
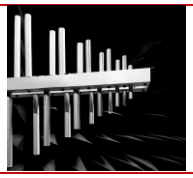
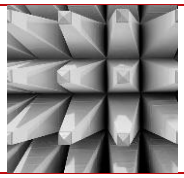

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consulting - testing - certification ➤➤➤

TEST REPORT

Test report no.: 1-0042/15-01-05

ilac-MRA DAkkS Deutsche Akkreditierungsstelle D-PL-12076-01-00

Testing laboratory

CETECOM ICT Services GmbH
Untertuerkheimer Strasse 6 – 10
66117 Saarbruecken / Germany
Phone: + 49 681 5 98 - 0
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Accredited Testing Laboratory:
The testing laboratory (area of testing) is accredited according to DIN EN ISO/IEC 17025 (2005) by the Deutsche Akkreditierungsstelle GmbH (DAkkS)
The accreditation is valid for the scope of testing procedures as stated in the accreditation certificate with the registration number: D-PL-12076-01-00

Applicant

Blackberry Limited
440 Phillip Street
Waterloo, ON N2L 5R9 / CANADA
Phone: +1 51 98 88 74 65
Fax: +1 51 98 88 69 06
Contact: Masud Attayi
e-mail: MAttayi@blackberry.com
Phone: +1 51 98 88 74 65 x72442

Manufacturer

Blackberry Limited
2200 University Avenue East
Waterloo, ON N2K 0A7 / CANADA

Test standard/s

47 CFR Part 22

47 CFR Part 24

47 CFR Part 27

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

Test Item

Kind of test item:	**Blackberry GSM Phones**
Model name:	**RHM181LW (STV100-4)**
FCC ID:	**L6ARHM180LW**
IC:	**-/-**
Frequency:	GSM: 824.2 – 848.8 MHz, 1850.2 – 1909.8 MHz UMTS: 826.4 – 846.6 MHz, 1712.4 – 1752.6 MHz, 1852.4 – 1907.6 MHz
Technology tested:	GSM / EDGE, UMTS
Antenna:	Integrated antenna
Power supply:	3.7 V DC by Li - Ion battery

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 report authorized:

cn=Andreas Luckenbill, o=CETECOM ICT Services GmbH, ou=LUC-111202, email=andreas.luckenbill@cetecom.com, c=DE
2015.09.28 16:28:14 +02'00'

Andreas Luckenbill
Lab Manager
Radio Communications & EMC

Test performed:

p.o.

cn=Mihail Dorongovskij, o=CETECOM ICT Services GmbH, ou=DOG-150526, email=mihail.dorongovskij@cetecom.com, c=DE
2015.09.28 16:26:54 +02'00'

Marco Bertolino
Lab Manager
Radio Communications & EMC

1 Table of contents

2 General information

2.1 Notes and disclaimer

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2.2 Application details

Date of receipt of order:	2015-06-08
Date of receipt of test item:	2015-07-27
Start of test:	2015-07-27
End of test:	2015-08-28
Person(s) present during the test:	-/-

3 Test standard/s

Test standard	Date	Test standard description
47 CFR Part 22	2015-07-27	Title 47 of the Code of Federal Regulations; Chapter I; Part 22 - Public mobile services
47 CFR Part 24	2015-07-27	Title 47 of the Code of Federal Regulations; Chapter I; Part 24 - Personal communications services
47 CFR Part 27	2015-07-27	Title 47 of the Code of Federal Regulations; Chapter I; Part 27 - Miscellaneous wireless communications services

3.1 Measurement guidance

Guidance	Version	Description
ANSI C63.4-2014	-/-	American national standard for methods of measurement of radio-noise emissions from low-voltage electrical and electronic equipment in the range of 9 kHz to 40 GHz

4 Test environment

Temperature:	T_{nom}	+22 °C during room temperature tests
	T_{max}	No tests under extreme conditions performed.
	T_{min}	No tests under extreme conditions performed.
Relative humidity content:		43 %
Barometric pressure:		not relevant for this kind of testing
Power supply:	V_{nom}	3.7 V DC by Li - Ion battery
	V_{max}	No tests under extreme conditions performed.
	V_{min}	No tests under extreme conditions performed.

5 Test item

Kind of test item	:	Blackberry GSM Phones
Type identification	:	RHM181LW (STV100-4)
PMN	:	-/-
HVIN	:	-/-
FVIN	:	-/-
HMN	:	-/-
S/N serial number	:	IMEI: 004402243073065 IMEI: 004402243072794
HW hardware status	:	CER-62543-001 Rev 1-x06-01 (mid and high bands) CER-62543-001 Rev 2-x06-01 (low bands)
SW software status	:	AAC056 (mid and high bands) AAC273 (low bands)
Frequency band	:	GSM: 824.2 – 848.8 MHz, 1850.2 – 1909.8 MHz UMTS: 826.4 – 846.6 MHz, 1712.4 – 1752.6 MHz, 1852.4 – 1907.6 MHz
Type of radio transmission **Use of frequency spectrum**	: :	GMSK, 8-PSK, QPSK
Type of modulation	:	GMSK, 8-PSK, QPSK
Antenna	:	Integrated antenna
Power supply	:	3.7 V DC by Li - Ion battery

5.1 Additional information

The content of the following annexes is defined in the QA. It may be that not all of the listed annexes are necessary for this report, thus some values in between may be missing.

Test setup- and EUT-photos are included in test report: 1-0042/15-01-01_AnnexA
1-0042/15-01-01_AnnexC

6 Test laboratories sub-contracted

None

7 Description of the test setup

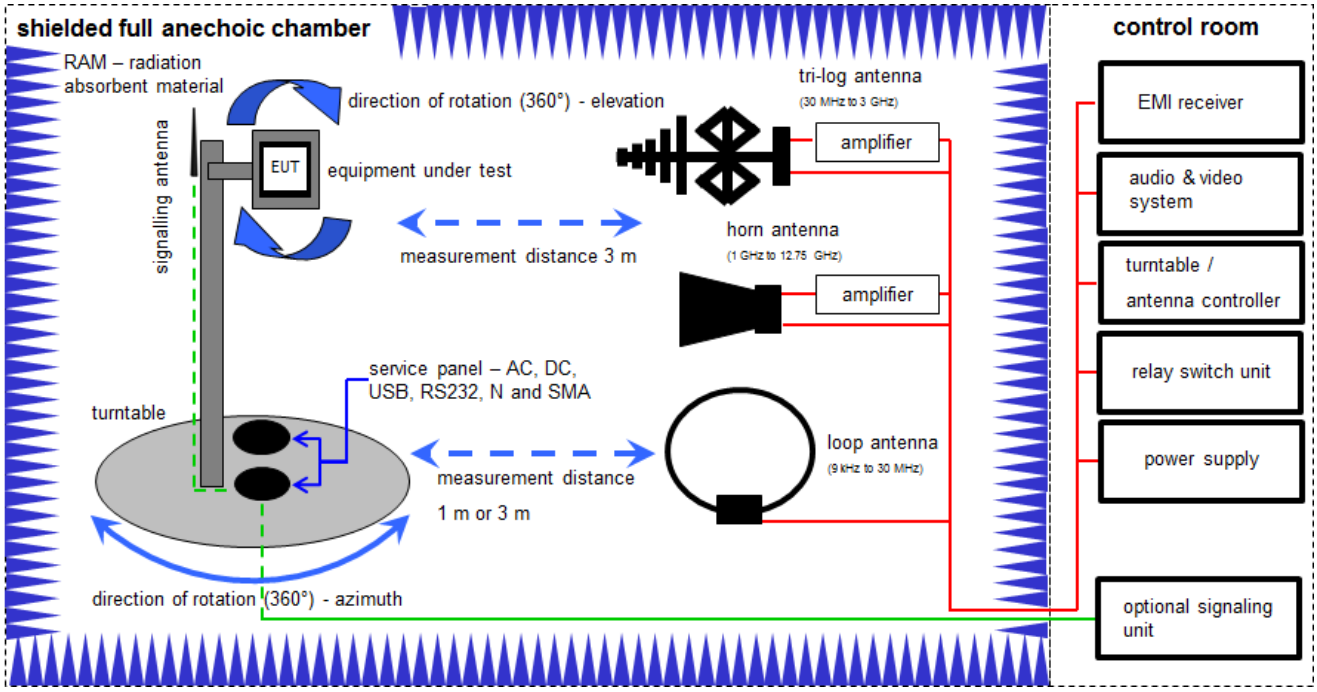
Typically, the calibrations of the test apparatus are commissioned to and performed by an accredited calibration laboratory. The calibration intervals are determined in accordance with the DIN EN ISO/IEC 17025. In addition to the external calibrations, the laboratory executes comparison measurements with other calibrated test systems or effective verifications. Weekly chamber inspections and range calibrations are performed. Where possible, RF generating and signaling 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 (Lab/Item).

Agenda: Kind of Calibration

k	calibration / calibrated	EK	limited calibration
ne	not required (k, ev, izw, zw not required)	zw	cyclical maintenance (external cyclical maintenance)
ev	periodic self verification	izw	internal cyclical maintenance
Ve	long-term stability recognized	g	blocked for accredited testing
vlkl!	Attention: extended calibration interval		
NK!	Attention: not calibrated	*)	next calibration ordered / currently in progress

7.1 Shielded fully anechoic chamber



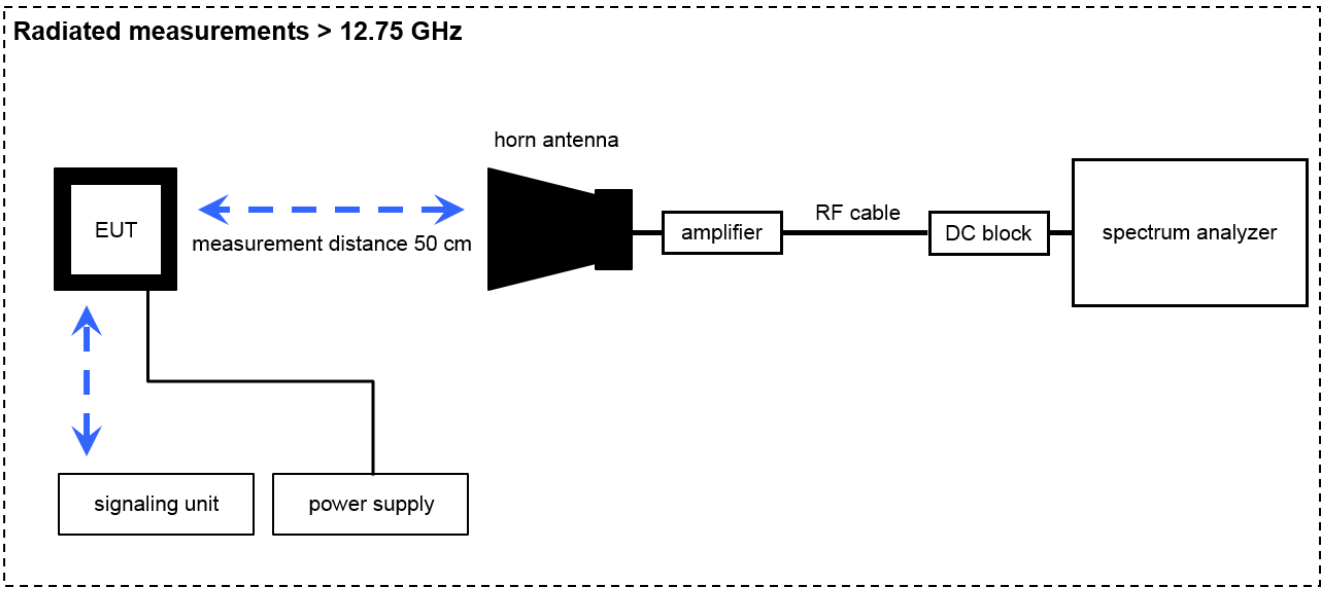
SS = U_R + CA + AF
(SS-signal strength; U_R-voltage at the receiver; CA-loss of the signal path; AF-antenna factor)

Example calculation:
SS [dBµV/m] = 40.0 [dBµV/m] + (-35.8) [dB] + 32.9 [dBµV/m] = 37.1 [dBµV/m] (71.61 µV/m)

Equipment table:

No.	Lab / Item	Equipment	Type	Manufact.	Serial No.	INV. No Cetecom	Kind of Calibration	Last Calibration	Next Calibration
1	A, B	Double-Ridged Waveguide Horn Antenna 1-18.0GHz	3115	EMCO	9005-3440	300002190	vIKI!	20.05.2015	20.05.2017
2	A, B	Double-Ridged Waveguide Horn Antenna 1-18.0GHz	3115	EMCO	9709-5290	300000212	k	13.08.2015	13.08.2017
3	A, B	EMI Test Receiver 20Hz- 26,5GHz	ESU26	R&S	100037	300003555	k	22.01.2015	22.01.2016
4	A	Band Reject Filter	WRCG1710/1755-1690/1775-90/14SS	Wainwright	7	300003793	ne	-/-	-/-
5	A	TRILOG Broadband Test-Antenna 30 MHz - 3 GHz	VULB9163	Schwarzbeck	318	300003696	k	22.04.2014	22.04.2017
6	A, B	Broadband Amplifier 0.5-18 GHz	CBLU5184540	CERNEX	22050	300004482	ev	-/-	-/-
7	A, B	4U RF Switch Platform	L4491A	Agilent Technologies	MY50000032	300004510	ne	-/-	-/-

7.2 Radiated measurements > 12.75 GHz



OP = AV + D - G + CA
(OP-output power; AV-analyzer value; D-distance; G-antenna gain+amplifier gain; CA-loss signal path)

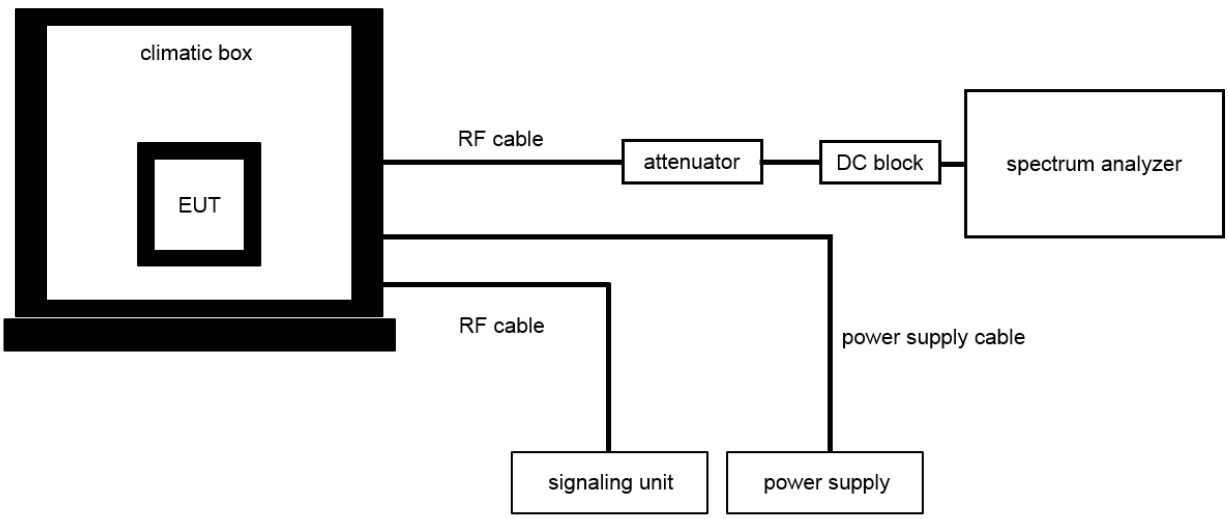
Example calculation:
OP [dBm] = -41.0 [dBm] + 26 [dB] - 20 [dB] + 5 [dB] = -30 [dBm] (1 µW)

Equipment table:

No.	Lab / Item	Equipment	Type	Manufact.	Serial No.	INV. No Cetecom	Kind of Calibration	Last Calibration	Next Calibration
1	A	Std. Gain Horn Antenna 12.4 to 18.0 GHz	639	Narda	8402	300000786	ne	-/-	-/-
2	A	Std. Gain Horn Antenna 18.0 to 26.5 GHz	638	Narda	8402	300000486	ne	-/-	-/-
3	A	Signal Analyzer 40 GHz	FSV40	R&S	101042	300004517	k	22.01.2015	22.01.2016
4	A	Amplifier 2-40 GHz	JS32-02004000-57-5P	MITEQ	1777200	300004541	ev	-/-	-/-
5	A	RF-Cable	ST18/SMAm/SMAm/48	Huber & Suhner	Batch no. 600918	400001182	ev	-/-	-/-
6	A	RF-Cable	ST18/SMAm/SMm/48	Huber & Suhner	Batch no. 127377	400001183	ev	-/-	-/-
7	A	DC-Blocker 0.1-40 GHz	8141A	Inmet		400001185	ev	-/-	-/-
8	A	Power Supply 0-20V; 0-5A	6632B	HP	US37478366	400000117	vIKI!	20.01.2015	20.01.2017

7.3 Conducted measurements

Conducted measurements normal & extreme conditions



OP = AV + CA
(OP-output power; AV-analyzer value; CA-loss signal path)

Example calculation:
OP [dBm] = 6.0 [dBm] + (11.7) [dB] = 17.7 [dBm] (58.88 mW)

Equipment table:

No.	Lab / Item	Equipment	Type	Manufact.	Serial No.	INV. No Cetecom	Kind of Calibration	Last Calibration	Next Calibration
1	A	Switch / Control Unit	3488A	HP	2605e08770	300001443	ne	-/-	-/-
2	A	Signal Analyzer 40 GHz	FSV40	R&S	101042	300004517	k	22.01.2015	22.01.2016
6	A	RF-Cable	ST18/SMAm/SMAm/ 72	Huber & Suhner	Batch no. 699714	400001184	ev	-/-	-/-
7	A	DC-Blocker 0.1-40 GHz	8141A	Inmet		400001185	ev	-/-	-/-
8	A	Coax Attenuator 10 dB 2W 0-40 GHz	MCL BW-K10-2W44+	Mini Circuits		400001186	ev	-/-	-/-

8 Measurement uncertainty

Measurement uncertainty	
Test case	**Uncertainty**
RF output power conducted	± 1 dB
RF output power radiated	± 3 dB
Frequency stability	± 20 Hz
Spurious emissions radiated below 30 MHz	± 3 dB
Spurious emissions radiated 30 MHz to 1 GHz	± 3 dB
Spurious emissions radiated 1 GHz to 12.75 GHz	± 3.7 dB
Spurious emissions radiated above 12.75 GHz	± 4.5 dB
Spurious emissions conducted	± 3 dB
Block edge compliance	± 3 dB
Occupied bandwidth	± RBW

9 Sequence of testing

9.1 Sequence of testing 9 kHz to 30 MHz

Setup

- The equipment was set up to simulate a typical usage like descripted in the user manual or described by manufacturer.
- If the EUT is a tabletop system, a rotatable table with 1.5 m height is used.
- If the EUT is a floor standing device, it is placed on the ground.
- Auxiliary equipment and cables were positioned to simulate normal operation conditions as described in ANSI C 63.4.
- The AC power port of the EUT (if available) is connected to a power outlet below the turntable.
- The measurement distance is 3 meter (see ANSI C 63.4) – see each test details
- The EUT was set into operation.

Premeasurement

- The turntable rotates from 0° to 315° using 45° steps.
- The antenna height is 1.5 meter.
- At each turntable position the analyzer sweeps with peak detection to find the maximum of all emissions

Final measurement

- Identified emissions during the premeasurement the software maximizes by rotating the turntable position (0° to 360°) and by rotating the elevation axes (0° to 360°).
- The final measurement will be done in the position (turntable and elevation) causing the highest emissions with RMS (RMS / see ANSI C 63.4) detector
- The final levels, frequency, measuring time, bandwidth, turntable position, correction factor, margin to the limit and limit will be recorded. Also a plot with the graph of the premeasurement and the limit will be stored.

9.2 Sequence of testing 30 MHz to 1 GHz

Setup

- The equipment was set up to simulate a typical usage like descripted in the user manual or described by manufacturer.
- If the EUT is a tabletop system, a table with 0.8 m height is used, which is placed on the ground plane.
- If the EUT is a floor standing device, it is placed on the ground plane with insulation between both.
- Auxiliary equipment and cables were positioned to simulate normal operation conditions as described in ANSI C 63.4.
- The AC power port of the EUT (if available) is connected to a power outlet below the turntable.
- The measurement distance is 10 or 3 meter (see ANSI C 63.4) – see each test details
- The EUT was set into operation.
-

Premeasurement

- The turntable rotates from 0° to 315° using 45° steps.
- The antenna is polarized vertical and horizontal.
- The antenna height changes from 1 to 3 meter.
- At each turntable position, antenna polarization and height the analyzer sweeps three times in peak to find the maximum of all emissions
-

Final measurement

- The final measurement will be performed with minimum the six highest peaks.
- According to the maximum antenna and turntable positions of premeasurement the software maximize the peaks by changing turntable position (± 45°) and antenna movement between 1 and 4 meter.
- The final measurement will be done with RMS (RMS / see ANSI C 63.4) detector with an EMI receiver
- The final levels, frequency, measuring time, bandwidth, antenna height, antenna polarization, turntable angle, correction factor, margin to the limit and limit will be recorded. Also a plot with the graph of the premeasurement with marked maximum final measurements and the limit will be stored.

9.3 Sequence of testing 1 GHz to 12.75 GHz

Setup

- The equipment was set up to simulate a typical usage like descripted in the user manual or described by manufacturer.
- If the EUT is a tabletop system, a rotatable table with 1.5 m height is used.
- If the EUT is a floor standing device, it is placed on the ground.
- Auxiliary equipment and cables were positioned to simulate normal operation conditions as described in ANSI C 63.4.
- The AC power port of the EUT (if available) is connected to a power outlet below the turntable.
- The measurement distance is 3 meter (see ANSI C 63.4) – see each test details
- The EUT was set into operation.

Premeasurement

- The turntable rotates from 0° to 315° using 45° steps.
- The antenna is polarized vertical and horizontal.
- The antenna height is 1.5 meter.
- At each turntable position and antenna polarization the analyzer sweeps with peak detection to find the maximum of all emissions

Final measurement

- The final measurement will be performed with minimum the six highest peaks according the requirements of the ANSI C63.4.
- According to the maximum found antenna polarization and turntable position of the premeasurement the software maximizes the peaks by rotating the turntable position (0° to 360°). This measurement is repeated for different EUT-table positions (0° to 150° in 30°-steps). This procedure is repeated for both antenna polarizations.
- The final measurement will be done in the position (turntable, EUT-table and antenna polarization) causing the highest emissions with Peak and RMS (RMS / see ANSI C 63.4) detector
- The final levels, frequency, measuring time, bandwidth, turntable position, EUT-table position, antenna polarization, correction factor, margin to the limit and limit will be recorded. Also a plot with the graph of the premeasurement with marked maximum final measurements and the limit will be stored.

9.4 Sequence of testing above 12.75 GHz

Setup

- The equipment was set up to simulate a typical usage like descripted in the user manual or described by manufacturer.
- Auxiliary equipment and cables were positioned to simulate normal operation conditions as described in ANSI C 63.4.
- The AC power port of the EUT (if available) is connected to a power outlet below the turntable.
- The measurement distance is 0.5 meter
- The EUT was set into operation.

Premeasurement

- The antenna is moved spherical over the EUT in different polarizations of the antenna.

Final measurement

- The final measurement will be performed at the position and antenna orientation for all detected emissions that were found during the premeasurements with Peak and RMS (RMS / see ANSI C 63.4) detector
- The final levels, frequency, measuring time, bandwidth, correction factor, margin to the limit and limit will be recorded. Also a plot with the graph of the premeasurement and the limit will be stored.

10 Summary of measurement results

☐	No deviations from the technical specifications were ascertained
☐	There were deviations from the technical specifications ascertained
☒	This test report is only a partial test report. The content and verdict of the performed test cases are listed below.

TC identifier	Description	verdict	date	Remark
RF-Testing	CFR Part 22, 24, 27	See table!	2015-09-28	Tests according to customers test list

10.1 GSM 850

Test Case	temperature conditions	power source voltages	C	NC	NA	NP	Remark
RF Output Power	Nominal	Nominal	☒	☐	☐	☐	-/-
Frequency Stability	Extreme	Extreme	☐	☐	☐	☒	-/-
Spurious Emissions Radiated	Nominal	Nominal	☒	☐	☐	☐	-/-
Spurious Emissions Conducted	Nominal	Nominal	☐	☐	☐	☒	-/-
Block Edge Compliance	Nominal	Nominal	☐	☐	☐	☒	-/-
Occupied Bandwidth	Nominal	Nominal	☐	☐	☐	☒	-/-

Note: C = Compliant; NC = Not compliant; NA = Not applicable; NP = Not performed

10.2 PCS 1900

Test Case	temperature conditions	power source voltages	C	NC	NA	NP	Remark
RF Output Power	Nominal	Nominal	☒	☐	☐	☐	-/-
Frequency Stability	Extreme	Extreme	☐	☐	☐	☒	-/-
Spurious Emissions Radiated	Nominal	Nominal	☒	☐	☐	☐	-/-
Spurious Emissions Conducted	Nominal	Nominal	☐	☐	☐	☒	-/-
Block Edge Compliance	Nominal	Nominal	☐	☐	☐	☒	-/-
Occupied Bandwidth	Nominal	Nominal	☐	☐	☐	☒	-/-

Note: C = Compliant; NC = Not compliant; NA = Not applicable; NP = Not performed

10.3 UMTS band II

Test Case	temperature conditions	power source voltages	C	NC	NA	NP	Remark
RF Output Power	Nominal	Nominal	☒	☐	☐	☐	-/-
Frequency Stability	Extreme	Extreme	☐	☐	☐	☒	-/-
Spurious Emissions Radiated	Nominal	Nominal	☒	☐	☐	☐	-/-
Spurious Emissions Conducted	Nominal	Nominal	☐	☐	☐	☒	-/-
Block Edge Compliance	Nominal	Nominal	☐	☐	☐	☒	-/-
Occupied Bandwidth	Nominal	Nominal	☐	☐	☐	☒	-/-

Note: C = Compliant; NC = Not compliant; NA = Not applicable; NP = Not performed

10.4 UMTS band IV

Test Case	temperature conditions	power source voltages	C	NC	NA	NP	Remark
RF Output Power	Nominal	Nominal	☒	☐	☐	☐	-/-
Frequency Stability	Extreme	Extreme	☐	☐	☐	☒	-/-
Spurious Emissions Radiated	Nominal	Nominal	☒	☐	☐	☐	-/-
Spurious Emissions Conducted	Nominal	Nominal	☐	☐	☐	☒	-/-
Block Edge Compliance	Nominal	Nominal	☐	☐	☐	☒	-/-
Occupied Bandwidth	Nominal	Nominal	☐	☐	☐	☒	-/-

Note: C = Compliant; NC = Not compliant; NA = Not applicable; NP = Not performed

10.5 UMTS band V

Test Case	temperature conditions	power source voltages	C	NC	NA	NP	Remark
RF Output Power	Nominal	Nominal	☒	☐	☐	☐	-/-
Frequency Stability	Extreme	Extreme	☐	☐	☐	☒	-/-
Spurious Emissions Radiated	Nominal	Nominal	☒	☐	☐	☐	-/-
Spurious Emissions Conducted	Nominal	Nominal	☐	☐	☐	☒	-/-
Block Edge Compliance	Nominal	Nominal	☐	☐	☐	☒	-/-
Occupied Bandwidth	Nominal	Nominal	☐	☐	☐	☒	-/-

Note: C = Compliant; NC = Not compliant; NA = Not applicable; NP = Not performed

11 RF measurements

11.1 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.

11.1.1 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
Test setup	See sub clause 7.1 B
Measurement uncertainty	See sub clause 8

Limits:

FCC
CFR Part 22.913 CFR Part 2.1046
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 (radiated) GMSK mode		
Frequency (MHz)	**Average Output Power (dBm) - ERP**	**Peak-to-average-ratio (dB)**
824.2	28.0	0.2
836.4	27.2	0.2
848.8	28.4	0.2

Output Power (radiated) 8-PSK mode		
Frequency (MHz)	**Average Output Power (dBm) - ERP**	**Peak-to-average-ratio (dB)**
824.2	24.7	3.2
836.4	26.1	3.2
848.8	27.4	3.2

11.1.2 Spurious emissions radiated

Description:

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

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

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

Measurement:

Measurement parameters	
Detector:	Peak
Sweep time:	2 sec.
Video bandwidth:	Below 1 GHz: 100 kHz Above 1 GHz: 1 MHz
Resolution bandwidth:	Below 1 GHz: 100 kHz Above 1 GHz: 1 MHz
Span:	100 MHz Steps
Trace mode:	Max Hold
Test setup	See sub clause 7.1 A
Measurement uncertainty	See sub clause 8

Limits:

FCC
CFR Part 22.917 CFR Part 2.1053
Spurious Emissions Radiated
Attenuation ≥ 43 + 10log(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.

