

## TEST REPORT

Test report no.: 1-5579/12-02-02-B



### Testing laboratory

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#### Accredited Testing Laboratory:

The testing laboratory (area of testing) is accredited according to DIN EN ISO/IEC 17025 (2005) by the Deutsche Akkreditierungsstelle GmbH (DAkkS). The accreditation is valid for the scope of testing procedures as stated in the accreditation certificate with the registration number: D-PL-12076-01-01  
 Area of Testing: Radio/Satellite Communications

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### Manufacturer

**Research In Motion Limited**  
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### Test standard/s

47 CFR Part 22 Title 47 of the Code of Federal Regulations; Chapter I  
 Part 22 - Public mobile services  
 47 CFR Part 24 Title 47 of the Code of Federal Regulations; Chapter I  
 Part 24 - Personal communications services

For further applied test standards please refer to section 3 of this test report.

### Test Item

**Kind of test item:** Blackberry GSM Phones  
**Model name:** RFM121LW  
**FCC ID:** L6ARFM120LW  
**IC:** 2503A-RFM120LW  
**Frequency:** GSM: 824.2 – 848.8 MHz, 1850.2 – 1909.8 MHz  
 UMTS: 826.4 – 846.6 MHz, 1852.4 – 1907.6 MHz  
 CDMA2000: 824.7 – 848.31 MHz, 1851.2 – 1908.75 MHz  
**Technology tested:** GSM, UMTS, CDMA2000, EV-DO  
**Antenna:** Integrated antenna  
**Power Supply:** 3.8 V DC by Li-Ion battery  
**Temperature Range:** -20°C to +55°C

This test report is electronically signed and valid without handwriting signature. For verification of the electronic signatures, the public keys can be requested at the testing laboratory.

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## 1 Table of contents

1	Table of contents .....	2
2	General information .....	4
2.1	Notes and disclaimer .....	4
2.2	Application details .....	4
3	Test standard/s .....	4
4	Test environment .....	5
5	Test item .....	5
5.1	Additional information .....	5
6	Test laboratories sub-contracted .....	5
7	Summary of measurement results .....	6
7.1	GSM 850 .....	6
7.2	PCS 1900 .....	6
7.3	UMTS band II .....	7
7.4	UMTS band V .....	7
7.5	CDMA2000 PCS .....	8
7.6	CDMA2000 Cellular .....	8
8	RF measurements .....	9
8.1	Description of test setup .....	9
8.1.1	Radiated measurements .....	9
8.1.2	Conducted measurements .....	10
8.2	Results GSM 850 .....	11
8.2.1	RF output power .....	11
8.2.2	Frequency stability .....	13
8.2.3	Spurious emissions radiated .....	14
8.2.4	Spurious emissions conducted .....	20
8.2.5	Block edge compliance .....	24
8.2.6	Occupied bandwidth .....	27
8.3	Results PCS 1900 .....	35
8.3.1	RF output power .....	35
8.3.2	Frequency stability .....	37
8.3.3	Spurious emissions radiated .....	38
8.3.4	Spurious emissions conducted .....	47
8.3.5	Block edge compliance .....	51
8.3.6	Occupied bandwidth .....	54
8.4	Results UMTS band II .....	62
8.4.1	RF output power .....	62
8.4.2	Frequency stability .....	64
8.4.3	Spurious emissions radiated .....	65
8.4.4	Spurious emissions conducted .....	76
8.4.5	Block edge compliance .....	80
8.4.6	Occupied bandwidth .....	82
8.5	Results UMTS band V .....	87
8.5.1	RF output power .....	87
8.5.2	Frequency stability .....	89
8.5.3	Spurious emissions radiated .....	90
8.5.4	Spurious emissions conducted .....	97
8.5.5	Block edge compliance .....	101
8.5.6	Occupied bandwidth .....	103
8.6	Results CDMA2000 PCS .....	107
8.6.1	RF output power .....	107

8.6.2	Frequency stability.....	109
8.6.3	Spurious emissions radiated .....	110
8.6.4	Spurious emissions conducted .....	139
8.6.5	Block edge compliance.....	139
8.6.6	Occupied bandwidth .....	139
<b>8.7</b>	<b>Results CDMA2000 Cellular.....</b>	<b>140</b>
8.7.1	RF output power .....	140
8.7.2	Frequency stability.....	142
8.7.3	Spurious emissions radiated .....	143
8.7.4	Spurious emissions conducted .....	163
8.7.5	Block edge compliance.....	163
8.7.6	Occupied bandwidth .....	163
<b>9</b>	<b>Test equipment and ancillaries used for tests .....</b>	<b>164</b>
<b>10</b>	<b>Observations .....</b>	<b>165</b>
<b>Annex A</b>	<b>Document history .....</b>	<b>166</b>
<b>Annex B</b>	<b>Further information.....</b>	<b>166</b>
<b>Annex C</b>	<b>Accreditation Certificate .....</b>	<b>167</b>

## 2 General information

### 2.1 Notes and disclaimer

The test results of this test report relate exclusively to the test item specified in this test report. CETECOM ICT Services GmbH does not assume responsibility for any conclusions and generalizations drawn from the test results with regard to other specimens or samples of the type of the equipment represented by the test item.

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### 2.2 Application details

Date of receipt of order:	2013-01-04
Date of receipt of test item:	2013-01-14
Start of test:	2013-01-14
End of test:	2013-03-28
Person(s) present during the test:	-/-

## 3 Test standard/s

Test standard	Date	Test standard description
47 CFR Part 22	2012-10	Title 47 of the Code of Federal Regulations; Chapter I Part 22 - Public mobile services
47 CFR Part 24	2012-10	Title 47 of the Code of Federal Regulations; Chapter I Part 24 - Personal communications services
RSS - 132 Issue 3	2013-01	Spectrum Management and Telecommunications Policy - Radio Standards Specifications Cellular Telephones Employing New Technologies Operating in the Bands 824-849 MHz and 869-894 MHz
RSS - 133 Issue 6	2013-01	Spectrum Management and Telecommunications Policy - Radio Standards Specifications 2 GHz Personal Communication Services

#### 4 Test environment

Temperature:	$T_{nom}$	+22 °C during room temperature tests
	$T_{max}$	+55 °C during high temperature tests
	$T_{min}$	-20 °C during low temperature tests
Relative humidity content:		52 %
Barometric pressure:		not relevant for this kind of testing
Power supply:	$V_{nom}$	3.8 V DC by Li-Ion battery
	$V_{max}$	-/- V
	$V_{min}$	-/- V

#### 5 Test item

Kind of test item	:	Blackberry GSM Phones		
Type identification	:	RFM121LW		
S/N serial number	:	Radiated unit: IMEI 990002430036416; PIN 303E5B59		
HW hardware status	:	CER-53013-001Rev2-905-00		
SW software status	:	127.0.1.4429		
Frequency band [MHz]	:	GSM:	824.2 – 848.8 MHz,	1850.2 – 1909.8 MHz
		UMTS:	826.4 – 846.6 MHz,	1852.4 – 1907.6 MHz
		CDMA2000:	824.7 – 848.31 MHz,	1851.2 – 1908.75 MHz
Type of modulation	:	GMSK, 8-PSK, QPSK, 16 – QAM		
Antenna	:	Integrated antenna		
Power supply	:	3.8 V DC by Li-Ion battery		
Temperature range	:	-20°C to +55°C		

#### 5.1 Additional information

Test setup- and EUT-photos are included in test reports: 1-5579/12-02-01\_AnnexA  
1-5579/12-02-01\_AnnexC

#### 6 Test laboratories sub-contracted

None

## 7 Summary of measurement results

- No deviations from the technical specifications were ascertained
- There were deviations from the technical specifications ascertained

TC identifier	Description	verdict	date	Remark
RF-Testing	CFR Part 22, 24 RSS 132, 133	passed	2013-04-04	-/-

### 7.1 GSM 850

Test Case	temperature conditions	power source voltages	Pass	Fail	NA	NP	Remark
RF Output Power	Nominal	Nominal	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	-/-
Frequency Stability	Nominal	Nominal	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	-/-
Spurious Emissions Radiated	Nominal	Nominal	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	-/-
Spurious Emissions Conducted	Nominal	Nominal	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	-/-
Block Edge Compliance	Nominal	Nominal	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	-/-
Occupied Bandwidth	Nominal	Nominal	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	-/-

**Note:** NA = Not applicable; NP = Not performed

### 7.2 PCS 1900

Test Case	temperature conditions	power source voltages	Pass	Fail	NA	NP	Remark
RF Output Power	Nominal	Nominal	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	-/-
Frequency Stability	Nominal	Nominal	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	-/-
Spurious Emissions Radiated	Nominal	Nominal	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	-/-
Spurious Emissions Conducted	Nominal	Nominal	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	-/-
Block Edge Compliance	Nominal	Nominal	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	-/-
Occupied Bandwidth	Nominal	Nominal	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	-/-

**Note:** NA = Not applicable; NP = Not performed

### 7.3 UMTS band II

Test Case	temperature conditions	power source voltages	Pass	Fail	NA	NP	Remark
RF Output Power	Nominal	Nominal	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	-/-
Frequency Stability	Nominal	Nominal	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	-/-
Spurious Emissions Radiated	Nominal	Nominal	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	-/-
Spurious Emissions Conducted	Nominal	Nominal	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	-/-
Block Edge Compliance	Nominal	Nominal	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	-/-
Occupied Bandwidth	Nominal	Nominal	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	-/-

**Note:** NA = Not applicable; NP = Not performed

### 7.4 UMTS band V

Test Case	temperature conditions	power source voltages	Pass	Fail	NA	NP	Remark
RF Output Power	Nominal	Nominal	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	-/-
Frequency Stability	Nominal	Nominal	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	-/-
Spurious Emissions Radiated	Nominal	Nominal	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	-/-
Spurious Emissions Conducted	Nominal	Nominal	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	-/-
Block Edge Compliance	Nominal	Nominal	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	-/-
Occupied Bandwidth	Nominal	Nominal	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	-/-

**Note:** NA = Not applicable; NP = Not performed

### 7.5 CDMA2000 PCS

Test Case	temperature conditions	power source voltages	Pass	Fail	NA	NP	Remark
RF Output Power	Nominal	Nominal	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	-/-
Frequency Stability	Nominal	Nominal	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	-/-
Spurious Emissions Radiated	Nominal	Nominal	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	-/-
Spurious Emissions Conducted	Nominal	Nominal	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	-/-
Block Edge Compliance	Nominal	Nominal	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	-/-
Occupied Bandwidth	Nominal	Nominal	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	-/-

**Note:** NA = Not applicable; NP = Not performed

### 7.6 CDMA2000 Cellular

Test Case	temperature conditions	power source voltages	Pass	Fail	NA	NP	Remark
RF Output Power	Nominal	Nominal	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	-/-
Frequency Stability	Nominal	Nominal	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	-/-
Spurious Emissions Radiated	Nominal	Nominal	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	-/-
Spurious Emissions Conducted	Nominal	Nominal	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	-/-
Block Edge Compliance	Nominal	Nominal	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	-/-
Occupied Bandwidth	Nominal	Nominal	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	-/-

**Note:** NA = Not applicable; NP = Not performed

## 8 RF measurements

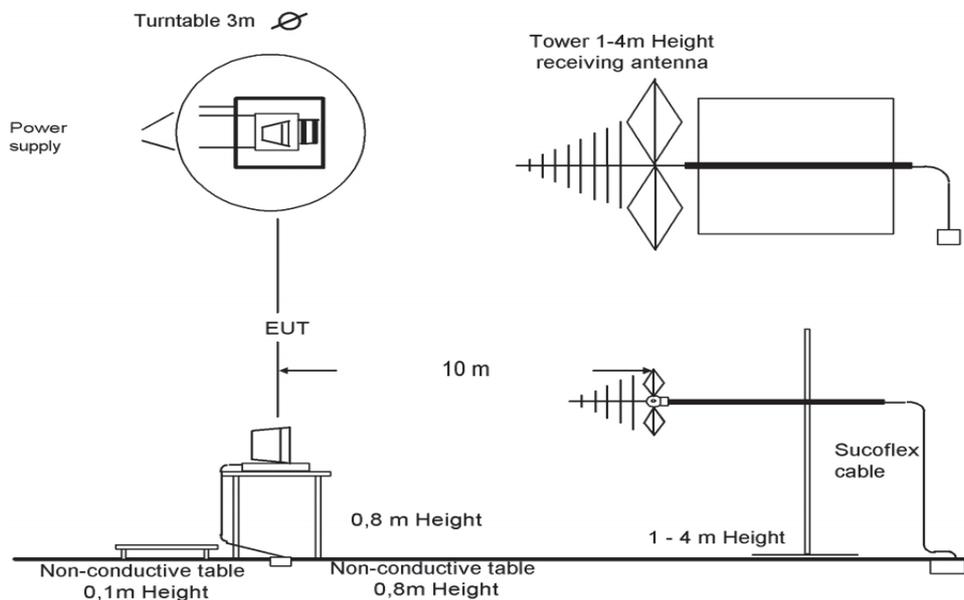
### 8.1 Description of test setup

For the spurious measurements we use the substitution method according TIA/EIA 603.

#### 8.1.1 Radiated measurements

The radiated emissions from the EUT are performed in a semi anechoic chamber. The EUT is placed on a conductive turntable and powered with nominal voltage. The signalling is performed either from outside the chamber with a signalling unit (AP or other) by air link using a signalling antenna or directly by special test software from the customer.

Semi anechoic chamber

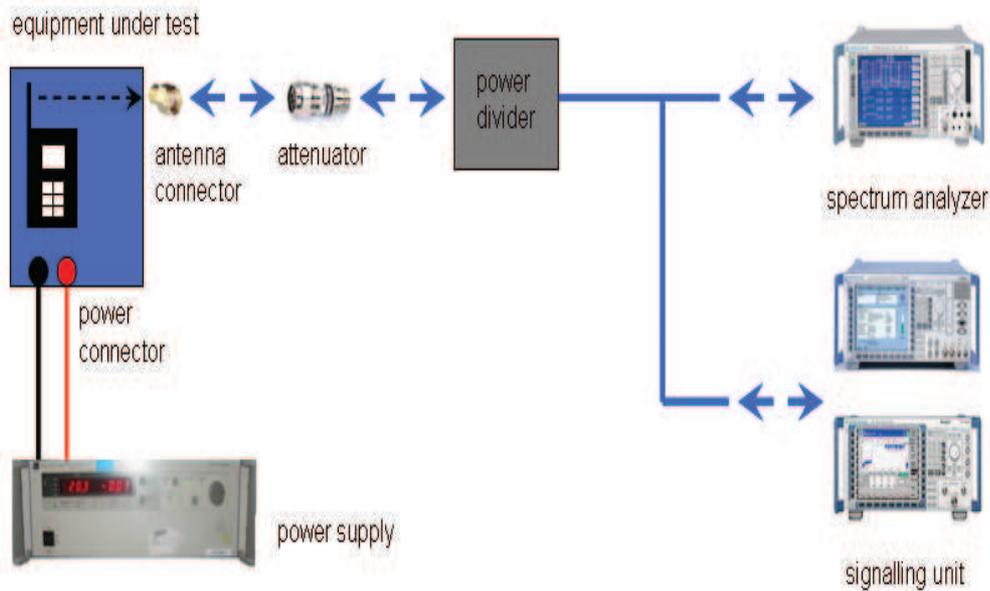


Picture 1: Diagram radiated measurements

9 kHz - 30 MHz:	active loop antenna
30 MHz – 1 GHz:	tri-log antenna
> 1 GHz:	horn antenna

### 8.1.2 Conducted measurements

The EUT's RF signal is coupled out by the antenna connector which is supplied by the manufacturer. The signal is first 10dB attenuated before it is power divided (~6dB loss per branch). One of the signal paths is connected to the signalling unit (AP or other), the other one is connected to the spectrum analyzer. The specific losses for both signal paths are first checked within a calibration. The measurement readings on the signalling unit/spectrum analyzer are corrected by the specific test set-up loss. The attenuator, power divider, signalling unit and the spectrum analyzer are impedance matched on 50 Ohm. If special software is used, there is no power divider necessary.



Picture 2: Diagram conducted measurements

The term measuring receiver refers to either a selective voltmeter or a spectrum analyser.

Frequency being measured f	Measuring receiver bandwidth 6 dB	Spectrum analyser bandwidth 3dB
$f < 150 \text{ kHz}$	200 Hz or	300 Hz
$150 \text{ kHz} \leq f < 25 \text{ MHz}$	9 kHz or	10 kHz
$25 \text{ MHz} \leq f < 1000 \text{ MHz}$	120 kHz or	100 kHz
$1000 \text{ MHz} \leq f$		1 MHz
NOTE: Specific requirements in CEPT/ERC/Recommendation 70-03 [2] shall be applied where applicable.		

## 8.2 Results GSM 850

All GSM-band measurements are done in GSM mode only (circuit switched).

All relevant tests have been repeated using 8-PSK modulation if EDGE mode is supported. All tests were performed with one timeslot in uplink activated and one timeslot in downlink activated. For each mode the highest output power was determined and used.

### 8.2.1 RF output power

#### Description:

This paragraph contains average power, peak output power and ERP measurements for the mobile station. In all cases, the peak output power is within the required mask (this mask is specified in the JTC standards, TIA PN3389 Vol. 1 Chap 7, and is no FCC requirement).

#### Measurement:

The mobile was set up for the maximum output power with pseudo random data modulation.

Measurement parameters	
Detector:	Peak and RMS (Power in Burst)
Sweep time:	Auto
Video bandwidth:	1 MHz
Resolution bandwidth:	1 MHz
Span:	Zero Span
Trace-Mode:	Max Hold

#### Limits:

FCC	IC
CFR Part 22.913 CFR Part 2.1046	RSS 132
Nominal Peak Output Power	
+38.45 dBm	
In measuring transmissions in this band using an average power technique, the peak-to-average ratio (PAR) of the transmission may not exceed 13 dB.	

**Results:**

Output Power (conducted) GMSK mode		
Frequency (MHz)	Average Output Power (dBm)	Peak to Average Ratio (dB)
824.2	32.0	0.11
836.4	31.0	0.13
848.8	30.8	0.08
Measurement uncertainty	± 0.5 dB	

Output Power (conducted) 8-PSK mode		
Frequency (MHz)	Average Output Power (dBm)	Peak to Average Ratio (dB)
824.2	27.2	3.14
836.4	26.9	3.12
848.8	26.4	3.23
Measurement uncertainty	± 0.5 dB	

Output Power (radiated) GMSK mode	
Frequency (MHz)	Average Output Power (dBm) - ERP
824.2	28.0
836.4	27.9
848.8	28.4
Measurement uncertainty	± 2.0 dB

Output Power (radiated) 8-PSK mode	
Frequency (MHz)	Average Output Power (dBm) - ERP
824.2	23.2
836.4	23.8
848.8	24.0
Measurement uncertainty	± 2.0 dB

**Result: Passed**

## 8.2.2 Frequency stability

Not performed

### 8.2.3 Spurious emissions radiated

**Description:**

The following steps outline the procedure used to measure the radiated emissions from the mobile station. The site is constructed in accordance with ANSI C63.4:2009 requirements and is recognized by the FCC to be in compliance for a 3 and a 10 meter site. The spectrum was scanned from 30 MHz to the 10th harmonic of the highest frequency generated within the equipment, which is the transmitted carrier that can be as high as 848.8 MHz. This was rounded up to 12 GHz. The resolution bandwidth is set as outlined in Part 22.917. The spectrum was scanned with the mobile station transmitting at carrier frequencies that pertain to low, mid and high channels of the GSM-850 band.

The final open field emission (here 10m semi-anechoic chamber listed by FCC) test procedure is as follows:

- a) The test item was placed on a 0.8 meter high non-conductive stand at a 3 meter test distance from the receive antenna.
- b) The antenna output was terminated in a 50 ohm load (if possible).
- c) A double ridged wave guide antenna was placed on an adjustable height antenna mast 3 meters from the test item for emission measurements.
- d) Detected emissions were maximized at each frequency by rotating the test item and adjusting the receive antenna height and polarization. The maximum meter reading was recorded. The radiated emission measurements of the harmonics of the transmit frequency through the 10th harmonic were measured with peak detector and 1 MHz bandwidth. If the harmonic could not be detected above the noise floor, the ambient level was recorded. The equivalent power into a dipole antenna was calculated from the field intensity levels measured at 3 meters.
- e) Now each detected emissions were substituted by the substitution method, in accordance with the TIA/EIA 603.

**Measurement:**

Measurement parameters	
Detector:	Peak
Sweep time:	2 sec.
Video bandwidth:	Below 1 GHz: 100 kHz Above 1 GHz: 1 MHz
Resolution bandwidth:	Below 1 GHz: 100 kHz Above 1 GHz: 1 MHz
Span:	100 MHz Steps
Trace-Mode:	Max Hold

**Limits:**

FCC	IC
CFR Part 22.917 CFR Part 2.1053	RSS 132
Spurious Emissions Radiated	
Attenuation $\geq 43 + 10\log(P)$ (P, Power in Watts)	
-13 dBm	

**Results:**

Radiated emissions measurements were made only at the upper, center, and lower carrier frequencies of the GSM-850 band (824.2 MHz, 836.4 MHz and 848.8 MHz). It was decided that measurements at these three carrier frequencies would be sufficient to demonstrate compliance with emissions limits because it was seen that all the significant spurs occur well outside the band and no radiation was seen from a carrier in one block of the GSM-850 band into any of the other blocks. The equipment must still, however, meet emissions requirements with the carrier at all frequencies over which it is capable of operating and it is the manufacturer's responsibility to verify this.

The final open field radiated levels are presented on the next pages. All measurements were done in horizontal and vertical polarization; the plots show the worst case. The plots show only the middle channel. If spurious were detected, the lowest and highest channel were checked too. The found values are stated in the table below.

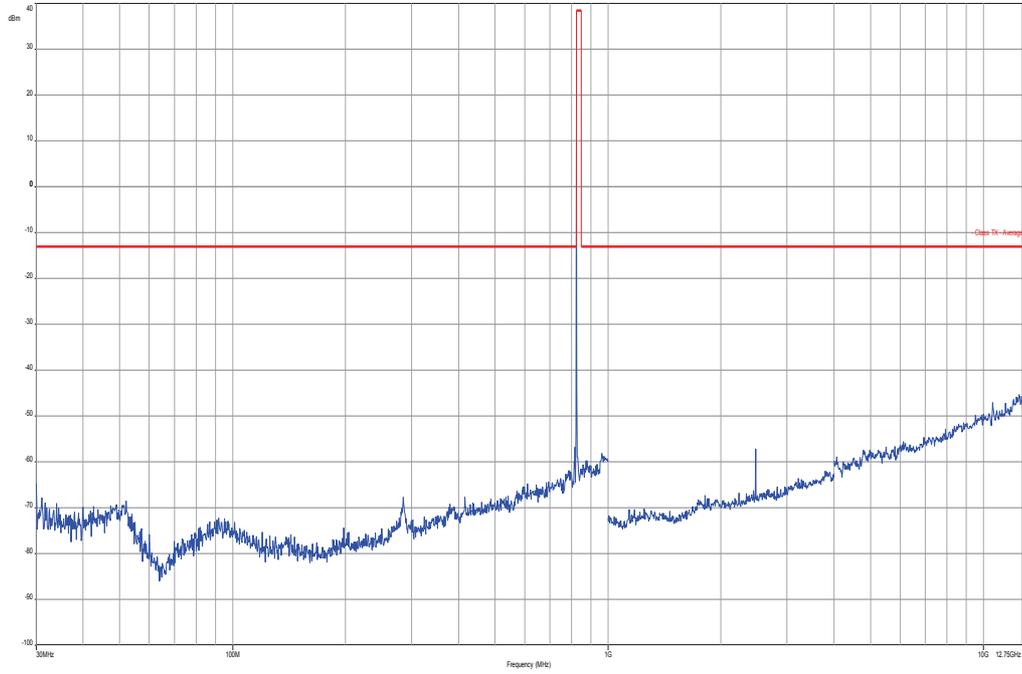
As can be seen from this data, the emissions from the test item were within the specification limit.

