AT4 wireless, S.A.
Parque Tecnológico de Andalucía,
c/ Severo Ochoa nº 2 · 29590 Campanillas · Málaga · España
www.at4wireless.com · C.I.F. A29 507 456

FCC LISTED, REGISTRATION NUMBER: 720267

IC LISTED REGISTRATION NUMBER IC 4621A-1

Test report No:

NIE: 43010RRF.002

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

Identificación del objeto ensayado.....: Identification of item tested	3G CELLULAR ALARM COMMUNICATOR
Marca .....: Trade	DSC
Modelo y/o referencia tipo .....: Model and /or type reference	Model: 3G4010, 3G4010CF
Other identification of the product .....:	Commercial name: 3G CELLULAR ALARM COMMUNICATOR FCC ID:F53143G4010 and IC:160A-3G4010
Final HW version .....:	UA673 Rev. 02
Final SW version .....:	Ver. 4.0
IMEI TAC .....:	354677050032348
Características .....: Features	3G Cellular interface used for connection to Alarm Systems in order to send events to monitoring station. Use integrated Telit radio model UE910-NAR. Module can use external whip antenna.
Peticionario .....: Applicant	DIGITAL SECURITY CONTROLS, A DIV. OF TYCO SAFETY PRODUCTS CANADA LTD. 3301 LANGSTAFF ROAD, CONCORD, ON L4K4L2. CANADA. Contact person: Dan Nita Telephone: +905 760 3000. Ext 2706; e-mail: dnita@tycoint.com
Método de ensayo solicitado, norma.....: Test method requested, standard	USA FCC Part 22 10-01-13 Edition. USA FCC Part 24 10-01-13 Edition. CANADA IC RSS-132 Issue 3, Jan. 2013. CANADA IC RSS-133 Issue 6, Jan. 2013. Measurement Guidance 971168 D01 v02r01 for certification of Licensed Digital Transmitters
Resultado.....: Summary	IN COMPLIANCE
Aprobado por (nombre / cargo y firma) .....: Approved by (name / position & signature)	A. Llamas RF Lab. Manager  Firmado digitalmente por Alejandro Llamas Rodríguez Fecha: 2014.10.27 16:13:02 +01'00'
Fecha de realización .....: Date of issue	2014-10-24
Formato de informe No.....: Report template No	FDT08_15

Index

Competences and guarantees

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 conjuction 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-1.

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.

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 M/01 is composed of the following elements:

Control Nº	Description	Model	Serial Nº	Date of reception
43010/002	Module with external connectors	3G4010, 3G4010CF	IMEI: 651S1421006568	2014-08-12
43010/015	External antenna	---	---	2014-08-12
43010/016	AC adaptor	HK-XX14-A138N	---	2014-08-12

1. Sample M/01 has undergone the test(s).

   All tests indicated in appendix A.

Test sample description

The test sample consists of 3 production ready samples provided for FCC/IC and PTCRB testing. Auto-answer and pass through mode available on the test samples to facilitate necessary testing. Testing and certification to be done using supplied antenna.

Test samples supplier

DIGITAL SECURITY CONTROLS,A DIV. OF TYCO SAFETY PRODUCTS CANADA LTD.

3301 LANGSTAFF ROAD, CONCORD, ON L4K4L2. CANADA.

VAT: N/A

Contact person: Dan Nita

Telephone: +905 760 3000. Ext 2706

e-mail: dnita@tycoint.com

Testing period

The performed test started on 2014-08-12 and finished on 2014-09-05.

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. = 20.1 ºC Max. = 23.2 ºC
Relative humidity	Min. = 40.8 % Max. = 44.8 %
Shielding effectiveness	> 100 dB
Electric insulation	> 10 kΩ
Reference resistance to earth	< 0,5 Ω

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

Temperature	Min. = 19.5 ºC Max. = 22.6 ºC
Relative humidity	Min. = 40.6 % Max. = 46.0 %
Air pressure	Min. = 1002 mbar Max. = 1009 mbar
Shielding effectiveness	> 100 dB
Electric insulation	> 10 kΩ
Reference resistance to earth	< 0,5 Ω
Normal site attenuation (NSA)	< ±4 dB at 10 m & 3m distance between item under test and receiver antenna, (30 MHz to 1000 MHz)
Site VSWR	< ±6 dB at 3m distance between item under test and receiver antenna, (1 GHz to 18 GHz)
Field homogeneity	More than 75% of illuminated surface is between 0 and 6 dB (26 MHz to 18 GHz).

In the chamber for conducted measurements the following limits were not exceeded during the test:

Temperature	Min. = 23.9 ºC Max. = 26.8 ºC
Relative humidity	Min. = 36.5 % Max. = 50.6 %
Air pressure	Min. = 1005 mbar Max. = 1009 mbar
Shielding effectiveness	> 100 dB
Electric insulation	> 10 kΩ
Reference resistance to earth	< 0,5 Ω

Remarks and comments

1: Used instrumentation.

Conducted Measurements

		Last Cal. date	Cal. due date
1.	Spectrum analyser Agilent PSA E4440A	2014/05	2016/05
2.	Climatic chamber HERAEUS VM 07/100	2012/10	2015/10
3.	DC power supply R&S NGPE 40/40	2011/11	2014/11
4.	Signal Analyzer R&S FSQ8	2014/05	2016/05

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	2013/11	2016/11
5.	SHF-EHF Horn antenna 15-40 GHz Schwarbeck BBHA 9170	2014/03	2017/03
6.	EMI Test Receiver R&S ESU 26	2013/08	2015/08
7.	Spectrum analyser Rohde & Schwarz FSW50	2013/10	2015/10
8.	RF pre-amplifier 10 MHz-6 GHz SCHWARZBECK BBV9743	2014/02	2015/02
9.	RF pre-amplifier 1-18 GHz Schwarzbeck BBV 9718	2014/02	2015/02
10.	RF pre-amplifier BONN BLMA 1840-1M 18-40 GHZ .	2014/02	2016/02
11.	Universal Radio communication Tester R&S CMU200	2014-02	2016-02

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.

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 4.4: RF output power		P		
Clause 2.1047/RSS-132 Clause 4.2: Modulation characteristics				NM[4]
Clause 22.355/RSS-132 Clause 4.3: Frequency stability				NM[4]
Clause 2.1049: Occupied Bandwidth		P		
Clause 22.917/RSS-132 Clause 4.5: Spurious emissions at antenna terminals		P		
Clause 22.917/RSS-132 Clause 4.5: Radiated emissions		P		

FCC PART 24/IC RSS-133 PARAGRAPH	VERDICT			
	NA	**P**	**F**	**NM**
Clause 24.232/RSS-133 Clause 6.4: RF output power		P		
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		P		
Clause 24.238/RSS-133 Clause 6.5: Spurious emissions at antenna terminals		P		
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 & 24

INDEX

TEST RESULTS FOR FCC PART 22 AND IC RSS-132

TEST CONDITIONS

Power supply (V):

V_{nom} = 13.8 Vdc

The subscript nom indicates voltage test conditions (nominal, minimum and maximum respectively, as declared by the applicant).

Type of power supply = DC Voltage from external power supply AC/DC (115VAC).
Type of antenna = external whip antenna.

- External White whip antenna: Band GSM850/900: 824-960 MHz/0-1dBi

TEST FREQUENCIES:

GPRS AND EDGE 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

RF Output Power (conducted and E.R.P.)

SPECIFICATION

§2.1046 and 22.913.

The Effective Radiated Power (E.R.P.) of mobile transmitter and auxiliary test transmitter must not exceed 7 Watts (38.45 dBm).

METHOD

The conducted RF output power measurements were made at the RF output terminals of the EUT using an attenuator. power splitter and spectrum analyser. The EUT was controlled via the Universal Radio Communication tester R&S CMU200 selecting maximum transmission power of the EUT and different modes of modulation.

The maximum conducted output power was measured using a spectrum analyzer according to point 5.2.1 of Guidance 971168 D01.

The maximum effective radiated power e.r.p. is calculated by adding the declared maximum antenna gain (dBd).

RESULTS

Maximum declared external connectable antenna gain (dBi)= 1 (-1.15 dBd).

MAXIMUM OUTPUT POWER (CONDUCTED). See plots in next pages.

GPRS MODULATION

Channel	Lowest	Middle	Highest
Measured maximum average power (dBm) at antenna port	31.08	31.42	31.46
Maximum effective radiated power E.R.P. (dBm)	29.93	30.27	30.31
Measurement uncertainty (dB)	±0.5		

EDGE MODULATION

Channel	Lowest	Middle	Highest
Measured maximum average power (dBm) at antenna port	25.83	26.23	26.30
Maximum effective radiated power E.R.P. (dBm)	24.68	25.08	25.15
Measurement uncertainty (dB)	±0.5		

WCDMA MODULATION

Channel	Lowest	Middle	Highest
Measured maximum average power (dBm) at antenna port	23.06	23.21	23.14
Maximum effective radiated power E.R.P. (dBm)	21.91	22.06	21.99
Measurement uncertainty (dB)	±0.5		

HSUPA MODULATION

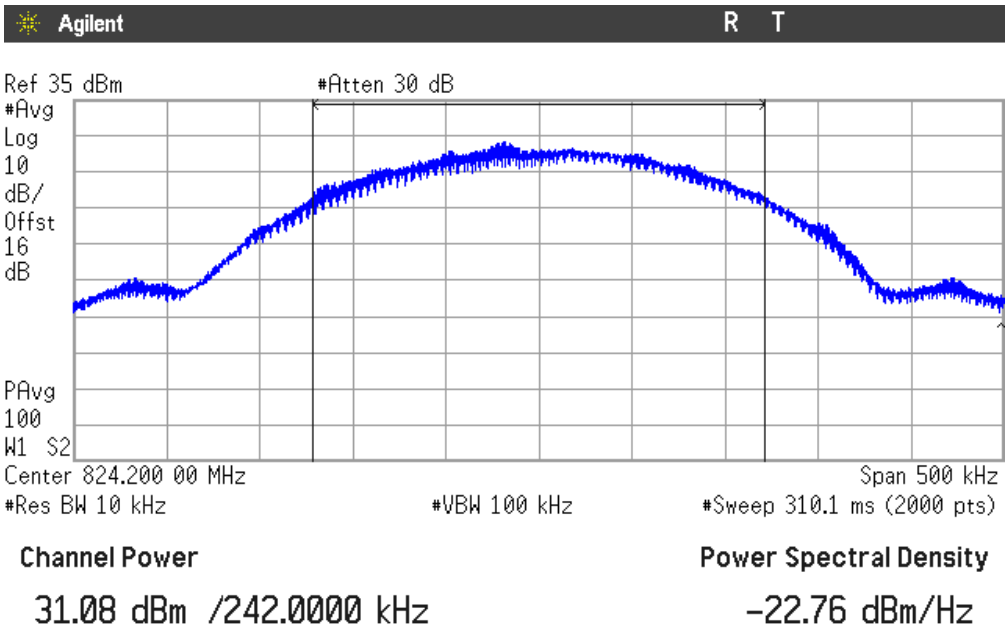
Channel	Lowest	Middle	Highest
Measured maximum average power (dBm) at antenna port	20.46	20.62	20.49
Maximum effective radiated power E.R.P. (dBm)	19.31	19.47	19.34
Measurement uncertainty (dB)	±0.5		

Verdict: PASS

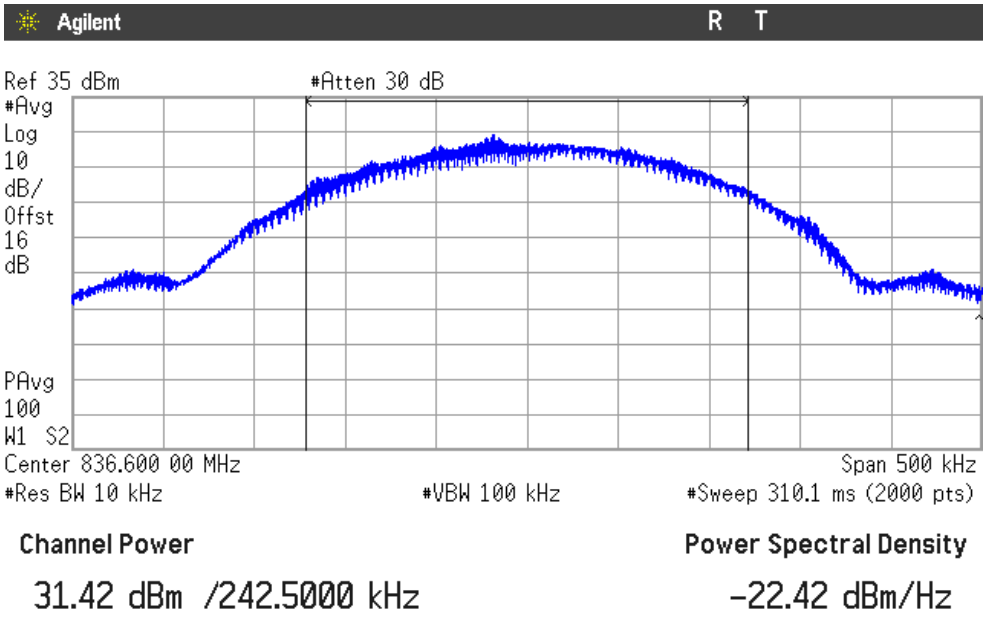
AVERAGE OUTPUT POWER (CONDUCTED).

GPRS MODULATION

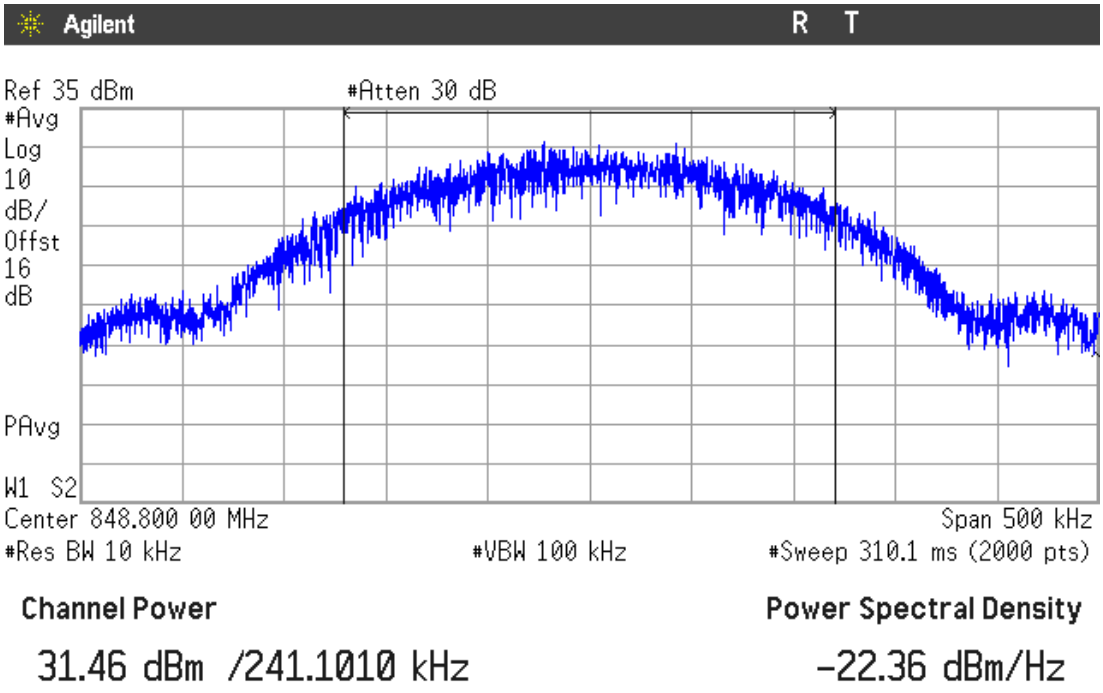
Lowest Channel



Middle Channel

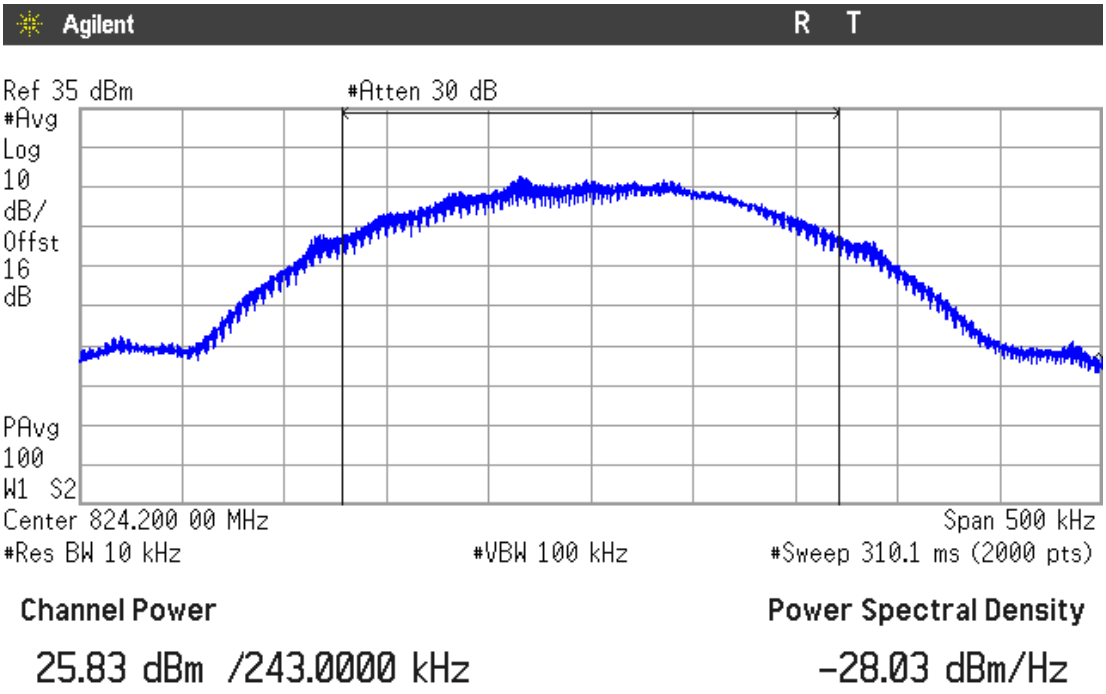


Highest Channel

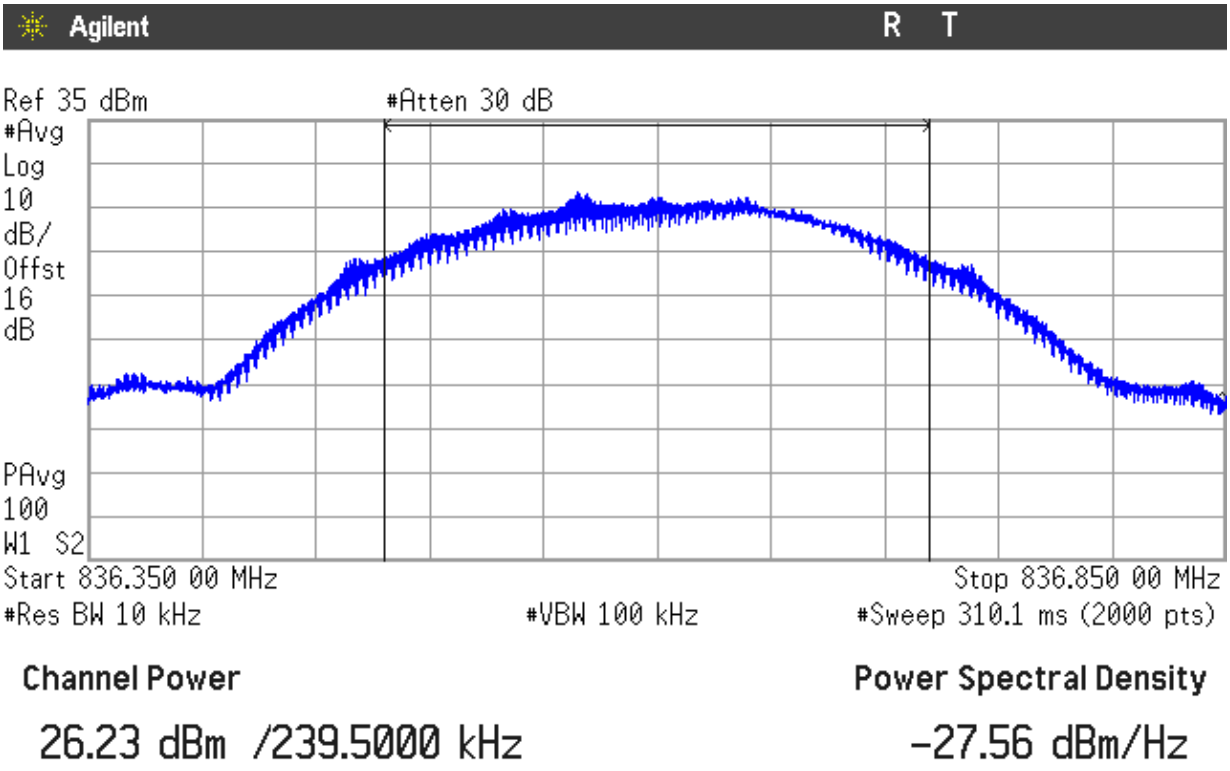


EDGE MODULATION

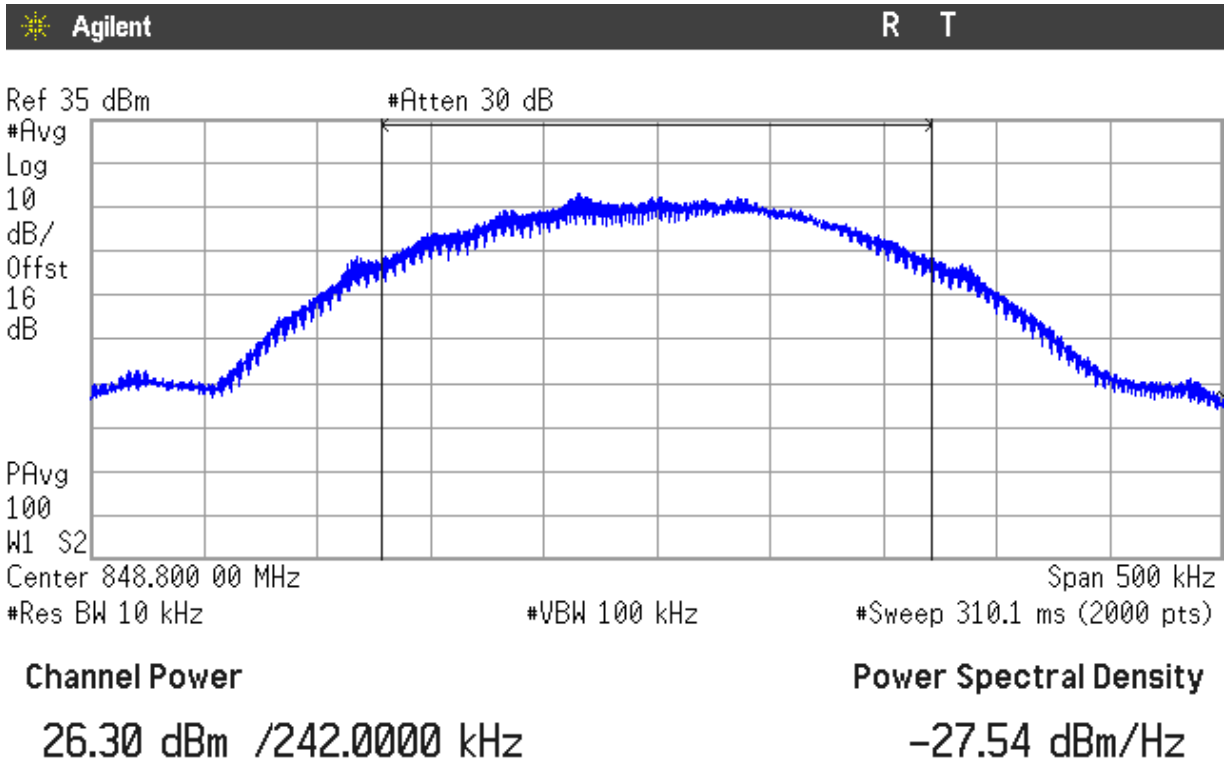
Lowest Channel



Middle Channel

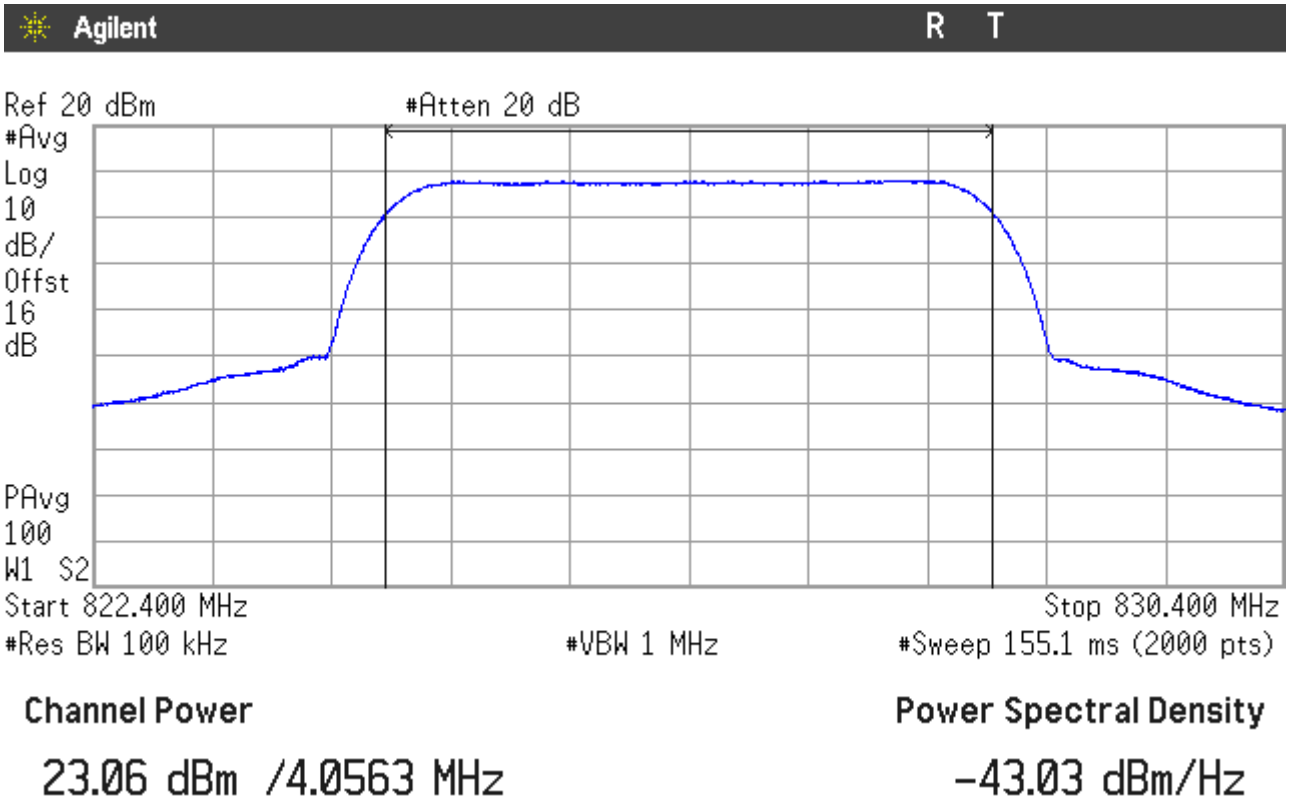


Highest Channel

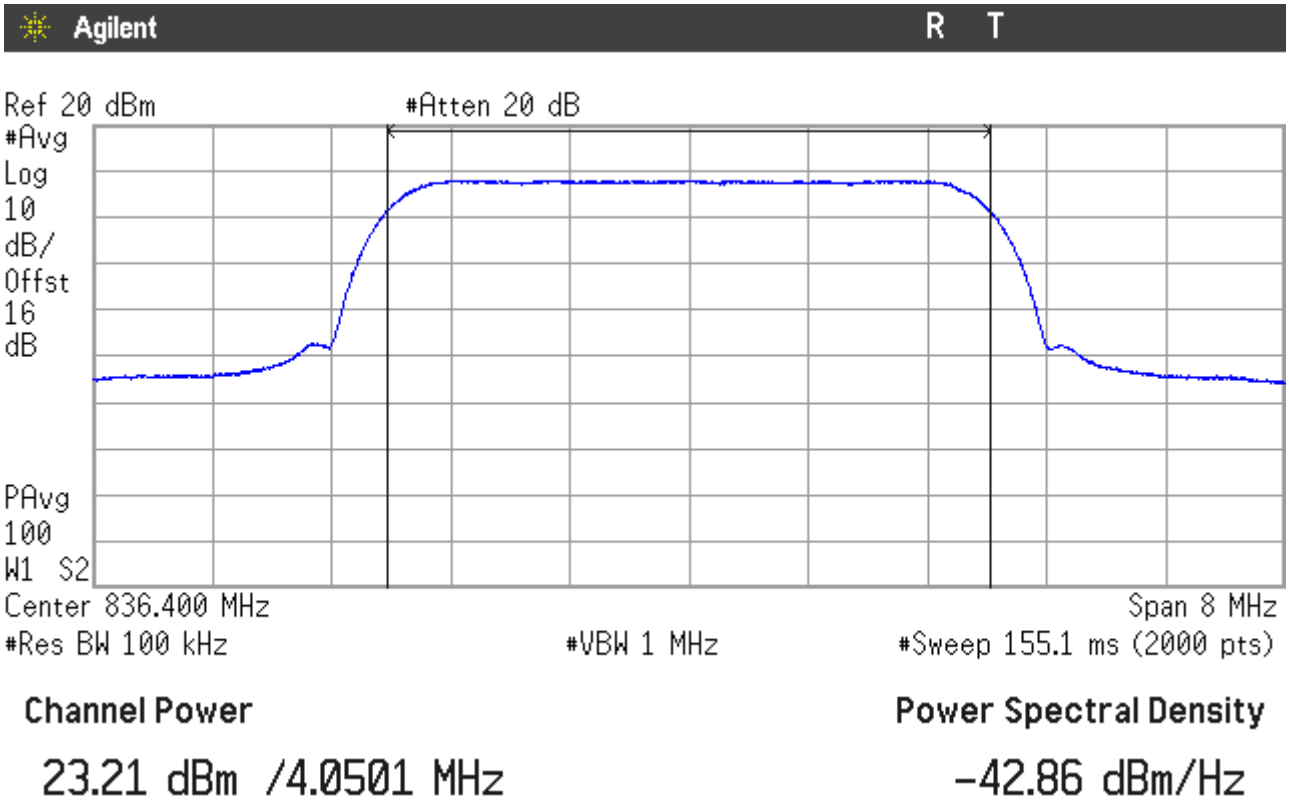


WCDMA MODULATION

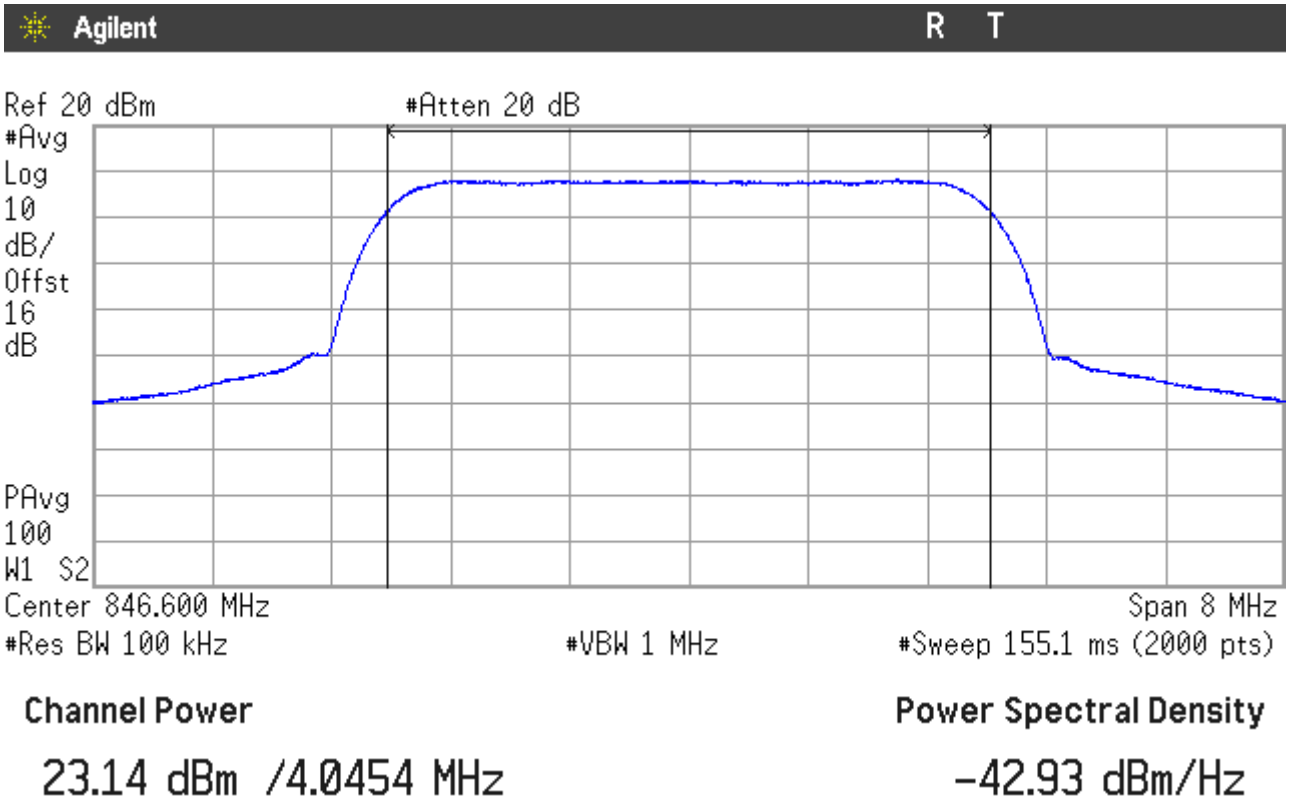
Lowest Channel



Middle Channel

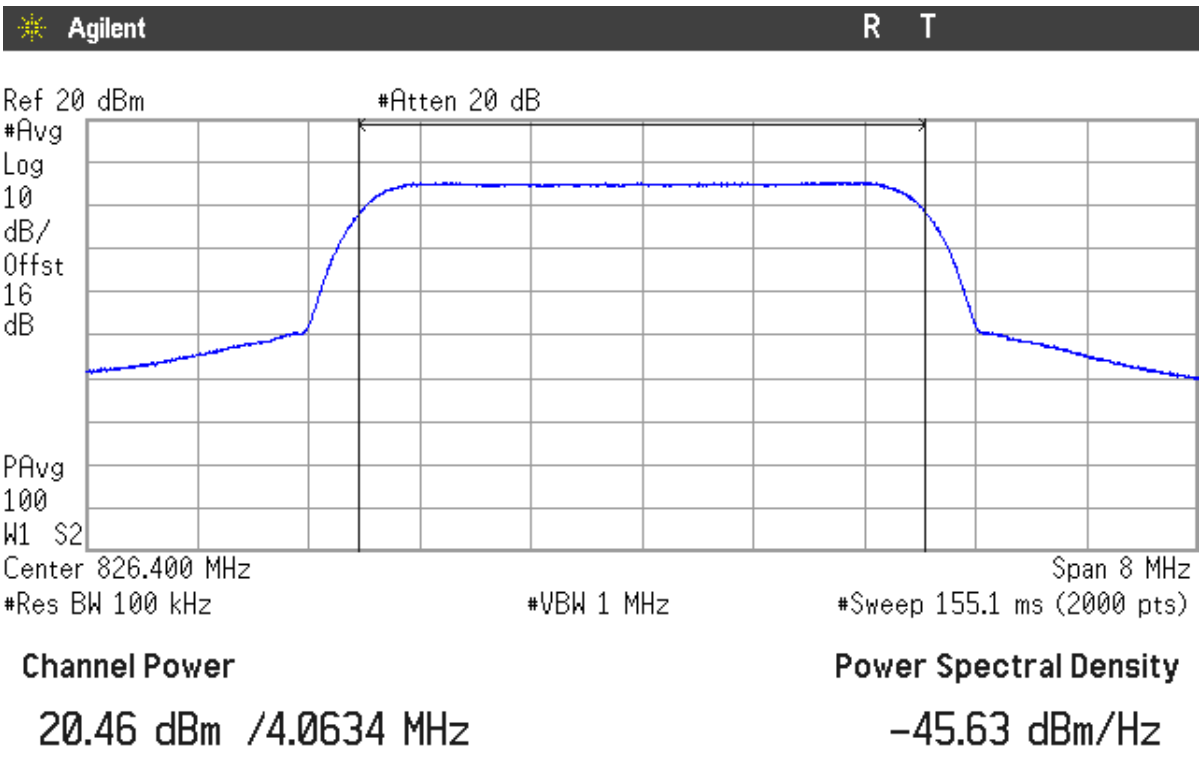


Highest Channel

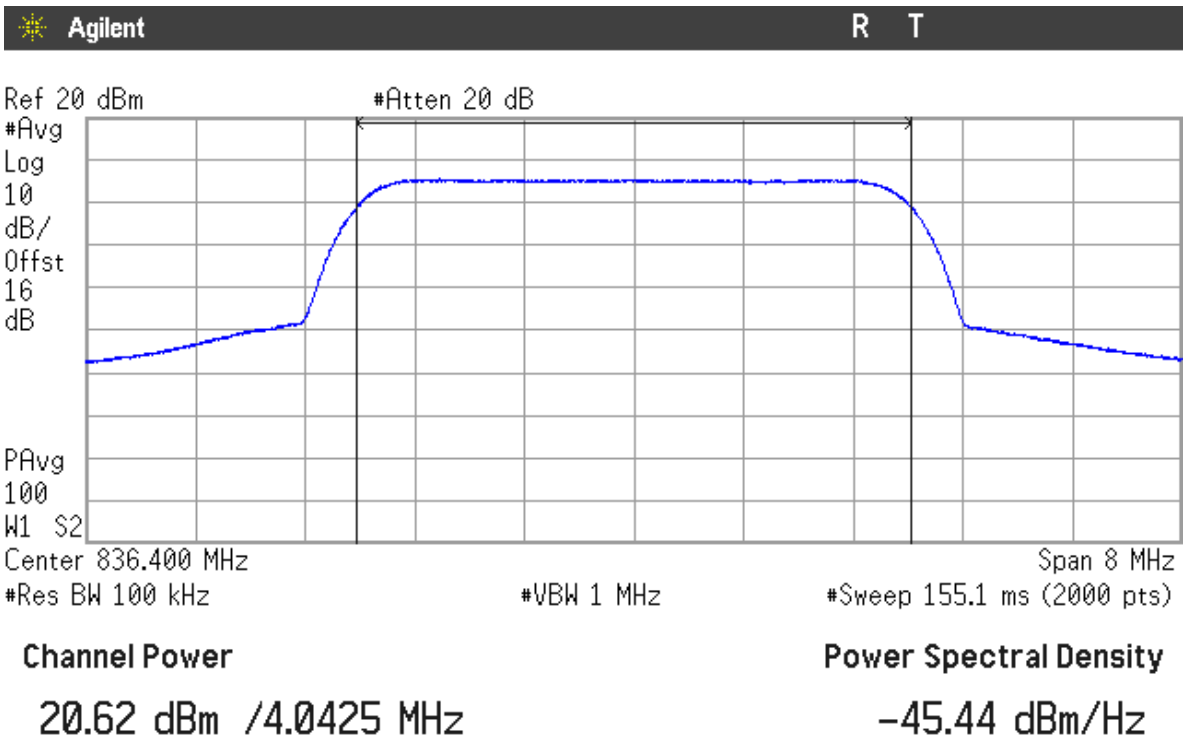


HSUPA MODULATION

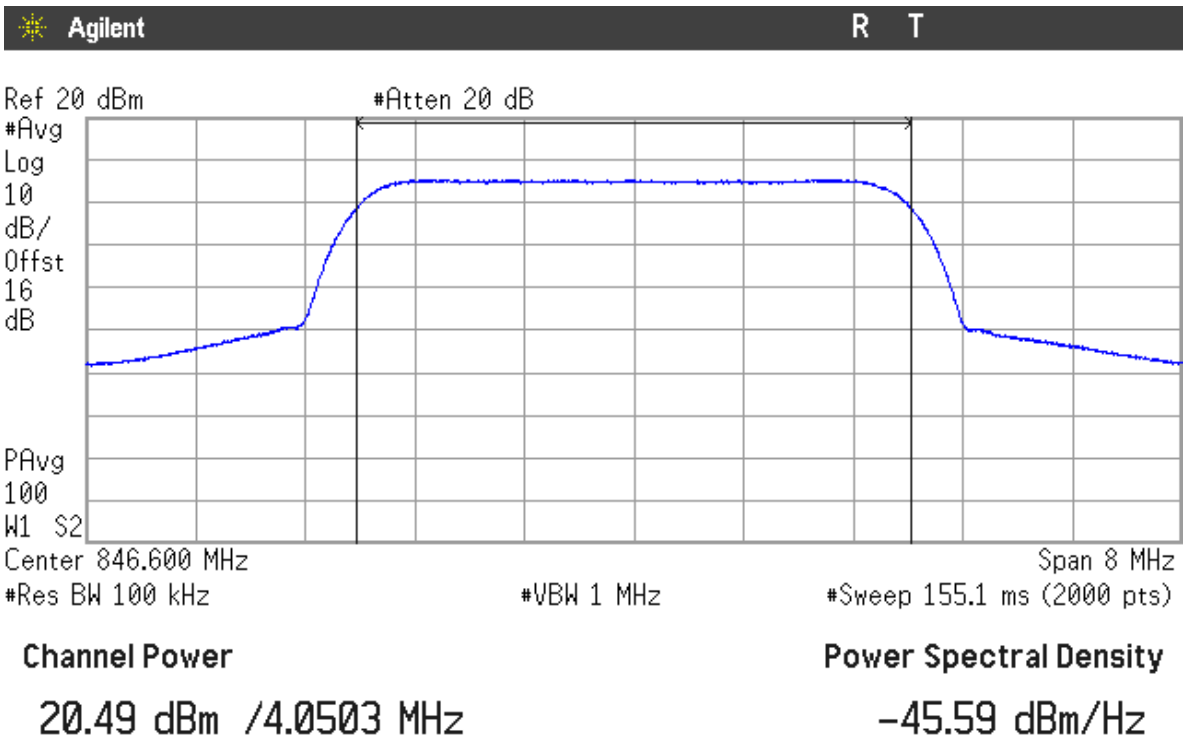
Lowest Channel



Middle Channel



Highest Channel



Occupied Bandwidth

SPECIFICATION

§2.1049

METHOD

The EUT was configured to transmit a modulated carrier signal. The 99% occupied bandwidth and the -26 dBc bandwidth was measured directly using the built-in bandwidth measuring option of the spectrum analyser.
The occupied Bandwidth was measured according to point 4.2 of Guidance 971168 D01.

RESULTS

GPRS MODULATION

Channel	Lowest	Middle	Highest
99% Occupied bandwidth (kHz)	242.00	242.50	241.10
-26 dBc bandwidth (kHz)	314.10	314.10	310.65
Measurement uncertainty (kHz)	<±1.67		

EDGE MODULATION

Channel	Lowest	Middle	Highest
99% Occupied bandwidth (kHz)	243.00	239.50	242.00
-26 dBc bandwidth (kHz)	310.90	309.29	309.29
Measurement uncertainty (kHz)	<±1.67		

WCDMA MODULATION

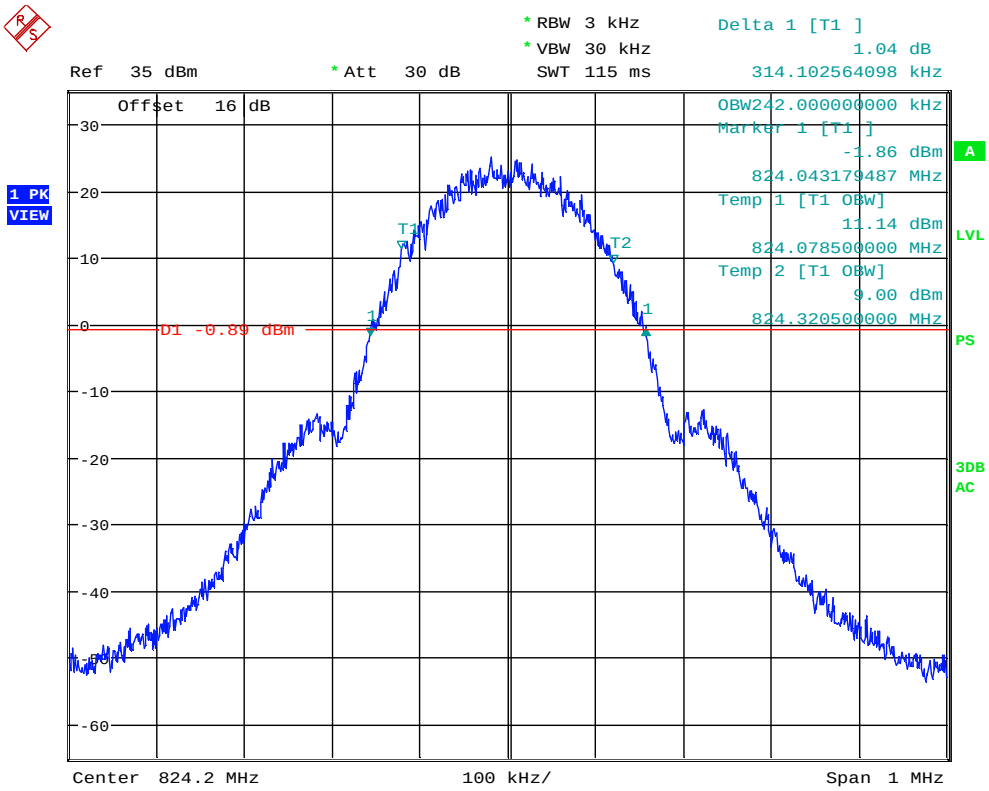
Channel	Lowest	Middle	Highest
99% Occupied bandwidth (kHz)	4056.3	4050.1	4045.4
-26 dBc bandwidth (kHz)	4602	4578	4588
Measurement uncertainty (kHz)	<±13.3		

HSUPA MODULATION

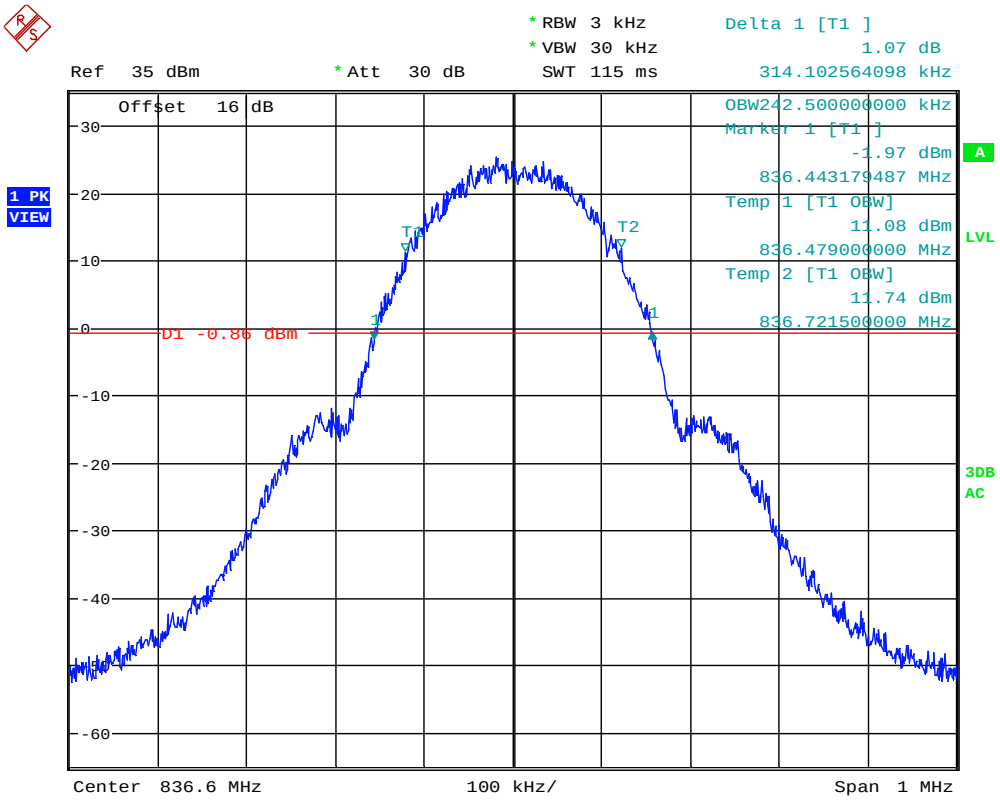
Channel	Lowest	Middle	Highest
99% Occupied bandwidth (kHz)	4063.4	4042.5	4050.3
-26 dBc bandwidth (kHz)	4592	4586	4597
Measurement uncertainty (kHz)	<±13.3		

