



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

Test report No:

NIE: 51670RRF.002

Partial Test report

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

Identificación del objeto ensayado.....: Identification of item tested	Edge Computing Gateway
Marca Trademark	EC3331
Modelo y/o referencia tipo Model and /or type reference	EC3331
Other identification of the product	FCC ID: QQD-EC3331 IC: 5248S-EC3331
Final HW version	1.0
Final SW version	4.4
Características Features	GSM/UMTS FDD: 850MHz Band I/900MHz Band II/1800MHz Band V/1900MHz Band VIII BT/WiFi/Z-Wave/NFC/GNSS
Solicitante Applicant	Flextronics Canada Design Services Inc. 1280 Teron Rd., Kanata On., Canada, K2K 2C1
Método de ensayo solicitado, norma.....: Test method requested, standard	USA FCC Part 22 10-1-15 Edition. - FCC § 22.917 Radiated emissions USA FCC Part 24 10-1-15 Edition. - FCC § 24.238 Radiated emissions CANADA IC RSS-132 Issue 3, Jan. 2013. - 5.5 Transmitter Unwanted Emissions CANADA IC RSS-133 Issue 6, Jan. 2013. - 6.5 Transmitter Unwanted Emissions 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 ALEJANDRO LLAMAS RODRIGUEZ Firmado digitalmente por ALEJANDRO LLAMAS RODRIGUEZ Fecha: 2017.06.20 15:10:25 +02'00'

Fecha de realización Date of issue	2017-06-16
Formato de informe No..... Report template No	FDT08_19

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Competences and guarantees

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DEKRA Testing and Certification 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.

DEKRA Testing and Certification 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: ISED 4621A-2.

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

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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

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4. This test report cannot be used partially or in full for publicity and/or promotional purposes without previous written permission of DEKRA Testing and Certification and the Accreditation Bodies.

Uncertainty

Uncertainty (factor $k=2$) was calculated according to the DEKRA Testing and Certification 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
51670/150	Edge Computing Gateway	EC3331	FZAUS171100006	2017-06-05
51670/111	Charging base	---	---	2017-05-25
51670/112	AC/DC Adapter	S008ACM0500200	---	2017-05-25
51670/125	USB Cable	---	---	2017-05-25
51670/114	Plug	---	---	2017-05-25

1. Sample S/01 has undergone following test(s).

All tests indicated in appendixes A and B.

Test sample description

The product is a gateway that gathers data wirelessly (using Bluetooth, Wi-Fi, GNSS, NFC, and possibly Z-Wave) and sends it to a cloud server via cellular (2G/3G) or Wi-Fi network connections.

Identification of the client

Flextronics Canada Design Services Inc.

1280 Teron Rd., Kanata On., Canada, K2K 2C1

Testing period

The performed test started on 2017-06-08 and finished on 2017-06-09.

The tests have been performed at DEKRA Testing and Certification.

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

- The tests have been performed by the technical personnel: Pedro Parada and Carolina Postigo.
- 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	2015/06	2018/06
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 SCHWARZBECK BBHA 9170	2017/03	2020/03
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 20 MHz-7 GHz PAM-0207	2016/09	2017/09
9.	RF pre-amplifier 1-18 GHz Bonn Elektronik BLMA 0118-1M	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

3. 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.

4. 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.

5. Test not requested. Only co-location 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 ⁵
Clause 2.1047/RSS-132 Clause 5.2: Modulation characteristics				NM ⁵
Clause 22.355/RSS-132 Clause 5.3: Frequency stability				NM ⁵
Clause 2.1049: Occupied Bandwidth				NM ⁵
Clause 22.917/RSS-132 Clause 5.5: Spurious emissions at antenna terminals				NM ⁵
Clause 22.917/RSS-132 Clause 5.5: Radiated emissions		P		

5: 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 ⁵
Clause 2.1047/RSS-133 Clause 6.2: Modulation characteristics				NM ⁵
Clause 24.235/RSS-133 Clause 6.3: Frequency stability				NM ⁵
Clause 2.1049: Occupied Bandwidth				NM ⁵
Clause 24.238/RSS-133 Clause 6.5: Spurious emissions at antenna terminals				NM ⁵
Clause 24.238/RSS-133 Clause 6.5: Radiated emissions		P		

5: 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):

$$V_{\text{nom}} = 3.7 \text{ Vdc}$$

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

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

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 = DC voltage from rechargeable battery.

TEST FREQUENCIES:

GPRS MODULATION

Middle channel (190): 836.6 MHz

WCDMA AND HSUPA MODULATION

Middle channel (4182): 836.4 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.

The test was performed with the equipment transmitting in cellular mode, WiFi (b mode, which is the worst case), Z-wave and NFC (NFC-A, which is the worst case) radios simultaneously to check the impact of the co-location of all radio interfaces.

Measurement Limit:

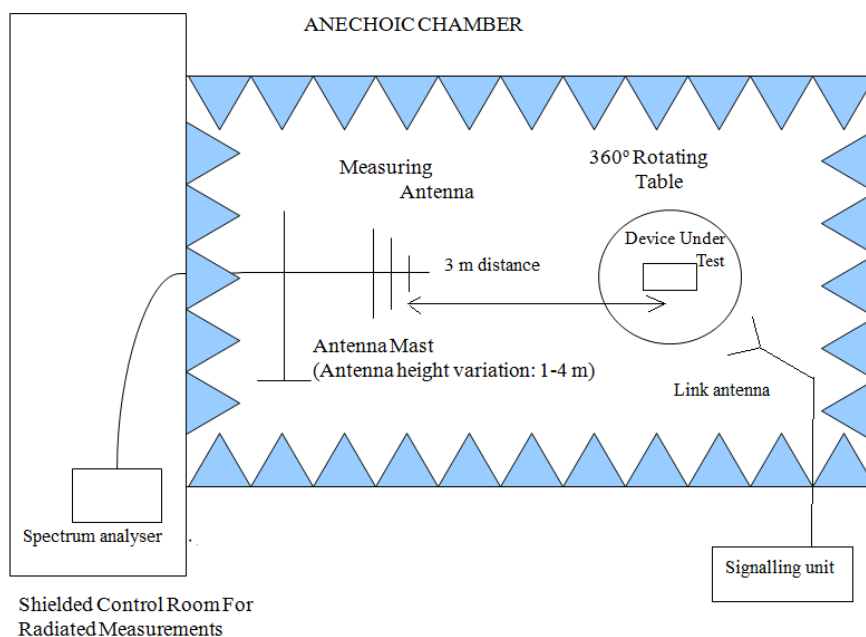
According to specification, the power of emissions shall be attenuated below the transmitter power (P) by a factor of at least $43 + 10 \log (P)$ dB. P in watts.

