



# TEST REPORT

**Test Report No. : UL-RPT-RP92315JD10A V2.0**

**Manufacturer** : Panasonic Mobile Communications Development of Europe Ltd  
**Model No.** : NTT docomo P-03E  
**FCC ID** : UCE313058A  
**Technology** : GSM850 / PCS1900  
**Test Standard(s)** : FCC Parts 15.107, 15.109, 22 & 24

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2. The results in this report apply only to the sample(s) tested.
3. The sample tested is in compliance with the above standard(s).
4. The test results in this report are traceable to the national or international standards.
5. Version 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  
Basingstoke,  
UL Verification Services



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**

















<b>Company Name:</b>	Panasonic Mobile Communications Development of Europe Ltd
<b>Address:</b>	Panasonic House Willoughby Road Bracknell Berkshire RG12 8FP United Kingdom

## **2. Summary of Testing**

### **2.1. General Information**

<b>Specification Reference:</b>	47CFR22
<b>Specification Title:</b>	Code of Federal Regulations Volume 47 (Telecommunications) 2012: Part 22 Subpart H (Public Mobile Services)
<b>Specification Reference:</b>	47CFR24
<b>Specification Title:</b>	Code of Federal Regulations Volume 47 (Telecommunications) 2012: Part 24 Subpart E (Personal Communication Services)
<b>Specification Reference:</b>	47CFR15.107 and 47CFR15.109
<b>Specification Title:</b>	Code of Federal Regulations Volume 47 (Telecommunications) 2012: Part 15 Subpart B (Unintentional Radiators) - Sections 15.107 and 15.109
<b>Site Registration:</b>	FCC: 209735
<b>Location of Testing:</b>	RFI Global Services Ltd trading as UL, Wade Road, Basingstoke, Hampshire, RG24 8AH
<b>Test Dates:</b>	26 March 2013 to 06 April 2013

## 2.2. Summary of Test Results

FCC Reference (47CFR)	Measurement	Result
<b>Part 22</b>		
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 Output 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	
<b>Part 24</b>		
Part 15.107(a)	Receiver/Idle Mode AC Conducted Spurious Emissions	
Part 15.109	Receiver/Idle Mode Radiated Spurious Emissions	
Part 24.232	Transmitter Output Power (EIRP)	
Part 2.1055/24.235	Transmitter Frequency Stability (Temperature and Voltage Variation)	
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	
<b>Key to Results</b>		
 = Complied  = Did not comply		

## 2.3. Methods and Procedures

<b>Reference:</b>	ANSI/TIA-603-C-2004
<b>Title:</b>	Land Mobile Communications Equipment, Measurements and performance Standards
<b>Reference:</b>	ANSI C63.4 (2003)
<b>Title:</b>	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.
<b>Reference:</b>	ANSI C63.10 (2009)
<b>Title:</b>	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)**

<b>Brand Name:</b>	NTT docomo
<b>Model Name or Number:</b>	P-03E
<b>IMEI:</b>	355335050017228 ( <i>Radiated sample #1</i> )
<b>Hardware Version Number:</b>	Rev B
<b>Software Version Number:</b>	ACPU: zoro-jb-10-0371 CCPU: 161022_DCM_00.15
<b>FCC ID:</b>	UCE313058A

<b>Brand Name:</b>	NTT docomo
<b>Model Name or Number:</b>	P-03E
<b>IMEI:</b>	355335050017236 ( <i>Radiated sample #2</i> )
<b>Hardware Version Number:</b>	Rev B
<b>Software Version Number:</b>	ACPU: zoro-jb-10-0371 CCPU: 161022_DCM_00.15
<b>FCC ID:</b>	UCE313058A

<b>Brand Name:</b>	NTT docomo
<b>Model Name or Number:</b>	P-03E
<b>IMEI:</b>	355335050017244 ( <i>Radiated sample #3</i> )
<b>Hardware Version Number:</b>	Rev B
<b>Software Version Number:</b>	ACPU: zoro-jb-10-0371 CCPU: 161022_DCM_00.15
<b>FCC ID:</b>	UCE313058A

<b>Brand Name:</b>	NTT docomo
<b>Model Name or Number:</b>	P-03E
<b>IMEI:</b>	355335050017079 ( <i>Conducted RF port sample #1</i> )
<b>Hardware Version Number:</b>	Rev B
<b>Software Version Number:</b>	ACPU: zoro-jb-10-0371 CCPU: 161022_DCM_00.15
<b>FCC ID:</b>	UCE313058A

<b>Brand Name:</b>	NTT docomo
<b>Description:</b>	AC Charger
<b>Model Name or Number:</b>	AC04

**Identification of Equipment Under Test (EUT) (continued)**

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

<b>Brand Name:</b>	NTT docomo
<b>Description:</b>	Personal Hands-Free
<b>Model Name or Number:</b>	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**

<b>Type of Radio Device:</b>	Transceiver		
<b>Mode:</b>	GSM/GPRS/EGPRS		
<b>Modulation Type:</b>	GMSK / 8PSK		
<b>Channel Spacing:</b>	200 kHz		
<b>Power Supply Requirement(s):</b>	Nominal	3.8 V	
	Minimum	3.4 V	
	Maximum	4.35 V	
<b>Technology Tested:</b>	GSM850		
<b>Maximum Output Power (ERP):</b>	GSM	28.7 dBm	
	GPRS	28.7 dBm	
	EGPRS	28.2 dBm	
<b>Transmit Frequency Range:</b>	824 to 849 MHz		
<b>Transmit Channels Tested:</b>	<b>Channel ID</b>	<b>Channel Number</b>	<b>Channel Frequency (MHz)</b>
	Bottom	128	824.2
	Middle	190	836.6
	Top	251	848.8
<b>Receive Frequency Range:</b>	869 to 894 MHz		
<b>Receive Channels Tested:</b>	<b>Channel ID</b>	<b>Channel Number</b>	<b>Channel Frequency (MHz)</b>
	Bottom	128	869.2
	Middle	190	881.6
	Top	251	893.8

**Additional Information Related to Testing (continued)**

<b>Technology Tested:</b>	PCS1900		
<b>Maximum Output Power (EIRP):</b>	GSM	28.7 dBm	
	GPRS	28.5 dBm	
	EGPRS	28.6 dBm	
<b>Transmit Frequency Range:</b>	1850 to 1910 MHz		
<b>Transmit Channels Tested:</b>	<b>Channel ID</b>	<b>Channel Number</b>	<b>Channel Frequency (MHz)</b>
	Bottom	512	1850.2
	Middle	660	1879.8
	Top	810	1909.8
<b>Receive Frequency Range:</b>	1930 to 1990 MHz		
<b>Receive Channels Tested:</b>	<b>Channel ID</b>	<b>Channel Number</b>	<b>Channel Frequency (MHz)</b>
	Bottom	512	1930.2
	Middle	660	1959.8
	Top	810	1989.8

**3.5. Support Equipment**

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

<b>Brand Name:</b>	Not marked or stated
<b>Description:</b>	2 GB Micro SD Card
<b>Model Name or Number:</b>	Not marked or stated
<b>Serial Number:</b>	Not marked or stated

<b>Brand Name:</b>	Not marked or stated
<b>Description:</b>	Dummy Battery
<b>Model Name or Number:</b>	Not marked or stated
<b>Serial Number:</b>	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/EIRP and band edge tests were performed with the EUT in GSM single timeslot circuit switched and GPRS/EGPRS Multislot Class 12 with the unit transmitting on one timeslot in the uplink. The EUT output power was initially checked when transmitting at maximum power on one, two, three and four timeslots. The highest power was observed when transmitting on one timeslot.
- EGPRS tests were performed with the EUT using MCS5 (8PSK modulation).
- Transmitter radiated spurious emissions were checked in all modes during pre-scans. Circuit switched voice 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 GSM/GPRS/EGPRS system simulator, operating in transceiver mode.
- Receiver/Idle mode and transmitter mode radiated spurious emissions tests were performed with the AC charger and Personal Hands-Free connected to the EUT as this was found to be worst case during pre-scans. The micro SD card was fitted during all tests.
- The dummy battery was fitted for frequency stability measurements.
- 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 sample with IMEI 355335050017228 was used for receiver AC conducted spurious emissions measurements.
- The radiated sample with IMEI 355335050017244 was used for receiver radiated spurious emissions measurements below 1 GHz.
- The radiated sample with IMEI 355335050017236 was used for all other radiated 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 - Part 22****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(a)
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 $\mu$ V)	Limit (dB $\mu$ 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 $\mu$ V)	Limit (dB $\mu$ 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

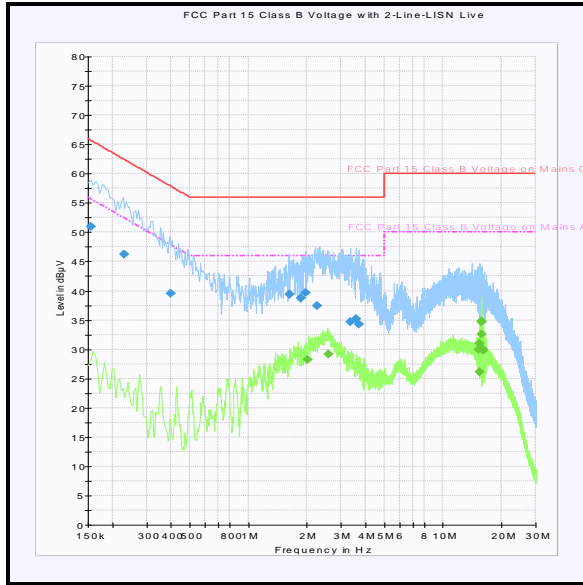
**Receiver/Idle Mode AC Conducted Spurious Emissions (continued)****Results: Neutral / Quasi Peak**

Frequency (MHz)	Line	Level (dB $\mu$ V)	Limit (dB $\mu$ 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

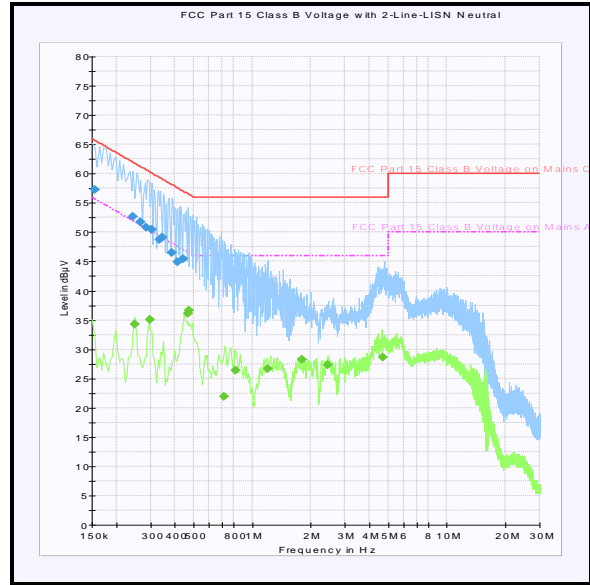
**Results: Neutral / Average**

Frequency (MHz)	Line	Level (dB $\mu$ V)	Limit (dB $\mu$ 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:**

<b>Test Engineer:</b>	Sarah Williams	<b>Test Date:</b>	29 March 2013
<b>Test Sample IMEI:</b>	355335050017236		

<b>FCC Reference:</b>	Part 15.109
<b>Test Method Used:</b>	As detailed in ANSI C63.10 Sections 6.3 and 6.5 referencing ANSI C63.4
<b>Frequency Range:</b>	30 MHz to 1000 MHz

