FCC LISTED, REGISTRATION NUMBER: 905266 **IC LISTED REGISTRATION NUMBER IC 4621**	**AT4 wireless, S.A.** Parque Tecnológico de Andalucía, c/ Severo Ochoa nº 2 29590 Campanillas/ Málaga/ España Tel. 952 61 91 00 - Fax 952 61 91 13 MÁLAGA, C.I.F. A29 507 456 Registro Mercantil de Málaga,Tomo 1169, Libro 82, Folio 133, Hoja MA3729

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

NIE ..... :	30575RET.002
Approved by (name / position & signature) ..... :	A. Llamas / RF Lab. manager Alejandro Llamas Rodríguez Firmado digitalmente por Alejandro Llamas Rodríguez Fecha: 2009.12.16 16:38:41 +01'00'
Elaboration date ..... :	16/12/2009
Identification of item tested ..... :	Mobile Broadband Module
Brand name ..... :	Ericsson
Model and/or type reference ..... :	F3607gw / KRD 131 15/01
Serial number ..... :	IMEI: 004401700257427
Other identification of the product ..... :	FCC ID: VV7-MBMF3607GW1 IC Type Approval #: 287AG-MBMF3607GW1
Final SW version ..... :	R1K06
Features ..... :	QUAD BAND GSM/GPRS/EGPRS class 10, WCDMA Bands I/II/V/VI HSDPA Cat. 8 HSUPA Cat. 5
Description ..... :	Mini-PCIe Wireless WAN card
Applicant ..... :	Ericsson AB
Address ..... :	Lindholmspiren 11 SE-417 56 Gothenburg, Sweden
CIF/NIF/Passport ..... :	N/A
Contact person:	Jonas Rinman
Telephone / Fax ..... :	Phone: + 46 10 712 5061 Fax: + 46 10 712 6033
e-mail: ..... :	Jonas.rinman@ericsson.com
Test samples supplier ..... :	Same as applicant
Manufacturer ..... :	Same as applicant

Test method requested .....:	See Standard
Standard .....:	USA FCC Part 22 10-1-08 Edition USA FCC Part 24 10-1-08 Edition CANADA IC RSS-132 Issue 2, Sep. 2005 CANADA IC RSS-133 Issue 5, Feb. 2009
Test procedure .....:	1. PEET000: Medidas de equipos radioeléctricos en condiciones radiadas. 2. PEET003: Medidas conducidas de equipos radioeléctricos.
Non-standardized test method .....:	N/A

Used instrumentation .....:

		Last Cal.	Cal. due date
1.	Semianechoic Absorber Lined Chamber IR 11. BS	N.A.	N.A.
2.	Control Chamber IR 12.BC	N.A.	N.A.
3.	Hybrid Bilog antenna Sunol Sciences Corporation JB6	2008-10	2011-10
4.	Antenna mast EM 1072 NMT	N.A.	N.A.
5.	Rotating table EM 1084-4. ON	N.A.	N.A.
6.	Double-ridge Guide Horn antenna 1-18 GHz HP 11966E	2008-03	2011-03
7.	Double-ridge Guide Horn antenna 18-40 GHz Agilent 119665J	2008-09	2011-09
8.	EMI Test Receiver R&S ESIB26	2009-09	2011-09
9.	Universal Radio communication Tester R&S CMU200	2009-02	2011-02
10.	Multi Device Controller EMCO 2090	N.A.	N.A.
11.	Spectrum Analyzer R&S ESU40	2007-11	2009-11
12.	Spectrum Analyzer Agilent E4440A	2008-01	2010-01
13.	Power amplifier AMF-4D-00400600-50-30P	2009-04	2011-04
14.	Log-Periodic antenna R&S HL 040	2009-10	2012-10
15.	RF generator Agilent ESG E4438C	2008-09	2010-09
16.	Climatic chamber HERAEUS VM 07/100	2006-12	2009-12

Report template No. .....: FDT08_11

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Competences and guarantees

AT4 wireless, S.A. 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: 905266.

AT4 wireless, S.A. 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 4621.

In order to assure the traceability to other national and international laboratories, AT4 wireless has a calibration and maintenance programme 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.

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
30575/07	Wireless module	F3607gw / KRD 131 15/01	IMEI: 004401700257427	18/11/2009
28940/46	AC Adaptor	04151V-050300	---	20/02/2009
28940/41	Cradle test board	---	---	20/02/2009
28940/76	Antenna structure	---	---	12/06/2009

1. Sample M/01 has undergone the test(s) specified in subclause “Test method requested”.

Testing period

The performed test started on 2009-11-20 and finished on. 2009-11-26.

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. = 22.1 ºC Max. = 25.2 ºC
Relative humidity	Min. = 39.5 % Max. = 53.7 %
Shielding effectiveness	> 100 dB
Electric insulation	> 10 kΩ
Reference resistance to earth	< 0,5 Ω

In the semianechoic chamber (21 meters x 11 meters x 8 meters), the following limits were not exceeded during the test.

Temperature	Min. = 20.6 ºC Max. = 21.6 ºC
Relative humidity	Min. = 39.0 % Max. = 53.2 %
Air pressure	Min. = 1020 mbar Max. = 1020 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 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).

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

Temperature	Min. = 23.5 ºC Max. = 24.3 ºC
Relative humidity	Min. = 49.6 % Max. = 50.2 %
Air pressure	Min. = 1020 mbar Max. = 1020 mbar
Shielding effectiveness	> 100 dB
Electric insulation	> 10 kΩ
Reference resistance to earth	< 0,5 Ω

Summary

Considering the results of the performed test according to standards USA FCC Part 22 and Part 24 and Canada IC RSS-132 and RSS-133, the item under test is **IN COMPLIANCE** with the requested specifications specified in the standard.

NOTE: The results presented in this Test Report apply only to the particular item under test established in page 1 of this document, as presented for test on the date(s) shown in section, "USAGE OF SAMPLES, TESTING PERIOD AND ENVIRONMENTAL CONDITIONS".

Remarks and comments

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.

Testing verdicts

Not applicable ..... : NA

Pass..... : P

Fail ..... : F

Not measured..... : NM

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		P		
Clause 22.355/RSS-132 Clause 4.3: Frequency stability		P		
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		P		
Clause 24.235/RSS-133 Clause 6.3: Frequency stability		P		
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		

APPENDIX A: Test results

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TEST RESULTS FOR FCC PART 22 AND IC RSS-132

TEST CONDITIONS

Power supply (V):

V_{nom} = 3.3 Vdc

V_{max} = 3.6 Vdc

V_{min} = 3.0 Vdc

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

Type of power supply = DC Voltage from external power supply

Type of antenna = external connectable antenna structure for Laptop computer

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

Modulation Characteristics

SPECIFICATION

§2.1047

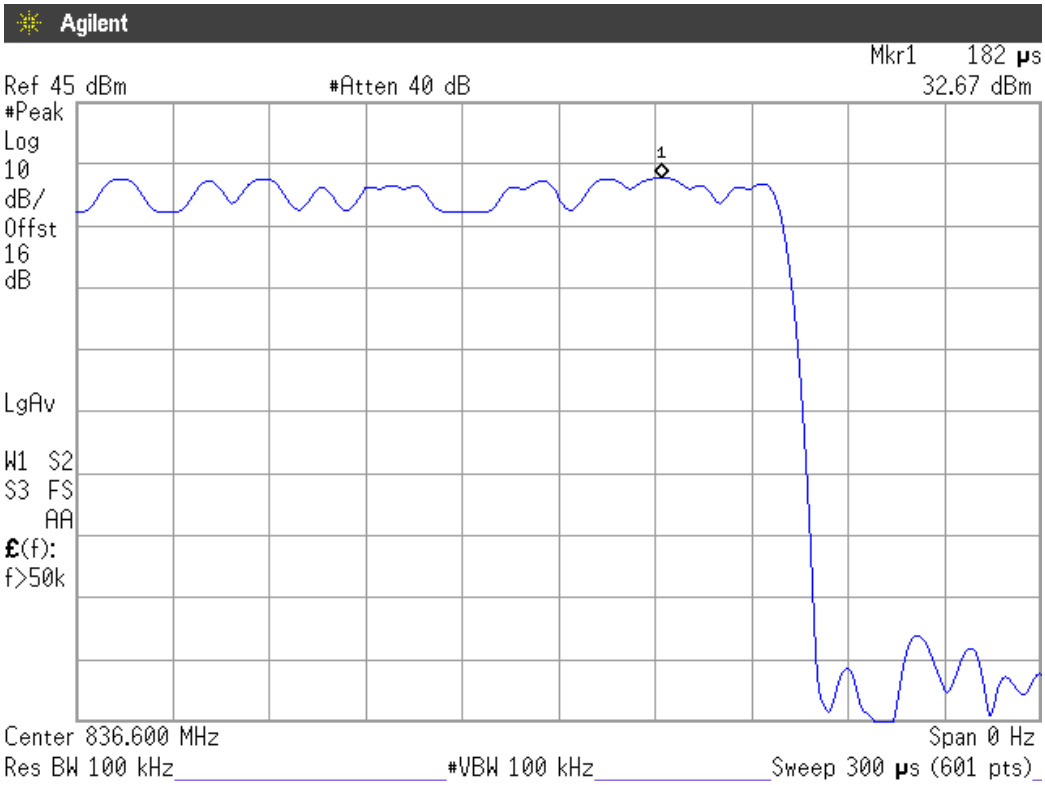
METHOD

The EUT operates with GPRS (GMSK), EDGE (GMSK/8-PSK), WCDMA/HSDPA (QPSK) and HSUPA (QPSK/16QAM) modes, in which the information is digitised and coded into a bit stream.

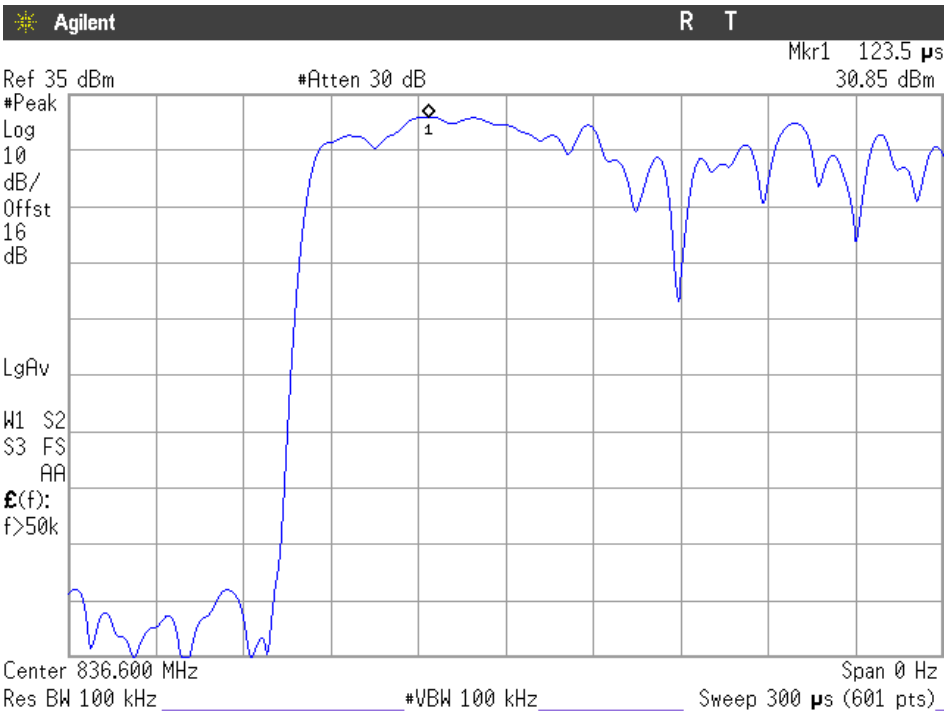
RESULTS

The following plot shows the modulation schemes in the EUT.

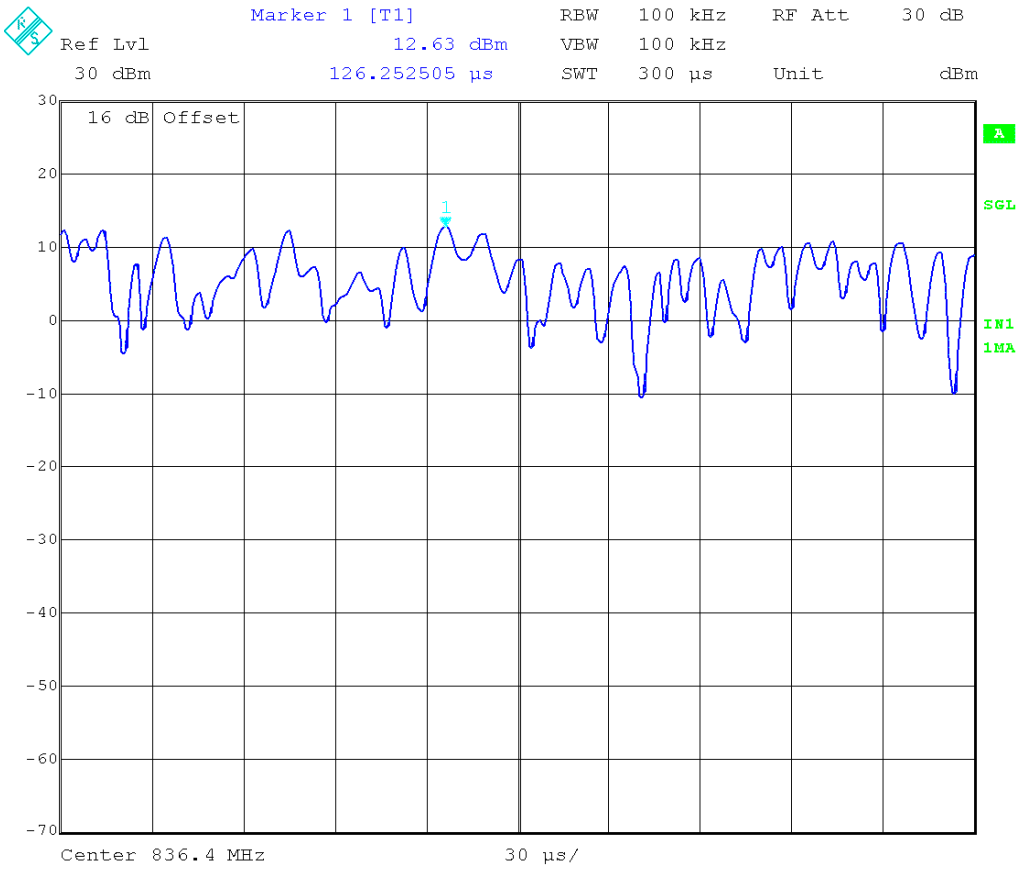
GPRS MODULATION



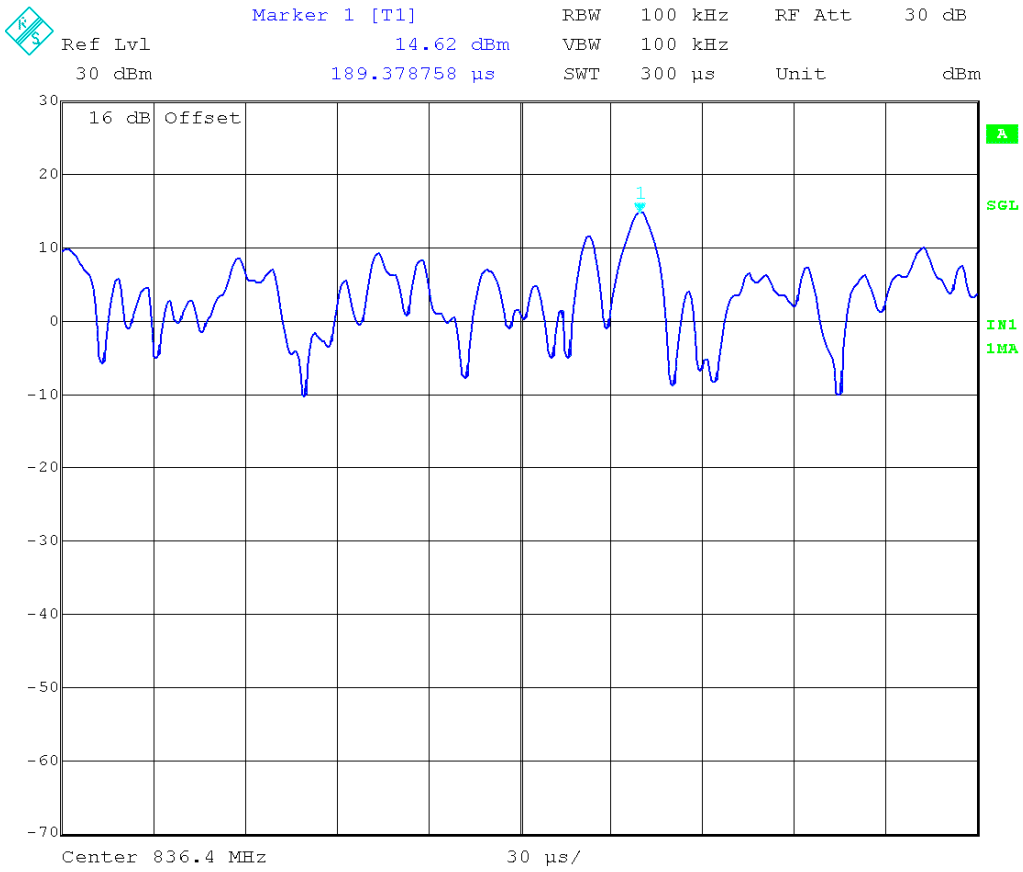
EDGE MODULATION



WCDMA MODULATION



HSUPA MODULATION



Frequency Stability

SPECIFICATION

§2.1055 and §22.355

METHOD

The frequency tolerance measurements over temperature variations were made over the temperature range of –30ºC to +50ºC. The EUT was placed inside a climatic chamber and the temperature was raised hourly in 10ºC steps from –30ºC up to +50ºC.

The EUT was set in "call mode" in the middle channel using the Universal Radio Communication tester R&S CMU200 (for modulations GPRS, EDGE, WCDMA and HSUPA) and the maximum frequency error was measured using the frequency meter of CMU200.

RESULTS

Frequency stability over temperature variations.

GPRS MODULATION

Temperature (ºC)	Frequency Error (Hz)	Frequency Error (ppm)	Frequency Error (%)
+50	-4	-0.0048	-0.00000048
+40	19	0.0227	0.00000227
+30	5	0.0060	0.00000060
+20	-12	-0.0143	-0.00000143
+10	16	0.0191	0.00000191
0	-4	-0.0048	-0.00000048
-10	8	0.0096	0.00000096
-20	-16	-0.0191	-0.00000191
-30	20	0.0239	0.00000239

EDGE MODULATION

Temperature (ºC)	Frequency Error (Hz)	Frequency Error (ppm)	Frequency Error (%)
+50	-10	-0.0120	-0.00000120
+40	-3	-0.0036	-0.00000036
+30	5	0.0060	0.00000060
+20	-11	-0.0131	-0.00000131
+10	-4	-0.0048	-0.00000048
0	-8	-0.0096	-0.00000096
-10	-14	-0.0167	-0.00000167
-20	1	0.0012	0.00000012
-30	26	0.0311	0.00000311

WCDMA MODULATION

Temperature (ºC)	Frequency Error (Hz)	Frequency Error (ppm)	Frequency Error (%)
+50	-3	-0.0036	-0.00000036
+40	20	0.0239	0.00000239
+30	-20	-0.0239	-0.00000239
+20	1	0.0012	0.00000012
+10	-4	-0.0048	-0.00000048
0	-8	-0.0096	-0.00000096
-10	3	0.0036	0.00000036
-20	-10	-0.0120	-0.00000120
-30	-6	-0.0072	-0.00000072

HSUPA MODULATION

Temperature (ºC)	Frequency Error (Hz)	Frequency Error (ppm)	Frequency Error (%)
+50	7	0.0084	0.00000084
+40	14	0.0167	0.00000167
+30	-7	-0.0084	-0.00000084
+20	-2	-0.0024	-0.00000024
+10	-4	-0.0048	-0.00000048
0	-7	-0.0084	-0.00000084
-10	-6	-0.0072	-0.00000072
-20	2	0.0024	0.00000024
-30	4	0.0048	0.00000048

Frequency stability over voltage variations.

GPRS MODULATION

Battery Supply voltage	Voltage (V)	Frequency Error (Hz)	Frequency Error (ppm)	Frequency Error (%)
Vmax	3.6	-24	-0.0287	-0.00000287
Vmin	3.0	-4	-0.0048	-0.00000048

EDGE MODULATION

Battery Supply voltage	Voltage (V)	Frequency Error (Hz)	Frequency Error (ppm)	Frequency Error (%)
Vmax	3.6	-7	-0.0084	-0.00000084
Vmin	3.0	-4	-0.0048	-0.00000048

WCDMA MODULATION

Battery Supply voltage	Voltage (V)	Frequency Error (Hz)	Frequency Error (ppm)	Frequency Error (%)
Vmax	3.6	-6	-0.0072	-0.00000072
Vmin	3.0	-8	-0.0096	-0.00000096

HSUPA MODULATION

Battery Supply voltage	Voltage (V)	Frequency Error (Hz)	Frequency Error (ppm)	Frequency Error (%)
Vmax	3.6	-12	-0.0143	-0.00000143
Vmin	3.0	-20	-0.0239	-0.00000239

Occupied Bandwidth

SPECIFICATION

§2.1049

METHOD

The EUT was configured to transmit a modulated carrier signal. An IF bandwidth of 3 kHz was used to determined the occupied bandwidth of the modulated emission for GPRS and EDGE modulation and 50 kHz for WCDMA and HSUPA modulation.

RESULTS

GPRS MODULATION

Channel	Lowest	Middle	Highest
99% Occupied bandwidth (kHz)	283.5	288.2	285.7
-26 dBc bandwidth (kHz)	318.9	320.3	321.1
Measurement uncertainty (kHz)	<±6.5		

EDGE MODULATION

Channel	Lowest	Middle	Highest
99% Occupied bandwidth (kHz)	261.4	274.8	273.8
-26 dBc bandwidth (kHz)	298.5	311.8	309.2
Measurement uncertainty (kHz)	<±6.5		

WCDMA MODULATION

Channel	Lowest	Middle	Highest
99% Occupied bandwidth (kHz)	4633.3	4697.4	4649.3
-26 dBc bandwidth (kHz)	4825.6	4825.6	4841.7
Measurement uncertainty (kHz)	<±52		

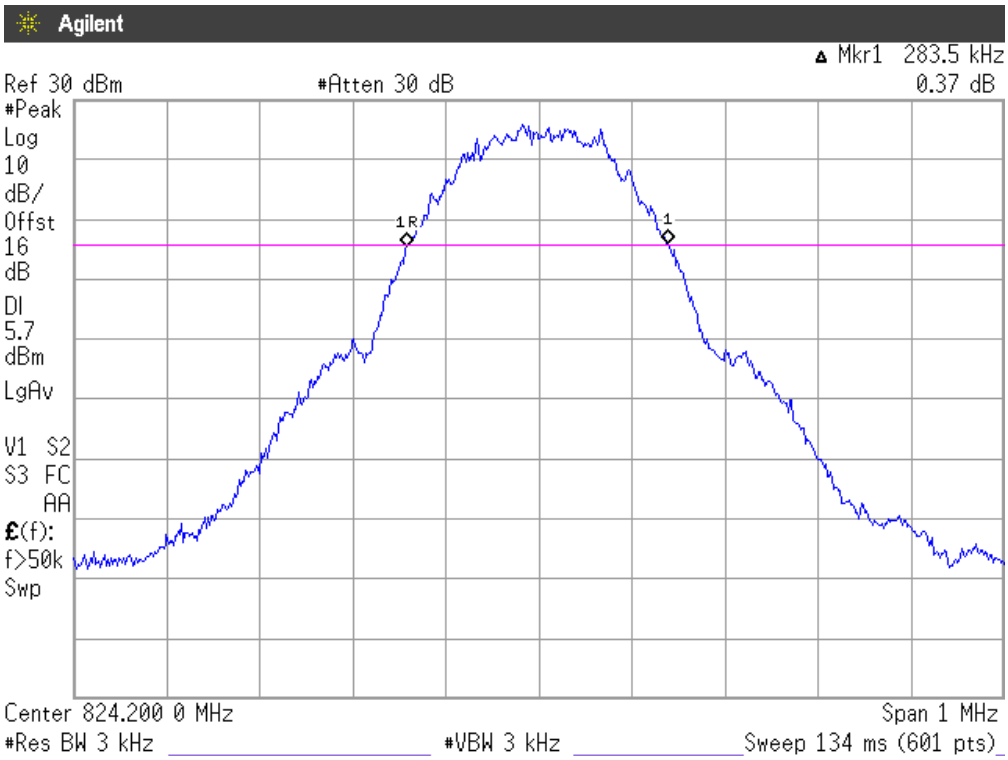
HSUPA MODULATION

Channel	Lowest	Middle	Highest
99% Occupied bandwidth (kHz)	4649.3	4681.4	4649.3
-26 dBc bandwidth (kHz)	4809.6	4809.6	4809.6
Measurement uncertainty (kHz)	<±52		

