



FCC LISTED,
REGISTRATION NUMBER:
720267
IC LISTED REGISTRATION
NUMBER IC 4621A-2

Test report No:

NIE: 52671RRF.001

Test report

REFERENCE STANDARD: USA FCC Part 22 & Part 24 CANADA IC RSS-132, RSS-133

Identificación del objeto ensayado.....: Identification of item tested	Outdoor Luminaire Controller
Marca Trademark	Philips
Modelo y/o referencia tipo Model and /or type reference	LLC7280
Other identification of the product	FCC ID: VBO-LLC7280, IC:135Y-LLC7280
Final HW version	9137 003 933
Final SW version	5.5.14.0
IMEI TAC	01433200 (SVN 07)
Características Features	Mobile connection / over the air update / DALI connection
Solicitante Applicant	Philips Lighting Electronics 3 Burlington Woods Drive, Burlington, MA01803 USA
Método de ensayo solicitado, norma.....: Test method requested, standard	USA FCC Part 22 10-1-15 Edition. USA FCC Part 24 10-1-15 Edition. CANADA IC RSS-132 Issue 3, Jan. 2013. CANADA IC RSS-133 Issue 6, Jan. 2013. Measurement Guidance 971168 D01 v02r02 for certification of Licensed Digital Transmitters. ANSI/TIA-603-D (2010).
Resultado.....: Summary	IN COMPLIANCE
Aprobado por (nombre / cargo y firma) Approved by (name / position & signature)	A. Llamas RF Lab. Manager
Fecha de realización Date of issue	2017-03-01
Formato de informe No.: Report template No	FDT08_18

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Competences and guarantees

AT4 wireless is a testing laboratory accredited by the National Accreditation Body (ENAC -Entidad Nacional de Acreditación), to perform the tests indicated in the Certificate No. 51/LE 147.

AT4 wireless is a laboratory with a measurement facility in compliance with the requirements of Section 2.948 of the FCC rules and has been added to the list of facilities whose measurements data will be accepted in conjunction with applications for Certification under Parts 15 or 18 of the Commission's Rules. Registration Number: 720267.

AT4 wireless is a laboratory with a measurement site in compliance with the requirements of RSS 212, Issue 1 (Provisional) and has been added to the list of filed sites of the Canadian Certification and Engineering Bureau. Reference File Number: IC 4621A-2.

In order to assure the traceability to other national and international laboratories, AT4 wireless has a calibration and maintenance program for its measurement equipment.

AT4 wireless guarantees the reliability of the data presented in this report, which is the result of the measurements and the tests performed to the item under test on the date and under the conditions stated on the report and, it is based on the knowledge and technical facilities available at AT4 wireless at the time of performance of the test.

AT4 wireless is liable to the client for the maintenance of the confidentiality of all information related to the item under test and the results of the test.

The results presented in this Test Report apply only to the particular item under test established in this document.

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General conditions

1. This report is only referred to the item that has undergone the test.
2. This report does not constitute or imply on its own an approval of the product by the Certification Bodies or competent Authorities.
3. This document is only valid if complete; no partial reproduction can be made without previous written permission of AT4 wireless.
4. This test report cannot be used partially or in full for publicity and/or promotional purposes without previous written permission of AT4 wireless and the Accreditation Bodies.

Uncertainty

Uncertainty (factor $k=2$) was calculated according to the AT4 wireless internal document PODT000.

Usage of samples

Samples undergoing test have been selected by: **the client**.

Sample S/01 is composed of the following elements:

Control N°	Description	Model	Serial N°	Date of reception
49993/006	Outdoor Luminaire Controller	LLC7280	014332000256991	2016-10-21
49993/020	NEMA receptacle	---	---	2016-10-21
49993/024	Power Supply	LLC7240	MP0000018935	2016-10-21

1. Sample S/01 has undergone the test(s).
All radiated tests indicated in appendixes A, B.

Test sample description

The OLC is a control node that is placed on top of a luminaire. It establishes a wireless connection through the mobile network by means of 2G/3G network.

Identification of the client

Philips Lighting Electronics
3 Burlington Woods Drive, Burlington, MA01803 USA

Testing period

The performed test started on 2017-02-18 and finished on 2017-02-19.

The tests have been performed at AT4 wireless.

Environmental conditions

In the control chamber, the following limits were not exceeded during the test:

Temperature	Min. = 15 °C Max. = 35 °C
Relative humidity	Min. = 20 % Max. = 75 %
Shielding effectiveness	> 100 dB
Electric insulation	> 10 kΩ
Reference resistance to earth	< 1 Ω

In the semianechoic chamber the following limits were not exceeded during the test.

Temperature	Min. = 15 °C Max. = 35 °C
Relative humidity	Min. = 20 % Max. = 75 %
Air pressure	Min. = 860 mbar Max. = 1060 mbar
Shielding effectiveness	> 100 dB
Electric insulation	> 10 kΩ
Reference resistance to earth	< 1 Ω
Normal site attenuation (NSA)	< ±4 dB at 10 m distance between item under test and receiver antenna, (30 MHz to 1000 MHz)
Field homogeneity	More than 75% of illuminated surface is between 0 and 6 dB (26 MHz to 1000 MHz).

Remarks and comments

1: Used instrumentation.

Radiated Measurements

		Last Cal. date	Cal. due date
1.	Semianechoic Absorber Lined Chamber ETS FACT3 200STP	N.A.	N.A.
2.	BiconicalLog antenna ETS LINDGREN 3142E	2014/03	2017/03
3.	Multi Device Controller EMCO 2090	N.A.	N.A.
4.	Double-ridge Guide Horn antenna 1-18 GHz SCHWARZBECK BBHA 9120 D	2016/11	2019/11
5.	Broadband Horn antenna 18-40 GHz Schwarbeck BBHA 9170	2014/03	2017/03
6.	EMI Test Receiver R&S ESU 40	2016/03	2018/03
7.	Spectrum analyser Rohde & Schwarz FSW50	2015/12	2017/12
8.	RF pre-amplifier 10 MHz-6 GHz SCHWARZBECK BBV9743	2016/04	2017/04
9.	RF pre-amplifier 1-18 GHz BONN ELEKTRONIK BLMA 0118-3A	2016/02	2018/02
10.	RF pre-amplifier 18-40 GHz BONN ELEKTRONIK BLMA 1840-1M	2015/12	2017/12
11.	Universal Radio communication Tester R&S CMW500	2014/07	2017/07

2. GSM mode has not been tested to prove USA FCC Part 22 and Part 24 and Canada IC RSS-132 and RSS-133 compliance because the modulation scheme and the power maximum levels are the same as for GPRS mode.

Taking into account the above comments, testing in GSM mode is redundant for FCC Parts 22 and Part 24 and IC RSS-132 and RSS-133 as it is the same as GPRS mode. GPRS mode has been tested as indicated on the present test report.

3. HSDPA modulation mode has not been tested to prove USA FCC Part 22 and Part 24 and Canada IC RSS-132 and RSS-133 compliance because it is an improved mode of operation only for Downlink (UE reception), but using the normal WCDMA mode for UL (Up Link, UE transmission). Therefore HSDPA has no associated a Power class or modulation scheme different than WCDMA mode for the UL transmission.

Taking into account the above comments, testing in HSDPA modulation mode is redundant for FCC Parts 22 and Part 24 and IC RSS-132 and RSS-133 as it is the same as WCDMA mode as long as UE transmission is concerned. WCDMA modulation mode has been tested as indicated on the present test report.

4. Test not requested. Only radiated spurious emission test was requested.

Testing verdicts

Not applicable	N/A
Pass	P
Fail	F
Not measured	N/M

FCC PART 22/IC RSS-132 PARAGRAPH	VERDICT			
	NA	P	F	NM
Clause 22.913/RSS-132 Clause 5.4: RF output power				NM ⁴
Clause 2.1047/RSS-132 Clause 5.2: Modulation characteristics				NM ⁴
Clause 22.355/RSS-132 Clause 5.3: Frequency stability				NM ⁴
Clause 2.1049: Occupied Bandwidth				NM ⁴
Clause 22.917/RSS-132 Clause 5.5: Spurious emissions at antenna terminals				NM ⁴
Clause 22.917/RSS-132 Clause 5.5: Radiated emissions		P		

4: See section "Remarks and comments".

FCC PART 24/IC RSS-133 PARAGRAPH	VERDICT			
	NA	P	F	NM
Clause 24.232/RSS-133 Clause 6.4: RF output power				NM ⁴
Clause 2.1047/RSS-133 Clause 6.2: Modulation characteristics				NM ⁴
Clause 24.235/RSS-133 Clause 6.3: Frequency stability				NM ⁴
Clause 2.1049: Occupied Bandwidth				NM ⁴
Clause 24.238/RSS-133 Clause 6.5: Spurious emissions at antenna terminals				NM ⁴
Clause 24.238/RSS-133 Clause 6.5: Radiated emissions		P		

4: See section "Remarks and comments".

Appendix A – Test result for FCC Part 22/IC RSS-132

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TEST RESULTS FOR FCC PART 22 AND IC RSS-132

TEST CONDITIONS

Power supply (V):

$$V_{\text{nominal}} = 115 \text{ Vac}$$

$$V_{\text{min}} = \text{N/A}$$

$$V_{\text{max}} = \text{N/A}$$

The subscripts nom, min and max indicate voltage test conditions (nominal, minimum and maximum respectively, as declared by the applicant).

N/A: Not applicable.

Type of power supply = AC Voltage.

Type of antenna = PIFA antenna GSM 850 & UMTS Band V (-3.76 dB)

TEST FREQUENCIES:

GPRS MODULATION

Lowest channel (128): 824.2 MHz

Middle channel (190): 836.6 MHz

Highest channel (251): 848.8 MHz

WCDMA AND HSUPA MODULATION

Lowest channel (4132): 826.4 MHz

Middle channel (4182): 836.4 MHz

Highest channel (4233): 846.6 MHz

Radiated emissions

SPECIFICATION

FCC § 22.917

RSS-132. Clause 5.5.

The power of emissions shall be attenuated below the transmitter power (P) by a factor of at least $43 + 10 \log (P)$ dB. P in watts.

METHOD

The measurement was performed with the EUT inside an anechoic chamber. The spectrum was scanned from 30 MHz to at least the 10th harmonic of the highest frequency generated within the equipment.

The EUT was placed on a non-conductive stand at a 3 meter distance from the measuring antenna for measurements below 1 GHz and at 1 m distance for measurements above 1 GHz.

Detected emissions were maximized at each frequency by rotating the EUT and adjusting the measuring antenna height and polarization. The maximum meter reading was recorded. The radiated emissions were measured with peak detector and 1 MHz bandwidth.

Each detected emission at less than 20 dB respect to the limit is substituted by the Substitution method, in accordance with the ANSI/TIA-603-D: 2010.

Measurement Limit:

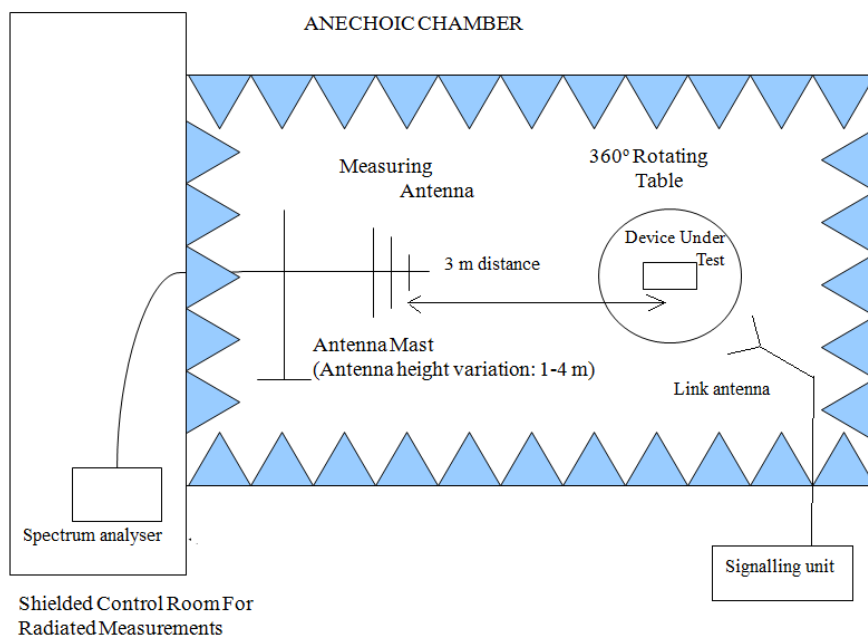
According to specification, the power of emissions shall be attenuated below the transmitter power (P) by a factor of at least $43 + 10 \log (P)$ dB. P in watts.

