

Cypress Semiconductor Reliability Qualification Report

QTP# D51711a, D51711b, D51711c, D23637b, D23637c, D23637d Version *A

**BCM20730A / BCM20732A / BCM20738A /
BCM20737A / BCM20738A**

**BCM20730A / BCM20732A / BCM20738A / BCM20737A / BCM20738A,
Single-Chip Bluetooth Transceiver / Low-Energy Only SoC in Fine Pitch
Ball Grid Array (FBGA) and Quad Flat No-Lead (QFN) Packages**

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

Product Description: BCM20730A1KFBG **Cypress Division:** IoT Division
Single-Chip Bluetooth Transceiver for Wireless Input Devices

Package: FBGA	QTP: D51711a	
Description: (7 x 7 x 1mm) 64 Ball, Fine Pitch Ball Grid Array Package (FBGA)		Flammability: O2 Index:
Assembly: Stats ChipPac China	Molding Compound: Kyocera KE-G1250LKDS-30	UL-V0 >28
Electrical Test: UTAC Singapore	Theta Ja / Psi Jt: 39 °C/W / 5 °C/W	
Substrate/Leadframe: Laminate Substrate	Die Attachment: Ablebond 2025D	
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: 27 mA	Life Test Dynamic Current: 5 mA
Est. Field Voltage: 1.8 V	Life Test Voltage: 2.07 V
Est. Field Power Dissipation: 48.6 mWatts	Est. Stress Power Dissipation: 10.3 mWatts
Est. Field Tj: 56.9 °C	Est. Stress Tj: 125.4 °C

Die: 20730B0	Die Size: 2.22 x 2.21 mm
Process: 65NM LP	Fab: TSMC-14
Type: Bluetooth	Density: N/A

I.B. Product and Package Information

Product Description: BCM20730A1KML2G **Cypress Division:** IoT Division
Single-Chip Bluetooth Transceiver for Wireless Input Devices

Package: QFN	QTP: D51711b	
Description: (5 x 5 x 0.9mm) 32 Contact, Quad Flat No Lead Package (QFN)		Flammability: O2 Index:
Assembly: ASE Taiwan	Molding Compound: Hitachi CEL-9240HF	UL-V0 >28
Electrical Test: ASE Taiwan	Theta Ja / Psi Jt: 18 °C/W / 8.8 °C/W	
Substrate/Leadframe: Copper Leadframe	Die Attachment: Hitach EN400G	
Lead Finish: 100% Matte Sn Plating	Bond Wire: Copper	
Comments:		

Est. Field Temperature: 55 °C	Life Test Temperature: 125 °C
Est. DC Field Current: 27 mA	Life Test Dynamic Current: 5 mA
Est. Field Voltage: 1.8 V	Life Test Voltage: 2.07 V
Est. Field Power Dissipation: 48.6 mWatts	Est. Stress Power Dissipation: 10.3 mWatts
Est. Field Tj: 55.8 °C	Est. Stress Tj: 125.1 °C

Die: 20730B0	Die Size: 2.22 x 2.21 mm
Process: 65NM LP	Fab: TSMC-14
Type: Bluetooth	Density: N/A

I.C. Product and Package Information

Product Description: BCM20730A1KMLG **Cypress Division:** IoT Division
Single-Chip Bluetooth Transceiver for Wireless Input Devices

Package: QFN	QTP: D51711c	
Description: (6 x 6 x mm) 40 Contact, Quad Flat No Lead Package (QFN)		Flammability: O2 Index:
Assembly: ASE Taiwan	Molding Compound: Hitachi CEL-9240HF	UL-V0 >28
Electrical Test: ASE Taiwan	Theta Ja / Psi Jt: 18 °C/W / 8.8 °C/W	
Substrate/Leadframe: Copper Leadframe	Die Attachment: Hitach EN400G	
Lead Finish: 100% Matte Sn Plating	Bond Wire: Copper	
Comments:		

