RADIO TEST REPORT

No. 1713846STO-001, Ed. 2

RF Performance

EQUIPMENT UNDER TEST

Equipment:	Remote head
Type/Model:	DDU-AWS3
Manufacturer:	Deltanode Solutions AB
Tested by request of:	Deltanode Solutions AB

SUMMARY

Referring to the emission limits, and the operating mode during the tests specified in this report, the equipment complies with the requirements according to the following standards:

47 CFR Part 2, subpart J, 47 CFR Part 27 Subpart C

RSS-131 Issue 3, RSS-139 Issue 3,

RSS-GEN Issue 4 (2014): General requirements of compliance of radio apparatus (2014).

For details, see clause 2 – 4.

Date of issue: 2018-05-22

Tested by: Matti Virkki

Approved by: Stefan Andersson

Revision History

Edition	Date	Description	Changes
1	2018-01-12	First release	
2	**2018-05-22**	**2na release**	**Change of model name and typo corrections**

CONTENTS

1 CLIENT INFORMATION

The EUT has been tested by request of

Company	Deltanode Solutions AB Hammarby fabriksväg 61 6tr 120 33 Stockholm Sweden
Name of contact	Daniel Kerek

2 EQUIPMENT UNDER TEST (EUT)

2.1 Identification of the EUT

Equipment:	Remote head	
Tested Model:	DDU-AWS3	
Brand name:	Deltanode	
Serial number:	7002100	
Manufacturer:	Deltanode Solutions AB	
Transmitter frequency range:	2110 – 2180 MHz	
Receiver frequency range:	1710 – 1780 MHz	
Frequency agile or hopping:	☐ Yes	☒ No
Antenna:	☐ Internal antenna	☒ External antenna
Antenna connector:	☐ None, internal antenna	☒ Yes, N
Rating RF output power:	+46 dBm rms	
Rated gain	+67 dB	
Type of modulation:	Tested with GMSK, QPSK	
Temperature range:	☐ Category I (General): -20°C to +55°C ☐ Category II (Portable equipment): -10°C to +55°C ☐ Category III (Equipment for normal indoor use): +5°C to +35°C ☒ Other: <-30°C to +55°C	
Power rating:	120 V, 60 Hz	
Transmitter standby mode supported:	☒ Yes	☐ No

2.2 Additional information about the EUT

The EUT consists of the following hardware and firmware:

PA Type	12:04 Multisystem MPI 1900MHz band ver. 0.0 prod. 2014W14 SN:0002-00121
PA HW-version	KS45.6 R1C 2014W14 DH00121
PA Bootloader	BF002005 0.0.0 Boot MPI 2009-11-05 16:05:55
PA Application	AF002005 0.2.4p MPI-BTI/EMP/Tek 2017-10-23 15:25:58
PA Loaded ver	AF002005 0.2.4p MPI-BTI/EMP/Tek 2017-10-23 15:25:58
Available PA upgrade	AF002005 0.2.4p MPI-BTI/EMP/Tek 2017-10-23 15:25:58
PA SWL Status	Idle
VGA Type	82:36 CDMA 2000/IS-95 VGA2 AWS 2100/1700 band ver. 0.0 prod. 2016W36 SN:0004-00110
VGA HW-version	KS55.11 P1A 2016W36 BH00110
VGA Bootloader	BF002008 0.0.0 Boot VGA2 2016-04-20 14:58:25
VGA Application	AF002011 0.0.0p VGA2 2016-04-22 12:40:50

2.3 Peripheral equipment

Peripheral equipment is equipment needed for correct operation of the EUT, but not included as part of the testing and evaluation of the EUT.

Equipment	Type / Model	Manufacturer
Fiber Optical Interface	FOI	Deltanode Solutions AB
Ethernet gateway		Deltanode Solutions AB
PC		Dell

2.4 Test signals

Continuous transmission on full power

Narrow band signal: GSM with GMSK modulation
Wide band signal: WCDMA QPSK modulation

3 TEST SPECIFICATIONS

3.1 Standards

Requirements:
47 CFR Part 2 subpart J, Part 27 subpart C
RSS-131 Issue 3, RSS-139 Issue 3

Test methods in:

KDB 935210 D05 Industrial booster Basic measurement

ANSI C63.26-2015 American National Standard for Compliance Testing of Transmitters Used in License Radio Services

3.2 Additions, deviations and exclusions from standards and accreditation

RSS-131 Issue 3 and RSS 139 Issue 3 are not within Intertek Semko's accreditation scope.
No other additions, deviations or exclusions have been made from standards and accreditation.

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
Intertek Semko AB is a FCC accredited conformity assessment body with designation number SE0002
Intertek Semko AB is an Industry Canada listed test facility with IC assigned code 2042G

Measurement chambers

Measurement Chamber	Type of chamber	IC Site filing #
BJÖRK HALLEN	Semi-anechoic 3 m	2042G-1

3.4 Mode of operation during the test

The EUT was tested with 120 V, 60 Hz.

4 TEST SUMMARY

The results in this report apply only to sample tested:

Standard	Description	Result
	Emission	
§2.1046 **§27.50** **RSS-GEN 6.12** **RSS-131 5.2.3** **RSS-139 4.1, 6.5**	**RF output power, AGC threshold, linearity and amplifier gain** The EUT complies with the limits.	**PASS**
§2.1047 **RSS-131 5.2.2** **RSS-139 6.2**	**Modulation characteristics input versus output signal comparison** The EUT complies with the limits.	**PASS**
§2.1049 **RSS-GEN 6.6** **RSS-131 5.2.1**	**Occupied bandwidth Out of band rejection** The EUT complies with the limits.	**PASS**
§2.1051 **§27.53** **RSS-GEN 6.13** **RSS-139 6.6**	**Spurious emissions, Intermodulation and band edge measurements at antenna terminals** The EUT complies with the limits.	**PASS**
§2.1053 **§27.53** **RSS-GEN 6.13** **RSS-139 6.6**	**Field strength of spurious radiation** The EUT complies with the limits.	**PASS**
§2.1055 **§27.54 KDB935210 D05 v01r01 3.7** **RSS-GEN 6.11** **RSS-131 5.2.4** **RSS-139 6.7**	**Frequency stability** The EUT does not have input signal processing capability	**Not Applicable**

5 AGC TRESHOLD, RF OUTPUT POWER AND LINEARITY

Date of test:	2017-11-02	Test location:	EMC Center
EUT Serial:	7002100	Ambient temp. ˚C	21˚C
Tested by:	MTV	Relative humidity	43 %
Test result:	Pass	Margin:	19 dB

5.1 5.1 Requirement

Reference: CFR 47 §2.1049, §27.50(a), KDB 935210 D05 clauses 3.2 and 3.5
RSS-131 Clauses 5.2.3 and 6.2, RSS-139 clause 6.5

5.2 Test set-up

Signal generator was connected to the FOI unit which converted rf signal to optical signal. The optical signal was then fed via fibre to the EUT.
The EUT's output port was connected to signal analyser via rf cables and a directional coupler.
A PC was connected to FOI via Ethernet hub. The PC was then used to control the EUT.

The output power was measured with EUT amplification set to 67 dB and input signal was increased until Automatic Gain Control threshold was reached but did not affect the gain. The EUT output response was monitored when input signal level was increased and the response is linear until AGC threshold is reached.

The test was then repeated with 3 dB higher input signal level so that AGC limited the gain.

The peak power was measured using signal analyser's CCDF measurement function. The value that is exceeded less than 0.1% time is reported as a peak to average ratio.

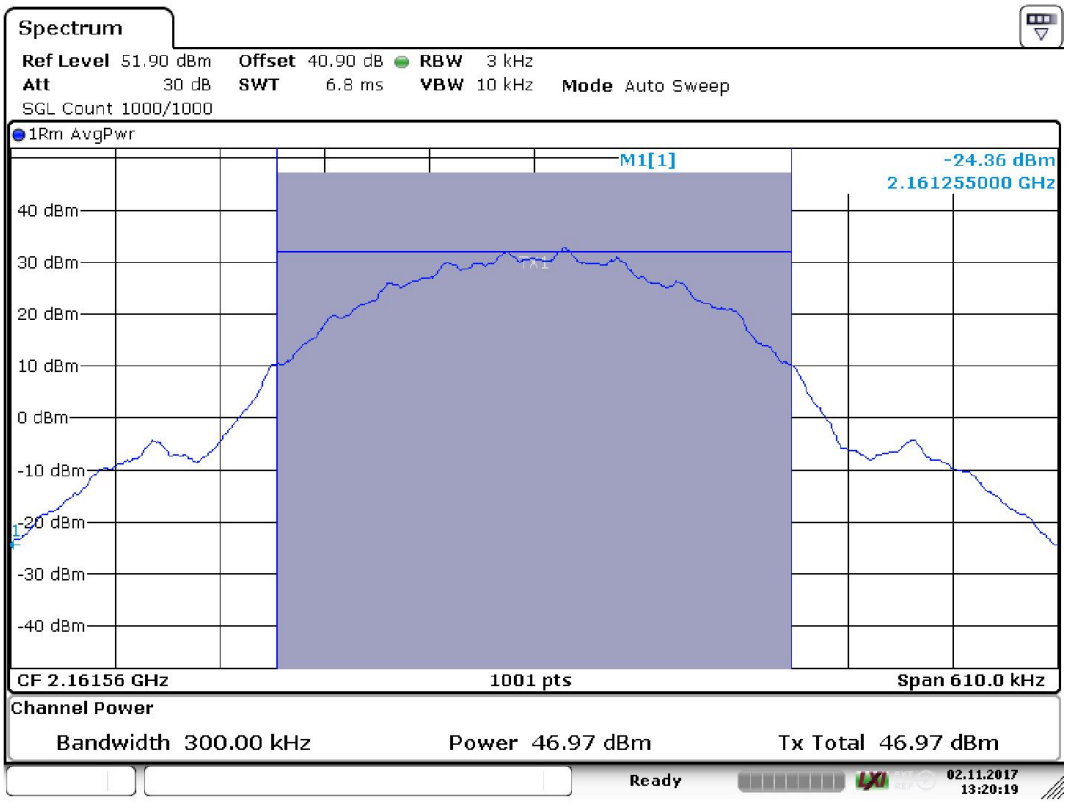
5.3 Test data

AWS GSM

Frequency MHz	Average power dBm	Automatic level control	Limit EIRP dBm / MHz	Peak to avg ratio dB	Peak to avg ratio limit dB
2161.56	47.0	off	62	0.6	13
2161.56	47.0	on	62	0.6	13

AWS WCDMA

Frequency MHz	Average power dBm	Automatic level control	Limit EIRP dBm / MHz	Peak to avg ratio dB	Peak to avg ratio limit dB
2161.56	46.2	off	62	6.8	13
2161.56	46.2	on	62	6.9	13



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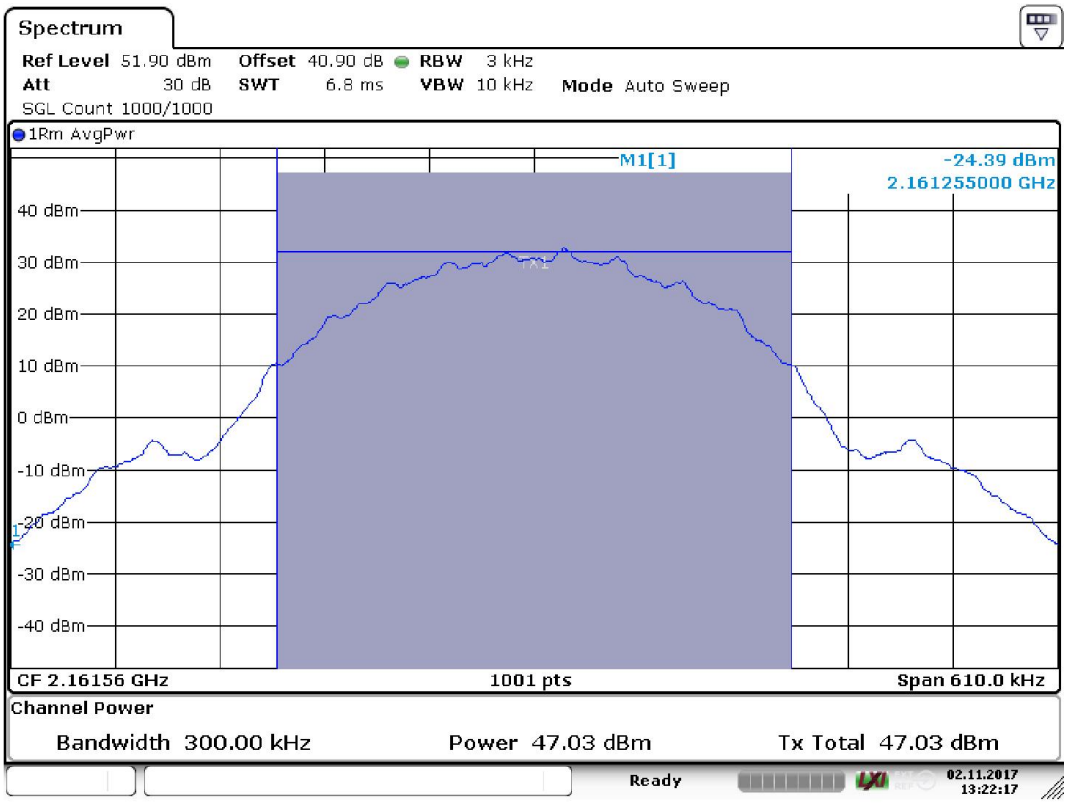
GSM AGC off



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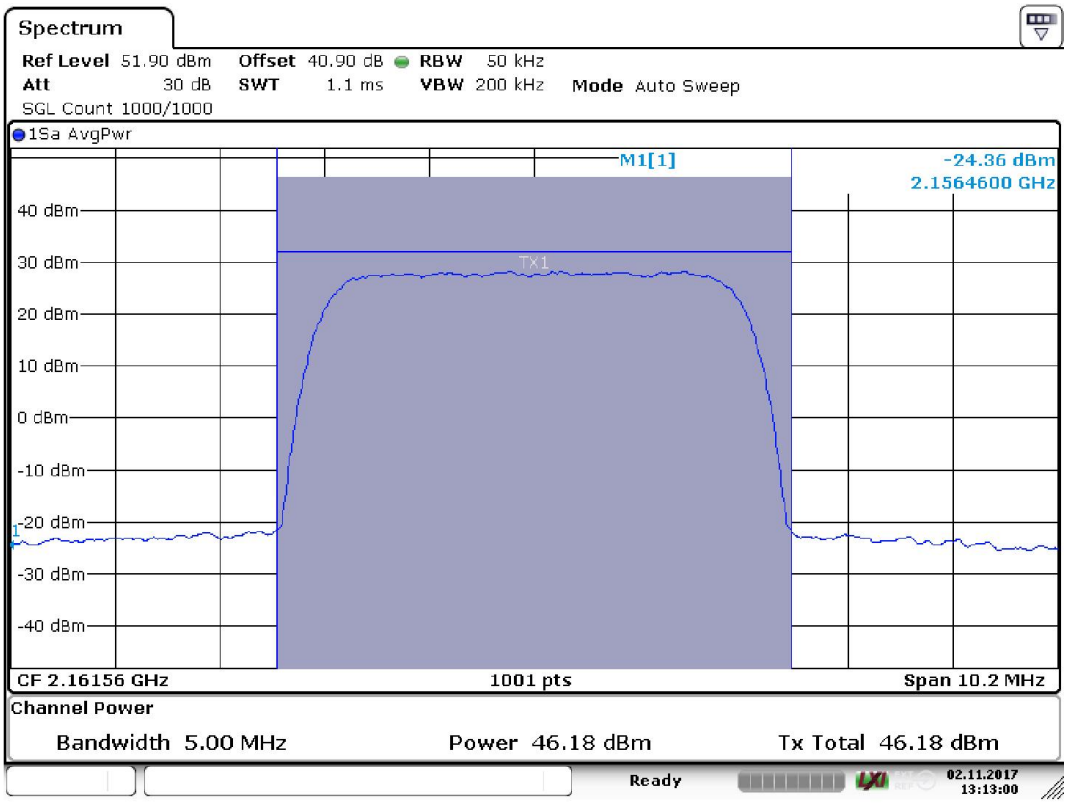

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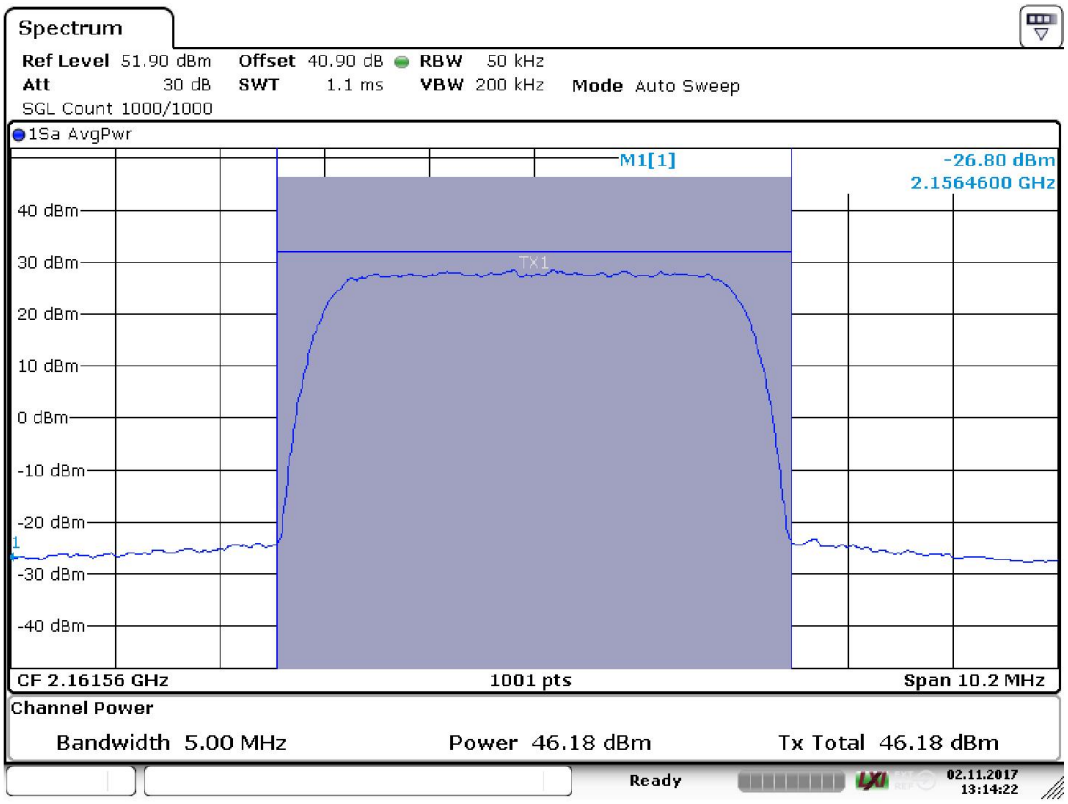
AWGN AGC off



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AWGN AGC on

5.4 Test equipment

Equipment type	Manufacturer	Model	Inv. No.	Cal. due date
Spectrum analyser	Rohde & Schwarz	FSV	32594	7/2018
Rf-attenuator	Narda	776B-10	8337	7/2018
Rf-attenuator	Huber Suhner	5920_N-50-010/199_N	32697	7/2018
Rf cable	Huber Suhner	Sucoflex 104PE	39076	7/2018
Rf cable	Huber Suhner	Sucoflex 104PE	39077	7/2018
Rf cable	Huber Suhner	Sucoflex 104PE	39079	7/2018
Signal generator	Rohde & Schwarz	SMIQ03B	12792	7/2018
Signal generator	Rohde & Schwarz	SMBV100	32593	7/2018
Signal generator	Rohde & Schwarz	SMBV100	32593	

6 OCCUPIED BANDWIDTH INPUT VS OUTPUT COMPARISON

Date of test:	2017-12-05	Test location:	EMC Center
EUT Serial:	7002100	Ambient temp. ˚C	21 ˚C
Tested by:	MTV	Relative humidity	37 %
Test result:	Pass	Margin:	--

6.1 Requirement

KDB 935219 D05:
The spectral shape of the rf-output shall look similar to input for all modulations.

RSS-131 5.2.2:
The spectral growth of the 99 % bandwidth of the output signal shall be less than 5% of the input signal spectrum.

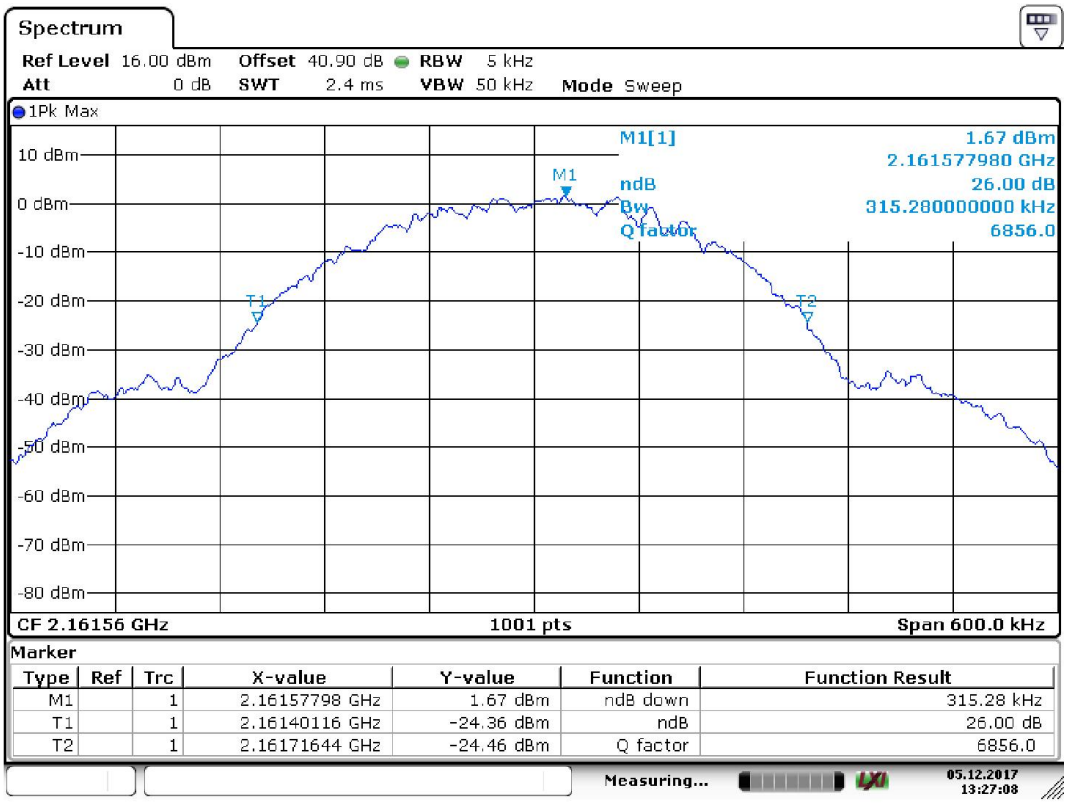
6.2 Test set-up

Signal generator was connected to the FOI unit which converted rf signal to optical signal. The optical signal was then fed via fibre to the EUT.
The EUT's output port was connected to signal analyser via rf cables and a directional coupler.
A PC was connected to FOI via Ethernet hub. The PC was then used to control the EUT.

