

RADIO TEST REPORT

No. 1118077-1 ed. 2

RF performance

EQUIPMENT UNDER TEST

Equipment : Pico node B
Type / model : N4/US80D-R2L24-TE1/V1Q6
Manufacturer : Celestica Inc. & CommScope Inc.
Tested by request of : Andrew AB

SUMMARY

All selected test cases specified in this report complies with the requirements according to the following standards:

47CFR part 2 (2011)
47CFR part 24 (2011)
47CFR part 15B (2011), Class B

Test methods according to ANSI C63.4-2009

Date of issue: January 12, 2012

Tested by:



Stefan Andersson

Approved by:



Niklas Boström

This report may not be reproduced other than in full, except with the prior written approval by Intertek Semko.

Intertek Semko AB

Torshamnsgatan 43, Box 1103, SE-164 22 Kista, Sweden

Telephone +46 8 750 00 00, Fax +46 8 750 60 30

www.intertek.se

Registered in Sweden: No: SE556024059901, Registered office: As address

Revision History

Edition	Date	Description
1	2011-12-16	First release
2	2012-01-12	Correction of manufacturer and client name

CONTENTS

	Page
1 CLIENT INFORMATION	5
2 EQUIPMENT UNDER TEST (EUT).....	5
2.1 IDENTIFICATION OF THE EUT ACCORDING TO THE MANUFACTURER/CLIENT DECLARATION.....	5
2.2 ADDITIONAL HARDWARE INFORMATION ABOUT THE EUT.....	6
2.3 TEST SIGNALS	6
2.4 MODIFICATION DURING THE TESTS	6
3 TEST SPECIFICATIONS.....	7
3.1 STANDARDS	7
3.2 ADDITIONS, DEVIATIONS AND EXCLUSIONS FROM STANDARDS	7
3.3 TEST SITE	7
3.4 TEST CONDITIONS	7
4 TEST SUMMARY.....	8
5 AC LINE CONDUCTED EMISSION, 150 KHZ TO 30 MHZ.....	9
5.1 REQUIREMENT	9
5.2 TEST SETUP DETAILS	9
5.3 TEST DATA.....	10
5.4 TEST EQUIPMENT	11
6 RADIATED EMISSIONS MEASUREMENTS FROM 30 MHZ TO 1000MHZ.....	12
6.1 REQUIREMENT	12
6.2 TEST SETUP DETAILS	13
6.3 TEST DATA.....	14
6.4 TEST EQUIPMENT	17
7 RADIATED EMISSIONS MEASUREMENTS ABOVE 1 GHZ	18
7.1 REQUIREMENT	18
7.2 TEST SETUP DETAILS	19
7.3 TEST DATA.....	20
7.4 TEST EQUIPMENT	24
8 CONDUCTED EMISSIONS MEASUREMENTS	25
8.1 REQUIREMENT	25
8.2 TEST SETUP DETAILS	25
8.3 TEST DATA.....	26
8.4 TEST EQUIPMENT	34
9 FREQUENCY STABILITY MEASUREMENTS	35
9.1 REQUIREMENT	35
9.2 TEST SETUP DETAILS	35
9.3 TEST DATA.....	35
9.4 TEST EQUIPMENT	35
10 RF OUTPUT POWER.....	36
10.1 REQUIREMENT	36
10.2 TEST SETUP DETAILS	36
10.3 TEST DATA.....	36
10.4 TEST EQUIPMENT	36
11 OCCUPIED BANDWIDTH.....	37
11.1 REQUIREMENT	37
11.2 TEST SETUP DETAILS	37

11.3	TEST DATA.....	38
11.4	TEST EQUIPMENT	40
12	BAND EDGE.....	41
12.1	REQUIREMENT	41
12.2	TEST SETUP DETAILS	41
12.3	TEST DATA.....	42
12.4	TEST EQUIPMENT	45
13	UNCERTAINTIES SUMMARY	46
14	PHOTO OF THE EUT	48

1 CLIENT INFORMATION

The EUT has been tested by request of

Company: Andrew AB
Isafjordsgatan 30A
164 40 Kista
Sweden

Name of contact: Anders Norberg

2 EQUIPMENT UNDER TEST (EUT)

2.1 Identification of the EUT according to the manufacturer/client declaration

Equipment:	Pico node B
Type/Model:	N4/US80D-R2L24-TE1/V1Q6
Brand name:	OneBase
Serial number:	XM104618002
Manufacturer:	Celestica Inc. & CommScope Inc.
Transmitter frequency range:	1930 – 1990 MHz
Receiver frequency range:	1850 – 1910 MHz
Antenna ports:	Port A: Tx/Rx Port B: Rx
Rating RF output power (RMS):	Single carrier: 24 dBm (250 mW) Multi carrier: N/A
Type of modulation:	QPSK, 16QAM and 64QAM
Nominal power voltage:	120 V AC

2.2 Additional hardware information about the EUT

The EUT consists of the following units:

Unit	Serial number
Pico node B	XM104618002

2.3 Test signals

The EUT was transmitting at maximum power with test models according to 3GPP TS 25.141.

For each test the worst case test model was determined.

The worst case was test model 1 (QPSK modulation) for all tests.

2.4 Modification during the tests

No modifications have been made during the tests.

3 TEST SPECIFICATIONS

3.1 Standards

47CFR part 2 (2011)
47CFR part 24 (2011)
47CFR part 15B (2011), Class B

Test methods according to ANSI C63.4-2009

3.2 Additions, deviations and exclusions from standards

No additions, deviations or exclusions have been made from standards.

3.3 Test site

Measurements were performed at:

Intertek Semko AB.
Torshamnsgatan 43,
P.O. Box 1103
SE-164 22 Kista

Intertek Semko AB is a FCC listed test site with site registration number 90913

Measurement chambers

Measurement Chamber	Type of chamber
STORA HALLEN a.k.a. BIG CHAMBER	Semi-anechoic 10m and 3m

3.4 Test conditions

If not additionally specified, the tests were performed under the following environmental conditions:

Parameter	Normal	Extreme
Supplying voltage, V	120 V AC, 60 Hz	102 – 138 V AC, 60 Hz
Air temperature, °C	20 °C	-30 °C to 50 °C

4 TEST SUMMARY

The results in this report apply only to the tested sample:

Test	Result	Section in report	Note
Standard test methods			
2.1046 RF Power output	Pass	10	
2.1049 Occupied bandwidth	Pass	11	
2.1051 Band edge	Pass	12	
2.1051 Spurious emission, conducted at antenna port	Pass	8	
2.1053 Spurious emission, radiated field strength	Pass	6, 7	
2.1055 Frequency stability	Pass	9	
15.109 Receiver spurious emission, radiated field strength	Pass	6, 7	
15.107 Conducted emission, AC Mains	Pass	5	

NT = Not Tested, by request of the Client

NA = Not Applicable

5 AC LINE CONDUCTED EMISSION, 150 KHZ TO 30 MHZ

Date of test:	2011-10-19	Test location:	EMC Center
EUT Serial:	XM104618002	Ambient temp.	23 °C
Test result:	Pass	Relative humidity	30 %

5.1 Requirement

Reference: FCC §15.207, Class B limit

Frequency MHz	Quasi-peak Limit dB μ V	Average Limit dB μ V
0.15 – 0.5	66 – 56	56 – 46
0.5 – 1.6	56	46
1.6 – 30	60	50

5.2 Test setup details

The mains terminal disturbance voltage was measured with the EUT located 0,8 m above the ground plane and 0,4 m from the vertical ground plane. The EUT was connected to an artificial mains network (AMN). The AMN was placed on the ground plane. Amplitude measurements were performed with a quasi-peak and average detector. The EUT was supplied by 120 VAC (60 Hz) during the test.

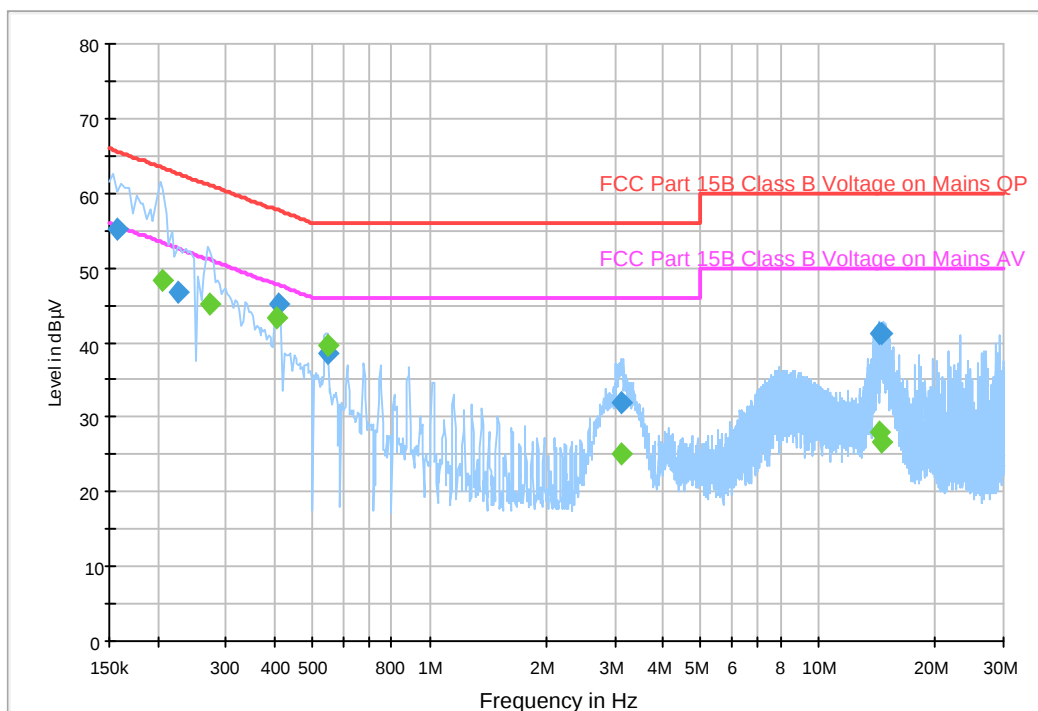
Test set-up photo:



5.3 Test data

Overview sweeps performed with peak detector

FCC Part 15B Class B Voltage on Mains ESH3-Z5



Frequency (MHz)	QuasiPeak (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Margin (dB)	Limit (dBµV)	Comment
0.157238	55.2	1000.0	9.000	10.4	65.6	
0.224400	46.7	1000.0	9.000	15.9	62.7	
0.410725	45.0	1000.0	9.000	12.6	57.6	
0.548781	38.6	1000.0	9.000	17.4	56.0	
3.110538	32.0	1000.0	9.000	24.0	56.0	
14.440494	41.1	1000.0	9.000	18.9	60.0	
14.617444	41.1	1000.0	9.000	18.9	60.0	

Frequency (MHz)	Average (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Margin (dB)	Limit (dBµV)	Comment
0.205238	48.2	1000.0	9.000	5.2	53.4	
0.272400	45.3	1000.0	9.000	5.8	51.0	
0.406725	43.4	1000.0	9.000	4.4	47.7	
0.544781	39.7	1000.0	9.000	6.3	46.0	
3.102538	25.2	1000.0	9.000	20.8	46.0	
14.444494	28.0	1000.0	9.000	22.0	50.0	
14.617444	26.6	1000.0	9.000	23.4	50.0	

Measured level [dBµV] = Analyser reading [dBµV] + cable loss [dB] + LISN insertion loss [dB]

5.4 Test equipment

Equipment type	Manufacturer	Model	Inv. No.	Cal. due date
Measurement software	Rohde & Schwarz	EMC32	--	--
Receiver	Rohde & Schwarz	ESCI	31686	2012-07
AMN / LISN	Rohde & Schwarz	ESH3-Z5	8768	2013-07

6 RADIATED EMISSIONS MEASUREMENTS FROM 30 MHZ TO 1000MHZ

Date of test:	2011-09-08 to 2011-09-14	Test location:	Big Chamber
EUT Serial:	XM104618002	Ambient temp.	20-25 °C
Test result:	Pass	Relative humidity	20-40 %

6.1 Requirement

Transmitter spurious emission:

Reference: FCC §24.238

Out of band emissions: The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log(P)$ dB. (equal to -13 dBm)

Receiver spurious emission:

Reference: FCC §15.209, IC RSS-210 Table 3

Frequency (MHz)	Field strength (dB μ V/m)	Measurement distance (m)
30 – 88	40.0	3
88 – 216	43.5	3
216 – 960	46.0	3
960 –	54.0	3

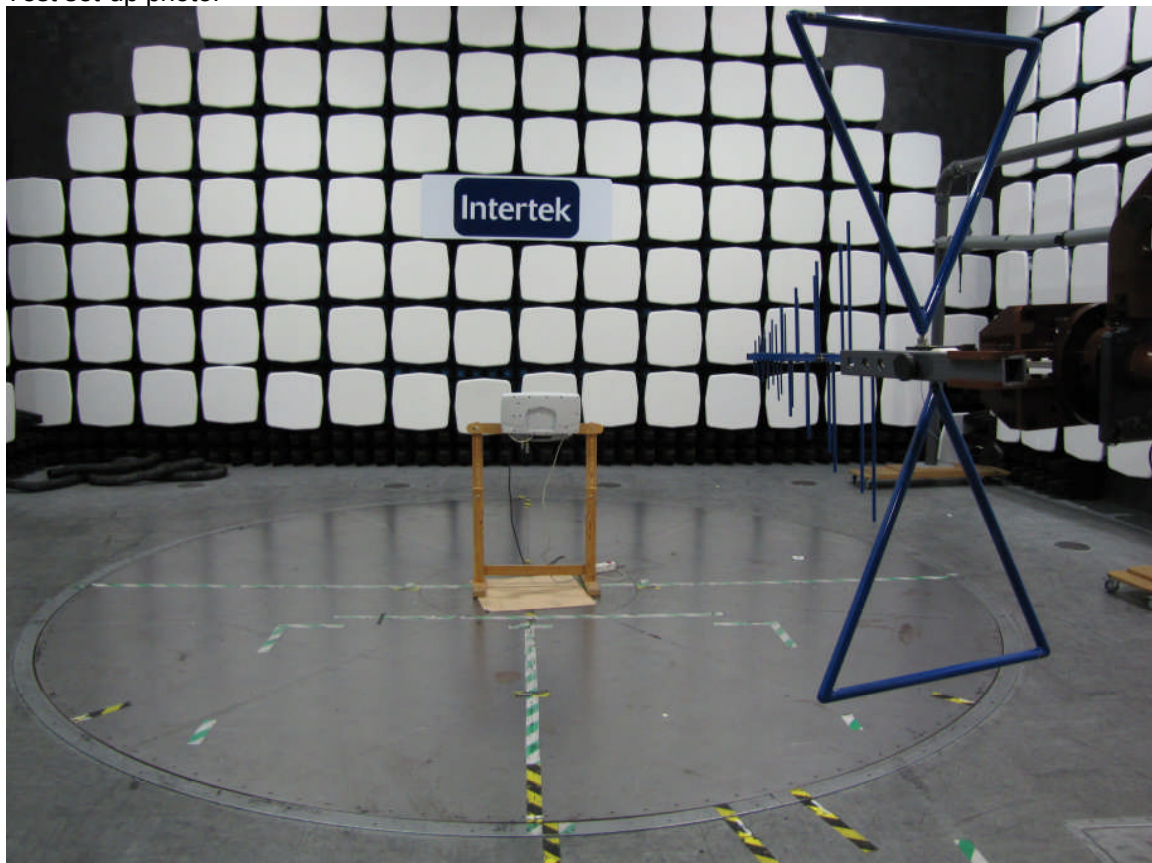
6.2 Test setup details

The radiated disturbance electric field intensity was measured in a semi-anechoic chamber at a distance of 3 m and the EUT was placed on a non-metallic stand, 0,8 m above the reference ground plane. In TX mode the EUT was transmitting with test model 1. Test set-up photos are given below.

