



# TEST REPORT

**Test Report No. : UL-RPT-RP10014929JD24A**

**Manufacturer** : Sony Mobile Communications AB  
**Type No.** : PM-0470-BV  
**FCC ID** : PY7PM-0470  
**Technology** : *Bluetooth* – Basic Rate & EDR  
**Test Standard(s)** : FCC Parts 15.207, 15.209(a) & 15.247

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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:** 31 July 2013

**Checked by:**   
Sarah Williams  
WiSE Laboratory Engineer

**Issued by :**   
pp  
John Newell  
Group Quality Manager, WiSE  
Basingstoke,  
UL VS LTD



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**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	5
2.4. Deviations from the Test Specification	5
<b>3. Equipment Under Test (EUT) .....</b>	<b>6</b>
3.1. Identification of Equipment Under Test (EUT)	6
3.2. Description of EUT	7
3.3. Modifications Incorporated in the EUT	7
3.4. Additional Information Related to Testing	8
3.5. Support Equipment	8
<b>4. Operation and Monitoring of the EUT during Testing .....</b>	<b>9</b>
4.1. Operating Modes	9
4.2. Configuration and Peripherals	9
<b>5. Measurements, Examinations and Derived Results .....</b>	<b>10</b>
5.1. General Comments	10
5.2. Test Results	11
5.2.1. Transmitter AC Conducted Spurious Emissions	11
5.2.2. Transmitter 20 dB Bandwidth	14
5.2.3. Transmitter Carrier Frequency Separation	19
5.2.4. Transmitter Number of Hopping Frequencies and Average Time of Occupancy	22
5.2.5. Transmitter Maximum Peak Output Power	25
5.2.6. Transmitter Radiated Emissions	33
5.2.7. Transmitter Band Edge Radiated Emissions	38
<b>6. Measurement Uncertainty .....</b>	<b>46</b>
<b>7. Report Revision History .....</b>	<b>47</b>

## **1. Customer Information**

<b>Company Name:</b>	Sony Mobile Communications AB
<b>Address:</b>	Nya Vattentornet Lund SE-221 88 Sweden

## 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): Part 15 Subpart C (Intentional Radiators) - Section 15.247
<b>Specification Reference:</b>	47CFR15.207 and 47CFR15.209
<b>Specification Title:</b>	Code of Federal Regulations Volume 47 (Telecommunications): Part 15 Subpart C (Intentional Radiators) - Sections 15.207 and 15.209
<b>Site Registration:</b>	FCC: 209735
<b>Location of Testing:</b>	UL VS LTD, Unit 3 Horizon, Wade Road, Kingsland Business Park, Basingstoke, Hampshire, RG24 8AH, United Kingdom
<b>Test Dates:</b>	16 July 2013 to 26 July 2013

### 2.2. Summary of Test Results

FCC Reference (47CFR)	Measurement	Result
Part 15.207	Transmitter AC Conducted Emissions	✓
Part 15.247(a)(1)	Transmitter 20 dB Bandwidth	✓
Part 15.247(a)(1)	Transmitter Carrier Frequency Separation	✓
Part 15.247(a)(1)(iii)	Transmitter Number of Hopping Frequencies and Average Time of Occupancy	✓
Part 15.247(b)(1)	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	✓

**Key to Results**

✓ = 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

### 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>	Sony
<b>IMEI:</b>	004402451245652 ( <i>Radiated sample</i> )
<b>Serial Number:</b>	CB5124VVNP
<b>Hardware Version Number:</b>	AP2
<b>Software Version Number:</b>	14.1.C.1.130
<b>FCC ID:</b>	PY7PM-0470

<b>Brand Name:</b>	Sony
<b>IMEI:</b>	004402451246551 ( <i>Conducted sample</i> )
<b>Serial Number:</b>	CB5124VVK8
<b>Hardware Version Number:</b>	AP2
<b>Software Version Number:</b>	14.1.C.1.130
<b>FCC ID:</b>	PY7PM-0470

<b>Brand Name:</b>	Sony
<b>Description:</b>	AC Charger
<b>Model Name or Number:</b>	EP880

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

<b>Brand Name:</b>	Sony
<b>Description:</b>	MHL Adaptor
<b>Model Name or Number:</b>	IM750

<b>Brand Name:</b>	Sony
<b>Description:</b>	Magnetic Plug
<b>Model Name or Number:</b>	EC801

<b>Brand Name:</b>	Sony
<b>Description:</b>	USB cable
<b>Model Name or Number:</b>	EC801

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

<b>Brand Name:</b>	Sony
<b>Description:</b>	PHF
<b>Model Name or Number:</b>	MH750

**3.2. Description of EUT**

The equipment under test (EUT) is a model of GSM/UMTS/LTE mobile phone with integrated antenna and inbuilt Li-Polymer battery.

The EUT supports GSM 850/900/1800/1900MHz bands, WCDMA FDD bands 1/2/5 and LTE FDD bands 1/3. It also supports GPRS service with multi-slots class 33 and EGPRS service with multi-slots class 33 too. The HSDPA and HSUPA features are also supported. It has MP3, camera, FM radio, USB memory, GPS receiver, NFC, Mobile High-Definition Link (MHL), Bluetooth (EDR and Bluetooth 4.0), WLAN (802.11 a/b/g/n/ac) and Wi-Fi hotspot functions.

**3.3. Modifications Incorporated in the EUT**

No modifications were applied to the EUT during testing.

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

<b>Tested Technology:</b>	<i>Bluetooth</i>		
<b>Power Supply Requirement:</b>	Nominal	3.8 V	
<b>Type of Unit:</b>	Transceiver		
<b>Channel Spacing:</b>	1 MHz		
<b>Mode:</b>	Basic Rate	Enhanced Data Rate	
<b>Modulation:</b>	GFSK	$\pi/4$ -DQPSK	8DQPSK
<b>Packet Type: (Maximum Payload)</b>	DH5	2DH5	3DH5
<b>Data Rate (Mbit/s):</b>	1	2	3
<b>Maximum Peak Output Power:</b>	9.6 dBm		
<b>Peak Antenna Gain:</b>	-4.7 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	39	2441
	Top	78	2480

### **3.5. Support Equipment**

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

<b>Brand Name:</b>	Generic
<b>Description:</b>	2 GB Micro SD Card
<b>Model Name or Number:</b>	Not marked or stated

<b>Brand Name:</b>	Logik
<b>Description:</b>	22" High Definition Television
<b>Model Name or Number:</b>	L22FE12A
<b>Serial Number:</b>	1309020661

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

### **4.1.Operating Modes**

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

- Transmit mode with Basic Rate (DH5 packets) or EDR (2DH5 or 3DH5 packets) as required.

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

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

- The EUT was placed into *Bluetooth* test mode by pressing a sequence of buttons on the EUT. The Customer had installed the application onto the EUT. Once in *Bluetooth* mode test mode, a link was established to a *Bluetooth* tester which was then used to control the EUT.
- Both EDR/Basic rate modes were compared and tests were performed with the mode that presented the worst case result. For output power, bandwidth, band edge and channel separation, all modes were tested.
- Transmitter radiated spurious emission tests were performed with the following configurations, employing all available accessories:
  - Configuration 1 – Handset with the AC charger, USB Cable, MHL cable (terminated in to a television), MHL adaptor and PHF
  - Configuration 2 – Handset with the AC charger, Magnetic plug and PHF

Pre-scans below 1 GHz were performed in both configurations 1 and 2, with final measurements limited to the configuration which provided worst case results. Pre-scans above 1 GHz were performed in the configuration that employed the most accessories (Configuration 1), with any final measurements being performed in both configurations.

- Transmitter radiated spurious emissions tests were performed with the EUT transmitting in 3DH5 mode as this mode was found to transmit the highest power.
- AC conducted emissions was tested with the EUT transmitting in 3DH5 mode as this mode was found to transmit the highest power. Both configurations were tested and configuration 2 was found to be the worst case.
- The EUT conducted sample with IMEI 004402451246551 was used for 20 dB bandwidth, carrier frequency separation, average time of occupancy tests and conducted output power tests.
- The radiated sample with IMEI 004402451245652 was used for AC conducted emissions and radiated spurious emissions 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. Transmitter AC Conducted Spurious Emissions**

#### **Test Summary:**

<b>Test Engineer:</b>	Mark Percival	<b>Test Date:</b>	16 July 2013
<b>Test Sample IMEI:</b>	004402451245652		

<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>	22
<b>Relative Humidity (%):</b>	38

#### **Results: Live / Quasi Peak**

Frequency (MHz)	Line	Level (dB $\mu$ V)	Limit (dB $\mu$ V)	Margin (dB)	Result
0.460	Live	39.4	56.7	17.3	Complied
1.369	Live	39.9	56.0	16.1	Complied
3.160	Live	35.4	56.0	20.6	Complied
16.836	Live	31.9	60.0	28.1	Complied

#### **Results: Live / Average**

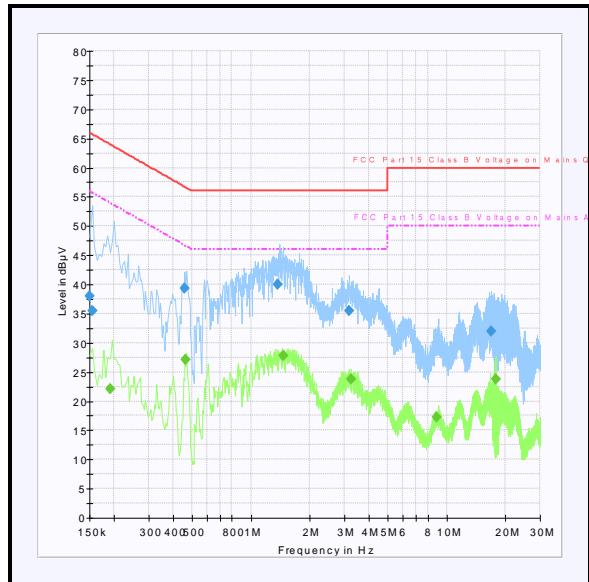
Frequency (MHz)	Line	Level (dB $\mu$ V)	Limit (dB $\mu$ V)	Margin (dB)	Result
0.465	Live	27.1	46.6	19.5	Complied
1.459	Live	27.8	46.0	18.2	Complied
3.237	Live	23.7	46.0	22.3	Complied
17.749	Live	23.8	50.0	26.2	Complied

