FCC LISTED, REGISTRATION NUMBER: 905266

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TEST REPORT
REFERENCE STANDARD:
USA FCC Part 22, Part 24 and Part 27

NIE ..... :	31913RET.001
Approved by (name / position & signature) ..... :	A. Llamas / RF Lab. manager
Elaboration date ..... :	14/10/2010

Alejandro Llamas Rodríguez
Firmado digitalmente por Alejandro Llamas Rodríguez
Fecha: 2010.10.14 09:55:56 +02'00'

Identification of item tested ..... :	2G/3.5G module
Trademark ..... :	Telit
Model and/or type reference..... :	UC864-AWS-AUTO
Other identification of the product ..... :	FCC ID: RI7UC864AWA
Final HW version ..... :	1.00
Final SW version ..... :	08.01.547-B009
IMEI TAC ..... :	35212704
Features ..... :	WCDMA/HSDPA FDD 4 and GSM/GPRS/EDGE 850/900/1800/1900
Description ..... :	HSDPA single band module

Applicant ..... :	Telit Communications S.p.A.
Address..... :	Via Stazione di Prosecco, 5/B 34010 Sgonico [TS] Italy
CIF/NIF/Passport..... :	N/A
Contact person: ..... :	Andrea Fragiacomo
Telephone / Fax ..... :	+39 040 4192 362
e-mail: ..... :	Andrea.fragiacomo@telit.com

Test samples supplier ..... :	Telit Wireless Solutions Co., Ltd.
Address..... :	12th Fl. Shinyoung Securities Ennex Bld., 34-12 Yeouido-dong, Yeongdeungpo-gu, Seoul, Korea
CIF/NIF/Passport..... :	N/A
Contact person:	Seong-Jin Cho
Telephone / Fax ..... :	+82-2-368-4665/+82-2-368-4666
e-mail: ..... :	Seongjin.cho@telit.com

Manufacturer ..... :	Same as applicant

Test method requested .....:	See Standard
Standard .....:	USA FCC Part 22 10-01-09 Edition. USA FCC Part 24 10-01-09 Edition. USA FCC part 27 10-01-09 Edition.
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	2009-11	2011-11
12.	Spectrum Analyzer Agilent E4440A	2010-02	2012-02
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	2010-09	2012-09
16.	Climatic chamber HERAEUS VM 07/100	2010-02	2013-02
17.	RF pre-amplifier Miteq AFS5-04001300-15-10P-6.	2010-07	2012-07
18.	RF pre-amplifier Schaffner CPA 9231.	2009-03	2011-03
19.	RF pre-amplifier Miteq JS4-12002600-30-5A.	2010-07	2012-07

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.

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 / Type	Serial No.	Date of reception
31913/10	Mobile Broadband Module		352127040000726	15/09/2010
31913/02	Test board	---	---	15/09/2010
31599/02	Power supply cable	---	---	01/06/2010
31759/18	Antenna	---	---	14/06/2010

Sample M/02 is composed of the following elements

Control No.	Description	Model / Type	Serial No.	Date of reception
31913/13	Mobile Broadband Module		352127040000668	15/09/2010
31913/02	Test board	---	---	15/09/2010
31599/02	Power supply cable	---	---	01/06/2010
31759/18	Antenna	---	---	14/06/2010

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

   FCC part 22 and part 24 tests indicated in appendix A.

2. Sample M/02 has undergone the following test(s) specified in subclause “Test method requested”:

   FCC part 27 tests indicated in appendix A.

Testing period

The performed test started on 2010-09-27 and finished on. 2010-10-04.

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. = 23.5 ºC Max. = 24.7 ºC
Relative humidity	Min. = 43.8 % Max. = 45.3 %
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. = 24.1 ºC Max. = 24.3 ºC
Relative humidity	Min. = 45 % Max. = 47 %
Air pressure	Min. = 1019 mbar Max. = 1019 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. = 24.5 ºC Max. = 25.6 ºC
Relative humidity	Min. = 49.4 % Max. = 52.3 %
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, Part 24 and Part 27, 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

GSM mode has not been tested to prove USA FCC Part 22 and Part 24 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 as it is the same as GPRS mode. GPRS mode has been tested as indicated on the present test report.

HSDPA modulation mode has not been tested to prove USA FCC Part 27 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 Part 27 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 PARAGRAPH	VERDICT			
	NA	P	F	NM
Clause 22.913: RF output power		P		
Clause 2.1047: Modulation characteristics		P		
Clause 22.355: Frequency stability		P		
Clause 2.1049: Occupied Bandwidth		P		
Clause 22.917: Spurious emissions at antenna terminals		P		
Clause 22.917: Radiated emissions		P		

FCC PART 24 PARAGRAPH	VERDICT			
	NA	P	F	NM
Clause 24.232: RF output power		P		
Clause 2.1047: Modulation characteristics		P		
Clause 24.235: Frequency stability		P		
Clause 2.1049: Occupied Bandwidth		P		
Clause 24.238: Spurious emissions at antenna terminals		P		
Clause 24.238: Radiated emissions		P		

FCC PART 27 PARAGRAPH	VERDICT			
	NA	P	F	NM
Clause 27.50: RF output power		P		
Clause 2.1047: Modulation characteristics		P		
Clause 27.54: Frequency stability		P		
Clause 2.1049: Occupied Bandwidth		P		
Clause 27.53: Spurious emissions at antenna terminals		P		
Clause 27.53: Radiated emissions		P		

APPENDIX A: Test results for FCC parts 22, 24 and 27

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TEST RESULTS FOR FCC PART 22

TEST CONDITIONS

Power supply (V):

V_{nom} = 3.8 Vdc

V_{max} = 4.2 Vdc

V_{min} = 3.4 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

TEST FREQUENCIES:

Lowest channel (128): 824.2 MHz

Middle channel (190): 836.6 MHz

Highest channel (251): 848.8 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.

For radiated measurements the EUT was placed on a 1 m high non-conductive stand inside an anechoic chamber. The measuring antenna was placed at 3 m distance and the maximum field strength was measured for the three channels. 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 Effective Radiated Power (E.R.P.) is obtained by using the Substitution Method according to ANSI/TIA/EIA-603-C: 2004.

RESULTS

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

GPRS MODULATION

Channel	Lowest	Middle	Highest
Maximum peak power (dBm)	32.80	32.76	32.76
Maximum peak power (W)	1.90	1.89	1.89
Measurement uncertainty (dB)	±0.5		

EDGE MODULATION

Channel	Lowest	Middle	Highest
Maximum peak power (dBm)	32.86	33.26	32.83
Maximum peak power (W)	1.93	2.12	1.92
Measurement uncertainty (dB)	±0.5		

MAXIMUM EFFECTIVE RADIATED POWER E.R.P. (RADIATED).

GPRS MODULATION

Substitution method data

Frequency (MHz) at max. reading	Max. Instrument reading (dBm)	Polarization	(1) RF Generator +power amplifier output (dBm)	(2) Cable loss (dB)	(3) Substitution antenna gain Gd (respect to λ/2 dipole) (dB)	E.R.P. (dBm) = (1) – (2) + (3)
824.2135	-18.27	Vertical	19.23	0.3	6.3	25.23
836.6510	-18.50	Vertical	19.60	0.3	6.2	25.50
848.8100	-20.04	Vertical	18.06	0.3	6.1	23.86

RBW = VBW = 1 MHz

Channel	Lowest	Middle	Highest
Maximum peak power E.R.P. (dBm)	25.3	25.5	23.86
Maximum peak power (W)	0.34	0.35	0.24
Measurement uncertainty (dB)	± 3.8		

EDGE MODULATION

Substitution method data

Frequency (MHz) at max. reading	Max. Instrument reading (dBm)	Polarization	(1) RF Generator +power amplifier output (dBm)	(2) Cable loss (dB)	(3) Substitution antenna gain Gd (respect to λ/2 dipole) (dB)	E.R.P. (dBm) = (1) – (2) + (3)
824.2233	-19.06	Vertical	18.44	0.3	6.3	24.44
836.6501	-19.34	Vertical	18.76	0.3	6.2	24.66
848.9303	-19.85	Vertical	18.25	0.3	6.1	24.05

RBW = VBW = 1 MHz

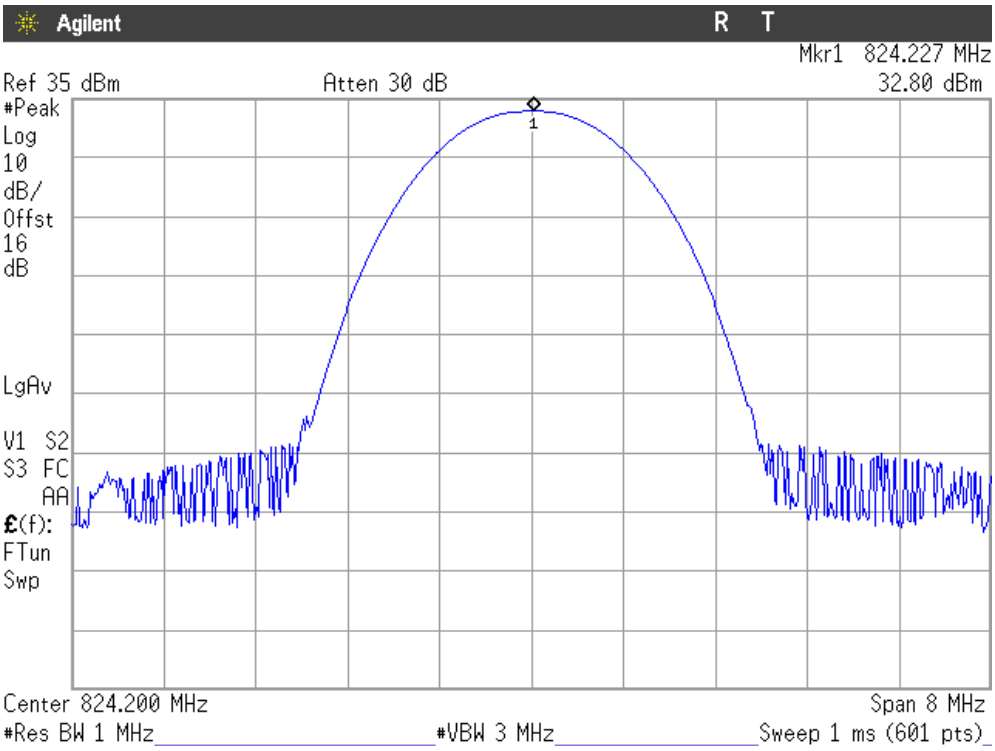
Channel	Lowest	Middle	Highest
Maximum peak power E.R.P. (dBm)	24.44	24.66	24.05
Maximum peak power (W)	0.28	0.29	0.25
Measurement uncertainty (dB)	± 3.8		

Verdict: PASS

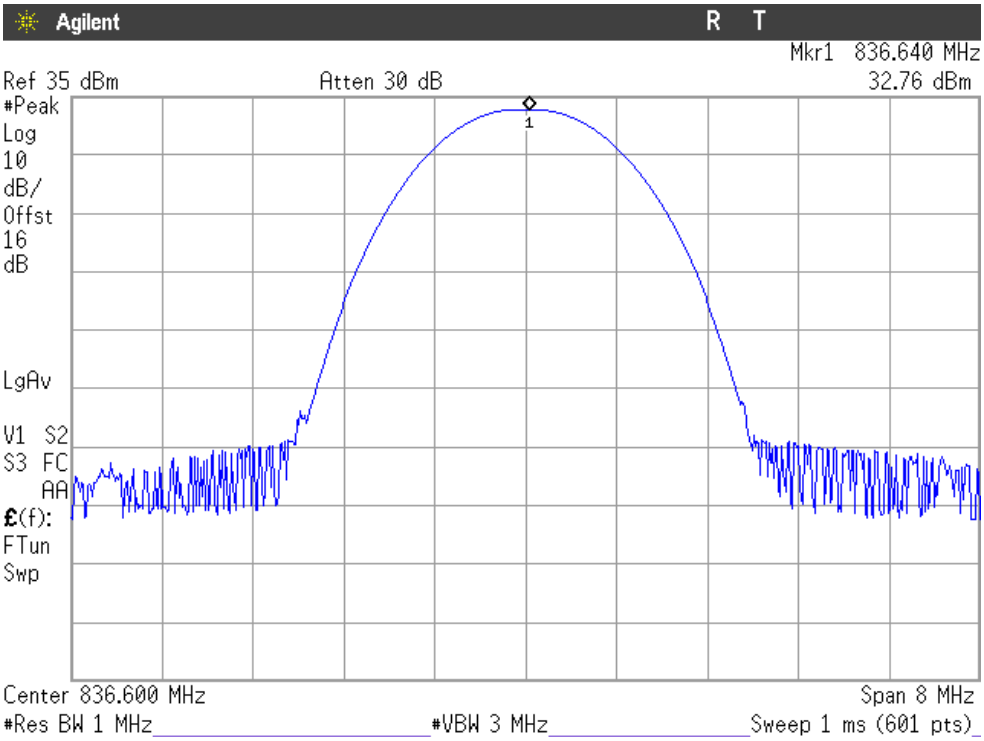
PEAK OUTPUT POWER (CONDUCTED).

GPRS MODULATION

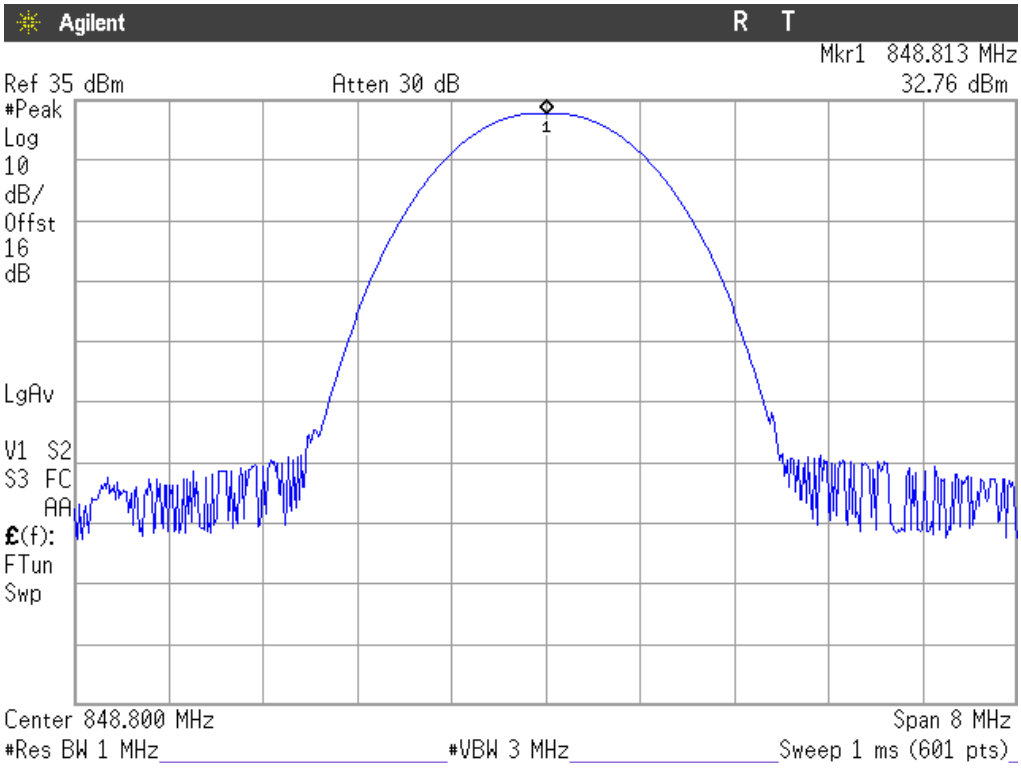
Lowest Channel.



Middle Channel.

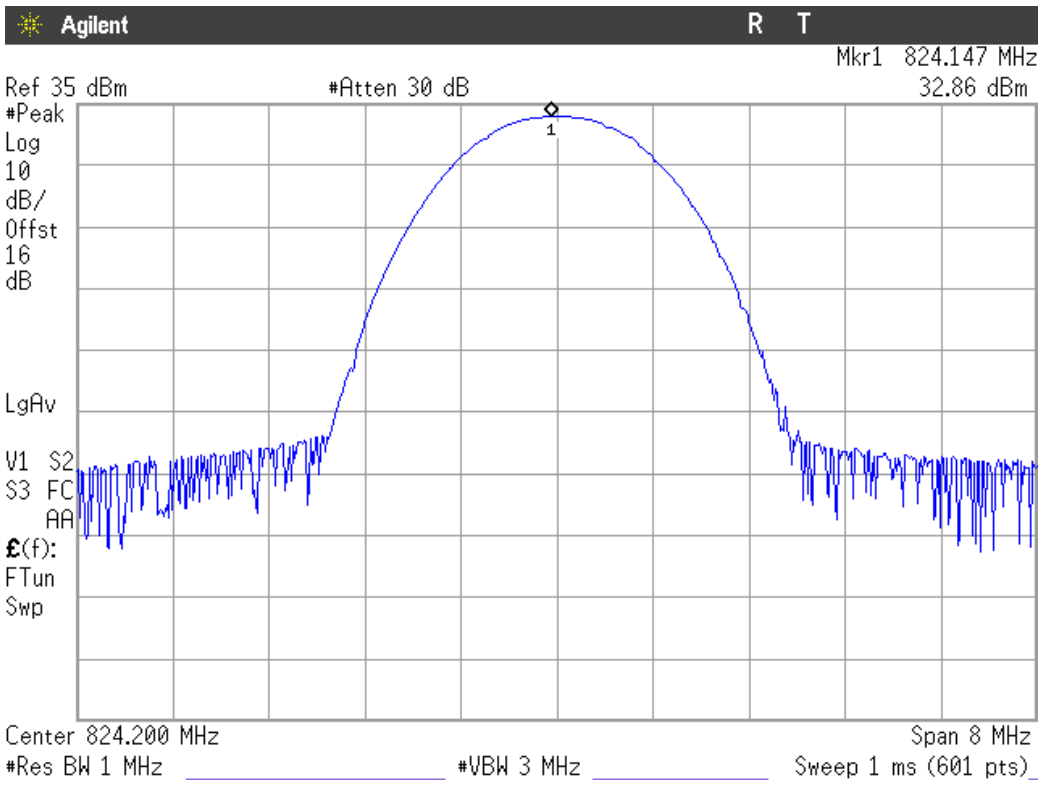


Highest Channel.

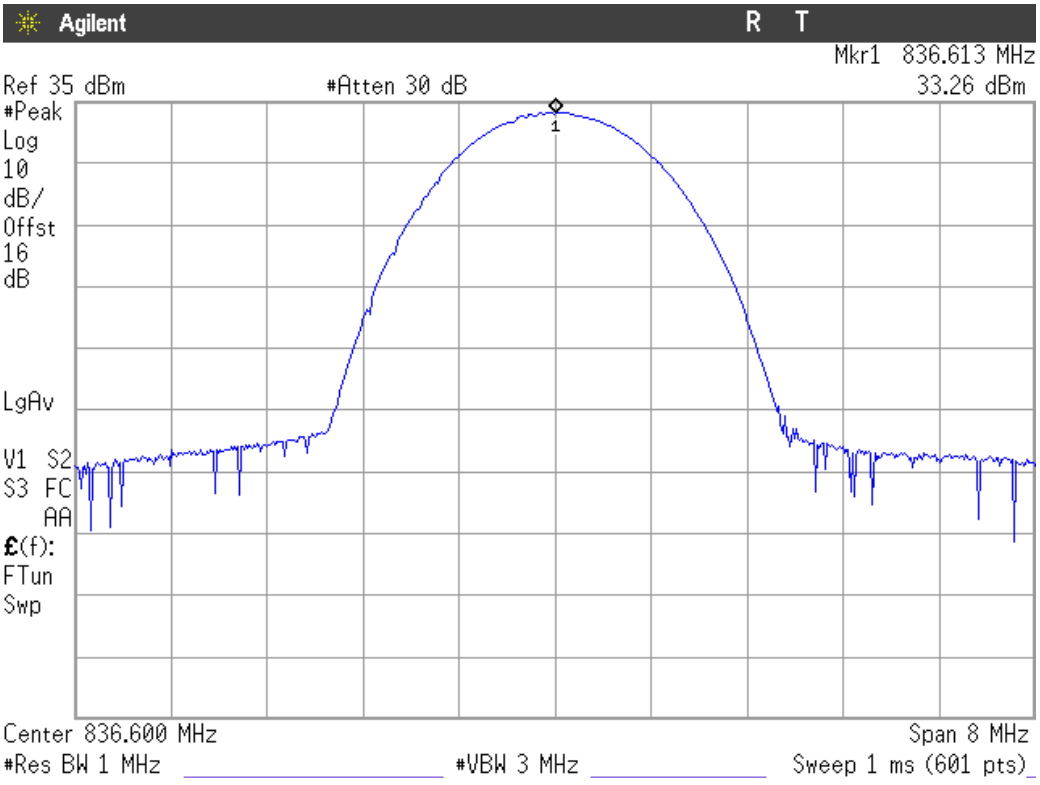


EDGE MODULATION

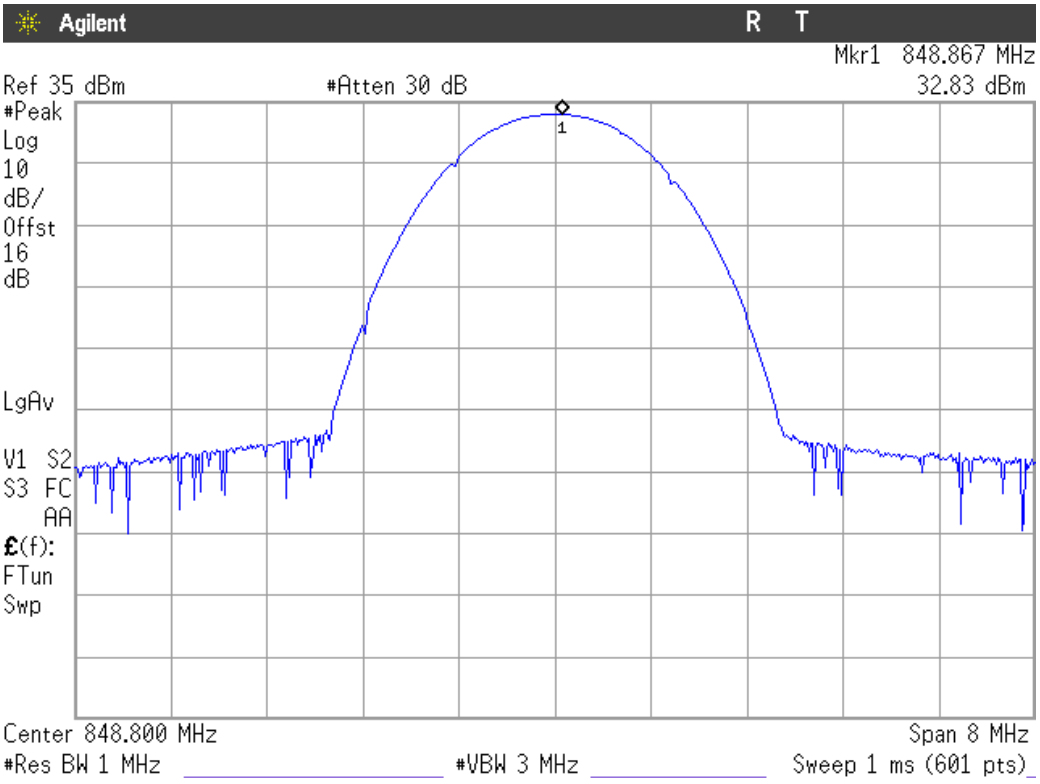
Lowest Channel.



Middle Channel.



Highest Channel.



Modulation Characteristics

SPECIFICATION

§2.1047

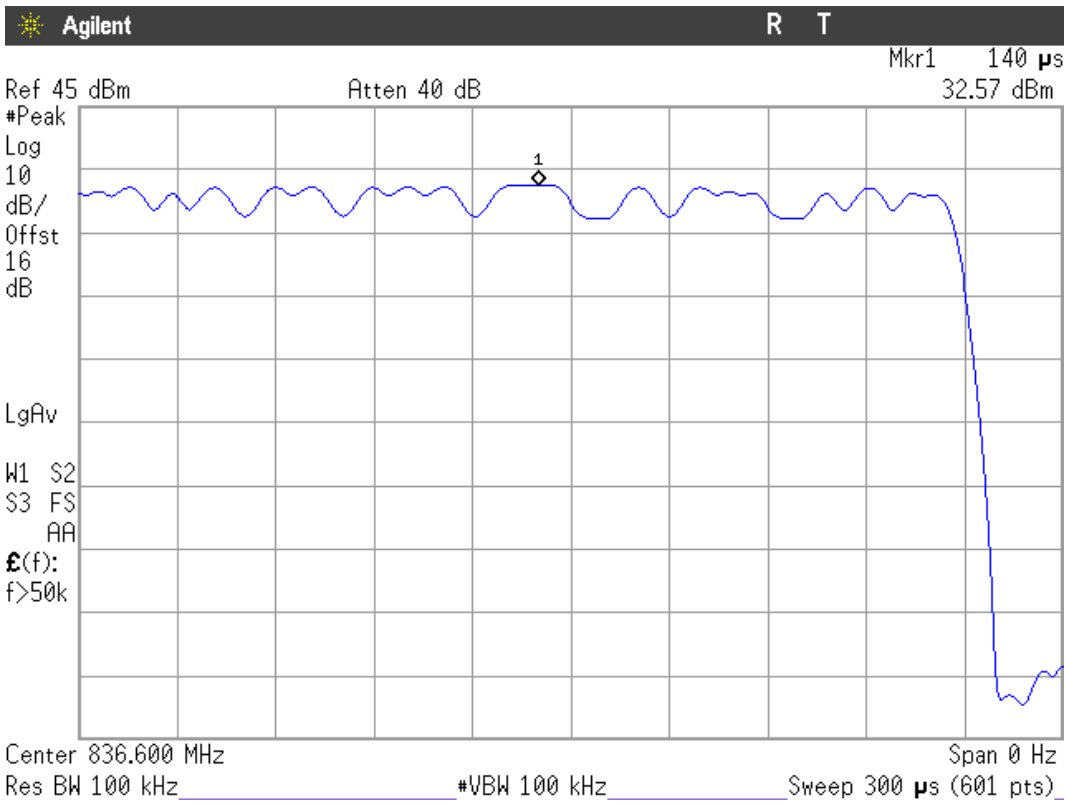
METHOD

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

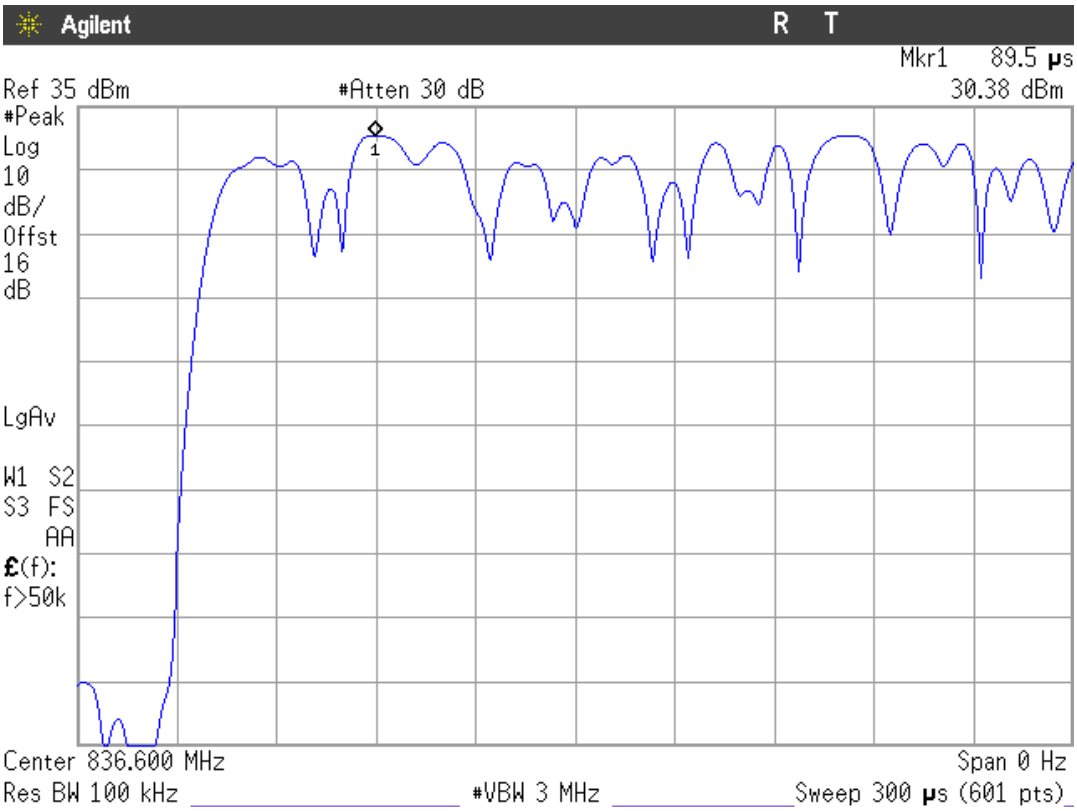
RESULTS

The following plot shows the modulation schemes in the EUT.

GPRS MODULATION



EDGE MODULATION



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 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	-16	-0.0191	-0.00000191
+40	-4	-0.0048	-0.00000048
+30	13	0.0155	0.00000155
+20	-6	-0.0072	-0.00000072
+10	-20	-0.0239	-0.00000239
0	-23	-0.0275	-0.00000275
-10	14	0.0167	0.00000167
-20	-18	-0.0215	-0.00000215
-30	6	0.0072	0.00000072

EDGE MODULATION

Temperature (ºC)	Frequency Error (Hz)	Frequency Error (ppm)	Frequency Error (%)
+50	-16	-0.0191	-0.00000191
+40	-27	-0.0323	-0.00000323
+30	6	0.0072	0.00000072
+20	-16	-0.0191	-0.00000191
+10	-20	-0.0239	-0.00000239
0	-10	-0.0120	-0.00000120
-10	-13	-0.0155	-0.00000155
-20	-18	-0.0215	-0.00000215
-30	-39	-0.0466	-0.00000466

Frequency stability over voltage variations.

GPRS MODULATION

Battery Supply voltage	Voltage (V)	Frequency Error (Hz)	Frequency Error (ppm)	Frequency Error (%)
Vmax	4.2	-19	-0.0227	-0.00000227
Vmin	3.4	-14	-0.0167	-0.00000167

EDGE MODULATION

Battery Supply voltage	Voltage (V)	Frequency Error (Hz)	Frequency Error (ppm)	Frequency Error (%)
Vmax	4.2	-23	-0.0275	-0.00000275
Vmin	3.4	-25	-0.0299	-0.00000299

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. The 99% occupied bandwidth and the -26 dBc bandwidth were measured directly using the built-in bandwidth measuring option of spectrum analyser E4440A.

