

TEST REPORT

Test Report No. : UL-RPT-RP10014929JD08A

Manufacturer : Sony Mobile Communications AB

Type No. : PM-0470-BV

FCC ID : PY7PM-0470

Technology : UMTS Band II

Test Standard(s) : FCC Part 24

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 1.0

Date of Issue: 25 July 2013

Checked by:



Sarah Williams
WiSE Laboratory Engineer

Issued by :



pp
John Newell
Group Quality Manager, WiSE
Basingstoke,
UL VS LTD



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

This page has been left intentionally blank.

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	8
4. Operation and Monitoring of the EUT during Testing	9
4.1. Operating Modes	9
4.2. Configuration and Peripherals	9
5. Measurements, Examinations and Derived Results	10
5.1. General Comments	10
5.2. Test Results	11
5.2.1. Transmitter Output Power (EIRP)	11
5.2.2. Transmitter Occupied Bandwidth	14
5.2.3. Transmitter Out of Band Radiated Emissions	25
5.2.4. Transmitter Band Edge Radiated Emissions	29
5.2.5. Transmitter Frequency Stability (Temperature Variation)	39
5.2.6. Transmitter Frequency Stability (Voltage Variation)	42
6. Measurement Uncertainty	44
7. Report Revision History	45

1. Customer Information








Company Name:	Sony Mobile Communications AB
Address:	Nya Vattentorget Lund SE-221 88 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:	11 July 2013 to 22 July 2013

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
Reference:	ANSI C63.4 (2009)
Title:	American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz.
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:	00440251245736 (<i>Radiated sample</i>)
Serial Number:	CB5124VVK5
Hardware Version Number:	AP2
Software Version Number:	14.1.C.0.172
FCC ID:	PY7PM-0470

Brand Name:	Sony
IMEI:	004402451246163(<i>Conducted sample</i>)
Serial Number:	CB5124VVND
Hardware Version Number:	AP2
Software Version Number:	14.1.C.0.172
FCC ID:	PY7PM-0470

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

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

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

Brand Name:	Sony
Description:	Magnetic Plug
Model Name or Number:	EC801

Brand Name:	Sony
Description:	USB cable
Model Name or Number:	EC21

Identification of Equipment Under Test (EUT) (continued)

Brand Name:	Sony
Description:	PHF
Model Name or Number:	MH750

3.2. Description of EUT

The equipment under test (EUT) is a model of GSM/UMTS/LTE mobile phone with integrated antenna and inbuilt Li-Polymer battery.

The EUT supports GSM 850/900/1800/1900MHz bands, WCDMA FDD bands 1/2/5 and LTE FDD bands 1/3. It also supports GPRS service with multi-slots class 33 and EGPRS service with multi-slots class 33 too. The HSDPA and HSUPA features are also supported. It has MP3, camera, FM radio, USB memory, GPS receiver, NFC, Mobile High-Definition Link (MHL), Bluetooth (EDR and Bluetooth 4.0), WLAN (802.11 a/b/g/n/ac) and Wi-Fi hotspot functions.”

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	3.6 V	
	Maximum	4.2 V	
Technology Tested:	PCS1900		
Maximum Output Power (EIRP):	Voice (12.2 kbps)	23.5 dBm	
	HSDPA Sub-Test 3	24.3 dBm	
	HSUPA Sub-Test 3	24.1 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:

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

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

Brand Name:	Not marked or stated
Description:	Voltage variation jig
Model Name or Number:	Not marked or stated
Serial Number:	310119

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 CMU 200 Universal Radio Communications Tester, operating in UMTS Band II mode.
- Transmitter radiated spurious emission tests were performed with the following configurations, employing all available accessories:
 - Configuration 1 – Handset with the AC charger, USB Cable, MHL cable (terminated in to a television), MHL adaptor and PHF
 - Configuration 2 – Handset with the AC charger, Magnetic plug 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 004402451246163 was used for conducted power, frequency stability and occupied bandwidth measurements.
- The radiated sample with IMEI 00440251245736 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:	22 July 2013
Test Sample IMEI:	004402451246163		

FCC Reference:	Part 24.232(c)
Test Method Used:	As detailed in FCC KDB 971168 D01 Section 5.1.1 and 5.2.1

Environmental Conditions:

Temperature (°C):	25
Relative Humidity (%):	32

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 -1.6 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	23.3	24.1	24.1	24.2	23.3	33.0	8.8	Complied
	9400	23.8	24.1	24.3	24.1	23.5	33.0	8.7	Complied
	9538	22.8	23.4	23.5	23.4	23.2	33.0	9.5	Complied
β_c		2	12	15	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	23.9	23.4	24.0	22.8	23.7	33.0	9.0	Complied
	9400	23.8	23.5	24.1	22.8	23.9	33.0	8.9	Complied
	9538	22.9	22.8	23.2	22.4	24.0	33.0	9.0	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			

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	17.9	16.6	16.2	16.1	18.1	33.0	14.9	Complied
	9400	17.9	16.5	16.2	16.3	17.8	33.0	15.1	Complied
	9538	17.8	16.6	16.3	16.1	17.8	33.0	15.2	Complied
β_c		2	12	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	17.4	17.3	17.7	17.6	17.7	33.0	15.3	Complied
	9400	17.4	17.4	17.6	17.5	17.7	33.0	15.3	Complied
	9538	17.6	17.3	17.7	17.6	17.7	33.0	15.3	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:

Asset No.	Instrument	Manufacturer	Type No.	Serial No.	Date Calibration Due	Cal. Interval (Months)
M1659	Thermometer / Hygrometer station	JM Handelspunkt	30.5015.13	None stated	24 May 2014	12
A1100	Directional Coupler	Hewlett Packard	HP87300C	3239A01058	Calibrated before use	-
A2141	Attenuator	Atlan TecRF	AN18-10	090918-04	Calibrated before use	-
L1028	Signal Analyser	Rohde & Schwarz	FSV30	100854	23 May 2014	12
M1269	Multimeter	Fluke	179	90250210	30 Jul 2013	12
S0537	DC Power Supply	TTI	EL302D	249928	Calibrated before use	-

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

Test Engineer:	David Doyle	Test Date:	22 July 2013
Test Sample IMEI:	004402451246163		

FCC Reference:	Part 2.1049
Test Method Used:	As detailed in KBD 971168 D01 Section 4.2

Environmental Conditions:

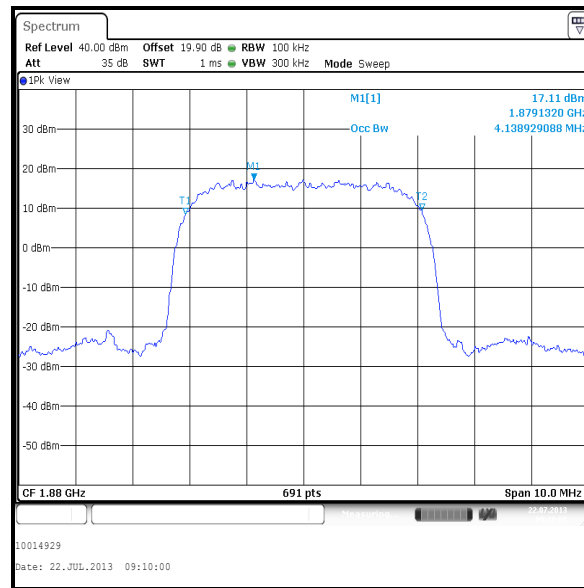
Temperature (°C):	25
Relative Humidity (%):	39

