TEST REPORT

Test Report No. : UL-RPT-RP10407443JD09C V3.0

Manufacturer	:	Apple Inc.
Type No.	:	A1600
FCC ID	:	BCGA1600
Technology	:	UMTS1700 Band IV
Test Standard(s)	:	FCC Part 27 Subpart C

1. This test report shall not be reproduced in full or partial, without the written approval of UL VS LTD.
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: 15 September 2014

Checked by:

Sarah Williams
Engineer, Radio Laboratory

Issued by :

pp
John Newell
Quality Manager,
UL VS LTD

0644

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

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1. Customer Information

Company Name:	Apple Inc.
Address:	1 Infinite Loop Cupertino, CA 95014 U.S.A.

2. Summary of Testing

2.1. General Information

Specification Reference:	47CFR27
Specification Title:	Code of Federal Regulations Volume 47 (Telecommunications): Part 27 Subpart C (Miscellaneous Wireless 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:	09 July 2014 to 23 July 2014

2.2. Summary of Test Results

FCC Reference (47CFR)	Measurement	Result
Part 2.1046/27.50(d)(4)	Transmitter Output Power (EIRP)	✓
Part 2.1049	Transmitter Occupied Bandwidth	✓
Part 2.1053/27.53(h)(1)	Transmitter Out of Band Radiated Emissions	✓
Part 2.1053/27.53(h)(1)	Transmitter Band Edge Radiated Emissions	✓
Part 2.1055/27.54	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:	Apple
Model Name or Number:	A1600
Test Sample IMEI:	352025060238798 *(Radiated sample)*
Hardware Version Number:	REV1.0
Software Version Number:	iOS 12A314 BB: 3.08.08
FCC ID:	BCGA1600

Brand Name:	Apple
Model Name or Number:	A1600
Test Sample IMEI:	352025060274728 *(Conducted sample #1)*
Hardware Version Number:	REV1.0
Software Version Number:	iOS 12A314 BB: 3.08.08
FCC ID:	BCGA1600

Brand Name:	Apple
Model Name or Number:	A1600
Test Sample IMEI:	352025060274538 *(Conducted sample #2)*
Hardware Version Number:	REV1.0
Software Version Number:	iOS 12A314 BB: 3.08.08
FCC ID:	BCGA1600

3.2. Description of EUT

The Equipment Under Test was a tablet with GSM/GPRS/EGPRS/UMTS/LTE and CDMA technologies. It also supports IEEE 802.11a/b/g/n (MIMO 2x2) and *Bluetooth*®. The rechargeable battery is not user accessible.

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:	UMTS1700		
Type of Radio Device:	Transceiver		
Mode:	UMTS FDD IV		
Modulation Type:	QPSK / 8PSK		
Channel Spacing:	5 MHz		
Power Supply Requirement(s):	Nominal	3.8 V	
	Minimum	3.4 V	
	Maximum	4.2 V	
Maximum Output Power (EIRP):	RMC (12.2 kbps)	27.7 dBm	
	HSDPA Sub-Test 2	28.3 dBm	
	HSUPA Sub-Test 5	28.8 dBm	
Transmit Frequency Range:	1710 MHz to 1755 MHz		
Transmit Channels Tested:	**Channel ID**	**Channel Number**	**Channel Frequency (MHz)**
	Bottom	1312	1712.4
	Middle	1412	1732.4
	Top	1513	1752.6

3.5. Support Equipment

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

Brand Name:	Dell
Description:	Laptop computer
Model Name or Number:	Inspiron
Serial Number:	Asset RFI00788

Brand Name:	Not stated
Description:	USB Diagnostic cable
Model Name or Number:	Not stated
Serial Number:	Not stated

Brand Name:	Apple
Description:	USB Cable
Model Name or Number:	A1480
Serial Number:	Not stated

Brand Name:	Apple
Description:	USB Charger
Model Name or Number:	A1399
Serial Number:	Not stated

Brand Name:	Apple
Description:	PHF
Model Name or Number:	Apple Ear Plugs
Serial Number:	Not stated

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 RMC (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. RMC (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 CMW 500 Wideband Radio Communications Tester, operating in UMTS Band IV mode.
- Transmitter radiated spurious emission tests were performed with the EUT connected to a PHF and USB charger. The charger was connected to a 120 VAC 50 Hz supply. The EUT was placed in three orthogonal orientations X, Y and Z to determine the worst case orientation for radiated spurious emissions and all final measurements were performed in this orientation.
- Testing for frequency stability and measurements at temperature and voltage extremes was performed using a conducted sample supplied by the customer. Short 4-wire DC flying leads were connected internally to the device in place of the battery, and exited through a hole in the casing. These leads were then extended to a DC power supply for testing purposes.
- For conducted cellular measurements, the RF conducted port was created by removing a micro connector from the pcb antenna and extending it with a short flexible microstrip supplied by the customer. This microstrip exited the device through a hole in the casing and was terminated in a proprietary micro-coax to SMA adaptor.
- The conducted sample with IMEI 352025060274538 frequency stability.
- The conducted sample with IMEI 352025060274728 was used for conducted power and occupied bandwidth measurements.
- The radiated sample with IMEI 352025060238798 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 Date:**	18 July 2014
Test Sample IMEI:	352025060274728		

FCC Reference:	Parts 2.1046 & 27.50(d)(4)
Test Method Used:	As detailed in FCC KDB 971168 Section 5.1.1 and 5.2.1

Environmental Conditions:

Temperature (°C):	20
Relative Humidity (%):	52

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 1.47 dBi.
4. The antenna gain was added to the conducted output power to obtain the EIRP.

Transmitter Effective Radiated Power (EIRP) (continued)

Results: Peak EIRP / HSDPA and RMC

Modes		HSDPA				RMC			
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
1700	1312	26.9	28.3	28.2	28.2	27.6	30.0	1.7	Complied
	1412	26.9	28.3	28.2	28.2	27.7	30.0	1.7	Complied
	1513	26.8	28.1	27.8	28.0	27.4	30.0	1.9	Complied
ßc		**2**	**11**	**15**	**15**				
ßd		**15**	**15**	**8**	**4**				
ΔACK, ΔNACK, ΔCQI		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
1700	1312	28.2	27.7	28.5	27.1	28.8	30.0	1.2	Complied
	1412	28.2	27.4	28.5	26.9	28.8	30.0	1.2	Complied
	1513	28.0	27.1	28.2	27.0	28.8	30.0	1.2	Complied
ßc		**10**	**6**	**15**	**2**	**15**			
ßd		**15**	**15**	**9**	**15**	**1**			
ΔACK, ΔNACK, ΔCQI		8	8	8	8	8			

Transmitter Effective Radiated Power (EIRP) (continued)

Results: RMS EIRP / HSDPA and RMC

Modes		HSDPA				RMC			
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
1700	1312	21.2	21.4	20.9	21.0	22.3	30.0	7.7	Complied
	1412	21.3	21.5	20.9	20.9	22.1	30.0	7.9	Complied
	1513	21.3	21.2	20.8	20.8	22.1	30.0	7.9	Complied
ßc		**2**	**11**	**15**	**15**				
ßd		**15**	**15**	**8**	**4**				
ΔACK, ΔNACK, ΔCQI		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
1700	1312	20.9	20.8	21.3	21.3	21.5	30.0	8.5	Complied
	1412	20.8	20.8	21.3	21.3	21.4	30.0	8.6	Complied
	1513	20.9	20.7	21.1	21.2	21.3	30.0	8.7	Complied
ßc		**10**	**6**	**15**	**2**	**15**			
ßd		**15**	**15**	**9**	**15**	**1**			
ΔACK, ΔNACK, ΔCQI		8	8	8	8	8			