RESULTS

GPRS MODULATION

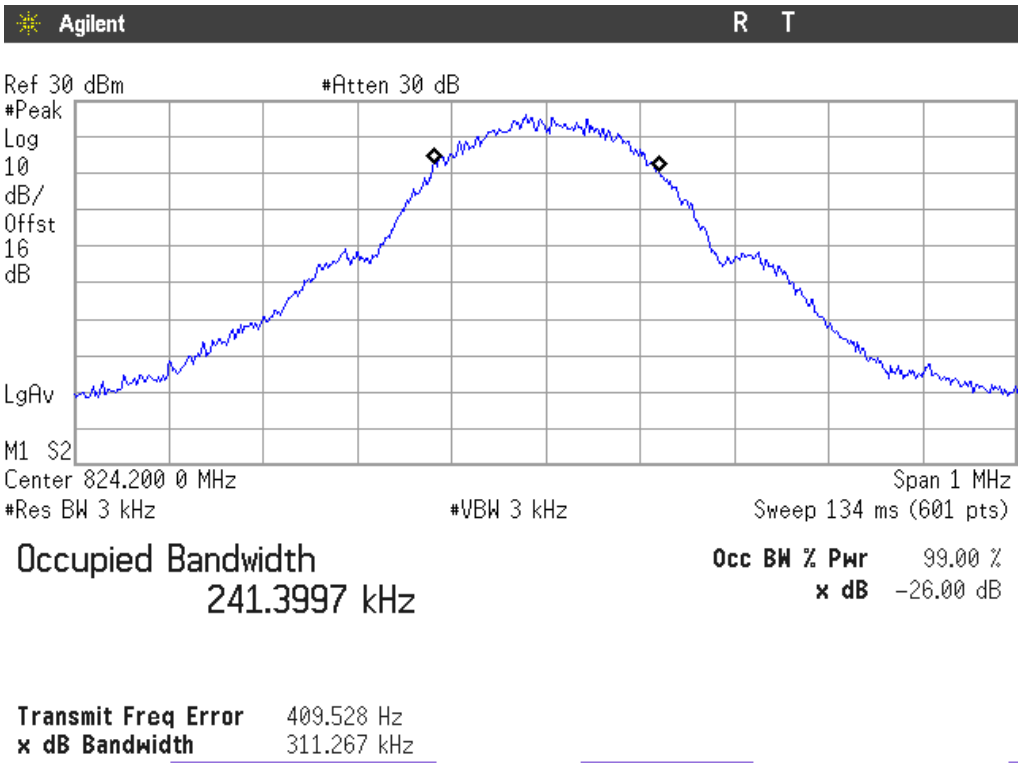
Channel	Lowest	Middle	Highest
99% Occupied bandwidth (kHz)	241.40	246.65	243.53
-26 dBc bandwidth (kHz)	311.27	317.48	314.96
Measurement uncertainty (kHz)	<±1.67		

EDGE MODULATION

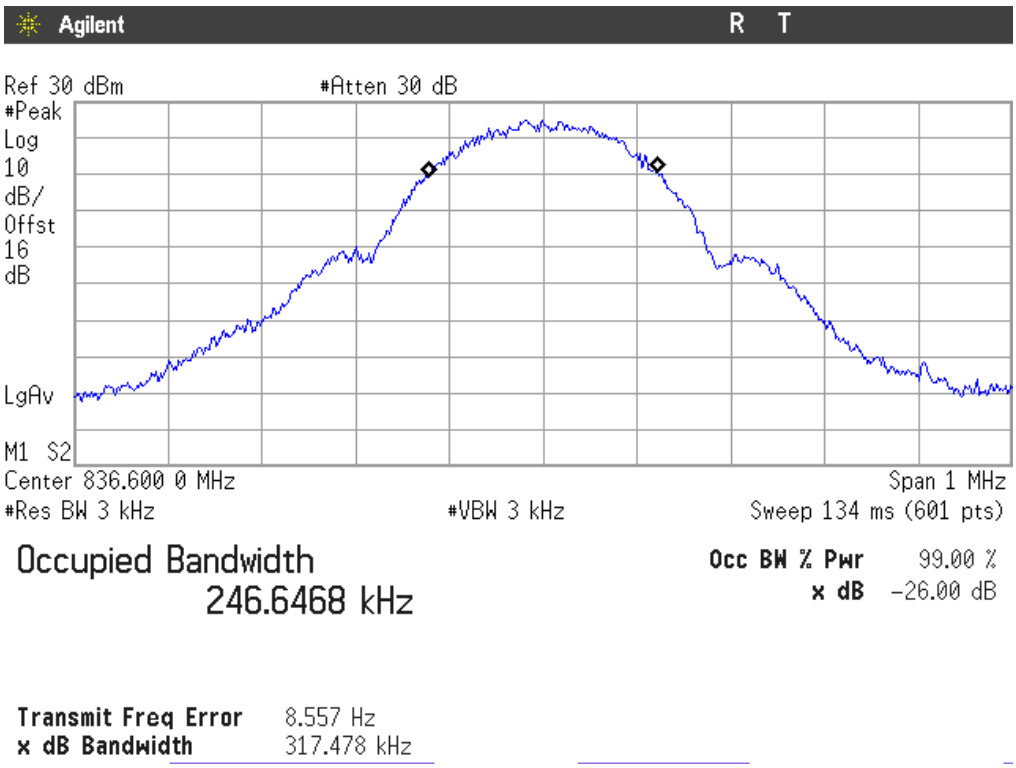
Channel	Lowest	Middle	Highest
99% Occupied bandwidth (kHz)	244.31	245.45	241.00
-26 dBc bandwidth (kHz)	309.61	311.13	306.83
Measurement uncertainty (kHz)	<±1.67		

GPRS MODULATION

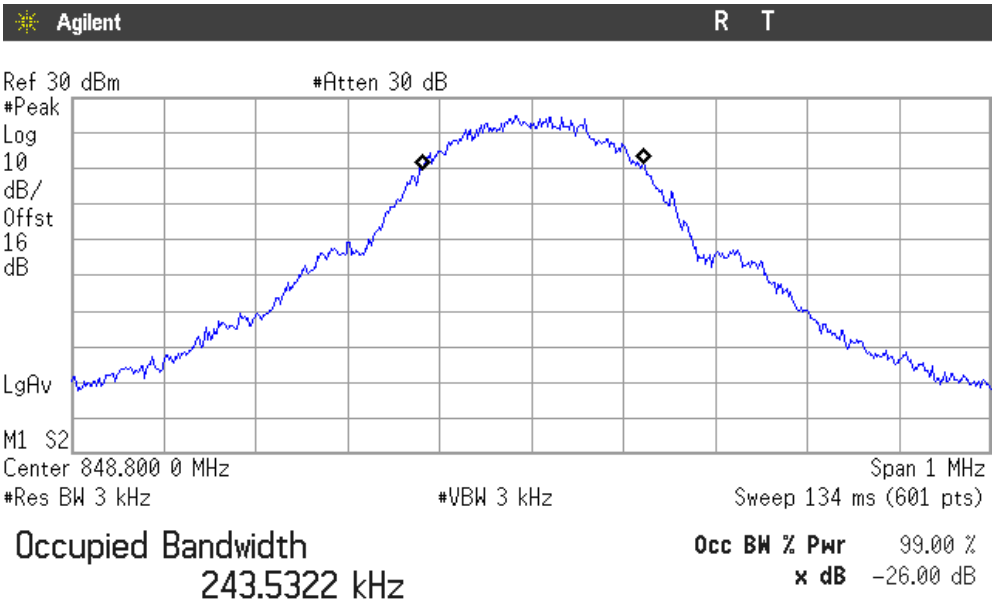
Lowest Channel



Middle Channel

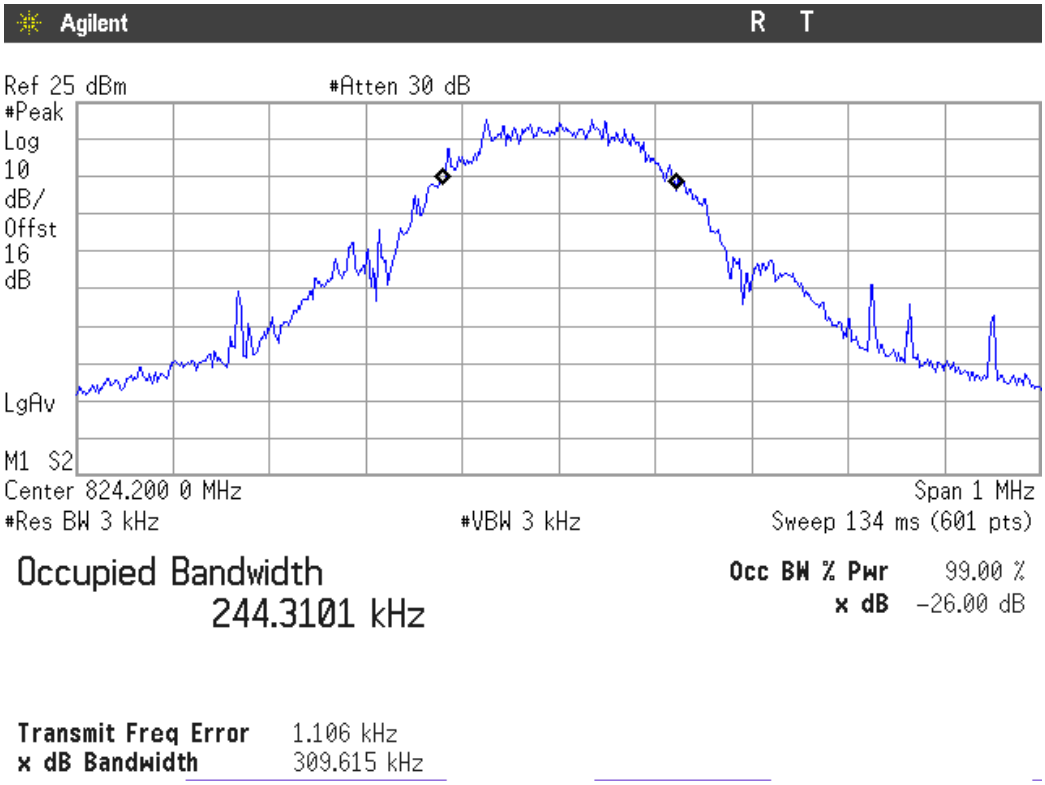


Highest Channel

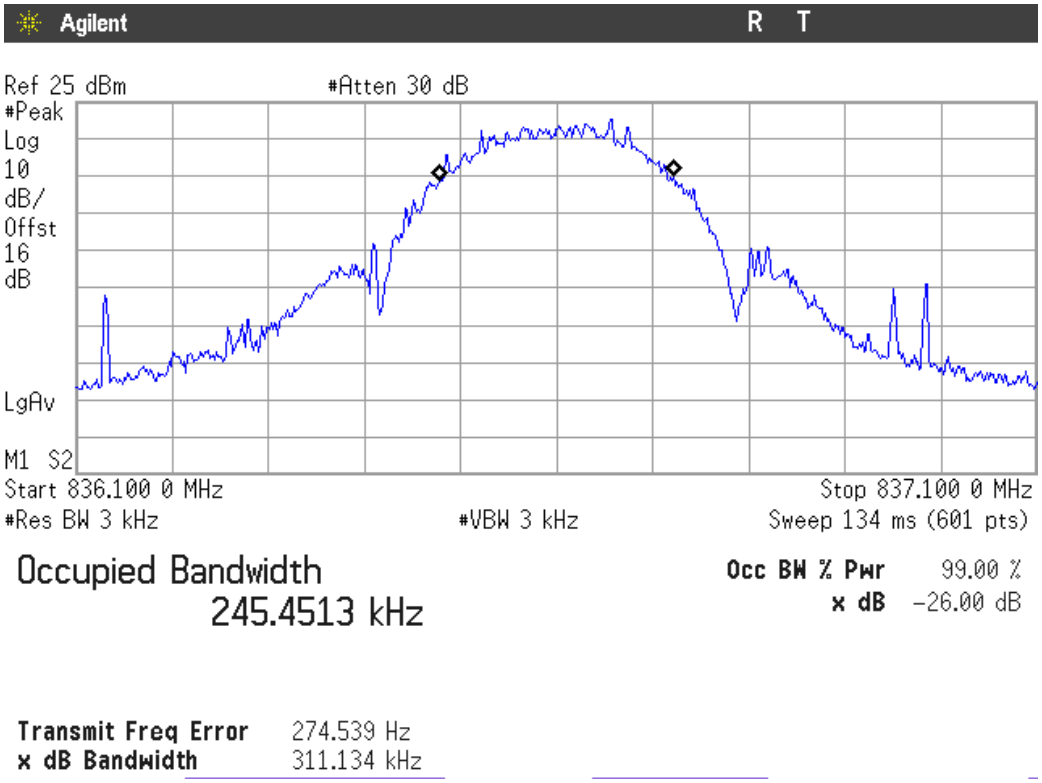


EDGE MODULATION

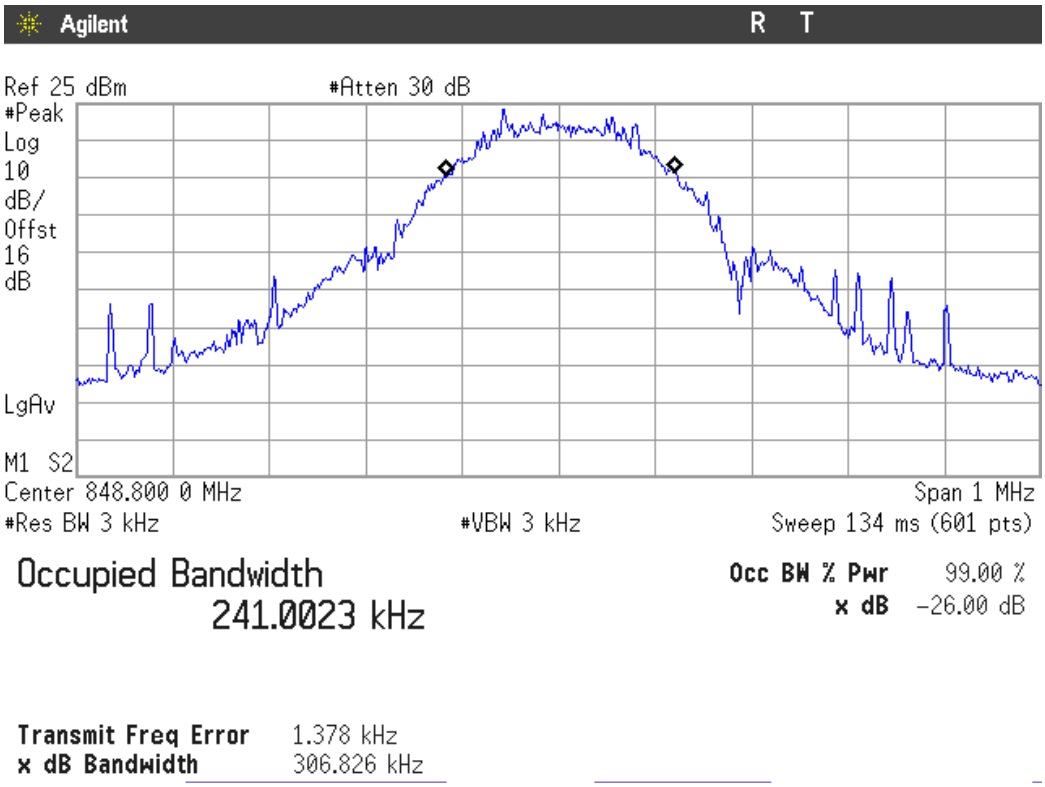
Lowest Channel



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.

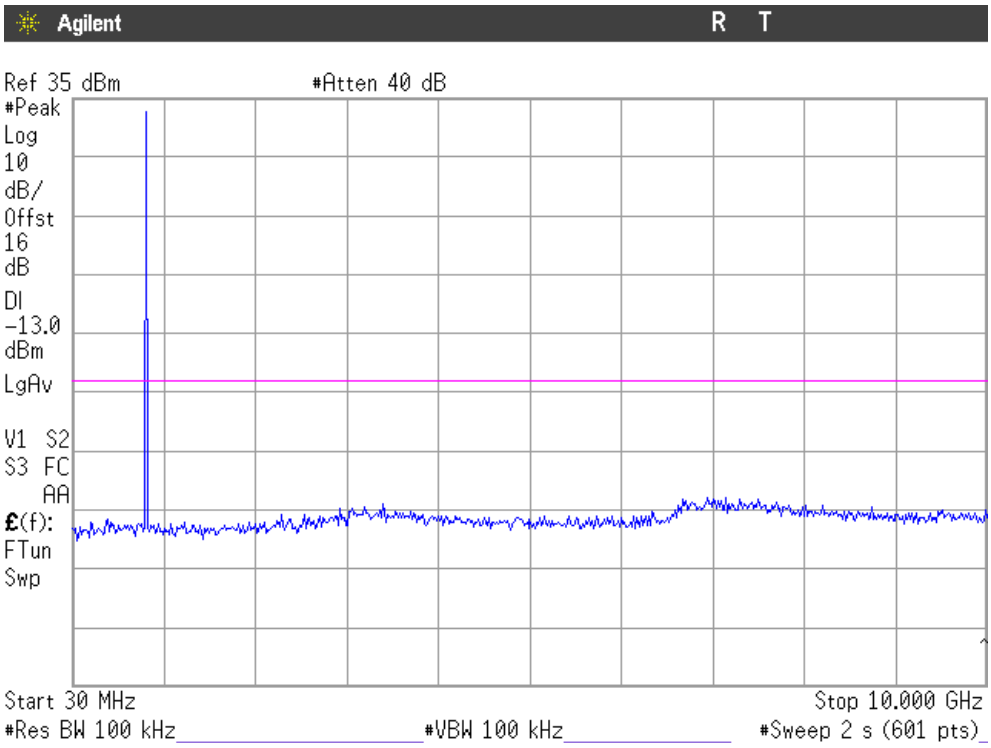
3. CHANNEL: HIGHEST

No spurious signals were found in all the range.

Verdict: PASS

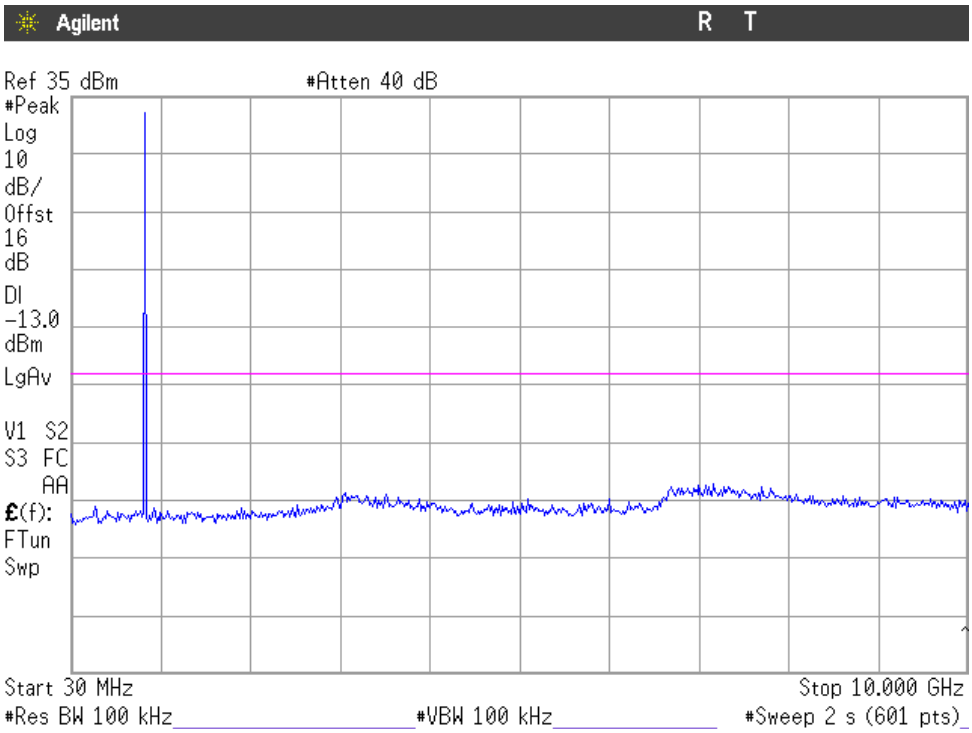
GPRS MODULATION

1. CHANNEL: LOWEST



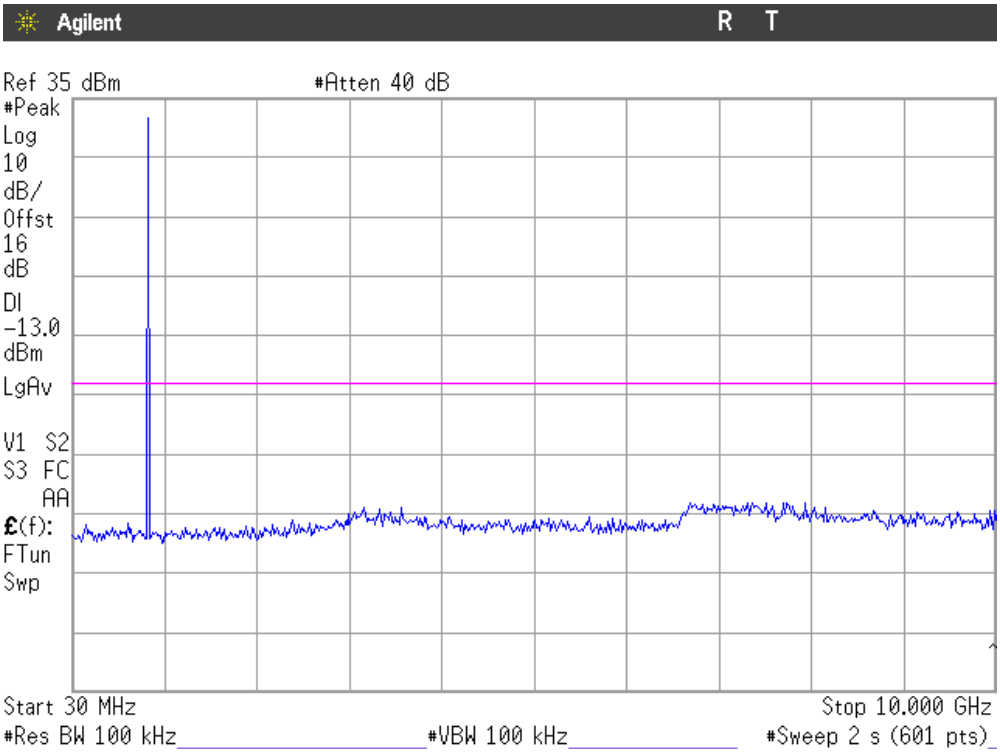
Note: The peak above the limit is the carrier frequency.

2. CHANNEL: MIDDLE



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

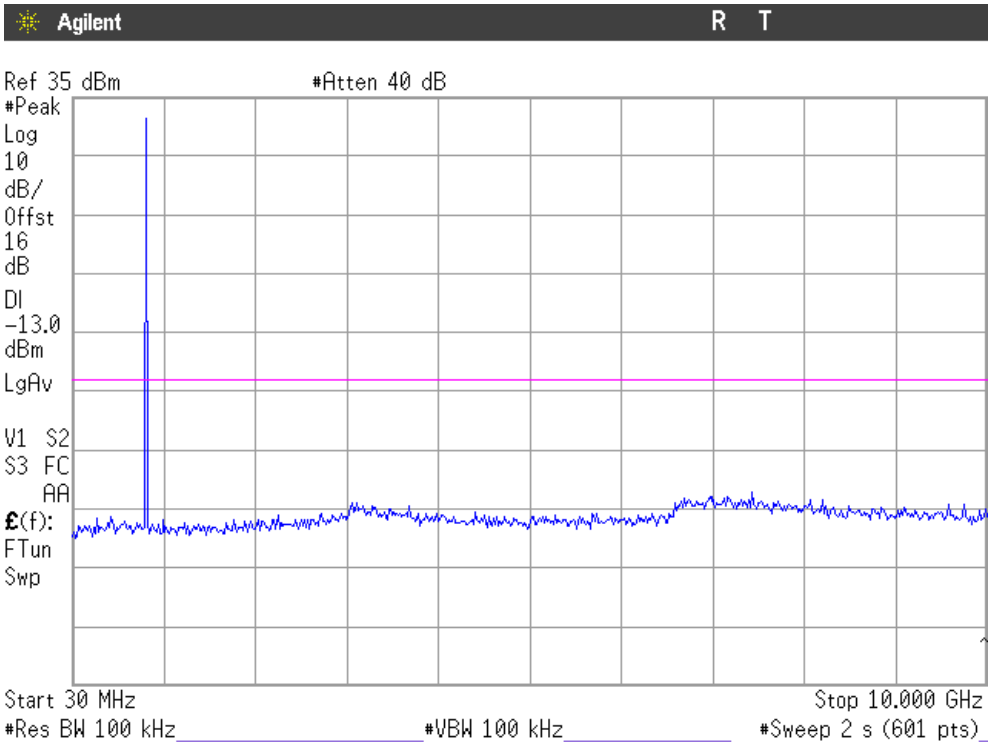
3. CHANNEL: HIGHEST



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

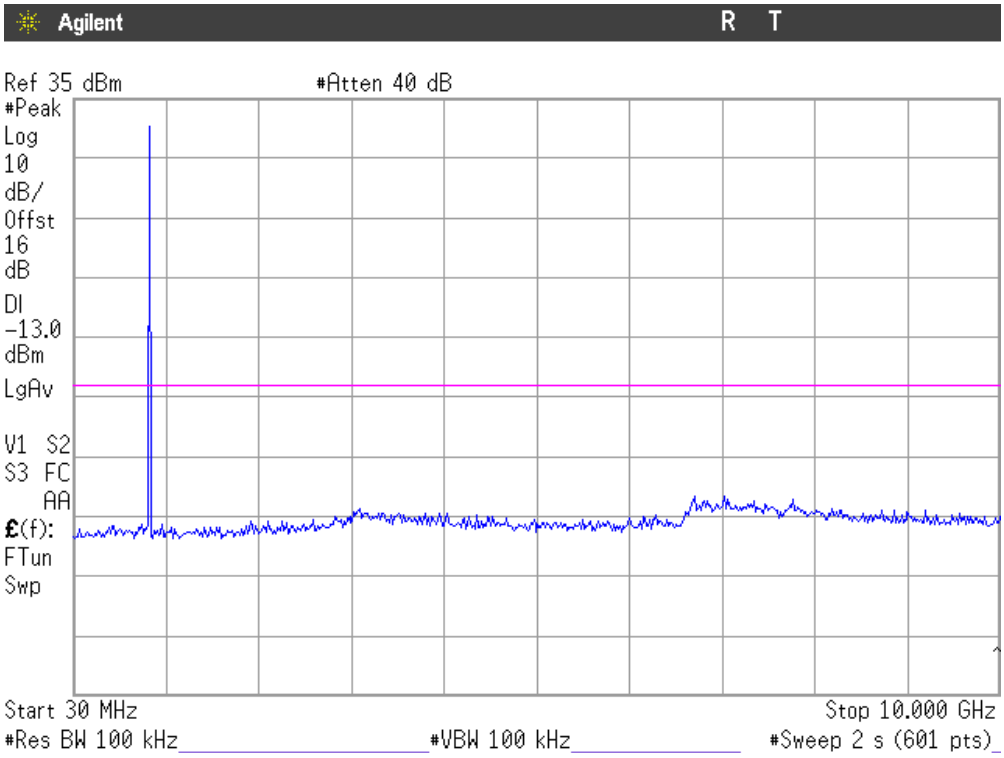
EDGE MODULATION

1. CHANNEL: LOWEST



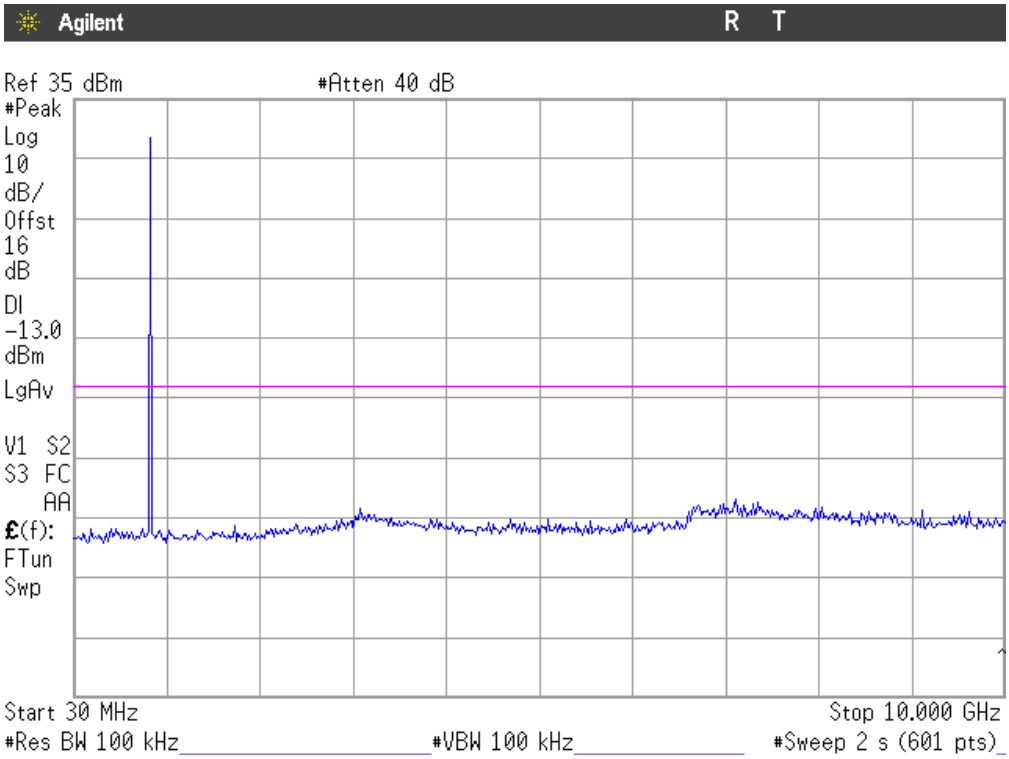
Note: The peak above the limit is the carrier frequency.

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.

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 (-26 dBc 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.

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

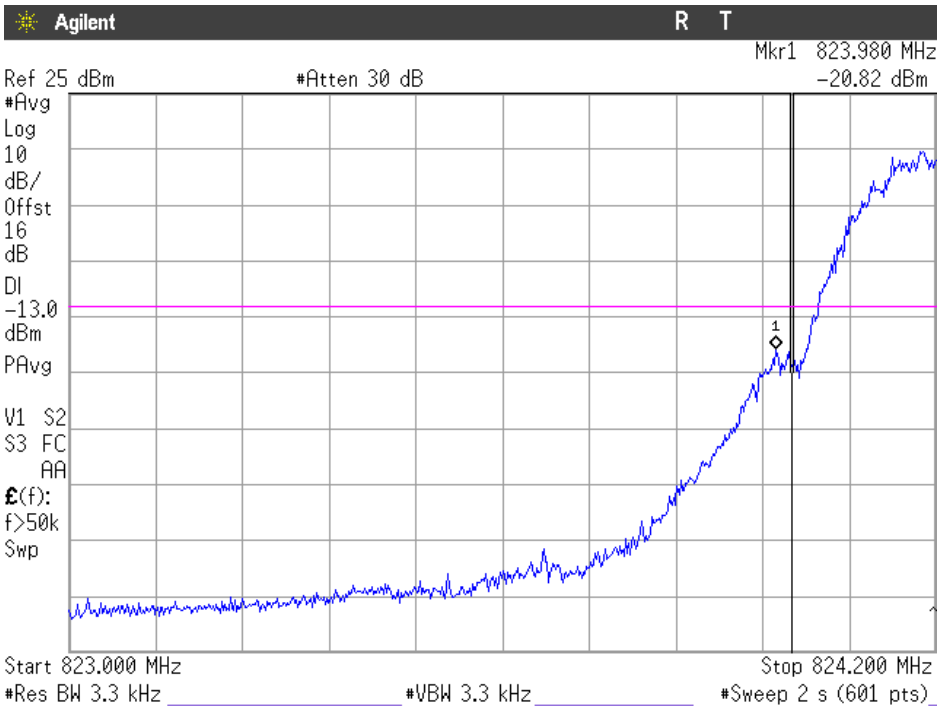
RESULTS (see plots in next pages)

MODULATION	Maximum level at lowest Block Edge (dBm)	Maximum level at highest Block Edge (dBm)
GPRS	-20.82	-21.25
EDGE	-23.48	-27.31

Measurement uncertainty = ±1.57 dB.

