

TEST REPORT

Test Report No.: 1-1954-31-02/10



Testing Laboratory

CETECOM ICT Services GmbH

Untertürkheimer Straße 6 – 10
66117 Saarbrücken/Germany
Phone: + 49 681 5 98 - 0
Fax: + 49 681 5 98 - 9075
Internet: <http://www.cetecom-ict.de>
e-mail: info@ict.cetecom.de

Accredited Test Laboratory:

The test laboratory (area of testing) is accredited according to DIN EN ISO/IEC 17025
DAR registration number: DGA-PL-176/94-D1

Area of Testing: Radio Satellite Communications

Applicant

Sony Ericsson Mobile Communications AB

Nya Vattentorget
22188 Lund/Sweden
Phone: +46 46 19 30 00
Fax: +46 46 19 32 95
Contact: Johan Wedin
e-mail: johan.wedin@sonyericsson.com
Phone: +46 707 19 57 36

Manufacturer

Sony Ericsson Mobile Communications AB

Nya Vattentorget
22188 Lund/Sweden

Test Standard/s

47 CFR Part 22	Title 47 of the Code of Federal Regulations; Chapter I-Federal Communications Commission subchapter B - common carrier services, Part 22-Public mobile services
47 CFR Part 24	Title 47 of the Code of Federal Regulations; Chapter I-Federal Communications Commission subchapter B - common carrier services, Part 24-Personal communications services
RSS - 132 Issue 2	Spectrum Management and Telecommunications Policy - Radio Standards Specifications Cellular Telephones Employing New Technologies Operating in the Bands 824-849 MHz and 869-894 MHz

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

Test Item

Kind of test item:	Mobile Phone 850/900/1800/1900/UMTS /HSDPA /HSUPA/ BT2.0+EDR, A-GPS, FM Rx, WLAN
Model name:	AAD-3880091-BV
FCC ID:	PY7A3880091
IC:	4170B-A3880091
Frequency [MHz]:	824.2 – 848.8 MHz and 1850.2 – 1909.8 MHz
Power supply:	3.70V DC by Li-Polymer Battery (EP800) and Power Supply
Temperature range:	-30 °C to 60 °C



Test performed:

2010-07-01 Jakob Reschke

Test Report authorised:

2010-07-01 Stefan Bös

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2 General Information

2.1 Notes

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 generalisations drawn from the test results with regard to other specimens or samples of the type of the equipment represented by the test item. The test report may only be reproduced or published in full. Reproduction or publication of extracts from the report requires the prior written approval of CETECOM ICT Services GmbH.

2.2 Application details

Date of receipt of order:	2010-06-16
Date of receipt of test item:	2010-06-23
Start of test:	2010-06-23
End of test:	2010-06-28
Person(s) present during the test:	-/-

3 Test standard/s

Test Standard	Version	Test Standard Description
47 CFR Part 22	2009-10	Title 47 of the Code of Federal Regulations; Chapter I-Federal Communications Commission subchapter B - common carrier services, Part 22-Public mobile services
47 CFR Part 24	2009-10	Title 47 of the Code of Federal Regulations; Chapter I-Federal Communications Commission subchapter B - common carrier services, Part 24-Personal communications services
RSS - 132 Issue 2	2005-09	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 5	2009-02	Spectrum Management and Telecommunications Policy - Radio Standards Specifications 2 GHz Personal Communication Services

4 Test Environment

Temperature:	T_{nom}	24	°C during room temperature tests
	T_{max}	60	°C during high temperature test
	T_{min}	-30	°C during low temperature test
Relative humidity content:		53	%
Air pressure:		not relevant for this kind of testing	
Power supply:	V_{nom}	3.70 V	DC by Li-Polymer Battery (EP800) and Power Supply
	V_{max}	4.40 V	
	V_{min}	3.30 V	

5 Test item

Kind of test item	:	Mobile Phone 850/900/1800/1900/UMTS /HSDPA/HSUPA/ BT2.0+EDR, A-GPS, FM Rx, WLAN
Type identification	:	AAD-3880091-BV
S/N serial number	:	Rad. CB511JVN9J Cond. CB511JVN9G
HW hardware status	:	AP1
SW software status	:	1.2.A.0.8
Frequency Band [MHz]	:	824.2 – 848.8 MHz and 1850.2 – 1909.8 MHz
Type of Modulation	:	GMSK; 8-PSK
Number of channels	:	125 (PCS850) and 300 (PCS1900)
Antenna	:	Integrated antenna
Power Supply	:	3.70 V DC by Li-Polymer Battery (EP800) and Power Supply
Temperature Range	:	-30°C to 60 °C

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	2010-07-01	-/-

7.1 GSM 850

Test Case	temperature conditions	power source voltages	Pass	Fail	NA	NP	Results (max.)
RF Output Power	Nominal	Nominal	☒	☐	☐	☐	Rad. 31.23 dBm Cond. 33.12 dBm
Frequency Stability	Nominal	Nominal	☒	☐	☐	☐	-41 Hz
Spurious Emissions Radiated	Nominal	Nominal	☒	☐	☐	☐	-24.55 dBm
Spurious Emissions Conducted	Nominal	Nominal	☒	☐	☐	☐	-21.68 dBm
Block Edge Compliance	Nominal	Nominal	☒	☐	☐	☐	-14.84 dBm
Occupied Bandwidth	Nominal	Nominal	☒	☐	☐	☐	279 kHz

Note:

NA = Not applicable; NP = Not performed

7.2 PCS 1900

Test Case	temperature conditions	power source voltages	Pass	Fail	NA	NP	Results (max.)
RF Output Power	Nominal	Nominal	☒	☐	☐	☐	Rad. 31.62 dBm Cond. 29.16 dBm
Frequency Stability	Nominal	Nominal	☒	☐	☐	☐	-67 Hz
Spurious Emissions Radiated	Nominal	Nominal	☒	☐	☐	☐	-41.39 dBm
Spurious Emissions Conducted	Nominal	Nominal	☒	☐	☐	☐	-/-
Block Edge Compliance	Nominal	Nominal	☒	☐	☐	☐	-20.33 dBm
Occupied Bandwidth	Nominal	Nominal	☒	☐	☐	☐	283 kHz

Note:

NA = Not applicable; NP = Not performed

7.3 Receiver

Test Case	temperature conditions	power source voltages	Pass	Fail	NA	NP	Results (max.)
Spurious Emissions Radiated	Nominal	Nominal	☒	☐	☐	☐	22.8 dBμV/m at 10 m - QP

Note:

NA = Not applicable; NP = Not performed

8 RF measurement testing

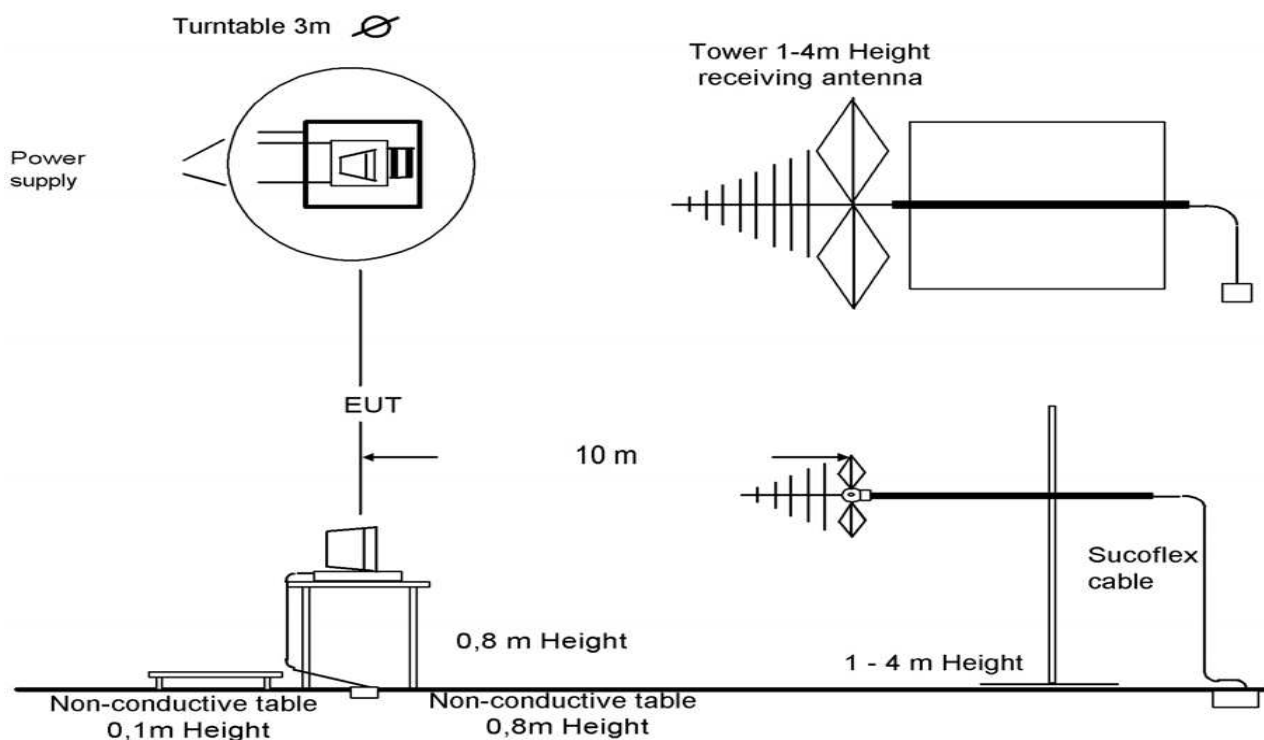
8.1 Description of test set-up

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

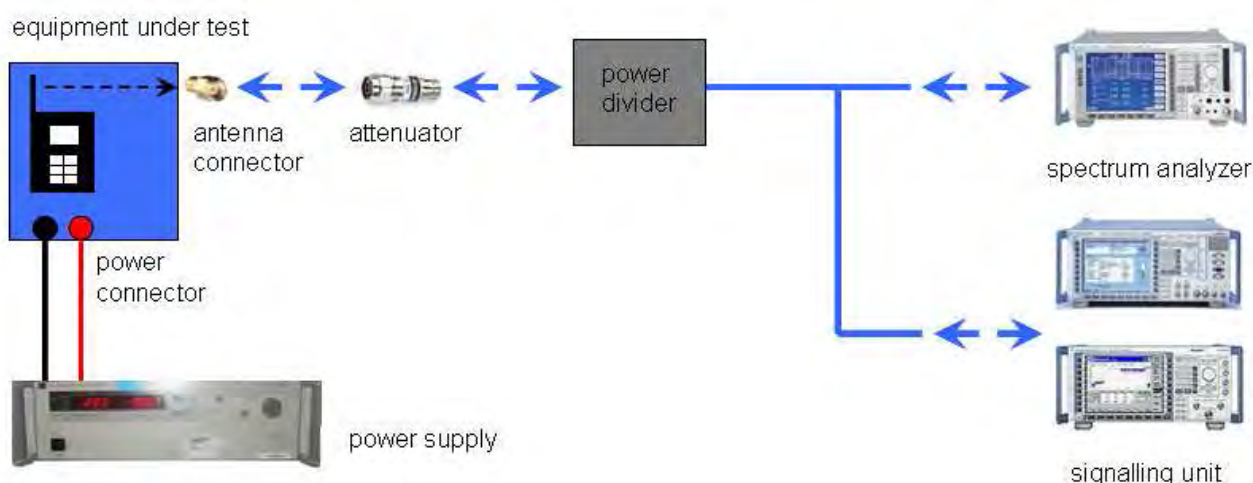


Picture 1: Diagram radiated measurements

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 Test Item

Kind of test item	:	Mobile Phone 850/900/1800/1900/UMTS /HSDPA/HSUPA/ BT2.0+EDR, A-GPS, FM Rx, WLAN
Type identification	:	AAD-3880091-BV
Serial Number	:	Rad. CB511JVN9J Cond. CB511JVN9G
Frequency:		824.2 – 848.8 MHz and 1850.2 – 1909.8 MHz
Type of modulation	:	GMSK; 8-PSK
Emission Designator for GSM 850 :		GMSK: 275KGXW 8-PSK: 279KG7W
Emission Designator for GSM 1900:		GMSK: 279KGXW 8-PSK: 283KG7W
Number of channels	:	125 (PCS850) and 300 (PCS1900)
Antenna Type	:	Integrated antenna
Power supply (normal)	:	3.70 V DC by Li-Polymer Battery (EP800) and Power Supply
Output power GSM 850 / GMSK	:	cond.: 33.12 dBm ERP: 31.23 dBm
Output power GSM 1900 / GMSK	:	cond : 29.16 dBm EIRP: 31.62 dBm
Output power GSM 850 / 8-PSK	:	cond.: 26.47 dBm ERP: 24.56 dBm
Output power GSM 1900 / 8-PSK	:	cond : 24.60 dBm EIRP: 27.39 dBm
Transmitter Spurious (worst case)	:	-24.55 dBm
Receiver Spurious (worst case)	:	13 µV/m @ 3 m QP
FCC ID	:	PY7A3880091
Certification No. IC	:	4170B-A3880091
Open Area Test Site IC No.	:	IC 3462C-1
IC Standards	:	RSS132, Issue 2; RSS133, Issue 5

ATTESTATION:

DECLARATION OF COMPLIANCE:

I declare that the testing was performed or supervised by me; that the test measurements were made in accordance with the above-mentioned Industry Canada standard(s); and that the equipment identified in this application has been subjected to all the applicable test conditions specified in the Industry Canada standards and all of the requirements of the standard have been met.

Laboratory Manager:

2010-07-01

Date

Jakob Reschke

Name



Signature

8.3 Results GSM 850

All GSM-band measurements are done in GSM mode only. The device is also able to transmit data in GPRS mode. But because the power measurements are performed within the duration of a burst no other results from GPRS mode are possible. The only difference is the absolute average power, which is 3 dB higher (by using 2 timeslots in the Up-link). All relevant tests have been repeated using 8-PSK modulation if EDGE mode is supported.

8.3.1 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 Average
Sweep time:	Auto
Video bandwidth:	1MHz
Resolution bandwidth:	1MHz
Span:	Zero Span
Trace-Mode:	Max Hold

Limits:

FCC	IC
CFR Part 22.9.1.3 CFR Part 2.1046	RSS 132, Issue 2, Section 4.4 and 6.4
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	33.12	0.30
836.4	33.02	0.30
848.8	32.26	0.20
Measurement uncertainty	± 0.5 dB	

Output Power (conducted) 8-PSK mode		
Frequency (MHz)	Average Output Power (dBm)	Peak to Average Ratio (dB)
824.2	26.47	3.20
836.4	26.30	3.30
848.8	26.36	3.30
Measurement uncertainty	± 0.5 dB	

Output Power (radiated) GMSK mode	
Frequency (MHz)	Average Output Power (dBm) - ERP
824.2	30.23
836.4	31.23
848.8	30.46
Measurement uncertainty	± 2.0 dB

Output Power (radiated) 8-PSK mode	
Frequency (MHz)	Average Output Power (dBm) - ERP
824.2	23.58
836.4	24.51
848.8	24.56
Measurement uncertainty	± 2.0 dB

Result: The result of the measurement is passed.

8.3.2 Frequency Stability

Description:

In order to measure the carrier frequency under the condition of AFC lock, it is necessary to make measurements with the mobile station in a "call mode". This is accomplished with the use of a R&S CMU200 DIGITAL RADIOCOMMUNICATION TESTER.

1. Measure the carrier frequency at room temperature.
2. Subject the mobile station to overnight soak at -30 C.
3. With the mobile station, powered with V_{nom} , connected to the CMU200 and in a simulated call on channel 189 (centre channel), measure the carrier frequency. These measurements should be made within two minutes of powering up the mobile station, to prevent significant self warming.
4. Repeat the above measurements at 10°C increments from -30°C to +60°C. Allow at least 1.5 hours at each temperature, unpowered, before making measurements.
5. Remeasure carrier frequency at room temperature with V_{nom} . Vary supply voltage from V_{min} to V_{max} , in 0.1 Volt steps remeasuring carrier frequency at each voltage. Pause at V_{nom} for 1.5 hours unpowered, to allow any self heating to stabilize, before continuing.
6. At all temperature levels hold the temperature to $\pm 0.5^\circ\text{C}$ during the measurement procedure.