GPRS MODULATION

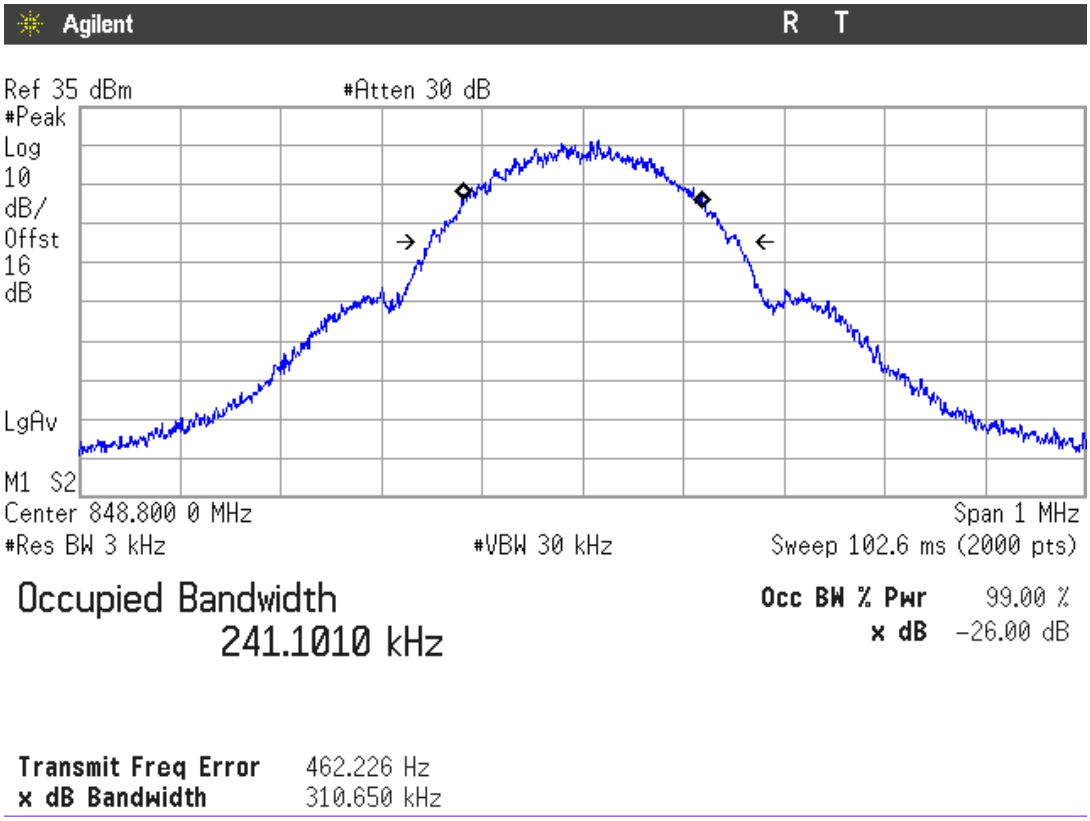
Lowest Channel



Middle Channel

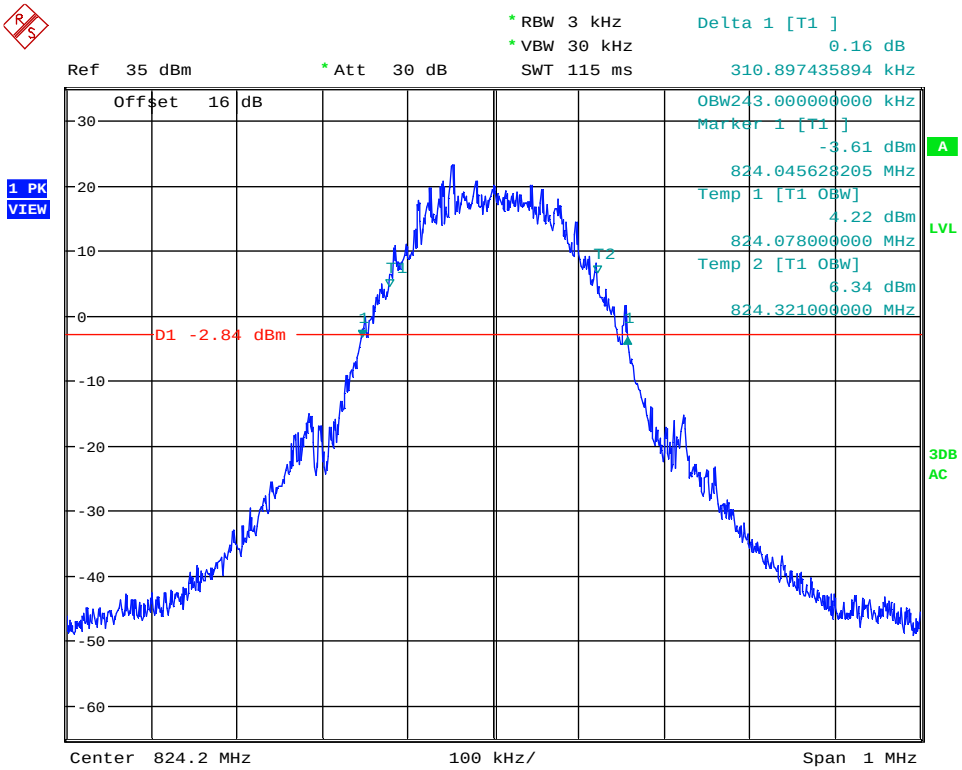


Highest Channel

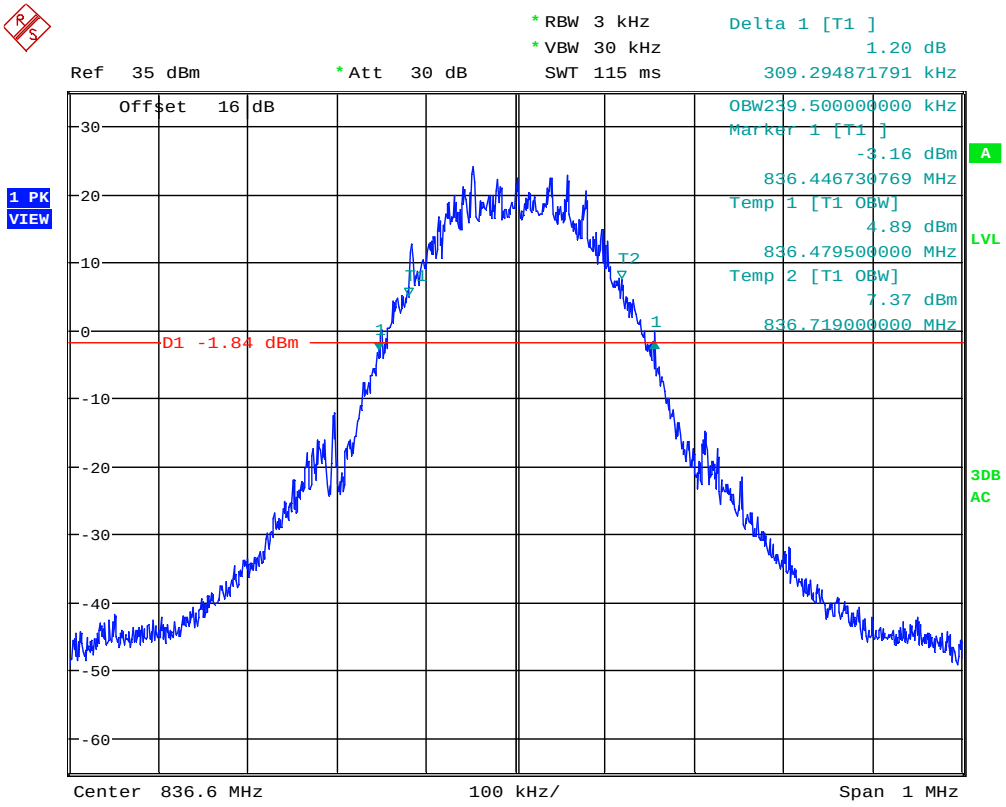


EDGE MODULATION

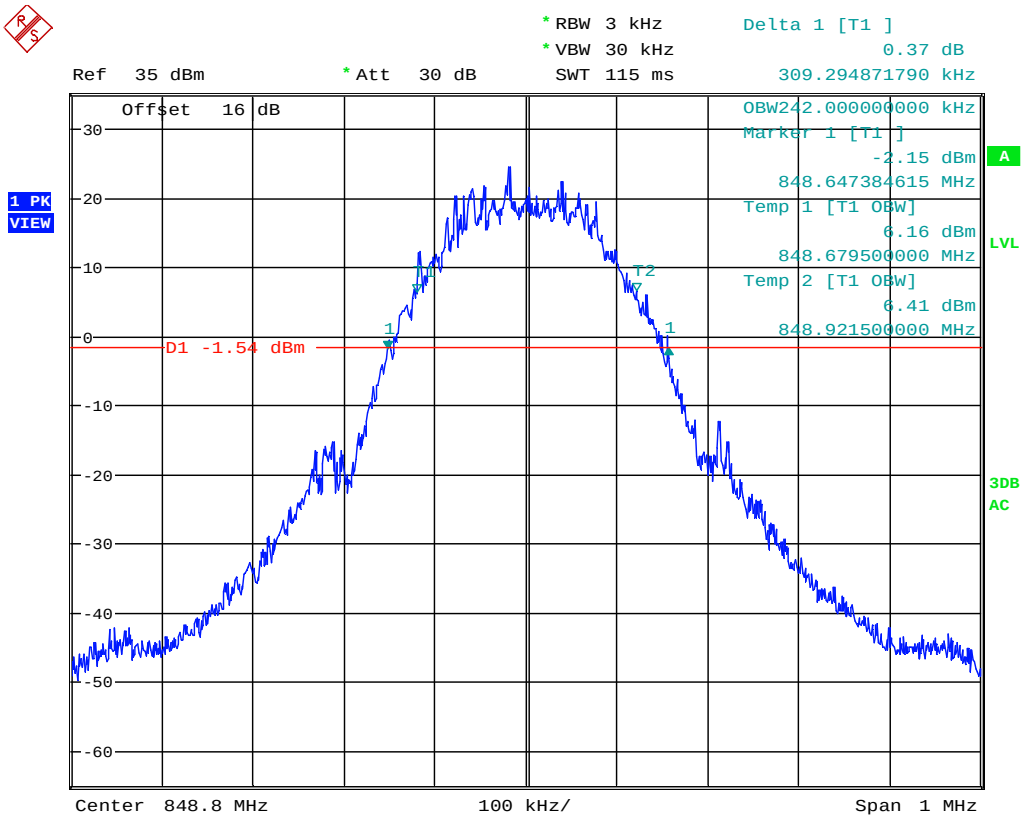
Lowest Channel



Middle Channel

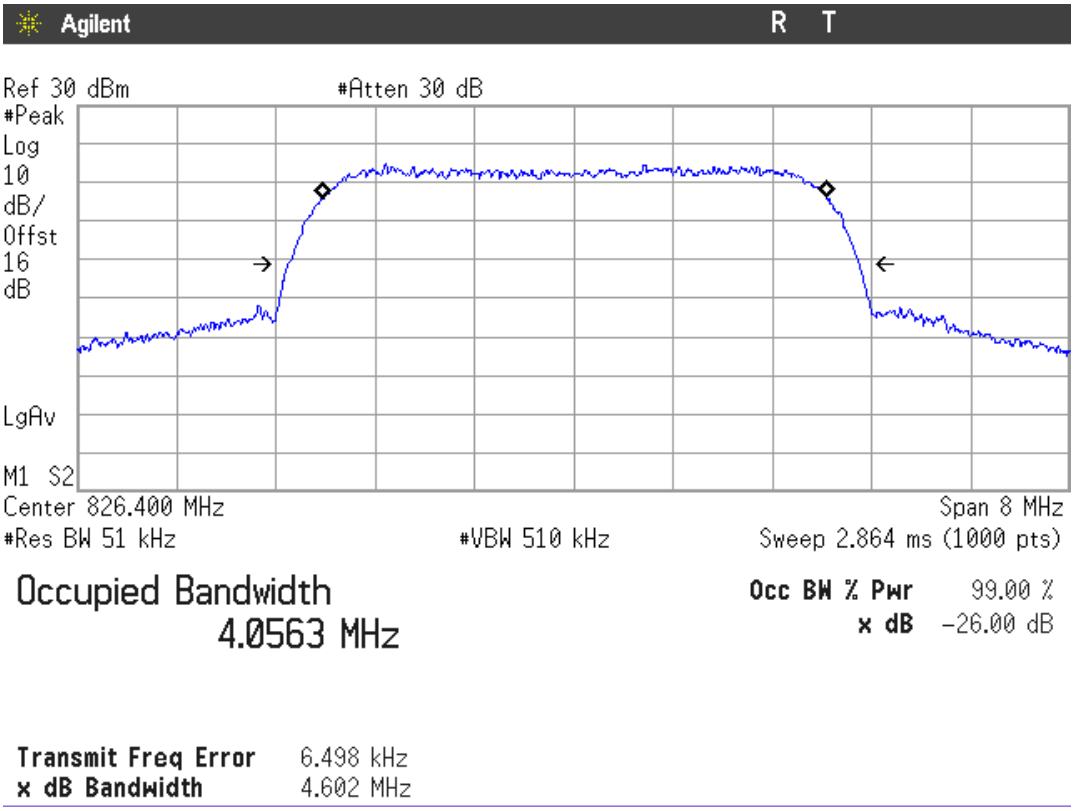


Highest Channel

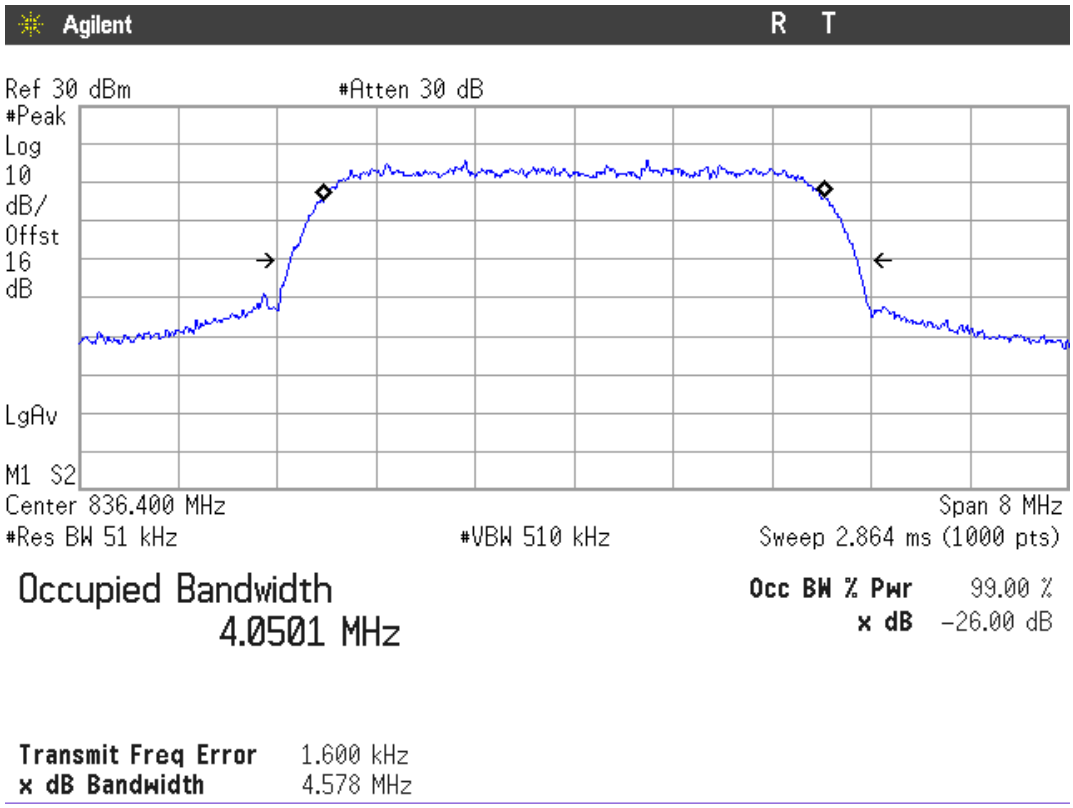


WCDMA MODULATION

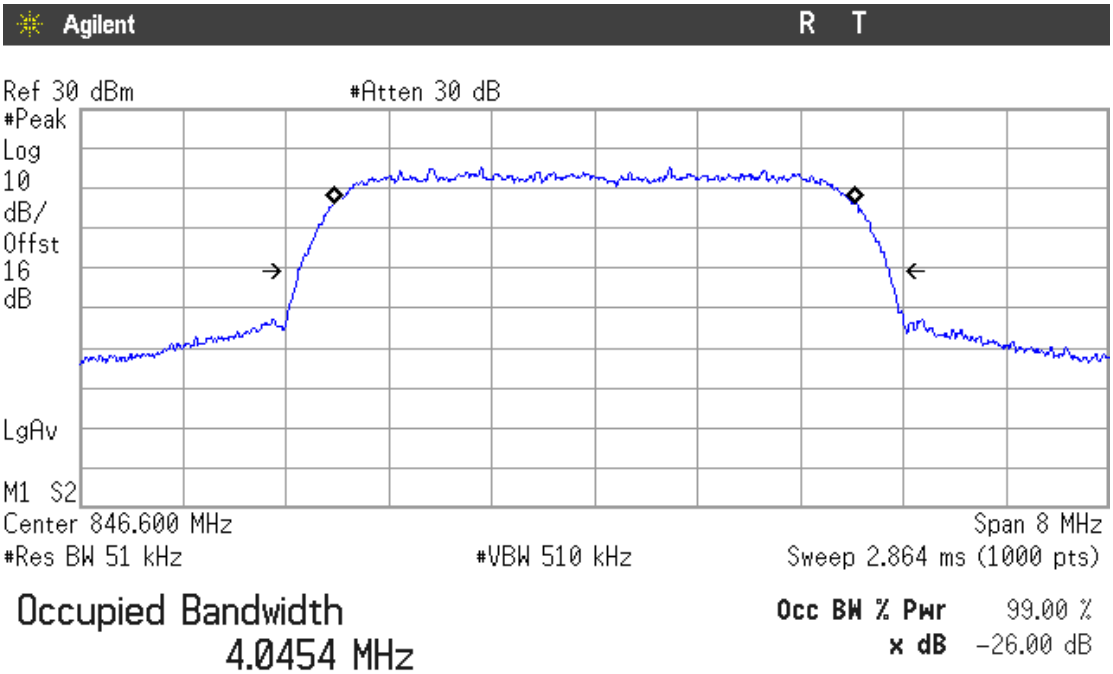
Lowest Channel



Middle Channel

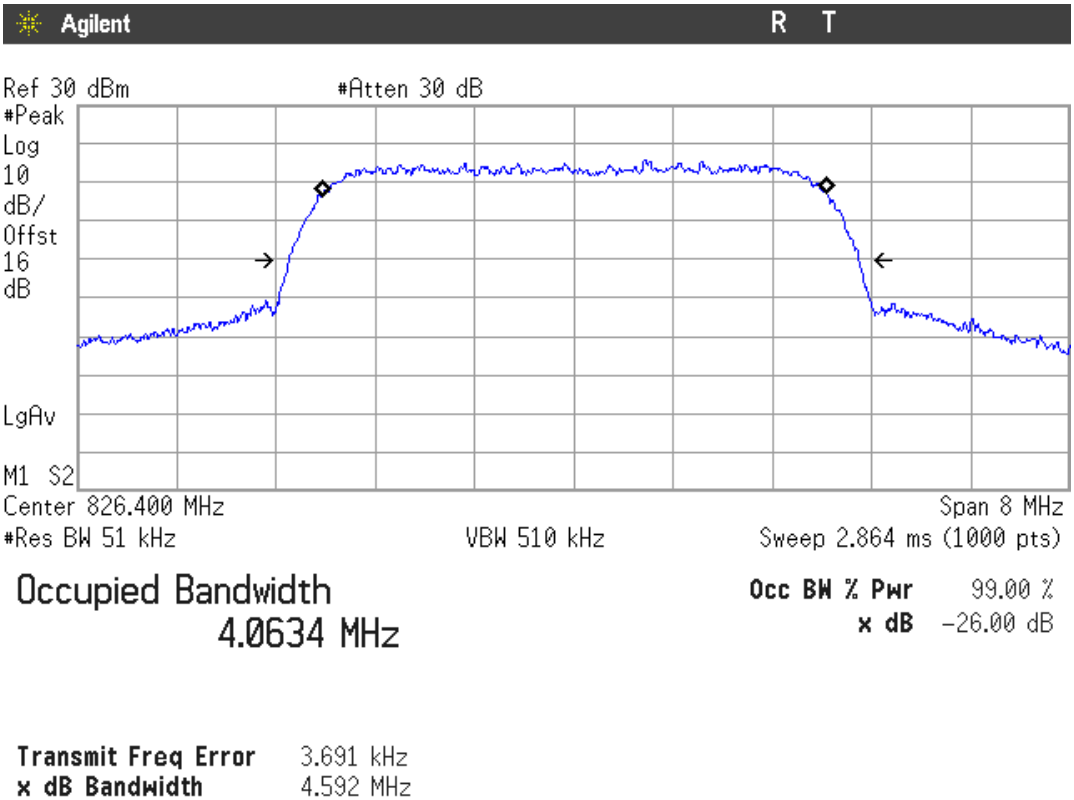


Highest Channel

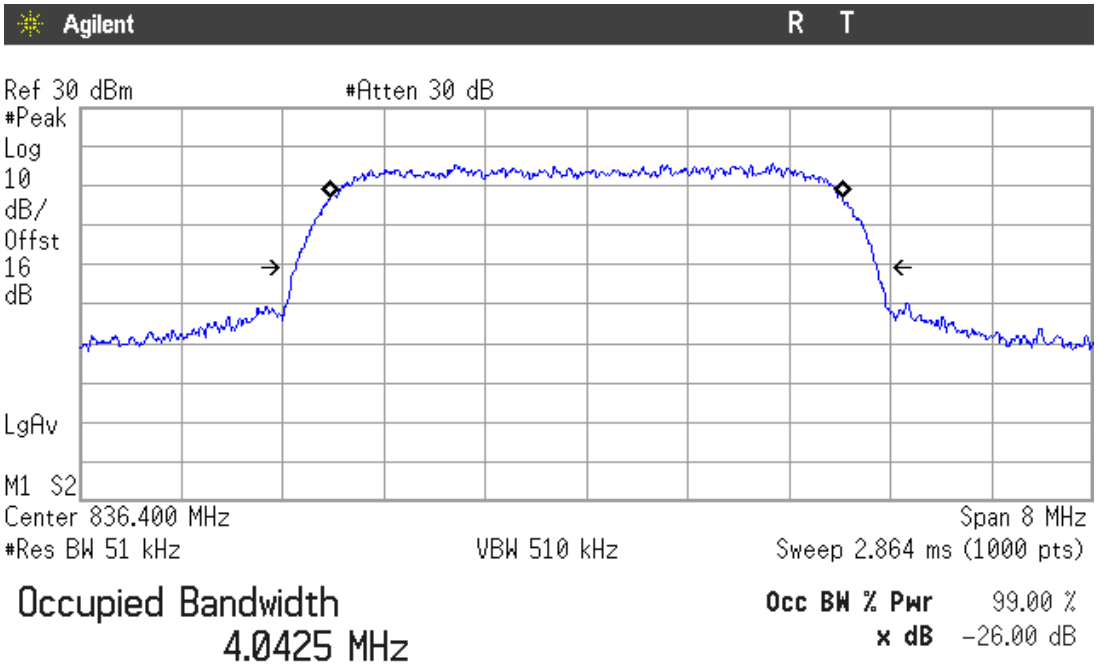


HSUPA MODULATION

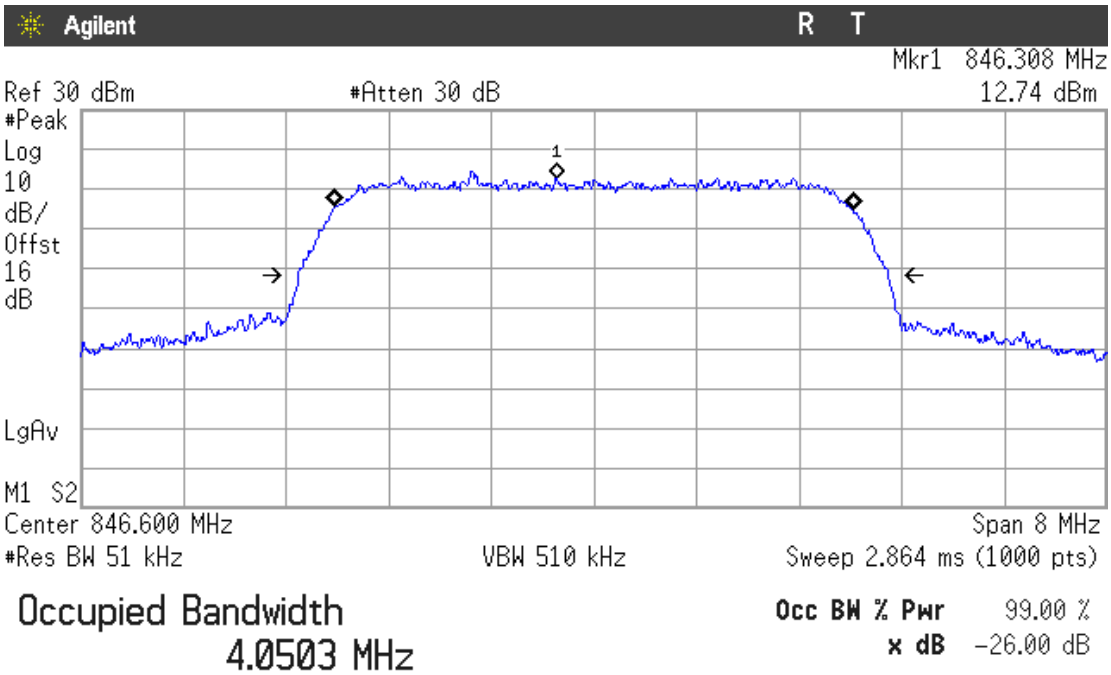
Lowest Channel



Middle Channel



Highest Channel



Spurious emissions at antenna terminals

SPECIFICATION

§2.1051 and §22.917

METHOD

The EUT RF output connector was connected to an spectrum analyser using an 50 ohm attenuator and the resolution bandwidth of the spectrum analyser was set to 1 MHz. The spectrum was investigated from 30 MHz to 10 GHz.

The reading of the spectrum analyser is corrected with the attenuation loss of connection between output terminal of EUT and input of the spectrum analyser.

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

Po (dBm) – [43 + 10 log (Po in mwatts) - 30] = - 13 dBm

RESULTS (see plots in next pages)

GPRS MODULATION

1. CHANNEL: LOWEST
No spurious signals were found in all the range.

2. CHANNEL: MIDDLE

No spurious signals were found in all the range.

3. CHANNEL: HIGHEST

No spurious signals were found in all the range.

EDGE MODULATION

1. CHANNEL: LOWEST
No spurious signals were found in all the range.

2. CHANNEL: MIDDLE

No spurious signals were found in all the range.

3. CHANNEL: HIGHEST

No spurious signals were found in all the range.

WCDMA MODULATION

1. CHANNEL: LOWEST
No spurious signals were found in all the range.

2. CHANNEL: MIDDLE

No spurious signals were found in all the range.

3. CHANNEL: HIGHEST

No spurious signals were found in all the range.

HSUPA MODULATION

1. CHANNEL: LOWEST
No spurious signals were found in all the range.

2. CHANNEL: MIDDLE

No spurious signals were found in all the range.

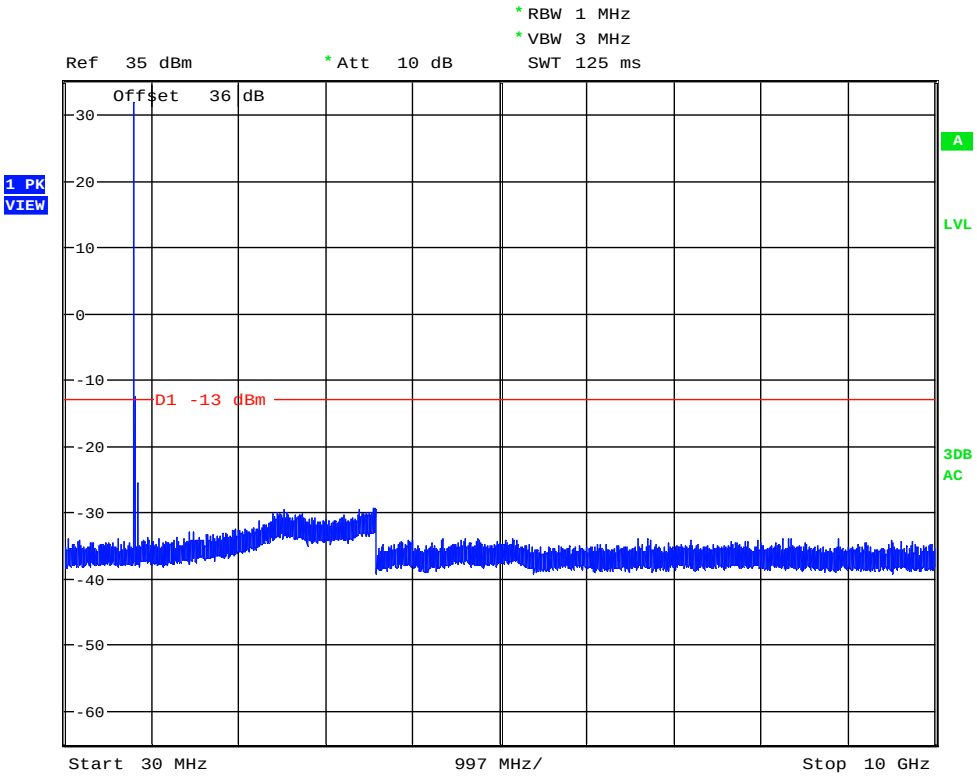
3. CHANNEL: HIGHEST

No spurious signals were found in all the range.

Verdict: PASS

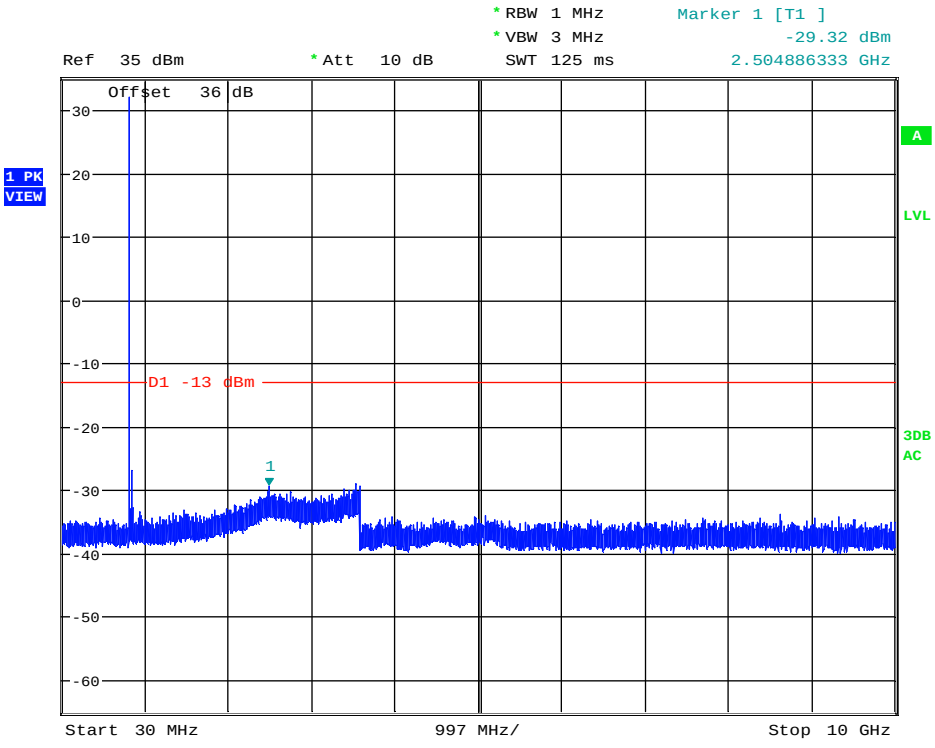
GPRS MODULATION

1. CHANNEL: LOWEST



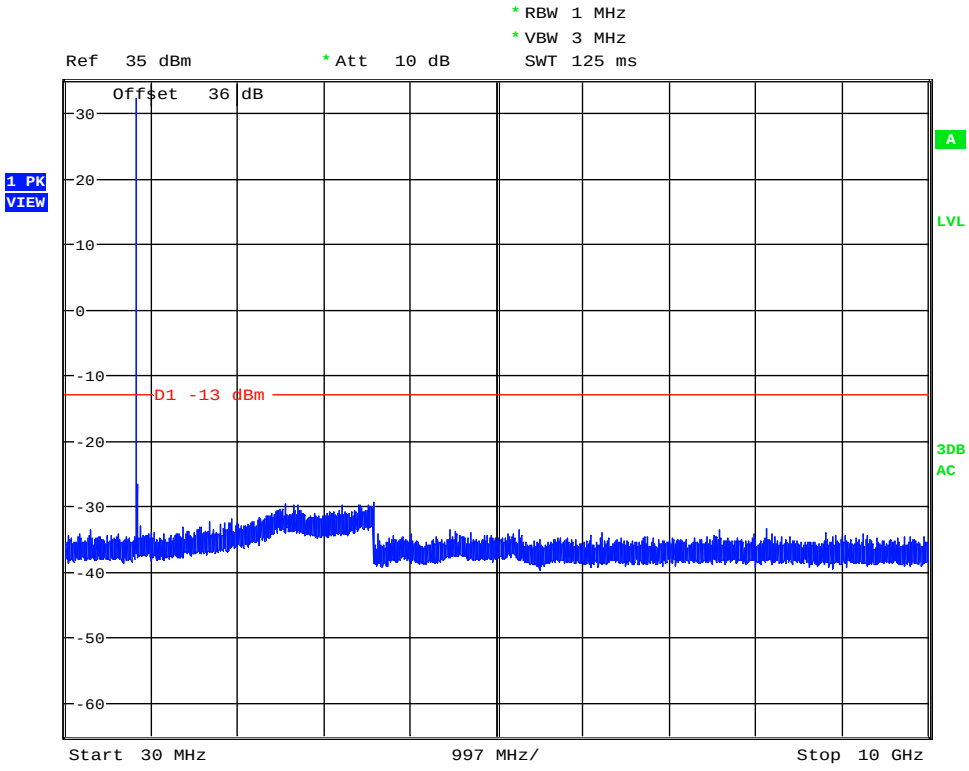
Note: The peak above the limit is the carrier frequency.

2. CHANNEL: MIDDLE



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

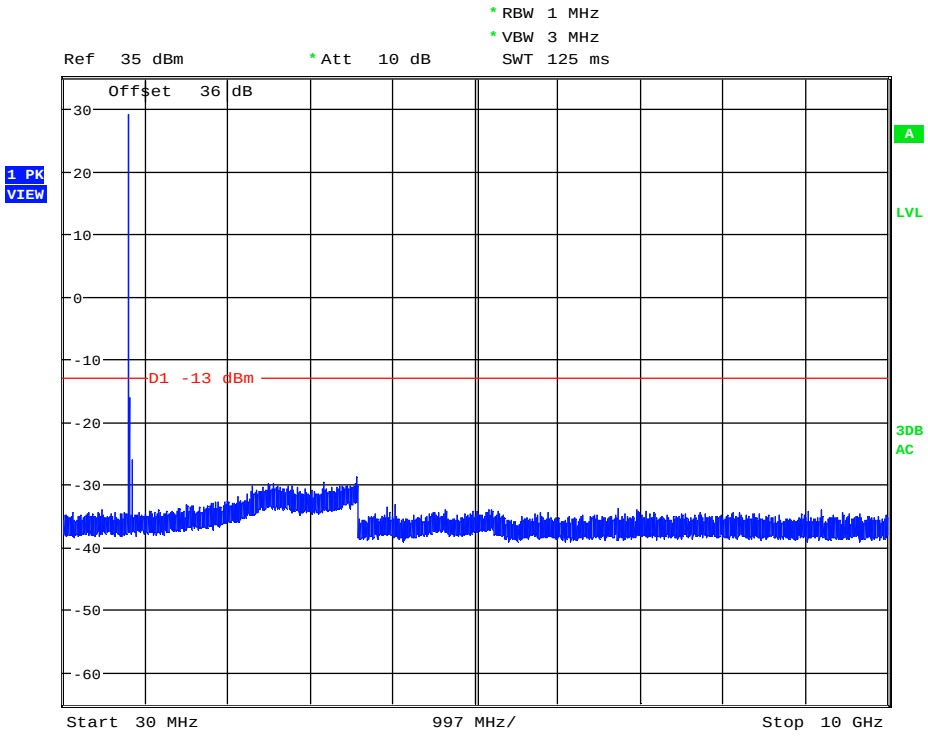
3. CHANNEL: HIGHEST



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

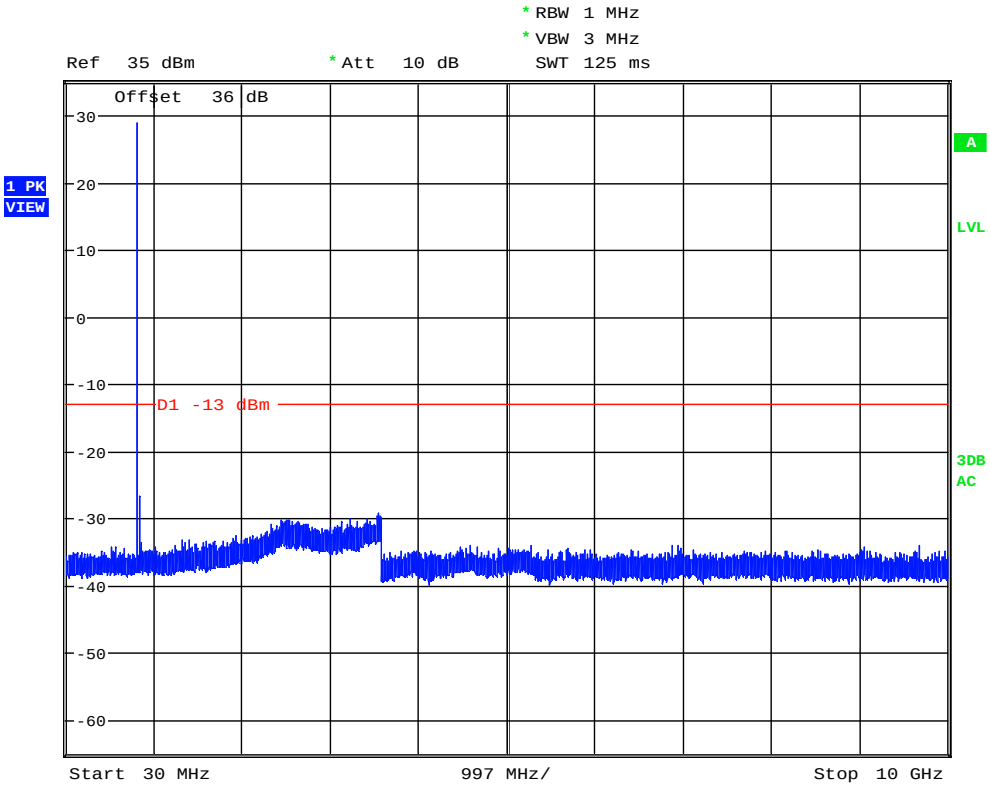
EDGE MODULATION

1. CHANNEL: LOWEST



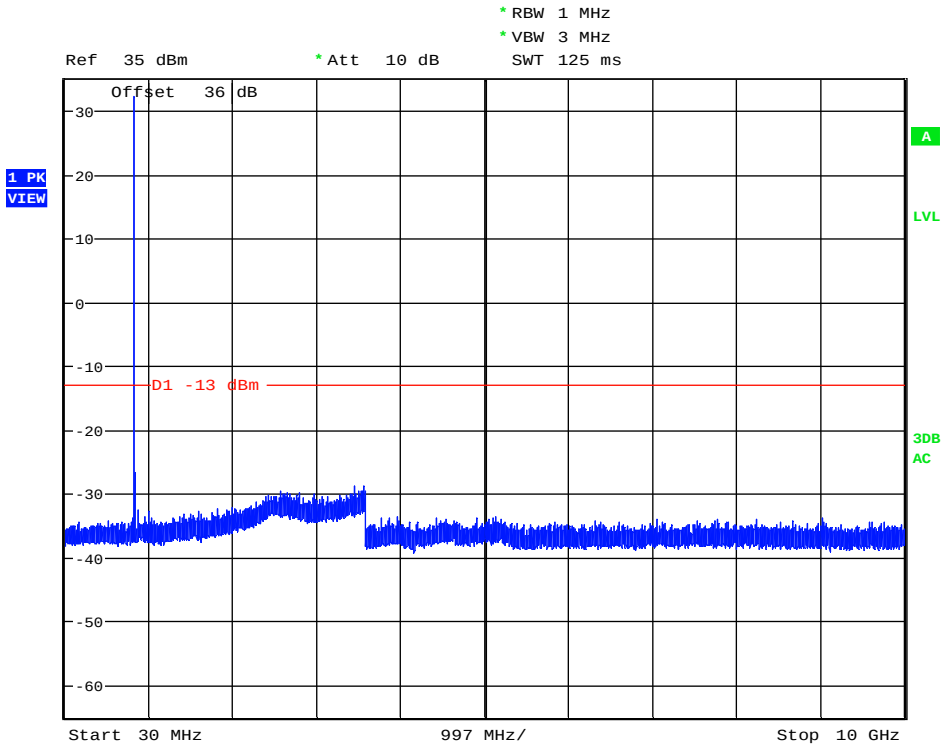
Note: The peak above the limit is the carrier frequency.

2. CHANNEL: MIDDLE



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

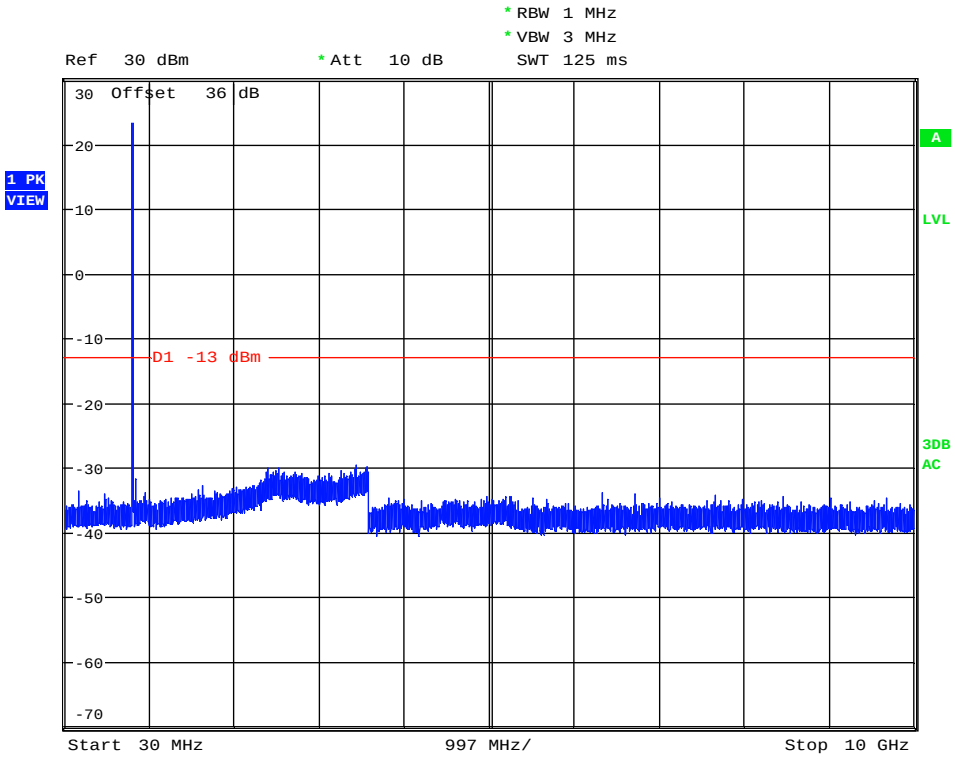
3. CHANNEL: HIGHEST



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

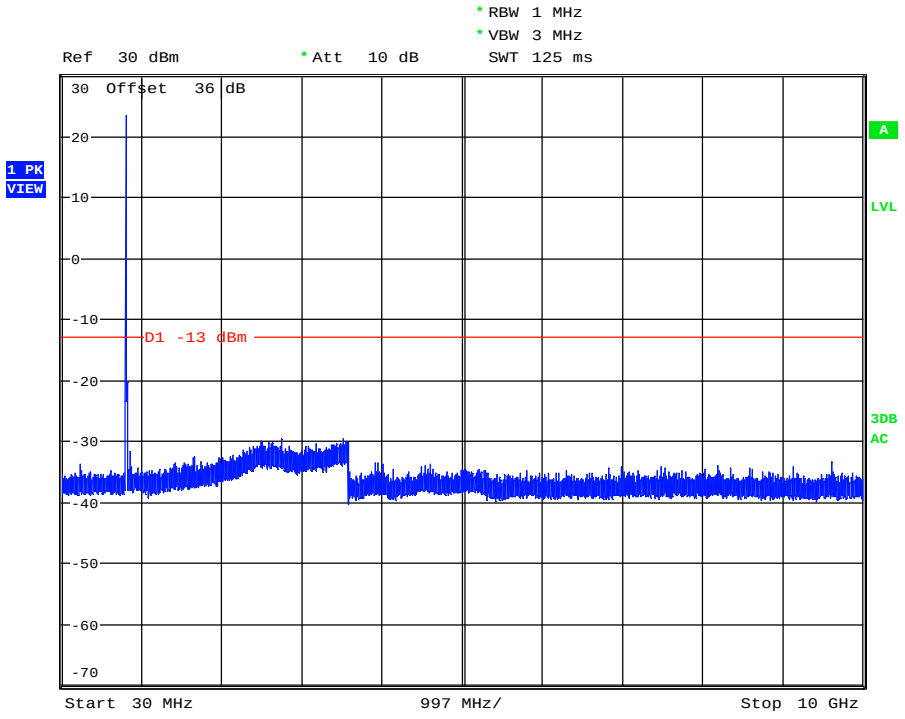
WCDMA MODULATION

1. CHANNEL: LOWEST



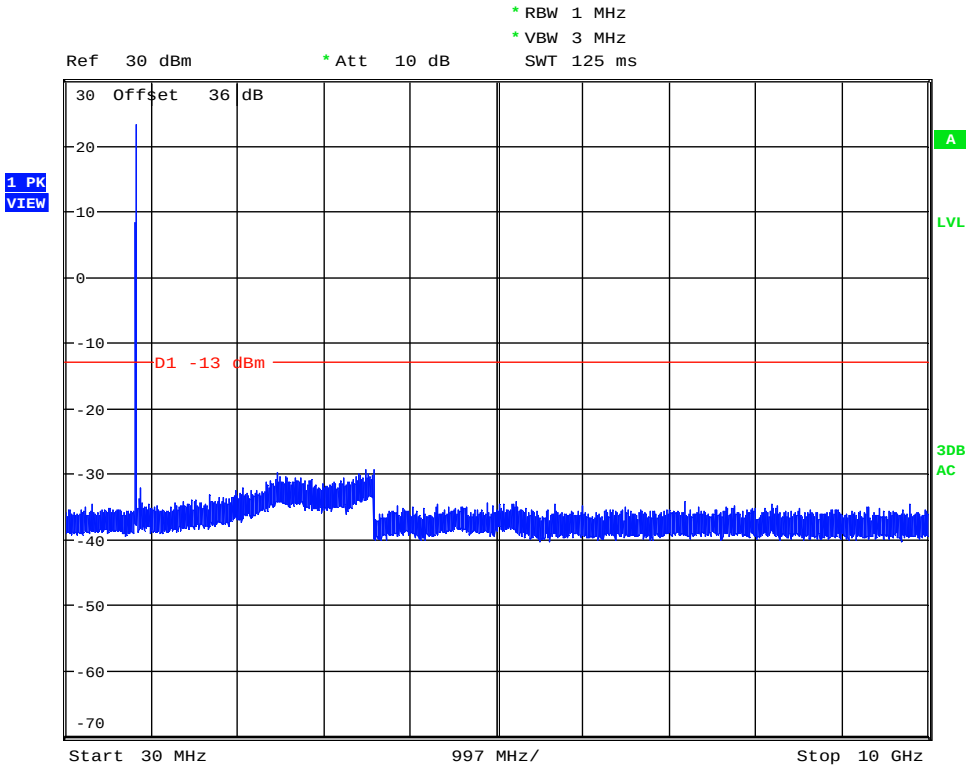
Note: The peak above the limit is the carrier frequency.

2. CHANNEL: MIDDLE



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

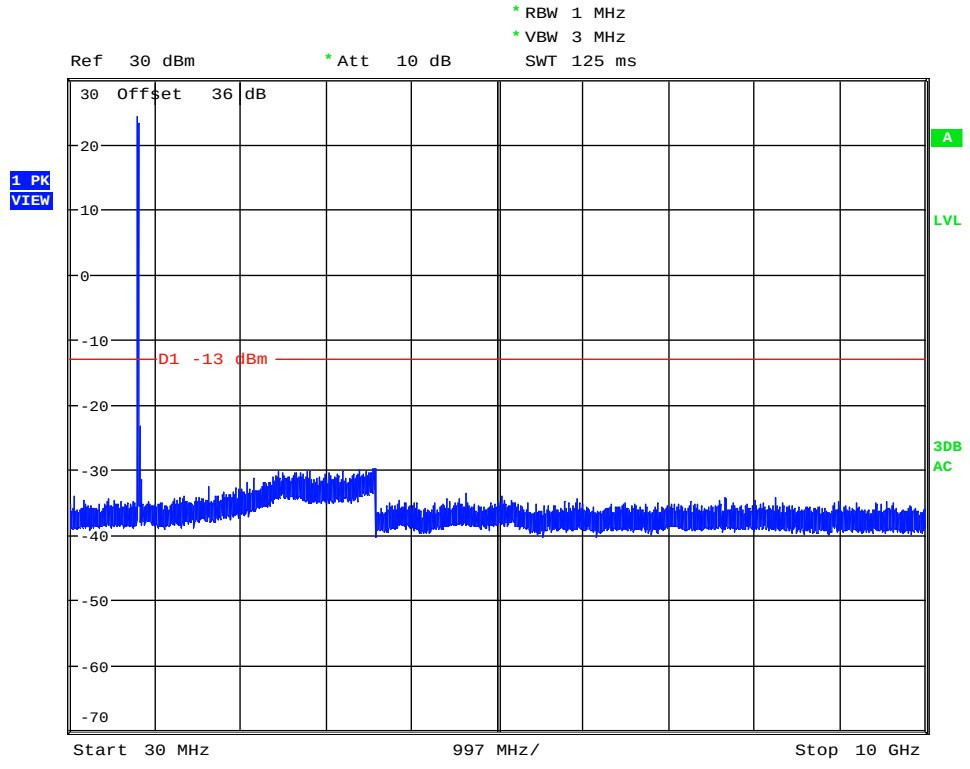
3. CHANNEL: HIGHEST



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

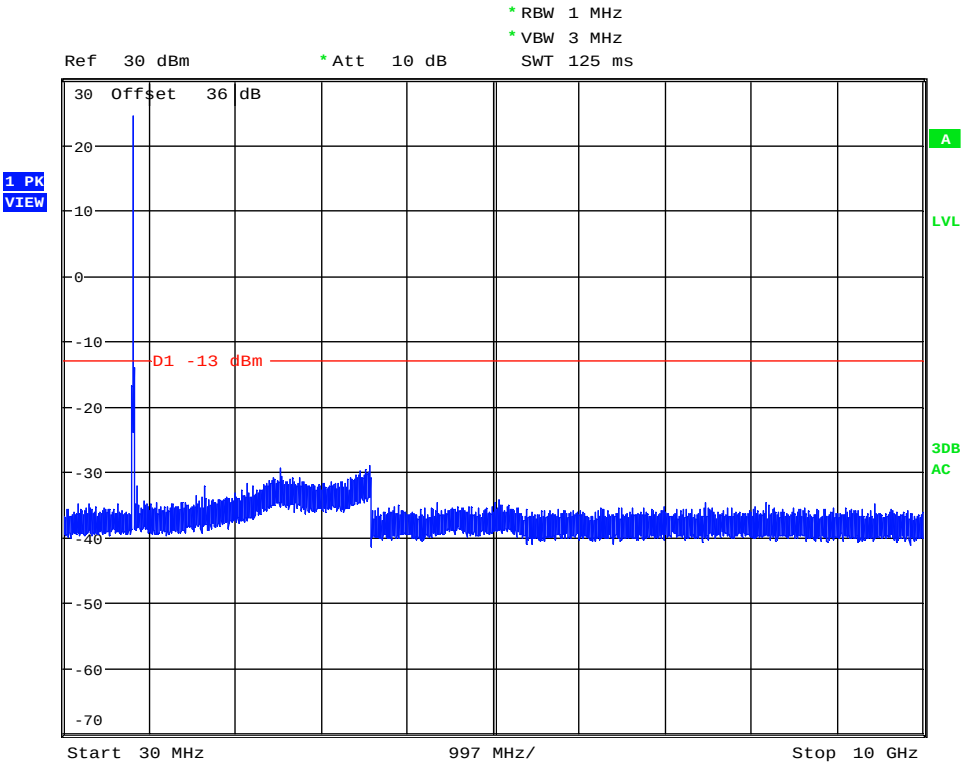
HSUPA MODULATION

1. CHANNEL: LOWEST



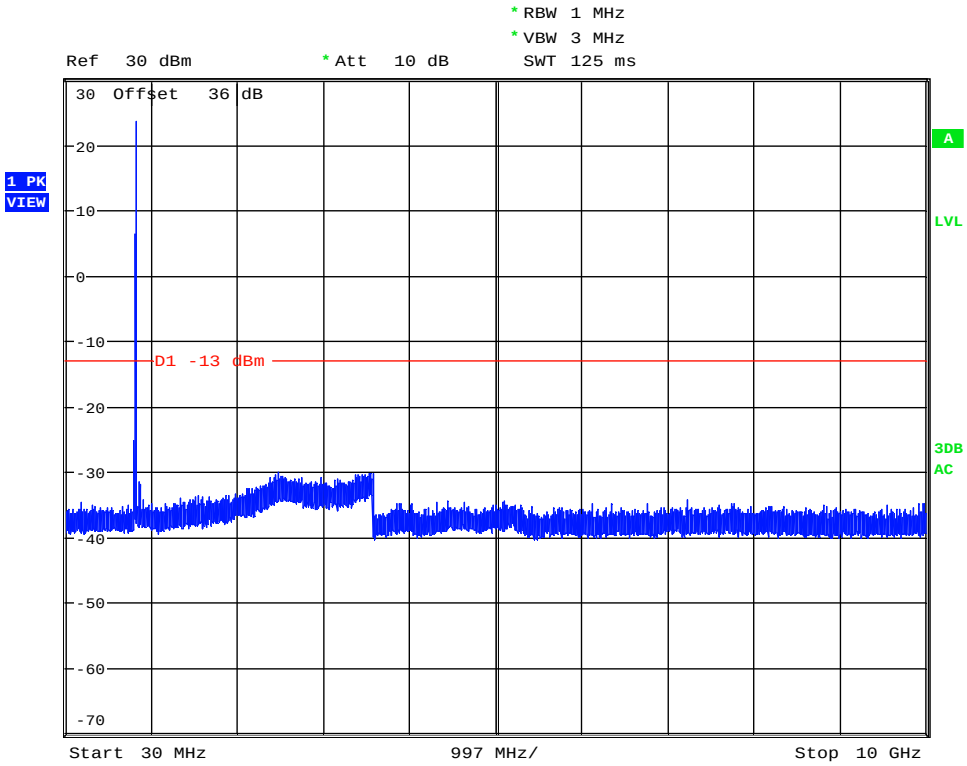
Note: The peak above the limit is the carrier frequency.

2. CHANNEL: MIDDLE



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

3. CHANNEL: HIGHEST



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

Spurious emissions at antenna terminals at Block Edges

SPECIFICATION

§2.1051 and §22.917

METHOD

As indicated in FCC part 22. in the 1 MHz bands immediately outside and adjacent to the frequency block or band a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. A resolution bandwidth of 3.3 kHz was used for GPRS and EDGE modulations and 51 kHz for WCDMA and HSUPA modulations.

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

Po (dBm) – [43 + 10 log (Po in mwatts) - 30] = - 13 dBm

RESULTS (see plots in next pages)

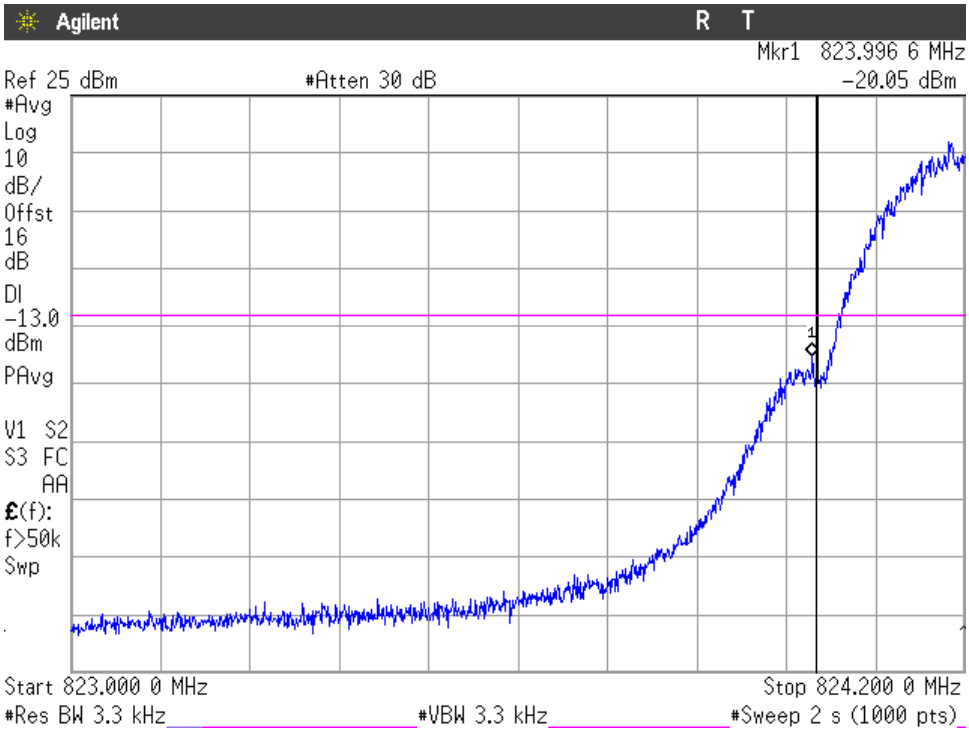
MODULATION:	GPRS	EDGE	WCDMA	HSUPA
Maximum measured level at lowest Block Edge at antenna port (dBm)	-20.05	-30.44	-32.24	-31.06

MODULATION:	GPRS	EDGE	WCDMA	HSUPA
Maximum measured level at highest Block Edge at antenna port (dBm)	-20.35	-30.33	-33.16	-31.77

Measurement uncertainty = ±1.57 dB.

