**CETECOM™****CETECOM ICT Services**
consulting - testing - certification >>>

TEST REPORT

Test report no.: 1-1928-38-07/10-B



Testing laboratory

CETECOM ICT Services GmbH

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

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

Yanmar Co., Ltd.

1600-4, Umegahara
Maibara / Japan
Phone: -/-
Fax: -/-
Contact: Junya Kusuno
e-mail: junya_kusuno@yanmar.co.jp
Phone: +81-749-52-8408

Manufacturer

Yanmar Co., Ltd.

1600-4, Umegahara
Maibara / Japan

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

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

Test item

Kind of test item: Telecommunication Controller
Model name: YSCRW01
FCC ID: Y6YYSCRW01
IC: 9461A-YSCRW01
Frequency [MHz]: 1850.2 – 1909.8 MHz and 824.2 – 848.8 MHz
Power supply: 10 – 16 V DC by Power Supply
Temperature range: -30 °C to +65 °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.

Test performed:**Test report authorised:**

Jakob Reschke

Stefan Bös

1 Table of contents

1	Table of contents	2
2	General information	4
2.1	Notes.....	4
2.2	Application details	4
3	Test standard/s	4
4	Test environment	4
5	Test item	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	Receiver	7
8	RF measurement testing	8
8.1	Description of test setup.....	8
8.1.1	Radiated measurements.....	8
8.1.2	Conducted measurements	9
8.2	RSP100 test report cover sheet / performance test data	10
8.3	Results GSM 850.....	11
8.3.1	RF output power	11
8.3.2	Frequency stability	13
8.3.3	Spurious emissions radiated	14
8.3.4	Spurious emissions conducted	22
8.3.5	Block edge compliance.....	22
8.3.6	Occupied bandwidth.....	22
8.4	Results PCS 1900	23
8.4.1	RF output power	23
8.4.2	Frequency stability	25
8.4.3	Spurious emissions radiated	26
8.4.4	Spurious emissions conducted	35
8.4.5	Block edge compliance.....	35
8.4.6	Occupied bandwidth.....	35
8.5	Results UMTS band II	36
8.5.1	RF output power	36
8.5.2	Frequency stability	38
8.5.3	Spurious emissions radiated	39
8.5.4	Spurious emissions conducted	48
8.5.5	Block edge compliance.....	48
8.5.6	Occupied bandwidth.....	48
8.6	Results UMTS band V.....	49
8.6.1	RF output power	49
8.6.2	Frequency stability	51
8.6.3	Spurious emissions radiated	52
8.6.4	Spurious emissions conducted	60
8.6.5	Block edge compliance.....	60
8.6.6	Occupied bandwidth.....	60
8.7	Results receiver mode.....	61

8.7.1	Spurious emissions radiated – receiver mode	61
9	Test equipment and ancillaries used for tests.....	66
Annex A	Document history	68
Annex B	Further information.....	68

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.

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.

2.2 Application details

Date of receipt of order:	2010-12-08
Date of receipt of test item:	2008-09-29
Start of test:	2008-09-29
End of test:	2008-10-05
Person(s) present during the test:	Mr. Junya Kusuno (Yanmar Co. Ltd.)

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}	+22 °C during room temperature tests
	T_{max}	+65 °C during high temperature test
	T_{min}	-30 °C during low temperature test
Relative humidity content:		55 %
Air pressure:		not relevant for this kind of testing
Power supply:	V_{nom}	13.0 V DC by Power Supply
	V_{max}	-/- V
	V_{min}	-/- V

5 Test item

Kind of test item	:	Telecommunication Controller
Type identification	:	YSCRW01
S/N serial number	:	69
HW hardware status	:	2 nd ; B2.12.1
SW software status	:	CT01; Revision 02.050
Frequency band [MHz]	:	1850.2 – 1909.8 MHz and 824.2 – 848.8 MHz (GSM-modes) 1852.2 – 1907.6 MHz and 826.4 – 846.6 MHz (WCDMA-modes)
Number of channels	:	300 (PCS1900) and 125 (PCS850) / 278 (FDD II) and 102 (FDD V)
Antenna	:	External antenna (GSM/GPS combi antenna - see photos)
Power supply	:	10 – 16 V DC by Power Supply
Temperature range	:	-30 °C to +65 °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	2011-02-18	Only delta measurements

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 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

7.2 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 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

7.3 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 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

7.4 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 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

7.5 Receiver

Test Case	temperature conditions	power source voltages	Pass	Fail	NA	NP	Remark
Spurious Emissions Radiated	Nominal	Nominal	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

Note:

NA = Not applicable; NP = Not performed

8 RF measurement testing

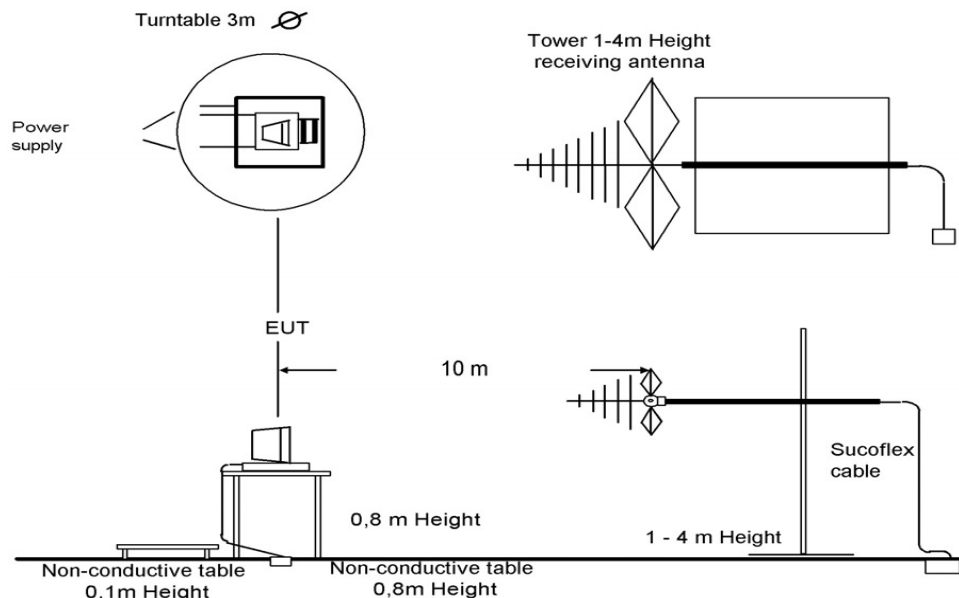
8.1 Description of test setup

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



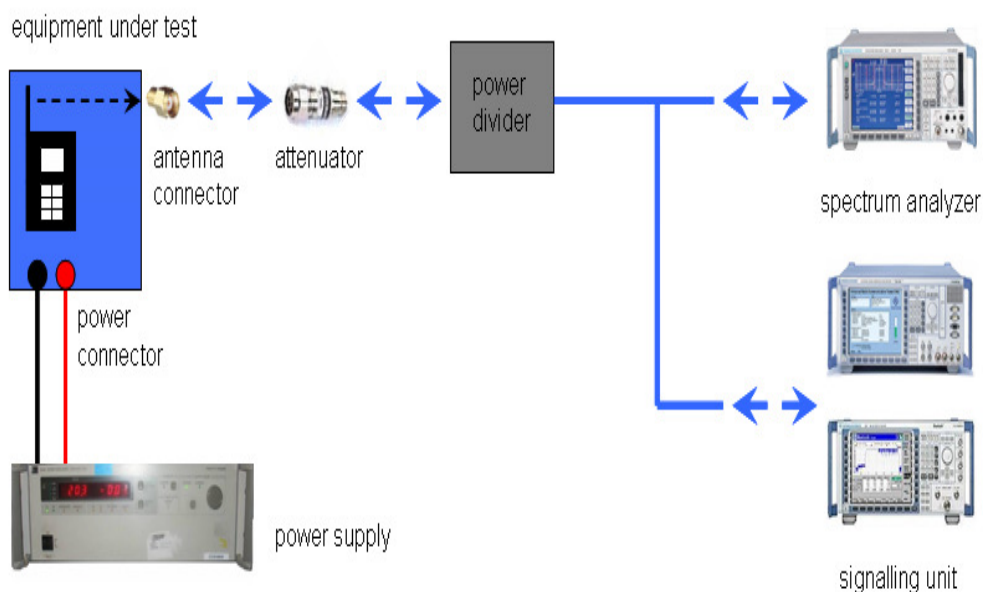
Picture 1: Diagram radiated measurements

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

8.1.2 Conducted measurements

Not performed – only delta 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 RSP100 test report cover sheet / performance test data

Test Report Number	:	1-1928-38-07/10-B			
Equipment Model Number	:	YSCRW01			
Certification Number	:	9461A-YSCRW01			
Manufacturer (complete Address)	:	Yanmar Co., Ltd. 1600-4, Umegahara Maibara / Japan			
Tested to radio standards specification no.	:	RSS132; RSS133; RSS210			
Open Area Test Site IC No.	:	IC 3462C-1			
Frequency Range	:	GSM Band: 824.2 – 848.8 MHz FDD5 Band: 826.4 – 846.6 MHz PCS Band: 1850.2 – 1909.8 MHz FDD2 Band: 1852.4 – 1907.6 MHz			
GPS receiver turned	:	Off			
RF-power [W] (max.)	:	Band	Conducted	ERP / EIRP	Mode
		GSM850	1698.2 mW *)	724.4 mW	GMSK
			602.5 mW *)	257.0 mW	8-PSK
		GSM1900	1000.0 mW *)	549.5 mW	GMSK
			630.9 mW *)	346.7 mW	8-PSK
		FDD2	489.8 mW *)	177.8 mW	WCDMA
FDD5	501.2 mW *)	288.4 mW	WCDMA		
Occupied bandwidth (99%-BW) [kHz]	:	GSM850	248 kHz *)		GMSK
			250 kHz *)		8-PSK
		GSM1900	250 kHz *)		GMSK
			242 kHz *)		8-PSK
		FDD2	4200 kHz *)		WCDMA
		FDD5	4180 kHz *)		WCDMA
Type of modulation	:	GMSK; 8-PSK; QPSK			
Emission Designator (TRC-43)	:	GSM850	248KGXW *)		GMSK
			250KG7W *)		8-PSK
		GSM1900	250KGXW *)		GMSK
			242KG7W *)		8-PSK
		FDD2	4M20F9W *)		WCDMA
		FDD5	4M18F9W *)		WCDMA
Antenna Information	:	Ground plane independent GPS-Cellular combo antenna			
Transmitter Spurious (worst case)	[dBm] :	-39.8 dBm @ 1697.6 MHz			
Receiver Spurious (worst case)	[µV/m @ 3m]:	108.4 µV/m @ 11.84 GHz (noise floor)			

*)Data taken from test reports "MDE_Siem_0605_FCCb" and "MDE_Siem_0605_FCCa" which were supplied by the applicant.

ATTESTATION:

DECLARATION OF COMPLIANCE:

I attest 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:

2011-02-18
Date

Stefan Bös
Name


Signature

8.3 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.

8.3.1 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 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 22.9.1.3 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	-	-
836.4	-	-
848.8	-	-
Measurement uncertainty	± 0.5 dB	

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

Output Power (radiated) GMSK mode	
Frequency (MHz)	Average Output Power (dBm) - ERP
824.2	27.9
836.4	28.2
848.8	28.6
Measurement uncertainty	± 2.0 dB

Output Power (radiated) 8-PSK mode	
Frequency (MHz)	Average Output Power (dBm) - ERP
824.2	23.6
836.4	23.8
848.8	24.1
Measurement uncertainty	± 2.0 dB

Result: The result of the measurement is 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 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:	2 sec.
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.

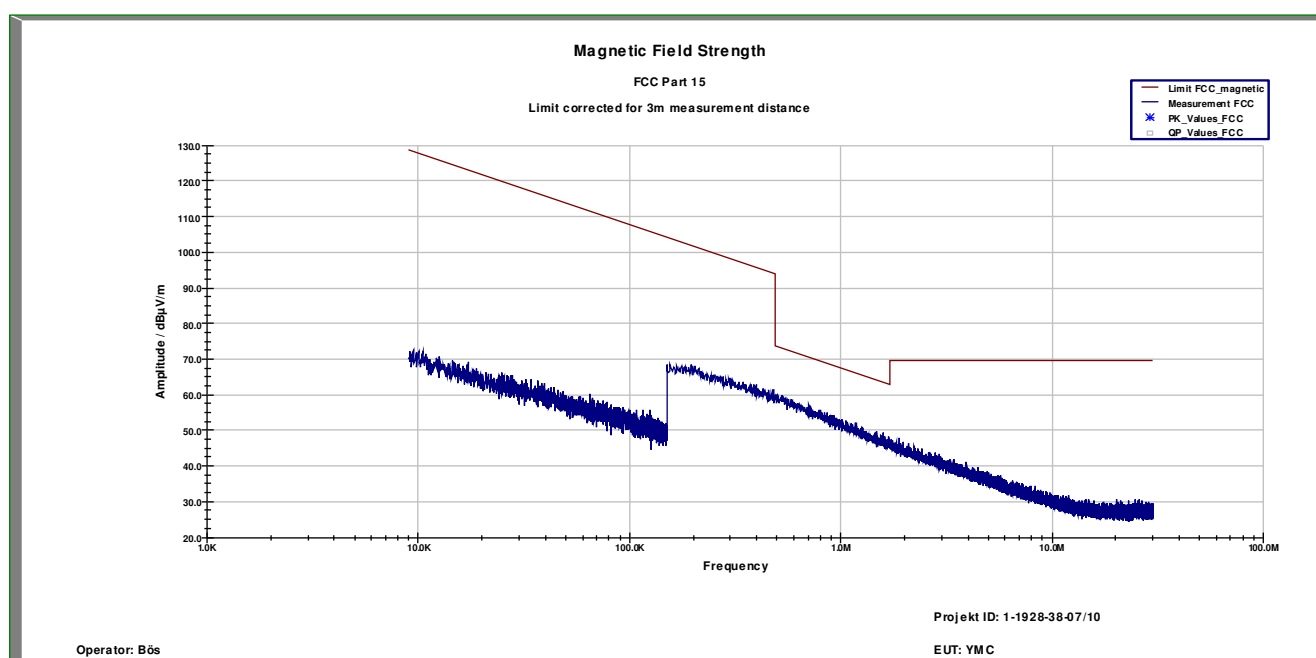
The plots show only the middle channel. If spurious were detected, the lowest and highest channel were checked too. The found values are stated in the table below.

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

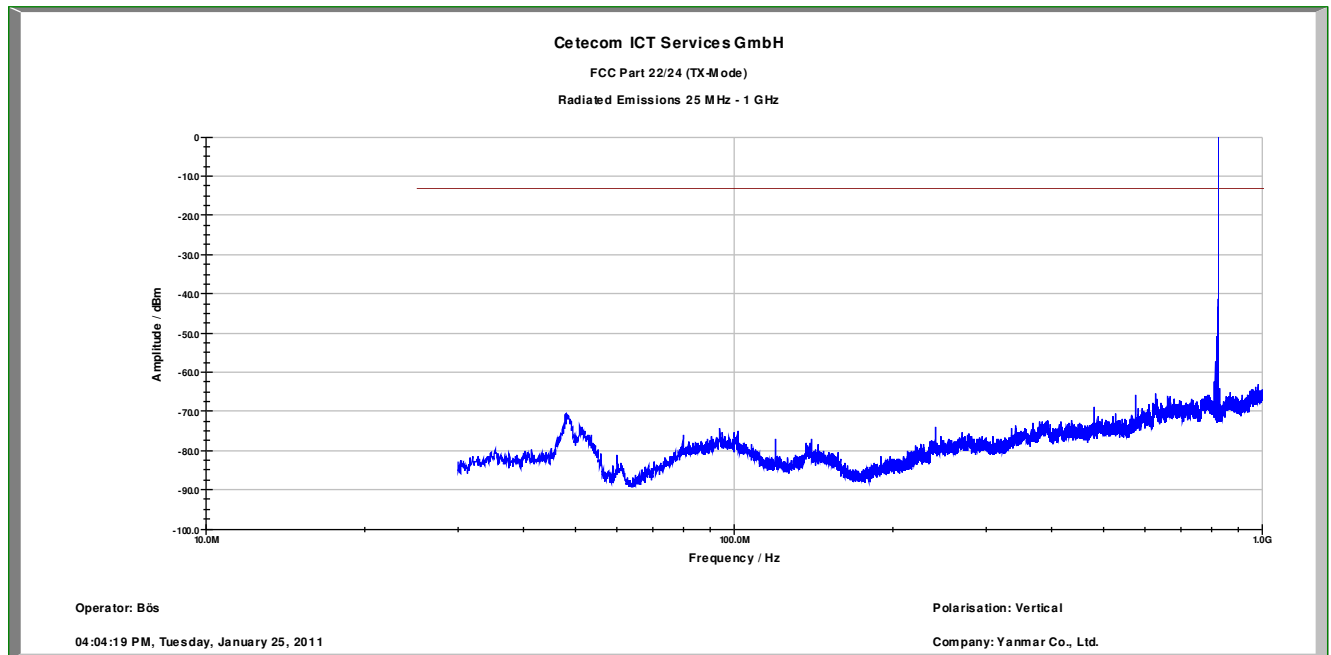
Spurious Emission Level (dBm)								
Harmonic	Ch. 128 Freq. (MHz)	Level [dBm]	Harmonic	Ch. 189 Freq. (MHz)	Level [dBm]	Harmonic	Ch. 251 Freq. (MHz)	Level [dBm]
2	1648.4	-40.2	2	1672.8	-	2	1697.6	-39.8
3	2472.6	-	3	2509.2	-54.6	3	2546.4	-48.2
4	3296.8	-	4	3345.6	-	4	3395.2	-
5	4121.0	-	5	4182.0	-	5	4244.0	-
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.

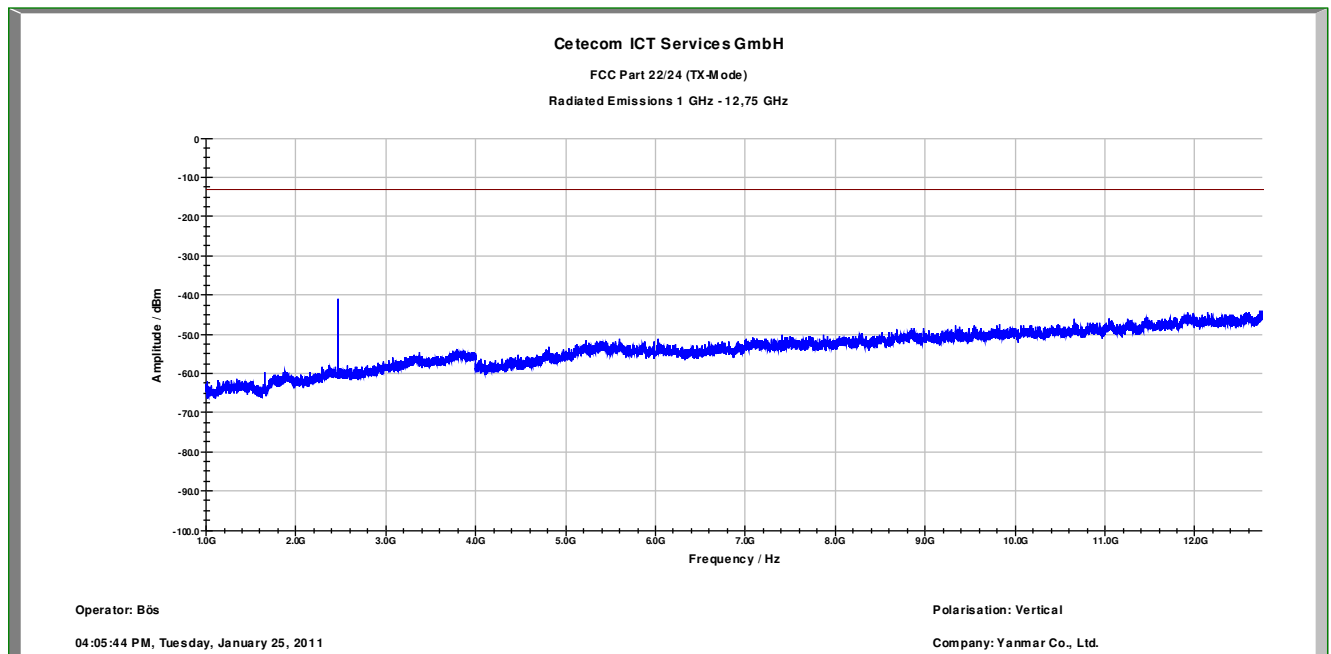
Plot 1: Channel 189 (Traffic mode up to 30 MHz)



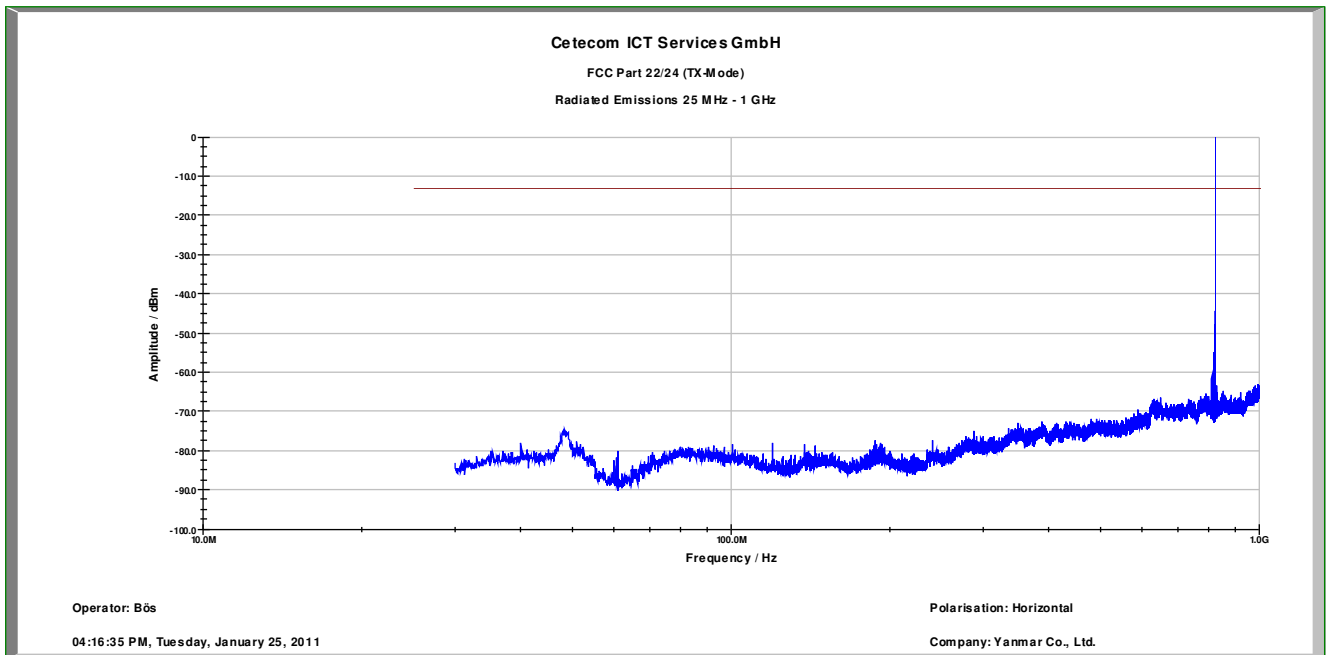
Plot 2: Channel 128 – vertical (30 MHz - 1 GHz)



