



# TEST REPORT

**Test Report No. :** UL-RPT-RP92315JD12A

**Manufacturer** : Panasonic Mobile Communications Development of Europe Ltd  
**Model No.** : NTT docomo P-03E  
**FCC ID** : UCE313058A  
**Technology** : WLAN  
**Test Standard(s)** : FCC Parts 15.107(a), 15.109, 15.207, 15.209(a) & 15.247

1. This test report shall not be reproduced in full or partial, without the written approval of UL.
2. The results in this report apply only to the sample(s) tested.
3. The sample tested is in compliance with the above standard(s).
4. The test results in this report are traceable to the national or international standards.
5. Version 1.0

**Date of Issue:** 13 April 2013

**Checked by:**

Ian Watch  
Senior Engineer, Radio Laboratory

**Issued by :**

  
pp

John Newell  
Group Quality Manager, WiSE  
Basingstoke,  
UL Verification Services



This laboratory is accredited by UKAS.  
The tests reported herein have been  
performed in accordance with its' terms  
of accreditation.

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## **1. Customer Information**











<b>Company Name:</b>	Panasonic Mobile Communications Development of Europe Ltd
<b>Address:</b>	Panasonic House Willoughby Road Bracknell Berkshire RG12 8FP United Kingdom

## 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) 2012: 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) 2012: 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) 2012: Part 15 Subpart C (Intentional Radiators) - Sections 15.207 and 15.209
<b>Site Registration:</b>	FCC: 209735
<b>Location of Testing:</b>	RFI Global Services Ltd trading as UL, Wade Road, Basingstoke, Hampshire, RG24 8AH.
<b>Test Dates:</b>	26 March 2013 to 09 April 2013

### 2.2. Summary of Test Results

FCC Reference (47CFR)	Measurement	Result
Part 15.107(a)	Receiver/Idle Mode AC Conducted Emissions	
Part 15.109	Receiver/Idle Mode Radiated Spurious Emissions	
Part 15.207	Transmitter AC Conducted Emissions	
Part 15.247(a)(2)	Transmitter Minimum 6 dB Bandwidth	
Part 15.35(c)	Transmitter Duty Cycle	Note 1
Part 15.247(e)	Transmitter Power Spectral Density	
Part 15.247(b)(3)	Transmitter Maximum Peak Output Power	
Part 15.247(d) & 15.209(a)	Transmitter Radiated Emissions	
Part 15.247(d) & 15.209(a)	Transmitter Band Edge Radiated Emissions	
<b>Key to Results</b>		
 = Complied  = Did not comply		

#### Note(s):

1. The measurement was performed to assist in the calculation of the level of maximum peak output power, power spectral density and emissions as the EUT employs pulsed operation.

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

<b>Reference:</b>	ANSI C63.4 (2003)
<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>	KDB 558074 D01 v02 10/04/2012
<b>Title:</b>	Guidance for Performing Compliance Measurements on Digital Transmission System (DTS) devices operating Under §15.247

### **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>	NTT docomo
<b>Model Name or Number:</b>	P-03E
<b>IMEI:</b>	355335050017244 ( <i>Radiated sample #1</i> )
<b>Hardware Version Number:</b>	Rev B
<b>Software Version Number:</b>	ACPU: zoro-jb-10-0371 CCPU: 161022_DCM_00.15
<b>FCC ID:</b>	UCE313058A

<b>Brand Name:</b>	NTT docomo
<b>Model Name or Number:</b>	P-03E
<b>IMEI:</b>	355335050017228 ( <i>Radiated sample #2</i> )
<b>Hardware Version Number:</b>	Rev B
<b>Software Version Number:</b>	ACPU: zoro-jb-10-0371 CCPU: 161022_DCM_00.15
<b>FCC ID:</b>	UCE313058A

<b>Brand Name:</b>	NTT docomo
<b>Model Name or Number:</b>	P-03E
<b>IMEI:</b>	355335050017236 ( <i>Radiated sample #3</i> )
<b>Hardware Version Number:</b>	Rev B
<b>Software Version Number:</b>	ACPU: zoro-jb-10-0371 CCPU: 161022_DCM_00.15
<b>FCC ID:</b>	UCE313058A

<b>Brand Name:</b>	NTT docomo
<b>Model Name or Number:</b>	P-03E
<b>IMEI:</b>	355335050017095 ( <i>Conducted RF port sample #1</i> )
<b>Hardware Version Number:</b>	Rev B
<b>Software Version Number:</b>	ACPU: zoro-jb-10-0371 CCPU: 161022_DCM_00.15
<b>FCC ID:</b>	UCE313058A

**Identification of Equipment Under Test (EUT) (continued)**

<b>Brand Name:</b>	NTT docomo
<b>Model Name or Number:</b>	P-03E
<b>IMEI:</b>	355335050017079 <i>(Conducted RF port sample #2)</i>
<b>Hardware Version Number:</b>	Rev B
<b>Software Version Number:</b>	ACPU: zoro-jb-10-0371 CCPU: 161022_DCM_00.15
<b>FCC ID:</b>	UCE313058A

<b>Brand Name:</b>	NTT docomo
<b>Model Name or Number:</b>	P-03E
<b>IMEI:</b>	355335050017087 <i>(Conducted RF port sample #3)</i>
<b>Hardware Version Number:</b>	Rev B
<b>Software Version Number:</b>	ACPU: zoro-jb-10-0371 CCPU: 161022_DCM_00.15
<b>FCC ID:</b>	UCE313058A

<b>Brand Name:</b>	NTT docomo
<b>Description:</b>	Battery
<b>Model Name or Number:</b>	P30

<b>Brand Name:</b>	NTT docomo
<b>Description:</b>	AC Charger
<b>Model Name or Number:</b>	AC04

<b>Brand Name:</b>	NTT docomo
<b>Description:</b>	Charge/USB Data cable
<b>Model Name or Number:</b>	Type 01

<b>Brand Name:</b>	NTT docomo
<b>Description:</b>	Personal Hands-Free
<b>Model Name or Number:</b>	Type 02

**3.2. Description of EUT**

The equipment under test was a Multi-Mode LTE/UMTS/GSM Mobile Phone with WLAN, *Bluetooth* and RFID.

**3.3. Modifications Incorporated in the EUT**

No modifications were applied to the EUT during testing.



**3.4. Additional Information Related to Testing**

<b>Technology Tested:</b>	WLAN (IEEE 802.11a,b,g,n) / Digital Transmission System		
<b>Type of Unit:</b>	Transceiver		
<b>Modulation Type:</b>	DBPSK, DQPSK, CCK, BPSK, QPSK, 16QAM & 64QAM		
<b>Data Rates:</b>	802.11b	1, 2, 5.5 & 11 Mbps	
	802.11g	6, 9, 12, 18, 24, 36, 48 & 54 Mbps	
	802.11n HT20	MCS0 to MCS7 (1 spatial stream) GI = 800 ns or 400 ns Greenfield & Mixed modes	
<b>Power Supply Requirement(s):</b>	Nominal	3.8 V	
<b>Maximum Conducted Output Power:</b>	17.5 dBm		
<b>Declared Antenna Gain:</b>	-2.0 dBi		
<b>Transmit Frequency Range:</b>	2412 MHz to 2462 MHz		
<b>Transmit Channels Tested:</b>	<b>Channel ID</b>	<b>Channel Number</b>	<b>Channel Frequency (MHz)</b>
	Bottom	1	2412
	Middle	6	2437
	Top	11	2462
<b>Receive Frequency Range:</b>	2412 MHz to 2462 MHz		
<b>Receive Channels Tested:</b>	<b>Channel ID</b>	<b>Channel Number</b>	<b>Channel Frequency (MHz)</b>
	Bottom	1	2412
	Middle	6	2437
	Top	11	2462

### **3.5. Support Equipment**

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

<b>Brand Name:</b>	Panasonic
<b>Description:</b>	Laptop PC
<b>Model Name or Number:</b>	Toughbook CF-74

<b>Brand Name:</b>	Not marked or stated
<b>Description:</b>	2 GB Micro SD Card
<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.
- Continuously transmitting with a modulated carrier at maximum power on the bottom, middle and top channels as required using the supported data rates/modulation types.

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

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

- Controlled using a bespoke application on the laptop PC supplied by the Customer. The application was used to enable continuous transmission and receive mode and to select the test channels, data rates and modulation schemes as required.
- Receive/Idle tests: The 802.11 mode was active but not transmitting.
- All supported modes and channel widths were initially investigated on one channel. The modes that produced the highest power, narrowest and widest bandwidths were:
  - Highest power
    - 802.11b – DBPSK / 1 Mbps
    - 802.11g – QPSK / 18 Mbps
    - 802.11n HT20 – 64QAM / 52 Mbps / MCS5 (Greenfield mode / GI = 800 ns)
  - Narrowest bandwidth (DTS bandwidth / 6 dB)
    - 802.11b – DQPSK / 2 Mbps
    - 802.11g – BPSK / 6 Mbps
    - 802.11n HT20 – BPSK / 7.2 Mbps / MCS0 (Mixed mode / GI = 400 ns)
  - Widest bandwidth (Emission bandwidth / 26 dB)
    - 802.11b – CCK / 5.5 Mbps
    - 802.11g – QPSK / 18 Mbps
    - 802.11n HT20 – BPSK / 7.2 Mbps / MCS0 (Mixed mode / GI = 400 ns)
- Transmitter spurious emissions were performed with the EUT transmitting with a data rate of 1 Mbps, as this was found to have the highest power level and therefore deemed to be worst case.
- Idle and transmitter radiated spurious emissions tests were performed with the AC charger and PHF connected to the EUT as this was found to be the worst case during pre-scans. All the accessories were individually connected and measurements made during the pre-scans to determine the worst case combination.
- Radiated emissions tests were performed with all unused ports terminated.
- The conducted samples with IMEI 355335050017095, IMEI 355335050017079, and IMEI 35533505017087 were used for 6 dB Bandwidth, maximum output power, power spectral density, and duty cycle tests.
- The radiated samples with IMEI 355335050017244 and IMEI 355335050017228 were used for AC conducted emissions, idle mode radiated spurious emissions > 1 GHz, and transmitter radiated spurious emissions tests.
- The radiated sample with IMEI 355335050017236 was used for all other tests.

## **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.

In accordance with UKAS requirements all the measurement equipment is on a calibration schedule. All equipment was within the calibration period on the date of testing.

**5.2. Test Results****5.2.1. Receiver/Idle Mode AC Conducted Spurious Emissions****Test Summary:**

<b>Test Engineer:</b>	Nick Steele	<b>Test Date:</b>	29 March 2013
<b>Test Sample IMEI:</b>	355335050017228		

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

**Environmental Conditions:**

<b>Temperature (°C):</b>	20
<b>Relative Humidity (%):</b>	30

**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
0.231	Live	46.2	62.4	16.2	Complied
0.398	Live	39.5	57.9	18.4	Complied
1.622	Live	39.5	56.0	16.5	Complied
1.856	Live	38.8	56.0	17.2	Complied
1.964	Live	39.7	56.0	16.3	Complied
2.252	Live	37.4	56.0	18.6	Complied

**Results: Live / Average**

Frequency (MHz)	Line	Level (dB $\mu$ V)	Limit (dB $\mu$ V)	Margin (dB)	Result
2.022	Live	28.2	46.0	17.8	Complied
2.594	Live	29.2	46.0	16.8	Complied
15.351	Live	30.0	50.0	20.0	Complied
15.414	Live	30.9	50.0	19.1	Complied
15.747	Live	32.6	50.0	17.4	Complied
15.842	Live	34.8	50.0	15.2	Complied
15.945	Live	30.0	50.0	20.0	Complied

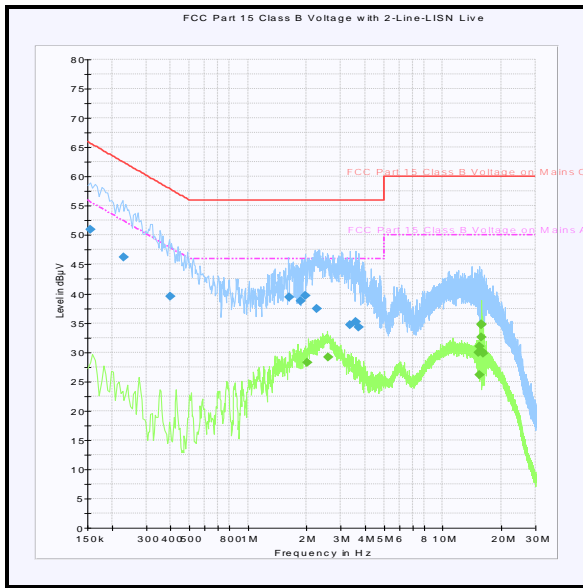
**Receiver/Idle Mode AC Conducted Spurious Emissions (continued)****Results: Neutral / Quasi Peak**

Frequency (MHz)	Line	Level (dB $\mu$ V)	Limit (dB $\mu$ V)	Margin (dB)	Result
0.155	Neutral	57.3	65.8	8.5	Complied
0.245	Neutral	52.7	61.9	9.2	Complied
0.267	Neutral	51.8	61.2	9.4	Complied
0.285	Neutral	50.8	60.7	9.9	Complied
0.303	Neutral	50.5	60.2	9.7	Complied
0.335	Neutral	48.8	59.3	10.5	Complied
0.344	Neutral	49.1	59.1	10.0	Complied
0.384	Neutral	46.5	58.2	11.7	Complied
0.411	Neutral	44.9	57.6	12.7	Complied
0.443	Neutral	45.5	57.0	11.5	Complied