At P_o transmitting power, the specified minimum attenuation becomes $43 + 10 \log (P_o)$ and the level in dBm relative P_o becomes:

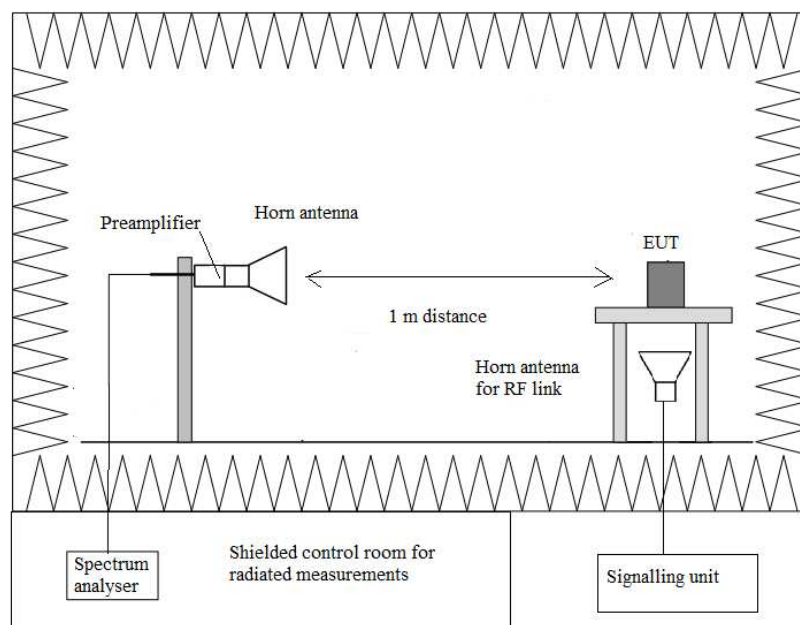
$$P_o \text{ (dBm)} - [43 + 10 \log (P_o \text{ in mwatts}) - 30] = -13 \text{ dBm}$$

TEST SETUP

Radiated measurements below 1 GHz.



Radiated measurements above 1 GHz.



RESULTS

GPRS AND EDGE MODULATION

A preliminary scan determined the GPRS modulation as the worst case. The following tables and plots show the results for GPRS modulation.

1. CHANNEL: LOWEST

Frequency range 30 MHz-1000 MHz.

No radiated spurious signals were detected at less than 20 dB respect to the limit.

Frequency range 1 GHz-10 GHz.

Frequency (MHz)	Instrument reading (dBm)	Polarization	(1) Generator output (dBm)	(2) Cable loss (dB)	(3) Substitution antenna gain G_i (respect to isotropic radiator) (dB)	E.I.R.P. (dBm) = (1) – (2) + (3)
1648.75	-28.82	Vertical	-39.71	1.90	8.64	-32.97

2. CHANNEL: MIDDLE

Frequency range 30 MHz-1000 MHz.

No radiated spurious signals were detected at less than 20 dB respect to the limit.

Frequency range 1 GHz-10 GHz.

No radiated spurious signals were detected at less than 20 dB respect to the limit.

3. CHANNEL: HIGHEST

Frequency range 30 MHz-1000 MHz.

No radiated spurious signals were detected at less than 20 dB respect to the limit.

Frequency range 1 GHz-10 GHz.

Frequency (MHz)	Instrument reading (dBm)	Polarization	(1) Generator output (dBm)	(2) Cable loss (dB)	(3) Substitution antenna gain G_i (respect to isotropic radiator) (dB)	E.I.R.P. (dBm) = (1) – (2) + (3)
1697.65	-27.08	Vertical	-37.91	2.00	8.81	-31.10

WCDMA AND HSUPA MODULATION

A preliminary scan determined the WCDMA modulation as the worst case. The following tables and plots show the results for WCDMA modulation.

1. CHANNEL: LOWEST

Frequency range 30 MHz-1000 MHz.

No radiated spurious signals were detected at less than 20 dB respect to the limit.

Frequency range 1 GHz-10 GHz.

2. CHANNEL: MIDDLE

Frequency range 30 MHz-1000 MHz.

No radiated spurious signals were detected at less than 20 dB respect to the limit.

Frequency range 1 GHz-10 GHz.

No radiated spurious signals were detected at less than 20 dB respect to the limit.

3. CHANNEL: HIGHEST

Frequency range 30 MHz-1000 MHz.

No radiated spurious signals were detected at less than 20 dB respect to the limit.

Frequency range 1 GHz-10 GHz.

No radiated spurious signals were detected at less than 20 dB respect to the limit.

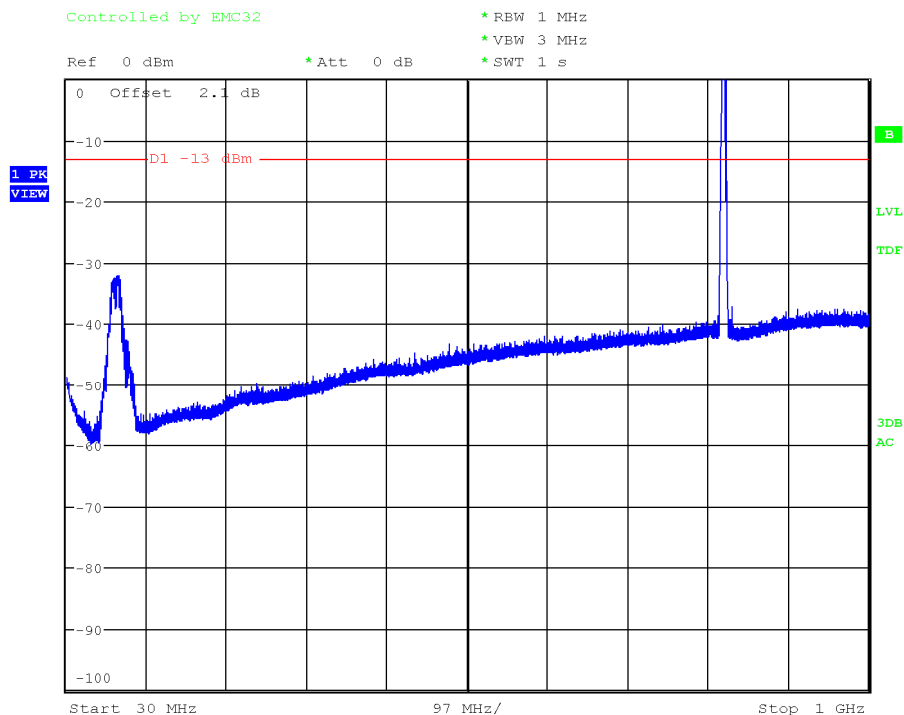
Measurement uncertainty (dB)	<±3.88 for $f < 1\text{GHz}$
	<±4.87 for $f \geq 1\text{GHz}$ up to 10 GHz

Verdict: PASS

FREQUENCY RANGE 30 MHz-1000 MHz.

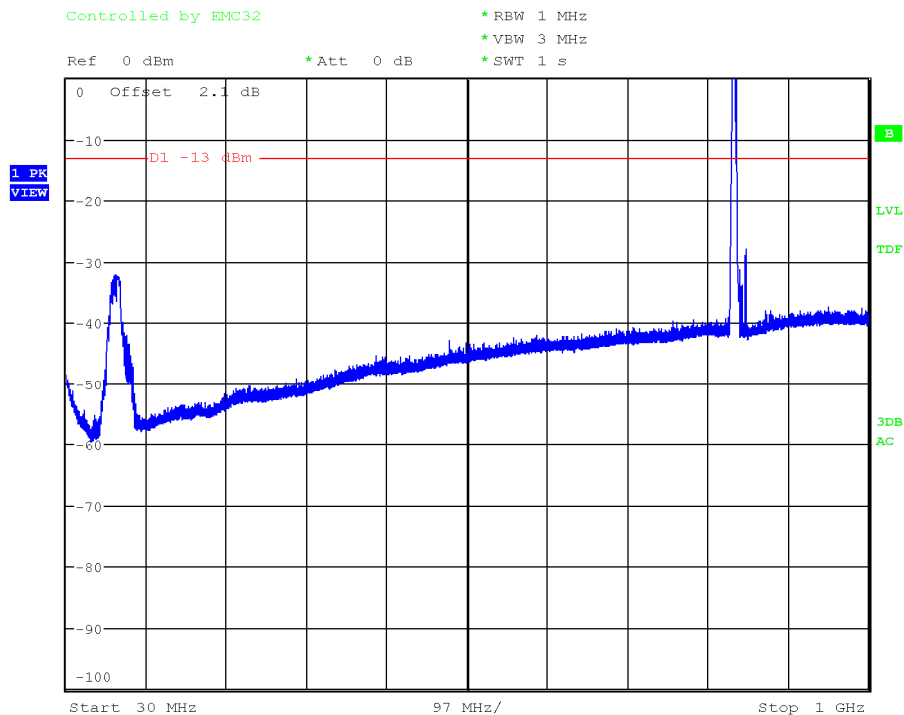
GPRS MODULATION

CHANNEL: LOWEST



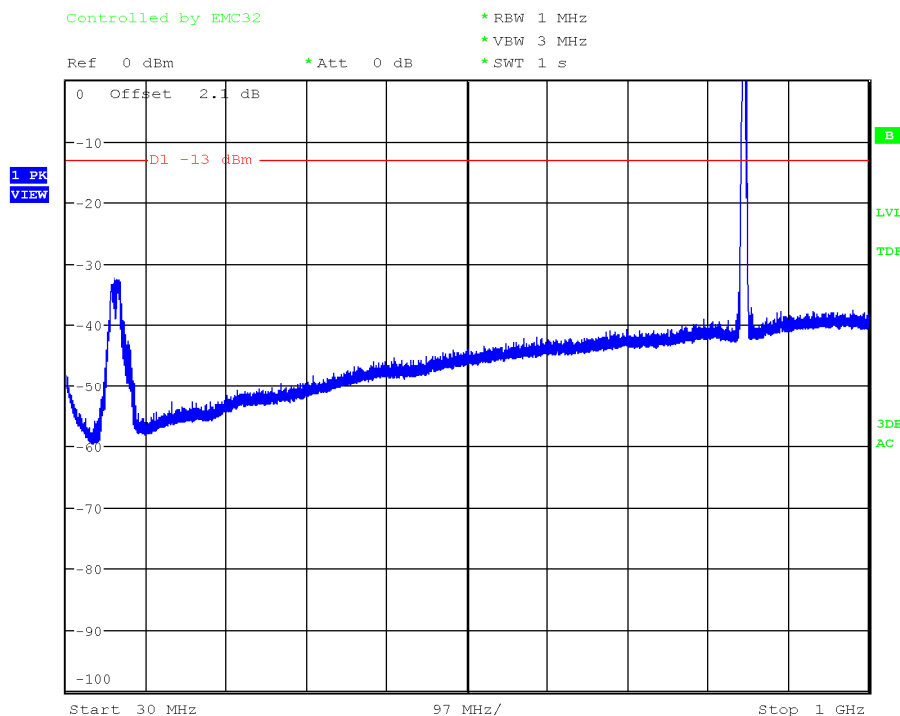
Note: The peak above the limit is the carrier frequency.

CHANNEL: MIDDLE



Note: The peak above the limit is the carrier frequency.

