



# TEST REPORT FROM RFI GLOBAL SERVICES LTD



Test of: XE500T1C

FCC ID: A3LXE500T1C & A3LXE500T1CN

Industry Canada Certification Number: 649E-XE500T1C & 649E-XE500T1CN

To: FCC Part 15.247: 2011 Subpart C & Industry Canada RSS-210 Issue  
8 December 2010; RSS-Gen Issue 3 December 2010

**Test Report Serial No.:**  
RFI-RPT-RP89958JD03B V2.0  
**Version 2.0 Supersedes All Previous Versions**

<b>This Test Report Is Issued Under The Authority Of John Newell, Group Quality Manager:</b>	
<b>Checked By:</b>	Ian Watch
<b>Signature:</b>	pp 
<b>Date of Issue:</b>	02 October 2012

The *Bluetooth*<sup>®</sup> word mark and logos are owned by the *Bluetooth* SIG, Inc. and any use of such marks by RFI Global Services Ltd. is under licence. Other trademarks and trade names are those of their respective owners.

This report is issued in Adobe Acrobat portable document format (PDF). It is only a valid copy of the report if it is being viewed in PDF format with the following security options not allowed: Changing the document, Selecting text and graphics, Adding or changing notes and form fields.

This report may not be reproduced other than in full, except with the prior written approval of RFI Global Services Ltd. The results in this report apply only to the sample(s) tested.

**RFI Global Services Ltd**  
Pavilion A, Ashwood Park, Ashwood Way, Basingstoke, Hampshire RG23 8BG  
Telephone: +44 (0)1256 312000 Facsimile: +44 (0)1256 312001  
Email: info@rfi-global.com Website: www.rfi-global.com

Registered in England and Wales. Company number: 2117901



This page has been left intentionally blank.

## **Table of Contents**

<b>1. Customer Information .....</b>	<b>4</b>
<b>2. Summary of Testing .....</b>	<b>5</b>
2.1. General Information	5
2.2. Summary of Test Results	5
2.3. Methods and Procedures	6
2.4. Deviations from the Test Specification	6
<b>3. Equipment Under Test (EUT) .....</b>	<b>7</b>
3.1. Identification of Equipment Under Test (EUT)	7
3.2. Description of EUT	7
3.3. Maximum Output Power	7
3.4. Modifications Incorporated in the EUT	8
3.5. Additional Information Related to Testing	8
3.6. Support Equipment	9
<b>4. Operation and Monitoring of the EUT during Testing .....</b>	<b>10</b>
4.1. Operating Modes	10
4.2. Configuration and Peripherals	10
<b>5. Measurements, Examinations and Derived Results .....</b>	<b>11</b>
5.1. General Comments	11
5.2. Test Results	12
5.2.1. Receiver/Idle Mode AC Conducted Spurious Emissions	12
5.2.2. Receiver/Idle Mode Radiated Spurious Emissions	15
5.2.3. Transmitter AC Conducted Spurious Emissions	19
5.2.4. Transmitter Minimum 6 dB Bandwidth	22
5.2.5. Transmitter Occupied Bandwidth	24
5.2.6. Transmitter Power Spectral Density	26
5.2.7. Transmitter Maximum Peak Output Power	28
5.2.8. Transmitter Radiated Emissions	30
5.2.9. Transmitter Band Edge Radiated Emissions	36
<b>6. Measurement Uncertainty .....</b>	<b>39</b>
<b>7. Report Revision History .....</b>	<b>40</b>
<b>8. Setup Photos .....</b>	<b>41</b>

**1. Customer Information**












<b>Company Name:</b>	Samsung Electronics Co. Ltd.
<b>Address:</b>	416, Maetan-3Dong, Yeongtong-Gu, Suwon-City, Gyeonggi-Do, 443-742, Korea

## 2. Summary of Testing

### 2.1. General Information

<b>Specification Reference:</b>	47CFR15.247
<b>Specification Title:</b>	Code of Federal Regulations Volume 47 (Telecommunications) 2011: Part 15 Subpart C (Intentional Radiators) - Section 15.247
<b>Specification Reference:</b>	47CFR15.107 and 47CFR15.109
<b>Specification Title:</b>	Code of Federal Regulations Volume 47 (Telecommunications) 2011: Part 15 Subpart B (Unintentional Radiators) - Sections 15.107 and 15.109
<b>Specification Reference:</b>	47CFR15.207 and 47CFR15.209
<b>Specification Title:</b>	Code of Federal Regulations Volume 47 (Telecommunications) 2011: Part 15 Subpart C (Intentional Radiators) - Sections 15.207 and 15.209
<b>Specification Reference:</b>	RSS-Gen Issue 3 December 2010
<b>Specification Title:</b>	General Requirements and Information for the Certification of Radio Apparatus
<b>Specification Reference:</b>	RSS-210 Issue 8 December 2010
<b>Specification Title:</b>	Licence-exempt Radio Apparatus (All Frequency Bands): Category I Equipment.
<b>Site Registration:</b>	FCC: 209735; Industry Canada: 3245B-2
<b>Location of Testing:</b>	RFI Global Services Ltd, Wade Road, Basingstoke, Hampshire, RG24 8AH.
<b>Test Dates:</b>	21 August 2012 to 05 September 2012

### 2.2. Summary of Test Results

FCC Reference (47CFR)	IC Reference	Measurement	Result
Part 15.107(a)	RSS-Gen 7.2.4	Receiver/Idle Mode AC Conducted Emissions	
Part 15.109	RSS-Gen 4.10/6.1	Receiver/Idle Mode Radiated Spurious Emissions	
Part 15.207	RSS-Gen 7.2.4	Transmitter AC Conducted Emissions	
Part 15.247(a)(2)	RSS-Gen 4.6.2 RSS-210 A8.1(a)	Transmitter 6 dB Bandwidth	
N/A	RSS-Gen 4.6.1	Transmitter Occupied Bandwidth	
Part 15.247(e)	RSS-210 A8.2(b)	Transmitter Peak Power spectral density	
Part 15.247(b)(3)	RSS-Gen 4.8 RSS-210 A8.4(4)	Transmitter Maximum Peak Output Power	
Part 15.247(d)/ 15.209(a)	RSS-Gen 4.9 RSS-210 A8.5	Transmitter Radiated Emissions	
Part 15.247(d)/ 15.209(a)	RSS-Gen 4.9 RSS-210 A8.5	Transmitter Band Edge Radiated Emissions	
<b>Key to Results</b>			
 = Complied  = Did not comply			

### **2.3. Methods and Procedures**

<b>Reference:</b>	ANSI C63.4 (2009)
<b>Title:</b>	American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz
<b>Reference:</b>	ANSI C63.10 (2009)
<b>Title:</b>	American National Standard for Testing Unlicensed Wireless Devices
<b>Reference:</b>	FCC KDB 558074 D01 v01 18 January 2012
<b>Title:</b>	Guidance for Performing Compliance Measurements on Digital Transmission System (DTS) devices operating Under §15.247
<b>Reference:</b>	FCC Response to Inquiry
<b>Title:</b>	Tracking number 453039 Date 23 March 2007

### **2.4. Deviations from the Test Specification**

For the measurements contained within this test report, there were no deviations from, additions to, or exclusions from the test specification identified above.

### **3. Equipment Under Test (EUT)**

#### **3.1. Identification of Equipment Under Test (EUT)**

<b>Brand Name:</b>	Samsung
<b>Model Name or Number:</b>	XE500T1C
<b>Serial Number:</b>	HX2W91SC700004R ( <i>Radiated sample</i> )
<b>Hardware Version Number:</b>	PV
<b>Software Version Number:</b>	Window OS
<b>FCC ID:</b>	A3LXE500T1C
<b>FCC ID:</b>	A3LXE500T1CN
<b>Industry Canada Certification Number:</b>	649E-XE500T1C
<b>Industry Canada Certification Number:</b>	649E-XE500T1CN

<b>Brand Name:</b>	Samsung
<b>Model Name or Number:</b>	XE500T1C
<b>Serial Number:</b>	HX2W91SC700031T ( <i>Conducted sample RF port</i> )
<b>Hardware Version Number:</b>	PV
<b>Software Version Number:</b>	Window OS
<b>FCC ID:</b>	A3LXE500T1C
<b>FCC ID:</b>	A3LXE500T1CN
<b>Industry Canada Certification Number:</b>	649E-XE500T1C
<b>Industry Canada Certification Number:</b>	649E-XE500T1CN

<b>Brand Name:</b>	Not stated
<b>Description:</b>	AC Charger
<b>Model Name or Number:</b>	Not stated
<b>Serial Number:</b>	CNS440001595DON825J00RA

#### **3.2. Description of EUT**

The equipment under test was a Tablet PC with 3G, IEEE 802.11a,b,g,n operating in the 2.4 GHz, 5 GHz bands and *Bluetooth* (including Basic Rate, EDR and Low Energy).

#### **3.3. Maximum Output Power**

Frequency Range (MHz)	Mode	Conducted Output Power (dBm)
2402 MHz to 2480 MHz	Low Energy	2.7

### **3.4. Modifications Incorporated in the EUT**

No modifications were applied to the EUT during testing.