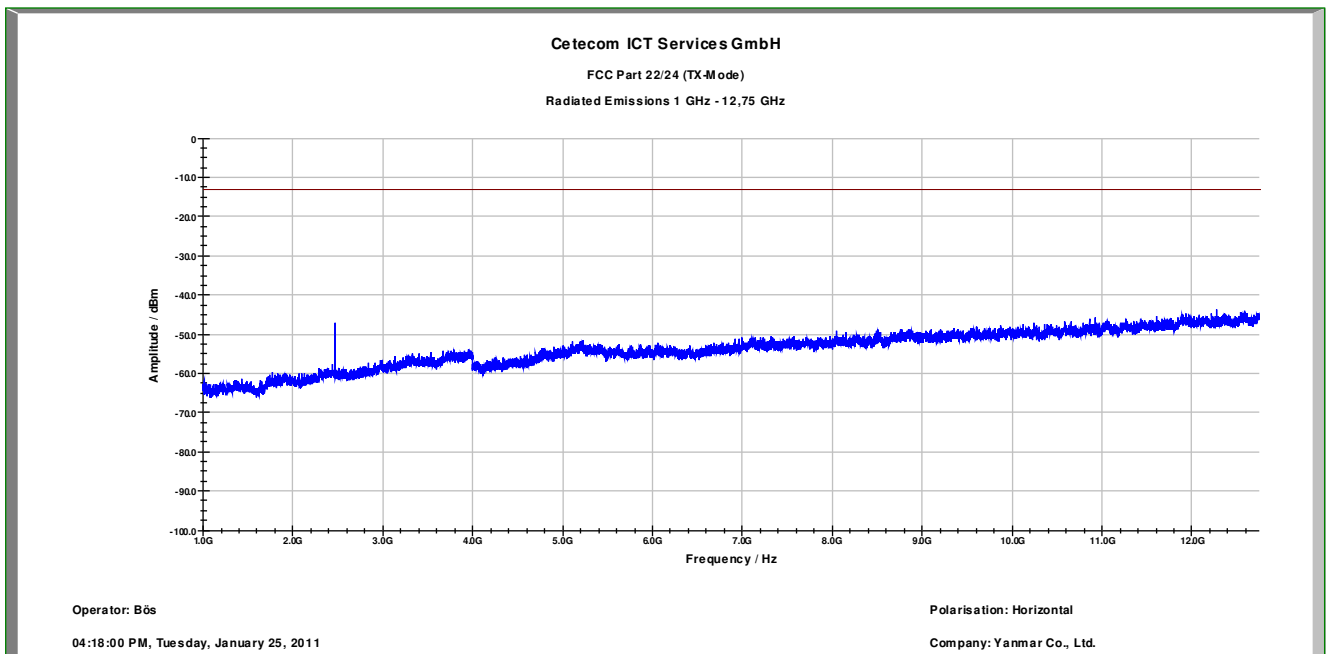
Plot 3: Channel 128 – vertical (1 GHz – 12.75 GHz)



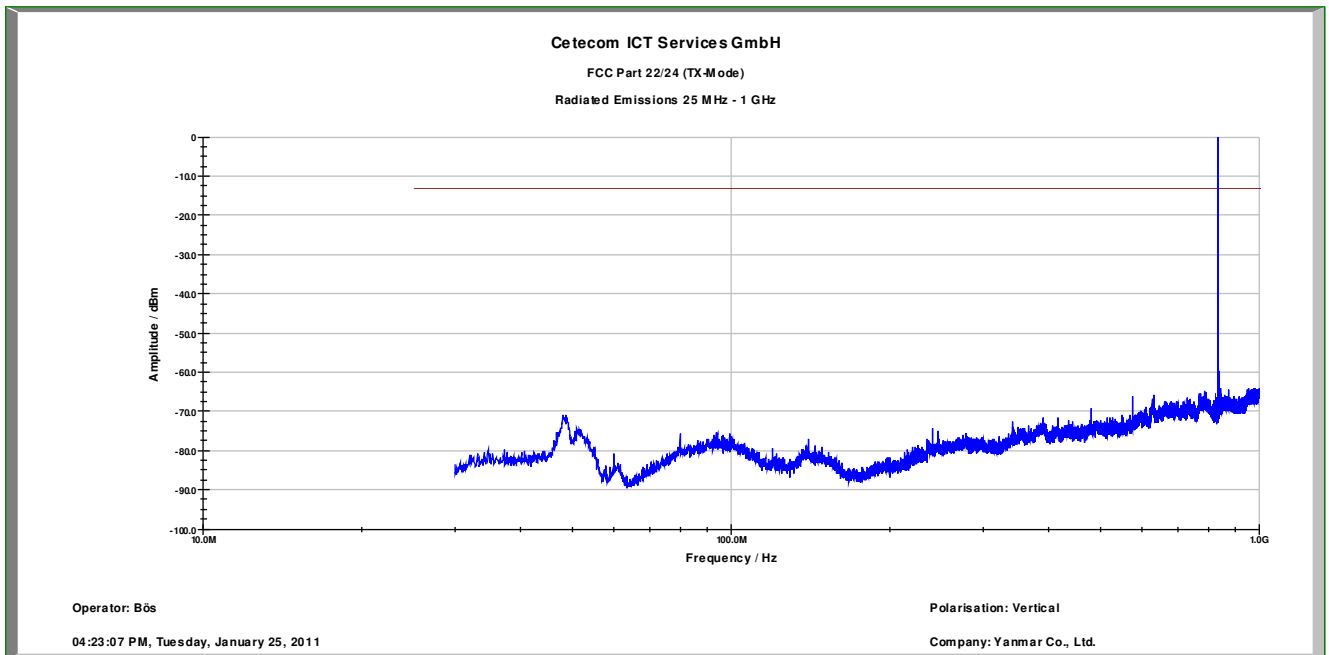
Plot 4: Channel 128 – horizontal (30 MHz - 1 GHz)



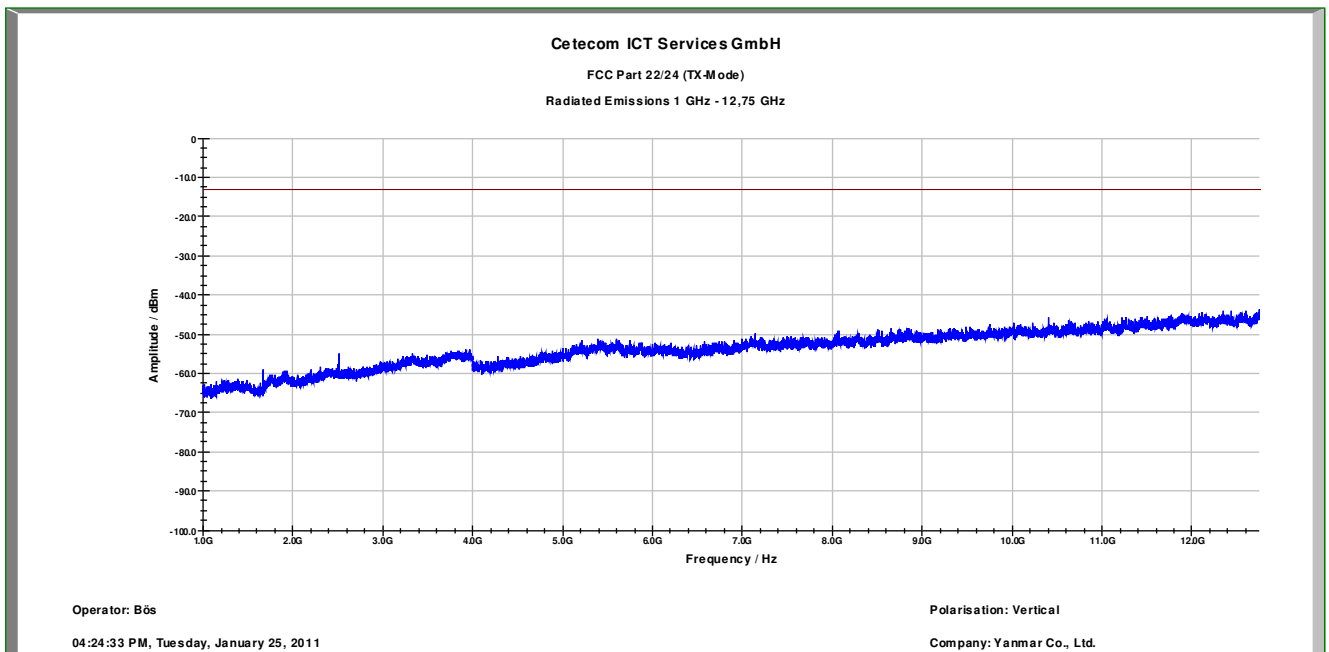
Plot 5: Channel 128 – horizontal (1 GHz – 12.75 GHz)



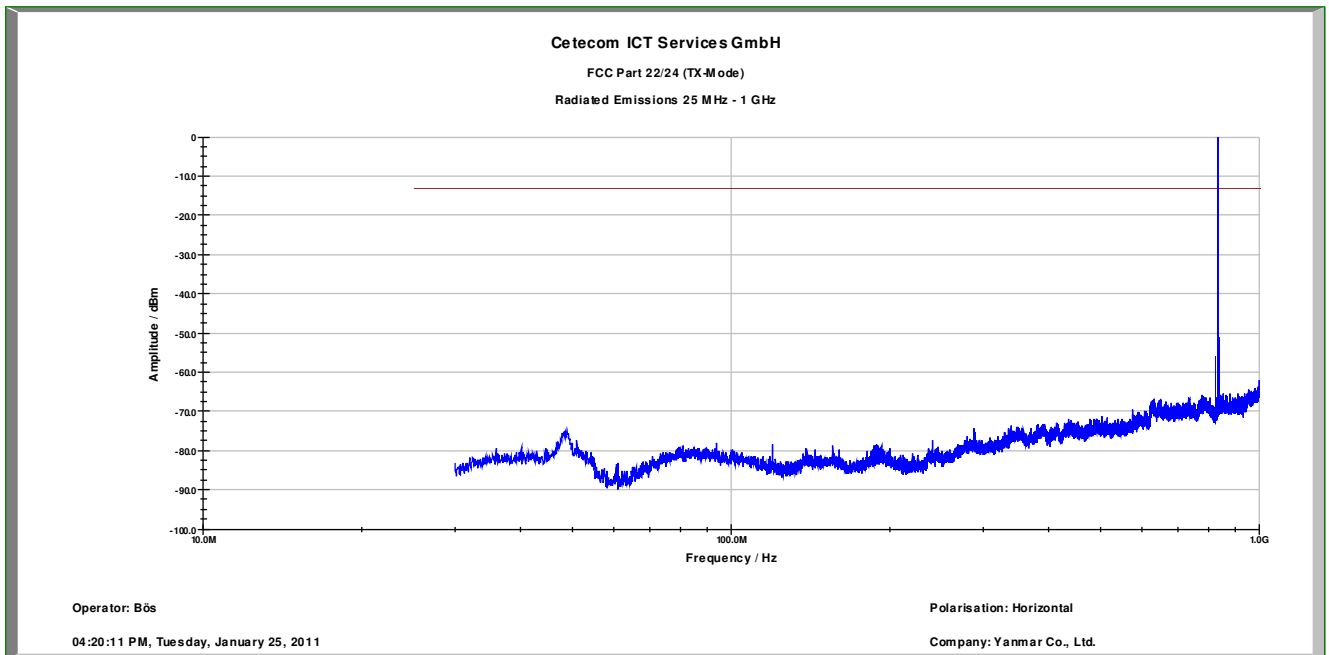
Plot 6: Channel 189 – vertical (30 MHz - 1 GHz)



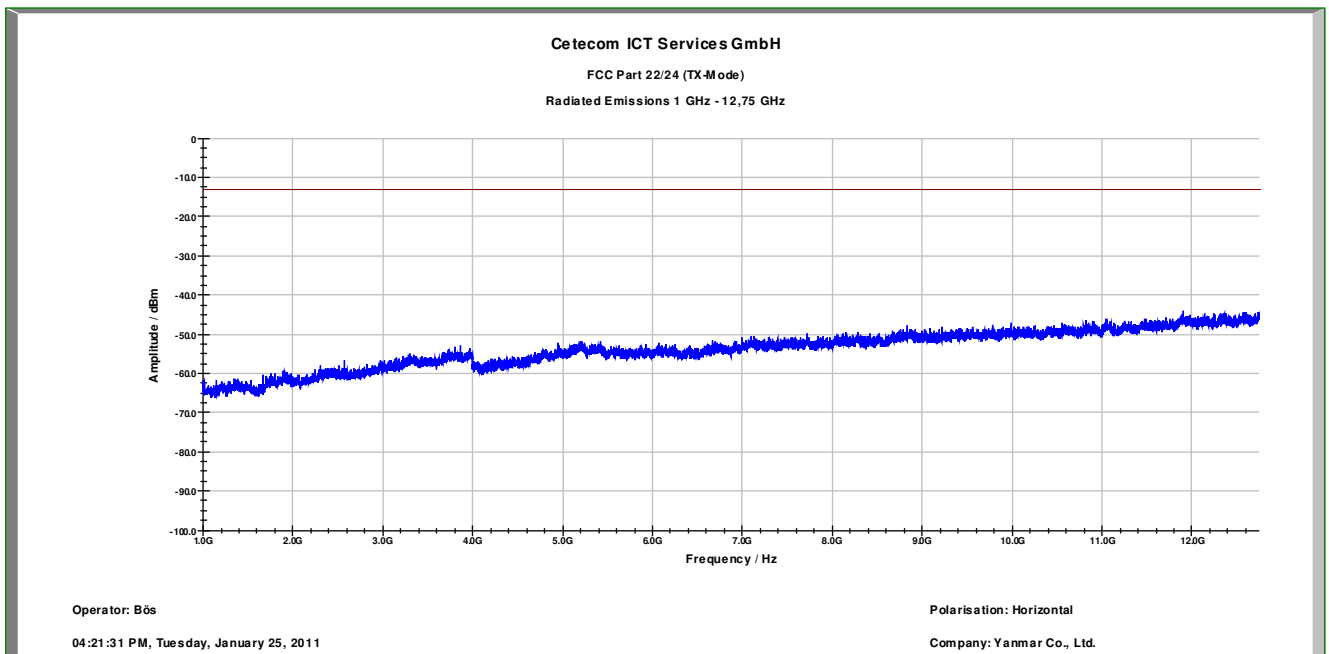
Plot 7: Channel 189 – vertical (1 GHz – 12.75 GHz)



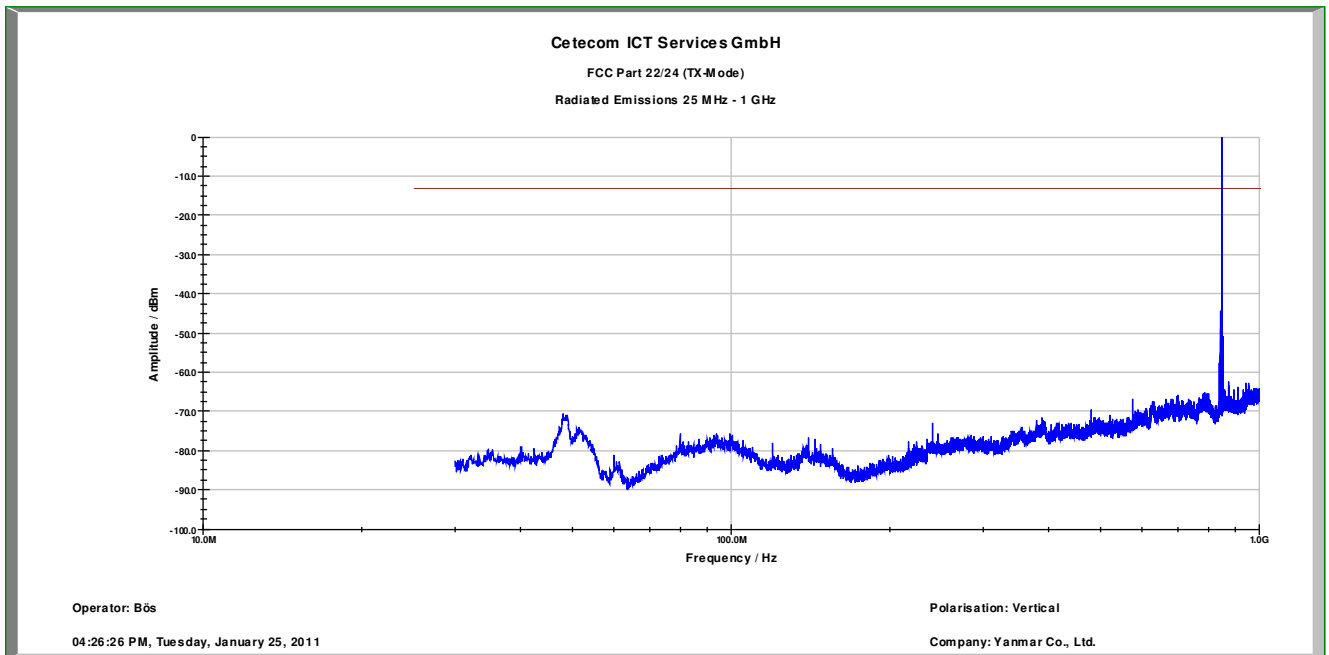
Plot 8: Channel 189 – horizontal (30 MHz - 1 GHz)



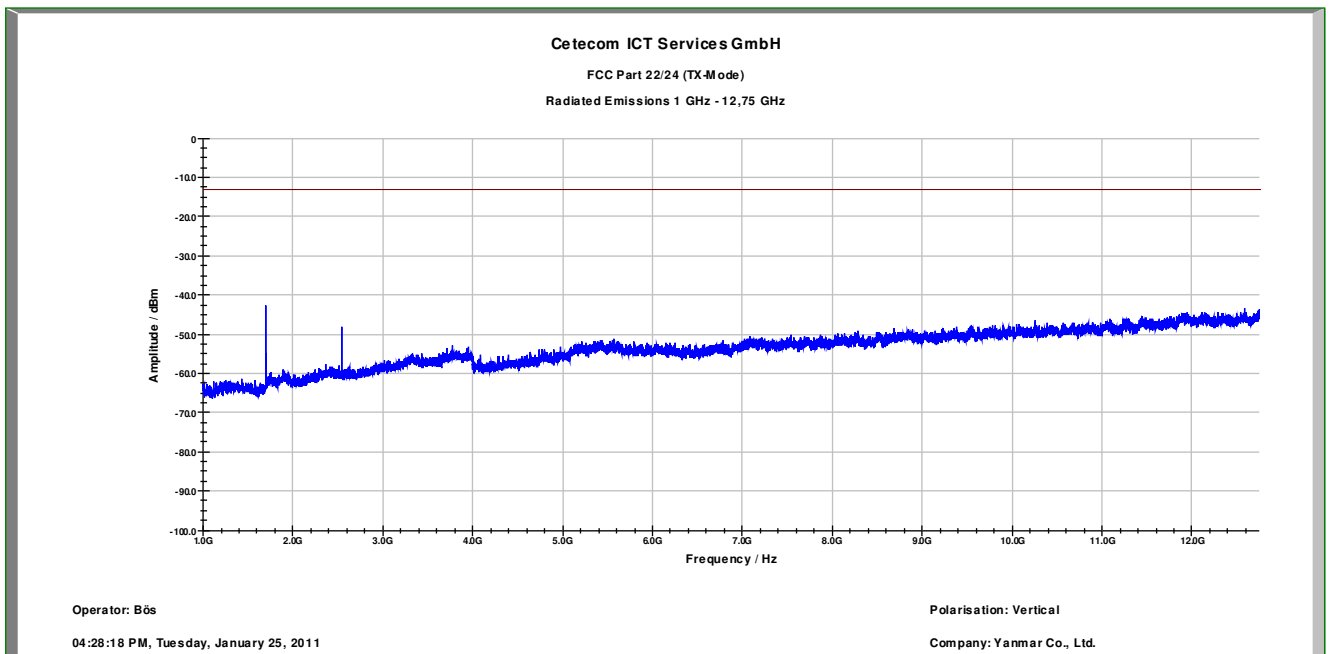
Plot 9: Channel 189 – horizontal (1 GHz – 12.75 GHz)



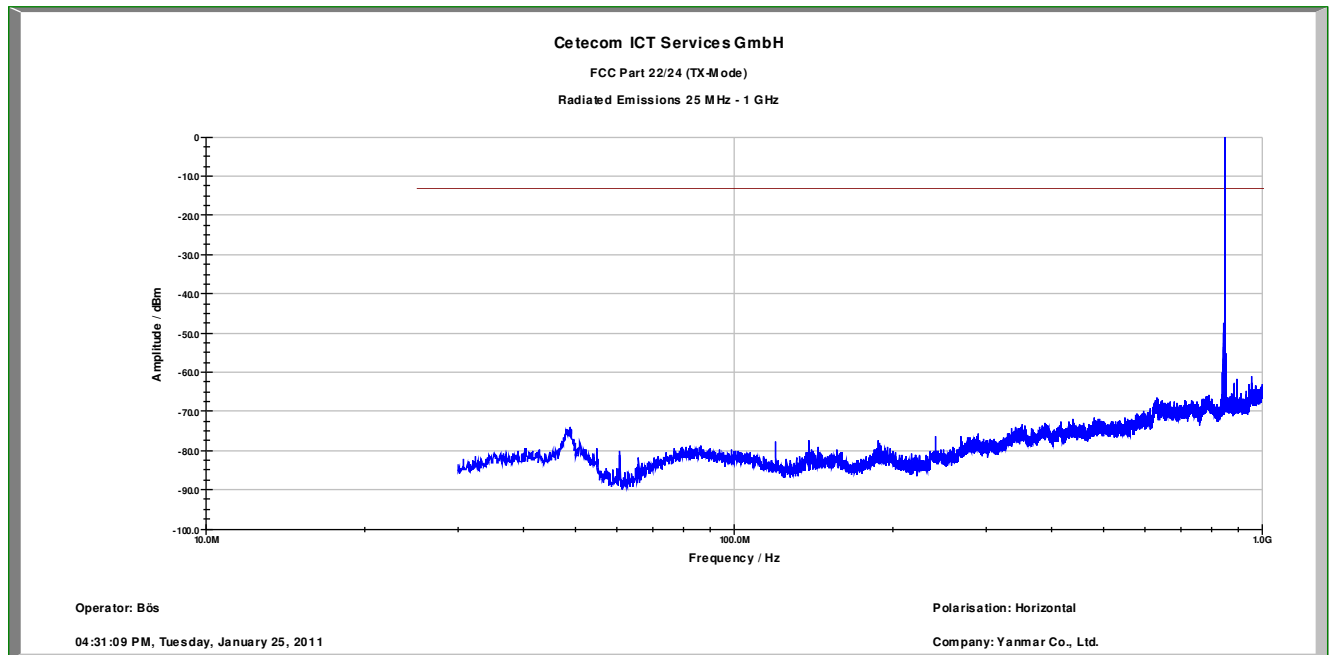
Plot 10: Channel 251 – vertical (30 MHz - 1 GHz)



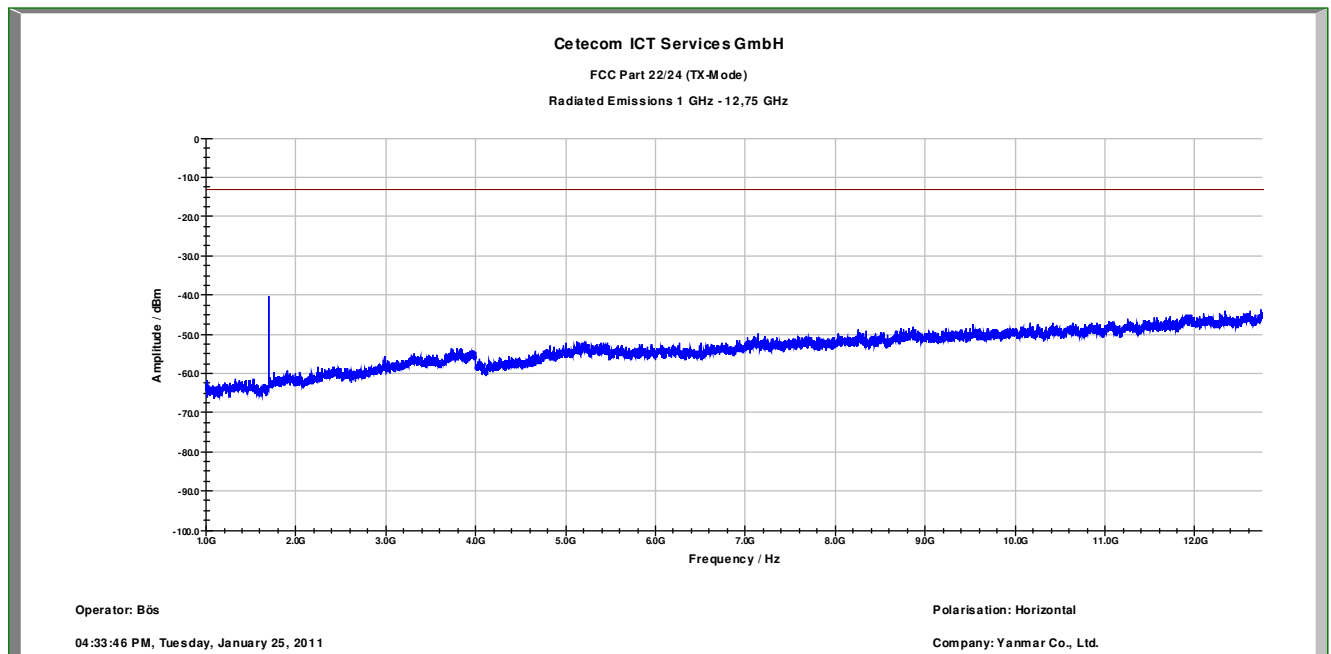
Plot 11: Channel 251 – vertical (1 GHz – 12.75 GHz)



Plot 12: Channel 251 – horizontal (30 MHz - 1 GHz)



Plot 13: Channel 251 – horizontal (1 GHz – 12.75 GHz)



8.3.4 Spurious emissions conducted

Not performed

8.3.5 Block edge compliance

Not performed

8.3.6 Occupied bandwidth

Not performed

8.4 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.