Test Equipment Used

Asset No.	Instrument	Manufacturer	Type No.	Serial No.	Date Calibration Due	Cal. Interval (Months)
M1657	Thermohygrometer	JM Handelspunkt	30.5015.13	None stated	14 Mar 2015	12
A2504	Directional Coupler	AtlanTecRF	CDC-003060-10	13122501839	Calibrated before use	-
A2526	Attenuator	AtlanTecRF	AN18W5-20	832828#1	Calibrated before use	-
M1873	Signal Analyser	Rohde & Schwarz	FSV30	103074	15 May 2015	12

5.2.2. Transmitter Occupied Bandwidth

Test Summary:

Test Engineer:	David Doyle	**Test Dates:**	17 July 2014 & 18 July 2014
Test Sample IMEI:	352025060274728		

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

Environmental Conditions:

Temperature (°C):	20 to 21
Relative Humidity (%):	49 to 51

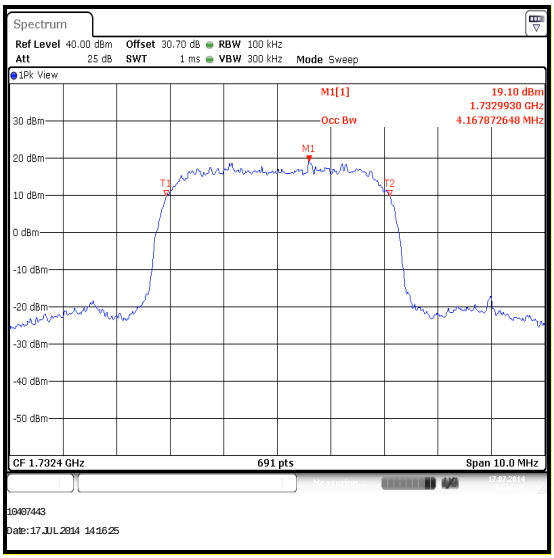
Note(s):

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: RMC / 12.2 kbps

Channel	Frequency (MHz)	Occupied Bandwidth (kHz)
Middle	1732.4	4167.873

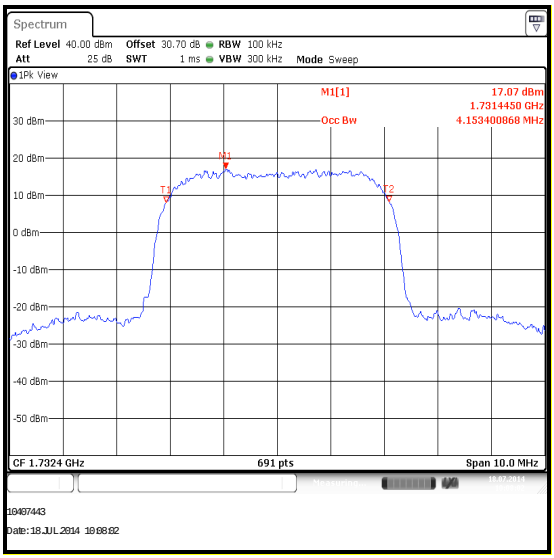


Middle Channel

Transmitter Occupied Bandwidth (continued)

Results: HSDPA Sub-Test 1

Channel	Frequency (MHz)	Occupied Bandwidth (kHz)
Middle	1732.4	4153.401

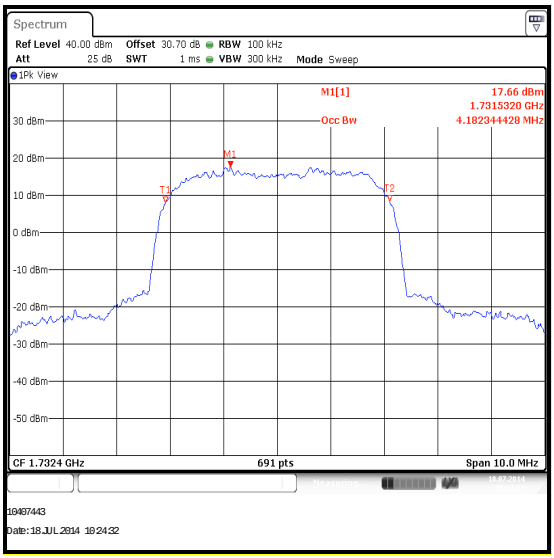


Middle Channel

Transmitter Occupied Bandwidth (continued)

Results: HSDPA Sub-Test 2

Channel	Frequency (MHz)	Occupied Bandwidth (kHz)
Middle	1732.4	4182.344

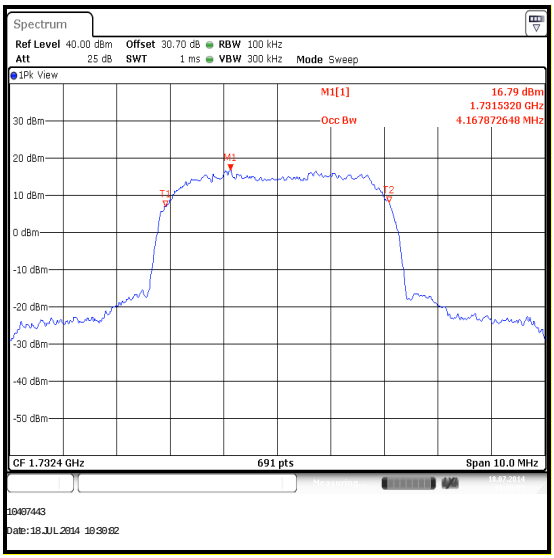


Middle Channel

Transmitter Occupied Bandwidth (continued)

Results: HSDPA Sub-Test 3

Channel	Frequency (MHz)	Occupied Bandwidth (kHz)
Middle	1732.4	4167.873

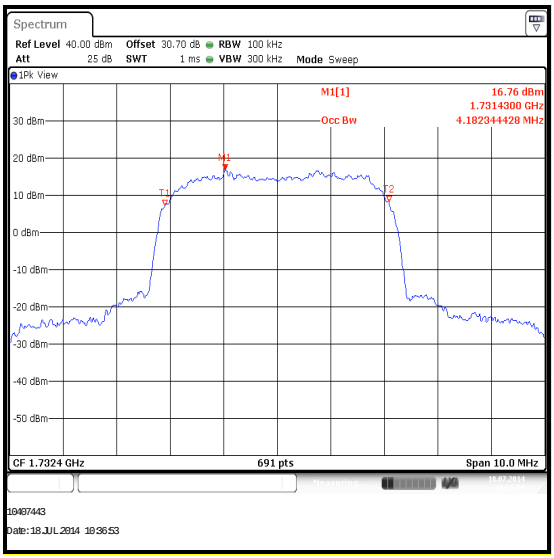


Middle Channel

Transmitter Occupied Bandwidth (continued)