### **3.5. Additional Information Related to Testing**

<b>Tested Technology:</b>	<i>Bluetooth</i> Low Energy (Digital Transmission System)		
<b>Power Supply Requirement:</b>	Nominal	7.8 VDC via 120 VAC 60 Hz adaptor	
<b>Type of Unit:</b>	Transceiver		
<b>Channel Spacing:</b>	2 MHz		
<b>Mode:</b>	LE		
<b>Modulation:</b>	GFSK		
<b>Data Rate (Mbit/s):</b>	1		
<b>Maximum Conducted Output Power:</b>	2.7 dBm		
<b>Antenna gain:</b>	3.48 dBi		
<b>Transmit Frequency Range:</b>	2402 MHz to 2480 MHz		
<b>Transmit Channels Tested:</b>	<b>Channel ID</b>	<b>Channel Number</b>	<b>Channel Frequency (MHz)</b>
	Bottom	0	2402
	Middle	19	2440
	Top	39	2480
<b>Receive Frequency Range:</b>	2402 MHz to 2480 MHz		
<b>Receive Channels Tested:</b>	<b>Channel ID</b>	<b>Channel Number</b>	<b>Channel Frequency (MHz)</b>
	Bottom	0	2402
	Middle	19	2440
	Top	39	2480

### **3.6. Support Equipment**

The following support equipment was used to exercise the EUT during testing:

<b>Description:</b>	USIM
<b>Brand Name:</b>	Comprion
<b>Model Name or Number:</b>	Micro USIM

<b>Description:</b>	SD RAM
<b>Brand Name:</b>	San Disk
<b>Model Name or Number:</b>	8 GB

<b>Description:</b>	USB Hub
<b>Brand Name:</b>	Belkin
<b>Model Name or Number:</b>	F5U404-BLK
<b>Serial Number:</b>	D12-00047182

<b>Brand Name:</b>	Not marked or stated
<b>Description:</b>	HDMI cable
<b>Model Name or Number:</b>	Not marked or stated

## **4. Operation and Monitoring of the EUT during Testing**

### **4.1. Operating Modes**

The EUT was tested in the following operating mode(s):

- Receiver/Idle mode.
- Transmit mode with GFSK modulation, maximum possible data length available, with a pay load set to set Pseudorandom Bit Sequence 9 and a maximum

### **4.2. Configuration and Peripherals**

The EUT was tested in the following configuration(s):

- Receive/Idle tests: Standalone, with the Bluetooth mode active but not transmitting.
- The EUT had a test application installed, which was used to place the EUT into Bluetooth LE mode.
- The EUT conducted sample was used for occupied bandwidth, power spectral density and conducted output power test
- The EUT radiated sample was used for AC conducted emissions and radiated measurements.
- All unused ports were terminated during emissions testing.

## **5. Measurements, Examinations and Derived Results**

### **5.1. General Comments**

Measurement uncertainties are evaluated in accordance with current best practice. Our reported expanded uncertainties are based on standard uncertainties, which are multiplied by an appropriate coverage factor to provide a statistical confidence level of approximately 95%. Please refer to *Section 6. Measurement Uncertainty* for details.

## **5.2. Test Results**

### **5.2.1. Receiver/Idle Mode AC Conducted Spurious Emissions**

#### **Test Summary:**

<b>Test Engineer:</b>	Andrew Edwards	<b>Test Date:</b>	23 August 2012
<b>Test Sample Serial Number:</b>	HX2W91SC700004R		

<b>FCC Reference:</b>	Part 15.107(a)
<b>Industry Canada Reference:</b>	RSS-Gen 7.2.4
<b>Test Method Used:</b>	As detailed in ANSI C63.10 Section 6.2 referencing ANSI C63.4

#### **Environmental Conditions:**

<b>Temperature (°C):</b>	25
<b>Relative Humidity (%):</b>	45

#### **Note(s):**

1. All other emissions shown on the pre-scan plots were >20 dB below the specified limit.

**Receiver/Idle Mode AC Conducted Spurious Emissions (continued)****Results: Live / Quasi Peak**

Frequency (MHz)	Line	Level (dB $\mu$ V)	Limit (dB $\mu$ V)	Margin (dB)	Result
0.155	Live	51.0	65.8	14.8	Complied
0.168	Live	51.5	65.1	13.6	Complied
0.222	Live	42.0	62.7	20.7	Complied
14.361	Live	24.6	60.0	35.4	Complied
16.899	Live	32.3	60.0	27.7	Complied
19.280	Live	31.3	60.0	28.7	Complied

**Results: Live / Average**

Frequency (MHz)	Line	Level (dB $\mu$ V)	Limit (dB $\mu$ V)	Margin (dB)	Result
0.164	Live	37.9	55.3	17.4	Complied
0.168	Live	33.3	55.1	21.8	Complied
0.267	Live	28.4	51.2	22.8	Complied
14.028	Live	18.6	50.0	31.4	Complied
14.276	Live	23.3	50.0	26.7	Complied
19.284	Live	28.4	50.0	21.6	Complied

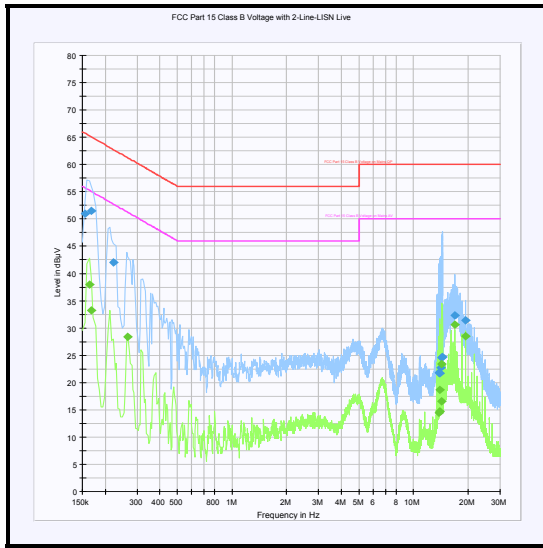
**Results: Neutral / Quasi Peak**

Frequency (MHz)	Line	Level (dB $\mu$ V)	Limit (dB $\mu$ V)	Margin (dB)	Result
0.159	Neutral	52.1	65.5	13.4	Complied
0.168	Neutral	50.3	65.1	14.8	Complied
0.222	Neutral	40.7	62.7	22.0	Complied
14.267	Neutral	25.1	60.0	34.9	Complied
14.388	Neutral	26.6	60.0	33.4	Complied
17.025	Neutral	38.9	60.0	21.1	Complied

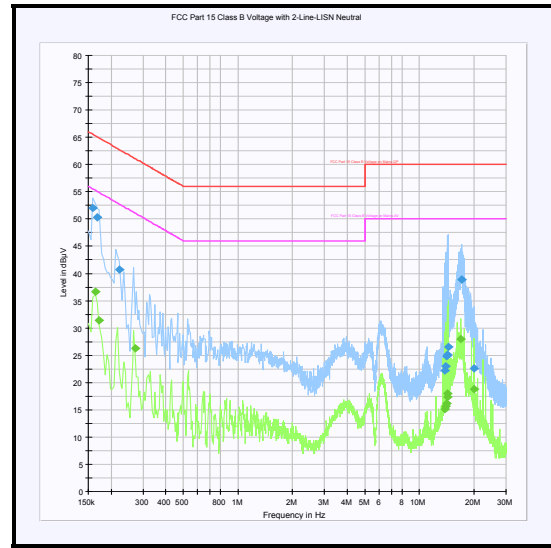
**Results: Neutral / Average**

Frequency (MHz)	Line	Level (dB $\mu$ V)	Limit (dB $\mu$ V)	Margin (dB)	Result
0.164	Neutral	36.6	55.3	18.7	Complied
0.173	Neutral	31.3	54.8	23.5	Complied
0.272	Neutral	26.2	51.1	24.9	Complied
14.357	Neutral	17.9	50.0	32.1	Complied
16.962	Neutral	28.0	50.0	22.0	Complied
20.058	Neutral	18.7	50.0	31.3	Complied

**Receiver/Idle Mode AC Conducted Spurious Emissions (continued)**



**Live**



**Neutral**

*Note: These plots are pre-scans and for indication purposes only. For final measurements, see accompanying tables.*

**Test Equipment Used:**

RFI ID	Instrument Description	Model Number	Calibration Due	Calibration Interval (Months)
M1263	EMI Test Receiver	ESIB7	04 Apr 2013	12
A1830	Pulse Limiter	ESH3-Z2	25 Feb 2013	12
A649	Single Phase LISN	ESH3-Z5	19 Feb 2013	12

**5.2.2. Receiver/Idle Mode Radiated Spurious Emissions****Test Summary:**

<b>Test Engineer:</b>	Andrew Edwards	<b>Test Date:</b>	21 August 2012
<b>Test Sample Serial Number:</b>	HX2W91SC700004R		

