



TEST REPORT

Test Report No. : UL-RPT-RP10295122JD03C V3.0

Manufacturer : Sony Mobile Communications Inc.

FCC ID : PY7PM-0801

Technology : UMTS Band II

Test Standard(s) : FCC Part 24

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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 3.0 supersedes all previous versions.

Date of Issue: 31 July 2014

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This laboratory is accredited by UKAS.
The tests reported herein have been
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1. Customer Information

Company Name:	Sony Mobile Communications Inc.
Address:	Nya Vattentornet Mobilvägen 10 Lund 22188 Sweden

2. Summary of Testing

2.1. General Information

Specification Reference:	47CFR24
Specification Title:	Code of Federal Regulations Volume 47 (Telecommunications): Part 24 Subpart E (Personal Communication Services)
Site Registration:	209735
Location of Testing:	UL VS LTD, Unit 3 Horizon, Wade Road, Kingsland Business Park, Basingstoke, Hampshire, RG24 8AH, United Kingdom
Test Dates:	29 May 2014 to 03 June 2014

2.2. Summary of Test Results

FCC Reference (47CFR)	Measurement	Result
Part 24.232(c)	Transmitter Output Power (EIRP)	
Part 2.1049	Transmitter Occupied Bandwidth	
Part 2.1053/24.238	Transmitter Out of Band Radiated Emissions	
Part 2.1053/24.238	Transmitter Band Edge Radiated Emissions	
Part 2.1055/24.235	Transmitter Frequency Stability (Temperature and Voltage Variation)	
Key to Results  = Complied  = Did not comply		

2.3. Methods and Procedures

Reference:	ANSI/TIA-603-C-2004
Title:	Land Mobile Communications Equipment, Measurements and performance Standards
Title:	FCC KDB 971168 D01 v02r01, 7 June 2013
Reference:	Measurement Guidance for Certification of Licensed Digital Transmitters

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:	Sony
IMEI:	004402452750601 (<i>Radiated sample</i>)
Test Sample Serial Number:	CB5A1Z1S11
Hardware Version Number:	A
Software Version Number:	23.0.A.0.204
FCC ID:	PY7PM-0801

Brand Name:	Sony
IMEI:	004402452752664 (<i>Conducted sample with RF port #1</i>)
Test Sample Serial Number:	CB5A1Z1S0N
Hardware Version Number:	A
Software Version Number:	23.0.A.0.204
FCC ID:	PY7PM-0801

Brand Name:	Sony
IMEI:	004402452752649 (<i>Conducted sample with RF port #2</i>)
Test Sample Serial Number:	CB5A1Z1S1P
Hardware Version Number:	A
Software Version Number:	23.0.A.0.204
FCC ID:	PY7PM-0801

Brand Name:	Sony
Description:	AC Charger
Model Name or Number:	EP880

Brand Name:	Generic
Description:	MHL Cable
Model Name or Number:	Not marked

Brand Name:	Sony
Description:	MHL Adaptor
Model Name or Number:	IM750

Identification of Equipment Under Test (EUT) (continued)

Brand Name:	Sony
Description:	USB Cable
Model Name or Number:	EC803

Brand Name:	Sony
Description:	Deskstand
Model Name or Number:	DK43

Brand Name:	Sony
Description:	PHF
Model Name or Number:	MH410c

3.2. Description of EUT

The equipment under test (EUT) was a GSM/WCDMA/LTE Phone + Bluetooth, DTS/UNII a/b/g/n/ac + NFC & ANT+.

3.3. Modifications Incorporated in the EUT

No modifications were applied to the EUT during testing.

3.4. Additional Information Related to Testing

Technology Tested:	UMTS1900		
Type of Radio Device:	Transceiver		
Mode:	UMTS FDD II		
Modulation Type:	QPSK / 8PSK		
Channel Spacing:	5 MHz		
Power Supply Requirement(s):	Nominal	3.8 V	
	Minimum	3.42 V	
	Maximum	4.18 V	
Maximum Output Power (EIRP):	Voice (12.2 kbps)	27.0 dBm	
	HSDPA Sub-Test 4	28.9 dBm	
	HSUPA Sub-Test 3	28.7 dBm	
Transmit Frequency Range:	1850 to 1910 MHz		
Transmit Channels Tested:	Channel ID	Channel Number	Channel Frequency (MHz)
	Bottom	9262	1852.4
	Middle	9400	1880.0
	Top	9538	1907.6

3.5. Support Equipment

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

Description:	2 GB Micro SD Card
Brand Name:	SanDisk
Model Name or Number:	Not marked

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

Description:	Voltage variation jig
Brand Name:	Not marked
Model Name or Number:	Not marked
Serial Number:	Not marked

4. Operation and Monitoring of the EUT during Testing

4.1. Operating Modes

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

- Constantly transmitting at full power on bottom, middle and top channels as required.
- Occupied bandwidth, EIRP and band edge tests were performed with the EUT in Voice (12.2 kbps), HSDPA (Sub-tests 1 to 4) or HSUPA (Sub-tests 1 to 5) modes.
- Transmitter radiated spurious emissions were checked in all modes during pre-scans. Voice / 12.2 kbps was found to be the worst case and all final measurements were performed with the EUT in this mode.

4.2. Configuration and Peripherals

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

- Connected to a Rohde & Schwarz Radio Communications Tester, operating in UMTS Band II mode.
- Transmitter radiated spurious emission tests were performed with the following configurations, employing all available accessories:
 - o Configuration 1 – Handset with the AC charger, USB Cable, MHL cable (terminated in to a television), MHL adaptor and PHF
 - o Configuration 2 – Handset with the AC charger, USB Cable, Deskstand and PHF.

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

- Testing at temperature and voltage extremes was performed using a voltage variation jig and adaptor supplied by the customer. The adaptor plugs onto the handset in place of the battery connector.
- The voltage variation jig and adaptor were used for conducted measurements set at the nominal voltage.
- The conducted sample with IMEI 004402452752649 was used for conducted power and occupied bandwidth measurements.
- The conducted sample with IMEI 004402452752664 was used for frequency stability measurements.
- The radiated sample with IMEI 004402452750601 was used for all other measurements.

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 Output Power (EIRP)****Test Summary:**

Test Engineer:	David Doyle	Test Dates:	29 May 2014 & 30 May 2014
Test Sample IMEI:	004402452752649		

FCC Reference:	Part 24.232(c)
Test Method Used:	As detailed in KDB 971168 Section 5.1.1 and 5.2.1

Environmental Conditions:

Temperature (°C):	25 to 26
Relative Humidity (%):	36 to 39

Note(s):

1. All modes were compared on each channel and the highest power recorded was subtracted from the limit to show the margin.
2. The signal analyser was connected to the RF port on the EUT using suitable attenuation and RF cable. An RF level offset was entered on the signal analyser to compensate for the loss of the attenuator and RF cable.
3. The customer stated a maximum antenna gain of 0.5 dBi.
4. The antenna gain was added to the conducted output power to obtain the EIRP.