Results: HSDPA Sub-Test 4

Channel	Frequency (MHz)	Occupied Bandwidth (kHz)
Middle	1732.4	4182.344

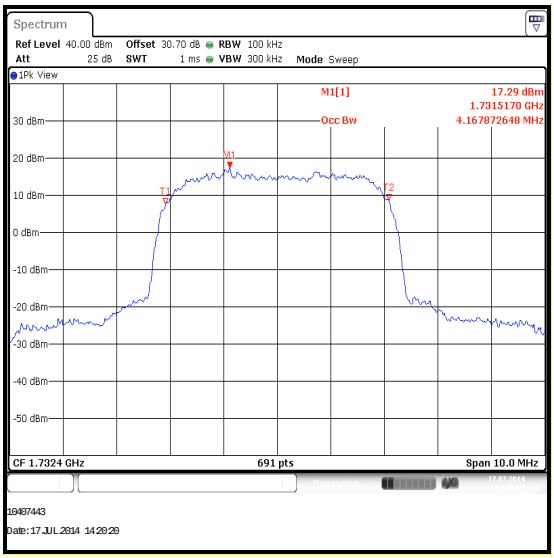


Middle Channel

Transmitter Occupied Bandwidth (continued)

Results: HSUPA Sub-Test 1

Channel	Frequency (MHz)	Occupied Bandwidth (kHz)
Middle	1732.4	4167.873

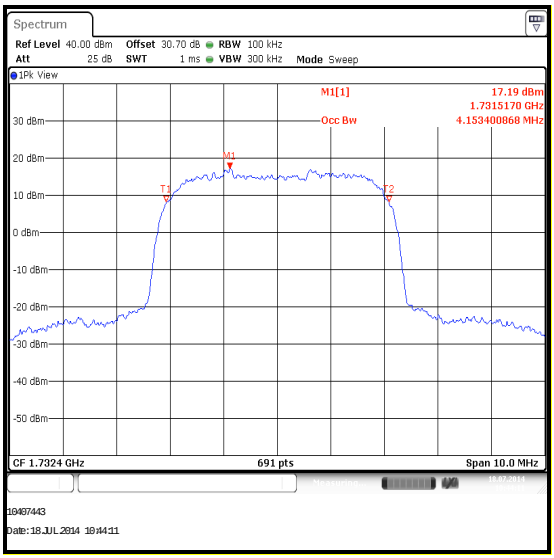


Middle Channel

Transmitter Occupied Bandwidth (continued)

Results: HSUPA Sub-Test 2

Channel	Frequency (MHz)	Occupied Bandwidth (kHz)
Middle	1732.4	4153.401

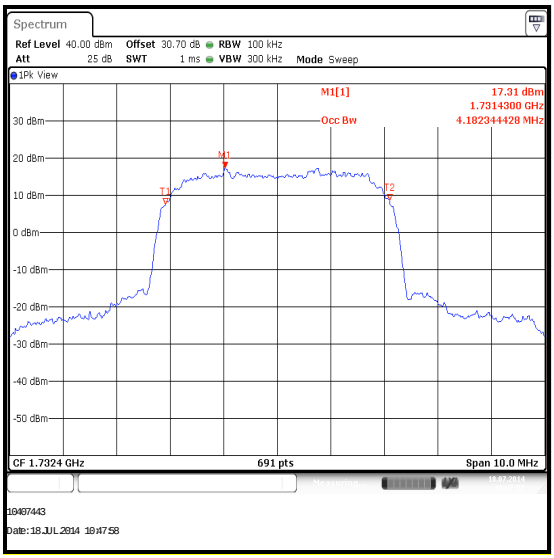


Middle Channel

Transmitter Occupied Bandwidth (continued)

Results: HSUPA Sub-Test 3

Channel	Frequency (MHz)	Occupied Bandwidth (kHz)
Middle	1732.4	4182.344

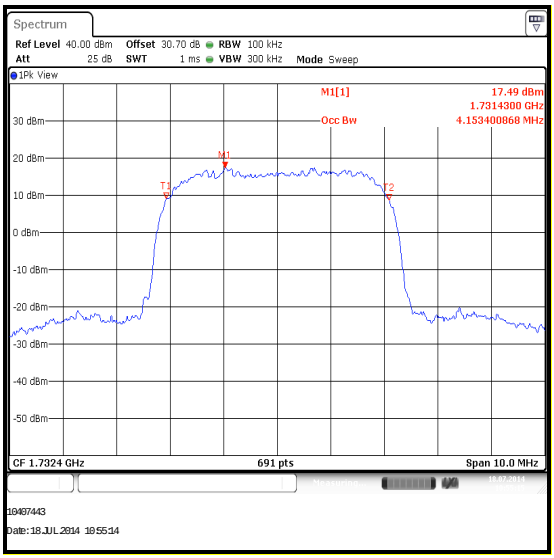


Middle Channel

Transmitter Occupied Bandwidth (continued)

Results: HSUPA Sub-Test 4

Channel	Frequency (MHz)	Occupied Bandwidth (kHz)
Middle	1732.4	4153.401

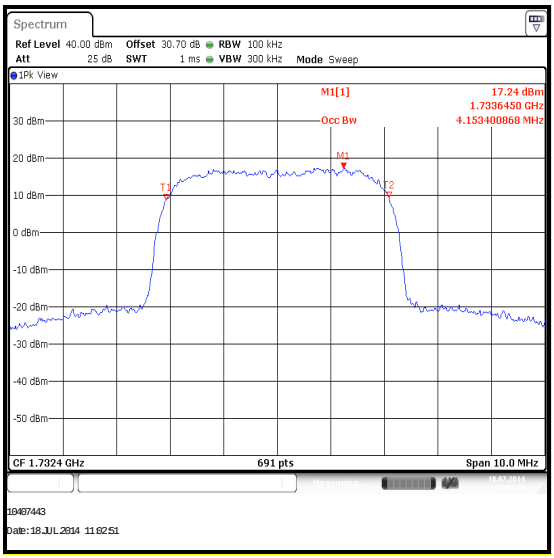


Middle Channel

Transmitter Occupied Bandwidth (continued)

Results: HSUPA Sub-Test 5

Channel	Frequency (MHz)	Occupied Bandwidth (kHz)
Middle	1732.4	4153.401



Middle Channel

Test Equipment Used

Asset No.	Instrument	Manufacturer	Type No.	Serial No.	Date Calibration Due	Cal. Interval (Months)
M1657	Thermohygrometer	JM Handelspunkt	30.5015.13	None stated	14 Mar 2015	12
A2504	Directional Coupler	AtlanTecRF	CDC-003060-10	13122501839	Calibrated before use	-
A2526	Attenuator	AtlanTecRF	AN18W5-20	832828#1	Calibrated before use	-
M1873	Signal Analyser	Rohde & Schwarz	FSV30	103074	15 May 2015	12

5.2.3. Transmitter Out of Band Radiated Emissions

Test Summary:

Test Engineers:	David Doyle & Georgios Vrezas	**Test Dates:**	21 July 2014 to 23 July 2014
Test Sample IMEI:	352025060238798		

FCC Reference:	Parts 2.1053 & 27.53(h)(1)
Test Method Used:	As detailed in KDB 971168 Section 6.1 referencing FCC Part 2.1053
Frequency Range:	30 MHz to 18 GHz
Configuration:	RMC / 12.2 kbps

Environmental Conditions:

Temperature (°C):	23 to 25
Relative Humidity (%):	28 to 50

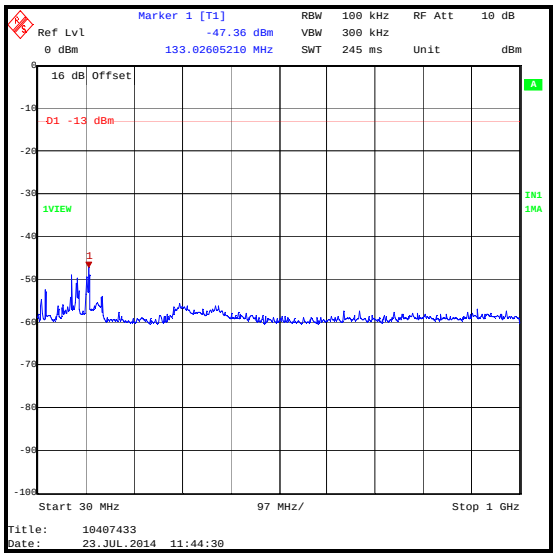
Note(s):

