



TEST REPORT

Test Report No. : UL-RPT-RP92315JD10B V2.0

Manufacturer : Panasonic Mobile Communications Development of Europe Ltd
Model No. : NTT docomo P-03E
FCC ID : UCE313058A
Technology : UMTS850 Band V
Test Standard(s) : FCC Parts 15.107, 15.109 & 22

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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: 16 April 2013

Checked by:

Sarah Williams
WiSE Laboratory Engineer

Issued by :

pp

John Newell
Group Quality Manager, WiSE
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This laboratory is accredited by UKAS.
The tests reported herein have been
performed in accordance with its' terms
of accreditation.

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Table of Contents

1. Customer Information.....	4
2. Summary of Testing.....	5
2.1. General Information	5
2.2. Summary of Test Results	5
2.3. Methods and Procedures	5
2.4. Deviations from the Test Specification	5
3. Equipment Under Test (EUT)	6
3.1. Identification of Equipment Under Test (EUT)	6
3.2. Description of EUT	7
3.3. Modifications Incorporated in the EUT	7
3.4. Additional Information Related to Testing	8
3.5. Support Equipment	9
4. Operation and Monitoring of the EUT during Testing	10
4.1. Operating Modes	10
4.2. Configuration and Peripherals	10
5. Measurements, Examinations and Derived Results	11
5.1. General Comments	11
5.2. Test Results	12
5.2.1. Receiver/Idle Mode AC Conducted Spurious Emissions	12
5.2.2. Receiver/Idle Mode Radiated Spurious Emissions	15
5.2.3. Transmitter Effective Radiated Power (ERP)	19
5.2.4. Transmitter Frequency Stability (Temperature Variation)	21
5.2.5. Transmitter Frequency Stability (Voltage Variation)	23
5.2.6. Transmitter Occupied Bandwidth	24
5.2.7. Transmitter Out of Band Radiated Emissions	34
5.2.8. Transmitter Radiated Emissions at Band Edges	37
6. Measurement Uncertainty	47
7. Report Revision History	48

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:	47CFR22
Specification Title:	Code of Federal Regulations Volume 47 (Telecommunications) 2012: Part 22 Subpart H (Public Mobile Services)
Specification Reference:	47CFR15.107 and 47CFR15.109
Specification Title:	Code of Federal Regulations Volume 47 (Telecommunications) 2012: Part 15 Subpart B (Unintentional Radiators) - Sections 15.107 and 15.109
Site Registration:	FCC: 209735
Location of Testing:	RFI Global Services Ltd trading as UL, Wade Road, Basingstoke, Hampshire, RG24 8AH.
Test Dates:	26 March 2013 to 09 April 2013

2.2. Summary of Test Results

FCC Reference (47CFR)	Measurement	Result
Part 15.107(a)	Receiver/Idle Mode AC Conducted Spurious Emissions	
Part 15.109	Receiver/Idle Mode Radiated Spurious Emissions	
Part 22.913(a)	Transmitter Effective Radiated Power (ERP)	
Part 2.1055/22.355	Transmitter Frequency Stability (Temperature and Voltage Variation)	
Part 2.1049	Transmitter Occupied Bandwidth	
Part 2.1053/22.917	Transmitter Out of Band Radiated Emissions	
Part 2.1053/22.917	Transmitter Band Edge Radiated Emissions	
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
Reference:	ANSI C63.4 (2003)
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:	NTT docomo
Model Name or Number:	P-03E
IMEI:	355335050017244 (<i>Radiated sample #1</i>)
Hardware Version Number:	Rev B
Software Version Number:	ACPU: zoro-jb-10-0371 CCPU: 161022_DCM_00.15
FCC ID:	UCE313058A

Brand Name:	NTT docomo
Model Name or Number:	P-03E
IMEI:	355335050017228 (<i>Radiated sample #2</i>)
Hardware Version Number:	Rev B
Software Version Number:	ACPU: zoro-jb-10-0371 CCPU: 161022_DCM_00.15
FCC ID:	UCE313058A

Brand Name:	NTT docomo
Model Name or Number:	P-03E
IMEI:	355335050017236 (<i>Radiated sample #3</i>)
Hardware Version Number:	Rev B
Software Version Number:	ACPU: zoro-jb-10-0371 CCPU: 161022_DCM_00.15
FCC ID:	UCE313058A

Brand Name:	NTT docomo
Model Name or Number:	P-03E
IMEI:	355335050017079 (<i>Conducted RF port sample</i>)
Hardware Version Number:	Rev B
Software Version Number:	ACPU: zoro-jb-10-0371 CCPU: 161022_DCM_00.15
FCC ID:	UCE313058A

Brand Name:	NTT docomo
Description:	AC Charger
Model Name or Number:	AC04

Identification of Equipment Under Test (EUT) (continued)

Brand Name:	NTT docomo
Description:	Charge/USB Data cable
Model Name or Number:	Type 01

Brand Name:	NTT docomo
Description:	Personal Hands-Free
Model Name or Number:	Type 02

3.2. Description of EUT

The equipment under test was a Multi-Mode LTE/UMTS/GSM Mobile Phone with WLAN, *Bluetooth* and RFID.

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:	UMTS850		
Type of Radio Device:	Transceiver		
Mode:	UMTS FDD V and 3GPP Rel. 5 HSDPA / Rel. 6 HSUPA		
Modulation Type:	QPSK / 8PSK		
Channel Spacing:	5 MHz		
Power Supply Requirement(s):	Nominal	3.8 V	
	Minimum	3.4 V	
	Maximum	4.35 V	
Maximum Output Power (ERP):	Voice (12.2 kbps)	22.7 dBm RMS	
	HSDPA Sub-Test 2	21.9 dBm RMS	
	HSUPA Sub-Test 5	21.9 dBm RMS	
Transmit Frequency Range:	824 to 849 MHz		
Transmit Channels Tested:	Channel ID	Channel Number	Channel Frequency (MHz)
	Bottom	4132	826.4
	Middle	4183	836.6
	Top	4233	846.6
Receive Frequency Range:	869 to 894 MHz		
Receive Channels Tested:	Channel ID	Channel Number	Channel Frequency (MHz)
	Bottom	4357	871.4
	Middle	4407	881.6
	Top	4458	891.6

3.5. Support Equipment

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

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

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

4. Operation and Monitoring of the EUT during Testing

4.1. Operating Modes

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

- Receiver/Idle mode.
- Constantly transmitting at full power on bottom, middle and top channels as required.
- Occupied bandwidth, ERP 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 CMU 200 Universal Radio Communications Tester, operating in UMTS Band V mode.
- The dummy battery was fitted for frequency stability measurements.
- Idle mode and transmit mode radiated spurious emissions tests were performed with the AC charger and Personal Hands-Free connected to the EUT. The micro SD card was fitted during all tests.
- AC conducted emissions tests were performed with the EUT connected to the AC charger. The AC charger was connected to a 120 VAC 60 Hz single phase supply via a LISN.
- The conducted sample with IMEI 355335050017079 was used for frequency stability measurements.
- The radiated samples with the IMEIs 355335050017228, 355335050017236 and 355335050017244 were 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. Receiver/Idle Mode AC Conducted Spurious Emissions****Test Summary:**

Test Engineer:	Nick Steele	Test Date:	29 March 2013
Test Sample IMEI:	355335050017228		

FCC Reference:	Part 15.107
Test Method Used:	As detailed in ANSI C63.10 Section 6.2 referencing ANSI C63.4

Environmental Conditions:

Temperature (°C):	20
Relative Humidity (%):	30

Results: Live / Quasi Peak

Frequency (MHz)	Line	Level (dB μ V)	Limit (dB μ V)	Margin (dB)	Result
0.155	Live	51.0	65.8	14.8	Complied
0.231	Live	46.2	62.4	16.2	Complied
0.398	Live	39.5	57.9	18.4	Complied
1.622	Live	39.5	56.0	16.5	Complied
1.856	Live	38.8	56.0	17.2	Complied
1.964	Live	39.7	56.0	16.3	Complied
2.252	Live	37.4	56.0	18.6	Complied

Results: Live / Average

Frequency (MHz)	Line	Level (dB μ V)	Limit (dB μ V)	Margin (dB)	Result
2.022	Live	28.2	46.0	17.8	Complied
2.594	Live	29.2	46.0	16.8	Complied
15.351	Live	30.0	50.0	20.0	Complied
15.414	Live	30.9	50.0	19.1	Complied
15.747	Live	32.6	50.0	17.4	Complied
15.842	Live	34.8	50.0	15.2	Complied
15.945	Live	30.0	50.0	20.0	Complied

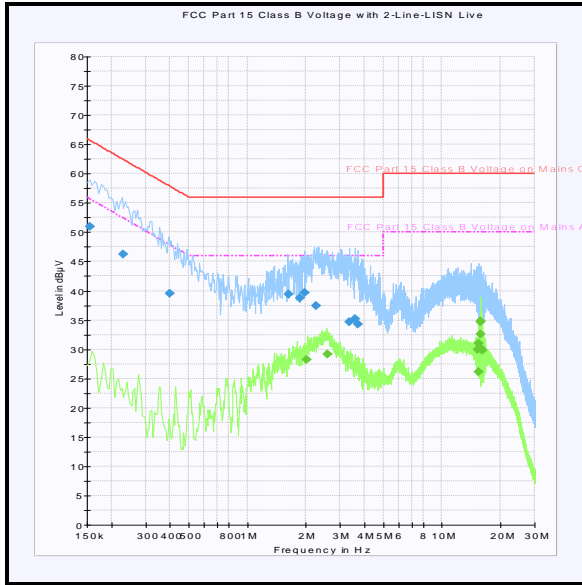
Receiver/Idle Mode AC Conducted Spurious Emissions (continued)**Results: Neutral / Quasi Peak**