8.4.1 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 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, 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	-	-
1880.0	-	-
1909.8	-	-
Measurement uncertainty	± 0.5 dB	

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

Output Power (radiated) GMSK mode	
Frequency (MHz)	Average Output Power (dBm) - EIRP
1850.2	26.1
1880.0	25.4
1909.8	27.4
Measurement uncertainty	± 2.0 dB

Output Power (radiated) 8-PSK mode	
Frequency (MHz)	Average Output Power (dBm) - EIRP
1850.2	24.3
1880.0	23.6
1909.8	25.4
Measurement uncertainty	± 2.0 dB

Result: The result of the measurement is 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 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:	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 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.

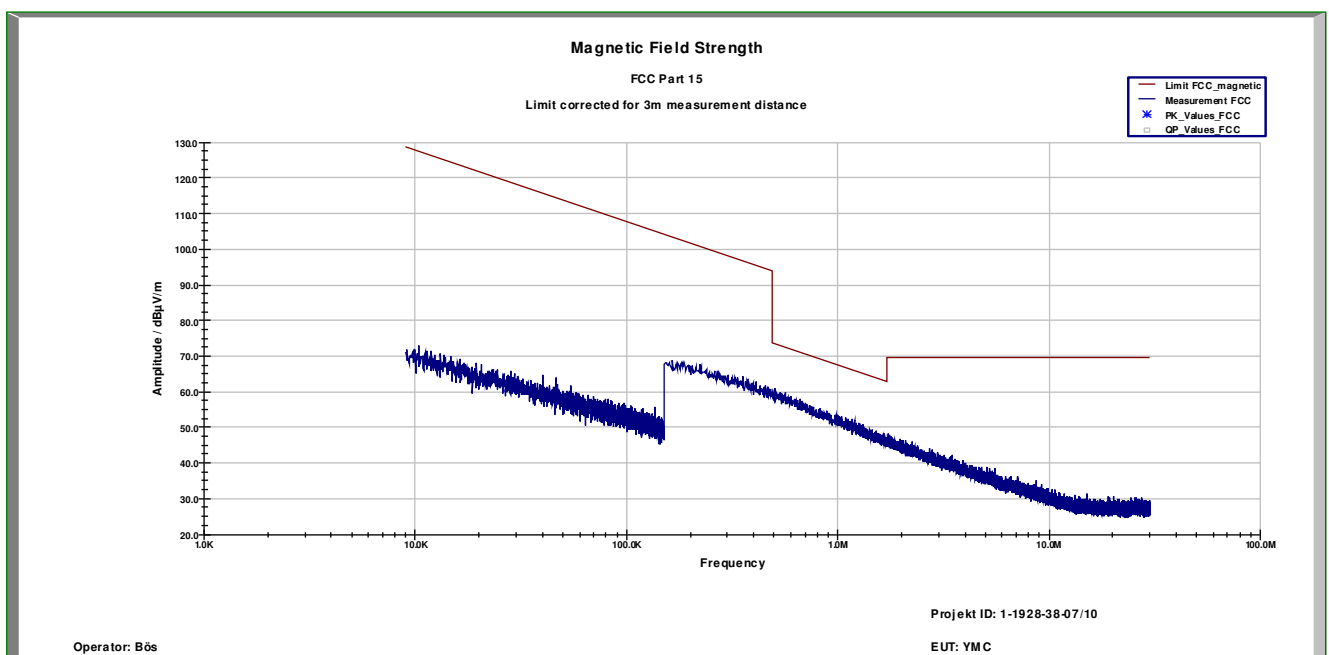
The plots show only the middle channel. If spurious were detected, the lowest and highest channel were checked too. The found values are stated in the table below.

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

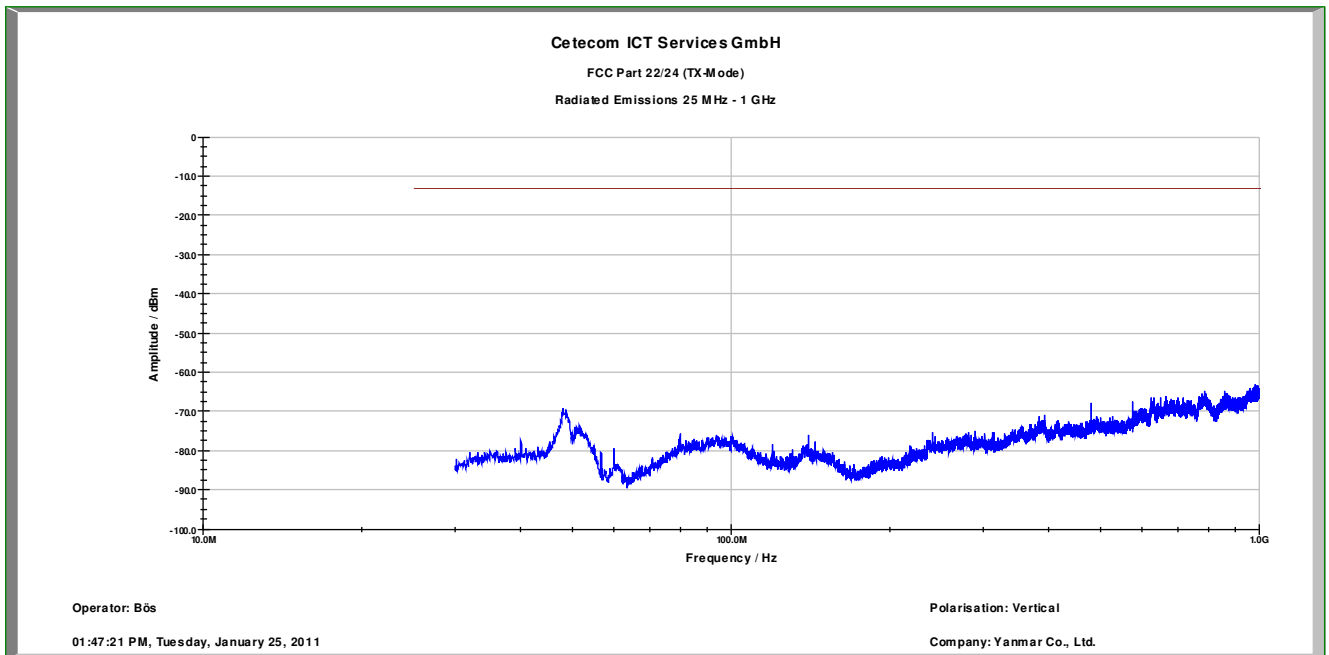
Spurious Emission Level (dBm)								
Harmonic	Ch. 512 Freq. (MHz)	Level [dBm]	Harmonic	Ch. 661 Freq. (MHz)	Level [dBm]	Harmonic	Ch. 810 Freq. (MHz)	Level [dBm]
2	3700.4	-	2	3760.0	-	2	3819.6	-
3	5550.6	-	3	5640.0	-	3	5729.4	-
4	7400.8	-	4	7520.0	-	4	7639.2	-
5	9251.0	-	5	9400.0	-	5	9549.0	-
6	11101.2	-	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.

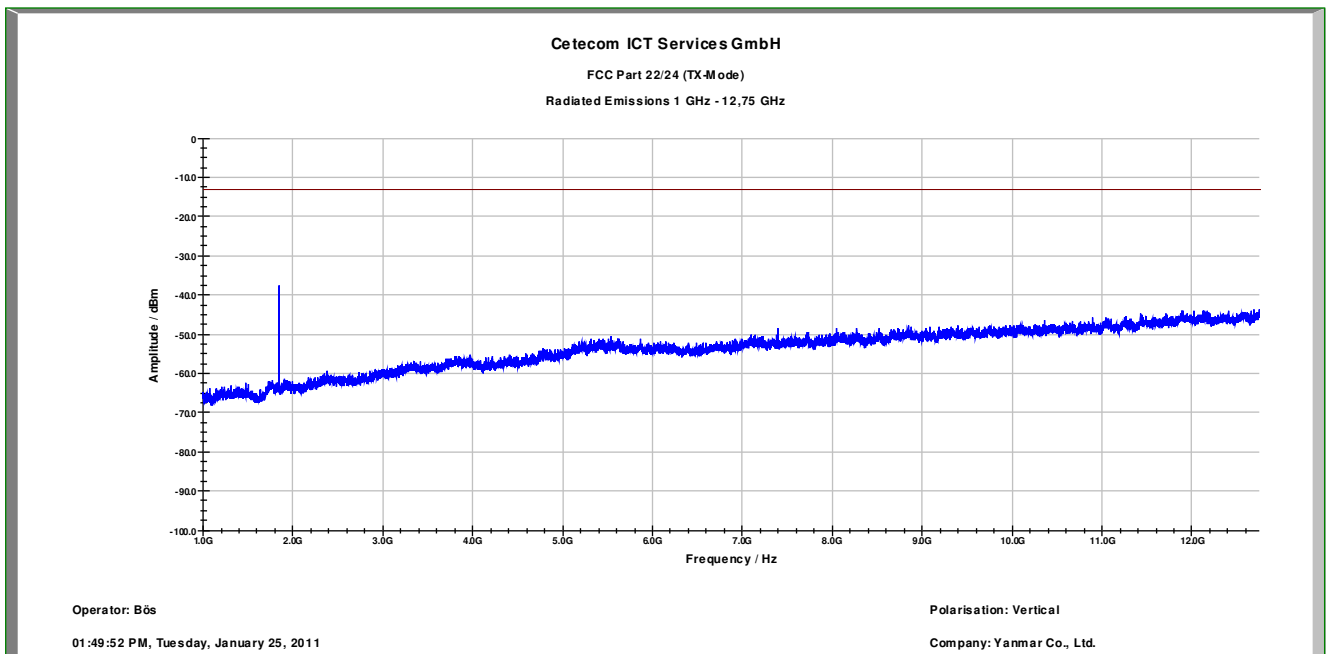
Plot 1: Channel 661 (Traffic mode up to 30 MHz)



Plot 2: Channel 512 – vertical (30 MHz - 1 GHz)

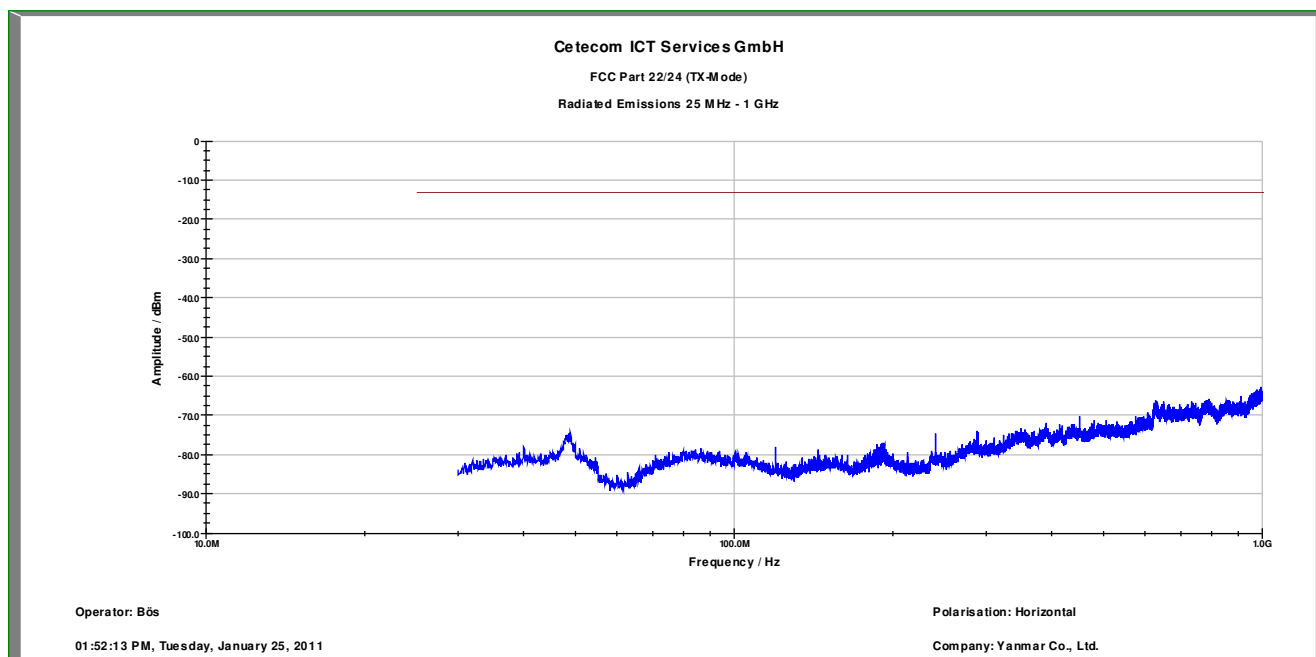


Plot 3: Channel 512 – vertical (1 GHz – 12.75 GHz)

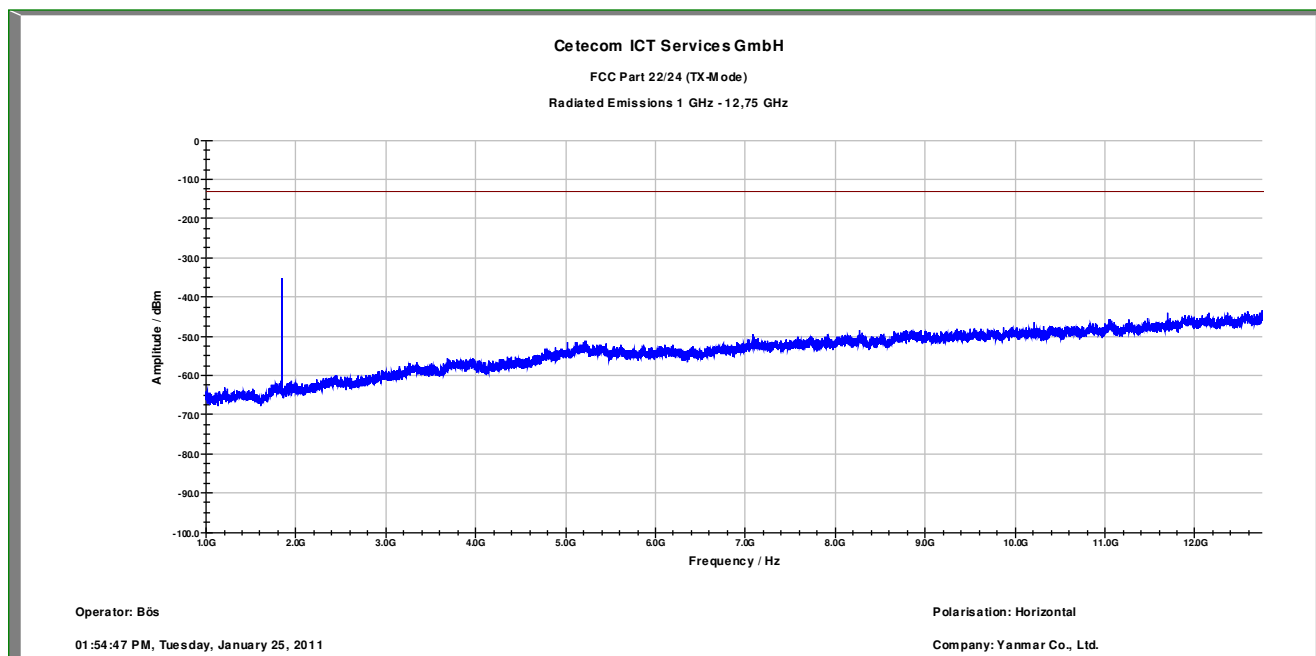


Carrier notched with a 1.9 GHz band rejection filter

Plot 4: Channel 512 – horizontal (30 MHz - 1 GHz)

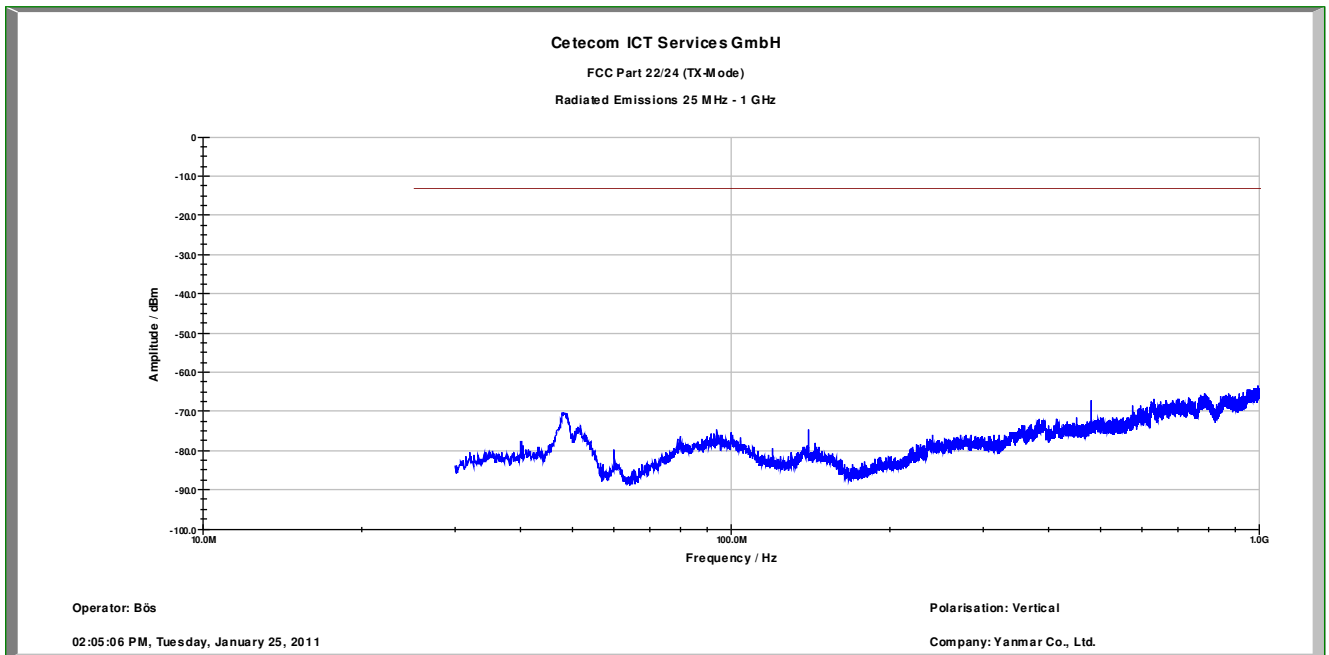


Plot 5: Channel 512 – horizontal (1 GHz – 12.75 GHz)

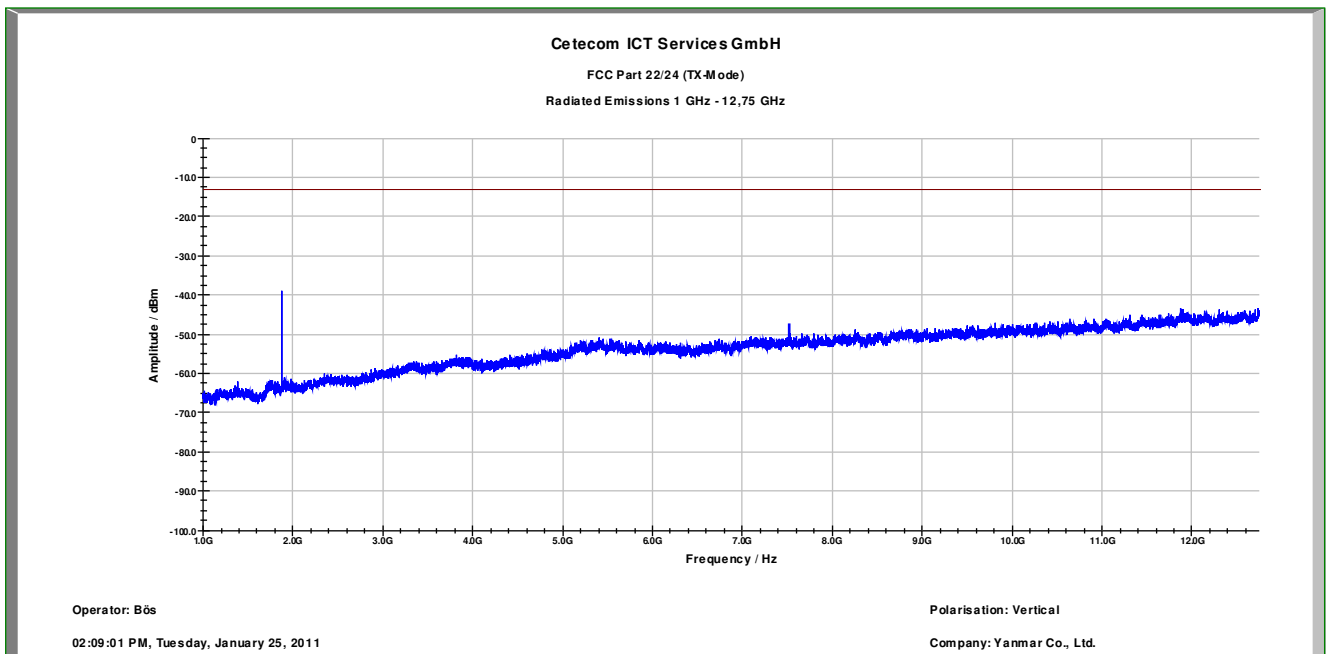


Carrier notched with a 1.9 GHz band rejection filter

Plot 6: Channel 661 – vertical (30 MHz - 1 GHz)