**Environmental Conditions:**

<b>Temperature (°C):</b>	22
<b>Relative Humidity (%):</b>	26

**Note(s):**

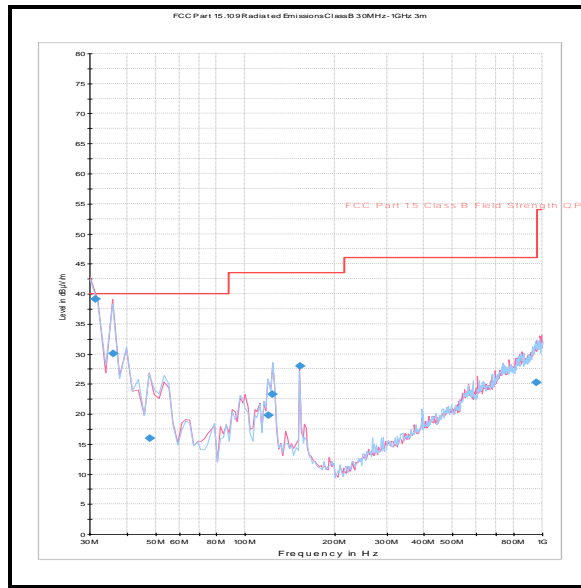
1. The final measured value, for the given emission, in the table below incorporates the calibrated antenna factor and cable loss.
2. All other emissions shown on the pre-scan plot were investigated and found to be ambient or >20 dB below the applicable limit or below the measurement system noise floor.
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 $\mu$ V/m)	Limit (dB $\mu$ 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:**

<b>Test Engineer:</b>	Nick Steele	<b>Test Date:</b>	26 March 2013
<b>Test Sample IMEI:</b>	355335050017244		

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

**Environmental Conditions:**

<b>Temperature (°C):</b>	23
<b>Relative Humidity (%):</b>	29

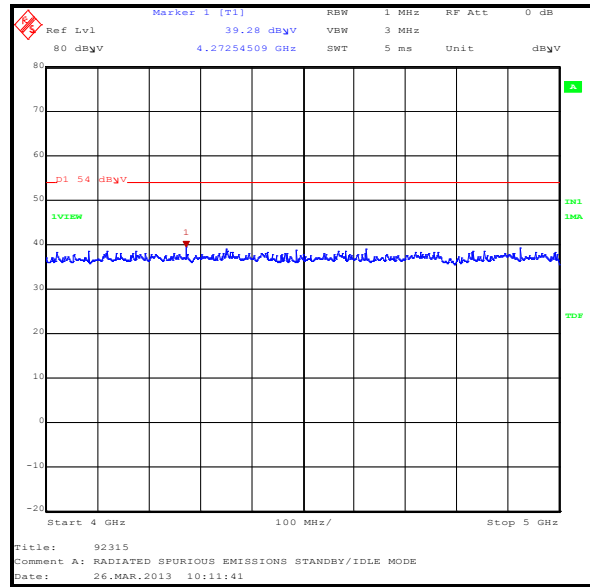
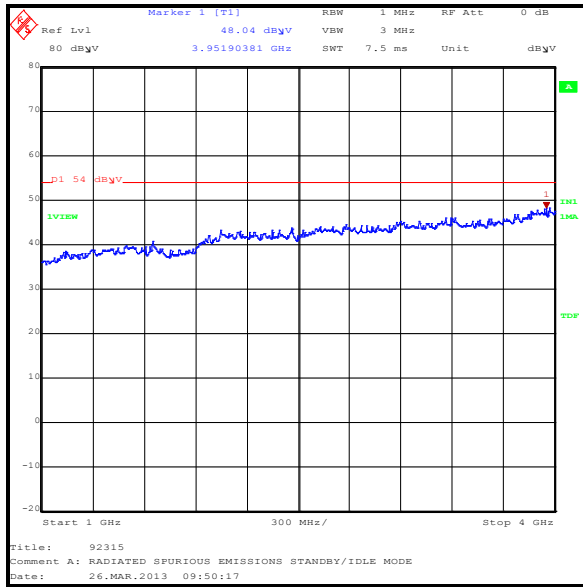
**Note(s):**

1. The final measured value, for the given emission, in the table below 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.
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:**

<b>Frequency (MHz)</b>	<b>Antenna Polarity</b>	<b>Peak Level (dB<math>\mu</math>V/m)</b>	<b>Average Limit (dB<math>\mu</math>V/m)</b>	<b>Margin (dB)</b>	<b>Result</b>
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 Output Power (ERP)****Test Summary:**

<b>Test Engineer:</b>	David Doyle	<b>Test Date:</b>	03 April 2013
<b>Test Sample IMEI:</b>	355335050017236		

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

**Environmental Conditions:**

<b>Temperature (°C):</b>	21
<b>Relative Humidity (%):</b>	29

**Results: GSM Circuit Switched**

Channel	Frequency (MHz)	Antenna Polarity	ERP (dBm)	ERP Limit (dBm)	Margin (dB)	Result
Bottom	824.2	Vertical	28.5	38.45	9.95	Complied
Middle	836.6	Vertical	28.7	38.45	9.75	Complied
Top	848.8	Vertical	28.7	38.45	9.75	Complied

**Results: GPRS**

Channel	Frequency (MHz)	Antenna Polarity	ERP (dBm)	ERP Limit (dBm)	Margin (dB)	Result
Bottom	824.2	Vertical	27.8	38.45	10.65	Complied
Middle	836.6	Vertical	28.3	38.45	10.15	Complied
Top	848.8	Vertical	28.7	38.45	9.75	Complied

**Results: EGPRS / MCS5**

Channel	Frequency (MHz)	Antenna Polarity	ERP (dBm)	ERP Limit (dBm)	Margin (dB)	Result
Bottom	824.2	Vertical	27.6	38.45	10.85	Complied
Middle	836.6	Vertical	27.9	38.45	10.55	Complied
Top	848.8	Vertical	28.2	38.45	10.25	Complied

**Transmitter Output Power (ERP) (continued)****Test Equipment Used:**

<b>RFI No.</b>	<b>Instrument</b>	<b>Manufacturer</b>	<b>Type No.</b>	<b>Serial No.</b>	<b>Date Calibration Due</b>	<b>Cal. Interval (Months)</b>
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
A1396	Attenuator	Huber & Suhner	6810.17.B	757987	06 July 2013	12

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

<b>Test Engineer:</b>	Ian Watch	<b>Test Date:</b>	06 April 2013
<b>Test Sample IMEI:</b>	355335050017079		

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

**Environmental Conditions:**

<b>Ambient Temperature (°C):</b>	19
<b>Ambient Relative Humidity (%):</b>	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 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 bi-directional communications link was established between the EUT and 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	836.600008	8	0.0096	2.5	2.4904	Complied
-20	836.600010	10	0.0120	2.5	2.4880	Complied
-10	836.600013	13	0.0155	2.5	2.4845	Complied
0	836.600018	18	0.0215	2.5	2.4785	Complied
10	836.600011	11	0.0131	2.5	2.4869	Complied
20	836.600011	11	0.0131	2.5	2.4869	Complied
30	836.600008	8	0.0096	2.5	2.4904	Complied
40	836.600008	8	0.0096	2.5	2.4904	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	-
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	504E005G2	Calibrated Before Use	-

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

<b>Test Engineer:</b>	Ian Watch	<b>Test Date:</b>	06 April 2013
<b>Test Sample IMEI:</b>	355335050017079		

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

**Environmental Conditions:**

<b>Temperature (°C):</b>	20
<b>Relative Humidity (%):</b>	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 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 bi-directional communications link was established between the EUT and 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	836.600008	8	0.0096	2.5	2.4904	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	504E005G2	Calibrated Before Use	N/A



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

<b>Test Engineer:</b>	David Doyle	<b>Test Date:</b>	03 April 2013
<b>Test Sample IMEI:</b>	355335050017236		

<b>FCC Reference:</b>	Part 2.1049
<b>Test Method Used:</b>	The 99% occupied bandwidth was measured using the Occupied Bandwidth function of a test receiver

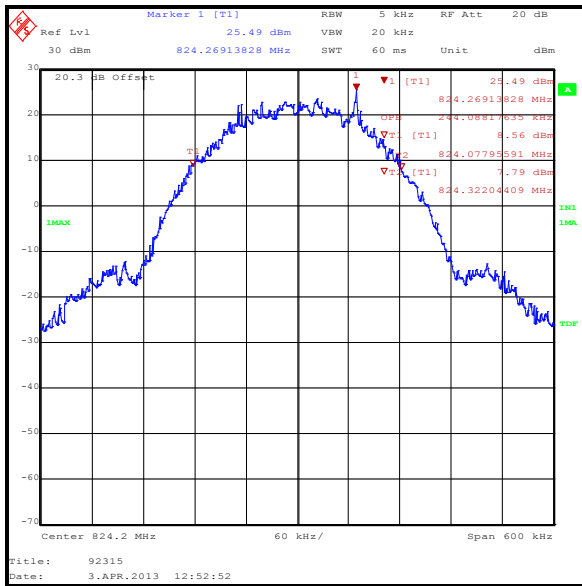
**Environmental Conditions:**

<b>Temperature (°C):</b>	22
<b>Relative Humidity (%):</b>	29

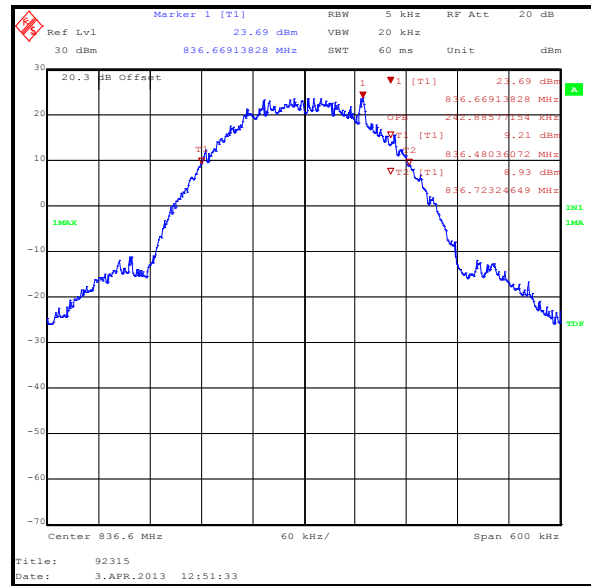
**Transmitter Occupied Bandwidth (continued)**

**Results: GSM Circuit Switched**

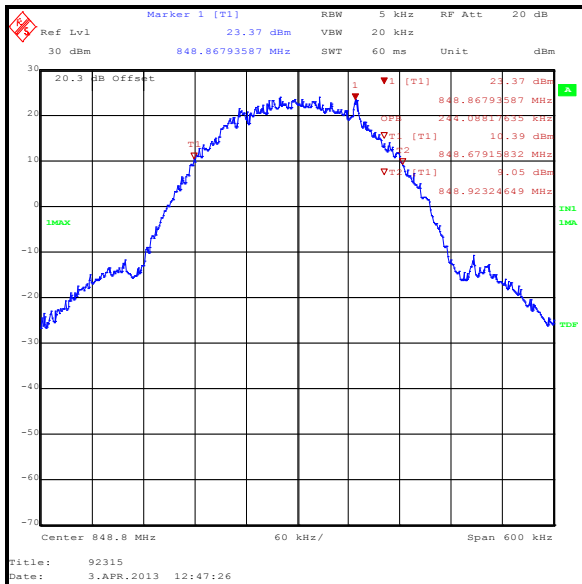
Channel	Frequency (MHz)	Occupied Bandwidth (kHz)
Bottom	824.2	244.088
Middle	836.6	242.886
Top	848.8	244.088