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

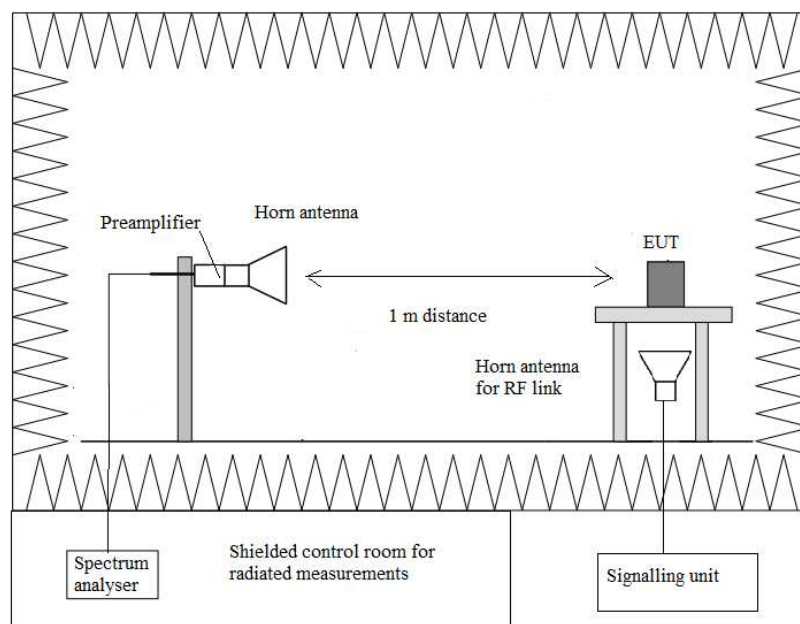
$$P_o \text{ (dBm)} - [43 + 10 \log (P_o \text{ in mwatts}) - 30] = - 13 \text{ dBm}$$

TEST SETUP

Radiated measurements below 1 GHz.



Radiated measurements above 1 GHz.



RESULTS

GPRS MODULATION

CHANNEL: MIDDLE

Frequency range 30 MHz-1000 MHz.

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

Frequency range 1 GHz-10 GHz.

No spurious signals were found 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.

CHANNEL: MIDDLE

Frequency range 30 MHz-1000 MHz.

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

Frequency range 1 GHz-10 GHz.

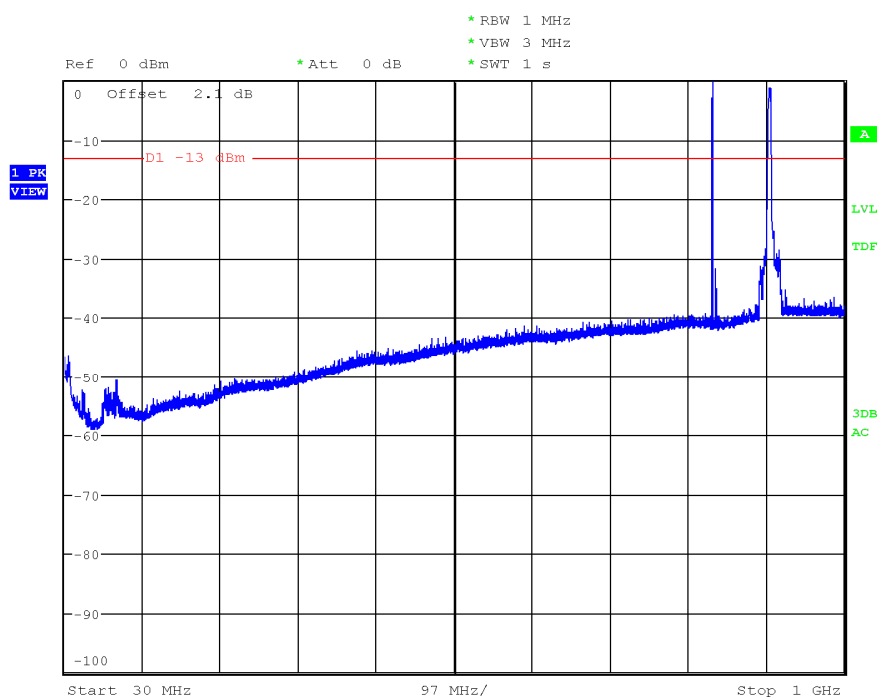
No spurious signals were found at less than 20 dB respect to the limit.