<b>FCC Reference:</b>	Part 15.109
<b>Industry Canada Reference:</b>	RSS-Gen 4.10
<b>Test Method Used:</b>	As detailed in ANSI C63.10 Sections 6.3 and 6.5 referencing ANSI C63.4
<b>Frequency Range:</b>	30 MHz to 1000 MHz

**Environmental Conditions:**

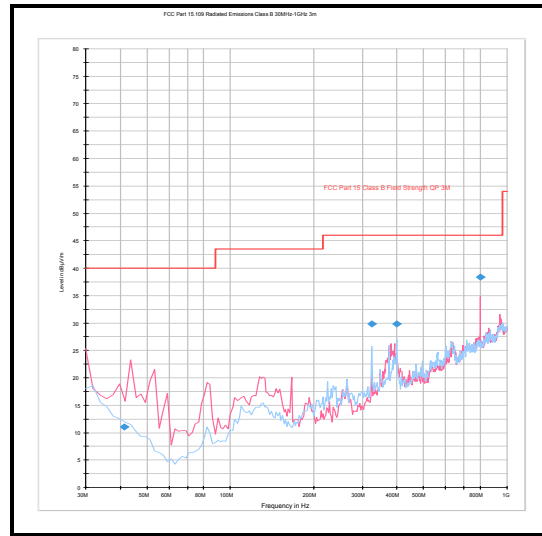
<b>Temperature (°C):</b>	29
<b>Relative Humidity (%):</b>	35

**Note(s):**

1. The final measured value, for the given emission, in the table below incorporates the calibrated antenna factor and cable loss.
2. All other emissions shown on the pre-scan plot were investigated and found to be ambient or >20 dB below the applicable limit or below the measurement system noise floor.
3. Measurements below 1 GHz were performed in a semi-anechoic chamber (RFI Asset Number K0001) at a distance of 3 metres. The EUT was placed at a height of 80 cm above the reference ground plane in the centre of the chamber turntable. Maximum emission levels were determined by height searching the measurement antenna over the range 1 metre to 4 metres.

**Results: Quasi Peak**

<b>Frequency (MHz)</b>	<b>Antenna Polarity</b>	<b>Level (dB<math>\mu</math>V/m)</b>	<b>Limit (dB<math>\mu</math>V/m)</b>	<b>Margin (dB)</b>	<b>Result</b>
41.486	Vertical	11.1	40.0	28.9	Complied
324.484	Horizontal	29.9	46.0	16.1	Complied
399.372	Horizontal	29.8	46.0	16.2	Complied
798.745	Vertical	38.3	46.0	7.7	Complied

**Receiver/Idle Mode Radiated Spurious Emissions (continued)**

Note: This plot is a pre-scan and for indication purposes only. For final measurements, see accompanying table.

**Test Equipment Used:**

RFI ID	Instrument Description	Model Number	Calibration Due	Calibration Interval (Months)
K0001	5 m Semi-Anechoic Chamber	N/A	31 Sep 2012	12
M1273	Test Receiver	ESIB 26	03 Feb 2013	12
A1834	Attenuator	8491B	29 Jan 2013	12
G0543	Amplifier 9 kHz – 1 GHz	310N	15 Oct 2012	12
A553	Bi-log Antenna	CBL6111A	15 Feb 2013	12

**Receiver/Idle Mode Radiated Spurious Emissions (continued)****Test Summary:**

<b>Test Engineer:</b>	Andrew Edwards	<b>Test Date:</b>	22 August 2012
<b>Test Sample Serial Number:</b>	HX2W91SC700004R		

<b>FCC Reference:</b>	Part 15.109
<b>Industry Canada Reference:</b>	RSS-Gen 4.10
<b>Test Method Used:</b>	As detailed in ANSI C63.10 Sections 6.3 and 6.6 referencing ANSI C63.4
<b>Frequency Range:</b>	1 GHz to 12.75 GHz

**Environmental Conditions:**

<b>Temperature (°C):</b>	25
<b>Relative Humidity (%):</b>	44

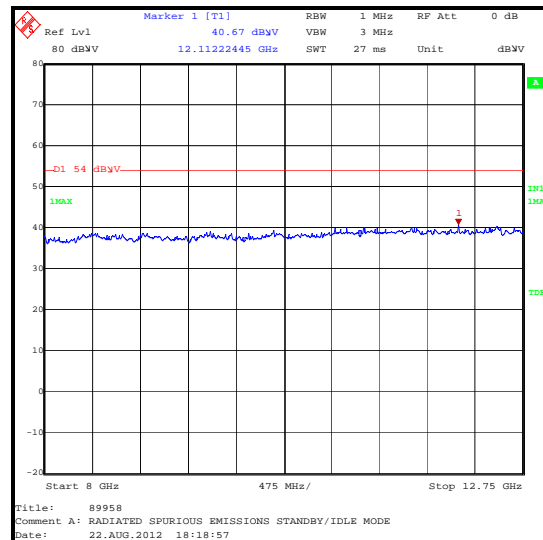
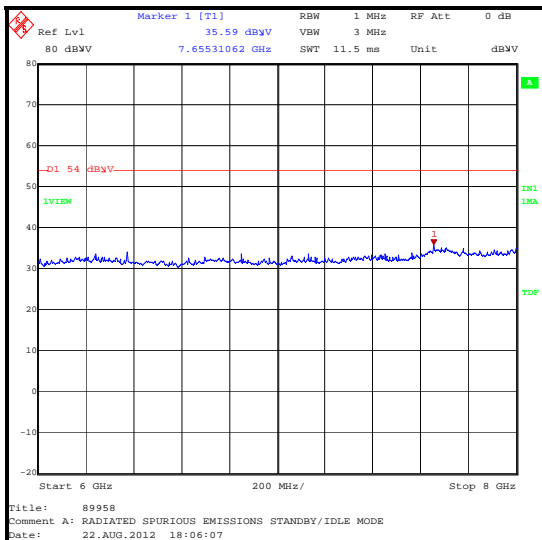
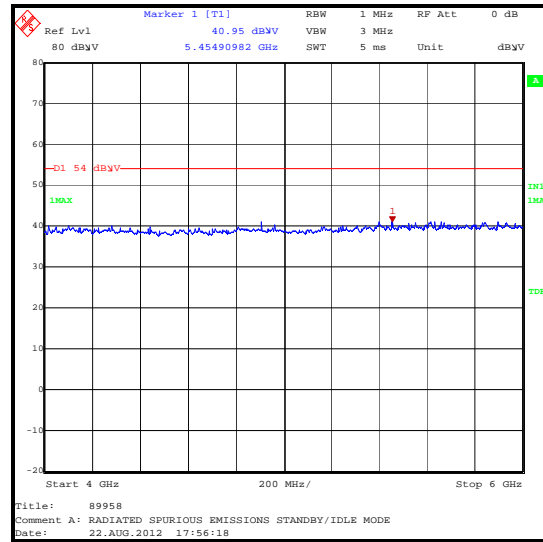
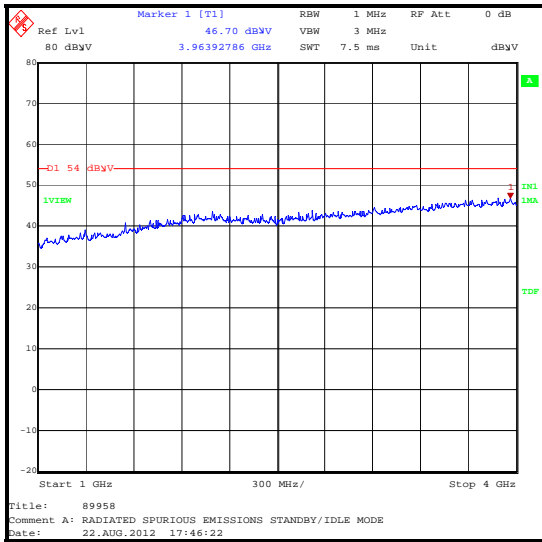
**Results:**

Frequency (MHz)	Antenna Polarity	Peak Level (dB $\mu$ V/m)	Average Limit (dB $\mu$ V/m)	Margin (dB)	Result
3963.928	Vertical	46.7	54.0	7.3	Complied

**Note(s):**

- No spurious emissions were detected above the noise floor of the measuring receiver therefore the highest peak noise floor reading of the measuring receiver was recorded as shown in the table above. The peak level was compared to the average limit as opposed to being compared to the peak limit because this is the more onerous limit.
- The final measured value, for the given emission, in the table above incorporates the calibrated antenna factor and cable loss.
- Pre-scans above 1 GHz were performed in a fully anechoic chamber (RFI Asset Number K0002) at a distance of 3 metres. The EUT was placed at a height of 1.5 metres above the test chamber floor in the centre of the chamber turntable. All measurement antennas were placed at a fixed height of 1.5 metres above the test chamber floor, in line with the EUT. Final measurements above 1 GHz were performed in a semi-anechoic chamber (RFI Asset Number K0001) at a distance of 3 metres. The EUT was placed at a height of 80 cm above the reference ground plane in the centre of the chamber turntable. Maximum emission levels were determined by height searching the measurement antenna over the range 1 metre to 4 metres.