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

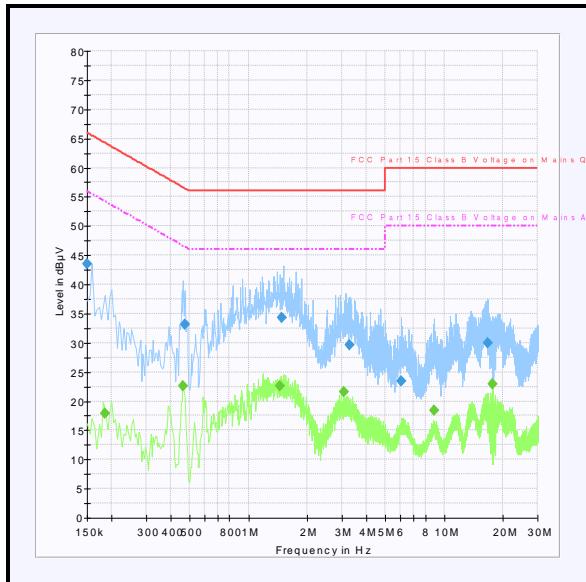
Frequency (MHz)	Line	Level (dB $\mu$ V)	Limit (dB $\mu$ V)	Margin (dB)	Result
0.150	Neutral	43.4	66.0	22.6	Complied
0.474	Neutral	33.1	56.4	23.3	Complied
1.486	Neutral	34.4	56.0	21.6	Complied
3.277	Neutral	29.7	56.0	26.3	Complied

**Results: Neutral / Average**

Frequency (MHz)	Line	Level (dB $\mu$ V)	Limit (dB $\mu$ V)	Margin (dB)	Result
0.465	Neutral	22.5	46.6	24.1	Complied
1.450	Neutral	22.7	46.0	23.3	Complied
3.075	Neutral	21.6	46.0	24.4	Complied
17.677	Neutral	23.0	50.0	27.0	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:**

Asset No.	Instrument	Manufacturer	Type No.	Serial No.	Date Calibration Due	Cal. Interval (Months)
M1625	Thermometer / Hygrometer station	JM Handelspunkt	30.5015.13	None stated	09 Jan 2014	12
A004	LISN	Rohde & Schwarz	ESH3-Z5	890604/027	30 Out 2013	12
A1830	Pulse Limiter	Rohde & Schwarz	ESH3-Z2	100668	19 Feb 2014	12
M1020	Test Receiver	Rohde & Schwarz	SME-03	834617/030	14 Dec 2013	12

**5.2.2. Transmitter 20 dB Bandwidth****Test Summary:**

<b>Test Engineers:</b>	Mark Percival & Ahmed Ali	<b>Test Dates:</b>	19 July 2013 & 26 July 2013
<b>Test Sample IMEI:</b>	004402451246551		

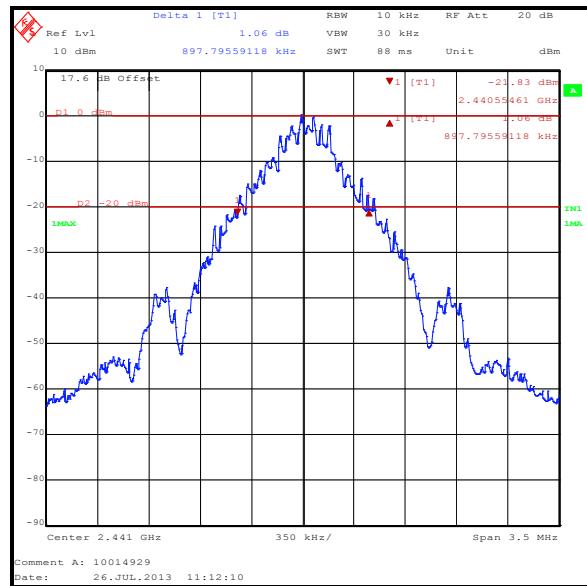
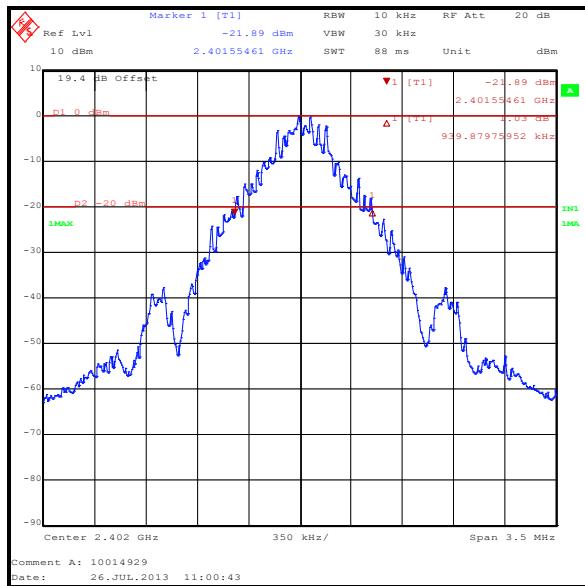
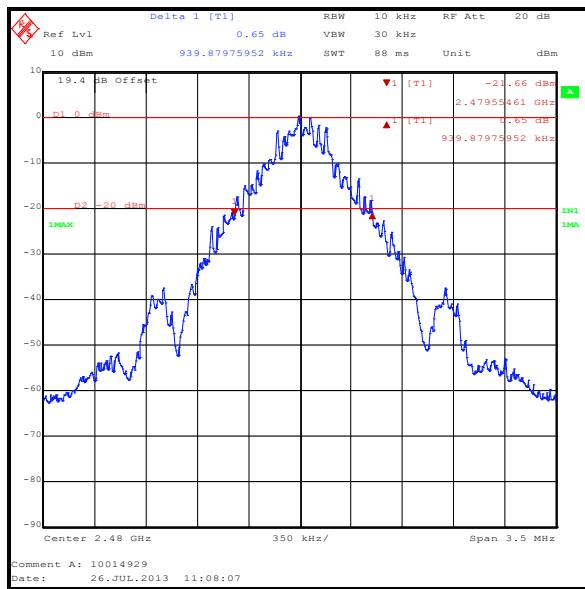
<b>FCC Reference:</b>	Part 15.247(a)(1)
<b>Test Method Used:</b>	As detailed in ANSI C63.10 Section 6.9.1

**Environmental Conditions:**

<b>Temperature (°C):</b>	23 to 25
<b>Relative Humidity (%):</b>	35 to 38

**Transmitter 20 dB Bandwidth (continued)****Results DH5:**

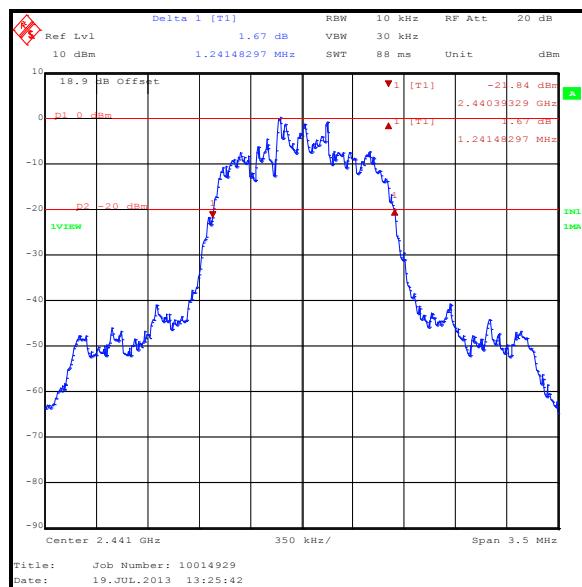
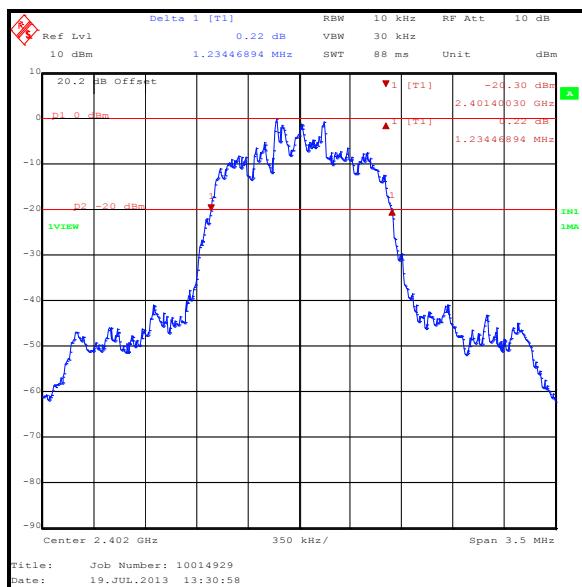
Channel	20 dB Bandwidth (kHz)
Bottom	939.880
Middle	897.796
Top	939.880

**Bottom Channel****Middle Channel****Top Channel**

## **Transmitter 20 dB Bandwidth (continued)**

## **Results 2DH5:**

Channel	20 dB Bandwidth (kHz)
Bottom	1234.469
Middle	1241.483
Top	1248.497



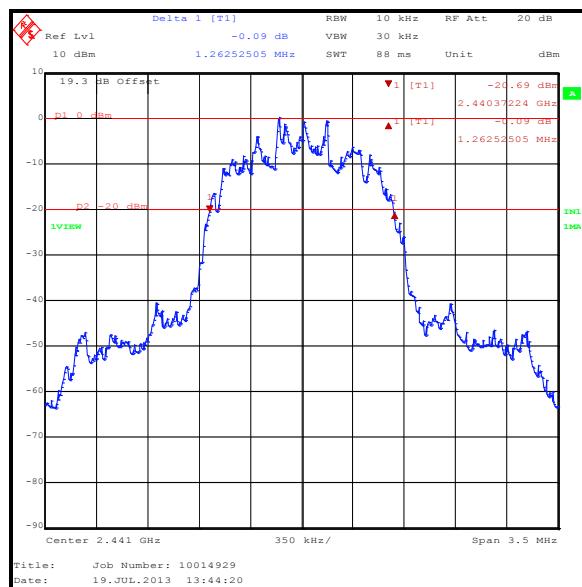
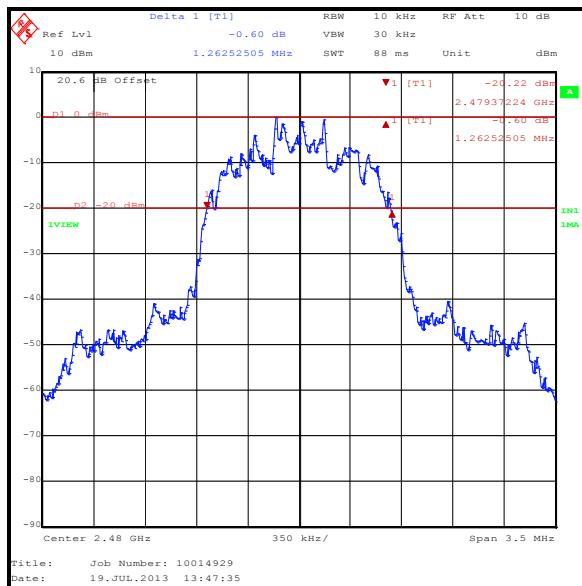
## Bottom Channel



