



TEST REPORT

Test Report No. : UL-RPT-RP10833755JD07A V2.0

Manufacturer : Panasonic Mobile Communications Development of Europe Ltd
Model No. : P-01H
FCC ID : UCE115064A
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 2.0 supersedes all previous versions.

Date of Issue: 21 September 2015

Checked by:

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Project Lead, Radio Laboratory

Issued by :

pp

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1. Customer Information










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

2. Summary of Testing

2.1. General Information

Specification Reference:	47CFR15.247
Specification Title:	Code of Federal Regulations Volume 47 (Telecommunications): Part 15 Subpart C (Intentional Radiators) - Section 15.247
Specification Reference:	47CFR15.207 and 47CFR15.209
Specification Title:	Code of Federal Regulations Volume 47 (Telecommunications): Part 15 Subpart C (Intentional Radiators) - Sections 15.207 and 15.209
Site Registration:	FCC: 209735
Location of Testing:	UL VS LTD, Unit 3 Horizon, Wade Road, Kingsland Business Park, Basingstoke, Hampshire, RG24 8AH, United Kingdom
Test Dates:	18 August 2015 to 25 August 2015

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

Reference:	ANSI C63.4 (2009)
Title:	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
Reference:	ANSI C63.10 (2009)
Title:	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)

Brand Name:	DoCoMo
Model Name or Number:	P-01H
Test Sample IMEI:	351772070005201 (<i>Conducted sample with RF port</i>)
Hardware Version Number:	Rev C
Software Version Number:	ACPU: B-D52CS1-01.03.2007 CCPU: D52CS1_Cv18122302
FCC ID:	UCE115064A

Brand Name:	DoCoMo
Model Name or Number:	P-01H
Test Sample IMEI:	351772070005144 (<i>Radiated sample</i>)
Hardware Version Number:	Rev C
Software Version Number:	ACPU: B-D52CS1-01.03.2007 CCPU: D52CS1_Cv18122302
FCC ID:	UCE115064A

Description:	AC Adaptor
Brand Name:	DoCoMo
Model Name or Number:	01
Serial Number:	N/A

Description:	Stereo Earphone
Brand Name:	DoCoMo
Model Name or Number:	01
Serial Number:	N/A

Description:	USB Cable with charge function
Brand Name:	NTT DoCoMo
Model Name or Number:	02
Serial Number:	N/A

Description:	Rechargeable Li-ion Battery Pack
Brand Name:	NTT DoCoMo
Model Name or Number:	P32
Serial Number:	N/A

3.2. Description of EUT

The equipment under test was a single mode UTRA mobile phone with *Bluetooth* and RFID technologies.

3.3. Modifications Incorporated in the EUT

No modifications were applied to the EUT during testing.

3.4. Additional Information Related to Testing

Tested Technology:	<i>Bluetooth</i>		
Power Supply Requirement:	Nominal	3.7 VDC	
Type of Unit:	Transceiver		
Channel Spacing:	1 MHz		
Mode:	Basic Rate	Enhanced Data Rate	
Modulation:	GFSK	$\pi/4$ -DQPSK	8DQPSK
Packet Type: (Maximum Payload)	DH5	2DH5	3DH5
Data Rate (Mbps):	1	2	3
Maximum Conducted Output Power:	0.6 dBm		
Antenna Gain:	0.0 dBi		
Transmit Frequency Range:	2400 MHz to 2483.5 MHz		
Transmit Channels Tested:	Channel ID	Channel Number	Channel Frequency (MHz)
	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:

Description:	Micro SD Card
Brand Name:	Panasonic
Model Name or Number:	Not marked or stated
Serial Number:	Not marked or stated

Description:	Dummy Battery
Brand Name:	Not marked or stated
Model Name or Number:	Not marked or stated
Serial Number:	Not marked or stated

Description:	Laptop PC
Brand Name:	Panasonic
Model Name or Number:	CF-74
Serial Number:	CF-74C3BBDBE

4. Operation and Monitoring of the EUT during Testing

4.1. Operating Modes

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

- Continuously transmitting at maximum power on bottom, middle and top channels in 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):

- Transmit tests: The EUT was placed into *Bluetooth* test mode using a laptop PC and application supplied by the customer. Once in *Bluetooth* test mode, a link was established with 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.
- AC conducted emission and transmitter radiated spurious emissions tests were performed with the EUT transmitting in DH5 mode as this mode was found to transmit the highest power.
- Transmitter radiated spurious emissions tests were performed with the AC Charger connected to the EUT, as this was found to be the worst case during pre-scans. All accessories were individually connected and measurements made during the pre-scans to determine the worst case combination.
- For conducted testing, the dummy battery was installed into the EUT. The power supply was set to 3.7 VDC and was powered by 120 VAC 60Hz.
- The EUT conducted sample was used for 20 dB Bandwidth, Carrier Frequency Separation, Transmitter Maximum Peak Output Power, Transmitter Number Of Hopping Frequencies and Average Time of Occupancy.
- The EUT radiated sample 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:**

Test Engineer:	David Doyle	Test Date:	25 August 2015
Test Sample IMEI:	351772070005144		

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

Environmental Conditions:

Temperature (°C):	23
Relative Humidity (%):	46

Results: Live / Quasi Peak

Frequency (MHz)	Line	Level (dB μ V)	Limit (dB μ V)	Margin (dB)	Result
0.1901	Live	31.0	64.0	33.0	Complied
0.195	Live	33.4	63.8	30.4	Complied
0.578	Live	28.9	56.0	27.1	Complied
1.464	Live	24.6	56.0	31.4	Complied
1.536	Live	23.8	56.0	32.2	Complied
25.058	Live	23.2	60.0	36.8	Complied

Results: Live / Average

Frequency (MHz)	Line	Level (dB μ V)	Limit (dB μ V)	Margin (dB)	Result
0.227	Live	26.2	52.6	26.4	Complied
0.452	Live	13.6	46.8	33.2	Complied
0.582	Live	8.5	46.0	37.5	Complied
1.289	Live	7.9	46.0	38.1	Complied
1.518	Live	10.0	46.0	36.0	Complied
25.202	Live	7.9	50.0	42.1	Complied

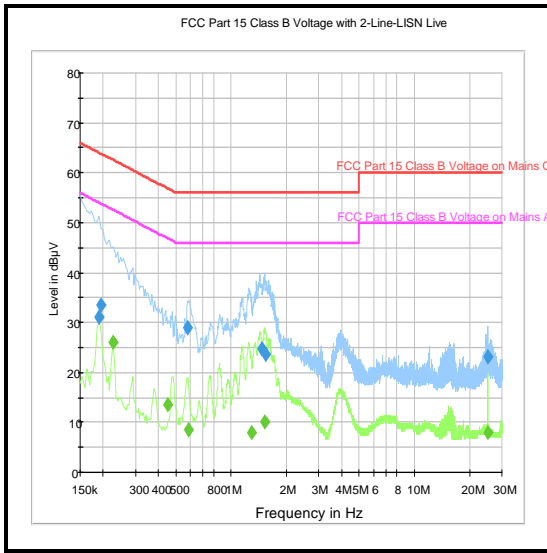
Transmitter AC Conducted Spurious Emissions (continued)**Results: Neutral / Quasi Peak**

Frequency (MHz)	Line	Level (dB μ V)	Limit (dB μ V)	Margin (dB)	Result
0.159	Neutral	41.4	65.5	24.1	Complied
1.253	Neutral	33.6	56.0	22.4	Complied
1.446	Neutral	34.9	56.0	21.1	Complied
1.743	Neutral	32.1	56.0	23.9	Complied
3.912	Neutral	24.0	56.0	32.0	Complied
25.058	Neutral	23.8	60.0	36.2	Complied

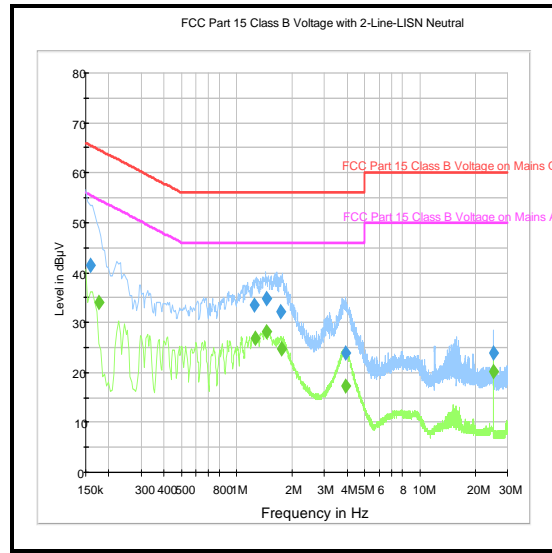
Results: Neutral / Average

Frequency (MHz)	Line	Level (dB μ V)	Limit (dB μ V)	Margin (dB)	Result
0.177	Neutral	34.0	54.6	20.6	Complied
1.257	Neutral	26.7	46.0	19.3	Complied
1.460	Neutral	28.1	46.0	17.9	Complied
1.757	Neutral	24.7	46.0	21.3	Complied
3.921	Neutral	17.3	46.0	28.7	Complied
25.058	Neutral	20.3	50.0	29.7	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	Thermohygrometer	JM Handelpunkt	30.5015.06	None stated	07 Jan 2016	12
A649	LISN	Rohde & Schwarz	ESH3-Z5	825562/008	14 Jul 2016	12
A1830	Pulse Limiter	Rohde & Schwarz	ESH3-Z2	100668	02 Mar 2016	12
M1263	Test Receiver	Rohde & Schwarz	ESIB7	100265	14 Oct 2015	12

