

Cypress Semiconductor Product Qualification Report

QTP# 052404 VERSION 2.0
July 2008

B53D-3GR Technology, Fab 4	
CYRF6936	Wireless USB™ LP2.4 GHz Radio SoC
CYRF7937	

CYPRESS TECHNICAL CONTACT FOR QUALIFICATION DATA:

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PRODUCT QUALIFICATION HISTORY

Qual Report	Description of Qualification Purpose	Date Comp
99256	New Technology, B53D-3, Fab 4, CY7B993V / CY7B994V	Aug 00
052404	WUSB-LS2 7B6936A New Device using B53D-3GR Technology in Fab4	Mar 06
082809	WUSB-LP Industrial Device CYRF7937 Device Qual using B53D-3GR Technology in Fab 4	July 08

PRODUCT DESCRIPTION (for qualification)	
Qualification Purpose: Qualify CYRF6936 Device in qualified B53D-3GR Technology in Fab4	
Marketing Part #:	CYRF6936, CYRF7937
Device Description:	3.3V, Wireless USB™ LP 2.4GHz Radio SoC available in 40-Pin QFN
Cypress Division:	Cypress Semiconductor Corporation – Consumer & Computation Division (CCD)
Overall Die (or Mask) REV Level (pre-requisite for qualification):	Rev. A
What ID markings on Die:	CY7B6936A

TECHNOLOGY/FAB PROCESS DESCRIPTION – B53D-3GR			
Number of Metal Layers:	2	Metal Composition:	Metal 1: 500Å TiW / 6000Å Al / 500Å TiW Metal 2: 500Å TiW / 8000Å Al / 500Å TiW
Passivation Type and Materials:	1,000Å TEOS + 9,000Å Si ₂ N ₄		
Free Phosphorus contents in top glass layer (%):	0%		
Die Coating(s), if used:	N/A		
Number of Transistors in Device	120K		
Number of Gates in Device	30K		
Generic Process Technology/Design Rule (μ-drawn):	CMOS, 0.25 μm		
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/B53D-3		

ELECTRICAL TEST / FINISH DESCRIPTION	
Test Location:	CML-R, KYEC

MAJOR PACKAGE INFORMATION USED IN THIS QUALIFICATION	
Package Designation:	LY40
40	40-pin QFN
Mold Compound Name/Manufacturer:	Sumitomo EME-G700
Mold Compound Flammability Rating:	V-O per UL94
Oxygen Rating Index:	N/A
Lead Frame Material:	Copper
Lead Finish, Composition / Thickness:	100% Matte Sn
Die Backside Preparation Method/Metallization:	Back Grinding
Die Separation Method:	100% Saw
Die Attach Supplier:	Ablestik
Die Attach Material:	8290
Die Attach Method:	Epoxy Cure
Bond Diagram Designation	001-00499
Wire Bond Method:	Thermosonic
Wire Material/Size:	Au 1.0mil
Thermal Resistance Theta JA °C/W:	21.2°C/W
Package Cross Section Yes/No:	N/A
Assembly Process Flow:	49-10994
Name/Location of Assembly (prime) facility:	Amkor-Seoul Korea-K1 (SEOUL-L)

PACKAGE AVAILABILITY

PACKAGE	ASSEMBLY SITE FACILITY
40-Pin QFN	Amkor-Seoul Korea (SEOUL-L)

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	Dynamic Operating Condition, Vcc = 3.8V, 125°C Dynamic Operating Condition, Vcc = 4.0V, 125°C	P
High Temperature Operating Life Latent Failure Rate	Dynamic Operating Condition, Vcc = 3.8V, 125°C Dynamic Operating Condition, Vcc = 4.0V, 125°C	P
High Temperature Steady State Life	125°C, 3.63V	P
Long Life Verification	Dynamic Operating Condition, Vcc = 4.0V, 125°C	P
Low Temperature Operating Life	Dynamic Operating Condition, Vcc = 4.3V, -30°C	P
Temperature Cycle	MIL-STD-883C, Method 1010, Condition C, -65°C to 150°C Precondition: JESD22 Moisture Sensitivity Level 3 192 Hrs., 30°C/60%RH+3IR-Reflow, 220°C+0, -5°C	P
Pressure Cooker	121°C, 100%RH MIL-STD-883C, Method 1010, Condition C, -65°C to 150°C Precondition: JESD22 Moisture Sensitivity Level 3 192 Hrs., 30°C/60%RH+3IR-Reflow, 220°C+0, -5°C	P
High Accelerated Saturation Test	130°C, 85%RH, 3.63V MIL-STD-883C, Method 1010, Condition C, -65°C to 150°C Precondition: JESD22 Moisture Sensitivity Level 3 192 Hrs., 30°C/60%RH+3IR-Reflow, 220°C+0, -5°C	P
Electrostatic Discharge Human Body Model (ESD-HBM)	1100V/2200V JESD22, Method A114-B	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/750V Cypress Spec. 25-00020	P
High Temperature Storage	150°C, no bias	P
Age Bond Strength	MIL-STD-883C, Method 2011	P
Acoustic Microscopy	Cypress Spec. 25-00104	P
Dynamic Latch up	Cypress Spec. 01-00081	P
Latch up Sensitivity	125°C, ± 200mA/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	1,020 Devices	0	N/A	N/A	0 PPM
High Temperature Operating Life ^{1,2} Long Term Failure Rate	703,484 DHRs	0	0.7	55	24 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 #: 99256