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

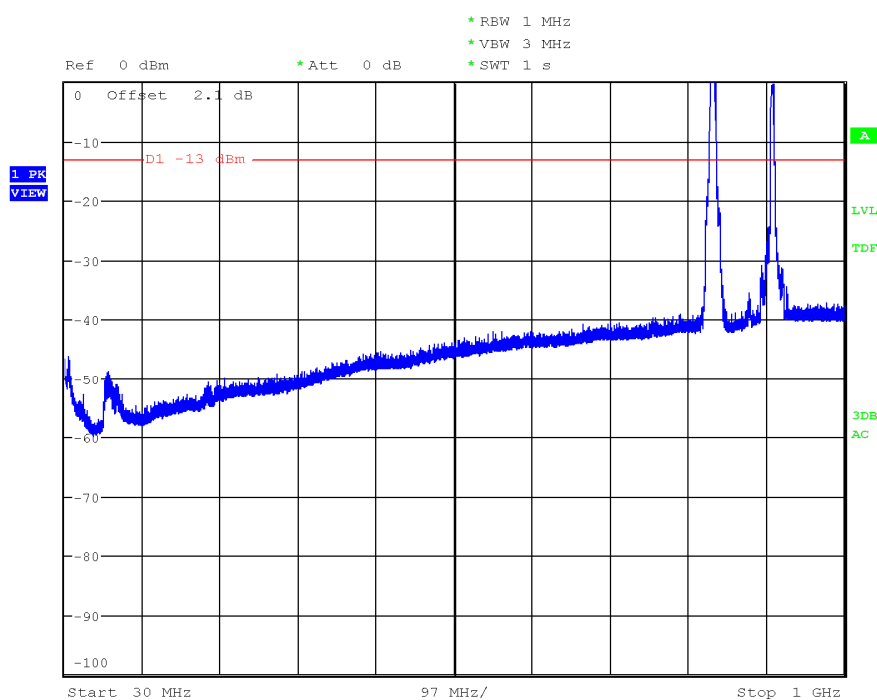
FREQUENCY RANGE 30 MHz-1000 MHz.

GPRS MODULATION



Note: The peaks above the limit are the carrier frequencies (Z-wave radio and GPRS 836.6 MHz)..

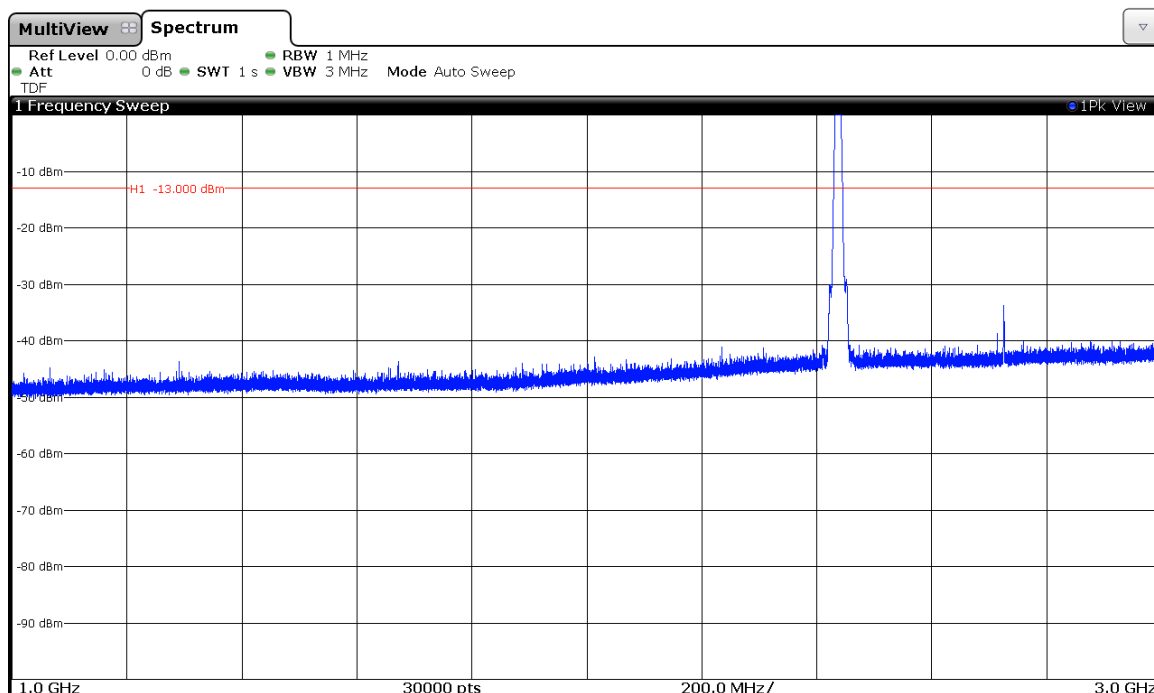
WCDMA MODULATION



Note: The peaks above the limit are the carrier frequencies (Z-wave radio and WCDMA 836.4 MHz)..

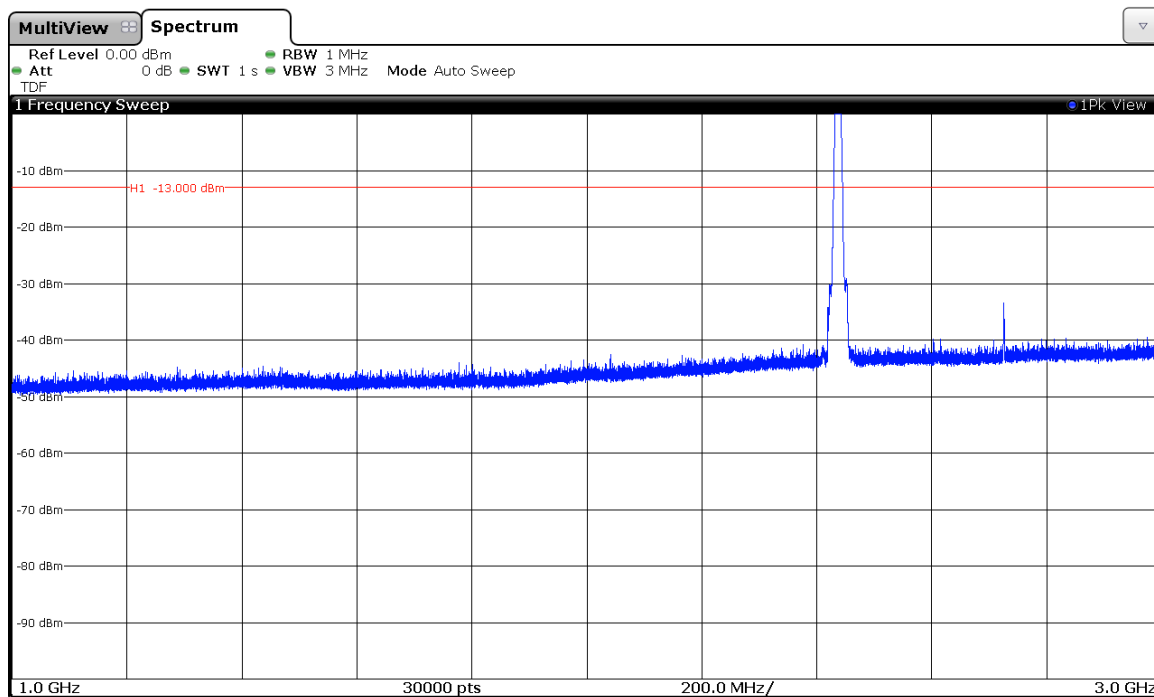
FREQUENCY RANGE 1 GHz to 3 GHz.