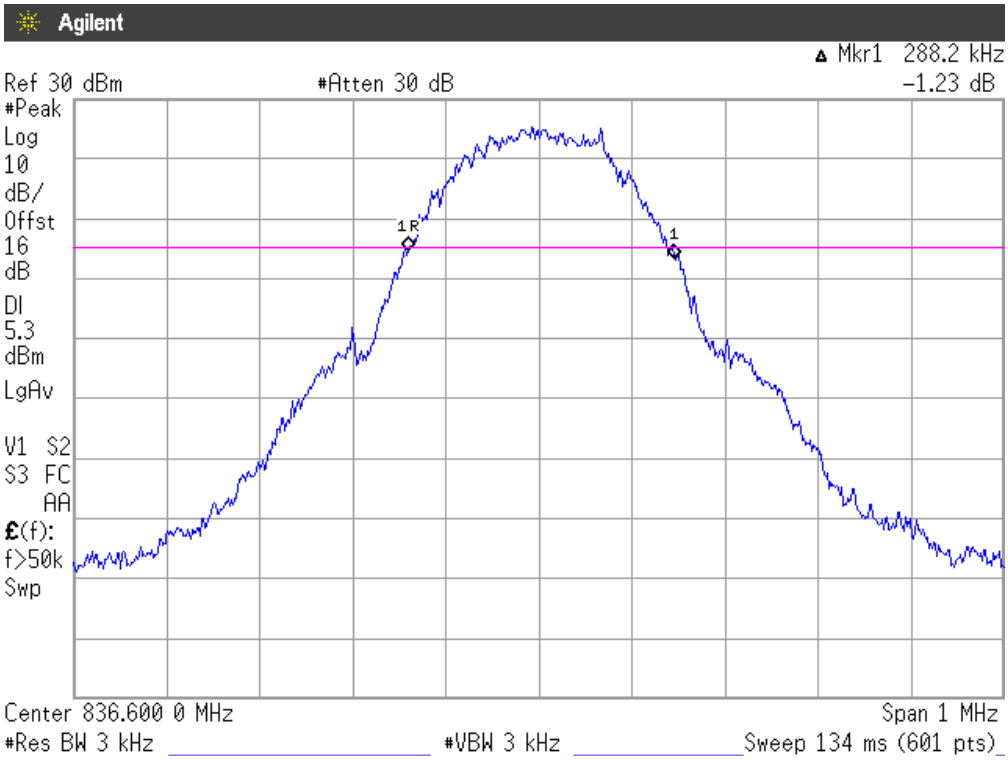
99% OCCUPIED BANDWIDTH

GPRS MODULATION

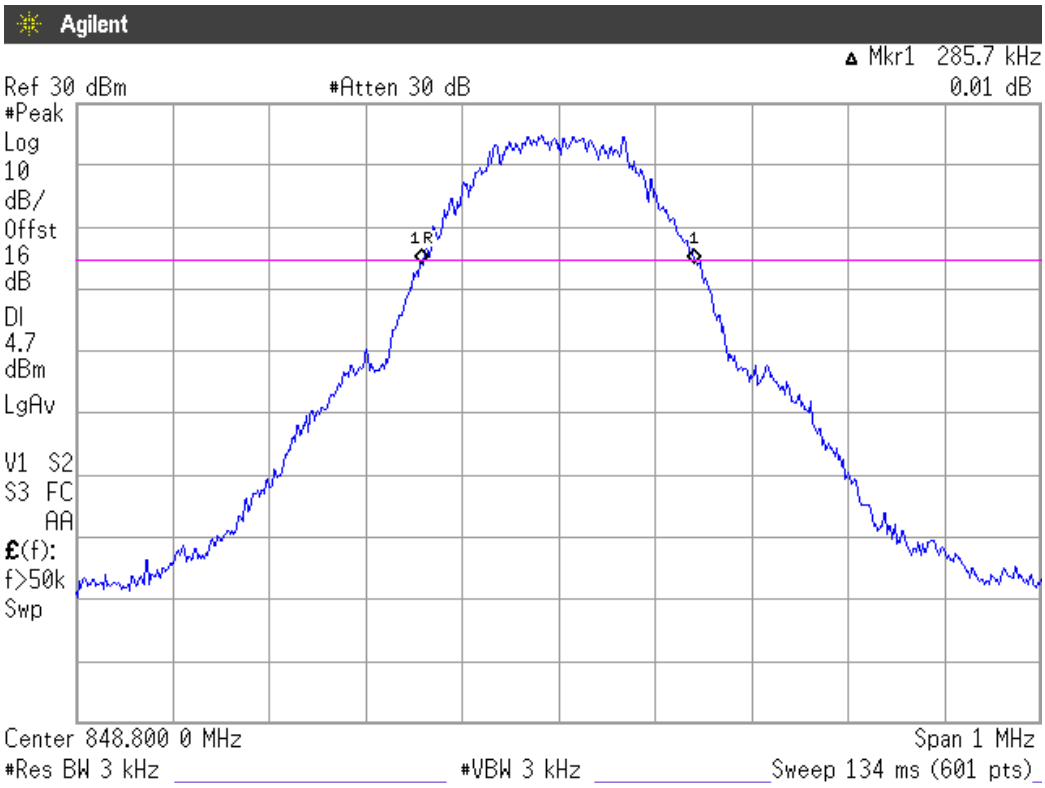
Lowest Channel



Middle Channel

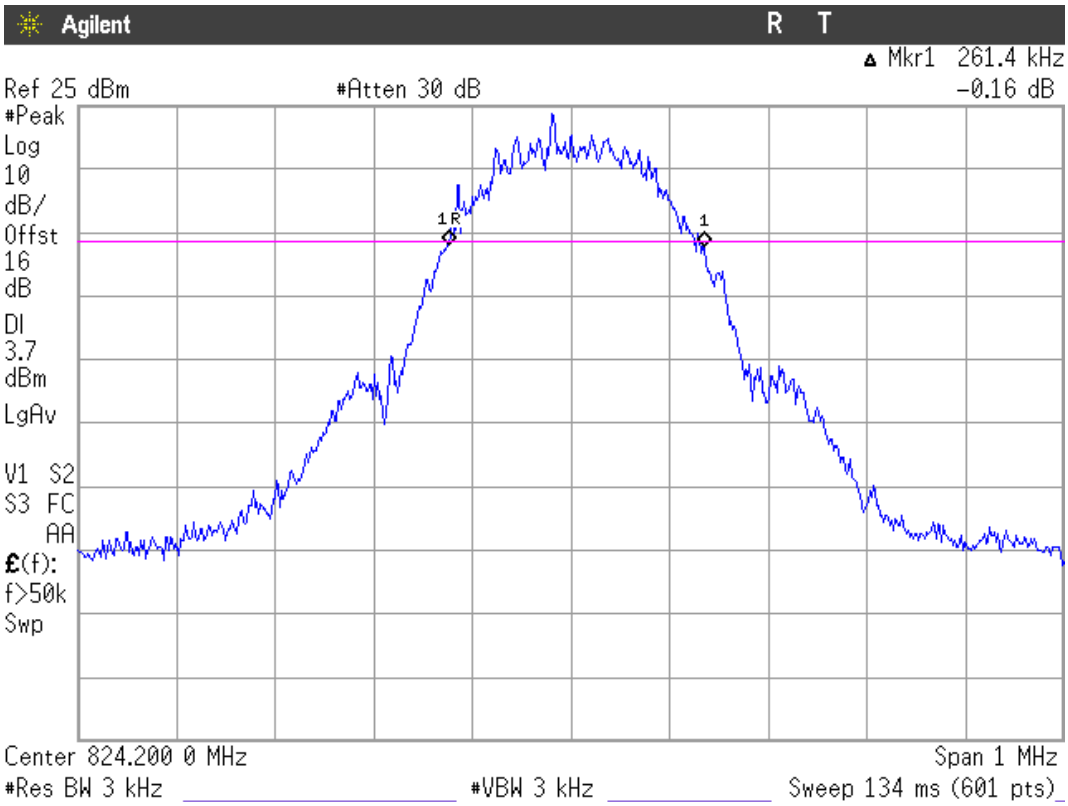


Highest Channel

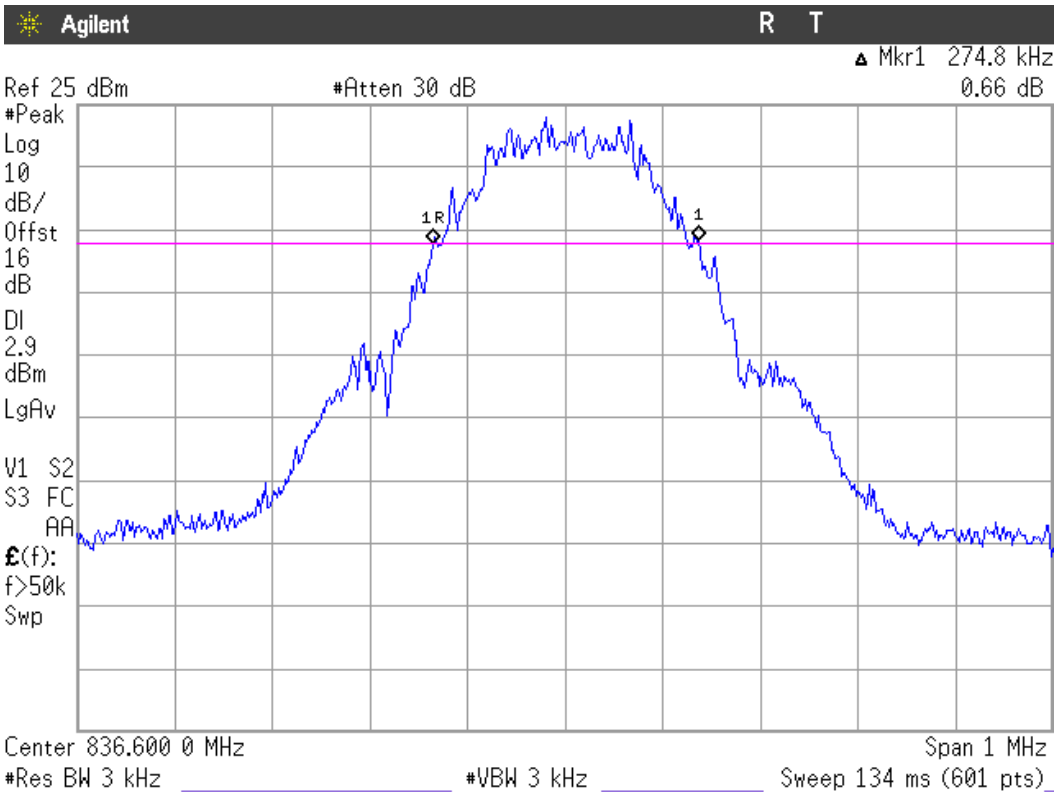


EDGE MODULATION

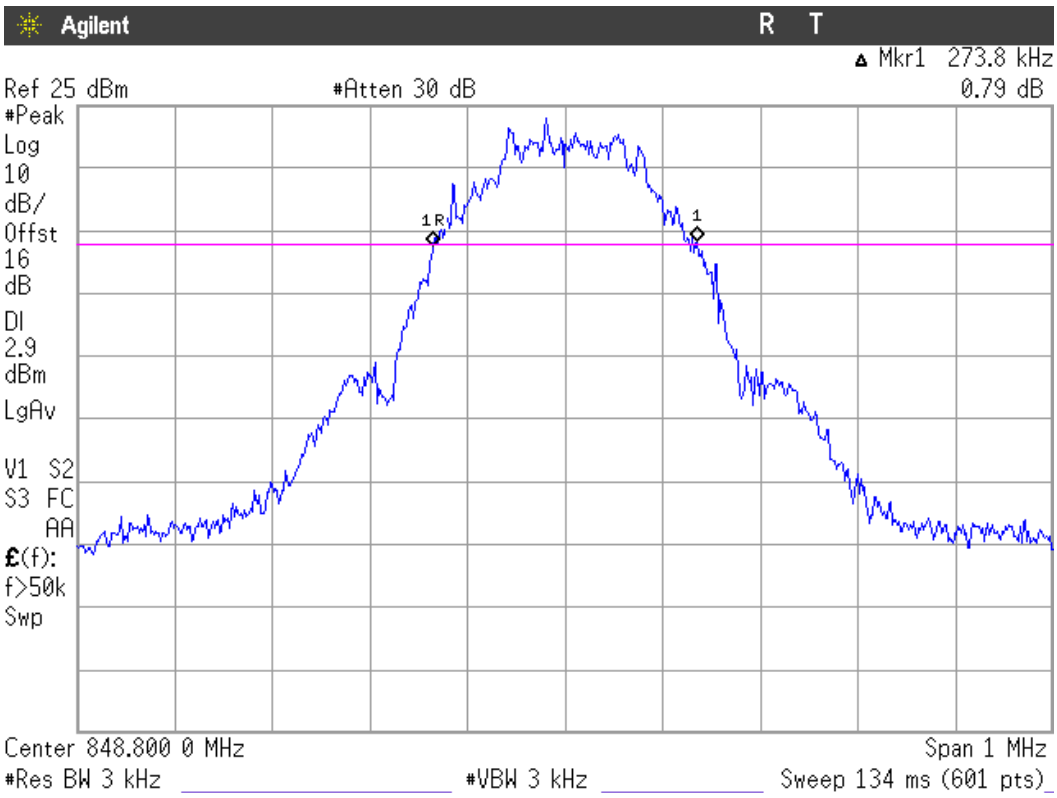
Lowest Channel



Middle Channel

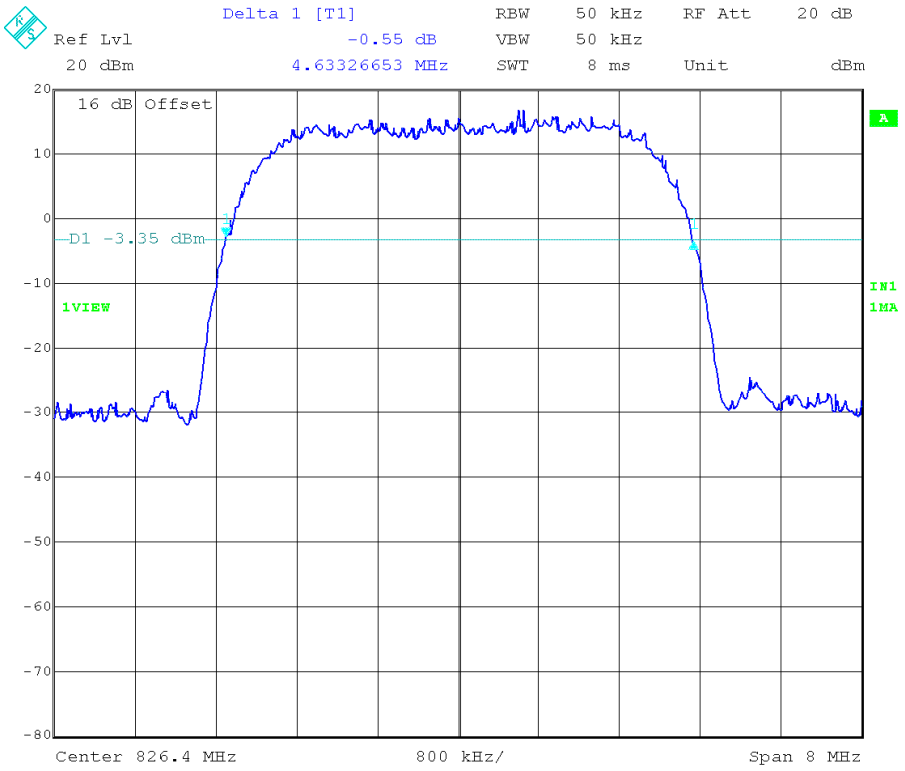


Highest Channel

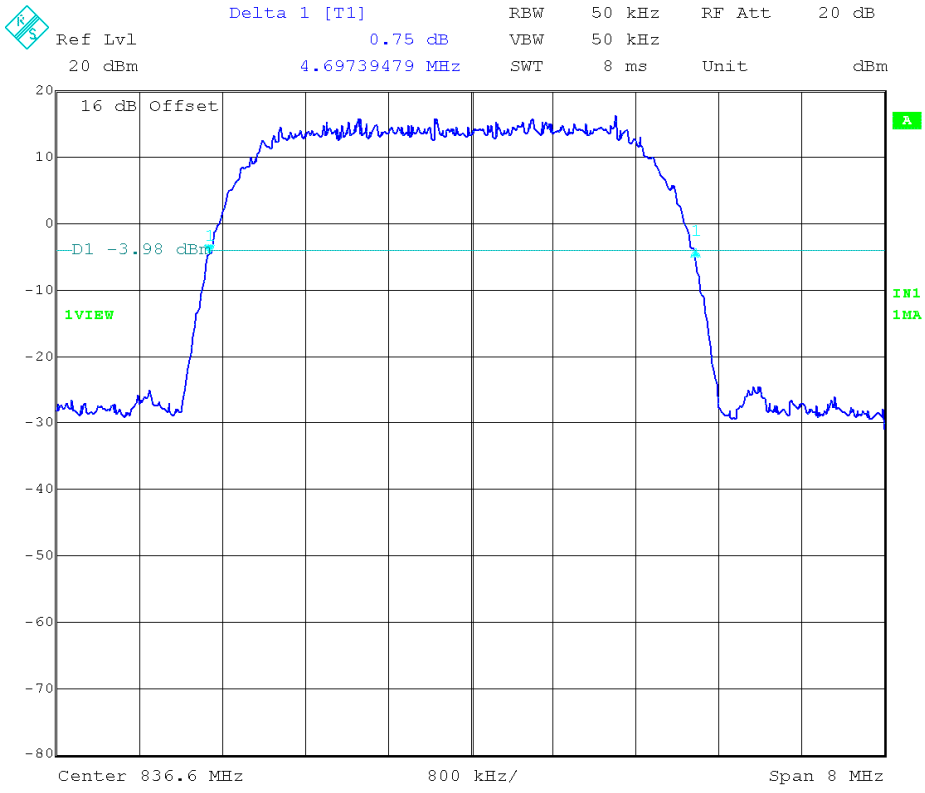


WCDMA MODULATION

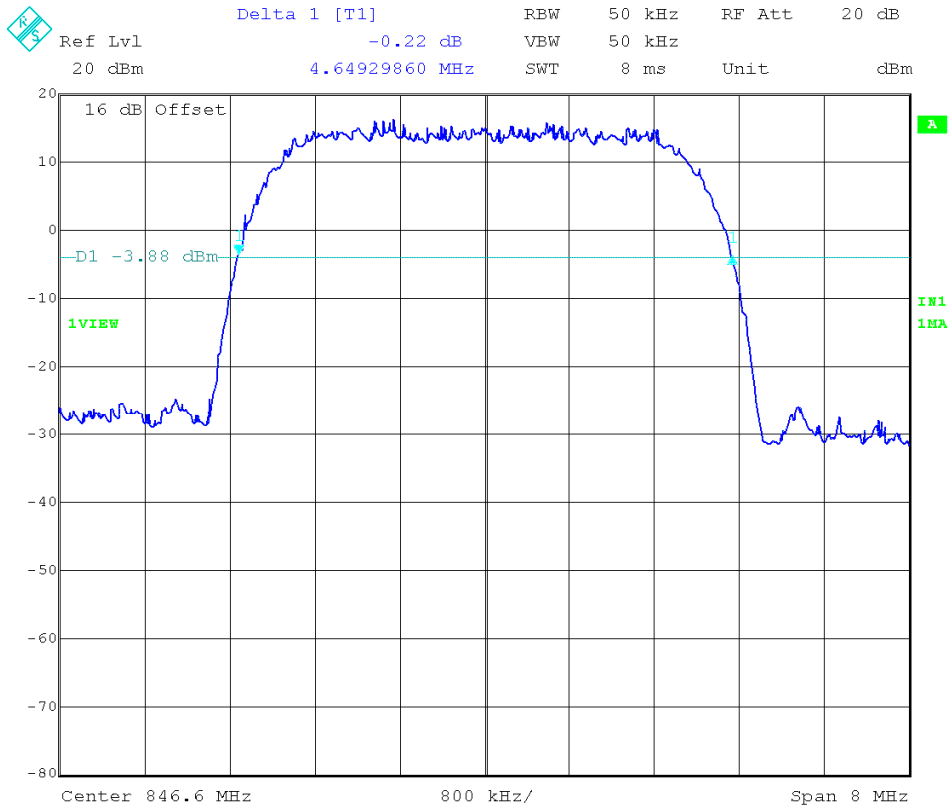
Lowest Channel



Middle Channel

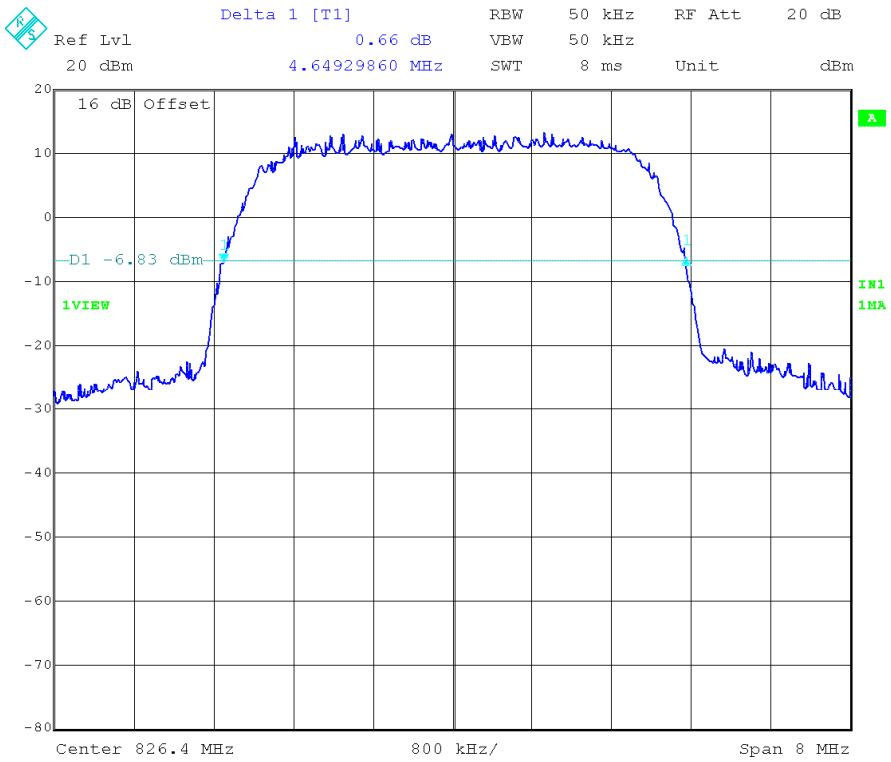


Highest Channel

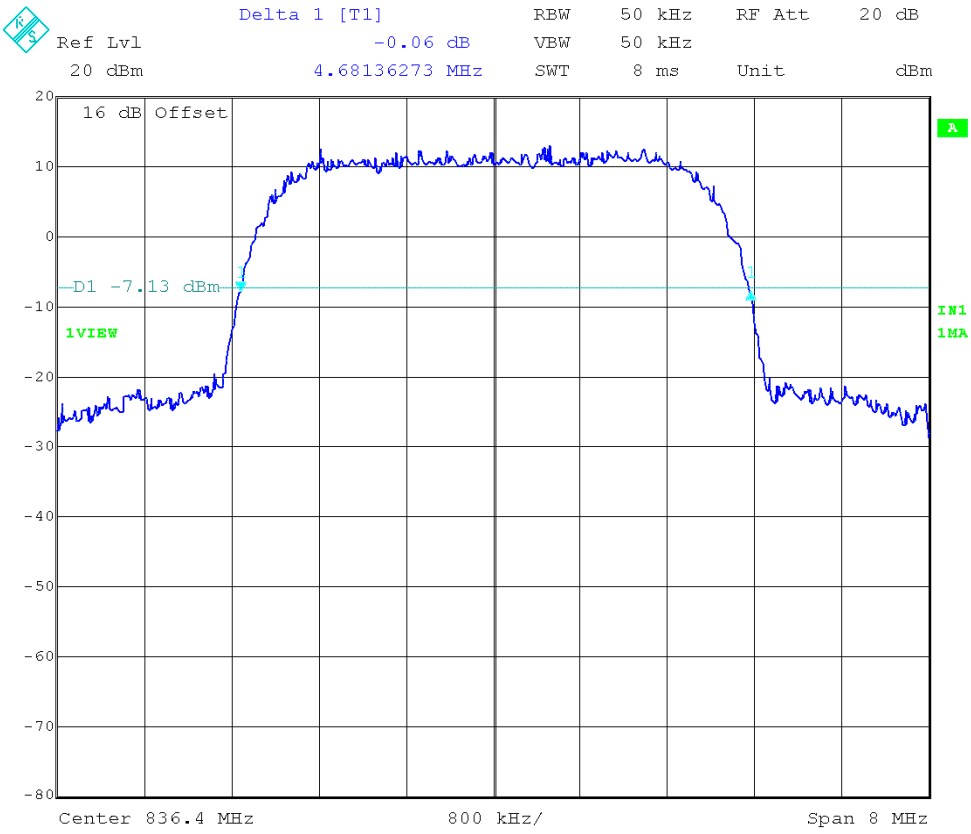


HSUPA MODULATION

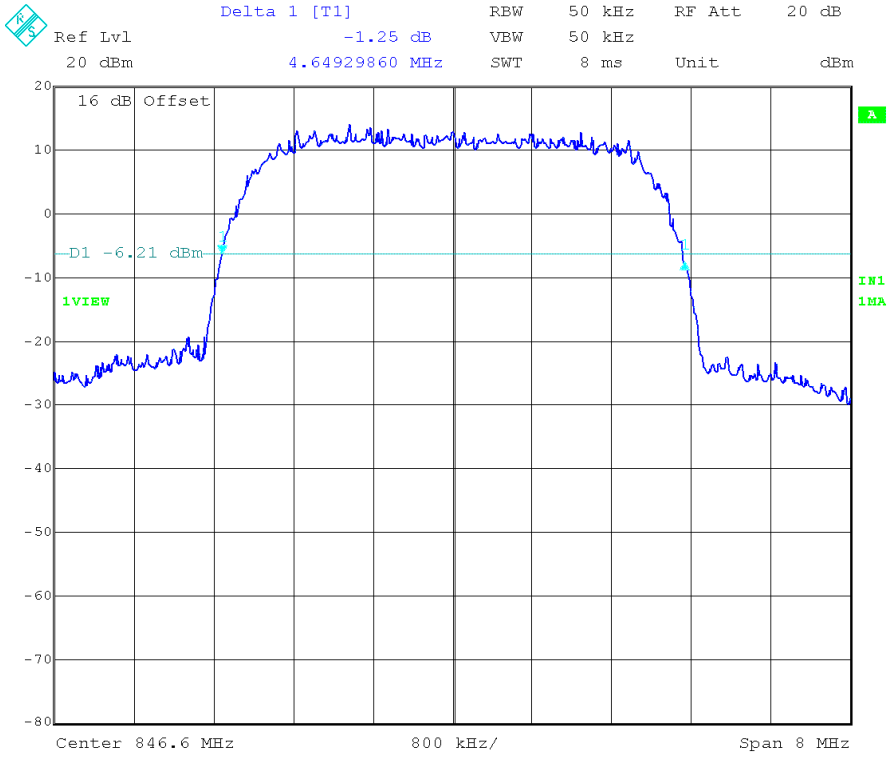
Lowest Channel



Middle Channel



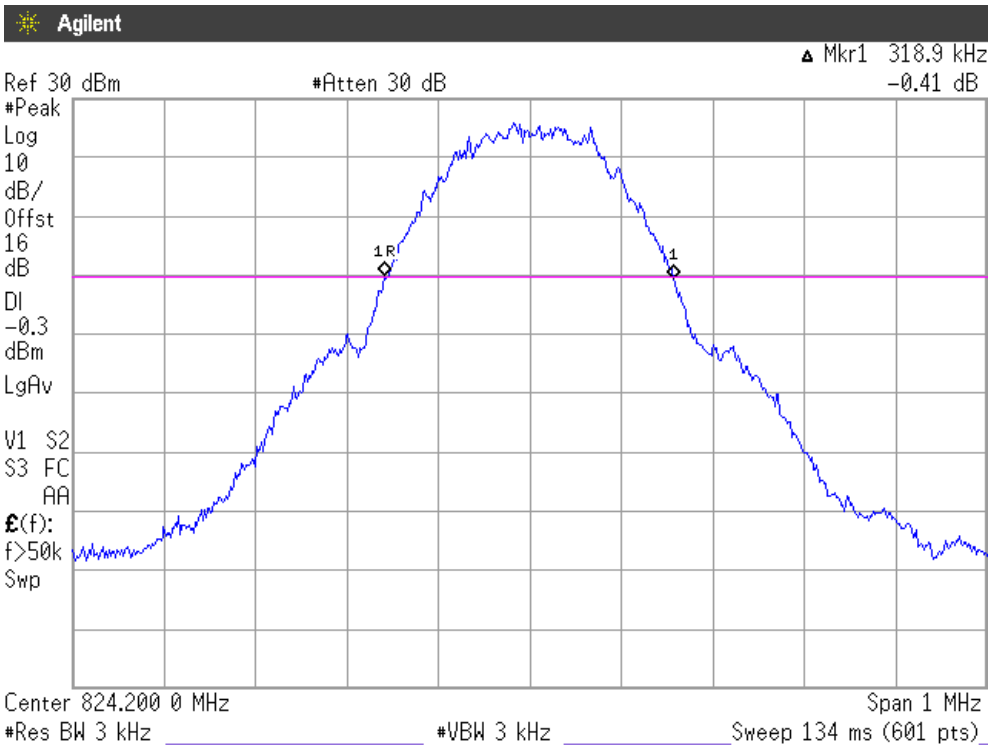
Highest Channel



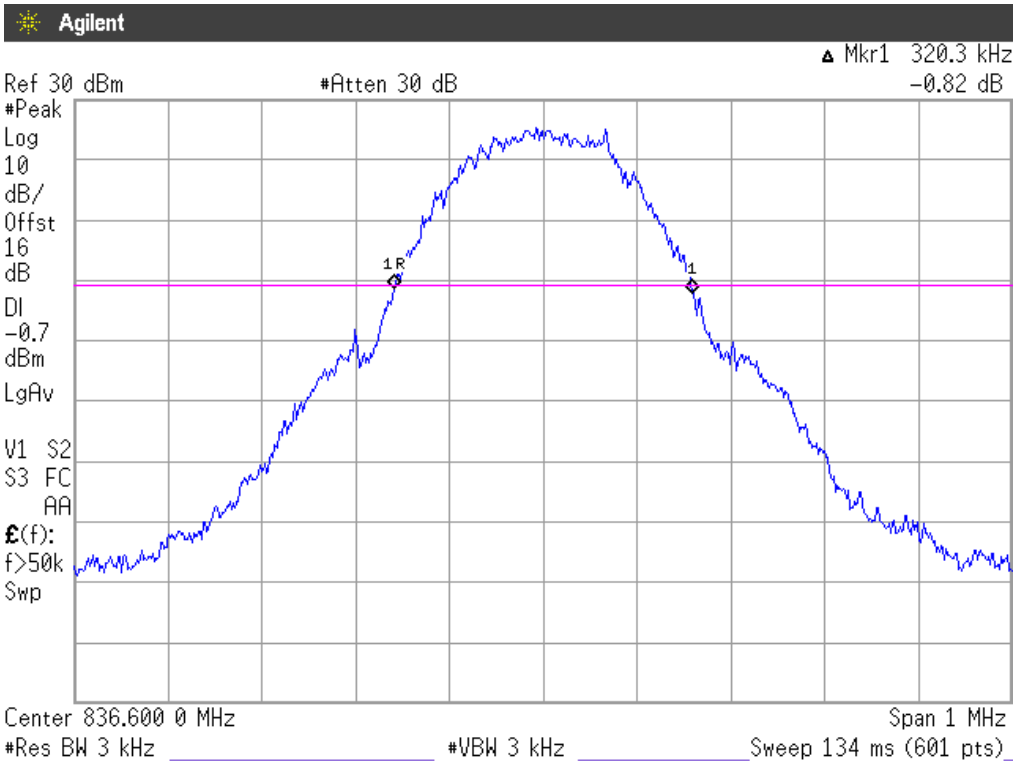
-26 dBc BANDWIDTH

GPRS MODULATION

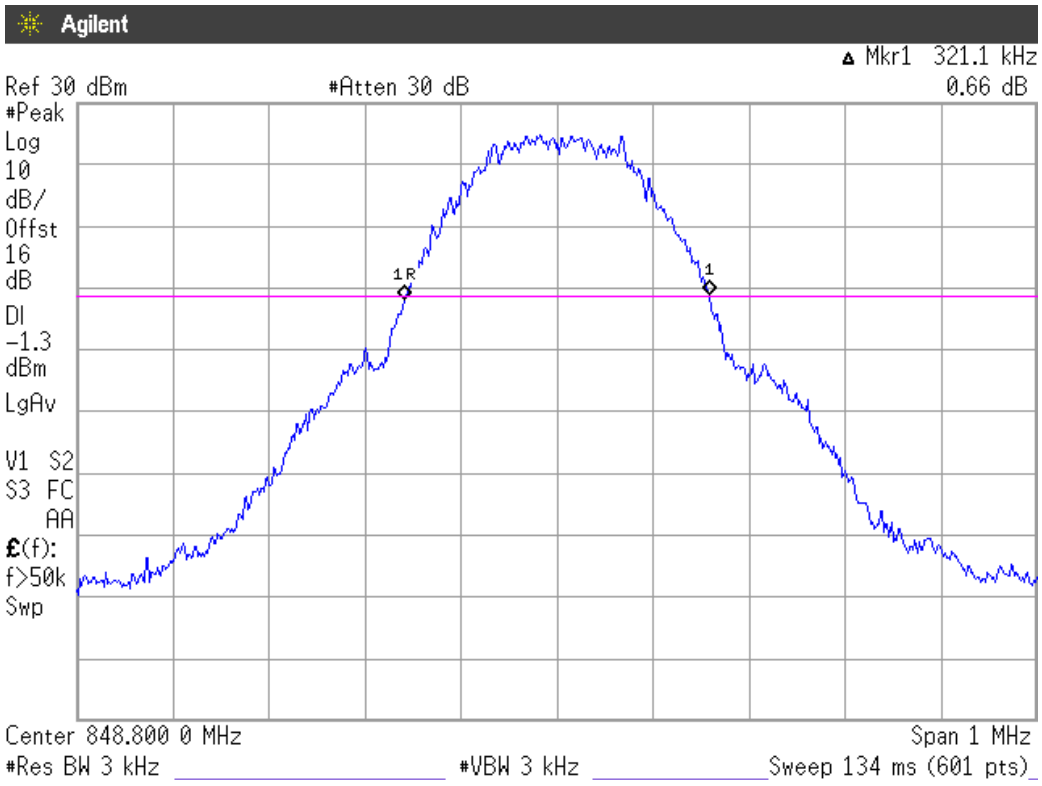
Lowest Channel



Middle Channel

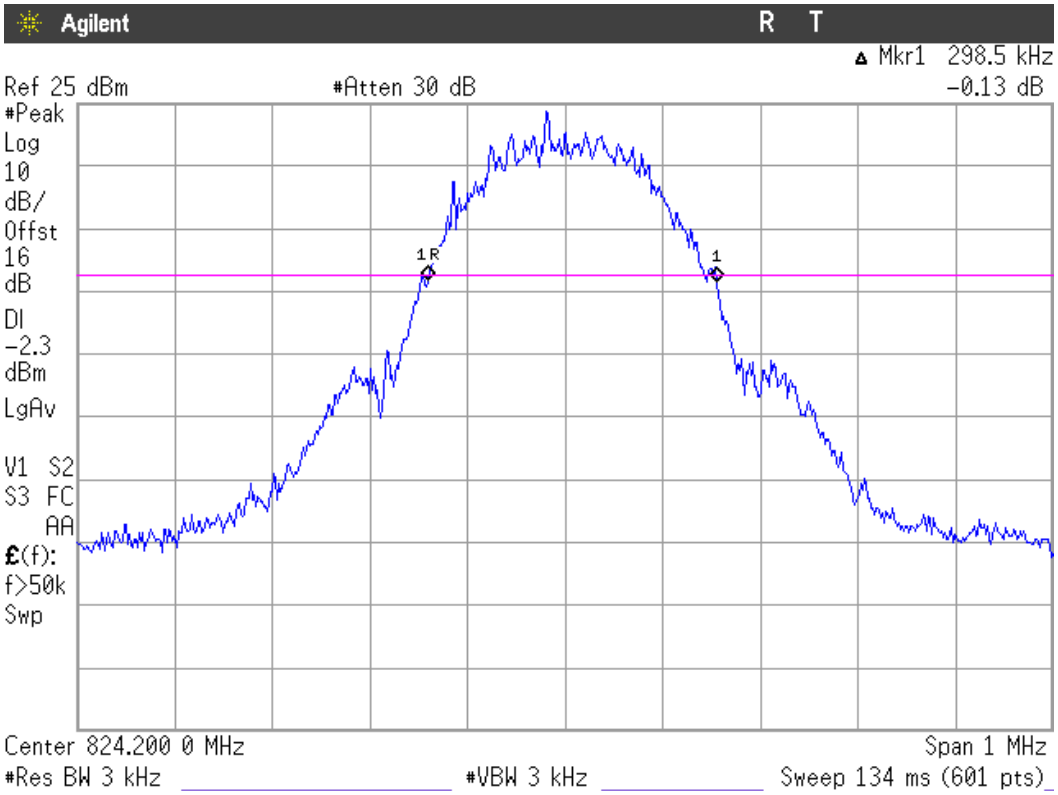


Highest Channel

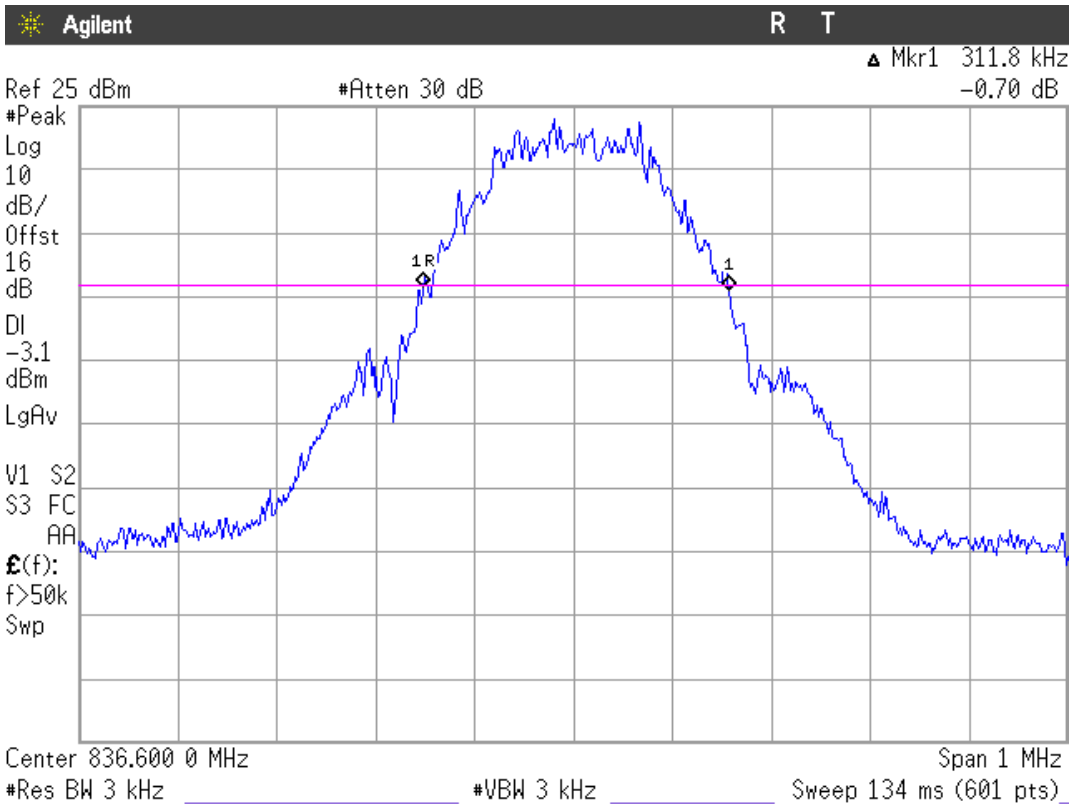


EDGE MODULATION

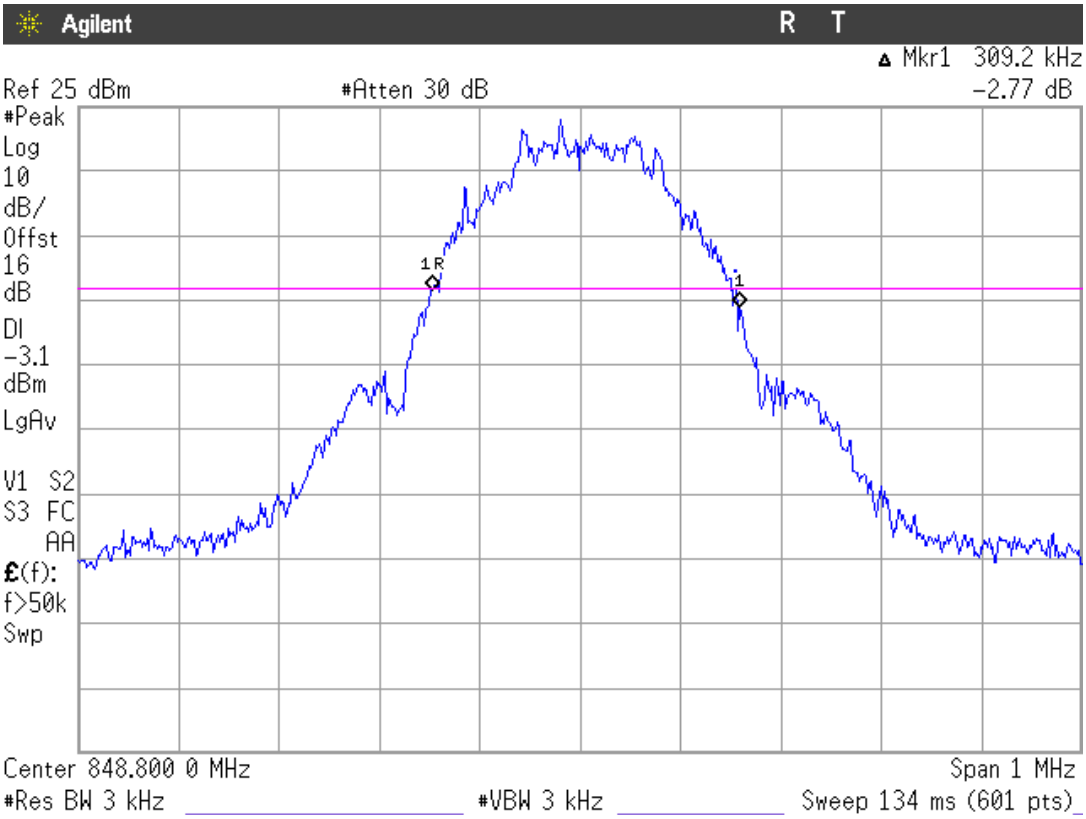
Lowest Channel



Middle Channel

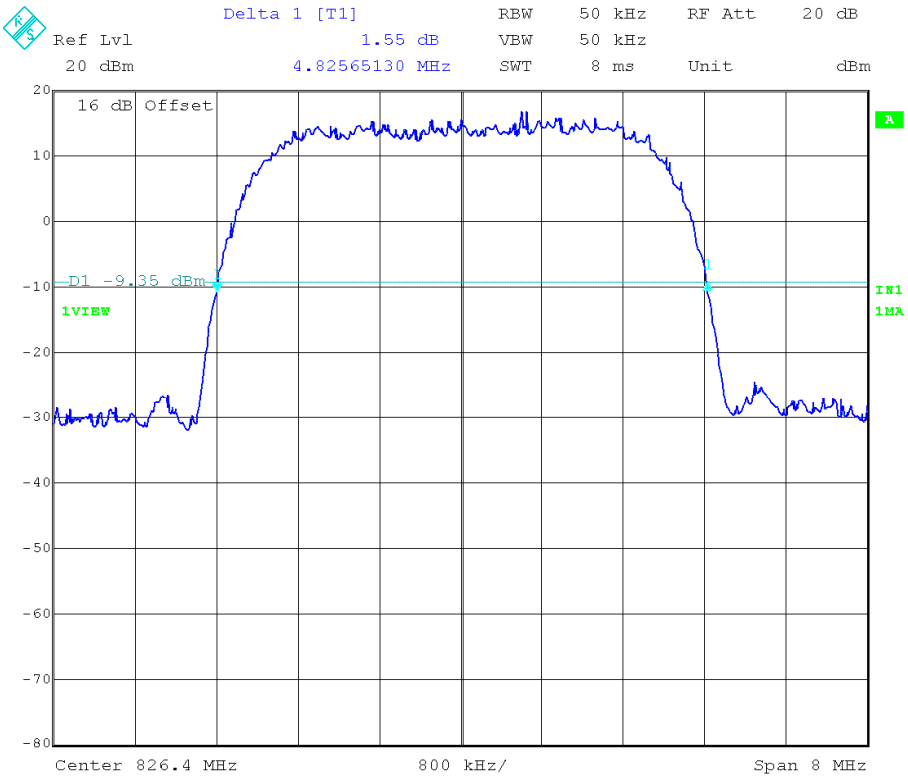


Highest Channel

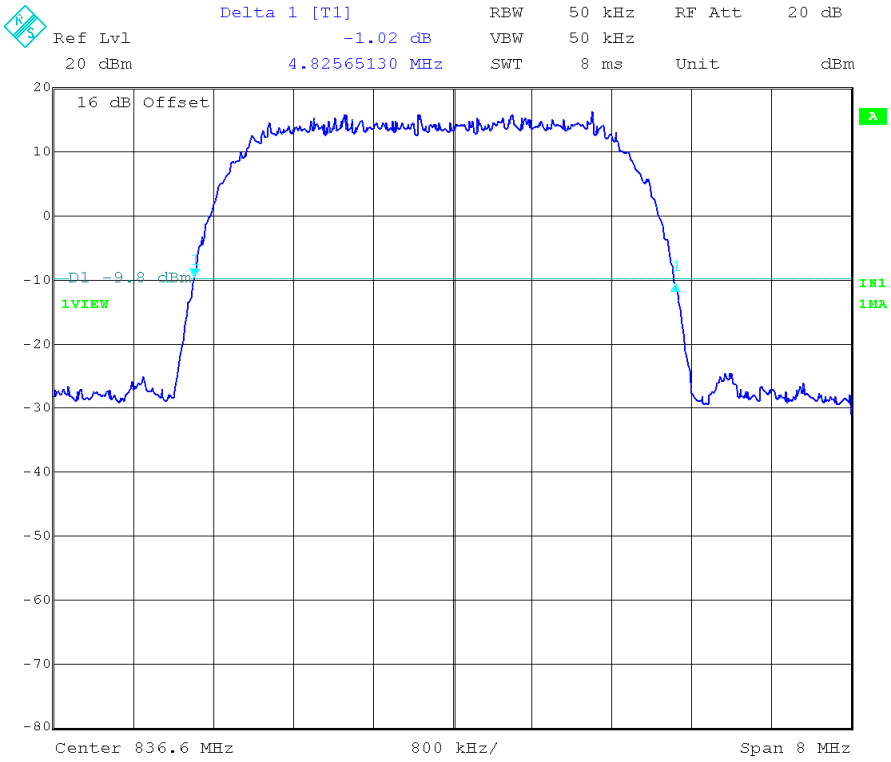


WCDMA MODULATION

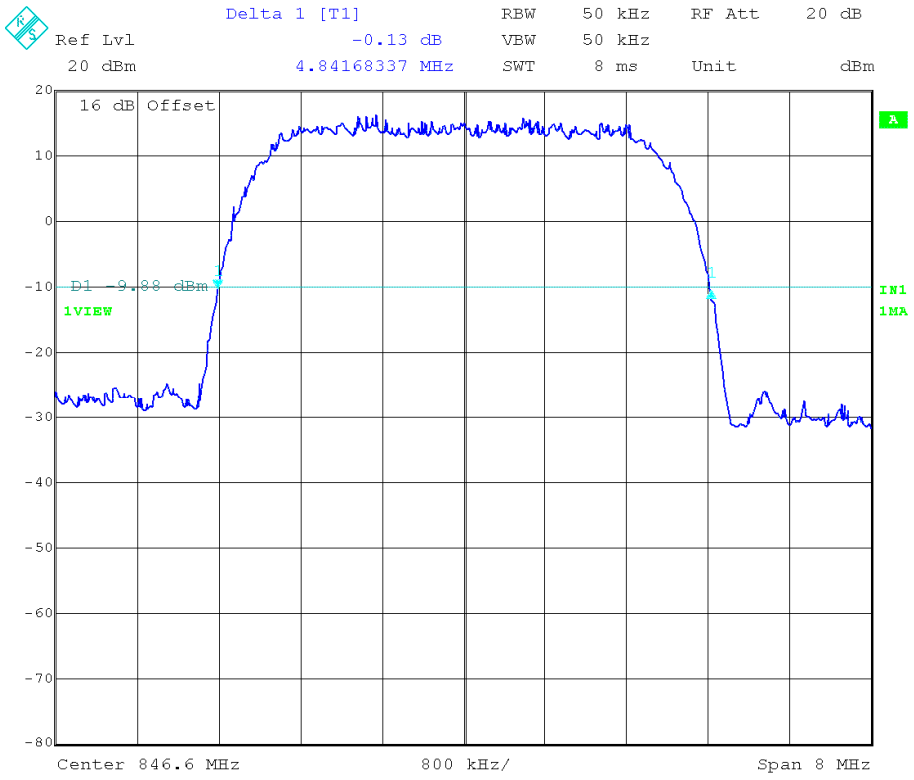
Lowest Channel



Middle Channel

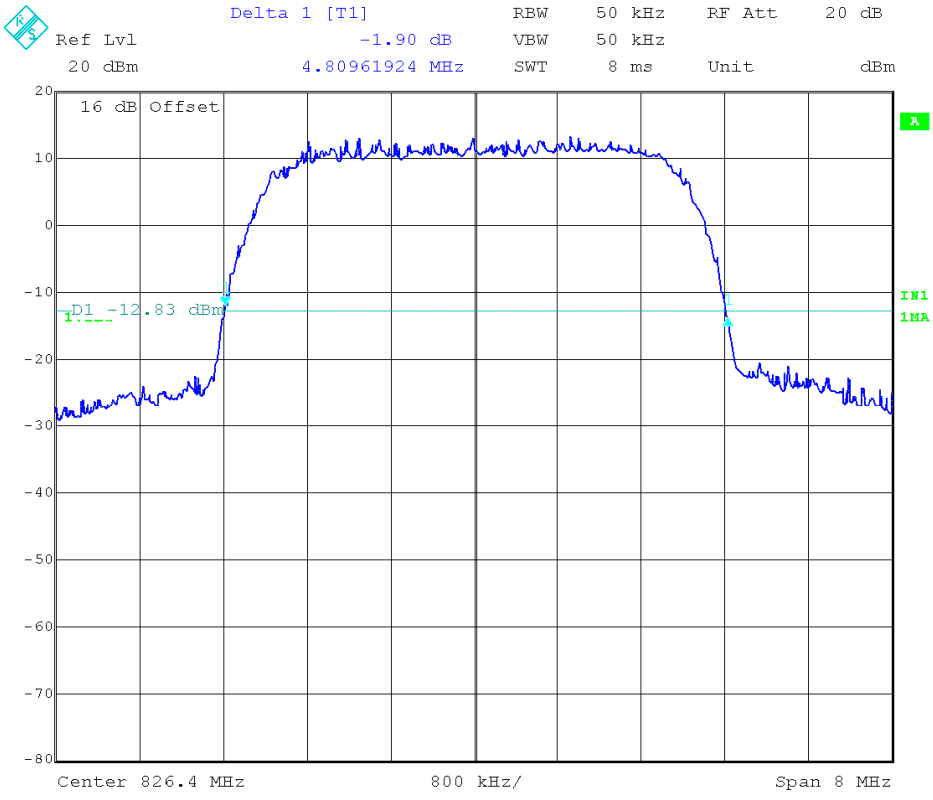


Highest Channel

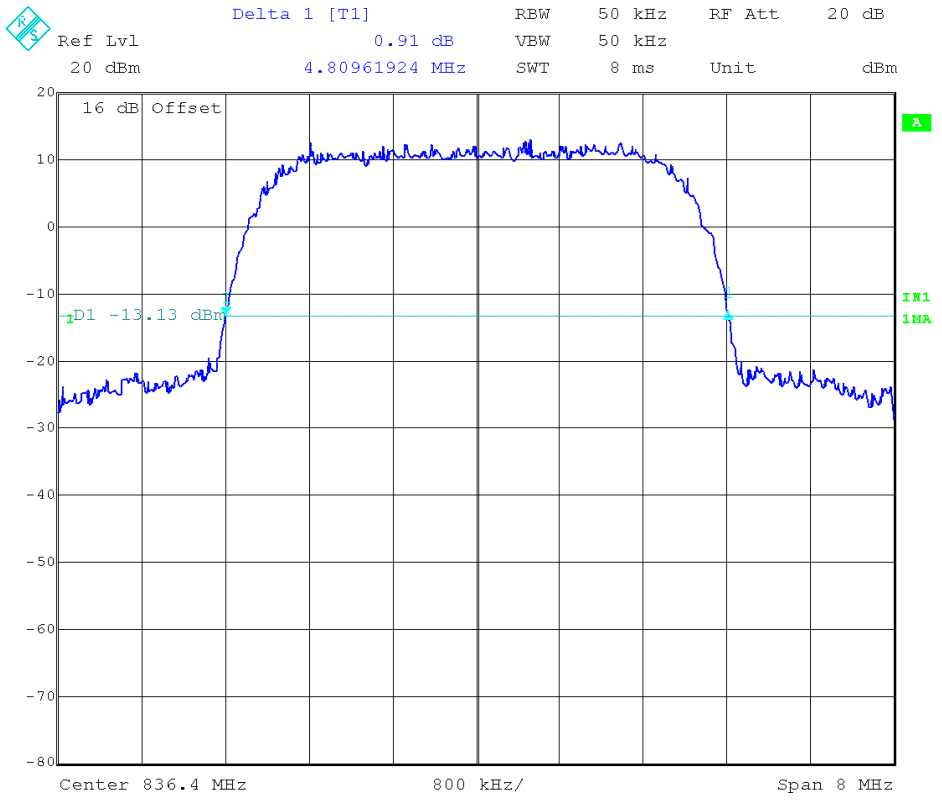


HSUPA MODULATION

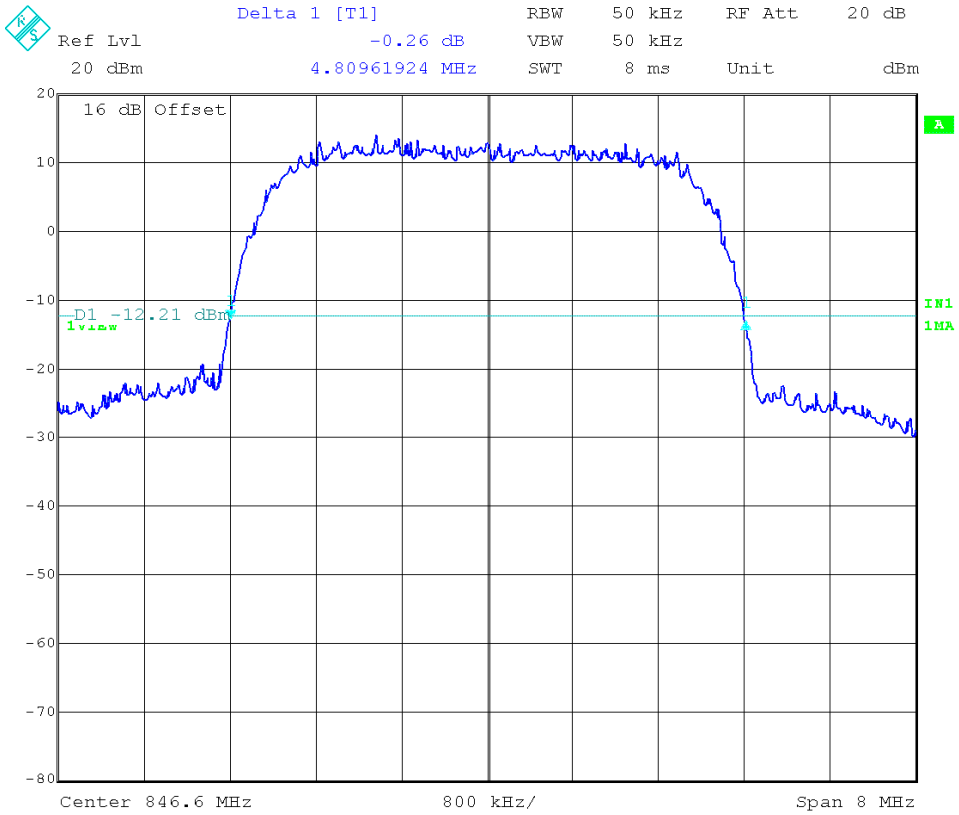
Lowest Channel



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 at least 100 kHz. 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.