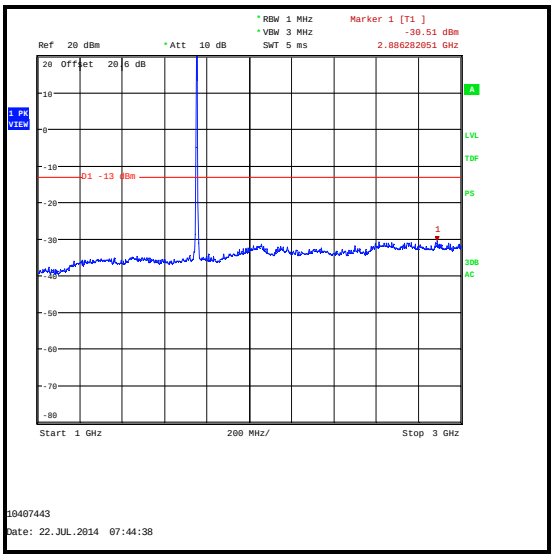
1. The uplink traffic channel is shown on the 1 GHz to 3 GHz plot.
2. All emissions shown on the pre-scan plots were investigated. Final measurements were made using appropriate RF filters and attenuators where required. All emissions shown on the pre-scan plots were found to be below the measurement system noise floor or ambient, therefore the highest peak noise floor reading of the measuring receiver was recorded in the table below.
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.

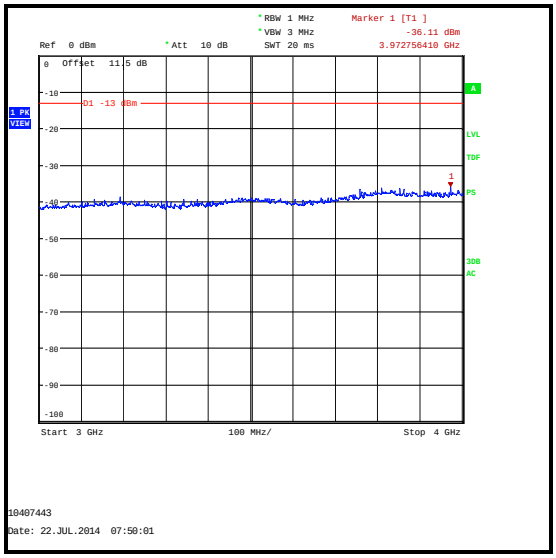
Results: RMC / 12.2 kbps – Top Channel

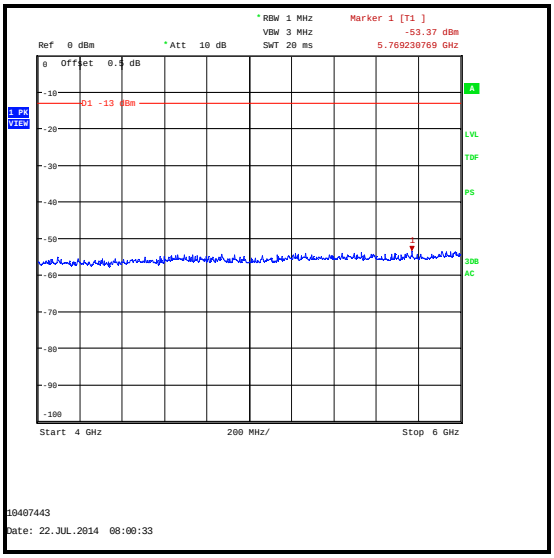
Frequency (MHz)	Peak Level (dBm)	Limit (dBm)	Margin (dB)	Result
2886.282	-30.5	-13.0	17.5	Complied

Transmitter Out of Band Radiated Emissions (continued)

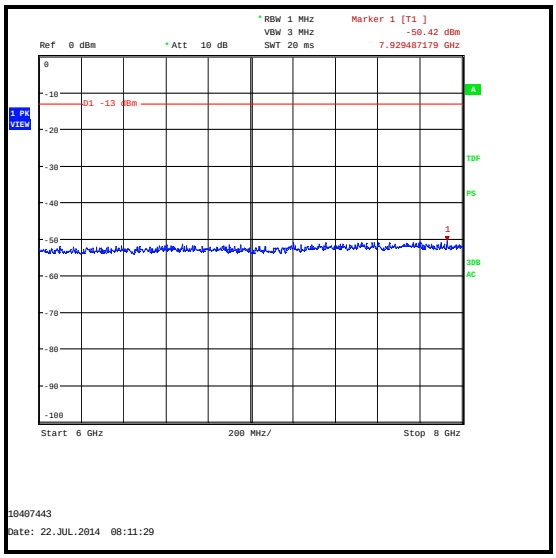


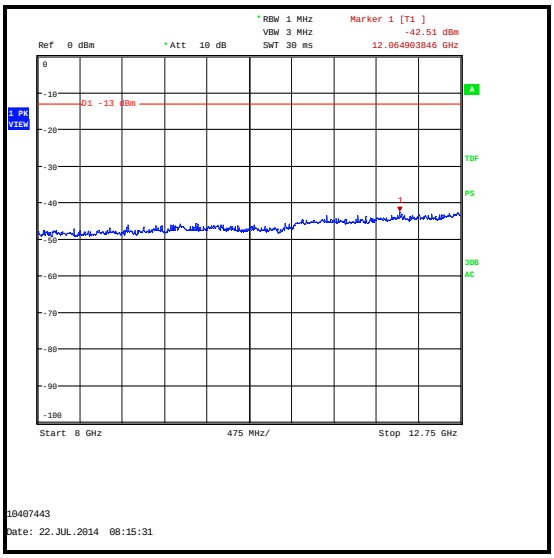


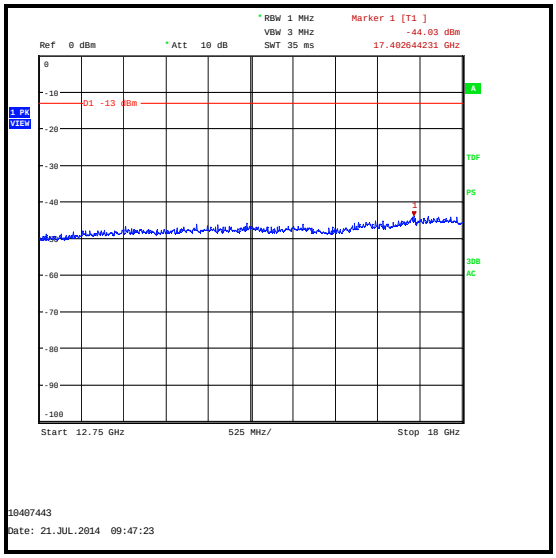




Transmitter Out of Band Radiated Emissions (continued)







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	None 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
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 Radiated Emissions at Band Edges

Test Summary:

Test Engineer:	David Doyle	**Test Date:**	22 July 2014
Test Sample IMEI:	352025060238798		

FCC Reference:	Parts 2.1053 & 27.53(h)(1)
Test Method Used:	As detailed in KDB 971168 Section 6.1 referencing FCC Part 27.53