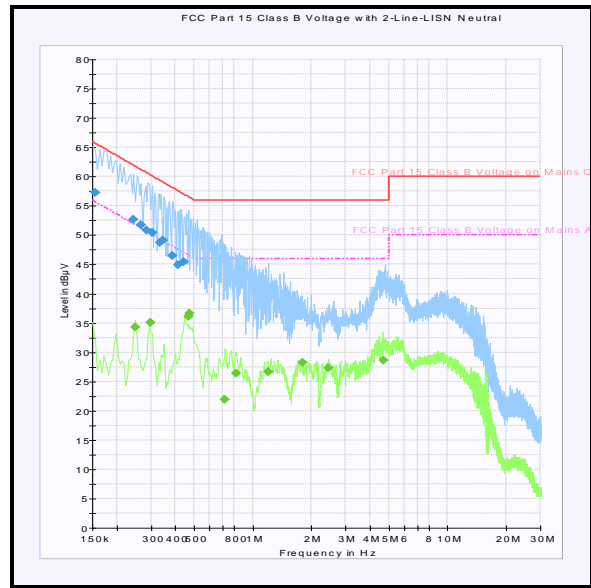
**Results: Neutral / Average**

Frequency (MHz)	Line	Level (dB $\mu$ V)	Limit (dB $\mu$ V)	Margin (dB)	Result
0.249	Neutral	34.3	51.8	17.5	Complied
0.299	Neutral	35.1	50.3	15.2	Complied
0.465	Neutral	36.1	46.6	10.5	Complied
0.474	Neutral	36.6	46.4	9.8	Complied
0.816	Neutral	26.4	46.0	19.6	Complied
1.199	Neutral	26.7	46.0	19.3	Complied
1.806	Neutral	28.3	46.0	17.7	Complied
2.432	Neutral	27.3	46.0	18.7	Complied
4.668	Neutral	28.7	46.0	17.3	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 No.	Instrument	Manufacturer	Type No.	Serial No.	Date Calibration Due	Cal. Interval (Months)
A649	LISN	Rohde & Schwarz	ESH3-Z5	825562/008	19 Apr 2013	12
A1830	Pulse Limiter	Rohde & Schwarz	ESH3-Z2	100668	19 Feb 2014	12
M1263	Test Receiver	Rohde & Schwarz	ESIB7	100265	09 Aug 2013	12

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

<b>Test Engineer:</b>	Sarah Williams	<b>Test Date:</b>	29 March 2013
<b>Test Sample IMEI:</b>	355335050017236		

<b>FCC Reference:</b>	Part 15.109
<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>	22
<b>Relative Humidity (%):</b>	26

**Note(s):**

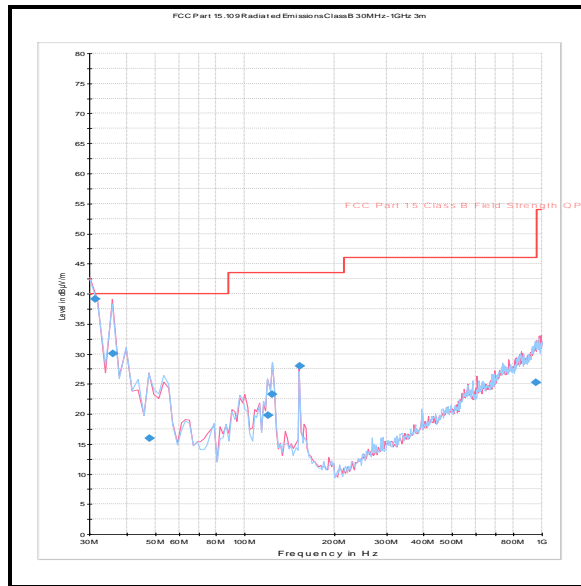
1. The final measured value, for the given emission, in the table below incorporates the calibrated antenna factor and cable loss.
2. All other emissions shown on the pre-scan plot were investigated and found to be ambient or >20 dB below the applicable limit or below the measurement system noise floor.
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>
31.337	Vertical	39.1	40.0	0.9	Complied
36.096	Vertical	30.0	40.0	10.0	Complied
123.571	Horizontal	23.3	43.5	20.2	Complied
153.307	Vertical	28.0	43.5	15.5	Complied
956.200	Vertical	25.3	46.0	20.7	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 No.	Instrument	Manufacturer	Type No.	Serial No.	Date Calibration Due	Cal. Interval (Months)
A1834	Attenuator	Hewlett Packard	8491B	10444	27 Jan 2014	12
A490	Antenna	Chase	CBL6111A	1590	14 May 2013	12
G0543	Amplifier	Sonoma	310N	230801	03 Apr 2013	3
K0001	5m RSE Chamber	Rainford EMC	N/A	N/A	24 Oct 2013	12
M1273	Test Receiver	Rohde & Schwarz	ESIB 26	100275	15 Feb 2014	12

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

<b>Test Engineer:</b>	Nick Steele	<b>Test Date:</b>	26 March 2013
<b>Test Sample IMEI:</b>	355335050017244		

<b>FCC Reference:</b>	Part 15.109
<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>	23
<b>Relative Humidity (%):</b>	29

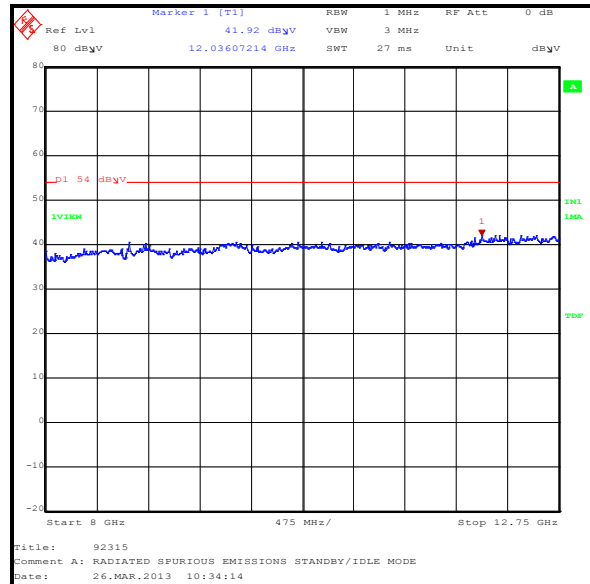
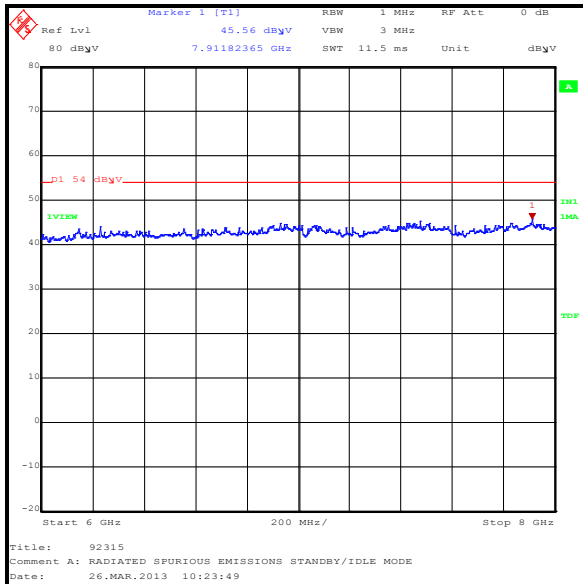
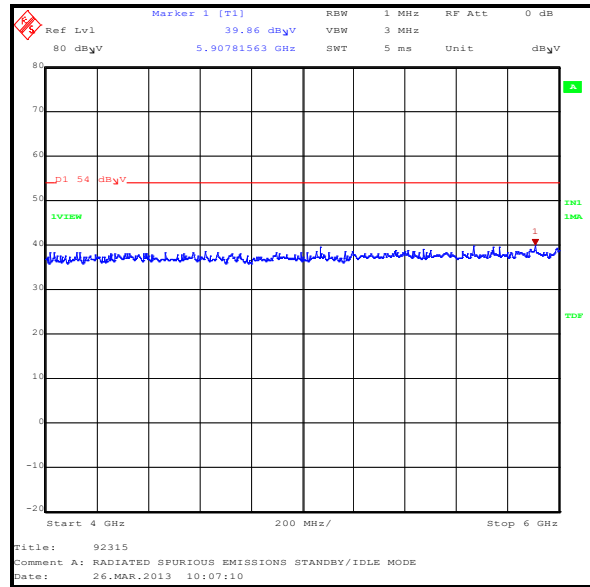
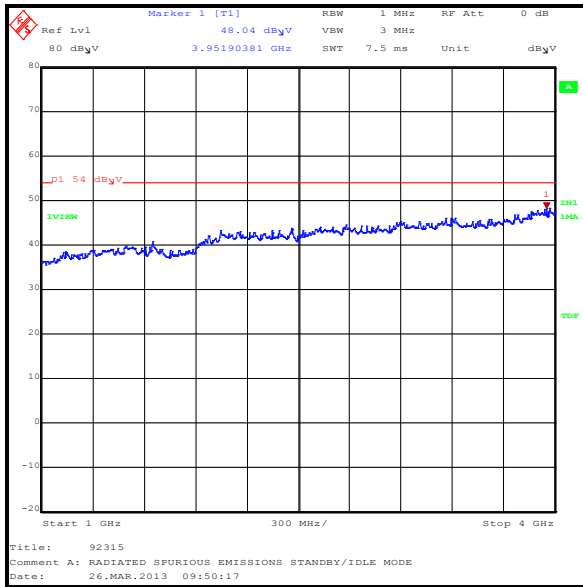
**Note(s):**

1. The final measured value, for the given emission, in the table below incorporates the calibrated antenna factor and cable loss.
2. 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 below. 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.
3. 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.

**Results:**

<b>Frequency (MHz)</b>	<b>Antenna Polarity</b>	<b>Peak Level (dB<math>\mu</math>V/m)</b>	<b>Average Limit (dB<math>\mu</math>V/m)</b>	<b>Margin (dB)</b>	<b>Result</b>
3951.904	Vertical	48.0	54.0	6.0	Complied

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



**Test Equipment Used:**

RFI No.	Instrument	Manufacturer	Type No.	Serial No.	Date Calibration Due	Cal. Interval (Months)
K0002	3m RSE Chamber	Rainford	N/A	N/A	04 Nov 2013	12
M1124	Test Receiver	Rohde & Schwarz	ESIB 26	100046K	14 Aug 2013	12
A1534	Pre Amplifier	Hewlett Packard	8449B	3008A00405	04 Nov 2013	12
A1818	Antenna	EMCO	3115	00075692	04 Nov 2013	12
A253	Antenna	Flann Microwave	12240-20	128	04 Nov 2013	12
A254	Antenna	Flann Microwave	14240-20	139	04 Nov 2013	12
A255	Antenna	Flann Microwave	16240-20	519	04 Nov 2013	12

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

<b>Test Engineer:</b>	Nick Steele	<b>Test Date:</b>	29 March 2013
<b>Test Sample IMEI:</b>	355335050017228		

<b>FCC Reference:</b>	Part 15.207
<b>Test Method Used:</b>	As detailed in ANSI C63.10 Section 6.2 referencing ANSI C63.4

**Environmental Conditions:**

<b>Temperature (°C):</b>	20
<b>Relative Humidity (%):</b>	30

**Results: Live / Quasi Peak**

Frequency (MHz)	Line	Level (dB $\mu$ V)	Limit (dB $\mu$ V)	Margin (dB)	Result
0.155	Live	50.3	65.8	15.5	Complied
0.182	Live	48.4	64.4	16.0	Complied
0.231	Live	45.5	62.4	16.9	Complied
0.263	Live	43.3	61.4	18.1	Complied
0.308	Live	41.2	60.0	18.8	Complied
0.357	Live	39.2	58.8	19.6	Complied
0.402	Live	37.4	57.8	20.4	Complied
2.679	Live	39.9	56.0	16.1	Complied
2.922	Live	38.8	56.0	17.2	Complied
2.931	Live	38.4	56.0	17.6	Complied

**Results: Live / Average**

Frequency (MHz)	Line	Level (dB $\mu$ V)	Limit (dB $\mu$ V)	Margin (dB)	Result
0.929	Live	24.4	46.0	21.6	Complied
1.199	Live	25.8	46.0	20.2	Complied
1.689	Live	27.5	46.0	18.5	Complied
2.747	Live	28.7	46.0	17.3	Complied
15.347	Live	28.9	50.0	21.1	Complied
15.423	Live	29.5	50.0	20.5	Complied
15.734	Live	31.3	50.0	18.7	Complied
15.824	Live	34.0	50.0	16.0	Complied
15.914	Live	30.3	50.0	19.7	Complied
16.148	Live	28.1	50.0	21.9	Complied

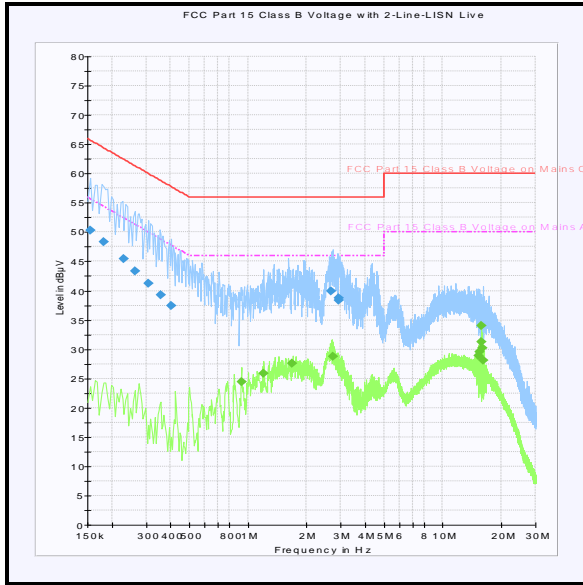
**Transmitter AC Conducted Spurious Emissions (continued)****Results: Neutral / Quasi Peak**

Frequency (MHz)	Line	Level (dB $\mu$ V)	Limit (dB $\mu$ V)	Margin (dB)	Result
0.155	Neutral	53.1	65.8	12.7	Complied
0.218	Neutral	49.4	62.9	13.5	Complied
0.434	Neutral	41.8	57.2	15.4	Complied
0.452	Neutral	39.9	56.8	16.9	Complied
0.479	Neutral	38.7	56.4	17.7	Complied
0.587	Neutral	37.3	56.0	18.7	Complied
2.742	Neutral	37.7	56.0	18.3	Complied
3.080	Neutral	36.9	56.0	19.1	Complied
3.282	Neutral	34.4	56.0	21.6	Complied
3.422	Neutral	35.2	56.0	20.8	Complied