Est. Field Temperature: 55 °C	Life Test Temperature: 125 °C
Est. DC Field Current: 27 mA	Life Test Dynamic Current: 5 mA
Est. Field Voltage: 1.8 V	Life Test Voltage: 2.07 V
Est. Field Power Dissipation: 48.6 mWatts	Est. Stress Power Dissipation: 10.3 mWatts
Est. Field Tj: 55.8 °C	Est. Stress Tj: 125.1 °C

Die: 20730B0	Die Size: 2.22 x 2.21 mm
Process: 65NM LP	Fab: TSMC-14
Type: Bluetooth	Density: N/A

I.D. Product and Package Information

Product Description: BCM20736A1KML2G **Cypress Division:** IoT Division
Single-Chip Bluetooth Transceiver for Wireless Input Devices

Package: QFN	QTP: D23637b	
Description: (5 x 5 x 0.9mm) 32 Contact, Quad Flat No Lead Package (QFN)		Flammability: O2 Index:
Assembly: ASE Taiwan	Molding Compound: Hitachi CEL-9240HF10	UL-V0 >28
Electrical Test: ASE	Theta Ja / Psi Jt: 18 °C/W / 8.8 °C/W	
Substrate/Leadframe: Copper Leadframe	Die Attachment: Hitachi EN-4900GC	
Lead Finish: 100% Matte Sn Plating	Bond Wire: Copper	
Comments:		

Est. Field Temperature: 55 °C	Life Test Temperature: 125 °C
Est. DC Field Current: 27 mA	Life Test Dynamic Current: 5 mA
Est. Field Voltage: 1.8 V	Life Test Voltage: 2.07 V
Est. Field Power Dissipation: 48.6 mWatts	Est. Stress Power Dissipation: 10.3 mWatts
Est. Field Tj: 55.8 °C	Est. Stress Tj: 125.1 °C

Die: 20730B3	Die Size: 2.22 x 2.21 mm
Process: 65NM LP	Fab: TSMC-14
Type: Bluetooth	Density: N/A

I.E. Product and Package Information

Product Description: BCM20738A2KML3G **Cypress Division:** IoT Division
Single-Chip Bluetooth Transceiver for Wireless Input Devices

Package: QFN	QTP: D23637c	
Description: (6 x 6 x 0.9mm) 40 Contact, Quad Flat No Lead Package (QFN)		Flammability: O2 Index:
Assembly: ASE Taiwan	Molding Compound: Hitachi CEL-9240HF10	UL-V0 >28
Electrical Test: ASE	Theta Ja / Psi Jt: 18 °C/W / 8.8 °C/W	
Substrate/Leadframe: Copper Leadframe	Die Attachment: Hitachi EN-4900GC	
Lead Finish: 100% Matte Sn Plating	Bond Wire: Copper	
Comments:		

Est. Field Temperature: 55 °C	Life Test Temperature: 125 °C
Est. DC Field Current: 27 mA	Life Test Dynamic Current: 5 mA
Est. Field Voltage: 1.8 V	Life Test Voltage: 2.07 V
Est. Field Power Dissipation: 48.6 mWatts	Est. Stress Power Dissipation: 10.3 mWatts
Est. Field Tj: 55.8 °C	Est. Stress Tj: 125.1 °C

Die: 20730B3	Die Size: 2.22 x 2.21 mm
Process: 65NM LP	Fab: TSMC-14
Type: Bluetooth	Density: N/A

I.F. Product and Package Information

Product Description: BCM20736A1KML2G **Cypress Division:** IoT Division
Single-Chip Bluetooth Transceiver for Wireless Input Devices

Package: QFN	QTP: D23637d	
Description: (5 x 5 x 0.9mm) 32 Contact, Quad Flat No Lead Package (QFN)		Flammability: O2 Index:
Assembly: ASE Taiwan	Molding Compound: Hitachi CEL-9240HF10	UL-V0 >28
Electrical Test: ASE	Theta Ja / Psi Jt: 18 °C/W / 8.8 °C/W	
Substrate/Leadframe: Copper Leadframe	Die Attachment: Hitachi EN-4900GC	
Lead Finish: 100% Matte Sn Plating	Bond Wire: Copper	
Comments:		

