Cypress Semiconductor
Reliability Qualification Report

QTP# D15882, D15882a Version **

BCM4334W / BCM4334X

Qualification of: BCM4334W / BCM4334X, Single-Chip IEEE 802.11 b/g/n MAC/Baseband/ Radio with Integrated Bluetooth 4.0 in 109 Ball, Wafer Level Ball Grid Array (WLBGA)

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

Product Description: BCM4334WKUBG
Single-Chip IEEE 802.11 b/g/n MAC/Baseband/ Radio with Integrated Bluetooth 4.0

Cypress Division: IoT Division

Package:	WLBGA	**QTP:**	D15882
Description:	(4.12 x 4.52 x 0.55mm) 109 Ball, Wafer Level Ball Grid Array (WLBGA)		
Assembly:	ASE Kaifa	**Molding Compound:**	N/A
Electrical Test:	ASE	**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:	100 mA	**Life Test Dynamic Current:**	25 mA
Est. Field Voltage:	1.2 V	**Life Test Voltage:**	1.5 V
Est. Field Power Dissipation:	120 mWatts	**Est. Stress Power Dissipation:**	37.5 mWatts
Est. Field Tj:	57.5 °C	**Est. Stress Tj:**	125.7 °C

Die:	4334UB7	**Die Size:**	4.11 x 4.51 mm
Process:	40NM LP	**Fab:**	UMC-12A
Type:	Bluetooth	**Density:**	N/A

I.B. Product and Package Information

Product Description:	BCM4334XKUBG	**Cypress Division:**	IoT Division
	Single-Chip IEEE 802.11 b/g/n MAC/Baseband/ Radio with Integrated Bluetooth 4.0 + HS and FM Receiver		

Package:	WLBGA	**QTP:**	D15882a		
Description:	(4.12 x 4.52 x 0.55mm) 109 Ball, Wafer Level Ball Grid Array (WLBGA)			**Flammability:**	**O2 Index:**
Assembly:	ASE Kaifa	**Molding Compound:**	N/A	UL-V0	>28
Electrical Test:	ASE	**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:					

Est. Field Temperature:	55 °C	**Life Test Temperature:**	125 °C
Est. DC Field Current:	100 mA	**Life Test Dynamic Current:**	25 mA
Est. Field Voltage:	1.2 V	**Life Test Voltage:**	1.5 V
Est. Field Power Dissipation:	120 mWatts	**Est. Stress Power Dissipation:**	37.5 mWatts
Est. Field Tj:	57.5 °C	**Est. Stress Tj:**	125.7 °C

Die:	4334UB3	**Die Size:**	4.11 x 4.51 mm
Process:	40NM LP	**Fab:**	UMC-12A
Type:	Bluetooth	**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 D15882:							
Early Life Failure Rate	125°C, Vddnom x 1.15	WLBGA [1]	162	1	0	0.00	24 Hours
HTOL (EL)	125°C, Vddnom x 1.15	WLBGA [1]	96	1	0	0.00	192 Hours
HTOL (IL)	125°C, Vddnom x 1.15	WLBGA [1]	96	1	0	0.00	500 Hours
HTOL (XL)	125°C, Vddnom x 1.15	WLBGA [1]	96	1	0	0.00	1000 Hours
ESD CDM	N/A	WLBGA [1]	3	1	Pass 500V		
ESD HBM	N/A	WLBGA [1]	3	1	Pass 1kV		
Latch Up	125°C	WLBGA [1]	3	1	Pass 200mA		
Generic Reference Data:							
High Temp Bake	(150°C)	WLBGA [2]	77	1	0	0.00	500 Hours
	(150°C)	WLBGA [2]	77	1	0	0.00	1000 Hours
Preconditioning	(PC5/245°C, +0°C/-5°C)	WLBGA [2]	231	1	Passed Jedec L1		
Precon+Temp Cycle	-55°C/125°C	WLBGA [2]	77	1	0	0.00	500 Cycles
	-55°C/125°C	WLBGA [2]	77	1	0	0.00	1000 Cycles
Precon+uHAST	130°C/85% RH	WLBGA [2]	77	1	0	0.00	96 Hours
Unbiased Temp/Humidity	85°C/85%RH	WLBGA [2]	77	1	0	0.00	500 hours
	85°C/85%RH	WLBGA [2]	77	1	0	0.00	1000 hours

Notes / Justification: 1) Results from Qual D15882, BCM4334WKUBG, 40NM LP Bluetooth in 109 Ball WLBGA (4.12 x 4.52 x 0.55mm)

2) Results from Qual PQ03084, BCM4343WKUBG in 74 Ball WLBGA (4.91 x 2.91 x 0.55mm) - Same Process Technology, Assembly Location, and Similar Device

Preconditioning Flows: 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
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+uHAST	130°C/85% RH	JESD22-A118
Preconditioning	(PC5/245°C, +0°C/-5°C)	J-STD-020
Unbiased Temp/Humidity	85°C/85%RH	JESD22-A101

IV. Revision History

Document Number: 002-18260

Document Title: QTP #D15882/a: BCM4334W / BCM4334X, Single-Chip IEEE 802.11 b/g/n MAC/Baseband/ Radio with Integrated Bluetooth 4.0

Rev.	Issue Date	ECN#	Originator	Description
**	12/21/2016	5562632	FCCL	Initial Release.

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