

Cypress Semiconductor Reliability Qualification Report

QTP# D13543, D13543a Version *A

BCM20702 / BCM20705

**Qualification of BCM20702 / BCM20705, Single-Chip Bluetooth
Transceiver and Baseband Processor, in 50 Ball, 4.5 x 4.0mm WFBGA
Package**

FOR ANY QUESTIONS ON THIS REPORT, PLEASE CONTACT
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I.A. Product and Package Information

Product Description: BCM20702B0KWFBG **Cypress Division:** IoT Division
Single-Chip Bluetooth Transceiver and Baseband Processor

Package: WFBGA	QTP: D13543	
Description: (4.5 x 4 x 0.8mm) 50 Ball, Wafer Level Fine Pitch Ball Grid Array (WFBGA)		Flammability: O2 Index:
Assembly: ASE Shanghai	Molding Compound: KE-G1250ULKDS-30	UL-V0 >28
Electrical Test: ASE Singapore	Theta Ja / Psi Jt: 21 °C/W / 1 °C/W	
Substrate/Leadframe: Laminate Substrate	Die Attachment: Ablebond 2025D	
Lead Finish: 96.5Sn/3.0Ag/0.5Cu	Bond Wire: Copper	
Comments:		

Est. Field Temperature: 55 °C	Life Test Temperature: 125 °C
Est. DC Field Current: 20 mA	Life Test Dynamic Current: 5 mA
Est. Field Voltage: 1.2 V	Life Test Voltage: 1.4 V
Est. Field Power Dissipation: 24.4 mWatts	Est. Stress Power Dissipation: 7 mWatts
Est. Field Tj: 55.5 °C	Est. Stress Tj: 125.1 °C

Die: 20702B0	Die Size: 3.04 x 2.53 mm
Process: 65NM LP	Fab: SMIC-B1
Type: Bluetooth	Density: N/A

I.B. Product and Package Information

Product Description: BCM20705B0KWFBG **Cypress Division:** IoT Division
Single-Chip Bluetooth Transceiver and Baseband Processor

Package: WFBGA	QTP: D13543a	
Description: (4.5 x 4 x 0.8mm) 50 Ball, Wafer Level Fine Pitch Ball Grid Array (WFBGA)		Flammability: O2 Index:
Assembly: ASE Shanghai	Molding Compound: KE-G1250ULKDS-30	UL-V0 >28
Electrical Test: ASE Singapore	Theta Ja / Psi Jt: 21 °C/W / 1 °C/W	
Substrate/Leadframe: Laminate Substrate	Die Attachment: Ablebond 2025D	
Lead Finish: 96.5Sn/3.0Ag/0.5Cu	Bond Wire: Copper	
Comments:		

Est. Field Temperature: 55 °C	Life Test Temperature: 125 °C
Est. DC Field Current: 20 mA	Life Test Dynamic Current: 5 mA
Est. Field Voltage: 1.2 V	Life Test Voltage: 1.4 V
Est. Field Power Dissipation: 24.4 mWatts	Est. Stress Power Dissipation: 7 mWatts
Est. Field Tj: 55.5 °C	Est. Stress Tj: 125.1 °C