Transmitter Output Power (EIRP) (continued)**Results: Peak EIRP / HSDPA and Voice**

Modes		HSDPA				Voice			
Sub-test		1	2	3	4	12.2 kbps			
Band	Channel	Power (dBm)	Power (dBm)	Power (dBm)	Power (dBm)	Power (dBm)	Limit (dBm)	Margin (dB)	Result
1900	9262	27.0	28.4	28.6	28.5	26.9	33.0	4.4	Complied
	9400	26.6	27.7	28.6	28.9	27.0	33.0	4.1	Complied
	9538	26.4	27.8	28.0	27.8	26.8	33.0	5.0	Complied
β_c		2	12	11	15				
β_d		15	15	8	4				
$\Delta ACK, \Delta NACK, \Delta CQI$		8	8	8	8				

Results: Peak EIRP / HSUPA

Modes		HSUPA							
Sub-test		1	2	3	4	5			
Band	Channel	Power (dBm)	Power (dBm)	Power (dBm)	Power (dBm)	Power (dBm)	Limit (dBm)	Margin (dB)	Result
1900	9262	28.4	27.6	28.7	26.9	28.5	33.0	4.3	Complied
	9400	27.7	27.5	27.4	26.6	28.1	33.0	4.9	Complied
	9538	27.7	27.3	28.0	26.5	28.0	33.0	5.0	Complied
β_c		10	6	15	2	15			
β_d		15	15	9	15	1			
$\Delta ACK, \Delta NACK, \Delta CQI$		8	8	8	8	8			

Transmitter Output Power (EIRP) (continued)**Results: RMS EIRP / HSDPA and Voice**

Modes		HSDPA				Voice			
Sub-test		1	2	3	4	12.2 kbps			
Band	Channel	Power (dBm)	Power (dBm)	Power (dBm)	Power (dBm)	Power (dBm)	Limit (dBm)	Margin (dB)	Result
1900	9262	20.8	20.9	20.9	20.8	21.2	33.0	11.8	Complied
	9400	20.8	20.8	20.8	20.6	21.1	33.0	11.9	Complied
	9538	20.7	20.7	20.8	20.7	21.0	33.0	12.0	Complied
β_c		2	11	15	15				
β_d		15	15	8	4				
$\Delta ACK, \Delta NACK, \Delta CQI$		8	8	8	8				

Results: RMS EIRP / HSUPA

Modes		HSUPA							
Sub-test		1	2	3	4	5			
Band	Channel	Power (dBm)	Power (dBm)	Power (dBm)	Power (dBm)	Power (dBm)	Limit (dBm)	Margin (dB)	Result
1900	9262	20.9	20.7	20.0	21.5	21.5	33.0	11.5	Complied
	9400	20.9	21.0	20.0	21.4	21.4	33.0	11.6	Complied
	9538	20.5	20.7	20.0	21.1	21.1	33.0	11.9	Complied
β_c		10	6	15	2	15			
β_d		15	15	9	15	1			
$\Delta ACK, \Delta NACK, \Delta CQI$		8	8	8	8	8			

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	14 Mar 2015	12
A2533	Directional Coupler	Atlan TecRF	CDC-003060-20	14041701717	Calibrated before use	-
A2525	Attenuator	Atlan TecRF	AN18W5-10	832827#3	Calibrated before use	-
L1138	Signal Analyser	Rohde & Schwarz	FSV13.6	101389	17 Apr 2015	12
M1269	Multimeter	Fluke	179	90250210	19 May 2015	12
S0523	DC Power Supply	TTI	PL320	224235	Calibrated before use	-

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

Test Engineer:	David Doyle	Test Date:	30 May 2014
Test Sample IMEI:	004402452752649		

FCC Reference:	Part 2.1049
Test Method Used:	As detailed in KBD 971168 Section 4.2

Environmental Conditions:

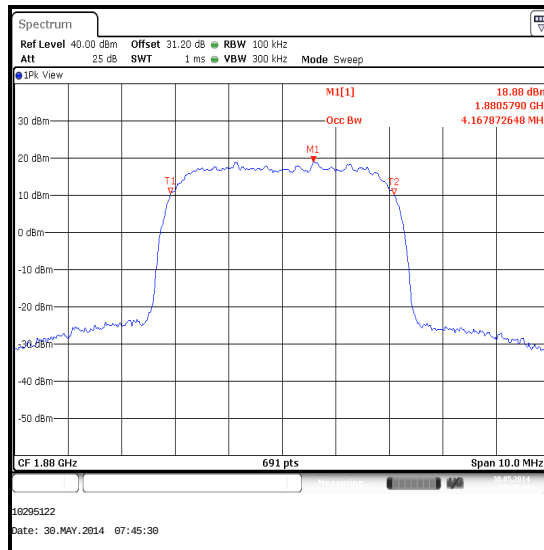
Temperature (°C):	25
Relative Humidity (%):	39

Note(s):

1. Occupied bandwidth (99% bandwidth) was measured using a signal analyser occupied bandwidth function.
2. The signal analyser was connected to the RF port on the EUT using suitable attenuation and RF cable.

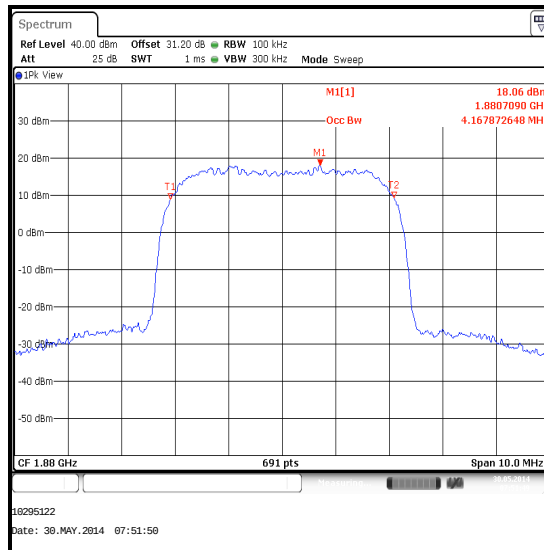
Transmitter Occupied Bandwidth (continued)**Results: Voice / 12.2 kbps**

Channel	Frequency (MHz)	Occupied Bandwidth (kHz)
Middle	1880.0	4167.873

**Middle Channel**

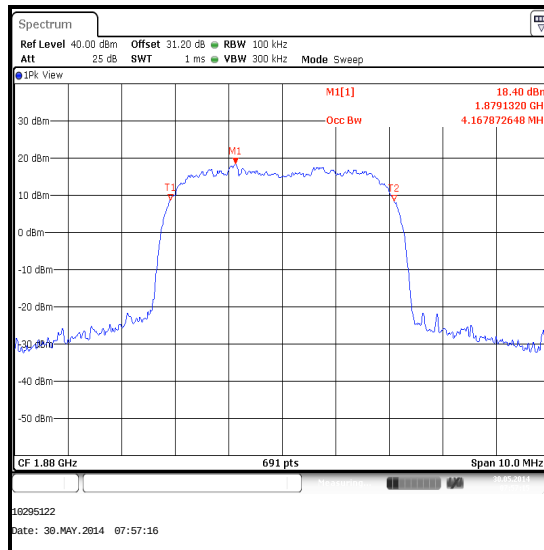
Transmitter Occupied Bandwidth (continued)**Results: HSDPA Sub-Test 1**

Channel	Frequency (MHz)	Occupied Bandwidth (kHz)
Middle	1880.0	4167.873

**Middle Channel**

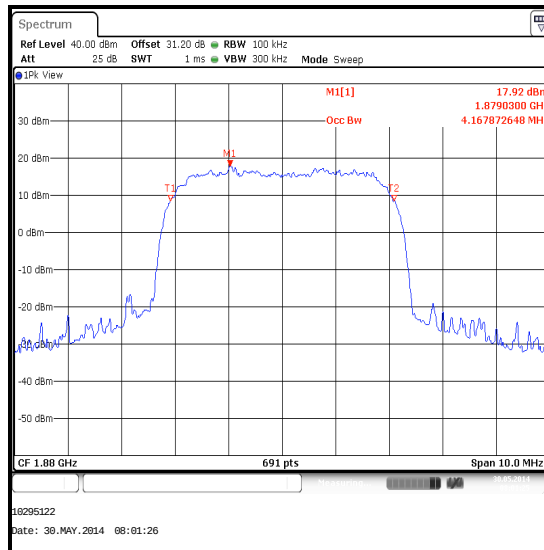
Transmitter Occupied Bandwidth (continued)**Results: HSDPA Sub-Test 2**

Channel	Frequency (MHz)	Occupied Bandwidth (kHz)
Middle	1880.0	4167.873

**Middle Channel**

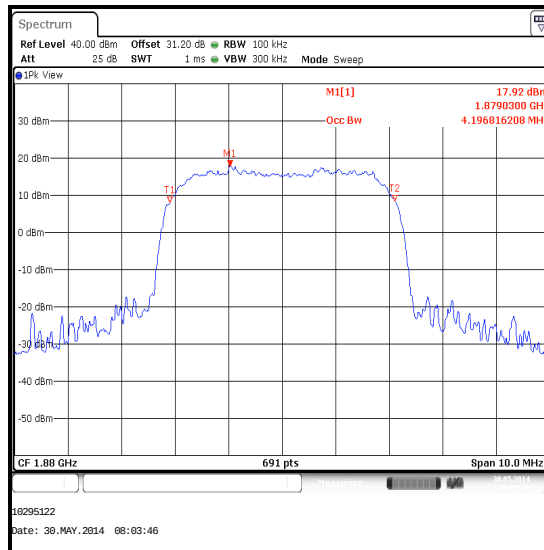
Transmitter Occupied Bandwidth (continued)**Results: HSDPA Sub-Test 3**