Environmental Conditions:

Temperature (°C):	23
Relative Humidity (%):	50

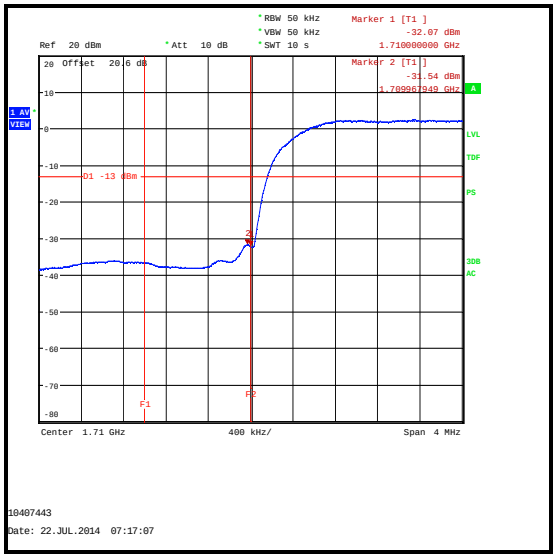
Note(s):

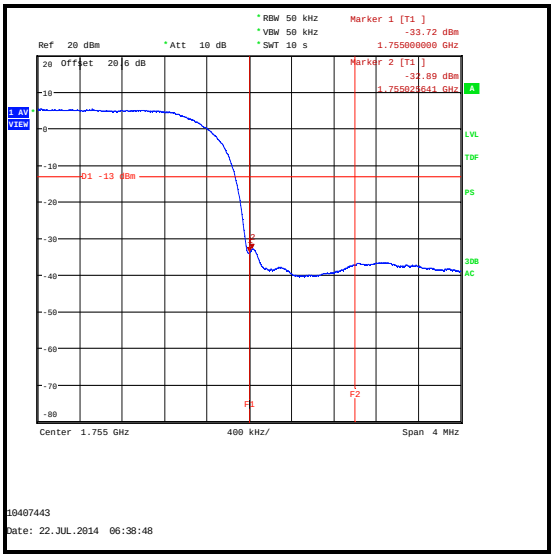
1. Measurements were performed with the EUT transmitting in all operating modes.
2. Measurements were performed in a fully anechoic chamber (Asset Number K0002) at a distance of 3 metres. The EUT was placed at a height of 1.5 metres above the test chamber floor in the centre of the chamber turntable. The measurement antenna was placed at a fixed height of 1.5 metres above the test chamber floor in line with the EUT.
3. In the first 1.0 MHz immediately outside and adjacent to the operating band, the test receiver resolution bandwidth was set to 50 kHz (>1% of 4.7 MHz, the widest 26 dB emission bandwidth) and video bandwidth 50 kHz (≥ the resolution bandwidth).

Transmitter Radiated Emissions at Band Edges (continued)

Results: RMC / 12.2 kbps

Frequency (MHz)	Peak Level (dBm)	Limit (dBm)	Margin (dB)	Result
1709.968	-31.5	-13.0	18.5	Complied
1710	-32.1	-13.0	19.1	Complied
1755	-33.7	-13.0	20.7	Complied
1755.026	-32.9	-13.0	19.9	Complied

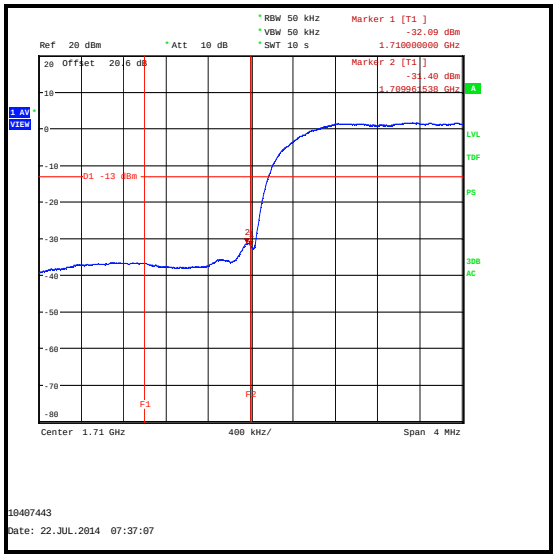


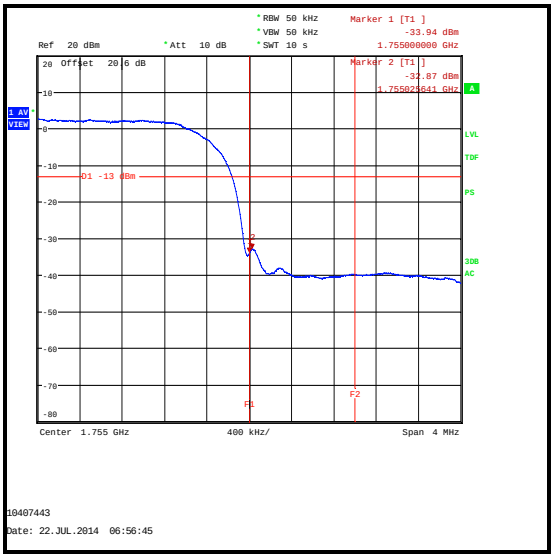


Transmitter Radiated Emissions at Band Edges (continued)

Results: HSDPA Sub-Test 1

Frequency (MHz)	Peak Level (dBm)	Limit (dBm)	Margin (dB)	Result
1709.962	-31.4	-13.0	18.4	Complied
1710	-32.1	-13.0	19.1	Complied
1755	-33.9	-13.0	20.9	Complied
1755.026	-32.9	-13.0	19.9	Complied

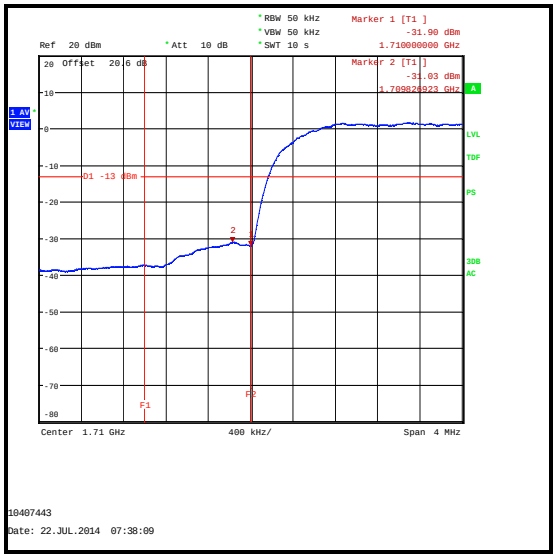


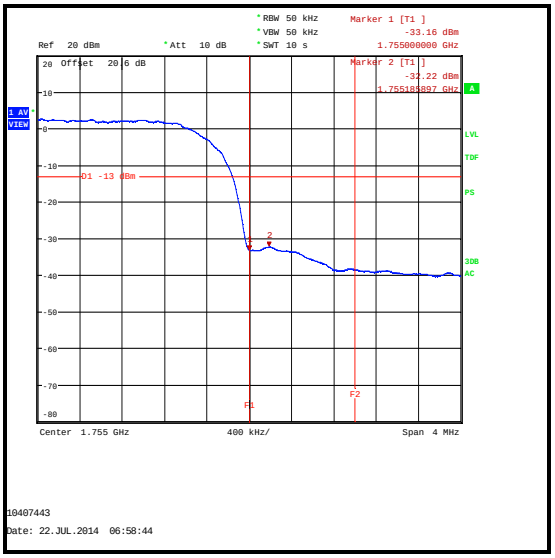


Transmitter Radiated Emissions at Band Edges (continued)