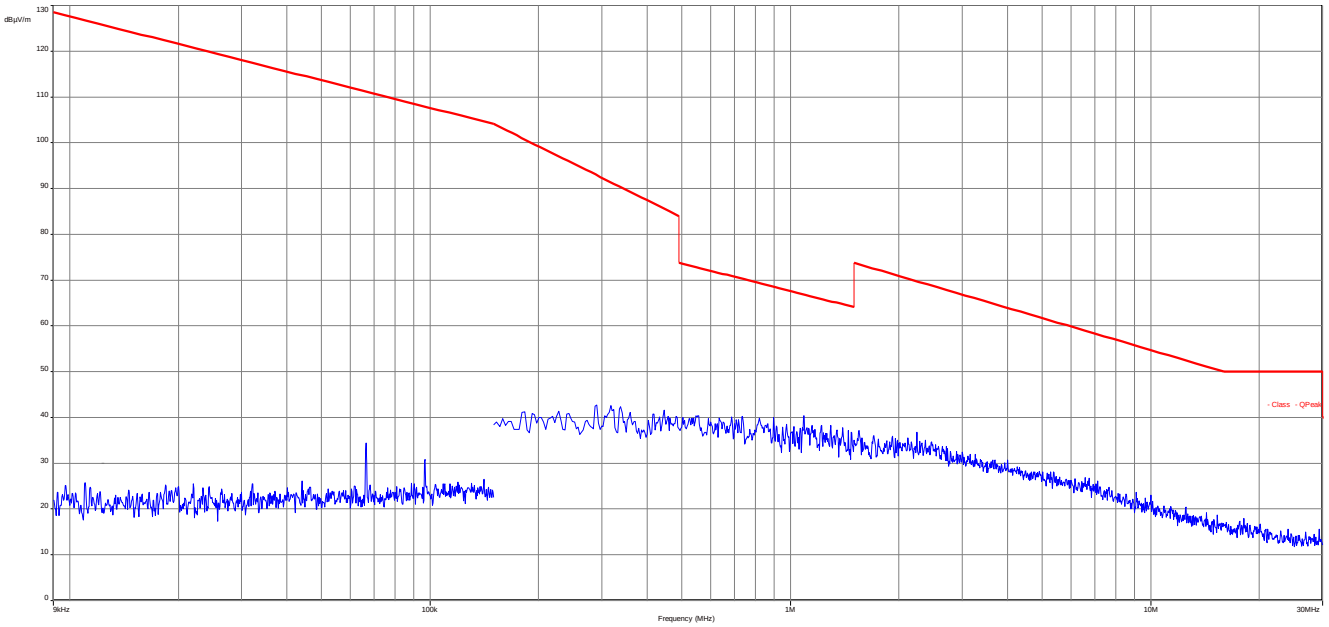
As can be seen from this data, the emissions from the test item were within the specification limit.

Spurious Emission Level GMSK (dBm)								
Harmonic	Ch. 128 Freq. (MHz)	Level [dBm]	Harmonic	Ch. 189 Freq. (MHz)	Level [dBm]	Harmonic	Ch. 251 Freq. (MHz)	Level [dBm]
2	1648.4	-/-	2	1672.8	-/-	2	1697.6	-/-
3	2472.6	-34.7	3	2509.2	-35.0	3	2546.4	-36.9
4	3296.8	-/-	4	3345.6	-/-	4	3395.2	-/-
5	4121.0	-/-	5	4182.0	-/-	5	4244.0	-36.3
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	-/-

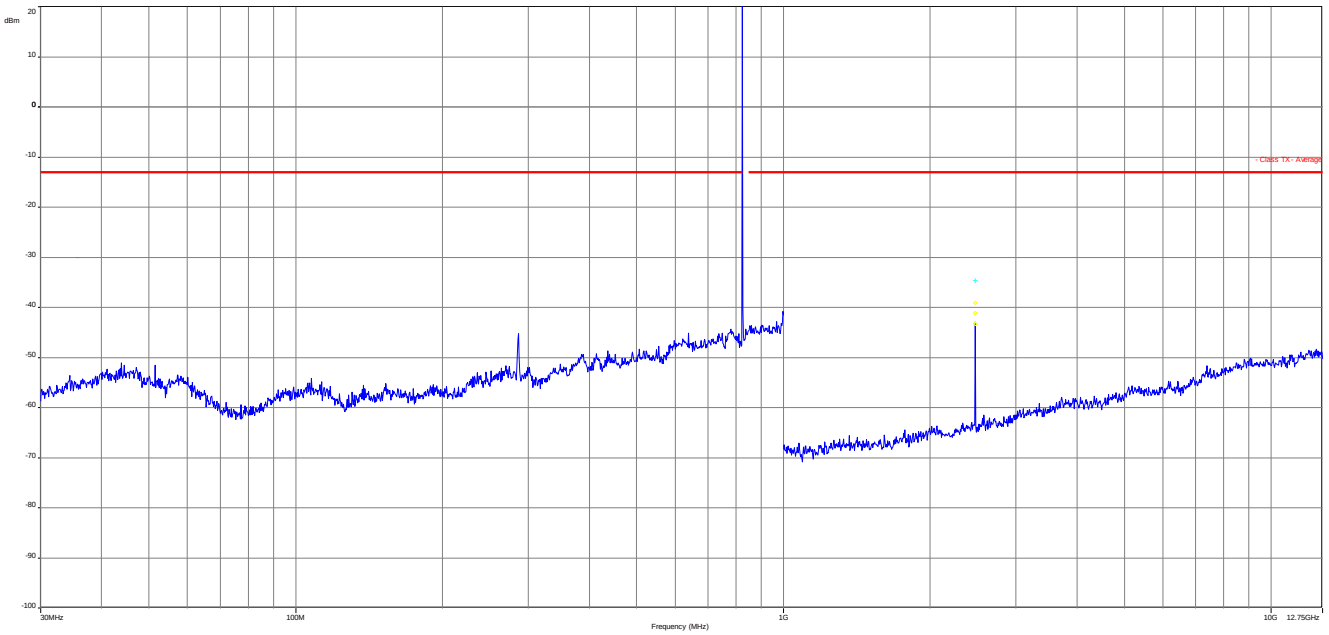
Spurious Emission Level 8.PSK (dBm)								
Harmonic	Ch. 128 Freq. (MHz)	Level [dBm]	Harmonic	Ch. 189 Freq. (MHz)	Level [dBm]	Harmonic	Ch. 251 Freq. (MHz)	Level [dBm]
2	1648.4	All detected emission are more than 20 dB below the limit.	2	1672.8	All detected emission are more than 20 dB below the limit.	2	1697.6	All detected emission are more than 20 dB below the limit.
3	2472.6		3	2509.2		3	2546.4	
4	3296.8		4	3345.6		4	3395.2	
5	4121.0		5	4182.0		5	4244.0	
6	4945.2		6	5018.4		6	5092.8	
7	5769.4		7	5854.8		7	5941.6	
8	6593.6		8	6691.2		8	6790.4	
9	7417.8		9	7527.6		9	7639.2	
10	8242.0		10	8364.0		10	8488.0	

Plots:

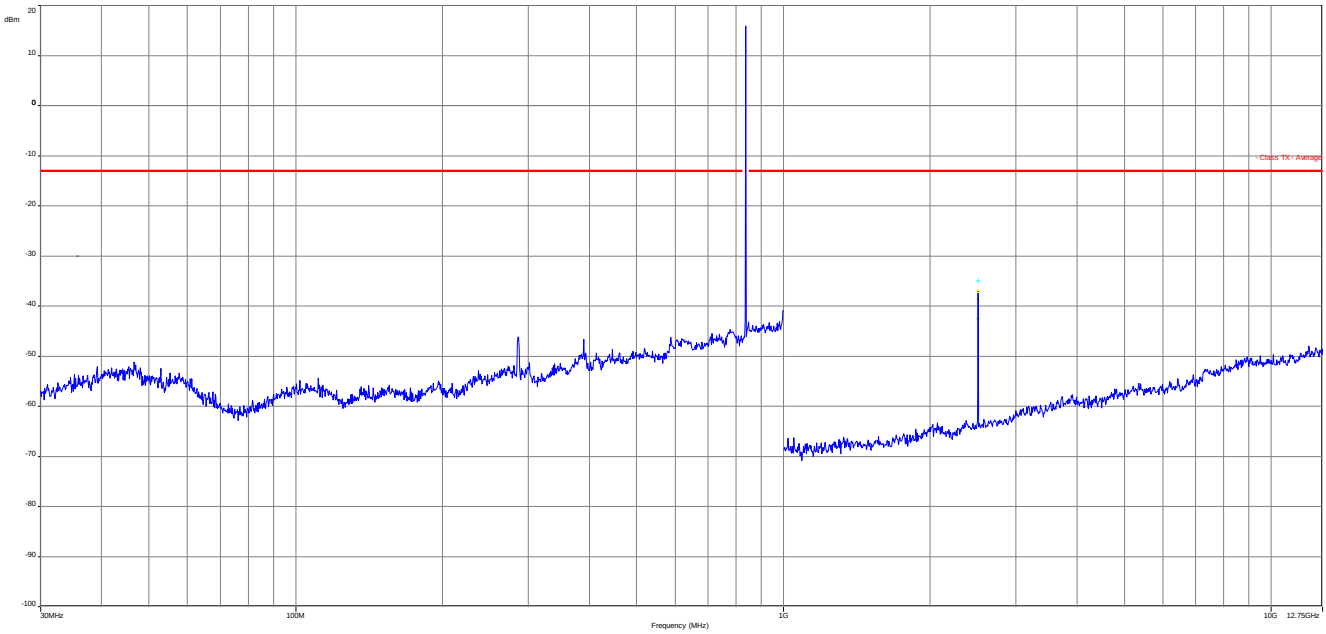
Plot 1: GMSK Channel 189 (Traffic mode up to 30 MHz)



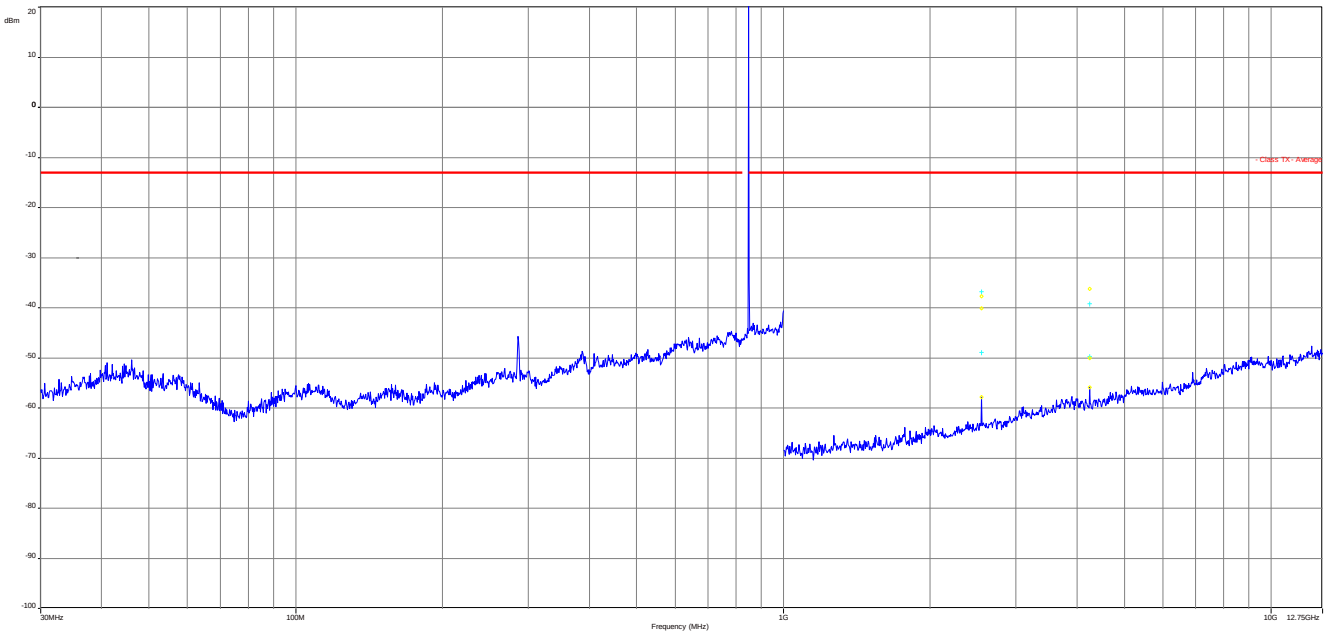
Plot 2: GMSK Channel 128 (30 MHz – 12.75 GHz)



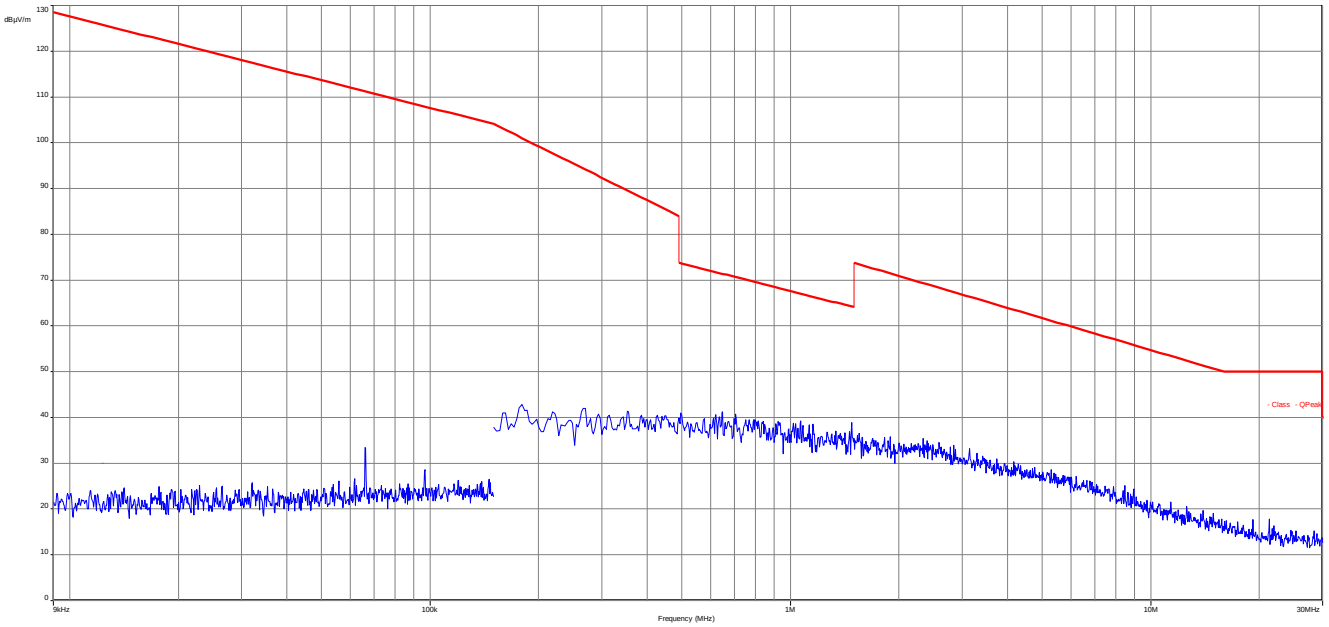
Plot 3: GMSK Channel 189 (30 MHZ – 12.75 GHZ)



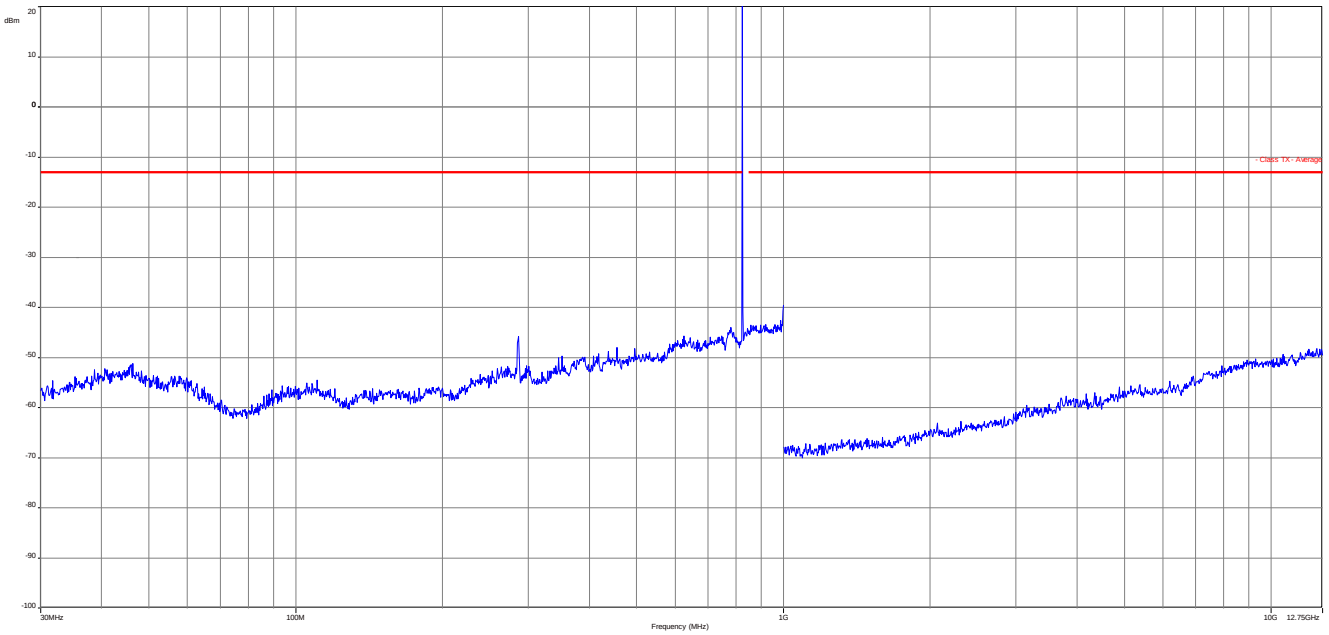
Plot 4: GMSK Channel 251 (30 MHz – 12.75 GHz)



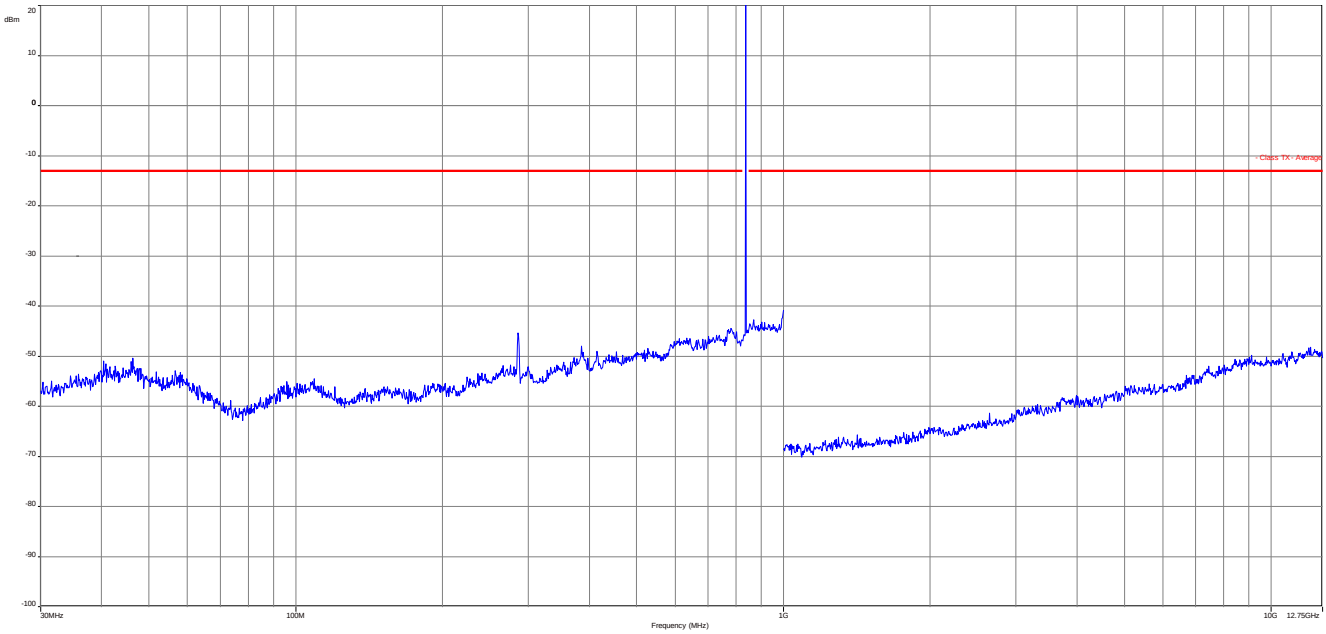
Plot 5: 8-PSK Channel 189 (Traffic mode up to 30 MHz)



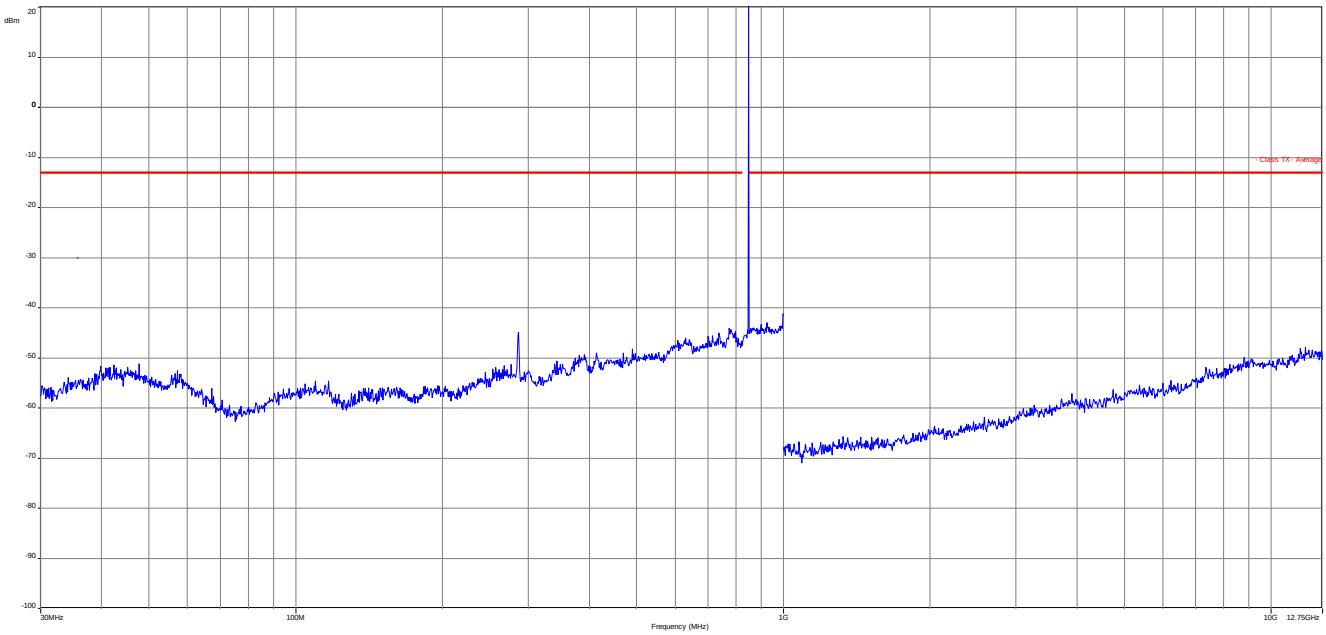
Plot 6: 8-PSK Channel 128 (30 MHz – 12.75 GHz)



Plot 7: 8-PSK Channel 189 (30 MHZ – 12.75 GHZ)



Plot 8: 8-PSK Channel 251 (30 MHz – 12.75 GHz)



11.2 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.

11.2.1 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
Test setup	See sub clause 7.1 B
Measurement uncertainty	See sub clause 8

Limits:

FCC
CFR Part 24.232 CFR Part 2.1046
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 (radiated) GMSK mode		
Frequency (MHz)	**Average Output Power (dBm) - ERP**	**Peak-to-average-ratio (dB)**
1850.2	30.4	0.2
1880.0	29.7	0.2
1909.8	30.3	0.2

Output Power (radiated) 8-PSK mode		
Frequency (MHz)	**Average Output Power (dBm) - ERP**	**Peak-to-average-ratio (dB)**
1850.2	27.3	3.2
1880.0	26.8	3.2
1909.8	26.9	3.2

11.2.2 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. Measurement made up to 25 GHz. The resolution bandwidth is set as outlined in Part 24.238. The spectrum was scanned with the mobile station transmitting at carrier frequencies that pertain to low, mid and high channels of the PCS1900 band.

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

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

Measurement:

Measurement parameters	
Detector:	Peak
Sweep time:	2 sec.
Video bandwidth:	Below 1 GHz: 100 kHz Above 1 GHz: 1 MHz
Resolution bandwidth:	Below 1 GHz: 100 kHz Above 1 GHz: 1 MHz
Span:	100 MHz Steps
Trace mode:	Max Hold
Test setup	See sub clause 7.1 A and 7.2. A
Measurement uncertainty	See sub clause 8

Limits:

FCC
CFR Part 24.238 CFR Part 2.1053
Spurious Emissions Radiated
Attenuation ≥ 43 + 10log(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.

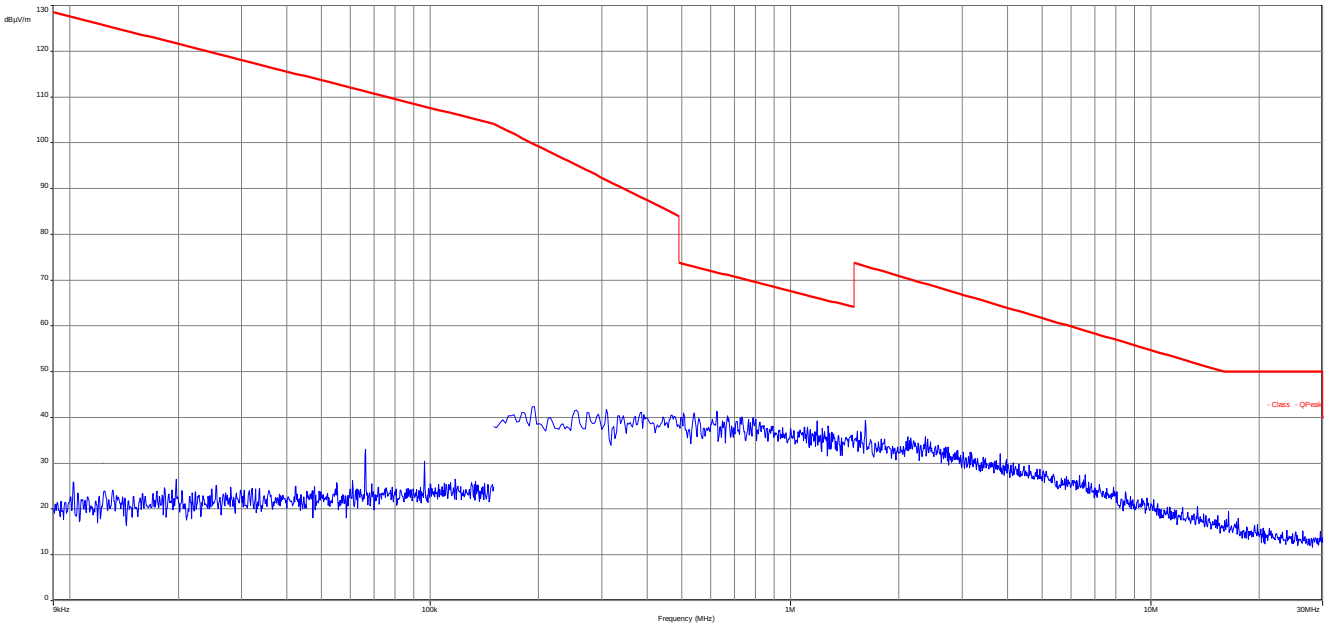
As can be seen from this data, the emissions from the test item were within the specification limit.