Die: 20702B0	Die Size: 3.04 x 2.53 mm
Process: 65NM LP	Fab: SMIC-B1
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 D13543:							
Early Life Failure Rate	125°C, Vddnom x 1.15	WFBGA ¹	96	1	0	0.00	24 Hours
HTOL (EL)	125°C, Vddnom x 1.15	WFBGA ¹	96	1	0	0.00	192 Hours
HTOL (IL)	125°C, Vddnom x 1.15	WFBGA ¹	96	1	0	0.00	500 Hours
HTOL (XL)	125°C, Vddnom x 1.15	WFBGA ¹	96	1	0	0.00	1000 Hours
ESD CDM	N/A	WFBGA ¹	3	1	Pass 500V		
ESD HBM	N/A	WFBGA ¹	3	1	Pass 2kV		
ESD MM	N/A	WFBGA ¹	3	1	Pass 150V		
Latch Up	125°C	WFBGA ¹	6	1	Pass 200mA		
Generic Reference Data:							
Preconditioning	(PC2/260°C, +0°C/-5°C)	WFBGA ²	77	1	Passed Jedec L3		
	(PC2/260°C, +0°C/-5°C)	WFBGA ³	260	1	Passed Jedec L3		
	(PC2/260°C, +0°C/-5°C)	WFBGA ⁴	260	1	Passed Jedec L3		
	(PC2/260°C, +0°C/-5°C)	WFBGA ⁵	260	1	Passed Jedec L3		
Precon+Temp Cycle	-55°C/125°C	WFBGA ³	76	1	0	0.00	500 cycles
	-55°C/125°C	WFBGA ³	76	1	0	0.00	1000 cycles
	-55°C/125°C	WFBGA ⁴	76	1	0	0.00	500 cycles
	-55°C/125°C	WFBGA ⁴	76	1	0	0.00	1000 cycles
	-55°C/125°C	WFBGA ⁵	76	1	0	0.00	500 cycles
	-55°C/125°C	WFBGA ⁵	76	1	0	0.00	1000 cycles
Precon+Thermal Shock	-55°C/125°C	WFBGA ³	76	1	0	0.00	500 cycles
	-55°C/125°C	WFBGA ³	76	1	0	0.00	300 cycles
	-55°C/125°C	WFBGA ⁴	75	1	0	0.00	500 cycles
	-55°C/125°C	WFBGA ⁴	76	1	0	0.00	300 cycles
	-55°C/125°C	WFBGA ⁵	76	1	0	0.00	500 cycles
	-55°C/125°C	WFBGA ⁵	76	1	0	0.00	300 cycles
Precon+HAST	130°C/85% RH	WFBGA ²	77	1	0	0.00	96 hours
	130°C/85% RH	WFBGA ³	76	1	0	0.00	96 hours
	130°C/85% RH	WFBGA ⁴	76	1	0	0.00	96 hours
	130°C/85% RH	WFBGA ⁵	76	1	0	0.00	96 hours

- Notes / Justification:**
- 1) Results from Qual D13543, BCM20702B0KWFBG, 65NM LP Bluetooth in 50 Ball WFBGA (4.5 x 4 x 0.8mm)
 - 2) Results from Qual PQ02509, BCM20702A1KWFBG in 50 Ball WLBGA (4.5 x 4 x 0.8mm) - Same ASE Assembly Facility, Process Technology, and Package, Similar Device
 - 3) Results from Qual PQ01749, BCM20702A1KWFBG in 50 Ball WLBGA (4.5 x 4 x 0.8mm) - Same ASE Assembly Facility, Process Technology, and Package, Similar Device
 - 4) Results from Qual PQ02078, BCM20702A1KWFBG in 50 Ball WLBGA (4.5 x 4 x 0.8mm) - Same Stats ChipPac Assembly Facility, Process Technology, and Package, Similar Device
 - 5) Results from Qual PQ02116, BCM20702A1KWFBG in 50 Ball WLBGA (4.5 x 4 x 0.8mm) - Same Stats ChipPac Assembly Facility, Process Technology, and Package, Similar Device

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
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+HAST	130°C/85% RH	JESD22-A110
Precon+Temp Cycle	-55°C/125°C	JESD22-A104
Precon+Thermal Shock	-55°C/125°C	JESD22-A106
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: 002-16384

Document Title: QTP# D13543: Qualification of BCM20702 / BCM20705, Single-Chip Bluetooth Transceiver and Baseband Processor

Rev.	Issue Date	ECN#	Originator	Description
**	8/17/2016	5423744	FCCL	Initial Release.
*A	12/15/2016	5555706	FCCL	Added BCM20705 OPN to Section II, and BCM20702 to Cover Page

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