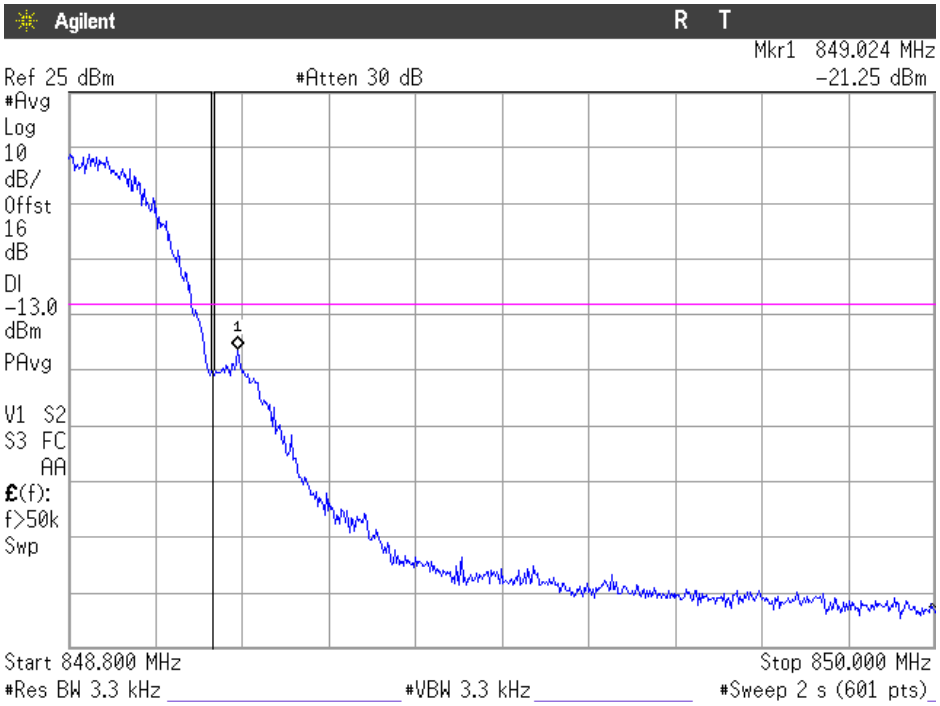
GPRS MODULATION

CHANNEL LOWEST



NOTE: The equipment transmits at the maximum output power

CHANNEL HIGHEST

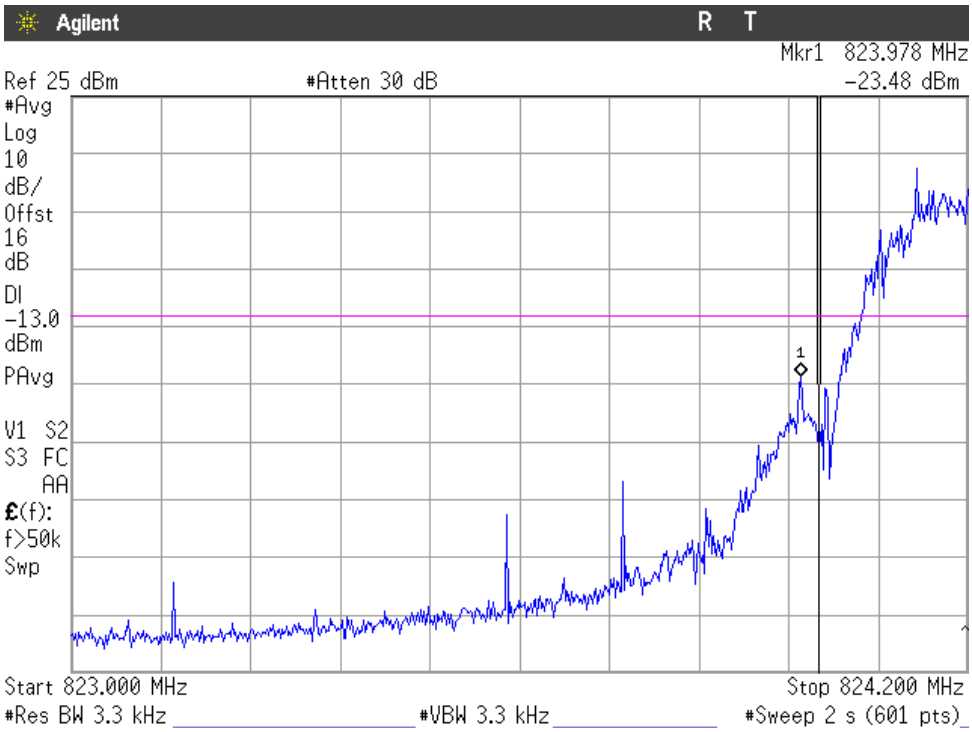


NOTE: The equipment transmits at the maximum output power

Verdict: PASS

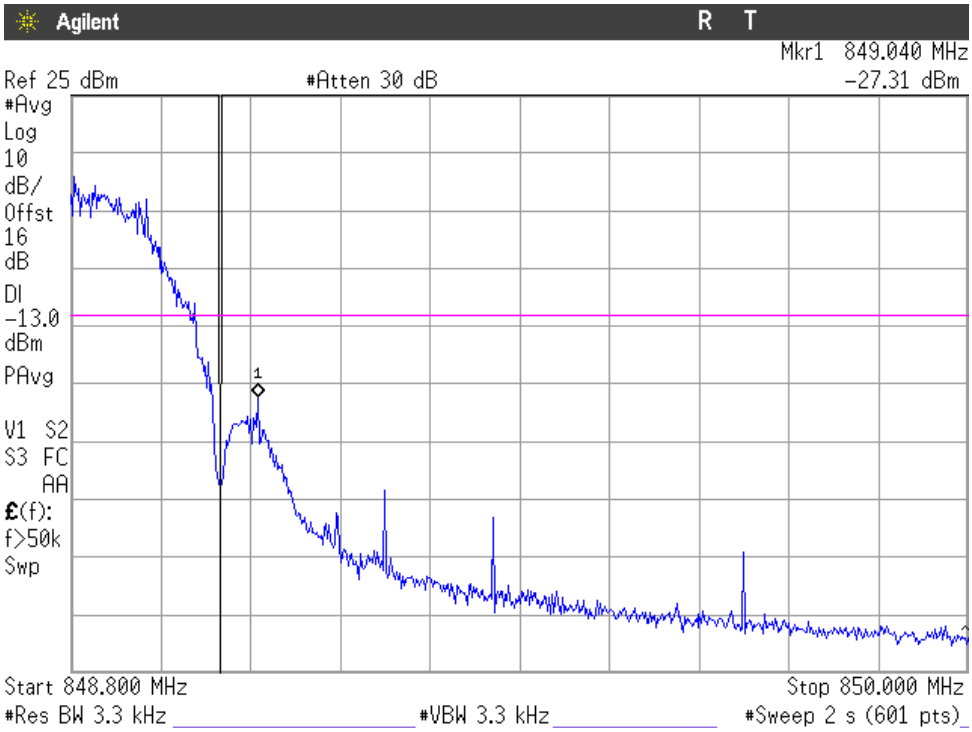
EDGE MODULATION

CHANNEL LOWEST



NOTE: The equipment transmits at the maximum output power

CHANNEL HIGHEST



NOTE: The equipment transmits at the maximum output power

Verdict: PASS

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.

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)
1648.4675	-61.84	Vertical	-34.84	1.90	6.40	-30.34
4121.3338	-54.74	Vertical	-47.66	2.50	10.51	-39.65

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.

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)
1673.3333	-62.97	Vertical	-35.97	1.90	6.40	-31.47
4182.8170	-55.58	Vertical	-48.50	2.50	10.51	-40.49

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)
1697.4830	-65.37	Vertical	-38.37	1.90	6.40	-33.87
4243.9330	-55.92	Vertical	-48.84	2.50	10.51	-40.83

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.

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)
1648.3175	-64.22	Vertical	-37.22	1.90	6.40	-32.72

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.

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)
1673.0805	-61.89	Vertical	-34.89	1.90	6.40	-30.39

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

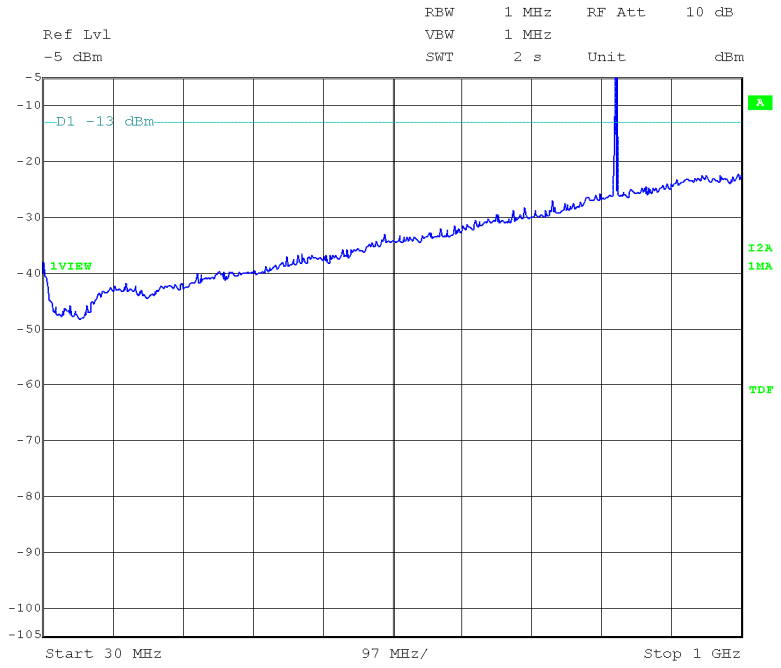
Frequency (MHz)	Instrument reading (dBm)	Polarization	(1) Generator output (dBm)	(2) Cable loss (dB)	(3) Substitution antenna gain Gi (respect to isotropic radiator) (dB)	E.I.R.P. (dBm) = (1) – (2) + (3)
1697.6508	-66.55	Vertical	-39.55	1.90	6.40	-35.05
4243.9500	-55.72	Vertical	-48.64	2.50	10.51	-40.63

Verdict: PASS

FREQUENCY RANGE 30 MHz-1000 MHz.

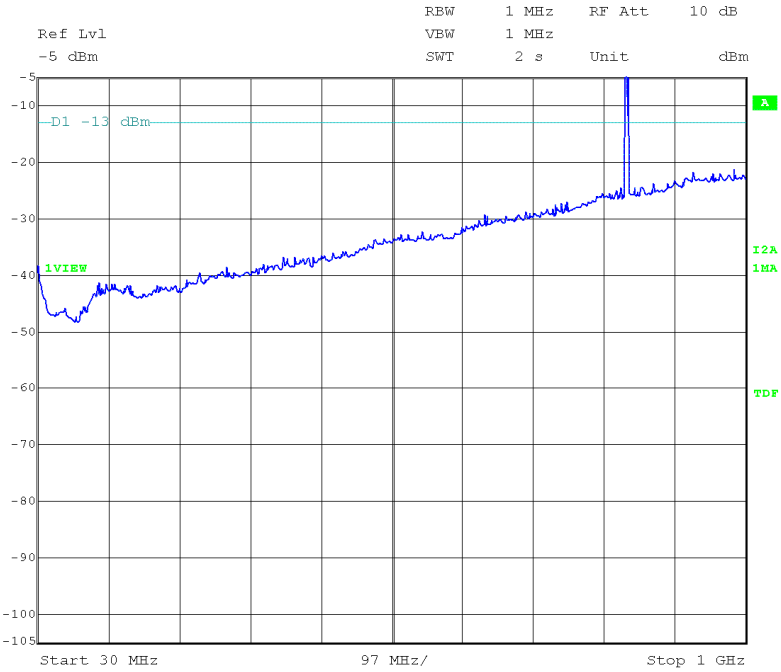
GPRS MODULATION

CHANNEL: LOWEST



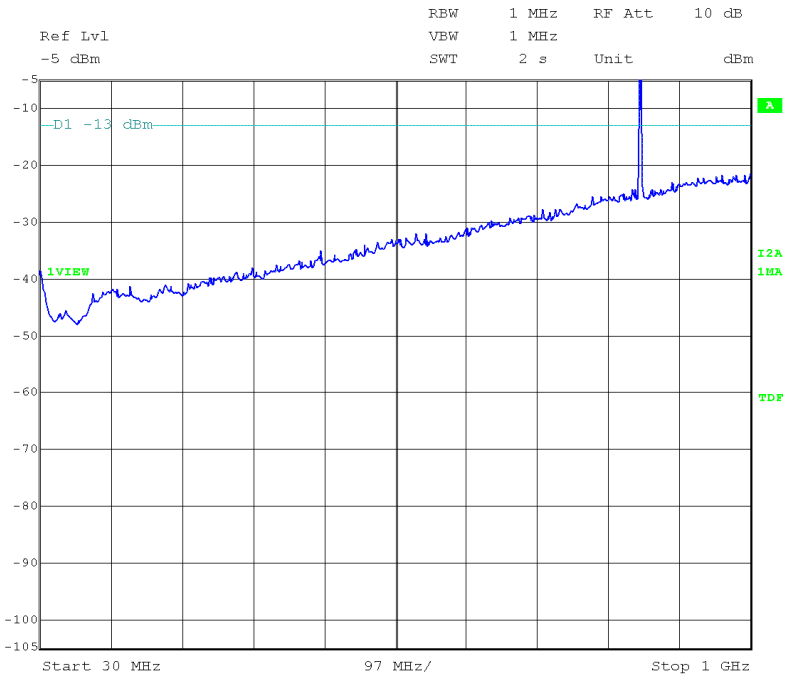
Note: The peak above the limit is the carrier frequency.

CHANNEL: MIDDLE



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

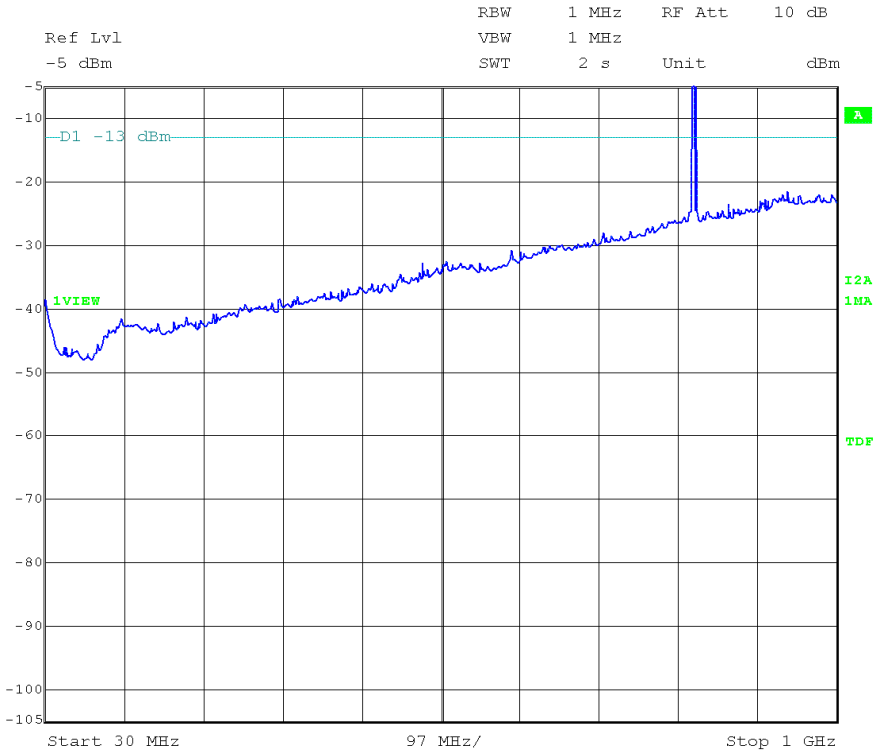
CHANNEL: HIGHEST



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

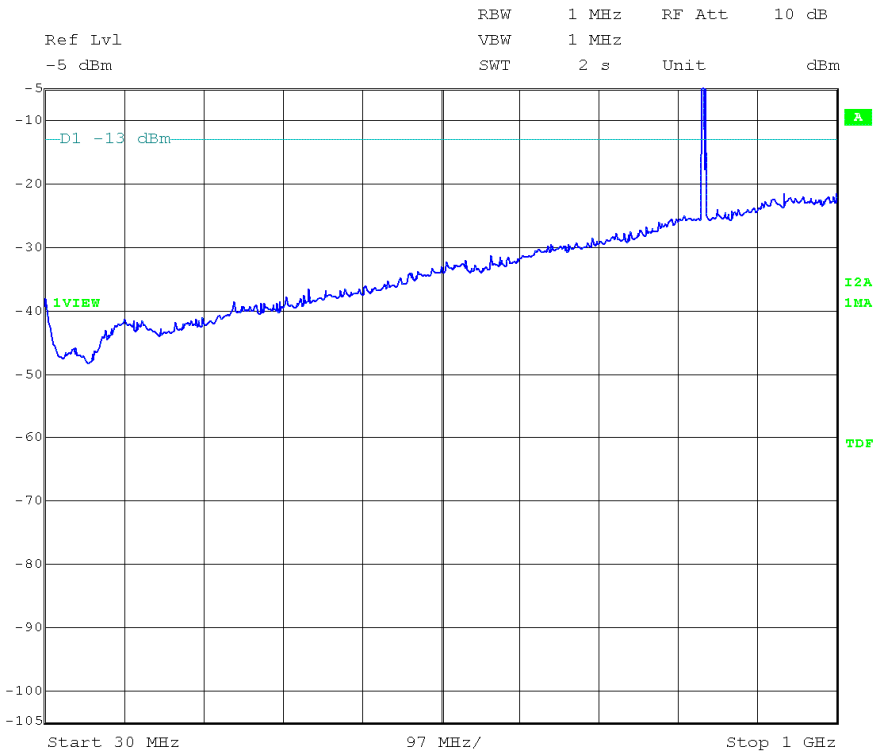
EDGE MODULATION

CHANNEL: LOWEST



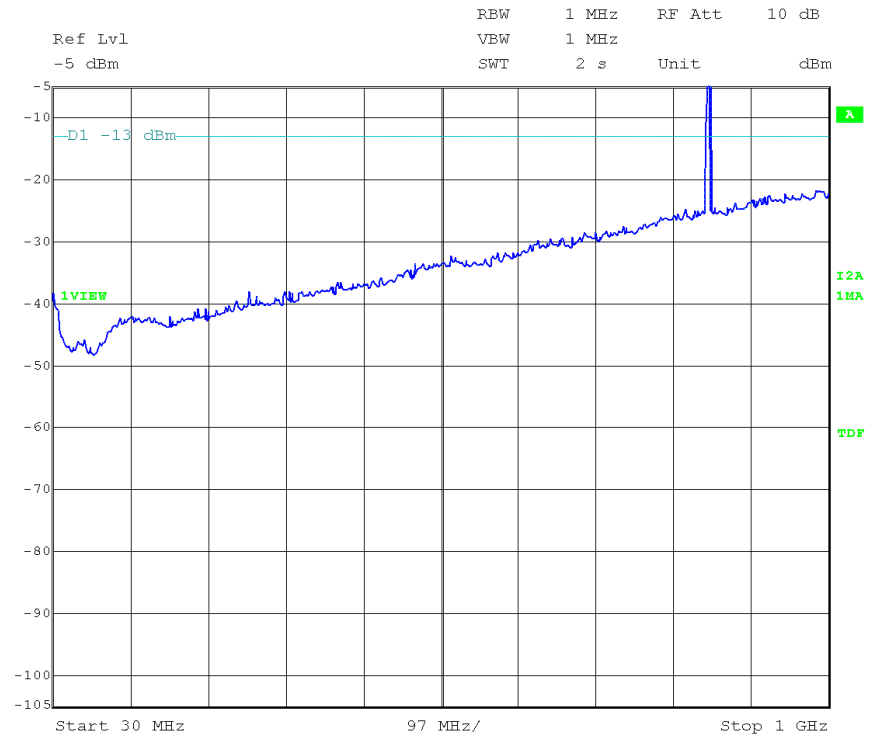
Note: The peak above the limit is the carrier frequency.

CHANNEL: MIDDLE



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

CHANNEL: HIGHEST

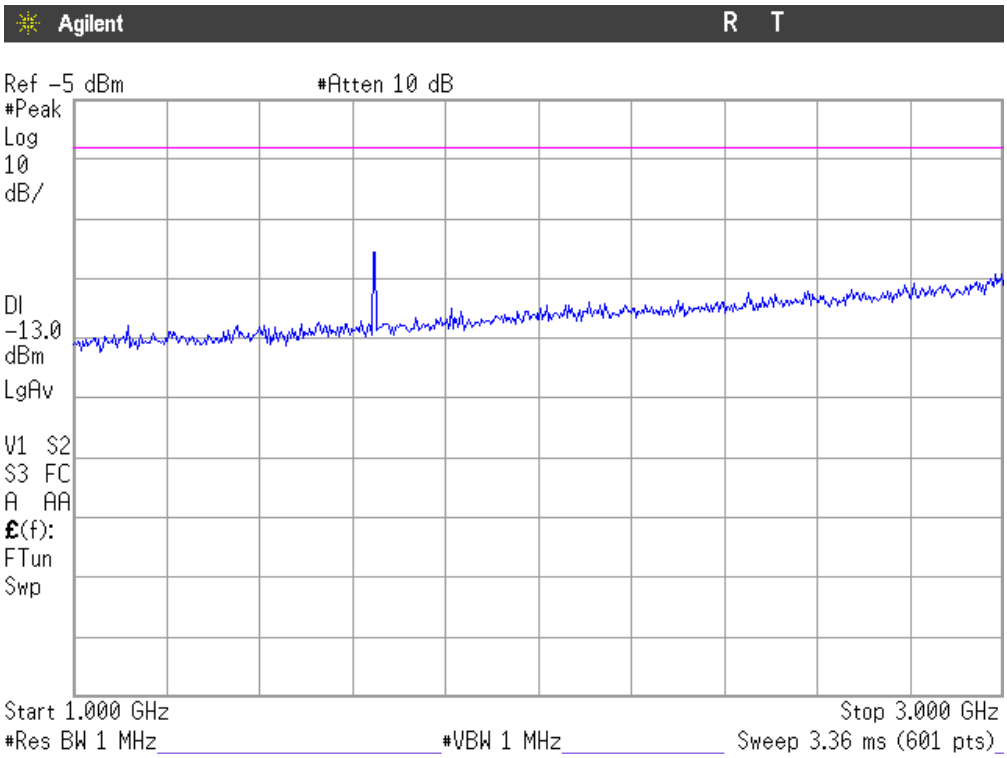


Note: The peak above the limit is the carrier frequency.

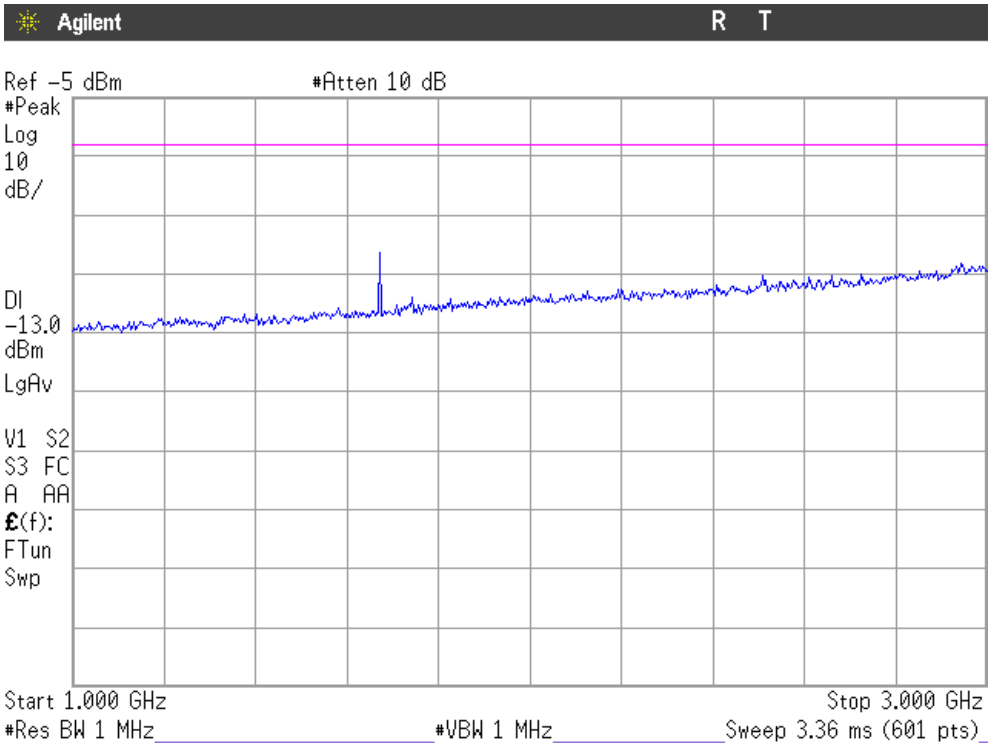
FREQUENCY RANGE 1 GHz to 3 GHz.