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**

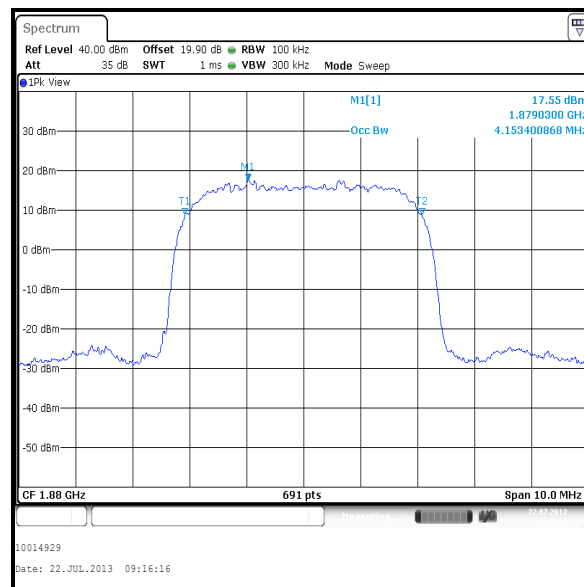
Channel	Frequency (MHz)	Occupied Bandwidth (kHz)
Middle	1880.0	4138.929

**Middle Channel**

Transmitter Occupied Bandwidth (continued)

Results: HSDPA Sub-Test 1

Channel	Frequency (MHz)	Occupied Bandwidth (kHz)
Middle	1880.0	4153.401

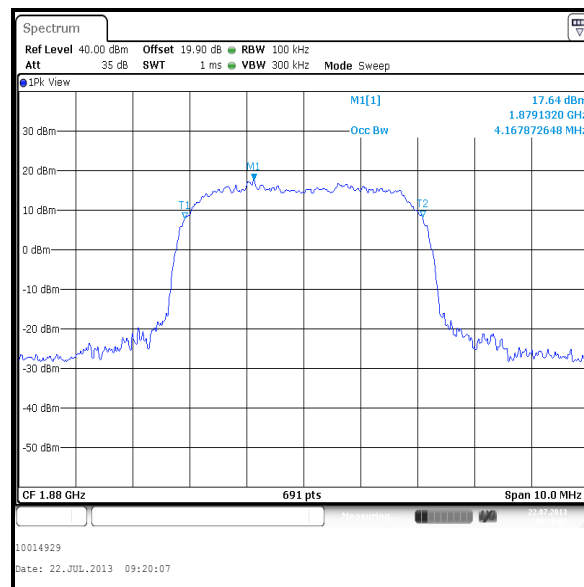


Middle Channel

Transmitter Occupied Bandwidth (continued)

Results: HSDPA Sub-Test 2

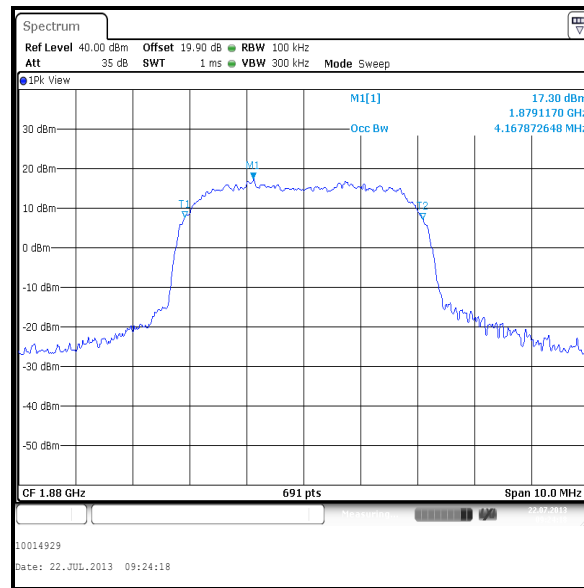
Channel	Frequency (MHz)	Occupied Bandwidth (kHz)
Middle	1880.0	4167.873



Middle Channel

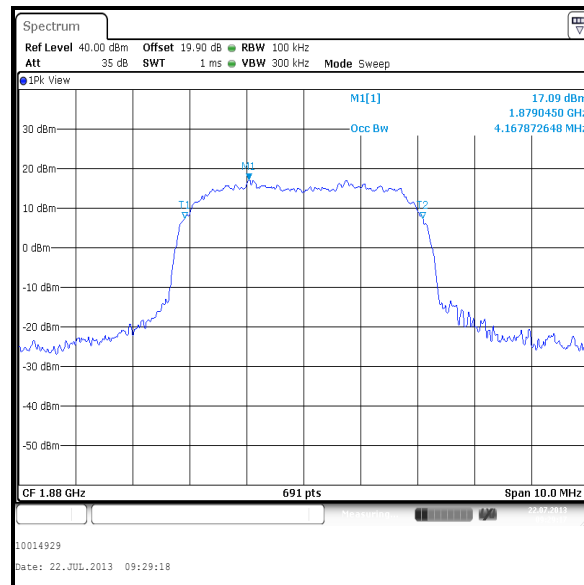
Transmitter Occupied Bandwidth (continued)**Results: HSDPA Sub-Test 3**

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

**Middle Channel**

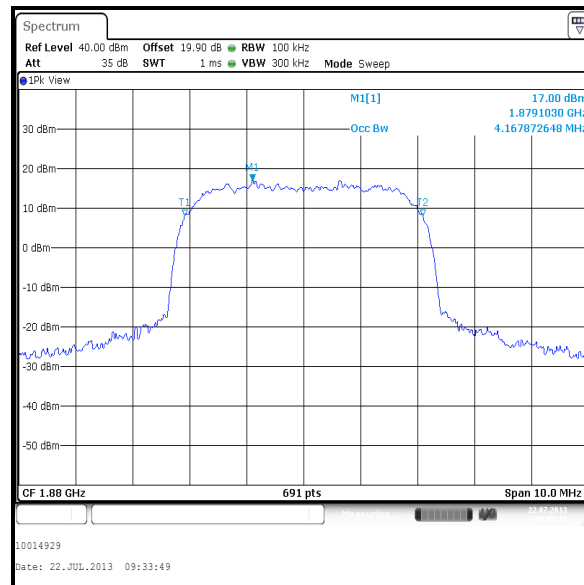
Transmitter Occupied Bandwidth (continued)**Results: HSDPA Sub-Test 4**

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

**Middle Channel**

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

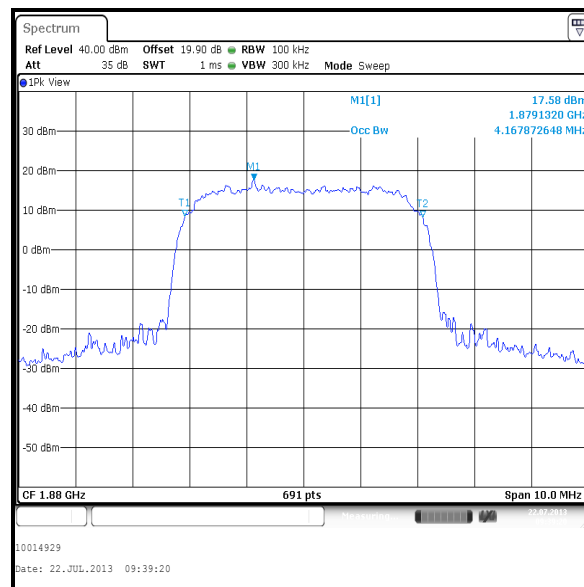
Channel	Frequency (MHz)	Occupied Bandwidth (kHz)
Middle	1880.0	4167.873

**Middle Channel**

Transmitter Occupied Bandwidth (continued)

Results: HSUPA Sub-Test 2

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

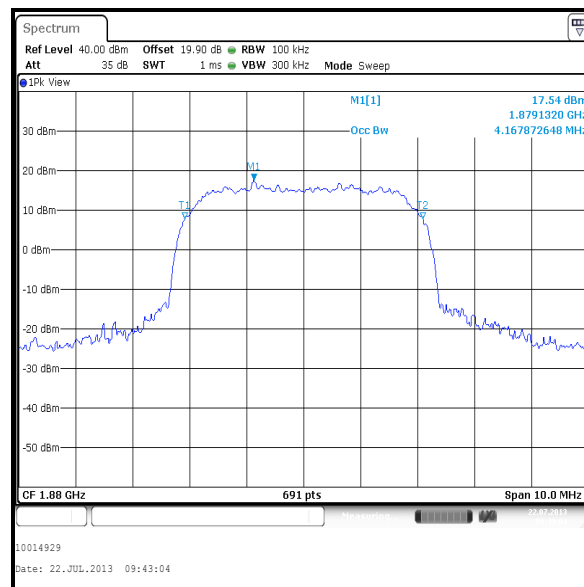


Middle Channel

Transmitter Occupied Bandwidth (continued)