An overview sweep with peak detection of the electric field intensity was performed with the measurement receiver in max-hold and with the antenna placed 1,5 m, 2,5 m and 3,5 m above the floor. The polarisation was horizontal and vertical. The measurements were repeated with the EUT rotated in 45-degree steps.

At the frequencies where high disturbance levels were found a search for max disturbance level was performed. With the EUT and antenna in the worst-case configuration new measurements with quasi-peak detector were carried out.

Test set-up photo:

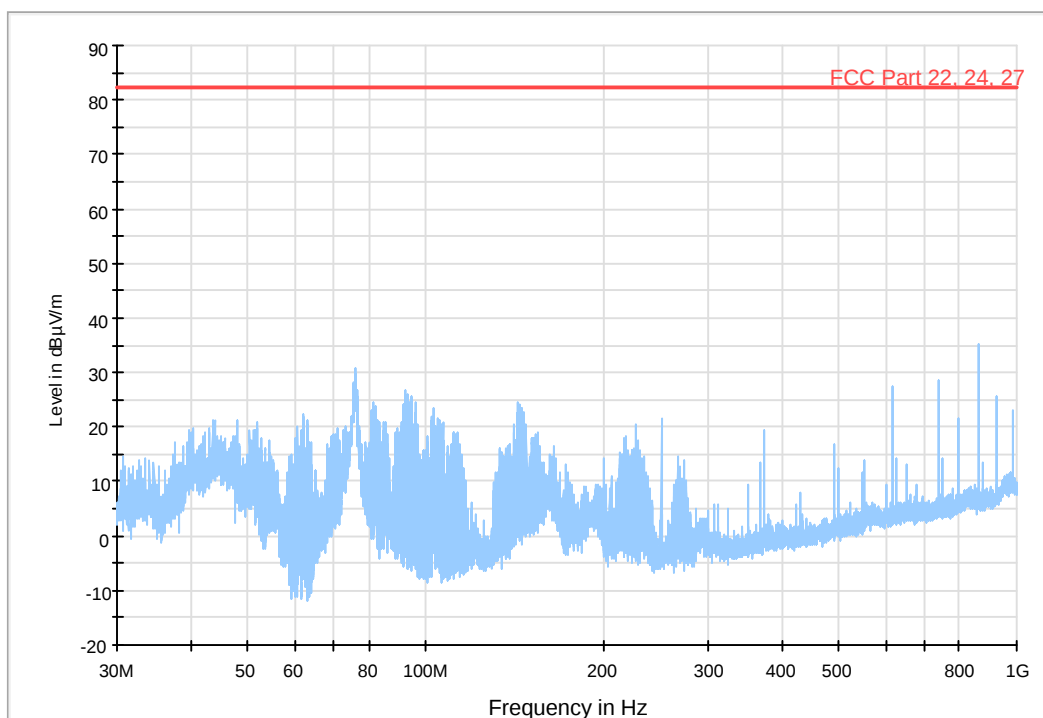


6.3 Test data

Overview sweeps performed with peak detector.

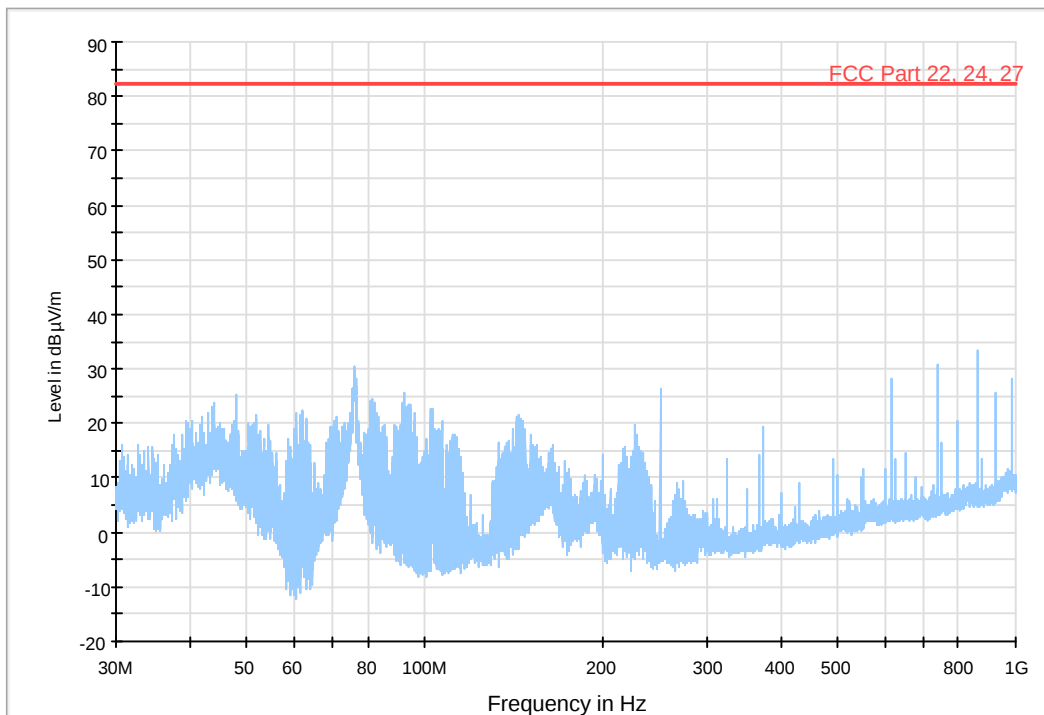
30 – 1000 MHz, max peak at a distance of 3m, Tx low channel, test model 1

Copy of FCC ANSI-TIA-603-C 30 - 1000 MHz



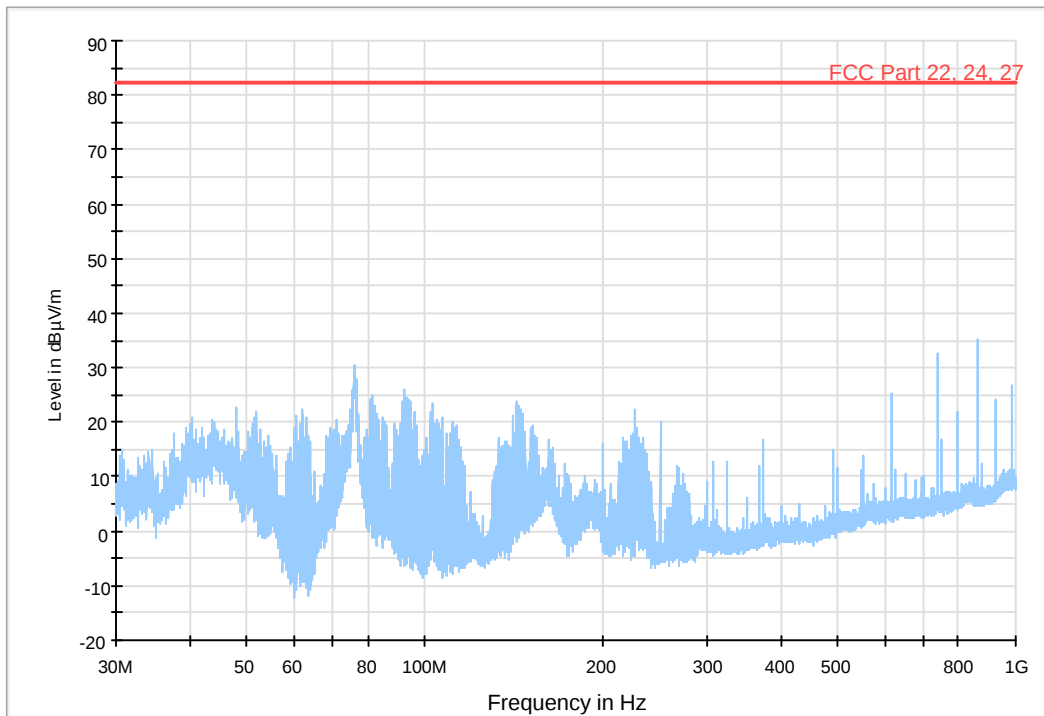
30 – 1000 MHz, max peak at a distance of 3m, Tx mid channel, test model 1

Copy of FCC ANSI-TIA-603-C 30 - 1000 MHz



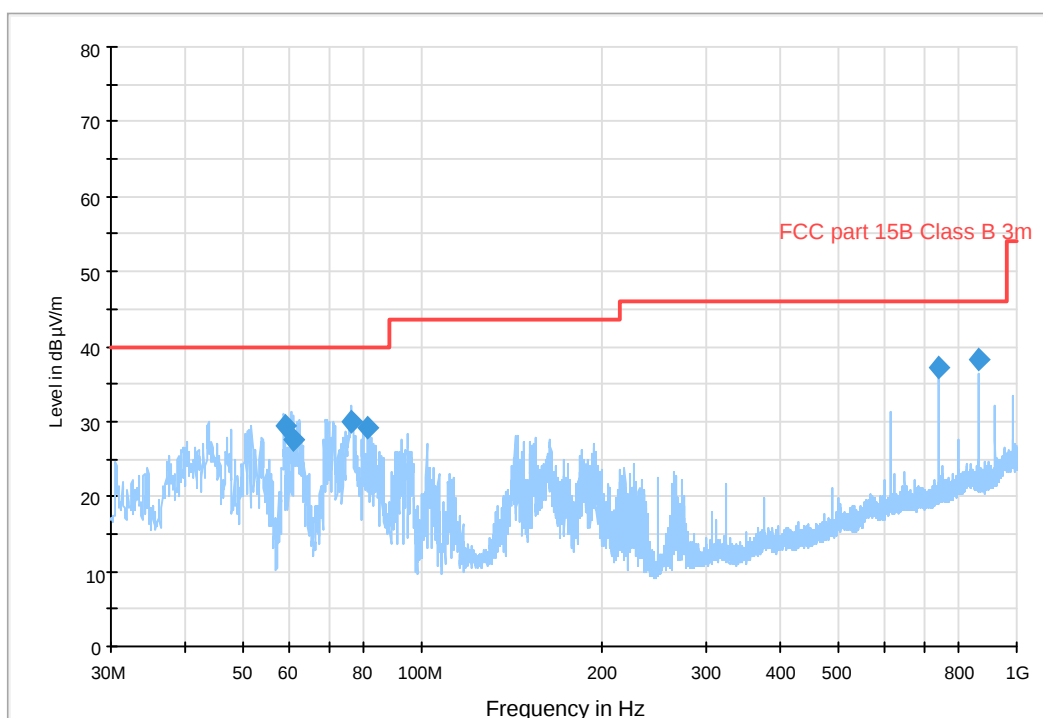
30 – 1000 MHz, max peak at a distance of 3m, Tx high channel, test model 1

Copy of FCC ANSI-TIA-603-C 30 - 1000 MHz



30 – 1000 MHz, max peak at a distance of 3m, Rx

FCC 30 - 1000 MHz FCC class B 3m



Test result, Tx on low, middle and high channel

Frequency (MHz)	QuasiPeak (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Limit (dBμV/m)	Margin (dB)
30 - 1000	-	1000.0	120.000	-	-	-	82.2	> 20

Test result, Rx

Frequency (MHz)	QuasiPeak (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Limit (dBμV/m)	Margin (dB)
58.722400	29.3	1000.0	120.000	115.0	V	47.0	40.0	10.7
60.814200	27.6	1000.0	120.000	100.0	V	140.0	40.0	12.4
60.832800	27.4	1000.0	120.000	100.0	V	54.0	40.0	12.6
75.955200	30.0	1000.0	120.000	115.0	V	-34.0	40.0	10.0
81.203200	29.3	1000.0	120.000	100.0	V	67.0	40.0	10.7
737.276000	37.1	1000.0	120.000	150.0	V	-21.0	46.0	8.9
860.161600	38.2	1000.0	120.000	151.0	V	218.0	46.0	7.8

Measured level [dBμV/m] = Analyser reading [dBμV] + cable loss [dB] – preamplifier gain [dB] + antenna factor [dB/m]

The measurement has been performed in field strength. The limit in FCC part 24 is -13 dBm e.i.r.p. which corresponds to 82.2 dBμV/m as worst case without counting the reflective floor.

6.4 Test equipment

Equipment type	Manufacturer	Model	Inv. No.	Cal. due date
Measurement software	Rohde & Schwarz	EMC 32	--	--
Receiver	Rohde & Schwarz	ESU 8	12866	2012-07
Logperiodic antenna	Chase	CBL6111A	971	2012-06
Antenna amplifier	Semko	-	7992	2012-07

7 RADIATED EMISSIONS MEASUREMENTS ABOVE 1 GHZ

Date of test:	2011-09-08 to 2011-09-14	Test location:	Big Chamber
EUT Serial:	XM104618002	Ambient temp.	20-25 °C
Test result:	Pass	Relative humidity	20-40 %

7.1 Requirement

Transmitter spurious emission:

Reference: FCC §24.238

Out of band emissions: The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log(P)$ dB. (equal to -13 dBm)

Receiver spurious emission:

Reference: FCC §15.209, IC RSS-210 Table 3

Frequency (GHz)	Field strength (dB μ V/m)	Measurement distance (m)
1 – 26	54.0 Av / 74.0 Pk	3

7.2 Test setup details

The radiated disturbance electric field intensity was measured in a semi-anechoic chamber at a distance of 3 m and the EUT was placed on a non-metallic stand, 0,8 m above the reference ground plane. In TX mode the EUT was transmitting with test model 1. Test set-up photos are given below.

An overview sweep with peak detection of the electric field intensity was performed with the measurement receiver in max-hold and with the antenna placed 1 m above the floor. The polarisation was horizontal and vertical. The measurements were repeated with the EUT rotated in 15-degree steps.