GPRS MODULATION

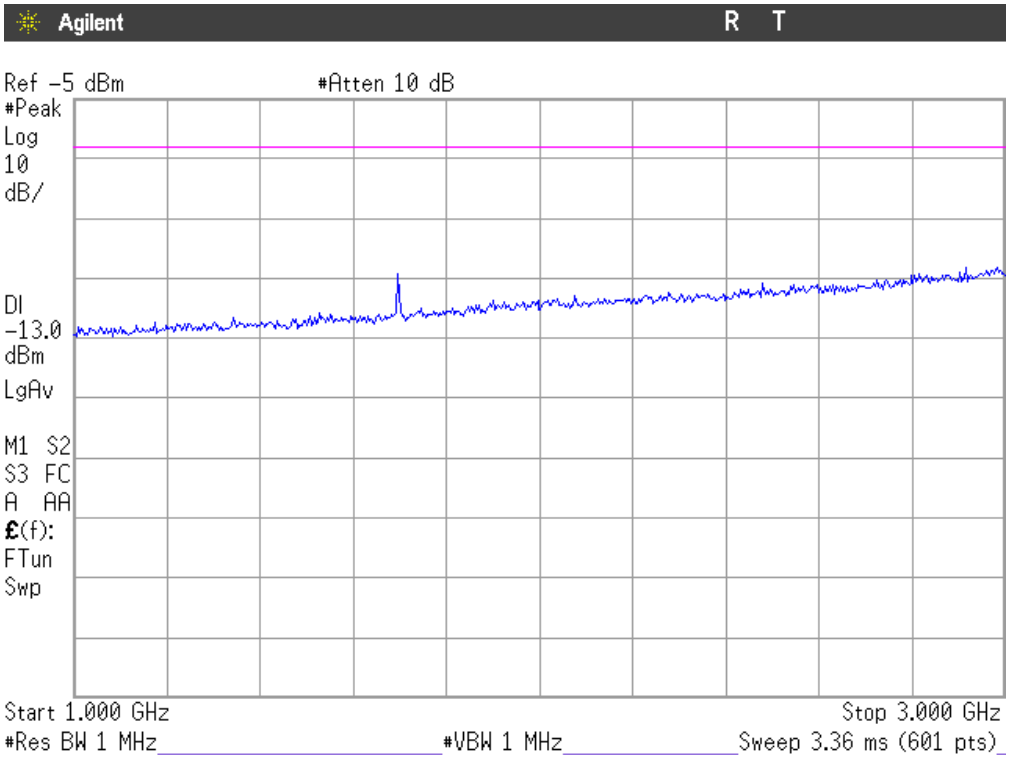
CHANNEL: LOWEST



CHANNEL: MIDDLE

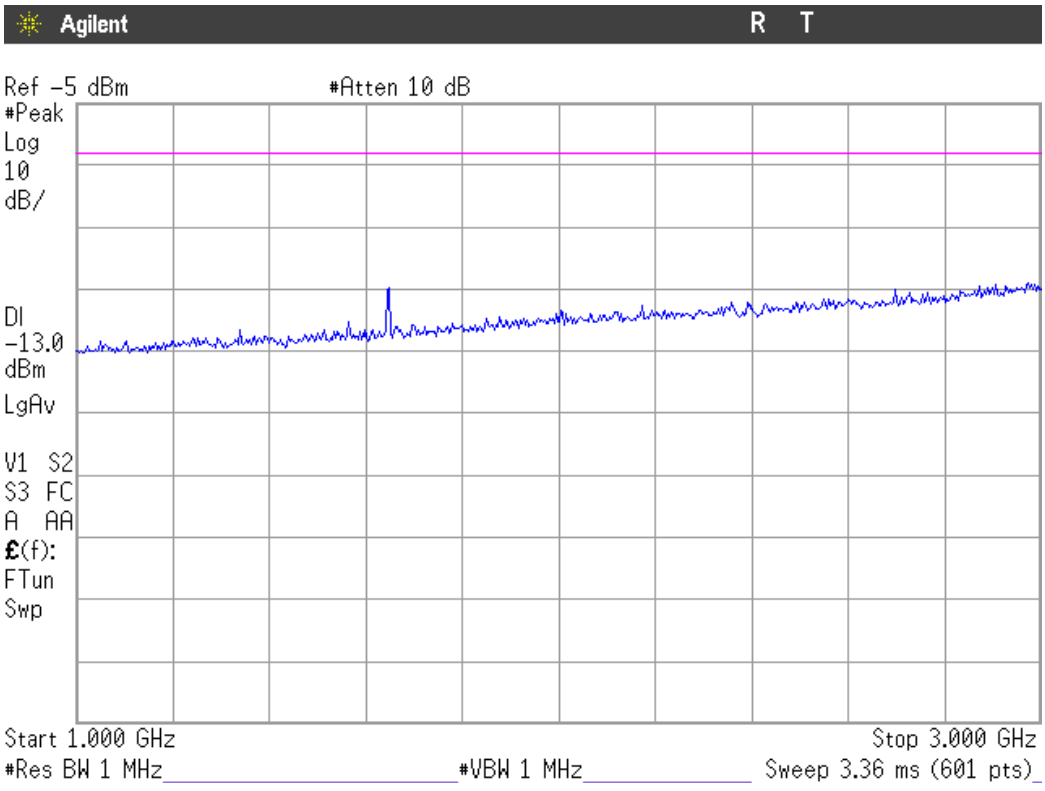


CHANNEL: HIGHEST

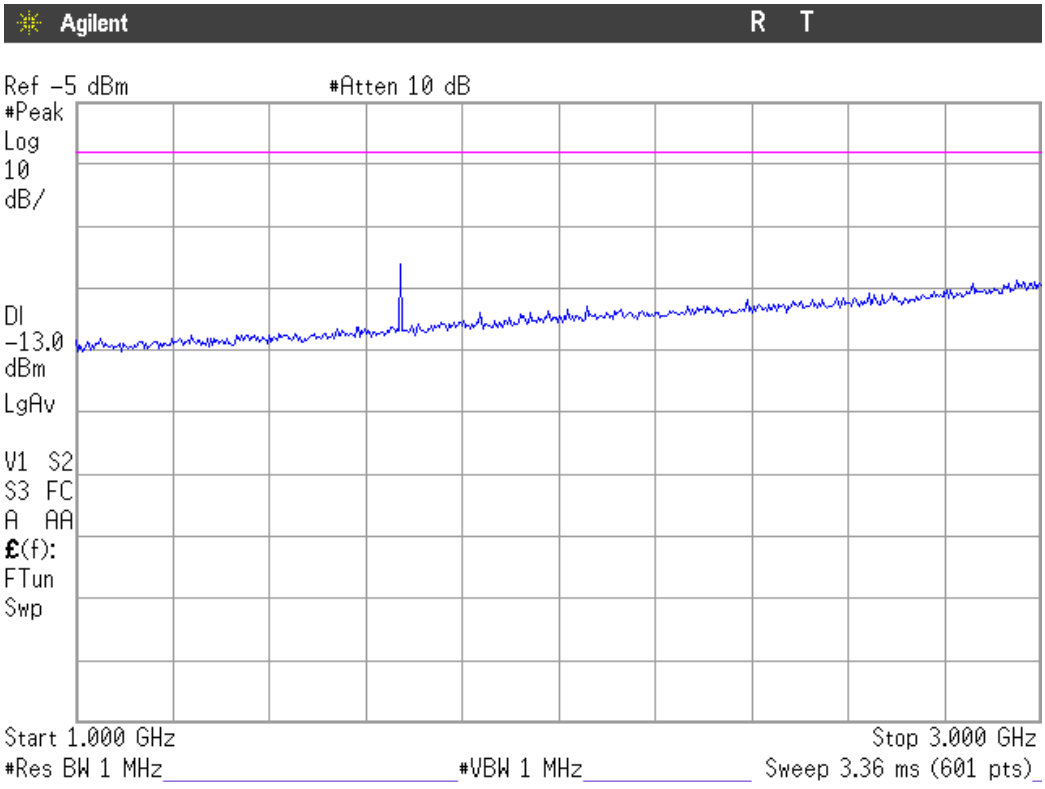


EDGE MODULATION

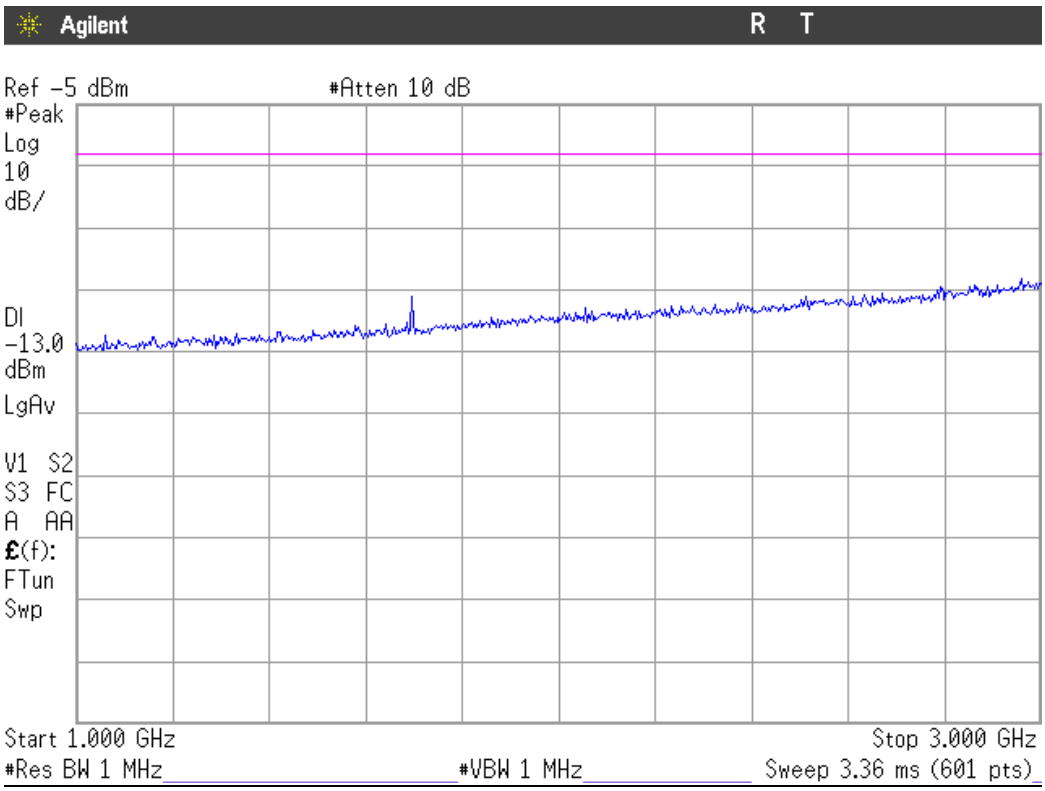
CHANNEL: LOWEST



CHANNEL: MIDDLE



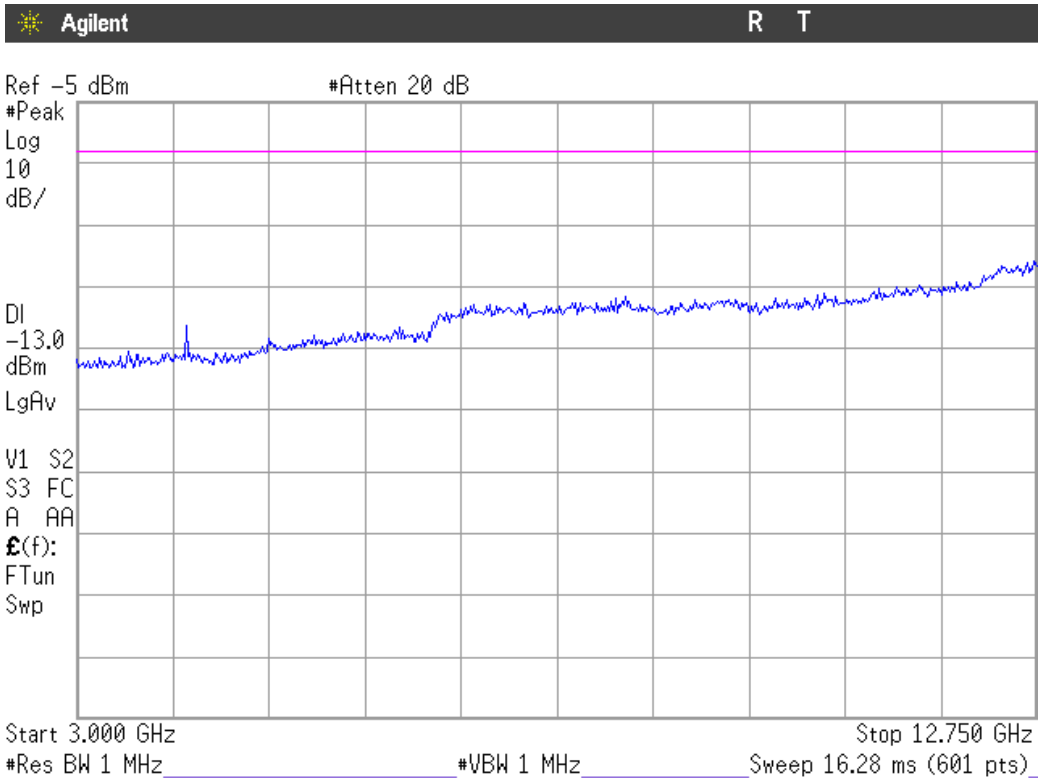
CHANNEL: HIGHEST



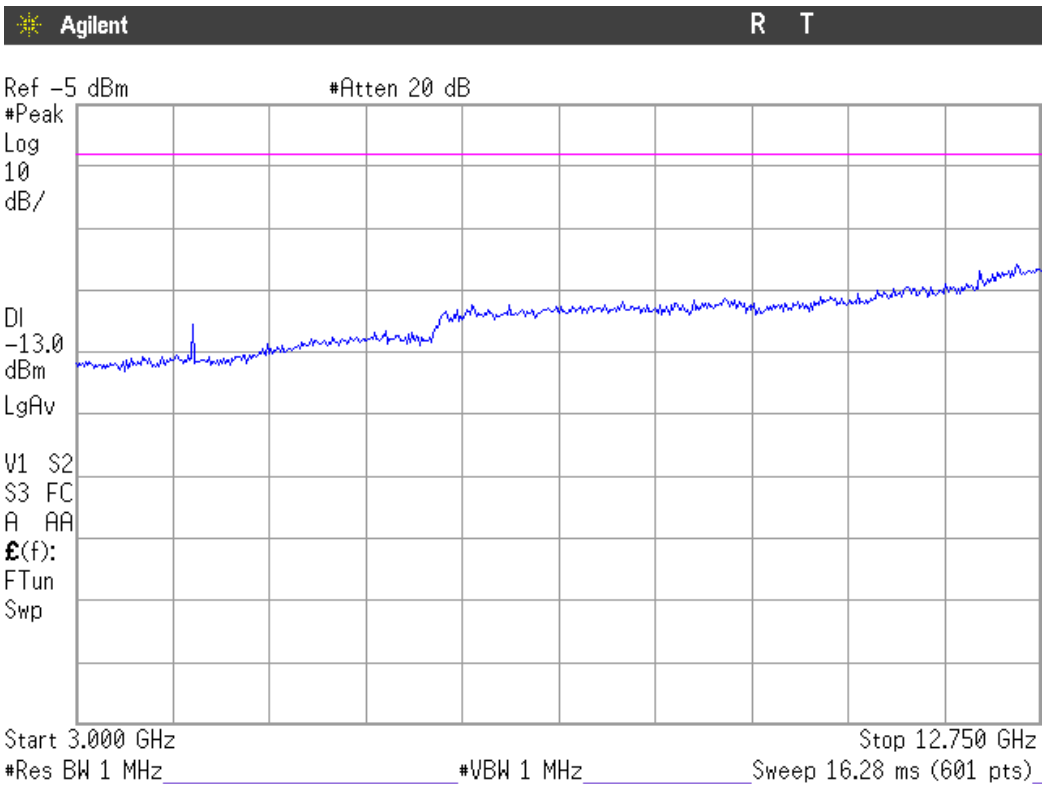
FREQUENCY RANGE 3 GHz to 12.75 GHz.

GPRS MODULATION

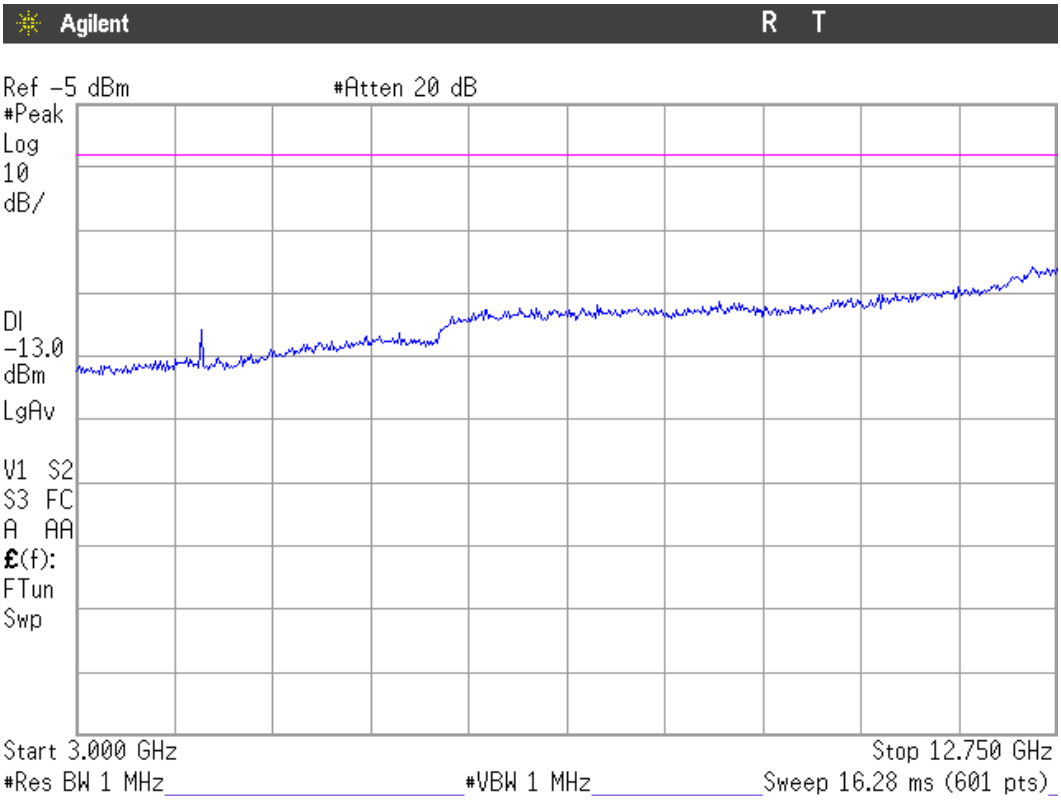
CHANNEL: LOWEST



CHANNEL: MIDDLE

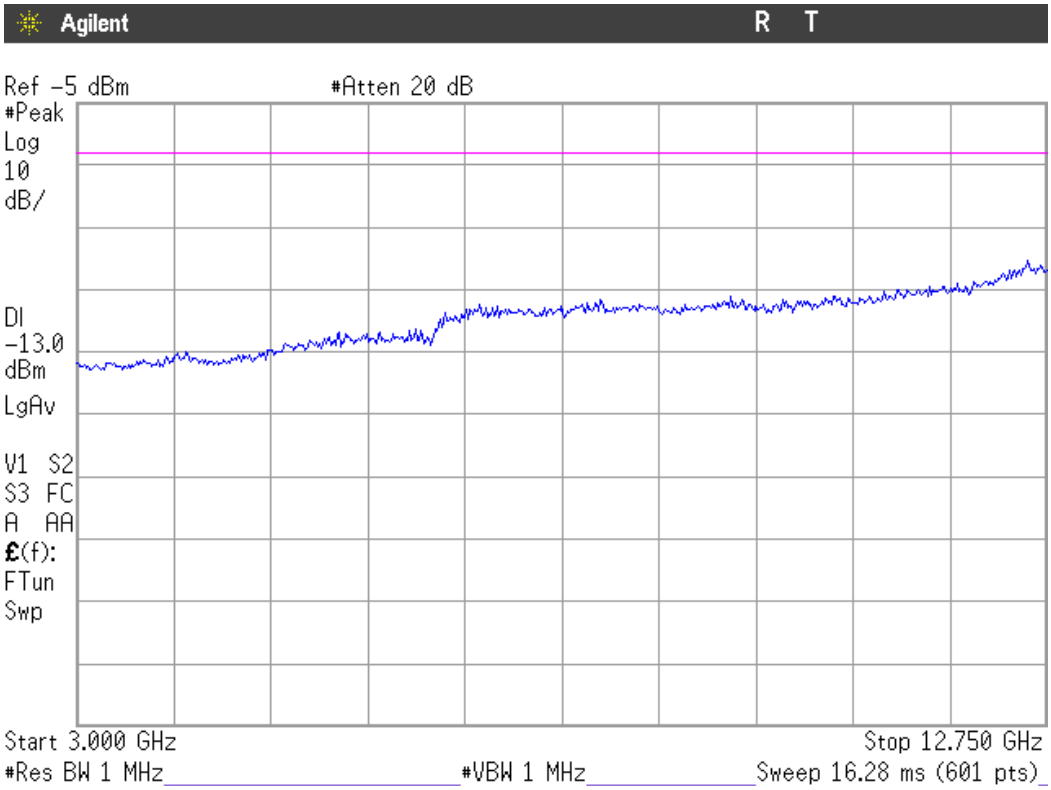


CHANNEL: HIGHEST

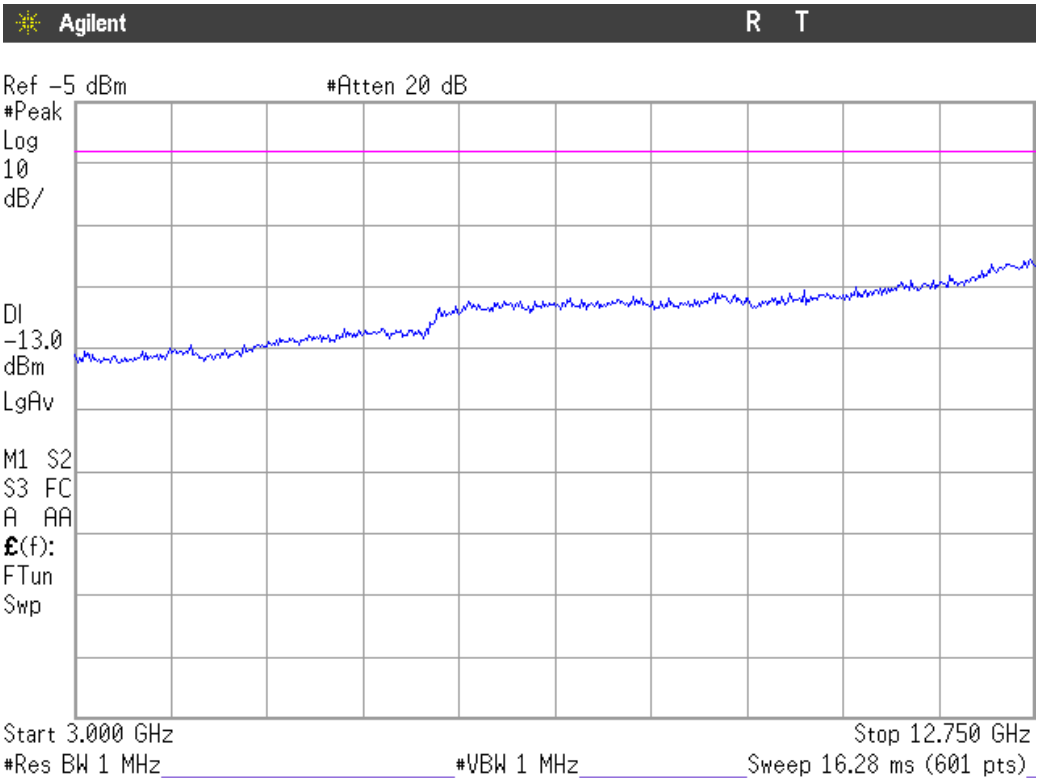


EDGE MODULATION

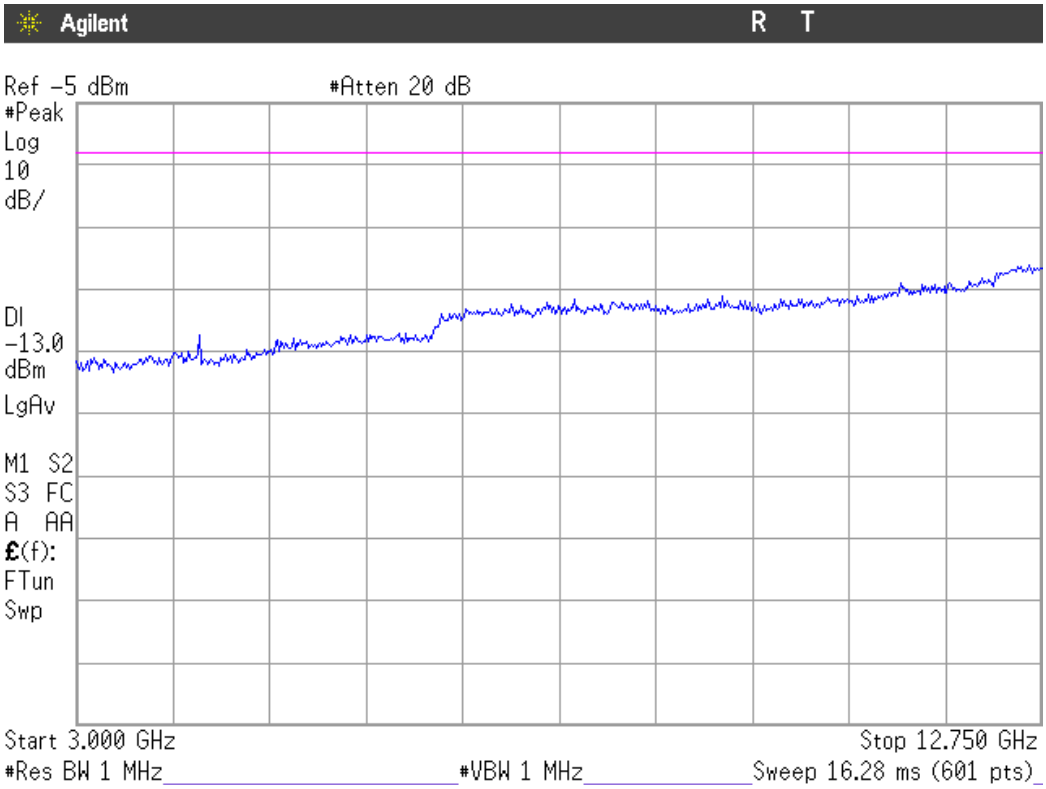
CHANNEL: LOWEST



CHANNEL: MIDDLE



CHANNEL: HIGHEST



TEST RESULTS FOR FCC PART 24

TEST CONDITIONS

Power supply (V):

V_{nom} = 3.8 Vdc

V_{max} = 4.2 Vdc

V_{min} = 3.4 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

TEST FREQUENCIES:

Lowest channel (512): 1850.2 MHz

Middle channel (662): 1880.2 MHz

Highest channel (810): 1909.8 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) Effective Isotropic Radiated Power (E.I.R.P.) peak power.

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.

For radiated measurements the EUT was placed on a 1 m high non-conductive stand inside an anechoic chamber. The measuring antenna was placed at 1 m distance and the maximum field strength was measured for the three channels. 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 Effective Isotropic Radiated Power (E.I.R.P.) is obtained by using the Substitution Method according to ANSI/TIA/EIA-603-C: 2004.

RESULTS

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

GPRS MODULATION

Channel	Lowest	Middle	Highest
Maximum peak power (dBm)	30.23	30.16	30.05
Maximum peak power (W)	1.05	1.04	1.12
Measurement uncertainty (dB)	±0.5		

EDGE MODULATION

Channel	Lowest	Middle	Highest
Maximum peak power (dBm)	30.20	30.15	30.06
Maximum peak power (W)	1.05	1.03	1.01
Measurement uncertainty (dB)	±0.5		

MAXIMUM EFFECTIVE ISOTROPIC RADIATED POWER E.I.R.P. (RADIATED).

GPRS MODULATION

Substitution method data

Frequency (MHz) at max. reading	Max. Instrument reading (dBm)	Polarization	(1) RF Generator +power amplifier output (dBm)	(2) Cable loss (dB)	(3) Substitution antenna gain Gi (respect to isotropic radiator) (dB)	E.I.R.P. (dBm) = (1) – (2) + (3)
1850.1507	-5.44	Vertical	18.96	0.5	8.6	27.06
1880.2008	-4.75	Vertical	20.15	0.5	8.3	27.95
1909.8504	-4.09	Vertical	21.21	0.5	8.0	28.71

RBW = VBW = 1 MHz

Channel	Lowest	Middle	Highest
Maximum peak power (dBm)	27.06	27.95	28.71
Maximum peak power (W)	0.51	0.62	0.74
Measurement uncertainty (dB)	± 4.0		

EDGE MODULATION

Substitution method data

Frequency (MHz) at max. reading	Max. Instrument reading (dBm)	Polarization	(1) RF Generator +power amplifier output (dBm)	(2) Cable loss (dB)	(3) Substitution antenna gain Gi (respect to isotropic radiator) (dB)	E.I.R.P. (dBm) = (1) – (2) + (3)
1850.1505	-5.15	Vertical	19.25	0.5	8.6	27.35
1880.2178	-4.52	Vertical	20.38	0.5	8.3	28.18
1909.8005	-3.91	Vertical	21.39	0.5	8.0	28.89

RBW = VBW = 1 MHz

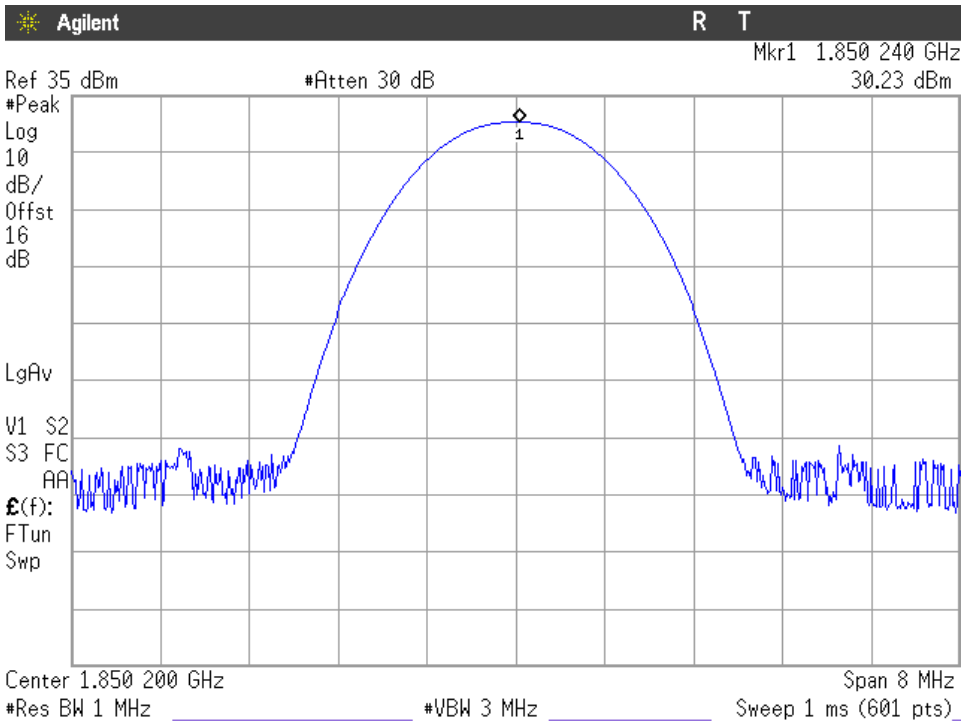
Channel	Lowest	Middle	Highest
Maximum peak power (dBm)	27.35	28.18	28.89
Maximum peak power (W)	0.54	0.66	0.77
Measurement uncertainty (dB)	± 4.0		

Verdict: PASS

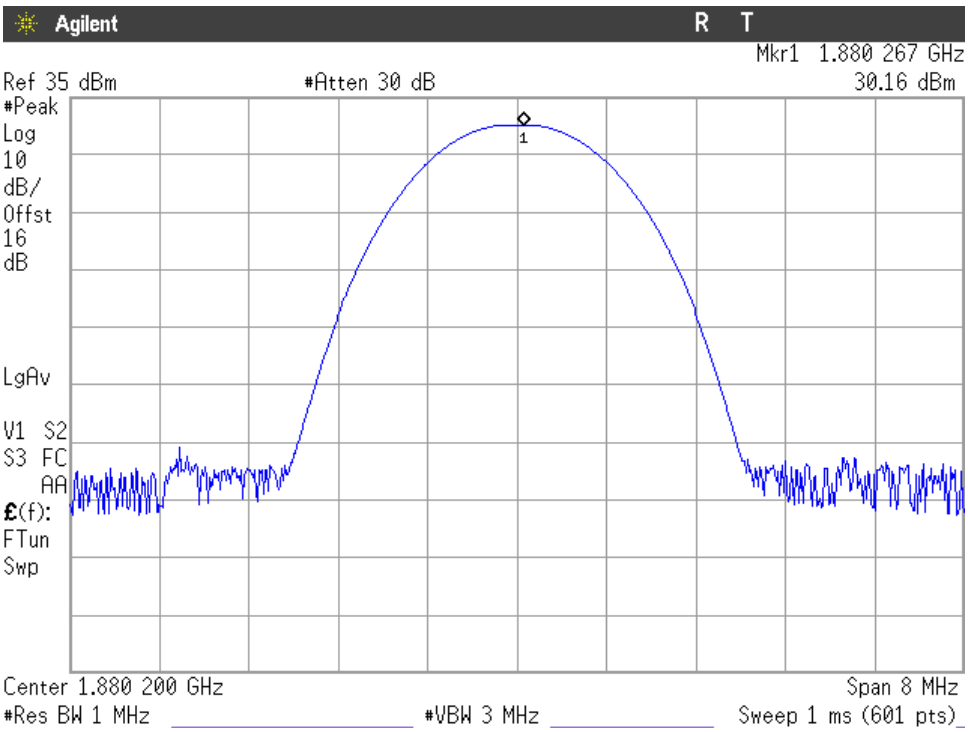
PEAK OUTPUT POWER (CONDUCTED).

GPRS MODULATION

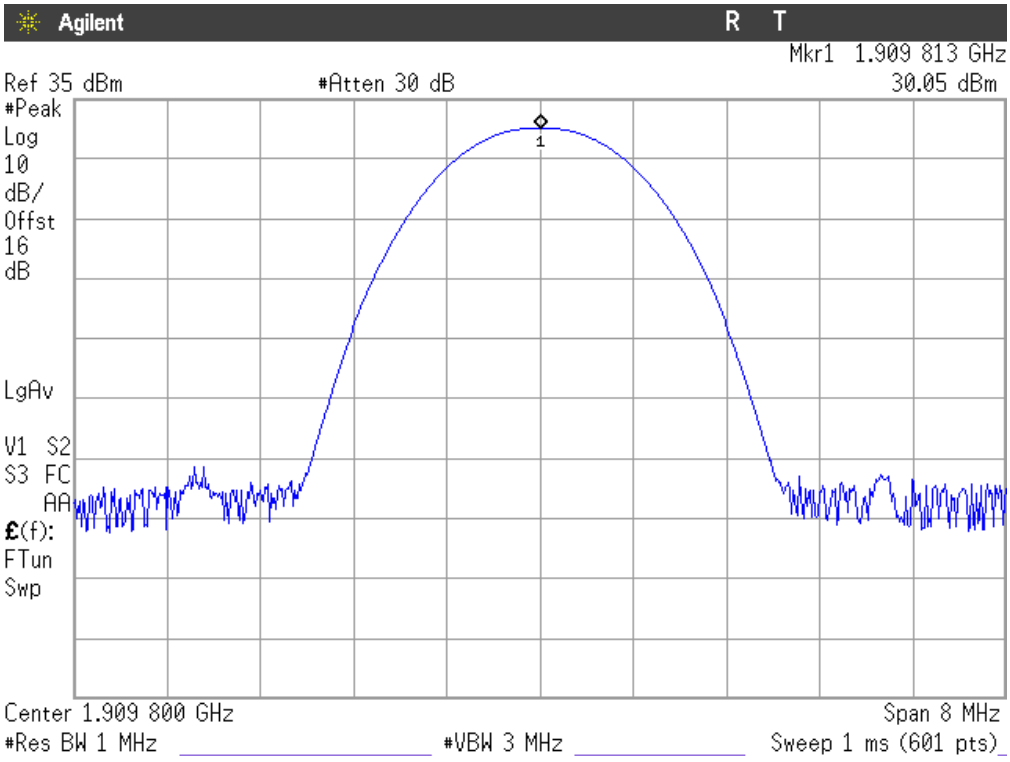
Lowest Channel.



Middle Channel.

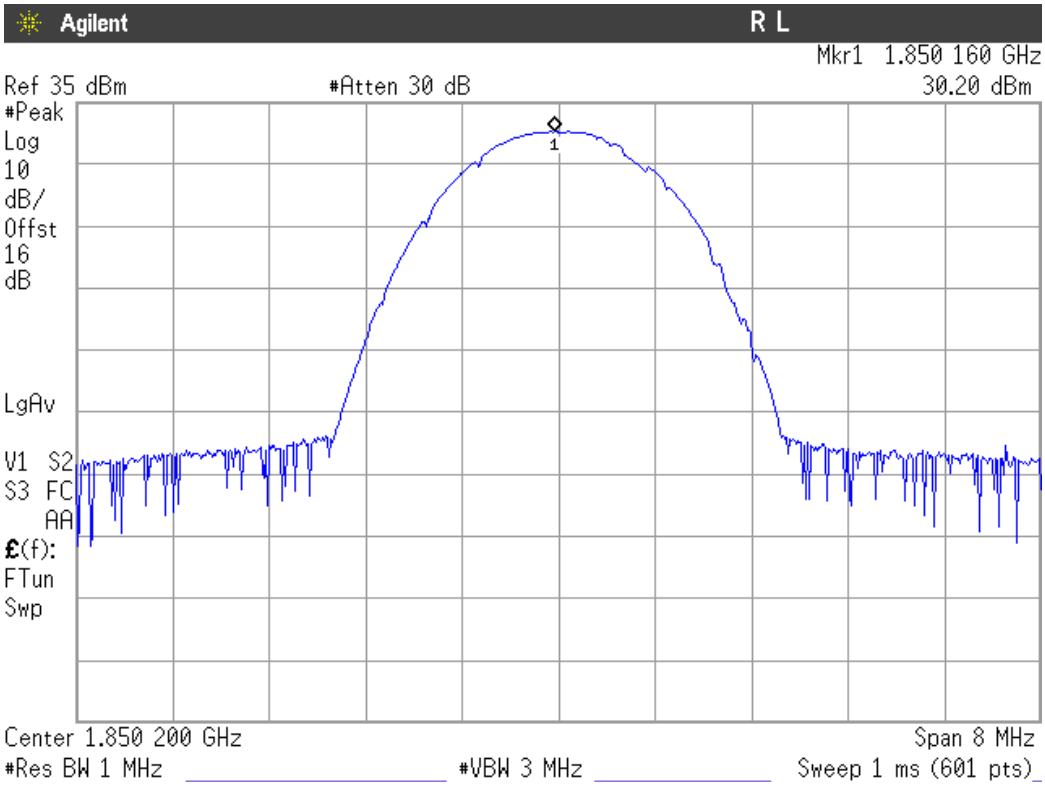


Highest Channel.