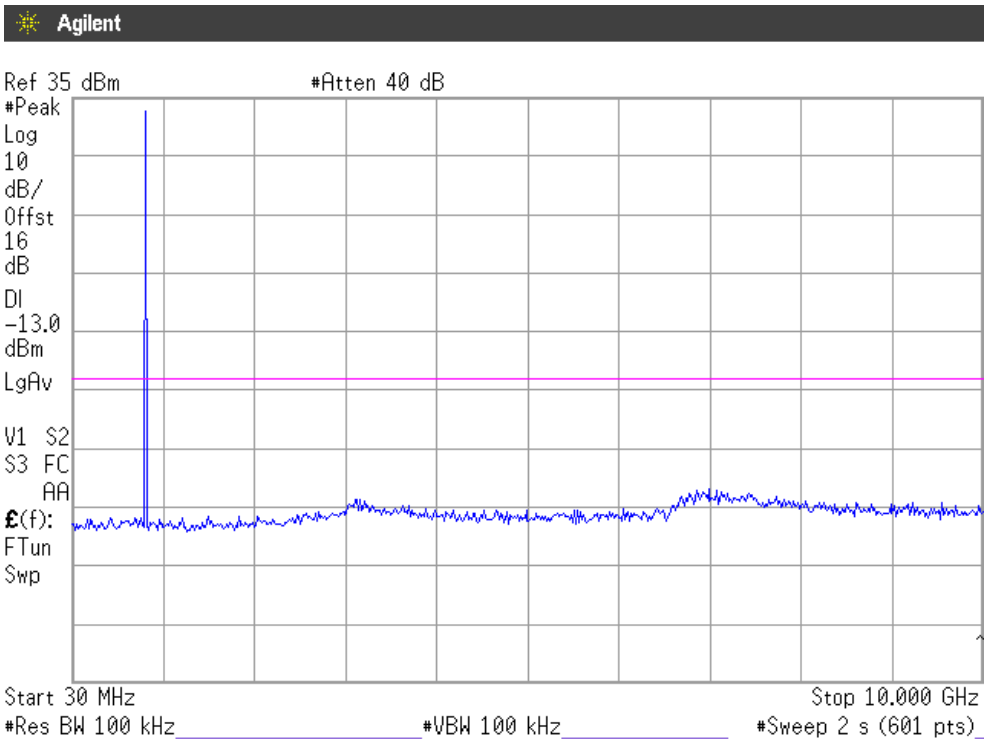
3. CHANNEL: HIGHEST

No spurious signals were found in all the range.

Verdict: PASS

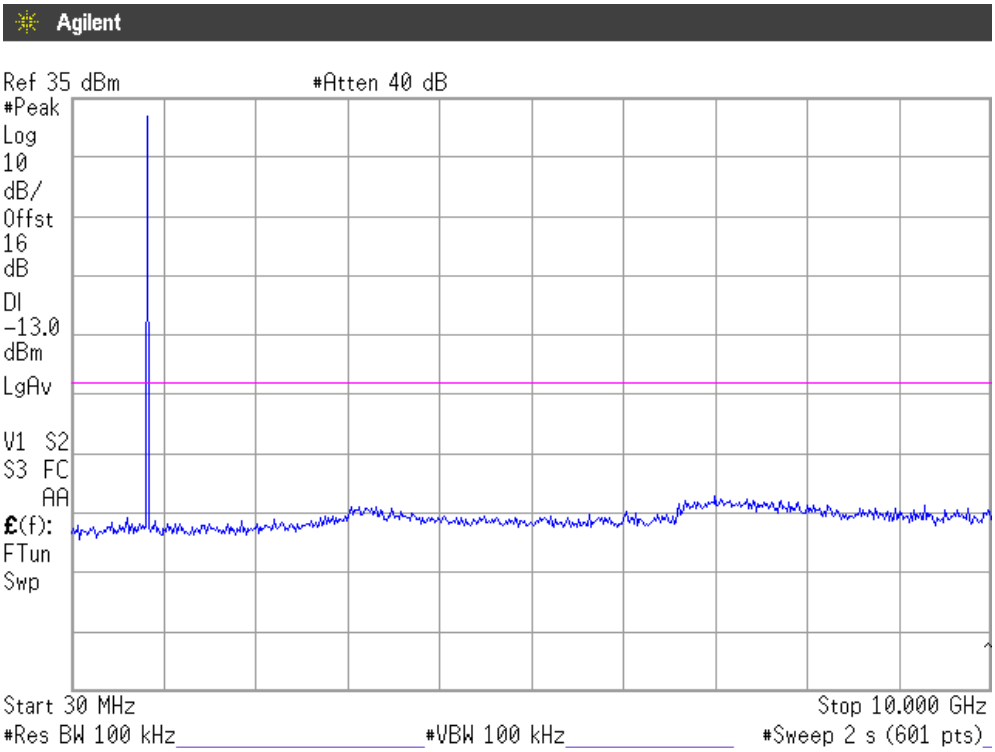
GPRS MODULATION

1. CHANNEL: LOWEST



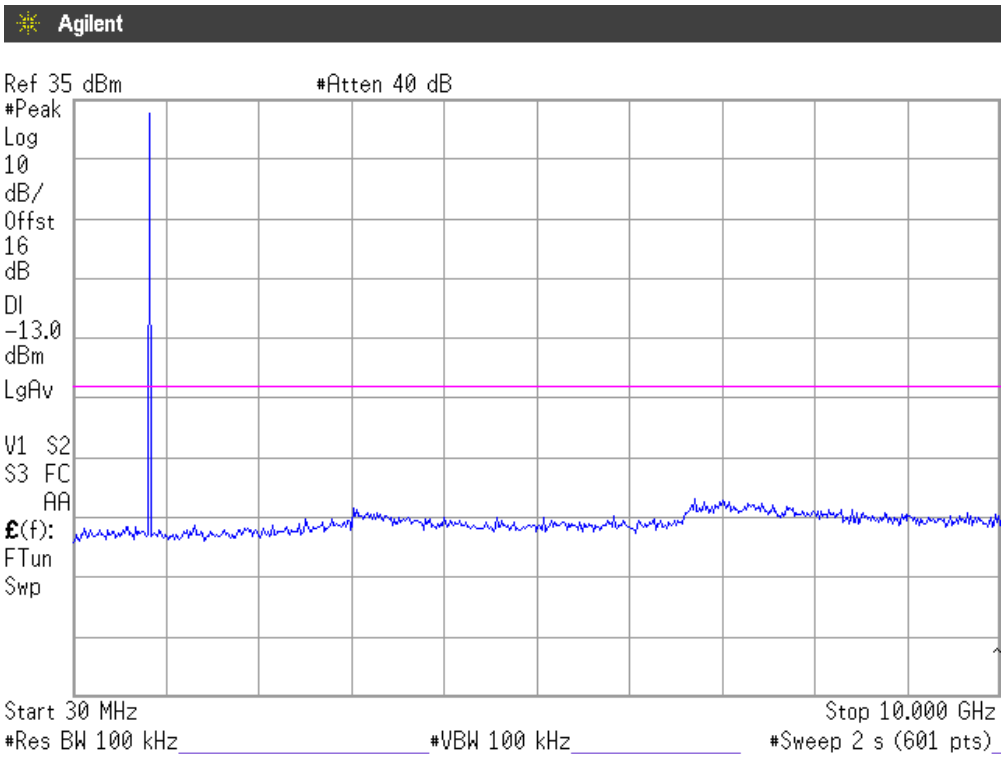
Note: The peak above the limit is the carrier frequency.

2. CHANNEL: MIDDLE



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

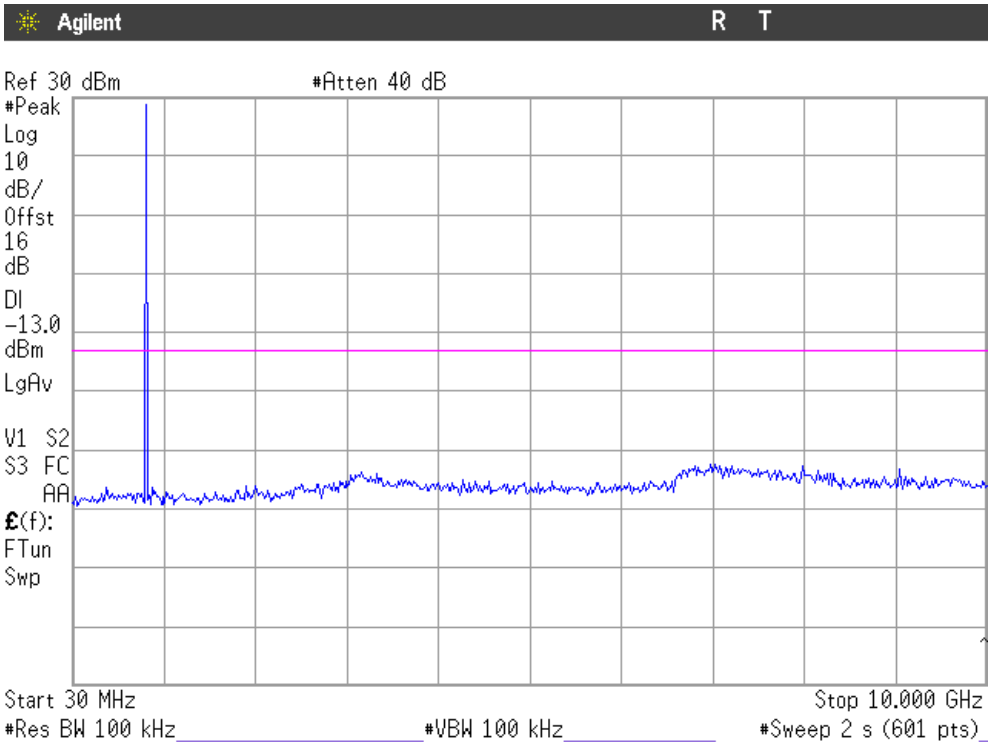
3. CHANNEL: HIGHEST



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

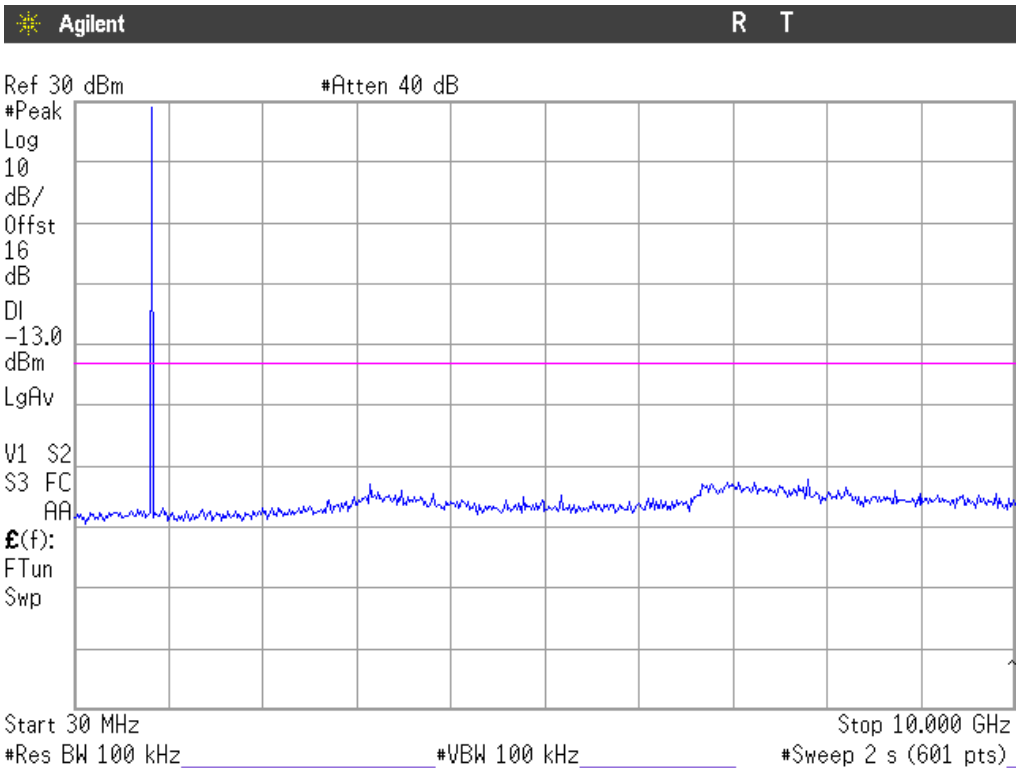
EDGE MODULATION

1. CHANNEL: LOWEST



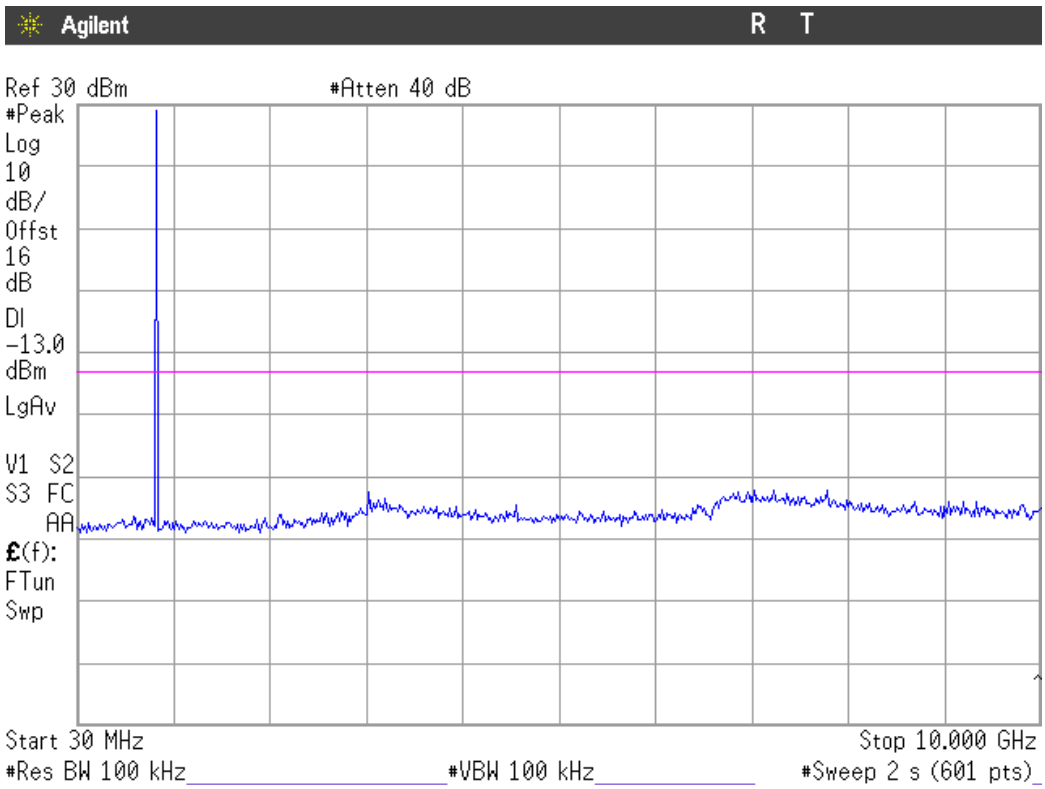
Note: The peak above the limit is the carrier frequency.

2. CHANNEL: MIDDLE



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

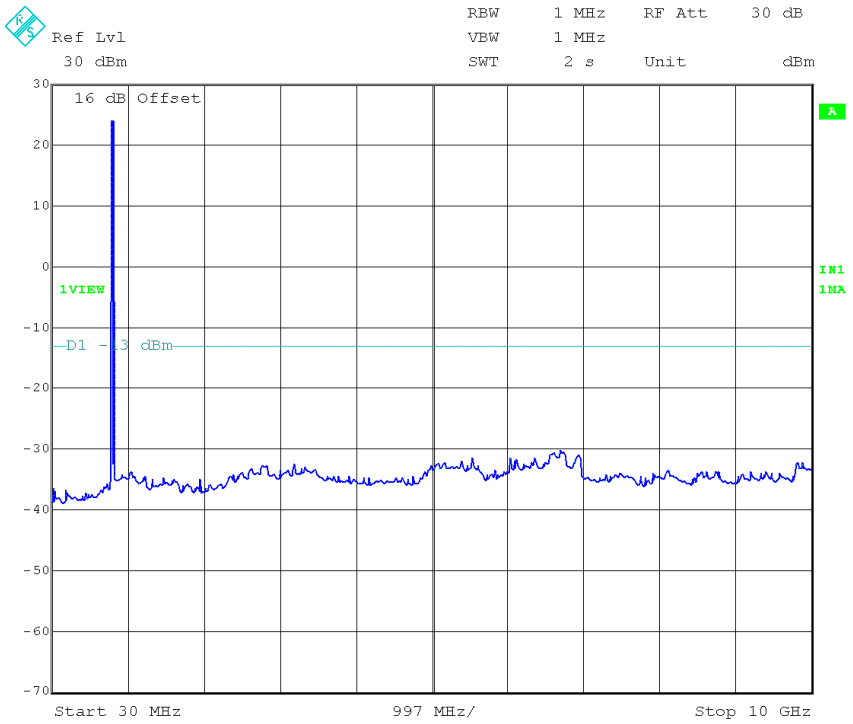
3. CHANNEL: HIGHEST



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

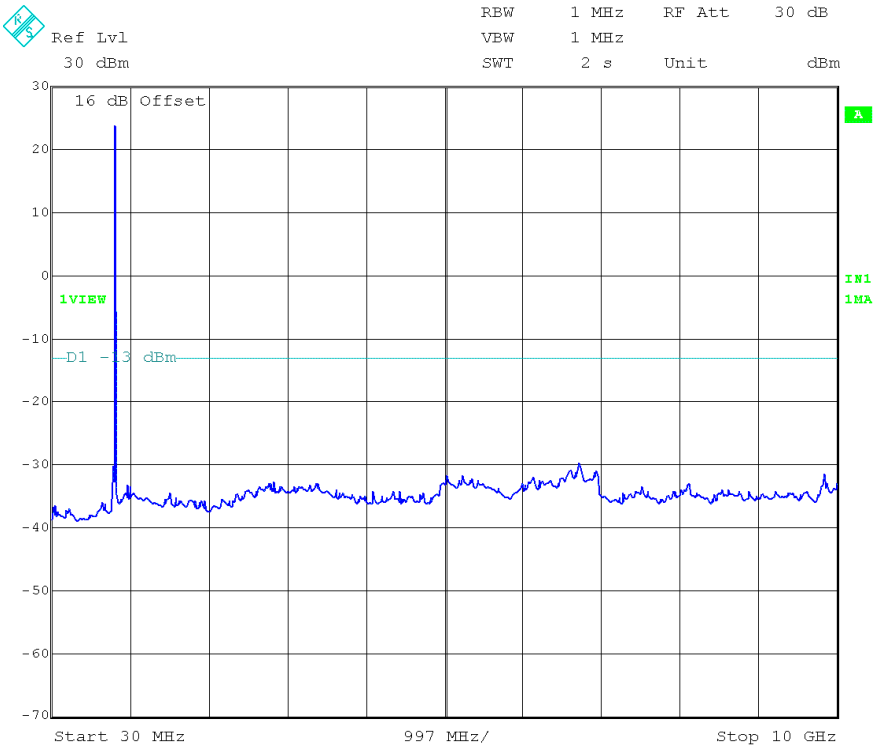
WCDMA MODULATION

1. CHANNEL: LOWEST



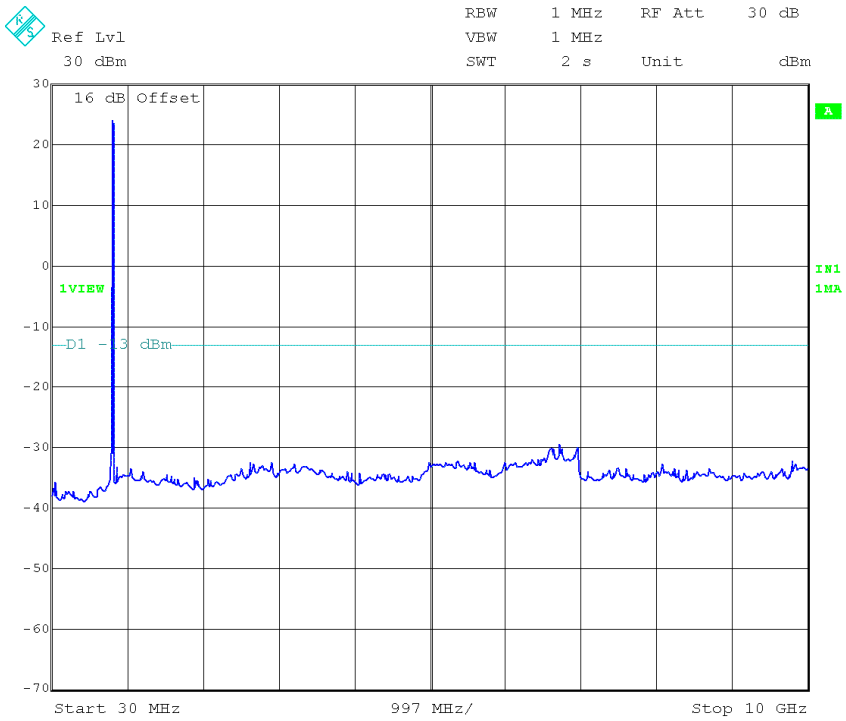
Note: The peak above the limit is the carrier frequency.

2. CHANNEL: MIDDLE



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

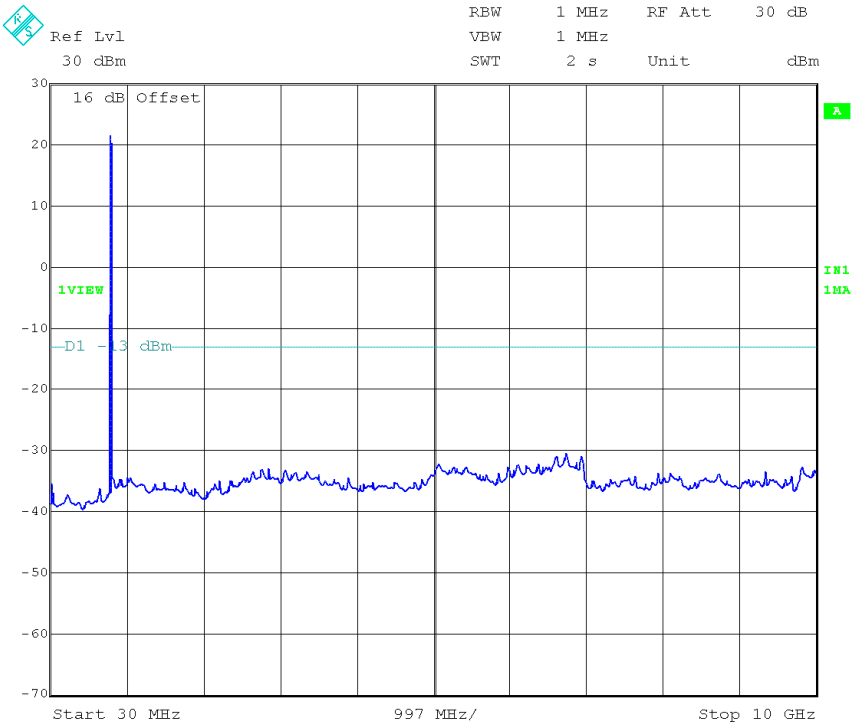
3. CHANNEL: HIGHEST



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

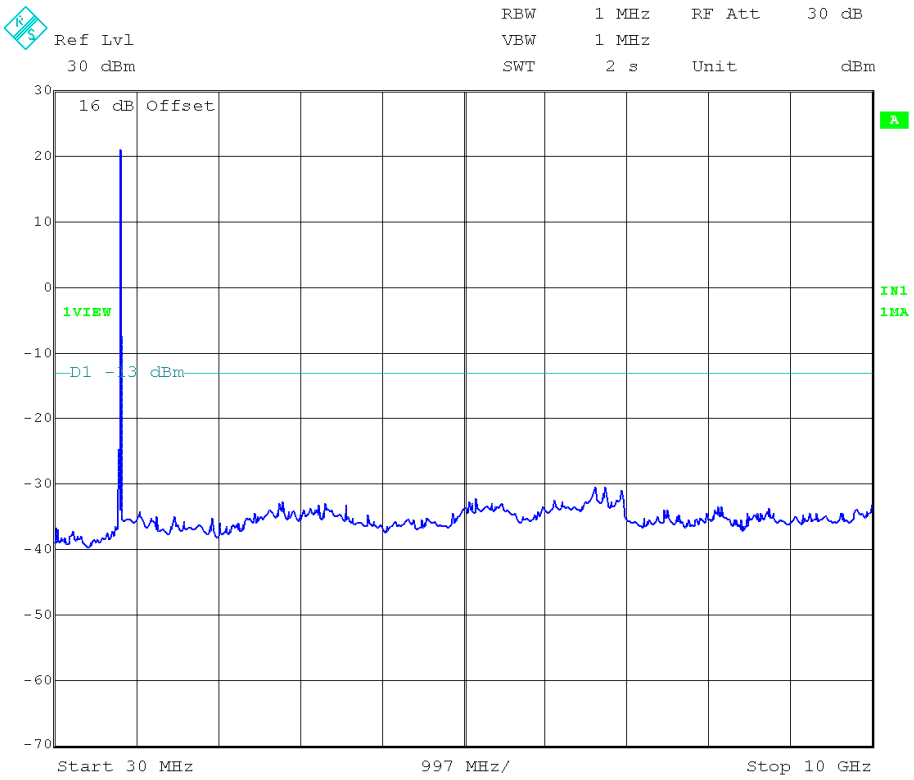
HSUPA MODULATION

1. CHANNEL: LOWEST



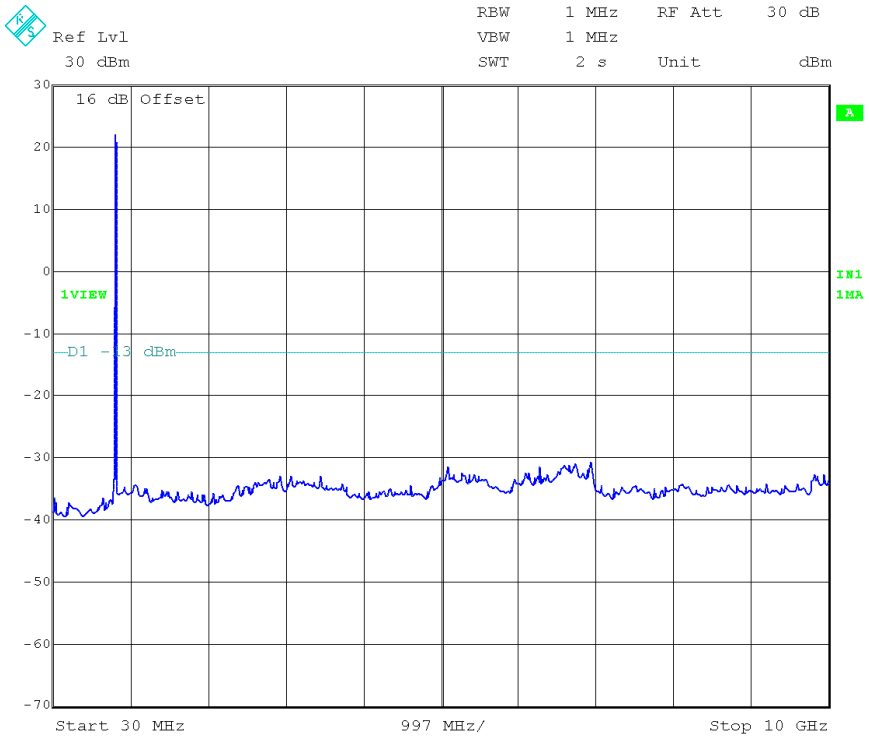
Note: The peak above the limit is the carrier frequency.

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 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

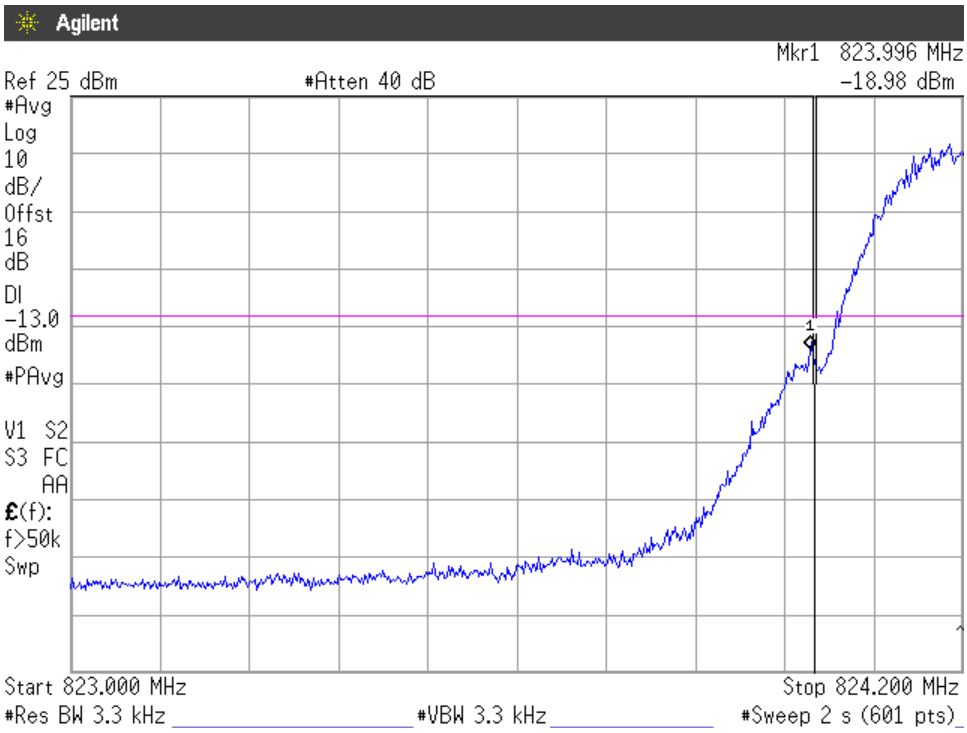
RESULTS (see plots in next pages)

MODULATION	Maximum level at lowest Block Edge (dBm)	Maximum level at highest Block Edge (dBm)
GPRS	-18.98	-21.68
EDGE	-22.94	-24.03
WCDMA	-17.41	-17.26
HSUPA	-21.11	-22.10

Measurement uncertainty = ±1.57 dB.

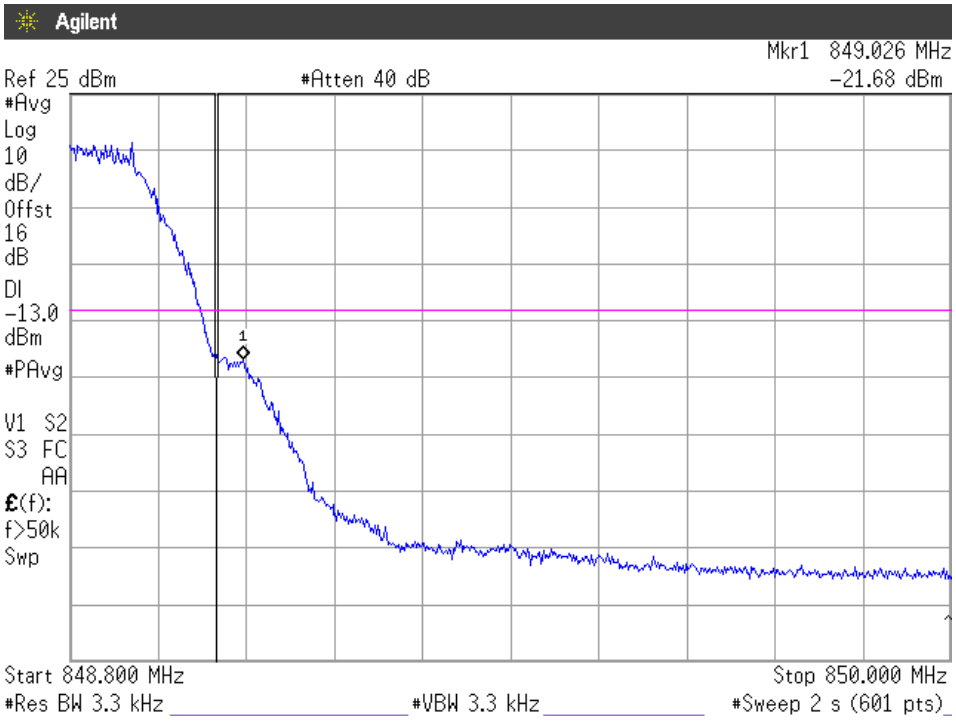
GPRS MODULATION

CHANNEL LOWEST



NOTE: The equipment transmits at the maximum output power

CHANNEL HIGHEST

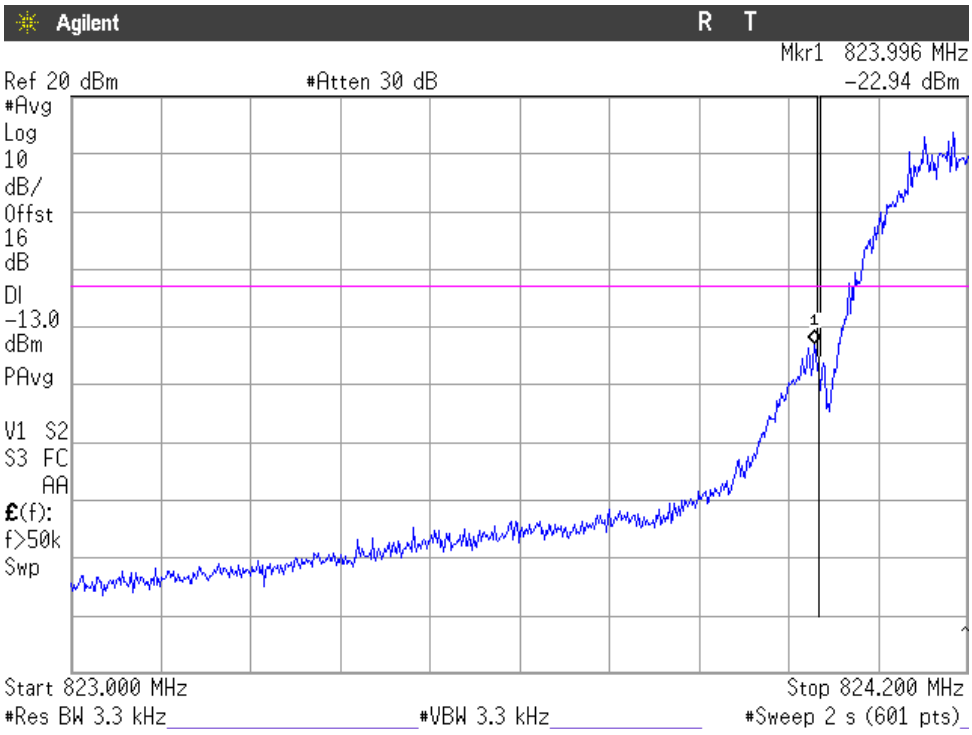


NOTE: The equipment transmits at the maximum output power

Verdict: PASS

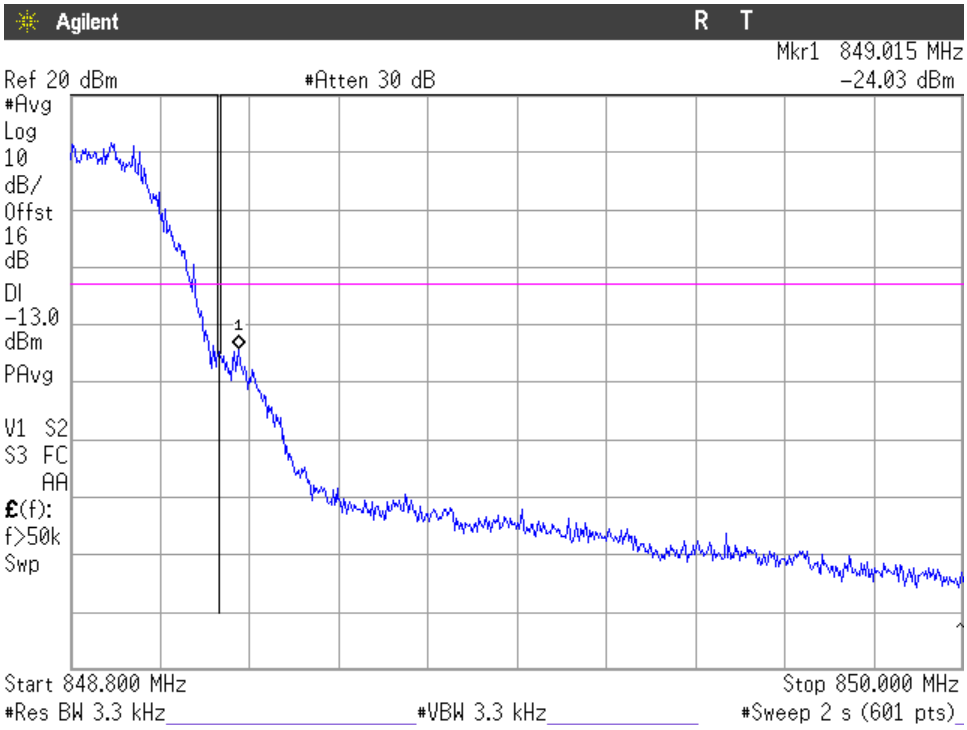
EDGE MODULATION

CHANNEL LOWEST



NOTE: The equipment transmits at the maximum output power

CHANNEL HIGHEST

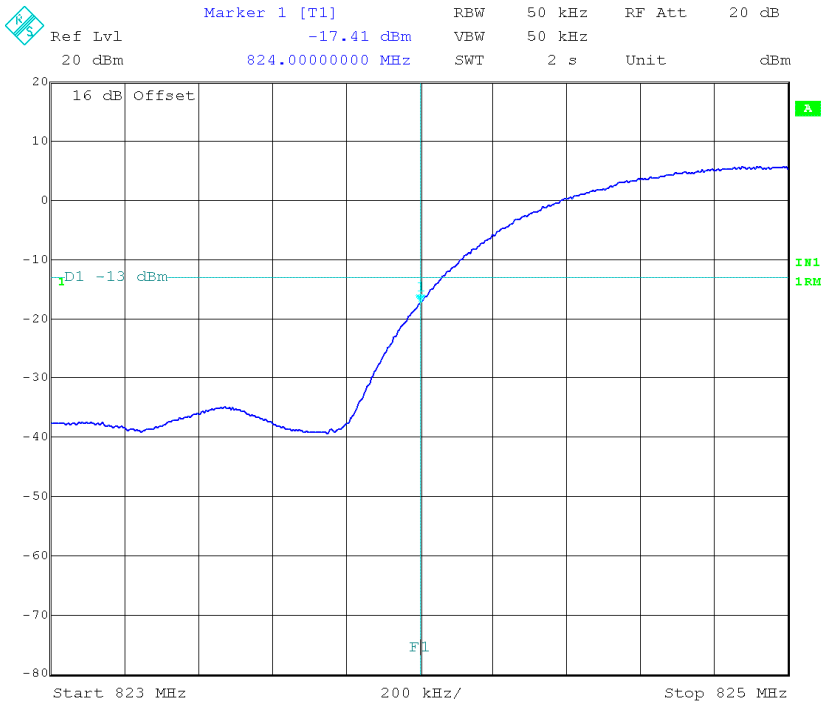


NOTE: The equipment transmits at the maximum output power

Verdict: PASS

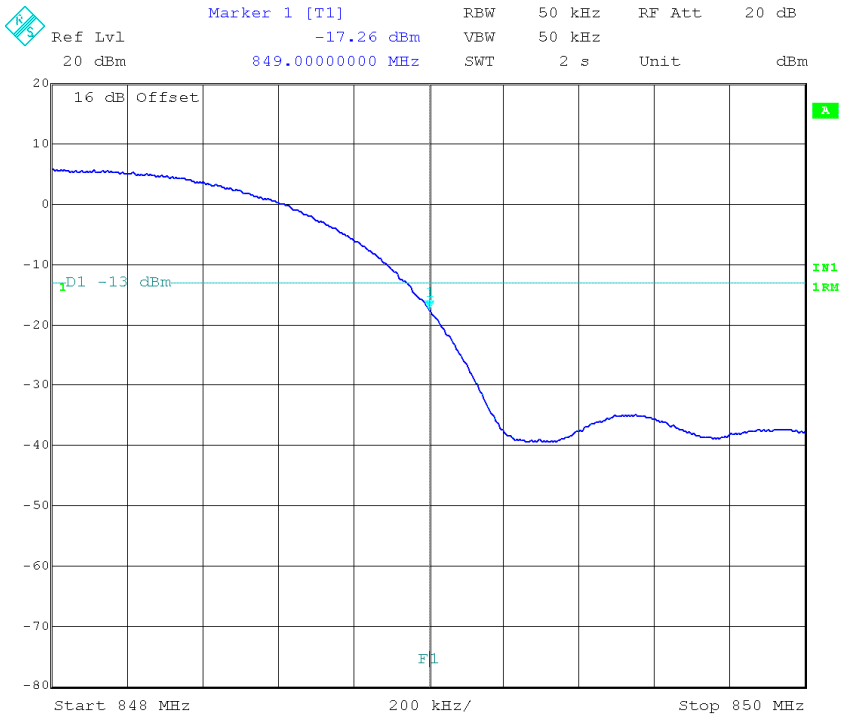
WCDMA MODULATION

CHANNEL LOWEST



NOTE: The equipment transmits at the maximum output power

CHANNEL HIGHEST

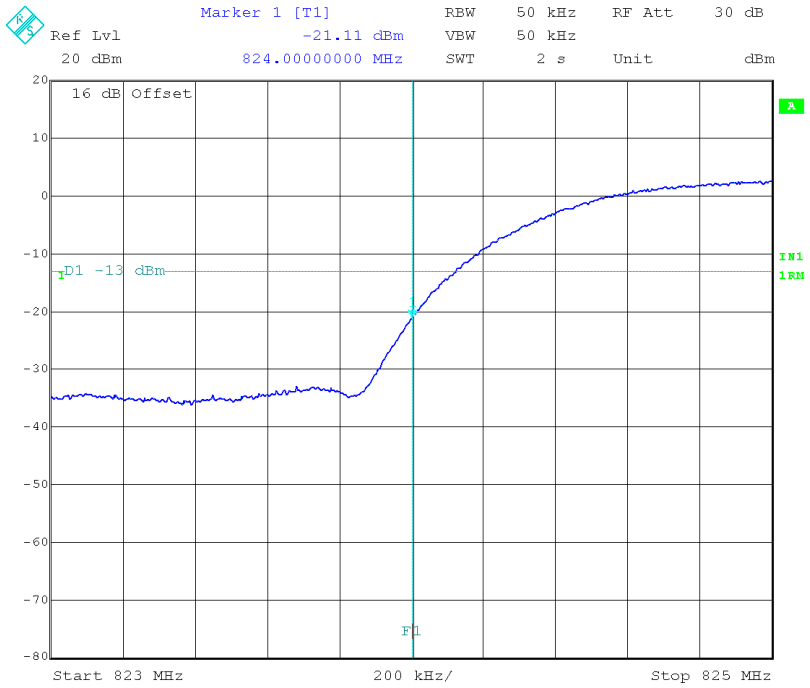


NOTE: The equipment transmits at the maximum output power

Verdict: PASS

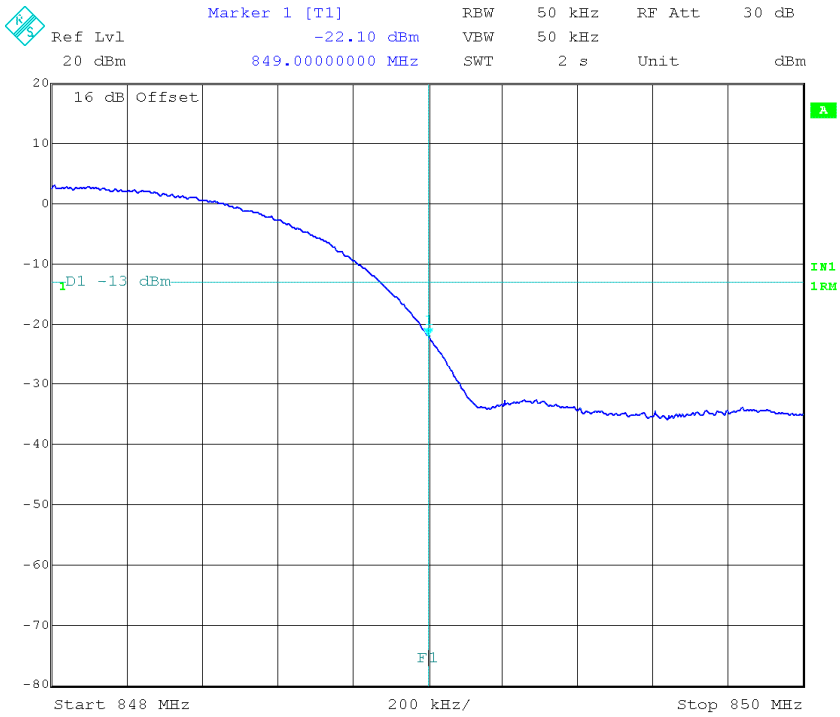
HSUPA MODULATION

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 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 spurious signals were found in all the range.