Est. Field Temperature: 55 °C	Life Test Temperature: 125 °C
Est. DC Field Current: 27 mA	Life Test Dynamic Current: 5 mA
Est. Field Voltage: 1.8 V	Life Test Voltage: 2.07 V
Est. Field Power Dissipation: 48.6 mWatts	Est. Stress Power Dissipation: 10.3 mWatts
Est. Field Tj: 55.8 °C	Est. Stress Tj: 125.1 °C

Die: 20730B3	Die Size: 2.22 x 2.21 mm
Process: 65NM LP	Fab: TSMC-14
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 D23637c:							
ESD CDM	N/A	QFN ¹	3	1		Pass 500V	
ESD HBM	N/A	QFN ¹	3	1		Pass 2kV	
ESD MM	N/A	QFN ¹	3	1		Pass 150V	
Latch Up	125°C	QFN ¹	3	1		Pass 200mA	
Generic Reference Data:							
Early Life Failure Rate	125°C, Vddnom x 1.15	FBGA ²	192	1	0	0.00	24 Hours
HTOL (EL)	125°C, Vddnom x 1.15	FBGA ²	96	1	0	0.00	192 Hours
HTOL (IL)	125°C, Vddnom x 1.15	FBGA ²	96	1	0	0.00	500 Hours
HTOL (XL)	125°C, Vddnom x 1.15	FBGA ²	96	1	0	0.00	1000 Hours
High Temp Bake	(150°C)	QFN ³	77	1	0	0.00	500 Hours
	(150°C)	QFN ³	77	1	0	0.00	1000 Hours
Preconditioning	(PC2/260°C, +0°C/-5°C)	QFN ³	260	1			Passed Jedec L3
	(PC2/260°C, +0°C/-5°C)	FBGA ⁴	228	1			Passed Jedec L3
Precon+Temp Cycle	-55°C/125°C	QFN ³	77	1	0	0.00	500 Cycles
	-55°C/125°C	QFN ³	77	1	0	0.00	1000 Cycles
	-55°C/125°C	FBGA ⁴	76	1	0	0.00	500 cycles
	-55°C/125°C	FBGA ⁴	76	1	0	0.00	1000 cycles
Precon+Thermal Shock	-55°C/125°C	QFN ³	77	1	0	0.00	300 Cycles
	-55°C/125°C	FBGA ⁴	76	1	0	0.00	500 cycles
	-55°C/125°C	FBGA ⁴	76	1	0	0.00	300 cycles
Precon+HAST	130°C/85% RH	FBGA ⁴	76	1	0	0.00	96 hours
Precon+Steam Pressure	121°C/100%RH/29.7 psia	QFN ³	77	1	0	0.00	96 Hours
	121°C/100%RH/29.7 psia	QFN ³	77	1	0	0.00	168 Hours

- Notes / Justification:**
- 1) Results from Qual D23637c, BCM20738A2KML3G, 65NM LP Bluetooth in 40 Contact QFN (6 x 6 x 0.9mm)
 - 2) Results from Qual D12666a, BCM20730A1KFBG in 64 Ball FBGA (7 x 7 x 1mm) - Same Product and Process Technology
 - 3) Results from Qual PQ02862, in 32 Contact QFN (5 x 5 x 0.9mm) - Same QFN Assembly Location and Material Set, Similar Package, Same Product, and Process Technology
 - 4) Results from Qual PQ01256, in 182 Ball FBGA (x x mm) - Same FBGA Assembly Location and Material Set, Similar Package, Same Product, and Process Technology

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+HAST	130°C/85% RH	JESD22-A110
Precon+Steam Pressure	121°C/100%RH/29.7 psia	JESD22-A102
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: 002-17018

Document Title: QTP #51711/23637: BCM20730A / BCM20732A / BCM20738A / BCM20737A / BCM20738A,
Single-Chip Bluetooth Transceiver / Low-Energy Only SoC

Rev.	Issue Date	ECN#	Originator	Description
**	10/13/2016	5475725	FCCL	Initial Release.
*A	12/19/2016	5559966	FCCL	Added additional sister products, including BCM20703, 20732, 20736, and 20737 variants.

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