At the frequencies where high disturbance levels were found a search for max disturbance level was performed. With the EUT and antenna in the worst-case configuration new measurements were carried out.

Test set-up photo:

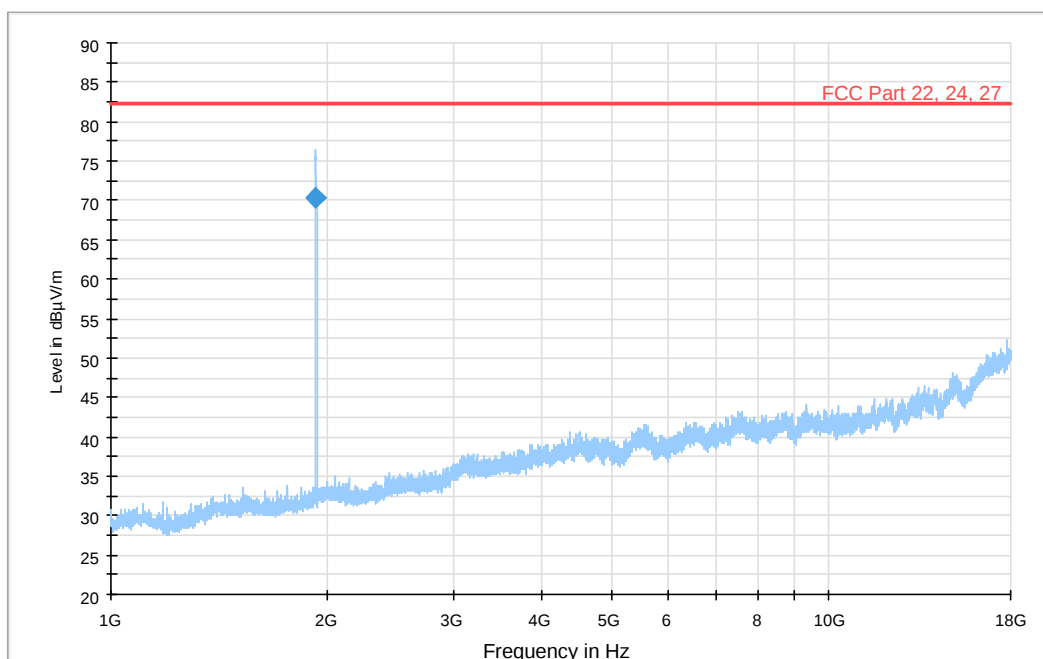


7.3 Test data

Overview sweeps performed with peak detector.

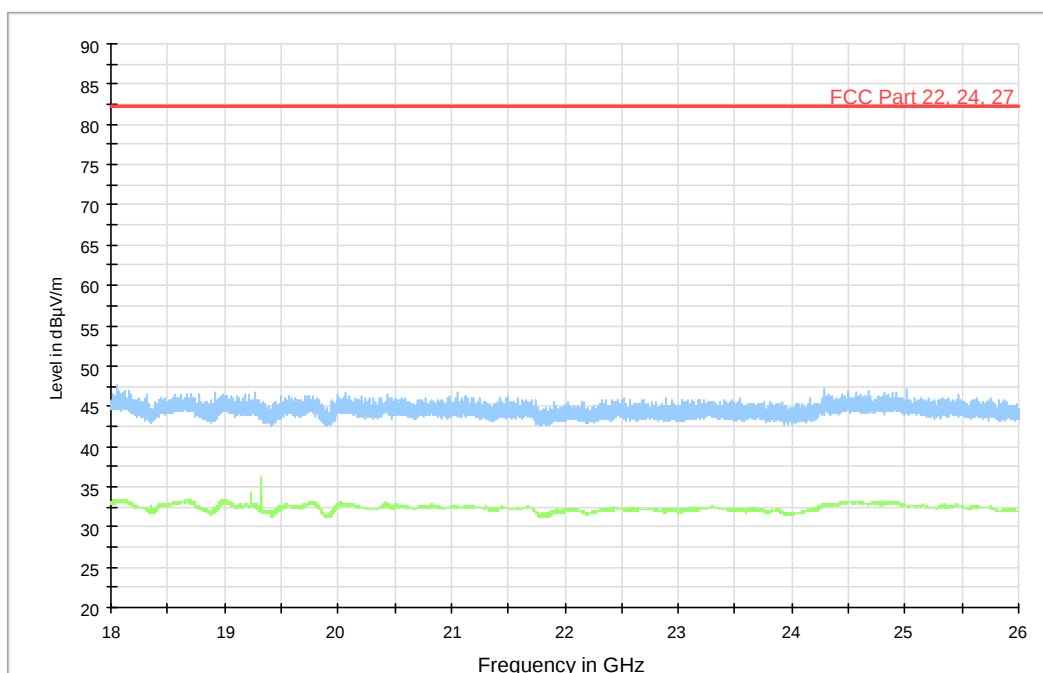
1 - 18 GHz, max peak at a distance of 3m, Tx low channel, test model 1

Copy (2) of FCC Part 22-24-27 1G - 18 G 3m ESU40



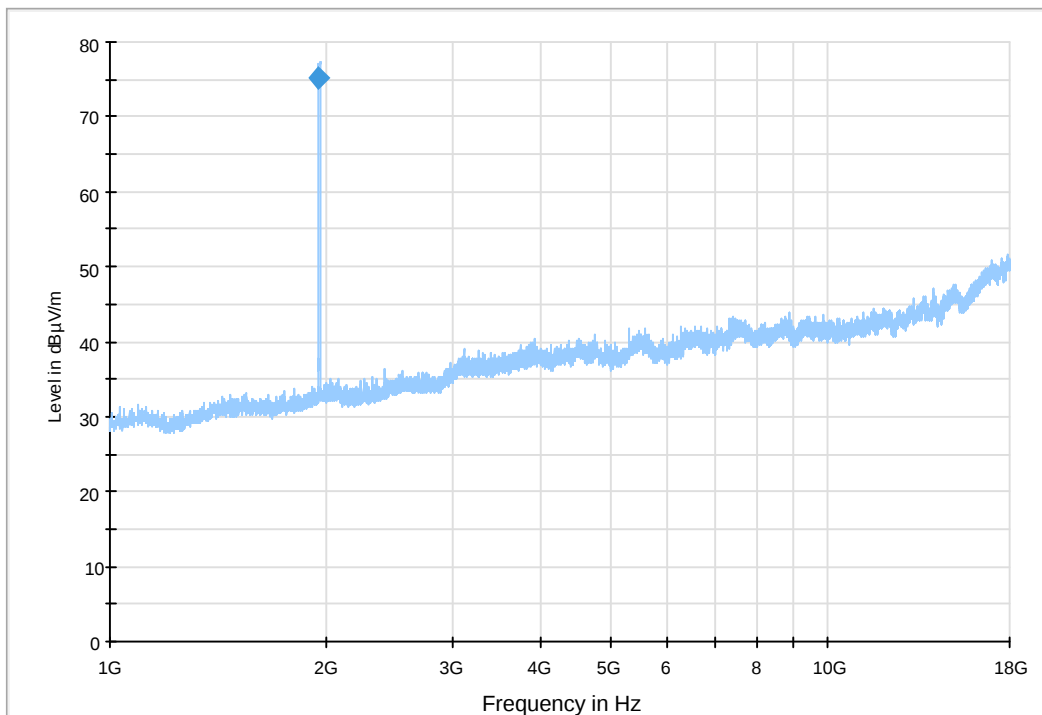
18 - 26 GHz, max peak and average at a distance of 3m, Tx low channel, test model 1

FCC 18 G -26 G part22 24 3m ESU40



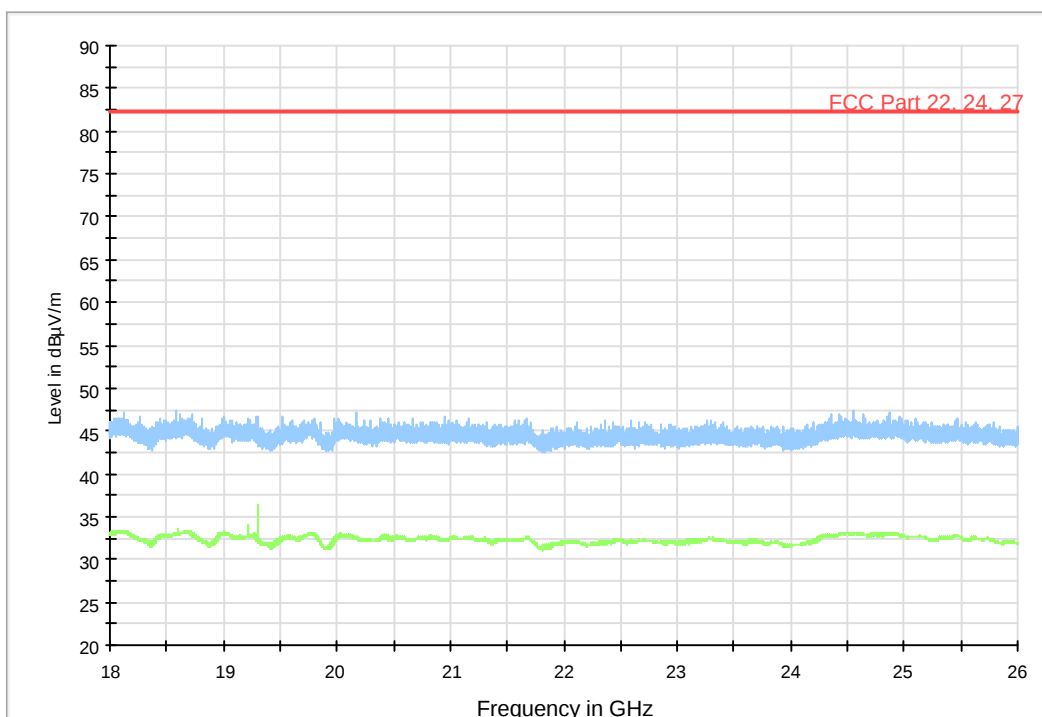
1 - 18 GHz, max peak at a distance of 3m, Tx mid channel, test model 1

Copy (2) of FCC Part 22-24-27 1G - 18 G 3m ESU40



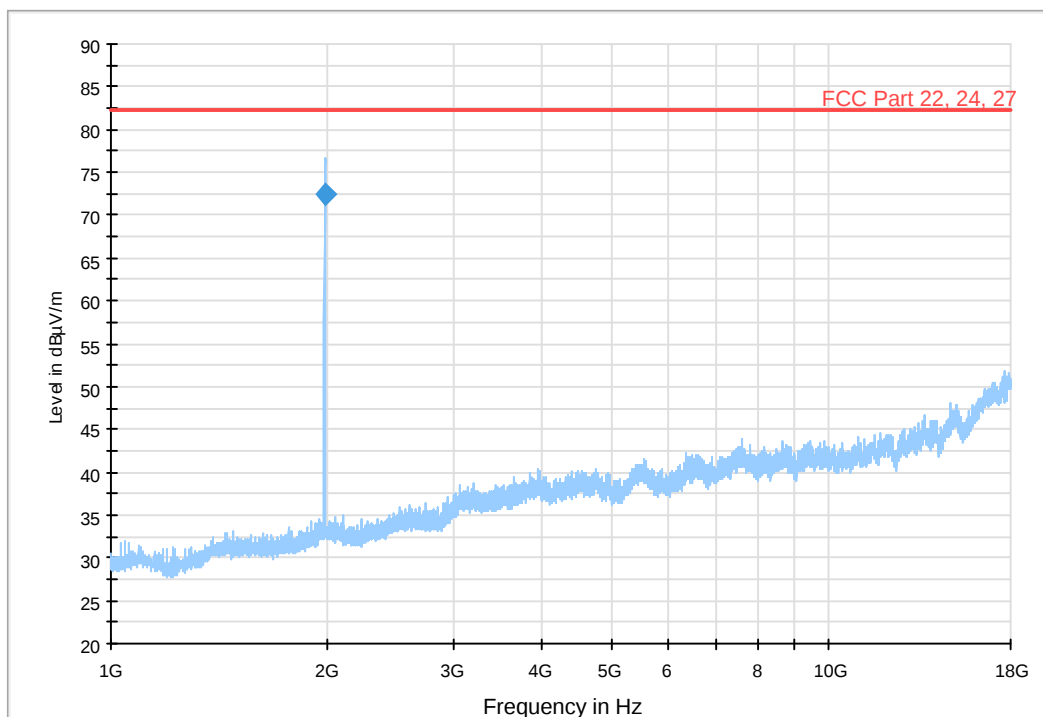
18 - 26 GHz, max peak and average at a distance of 3m, Tx mid channel, test model 1

FCC 18 G -26 G part22 24 3m ESU40



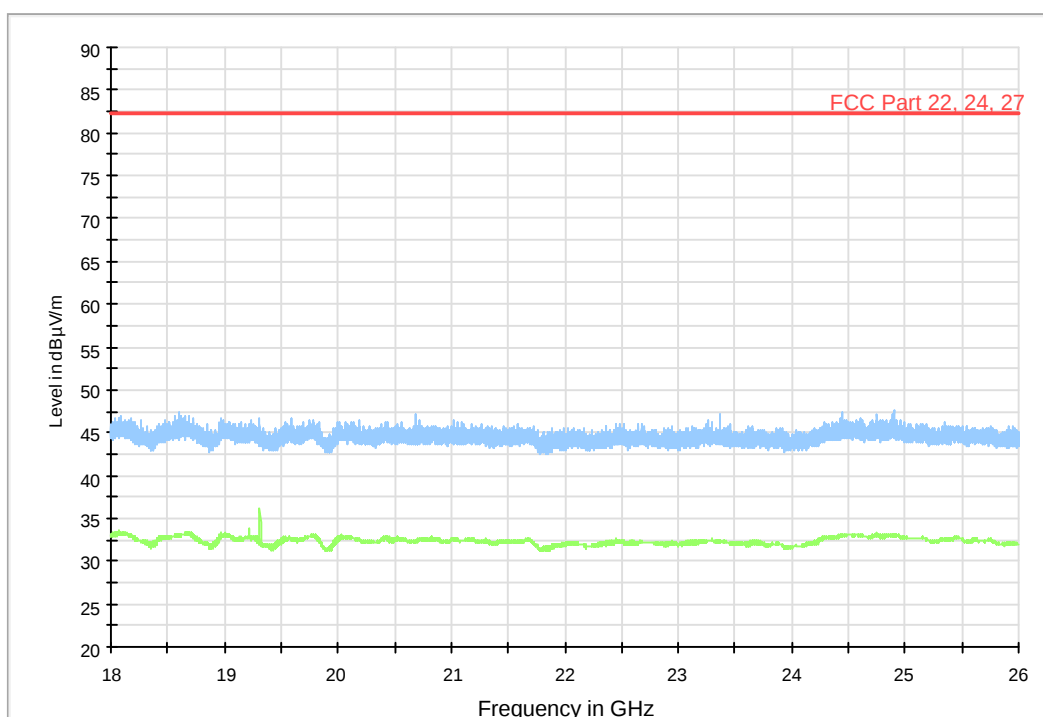
1 - 18 GHz, max peak at a distance of 3m, Tx high channel, test model 1