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

Test Engineer:	Nick Steele	Test Date:	18 August 2015
Test Sample IMEI:	351772070005201		

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

Environmental Conditions:

Temperature (°C):	25
Relative Humidity (%):	40

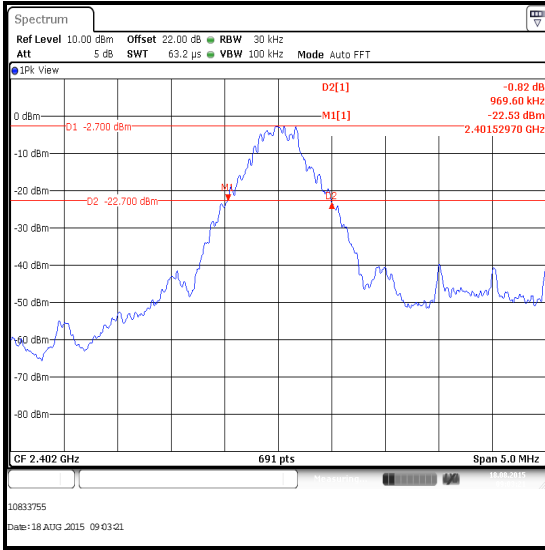
Note(s):

1. The spectrum analyser resolution bandwidth was set between 1% & 5% of the 20dB bandwidth and the video bandwidth was set to at least equal to 3 times the resolution bandwidth. A peak detector was used, sweep time was set to auto and the trace was Max hold. The span was set between 2 & 5 times the 20dB bandwidth. Normal delta markers were placed 20dB down from the peak of the carrier. These results are documented in the tables below.
2. The test receiver was connected to the RF port on the EUT using suitable attenuation and RF cable.

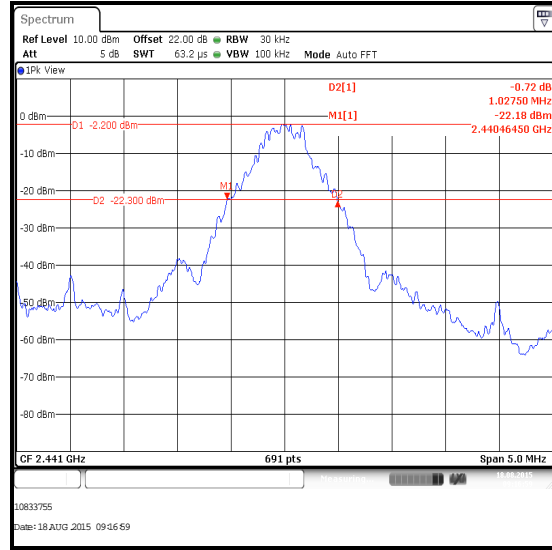
Transmitter 20 dB Bandwidth (continued)

Results DH5:

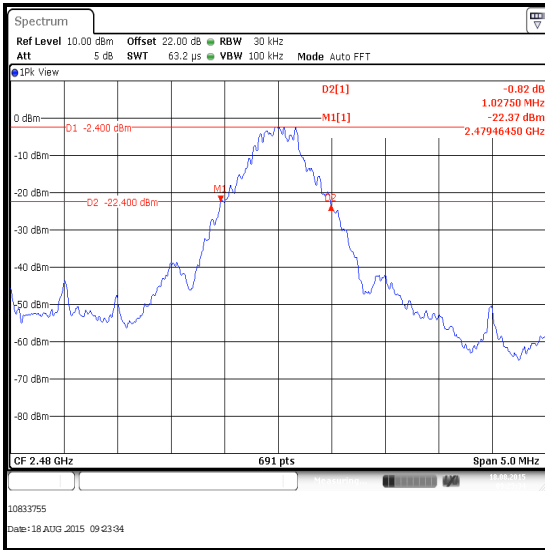
Channel	20 dB Bandwidth (kHz)
Bottom	969.600
Middle	1027.500
Top	1027.500



Bottom Channel



Middle Channel

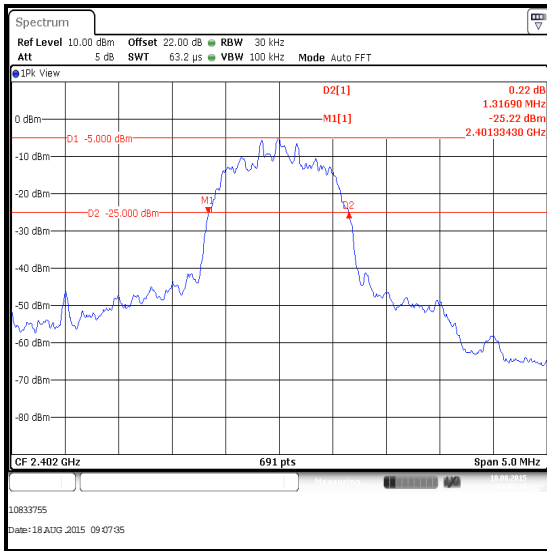


Top Channel

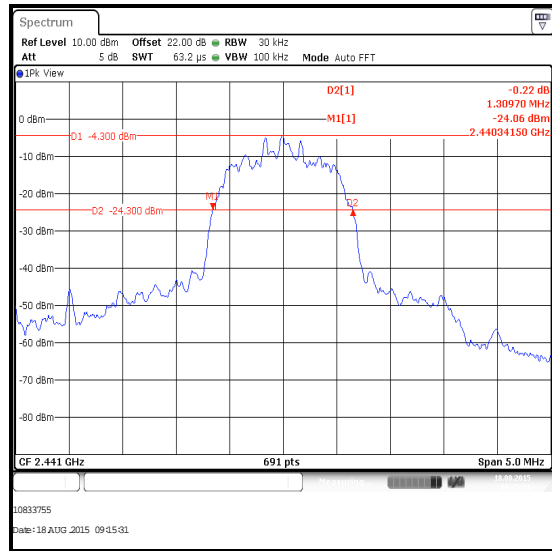
Transmitter 20 dB Bandwidth (continued)

Results 2DH5:

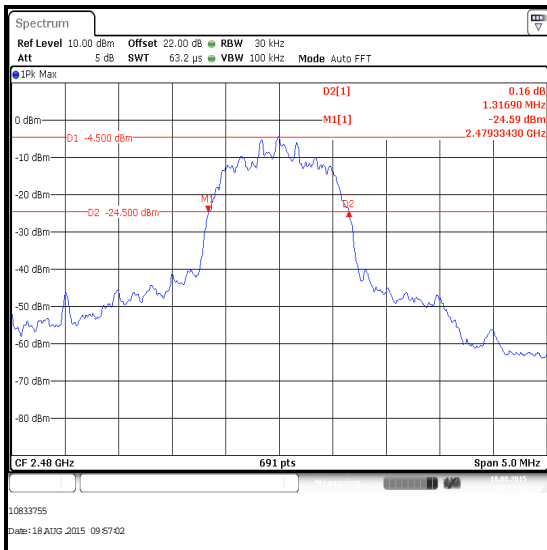
Channel	20 dB Bandwidth (kHz)
Bottom	1316.900
Middle	1309.700
Top	1316.900