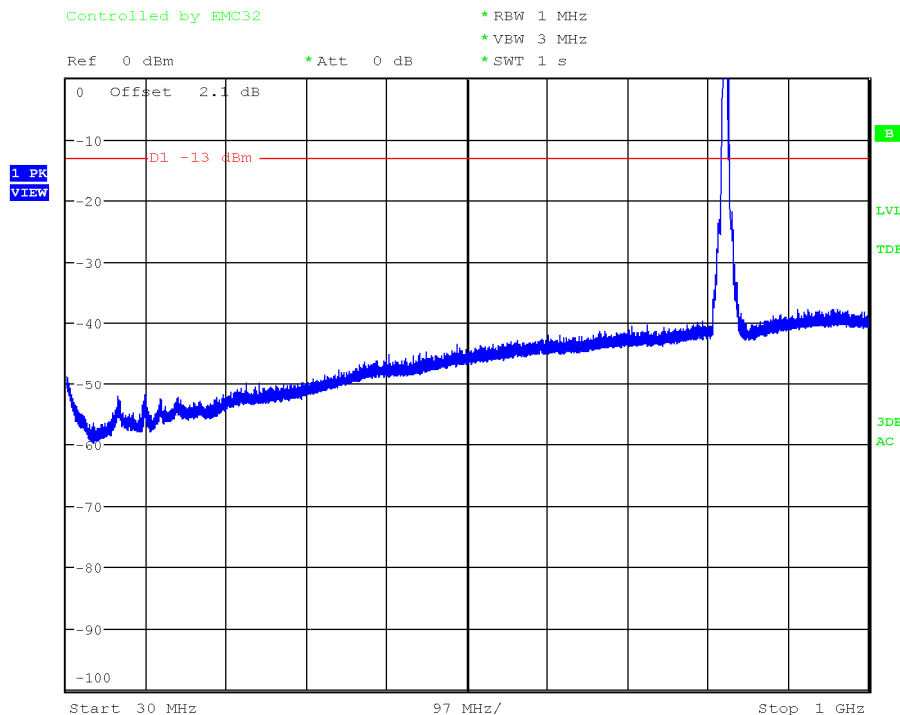
CHANNEL: HIGHEST



Note: The peak above the limit is the carrier frequency.

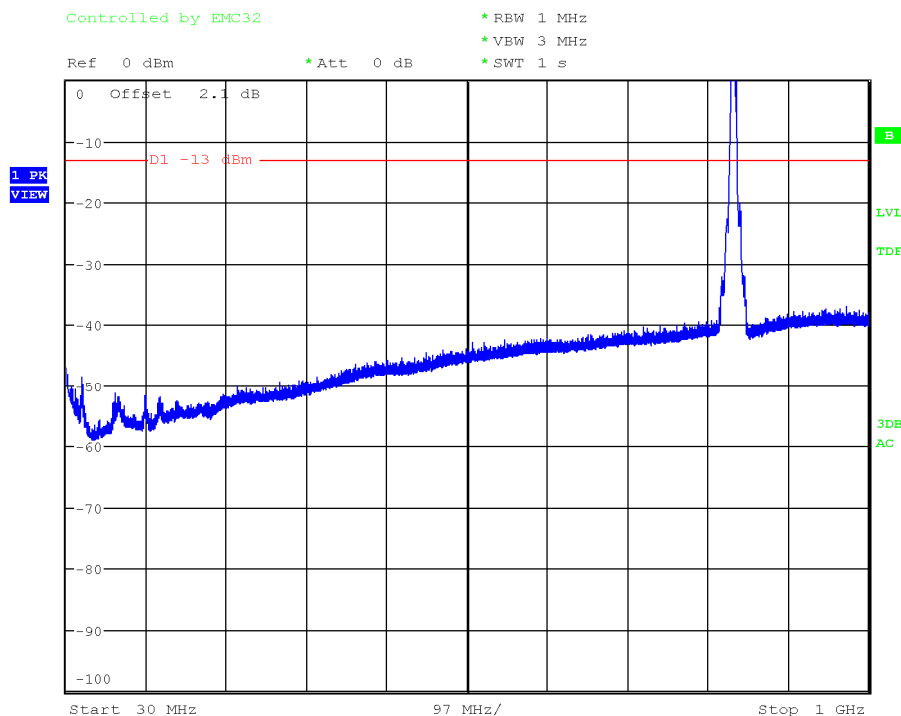
WCDMA MODULATION

CHANNEL: LOWEST



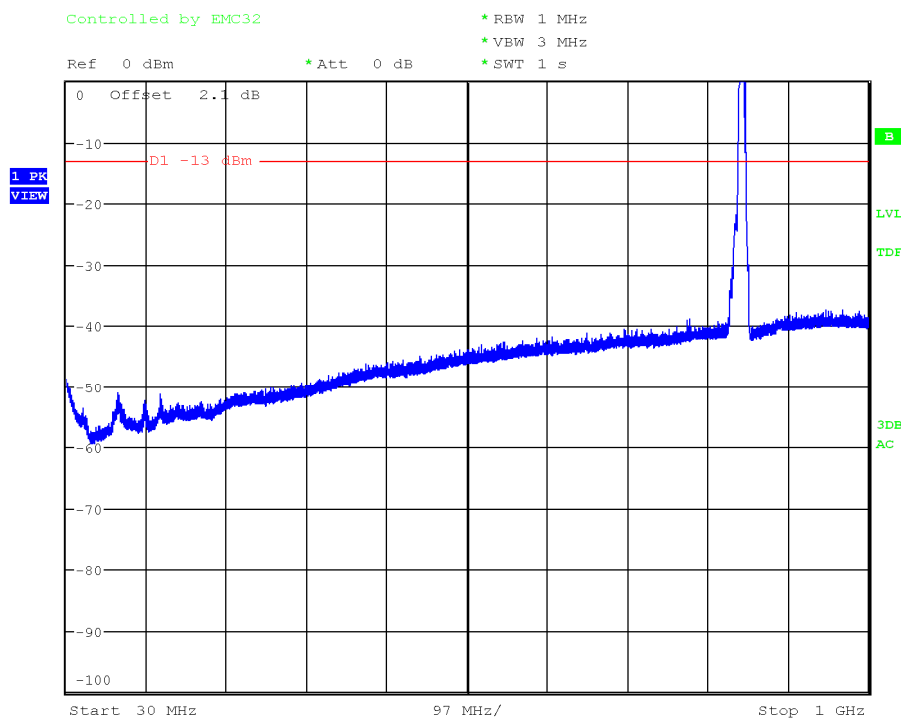
Note: The peak above the limit is the carrier frequency.

CHANNEL: MIDDLE



Note: The peak above the limit is the carrier frequency.

CHANNEL: HIGHEST

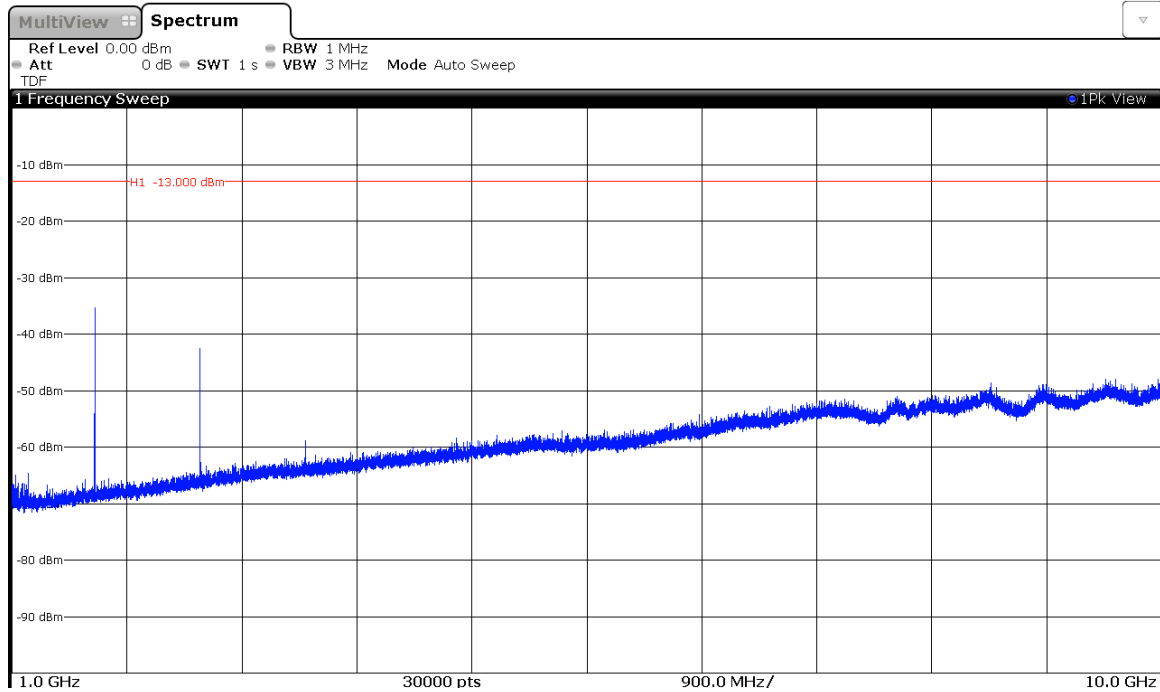


Note: The peak above the limit is the carrier frequency.

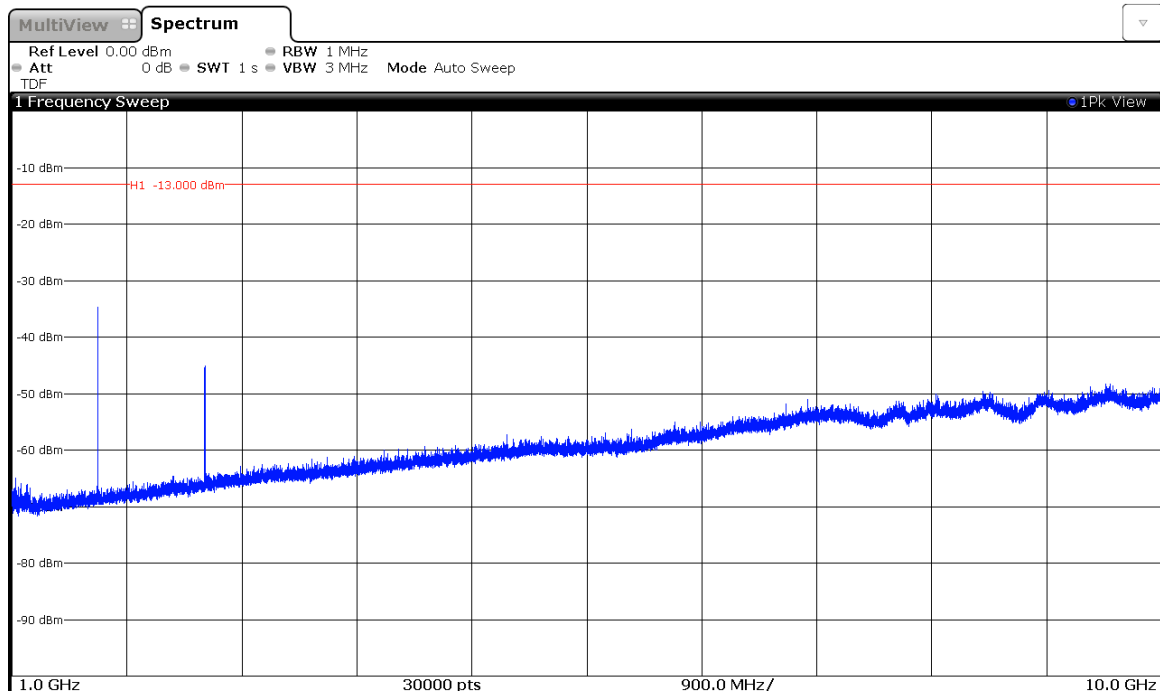
FREQUENCY RANGE 1 GHz to 10 GHz.