Results: HSUPA Sub-Test 3

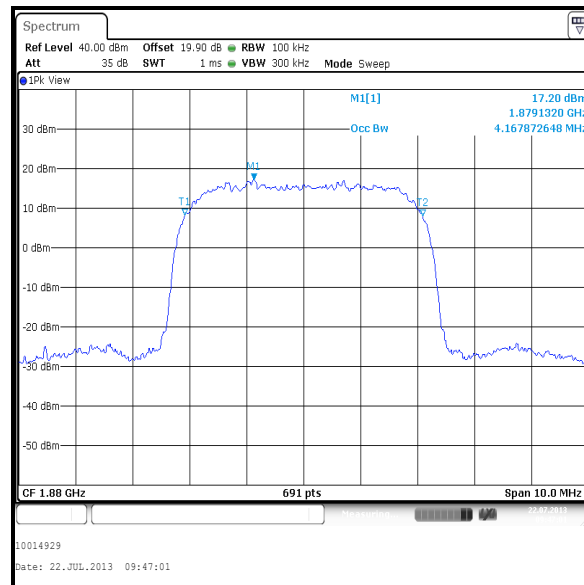
Channel	Frequency (MHz)	Occupied Bandwidth (kHz)
Middle	1880.0	4167.873



Middle Channel

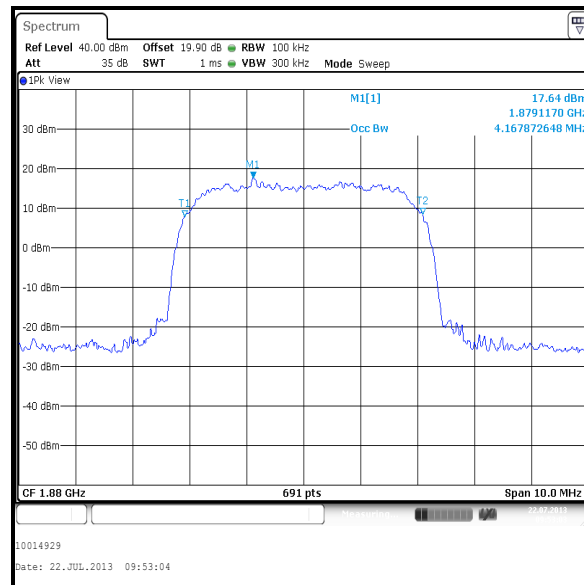
Transmitter Occupied Bandwidth (continued)**Results: HSUPA Sub-Test 4**

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)
M1659	Thermometer / Hygrometer station	JM Handelspunkt	30.5015.13	None stated	24 May 2014	12
A1100	Directional Coupler	Hewlett Packard	HP87300C	3239A01058	Calibrated before use	-
A2141	Attenuator	Atlan TecRF	AN18-10	090918-04	Calibrated before use	-
L1028	Signal Analyser	Rohde & Schwarz	FSV30	100854	23 May 2014	12
M1269	Multimeter	Fluke	179	90250210	30 Jul 2013	12
S0537	DC Power Supply	TTI	EL302D	249928	Calibrated before use	-

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

Test Engineer:	Andrew Edwards	Test Dates:	12 July 2013 & 16 July 2013
Test Sample IMEI:	00440251245736		

FCC Reference:	Parts 2.1053 & 24.238
Test Method Used:	As detailed in ANSI TIA-603-C-2004 Section 2.2.12 referencing FCC CFR Parts 2.1053 and 24.238
Frequency Range:	30 MHz to 20 GHz
Configuration:	Voice / 12.2 kbps

Environmental Conditions:

Temperature (°C):	22 to 25
Relative Humidity (%):	35 to 39

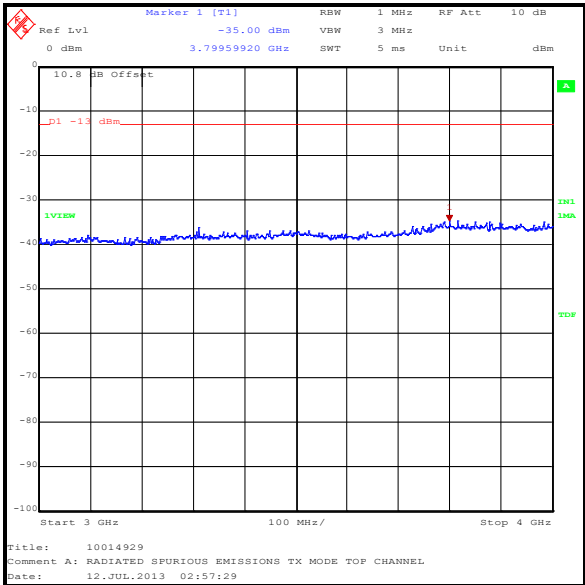
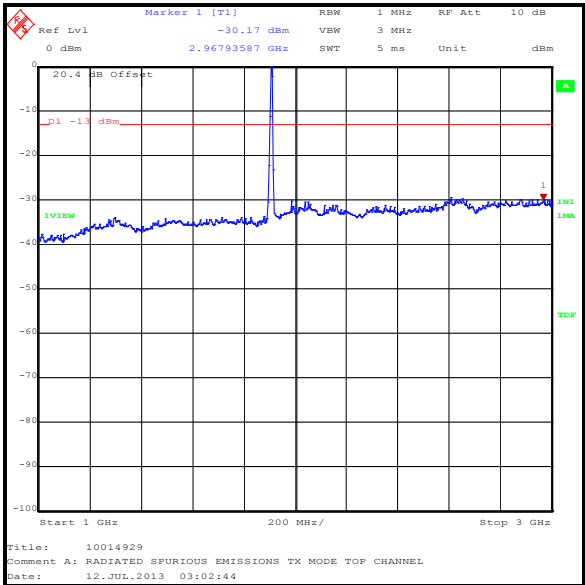
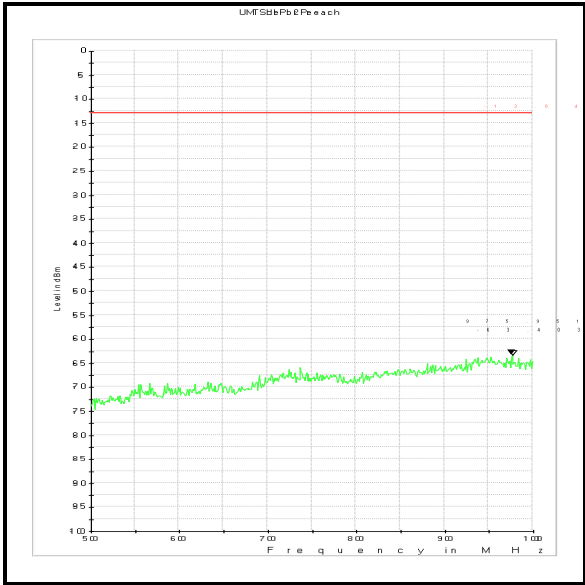
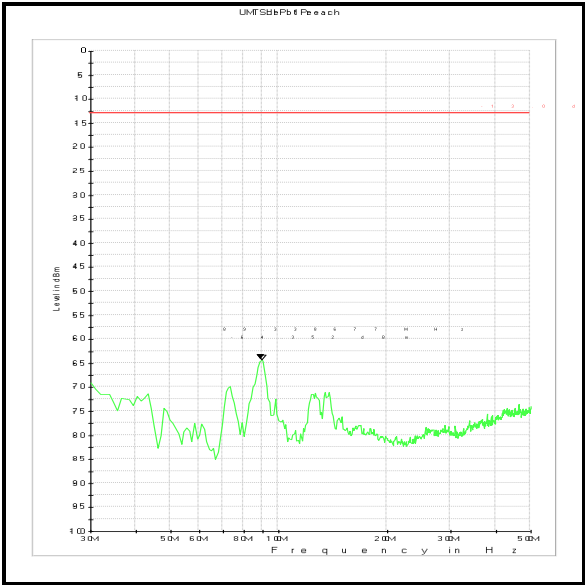
Note(s):