Device	Fab Lot #	Assy Lot #	Assy Loc	Duration	Samp	Rej	Failure Mechanism
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STRESS: ACOUSTIC, MSL3

CY7B993V-AC	1937245	619937409	TAIWN-G	COMP	15	0	
CY7B994V-ACB	1942384	610003953	TAIWN-G	COMP	15	0	
CY7B994V-AC	1949608	340000124	TAIWN-G	COMP	15	0	

STRESS: HIGH TEMP DYNAMIC OPERTING LIFE - EARLY FAILURE RATE, 125C, 4.0V, >Vcc Max

CY7B994V-AC	1009007	610021056	TAIWN-G	96	672	0	
CY7B993V-AC	1937245	619937409	TAIWN-G	96	665	0	
CY7B994V-ACB	1942384	610003953	TAIWN-G	96	664	0	
CY7B994V-AC	1949608	340000124	TAIWN-G	96	681	0	

STRESS: HIGH TEMP DYNAMIC OPERTING LIFE-LATENT FAILURE RATE, 125C, 4.0V, >Vcc Max

CY7B993V-AC	1937245	619937409	TAIWN-G	168	235	0	
CY7B994V-ACB	1937245	619937409	TAIWN-G	770	234	0	
CY7B994V-ACB	1942384	610003953	TAIWN-G	168	232	0	
CY7B994V-ACB	1942384	610003953	TAIWN-G	770	232	0	
CY7B994V-AC	1949608	340000124	TAIWN-G	168	236	0	
CY7B994V-AC	1949608	340000124	TAIWN-G	770	224	0	

STRESS: LONG LIFE VERIFICATION 125C, 4.0V, >Vcc Max

CY7B993V-AC	1937245	619937409	TAIWN-G	2000	170	0	
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STRESS: AGE BOND STRENGTH

CY7B993V-AC	1937245	619937409	TAIWN-G	COMP	3	0	
CY7B994V-ACB	1942384	610003953	TAIWN-G	COMP	6	0	
CY7B994V-AC	1949608	340000124	TAIWN-G	COMP	6	0	

STRESS: ESD-CHARGE DEVICE MODEL, 750V

CY7B994V-AC	1937245	619936456S	TAIWN-G	COMP	3	0	
CY7B994V-ACB	1942384	610003953	TAIWN-G	COMP	3	0	
CY7B994V-AC	1949608	340000124	TAIWN-G	COMP	3	0	

STRESS: ESD-HUMAN BODY CIRCUIT PER MIL STD 883, METHOD 3015, 1,100V

CY7B994V-AC	1937245	619936456S	TAIWN-G	COMP	3	0	
CY7B994V-ACB	1942384	610003953	TAIWN-G	COMP	3	0	
CY7B994V-AC	1949608	340000124	TAIWN-G	COMP	3	0	

STRESS: DYNAMIC LATCH-UP TESTING, 6.5V

CY7B994V-ACB	1942384	610003953	TAIWN-G	COMP	3	0	
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Reliability Test Data

QTP #: 99256

Device	Fab Lot #	Assy Lot #	Assy Loc	Duration	Samp	Rej	Failure Mechanism
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STRESS: HI-ACCEL SATURATION TEST, 130C, 85%RH, 3.63V, PRE COND 192 HR 30C/60%RH, MSL3