## Middle Channel

**Transmitter 20 dB Bandwidth (continued)****Results 3DH5:**

Channel	20 dB Bandwidth (kHz)
Bottom	1262.525
Middle	1262.525
Top	1262.525

**Bottom Channel****Top Channel****Middle Channel**

**Transmitter 20 dB Bandwidth (continued)****Test Equipment Used:**

Asset No.	Instrument	Manufacturer	Type No.	Serial No.	Date Calibration Due	Cal. Interval (Months)
M1659	Thermometer / Hygrometer station	JM Handelspunkt	30.5015.13	None stated	24 May 2014	12
M1379	Test Receiver	Rohde & Schwarz	ESIB7	100330	15 Oct 2013	12
S0523	DC Power Supply	TTi	PL320	224235	Calibrated before use	-
M1269	Digital Multimeter	Fluke	179	90250210	30 Jul 2013	12
A1096	Directional Coupler	MIDISCO	MDC6223 W20	None	Calibrated before use	-

### 5.2.3. Transmitter Carrier Frequency Separation

#### Test Summary:

Test Engineer:	Mark Percival	Test Date:	19 July 2013
Test Sample IMEI:	004402451246551		

FCC Reference:	Part 15.247(a)(1)
Test Method Used:	As detailed in ANSI C63.10 Section 7.7.2

#### Environmental Conditions:

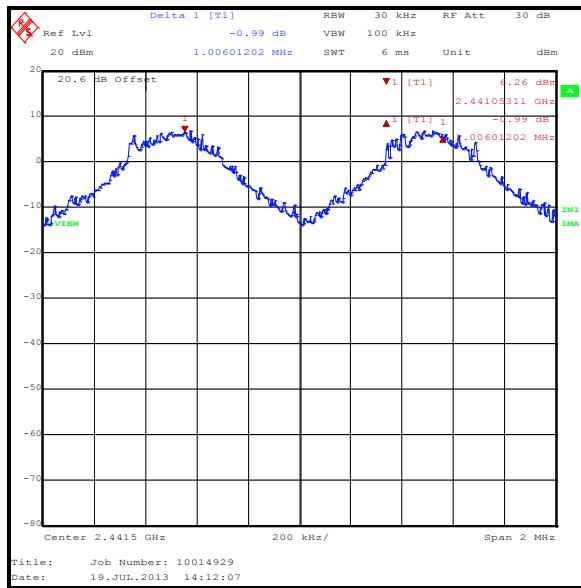
Temperature (°C):	25
Relative Humidity (%):	35

#### Note(s):

1. The 20 dB bandwidth measured for the middle channel operating at 2441 MHz was used to calculate the limit.

#### Results: DH5

Carrier Frequency Separation (kHz)	Limit (2/3 of 20 dB BW) (kHz)	Margin (kHz)	Result
1006.012	598.531	407.481	Complied

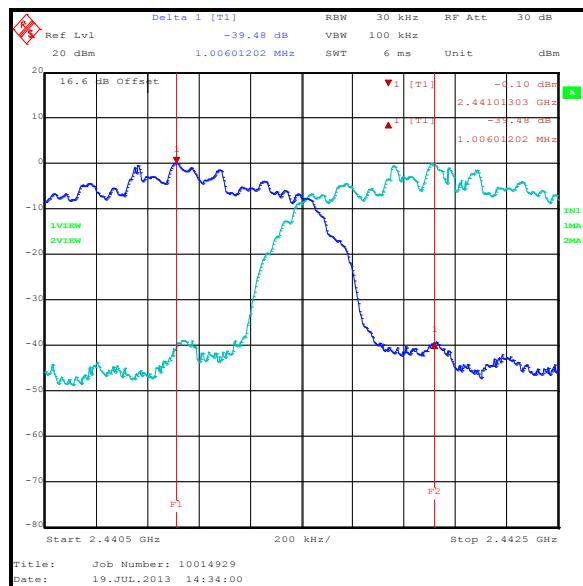


**Transmitter Carrier Frequency Separation (continued)****Note(s):**

1. The 20 dB bandwidth measured for the middle channel operating at 2441 MHz was used to calculate the limit.

**Results: 2DH5**

Carrier Frequency Separation (kHz)	Limit ( $\frac{2}{3}$ of 20 dB BW) (kHz)	Margin (kHz)	Result
1006.012	827.655	178.357	Complied

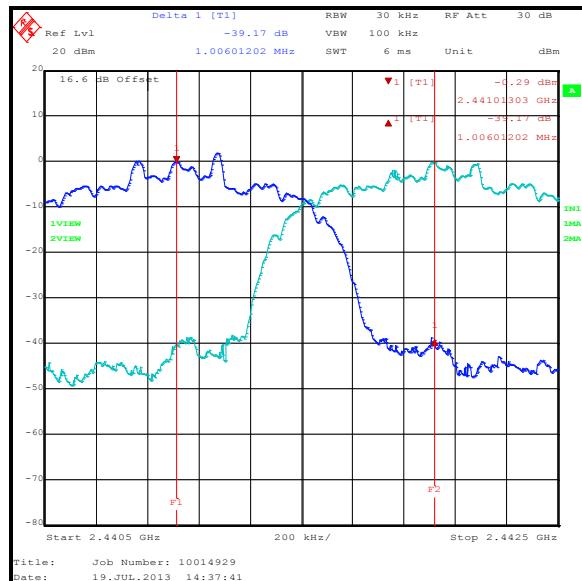


**Transmitter Carrier Frequency Separation (continued)****Note(s):**

1. The 20 dB bandwidth measured for the middle channel operating at 2441 MHz was used to calculate the limit.

**Results: 3DH5**

Carrier Frequency Separation (kHz)	Limit ( $\frac{2}{3}$ of 20 dB BW) (kHz)	Margin (kHz)	Result
1006.012	841.683	164.329	Complied

**Test Equipment Used:**

Asset No.	Instrument	Manufacturer	Type No.	Serial No.	Date Calibration Due	Cal. Interval (Months)
M1659	Thermometer / Hygrometer station	JM Handelspunkt	30.5015.13	None stated	24 May 2014	12
M1379	Test Receiver	Rohde & Schwarz	ESIB7	100330	15 Oct 2013	12
A2144	Attenuator	Atlan TecRF	AN18-20	081120-23	10 May 2014	12
S0523	DC Power Supply	TTi	PL320	224235	Calibrated before use	-
M1269	Digital Multimeter	Fluke	179	90250210	30 Jul 2013	12
A1096	Directional Coupler	MIDISCO	MDC6223 W20	None	Calibrated before use	-

**5.2.4. Transmitter Number of Hopping Frequencies and Average Time of Occupancy****Test Summary:**

<b>Test Engineer:</b>	Mark Percival	<b>Test Date:</b>	19 July 2013
<b>Test Sample IMEI:</b>	004402451246551		

<b>FCC Reference:</b>	Part 15.247(a)(1)(iii)
<b>Test Method Used:</b>	As detailed in ANSI C63.10 Section 7.7.3 & 7.7.4

**Environmental Conditions:**

<b>Temperature (°C):</b>	25
<b>Relative Humidity (%):</b>	35

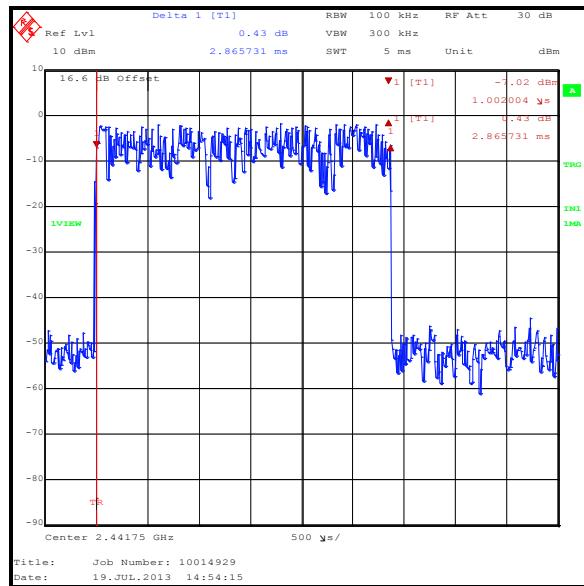
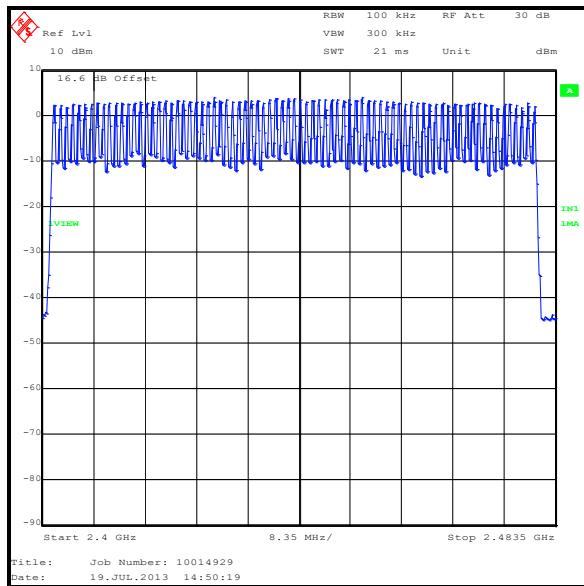
**Note(s):**

1. Tests were performed to identify the average time of occupancy in number of channels (79) x 0.4 seconds. The calculated period is 31.6 seconds.