Results: HSDPA Sub-Test 2

Frequency (MHz)	Peak Level (dBm)	Limit (dBm)	Margin (dB)	Result
1709.827	-31.0	-13.0	18.0	Complied
1710	-31.9	-13.0	18.9	Complied
1755	-33.2	-13.0	20.2	Complied
1755.186	-32.2	-13.0	19.2	Complied

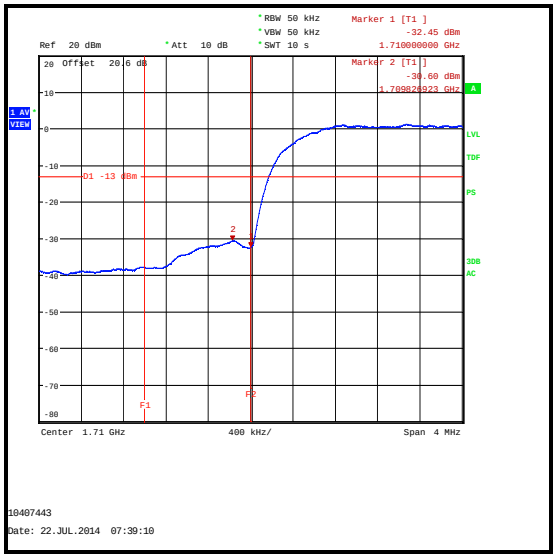


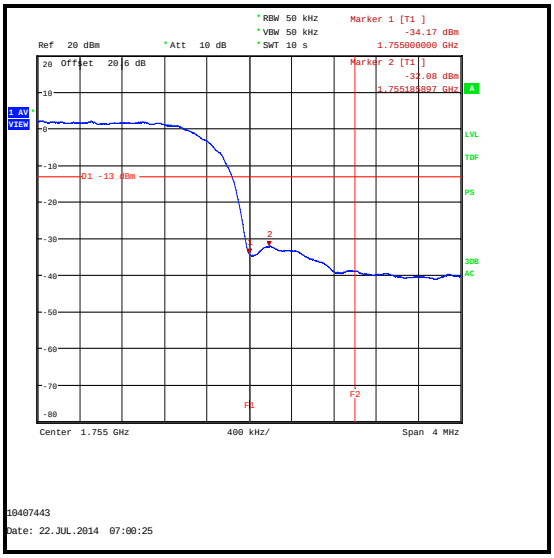


Transmitter Radiated Emissions at Band Edges (continued)

Results: HSDPA Sub-Test 3

Frequency (MHz)	Peak Level (dBm)	Limit (dBm)	Margin (dB)	Result
1709.827	-30.6	-13.0	17.6	Complied
1710	-32.5	-13.0	19.5	Complied
1755	-34.2	-13.0	21.2	Complied
1755.186	-32.1	-13.0	19.1	Complied

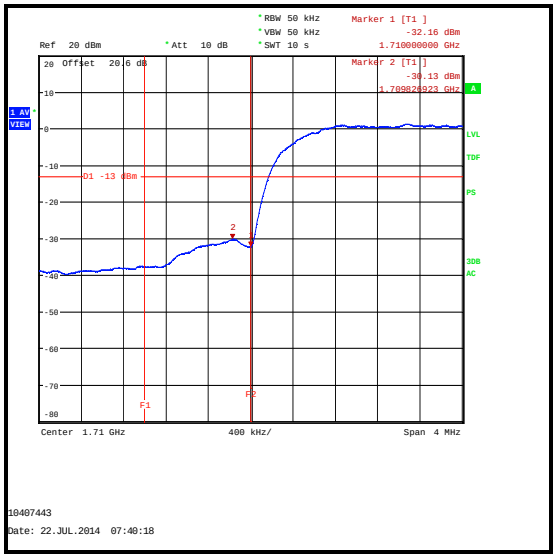


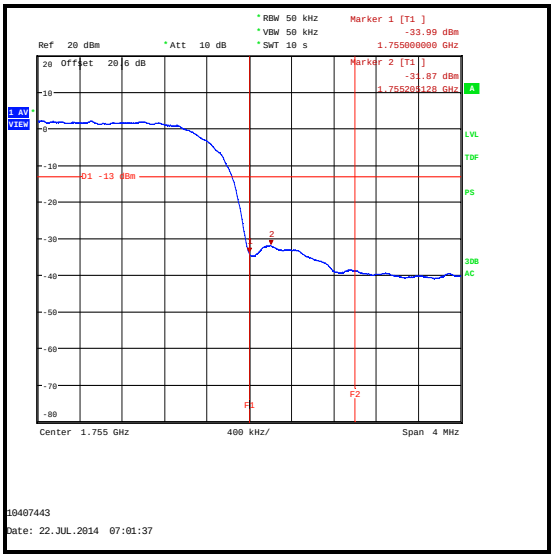


Transmitter Radiated Emissions at Band Edges (continued)

Results: HSDPA Sub-Test 4

Frequency (MHz)	Peak Level (dBm)	Limit (dBm)	Margin (dB)	Result
1709.827	-30.1	-13.0	17.1	Complied
1710	-32.2	-13.0	19.2	Complied
1755	-34.0	-13.0	21.0	Complied
1755.205	-31.9	-13.0	18.9	Complied

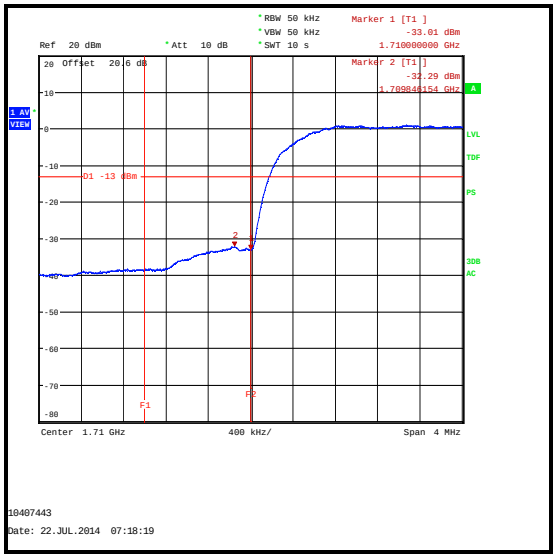


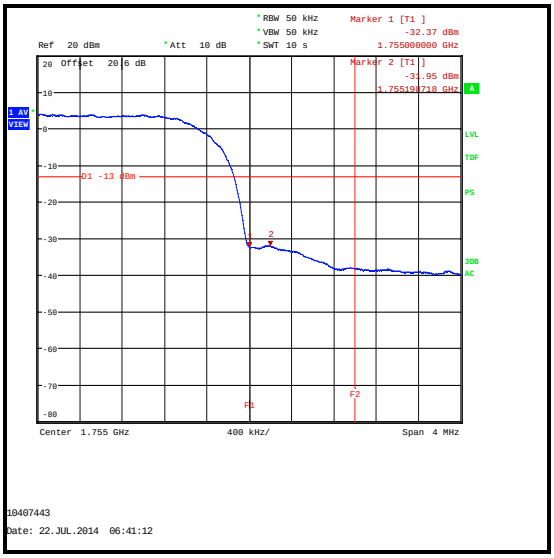


Transmitter Radiated Emissions at Band Edges (continued)