Spurious Emission Level GMSK (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	All detected emission are more than 20 dB below the limit.	2	3760.0	All detected emission are more than 20 dB below the limit.	2	3819.6	All detected emission are more than 20 dB below the limit.
3	5550.6		3	5640.0		3	5729.4	
4	7400.8		4	7520.0		4	7639.2	
5	9251.0		5	9400.0		5	9549.0	
6	11101.2		6	11280.0		6	11458.8	
7	12951.4		7	13160.0		7	13368.6	
8	14801.6		8	15040.0		8	15278.4	
9	16651.8		9	16920.0		9	17188.2	
10	18502.0		10	18800.0		10	19098.0	

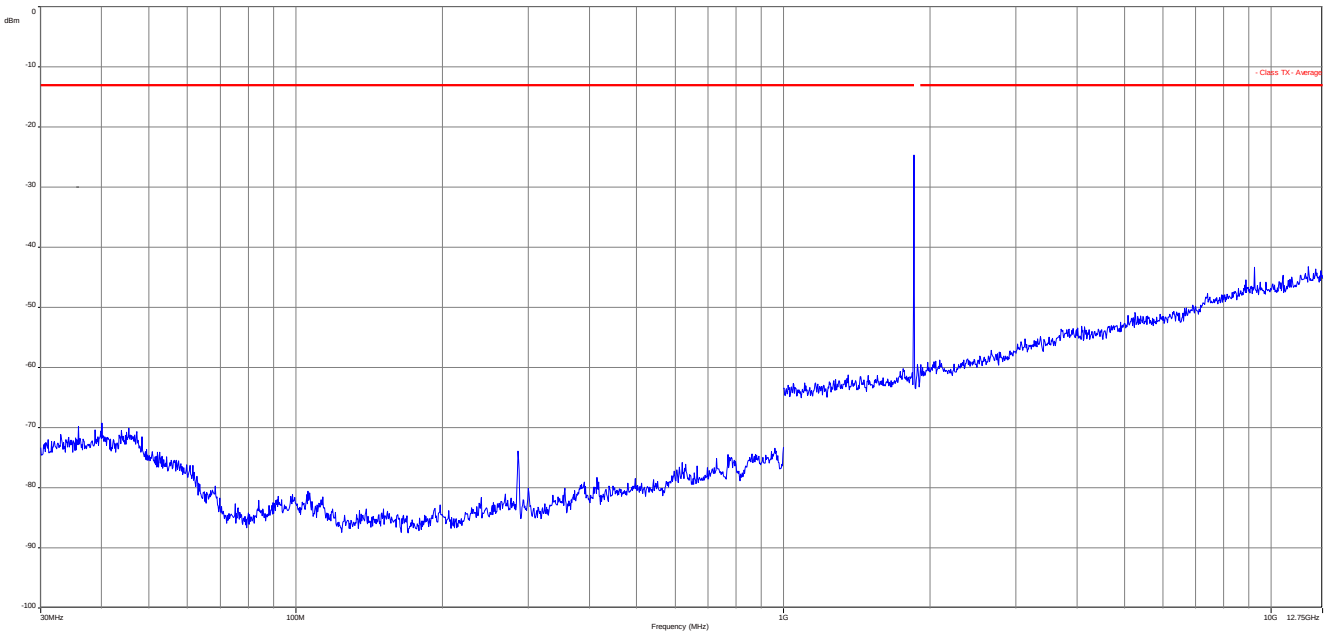
Spurious Emission Level 8-PSK (dBm)								
Harmonic	Ch. 512 Freq. (MHz)	Level [dBm]	Harmonic	Ch. 661 Freq. (MHz)	Level [dBm]	Harmonic	Ch. 810 Freq. (MHz)	Level [dBm]
2	3700.4	All detected emission are more than 20 dB below the limit.	2	3760.0	All detected emission are more than 20 dB below the limit.	2	3819.6	All detected emission are more than 20 dB below the limit.
3	5550.6		3	5640.0		3	5729.4	
4	7400.8		4	7520.0		4	7639.2	
5	9251.0		5	9400.0		5	9549.0	
6	11101.2		6	11280.0		6	11458.8	
7	12951.4		7	13160.0		7	13368.6	
8	14801.6		8	15040.0		8	15278.4	
9	16651.8		9	16920.0		9	17188.2	
10	18502.0		10	18800.0		10	19098.0	

Plots:

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

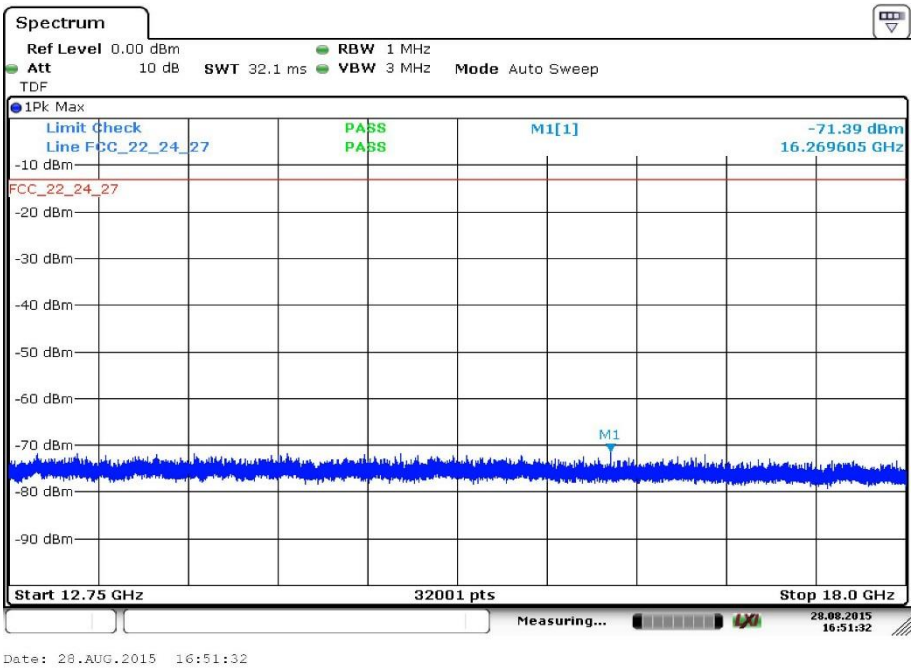


Plot 2: GMSK Channel 512 (30 MHz – 12.75 GHz)



Carrier notched with 1.9 GHz rejection filter

Plot 3: GMSK Channel 512 (12.75 GHz - 18 GHz)



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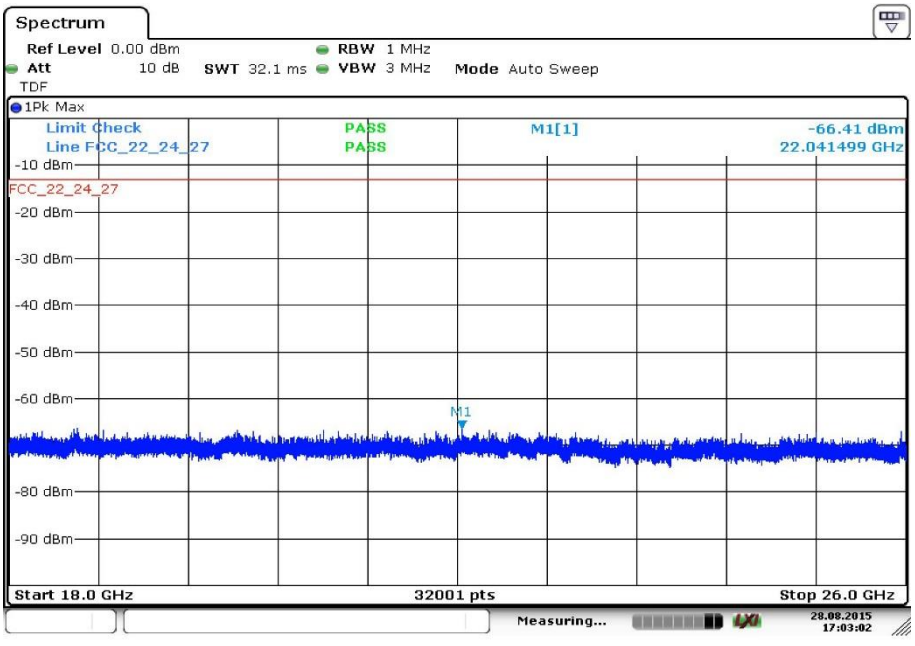
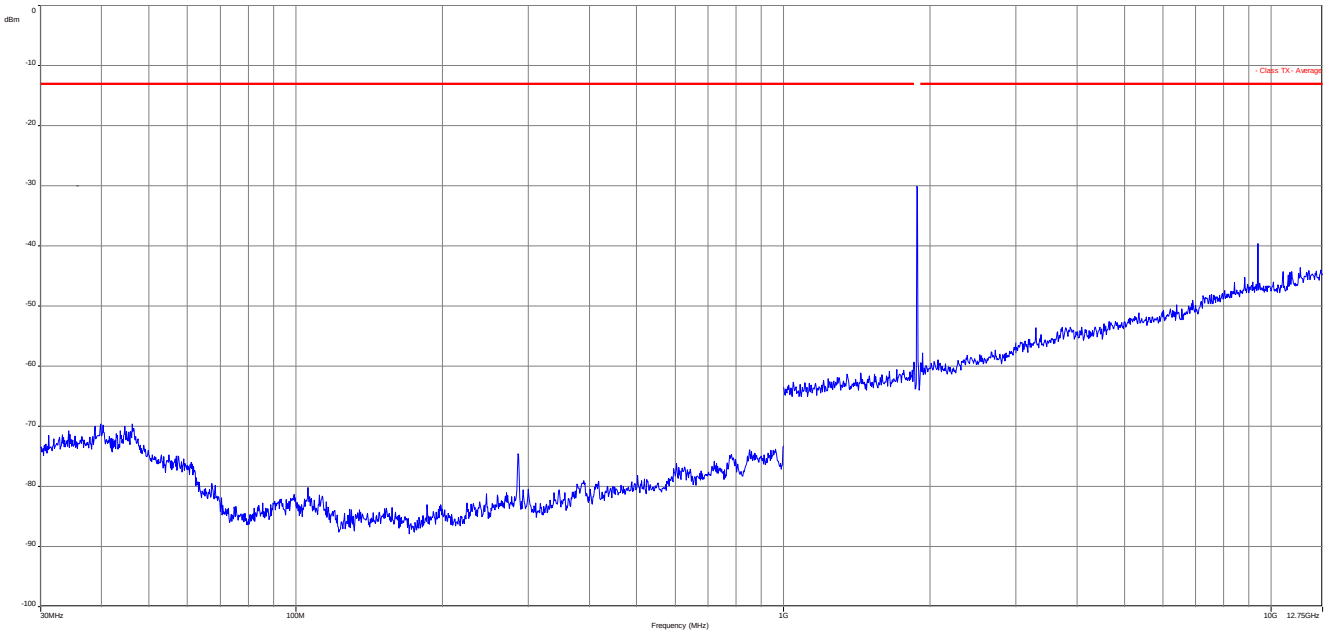
Plot 4: GMSK Channel 512 (18 GHz - 26 GHz)



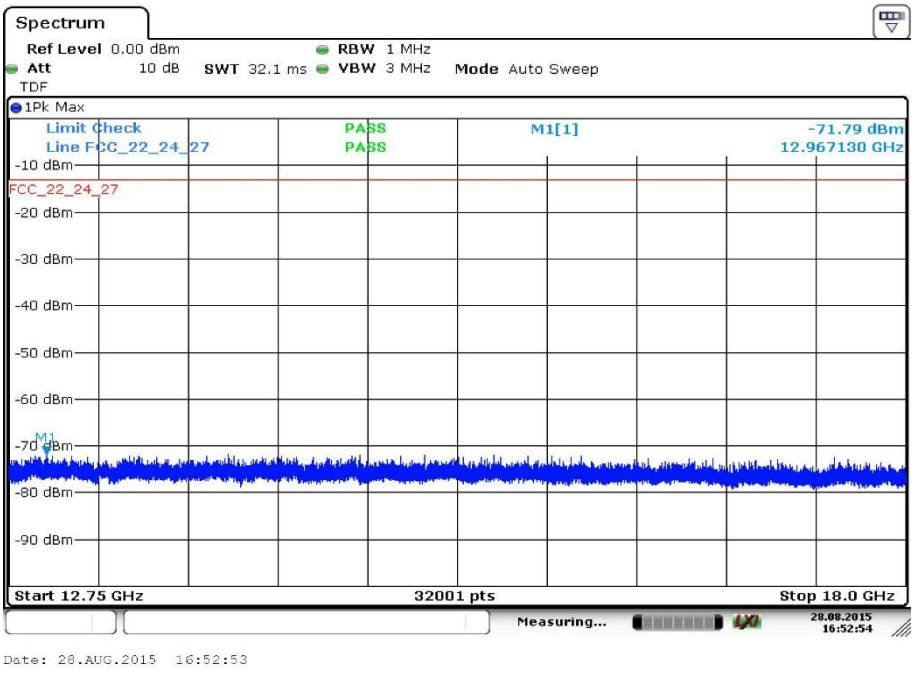
Date: 28.AUG.2015 17:03:02

Plot 5: GMSK Channel 661 (30 MHz – 12.75 GHz)

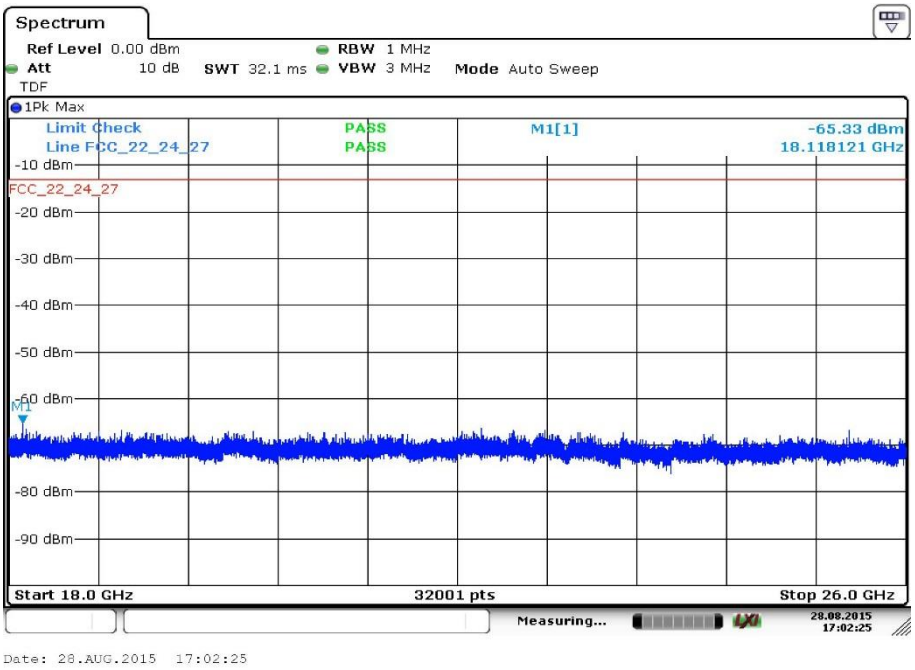


Carrier notched with 1.9 GHz rejection filter

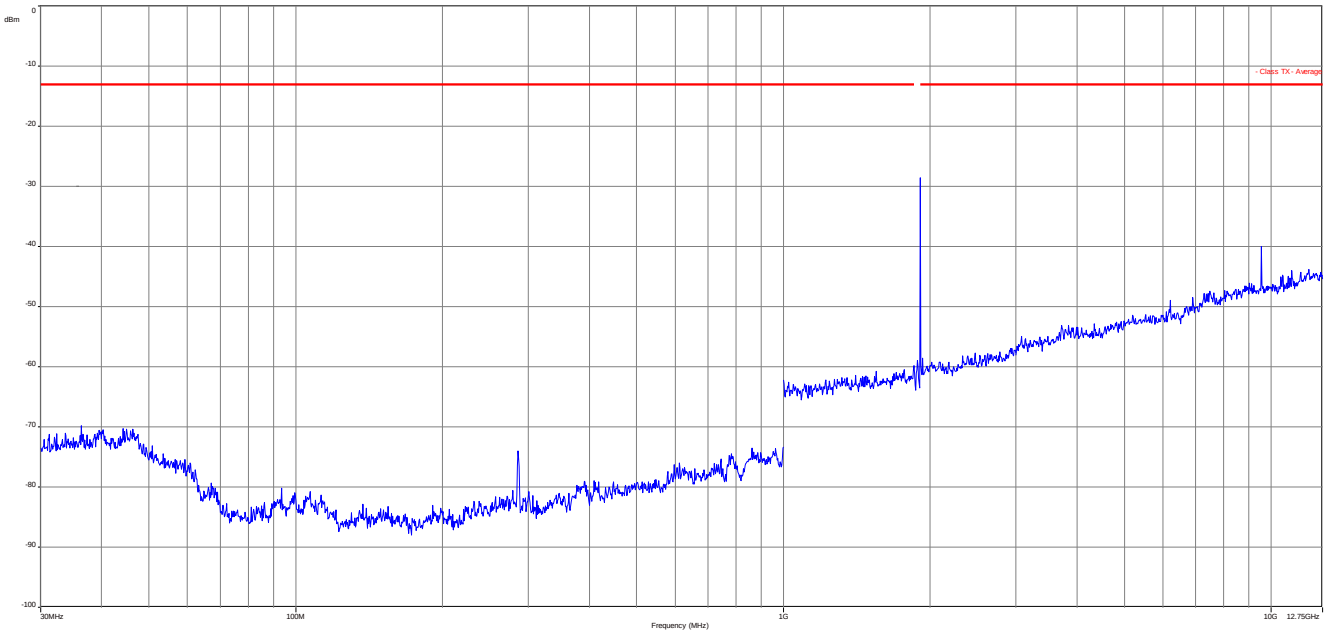
Plot 6: GMSK Channel 661 (12.75 GHz - 18 GHz)



Plot 7: GMSK Channel 661 (18 GHz - 26 GHz)

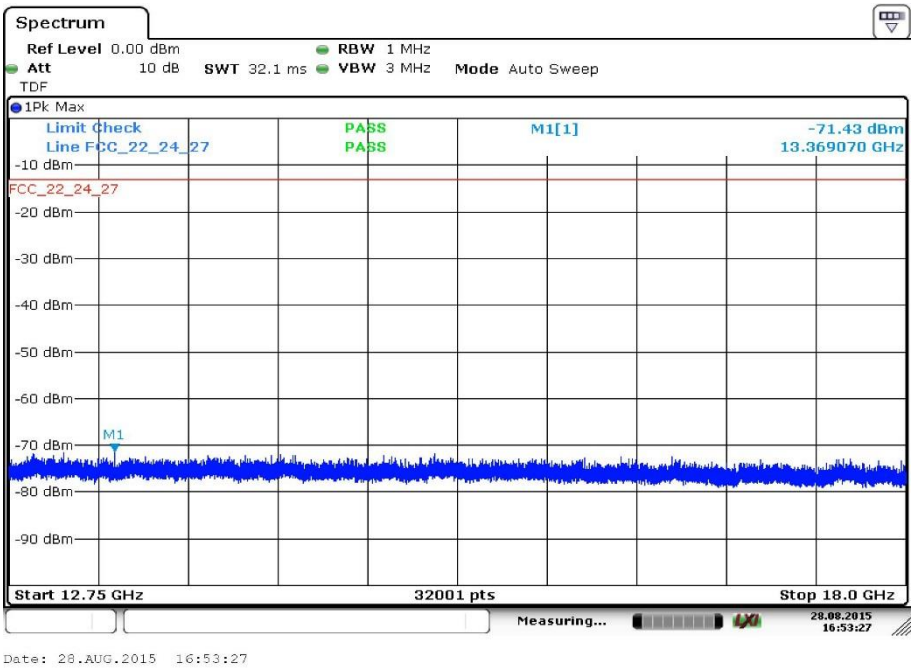


Plot 8: GMSK Channel 810 (30 MHz – 12.75 GHz)

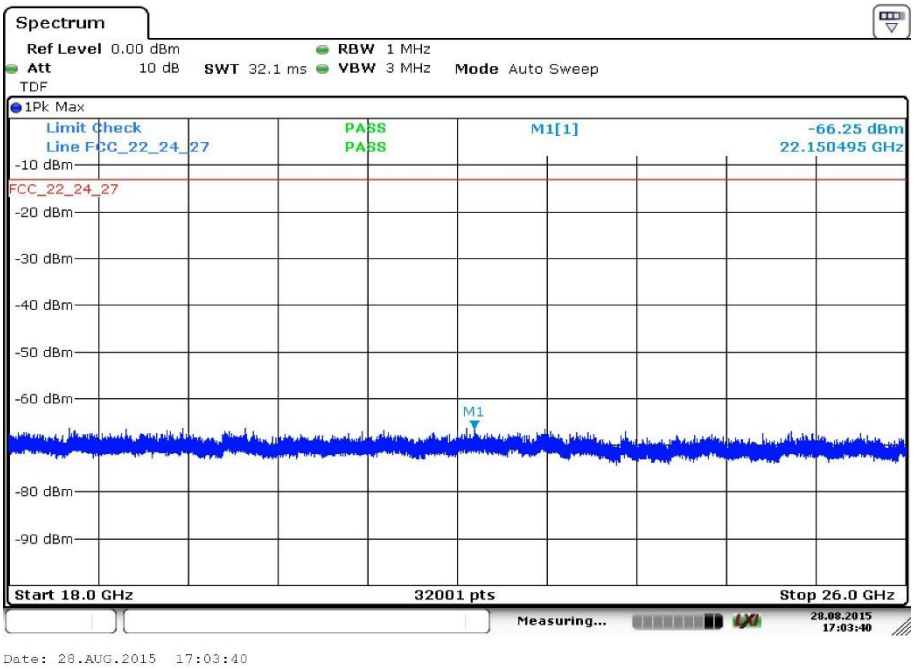


Carrier notched with 1.9 GHz rejection filter

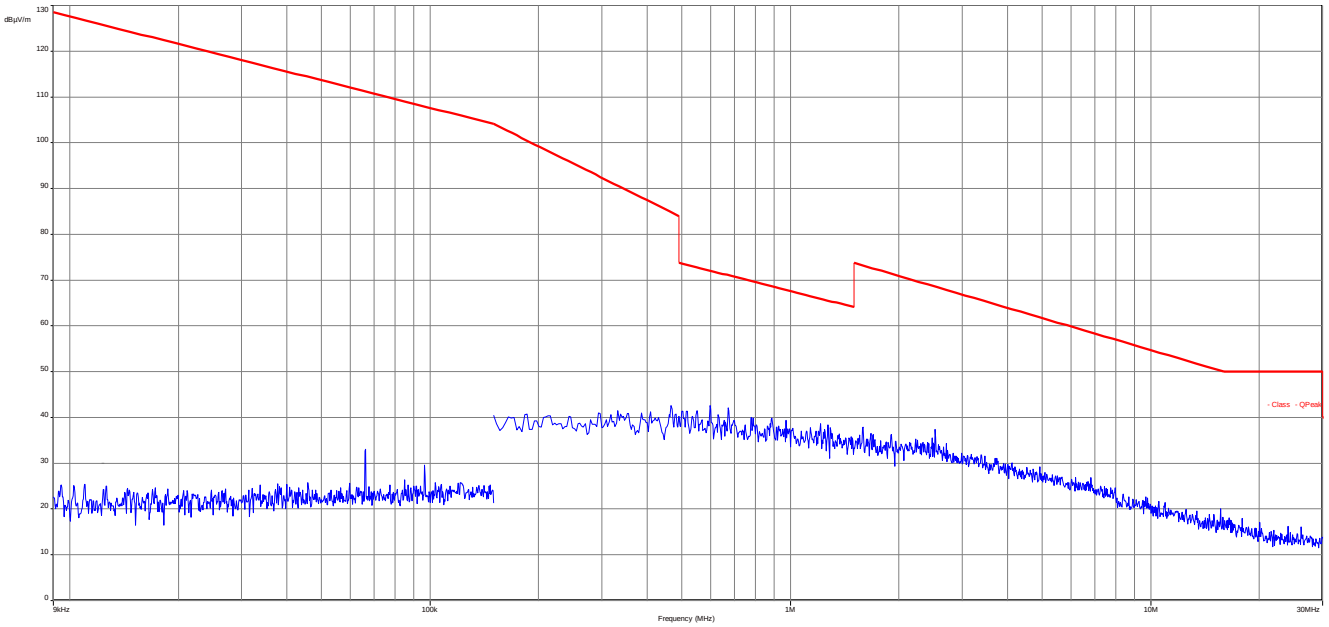
Plot 9: GMSK Channel 810 (12.75 GHz - 18 GHz)



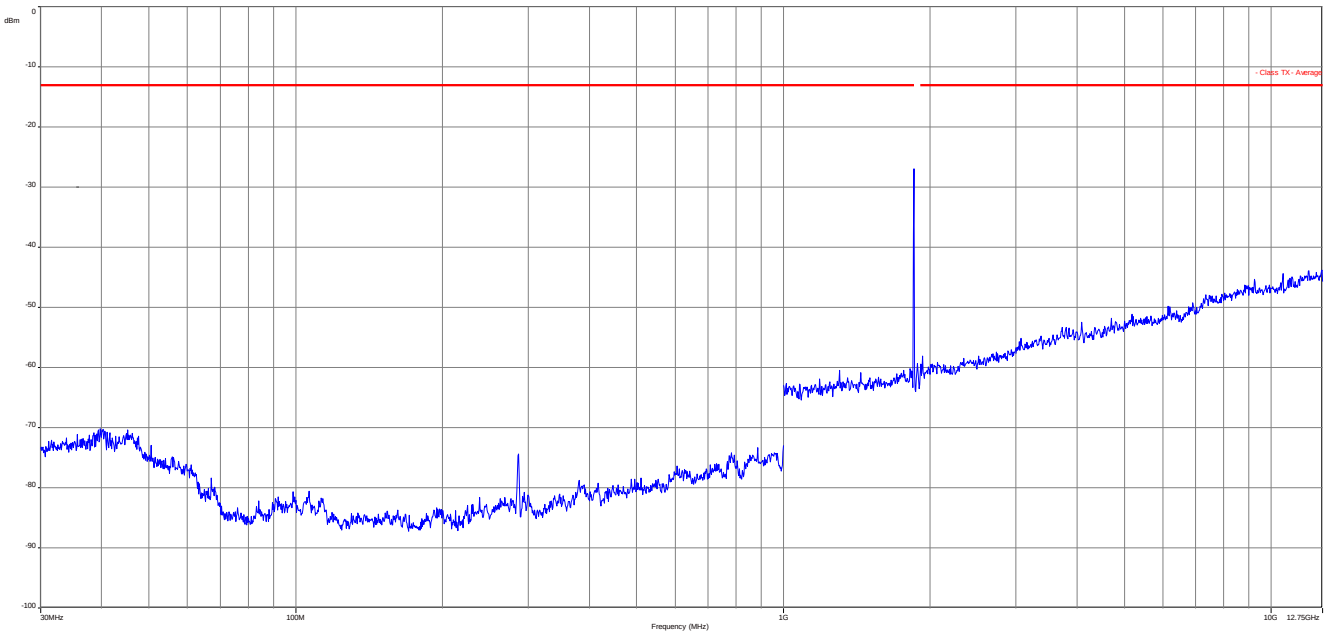
Plot 10: GMSK Channel 810 (18 GHz - 26 GHz)



Plot 11: 8-PSK Channel 661 (Traffic mode up to 30 MHz)

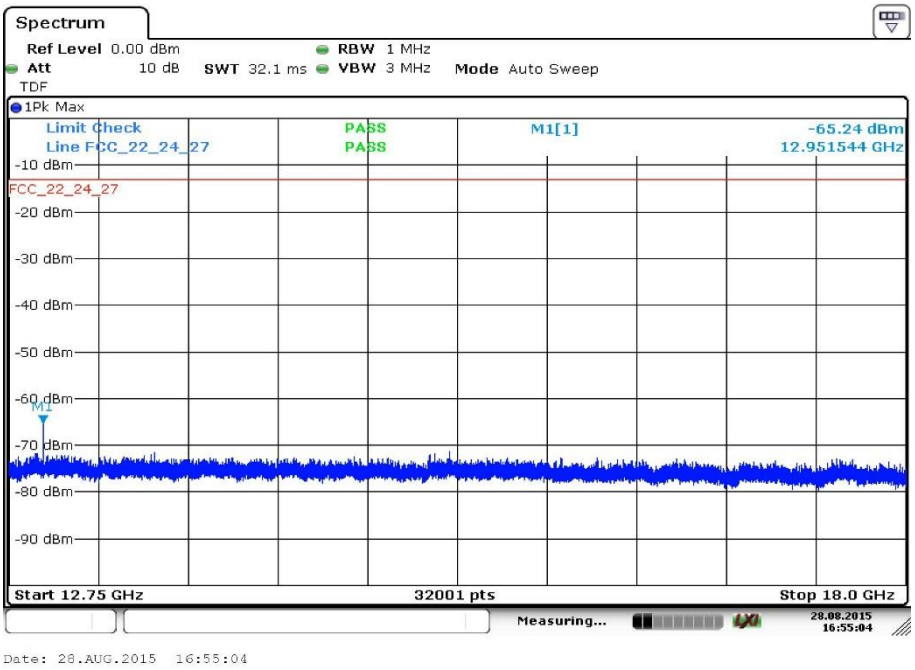


Plot 12: 8-PSK Channel 512 (30 MHz – 12.75 GHz)