Copy (2) of FCC Part 22-24-27 1G - 18 G 3m ESU40

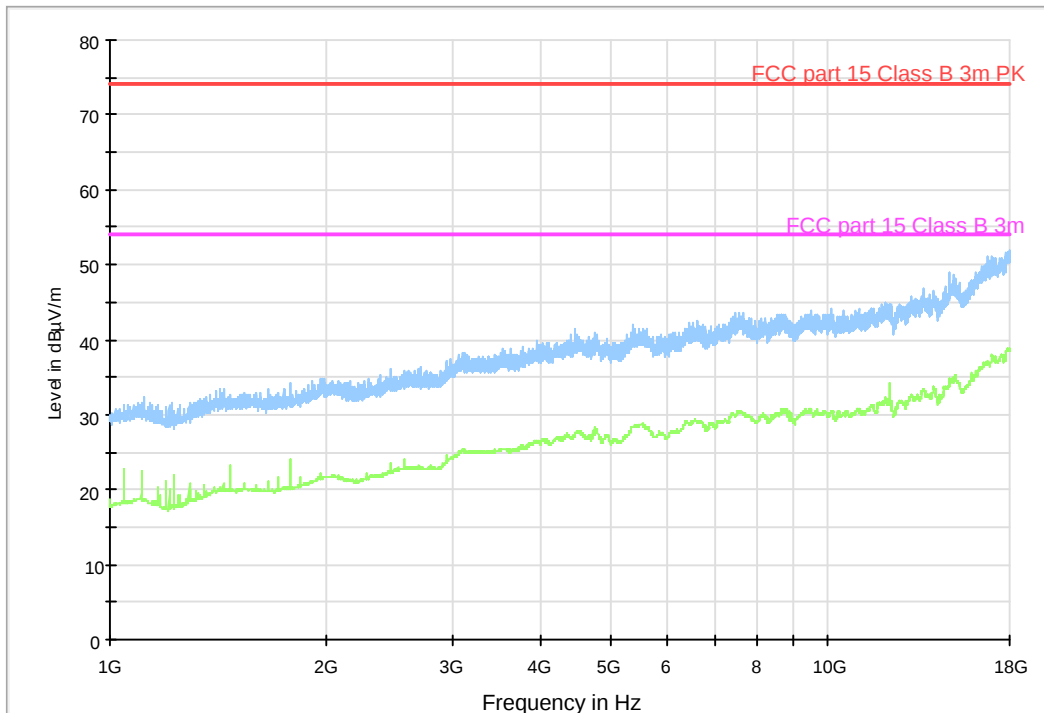


18 - 26 GHz, max peak and average at a distance of 3m, Tx high channel, test model 1

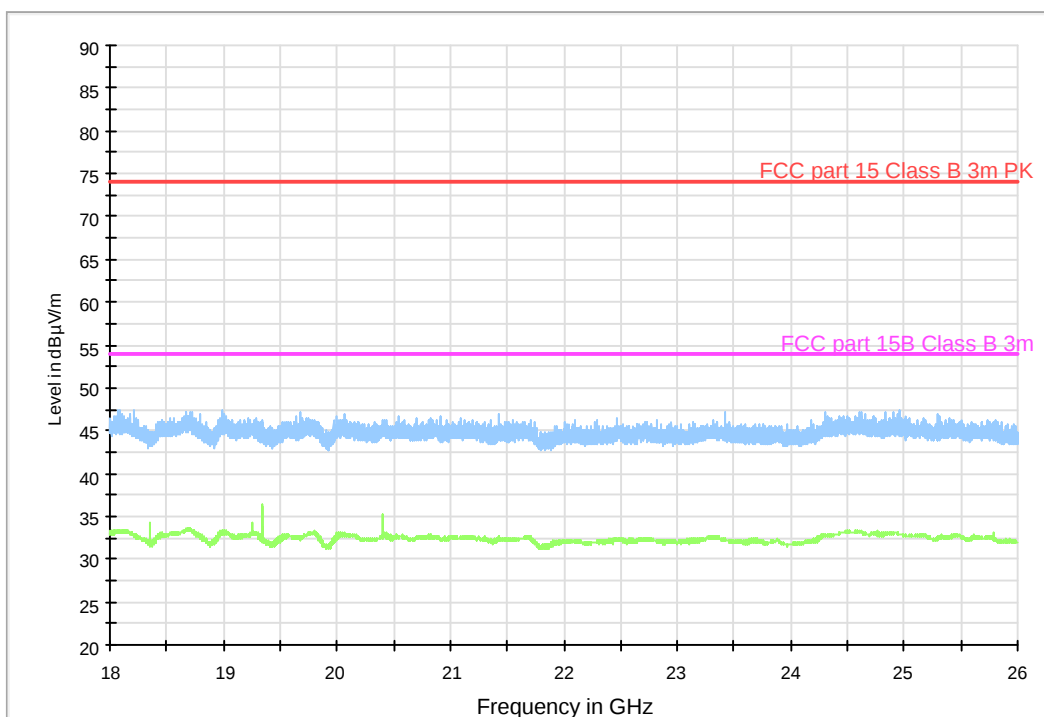
FCC 18 G -26 G part22 24 3m ESU40



1 - 18 GHz GHz, max peak and average at a distance of 3m, Rx
sna of FCC 1G - 18 G class B 3m ESU40



18 - 26 GHz GHz, max peak and average at a distance of 3m, Rx
FCC 18 G -26 G part22 24 3m ESU40



Test result, Tx on low, middle and high channel

Frequency (MHz)	QuasiPeak (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Limit (dBμV/m)	Margin (dB)	Note
1933.60000	70.3	1000.0	1000.000	150.0	H	146.0	-	-	Carrier
1958.45000	75.2	1000.0	1000.000	115.0	H	161.0	-	-	Carrier
1986.05000	72.4	1000.0	1000.000	115.0	H	155.0	-	-	Carrier

Test result, Rx

Frequency (MHz)	Average (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Limit (dBμV/m)	Margin (dB)	Note
1000-26000	-	-	1000.000	-	-	-	54		1

Frequency (MHz)	Peak (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Limit (dBμV/m)	Margin (dB)	Note
1000-26000	-	-	1000.000	-	-	-	74		1

1) No significant peaks above noise floor

Measured level [dBμV/m] = Analyser reading [dBμV] + cable loss [dB] – preamplifier gain [dB] + antenna factor [dB/m]

The measurement has been performed in field strength. The limit in FCC part 24 is -13 dBm e.i.r.p. which corresponds to 82.2 dBμV/m as worst case without counting the reflective floor.

7.4 Test equipment

Equipment type	Manufacturer	Model	Inv. No.	Cal. due date
Measurement software	Rohde & Schwarz	EMC 32	--	--
Receiver	Rohde & Schwarz	ESU 40	13178	2012-07
Horn antenna	Rohde & Schwarz	HF907	31245	2012-11
Antenna amplifier	Rohde & Schwarz	HF907	31246	2012-07
Horn + amplifier	Bonn	BLMA1826-5A	31247	2013-12

8 CONDUCTED EMISSIONS MEASUREMENTS

Date of test:	2011-10-03	Test location:	Radio lab
EUT Serial:	XM104618002	Ambient temp.	20-25 °C
Test result:	Pass	Relative humidity	20-40 %

8.1 Requirement

Reference: FCC §24.238

Out of band emissions: The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log(P)$ dB. (equal to -13 dBm)

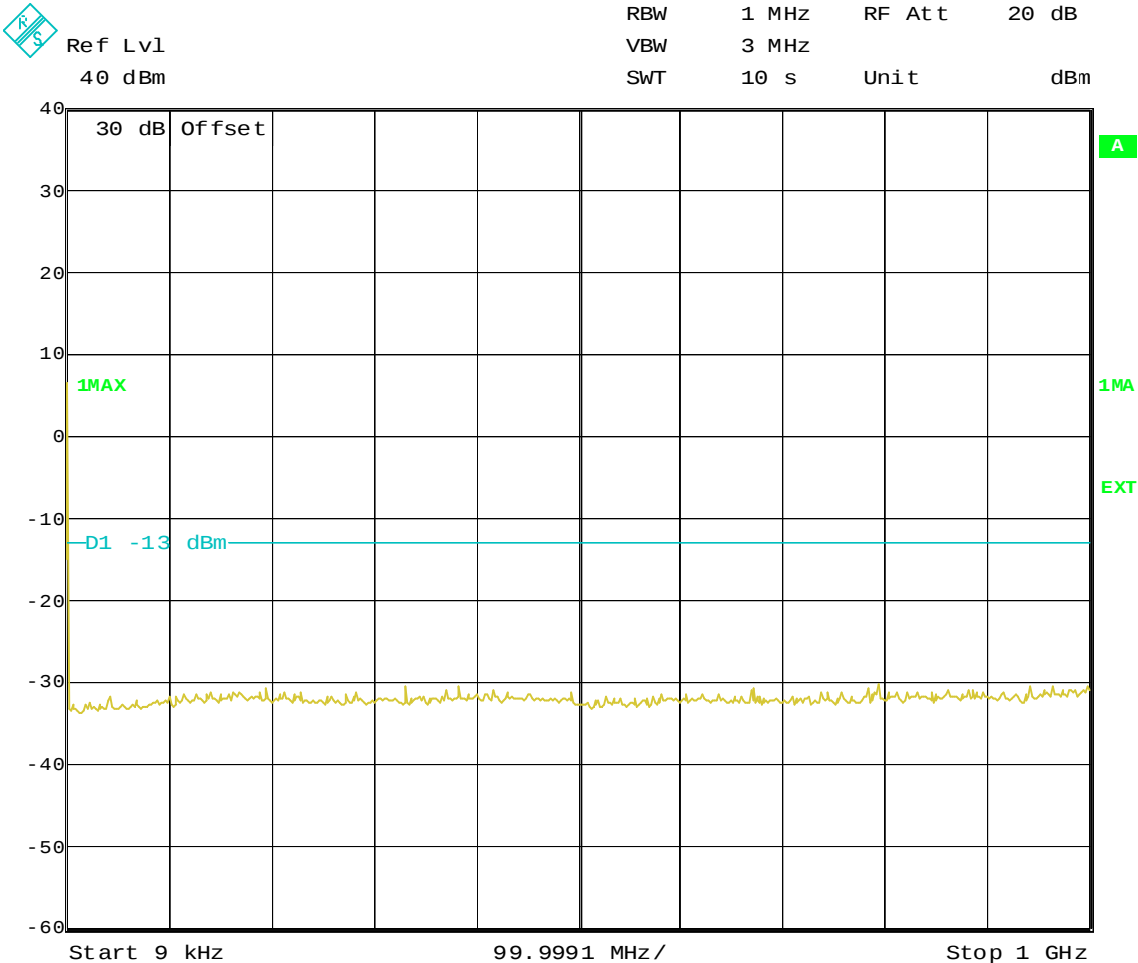
8.2 Test setup details

The EUT was connected via an attenuator to a spectrum analyzer. Attenuation in test setup were corrected with an offset in the spectrum analyzer.

8.3 Test data

Overview sweeps performed with peak detector.

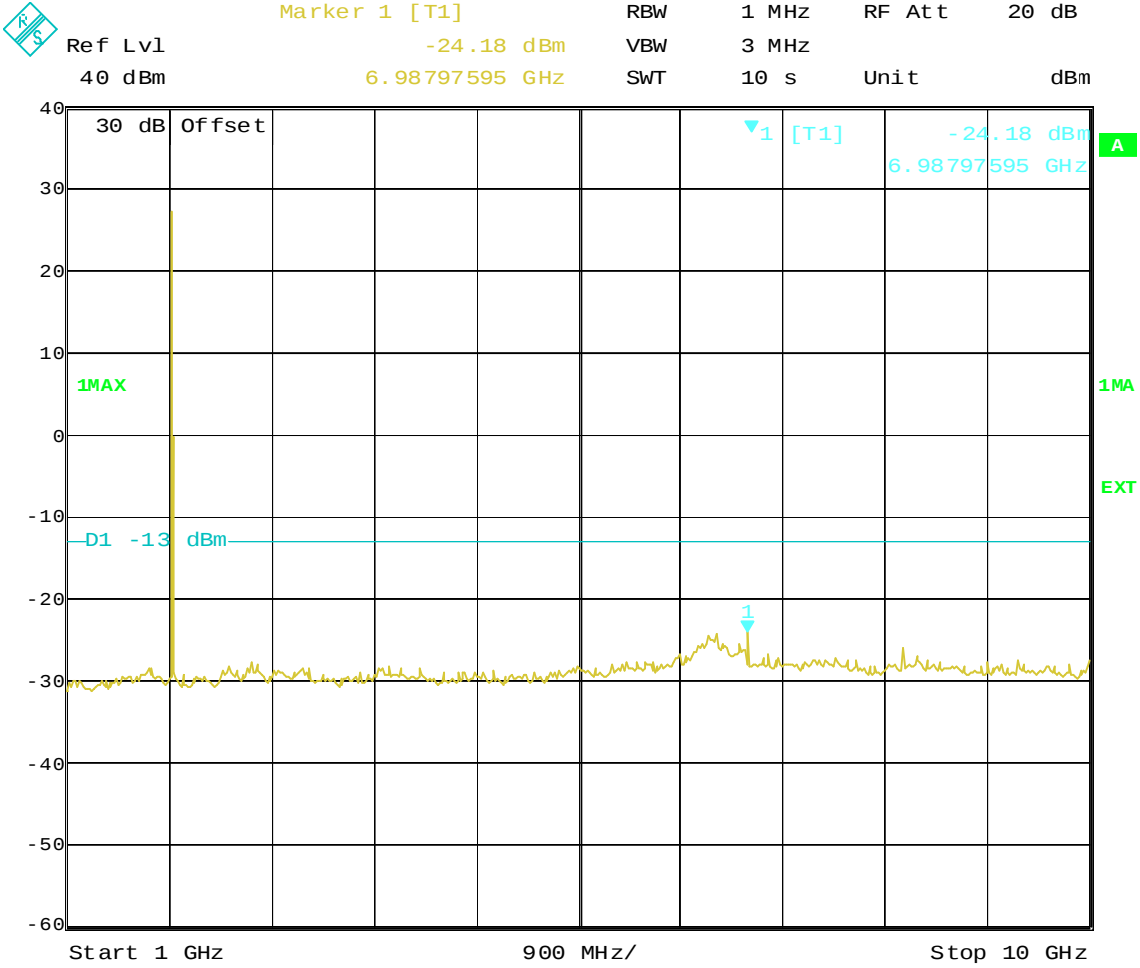
9 kHz - 1 GHz, max peak, Port A, Tx low channel, test model 1