Channel	Frequency (MHz)	Occupied Bandwidth (kHz)
Middle	1880.0	4167.873

**Middle Channel**

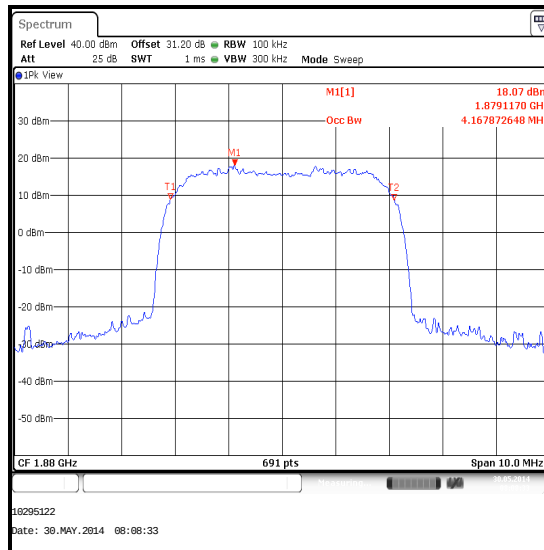
Transmitter Occupied Bandwidth (continued)**Results: HSDPA Sub-Test 4**

Channel	Frequency (MHz)	Occupied Bandwidth (kHz)
Middle	1880.0	4196.816

**Middle Channel**

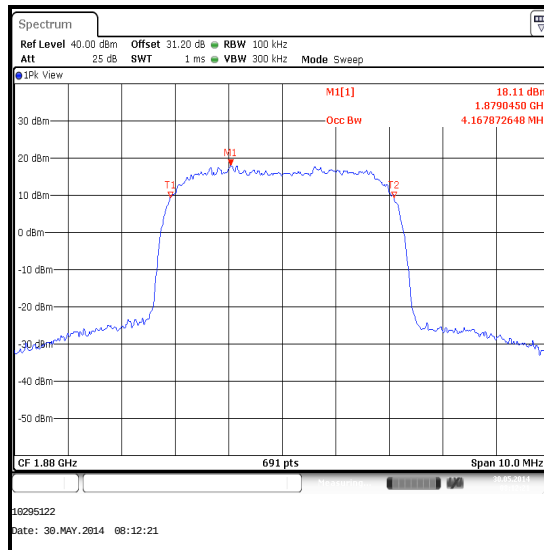
Transmitter Occupied Bandwidth (continued)**Results: HSUPA Sub-Test 1**

Channel	Frequency (MHz)	Occupied Bandwidth (kHz)
Middle	1880.0	4167.873

**Middle Channel**

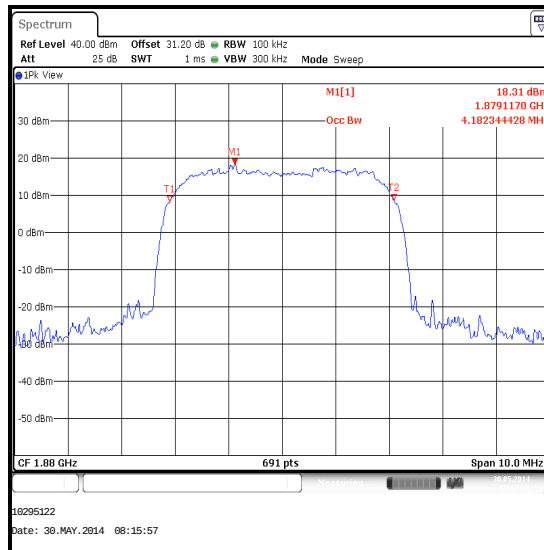
Transmitter Occupied Bandwidth (continued)**Results: HSUPA Sub-Test 2**

Channel	Frequency (MHz)	Occupied Bandwidth (kHz)
Middle	1880.0	4167.873

**Middle Channel**

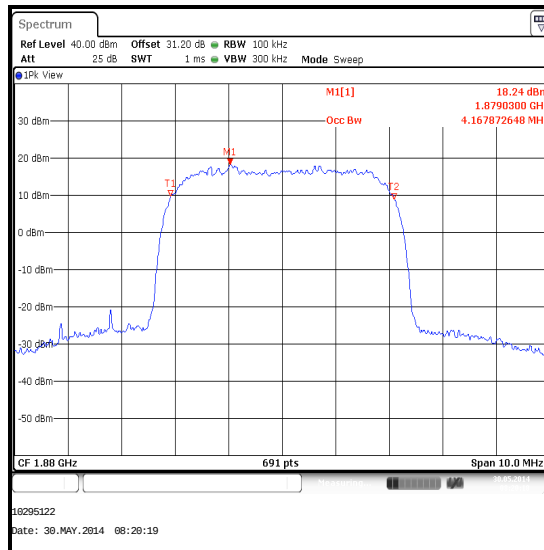
Transmitter Occupied Bandwidth (continued)**Results: HSUPA Sub-Test 3**

Channel	Frequency (MHz)	Occupied Bandwidth (kHz)
Middle	1880.0	4182.344

**Middle Channel**

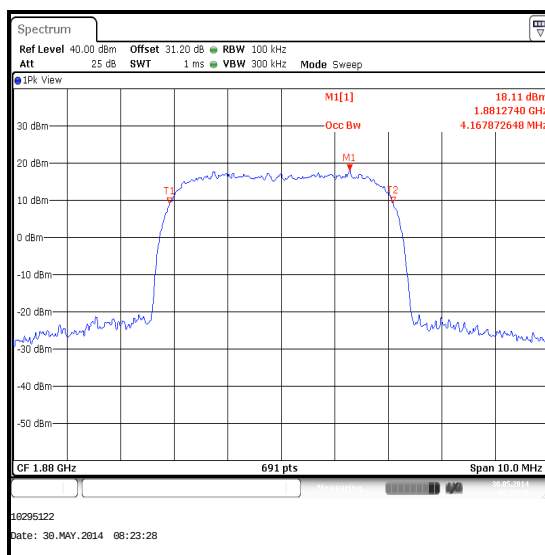
Transmitter Occupied Bandwidth (continued)**Results: HSUPA Sub-Test 4**

Channel	Frequency (MHz)	Occupied Bandwidth (kHz)
Middle	1880.0	4167.873

**Middle Channel**

Transmitter Occupied Bandwidth (continued)**Results: HSUPA Sub-Test 5**

Channel	Frequency (MHz)	Occupied Bandwidth (kHz)
Middle	1880.0	4167.873

**Middle Channel****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	14 Mar 2015	12
A2533	Directional Coupler	Atlan TecRF	CDC-003060-20	14041701717	Calibrated before use	-
A2525	Attenuator	Atlan TecRF	AN18W5-10	832827#3	Calibrated before use	-
L1138	Signal Analyser	Rohde & Schwarz	FSV13.6	101389	17 Apr 2015	12
M1269	Multimeter	Fluke	179	90250210	19 May 2015	12
S0523	DC Power Supply	TTI	PL320	224235	Calibrated before use	-

5.2.3. Transmitter Out of Band Radiated Emissions**Test Summary:**

Test Engineers:	Andrew Edwards & David Doyle	Test Dates:	29 May 2014 & 03 June 2014
Test Sample IMEI:	004402452750601		

FCC Reference:	Parts 2.1053 & 24.238
Test Method Used:	As detailed in KDB 971168 Section 6.1 referencing FCC Part 2.1053
Frequency Range:	30 MHz to 20 GHz
Configuration:	Voice / 12.2 kbps

Environmental Conditions:

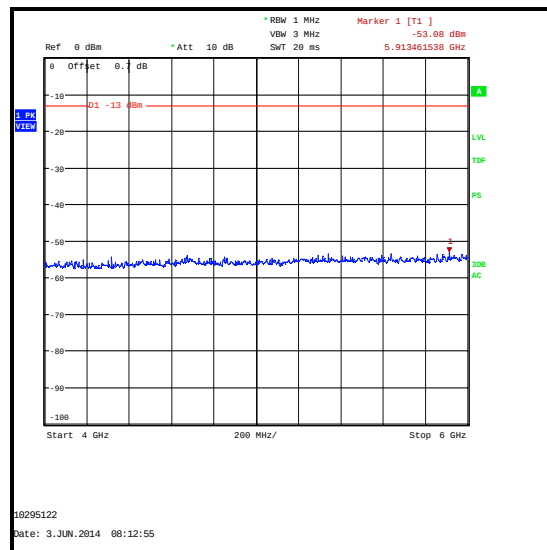
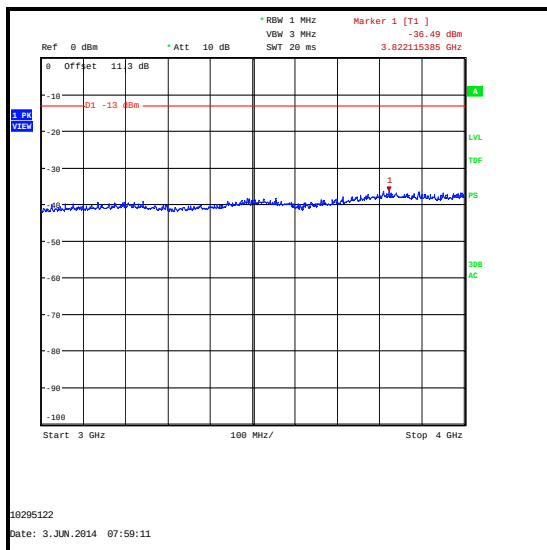
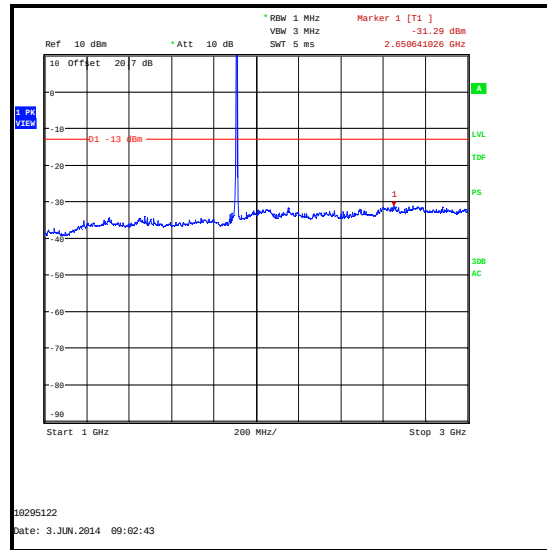
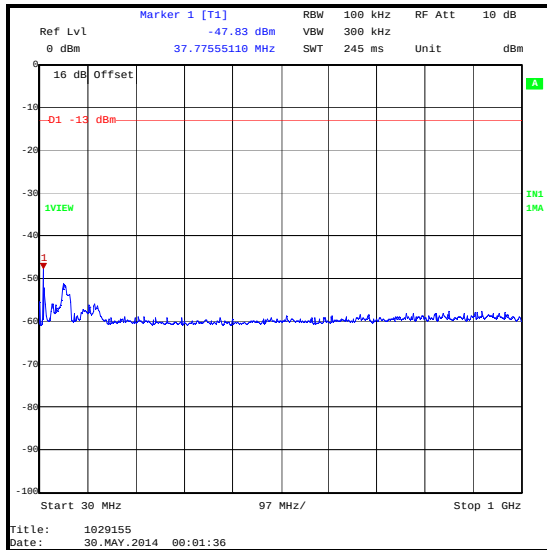
Temperature (°C):	25 to 28
Relative Humidity (%):	33 to 34

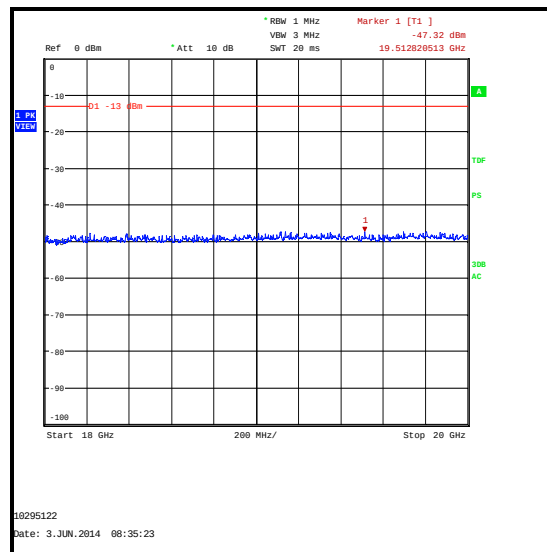
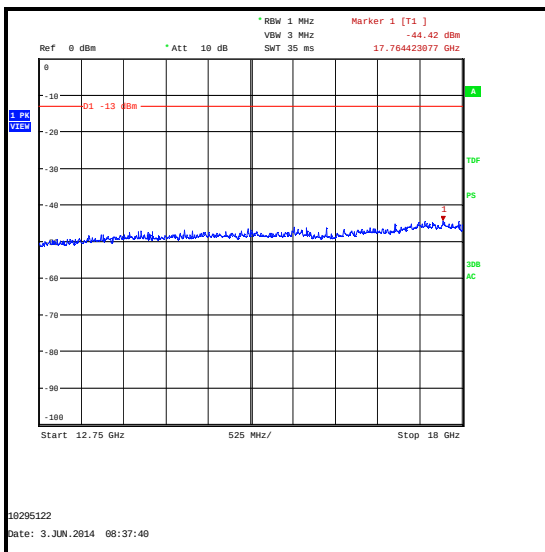
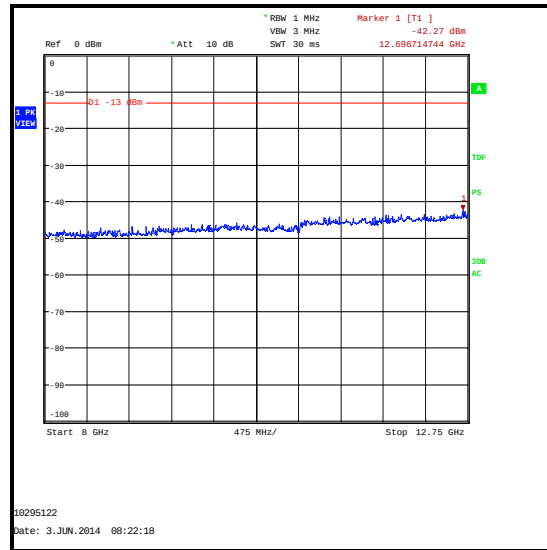
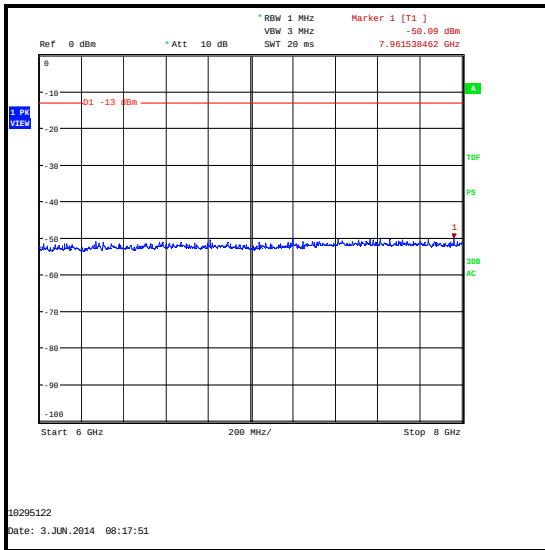
Note(s):

1. The uplink traffic channel is shown on the 1 GHz to 3 GHz plot.
2. No spurious emissions were detected above the noise floor of the measuring receiver; the highest peak noise floor reading of the measuring receiver was recorded.
3. 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.
4. Pre-scans above 1 GHz were performed in a fully anechoic chamber (Asset Number K0002) at a distance of 3 metres. The EUT was placed at a height of 1.5 metres above the test chamber floor in the centre of the chamber turntable. All measurement antennas were placed at a fixed height of 1.5 metres above the test chamber floor, in line with the EUT. Final measurements above 1 GHz were performed in a semi-anechoic chamber (Asset Number K0001) at a distance of 3 metres. The EUT was placed at a height of 80 cm above the reference ground plane in the centre of the chamber turntable. Maximum emission levels were determined by height searching the measurement antenna over the range 1 metre to 4 metres.