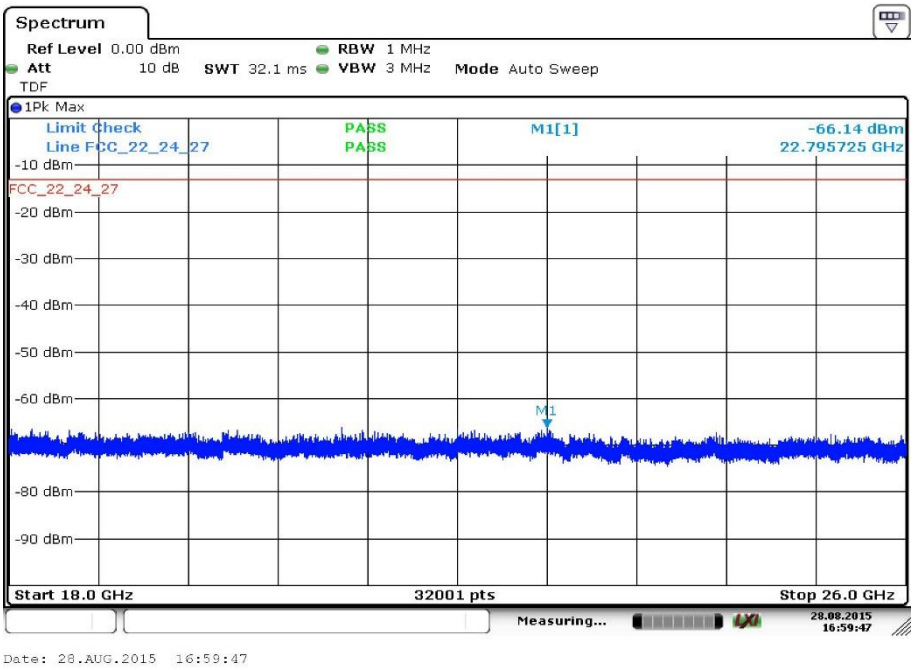


Carrier notched with 1.9 GHz rejection filter

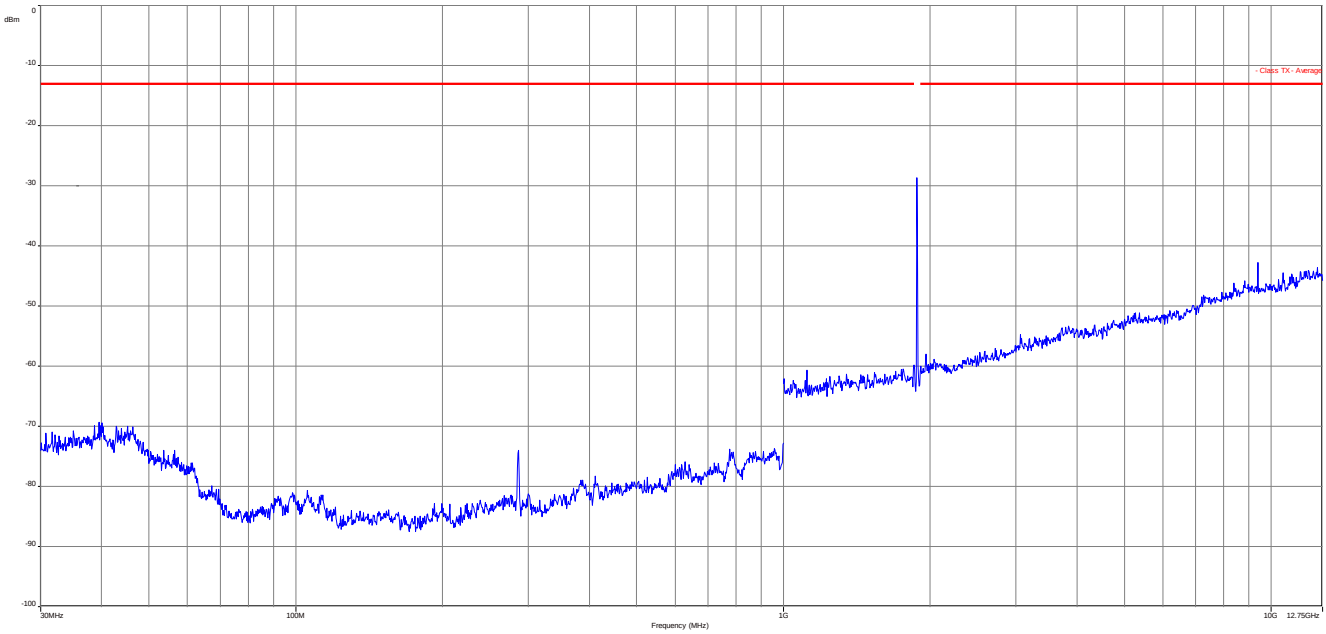
Plot 13: 8-PSK Channel 512 (12.75 GHz - 18 GHz)



Plot 14: 8-PSK Channel 512 (18 GHz - 26 GHz)

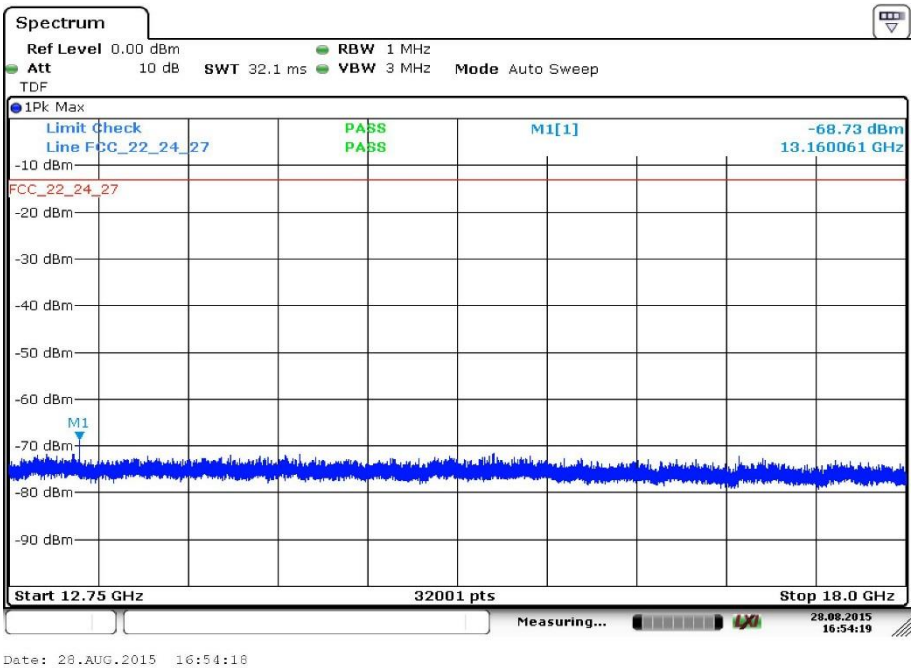


Plot 15: 8-PSK Channel 661 (30 MHz – 12.75 GHz)

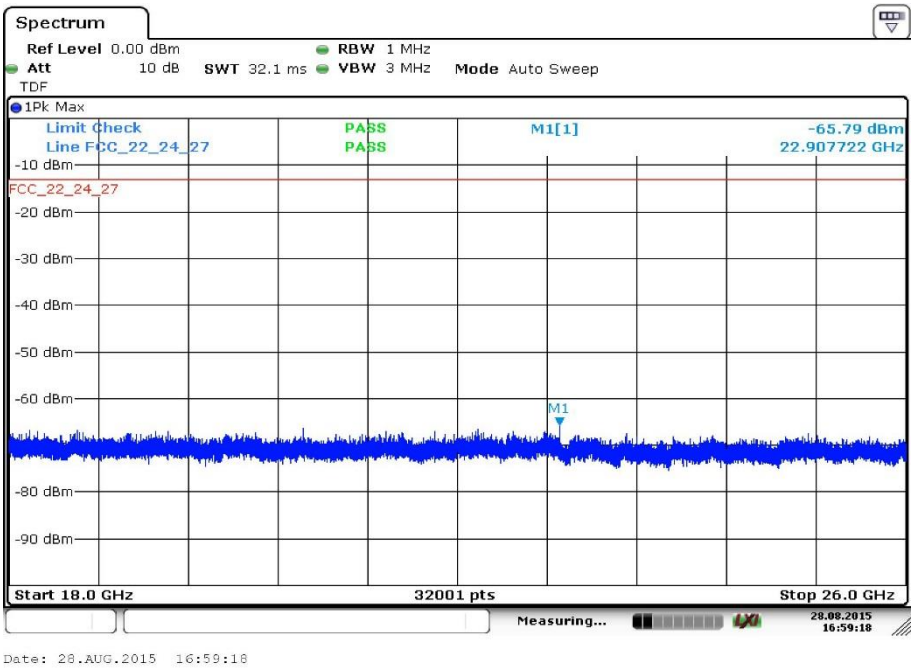


Carrier notched with 1.9 GHz rejection filter

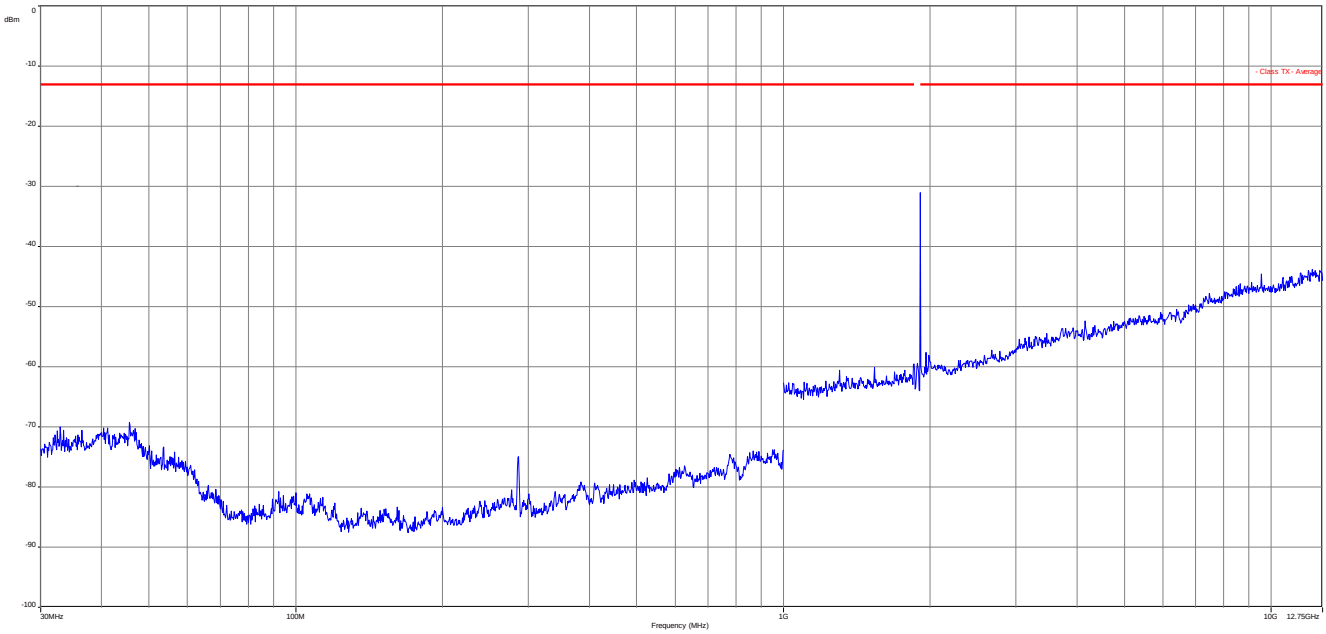
Plot 16: 8-PSK Channel 661 (12.75 GHz - 18 GHz)



Plot 17: 8-PSK Channel 661 (18 GHz - 26 GHz)

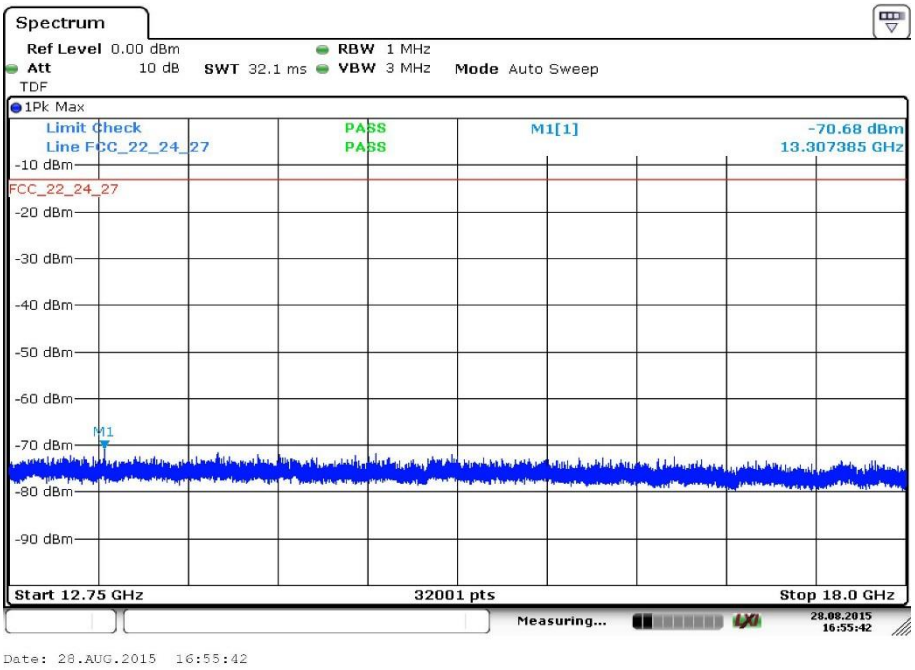


Plot 18: 8-PSK Channel 810 (30 MHz – 12.75 GHz)



Carrier notched with 1.9 GHz rejection filter

Plot 19: 8-PSK Channel 810 (12.75 GHz - 18 GHz)



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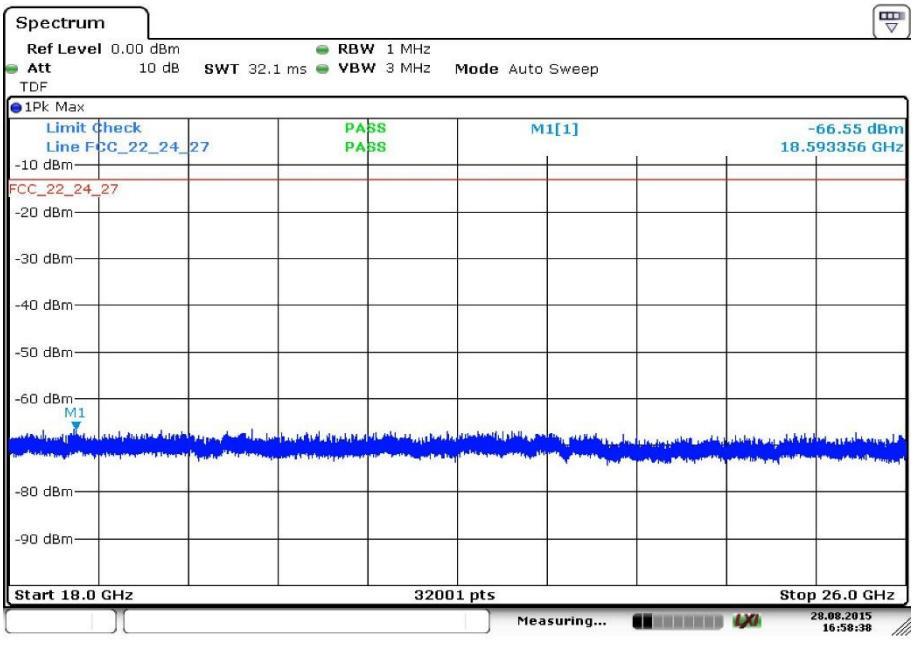
Plot 20: 8-PSK Channel 810 (18 GHz - 26 GHz)



Date: 28.AUG.2015 16:58:37

11.3 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)

11.3.1 RF output power

Description:

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

Measurement:

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

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

Measurement parameters	
Detector:	Peak and RMS (Power in Burst)
Sweep time:	Auto
Video bandwidth:	10 MHz
Resolution bandwidth:	10 MHz
Span:	Zero Span
Trace mode:	Max Hold
Test setup	See sub clause 7.1 B
Measurement uncertainty	See sub clause 8

Limits:

FCC
CFR Part 24.232 CFR Part 2.1046
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 (radiated) WCDMA Voice mode		
Frequency (MHz)	**Average Output Power (dBm) - ERP**	**Peak-to-average-ratio (dB)**
1852.4	23.6	3.0
1880.0	23.0	3.0
1907.6	22.7	3.0

Output Power (radiated) WCDMA HSUPA mode		
Frequency (MHz)	**Average Output Power (dBm) - ERP**	**Peak-to-average-ratio (dB)**
1852.4	21.8	3.0
1880.0	22.1	3.0
1907.6	22.3	3.0

11.3.2 Spurious emissions radiated

Description:

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

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

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

Measurement:

Measurement parameters	
Detector:	Peak
Sweep time:	2 sec.
Video bandwidth:	Below 1 GHz: 100 kHz Above 1 GHz: 1 MHz
Resolution bandwidth:	Below 1 GHz: 100 kHz Above 1 GHz: 1 MHz
Span:	100 MHz Steps
Trace mode:	Max Hold
Test setup	See sub clause 7.1 A and 7.2 A
Measurement uncertainty	See sub clause 8

Limits:

FCC
CFR Part 24.238 CFR Part 2.1053
Spurious Emissions Radiated
Attenuation ≥ 43 + 10log(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.

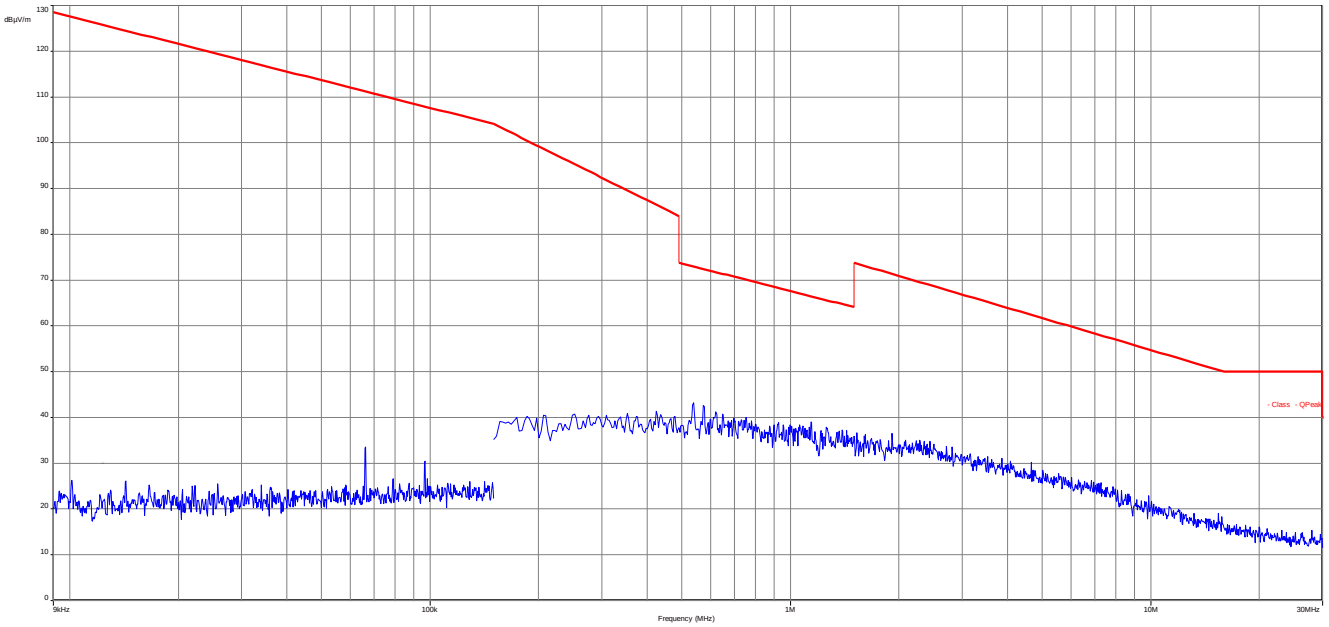
As can be seen from this data, the emissions from the test item were within the specification limit.

Spurious Emission Level (dBm) Voice								
Harmonic	Ch. 9262 Freq. (MHz)	Level [dBm]	Harmonic	Ch. 9400 Freq. (MHz)	Level [dBm]	Harmonic	Ch. 9538 Freq. (MHz)	Level [dBm]
2	3704.8	All detected emission are more than 20 dB below the limit.	2	3760.0	All detected emission are more than 20 dB below the limit.	2	3815.2	All detected emission are more than 20 dB below the limit.
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	

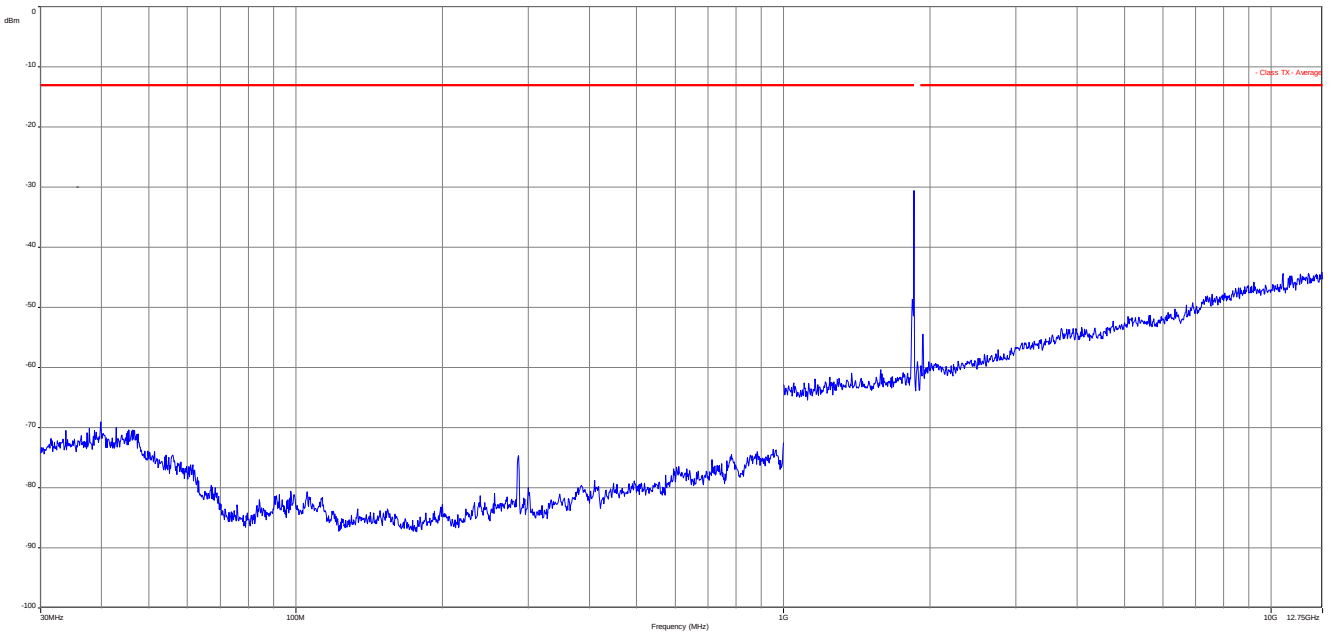
Spurious Emission Level (dBm) HSUPA								
Harmonic	Ch. 9262 Freq. (MHz)	Level [dBm]	Harmonic	Ch. 9400 Freq. (MHz)	Level [dBm]	Harmonic	Ch. 9538 Freq. (MHz)	Level [dBm]
2	3704.8	All detected emission are more than 20 dB below the limit.	2	3760.0	All detected emission are more than 20 dB below the limit.	2	3815.2	All detected emission are more than 20 dB below the limit.
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	

Plots:

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

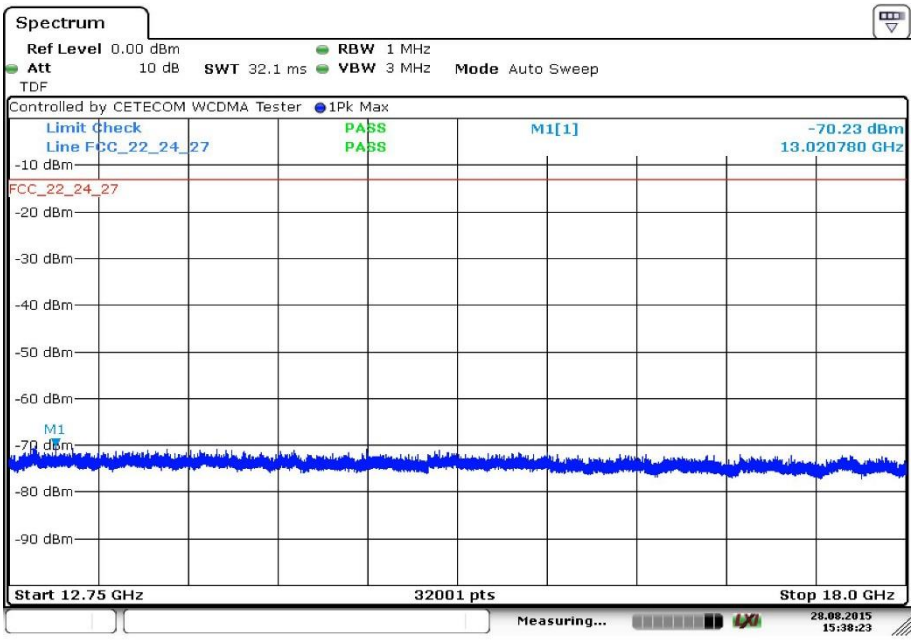


Plot 2: Voice Channel 9262 (30 MHz – 12.75 GHz)



Carrier notched with 1.9 GHz rejection filter

Plot 3: Voice Channel 9262 (12.75 GHz - 18 GHz)



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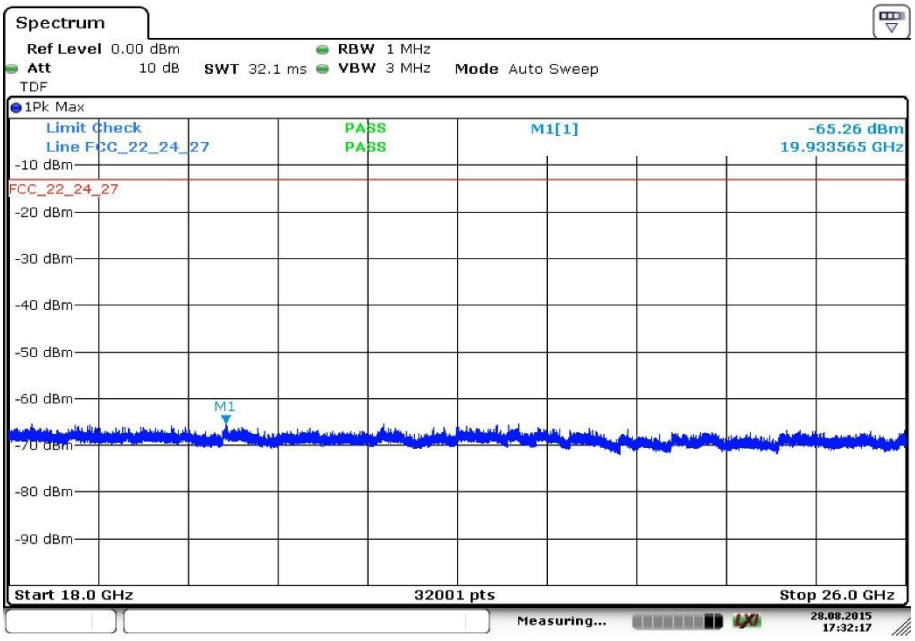
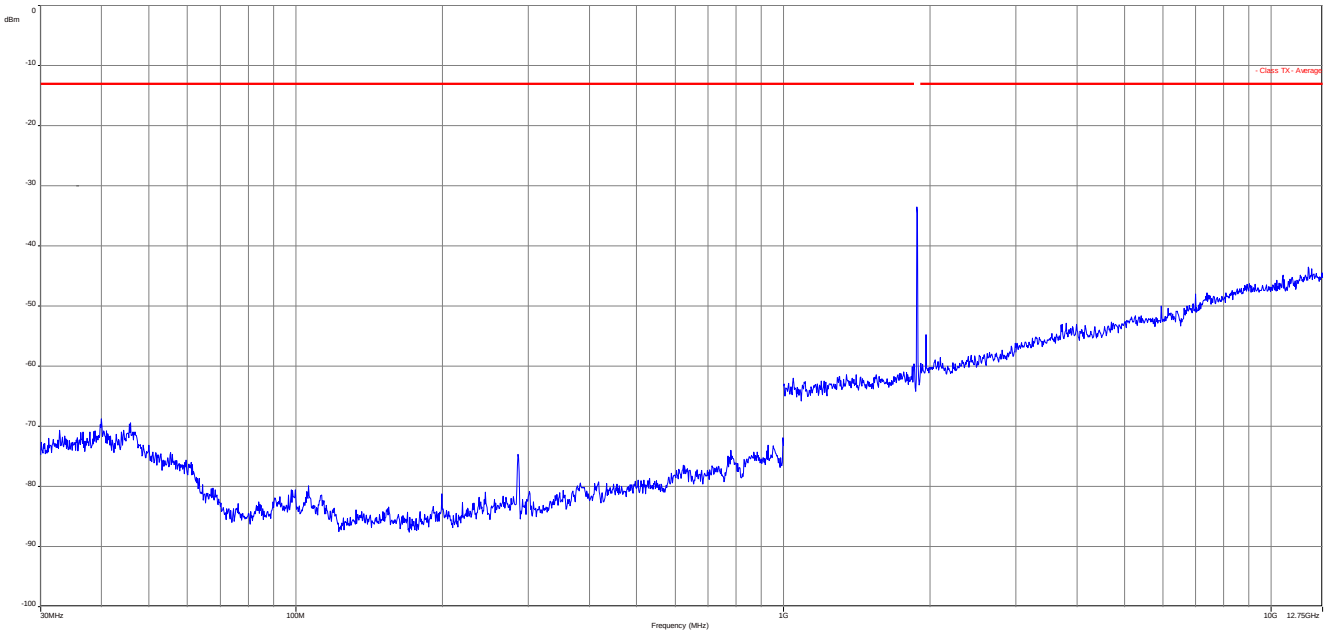
Plot 4: Voice Channel 9262 (18 GHz - 26 GHz)



