



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:

Steven White
Project Lead, Radio Laboratory

Issued by :

pp

John Newell
Quality Manager,
UL VS LTD



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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-74C3BBDDE |

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 |

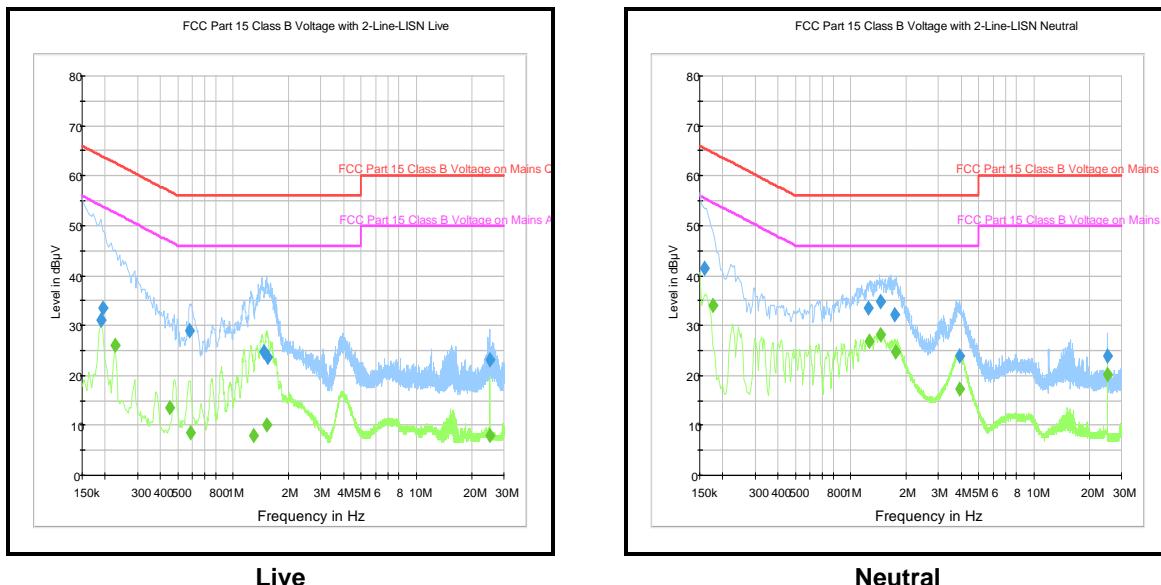
Transmitter AC Conducted Spurious Emissions (continued)**Results: Neutral / Quasi Peak**

| 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 Handelspunkt | 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:

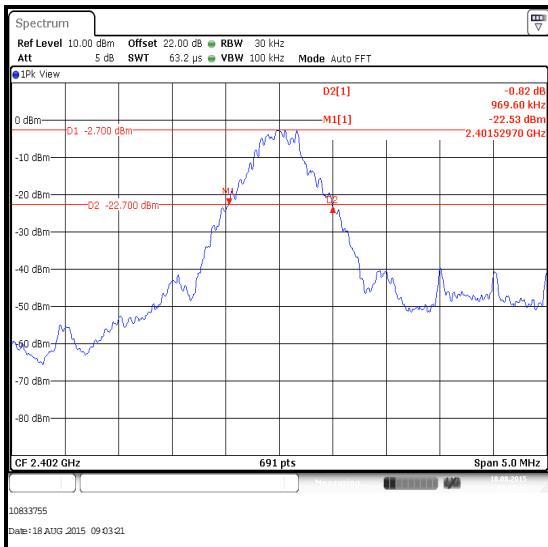
| | |
|------------------------|----|
| Temperature (°C): | 25 |
| Relative Humidity (%): | 40 |

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.

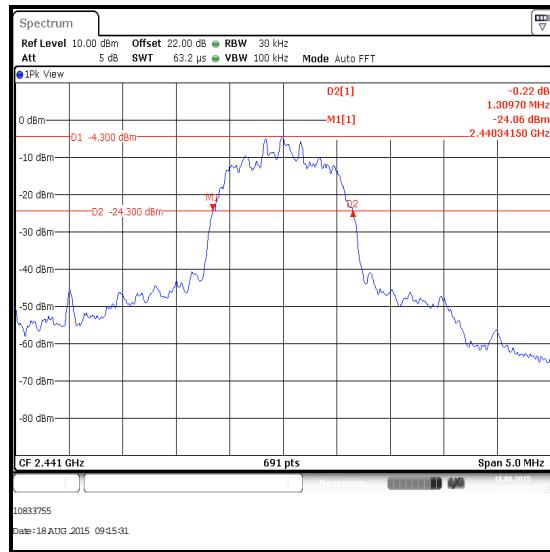
Transmitter 20 dB Bandwidth (continued)**Results DH5:**