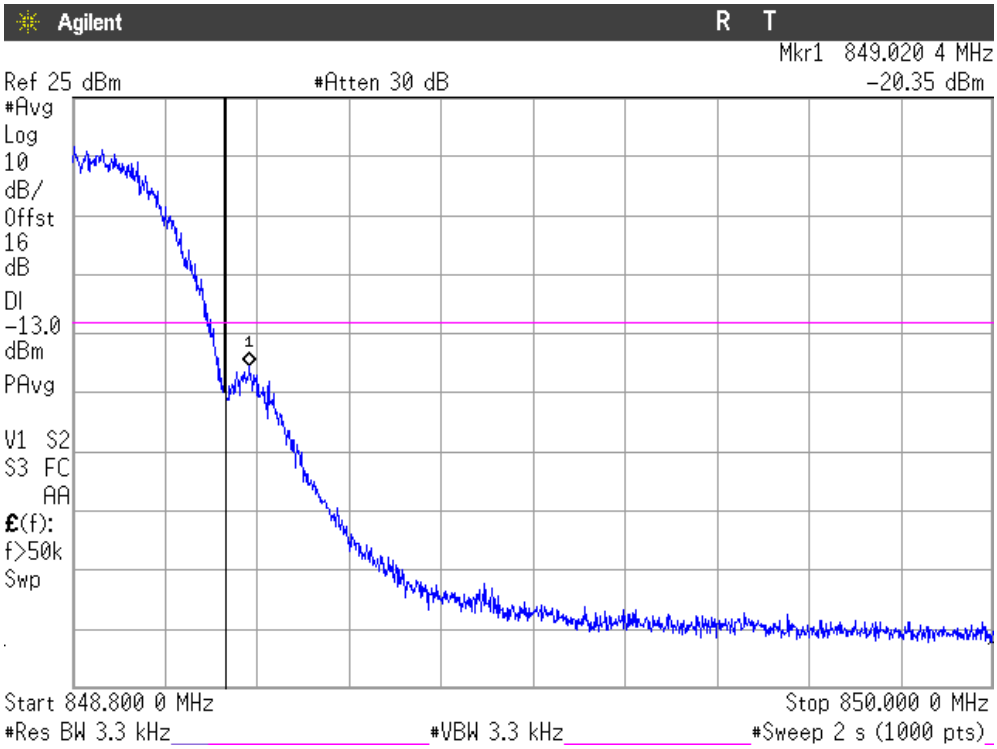
GPRS MODULATION

CHANNEL LOWEST



NOTE: The equipment transmits at the maximum output power

CHANNEL HIGHEST

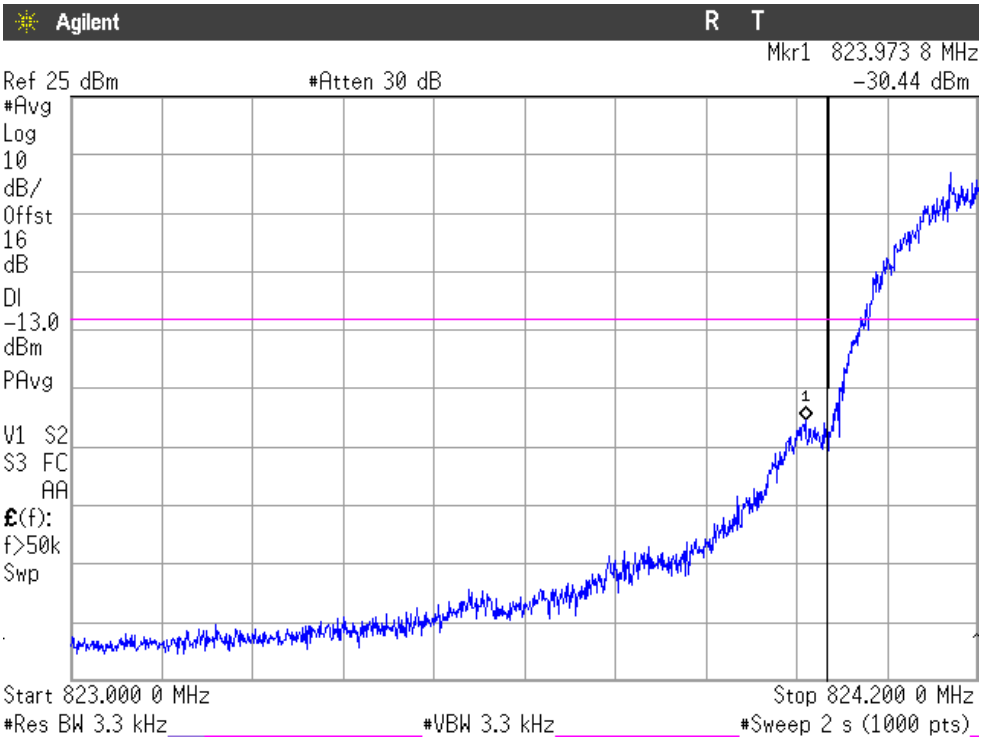


NOTE: The equipment transmits at the maximum output power

Verdict: PASS

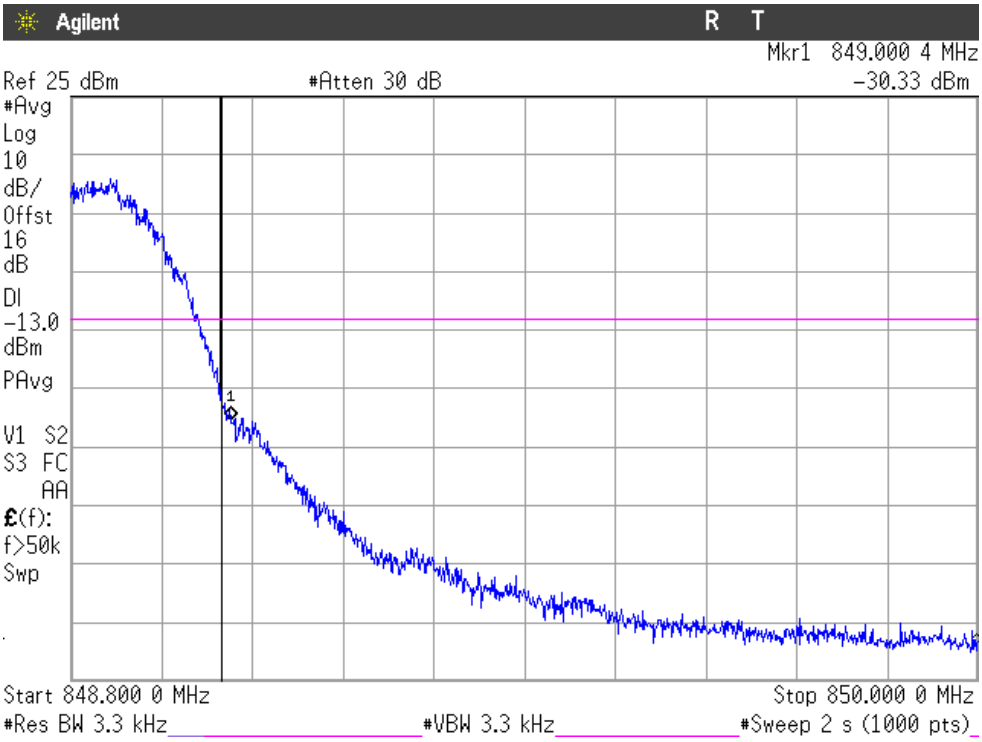
EDGE MODULATION

CHANNEL LOWEST



NOTE: The equipment transmits at the maximum output power

CHANNEL HIGHEST

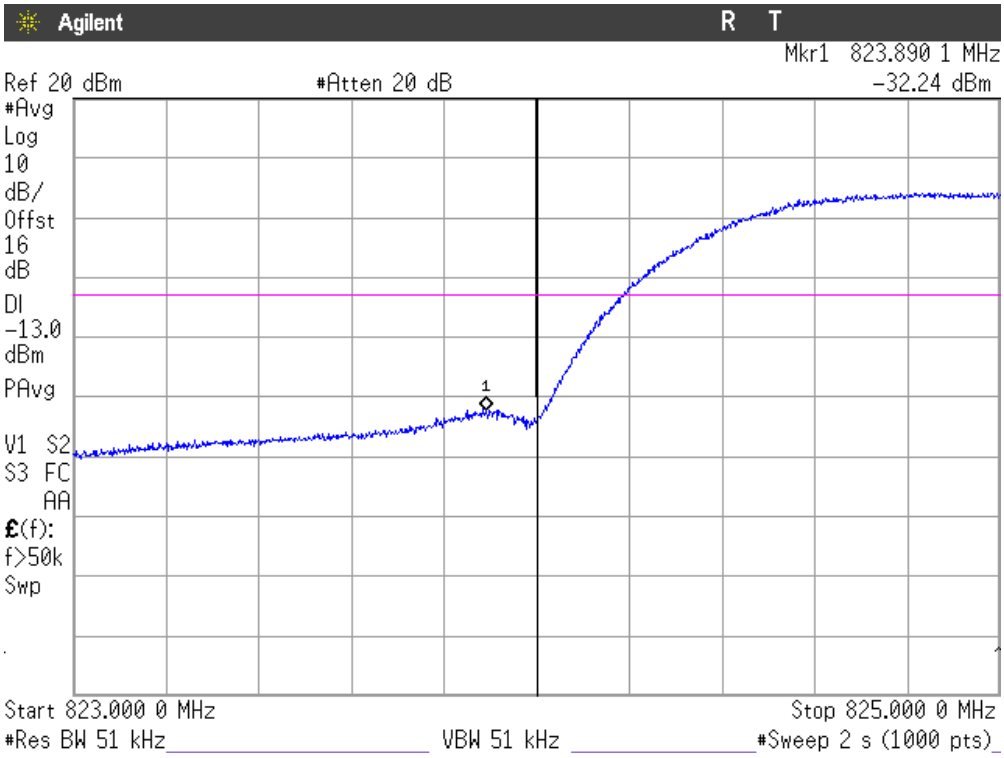


NOTE: The equipment transmits at the maximum output power

Verdict: PASS

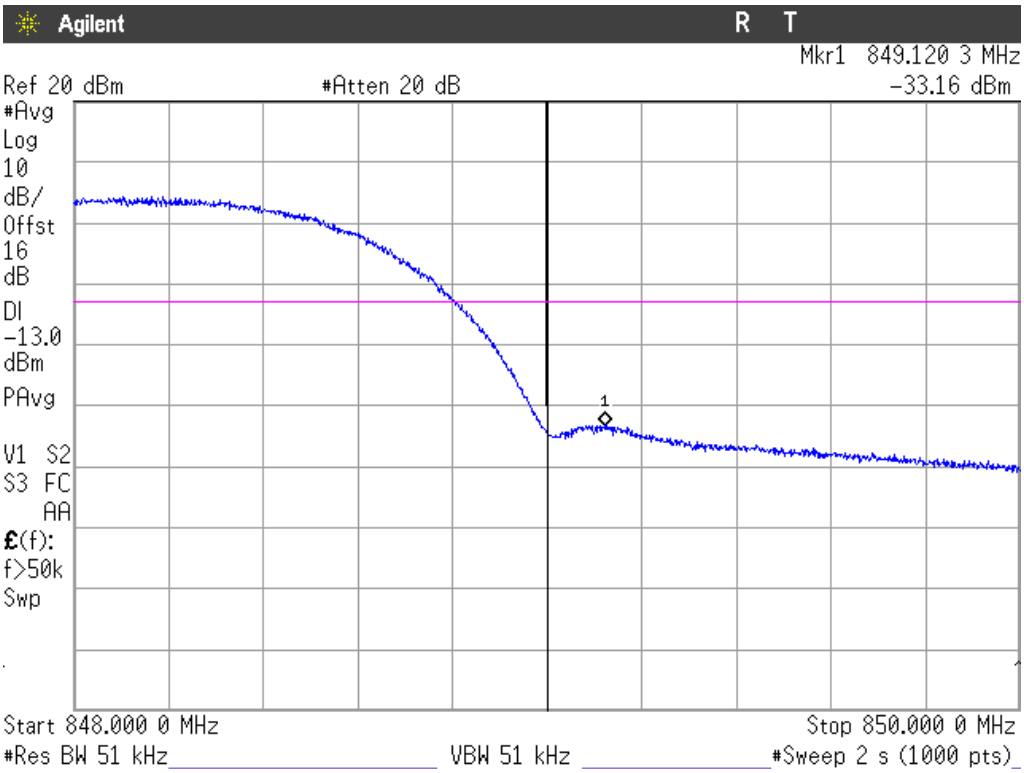
WCDMA MODULATION

CHANNEL LOWEST



NOTE: The equipment transmits at the maximum output power

CHANNEL HIGHEST

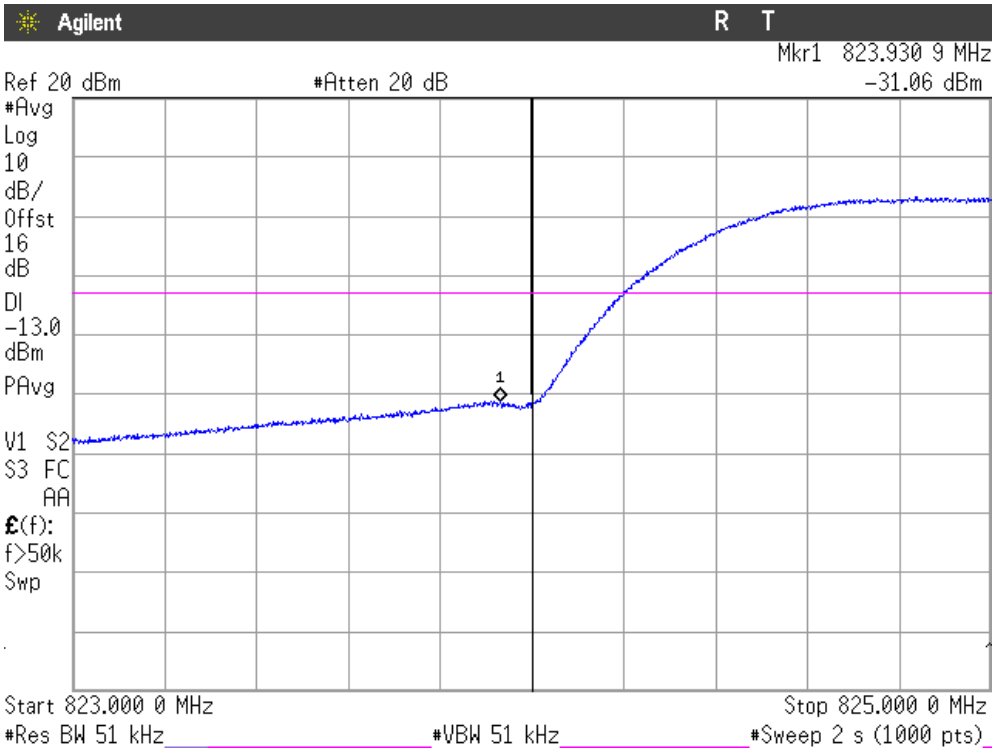


NOTE: The equipment transmits at the maximum output power

Verdict: PASS

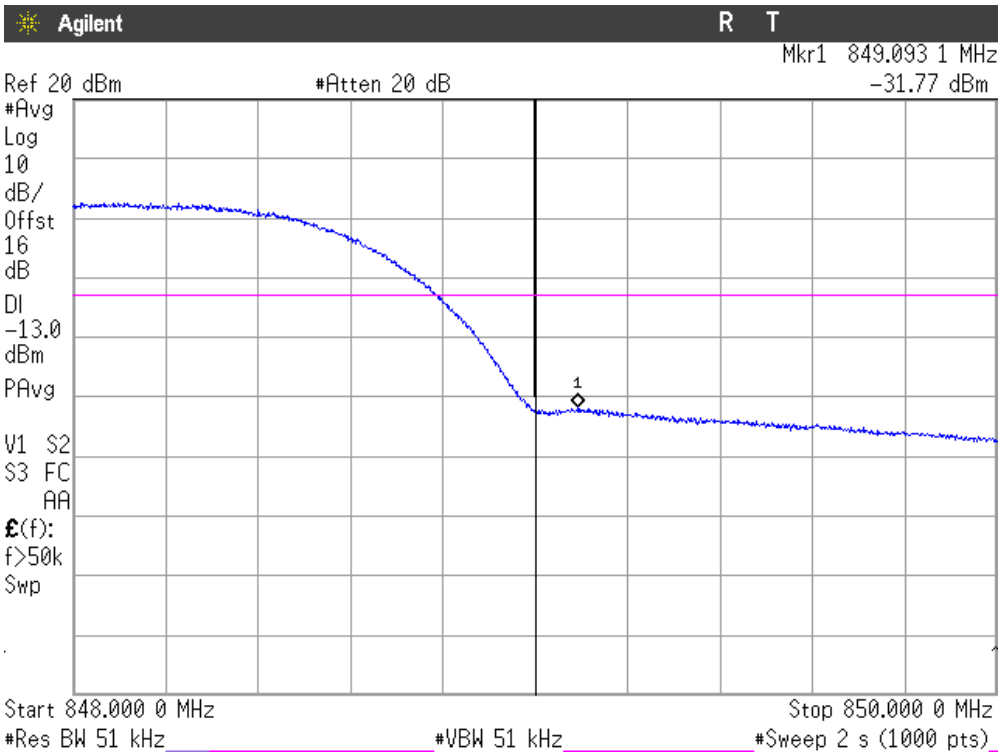
HSUPA MODULATION

CHANNEL LOWEST



NOTE: The equipment transmits at the maximum output power

CHANNEL HIGHEST



NOTE: The equipment transmits at the maximum output power

Verdict: PASS

Radiated emissions

SPECIFICATION

§ 22.917

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 1 meter high 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 emissions were substituted by the Substitution method. in accordance with the ANSI/TIA/EIA-603-C: 2004.

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

Po (dBm) – [43 + 10 log (Po in mwatts) - 30] = - 13 dBm

RESULTS

GPRS AND EDGE MODULATION

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

1. CHANNEL: LOWEST

Frequency range 30 MHz-1000 MHz.
No spurious signals were found in all the range.

Frequency range 1 GHz-12.75 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 spurious signals were found in all the range.

Frequency range 1 GHz-12.75 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 spurious signals were found in all the range.

Frequency range 1 GHz-12.75 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 plots show the results for WCDMA modulation.

1. CHANNEL: LOWEST

Frequency range 30 MHz-1000 MHz.
No spurious signals were found in all the range.

Frequency range 1 GHz-12.75 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 spurious signals were found in all the range.

Frequency range 1 GHz-12.75 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 spurious signals were found in all the range.

Frequency range 1 GHz-12.75 GHz.

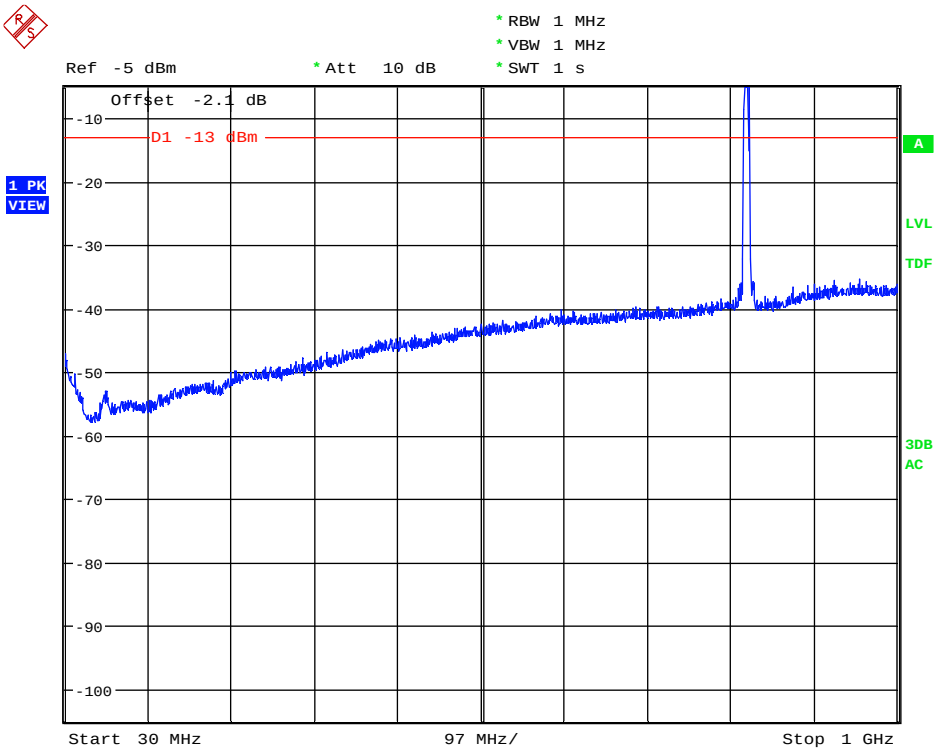
No radiated spurious signals were detected at less than 20 dB respect to the limit.

Verdict: PASS

FREQUENCY RANGE 30 MHz-1000 MHz.

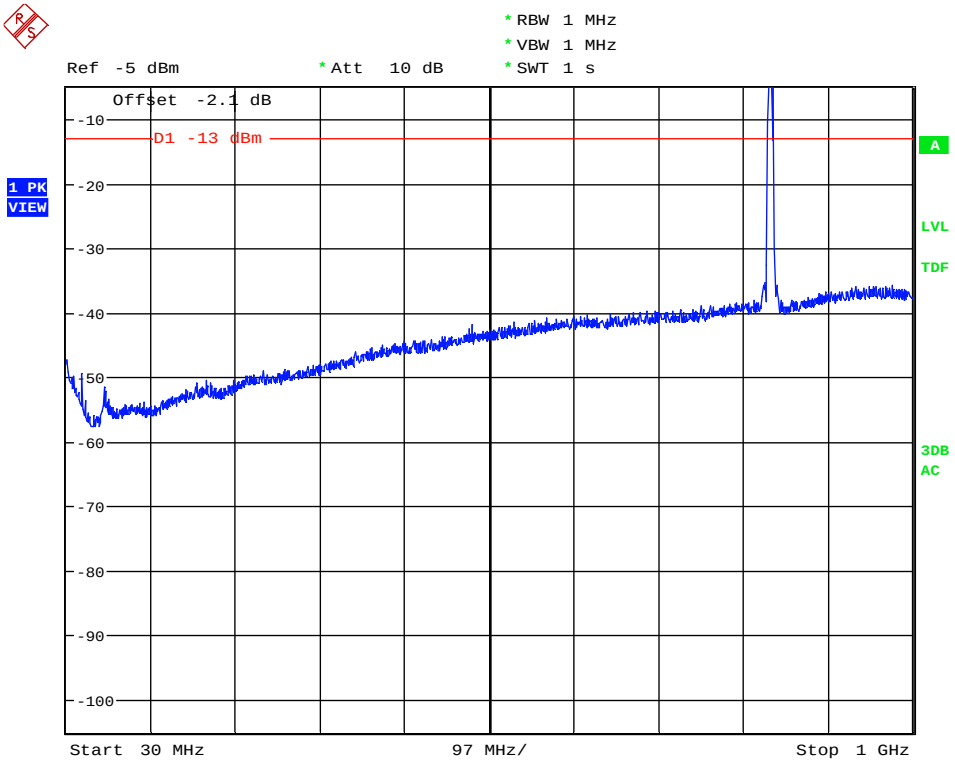
GPRS MODULATION

CHANNEL: LOWEST



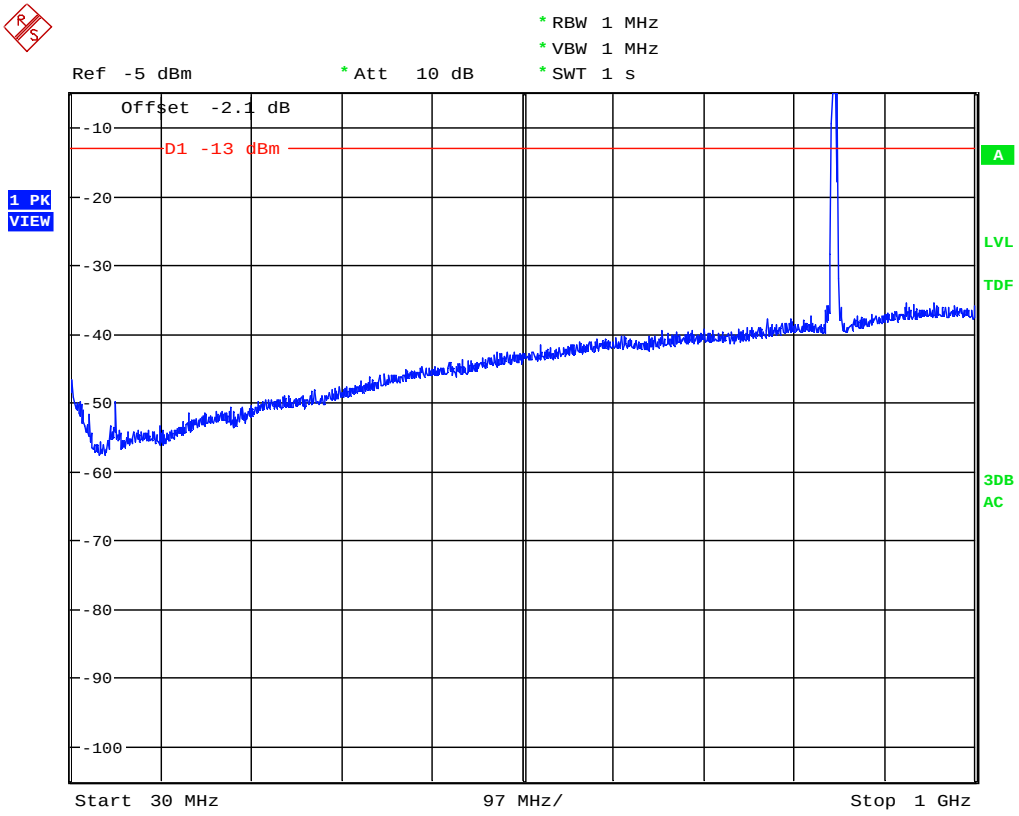
Note: The peak above the limit is the carrier frequency.

CHANNEL: MIDDLE



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

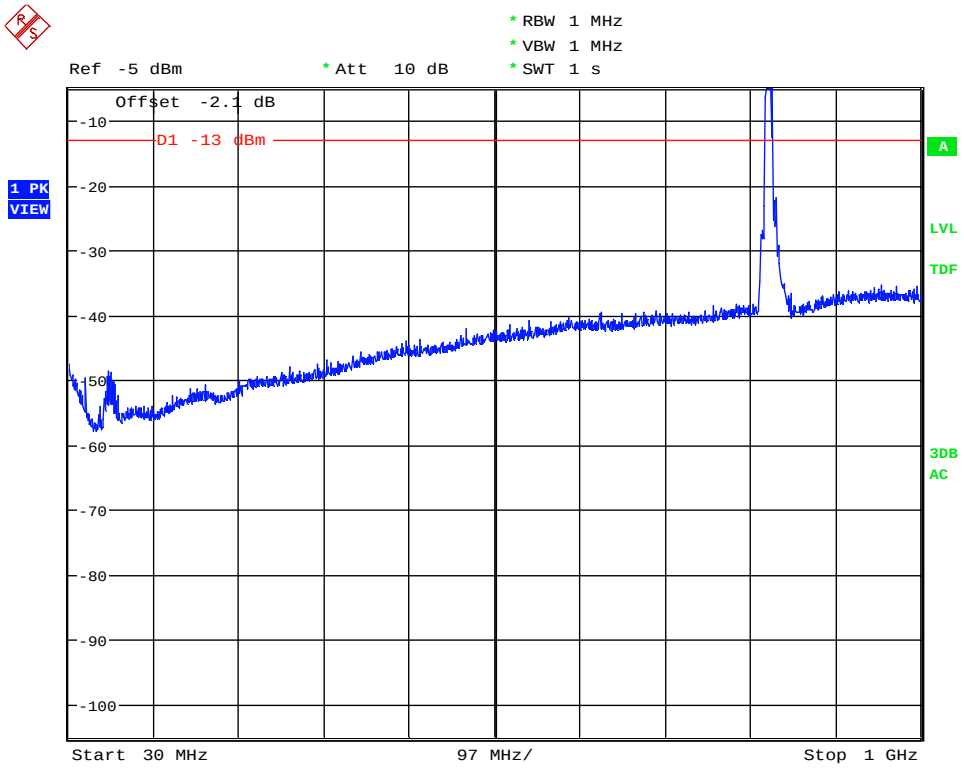
CHANNEL: HIGHEST



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

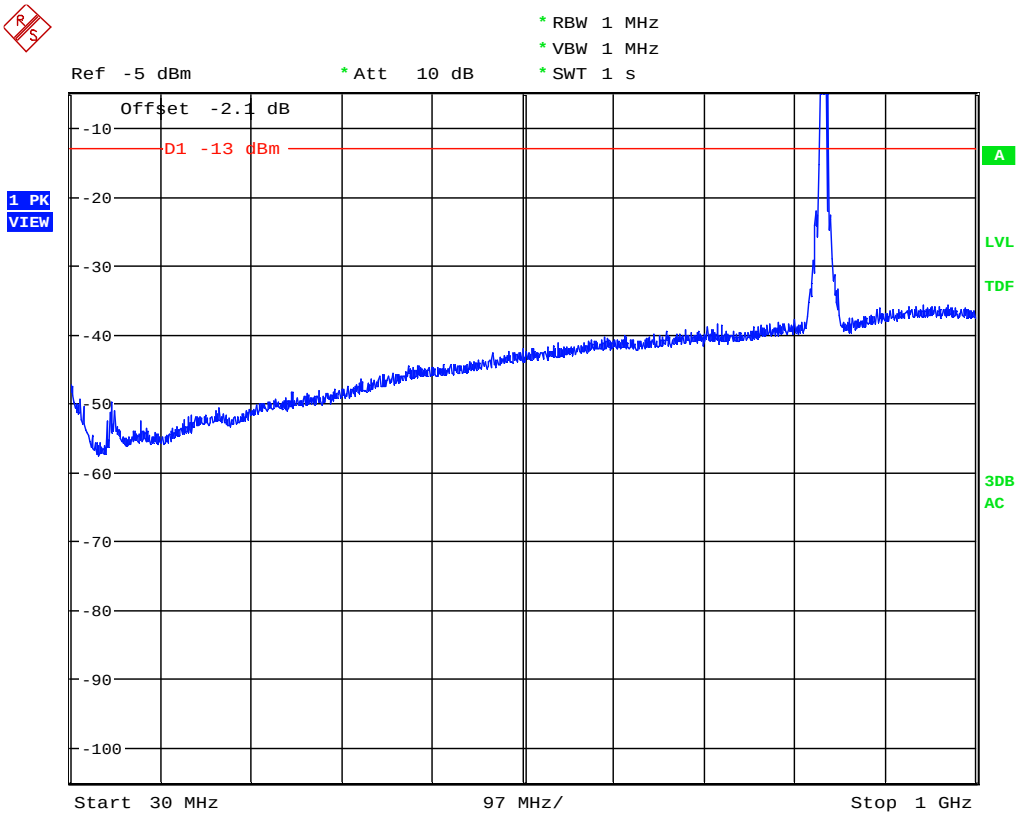
WCDMA MODULATION

CHANNEL: LOWEST



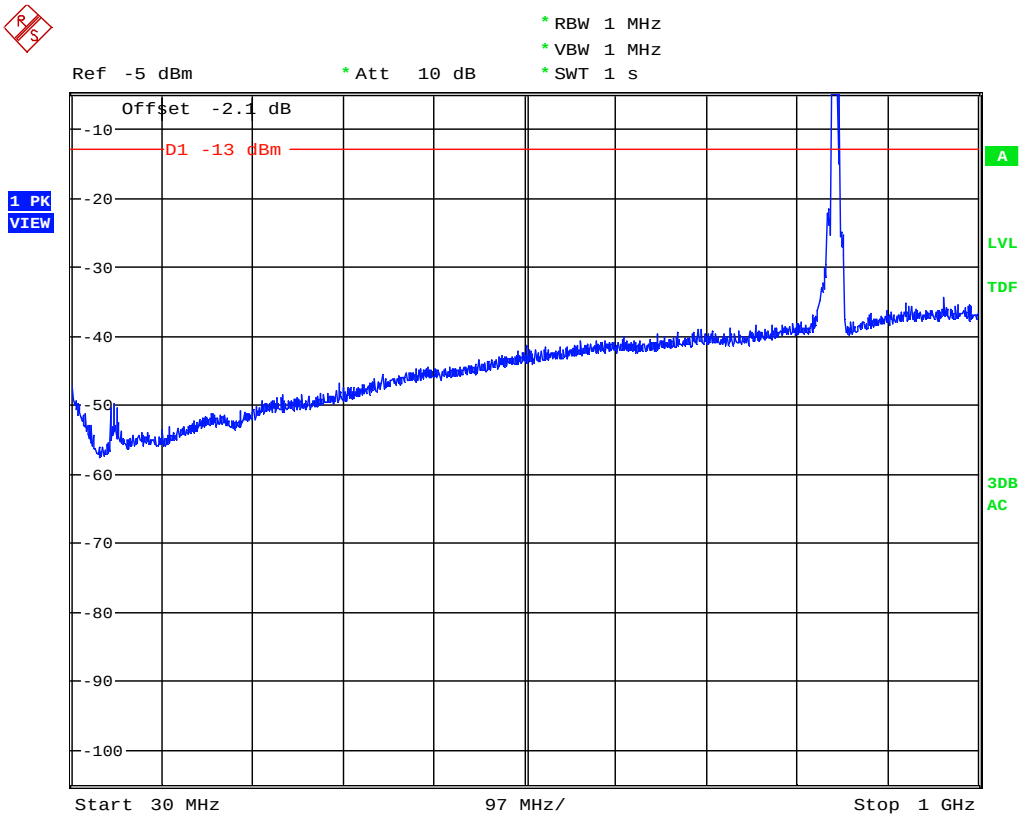
Note: The peak above the limit is the carrier frequency.

CHANNEL: MIDDLE



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

CHANNEL: HIGHEST

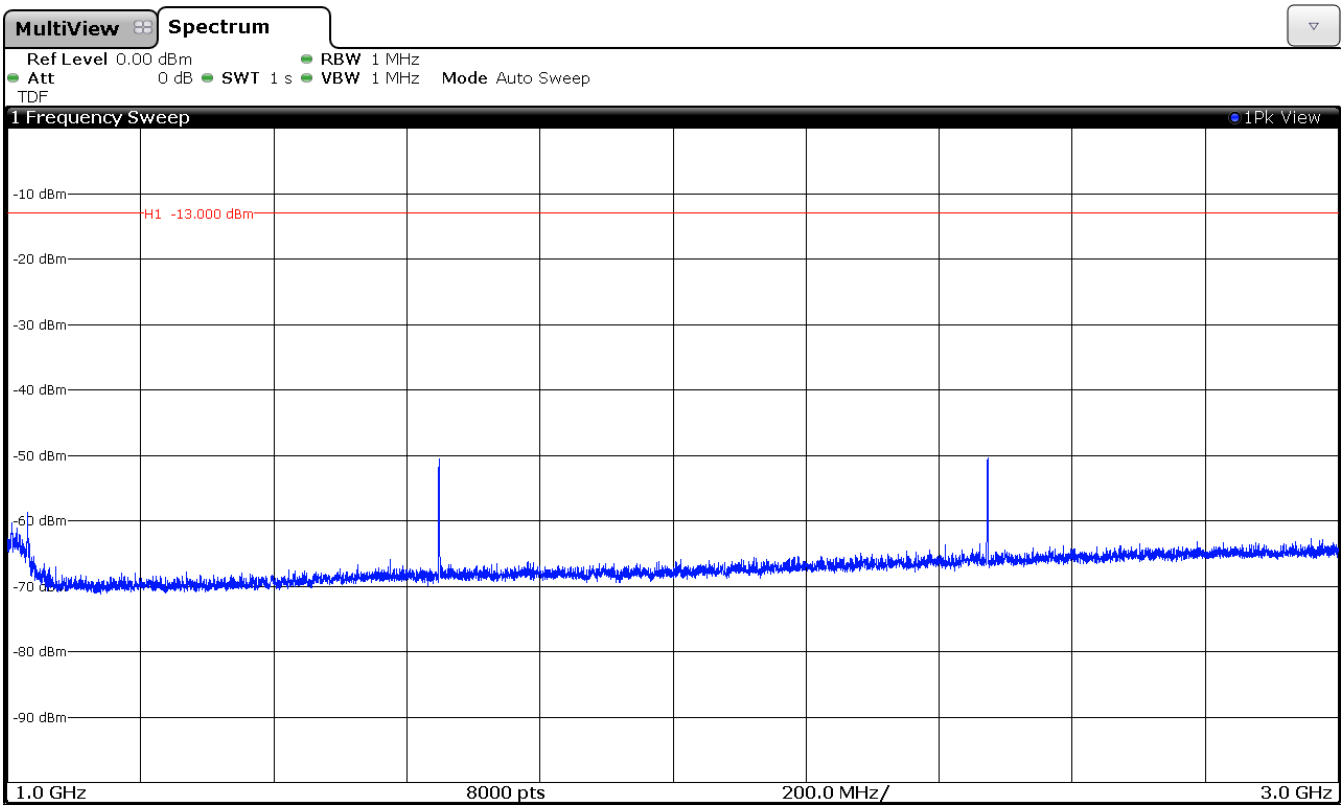


Note: The peak above the limit is the carrier frequency.

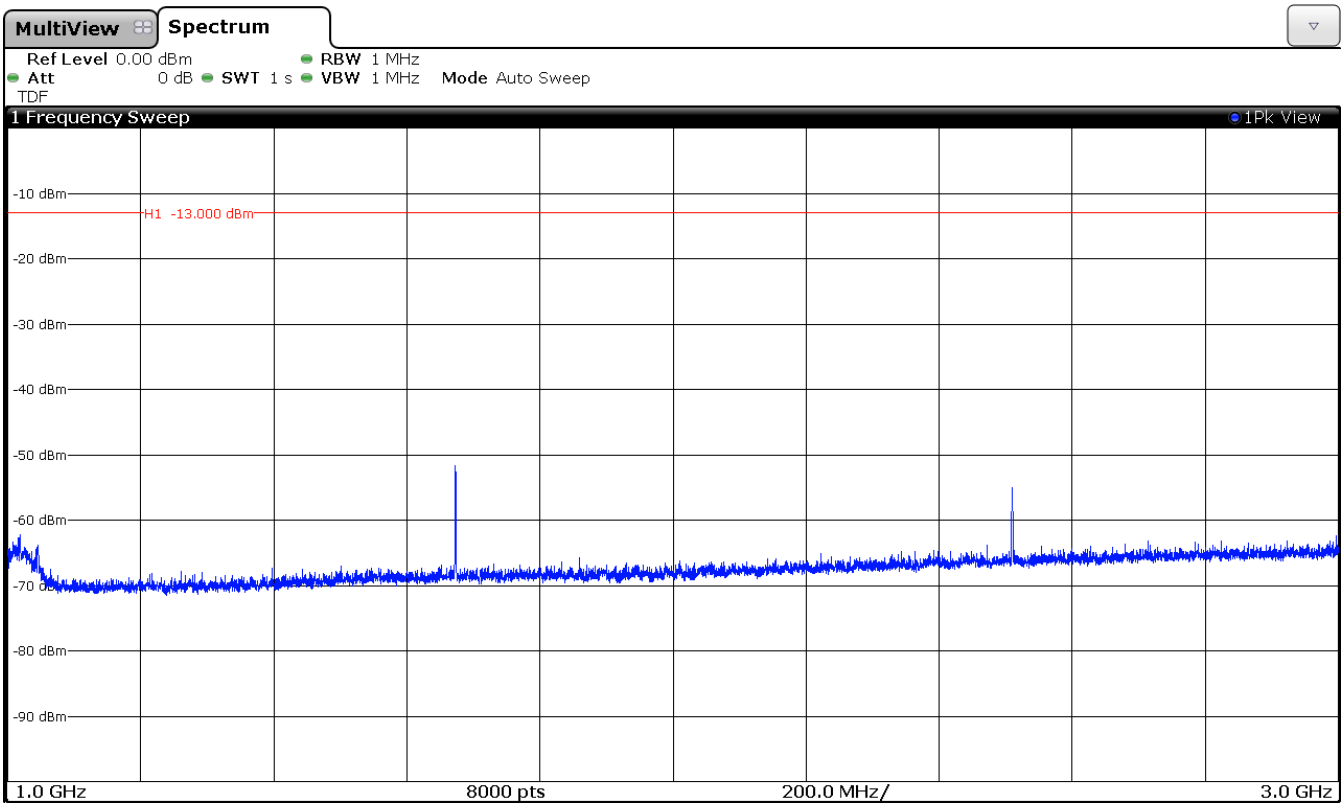
FREQUENCY RANGE 1 GHz to 3 GHz.

GPRS MODULATION

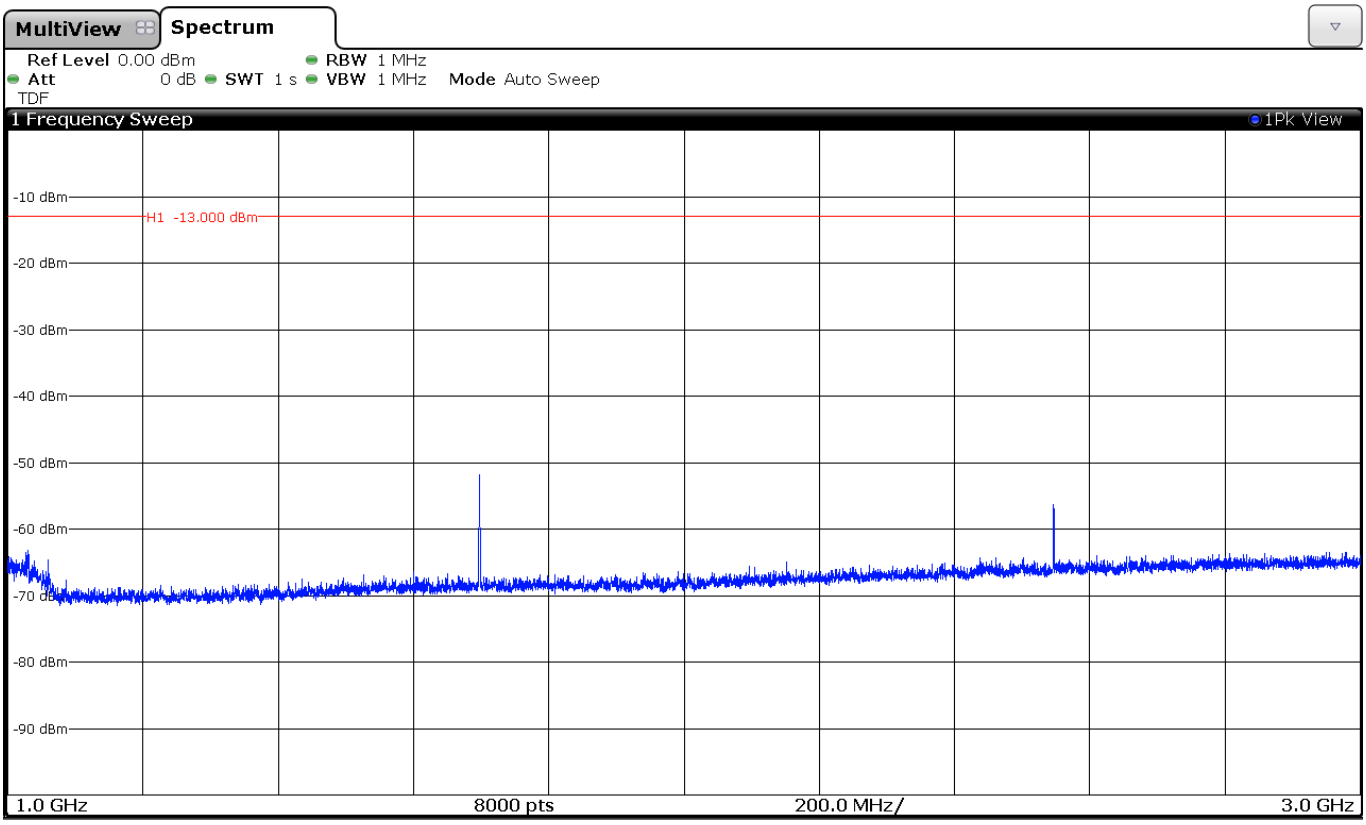
CHANNEL: LOWEST



CHANNEL: MIDDLE

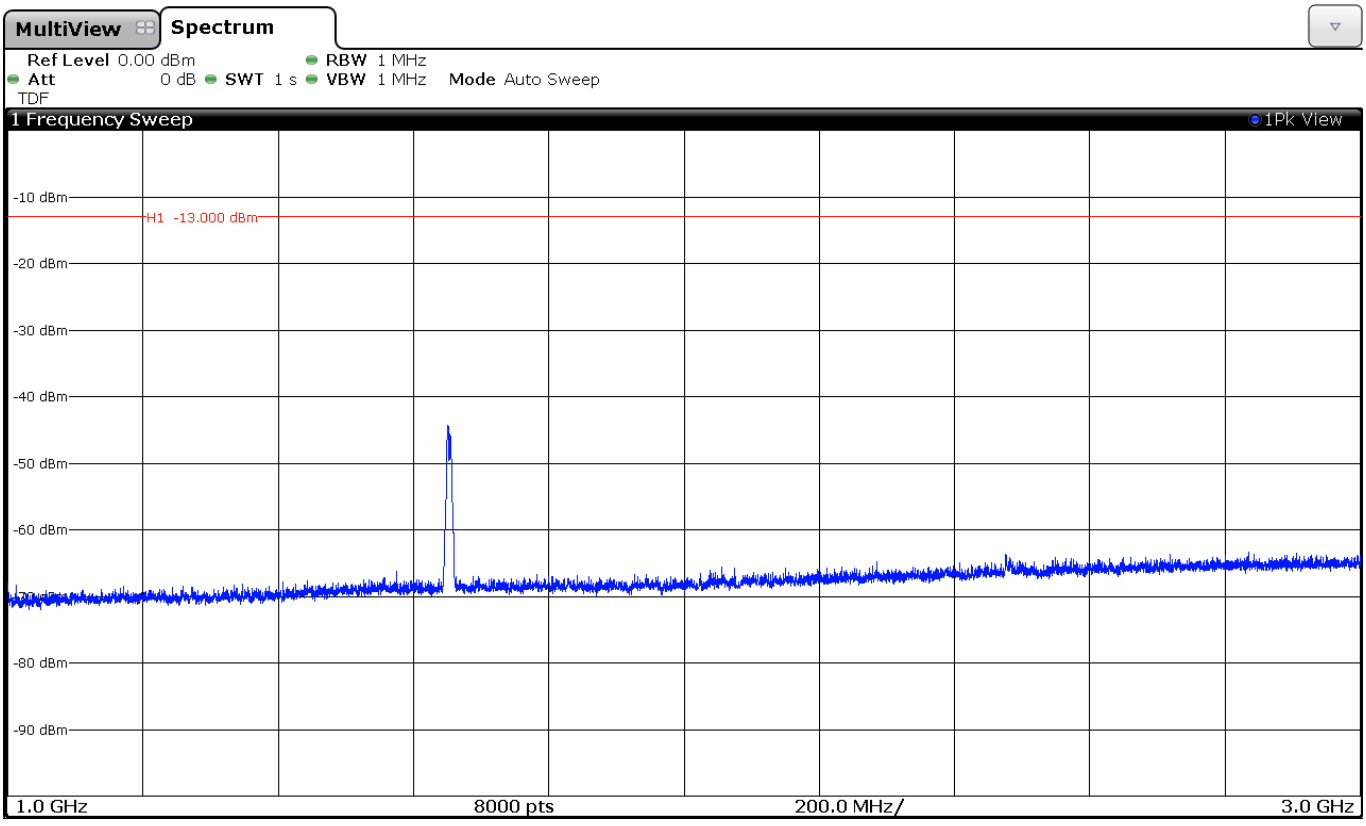


CHANNEL: HIGHEST

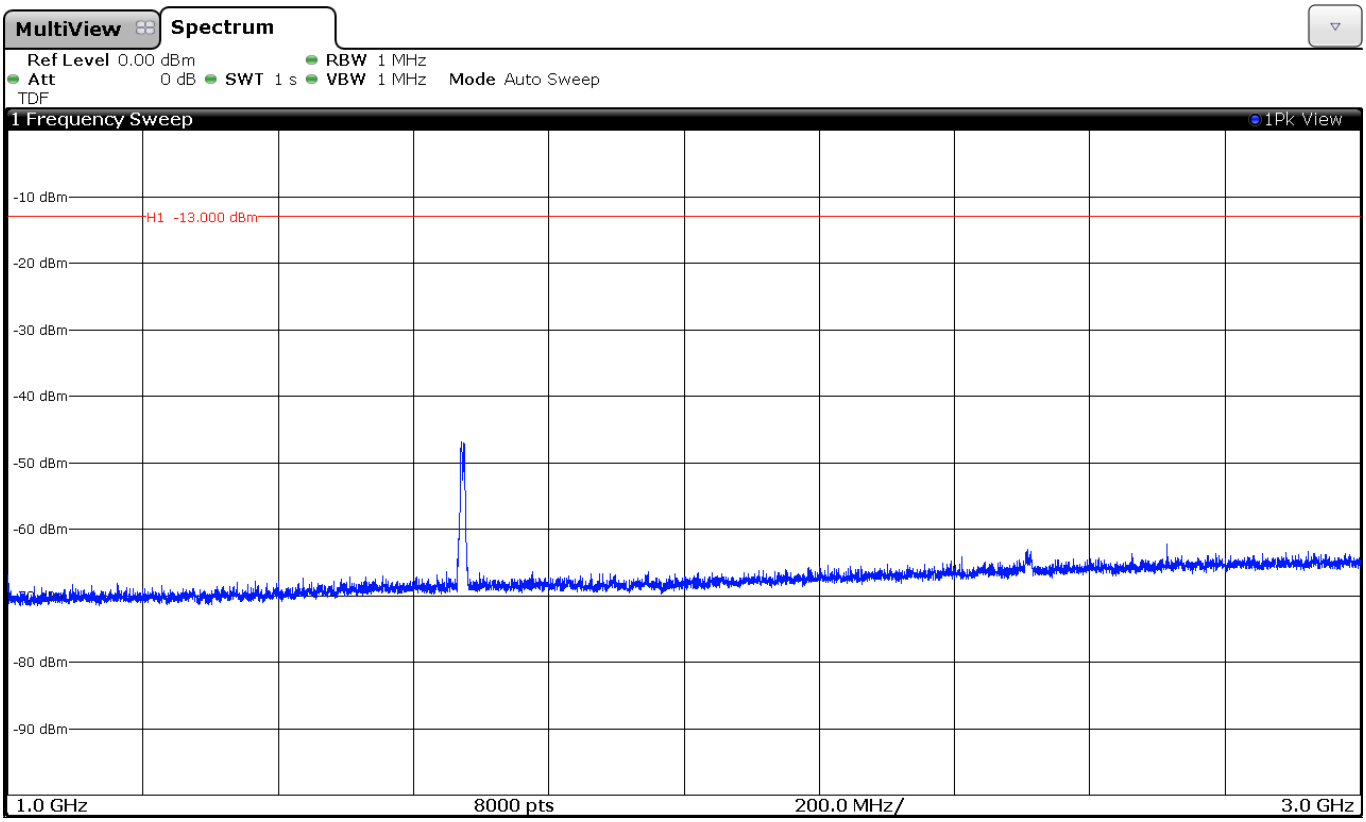


WCDMA MODULATION

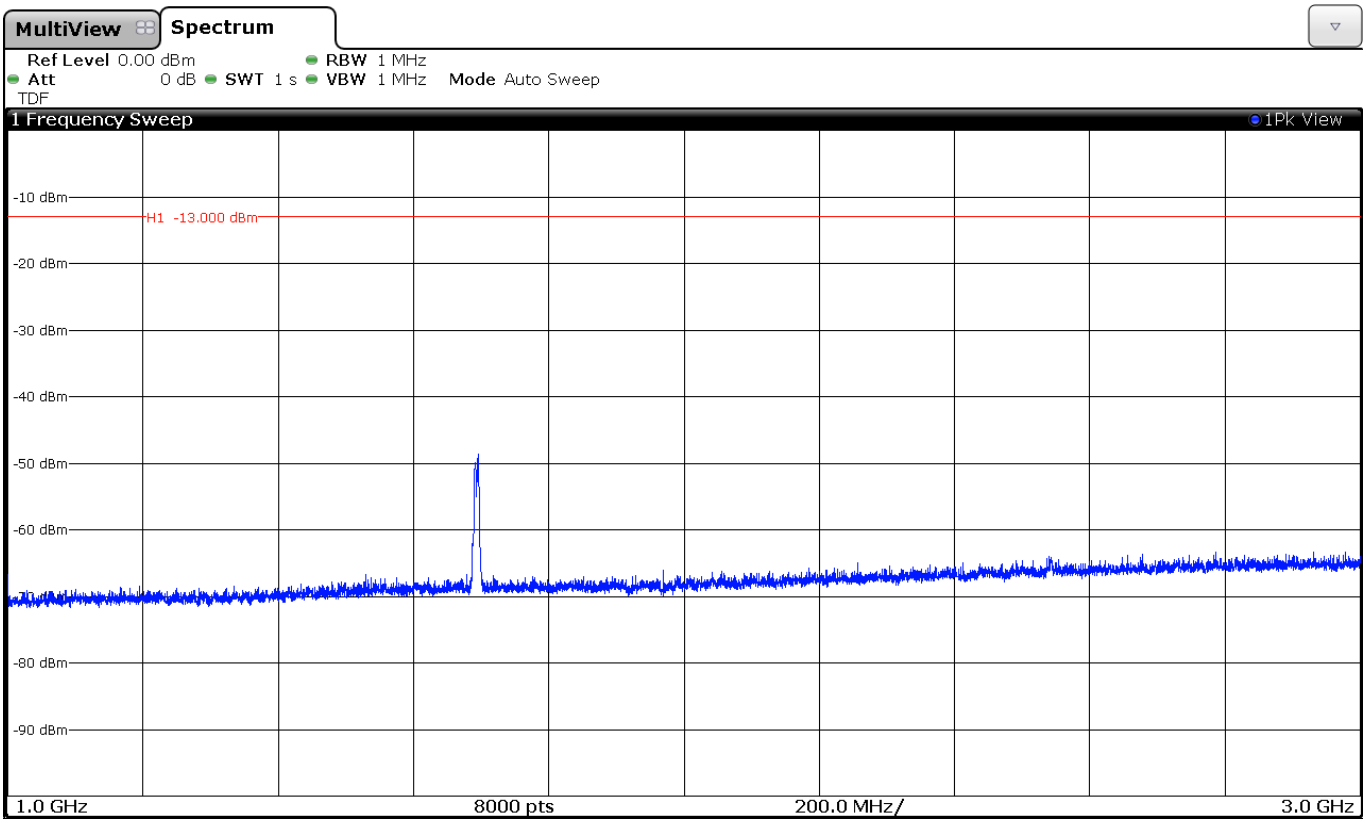
CHANNEL: LOWEST



CHANNEL: MIDDLE



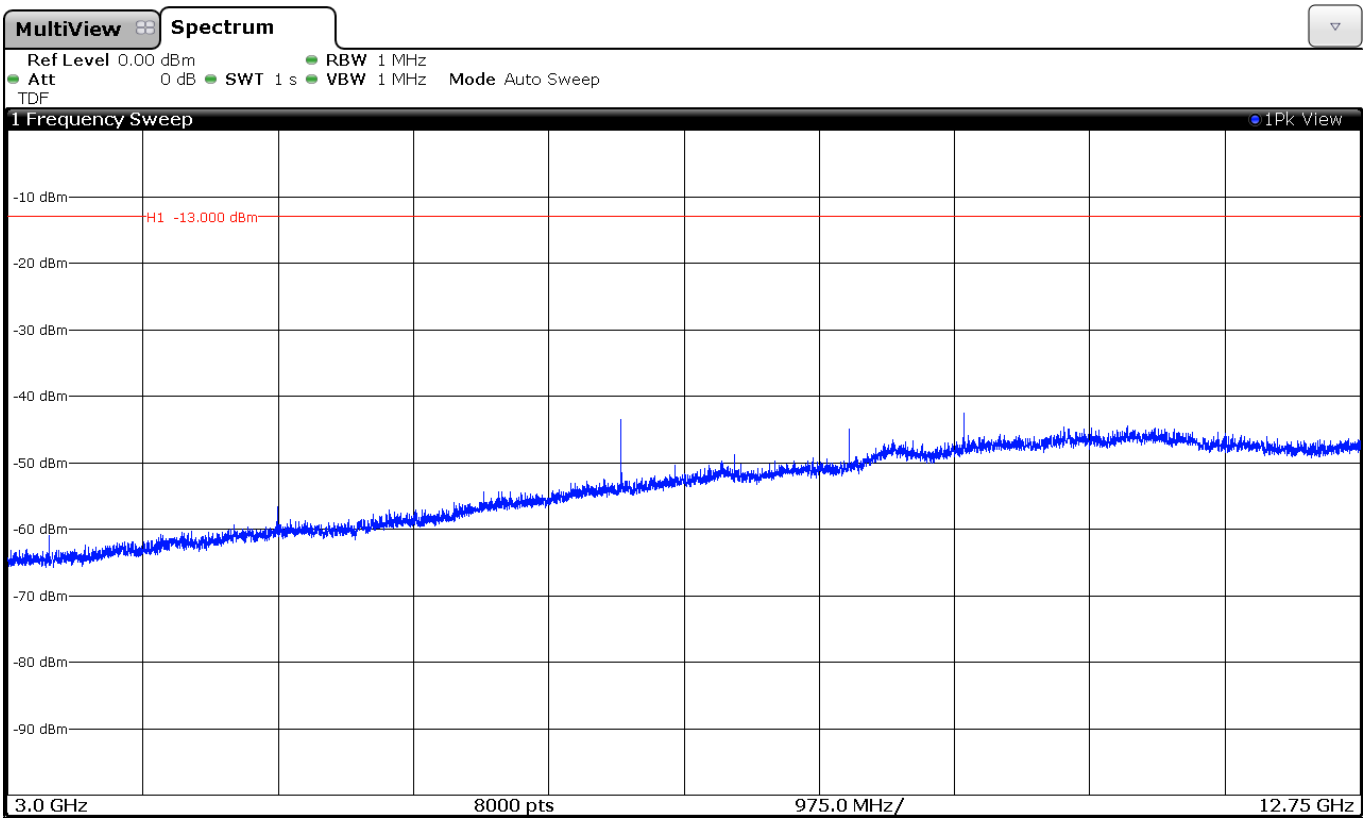
CHANNEL: HIGHEST



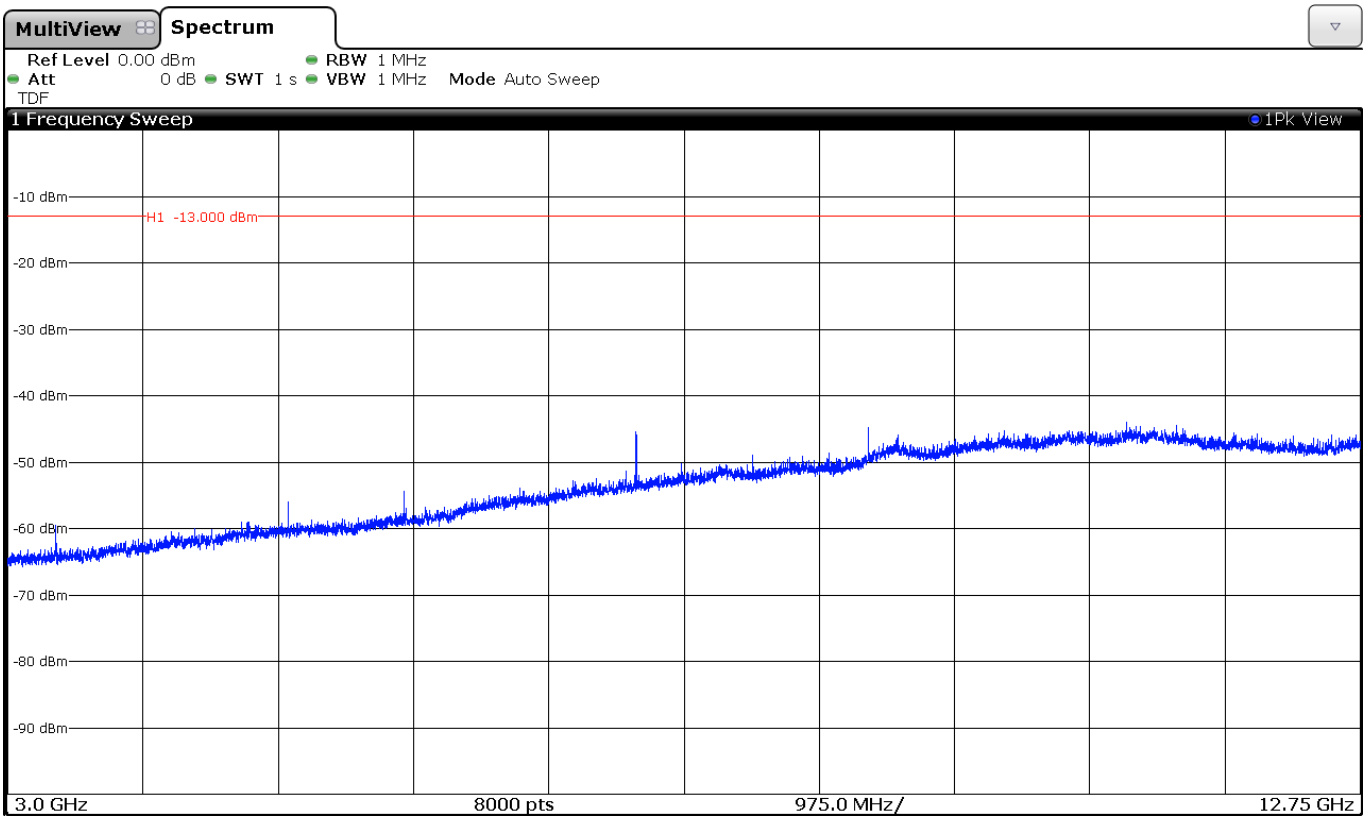
FREQUENCY RANGE 3 GHz to 12.75 GHz.

