

Cypress Semiconductor Reliability Qualification Report

QTP# D18909, D18909a Version *B

BCM43340 / BCM43341

**Qualification of: BCM43340 / BCM43341, Single-Chip, Dual-Band IEEE
802.11 a/b/g/n MAC/Baseband/Radio with Bluetooth and FM Receiver in
141 Ball WLBGA**

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

Product Description: BCM43340HKUBG **Cypress Division:** IoT Division
 Single-Chip, Dual-Band (2.4 GHz/5 GHz) IEEE 802.11 a/b/g/n MAC/Baseband/Radio with
 Integrated Bluetooth 4.0 and FM Receiver

| | | |
|--|--|--------------------------------|
| Package: WLBGA | QTP: D18909 | |
| Description: (4.51 x 5.71 x 0.55mm) 141 Ball, Wafer Level Ball Grid Array (WLBGA) | | Flammability: O2 Index: |
| Assembly: ASE Kaifa | Molding Compound: N/A | UL-V0 >28 |
| Electrical Test: ASE Taiwan | 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: 40 mA | Life Test Dynamic Current: 10 mA |
| Est. Field Voltage: 3.6 V | Life Test Voltage: 4.14 V |
| Est. Field Power Dissipation: 144 mWatts | Est. Stress Power Dissipation: 41.4 mWatts |
| Est. Field Tj: 58.0 °C | Est. Stress Tj: 125.8 °C |

| | |
|-------------------------|---------------------------------|
| Die: 43341B0 | Die Size: 5.71 x 4.51 mm |
| Process: 40NM LP | Fab: UMC-12A |
| Type: Bluetooth | Density: N/A |

I.B. Product and Package Information

Product Description: BCM43341XKUBG **Cypress Division:** IoT Division
Single-Chip, Dual-Band (2.4 GHz/5 GHz) IEEE 802.11 a/b/g/n MAC/Baseband/Radio with
Integrated Bluetooth 4.0 and FM Receiver

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|--|--|--------------------------------|
| Package: WLBGA | QTP: D18909a | |
| Description: (4.51 x 5.71 x 0.55mm) 141 Ball, Wafer Level Ball Grid Array (WLBGA) | | Flammability: O2 Index: |
| Assembly: ASE Kaifa | Molding Compound: N/A | UL-V0 >28 |
| Electrical Test: ASE Taiwan | 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: 40 mA | Life Test Dynamic Current: 10 mA |
| Est. Field Voltage: 3.6 V | Life Test Voltage: 4.14 V |
| Est. Field Power Dissipation: 144 mWatts | Est. Stress Power Dissipation: 41.4 mWatts |
| Est. Field Tj: 58.0 °C | Est. Stress Tj: 125.8 °C |

| | |
|-------------------------|---------------------------------|
| Die: 43341B0 | Die Size: 5.71 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) | PPM | FIT |
| PLASTIC | | | | | | | | | | | |
| Sample Size | 2716 | 2519 | 1559 | 1559 | | | | | | | |
| Zero fails, Process ave. Ea | 0 * | 0 | 0 | 0 | 0.66 | 71 | 1 | 71 | | | |
| Totals | 0 | 0 | 0 | 0 | | | | | 14269 | 0 | 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 D18909: | | | | | | | |
| Early Life Failure Rate | (125°C, Vddnom x 1.15) | WLBGA ¹ | 200 | 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 | 1000 hours |
| ESD CDM | N/A | WLBGA ¹ | 3 | 1 | Pass 500V | | |
| ESD HBM | N/A | WLBGA ¹ | 3 | 1 | Pass 2kV | | |
| ESD MM | N/A | WLBGA ¹ | 3 | 1 | Pass 100V | | |
| 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 |
| | (150°C) | WLBGA ³ | 77 | 1 | 0 | 0.00 | 1000 Hours |
| | (150°C) | WLBGA ⁴ | 77 | 1 | 0 | 0.00 | 1000 Hours |
| Preconditioning | (PC5/245°C, +0°C/-5°C) | WLBGA ² | 231 | 1 | Passed Jedec L1 | | |
| | (PC5/245°C, +0°C/-5°C) | WLBGA ³ | 231 | 1 | Passed Jedec L1 | | |
| | (PC5/245°C, +0°C/-5°C) | WLBGA ⁴ | 231 | 1 | Passed Jedec L1 | | |
| Precon+Temp Cycle | (PC5/245°C, -55°C/125°C) | WLBGA ² | 77 | 1 | 0 | 0.00 | 500 Cycles |
| | (PC5/245°C, -55°C/125°C) | WLBGA ² | 77 | 1 | 0 | 0.00 | 1000 Cycles |
| | (PC5/245°C, -55°C/125°C) | WLBGA ³ | 77 | 1 | 0 | 0.00 | 500 Cycles |
| | (PC5/245°C, -55°C/125°C) | WLBGA ³ | 77 | 1 | 0 | 0.00 | 1000 Cycles |
| | (PC5/245°C, -55°C/125°C) | WLBGA ⁴ | 77 | 1 | 0 | 0.00 | 500 Cycles |
| | (PC5/245°C, -55°C/125°C) | WLBGA ⁴ | 77 | 1 | 0 | 0.00 | 1000 Cycles |
| Precon+uHAST | (PC5/245°C, Unbiased, 130°C/85% RH) | WLBGA ² | 77 | 1 | 0 | 0.00 | 96 Hours |
| | (PC5/245°C, Unbiased, 130°C/85% RH) | WLBGA ³ | 77 | 1 | 0 | 0.00 | 96 Hours |
| | (PC5/245°C, Unbiased, 130°C/85% RH) | WLBGA ⁴ | 77 | 1 | 0 | 0.00 | 96 Hours |

- Notes / Justification:**
- 1) Results from Qual D18909, BCM43340HKUBG, 40NM LP Bluetooth in 141 Ball WLBGA (4.51 x 5.71 x 0.55mm)
 - 2) Results from Qual PQ03084, BCM43343WKUBG in 74 Ball WLBGA (4.91 x 2.91 x 0.55mm) - Same assembly location, package type, and process technology
 - 3) Results from Qual PQ03085, BCM43343WKUBG in 74 Ball WLBGA (4.91 x 2.91 x 0.55mm) - Same assembly location, package type, and process technology
 - 4) Results from Qual PQ03086, BCM43343WKUBG in 74 Ball WLBGA (4.91 x 2.91 x 0.55mm) - Same assembly location, package type, and process technology

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 |
| 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) | |
| Latch Up | (125°C) | JESD78 / AEC Q100-004 |
| Precon+Temp Cycle | (PC5/245°C, -55°C/125°C) | JESD22-A104 |
| Precon+uHAST | (PC5/245°C, Unbiased, 130°C/85% RH) | JESD22-A118 |
| Preconditioning | (PC5/245°C, +0°C/-5°C) | J-STD-020 |

IV. Revision History

Document Number: 002-16117**Document Title:** QTP #D18909/a: BCM43340 / BCM43341, Single-Chip, Dual-Band IEEE 802.11 a/b/g/n
MAC/Baseband/Radio with Bluetooth and FM Receiver

| Rev. | Issue Date | ECN# | Originator | Description |
|------|------------|---------|------------|------------------------------------|
| ** | 8/15/2016 | 5408559 | FCCL | Initial Release. |
| *A | 12/22/2016 | 5564261 | FCCL | Adding OPN BCM43341 to the report. |
| *B | 5/18/2017 | 5740906 | BAKC | Added 1000 hours HTOL data. |

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