**Results:**

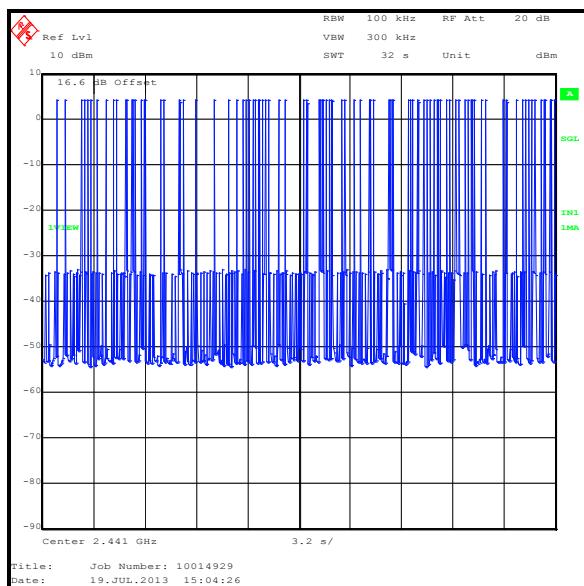
<b>Emission Width (μs)</b>	<b>Number of Hops in 31.6 Seconds</b>	<b>Average Time of Occupancy (s)</b>	<b>Limit (s)</b>	<b>Margin (s)</b>	<b>Result</b>
2865.731	96	0.275	0.4	0.125	Complied

### Transmitter Number of Hopping Frequencies and Average Time of Occupancy (continued)



Number of Hopping Frequencies

Emission Width



Number of Hopping Frequencies in 32 s

**Transmitter Number of Hopping Frequencies and Average Time of Occupancy (continued)****Test Equipment Used:**

Asset No.	Instrument	Manufacturer	Type No.	Serial No.	Date Calibration Due	Cal. Interval (Months)
M1659	Thermometer / Hygrometer station	JM Handelspunkt	30.5015.13	None stated	24 May 2014	12
M1379	Test Receiver	Rohde & Schwarz	ESIB7	100330	15 Oct 2013	12
S0523	DC Power Supply	TTi	PL320	224235	Calibrated before use	-
A2144	Attenuator	Atlan TecRF	AN18-20	081120-23	10 May 2014	12
M1269	Digital Multimeter	Fluke	179	90250210	30 Jul 2013	12
A1096	Directional Coupler	MIDISCO	MDC6223 W20	None	Calibrated before use	-

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

<b>Test Engineer:</b>	Mark Percival	<b>Test Date:</b>	19 July 2013
<b>Test Sample IMEI:</b>	004402451246551		

<b>FCC Reference:</b>	Part 15.247(b)(1)
<b>Test Method Used:</b>	As detailed in ANSI C63.10 Section 6.10.1

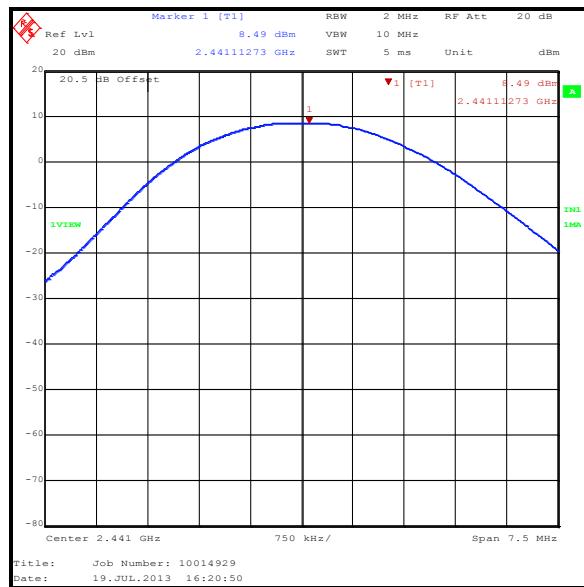
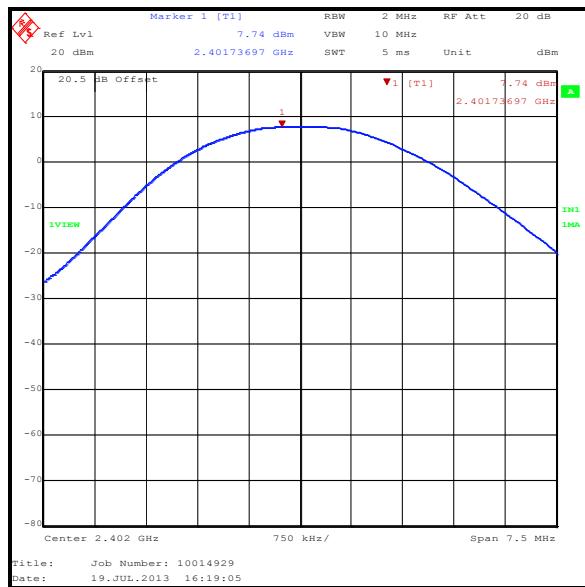
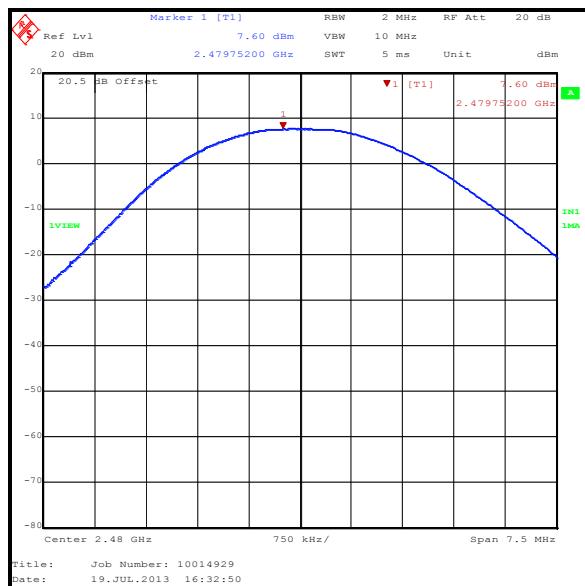
**Environmental Conditions:**

<b>Temperature (°C):</b>	25
<b>Relative Humidity (%):</b>	35

**Transmitter Maximum Peak Output Power (continued)****Results: DH5**

Channel	Conducted Peak Power (dBm)	Conducted Peak Power Limit (dBm)	Margin (dB)	Result
Bottom	7.7	30.0	22.3	Complied
Middle	8.5	30.0	21.5	Complied
Top	7.6	30.0	22.4	Complied

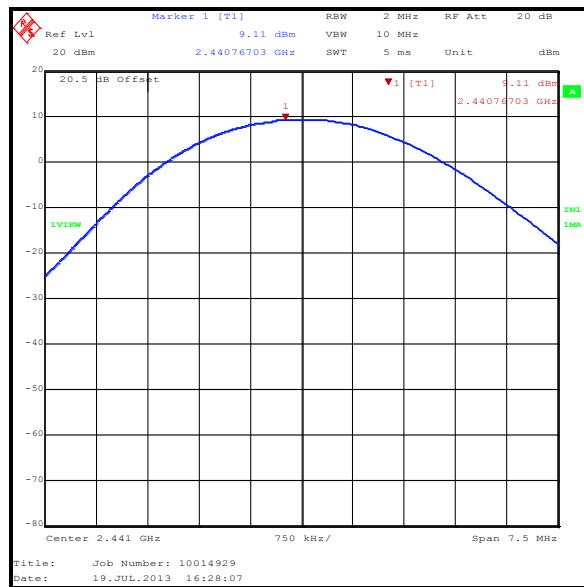
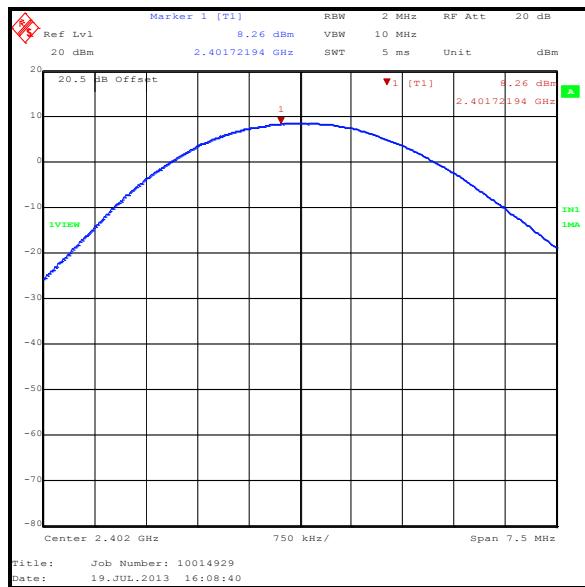
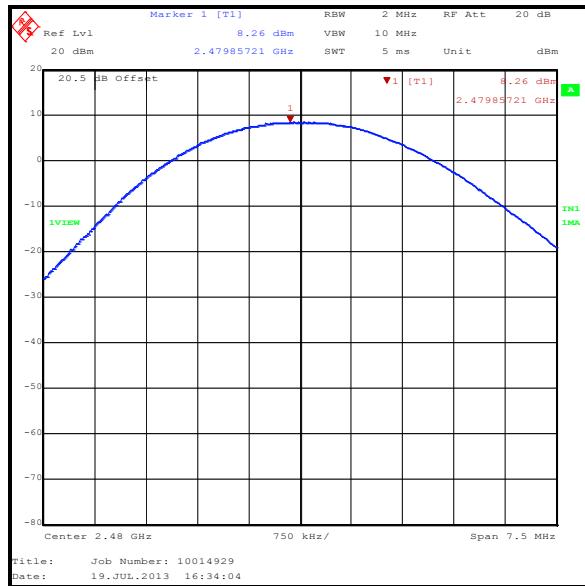
Channel	Conducted Peak Power (dBm)	Declared Antenna Gain (dBi)	EIRP (dBm)	De Facto EIRP Limit (dBm)	Margin (dB)	Result
Bottom	7.7	-4.7	3.0	36.0	33.0	Complied
Middle	8.5	-4.7	3.8	36.0	32.2	Complied
Top	7.6	-4.7	2.9	36.0	33.1	Complied