SPURIOUS EMISSION LEVEL (dBm)								
Harmonic	Ch. 128 Freq. (MHz)	Level [dBm]	Harmonic	Ch. 189 Freq. (MHz)	Level [dBm]	Harmonic	Ch. 251 Freq. (MHz)	Level [dBm]
2	1648.4	No peaks detected. All detected emissions are more than 10 dB below the limit!	2	1672.8	No peaks detected. All detected emissions are more than 10 dB below the limit!	2	1697.6	No peaks detected. All detected emissions are more than 10 dB below the limit!
3	2472.6		3	2509.2		3	2546.4	
4	3296.8		4	3345.6		4	3395.2	
5	4121.0		5	4182.0		5	4244.0	
6	4945.2		6	5018.4		6	5092.8	
7	5769.4		7	5854.8		7	5941.6	
8	6593.6		8	6691.2		8	6790.4	
9	7417.8		9	7527.6		9	7639.2	
10	8242.0		10	8364.0		10	8488.0	
Measurement uncertainty						± 3dB		

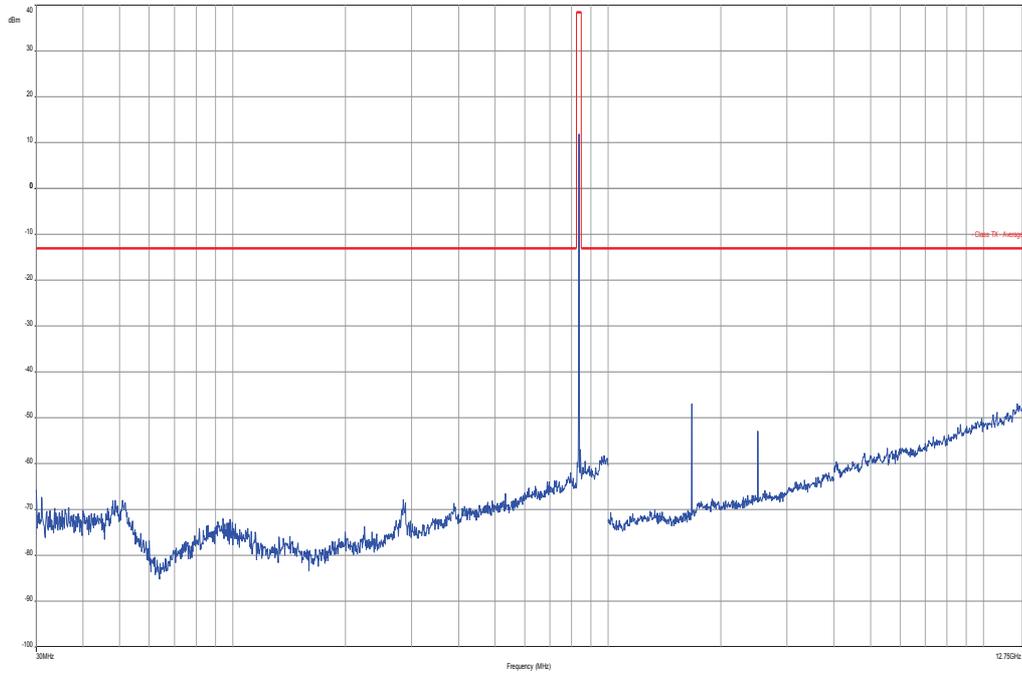
**Result: Passed**

**Plots:**

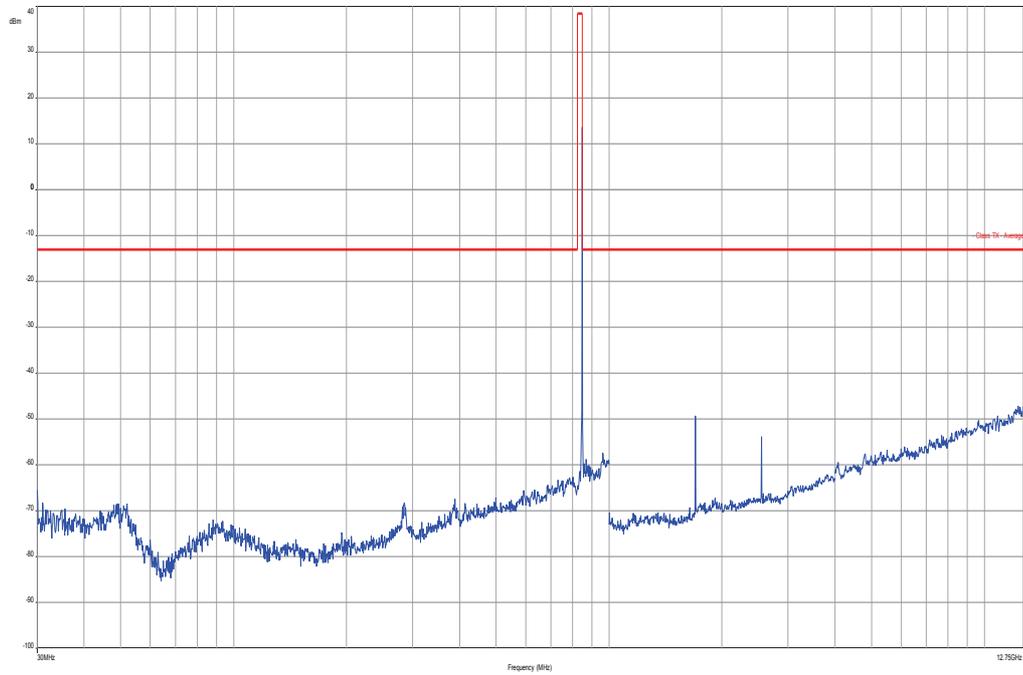
**Plot 1:** Channel 128 / CALL (30 MHz – 12.75 GHz)



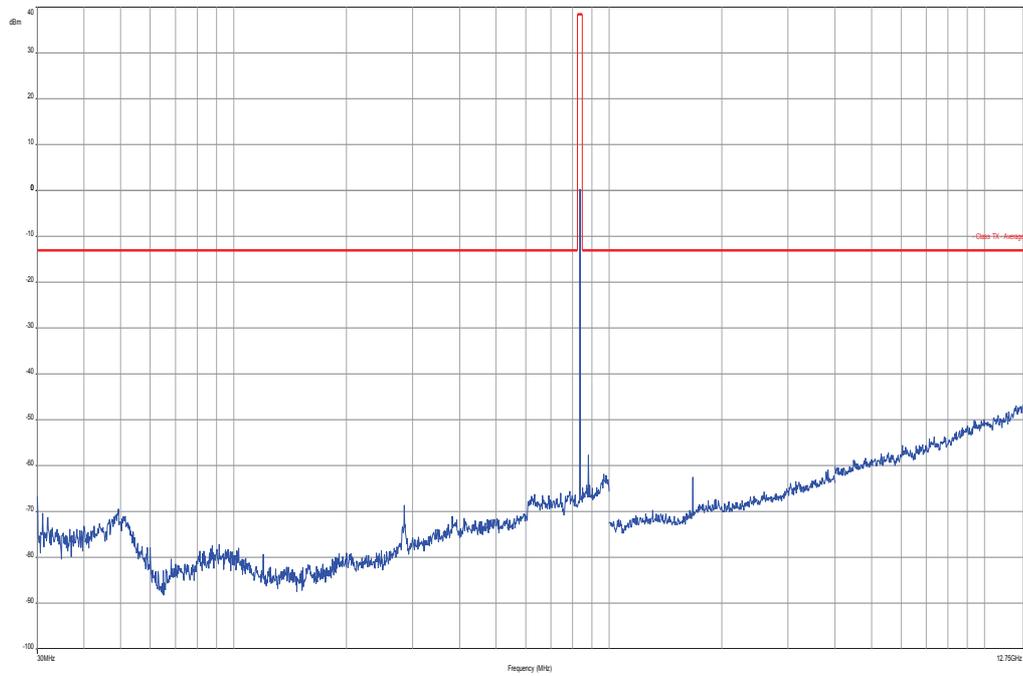
**Plot 2:** Channel 190 / CALL (30 MHz – 12.75 GHz)



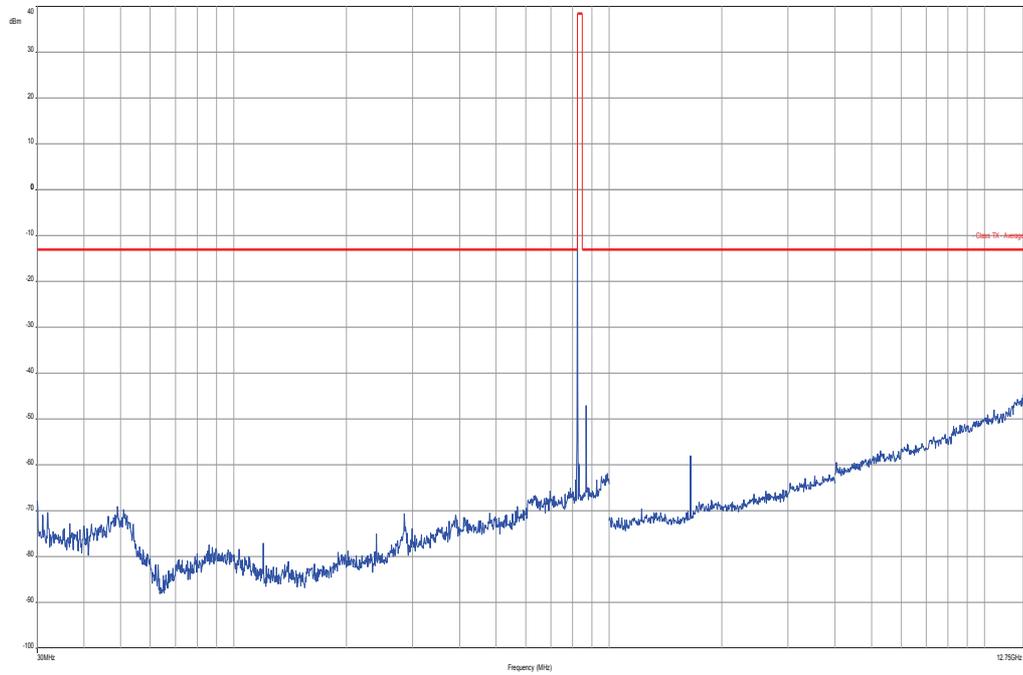
Plot 3: Channel 251 / CALL (30 MHz – 12.75 GHz)



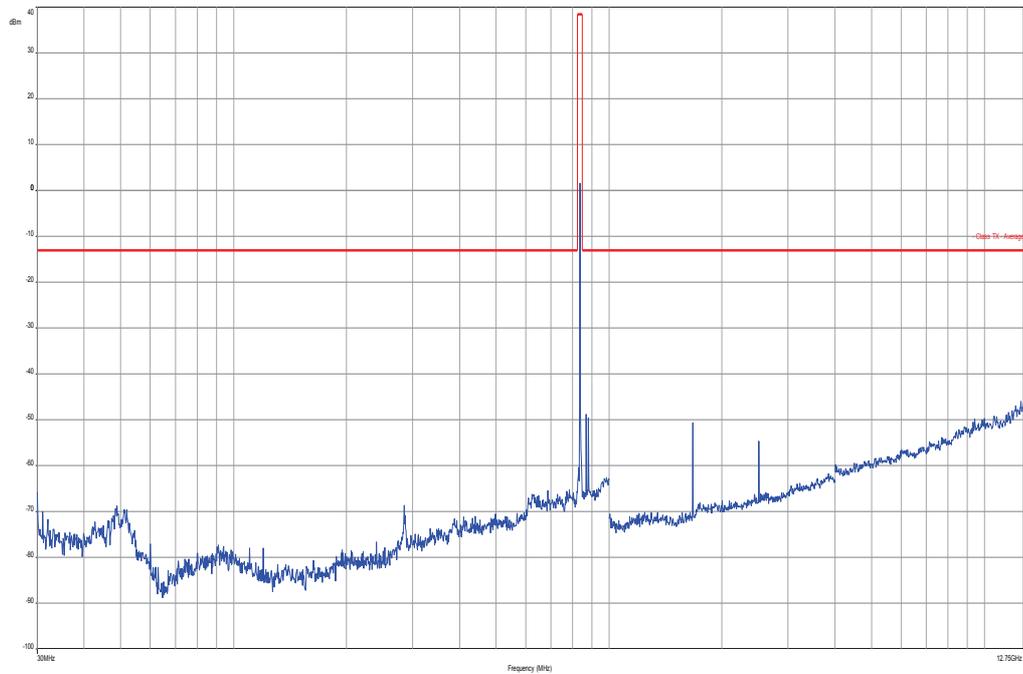
Plot 4: Channel 190 / GPRS (30 MHz – 12.75 GHz)



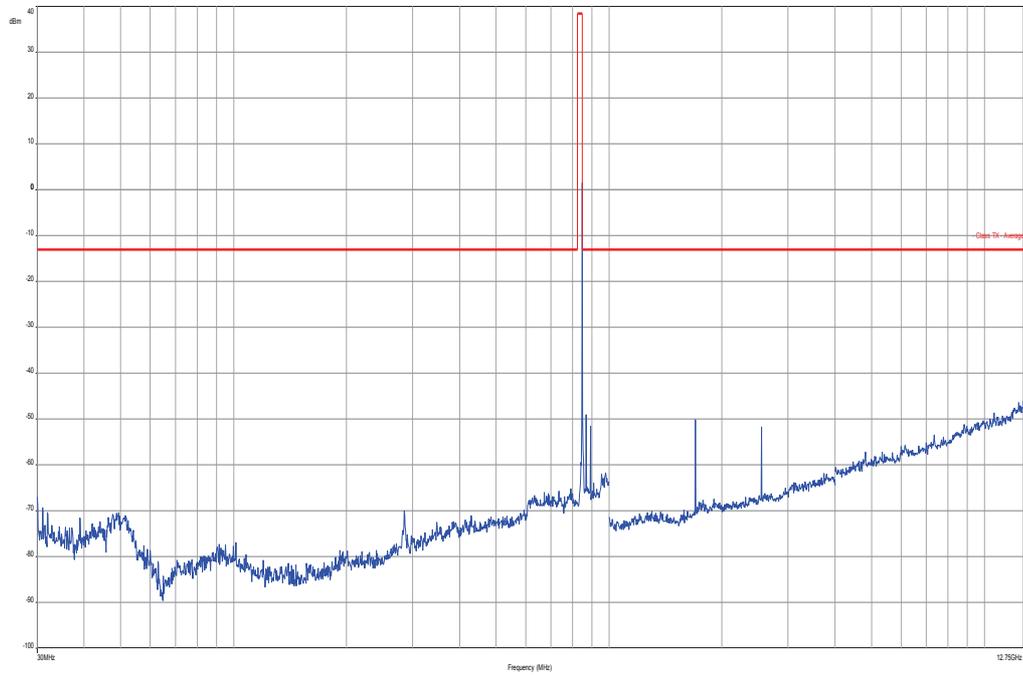
**Plot 5:** Channel 128 / EDGE (30 MHz – 12.75 GHz)



**Plot 6:** Channel 190 / EDGE (30 MHz – 12.75 GHz)



Plot 7: Channel 251 / EDGE (30 MHz – 12.75 GHz)



## 8.2.4 Spurious emissions conducted

### Description:

The following steps outline the procedure used to measure the conducted emissions from the mobile station.

1. Determine frequency range for measurements: From CFR 2.1057 the spectrum should be investigated from the lowest radio frequency generated in the equipment up to at least the 10th harmonic of the carrier frequency. For the mobile station equipment tested, this equates to a frequency range of 13 MHz to 9 GHz, data taken from 10 MHz to 25 GHz.
2. Determine mobile station transmits frequencies: below outlines the band edge frequencies pertinent to conducted emissions testing.

GSM-850 Transmitter Channel Frequency

128 824.2 MHz

189 836.4 MHz

251 848.8 MHz

### Measurement:

Measurement parameters	
Detector:	Peak
Sweep time:	Auto
Video bandwidth:	Pre-measurement with 1 MHz On spurious detection re-measurement below 1 GHz with 100 kHz Above 1 GHz with 1 MHz
Resolution bandwidth:	Pre-measurement with 1 MHz On spurious detection re-measurement below 1 GHz with 100 kHz Above 1 GHz with 1 MHz
Span:	30 MHz – 25 GHz
Trace-Mode:	Max Hold

### Limits:

FCC	IC
CFR Part 22.917 CFR Part 2.1051	RSS 132
Spurious Emissions Conducted	
Attenuation $\geq 43 + 10\log(P)$ (P, Power in Watts)	
-13 dBm	

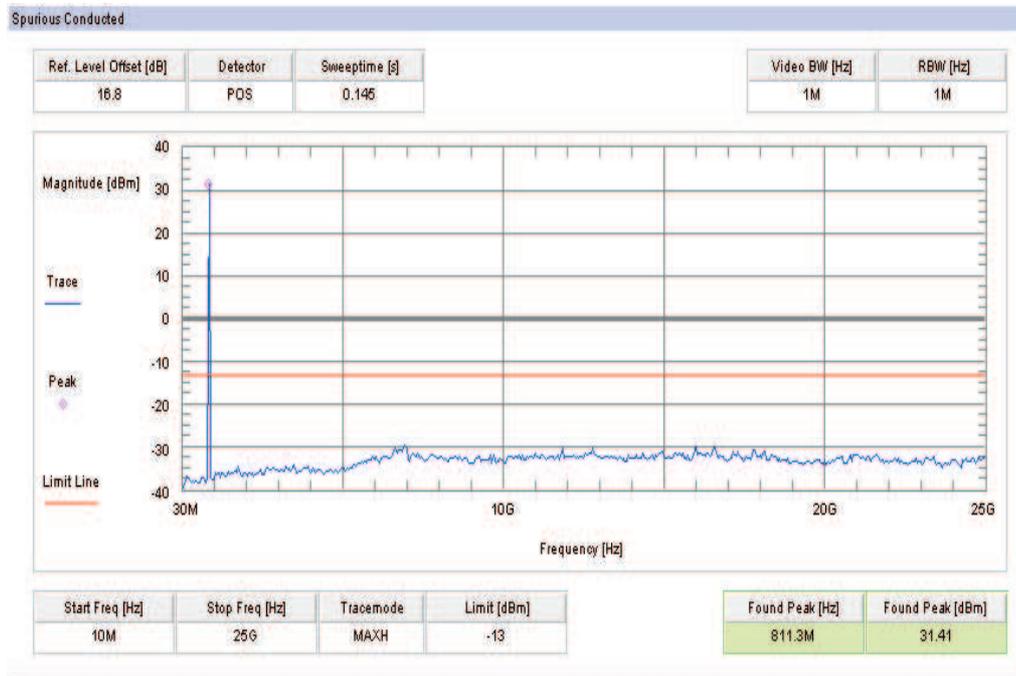
**Results:**

SPURIOUS EMISSION LEVEL (dBm)								
Harmonic	Ch. 128 Freq. (MHz)	Level [dBm]	Harmonic	Ch. 189 Freq. (MHz)	Level [dBm]	Harmonic	Ch. 251 Freq. (MHz)	Level [dBm]
2	1648.4	-	2	1672.8	-	2	1697.6	-
3	2472.6	-	3	2509.2	-	3	2546.4	-
4	3296.8	-	4	3345.6	-	4	3395.2	-
5	4121.0	-	5	4182.0	-	5	4244.0	-
6	4945.2	-	6	5018.4	-	6	5092.8	-
7	5769.4	-	7	5854.8	-	7	5941.6	-
8	6593.6	-	8	6691.2	-	8	6790.4	-
9	7417.8	-	9	7527.6	-	9	7639.2	-
10	8242.0	-	10	8364.0	-	10	8488.0	-
Measurement uncertainty					± 3dB			

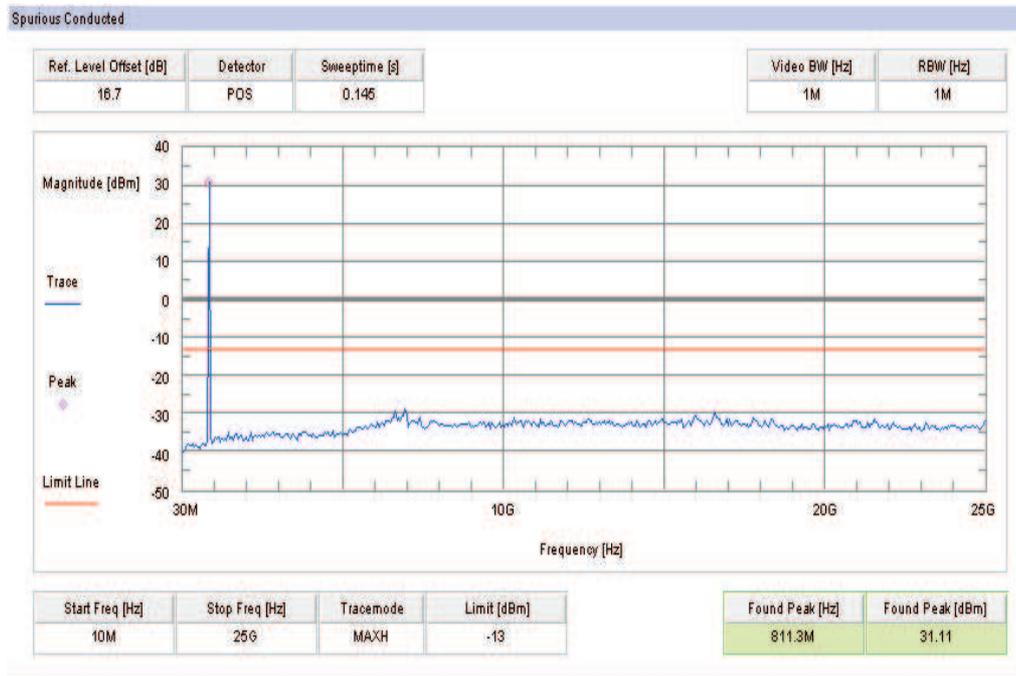
**Result: Passed**

**Plots:**

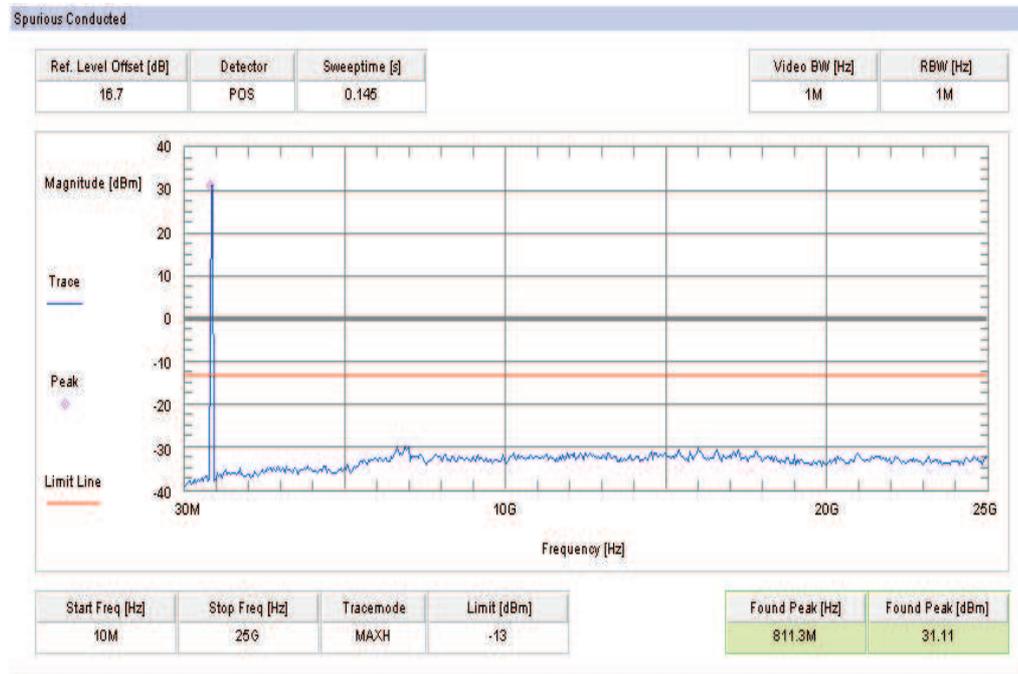
**Plot 1: Channel 128 (10 MHz - 25 GHz)**



**Plot 2: Channel 189 (10 MHz - 25 GHz)**



Plot 3: Channel 251 (10 MHz - 25 GHz)



### 8.2.5 Block edge compliance

**Description:**

The spectrum at the band edges must comply with the spurious emissions limits.