Measurement:

Measurement parameters	
Detector:	Measured with CMU200
Sweep time:	
Video bandwidth:	
Resolution bandwidth:	
Span:	
Trace-Mode:	

Limits:

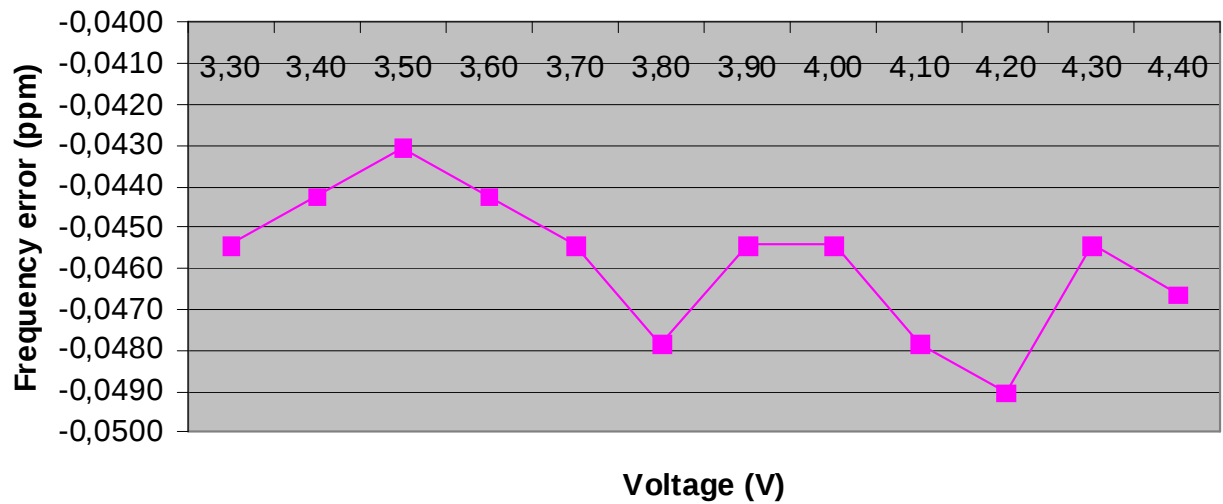
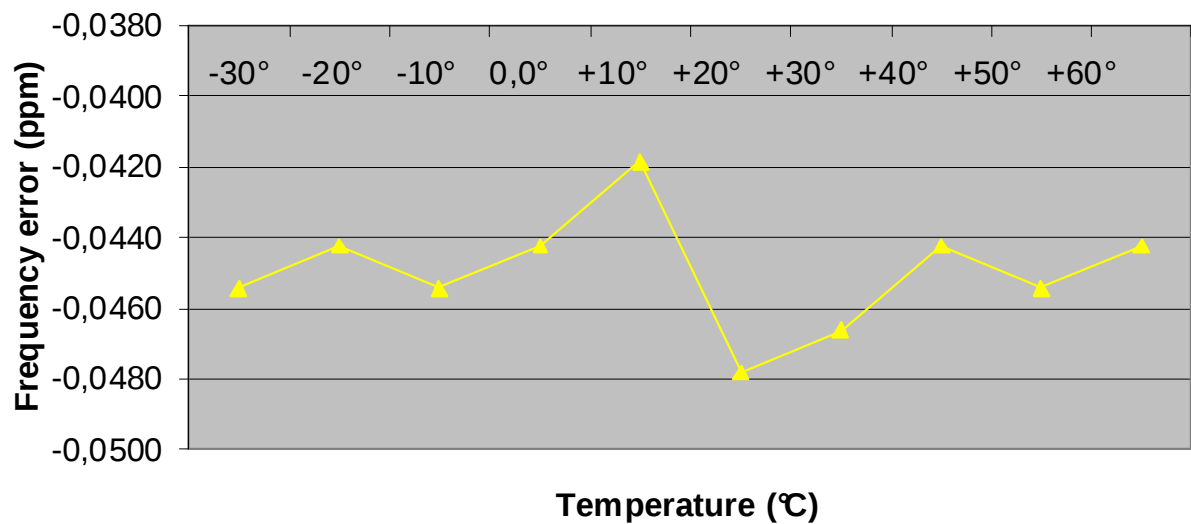
FCC	IC
CFR Part 22.355 CFR Part 2.1055	RSS 132, Issue 2, Section 4.3 and 6.3
Frequency Stability	
± 0.1 ppm	

Results:**AFC FREQ ERROR versus VOLTAGE**

Voltage (V)	Frequency Error (Hz)	Frequency Error (%)	Frequency Error (ppm)
3.3	-38	-0,00000454	-0,0454
3.4	-37	-0,00000442	-0,0442
3.5	-36	-0,00000430	-0,0430
3.6	-37	-0,00000442	-0,0442
3.7	-38	-0,00000454	-0,0454
3.8	-40	-0,00000478	-0,0478
3.9	-38	-0,00000454	-0,0454
4.0	-38	-0,00000454	-0,0454
4.1	-40	-0,00000478	-0,0478
4.2	-41	-0,00000490	-0,0490
4.3	-38	-0,00000454	-0,0454
4.4	-39	-0,00000466	-0,0466

AFC FREQ ERROR versus TEMPERATURE

Temperature (°C)	Frequency Error (Hz)	Frequency Error (%)	Frequency Error (ppm)
-30	-38	-0,00000454	-0,0454
-20	-37	-0,00000442	-0,0442
-10	-38	-0,00000454	-0,0454
± 0	-37	-0,00000442	-0,0442
10	-35	-0,00000418	-0,0418
20	-40	-0,00000478	-0,0478
30	-39	-0,00000466	-0,0466
40	-37	-0,00000442	-0,0442
50	-38	-0,00000454	-0,0454
60	-37	-0,00000442	-0,0442

Frequency Error vs. Voltage**Frequency Error vs. Temperature**

Result: The result of the measurement is passed.

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 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:

- The test item was placed on a 0.8 meter high non-conductive stand at a 3 meter test distance from the receive antenna.
- The antenna output was terminated in a 50 ohm load (if possible).
- A double ridged wave guide antenna was placed on an adjustable height antenna mast 3 meters from the test item for emission measurements.
- 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.
- Now each detected emissions were substituted by the substitution method, in accordance with the TIA/EIA 603 .

Measurement:

Measurement parameters	
Detector:	Peak
Sweep time:	Auto
Video bandwidth:	Below 1 GHz 120 kHz Above 1 GHz 1 MHz
Resolution bandwidth:	Below 1 GHz 120 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, Issue 2, Section 4.5 and 6.5
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.

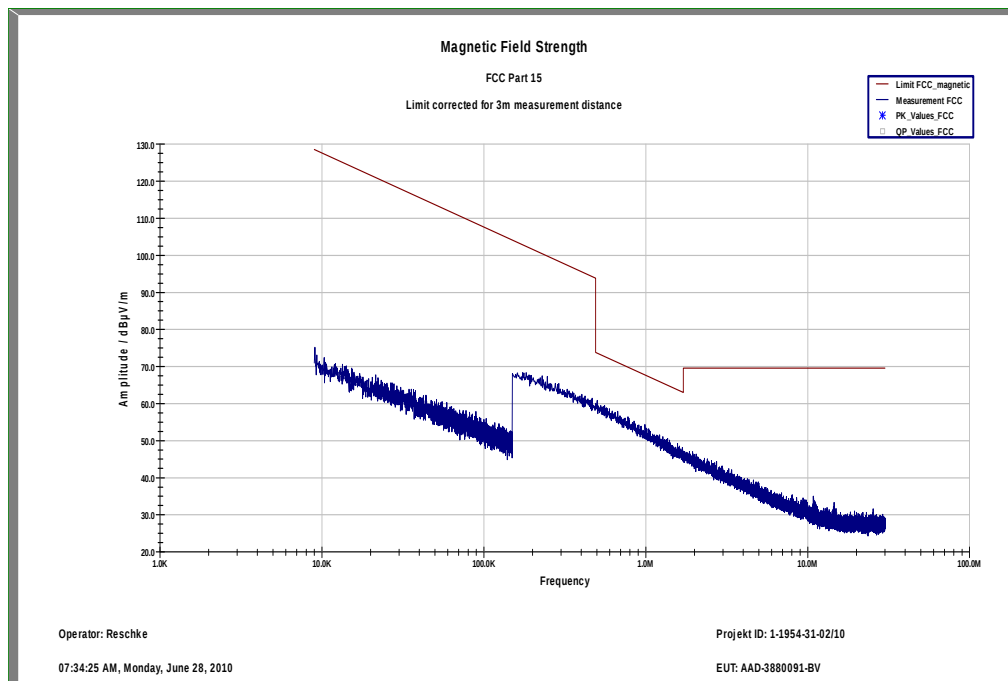
The final open field radiated levels are presented on the next pages.
All measurements were done in horizontal and vertical polarization; the plots show the worst case.
The plots show only the middle channel. If spurious were detected, the lowest and highest channel were checked too. The found values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

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

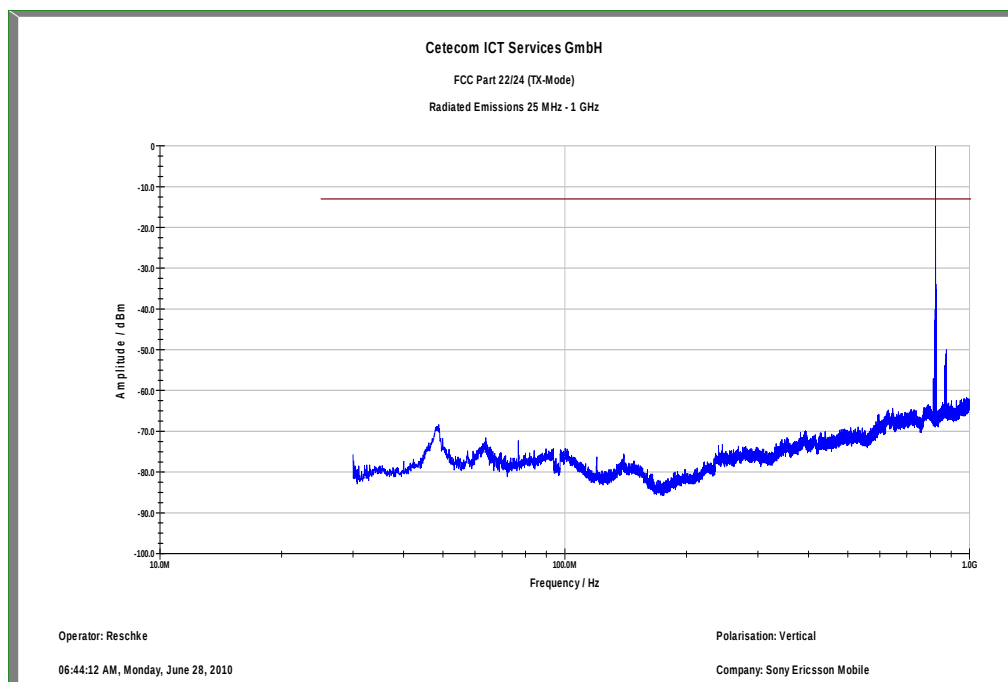
Spurious Emission Level (dBm)								
Harmonic	Ch. 128 Freq. (MHz)	Level [dBm]	Harmonic	Ch. 189 Freq. (MHz)	Level [dBm]	Harmonic	Ch. 251 Freq. (MHz)	Level [dBm]
2	1648.4	-25.80	2	1672.8	-26.45	2	1697.6	-24.92
3	2472.6	-24.55	3	2509.2	-25.86	3	2546.4	-28.72
4	3296.8	-	4	3345.6	-	4	3395.2	-
5	4121.0	-	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: The result of the measurement is passed.

Plot 1: Channel 189 (Traffic mode up to 30 MHz)

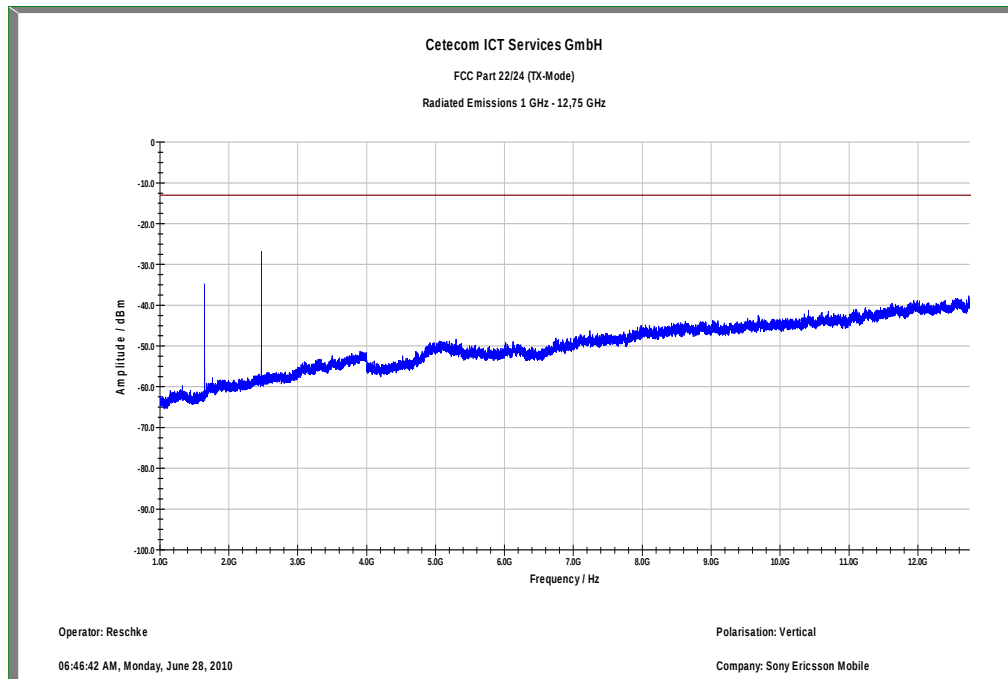


Plot 2: Channel 189 (30 MHz - 1 GHz)



RBW/VBW: 100 kHz

Plot 3: Channel 189 (1 GHz – 12.75 GHz)



RBW/VBW: 1MHz

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 9 GHz, data taken from 10 MHz to 12 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:	145 ms
Video bandwidth:	1MHz
Resolution bandwidth:	1MHz
Span:	25 GHz
Trace-Mode:	Max Hold

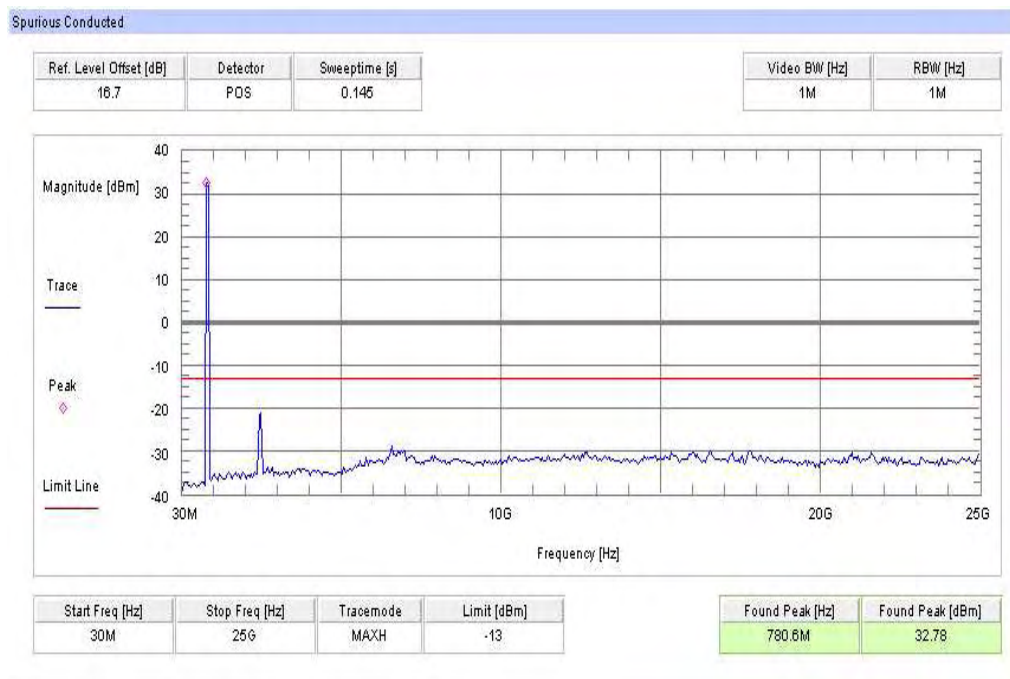
Limits:

FCC	IC
CFR Part 22.917 CFR Part 2.1051	RSS 132, Issue 2, Section 4.5 and 6.5
Spurious Emissions Conducted	
Attenuation $\geq 43 + 10\log(P)$ (P, Power in Watts)	
-13 dBm	

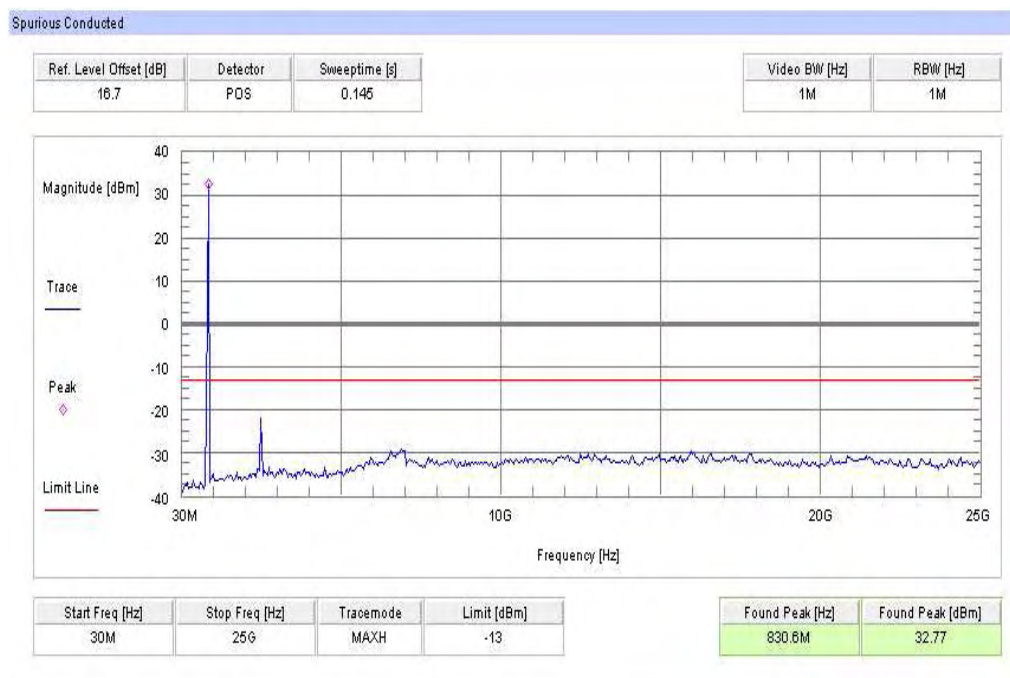
Results:

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	-22.35	2	1672.8	-23.56	2	1697.6	-21.68
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			

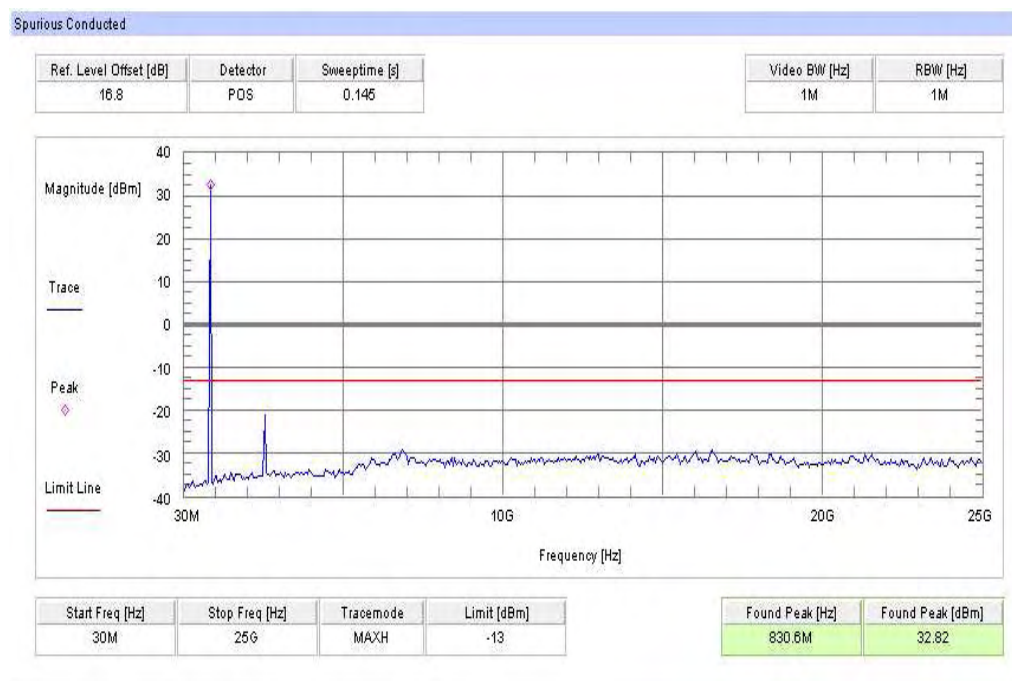
Result: The result of the measurement is passed.