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

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

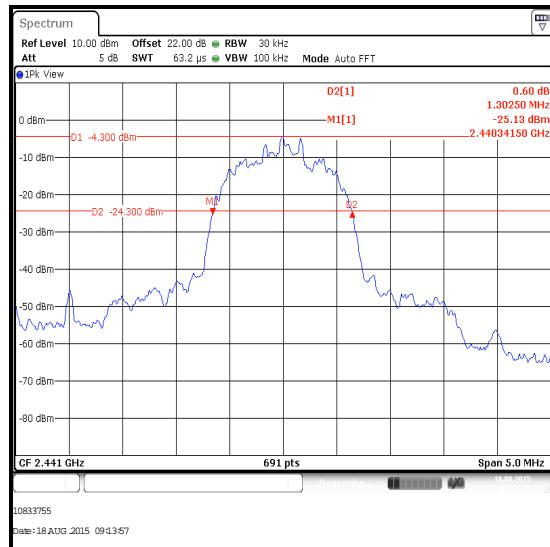
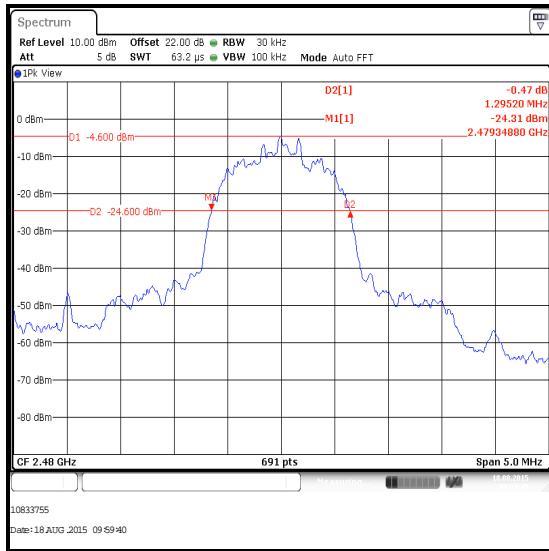
Transmitter 20 dB Bandwidth (continued)**Results 2DH5:**

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

**Bottom Channel****Top Channel****Middle 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 | 13I00030SNO36 | 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 $\frac{2}{3}$ of 20 dB BW (kHz) | Margin (kHz) | Result |
|-------------------------------------------|---------------------------------------------------------|---------------------|---------------|
| 1002.900 | 685.000 | 317.900 | Complied |

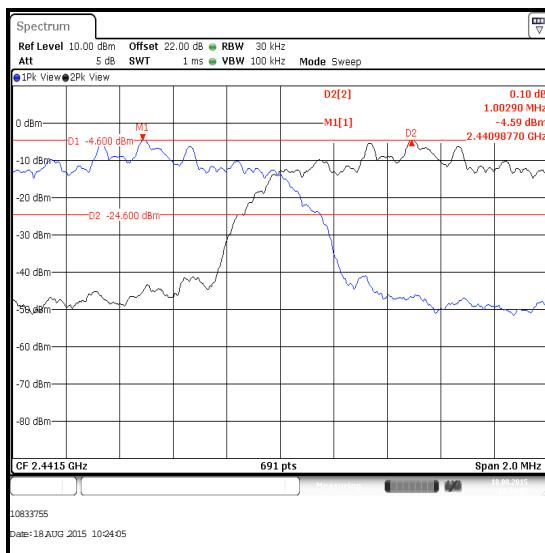


Transmitter Carrier Frequency Separation (continued)**Note(s):**

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 ($\frac{2}{3}$ of 20 dB BW) (kHz) | Margin (kHz) | Result |
|------------------------------------|------------------------------------------|--------------|----------|
| 1002.900 | 873.133 | 129.767 | Complied |

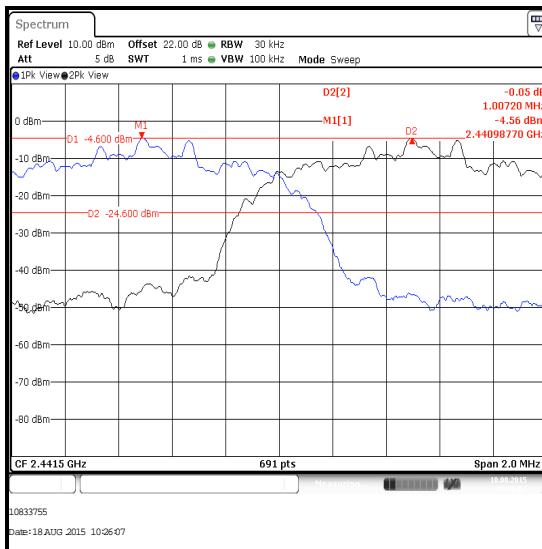


Transmitter Carrier Frequency Separation (continued)**Note(s):**

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 ($\frac{2}{3}$ 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 | 13I00030SNO36 | 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 |

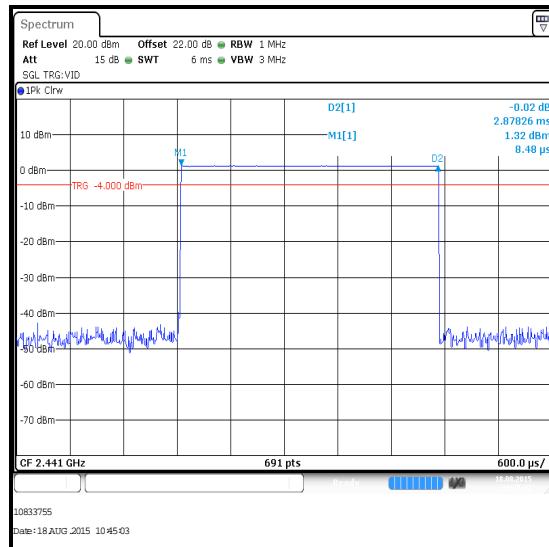
Note(s):

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.