Results: Voice / 12.2 kbps - Top Channel

Frequency (MHz)	Peak Level (dBm)	Limit (dBm)	Margin (dB)	Result
2650.641	-31.3	-13.0	18.3	Complied

Transmitter Out of Band Radiated Emissions (continued)

Transmitter Out of Band Radiated Emissions (continued)

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

Asset No.	Instrument	Manufacturer	Type No.	Serial No.	Date Calibration Due	Cal. Interval (Months)
A490	Antenna	Chase	CBL6111A	1590	29 Apr 2015	12
A1834	Attenuator	Hewlett Packard	8491B	10444	15 Nov 2014	12
K0001	5m RSE Chamber	Rainford EMC	N/A	N/A	26 Nov 2014	12
G0543	Amplifier	Sonoma	310N	230801	19 Aug 2014	3
M1622	Thermohygrometer	JM Handelspunkt	30.5015.06	Not stated	31 Dec 2014	12
M1273	Test Receiver	Rohde & Schwarz	ESIB 26	100275	15 Feb 2015	12
A253	Antenna	Flann Microwave	12240-20	128	14 Nov 2014	12
A254	Antenna	Flann Microwave	14240-20	139	14 Nov 2014	12
A255	Antenna	Flann Microwave	16240-20	519	14 Nov 2014	12
A256	Antenna	Flann Microwave	18240-20	400	14 Nov 2014	12
A436	Antenna	Flann Microwave	20240-20	330	14 Nov 2014	12
A1534	Pre-Amplifier	Hewlett Packard	8449B	3008A00405	18 May 2015	12
A1818	Antenna	EMCO	3115	00075692	14 Nov 2014	12
A1393	Attenuator	Huber & Suhner	6820.17.B	757456	02 May 2015	12
A1396	Attenuator	Huber & Suhner	6810.17.B	757987	02 May 2015	12
A1975	High Pass Filter	AtlanTecRF	AFH-03000	090424010	12 Apr 2015	12
K0002	3m RSE Chamber	Rainford EMC	N/A	N/A	14 Nov 2014	12
M1874	Test receiver	Rohde & Schwarz	ESU26	100553	13 May 2015	12
M1656	Thermohygrometer	JM Handelspunkt	30.5015.13	Not stated	14 Mar 2015	12

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

Test Engineer:	David Doyle	Test Date:	02 June 2014
Test Sample IMEI:	004402452750601		

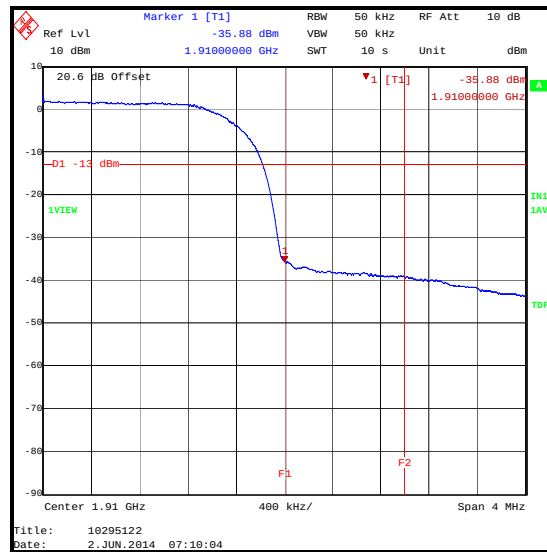
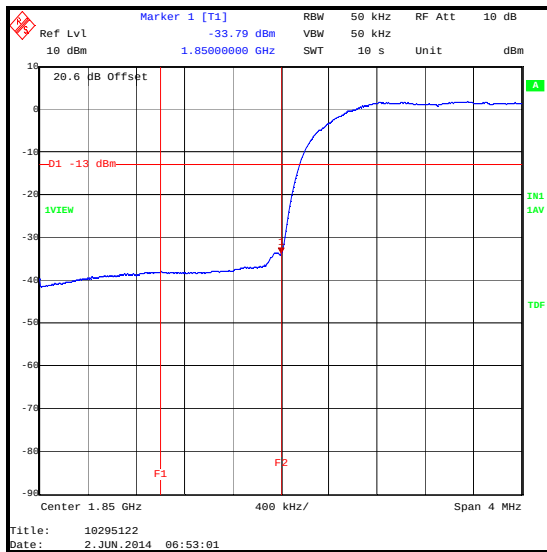
FCC Reference:	Parts 2.1053 & 24.238
Test Method Used:	As detailed in KDB 971168 Section 6.1 referencing FCC Part 24.238

Environmental Conditions:

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

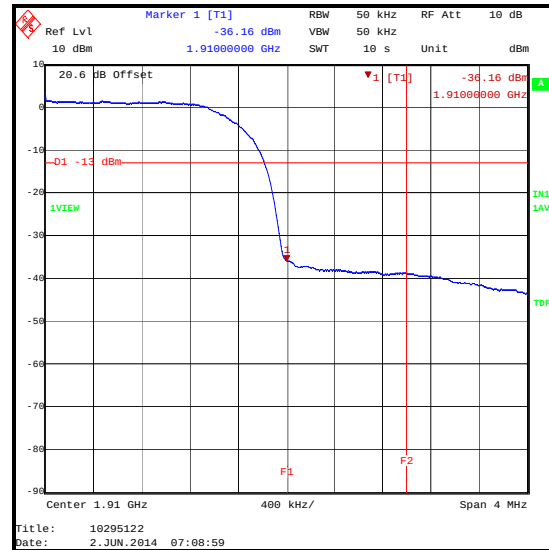
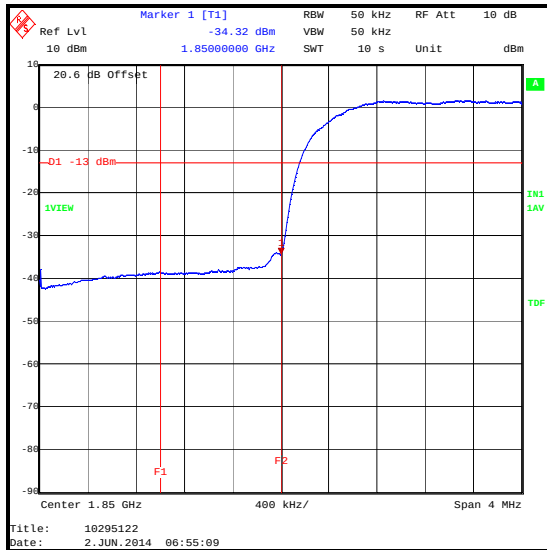
Results: Voice / 12.2 kbps

Frequency (MHz)	Peak Level (dBm)	Limit (dBm)	Margin (dB)	Result
1850	-33.8	-13.0	20.8	Complied
1910	-35.9	-13.0	22.9	Complied