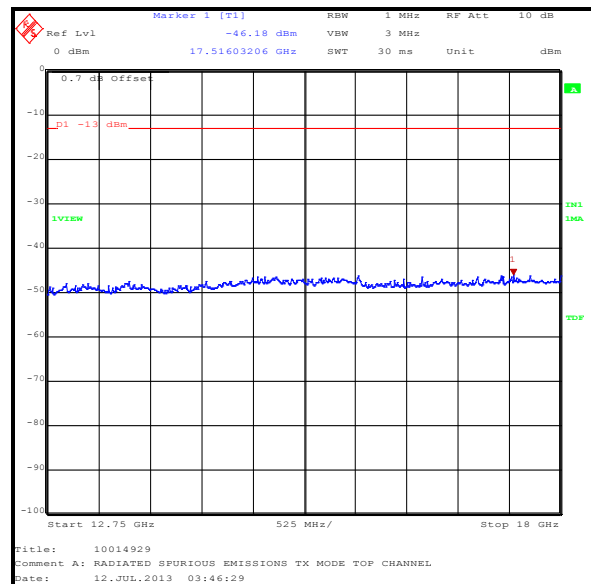
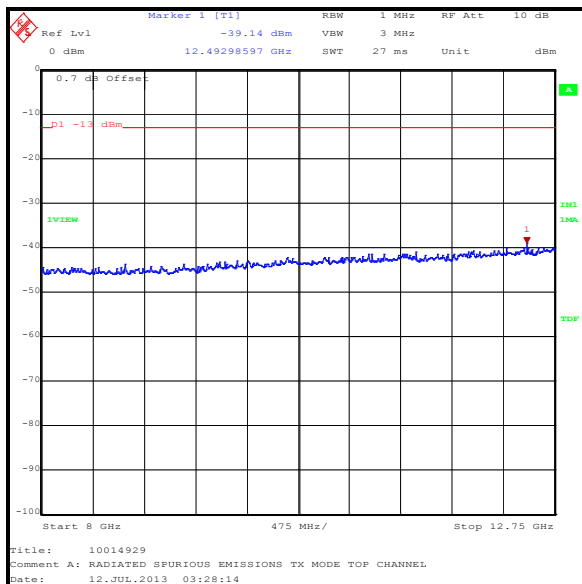
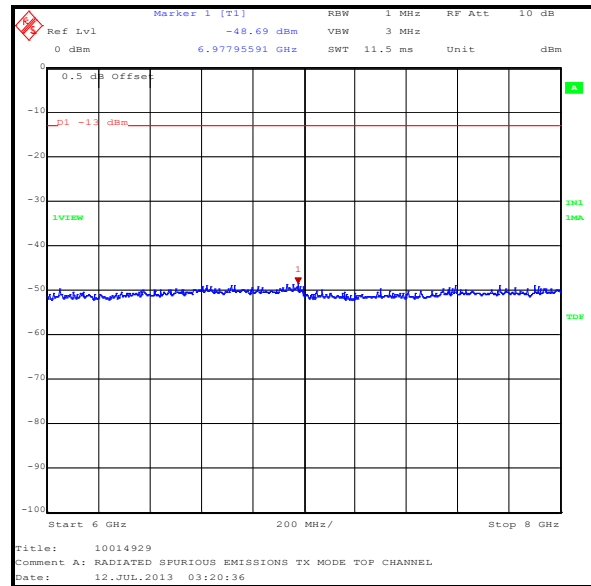
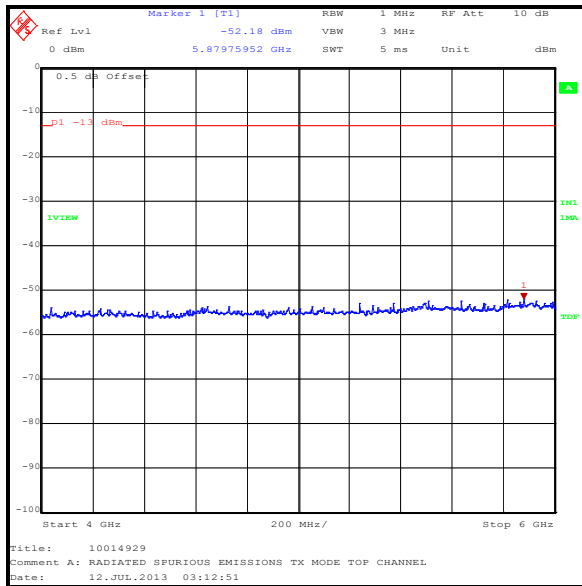
1. No spurious emissions were detected above the noise floor of the measuring receiver; the highest peak noise floor reading of the measuring receiver was recorded.
2. The uplink traffic channel is shown on the 1 GHz to 3 GHz plot.
3. Measurements below 1 GHz were performed in a semi-anechoic chamber (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.

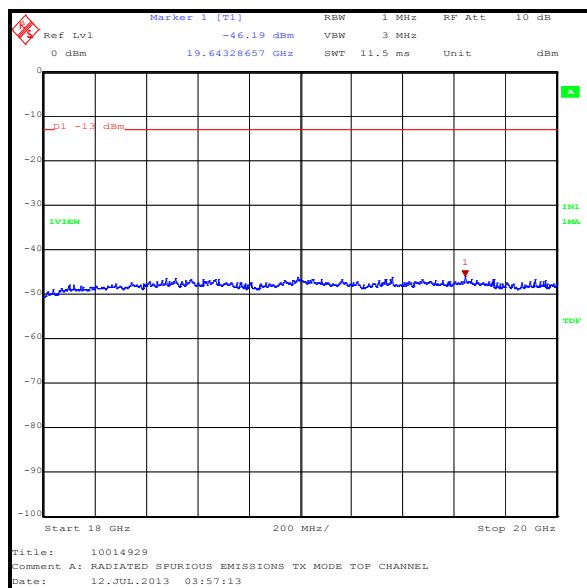
Results: Voice / 12.2 kbps - Top Channel

Frequency (MHz)	Peak Level (dBm)	Limit (dBm)	Margin (dB)	Result
2967.934	-30.2	-13.0	17.2	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	09 Apr 2014	12
A1834	Attenuator	Hewlett Packard	8491B	10444	27 Jan 2014	12
G0543	Pre Amplifier	Sonoma	310N	230801	05 Oct 2013	3
K0001	5m RSE Chamber	Rainford EMC	N/A	N/A	24 Oct 2013	12
M1273	Test receiver	Rohde & Schwarz	ESIB 26	100275	07 Feb 2014	12
M1622	Thermometer / Hygrometer station	JM Handelspunkt	30.5015.13	None stated	24 May 2014	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
A256	Antenna	Flann Microwave	18240-20	400	04 Nov 2013	12
A436	Antenna	Flann Microwave	20240-20	330	04 Nov 2013	12
A1396	Attenuator	Huber & Suhner	6810.17.B	757987	10 May 2014	12
A1534	Pre-Amplifier	Hewlett Packard	8449B	3008A00405	04 Nov 2013	12
A1818	Antenna	EMCO	3115	00075692	04 Nov 2013	12
A1975	High Pass Filter	AtlanTecRF	AFH-03000	090424010	19 Apr 2014	12
A2176	High Pass Filter	AtlanTecRF	AFH-07000	800980	10 May 2014	12
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
M1656	Thermometer / Hygrometer station	JM Handelspunkt	30.5015.13	Not stated	24 May 2014	12