**Transmitter Maximum Peak Output Power (continued)****Results: DH5****Bottom Channel****Top Channel****Middle Channel**

**Transmitter Maximum Peak Output Power (continued)****Results: 2DH5**

Channel	Conducted Peak Power (dBm)	Conducted Peak Power Limit (dBm)	Margin (dB)	Result
Bottom	8.3	21.0	12.7	Complied
Middle	9.1	21.0	11.9	Complied
Top	8.3	21.0	12.7	Complied

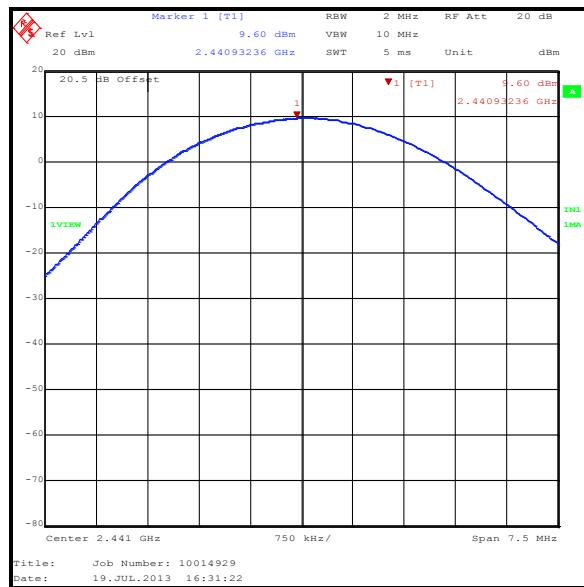
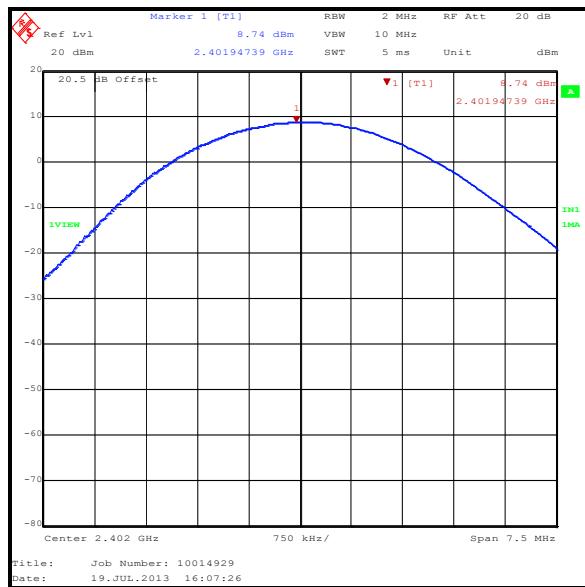
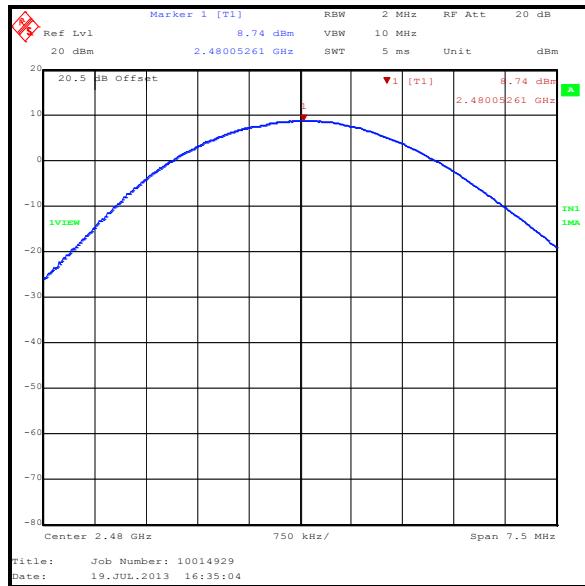
Channel	Conducted Peak Power (dBm)	Declared Antenna Gain (dBi)	EIRP (dBm)	De Facto EIRP Limit (dBm)	Margin (dB)	Result
Bottom	8.3	-4.7	3.6	27.0	23.4	Complied
Middle	9.1	-4.7	4.4	27.0	22.6	Complied
Top	8.3	-4.7	3.6	27.0	23.4	Complied

**Transmitter Maximum Peak Output Power (continued)****Results: 2DH5****Bottom Channel****Middle Channel****Top Channel**

**Transmitter Maximum Peak Output Power (continued)****Results: 3DH5**

Channel	Conducted Peak Power (dBm)	Conducted Peak Power Limit (dBm)	Margin (dB)	Result
Bottom	8.7	21.0	12.3	Complied
Middle	9.6	21.0	11.4	Complied
Top	8.7	21.0	12.3	Complied

Channel	Conducted Peak Power (dBm)	Declared Antenna Gain (dBi)	EIRP (dBm)	De Facto EIRP Limit (dBm)	Margin (dB)	Result
Bottom	8.7	-4.7	4.0	27.0	23.0	Complied
Middle	9.6	-4.7	4.9	27.0	22.1	Complied
Top	8.7	-4.7	4.0	27.0	23.0	Complied

**Transmitter Maximum Peak Output Power (continued)****Results: 3DH5****Bottom Channel****Middle Channel****Top Channel**

**Transmitter Maximum Peak Output Power (continued)****Test Equipment Used:**

Asset No.	Instrument	Manufacturer	Type No.	Serial No.	Date Calibration Due	Cal. Interval (Months)
M1659	Thermometer / Hygrometer station	JM Handelspunkt	30.5015.13	None stated	24 May 2014	12
M1379	Test Receiver	Rohde & Schwarz	ESIB7	100330	15 Oct 2013	12
S0523	DC Power Supply	TTi	PL320	224235	Calibrated before use	-
M1269	Digital Multimeter	Fluke	179	90250210	30 Jul 2013	12
A1096	Directional Coupler	MIDISCO	MDC6223 W20	None	Calibrated before use	-
M199	Power Meter	Rohde & Schwarz	NRVS	827023/075	15 May 2014	12
A2144	Attenuator	Atlan TecRF	AN18-20	081120-23	10 May 2014	12
M1267	Thermal Power Sensor	Rohde & Schwarz	NRV-Z52	100155	14 May 2014	12
M1021	Signal Generator	Rohde & Schwarz	SMP-02	833286/004	05 Feb 2014	12

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

<b>Test Engineer:</b>	Mark Percival	<b>Test Date:</b>	26 July 2013
<b>Test Sample IMEI:</b>	004402451245652		

<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:**

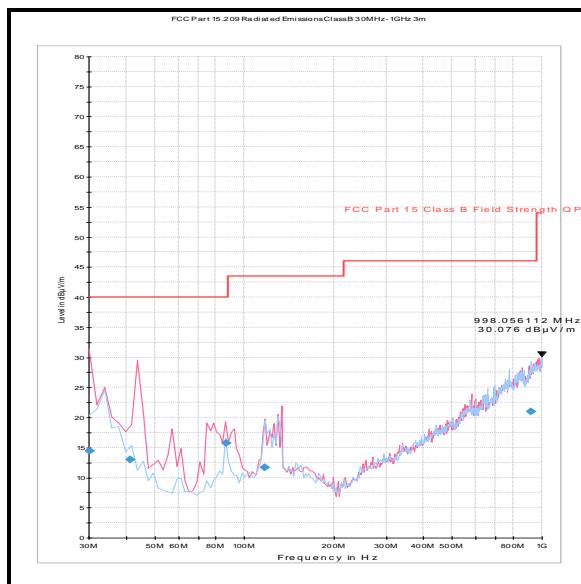
<b>Temperature (°C):</b>	22
<b>Relative Humidity (%):</b>	47

**Note(s):**

1. Transmitter radiated spurious emissions tests were performed with the EUT transmitting in 3DH5 mode as this was found to transmit the highest power and therefore deemed worst case.
2. The final measured value, for the given emission, in the table below incorporates the calibrated antenna factor and cable loss.
3. 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.
4. All emissions shown on the pre-scan plots were investigated and found to be ambient, or >20 dB below the applicable limit or below the measurement system noise floor. Therefore the highest peak noise floor reading of the measuring receiver was recorded in the table below.
5. Measurements below 1 GHz were performed in a semi-anechoic chamber (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 / 3DH5**

Frequency (MHz)	Antenna Polarity	Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
998.056	Vertical	30.1	54.0	23.9	Complied

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

Asset No.	Instrument	Manufacturer	Type No.	Serial No.	Date Calibration Due	Cal. Interval (Months)
A490	Antenna	Chase	CBL6111A	1590	09 Apr 2014	12
A1834	Attenuator	Hewlett Packard	8491B	10444	27 Jan 2014	12
G0543	Pre-Amplifier	Sonoma	310N	230801	05 Oct 2013	3
K0001	5m RSE Chamber	Rainford EMC	N/A	N/A	24 Oct 2013	12
M1273	Test Receiver	Rohde & Schwarz	ESIB 26	100275	07 Feb 2014	12
M1622	Thermometer / Hygrometer station	JM Handelpunkt	30.5015.13	None stated	24 May 2014	12

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

<b>Test Engineer:</b>	Mark Percival	<b>Test Date:</b>	16 July 2013
<b>Test Sample IMEI:</b>	004402451245652		