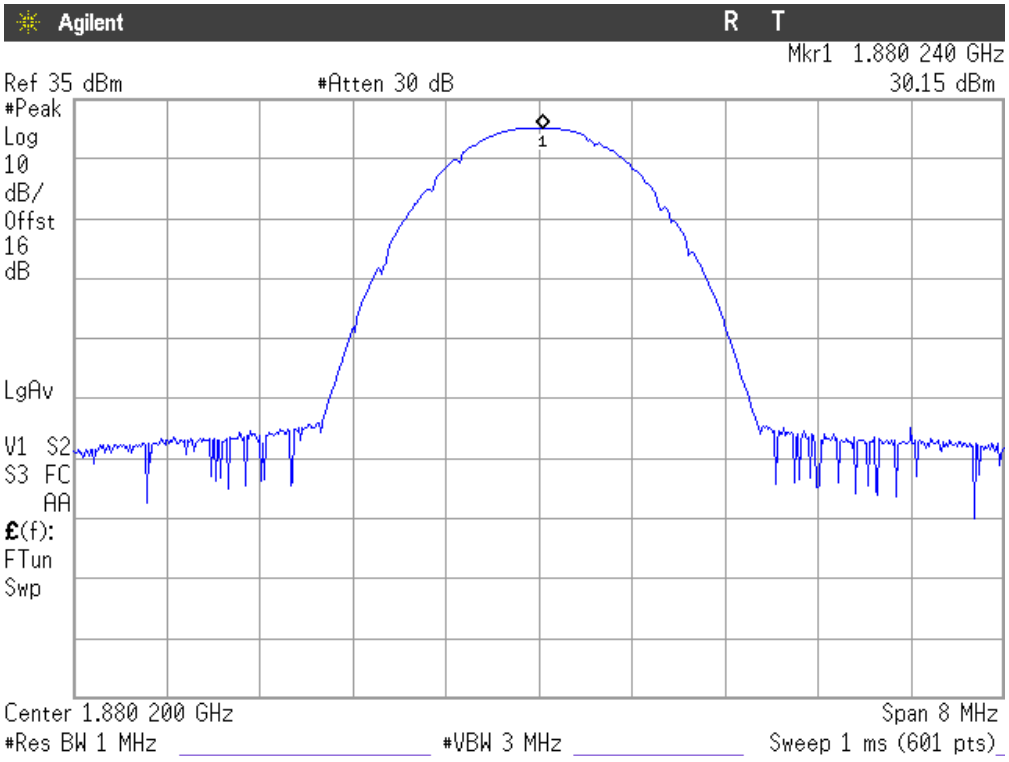


EDGE MODULATION

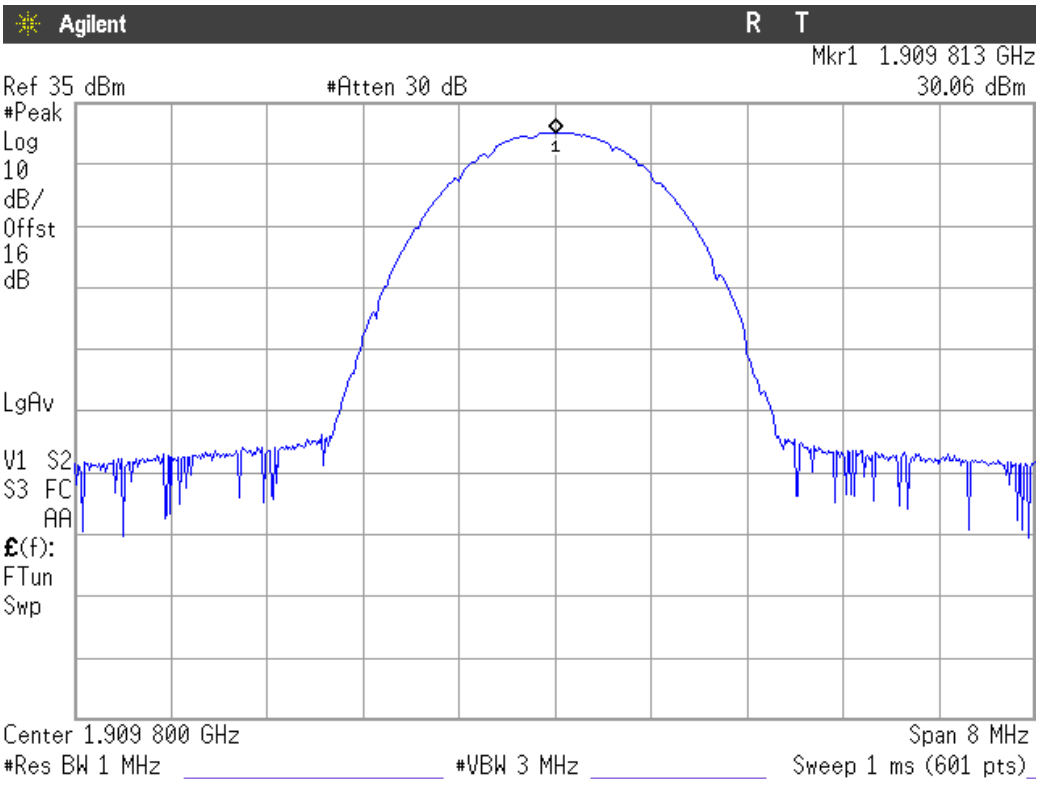
Lowest Channel.



Middle Channel.



Highest Channel.



Modulation Characteristics

SPECIFICATION

§2.1047

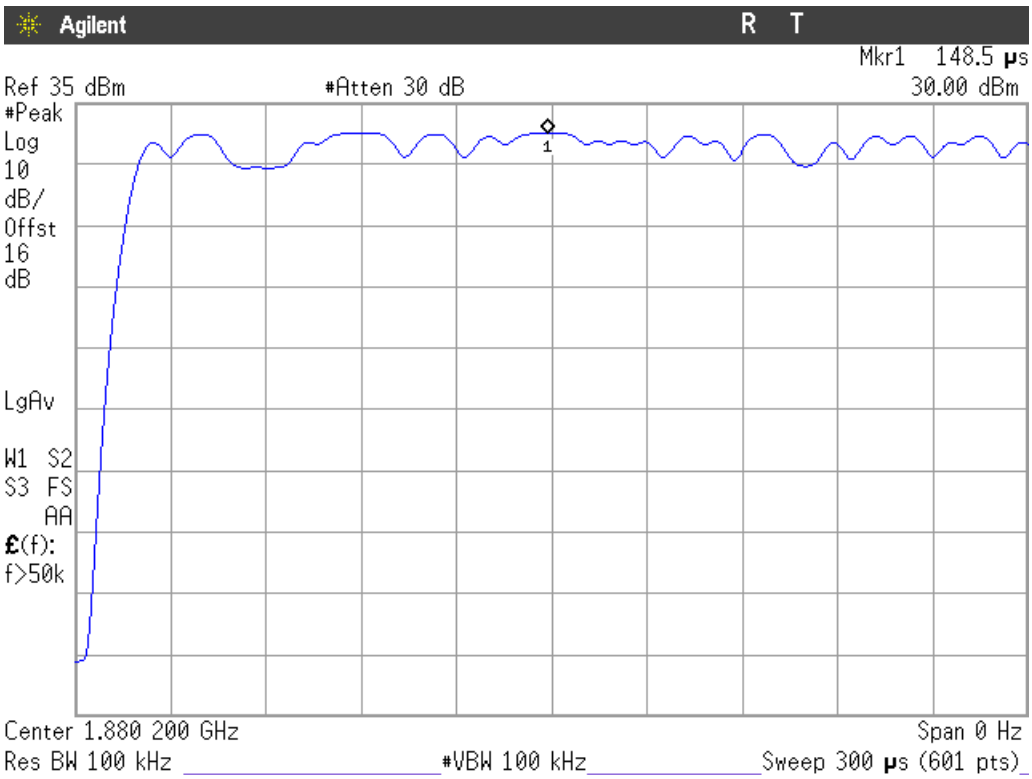
METHOD

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

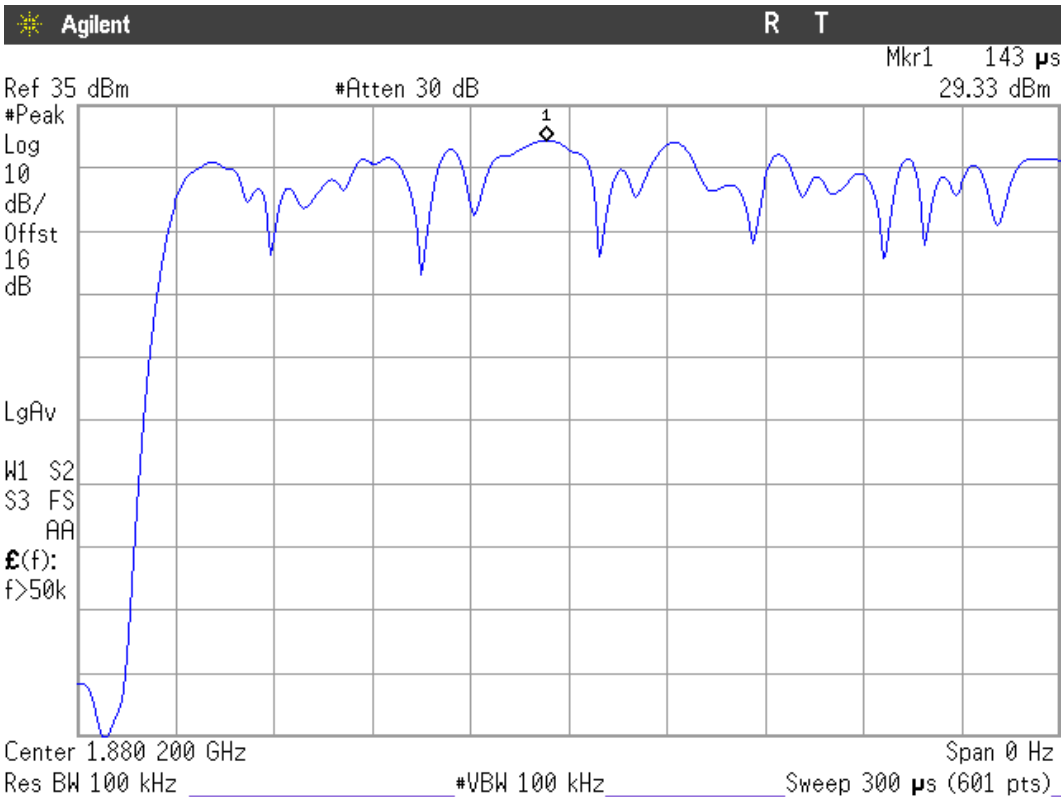
RESULTS

The following plot shows the modulation schemes in the EUT.

GPRS MODULATION



EDGE MODULATION



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 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	-22	-0.0117	-0.00000117
+40	-5	-0.0027	-0.00000027
+30	-27	-0.0144	-0.00000144
+20	-13	-0.0069	-0.00000069
+10	-28	-0.0149	-0.00000149
0	-47	-0.0250	-0.00000250
-10	-32	-0.0170	-0.00000170
-20	-49	-0.0261	-0.00000261
-30	-10	-0.0053	-0.00000053

EDGE MODULATION

Temperature (ºC)	Frequency Error (Hz)	Frequency Error (ppm)	Frequency Error (%)
+50	20	0.0106	0.00000106
+40	-10	-0.0053	-0.00000053
+30	11	0.0059	0.00000059
+20	-14	-0.0074	-0.00000074
+10	12	0.0064	0.00000064
0	22	0.0117	0.00000117
-10	-18	-0.0096	-0.00000096
-20	-12	-0.0064	-0.00000064
-30	-37	-0.0197	-0.00000197

Frequency stability over voltage variations.

GPRS MODULATION

Battery Supply voltage	Voltage (V)	Frequency Error (Hz)	Frequency Error (ppm)	Frequency Error (%)
Vmax	4.2	-9	-0.0048	-0.00000048
Vmin	3.4	-4	-0.0021	-0.00000021

EDGE MODULATION

Battery Supply voltage	Voltage (V)	Frequency Error (Hz)	Frequency Error (ppm)	Frequency Error (%)
Vmax	4.2	-21	-0.0112	-0.00000112
Vmin	3.4	-14	-0.0074	-0.00000074

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. The 99% occupied bandwidth and the -26 dBc bandwidth were measured directly using the built-in bandwidth measuring option of spectrum analyser E4440A.

RESULTS

GPRS MODULATION

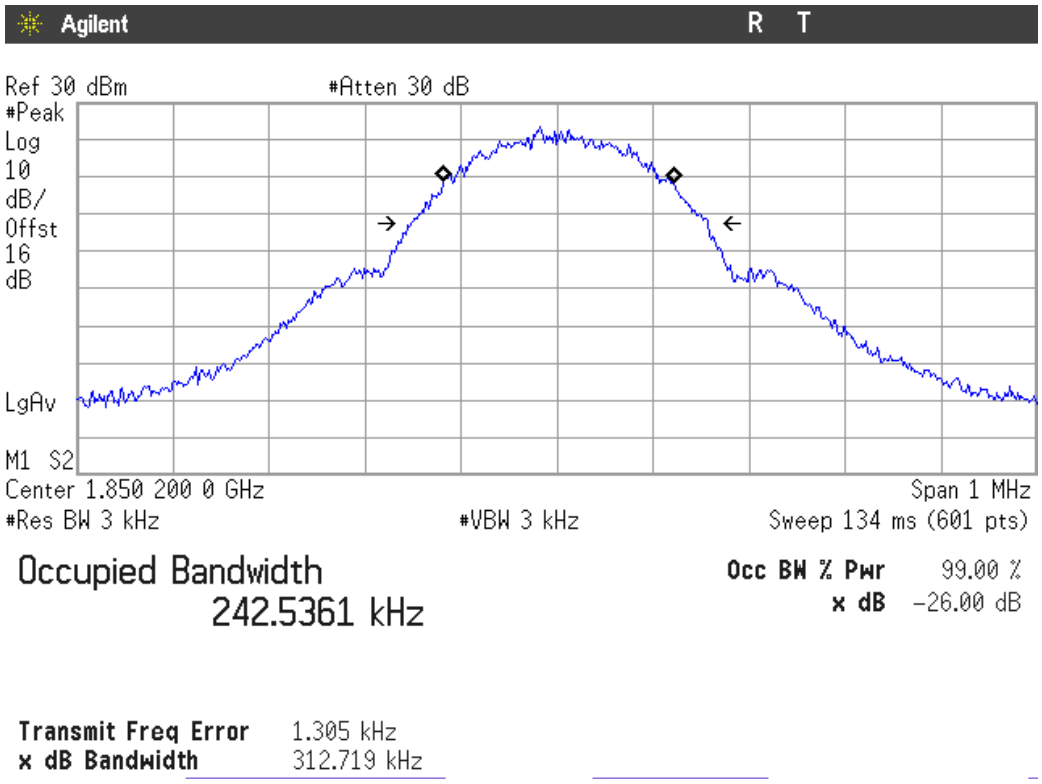
Channel	Lowest	Middle	Highest
99% Occupied bandwidth (kHz)	242.54	244.93	243.77
-26 dBc bandwidth (kHz)	312.72	318.26	315.05
Measurement uncertainty (kHz)	<±1.67		

EDGE MODULATION

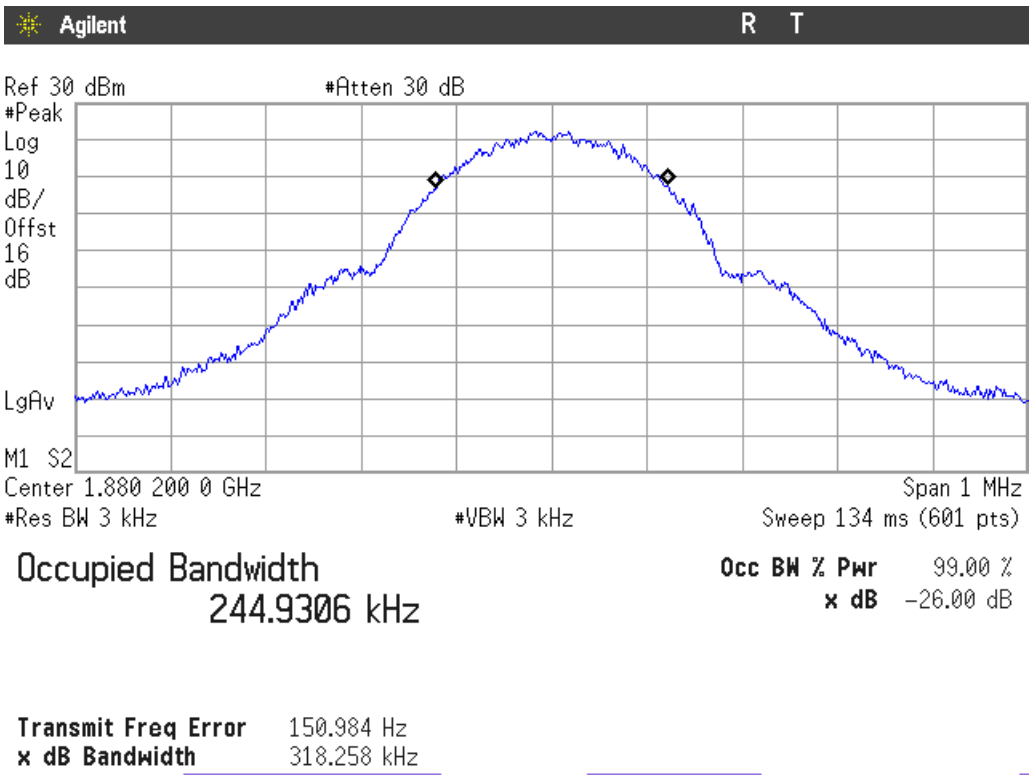
Channel	Lowest	Middle	Highest
99% Occupied bandwidth (kHz)	243.10	244.61	240.03
-26 dBc bandwidth (kHz)	311.78	309.68	310.53
Measurement uncertainty (kHz)	<±1.67		

GPRS MODULATION

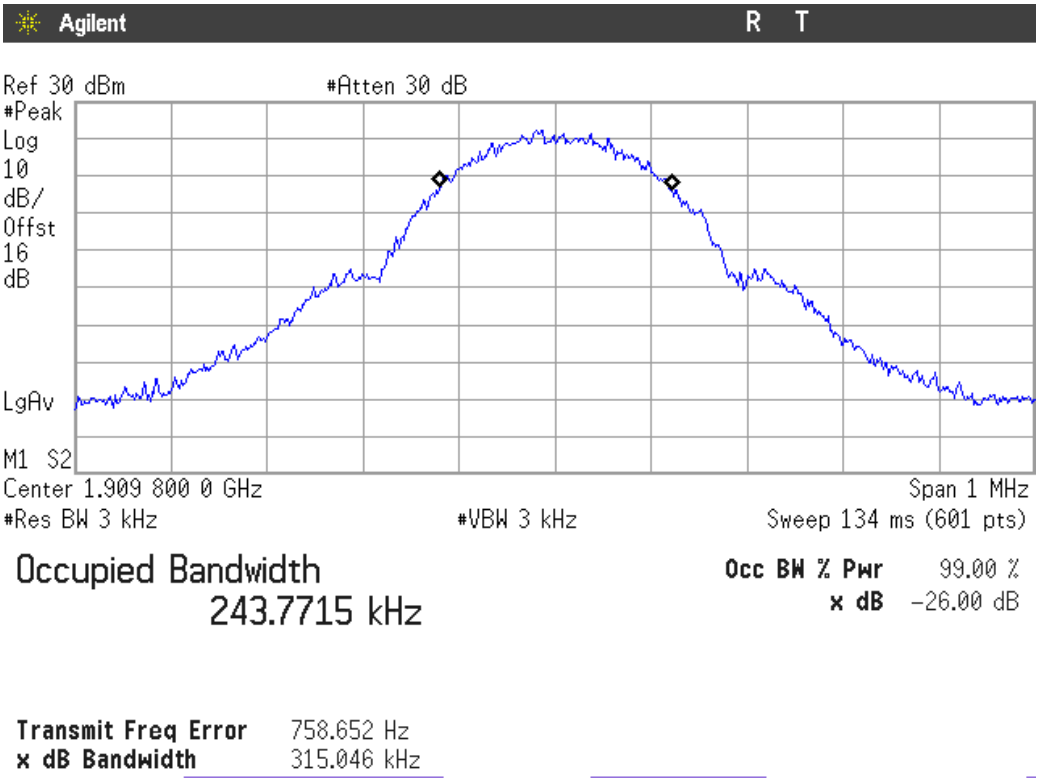
Lowest Channel



Middle Channel

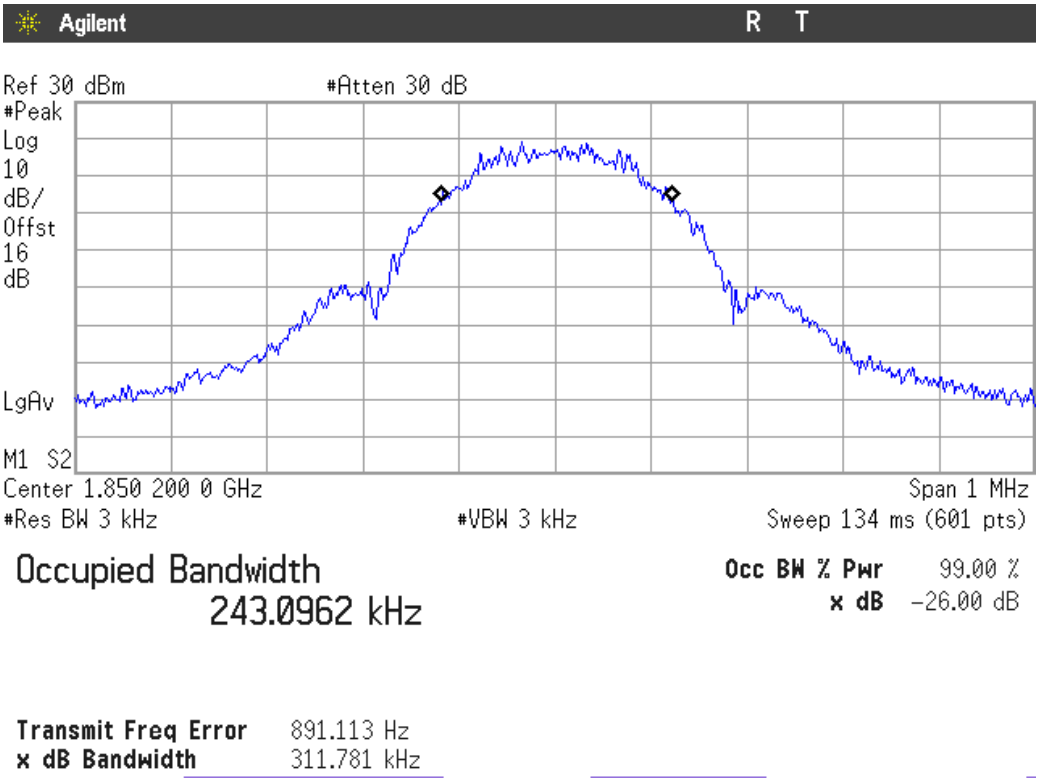


Highest Channel

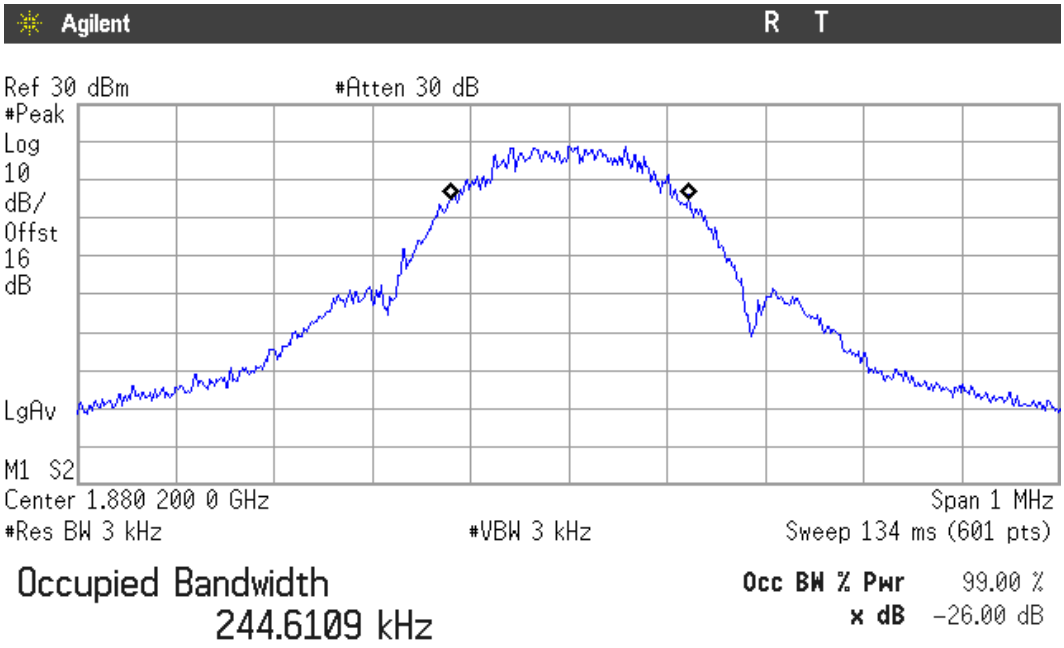


EDGE MODULATION

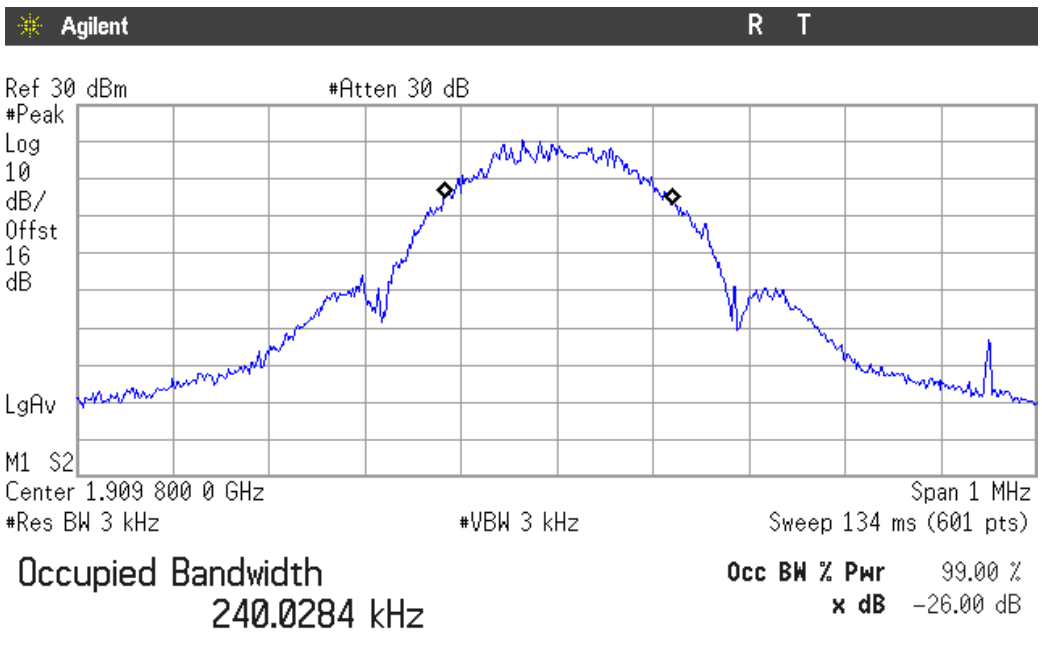
Lowest Channel



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.

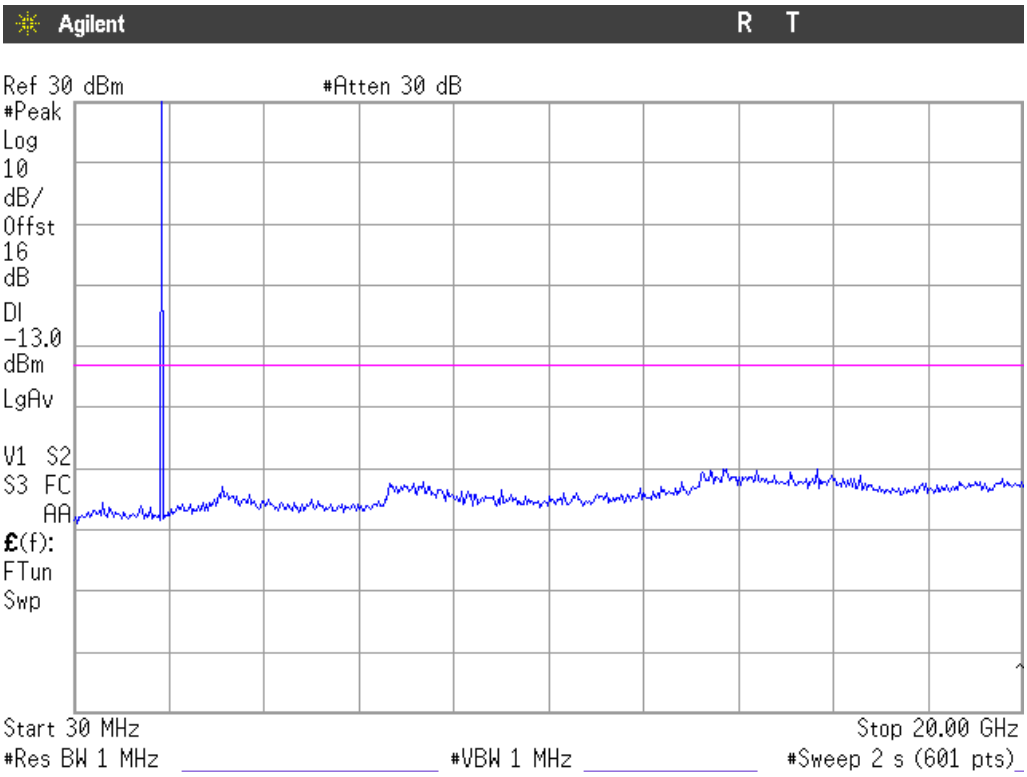
3. CHANNEL: HIGHEST

No spurious signals were found in all the range.