The 99% occupied bandwidth was measured using spectrum analyser's occupied bandwidth function.
The EUT was set to use 60 dB gain and input signal was adjusted so that Automatic Gain Control did not yet limit the output power.
The test was then repeated with higher input signal level so that AGC limited the output power.
Finally occupied bandwidth of signal generator was measured and input signal output was compared to EUT outputs.

6.3 Test data

Frequency MHz	Signal type	26 dB Occupied band width Input (kHz)	26 dB Occupied band width output (kHz)	26 dB Occupied band width output with AGC (kHz)	Difference %
2161.6	GSM	315.28	317.08	317.68	0.7
2161.6	WCDMA	4587.4	4587.4	4587.4	0.0



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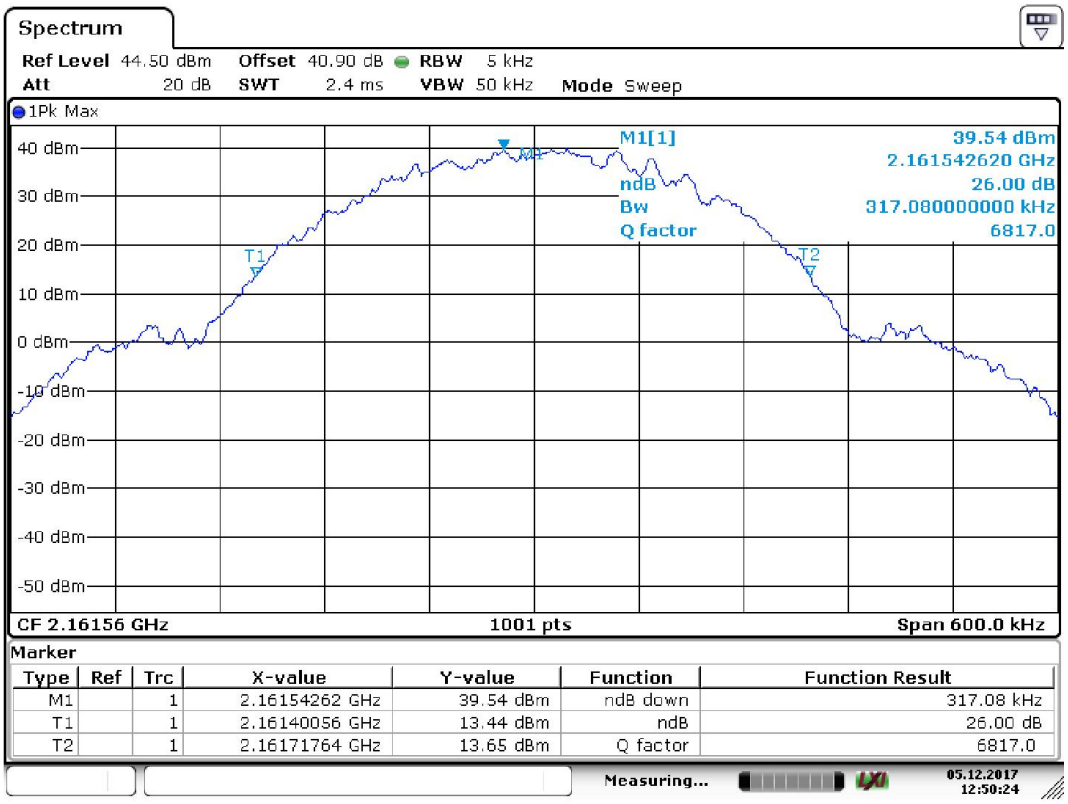
AWS Occupied bandwidth GSM input



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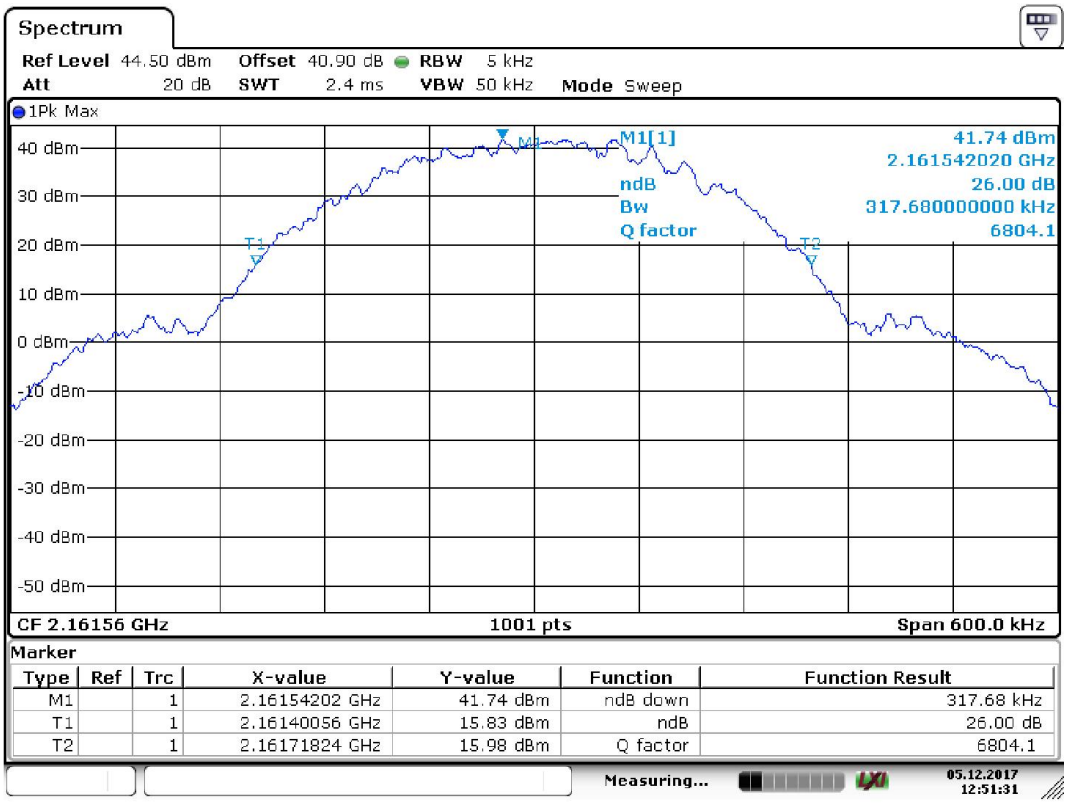
AWS Occupied bandwidth GSM agc off



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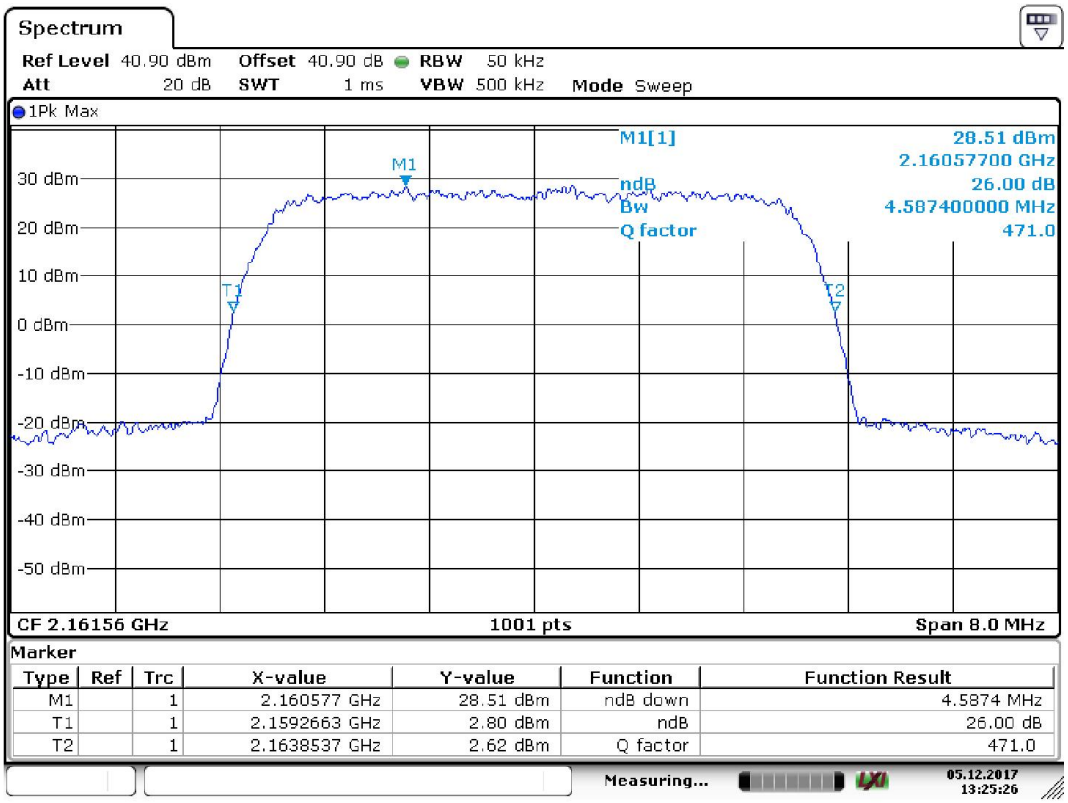
AWS Occupied bandwidth GSM agc on



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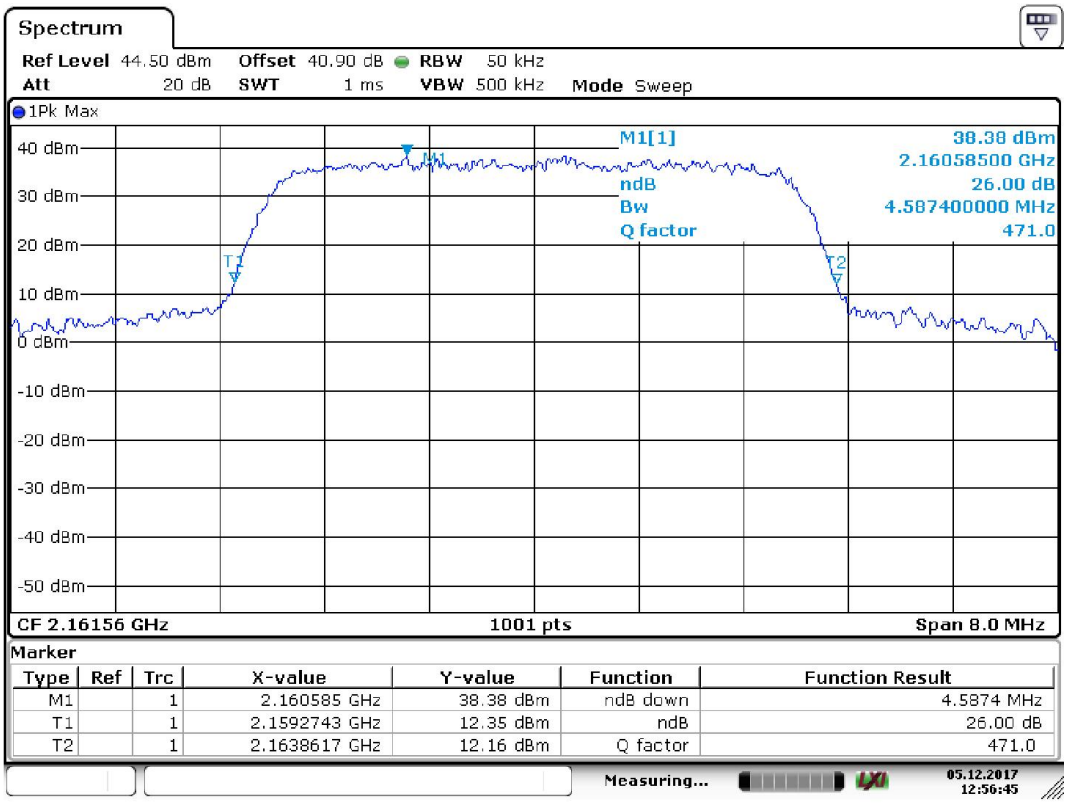
AWS Occupied bandwidth WCDMA input



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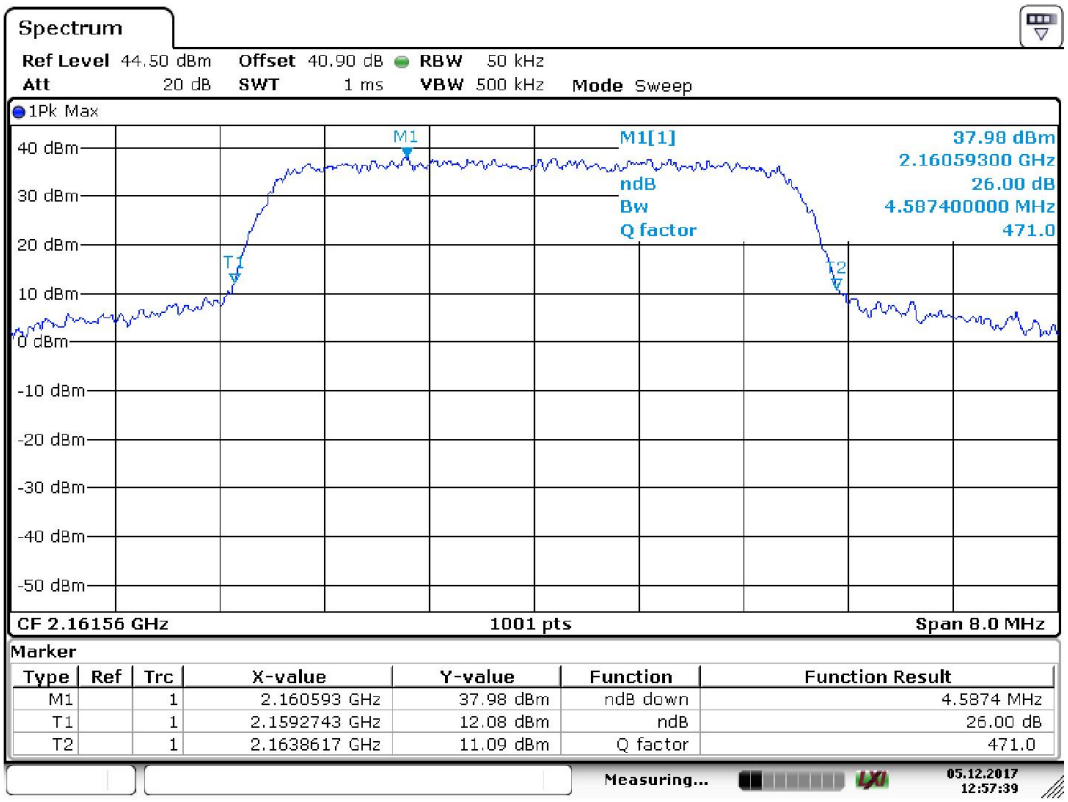
AWS Occupied bandwidth WCDMA agc off



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AWS Occupied bandwidth WCDMA agc on

6.4 Test equipment

Equipment type	Manufacturer	Model	Inv. No.	Cal. due date
Spectrum analyser	Rohde & Schwarz	FSV	32594	7/2018
Rf-attenuator	Narda	776B-10	8337	
Rf-attenuator	Huber Suhner	5920_N-50-010/199_N	32697	7/2018
Rf cable	Huber Suhner	Sucoflex 104PE	39076	7/2018
Rf cable	Huber Suhner	Sucoflex 104PE	39077	7/2018
Rf cable	Huber Suhner	Sucoflex 104PE	39079	7/2018
Signal generator	Rohde & Schwarz	SMIQ03B	12792	7/2018
Signal generator	Rohde & Schwarz	SMBV100	32593	7/2018

7 PASSBAND GAIN AND BANDWIDTH

Date of test:	2017-11-02	Test location:	EMC Center
EUT Serial:	7002100	Ambient temp. ˚C	21 ˚C
Tested by:	MTV	Relative humidity	37 %
Test result:	Pass	Margin:	-

7.1 Requirement

RSS-131 clause 6.1

The passband gain shall not exceed the nominal gain by more than 1.0 dB. The 20 dB bandwidth shall not exceed the nominal bandwidth that is stated by the manufacturer. Outside of the 20 dB bandwidth, the gain shall not exceed the gain at the 20 dB point.

7.2 Test set-up

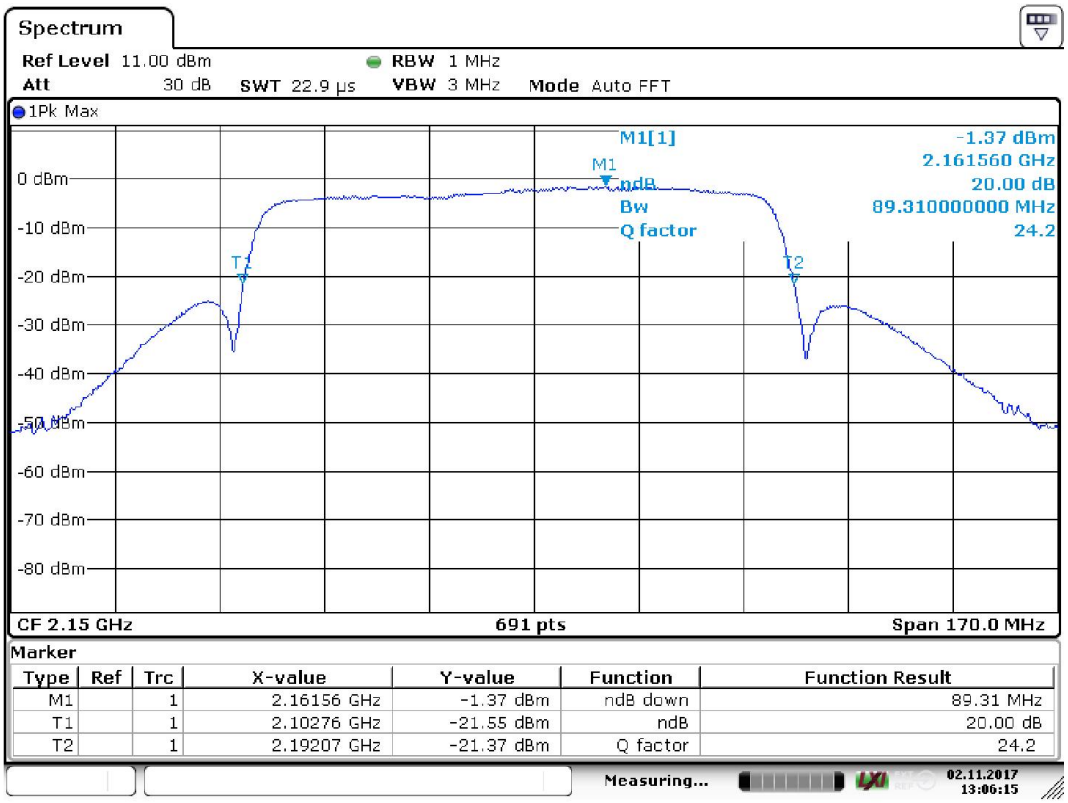
Signal generator was connected to the FOI unit which converted rf signal to optical signal. The optical signal was then fed via fibre to the EUT.
The EUT's output port was connected to spectrum analyser via rf cables and 30 dB attenuator.
The power amplifier gain was set to 68 dB
A PC was connected to FOI via Ethernet hub. The PC was then used to control the EUT.

7.3 Test data

Frequency MHz	Signal type	Occupied 20 dB band width (MHz)
2150	CW	89.21

The pass band maximum gain is measured from FOI unit's rf input to EUT output.
This is not same as EUT's power amplifier gain.
The EUT requires a professional installation and output power is set by trained technician.

Frequency MHz	Gen. out (dBm)	Pathloss (dB)	Measured output (dBm)	Gain dB
2161.56	-28.8	0.4	47.0	75.8



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Passband bandwidth

Equipment type	Manufacturer	Model	Inv. No.	Cal. due date
Spectrum analyser	Rohde & Schwarz	FSV	32594	7/2018
Rf-attenuator	Narda	776B-10	8337	7/2018
Rf-attenuator	Huber Suhner	5920_N-50-010/199_N	32697	7/2018
Rf cable	Huber Suhner	Sucoflex 104PE	39076	7/2018
Rf cable	Huber Suhner	Sucoflex 104PE	39077	7/2018
Rf cable	Huber Suhner	Sucoflex 104PE	39079	7/2018
Signal generator	Rohde & Schwarz	SMIQ03B	12792	7/2018
Signal generator	Rohde & Schwarz	SMBV100	32593	7/2018

8 BAND EDGE EMISSION AND INTERMODULATION

Date of test:	2017-12-07	Test location:	Wireless centre
EUT Serial:	7002100	Ambient temp.	21 °C
Tested by:	MTV	Relative humidity	42%
Test result:	Pass	Margin:	0.8 dB

8.1 Requirement

CFR 47 Part 27.53(h) RSS-139 clause 6.6

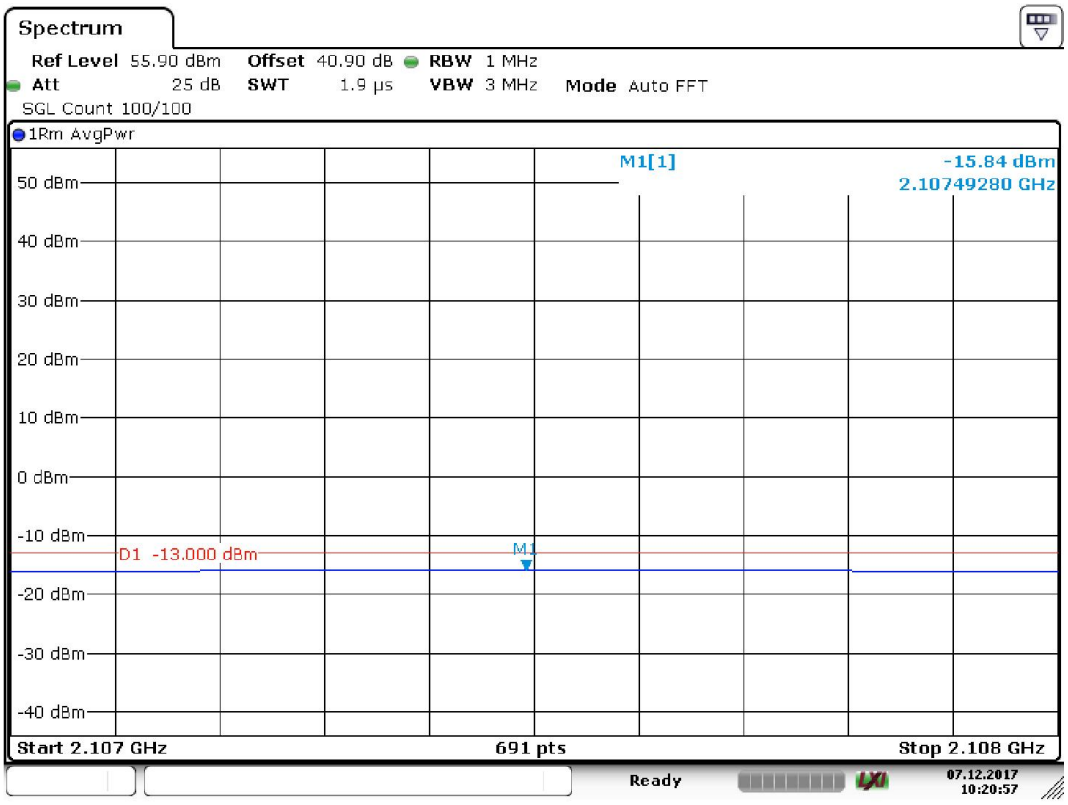
In the first 1.0 MHz bands immediately outside and adjacent to the equipment's smallest operating frequency block which can contain the equipment's occupied bandwidth, the emission power per any 1% of the emission bandwidth shall be attenuated below the transmitter output power P (in dBW) by at least 43 + 10 $\log_{10}$ p (watts) dB.