<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>	40

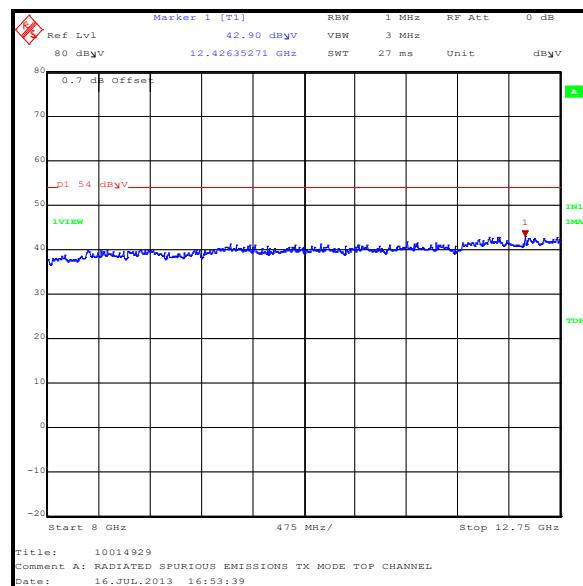
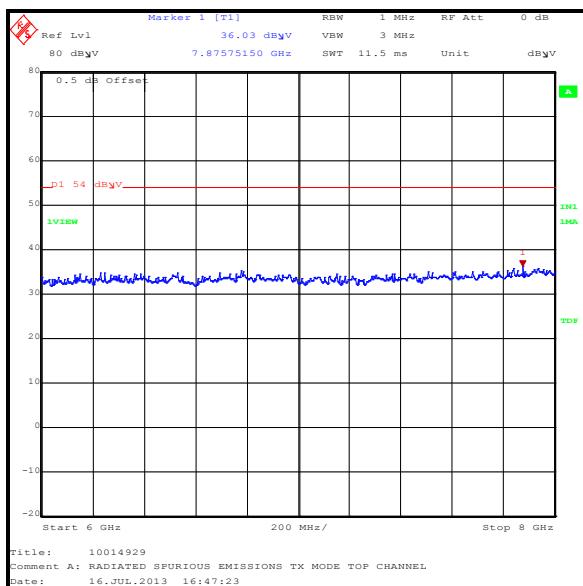
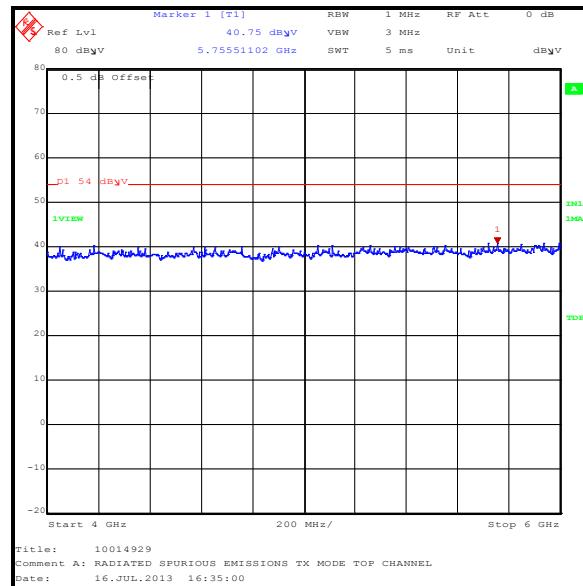
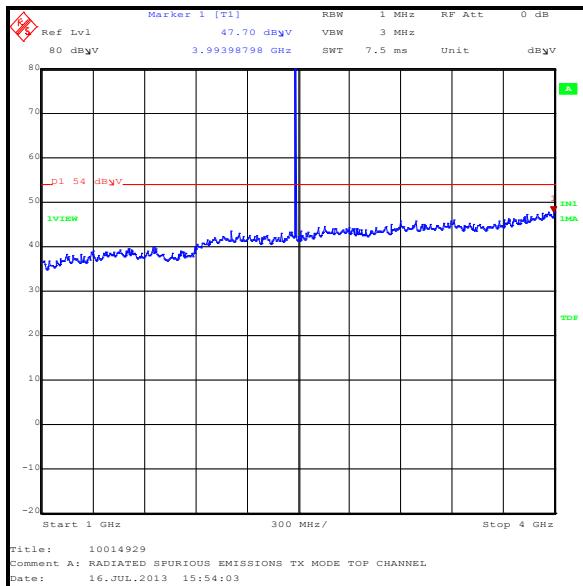
**Note(s):**

1. Transmitter radiated spurious emissions tests were performed with the EUT transmitting in 3DH5 mode as this was found to transmit the highest power and therefore deemed worst case.
2. The final measured value, for the given emission, in the table below incorporates the calibrated antenna factor and cable loss.
3. The emission shown on the 1 GHz to 4 GHz plot is the EUT fundamental at 2480 MHz.
4. 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.
5. Pre-scans above 1 GHz were performed in a fully anechoic chamber (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 (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.

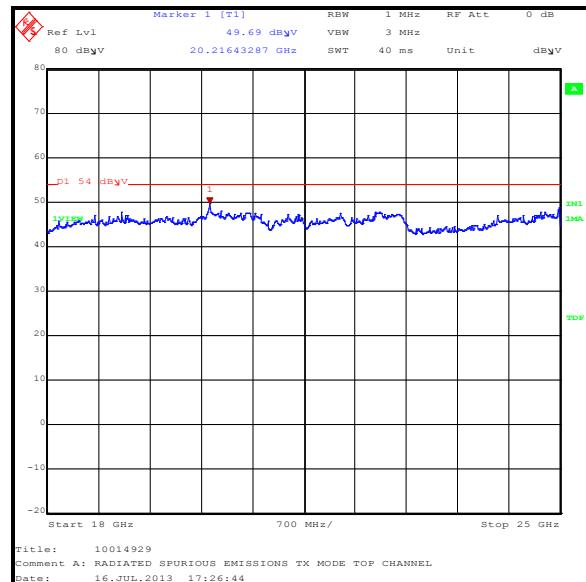
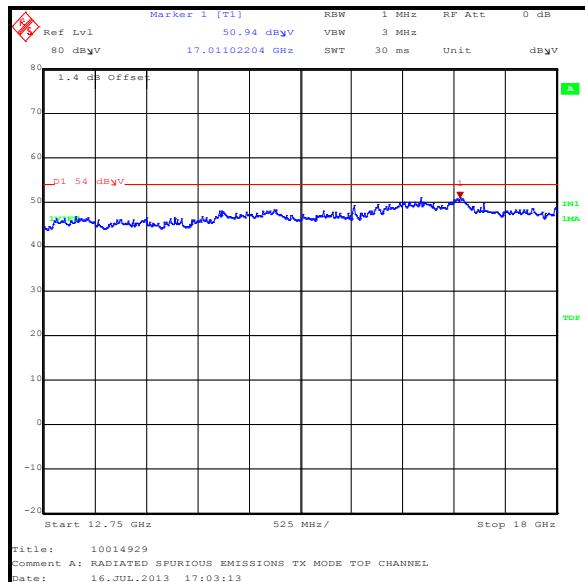
**Results:**

Frequency (MHz)	Antenna Polarity	Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
17011.022	Vertical	50.9	54.0	3.1	Complied

## Transmitter Radiated Emissions (continued)



## Transmitter Radiated Emissions (continued)



## Test Equipment Used:

Asset 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
A1975	High Pass Filter	AtlanTecRF	AFH-03000	090424010	19 Apr 2014	12
M1656	Thermometer / Hygrometer station	JM Handelspunkt	30.5015.13	Not stated	24 May 2014	12

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

<b>Test Engineer:</b>	Mark Percival	<b>Test Date:</b>	16 July 2013
<b>Test Sample IMEI:</b>	004402451245652		

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

**Environmental Conditions:**

<b>Temperature (°C):</b>	21
<b>Relative Humidity (%):</b>	40

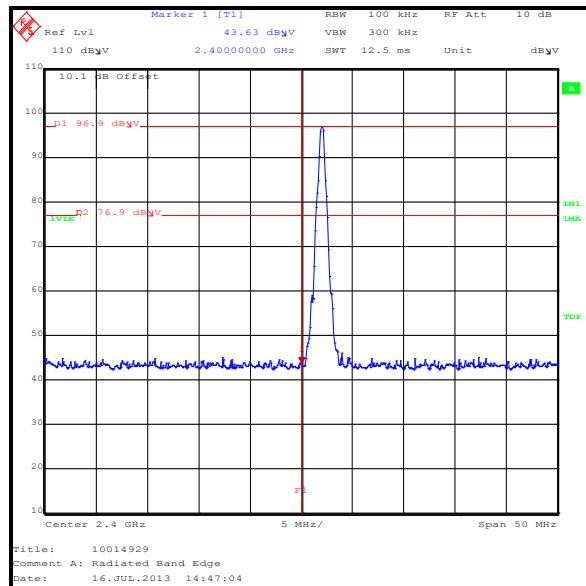
**Note(s):**

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

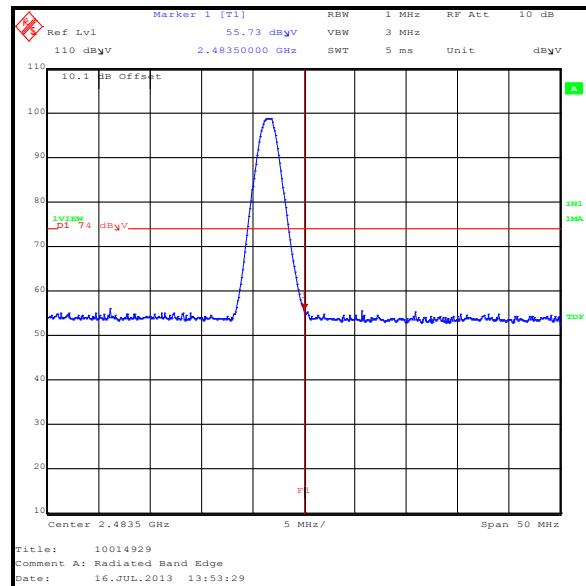
**Transmitter Band Edge Radiated Emissions (continued)****Results: Static Mode / DH5**

Frequency (MHz)	Antenna Polarity	Peak Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
2400.0	Vertical	43.6	76.9*	33.3	Complied
2483.5	Vertical	55.7	74.0	18.3	Complied

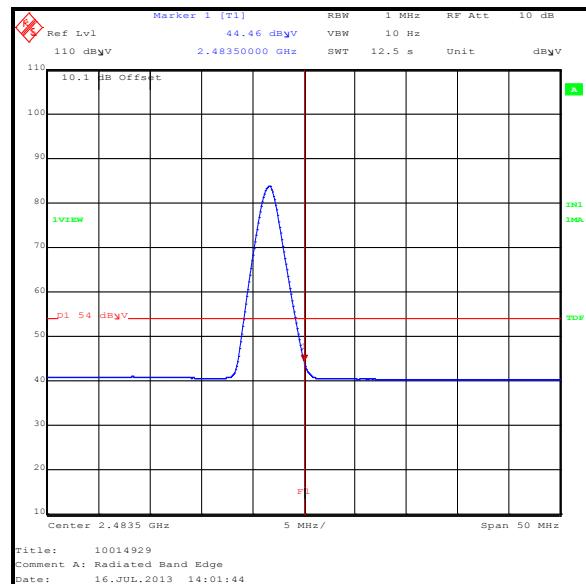
Frequency (MHz)	Antenna Polarity	Average Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
2483.5	Vertical	44.5	54.0	9.5	Complied