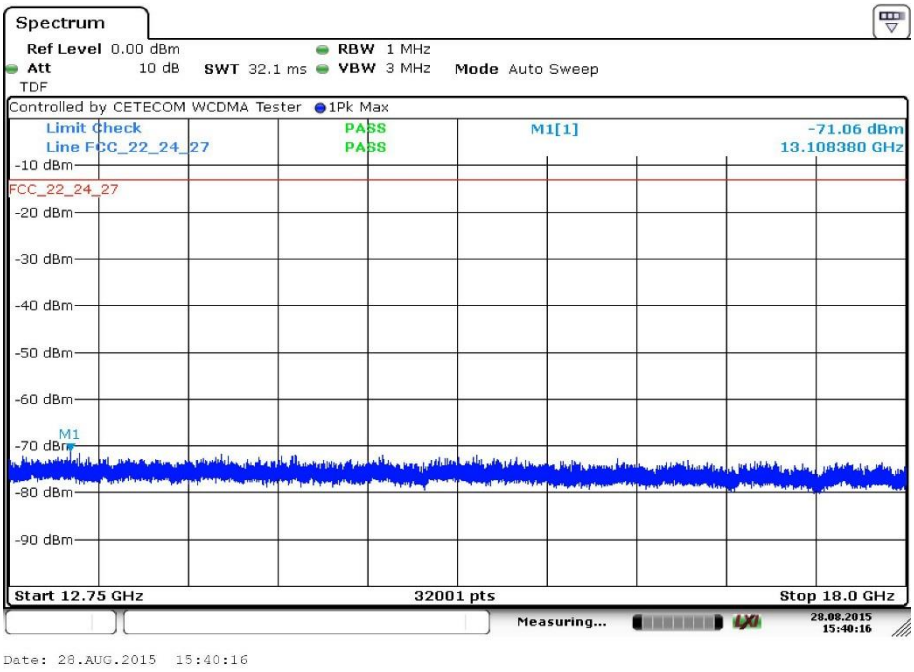
Date: 28.AUG.2015 17:32:16

Plot 5: Voice Channel 9400 (30 MHz – 12.75 GHz)

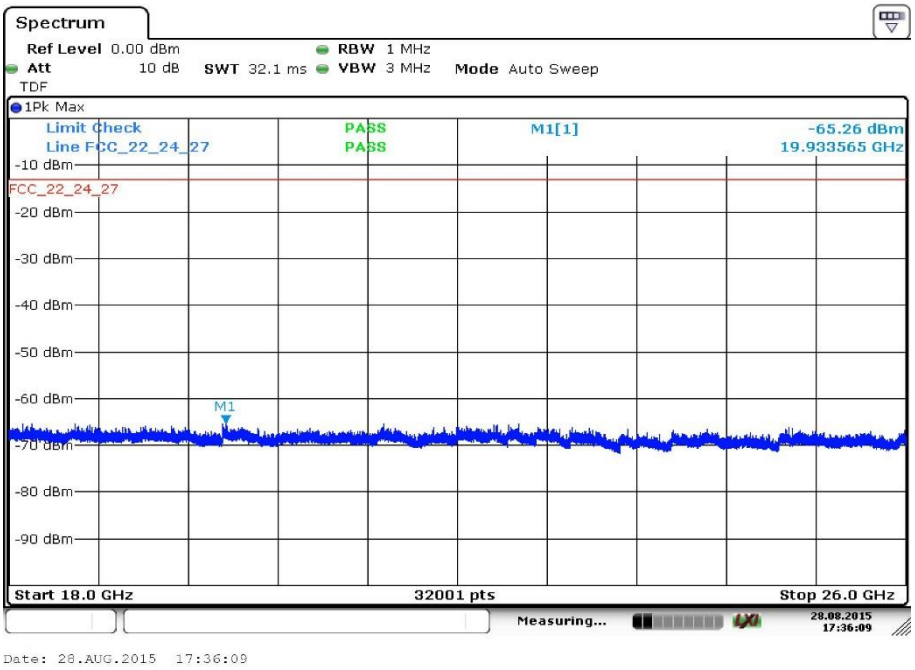


Carrier notched with 1.9 GHz rejection filter

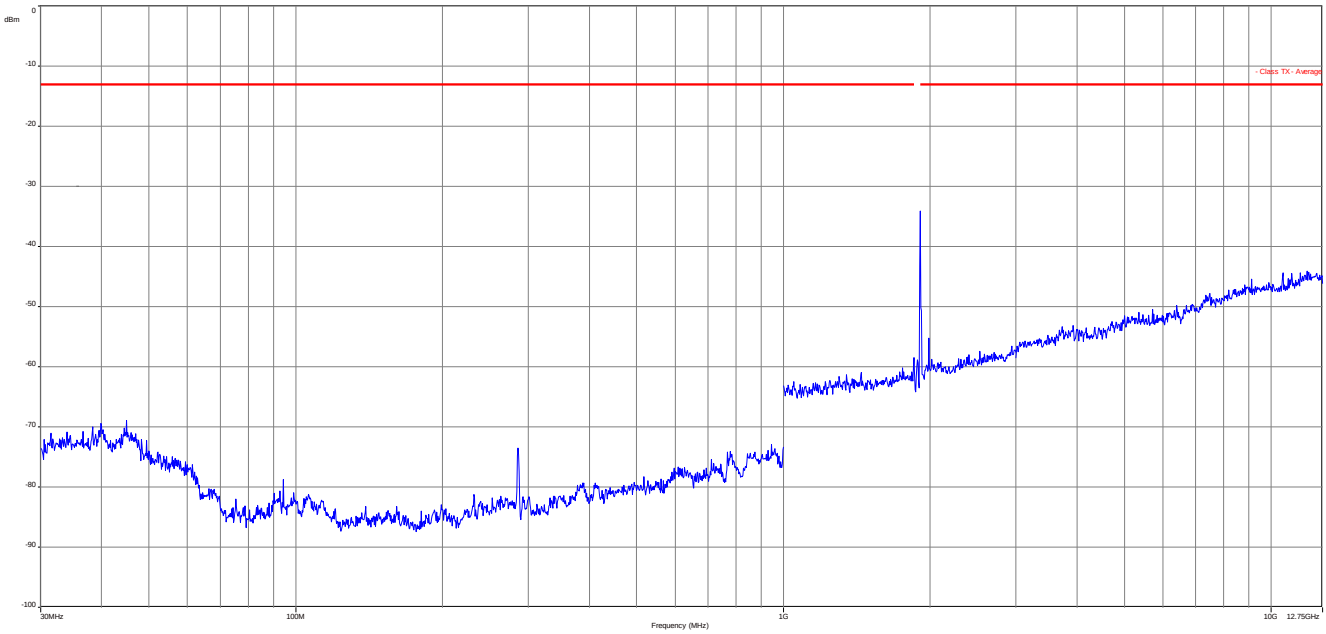
Plot 6: Voice Channel 9400 (12.75 GHz - 18 GHz)



Plot 7: Voice Channel 9400 (18 GHz - 26 GHz)

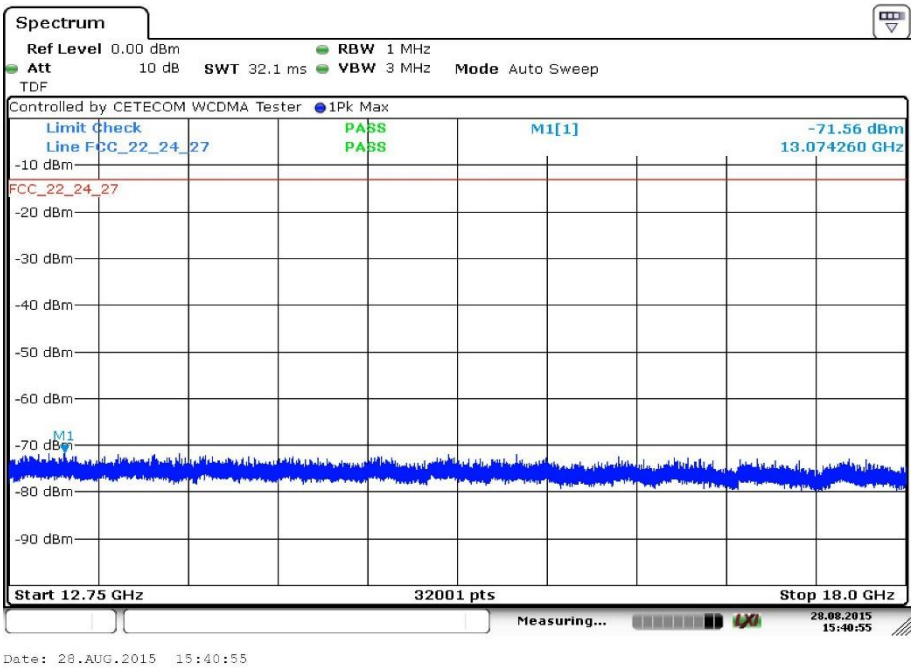


Plot 8: Voice Channel 9538 (30 MHz – 12.75 GHz)

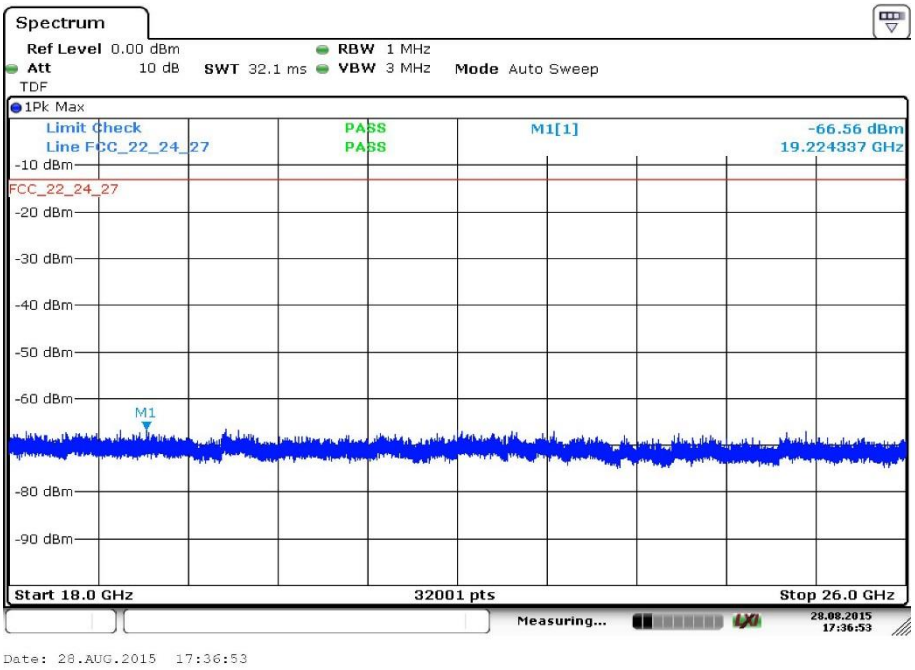


Carrier notched with 1.9 GHz rejection filter

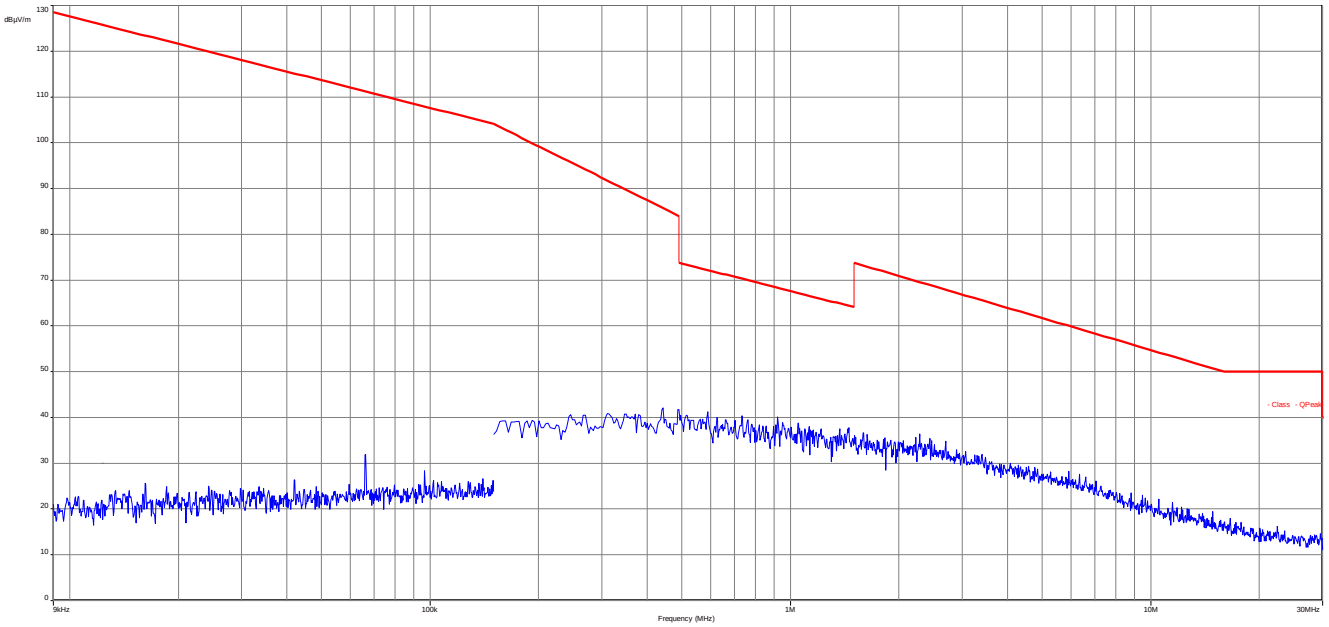
Plot 9: Voice Channel 9538 (12.75 GHz - 18 GHz)



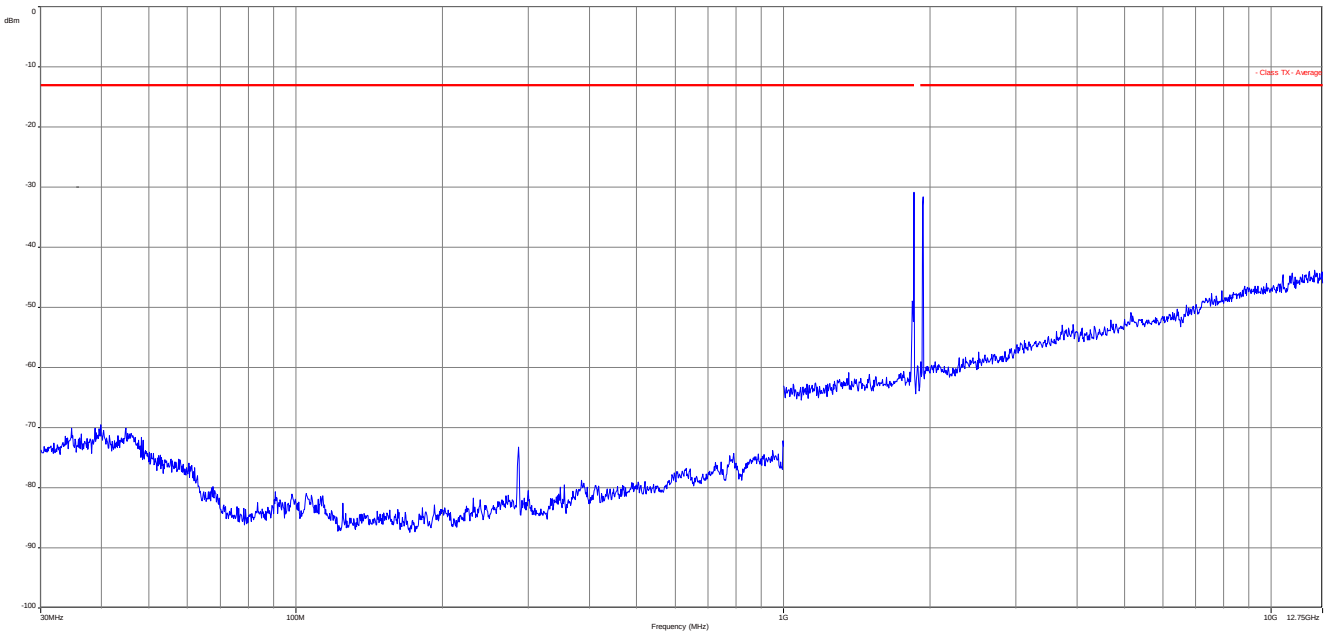
Plot 10: Voice Channel 9538 (18 GHz - 26 GHz)



Plot 11: HSUPA Channel 9400 (Traffic mode up to 30 MHz)

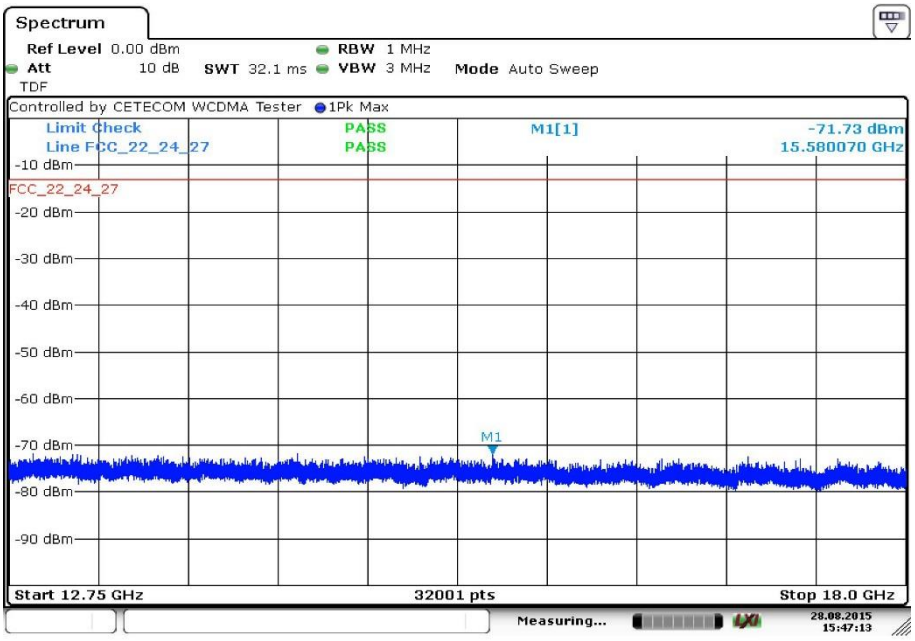


Plot 12: HSUPA Channel 9262 (30 MHz – 12.75 GHz)

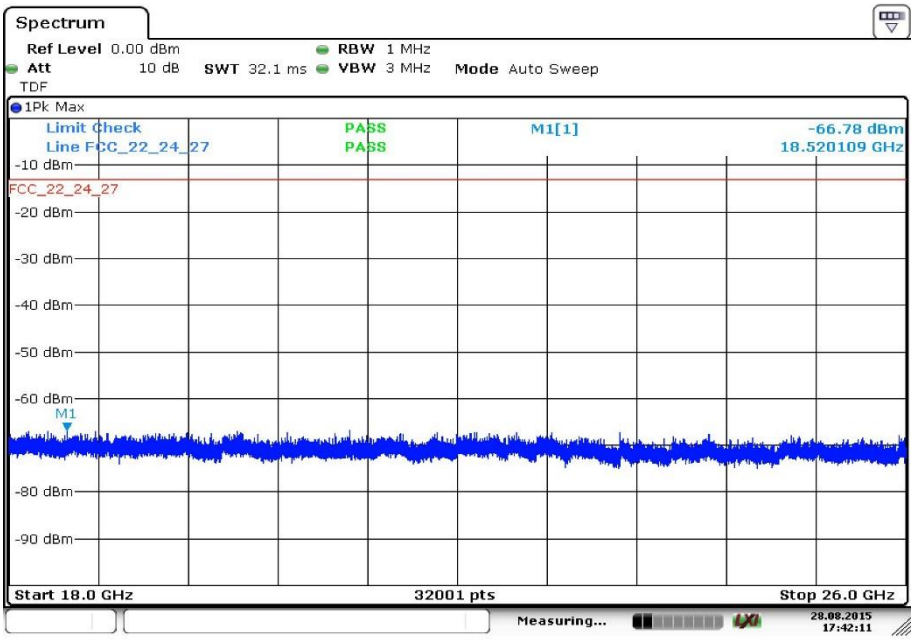


Carrier notched with 1.9 GHz rejection filter

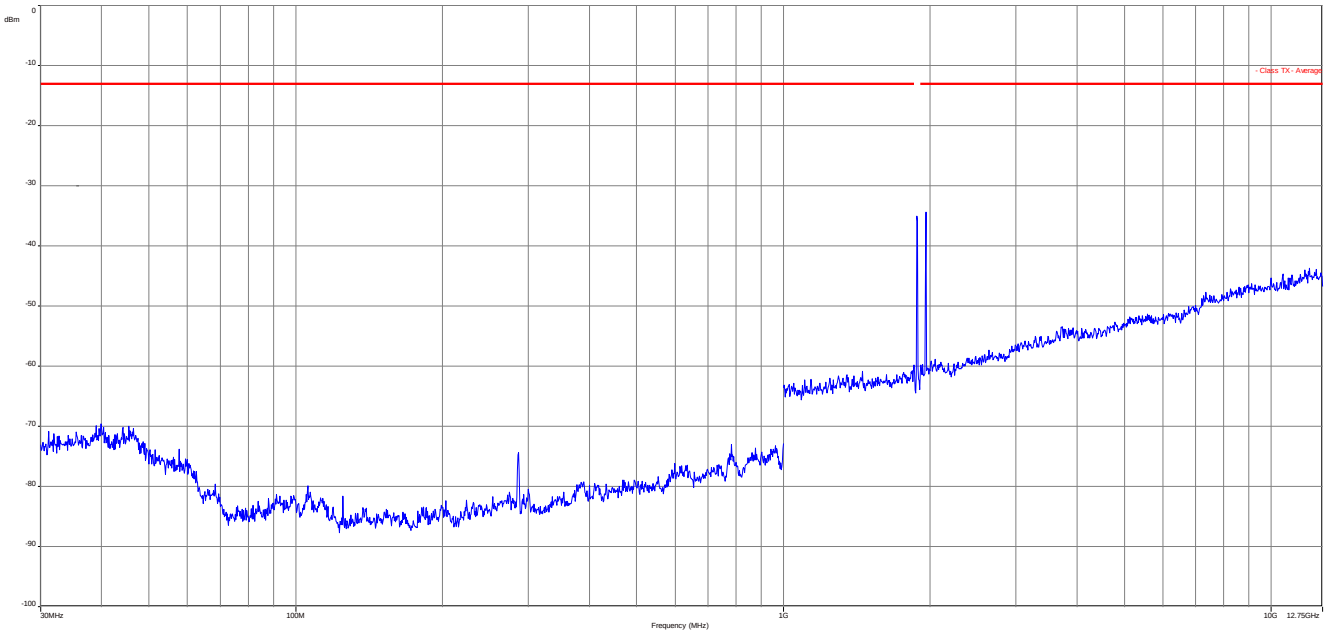
Plot 13: HSUPA Channel 9262 (12.75 GHz - 18 GHz)



Plot 14: HSUPA Channel 9262 (18 GHz - 26 GHz)

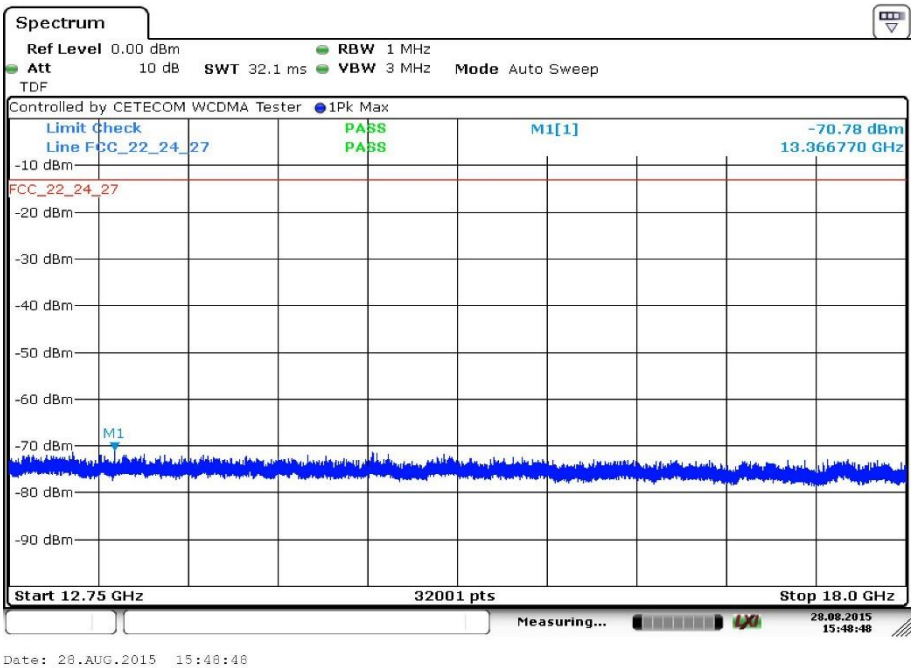


Plot 15: HSUPA Channel 9400 (30 MHz – 12.75 GHz)