GPRS MODULATION

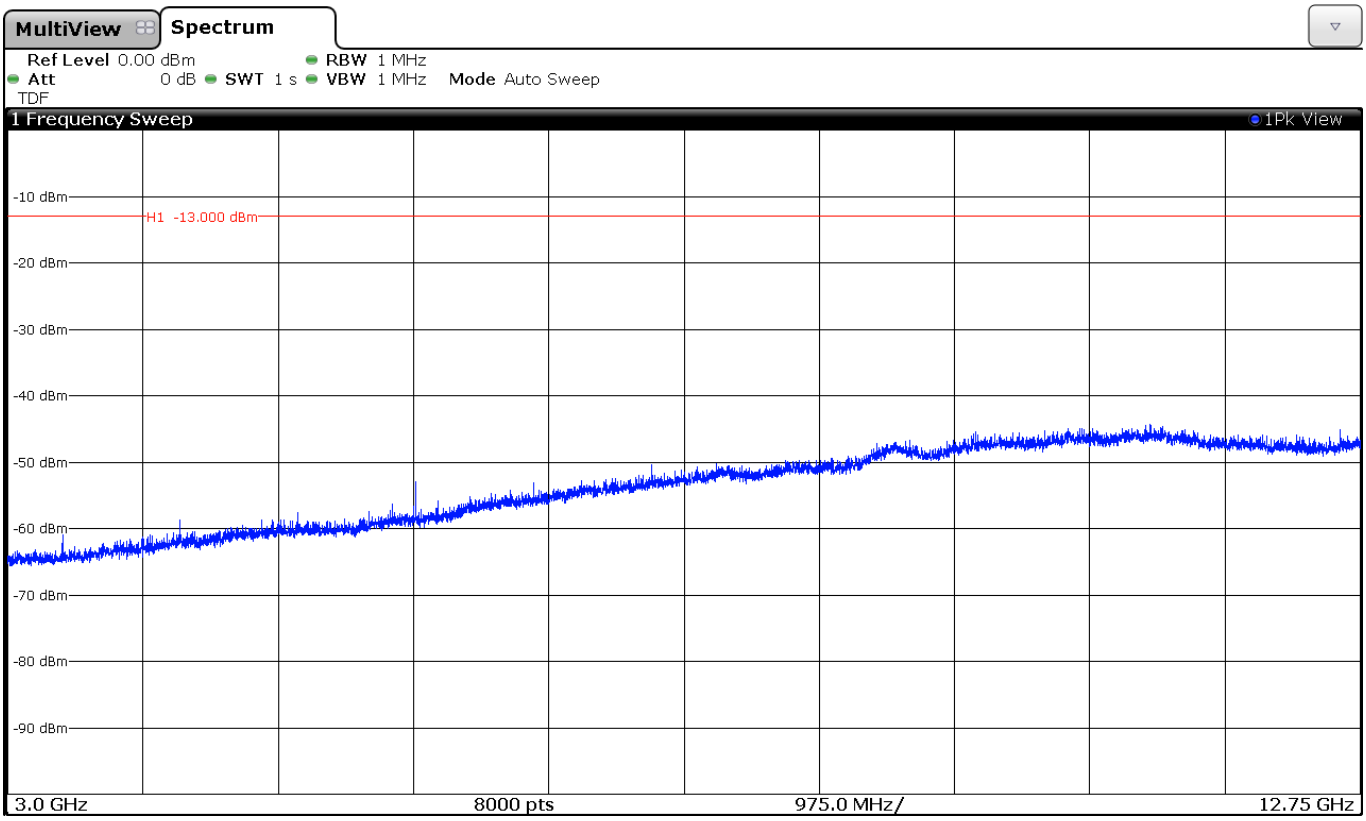
CHANNEL: LOWEST



CHANNEL: MIDDLE

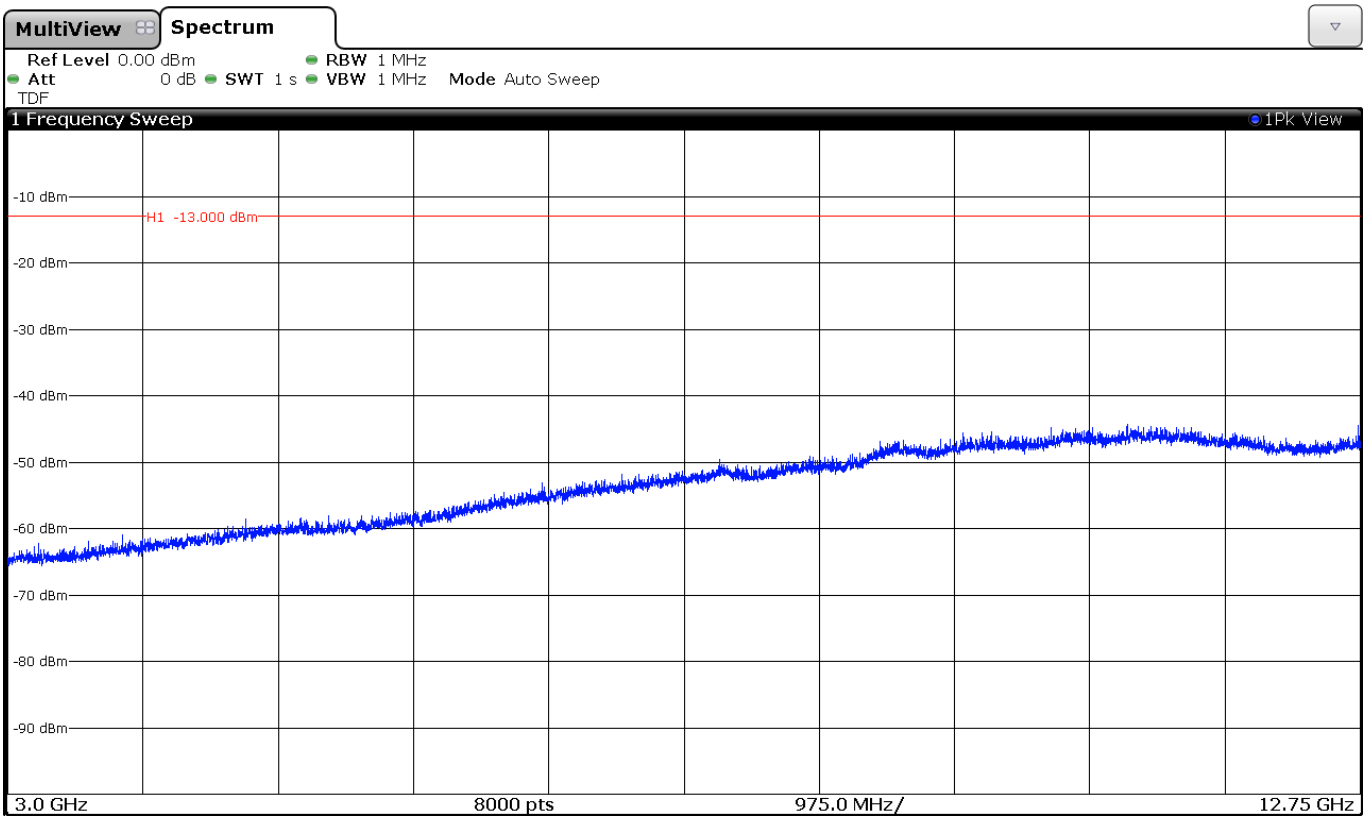


CHANNEL: HIGHEST

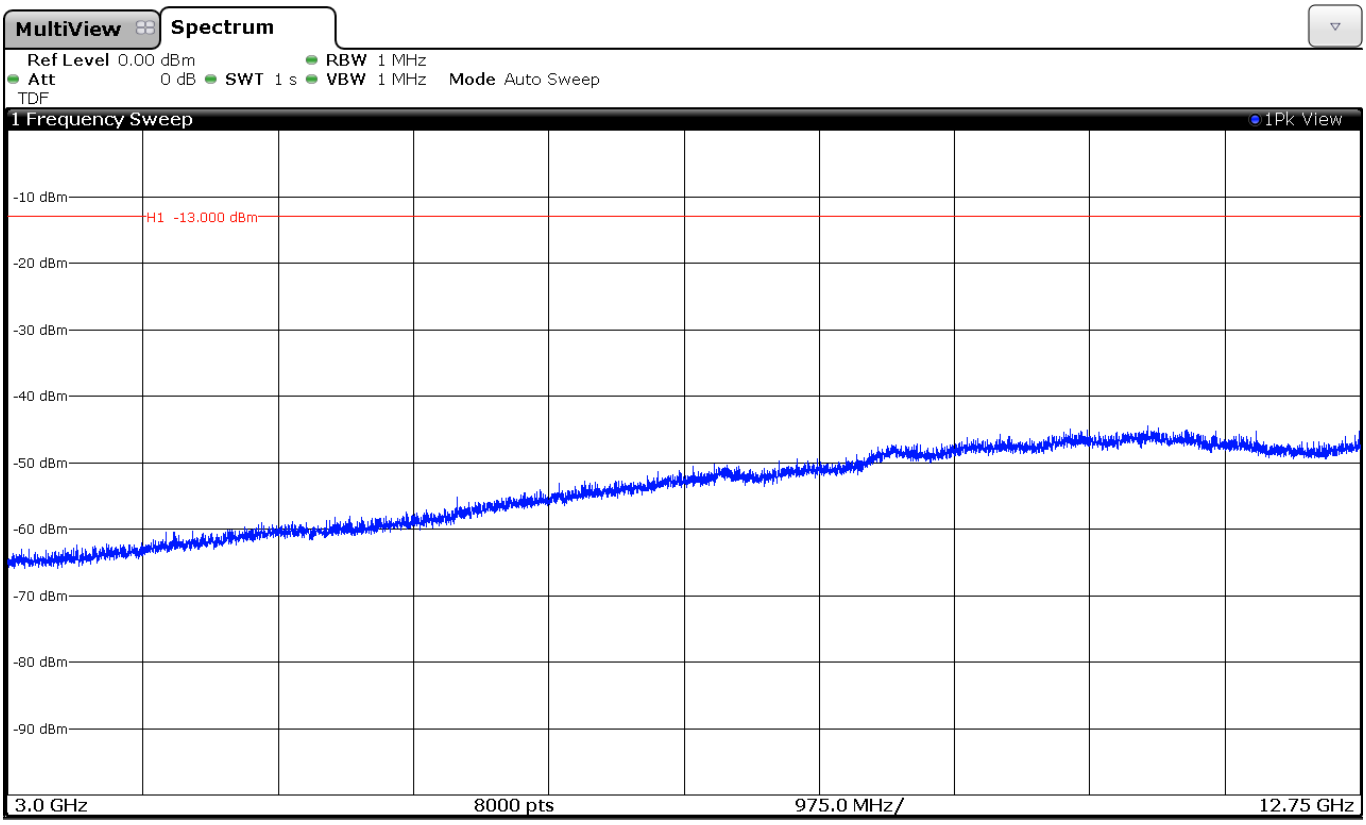


WCDMA MODULATION

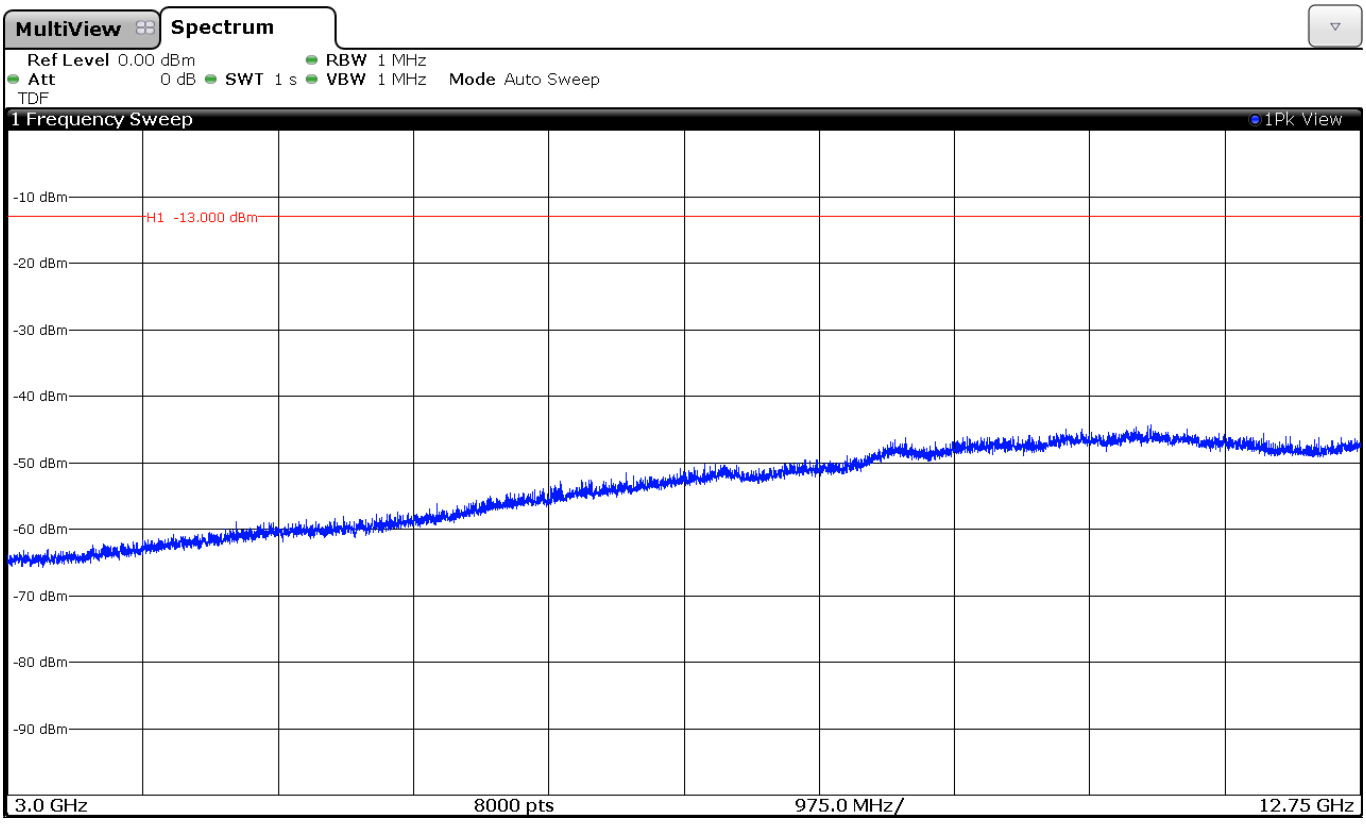
CHANNEL: LOWEST



CHANNEL: MIDDLE



CHANNEL: HIGHEST



TEST RESULTS FOR FCC PART 24 AND RSS-133

TEST CONDITIONS

Power supply (V):

V_{nom} = 13.8 Vdc

The subscript nom indicates voltage test conditions (nominal, minimum and maximum respectively, as declared by the applicant).

Type of power supply = DC Voltage from external power supply AC/DC (115VAC).

Type of antenna = external whip antenna.

- External White whip antenna: Band GSM1800/1900/2100: 1710-2170MHz/3.5dBi

TEST FREQUENCIES:

GPRS AND EDGE 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

RF Output Power (conducted and E.I.R.P)

SPECIFICATION

§2.1046 and 24.232

Mobile/portable stations are limited to 2 Watts (33 dBm) Equivalent Isotropic Radiated Power (E.I.R.P.) peak power.
In measuring transmissions using an average power technique, the peak-to-average ratio (PAR) of the transmission may not exceed 13 dB.

METHOD

The conducted RF output power measurements were made at the RF output terminals of the EUT using an attenuator, power splitter and spectrum analyser. The EUT was controlled via the Universal Radio Communication tester R&S CMU200 selecting maximum transmission power of the EUT and different modes of modulation.

The maximum conducted output power was measured using a spectrum analyzer according to point 5.1.1. for peak power measurement and according to point 5.2.1. for average power measurement of Guidance 971168 D01.

The maximum equivalent isotropic radiated power e.i.r.p. is calculated by adding the declared maximum antenna gain (dBi).

RESULTS

Maximum declared external connectable antenna gain (dBi)= 3.5 dBi

MAXIMUM OUTPUT POWER (CONDUCTED). See plots in next pages.

GPRS MODULATION

Channel	Lowest	Middle	Highest
Measured maximum peak power (dBm) at antenna port	29.48	29.28	29.29
Maximum equivalent isotropic radiated peak power E.I.R.P. (dBm)	32.98	32.78	32.79
Measured maximum average power (dBm) at antenna port	29.05	28.69	28.71
Maximum equivalent isotropic radiated average power E.I.R.P. (dBm)	32.55	32.19	32.21
Peak-to-average ratio (PAR) (dB)	0.60	0.59	0.58
Measurement uncertainty (dB)	±0.5		

EDGE MODULATION

Channel	Lowest	Middle	Highest
Measured maximum peak power (dBm) at antenna port	28.81	28.47	28.48
Maximum equivalent isotropic radiated peak power E.I.R.P. (dBm)	32.31	31.97	31.98
Measured maximum average power (dBm) at antenna port	25.33	24.97	25.00
Maximum equivalent isotropic radiated average power E.I.R.P. (dBm)	28.83	28.47	28.50
Peak-to-average ratio (PAR) (dB)	3.48	3.50	3.48
Measurement uncertainty (dB)	±0.5		

WCDMA MODULATION

Channel	Lowest	Middle	Highest
Measured maximum peak power (dBm) at antenna port	26.71	26.13	25.82
Maximum equivalent isotropic radiated peak power E.I.R.P. (dBm)	30.21	29.63	29.32
Measured maximum average power (dBm) at antenna port	23.12	22.76	22.48
Maximum equivalent isotropic radiated average power E.I.R.P. (dBm)	26.62	26.26	25.98
Peak-to-average ratio (PAR) (dB)	3.59	3.37	3.34
Measurement uncertainty (dB)	±0.5		

HSUPA MODULATION

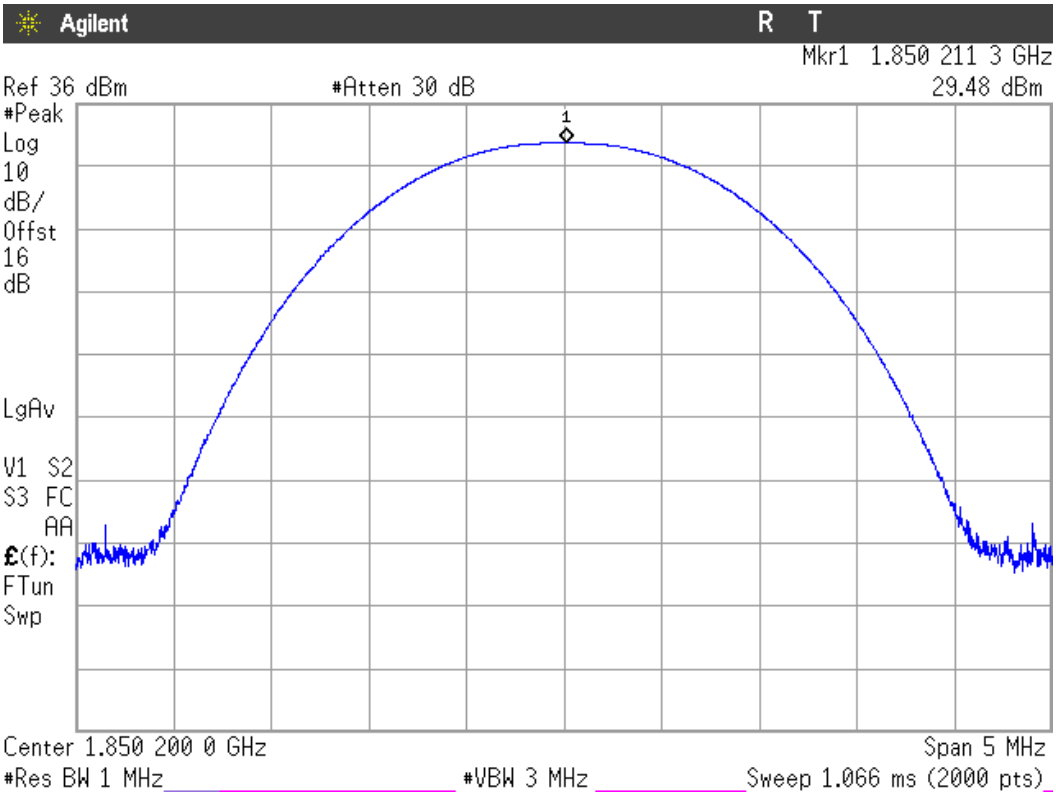
Channel	Lowest	Middle	Highest
Measured maximum peak power (dBm) at antenna port	24.93	24.70	24.30
Maximum equivalent isotropic radiated peak power E.I.R.P. (dBm)	28.43	28.20	27.80
Measured maximum average power (dBm) at antenna port	20.30	20.06	19.90
Maximum equivalent isotropic radiated average power E.I.R.P. (dBm)	23.80	23.56	23.40
Peak-to-average ratio (PAR) (dB)	4.63	4.64	4.40
Measurement uncertainty (dB)	±0.5		

Verdict: PASS

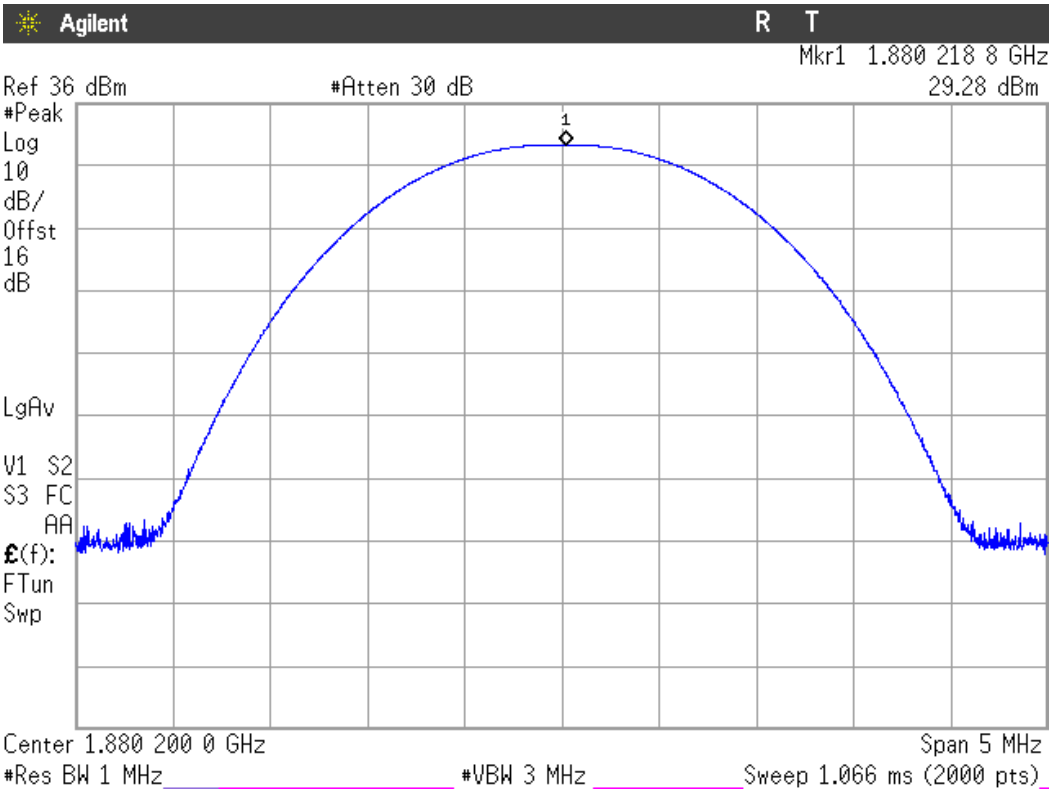
PEAK OUTPUT POWER (CONDUCTED).

GPRS MODULATION

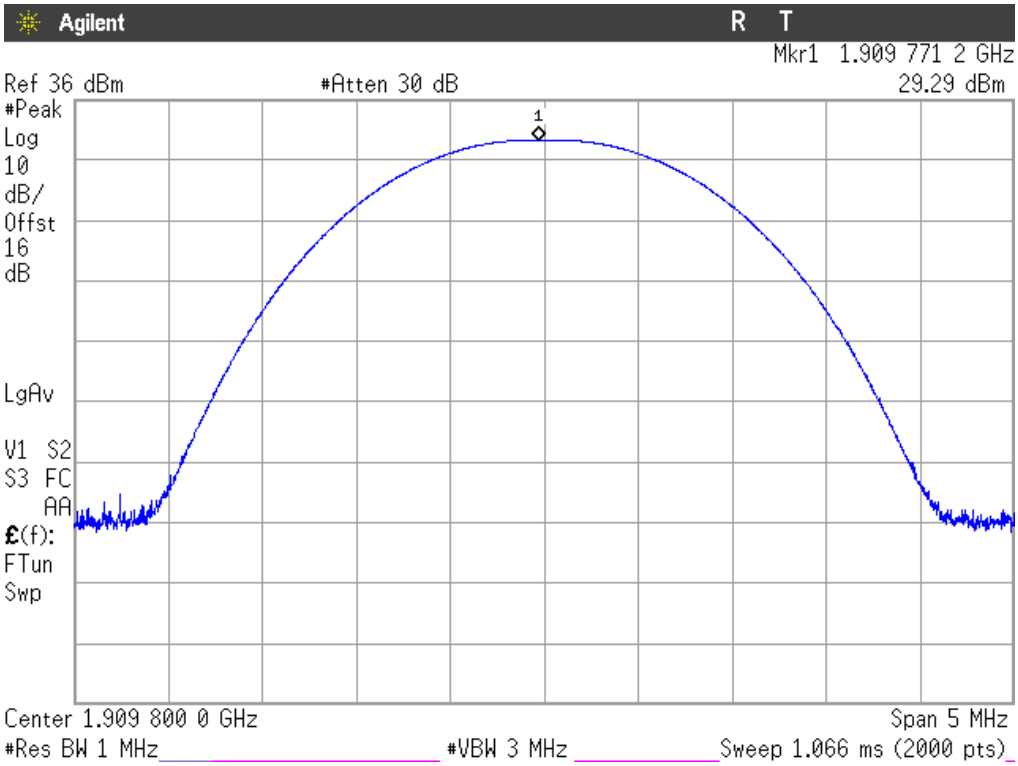
Lowest Channel



Middle Channel

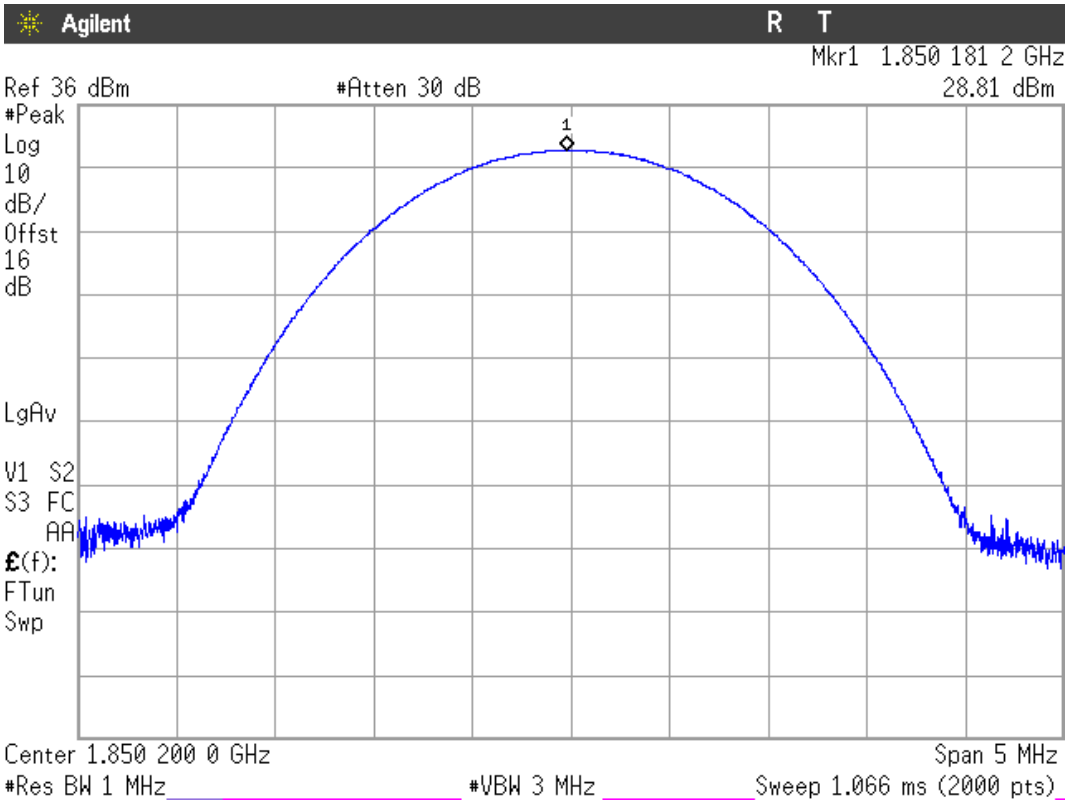


Highest Channel

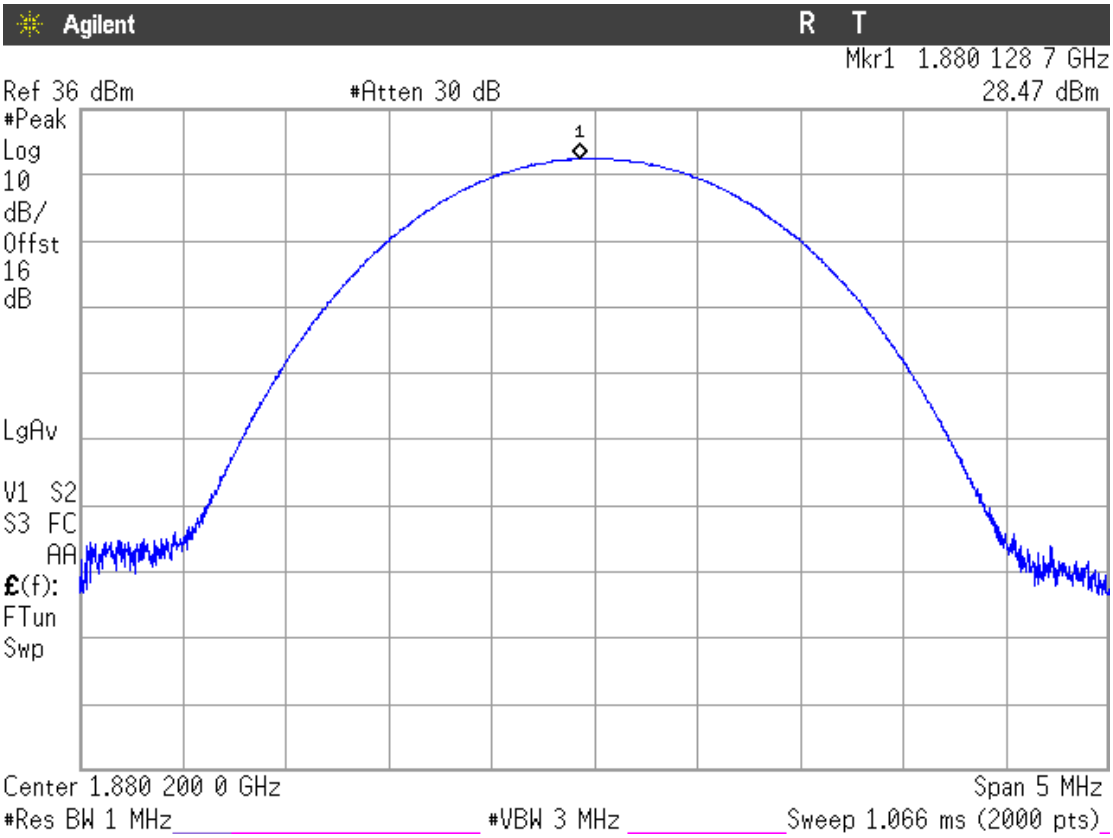


EDGE MODULATION

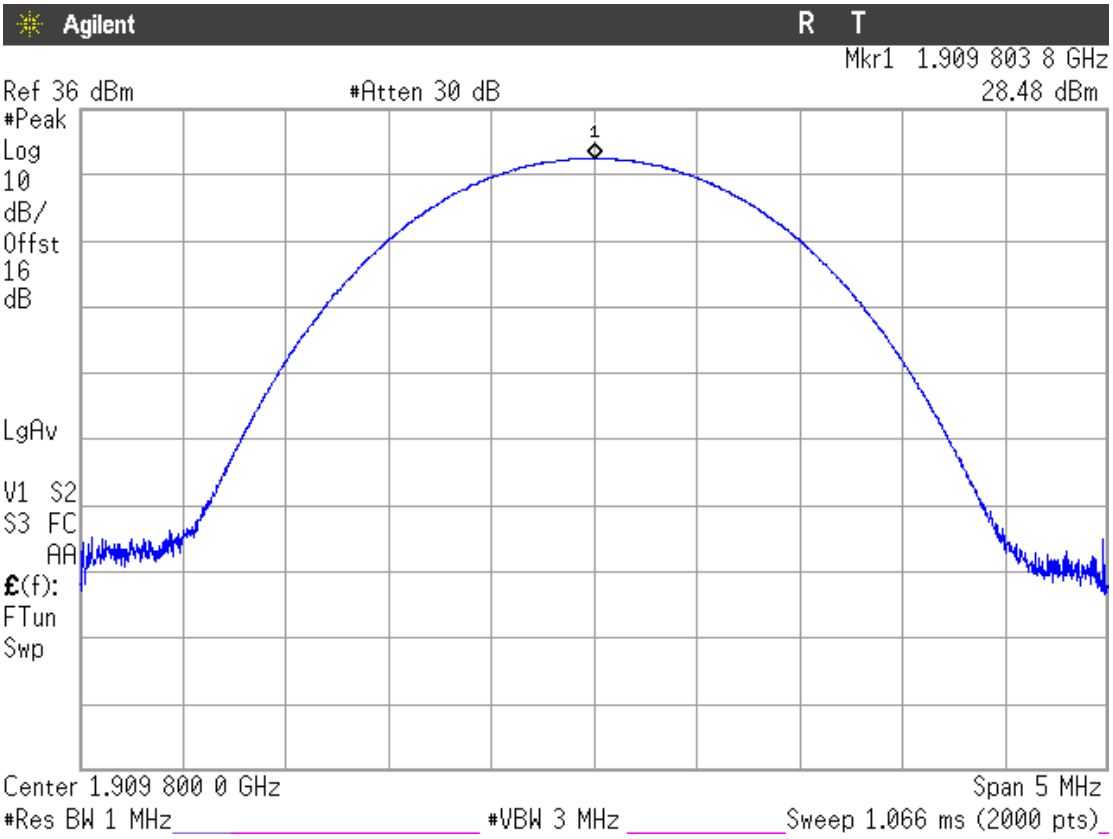
Lowest Channel



Middle Channel

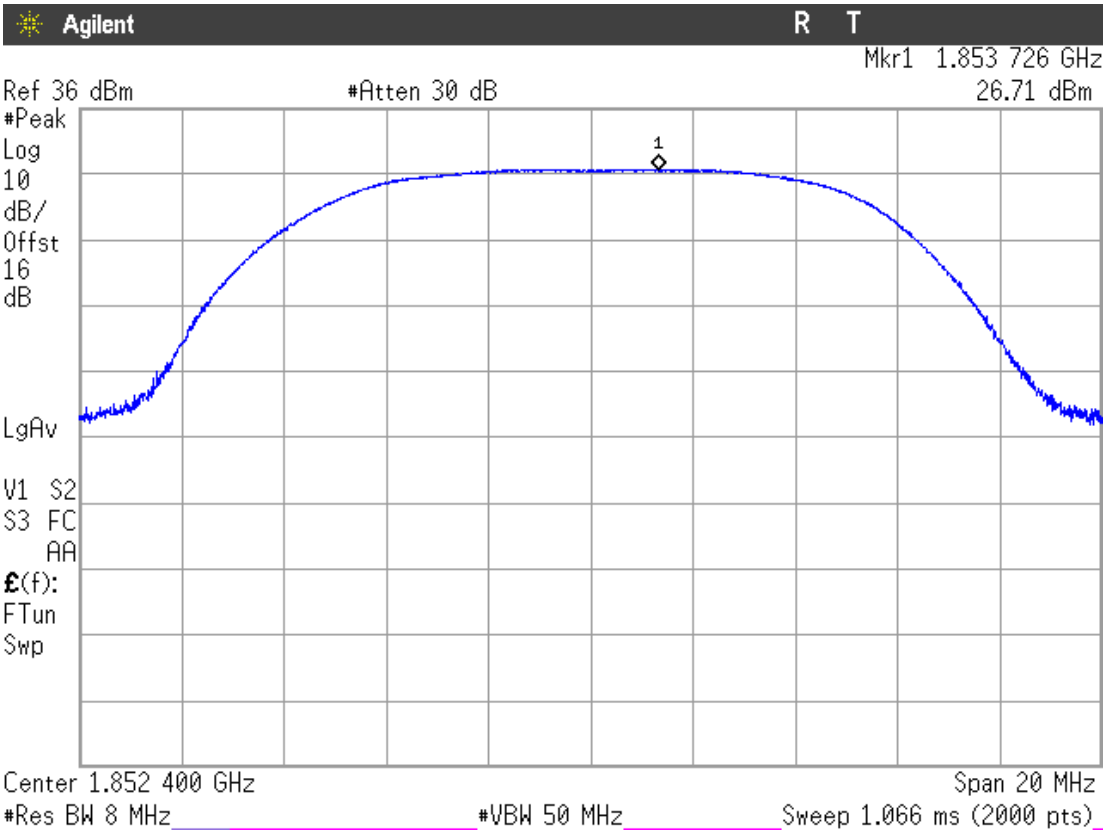


Highest Channel

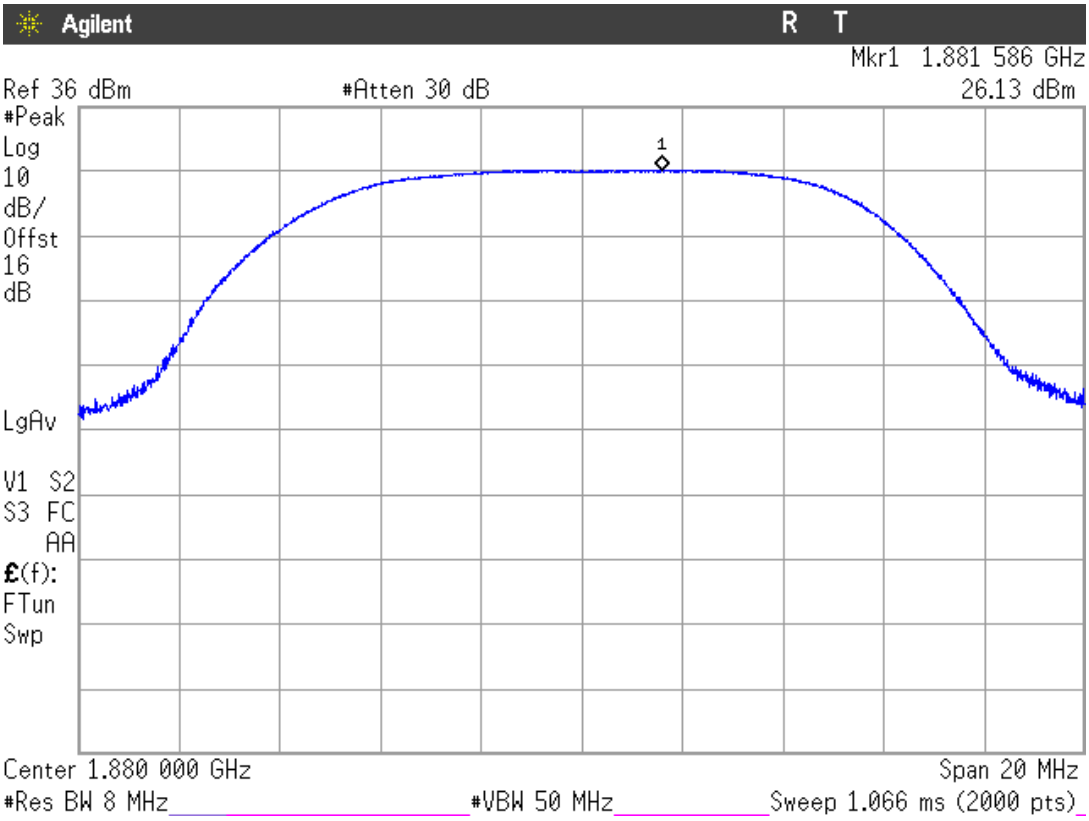


WCDMA MODULATION

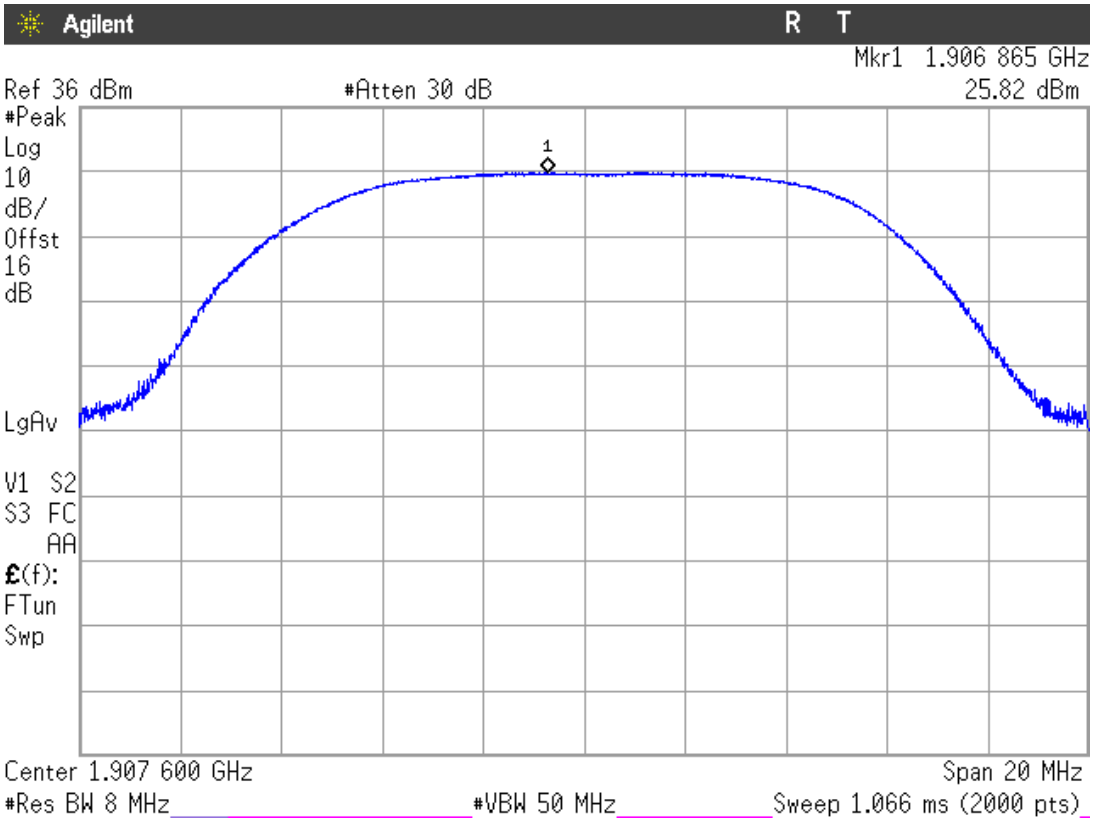
Lowest Channel



Middle Channel

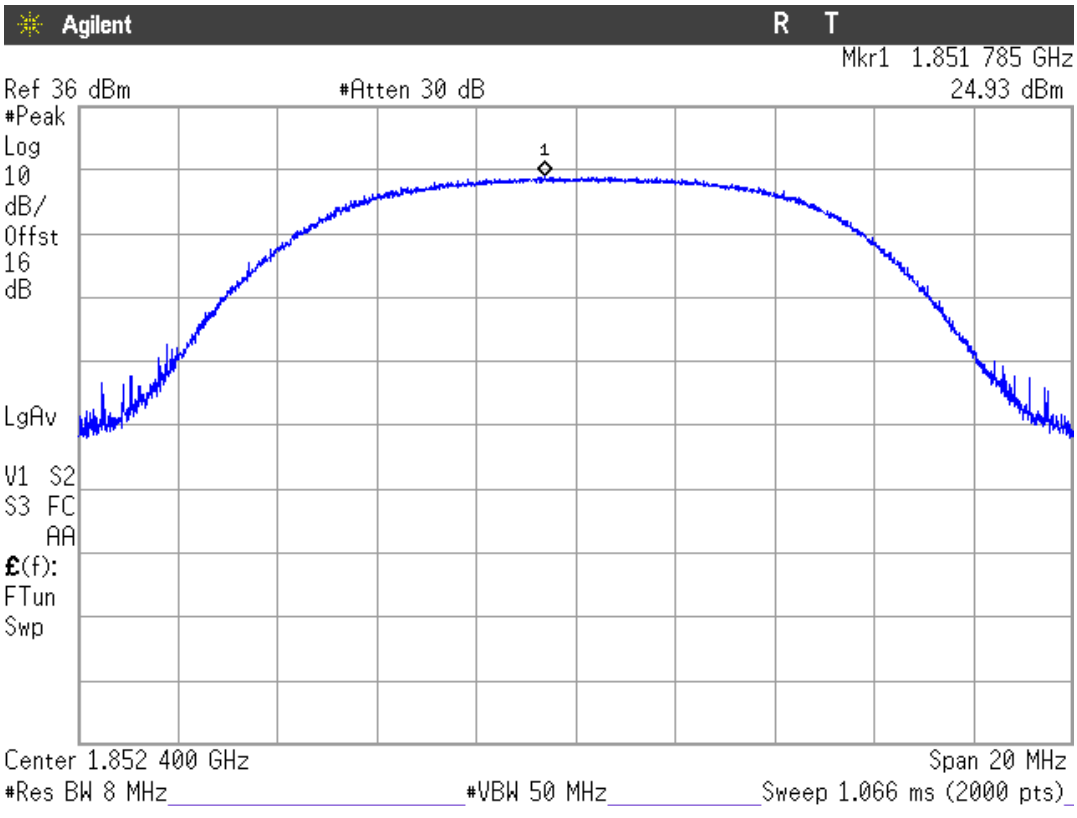


Highest Channel

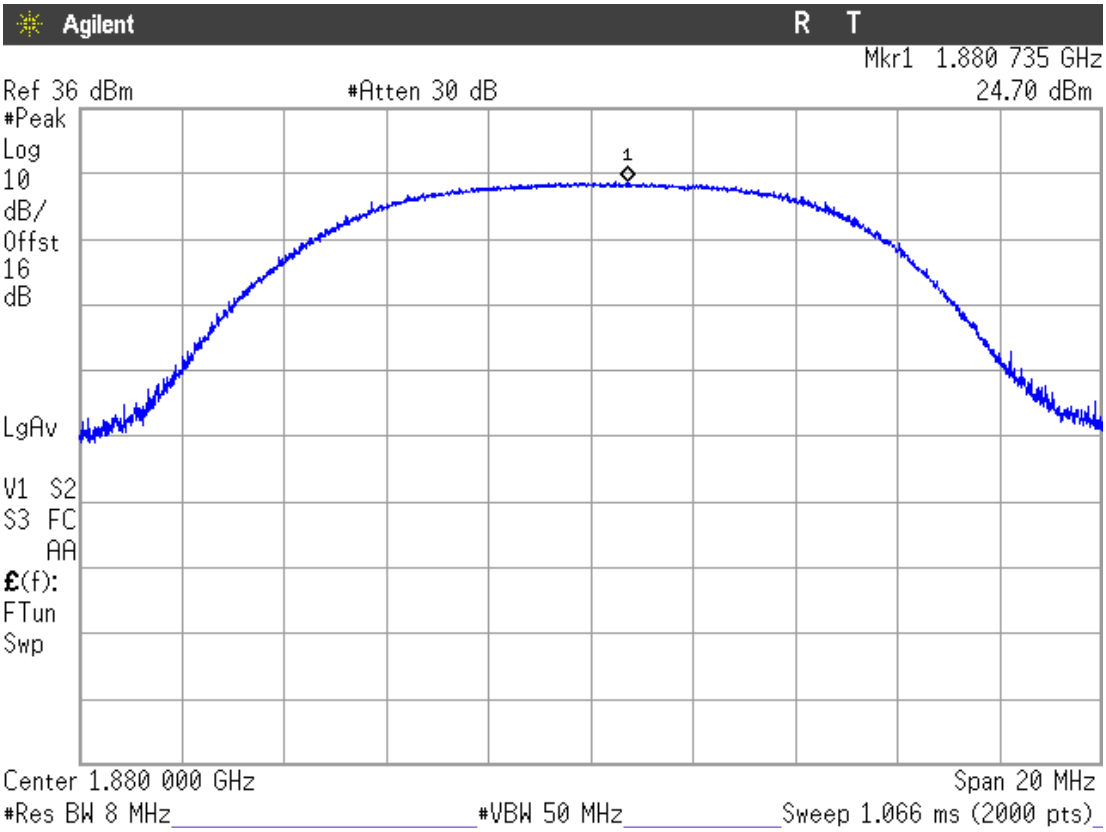


HSUPA MODULATION

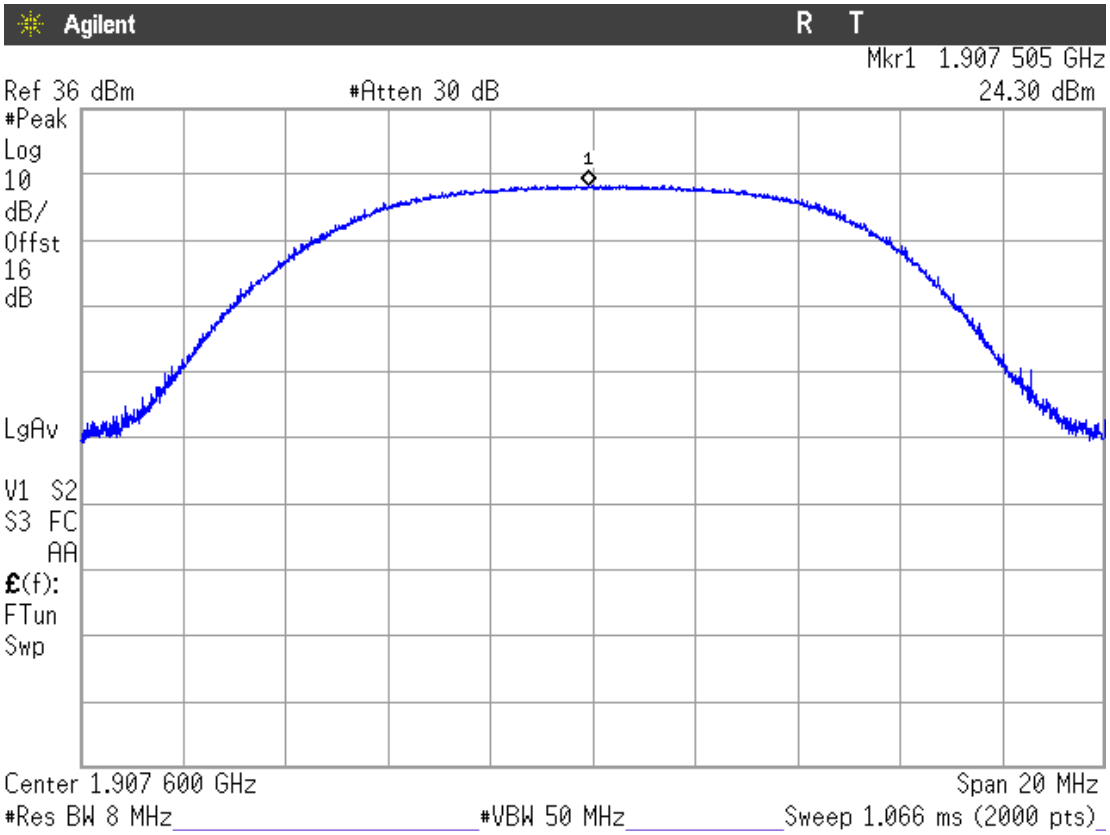
Lowest Channel



Middle Channel



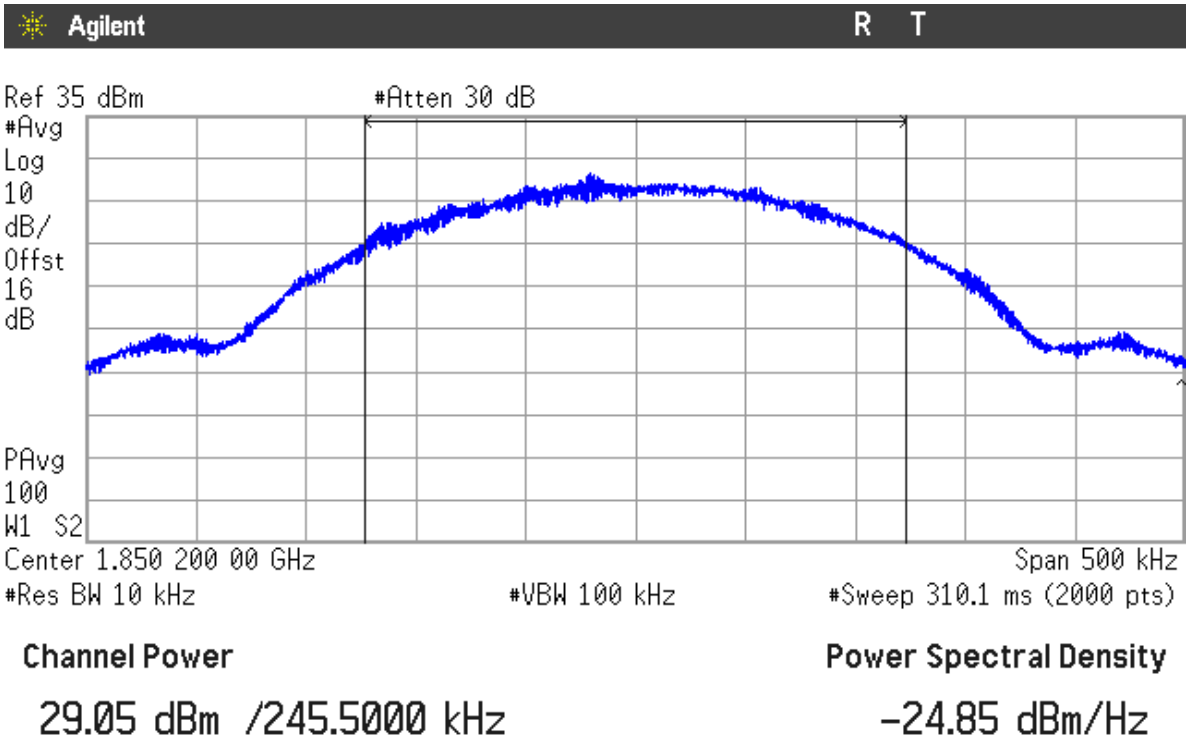
Highest Channel



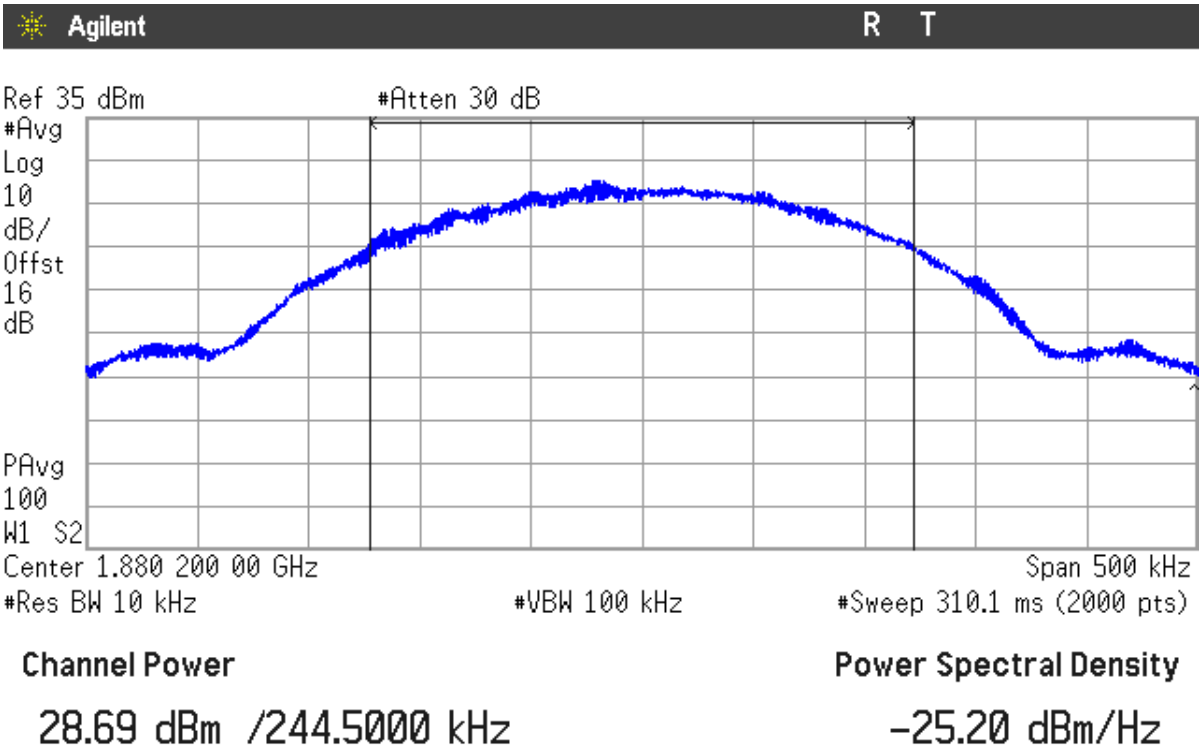
AVERAGE OUTPUT POWER (CONDUCTED).