Frequency (MHz)	Line	Level (dB μ V)	Limit (dB μ V)	Margin (dB)	Result
0.155	Neutral	57.3	65.8	8.5	Complied
0.245	Neutral	52.7	61.9	9.2	Complied
0.267	Neutral	51.8	61.2	9.4	Complied
0.285	Neutral	50.8	60.7	9.9	Complied
0.303	Neutral	50.5	60.2	9.7	Complied
0.335	Neutral	48.8	59.3	10.5	Complied
0.344	Neutral	49.1	59.1	10.0	Complied
0.384	Neutral	46.5	58.2	11.7	Complied
0.411	Neutral	44.9	57.6	12.7	Complied
0.443	Neutral	45.5	57.0	11.5	Complied

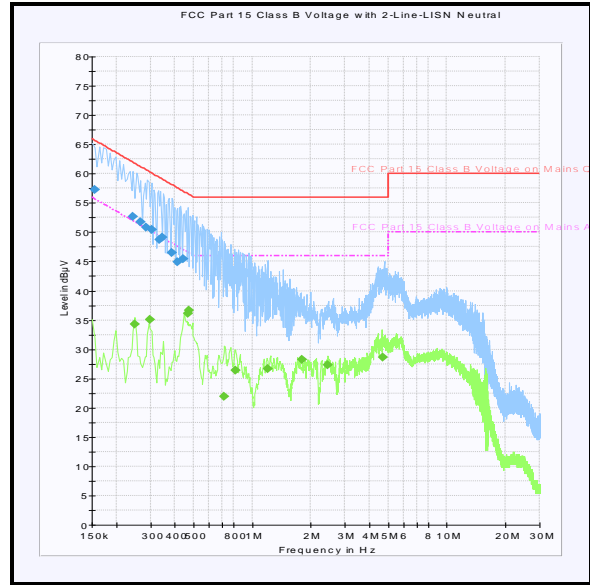
Results: Neutral / Average

Frequency (MHz)	Line	Level (dB μ V)	Limit (dB μ V)	Margin (dB)	Result
0.249	Neutral	34.3	51.8	17.5	Complied
0.299	Neutral	35.1	50.3	15.2	Complied
0.465	Neutral	36.1	46.6	10.5	Complied
0.474	Neutral	36.6	46.4	9.8	Complied
0.816	Neutral	26.4	46.0	19.6	Complied
1.199	Neutral	26.7	46.0	19.3	Complied
1.806	Neutral	28.3	46.0	17.7	Complied
2.432	Neutral	27.3	46.0	18.7	Complied
4.668	Neutral	28.7	46.0	17.3	Complied

Receiver/Idle Mode 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:

RFI No.	Instrument	Manufacturer	Type No.	Serial No.	Date Calibration Due	Cal. Interval (Months)
A649	LISN	Rohde & Schwarz	ESH3-Z5	825562/008	19 Apr 2013	12
A1830	Pulse Limiter	Rohde & Schwarz	ESH3-Z2	100668	19 Feb 2014	12
M1263	Test Receiver	Rohde & Schwarz	ESIB7	100265	09 Aug 2013	12

5.2.2. Receiver/Idle Mode Radiated Spurious Emissions**Test Summary:**

Test Engineer:	Sarah Williams	Test Date:	29 March 2013
Test Sample IMEI:	355335050017236		

FCC Reference:	Part 15.109
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:

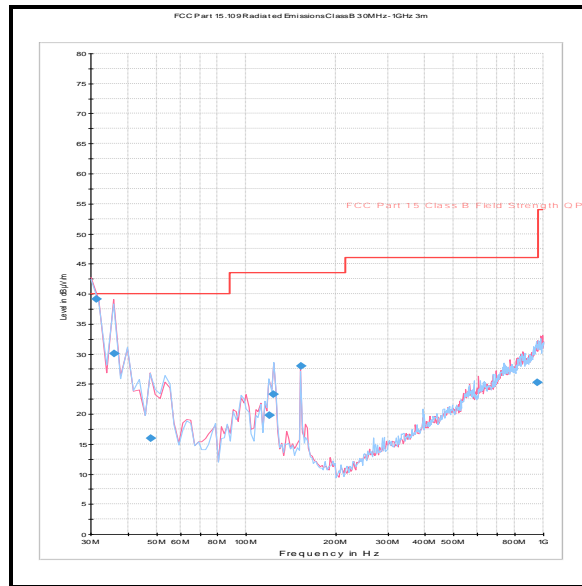
Temperature (°C):	22
Relative Humidity (%):	26

Note(s):

1. The final measured value, for the given emission, in the table above incorporates the calibrated antenna factor and cable loss.
2. All other 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.
3. Measurements below 1 GHz were performed in a semi-anechoic chamber (RFI Asset Number K0001) at a distance of 3 metres. The EUT was placed at a height of 80 cm above the reference ground plane in the centre of the chamber turntable. Maximum emission levels were determined by height searching the measurement antenna over the range 1 metre to 4 metres.

Results: Quasi Peak

Frequency (MHz)	Antenna Polarity	Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Result
31.337	Vertical	39.1	40.0	0.9	Complied
36.096	Vertical	30.0	40.0	10.0	Complied
123.571	Horizontal	23.3	43.5	20.2	Complied
153.307	Vertical	28.0	43.5	15.5	Complied
956.200	Vertical	25.3	46.0	20.7	Complied

Receiver/Idle Mode Radiated Spurious Emissions (continued)

Note: This plot is a pre-scan and for indication purposes only. For final measurements, see accompanying table.

Test Equipment Used:

RFI No.	Instrument	Manufacturer	Type No.	Serial No.	Date Calibration Due	Cal. Interval (Months)
A1834	Attenuator	Hewlett Packard	8491B	10444	27 Jan 2014	12
A490	Antenna	Chase	CBL6111A	1590	14 May 2013	12
G0543	Amplifier	Sonoma	310N	230801	03 Apr 2013	3
K0001	5m RSE Chamber	Rainford EMC	N/A	N/A	24 Oct 2013	12
M1273	Test Receiver	Rohde & Schwarz	ESIB 26	100275	15 Feb 2014	12

Receiver/Idle Mode Radiated Spurious Emissions (continued)**Test Summary:**

Test Engineer:	Nick Steele	Test Date:	26 March 2013
Test Sample IMEI:	355335050017244		

FCC Reference:	Part 15.109
Test Method Used:	As detailed in ANSI C63.4 Section 8
Frequency Range:	1 GHz to 5 GHz

Environmental Conditions:

Temperature (°C):	23
Relative Humidity (%):	29

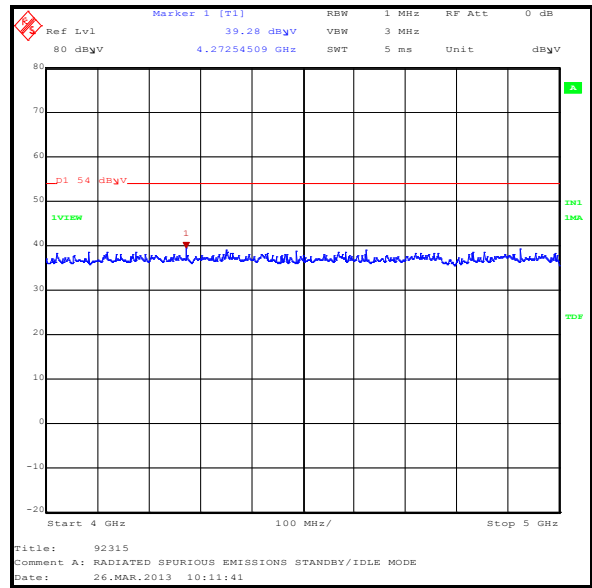
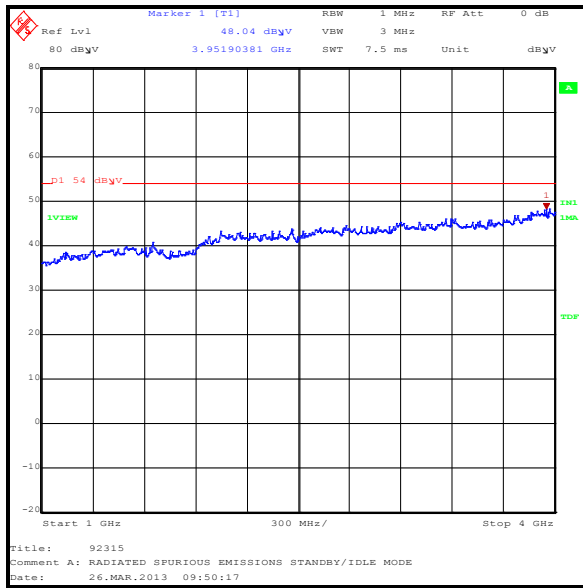
Note(s):

1. The final measured value, for the given emission, in the table above incorporates the calibrated antenna factor and cable loss.
2. 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 above. 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.
3. Pre-scans above 1 GHz were performed in a fully anechoic chamber (RFI 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 (RFI Asset Number K0001) at a distance of 3 metres. The EUT was placed at a height of 80 cm above the reference ground plane in the centre of the chamber turntable. Maximum emission levels were determined by height searching the measurement antenna over the range 1 metre to 4 metres.