**Bottom Channel**



**Middle Channel**

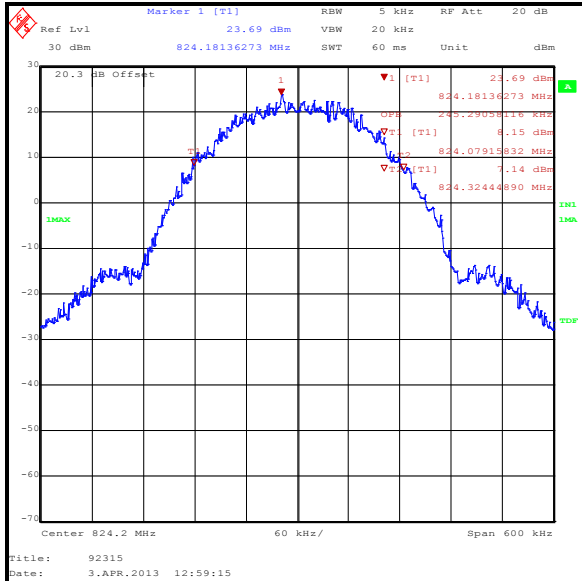


**Top Channel**

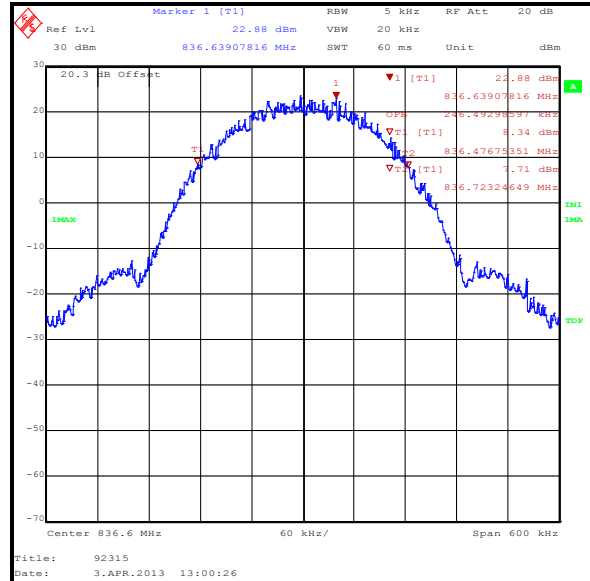
**Transmitter Occupied Bandwidth (continued)**

**Results: GPRS**

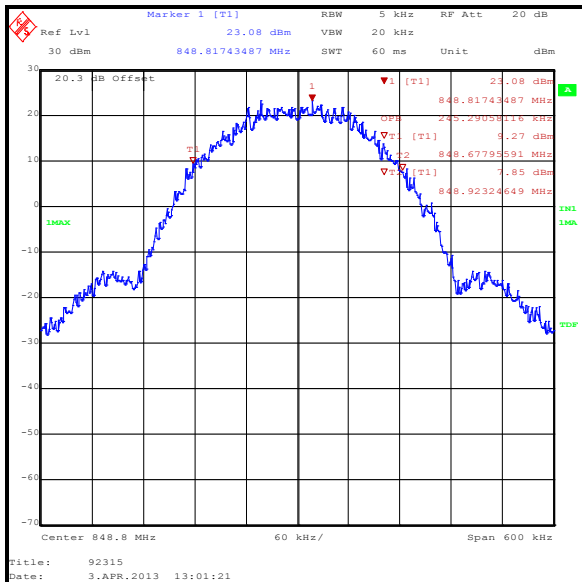
Channel	Frequency (MHz)	Occupied Bandwidth (kHz)
Bottom	824.2	245.291
Middle	836.6	246.493
Top	848.8	245.291



**Bottom Channel**



**Middle Channel**

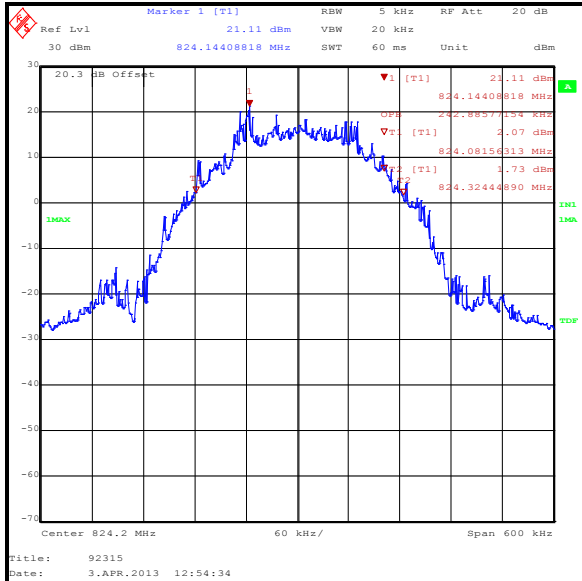


**Top Channel**

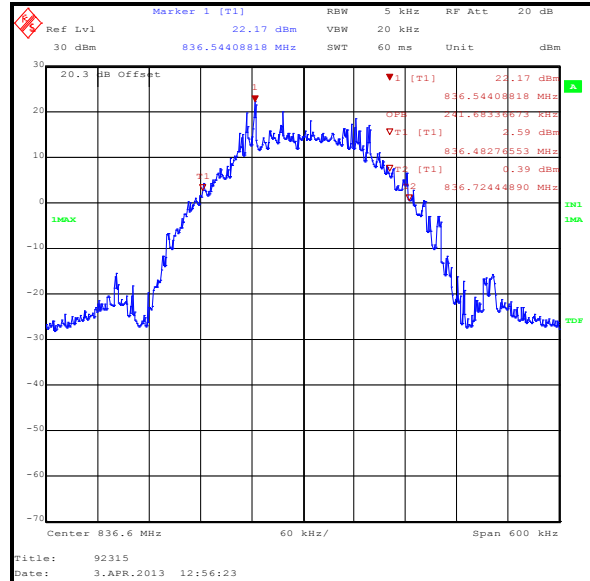
**Transmitter Occupied Bandwidth (continued)**

**Results: EGPRS / MCS5**

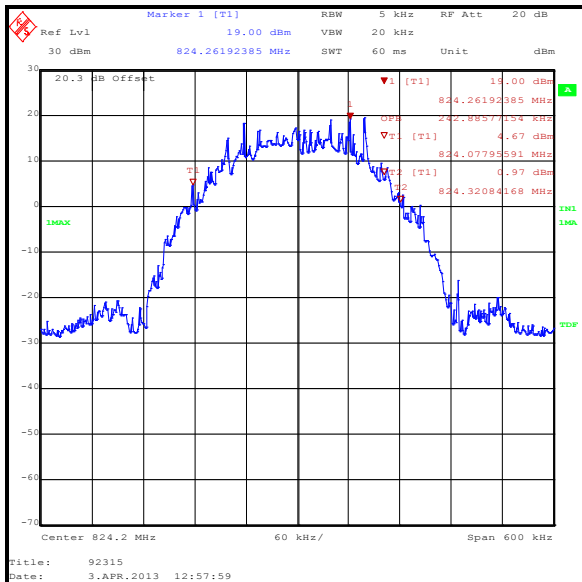
Channel	Frequency (MHz)	Occupied Bandwidth (kHz)
Bottom	824.2	242.886
Middle	836.6	241.683
Top	848.8	242.886



**Bottom Channel**



**Middle Channel**



**Top Channel**

**Transmitter Occupied Bandwidth (continued)****Test Equipment Used:**

<b>RFI No.</b>	<b>Instrument</b>	<b>Manufacturer</b>	<b>Type No.</b>	<b>Serial No.</b>	<b>Date Calibration Due</b>	<b>Cal. Interval (Months)</b>
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:**

<b>Test Engineers:</b>	David Doyle & Sandeep Bharat	<b>Test Dates:</b>	03 April 2013 & 04 April 2013
<b>Test Sample IMEI:</b>	355335050017236		

<b>FCC Reference:</b>	Parts 2.1053 & 22.917
<b>Test Method Used:</b>	As detailed in ANSI TIA-603-C-2004 Section 2.2.12 referencing FCC CFR Part 2.1053
<b>Frequency Range:</b>	30 MHz to 9 GHz
<b>Configuration:</b>	GSM Circuit Switched

**Environmental Conditions:**

<b>Temperature (°C):</b>	21 to 22
<b>Relative Humidity (%):</b>	29

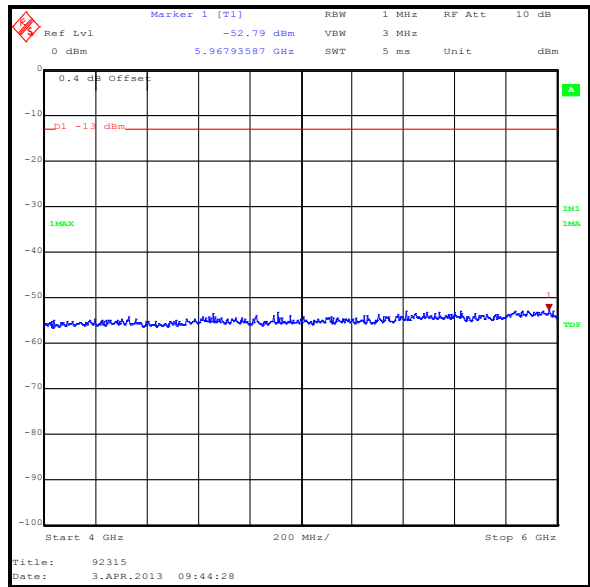
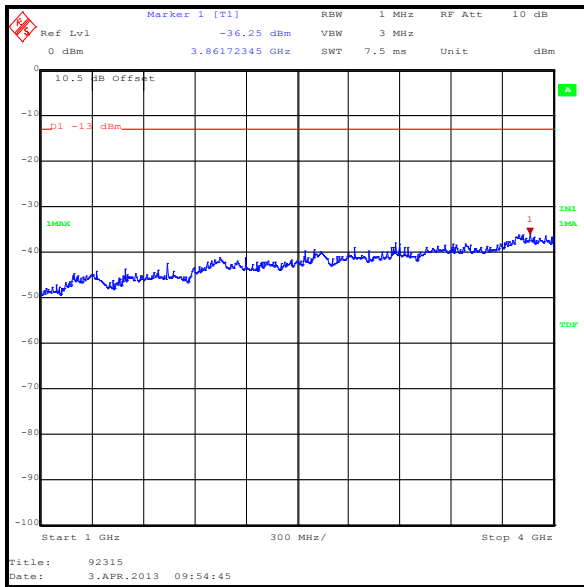
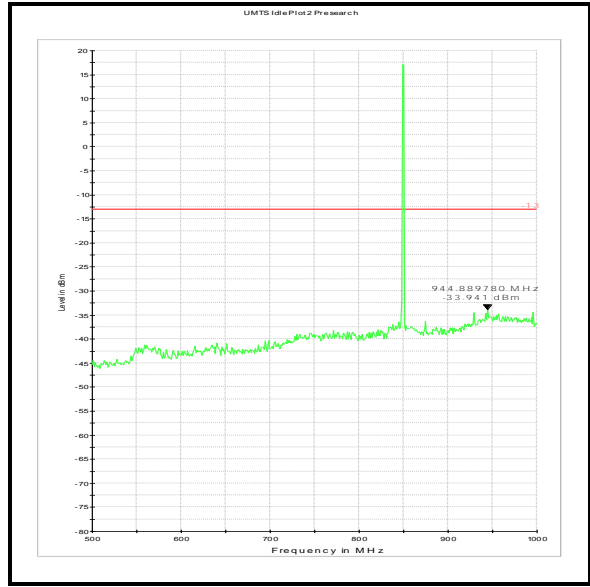
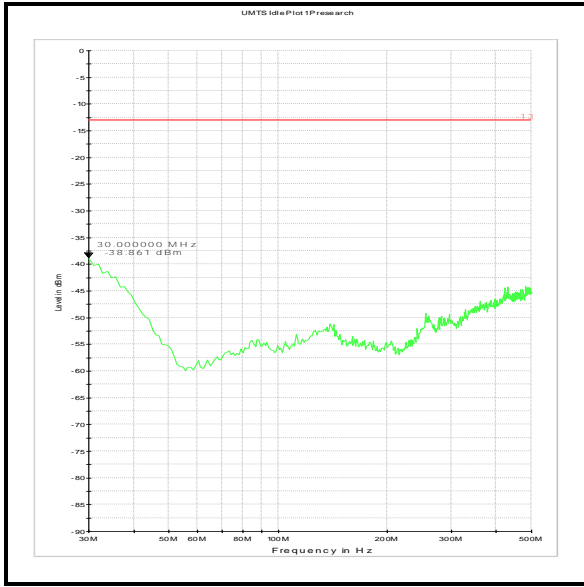
**Note(s):**

1. The uplink traffic channel is shown on the 500 MHz to 1 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 (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.