Bottom Channel



Middle Channel

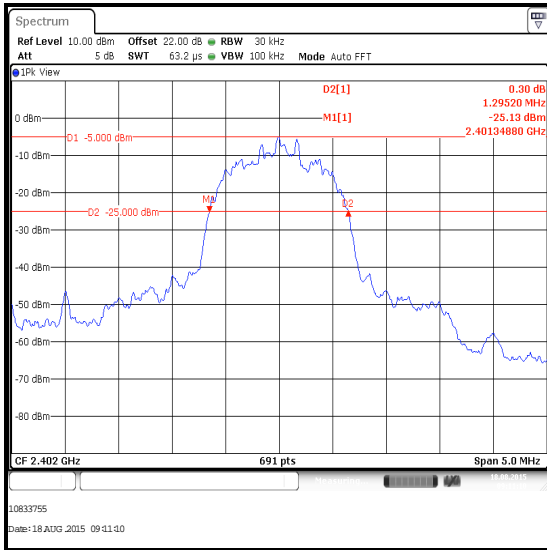


Top Channel

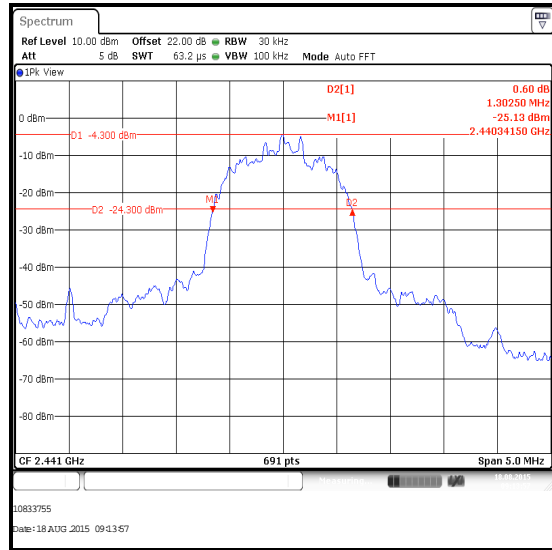
Transmitter 20 dB Bandwidth (continued)

Results 3DH5:

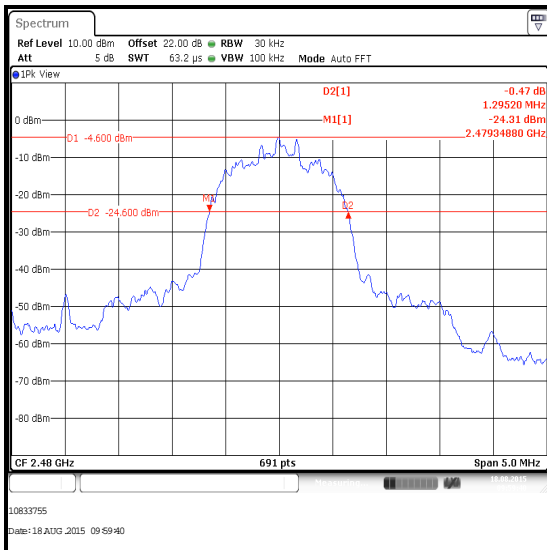
Channel	20 dB Bandwidth (kHz)
Bottom	1295.200
Middle	1302.500
Top	1295.200



Bottom Channel



Middle Channel



Top Channel

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

Asset No.	Instrument	Manufacturer	Type No.	Serial No.	Date Calibration Due	Cal. Interval (Months)
M1659	Thermohygrometer	JM Handelpunkt	30.5015.13	None stated	23 Apr 2016	12
M1835	Signal Analyser	Rohde & Schwarz	FSV30	103050	18 Feb 2016	12
A2508	Attenuator	AtlanTecRF	AN18-10	821846#3	Calibrated before use	-
A2504	Directional Coupler	AtlanTecRF	CDC-003060-10	13122501839	Calibrated before use	-
M1764	RF Power Sensor	Dare Instruments	RPR3006W	13I00030SNO 36	11 Dec 2015	12
G0607	Signal Generator	Rohde & Schwarz	SMU200A	100943	18 Jul 2016	36

5.2.3. Transmitter Carrier Frequency Separation

Test Summary:

Test Engineer:	Nick Steele	Test Date:	18 August 2015
Test Sample IMEI:	351772070005201		

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

Environmental Conditions:

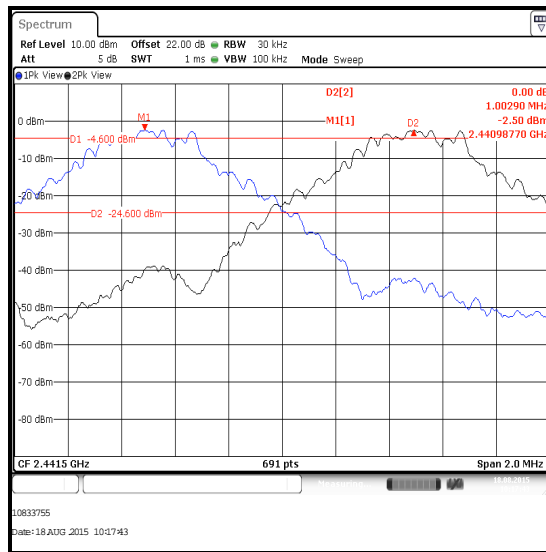
Temperature (°C):	25
Relative Humidity (%):	39

Note(s):

1. The 20 dB bandwidth measured for the middle channel operating at 2441 MHz was used to calculate the limit.
2. The spectrum analyser resolution bandwidth was set to at least 1% of the span and the video bandwidth was set to at least equal to the resolution bandwidth. A peak detector was used, sweep time was set to auto and trace mode was Max Hold. The span was set wide enough to capture both adjacent channels. A marker was placed at the peak of one channel and a delta marker was placed at the peak of the other, the results are recorded in the tables below.
3. The spectrum analyser was connected to the RF port on the EUT using suitable attenuation and RF cable.

Results: DH5

Carrier Frequency Separation (kHz)	Limit ($2/3$ of 20 dB BW) (kHz)	Margin (kHz)	Result
1002.900	685.000	317.900	Complied



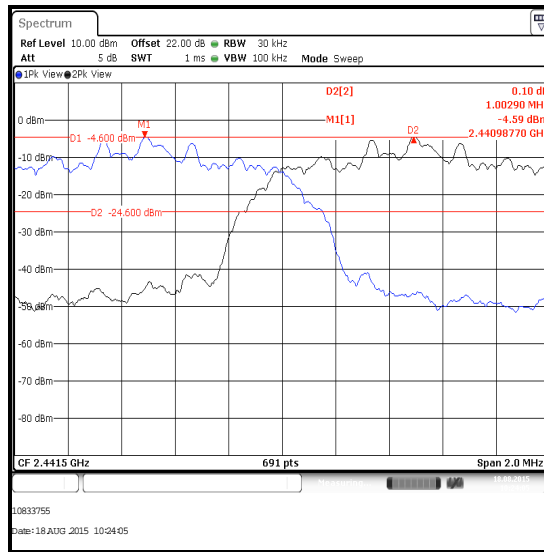
Transmitter Carrier Frequency Separation (continued)

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 ($2/3$ of 20 dB BW) (kHz)	Margin (kHz)	Result
1002.900	873.133	129.767	Complied



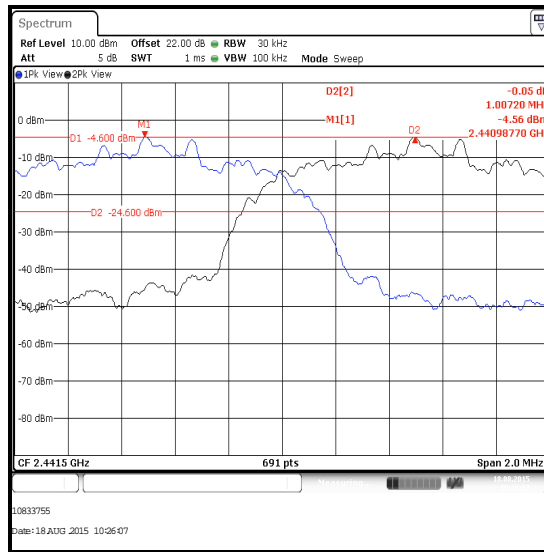
Transmitter Carrier Frequency Separation (continued)

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 ($2/3$ of 20 dB BW) (kHz)	Margin (kHz)	Result
1007.200	868.333	138.867	Complied



Test Equipment Used:

Asset No.	Instrument	Manufacturer	Type No.	Serial No.	Date Calibration Due	Cal. Interval (Months)
M1659	Thermohygrometer	JM Handelpunkt	30.5015.13	None stated	23 Apr 2016	12
M1835	Signal Analyser	Rohde & Schwarz	FSV30	103050	18 Feb 2016	12
A2508	Attenuator	AtlanTecRF	AN18-10	821846#3	Calibrated before use	-
A2504	Directional Coupler	AtlanTecRF	CDC-003060-10	13122501839	Calibrated before use	-
M1764	RF Power Sensor	Dare Instruments	RPR3006W	13100030SNO36	11 Dec 2015	12
G0607	Signal Generator	Rohde & Schwarz	SMU200A	100943	18 Jul 2016	36

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

Test Engineer:	Nick Steele	Test Date:	18 August 2015
Test Sample IMEI:	351772070005201		

FCC Reference:	Part 15.247(a)(1)(iii)
Test Method Used:	As detailed in ANSI C63.10 Sections 7.7.3 & 7.7.4

Environmental Conditions:

Temperature (°C):	25
Relative Humidity (%):	38

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.
2. The EUT was set to transmit whilst hopping across the band of operation for all tests below.
3. The spectrum analyser was set up for the Number of Hopping Frequencies measurement as follows: the span was set to match the band of operation. The resolution bandwidth was set to at least 1% of the span and video bandwidth was set to at least equal to the resolution bandwidth. A peak detector was used, sweep time was set to auto and trace mode was Max Hold.
4. The spectrum analyser was set up for the Pulse Length measurement as follows: the resolution bandwidth was set to 1 MHz and the video bandwidth was set to at least equal to the resolution bandwidth. A peak detector was used and sweep time was set sufficiently long enough to capture a full pulse when in time domain (span of zero Hz). The spectrum analyser was set to video trigger to capture the highest burst, a marker placed at the start of the emission burst and a delta marker placed at the end of the emission burst. The emission width is recorded in the table below.
5. The spectrum analyser was set up for the Number of Hopping Frequencies in 32 seconds measurement as follows: the resolution bandwidth was set to 100 kHz and video bandwidth of 300 kHz. A peak detector was used and sweep time was set to 32 seconds. The total number of hopping frequencies were counted and recorded in the table below.