After the first 1.0 MHz outside the equipment's smallest operating frequency block, which can contain the equipment's occupied bandwidth, the emission power in any 1 MHz bandwidth shall be attenuated below the transmitter output power P (in dBW) by at least 43 + 10 $\log_{10}$ p (watts) dB.

8.2 Test set-up

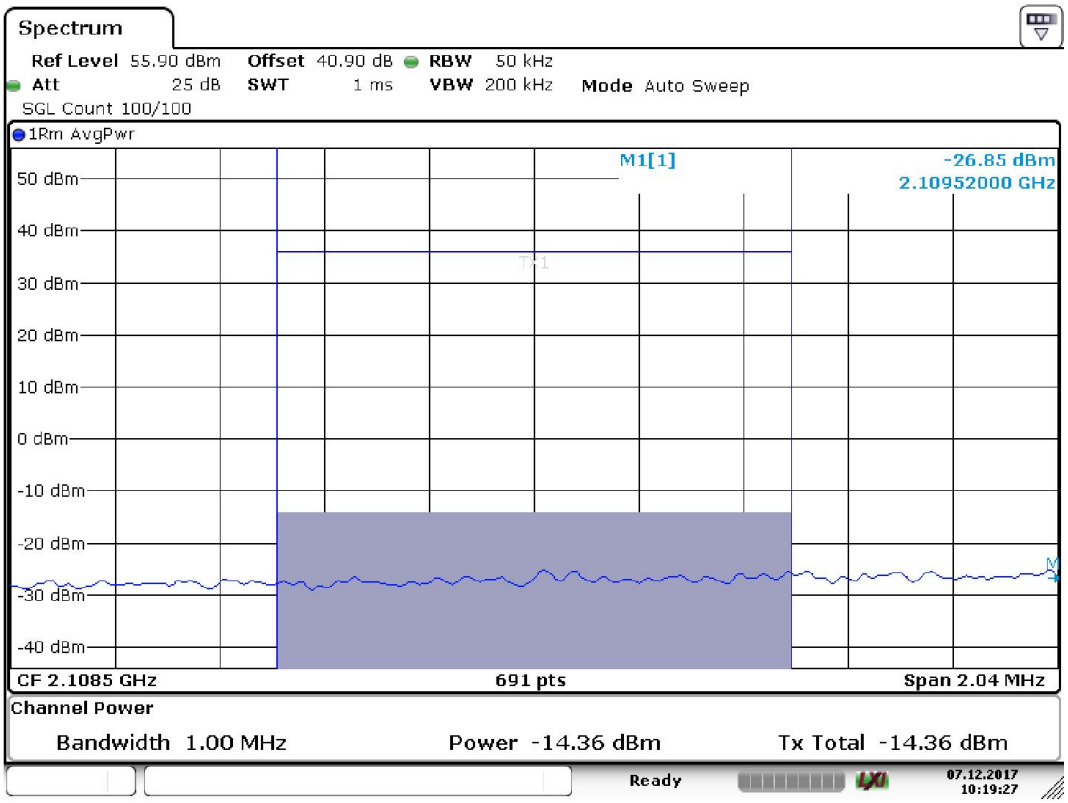
2 Signal generators were connected to power combiner who was then connected to the FOI unit.
Signals were placed on two lowest adjacent channels of the band.
The test was repeated on 2 highest channels.

8.3 Test data



Date: 7.DEC.2017 10:20:58

2 WCDMA signals lower band edge AGC off 2107-2108 MHz



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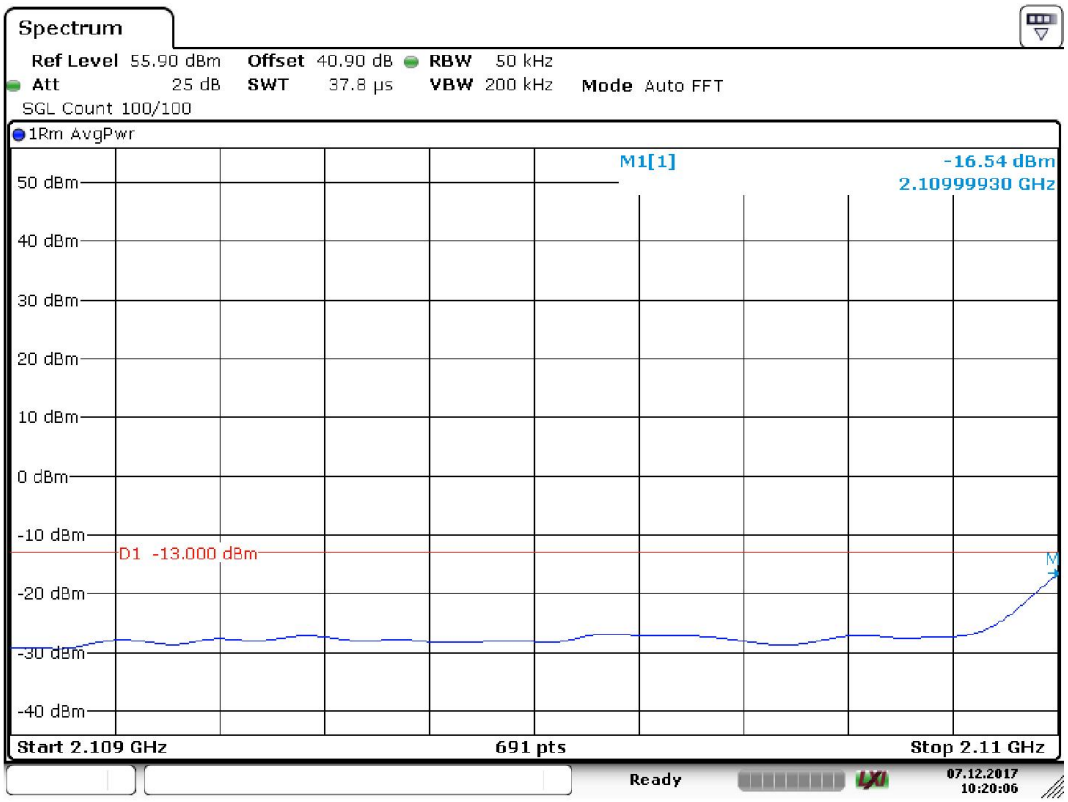
2 WCDMA signals lower band edge AGC off 2108-2109 MHz



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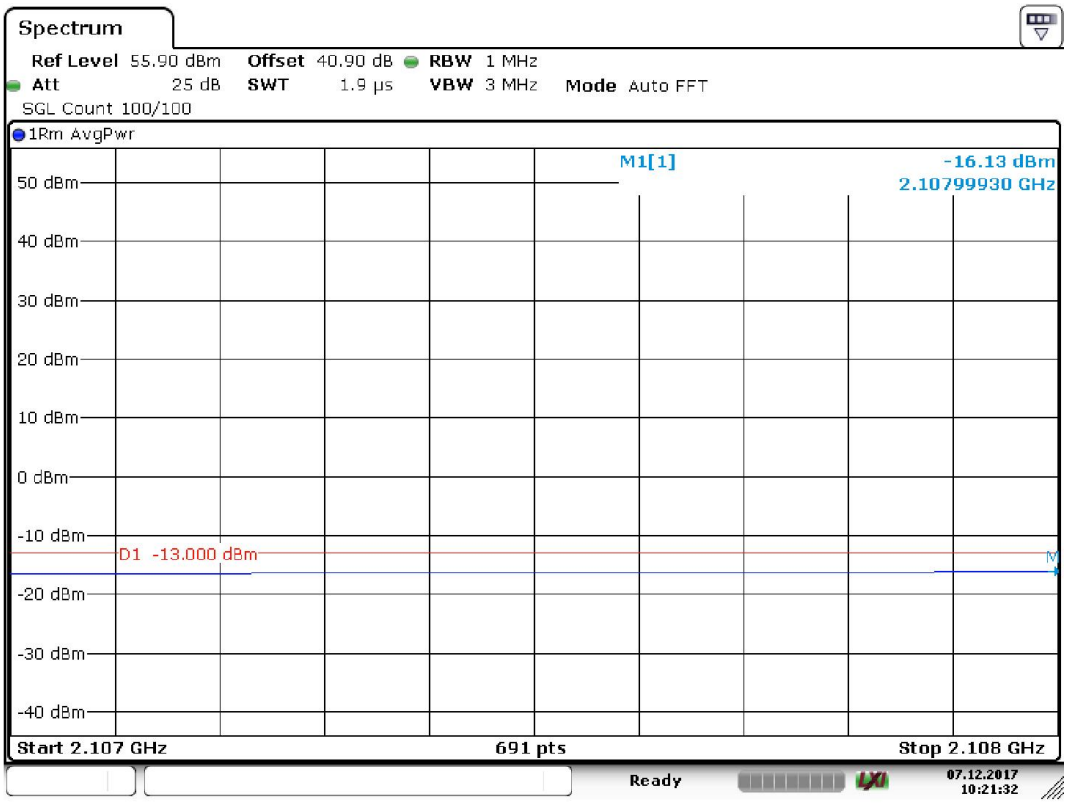
2 WCDMA signals lower band edge AGC off 22109 – 2110 MHz



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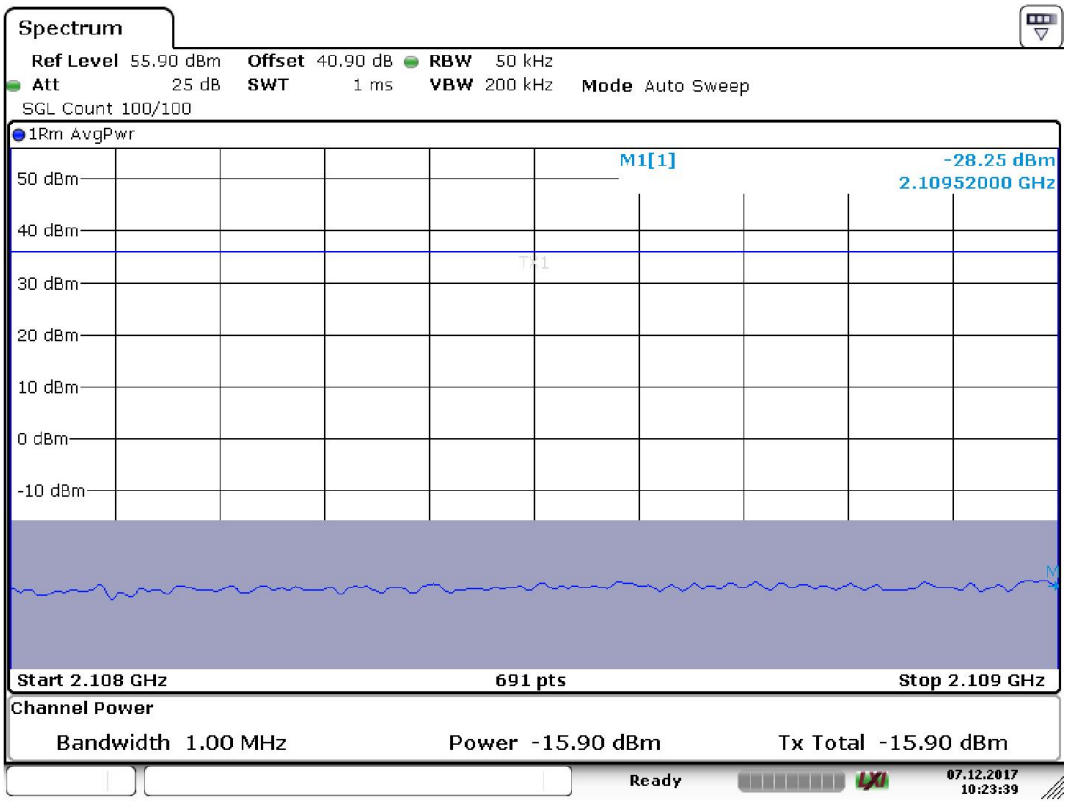
2 WCDMA signals lower band edge AGC on 2107-2108 MHz



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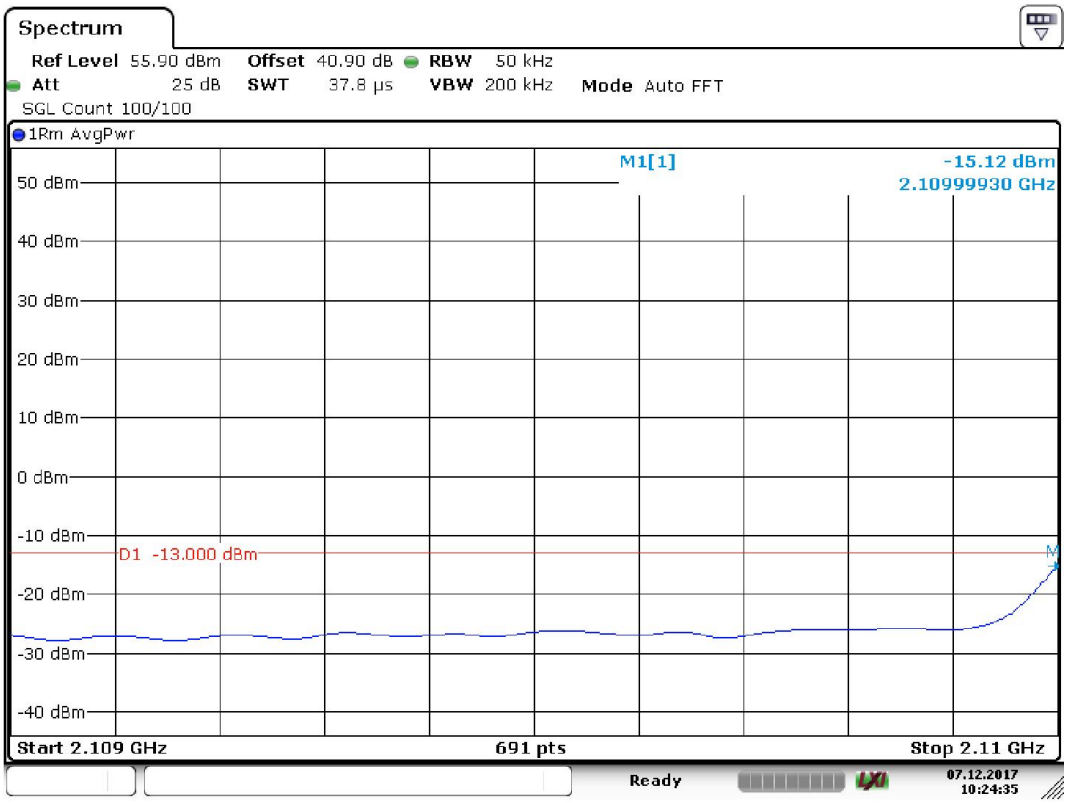
2 WCDMA signals lower band edge AGC on 2108-2109 MHz



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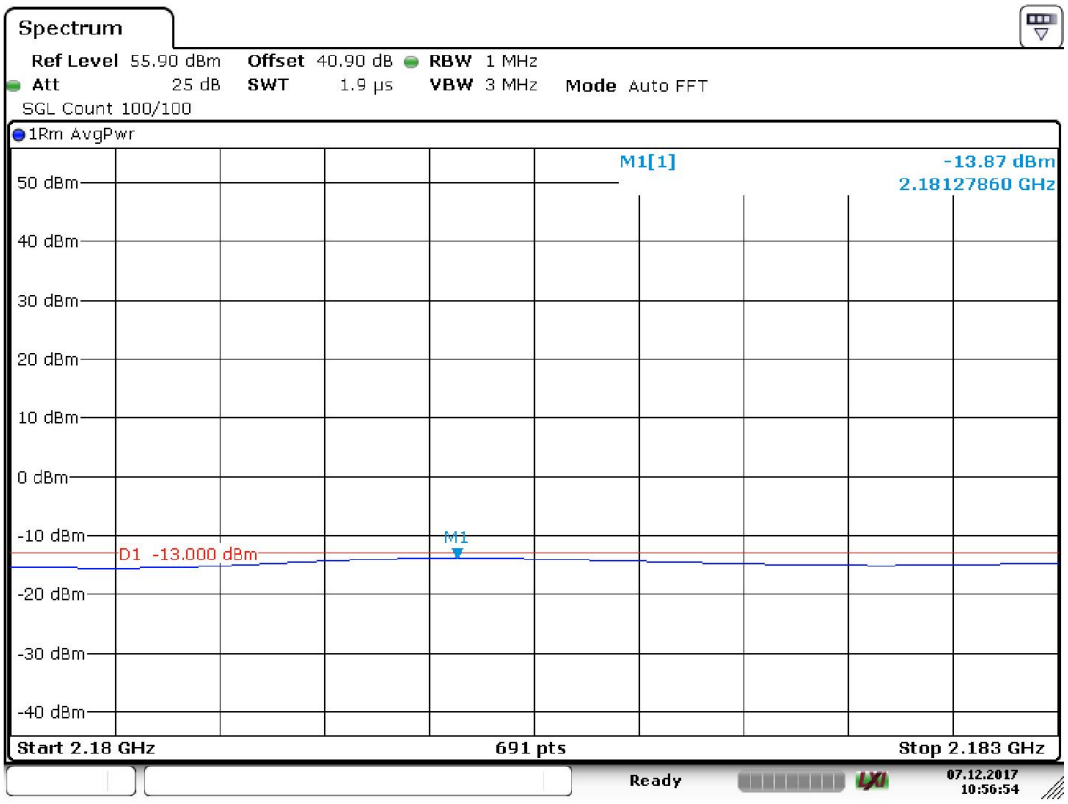
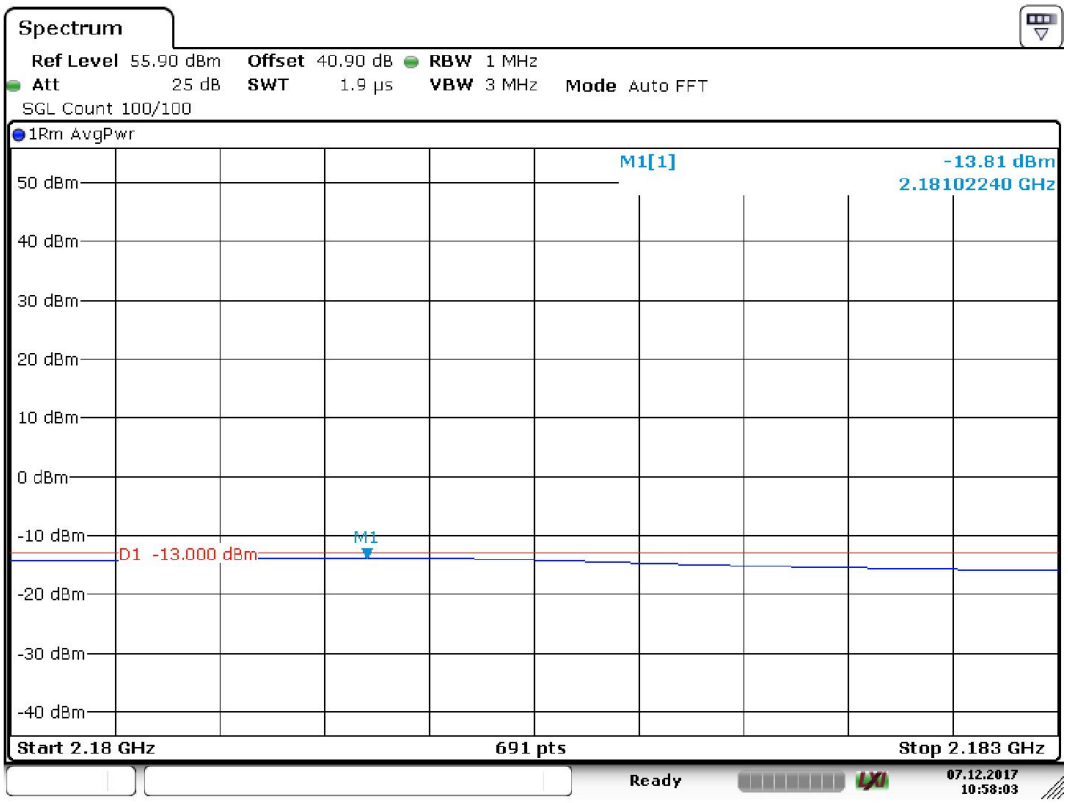
2 WCDMA signals lower band edge AGC on 2109-2110 MHz