GPRS MODULATION



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

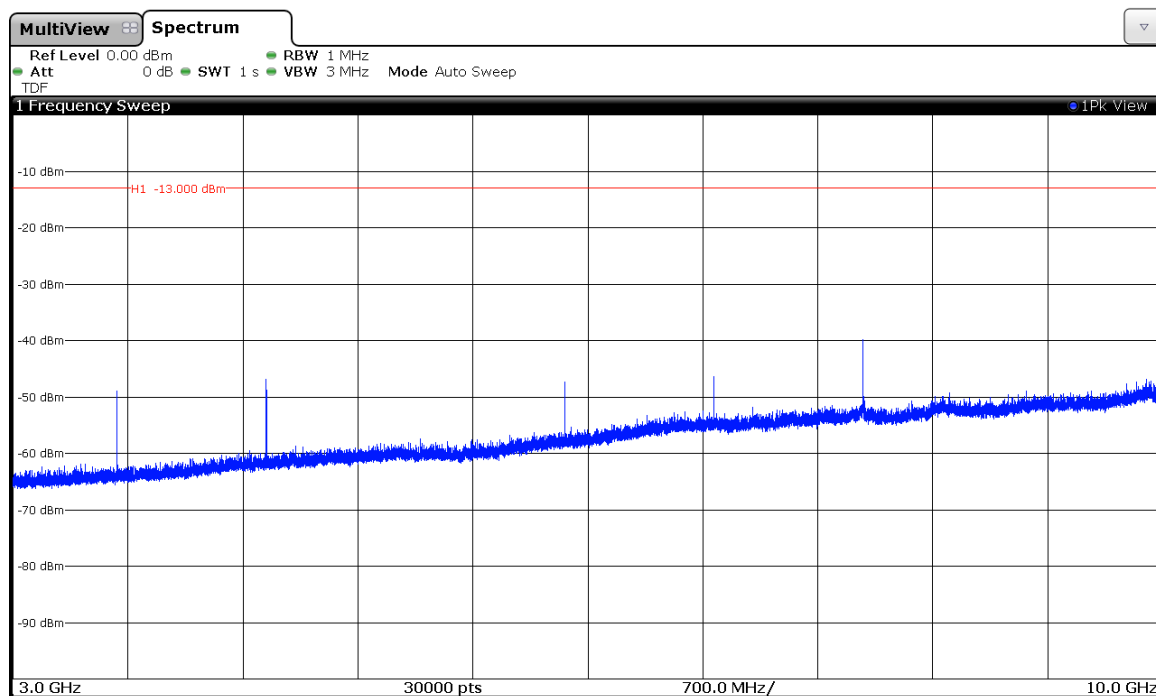
WCDMA MODULATION



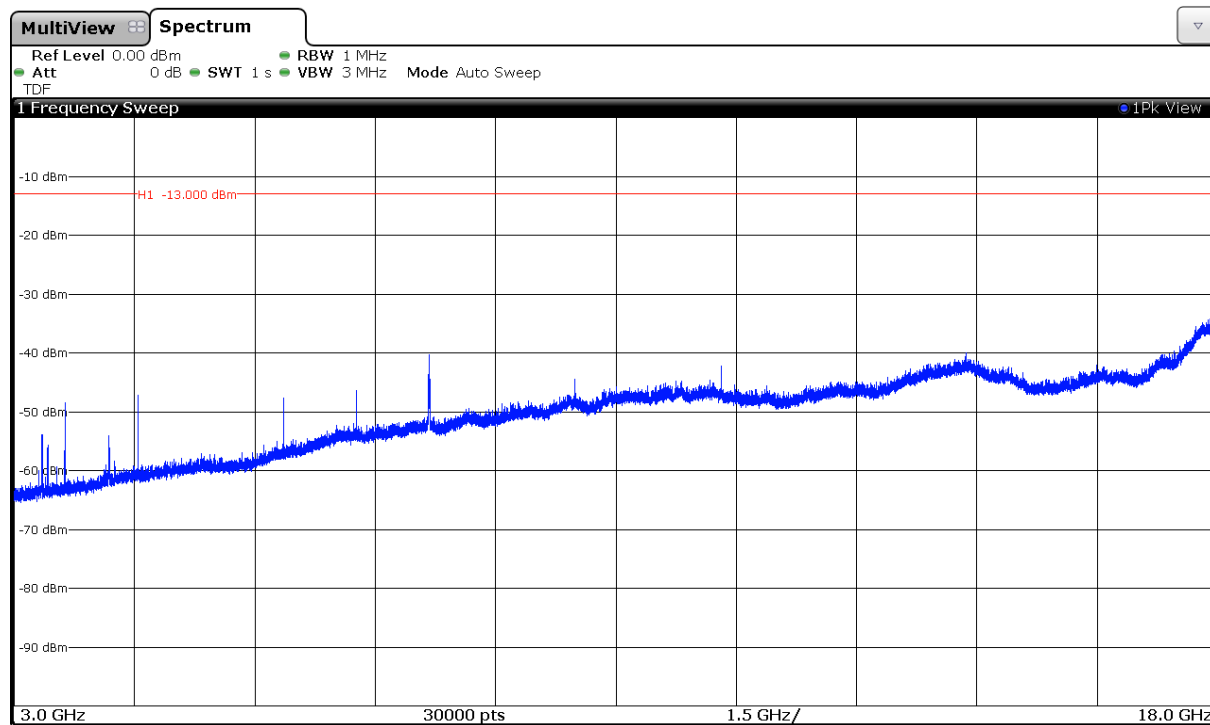
Note: The peak above the limit is the WiFi carrier frequency.