Date: 3.OCT.2011 12:07:15

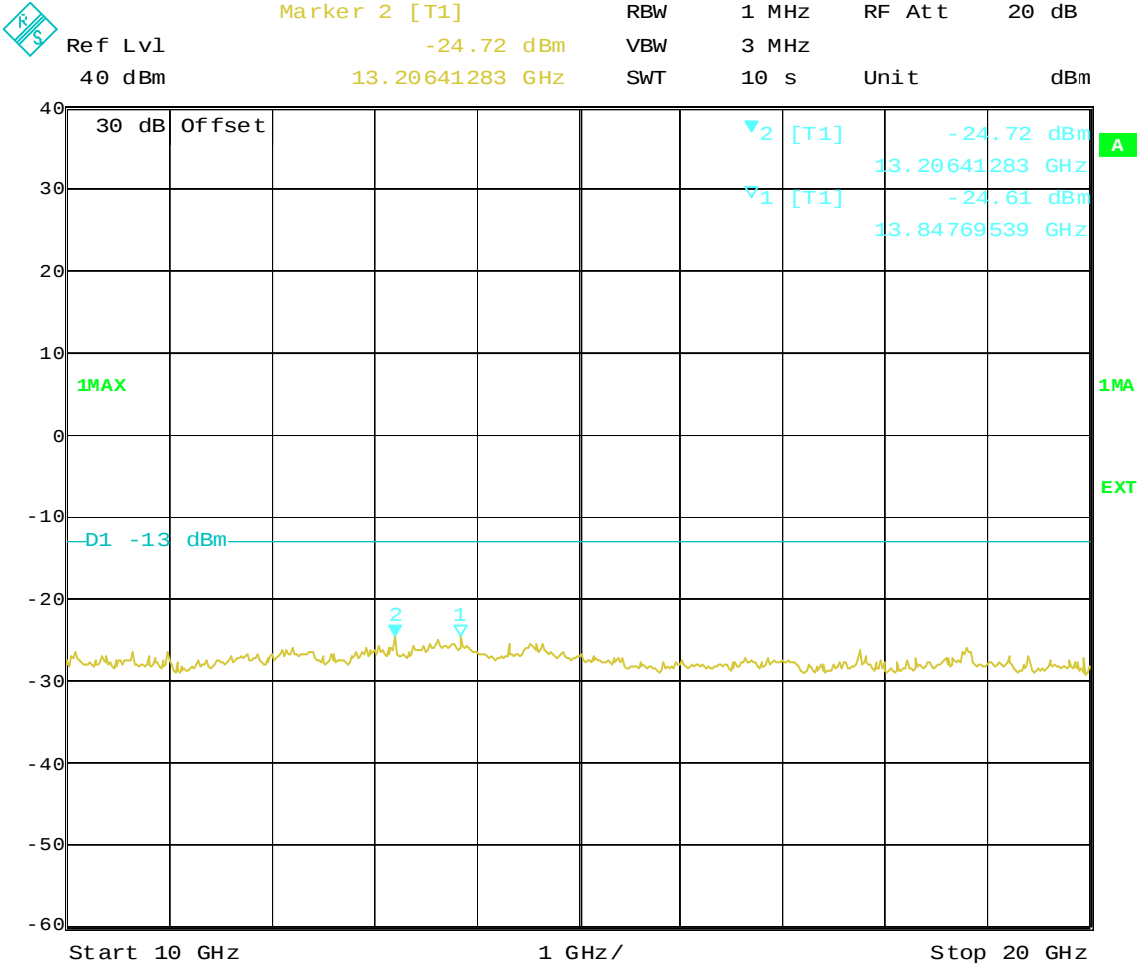
Peak at 9 kHz is not generated in the EUT, it comes from LO feed-through in the spectrum analyzer.

1 - 10 GHz, max peak, Port A, Tx low channel, test model 1



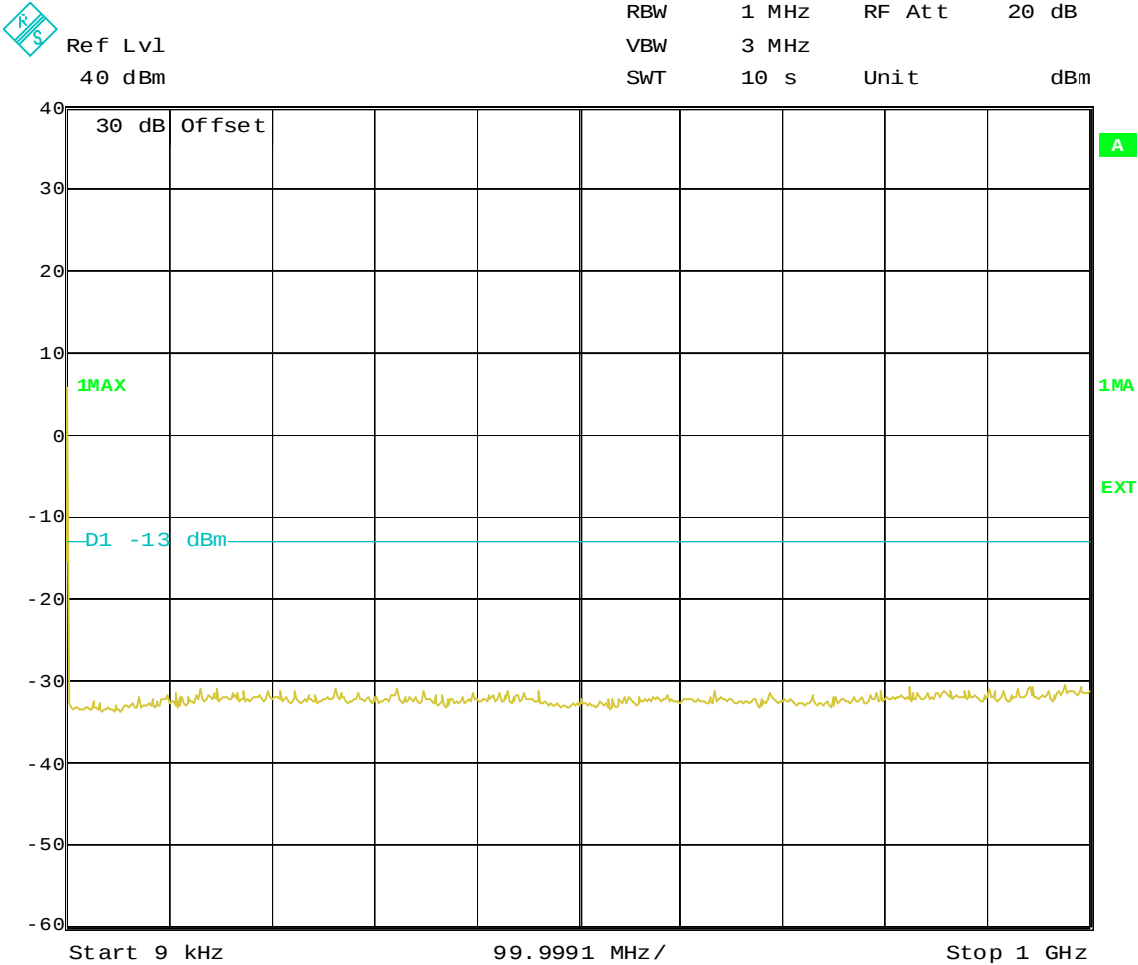
Date: 3.OCT.2011 12:08:02

10 - 20 GHz, max peak, Port A, Tx low channel, test model 1



Date: 3.OCT.2011 12:11:49

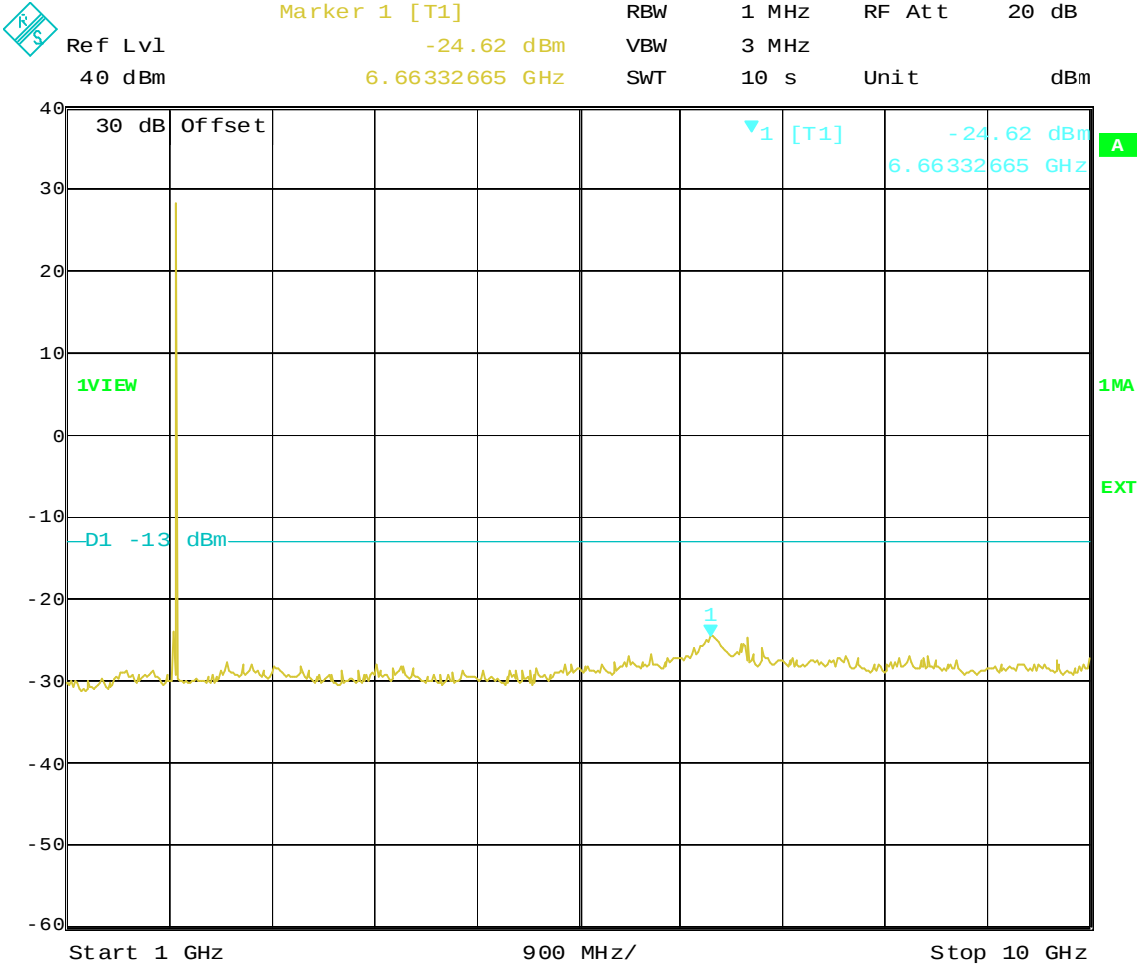
9 kHz - 1 GHz, max peak, Port A, Tx mid channel, test model 1



Date: 3.OCT.2011 12:12:20

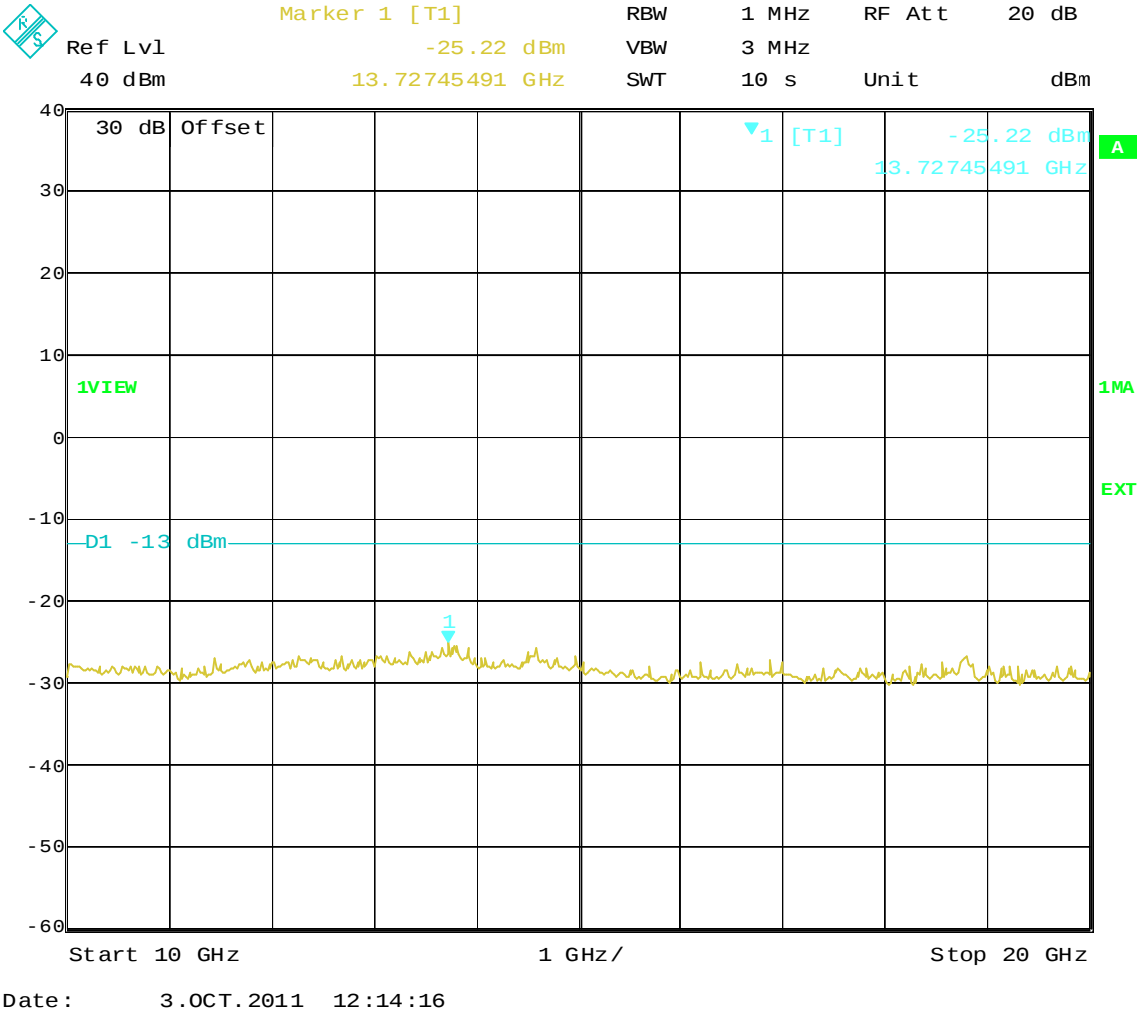
Peak at 9 kHz is not generated in the EUT, it comes from LO feed-through in the spectrum analyzer.