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

Test Engineer:	Andrew Edwards	Test Dates:	11 July 2013, 12 July 2013 & 16 July 2013
Test Sample IMEI:	00440251245736		

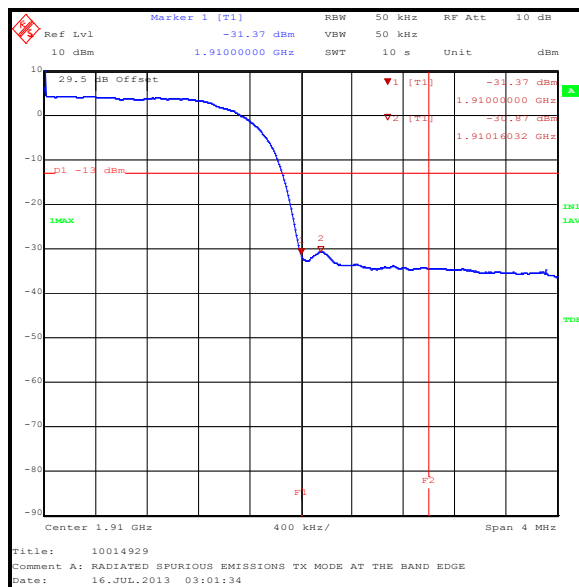
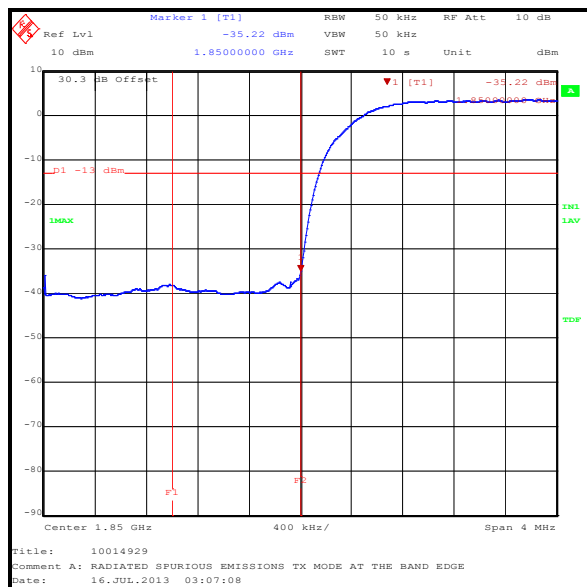
FCC Reference:	Parts 2.1053 & 24.238
Test Method Used:	As detailed in ANSI TIA-603-C-2004 Section 2.2.12 referencing FCC CFR Parts 2.1053 and 24.238

Environmental Conditions:

Temperature (°C):	25 to 26
Relative Humidity (%):	34 to 39

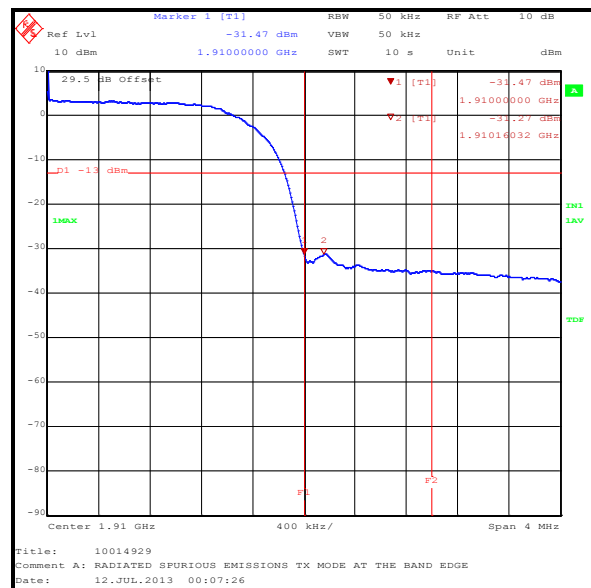
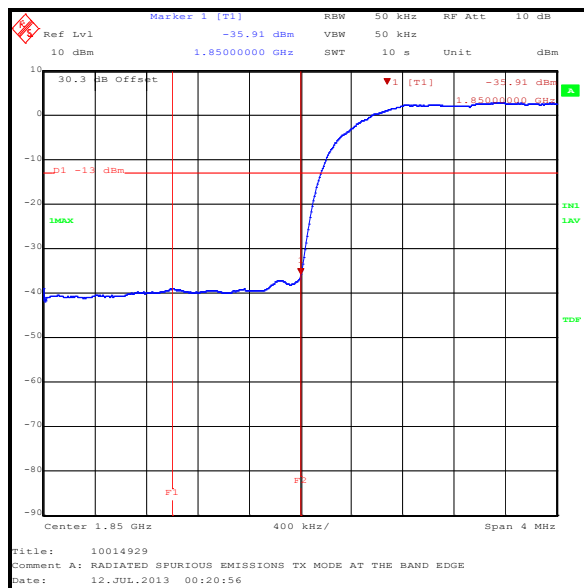
Results: Voice / 12.2 kbps

Frequency (MHz)	Peak Level (dBm)	Limit (dBm)	Margin (dB)	Result
1850	-35.2	-13.0	22.2	Complied
1910	-31.4	-13.0	18.4	Complied
1910.160	-30.9	-13.0	17.9	Complied



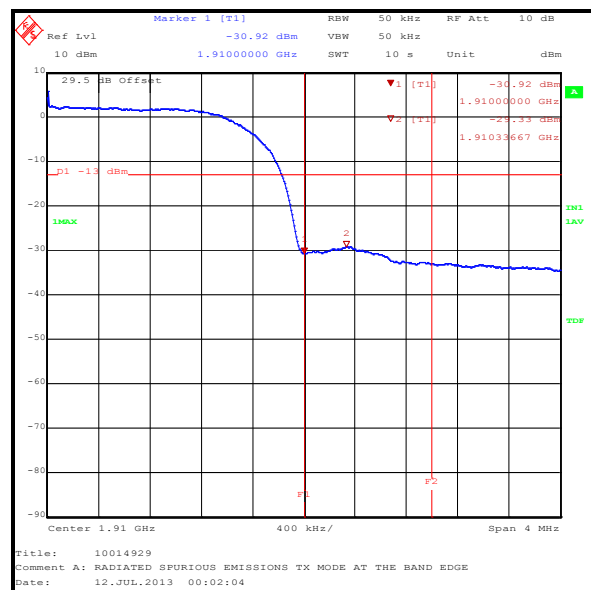
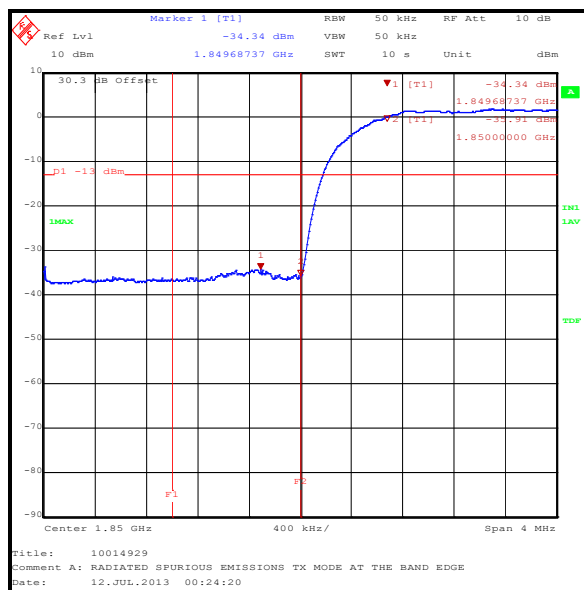
Transmitter Band Edge Radiated Emissions (continued)**Results: HSDPA Sub-Test 1**