GPRS MODULATION

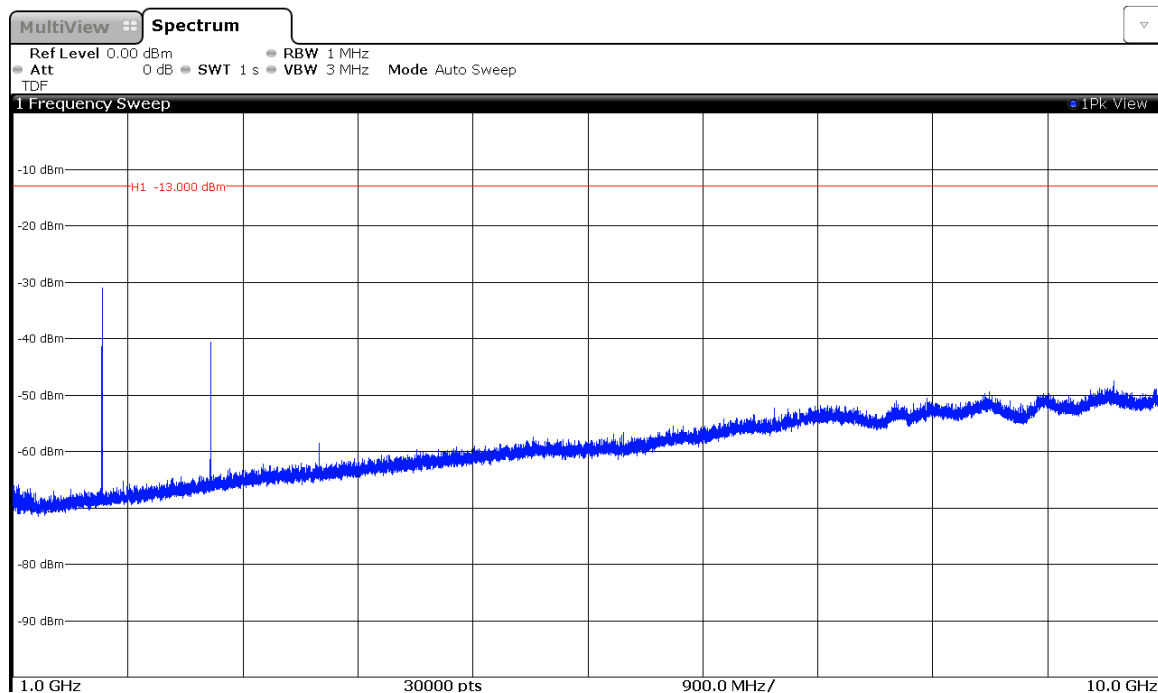
CHANNEL: LOWEST



CHANNEL: MIDDLE

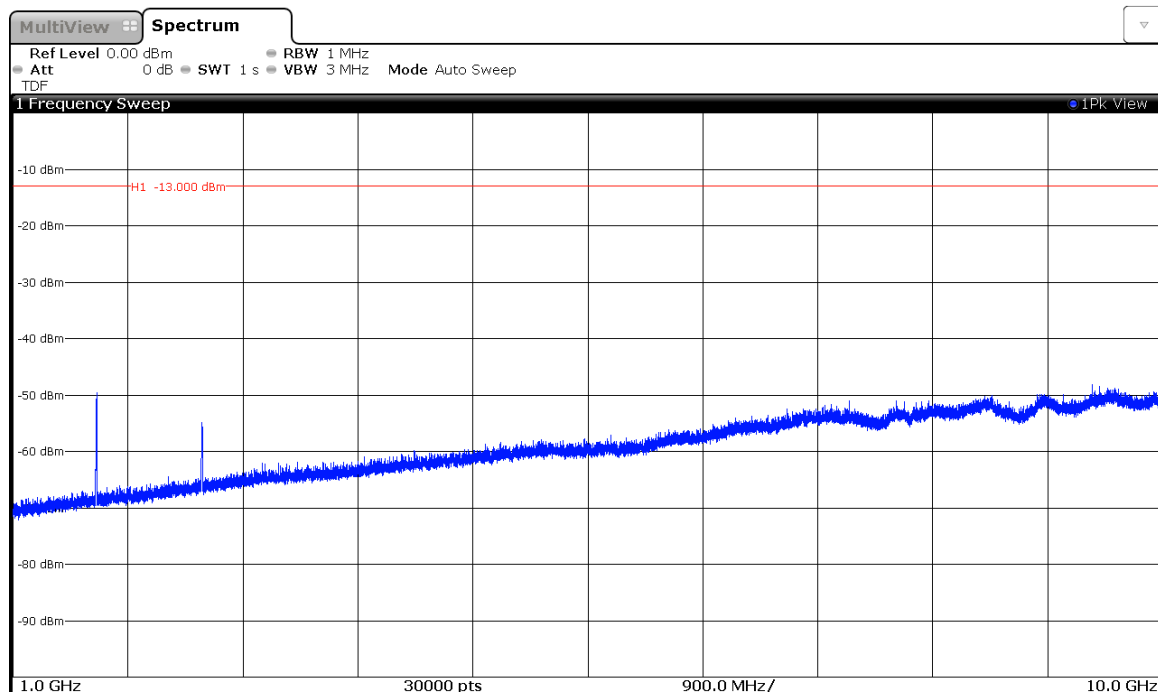


CHANNEL: HIGHEST

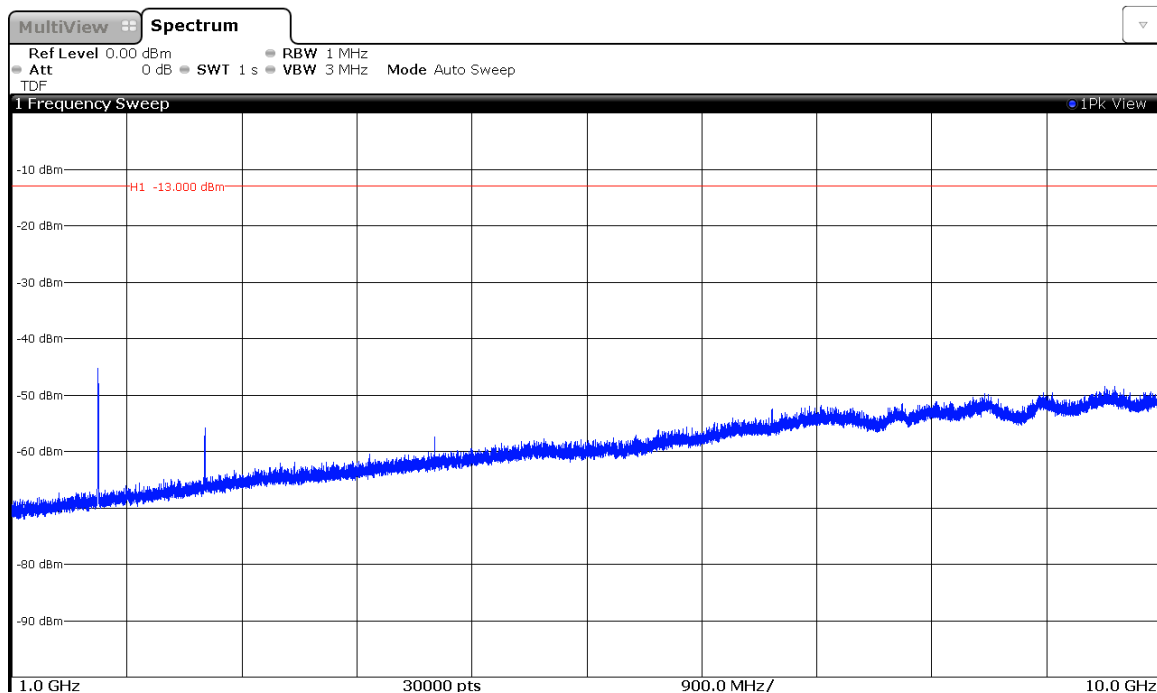


WCDMA MODULATION

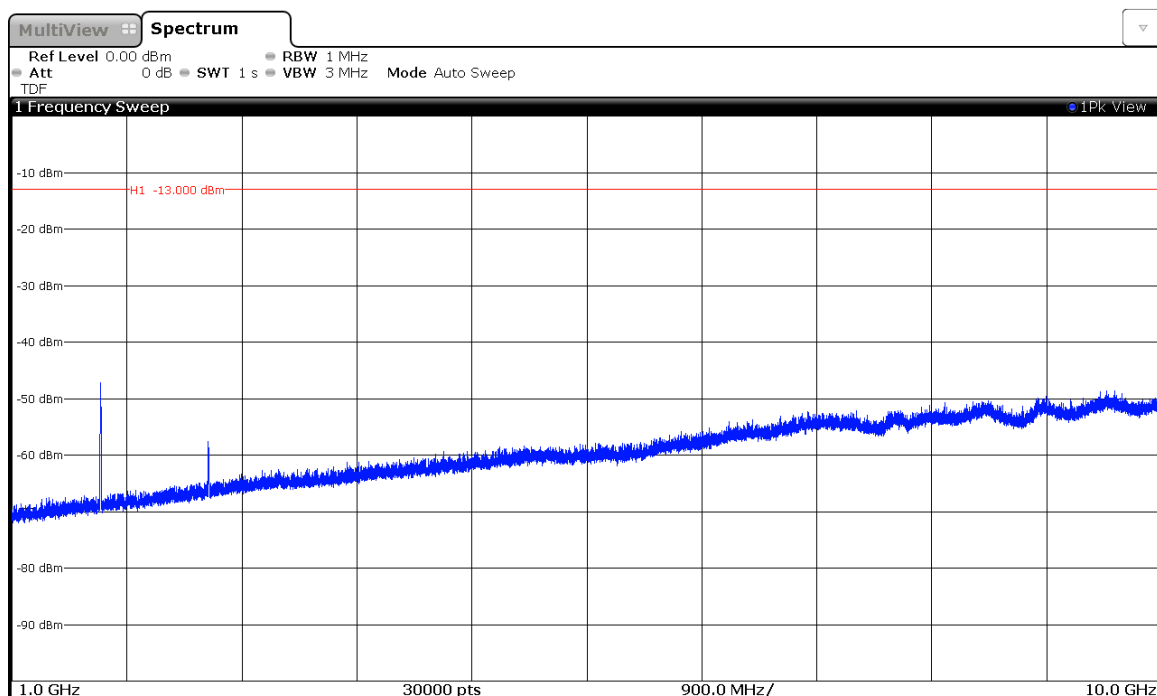
CHANNEL: LOWEST



CHANNEL: MIDDLE



CHANNEL: HIGHEST



Appendix B – Test result for FCC Part 24/IC RSS-133

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TEST RESULTS FOR FCC PART 24 AND IC RSS-133

TEST CONDITIONS

Power supply (V):

$$V_{\text{nominal}} = 115 \text{ Vac}$$

$$V_{\text{min}} = \text{N/A}$$

$$V_{\text{max}} = \text{N/A}$$

The subscripts nom, min and max indicate voltage test conditions (nominal, minimum and maximum respectively, as declared by the applicant).

N/A: Not applicable.

Type of power supply = AC Voltage.

Type of antenna = PIFA antenna GSM 1900 & UMTS Band II (-1.70 dB)

TEST FREQUENCIES:

GPRS MODULATION

Lowest channel (512): 1850.2 MHz

Middle channel (662): 1880.2 MHz

Highest channel (810): 1909.8 MHz

WCDMA AND HSUPA MODULATION

Lowest channel (9262): 1852.4 MHz

Middle channel (9400): 1880.0 MHz

Highest channel (9538): 1907.6 MHz

Radiated emissions

SPECIFICATION

FCC § 24.238

RSS-133. Clause 6.5.

The power of emissions shall be attenuated below the transmitter power (P) by a factor of at least $43 + 10 \log (P)$ dB. P in watts.

METHOD

The measurement was performed with the EUT inside an anechoic chamber. The spectrum was scanned from 30 MHz to at least the 10th harmonic of the highest frequency generated within the equipment.

The EUT was placed on a non-conductive stand at a 3 meter distance from the measuring antenna for measurements below 1 GHz and at 1 m distance for measurements above 1 GHz.