GPRS MODULATION

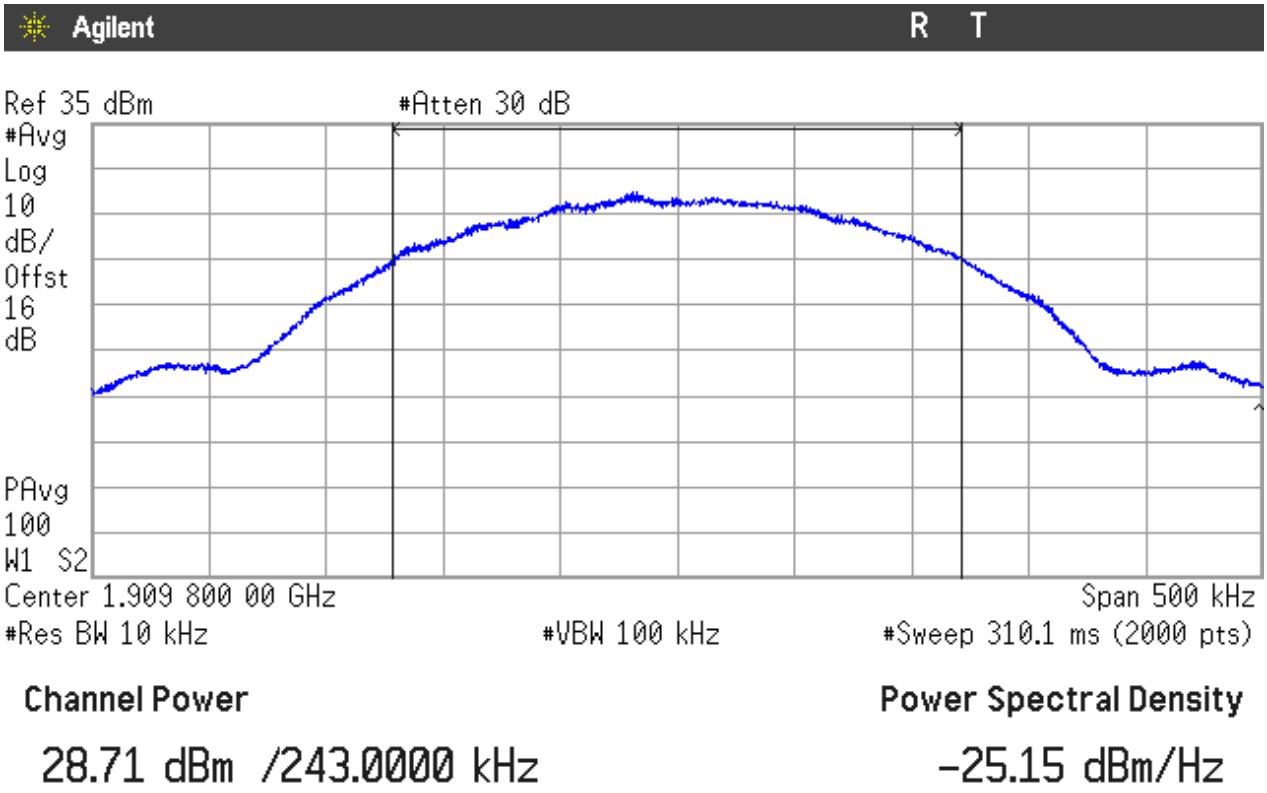
Lowest Channel



Middle Channel

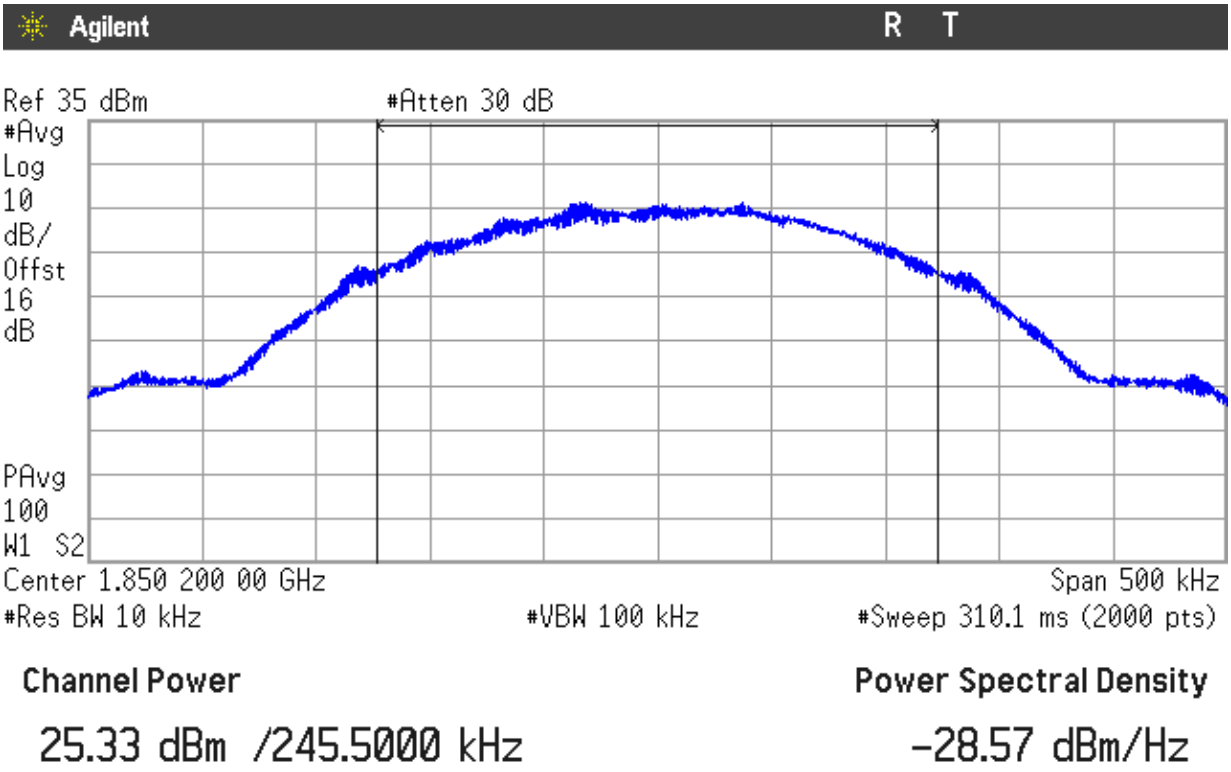


Highest Channel

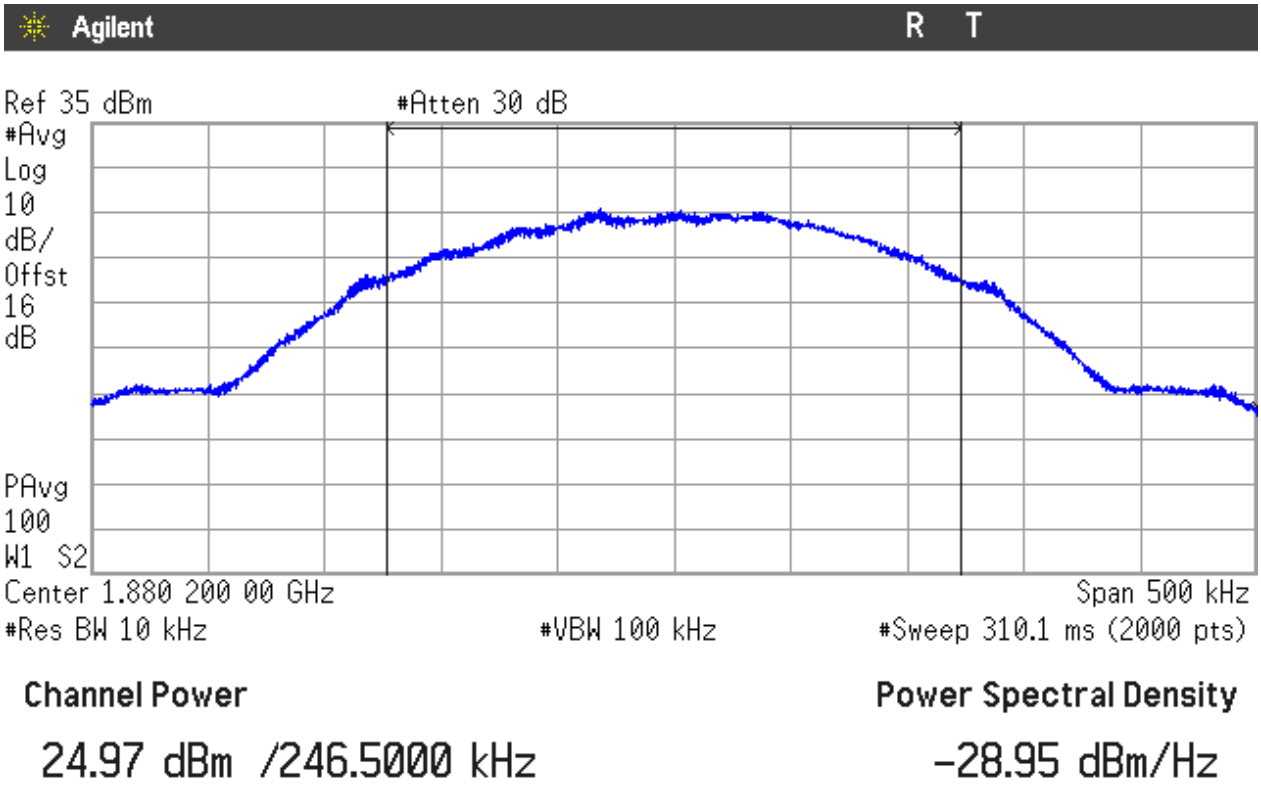


EDGE MODULATION

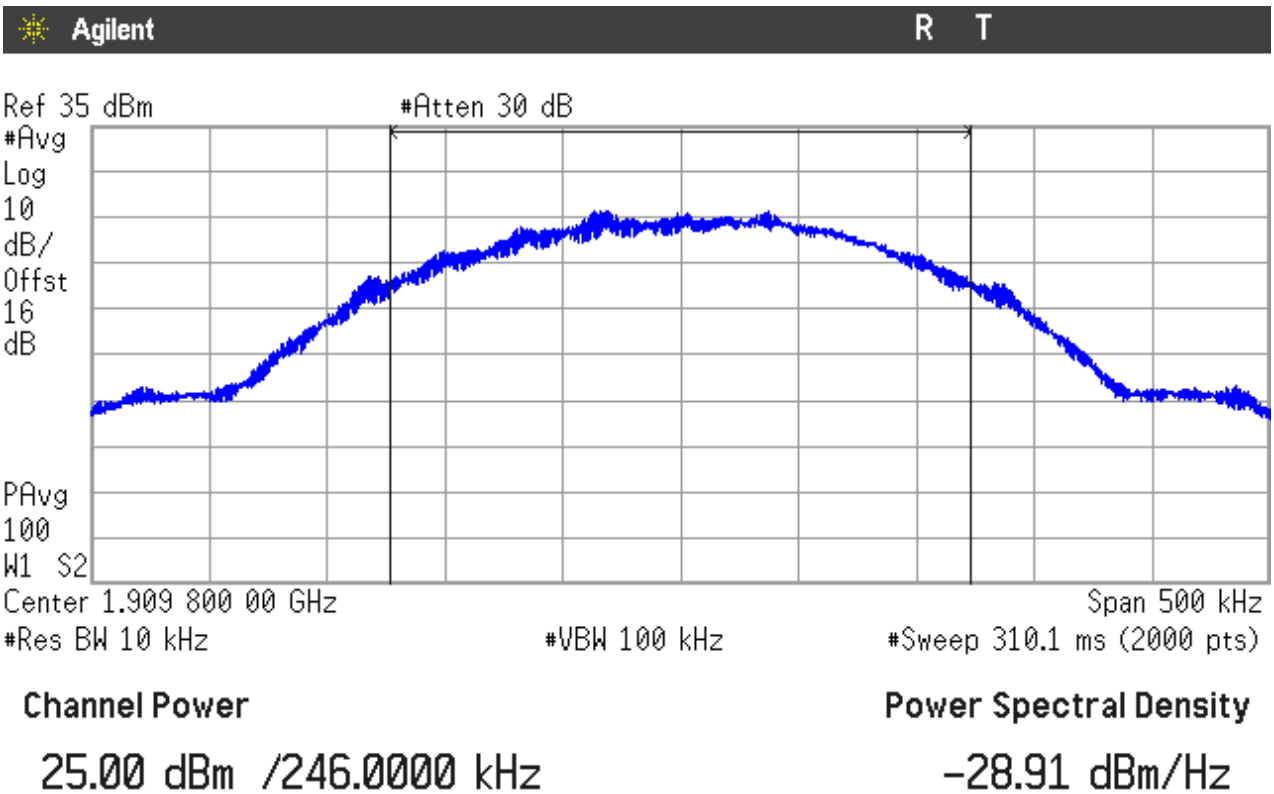
Lowest Channel



Middle Channel

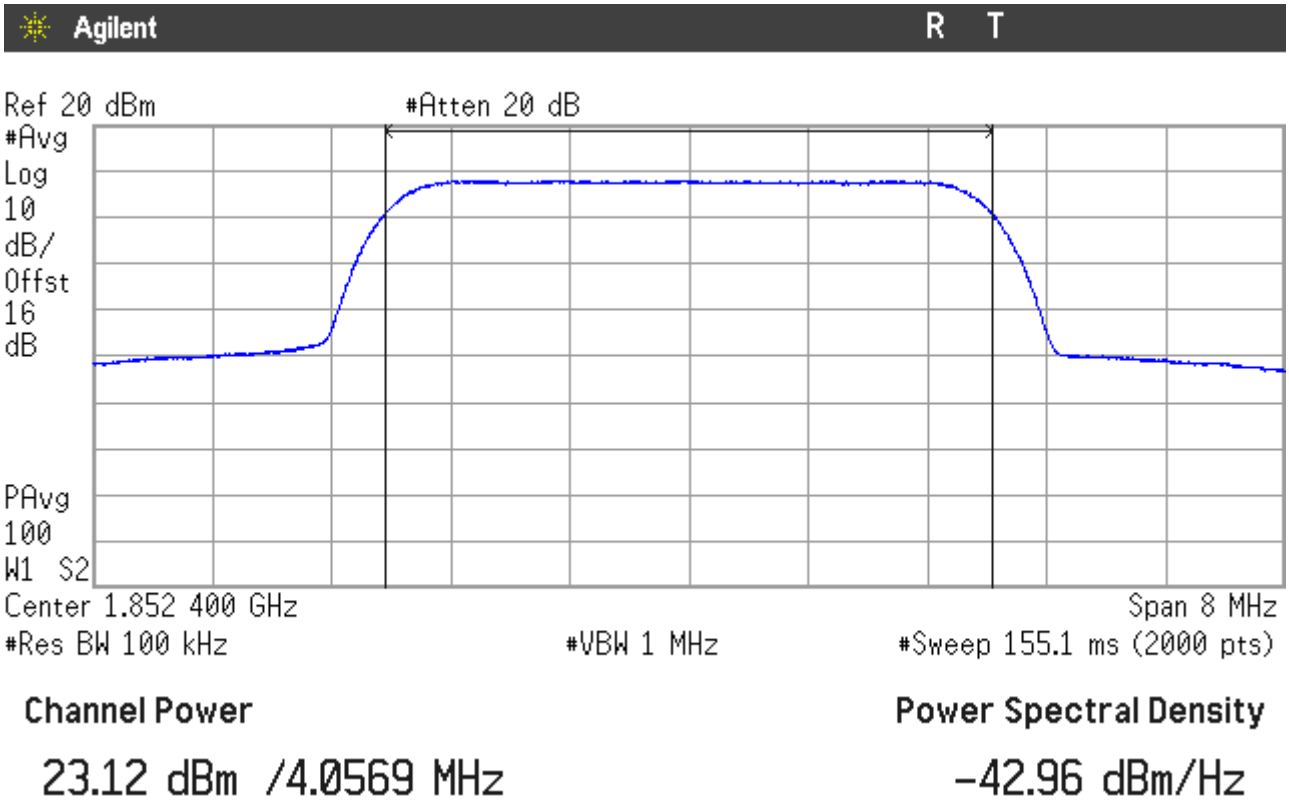


Highest Channel

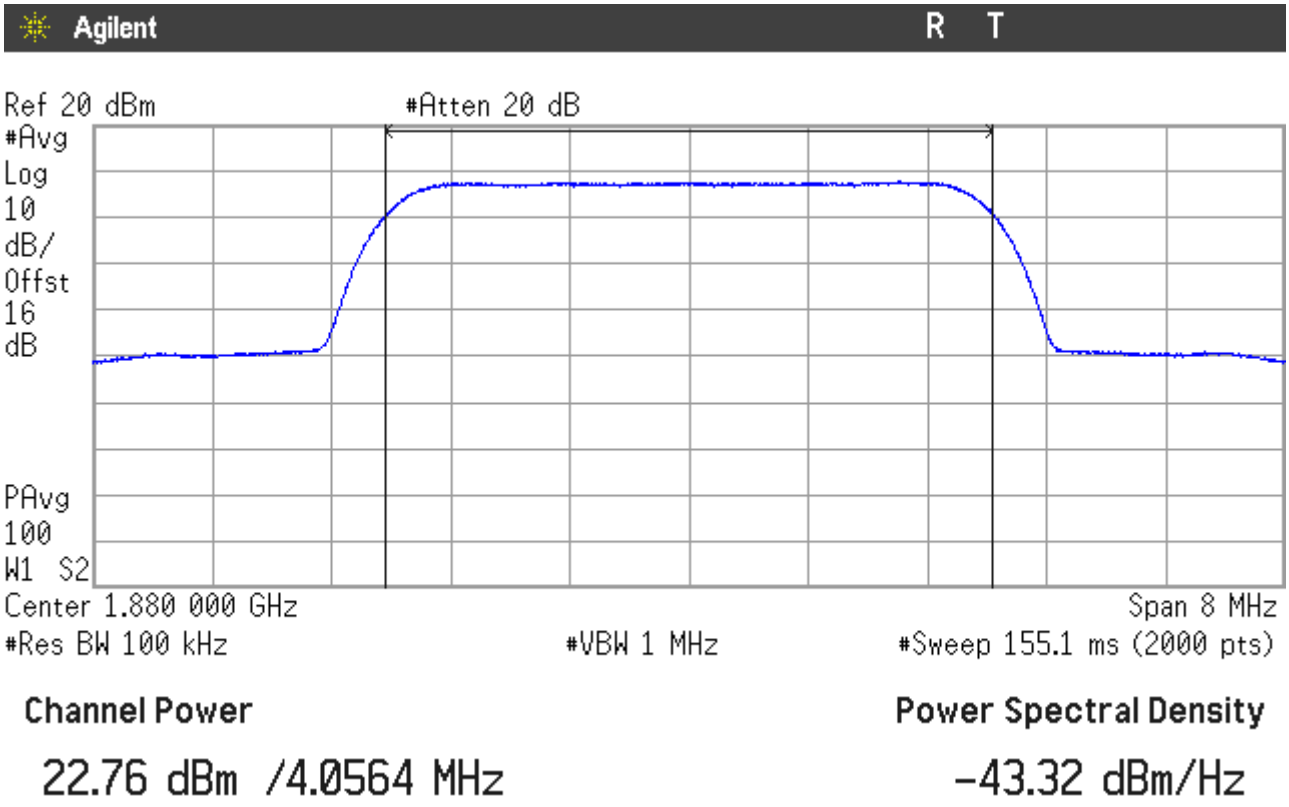


WCDMA MODULATION

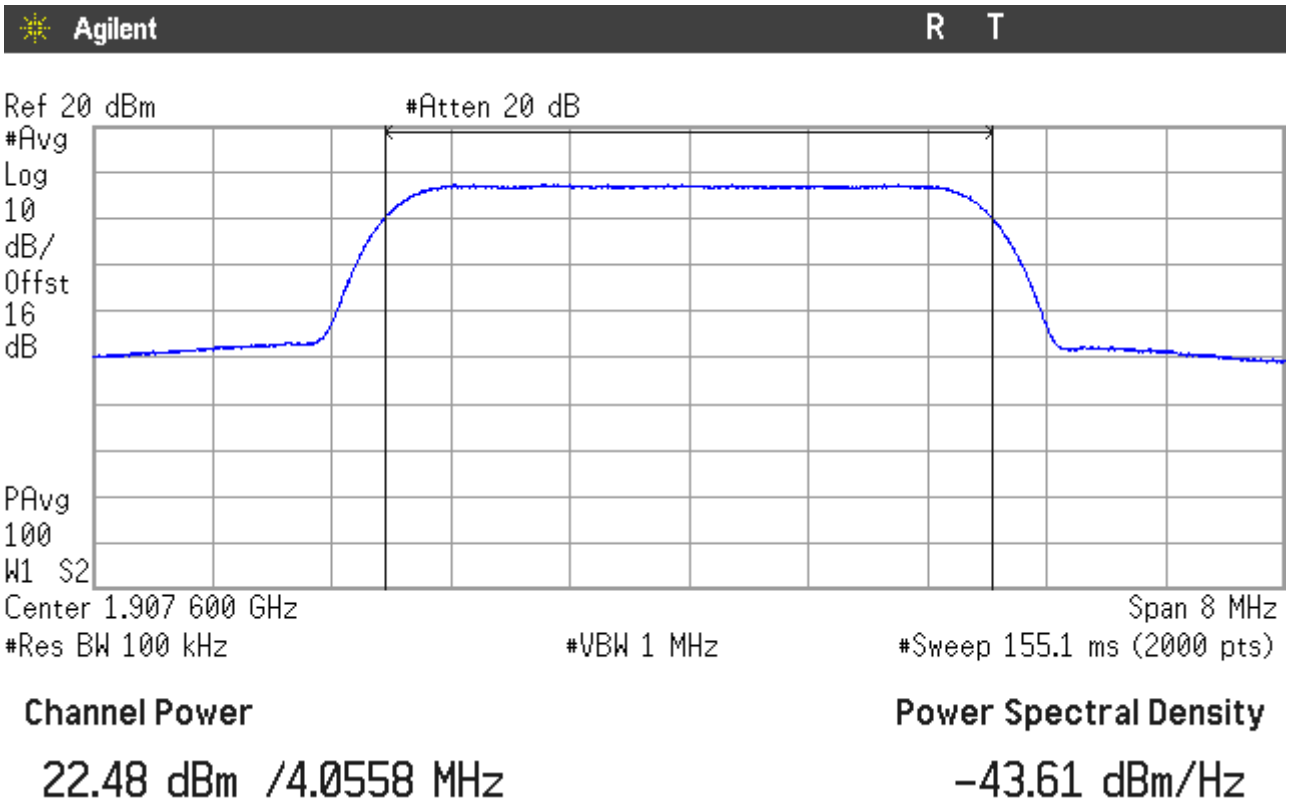
Lowest Channel



Middle Channel

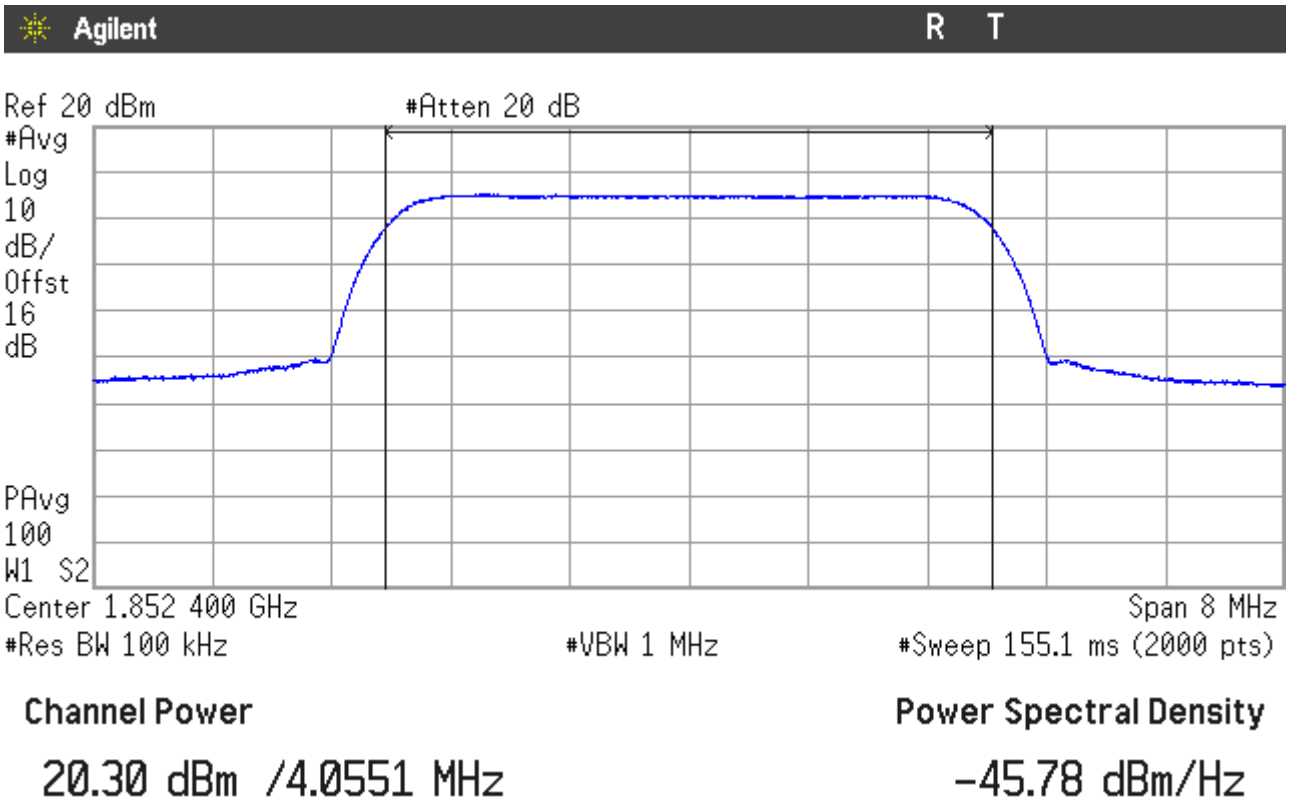


Highest Channel

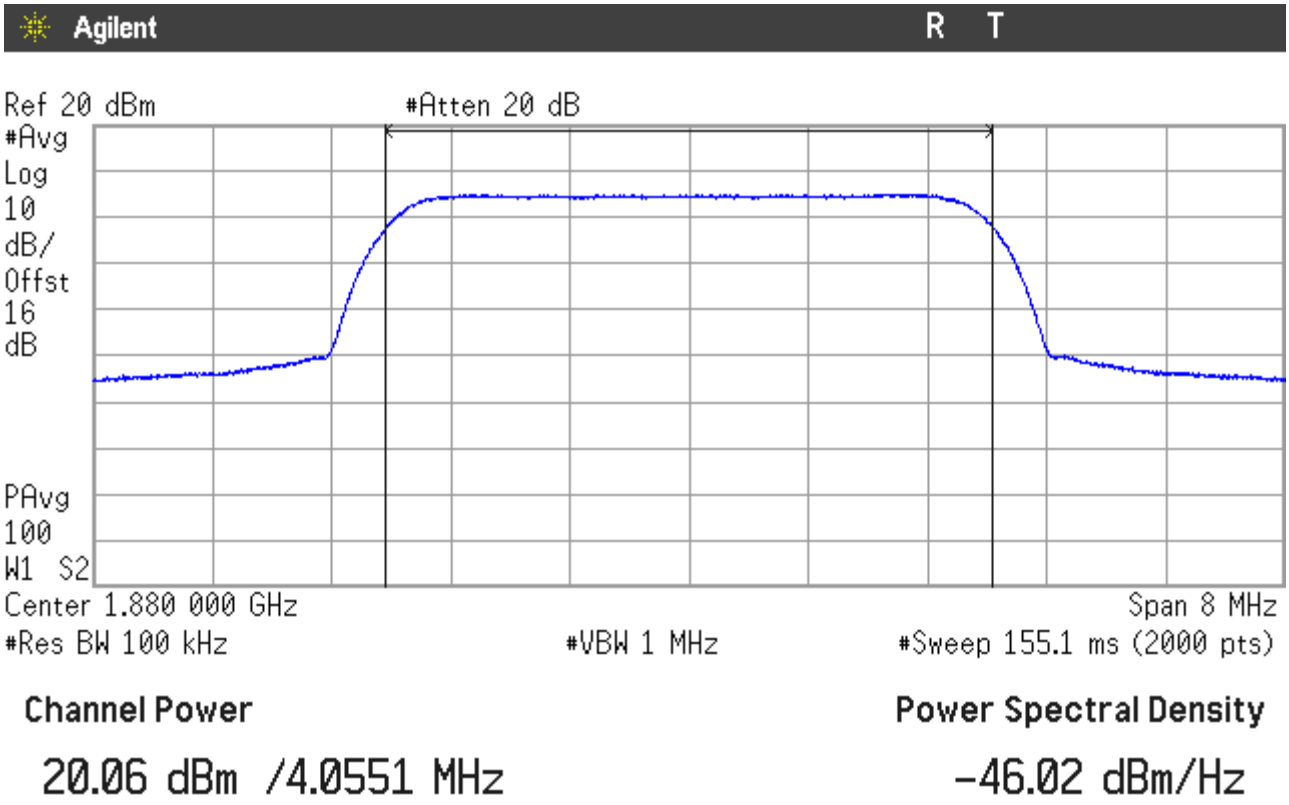


HSUPA MODULATION

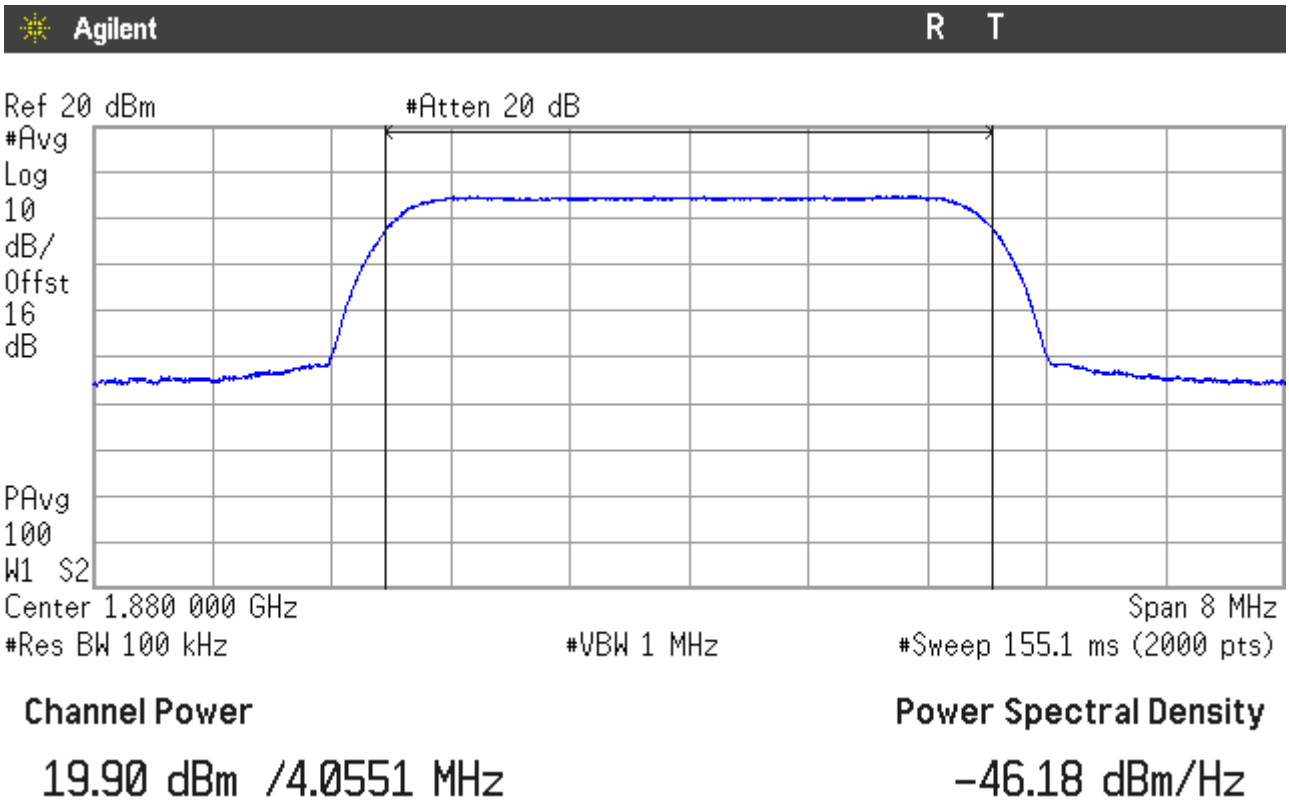
Lowest Channel



Middle Channel



Highest Channel



Occupied Bandwidth

SPECIFICATION

§2.1049

METHOD

The EUT was configured to transmit a modulated carrier signal. The 99% occupied bandwidth and the -26 dBc bandwidth was measured directly using the built-in bandwidth measuring option of the spectrum analyser.

RESULTS

GPRS MODULATION

Channel	Lowest	Middle	Highest
99% Occupied bandwidth (kHz)	245.50	244.50	243.00
-26 dBc bandwidth (kHz)	315.10	317.31	320.51
Measurement uncertainty (kHz)	<±1.67		

EDGE MODULATION

Channel	Lowest	Middle	Highest
99% Occupied bandwidth (kHz)	245.50	246.50	246.00
-26 dBc bandwidth (kHz)	309.29	312.50	317.31
Measurement uncertainty (kHz)	<±1.67		

WCDMA MODULATION

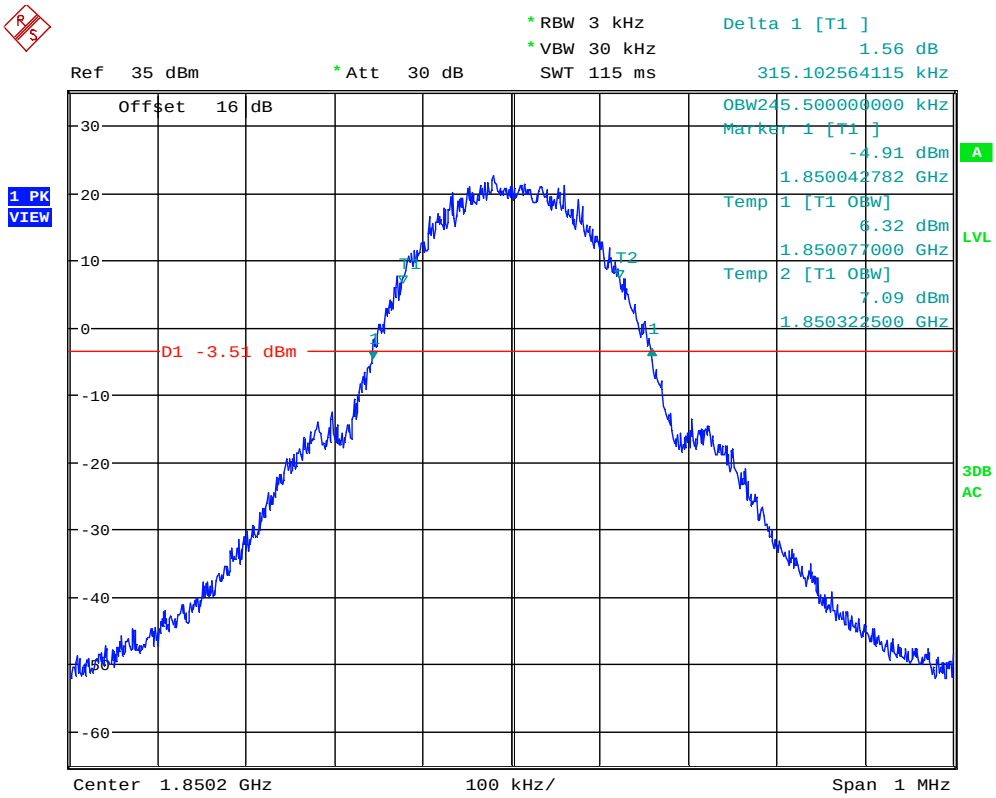
Channel	Lowest	Middle	Highest
99% Occupied bandwidth (kHz)	4056.9	4056.4	4055.8
-26 dBc bandwidth (kHz)	4604	4628	4622
Measurement uncertainty (kHz)	<±13.3		

HSUPA MODULATION

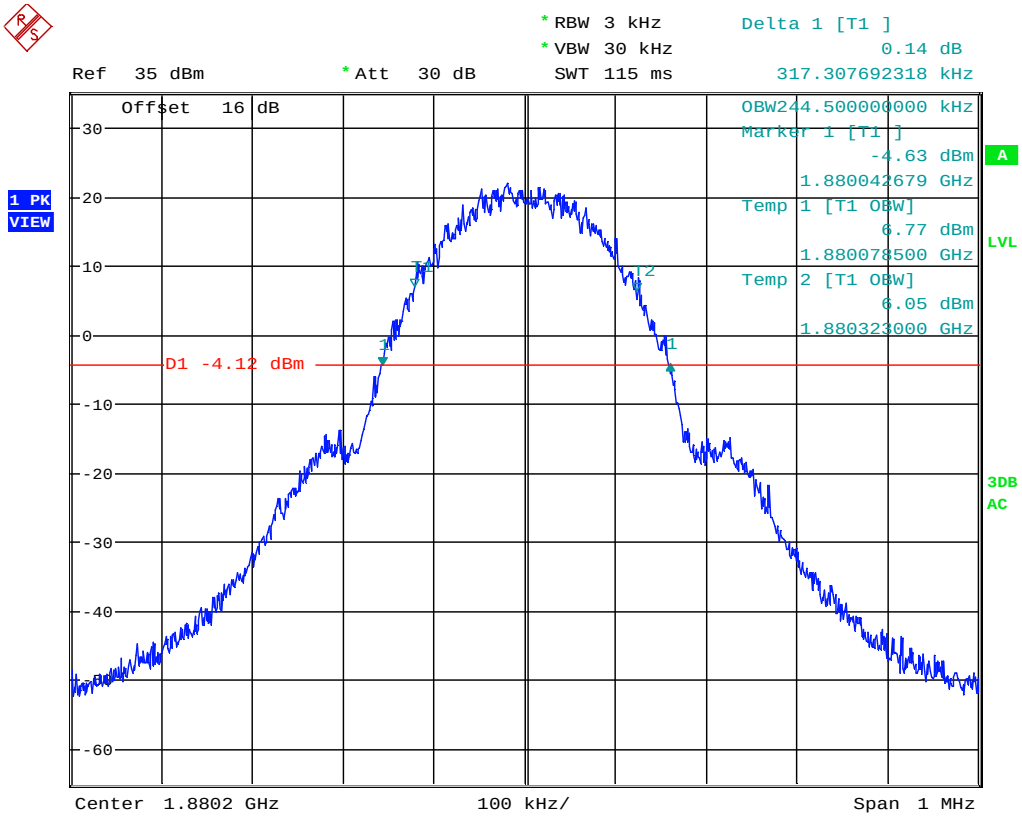
Channel	Lowest	Middle	Highest
99% Occupied bandwidth (kHz)	4055.1	4055.1	4053.2
-26 dBc bandwidth (kHz)	4606	4569	4598
Measurement uncertainty (kHz)	<±13.3		