Date: 7.DEC.2017 10:56:54

2 WCDMA signals upper band edge 2180 – 2183 MHz AGC off



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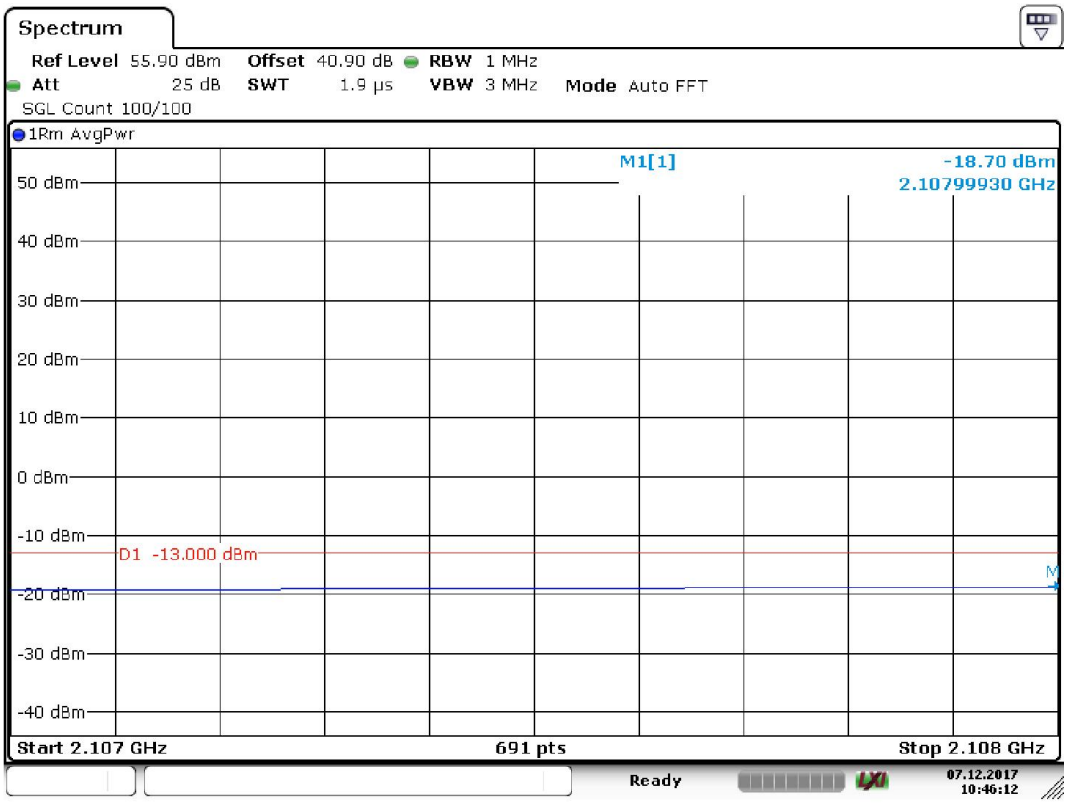
2 WCDMA signals upper band edge 2180 – 2183 MHz AGC on



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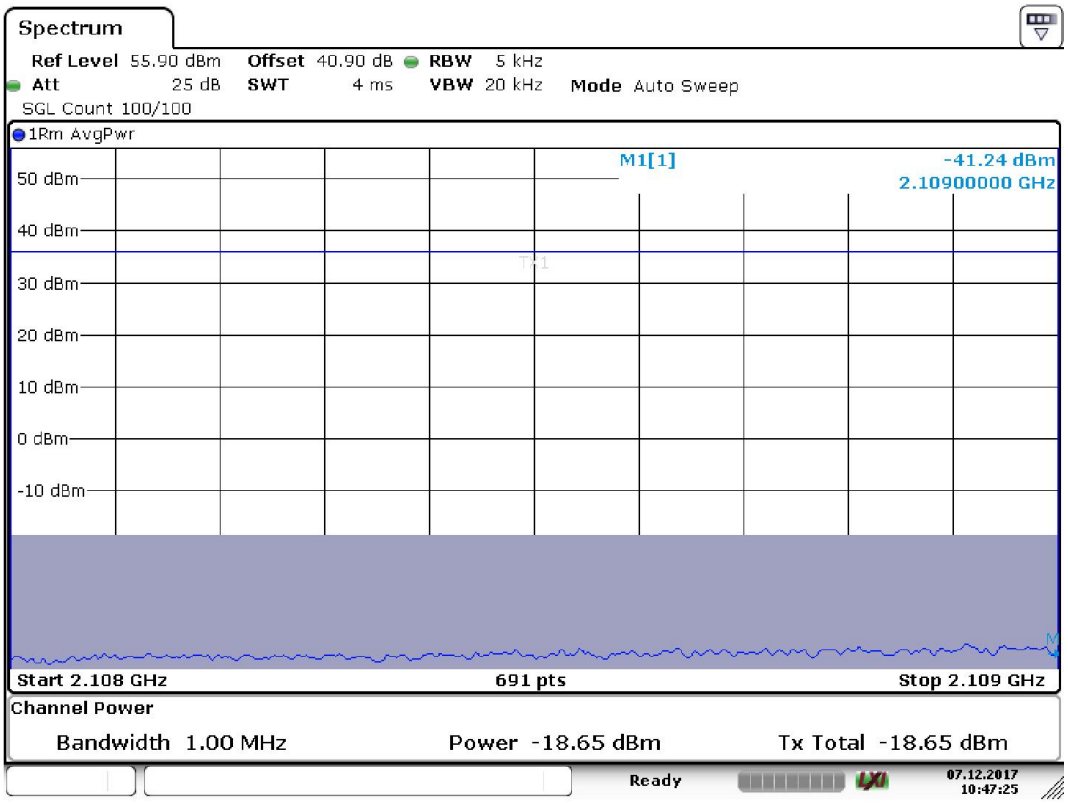

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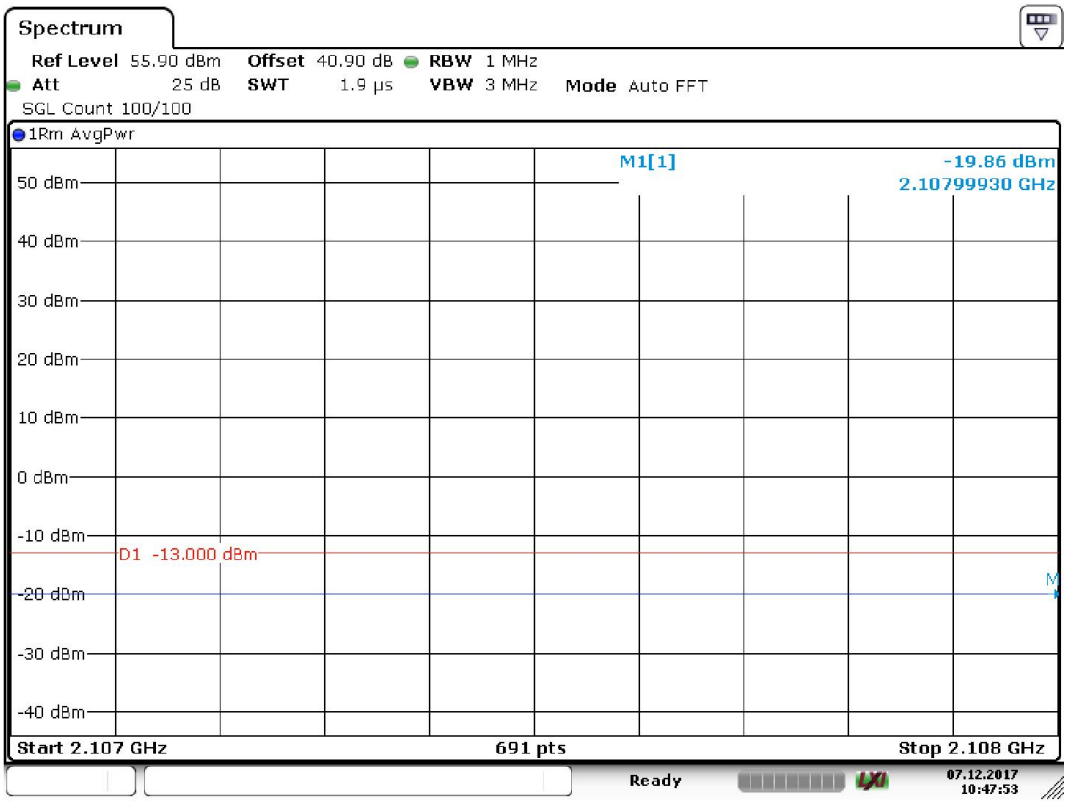
2 GSM signals lower band edge AGC off 2108-2109 MHz

Date: 7.DEC.2017 10:45:13

2 GSM signals lower band edge AGC off 2109-2110 MHz



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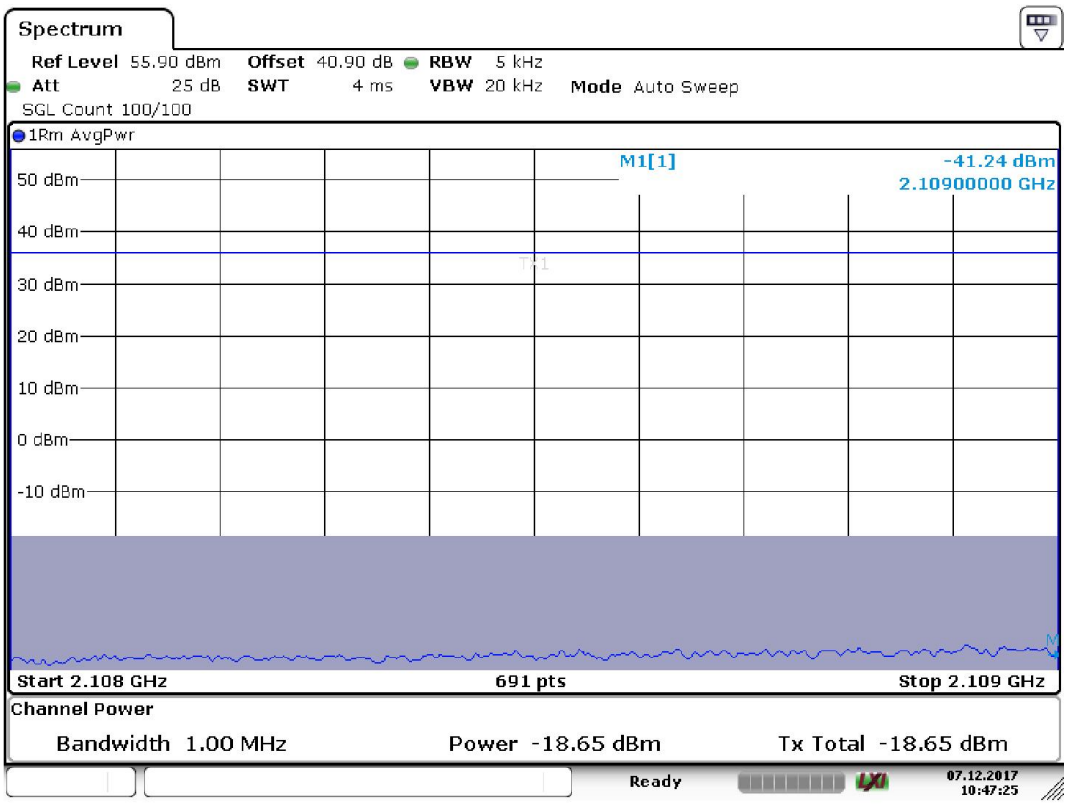
2 GSM signals lower band edge AGC off 2107-2108 MHz



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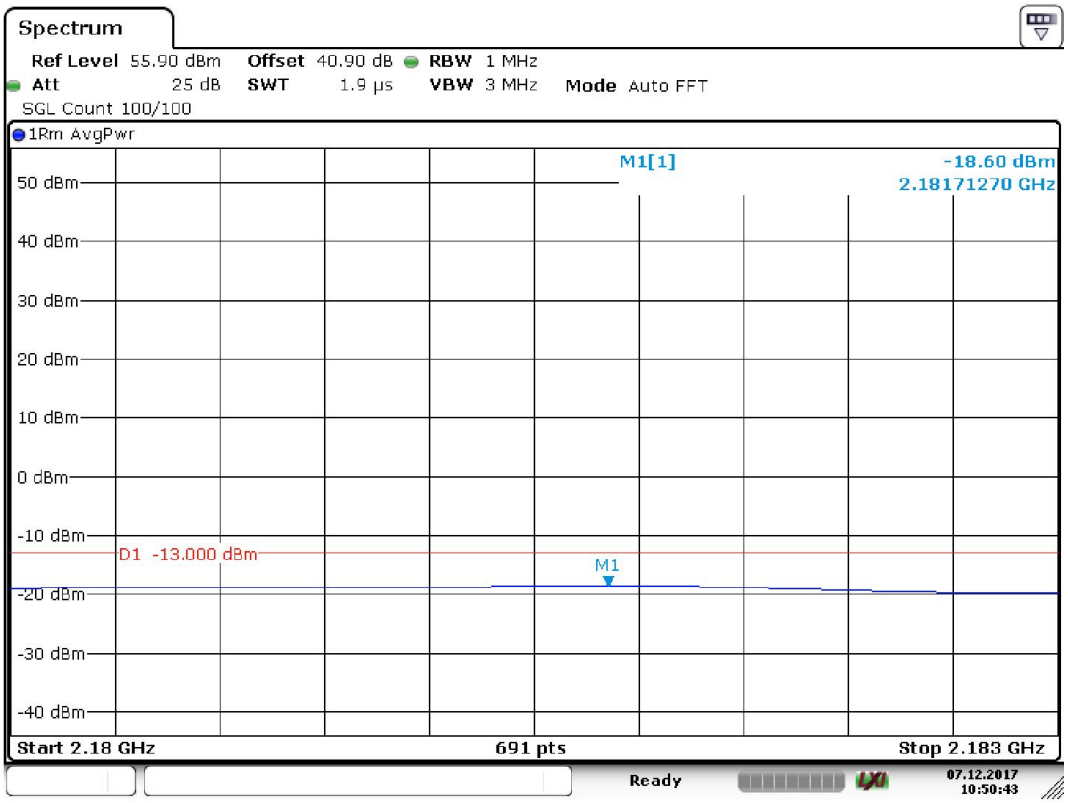
2 GSM signals lower band edge AGC on 2108-2109 MHz

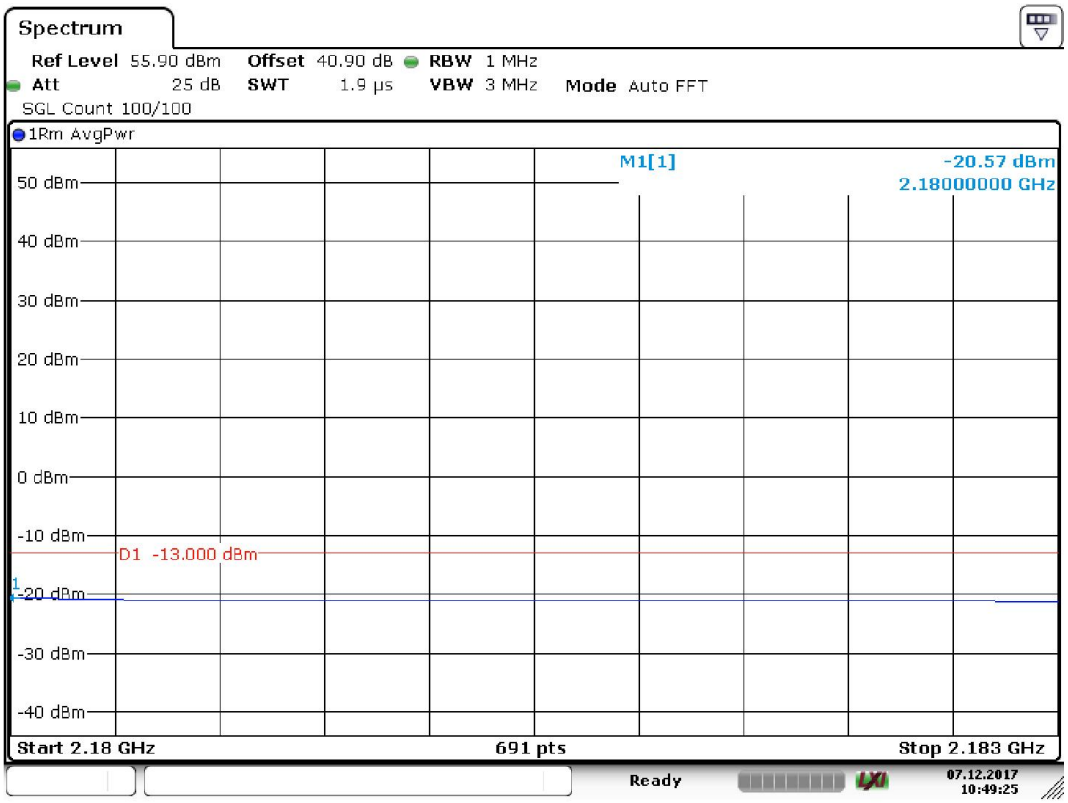
Date: 7.DEC.2017 10:48:17

2 GSM signals lower band edge AGC on 2109-2110 MHz



Date: 7.DEC.2017 10:50:43

2 GSM signals upper band edge 2180 – 2183 MHz AGC off



Date: 7.DEC.2017 10:49:25

2 GSM signals upper band edge 2180 – 2183 MHz AGC on

8.4 Test equipment

Equipment type	Manufacturer	Model	Inv. No.	Cal. due date
Spectrum analyser	Rohde & Schwarz	FSV	32594	7/2018
Rf-attenuator	Narda	776B-10	8337	7/2018
Rf-attenuator	Huber Suhner	5920_N-50-010/199_N	32697	7/2018
Rf cable	Huber Suhner	Sucoflex 104PE	39076	7/2018
Rf cable	Huber Suhner	Sucoflex 104PE	39077	7/2018
Rf cable	Huber Suhner	Sucoflex 104PE	39079	7/2018
Signal generator	Rohde & Schwarz	SMIQ03B	12792	7/2018
Signal generator	Rohde & Schwarz	SMBV100	32593	7/2018

9 CONDUCTED SPURIOUS EMISSION FROM ANTENNA PORT

Date of test:	2017-12-05	Test location:	Wireless centre
EUT Serial:	7002100	Ambient temp.	21˚C
Tested by:	MTV	Relative humidity	37 %
Test result:	Pass	Margin:	0.3 dB

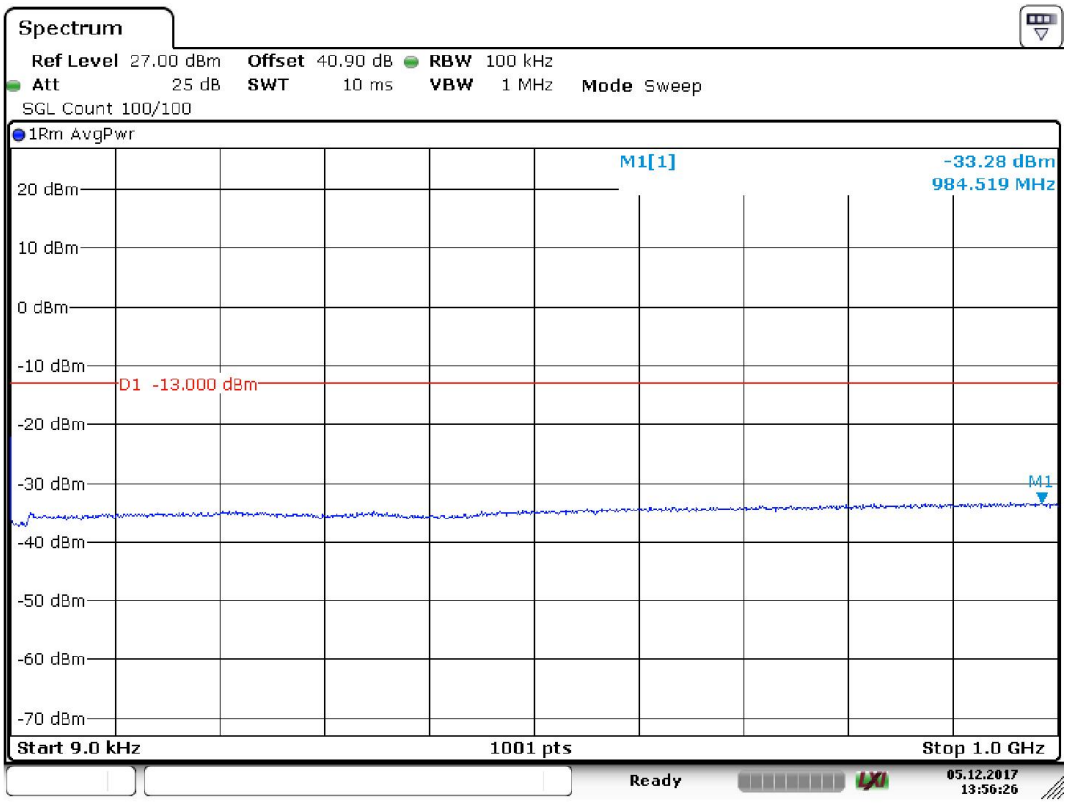
9.1 Requirement

CFR 47 Part 27.53(h) RSS-139 clause 6.6
In the first 1.0 MHz bands immediately outside and adjacent to the equipment's smallest operating frequency block which can contain the equipment's occupied bandwidth, the emission power per any 1% of the emission bandwidth shall be attenuated below the transmitter output power P (in dBW) by at least 43 + 10 $\log_{10}$ p (watts) dB.
After the first 1.0 MHz outside the equipment's smallest operating frequency block, which can contain the equipment's occupied bandwidth, the emission power in any 1 MHz bandwidth shall be attenuated below the transmitter output power P (in dBW) by at least 43 + 10 $\log_{10}$ p (watts) dB.

9.2 Test set-up

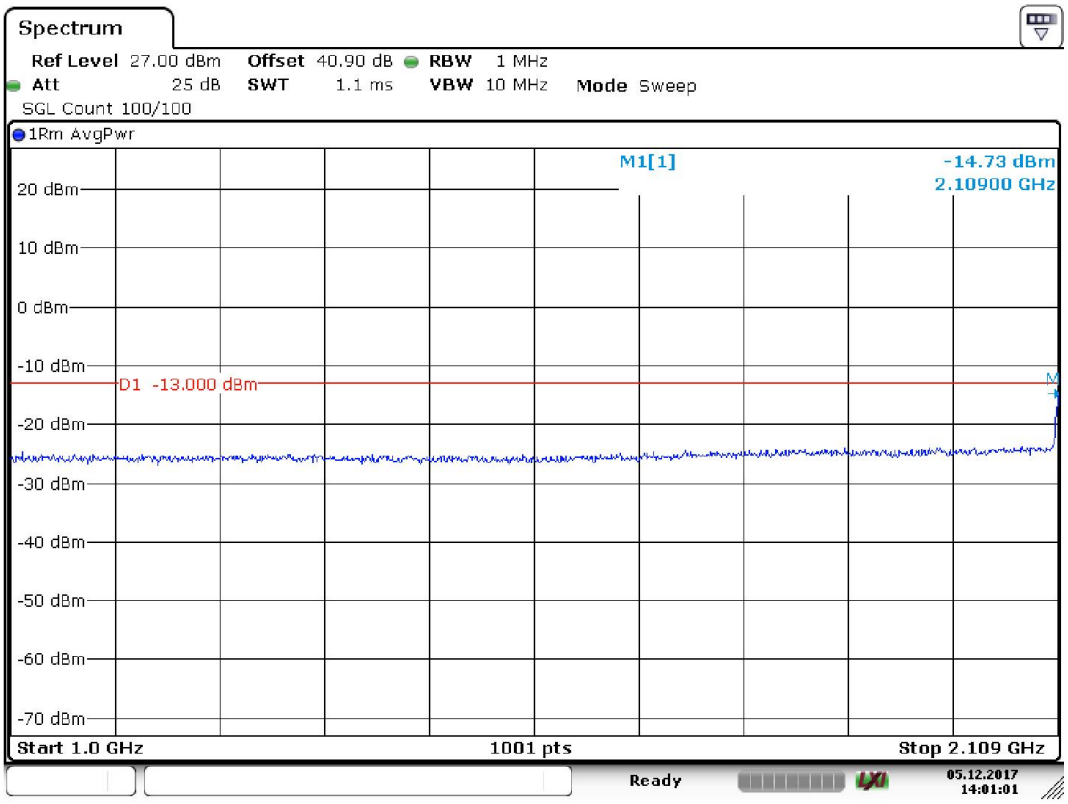
Signal generator was connected to the FOI unit which converted rf signal to optical signal. The optical signal was then fed via fibre to the EUT.
The EUT's output port was connected to spectrum analyser via rf cables and a directional coupler.
A PC was connected to FOI via Ethernet hub. The PC was then used to control the EUT.