Frequency (MHz)	Peak Level (dBm)	Limit (dBm)	Margin (dB)	Result
1850	-35.9	-13.0	22.9	Complied
1910	-31.5	-13.0	18.5	Complied
1910.160	-31.3	-13.0	18.3	Complied



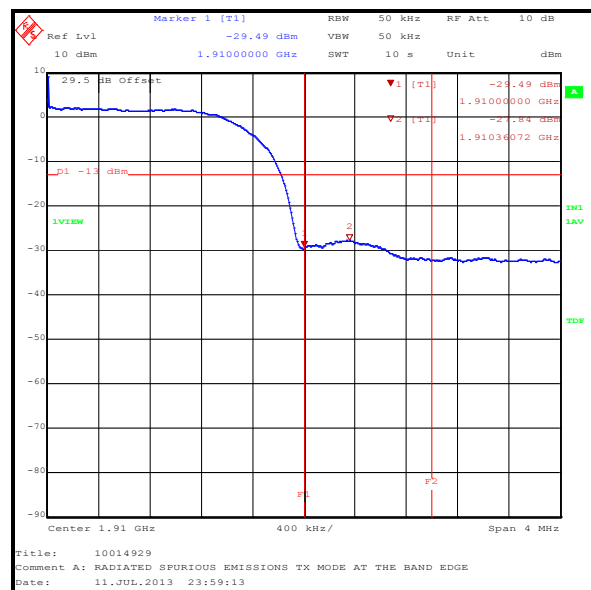
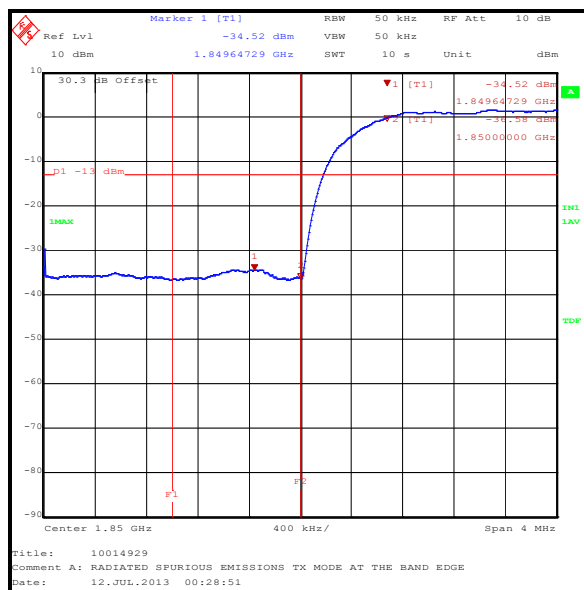
Transmitter Band Edge Radiated Emissions (continued)**Results: HSDPA Sub-Test 2**

Frequency (MHz)	Peak Level (dBm)	Limit (dBm)	Margin (dB)	Result
1849.687	-34.3	-13.0	21.3	Complied
1850	-35.9	-13.0	22.9	Complied
1910	-30.9	-13.0	17.9	Complied
1910.337	-29.3	-13.0	16.3	Complied



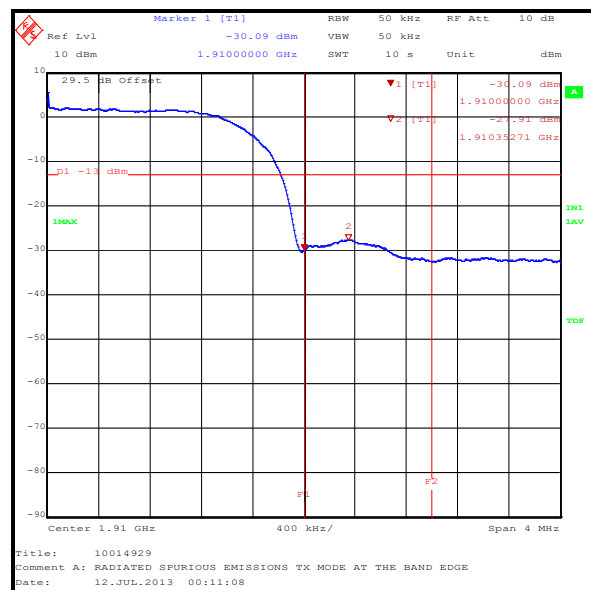
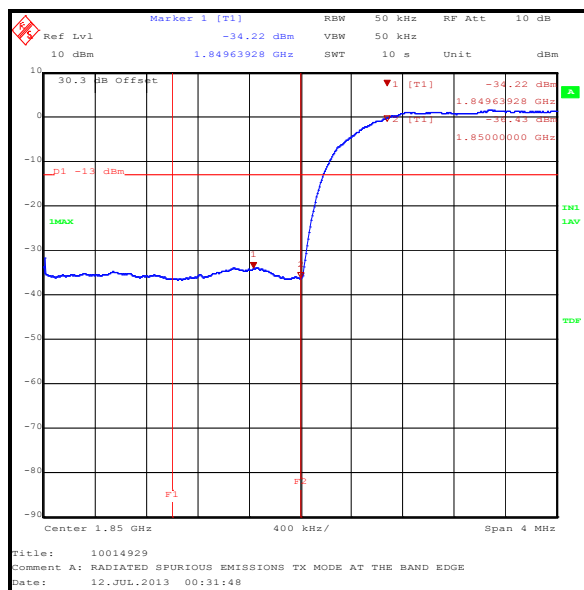
Transmitter Band Edge Radiated Emissions (continued)**Results: HSDPA Sub-Test 3**

Frequency (MHz)	Peak Level (dBm)	Limit (dBm)	Margin (dB)	Result
1849.647	-34.5	-13.0	21.5	Complied
1850	-36.6	-13.0	23.6	Complied
1910	-29.5	-13.0	16.5	Complied
1910.361	-27.8	-13.0	14.8	Complied



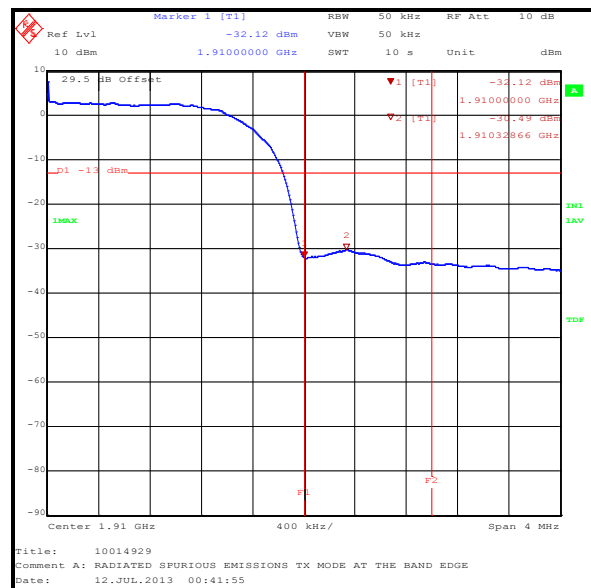
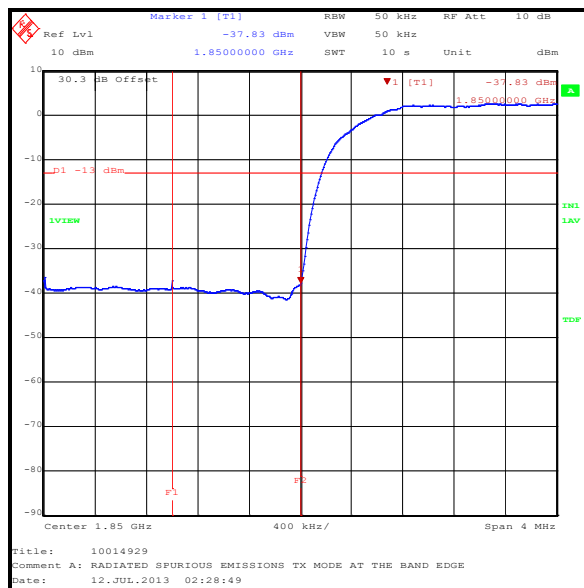
Transmitter Band Edge Radiated Emissions (continued)**Results: HSDPA Sub-Test 4**