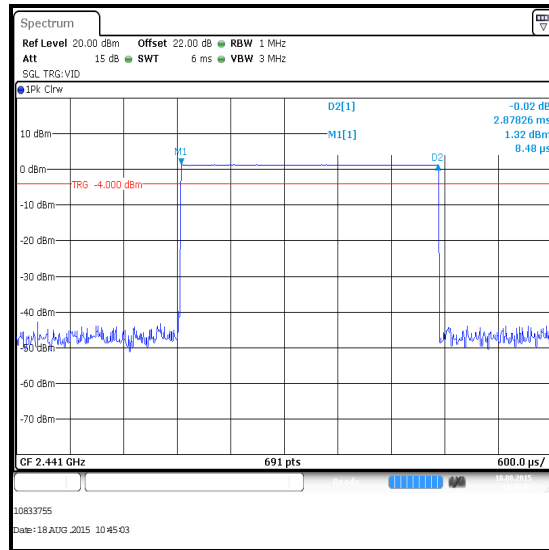
Results:

Emission Width (µs)	Number of Hops in 31.6 Seconds	Average Time of Occupancy (s)	Limit (s)	Margin (s)	Result
2878.260	82	0.236	0.4	0.164	Complied

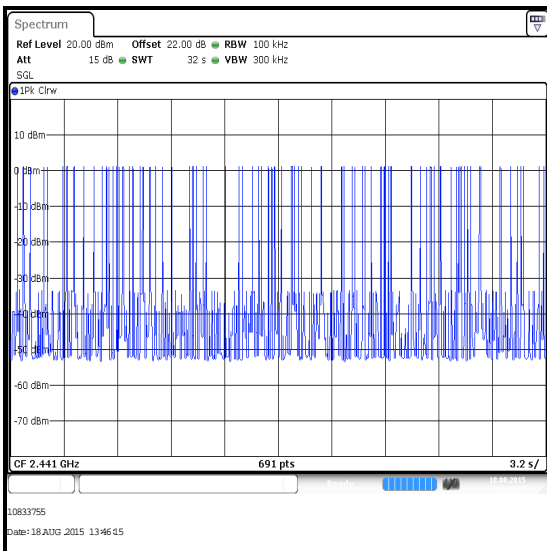
Transmitter Number of Hopping Frequencies and Average Time of Occupancy (continued)



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	Thermohygrometer	JM Handelpunkt	30.5015.13	None stated	23 Apr 2016	12
M1835	Signal Analyser	Rohde & Schwarz	FSV30	103050	18 Feb 2016	12
A2508	Attenuator	AtlanTecRF	AN18-10	821846#3	Calibrated before use	-
A2504	Directional Coupler	AtlanTecRF	CDC-003060-10	13122501839	Calibrated before use	-
M1764	RF Power Sensor	Dare Instruments	RPR3006W	13I00030SNO 36	11 Dec 2015	12
G0607	Signal Generator	Rohde & Schwarz	SMU200A	100943	18 Jul 2016	36

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

Test Engineer:	Nick Steele	Test Date:	18 August 2015
Test Sample IMEI:	351772070005201		

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

Environmental Conditions:

Temperature (°C):	25
Relative Humidity (%):	37

Note(s):

1. The spectrum analyser resolution bandwidth was set to greater than the 20 dB Bandwidth of the signal. Video bandwidth was set to at least equal to the resolution bandwidth. A peak detector was used, sweep time was set to auto and trace mode was Max Hold. The span was set to approximately 5 times the 20 dB Bandwidth of the signal. A marker was placed at the peak of the signal and the results recorded in the tables below.
2. The test receiver was connected to the RF port on the EUT using suitable attenuation and RF cable. An RF offset level was entered on the test receiver to compensate for the loss of the attenuator and RF cable.
3. The declared antenna gain was added to the conducted peak power to obtain the EIRP.

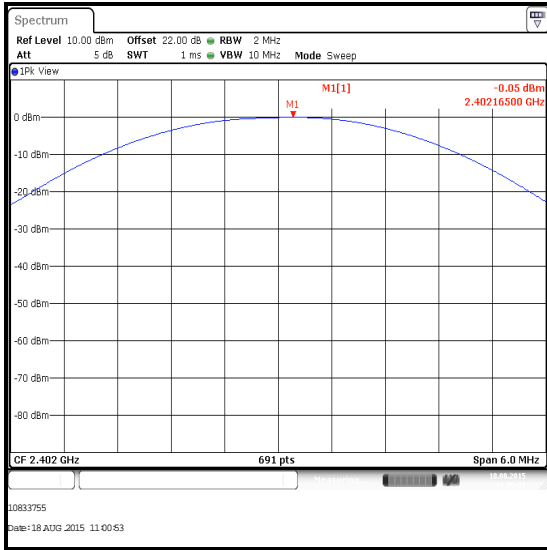
Transmitter Maximum Peak Output Power (continued)**Results: DH5**

Channel	Conducted Peak Power (dBm)	Conducted Peak Power Limit (dBm)	Margin (dB)	Result
Bottom	-0.1	30.0	30.1	Complied
Middle	0.6	30.0	29.4	Complied
Top	0.5	30.0	29.5	Complied

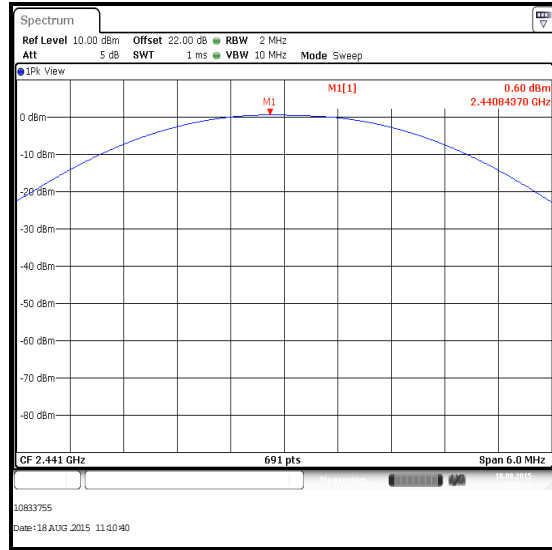
Channel	Conducted Peak Power (dBm)	Declared Antenna Gain (dBi)	EIRP (dBm)	De Facto EIRP Limit (dBm)	Margin (dB)	Result
Bottom	-0.1	0.0	-0.1	36.0	36.1	Complied
Middle	0.6	0.0	0.6	36.0	35.4	Complied
Top	0.5	0.0	0.5	36.0	35.5	Complied

Transmitter Maximum Peak Output Power (continued)

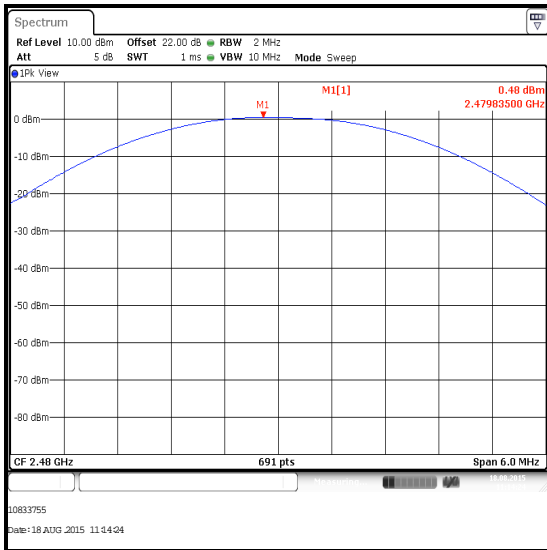
Results: DH5



Bottom Channel



Middle Channel



Top Channel

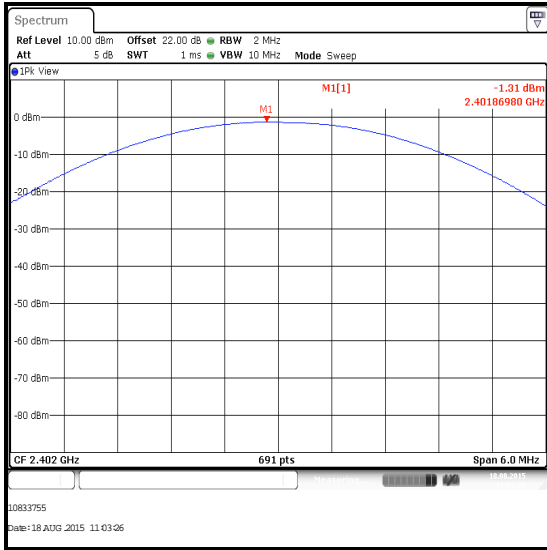
Transmitter Maximum Peak Output Power (continued)**Results: 2DH5**