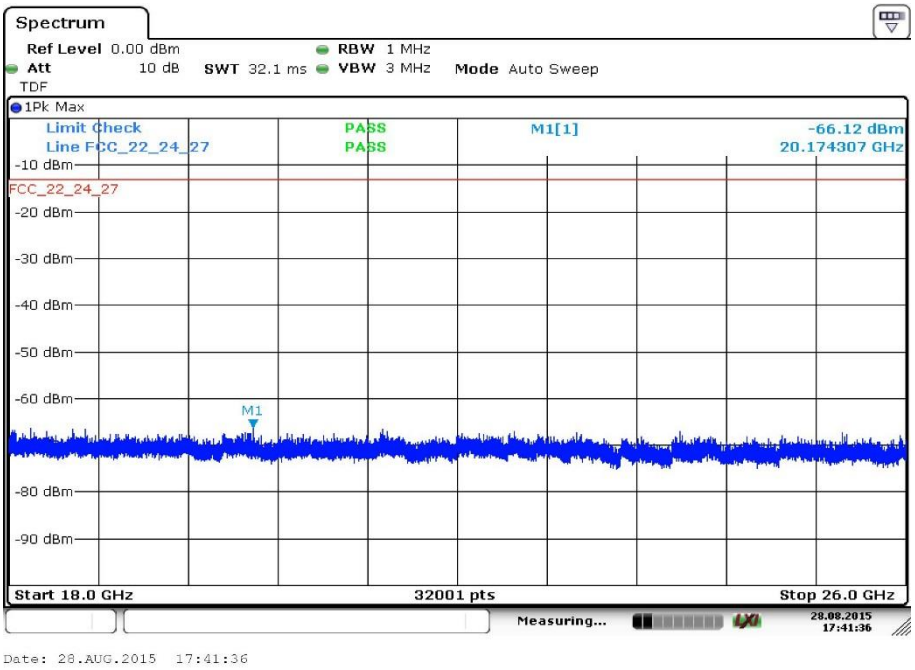


Carrier notched with 1.9 GHz rejection filter

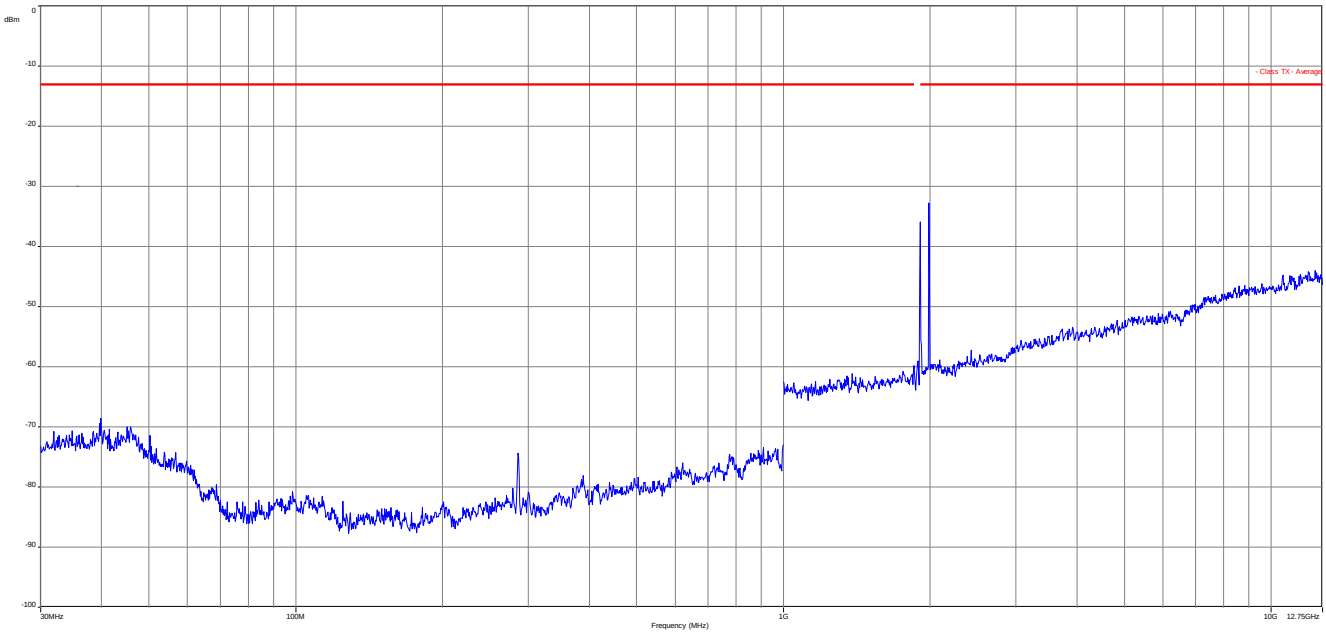
Plot 16: HSUPA Channel 9400 (12.75 GHz - 18 GHz)



Plot 17: HSUPA Channel 9400 (18 GHz - 26 GHz)

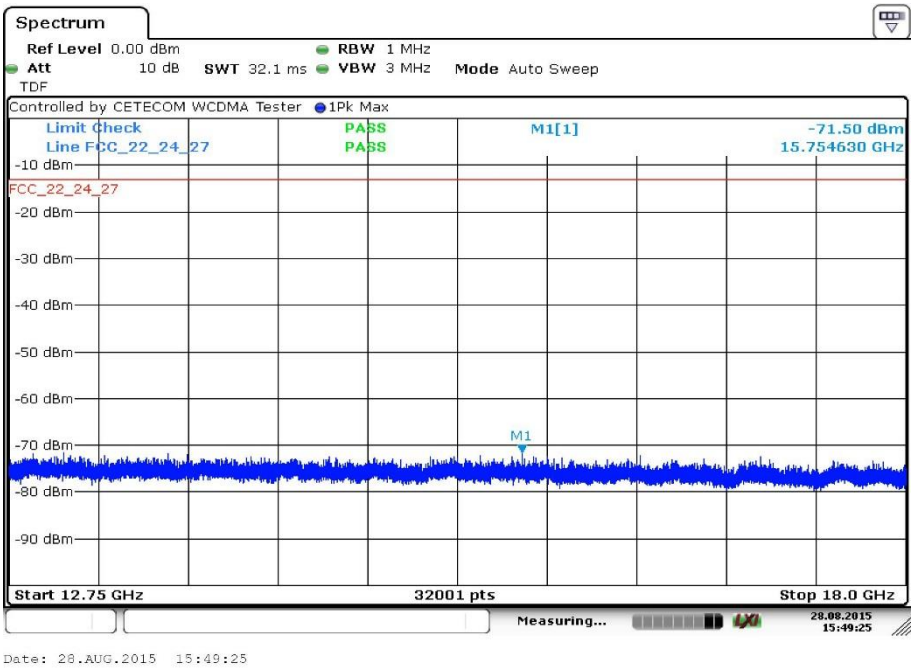


Plot 18: HSUPA Channel 9538 (30 MHz – 12.75 GHz)



Carrier notched with 1.9 GHz rejection filter

Plot 19: HSUPA Channel 9538 (12.75 GHz - 18 GHz)



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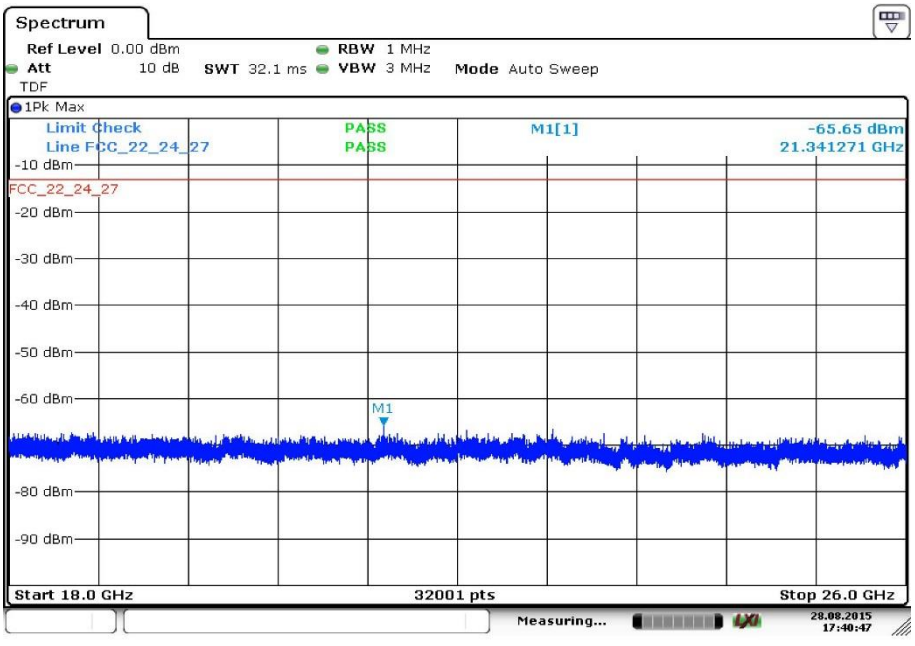
Plot 20: HSUPA Channel 9538 (18 GHz - 26 GHz)



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11.4 Results UMTS band IV

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)

11.4.1 RF output power

Description:

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

Measurement:

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

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

Measurement parameters	
Detector:	Peak and RMS (Power in Burst)
Sweep time:	Auto
Video bandwidth:	10 MHz
Resolution bandwidth:	10 MHz
Span:	Zero Span
Trace mode:	Max Hold
Test setup	See sub clause 7.1 B
Measurement uncertainty	See sub clause 8

Limits:

FCC
CFR Part 27.50 CFR Part 2.1046
Nominal Peak Output Power
+30.00 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 (radiated) WCDMA Voice mode		
Frequency (MHz)	**Average Output Power (dBm) - ERP**	**Peak-to-average-ratio (dB)**
1712.4	27.5	3.0
1732.4	27.0	3.0
1752.6	26.4	3.0

Output Power (radiated) WCDMA HSUPA mode		
Frequency (MHz)	**Average Output Power (dBm) - ERP**	**Peak-to-average-ratio (dB)**
1712.4	24.3	3.0
1732.4	24.1	3.0
1752.6	22.4	3.0

11.4.2 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 1755 MHz. Measurement made up to 25 GHz. The resolution bandwidth is set as outlined in Part 27.53. The spectrum was scanned with the mobile station transmitting at carrier frequencies that pertain to low, mid and high channels of the UMTS band IV.

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

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

Measurement:

Measurement parameters	
Detector:	Peak
Sweep time:	2 sec.
Video bandwidth:	Below 1 GHz: 100 kHz Above 1 GHz: 1 MHz
Resolution bandwidth:	Below 1 GHz: 100 kHz Above 1 GHz: 1 MHz
Span:	100 MHz Steps
Trace mode:	Max Hold
Test setup	See sub clause 7.1 A and 7.2 A
Measurement uncertainty	See sub clause 8

Limits:

FCC
CFR Part 27.53(g) CFR Part 2.1053
Spurious Emissions Radiated
Attenuation ≥ 43 + 10log(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 IV (1712.4 MHz, 1732.4 MHz and 1752.6 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 IV 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.

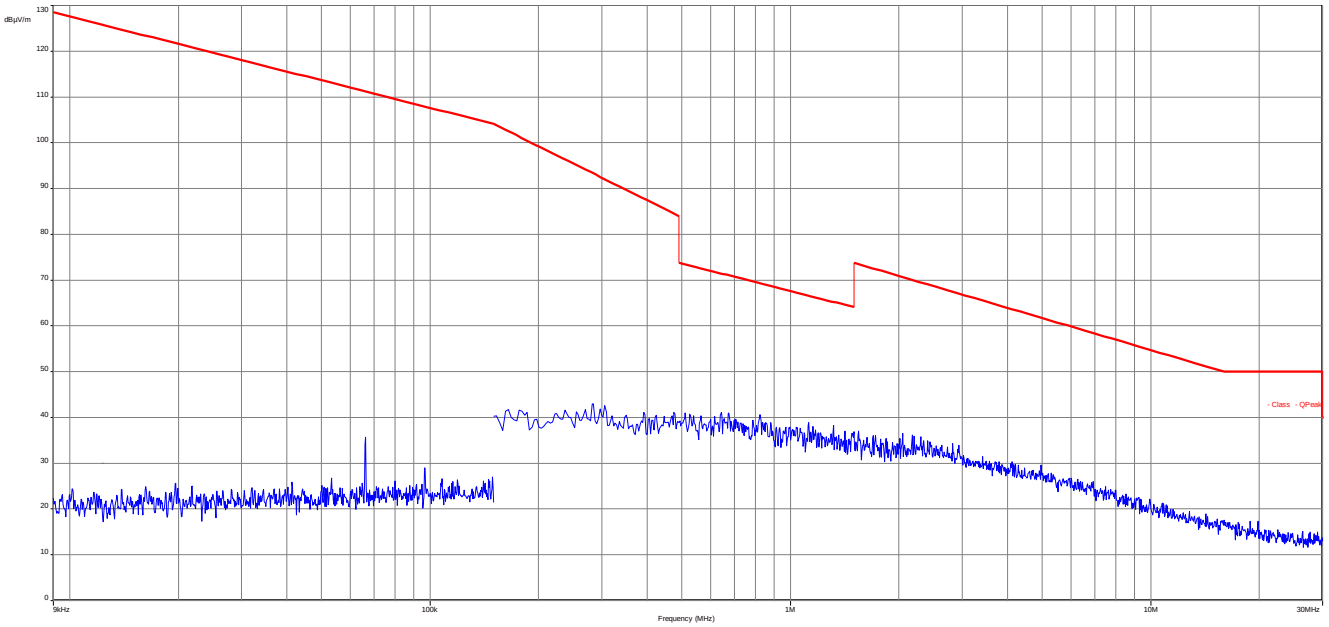
As can be seen from this data, the emissions from the test item were within the specification limit.

Spurious Emission Level Voice (dBm)								
Harmonic	Ch. 1312 Freq. (MHz)	Level [dBm]	Harmonic	Ch. 1412 Freq. (MHz)	Level [dBm]	Harmonic	Ch. 1513 Freq. (MHz)	Level [dBm]
2	3424.8	All detected emission are more than 20 dB below the limit.	2	3464.8	All detected emission are more than 20 dB below the limit.	2	3505.2	All detected emission are more than 20 dB below the limit.
3	5137.2		3	5197.2		3	5257.8	
4	6849.6		4	6929.6		4	7010.4	
5	8562.0		5	8662.0		5	8763.0	
6	10274.4		6	10394.4		6	10515.6	
7	11986.8		7	12126.8		7	12268.2	
8	13699.2		8	13859.2		8	14020.8	
9	15411.6		9	15591.6		9	15773.4	
10	17124.0		10	17324.0		10	17526.0	

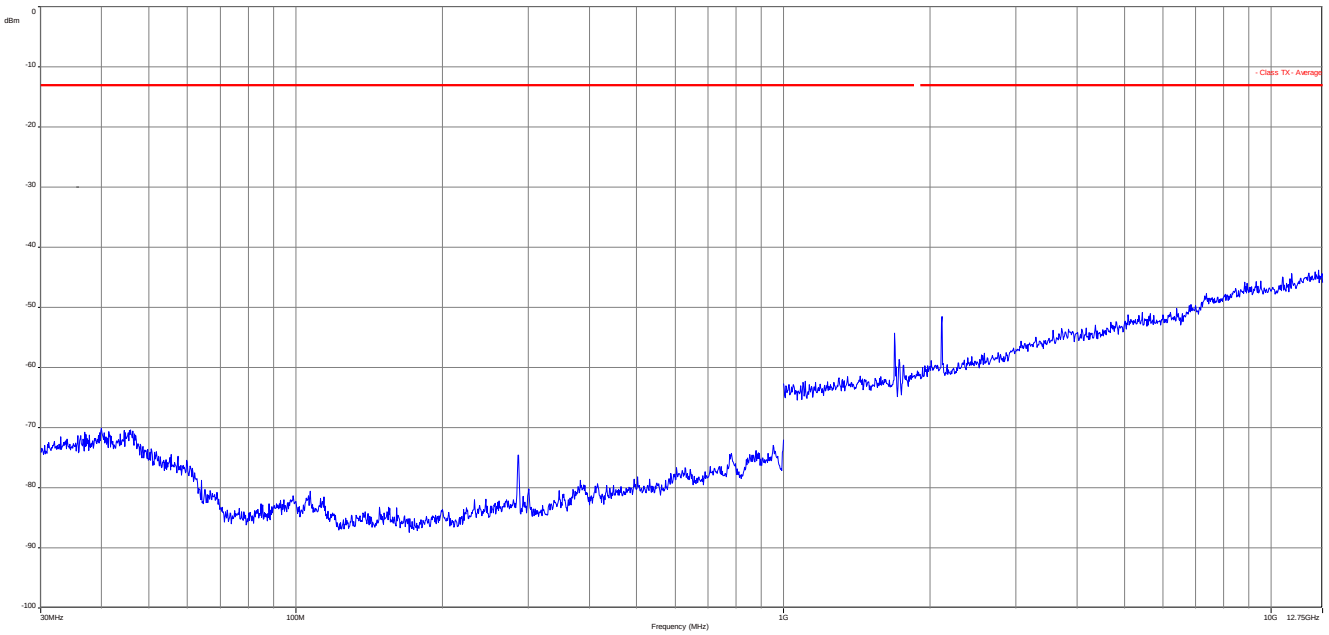
Spurious Emission Level HSUPA (dBm)								
Harmonic	Ch. 1312 Freq. (MHz)	Level [dBm]	Harmonic	Ch. 1412 Freq. (MHz)	Level [dBm]	Harmonic	Ch. 1513 Freq. (MHz)	Level [dBm]
2	3424.8	All detected emission are more than 20 dB below the limit.	2	3464.8	All detected emission are more than 20 dB below the limit.	2	3505.2	All detected emission are more than 20 dB below the limit.
3	5137.2		3	5197.2		3	5257.8	
4	6849.6		4	6929.6		4	7010.4	
5	8562.0		5	8662.0		5	8763.0	
6	10274.4		6	10394.4		6	10515.6	
7	11986.8		7	12126.8		7	12268.2	
8	13699.2		8	13859.2		8	14020.8	
9	15411.6		9	15591.6		9	15773.4	
10	17124.0		10	17324.0		10	17526.0	

Plots:

Plot 1: Voice Channel 1412 (Traffic mode up to 30 MHz)

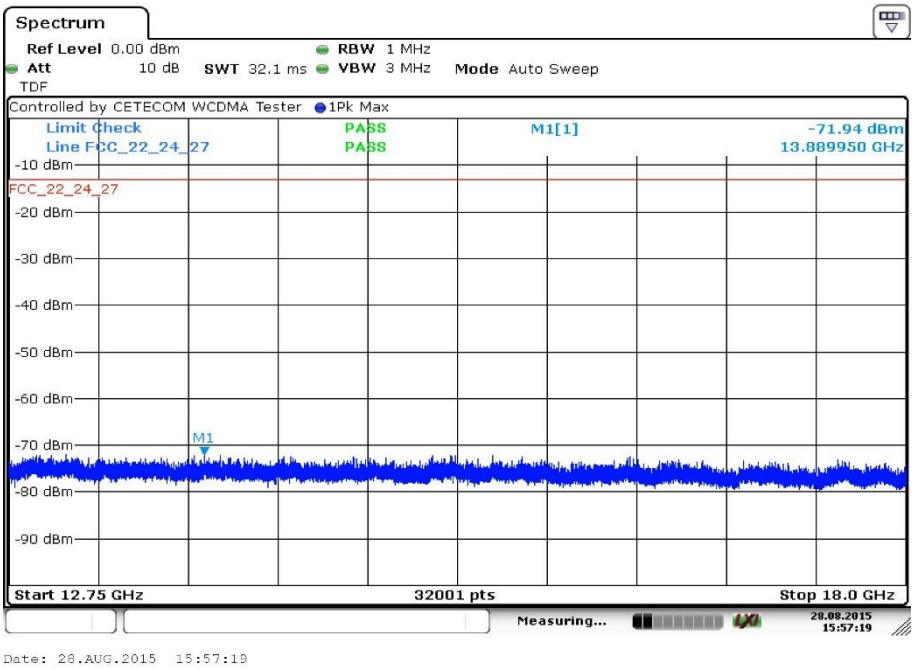


Plot 2: Voice Channel 1312 (30 MHz – 12.75 GHz)



Carrier notched with 1.9 GHz rejection filter

Plot 3: Voice Channel 1312 (12.75 GHz - 18 GHz)



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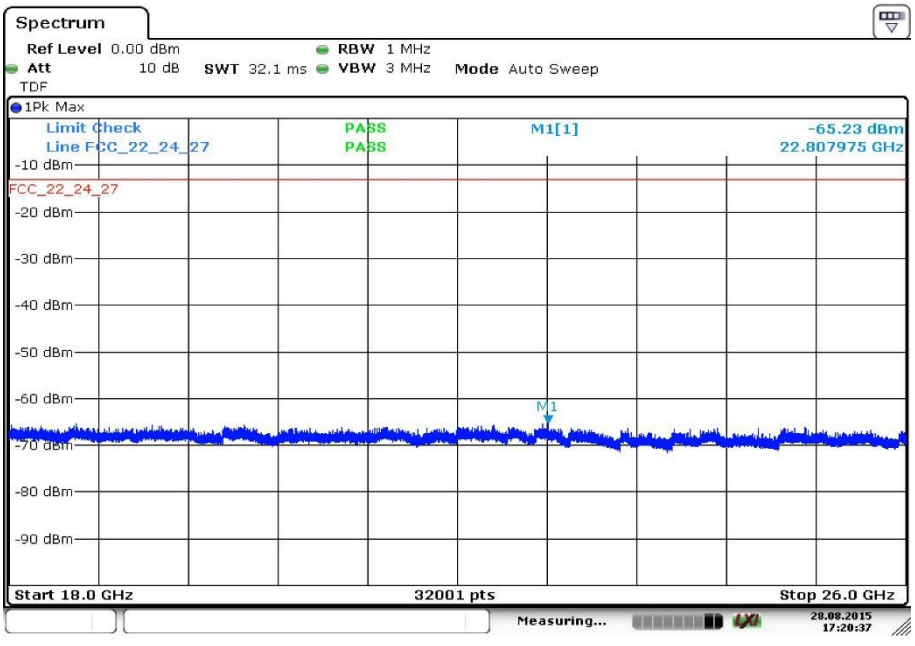
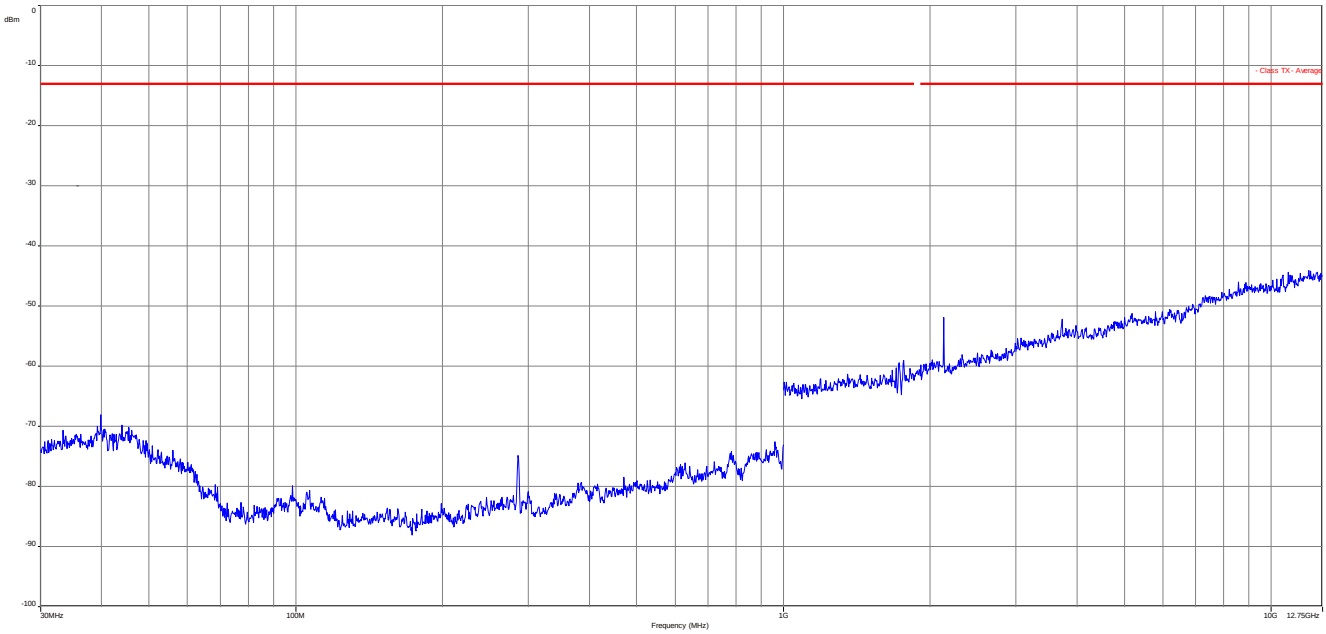
Plot 4: Voice Channel 1312 (18 GHz - 26 GHz)



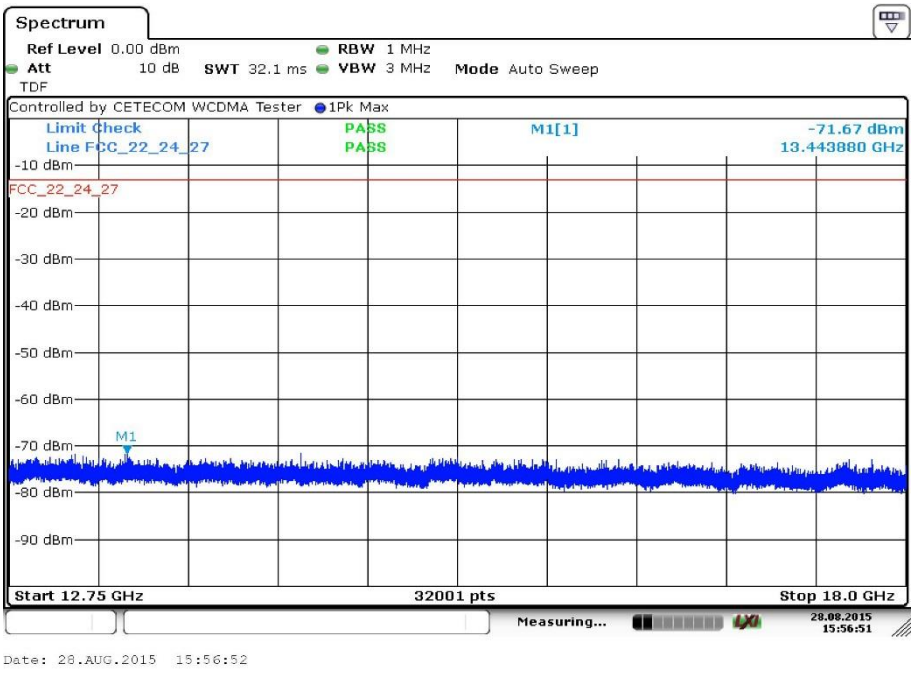
Date: 28.AUG.2015 17:20:37

Plot 5: Voice Channel 1412 (30 MHz – 12.75 GHz)

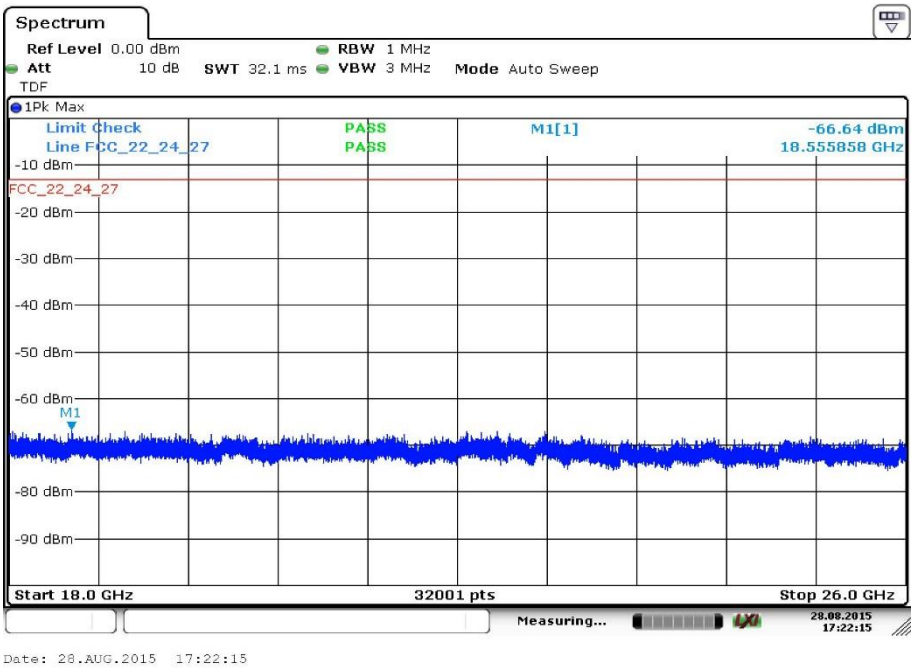


Carrier notched with 1.9 GHz rejection filter

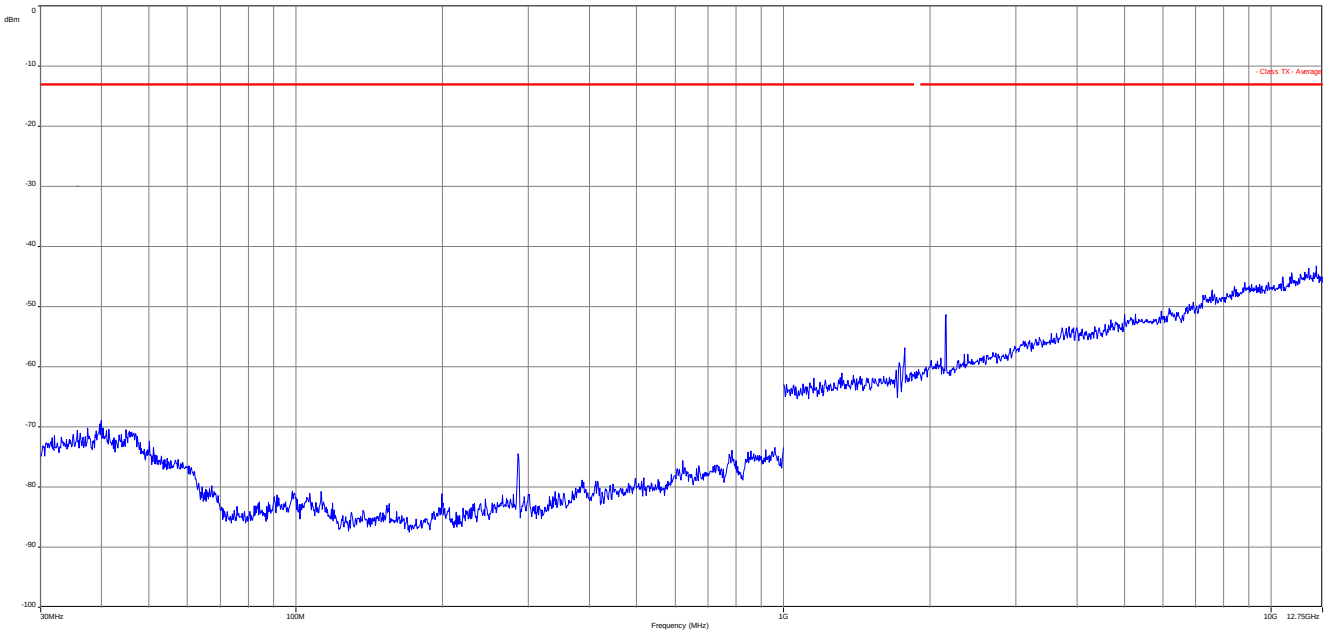
Plot 6: Voice Channel 1412 (12.75 GHz - 18 GHz)