CY7B993V-AC	1937245	619937409	TAIWN-G	128	46	0	
CY7B993V-AC	1937245	619937409	TAIWN-G	256	46	0	
CY7B994V-ACB	1942384	610003953	TAIWN-G	128	46	0	
CY7B994V-AC	1949608	340000124	TAIWN-G	128	48	0	

STRESS: PRESSURE COOKER TEST, 121C, 100%RH, PRE COND 192HRS 30C/60%RH, MSL3

CY7B993V-AC	1937245	619937409	TAIWN-G	168	50	0	
CY7B994V-ACB	1942384	610003953	TAIWN-G	168	46	0	
CY7B994V-AC	1949608	340000124	TAIWN-G	168	48	0	

STRESS: HIGH TEMP STEADY STATE LIFE TEST, 125C, 3.63V, >Vcc Max

CY7B993V-AC	1937245	619937409	TAIWN-G	168	78	0	
CY7B993V-AC	1937245	619937409	TAIWN-G	336	76	0	

STRESS: LOW TEMPERATURE OPERATING LIKE, -30C, 4.3V, 8MHZ

CY7B993V-AC	1937245	619937409	TAIWN-G	500	50	0	
CY7B993V-AC	1937245	619937409	TAIWN-G	1000	50	0	

STRESS: HIGH TEMP STORGAE, PLASTIC, 150C

CY7B993V-AC	1937245	619937409	TAIWN-G	500	50	0	
CY7B993V-AC	1937245	619937409	TAIWN-G	1000	50	0	
CY7B994V-ACB	1942384	610003953	TAIWN-G	500	48	0	
CY7B994V-ACB	1942384	610003953	TAIWN-G	1000	48	0	
CY7B994V-AC	1949608	340000124	TAIWN-G	500	48	0	
CY7B994V-AC	1949608	340000124	TAIWN-G	1000	48	0	

STRESS: TC CONDITION C, -65C TO 150C, PRE COND 192 HRS 30C/60% RH, MSL3

CY7B993V-AC	1937245	619937409	TAIWN-G	300	50	0	
CY7B993V-AC	1937245	619937409	TAIWN-G	500	50	0	
CY7B993V-AC	1937245	619937409	TAIWN-G	1000	50	0	
CY7B994V-ACB	1942384	610003953	TAIWN-G	300	46	0	
CY7B994V-ACB	1942384	610003953	TAIWN-G	500	46	0	
CY7B994V-AC	1949608	340000124	TAIWN-G	300	48	0	
CY7B994V-AC	1949608	340000124	TAIWN-G	500	48	0	
CY7B994V-AC	1949608	340000124	TAIWN-G	1000	48	0	

Reliability Test Data

QTP #: 052404

Device	Fab Lot #	Assy Lot #	Assy Loc	Duration	Samp	Rej	Failure Mechanism
STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-EARLY FAILURE RATE (125C, 3.8V, Vcc Max)							
CYWUSB6936	4530746	610560091	SEOUL-L	96	1020	0	
STRESS: HIGH TEMP DYNAMIC OPERATING LIFE-LATENT FAILURE RATE (125C, 3.8V, Vcc Max)							
CYWUSB6936	4530746	610560091	SEOUL-L	168	340	0	
CYWUSB6936	4530746	610560091	SEOUL-L	500	340	0	
STRESS: ESD-CHARGE DEVICE MODEL (500V)							
CYWUSB6936	4545906	610609523	SEOUL-L	COMP	9	0	
STRESS: ESD-HUMAN BODY CIRCUIT PER JESD22, METHOD A114-B, 2,200V							
CYWUSB6936	4530746	610560091	SEOUL-L	COMP	9	0	
STRESS: ESD-HUMAN BODY CIRCUIT PER MIL STD 883, METHOD 3015, 2,200V							
CYWUSB6936	4530746	610560091	SEOUL-L	COMP	3	0	
STRESS: STATIC LATCH-UP TESTING (125C, 5V, +/-200mA)							
CYWUSB6936	4545906	610609523	SEOUL-L	COMP	3	0	
STRESS: PRESSURE COOKER TEST, 121C, 100%RH, PRE COND 192HRS 30C/60%RH, MSL3							
CYWUSB6934	4409927	610441446	SEOL-L	168	50	0	
STRESS: TC COND. C -65C TO 150C, PRE COND 192HRS 30C/60%RH, MSL3							
CYWUSB6934	4409927	610441446	SEOL-L	300	50	0	
CYWUSB6934	4409927	610441446	SEOL-L	500	50	0	
CYWUSB6934	4409927	610441446	SEOL-L	1000	50	0	