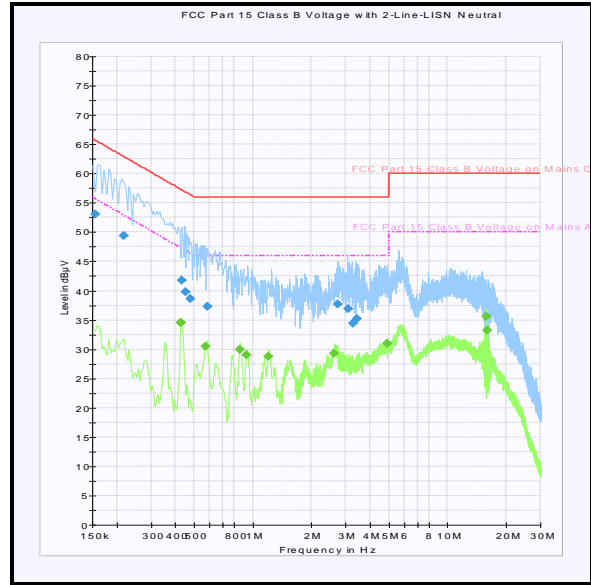
**Results: Neutral / Average**

Frequency (MHz)	Line	Level (dB $\mu$ V)	Limit (dB $\mu$ V)	Margin (dB)	Result
0.429	Neutral	34.6	47.3	12.7	Complied
0.573	Neutral	30.5	46.0	15.5	Complied
0.861	Neutral	30.0	46.0	16.0	Complied
0.933	Neutral	29.1	46.0	16.9	Complied
1.199	Neutral	28.8	46.0	17.2	Complied
2.607	Neutral	29.3	46.0	16.7	Complied
4.889	Neutral	31.0	46.0	15.0	Complied
15.824	Neutral	35.6	50.0	14.4	Complied
15.900	Neutral	33.2	50.0	16.8	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 No.	Instrument	Manufacturer	Type No.	Serial No.	Date Calibration Due	Cal. Interval (Months)
A649	LISN	Rohde & Schwarz	ESH3-Z5	825562/008	19 Apr 2013	12
A1830	Pulse Limiter	Rohde & Schwarz	ESH3-Z2	100668	19 Feb 2014	12
M1263	Test Receiver	Rohde & Schwarz	ESIB7	100265	09 Aug 2013	12

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

<b>Test Engineer:</b>	Patrick Jones	<b>Test Date:</b>	05 April 2013
<b>Test Sample IMEI:</b>	35533505017087		

<b>FCC Reference:</b>	Part 15.247(a)(2)
<b>Test Method Used:</b>	As detailed in FCC KDB 558074 Section 7.0 Option 1

**Environmental Conditions:**

<b>Temperature (°C):</b>	24
<b>Relative Humidity (%):</b>	29

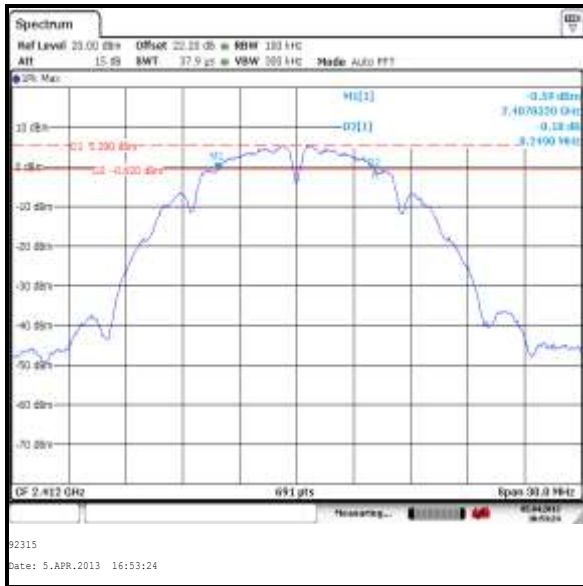
**Note(s):**

1. All configurations supported by the EUT were investigated on one channel in accordance with KDB 558074 Section 7.1 DTS channel bandwidth measurement procedure. The data rates that produced the narrowest bandwidth and therefore deemed worst case were:
  - 802.11b – DQPSK / 2 Mbps
  - 802.11g – BPSK / 6 Mbps
  - 802.11n HT20 – BPSK / 7.2 Mbps / MCS0 (Mixed mode / GI = 400 ns)
2. Final measurements were performed using the above configurations on the bottom, middle and top channels.

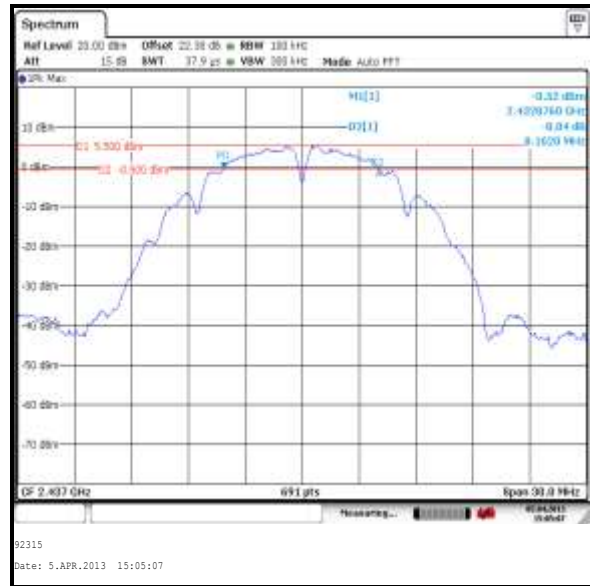
**Transmitter Minimum 6 dB Bandwidth (continued)**

**Results: 802.11b / 20 MHz / DQPSK / 2 Mbps**

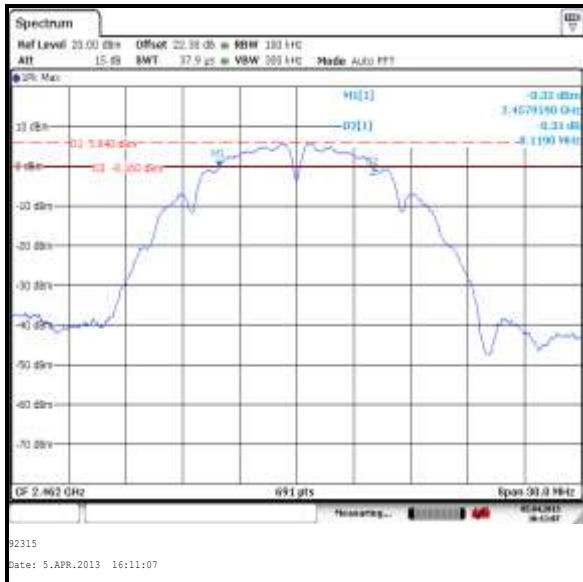
Channel	6 dB Bandwidth (kHz)	Limit (kHz)	Margin (kHz)	Result
Bottom	8249.000	≥500	7749.000	Complied
Middle	8162.000	≥500	Complied	
Top	8119.000	≥500	7619.000	Complied



**Bottom Channel**



**Middle Channel**



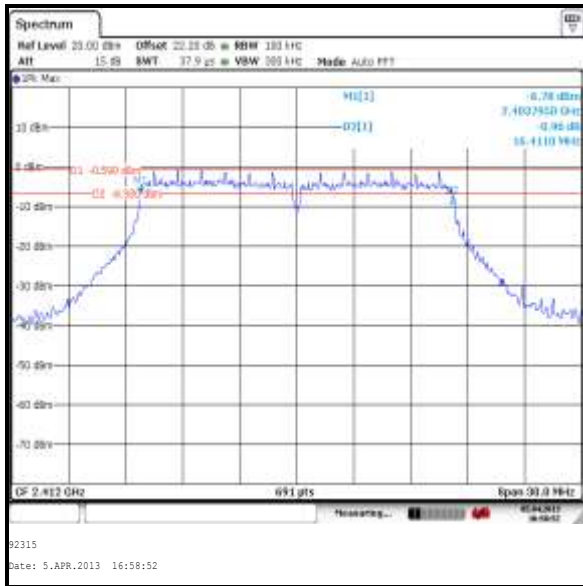
**Top Channel**



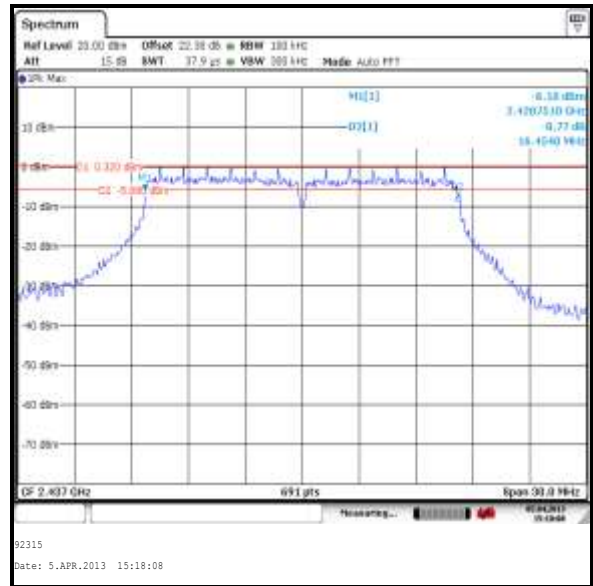
**Transmitter Minimum 6 dB Bandwidth (continued)**

**Results: 802.11g / 20 MHz / BPSK / 6 Mbps**

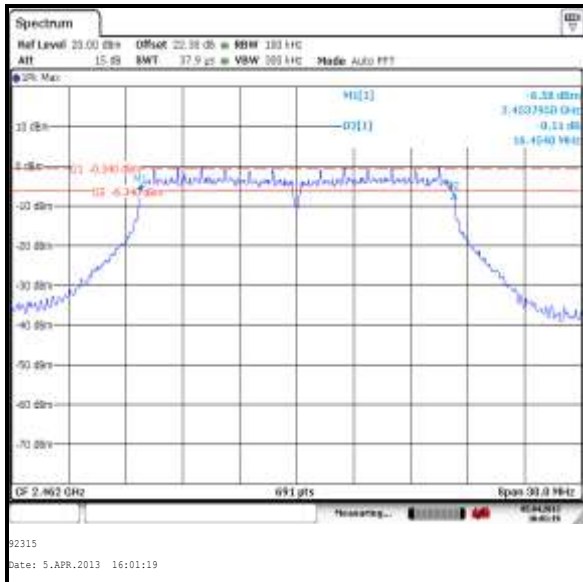
Channel	6 dB Bandwidth (kHz)	Limit (kHz)	Margin (kHz)	Result
Bottom	16411.000	≥500	15911.000	Complied
Middle	16454.000	≥500	15954.000	Complied
Top	16454.000	≥500	15954.000	Complied



**Bottom Channel**



**Middle Channel**

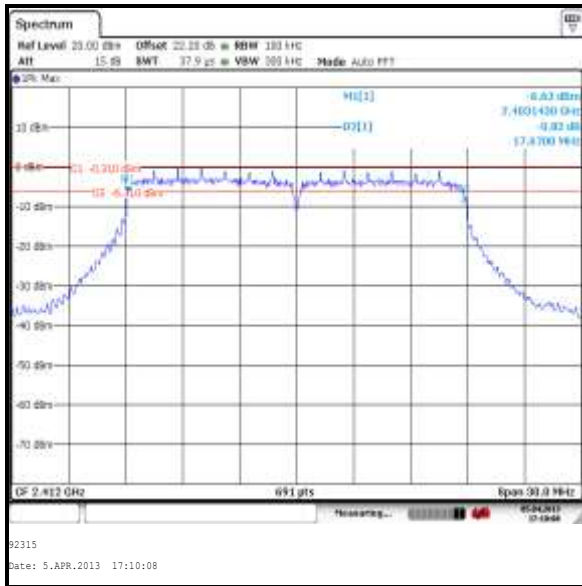


**Top Channel**

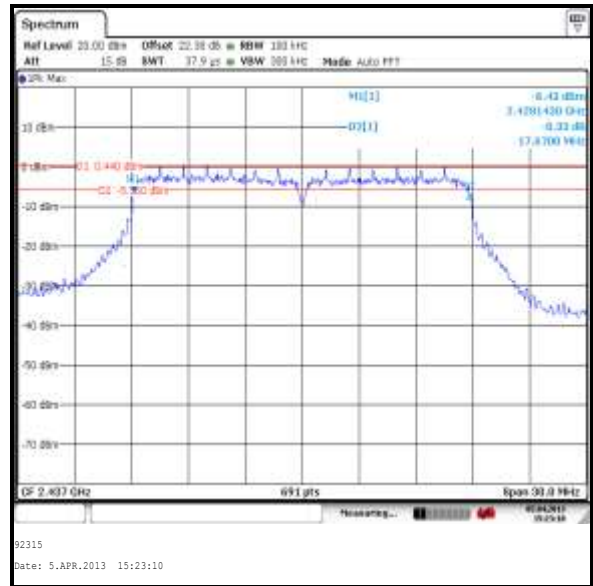
**Transmitter Minimum 6 dB Bandwidth (continued)**

**Results: 802.11n / 20 MHz / BPSK / 7.2 Mbps / MCS0**

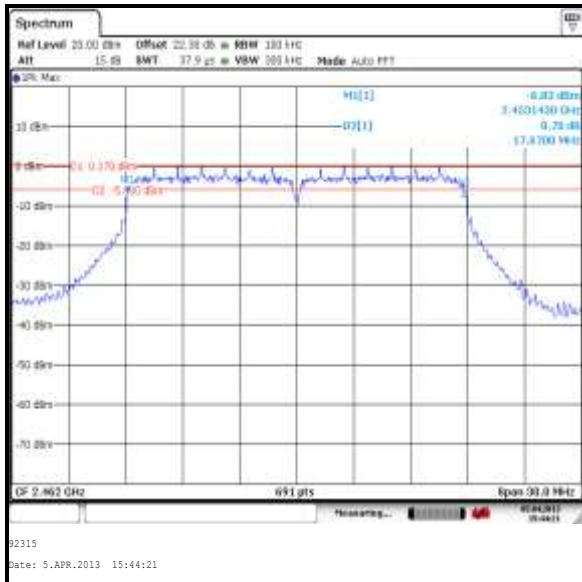
Channel	6 dB Bandwidth (kHz)	Limit (kHz)	Margin (kHz)	Result
Bottom	17670.000	≥500	17170.000	Complied
Middle	17670.000	≥500	17170.000	Complied
Top	17670.000	≥500	17170.000	Complied



**Bottom Channel**



**Middle Channel**



**Top Channel**

**Transmitter Minimum 6 dB Bandwidth (continued)****Test Equipment Used:**

<b>RFI No.</b>	<b>Instrument</b>	<b>Manufacturer</b>	<b>Type No.</b>	<b>Serial No.</b>	<b>Date Calibration Due</b>	<b>Cal. Interval (Months)</b>
A1393	Attenuator	Huber & Suhner	6820.17.B	757456	06 Jul 2013	12
L1028	Signal Analyser	Rohde & Schwarz	FSV	100854	15 Feb 2014	12