Detected emissions were maximized at each frequency by rotating the EUT and adjusting the measuring antenna height and polarization. The maximum meter reading was recorded. The radiated emissions were measured with peak detector and 1 MHz bandwidth.

Each detected emission at less than 20 dB respect to the limit is substituted by the Substitution method, in accordance with the ANSI/TIA/EIA-603-D.

Measurement Limit:

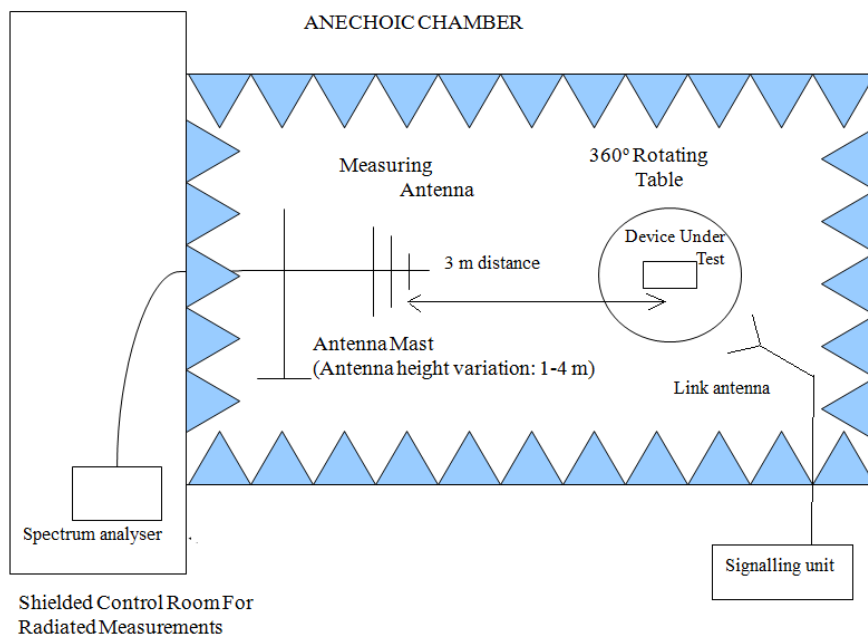
According to specification, the power of emissions shall be attenuated below the transmitter power (P) by a factor of at least $43 + 10 \log (P)$ dB. P in watts.

At P_o transmitting power, the specified minimum attenuation becomes $43 + 10 \log (P_o)$ and the level in dBm relative P_o becomes:

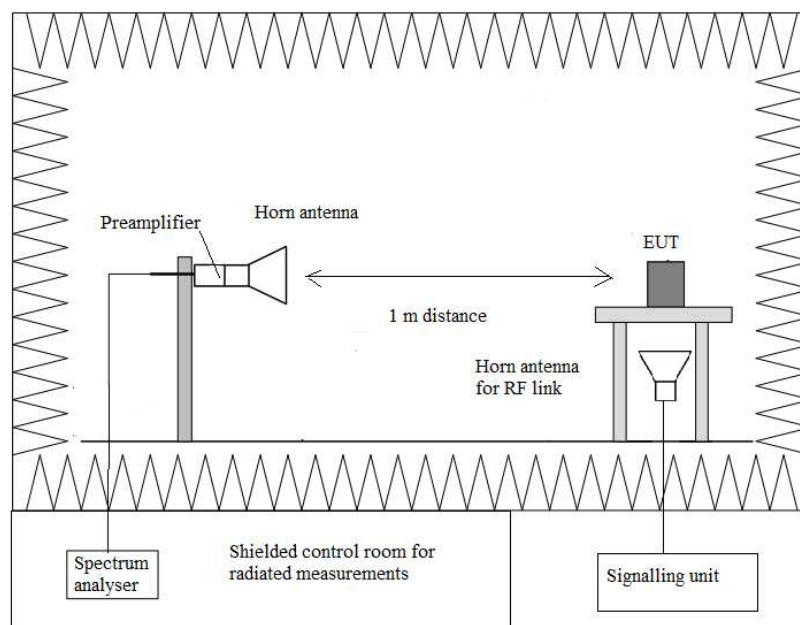
$$P_o \text{ (dBm)} - [43 + 10 \log (P_o \text{ in mwatts}) - 30] = -13 \text{ dBm}$$

TEST SETUP

Radiated measurements below 1 GHz.



Radiated measurements above 1 GHz.



RESULTS

GPRS MODULATION

GPRS AND EDGE MODULATION

A preliminary scan determined the GPRS modulation as the worst case. The following tables and plots show the results for GPRS modulation.

1. CHANNEL: LOWEST

Frequency range 30 MHz-1000 MHz.

No radiated spurious signals were detected at less than 20 dB respect to the limit.

Frequency range 1 GHz-20 GHz.

No radiated spurious signals were detected at less than 20 dB respect to the limit.

2. CHANNEL: MIDDLE

Frequency range 30 MHz-1000 MHz.

No radiated spurious signals were detected at less than 20 dB respect to the limit.

Frequency range 1 GHz-20 GHz.

No radiated spurious signals were detected at less than 20 dB respect to the limit.

3. CHANNEL: HIGHEST

Frequency range 30 MHz-1000 MHz.

No radiated spurious signals were detected at less than 20 dB respect to the limit.

Frequency range 1 GHz-20 GHz.

No radiated spurious signals were detected at less than 20 dB respect to the limit.

WCDMA AND HSUPA MODULATION

A preliminary scan determined the WCDMA modulation as the worst case. The following tables and plots show the results for WCDMA modulation.

1. CHANNEL: LOWEST

Frequency range 30 MHz-1000 MHz.

No radiated spurious signals were detected at less than 20 dB respect to the limit.

Frequency range 1 GHz-20 GHz.

No radiated spurious signals were detected at less than 20 dB respect to the limit.

2. CHANNEL: MIDDLE

Frequency range 30 MHz-1000 MHz.

No radiated spurious signals were detected at less than 20 dB respect to the limit.

Frequency range 1 GHz-20 GHz.

No radiated spurious signals were detected at less than 20 dB respect to the limit.

3. CHANNEL: HIGHEST

Frequency range 30 MHz-1000 MHz.

No radiated spurious signals were detected at less than 20 dB respect to the limit.

Frequency range 1 GHz-20 GHz.

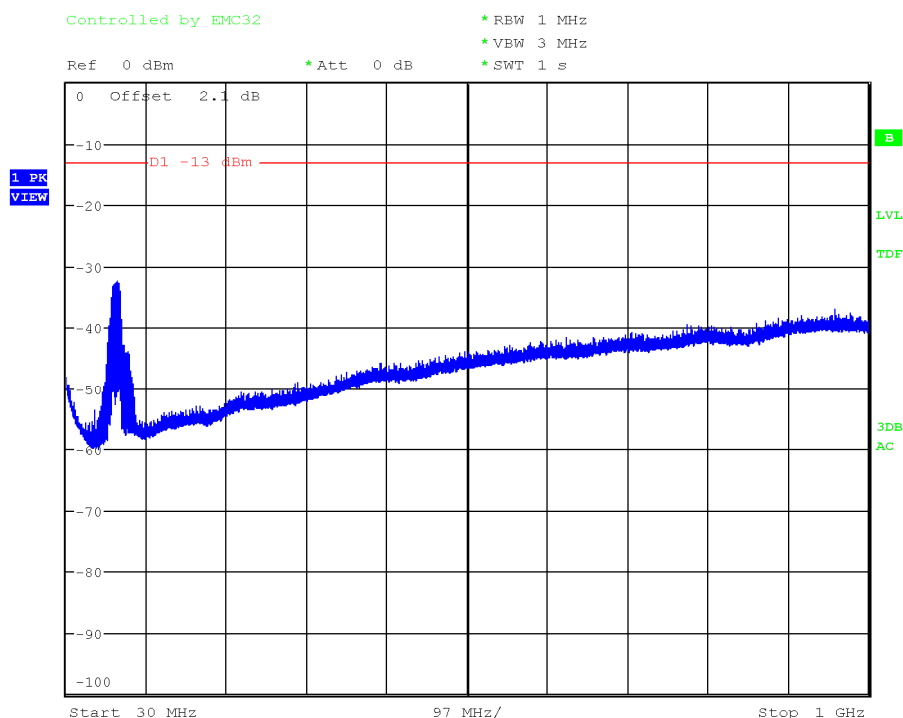
No radiated spurious signals were detected at less than 20 dB respect to the limit.

Measurement uncertainty (dB)	<±3.88 for $f < 1\text{GHz}$ <±4.87 for $f \geq 1\text{GHz}$ up to 20 GHz
------------------------------	--

Verdict: PASS

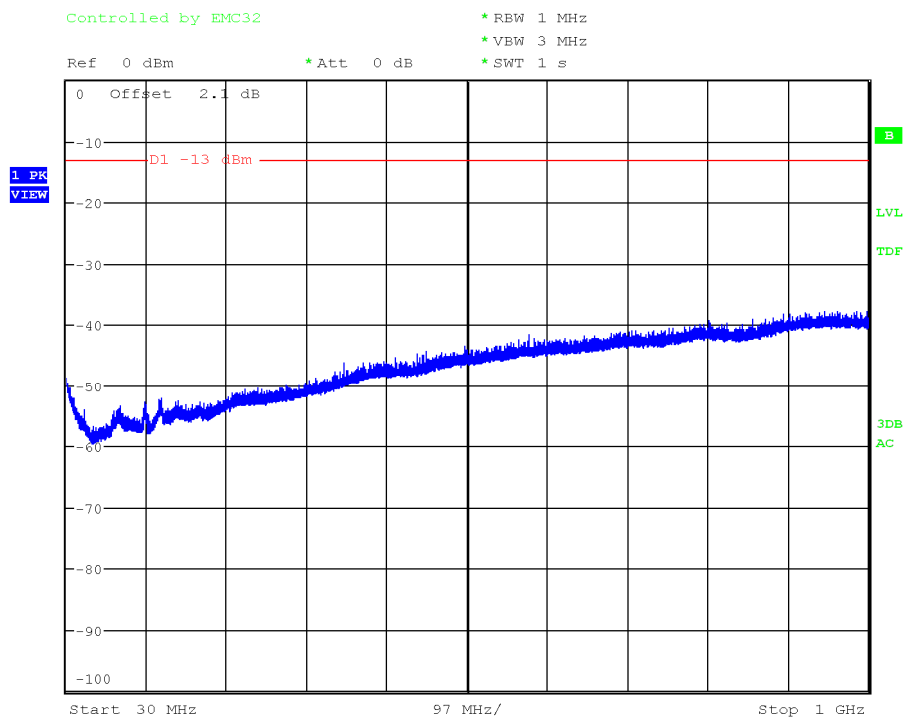
FREQUENCY RANGE 30 MHz-1000 MHz.