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 spurious signals were found in all the range.

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 spurious signals were found in all the range.

EDGE 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 spurious signals were found in all the range.

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 spurious signals were found in all the range.

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.
Substitution method data

Frequency (MHz)	Instrument reading (dBm)	Polarization	(1) Generator output (dBm)	(2) Cable loss (dB)	(3) Substitution antenna gain Gi (respect to isotropic radiator) (dB)	E.I.R.P. (dBm) = (1) – (2) + (3)	E.R.P. (dBm) = E.I.R.P. (dBm) -2.15 dB
2546.5334	-70.35	Vertical	-40.65	2.20	7.00	-33.7	-35.85

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 spurious signals were found in all the range.

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 spurious signals were found in all the range.

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 spurious signals were found in all the range.

HSUPA 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 spurious signals were found in all the range.

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 spurious signals were found in all the range.

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.

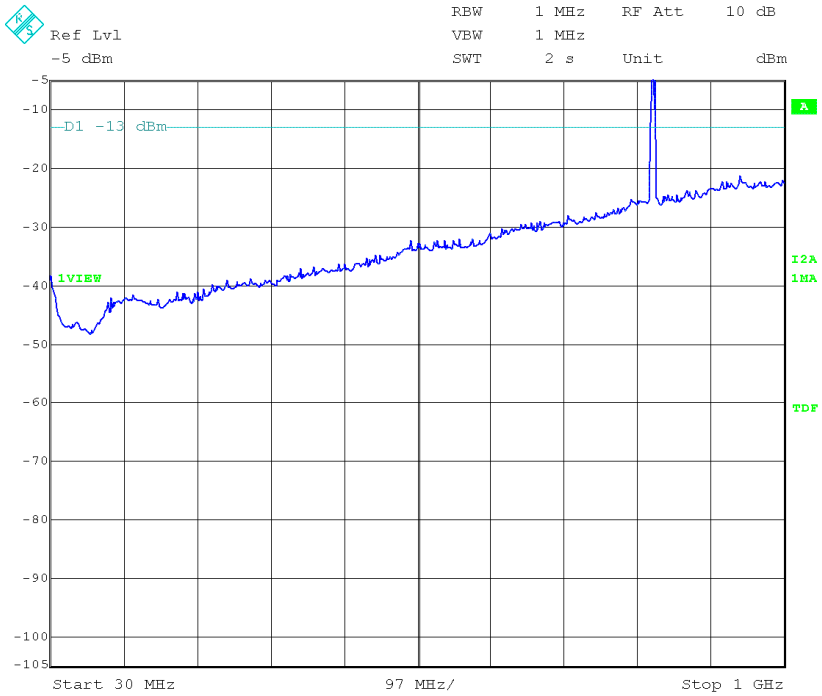
No spurious signals were found in all the range.

Verdict: PASS

FREQUENCY RANGE 30 MHz-1000 MHz.

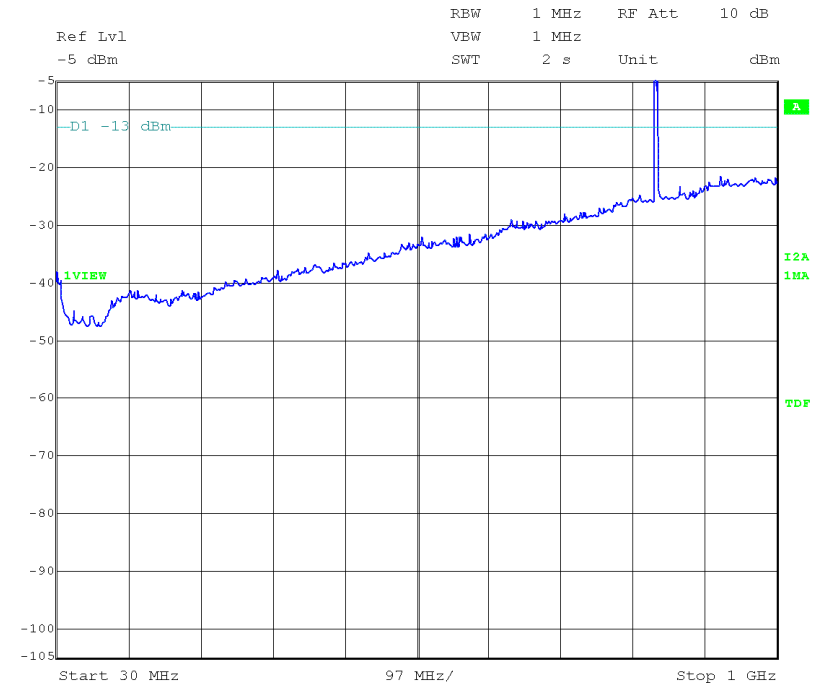
GPRS MODULATION

CHANNEL: LOWEST



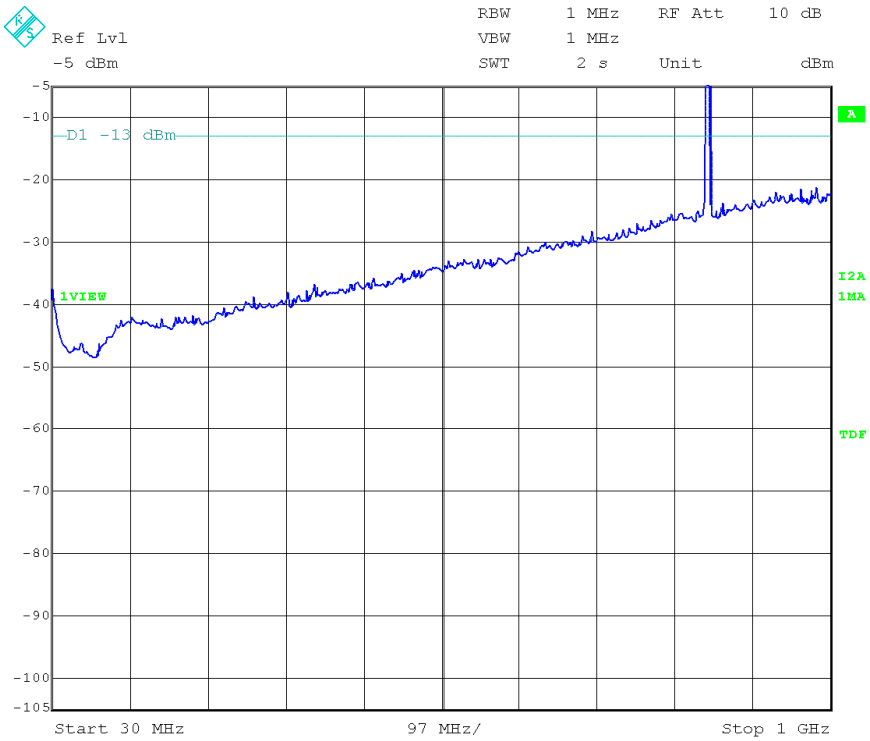
Note: The peak above the limit is the carrier frequency.

CHANNEL: MIDDLE



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

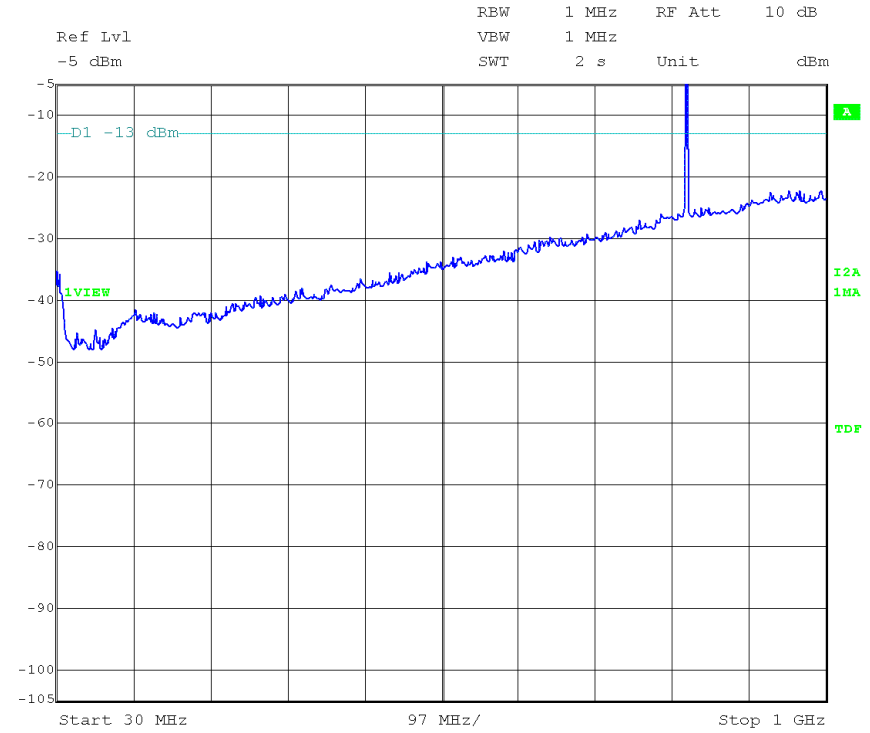
CHANNEL: HIGHEST



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

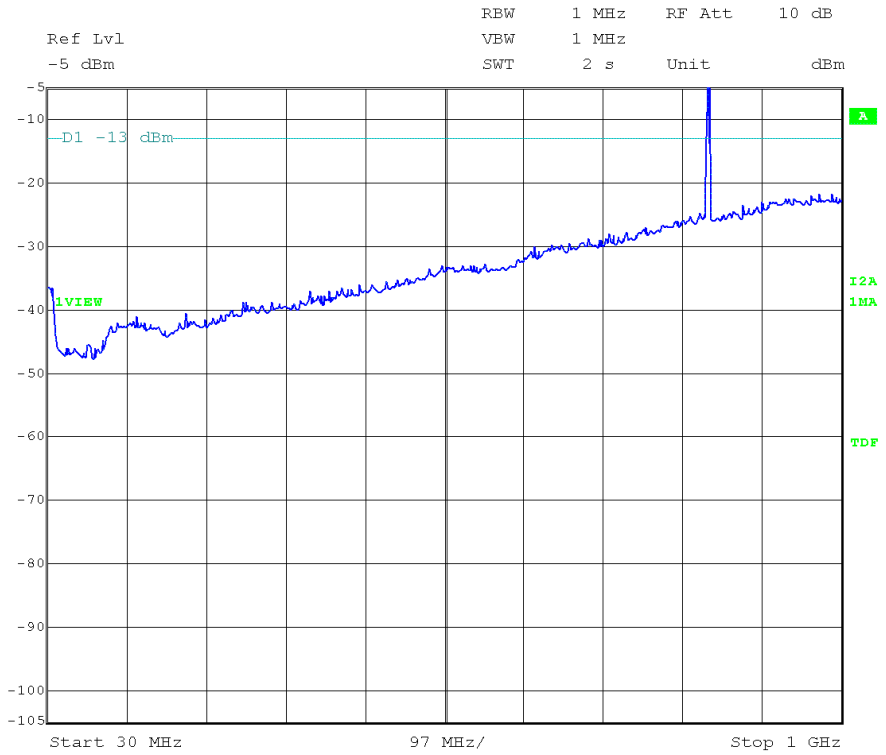
EDGE MODULATION

CHANNEL: LOWEST



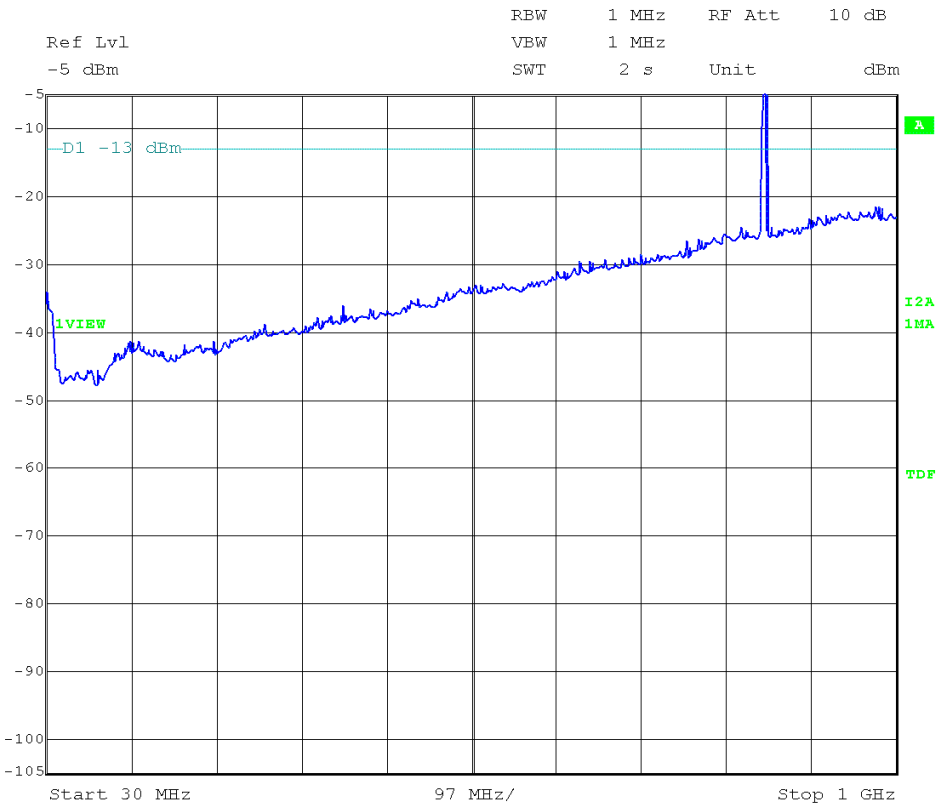
Note: The peak above the limit is the carrier frequency.

CHANNEL: MIDDLE



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

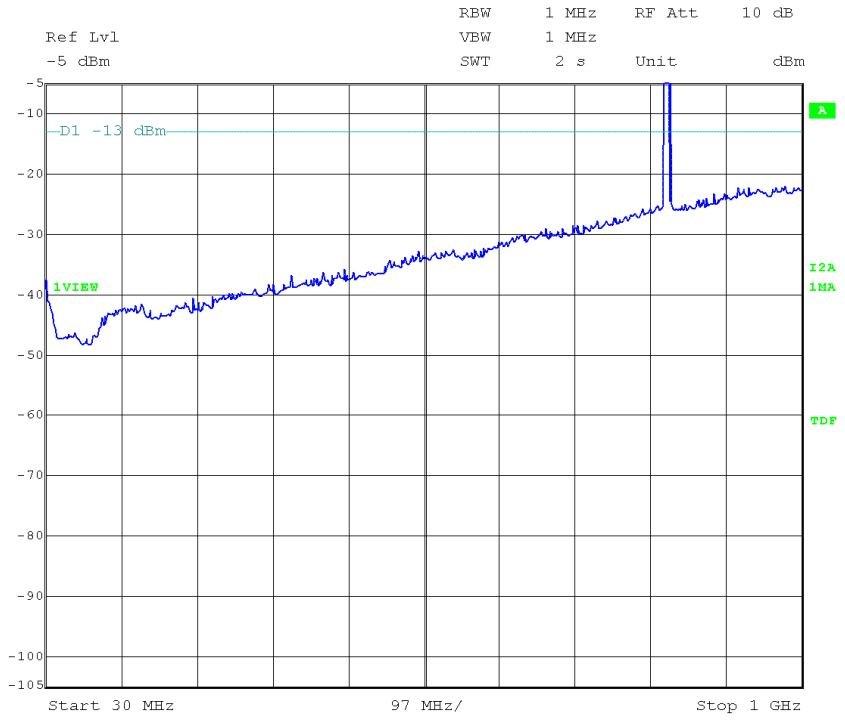
CHANNEL: HIGHEST



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

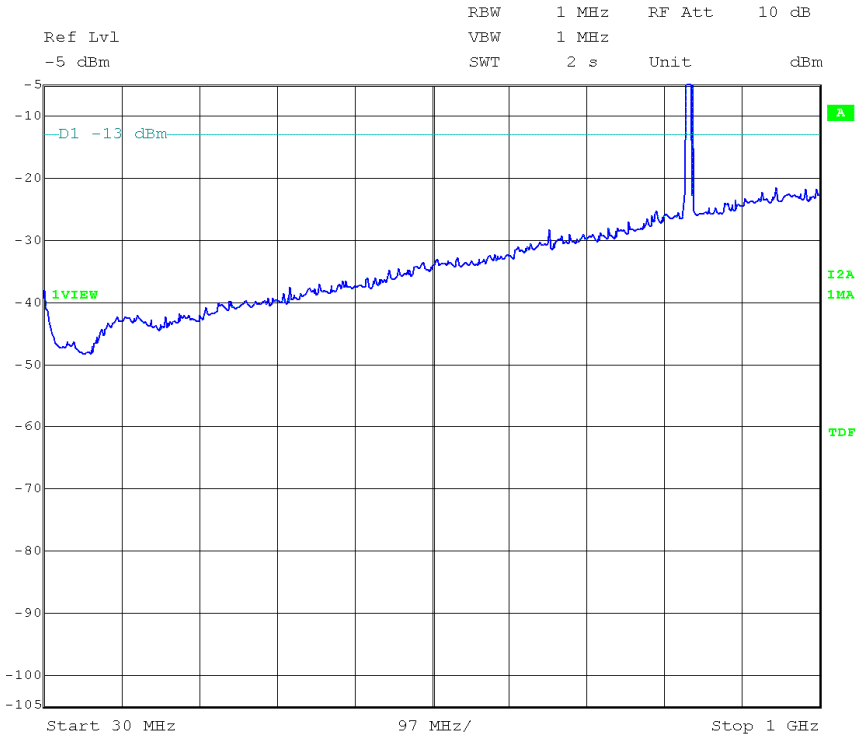
WCDMA MODULATION

CHANNEL: LOWEST



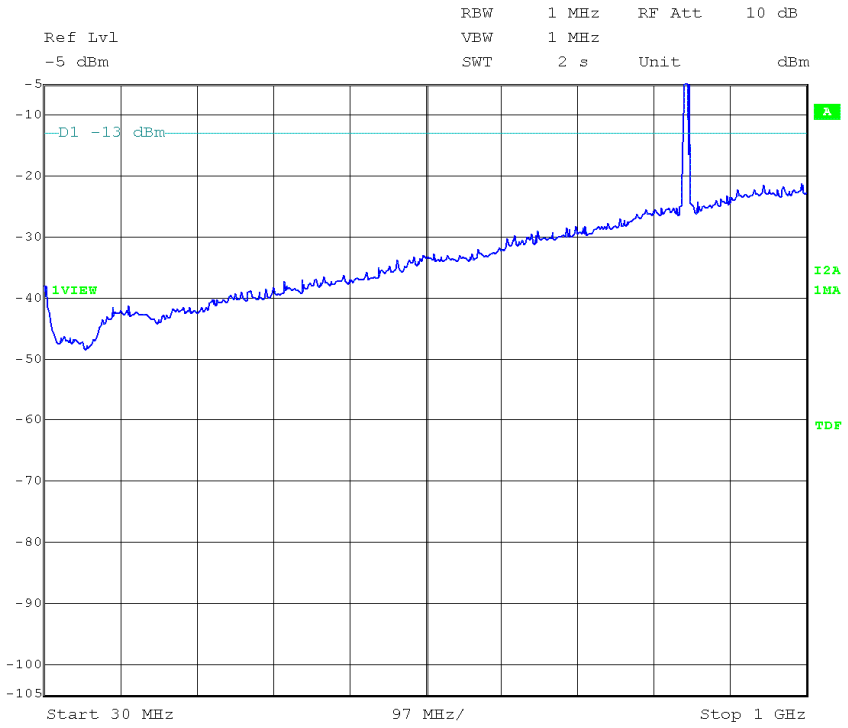
Note: The peak above the limit is the carrier frequency.

CHANNEL: MIDDLE



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

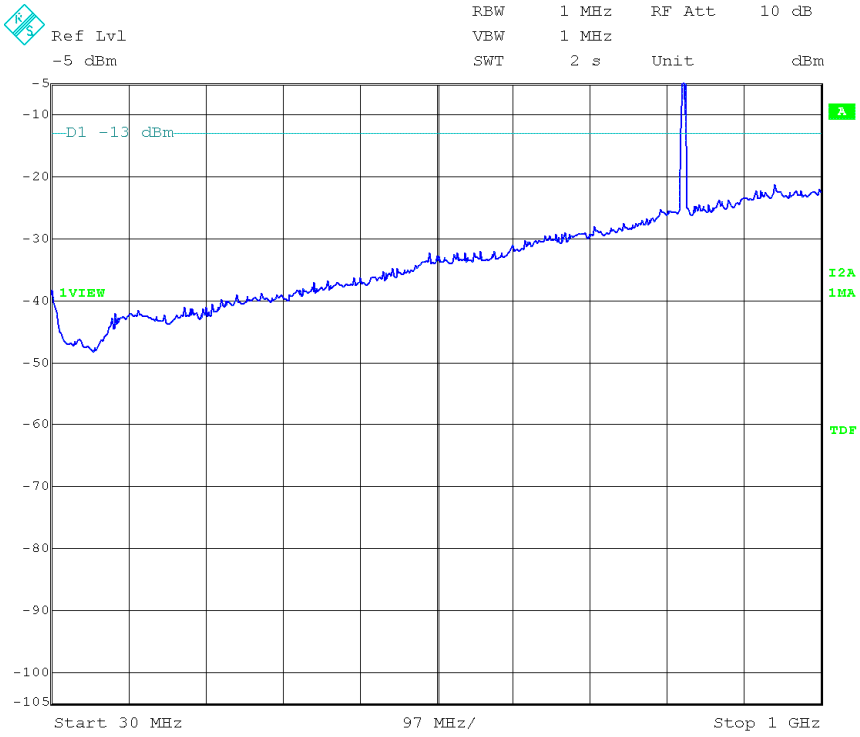
CHANNEL: HIGHEST



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

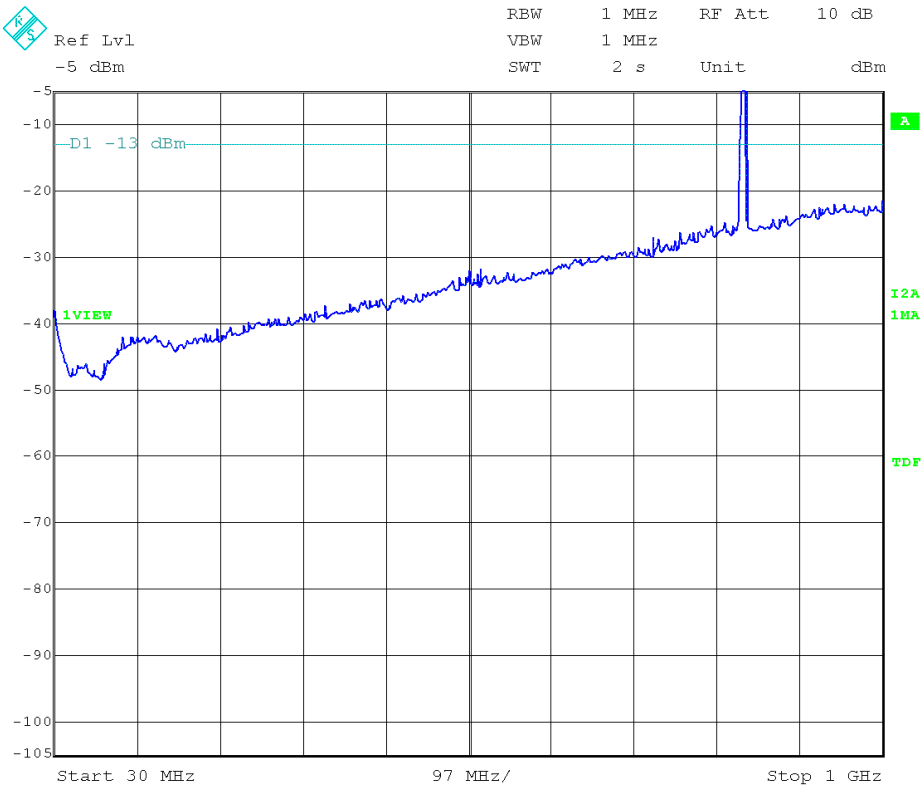
HSUPA MODULATION

CHANNEL: LOWEST



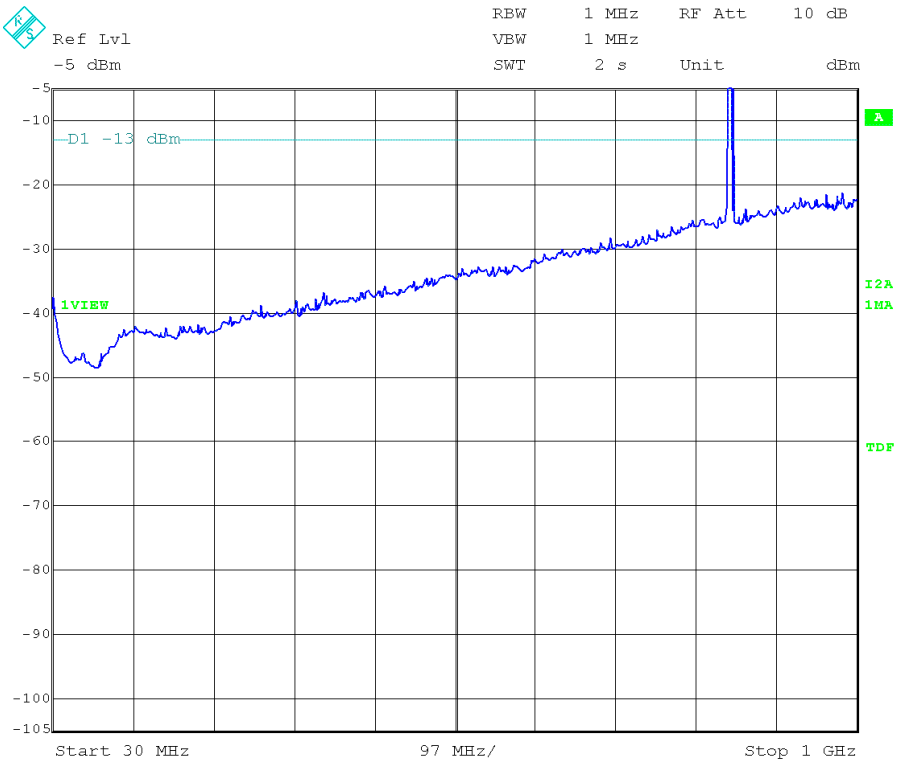
Note: The peak above the limit is the carrier frequency.

CHANNEL: MIDDLE



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

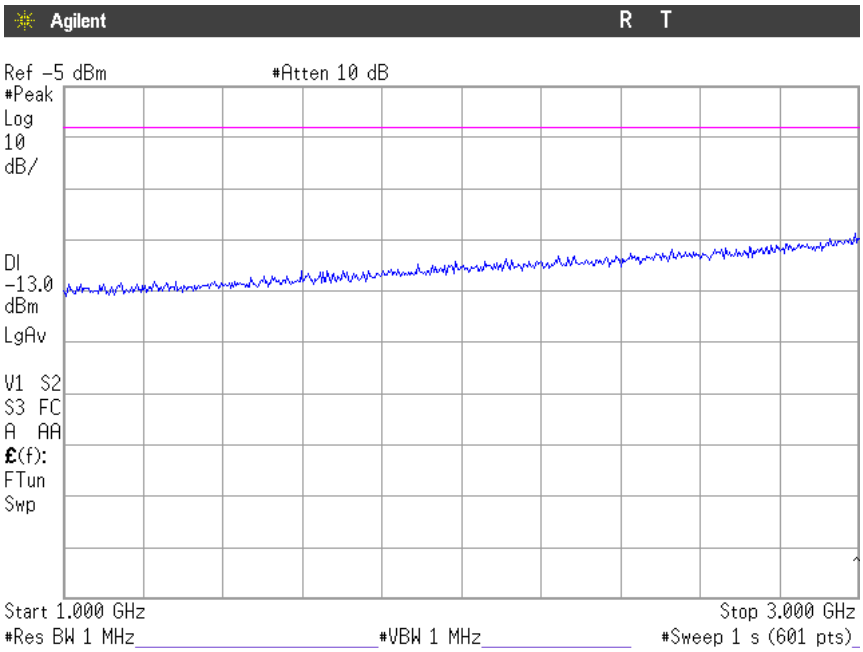
CHANNEL: HIGHEST



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

FREQUENCY RANGE 1 GHz to 3 GHz.

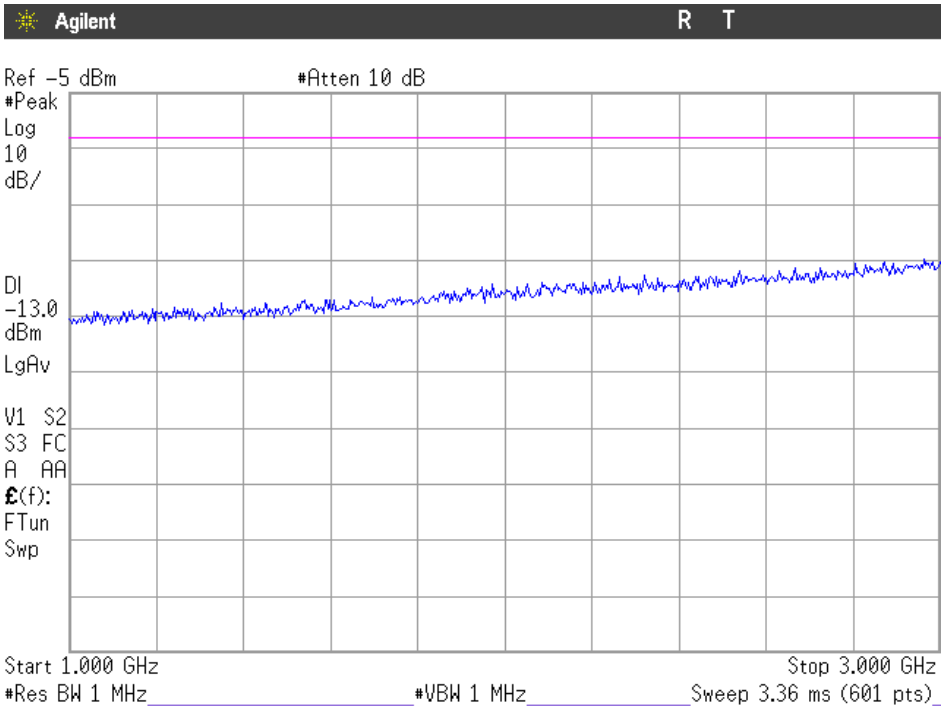
GPRS MODULATION



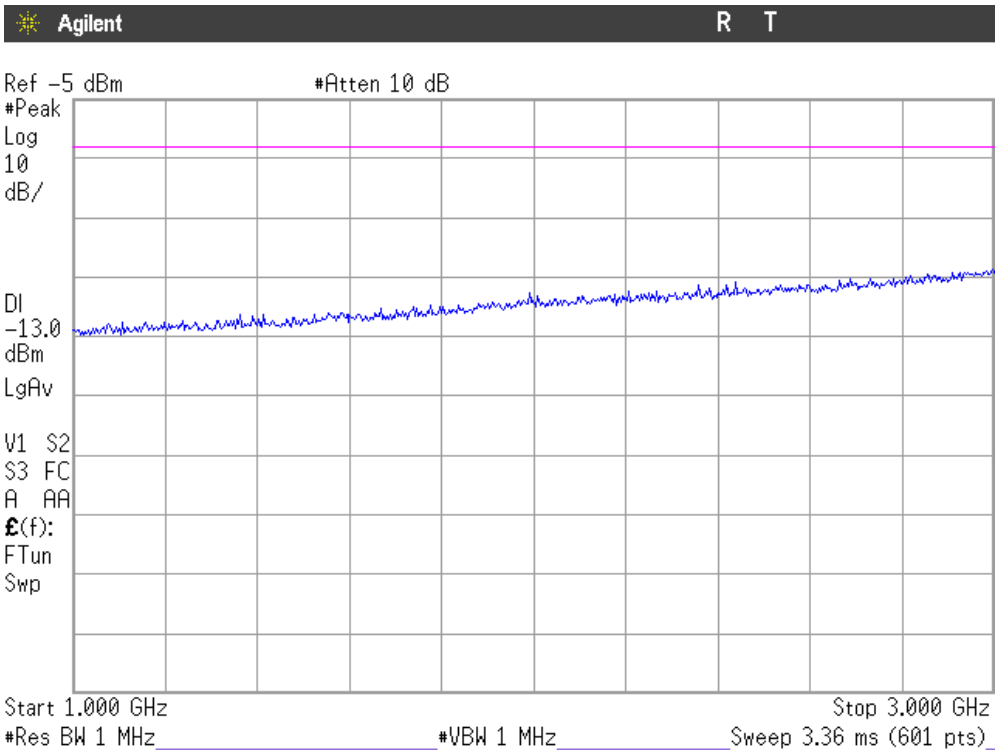
(This plot is valid for all three channels)

EDGE MODULATION

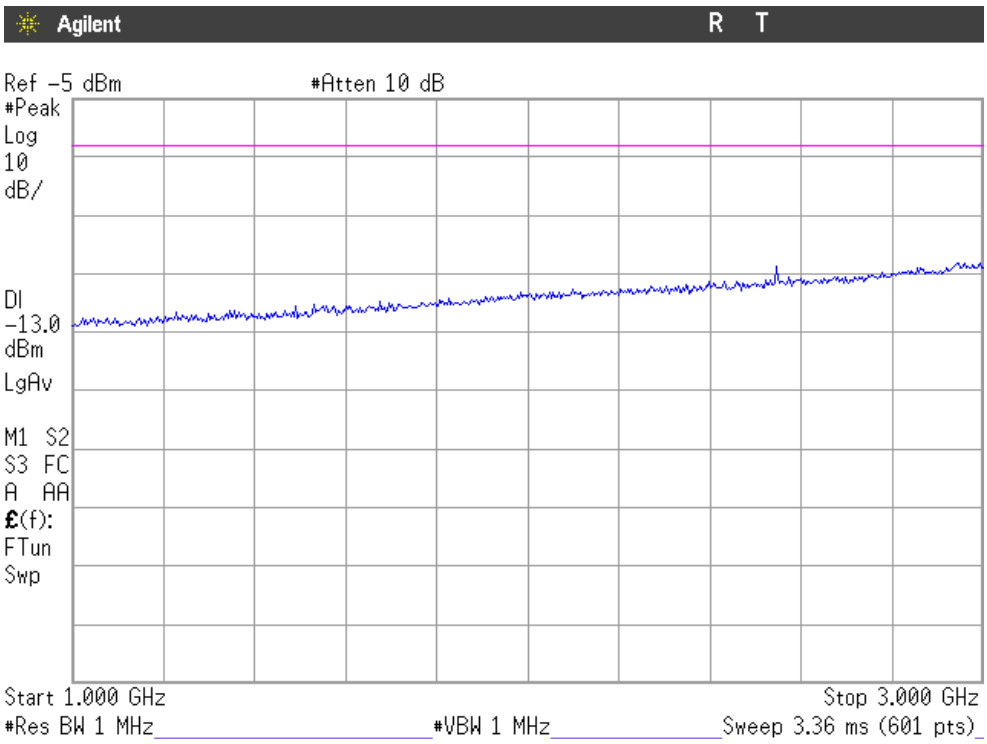
CHANNEL: LOWEST



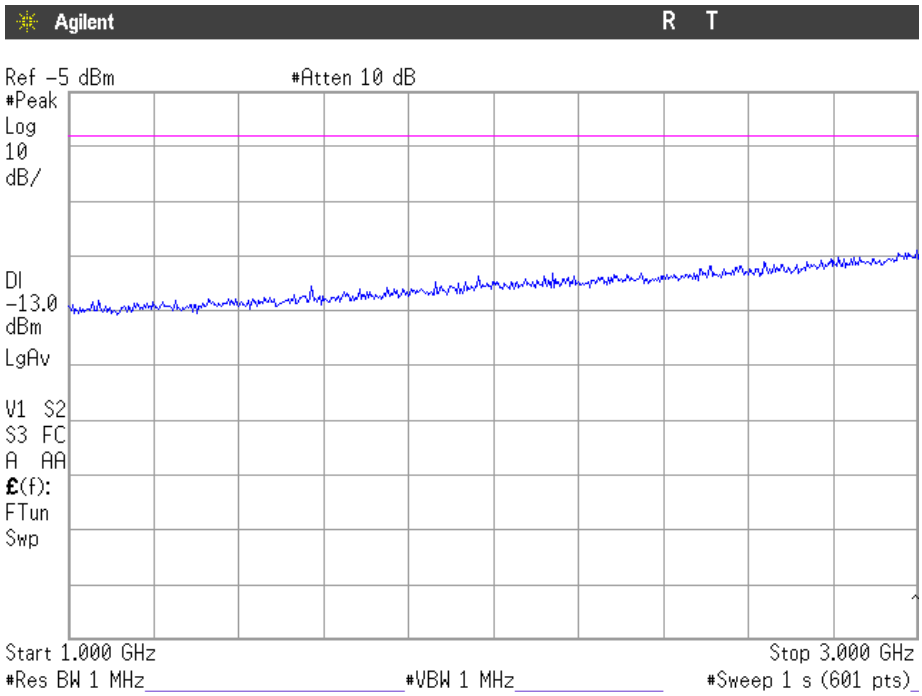
CHANNEL: MIDDLE



CHANNEL: HIGHEST

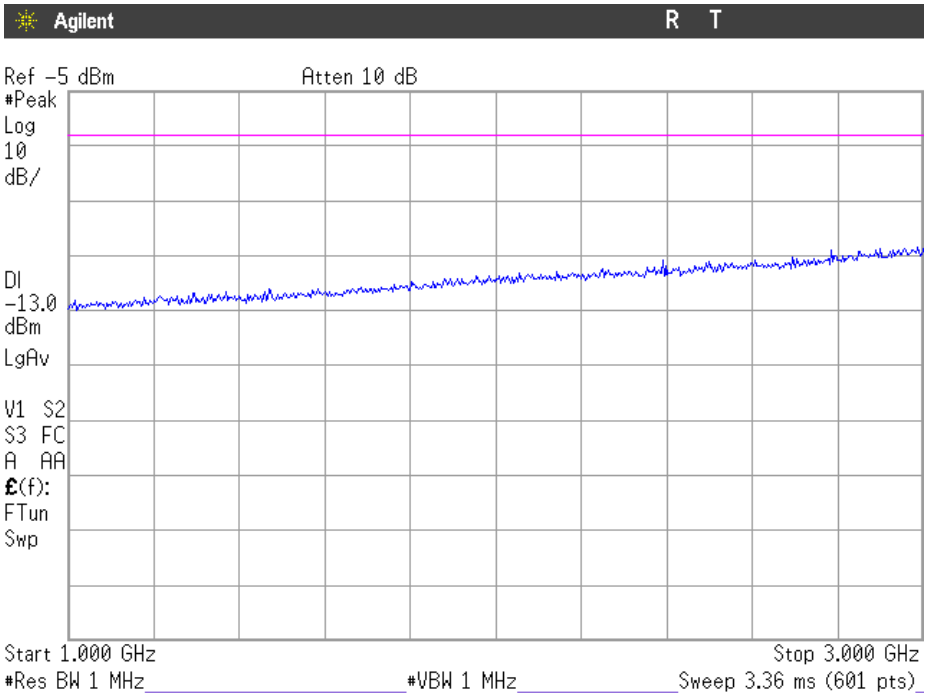


WCDMA MODULATION



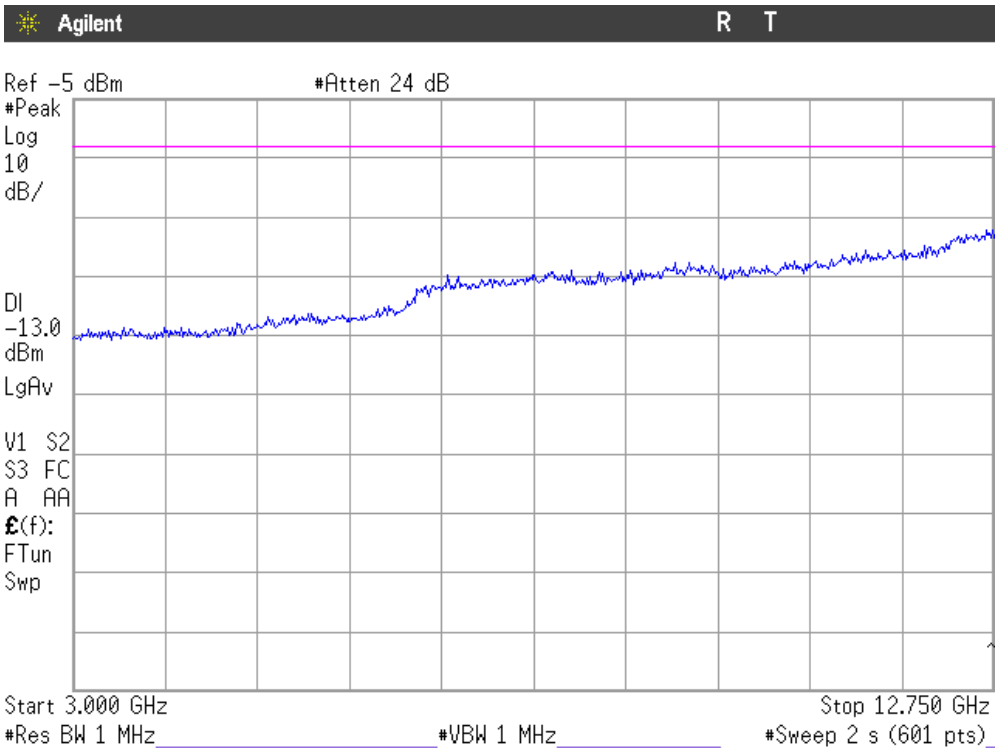
(This plot is valid for all three channels)

HSUPA MODULATION



(This plot is valid for all three channels)

FREQUENCY RANGE 3 GHz to 12.75 GHz.