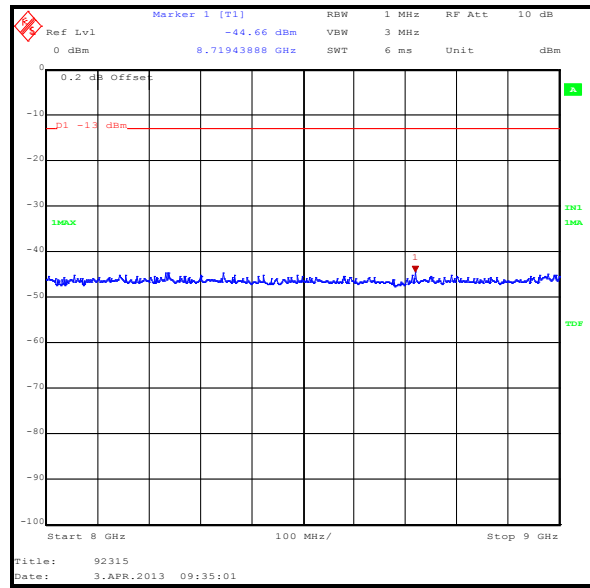
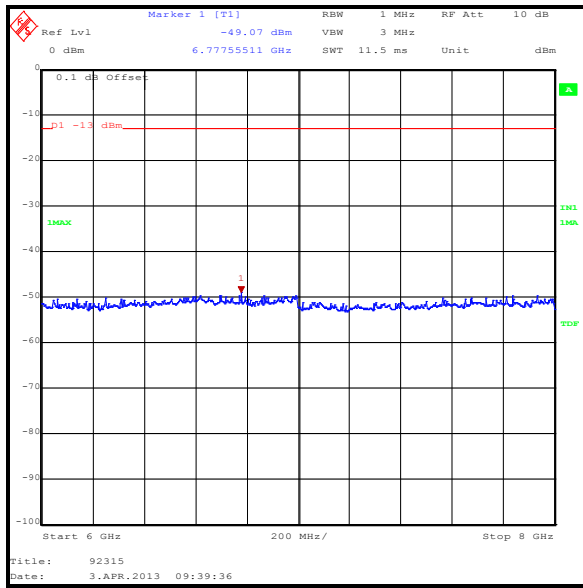
**Results:**

Frequency (MHz)	Peak Level (dBm)	Limit (dBm)	Margin (dB)	Result
3861.723	-36.3	-13.0	23.3	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
G0543	Pre Amplifier	Sonoma	310N	230801	04 Jul 2013	3
A490	Antenna	Chase	CBL6111A	1590	14 May 2013	12
M1273	Test Receiver	Rohde & Schwarz	ESIB 26	100275	15 Feb 2014	12
A1834	Attenuator	Hewlett Packard	8491B	10444	27 Jan 2014	12
A1393	Attenuator	Huber & Suhner	6820.17.B	757456	06 Jul 2013	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
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
A1974	High Pass Filter	AtlanTecRF	AFH-01000	090000283	14 Mar 2014	12
A1975	High Pass Filter	AtlanTecRF	AFH-03000	090424010	14 Mar 2014	12
A1396	Attenuator	Huber & Suhner	6810.17.B	757987	06 Jul 2013	12



**5.2.8. Transmitter Band Edge Radiated Emissions**

**Test Summary:**

<b>Test Engineer:</b>	David Doyle	<b>Test Date:</b>	03 April 2013
<b>Test Sample IMEI:</b>	355335050017236		

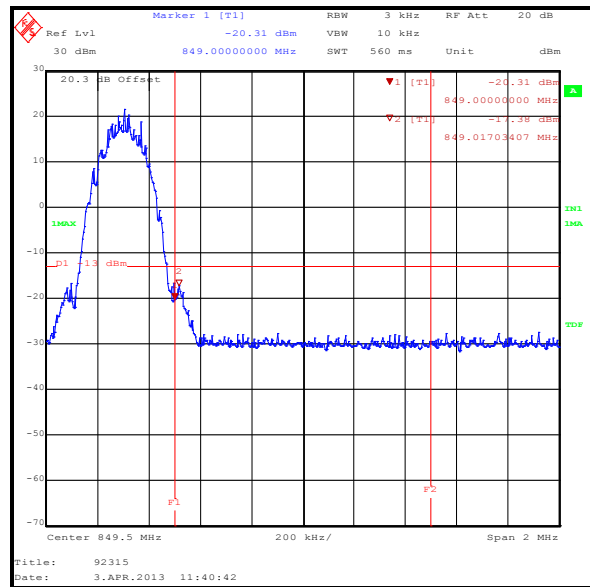
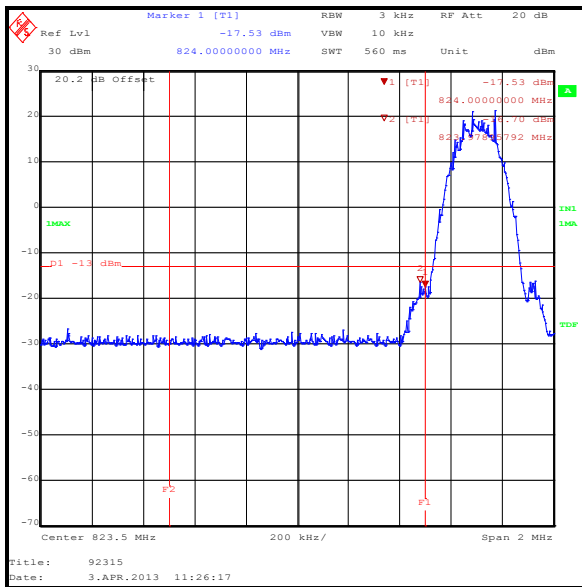
<b>FCC Reference:</b>	Parts 2.1053 & 22.917
<b>Test Method Used:</b>	As detailed in ANSI TIA-603-C-2004 Section 2.2.12 referencing FCC CFR Part 22.917

**Environmental Conditions:**

<b>Temperature (°C):</b>	21
<b>Relative Humidity (%):</b>	29

**Results: GSM Circuit Switched**

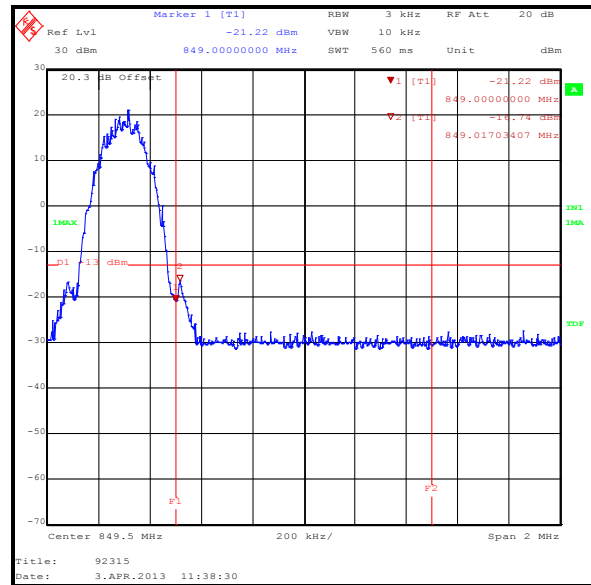
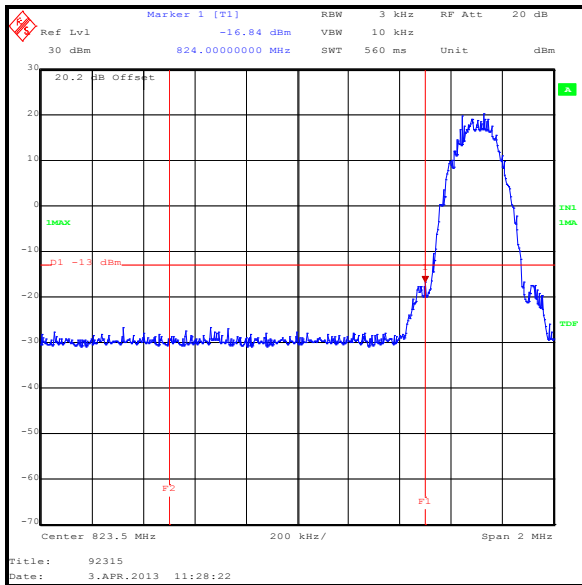
Frequency (MHz)	Peak Level (dBm)	Limit (dBm)	Margin (dB)	Result
823.979	-16.7	-13.0	3.7	Complied
824	-17.5	-13.0	4.5	Complied
849	-20.3	-13.0	7.3	Complied
849.017	-17.4	-13.0	4.4	Complied



**Transmitter Band Edge Radiated Emissions (continued)**

**Results: GPRS**

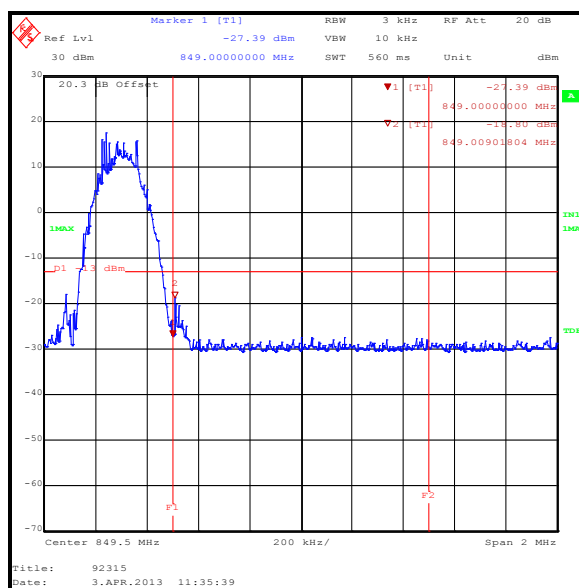
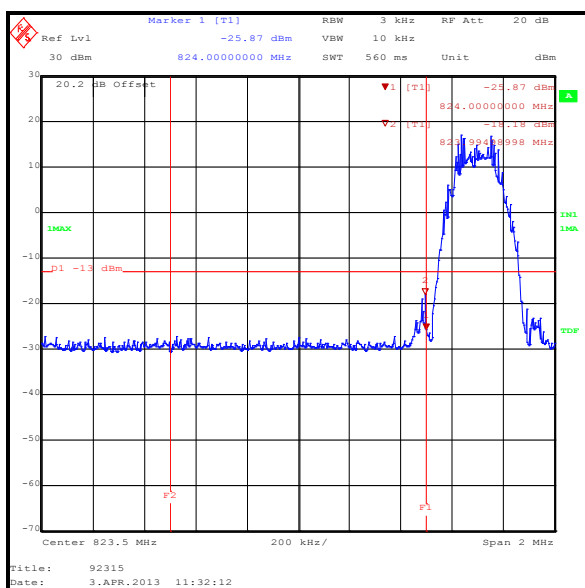
Frequency (MHz)	Peak Level (dBm)	Limit (dBm)	Margin (dB)	Result
824	-16.8	-13.0	3.8	Complied
849	-21.2	-13.0	8.2	Complied
849.017	-16.7	-13.0	3.7	Complied



**Transmitter Band Edge Radiated Emissions (continued)**

**Results: EGPRS / MCS5**

Frequency (MHz)	Peak Level (dBm)	Limit (dBm)	Margin (dB)	Result
823.995	-18.2	-13.0	5.2	Complied
824	-25.9	-13.0	12.9	Complied
849	-27.4	-13.0	14.4	Complied
849.009	-18.8	-13.0	5.8	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

**5.3. Test Results - Part 24****5.3.1. Receiver/Idle Mode AC Conducted Spurious Emissions****Test Summary:**

<b>Test Engineer:</b>	Nick Steele	<b>Test Date:</b>	29 March 2013
<b>Test Sample IMEI:</b>	355335050017228		

<b>FCC Reference:</b>	Part 15.107(a)
<b>Test Method Used:</b>	As detailed in ANSI C63.10 Section 6.2 referencing ANSI C63.4

**Environmental Conditions:**

<b>Temperature (°C):</b>	20
<b>Relative Humidity (%):</b>	30

**Results: Live / Quasi Peak**

Frequency (MHz)	Line	Level (dB $\mu$ V)	Limit (dB $\mu$ 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 $\mu$ V)	Limit (dB $\mu$ 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