GPRS MODULATION



(This plot is valid for all three channels)

WCDMA MODULATION

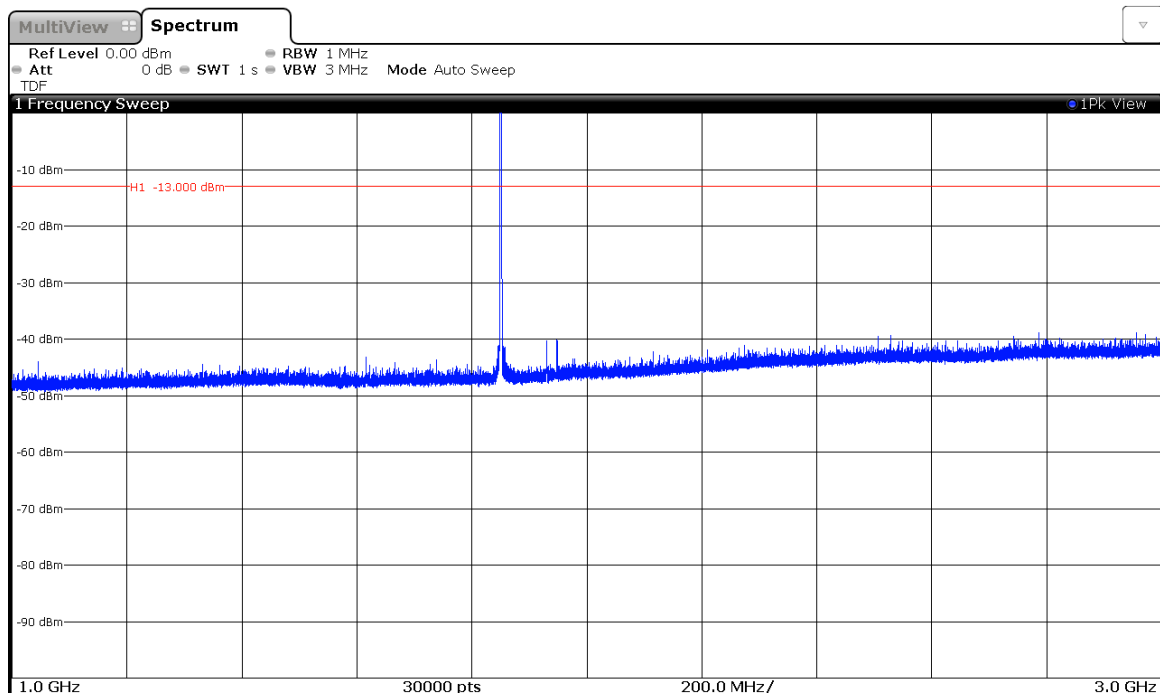


(This plot is valid for all three channels)

FREQUENCY RANGE 1 GHz to 3 GHz.

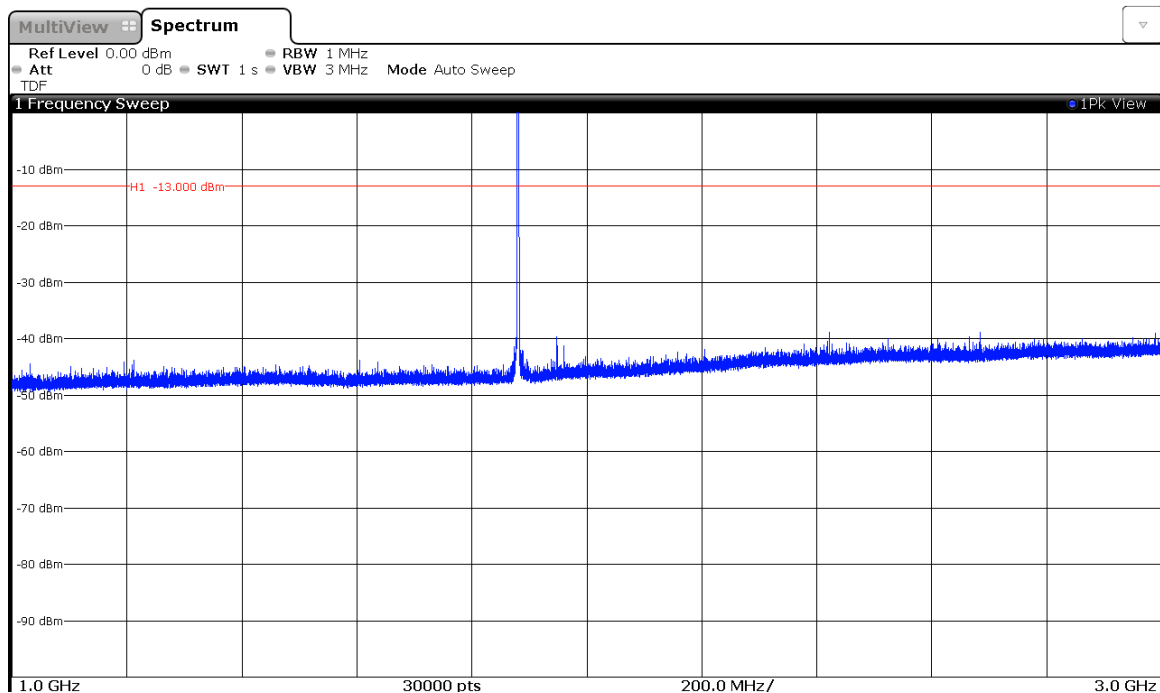
GPRS MODULATION

CHANNEL: LOWEST



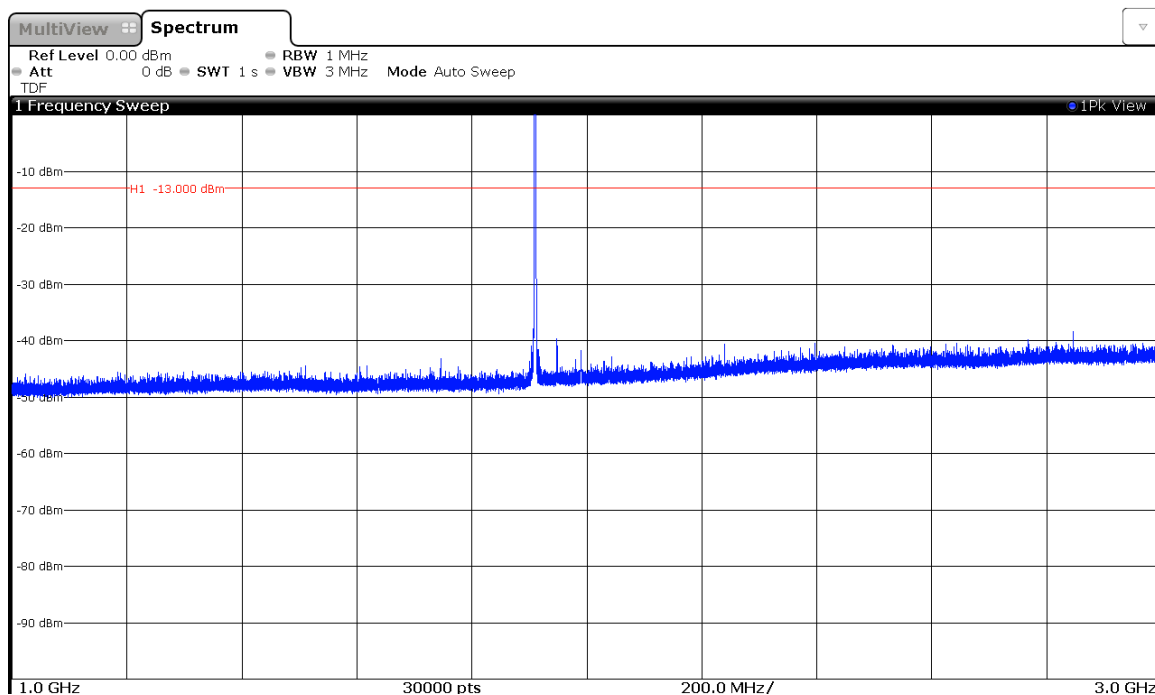
Note: The peak above the limit is the carrier frequency.

CHANNEL: MIDDLE



Note: The peak above the limit is the carrier frequency.

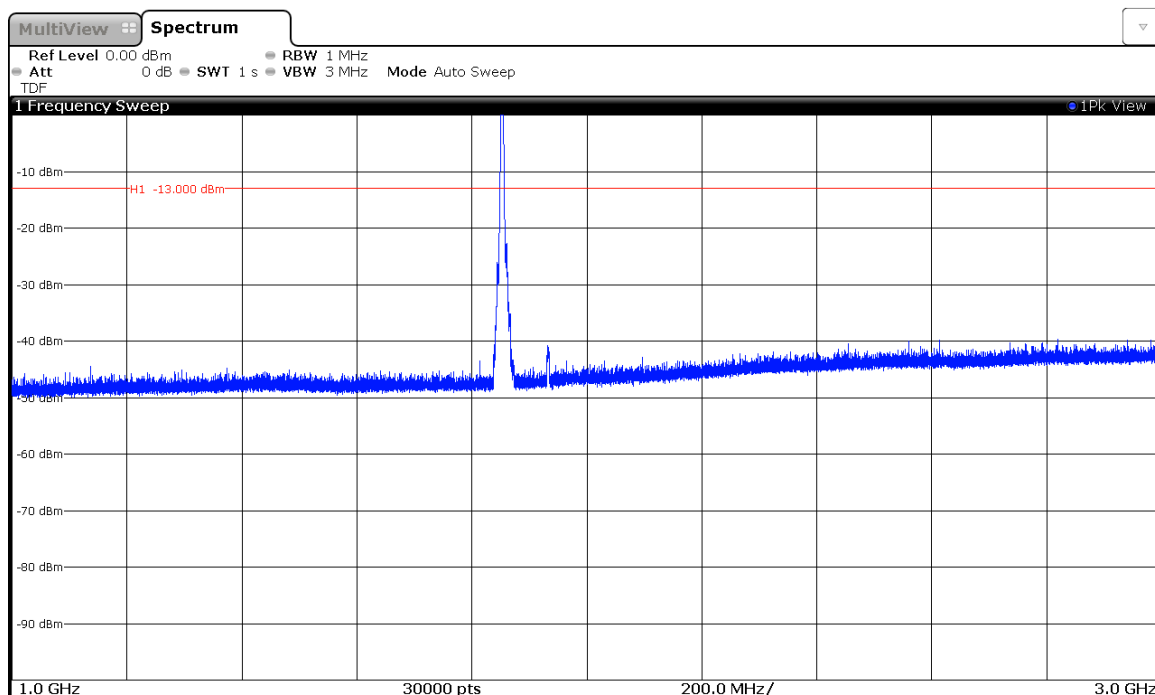
CHANNEL: HIGHEST



Note: The peak above the limit is the carrier frequency.