Plot 1: Channel 128 (10 MHz - 12 GHz)

RBW/VBW: 1 MHz

Plot 2: Channel 189 (10 MHz - 12 GHz)

RBW/VBW: 1 MHz

Plot 3: Channel 251 (10 MHz - 12 GHz)

RBW/VBW: 1 MHz

8.3.5 Block Edge Compliance

Description:

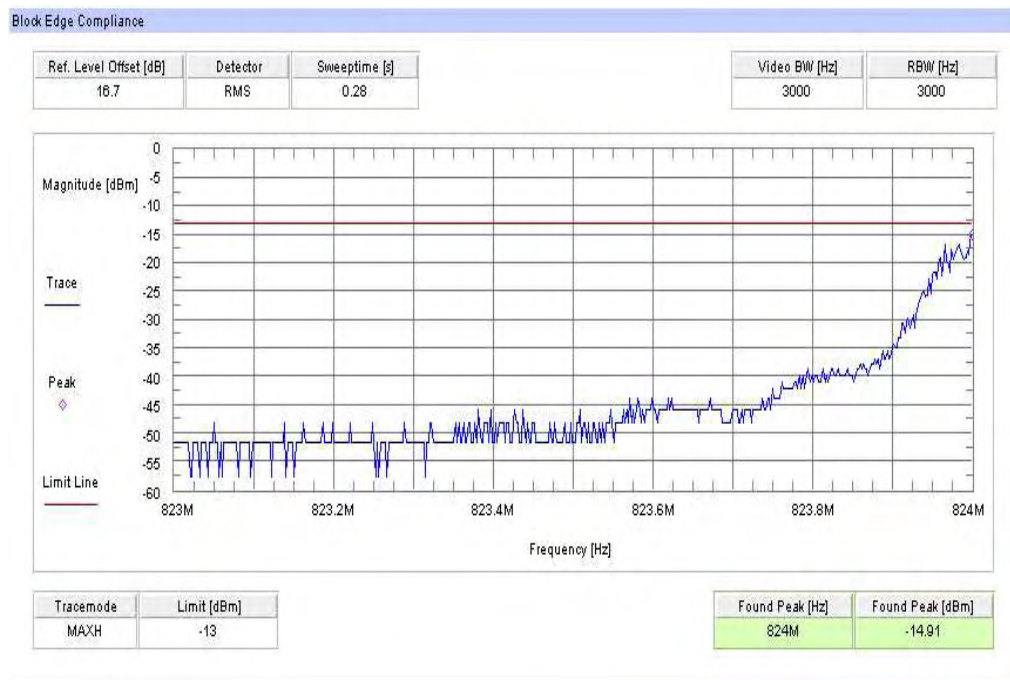
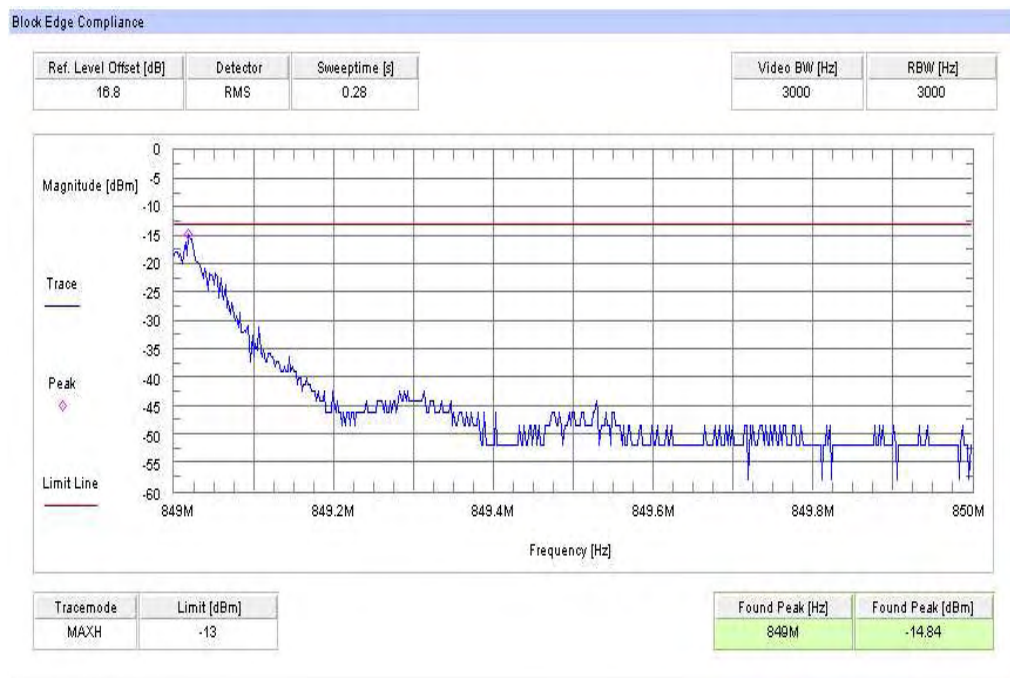
The spectrum at the band edges must comply with the spurious emissions limits.

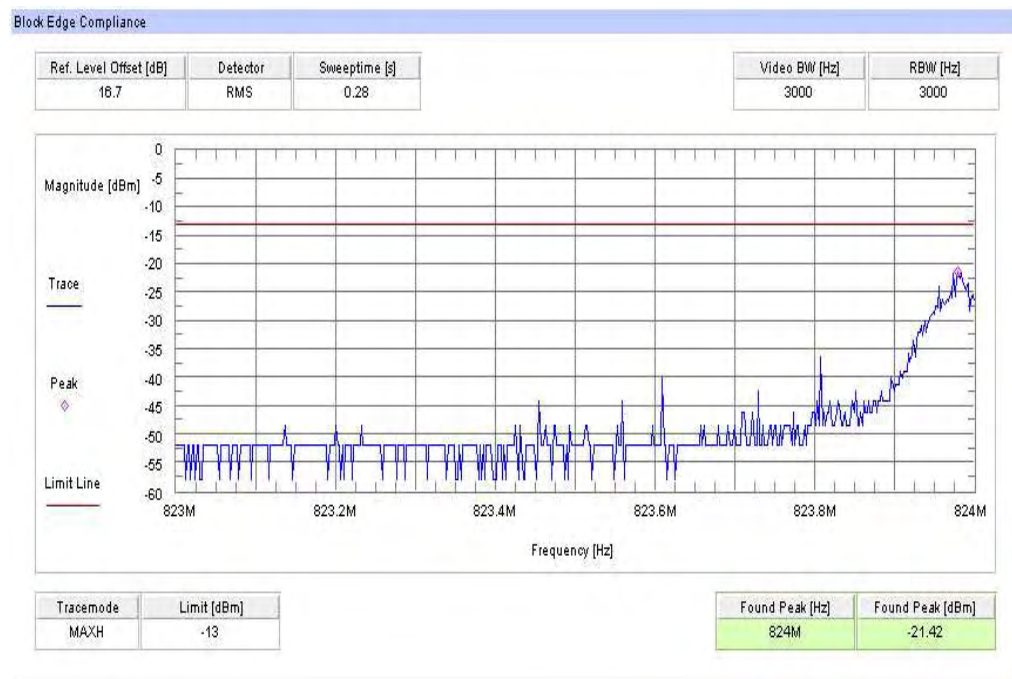
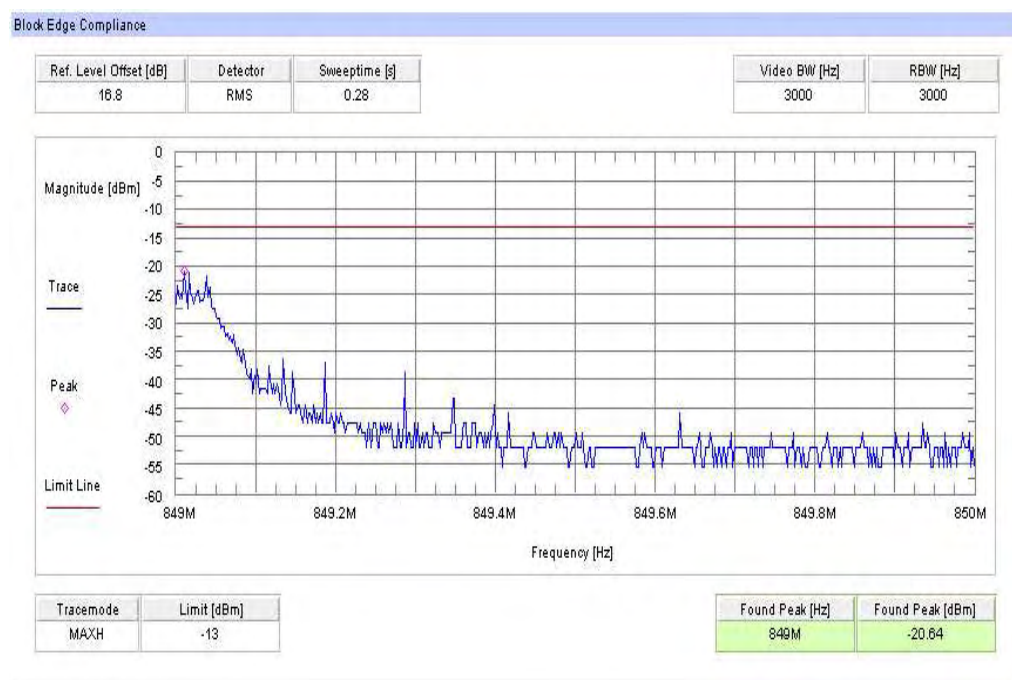
Measurement:

Measurement parameters	
Detector:	RMS
Sweep time:	280 ms
Video bandwidth:	3kHz
Resolution bandwidth:	3kHz
Span:	1 MHz
Trace-Mode:	Max Hold

Limits:

FCC	IC
CFR Part 22.917 CFR Part 2.1051	RSS 132, Issue 2, Section 6.5
Block Edge Compliance	
Attenuation $\geq 43 + 10\log(P)$ (P, Power in Watts)	
-13 dBm	

Results:**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: The result of the measurement is 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 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:	280 ms
Video bandwidth:	3kHz
Resolution bandwidth:	3kHz
Span:	1MHz
Trace-Mode:	Max Hold

Limits:

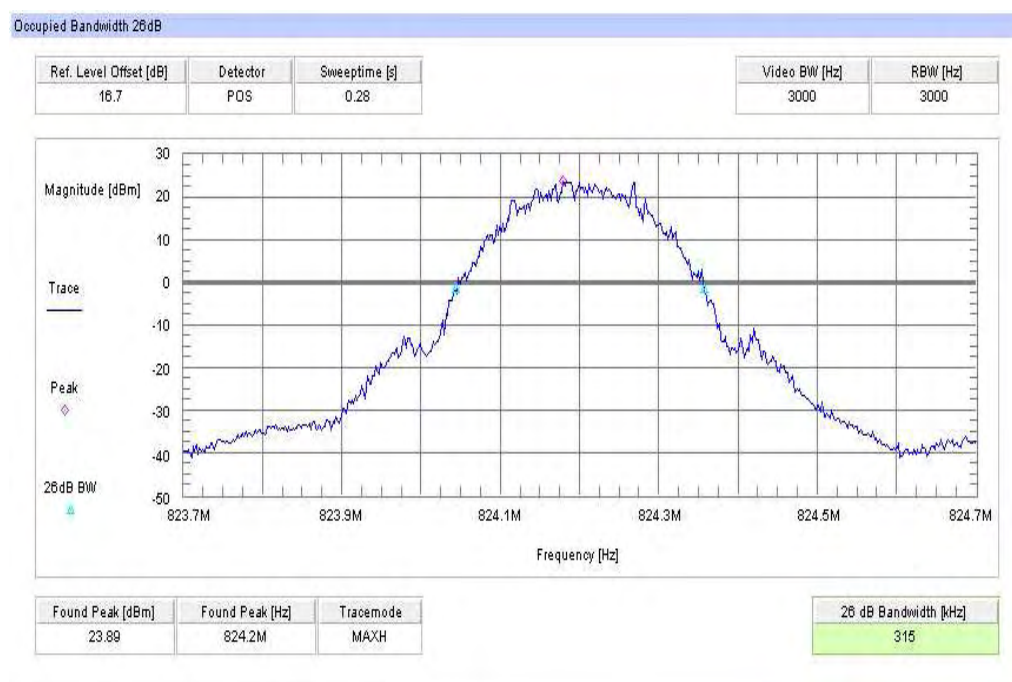
FCC	IC
CFR Part 22.917 CFR Part 2.1049	RSS 132, Issue 2, Section 4.5.1
Occupied Bandwidth	
Spectrum must fall completely in the specified band	

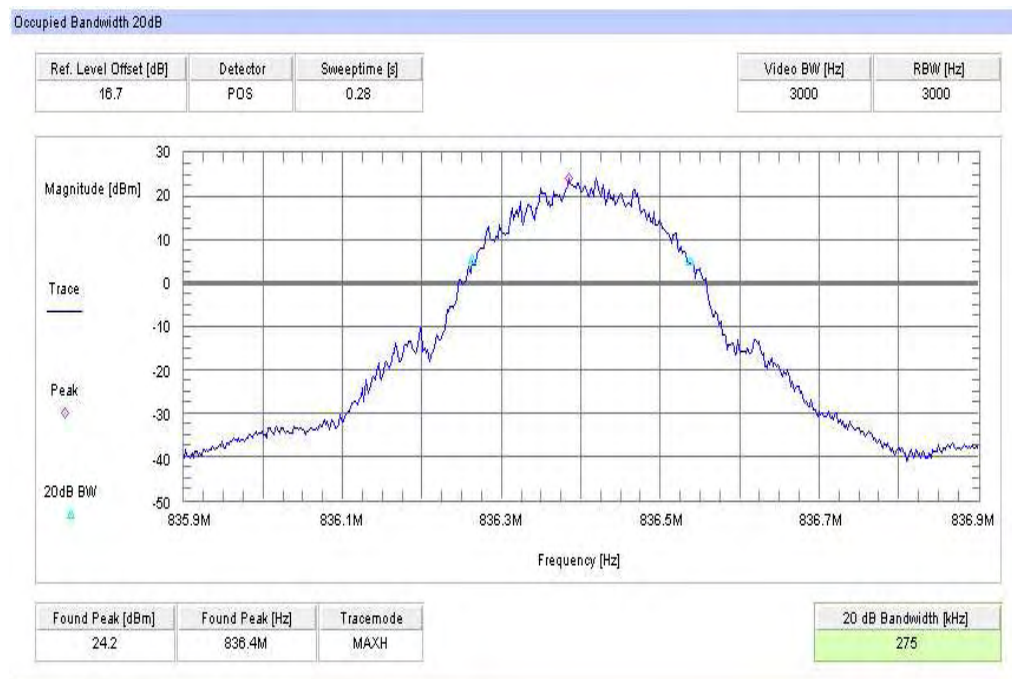
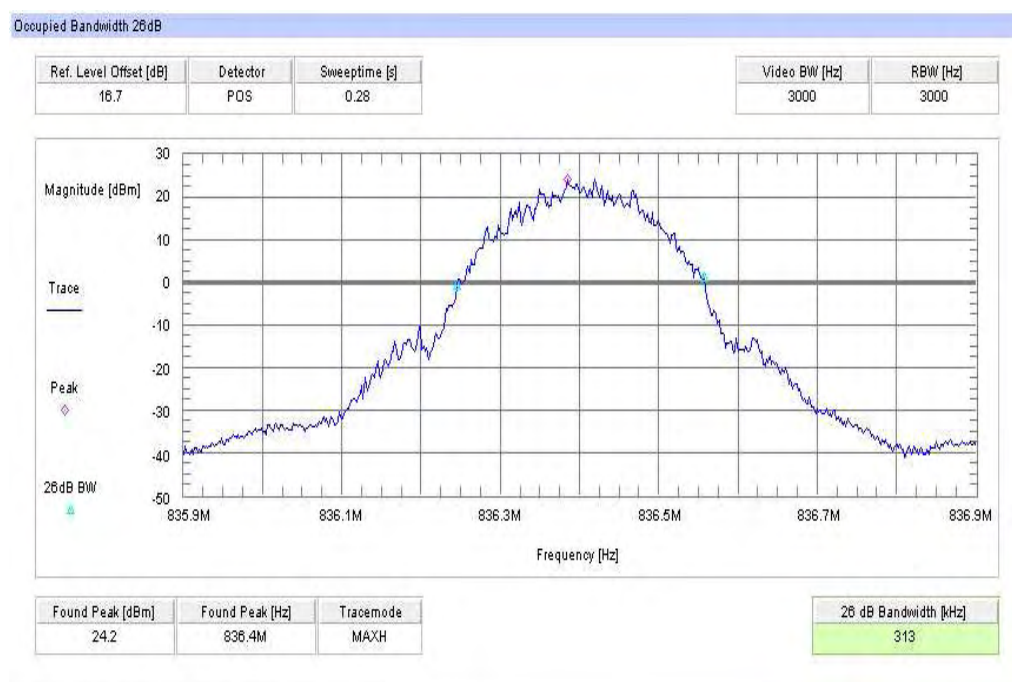
Results:

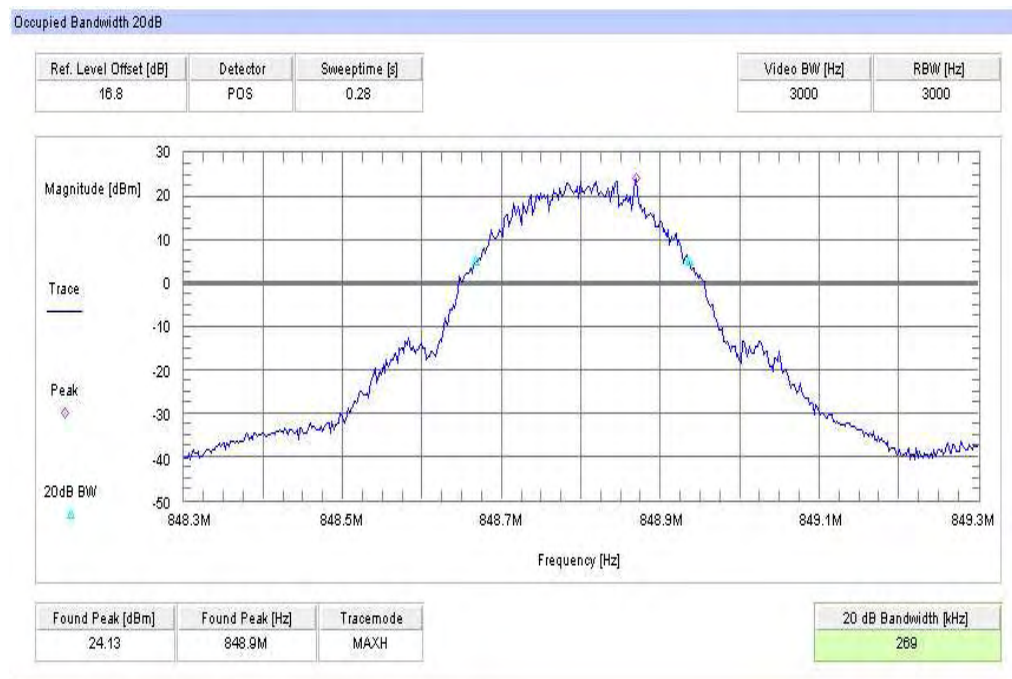
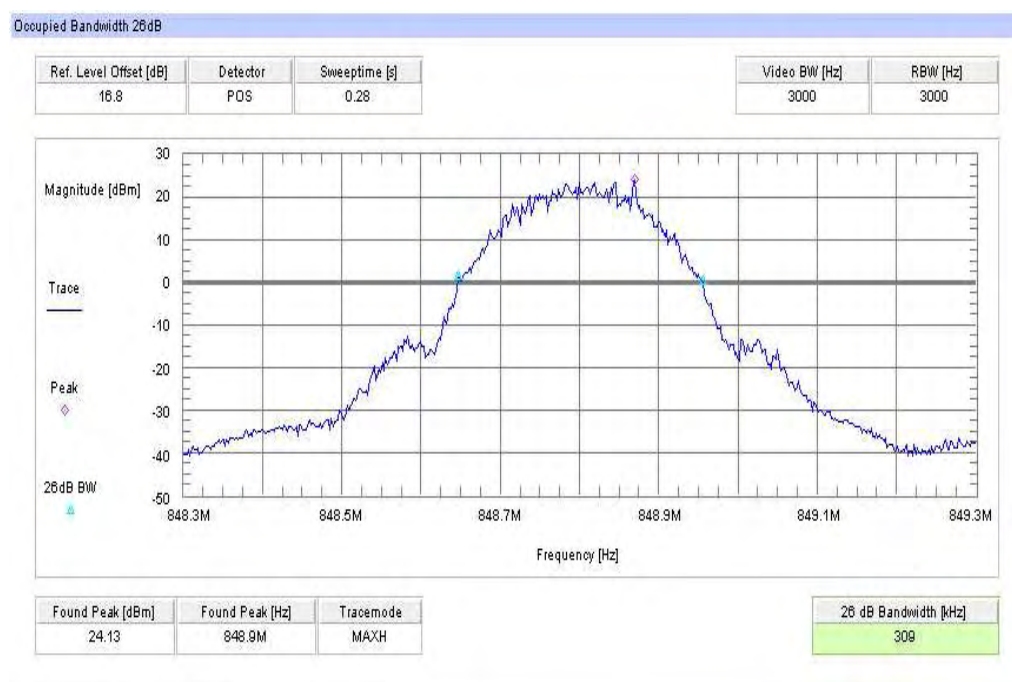
Occupied Bandwidth - GMSK mode		
Frequency (MHz)	99% OBW (kHz)	-26 dBc BW (kHz)
824.2	275	315
836.4	275	313
848.8	269	309
Measurement uncertainty	± 3 kHz	

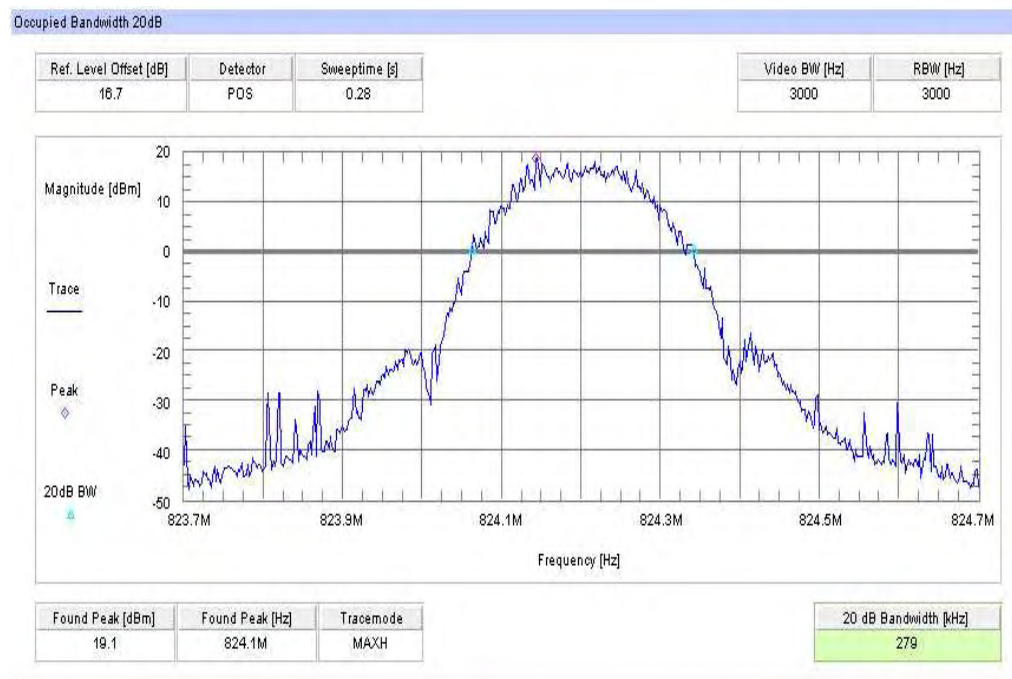
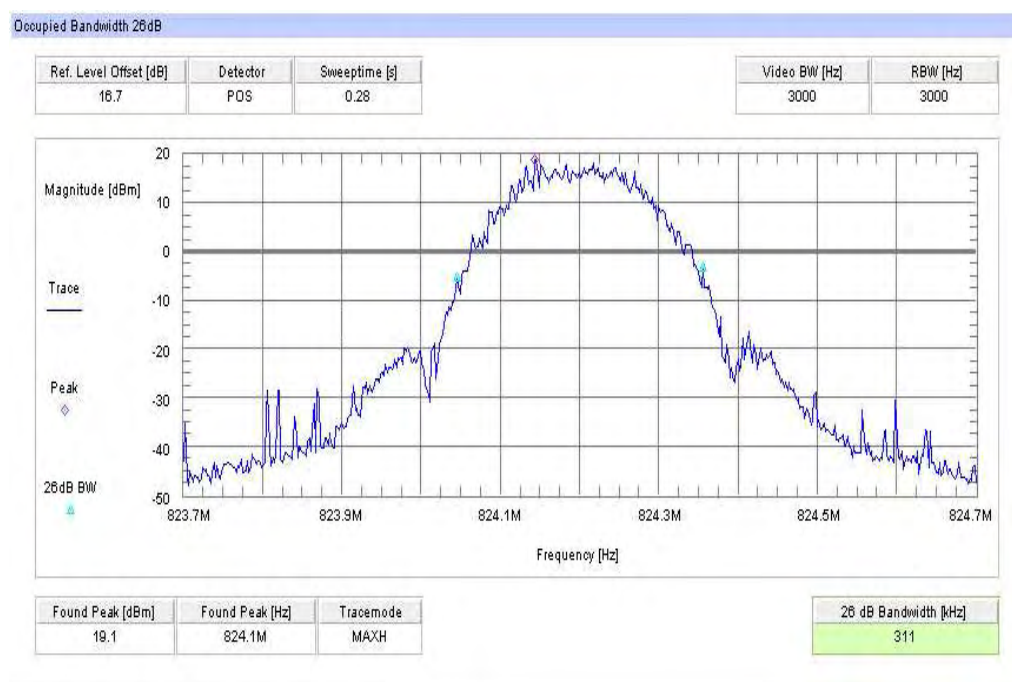
Occupied Bandwidth - EDGE mode		
Frequency (MHz)	99% OBW (kHz)	-26 dBc BW (kHz)
824.2	279	311
836.4	279	311
848.8	257	313
Measurement uncertainty	± 3 kHz	

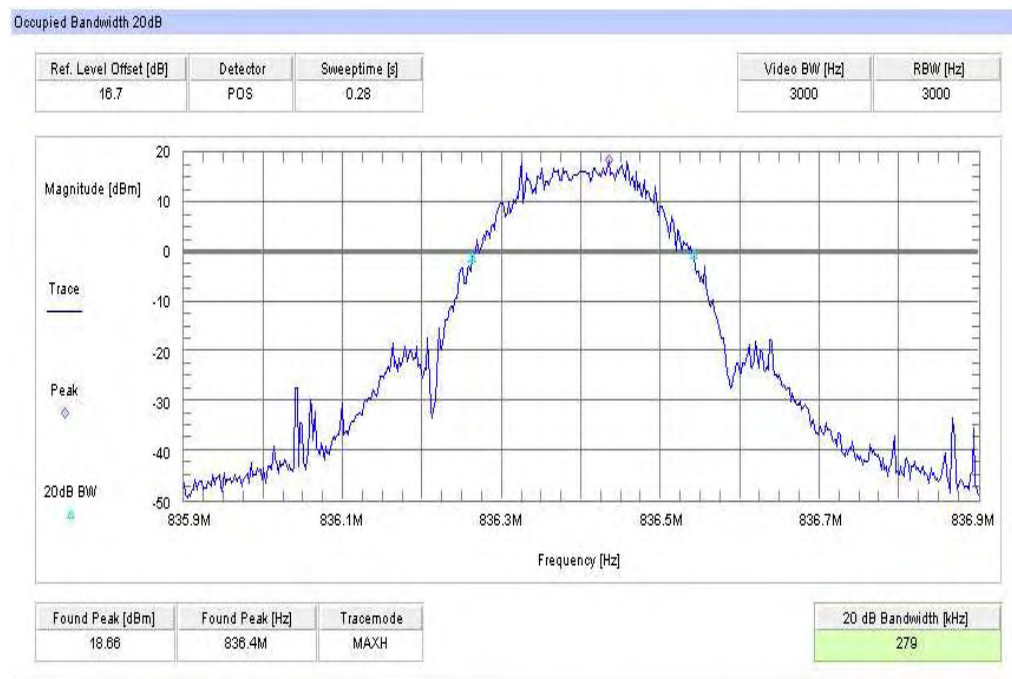
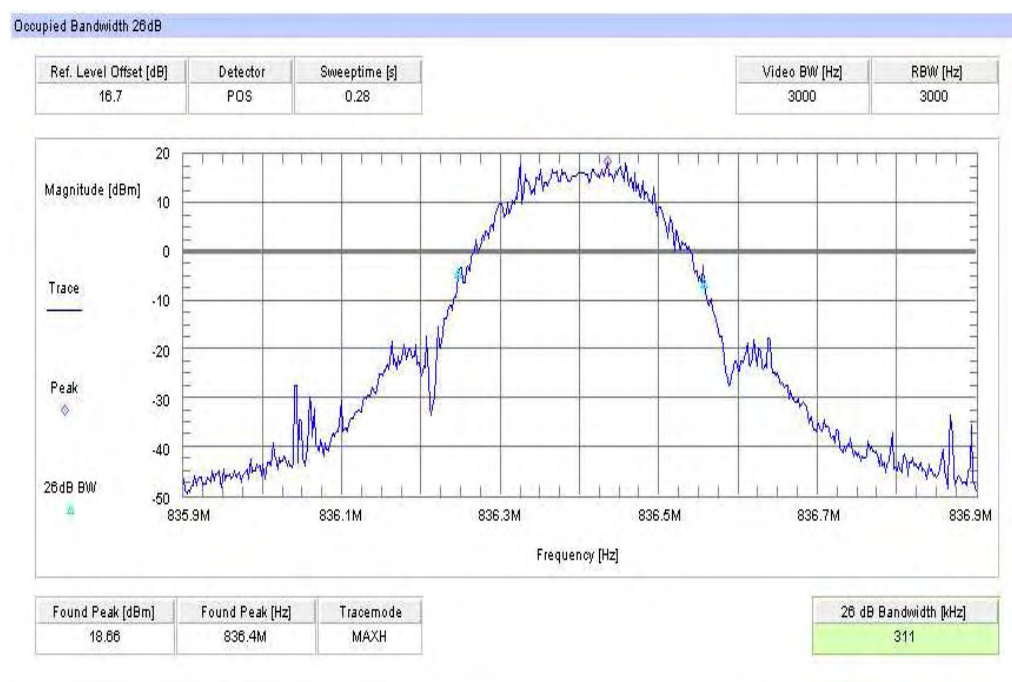
Result: [The result of the measurement is passed.](#)

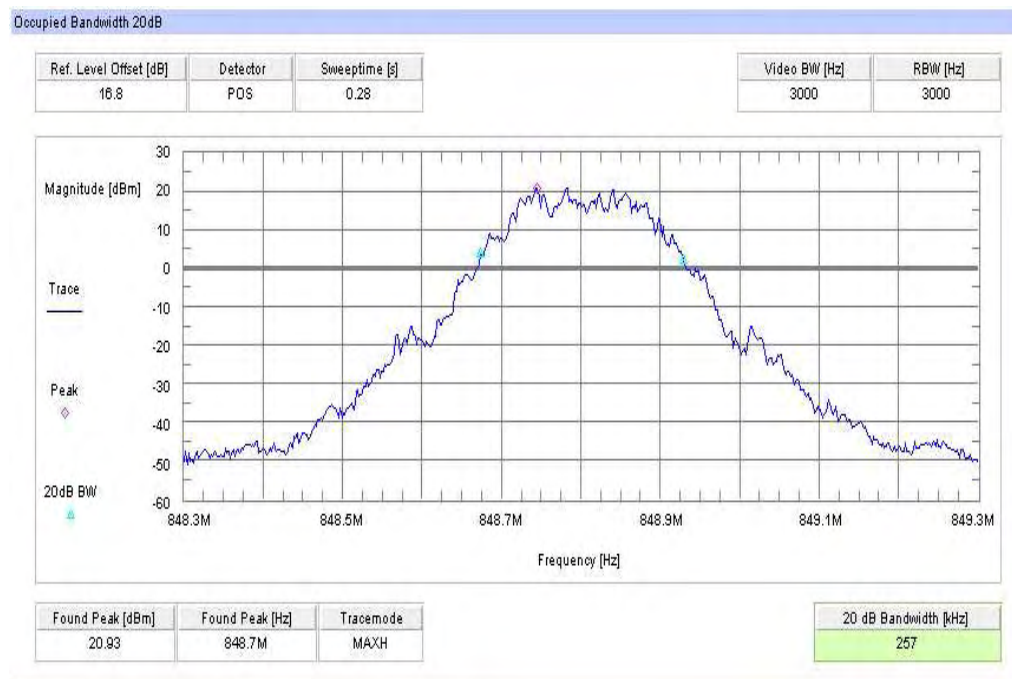
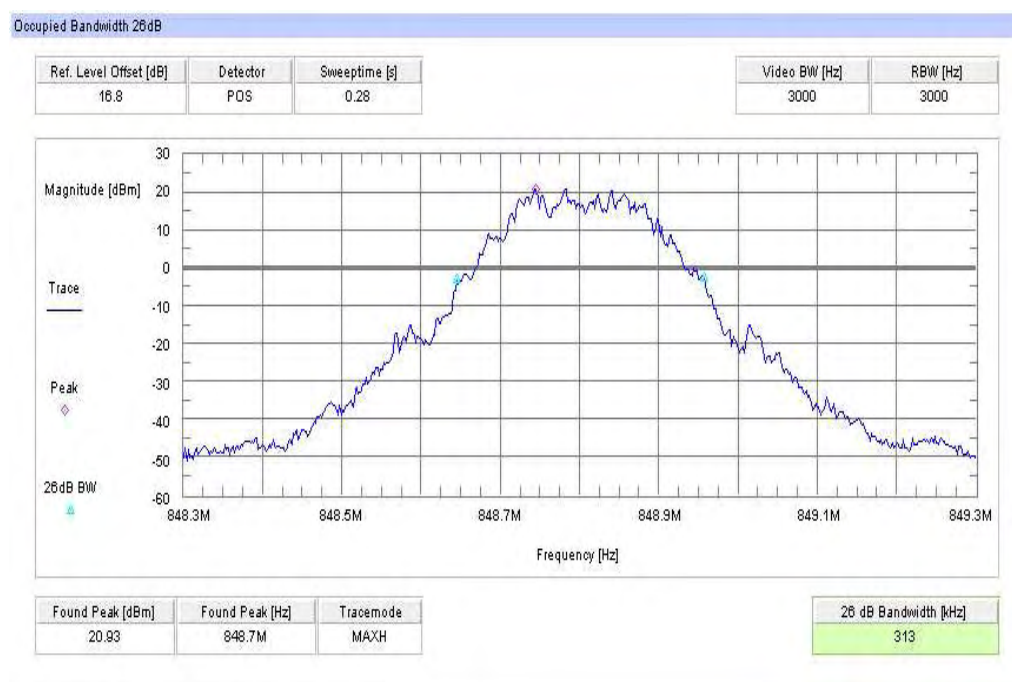
Plot 1: Channel 128 (99% - OBW)**Plot 2: Channel 128 (-26 dBc BW)**

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) EDGE**Plot 8: Channel 128 (-26 dBc BW) EDGE**

Plot 9: Channel 189 (99% - OBW) EDGE**Plot 10: Channel 189 (-26 dBc BW) EDGE**

Plot 11: Channel 251 (99% - OBW) EDGE**Plot 12: Channel 251 (-26 dBc BW) EDGE**

8.4 Results PCS 1900

All GSM-band measurements are done in GSM mode only. The device is also able to transmit data in GPRS mode. But because the power measurements are performed within the duration of a burst no other results from GPRS mode are possible. The only difference is the absolute average power, which is 3 dB higher (by using 2 timeslots in the Up-link). All relevant tests have been repeated using 8-PSK modulation if EDGE mode is supported.

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.

Measurement parameters	
Detector:	Peak and Average
Sweep time:	Auto
Video bandwidth:	1MHz
Resolution bandwidth:	1MHz
Span:	Zero Span
Trace-Mode:	Max Hold

Limits:

FCC	IC
CFR Part 24.232 CFR Part 2.1046	RSS 133, Issue 5, Section 6.4
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	28.50	0.10
1880.0	28.94	0.10
1909.8	29.16	0.10
Measurement uncertainty	± 0.5 dB	

Output Power (conducted) 8-PSK mode		
Frequency (MHz)	Average Output Power (dBm)	Peak to Average Ratio (dB)
1850.2	24.27	3.20
1880.0	24.42	3.20
1909.8	24.60	3.40
Measurement uncertainty	± 0.5 dB	

Output Power (radiated) GMSK mode	
Frequency (MHz)	Average Output Power (dBm) - EIRP
1850.2	31.62
1880.0	31.39
1909.8	31.58
Measurement uncertainty	± 2.0 dB

Output Power (radiated) 8-PSK mode	
Frequency (MHz)	Average Output Power (dBm) - EIRP
1850.2	27.39
1880.0	26.87
1909.8	27.02
Measurement uncertainty	± 2.0 dB

Result: The result of the measurement is passed.