Results:

Frequency (MHz)	Antenna Polarity	Peak Level (dBμV/m)	Average Limit (dBμV/m)	Margin (dB)	Result
3951.904	Vertical	48.0	54.0	6.0	Complied

Receiver/Idle Mode Radiated Spurious Emissions (continued)



Test Equipment Used:

RFI No.	Instrument	Manufacturer	Type No.	Serial No.	Date Calibration Due	Cal. Interval (Months)
K0002	3m RSE Chamber	Rainford	N/A	N/A	04 Nov 2013	12
M1124	Test Receiver	Rohde & Schwarz	ESIB 26	100046K	14 Aug 2013	12
A1534	Pre Amplifier	Hewlett Packard	8449B	3008A00405	04 Nov 2013	12
A1818	Antenna	EMCO	3115	00075692	04 Nov 2013	12
A253	Antenna	Flann Microwave	12240-20	128	04 Nov 2013	12

5.2.3. Transmitter Effective Radiated Power (ERP)**Test Summary:**

Test Engineer:	David Doyle	Test Date:	02 April 2013
Test Sample IMEI:	355335050017236		

FCC Reference:	Part 22.913(a)
Test Method Used:	As detailed in ANSI TIA-603-C-2004 Section 2.2.17.2

Environmental Conditions:

Temperature (°C):	23
Relative Humidity (%):	29

Note(s):

- All modes were compared on each channel and the highest power recorded was subtracted from the limit to show the margin.

Results: Peak ERP

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
850	4132	25.2	25.7	25.8	26.0	26.2	38.5	12.3	Complied
	4183	23.3	24.1	24.0	23.9	25.5	38.5	13.0	Complied
	4233	22.6	23.2	23.2	22.8	23.6	38.5	14.9	Complied
βc		2	12	15	15				
βd		15	15	8	4				
ΔACK, ΔNACK, ΔCQI		8	8	8	8				

Results: RMS ERP

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
850	4132	21.8	21.9	21.5	21.5	22.7	38.5	15.8	Complied
	4183	20.7	20.9	20.6	20.3	21.5	38.5	17.0	Complied
	4233	19.5	19.4	19.2	18.9	20.2	38.5	18.3	Complied
βc		2	12	15	15				
βd		15	15	8	4				
ΔACK, ΔNACK, ΔCQI		8	8	8	8				

Transmitter Effective Radiated Power (ERP) (Continued)**Results: Peak ERP**

Modes		HSUPA					Limit (dBm)	Margin (dB)	Result
Sub-test		1	2	3	4	5			
Band	Channel	Power (dBm)	Power (dBm)	Power (dBm)	Power (dBm)	Power (dBm)			
850	4132	25.2	25.7	26.1	25.1	26.1	38.5	12.4	Complied
	4183	24.0	23.5	24.1	23.4	24.1	38.5	14.4	Complied
	4233	22.8	22.7	23.5	23.1	23.4	38.5	15.0	Complied
β_c		11	6	15	2	15			
β_d		15	15	9	15	15			
$\Delta ACK, \Delta NACK, \Delta CQI$		8	8	8	8	8			

Results: RMS ERP

Modes		HSUPA					Limit (dBm)	Margin (dB)	Result
Sub-test		1	2	3	4	5			
Band	Channel	Power (dBm)	Power (dBm)	Power (dBm)	Power (dBm)	Power (dBm)			
850	4132	21.3	21.3	21.8	21.7	21.9	38.5	16.6	Complied
	4183	20.5	20.5	20.7	20.7	20.8	38.5	17.7	Complied
	4233	19.0	19.1	19.5	19.5	19.5	38.5	19.0	Complied
β_c		11	6	15	2	15			
β_d		15	15	9	15	15			
$\Delta ACK, \Delta NACK, \Delta CQI$		8	8	8	8	8			

Test Equipment Used:

RFI No.	Instrument	Manufacturer	Type No.	Serial No.	Date Calibration Due	Cal. Interval (Months)
K0002	3m RSE Chamber	Rainford EMC	N/A	N/A	04 Nov 2013	12
M1124	Test Receiver	Rohde & Schwarz	ESIB 26	100046K	14 Aug 2013	12
A1534	Pre Amplifier	Hewlett Packard	8449B	3008A00405	04 Nov 2013	12
A288	Antenna	Chase	CBL6111A	1589	15 Aug 2013	12
A1393	Attenuator	Huber & Suhner	6820.17.B	757456	06 Jul 2013	12
M1662	Radio Comms Tester	Rohde & Schwarz	CMU 200	109374	21 May 2013	12

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

Test Engineer:	Ian Watch	Test Date:	06 April 2013
Test Sample IMEI:	355335050017079		

FCC Reference:	Parts 2.1055 & 22.355
Test Method Used:	As detailed in ANSI TIA-603-C-2004 Section 2.2.2 referencing FCC CFR Part 2.1055

Environmental Conditions:

Ambient Temperature (°C):	19
Ambient Relative Humidity (%):	23

Note(s):

1. A dummy battery was placed on the EUT and the dummy battery cables connected to a bench power supply.
2. Frequency error was measured using the UMTS Band V modulation test on a calibrated Rohde & Schwarz CMU 200 Universal Radio Communications Tester in accordance with current Rohde & Schwarz application notes. The EUT was placed in a temperature chamber and connected by suitable RF cables to the CMU 200 outside the chamber. A bidirectional communications link was established on the centre channel between the EUT and the CMU 200. The frequency meter value was recorded.
3. Temperature was monitored throughout the test with a calibrated digital thermometer.

Results: Middle Channel (836.6 MHz)

Temperature (°C)	Measured Frequency (MHz)	Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)	Margin (ppm)	Result
-30	836.600006	6	0.0072	2.5	2.4928	Complied
-20	836.600007	7	0.0084	2.5	2.4916	Complied
-10	836.600007	7	0.0084	2.5	2.4916	Complied
0	836.600007	7	0.0084	2.5	2.4916	Complied
10	836.599994	6	0.0072	2.5	2.4928	Complied
20	836.599994	6	0.0072	2.5	2.4928	Complied
30	836.600009	9	0.0108	2.5	2.4892	Complied
40	836.599995	5	0.0060	2.5	2.4940	Complied
50	836.600009	9	0.0108	2.5	2.4892	Complied

Transmitter Frequency Stability (Temperature Variation)**Test Equipment Used:**

RFI No.	Instrument	Manufacturer	Type No.	Serial No.	Date Calibration Due	Cal. Interval (Months)
E0513	Environmental Chamber	TAS	LT600	23900506	Calibrated Before Use	N/A
M1229	Multimeter	Fluke	179	87640015	18 Jun 2013	12
M1642	Thermometer	Fluke	52II	18890119	19 Mar 2014	12
M1662	Radio Comms Tester	Rohde & Schwarz	CMU 200	109374	21 May 2013	12
S0529	Dual DC Power Supply Unit	ISO-Tech	IPS2302A	504E005 G2	Calibrated Before Use	N/A

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

Test Engineer:	Ian Watch	Test Date:	06 April 2013
Test Sample IMEI:	355335050017079		

FCC Part:	2.1055 & 22.355
Test Method Used:	As detailed in ANSI TIA-603-C-2004 Section 2.2.2 referencing FCC CFR Part 2.1055

Environmental Conditions:

Temperature (°C):	20
Relative Humidity (%):	32

Note(s):

1. A dummy battery was placed on the EUT and the dummy battery cables connected to a bench power supply.
2. Frequency error was measured using the UMTS Band V modulation test on a calibrated Rohde & Schwarz CMU 200 Universal Radio Communications Tester in accordance with current Rohde & Schwarz application notes. The EUT was connected by suitable RF cables to the CMU 200. A bidirectional communications link was established on the centre channel between the EUT and the CMU 200. The frequency meter value was recorded.
3. Voltage was monitored throughout the test with a calibrated digital voltmeter.

Results: Middle Channel (836.6 MHz)

Supply Voltage (V)	Measured Frequency (MHz)	Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)	Margin (ppm)	Result
3.4	836.599996	4	0.0048	2.5	2.4952	Complied
4.35	836.599994	6	0.0072	2.5	2.4928	Complied

Test Equipment Used:

RFI No.	Instrument	Manufacturer	Type No.	Serial No.	Date Calibration Due	Cal. Interval (Months)
M1229	Multimeter	Fluke	179	87640015	18 Jun 2013	12
M1642	Thermometer	Fluke	52II	18890119	19 Mar 2014	12
M1662	Radio Comms Tester	Rohde & Schwarz	CMU 200	109374	21 May 2013	12
S0529	Dual DC Power Supply Unit	ISO-Tech	IPS2302A	504E005 G2	Calibrated Before Use	N/A

5.2.6. Transmitter Occupied Bandwidth

Test Summary:

Test Engineer:	David Doyle	Test Date:	02 April 2013
Test Sample IMEI:	355335050017236		

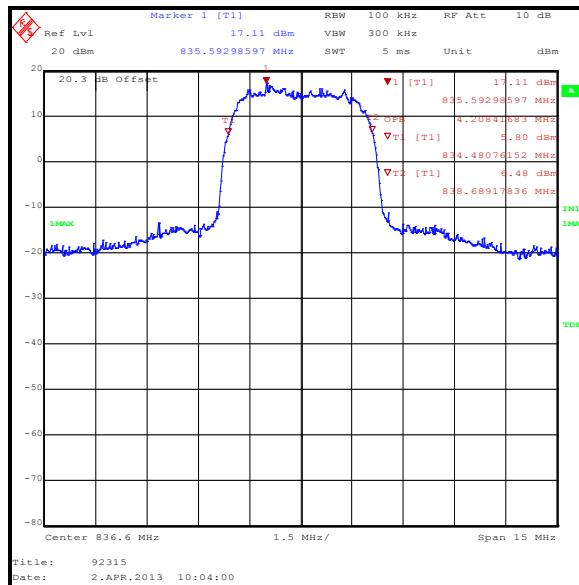
FCC Reference:	Part 2.1049
Test Method Used:	The 99% occupied bandwidth was measured using the Occupied Bandwidth function of a spectrum analyser

Environmental Conditions:

Temperature (°C):	22
Relative Humidity (%):	29

Results: Voice / 12.2 kbps

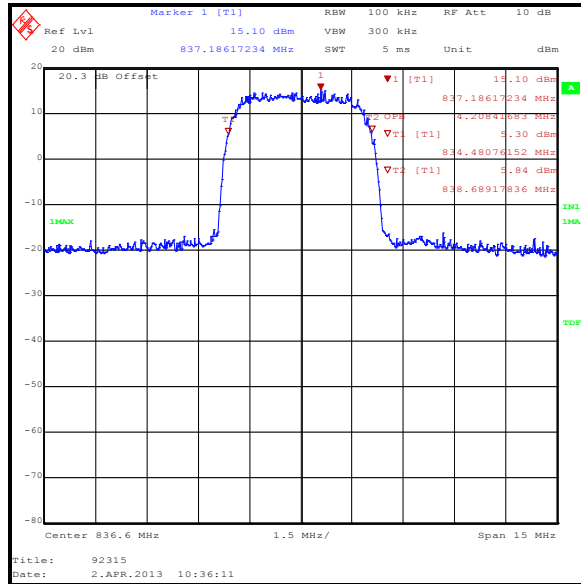
Channel	Frequency (MHz)	Occupied Bandwidth (kHz)
Middle	836.6	4208.417



Transmitter Occupied Bandwidth (continued)

Results: HSDPA Sub-Test 1

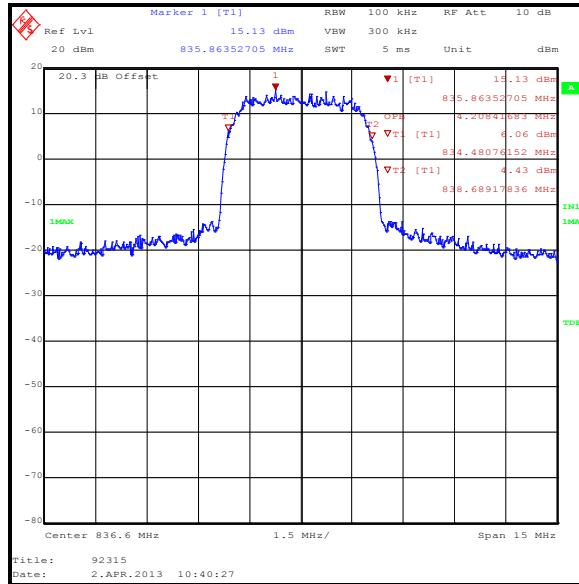
Channel	Frequency (MHz)	Occupied Bandwidth (kHz)
Middle	836.6	4208.417



Transmitter Occupied Bandwidth (continued)

Results: HSDPA Sub-Test 2

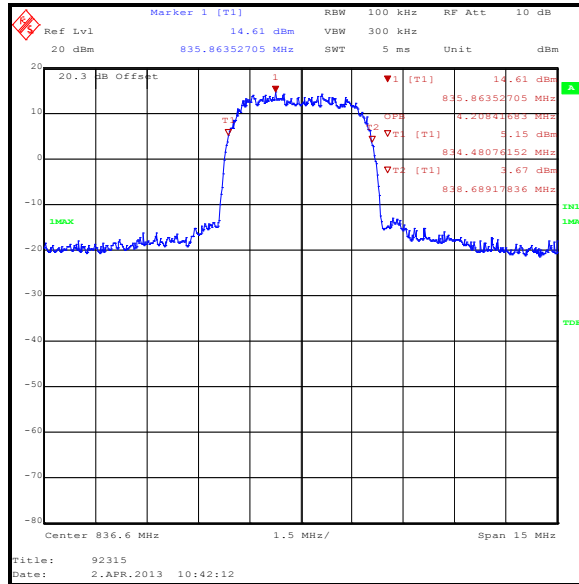
Channel	Frequency (MHz)	Occupied Bandwidth (kHz)
Middle	836.6	4208.417



Transmitter Occupied Bandwidth (continued)

Results: HSDPA Sub-Test 3

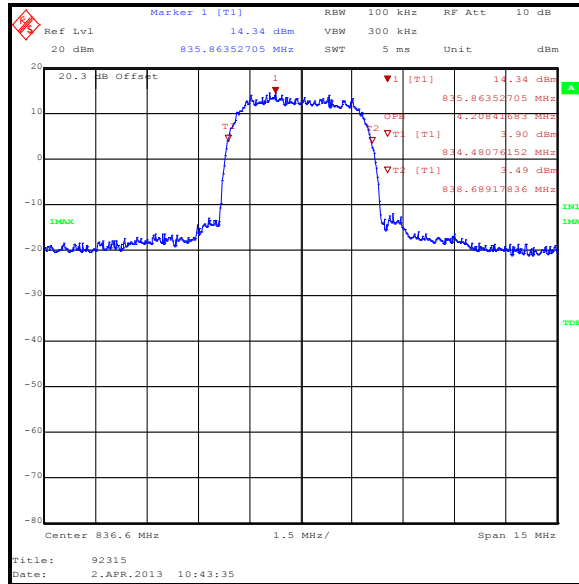
Channel	Frequency (MHz)	Occupied Bandwidth (kHz)
Middle	836.6	4208.417



Transmitter Occupied Bandwidth (continued)

Results: HSDPA Sub-Test 4

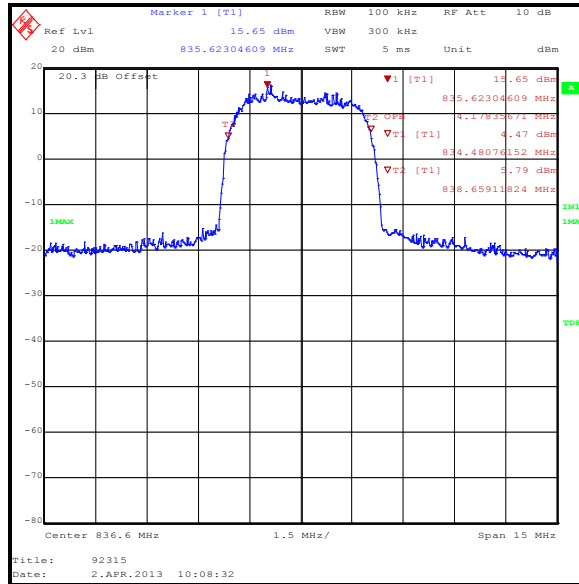
Channel	Frequency (MHz)	Occupied Bandwidth (kHz)
Middle	836.6	4208.417



Transmitter Occupied Bandwidth (continued)

Results: HSUPA Sub-Test 1

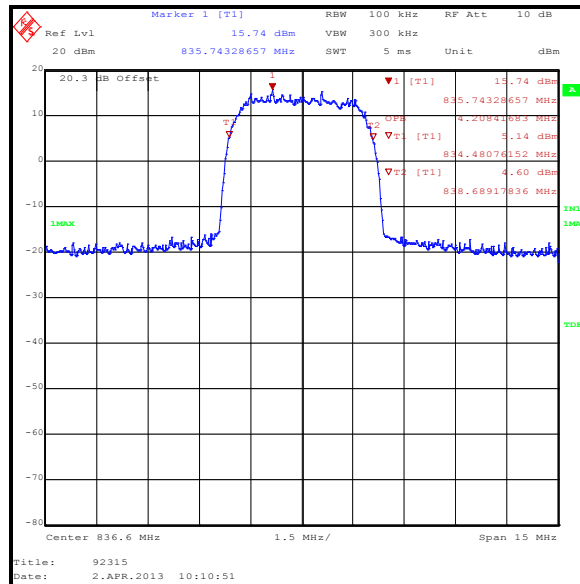
Channel	Frequency (MHz)	Occupied Bandwidth (kHz)
Middle	836.6	4178.357



Transmitter Occupied Bandwidth (continued)

Results: HSUPA Sub-Test 2

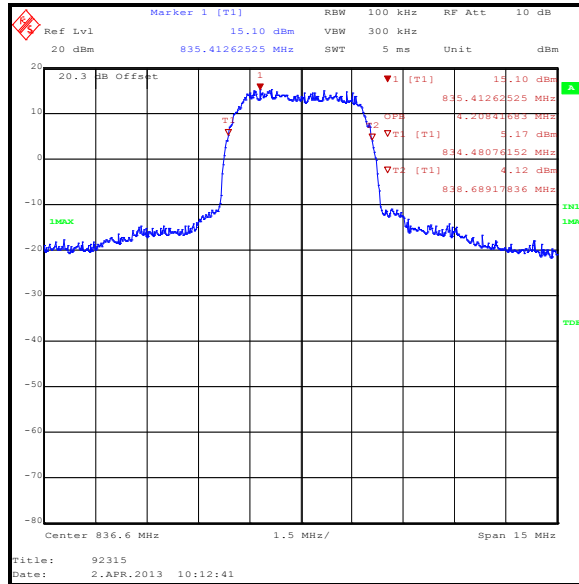
Channel	Frequency (MHz)	Occupied Bandwidth (kHz)
Middle	836.6	4208.417



Transmitter Occupied Bandwidth (continued)

Results: HSUPA Sub-Test 3

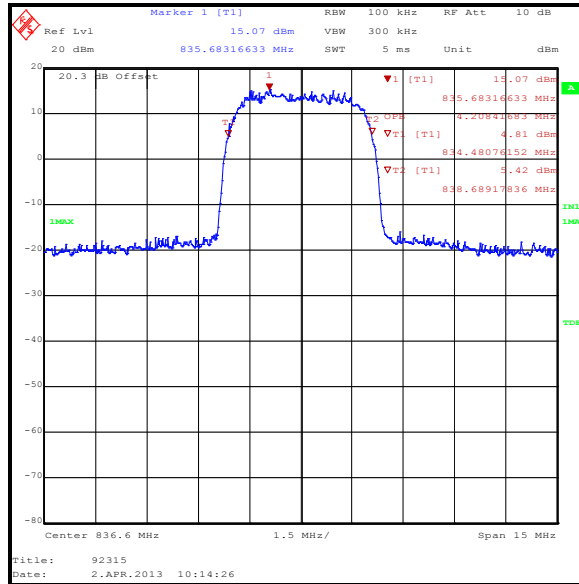
Channel	Frequency (MHz)	Occupied Bandwidth (kHz)
Middle	836.6	4208.417