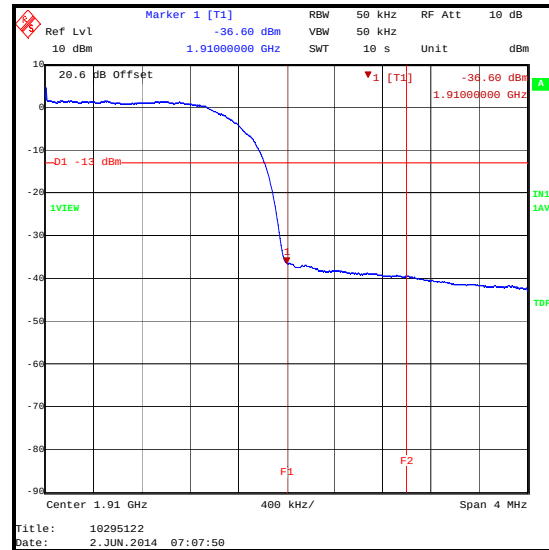
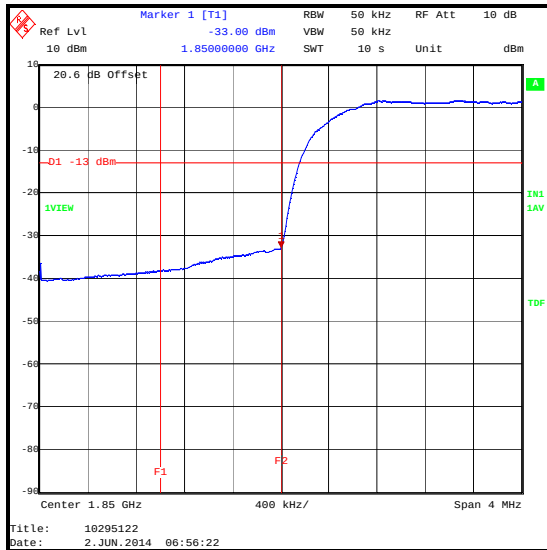
Transmitter Band Edge Radiated Emissions (continued)**Results: HSDPA Sub-Test 1**

Frequency (MHz)	Peak Level (dBm)	Limit (dBm)	Margin (dB)	Result
1850	-34.3	-13.0	21.3	Complied
1910	-36.2	-13.0	23.2	Complied



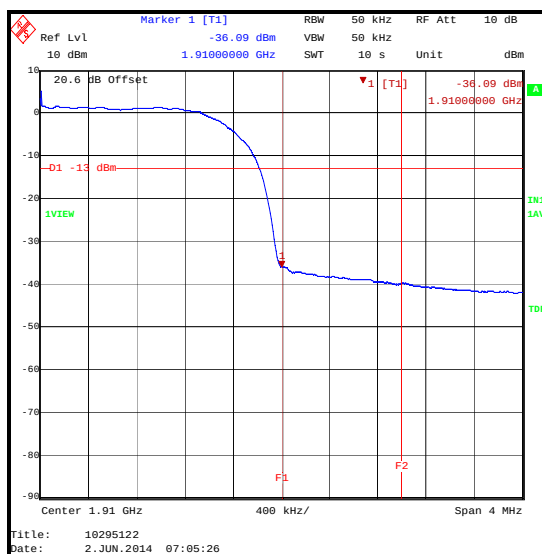
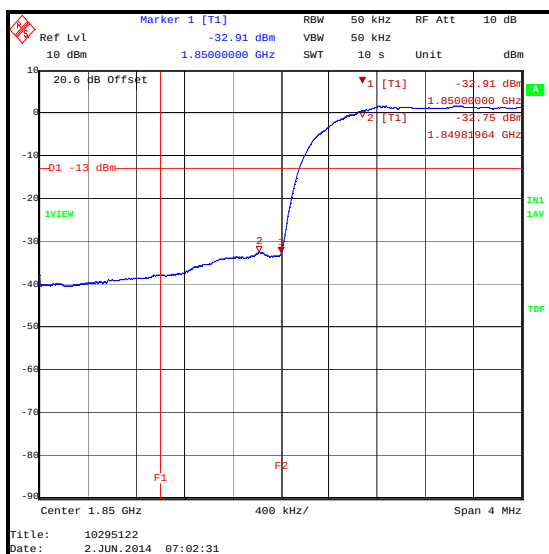
Transmitter Band Edge Radiated Emissions (continued)**Results: HSDPA Sub-Test 2**

Frequency (MHz)	Peak Level (dBm)	Limit (dBm)	Margin (dB)	Result
1850	-33.0	-13.0	20.0	Complied
1910	-36.6	-13.0	23.6	Complied



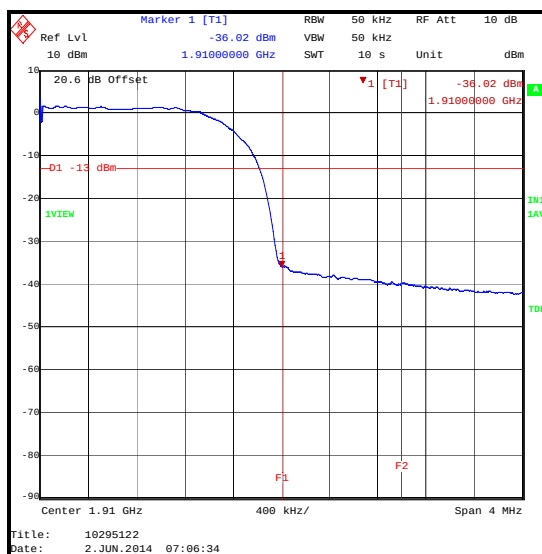
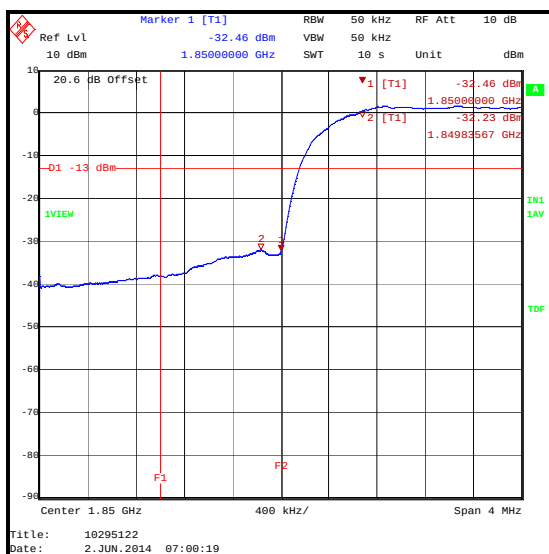
Transmitter Band Edge Radiated Emissions (continued)**Results: HSDPA Sub-Test 3**

Frequency (MHz)	Peak Level (dBm)	Limit (dBm)	Margin (dB)	Result
1849.820	-32.8	-13.0	19.8	Complied
1850	-32.9	-13.0	19.9	Complied
1910	-36.1	-13.0	23.1	Complied



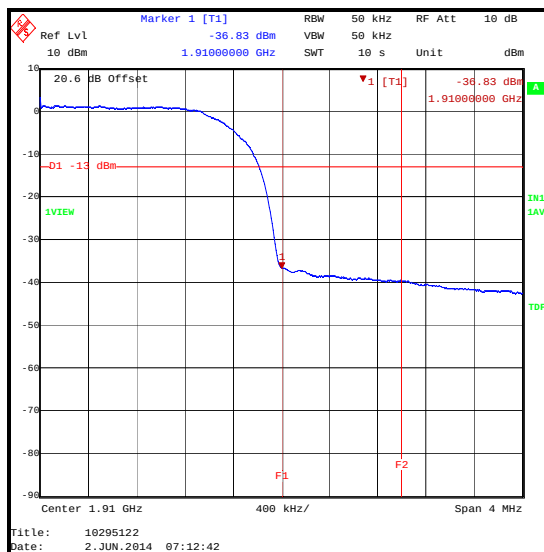
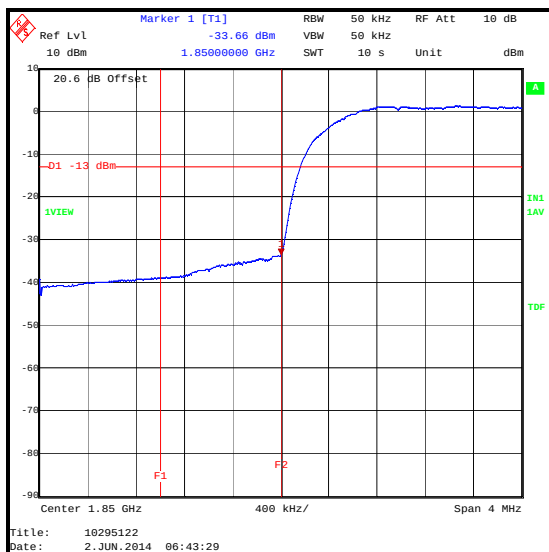
Transmitter Band Edge Radiated Emissions (continued)**Results: HSDPA Sub-Test 4**