8.4.2 Frequency Stability

Description:

In order to measure the carrier frequency under the condition of AFC lock, it is necessary to make measurements with the mobile station in a "call mode". This is accomplished with the use of a R&S CMU200 DIGITAL RADIOCOMMUNICATION TESTER.

1. Measure the carrier frequency at room temperature.
2. Subject the mobile station to overnight soak at -30 C.
3. With the mobile station, powered with V_{nom} , connected to the CMU200 and in a simulated call on channel 661 (centre channel), measure the carrier frequency. These measurements should be made within two minutes of powering up the mobile station, to prevent significant self warming.
4. Repeat the above measurements at 10°C increments from -30°C to +60°C. Allow at least 1.5 hours at each temperature, unpowered, before making measurements.
5. Remeasure carrier frequency at room temperature with V_{nom} . Vary supply voltage from V_{min} to V_{max} , in 0.1 Volt steps remeasuring carrier frequency at each voltage. Pause at V_{nom} for 1.5 hours unpowered, to allow any self heating to stabilize, before continuing.
6. At all temperature levels hold the temperature to $\pm 0.5^\circ\text{C}$ during the measurement procedure.

Measurement:

Measurement parameters	
Detector:	Measured with CMU200
Sweep time:	
Video bandwidth:	
Resolution bandwidth:	
Span:	
Trace-Mode:	

Limits:

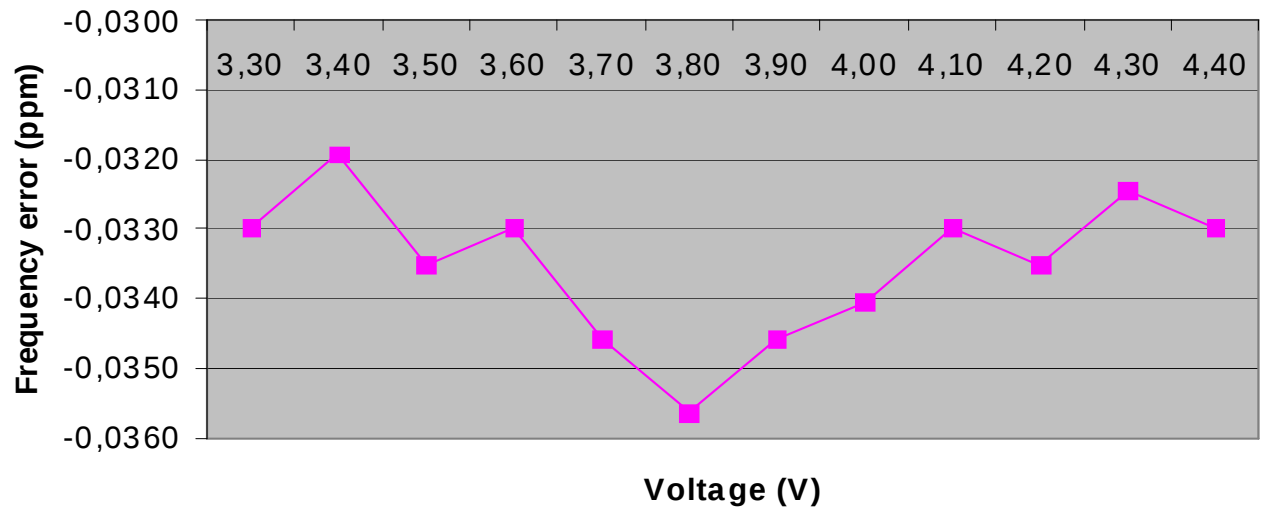
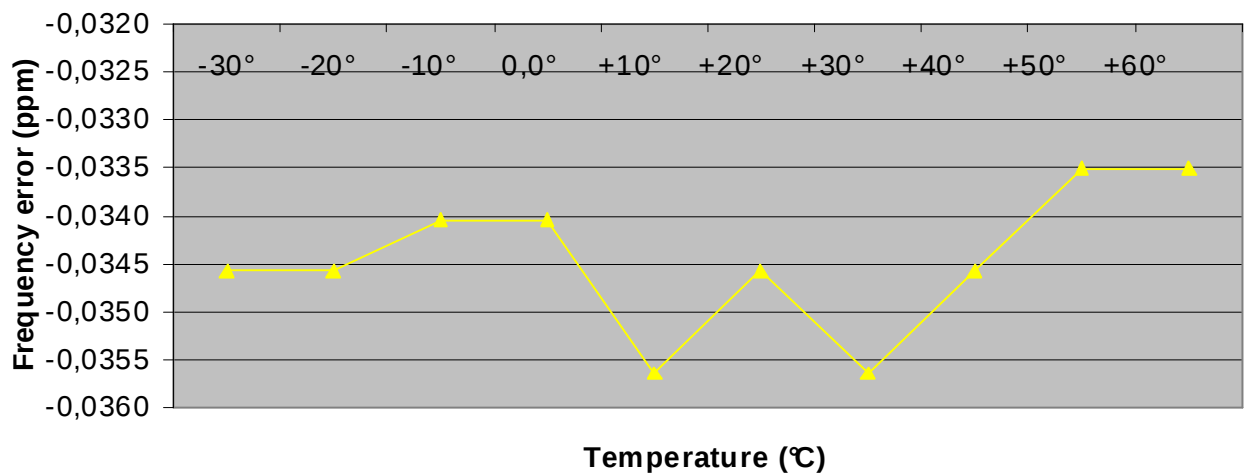
FCC	IC
CFR Part 24.235 CFR Part 2.1055	RSS 133, Issue 5, Section 6.3
Frequency Stability	
± 0.1 ppm	

Results:**AFC FREQ ERROR versus VOLTAGE**

Voltage (V)	Frequency Error (Hz)	Frequency Error (%)	Frequency Error (ppm)
3.3	-62	-0,00000330	-0,0330
3.4	-60	-0,00000319	-0,0319
3.5	-63	-0,00000335	-0,0335
3.6	-62	-0,00000330	-0,0330
3.7	-65	-0,00000346	-0,0346
3.8	-67	-0,00000356	-0,0356
3.9	-65	-0,00000346	-0,0346
4.0	-64	-0,00000340	-0,0340
4.1	-62	-0,00000330	-0,0330
4.2	-63	-0,00000335	-0,0335
4.3	-61	-0,00000324	-0,0324
4.4	-62	-0,00000330	-0,0330

AFC FREQ ERROR versus TEMPERATURE

Temperature (°C)	Frequency Error (Hz)	Frequency Error (%)	Frequency Error (ppm)
-30	-65	-0,00000346	-0,0346
-20	-65	-0,00000346	-0,0346
-10	-64	-0,00000340	-0,0340
± 0	-64	-0,00000340	-0,0340
10	-67	-0,00000356	-0,0356
20	-65	-0,00000346	-0,0346
30	-67	-0,00000356	-0,0356
40	-65	-0,00000346	-0,0346
50	-63	-0,00000335	-0,0335
60	-63	-0,00000335	-0,0335

Frequency Error vs. Voltage**Frequency Error vs. Temperature**

Result: The result of the measurement is passed.

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 PCS1900 band.

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

- The test item was placed on a 0.8 meter high non-conductive stand at a 3 meter test distance from the receive antenna.
- The antenna output was terminated in a 50 ohm load (if possible).
- A double ridged wave guide antenna was placed on an adjustable height antenna mast 3 meters from the test item for emission measurements.
- 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.
- 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:	1 MHz
Resolution bandwidth:	1 MHz
Span:	100 MHz Steps
Trace-Mode:	Max Hold

Limits:

FCC	IC
CFR Part 24.238 CFR Part 2.1053	RSS 133, Issue 5, Section 6.5
Spurious Emissions Radiated	
Attenuation $\geq 43 + 10\log(P)$ (P, Power in Watts)	
-13 dBm	

Results:

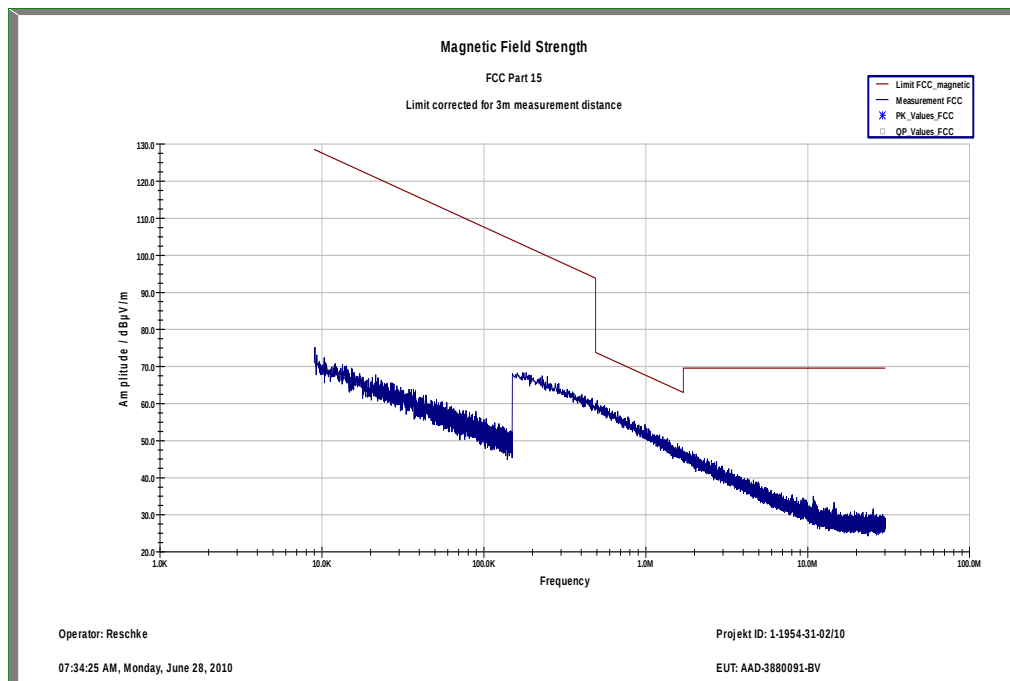
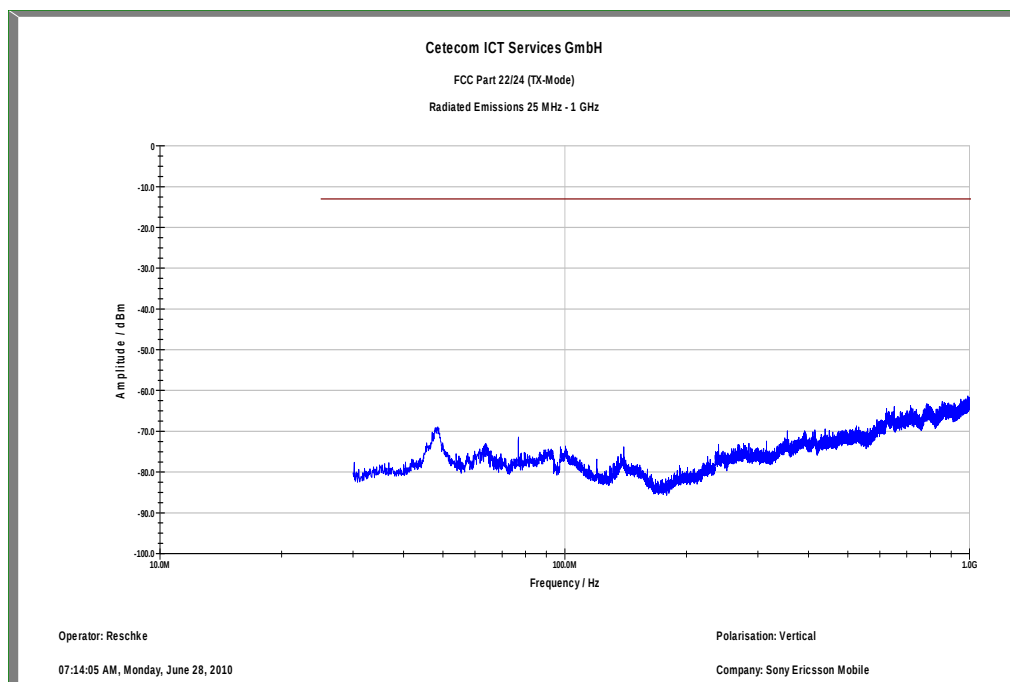
Radiated emissions measurements were made only at the upper, center, and lower carrier frequencies of the PCS1900 band (1850.2 MHz, 1880.0 MHz and 1909.8 MHz). It was decided that measurements at these three carrier frequencies would be sufficient to demonstrate compliance with emissions limits because 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.

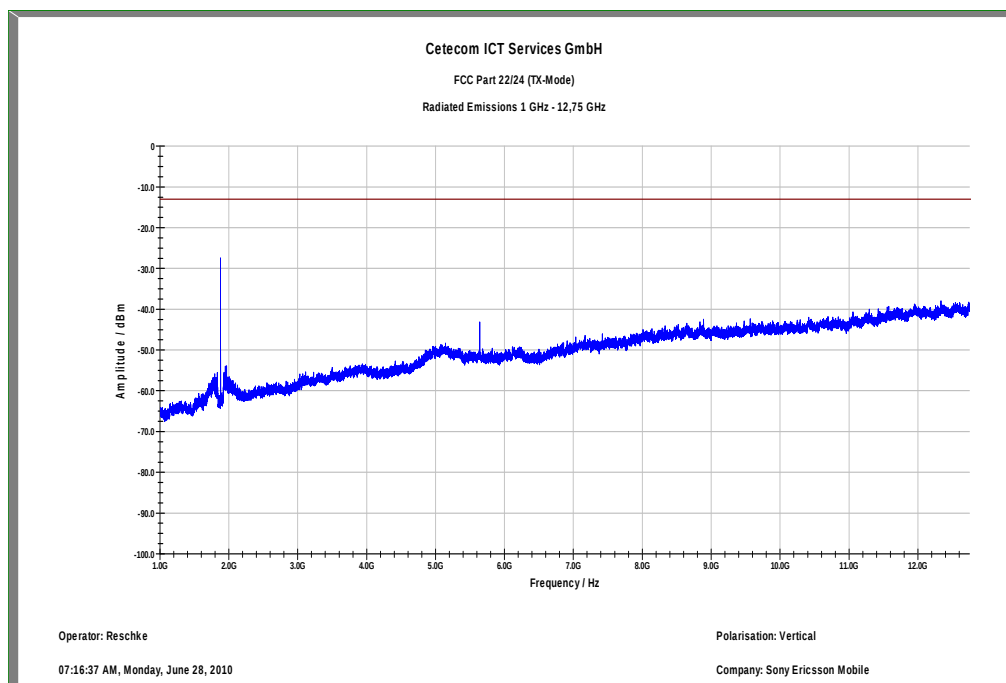
Spurious Emission Level (dBm)								
Harmonic	Ch. 512 Freq. (MHz)	Level [dBm]	Harmonic	Ch. 661 Freq. (MHz)	Level [dBm]	Harmonic	Ch. 810 Freq. (MHz)	Level [dBm]
2	3700.4	-47.66	2	3760.0	-47.02	2	3819.6	-47.48
3	5550.6	-41.68	3	5640.0	-41.39	3	5729.4	-41.94
4	7400.8	-	4	7520.0	-	4	7639.2	-
5	9251.0	-	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: The result of the measurement is passed.

Plot 1: Channel 661 (Traffic mode up to 30 MHz)**Plot 2: Channel 661 (30 MHz - 1 GHz)**

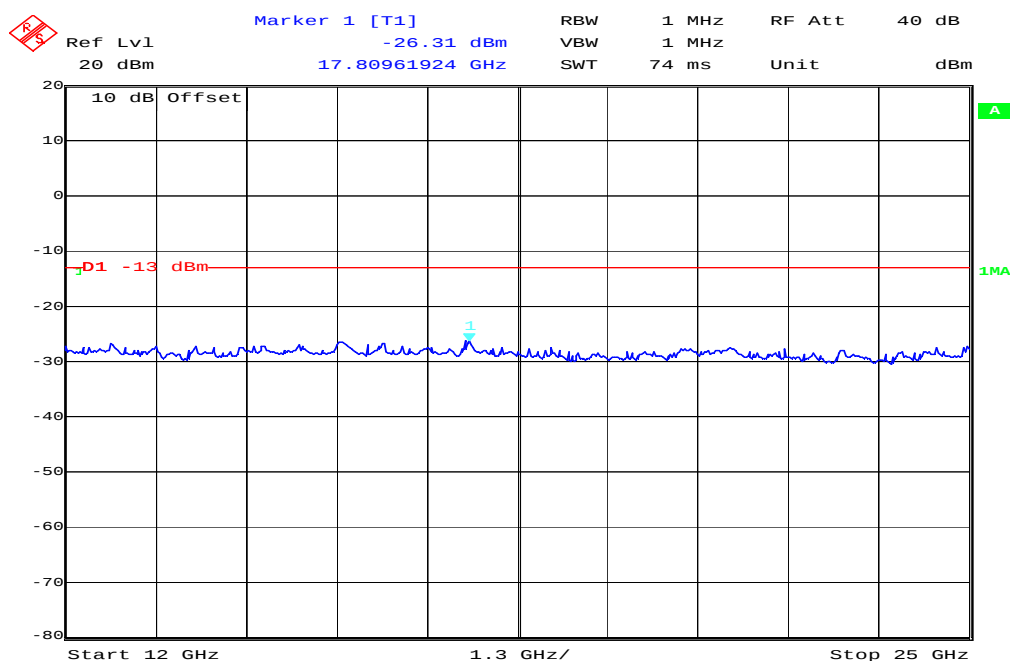
RBW/VBW: 100 kHz

Plot 3: Channel 661 (1 GHz – 12.75 GHz)



RBW/VBW: 1MHz

Plot 4: Channel 661 (12 GHz - 25 GHz)



Date: 23. JUN. 2010 11:49:03

RBW/VBW: 1MHz

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 20 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:	145 ms
Video bandwidth:	1MHz
Resolution bandwidth:	1MHz
Span:	25 GHz
Trace-Mode:	Max Hold