**5.2.5.Transmitter Duty Cycle****Test Summary:**

<b>Test Engineer:</b>	Nick Steele	<b>Test Dates:</b>	28 March 2013 & 29 March 2013
<b>Test Sample IMEI:</b>	355335050017095		

<b>FCC Part:</b>	15.35(c)
<b>Test Method Used:</b>	FCC KDB 558074 Section 5.0

**Environmental Conditions:**

<b>Temperature (°C):</b>	21
<b>Relative Humidity (%):</b>	28

**Note(s):**

- In order to assist with the determination of the average level of fundamental and spurious emissions field strength, measurements were made of duty cycle to determine the transmission duration and the silent period time of the transmitter. The transmitter duty cycle was measured using a spectrum analyser in the time domain and calculated by using the following calculation:

$$10 \log (1 / (\text{On Time} / [\text{Period or } 100\text{ms whichever is the lesser}])).$$

$$802.11b \ 1 \ \text{Mbps duty cycle: } 10 \log (1 / (8.254/8.434)) = 0.1 \ \text{dB}$$

$$802.11g \ 18 \ \text{Mbps duty cycle } 10 \log (1 / (0.441/0.649)) = 1.7 \ \text{dB}$$

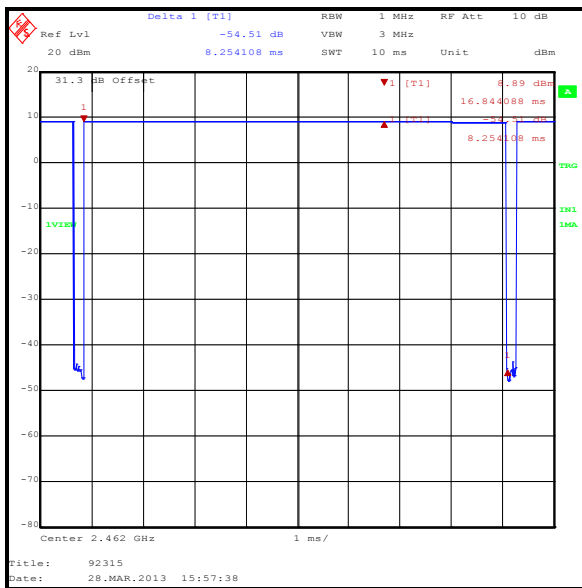
$$802.11n \ \text{HT20 MCS5 duty cycle: } 10 \log (1 / (0.178/0.391)) = 3.4 \ \text{dB}$$

**Transmitter Duty Cycle (continued)**

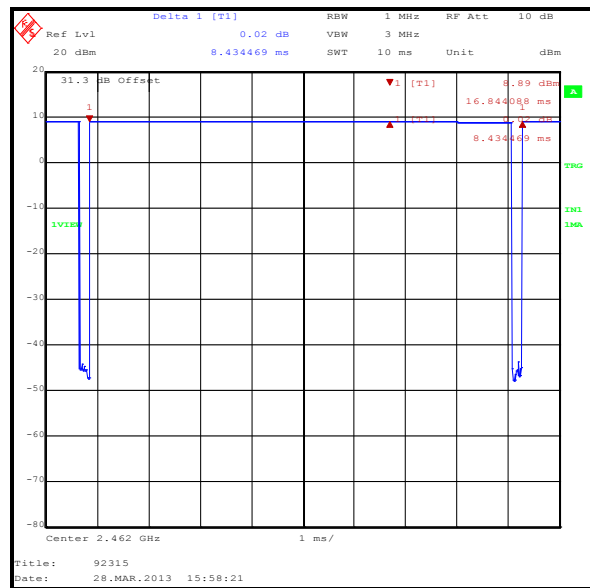
**Results: 802.11b / 20 MHz / 1 Mbps**

Pulse Duration (ms)	Duty Cycle (dB)
8.254	0.1

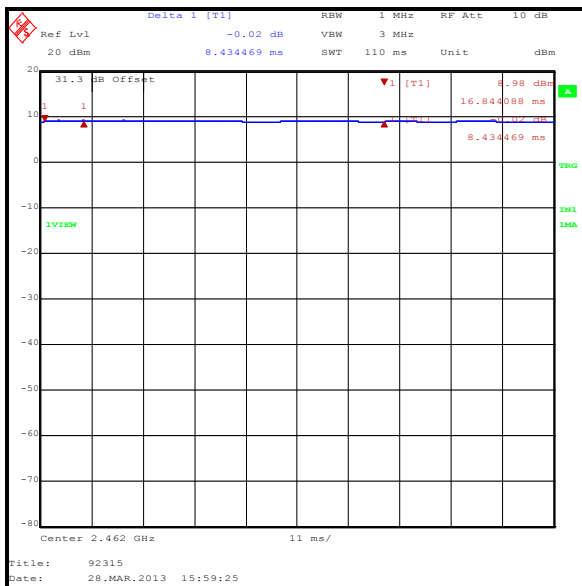
Period (ms)
8.434



**TX on time**



**TX on + off time / period**



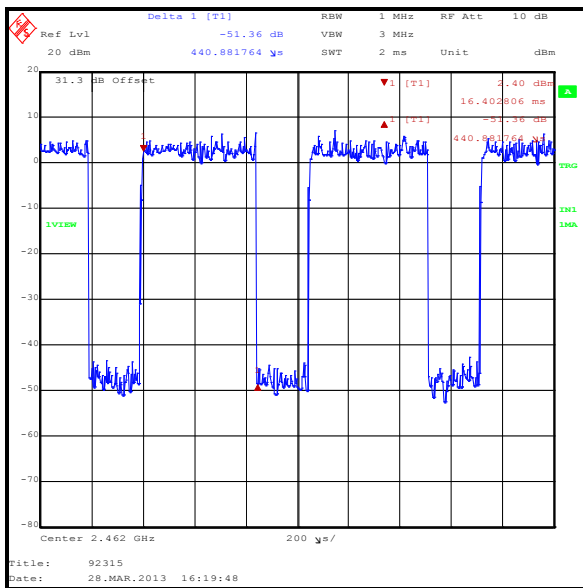
**100 ms**

**Transmitter Duty Cycle (continued)**

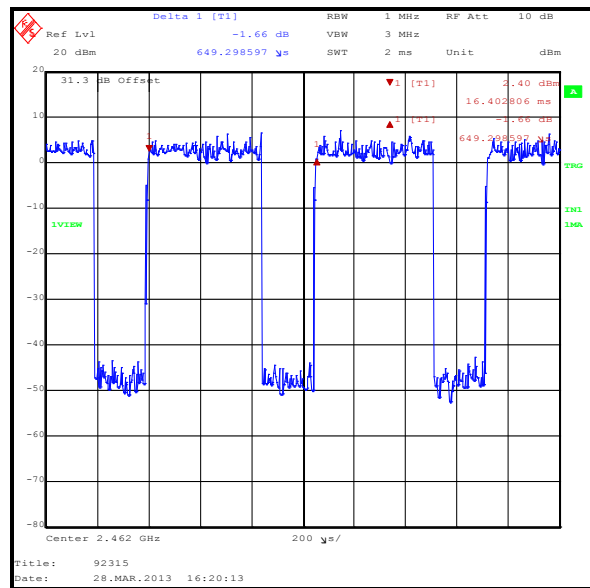
**Results: 802.11g / 20 MHz / 18 Mbps**

Pulse Duration (ms)	Duty Cycle (dB)
0.441	1.7

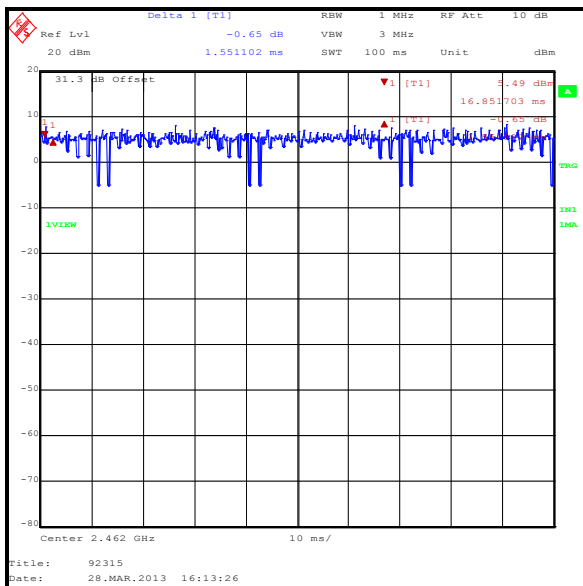
Period (ms)
0.649



**TX on time**



**TX on + off time / period**



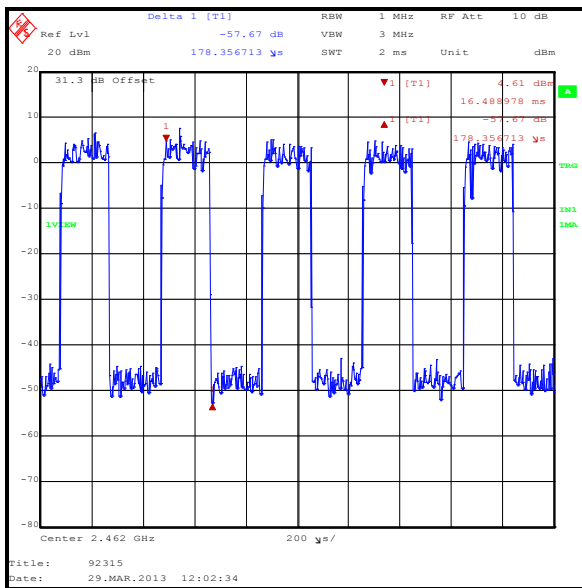
**100 ms**

**Transmitter Duty Cycle (continued)**

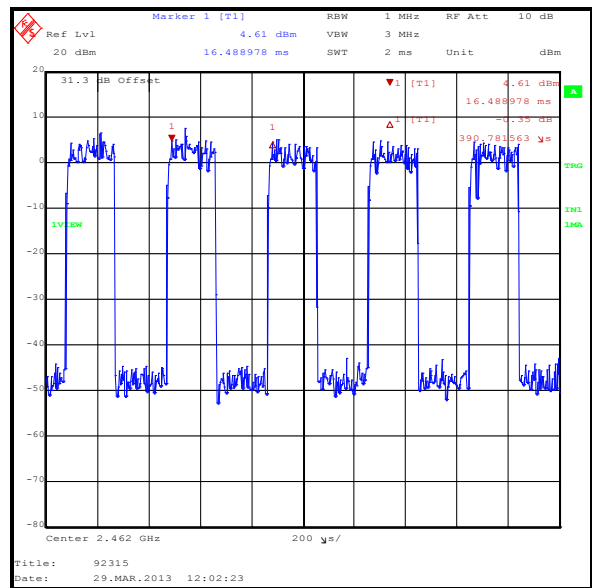
**Results: 802.11n / 20 MHz / 52 Mbps / MCS5**

Pulse Duration (ms)	Duty Cycle (dB)
0.178	3.4

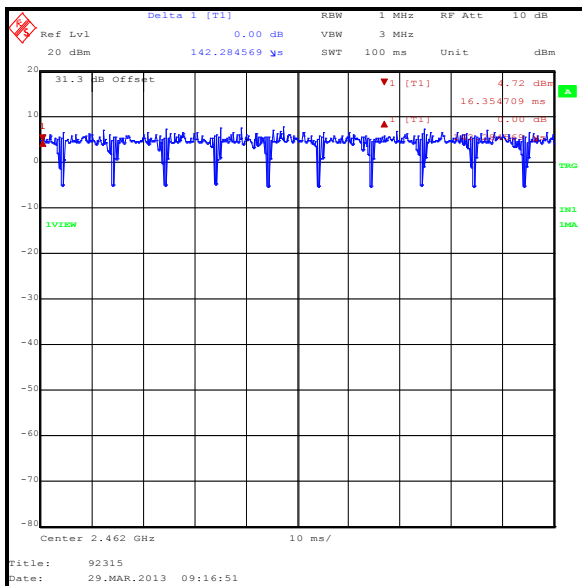
Period (ms)
0.391



**TX on time**



**TX on + off time / period**



**100 ms**

**Transmitter Duty Cycle (continued)****Test Equipment Used:**

<b>RFI No.</b>	<b>Instrument</b>	<b>Manufacturer</b>	<b>Type No.</b>	<b>Serial No.</b>	<b>Date Calibration Due</b>	<b>Cal. Interval (Months)</b>
A1490	Attenuator	Weinschel Corp	23-30-34	BH9156	03 Apr 2013	12
M1379	Spectrum Analyser	Rohde & Schwarz	ESIB7	100330	15 Oct 2013	12



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

<b>Test Engineer:</b>	Patrick Jones	<b>Test Date:</b>	09 April 2013
<b>Test Sample IMEI:</b>	355335050017079		

<b>FCC Reference:</b>	Part 15.247(e)
<b>Test Method Used:</b>	As detailed in FCC KDB 558074 Sections 9.1, 9.3 & 9.4

**Environmental Conditions:**

<b>Temperature (°C):</b>	24
<b>Relative Humidity (%):</b>	29

**Note(s):**

- All configurations supported by the EUT were investigated on one channel in accordance with KDB 558074 Section 9.3 Option 3 measurement procedure and 9.4 Alternative 1. The data rates that produced the highest power and therefore deemed worst case were:
  - 802.11b – DBPSK / 1 Mbps
  - 802.11g – QPSK / 18 Mbps
  - 802.11n HT20 – 64QAM / 52 Mbps / MCS5 (Greenfield mode / GI = 800 ns)
- Final measurements were performed using the above configurations on the bottom, middle and top channels.
- For 802.11b, the EUT was transmitting at 98% duty cycle and testing was performed in accordance with KDB 558074 Section 9.1.
- For 802.11g and 802.11n, the EUT was transmitting at <98% duty cycle. The calculated duty cycle in section 5.2.5 was added to the measured average power spectral density in order to compute the power spectral density.