Frequency (MHz)	Peak Level (dBm)	Limit (dBm)	Margin (dB)	Result
1849.639	-34.2	-13.0	21.2	Complied
1850	-36.4	-13.0	23.4	Complied
1910	-30.1	-13.0	17.1	Complied
1910.353	-27.9	-13.0	14.9	Complied



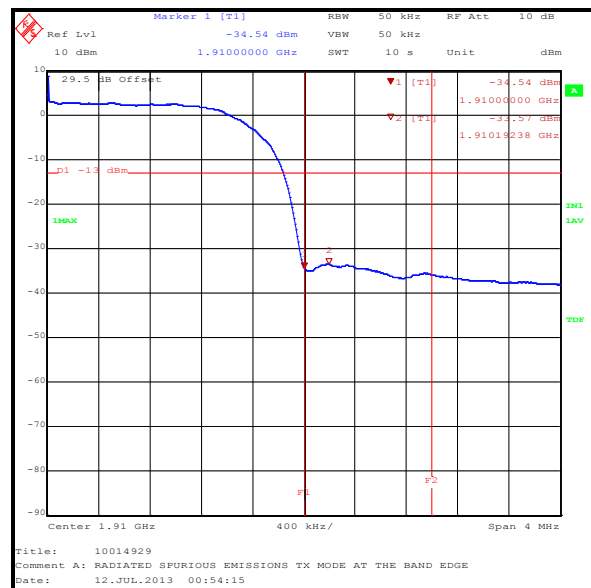
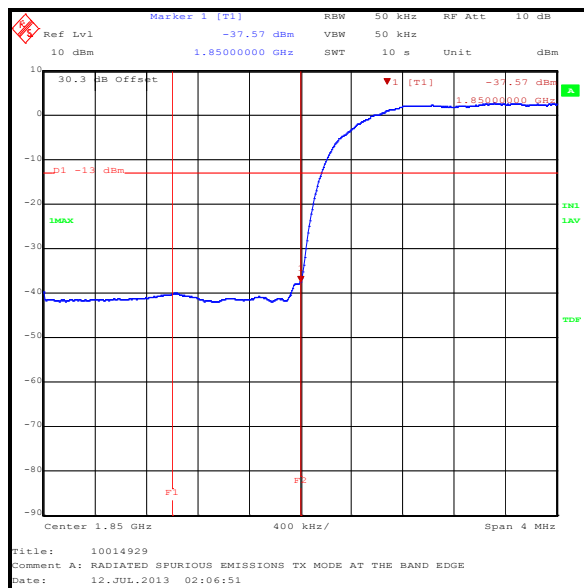
Transmitter Band Edge Radiated Emissions (continued)**Results: HSUPA Sub-Test 1**

Frequency (MHz)	Peak Level (dBm)	Limit (dBm)	Margin (dB)	Result
1850	-37.8	-13.0	24.8	Complied
1910	-32.1	-13.0	19.1	Complied
1910.329	-30.5	-13.0	17.5	Complied



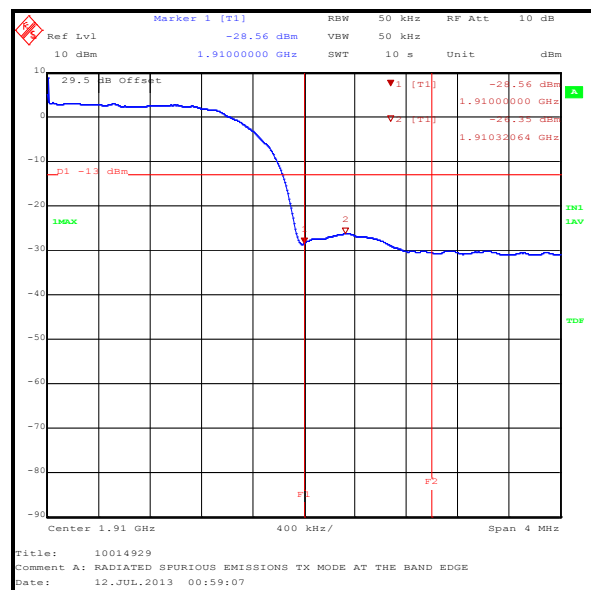
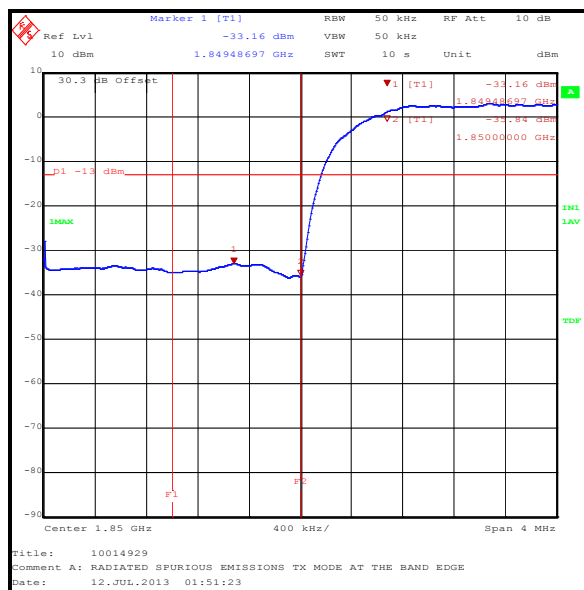
Transmitter Band Edge Radiated Emissions (continued)**Results: HSUPA Sub-Test 2**

Frequency (MHz)	Peak Level (dBm)	Limit (dBm)	Margin (dB)	Result
1850	-37.6	-13.0	24.6	Complied
1910	-34.5	-13.0	21.5	Complied
1910.192	-33.6	-13.0	20.6	Complied



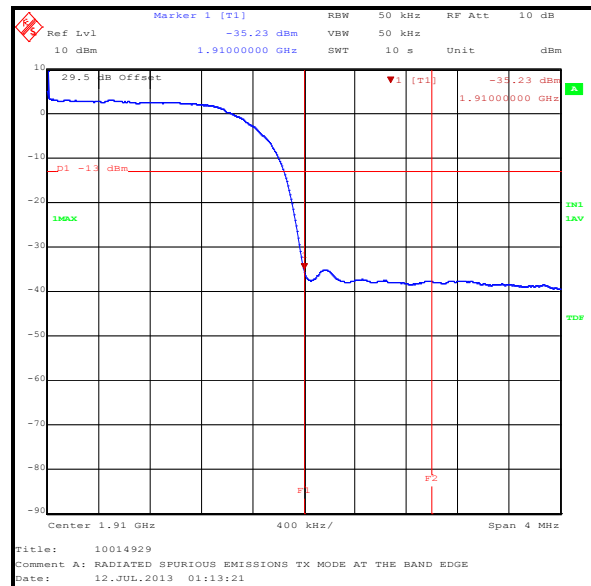
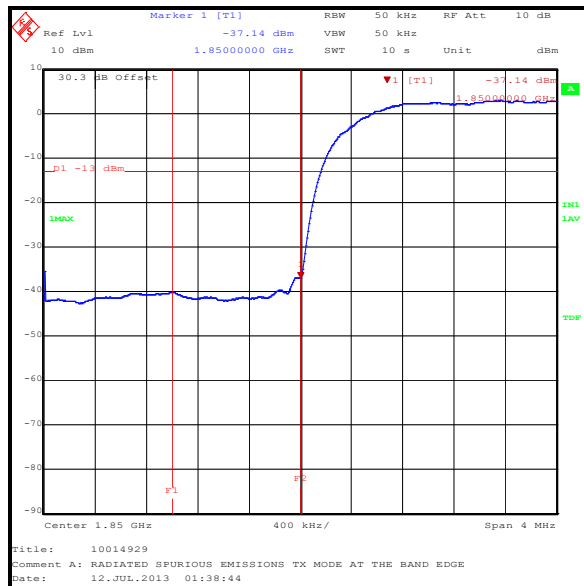
Transmitter Band Edge Radiated Emissions (continued)**Results: HSUPA Sub-Test 3**