**Measurement:**

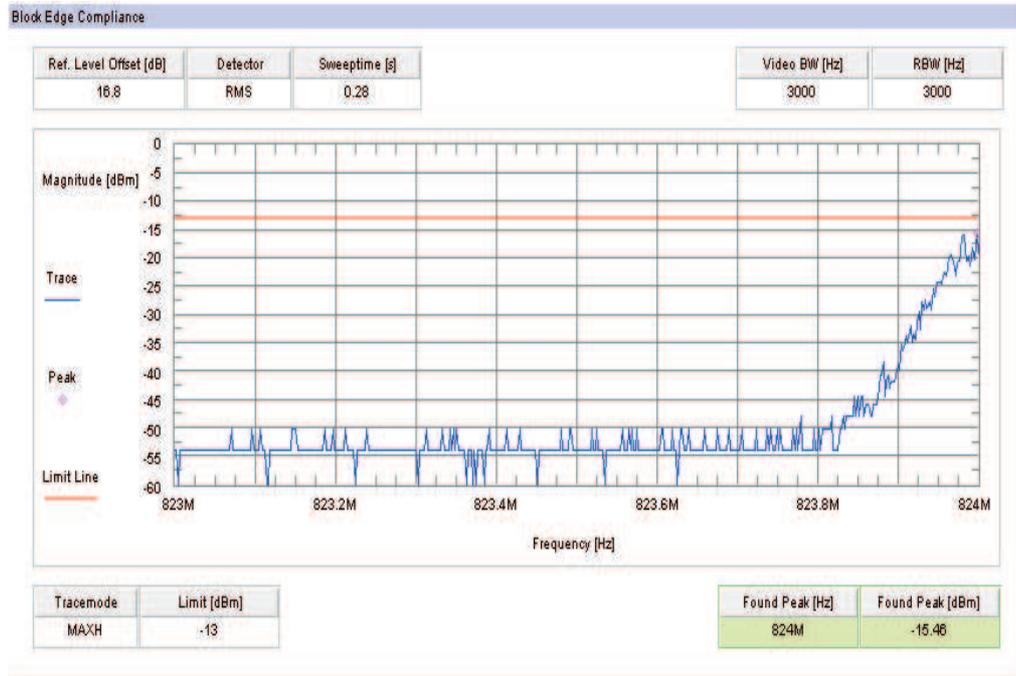
Measurement parameters	
Detector:	RMS
Sweep time:	Auto
Video bandwidth:	3 kHz
Resolution bandwidth:	3 kHz
Span:	1 MHz
Trace-Mode:	Max Hold

**Limits:**

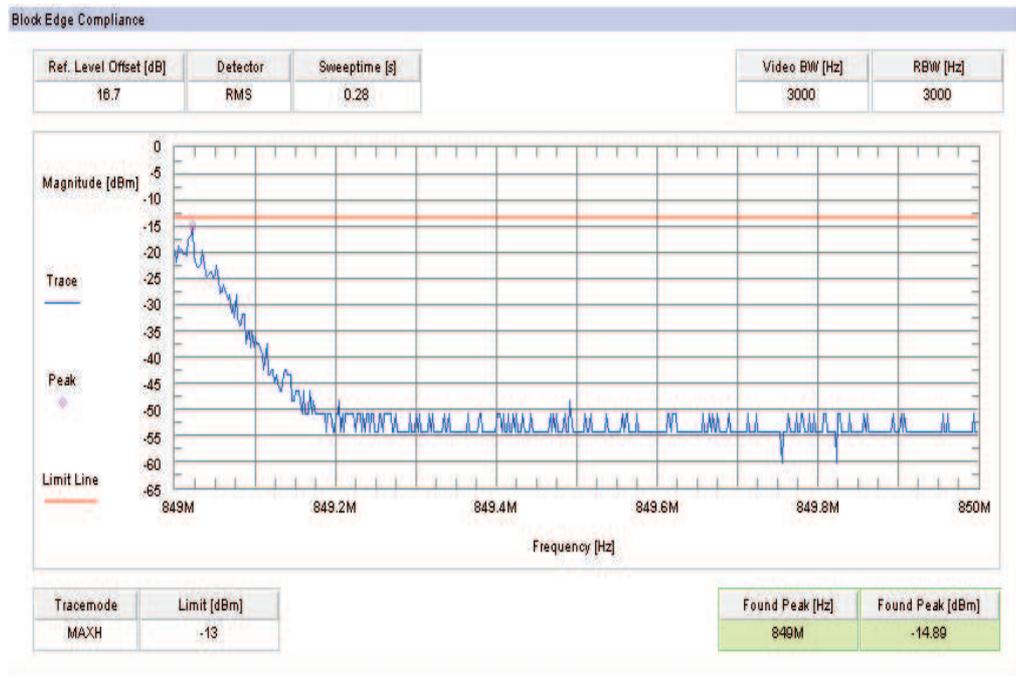
FCC	IC
CFR Part 22.917 CFR Part 2.1051	RSS 132
Block Edge Compliance	
Attenuation $\geq 43 + 10\log(P)$ (P, Power in Watts)	
-13 dBm	

**Plots:**

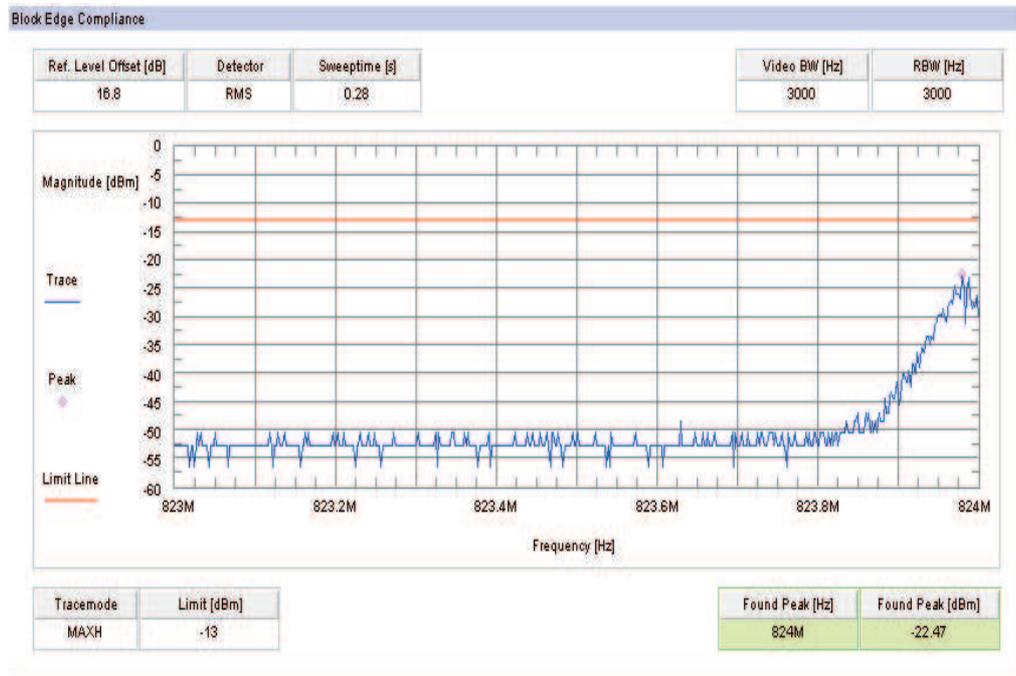
**Plot 1: Channel 128 (GSM-mode)**



**Plot 2: Channel 251 (GSM-mode)**



Plot 3: Channel 128 (EDGE-mode)



Plot 4: Channel 251 (EDGE-mode)



**Result: Passed**

## 8.2.6 Occupied bandwidth

### Description:

Measurement of the occupied bandwidth of the transmitted signal.

### Measurement:

Similar to conducted emissions, occupied bandwidth measurements are only provided for selected frequencies in order to reduce the amount of submitted data. Data were taken at the extreme and mid frequencies of the GSM-850 frequency band. The table below lists the measured 99% power and -26dBc occupied bandwidths. Spectrum analyzer plots are included on the following pages.

Part 22.917 requires a measurement bandwidth of at least 1% of the occupied bandwidth. For ca. 300 kHz, this equates to a resolution bandwidth of at least 3 kHz. For this testing, a resolution bandwidth 3.0 kHz was used.

Measurement parameters	
Detector:	Peak
Sweep time:	Auto
Video bandwidth:	30 kHz
Resolution bandwidth:	10 kHz
Span:	1 MHz
Trace-Mode:	Max Hold

### Limits:

FCC	IC
CFR Part 22.917 CFR Part 2.1049	RSS 132
Occupied Bandwidth	
Spectrum must fall completely in the specified band	

**Results:**

Occupied Bandwidth – GMSK mode		
Frequency (MHz)	99% OBW (kHz)	-26 dBc BW (kHz)
824.2	279	313
836.4	279	311
848.8	281	313
Measurement uncertainty	± 3 kHz	

Occupied Bandwidth – 8-PSK mode		
Frequency (MHz)	99% OBW (kHz)	-26 dBc BW (kHz)
824.2	273	313
836.4	277	305
848.8	277	303
Measurement uncertainty	± 3 kHz	

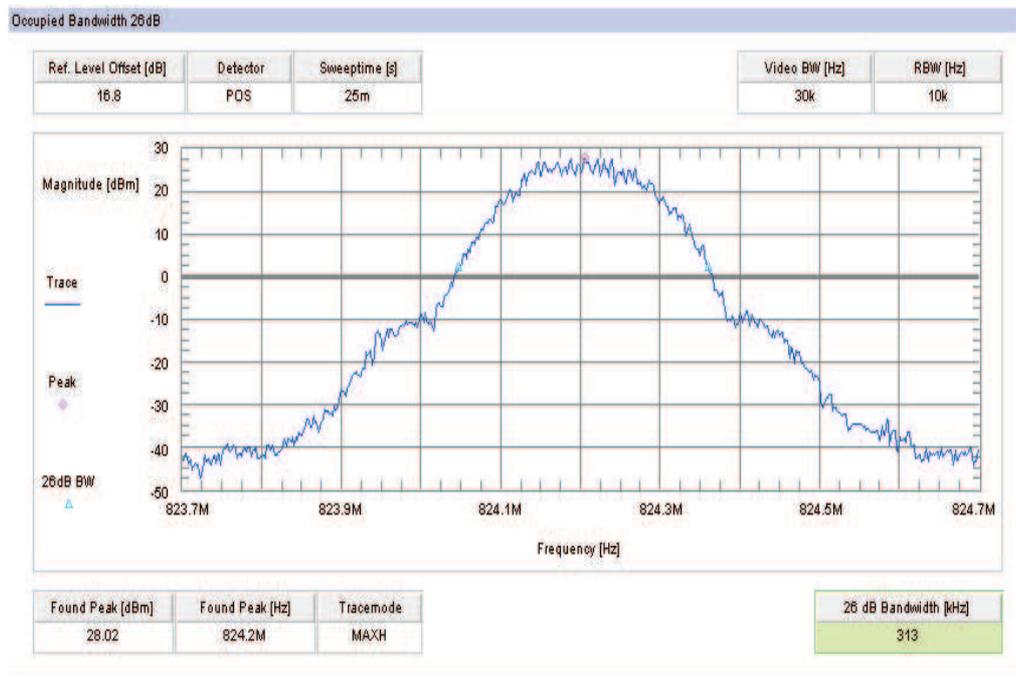
**Result: Passed**

**Plots:**

**Plot 1: Channel 128 (99% - OBW)**



**Plot 2: Channel 128 (-26 dBc BW)**



Plot 3: Channel 189 (99% - OBW)



Plot 4: Channel 189 (-26 dBc BW)



Plot 5: Channel 251 (99% - OBW)



Plot 6: Channel 251 (-26 dBc BW)



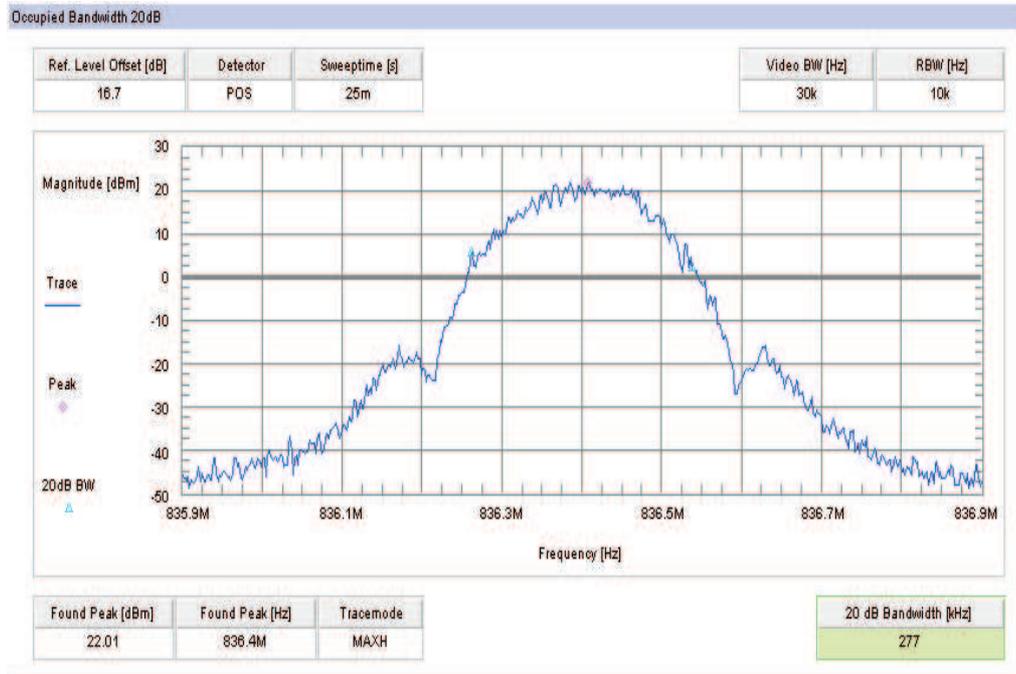
Plot 7: Channel 128 (99% - OBW) – 8-PSK



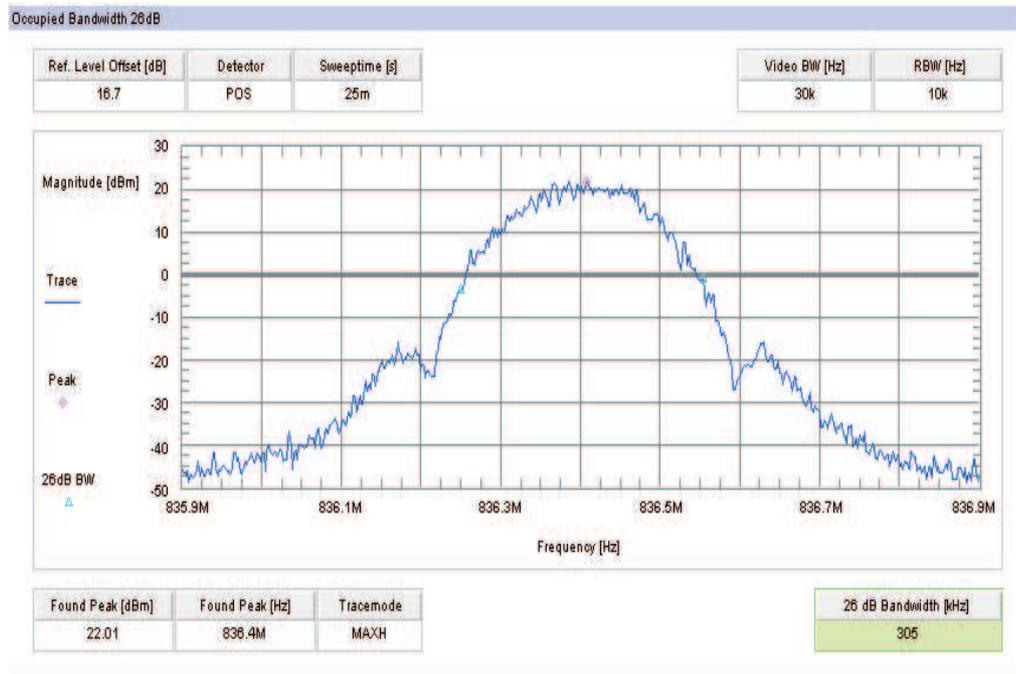
Plot 8: Channel 128 (-26 dBc BW) – 8-PSK



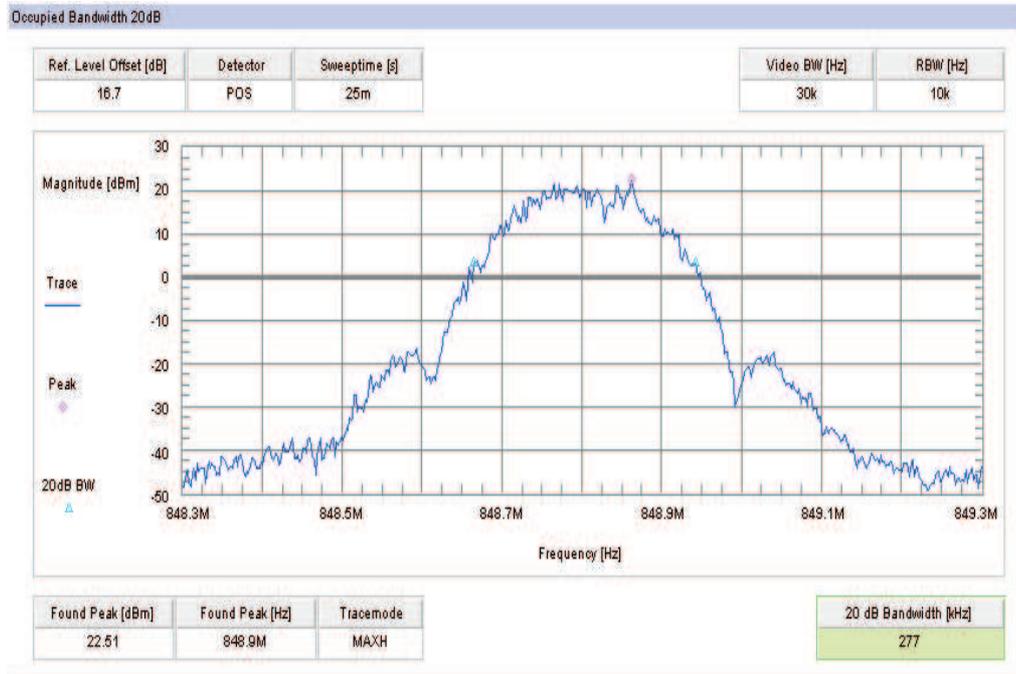
**Plot 9:** Channel 189 (99% - OBW) – 8-PSK



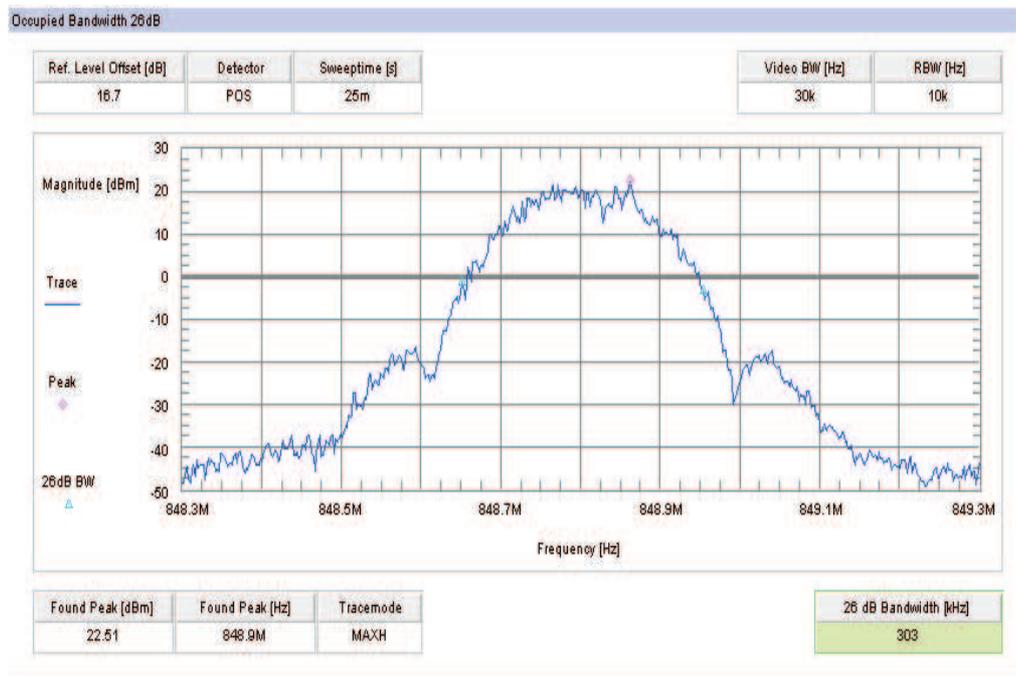
**Plot 10:** Channel 189 (-26 dBc BW) – 8-PSK



Plot 11: Channel 251 (99% - OBW) – 8-PSK



Plot 12: Channel 251 (-26 dBc BW) – 8-PSK



### 8.3 Results PCS 1900

All GSM-band measurements are done in GSM mode only (circuit switched). All relevant tests have been repeated using 8-PSK modulation if EDGE mode is supported. All tests were performed with one timeslot in uplink activated and one timeslot in downlink activated. For each mode the highest output power was determined and used.

#### 8.3.1 RF output power

**Description:**

This paragraph contains average power, peak output power and EIRP measurements for the mobile station. In all cases, the peak output power is within the required mask (this mask is specified in the JTC standards, TIA PN3389 Vol. 1 Chap 7, and is no FCC requirement).

**Measurement:**

The mobile was set up for the maximum output power with pseudo random data modulation.

Measurement parameters	
Detector:	Peak and RMS (Power in Burst)
Sweep time:	Auto
Video bandwidth:	1 MHz
Resolution bandwidth:	1 MHz
Span:	Zero Span
Trace-Mode:	Max Hold

**Limits:**

FCC	IC
CFR Part 24.232 CFR Part 2.1046	RSS 133
Nominal Peak Output Power	
+33.00 dBm	
In measuring transmissions in this band using an average power technique, the peak-to-average ratio (PAR) of the transmission may not exceed 13 dB.	

**Results:**

Output Power (conducted) GMSK mode		
Frequency (MHz)	Average Output Power (dBm)	Peak to Average Ratio (dB)
1850.2	28.8	0.07
1880.0	28.6	0.04
1909.8	29.0	0.12
Measurement uncertainty	± 0.5 dB	

Output Power (conducted) 8-PSK mode		
Frequency (MHz)	Average Output Power (dBm)	Peak to Average Ratio (dB)
1850.2	26.1	3.02
1880.0	26.1	3.04
1909.8	26.1	3.13
Measurement uncertainty	± 0.5 dB	

Output Power (radiated) GMSK mode	
Frequency (MHz)	Average Output Power (dBm) - EIRP
1850.2	26.2
1880.0	27.5
1909.8	29.0
Measurement uncertainty	± 2.0 dB

Output Power (radiated) 8-PSK mode	
Frequency (MHz)	Average Output Power (dBm) - EIRP
1850.2	23.5
1880.0	25.0
1909.8	26.1
Measurement uncertainty	± 2.0 dB

**Result: Passed**

### 8.3.2 Frequency stability

Not performed

### 8.3.3 Spurious emissions radiated

**Description:**

The following steps outline the procedure used to measure the radiated emissions from the mobile station. The site is constructed in accordance with ANSI C63.4:2009 requirements and is recognized by the FCC to be in compliance for a 3 and a 10 meter site. The spectrum was scanned from 30 MHz to the 10th harmonic of the highest frequency generated within the equipment, which is the transmitted carrier that can be as high as 1910 MHz. This was rounded up to 20 GHz. The resolution bandwidth is set as outlined in Part 24.238. The spectrum was scanned with the mobile station transmitting at carrier frequencies that pertain to low, mid and high channels of the PCS1900 band.