FREQUENCY RANGE 3 GHz to 10 GHz.

GPRS MODULATION



WCDMA MODULATION



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):

$$V_{\text{nom}} = 3.7 \text{ Vdc}$$

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

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

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 = DC voltage from rechargeable battery.

TEST FREQUENCIES:

GPRS MODULATION

Middle channel (662): 1880.2 MHz

WCDMA AND HSUPA MODULATION

Middle channel (9400): 1880.0 MHz

Radiated emissions

SPECIFICATION

FCC §2.1046 and 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.

The test was performed with the equipment transmitting in cellular mode, WiFi (b mode, which is the worst case), Z-wave and NFC (NFC-A, which is the worst case) radios simultaneously to check the impact of the co-location of all radio interfaces.

Measurement Limit:

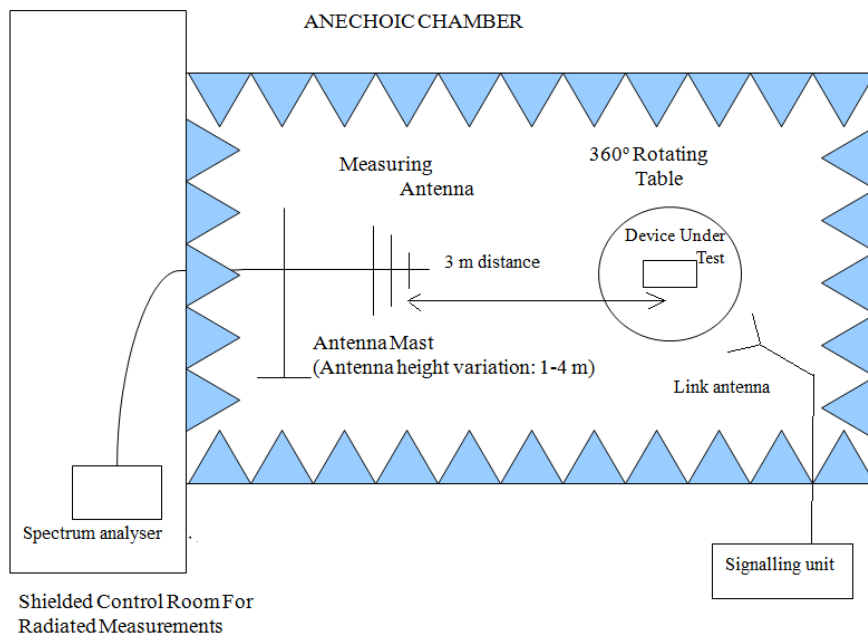
According to specification. the power of emissions shall be attenuated below the transmitter power (P) by a factor of at least $43 + 10 \log (P)$ dB. P in watts.

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

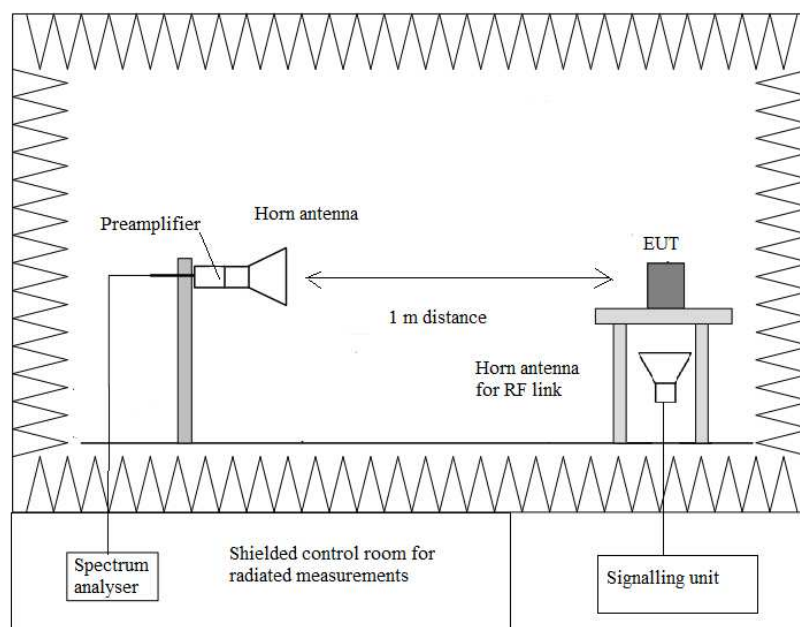
$$P_o \text{ (dBm)} - [43 + 10 \log (P_o \text{ in mwatts}) - 30] = -13 \text{ dBm}$$

TEST SETUP

Radiated measurements below 1 GHz.



Radiated measurements above 1 GHz.



RESULTS

GPRS MODULATION

CHANNEL: MIDDLE

Frequency range 30 MHz-1000 MHz.

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

Frequency range 1 GHz-20 GHz.

No spurious signals were found 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.

CHANNEL: MIDDLE

Frequency range 30 MHz-1000 MHz.

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

Frequency range 1 GHz-20 GHz.