Verdict: PASS

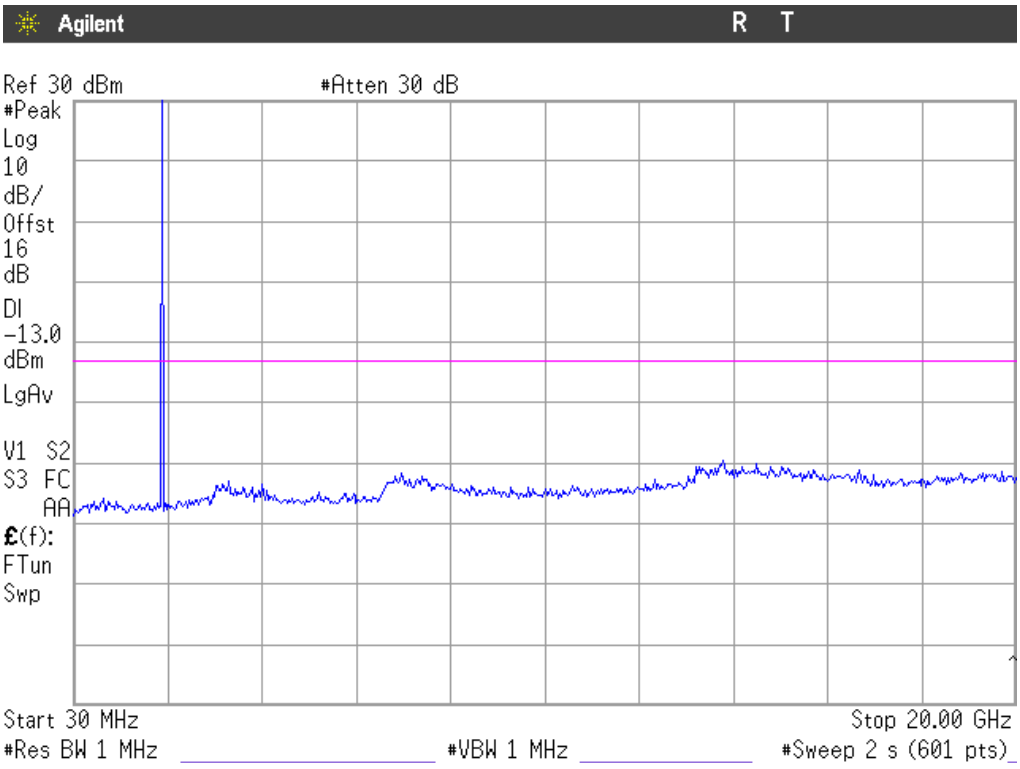
GPRS MODULATION

1. CHANNEL: LOWEST



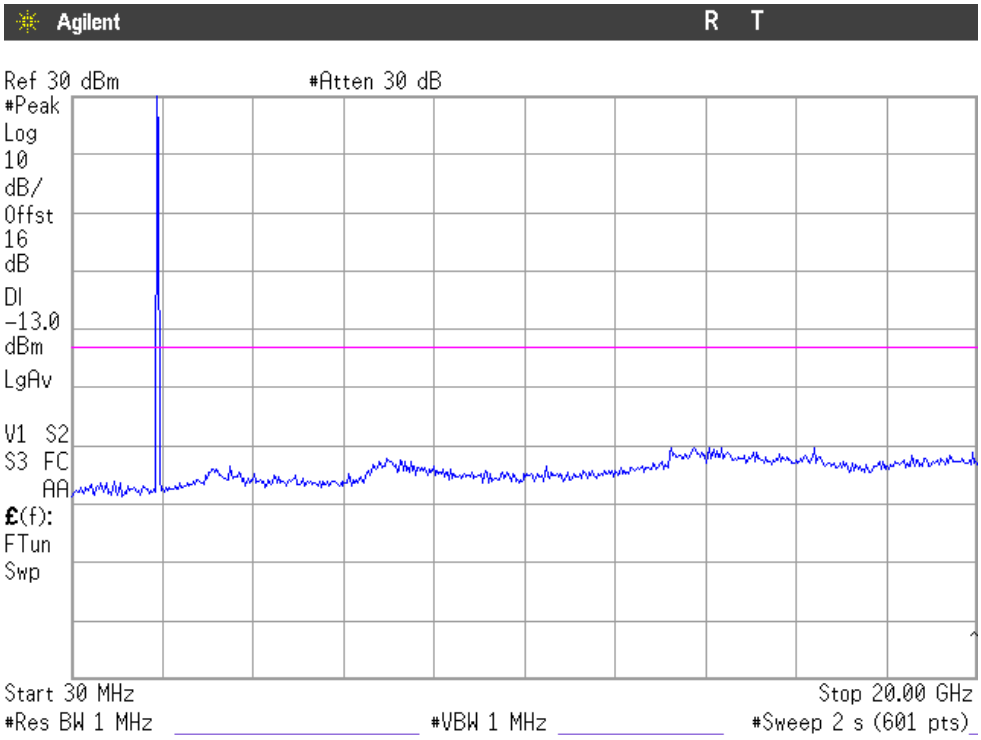
Note: The peak above the limit is the carrier frequency.

2. CHANNEL: MIDDLE



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

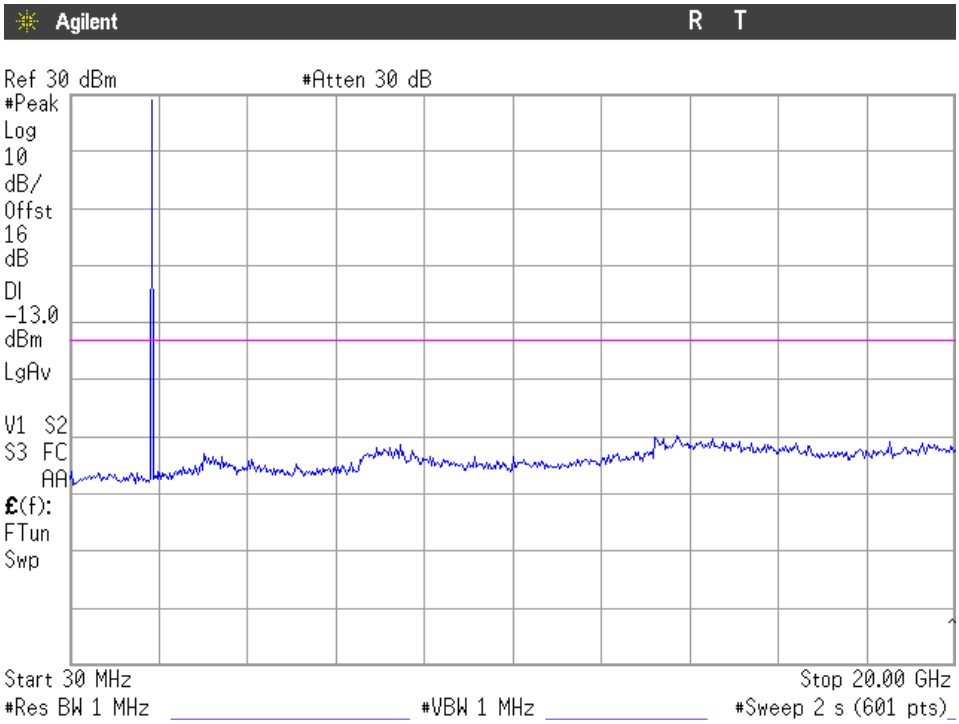
3. CHANNEL: HIGHEST



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

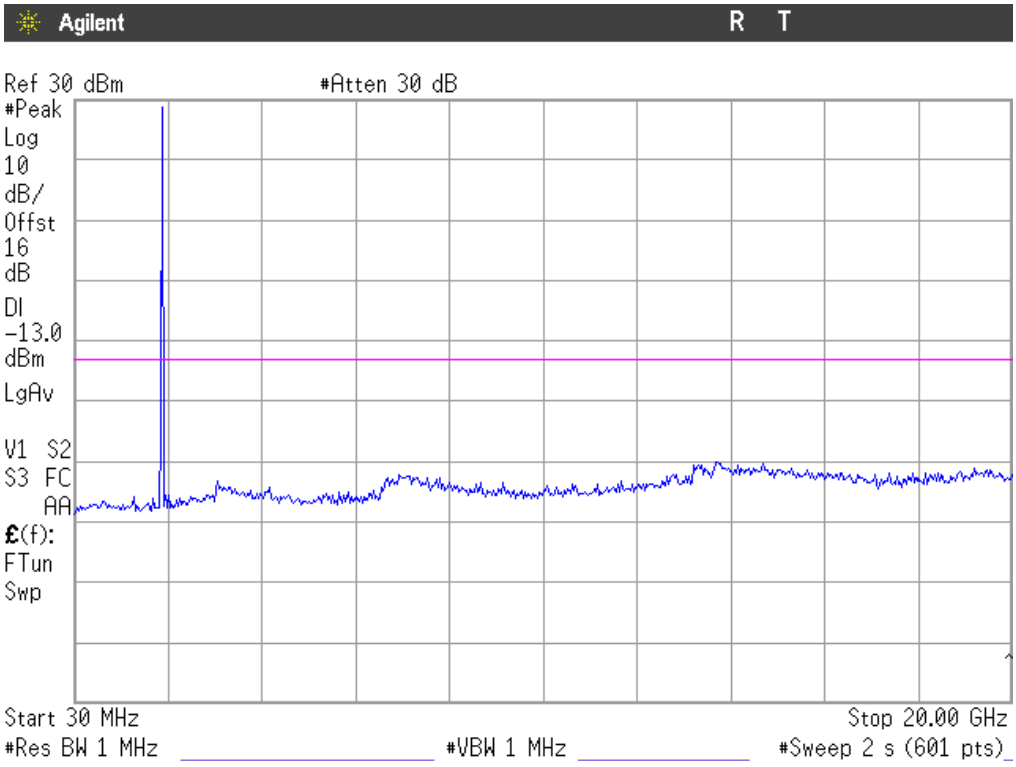
EDGE MODULATION

1. CHANNEL: LOWEST



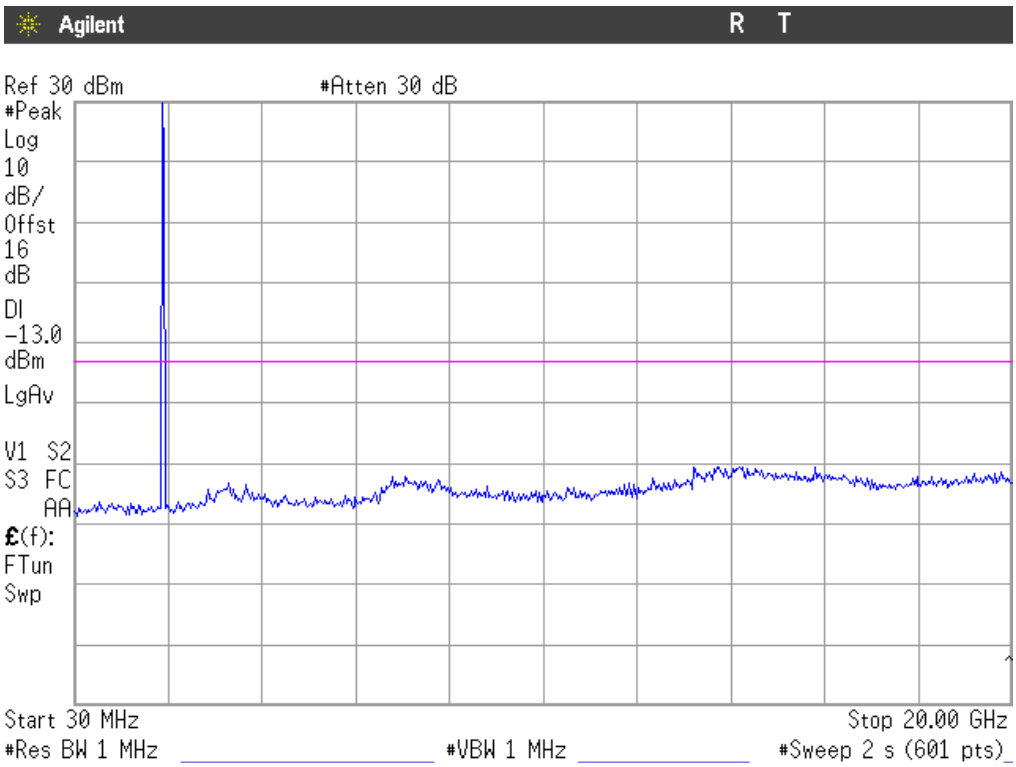
Note: The peak above the limit is the carrier frequency.

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.

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 (-26 dBc 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.

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

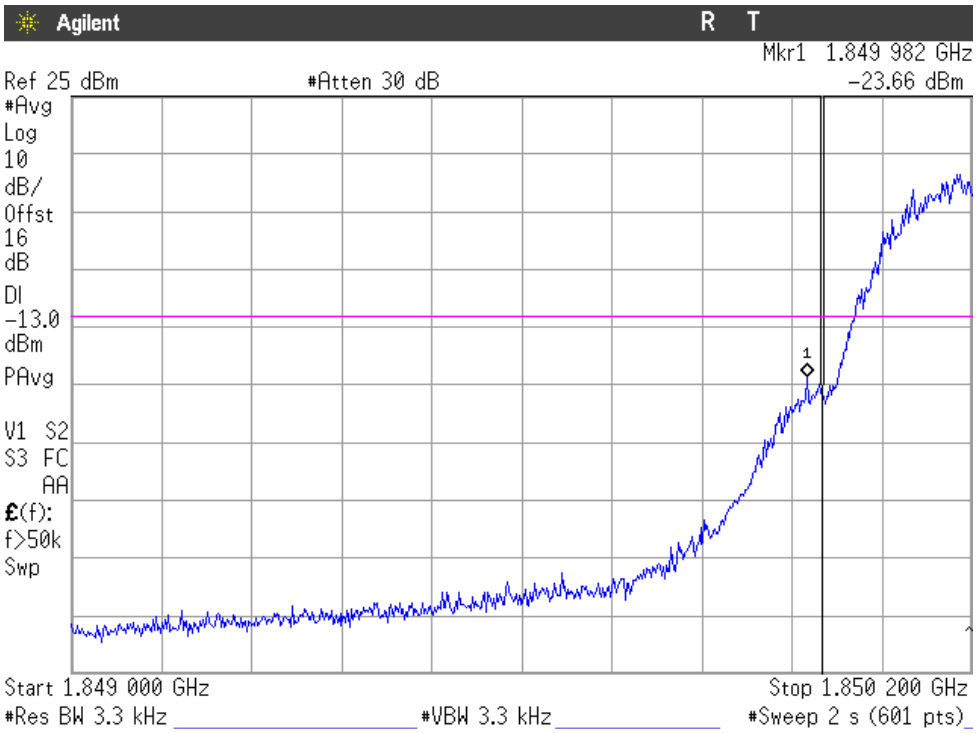
RESULTS (see plots in next pages)

MODULATION	Maximum level at lowest Block Edge (dBm)	Maximum level at highest Block Edge (dBm)
GPRS	-23.66	-24.99
EDGE	-26.65	-27.04

Measurement uncertainty = ±1.57 dB.

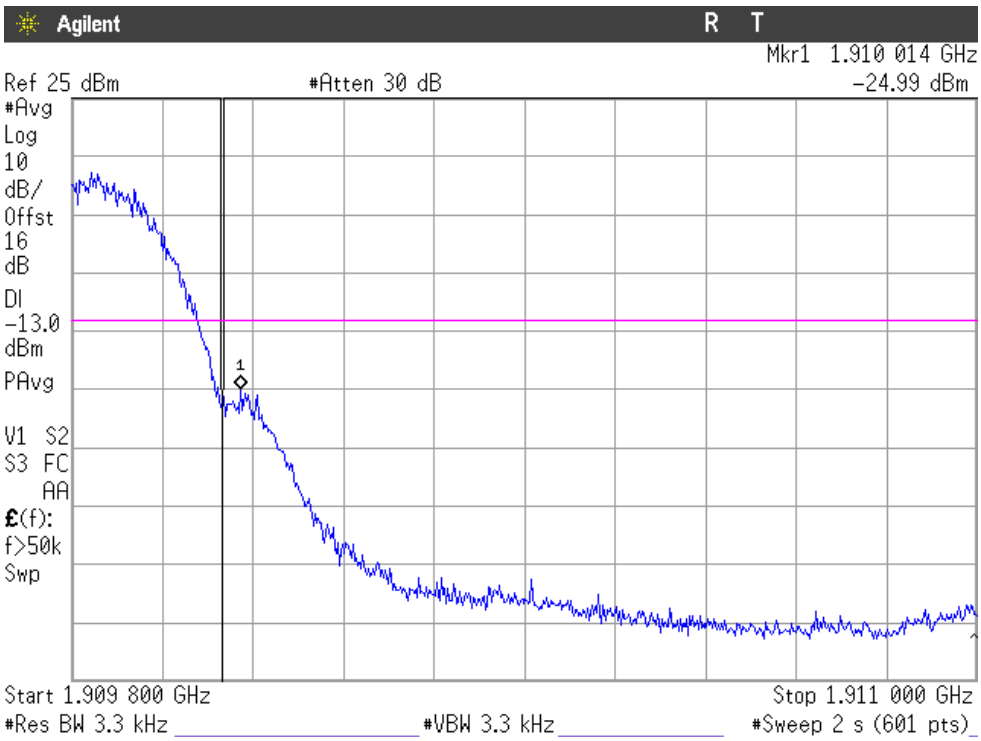
GPRS MODULATION

CHANNEL LOWEST



NOTE: The equipment transmits at the maximum output power

CHANNEL HIGHEST

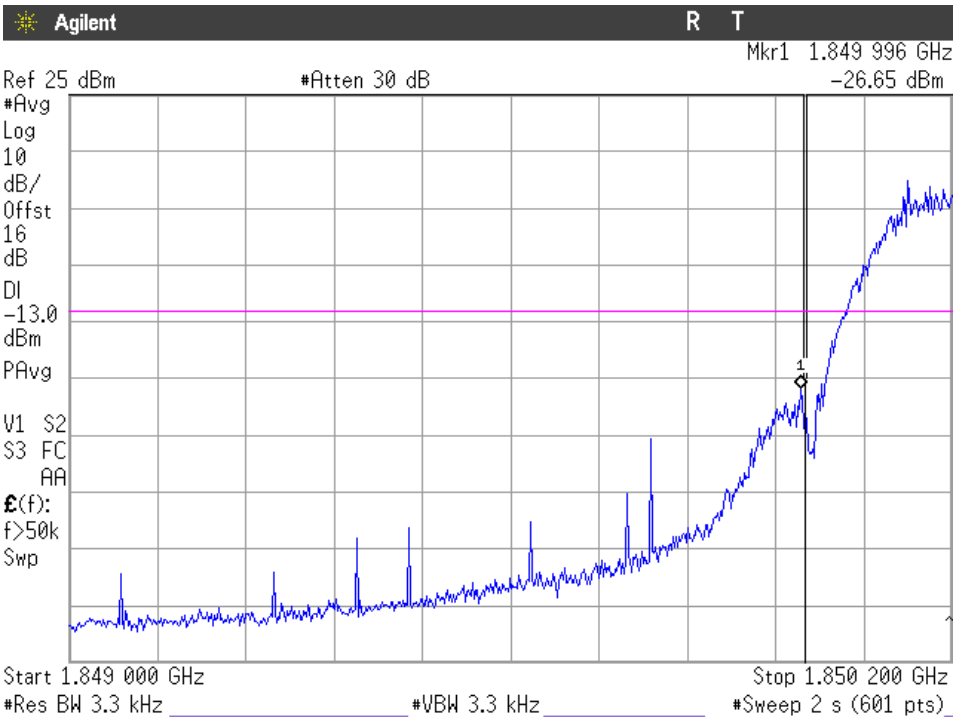


NOTE: The equipment transmits at the maximum output power

Verdict: PASS

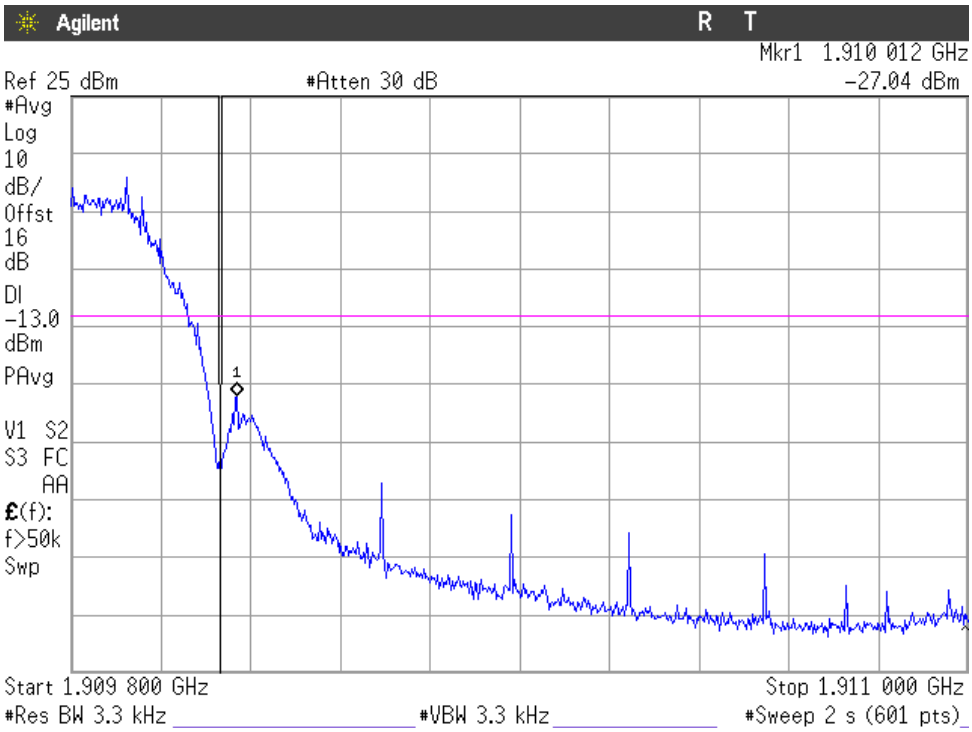
EDGE MODULATION

CHANNEL LOWEST



NOTE: The equipment transmits at the maximum output power

CHANNEL HIGHEST



NOTE: The equipment transmits at the maximum output power

Verdict: PASS

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.

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)
5729.3255	-51.51	Vertical	-43.71	2.60	10.80	-35.51

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.

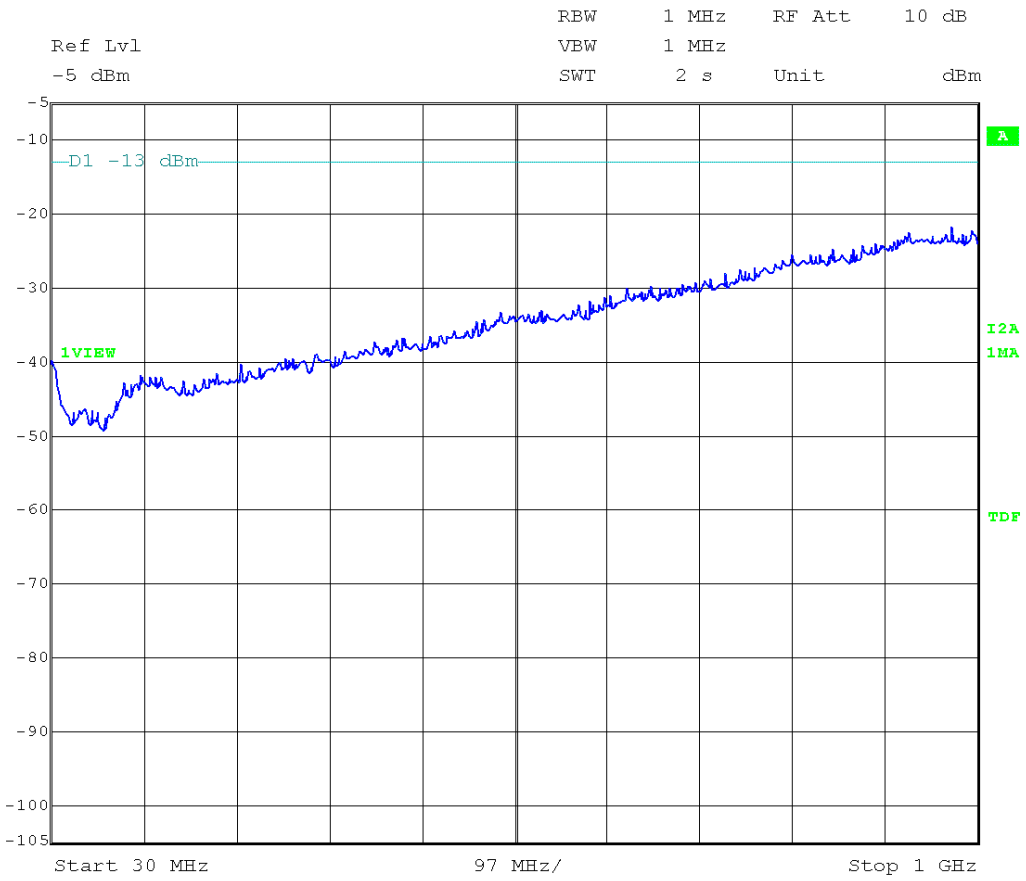
Frequency range 1 GHz-20 GHz.

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)
5729.6675	-53.47	Vertical	-45.67	2.60	10.80	-37.47

Verdict: PASS

FREQUENCY RANGE 30 MHz-1000 MHz.

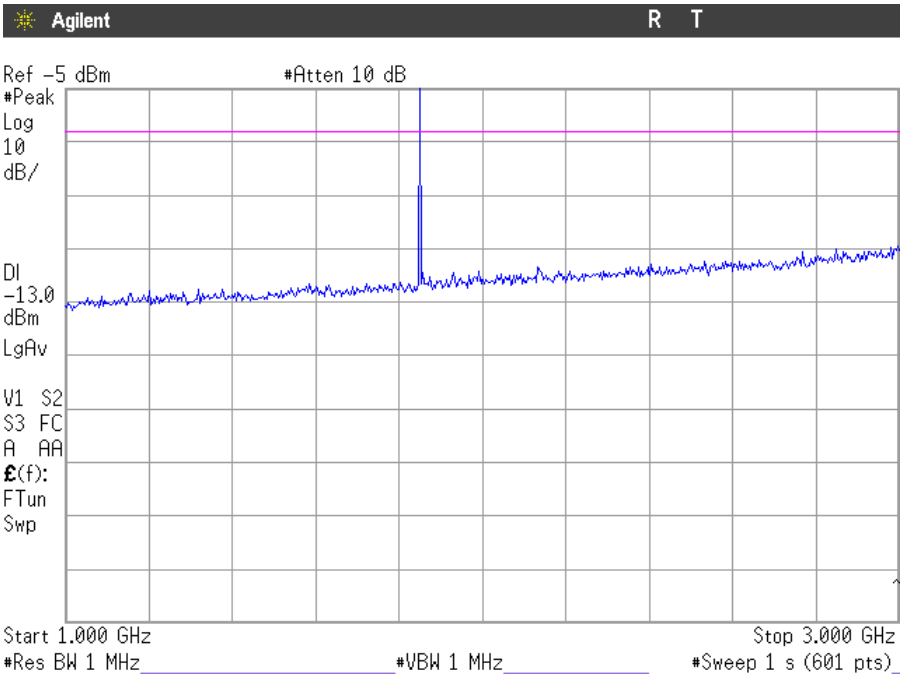


(This plot is valid for all three channels and all modulations).

FREQUENCY RANGE 1 GHz to 3 GHz.

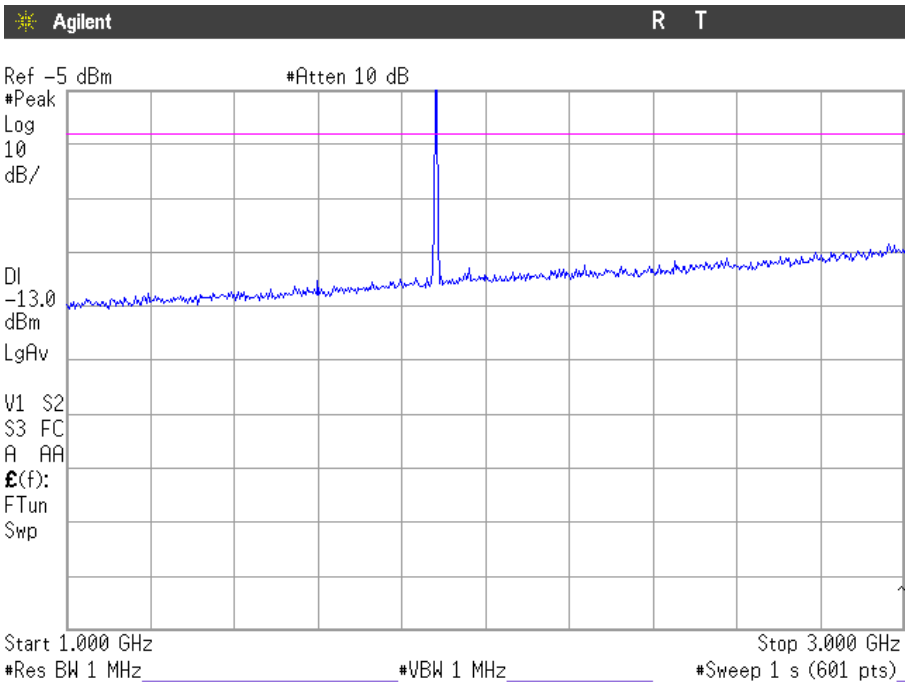
GPRS MODULATION

CHANNEL: LOWEST



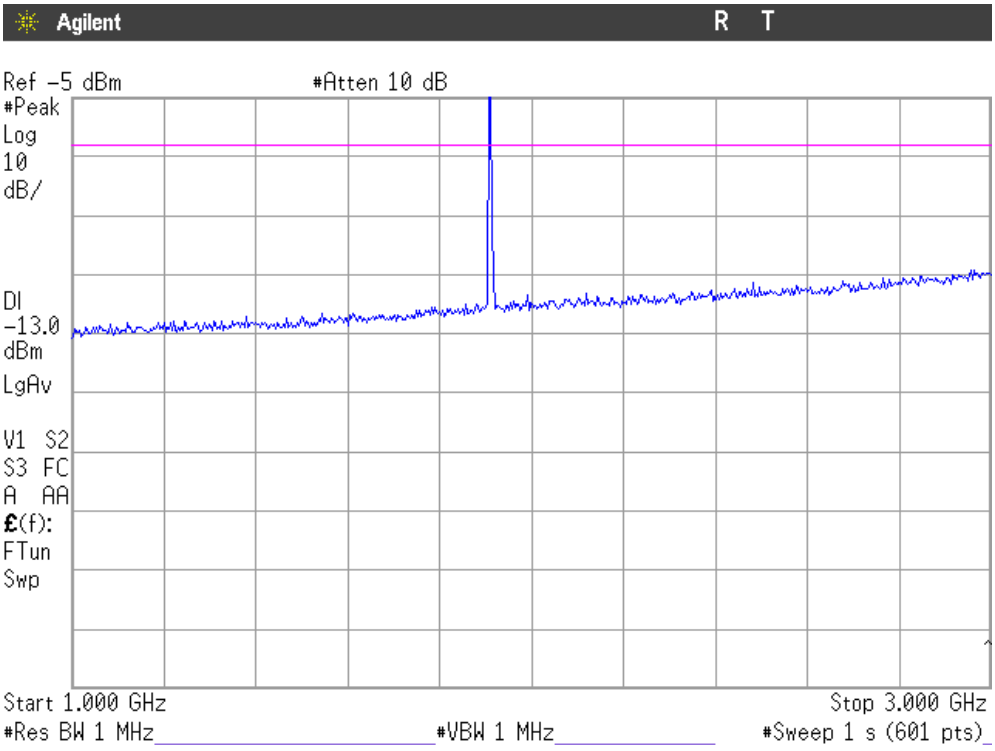
Note: The peak above the limit is the carrier frequency.