The final open field emission (here 10m semi-anechoic chamber listed by FCC) test procedure is as follows:

- a) The test item was placed on a 0.8 meter high non-conductive stand at a 3 meter test distance from the receive antenna.
- b) The antenna output was terminated in a 50 ohm load (if possible).
- c) A double ridged wave guide antenna was placed on an adjustable height antenna mast 3 meters from the test item for emission measurements.
- d) Detected emissions were maximized at each frequency by rotating the test item and adjusting the receive antenna height and polarization. The maximum meter reading was recorded. The radiated emission measurements of the harmonics of the transmit frequency through the 10th harmonic were measured with peak detector and 1 MHz bandwidth. If the harmonic could not be detected above the noise floor, the ambient level was recorded. The equivalent power into a dipole antenna was calculated from the field intensity levels measured at 3 meters.
- e) Now each detected emissions were substituted by the substitution method, in accordance with the TIA/EIA 603.

**Measurement:**

Measurement parameters	
Detector:	Peak
Sweep time:	2 sec.
Video bandwidth:	Below 1 GHz: 100 kHz Above 1 GHz: 1 MHz
Resolution bandwidth:	Below 1 GHz: 100 kHz Above 1 GHz: 1 MHz
Span:	100 MHz Steps
Trace-Mode:	Max Hold

**Limits:**

FCC	IC
CFR Part 24.238 CFR Part 2.1053	RSS 133
Spurious Emissions Radiated	
Attenuation $\geq 43 + 10\log(P)$ (P, Power in Watts)	
-13 dBm	

**Results:**

Radiated emissions measurements were made only at the upper, center, and lower carrier frequencies of the PCS1900 band (1850.2 MHz, 1880.0 MHz and 1909.8 MHz). It was decided that measurements at these three carrier frequencies would be sufficient to demonstrate compliance with emissions limits because it was seen that all the significant spurs occur well outside the band and no radiation was seen from a carrier in one block of the PCS1900 band into any of the other blocks. The equipment must still, however, meet emissions requirements with the carrier at all frequencies over which it is capable of operating and it is the manufacturer's responsibility to verify this.

The final open field radiated levels are presented on the next pages. All measurements were done in horizontal and vertical polarization; the plots show the worst case. The plots show only the middle channel. If spurious were detected, the lowest and highest channel were checked too. The found values are stated in the table below.

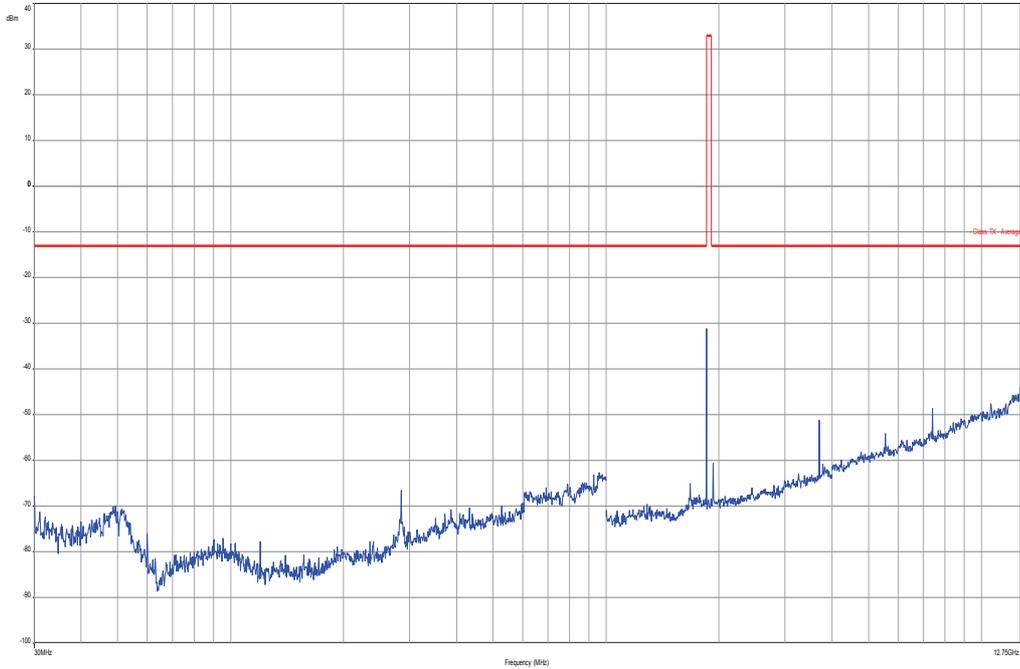
As can be seen from this data, the emissions from the test item were within the specification limit.

SPURIOUS EMISSION LEVEL (dBm)								
Harmonic	Ch. 512 Freq. (MHz)	Level [dBm]	Harmonic	Ch. 661 Freq. (MHz)	Level [dBm]	Harmonic	Ch. 810 Freq. (MHz)	Level [dBm]
2	3700.4	No peaks detected. All detected emissions are more than 10 dB below the limit!	2	3760.0	No peaks detected. All detected emissions are more than 10 dB below the limit!	2	3819.6	No peaks detected. All detected emissions are more than 10 dB below the limit!
3	5550.6		3	5640.0		3	5729.4	
4	7400.8		4	7520.0		4	7639.2	
5	9251.0		5	9400.0		5	9549.0	
6	11101.2		6	11280.0		6	11458.8	
7	12951.4		7	13160.0		7	13368.6	
8	14801.6		8	15040.0		8	15278.4	
9	16651.8		9	16920.0		9	17188.2	
10	18502.0		10	18800.0		10	19098.0	
Measurement uncertainty						± 3dB		

**Result: Passed**

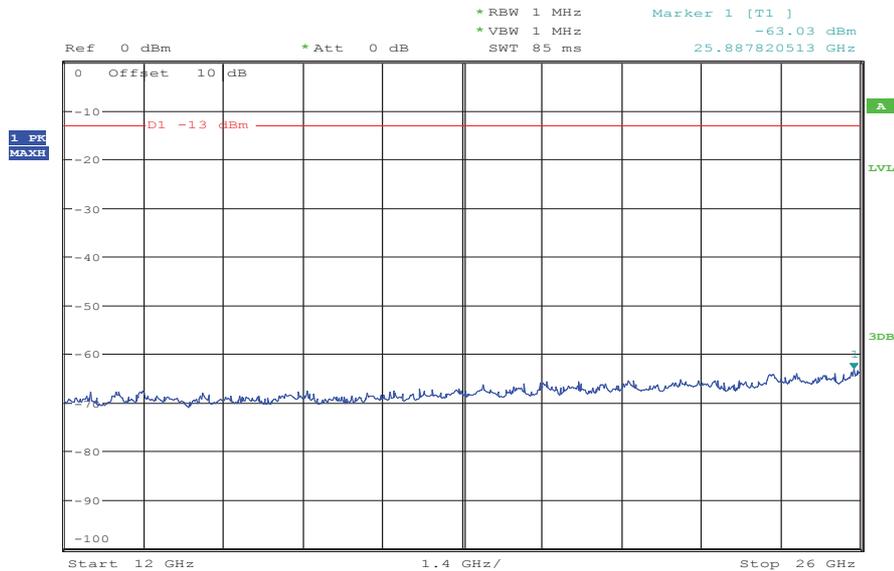
**Plots:**

**Plot 1:** Channel 512 / CALL (30 MHz – 12.75 GHz)



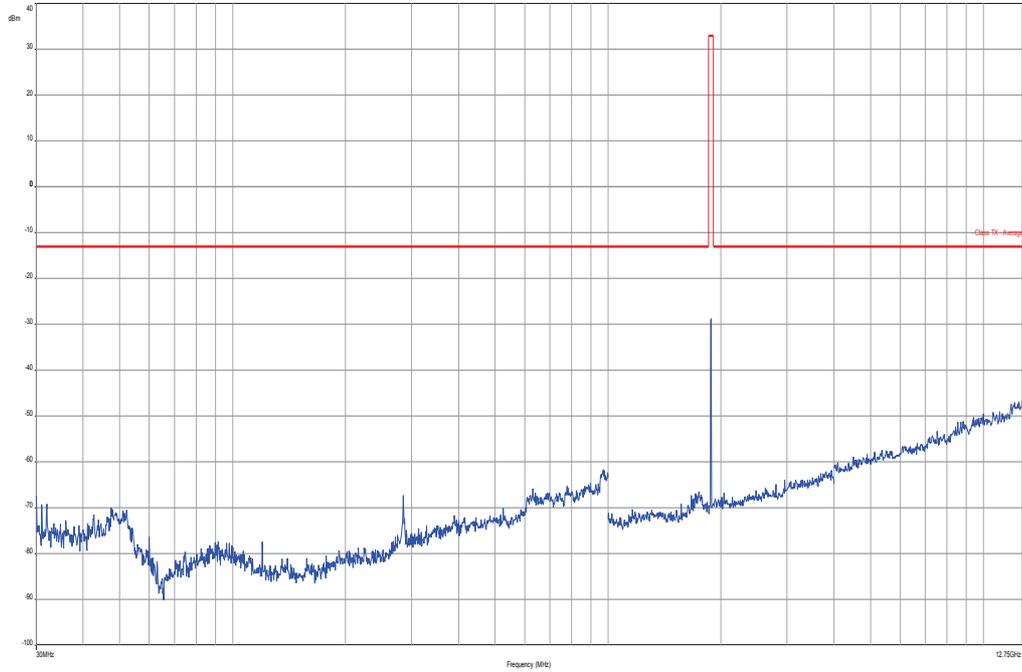
*Carrier notched with 1.9 GHz rejection filter*

**Plot 2:** Channel 512 / CALL (12 GHz – 26 GHz)



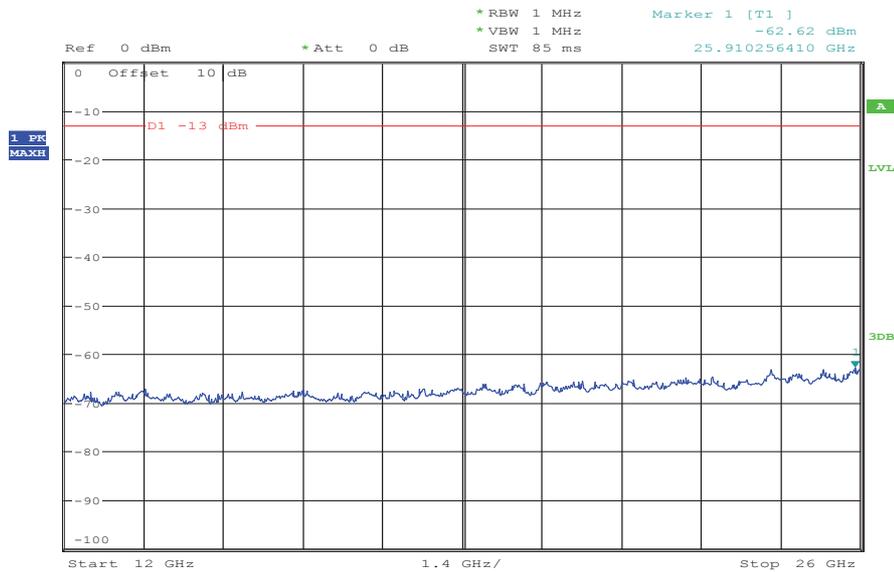
Date: 26.MAR.2013 09:05:43

Plot 3: Channel 661 / CALL (30 MHz – 12.75 GHz)



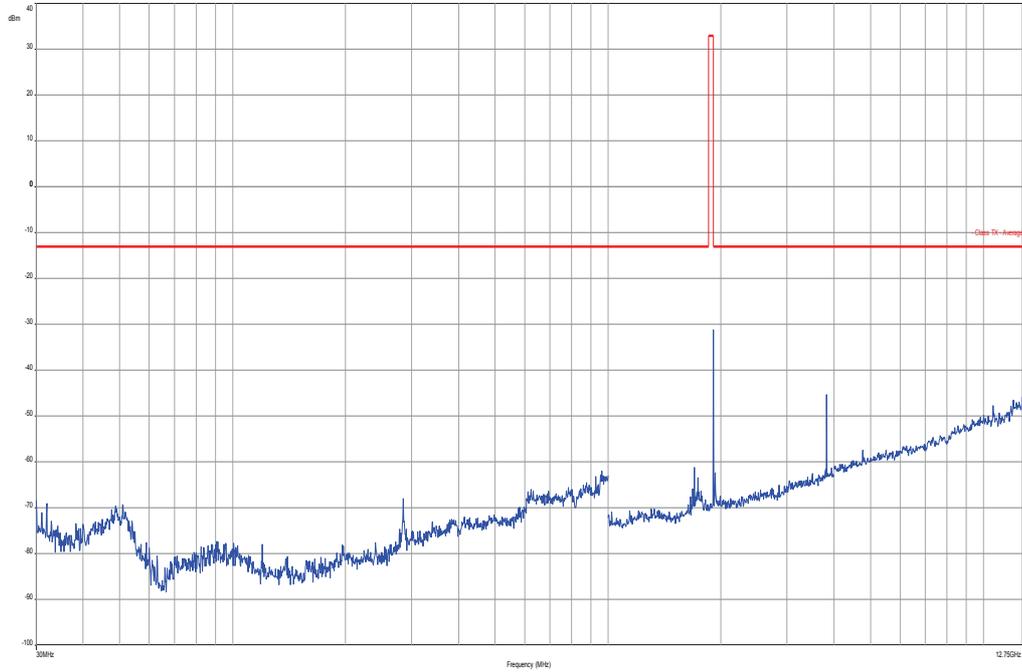
Carrier notched with 1.9 GHz rejection filter

Plot 4: Channel 661 / CALL (12 GHz – 26 GHz)



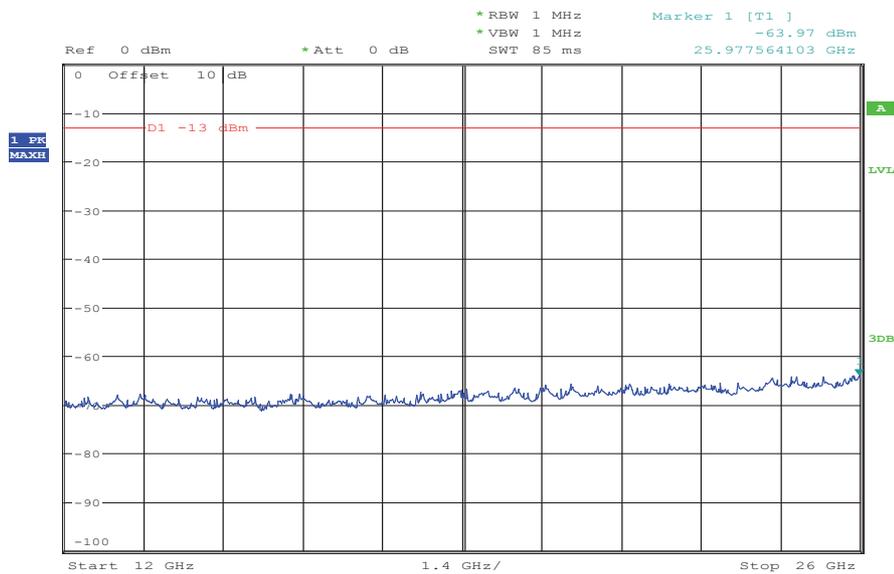
Date: 26.MAR.2013 09:09:58

**Plot 5: Channel 810 / CALL (30 MHz – 12.75 GHz)**



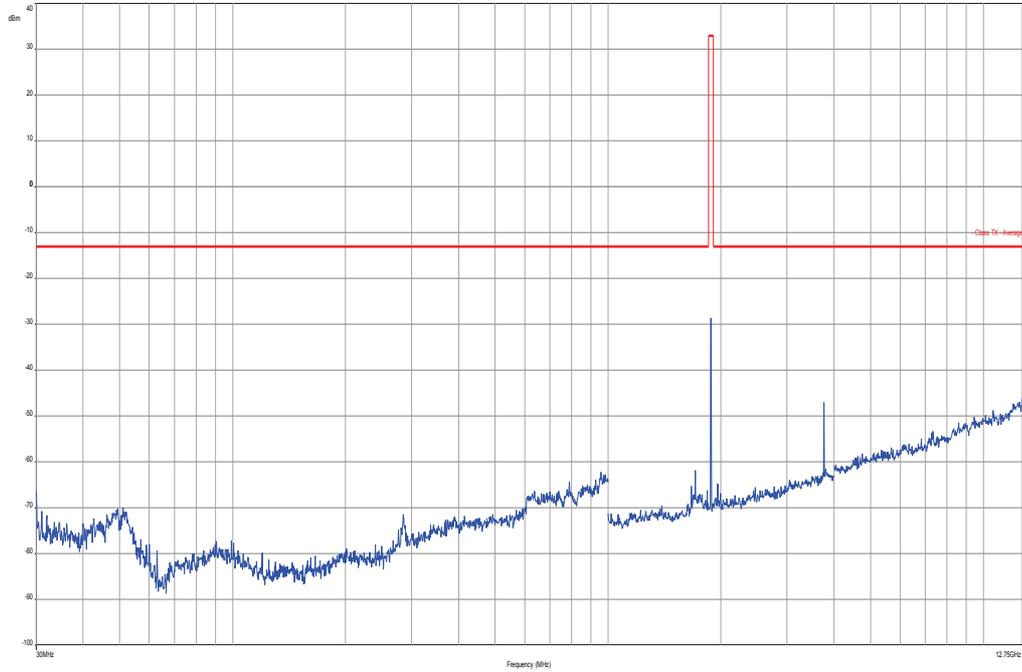
*Carrier notched with 1.9 GHz rejection filter*

**Plot 6: Channel 810 / CALL (12 GHz – 26 GHz)**



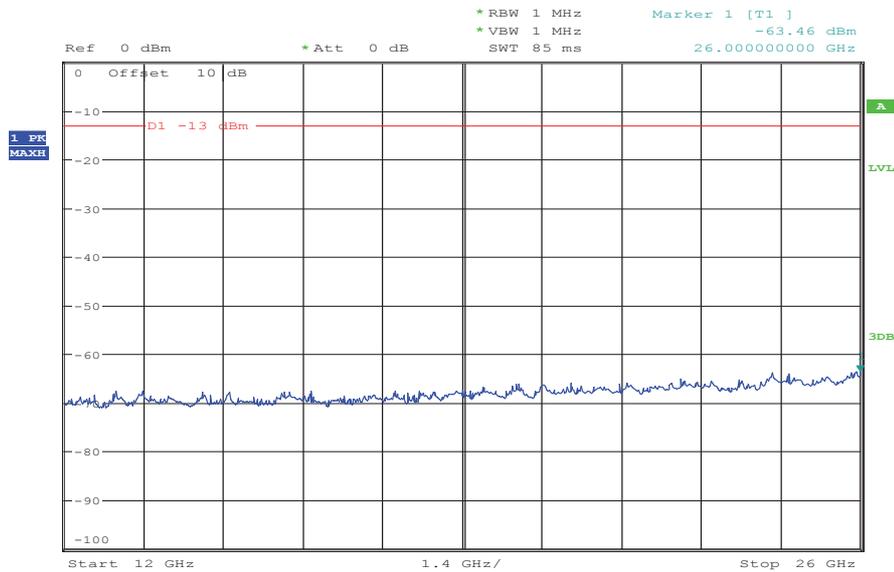
Date: 26.MAR.2013 09:13:06

Plot 7: Channel 661 / GPRS (30 MHz – 12.75 GHz)



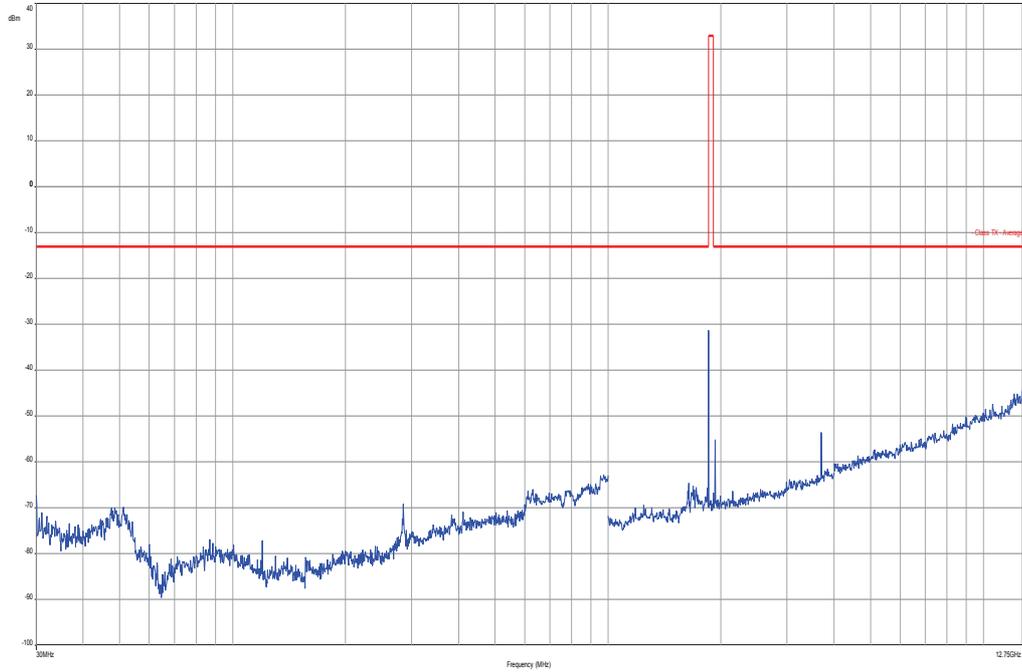
Carrier notched with 1.9 GHz rejection filter

Plot 8: Channel 661 / GPRS (12 GHz – 26 GHz)



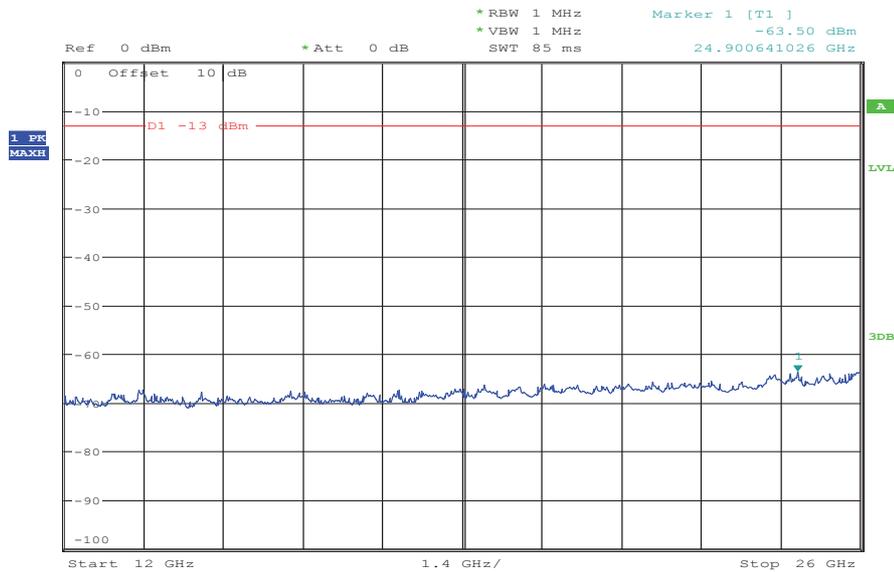
Date: 26.MAR.2013 09:18:49

Plot 9: Channel 512 / EDGE (30 MHz – 12.75 GHz)