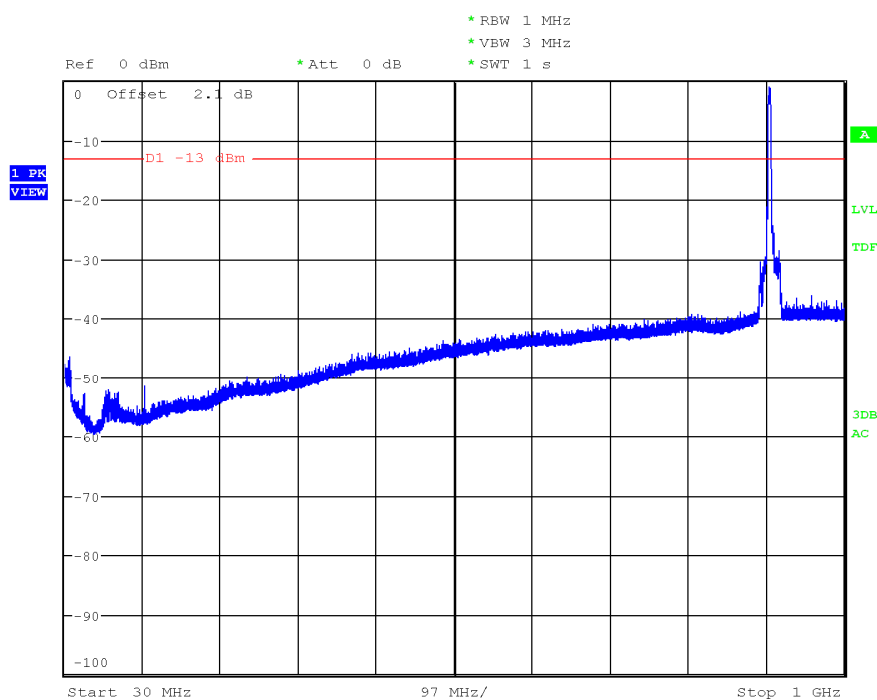
No spurious signals were found at less than 20 dB respect to the limit.

Measurement uncertainty (dB)	<±3.88 for $f < 1\text{GHz}$ <±4.87 for $f \geq 1\text{ GHz}$ up to 18 GHz <±3.99 for $f \geq 18\text{ GHz}$ up to 20 GHz
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Verdict: PASS

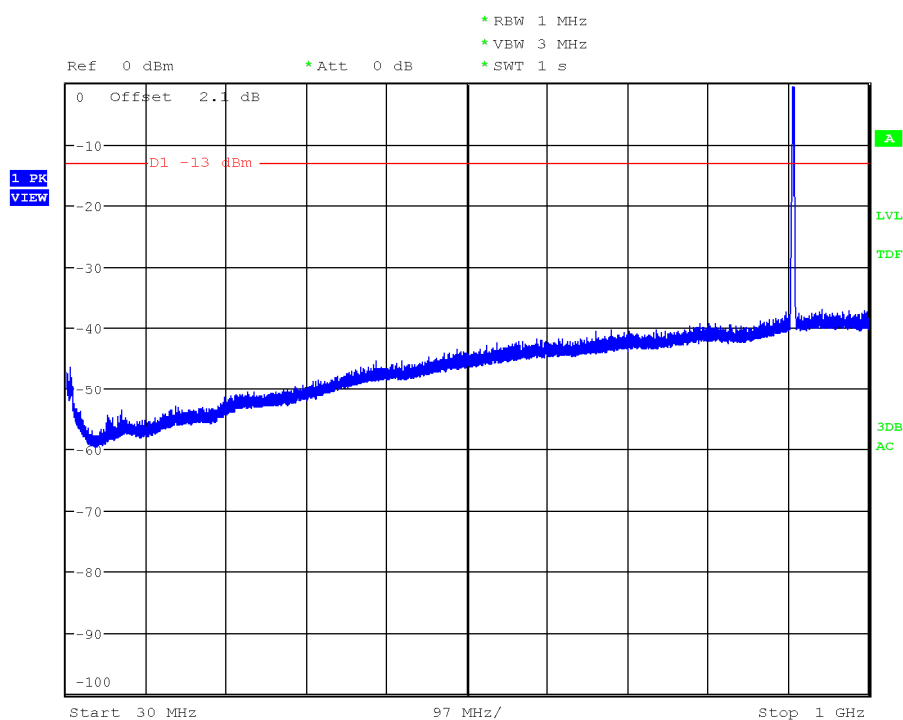
FREQUENCY RANGE 30 MHz-1000 MHz.

GPRS MODULATION



Note: The peak above the limit is the Z-wave radio carrier frequency.

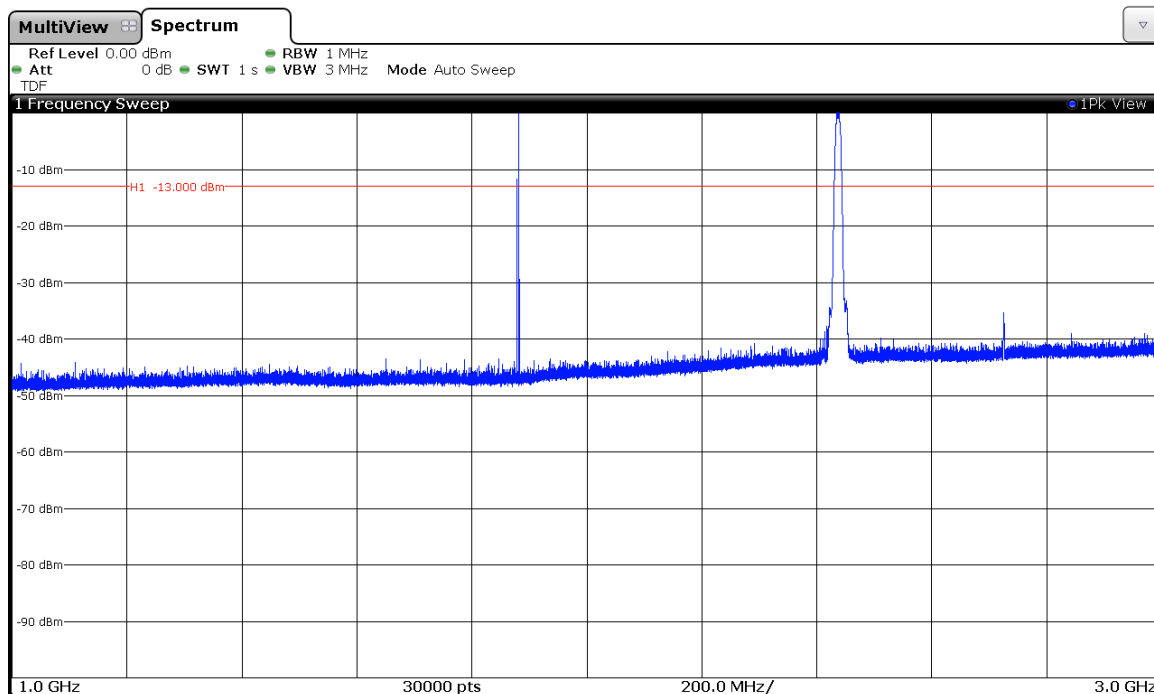
WCDMA MODULATION



Note: The peak above the limit is the Z-wave radio carrier frequency.