**Receiver/Idle Mode Radiated Spurious Emissions (continued)**



**Test Equipment Used:**

RFI ID	Instrument Description	Model Number	Calibration Due	Calibration Interval (Months)
K0002	3m RSE Chamber	N/A	09 Oct 2012	12
M1124	Test Receiver	ESIB 26	14 Aug 2013	12
A1534	Pre Amplifier	8449B	09 Oct 2012	12
A1818	Horn Antenna	3115	09 Oct 2012	12
A253	Horn Antenna	12240-20	09 Oct 2012	12
A254	Horn Antenna	14240-20	09 Oct 2012	12
A255	Horn Antenna	16240-20	09 Oct 2012	12

**5.2.3. Transmitter AC Conducted Spurious Emissions****Test Summary:**

<b>Test Engineer:</b>	Nick Steele	<b>Test Date:</b>	05 September 2012
<b>Test Sample Serial Number:</b>	HX2W91SC700004R		

<b>FCC Reference:</b>	Part 15.207
<b>Industry Canada Reference:</b>	RSS-Gen 7.2.4
<b>Test Method Used:</b>	As detailed in ANSI C63.10 Section 6.2 referencing ANSI C63.4

**Environmental Conditions:**

<b>Temperature (°C):</b>	26
<b>Relative Humidity (%):</b>	43

**Note(s):**

1. All other emissions were >20 dB below the specified limit.

**Transmitter AC Conducted Spurious Emissions (continued)****Results: Live / Quasi Peak**

Frequency (MHz)	Line	Level (dB $\mu$ V)	Limit (dB $\mu$ V)	Margin (dB)	Result
0.150	Live	47.3	66.0	18.7	Complied
0.150	Live	47.2	66.0	18.8	Complied
17.412	Live	21.3	60.0	38.7	Complied
19.203	Live	28.0	60.0	32.0	Complied
21.016	Live	24.8	60.0	35.2	Complied
24.045	Live	41.2	60.0	18.8	Complied

**Results: Live / Average**

Frequency (MHz)	Line	Level (dB $\mu$ V)	Limit (dB $\mu$ V)	Margin (dB)	Result
0.150	Live	26.3	56.0	29.7	Complied
0.150	Live	26.6	56.0	29.4	Complied
19.203	Live	26.4	50.0	23.6	Complied
21.332	Live	17.7	50.0	32.3	Complied
22.488	Live	17.3	50.0	32.8	Complied
24.045	Live	41.0	50.0	9.0	Complied

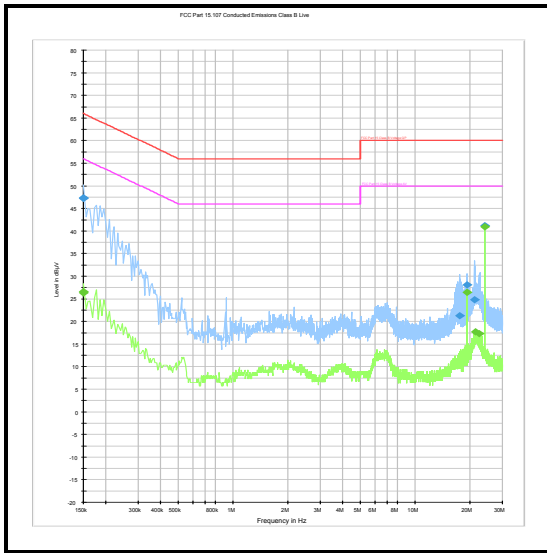
**Results: Neutral / Quasi Peak**

Frequency (MHz)	Line	Level (dB $\mu$ V)	Limit (dB $\mu$ V)	Margin (dB)	Result
0.150	Neutral	47.0	66.0	19.0	Complied
19.203	Neutral	28.0	60.0	32.0	Complied
19.518	Neutral	21.9	60.0	38.1	Complied
21.003	Neutral	24.6	60.0	35.4	Complied
24.045	Neutral	41.3	60.0	18.7	Complied

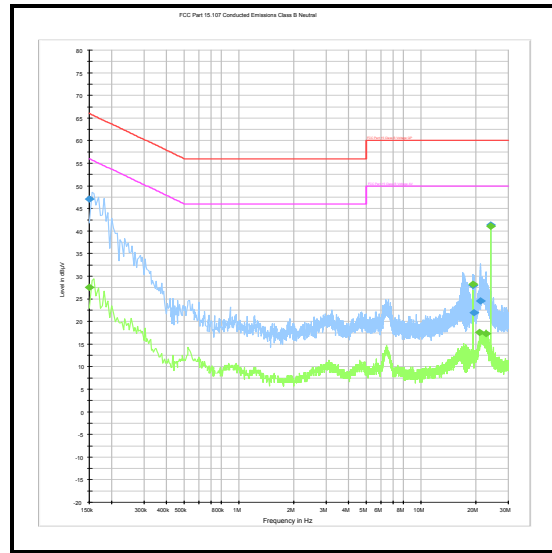
**Results: Neutral / Average**

Frequency (MHz)	Line	Level (dB $\mu$ V)	Limit (dB $\mu$ V)	Margin (dB)	Result
0.150	Neutral	27.6	56.0	28.4	Complied
19.203	Neutral	28.3	50.0	21.7	Complied
20.769	Neutral	17.6	50.0	32.4	Complied
22.502	Neutral	17.2	50.0	32.8	Complied
24.045	Neutral	41.1	50.0	8.9	Complied

**Transmitter AC Conducted Spurious Emissions (continued)**



**Live**



**Neutral**

*Note: These plots are pre-scans and for indication purposes only. For final measurements, see accompanying tables.*

**Test Equipment Used:**

RFI ID	Instrument Description	Model Number	Calibration Due	Calibration Interval (Months)
M1263	EMI Test Receiver	ESIB7	04 Apr 2013	12
A1830	Pulse Limiter	ESH3-Z2	25 Feb 2013	12
A649	Single Phase LISN	ESH3-Z5	19 Feb 2013	12

**5.2.4. Transmitter Minimum 6 dB Bandwidth****Test Summary:**

<b>Test Engineer:</b>	Andrew Edwards	<b>Test Date:</b>	05 September 2012
<b>Test Sample Serial Number:</b>	HX2W91SC700031T		

<b>FCC Reference:</b>	Part 15.247(a)(2)
<b>Industry Canada Reference:</b>	RSS-Gen 4.6.2, RSS-210 A8.2(a)
<b>Test Method Used:</b>	FCC KDB 558074 Section 5.1.1

**Environmental Conditions:**

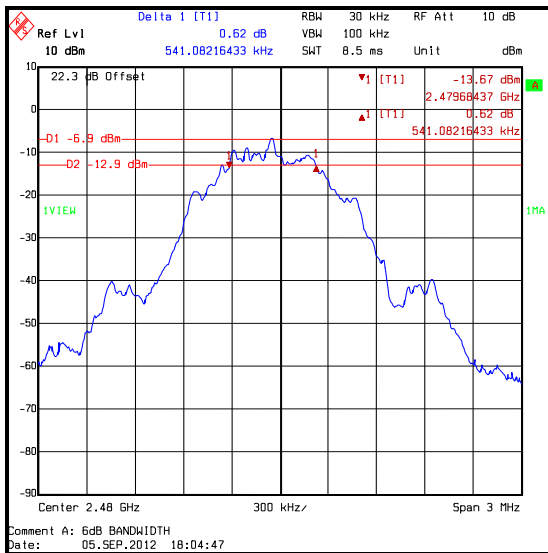
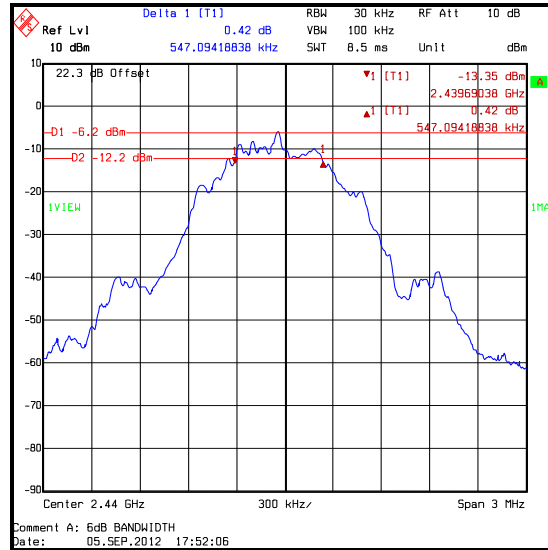
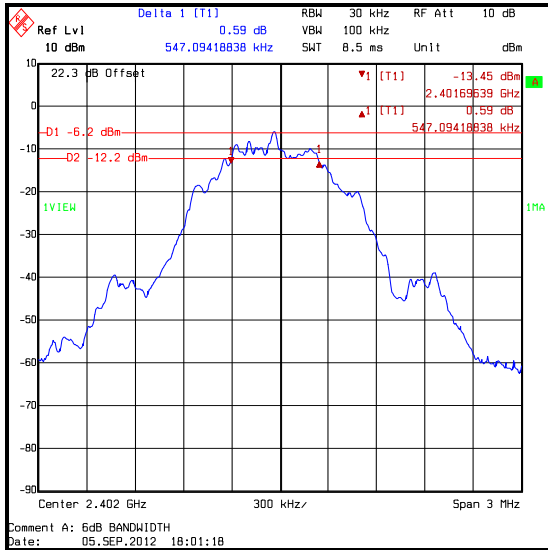
<b>Temperature (°C):</b>	26
<b>Relative Humidity (%):</b>	36