Carrier notched with 1.9 GHz rejection filter

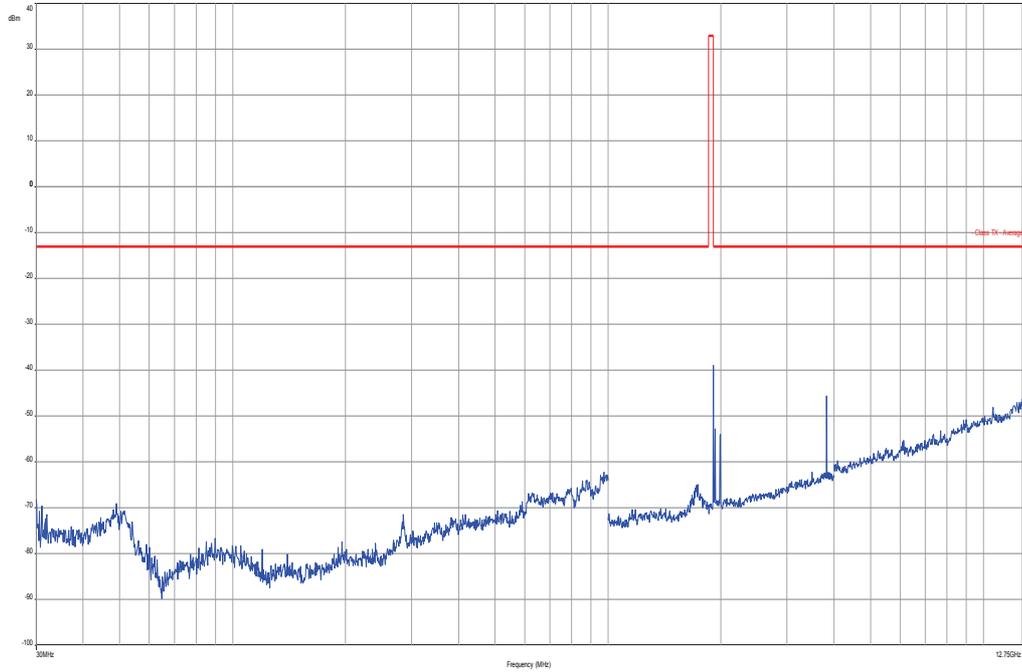
Plot 10: Channel 512 / EDGE (12 GHz – 26 GHz)



Date: 26.MAR.2013 09:27:39

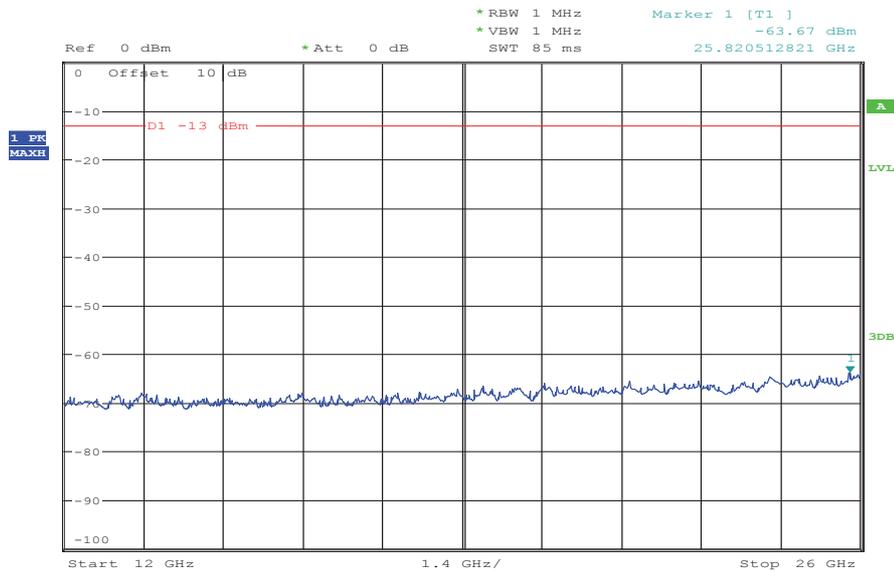


Plot 13: Channel 810 / EDGE (30 MHz – 12.75 GHz)



Carrier notched with 1.9 GHz rejection filter

Plot 14: Channel 810 / EDGE (12 GHz – 26 GHz)



Date: 26.MAR.2013 09:28:21

### 8.3.4 Spurious emissions conducted

**Description:**

The following steps outline the procedure used to measure the conducted emissions from the mobile station.

1. Determine frequency range for measurements: From CFR 2.1057 the spectrum should be investigated from the lowest radio frequency generated in the equipment up to at least the 10th harmonic of the carrier frequency. For the mobile station equipment tested, this equates to a frequency range of 13 MHz to 19.1 GHz, data taken from 10 MHz to 25 GHz.
2. Determine mobile station transmits frequencies: below outlines the band edge frequencies pertinent to conducted emissions testing.

PCS1900 Transmitter Channel Frequency

512 1850.2 MHz

661 1880.0 MHz

810 1909.8 MHz

**Measurement:**

Measurement parameters	
Detector:	Peak
Sweep time:	Auto
Video bandwidth:	Pre-measurement with 1 MHz On spurious detection re-measurement below 1 GHz with 100 kHz Above 1 GHz with 1 MHz
Resolution bandwidth:	Pre-measurement with 1 MHz On spurious detection re-measurement below 1 GHz with 100 kHz Above 1 GHz with 1 MHz
Span:	30 MHz – 25 GHz
Trace-Mode:	Max Hold

**Limits:**

FCC	IC
CFR Part 24.238 CFR Part 2.1051	RSS 133
Spurious Emissions Conducted	
Attenuation $\geq 43 + 10\log(P)$ (P, Power in Watts)	
-13 dBm	

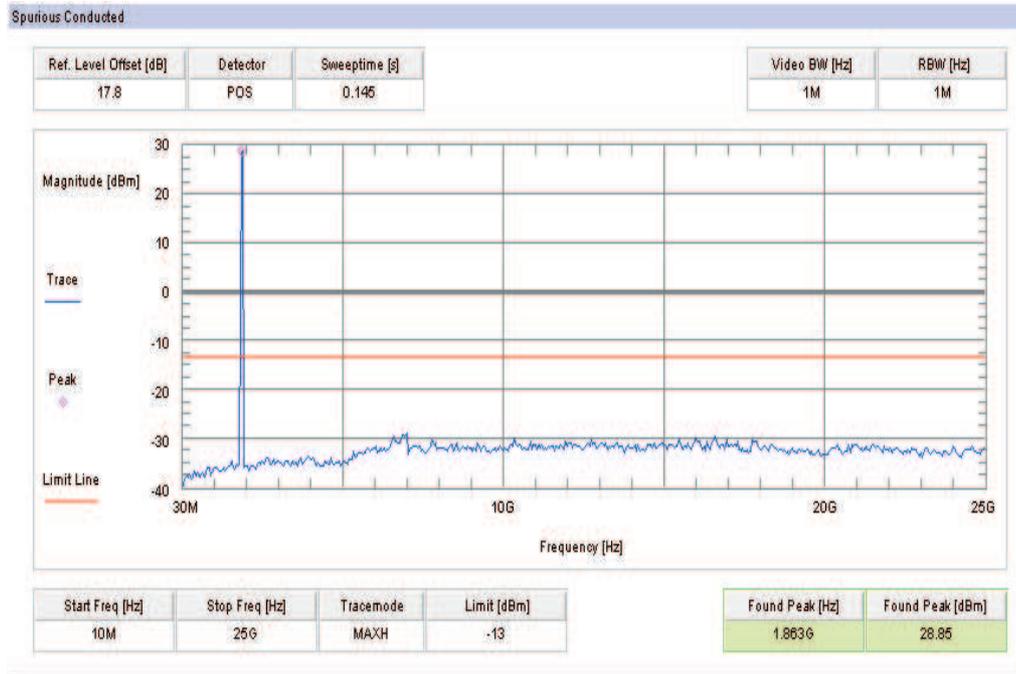
**Results:**

SPURIOUS EMISSION LEVEL (dBm)								
Harmonic	Ch. 512 Freq. (MHz)	Level [dBm]	Harmonic	Ch. 661 Freq. (MHz)	Level [dBm]	Harmonic	Ch. 810 Freq. (MHz)	Level [dBm]
2	3700.4	-	2	3760.0	-	2	3819.6	-
3	5550.6	-	3	5640.0	-	3	5729.4	-
4	7400.8	-	4	7520.0	-	4	7639.2	-
5	9251.0	-	5	9400.0	-	5	9549.0	-
6	11101.2	-	6	11280.0	-	6	11458.8	-
7	12951.4	-	7	13160.0	-	7	13368.6	-
8	14801.6	-	8	15040.0	-	8	15278.4	-
9	16651.8	-	9	16920.0	-	9	17188.2	-
10	18502.0	-	10	18800.0	-	10	19098.0	-
Measurement uncertainty					± 3dB			

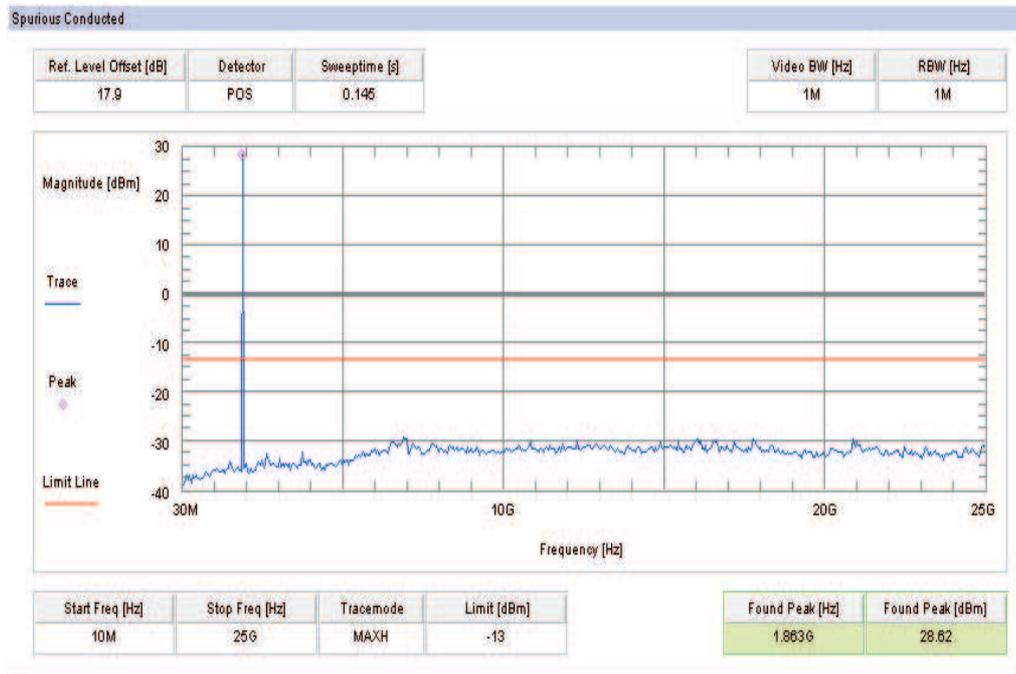
**Result: Passed**

**Plots:**

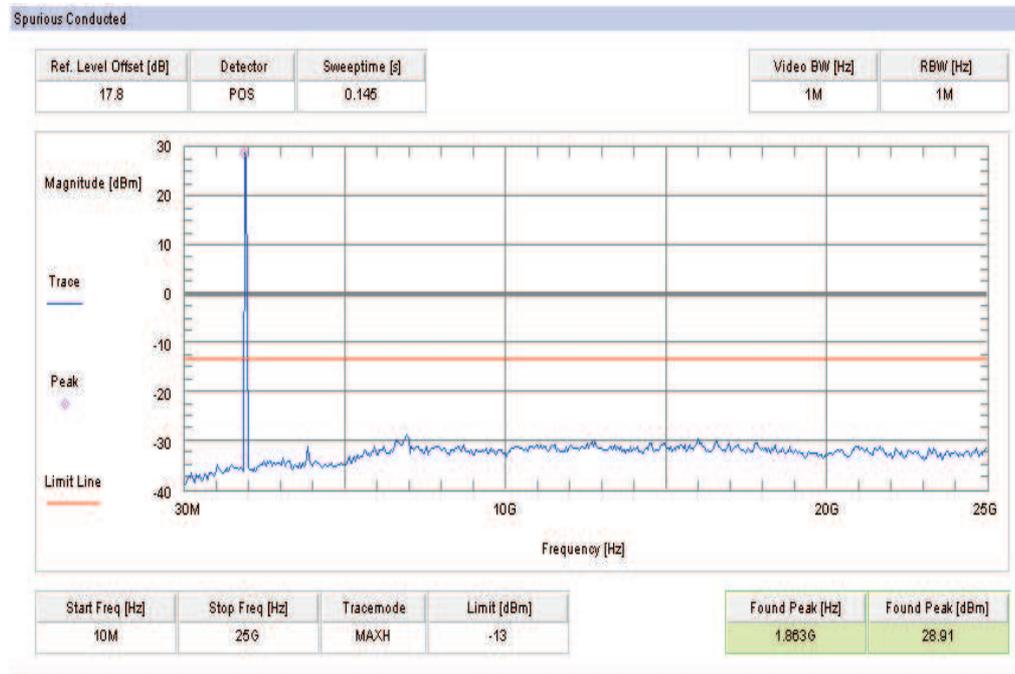
**Plot 1: Channel 512 (10 MHz - 25 GHz)**



**Plot 2: Channel 661 (10 MHz - 25 GHz)**



Plot 3: Channel 810 (10 MHz - 25 GHz)



### 8.3.5 Block edge compliance

**Description:**

The spectrum at the band edges must comply with the spurious emissions limits.

**Measurement:**

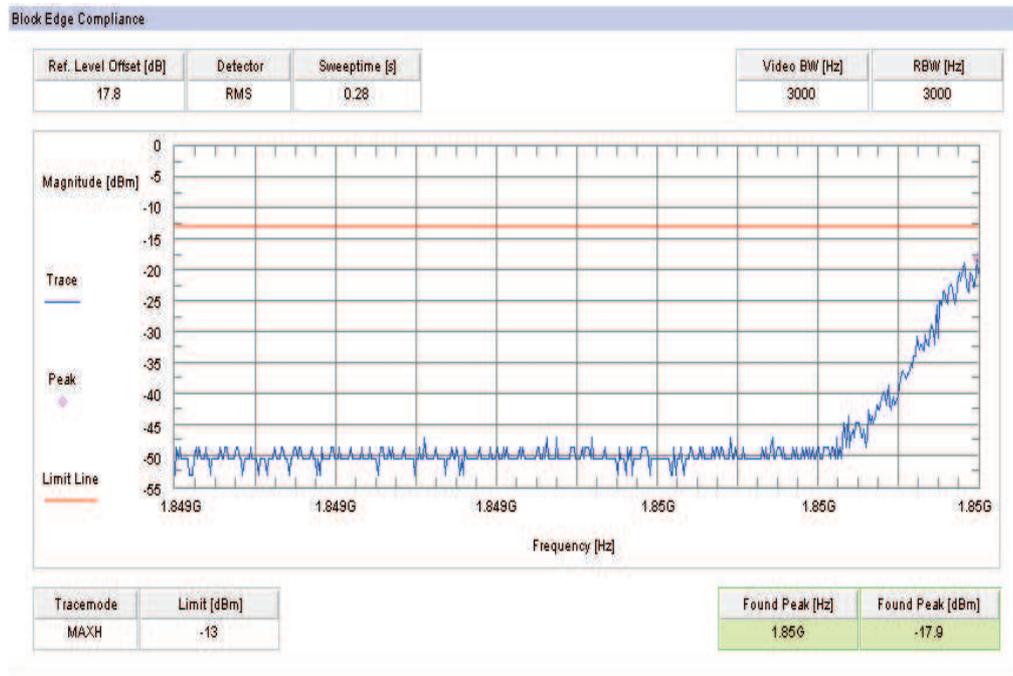
Measurement parameters	
Detector:	RMS
Sweep time:	Auto
Video bandwidth:	3 kHz
Resolution bandwidth:	3 kHz
Span:	1 MHz
Trace-Mode:	Max Hold

**Limits:**

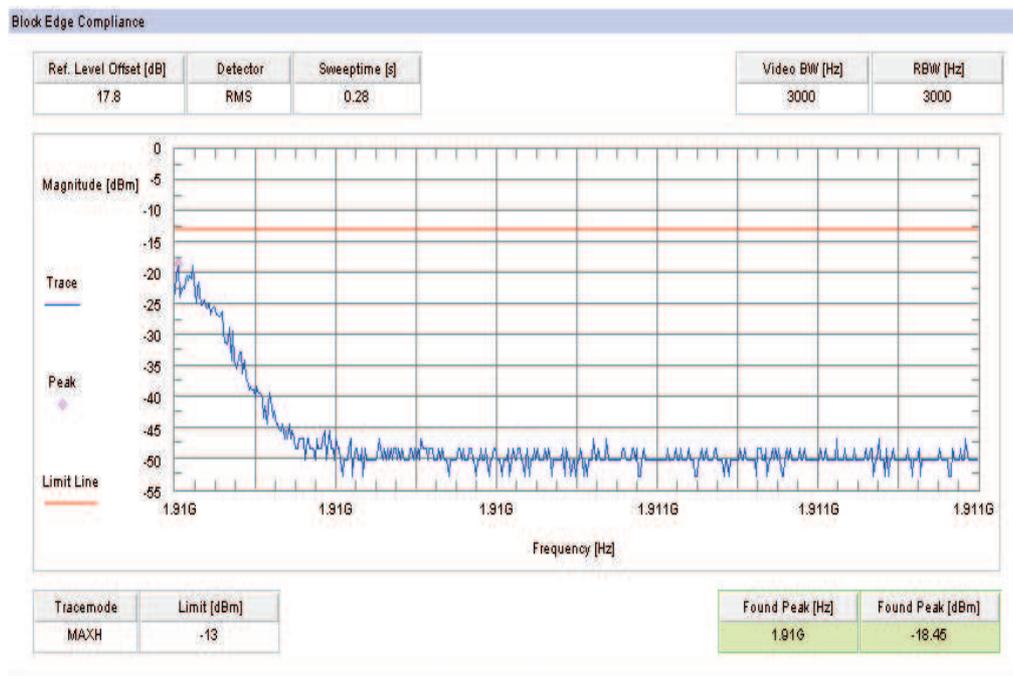
FCC	IC
CFR Part 24.238 CFR Part 2.1051	RSS 133
Block Edge Compliance	
Attenuation $\geq 43 + 10\log(P)$ (P, Power in Watts)	
-13 dBm	

**Plots:**

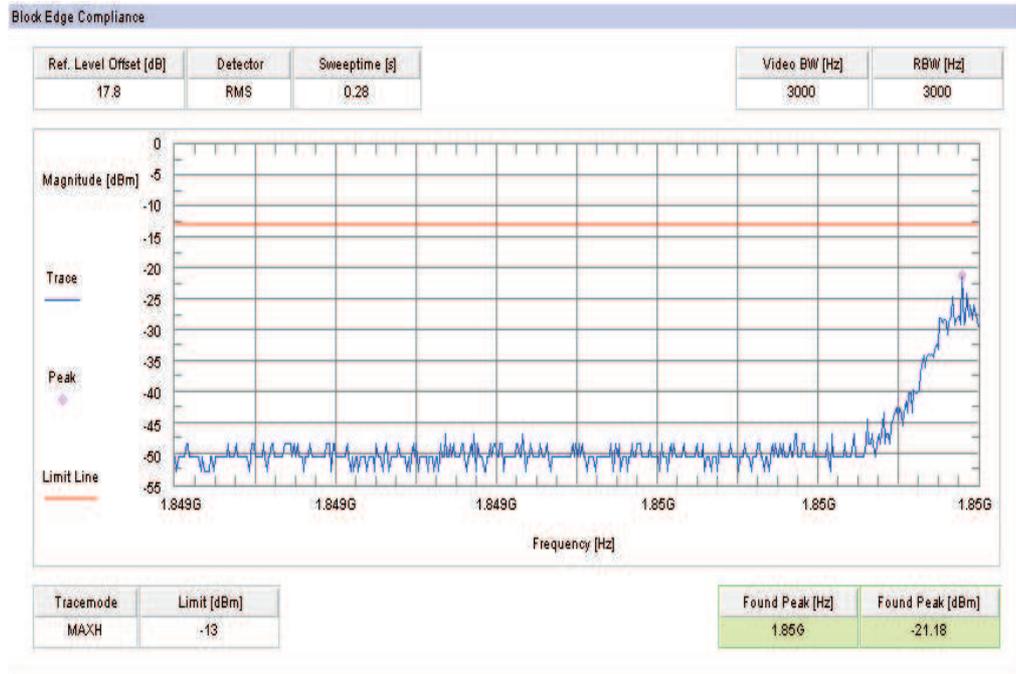
**Plot 1: Channel 512 (GSM-mode)**



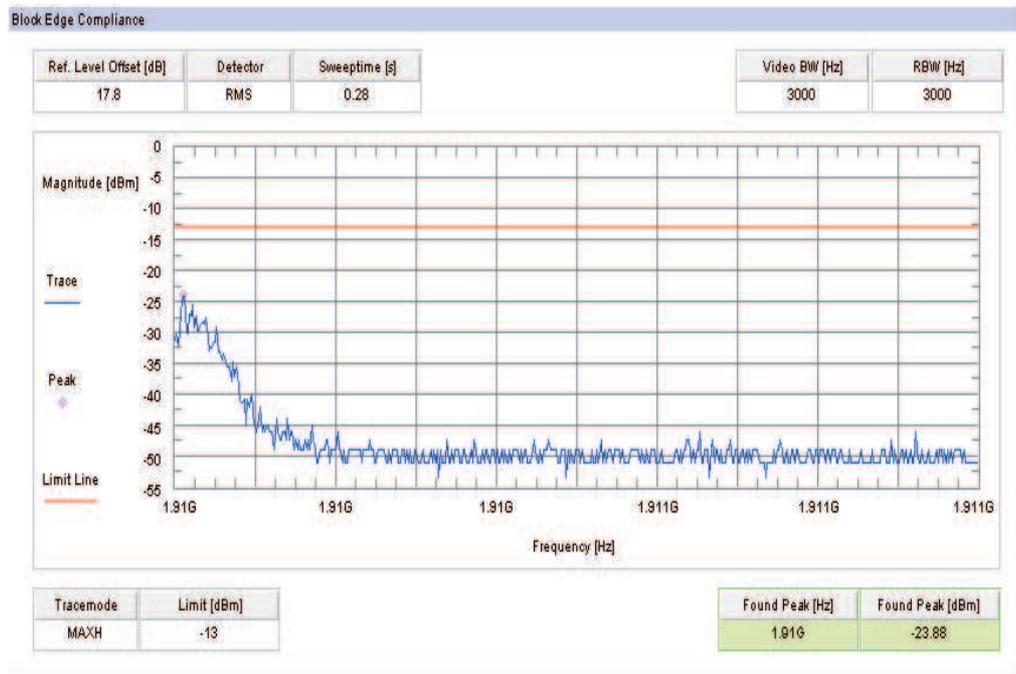
**Plot 2: Channel 810 (GSM-mode)**



Plot 3: Channel 512 (EDGE-mode)



Plot 4: Channel 810 (EDGE-mode)



**Result: Passed**

### 8.3.6 Occupied bandwidth

**Description:**

Measurement of the occupied bandwidth of the transmitted signal.

**Measurement:**

Similar to conducted emissions, occupied bandwidth measurements are only provided for selected frequencies in order to reduce the amount of submitted data. Data were taken at the extreme and mid frequencies of the PCS1900 frequency band. The table below lists the measured 99% power and -26dBc occupied bandwidths. Spectrum analyzer plots are included on the following pages.

Part 24.238 requires a measurement bandwidth of at least 1% of the occupied bandwidth. For ca. 300 kHz, this equates to a resolution bandwidth of at least 3.0 kHz. For this testing, a resolution bandwidth 3.0 kHz was used.