Channel	Conducted Peak Power (dBm)	Conducted Peak Power Limit (dBm)	Margin (dB)	Result
Bottom	-1.3	21.0	22.3	Complied
Middle	-0.7	21.0	21.7	Complied
Top	-0.8	21.0	21.8	Complied

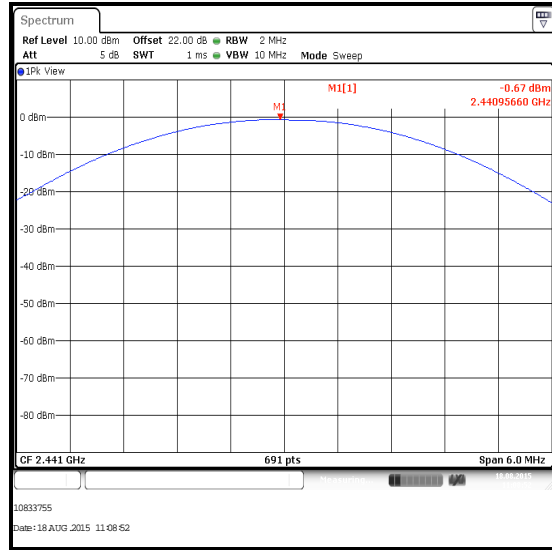
Channel	Conducted Peak Power (dBm)	Declared Antenna Gain (dBi)	EIRP (dBm)	De Facto EIRP Limit (dBm)	Margin (dB)	Result
Bottom	-1.3	0.0	-1.3	27.0	28.3	Complied
Middle	-0.7	0.0	-0.7	27.0	27.7	Complied
Top	-0.8	0.0	-0.8	27.0	27.8	Complied

Transmitter Maximum Peak Output Power (continued)

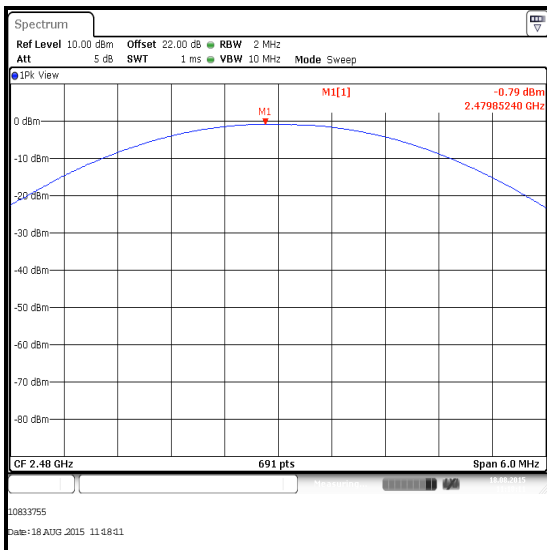
Results: 2DH5



Bottom Channel



Middle Channel



Top Channel

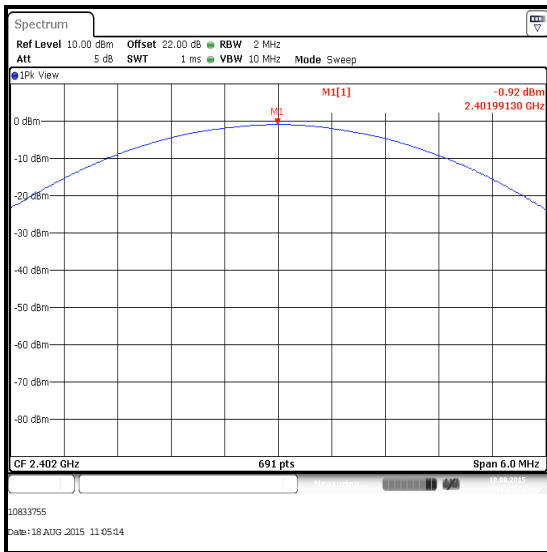
Transmitter Maximum Peak Output Power (continued)**Results: 3DH5**

Channel	Conducted Peak Power (dBm)	Conducted Peak Power Limit (dBm)	Margin (dB)	Result
Bottom	-0.9	21.0	21.9	Complied
Middle	-0.3	21.0	21.3	Complied
Top	-0.4	21.0	21.4	Complied

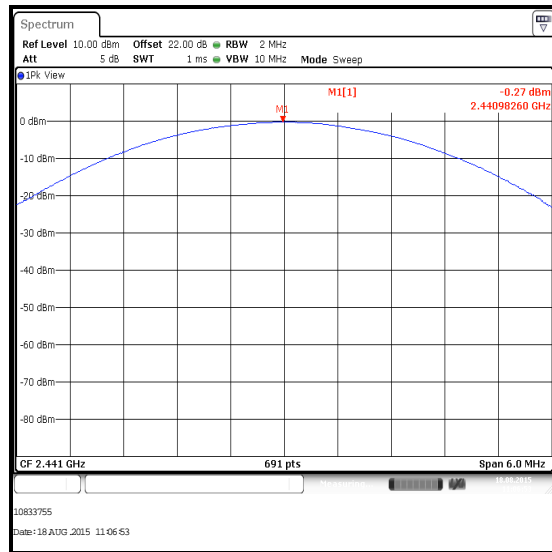
Channel	Conducted Peak Power (dBm)	Declared Antenna Gain (dBi)	EIRP (dBm)	De Facto EIRP Limit (dBm)	Margin (dB)	Result
Bottom	-0.9	0.0	-0.9	27.0	27.9	Complied
Middle	-0.3	0.0	-0.3	27.0	27.3	Complied
Top	-0.4	0.0	-0.4	27.0	27.4	Complied

Transmitter Maximum Peak Output Power (continued)

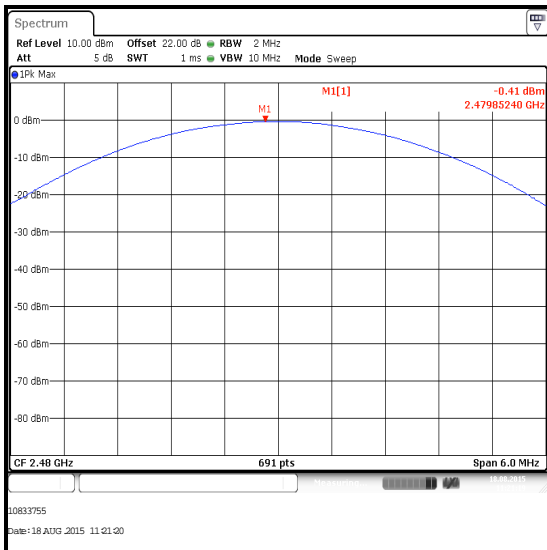
Results: 3DH5



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	Thermohygrometer	JM Handelspunkt	30.5015.13	None stated	23 Apr 2016	12
M1835	Signal Analyser	Rohde & Schwarz	FSV30	103050	18 Feb 2016	12
A2508	Attenuator	AtlanTecRF	AN18-10	821846#3	Calibrated before use	-
A2504	Directional Coupler	AtlanTecRF	CDC-003060-10	13122501839	Calibrated before use	-
M1764	RF Power Sensor	Dare Instruments	RPR3006W	13I00030SNO 36	11 Dec 2015	12
G0607	Signal Generator	Rohde & Schwarz	SMU200A	100943	18 Jul 2016	36

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

Test Engineer:	David Doyle	Test Date:	21 August 2015
Test Sample IMEI:	351772070005144		

FCC Reference:	Parts 15.247(d) & 15.209(a)
Test Method Used:	As detailed in ANSI C63.10 Sections 6.3 and 6.5 referencing ANSI C63.4
Frequency Range	30 MHz to 1000 MHz

Environmental Conditions:

Temperature (°C):	22
Relative Humidity (%):	46

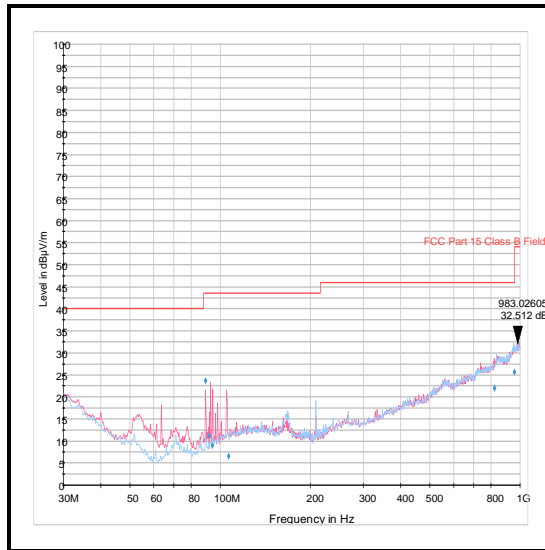
Note(s):

1. Transmitter radiated spurious emissions tests were performed with the EUT transmitting in DH5 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 plot 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.
6. Pre-scans were performed and markers placed on the highest measured levels. The test receiver resolution bandwidth was set to 100 kHz and video bandwidth 300 kHz. The sweep time was set to auto. A peak detector was used, sweep time was set to auto and trace mode was Max Hold.