**Results: GFSK**

<b>Channel</b>	<b>6 dB Bandwidth (kHz)</b>	<b>Limit (kHz)</b>	<b>Margin (kHz)</b>	<b>Result</b>
Bottom	547.094	≥500	47.094	Complied
Middle	547.094	≥500	47.094	Complied
Top	547.082	≥500	47.082	Complied

**Transmitter 6 dB Bandwidth (continued)**

**Results: GFSK**



**Test Equipment Used:**

RFI ID	Instrument Description	Model Number	Calibration Due	Calibration Interval (Months)
M127	Spectrum Analyser	FSB30	13 Aug 2013	12
A1997	Attenuator	6810.17.B	03 Apr 2013	12
A2137	Directional coupler	A4224-10	Calibrated before use	-

**5.2.5. Transmitter Occupied Bandwidth****Test Summary:**

<b>Test Engineer:</b>	Andrew Edwards	<b>Test Date:</b>	05 September 2012
<b>Test Sample Serial Number:</b>	HX2W91SC700031T		

<b>FCC Reference:</b>	N/A
<b>Industry Canada Reference:</b>	RSS-Gen 4.6.1
<b>Test Method Used:</b>	Tested using the occupied bandwidth function of a test receiver

**Environmental Conditions:**

<b>Temperature (°C):</b>	27
<b>Relative Humidity (%):</b>	36

**Results: GFSK**

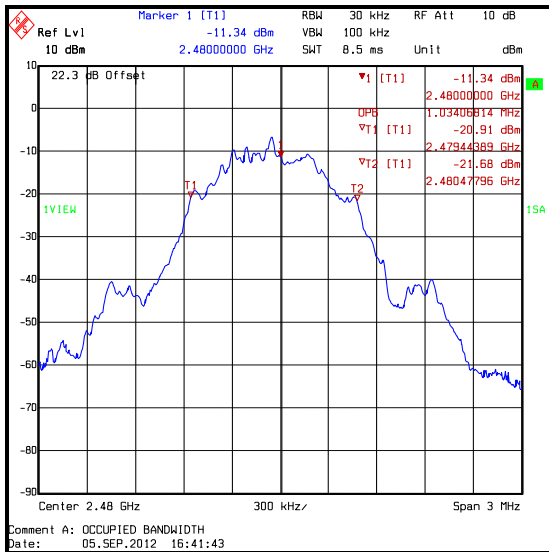
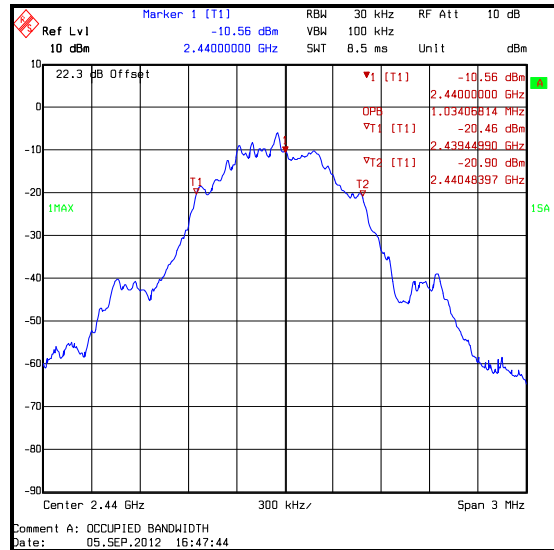
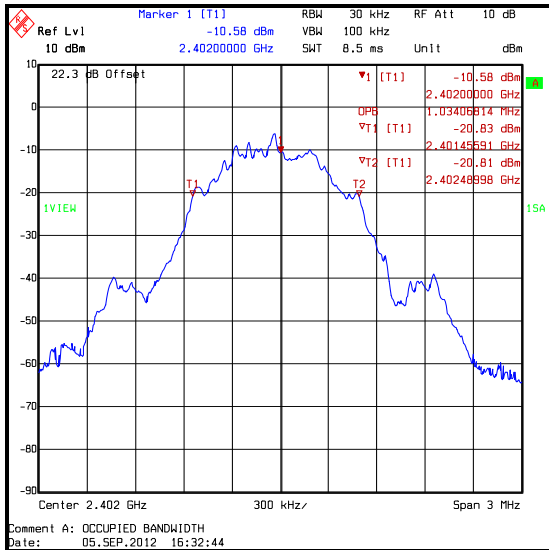
<b>Channel</b>	<b>Occupied Bandwidth (MHz)</b>
Bottom	1034.068
Middle	1034.068
Top	1034.068

**Note(s):**

1. Occupied bandwidth (99% bandwidth) was measured using a test receiver occupied bandwidth function with the test receiver set to the appropriate bandwidth according to the channel width under test. Measurement bandwidths were set automatically by the test receiver.

**Transmitter Occupied Bandwidth (continued)**

**Results: GFSK**



**Test Equipment Used:**

RFI ID	Instrument Description	Model Number	Calibration Due	Calibration Interval (Months)
M127	Spectrum Analyser	FSB30	13 Aug 2013	12
A1997	Attenuator	6810.17.B	03 Apr 2013	12
A2137	Directional coupler	A4224-10	Calibrated before use	-

**5.2.6. Transmitter Power Spectral Density****Test Summary:**

<b>Test Engineer:</b>	Andrew Edwards	<b>Test Date:</b>	05 September 2012
<b>Test Sample Serial Number:</b>	HX2W91SC700031T		

<b>FCC Reference:</b>	Part 15.247(e) & (f)
<b>Industry Canada Reference:</b>	RSS-210 A8.2(b) & A8.3(2)
<b>Test Method Used:</b>	KDB 558074 Section 5.3.1

**Environmental Conditions:**

<b>Temperature (°C):</b>	27
<b>Relative Humidity (%):</b>	36

**Results: GFSK**

Channel	PSD (dBm / 100 kHz)	PSD (dBm / 3 kHz)	Limit (dBm / 3 kHz)	Margin (dB)	Result
Bottom	-4.7	-19.9	8.0	27.9	Complied
Middle	-4.7	-19.9	8.0	27.9	Complied
Top	-5.3	-20.5	8.0	28.5	Complied

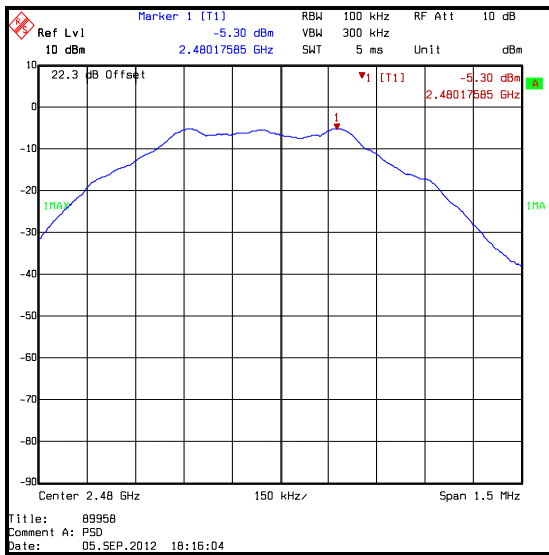
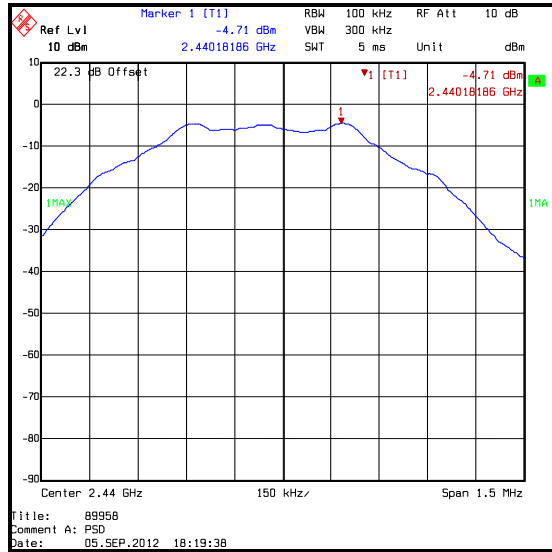
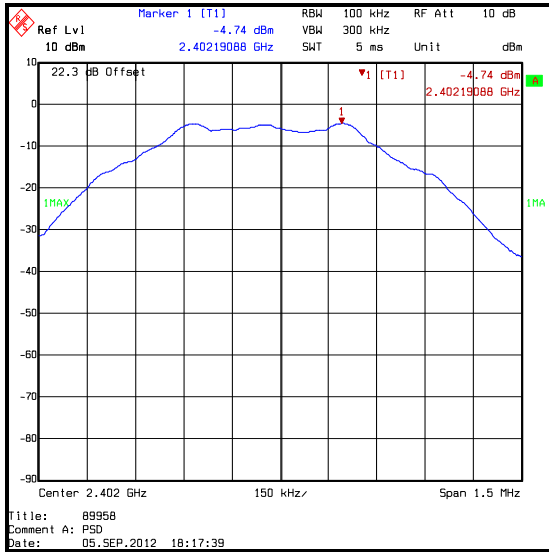
**Note(s):**