CHANNEL: MIDDLE



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

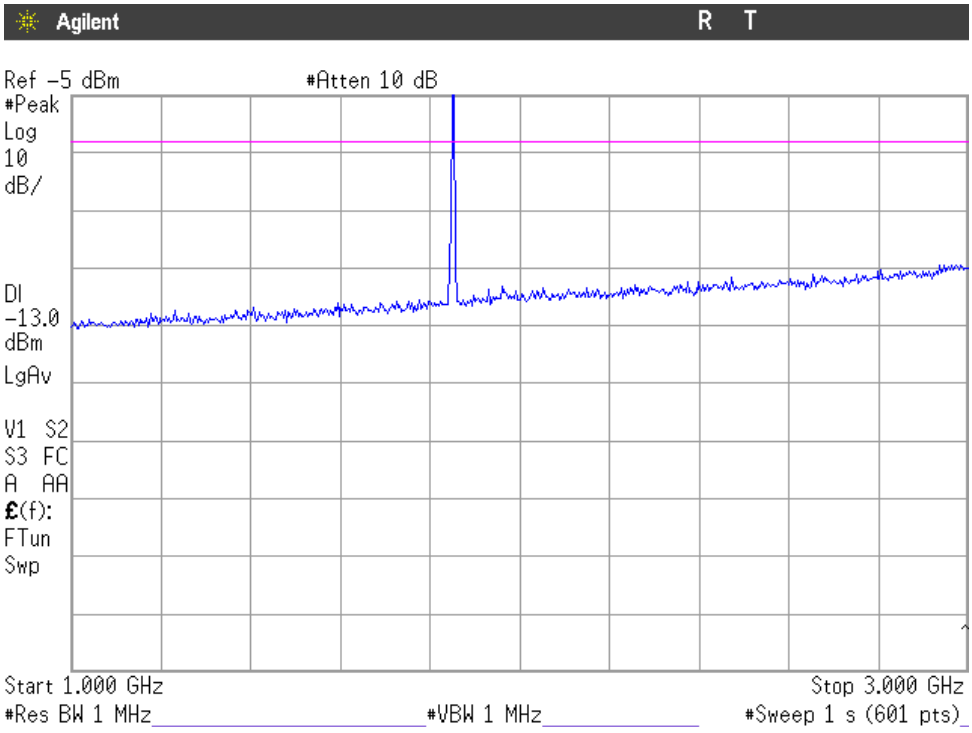
CHANNEL: HIGHEST



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

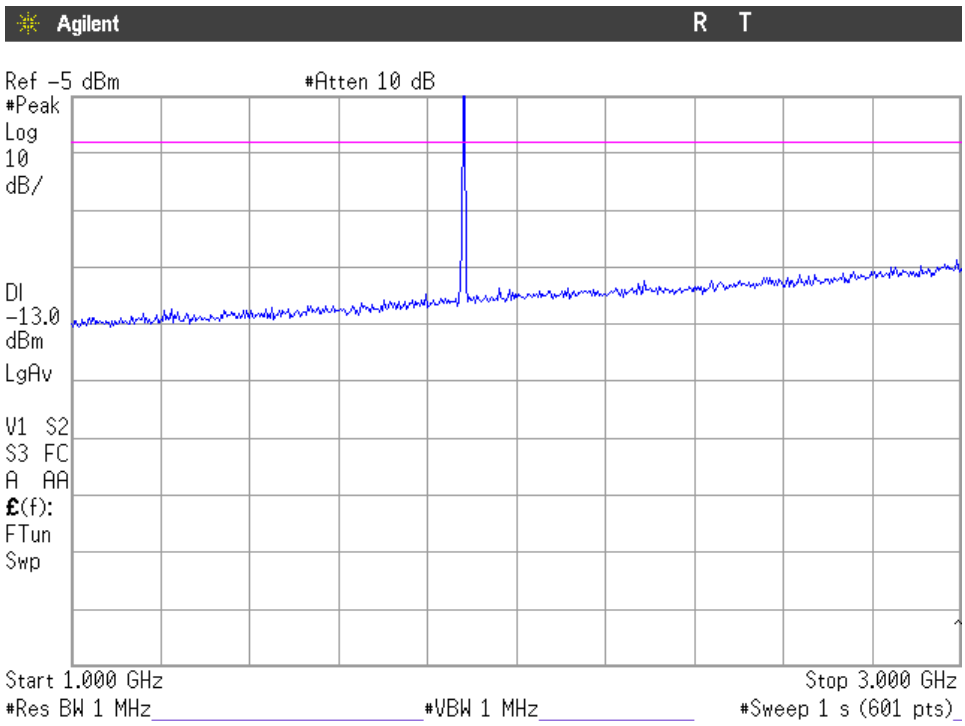
EDGE MODULATION

CHANNEL: LOWEST



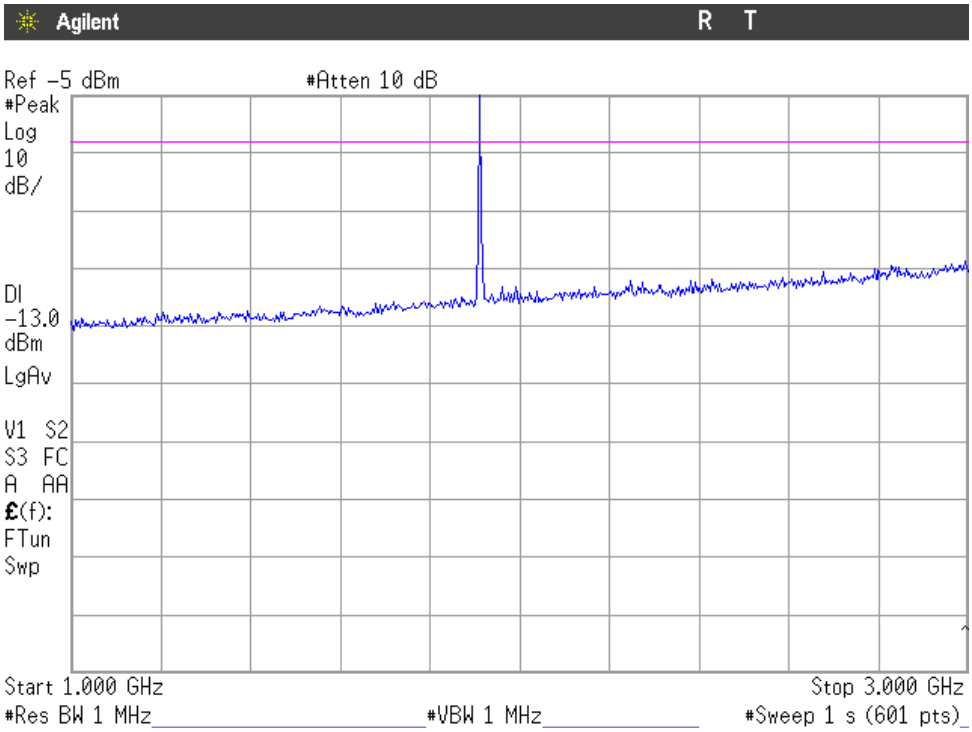
Note: The peak above the limit is the carrier frequency.

CHANNEL: MIDDLE



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

CHANNEL: HIGHEST

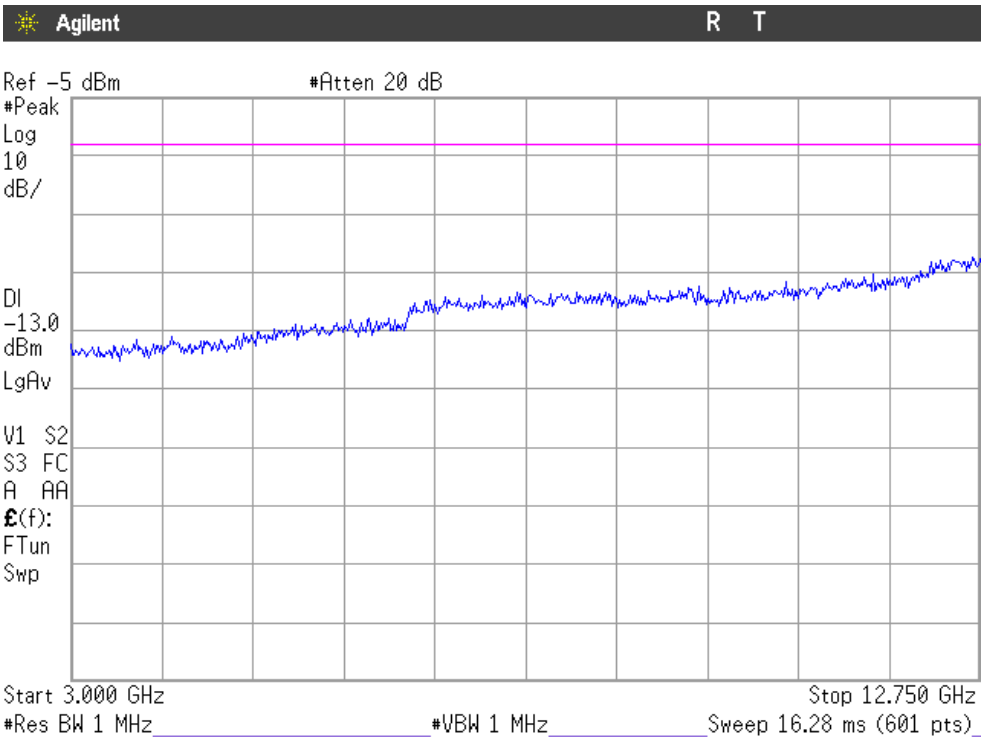


Note: The peak above the limit is the carrier frequency.

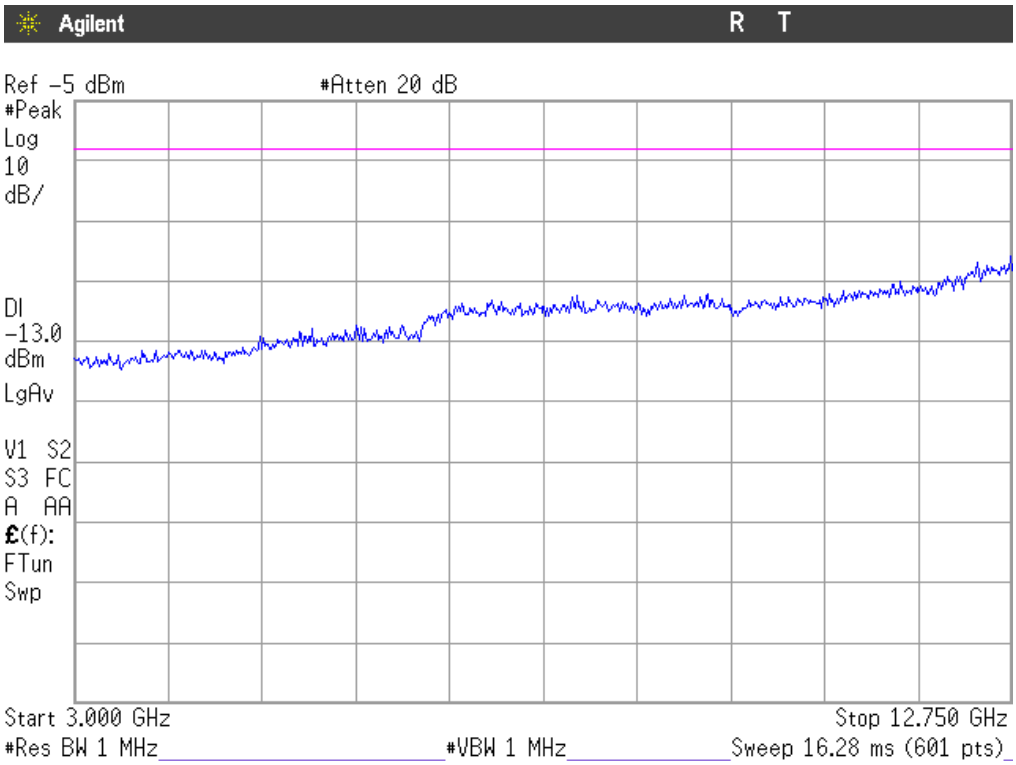
FREQUENCY RANGE 3 GHz to 12.75 GHz.

GPRS MODULATION

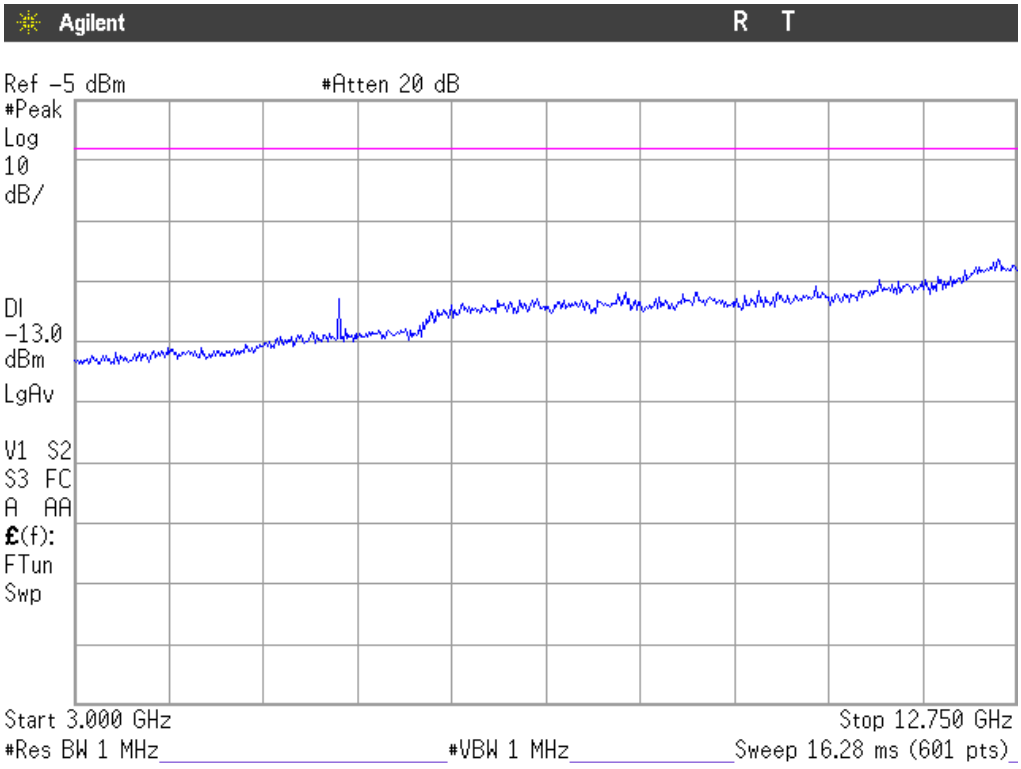
CHANNEL: LOWEST



CHANNEL: MIDDLE

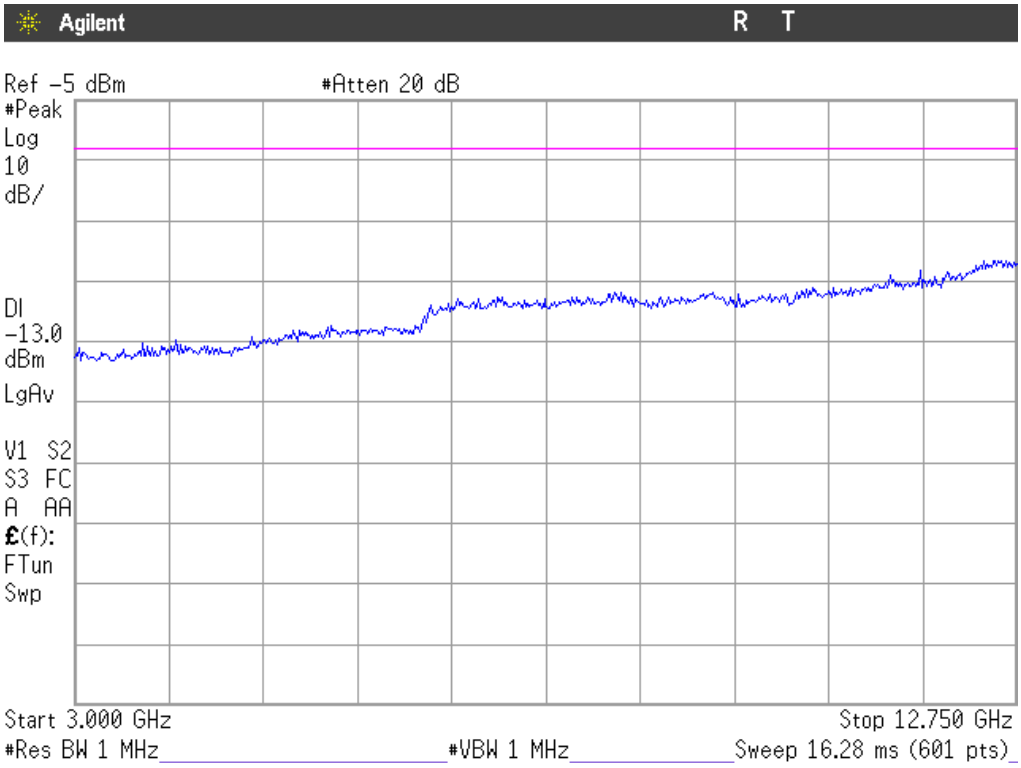


CHANNEL: HIGHEST

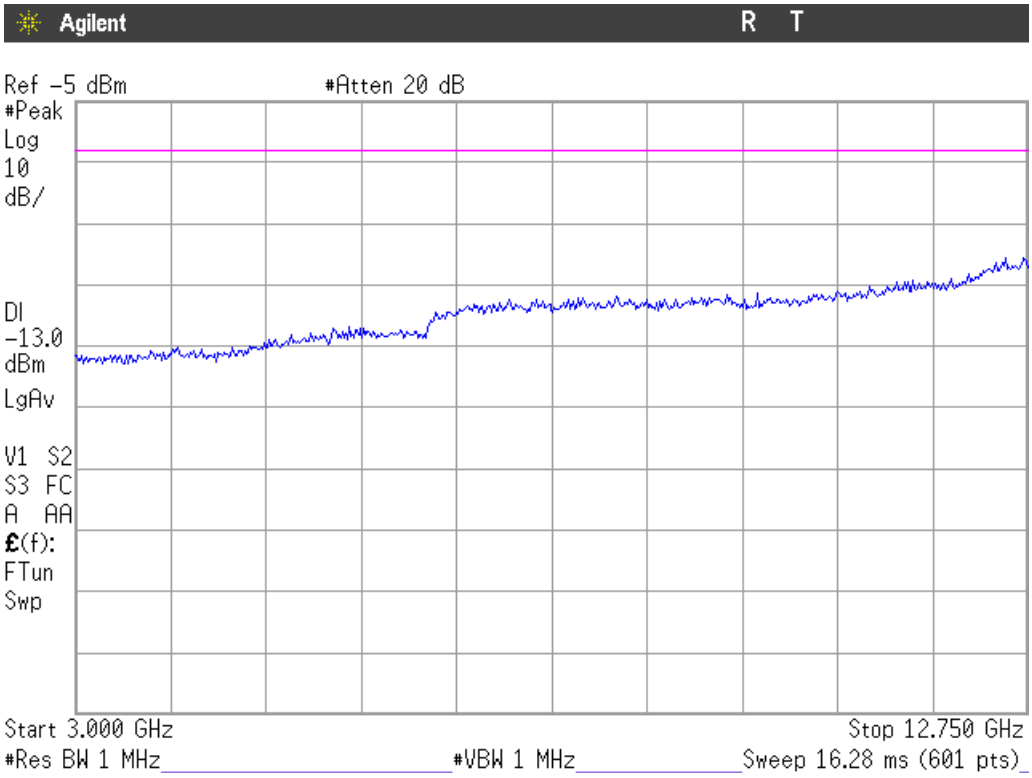


EDGE MODULATION

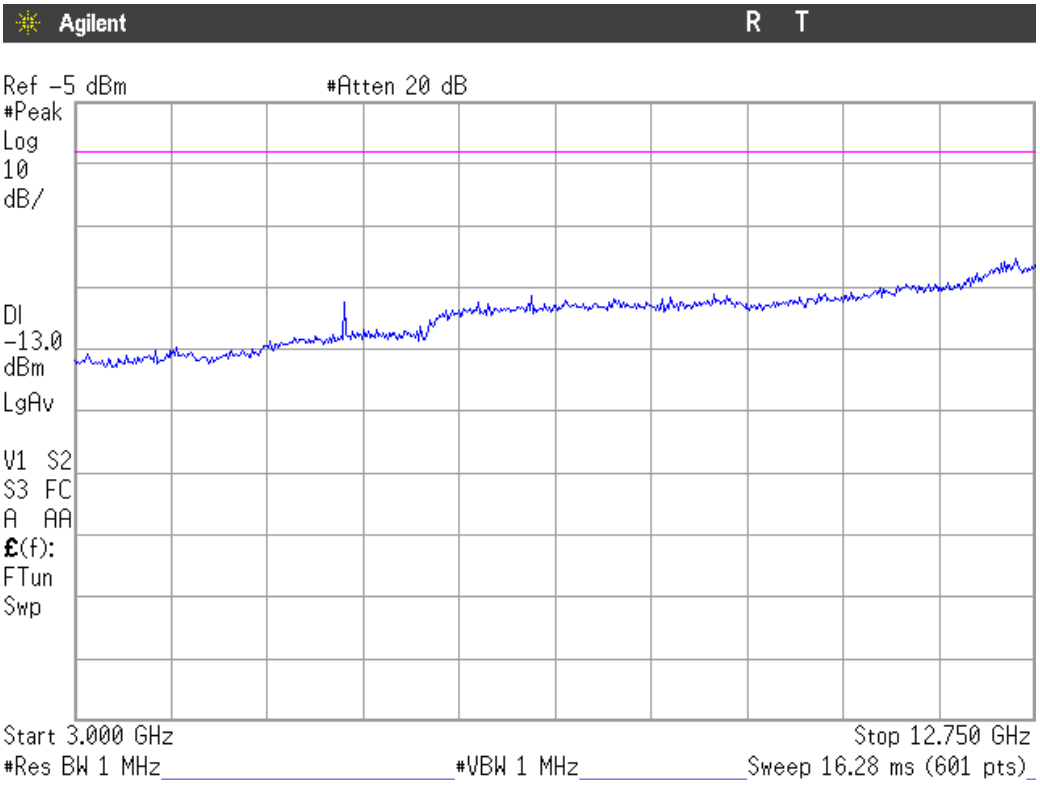
CHANNEL: LOWEST



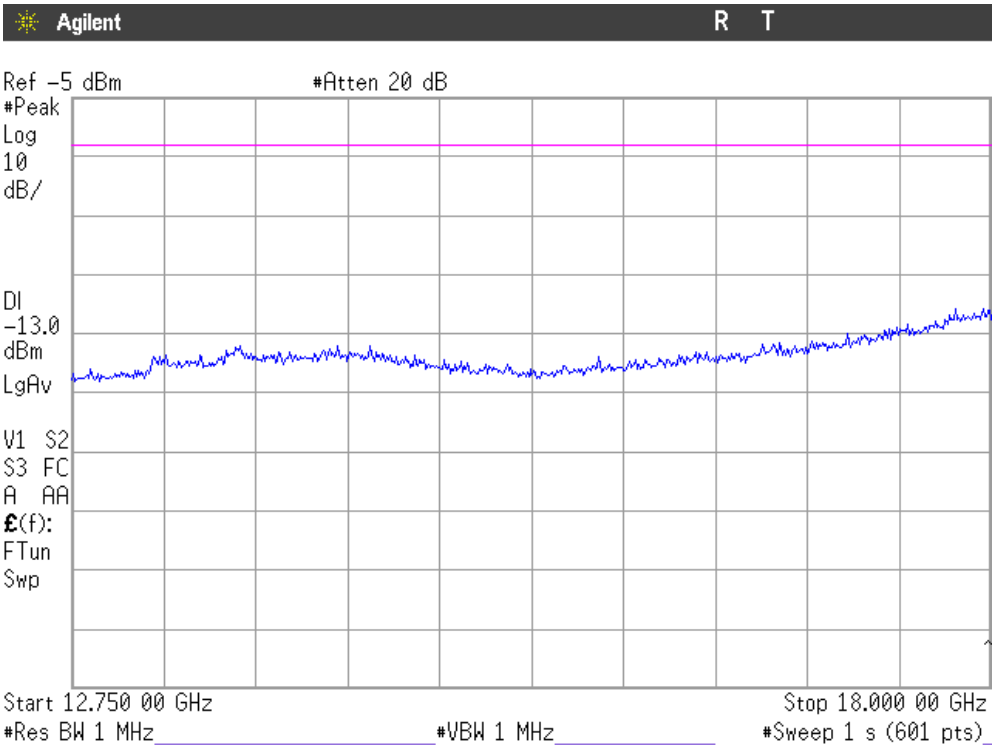
CHANNEL: MIDDLE



CHANNEL: HIGHEST

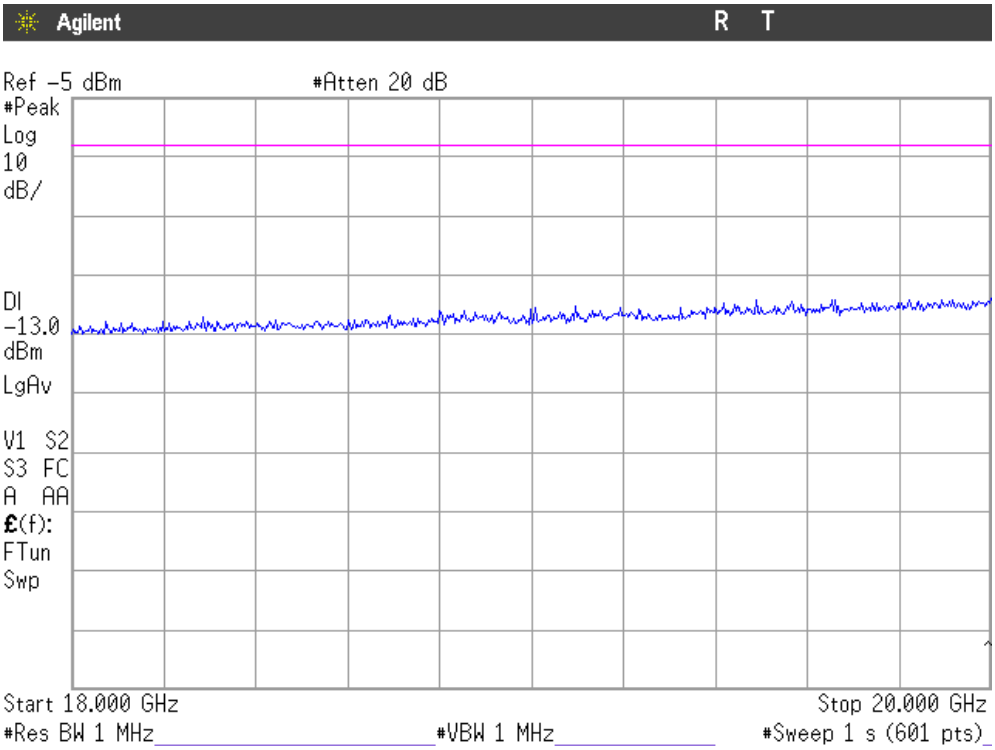


FREQUENCY RANGE 12.75 GHz TO 18 GHz.



(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).

TEST RESULTS FOR FCC PART 27

TEST CONDITIONS

Power supply (V):

V_{nom} = 3.8 Vdc

V_{max} = 4.2 Vdc

V_{min} = 3.4 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

TEST FREQUENCIES:

Lowest channel (1312): 1712.4 MHz

Middle channel (1762): 1732.5 MHz

Highest channel (1513): 1752.6 MHz

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

SPECIFICATION

§2.1046 and 27.50

Fixed, mobile and portable (hand-held) stations operating in the 1710–1755 MHz band are limited to a peak Effective Isotropic Radiated Power (E.I.R.P.) of 1 Watt (30 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.

For radiated measurements the EUT was placed on a 1 m high non-conductive stand inside an anechoic chamber. The measuring antenna was placed at 1 m distance and the maximum field strength was measured for the three channels. The EUT was controlled via the Universal Radio Communication tester R&S CMU200 selecting maximum transmission power of the EUT.

The Effective Isotropic Radiated Power (E.I.R.P.) is obtained by using the Substitution Method according to ANSI/TIA/EIA-603-C: 2004.

RESULTS

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

Channel	Lowest	Middle	Highest
Maximum peak power (dBm)	28.06	28.45	28.57
Maximum peak power (W)	0.64	0.70	0.72
Measurement uncertainty (dB)	±0.5		

MAXIMUM EFFECTIVE ISOTROPIC RADIATED POWER E.I.R.P. (RADIATED).

Substitution method data

Frequency (MHz) at max. reading	Max. Instrument reading (dBm)	Polarization	(1) RF Generator (dBm)	(2) Cable loss (dB)	(3) Substitution antenna gain Gi (respect to isotropic radiator) (dB)	E.I.R.P. (dBm) = (1) – (2) + (3)
1713.4255	-6.61	Vertical	17.99	0.3	8.2	25.89
1732.3338	-7.78	Vertical	17.12	0.3	8.1	24.92
1752.1345	-7.48	Vertical	17.52	0.3	8.1	25.32

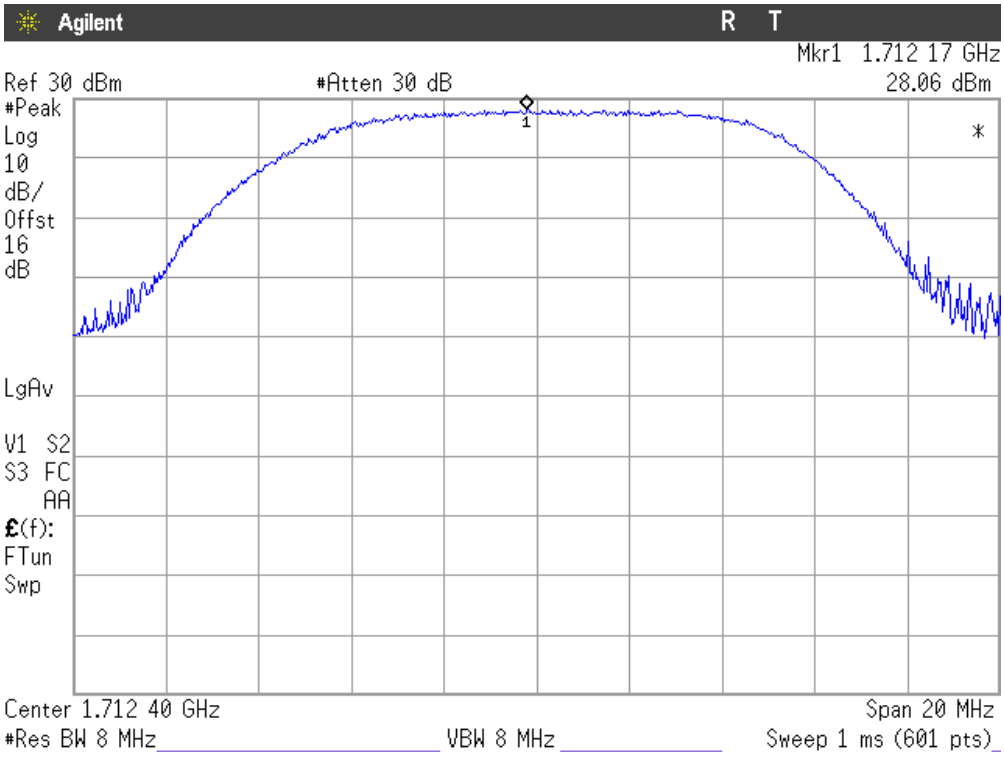
RBW = VBW = 8 MHz

Channel	Lowest	Middle	Highest
Maximum peak power (dBm)	25.89	24.92	25.32
Maximum peak power (W)	0.39	0.31	0.34
Measurement uncertainty (dB)	± 4.0		

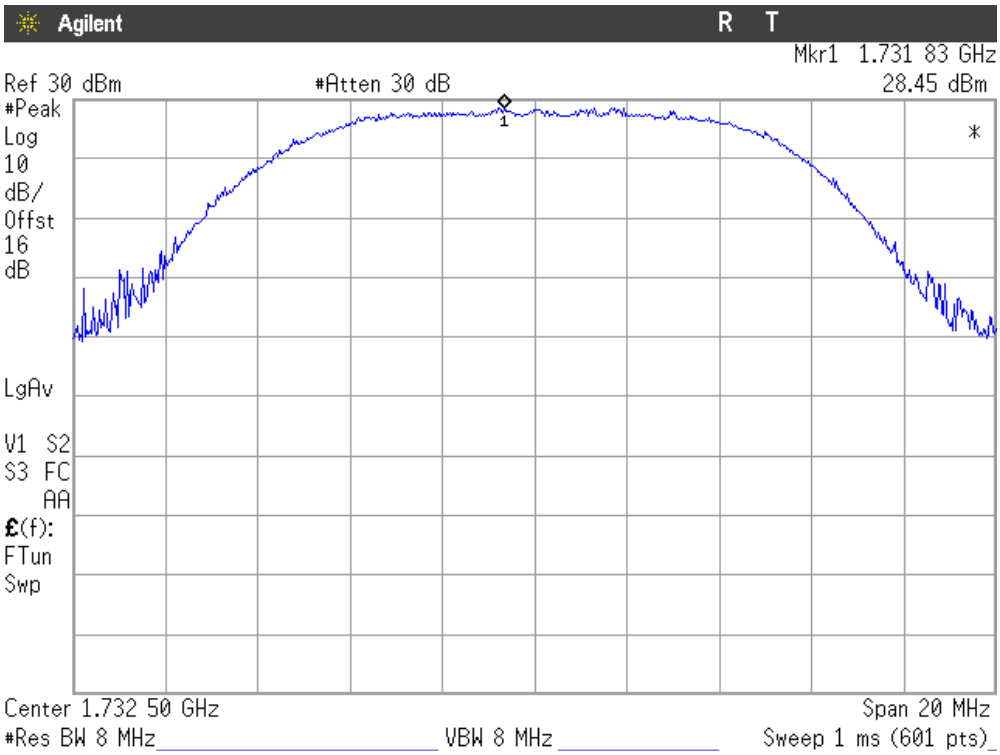
Verdict: PASS

PEAK OUTPUT POWER (CONDUCTED).