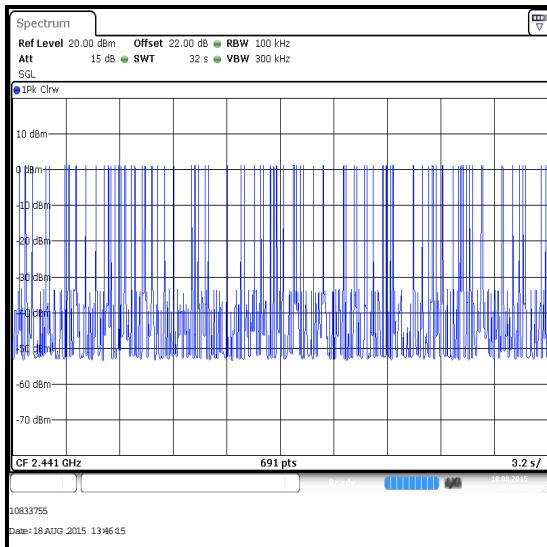
Results:

| 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 | 13I00030SNO36 | 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 |

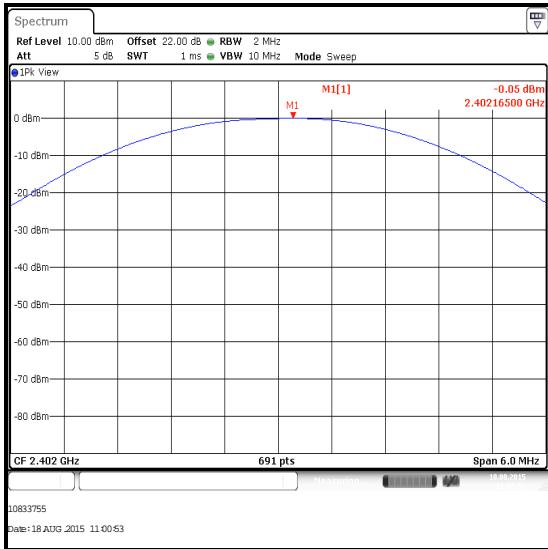
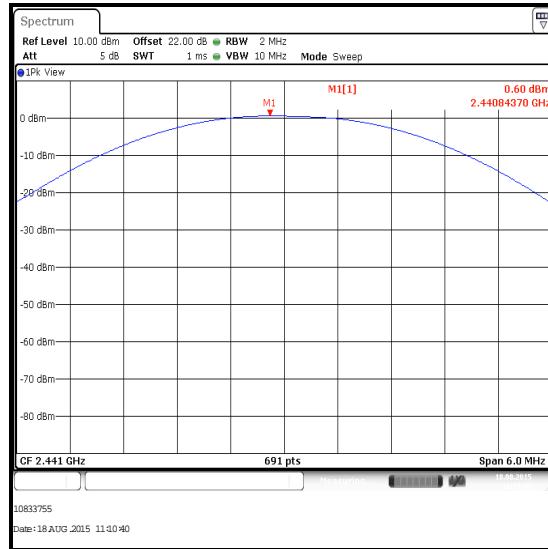
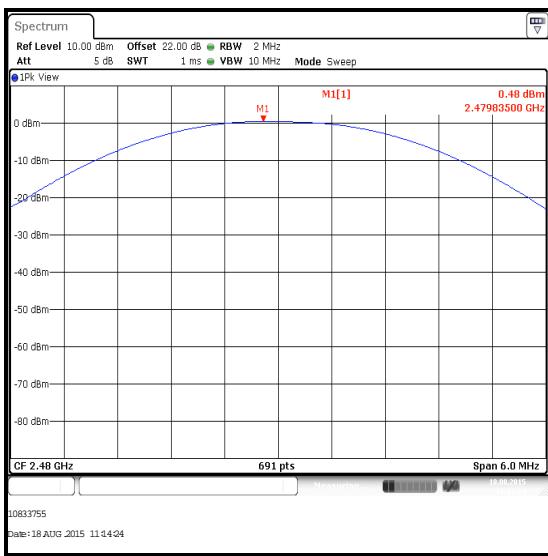
Note(s):