Lower Band Edge Peak Static



Upper Band Edge Peak Static

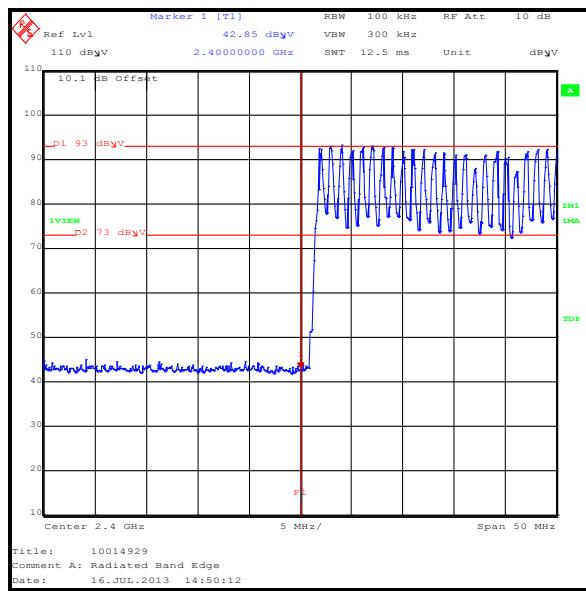


Upper Band Edge Average Static

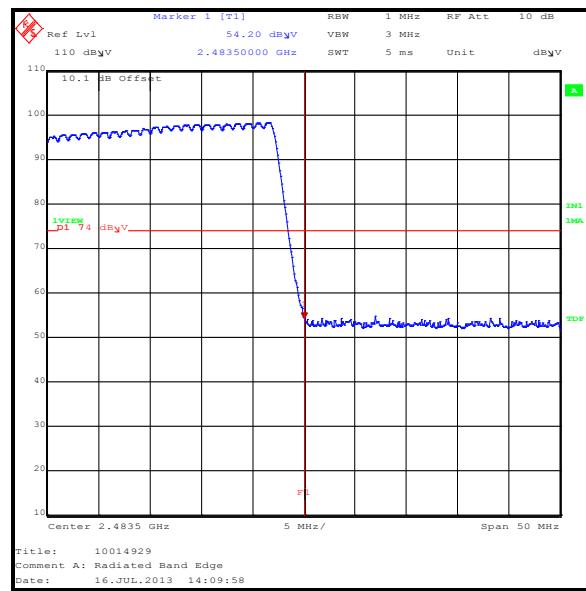
**Transmitter Band Edge Radiated Emissions (continued)****Results: Hopping Mode / DH5**

Frequency (MHz)	Antenna Polarity	Peak Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
2400.0	Vertical	42.9	73.0*	30.1	Complied
2483.5	Vertical	54.2	74.0	19.8	Complied

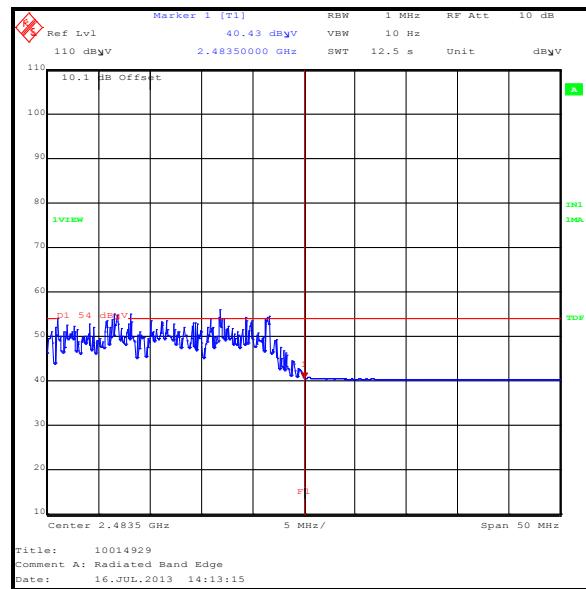
Frequency (MHz)	Antenna Polarity	Average Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
2483.5	Vertical	40.4	54.0	13.6	Complied



Lower Band Edge Peak Hopping



Upper Band Edge Peak Hopping

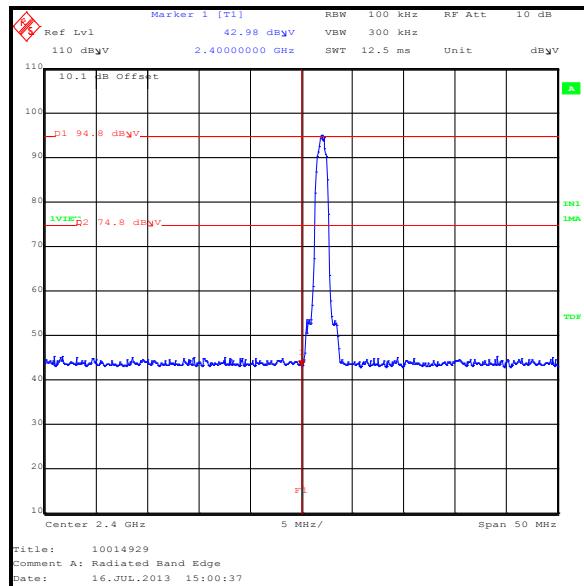


Upper Band Edge Average Hopping

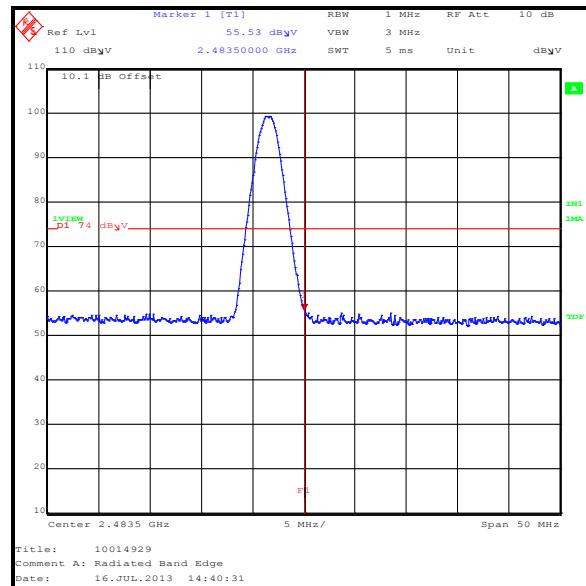
**Transmitter Band Edge Radiated Emissions (continued)****Results: Static Mode / 2DH5**

Frequency (MHz)	Antenna Polarity	Peak Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
2400.0	Vertical	43.0	74.8*	31.8	Complied
2483.5	Vertical	55.5	74.0	18.5	Complied

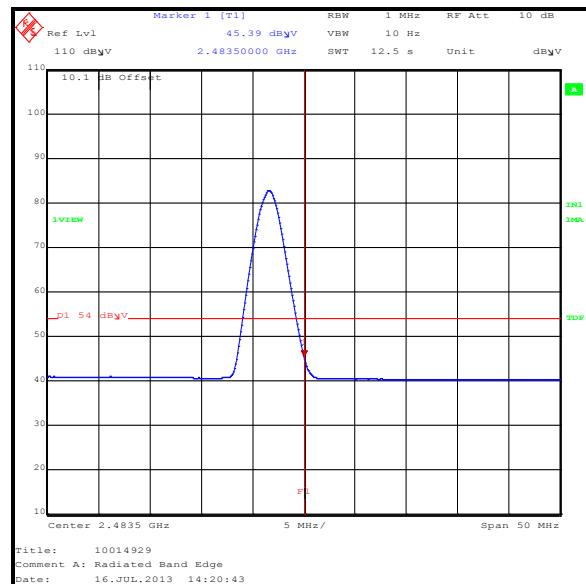
Frequency (MHz)	Antenna Polarity	Average Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
2483.5	Vertical	45.4	54.0	8.6	Complied



Lower Band Edge Peak Static



Upper Band Edge Peak Static

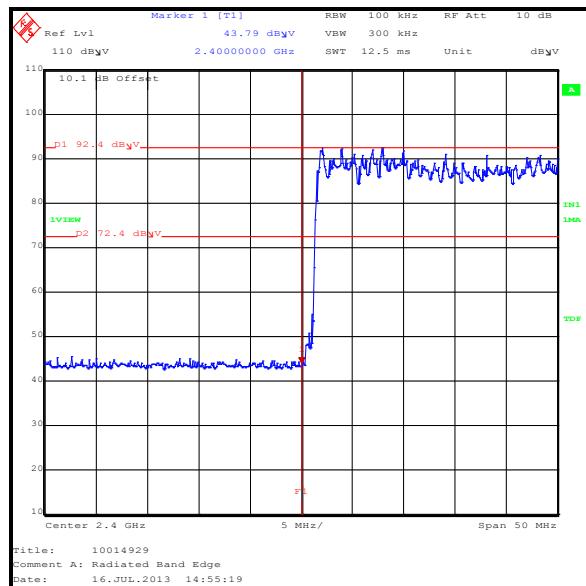


Upper Band Edge Average Static

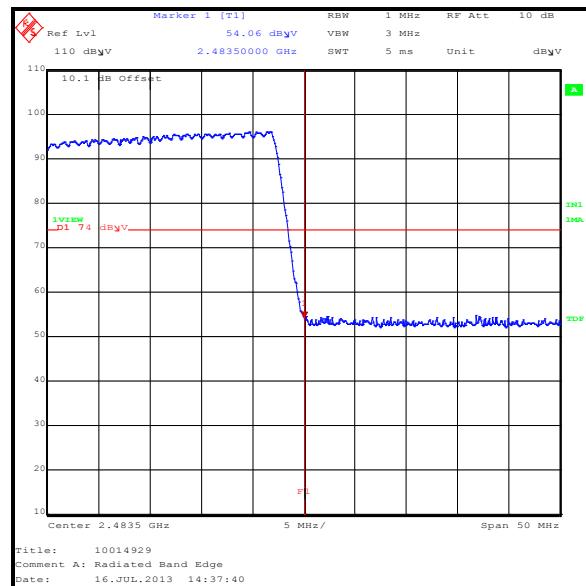
**Transmitter Band Edge Radiated Emissions (continued)****Results: Hopping Mode / 2DH5**

Frequency (MHz)	Antenna Polarity	Peak Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
2400.0	Vertical	43.8	72.4*	28.6	Complied
2483.5	Vertical	54.1	74.0	19.9	Complied