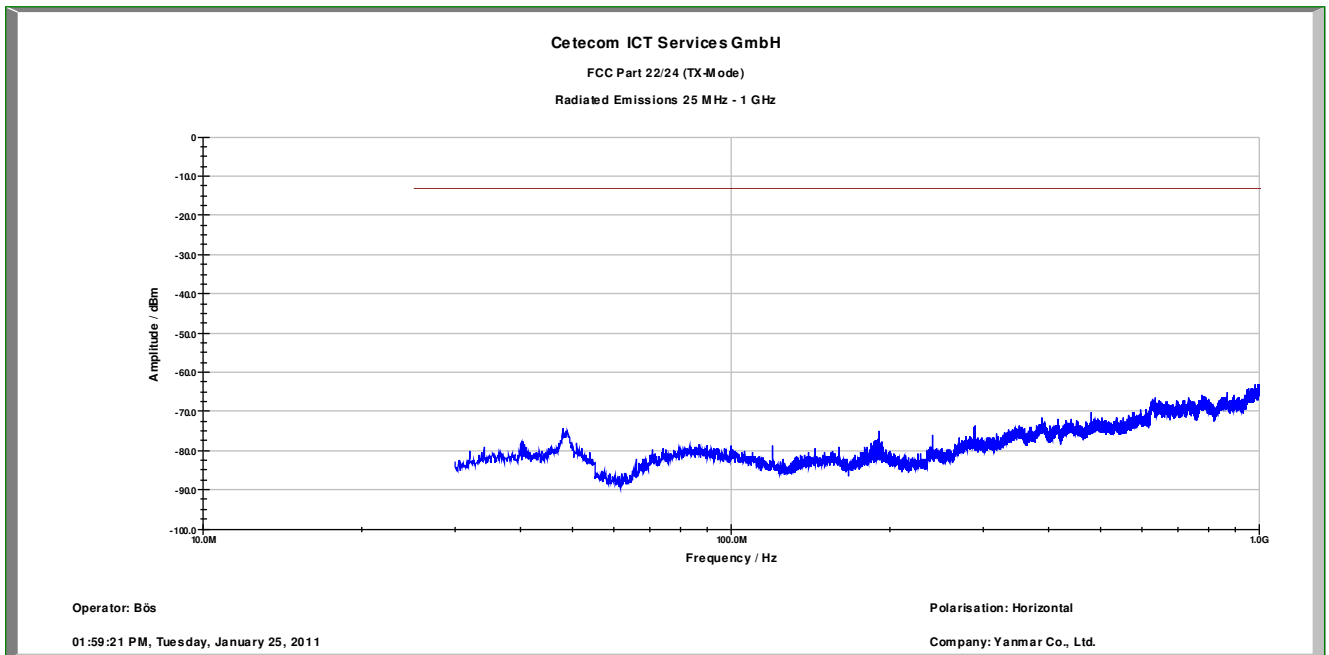


Plot 7: Channel 661 – vertical (1 GHz – 12.75 GHz)

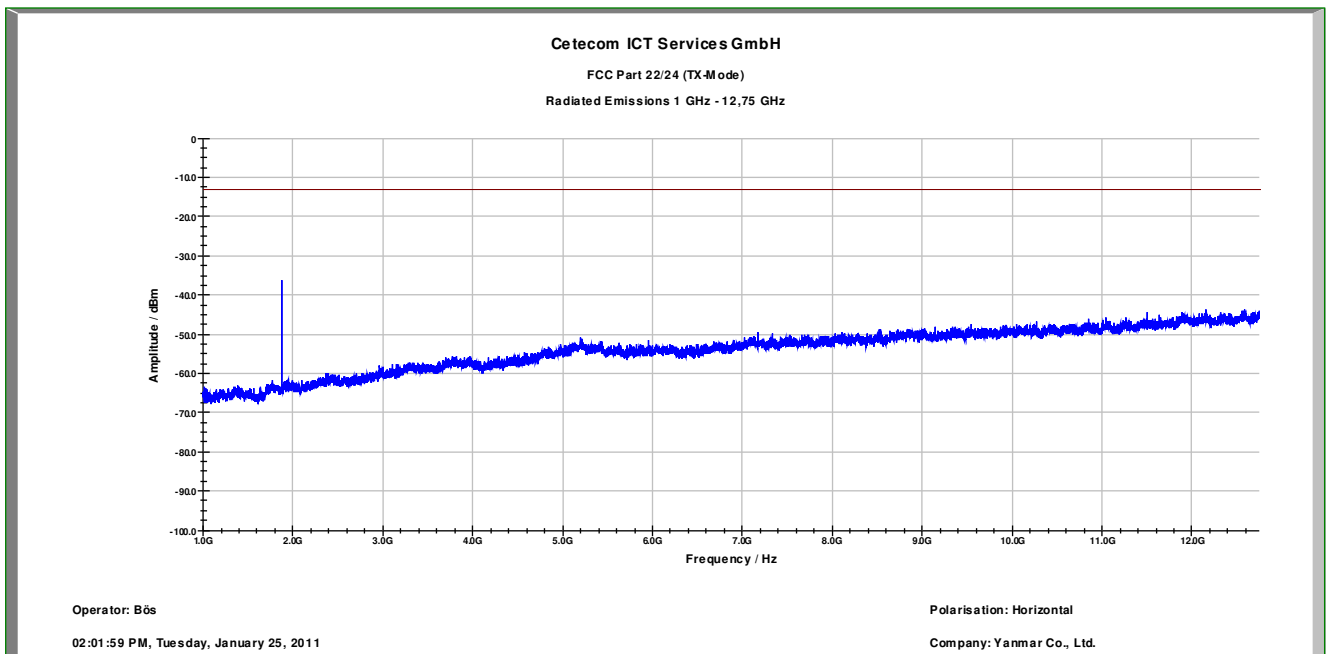


Carrier notched with a 1.9 GHz band rejection filter

Plot 8: Channel 661 – horizontal (30 MHz - 1 GHz)

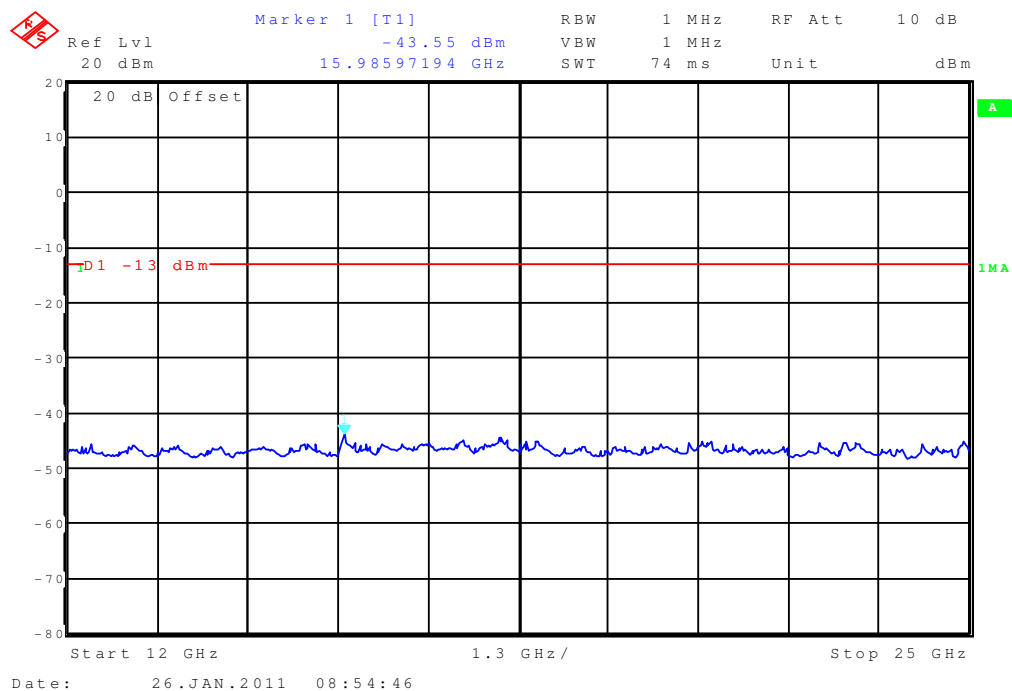


Plot 9: Channel 661 – horizontal (1 GHz – 12.75 GHz)

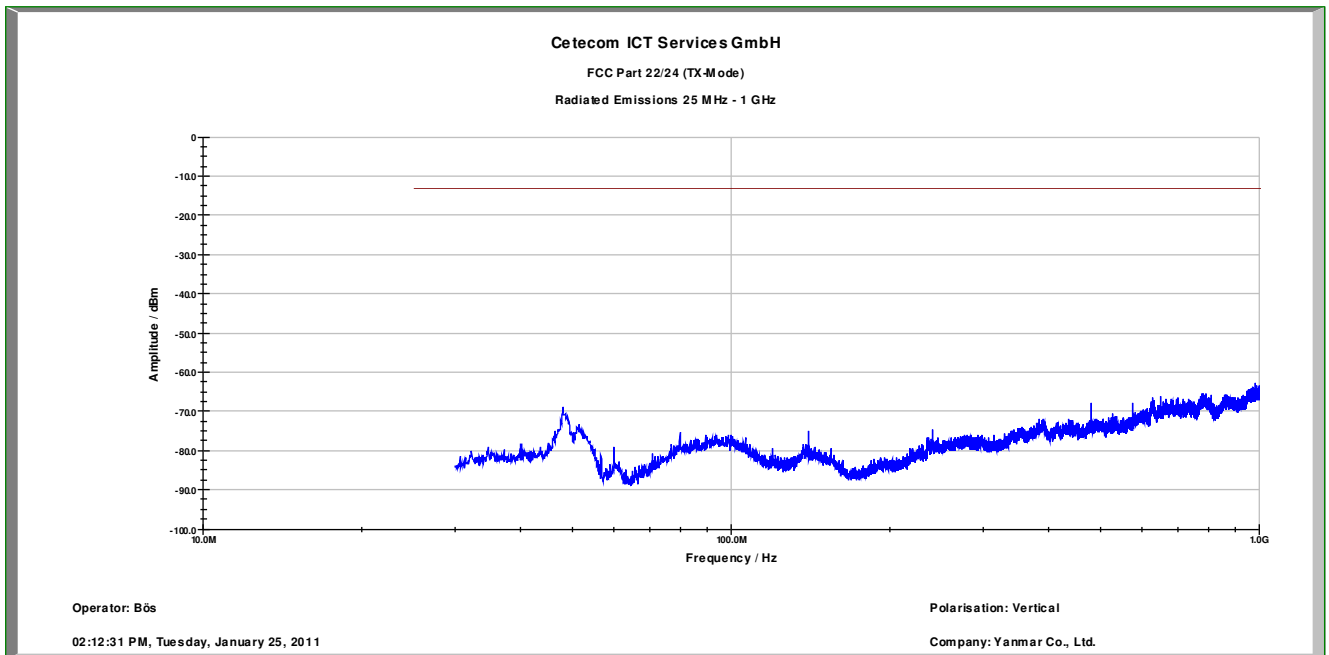


Carrier notched with a 1.9 GHz band rejection filter

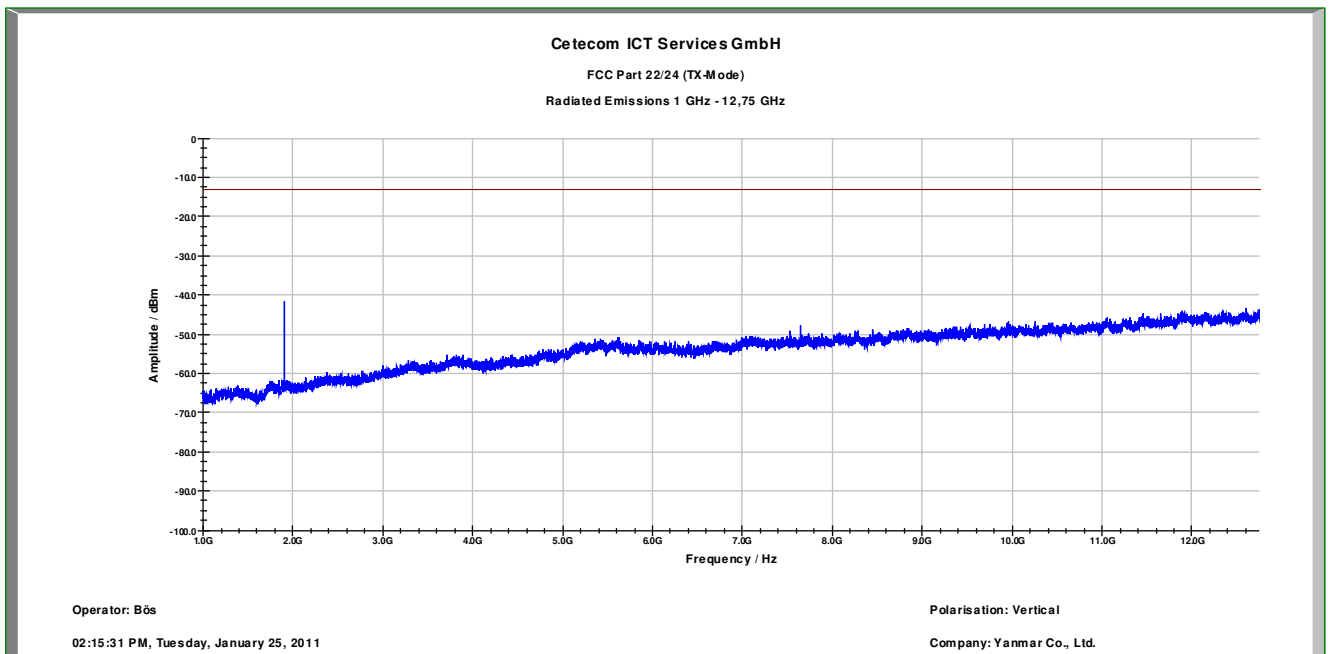
Plot 10: Channel 661 – horizontal/vertical (12.75 GHz to 25 GHz)



Plot 11: Channel 810 – vertical (30 MHz - 1 GHz)

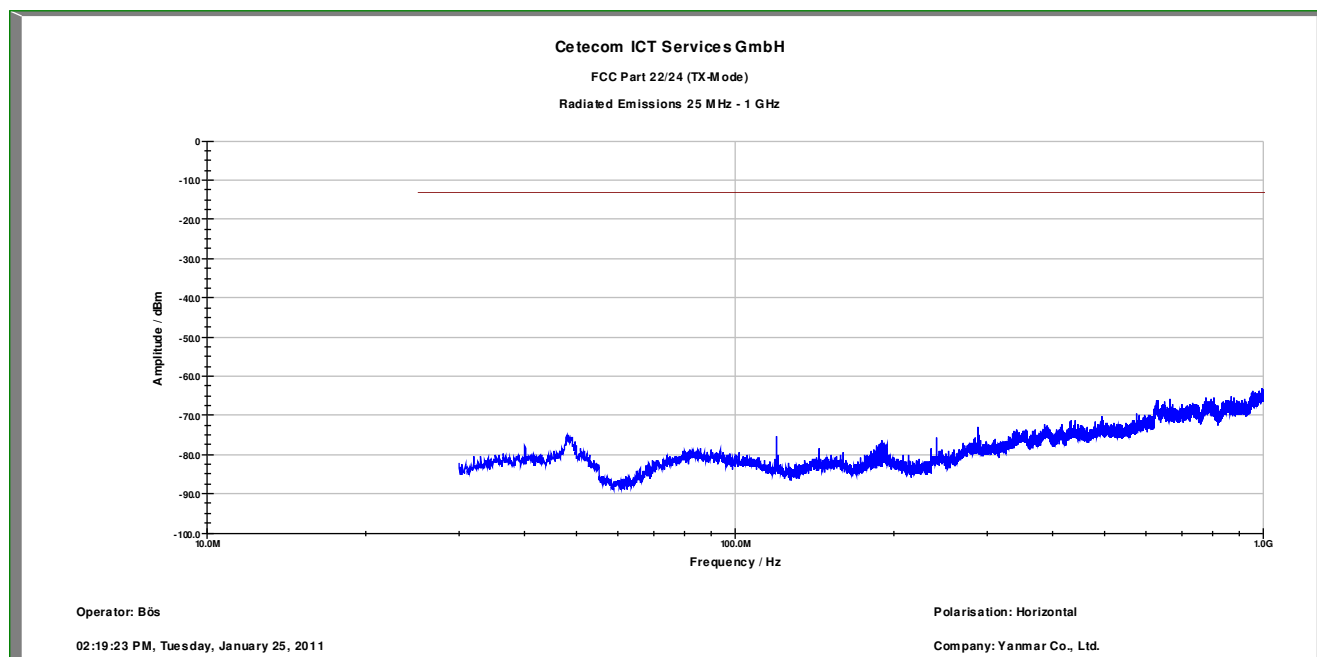


Plot 12: Channel 810 – vertical (1 GHz – 12.75 GHz)

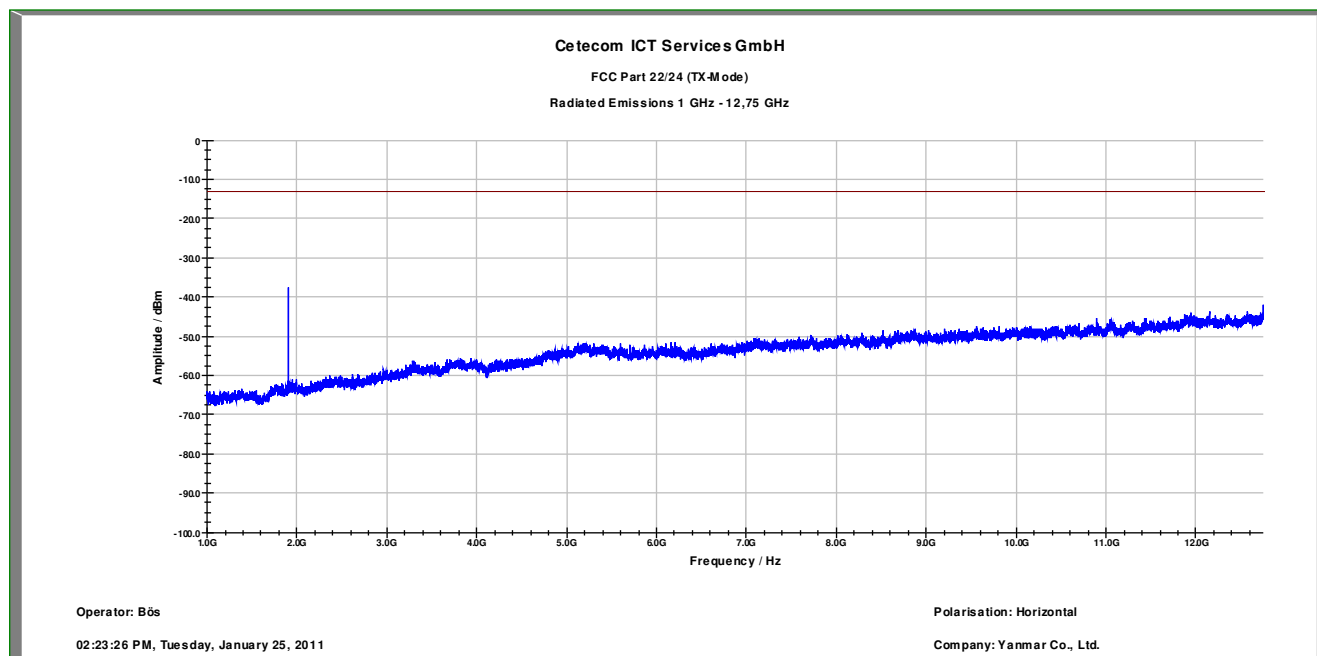


Carrier notched with a 1.9 GHz band rejection filter

Plot 13: Channel 810 – horizontal (30 MHz - 1 GHz)



Plot 14: Channel 810 – horizontal (1 GHz – 12.75 GHz)



Carrier notched with a 1.9 GHz band rejection filter

8.4.4 Spurious emissions conducted

Not performed

8.4.5 Block edge compliance

Not performed

8.4.6 Occupied bandwidth

Not performed

8.5 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)

8.5.1 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:	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, 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) WCDMA mode		
Frequency (MHz)	Average Output Power (dBm)	Peak to Average Ratio (dB)
1852.4	-	-
1880.0	-	-
1907.6	-	-
Measurement uncertainty	± 0.5 dB	

Output Power (radiated) WCDMA mode	
Frequency (MHz)	Average Output Power (dBm) - EIRP
1852.4	24.6
1880.0	23.5
1907.6	23.1
Measurement uncertainty	± 2.0 dB

Result: The result of the measurement is passed.

8.5.2 Frequency stability

Not performed

8.5.3 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:

- 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:	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 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 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.

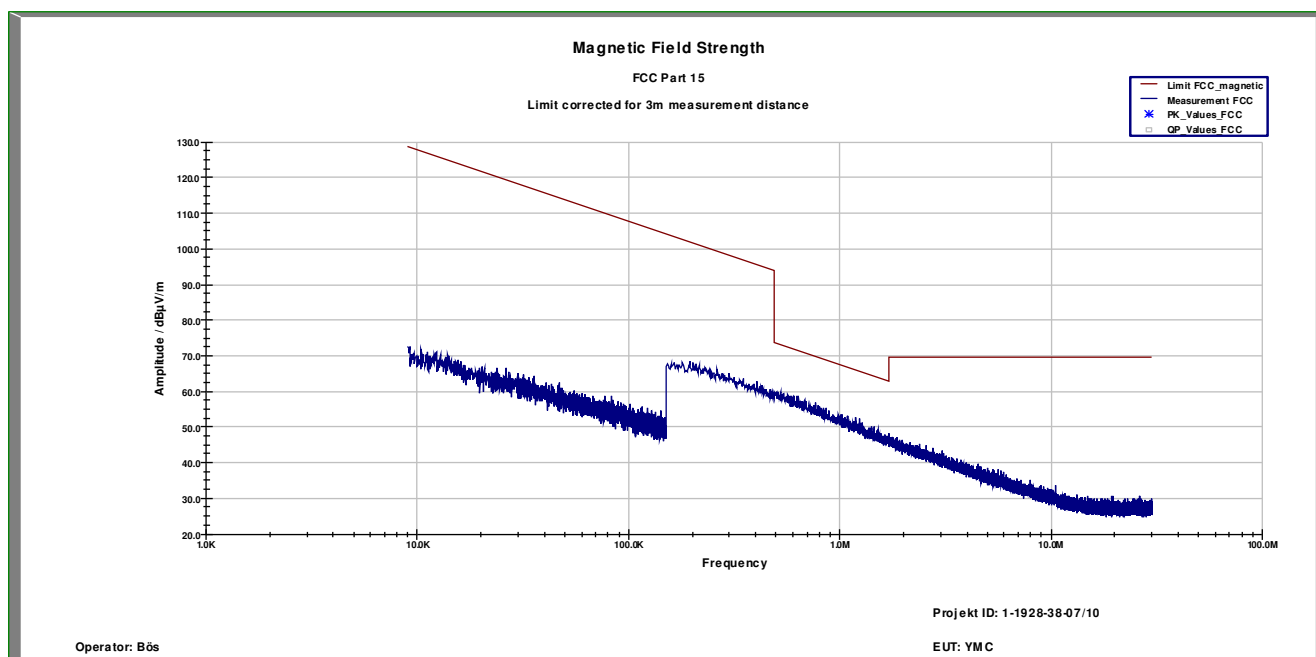
The plots show only the middle channel. If spurious were detected, the lowest and highest channel were checked too. The found values are stated in the table below.