**Transmitter Power Spectral Density (continued)**

**Results: 802.11b / 20 MHz / DBPSK / 1 Mbps**

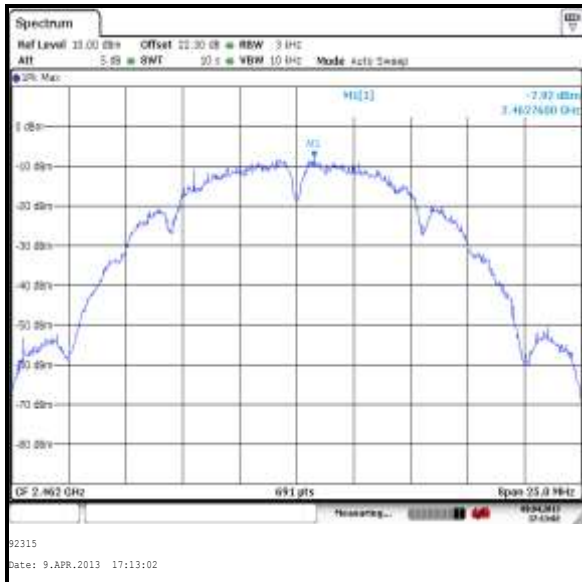
Channel	Output Power (dBm/3 kHz)	Limit (dBm/3 kHz)	Margin (dB)	Result
Bottom	-6.5	8.0	14.5	Complied
Middle	-7.4	8.0	15.4	Complied
Top	-7.9	8.0	15.9	Complied



**Bottom Channel**



**Middle Channel**

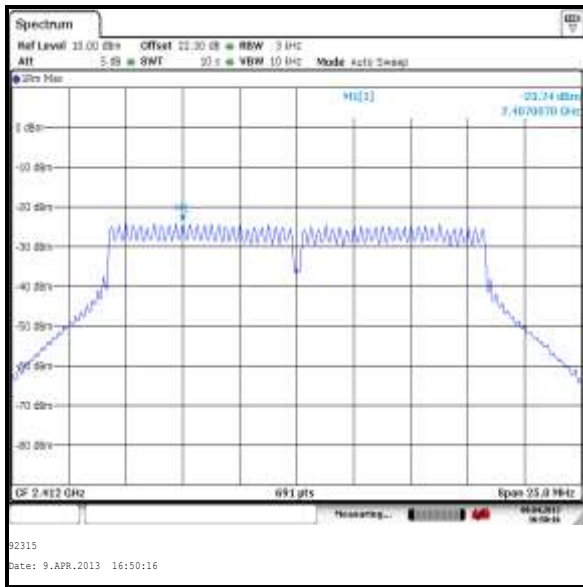


**Top Channel**

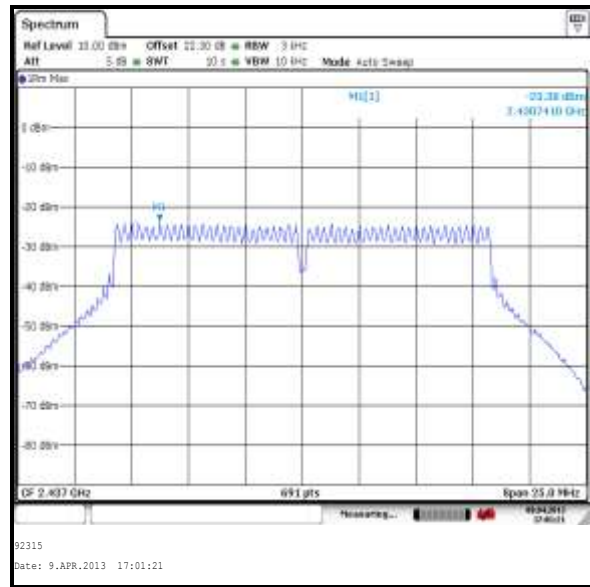
**Transmitter Power Spectral Density (continued)**

**Results: 802.11g / 20 MHz / QPSK / 18 Mbps**

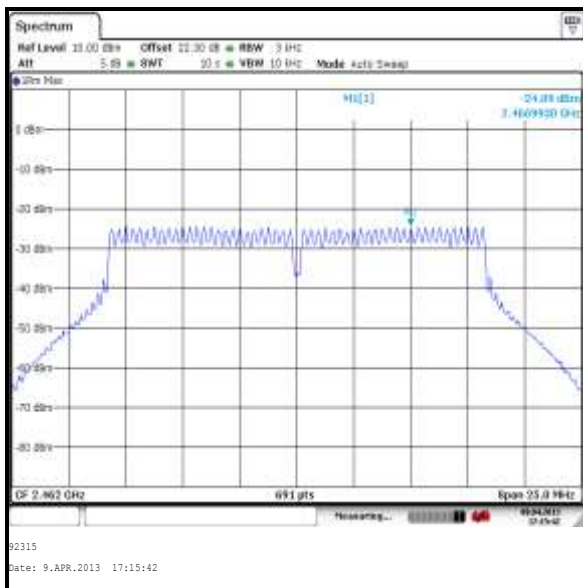
Channel	Output Power (dBm/3 kHz)	Duty cycle correction (dB)	Corrected Output Power (dBm/3 kHz)	Limit (dBm/3 kHz)	Margin (dB)	Result
Bottom	-23.7	1.7	-22.0	8.0	30.0	Complied
Middle	-23.4	1.7	-21.7	8.0	29.7	Complied
Top	-24.1	1.7	-22.4	8.0	30.4	Complied



**Bottom Channel**



**Middle Channel**

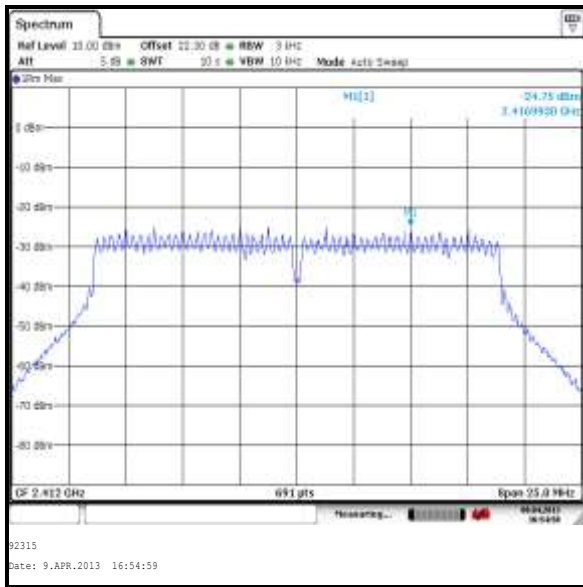


**Top Channel**

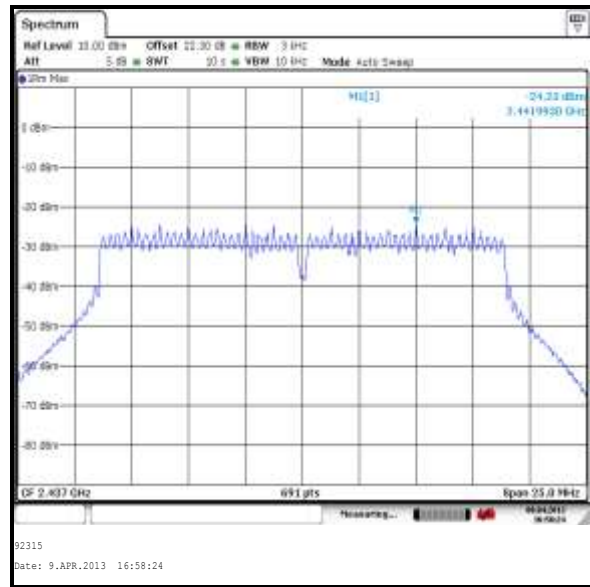
**Transmitter Power Spectral Density (continued)**

**Results: 802.11n / 20 MHz / 64QAM / 52 Mbps / MCS5**

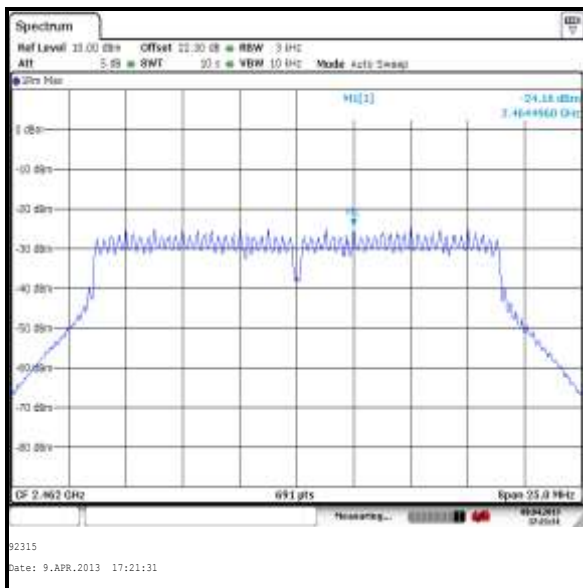
Channel	Output Power (dBm/3 kHz)	Duty cycle correction (dB)	Corrected Output Power (dBm/3 kHz)	Limit (dBm/3 kHz)	Margin (dB)	Result
Bottom	-24.8	3.4	-21.4	8.0	29.4	Complied
Middle	-24.2	3.4	-20.8	8.0	28.8	Complied
Top	-24.2	3.4	-20.8	8.0	28.8	Complied



**Bottom Channel**



**Middle Channel**



**Top Channel**

**Transmitter Power Spectral Density (continued)****Test Equipment Used:**

<b>RFI No.</b>	<b>Instrument</b>	<b>Manufacturer</b>	<b>Type No.</b>	<b>Serial No.</b>	<b>Date Calibration Due</b>	<b>Cal. Interval (Months)</b>
A1393	Attenuator	Huber & Suhner	6820.17.B	757456	06 Jul 2013	12
L1028	Signal Analyser	Rohde & Schwarz	FSV	100854	15 Feb 2014	12

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

<b>Test Engineer:</b>	Patrick Jones	<b>Test Date:</b>	08 April 2013
<b>Test Sample IMEI:</b>	355335050017079		

<b>FCC Reference:</b>	Part 15.247(b)(3)
<b>Test Method Used:</b>	As detailed in FCC KDB 558074 Sections 8.1.2, 8.2.2 / Alternative 1

**Environmental Conditions:**

<b>Temperature (°C):</b>	24
<b>Relative Humidity (%):</b>	29

**Note(s):**

1. All configurations supported by the EUT were investigated on one channel in accordance with KDB 558074 Section 8.2.2 measurement procedure and 8.2.4 Alternative 1. The spectrum analyser was connected to the RF port on the EUT using suitable attenuation and RF cable. The data rates that produced the highest power and therefore deemed worst case were:
  - 802.11b – DBPSK / 1 Mbps
  - 802.11g – QPSK / 18 Mbps
  - 802.11n HT20 – 64QAM / 52 Mbps / MCS5 (Greenfield mode / GI = 800 ns)
2. Final measurements were performed using the above configurations on the bottom, middle and top channels.
3. For 802.11b, the EUT was transmitting at 98% duty cycle and testing was performed in accordance with KDB 558074 Section 8.1.2.
4. For 802.11g and 802.11n, the EUT was transmitting at <98% duty cycle. The calculated duty cycle in section 5.2.5 was added to the measured average power in order to compute the power during the actual transmission time.

**Transmitter Maximum Peak Output Power (continued)****Results: 802.11b / 20 MHz / DBPSK / 1 Mbps****Conducted Peak Limit Comparison**

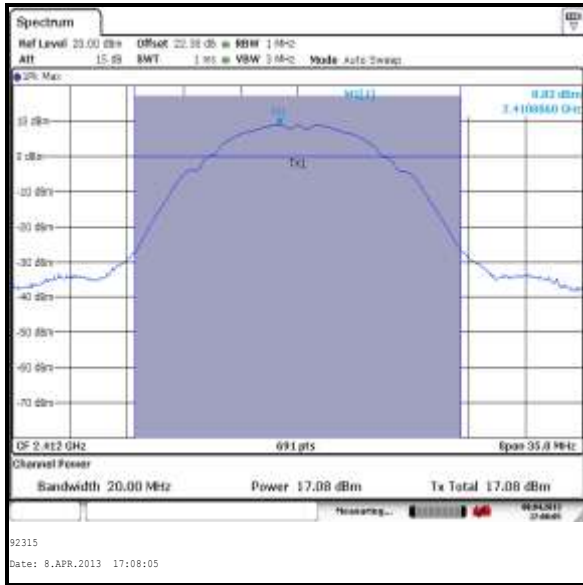
Channel	Conducted Power (dBm)	Conducted Peak Power Limit (dBm)	Margin (dB)	Result
Bottom	17.1	30.0	12.9	Complied
Middle	17.5	30.0	12.5	Complied
Top	17.3	30.0	12.7	Complied

**De Facto EIRP Limit Comparison**

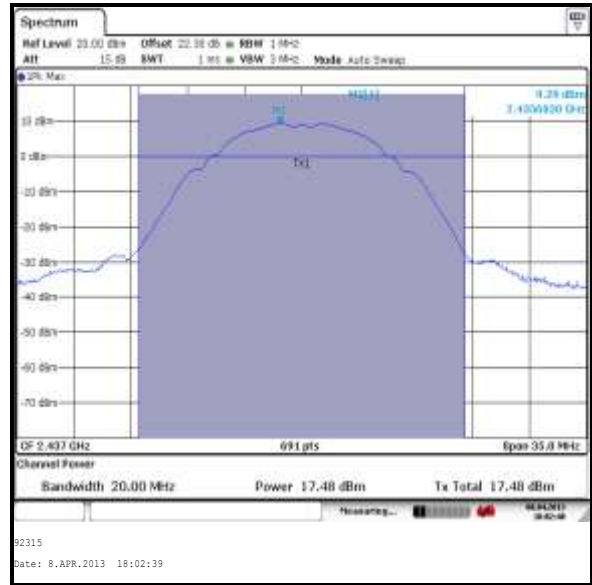
Channel	Conducted Power (dBm)	Declared Antenna Gain (dBi)	EIRP (dBm)	De Facto EIRP Limit (dBm)	Margin (dB)	Result
Bottom	17.1	-2.0	15.1	36.0	20.9	Complied
Middle	17.5	-2.0	15.5	36.0	20.5	Complied
Top	17.3	-2.0	15.3	36.0	20.7	Complied

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

**Results: 802.11b / 20 MHz / DBPSK / 1 Mbps**



**Bottom Channel**



**Middle Channel**



**Top Channel**



**Transmitter Maximum Peak Output Power (continued)****Results: 802.11g / 20 MHz / QPSK / 18 Mbps****Conducted Peak Limit Comparison**