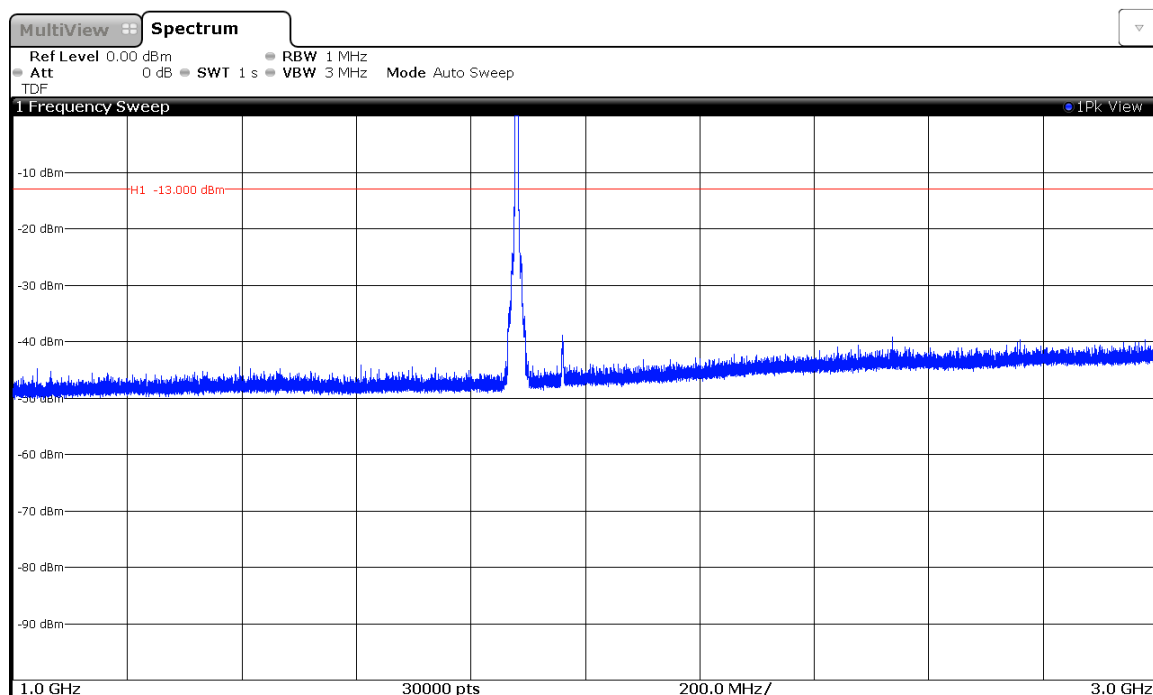
WCDMA MODULATION

CHANNEL: LOWEST



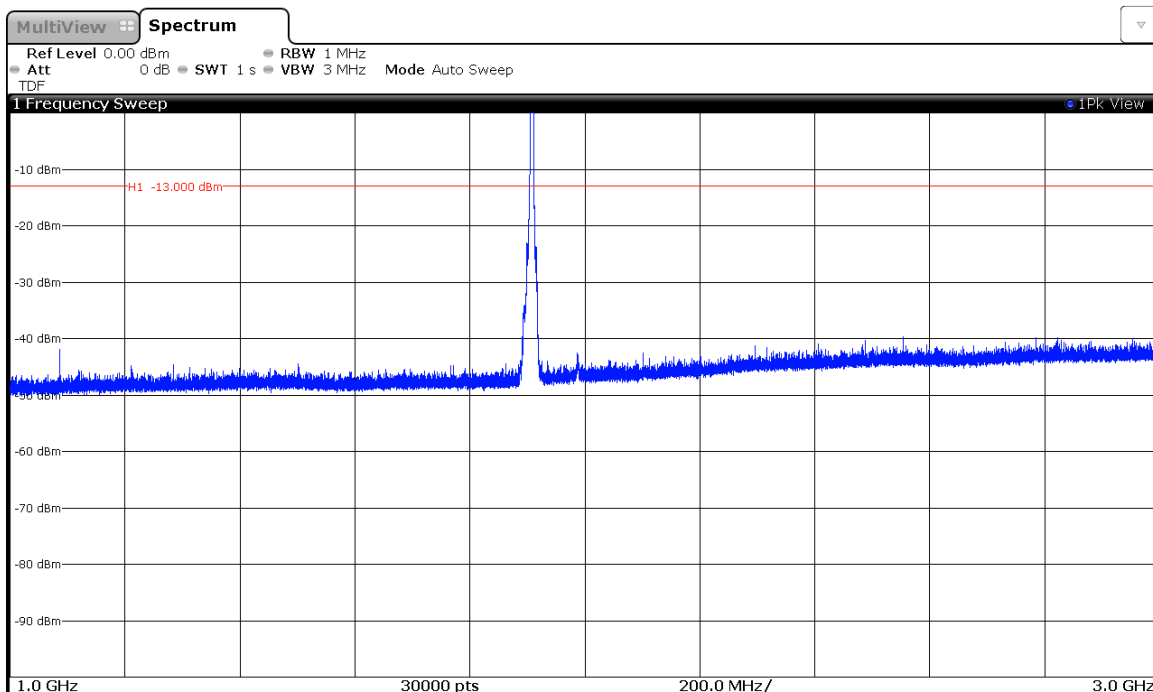
Note: The peak above the limit is the carrier frequency.

CHANNEL: MIDDLE



Note: The peak above the limit is the carrier frequency.

CHANNEL: HIGHEST

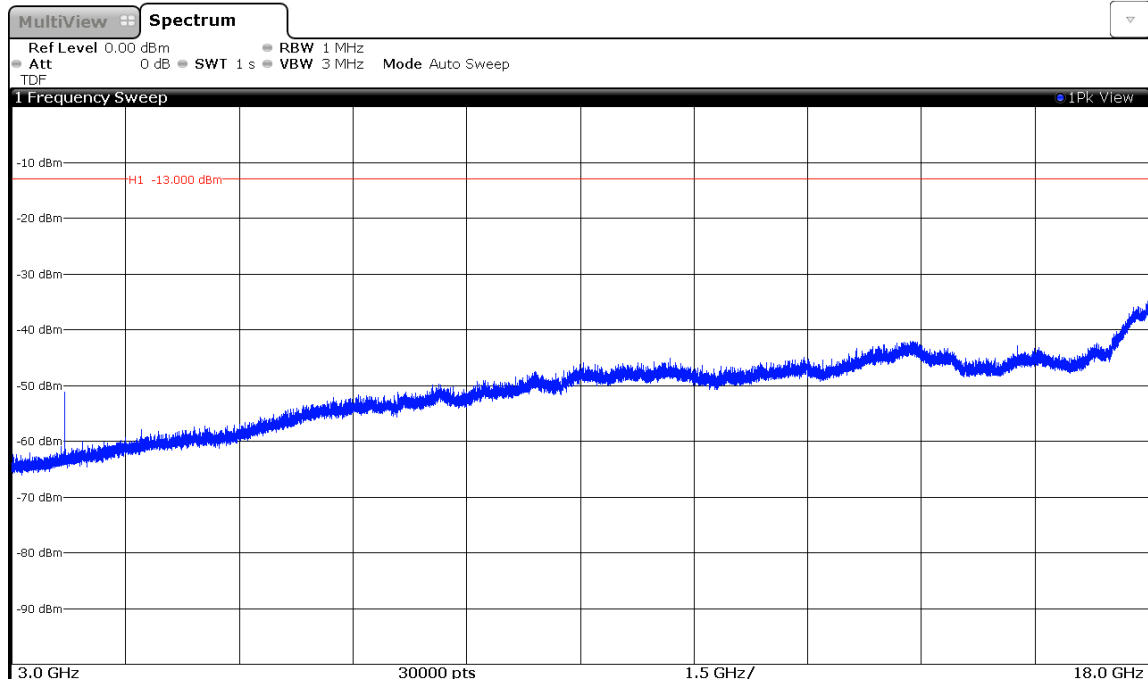


Note: The peak above the limit is the carrier frequency.

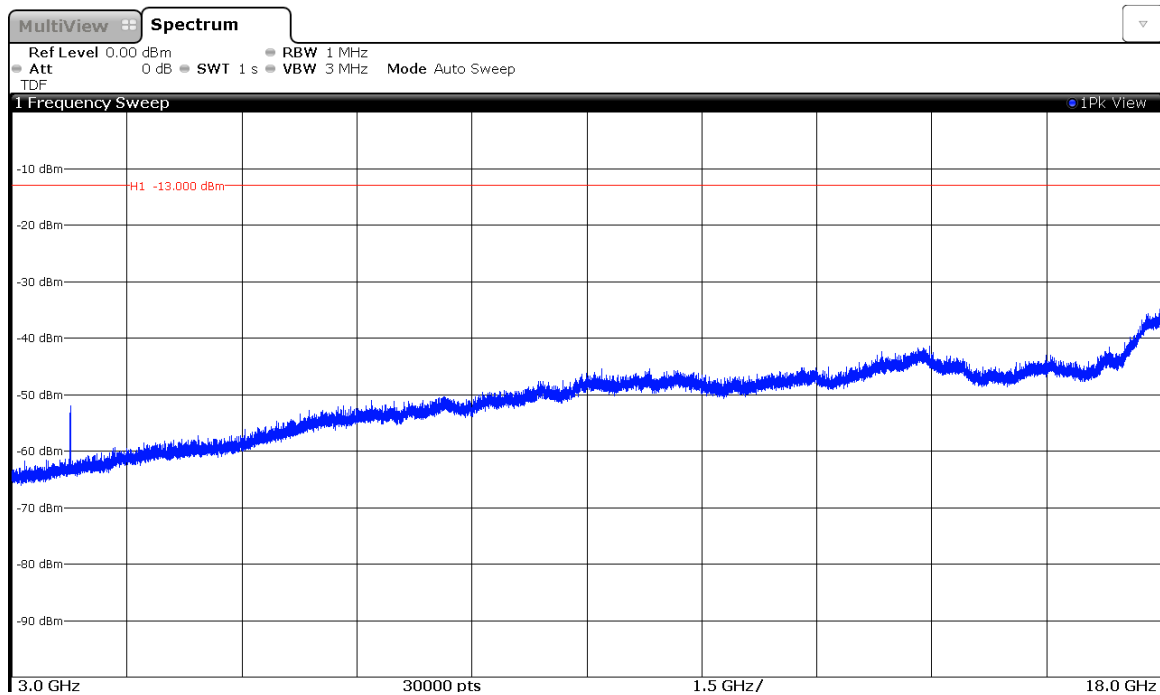
FREQUENCY RANGE 3 GHz to 18 GHz.