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

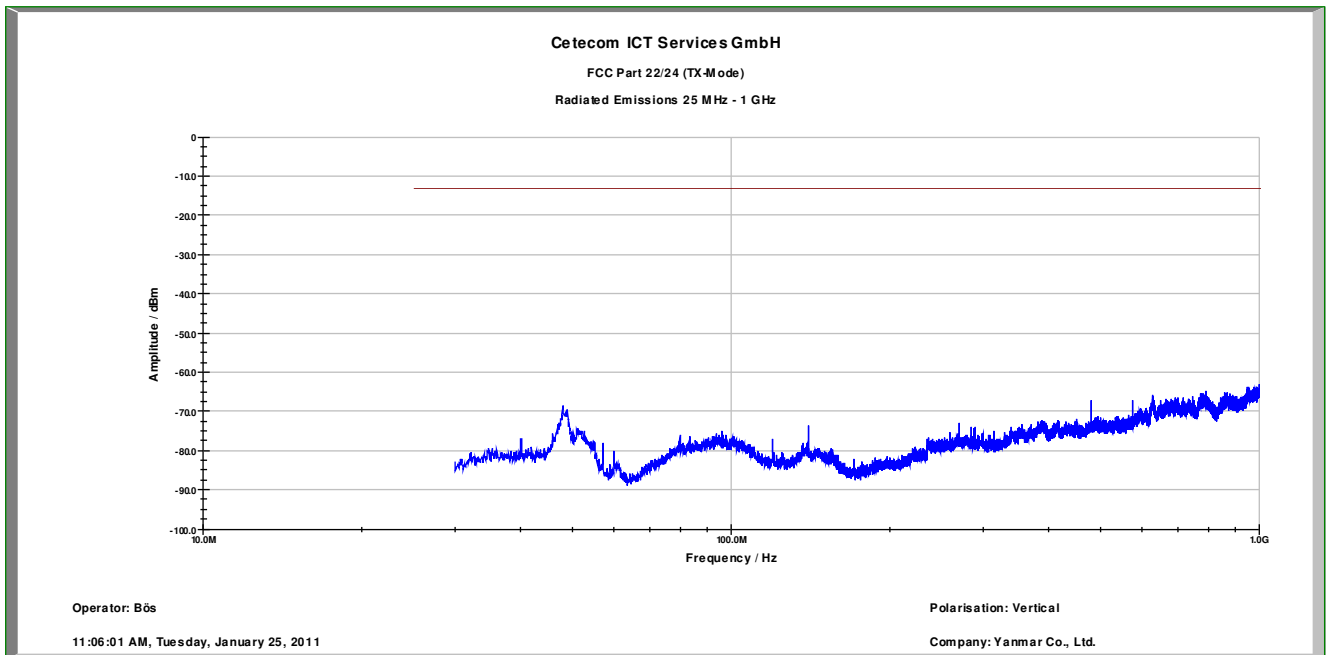
Spurious Emission Level (dBm)								
Harmonic	Ch. 9262 Freq. (MHz)	Level [dBm]	Harmonic	Ch. 9400 Freq. (MHz)	Level [dBm]	Harmonic	Ch. 9538 Freq. (MHz)	Level [dBm]
2	3704.8	-	2	3760.0	-	2	3815.2	-
3	5557.2	-	3	5640.0	-	3	5722.8	-
4	7409.6	-	4	7520.0	-	4	7630.4	-
5	9262.0	-	5	9400.0	-	5	9538.0	-
6	11114.4	-	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: The result of the measurement is passed.

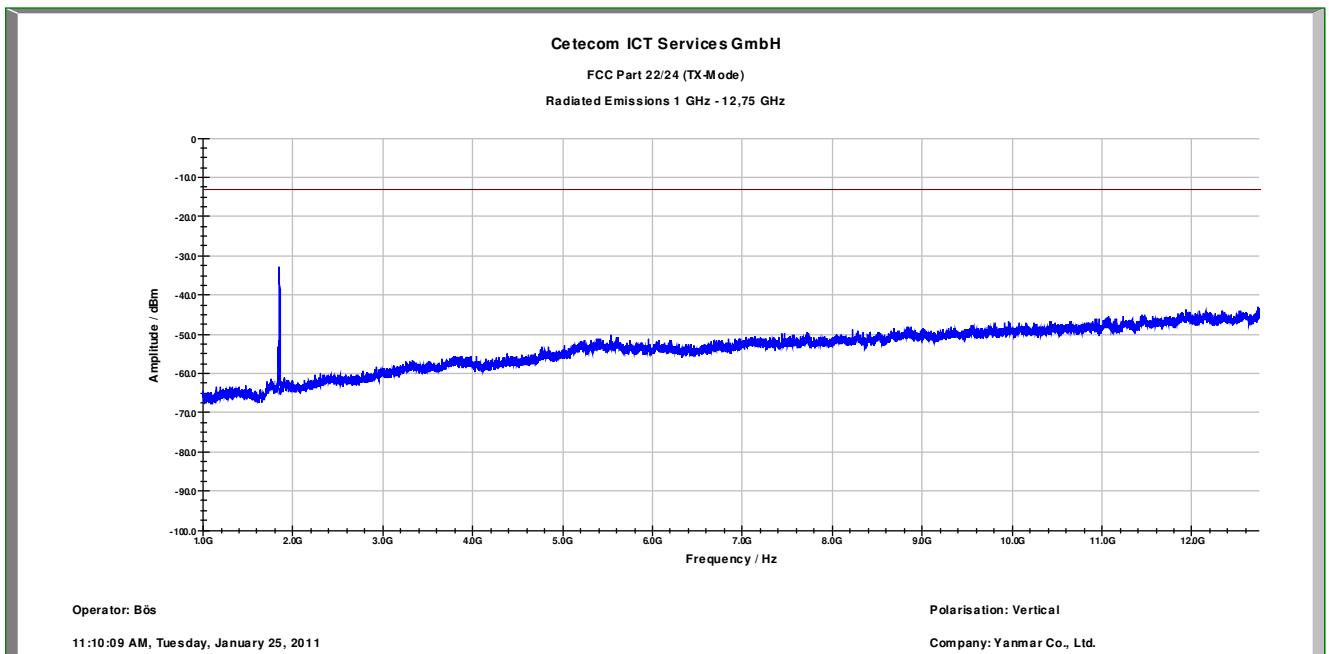
Plot 1: Channel 9400 (Traffic mode up to 30 MHz)



Plot 2: Channel 9262 – vertical (30 MHz - 1 GHz)

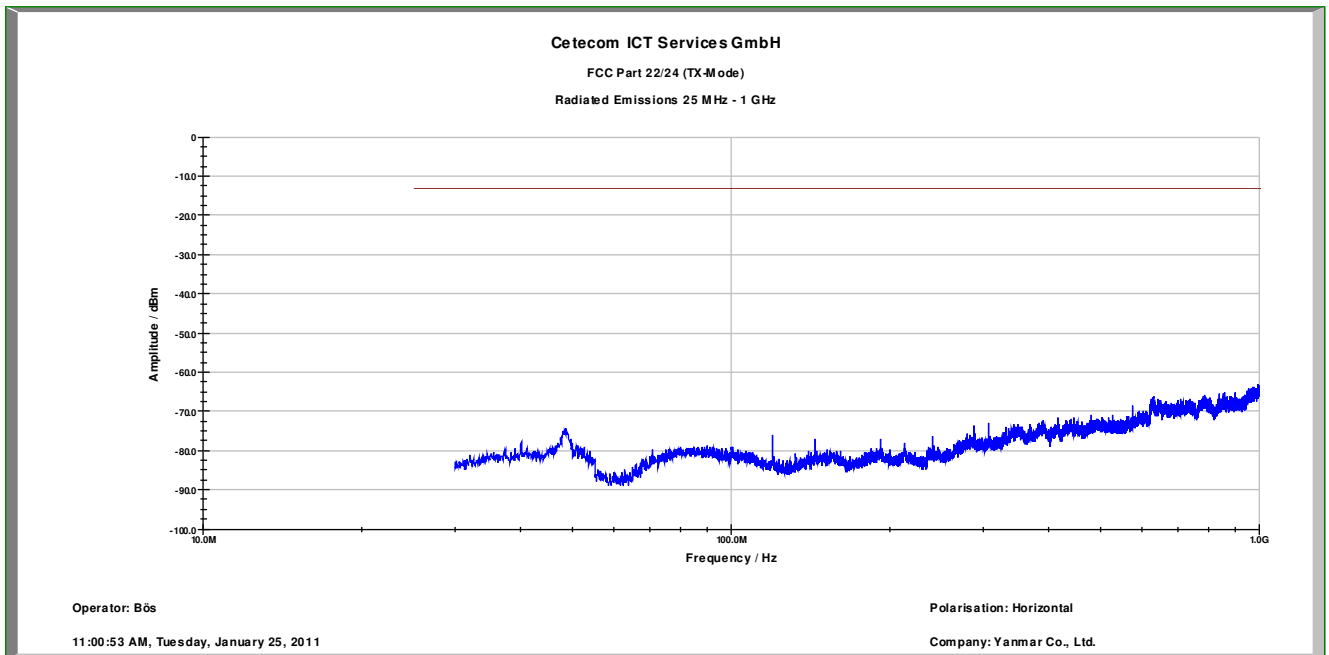


Plot 3: Channel 9262 – vertical (1 GHz – 12.75 GHz)

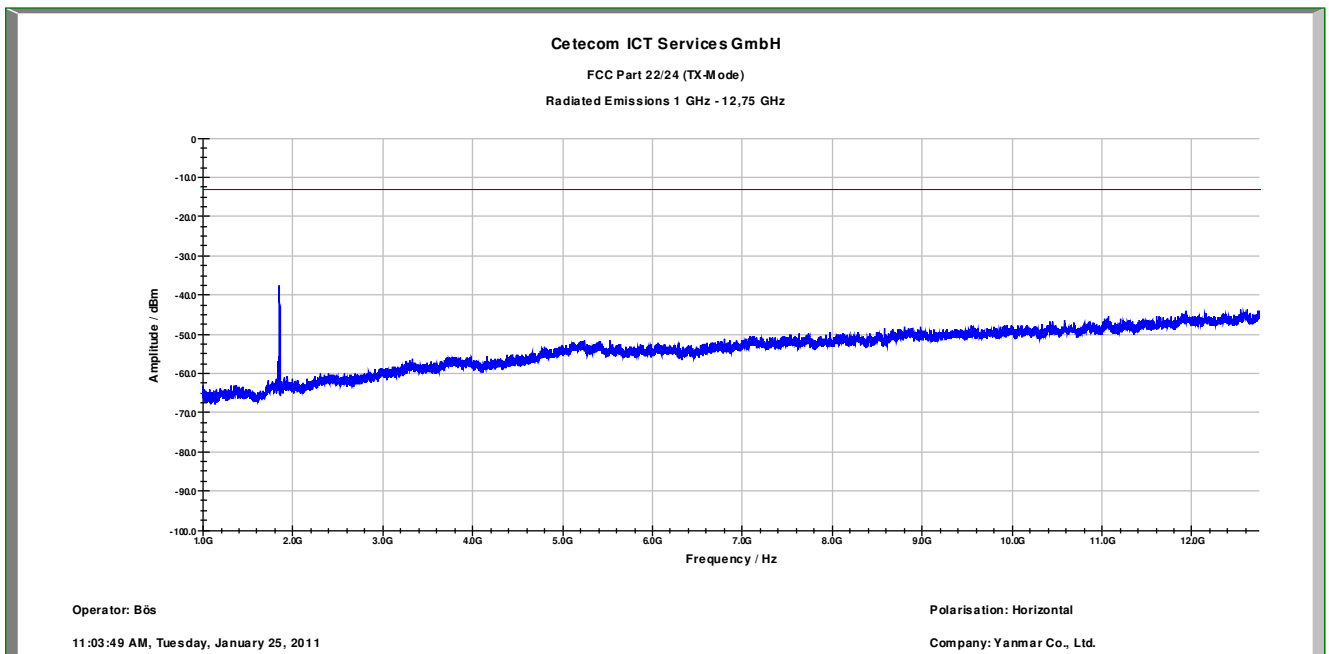


Carrier notched with a 1.9 GHz band rejection filter

Plot 4: Channel 9262 – horizontal (30 MHz - 1 GHz)

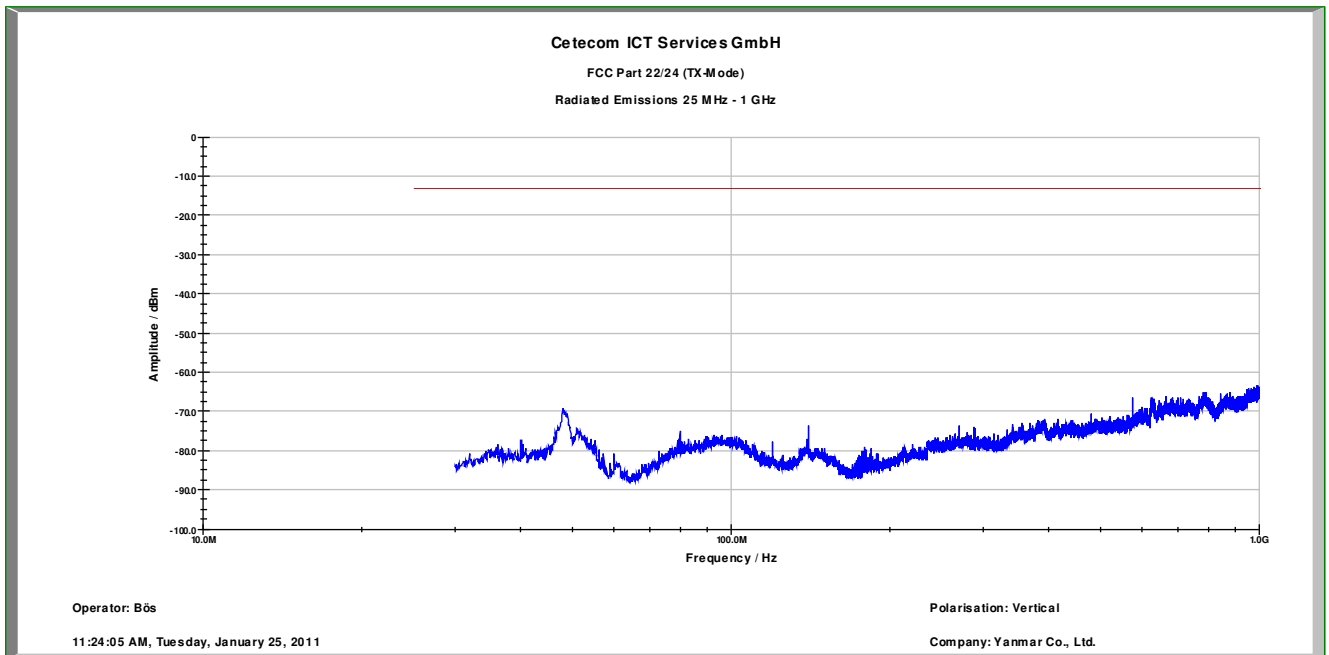


Plot 5: Channel 9262 – horizontal (1 GHz – 12.75 GHz)

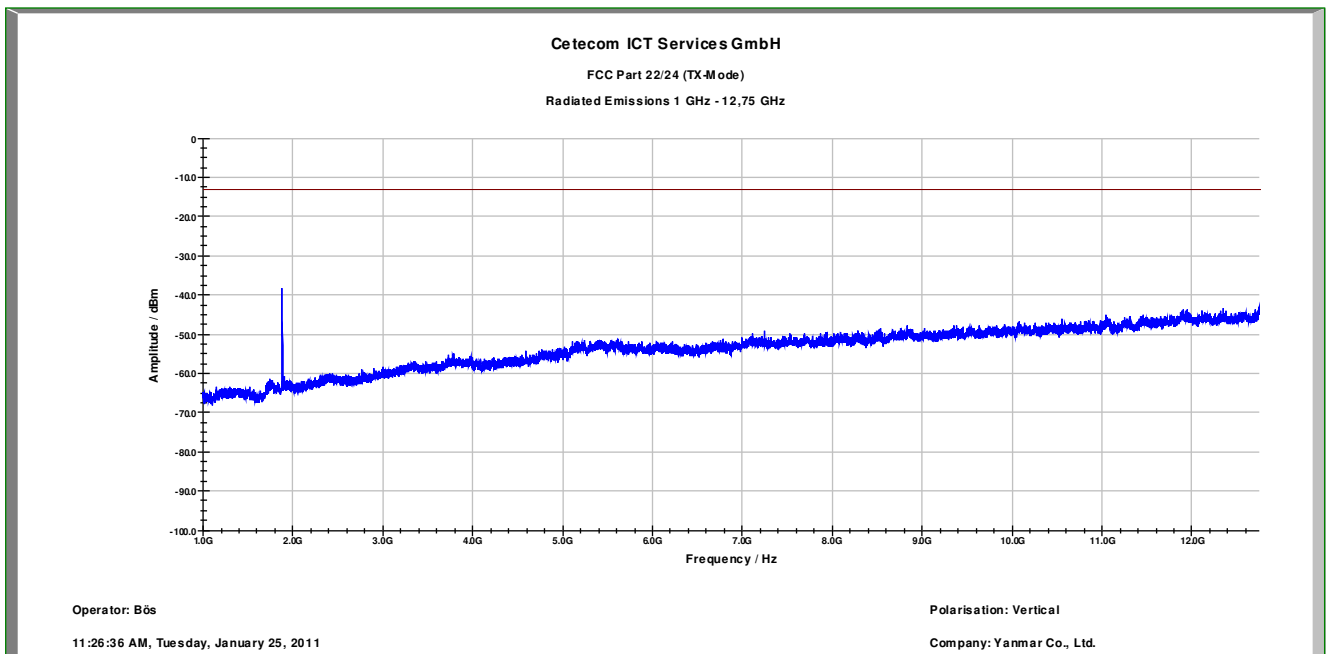


Carrier notched with a 1.9 GHz band rejection filter

Plot 6: Channel 9400 – vertical (30 MHz - 1 GHz)

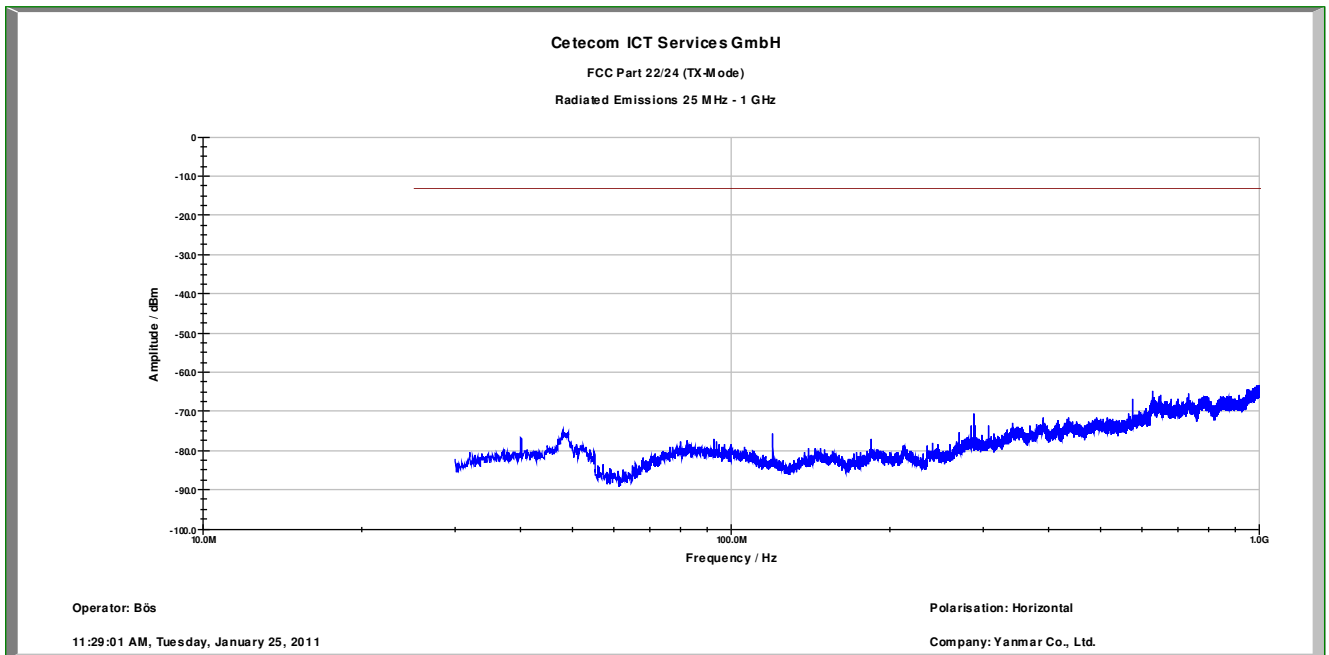


Plot 7: Channel 9400 – vertical (1 GHz – 12.75 GHz)

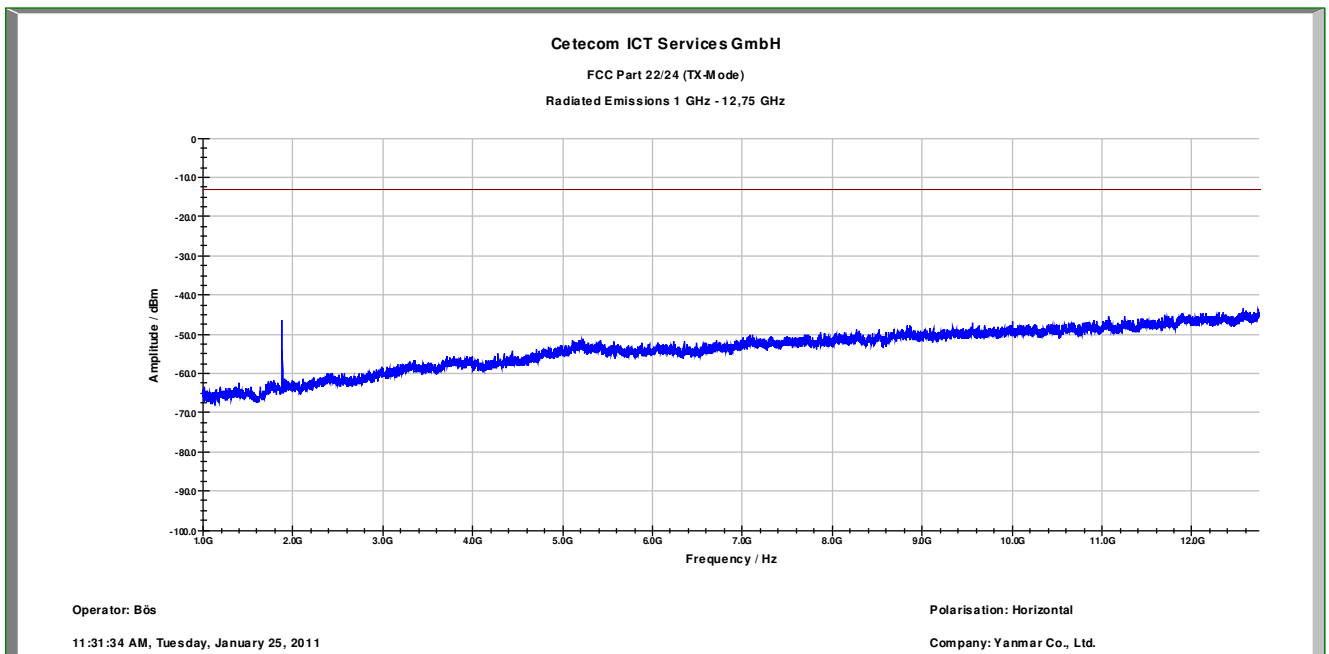


Carrier notched with a 1.9 GHz band rejection filter

Plot 8: Channel 9400 – horizontal (30 MHz - 1 GHz)