9.3 Test data



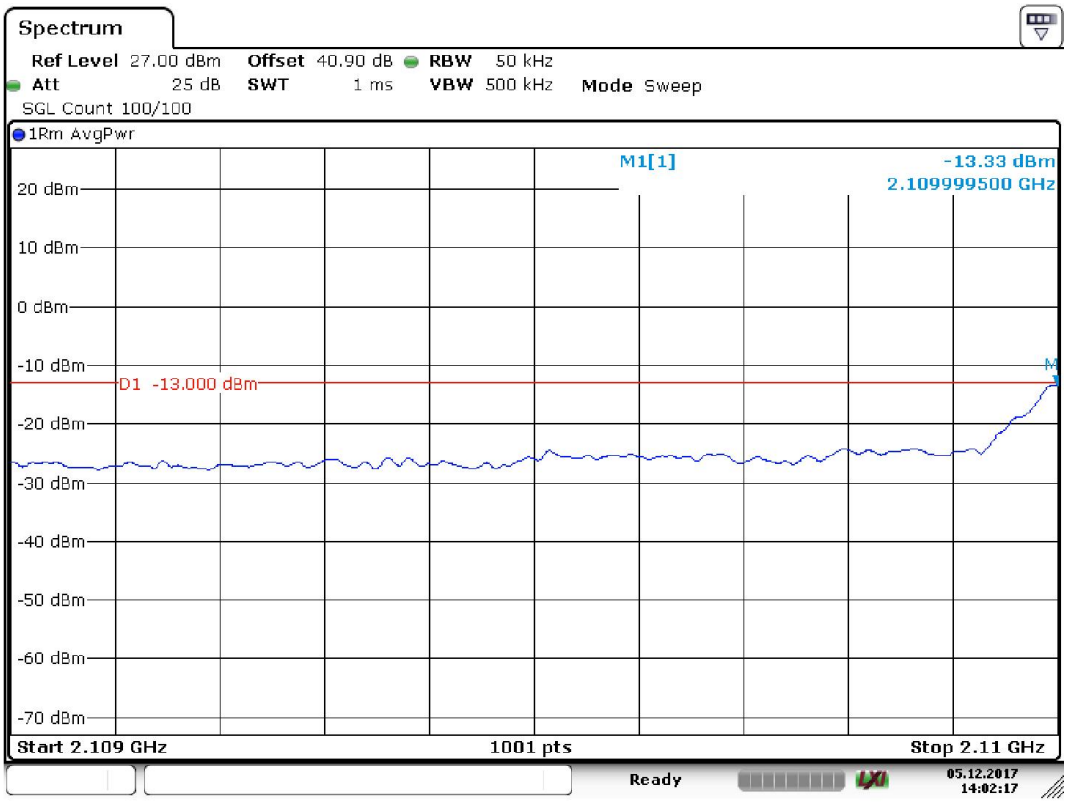
Date: 5.DEC.2017 13:56:26

WCDMA low channel 9 kHz – 1GHz



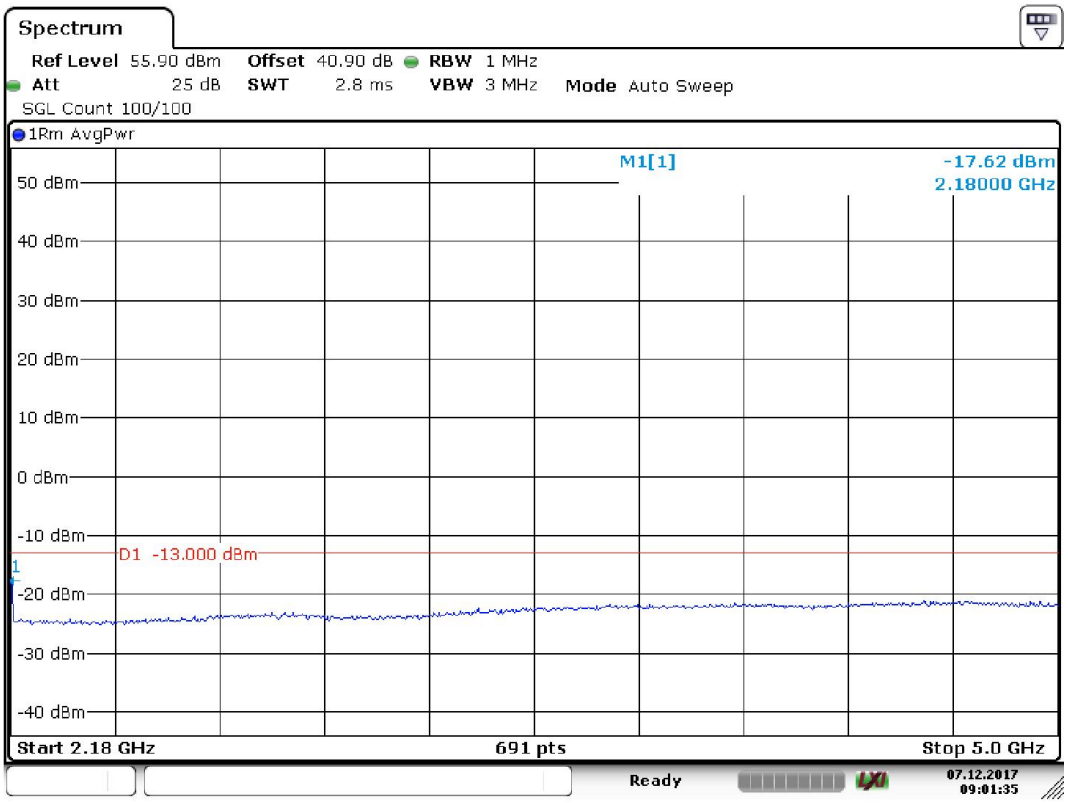
Date: 5.DEC.2017 14:01:02

WCDMA low channel 1 – 2.109 GHz



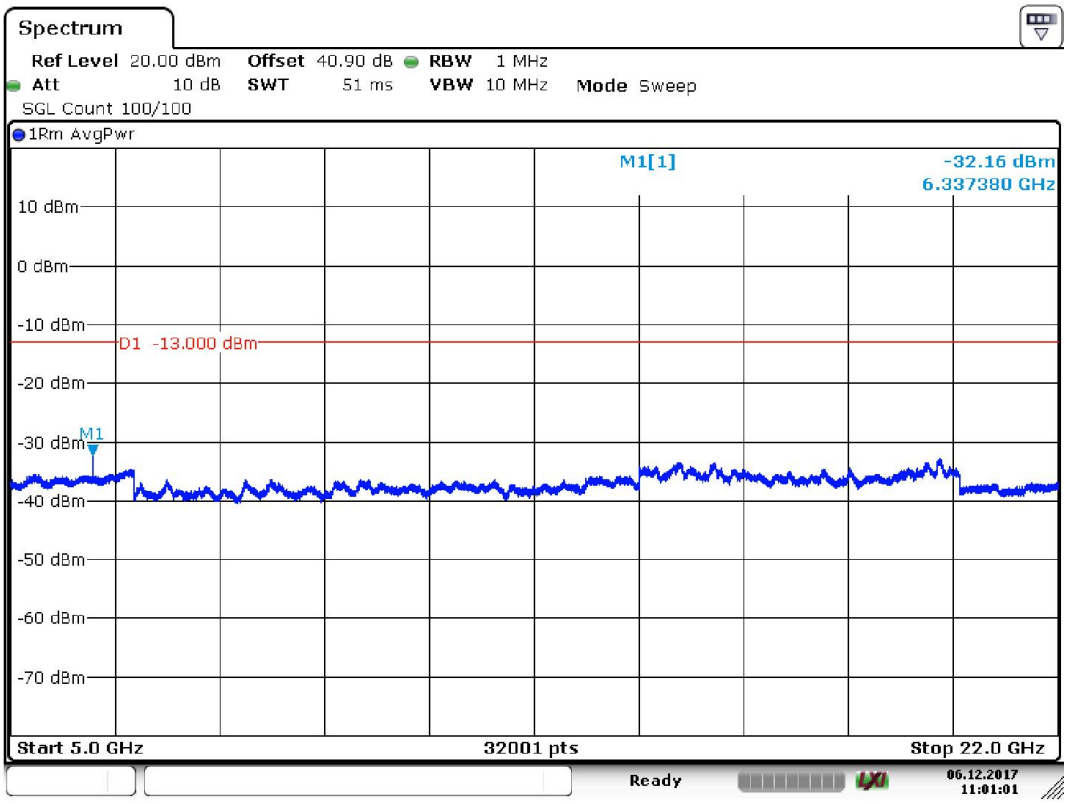
Date: 5.DEC.2017 14:02:17

WCDMA low channel 2.109 – 2.110 GHz



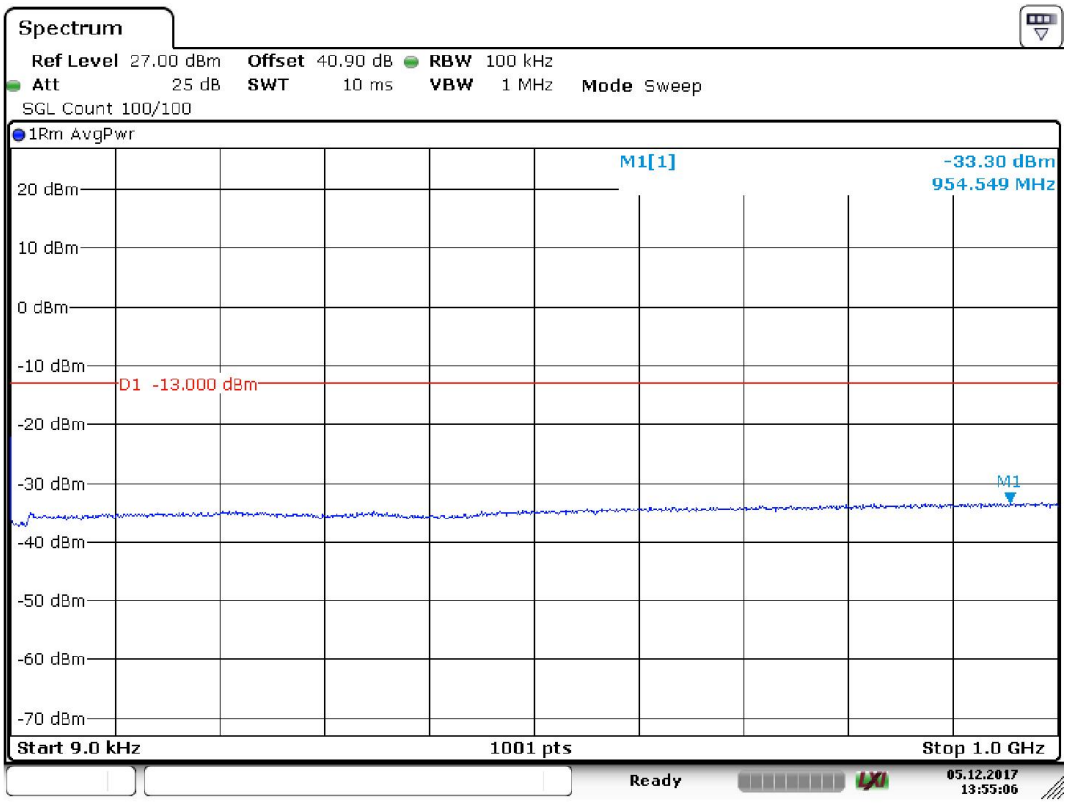
Date: 7.DEC.2017 09:01:36

WCDMA low channel 2.11 – 5 GHz



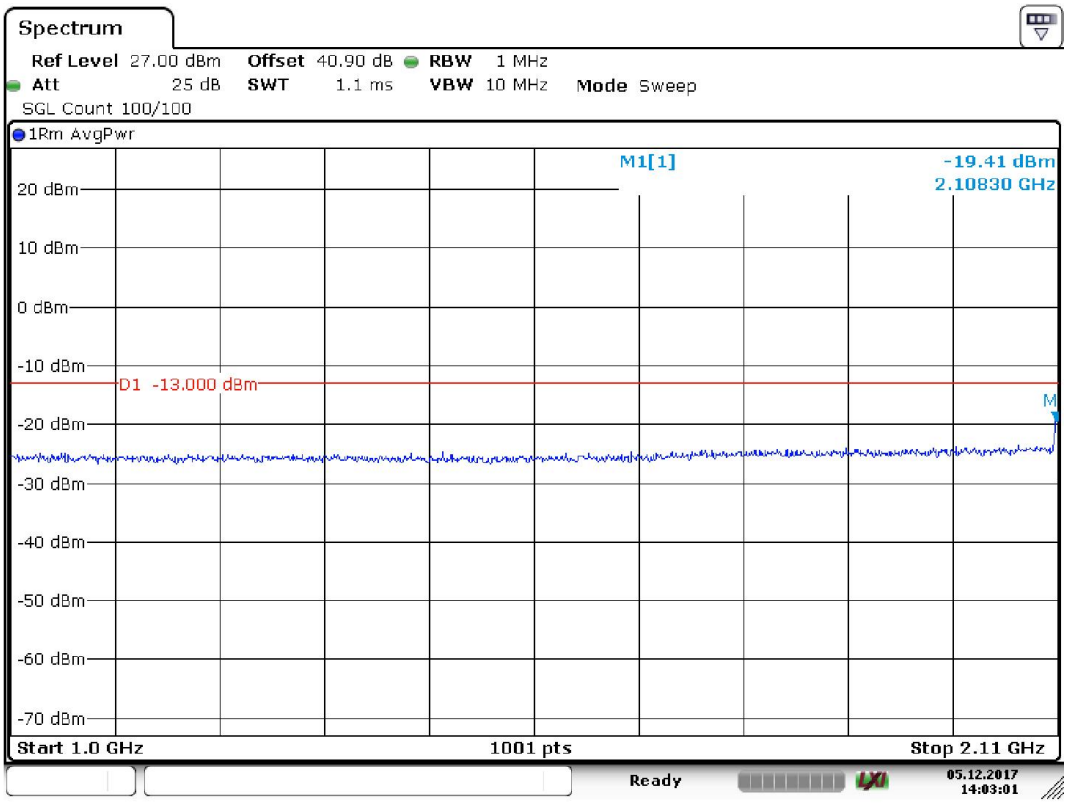
Date: 6.DEC.2017 11:01:02

WCDMA low channel 5 – 22 GHz



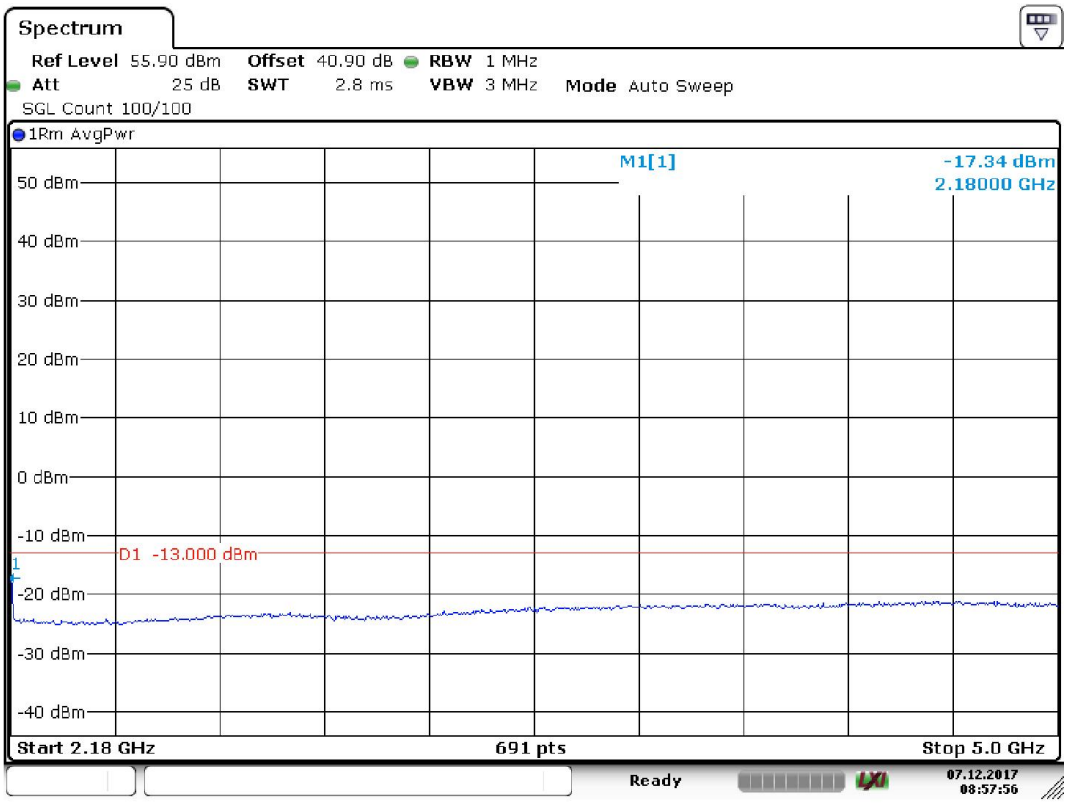
Date: 5.DEC.2017 13:55:05

WCDMA middle channel 9 kHz – 1GHz



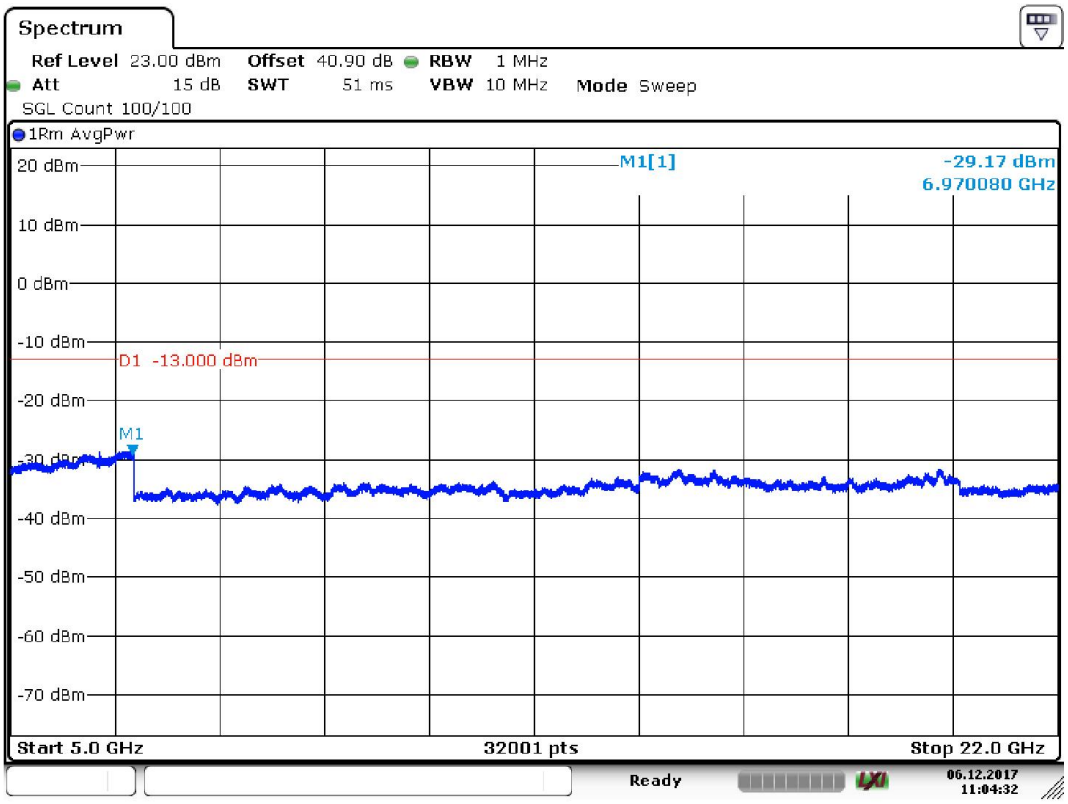
Date: 5.DEC.2017 14:03:01

WCDMA middle channel 1 – 2.11 GHz



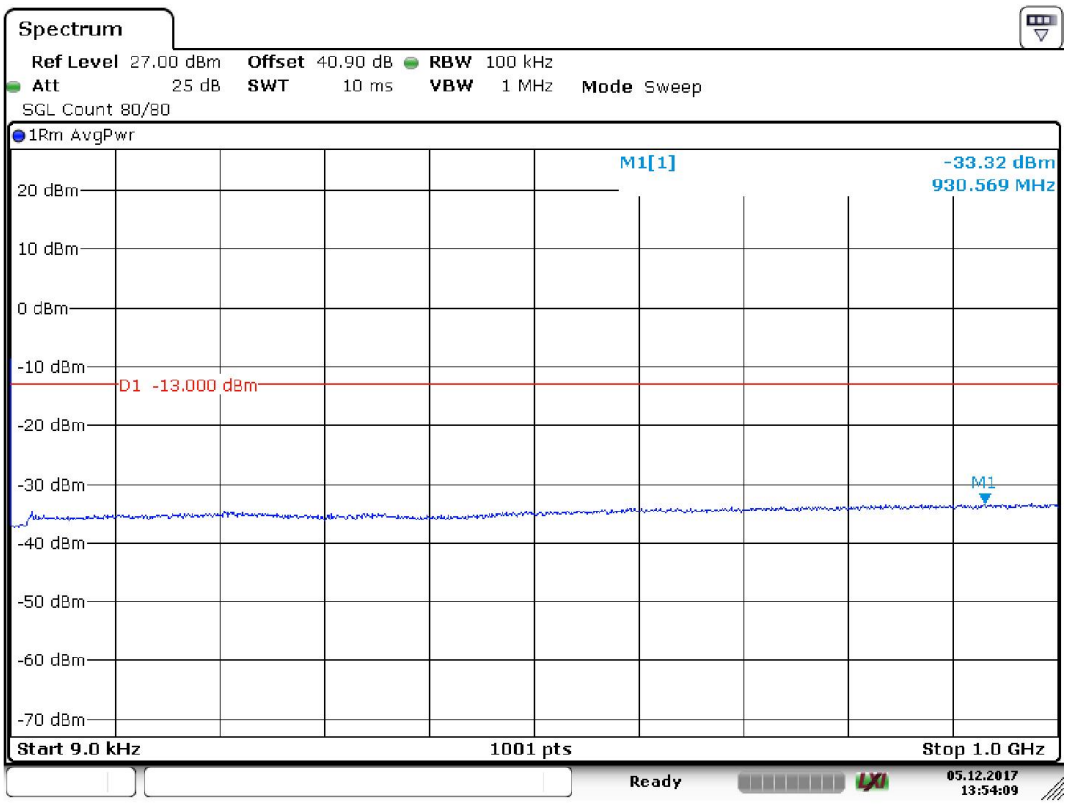
Date: 7.DEC.2017 08:57:57

WCDMA middle channel 2.18 – 5 GHz



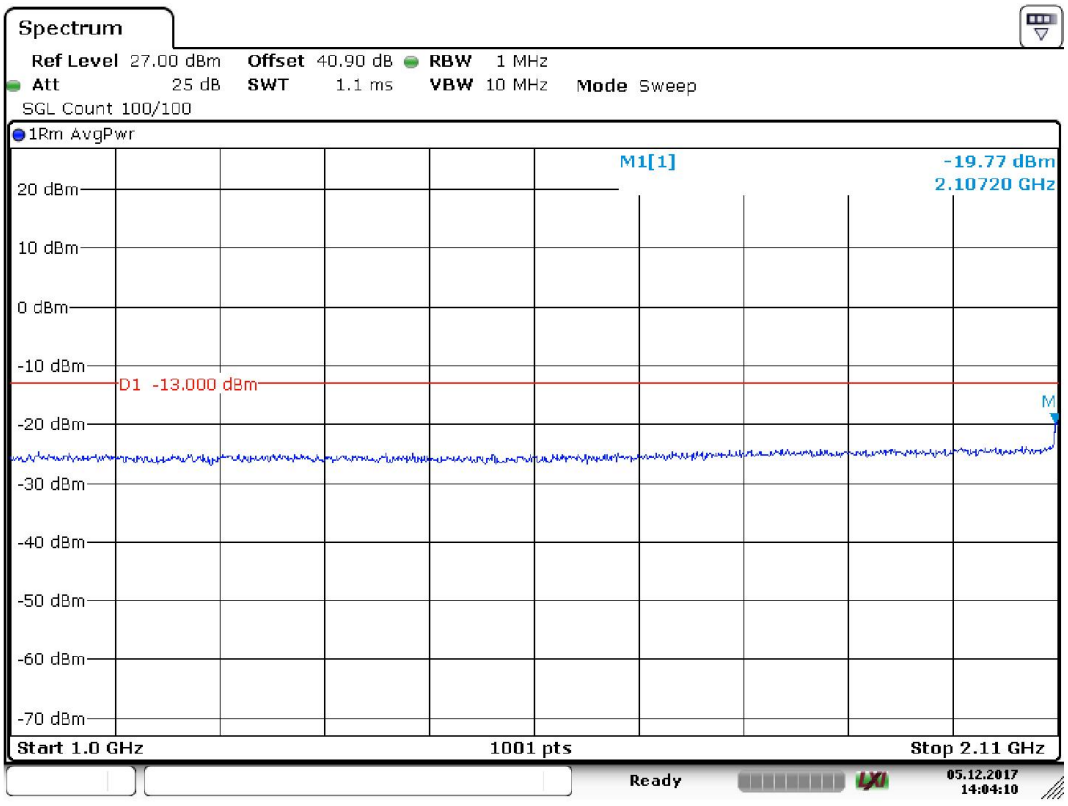
Date: 6.DEC.2017 11:04:32

WCDMA middle channel 5 – 22 GHz



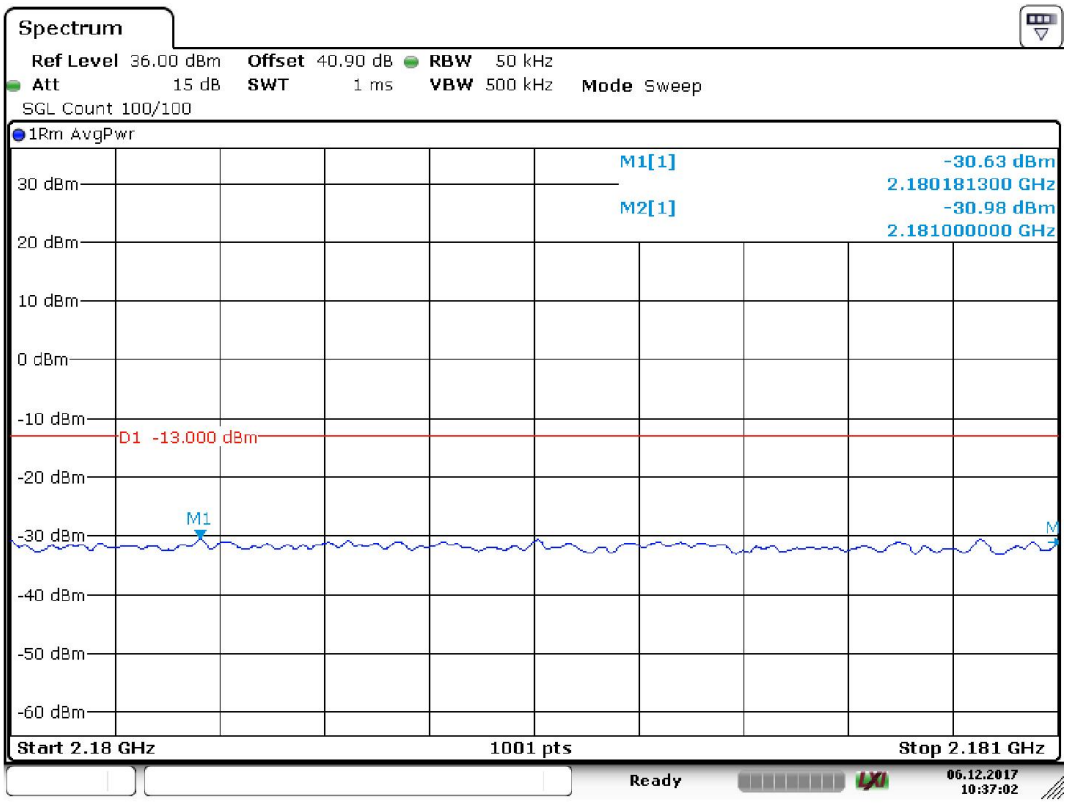
Date: 5.DEC.2017 13:54:09

WCDMA high channel 9 kHz – 1GHz



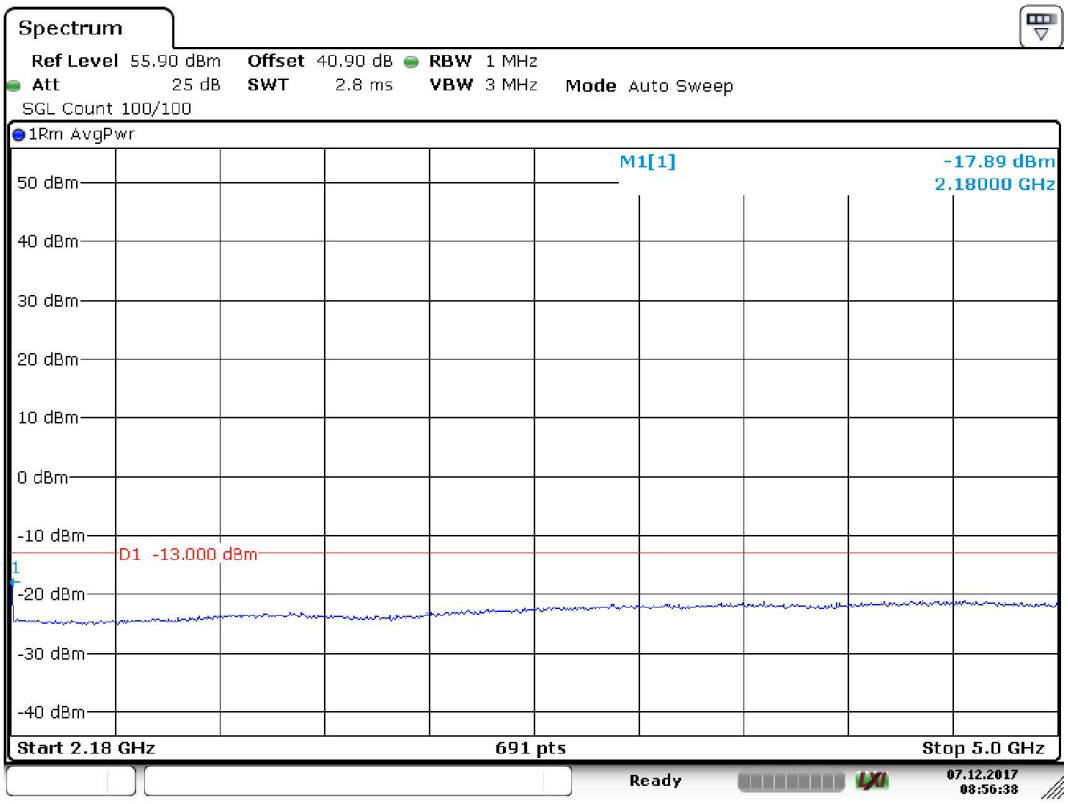
Date: 5.DEC.2017 14:04:11

WCDMA high channel 1 – 2.11 GHz



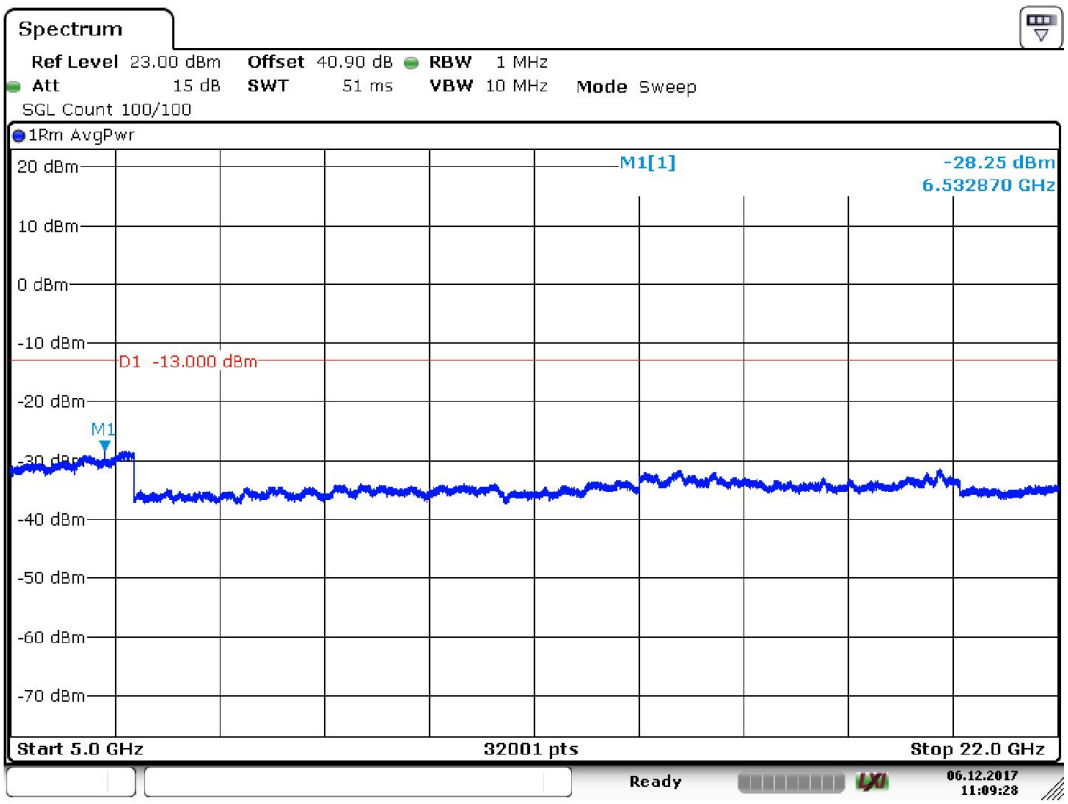
