

Cypress Semiconductor Technology Qualification Report

QTP# 024604 VERSION 1.0
May, 2003

R52T-3 Technology, Fab 4	
CYWUSB6942	WirelessUSB™ EX Baseband IC

CYPRESS TECHNICAL CONTACT FOR QUALIFICATION DATA:

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PRODUCT QUALIFICATION HISTORY

Qual Report	Description of Qualification Purpose	Date Comp
024604	R52T-3 Technology Process Derivative Qual	May 03

PRODUCT DESCRIPTION (for qualification)	
Qualification Purpose: R52T-3 Technology Process Derivative Qual, Fab 4	
Marketing Part #:	CY6981
Device Description:	Wireless USB™ EX Baseband IC + Wireless USB™ Radio
Cypress Division:	Cypress Semiconductor Corporation – Personal Communication Division (PCD) WA
Overall Die (or Mask) REV Level (pre-requisite for qualification):	Rev. A
What ID markings on Die:	CY7C6951A

TECHNOLOGY/FAB PROCESS DESCRIPTION – R52T-3			
Number of Metal Layers:	3	Metal Composition:	Metal 1: 500/6000/300 [Å] Metal 2: 500/6000/300 [Å] Metal 3: 500/8000/300 [Å]
Passivation Type and Materials:	1,000A TEOS + 9,000A Si ₂ N ₄		
Free Phosphorus contents in top glass layer(%):	0%		
Die Coating(s), if used:	N/A		
Number of Transistors in Device	7C6951 = 600K 7C6961 = 150K		
Number of Gates in Device	7C6951 = 90K 7C6961 = 30K		
Generic Process Technology/Design Rule (μ-drawn):	CMOS, Triple Metal, 0.25 μm (Triple Layer Metal)		
Gate Oxide Material/Thickness (MOS):	SiO ₂ / 55Å		
Name/Location of Die Fab (prime) Facility:	Cypress Minnesota, Fab4		
Die Fab Line ID/Wafer Process ID:	Fab4 / R52T-3		

ELECTRICAL TEST / FINISH DESCRIPTION	
Test Location:	CML-R
Fault Coverage:	100%

Note: Package Qualification details upon request.

MAJOR PACKAGE INFORMATION USED IN THIS QUALIFICATION	
Package Designation:	BA81
Package Outline, Type, or Name:	81-Ball Thin Ball Grid Array (FBGA)
Mold Compound Name/Manufacturer:	Plaskon SMT-IN
Mold Compound Flammability Rating:	V-O per UL94
Oxygen Rating Index:	>28%
Substrate Material:	ASE
Lead Finish, Composition / Thickness:	Solder Ball 63% Sn, 37%Pb
Die Backside Preparation Method/Metallization:	Grinding / 11 mils
Die Separation Method:	Diamond wheel Dicing
Die Attach Supplier:	Ablestick
Die Attach Material:	8355F
Die Attach Method:	Sawing
Bond Diagram Designation:	10-04717
Wire Bond Method:	Thermosonic
Wire Material/Size:	Au, 1.0mil
Thermal Resistance Theta JA °C/W:	88° C/W
Package Cross Section Yes/No:	N/A
Assembly Process Flow:	49-41010
Name/Location of Assembly (prime) facility:	ASE Taiwan (TAIWN-G)

PACKAGE AVAILABILITY

PACKAGE	ASSEMBLY SITE FACILITY
81-lead FBGA	ASE Taiwan (TAIWN-G)

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, 125°C	P
High Temperature Operating Life Latent Failure Rate	Dynamic Operating Condition, Vcc Max=3.8V, 125°C	P
High Accelerated Saturation Test (HAST)	130°C, 3.63V,85%RH Precondition: JESD22 Moisture Sensitivity MSL 3 192 Hrs, 30°C/60%RH+3IR-Reflow, 220°C+5, 0°C	P
Temperature Cycle	MIL-STD-883C, Method 1010, Condition C, -65°C to 150°C Precondition: JESD22 Moisture Sensitivity MSL 3 192 Hrs, 30°C/60%RH+3IR-Reflow, 220°C+5, 0°C	P
Pressure Cooker	121°C, 100%RH Precondition: JESD22 Moisture Sensitivity MSL 3 192 Hrs, 30°C/60%RH+3IR-Reflow, 220°C+5, 0°C	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 Cypress Spec. 25-00020	P
Acoustic Microscopy, Level 3	Spec. 25-00104	P
Latchup Sensitivity	± 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
High Temperature Operating Life Early Failure Rate ¹	3377 Devices	0	N/A	N/A	0 PPM
High Temperature Operating Life ^{1,2} Long Term Failure Rate	547,000 DHRs	0	0.7	55	30 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 #: 024604