Results: HSUPA Sub-Test 1

Frequency (MHz)	Peak Level (dBm)	Limit (dBm)	Margin (dB)	Result
1709.846	-32.3	-13.0	19.3	Complied
1710	-33.0	-13.0	20.0	Complied
1755	-32.4	-13.0	19.4	Complied
1755.199	-32.0	-13.0	19.0	Complied

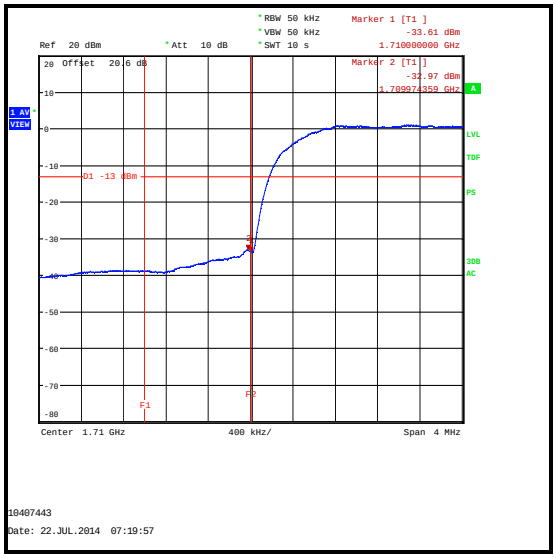


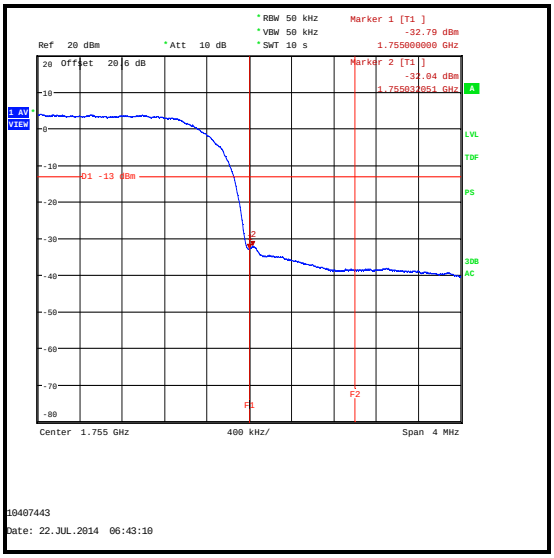


Transmitter Radiated Emissions at Band Edges (continued)

Results: HSUPA Sub-Test 2

Frequency (MHz)	Peak Level (dBm)	Limit (dBm)	Margin (dB)	Result
1709.974	-33.0	-13.0	20.0	Complied
1710	-33.6	-13.0	20.6	Complied
1755	-32.8	-13.0	19.8	Complied
1755.032	-32.0	-13.0	19.0	Complied

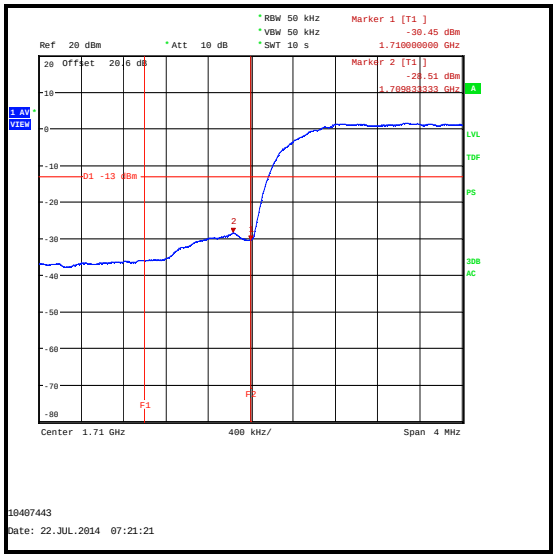


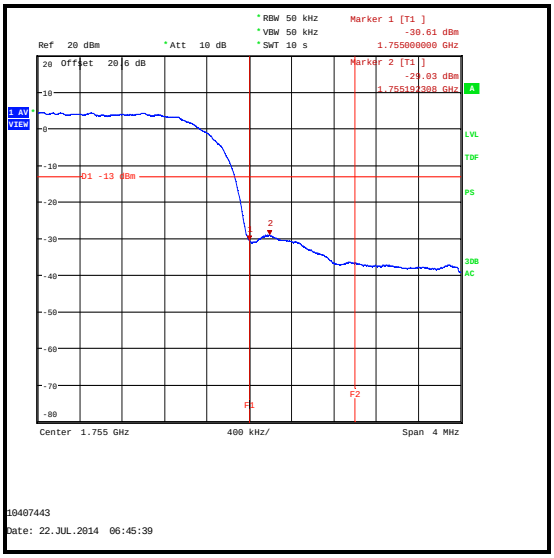


Transmitter Radiated Emissions at Band Edges (continued)

Results: HSUPA Sub-Test 3

Frequency (MHz)	Peak Level (dBm)	Limit (dBm)	Margin (dB)	Result
1709.833	-28.5	-13.0	15.5	Complied
1710	-30.5	-13.0	17.5	Complied
1755	-30.6	-13.0	17.6	Complied
1755.192	-29.0	-13.0	16.0	Complied

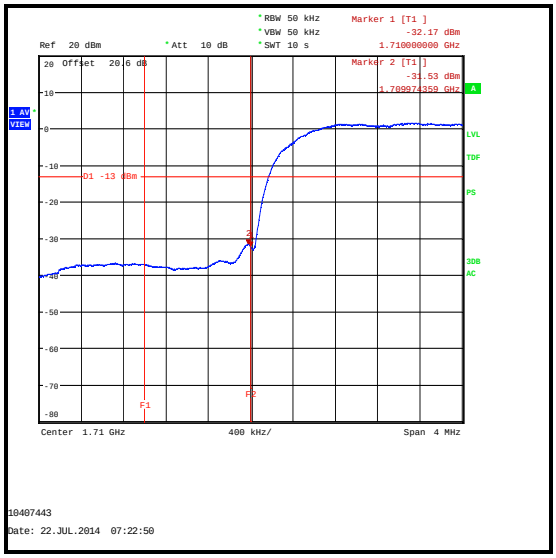


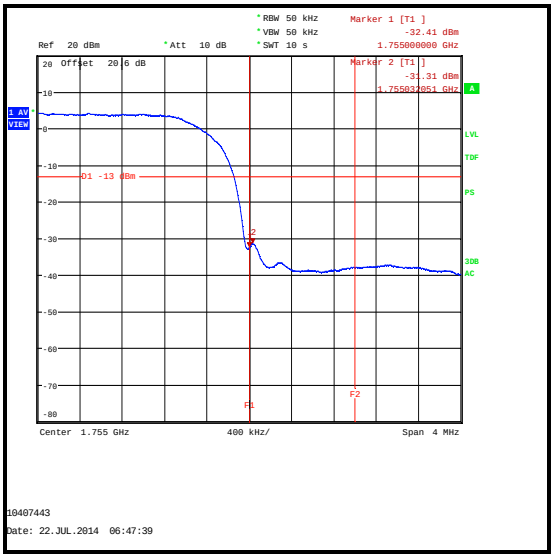


Transmitter Radiated Emissions at Band Edges (continued)

Results: HSUPA Sub-Test 4

Frequency (MHz)	Peak Level (dBm)	Limit (dBm)	Margin (dB)	Result
1709.974	-31.5	-13.0	18.5	Complied
1710	-32.2	-13.0	19.2	Complied
1755	-32.4	-13.0	19.4	Complied
1755.032	-31.3	-13.0	18.3	Complied