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 |

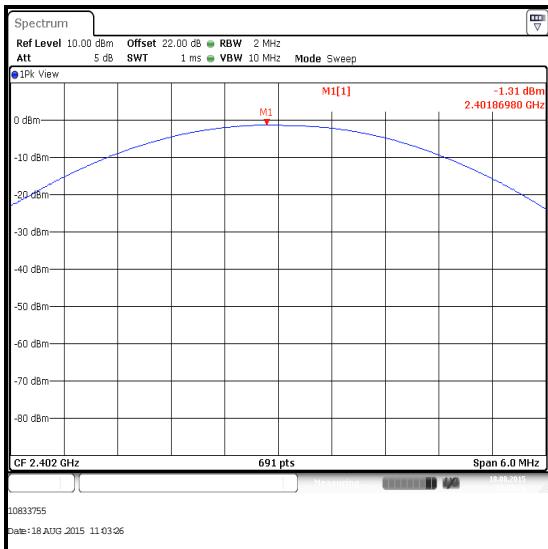
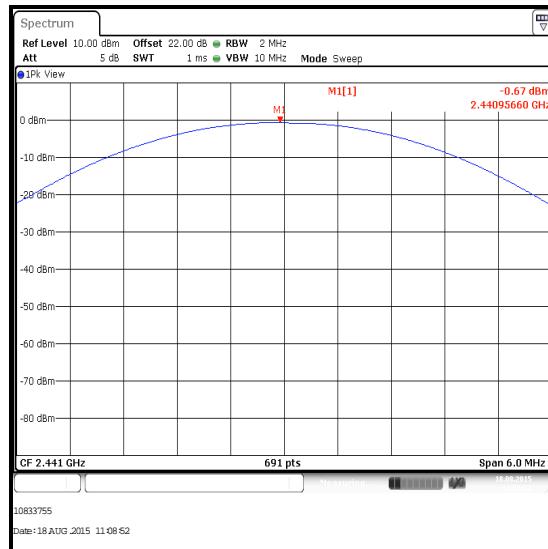
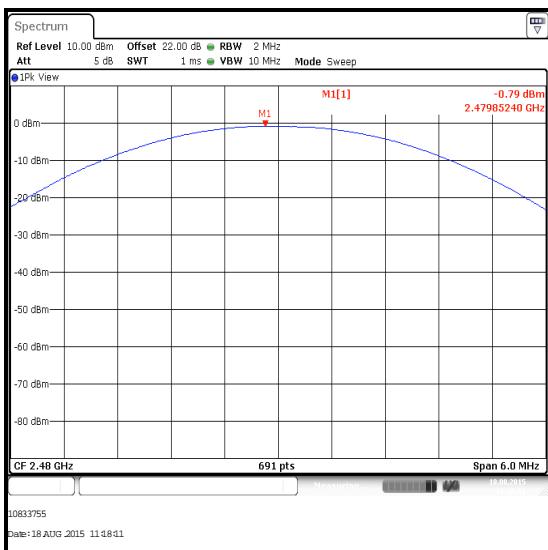
| Channel | Conducted Peak Power (dBm) | Declared Antenna Gain (dBi) | EIRP (dBm) | De Facto EIRP Limit (dBm) | Margin (dB) | Result |
|---------|----------------------------|-----------------------------|------------|---------------------------|-------------|----------|
| Bottom | -0.1 | 0.0 | -0.1 | 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 |

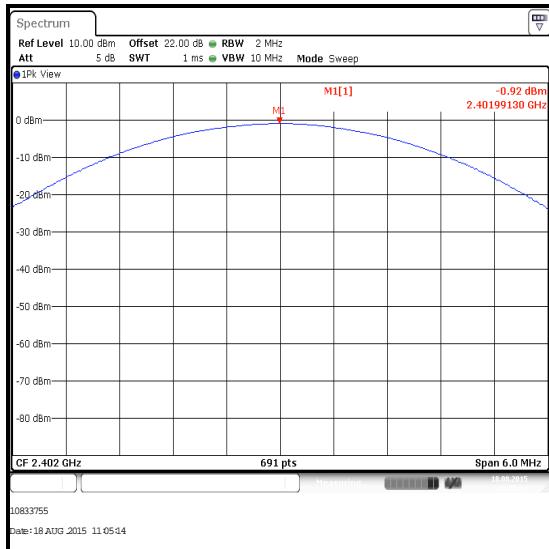
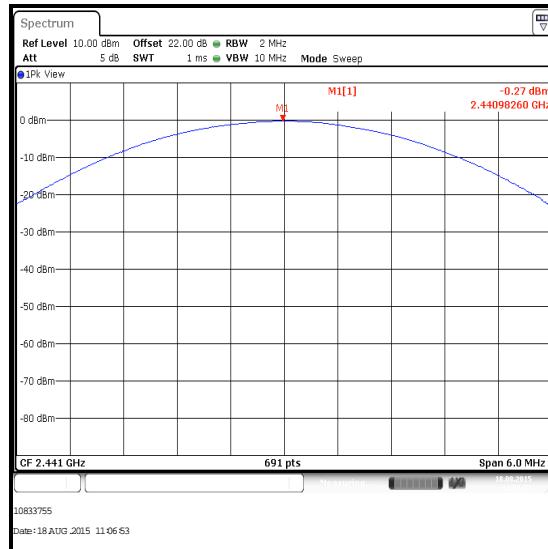
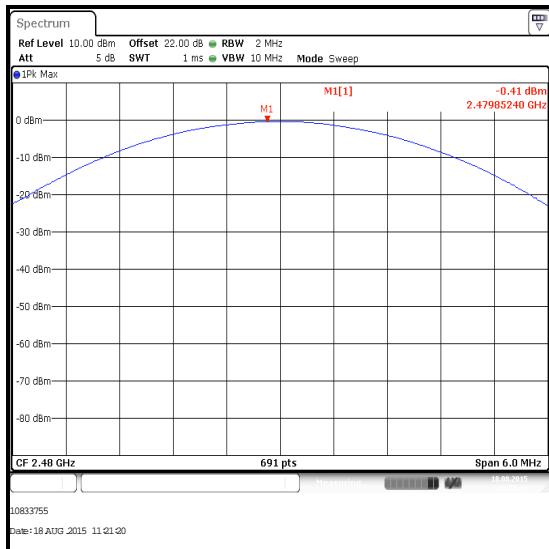
| Channel | Conducted Peak Power (dBm) | Declared Antenna Gain (dBi) | EIRP (dBm) | De Facto EIRP Limit (dBm) | Margin (dB) | Result |
|---------|----------------------------|-----------------------------|------------|---------------------------|-------------|----------|
| Bottom | -1.3 | 0.0 | -1.3 | 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 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 | 13I00030SNO36 | 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:

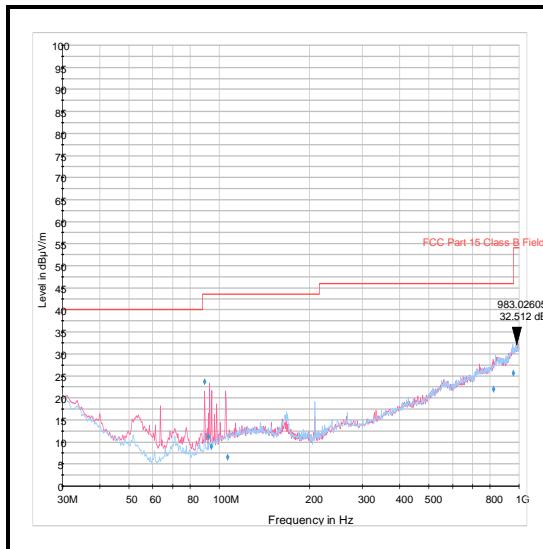
| | |
|-------------------------------|----|
| Temperature (°C): | 22 |
| Relative Humidity (%): | 46 |

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 Handelpunkt | 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 |

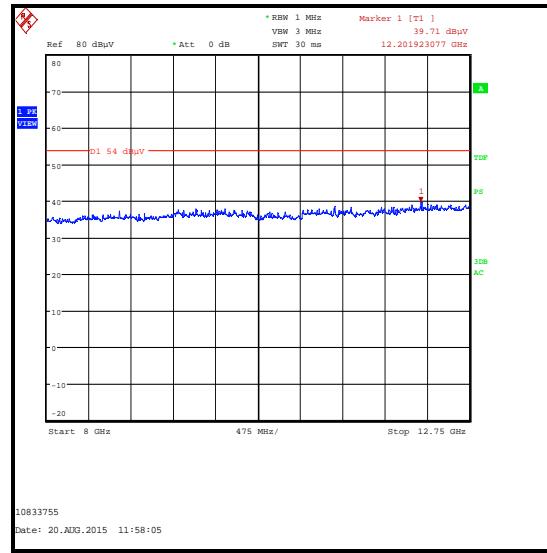
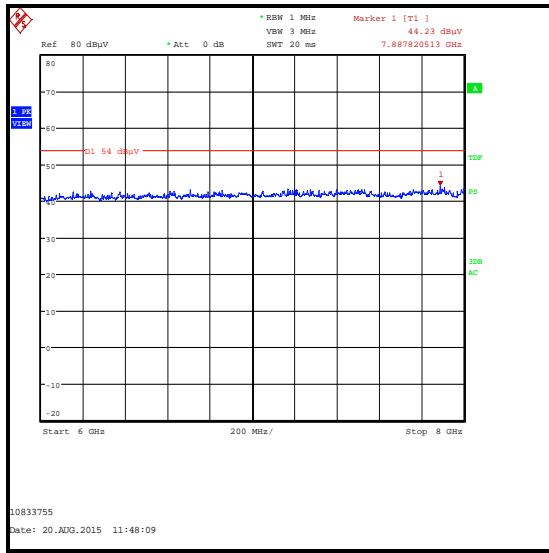
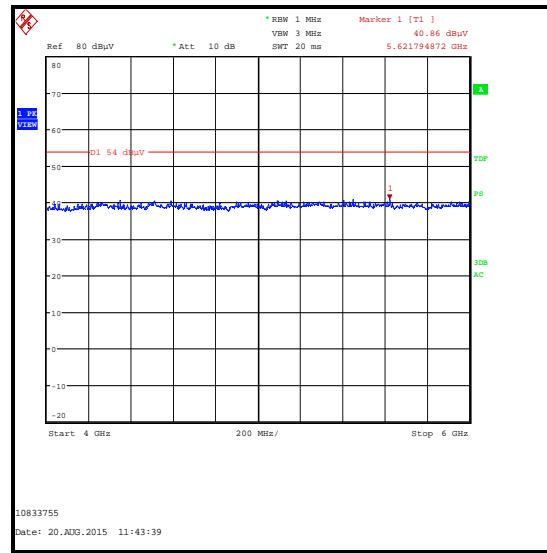
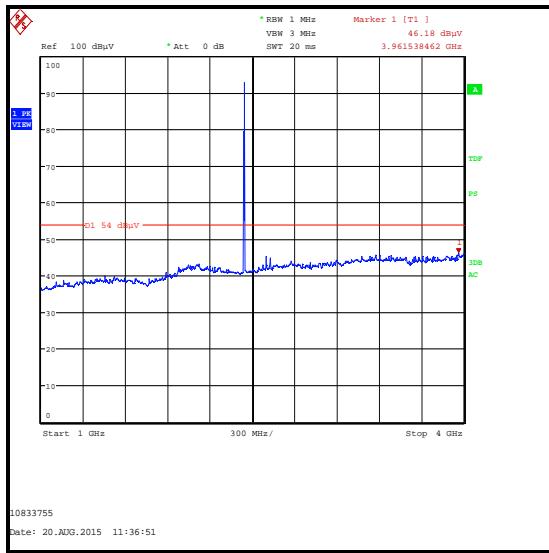
Note(s):