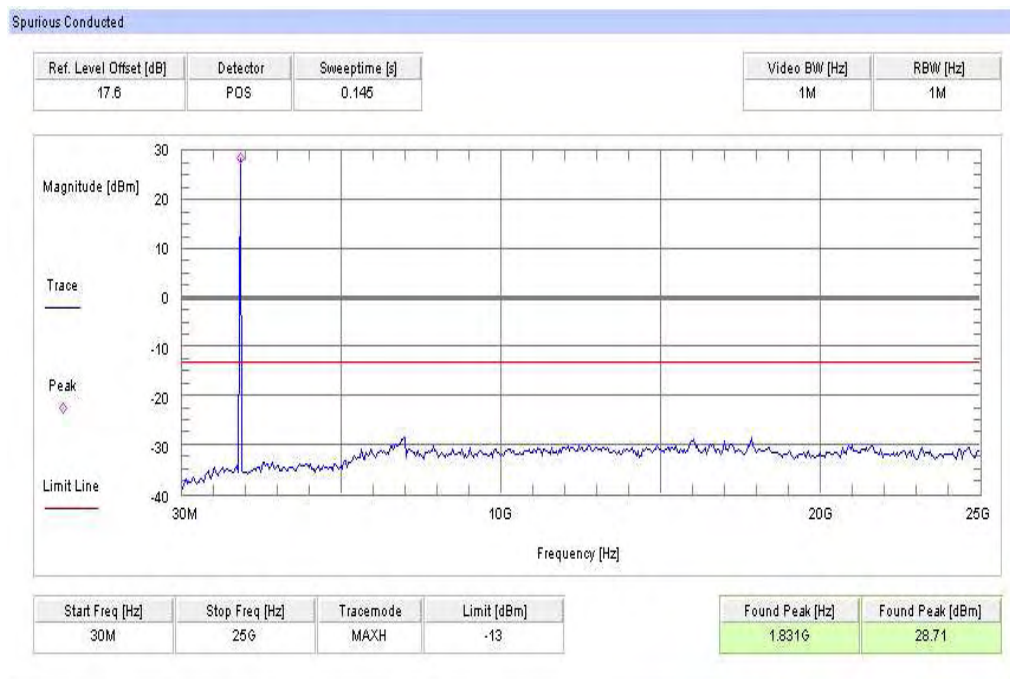
Limits:

FCC	IC
CFR Part 24.238 CFR Part 2.1051	RSS 133, Issue 5, Section 6.5
Spurious Emissions Conducted	
Attenuation $\geq 43 + 10\log(P)$ (P, Power in Watts)	
-13 dBm	

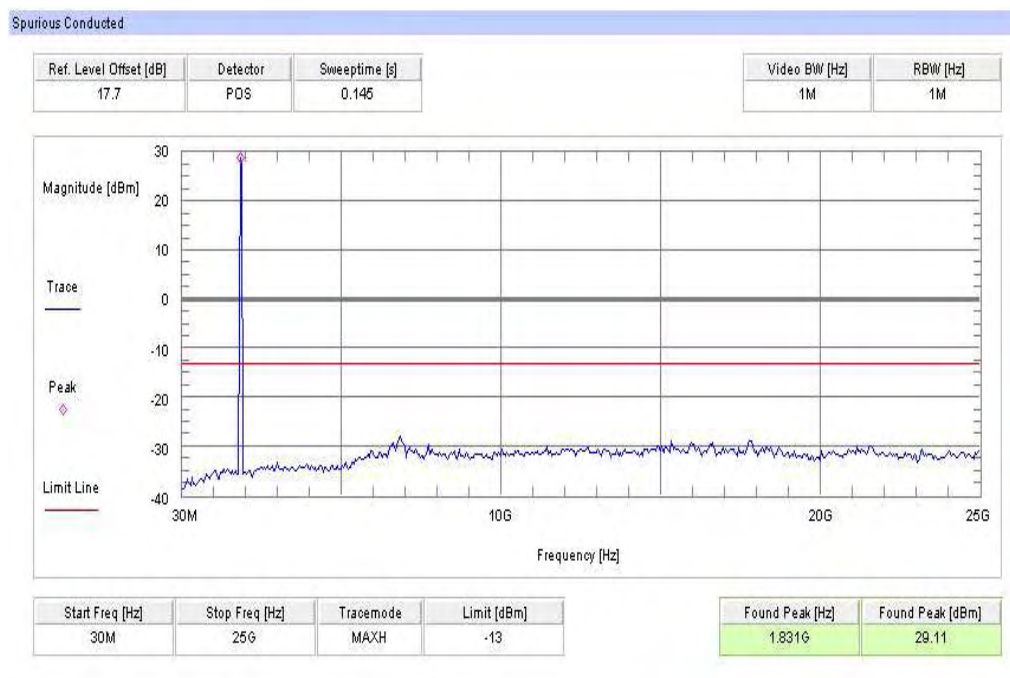
Results:

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			

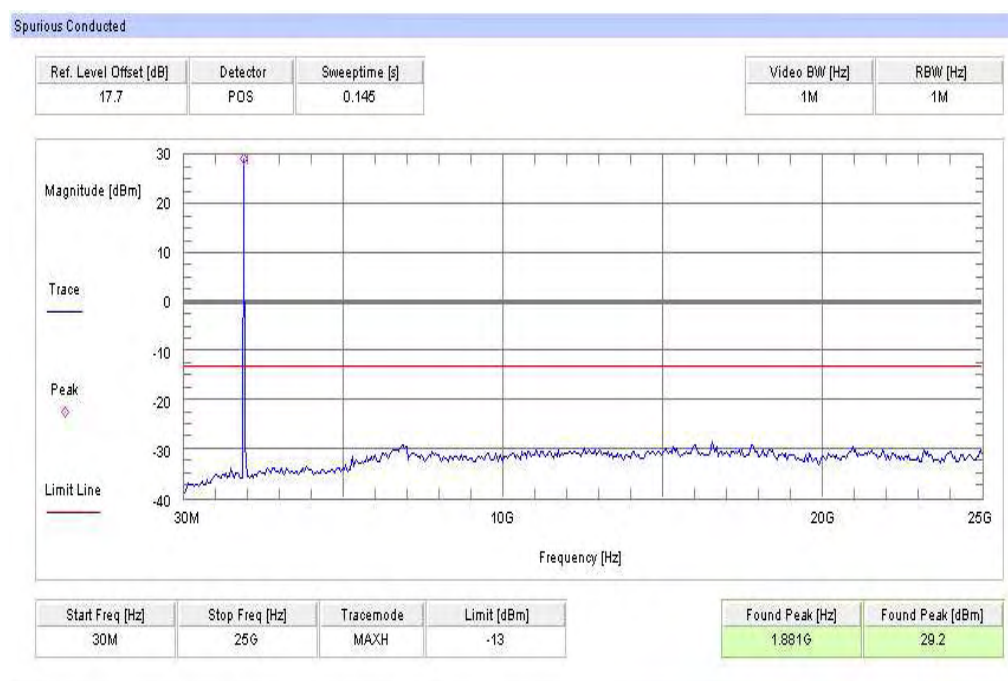
Result: The result of the measurement is passed.

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

RBW/VBW: 1 MHz

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

RBW/VBW: 1 MHz

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

RBW/VBW: 1 MHz

8.4.5 Block Edge Compliance

Description:

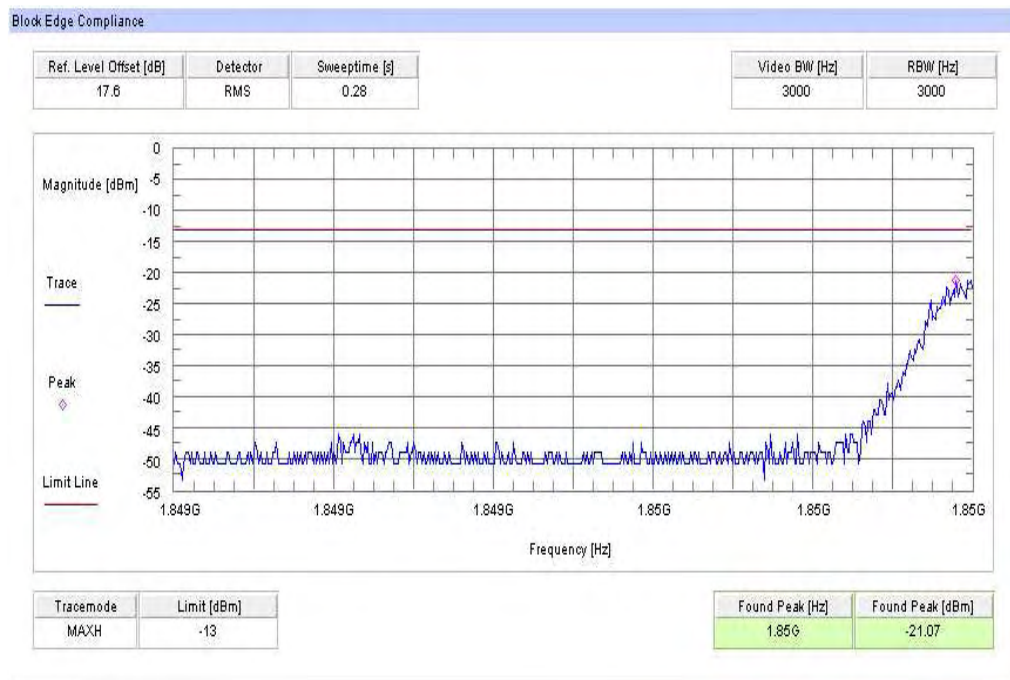
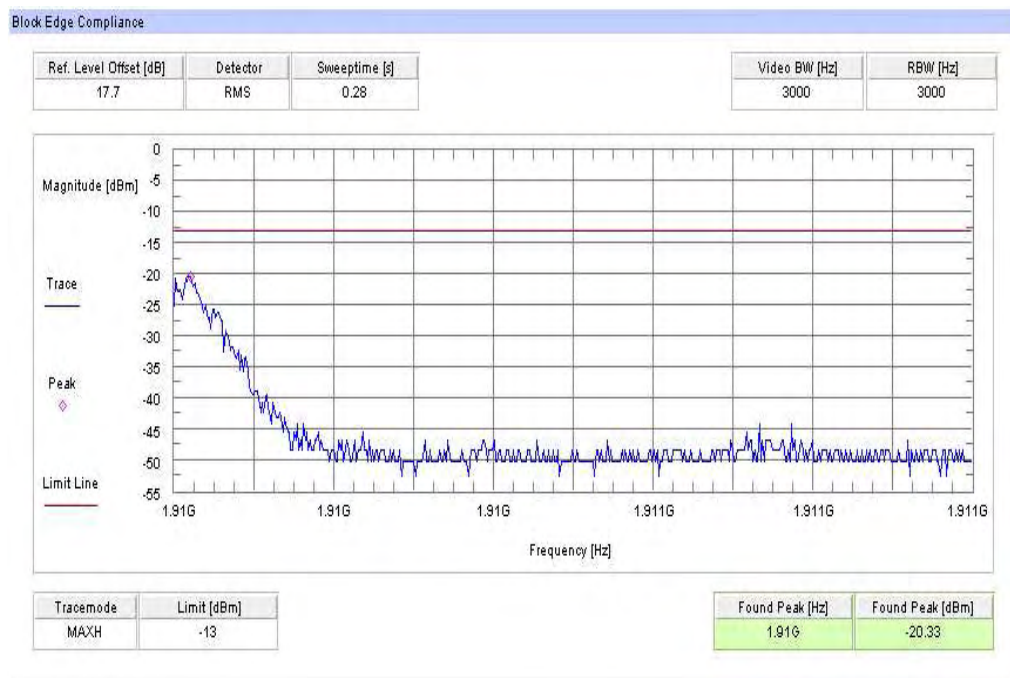
The spectrum at the band edges must comply with the spurious emissions limits.

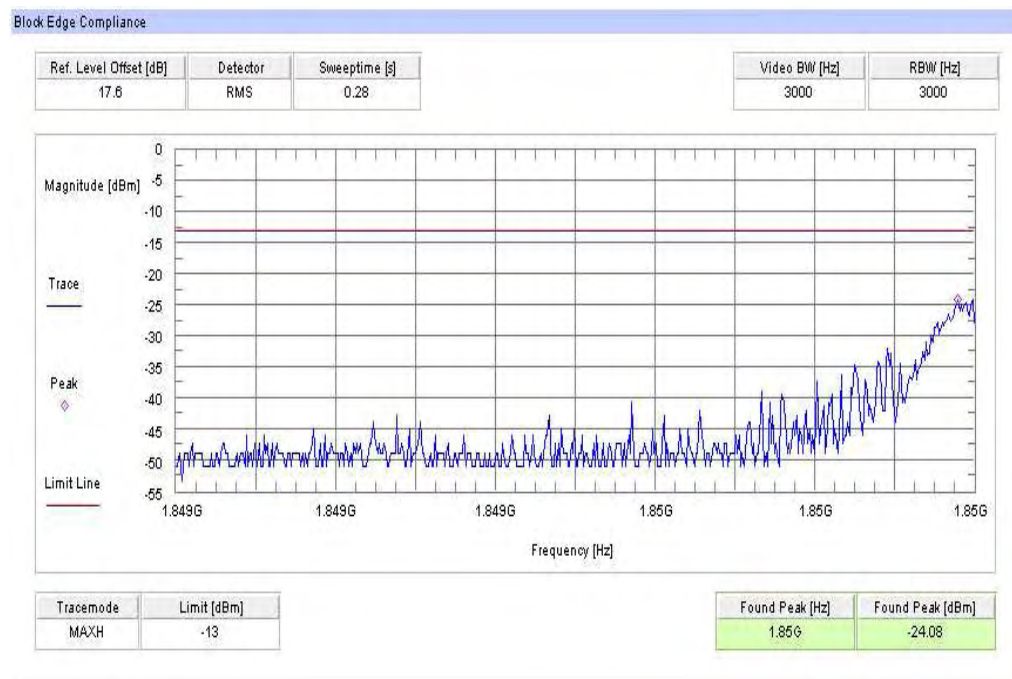
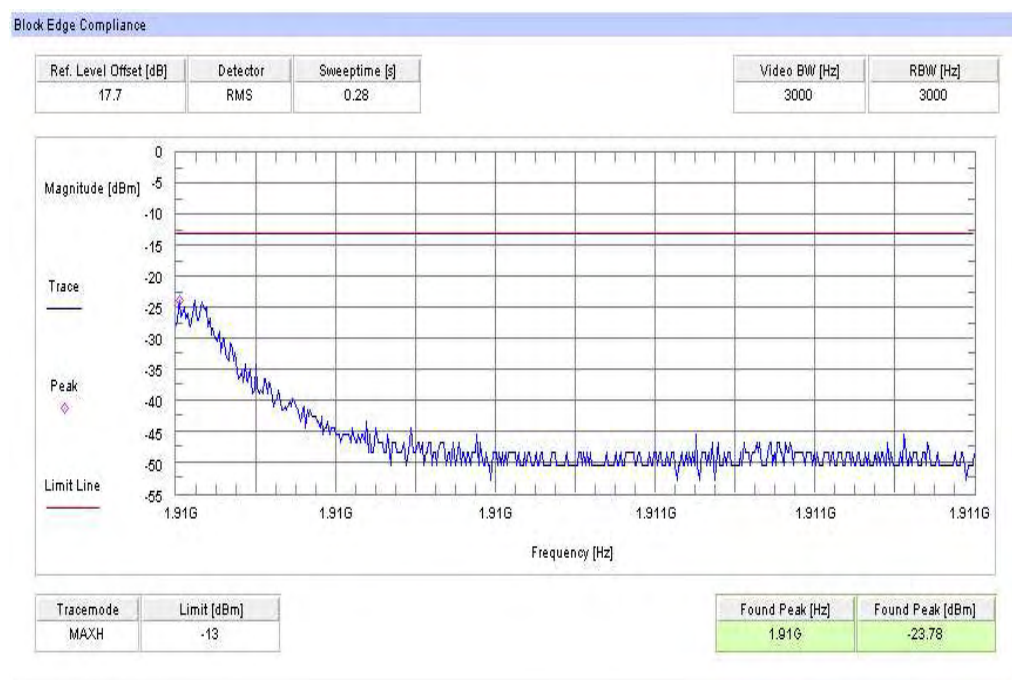
Measurement:

Measurement parameters	
Detector:	RMS
Sweep time:	280 ms
Video bandwidth:	3kHz
Resolution bandwidth:	3kHz
Span:	1 MHz
Trace-Mode:	Max Hold

Limits:

FCC	IC
CFR Part 24.238 CFR Part 2.1051	RSS 133, Issue 5, Section 6.5
Block Edge Compliance	
Attenuation $\geq 43 + 10\log(P)$ (P, Power in Watts)	
-13 dBm	

Results:**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: The result of the measurement is 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 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:	280 ms
Video bandwidth:	3kHz
Resolution bandwidth:	3kHz
Span:	1MHz
Trace-Mode:	Max Hold

Limits:

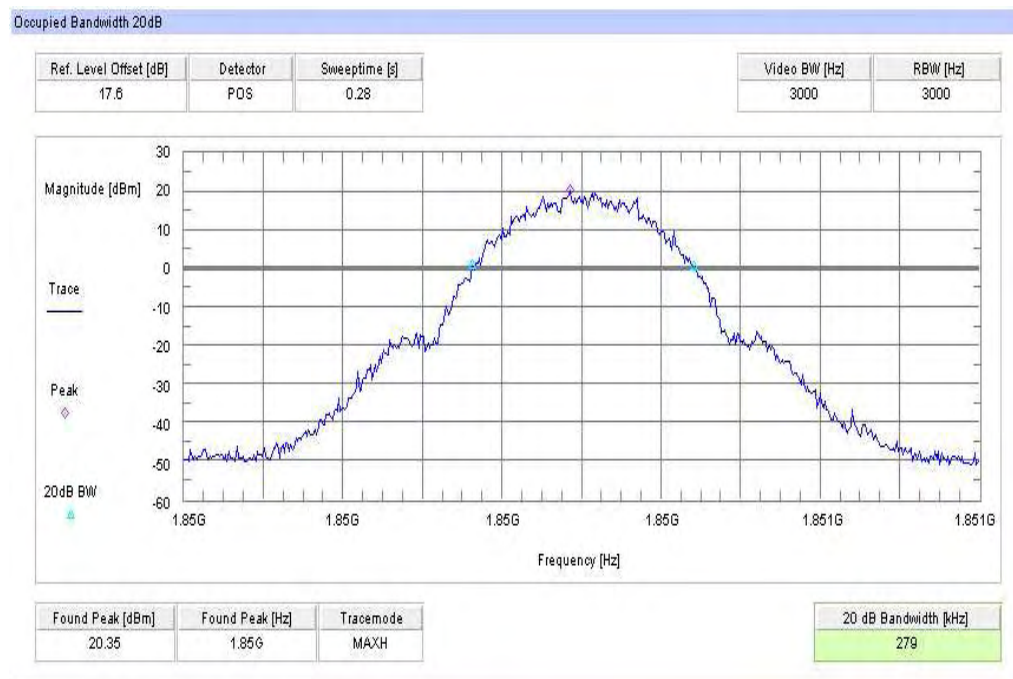
FCC	IC
CFR Part 24.238 CFR Part 2.1049	RSS 133, Issue 5, Section 6.5
Occupied Bandwidth	
Spectrum must fall completely in the specified band	