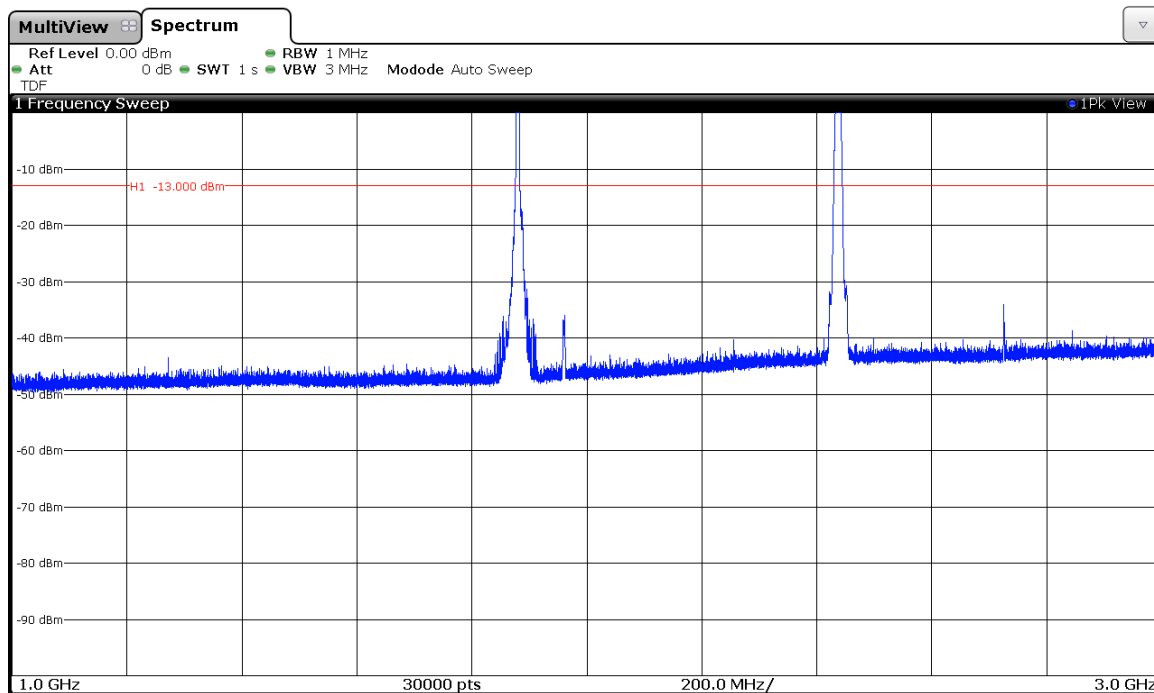
FREQUENCY RANGE 1 GHz to 3 GHz.

GPRS MODULATION



Note: The peaks above the limit are the carrier frequencies (WiFi radio and GPRS 1880.2 MHz).