Frequency (MHz)	Peak Level (dBm)	Limit (dBm)	Margin (dB)	Result
1849.836	-32.2	-13.0	19.2	Complied
1850	-32.5	-13.0	19.5	Complied
1910	-36.0	-13.0	23.0	Complied



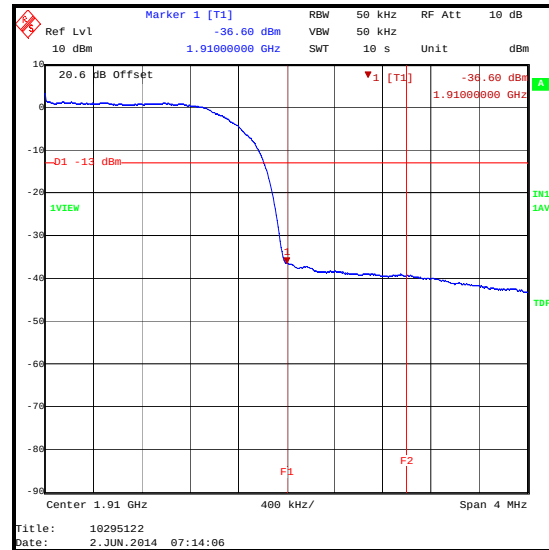
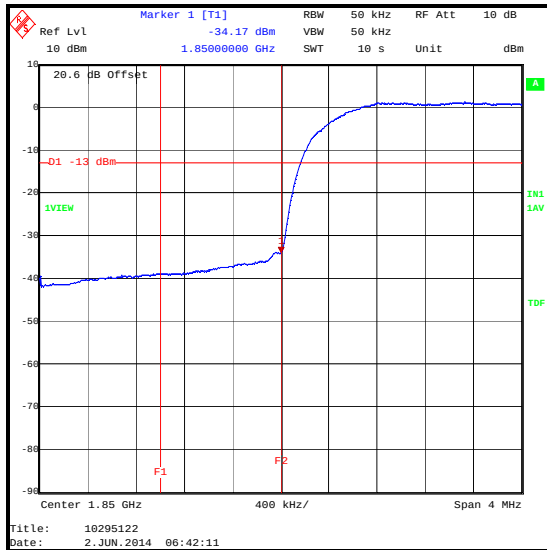
Transmitter Band Edge Radiated Emissions (continued)**Results: HSUPA Sub-Test 1**

Frequency (MHz)	Peak Level (dBm)	Limit (dBm)	Margin (dB)	Result
1850	-33.7	-13.0	20.7	Complied
1910	-36.8	-13.0	23.8	Complied



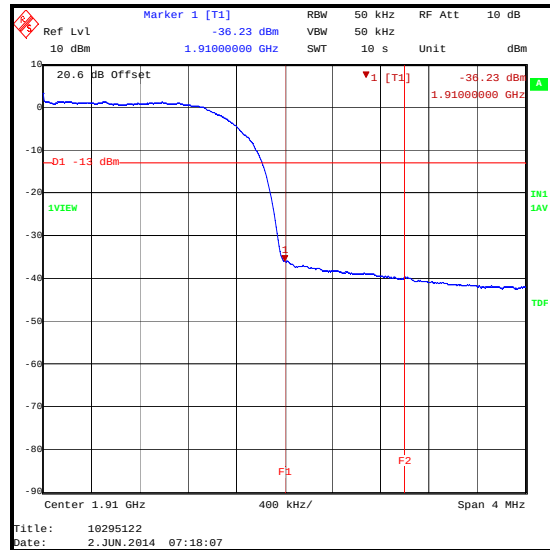
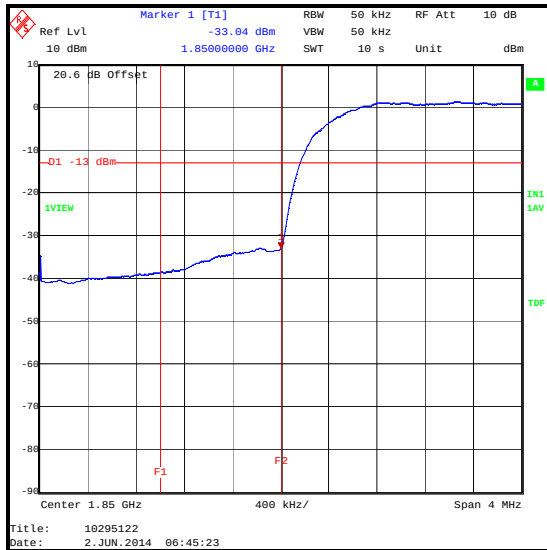
Transmitter Band Edge Radiated Emissions (continued)**Results: HSUPA Sub-Test 2**

Frequency (MHz)	Peak Level (dBm)	Limit (dBm)	Margin (dB)	Result
1850	-34.2	-13.0	21.2	Complied
1910	-36.6	-13.0	23.6	Complied



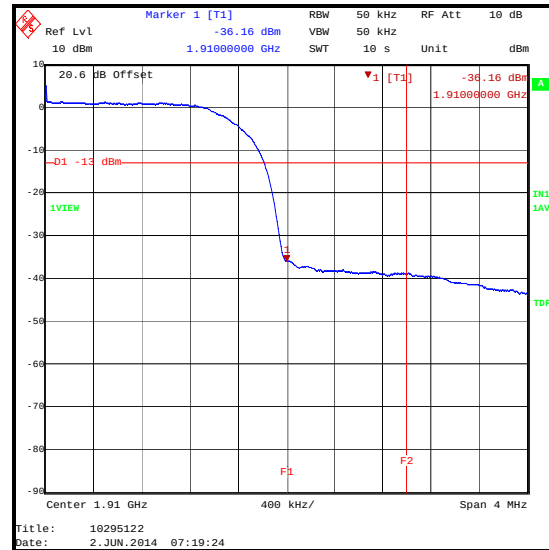
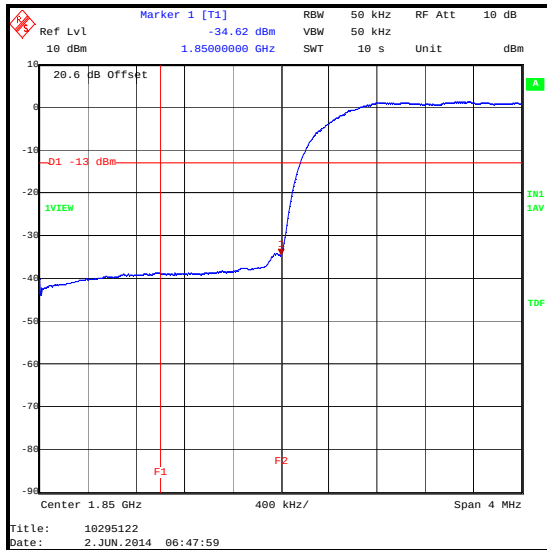
Transmitter Band Edge Radiated Emissions (continued)**Results: HSUPA Sub-Test 3**

Frequency (MHz)	Peak Level (dBm)	Limit (dBm)	Margin (dB)	Result
1850	-33.0	-13.0	20.0	Complied
1910	-36.2	-13.0	23.2	Complied