Plot 7: Voice Channel 1412 (18 GHz - 26 GHz)

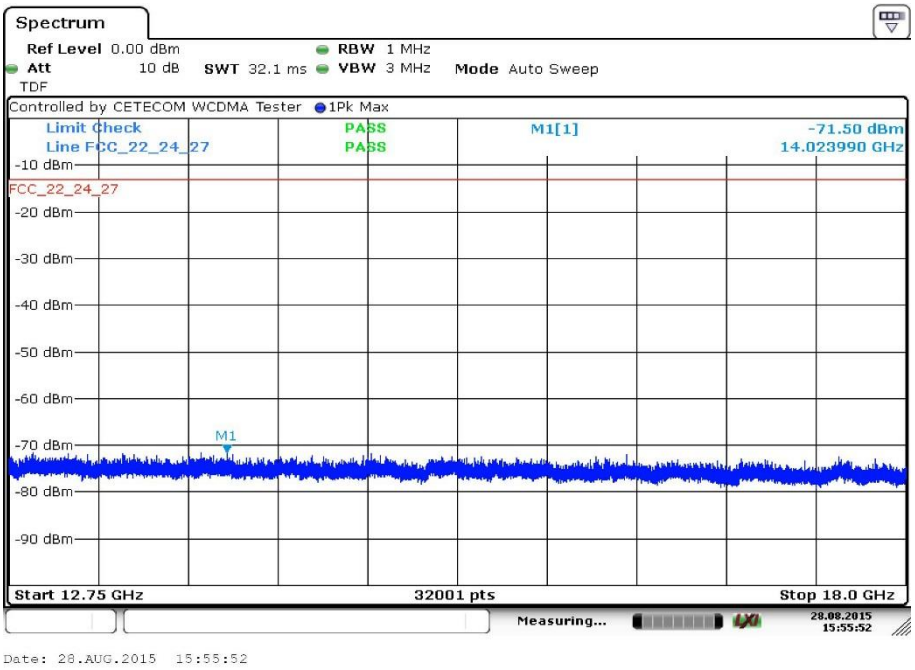


Plot 8: Voice Channel 1513 (30 MHz – 12.75 GHz)



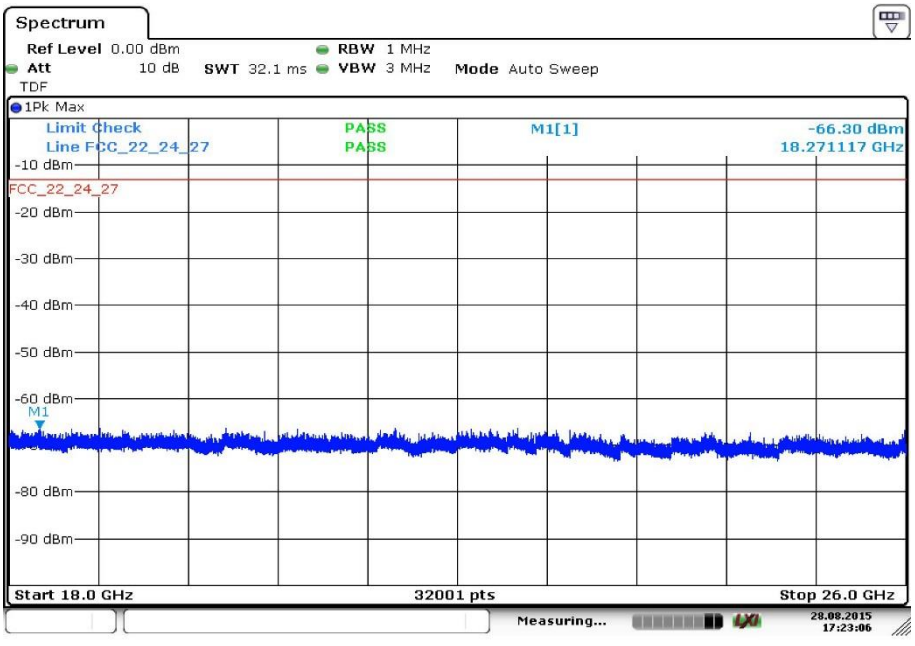
Carrier notched with 1.9 GHz rejection filter

Plot 9: Voice Channel 1513 (12.75 GHz - 18 GHz)



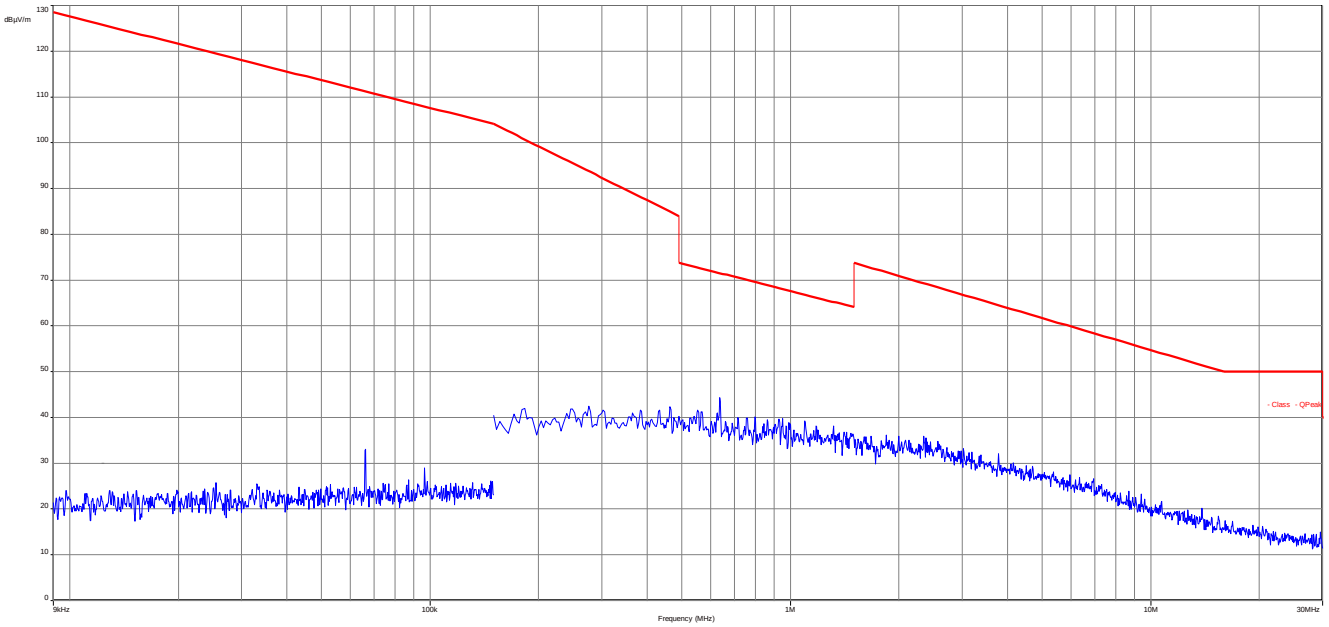
Date: 28.AUG.2015 15:55:52

Plot 10: Voice Channel 1513 (18 GHz - 26 GHz)

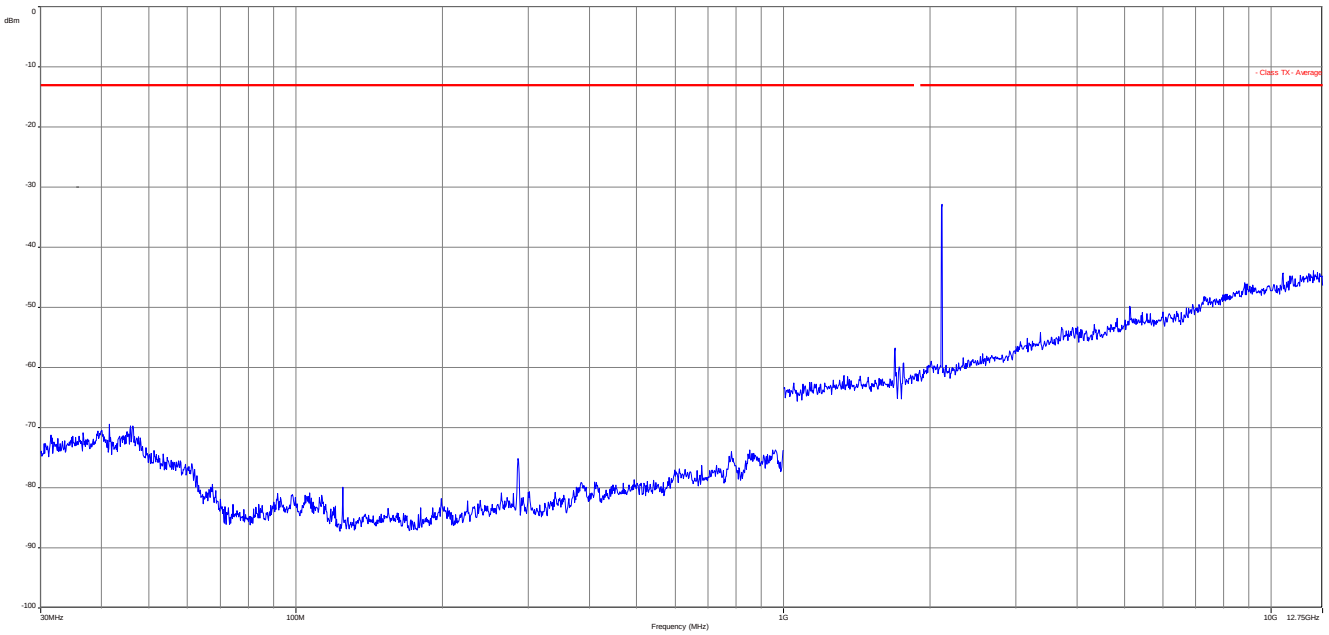


Date: 28.AUG.2015 17:23:06

Plot 11: HSUPA Channel 1412 (Traffic mode up to 30 MHz)

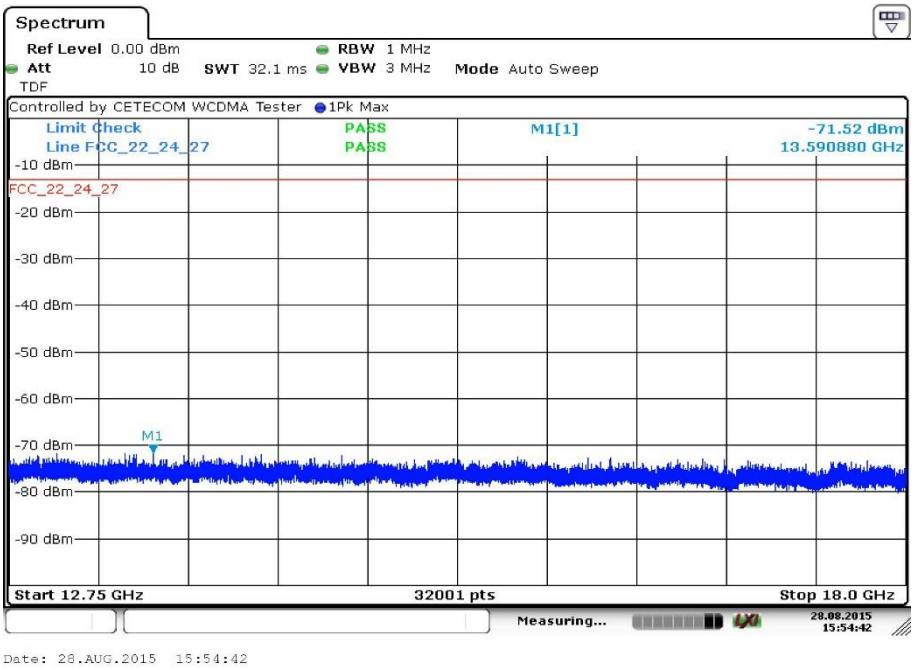


Plot 12: HSUPA Channel 1312 (30 MHz – 12.75 GHz)



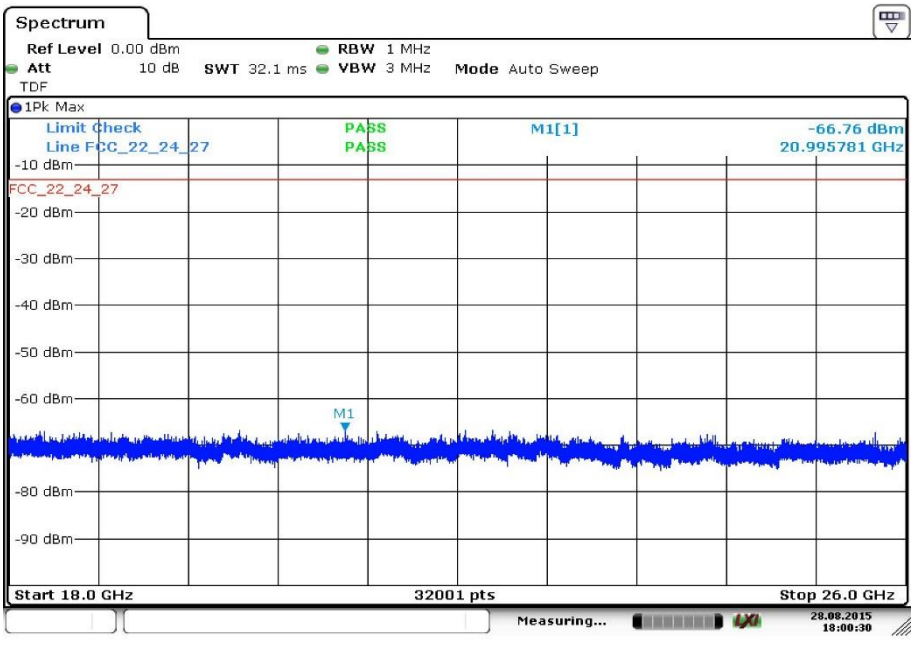
Carrier notched with 1.9 GHz rejection filter

Plot 13: HSUPA Channel 1312 (12.75 GHz - 18 GHz)



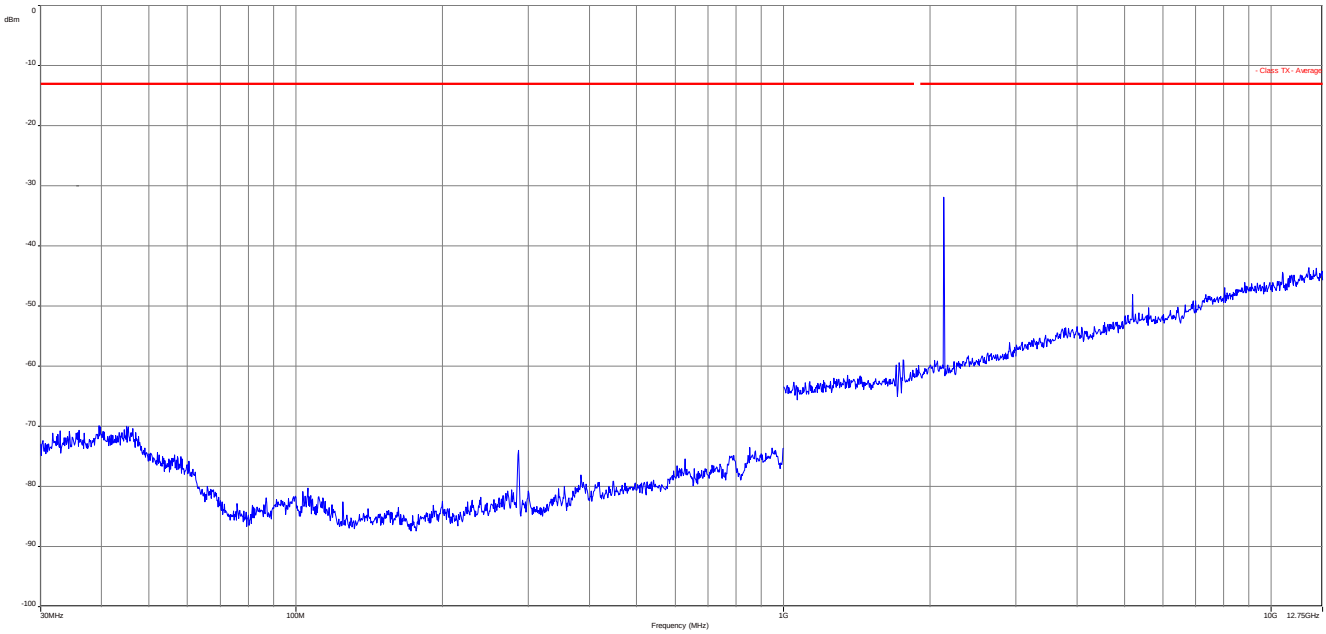
Date: 28.AUG.2015 15:54:42

Plot 14: HSUPA Channel 1312 (18 GHz - 26 GHz)



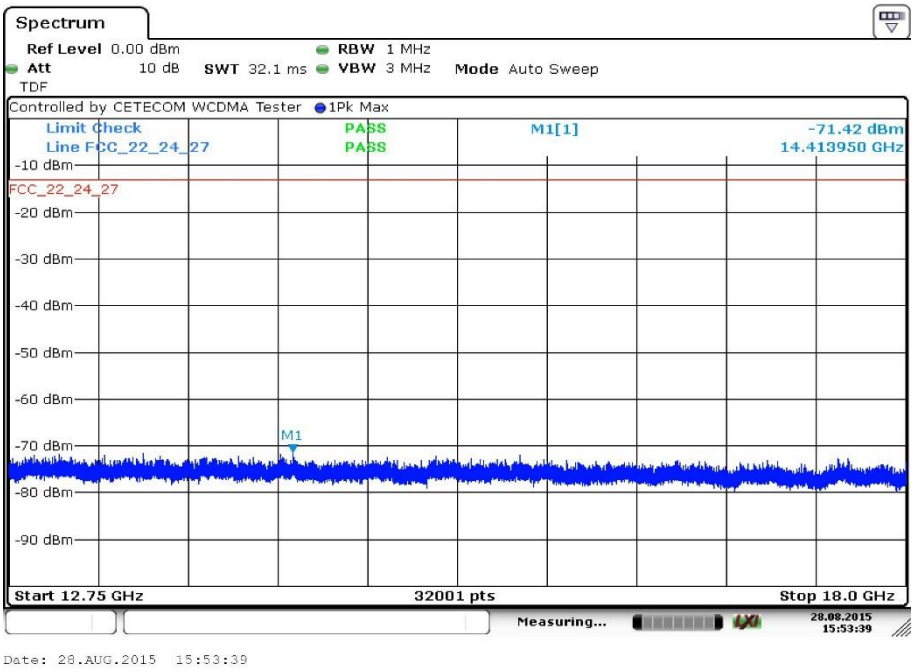
Date: 28.AUG.2015 18:00:30

Plot 15: HSUPA Channel 1412 (30 MHz – 12.75 GHz)

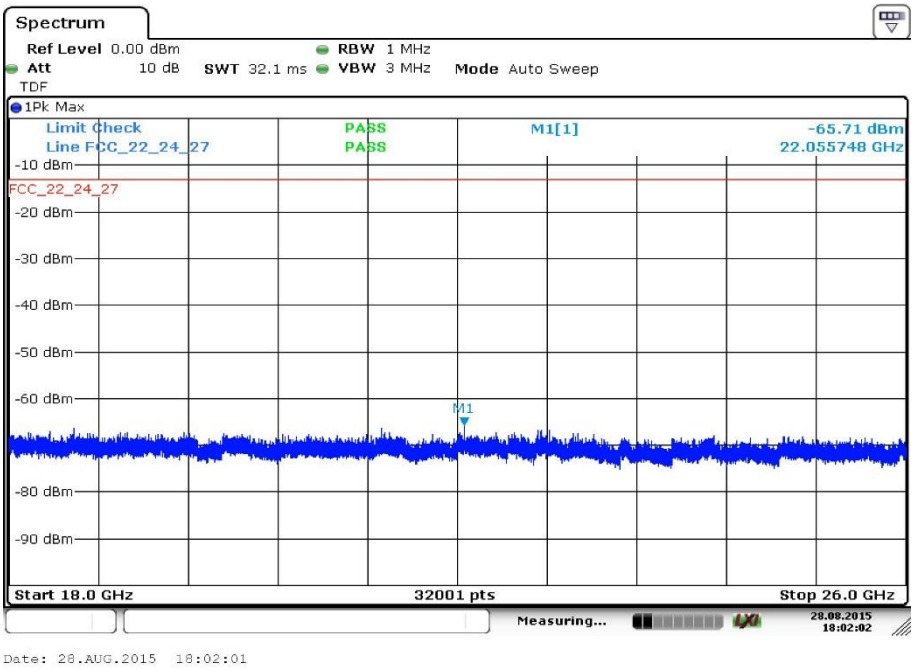


Carrier notched with 1.9 GHz rejection filter

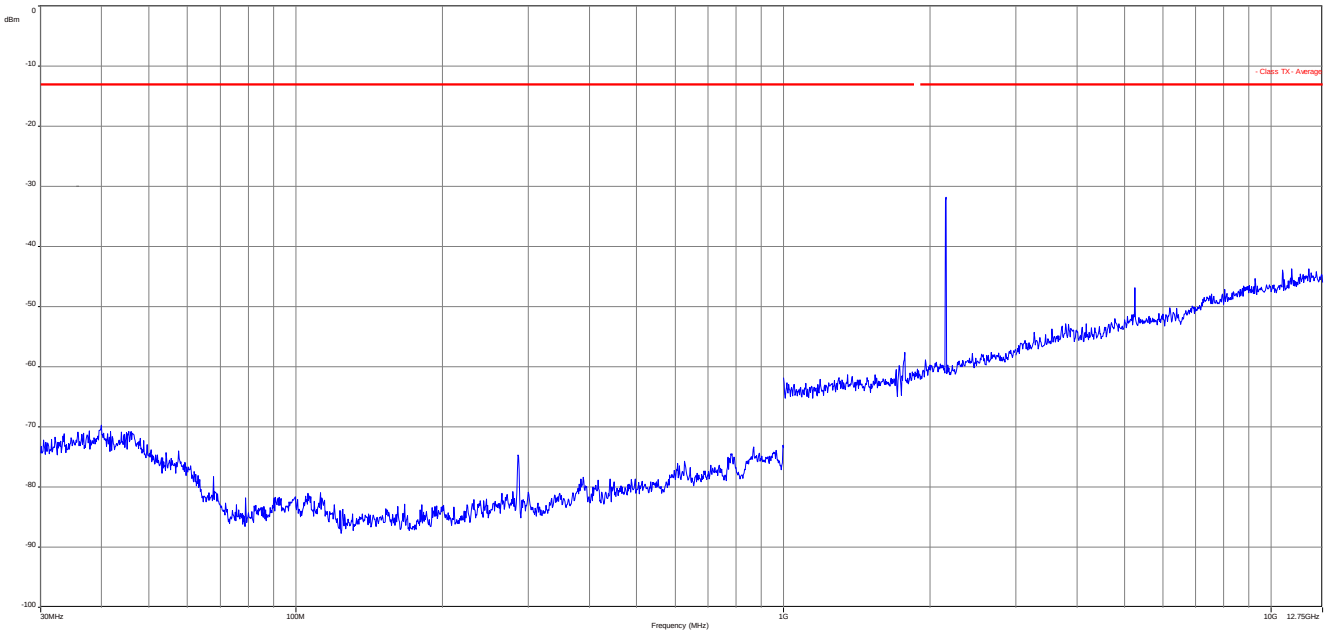
Plot 16: HSUPA Channel 1412 (12.75 GHz - 18 GHz)



Plot 17: HSUPA Channel 1412 (18 GHz - 26 GHz)

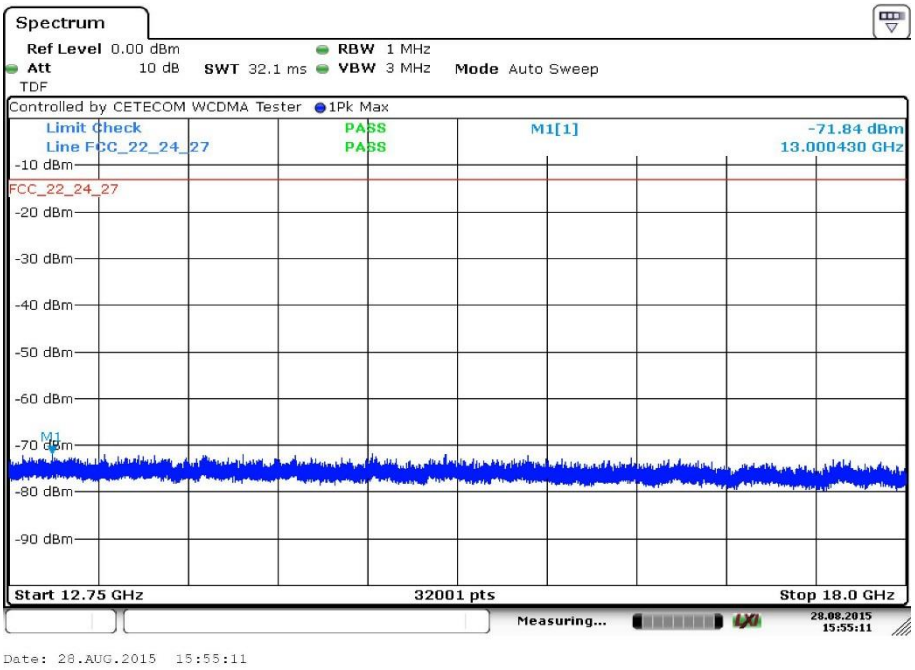


Plot 18: HSUPA Channel 1513 (30 MHz – 12.75 GHz)

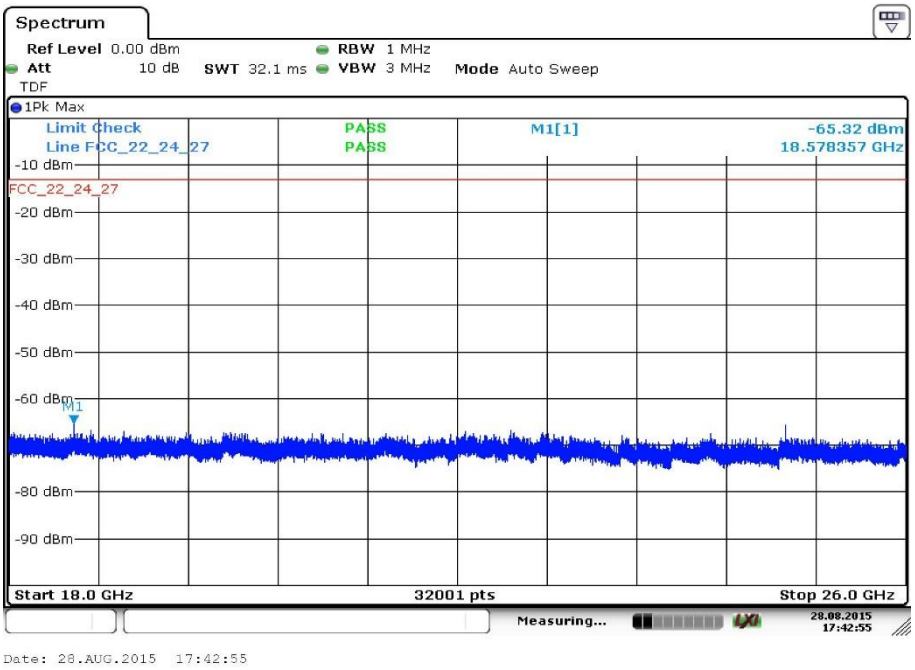


Carrier notched with 1.9 GHz rejection filter

Plot 19: HSUPA Channel 1513 (12.75 GHz - 18 GHz)



Plot 20: HSUPA Channel 1513 (18 GHz - 26 GHz)



11.5 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)

11.5.1 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.