(This plot is valid for all three channels and all modulations)

TEST RESULTS FOR FCC PART 24 AND RSS-133

TEST CONDITIONS

Power supply (V):

V_{nom} = 3.3 Vdc

V_{max} = 3.6 Vdc

V_{min} = 3.0 Vdc

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

Type of power supply = DC Voltage from external power supply

Type of antenna = external connectable antenna structure for Laptop computer

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

Modulation Characteristics

SPECIFICATION

§2.1047

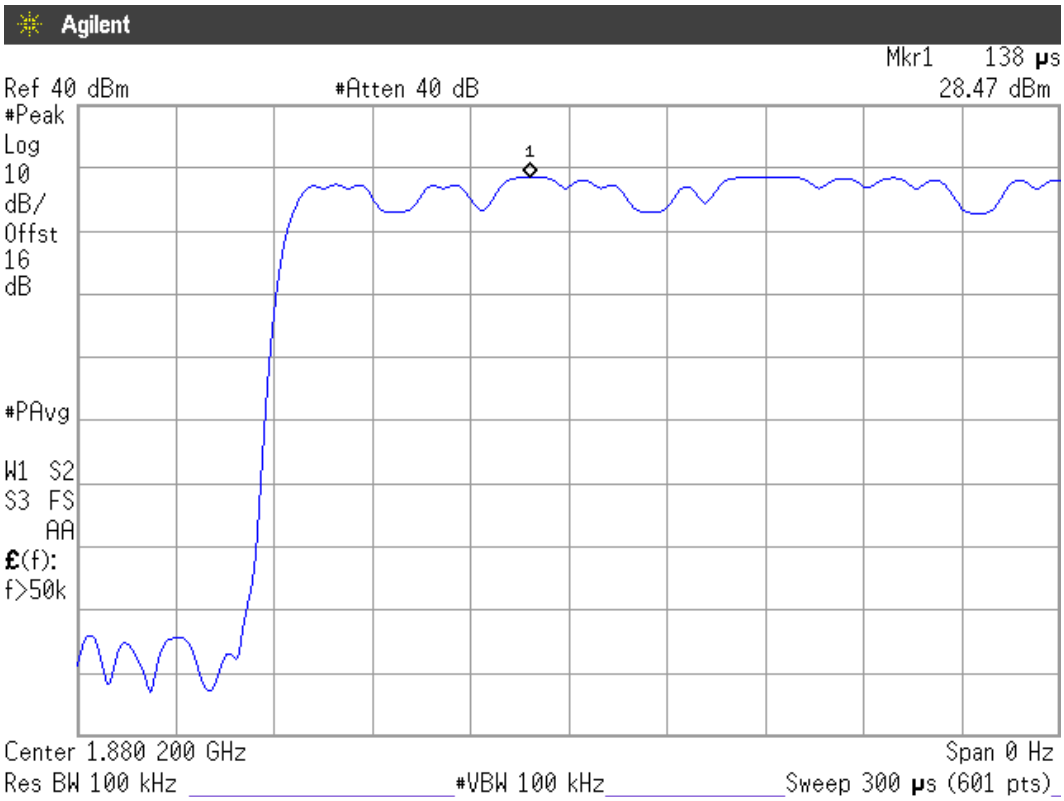
METHOD

The EUT operates with GPRS (GMSK), EDGE (GMSK/8-PSK), WCDMA/HSDPA (QPSK) and HSUPA (QPSK/16QAM) modes, in which the information is digitised and coded into a bit stream.

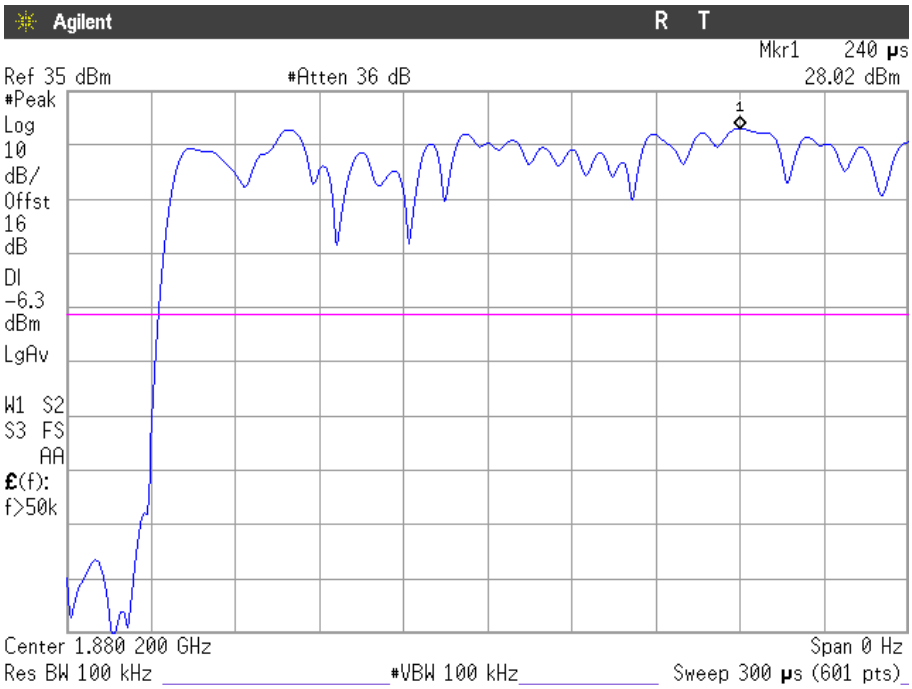
RESULTS

The following plot shows the modulation schemes in the EUT.

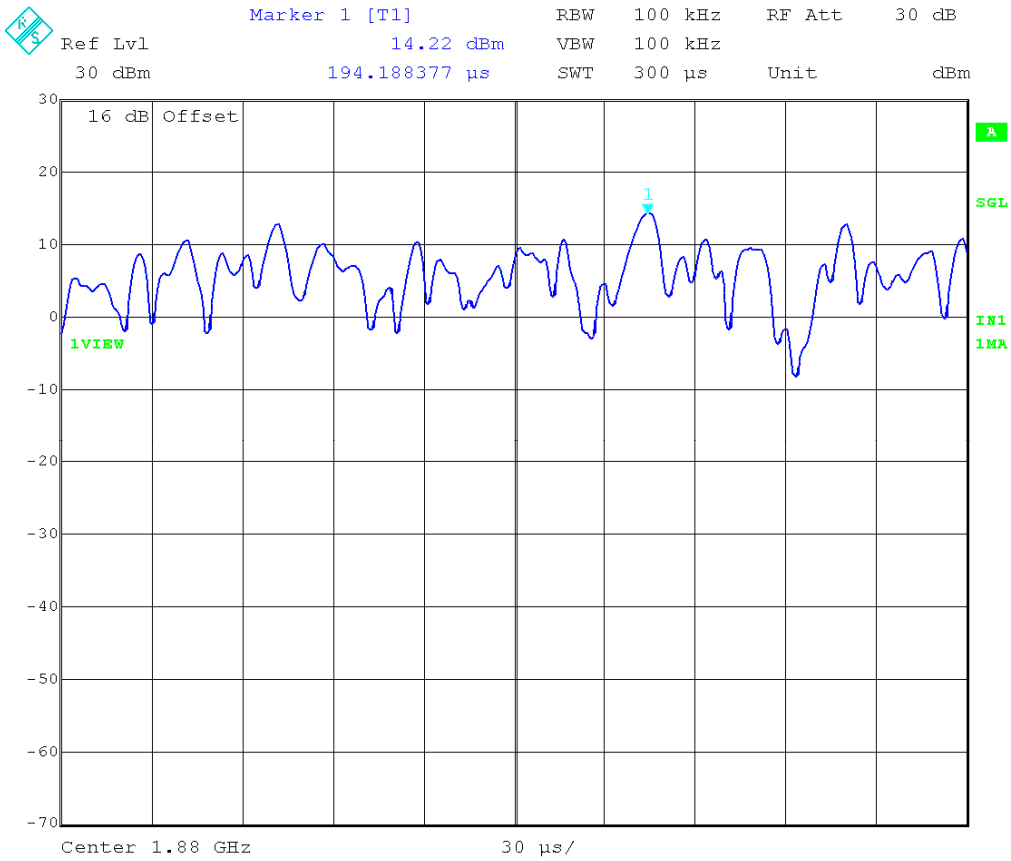
GPRS MODULATION



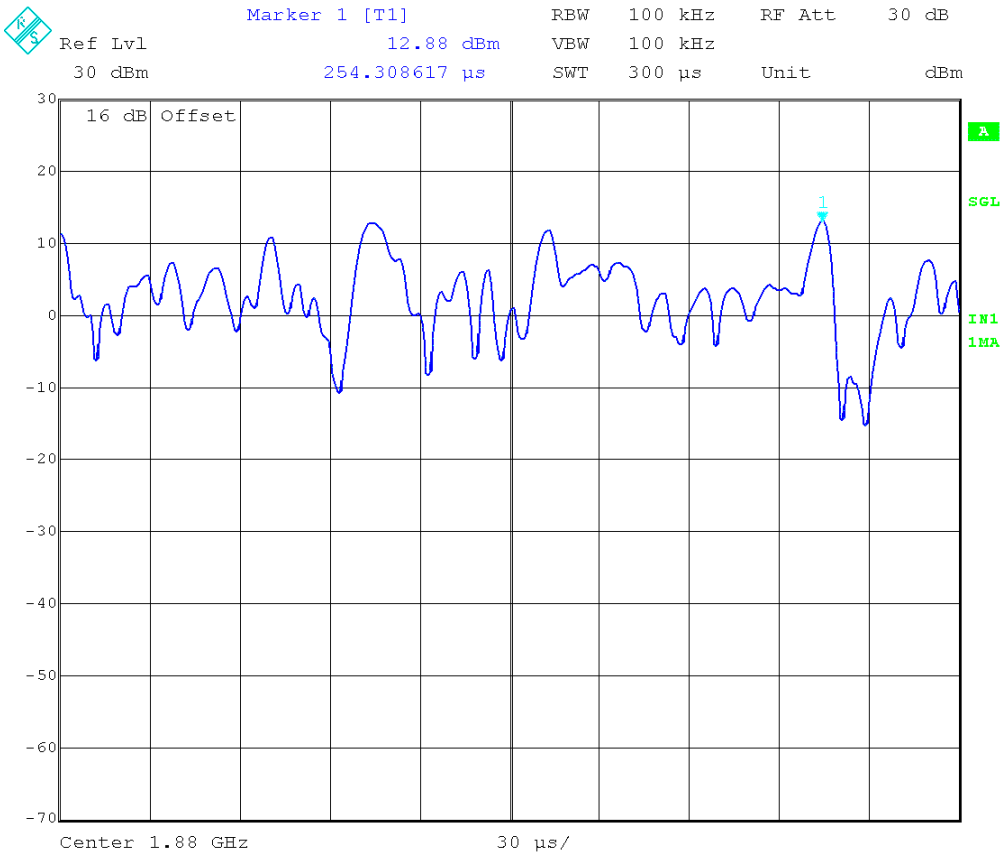
EDGE MODULATION



WCDMA MODULATION



HSUPA MODULATION



Frequency Stability

SPECIFICATION

§2.1055 and 24.235

METHOD

The frequency tolerance measurements over temperature variations were made over the temperature range of –30ºC to +50ºC. The EUT was placed inside a climatic chamber and the temperature was raised hourly in 10ºC steps from –30ºC up to +50ºC.

The EUT was set in "call mode" in the middle channel using the Universal Radio Communication tester R&S CMU200 (for modulations GPRS, EDGE, WCDMA and HSUPA) and the maximum frequency error was measured using the frequency meter of CMU200.

RESULTS

Frequency stability over temperature variations.

GPRS MODULATION

Temperature (ºC)	Frequency Error (Hz)	Frequency Error (ppm)	Frequency Error (%)
+50	24	0.0128	0.00000128
+40	52	0.0277	0.00000277
+30	59	0.0314	0.00000314
+20	63	0.0335	0.00000335
+10	69	0.0367	0.00000367
0	48	0.0255	0.00000255
-10	52	0.0277	0.00000277
-20	-7	-0.0037	-0.00000037
-30	77	0.0410	0.00000410

EDGE MODULATION

Temperature (ºC)	Frequency Error (Hz)	Frequency Error (ppm)	Frequency Error (%)
+50	14	0.0074	0.00000074
+40	20	0.0106	0.00000106
+30	25	0.0133	0.00000133
+20	32	0.0170	0.00000170
+10	35	0.0186	0.00000186
0	28	0.0149	0.00000149
-10	41	0.0218	0.00000218
-20	-14	-0.0074	-0.00000074
-30	-20	-0.0106	-0.00000106

WCDMA MODULATION

Temperature (ºC)	Frequency Error (Hz)	Frequency Error (ppm)	Frequency Error (%)
+50	8	0.0043	0.00000043
+40	26	0.0138	0.00000138
+30	12	0.0064	0.00000064
+20	6	0.0032	0.00000032
+10	4	0.0021	0.00000021
0	10	0.0053	0.00000053
-10	7	0.0037	0.00000037
-20	-5	-0.0027	-0.00000027
-30	2	0.0011	0.00000011

HSUPA MODULATION

Temperature (ºC)	Frequency Error (Hz)	Frequency Error (ppm)	Frequency Error (%)
+50	21	0.0112	0.00000112
+40	28	0.0149	0.00000149
+30	-21	-0.0112	-0.00000112
+20	-28	-0.0149	-0.00000149
+10	-8	-0.0043	-0.00000043
0	-10	-0.0053	-0.00000053
-10	-6	-0.0032	-0.00000032
-20	12	0.0064	0.00000064
-30	6	0.0032	0.00000032

Frequency stability over voltage variations.

GPRS MODULATION

Battery Supply voltage	Voltage (V)	Frequency Error (Hz)	Frequency Error (ppm)	Frequency Error (%)
Vmax	3.6	-50	-0.0266	-0.00000266
Vmin	3.0	-65	-0.0346	-0.00000346

EDGE MODULATION

Battery Supply voltage	Voltage (V)	Frequency Error (Hz)	Frequency Error (ppm)	Frequency Error (%)
Vmax	3.6	21	0.0112	0.00000112
Vmin	3.0	18	0.0096	0.00000096

WCDMA MODULATION

Battery Supply voltage	Voltage (V)	Frequency Error (Hz)	Frequency Error (ppm)	Frequency Error (%)
Vmax	3.6	-25	-0.0133	-0.00000133
Vmin	3.0	27	0.0144	0.00000144

HSUPA MODULATION

Battery Supply voltage	Voltage (V)	Frequency Error (Hz)	Frequency Error (ppm)	Frequency Error (%)
Vmax	3.6	-10	-0.0053	-0.00000053
Vmin	3.0	4	0.0021	0.00000021

Occupied Bandwidth

SPECIFICATION

§2.1049

METHOD

The EUT was configured to transmit a modulated carrier signal. An IF bandwidth of 3 kHz was used to determined the occupied bandwidth of the modulated emission for GPRS and EDGE modulation and 50 kHz for WCDMA and HSUPA modulation.

RESULTS

GPRS MODULATION

Channel	Lowest	Middle	Highest
99% Occupied bandwidth (kHz)	281.8	283.3	278.6
-26 dBc bandwidth (kHz)	317.3	313.6	314.1
Measurement uncertainty (kHz)	<±6.5		

EDGE MODULATION

Channel	Lowest	Middle	Highest
99% Occupied bandwidth (kHz)	276.8	276.5	280.4
-26 dBc bandwidth (kHz)	313.9	310.3	309.0
Measurement uncertainty (kHz)	<±6.5		

WCDMA MODULATION

Channel	Lowest	Middle	Highest
99% Occupied bandwidth (kHz)	4665.3	4665.3	4665.3
-26 dBc bandwidth (kHz)	4841.7	4825.6	4841.7
Measurement uncertainty (kHz)	<±52		

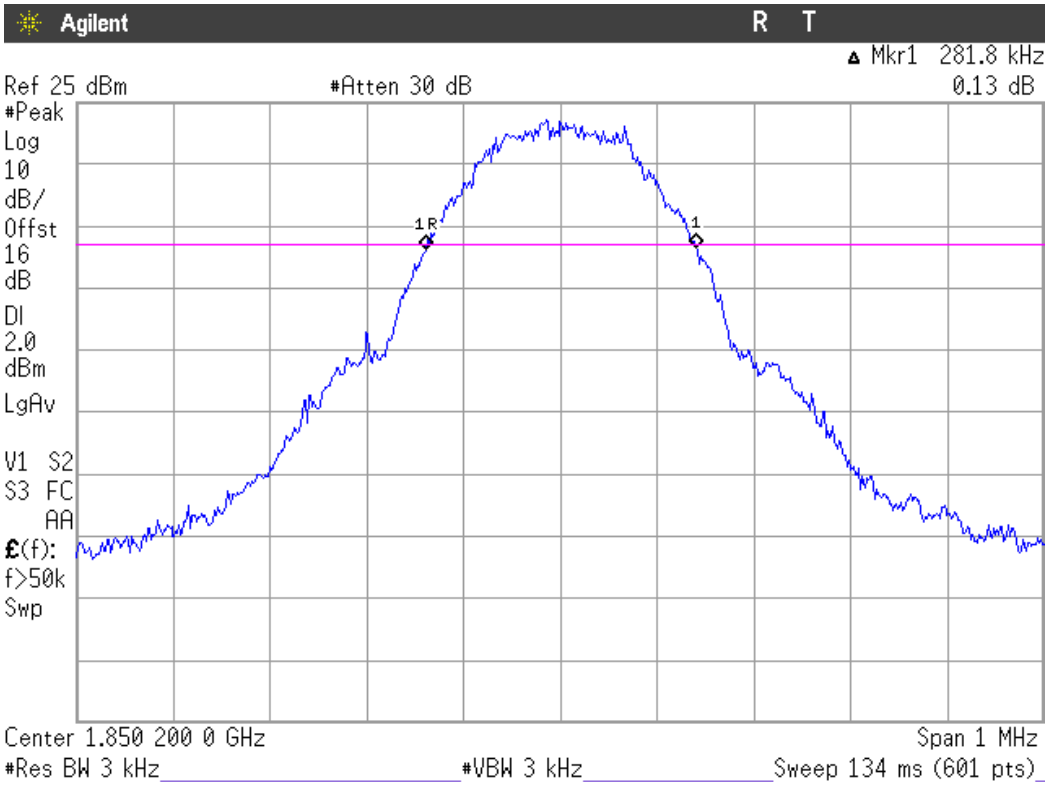
HSUPA MODULATION

Channel	Lowest	Middle	Highest
99% Occupied bandwidth (kHz)	4649.3	4681.4	4649.3
-26 dBc bandwidth (kHz)	4841.7	4809.6	4809.6
Measurement uncertainty (kHz)	<±52		