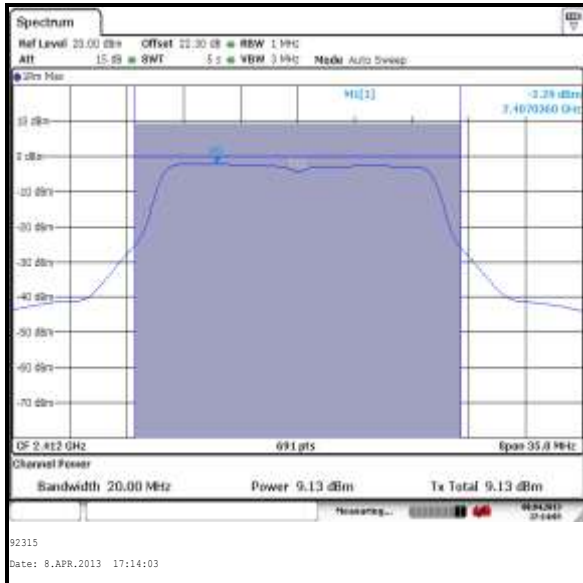
Channel	Conducted Power (dBm)	Duty cycle correction (dB)	Corrected Conducted Power (dBm)	Conducted Peak Power Limit (dBm)	Margin (dB)	Result
Bottom	9.1	1.7	10.8	30.0	19.2	Complied
Middle	9.7	1.7	11.4	30.0	18.6	Complied
Top	9.7	1.7	11.4	30.0	18.6	Complied

**De Facto EIRP Limit Comparison**

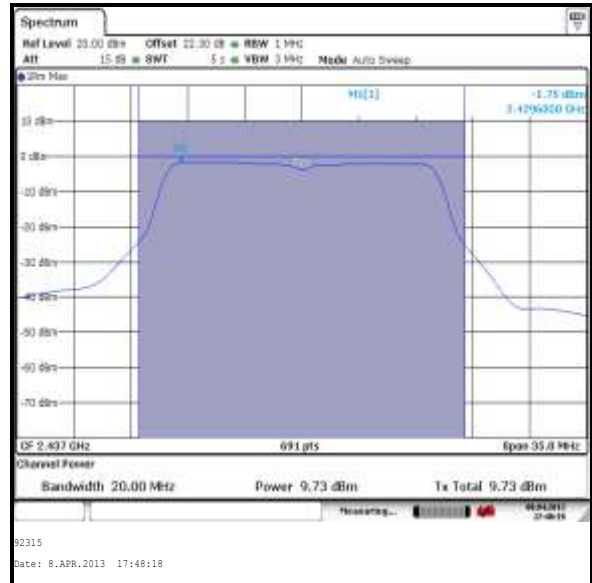
Channel	Corrected Conducted Power (dBm)	Declared Antenna Gain (dBi)	EIRP (dBm)	De Facto EIRP Limit (dBm)	Margin (dB)	Result
Bottom	10.8	-2.0	8.8	36.0	27.2	Complied
Middle	11.4	-2.0	9.4	36.0	26.6	Complied
Top	11.4	-2.0	9.4	36.0	26.6	Complied

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

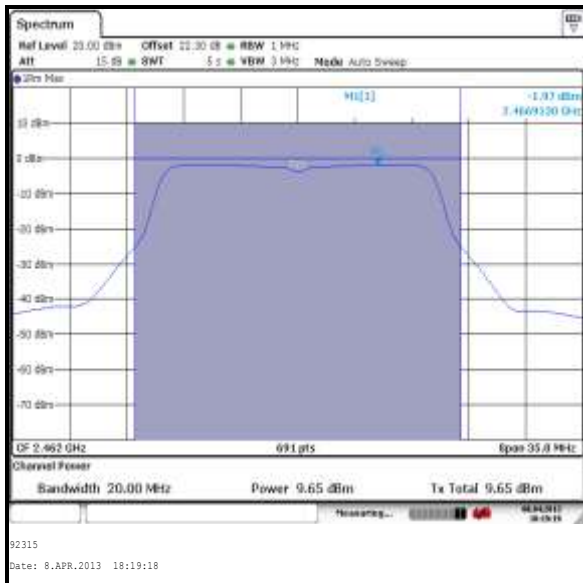
**Results: 802.11g / 20 MHz / QPSK / 18 Mbps**



**Bottom Channel**



**Middle Channel**



**Top Channel**

**Transmitter Maximum Peak Output Power (continued)****Results: 802.11n / 20 MHz / 64QAM / 52 Mbps / MCS5****Conducted Peak Limit Comparison**

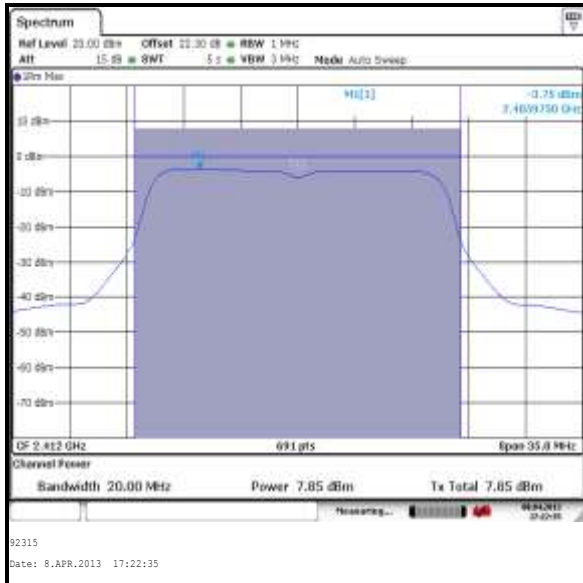
Channel	Conducted Power (dBm)	Duty cycle correction (dB)	Corrected Conducted Power (dBm)	Conducted Peak Power Limit (dBm)	Margin (dB)	Result
Bottom	7.9	3.4	11.3	30.0	18.7	Complied
Middle	8.2	3.4	11.6	30.0	18.4	Complied
Top	8.1	3.4	11.5	30.0	18.5	Complied

**De Facto EIRP Limit Comparison**

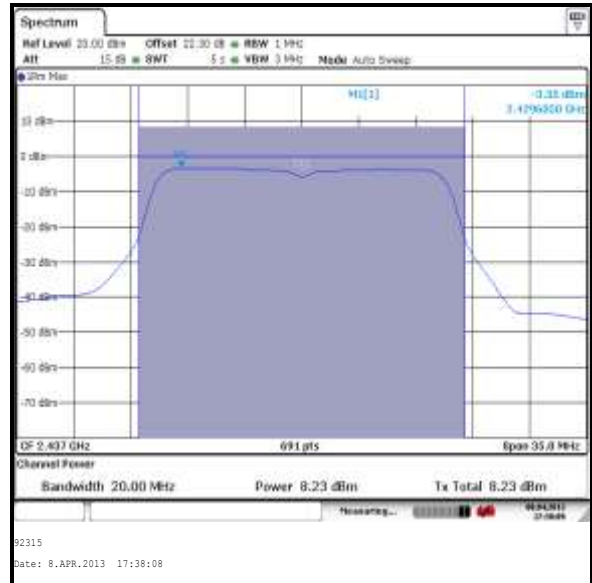
Channel	Corrected Conducted Power (dBm)	Declared Antenna Gain (dBi)	EIRP (dBm)	De Facto EIRP Limit (dBm)	Margin (dB)	Result
Bottom	11.3	-2.0	9.3	36.0	26.7	Complied
Middle	11.6	-2.0	9.6	36.0	26.4	Complied
Top	11.5	-2.0	9.5	36.0	26.5	Complied

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

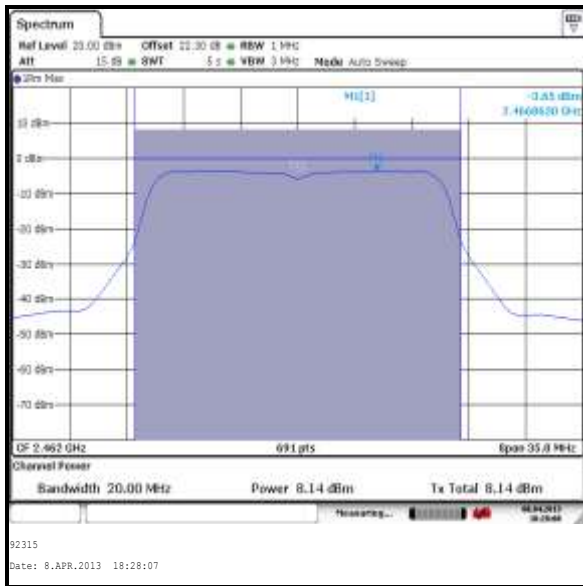
**Results: 802.11n / 20 MHz / 64QAM / 52 Mbps / MCS5**



**Bottom Channel**



**Middle Channel**



**Top Channel**

**Test Equipment Used:**

RFI No.	Instrument	Manufacturer	Type No.	Serial No.	Date Calibration Due	Cal. Interval (Months)
A1393	Attenuator	Huber & Suhner	6820.17.B	757456	06 Jul 2013	12
L1028	Signal Analyser	Rohde & Schwarz	FSV	100854	15 Feb 2014	12

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

<b>Test Engineer:</b>	Sarah Williams	<b>Test Date:</b>	29 March 2013
<b>Test Sample IMEI:</b>	355335050017228		

<b>FCC Reference:</b>	Parts 15.247(d) & 15.209(a)
<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>	22
<b>Relative Humidity (%):</b>	26

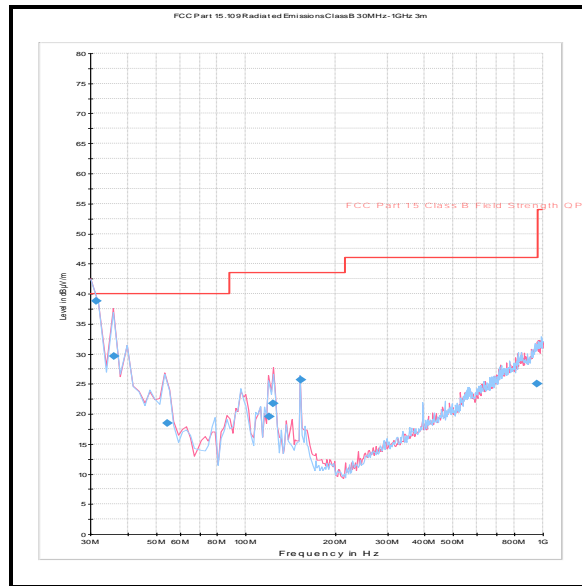
**Note(s):**

1. The final measured value, for the given emission, in the table below 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 were at least 20 dB below the appropriate limit or below the noise floor of the measurement system.
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.

**Results: Top Channel / 802.11b / 20 MHz / DBPSK / 1 Mbps**

<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>
120.030	Vertical	19.6	43.5	23.9	Complied
123.994	Vertical	21.8	43.5	21.7	Complied

**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 No.	Instrument	Manufacturer	Type No.	Serial No.	Date Calibration Due	Cal. Interval (Months)
A1834	Attenuator	Hewlett Packard	8491B	10444	27 Jan 2014	12
A490	Antenna	Chase	CBL6111A	1590	14 May 2013	12
G0543	Amplifier	Sonoma	310N	230801	03 Apr 2013	3
K0001	5m RSE Chamber	Rainford EMC	N/A	N/A	24 Oct 2013	12
M1273	Test Receiver	Rohde & Schwarz	ESIB 26	100275	15 Feb 2014	12

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

<b>Test Engineer:</b>	David Doyle	<b>Test Date:</b>	04 April 2013
<b>Test Sample IMEI:</b>	355335050017228		

<b>FCC Reference:</b>	Parts 15.247(d) & 15.209(a)
<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 25 GHz

**Environmental Conditions:**

<b>Temperature (°C):</b>	21
<b>Relative Humidity (%):</b>	29

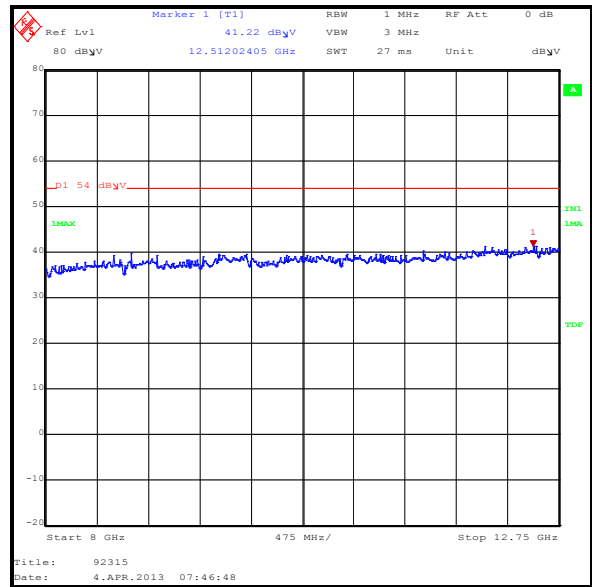
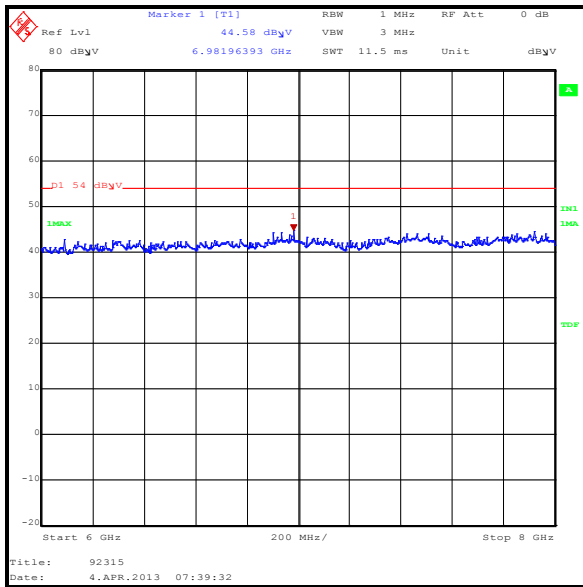
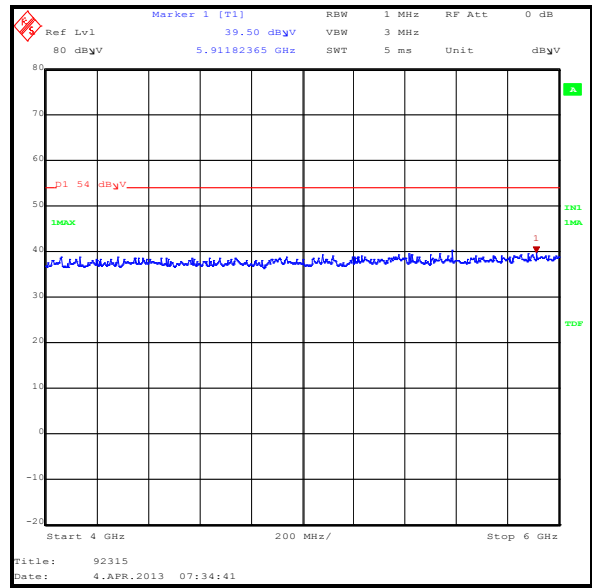
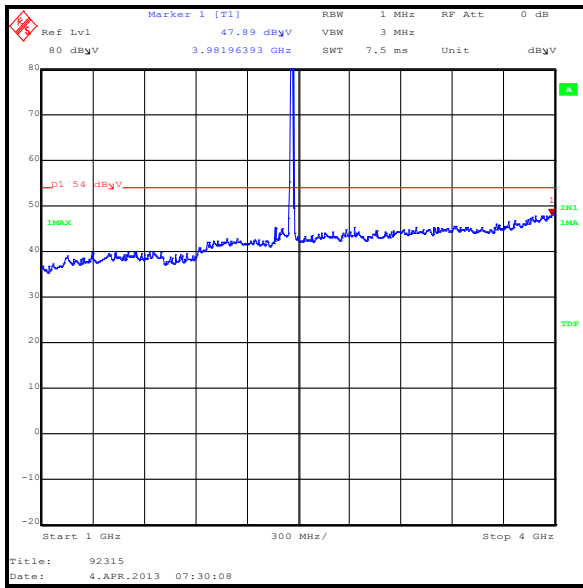
**Note(s):**

1. The final measured value, for the given emission, in the table below incorporates the calibrated antenna factor and cable loss
2. 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 below. 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.
3. The emission shown at 2462 MHz on the 1 GHz to 4 GHz plot is the EUT fundamental.
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.