Date: 6.DEC.2017 10:37:02

WCDMA high channel 2180 – 2181 MHz



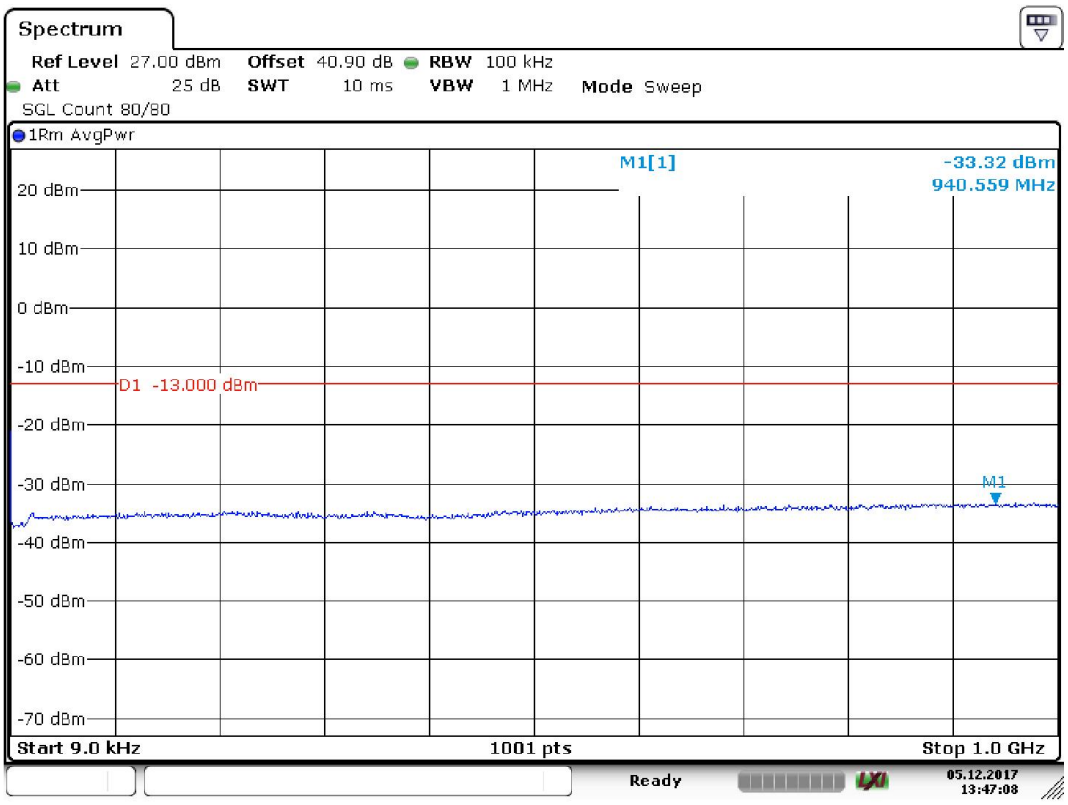
Date: 7.DEC.2017 08:56:38

WCDMA high channel 2181 – 5000 MHz



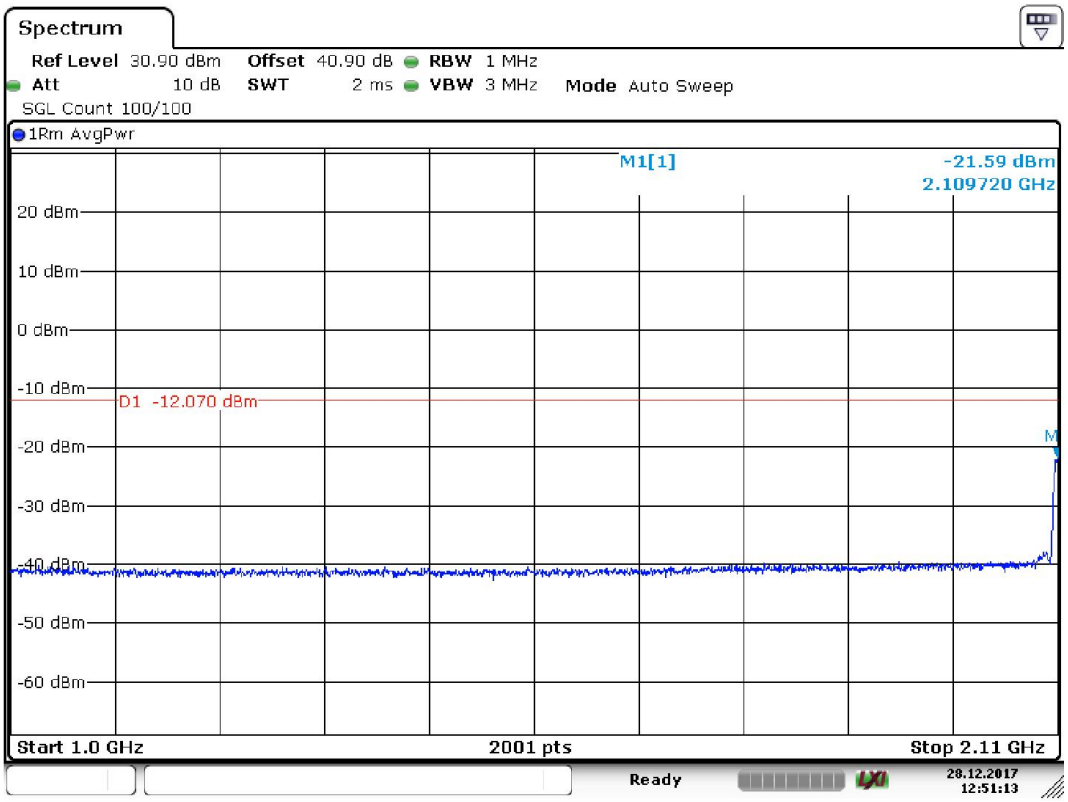
Date: 6.DEC.2017 11:09:28

WCDMA high channel 5 – 22 GHz



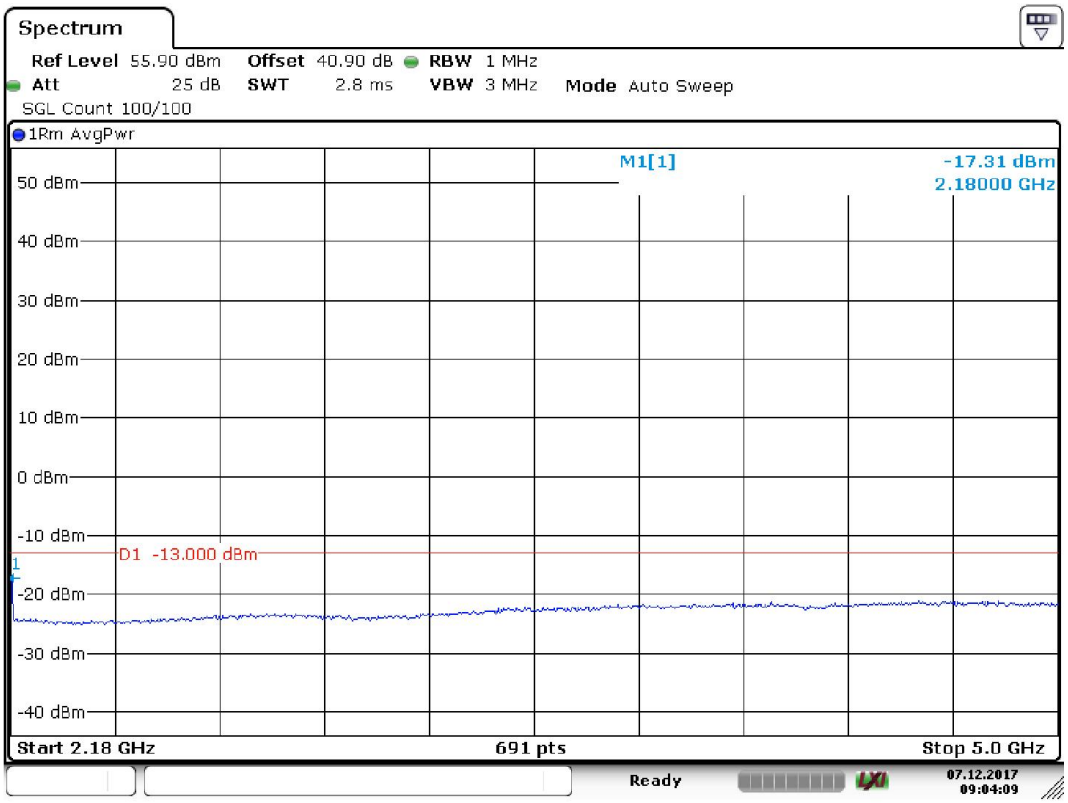
Date: 5.DEC.2017 13:47:08

GSM low channel 9 KHz – 1 GHz



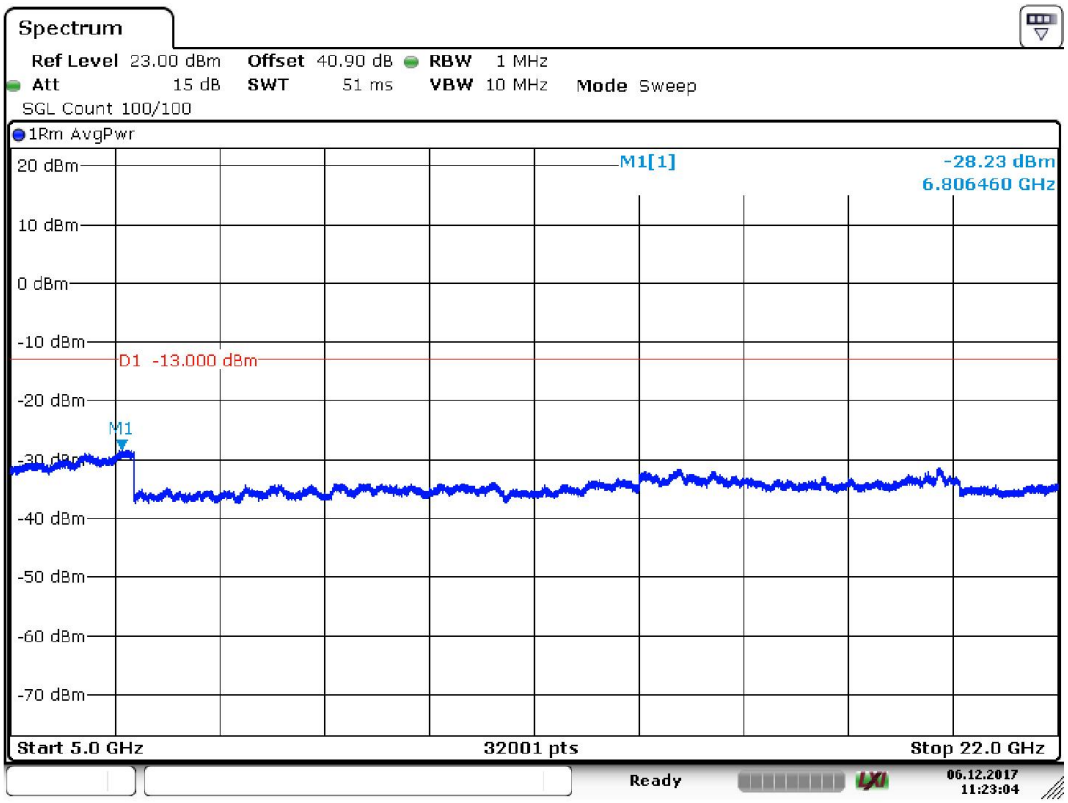
Date: 28.DEC.2017 12:51:14

GSM low channel 1 – 2.11 GHz



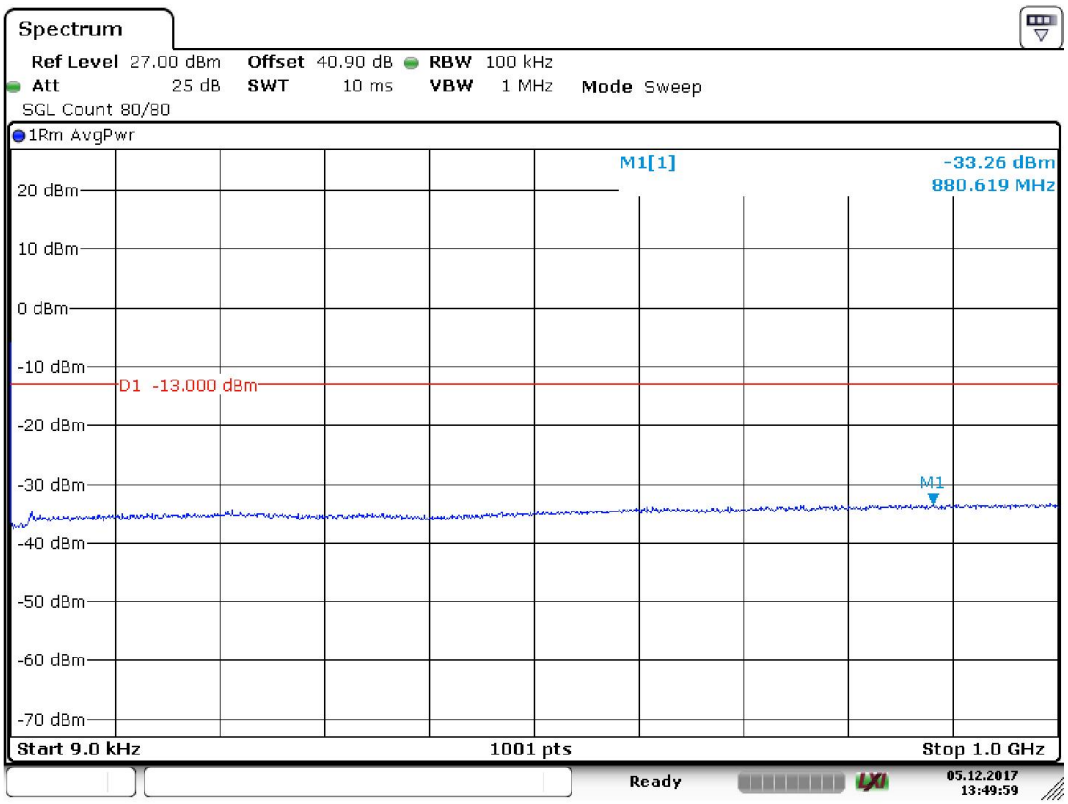
Date: 7.DEC.2017 09:04:10

GSM low channel 2.18 – 5 GHz



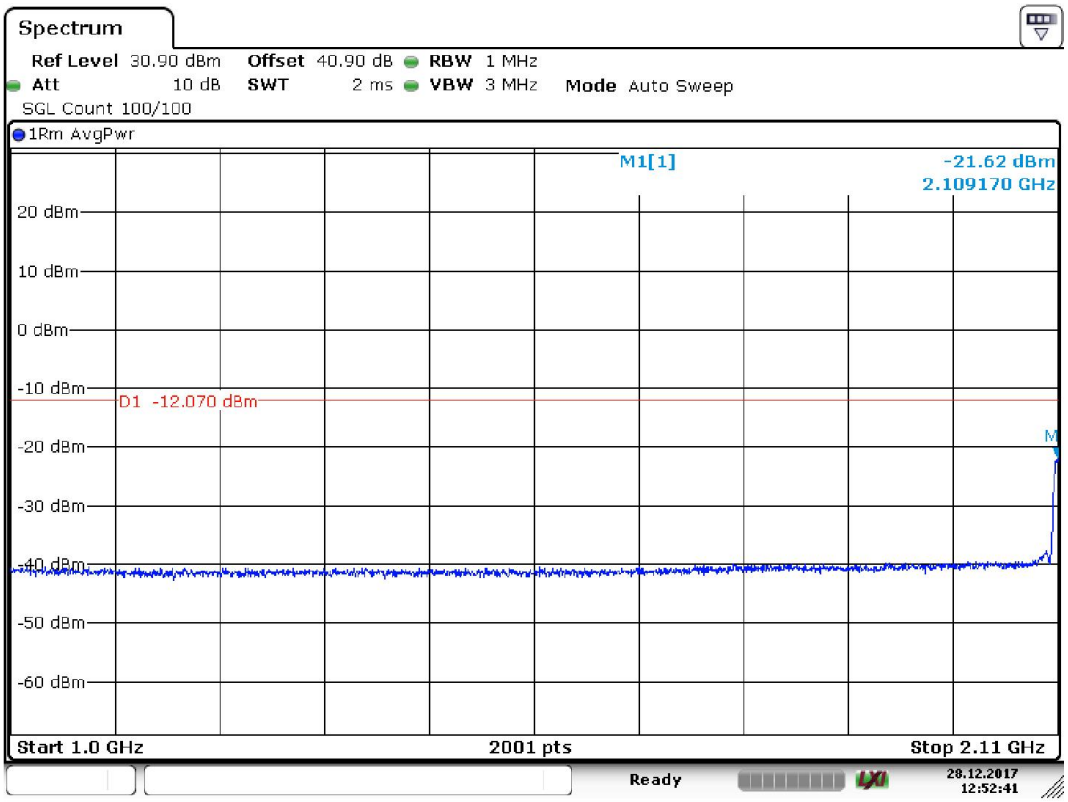
Date: 6.DEC.2017 11:23:04

GSM low channel 5 – 22 GHz



Date: 5.DEC.2017 13:49:59

GSM middle channel 9 KHz – 1 GHz



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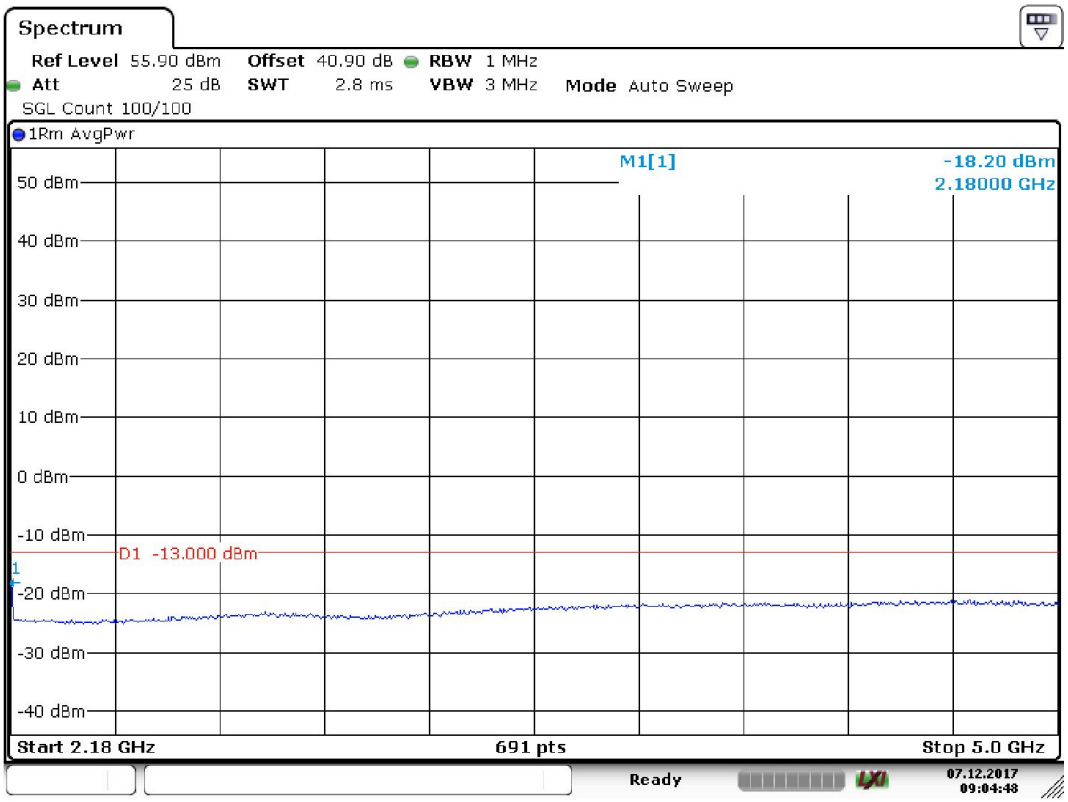
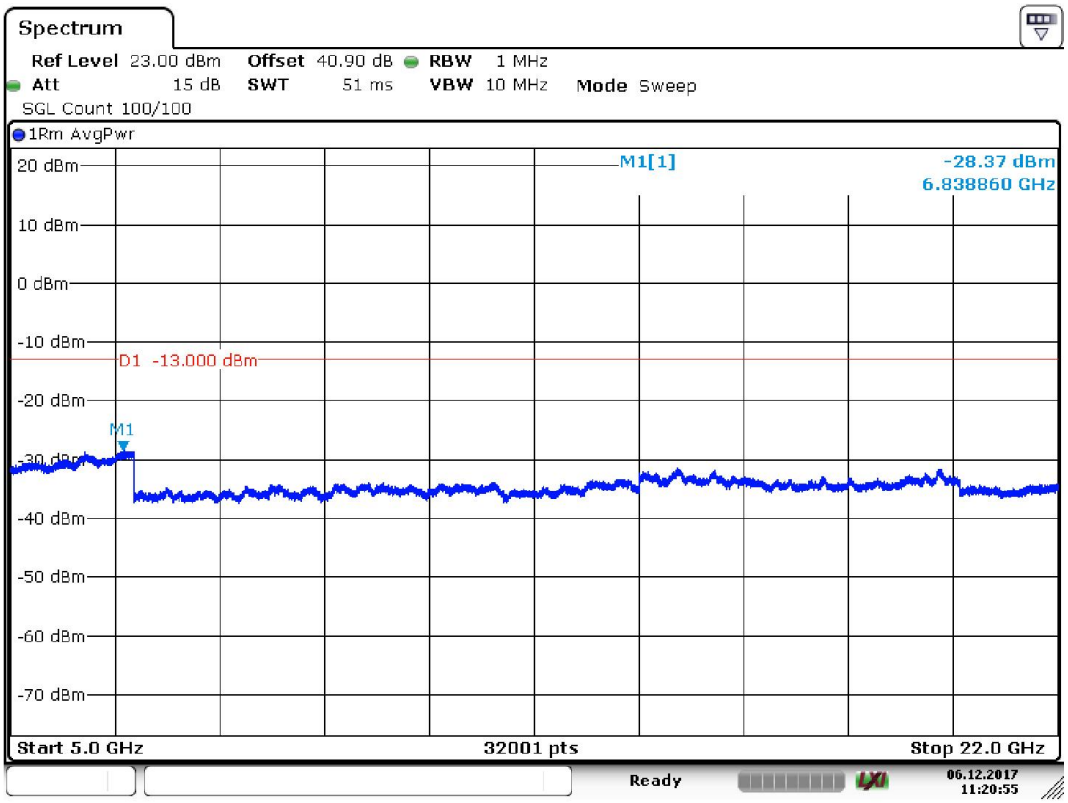
GSM middle channel 1 – 2.11 GHz



Date: 7.DEC.2017 09:04:48

GSM middle channel 2180 – 5000 MHz



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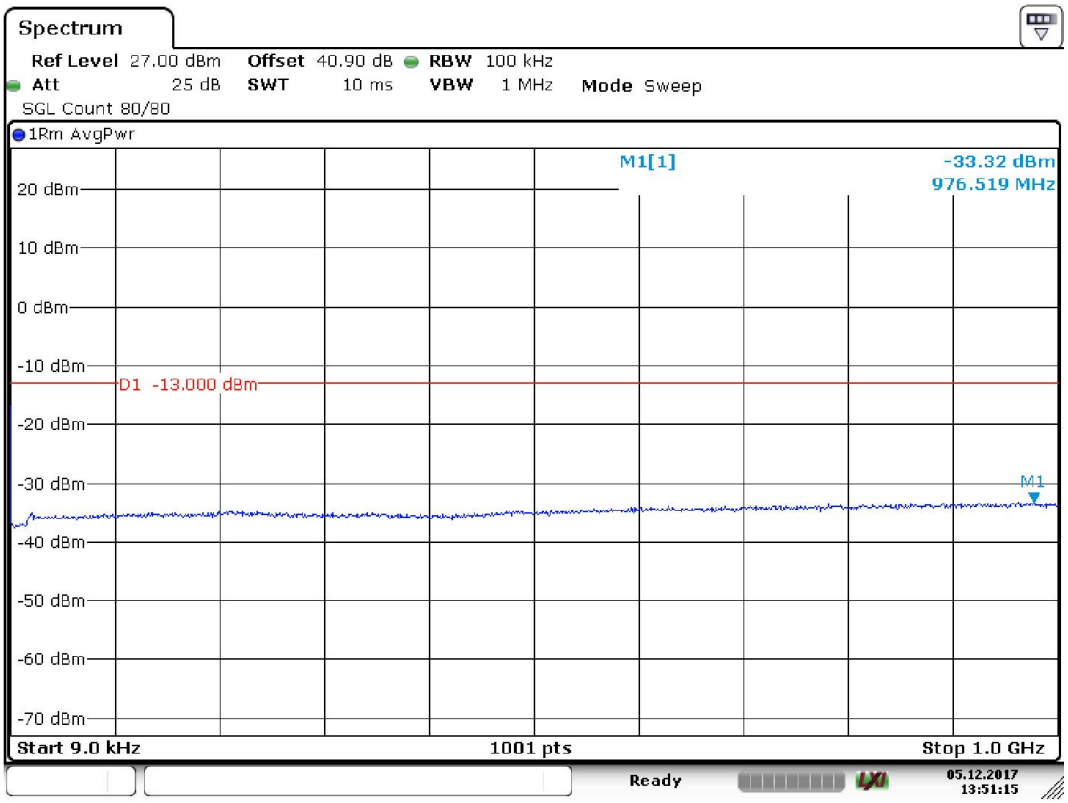
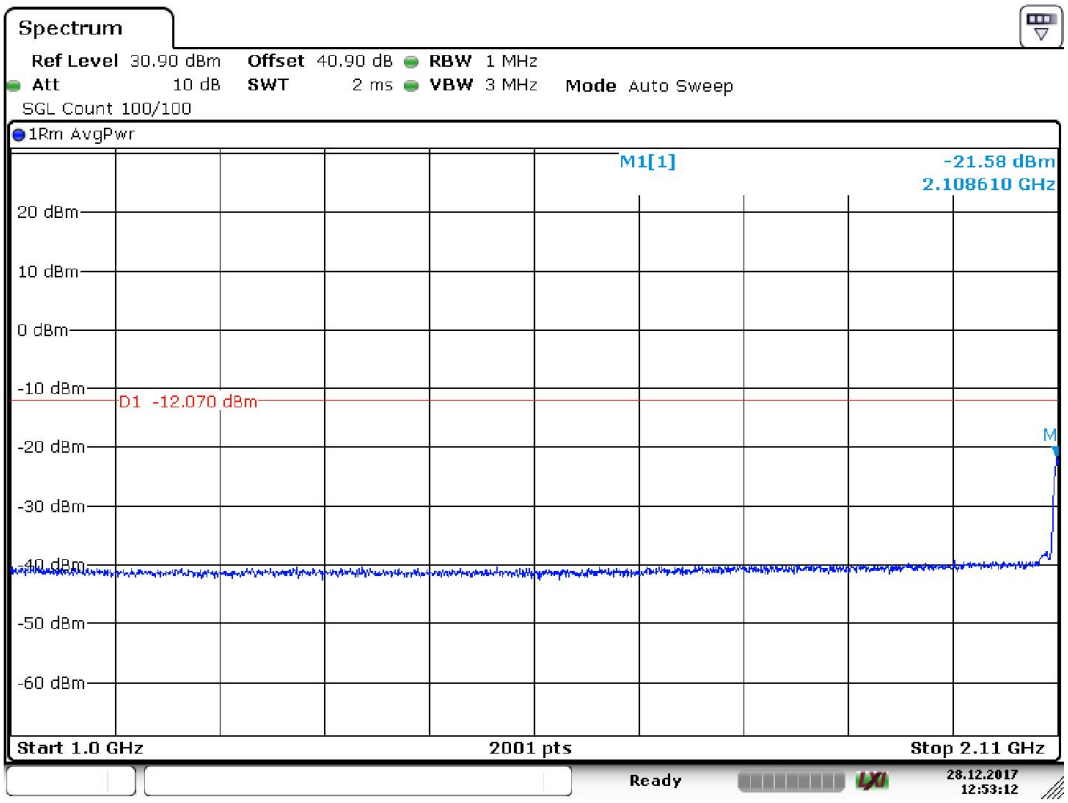
GSM middle channel 5 – 22 GHz



Date: 5.DEC.2017 13:51:15

GSM high channel 9 kHz – 1 GHz