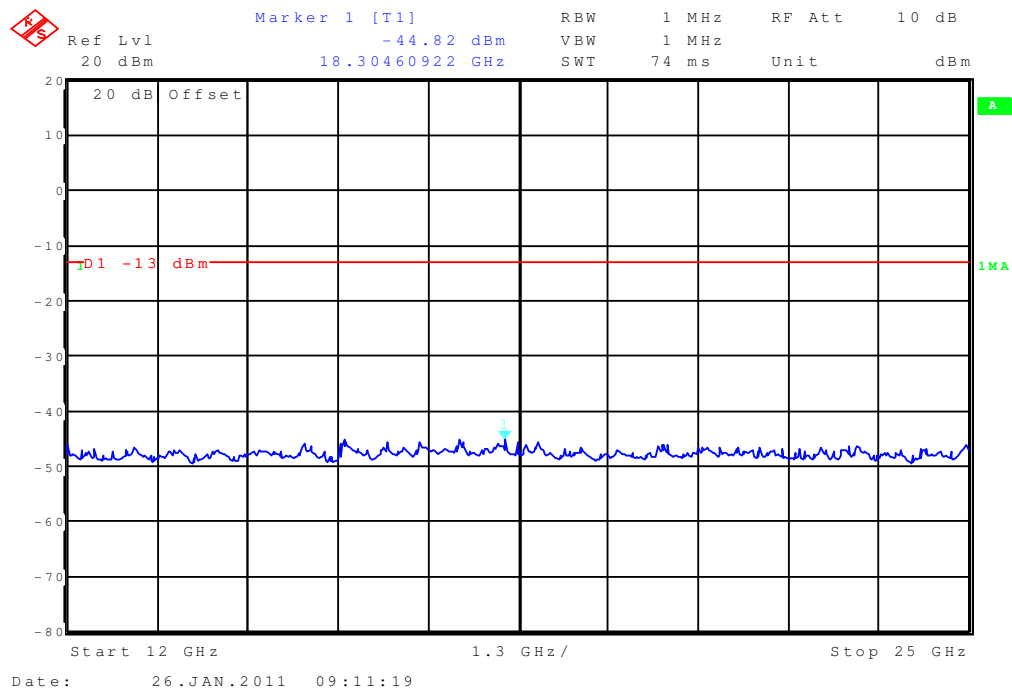


Plot 9: Channel 9400 – horizontal (1 GHz – 12.75 GHz)

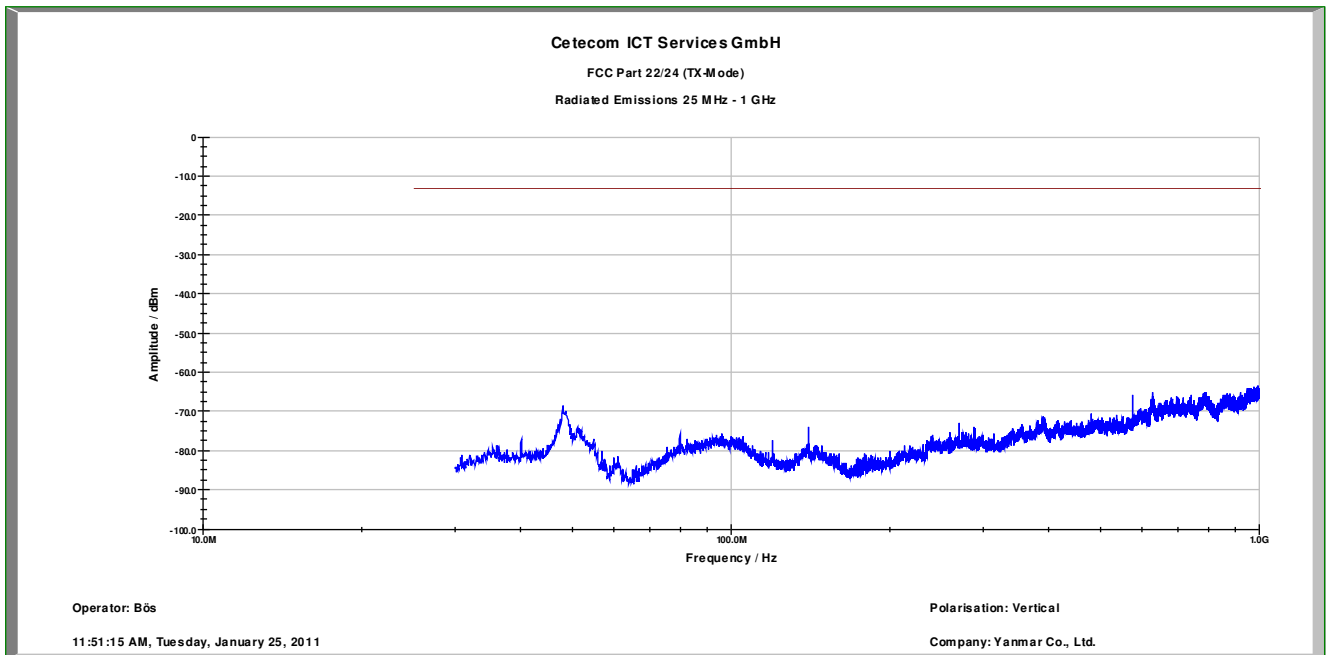


Carrier notched with a 1.9 GHz band rejection filter

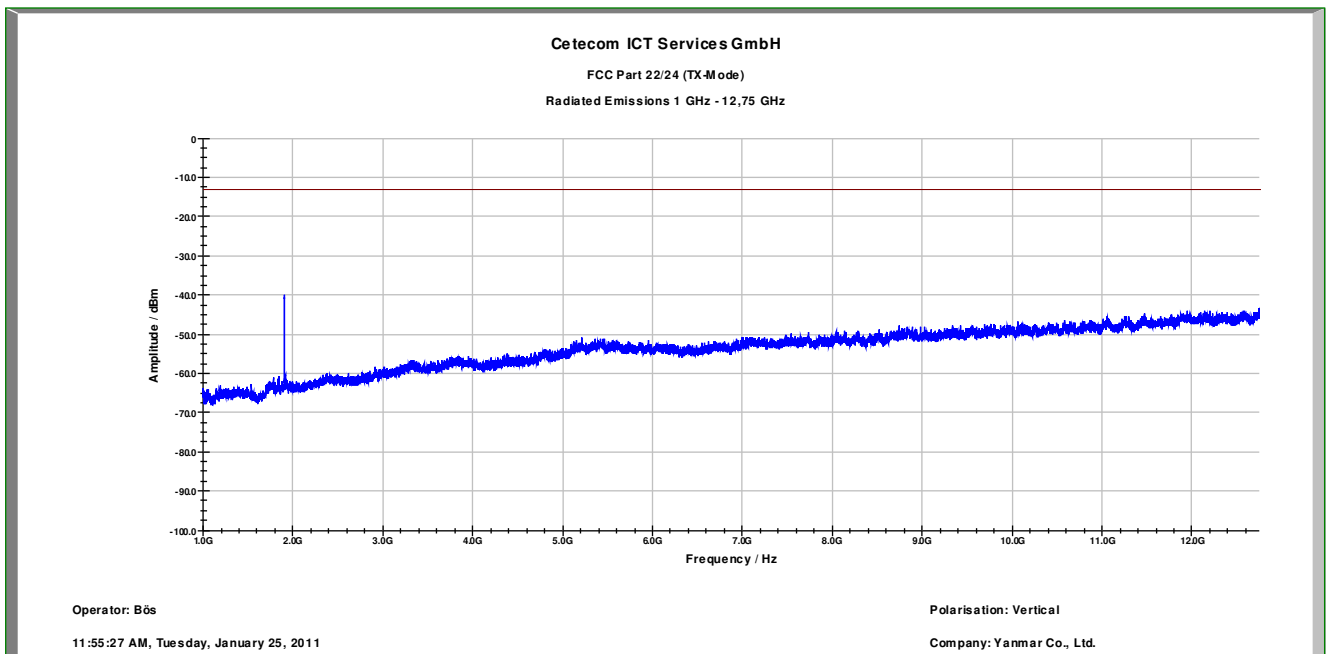
Plot 10: Channel 9400 – horizontal/vertical (12.75 GHz to 25 GHz)



Plot 11: Channel 9538 – vertical (30 MHz - 1 GHz)

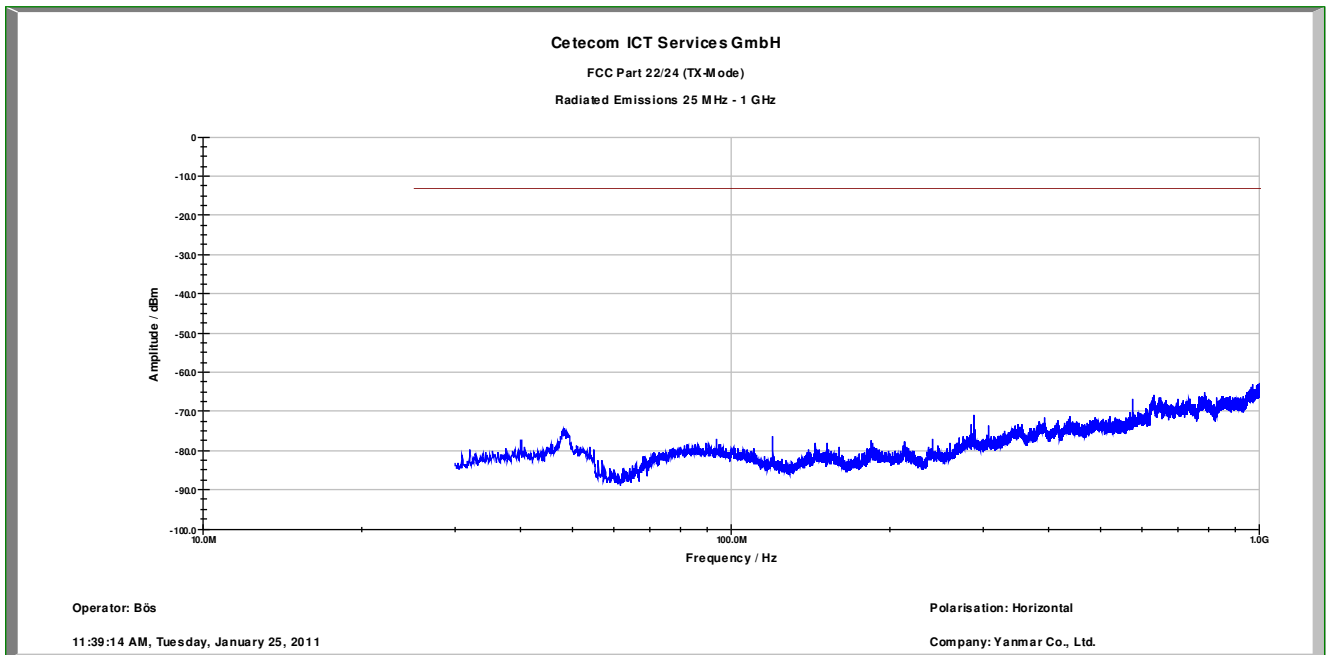


Plot 12: Channel 9538 – vertical (1 GHz – 12.75 GHz)

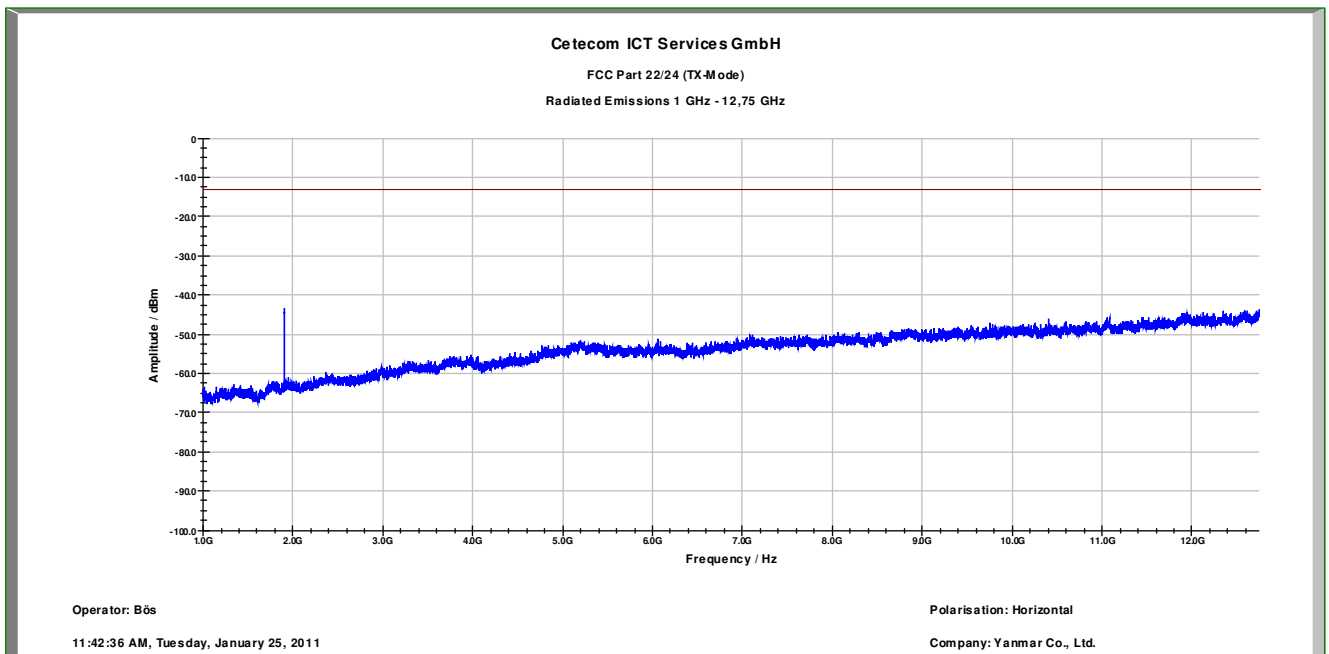


Carrier notched with a 1.9 GHz band rejection filter

Plot 13: Channel 9538 – horizontal (30 MHz - 1 GHz)



Plot 14: Channel 9538 – horizontal (1 GHz – 12.75 GHz)



Carrier notched with a 1.9 GHz band rejection filter

8.5.4 Spurious emissions conducted

Not performed

8.5.5 Block edge compliance

Not performed

8.5.6 Occupied bandwidth

Not performed

8.6 Results UMTS band V

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)

8.6.1 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:	10 MHz
Resolution bandwidth:	10 MHz
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) WCDMA mode		
Frequency (MHz)	Average Output Power (dBm)	Peak to Average Ratio (dB)
826.4	-	-
836.0	-	-
846.6	-	-
Measurement uncertainty	± 0.5 dB	

Output Power (radiated) WCDMA mode	
Frequency (MHz)	Average Output Power (dBm) - ERP
826.4	21.8
836.0	22.5
846.6	22.4
Measurement uncertainty	± 2.0 dB

Result: The result of the measurement is passed.

8.6.2 Frequency stability

Not performed

8.6.3 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 846.6 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 UMTS band V.

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:	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 UMTS band V (826.4 MHz, 836.0 MHz and 846.6 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 V 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.

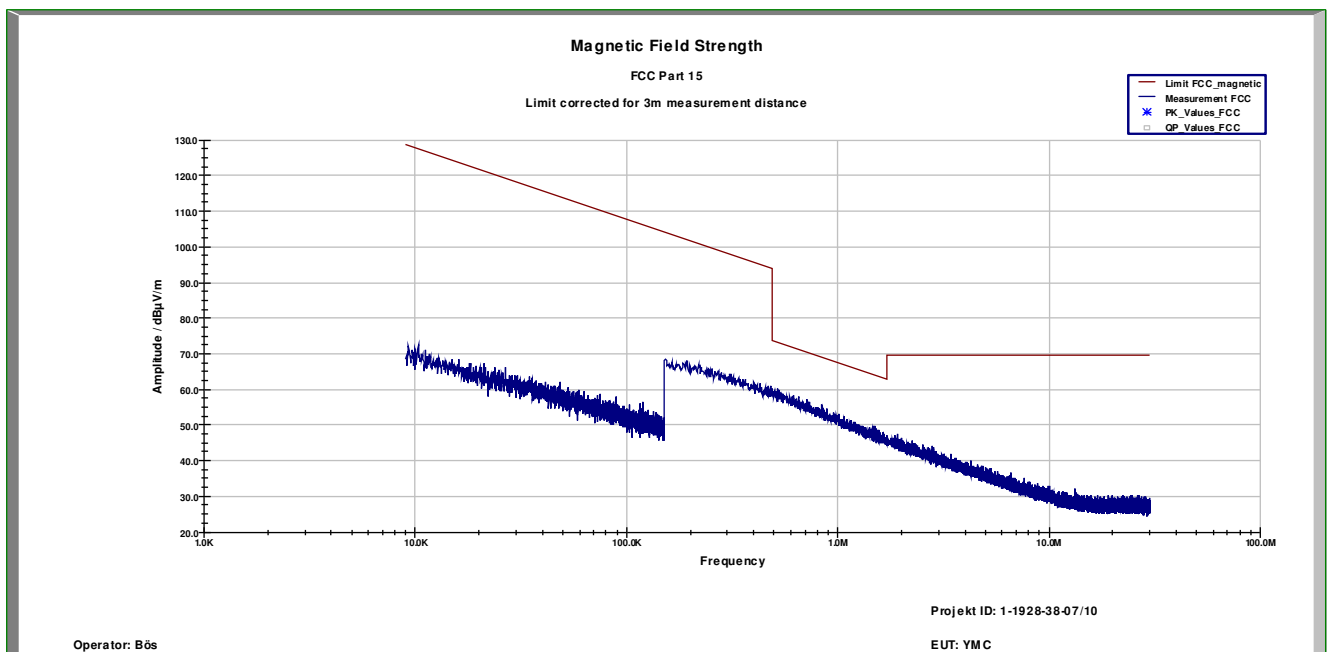
The final open field radiated levels are presented on the next pages.
All measurements were done in horizontal and vertical polarization; the plots show the worst case.
The plots show only the middle channel. If spurious were detected, the lowest and highest channel were checked too. The found values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

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

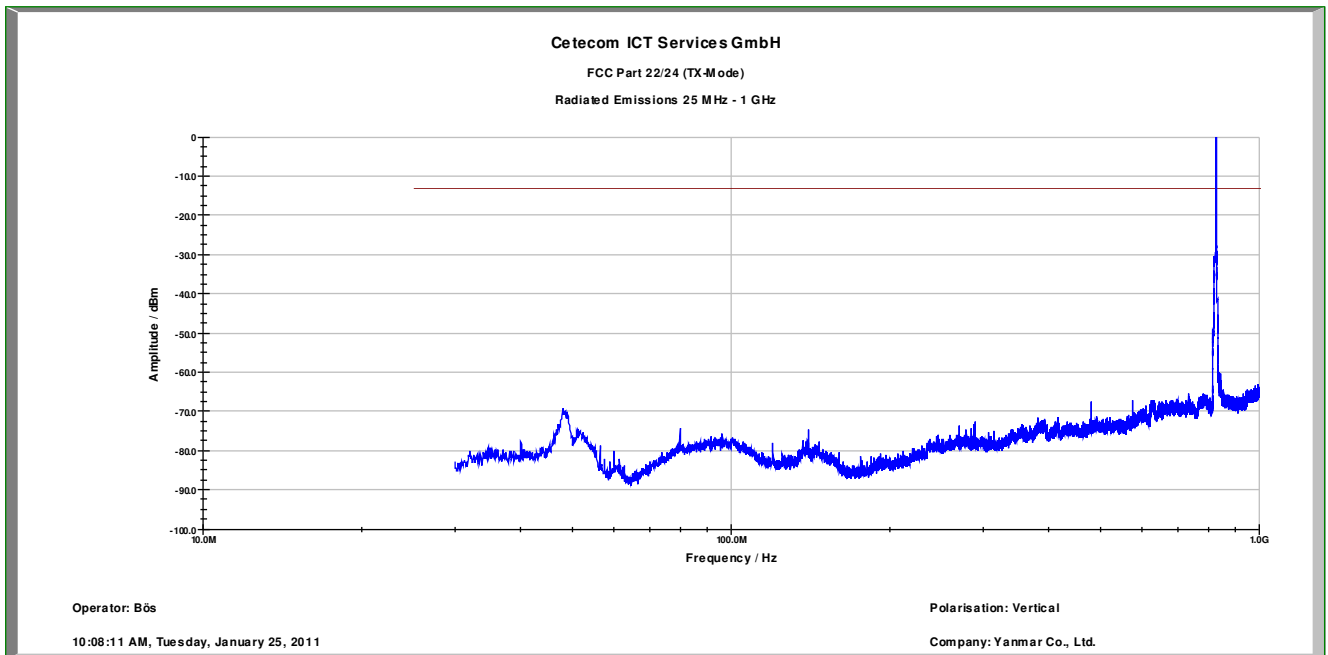
Spurious Emission Level (dBm)								
Harmonic	Ch. 4132 Freq. (MHz)	Level [dBm]	Harmonic	Ch. 4180 Freq. (MHz)	Level [dBm]	Harmonic	Ch. 4233 Freq. (MHz)	Level [dBm]
2	1652.8	-	2	1672.0	-	2	1693.2	-
3	2479.2	-	3	2508.0	-	3	2539.8	-
4	3305.6	-	4	3344.0	-	4	3386.4	-
5	4132.0	-	5	4180.0	-	5	4233.0	-
6	4958.4	-	6	5016.0	-	6	5079.6	-
7	5784.8	-	7	5852.0	-	7	5926.2	-
8	6611.2	-	8	6688.0	-	8	6772.8	-
9	7437.6	-	9	7524.0	-	9	7619.4	-
10	8264.0	-	10	8360.0	-	10	8466.0	-
Measurement uncertainty					± 3dB			

Result: The result of the measurement is passed.