GPRS MODULATION

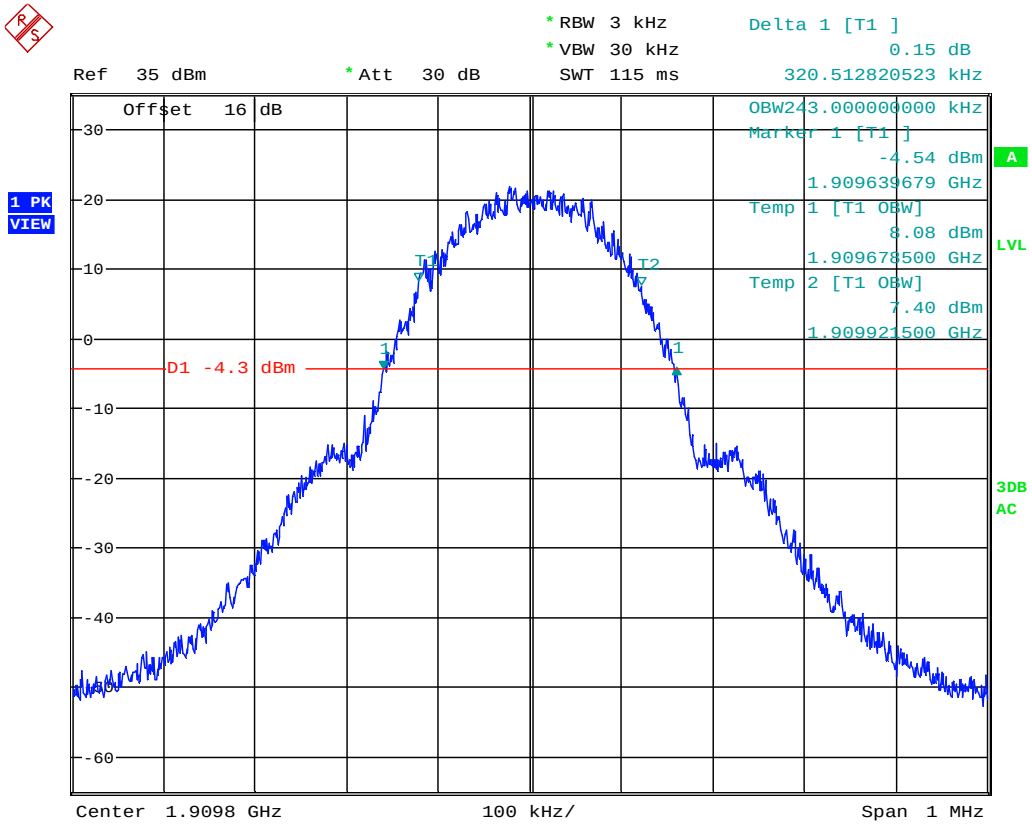
Lowest Channel



Middle Channel

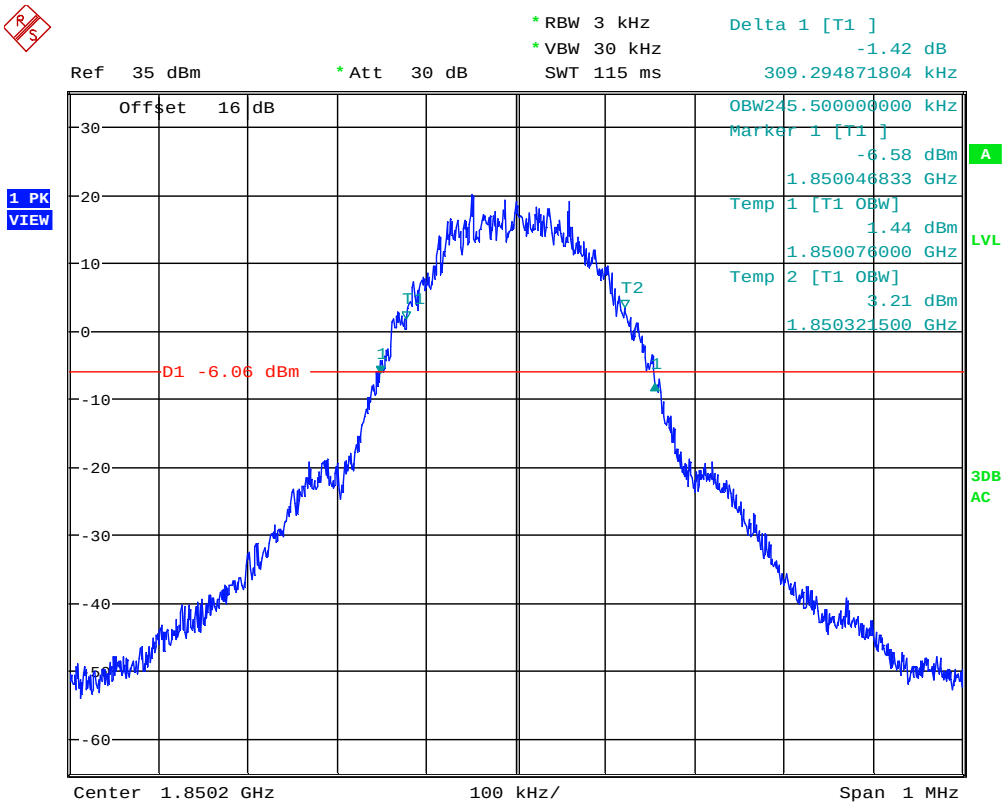


Highest Channel

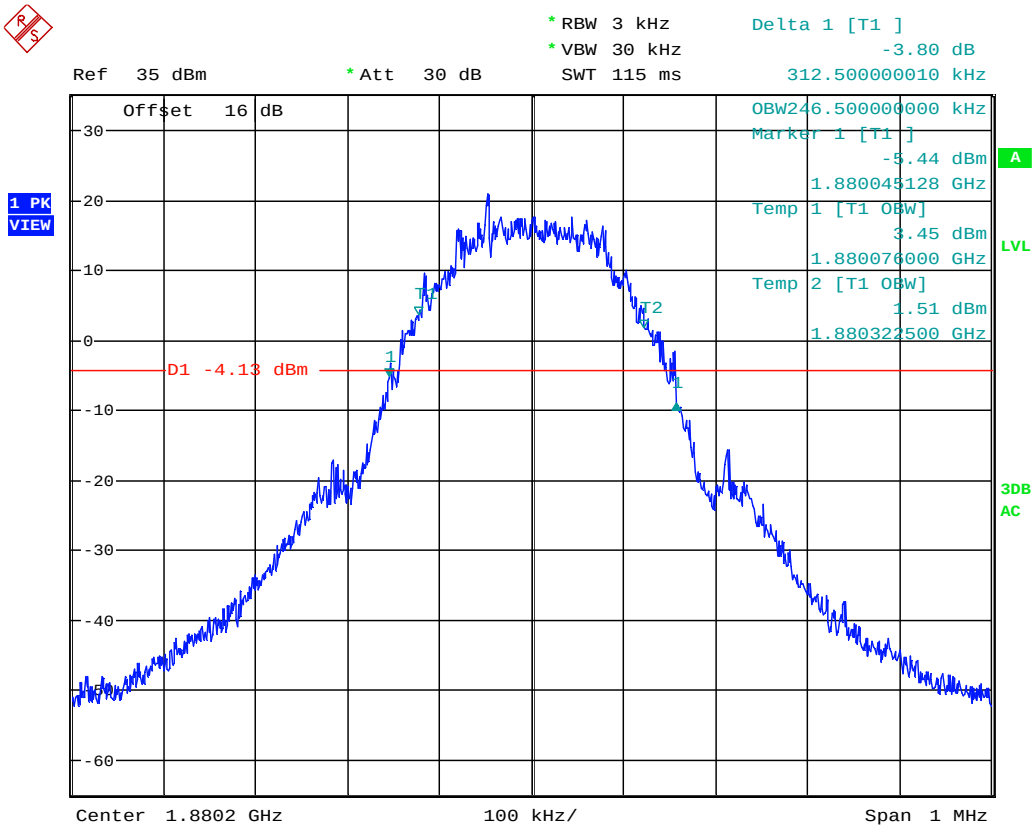


EDGE MODULATION

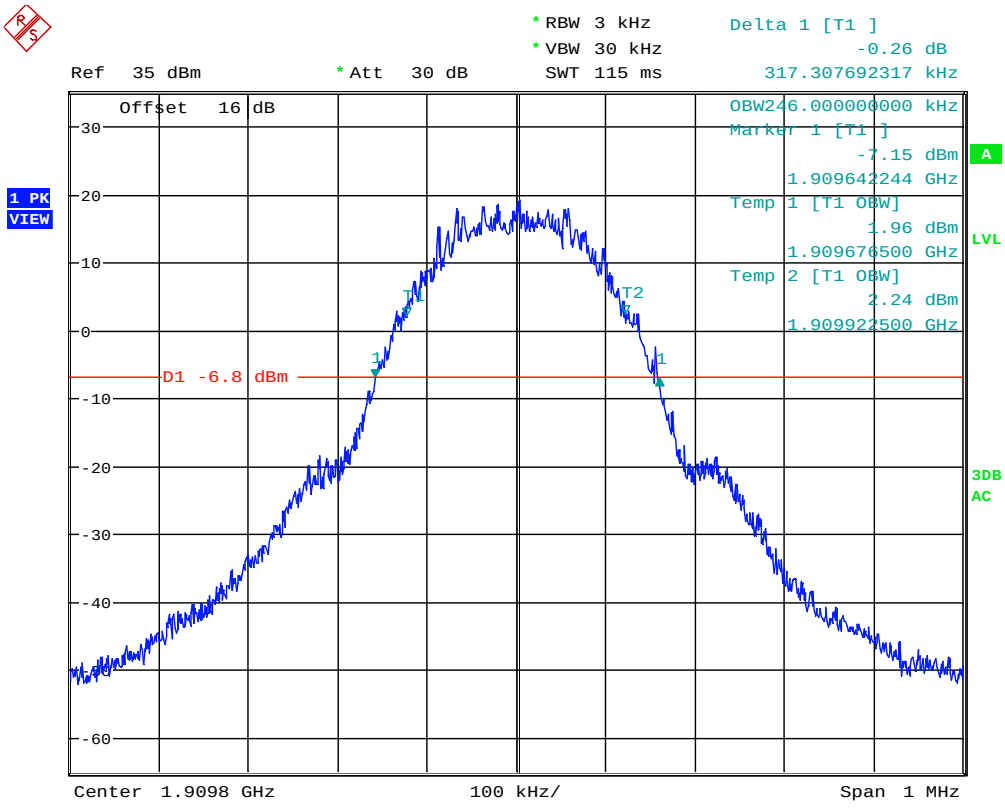
Lowest Channel



Middle Channel

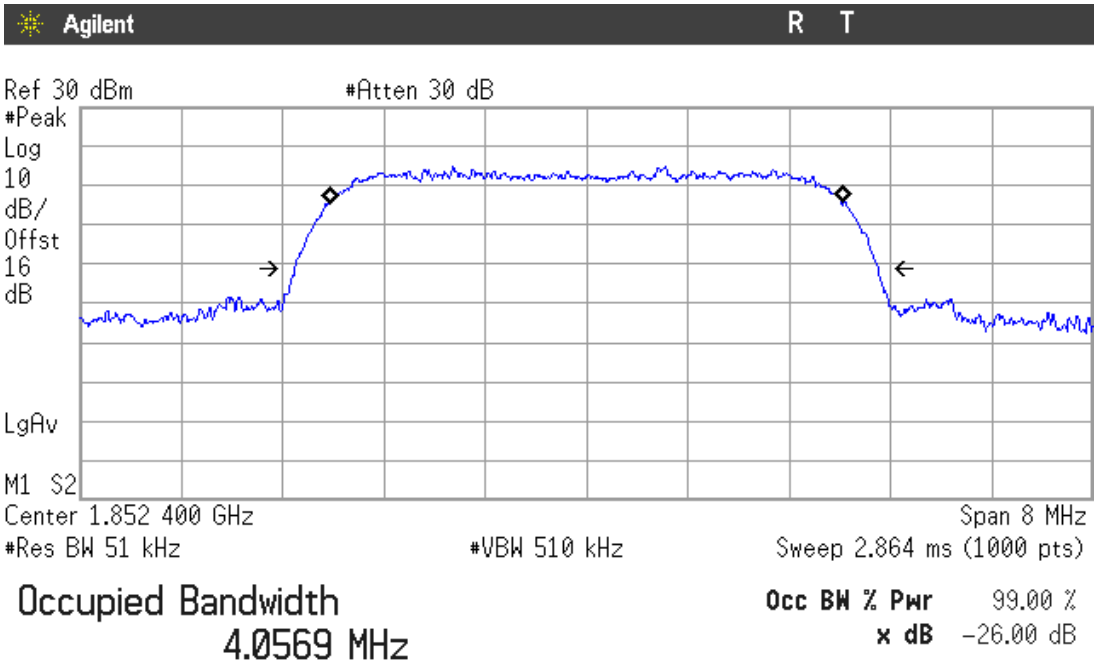


Highest Channel

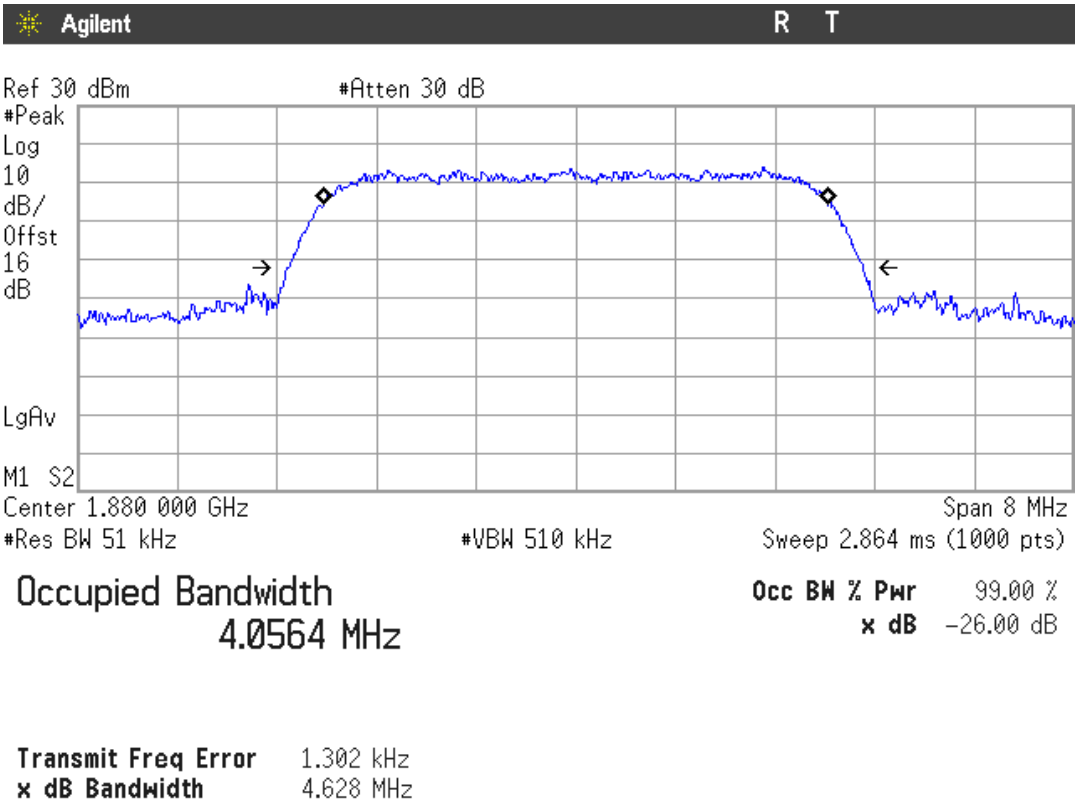


WCDMA MODULATION

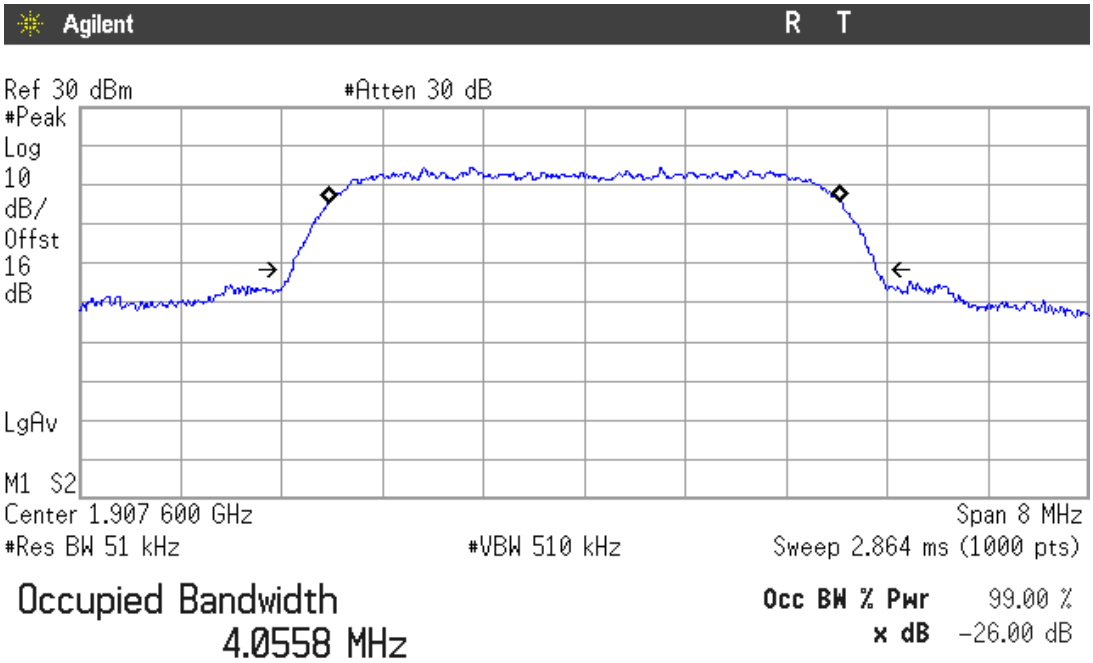
Lowest Channel



Middle Channel

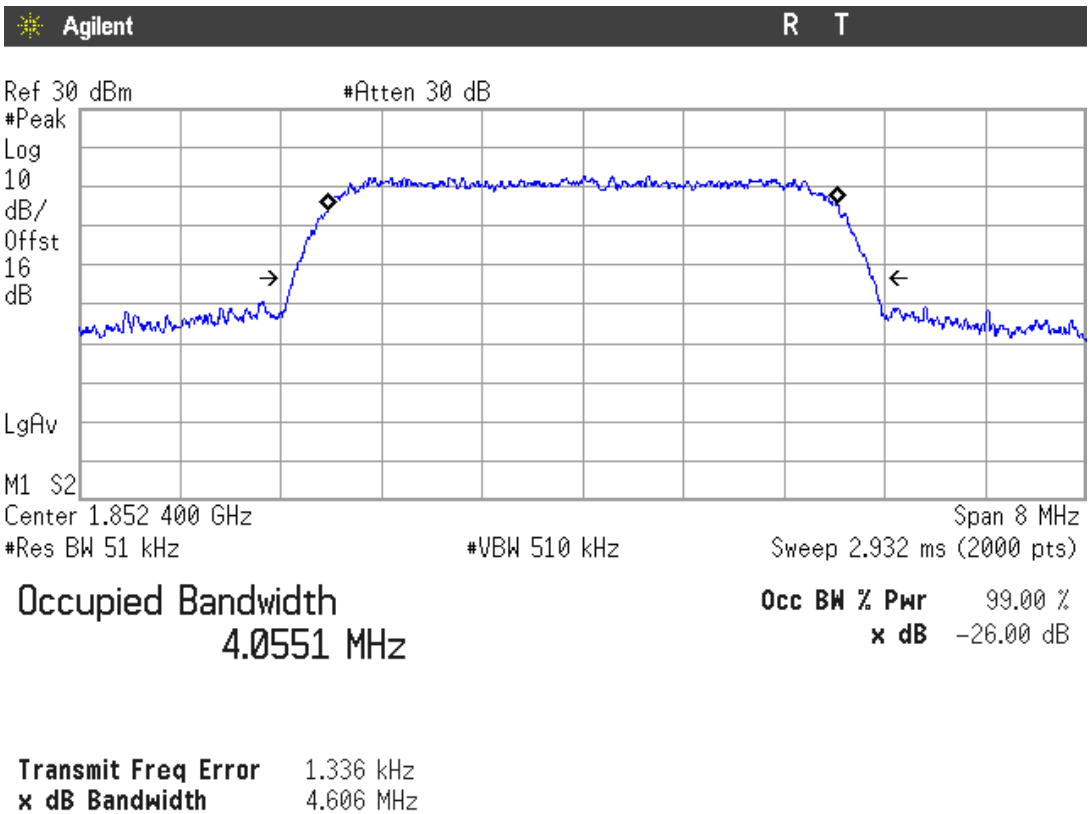


Highest Channel

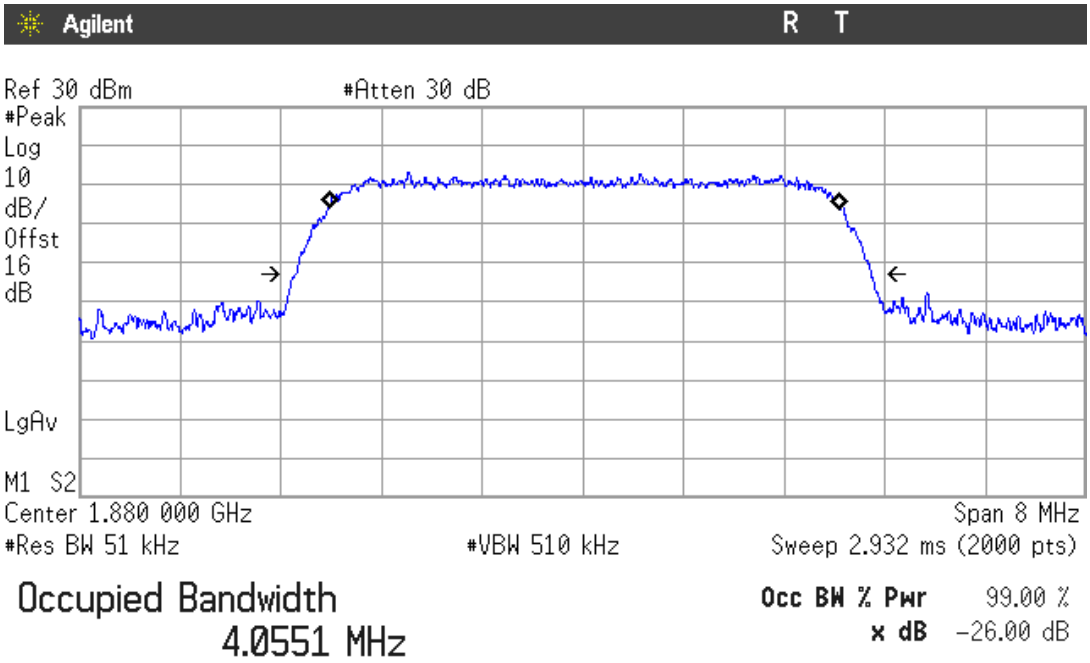


HSUPA MODULATION

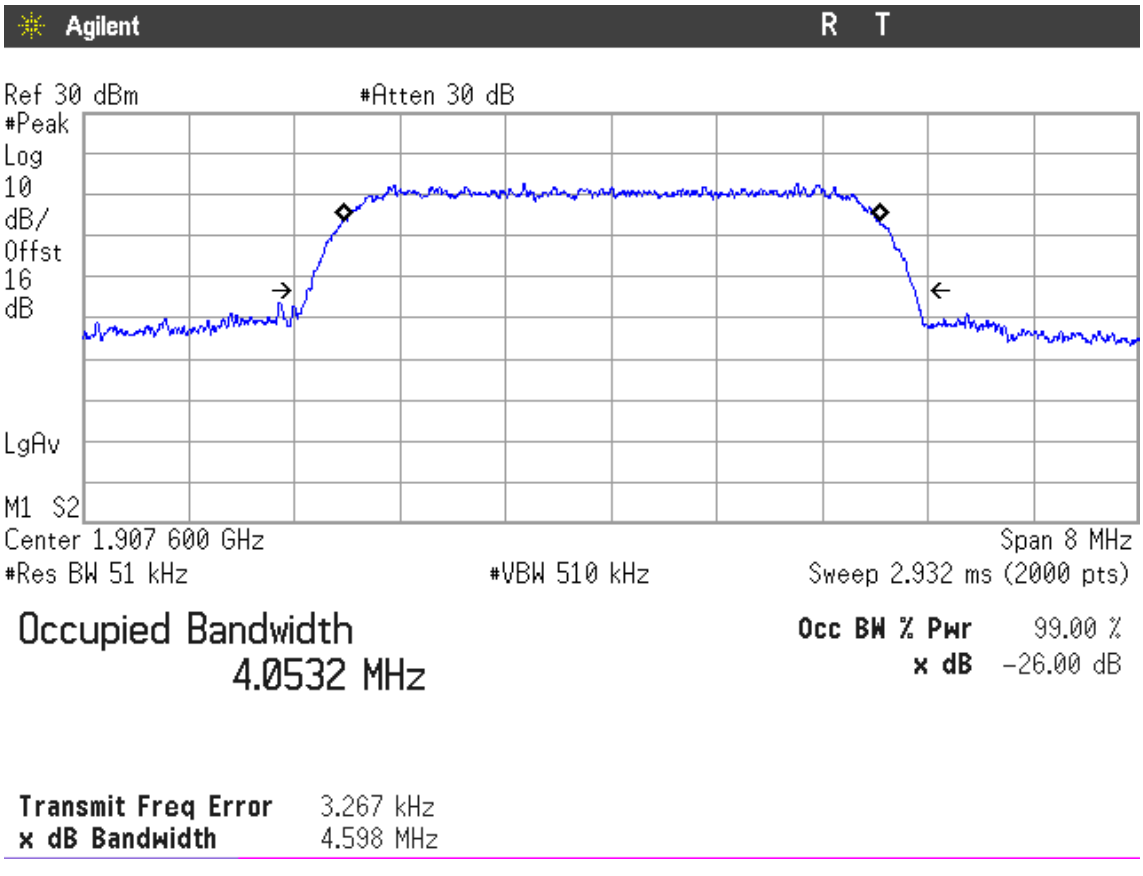
Lowest Channel



Middle Channel



Highest Channel



Spurious emissions at antenna terminals

SPECIFICATION

§2.1051 and §24.238

METHOD

The EUT RF output connector was connected to a spectrum analyser using an 50 ohm attenuator and the resolution bandwidth of the spectrum analyser was set to 1 MHz. The spectrum was investigated from 30 MHz to 20 GHz.

The reading of the spectrum analyser is corrected with the attenuation loss of connection between output terminal of EUT and input of the spectrum analyser.

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

Po (dBm) – [43 + 10 log (Po in mwatts) - 30] = - 13 dBm

RESULTS (see plots in next pages)

GPRS MODULATION

1. CHANNEL: LOWEST
No spurious signals were found in all the range.

2. CHANNEL: MIDDLE

No spurious signals were found in all the range.

3. CHANNEL: HIGHEST

No spurious signals were found in all the range.

EDGE MODULATION

1. CHANNEL: LOWEST
No spurious signals were found in all the range.

2. CHANNEL: MIDDLE

No spurious signals were found in all the range.

3. CHANNEL: HIGHEST

No spurious signals were found in all the range.

WCDMA MODULATION

1. CHANNEL: LOWEST
No spurious signals were found in all the range.

2. CHANNEL: MIDDLE
No spurious signals were found in all the range.

3. CHANNEL: HIGHEST
No spurious signals were found in all the range.

HSUPA MODULATION

1. CHANNEL: LOWEST
No spurious signals were found in all the range.

2. CHANNEL: MIDDLE

No spurious signals were found in all the range.

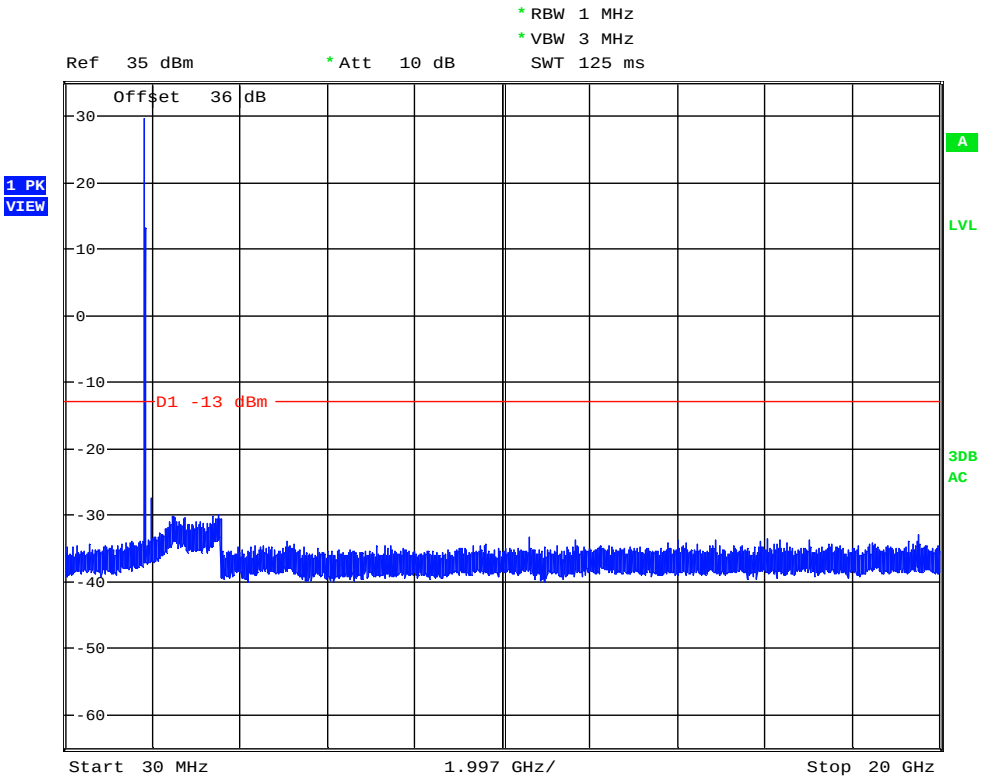
3. CHANNEL: HIGHEST

No spurious signals were found in all the range.

Verdict: PASS

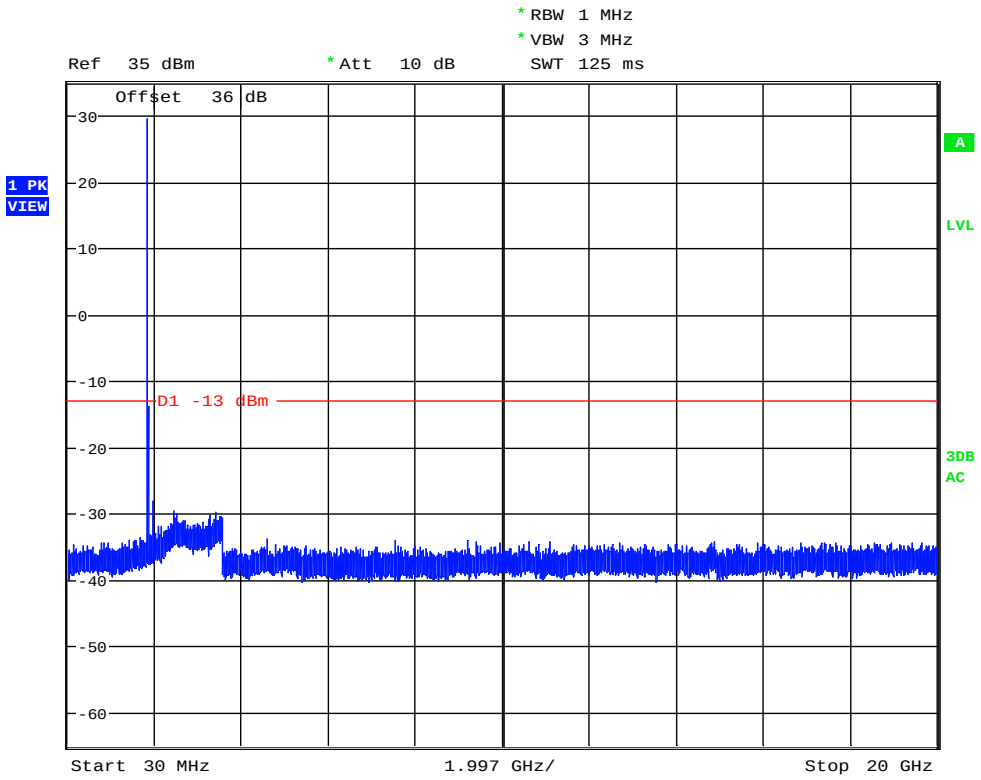
GPRS MODULATION

1. CHANNEL: LOWEST



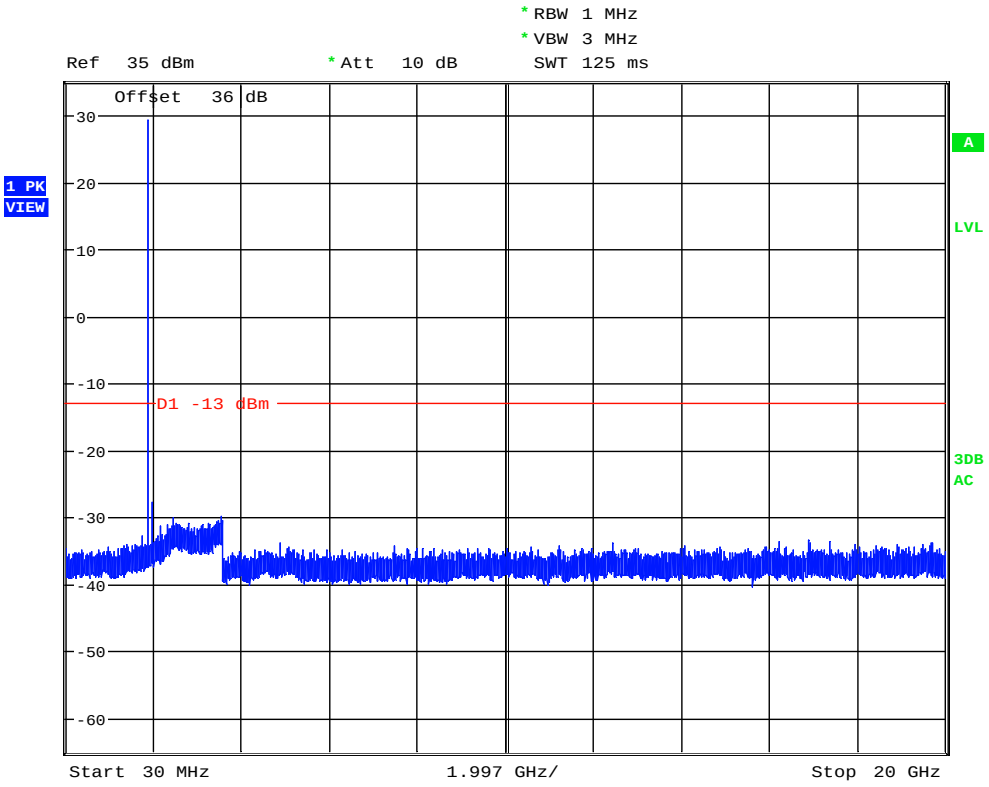
Note: The peak above the limit is the carrier frequency.

2. CHANNEL: MIDDLE



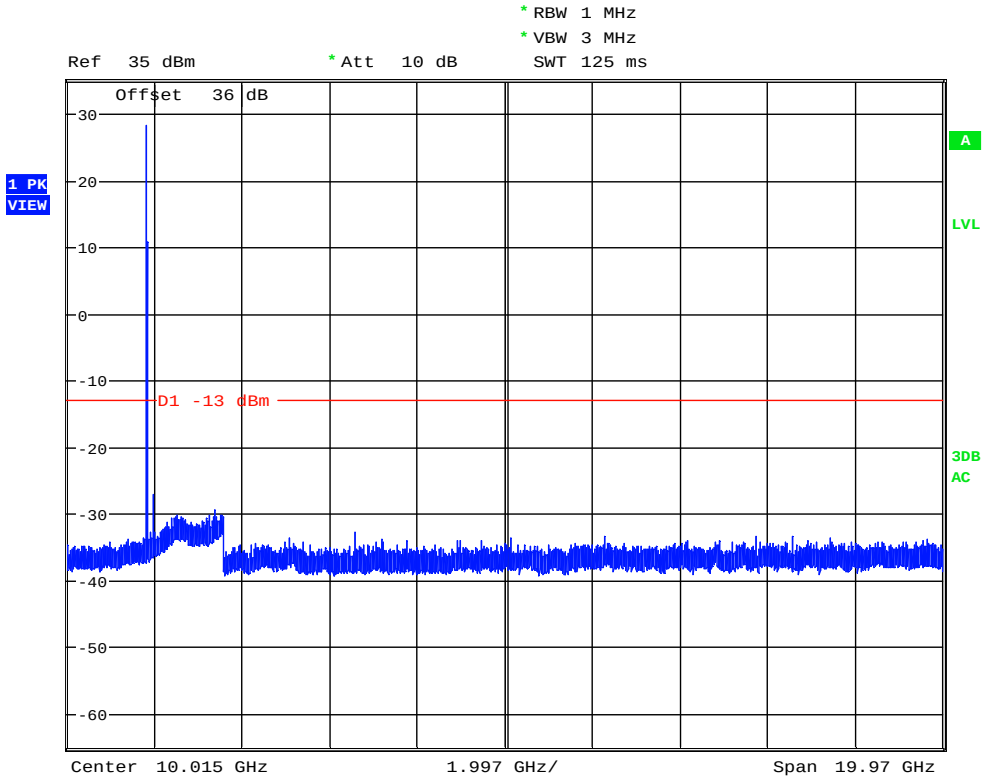
Note: The peak above the limit is the carrier frequency.

3. CHANNEL: HIGHEST



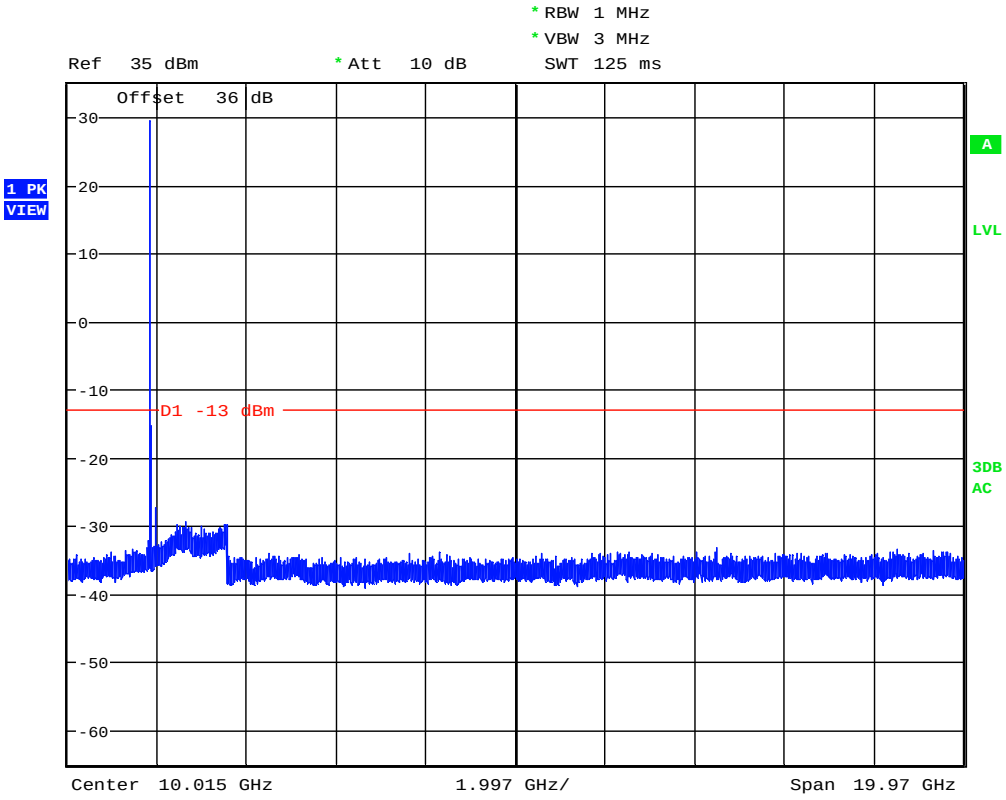
Note: The peak above the limit is the carrier frequency.
EDGE MODULATION

1. CHANNEL: LOWEST



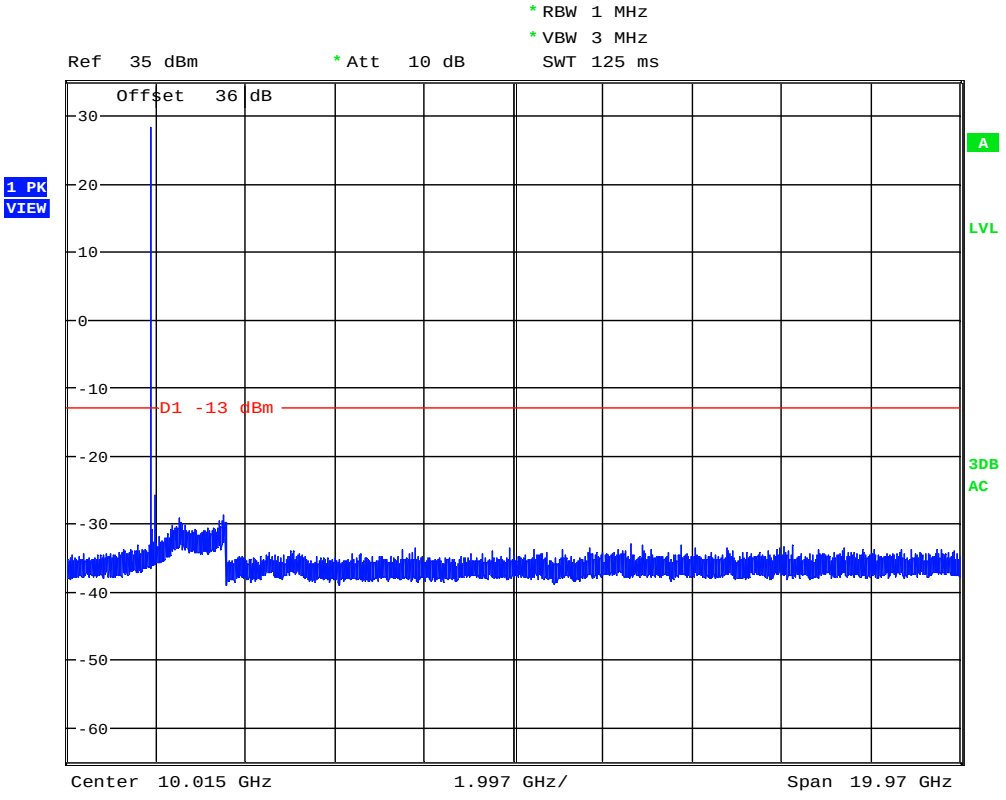
Note: The peak above the limit is the carrier frequency.

2. CHANNEL: MIDDLE



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

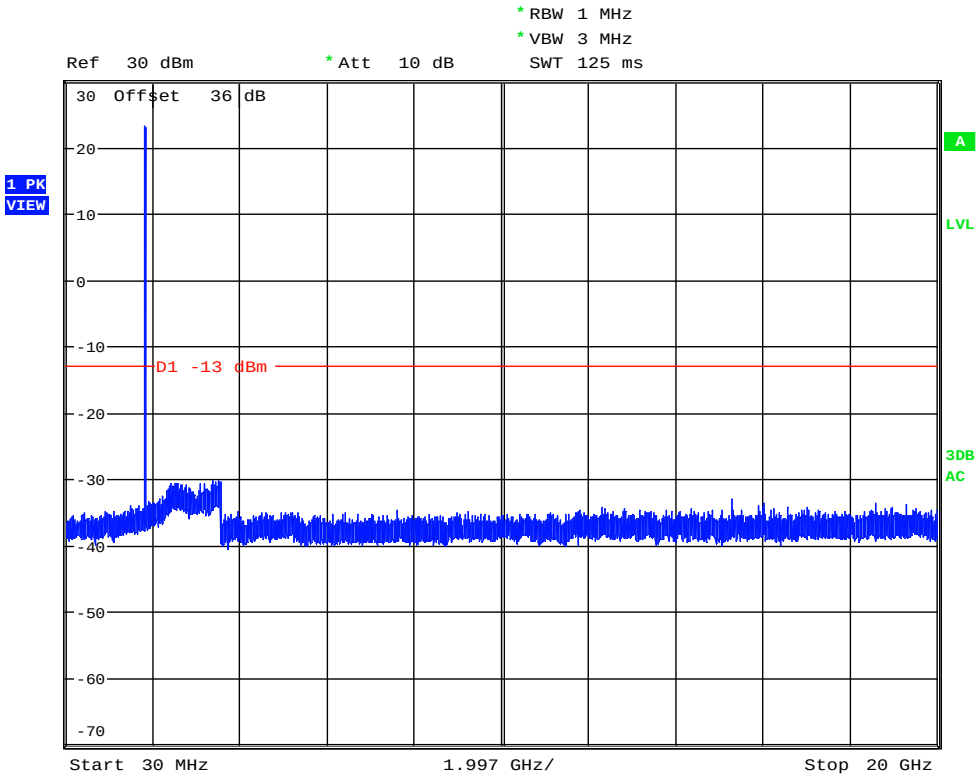
3. CHANNEL: HIGHEST



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

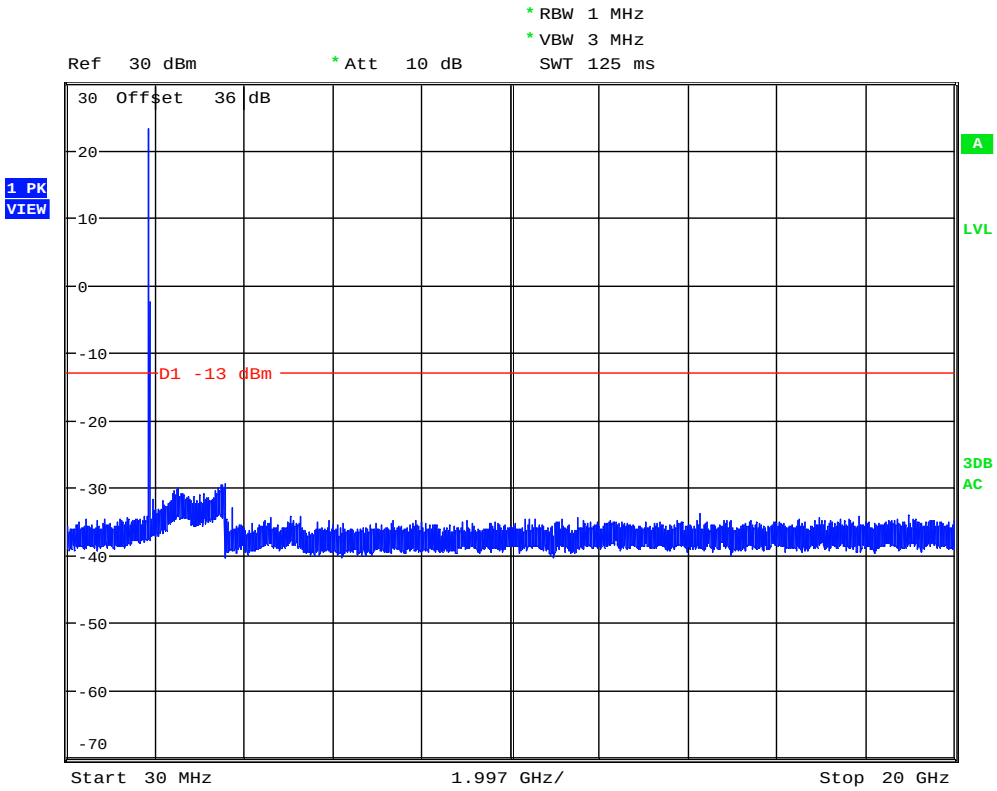
WCDMA MODULATION

1. CHANNEL: LOWEST



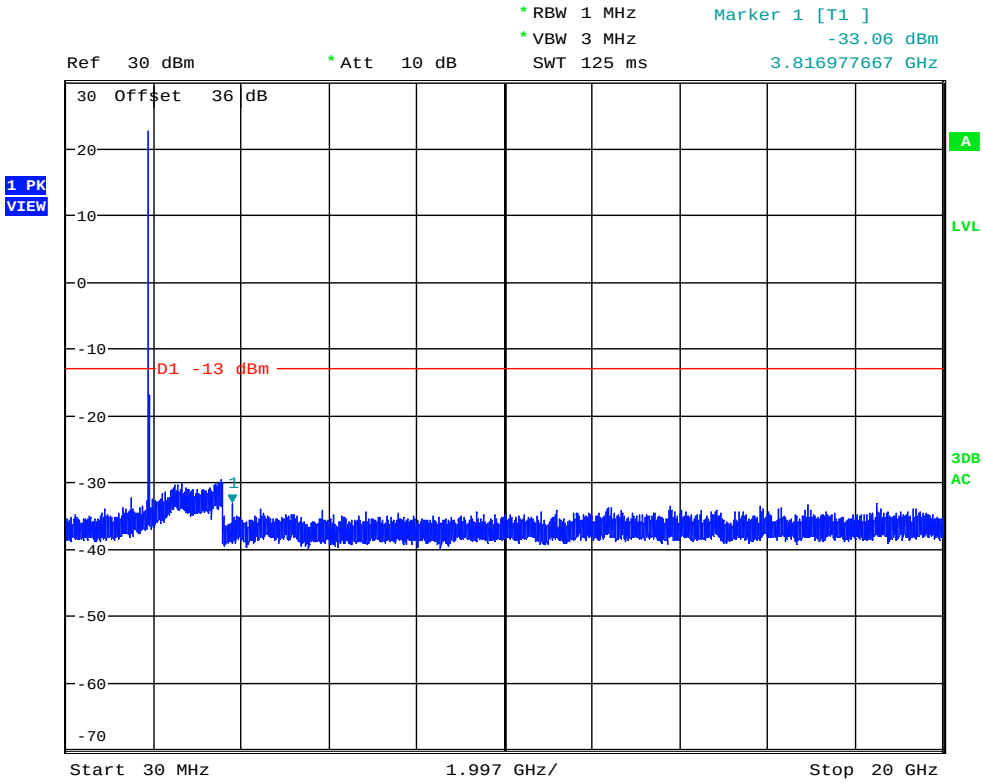
Note: The peak above the limit is the carrier frequency.

2. CHANNEL: MIDDLE



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

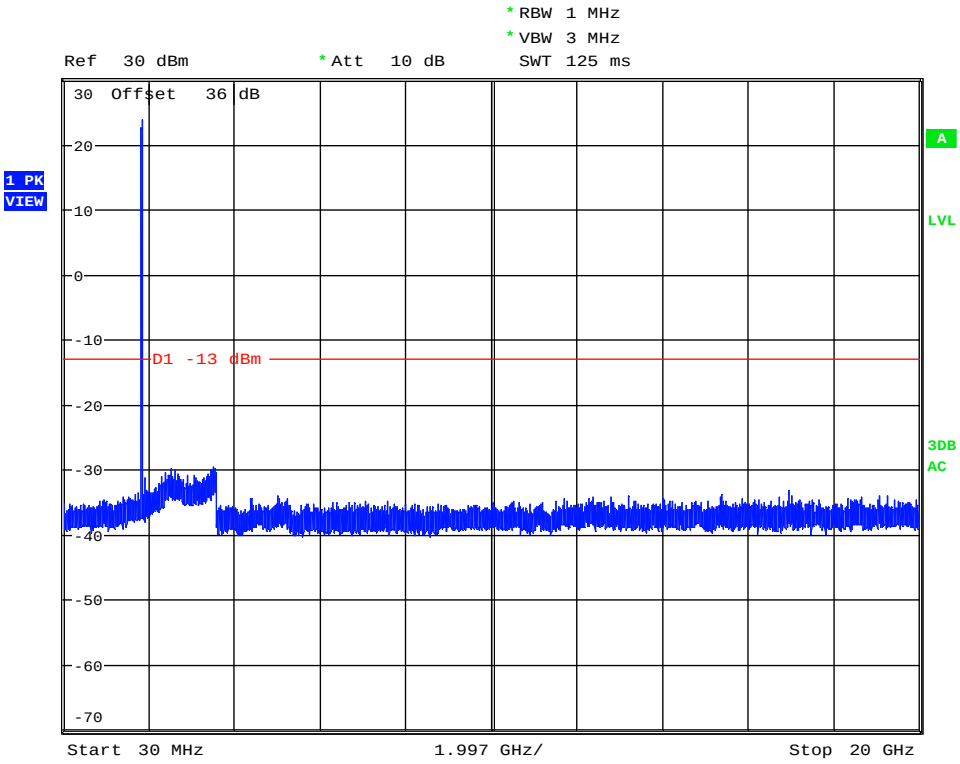
3. CHANNEL: HIGHEST



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

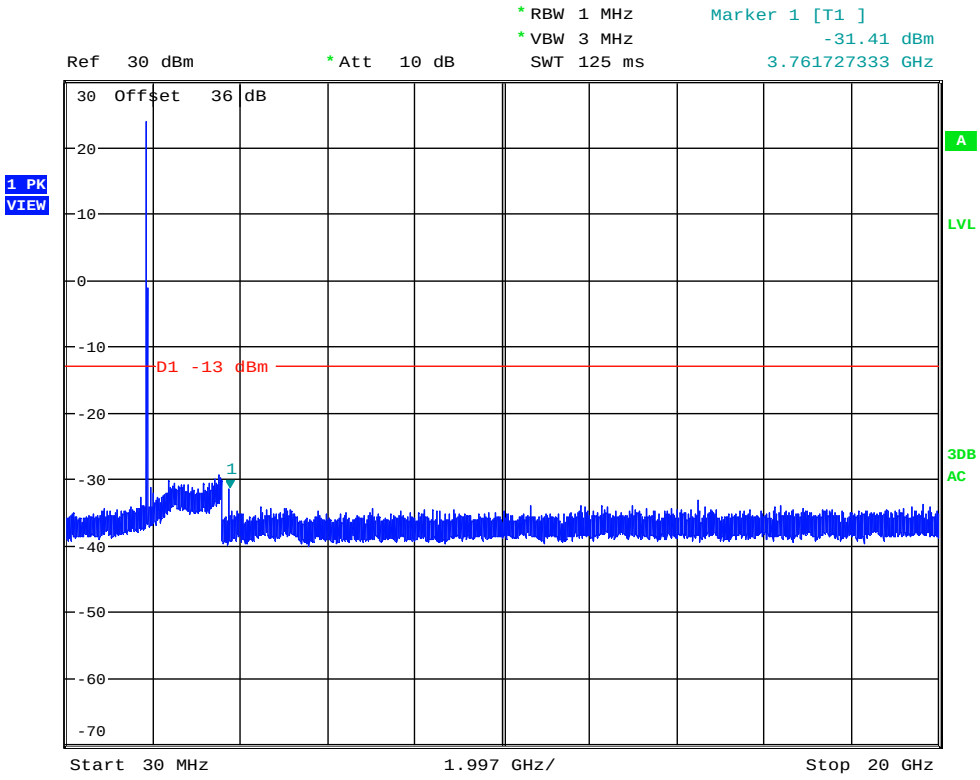
HSUPA MODULATION

1. CHANNEL: LOWEST



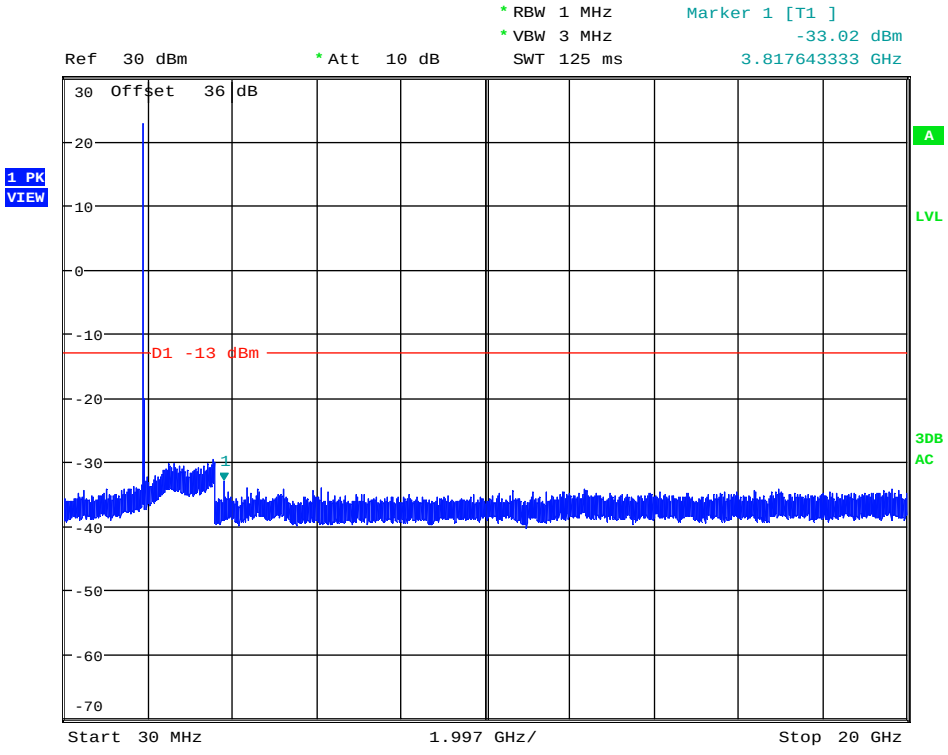
Note: The peak above the limit is the carrier frequency.

2. CHANNEL: MIDDLE



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

3. CHANNEL: HIGHEST



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

Spurious emissions at antenna terminals at Block Edges

SPECIFICATION

§2.1051 and §24.238

METHOD

As indicated in FCC part 24. in the 1 MHz bands immediately outside and adjacent to the frequency block or band a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. A resolution bandwidth of 5 kHz/3.3 kHz was used for GPRS and EDGE modulations. and 50 kHz for WCDMA and HSUPA modulations.

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

Po (dBm) – [43 + 10 log (Po in mwatts) - 30] = - 13 dBm

RESULTS (see plots in next pages)

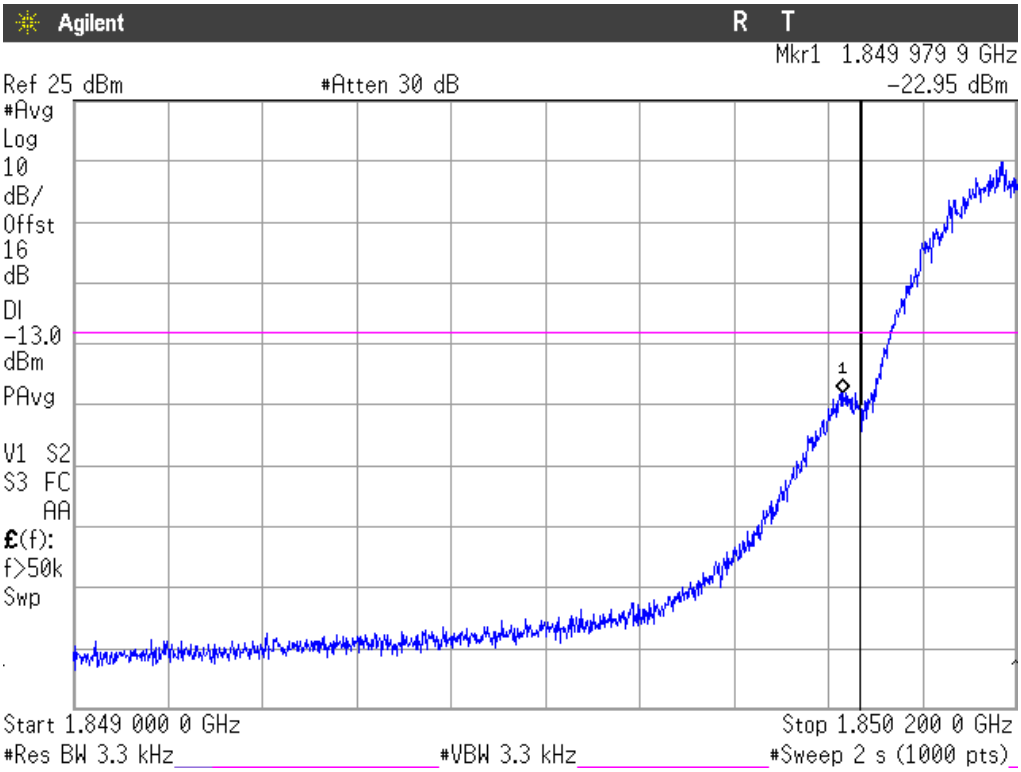
MODULATION:	GPRS	EDGE	WCDMA	HSUPA
Maximum measured level at lowest Block Edge at antenna port (dBm)	-22.95	-28.45	-29.44	-31.82

MODULATION:	GPRS	EDGE	WCDMA	HSUPA
Maximum measured level at highest Block Edge at antenna port (dBm)	-21.85	-27.62	-26.76	-28.83

Measurement uncertainty = ±1.57 dB.