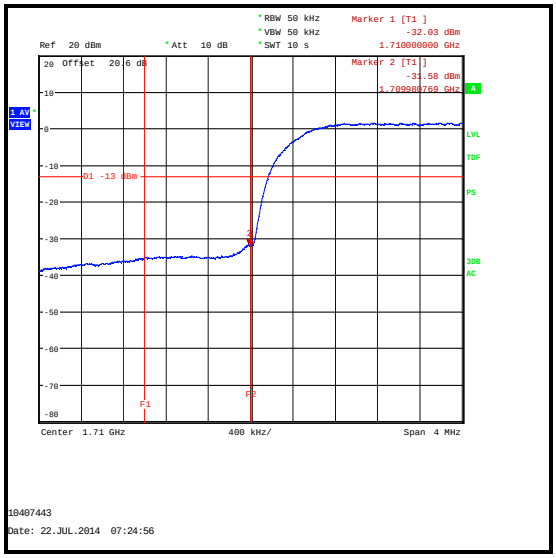


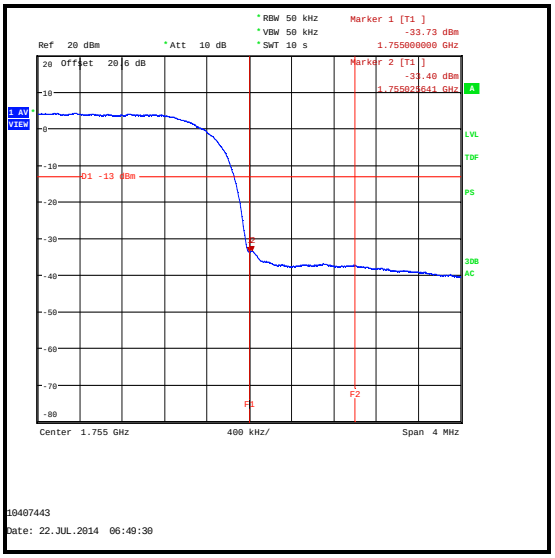


Transmitter Radiated Emissions at Band Edges (continued)

Results: HSUPA Sub-Test 5

Frequency (MHz)	Peak Level (dBm)	Limit (dBm)	Margin (dB)	Result
1709.981	-31.6	-13.0	18.6	Complied
1710	-32.0	-13.0	19.0	Complied
1755	-33.7	-13.0	20.7	Complied
1755.026	-33.4	-13.0	20.4	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
M1874	Test Receiver	Rohde & Schwarz	ESU26	100553	13 May 2015	12
M1656	Thermohygrometer	JM Handelspunkt	30.5015.13	Not stated	14 Mar 2015	12

5.2.5. Transmitter Frequency Stability (Temperature Variation)

Test Summary:

Test Engineer:	Keith Tucker	**Test Dates:**	09 July 2014 & 10 July 2014
Test Sample IMEI:	352025060274538		

FCC Reference:	Parts 2.1055 & 27.54
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
Test Mode:	RMC

Environmental Conditions:

Ambient Temperature (°C):	22 to 23
Ambient Relative Humidity (%):	38 to 49

Note(s):

1. Flying leads were connected internally to the EUT in place of the battery. These leads were extended and connected to 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. Temperature was monitored throughout the test with a calibrated digital thermometer.

Transmitter Frequency Stability (Temperature Variation) (continued)

Results: Bottom Channel (1712.4 MHz)

Temperature (ºC)	Frequency Error (Hz)	Measured Frequency (MHz)	Lower Band Edge Limit (MHz)	Margin (MHz)	Result
-30	11	1712.399989	1710.0	2.399989	Complied
-20	26	1712.399974	1710.0	2.399974	Complied
-10	32	1712.399968	1710.0	2.399968	Complied
0	31	1712.399969	1710.0	2.399969	Complied
10	26	1712.399974	1710.0	2.399974	Complied
20	20	1712.399980	1710.0	2.399980	Complied
30	10	1712.399990	1710.0	2.399990	Complied
40	12	1712.399988	1710.0	2.399988	Complied
50	15	1712.400015	1710.0	2.400015	Complied

Results: Top Channel (1752.6 MHz)

Temperature (ºC)	Frequency Error (Hz)	Measured Frequency (MHz)	Upper Band Edge Limit (MHz)	Margin (MHz)	Result
-30	6	1752.599994	1755.0	2.400006	Complied
-20	19	1752.600019	1755.0	2.399981	Complied
-10	25	1752.600025	1755.0	2.399975	Complied
0	28	1752.600028	1755.0	2.399972	Complied
10	21	1752.600021	1755.0	2.399979	Complied
20	13	1752.600013	1755.0	2.399987	Complied
30	7	1752.599993	1755.0	2.400007	Complied
40	16	1752.599984	1755.0	2.400016	Complied
50	22	1752.599978	1755.0	2.400022	Complied

Test Equipment Used:

Asset No.	Instrument	Manufacturer	Type No.	Serial No.	Date Calibration Due	Cal. Interval (Months)
M1658	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
G088	Dual DC power supply	Tti	CPX200	100700	Calibrated before use	-
M1251	Multimeter	Fluke	175	89170179	19 May 2015	12
M1643	Thermometer	Fluke	52II	18890136	07 Apr 2015	12
E013	Environmental Chamber	Sanyo	MTH-4200PR	none	Calibrated before use	-

5.2.6. Transmitter Frequency Stability (Voltage Variation)

Test Summary:

Test Engineer:	Keith Tucker	**Test Dates:**	09 July 2014 & 10 July 2014
Test Sample IMEI:	352025060274538		

FCC Reference:	Parts 2.1055 & 27.54
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
Test Mode:	RMC

Environmental Conditions:

Temperature (°C):	22 to 23
Relative Humidity (%):	38 to 49

Note(s):

1. Flying leads were connected internally to the EUT in place of the battery. These leads were extended and connected to 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 (1712.4 MHz)

Supply Voltage (V)	Frequency Error (Hz)	Measured Frequency (MHz)	Lower Band Edge Limit (MHz)	Margin (MHz)	Result
3.4	18	1712.399982	1710.0	2.399982	Complied
4.2	17	1712.400017	1710.0	2.400017	Complied

Results: Top Channel (1752.6 MHz)

Supply Voltage (V)	Frequency Error (Hz)	Measured Frequency (MHz)	Upper Band Edge Limit (MHz)	Margin (MHz)	Result
3.4	13	1752.600013	1755.0	2.399987	Complied
4.2	13	1752.600013	1755.0	2.399987	Complied

Transmitter Frequency Stability (Voltage Variation) (continued)

Test Equipment Used:

Asset No.	Instrument	Manufacturer	Type No.	Serial No.	Date Calibration Due	Cal. Interval (Months)
M1658	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
G088	Dual DC power supply	Tti	CPX200	100700	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	1710 to 1755 MHz	95%	±1.13 dB
Occupied Bandwidth	1710 to 1755 MHz	95%	±3.92 %
Radiated Spurious Emissions	30 MHz to 1 GHz	95%	±5.65 dB
Radiated Spurious Emissions	1 GHz to 18 GHz	95%	±2.94 dB
Frequency Stability	1710 to 1755 MHz	95%	±23 Hz

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	-	-	Transmitter Radiated Emissions FCC reference updated
3.0	-	-	Admin updates

--- END OF REPORT ---