**Results:**

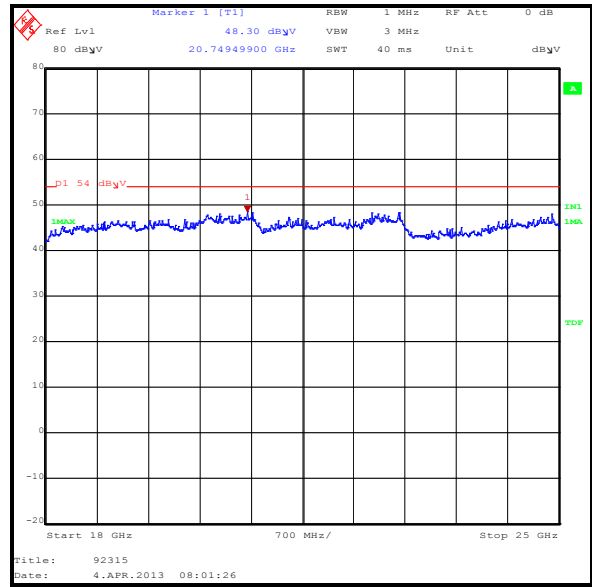
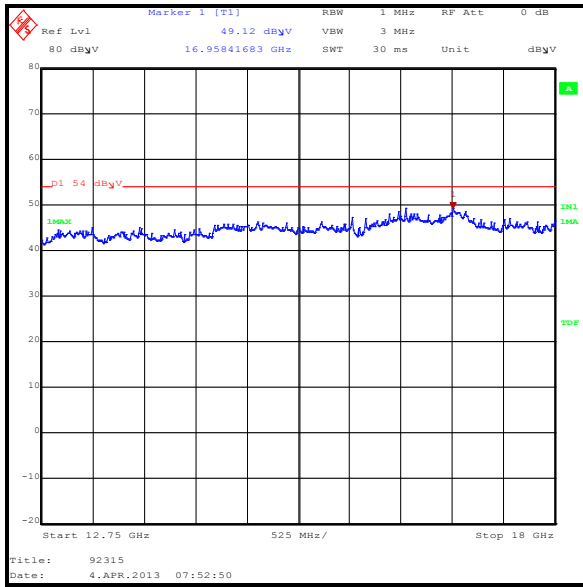
<b>Frequency (MHz)</b>	<b>Antenna Polarity</b>	<b>Peak Level (dB<math>\mu</math>V/m)</b>	<b>Average Limit (dB<math>\mu</math>V/m)</b>	<b>Margin (dB)</b>	<b>Result</b>
16958.417	Horizontal	49.1	54.0	4.9	Complied

### Transmitter Radiated Emissions (continued)





**Transmitter Radiated Emissions (continued)**



**Test Equipment Used:**

RFI No.	Instrument	Manufacturer	Type No.	Serial No.	Date Calibration Due	Cal. Interval (Months)
K0002	3m RSE Chamber	Rainford EMC	N/A	N/A	04 Nov 2013	12
M1124	Test Receiver	Rohde & Schwarz	ESIB 26	100046K	14 Aug 2013	12
A1534	Pre Amplifier	Hewlett Packard	8449B	3008A00405	04 Nov 2013	12
A1818	Antenna	EMCO	3115	00075692	04 Nov 2013	12
A253	Antenna	Flann Microwave	12240-20	128	04 Nov 2013	12
A254	Antenna	Flann Microwave	14240-20	139	04 Nov 2013	12
A255	Antenna	Flann Microwave	16240-20	519	04 Nov 2013	12
A256	Antenna	Flann Microwave	18240-20	400	04 Nov 2013	12
A436	Antenna	Flann Microwave	20240-20	330	04 Nov 2013	12

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

<b>Test Engineer:</b>	David Doyle	<b>Test Date:</b>	04 April 2013
<b>Test Sample IMEI:</b>	355335050017228		

<b>FCC Reference:</b>	Parts 15.247(d) & 15.209(a)
<b>Test Method Used:</b>	As detailed in ANSI C63.10 Section 6.9.2

**Environmental Conditions:**

<b>Temperature (°C):</b>	21
<b>Relative Humidity (%):</b>	29

**Note(s):**

- All configurations supported by the EUT were investigated on one channel. The data rates that produced the highest power and widest bandwidth were therefore deemed worst case :
- Highest power
  - 802.11b – DBPSK / 1 Mbps
  - 802.11g – QPSK / 18 Mbps
  - 802.11n HT20 – 64QAM / 52 Mbps / MCS5 (Greenfield mode / GI = 800 ns)
- Widest bandwidth
  - 802.11b – CCK / 5.5 Mbps
  - 802.11g – QPSK / 18 Mbps
  - 802.11n HT20 – BPSK / 7.2 Mbps / MCS0 (Mixed mode / GI = 400 ns)
- Final measurements were performed with the above configurations.
- The final measured value, for the given emission, in the table below incorporates the calibrated antenna factor and cable loss.
- For 802.11b / 1 Mbps, maximum peak conducted output power was previously measured. In accordance with FCC KDB 558074 Section 10.1 note 1, the lower band edge measurement was performed with a peak detector and the -20 dBc limit applied.
- For 802.11b / 5.5 Mbps, 802.11g and 802.11n, maximum (average) conducted power was previously measured or the duty cycle was less than 98% in the case of the widest bandwidth data rates. In accordance with FCC KDB 558074 Section 10.1 note 2, the lower band edge measurement should be performed with a peak detector and the -30 dBc limit applied.
- For 802.11b / 5.5 Mbps, 802.11g and 802.11n, the plots show the lower band edge measurements with a -20 dBc limit. The limit in the results tables have been adjusted for a -30 dBc limit.
- \* -20 dBc limit.
- \*\* -30 dBc limit (adjusted).

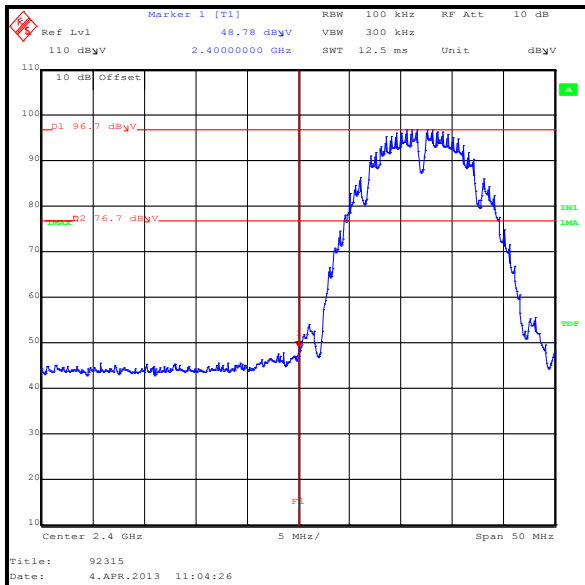
**Transmitter Band Edge Radiated Emissions (continued)**

**Results: Peak / 802.11b / 20 MHz / DBPSK / 1 Mbps**

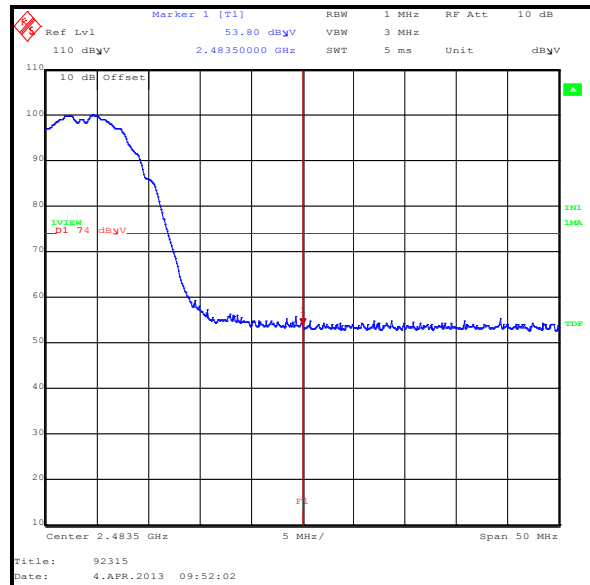
Frequency (MHz)	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Result
2400	48.8	76.7*	27.9	Complied
2483.5	53.8	74.0	20.2	Complied

**Results: Average / 802.11b / 20 MHz / DBPSK / 1 Mbps**

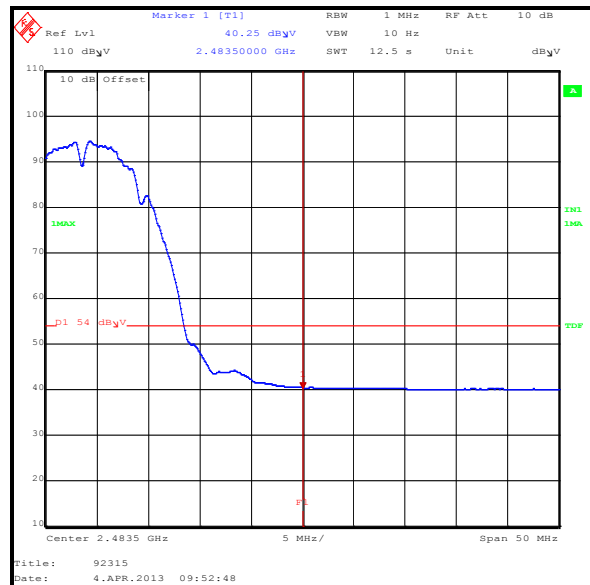
Frequency (MHz)	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Result
2483.5	40.3	54.0	13.7	Complied



**Lower Band Edge Peak Measurement**



**Upper Band Edge Peak Measurement**



**Upper Band Edge Average Measurement**

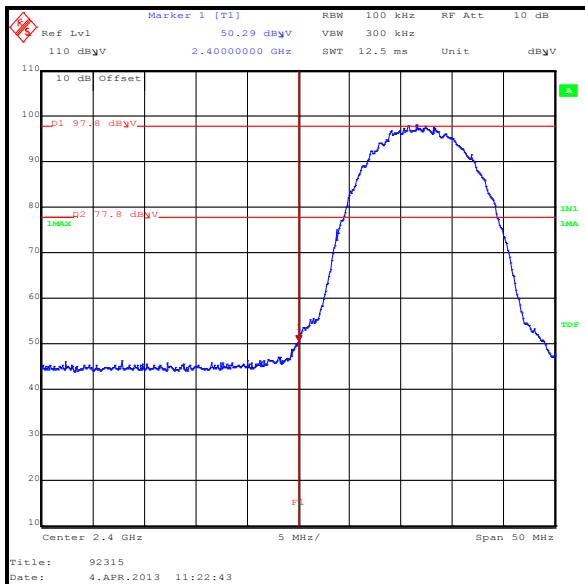
**Transmitter Band Edge Radiated Emissions (continued)**

**Results: Peak / 802.11b / 20 MHz / CCK / 5.5 Mbps**

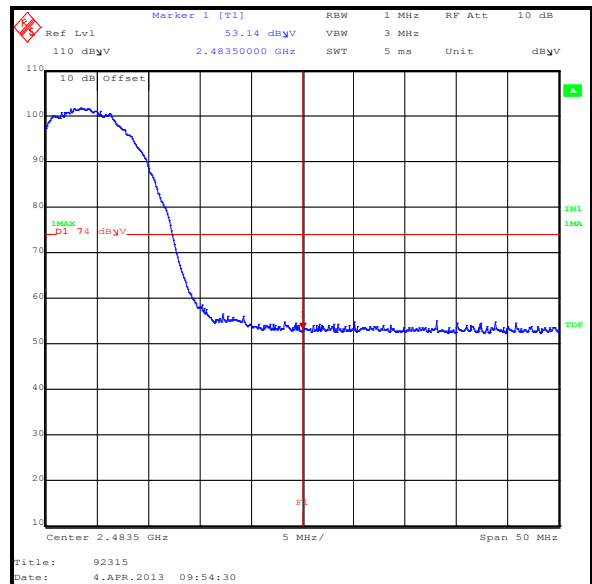
Frequency (MHz)	Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
2400	50.3	67.8**	17.5	Complied
2483.5	53.1	74.0	20.9	Complied