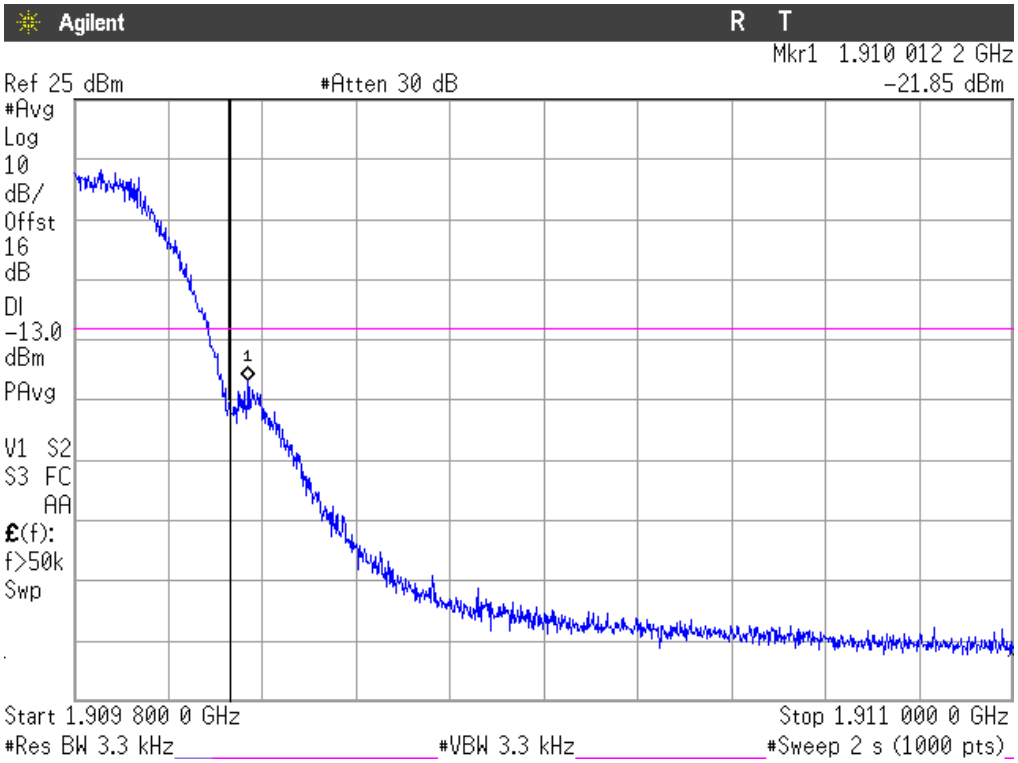
GPRS MODULATION

CHANNEL LOWEST



NOTE: The equipment transmits at the maximum output power

CHANNEL HIGHEST

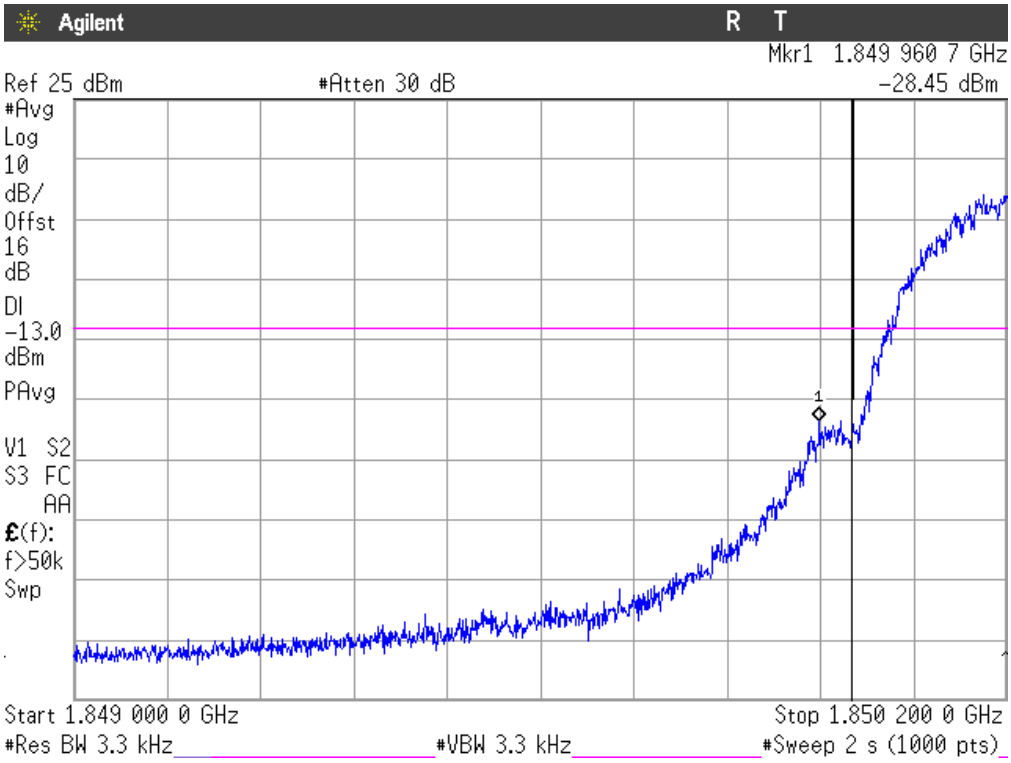


NOTE: The equipment transmits at the maximum output power

Verdict: PASS

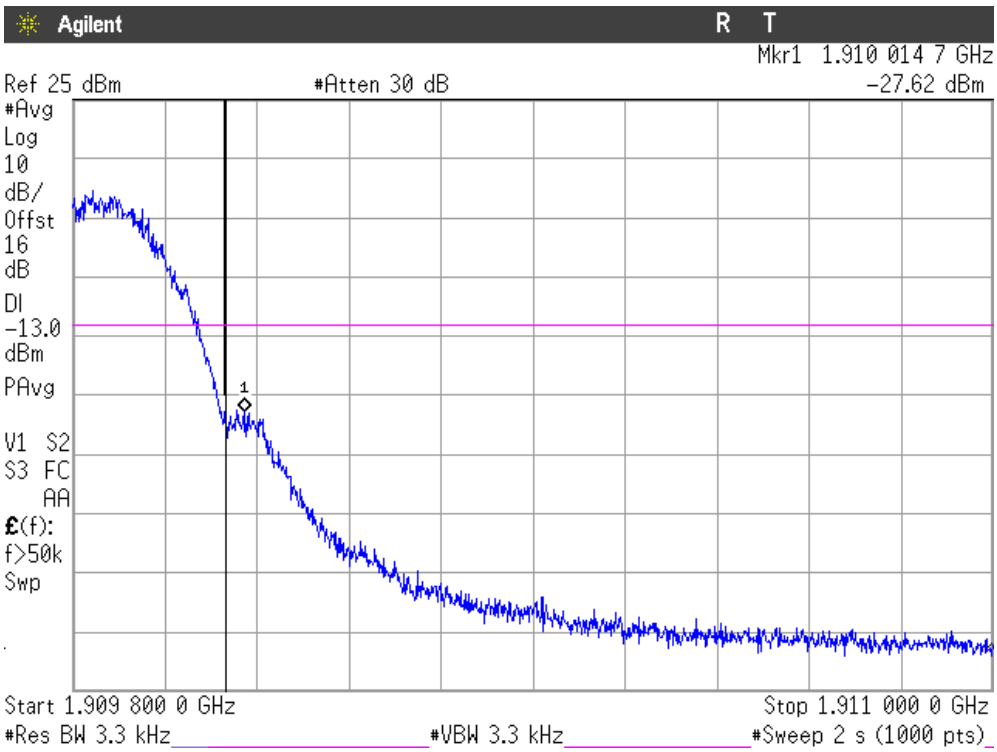
EDGE MODULATION

CHANNEL LOWEST



NOTE: The equipment transmits at the maximum output power

CHANNEL HIGHEST

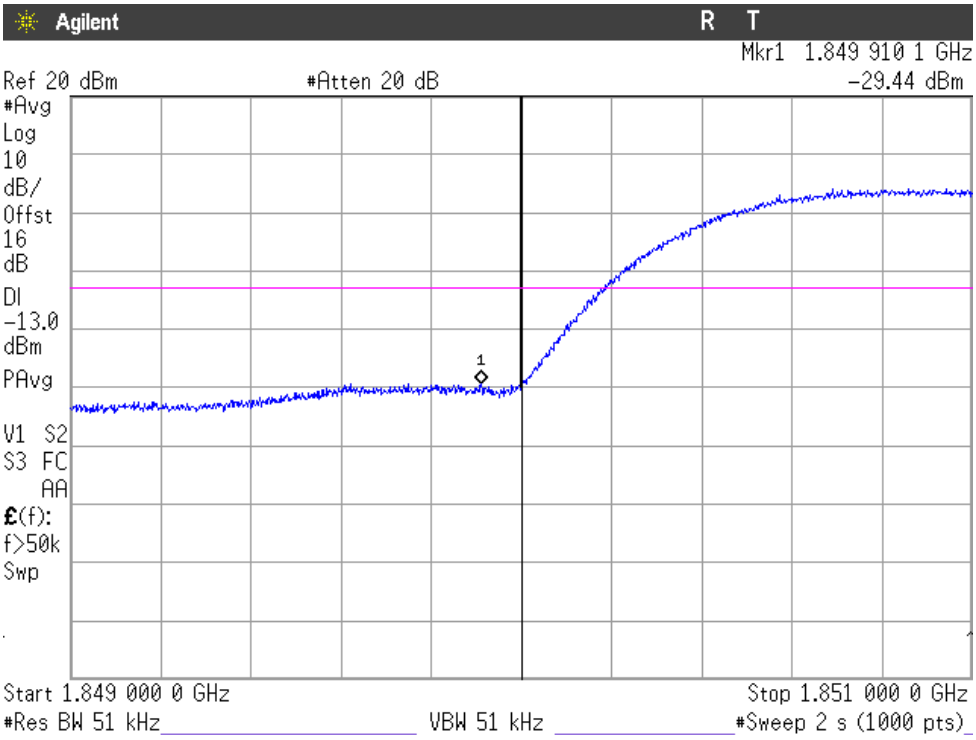


NOTE: The equipment transmits at the maximum output power

Verdict: PASS

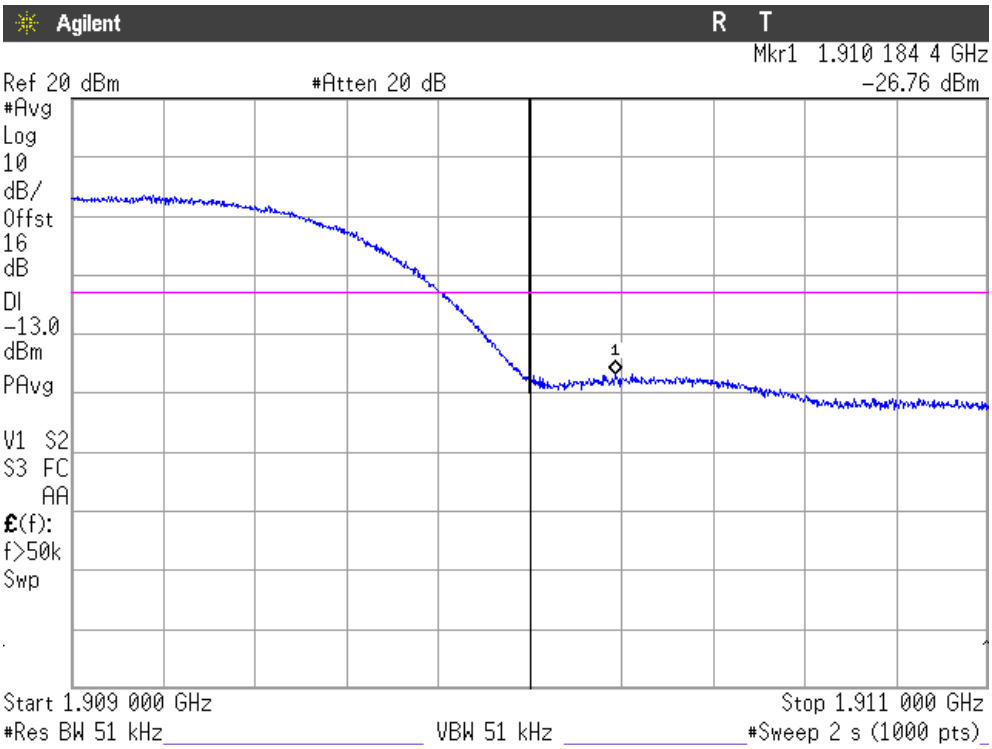
WCDMA MODULATION

CHANNEL LOWEST



NOTE: The equipment transmits at the maximum output power

CHANNEL HIGHEST

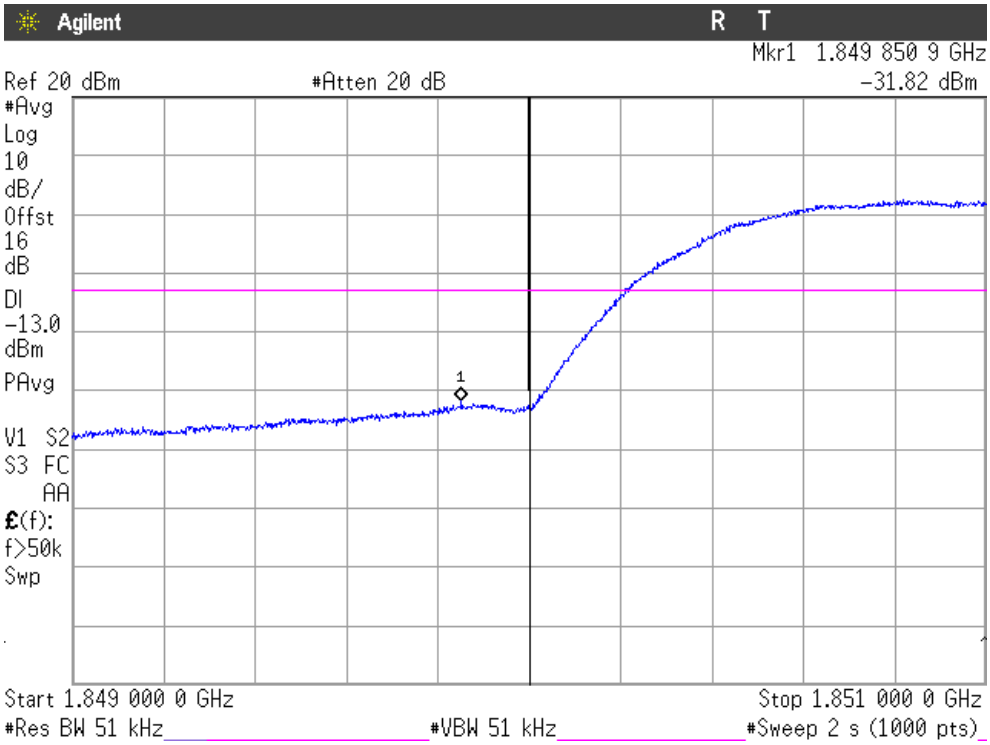


NOTE: The equipment transmits at the maximum output power

Verdict: PASS

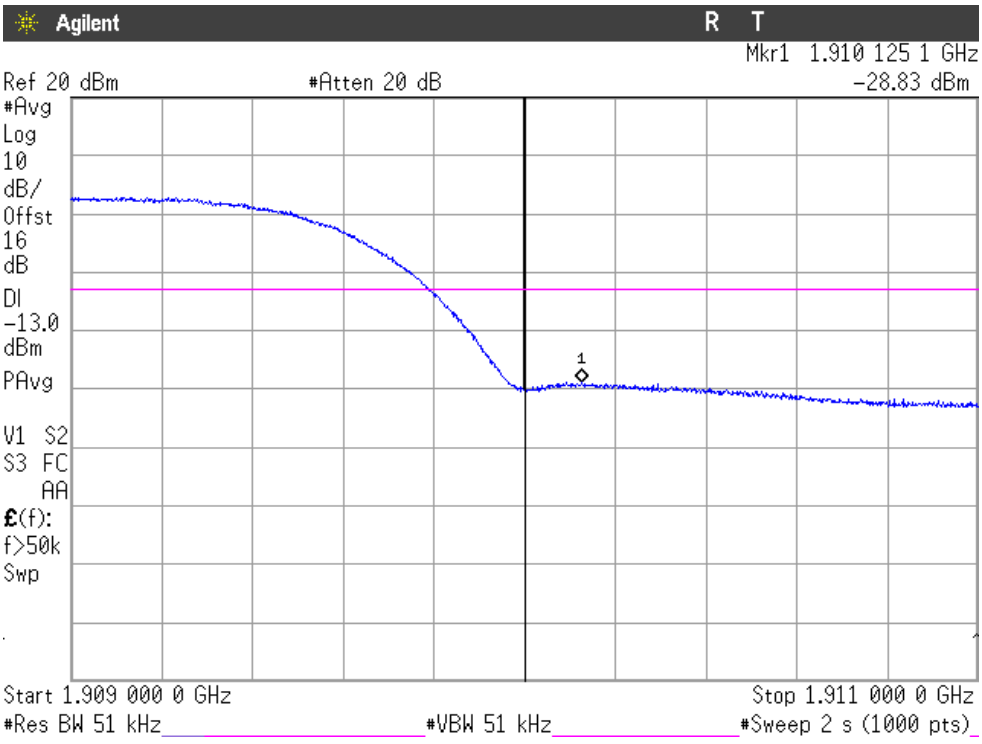
HSUPA MODULATION

CHANNEL LOWEST



NOTE: The equipment transmits at the maximum output power

CHANNEL HIGHEST



NOTE: The equipment transmits at the maximum output power

Verdict: PASS

Radiated emissions

SPECIFICATION

§ 24.238

METHOD

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

The EUT was placed on a 1 meter high 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 emissions were substituted by the Substitution method. in accordance with the ANSI/TIA/EIA-603-C: 2004.

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

Po (dBm) – [43 + 10 log (Po in mwatts) - 30] = - 13 dBm

RESULTS

GPRS AND EDGE MODULATION

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

1. CHANNEL: LOWEST

Frequency range 30 MHz-1000 MHz.
No spurious signals were found in all the range.

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 spurious signals were found in all the range.

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 spurious signals were found in all the range.

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 plots show the results for WCDMA modulation.

1. CHANNEL: LOWEST

Frequency range 30 MHz-1000 MHz.
No spurious signals were found in all the range.

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 spurious signals were found in all the range.

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 spurious signals were found in all the range.

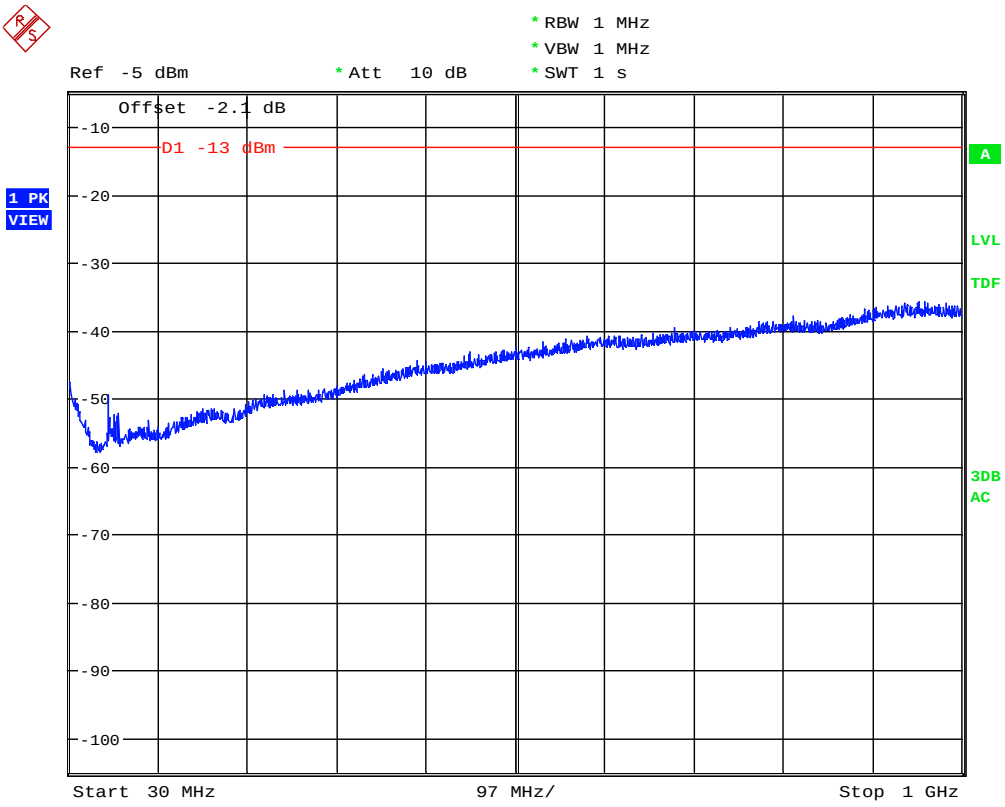
Frequency range 1 GHz-20 GHz.
No radiated spurious signals were detected at less than 20 dB respect to the limit.

Verdict: PASS

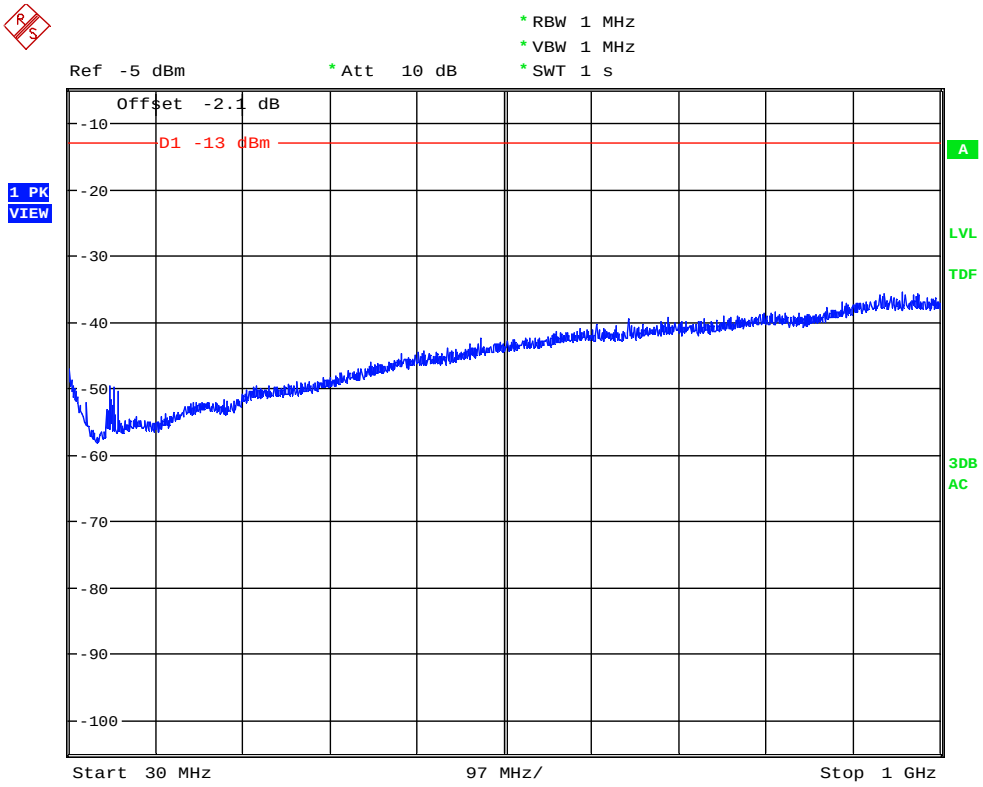
FREQUENCY RANGE 30 MHz-1000 MHz.

GPRS MODULATION

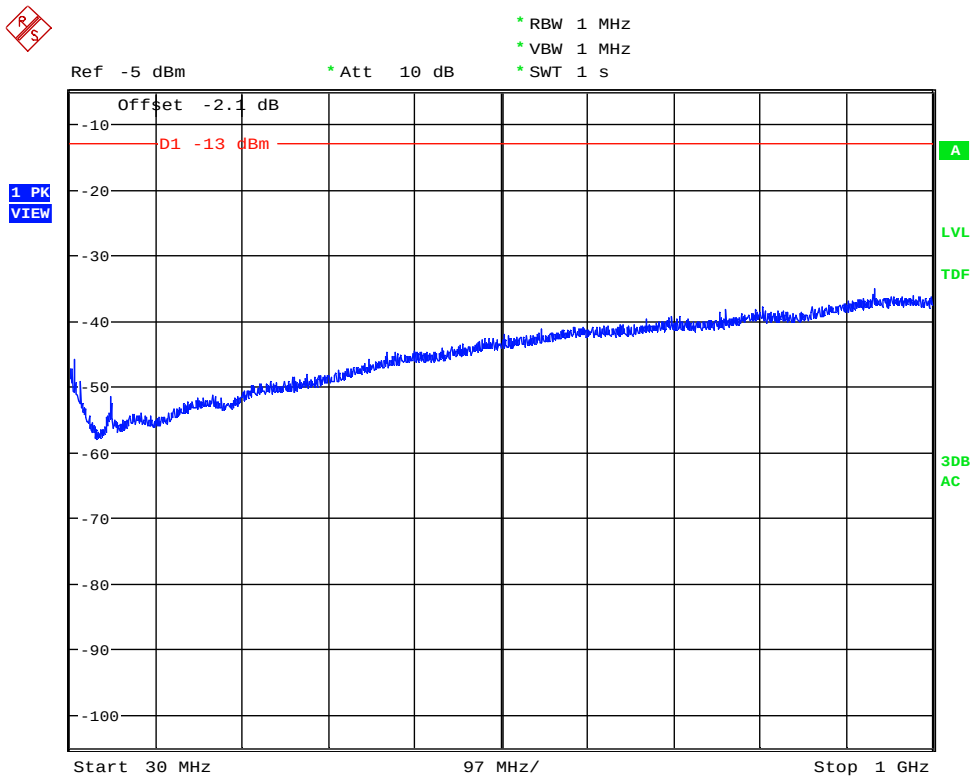
CHANNEL: LOWEST



CHANNEL: MIDDLE

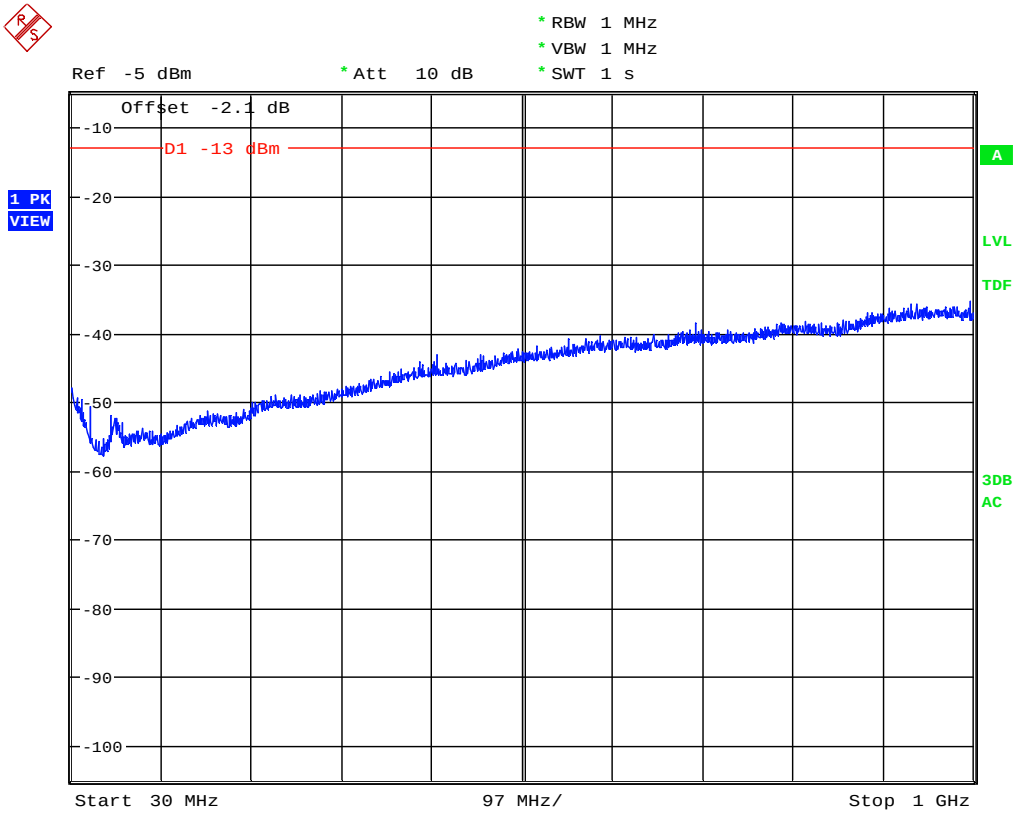


CHANNEL: HIGHEST

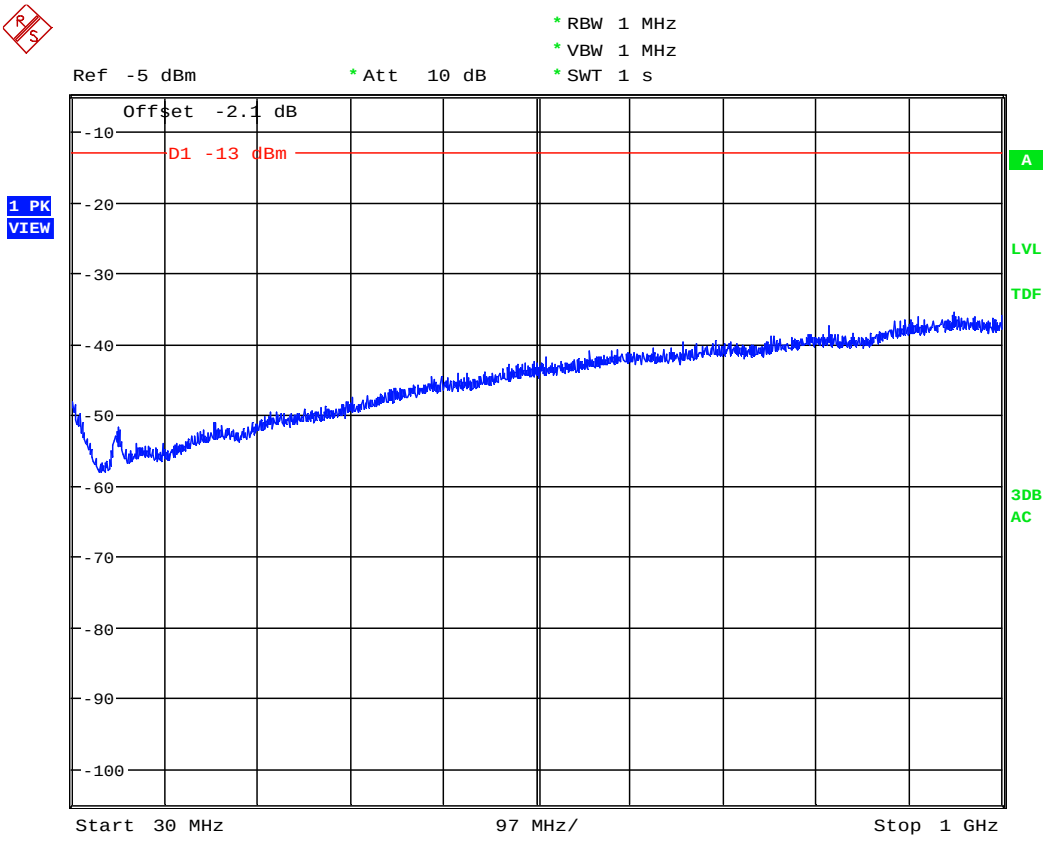


WCDMA MODULATION

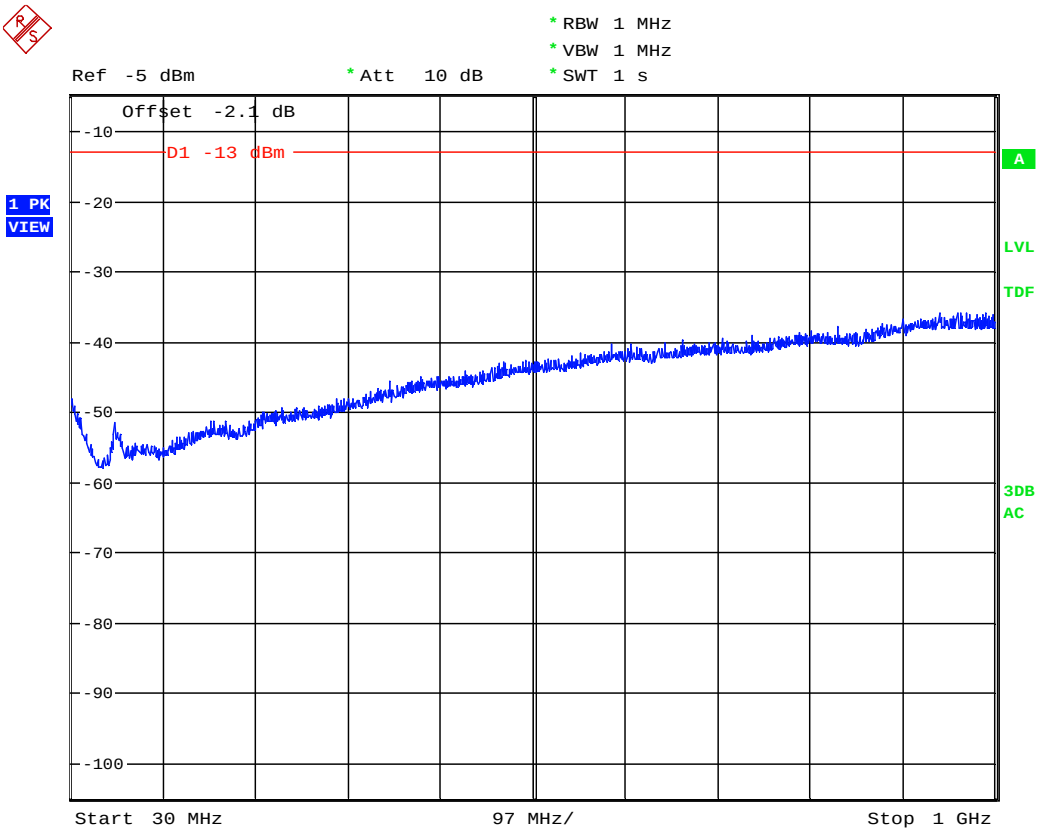
CHANNEL: LOWEST



CHANNEL: MIDDLE



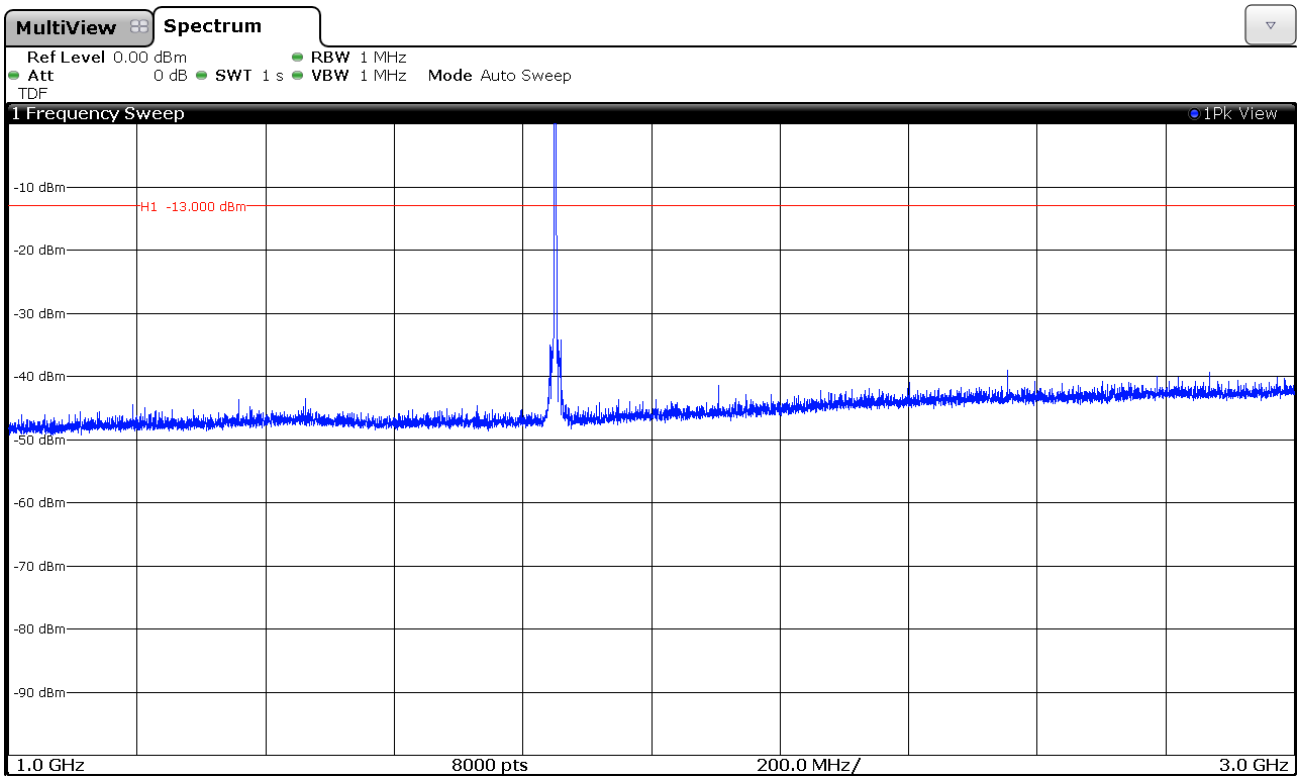
CHANNEL: HIGHEST



FREQUENCY RANGE 1 GHz to 3 GHz.

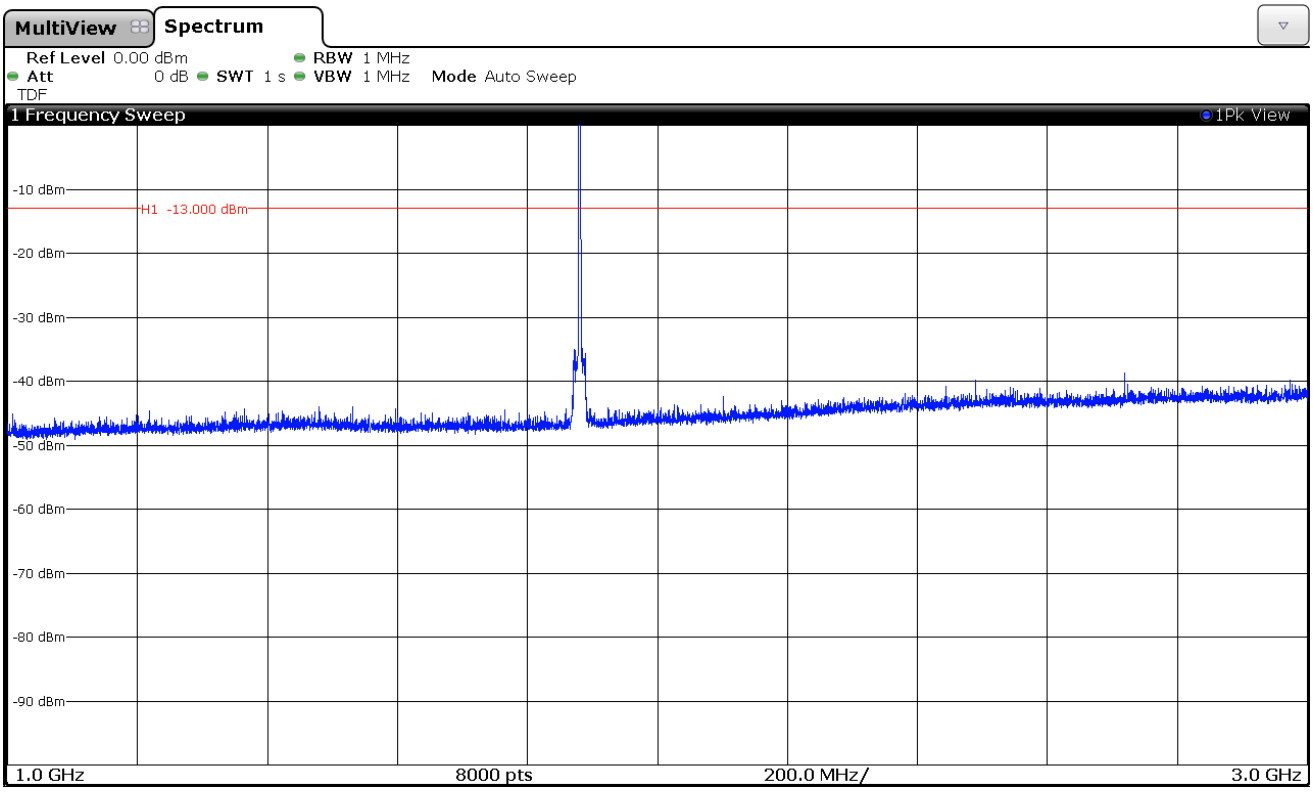
GPRS MODULATION

CHANNEL: LOWEST



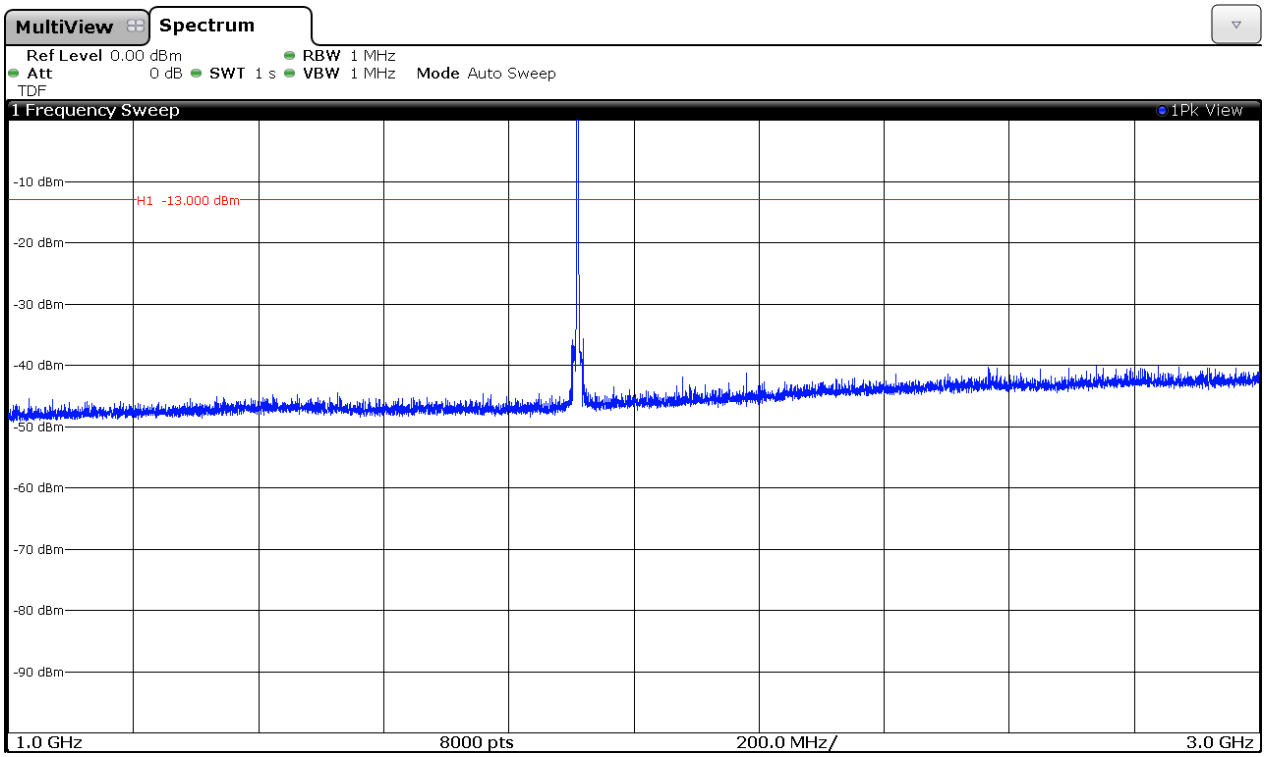
Note: The peak above the limit is the carrier frequency.

CHANNEL: MIDDLE



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

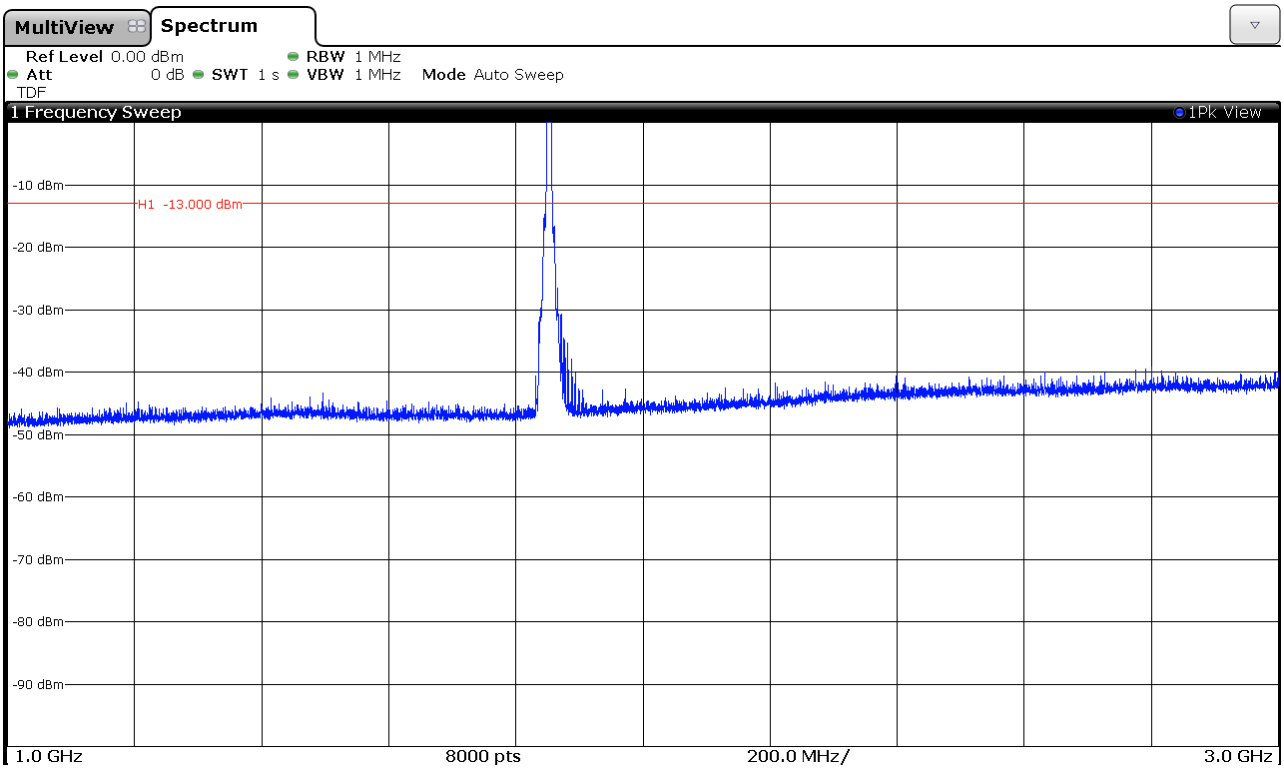
CHANNEL: HIGHEST



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

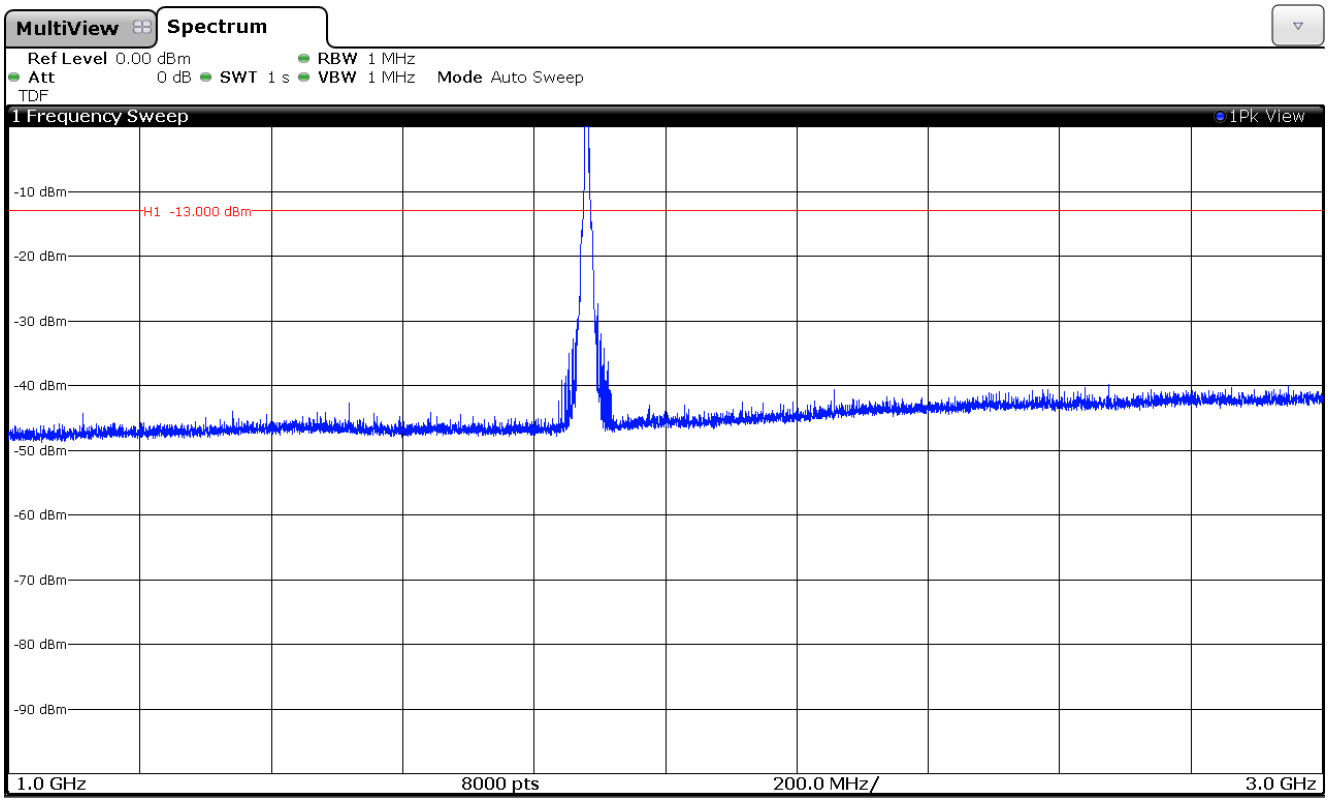
WCDMA MODULATION

CHANNEL: LOWEST



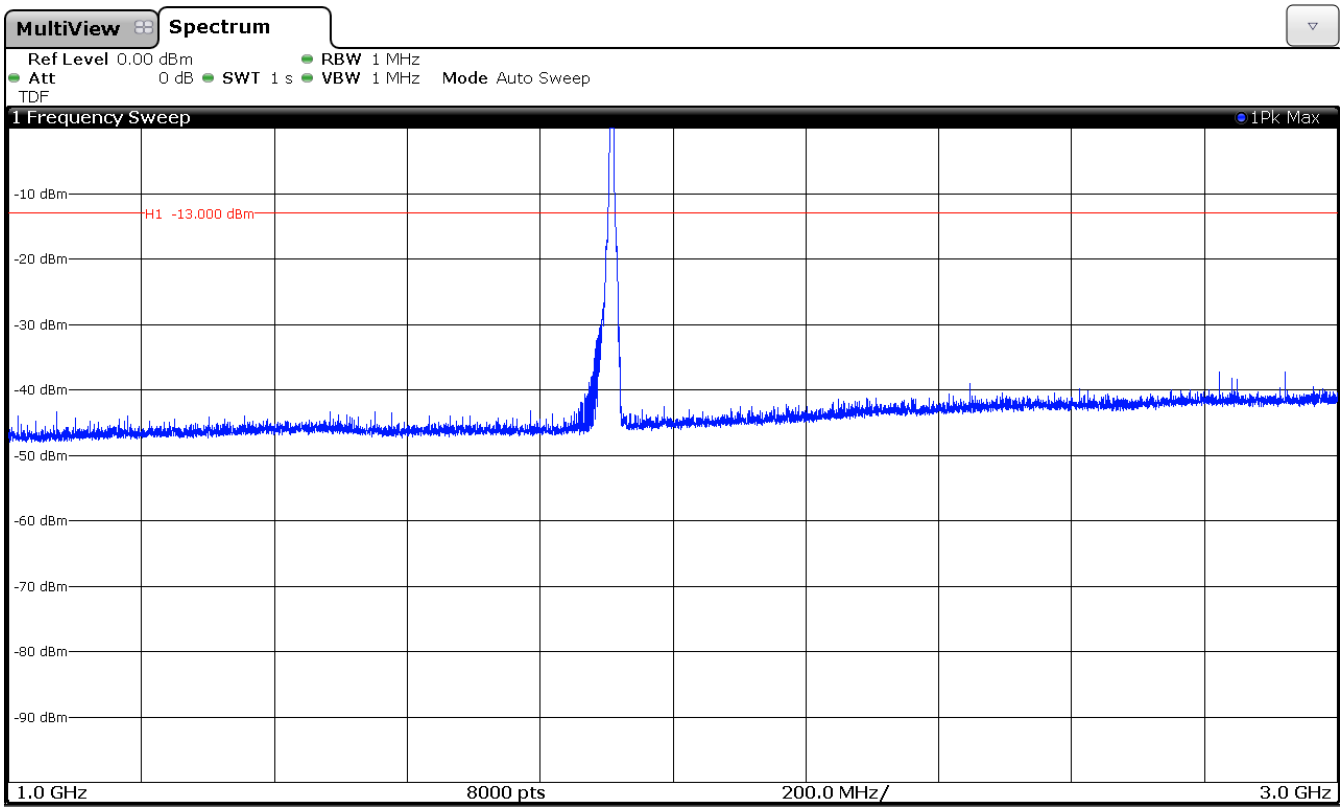
Note: The peak above the limit is the carrier frequency.

CHANNEL: MIDDLE



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

CHANNEL: HIGHEST

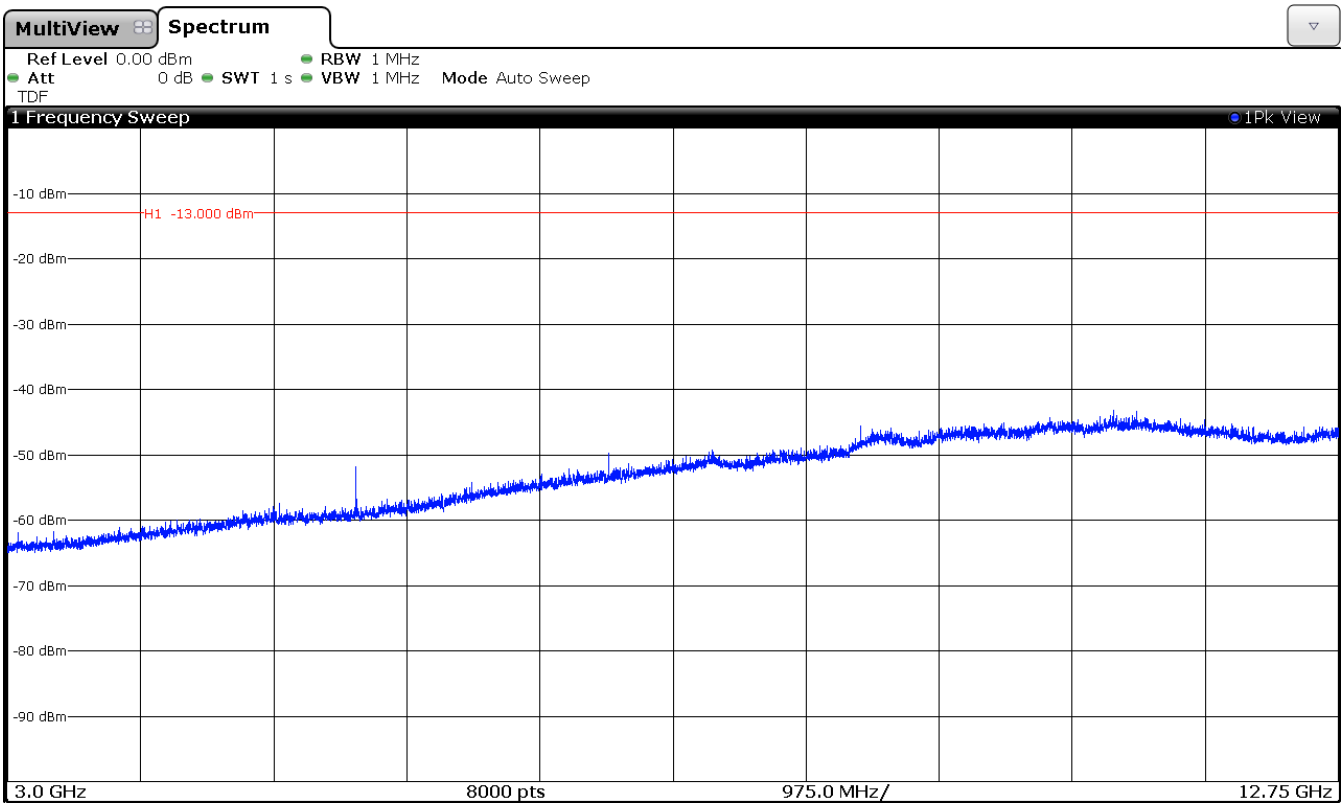


Note: The peak above the limit is the carrier frequency.