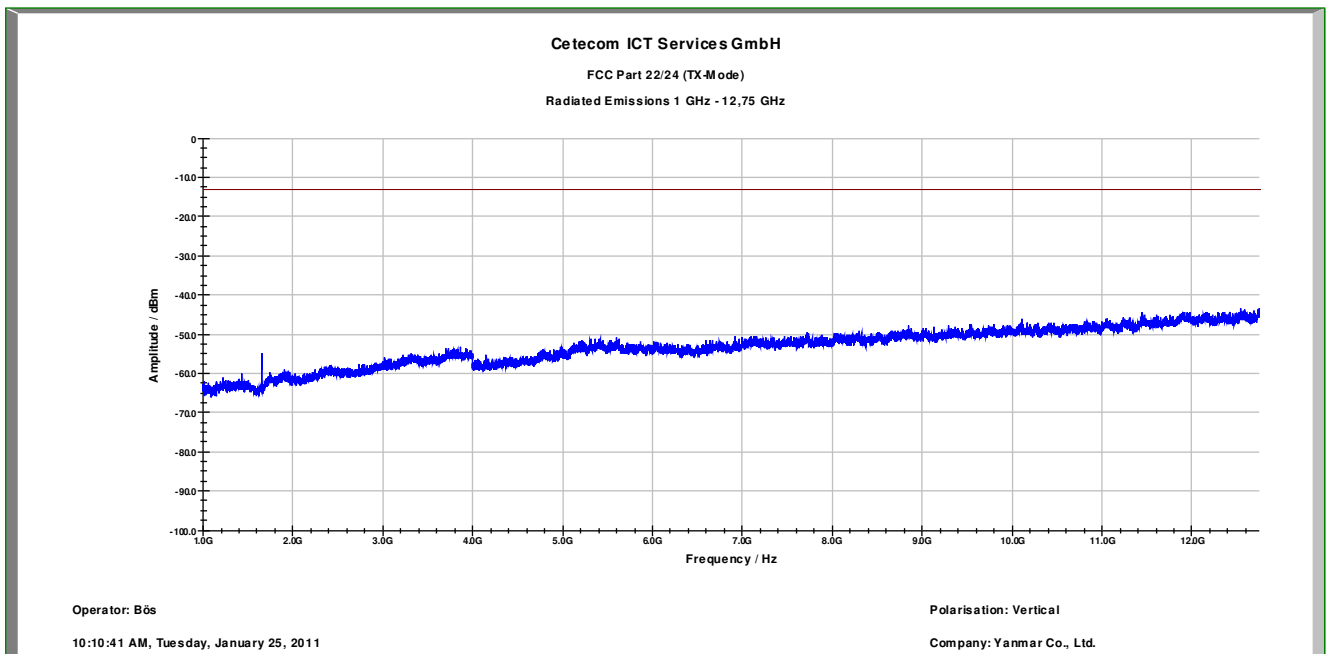
Plot 1: Channel 4180 (Traffic mode up to 30 MHz)



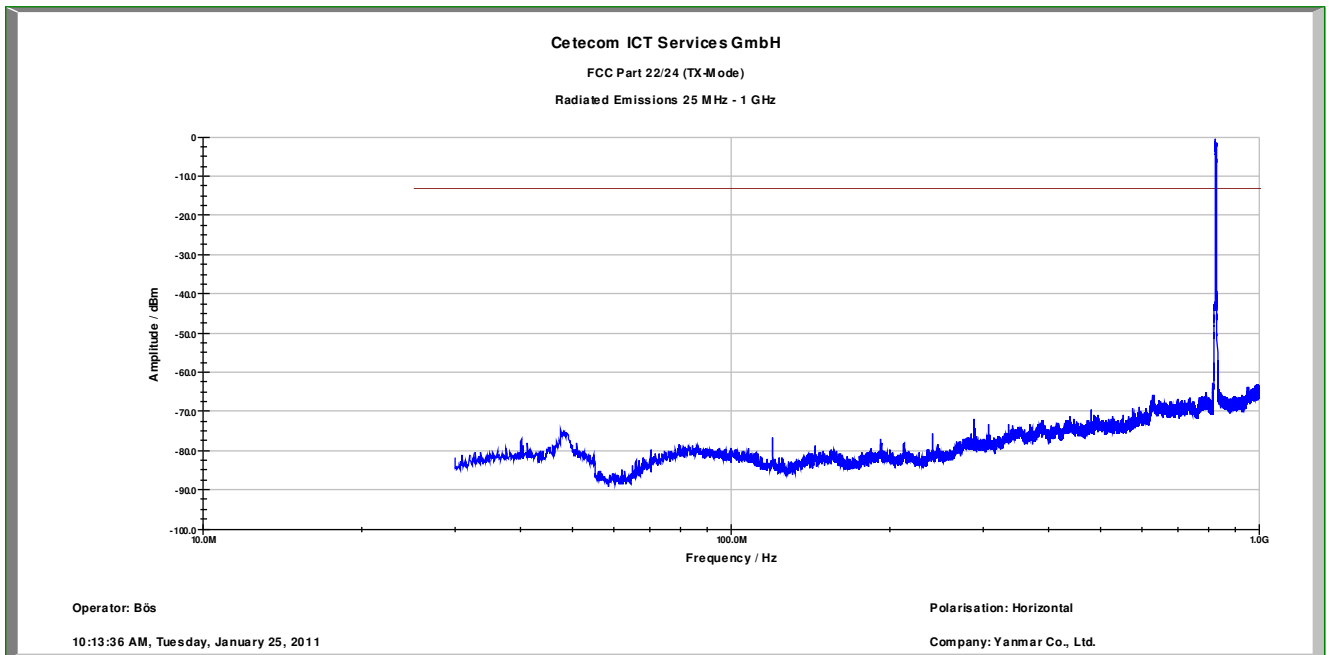
Plot 2: Channel 4132 – vertical (30 MHz - 1 GHz)



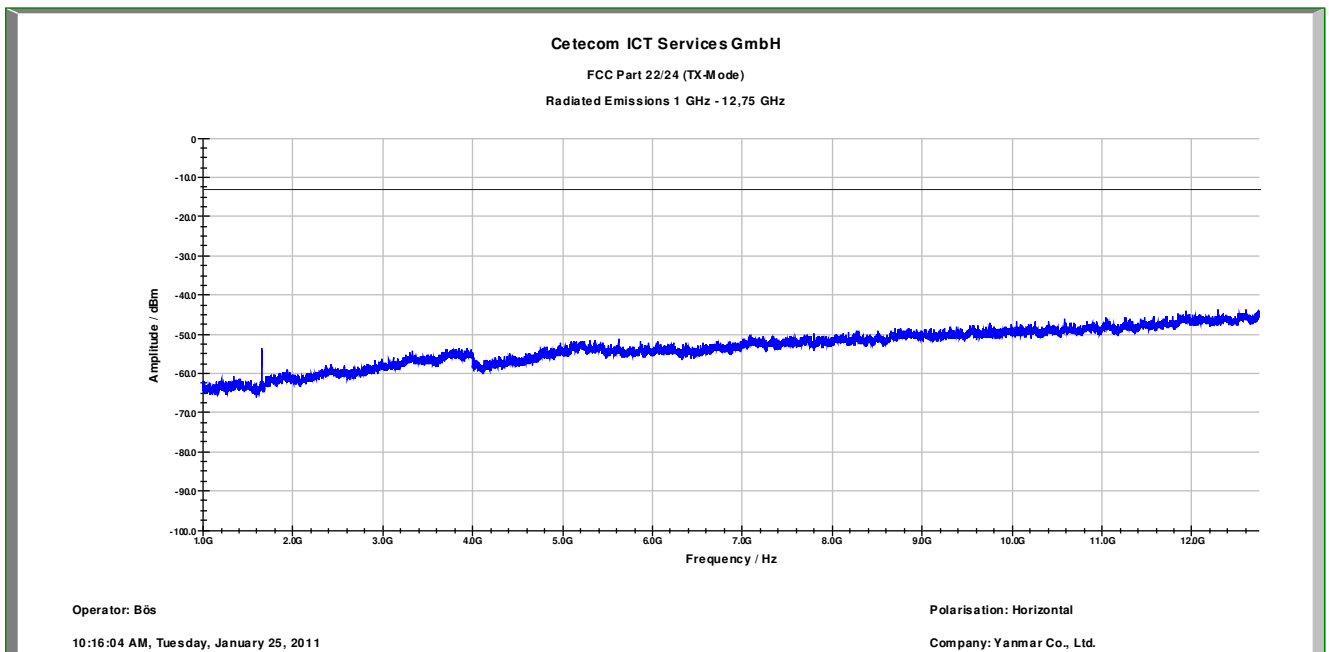
Plot 3: Channel 4132 – vertical (1 GHz – 12.75 GHz)



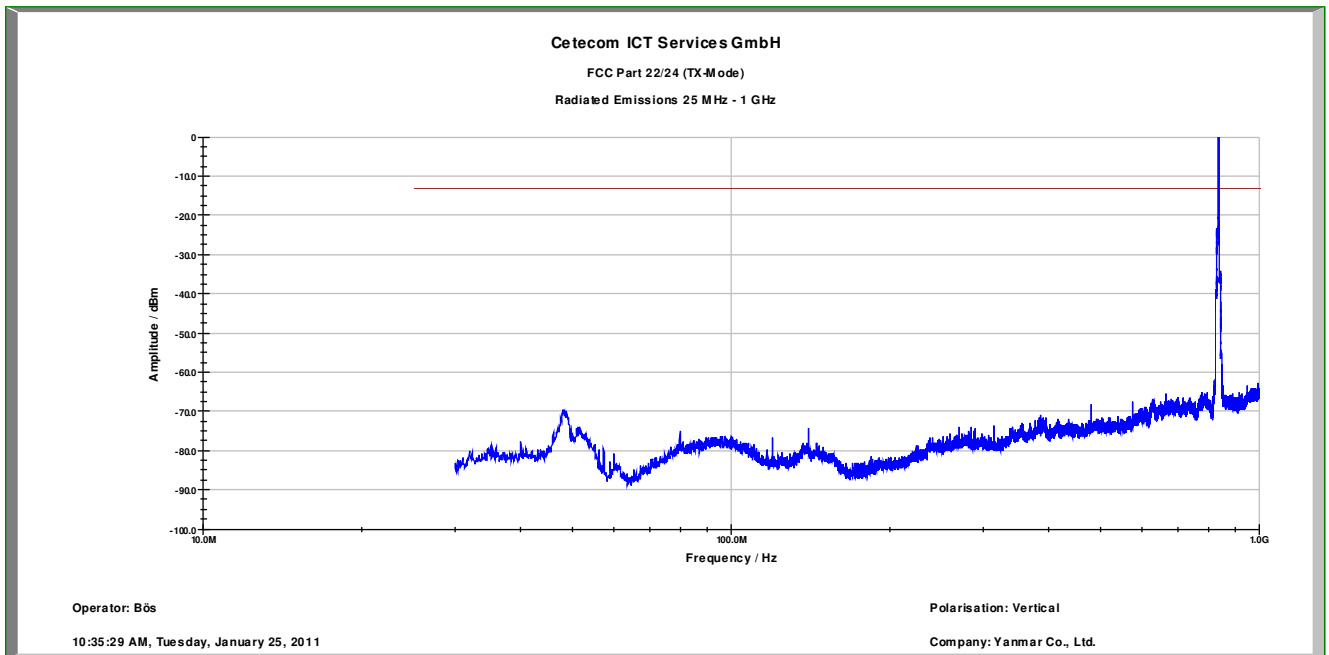
Plot 4: Channel 4132 – horizontal (30 MHz - 1 GHz)



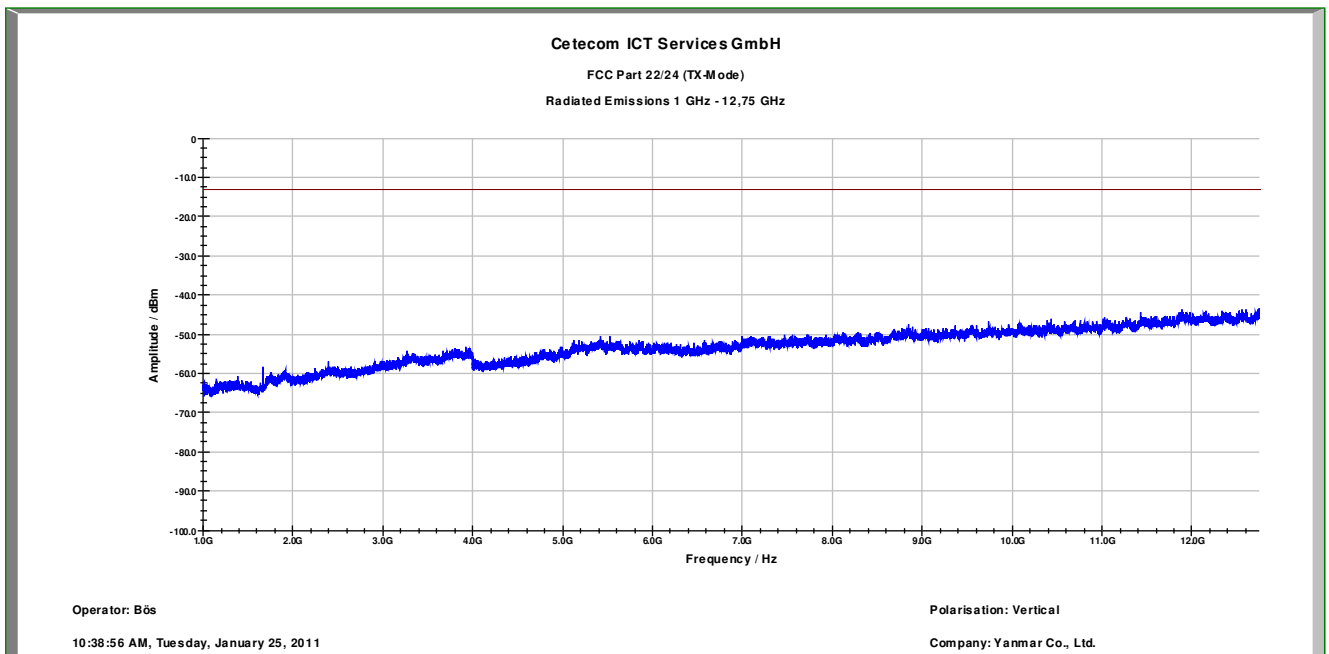
Plot 5: Channel 4132 – horizontal (1 GHz – 12.75 GHz)



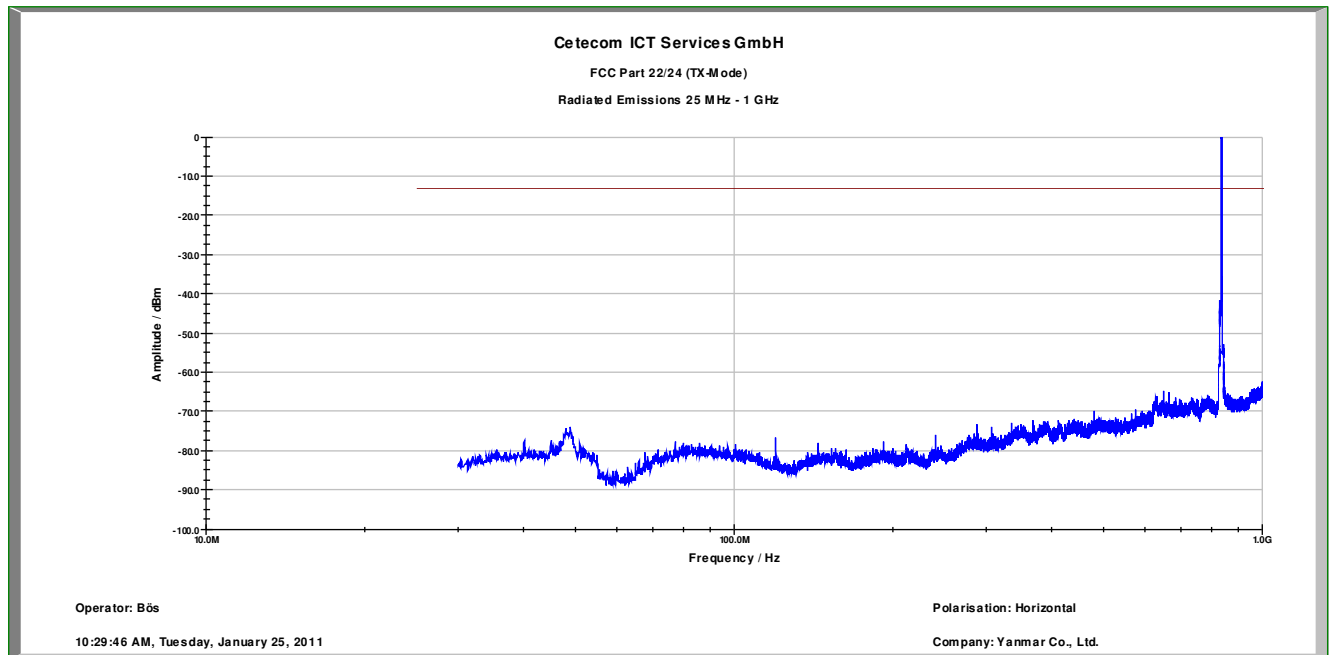
Plot 6: Channel 4180 – vertical (30 MHz - 1 GHz)



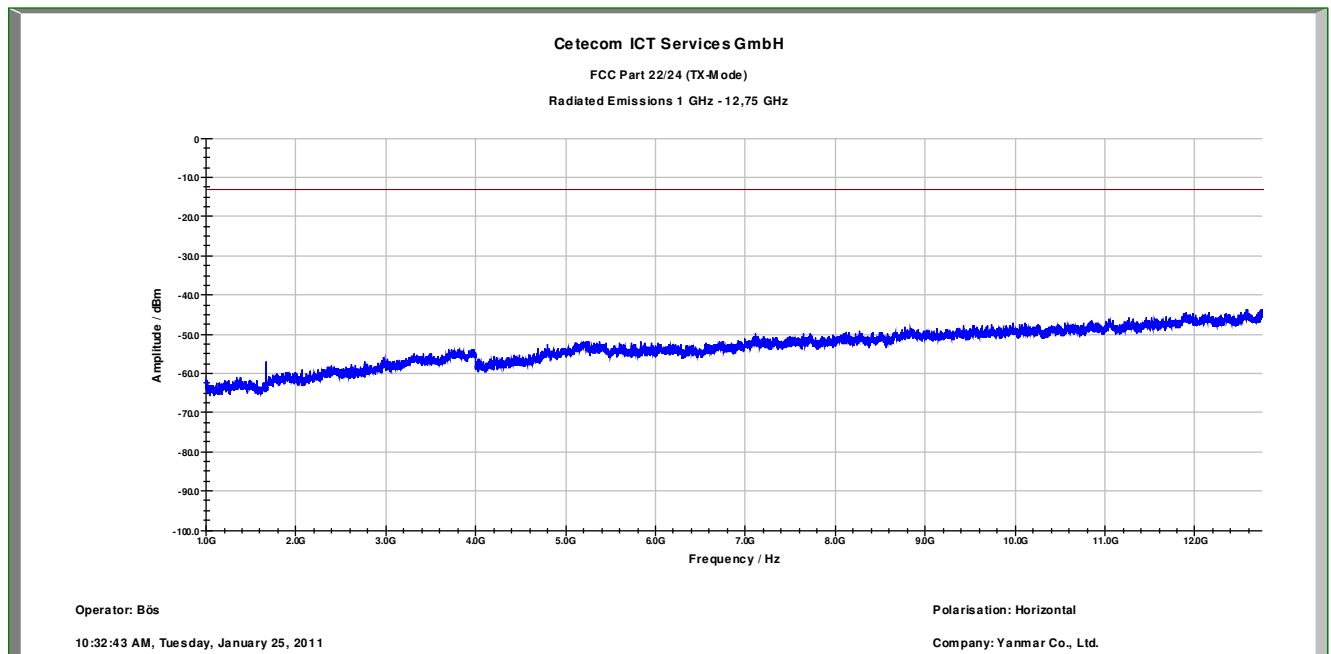
Plot 7: Channel 4180 – vertical (1 GHz – 12.75 GHz)



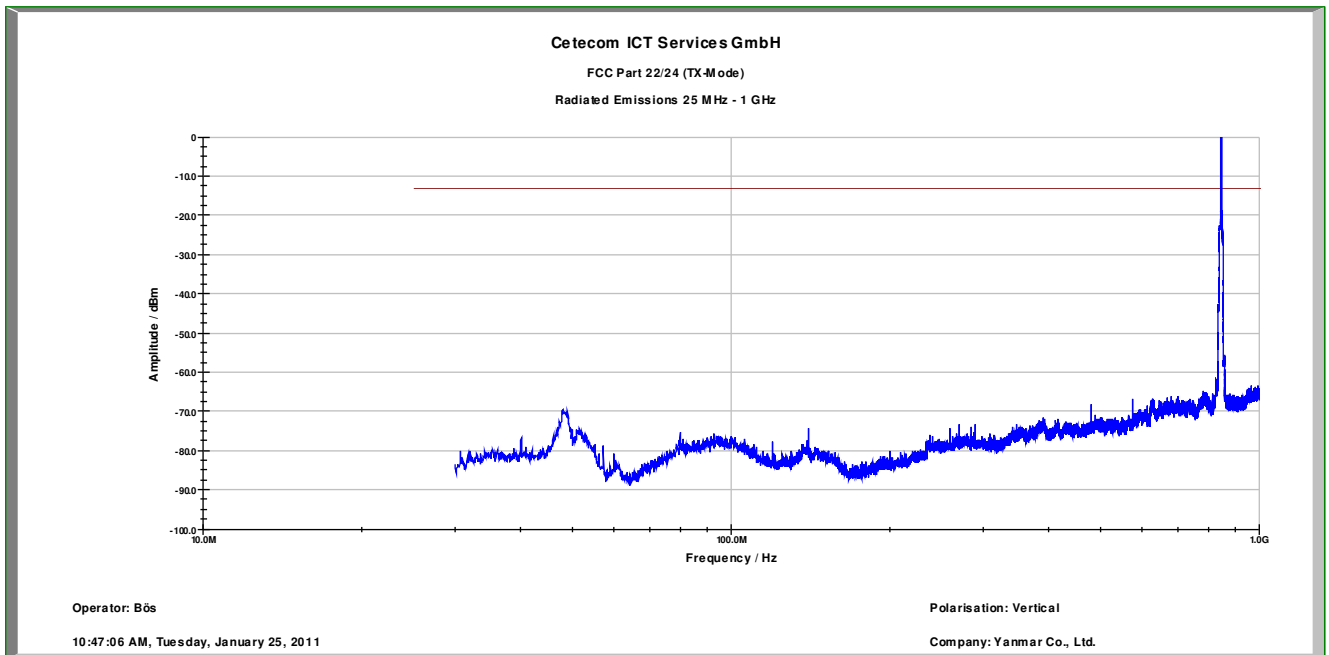
Plot 8: Channel 4180 – horizontal (30 MHz - 1 GHz)



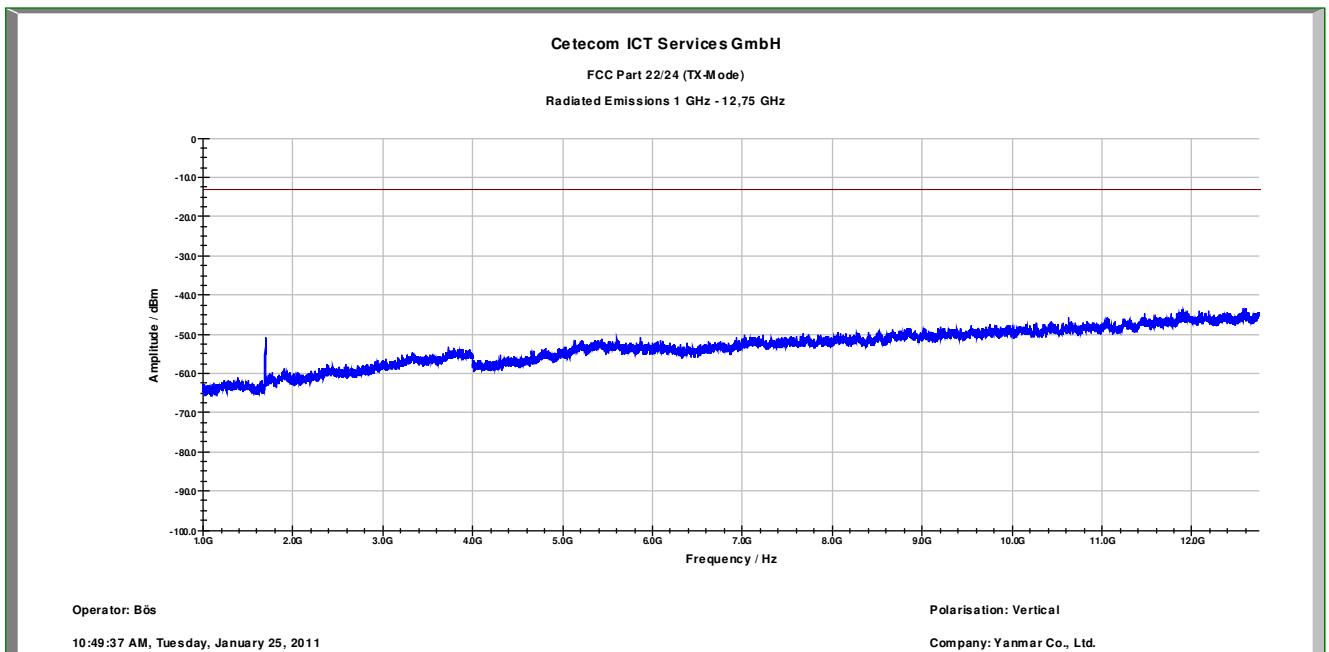
Plot 9: Channel 4180 – horizontal (1 GHz – 12.75 GHz)