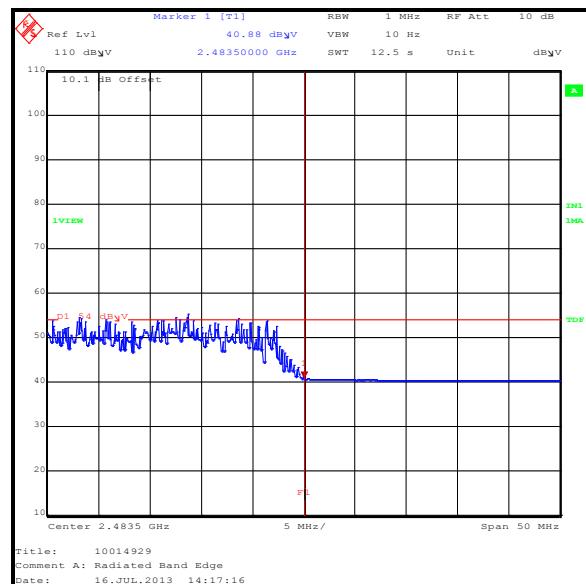
Frequency (MHz)	Antenna Polarity	Average Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
2483.5	Vertical	40.9	54.0	13.1	Complied



Lower Band Edge Peak Hopping



Upper Band Edge Peak Hopping

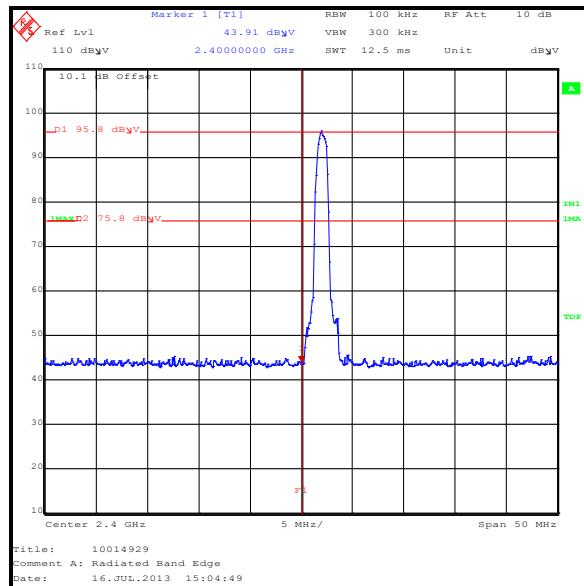


Upper Band Edge Average Hopping

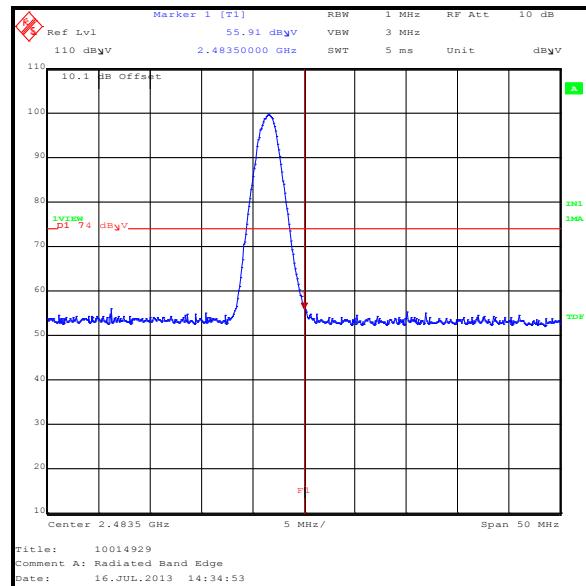
**Transmitter Band Edge Radiated Emissions (continued)****Results: Static Mode / 3DH5**

Frequency (MHz)	Antenna Polarity	Peak Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
2400.0	Vertical	43.9	75.8*	31.9	Complied
2483.5	Vertical	55.9	74.0	18.1	Complied

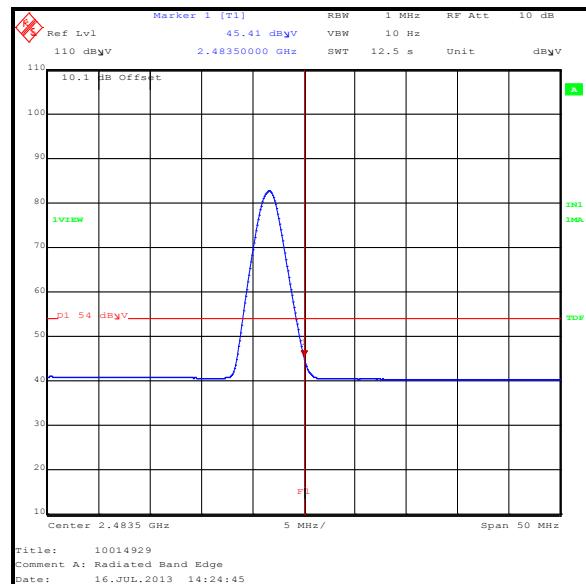
Frequency (MHz)	Antenna Polarity	Average Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
2483.5	Vertical	45.4	54.0	8.6	Complied



Lower Band Edge Peak Static



Upper Band Edge Peak Static

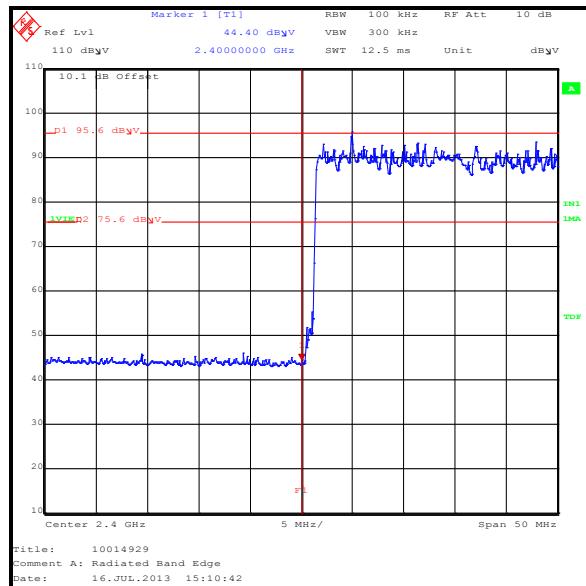


Upper Band Edge Average Static

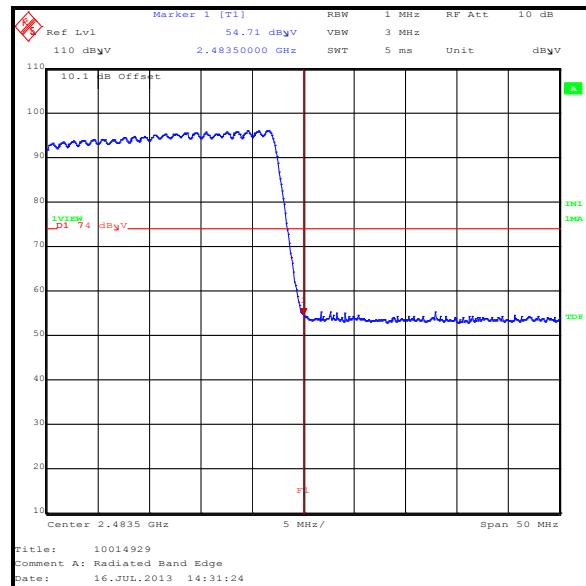
**Transmitter Band Edge Radiated Emissions (continued)****Results: Hopping Mode / 3DH5**

Frequency (MHz)	Antenna Polarity	Peak Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
2400.0	Vertical	44.4	75.6*	31.2	Complied
2483.5	Vertical	54.7	74.0	19.3	Complied

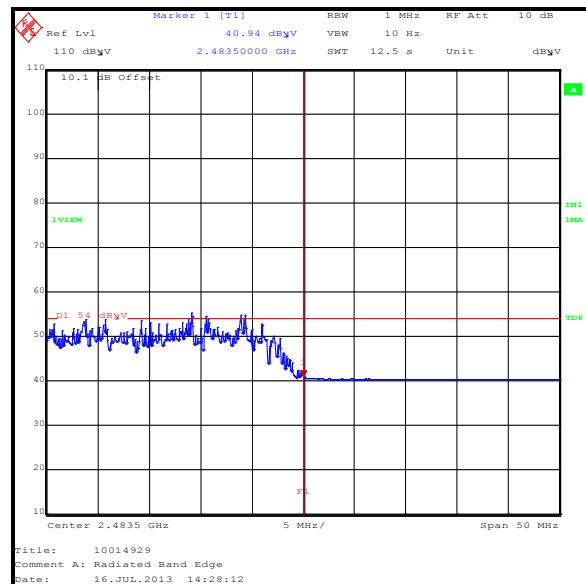
Frequency (MHz)	Antenna Polarity	Average Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
2483.5	Vertical	40.9	54.0	13.1	Complied



Lower Band Edge Peak Hopping



Upper Band Edge Peak Hopping



Upper Band Edge Average Hopping

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

Asset No.	Instrument	Manufacturer	Type No.	Serial No.	Date Calibration Due	Cal. Interval (Month s)
M1656	Thermometer / Hygrometer station	JM Handelspunkt	30.5015.13	None stated	24 May 2014	12
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
A1396	Attenuator	Huber & Suhner	6810.17.B	757987	10 May 2014	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".

Measurement Type	Range	Confidence Level (%)	Calculated Uncertainty
AC Conducted Spurious Emissions	0.15 MHz to 30 MHz	95%	$\pm 4.69$ dB
Maximum Peak Output Power	2.4 GHz to 2.4835 GHz	95%	$\pm 1.13$ dB
Carrier Frequency Separation	2.4 GHz to 2.4835 GHz	95%	$\pm 0.92$ ppm
Average Time of Occupancy	2.4 GHz to 2.4835 GHz	95%	$\pm 0.3$ ns
20 dB Bandwidth	2.4 GHz to 2.4835 GHz	95%	$\pm 0.92$ ppm
Radiated Spurious Emissions	30 MHz to 1 GHz	95%	$\pm 5.65$ dB
Radiated Spurious Emissions	1 GHz to 26.5 GHz	95%	$\pm 2.94$ 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**

<b>Version Number</b>	<b>Revision Details</b>		
	<b>Page No(s)</b>	<b>Clause</b>	<b>Details</b>
1.0	-	-	Initial Version