Transmitter Occupied Bandwidth (continued)

Results: HSUPA Sub-Test 4

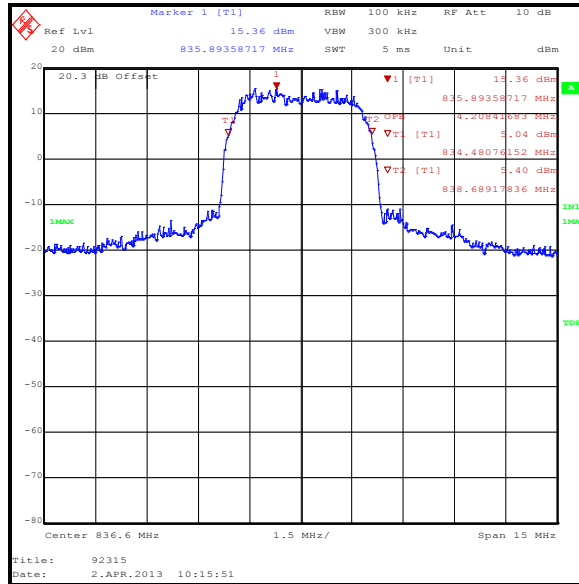
Channel	Frequency (MHz)	Occupied Bandwidth (kHz)
Middle	836.6	4208.417



Transmitter Occupied Bandwidth (continued)

Results: HSUPA Sub-Test 5

Channel	Frequency (MHz)	Occupied Bandwidth (kHz)
Middle	836.6	4208.417



Test Equipment Used:

RFI No.	Instrument	Manufacturer	Type No.	Serial No.	Date Calibration Due	Cal. Interval (Months)
K0002	3m RSE Chamber	Rainford EMC	N/A	N/A	04 Nov 2013	12
M1124	Test Receiver	Rohde & Schwarz	ESIB 26	100046K	14 Aug 2013	12
A1534	Pre Amplifier	Hewlett Packard	8449B	3008A00405	04 Nov 2013	12
A288	Antenna	Chase	CBL6111A	1589	15 Aug 2013	12
A1393	Attenuator	Huber & Suhner	6820.17.B	757456	06 Jul 2013	12

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

Test Engineers:	David Doyle & Nick Steele	Test Dates:	02 April 2013 & 09 April 2013
Test Sample IMEI:	355335050017236		

FCC Reference:	Parts 2.1053 & 22.917
Test Method Used:	As detailed in ANSI TIA-603-C-2004 Section 2.2.12 referencing FCC CFR Part 2.1053
Frequency Range:	30 MHz to 9 GHz
Configuration:	Voice / 12.2 kbps

Environmental Conditions:

Temperature (°C):	21 to 24
Relative Humidity (%):	24 to 29

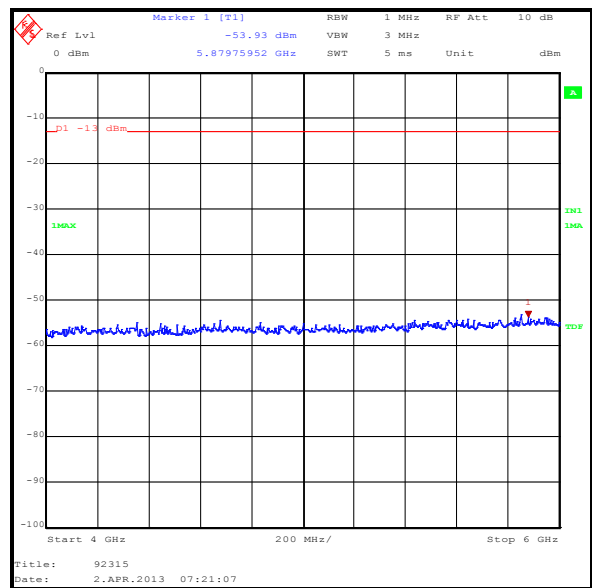
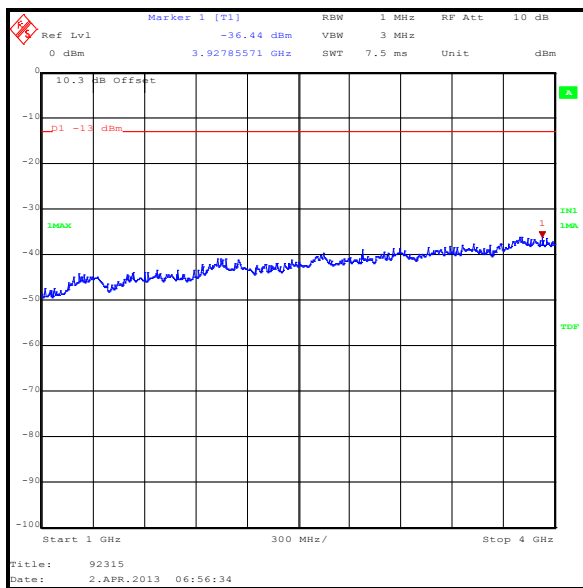
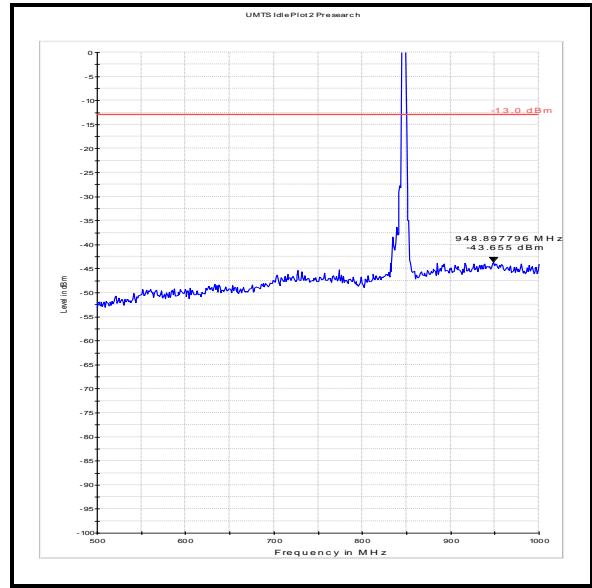
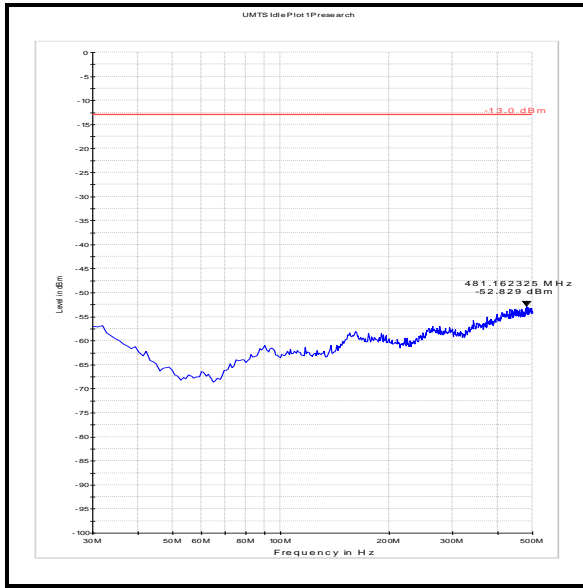
Note(s):

1. 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.
2. The EUT uplink is shown on the 30 MHz to 1 GHz plot.
3. Measurements below 1 GHz were performed in a semi-anechoic chamber (RFI 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 (RFI 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 (RFI Asset Number K0001) at a distance of 3 metres. The EUT was placed at a height of 80 cm above the reference ground plane in the centre of the chamber turntable. Maximum emission levels were determined by height searching the measurement antenna over the range 1 metre to 4 metres.

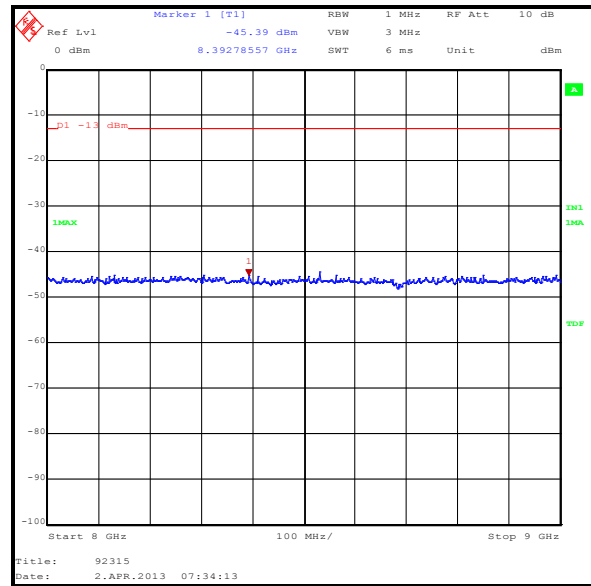
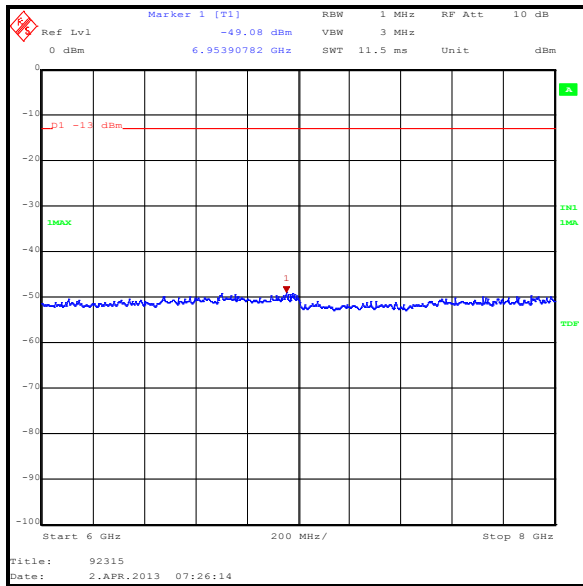
Results:

Frequency (MHz)	Peak Level (dBm)	Limit (dBm)	Margin (dB)	Result
3927.856	-36.4	-13.0	23.4	Complied

Transmitter Out of Band Radiated Emissions (continued)



Transmitter Out of Band Radiated Emissions (continued)



Test Equipment Used:

RFI No.	Instrument	Manufacturer	Type No.	Serial No.	Date Calibration Due	Cal. Interval (Months)
K0001	5m RSE Chamber	Rainford EMC	N/A	N/A	24 Oct 2013	12
M1379	Test Receiver	Rohde & Schwarz	ESIB7	100330	15 Oct 2013	12
A259	Antenna	Chase	CBL6111	1513	27 Mar 2014	12
G0543	Amplifier	Sonoma	310N	230801	04 Jul 2013	3
A1998	Attenuator	Huber & Suhner	6820.17.B	07101	05 Apr 2014	12
K0002	3m RSE Chamber	Rainford EMC	N/A	N/A	04 Nov 2013	12
M1124	Test Receiver	Rohde & Schwarz	ESIB 26	100046K	14 Aug 2013	12
A1534	Pre Amplifier	Hewlett Packard	8449B	3008A00405	04 Nov 2013	12
A1396	Attenuator	Huber & Suhner	6810.17.B	757987	06 Jul 2013	12
A1974	High Pass Filter	AtlanTecRF	AFH-01000	090000283	14 Mar 2014	12
A1818	Antenna	EMCO	3115	00075692	04 Nov 2013	12
A253	Antenna	Flann Microwave	12240-20	128	04 Nov 2013	12
A254	Antenna	Flann Microwave	14240-20	139	04 Nov 2013	12
A255	Antenna	Flann Microwave	16240-20	519	04 Nov 2013	12

5.2.8. Transmitter Radiated Emissions at Band Edges

Test Summary:

Test Engineer:	David Doyle	Test Date:	02 April 2013
Test Sample IMEI:	355335050017236		

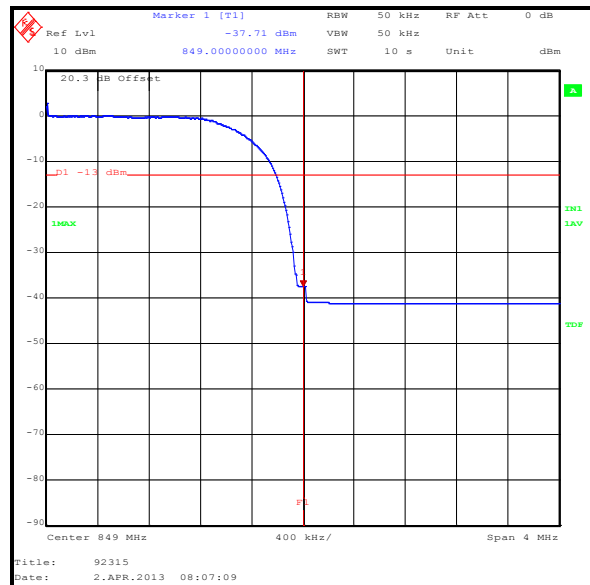
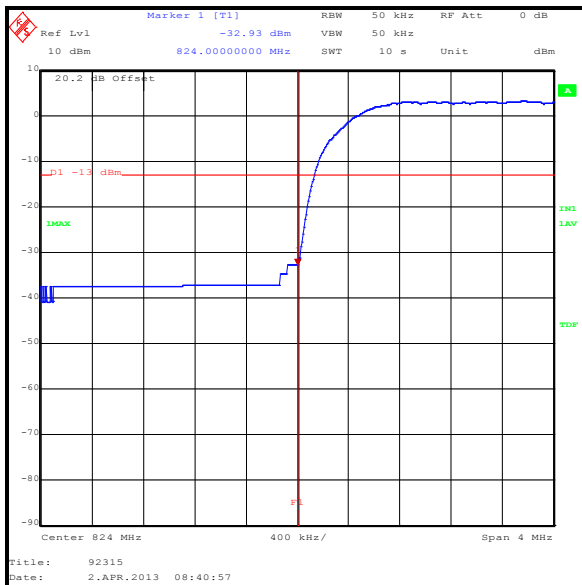
FCC Reference:	Parts 2.1053 & 22.917
Test Method Used:	As detailed in ANSI TIA-603-C-2004 Section 2.2.12 referencing FCC CFR Part 22.917

Environmental Conditions:

Temperature (°C):	21
Relative Humidity (%):	29

Results: Voice / 12.2 kbps

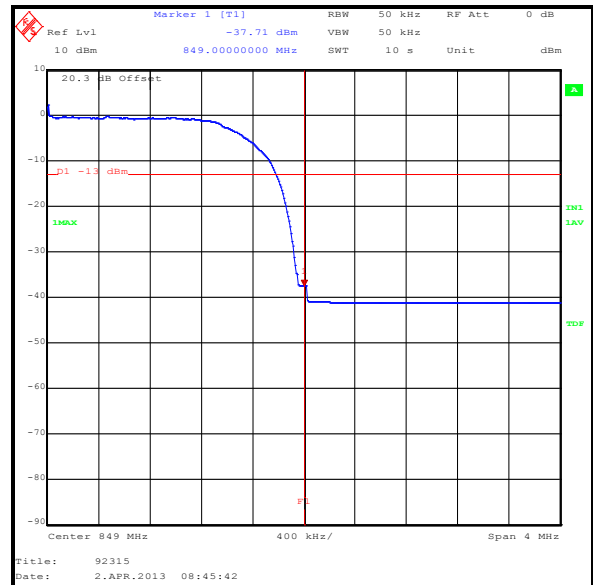
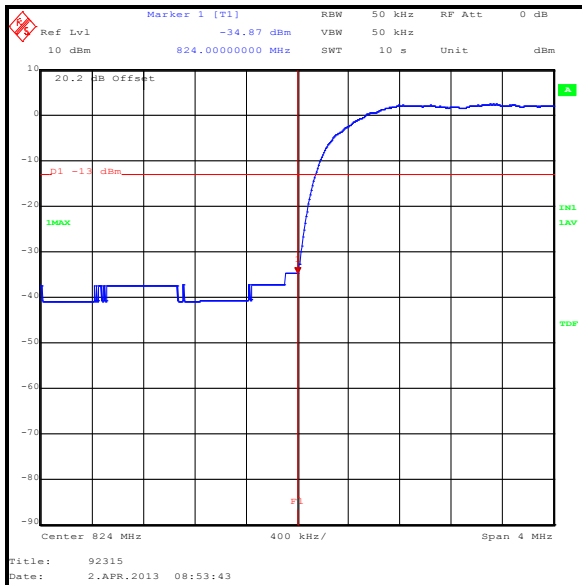
Frequency (MHz)	Peak Level (dBm)	Limit (dBm)	Margin (dB)	Result
824	-32.9	-13.0	19.9	Complied
849	-37.7	-13.0	24.7	Complied



Transmitter Radiated Emissions at Band Edges (continued)

Results: HSDPA Sub-Test 1

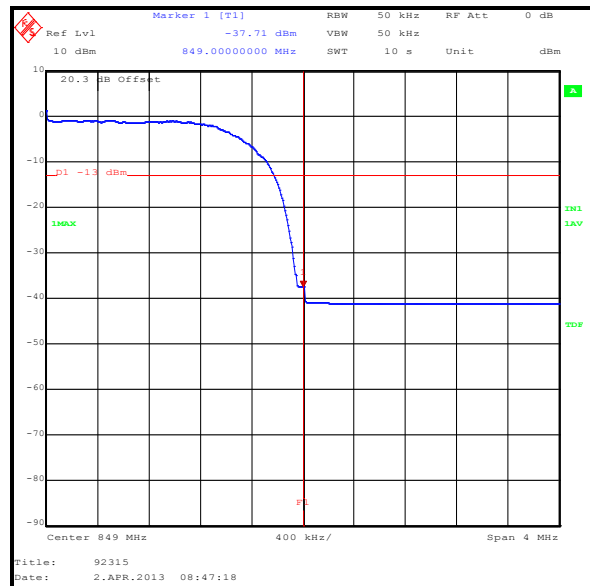
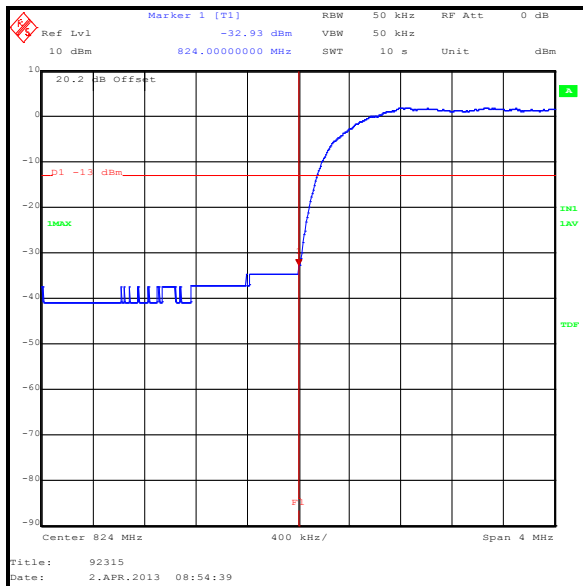
Frequency (MHz)	Peak Level (dBm)	Limit (dBm)	Margin (dB)	Result
824	-34.9	-13.0	21.9	Complied
849	-37.7	-13.0	24.7	Complied