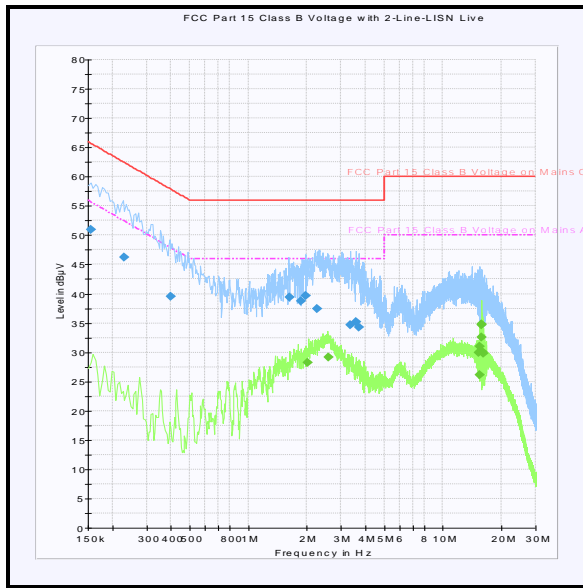
**Receiver/Idle Mode AC Conducted Spurious Emissions (continued)****Results: Neutral / Quasi Peak**

Frequency (MHz)	Line	Level (dB $\mu$ V)	Limit (dB $\mu$ 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

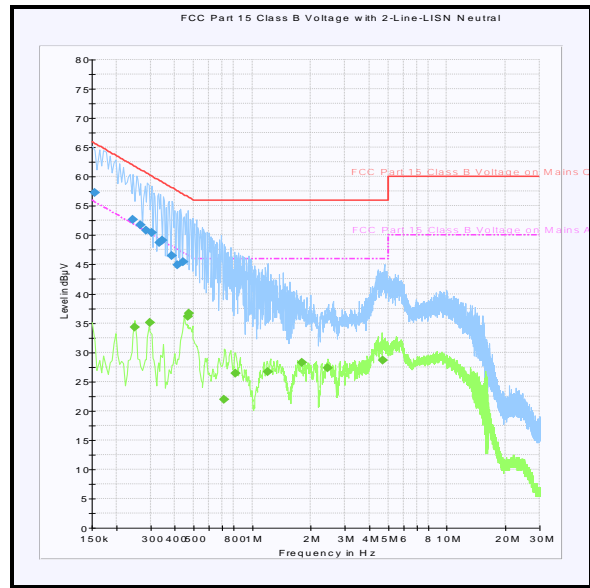
**Results: Neutral / Average**

Frequency (MHz)	Line	Level (dB $\mu$ V)	Limit (dB $\mu$ 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

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

<b>Test Engineer:</b>	Sarah Williams	<b>Test Date:</b>	29 March 2013
<b>Test Sample IMEI:</b>	355335050017236		

<b>FCC Reference:</b>	Part 15.109
<b>Test Method Used:</b>	As detailed in ANSI C63.10 Sections 6.3 and 6.5 referencing ANSI C63.4
<b>Frequency Range:</b>	30 MHz to 1000 MHz

**Environmental Conditions:**

<b>Temperature (°C):</b>	22
<b>Relative Humidity (%):</b>	26

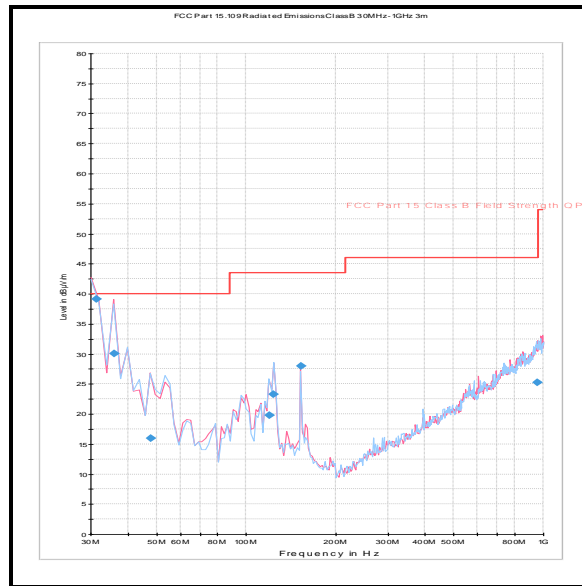
**Note(s):**

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 $\mu$ V/m)	Limit (dB $\mu$ 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:**

<b>Test Engineer:</b>	Nick Steele	<b>Test Date:</b>	26 March 2013
<b>Test Sample IMEI:</b>	355335050017244		

<b>FCC Reference:</b>	Part 15.109
<b>Test Method Used:</b>	As detailed in ANSI C63.4 Section 8
<b>Frequency Range:</b>	1 GHz to 10 GHz

**Environmental Conditions:**

<b>Temperature (°C):</b>	23
<b>Relative Humidity (%):</b>	29

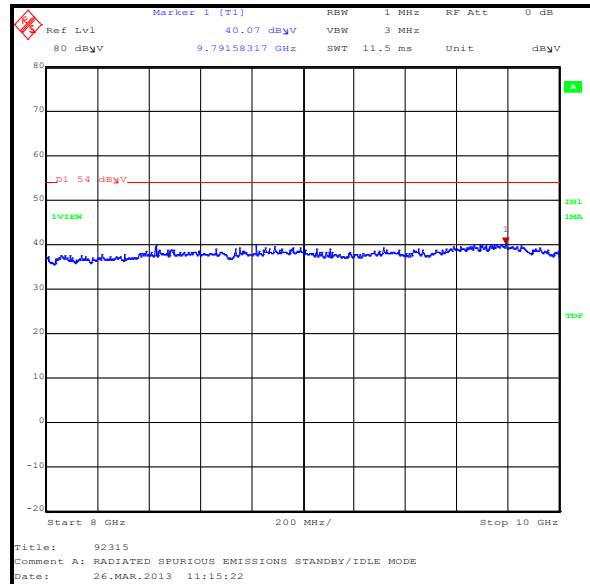
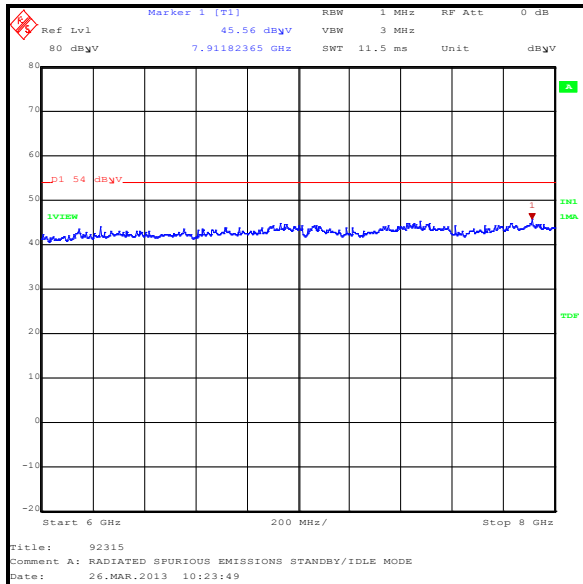
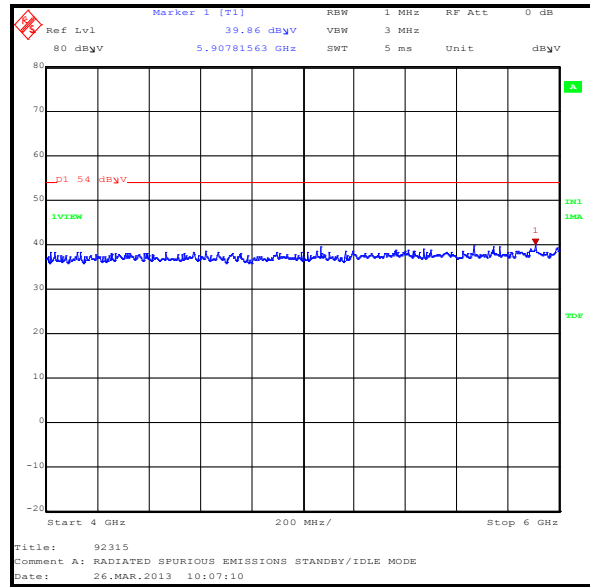
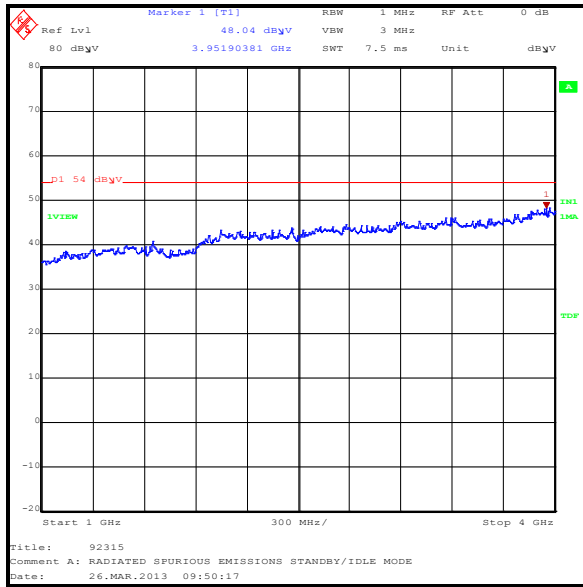
**Note(s):**

1. The final measured value, for the given emission, in the table below 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.
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:**

<b>Frequency (MHz)</b>	<b>Antenna Polarity</b>	<b>Peak Level (dB<math>\mu</math>V/m)</b>	<b>Average Limit (dB<math>\mu</math>V/m)</b>	<b>Margin (dB)</b>	<b>Result</b>
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	3008A004 05	04 Nov 2013	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

**5.3.3. Transmitter Output Power (EIRP)****Test Summary:**

<b>Test Engineer:</b>	David Doyle	<b>Test Date:</b>	03 April 2013
<b>Test Sample IMEI:</b>	355335050017236		

<b>FCC Reference:</b>	Part 24.232
<b>Test Method Used:</b>	As detailed in ANSI TIA-603-C-2004 Section 2.2.17.2

**Environmental Conditions:**

<b>Temperature (°C):</b>	21
<b>Relative Humidity (%):</b>	29

**Results: GSM Circuit Switched**

Channel	Frequency (MHz)	Antenna Polarity	EIRP (dBm)	Limit (dBm)	Margin (dB)	Result
Bottom	1850.2	Horizontal	27.8	33.0	5.2	Complied
Middle	1879.8	Vertical	26.7	33.0	6.3	Complied
Top	1909.8	Horizontal	28.7	33.0	4.3	Complied

**Results: GPRS**

Channel	Frequency (MHz)	Antenna Polarity	EIRP (dBm)	Limit (dBm)	Margin (dB)	Result
Bottom	1850.2	Horizontal	27.8	33.0	5.2	Complied
Middle	1879.8	Vertical	26.7	33.0	6.3	Complied
Top	1909.8	Horizontal	28.5	33.0	4.5	Complied

**Results: EGPRS / MCS5**

Channel	Frequency (MHz)	Antenna Polarity	EIRP (dBm)	Limit (dBm)	Margin (dB)	Result
Bottom	1850.2	Horizontal	27.8	33.0	5.2	Complied
Middle	1879.8	Vertical	26.5	33.0	6.5	Complied
Top	1909.8	Horizontal	28.6	33.0	4.4	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
A1818	Antenna	EMCO	3115	00075692	04 Nov 2013	12
A1396	Attenuator	Huber & Suhner	6810.17.B	757987	06 Jul 2013	12

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

<b>Test Engineer:</b>	Ian Watch	<b>Test Date:</b>	06 April 2013
<b>Test Sample IMEI:</b>	355335050017079		

<b>FCC Reference:</b>	Parts 2.1055 & 24.235
<b>Test Method Used:</b>	As detailed in ANSI TIA-603-C-2004 Section 2.2.2 referencing FCC CFR Part 2.1055

**Environmental Conditions:**

<b>Ambient Temperature (°C):</b>	19
<b>Ambient Relative Humidity (%):</b>	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 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 between the EUT and CMU 200. The frequency meter value was recorded.
3. Temperature was monitored throughout the test with a calibrated digital thermometer.