Device	Fab Lot #	Assy Lot #	Assy Loc	Duration	Samp	Rej	Failure Mechanism
STRESS: ACOUSTIC-MSL3							
CY6981-BA (7C6981A)	4223346	610243127/3004	TAIWN-G	COMP	18	0	
STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-EARLY FAILURE RATE (125C, 3.8V, Vcc Max)							
CY6981-BA (7C6981A)	4147861	610221501/2/27521	TAIWN-G	96	1342	0	
CY6981-BA (7C6981A)	4238026	610250542	TAIWN-G	96	1020	0	
CY6981-BA (7C6981A)	4223346	610243127/3004/7	TAIWN-G	96	1015	0	
STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-LATENT FAILURE RATE (125C, 3.8V, Vcc Max)							
CY6981-BA (7C6981A)	4147861	610221501/2	TAIWN-G	168	182	0	
CY6981-BA (7C6981A)	4147861	610221501/2	TAIWN-G	500	182	0	
CY6981-BA (7C6981A)	4147861	610221501/2	TAIWN-G	1000	182	0	
CY6981-BA (7C6981A)	4223346	610243127/3004	TAIWN-G	168	182	0	
CY6981-BA (7C6981A)	4223346	610243127/3004	TAIWN-G	500	182	0	
CY6981-BA (7C6981A)	4223346	610243127/3004	TAIWN-G	1000	180	0	
CY6981-BA (7C6981A)	4238026	610250542	TAIWN-G	168	368	0	
CY6981-BA (7C6981A)	4238026	610250542	TAIWN-G	500	368	0	
STRESS: ESD-CHARGE DEVICE MODEL (500V)							
CY6981-BA (7C6981A)	4147861	610221501/2/2752	TAIWN-G	COMP	9	0	
CY6981-BA (7C6981A)	4223346	610243127/3004	TAIWN-G	COMP	9	0	
ESD-HUMAN BODY CIRCUIT PER MIL STD 883, METHOD 3015 (2,200V)							
CY6981-BA (7C6981A)	4147861	610221501/2/2752	TAIWN-G	COMP	9	0	
CY6981-BA (7C6981A)	4223346	610243127/3004	TAIWN-G	COMP	9	0	
STRESS: STATIC LATCH-UP TESTING (125C, 10V, +/-300mA)							
CY6981-BA (7C6981A)	4147861	610221501/2/2752	TAIWN-G	COMP	3	0	
CY6981-BA (7C6981A)	4238026	610250542	TAIWN-G	COMP	3	0	

Reliability Test Data

QTP #: 024604

Device	Fab Lot #	Assy Lot #	Assy Loc	Duration	Samp	Rej	Failure Mechanism
STRESS: HI-ACCEL SATURATION TEST (130C, 85%RH, 3.63V), PRE COND 168 HR 85C/85%RH							
CY6981-BA (7C6981A)	4147861	610221501/2/2752	TAIWN-G	128	50	0	
CY6981-BA (7C6981A)	4223346	610243127/3004	TAIWN-G	128	47	0	
STRESS: PRESSURE COOKER TEST, 121C, 100%RH), PRE COND 192 HR 30C/60%RH, MSL3							
CY6981-BA (7C6981A)	4147861	610221501/2/2752	TAIWN-G	168	50	0	
CY6981-BA (7C6981A)	4223346	610243127/3004	TAIWN-G	168	48	0	
CY6981-BA (7C6981A)	4223346	610243127/3004	TAIWN-G	288	48	0	
CY6981-BA (7C6981A)	4238026	610250542	TAIWN-G	168	48	0	
CY6981-BA (7C6981A)	4238026	610250542	TAIWN-G	288	48	0	
STRESS: TC COND. C -65C TO 150C, PRECONDITION 192 HRS 30C/60%RH, MSL3							
CY6981-BA (7C6981A)	4147861	610221501/2/2752	TAIWN-G	300	50	0	
CY6981-BA (7C6981A)	4147861	610221501/2/2752	TAIWN-G	500	50	0	
CY6981-BA (7C6981A)	4147861	610221501/2/2752	TAIWN-G	1000	50	0	
CY6981-BA (7C6981A)	4223346	610243127/3004	TAIWN-G	300	48	0	
CY6981-BA (7C6981A)	4223346	610243127/3004	TAIWN-G	500	48	0	
CY6981-BA (7C6981A)	4223346	610243127/3004	TAIWN-G	1000	48	0	
CY6981-BA (7C6981A)	4238026	610250542	TAIWN-G	300	48	0	
CY6981-BA (7C6981A)	4238026	610250542	TAIWN-G	500	48	0	
CY6981-BA (7C6981A)	4238026	610250542	TAIWN-G	1000	48	0	