Transmitter Radiated Emissions at Band Edges (continued)

Results: HSDPA Sub-Test 2

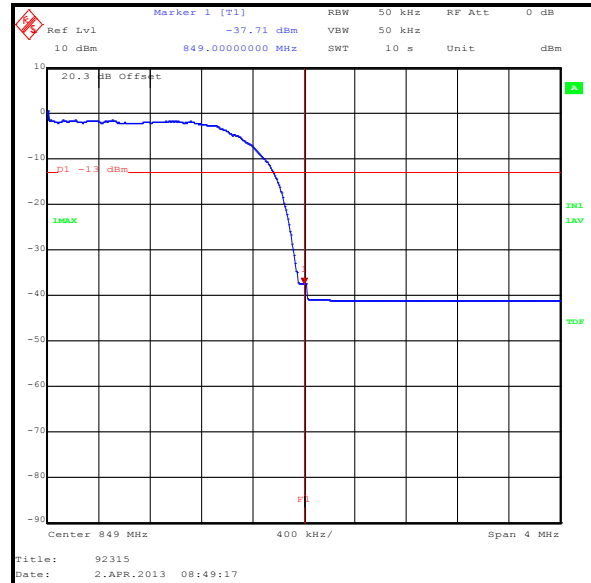
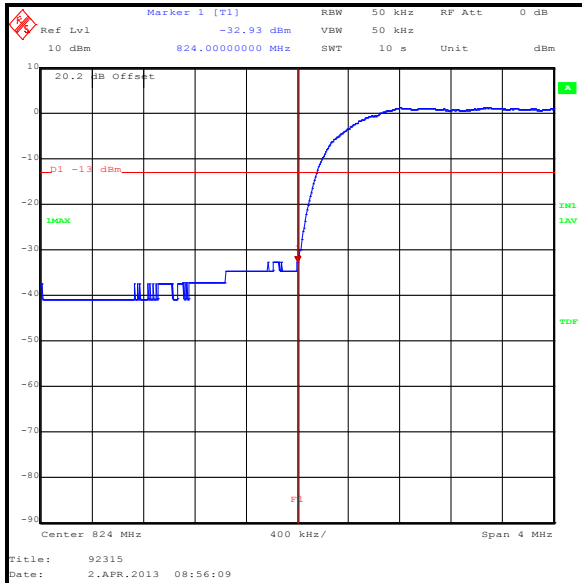
Frequency (MHz)	Peak Level (dBm)	Limit (dBm)	Margin (dB)	Result
824	-32.9	-13.0	19.9	Complied
849	-37.7	-13.0	24.7	Complied



Transmitter Radiated Emissions at Band Edges (continued)

Results: HSDPA Sub-Test 3

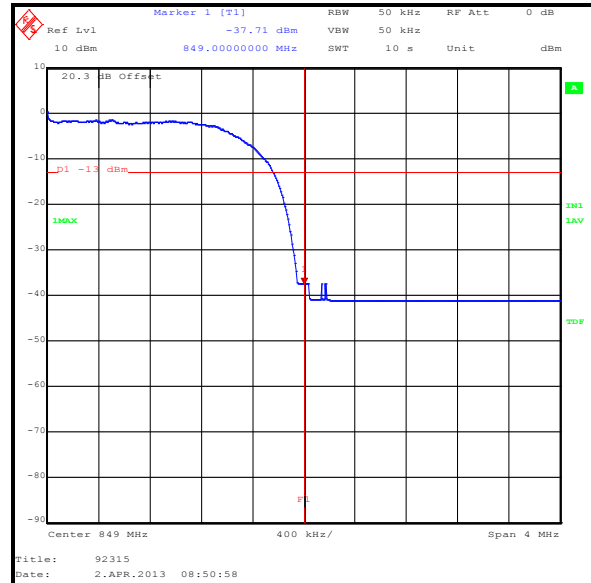
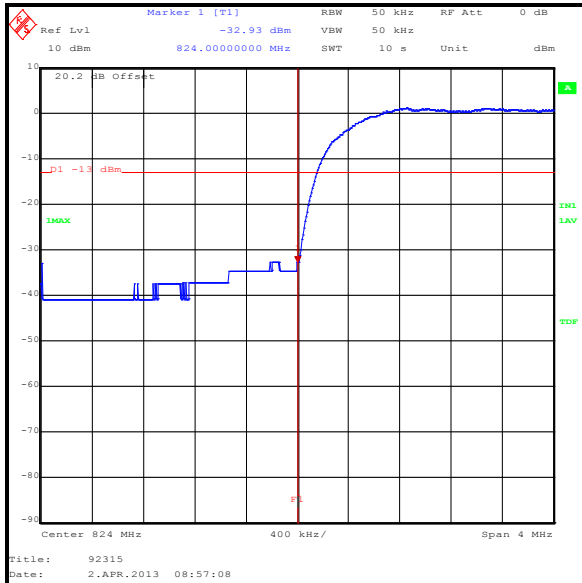
Frequency (MHz)	Peak Level (dBm)	Limit (dBm)	Margin (dB)	Result
824	-32.9	-13.0	19.9	Complied
849	-37.7	-13.0	24.7	Complied



Transmitter Radiated Emissions at Band Edges (continued)

Results: HSDPA Sub-Test 4

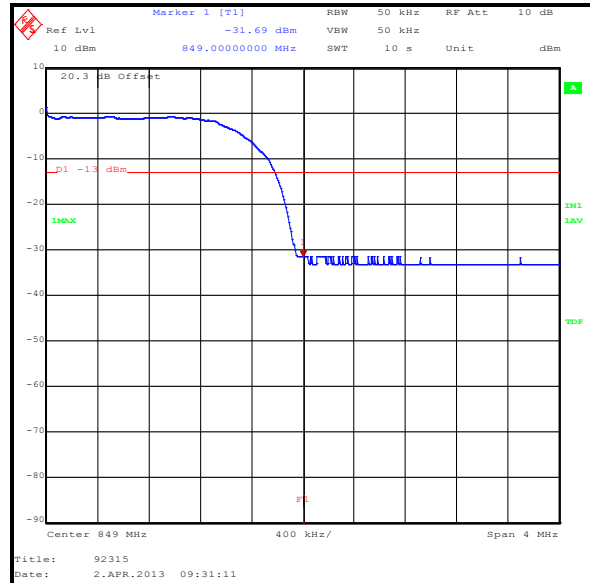
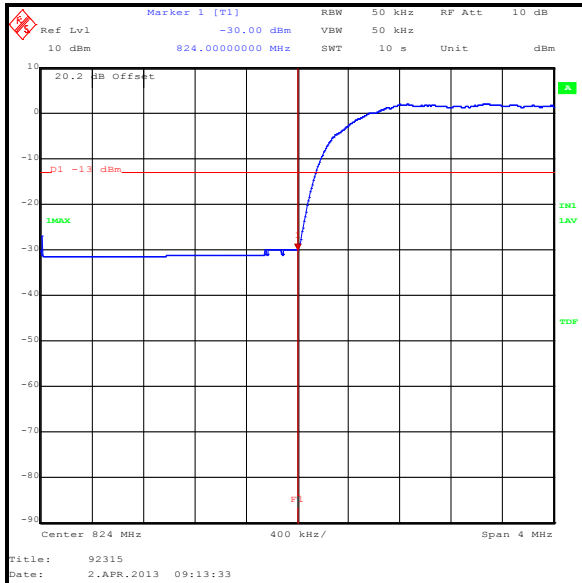
Frequency (MHz)	Peak Level (dBm)	Limit (dBm)	Margin (dB)	Result
824	-32.9	-13.0	19.9	Complied
849	-37.7	-13.0	24.7	Complied



Transmitter Radiated Emissions at Band Edges (continued)

Results: HSUPA Sub-Test 1

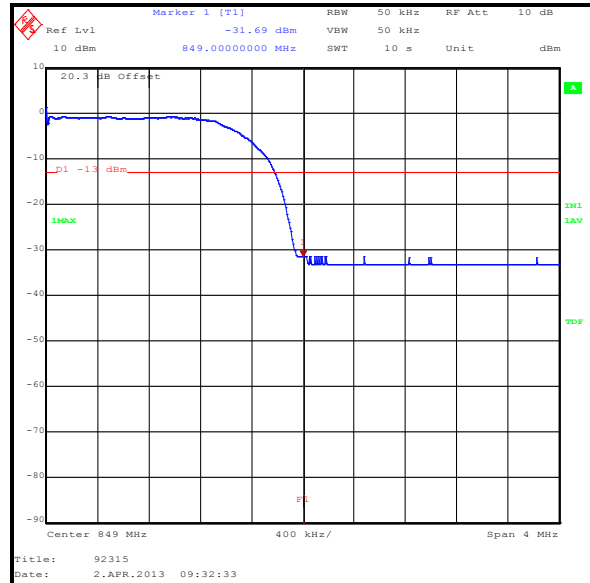
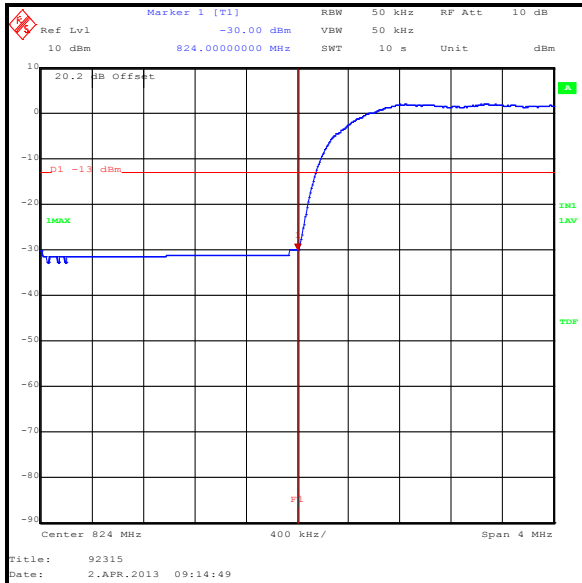
Frequency (MHz)	Peak Level (dBm)	Limit (dBm)	Margin (dB)	Result
824	-30.0	-13.0	17.0	Complied
849	-31.7	-13.0	18.7	Complied