**Results: Average / 802.11b / 20 MHz / CCK / 5.5 Mbps**

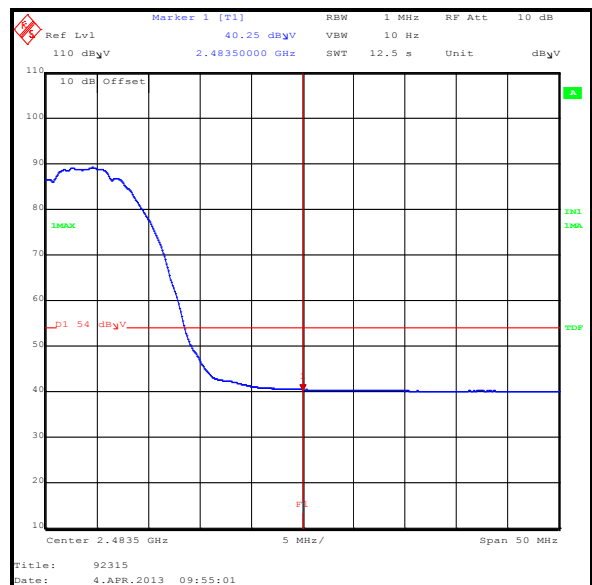
Frequency (MHz)	Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
2483.5	40.3	54.0	13.7	Complied



**Lower Band Edge Peak Measurement**



**Upper Band Edge Peak Measurement**



**Upper Band Edge Average Measurement**

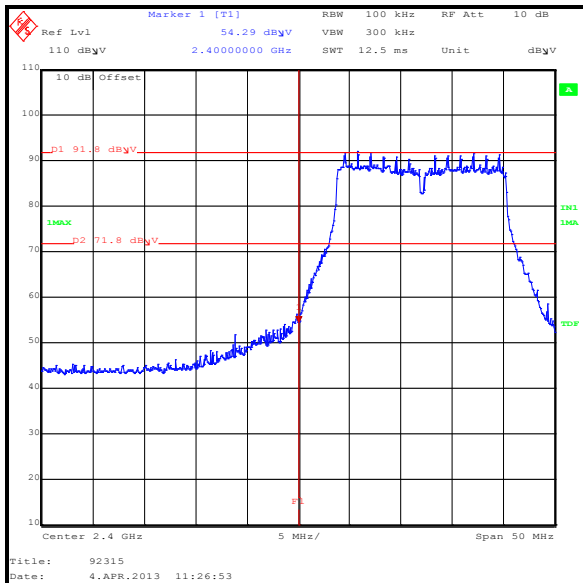
**Transmitter Band Edge Radiated Emissions (continued)**

**Results: Peak / 802.11g / 20 MHz / QPSK / 18 Mbps**

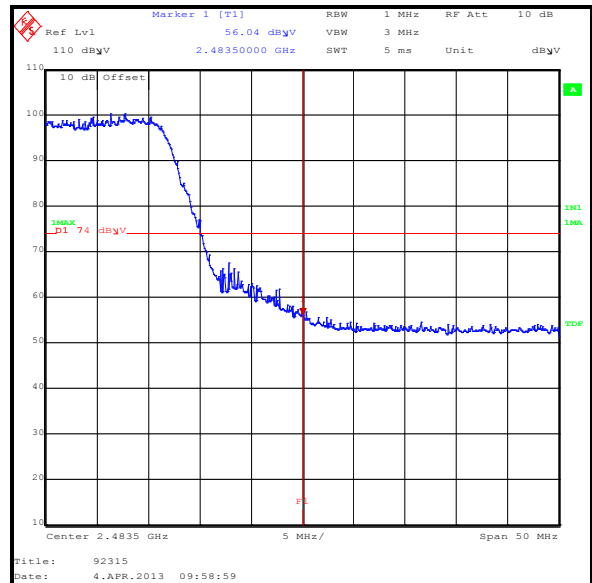
Frequency (MHz)	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Result
2400	54.3	61.8**	7.5	Complied
2483.5	56.0	74.0	18.0	Complied

**Results: Average / 802.11g / 20 MHz / QPSK / 18 Mbps**

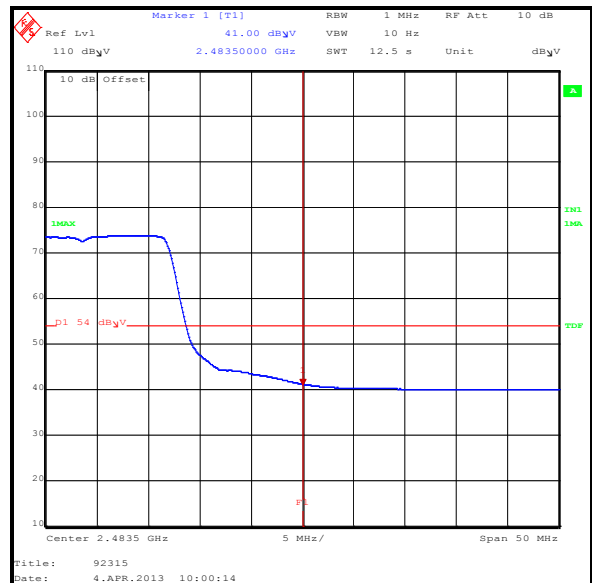
Frequency (MHz)	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Result
2483.5	41.0	54.0	13.0	Complied



**Lower Band Edge Peak Measurement**



**Upper Band Edge Peak Measurement**



**Upper Band Edge Average Measurement**

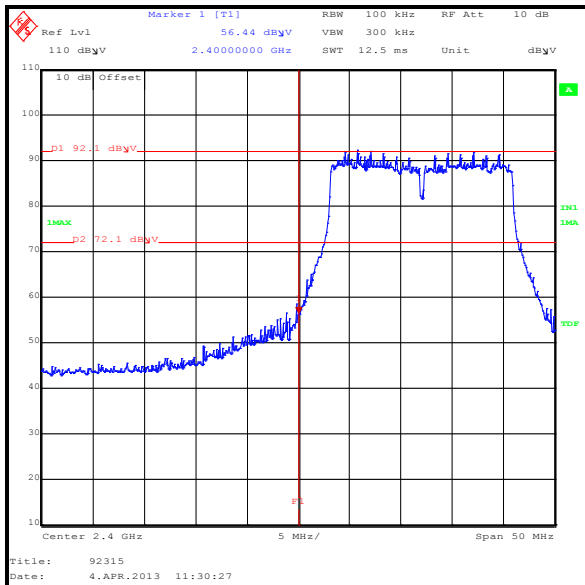
**Transmitter Band Edge Radiated Emissions (continued)**

**Results: Peak / 802.11n / 20 MHz / 64QAM / 52.0 Mbps / MCS5**

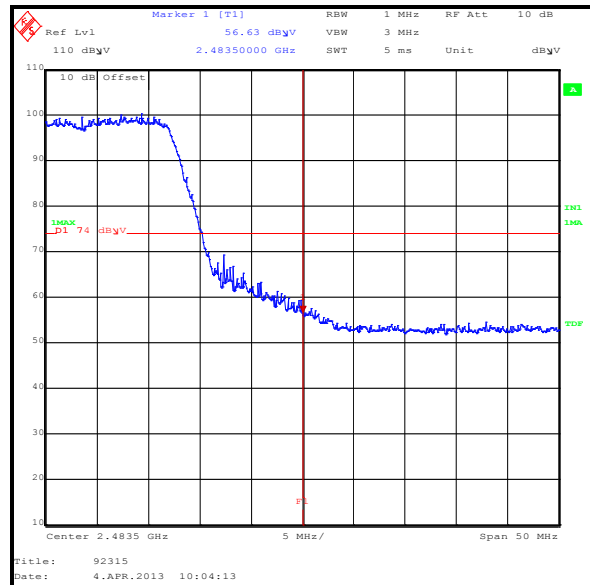
Frequency (MHz)	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Result
2400	56.4	62.1**	5.7	Complied
2483.5	56.6	74.0	17.4	Complied

**Results: Average / 802.11n / 20 MHz / 64QAM / 52.0 Mbps / MCS5**

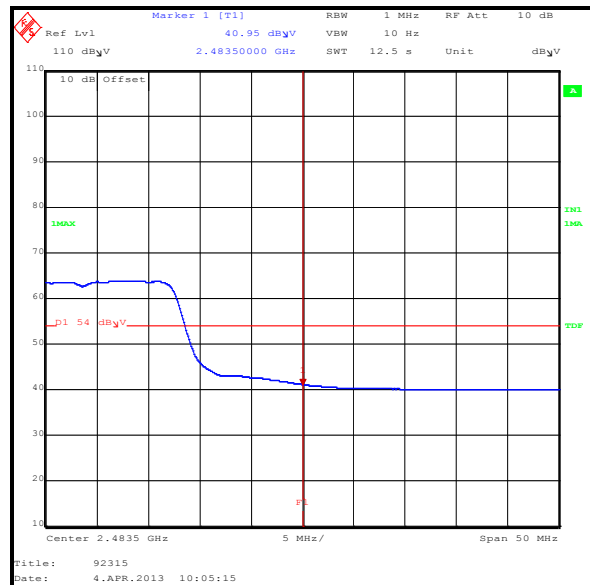
Frequency (MHz)	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Result
2483.5	41.0	54.0	13.0	Complied



**Lower Band Edge Peak Measurement**



**Upper Band Edge Peak Measurement**



**Upper Band Edge Average Measurement**

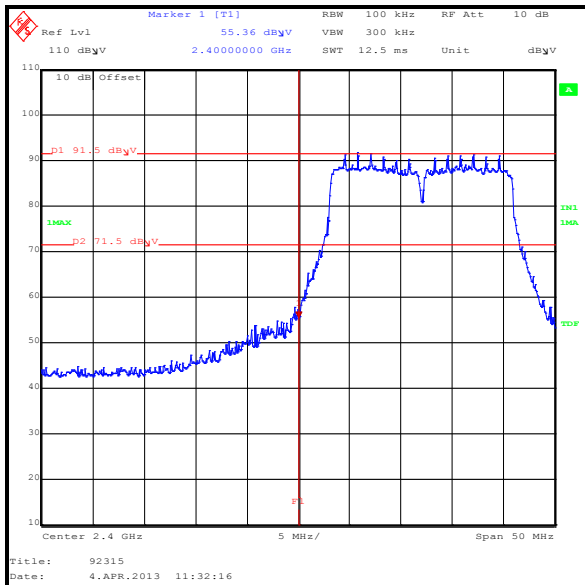
**Transmitter Band Edge Radiated Emissions (continued)**

**Results: Peak / 802.11n / 20 MHz / BPSK / 7.2 Mbps / MCS0**

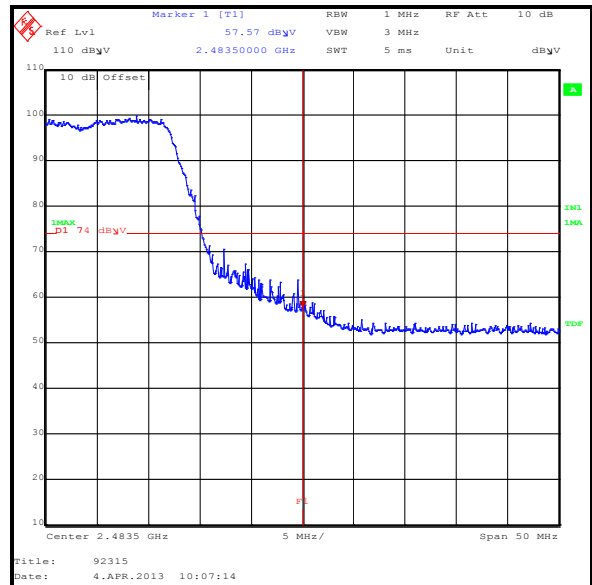
Frequency (MHz)	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Result
2400	55.4	61.5**	6.1	Complied
2483.5	57.6	74.0	16.4	Complied

**Results: Average / 802.11n / 20 MHz / BPSK / 7.2 Mbps / MCS0**

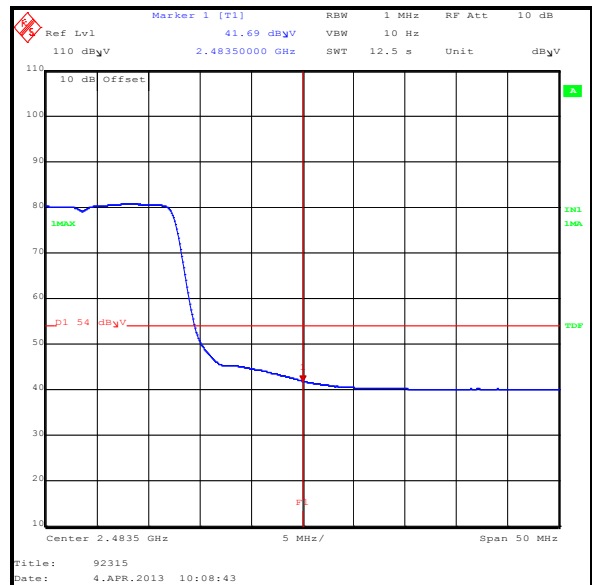
Frequency (MHz)	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Result
2483.5	41.7	54.0	12.3	Complied



**Lower Band Edge Peak Measurement**



**Upper Band Edge Peak Measurement**



**Upper Band Edge Average Measurement**

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

<b>RFI No.</b>	<b>Instrument</b>	<b>Manufacturer</b>	<b>Type No.</b>	<b>Serial No.</b>	<b>Date Calibration Due</b>	<b>Cal. Interval (Months)</b>
K0002	3m RSE Chamber	Rainford EMC	N/A	N/A	04 Nov 2013	12
A1818	Antenna	EMCO	3115	00075692	04 Nov 2013	12
A1534	Pre Amplifier	Hewlett Packard	8449B	3008A00405	04 Nov 2013	12
M1124	Test Receiver	Rohde & Schwarz	ESIB 26	100046K	14 Aug 2013	12
A1396	Attenuator	Huber & Suhner	6810.17.B	757987	06 Jul 2013	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%	±4.69 dB
Conducted Maximum Peak Output Power	2.4 GHz to 2.4835 GHz	95%	±1.13 dB
Spectral Power Density	2.4 GHz to 2.4835 GHz	95%	±1.13 dB
6 dB Bandwidth	2.4 GHz to 2.4835 GHz	95%	±0.92 ppm
Radiated Spurious Emissions	30 MHz to 25 GHz	95%	±2.94 dB
Duty Cycle	2.4 GHz to 2.4835 GHz	95%	±0.3 ns

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