1 - 10 GHz, max peak, Port A, Tx mid channel, test model 1

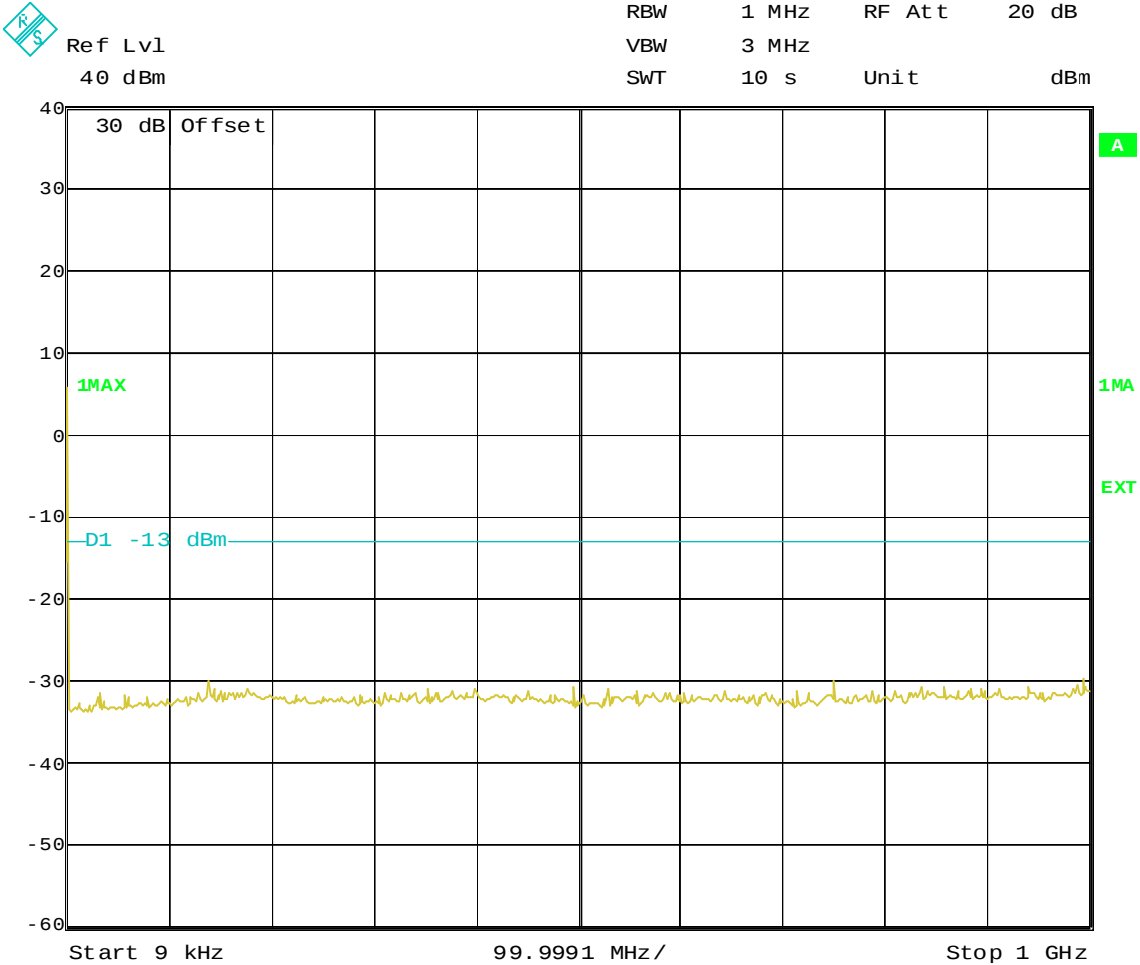


Date: 3.OCT.2011 12:13:34

10 - 20 GHz, max peak, Port A, Tx mid channel, test model 1



9 kHz - 1 GHz, max peak, Port A, Tx high channel, test model 1

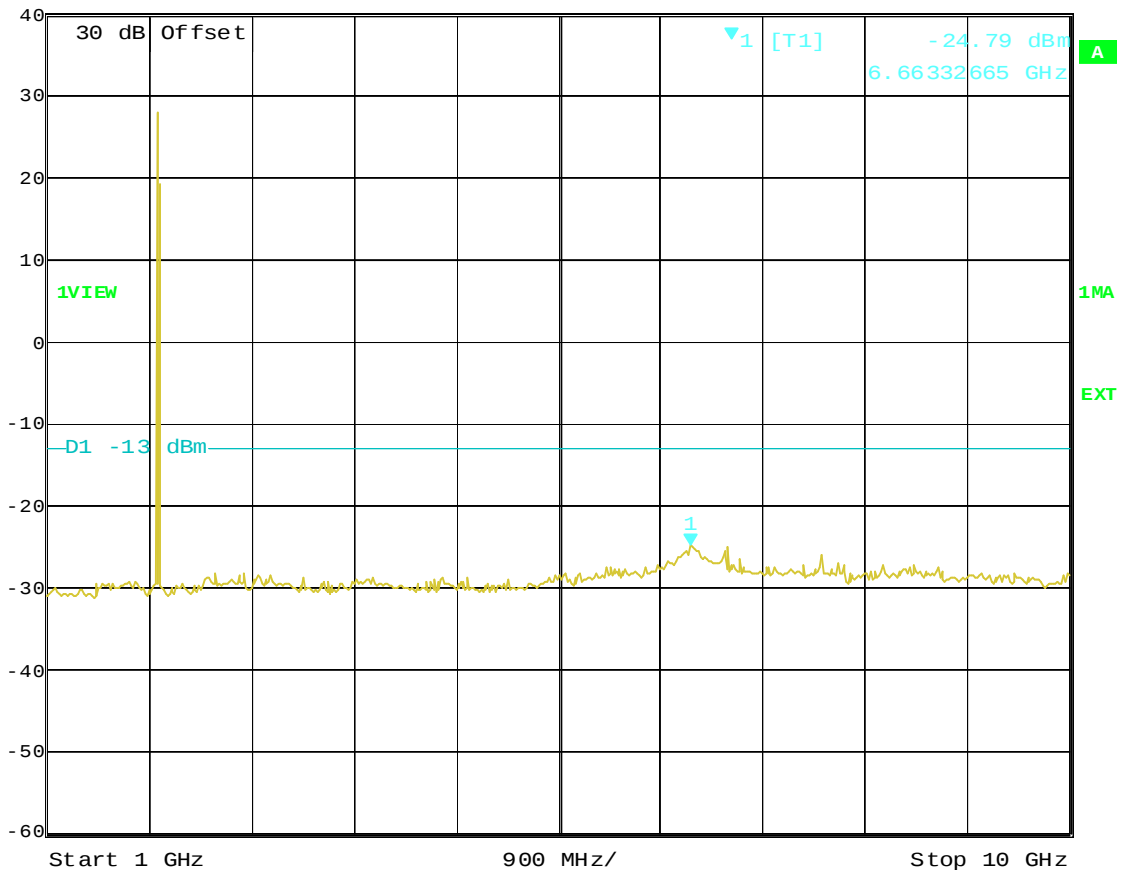


Date: 3.OCT.2011 12:15:28

Peak at 9 kHz is not generated in the EUT, it comes from LO feed-through in the spectrum analyzer.

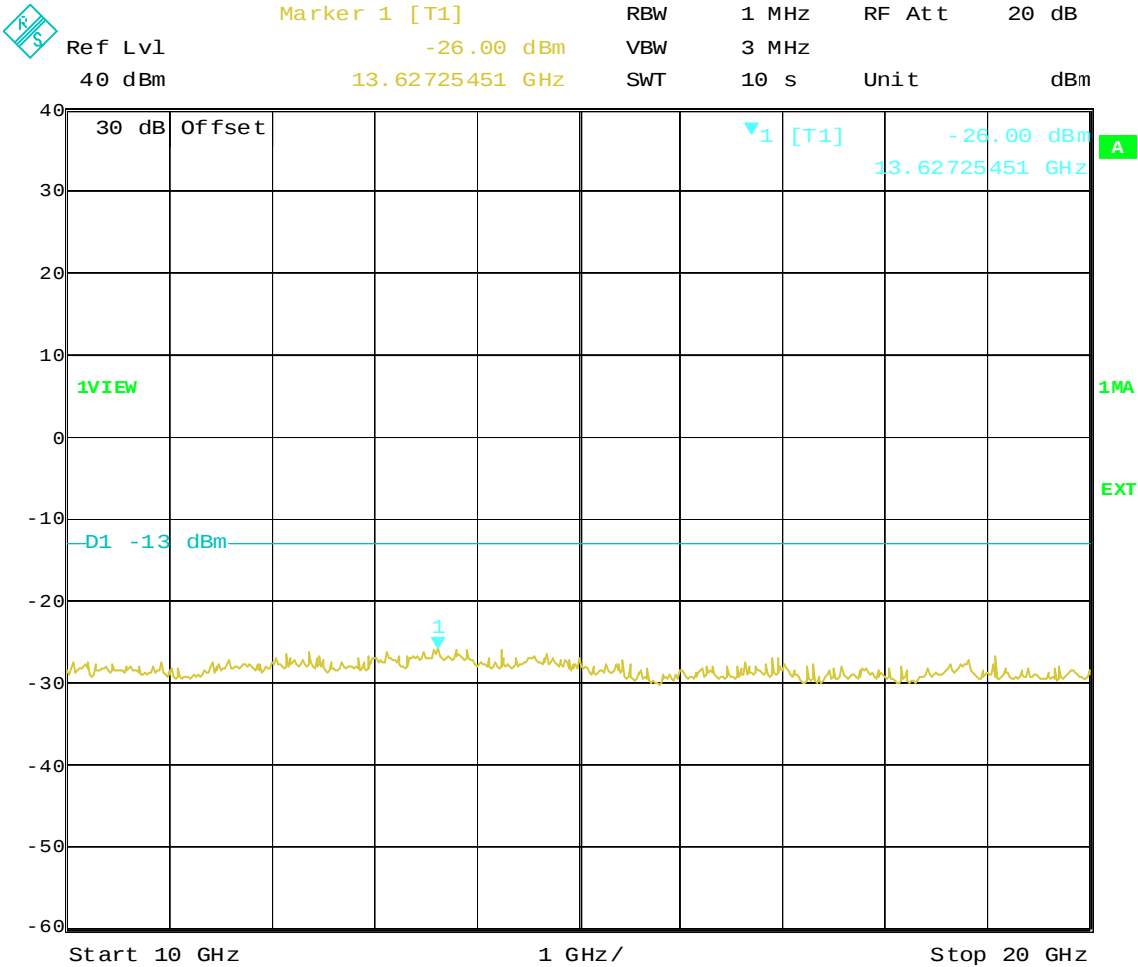
1 - 10 GHz, max peak, Port A, Tx high channel, test model 1


 Ref Lvl 40 dBm Marker 1 [T1] -24.79 dBm RBW 1 MHz RF Att 20 dB
 6.66332665 GHz VBW 3 MHz Unit dBm
 10 s



Date: 3.OCT.2011 12:16:09

10 - 20 GHz, max peak, Port A, Tx high channel, test model 1



Date: 3.OCT.2011 12:16:47

Measured level [dBm] = Analyser reading [dBm] + cable loss [dB] + attenuator [dB]

8.4 Test equipment

Equipment type	Manufacturer	Model	Inv. No.	Cal. due date
Spectrum analyzer	Rohde & Schwarz	FSIQ 40	12793	2012-07
Rubidium reference	Datum	-	40032	2012-07

9 FREQUENCY STABILITY MEASUREMENTS

Date of test:	2011-09-19	Test location:	Radio lab
EUT Serial:	XM104618002	Ambient temp.	20-25 °C
Test result:	Pass	Relative humidity	20-40 %

9.1 Requirement

Reference: FCC §24.235

The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

9.2 Test setup details

EUT was placed in a climate chamber and connected to a spectrum analyzer in WCDMA measurement mode.

EUT was transmitting in test mode 1.

9.3 Test data

Test Conditions		Frequency
Temperature °C	Voltage V AC	Error Hz
50	Nominal = 120	+3
40		-10
30		-23
20		-17
10		-35
0		-52
-10		-58
-20		-65
-30		-80
Nominal (20)	85% of nominal = 102	-21
	Nominal = 120	-17
	115% of nominal = 138	-21

9.4 Test equipment

Equipment type	Manufacturer	Model	Inv. No.	Cal. due date
Spectrum analyzer	Rohde & Schwarz	FSIQ 40	12793	2012-07
Rubidium reference	Datum	-	40032	2012-07

10 RF OUTPUT POWER

Date of test:	2011-10-07	Test location:	Radio lab
EUT Serial:	XM104618002	Ambient temp.	20-25 °C
Test result:	Pass	Relative humidity	20-40 %

10.1 Requirement

Reference: FCC §24.232

Base stations with an emission bandwidth greater than 1 MHz are limited to 1640 W/MHz e.i.r.p with an antenna height up to 300 meters HAAT

10.2 Test setup details

EUT was connected to a spectrum analyzer in WCDMA measurement mode.

EUT was transmitting in test mode 1.

The RF output power has been measured at the TX port and no compensation for antenna gain has been made.

