CONCLUSION
The CC2400 meets the Chipcon product reliability qualification standards based on the procedures and tests documented in the following.

Design phase
Design is made for robustness using extensive corner simulations for:
- Process variations
- Minimum/maximum operating temperature
- Minimum/maximum operating voltage
- Minimum/maximum process limitations

Process
The CC2400 is based on the Chipcon SmartRF®-03 platform. It is designed in an industry standard 0.18µm mixed signal CMOS process with 1 poly layer and 4 metal layers.

Package reliability (QFN-48 RoHS compatible)
<table>
<thead>
<tr>
<th>Moisture Sensitivity Level</th>
<th>JEDEC Level 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temp Cycling</td>
<td>-65/150°C, 1000 cycles</td>
</tr>
<tr>
<td>Thermal shock Test</td>
<td>-65/150°C, 500 cycles</td>
</tr>
<tr>
<td>HAST</td>
<td>130°C / 85% r.h. 168 hrs</td>
</tr>
<tr>
<td>Autoclave</td>
<td>121°C / 15 psi / saturated steam, 168 hrs</td>
</tr>
</tbody>
</table>

ESD and Latch-Up
Latch-up testing according to JEDEC 17.
Minimum immunity level: ±100mA at all pins. VDD abs. max. rating +20% at all supply pins.
ESD test according to Mil. Std. 883E 3015 Human Body Model.

Minimum immunity level RF pin groups: 0.5kV, except:
- DI to DGUARD 0.1kV
- RF_IO to AVDD_PRE 0.25kV
- RF_IO to DVDD_ADC 0.25kV
- RF_IO to DVDD.3 0.25kV
- RF_IO to DVDD.1.8 0.25kV
- RF_IO to AVDD_CHP 0.25kV
- RF_IO to GND 0.1kV
- RF_IO to DGND_GUARD 0.1kV
- DIO to DGUARD 0.1kV
- AIO to DGUARD 0.25kV
- AO&AI to DGUARD 0.1kV
- AO&AI to GND 0.1kV
- VCO GUARD to DGUARD 0.25kV
- AVDD_VCC to DGUARD 0.25kV
- AVDD_PRE to DGUARD 0.25kV
- AVDD_RF1 to DGUARD 0.25kV
- TXRX_SWITCH to DGUARD 0.25kV
- AVDD_SW to DGUARD 0.25kV
- AVDD_RF2 to DGUARD 0.25kV
- AVDD_IF2 to DGUARD 0.25kV
- DVDD_ADC to DGND_GUARD 0.25kV
- DGUARD to DVDD.3 0.1kV
- DGUARD to DVDD.1.8 0.1kV
- DGUARD to AVDD_ACCESS 0.25kV
- DGUARD to AVDD_CHP 0.25kV
- DGUARD to GND 0.1kV
- DGUARD to DGND 0.1kV
- DGUARD to DSUB_PADS 0.1kV
- DGUARD to SUB_CORE 0.1kV
- DGUARD to GND_PT 0.25kV
- RF_IO to RF_IO 0.25kV
Minimum immunity level non-RF pin groups: 1kV, except:

- DI to AVDD_VCC: 0.5kV
- DI to AVDD_PRE: 0.75kV
- DI to AVDD_RF2: 0.5kV
- DI to AVDD_IF2: 0.75kV
- DI to AVDD_ADC: 0.5kV
- DI to AVDD_XOSC: 0.75kV
- DI to AVDD_CHP: 0.25kV
- DIO to VCO_GUARD: 0.5kV
- DIO to AVDD_VCC: 0.5kV
- DIO to AVDD_PRE: 0.5kV
- DIO to AVDD_RF1: 0.75kV
- DIO to AVDD_IF2: 0.75kV
- DIO to AVDD_ADC: 0.75kV
- DIO to GND_PT: 0.75kV
- AIO to DVDD_ADC: 0.25kV
- AO&AI to AVDD_ADC: 0.75kV
- AO&AI to AVDD_RF2: 0.5kV
- AO&AI to TXRX_SWITCH: 0.5kV
- AO&AI to DVDD1.8: 0.25kV

Transfer to Production

First Article Inspection (testing at –40/+25/+85°C)
Production test limits extraction based on statistical methods.
Accelerated lifetime test. Minimum expected lifetime (*): 10 years at 58°C, 1.4 years at 85°C, FIT of approx. 60 (at room temp) with 60% confidence level.

(*) based on test of 9 devices at 125°C and 1 at 25°C for 1040hrs, 0 failures. Devices from lot 0447XAB - WAC.

Production test
Final test +25°C
Sampling test (-40/+25/+85 °C)

Tape & Reel specification
Package: QFN 48 - RoHS compatible
Tape Width: 16.0mm
Component Pitch: 12.0mm
Hole Pitch: 4.0mm
13inch tape with 4000 pcs.
Carrier tape and reel is in accordance with EIA specification 481.

**Solderability**
Recommended soldering profile is according to IPC/JEDEC J-STD-020C July 2004

**Summary**
The above data show that CC2400 meets the Chipcon product reliability qualification standards and has an acceptable level of reliability.

**Revision history**
1.0 Initial Version
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