**Results: Bottom Channel (1850.2 MHz)**

Temperature (°C)	Frequency Error (Hz)	Measured Frequency (MHz)	Lower Band Edge Limit (MHz)	Margin (MHz)	Result
-30	20	1850.199980	1850.0	0.199980	Complied
-20	23	1850.199977	1850.0	0.199977	Complied
-10	19	1850.199981	1850.0	0.199981	Complied
0	21	1850.199979	1850.0	0.199979	Complied
10	19	1850.199981	1850.0	0.199981	Complied
20	20	1850.199980	1850.0	0.199980	Complied
30	22	1850.199978	1850.0	0.199978	Complied
40	16	1850.199984	1850.0	0.199984	Complied
50	23	1850.199977	1850.0	0.199977	Complied

**Transmitter Frequency Stability (Temperature Variation) (continued)****Results: Top Channel (1909.8 MHz)**

Temperature (°C)	Frequency Error (Hz)	Measured Frequency (MHz)	Upper Band Edge Limit (MHz)	Margin (MHz)	Result
-30	22	1909.799978	1910.0	0.200022	Complied
-20	27	1909.799973	1910.0	0.200027	Complied
-10	20	1909.799980	1910.0	0.200020	Complied
0	22	1909.799978	1910.0	0.200022	Complied
10	25	1909.799975	1910.0	0.200025	Complied
20	20	1909.799980	1910.0	0.200020	Complied
30	20	1909.799980	1910.0	0.200020	Complied
40	21	1909.799979	1910.0	0.200021	Complied
50	22	1909.799978	1910.0	0.200022	Complied

**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	-
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	504E005G2	Calibrated Before Use	-

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

<b>Test Engineer:</b>	Ian Watch	<b>Test Date:</b>	06 April 2013
<b>Test Sample IMEI:</b>	355335050017079		

<b>FCC Reference:</b>	Parts 2.1055 & 24.235
<b>Test Method Used:</b>	As detailed in ANSI TIA-603-C-2004 Section 2.2.2 referencing FCC CFR Part 2.1055

**Environmental Conditions:**

<b>Temperature (°C):</b>	20
<b>Relative Humidity (%):</b>	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 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 between the EUT and CMU 200. The frequency meter value was recorded.
3. Voltage was monitored throughout the test with a calibrated digital voltmeter.

**Results: Bottom Channel (1850.2 MHz)**

Supply Voltage (V)	Frequency Error (Hz)	Measured Frequency (MHz)	Lower Band Edge Limit (MHz)	Margin (MHz)	Result
3.4	16	1850.199984	1850.0	0.199984	Complied
4.35	21	1850.199979	1850.0	0.199979	Complied

**Results: Top Channel (1909.8 MHz)**

Supply Voltage (V)	Frequency Error (Hz)	Measured Frequency (MHz)	Upper Band Edge Limit (MHz)	Margin (MHz)	Result
3.4	19	1909.799981	1910.0	0.200019	Complied
4.35	21	1909.799979	1910.0	0.200021	Complied

**Transmitter Frequency Stability (Voltage Variation)****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	504E005G2	Calibrated Before Use	-

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

<b>Test Engineer:</b>	David Doyle	<b>Test Date:</b>	04 April 2013
<b>Test Sample IMEI:</b>	355335050017236		

<b>FCC Reference:</b>	Part 2.1049
<b>Test Method Used:</b>	The 99% occupied bandwidth was measured using the Occupied Bandwidth function of a test receiver

**Environmental Conditions:**

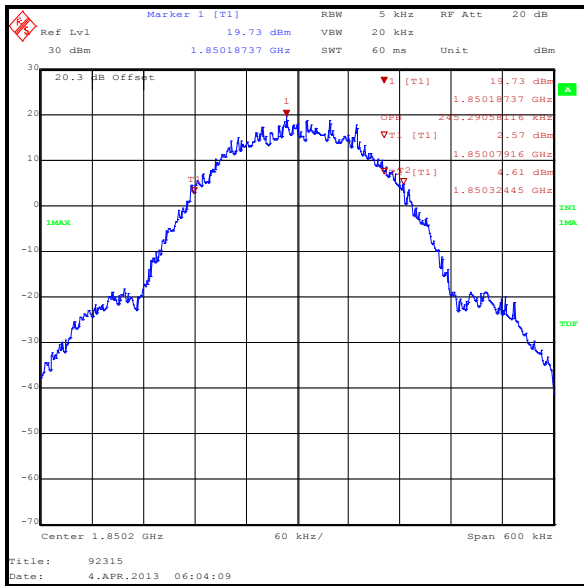
<b>Temperature (°C):</b>	19
<b>Relative Humidity (%):</b>	30



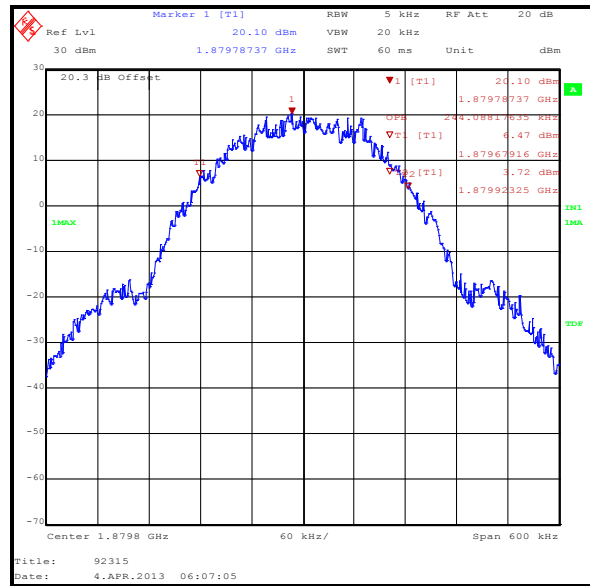
**Transmitter Occupied Bandwidth (continued)**

**Results: GSM Circuit Switched**

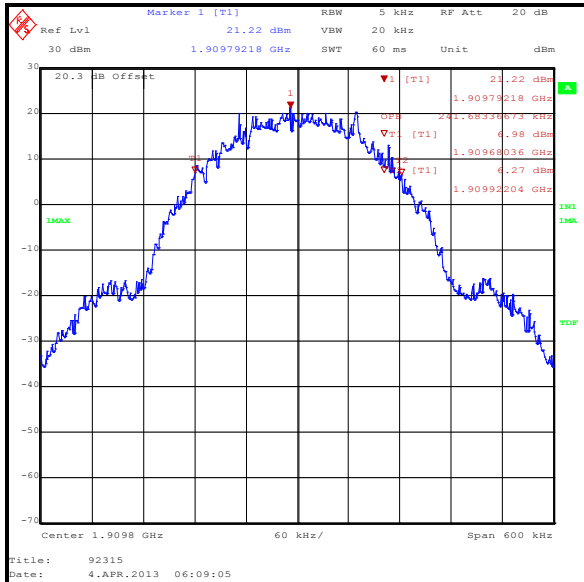
Channel	Frequency (MHz)	Occupied Bandwidth (kHz)
Bottom	1850.2	245.291
Middle	1879.8	244.088
Top	1909.8	241.683



**Bottom Channel**



**Middle Channel**

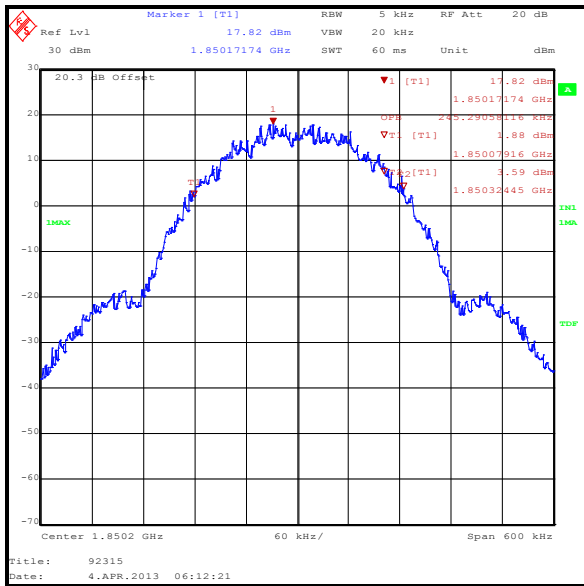


**Top Channel**

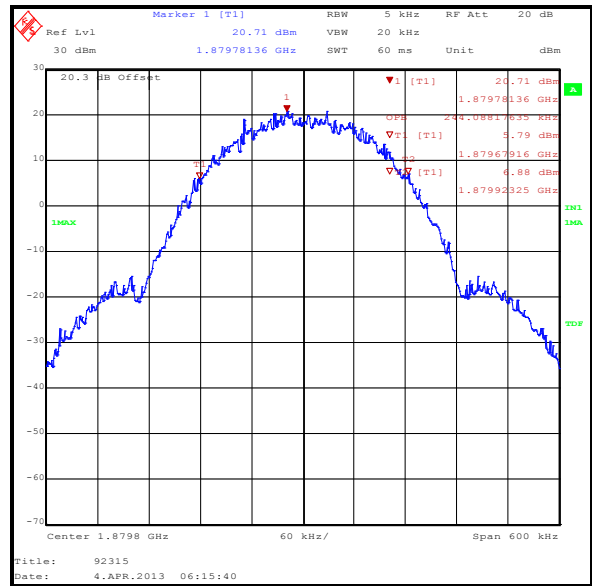
**Transmitter Occupied Bandwidth (continued)**

**Results: GPRS**

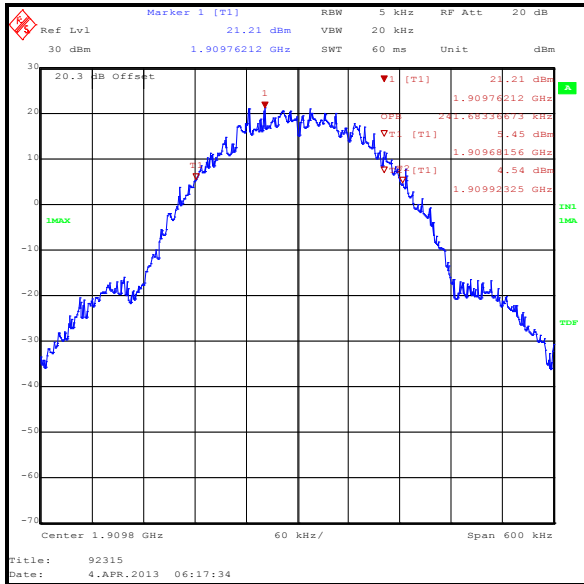
Channel	Frequency (MHz)	Occupied Bandwidth (kHz)
Bottom	1850.2	245.291
Middle	1879.8	244.088
Top	1909.8	241.683



**Bottom Channel**



**Middle Channel**

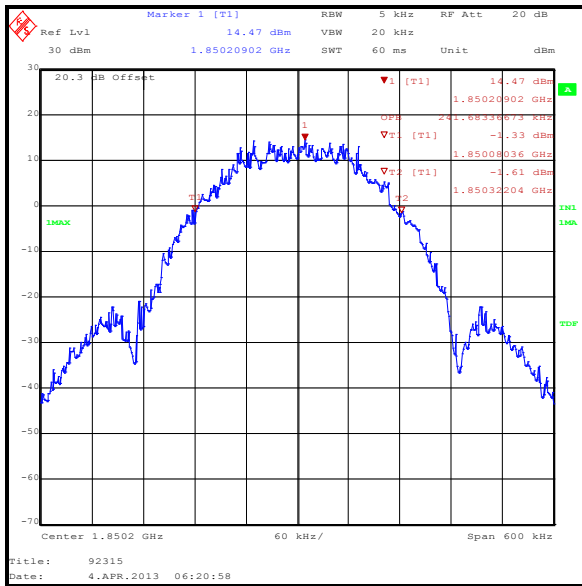


**Top Channel**

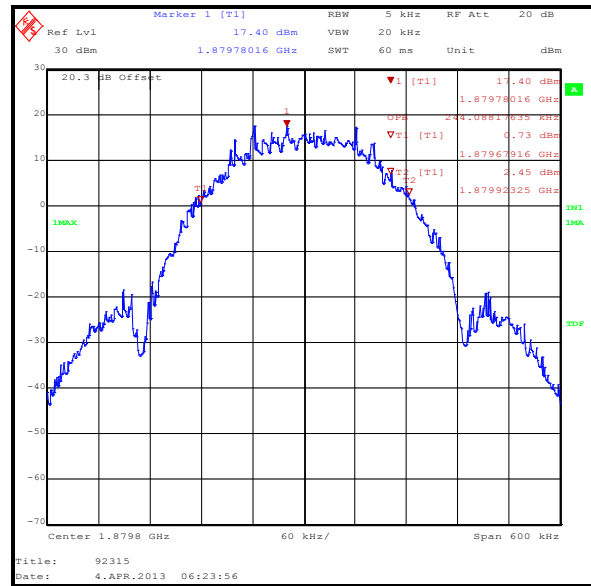
**Transmitter Occupied Bandwidth (continued)**