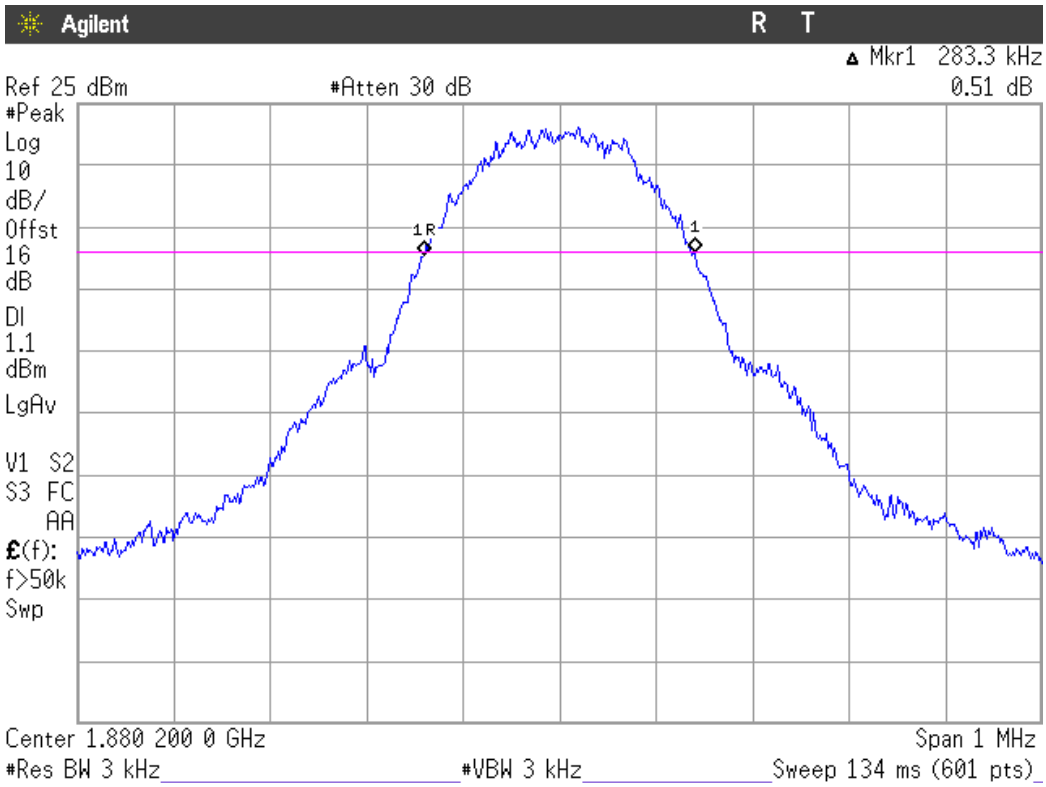
99% OCCUPIED BANDWIDTH

GPRS MODULATION

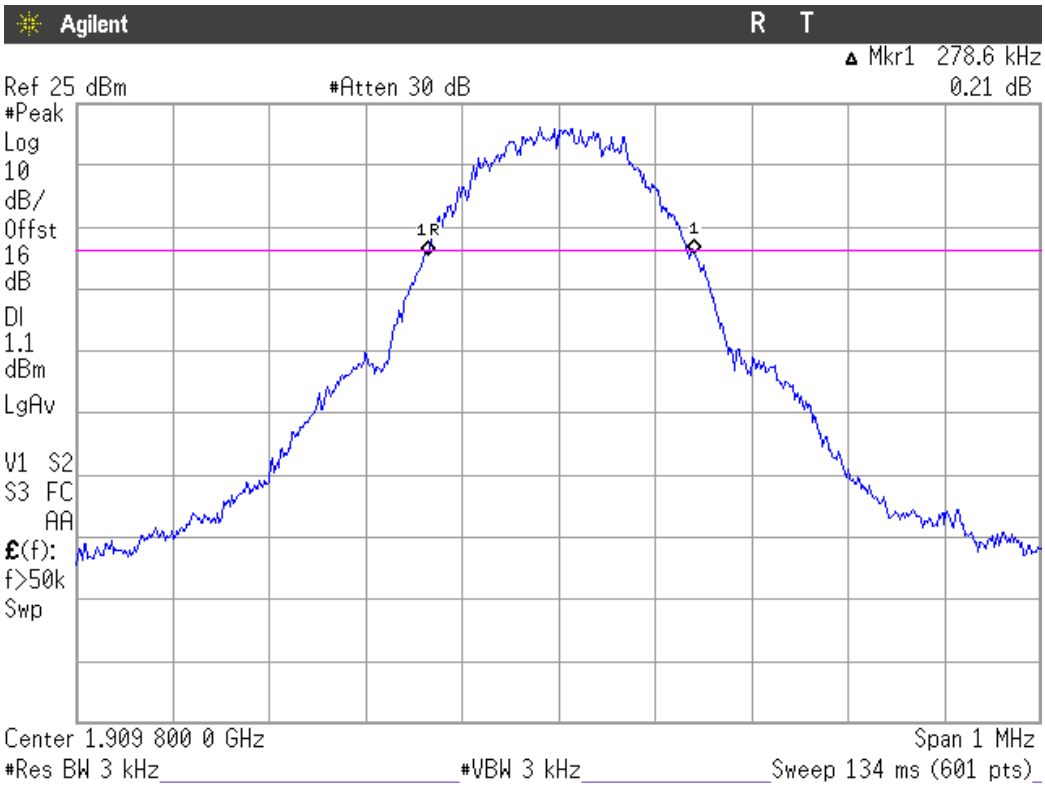
Lowest Channel



Middle Channel

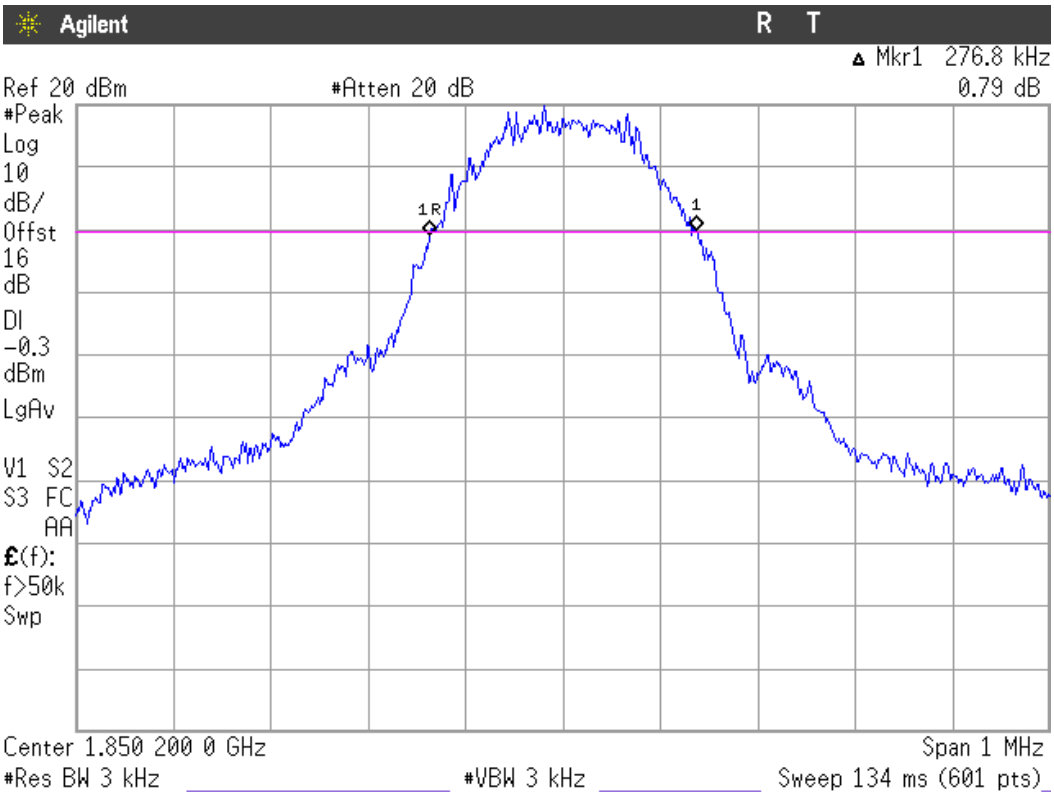


Highest Channel

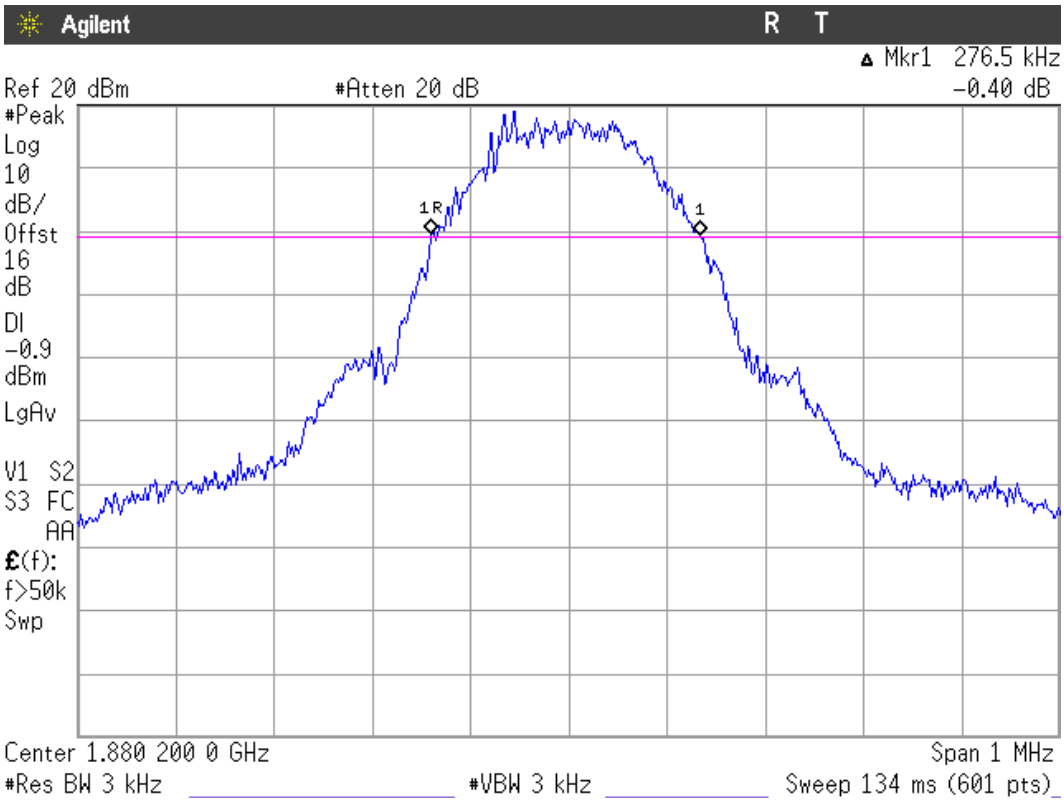


EDGE MODULATION

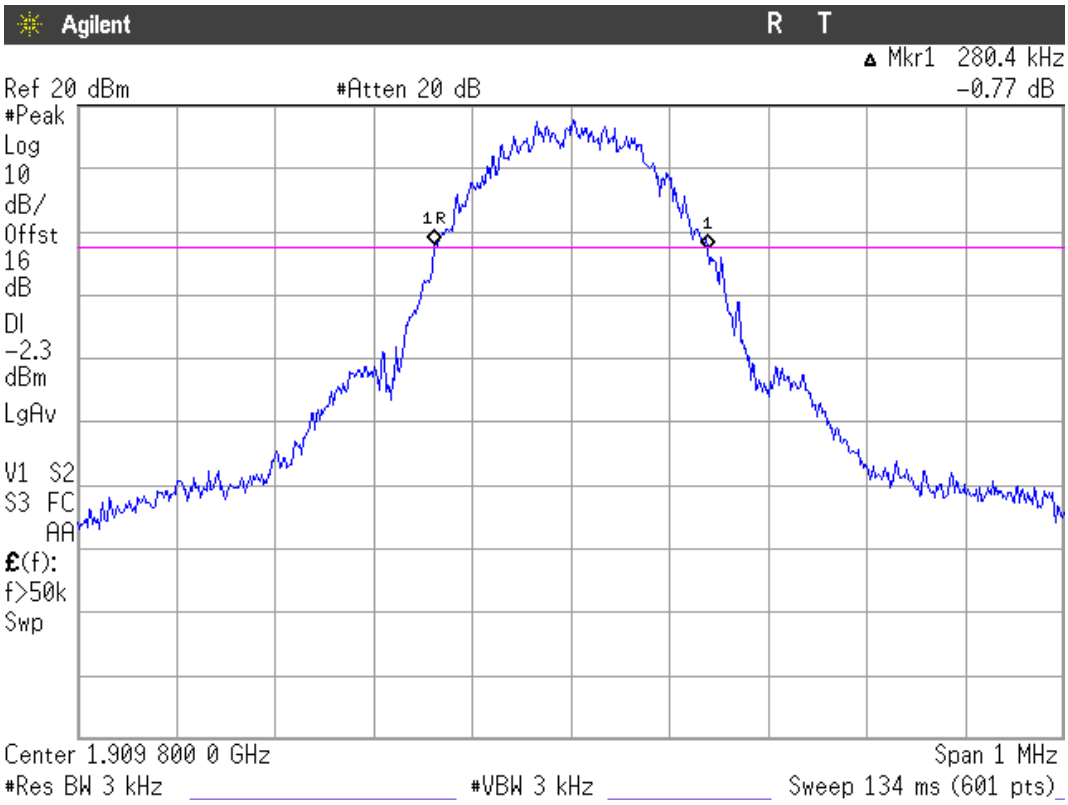
Lowest Channel



Middle Channel

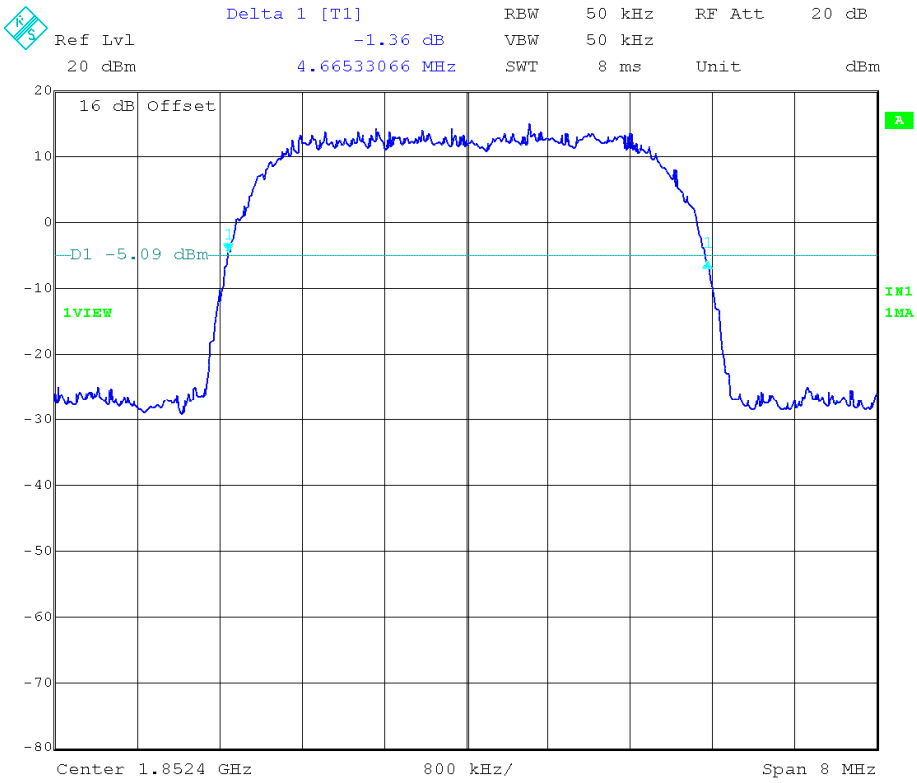


Highest Channel

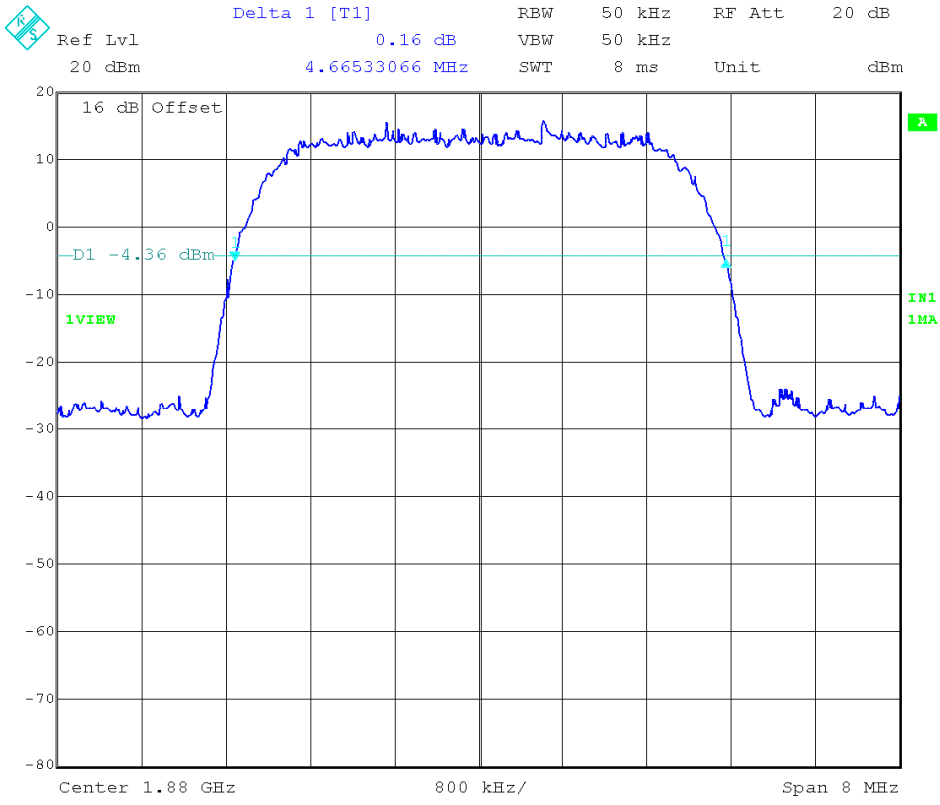


WCDMA MODULATION

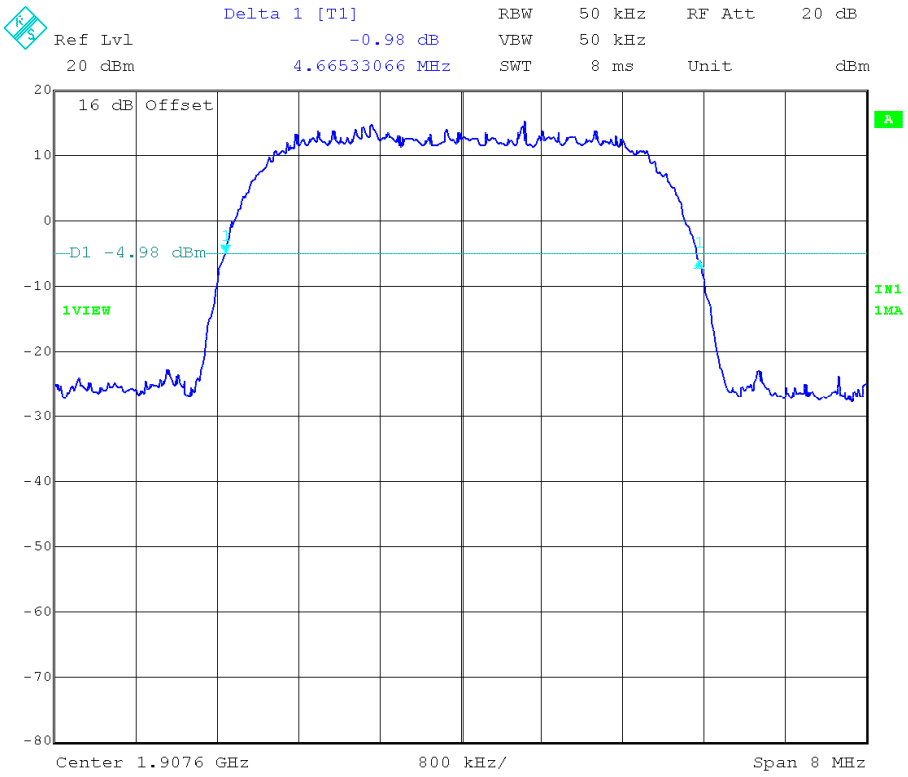
Lowest Channel



Middle Channel

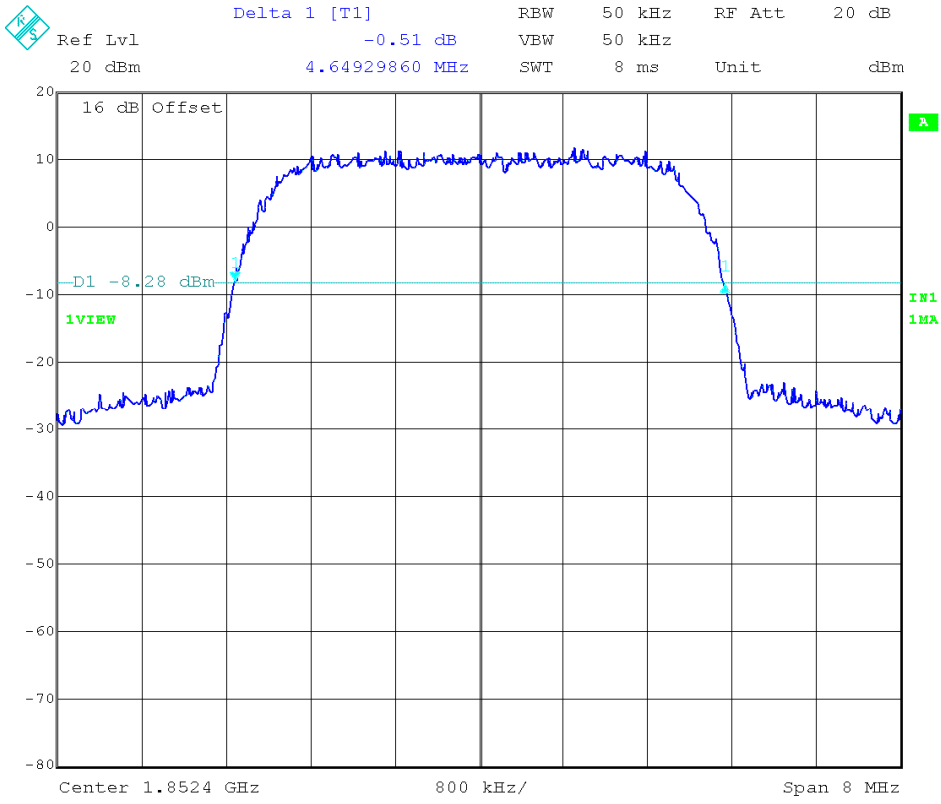


Highest Channel

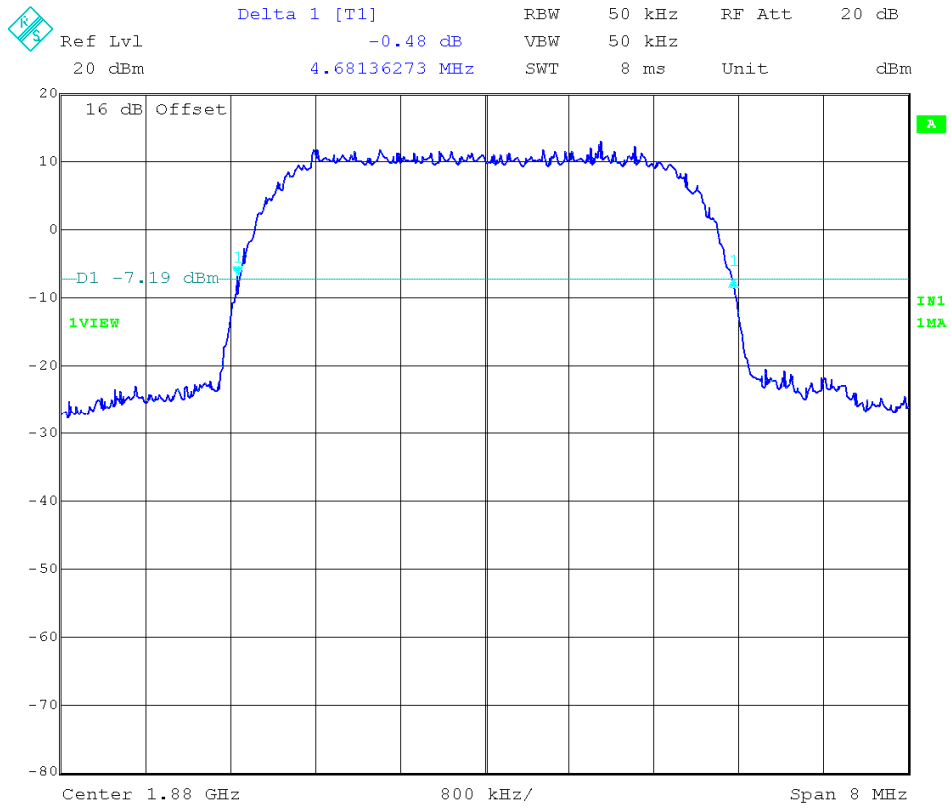


HSUPA MODULATION

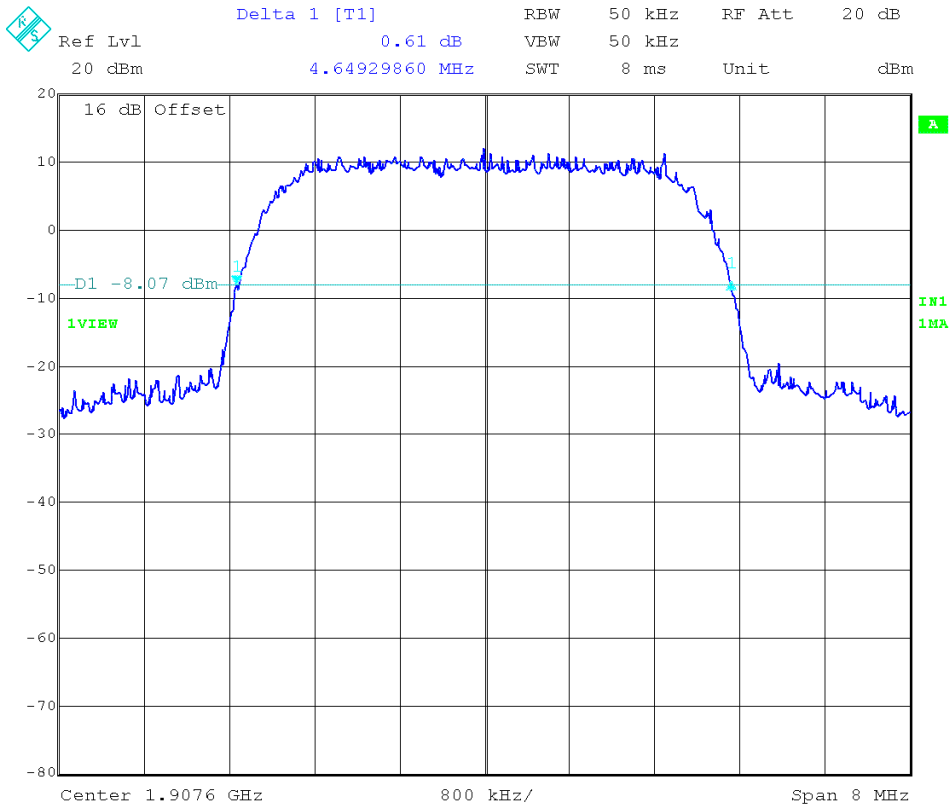
Lowest Channel



Middle Channel



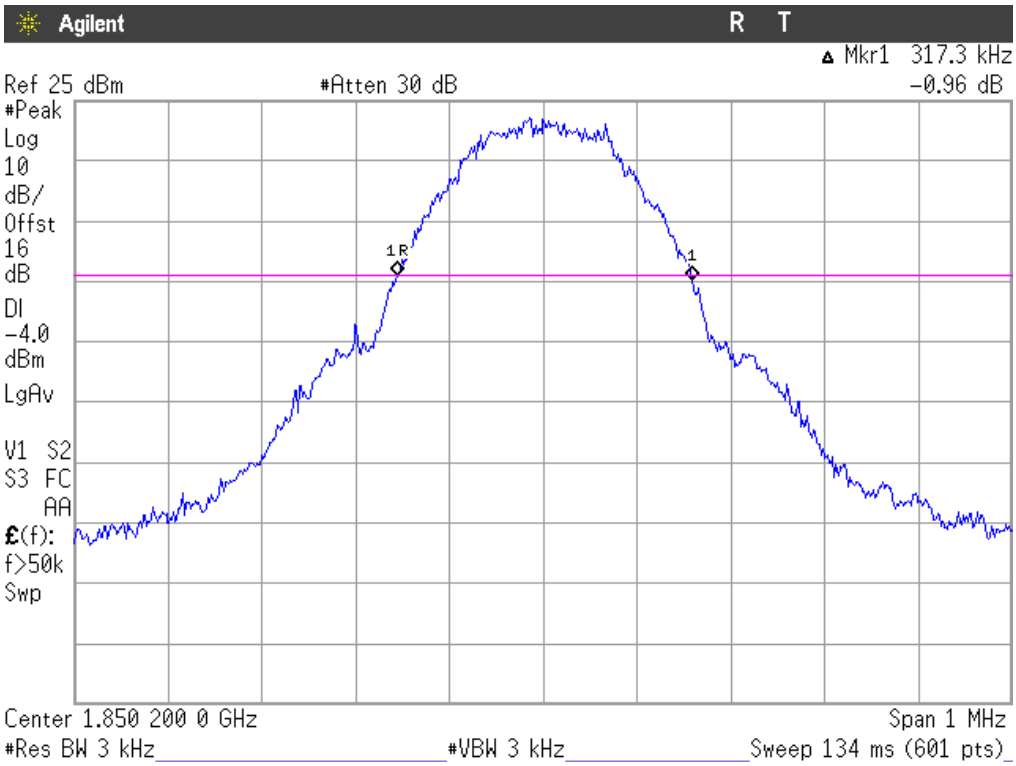
Highest Channel



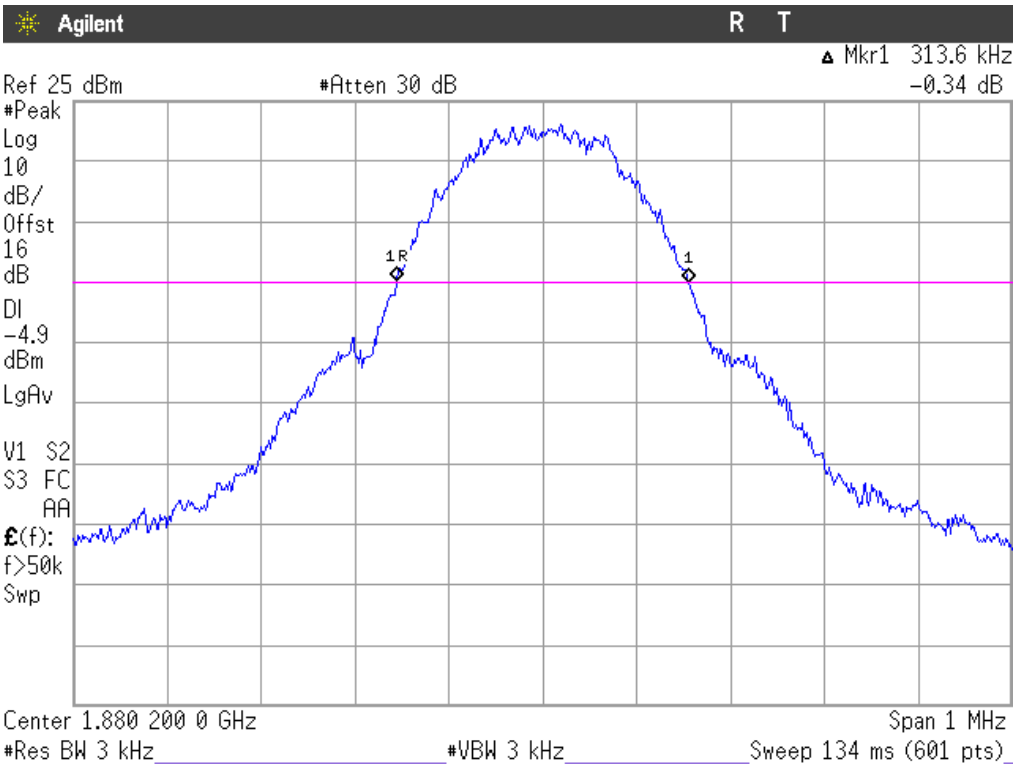
-26 dBc BANDWIDTH

GPRS MODULATION

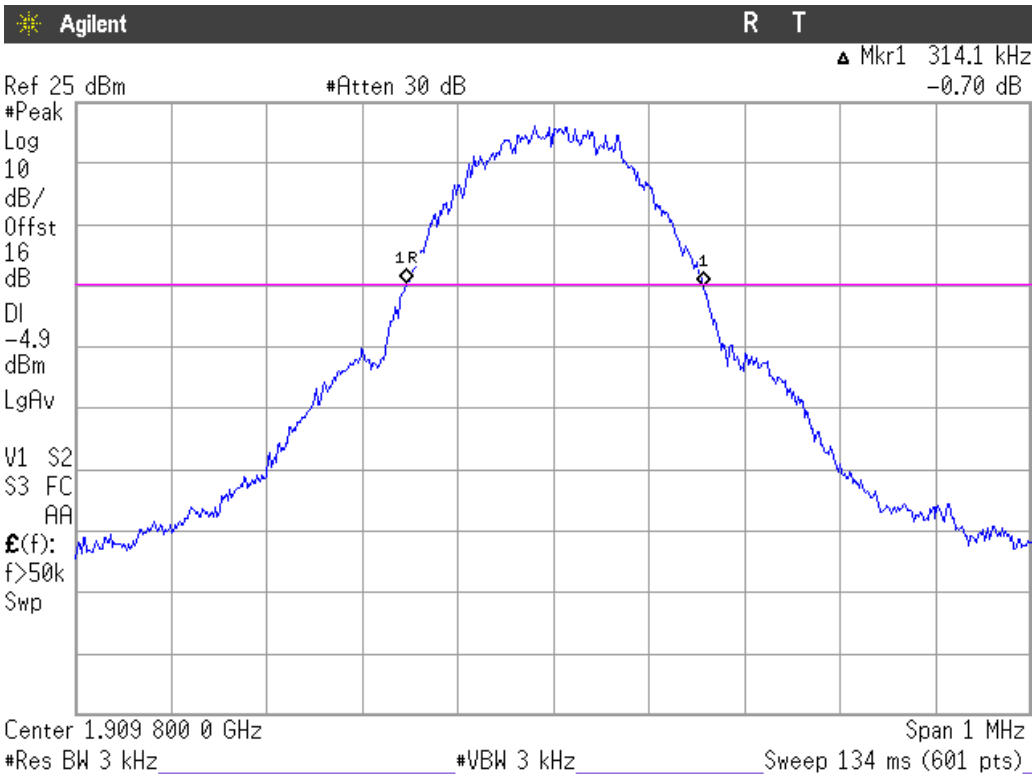
Lowest Channel



Middle Channel

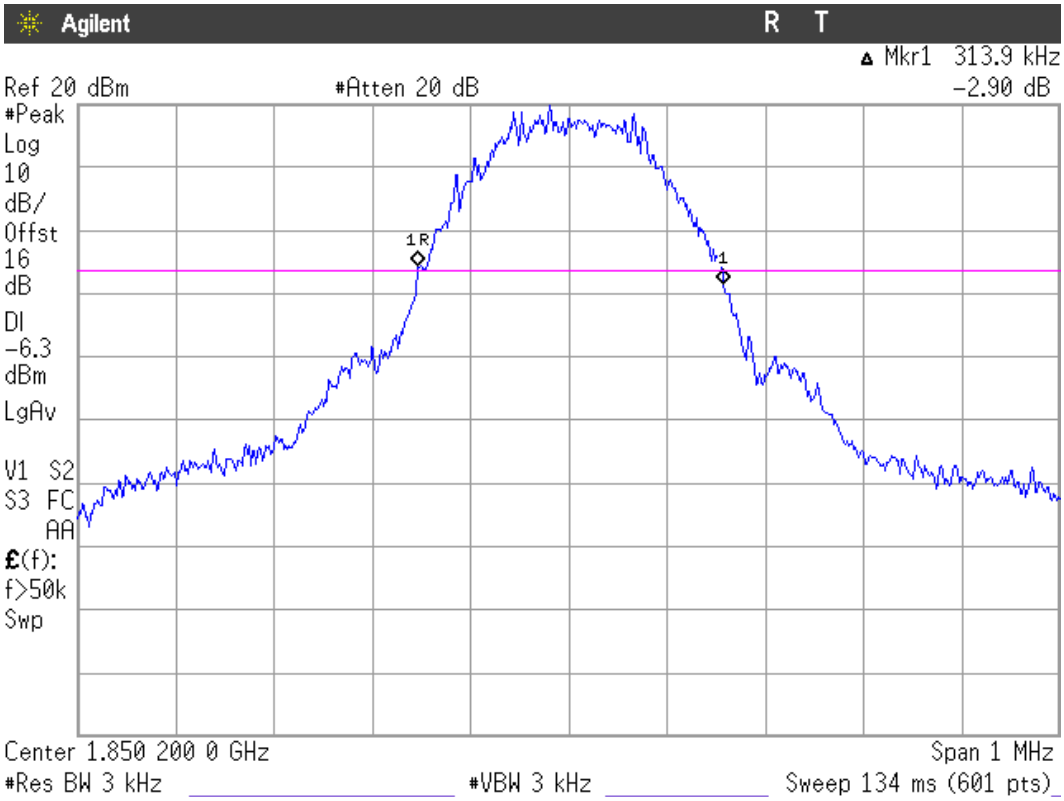


Highest Channel

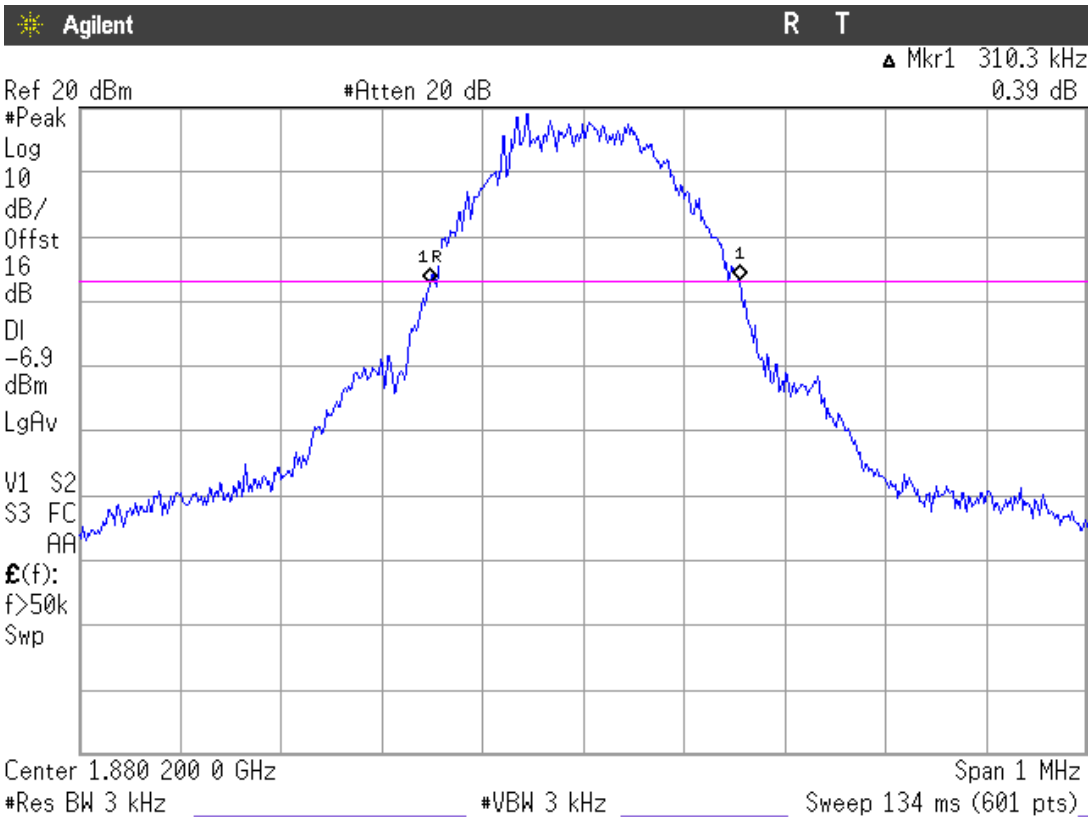


EDGE MODULATION

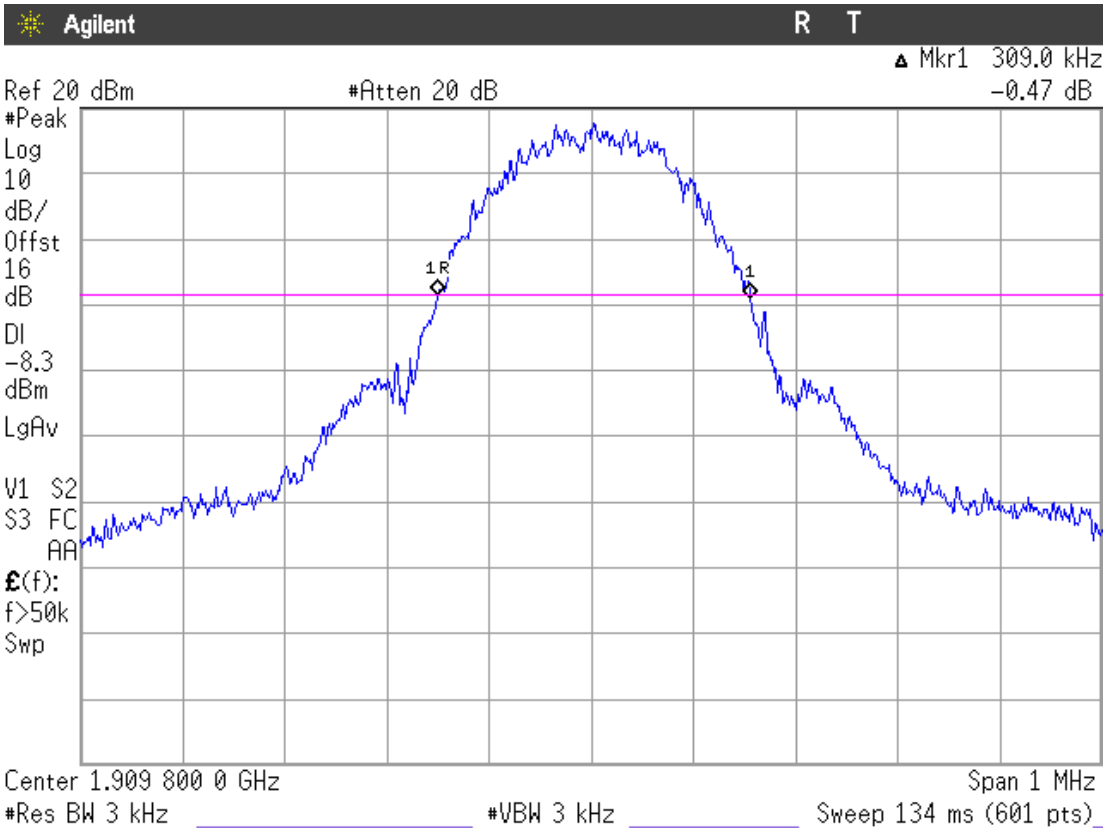
Lowest Channel



Middle Channel

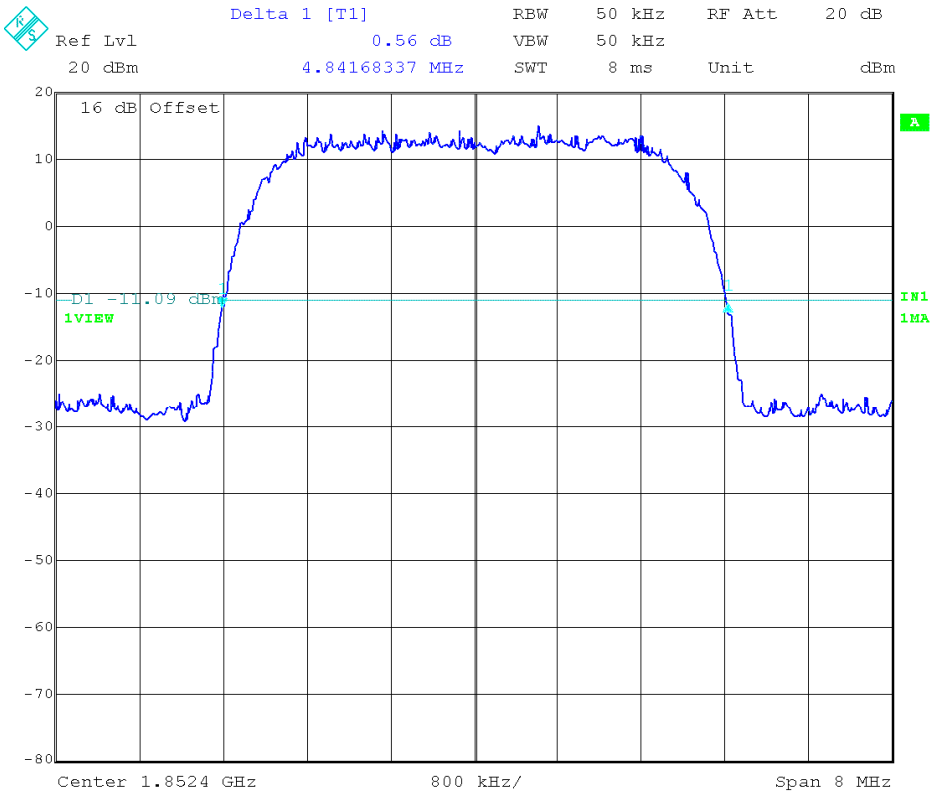


Highest Channel

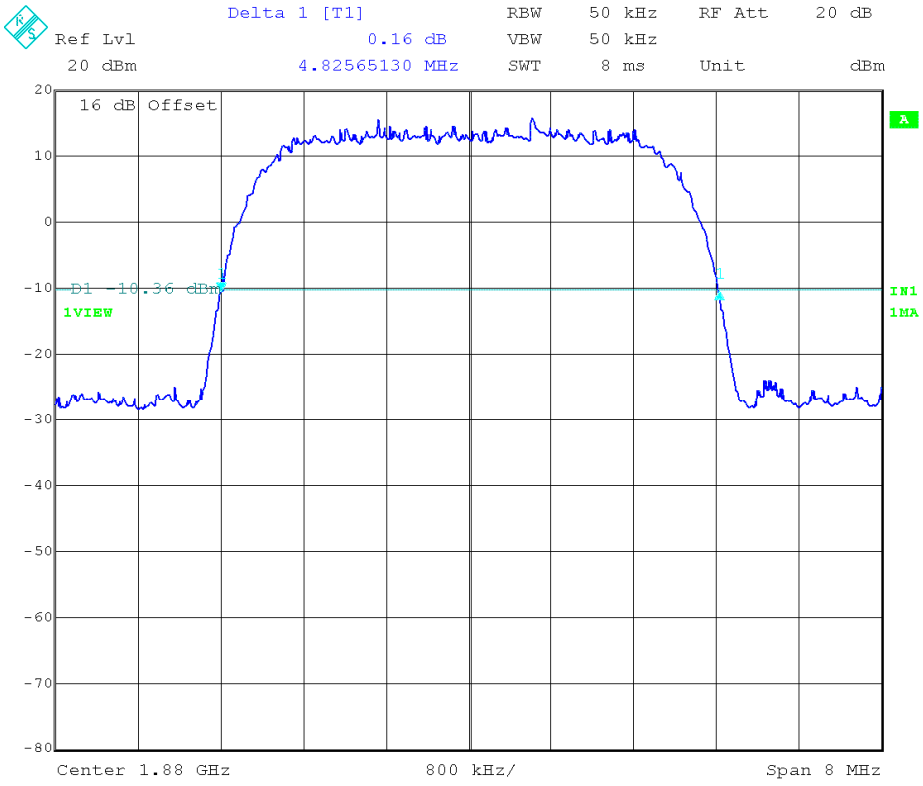


WCDMA MODULATION

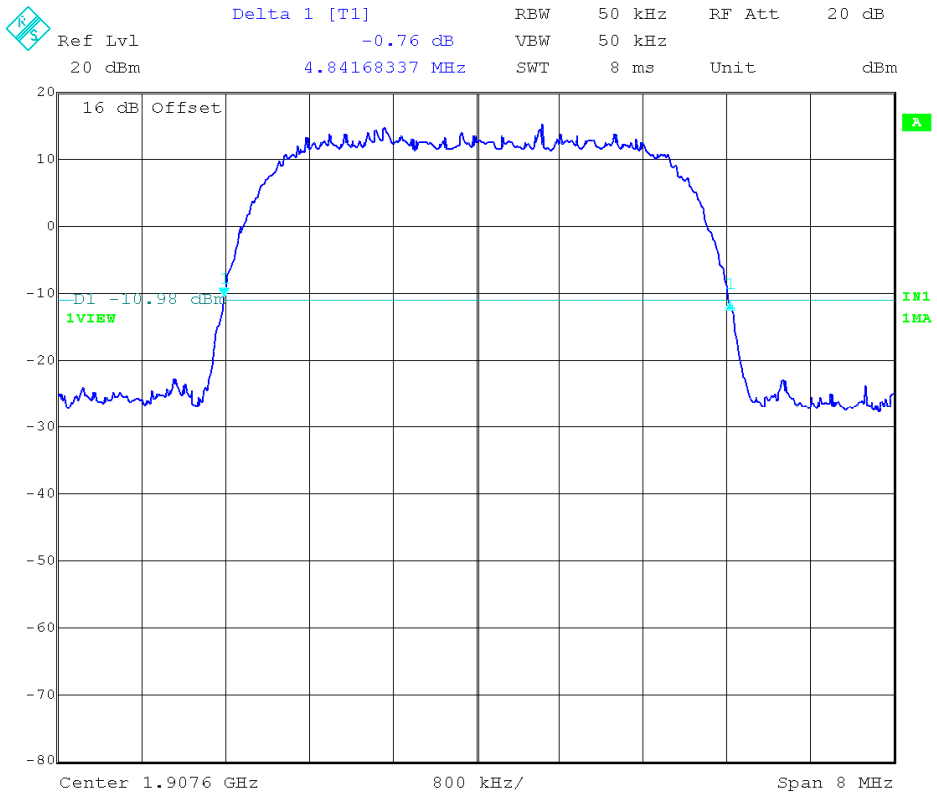
Lowest Channel



Middle Channel

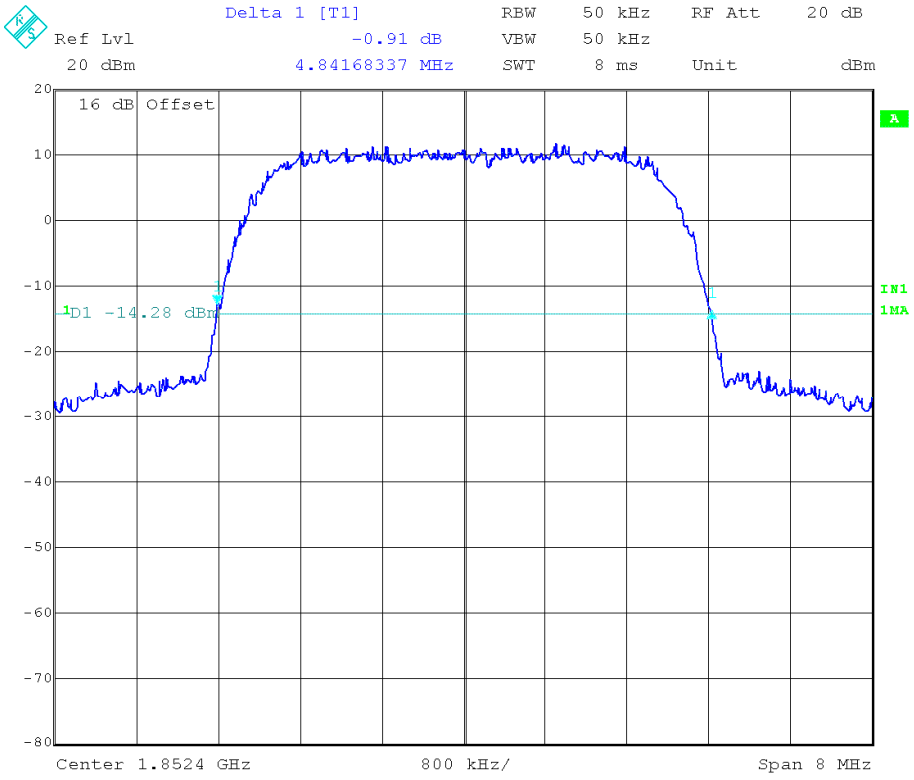


Highest Channel

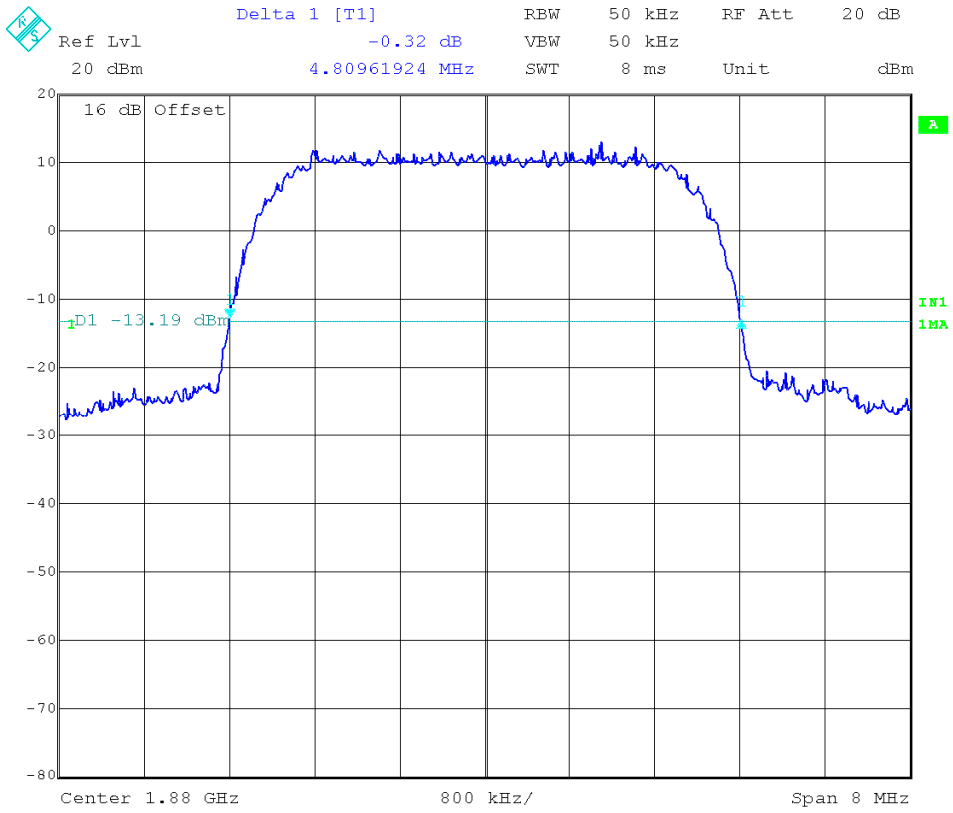


HSUPA MODULATION

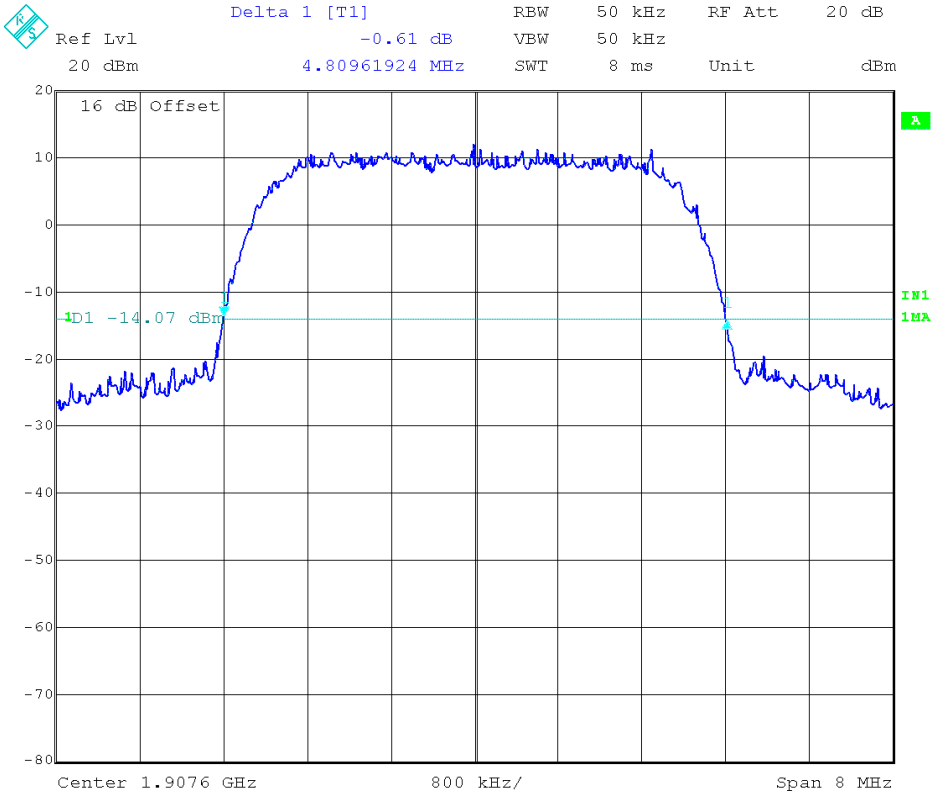
Lowest Channel



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.

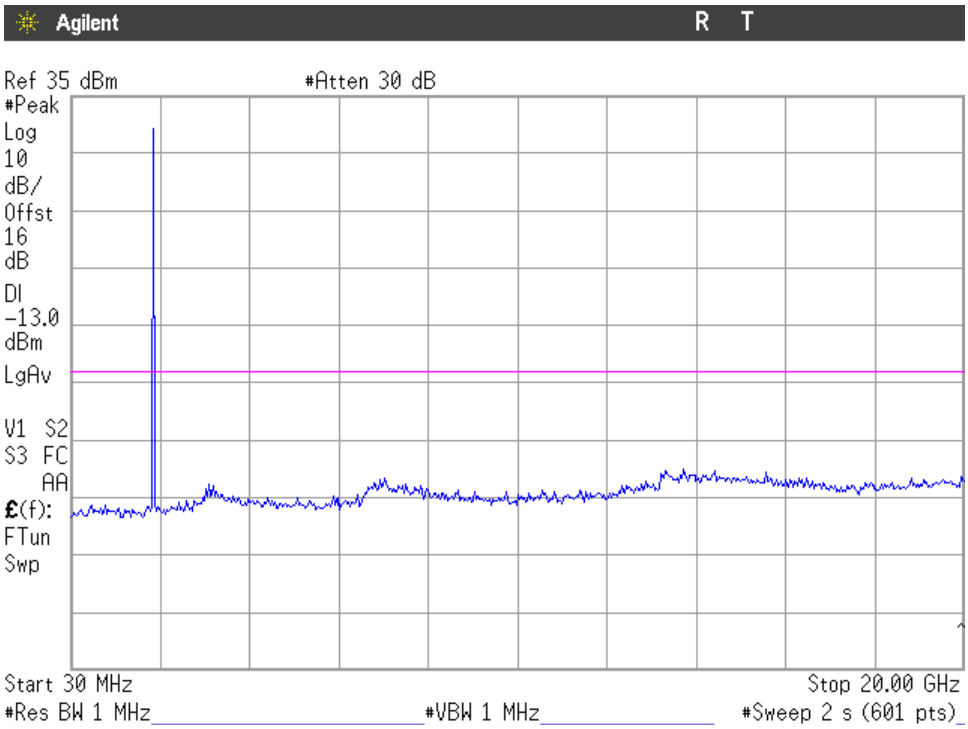
3. CHANNEL: HIGHEST

No spurious signals were found in all the range.