Measurement parameters	
Detector:	Peak
Sweep time:	Auto
Video bandwidth:	30 kHz
Resolution bandwidth:	10 kHz
Span:	1 MHz
Trace-Mode:	Max Hold

**Limits:**

FCC	IC
CFR Part 24.238 CFR Part 2.1049	RSS 133
Occupied Bandwidth	
Spectrum must fall completely in the specified band	

**Results:**

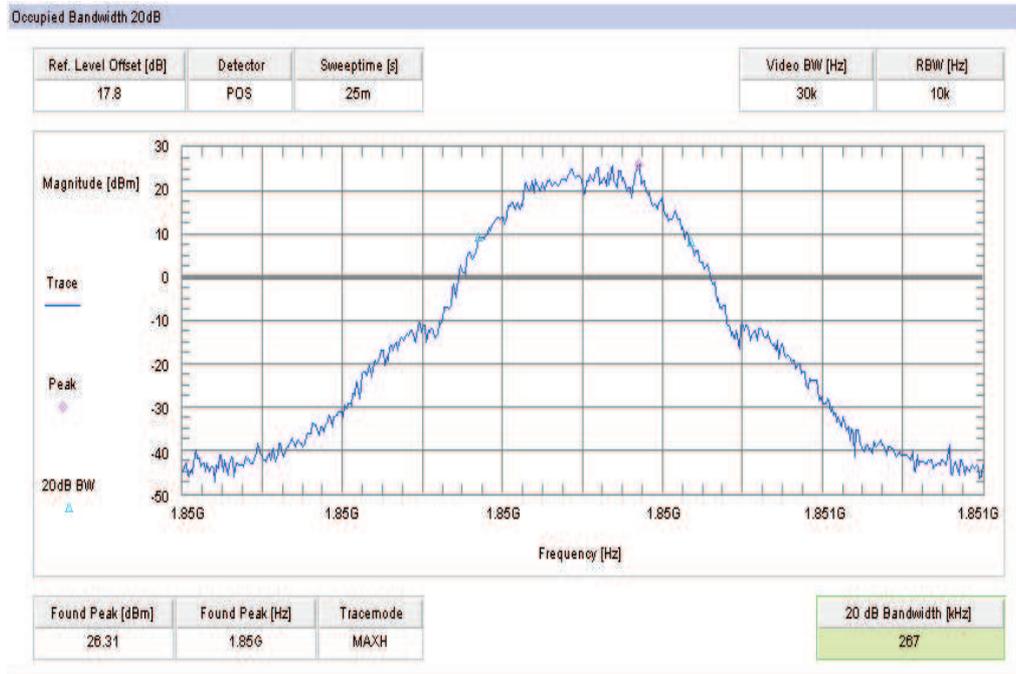
Occupied Bandwidth - GMSK mode		
Frequency (MHz)	99% OBW (kHz)	-26 dBc BW (kHz)
1850.2	267	313
1880.0	267	317
1909.8	281	317
Measurement uncertainty	± 3 kHz	

Occupied Bandwidth - EDGE mode		
Frequency (MHz)	99% OBW (kHz)	-26 dBc BW (kHz)
1850.2	277	313
1880.0	275	311
1909.8	269	301
Measurement uncertainty	± 3 kHz	

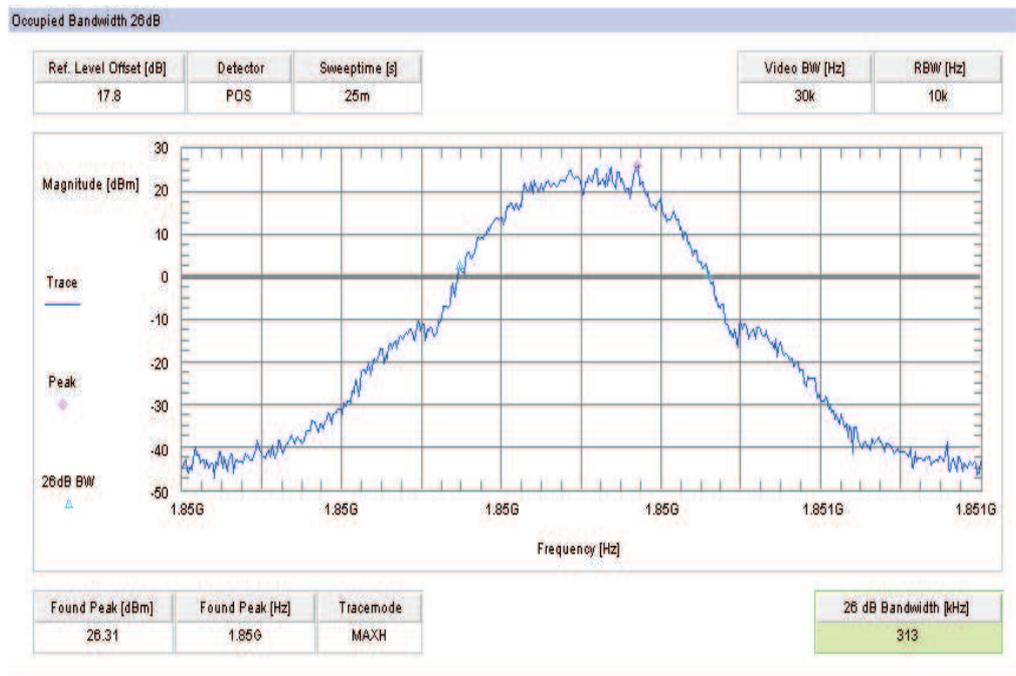
**Result: Passed**

**Plots:**

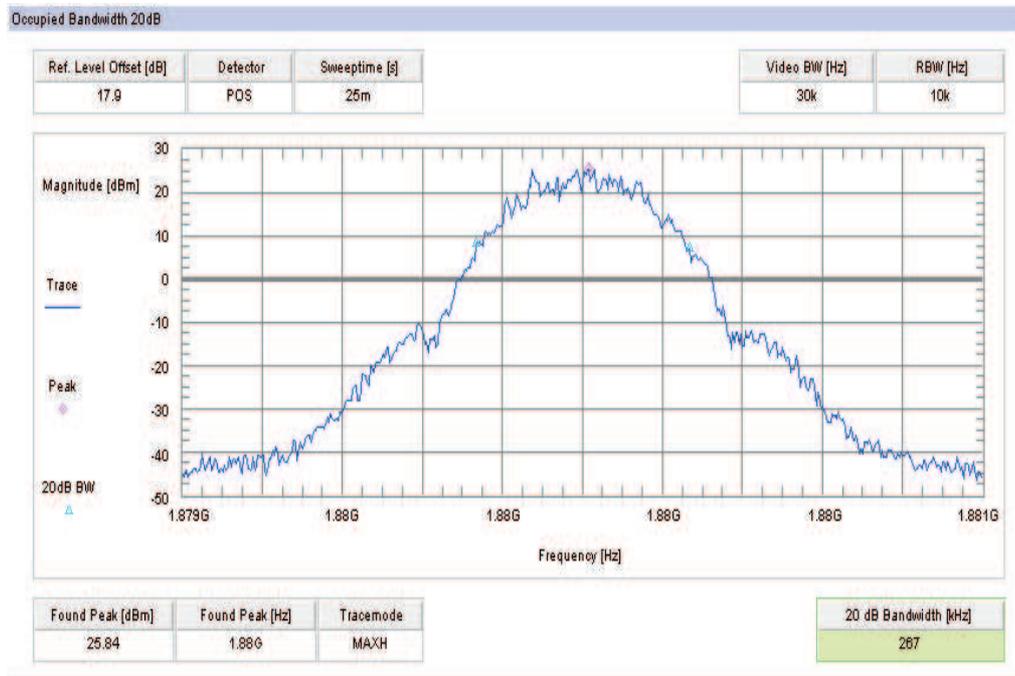
**Plot 1: Channel 512 (99% - OBW)**



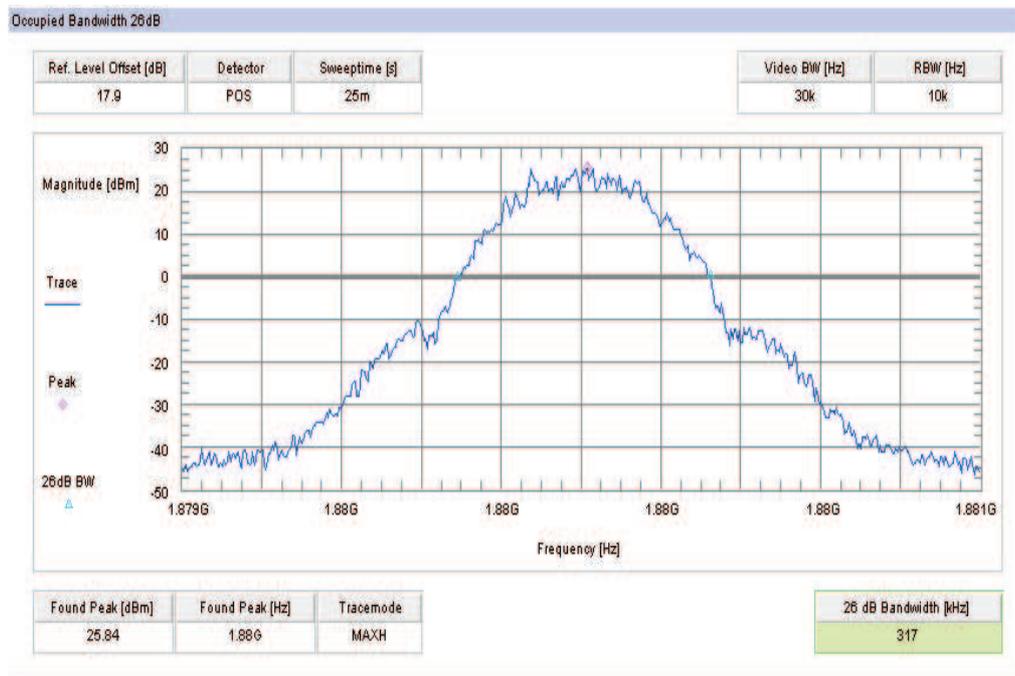
**Plot 2: Channel 512 (-26 dBc BW)**



Plot 3: Channel 661 (99% - OBW)



Plot 4: Channel 661 (-26 dBc BW)



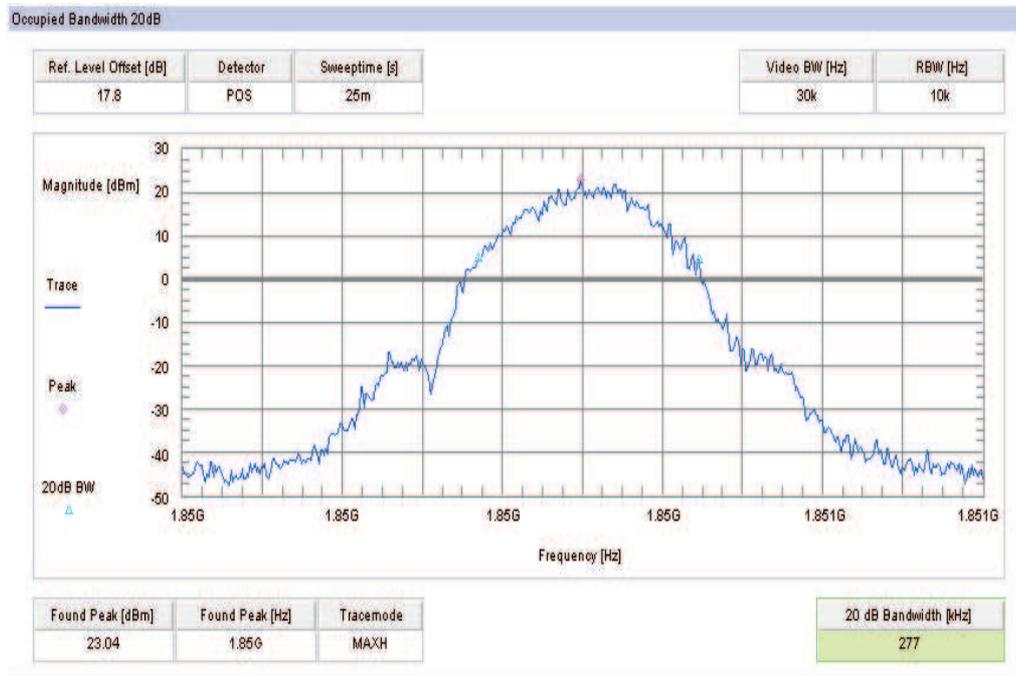
Plot 5: Channel 810 (99% - OBW)



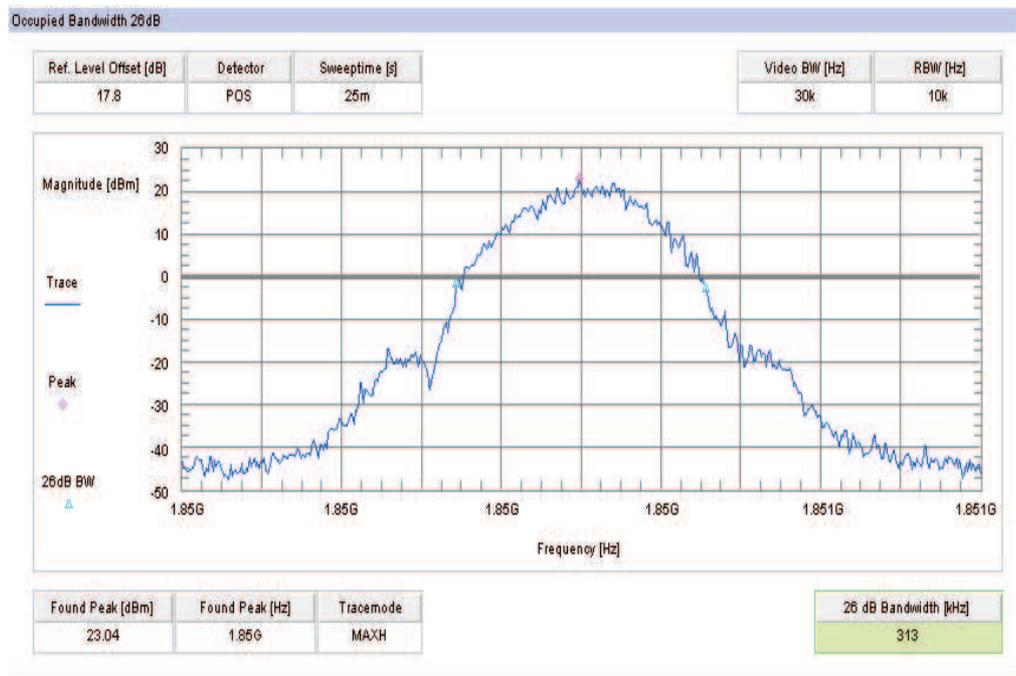
Plot 6: Channel 810 (-26 dBc BW)



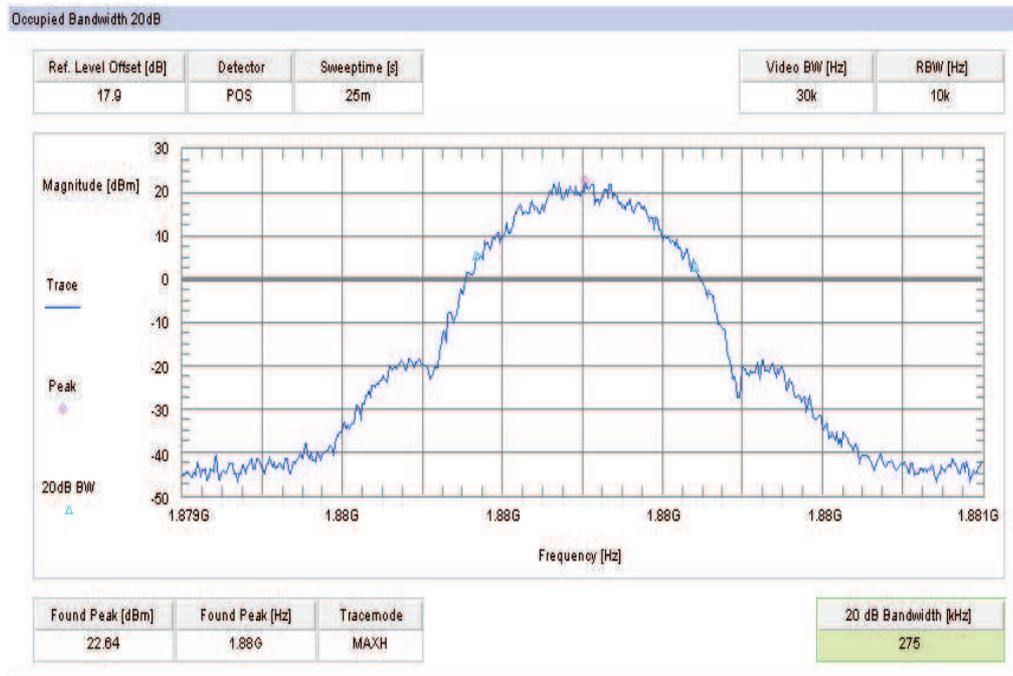
Plot 7: Channel 512 (99% - OBW) – EDGE



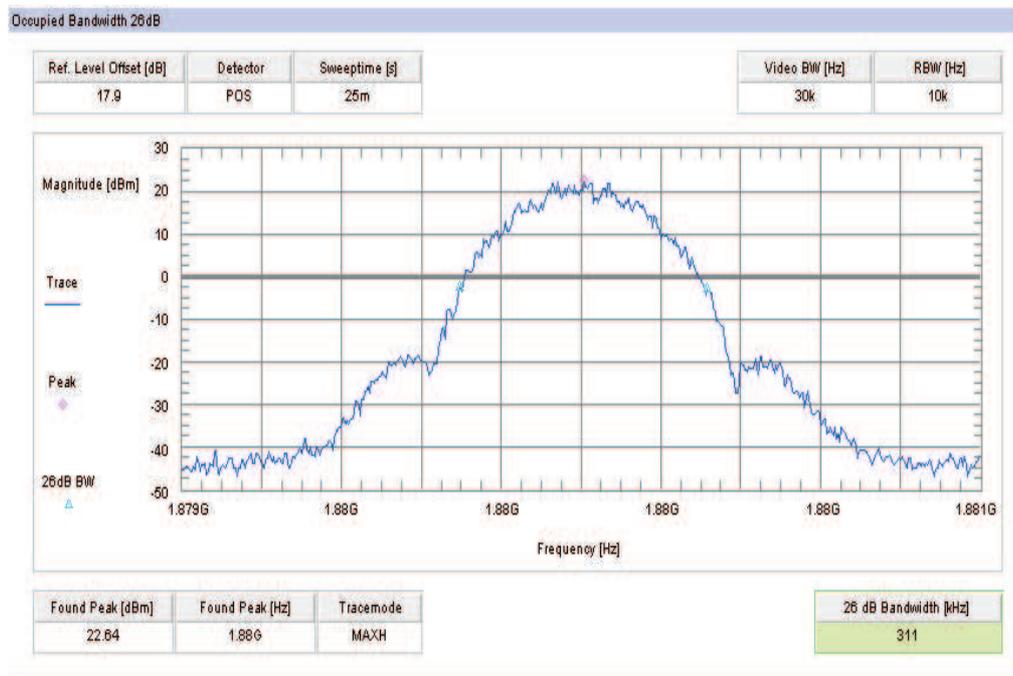
Plot 8: Channel 512 (-26 dBc BW) – EDGE



Plot 9: Channel 661 (99% - OBW) – EDGE



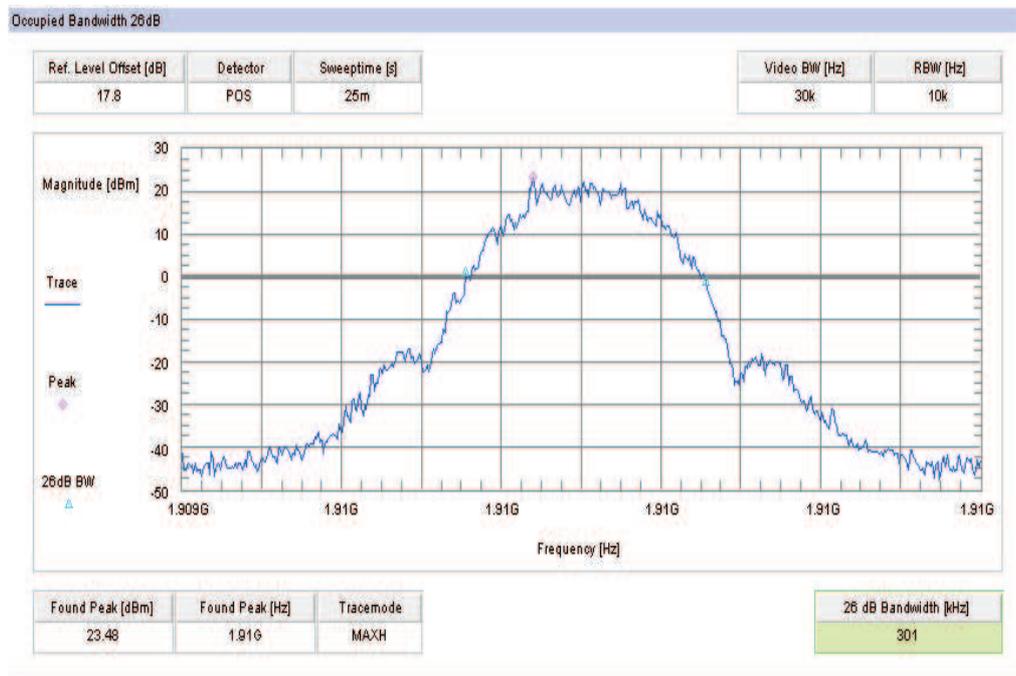
Plot 10: Channel 661 (-26 dBc BW) – EDGE



Plot 11: Channel 810 (99% - OBW) – EDGE



Plot 12: Channel 810 (-26 dBc BW) – EDGE



## 8.4 Results UMTS band II

All UMTS-band measurements are done in WCDMA mode only.

The connection was established with the following setup: WCDMA CS-RMC, Max Power (All Bit up)

### 8.4.1 RF output power

#### Description:

This paragraph contains average power, peak output power and EIRP measurements for the mobile station. In all cases, the peak output power is within the required mask (this mask is specified in the JTC standards, TIA PN3389 Vol. 1 Chap 7, and is no FCC requirement).

#### Measurement:

The mobile was set up for the maximum output power with pseudo random data modulation.

To determine the Peak-To-Average Power Ratio (PAPR) the measurement was performed with the Power Complementary Cumulative Distribution Function (CCDF).

Measurement parameters	
Detector:	Peak and RMS (Power in Burst)
Sweep time:	Auto
Video bandwidth:	10 MHz
Resolution bandwidth:	10 MHz
Span:	Zero Span
Trace-Mode:	Max Hold

#### Limits:

FCC	IC
CFR Part 24.232 CFR Part 2.1046	RSS 133
Nominal Peak Output Power	
+33.00 dBm	
In measuring transmissions in this band using an average power technique, the peak-to-average ratio (PAR) of the transmission may not exceed 13 dB.	

**Results:**

Output Power (conducted) WCDMA mode		
Frequency (MHz)	Average Output Power (dBm)	Peak to Average Ratio (dB)
1852.4	23.5	3.29
1880.0	23.4	3.08
1907.6	23.4	2.91
Measurement uncertainty	± 0.5 dB	

Output Power (radiated) WCDMA mode (VOICE)	
Frequency (MHz)	Average Output Power (dBm) - EIRP
1852.4	21.8
1880.0	22.1
1907.6	23.5
Measurement uncertainty	± 2.0 dB

Output Power (radiated) WCDMA mode (HSPA)	
Frequency (MHz)	Average Output Power (dBm) - EIRP
1852.4	21.9
1880.0	23.0
1907.6	23.3
Measurement uncertainty	± 2.0 dB

Output Power (radiated) WCDMA mode (HSPA+)	
Frequency (MHz)	Average Output Power (dBm) - EIRP
1852.4	25.4
1880.0	25.3
1907.6	25.5
Measurement uncertainty	± 2.0 dB

**Result: Passed**

#### 8.4.2 Frequency stability

Not performed

### 8.4.3 Spurious emissions radiated

**Description:**

The following steps outline the procedure used to measure the radiated emissions from the mobile station. The site is constructed in accordance with ANSI C63.4:2009 requirements and is recognized by the FCC to be in compliance for a 3 and a 10 meter site. The spectrum was scanned from 30 MHz to the 10th harmonic of the highest frequency generated within the equipment, which is the transmitted carrier that can be as high as 1910 MHz. This was rounded up to 20 GHz. The resolution bandwidth is set as outlined in Part 24.238. The spectrum was scanned with the mobile station transmitting at carrier frequencies that pertain to low, mid and high channels of the UMTS band II.