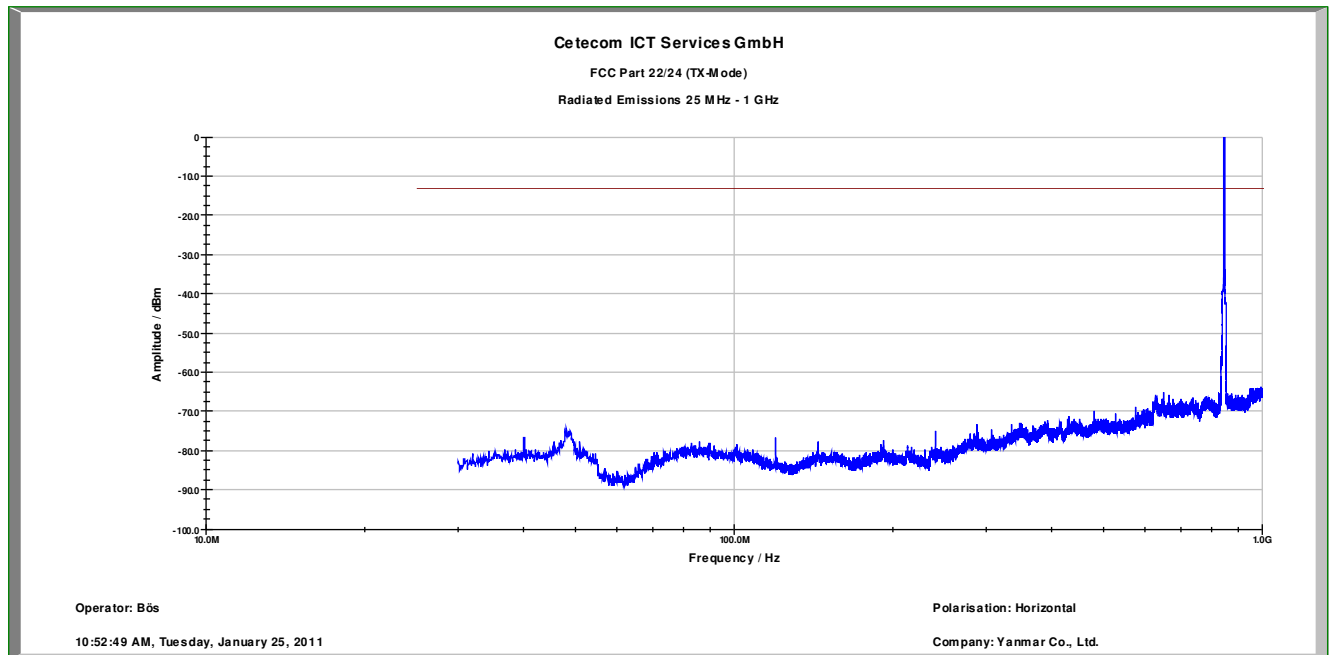
Plot 10: Channel 4233 – vertical (30 MHz - 1 GHz)



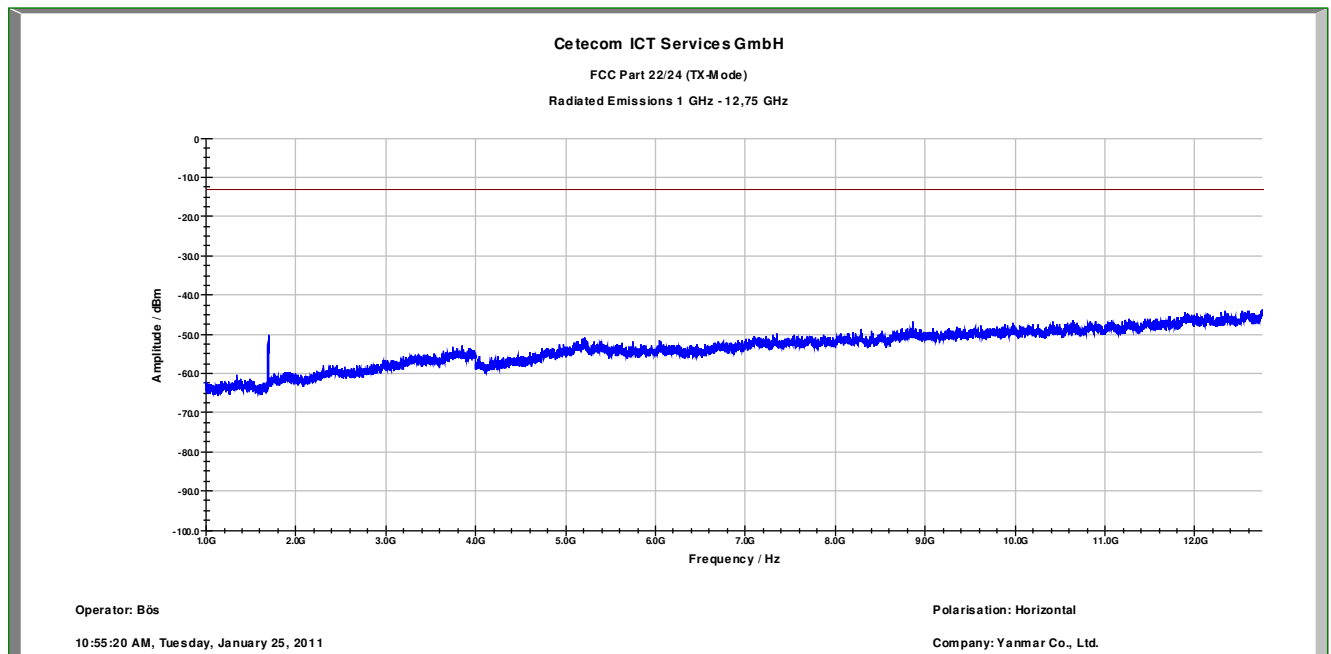
Plot 11: Channel 4233 – vertical (1 GHz – 12.75 GHz)



Plot 12: Channel 4233 – horizontal (30 MHz - 1 GHz)



Plot 13: Channel 4233 – horizontal (1 GHz – 12.75 GHz)



8.6.4 Spurious emissions conducted

Not performed

8.6.5 Block edge compliance

Not performed

8.6.6 Occupied bandwidth

Not performed

8.7 Results receiver mode

8.7.1 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 Peak / QuasiPeak Above 1 GHz Peak / 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:

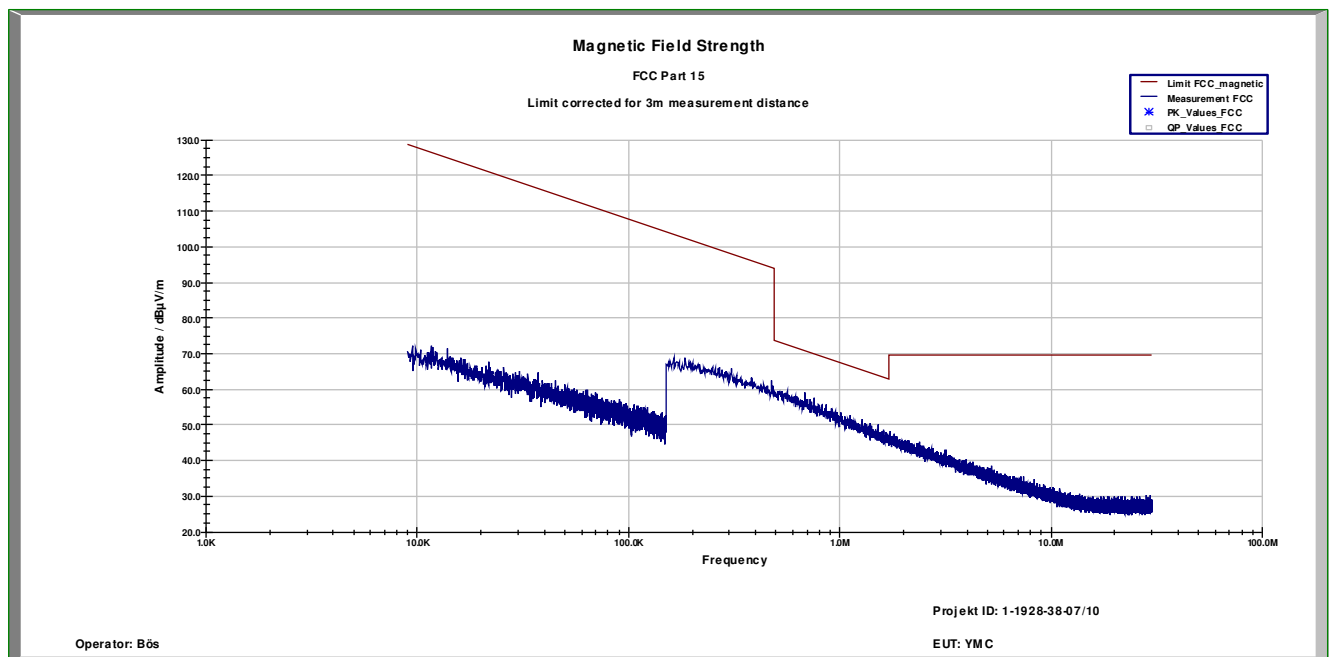
FCC		IC
CFR Part 15.109 CFR Part 2.1053		RSS Gen, Issue 2, Section 4.10
Spurious Emissions Radiated – Receiver Mode		
Frequency (MHz)	Field Strength (dBμV/m)	Measurement distance (m)
30 – 88	30.0	10
88 - 216	33.5	10
216 – 960	36.0	10
Above 960	54.0	3

Results:

Spurious Emission Level (dB μ V/m)		
Frequency (MHz)	Detector	Level (dB μ V/m)
No critical peaks detected		
Measurement uncertainty		$\pm 3\text{dB}$

Result: The result of the measurement is passed.

Plot 1: Receiver mode up to 30 MHz



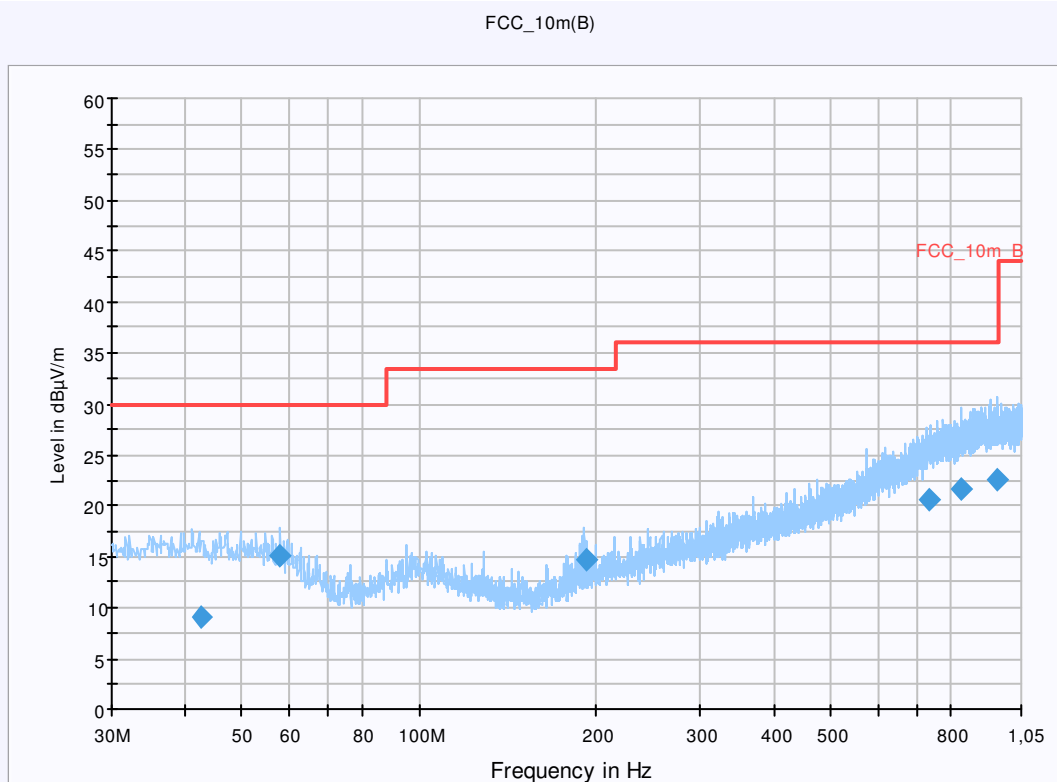
Plot 2: Receiver mode (30 MHz - 1 GHz)**Common Information**

EUT: YSCRW01
 Serial Number: 69
 Test Description: FCC part 15 class B @ 10 m
 Operating Conditions: idle
 Operator Name: Hennemann
 Comment: DC: 13 V

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
42.642750	9.1	15000.000	120.000	141.0	H	73.0	13.3	20.9	30.0	
58.000050	15.2	15000.000	120.000	107.0	V	291.0	12.1	14.8	30.0	
191.205300	14.7	15000.000	120.000	100.0	V	324.0	11.2	18.8	33.5	
735.147750	20.7	15000.000	120.000	100.0	H	128.0	23.3	15.3	36.0	
831.726000	21.7	15000.000	120.000	366.0	V	189.0	24.3	14.3	36.0	
958.955250	22.6	15000.000	120.000	400.0	H	114.0	25.4	13.4	36.0	

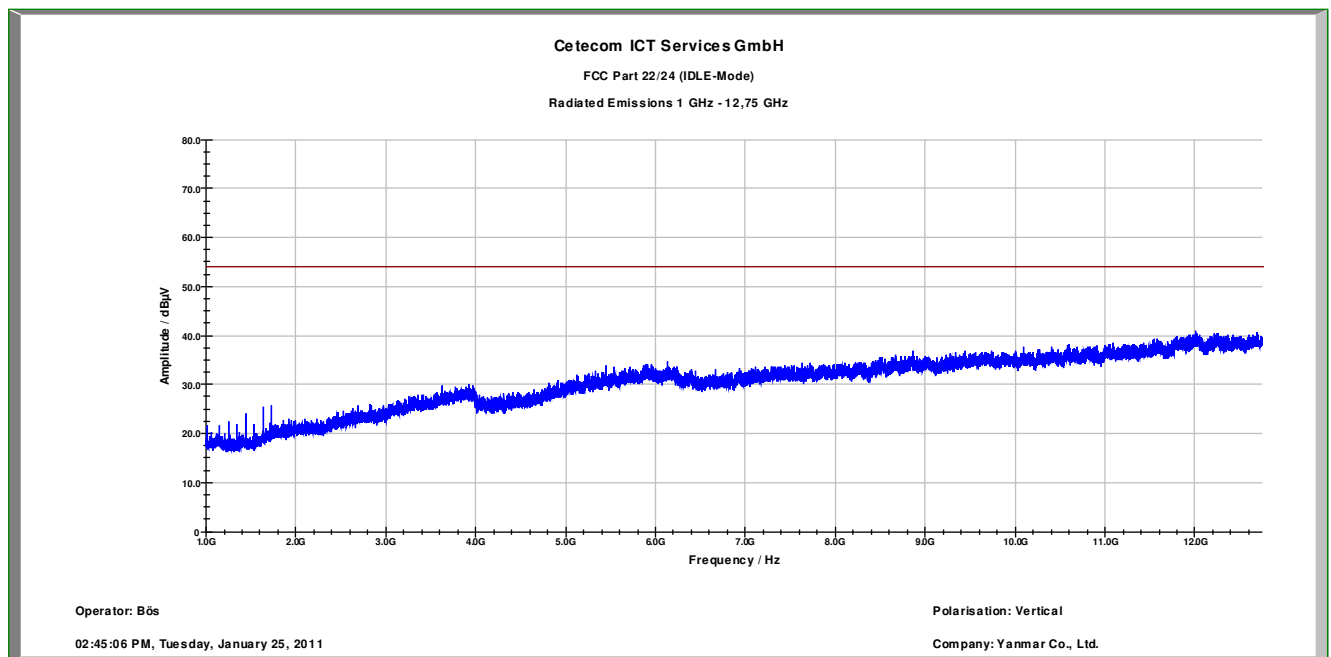
Hardware Setup: EMI radiated\Electric Field (NOS) - [EMI radiated]

Subrange 1

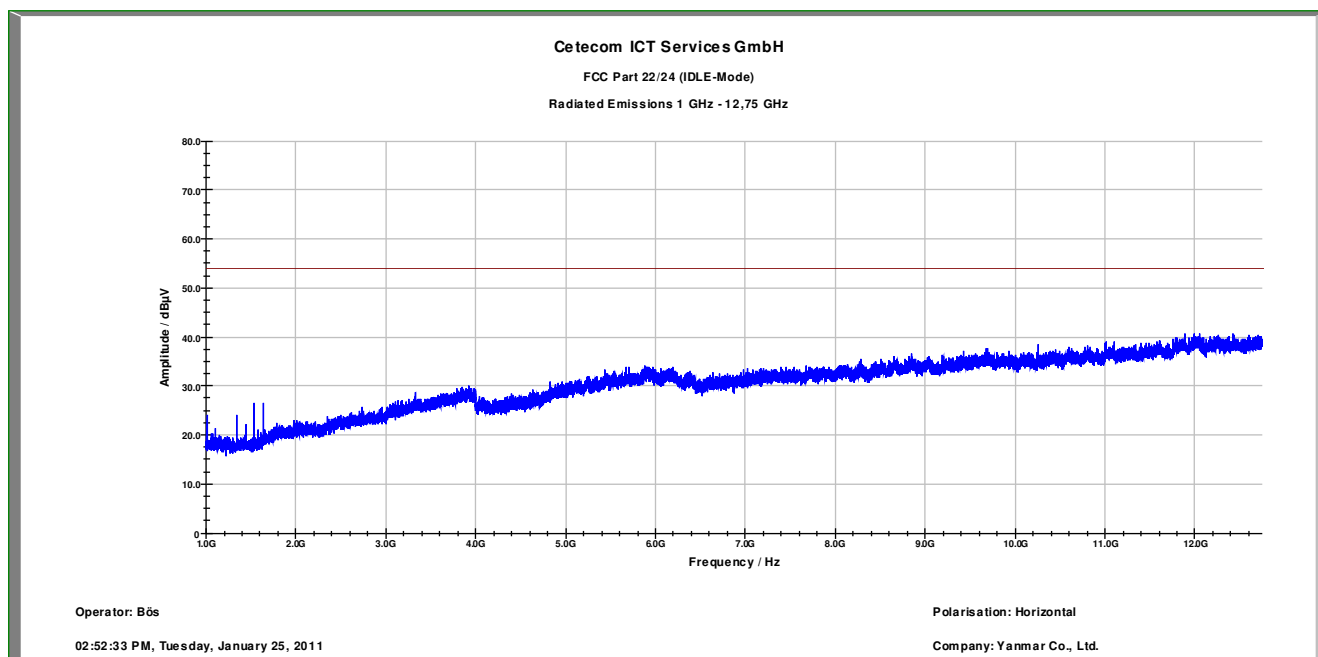
Frequency Range: 30 MHz - 2 GHz

Receiver: Receiver [ESCI 3]
@ GPIB0 (ADR 20), SN 100083/003, FW 4.32Signal Path: without Notch
FW 1.0Antenna: 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 3.12Turntable: Turntable [EMCO Turntable]
@ GPIB0 (ADR 9), FW REV 3.12

EMC 32 Version 8.10.00

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

Plot 4: Receiver mode - horizontal (1 GHz – 12.75 GHz)



9 Test equipment and ancillaries used for tests

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).

In order to simplify the identification of the equipment used at some special tests, some items of test equipment and ancillaries can be provided with an identifier or number in the equipment list below (Labor/Item).

No.	Lab / Item	Equipment	Type	Manufact.	Serial No.	INV. No Cetecom	Kind of Calibration	Last Calibration	Next Calibration
1	n. a.	Isolating Transformer	RT5A	Grundig	8041	300001626	g		
2	n. a.	DC power supply, 60Vdc, 50A, 1200 W	6032A	HP Meßtechnik	2818A03450	300001040	Ve	08.01.2009	08.01.2012
3	n. a.	Power Attenuator	8325	Byrd	1530	300001595	ev		
4	n. a.	Double-Ridged Waveguide Horn Antenna 1-18.0GHz	3115	EMCO	8812-3088	300001032	viKI	05.03.2009	05.03.2011
5	n. a.	Active Loop Antenna	6502	EMCO	2210	300001015	ne		
6	n. a.	Anechoic chamber	FAC 3/5m	MWB / TDK	87400/02	300000996		23.03.2009	
7	Spec.A. 2_2e	System rack for EMI measurement solution	85900	HP I.V.	*	300000222	ne		
8	9	Artificial Mains 9 kHz to 30 MHz	ESH3-Z5	R&S	828576/020	300001210	Ve	06.01.2010	06.01.2012
9	n. a.	Relais Matrix	3488A	HP Meßtechnik	2719A15013	300001156	ne		
10	n. a.	Relais Matrix	PSU	R&S	890167/024	300001168	ne		
11	n. a.	Isolating Transformer	RT5A	Grundig	9242	300001263	ne		
12	n. a.	Three-Way Power Splitter, 50 Ohm	11850C	HP Meßtechnik		300000997	ne		
13	n. a.	Switch / Control Unit	3488A	HP	2605e08770	300001443	ne		
14	n. a.	Amplifier	js42-00502650-28-5a	Parzich GMBH	928979	300003143	ne		
15	n. a.	Band Reject filter	WRCG1855/1910-1835/1925-40/8SS	Wainwright	7	300003350	ev		
16	n. a.	Band Reject filter	WRCG2400/2483-2375/2505-50/10SS	Wainwright	11	300003351	ev		
17	n. a.	TILE-Software Emission	Quantum Change, Modell TILE-ICS/FULL	EMCO	none	300003451	ne		
18	n. a.	Highpass Filter	WHKX2.9/18G-12SS	Wainwright	1	300003492	ev		
19	n. a.	Highpass Filter	WHK1.1/15G-10SS	Wainwright	3	300003255	ev		
20	n. a.	Highpass Filter	WHKX7.0/18G-8SS	Wainwright	18	300003789	ne		
21	n. a.	PSA Spectrum Analyzer 3 Hz - 26.5 GHz	E4440A	Agilent Technologies	MY48250080	300003812	k	08.09.2010	08.09.2012
22	n. a.	MXG Microwave Analog Signal Generator	N5183A	Agilent Technologies	MY47420220	300003813	k	13.09.2010	13.09.2012
23	n. a.	RF Filter Section 9kHz - 1GHz	N9039A	Agilent Technologies	MY48260003	300003825	viKI	08.09.2010	08.09.2012
24	n. a.	TRILOG Broadband Test-Antenna 30 MHz - 3 GHz	VULB9163	Schwarzbeck	371	300003854	viKI	17.12.2008	17.12.2011
25	45	Switch-Unit	3488A	HP Meßtechnik	2719A14505	300000368	g		

26	50	DC power supply, 60Vdc, 50A, 1200 W	6032A	HP Meßtechnik	2920A04466	300000580	k	06.01.2009	06.01.2011
27	n. a.	software	SPS_PHE 1.4f	Spitzberger & Spieß	B5981; 5D1081; B5979	300000210	ne		
28	n. a.	EMI Test Receiver	ESCI 1166.5950.03	R&S	100083	300003312	k	08.01.2010	08.01.2012
29	n. a.	Analyzer-Reference-System (Harmonics and Flicker)	ARS 16/1	SPS	A3509 07/0 0205	300003314	k	01.06.2009	01.06.2011
30	n. a.	Amplifier	JS42-00502650-28-5A	MITEQ	1084532	300003379	ev		
31	n. a.	Antenna Tower	Model 2175	ETS-LINDGREN	64762	300003745	izw		
32	n. a.	Positioning Controller	Model 2090	ETS-LINDGREN	64672	300003746	izw		
33	n. a.	Turntable Interface-Box	Model 105637	ETS-LINDGREN	44583	300003747	izw		
34	n. a.	TRILOG Broadband Test-Antenna 30 MHz - 3 GHz	VULB9163	Schwarzbeck	295	300003787	k	01.04.2010	01.04.2012
35	n. a.	Spectrum-Analyzer	FSU26	R&S	200809	300003874	k	08.01.2010	08.01.2012

Agenda: Kind of Calibration

k calibration / calibrated
 ne not required (k, ev, izw, zw not required)
 ev periodic self verification
 Ve long-term stability recognized
 vlkl! Attention: extended calibration interval
 NK! Attention: not calibrated

EK limited calibration
 zw cyclical maintenance (external cyclical maintenance)
 izw internal cyclical maintenance
 g blocked for accredited testing
 *) next calibration ordered / currently in progress

Annex A Document history

Version	Applied changes	Date of release
1.0	Initial release	2011-02-01
-A	Results EDGE mode added; RSP100 sheet added	2011-02-17
-B	Photos extracted to "Annex to 1-1928-38-07_10-B"	2011-02-18

Annex B Further information**Glossary**

DUT	-	Device under Test
EMC	-	Electromagnetic Compatibility
EUT	-	Equipment under Test
FCC	-	Federal Communication Commission
FCC ID	-	Company Identifier at FCC
HW	-	Hardware
IC	-	Industry Canada
Inv. No.	-	Inventory number
N/A	-	not applicable
S/N	-	Serial Number
SW	-	Software