GPRS MODULATION

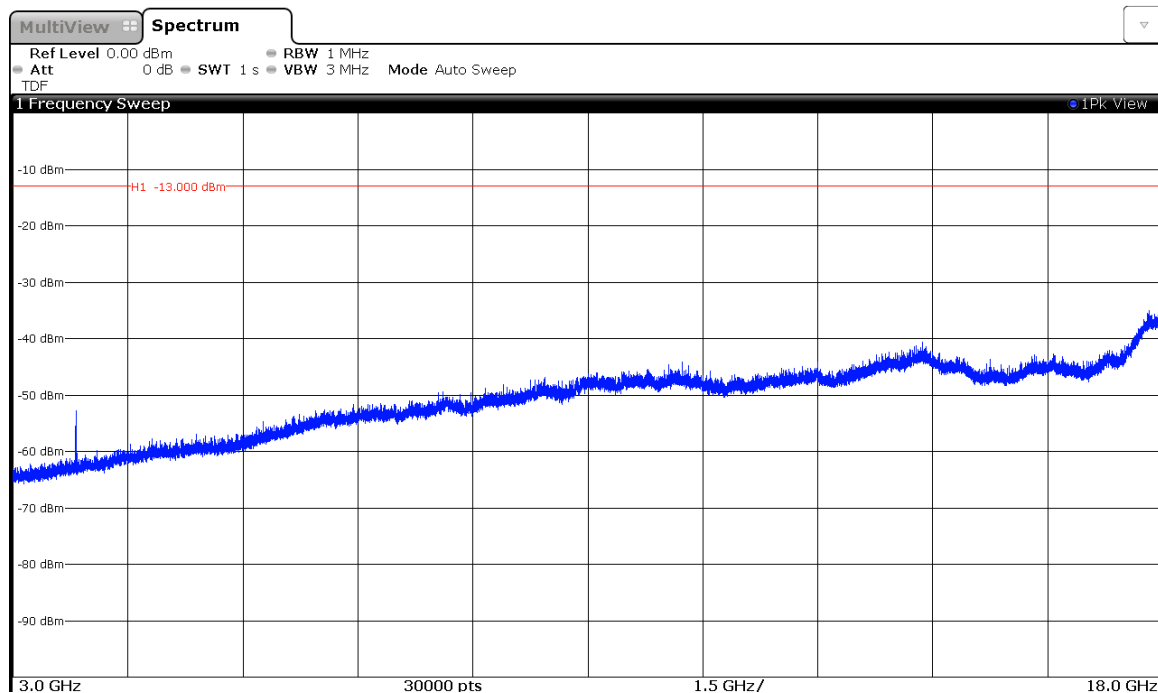
CHANNEL: LOWEST



CHANNEL: MIDDLE

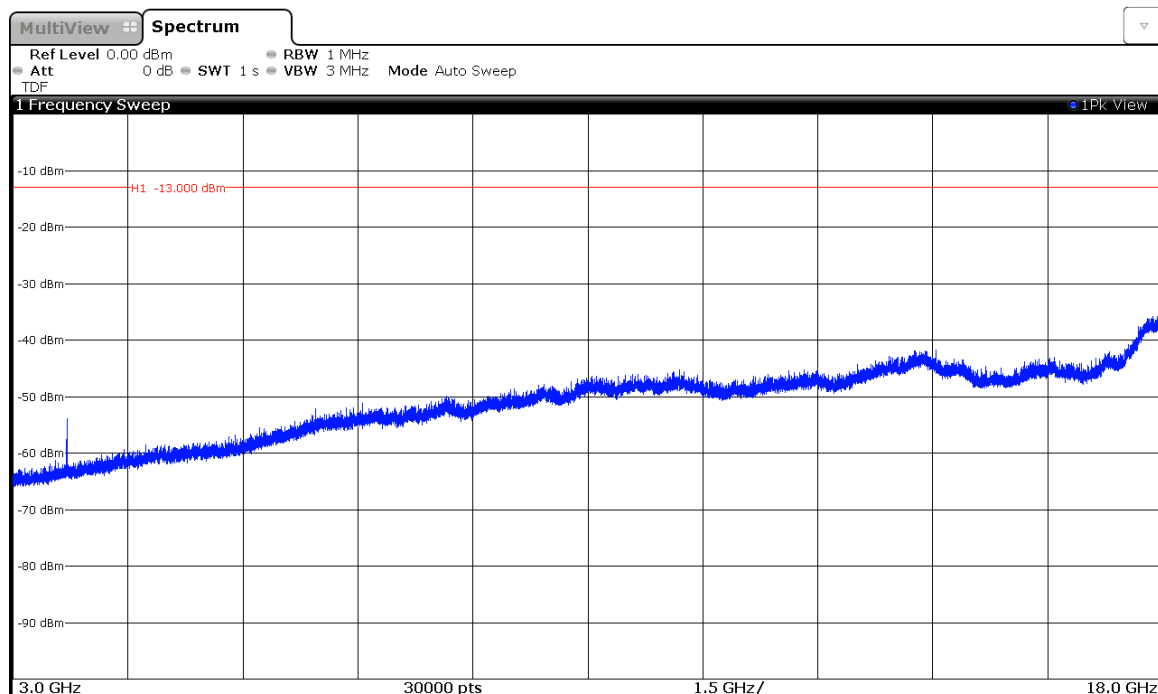


CHANNEL: HIGHEST

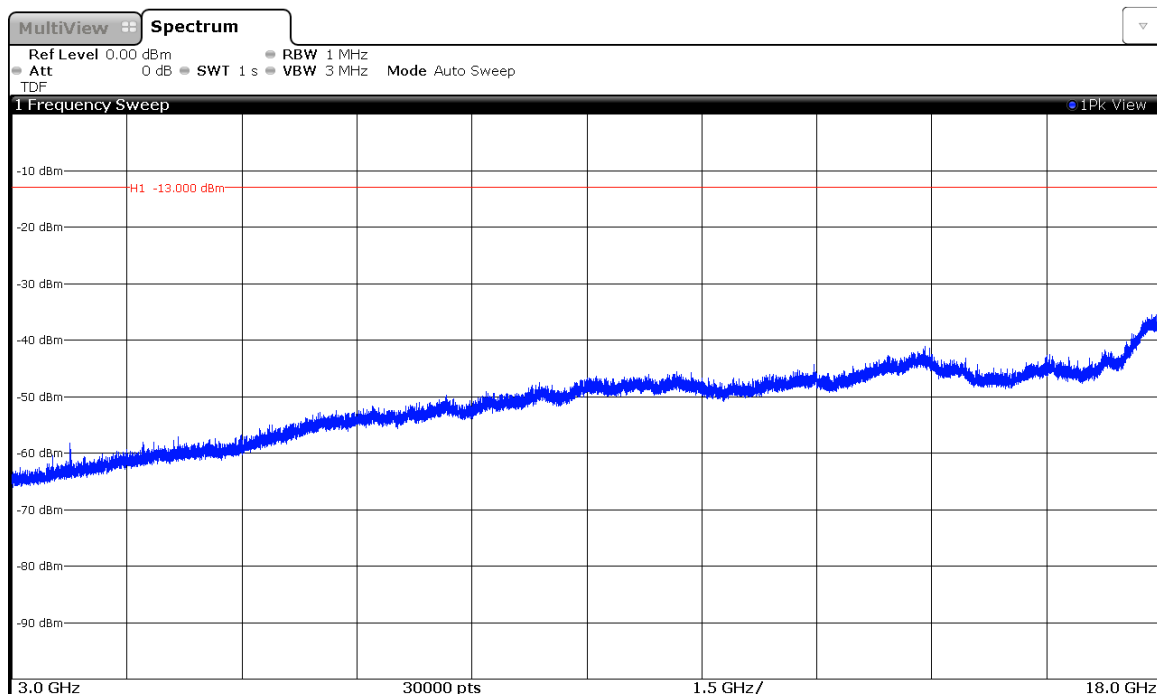


WCDMA MODULATION

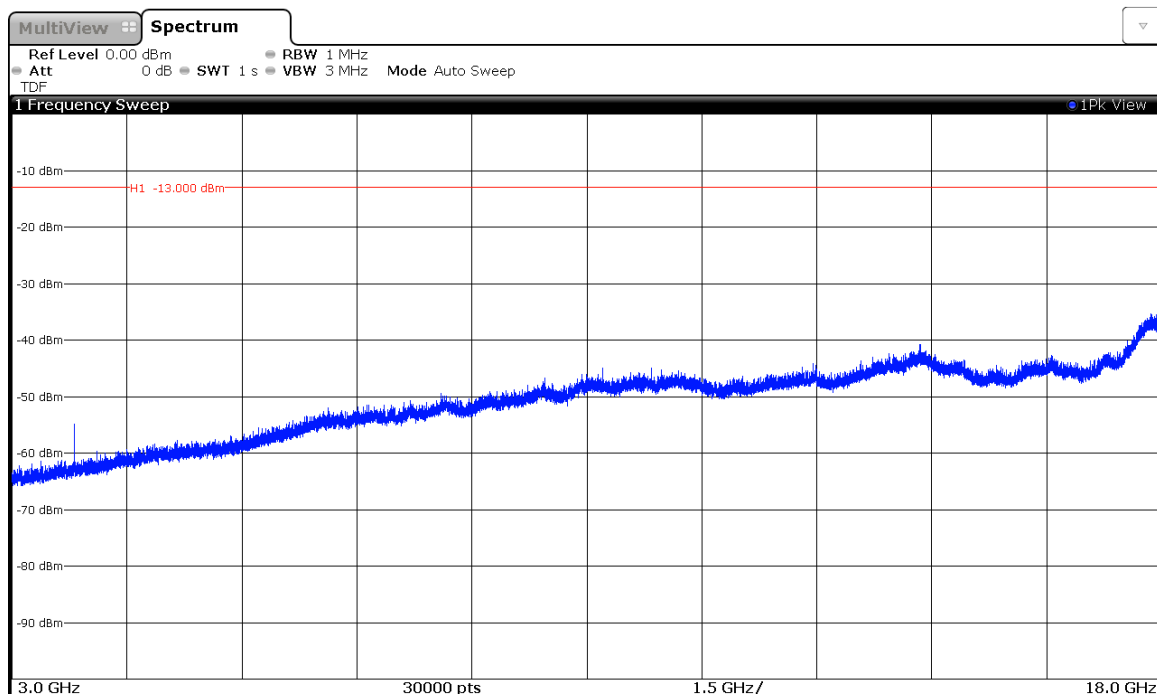
CHANNEL: LOWEST



CHANNEL: MIDDLE

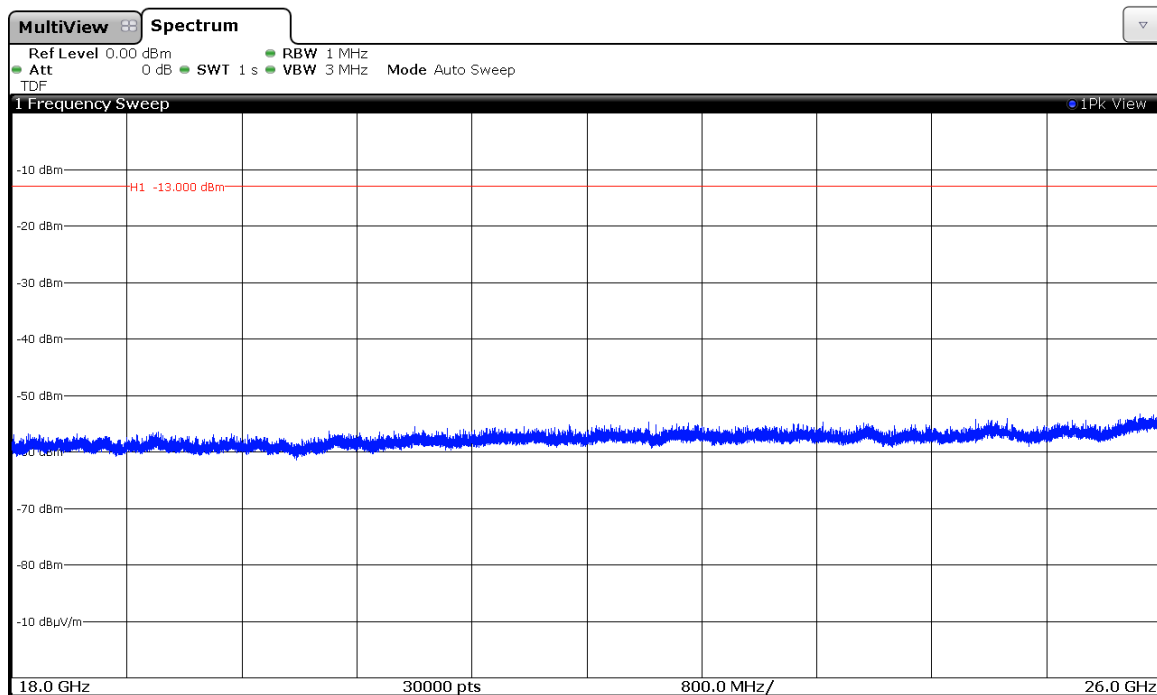


CHANNEL: HIGHEST



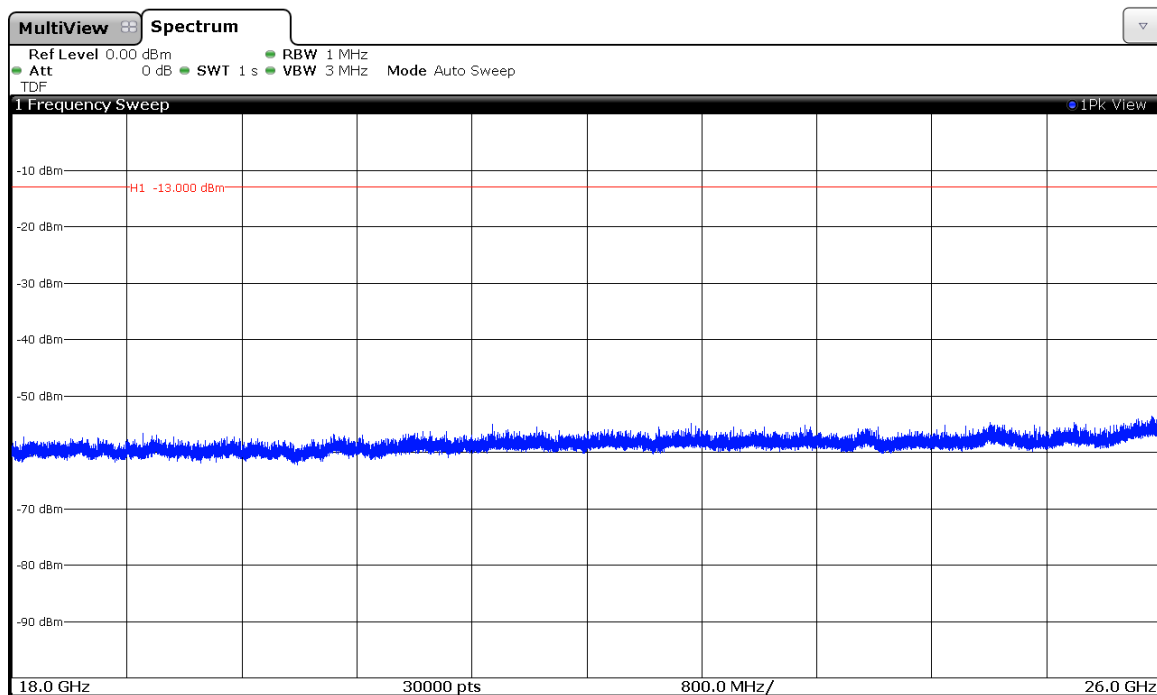
FREQUENCY RANGE 18 GHz TO 26 GHz.

GPRS MODULATION



(This plot is valid for all three channels)

WCDMA MODULATION



(This plot is valid for all three channels)