Results: Quasi-Peak / DH5

Frequency (MHz)	Antenna Polarity	Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Result
983.026	Horizontal	32.5	54.0	21.5	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:

Asset No.	Instrument	Manufacturer	Type No.	Serial No.	Date Calibration Due	Cal. Interval (Months)
M1945	Thermohygrometer	JM Handelspunkt	30.5015.01	0112	23 Apr 2016	12
K0001	5 m RSE Chamber	Rainford EMC	N/A	N/A	19 Mar 2016	12
M1124	Test Receiver	Rohde & Schwarz	ESIB26	100046	06 Oct 2015	12
A490	Antenna	Chase	CBL6111A	1590	30 Apr 2016	12
G0543	Amplifier	Sonoma	310N	230801	06 Nov 2015	3
A1834	Attenuator	Hewlett Packard	8491B	10444	05 Mar 2016	12

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

Test Engineer:	David Doyle	Test Date:	20 August 2015
Test Sample IMEI:	351772070005144		

FCC Reference:	Parts 15.247(d) & 15.209(a)
Test Method Used:	As detailed in ANSI C63.10 Sections 6.3 and 6.6 referencing ANSI C63.4
Frequency Range	1 GHz to 25 GHz

Environmental Conditions:

Temperature (°C):	22
Relative Humidity (%):	46

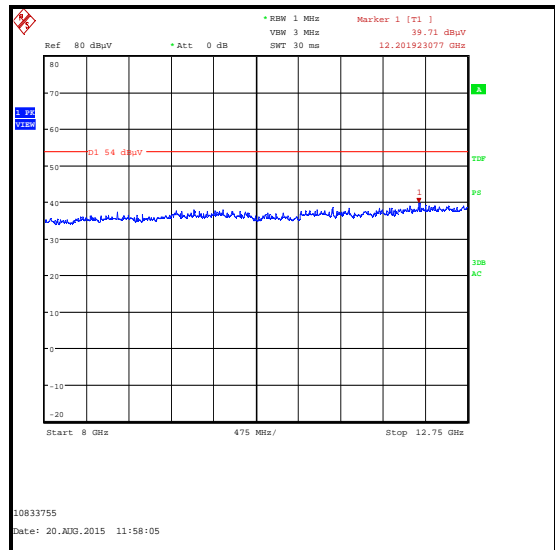
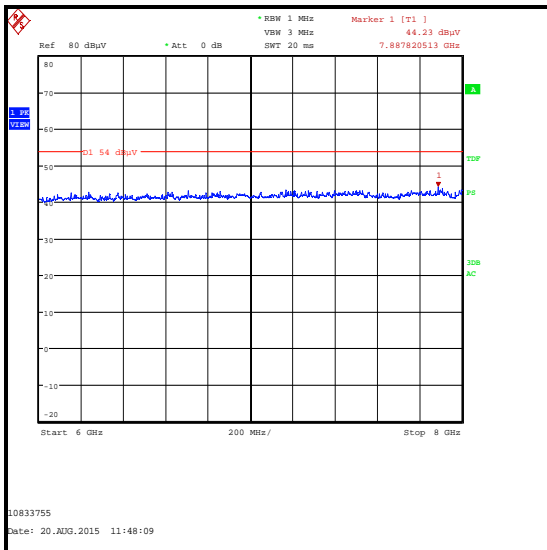
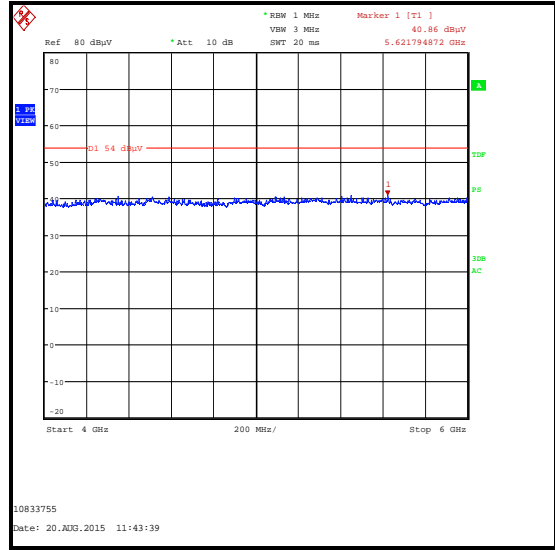
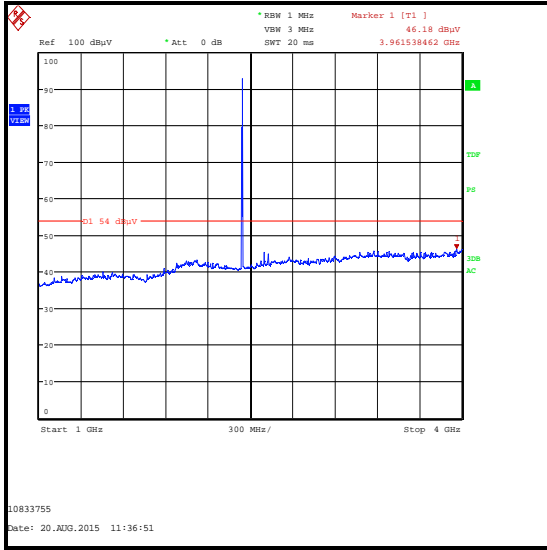
Note(s):

1. Transmitter radiated spurious emissions tests were performed with the EUT transmitting in DH5 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 2441 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.
6. Pre-scans were performed and a marker placed on the highest measured level of the appropriate plot. The test receiver resolution bandwidth was set to 1 MHz and video bandwidth 3 MHz. The sweep time was set to auto.

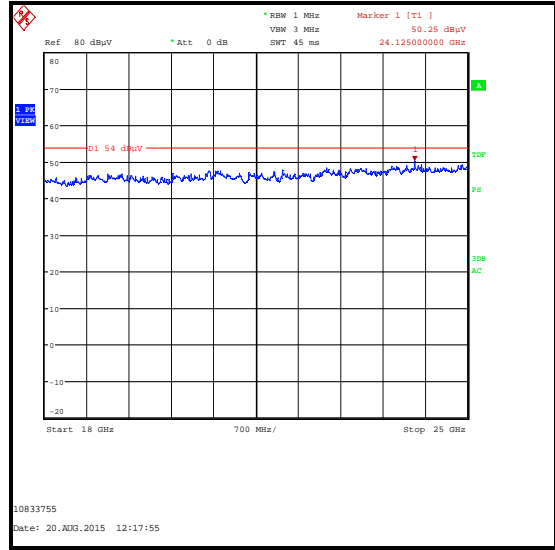
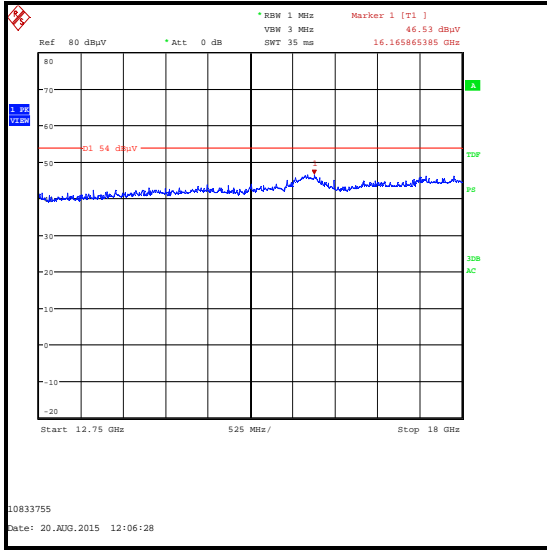
Results: Middle Channel / DH5