Frequency (MHz)	Peak Level (dBm)	Limit (dBm)	Margin (dB)	Result
1849.487	-33.2	-13.0	20.2	Complied
1850	-35.8	-13.0	22.8	Complied
1910	-28.6	-13.0	15.6	Complied
1910.321	-26.4	-13.0	13.4	Complied



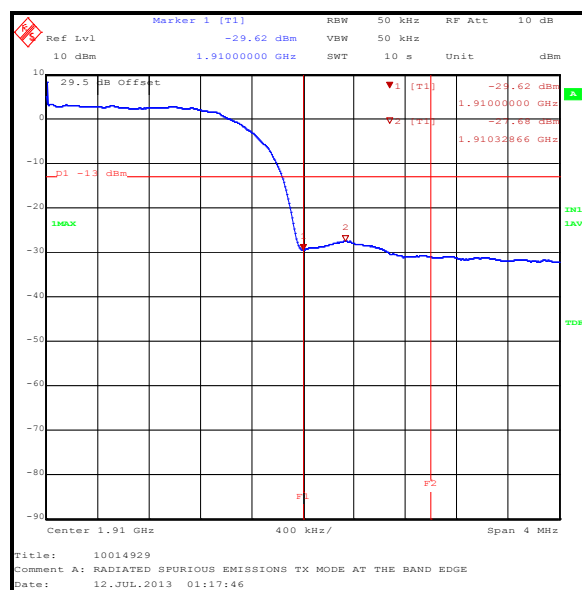
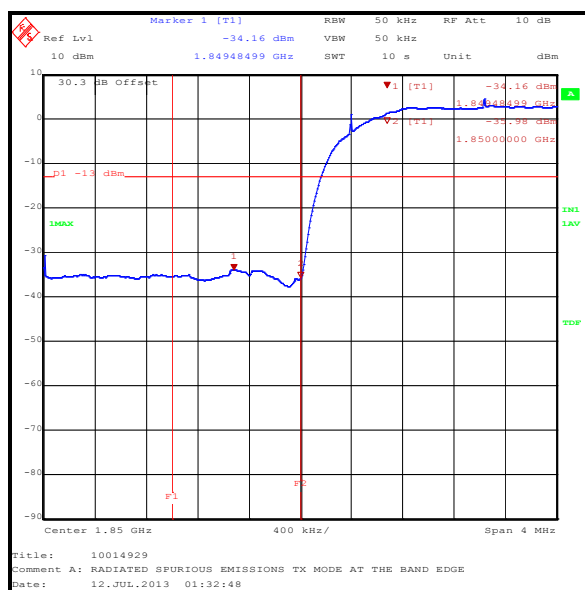
Transmitter Band Edge Radiated Emissions (continued)**Results: HSUPA Sub-Test 4**

Frequency (MHz)	Peak Level (dBm)	Limit (dBm)	Margin (dB)	Result
1850	-37.1	-13.0	24.1	Complied
1910	-35.2	-13.0	22.2	Complied



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

Frequency (MHz)	Peak Level (dBm)	Limit (dBm)	Margin (dB)	Result
1849.485	-34.2	-13.0	21.2	Complied
1850	-36.0	-13.0	23.0	Complied
1910	-29.6	-13.0	16.6	Complied
1910.329	-27.7	-13.0	14.7	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	04 Nov 2013	12
A1818	Antenna	EMCO	3115	00075692	04 Nov 2013	12
A2000	Attenuator	Huber & Suhner	6830.17.B	301623	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
M1656	Thermometer / Hygrometer station	JM Handelspunkt	30.5015.13	Not stated	24 May 2014	12

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

Test Engineers:	Ahmed Ali & Nick Steele	Test Date:	17 July 2013
Test Sample IMEI:	004402451246163		

FCC Reference:	Parts 2.1055 & 24.235
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):	23
Ambient Relative Humidity (%):	35

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 Wideband Radio Communications Tester in accordance with current Rohde & Schwarz application notes. The EUT was connected by suitable RF cables to the CMW 500. A bidirectional 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	33	1852.399967	1850.0	2.399967	Complied
-20	23	1852.399977	1850.0	2.399977	Complied
-10	21	1852.400021	1850.0	2.400021	Complied
0	19	1852.399981	1850.0	2.399981	Complied
10	28	1852.399972	1850.0	2.399972	Complied
20	24	1852.399976	1850.0	2.399976	Complied
30	20	1852.399980	1850.0	2.399980	Complied
40	19	1852.399981	1850.0	2.399981	Complied
50	21	1852.399979	1850.0	2.399979	Complied

Results: Top Channel (1907.6 MHz)

Temperature (°C)	Frequency Error (Hz)	Measured Frequency (MHz)	Upper Band Edge Limit (MHz)	Margin (MHz)	Result
-30	37	1907.599963	1910.0	2.400037	Complied
-20	30	1907.599970	1910.0	2.400030	Complied
-10	32	1907.599968	1910.0	2.400032	Complied
0	21	1907.599979	1910.0	2.400021	Complied
10	27	1907.599973	1910.0	2.400027	Complied
20	25	1907.599975	1910.0	2.400025	Complied
30	19	1907.599981	1910.0	2.400019	Complied
40	26	1907.599974	1910.0	2.400026	Complied
50	26	1907.599974	1910.0	2.400026	Complied

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

Asset No.	Instrument	Manufacturer	Type No.	Serial No.	Date Calibration Due	Cal. Interval (Months)
M1659	Thermometer / Hygrometer station	JM Handelspunkt	30.5015.13	None stated	24 May 2014	12
L1106	Radio Comms Tester	Rohde & Schwarz	CMW 500	114656	10 Jun 2014	12
E0513	Environmental Chamber	TAS	LT600 Series 3	23900506	Calibrated before use	-
M1643	Thermometer	Fluke	52II	18890136	19 Mar 2014	12
S0523	DC power supply	TTI	PL320	224235	Calibrated before use	-
M1269	Multimeter	Fluke	179	90250210	30 Jul 2013	12

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

Test Engineers:	Ahmed Ali & Nick Steele	Test Date:	17 July 2013
Test Sample IMEI:	004402451246163		

FCC Reference:	Parts 2.1055 & 24.235
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):	23
Relative Humidity (%):	35

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 Wideband Radio Communications Tester in accordance with current Rohde & Schwarz application notes. The EUT was connected by suitable RF cables to the CMW 500. A bidirectional 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
3.6	24	1852.399976	1850.0	2.399976	Complied
4.2	26	1852.399974	1850.0	2.399974	Complied

Results: Top Channel (1907.6 MHz)

Supply Voltage (V)	Frequency Error (Hz)	Measured Frequency (MHz)	Upper Band Edge Limit (MHz)	Margin (MHz)	Result
3.6	20	1907.599980	1910.0	2.400020	Complied
4.2	29	1907.599971	1910.0	2.400029	Complied

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

Asset No.	Instrument	Manufacturer	Type No.	Serial No.	Date Calibration Due	Cal. Interval (Months)
M1659	Thermometer / Hygrometer station	JM Handelspunkt	30.5015.13	None stated	24 May 2014	12
L1106	Radio Comms Tester	Rohde & Schwarz	CMW 500	114656	10 Jun 2014	12
S0523	DC power supply	TTI	PL320	224235	Calibrated before use	-
M1269	Multimeter	Fluke	179	90250210	30 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
Conducted Output Power	1850 to 1910 MHz	95%	±1.13 dB
Frequency Stability	1850 to 1910 MHz	95%	±0.92 ppm
Occupied Bandwidth	1850 to 1910 MHz	95%	±0.92 ppm
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