10.3 Test data

RF output power		
	Peak [dBm]	Average (RMS) [dBm]
Low channel	31.1	23.3
Mid channel	31.5	23.6
High channel	31.4	23.7

10.4 Test equipment

Equipment type	Manufacturer	Model	Inv. No.	Cal. due date
Power meter	Rohde & Schwarz	NRVD	31741	2012-03
Power sensor	Rohde & Schwarz	NRV Z31	7411	2012-07
Power sensor	Rohde & Schwarz	NRV Z51	7861	2012-07

11 OCCUPIED BANDWIDTH

Date of test:	2011-09-27	Test location:	Radio lab
EUT Serial:	XM104618002	Ambient temp.	20-25 °C
Test result:	Pass	Relative humidity	20-40 %

11.1 Requirement

Reference: 2.1049 Occupied bandwidth

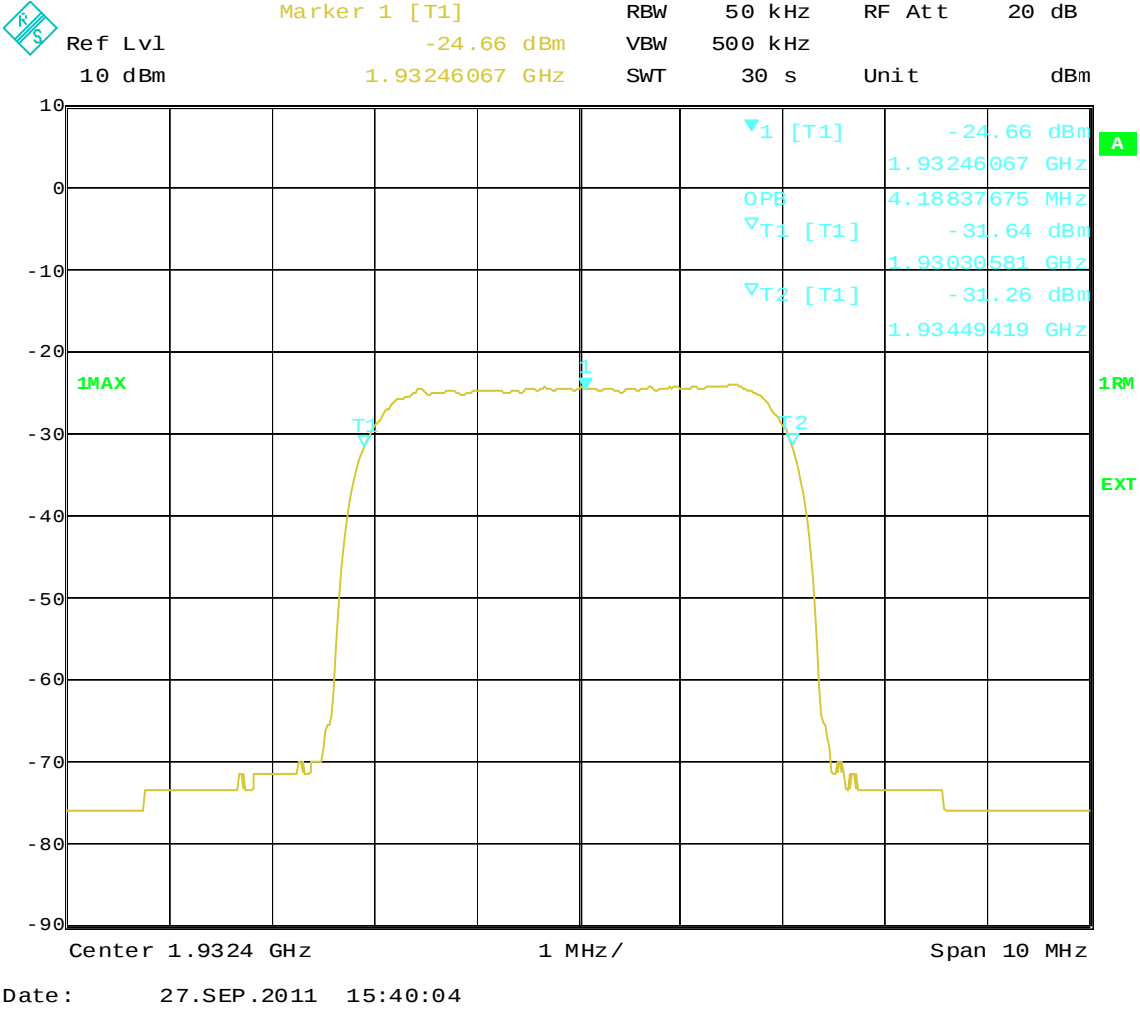
11.2 Test setup details

EUT was connected to a spectrum analyzer.
EUT was transmitting in test mode 1.

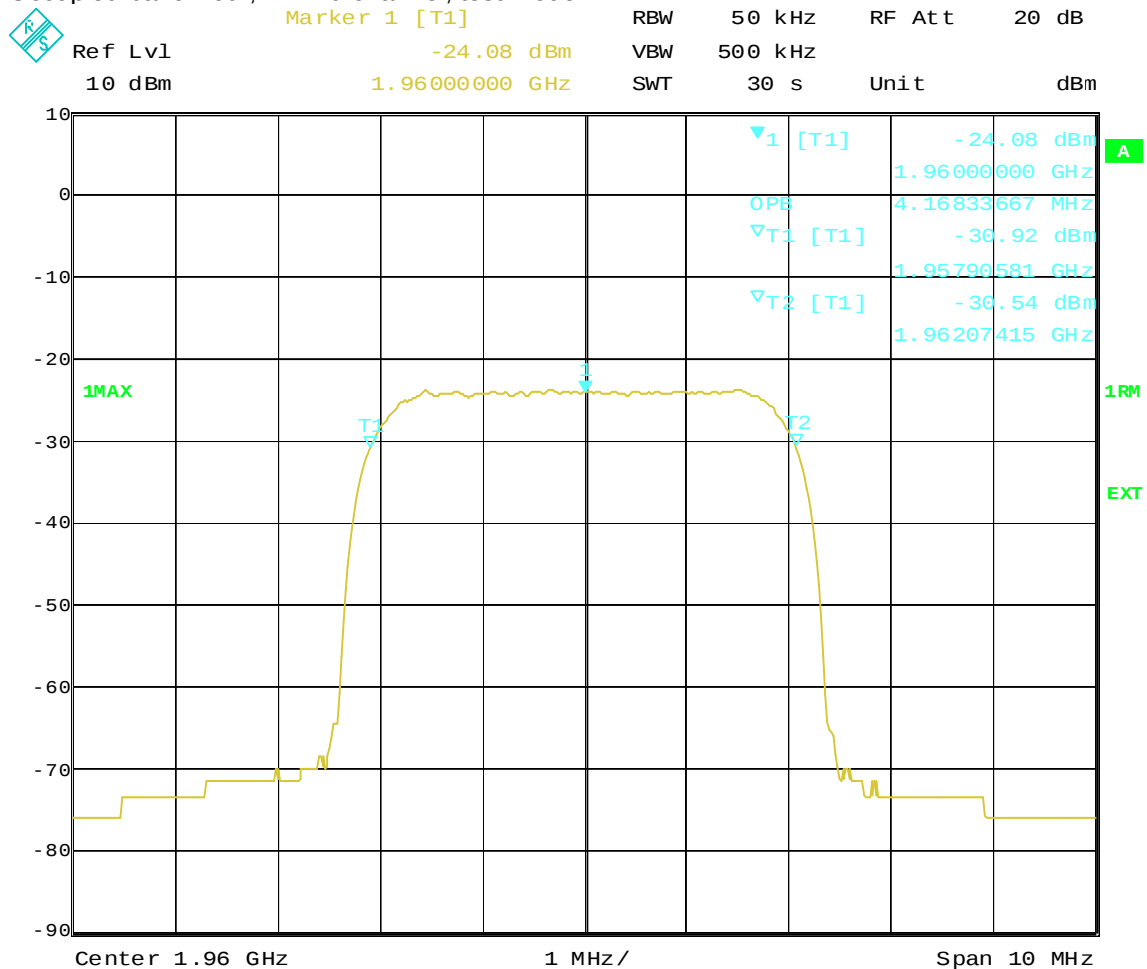
The spectrum analyzed calculated/integrated the bandwidth as a 99% BW

11.3 Test data

Occupied bandwidth, Tx low channel, test model 1

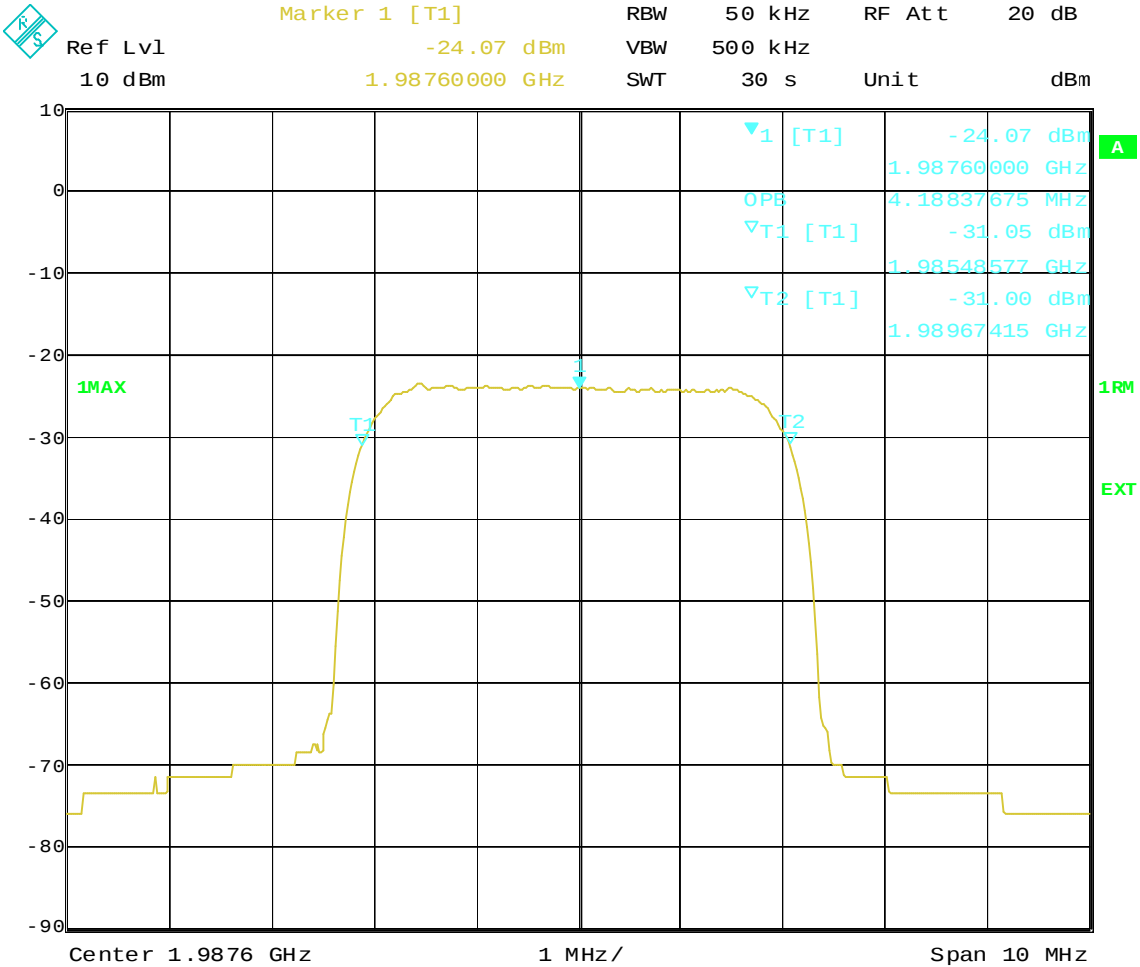


Occupied bandwidth, Tx mid channel, test model 1



Date: 27.SEP.2011 15:42:12

Occupied bandwidth, Tx low channel, test model 1



Date: 27.SEP.2011 15:44:15

Occupied bandwidth	
Low channel	4.19 MHz
Mid channel	4.17 MHz
High channel	4.19 MHz

11.4 Test equipment

Equipment type	Manufacturer	Model	Inv. No.	Cal. due date
Spectrum analyzer	Rohde & Schwarz	FSIQ 40	12793	2012-07
Rubidium reference	Datum	-	40032	2012-07

12 BAND EDGE

Date of test:	2012-10-06	Test location:	Radio lab
EUT Serial:	XM104618002	Ambient temp.	20-25 °C
Test result:	Pass	Relative humidity	20-40 %

12.1 Requirement

Reference: FCC §24.238

The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log(P)$ dB = -13 dBm

12.2 Test setup details

EUT connected to a spectrum analyzer. The spectrum analyzer was connected to an external 10 MHz reference.

Attenuations in the test setup were compensated with a level offset in the spectrum analyzer.

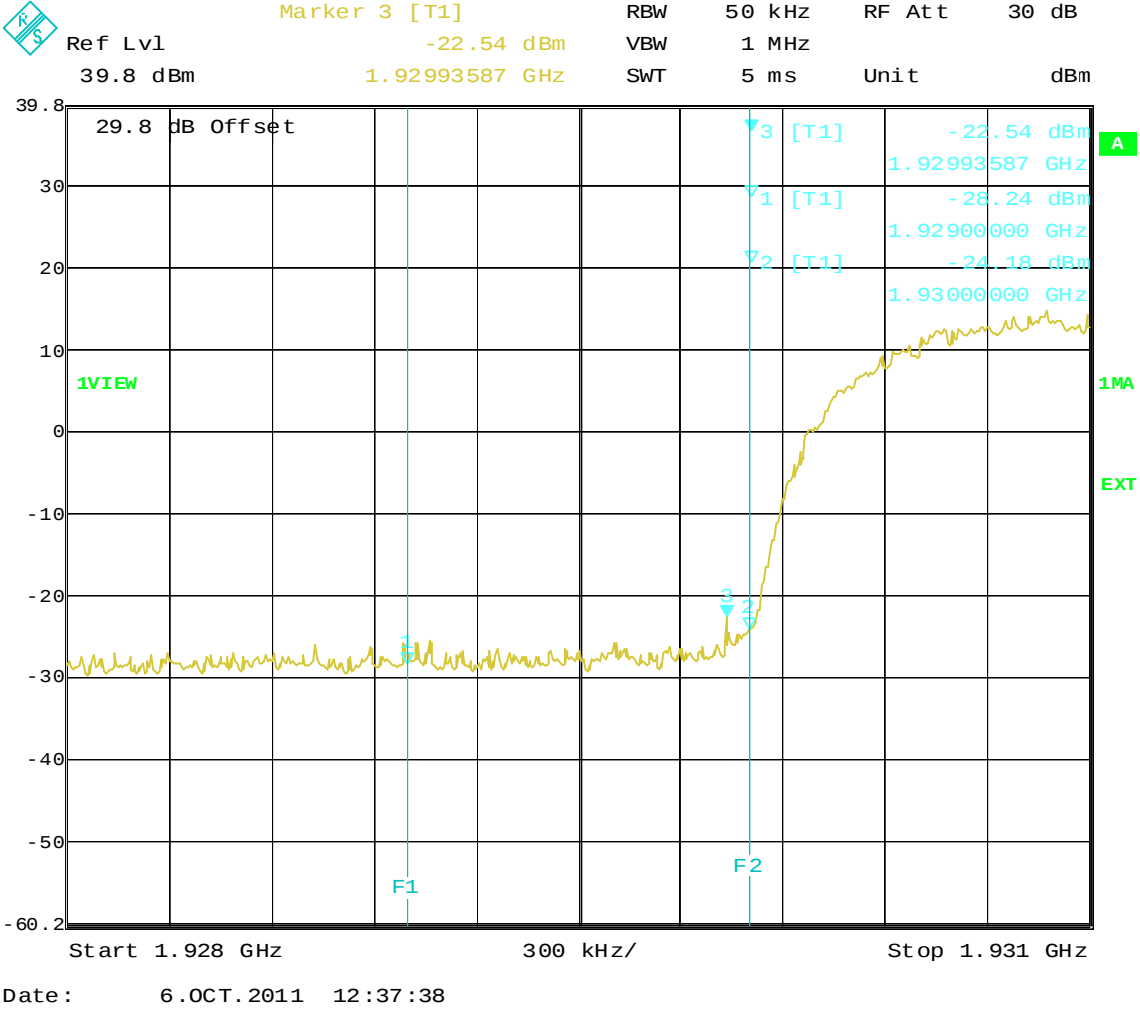
A resolution bandwidth of 50 kHz ($> 1\%$ of 26 dB BW) was used up to 1 MHz from the band edge.