**Results: EGPRS / MCS5**

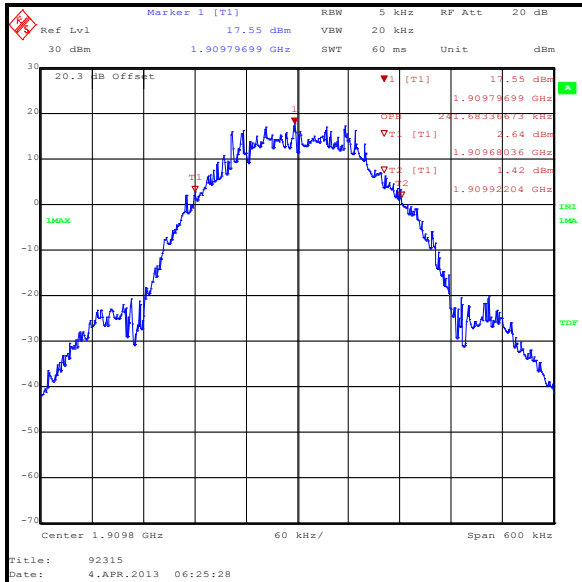
Channel	Frequency (MHz)	Occupied Bandwidth (kHz)
Bottom	1850.2	241.683
Middle	1879.8	244.088
Top	1909.8	241.683



**Bottom Channel**



**Middle Channel**



**Top Channel**

**Transmitter Occupied Bandwidth (continued)****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
A1818	Antenna	EMCO	3115	00075692	04 Nov 2013	12
A1393	Attenuator	Huber & Suhner	6820.17.B	757456	06 Jul 2013	12

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

<b>Test Engineers:</b>	David Doyle & Sandeep Bharat	<b>Test Dates:</b>	03 April 2013 & 04 April 2013
<b>Test Sample IMEI:</b>	355335050017236		

<b>FCC Reference:</b>	Parts 2.1053 & 24.238
<b>Test Method Used:</b>	As detailed in ANSI TIA-603-C-2004 Section 2.2.12 referencing FCC CFR Parts 2.1053 and 24.238
<b>Frequency Range:</b>	30 MHz to 20 GHz
<b>Configuration:</b>	GSM Circuit Switched

**Environmental Conditions:**

<b>Temperature (°C):</b>	21 to 22
<b>Relative Humidity (%):</b>	29

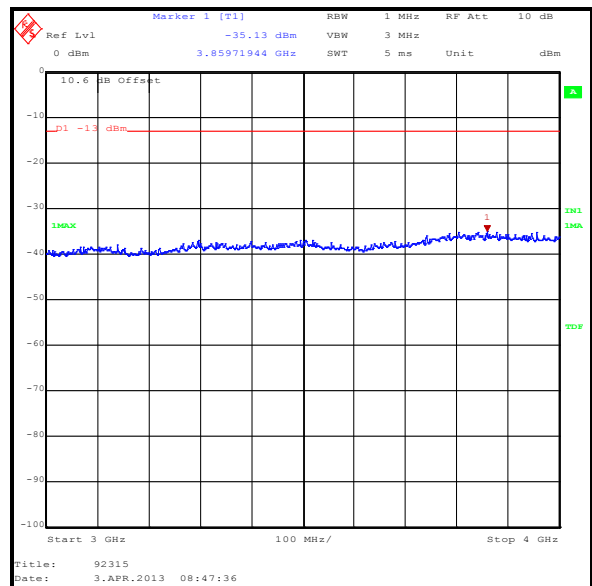
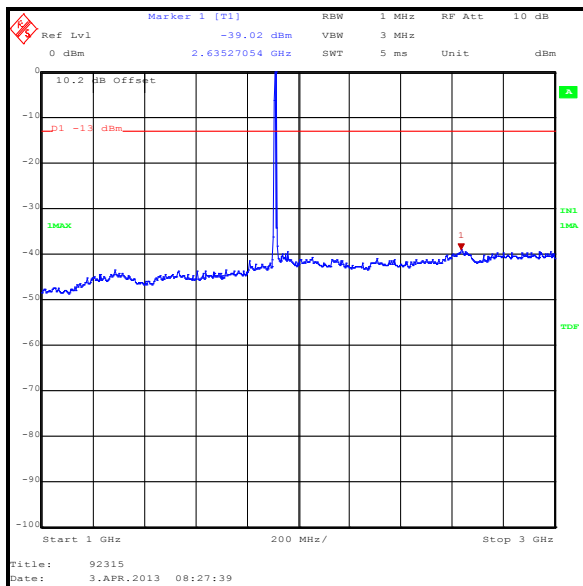
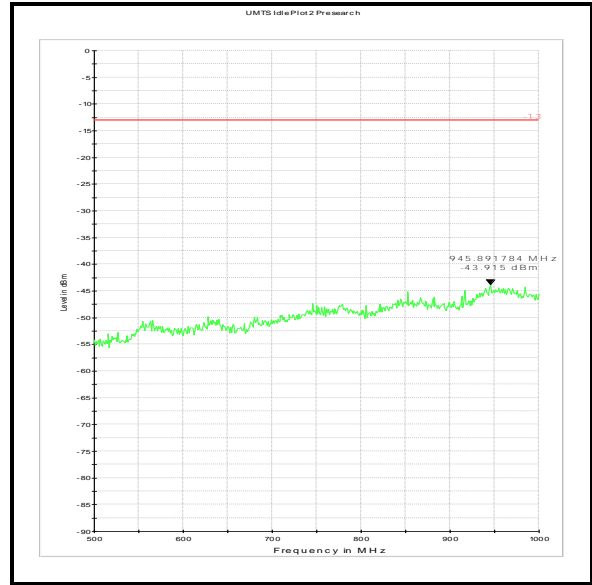
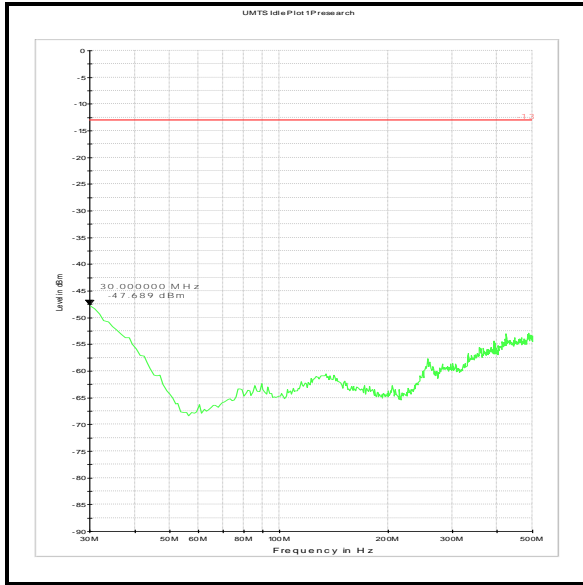
**Note(s):**

1. All emissions shown on the pre-scan plots were investigated and found to be ambient, or >20 dB below the applicable limit or below the measurement system noise floor. Therefore the highest peak noise floor reading of the measuring receiver was recorded in the table above.
2. The uplink traffic channel is shown on the 1 GHz to 4 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.

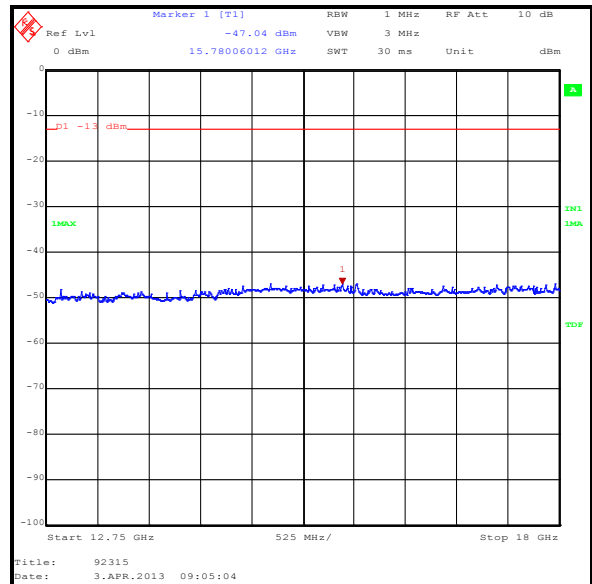
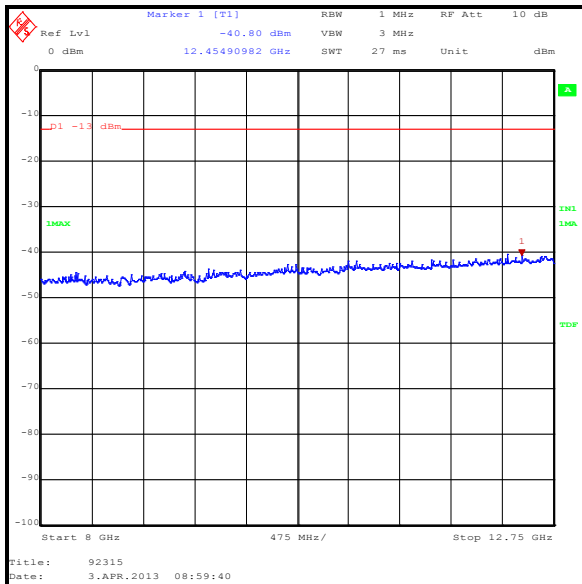
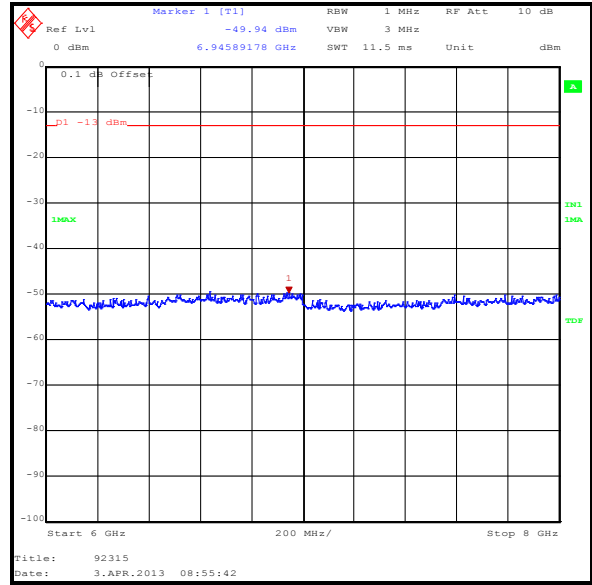
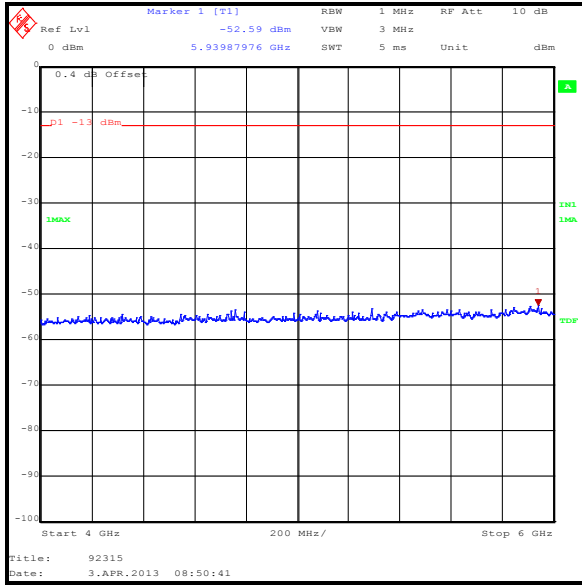
**Results:**

