	*610521613*	TAIWN-T	COMP	3	0	
STRESS: STATIC LATCH-UP TESTING, 125C, 8.25V, ±300mA							
CY8C21534 (8C21534A)	2507173	*610521613*	TAIWN-T	COMP	6	0	