Frequency (MHz)	Antenna Polarity	Peak Level (dB μ V/m)	Average Limit (dB μ V/m)	Margin (dB)	Result
3961.538	Horizontal	46.2	54.0	7.8	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)
M1656	Thermohygrometer	JM Handelspunkt	30.5015.13	None stated	23 Apr 2016	12
K0002	3m RSE Chamber	Rainford EMC	N/A	N/A	01 May 2016	12
M1874	Test Receiver	Rohde & Schwarz	ESU26	100553	12 Jun 2016	12
A1534	Pre Amplifier	Hewlett Packard	8449B	3008A00405	21 Dec 2015	12
A1818	Antenna	EMCO	3115	00075692	20 Dec 2015	12
A253	Antenna	Flann Microwave	12240-20	128	20 Dec 2015	12
A254	Antenna	Flann Microwave	14240-20	139	20 Dec 2015	12
A255	Antenna	Flann Microwave	16240-20	519	20 Dec 2015	12

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

Test Engineer:	David Doyle	Test Date:	19 August 2015
Test Sample IMEI:	351772070005144		

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

Environmental Conditions:

Temperature (°C):	22
Relative Humidity (%):	42

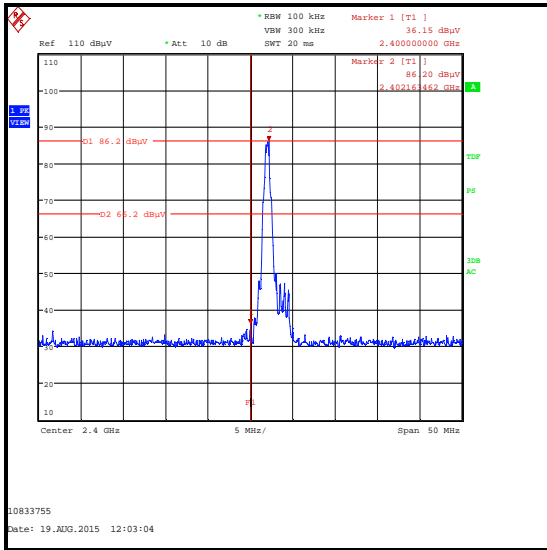
Note(s):

1. The final measured value, for the given emission, in the table below incorporates the calibrated antenna factor and cable loss.
2. For the lower band edge measurements: As the lower band edge falls within the non-restricted band only peak measurements are required. The test receiver resolution bandwidth was set to 100 kHz and video bandwidth 300 kHz. A peak detector was used, sweep time was set to auto and trace mode was Max Hold. The test receiver was left to sweep for a sufficient length of time in order to maximise the carrier level and out-of-band emissions. A marker and corresponding reference level line were placed on the peak of the carrier. A marker was placed on the band edge spot frequencies and a second marker placed on the highest emission level in the adjacent band (where a higher level emission was present). Marker frequencies and levels were recorded.
3. For the upper band edge measurements: As the upper band edge falls within restricted band both peak and average measurements were recorded by placing a marker at the edge of the band (2483.5 MHz). For peak measurements the test receiver resolution bandwidth was set to 1 MHz and video bandwidth 3 MHz. A peak detector was used, sweep time was set to auto and trace mode was Max Hold. The test receiver was left to sweep for a sufficient length of time in order to maximise the carrier level and out-of-band emissions. A marker was placed on the band edge spot frequencies and a second marker placed on the highest emission level in the adjacent band (where a higher level emission was present). Marker frequencies and levels were recorded.
4. There is a restricted band 10 MHz below the lower band edge. The test receiver was set up as follows: the RBW set to 1 MHz, the VBW set to 3 MHz, with the sweep time set to auto couple. Peak and average measurements were performed with their respective detectors. Markers were placed on the highest point on each trace.
5. The restricted band plot for 2310 MHz to 2390 MHz can be found under the results for DH5 static as this mode had the highest output power and was therefore deemed worst case.
6. * -20 dBc limit.
7. **In accordance with ANSI C63.10 Section 6.6.4.2 (Note 1), if the peak measured value complies with the average limit, it is unnecessary to perform an average measurement.

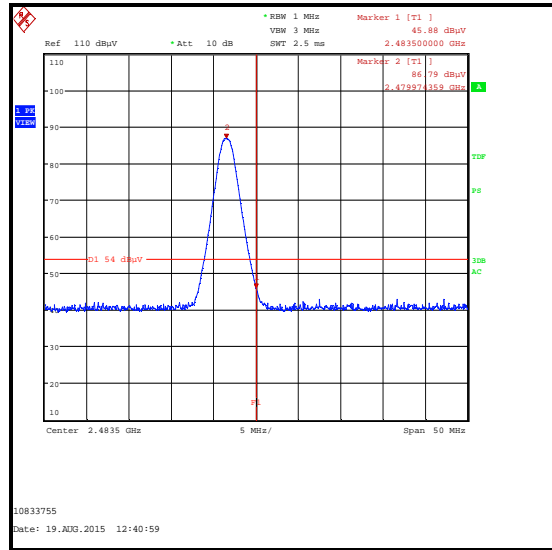
Transmitter Band Edge Radiated Emissions (continued)

Results: Static Mode / DH5

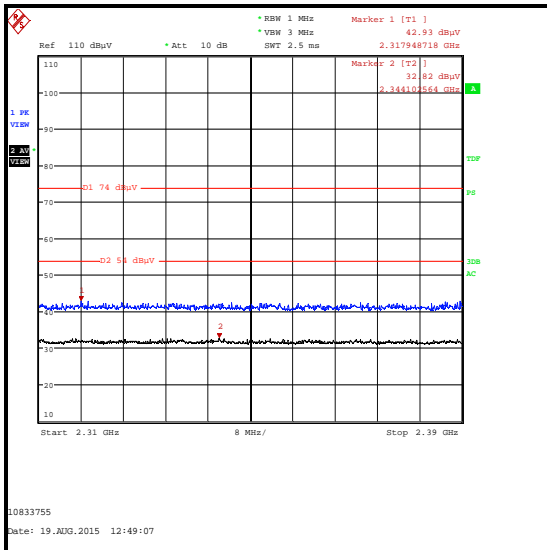
Frequency (MHz)	Antenna Polarity	Peak Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Result
2317.949	Horizontal	42.9	54.0**	11.1	Complied
2400.0	Horizontal	36.2	66.2*	30.0	Complied
2483.5	Horizontal	45.9	54.0**	8.1	Complied



Lower Band Edge Peak Static



Upper Band Edge Peak Static

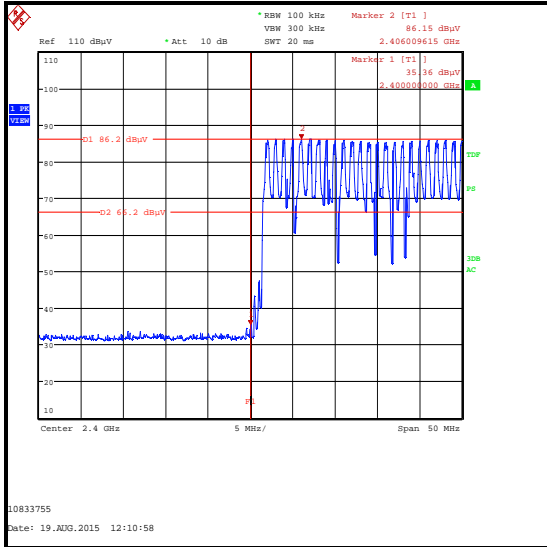


2310 MHz to 2390 MHz Restricted Band Plot

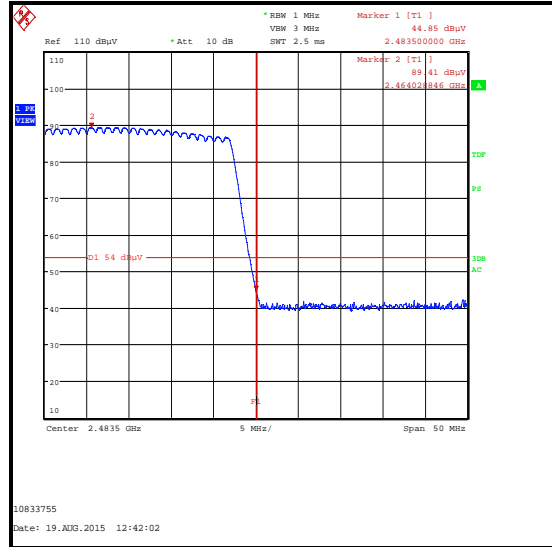
Transmitter Band Edge Radiated Emissions (continued)

Results: Hopping Mode / DH5

Frequency (MHz)	Antenna Polarity	Peak Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Result
2400.0	Horizontal	35.4	66.2*	30.8	Complied
2483.5	Horizontal	44.9	54.0**	9.1	Complied