<b>Frequency (MHz)</b>	<b>Peak Level (dBm)</b>	<b>Limit (dBm)</b>	<b>Margin (dB)</b>	<b>Result</b>
3859.719	-35.1	-13.0	22.1	Complied

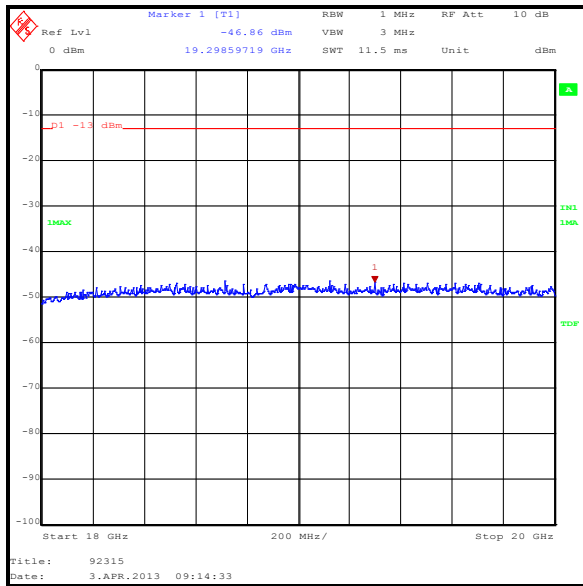
### Transmitter Out of Band Radiated Emissions (continued)



**Transmitter Out of Band Radiated Emissions (continued)**



**Transmitter Out of Band Radiated Emissions (continued)**



**Test Equipment Used:**

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
G0543	Pre Amplifier	Sonoma	310N	230801	04 Jul 2013	3
A490	Antenna	Chase	CBL6111A	1590	14 May 2013	12
M1273	Test Receiver	Rohde & Schwarz	ESIB 26	100275	15 Feb 2014	12
A1834	Attenuator	Hewlett Packard	8491B	10444	27 Jan 2014	12
A1393	Attenuator	Huber & Suhner	6820.17.B	757456	06 Jul 2013	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
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
A256	Antenna	Flann Microwave	18240-20	400	04 Nov 2013	12
A436	Antenna	Flann Microwave	20240-20	330	04 Nov 2013	12
A1975	High Pass Filter	AtlanTecRF	AFH-03000	090424010	14 Mar 2014	12
A1396	Attenuator	Huber & Suhner	6810.17.B	757987	06 Jul 2013	12



**5.3.8. Transmitter Band Edge Radiated Emissions**

**Test Summary:**

<b>Test Engineer:</b>	David Doyle	<b>Test Date:</b>	03 April 2013
<b>Test Sample IMEI:</b>	355335050017236		

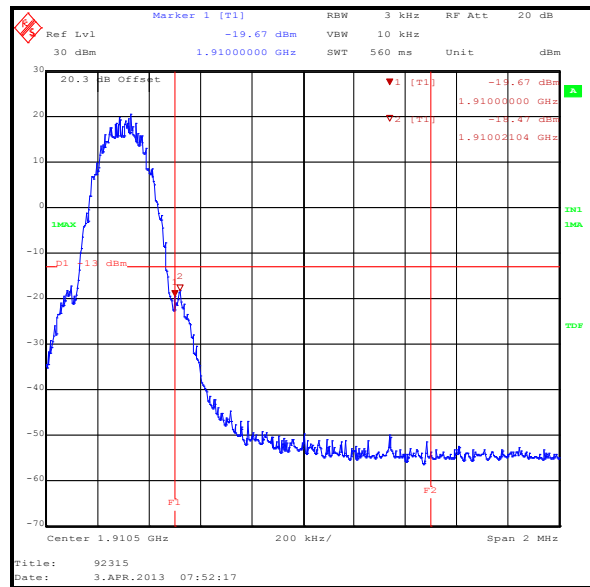
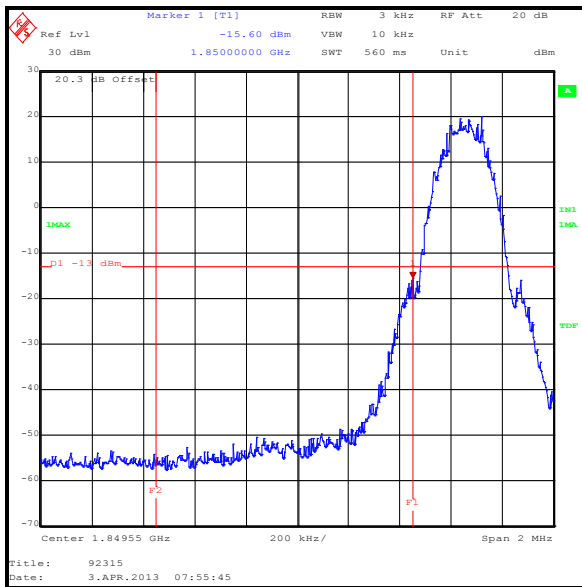
<b>FCC Reference:</b>	Parts 2.1053 & 24.238
<b>Test Method Used:</b>	As detailed in ANSI TIA-603-C-2004 Section 2.2.12 referencing FCC CFR Parts 2.1053 and 24.238

**Environmental Conditions:**

<b>Temperature (°C):</b>	21
<b>Relative Humidity (%):</b>	29

**Results: GSM Circuit Switched**

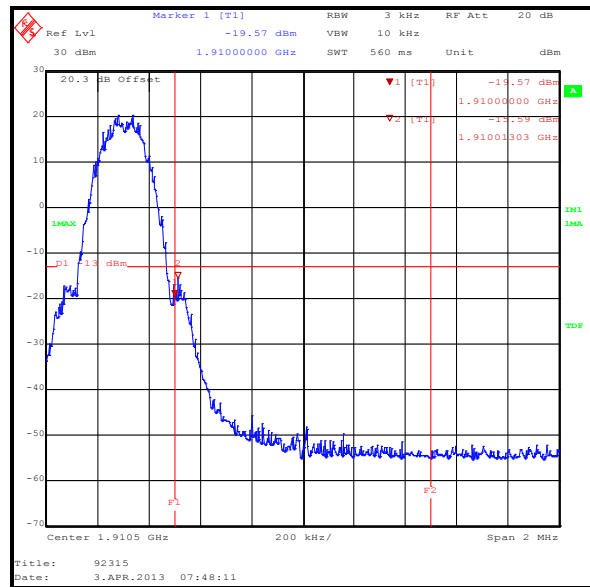
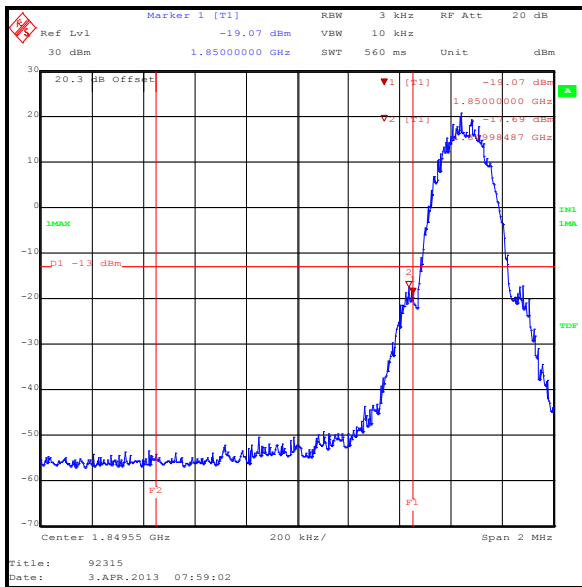
Frequency (MHz)	Peak Level (dBm)	Limit (dBm)	Margin (dB)	Result
1850.0	-15.6	-13.0	2.6	Complied
1910.0	-19.7	-13.0	6.7	Complied
1910.021	-18.5	-13.0	5.5	Complied



**Transmitter Band Edge Radiated Emissions (continued)**

**Results: GPRS**

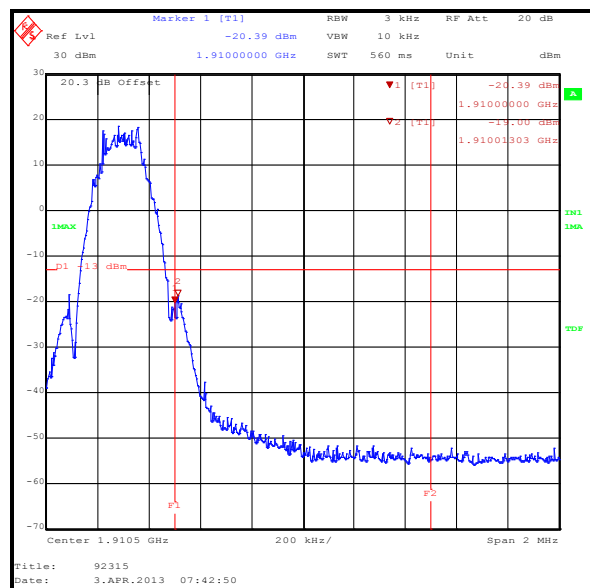
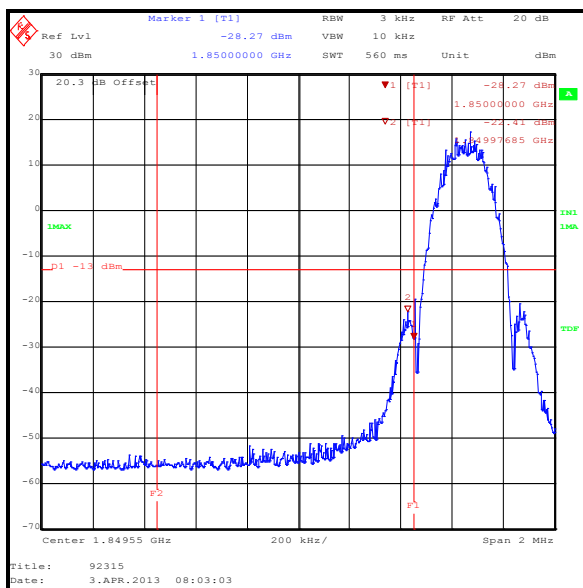
Frequency (MHz)	Peak Level (dBm)	Limit (dBm)	Margin (dB)	Result
1849.985	-17.7	-13.0	4.7	Complied
1850.0	-19.1	-13.0	6.1	Complied
1910.0	-19.6	-13.0	6.6	Complied
1910.013	-15.6	-13.0	2.6	Complied



**Transmitter Band Edge Radiated Emissions (continued)**

**Results: EGPRS / MCS5**

Frequency (MHz)	Peak Level (dBm)	Limit (dBm)	Margin (dB)	Result
1849.977	-22.4	-13.0	9.4	Complied
1850.0	-28.3	-13.0	15.3	Complied
1910.0	-20.4	-13.0	7.4	Complied
1910.013	-19.0	-13.0	6.0	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
A1818	Antenna	EMCO	3115	00075692	04 Nov 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".

<b>Measurement Type</b>	<b>Range</b>	<b>Confidence Level (%)</b>	<b>Calculated Uncertainty</b>
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
Effective Isotropic Radiated Power (EIRP)	1850 to 1910 MHz	95%	±2.94 dB
Frequency Stability	824 to 849 MHz / 1850 to 1910 MHz	95%	±0.92 ppm
Occupied Bandwidth	824 to 849 MHz / 1850 to 1910 MHz	95%	±0.92 ppm
Radiated Spurious Emissions	30 MHz 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**

<b>Version Number</b>	<b>Revision Details</b>		
	<b>Page No(s)</b>	<b>Clause</b>	<b>Details</b>
1.0	-	-	Initial Version
2.0	-	-	Update to voltages