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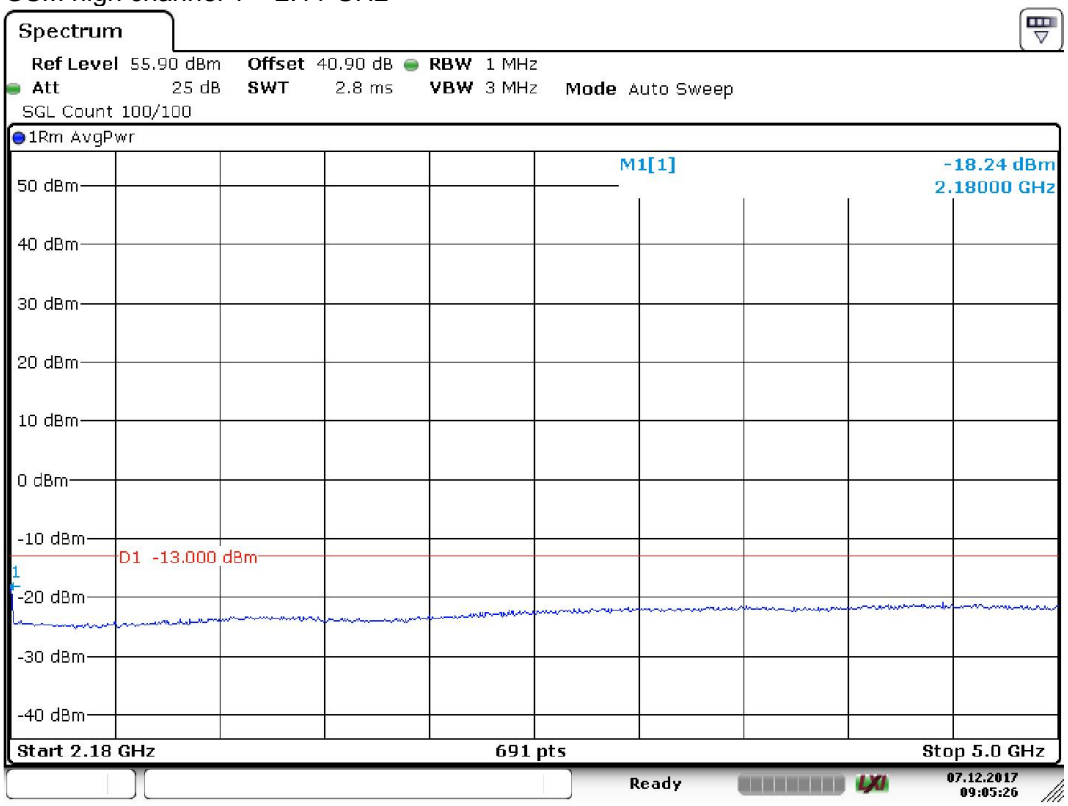
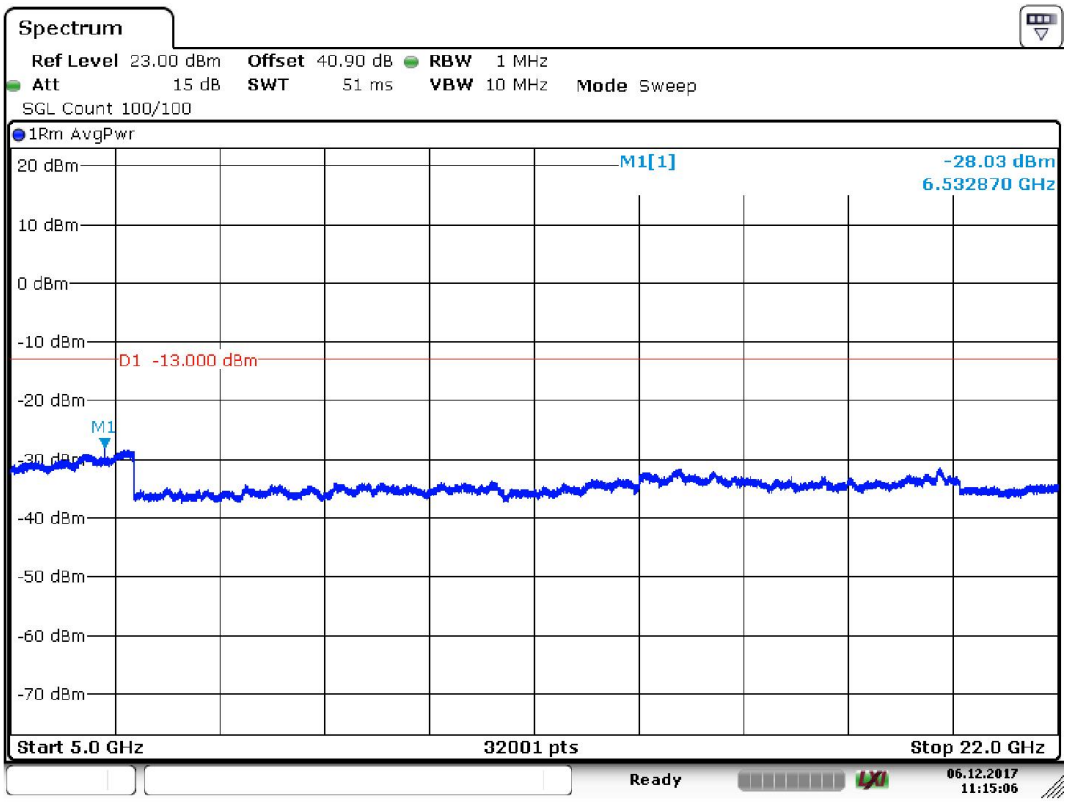
GSM high channel 1 – 2.11 GHz



Date: 7.DEC.2017 09:05:26

GSM high channel 2180 – 5000 MHz



Date: 6.DEC.2017 11:15:07

GSM high channel 5 - 22 GHz

9.4 Test equipment

Equipment type	Manufacturer	Model	Inv. No.	Cal. due date
Spectrum analyser	Rohde & Schwarz	FSV	32594	7/2018
Rf-attenuator	Narda	776B-10	8337	7/2018
Rf-attenuator	Huber Suhner	5920_N-50-010/199_N	32697	7/2018
Rf cable	Huber Suhner	Sucoflex 104PE	39076	7/2018
Rf cable	Huber Suhner	Sucoflex 104PE	39077	7/2018
Rf cable	Huber Suhner	Sucoflex 104PE	39079	7/2018
Signal generator	Rohde & Schwarz	SMIQ03B	12792	7/2018
Signal generator	Rohde & Schwarz	SMBV100	32593	7/2018

10 RADIATED SPURIOUS EMISSION

Date of test:	2017-11-06/07	Test location:	Björk hallen
EUT Serial:	7002100	Ambient temp.	21ºC
Tested by:	MTV	Relative humidity	32 %
Test result:	Pass	Margin:	> 20 dB

10.1 Test set-up

The test method is in accordance with ANSI C63.26.
Both receiver and transmitter are active during the tests.
The EUT was placed on an insulating support above the turntable which is part of the reference ground plane.