Lower Band Edge Peak Hopping

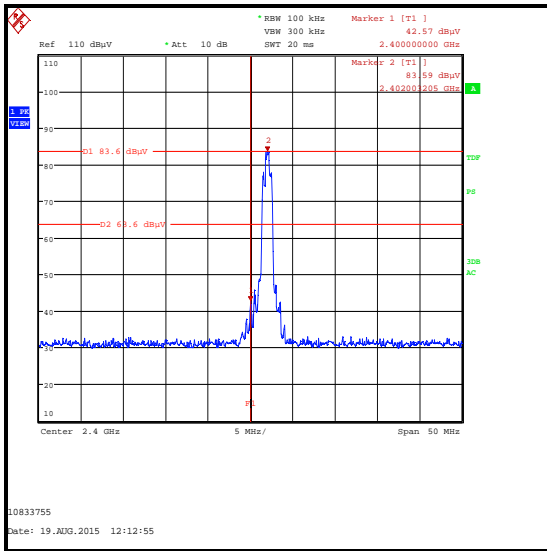


Upper Band Edge Peak Hopping

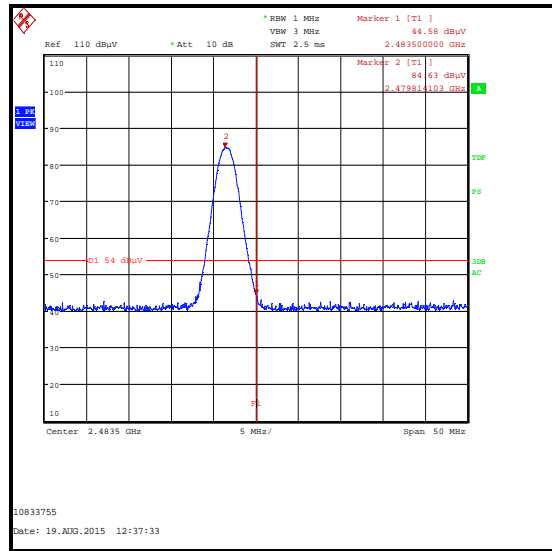
Transmitter Band Edge Radiated Emissions (continued)

Results: Static Mode / 2DH5

Frequency (MHz)	Antenna Polarity	Peak Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Result
2400.0	Horizontal	42.6	63.6*	21.0	Complied
2483.5	Horizontal	44.6	54.0**	9.4	Complied



Lower Band Edge Peak Static

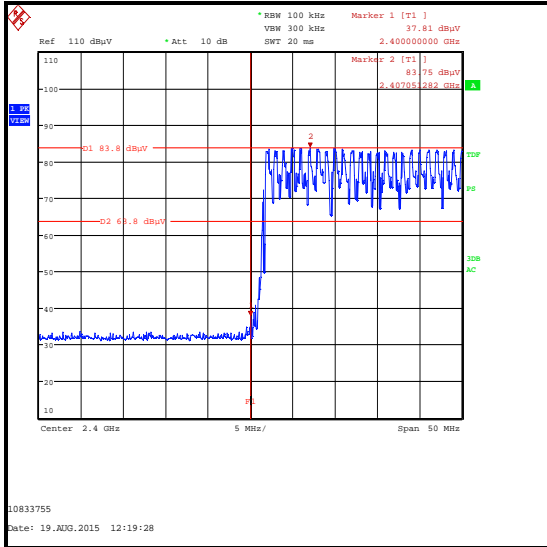


Upper Band Edge Peak Static

Transmitter Band Edge Radiated Emissions (continued)

Results: Hopping Mode / 2DH5

Frequency (MHz)	Antenna Polarity	Peak Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Result
2400.0	Horizontal	37.8	63.8*	26.0	Complied
2483.5	Horizontal	43.4	54.0**	10.6	Complied



Lower Band Edge Peak Hopping

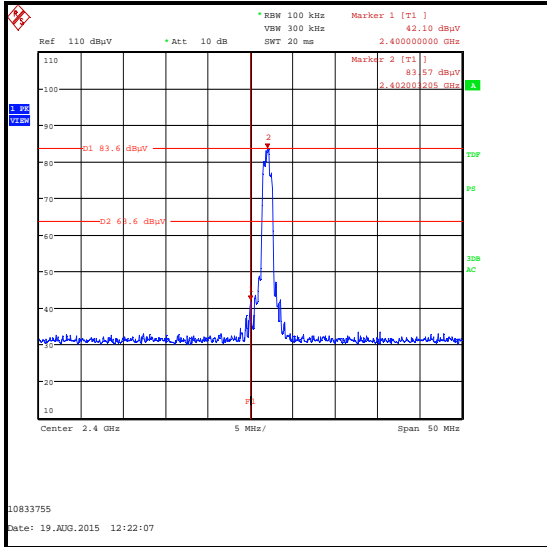


Upper Band Edge Peak Hopping

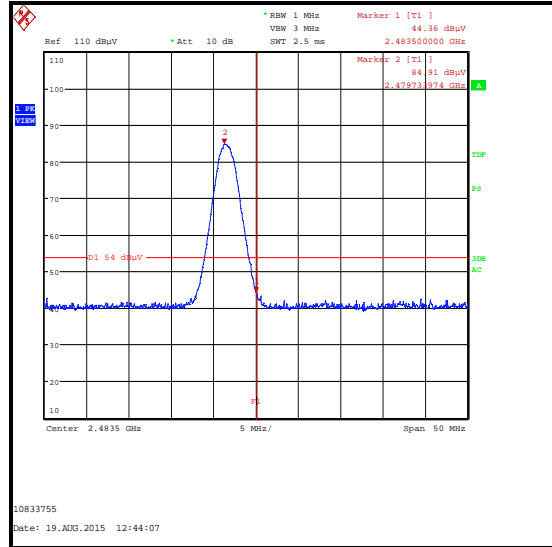
Transmitter Band Edge Radiated Emissions (continued)

Results: Static Mode / 3DH5

Frequency (MHz)	Antenna Polarity	Peak Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Result
2400.0	Horizontal	42.1	63.6*	21.5	Complied
2483.5	Horizontal	44.4	54.0**	9.6	Complied



Lower Band Edge Peak Static

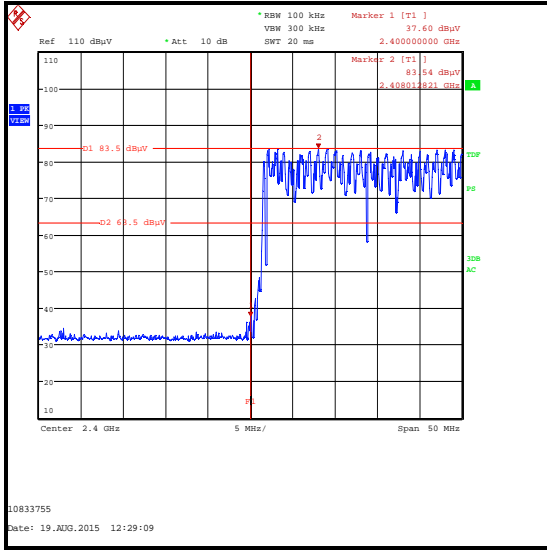


Upper Band Edge Peak Static

Transmitter Band Edge Radiated Emissions (continued)

Results: Hopping Mode / 3DH5

Frequency (MHz)	Antenna Polarity	Peak Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Result
2400.0	Horizontal	37.6	63.5*	25.9	Complied
2483.5	Horizontal	45.4	54.0**	8.6	Complied



Test Equipment Used:

Asset No.	Instrument	Manufacturer	Type No.	Serial No.	Date Calibration Due	Cal. Interval (Months)
M1656	Thermohygrometer	JM Handelspunkt	30.5015.13	None stated	23 Apr 2016	12
K0002	3m RSE Chamber	Rainford EMC	N/A	N/A	01 May 2016	12
M1874	Test Receiver	Rohde & Schwarz	ESU26	100553	12 Jun 2016	12
A1534	Pre Amplifier	Hewlett Packard	8449B	3008A00405	21 Dec 2015	12
A1818	Antenna	EMCO	3115	00075692	20 Dec 2015	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%	±4.69 dB
Conducted Maximum Peak Output Power	2.4 GHz to 2.4835 GHz	95%	±1.13 dB
Carrier Frequency Separation	2.4 GHz to 2.4835 GHz	95%	±0.92 ppm
Average Time of Occupancy	2.4 GHz to 2.4835 GHz	95%	±3.53 ns
20 dB Bandwidth	2.4 GHz to 2.4835 GHz	95%	±3.92 %
Radiated Spurious Emissions	30 MHz to 1 GHz	95%	±5.65 dB
Radiated Spurious Emissions	1 GHz to 26.5 GHz	95%	±2.94 dB

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

7. Report Revision History

Version Number	Revision Details		
	Page No(s)	Clause	Details
1.0	-	-	Initial Version
2.0	-	-	Admin updates, Sections 3.1, 3.5 & 4.2 updated

--- END OF REPORT ---