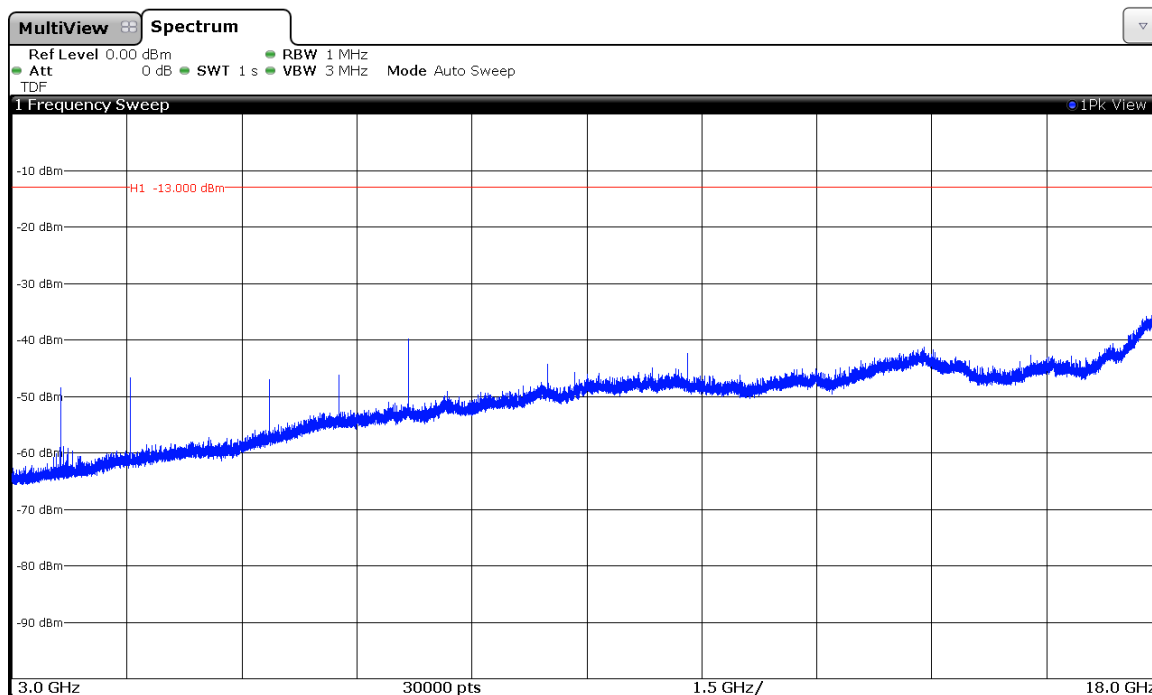
WCDMA MODULATION



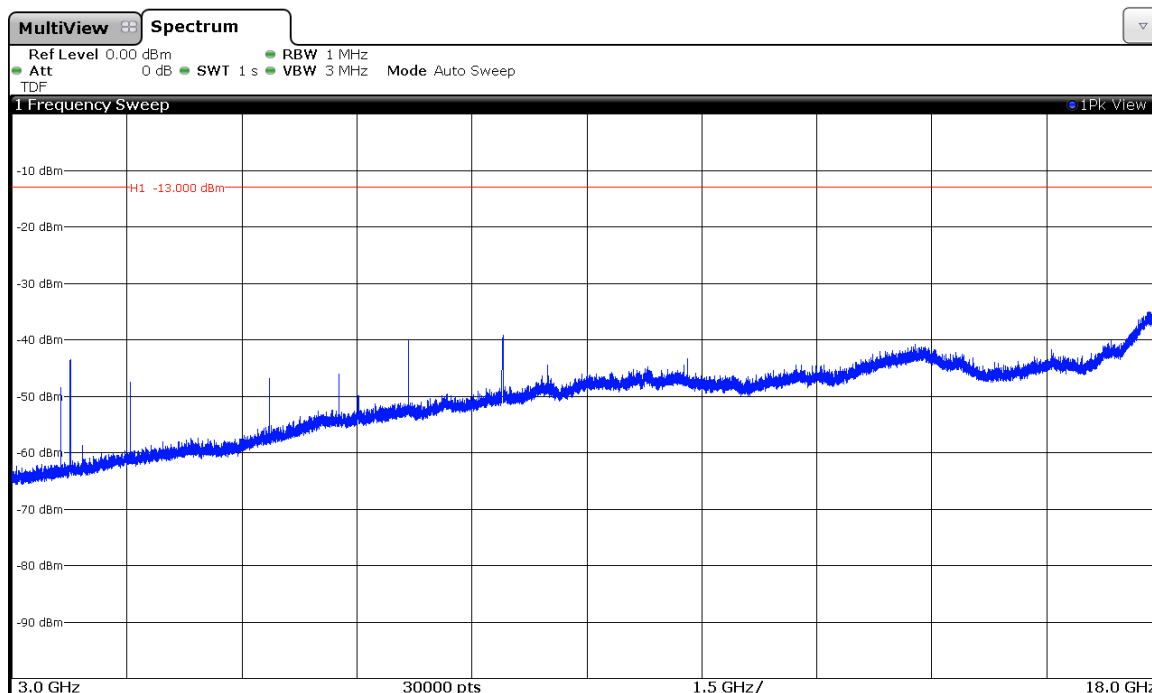
Note: The peaks above the limit are the carrier frequencies (WiFi radio and GPRS 1880.2 MHz).

FREQUENCY RANGE 3 GHz to 18 GHz.

GPRS MODULATION

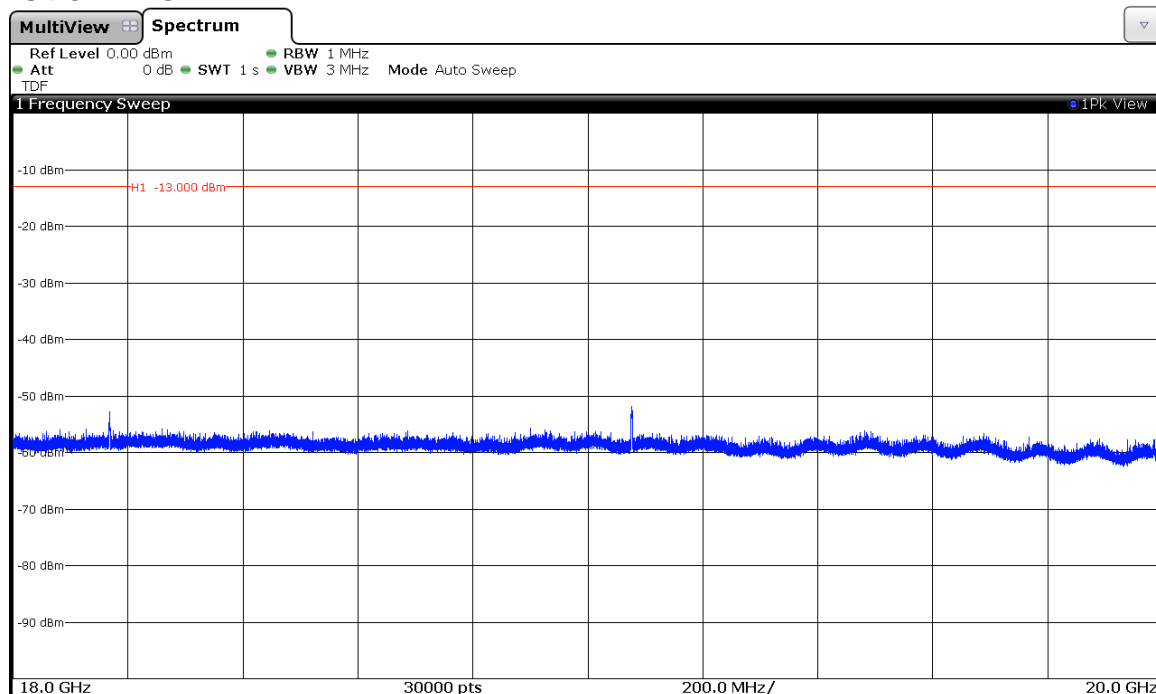


WCDMA MODULATION



FREQUENCY RANGE 18 GHz TO 20 GHz.

GPRS MODULATION



WCDMA MODULATION