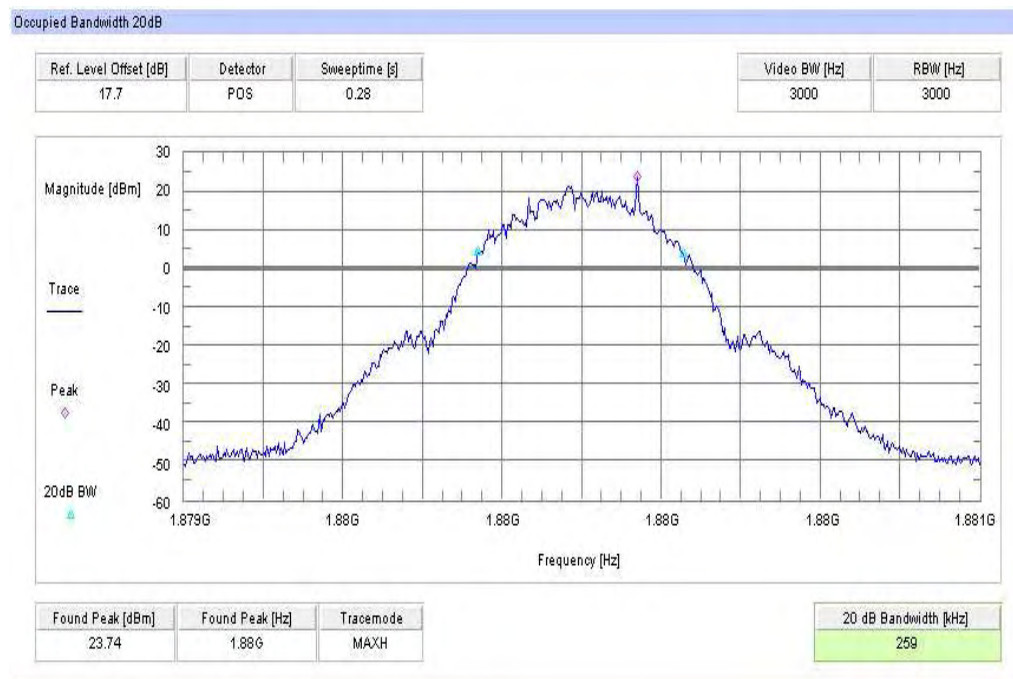
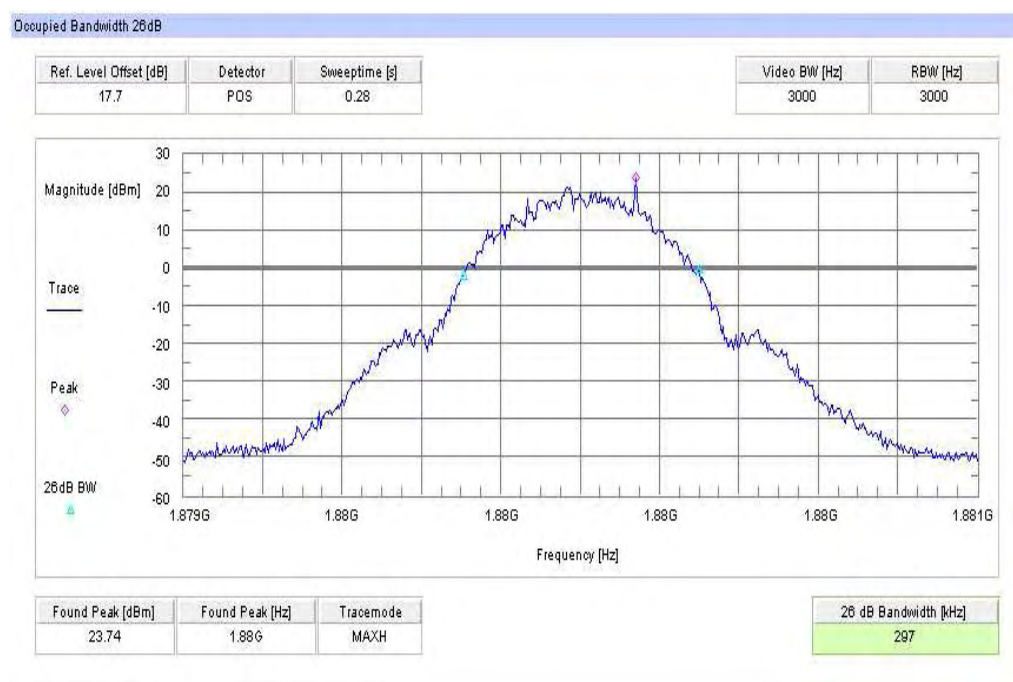
Results:

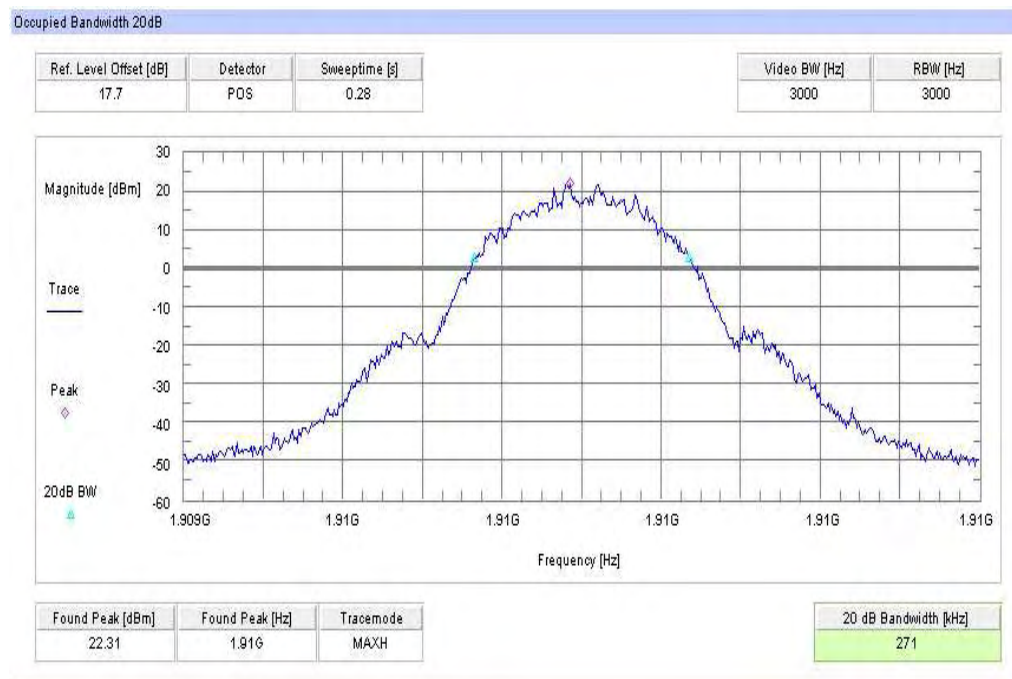
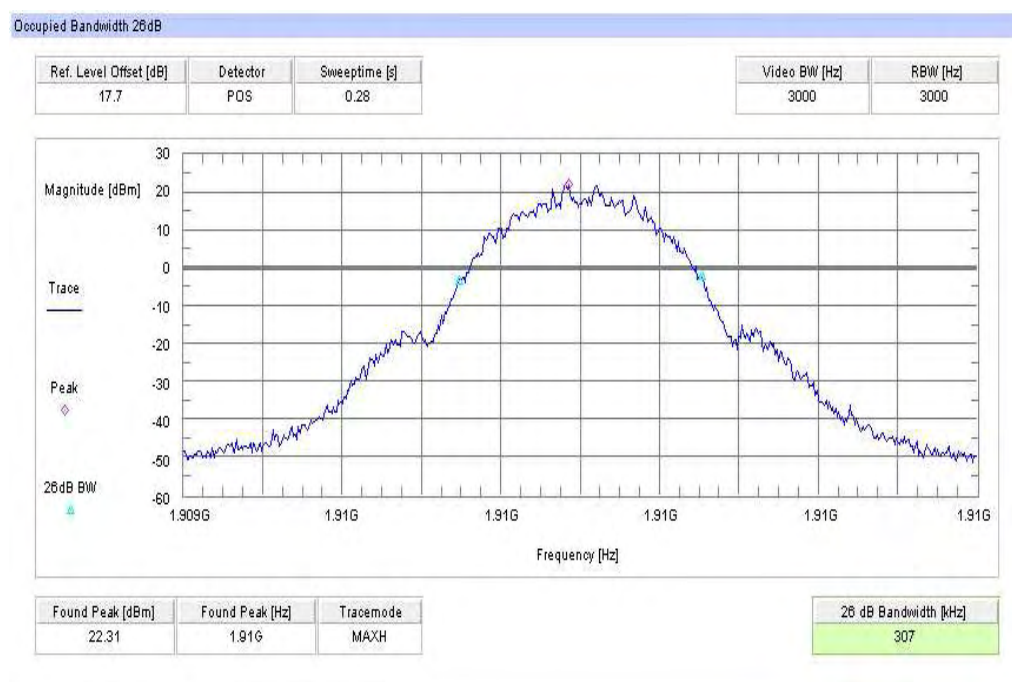
Occupied Bandwidth - GMSK mode		
Frequency (MHz)	99% OBW (kHz)	-26 dBc BW (kHz)
1850.2	279	315
1880.0	259	297
1909.8	271	307
Measurement uncertainty	± 3 kHz	

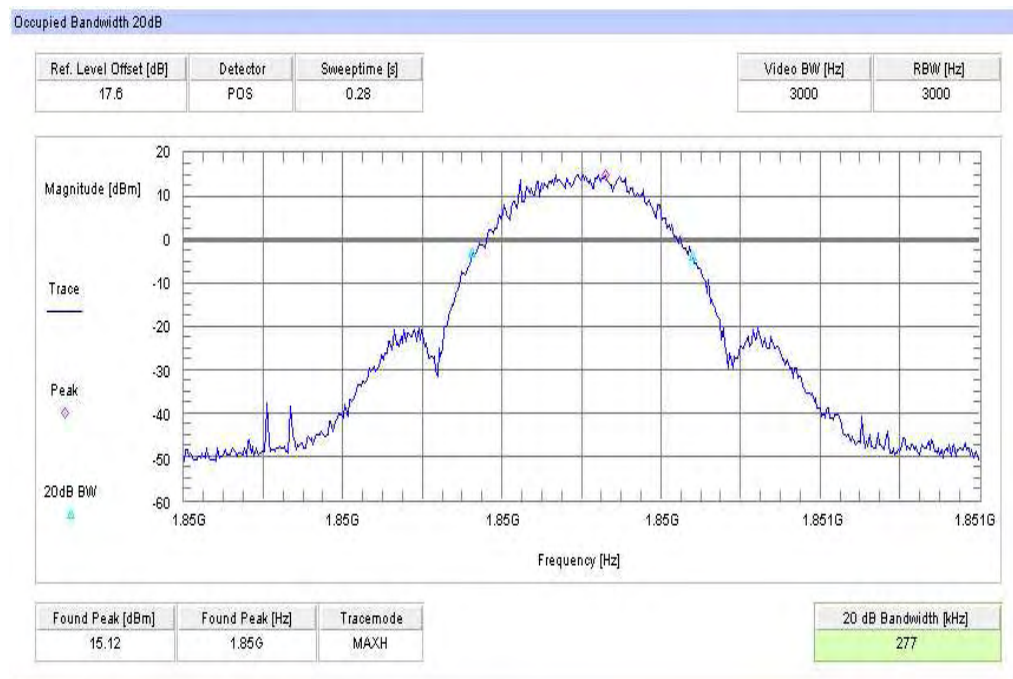
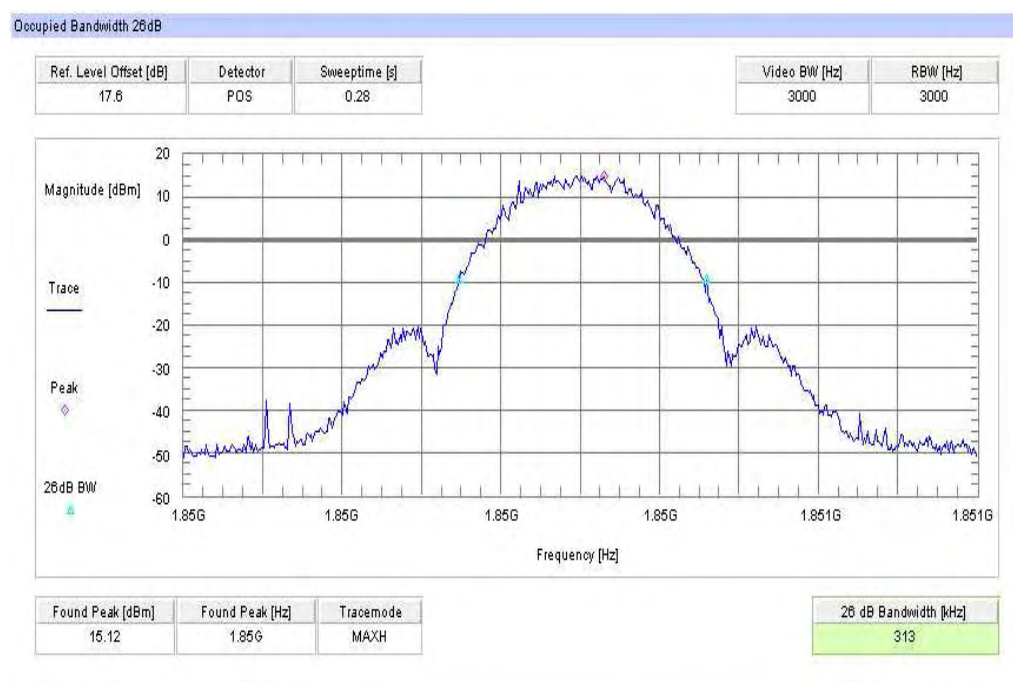
Occupied Bandwidth - EDGE mode		
Frequency (MHz)	99% OBW (kHz)	-26 dBc BW (kHz)
1850.2	277	313
1880.0	277	305
1909.8	283	307
Measurement uncertainty	± 3 kHz	

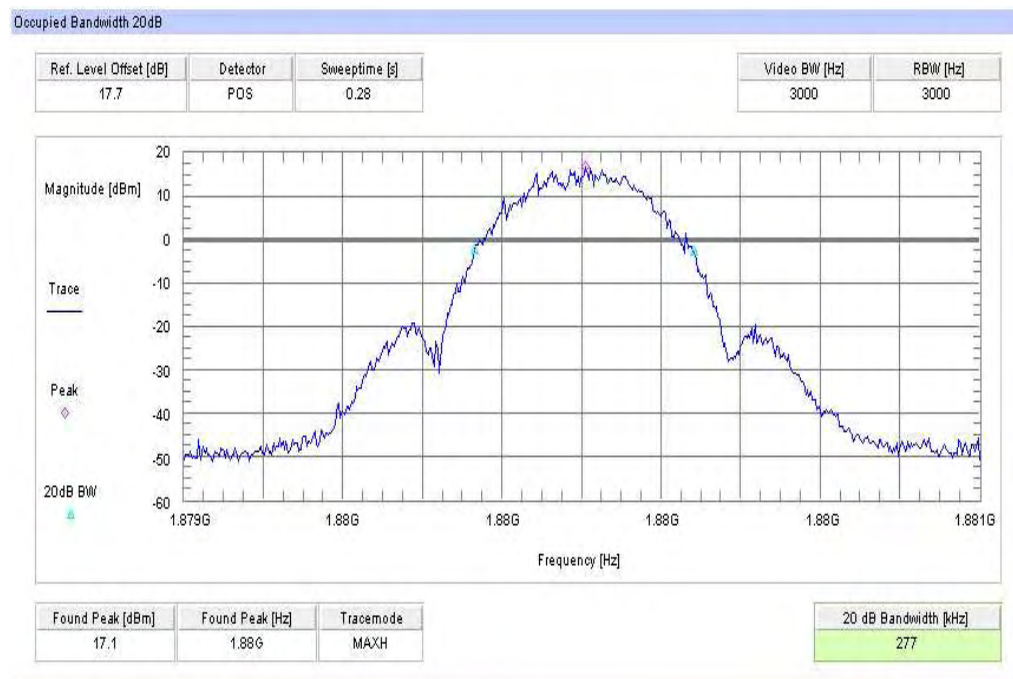
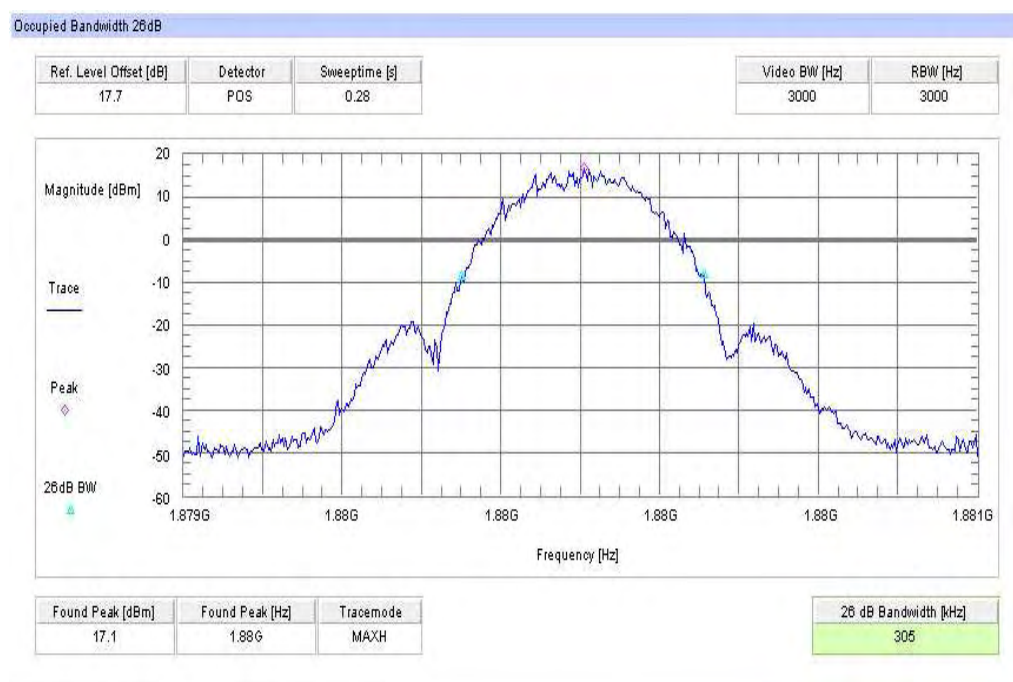
Result: The result of the measurement is passed.