1. A 20 dB attenuator and RF cable were used to connect the EUT to the spectrum analyser.
2. FCC KDB 453039 and Industry Canada RSS-210 clause A8.3 (2) for hybrid device states that frequency hopping should be turned off in order to comply with power spectral density limit of 8 dBm/3 kHz.
3. In accordance with FCC KDB 558074 Section 5.3.1, the measurements were performed using a 100 kHz resolution bandwidth. A Band Width Correction Factor of 15.2 dB was then subtracted from the combined results as the limit is specified in a 3 kHz bandwidth. The correction factor (BWCF) was calculated as shown below:

$$10 \log_{10} (3 \text{ kHz} / 100 \text{ kHz}) = -15.2 \text{ dB.}$$

**Transmitter Power Spectral Density (continued)**

**Results: GFSK**



**Test Equipment Used:**

RFI ID	Instrument Description	Model Number	Calibration Due	Calibration Interval (Months)
M127	Spectrum Analyser	FSB30	13 Aug 2013	12
A1997	Attenuator	6810.17.B	03 Apr 2013	12
A2137	Directional coupler	A4224-10	Calibrate before use	-
M199	Power Meter	NRVS	07 Jun 2013	12
M1267	Thermal Power Sensor	NRV-Z52	07 Jun 2013	12
G085	CW Generator	83650L	09 Nov 2012	12

**5.2.7. Transmitter Maximum Peak Output Power****Test Summary:**

<b>Test Engineer:</b>	Andrew Edwards	<b>Test Date:</b>	05 September 2012
<b>Test Sample Serial Number:</b>	HX2W91SC700031T		

<b>FCC Reference:</b>	Part 15.247(b)(3)
<b>Industry Canada Reference:</b>	RSS-Gen 4.8, RSS-210 A8.4(4)
<b>Test Method Used:</b>	KDB 558074 Section 5.2.1.2

**Environmental Conditions:**

<b>Temperature (°C):</b>	27
<b>Relative Humidity (%):</b>	35

**Results: GFSK**

Channel	Conducted Peak Power (dBm)	Conducted Peak Power Limit (dBm)	Margin (dB)	Result
Bottom	2.6	30.0	27.4	Complied
Middle	2.7	30.0	27.3	Complied
Top	2.0	30.0	28.0	Complied

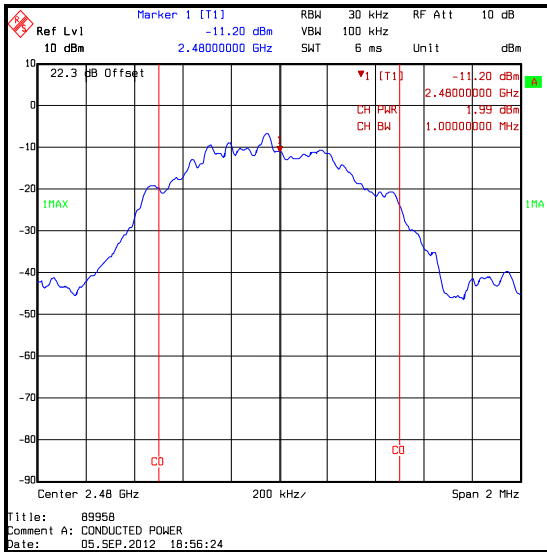
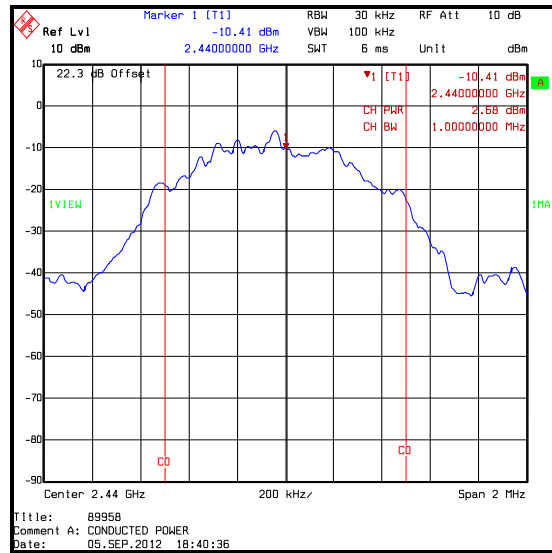
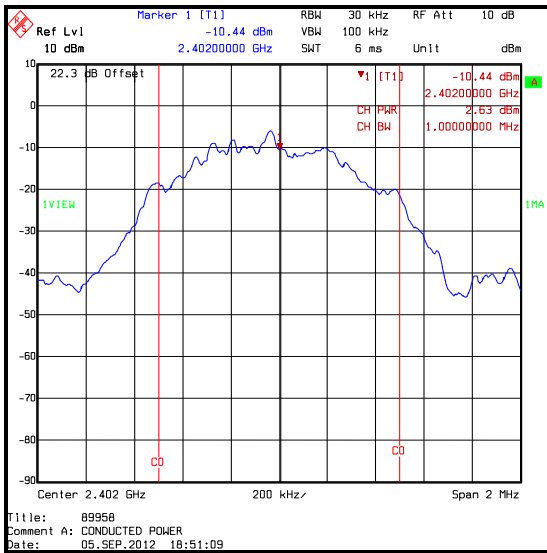
Channel	Conducted Peak Power (dBm)	Declared Antenna Gain (dBi)	EIRP (dBm)	De Facto EIRP Limit (dBm)	Margin (dB)	Result
Bottom	2.6	3.48	6.08	36.0	29.92	Complied
Middle	2.7	3.48	6.18	36.0	29.82	Complied
Top	2.0	3.48	5.48	36.0	30.52	Complied

**Note(s):**

1. Conducted power tests were performed using a spectrum analyser in accordance with FCC KDB 558074 Section 5.2.1.2 Measurement Procedure PK2. The spectrum analyser was connected to the RF port on the EUT using suitable attenuation and RF cables.

**Transmitter Maximum Peak Output Power (continued)**

**Results: GFSK**



**Test Equipment Used:**

RFI ID	Instrument Description	Model Number	Calibration Due	Calibration Interval (Months)
M127	Spectrum Analyser	FSB30	13 Aug 2013	12
A1997	Attenuator	6810.17.B	03 Apr 2013	12
A2137	Directional coupler	A4224-10	Calibrated before use	-
M199	Power Meter	NRVS	07 Jun 2013	12
M1267	Thermal Power Sensor	NRV-Z52	07 Jun 2013	12
G085	CW Generator	83650L	09 Nov 2012	12

**5.2.8. Transmitter Radiated Emissions****Test Summary:**

<b>Test Engineer:</b>	Nick Steele	<b>Test Date:</b>	05 September 2012
<b>Test Sample Serial Number:</b>	HX2W91SC700004R		

<b>FCC Reference:</b>	15.247(d) & 15.209(a)
<b>Industry Canada Reference:</b>	RSS-Gen 4.9, RSS-210 A8.5
<b>Test Method Used:</b>	ANSI C63.10 Sections 6.3 and 6.5 referencing ANSI C63.4
<b>Frequency Range</b>	30 MHz to 1000 MHz

**Environmental Conditions:**

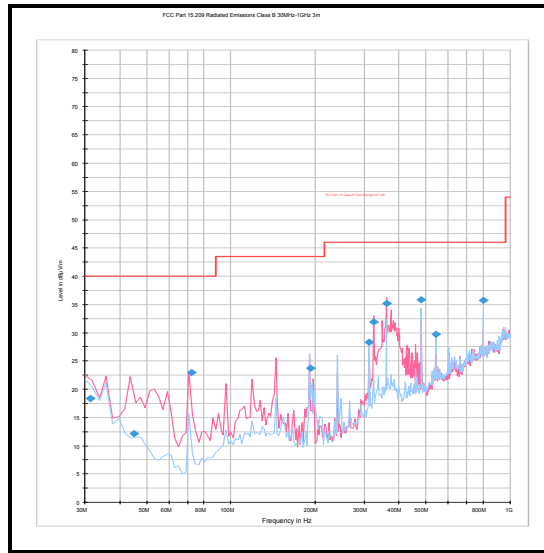
<b>Temperature (°C):</b>	28
<b>Relative Humidity (%):</b>	53

**Results: Quasi-Peak**

Frequency (MHz)	Antenna Polarity	Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
72.135	Vertical	23.0	40.0	17.0	Complied
324.484	Vertical	31.9	46.0	14.1	Complied

**Note(s):**

1. The final measured value, for the given emission, in the table above incorporates the calibrated antenna factor and cable loss
2. The preliminary scans showed similar emission levels below 1 GHz, for each channel of operation. Therefore final radiated emissions measurements were performed with the EUT set to the top channel only.
3. All other emissions shown on the pre-scan plot were investigated and found to be ambient or >20 dB below the applicable limit or below the measurement system noise floor.
4. Measurements below 1 GHz were performed in a semi-anechoic chamber (RFI Asset Number K0001) at a distance of 3 metres. The EUT was placed at a height of 80 cm above the reference ground plane in the centre of the chamber turntable. Maximum emission levels were determined by height searching the measurement antenna over the range 1 metre to 4 metres.