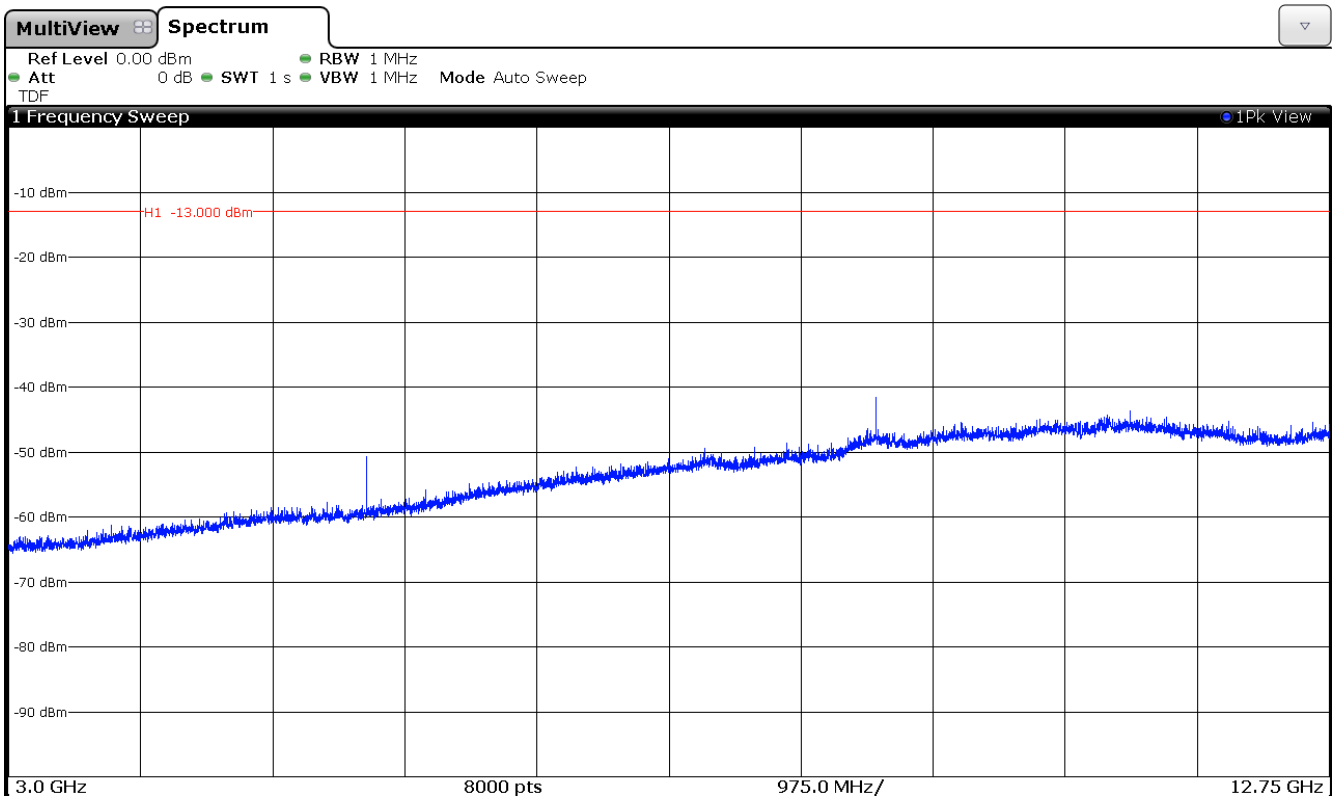
FREQUENCY RANGE 3 GHz to 12.75 GHz.

GPRS MODULATION

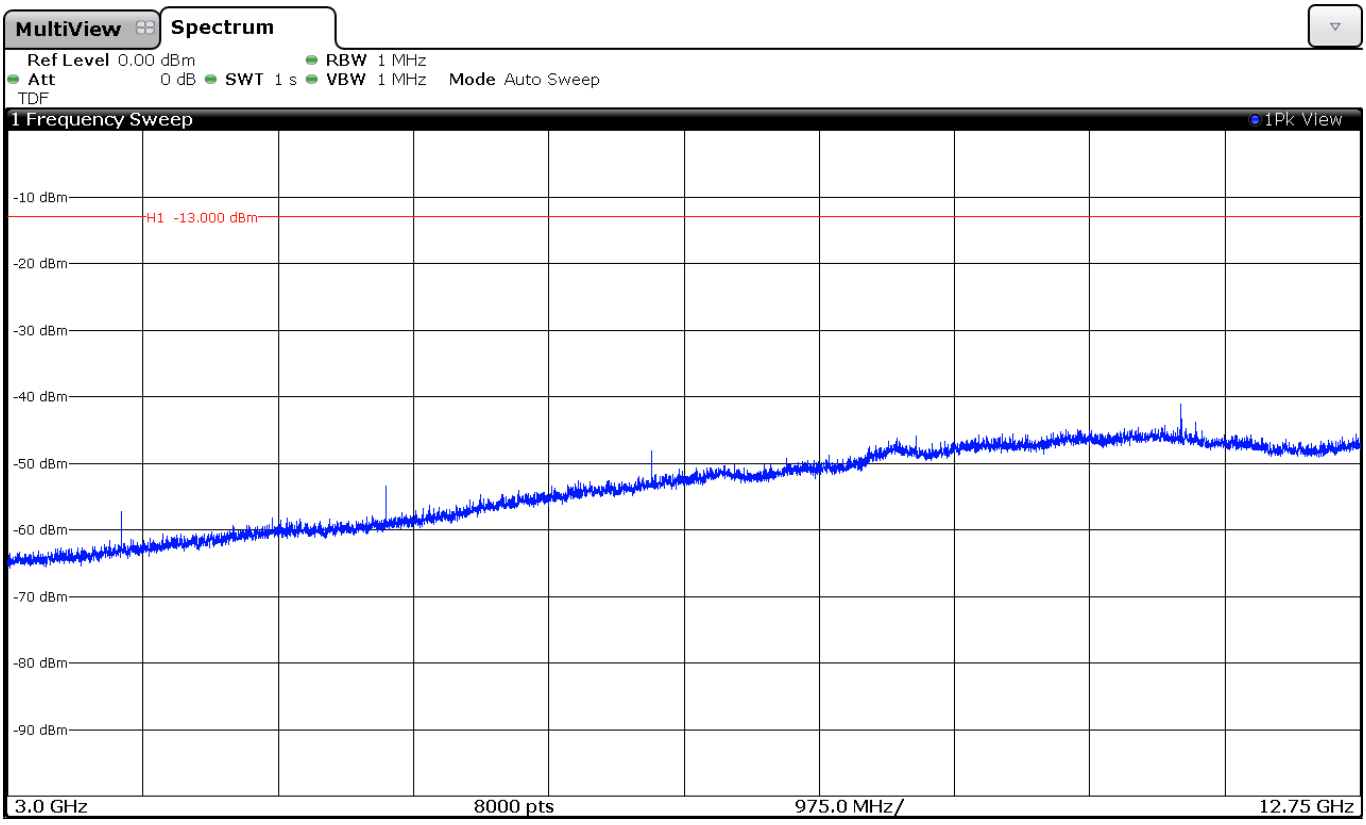
CHANNEL: LOWEST



CHANNEL: MIDDLE

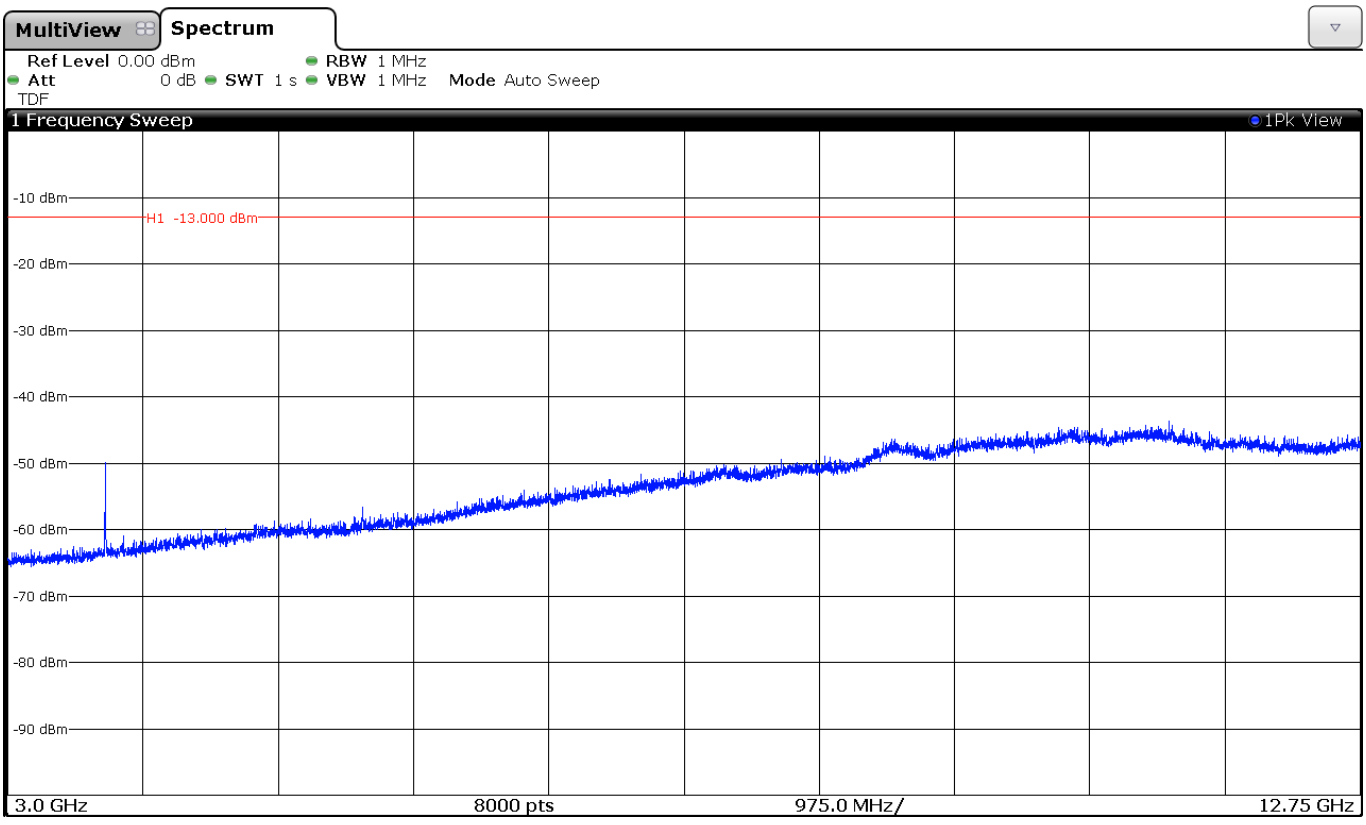


CHANNEL: HIGHEST

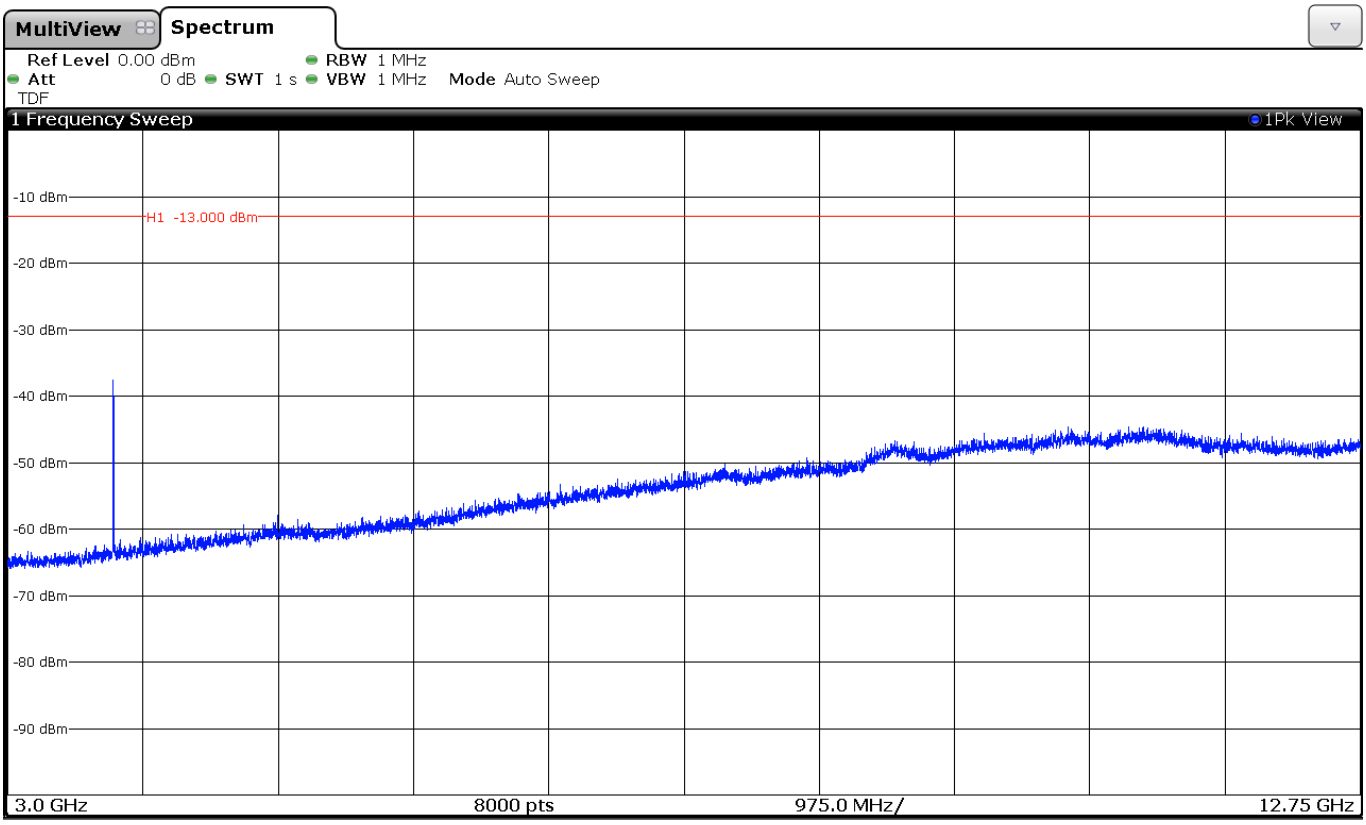


WCDMA MODULATION

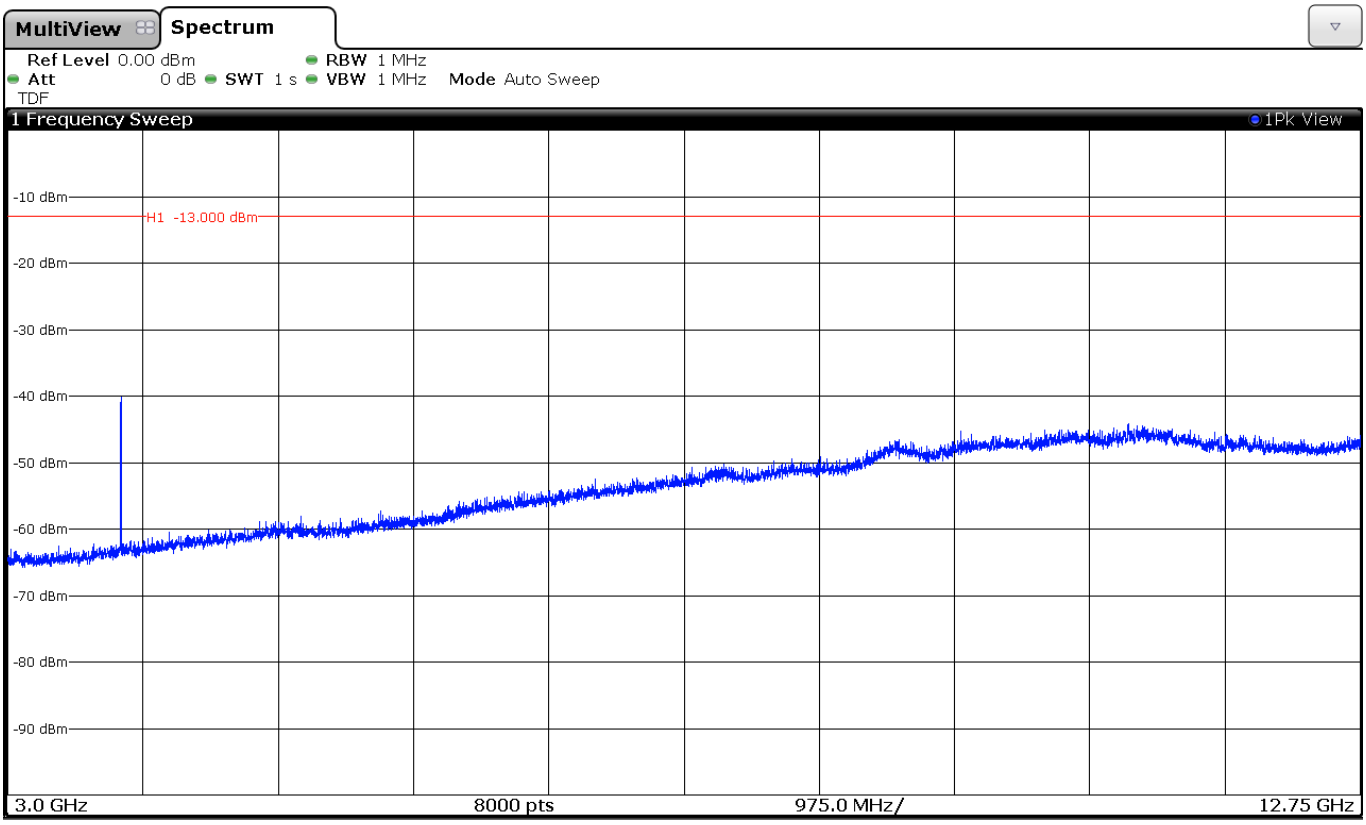
CHANNEL: LOWEST



CHANNEL: MIDDLE



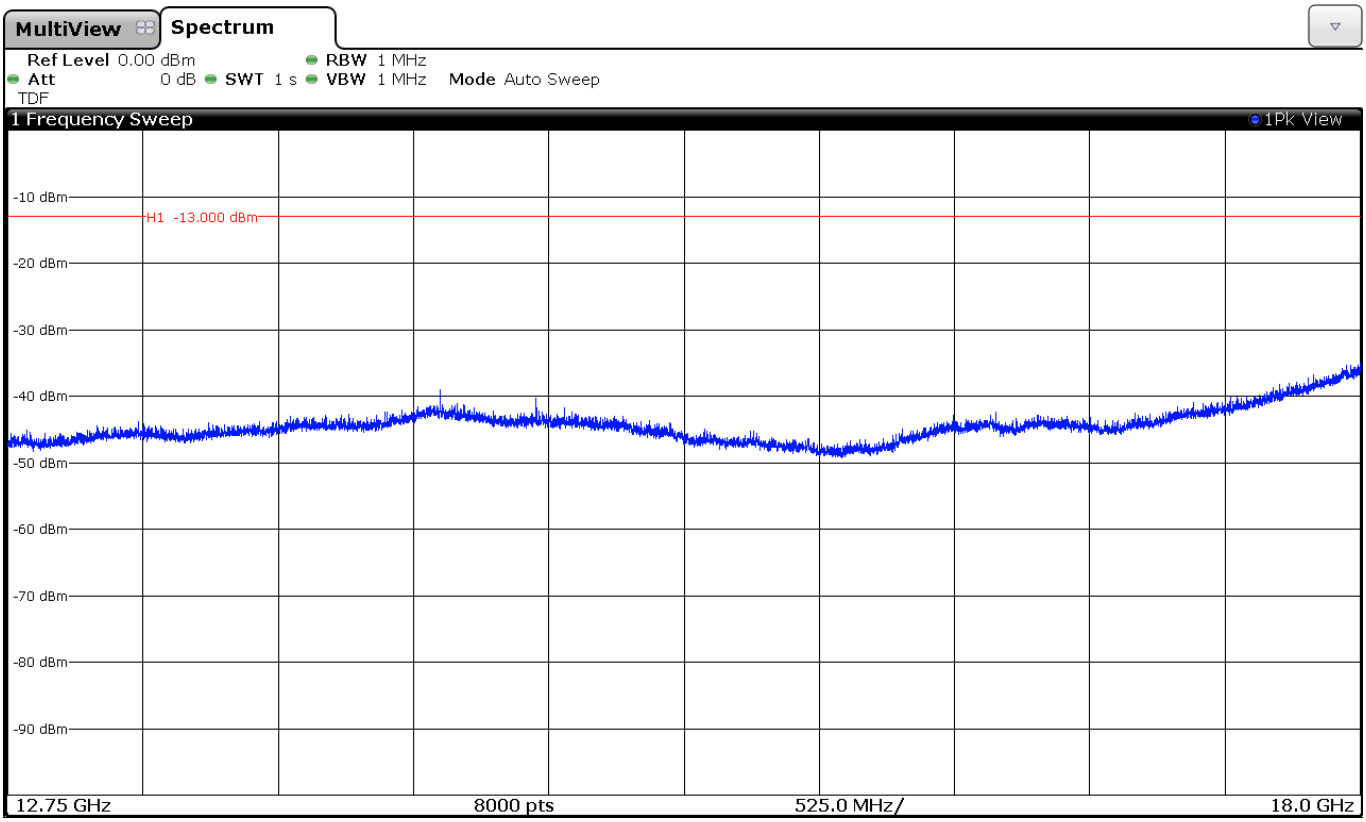
CHANNEL: HIGHEST



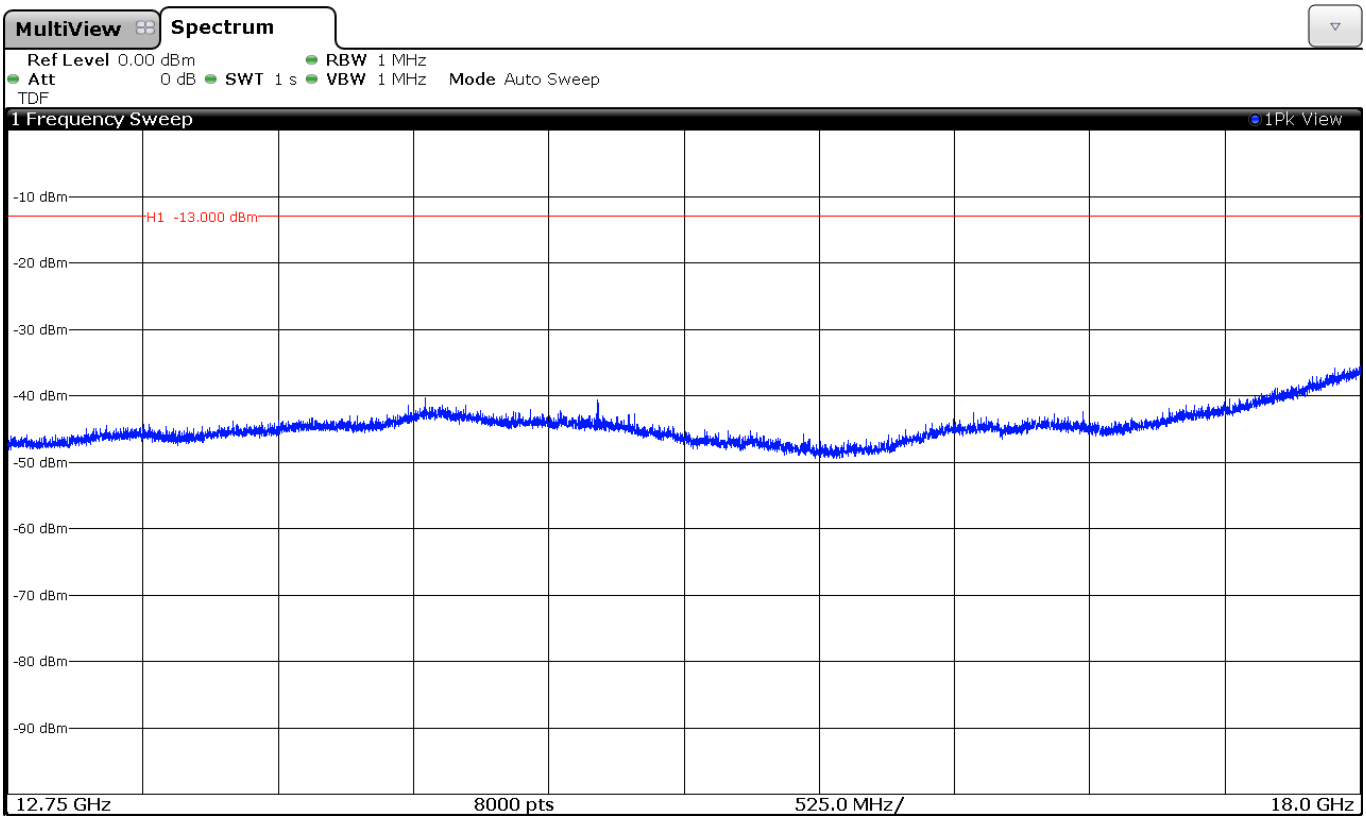
FREQUENCY RANGE 12.75 GHz TO 18 GHz.

GPRS MODULATION

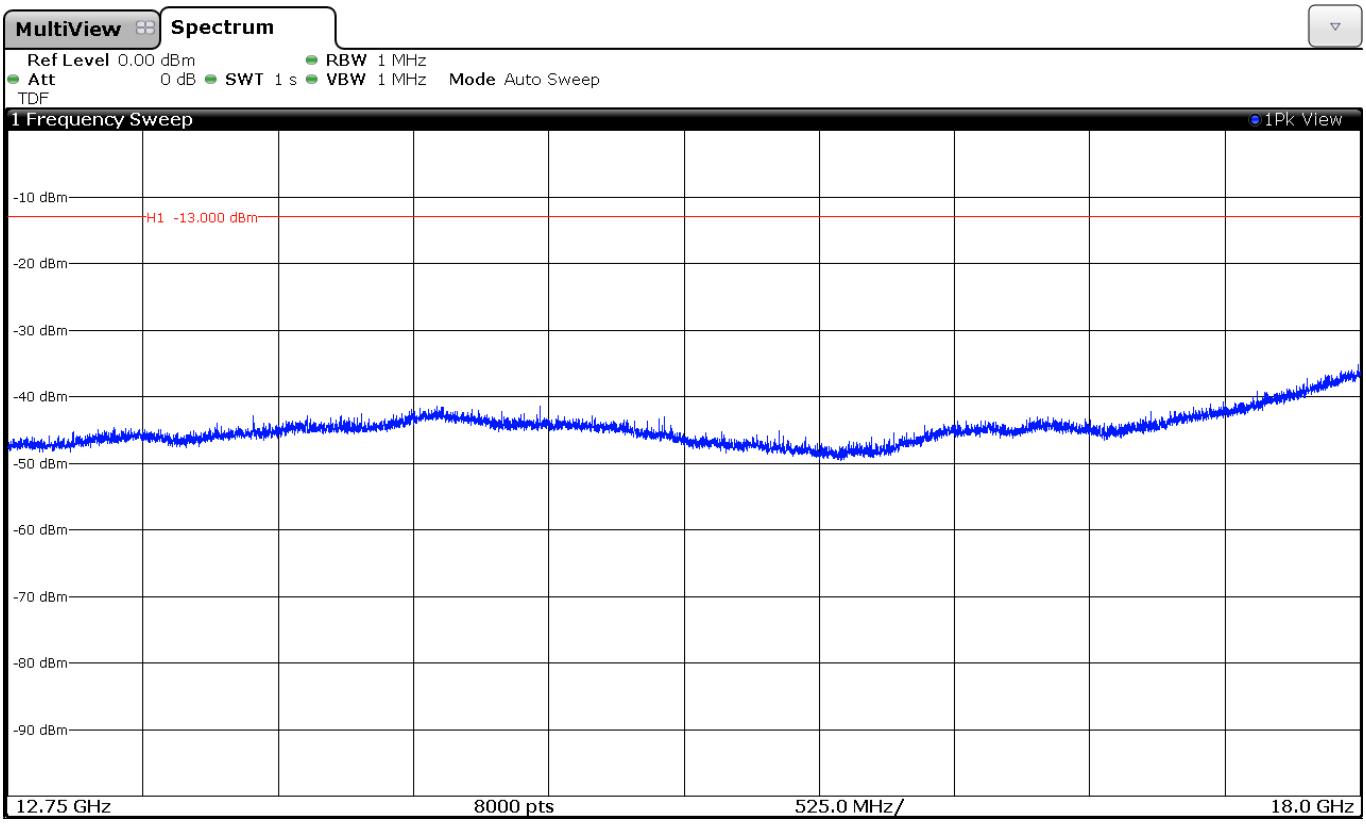
CHANNEL: LOWEST



CHANNEL: MIDDLE

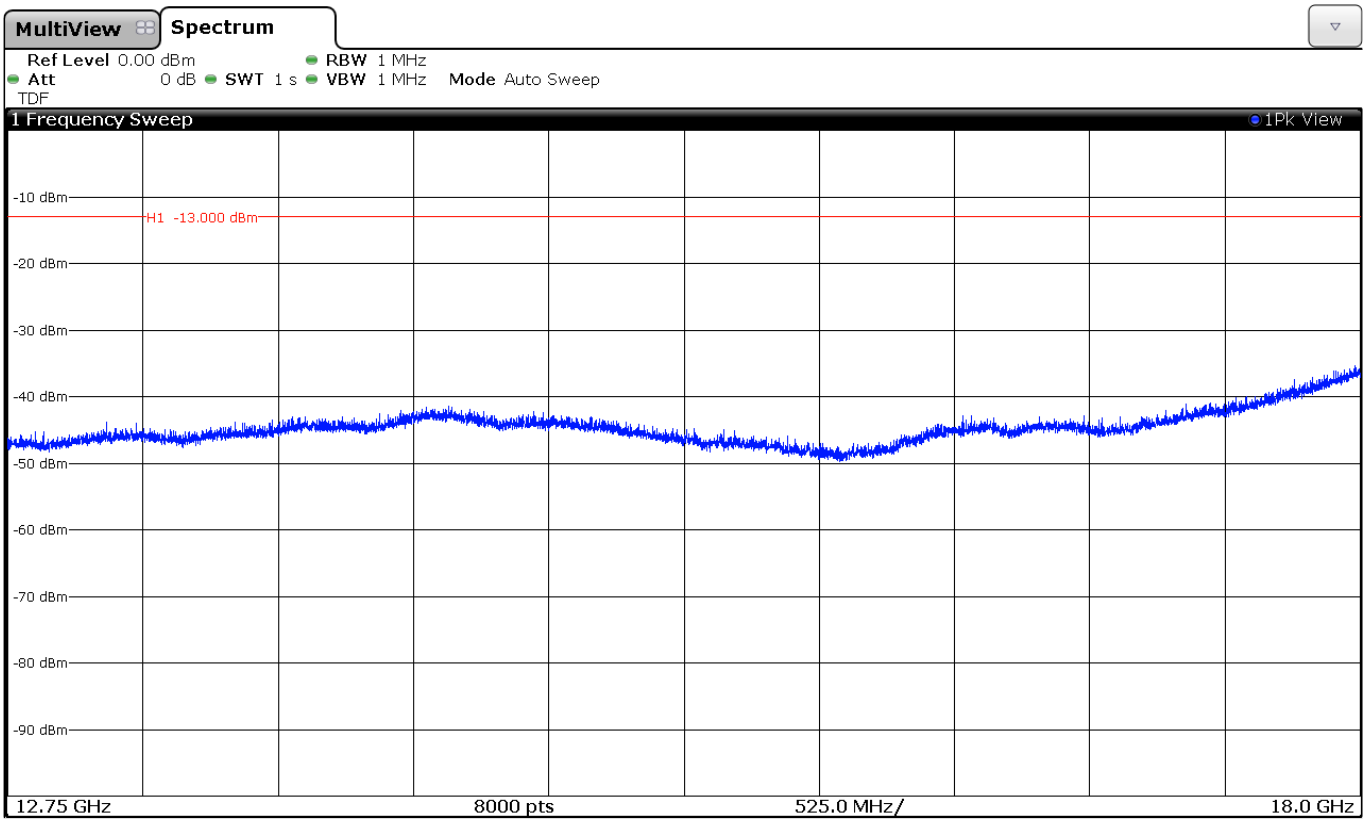


CHANNEL: HIGHEST

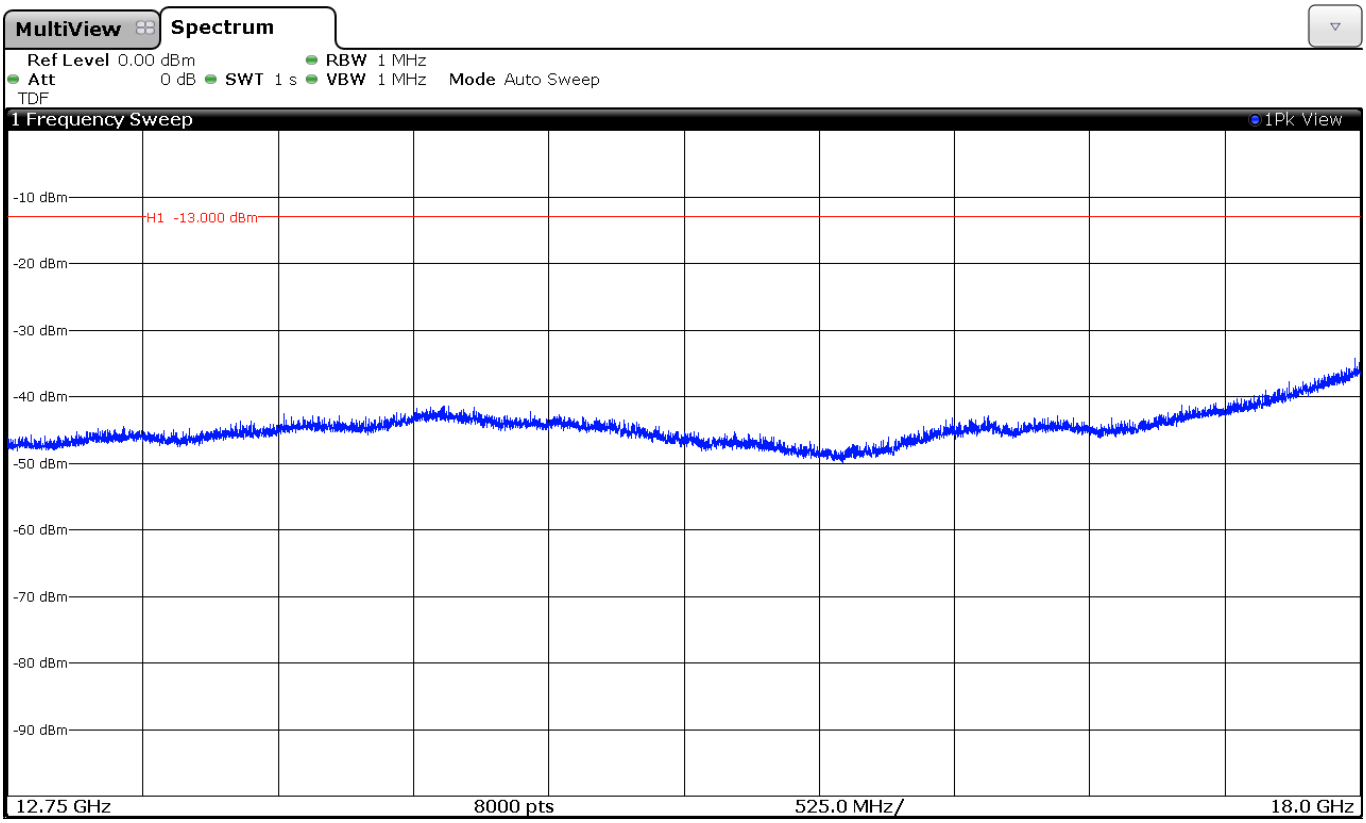


WCDMA MODULATION

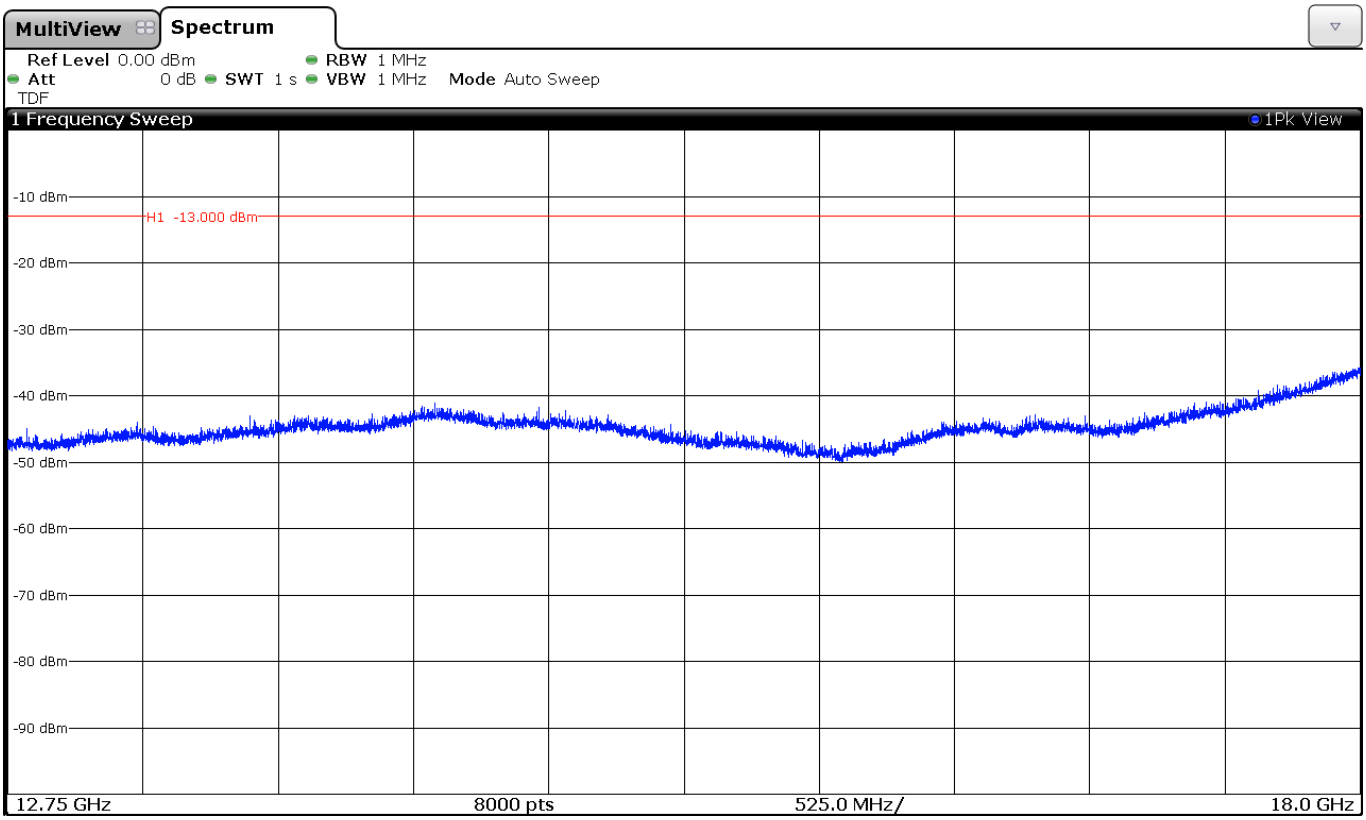
CHANNEL: LOWEST



CHANNEL: MIDDLE



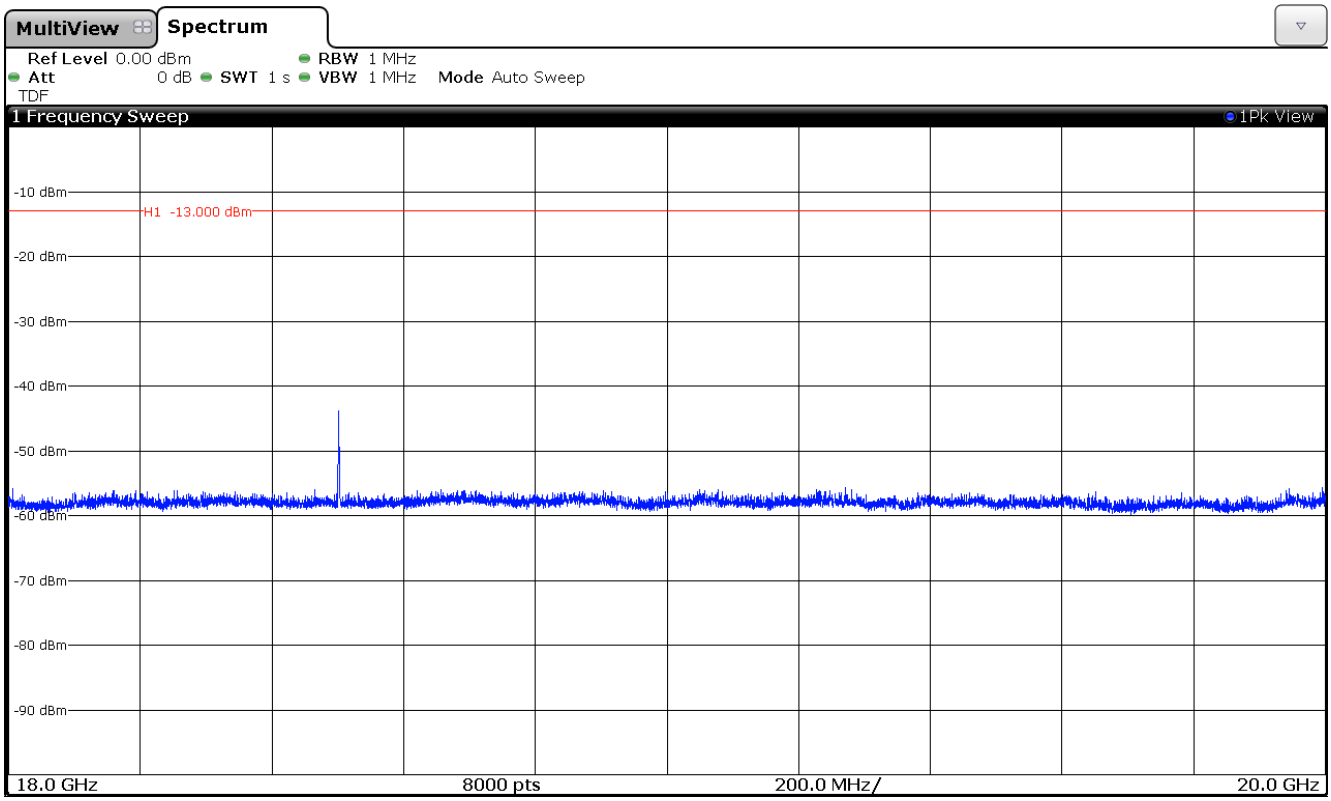
CHANNEL: HIGHEST



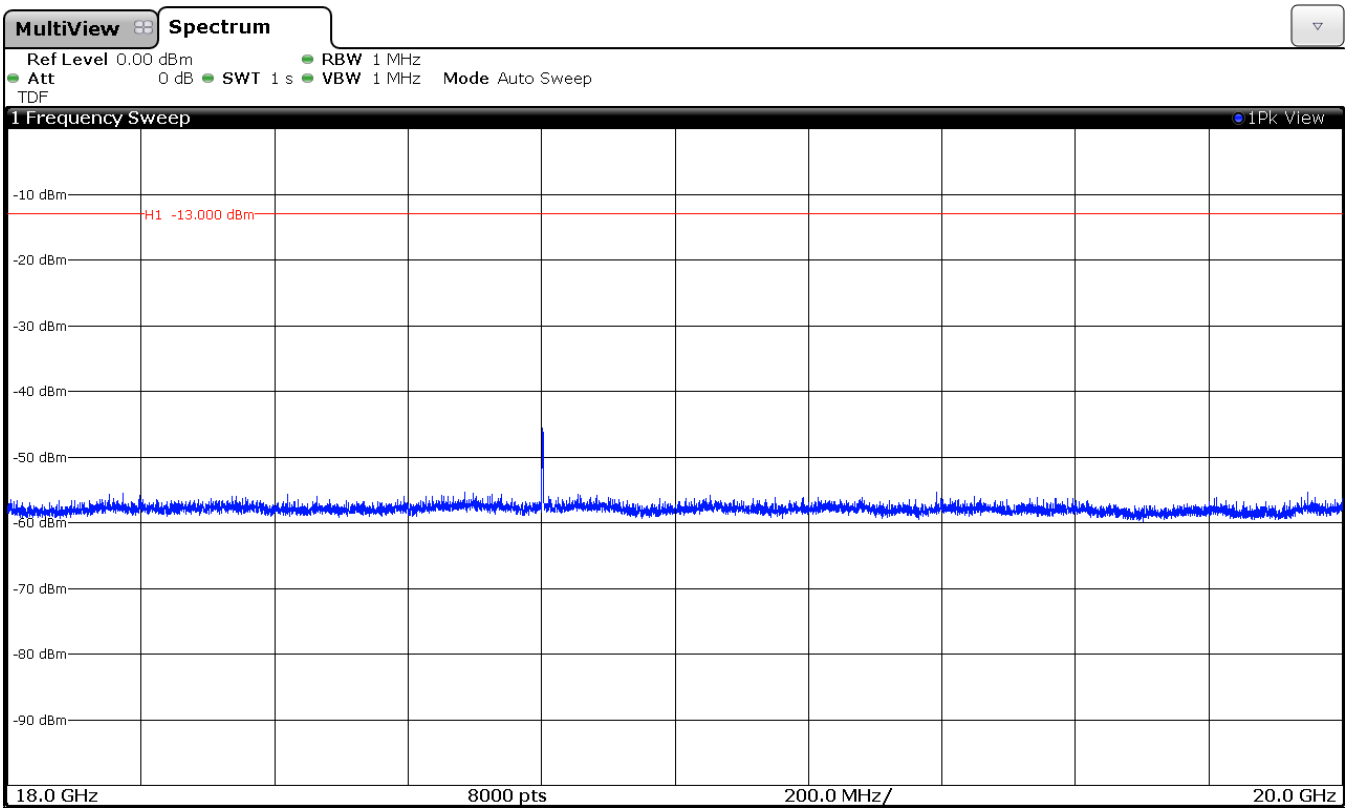
FREQUENCY RANGE 18 GHz TO 20 GHz.

GPRS MODULATION

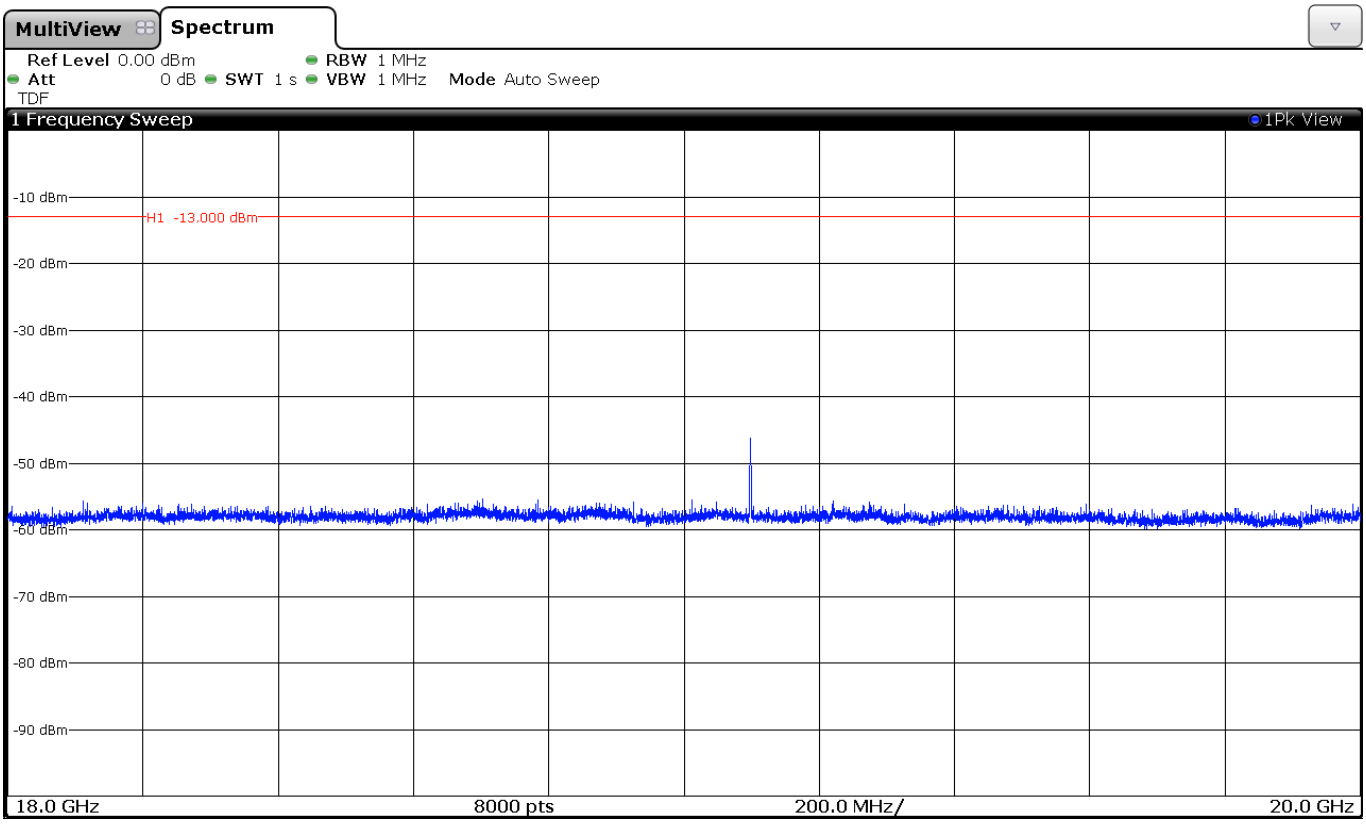
CHANNEL: LOWEST



CHANNEL: MIDDLE

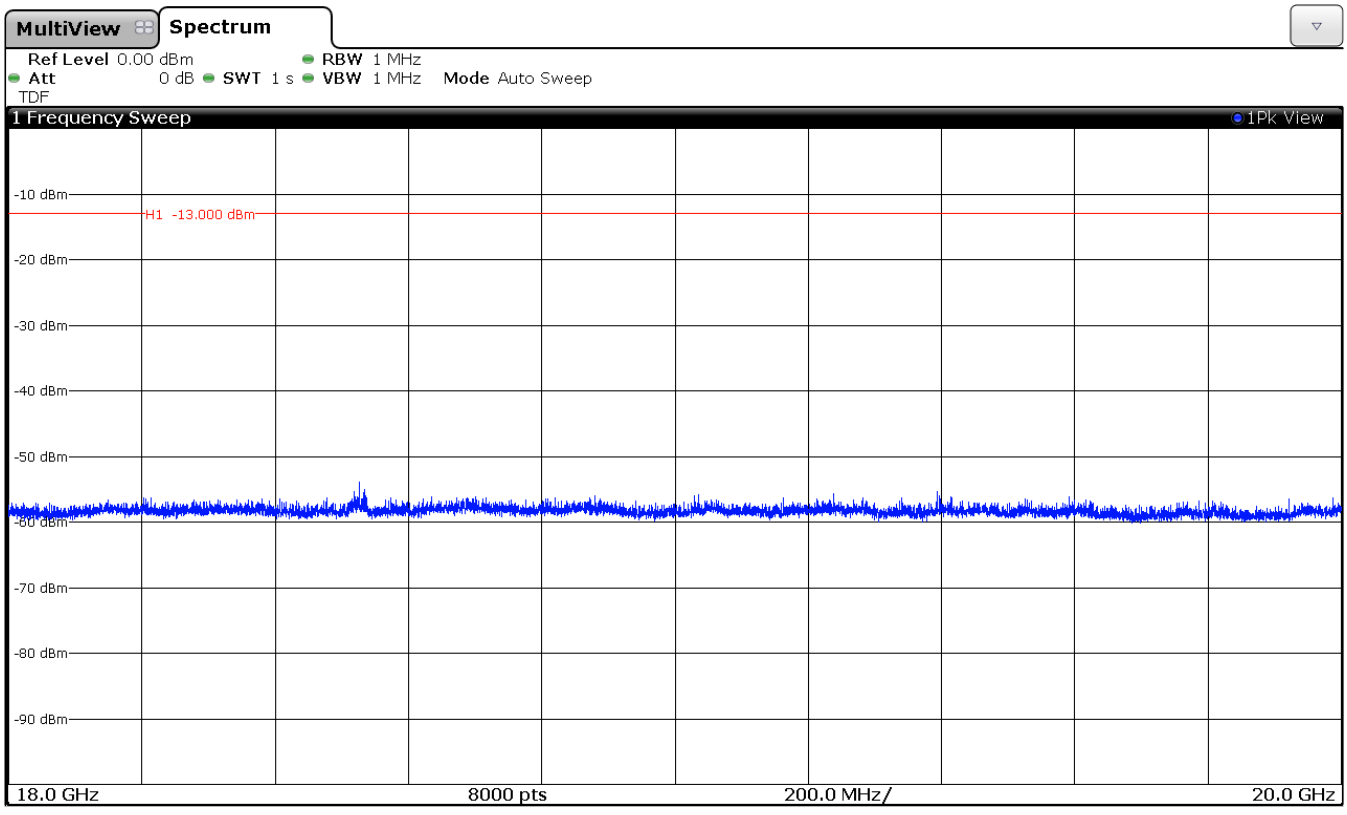


CHANNEL: HIGHEST

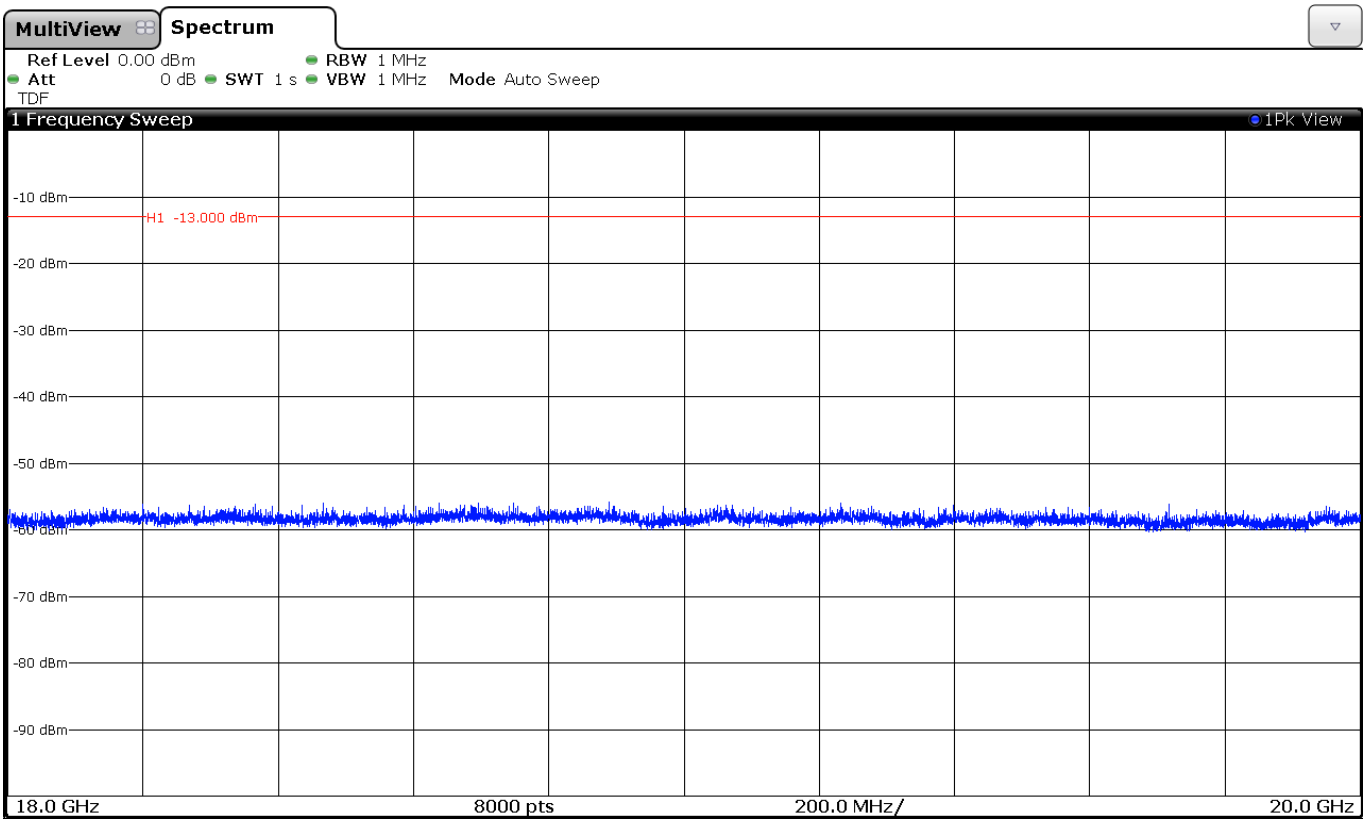


WCDMA MODULATION

CHANNEL: LOWEST



CHANNEL: MIDDLE



CHANNEL: HIGHEST