Cypress Semiconductor
Reliability Qualification Report

QTP# D22120a, D22120c, D22120d, D22120e Version *A

BCM20703 / 20704 / 20706 / 20707

Qualification of: BCM20704 / 20704 / 20706 / 20707, Single-Chip Dual Mode Bluetooth Transceiver / SoC for Embedded Wireless Devices in FCFBGA (4.5 x 4 x 1mm) 49 Ball, Flip Chip Fine Pitch Ball Grid Array Package (FCFBGA)

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

Prepared By:
Francis Classe
Reliability Engineer

Reviewed By:
Francis Classe
Reliability Manager

Approved By:
David Hoffman
Reliability Director

I.A. Product and Package Information

Product Description: BCM20704UA1KFFB **Cypress Division:** IoT Division
Single-Chip Dual Mode Bluetooth Transceiver and Baseband Processor

Package: FCFBGA **QTP:** D22120a

Description: (4.5 x 4 x 1mm) 49 Ball, Flip Chip Fine Pitch Ball Grid Array Package (FCFBGA)

Flammability: UL-V0 **O2 Index:** >28

Assembly: SPIL Taiwan **Molding Compound:** Panasonic CV8710TAC

Electrical Test: ASE Singapore **Theta Ja / Psi Jt:** 39 °C/W / °C/W

Substrate/Leadframe: Laminate Substrate **Die Attachment:** N/A

Lead Finish: 98.25Sn/1.2Ag/0.5Cu/0.05Ni **Bond Wire:** N/A

Comments:

Est. Field Temperature:	55 °C	**Life Test Temperature:**	125 °C
Est. DC Field Current:	40 mA	**Life Test Dynamic Current:**	10 mA
Est. Field Voltage:	3.3 V	**Life Test Voltage:**	3.6 V
Est. Field Power Dissipation:	132 mWatts	**Est. Stress Power Dissipation:**	36 mWatts
Est. Field Tj:	60.1 °C	**Est. Stress Tj:**	126.4 °C

Die:	20703A1	**Die Size:**	2.56 x 2.81 mm
Process:	40NM LP	**Fab:**	UMC-12A
Type:	Bluetooth	**Density:**	N/A

I.B. Product and Package Information

Product Description: BCM20703UA1KFFB **Cypress Division:** IoT Division

Single-Chip Dual Mode Bluetooth Transceiver and Baseband Processor

Package:	FCFBGA	**QTP:**	D22120c
Description:	(4.5 x 4 x 1mm) 49 Ball, Flip Chip Fine Pitch Ball Grid Array Package (FCFBGA)		
Assembly:	SPIL Taiwan	**Molding Compound:**	Panasonic CV8710TAC
Electrical Test:	ASE Singapore	**Theta Ja / Psi Jt:**	39 °C/W / °C/W
Substrate/Leadframe:	Laminate Substrate	**Die Attachment:**	N/A
Lead Finish:	98.25Sn/1.2Ag/0.5Cu/0.05Ni	**Bond Wire:**	N/A
Comments:			

Flammability:	**O2 Index:**
UL-V0	>28

Est. Field Temperature:	55 °C	**Life Test Temperature:**	125 °C
Est. DC Field Current:	40 mA	**Life Test Dynamic Current:**	10 mA
Est. Field Voltage:	3.3 V	**Life Test Voltage:**	3.6 V
Est. Field Power Dissipation:	132 mWatts	**Est. Stress Power Dissipation:**	36 mWatts
Est. Field Tj:	60.1 °C	**Est. Stress Tj:**	126.4 °C

Die:	20703A1	**Die Size:**	2.56 x 2.81 mm
Process:	40NM LP	**Fab:**	UMC-12A
Type:	Bluetooth	**Density:**	N/A

I.C. Product and Package Information

Product Description: BCM20706UA1KFFB
Bluetooth SoC for Embedded Wireless Devices

Cypress Division: IoT Division

Package: FCFBGA

QTP: D22120d

Description: (4.5 x 4 x 1mm) 49 Ball, Flip Chip Fine Pitch Ball Grid Array Package (FCFBGA)

Flammability: UL-V0

O2 Index: >28

Assembly: SPIL Taiwan

Molding Compound: Panasonic CV8710TAC

Electrical Test: ASE Singapore

Theta Ja / Psi Jt: 39 °C/W / °C/W

Substrate/Leadframe: Laminate Substrate

Die Attachment: N/A

Lead Finish: 98.25Sn/1.2Ag/0.5Cu/0.05Ni

Bond Wire: N/A

Comments:

Est. Field Temperature:	55 °C	**Life Test Temperature:**	125 °C
Est. DC Field Current:	40 mA	**Life Test Dynamic Current:**	10 mA
Est. Field Voltage:	3.3 V	**Life Test Voltage:**	3.6 V
Est. Field Power Dissipation:	132 mWatts	**Est. Stress Power Dissipation:**	36 mWatts
Est. Field Tj:	60.1 °C	**Est. Stress Tj:**	126.4 °C

Die:	20703A1	**Die Size:**	2.56 x 2.81 mm
Process:	40NM LP	**Fab:**	UMC-12A
Type:	Bluetooth	**Density:**	N/A

I.D. Product and Package Information

Product Description: BCM20707UA1KFFB4G
Bluetooth SoC for Embedded Wireless Devices

Cypress Division: IoT Division

Package: FCFBGA

QTP: D22120e

Description: (4.5 x 4 x 1mm) 49 Ball, Flip Chip Fine Pitch Ball Grid Array Package (FCFBGA)

