Cypress Semiconductor
Reliability Qualification Report

QTP# D23477, D23477a Version **

BCM20713

Qualification of: BCM20713, Single Chip Bluetooth Transceiver and Baseband Processor in 50 Ball, Ultra Thin Fine Pitch Ball Grid Array Package (uFBGA)

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

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I.A. Product and Package Information

Product Description: BCM20713A1KUFBXG
Single Chip Bluetooth Transceiver and Baseband Processor

Cypress Division: IoT Division

Package: UFBGA

QTP: D23477

Description: (4.5 x 4 x 0.6mm) 50 Ball, Ultra Thin Fine Pitch Ball Grid Array Package (uFBGA)

Flammability: UL-V0

O2 Index: >28

Assembly: Stats ChipPac China

Molding Compound: Kyocera KE-G1250ULKDS-30

Electrical Test: ASE Singapore

Theta Ja / Psi Jt: 39 °C/W / 5 °C/W

Substrate/Leadframe: Laminate Substrate

Die Attachment: ATB-120U

Lead Finish: 96.5Sn/3.0Ag/0.5Cu

Bond Wire: 0.8 CuPd

Comments:

Est. Field Temperature:	55 °C	**Life Test Temperature:**	125 °C
Est. DC Field Current:	25 mA	**Life Test Dynamic Current:**	40 mA
Est. Field Voltage:	3.0 V	**Life Test Voltage:**	3.45 V
Est. Field Power Dissipation:	75 mWatts	**Est. Stress Power Dissipation:**	138 mWatts
Est. Field Tj:	57.9 °C	**Est. Stress Tj:**	130.4 °C

Die:	20702UA5	**Die Size:**	3.04 x 2.53 mm
Process:	65NM LP	**Fab:**	UMC-12I
Type:	Bluetooth	**Density:**	N/A

I.B. Product and Package Information

Product Description:	BCM20713A1KUBXG Single Chip Bluetooth Transceiver and Baseband Processor	**Cypress Division:**	IoT Division

Package:	WLBGA	**QTP:**	D23477a
Description:	(3.04 x 2.53 x 0.6mm) 42 Ball, Wafer Level Ball Grid Array (WLBGA)		
Assembly:	UTAC Singapore	**Molding Compound:**	N/A
Electrical Test:	UTAC Singapore	**Theta Ja / Psi Jt:**	21 °C/W / 1 °C/W
Substrate/Leadframe:	N/A	**Die Attachment:**	N/A
Lead Finish:	95.5Sn / 4.0Ag / 0.5Cu	**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:	25 mA	**Life Test Dynamic Current:**	40 mA
Est. Field Voltage:	3.0 V	**Life Test Voltage:**	3.45 V
Est. Field Power Dissipation:	75 mWatts	**Est. Stress Power Dissipation:**	138 mWatts
Est. Field Tj:	56.5 °C	**Est. Stress Tj:**	127.8 °C

Die:	20702UA5	**Die Size:**	3.04 x 2.53 mm
Process:	65NM LP	**Fab:**	UMC-12I
Type:	Bluetooth	**Density:**	N/A

II. 65nm G/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	504 hrs	1000 hrs	Ea eV	TAF	VAF	OAF	MTTF (yrs)	Early Life	Inherent Life
PLASTIC											
Sample Size	3305	2755	2083	2083							
Zero fails, Process ave. Ea	0 *	0	0	0	0.7	73	1	73		76	6
Totals	**0**	**0**	**0**	**0**					**19026**	**76**	**6**