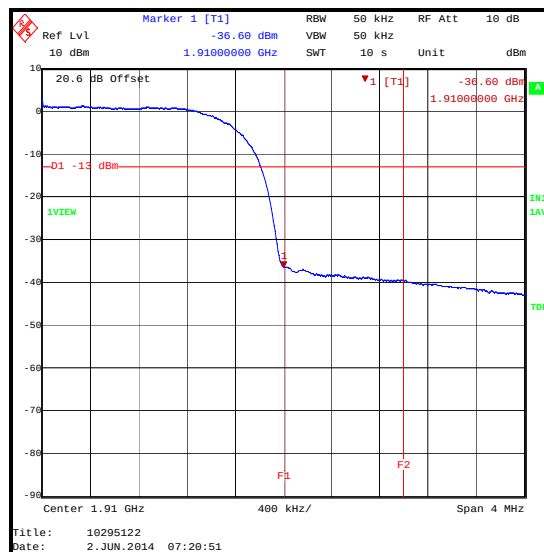
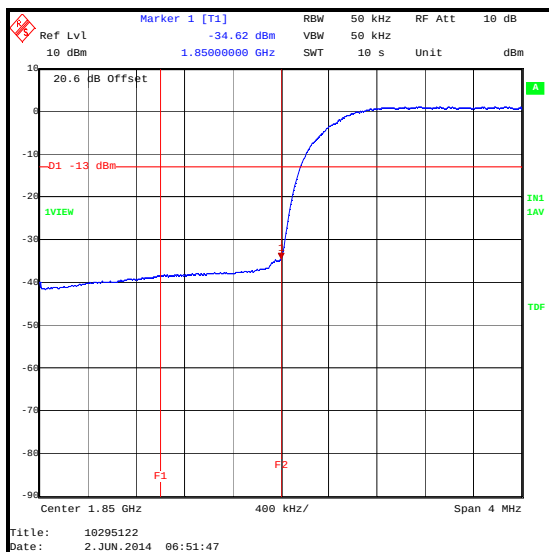
Transmitter Band Edge Radiated Emissions (continued)**Results: HSUPA Sub-Test 4**

Frequency (MHz)	Peak Level (dBm)	Limit (dBm)	Margin (dB)	Result
1850	-34.6	-13.0	21.6	Complied
1910	-36.2	-13.0	23.2	Complied



Transmitter Band Edge Radiated Emissions (continued)**Results: HSUPA Sub-Test 5**

Frequency (MHz)	Peak Level (dBm)	Limit (dBm)	Margin (dB)	Result
1850	-34.6	-13.0	21.6	Complied
1910	-36.6	-13.0	23.6	Complied

**Test Equipment Used:**

Asset No.	Instrument	Manufacturer	Type No.	Serial No.	Date Calibration Due	Cal. Interval (Months)
A1534	Pre-Amplifier	Hewlett Packard	8449B	3008A00405	18 May 2015	12
A1818	Antenna	EMCO	3115	00075692	14 Nov 2014	12
A1393	Attenuator	Huber & Suhner	6820.17B	757456	02 May 2015	12
K0002	3m RSE Chamber	Rainford EMC	N/A	N/A	14 Nov 2014	12
M1124	Test receiver	Rohde & Schwarz	ESIB 26	100046K	01 Oct 2014	12
M1656	Thermohygrometer	JM Handelspunkt	30.5015.13	Not stated	14 Mar 2015	12

5.2.5. Transmitter Frequency Stability (Temperature Variation)**Test Summary:**

Test Engineer:	Ben Mercer	Test Dates:	29 May 2014 & 30 May 2014
Test Sample IMEI:	004402452752664		

FCC Reference:	Parts 2.1055 & 24.235
Test Method Used:	As detailed in KDB 971168 Section 9.0 referencing ANSI TIA-603-C-2004 Section 2.2.2 and FCC Part 2.1055

Environmental Conditions:

Ambient Temperature (°C):	24 to 25
Ambient Relative Humidity (%):	36 to 37

Note(s):

1. A voltage variation jig was connected to the EUT which was powered via a bench power supply at the nominal voltage of 3.8V.
2. Frequency error was measured using a calibrated Rohde & Schwarz CMW 500 Universal Radio Communications Tester in accordance with current Rohde & Schwarz application notes. The EUT was connected by suitable RF cables to the CMW 500. A bi-directional communications link was established between the EUT and CMW 500. The frequency meter value was recorded.
3. Temperature was monitored throughout the test with a calibrated digital thermometer.

Transmitter Frequency Stability (Temperature Variation) (continued)**Results: Bottom Channel (1852.4 MHz)**

Temperature (°C)	Frequency Error (Hz)	Measured Frequency (MHz)	Lower Band Edge Limit (MHz)	Margin (MHz)	Result
-30	6	1852.399994	1850.0	2.399994	Complied
-20	4	1852.399996	1850.0	2.399996	Complied
-10	8	1852.399992	1850.0	2.399992	Complied
0	7	1852.399993	1850.0	2.399993	Complied
10	6	1852.399994	1850.0	2.399994	Complied
20	5	1852.399995	1850.0	2.399995	Complied
30	9	1852.400009	1850.0	2.400009	Complied
40	6	1852.400006	1850.0	2.400006	Complied
50	10	1852.400010	1850.0	2.400010	Complied

Results: Top Channel (1907.6 MHz)

Temperature (°C)	Frequency Error (Hz)	Measured Frequency (MHz)	Upper Band Edge Limit (MHz)	Margin (MHz)	Result
-30	5	1907.600005	1910.0	2.399995	Complied
-20	9	1907.600009	1910.0	2.399991	Complied
-10	12	1907.600012	1910.0	2.399988	Complied
0	12	1907.600012	1910.0	2.399988	Complied
10	13	1907.600013	1910.0	2.399987	Complied
20	10	1907.600010	1910.0	2.399990	Complied
30	7	1907.600007	1910.0	2.399993	Complied
40	6	1907.600006	1910.0	2.399994	Complied
50	4	1907.599996	1910.0	2.400004	Complied

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	14 Mar 2015	12
M1870	Wideband Radio Comms Tester	Rohde & Schwarz	CMW500	145919	05 May 2015	12
E0513	Environmental Chamber	TAS	LT600 Series 3	23900506	Calibrated before use	-
M1249	Thermometer	Fluke	52II	88800049	02 May 2015	12
S021	Dual DC power supply	TTi	CPX200	061034	Calibrated before use	-
M1251	Multimeter	Fluke	175	89170179	19 May 2015	12

5.2.6. Transmitter Frequency Stability (Voltage Variation)**Test Summary:**

Test Engineer:	Ben Mercer	Test Date:	29 May 2014
Test Sample IMEI:	004402452752664		

FCC Reference:	Parts 2.1055 & 24.235
Test Method Used:	As detailed in KDB 971168 Section 9.0 referencing ANSI TIA-603-C-2004 Section 2.2.2 and FCC Part 2.1055

Environmental Conditions:

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

Note(s):

1. A voltage variation jig was connected to the EUT which was powered via a bench power supply.
2. Frequency error was measured using a calibrated Rohde & Schwarz CMW 500 Universal Radio Communications Tester in accordance with current Rohde & Schwarz application notes. The EUT was connected by suitable RF cables to the CMW 500. A bi-directional communications link was established between the EUT and CMW 500. The frequency meter value was recorded.
3. Voltage was monitored throughout the test with a calibrated digital voltmeter.

Results: Bottom Channel (1852.4 MHz)

Supply Voltage (V)	Frequency Error (Hz)	Measured Frequency (MHz)	Lower Band Edge Limit (MHz)	Margin (MHz)	Result
3.42	6	1852.399994	1850.0	2.399994	Complied
4.18	4	1852.399996	1850.0	2.399996	Complied

Results: Top Channel (1907.6 MHz)

Supply Voltage (V)	Frequency Error (Hz)	Measured Frequency (MHz)	Upper Band Edge Limit (MHz)	Margin (MHz)	Result
3.42	11	1907.600011	1910.0	2.399989	Complied
4.18	12	1907.600012	1910.0	2.399988	Complied

Transmitter Frequency Stability (Voltage Variation) (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	14 Mar 2015	12
M1870	Wideband Radio Comms Tester	Rohde & Schwarz	CMW500	145919	05 May 2015	12
S021	Dual DC power supply	TTi	CPX200	061034	Calibrated before use	-
M1251	Multimeter	Fluke	175	89170179	19 May 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
Conducted Output Power	1850 to 1910 MHz	95%	±1.13 dB
Frequency Stability	1850 to 1910 MHz	95%	±23 Hz
Occupied Bandwidth	1850 to 1910 MHz	95%	±3.92 %
Radiated Spurious Emissions	30 MHz to 1 GHz	95%	±5.65 dB
Radiated Spurious Emissions	1 GHz to 20 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	-	-	Update to Section 1 Section 5.2.5 Note 1 amended Section 6 Frequency stability MU updated
3.0	-	-	EUT Description update

--- END OF REPORT ---