Overview sweeps were performed with the measurement receiver in max-hold mode and the peak detector activated. Above 1 GHz both peak and average detector is activated.

Signal generator was connected to the FOI unit which converted rf signal to optical signal. The optical signal was then fed via fibre to the EUT.
The EUT's output port was terminated to the 50 Ω terminator.

A PC was connected to FOI via Ethernet hub. The PC was then used to control the EUT.

10.2 Test conditions

Test set-up: **30 MHz to 1000 MHz**
Test receiver set-up:
Preview test: Peak, RBW 120 kHz, VBW 1 MHz
Final test: Quasi-Peak, RBW 120 kHz, VBW 1 MHz
Measuring distance: 3 m
EUT height above ground plane: 0.8 m
Measuring angle: 0 – 359□
Antenna
Height above ground plane: 1 – 4 m
Polarisation: Vertical and Horizontal
Type: Bilog

Test set-up: **1 GHz – 22 GHz**
Test receiver set-up:
Preview test: Peak, RBW 1 MHz, VBW 3 MHz
Average, RBW 1 MHz, VBW 3 MHz
Final test: Average, RBW 1 MHz, VBW 3 MHz
Peak, RBW 1 MHz, VBW 3 MHz
Measuring distance: 3 m
EUT height above ground plane: 1.5 m
Measuring angle: 0 – 359□
Antenna
Height above ground plane: 1 – 4 m
Polarisation: Vertical and Horizontal
Type: Horn
Antenna tilt: Activated

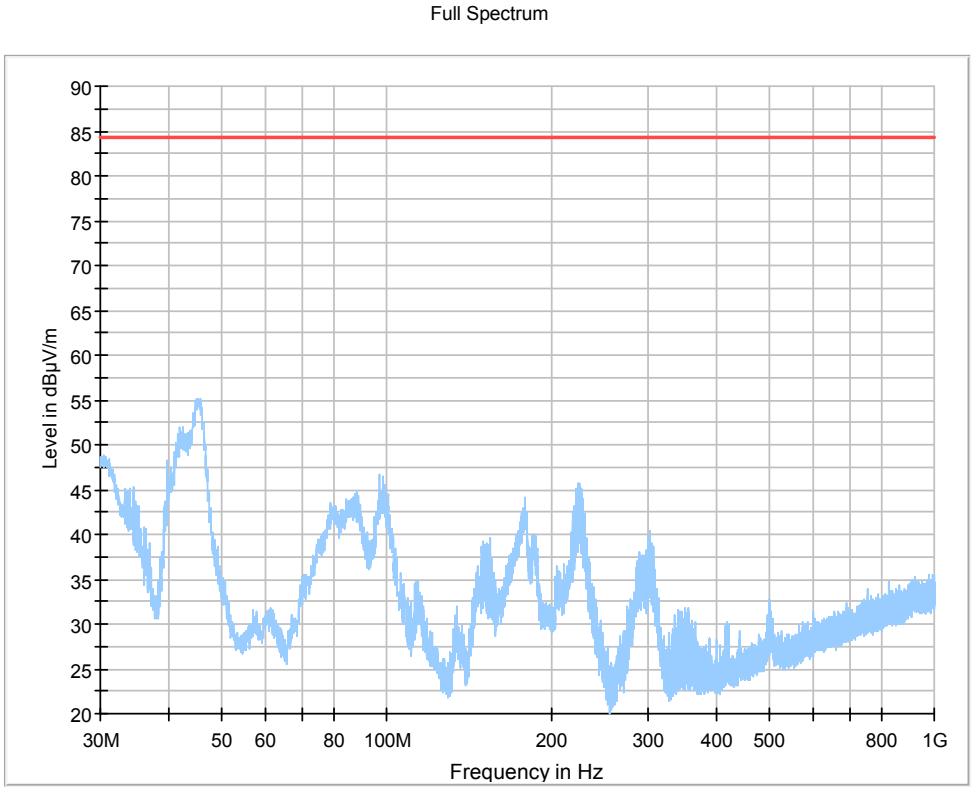
10.3 Requirement

The frequency range to be inspected is up to the tenth harmonics of the highest fundamental frequency according to 47 CFR 2.1057 and RSS-Gen Section 6.13.
The field strength limit is calculated using the plane wave relation.
$GP/4\pi R^2 = E^2 / 120\pi$

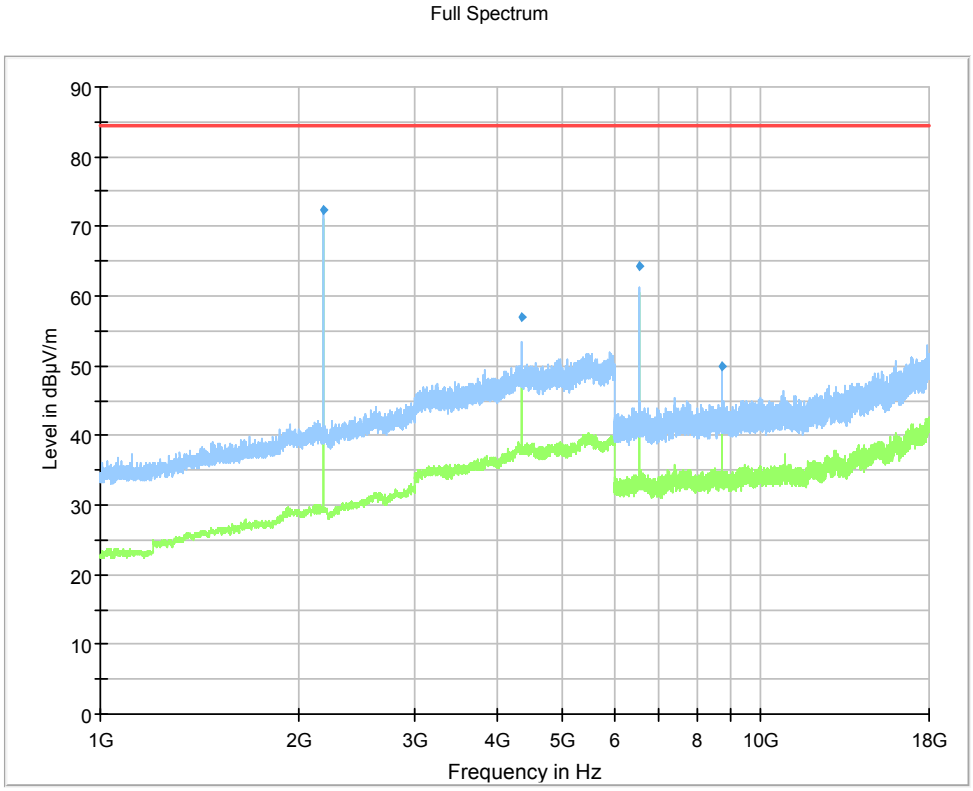
G: antenna gain
P: power (W)
R: measurement distance (m)

10.4 Test results

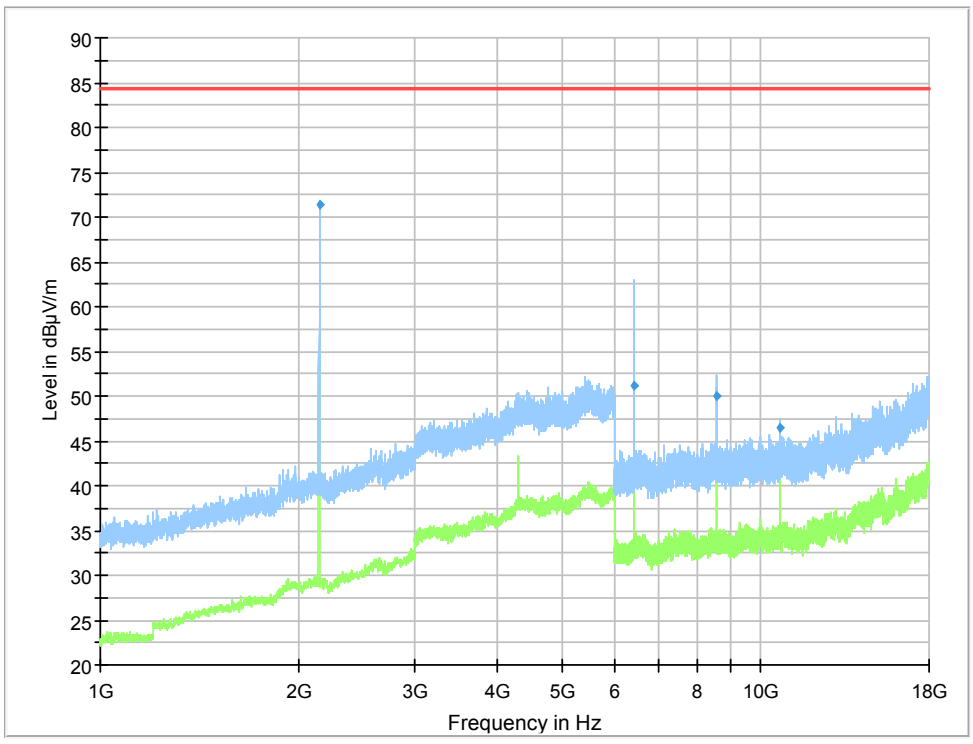
All measured unwanted emissions have at least 20 dB margin to the limit.
Only pre-sweep graphs are reported.



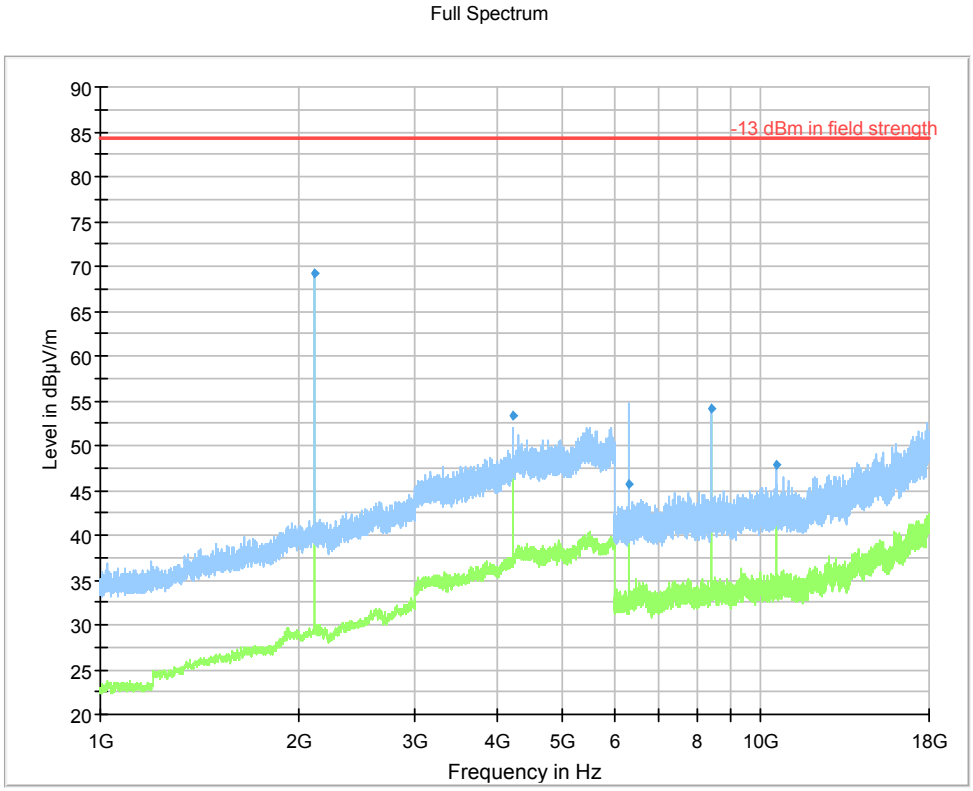
30 MHz – 1000 MHz



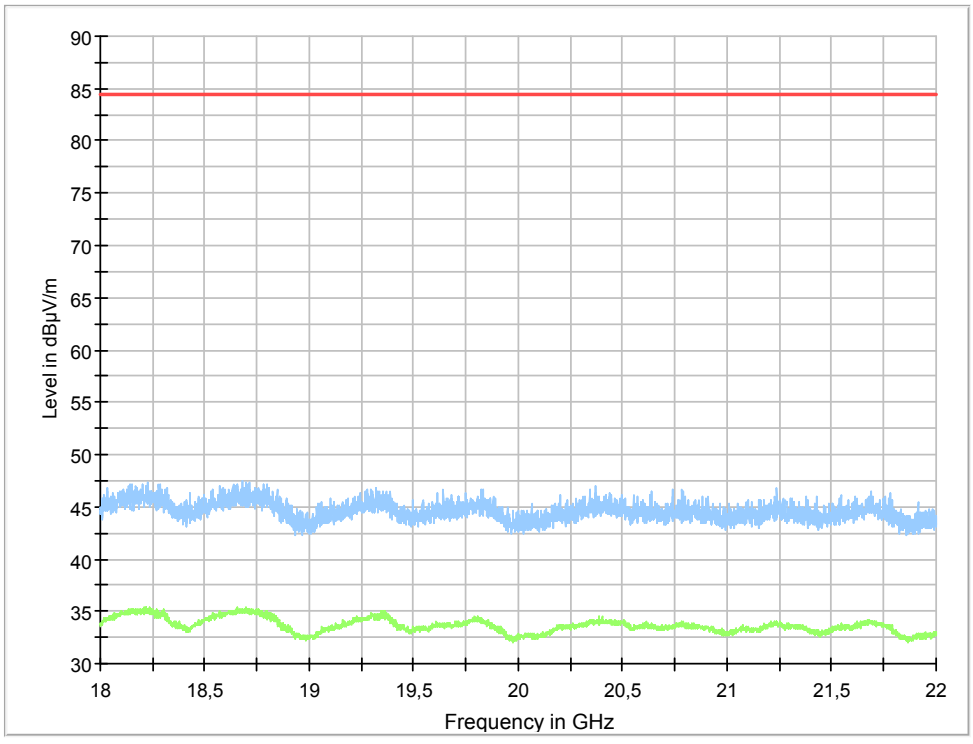
1-18 GHz low channel



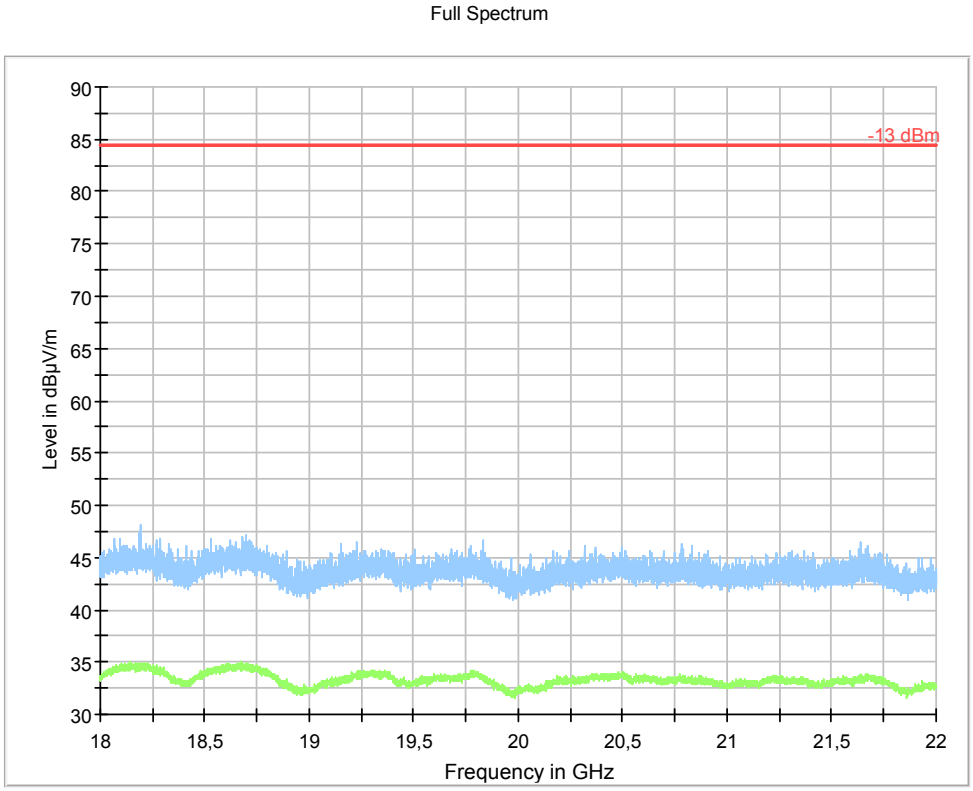
1-18 GHz middle channel



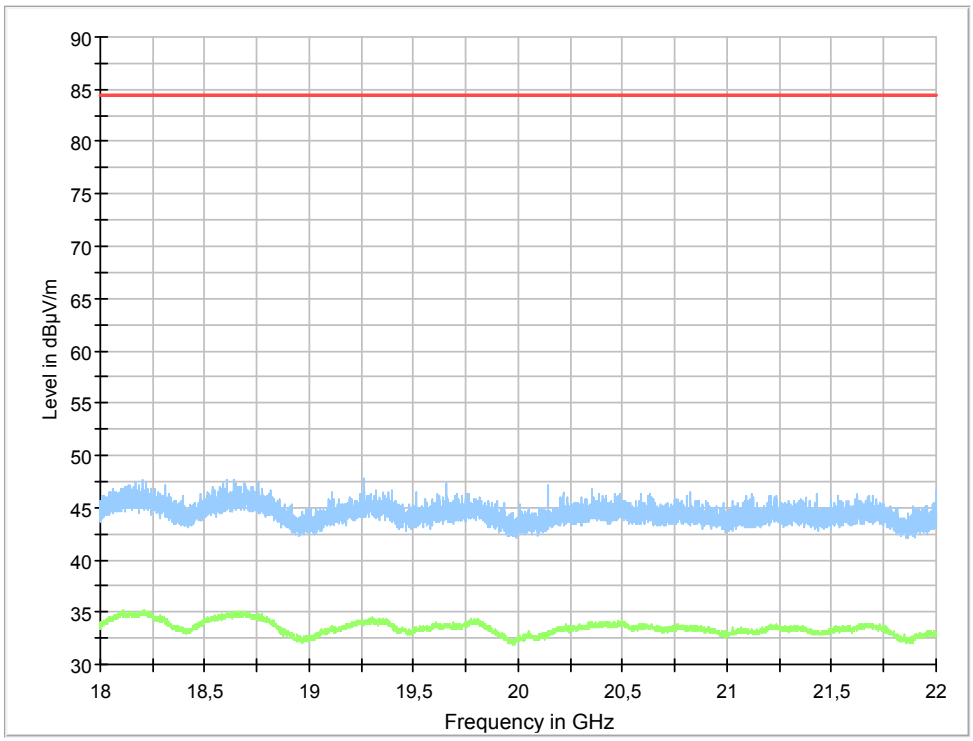
1-18 GHz high channel



18-22 GHz low channel



18-22 GHz middle channel



18-22 GHz high channel

10.5 Test equipment

Equipment type	Manufacturer	Model	Inv. No.	Cal. due date
Measurement receiver	Rohde & Schwarz	ESI 26	32291	7/2018
Measurement receiver	Rohde & Schwarz	ESU 40	13178	7/2018
UltraLog antenna	Rohde & Schwarz	HL562	30711	12/2018
Horn antenna	Rohde & Schwarz	HF907	32307	7/2018
Pre amplifier	Rohde & Schwarz	TS-pre1	32306	7/2018
Horn antenna + preamp	Bonn	BLMA 1826-5A	31247	1/2020
Rf cable	Megaphase	GC12-K1K1-315	39127	7/2018

11 MEASUREMENT UNCERTAINTY

Measurement uncertainty for radiated disturbance

Uncertainty for the frequency range 0.09 to 30 MHz at 10 m	± 3.2 dB
Uncertainty for the frequency range 30 to 1000 MHz at 3 m	± 5.1 dB
Uncertainty for the frequency range 30 to 1000 MHz at 10 m	± 5.0 dB
Uncertainty for the frequency range 1.0 to 18 GHz at 3 m	± 4.7 dB
Uncertainty for the frequency range 18 to 26 GHz at 3 m	± 4.8 dB
Uncertainty for the frequency range 26 to 40 GHz at 3 m	± 5.7 dB

Measurement uncertainty is calculated in accordance with CISPR 16-4-2:2011.
The measurement uncertainty is given with a confidence of 95 %.

Measurement uncertainty for antenna port measurements

Uncertainty for conducted spurious emission	± 2,5 dB
Uncertainty for carrier power	± 1,3 dB

Frequency error

Frequency to be measured [MHz]	Expanded (k=1,96) Measurement Uncertainty [Hz]	Expanded (k=1,96) Measurement Uncertainty [%]
25	0,34	$1,36 \times 10^{-8}$
433	3,40	$7,90 \times 10^{-9}$
868	3,40	$3,91 \times 10^{-9}$
1900	33,95	$1,79 \times 10^{-8}$
2483,5	33,96	$1,37 \times 10^{-8}$
5850	34,00	$5,81 \times 10^{-9}$

Measurement uncertainty is calculated in accordance with ETSI TS 100028.
The measurement uncertainty is given with a confidence of 95 %.

12 TEST SET UP AND EUT PHOTOS

EUT photos are in separate document 1713846STO-001 Annex 1.
Test set up photos are in separate document 1718386STO-01 Annex 2.