* 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 D23477:							
Early Life Failure Rate	125°C, Vddnom x 1.15	UFBGA [1]	77	1	0	0.00	24 Hours
HTOL (EL)	125°C, Vddnom x 1.15	UFBGA [1]	231	1	0	0.00	192 Hours
ESD CDM	N/A	UFBGA [1]	3	1	Pass 750V		
ESD HBM	N/A	UFBGA [1]	3	1	Pass 2kV		
ESD MM	N/A	UFBGA [1]	3	1	Pass 150V		
Latch Up	125°C	UFBGA [1]	6	1	Pass 200mA		
Generic Reference Data:							
High Temp Bake	(150°C)	UFBGA [2]	77	1	0	0.00	500 hours
	(150°C)	UFBGA [2]	77	1	0	0.00	1000 hours
	(150°C)	WLBGA [4]	77	1	0	0.00	1000 Hours
Preconditioning	(PC2/260°C, +0°C/-5°C)	UFBGA [2]	260	1	Passed Jedec L3		
	(PC5/260°C, +0°C/-5°C)	WLBGA [3]	308	1	Passed Jedec L1		
	(PC5/260°C, +0°C/-5°C)	WLBGA [4]	77	1	Passed Jedec L1		
Precon+Temp Cycle	(PC2/260°C, -55°C/125°C)	UFBGA [2]	77	1	0	0.00	500 cycles
	(PC2/260°C, -55°C/125°C)	UFBGA [2]	77	1	0	0.00	1000 Cycles
	(PC5/260°C, -55°C/125°C)	WLBGA [3]	82	1	0	0.00	700 Cycles
	(PC5/260°C, -55°C/125°C)	WLBGA [4]	77	1	0	0.00	500 Cycles
	(PC5/260°C, -55°C/125°C)	WLBGA [4]	77	1	0	0.00	1000 Cycles
Precon+Thermal Shock	(PC2/260°C, -55°C/125°C)	UFBGA [2]	77	1	0	0.00	300 Cycles
Precon+HAST	(PC2/260°C, Biased, 130°C/85% RH)	UFBGA [2]	77	1	0	0.00	96 hours
	(PC5/260°C, Biased, 130°C/85% RH)	WLBGA [3]	77	1	0	0.00	96 Hours
Precon+uHAST	(PC5/260°C, Unbiased, 130°C/85% RH)	WLBGA [3]	82	1	0	0.00	96 Hours
	(PC5/260°C, Unbiased, 130°C/85% RH)	WLBGA [4]	77	1	0	0.00	96 Hours
Temp Humidity Test	(Unbiased, 85°C/85% RH)	WLBGA [4]	77	1	0	0.00	1000 hours

Notes / Justification: 1) Results from Qual D23477, BCM20713A1KUFBXG, 65NM LP Bluetooth in 50 Ball uFBGA (4.5 x 4 x 0.6mm)

2) Results from Qual PQa2522, BCM20710A1KUFBXG in 50 UFBGA (4 x 4.5 x 0.6mm) - Same UBGA Package, Fab and Process Technology, Assembly Location

3) Results from Qual PQ03403, in 63 Ball WLBGA (2.91 x 3.73 x 0.55mm) - Same WLBGA Package and Assembly Location

4) Results from Qual PQ03417, in 151 Ball WLBGA (5.89 x 4.95 x 0.55mm) - Same WLBGA Package and Assembly Location

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

PC5 (JEDEC L1): Bake 125°C, 24hr => Soak @ 85°C/85%RH, 168hr => 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
Latch Up	125°C	JESD78 / AEC Q100-004
Precon+HAST	(PC2/260°C, Biased, 130°C/85% RH)	JESD22-A110
Precon+HAST	(PC5/260°C, Biased, 130°C/85% RH)	JESD22-A110
Precon+Temp Cycle	(PC2/260°C, -55°C/125°C)	JESD22-A104
Precon+Temp Cycle	(PC5/260°C, -55°C/125°C)	JESD22-A104
Precon+Thermal Shock	(PC2/260°C, -55°C/125°C)	JESD22-A106
Precon+uHAST	(PC5/260°C, Unbiased, 130°C/85% RH)	JESD22-A118
Preconditioning	(PC2/260°C, +0°C/-5°C)	J-STD-020
Preconditioning	(PC5/260°C, +0°C/-5°C)	J-STD-020
Temp Humidity Test	(Unbiased, 85°C/85% RH)	JESD22-A101

IV. Revision History

Document Number: 002-18670

Document Title: QTP #D23477 and D23477a: BCM20713, Single Chip Bluetooth Transceiver and Baseband Processor

Rev.	Issue Date	ECN#	Originator	Description
**	2/6/2017	5622085	FCCL	Initial Release.

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