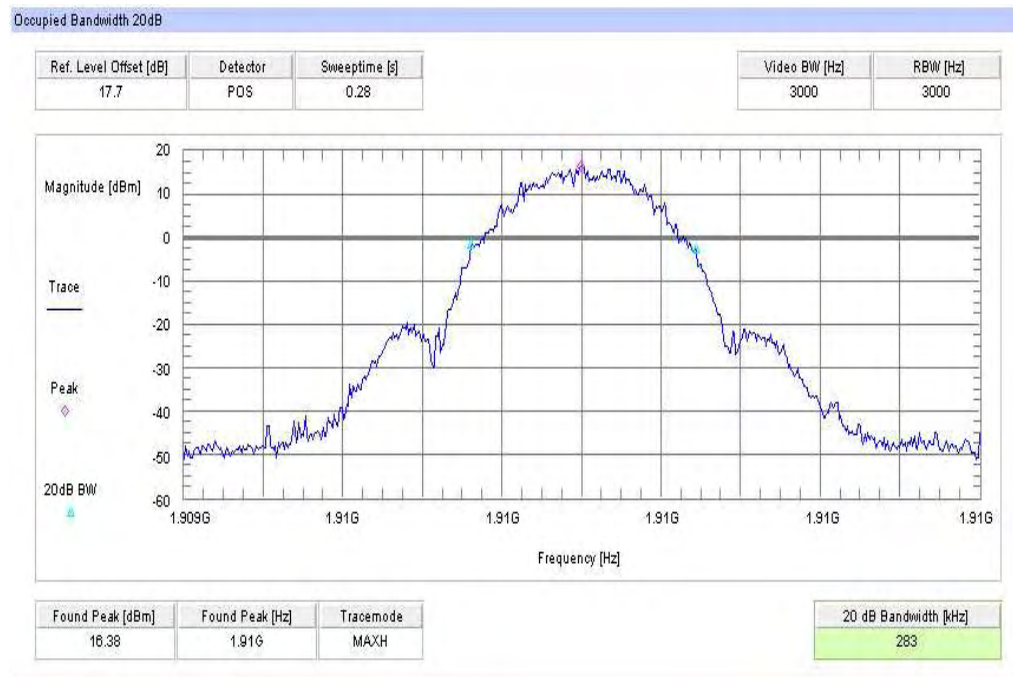
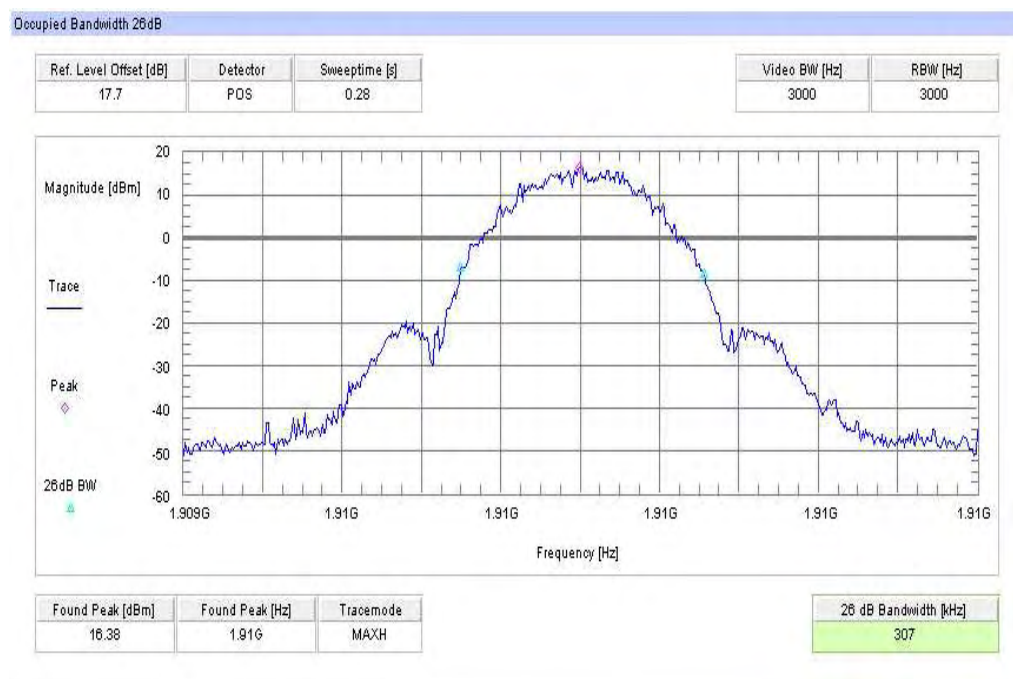
Plot 1: Channel 512 (99% - OBW)**Plot 2: Channel 512 (-26 dBc BW)**

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**

8.5 Results Receiver Mode

8.5.1 Spurious Emissions Radiated – Receiver Mode

Description:

The measurement was performed in worst case. The EUT was not connected to the CMU 200. So the EUT performs a network search. In this mode all oscillators are active.

Measurement:

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

Limits:

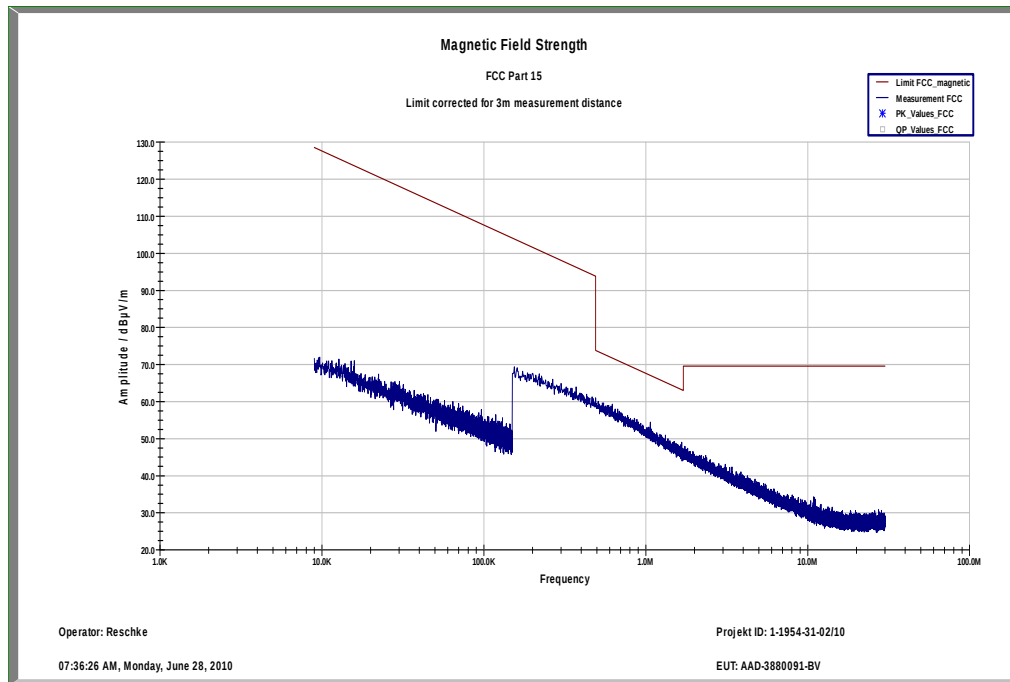
FCC		IC
CFR Part 15.109 CFR Part 2.1053		RSS Gen, Issue 2, Section 4.10
Spurious Emissions Radiated – Receiver Mode		
Frequency (MHz)	Field Strength (dB μ V/m)	Measurement distance (m)
30 – 88	30.0	10
88 - 216	33.5	10
216 – 960	36.0	10
Above 960	54.0	3

Results:

Spurious Emission Level (dBµV/m)		
Frequency (MHz)	Detector	Level (dBµV/m)
No critical peaks found		
Measurement uncertainty		± 3dB

Result: The result of the measurement is passed.

Plot 1: Receiver mode up to 30 MHz



Plot 2: Receiver mode (30 MHz - 1 GHz)

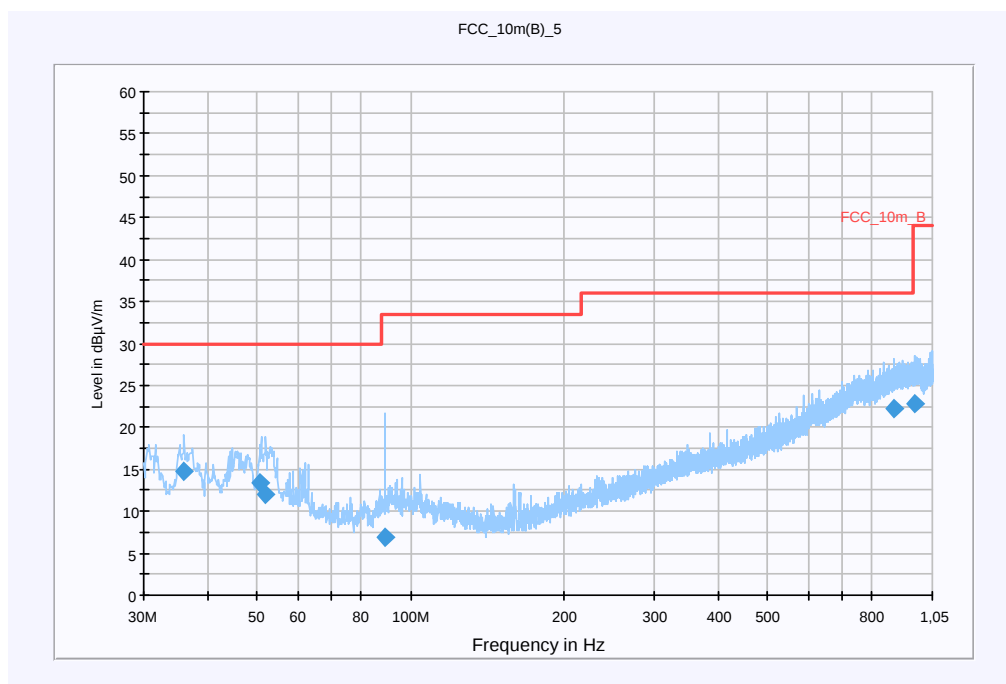
Common Information

EUT: AAD-3880091-BV + EP 800
 Serial Number: IMEI:00440214-075762-0 + 1109w50400488
 Test Description: FCC part 15 @ 10 m
 Operating Conditions: GSM idle; GPS on
 Operator Name: Lang
 Comment: Power: 115 V / 60 Hz

Scan Setup: STAN_Fin [EMI radiated]

Hardware Setup: Electric Field (NOS)
 Level Unit: dB μ V/m

Subrange	Detectors	IF Bandwidth	Meas. Time	Receiver
30 MHz - 1,05 GHz	QuasiPeak	120 kHz	15 s	Receiver



Final Result 1

Frequency (MHz)	QuasiPeak (dB μ V/m)	Meas. Time (ms)	Bandwidth (kHz)	Antenna height (cm)	Polarity	Turntable position (deg)	Corr. (dB)	Margin (dB)	Limit (dB μ V/m)	Comment
36.000000	14.7	15000.000	120.000	207.0	V	303.0	13.1	15.3	30.0	
50.640000	13.3	15000.000	120.000	110.0	V	10.0	13.3	16.7	30.0	
52.080000	12.0	15000.000	120.000	220.0	V	268.0	13.2	18.0	30.0	
89.280000	6.8	15000.000	120.000	129.0	V	253.0	10.4	26.7	33.5	
886.440000	22.2	15000.000	120.000	198.0	H	10.0	25.0	13.8	36.0	
969.480000	22.8	15000.000	120.000	220.0	H	268.0	25.5	21.2	44.0	

Hardware Setup: EMI radiated\Electric Field (NOS) - [EMI radiated]

Subrange 1

Frequency Range: 30 MHz - 2 GHz

Receiver: Receiver [ESCI 3]
@ GPIB0 (ADR 20), SN 100083/003, FW 4.32

Signal Path: without Notch
FW 1.0

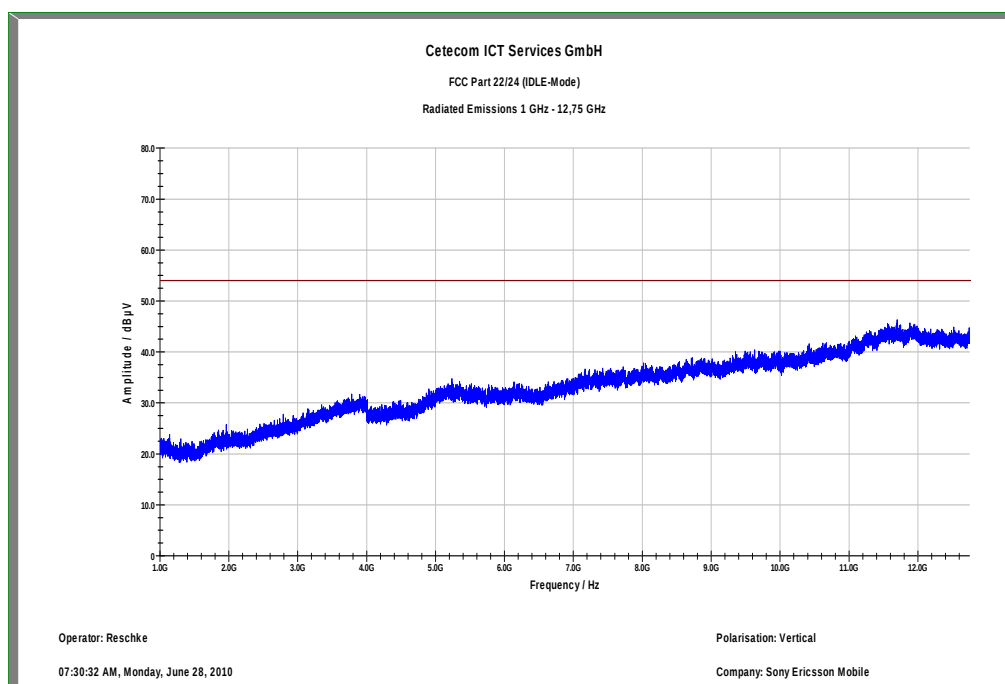
Antenna: VULB 9163
SN 9163-295, FW ---
Correction Table (vertical): VULP6113
Correction Table (horizontal): VULP6113
Correction Table: Cable_EN_1GHz (1005)

Antenna Tower: Tower [EMCO 2090 Antenna Tower]
@ GPIB0 (ADR 8), FW REV 3.12

Turntable: Turntable [EMCO Turntable]
@ GPIB0 (ADR 9), FW REV 3.12

RBW/VBW: 100 kHz

Plot 3: Receiver mode (1 GHz – 12.75 GHz)



RBW/VBW: 1MHz

9 Test equipment and ancillaries used for tests

In order to simplify the identification of the equipment used at each specific test, each item of test equipment and ancillaries are provided with an identifier or number in the equipment list below.

Typically, the calibrations of the test apparatus are commissioned to and performed by an accredited calibration laboratory. The calibration intervals are determined in accordance with the DIN EN ISO/IEC 17025. In addition to the external calibrations, the laboratory executes comparison measurements with other calibrated test systems or effective verifications. Weekly chamber inspections and range calibrations are performed. Where possible, rf-generating and signalling equipment as well as measuring receivers and analyzers are connected to an external high-precision 10 MHz reference (GPS-based or rubidium frequency standard).

No.	Labor / Item	Equipment	Type	Manufact.	Serial No.	INV. No Cetecom	Kal. Art	Last Calibration	Next Calibration
1	n. a.	DC power supply, 60Vdc, 50A, 1200 W	6032A	HP Meßtechnik	2818A03450	300001040	Ve	08.01.2009	08.01.2012
2	n. a.	PowerAttenuator	8325	Byrd	1530	300001595			
3	n. a.	Double-Ridged Waveguide Horn Antenna 1- 18.0GHz	3115	EMCO	8812-3088	300001032	vIKII	05.03.2009	05.03.2011
4	n. a.	Active Loop Antenna	6502	EMCO	2210	300001015	ne		
5	n. a.	Anechoic chamber		MWB	87400/02	300000996			
6	Spec.A. 2_2e	System rack for EMI measurement solution	85900	HP I.V.	*	300000222	ne		
7	9	Artificial Mains 9 kHz to 30 MHz, 4 x 25 Ampere	ESH3-Z5	R&S	828576/020	300001210	Ve	06.01.2010	06.01.2012
8	n. a.	Relais Matrix	3488A	HP Meßtechnik	2719A15013	300001156	ne		
9	n. a.	Relais Matrix	PSU	R&S	890167/024	300001168	ne		
10	n. a.	Isolating Transformer	RT5A	Grundig	9242	300001263	ne		
11	n. a.	Three-Way Power Splitter, 50 Ohm	11850C	HP Meßtechnik		300000997	ne		
12	n. a.	Switch / Control Unit	3488A	HP	2605e08770	300001443	ne		
13	n. a.	Band Reject filter	WRCG1855/1910-1835/1925-40/8SS	Wainwright	7	300003350	ev		
14	n. a.	Band Reject filter	WRCG2400/2483-2375/2505-50/10SS	Wainwright	11	300003351	ev		
15	n. a.	TILE-Software Emission	Quantum Change, Modell TILE-ICS/FULL	EMCO	none	300003451	ne		
16	n. a.	Highpass Filter	WHKX2.9/18G-12SS	Wainwright	1	300003492	ev		
17	n. a.	Highpass Filter	WHK1.1/15G-10SS	Wainwright	3	300003255	ev		
18	n. a.	Highpass Filter	WHKX7.0/18G-8SS	Wainwright	18	300003789	ne		
19	n. a.	PSA Spectrum Analyzer 3 Hz - 26.5 GHz	E4440A	Agilent Technologies	MY48250080	300003812	k	05.08.2008	05.08.2010
20	n. a.	MXG Microwave Analog Signal Generator	N5183A	Agilent Technologies	MY47420220	300003813	k	06.08.2008	06.08.2010
21	n. a.	RF Filter Section 9kHz - 1GHz	N9039A	Agilent Technologies	MY48260003	300003825	vIKII	19.08.2008	19.08.2010
22	n. a.	TRILOG Broadband Test-Antenna 30 MHz - 3 GHz	VULB9163	Schwarzbeck	371	300003854	vIKII	17.12.2008	17.12.2010
23	n. a.	DC Power Supply 0 – 32V	1108-32	Heiden	001802	300001383	Ve		
24	n. a.	Temperature Test Chamber	VT 4002	Heraeus Voetsch	521/83761	300002326	Ve	28.05.2009	28.05.2011

25	n. a.	Signal Analyzer 20Hz-26,5GHz- 150 to + 30 DBM	FSiQ26	R&S	835111/0004	300002678	Ve	06.01.2009	06.01.2011
26	n. a.	Universal Communication Tester	CMU200	R&S	832221/055	300002862	k	20.03.2008	20.03.2011