**Transmitter Radiated Emissions (continued)**

Note: This plot is a pre-scan and for indication purposes only. For final measurements, see accompanying table.

**Test Equipment Used:**

RFI ID	Instrument Description	Model Number	Calibration Due	Calibration Interval (Months)
K0001	5 m Semi-Anechoic Chamber	N/A	31 Sep 2012	12
M1273	Test Receiver	ESIB 26	03 Feb 2013	12
A1834	Attenuator	8491B	29 Jan 2013	12
G0543	Amplifier 9 kHz – 1 GHz	310N	15 Oct 2012	12
A553	Bi-log Antenna	CBL6111A	15 Feb 2013	12

**Transmitter Radiated Emissions (continued)****Test Summary:**

<b>Test Engineers:</b>	Andrew Edwards & Nick Steele	<b>Test Date:</b>	04 September 2012
<b>Test Sample Serial Number:</b>	HX2W91SC700004R		

<b>FCC Reference:</b>	15.247(d) & 15.209(a)
<b>Industry Canada Reference:</b>	RSS-Gen 4.9, RSS-210 A8.5
<b>Test Method Used:</b>	ANSI C63.10 Sections 6.3 and 6.6 referencing ANSI C63.4
<b>Frequency Range</b>	1 GHz to 25 GHz

**Environmental Conditions:**

<b>Temperature (°C):</b>	25
<b>Relative Humidity (%):</b>	52

**Results: Peak**

Frequency (MHz)	Antenna Polarity	Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
3933.868	Horizontal	58.5	74.0	15.5	Complied

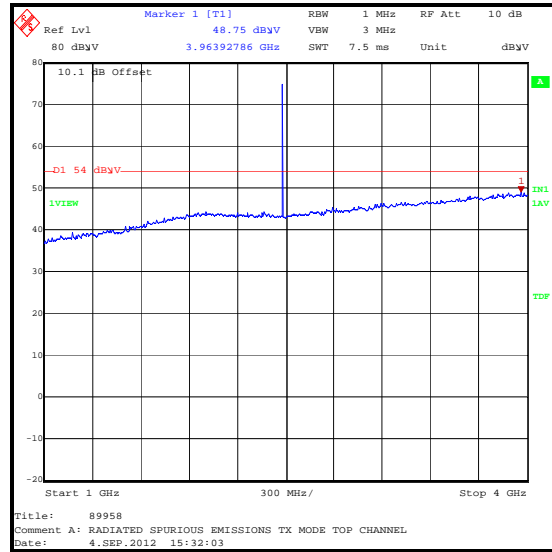
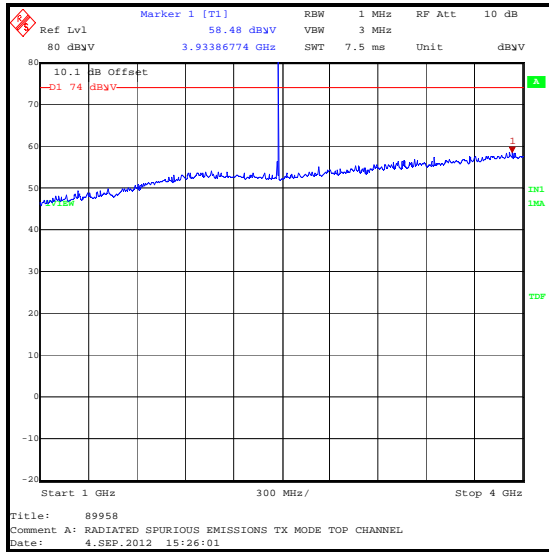
**Results: Average**

Frequency (MHz)	Antenna Polarity	Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
3963.928	Horizontal	48.8	54.0	5.2	Complied

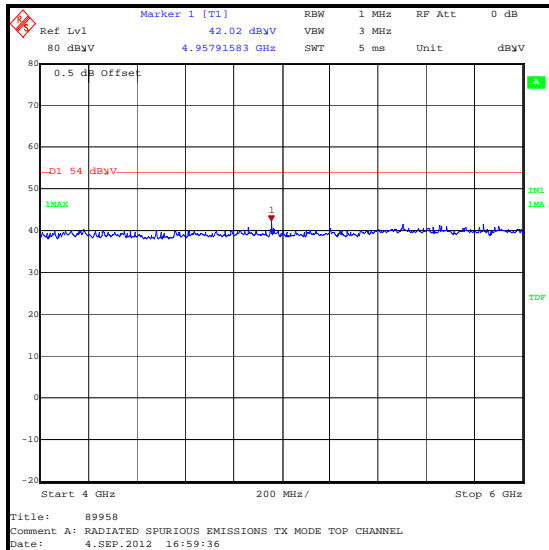
**Note(s):**

1. The final measured value, for the given emission, in the table above incorporates the calibrated antenna factor and cable loss.
2. The emission shown on the 1 GHz to 4 GHz plot is the EUT fundamental at 2480 MHz.
3. No spurious emissions were detected above the noise floor of the measuring receiver; the highest noise floor readings of the measuring receiver were recorded.
4. Pre-scans above 1 GHz were performed in a fully anechoic chamber (RFI Asset Number K0002) at a distance of 3 metres. The EUT was placed at a height of 1.5 metres above the test chamber floor in the centre of the chamber turntable. All measurement antennas were placed at a fixed height of 1.5 metres above the test chamber floor, in line with the EUT. Final measurements above 1 GHz were performed in a semi-anechoic chamber (RFI Asset Number K0001) at a distance of 3 metres. The EUT was placed at a height of 80 cm above the reference ground plane in the centre of the chamber turntable. Maximum emission levels were determined by height searching the measurement antenna over the range 1 metre to 4 metres.

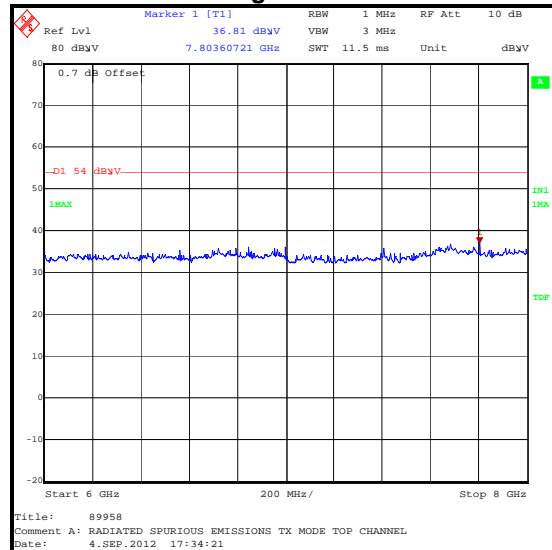
### Transmitter Radiated Emissions (continued)



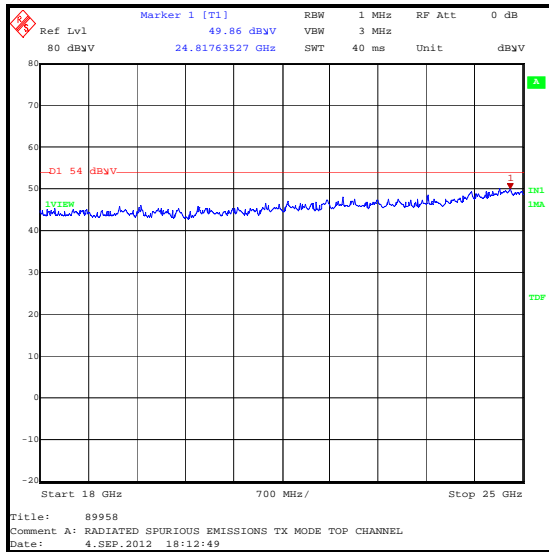
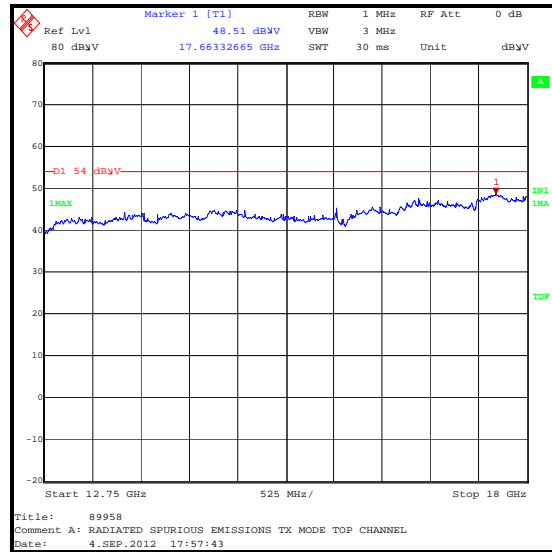
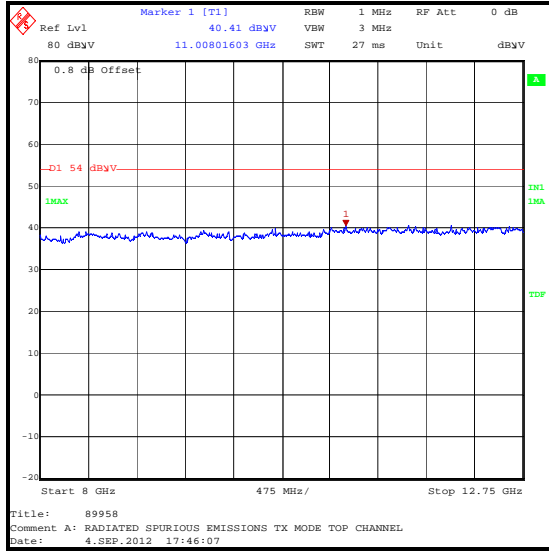
### Peak Detector