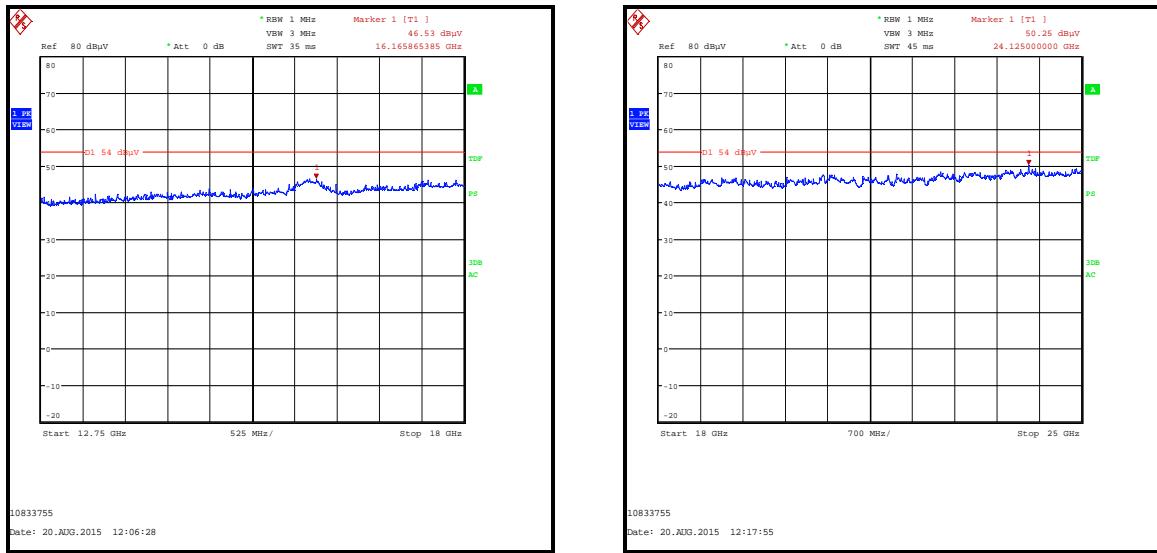
1. Transmitter radiated spurious emissions tests were performed with the EUT transmitting in DH5 mode as this was found to transmit the highest power and therefore deemed worst case.
2. The final measured value, for the given emission, in the table below incorporates the calibrated antenna factor and 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 Handelpunkt | 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:

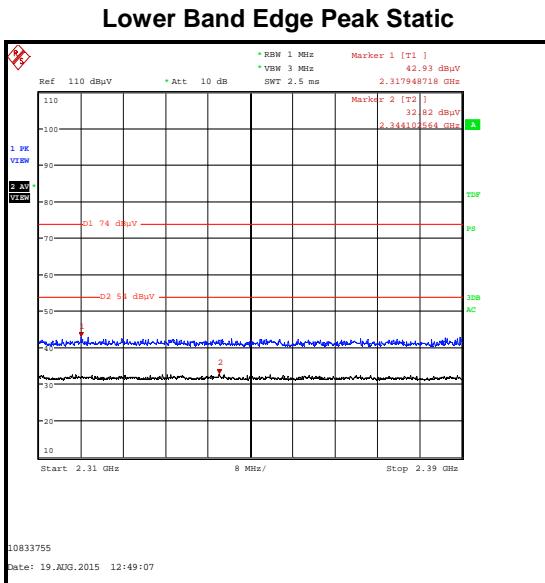
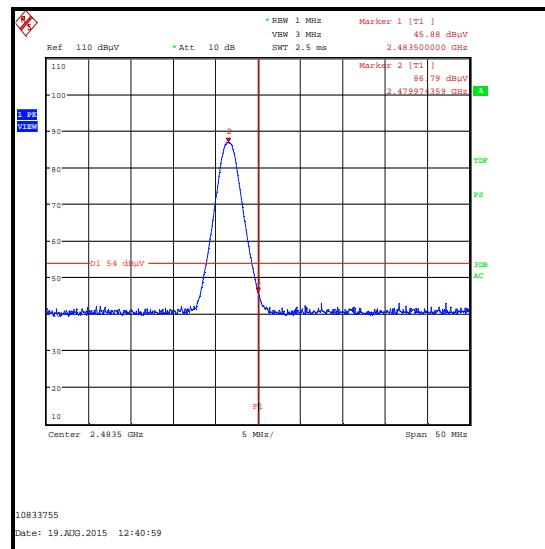
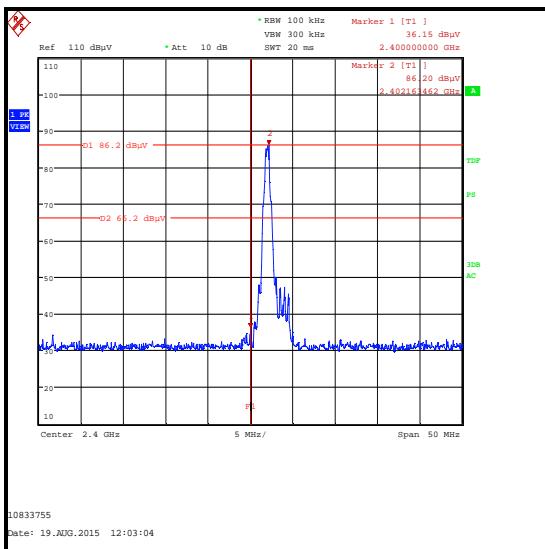
| | |
|-------------------------------|----|
| Temperature (°C): | 22 |
| Relative Humidity (%): | 42 |

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**

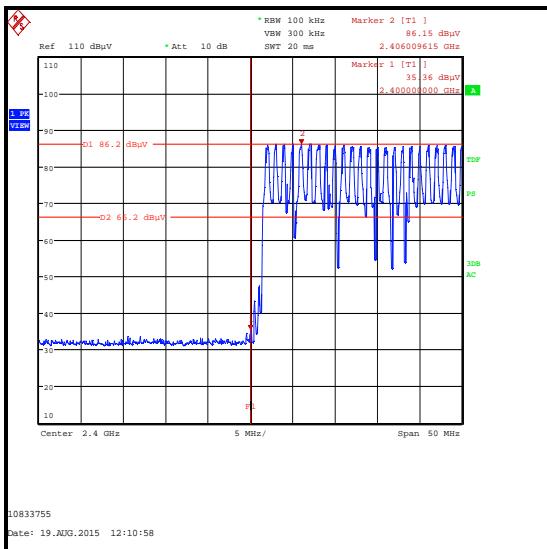
| Frequency (MHz) | Antenna Polarity | Peak Level (dB μ V/m) | Limit (dB μ V/m) | Margin (dB) | Result |
|-----------------|------------------|---------------------------|----------------------|-------------|----------|
| 2317.949 | Horizontal | 42.9 | 54.0** | 11.1 | Complied |
| 2400.0 | Horizontal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