Flammability: UL-V0

O2 Index: >28

Assembly: SPIL Taiwan

Molding Compound: Panasonic CV8710TAC

Electrical Test: ASE Singapore

Theta Ja / Psi Jt: 39 °C/W / °C/W

Substrate/Leadframe: Laminate Substrate

Die Attachment: N/A

Lead Finish: 98.25Sn/1.2Ag/0.5Cu/0.05Ni

Bond Wire: N/A

Comments:

Est. Field Temperature: 55 °C

Est. DC Field Current: 40 mA

Est. Field Voltage: 3.3 V

Est. Field Power Dissipation: 132 mWatts

Est. Field Tj: 60.1 °C

Life Test Temperature: 125 °C

Life Test Dynamic Current: 10 mA

Life Test Voltage: 3.6 V

Est. Stress Power Dissipation: 36 mWatts

Est. Stress Tj: 126.4 °C

Die: 20703A1

Process: 40NM LP

Type: Bluetooth

Die Size: 2.56 x 2.81 mm

Fab: UMC-12A

Density: N/A

II. 40nm GLL/LP/RF Life Test Failure Rate Calculation

HTOL Stress Temperature - 125 °C

Failure Mechanism	Read Points / Test Results				Modeling Parameters @ 55°C					Avg. Failure Rate FITS @ 55°C, 60% Conf.	
	24 hrs	168 hrs	500 hrs	1000 hrs	Ea eV	TAF	VAF	OAF	MTTF (yrs)	Early Life	Inherent Life
PLASTIC											
Sample Size	2716	2519	1559	1559							
Zero fails, Process ave. Ea	0 *	0	0	0	0.66	71	1	71		88	8
Totals	**0**	**0**	**0**	**0**					**14269**	**88**	**8**

* - Contributes to early life FITS

III. Summary of Stress Test Results

Stress Test	Stress Condition	Package Type	Sample Size	Num. of Lots	Num. of Fails	Failure Rate %	Comments
Data From Qualification D22120a:							
Early Life Failure Rate	125°C, Vddnom x 1.15	FCFBGA [1]	96	1	0	0.00	24 Hours
HTOL (EL)	125°C, Vddnom x 1.15	FCFBGA [1]	96	1	0	0.00	192 Hours
HTOL (IL)	125°C, Vddnom x 1.15	FCFBGA [1]	96	1	0	0.00	500 Hours
HTOL (XL)	125°C, Vddnom x 1.15	FCFBGA [1]	96	1	0	0.00	1000 Hours
ESD CDM	N/A	FCFBGA [1]	3	1	Pass 500V		
ESD HBM	N/A	FCFBGA [1]	3	1	Pass 2kV		
ESD MM	N/A	FCFBGA [1]	3	1	Pass 150V		
Latch Up	125°C	FCFBGA [1]	3	1	Pass 200mA		
Generic Reference Data:							
High Temp Bake	(150°C)	FCFBGA [2]	77	1	0	0.00	500 Hours
	(150°C)	FCFBGA [2]	77	1	0	0.00	1000 Hours
Preconditioning	(PC2/260°C, +0°C/-5°C)	FCFBGA [2]	260	1	Passed Jedec L3		
Precon+Temp Cycle	-55°C/125°C	FCFBGA [2]	77	1	0	0.00	700 Cycles
	-55°C/125°C	FCFBGA [2]	77	1	0	0.00	500 Cycles
	-55°C/125°C	FCFBGA [2]	77	1	0	0.00	1000 Cycles
Precon+Thermal Shock	-55°C/125°C	FCFBGA [2]	77	1	0	0.00	300 Cycles
Precon+uHAST	130°C/85% RH	FCFBGA [2]	77	1	0	0.00	96 Hours

Notes / Justification: 1) Results from Qual D22120a, BCM20704UA1KFFB, 40NM LP Bluetooth in 49 Ball FCFBGA (4.5 x 4 x 1mm)
2) Results from Qual PQ03165, BCM20707UA1KFFB4G in 49 Ball FCFBGA (4.5 x 4 x 1mm) - Same Product, Package, and Assembly Site

Preconditioning Flows: PC2 (JEDEC L3): Bake 125°C, 24hr => Soak @ 30°C/60%RH, 192hr => 3x Reflow

Reliability Tests Performed per Specification Requirements

Stress	Condition	Specification Reference
Early Life Failure Rate	125°C, Vddnom x 1.15	JESD22-A108 / AEC-Q100-008
ESD CDM	N/A	JS002 / AEC-Q100-011
ESD HBM	N/A	JS001 / AEC-Q100-002
ESD MM	N/A	JS001 / AEC-Q100-002
High Temp Bake	(150°C)	JESD22-A103
HTOL (EL)	125°C, Vddnom x 1.15	JESD22-A108
HTOL (IL)	125°C, Vddnom x 1.15	JESD22-A108
HTOL (XL)	125°C, Vddnom x 1.15	JESD22-A108
Latch Up	125°C	JESD78 / AEC Q100-004
Precon+Temp Cycle	-55°C/125°C	JESD22-A104
Precon+Thermal Shock	-55°C/125°C	JESD22-A106
Precon+uHAST	130°C/85% RH	JESD22-A118
Preconditioning	(PC2/260°C, +0°C/-5°C)	J-STD-020
Preconditioning	(PC2/260°C, +0°C/-5°C)	J-STD-020 / EIAJ ED-4701-100 Method 104

IV. Revision History

Document Number: 002-17688

Document Title: QTP #D22120a/c/d/e: BCM20703 / 20704 / 20706 / 20707, Single-Chip Dual Mode Bluetooth Transceiver and Baseband Processor / SoC for Embedded Wireless Devices

Rev.	Issue Date	ECN#	Originator	Description
**	10/29/2016	5516297	FCCL	Initial Release.
*A	12/15/2016	5555841	FCCL	Added additional sister devices BCM20703/20706/20707.

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