### Average Detector



**Transmitter Radiated Emissions (continued)**



**Transmitter Radiated Emissions (continued)****Test Equipment Used:**

RFI ID	Instrument Description	Model Number	Calibration Due	Calibration Interval (Months)
K0001	5 m Semi-Anechoic Chamber	N/A	31 Sep 2012	12
K0002	3m RSE Chamber	N/A	09 Oct 2012	12
M1124	Test Receiver	ESIB 26	14 Aug 2013	12
A1534	Pre Amplifier	8449B	09 Oct 2012	12
A1818	Horn Antenna	3115	09 Oct 2012	12
A1396	Attenuator	6810.17.B	06 Jul 2013	12
A1975	High Pass Filter	AFH-03000	15 May 2013	12
A253	Horn Antenna	12240-20	09 Oct 2012	12
A254	Horn Antenna	14240-20	09 Oct 2012	12
A255	Horn Antenna	16240-20	09 Oct 2012	12
A256	Horn Antenna	18240-20	09 Oct 2012	12
A436	Horn Antenna	20240-20	09 Oct 2012	12

**5.2.9. Transmitter Band Edge Radiated Emissions****Test Summary:**

<b>Test Engineer:</b>	Nick Steele	<b>Test Date:</b>	04 September 2012
<b>Test Sample Serial Number:</b>	HX2W91SC700004R		

<b>FCC Reference:</b>	15.247(d) & 15.209(a)
<b>Industry Canada Reference:</b>	RSS-Gen 4.9 & RSS-210 A8.5
<b>Test Method Used:</b>	FCC KDB 558074 D01 Section 5.4 ANSI C63.10 Sections 6.3 and 6.6

**Environmental Conditions:**

<b>Temperature (°C):</b>	27
<b>Relative Humidity (%):</b>	54

**Results:**

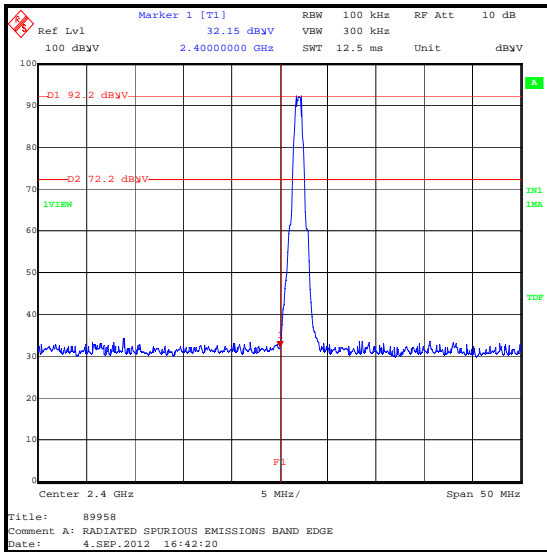
Frequency (MHz)	Antenna Polarity	Peak Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
2400.0	Horizontal	32.2	72.2*	40.0	Complied
2483.5	Horizontal	43.0	74.0	31.0	Complied

Frequency (MHz)	Antenna Polarity	Average Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
2483.5	Horizontal	28.9	54.0	25.1	Complied

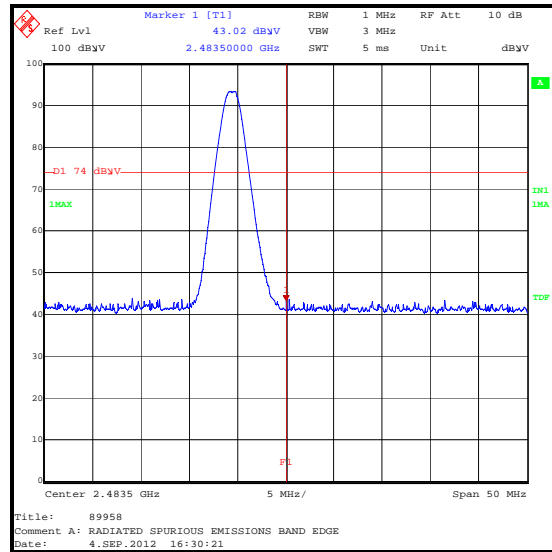
**Note(s):**

1. The final measured value, for the given emission, in the table above incorporates the calibrated antenna factor and cable loss.
2. \* -20 dBc limit

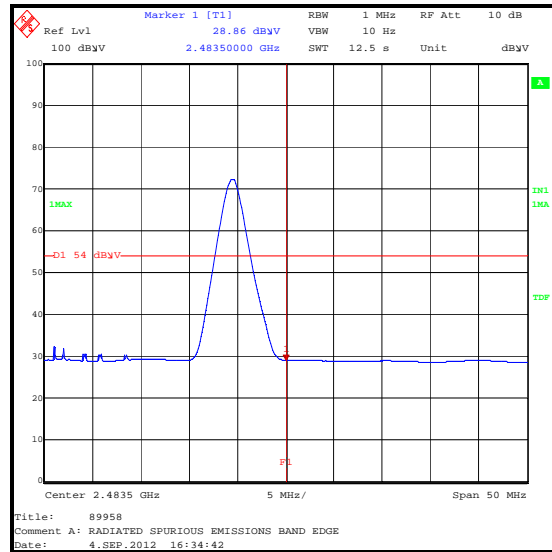
### Transmitter Band Edge Radiated Emissions (continued)



Lower Band Edge Peak Static



Upper Band Edge Peak Static



Upper Band Edge Average Static

**Transmitter Band Edge Radiated Emissions (continued)****Test Equipment Used:**

<b>RFI ID</b>	<b>Instrument Description</b>	<b>Model Number</b>	<b>Calibration Due</b>	<b>Calibration Interval (Months)</b>
K0001	5 m Semi-Anechoic Chamber	N/A	31 Sep 2012	12
K0002	3m RSE Chamber	N/A	09 Oct 2012	12
M1124	Test Receiver	ESIB 26	14 Aug 2013	12
A1534	Pre Amplifier	8449B	09 Oct 2012	12
A1818	Horn Antenna	3115	09 Oct 2012	12

## **6. Measurement Uncertainty**

No measurement or test can ever be perfect and the imperfections give rise to error of measurement in the results. Consequently the result of a measurement is only an approximation to the value of the measurand (the specific quantity subject to measurement) and is only complete when accompanied by a statement of the uncertainty of the approximation.

The expression of uncertainty of a measurement result allows realistic comparison of results with reference values and limits given in specifications and standards.

The uncertainty of the result may need to be taken into account when interpreting the measurement results.

The reported expanded uncertainties below are based on a standard uncertainty multiplied by an appropriate coverage factor such that a confidence level of approximately 95% is maintained. For the purposes of this document "approximately" is interpreted as meaning "effectively" or "for most practical purposes".

<b>Measurement Type</b>	<b>Range</b>	<b>Confidence Level (%)</b>	<b>Calculated Uncertainty</b>
AC Conducted Spurious Emissions	0.15 MHz to 30 MHz	95%	±3.25 dB
Conducted Maximum Peak Output Power	2.4 GHz to 2.4835 GHz	95%	±0.28 dB
Spectral Power Density	2.4 GHz to 2.4835 GHz	95%	±2.94 dB
Occupied Bandwidth	2.4 GHz to 2.4835 GHz	95%	±0.92 ppm
6 dB Bandwidth	2.4 GHz to 2.4835 GHz	95%	±0.92 ppm
Radiated Spurious Emissions	30 MHz to 26.5 GHz	95%	±2.94 dB

The methods used to calculate the above uncertainties are in line with those recommended within the various measurement specifications. Where measurement specifications do not include guidelines for the evaluation of measurement uncertainty the published guidance of the appropriate accreditation body is followed.

## **7. Report Revision History**

Version Number	Revision Details		
	Page No(s)	Clause	Details
1.0	-	-	Initial Version
2.0	-	-	Added setup photos and power versus frequency table