Transmitter Radiated Emissions at Band Edges (continued)

Results: HSPA Sub-Test 2

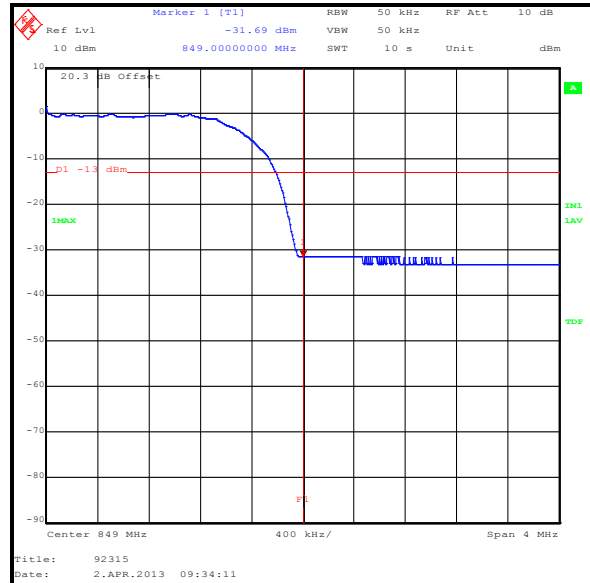
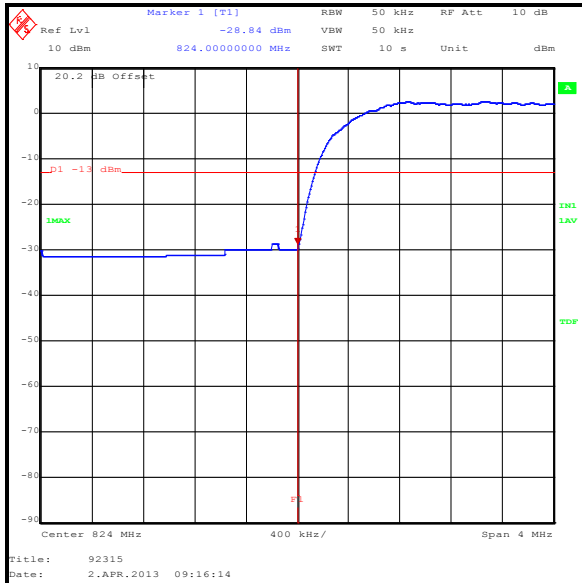
Frequency (MHz)	Peak Level (dBm)	Limit (dBm)	Margin (dB)	Result
824	-30.0	-13.0	17.0	Complied
849	-31.7	-13.0	18.7	Complied



Transmitter Radiated Emissions at Band Edges (continued)

Results: HSUPA Sub-Test 3

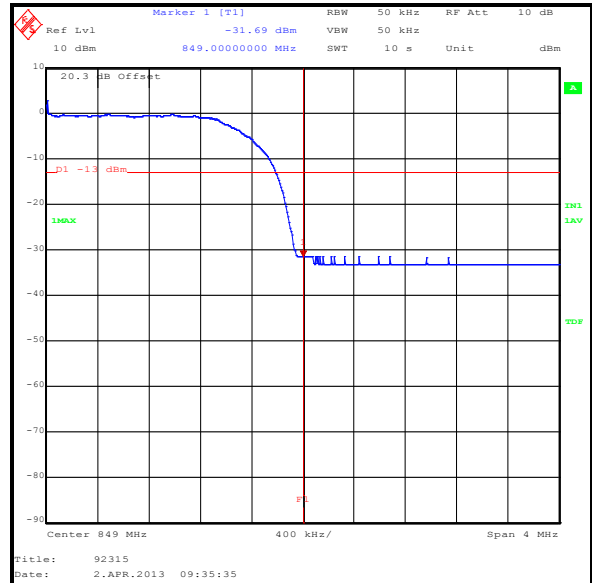
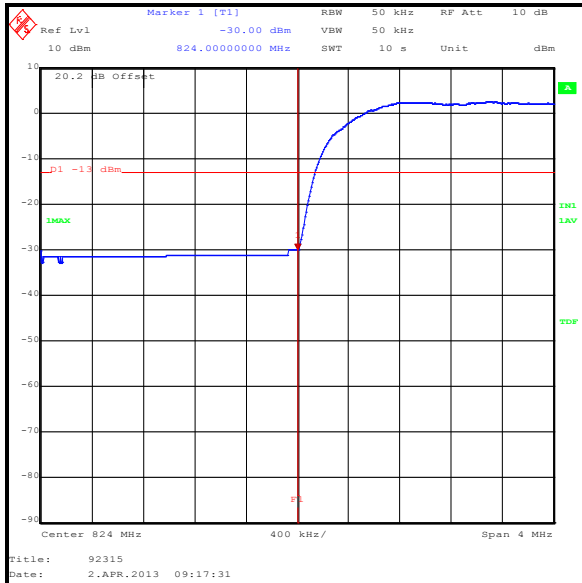
Frequency (MHz)	Peak Level (dBm)	Limit (dBm)	Margin (dB)	Result
824	-28.8	-13.0	15.8	Complied
849	-31.7	-13.0	18.7	Complied



Transmitter Radiated Emissions at Band Edges (continued)

Results: HSUPA Sub-Test 4

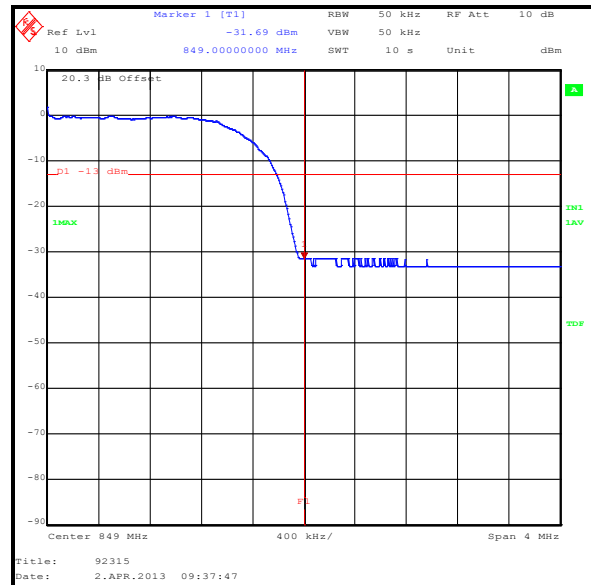
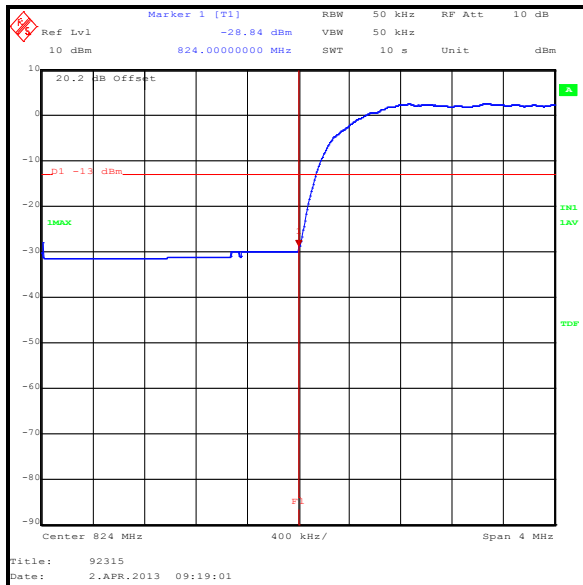
Frequency (MHz)	Peak Level (dBm)	Limit (dBm)	Margin (dB)	Result
824	-30.0	-13.0	17.0	Complied
849	-31.7	-13.0	18.7	Complied



Transmitter Radiated Emissions at Band Edges (continued)

Results: HSUPA Sub-Test 5

Frequency (MHz)	Peak Level (dBm)	Limit (dBm)	Margin (dB)	Result
824	-28.8	-13.0	15.8	Complied
849	-31.7	-13.0	18.7	Complied



Test Equipment Used:

RFI No.	Instrument	Manufacturer	Type No.	Serial No.	Date Calibration Due	Cal. Interval (Months)
K0002	3m RSE Chamber	Rainford EMC	N/A	N/A	04 Nov 2013	12
M1124	Test Receiver	Rohde & Schwarz	ESIB 26	100046K	14 Aug 2013	12
A1534	Pre Amplifier	Hewlett Packard	8449B	3008A00405	04 Nov 2013	12
A288	Antenna	Chase	CBL6111A	1589	15 Aug 2013	12
A1393	Attenuator	Huber & Suhner	6820.17.B	757456	06 Jul 2013	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
Effective Radiated Power (ERP)	824 to 849 MHz	95%	±2.94 dB
Frequency Stability	824 to 849 MHz	95%	±0.92 ppm
Occupied Bandwidth	824 to 849 MHz	95%	±0.92 ppm
Radiated Spurious Emissions	30 MHz to 9 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 voltages