Verdict: PASS

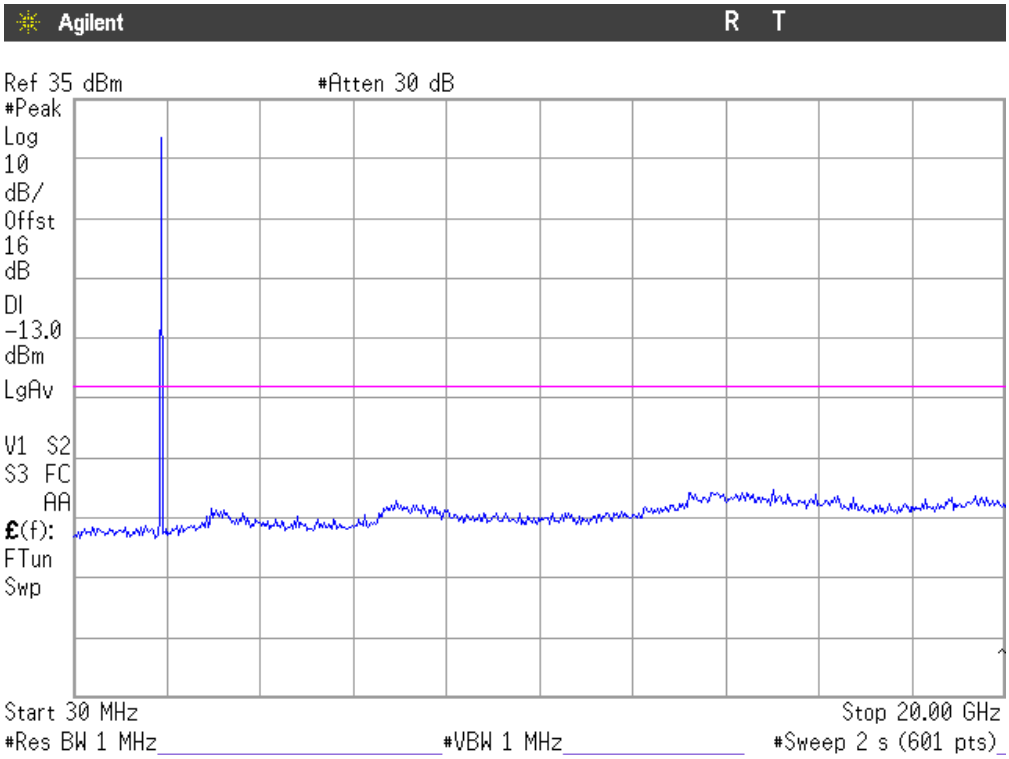
GPRS MODULATION

1. CHANNEL: LOWEST



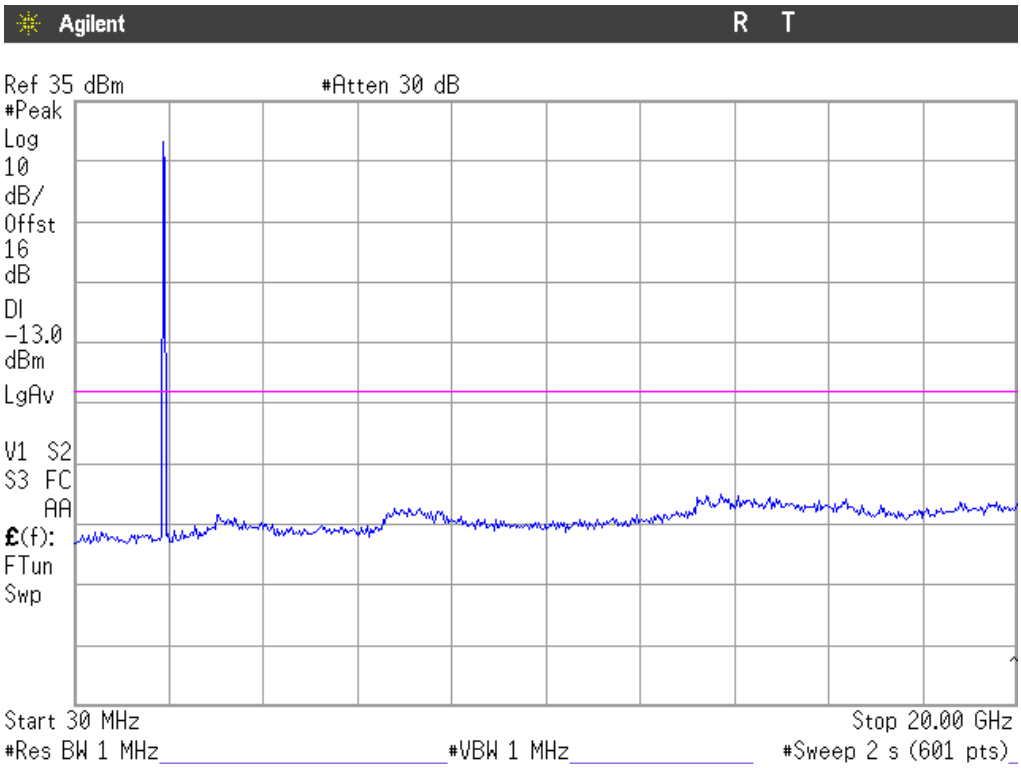
Note: The peak above the limit is the carrier frequency.

2. CHANNEL: MIDDLE



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

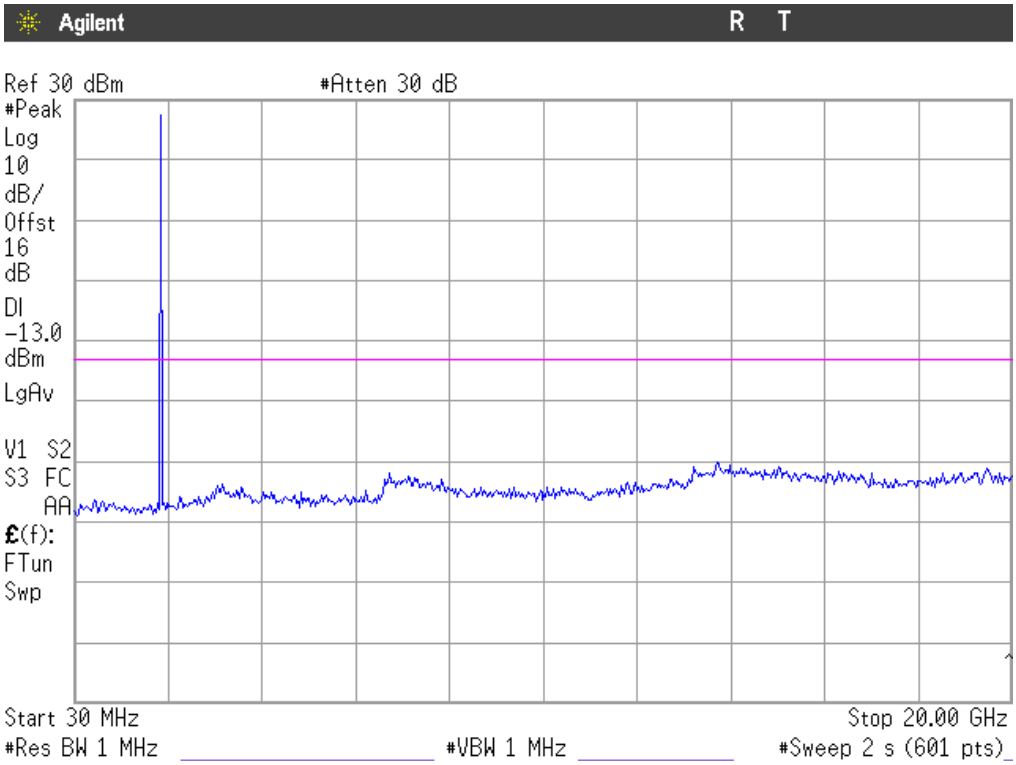
3. CHANNEL: HIGHEST



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

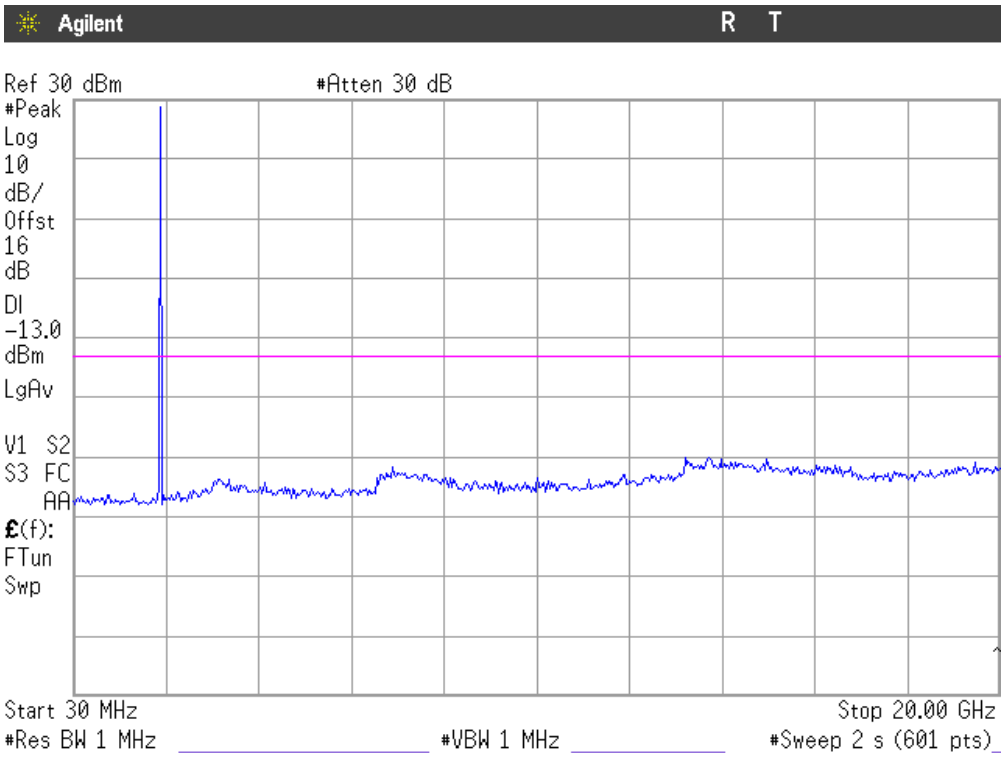
EDGE MODULATION

1. CHANNEL: LOWEST



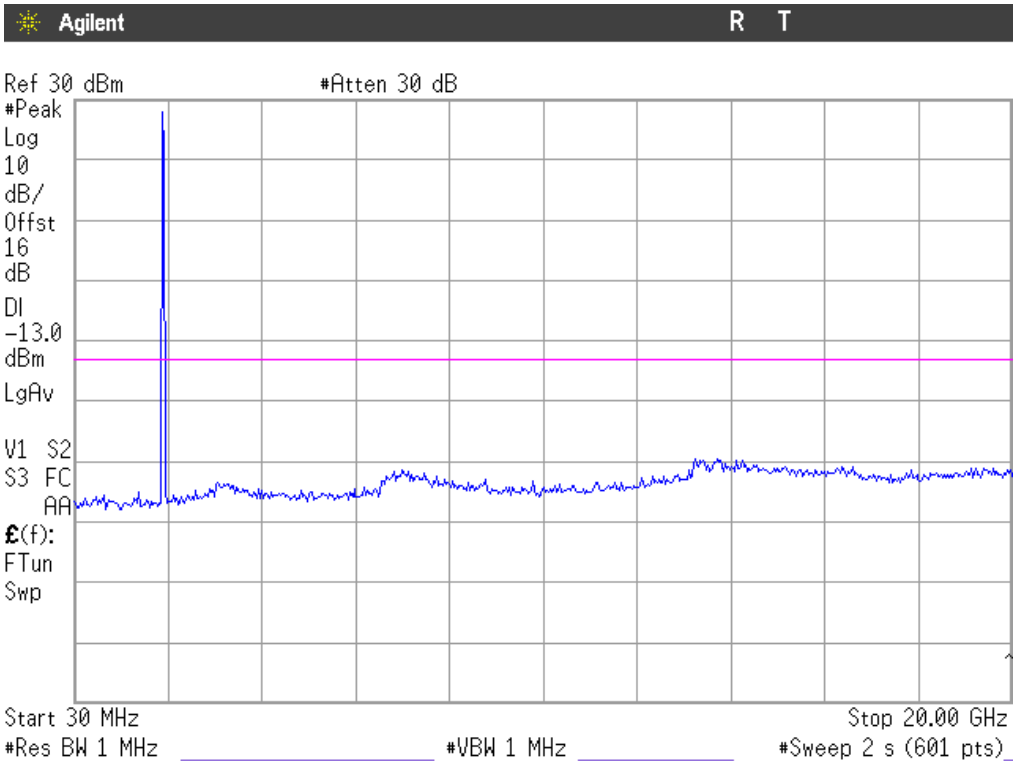
Note: The peak above the limit is the carrier frequency.

2. CHANNEL: MIDDLE



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

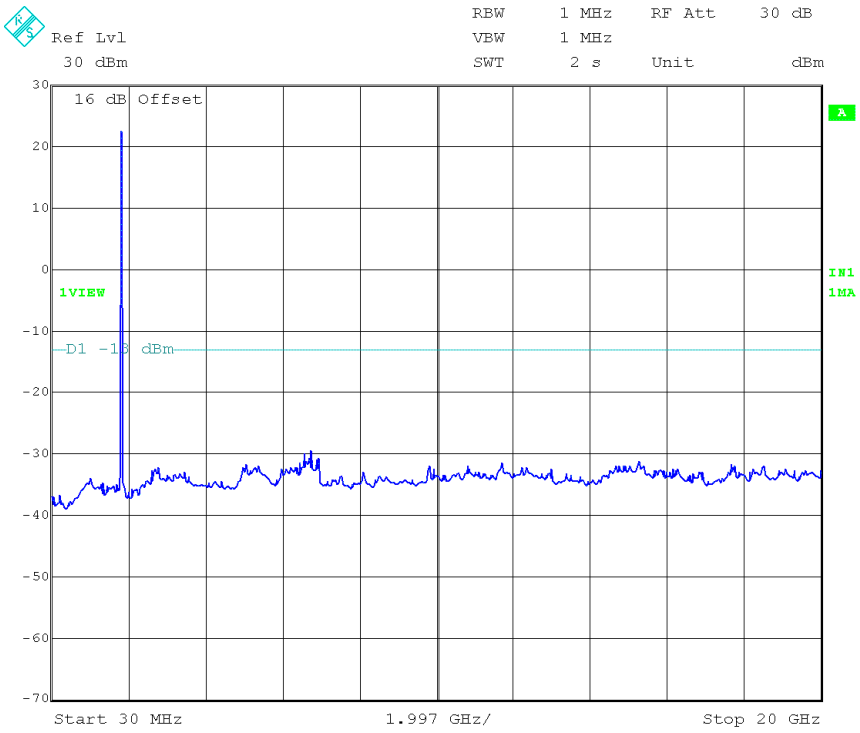
3. CHANNEL: HIGHEST



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

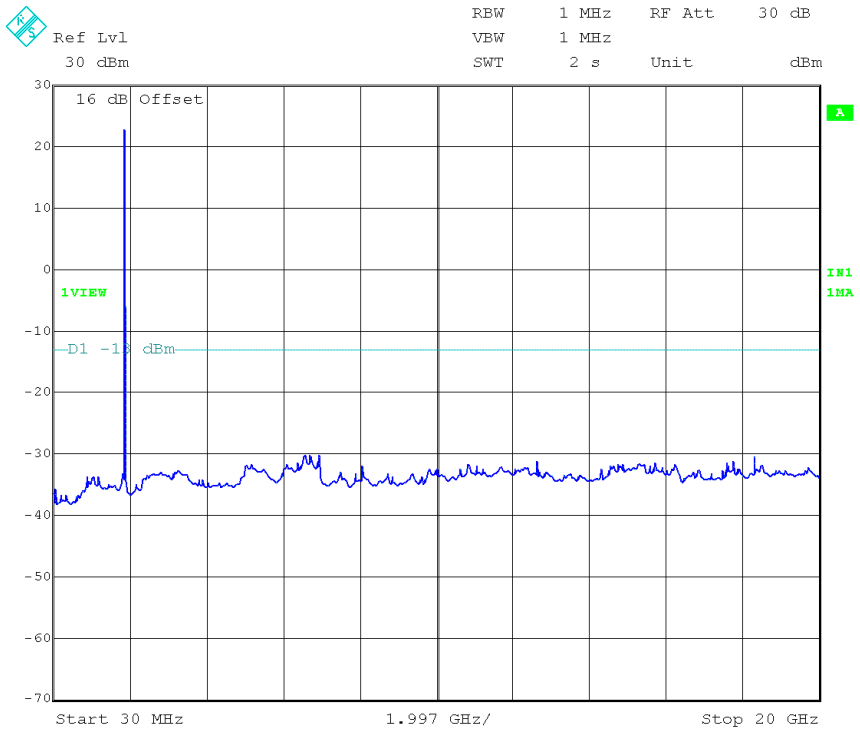
WCDMA MODULATION

1. CHANNEL: LOWEST



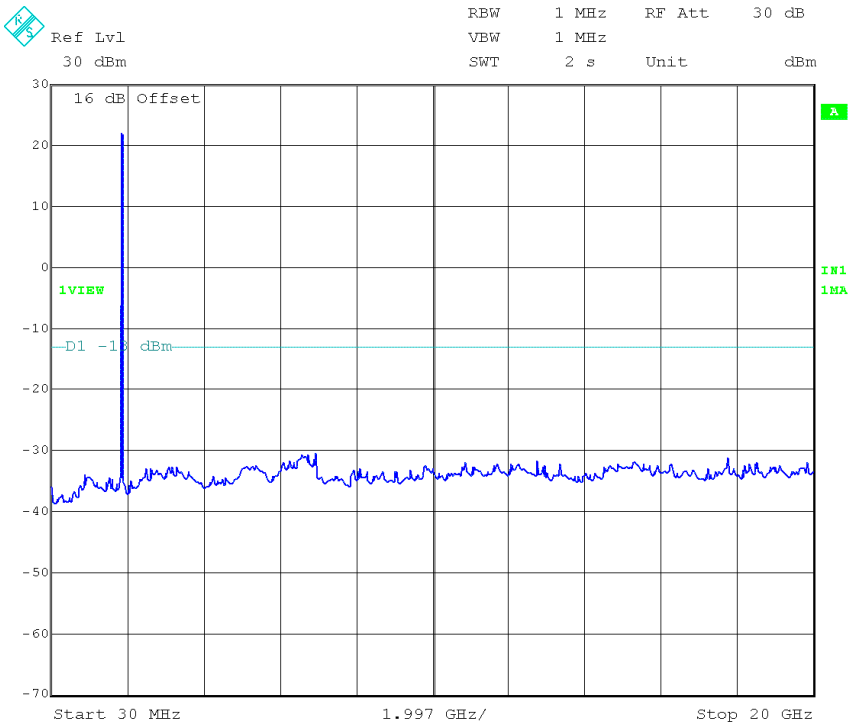
Note: The peak above the limit is the carrier frequency.

2. CHANNEL: MIDDLE



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

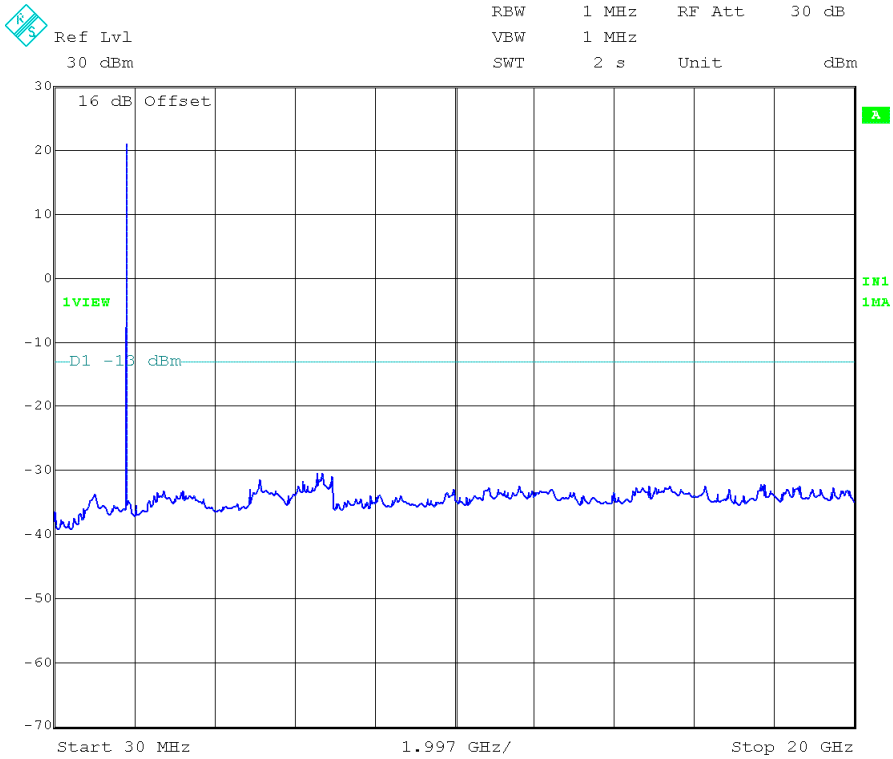
3. CHANNEL: HIGHEST



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

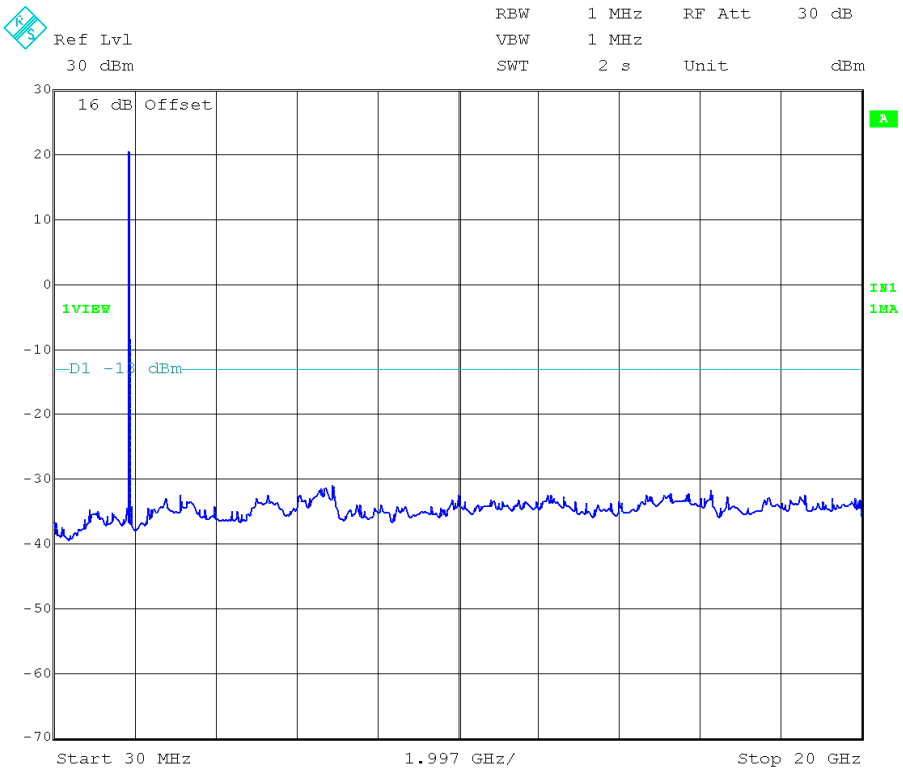
HSUPA MODULATION

1. CHANNEL: LOWEST



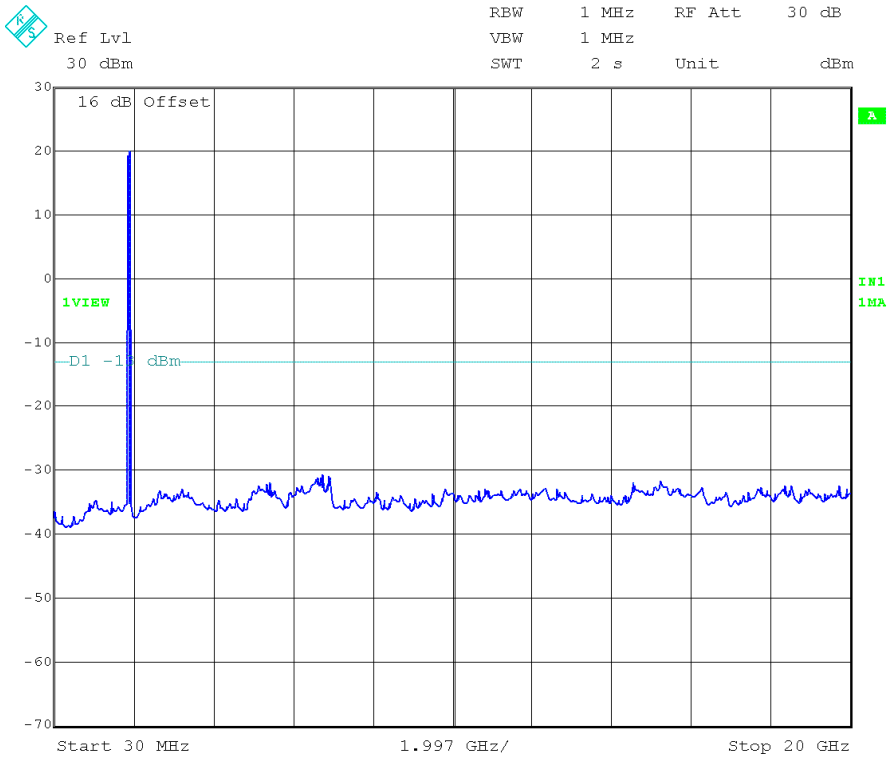
Note: The peak above the limit is the carrier frequency.

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

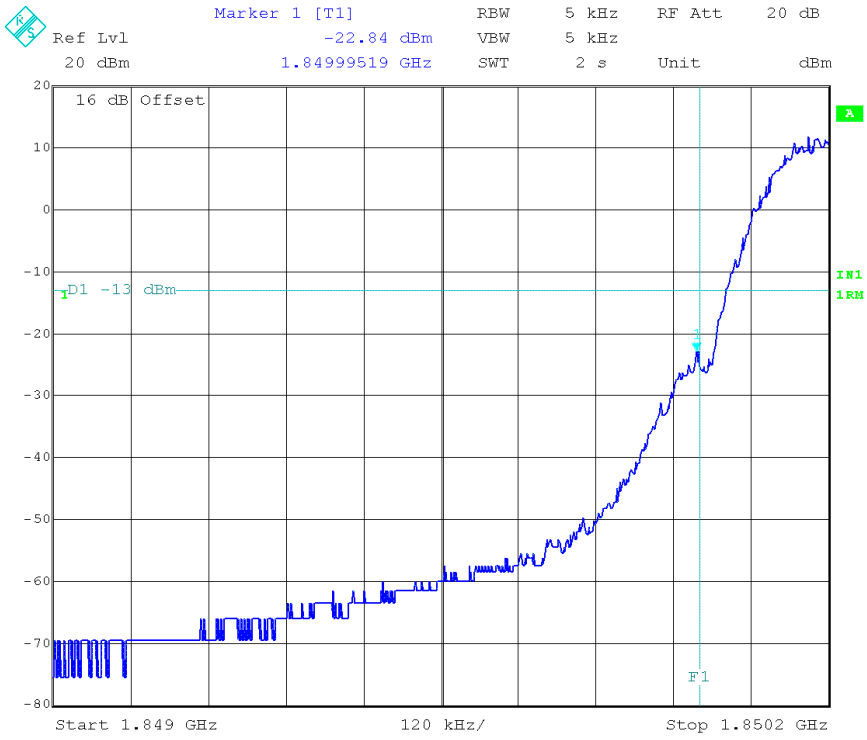
RESULTS (see plots in next pages)

MODULATION	Maximum level at lowest Block Edge (dBm)	Maximum level at highest Block Edge (dBm)
GPRS	-22.84	-26.02
EDGE	-28.84	-24.64
WCDMA	-18.70	-18.36
HSUPA	-21.00	-23.12

Measurement uncertainty = ±1.57 dB.

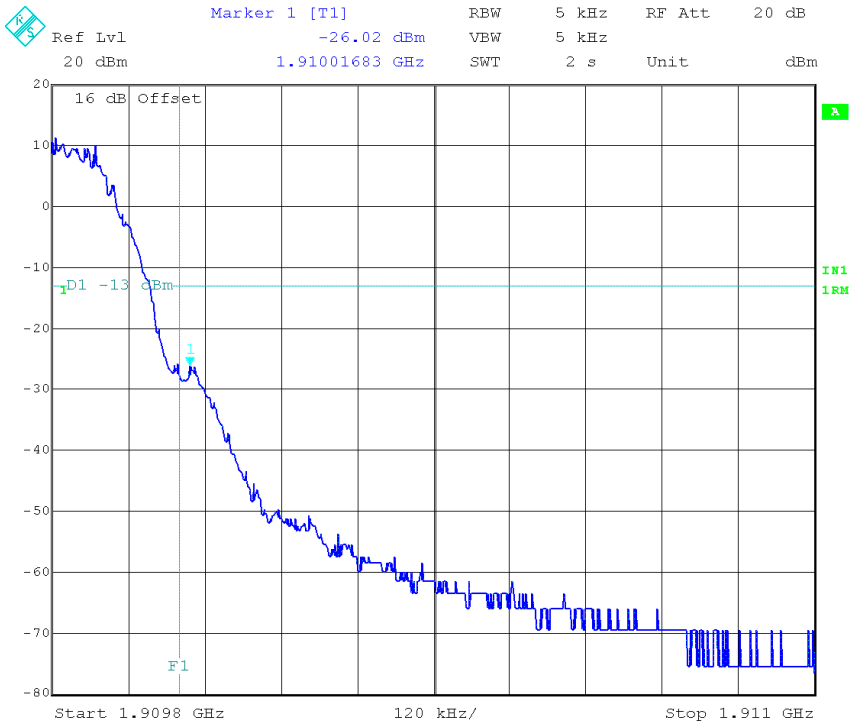
GPRS MODULATION

CHANNEL LOWEST



NOTE: The equipment transmits at the maximum output power

CHANNEL HIGHEST

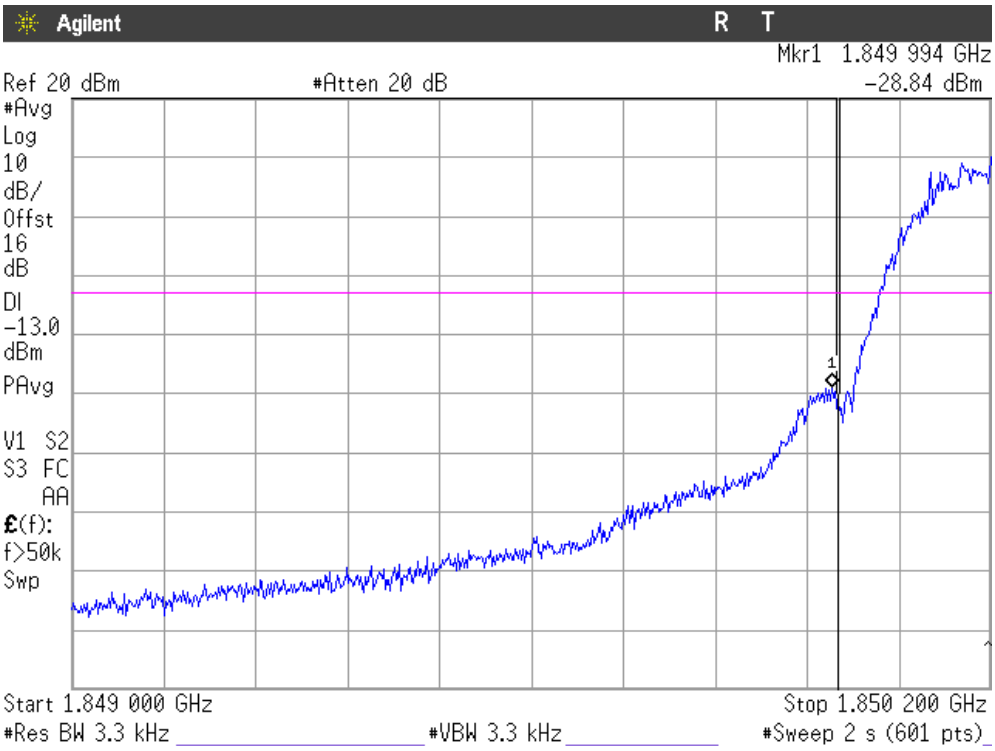


NOTE: The equipment transmits at the maximum output power

Verdict: PASS

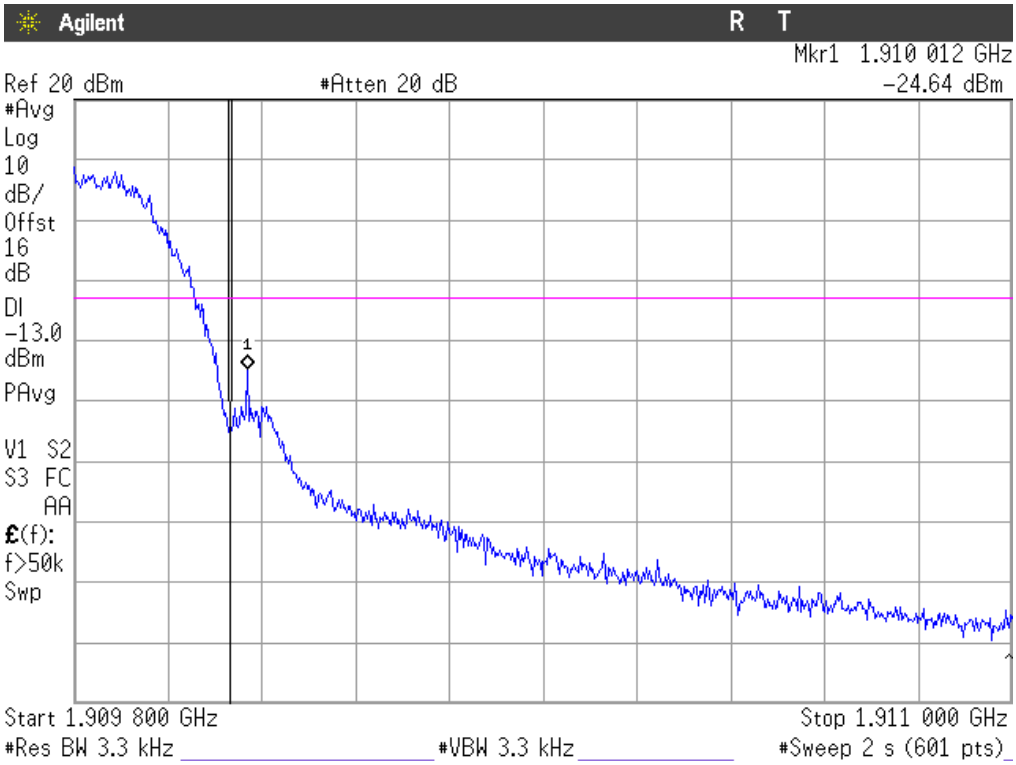
EDGE MODULATION

CHANNEL LOWEST



NOTE: The equipment transmits at the maximum output power

CHANNEL HIGHEST

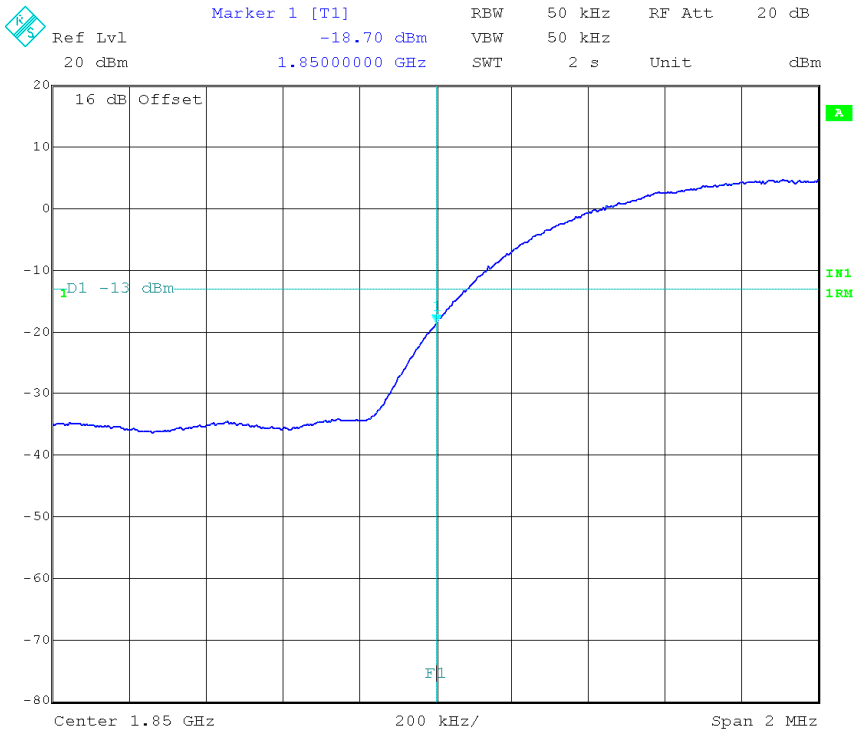


NOTE: The equipment transmits at the maximum output power

Verdict: PASS

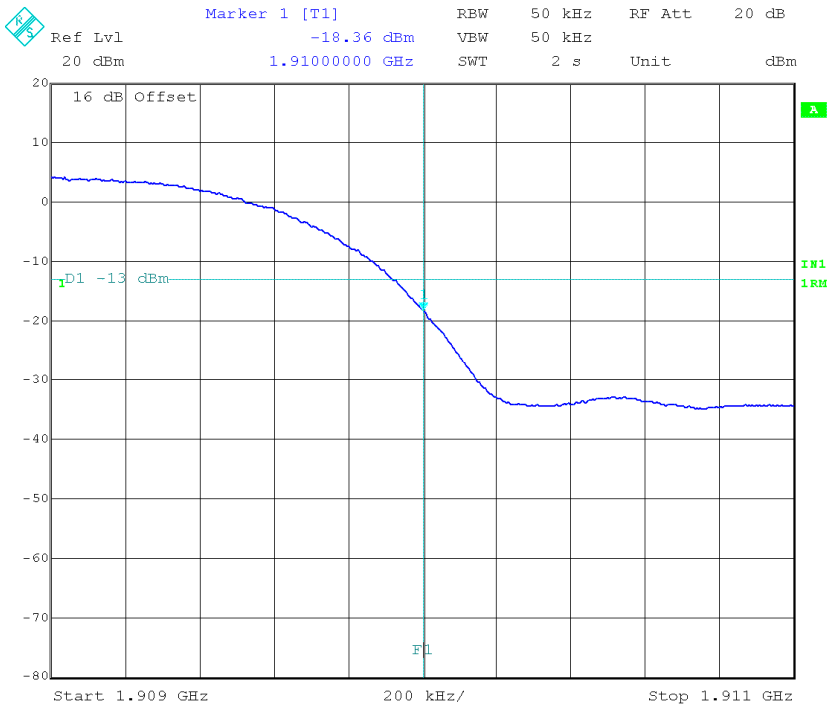
WCDMA MODULATION

CHANNEL LOWEST



NOTE: The equipment transmits at the maximum output power

CHANNEL HIGHEST

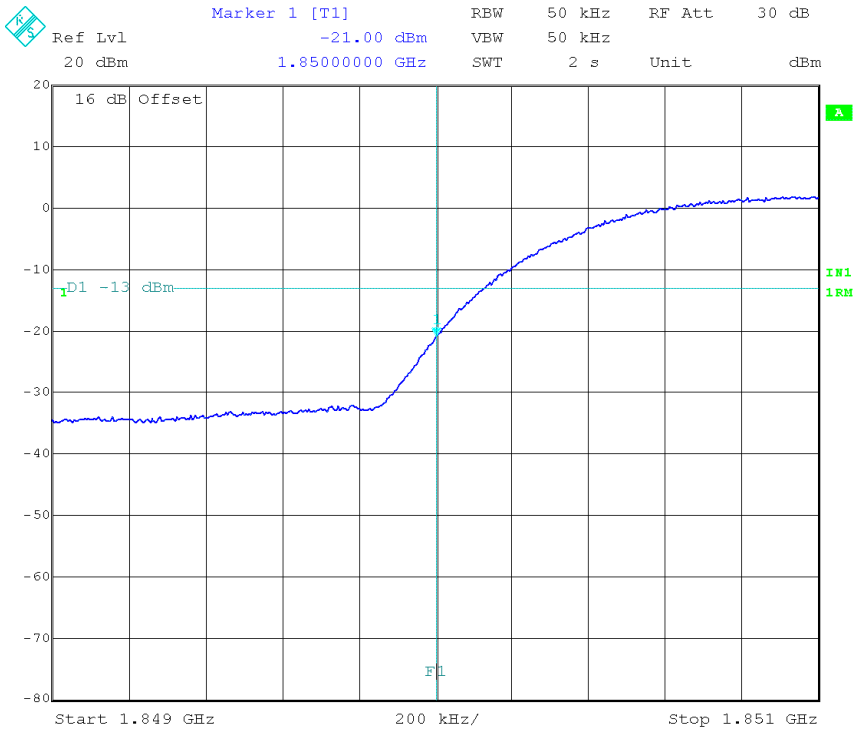


NOTE: The equipment transmits at the maximum output power

Verdict: PASS

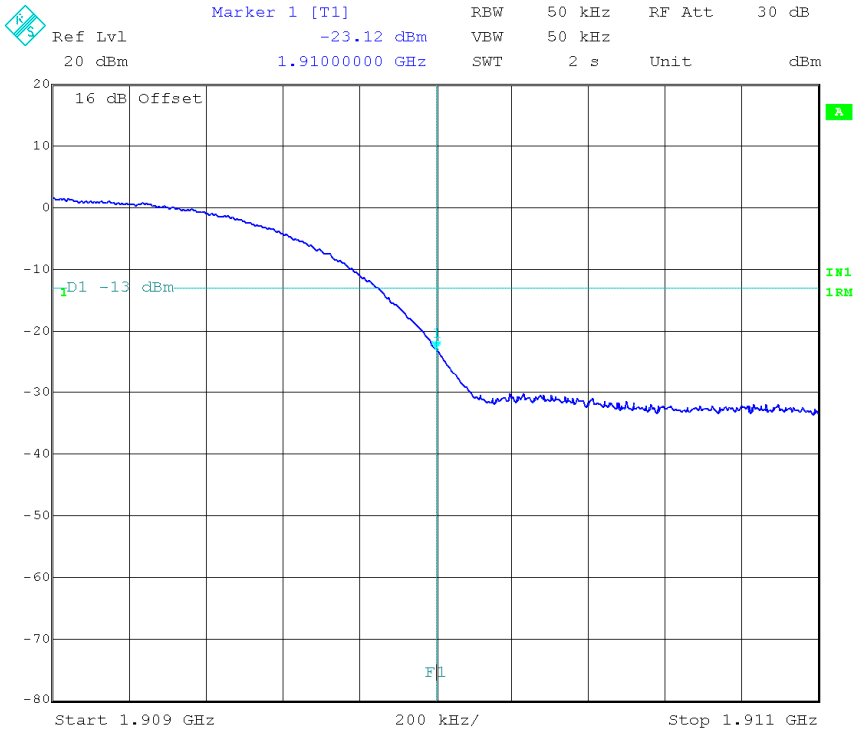
HSUPA MODULATION

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 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 spurious signals were found in all the range.