**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 |



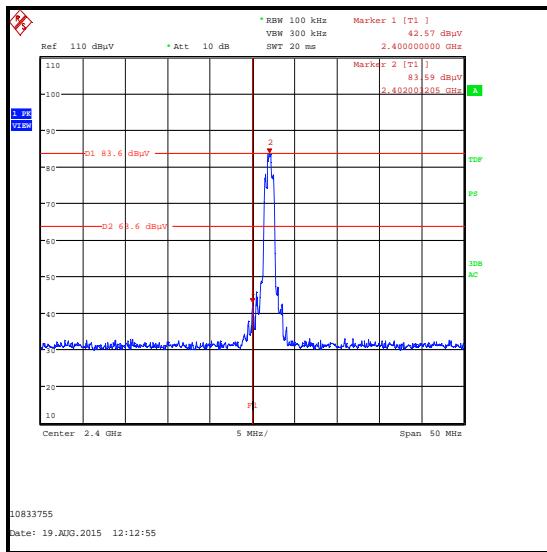
Lower Band Edge Peak Hopping



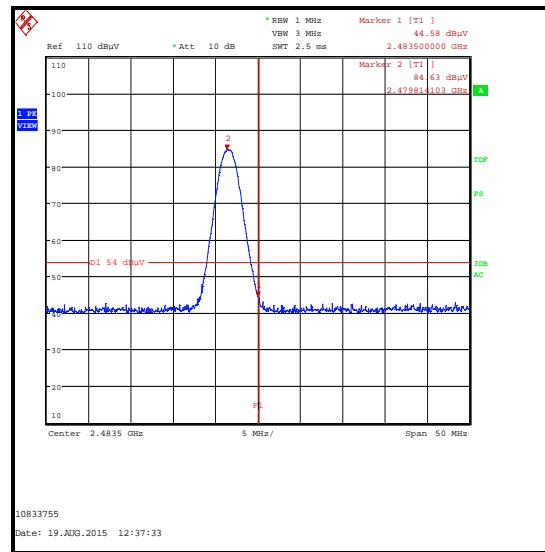
Upper Band Edge Peak Hopping

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 |



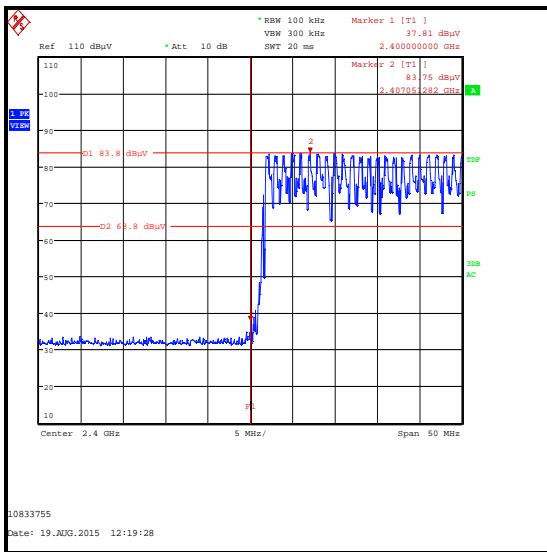
Lower Band Edge Peak Static



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 |



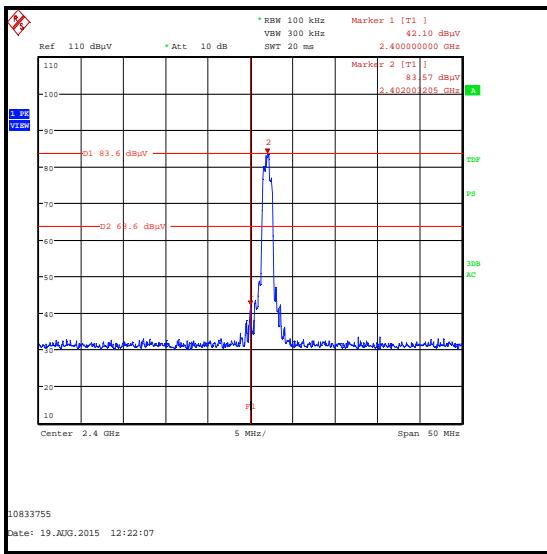
Lower Band Edge Peak Hopping



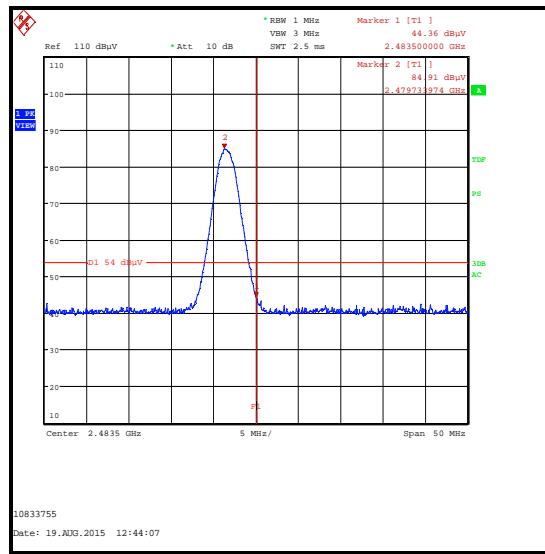
Upper Band Edge Peak Hopping

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

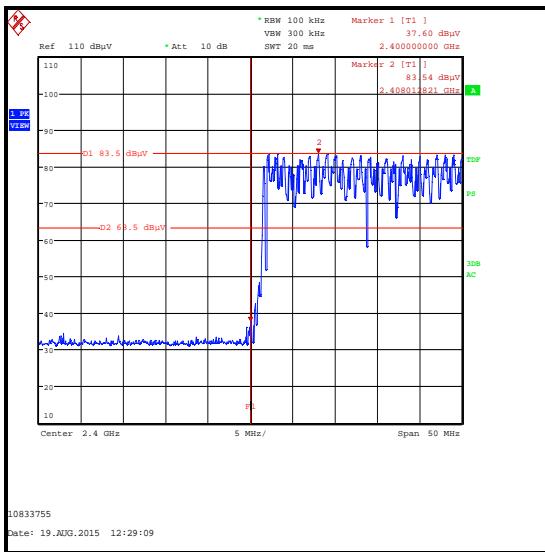


Upper Band Edge Peak Static

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 |



Lower Band Edge Peak Hopping



Upper Band Edge Peak Hopping

Test Equipment Used:

| Asset No. | Instrument | Manufacturer | Type No. | Serial No. | Date Calibration Due | Cal. Interval (Months) |
|-----------|------------------|-----------------|------------|-------------|----------------------|------------------------|
| M1656 | Thermohygrometer | JM Handelpunkt | 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 ---