The final open field emission (here 10m semi-anechoic chamber listed by FCC) test procedure is as follows:

- a) The test item was placed on a 0.8 meter high non-conductive stand at a 3 meter test distance from the receive antenna.
- b) The antenna output was terminated in a 50 ohm load (if possible).
- c) A double ridged wave guide antenna was placed on an adjustable height antenna mast 3 meters from the test item for emission measurements.
- d) Detected emissions were maximized at each frequency by rotating the test item and adjusting the receive antenna height and polarization. The maximum meter reading was recorded. The radiated emission measurements of the harmonics of the transmit frequency through the 10th harmonic were measured with peak detector and 1 MHz bandwidth. If the harmonic could not be detected above the noise floor, the ambient level was recorded. The equivalent power into a dipole antenna was calculated from the field intensity levels measured at 3 meters.
- e) Now each detected emissions were substituted by the substitution method, in accordance with the TIA/EIA 603.

**Measurement:**

Measurement parameters	
Detector:	Peak
Sweep time:	2 sec.
Video bandwidth:	Below 1 GHz: 100 kHz Above 1 GHz: 1 MHz
Resolution bandwidth:	Below 1 GHz: 100 kHz Above 1 GHz: 1 MHz
Span:	100 MHz Steps
Trace-Mode:	Max Hold

**Limits:**

FCC	IC
CFR Part 24.238 CFR Part 2.1053	RSS 133
Spurious Emissions Radiated	
Attenuation $\geq 43 + 10\log(P)$ (P, Power in Watts)	
-13 dBm	

### Results:

Radiated emissions measurements were made only at the upper, center, and lower carrier frequencies of the UMTS band II (1852.4 MHz, 1880.0 MHz and 1907.6 MHz). It was decided that measurements at these three carrier frequencies would be sufficient to demonstrate compliance with emissions limits because it was seen that all the significant spurs occur well outside the band and no radiation was seen from a carrier in one block of the UMTS band II into any of the other blocks. The equipment must still, however, meet emissions requirements with the carrier at all frequencies over which it is capable of operating and it is the manufacturer's responsibility to verify this.

The final open field radiated levels are presented on the next pages.

All measurements were done in horizontal and vertical polarization; the plots show the worst case.

The plots show only the middle channel. If spurious were detected, the lowest and highest channel were checked too. The found values are stated in the table below.

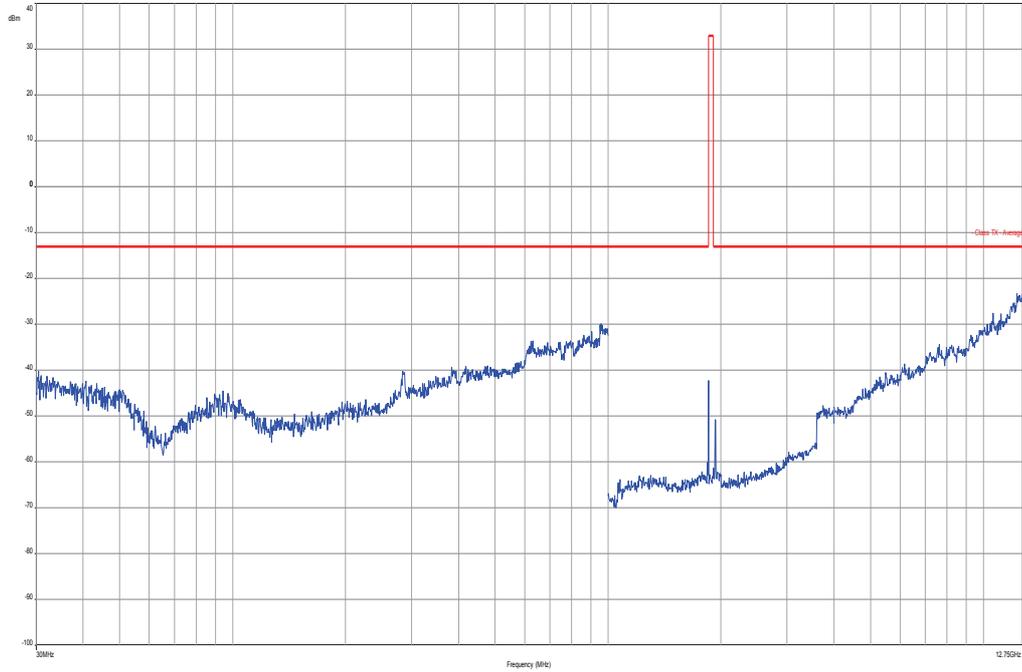
As can be seen from this data, the emissions from the test item were within the specification limit.

SPURIOUS EMISSION LEVEL (dBm)								
Harmonic	Ch. 9262 Freq. (MHz)	Level [dBm]	Harmonic	Ch. 9400 Freq. (MHz)	Level [dBm]	Harmonic	Ch. 9538 Freq. (MHz)	Level [dBm]
2	3704.8	-	2	3760.0	-	2	3815.2	-
3	5557.2	-	3	5640.0	-	3	5722.8	-
4	7409.6	-	4	7520.0	-	4	7630.4	-
5	9262.0	-	5	9400.0	-	5	9538.0	-
6	11114.4	-	6	11280.0	-	6	11445.6	-
7	12966.8	-	7	13160.0	-	7	13353.2	-
8	14819.2	-	8	15040.0	-	8	15260.8	-
9	16671.6	-	9	16920.0	-	9	17168.4	-
10	18524.0	-	10	18800.0	-	10	19076.0	-
Measurement uncertainty					± 3dB			

**Result: Passed**

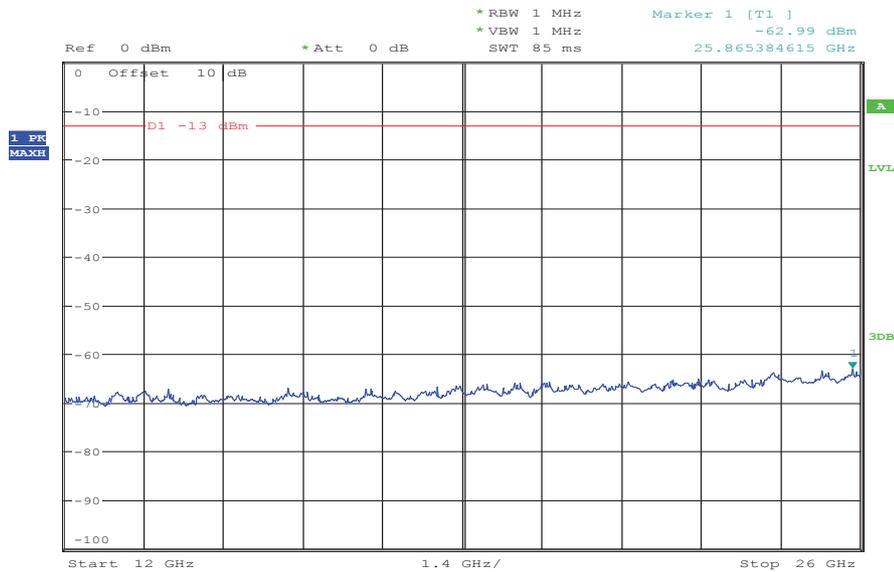
**Plots:**

Plot 1: Channel 9262 / VOICE (30 MHz – 12.75 GHz)



Carrier notched with 1.9 GHz rejection filter

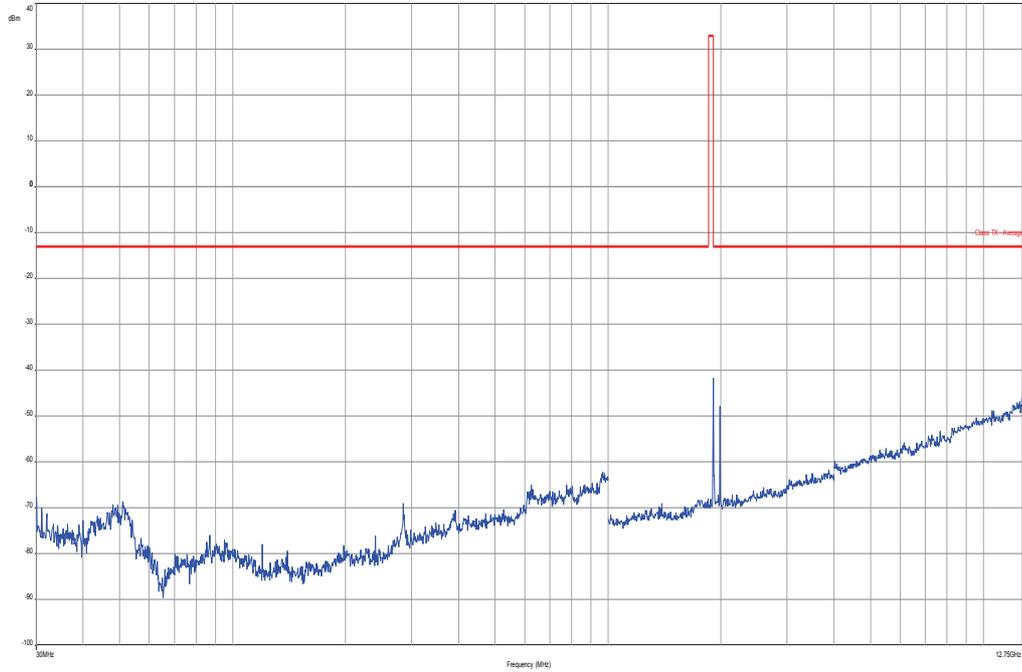
Plot 2: Channel 9262 / VOICE (12 GHz – 26 GHz)



Date: 26.MAR.2013 08:38:08

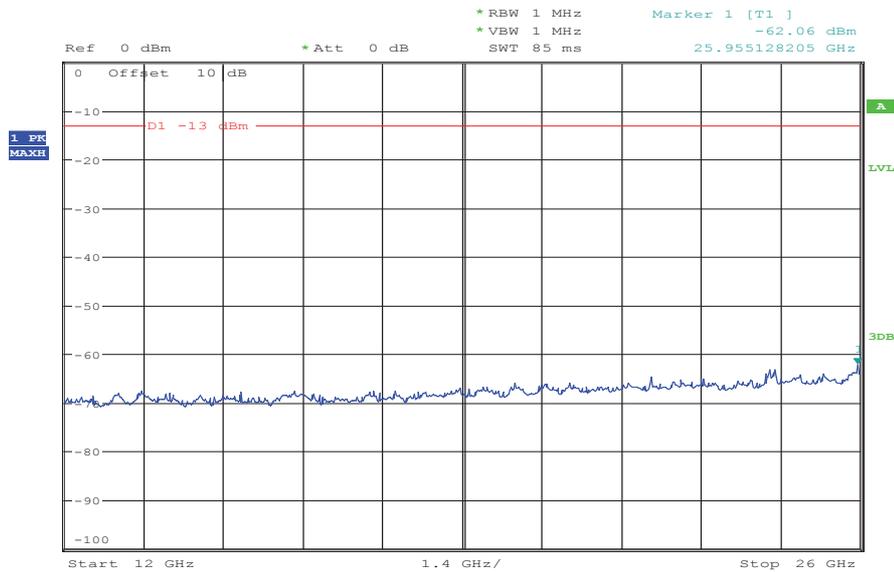


Plot 5: Channel 9538 / VOICE (30 MHz – 12.75 GHz)



Carrier notched with 1.9 GHz rejection filter

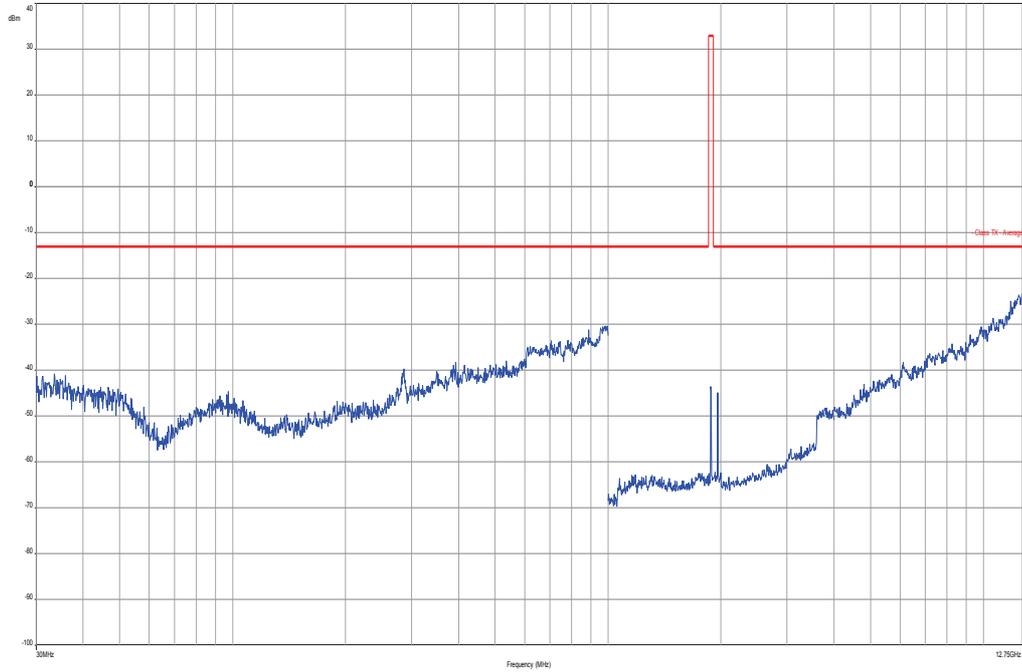
Plot 6: Channel 9538 / VOICE (12 GHz – 26 GHz)



Date: 26.MAR.2013 08:43:51

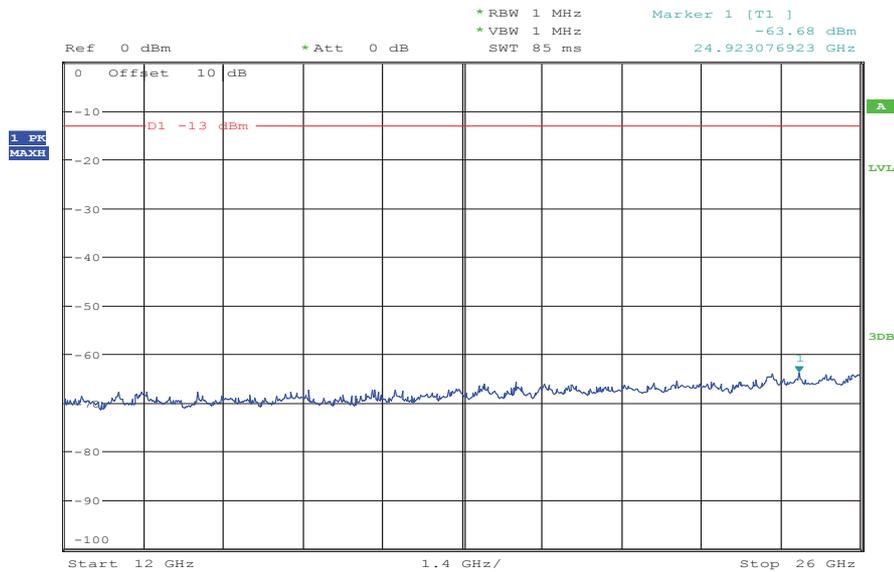


Plot 9: Channel 9400 / HSPA (30 MHz – 12.75 GHz)



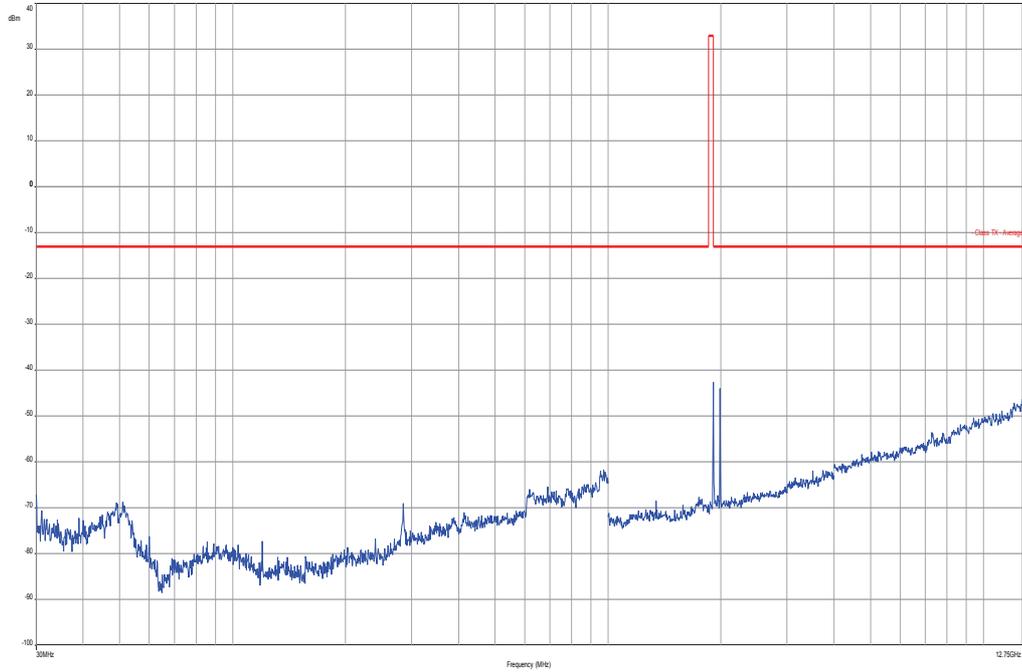
Carrier notched with 1.9 GHz rejection filter

Plot 10: Channel 9400 / HSPA (12 GHz – 26 GHz)



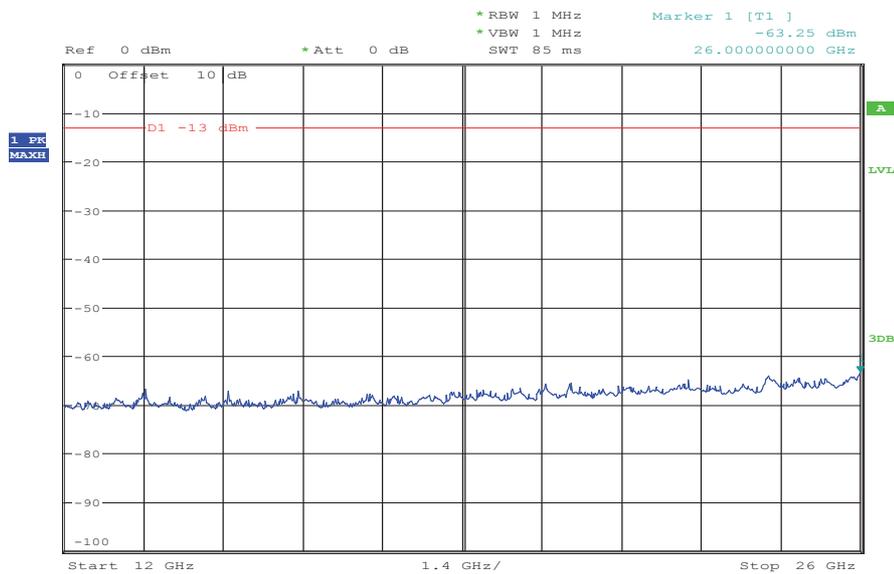
Date: 26.MAR.2013 11:00:21

Plot 11: Channel 9538 / HSPA (30 MHz – 12.75 GHz)



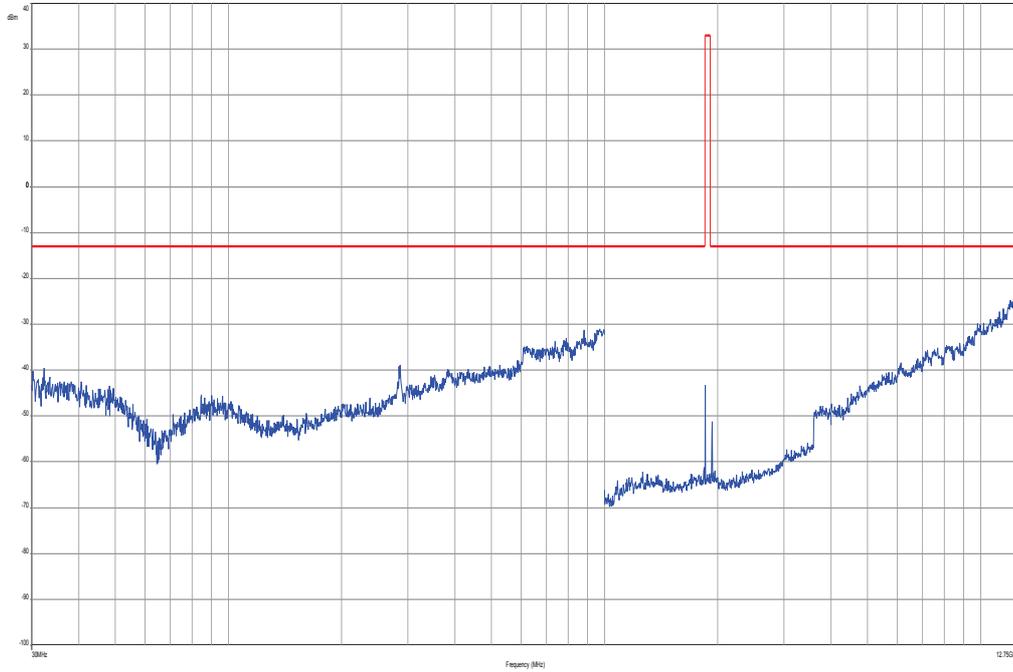
Carrier notched with 1.9 GHz rejection filter

Plot 12: Channel 9538 / HSPA (12 GHz – 26 GHz)



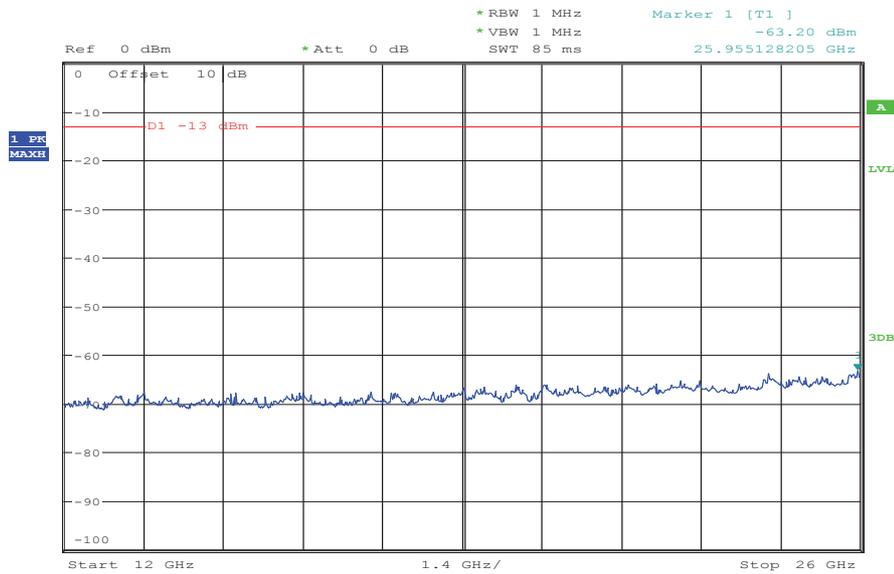
Date: 26.MAR.2013 11:01:11

Plot 13: Channel 9262 / HSPA+ (30 MHz – 12.75 GHz)