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 spurious signals were found in all the range.

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 spurious signals were found in all the range.

EDGE 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 spurious signals were found in all the range.

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 spurious signals were found in all the range.

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 spurious signals were found in all the range.

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 spurious signals were found in all the range.

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 spurious signals were found in all the range.

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 spurious signals were found in all the range.

HSUPA 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 spurious signals were found in all the range.

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 spurious signals were found in all the range.

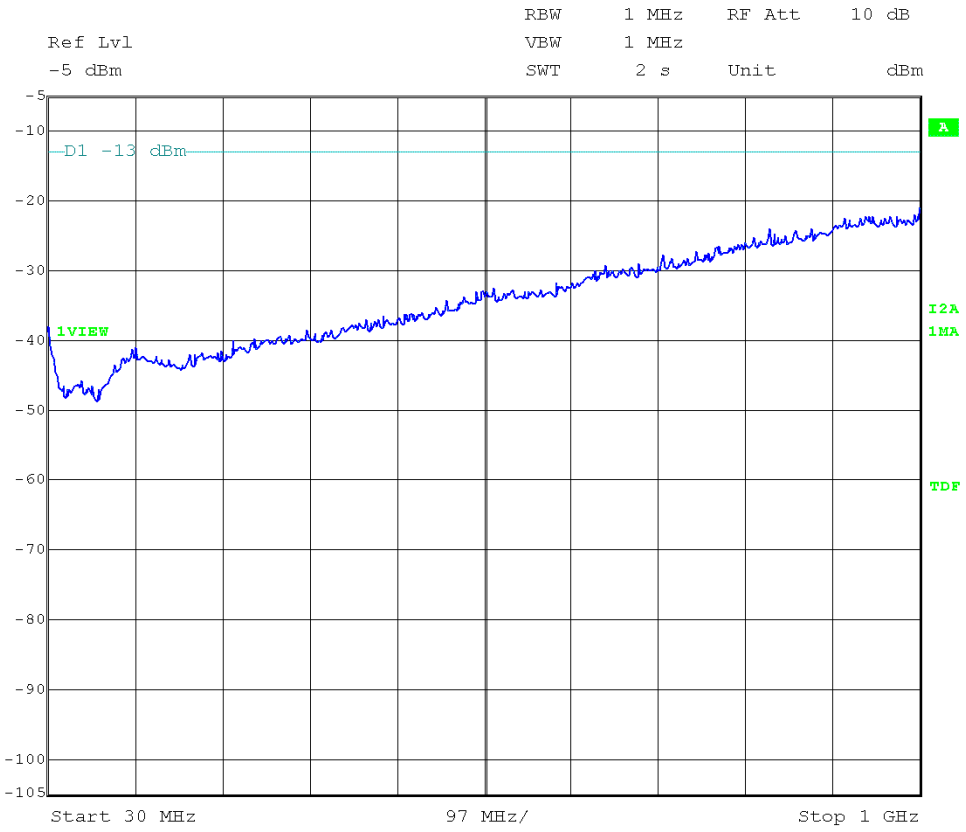
3. CHANNEL: HIGHEST

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

Frequency range 1 GHz-20 GHz.
No spurious signals were found in all the range.

Verdict: PASS

FREQUENCY RANGE 30 MHz-1000 MHz.

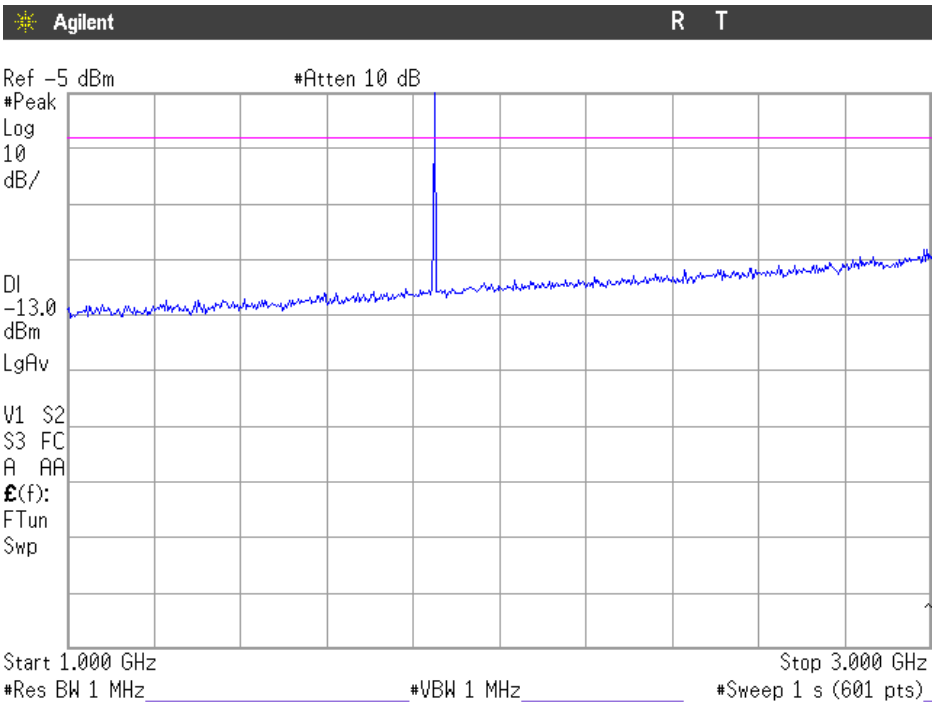


(This plot is valid for all three channels and all modulations).

FREQUENCY RANGE 1 GHz to 3 GHz.

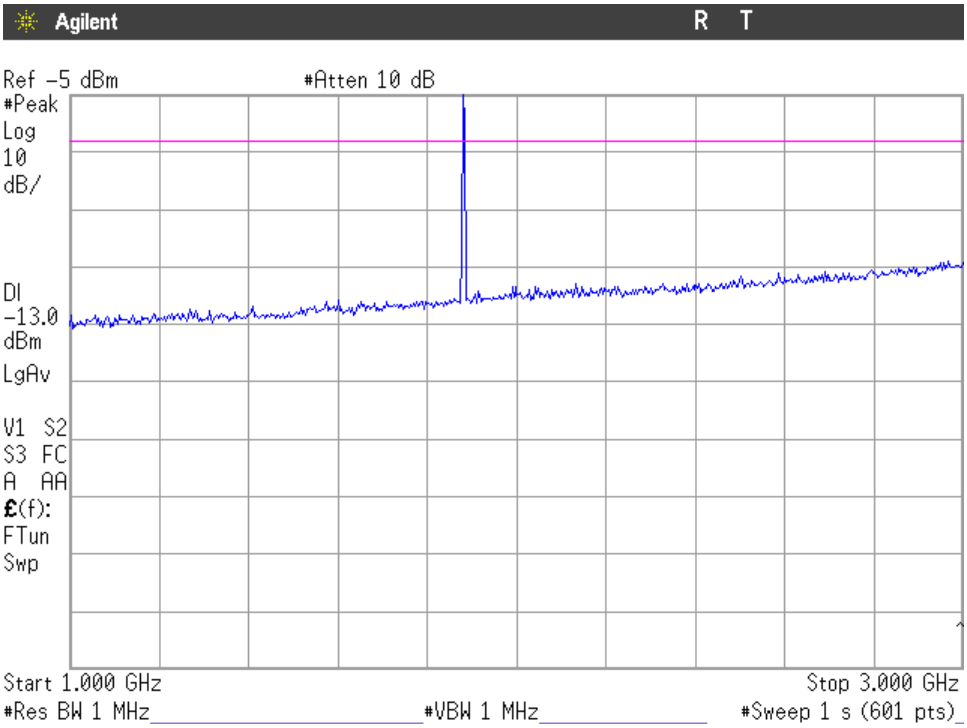
GPRS MODULATION

CHANNEL: LOWEST



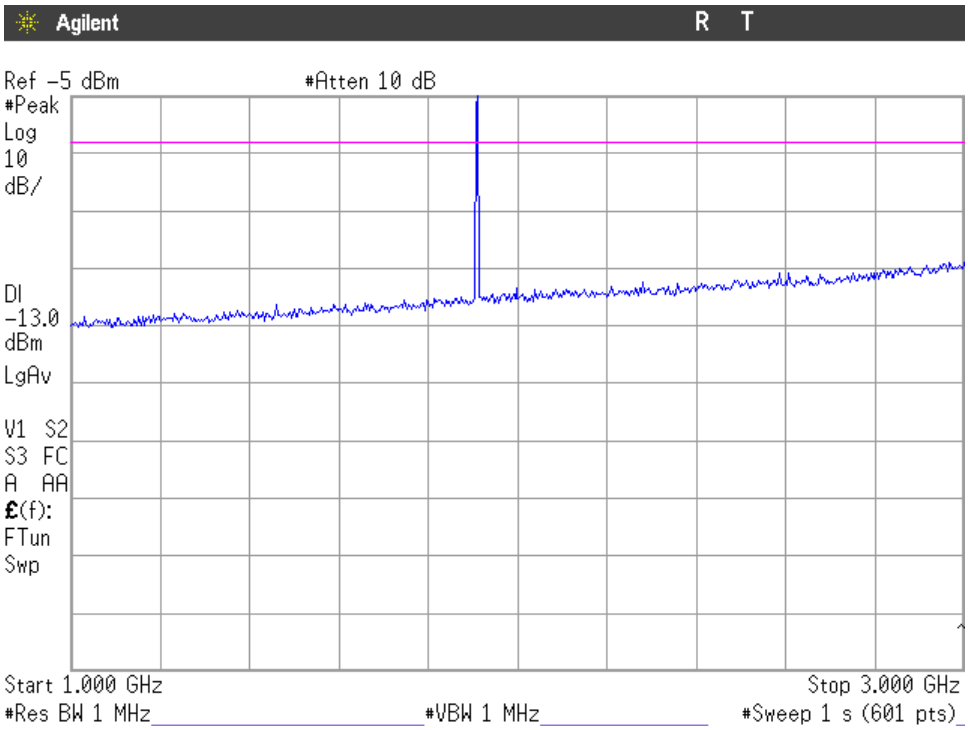
Note: The peak above the limit is the carrier frequency.

CHANNEL: MIDDLE



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

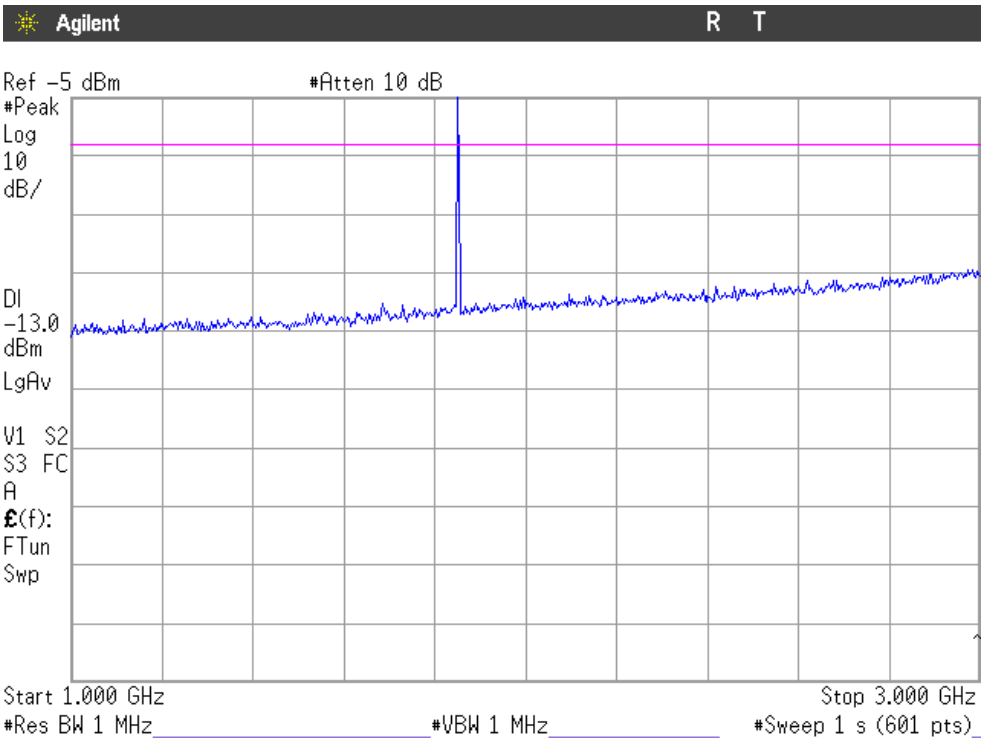
CHANNEL: HIGHEST



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

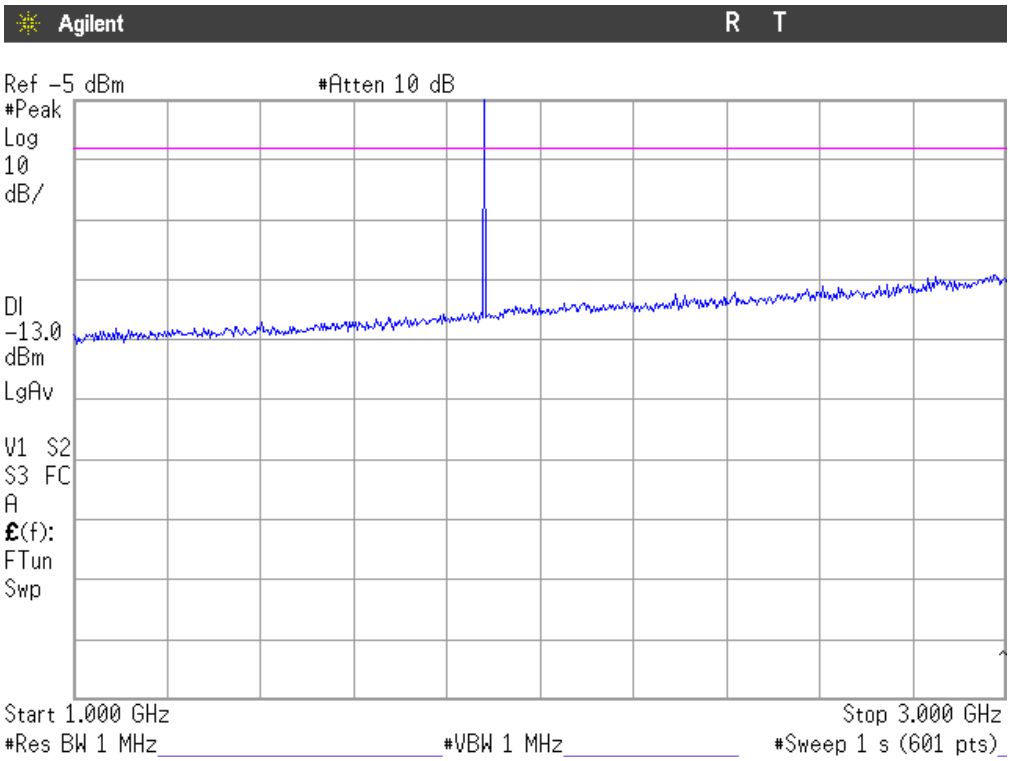
EDGE MODULATION

CHANNEL: LOWEST



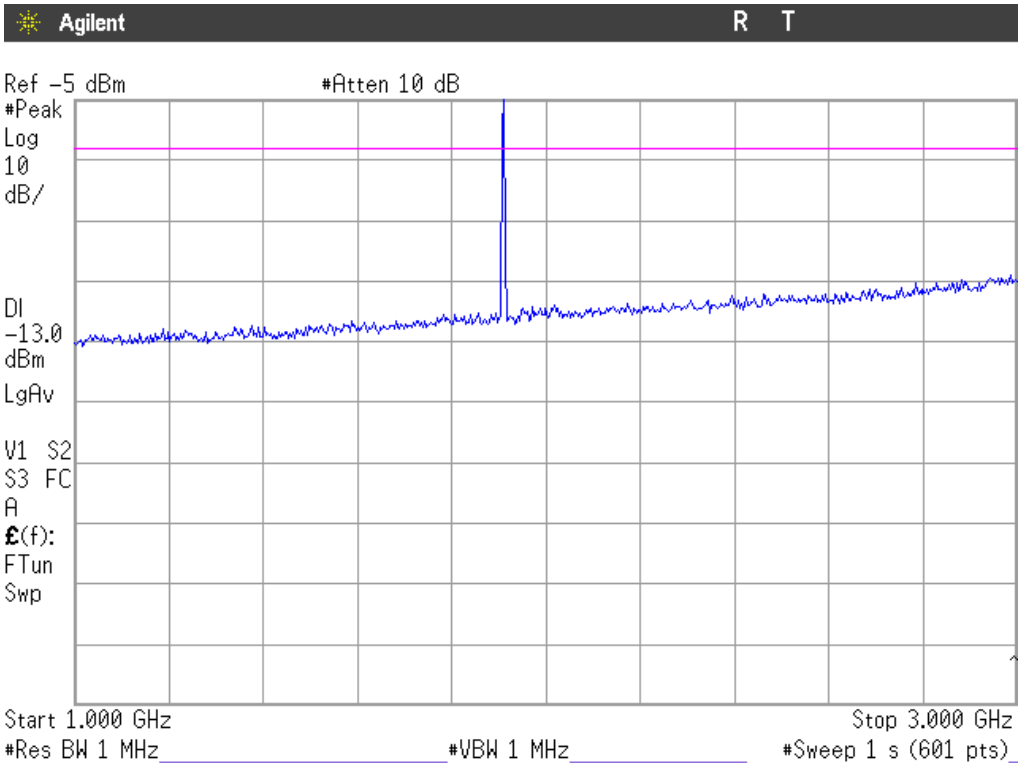
Note: The peak above the limit is the carrier frequency.

CHANNEL: MIDDLE



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

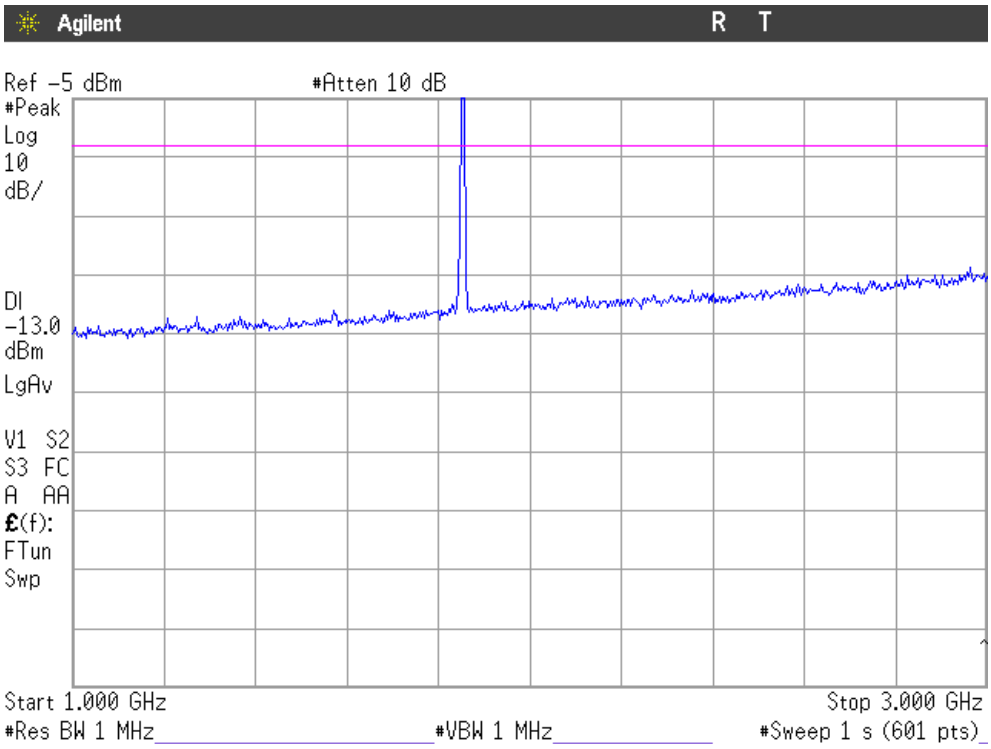
CHANNEL: HIGHEST



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

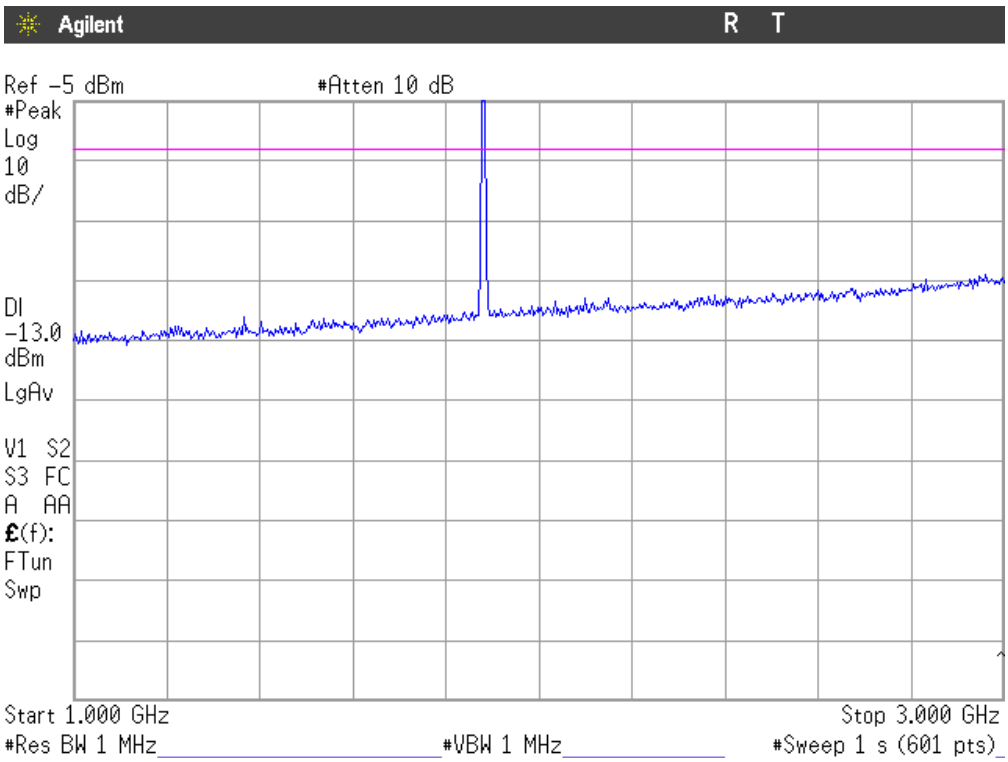
WCDMA MODULATION

CHANNEL: LOWEST



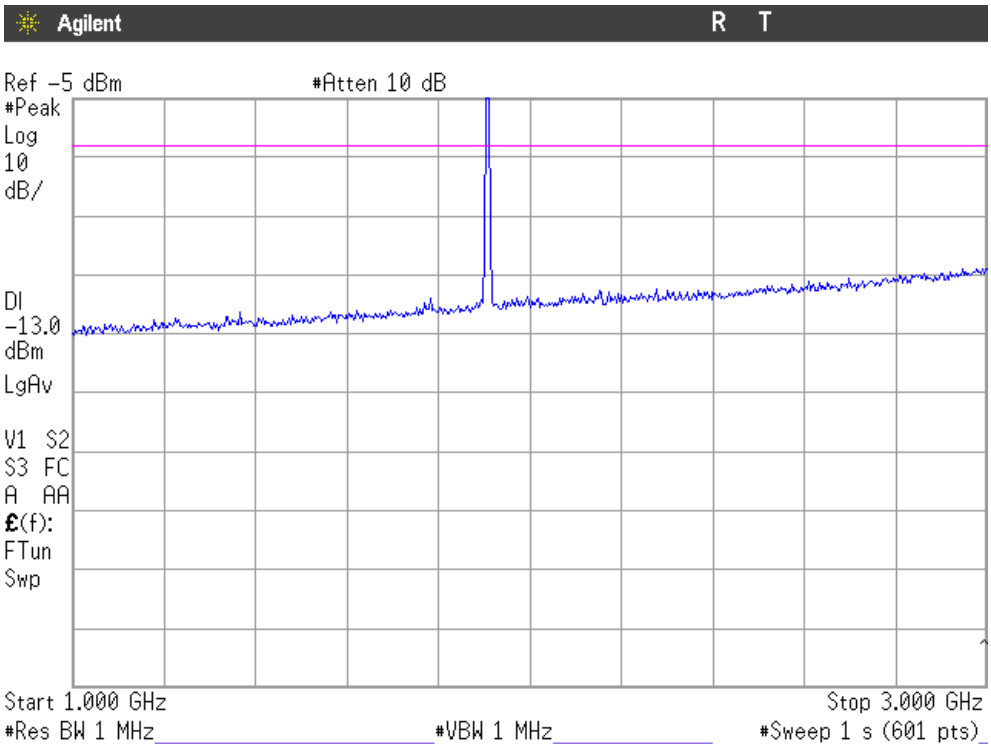
Note: The peak above the limit is the carrier frequency.

CHANNEL: MIDDLE



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

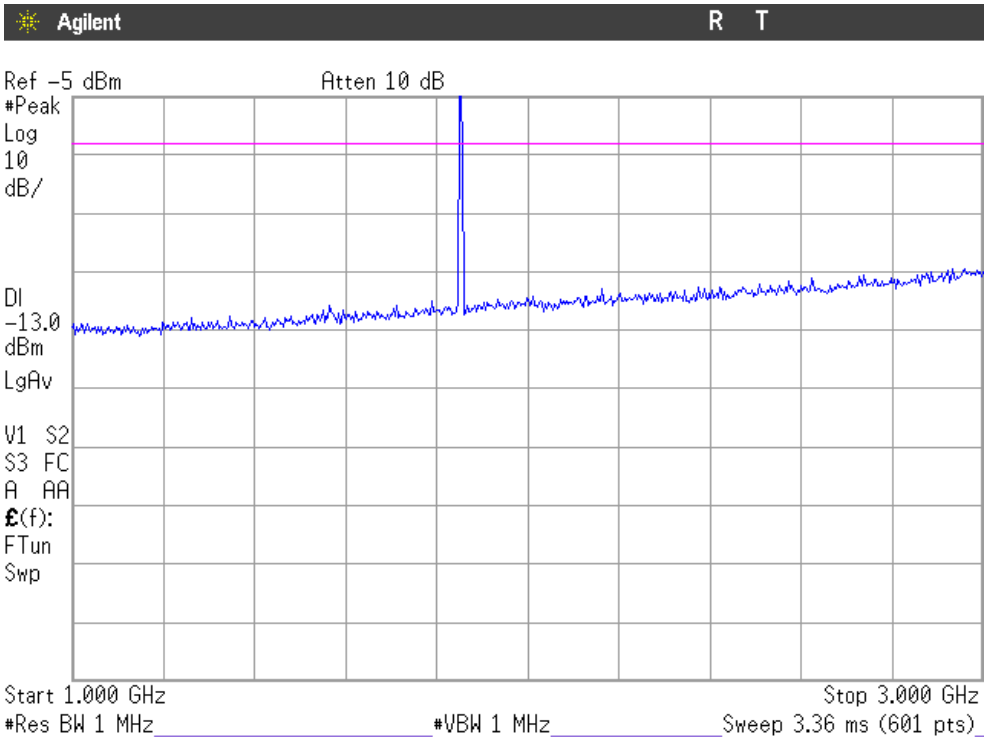
CHANNEL: HIGHEST



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

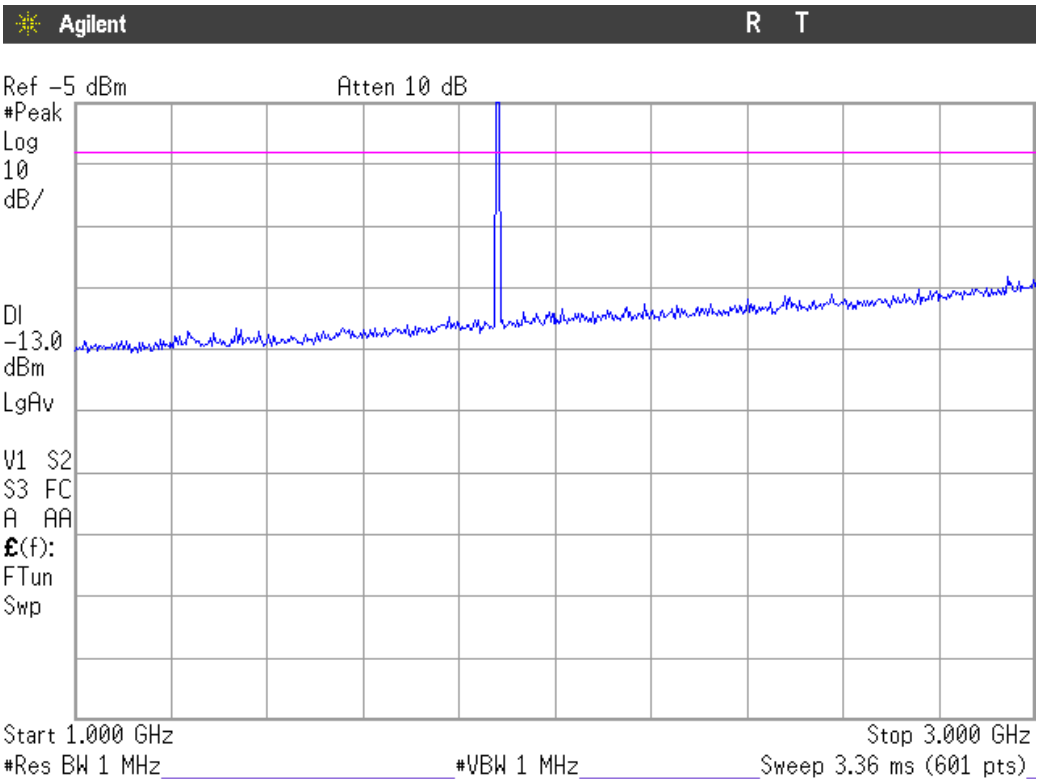
HSUPA MODULATION

CHANNEL: LOWEST



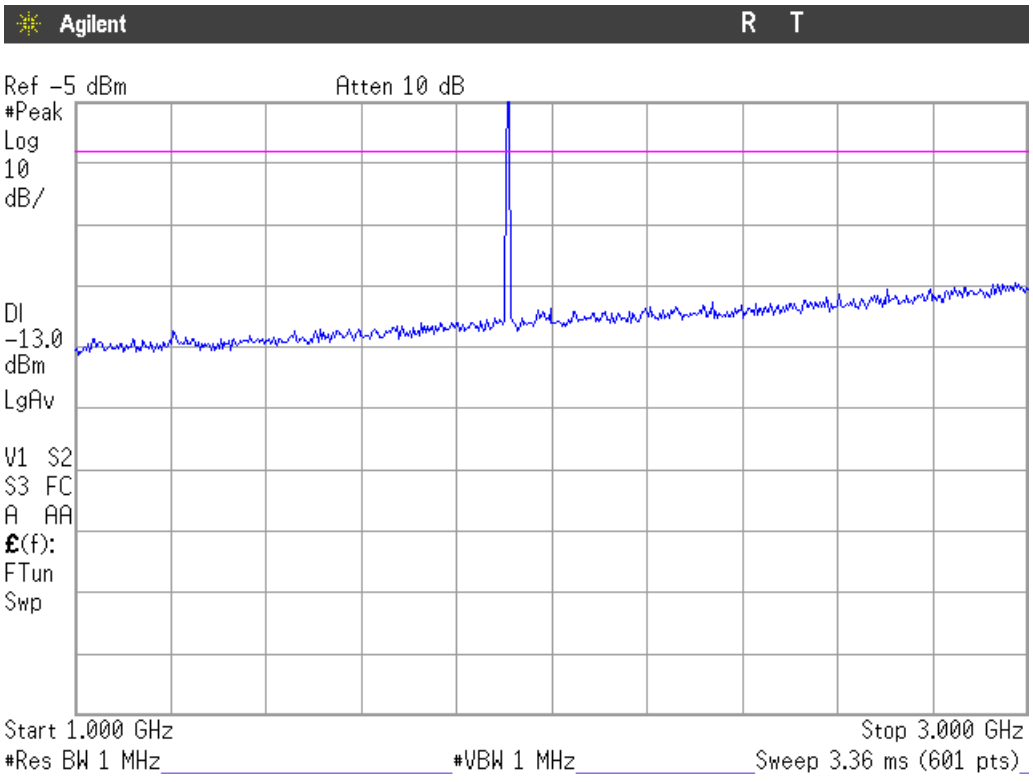
Note: The peak above the limit is the carrier frequency.

CHANNEL: MIDDLE



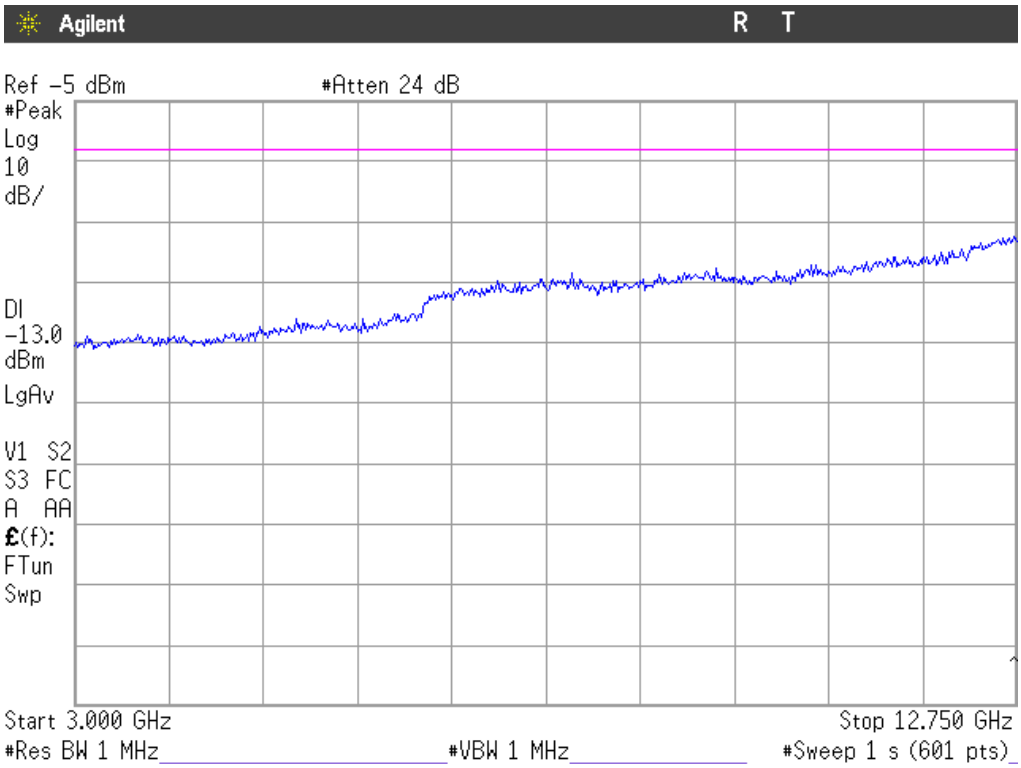
Note: The peak above the limit is the carrier frequency.

CHANNEL: HIGHEST



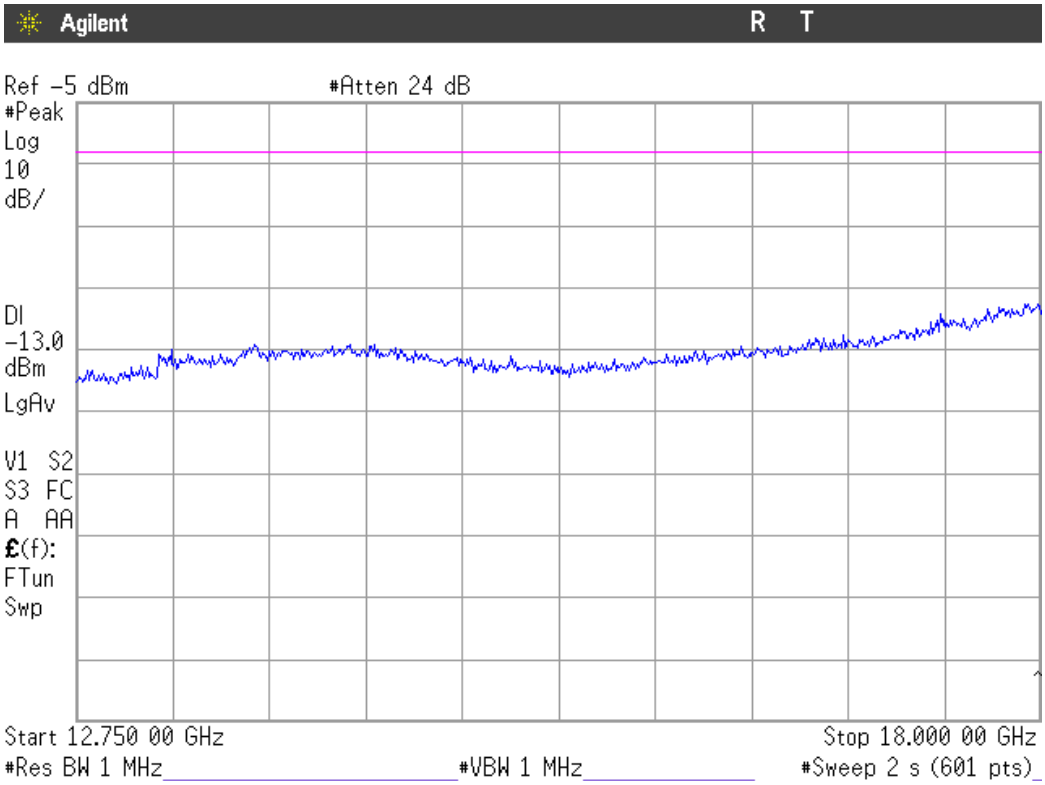
Note: The peak above the limit is the carrier frequency.

FREQUENCY RANGE 3 GHz to 12.75 GHz.



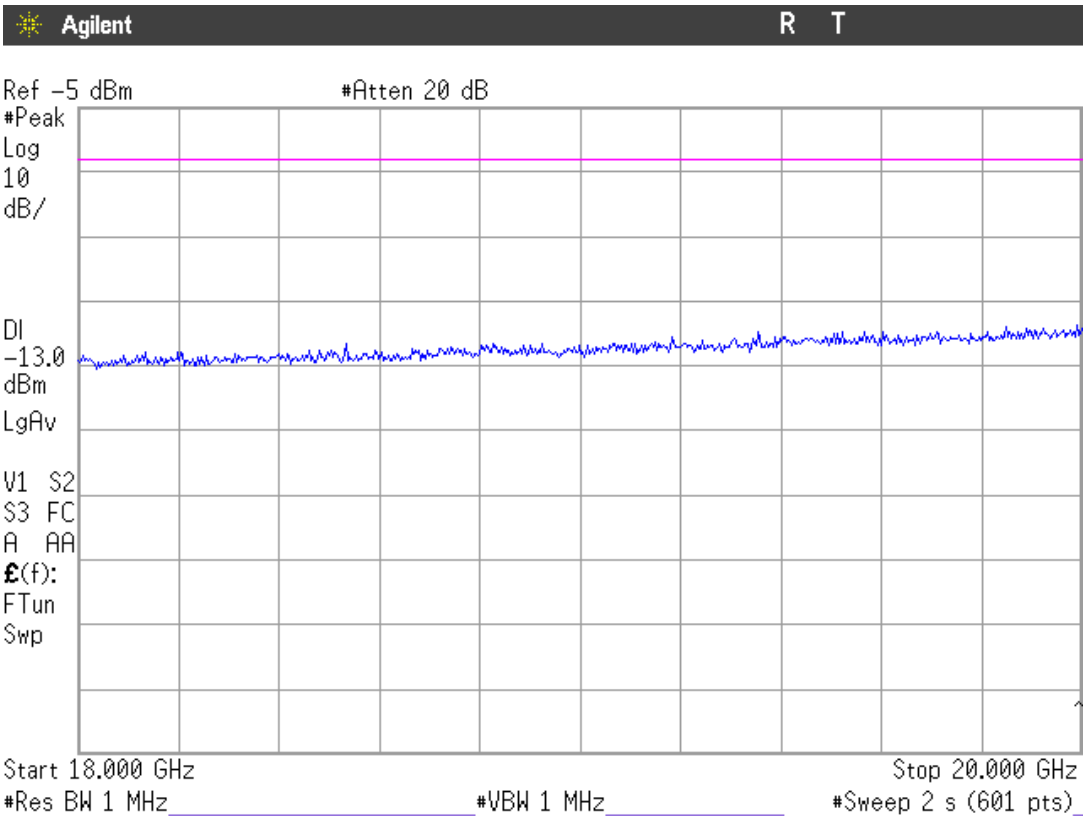
(This plot is valid for all three channels and all modulations).

FREQUENCY RANGE 12.75 GHz TO 18 GHz.



(This plot is valid for all three channels and all modulations).

FREQUENCY RANGE 18 GHz TO 20 GHz.



(This plot is valid for all three channels and all modulations).