A resolution bandwidth of 100 kHz was used 1 - 5 MHz from the band edge. The limit was decreased to -23 dBm due to the reduced resolution bandwidth.

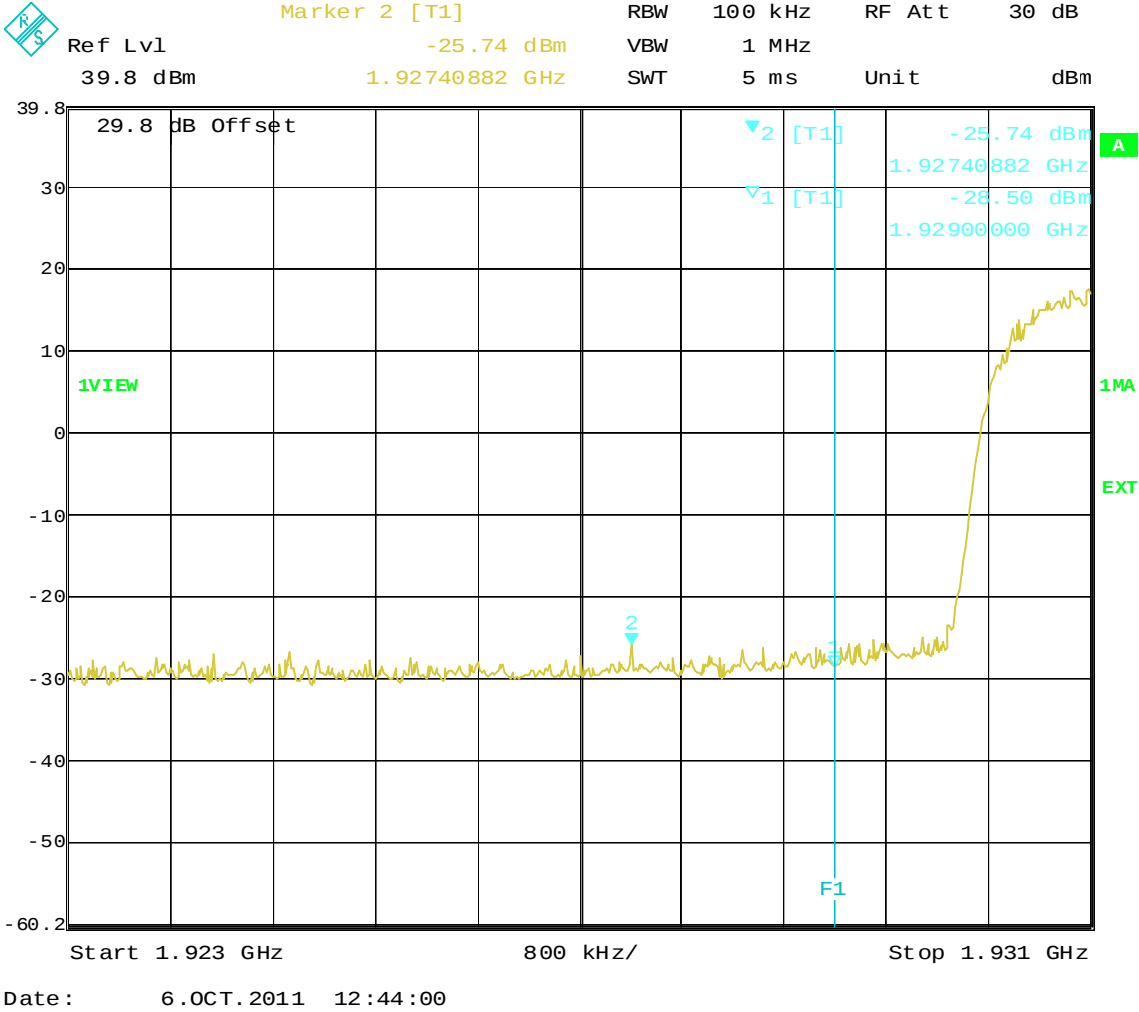
EUT was transmitting in test mode 1.

12.3 Test data

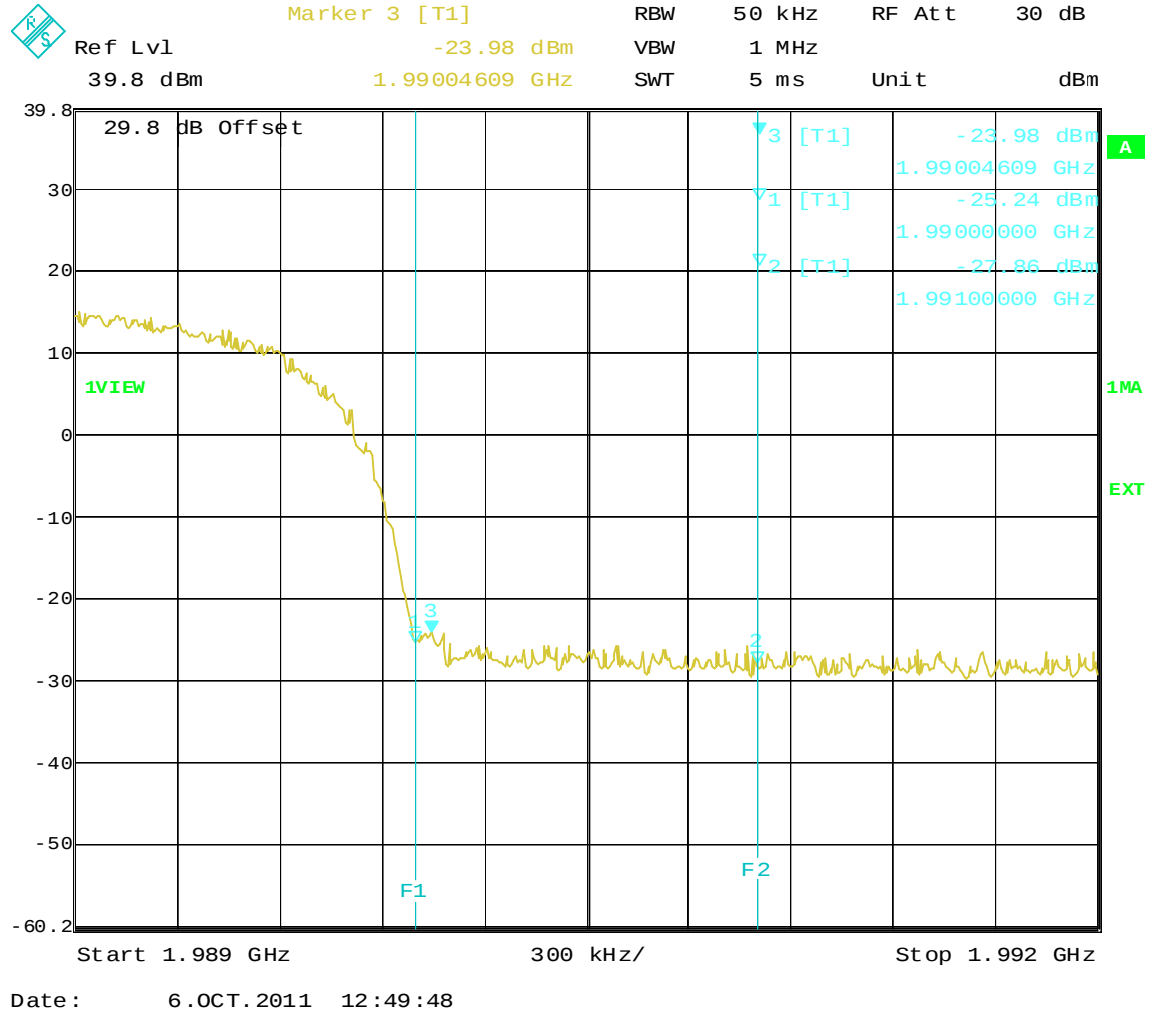
Low band edge, test model 1



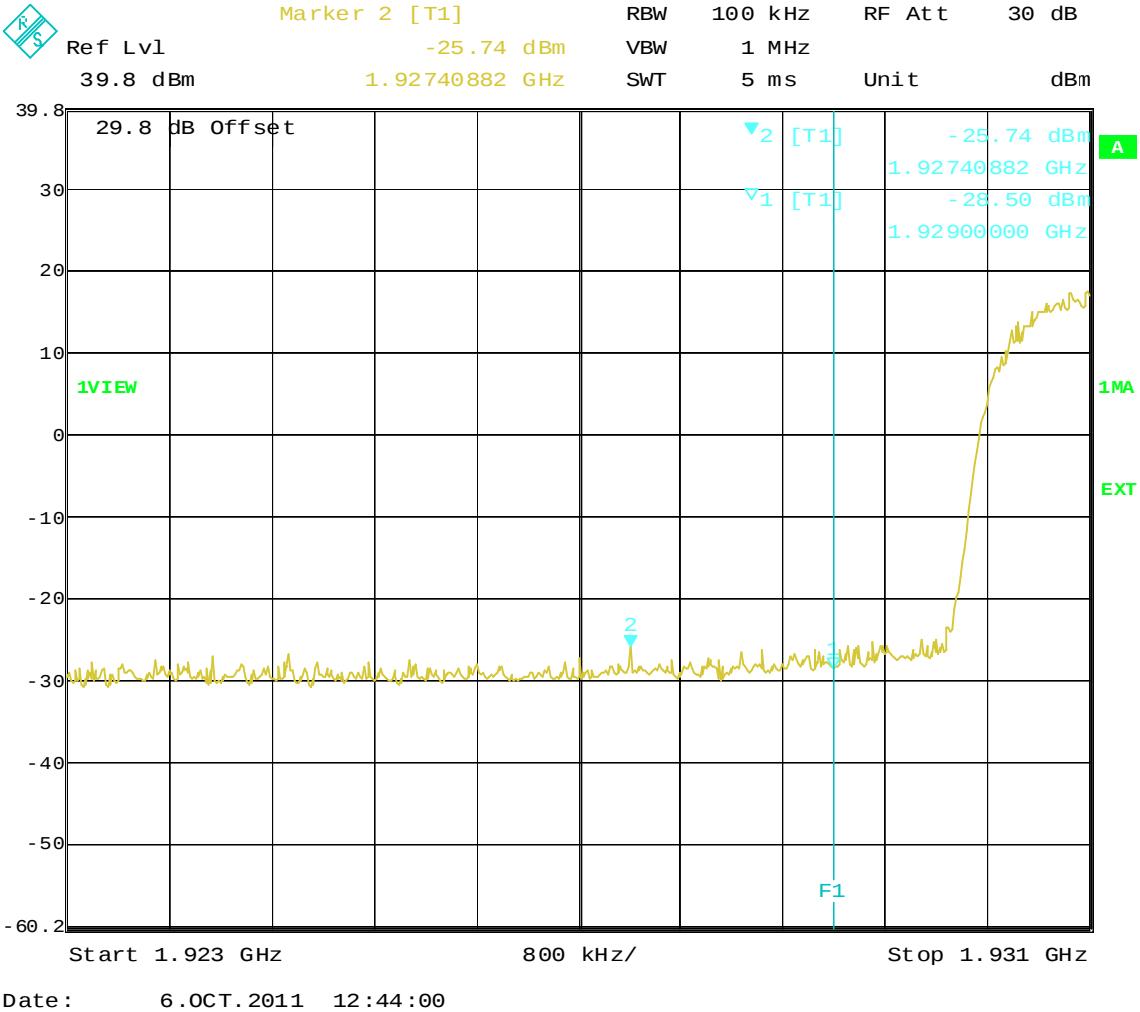
Low band edge, test model 1



High band edge, test model 1



High band edge, test model 1



12.4 Test equipment

Equipment type	Manufacturer	Model	Inv. No.	Cal. due date
Spectrum analyzer	Rohde & Schwarz	FSIQ 40	12793	2012-07
Rubidium reference	Datum	-	40032	2012-07

13 UNCERTAINTIES SUMMARY

The measurement uncertainty describes the overall uncertainty of the given measured value during operation of the EUT.

Measurement uncertainty is calculated in accordance with EA-4/02-1997.

The measurement uncertainty is given with a confidence of 95% ($k=2$).

Radiated disturbance, field strength, 30 MHz - 1000 MHz

30 to 1000 MHz at 3 m

± 4,8 dB

Radiated disturbance, field strength, 1 to 40 GHz in Semi Anechoic Chambers "Stora Hallen" and "Björkhallen"

1 to 18 GHz with filter or attenuator

± 5,4 dB

1 to 18 GHz without filter or attenuator

± 5,2 dB

18 to 26 GHz without filter or attenuator

± 5,5 dB

26 to 40 GHz without filter or attenuator

± 5,6 dB

Conducted disturbances at the antenna port on radio equipment

Frequency range 9 kHz – 1 GHz

± 0,9 dB

Frequency range 1 GHz – 7 GHz

± 1,4 dB

Frequency range 7 GHz -18GHz

± 2,4 dB

Frequency range 18 GHz -26,5GHz

± 3,0 dB

Frequency range 26,5 GHz - 40 GHz

± 3,6 dB

Radiated power

25 MHz - 1000 MHz

± 3,7 dB

1 – 18 GHz at 3 m

± 3,4 dB

Intermodulation attenuation

± 4,1 dB

Out of band gain

± 2,6 dB

Adjacent channel power

Amplitude

± 2,0 dB

Frequency, 9 kHz - 30 MHz:

± 0,8 %

Frequency, 20 MHz - 1 GHz:

± 0,002 %

Frequency error

With rubidium reference

± 10⁻⁸

Output power

Analog signals, conducted:

RF-power meter

± 0,6 dB

Spectrum analyser

± 3,5 dB

Analog signals, radiated:

25 MHz - 1000 MHz

± 3,7 dB

1 GHz - 18 GHz

± 3,4 dB

Digital signals, conducted

± 0,6 dB

Digital signals, radiated:

25 MHz - 1000 MHz

± 3,7 dB

1 GHz - 18 GHz

± 3,4 dB

Peak power density

Conducted:

8593E	± 2,5 dB
8566B	± 2,7 dB
Radiated:	
8593E & 8566B, 25 - 1000 MHz	± 4,5 dB
8593E & 8566B, 1 - 18 GHz	± 4,7 dB
Spurious response rejection	± 3,6 dB
Modulation accuracy	
Phase error (RMS) for GSM GMSK	± 1,4 °
Phase error (Peak) for GSM GMSK	± 3,7 °
EVM for GSM EDGE	± 2,2 %

14 PHOTO OF THE EUT