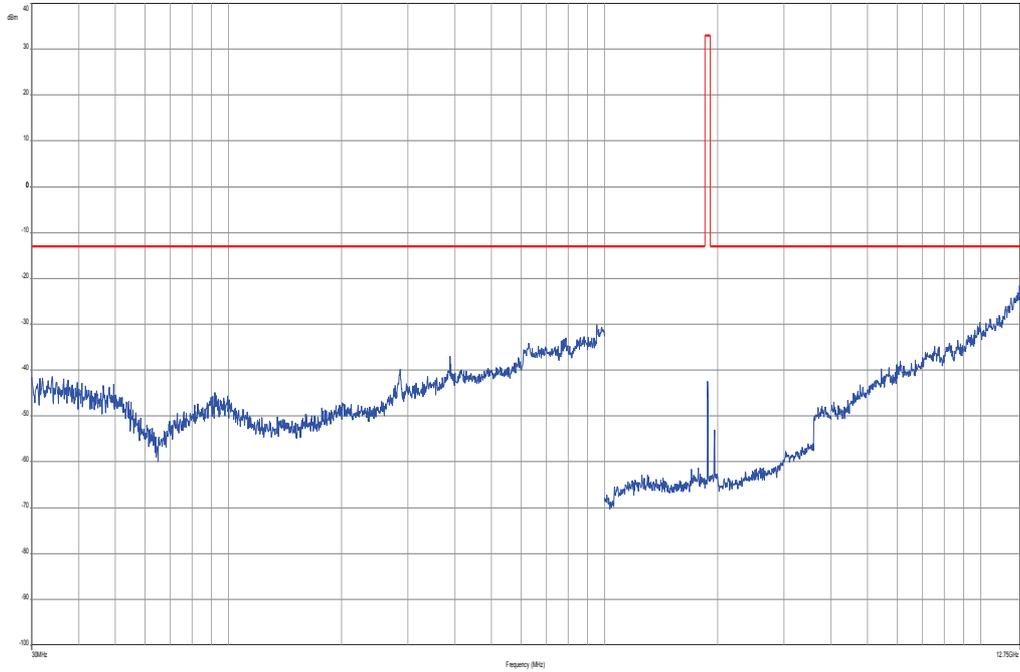
Carrier notched with 1.9 GHz rejection filter

Plot 14: Channel 9262 / HSPA+ (12 GHz – 26 GHz)



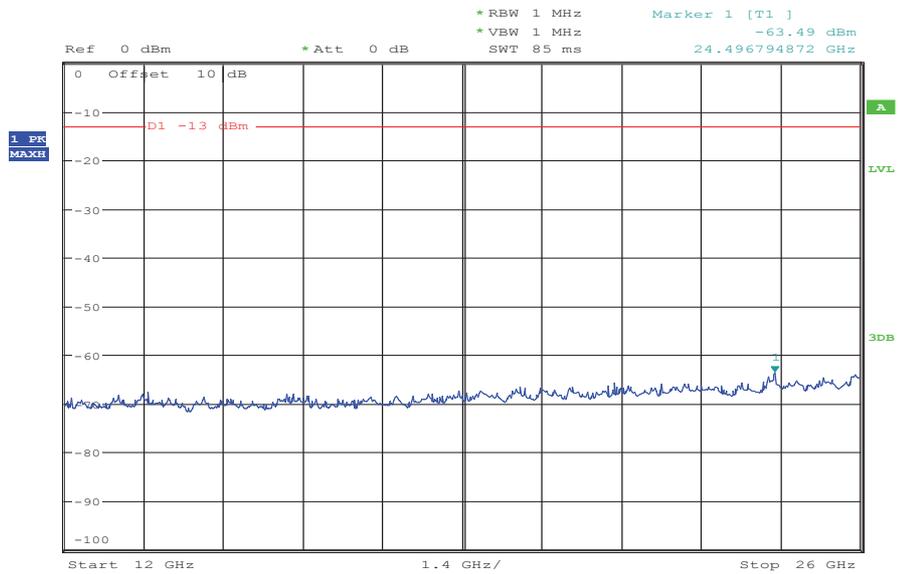
Date: 26.MAR.2013 11:03:57

Plot 15: Channel 9400 / HSPA+ (30 MHz – 12.75 GHz)



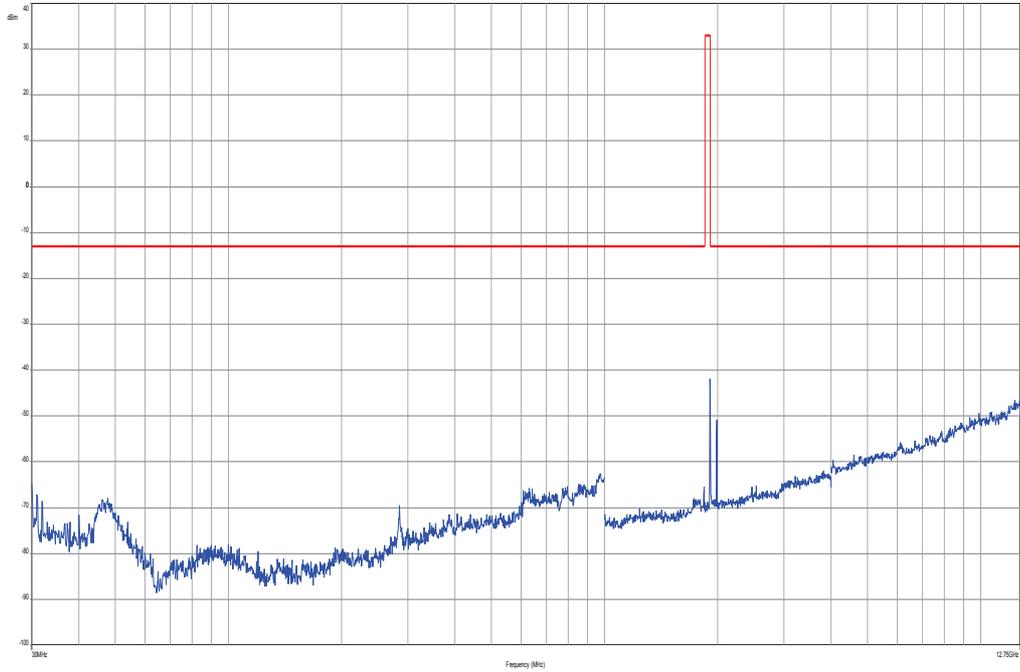
Carrier notched with 1.9 GHz rejection filter

Plot 16: Channel 9400 / HSPA+ (12 GHz – 26 GHz)



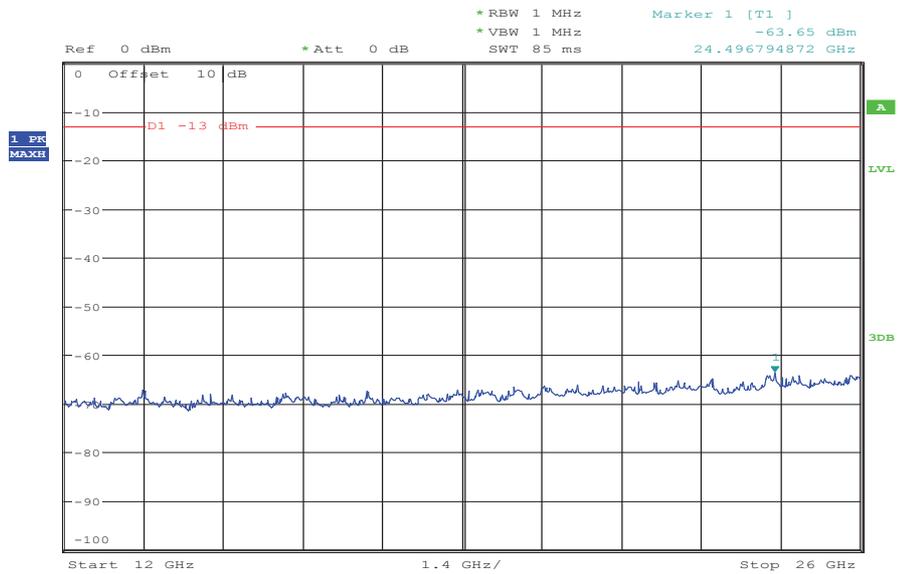
Date: 26.MAR.2013 11:04:44

Plot 17: Channel 9538 / HSPA+ (30 MHz – 12.75 GHz)



Carrier notched with 1.9 GHz rejection filter

Plot 18: Channel 9538 / HSPA+ (12 GHz – 26 GHz)



Date: 26.MAR.2013 11:02:41

### 8.4.4 Spurious emissions conducted

**Description:**

The following steps outline the procedure used to measure the conducted emissions from the mobile station.

1. Determine frequency range for measurements: From CFR 2.1057 the spectrum should be investigated from the lowest radio frequency generated in the equipment up to at least the 10th harmonic of the carrier frequency. For the mobile station equipment tested, this equates to a frequency range of 13 MHz to 19.1 GHz, data taken from 10 MHz to 25 GHz.
2. Determine mobile station transmits frequencies: below outlines the band edge frequencies pertinent to conducted emissions testing.

UMTS band II Transmitter Channel Frequency  
 9262 1852.4 MHz  
 9400 1880.0 MHz  
 9538 1907.6 MHz

**Measurement:**

Measurement parameters	
Detector:	Peak
Sweep time:	Auto
Video bandwidth:	Pre-measurement with 1 MHz On spurious detection re-measurement below 1 GHz with 100 kHz Above 1 GHz with 1 MHz
Resolution bandwidth:	Pre-measurement with 1 MHz On spurious detection re-measurement below 1 GHz with 100 kHz Above 1 GHz with 1 MHz
Span:	30 MHz – 25 GHz
Trace-Mode:	Max Hold

**Limits:**

FCC	IC
CFR Part 24.238 CFR Part 2.1051	RSS 133
Spurious Emissions Conducted	
Attenuation $\geq 43 + 10\log(P)$ (P, Power in Watts)	
-13 dBm	

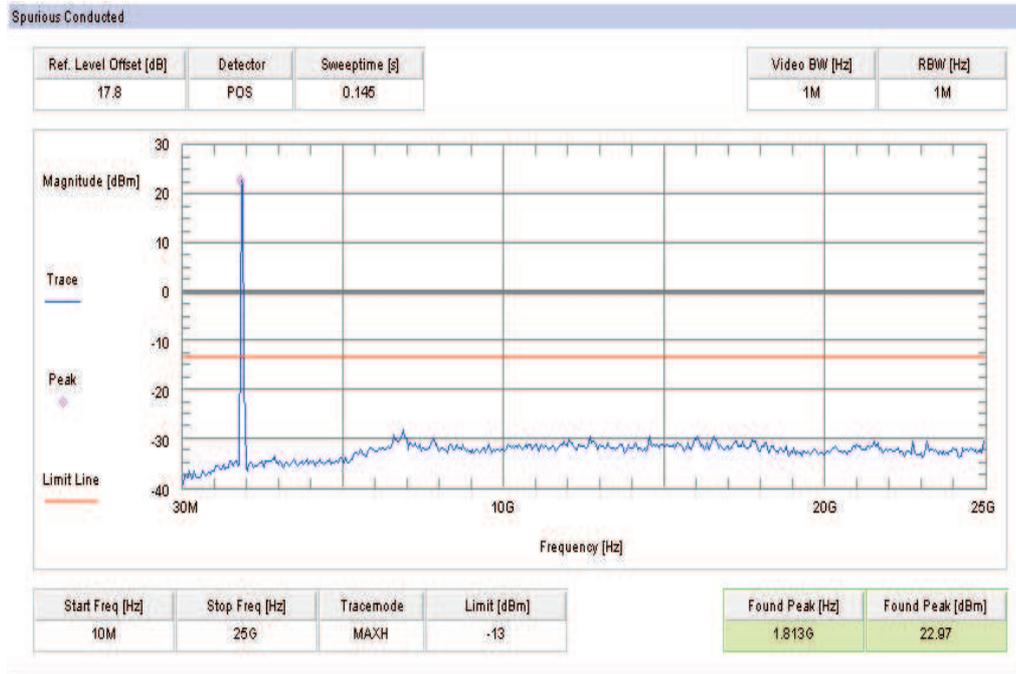
**Results:**

SPURIOUS EMISSION LEVEL (dBm)								
Harmonic	Ch. 9262 Freq. (MHz)	Level [dBm]	Harmonic	Ch. 9400 Freq. (MHz)	Level [dBm]	Harmonic	Ch. 9538 Freq. (MHz)	Level [dBm]
2	3704.8	-	2	3760.0	-	2	3815.2	-
3	5557.2	-	3	5640.0	-	3	5722.8	-
4	7409.6	-	4	7520.0	-	4	7630.4	-
5	9262.0	-	5	9400.0	-	5	9538.0	-
6	11114.4	-	6	11280.0	-	6	11445.6	-
7	12966.8	-	7	13160.0	-	7	13353.2	-
8	14819.2	-	8	15040.0	-	8	15260.8	-
9	16671.6	-	9	16920.0	-	9	17168.4	-
10	18524.0	-	10	18800.0	-	10	19076.0	-
Measurement uncertainty					± 3dB			

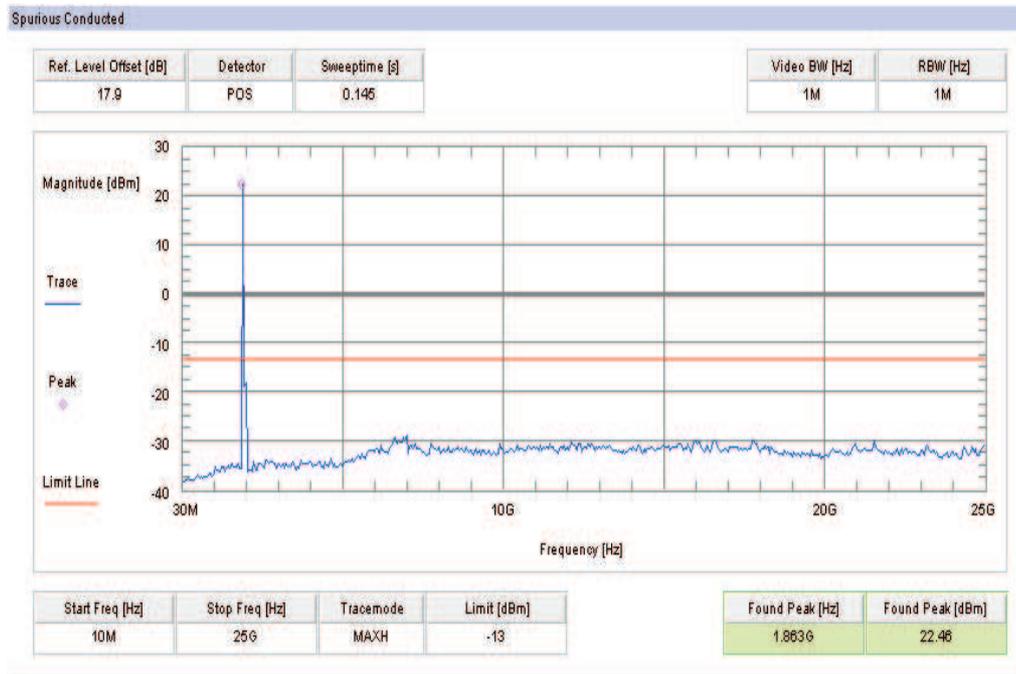
**Result: Passed**

**Plots:**

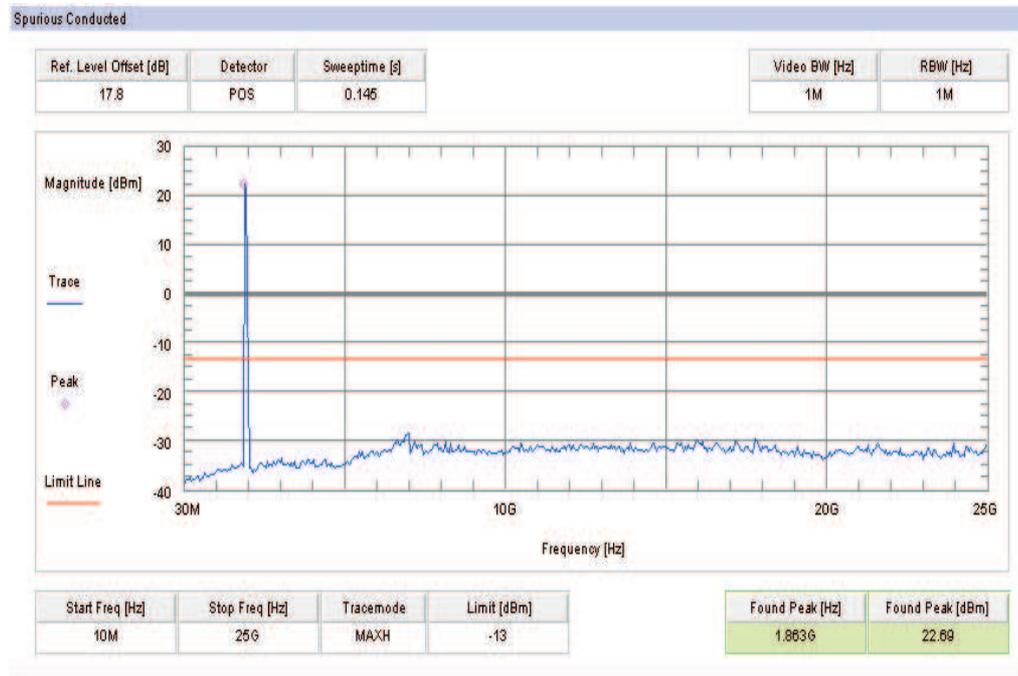
**Plot 1: Channel 9262 (10 MHz - 25 GHz)**



**Plot 2: Channel 9400 (10 MHz - 25 GHz)**



Plot 3: Channel 9538 (10 MHz - 25 GHz)



### 8.4.5 Block edge compliance

**Description:**

The spectrum at the band edges must comply with the spurious emissions limits.

**Measurement:**

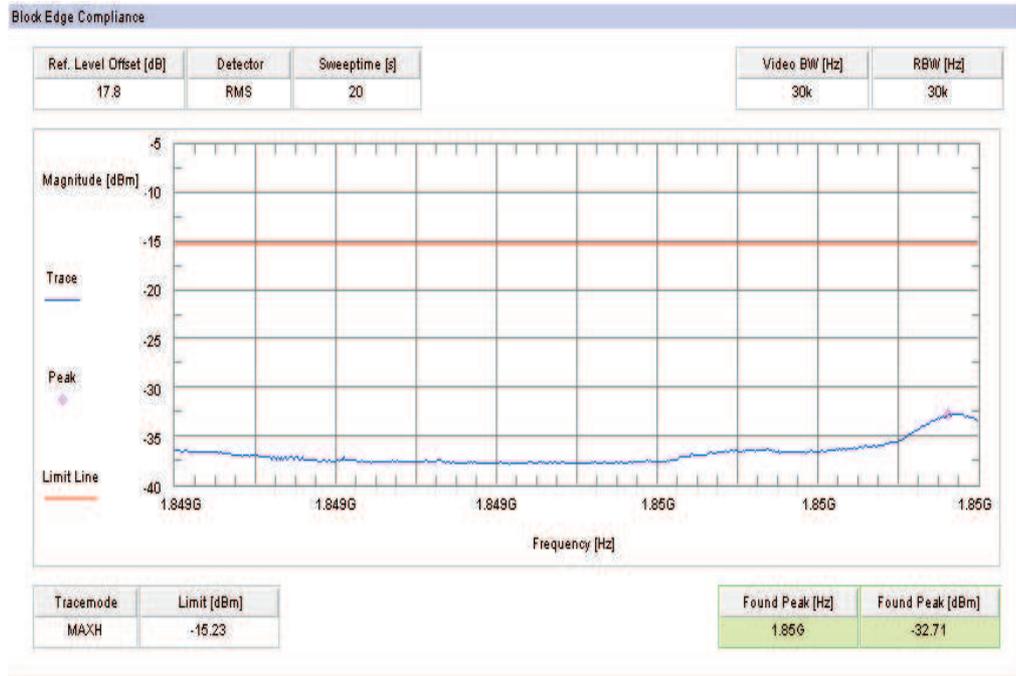
Measurement parameters	
Detector:	RMS
Sweep time:	20 sec.
Video bandwidth:	30 kHz
Resolution bandwidth:	30 kHz
Span:	1 MHz
Trace-Mode:	Max Hold

**Limits:**

FCC	IC
CFR Part 24.238 CFR Part 2.1051	RSS 133
Block Edge Compliance	
<p>Part 24.238 specifies that “the power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB.”</p> <p>However, in publication number 890810, The FCC Office of Engineering and Technology specified the following correction to the limits when a resolution bandwidth smaller than 1% of the emission bandwidth is used:</p> <p>“An alternative is to add an additional correction factor of 10 Log (RBW1/ RBW2) to the 43 +10 Log (P) limit. RBW1 is the narrower measurement resolution bandwidth and RBW2 is either the 1% emissions bandwidth or 1 MHz.”</p> <p>When using a 30 kHz bandwidth, this yields a -2.2185 adjustment to the limit [10log(30kHz/50kHz) = -2.2185]. When this adjustment is applied to the limit, the limit becomes -15.2185.</p>	
-15.22 dBm	

**Plots:**

**Plot 1: Channel 9262**



**Plot 2: Channel 9538**



**Result: Passed**

### 8.4.6 Occupied bandwidth

**Description:**

Measurement of the occupied bandwidth of the transmitted signal.

**Measurement:**

Similar to conducted emissions, occupied bandwidth measurements are only provided for selected frequencies in order to reduce the amount of submitted data. Data were taken at the extreme and mid frequencies of the UMTS band II frequency band. The table below lists the measured 99% power and -26dBc occupied bandwidths. Spectrum analyzer plots are included on the following pages.

Part 24.238 requires a measurement bandwidth of at least 1% of the occupied bandwidth. For ca. 4700 kHz, this equates to a resolution bandwidth of at least 50 kHz. For this testing, a resolution bandwidth 100 kHz was used.

Measurement parameters	
Detector:	Peak
Sweep time:	Auto
Video bandwidth:	300 kHz
Resolution bandwidth:	100 kHz
Span:	6 MHz
Trace-Mode:	Max Hold

**Limits:**

FCC	IC
CFR Part 24.238 CFR Part 2.1049	RSS 133
Occupied Bandwidth	
Spectrum must fall completely in the specified band	

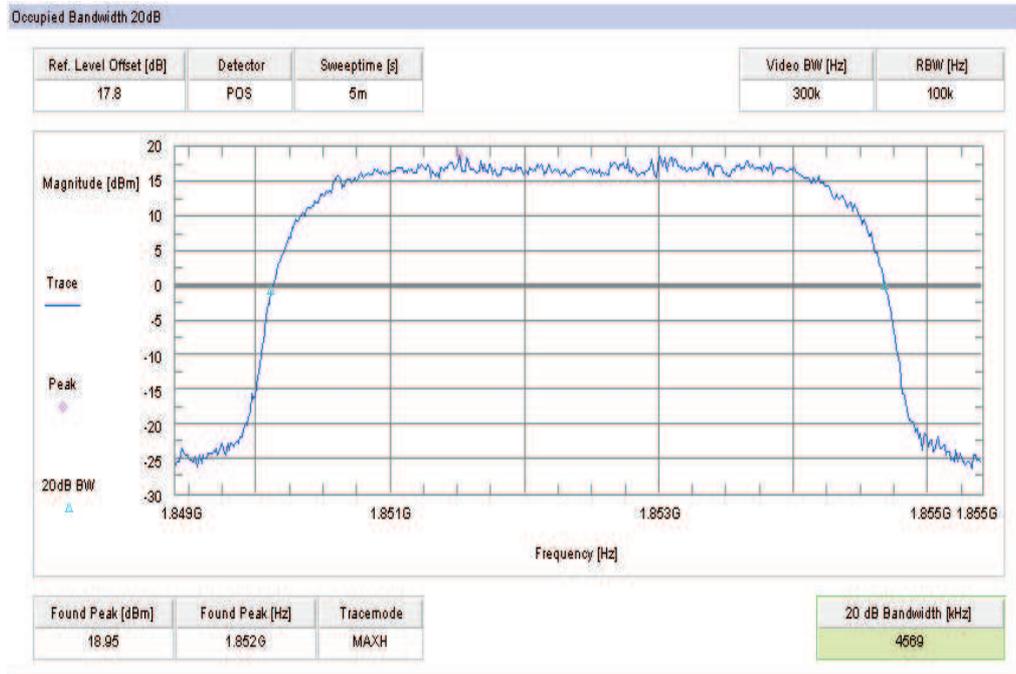
**Results:**

Occupied Bandwidth		
Frequency (MHz)	99% OBW (kHz)	-26 dBc BW (kHz)
1852.4	4569	4677
1880.0	4557	4677
1907.6	4557	4689
Measurement uncertainty	± 100 kHz	

**Result:** Passed

**Plots:**

**Plot 1: Channel 9262 (99% - OBW)**



**Plot 2: Channel 9262 (-26 dBc BW)**