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

Measurement parameters	
Detector:	Peak and RMS (Power in Burst)
Sweep time:	Auto
Video bandwidth:	10 MHz
Resolution bandwidth:	10 MHz
Span:	Zero Span
Trace mode:	Max Hold
Test setup	See sub clause 7.1 B
Measurement uncertainty	See sub clause 8

Limits:

FCC
CFR Part 22.913 CFR Part 2.1046
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 (radiated) WCDMA Voice mode		
Frequency (MHz)	**Average Output Power (dBm) - ERP**	**Peak-to-average-ratio (dB)**
826.4	18.1	3.0
836.0	19.2	3.0
846.6	21.0	3.0

Output Power (radiated) WCDMA HSUPA mode		
Frequency (MHz)	**Average Output Power (dBm) - ERP**	**Peak-to-average-ratio (dB)**
826.4	19.0	3.0
836.0	20.3	3.0
846.6	21.2	3.0

11.5.2 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:

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

Measurement:

Measurement parameters	
Detector:	Peak
Sweep time:	2 sec.
Video bandwidth:	Below 1 GHz: 100 kHz Above 1 GHz: 1 MHz
Resolution bandwidth:	Below 1 GHz: 100 kHz Above 1 GHz: 1 MHz
Span:	100 MHz Steps
Trace mode:	Max Hold
Test setup	See sub clause 7.1 A
Measurement uncertainty	See sub clause 8

Limits:

FCC
CFR Part 22.917 CFR Part 2.1053
Spurious Emissions Radiated
Attenuation ≥ 43 + 10log(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.

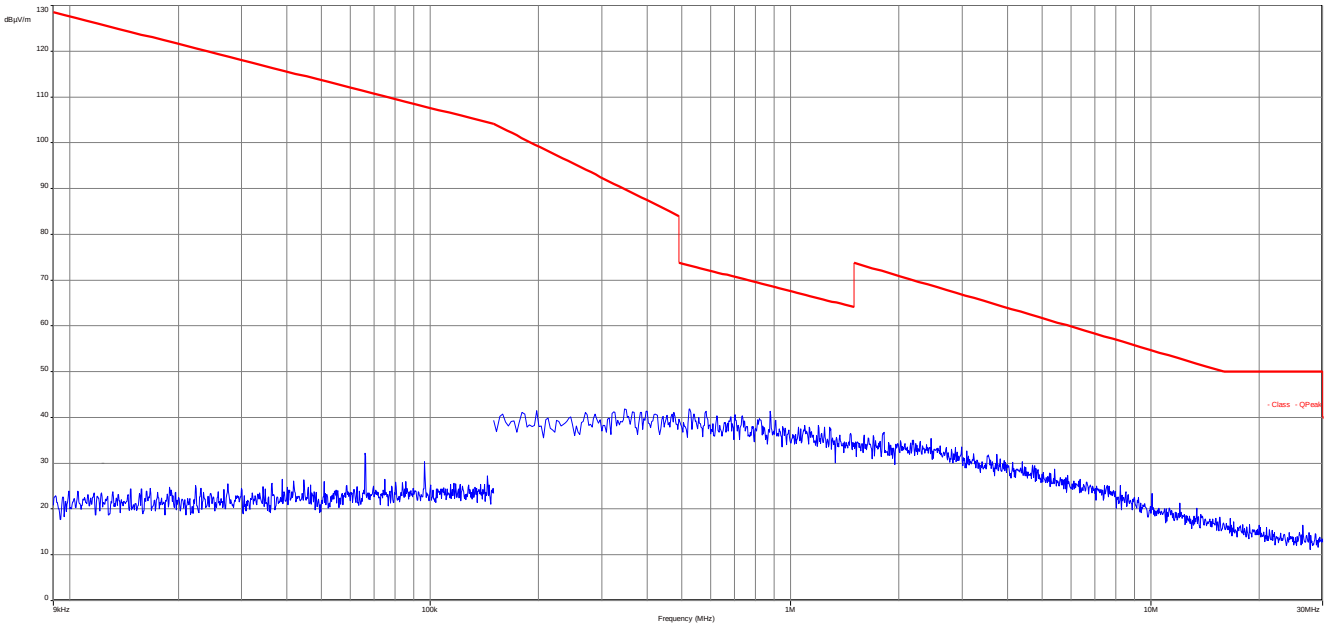
As can be seen from this data, the emissions from the test item were within the specification limit.

Spurious Emission Level (dBm) Voice								
Harmonic	Ch. 4132 Freq. (MHz)	Level [dBm]	Harmonic	Ch. 4180 Freq. (MHz)	Level [dBm]	Harmonic	Ch. 4233 Freq. (MHz)	Level [dBm]
2	1652.8	All detected emission are more than 20 dB below the limit.	2	1672.0	All detected emission are more than 20 dB below the limit.	2	1693.2	All detected emission are more than 20 dB below the limit.
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	

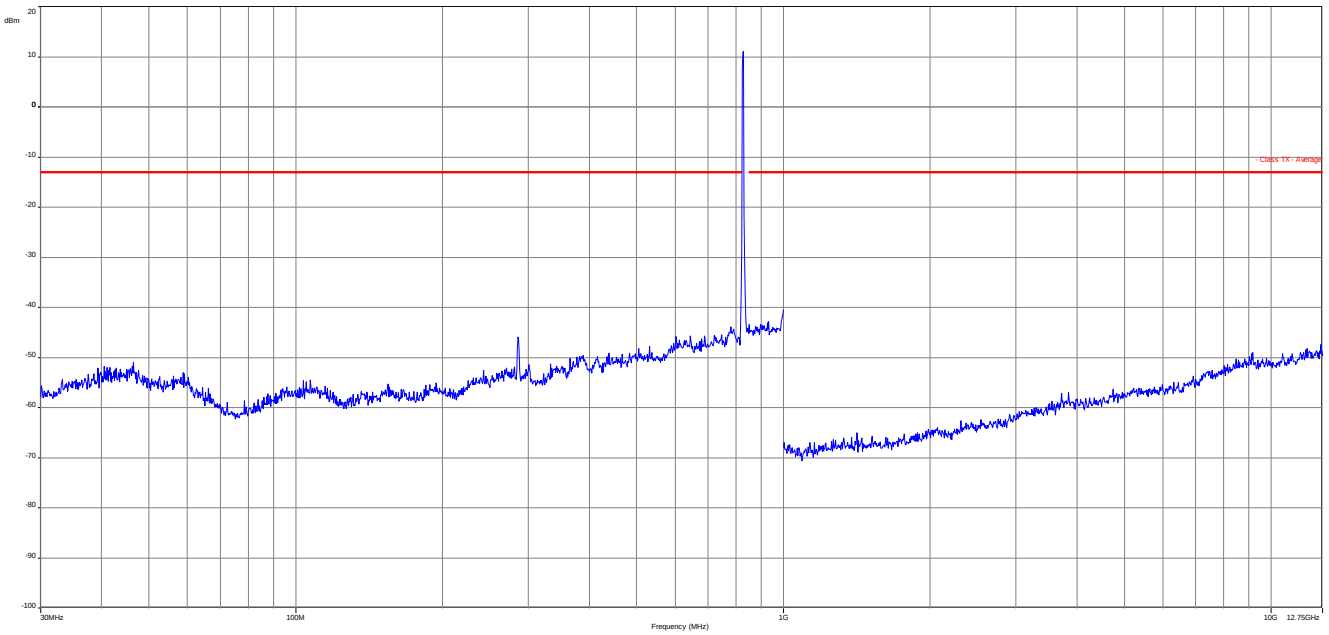
Spurious Emission Level (dBm) HSUPA								
Harmonic	Ch. 4132 Freq. (MHz)	Level [dBm]	Harmonic	Ch. 4180 Freq. (MHz)	Level [dBm]	Harmonic	Ch. 4233 Freq. (MHz)	Level [dBm]
2	1652.8	All detected emission are more than 20 dB below the limit.	2	1672.0	All detected emission are more than 20 dB below the limit.	2	1693.2	All detected emission are more than 20 dB below the limit.
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	

Plots:

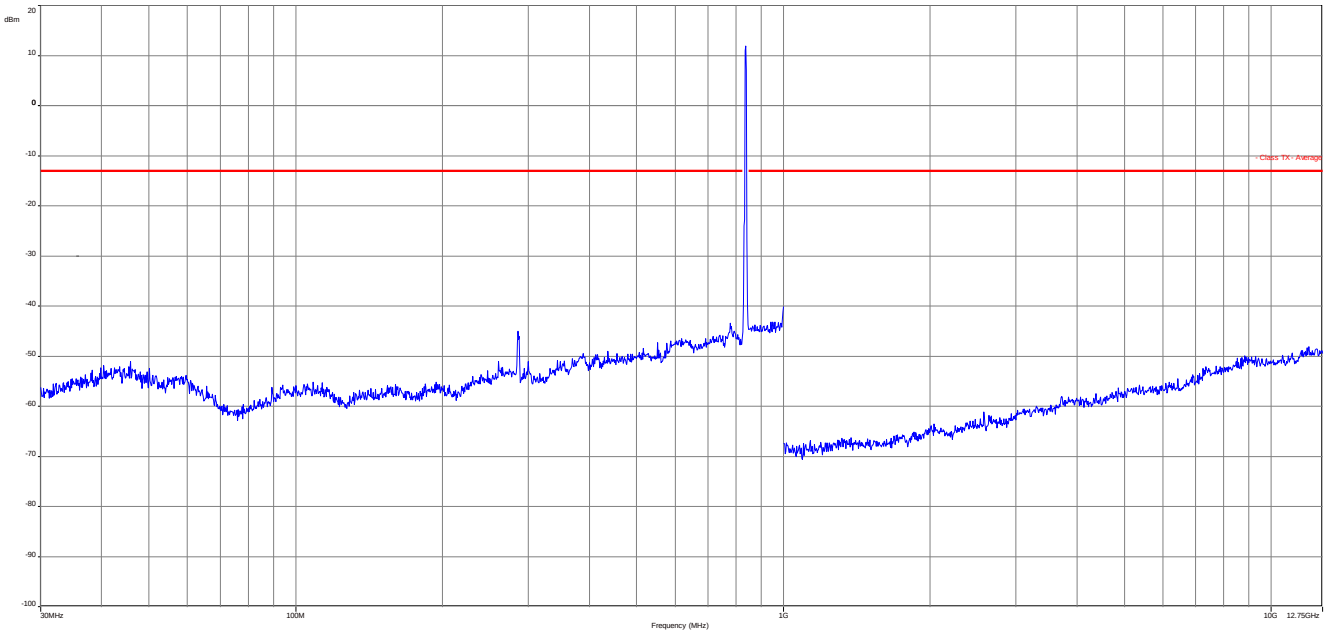
Plot 1: Voice Channel 4180 (Traffic mode up to 30 MHz)



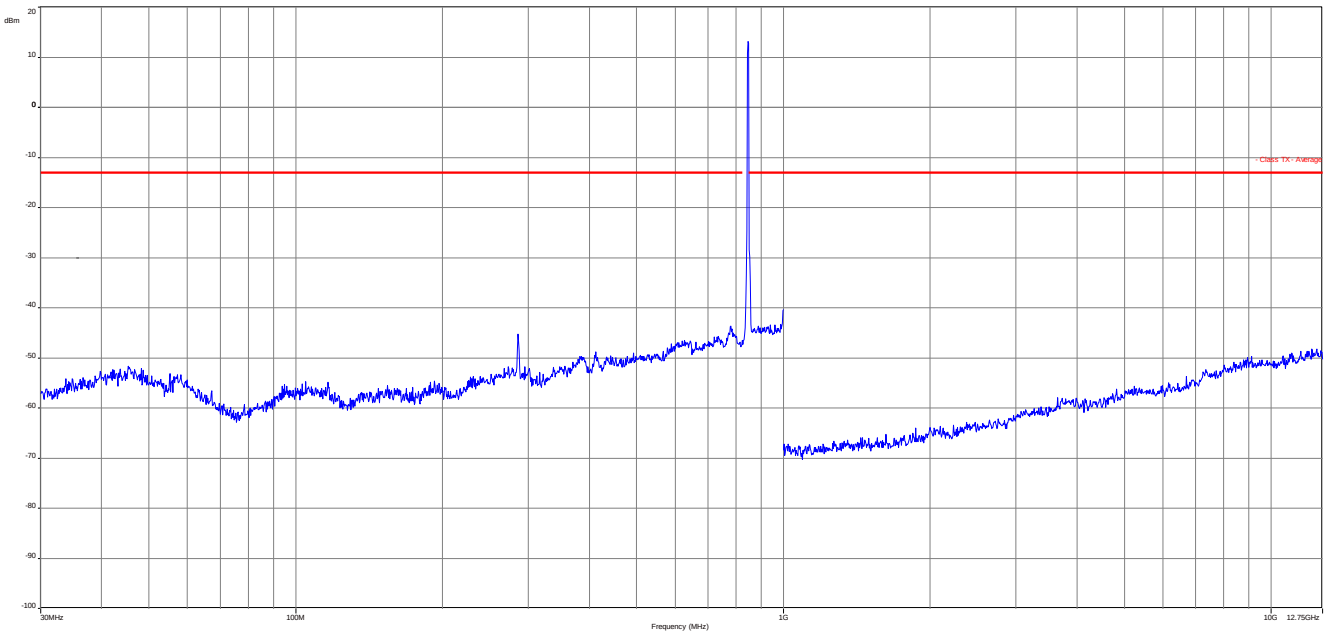
Plot 2: Voice Channel 4132 (30 MHz – 12.75 GHz)



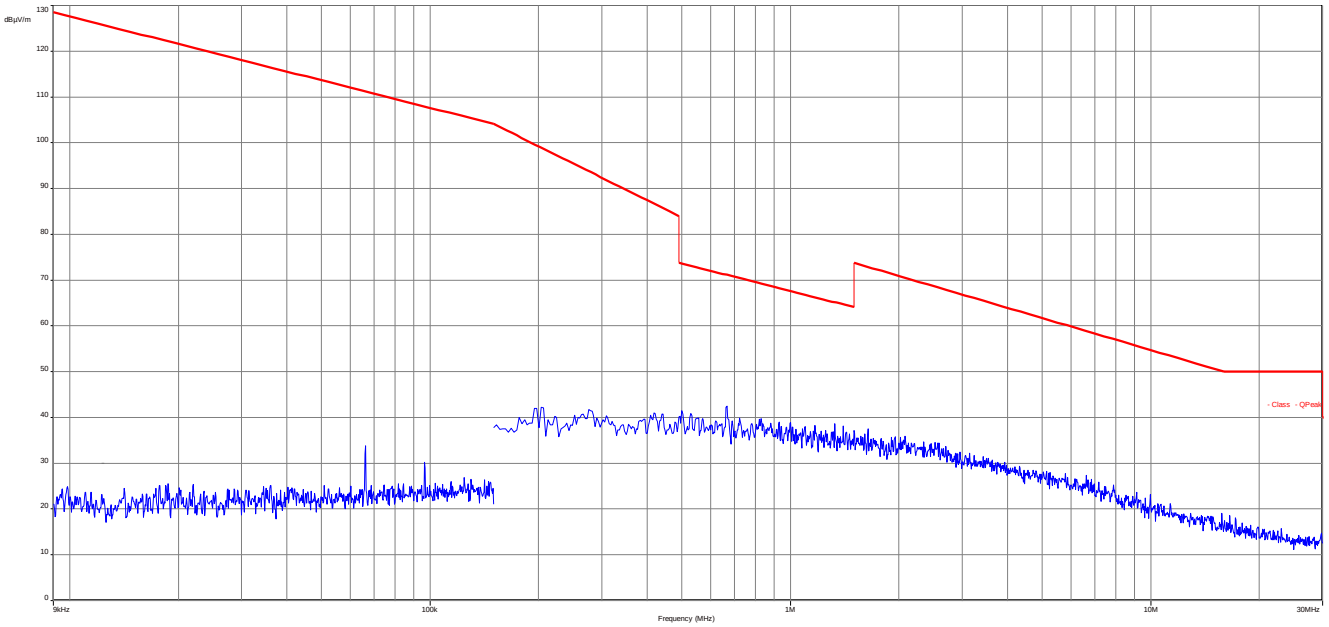
Plot 3: Voice Channel 4180 (30 MHZ – 12.75 GHZ)



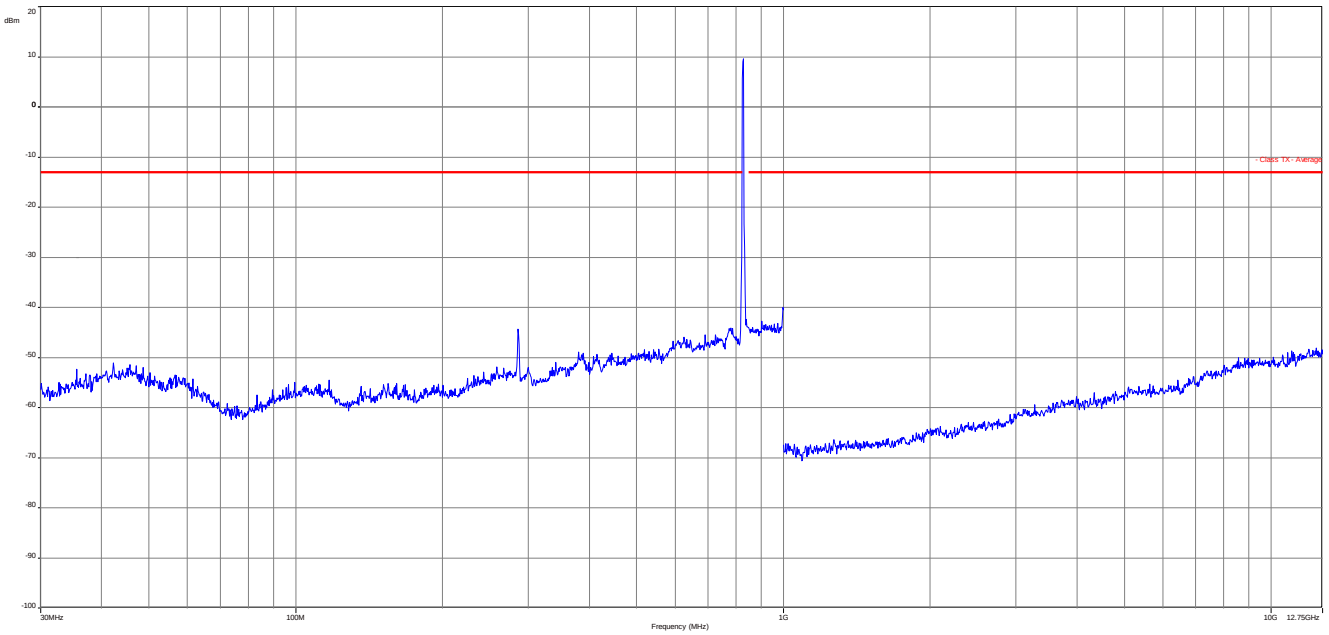
Plot 4: Voice Channel 4233 (30 MHz – 12.75 GHz)



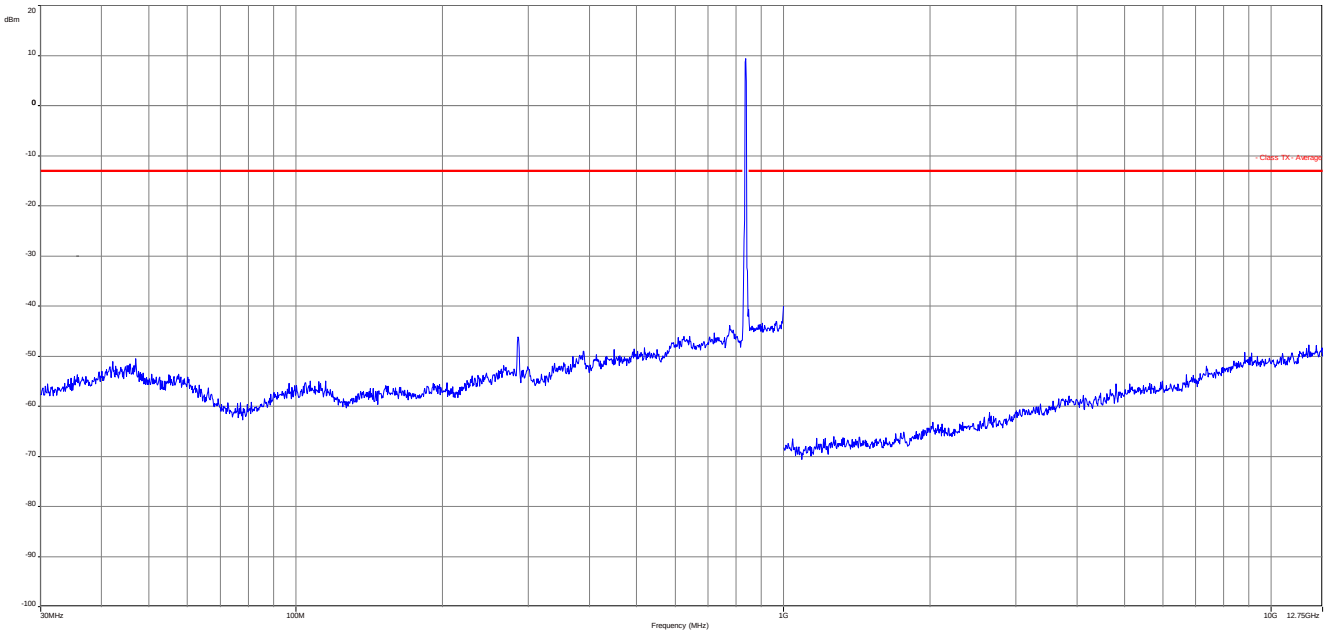
Plot 5: HSUPA Channel 4180 (Traffic mode up to 30 MHz)



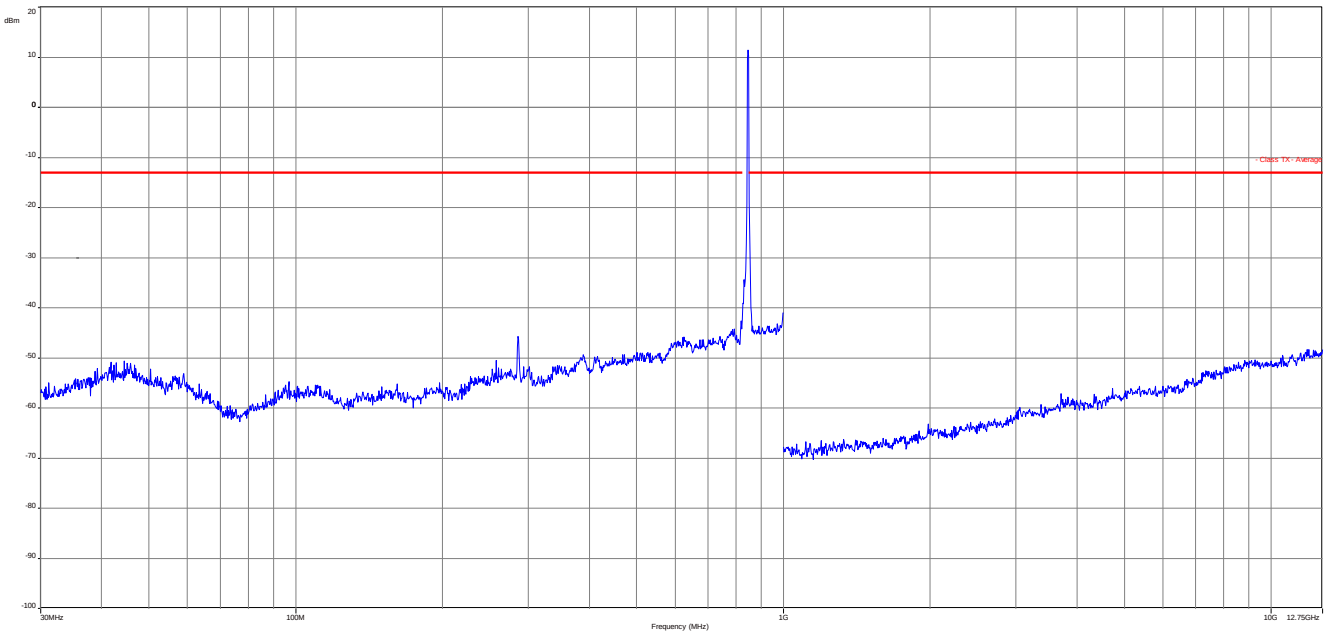
Plot 6: HSUPA Channel 4132 (30 MHz – 12.75 GHz)



Plot 7: HSUPA Channel 4180 (30 MHZ – 12.75 GHZ)



Plot 8: HSUPA Channel 4233 (30 MHz – 12.75 GHz)



Annex A Document history

Version	Applied changes	Date of release
	Initial release	2015-09-28

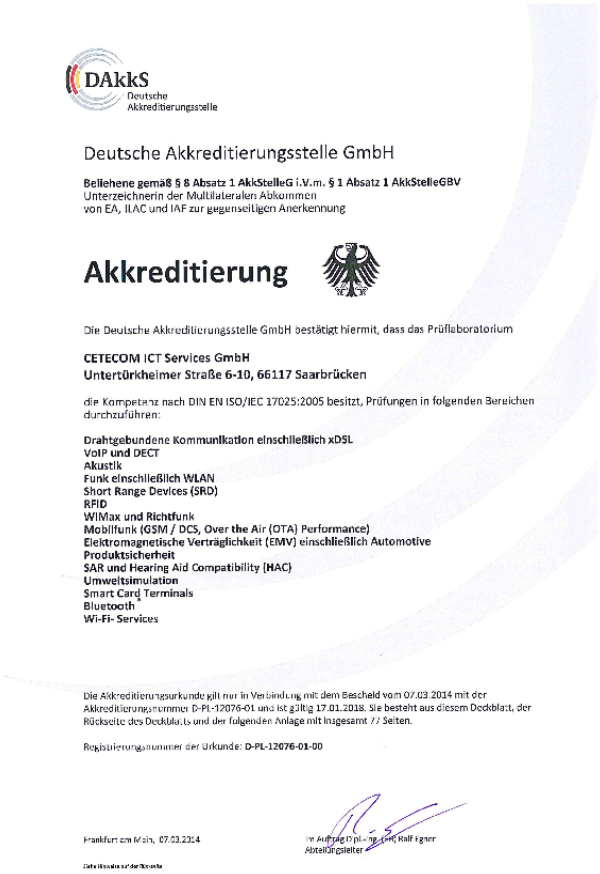
Annex B Further information

Glossary

AVG	-	Average
DUT	-	Device under test
EMC	-	Electromagnetic Compatibility
EN	-	European Standard
EUT	-	Equipment under test
ETSI	-	European Telecommunications Standard Institute
FCC	-	Federal Communication Commission
FCC ID	-	Company Identifier at FCC
HW	-	Hardware
IC	-	Industry Canada
Inv. No.	-	Inventory number
N/A	-	Not applicable
PP	-	Positive peak
QP	-	Quasi peak
S/N	-	Serial number
SW	-	Software
PMN		Product marketing name
HMN		Host marketing name
HVIN		Hardware version identification number
FVIN		Firmware version identification number

12 Accreditation Certificate

Front side of certificate



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Untertürkheimer Straße 6-10, 66117 Saarbrücken

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Akustik
Funk einschließlich WLAN
Short Range Devices (SRD)
RFID
WiMax und Richtfunk
Mobilfunk (GSM / DCS, Over the Air (OTA) Performance)
Elektromagnetische Verträglichkeit (EMV) einschließlich Automotive
Produktsicherheit
SAR und Hearing Aid Compatibility (HAC)
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Smart Card Terminals
Bluetooth
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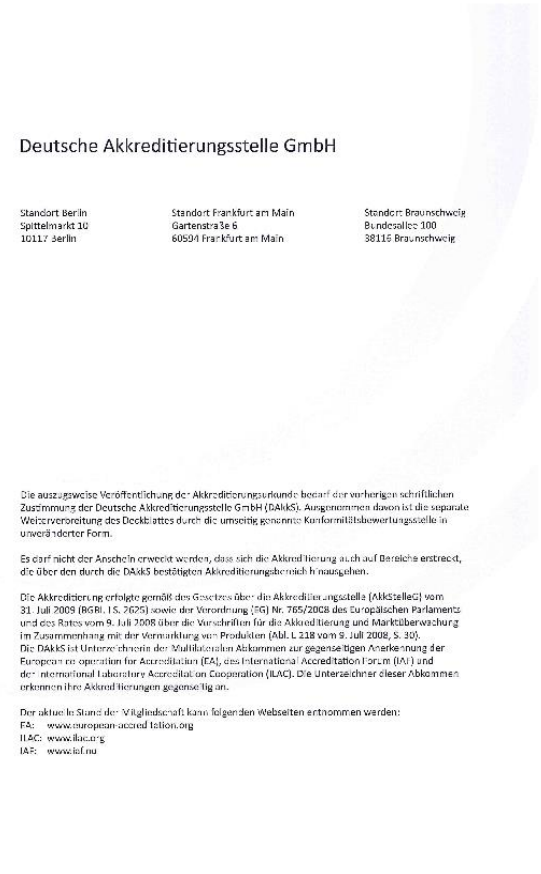
Registrierungsnummer der Urkunde: **D-PL-12076-01-00**

Frankfurt am Main, 07.03.2014

Im Auftrag Dipl.-Ing. (FH) Ralf Egner
Abteilungsleiter

Back side of certificate



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