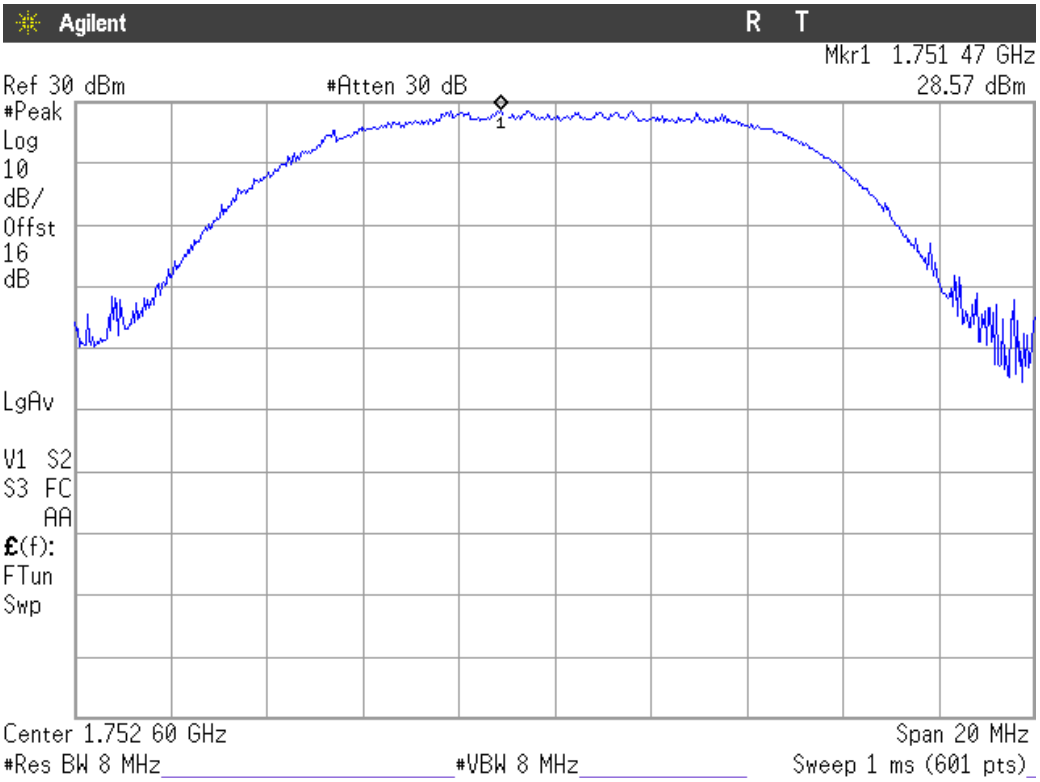
Lowest Channel.



Middle Channel.



Highest Channel.



Modulation Characteristics

SPECIFICATION

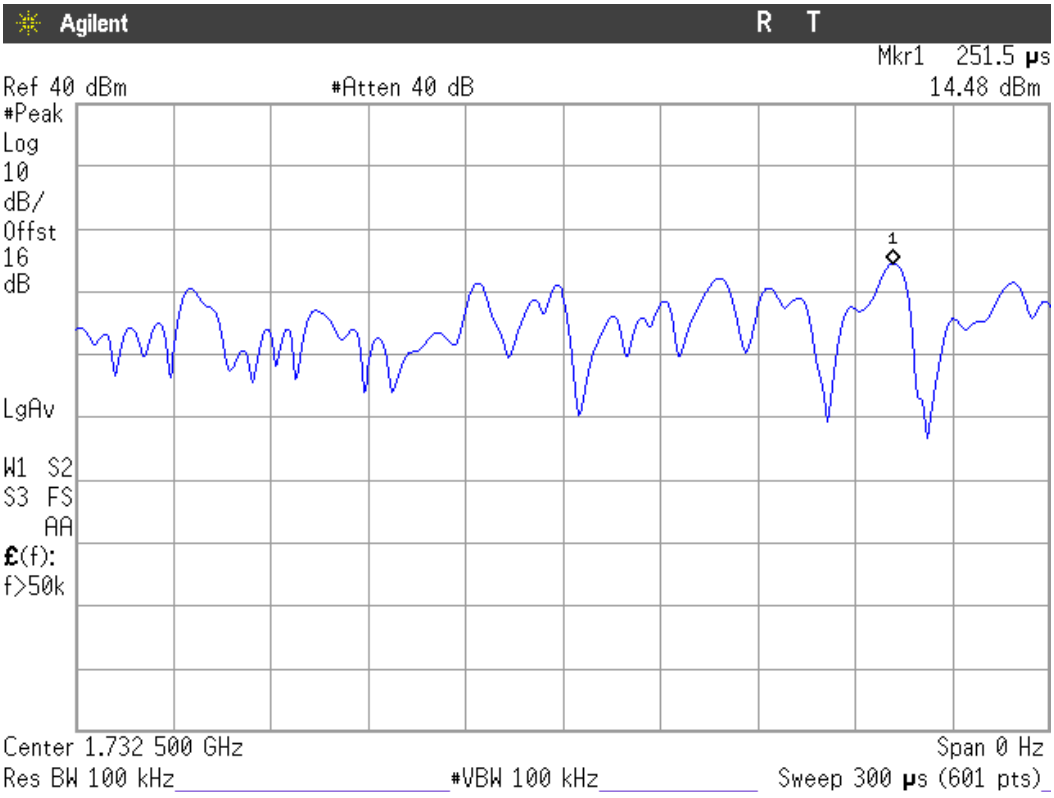
§2.1047

METHOD

The EUT operates with WCDMA (QPSK) mode in which the information is digitised and coded into a bit stream.

RESULTS

The following plot shows the modulation schemes in the EUT.



Frequency Stability

SPECIFICATION

§2.1055 and 27.54

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 and the maximum frequency error was measured using the frequency meter of CMU200.

RESULTS

Frequency stability over temperature variations.

Temperature (ºC)	Frequency Error (Hz)	Frequency Error (ppm)	Frequency Error (%)
+50	14	0.0081	0.00000081
+40	7	0.0040	0.00000040
+30	13	0.0075	0.00000075
+20	14	0.0081	0.00000081
+10	9	0.0052	0.00000052
0	4	0.0023	0.00000023
-10	8	0.0046	0.00000046
-20	9	0.0052	0.00000052
-30	12	0.0069	0.00000069

Frequency stability over voltage variations.

Battery Supply voltage	Voltage (V)	Frequency Error (Hz)	Frequency Error (ppm)	Frequency Error (%)
Vmax	4.2	11	0.0063	0.00000063
Vmin	3.4	8	0.0046	0.00000046

Occupied Bandwidth

SPECIFICATION

§2.1049

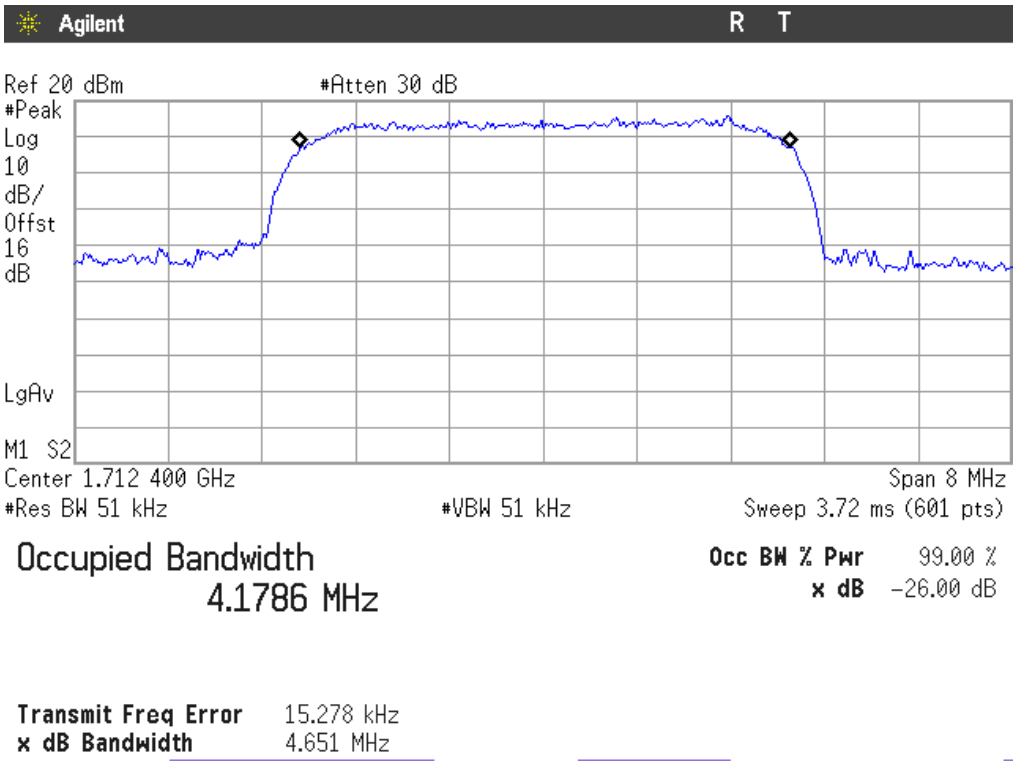
METHOD

The EUT was configured to transmit a modulated carrier signal. An IF bandwidth of 51 kHz was used to determined the occupied bandwidth of the modulated emission. The 99% occupied bandwidth and the -26 dBc bandwidth were measured directly using the built-in bandwidth measuring option of spectrum analyser E4440A.

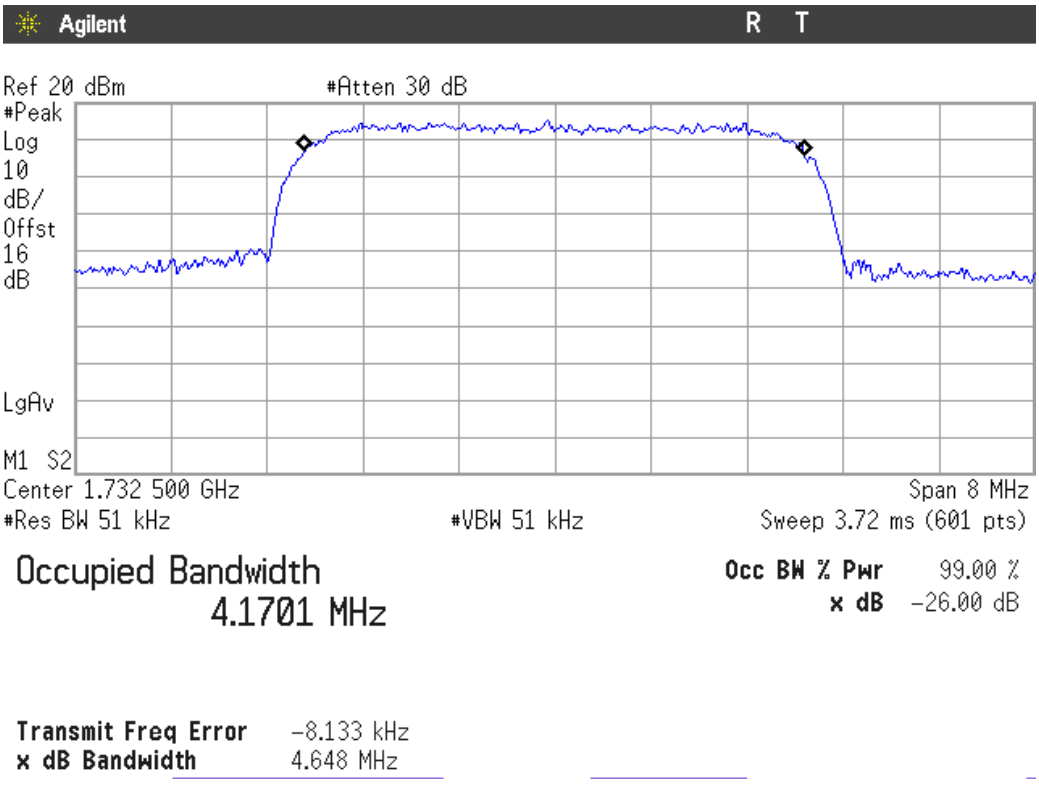
RESULTS

Channel	Lowest	Middle	Highest
99% Occupied bandwidth (kHz)	4178.6	4170.1	4178.7
-26 dBc bandwidth (kHz)	4651	4648	4641
Measurement uncertainty (kHz)	<±13.3		

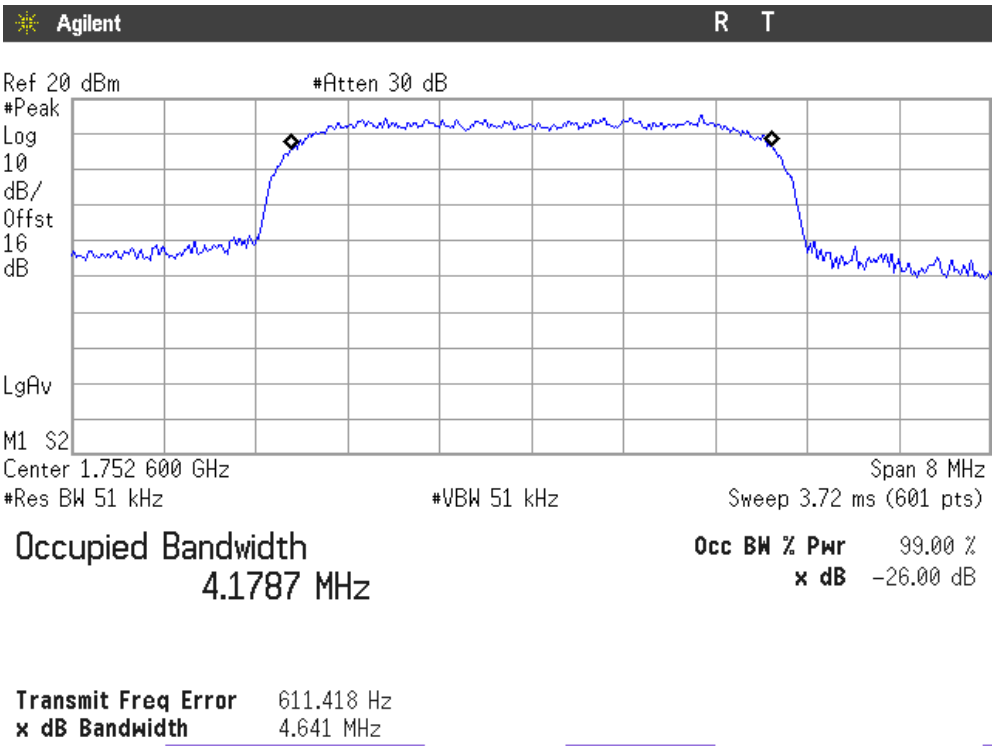
Lowest Channel



Middle Channel



Highest Channel



Spurious emissions at antenna terminals

SPECIFICATION

§2.1051 and §27.53

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 18 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 in the 1710-1755 MHz band 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)

1. CHANNEL: LOWEST

No spurious signals were found in all the range.

2. CHANNEL: MIDDLE

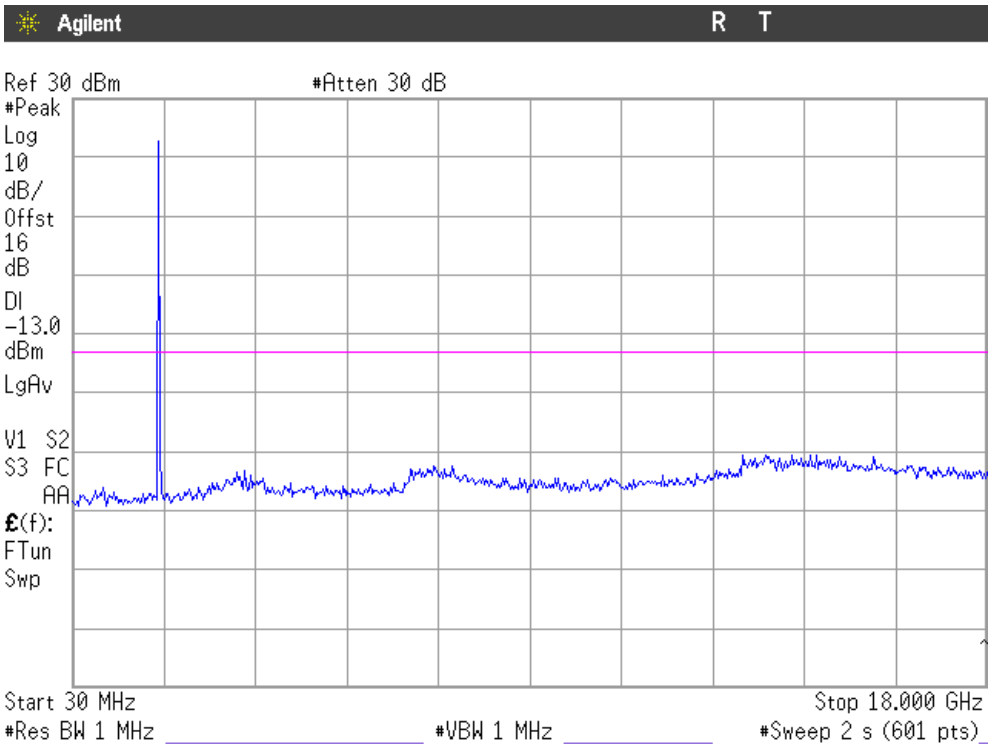
No spurious signals were found in all the range.

3. CHANNEL: HIGHEST

No spurious signals were found in all the range.

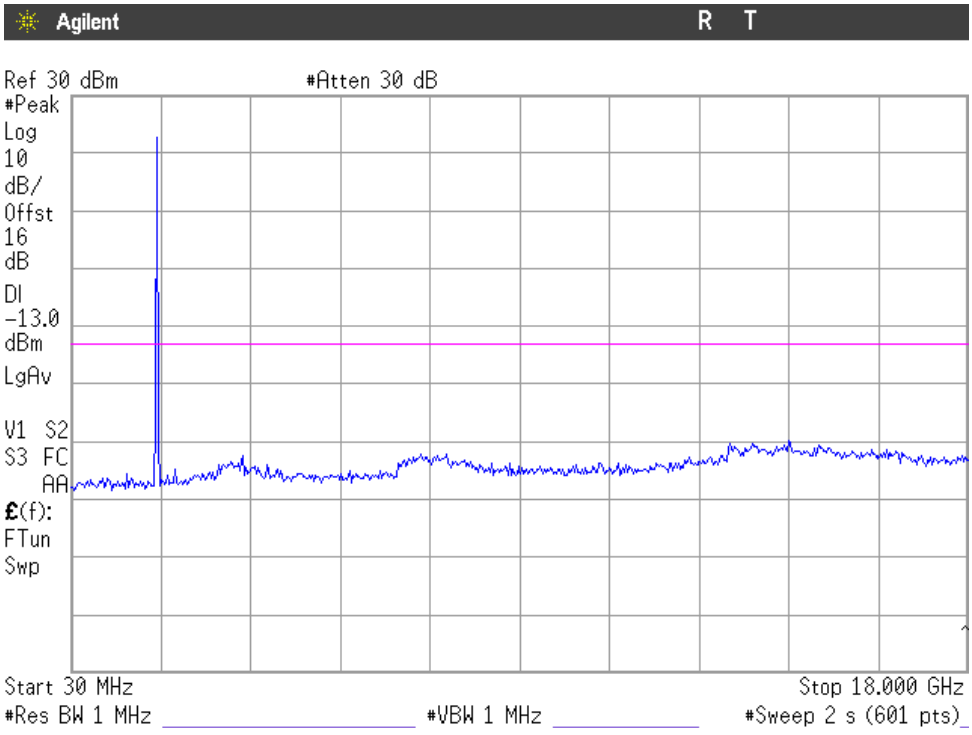
Verdict: PASS

1. CHANNEL: LOWEST



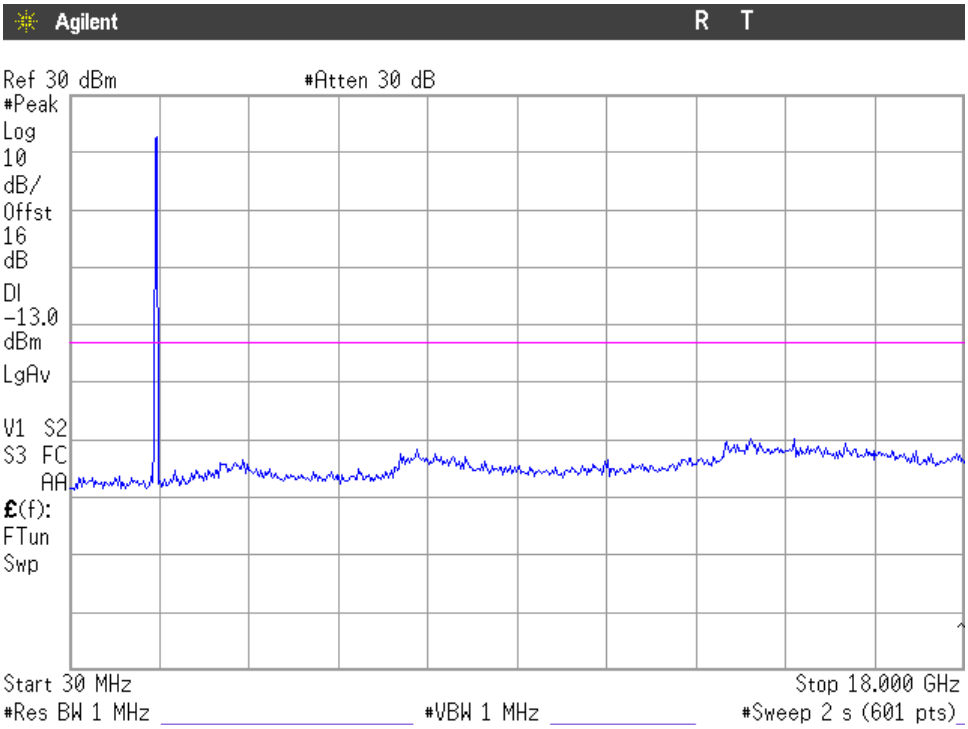
Note: The peak above the limit is the carrier frequency.

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 §27.53

METHOD

As indicated in FCC part 27.53, in the 1 MHz bands immediately outside and adjacent to the licensee's frequency block, a resolution bandwidth of at least one percent of the emission bandwidth (-26 dBc bandwidth) of the fundamental emission of the transmitter may be employed. A resolution bandwidth of 51 kHz was used.

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:

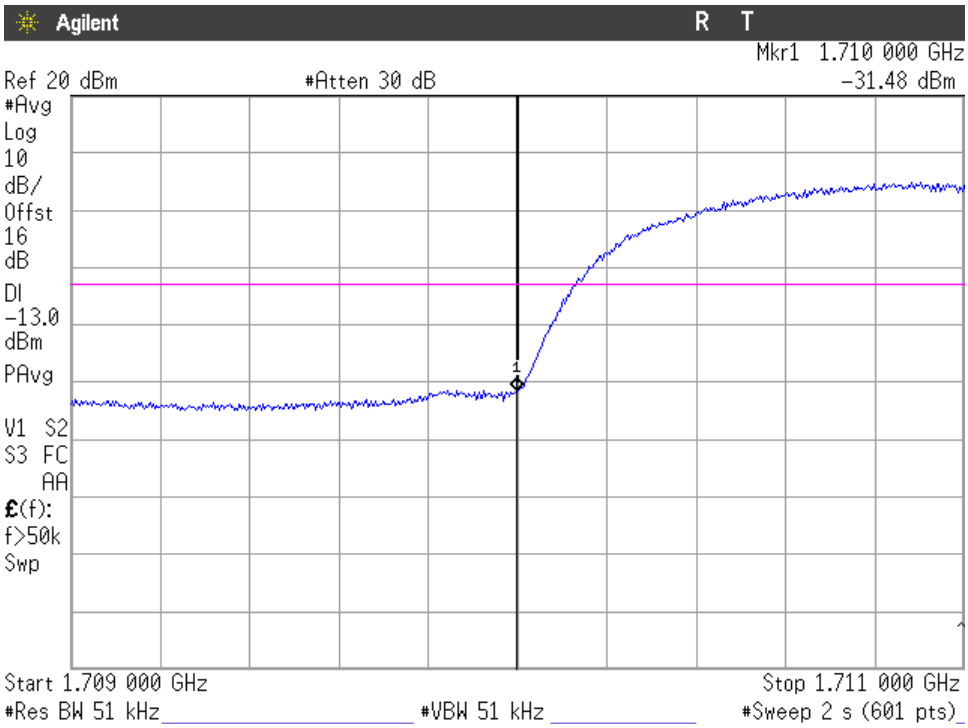
Po (dBm) – [43 + 10 log (Po in mwatts) - 30] = - 13 dBm

RESULTS (see plots in next pages)

Maximum level at lowest Block Edge (dBm)	Maximum level at highest Block Edge (dBm)
-31.48	-32.06

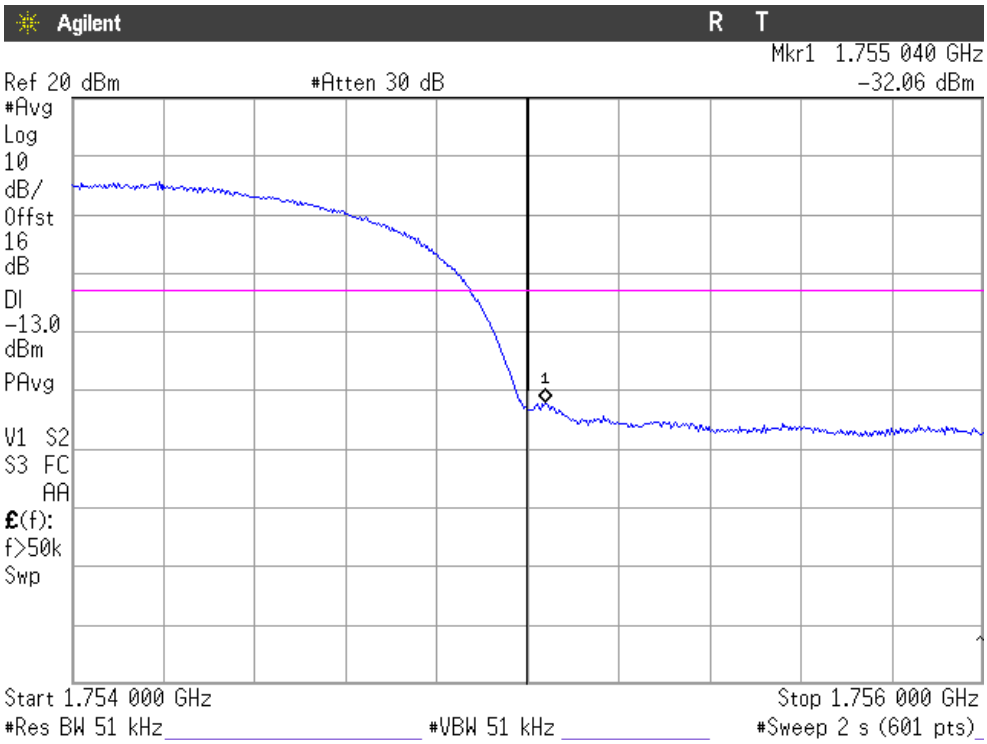
Measurement uncertainty = ±1.57 dB.

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

§ 27.53

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

1. CHANNEL: LOWEST

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

Frequency range 1 GHz-18 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-18 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)
3462.9038	-51.59	Vertical	-47.29	2.20	10.40	-39.09

3. CHANNEL: HIGHEST

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

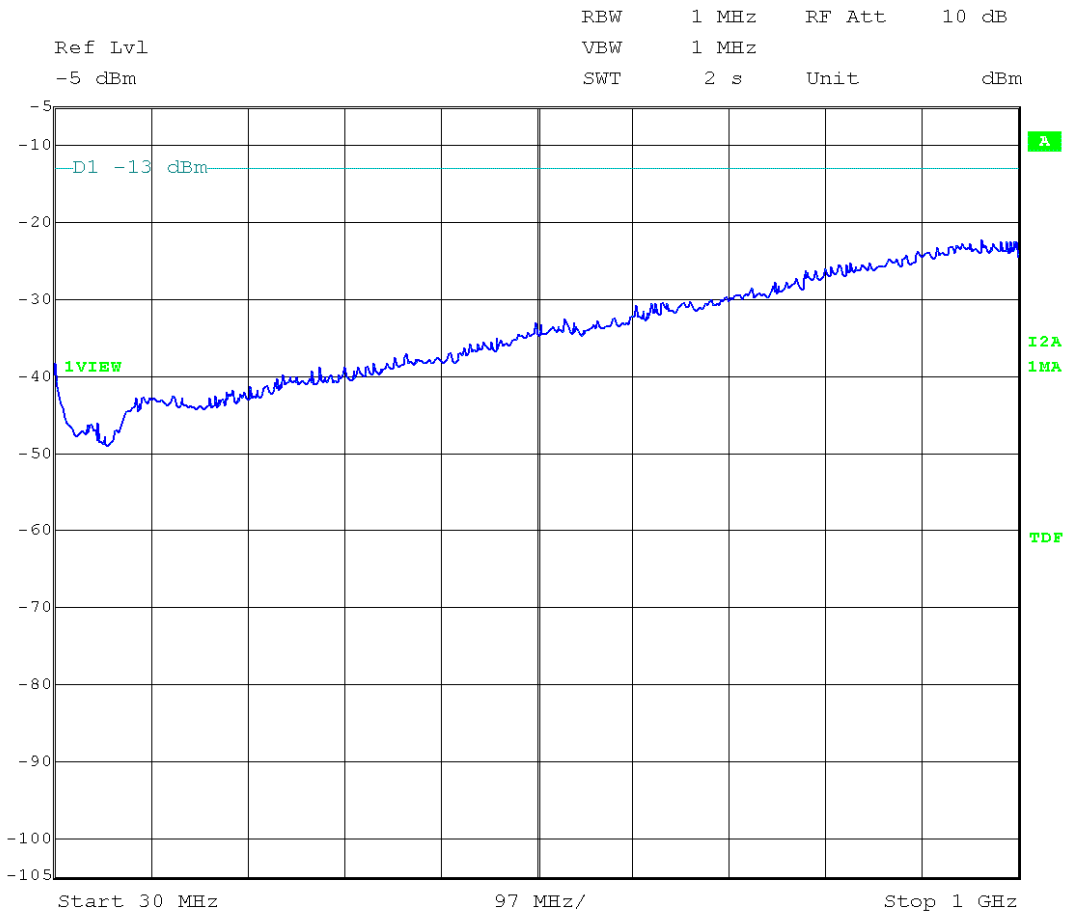
Frequency range 1 GHz-18 GHz.

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)
3507.3335	-51.56	Vertical	-47.26	2.20	10.40	-39.06

Verdict: PASS

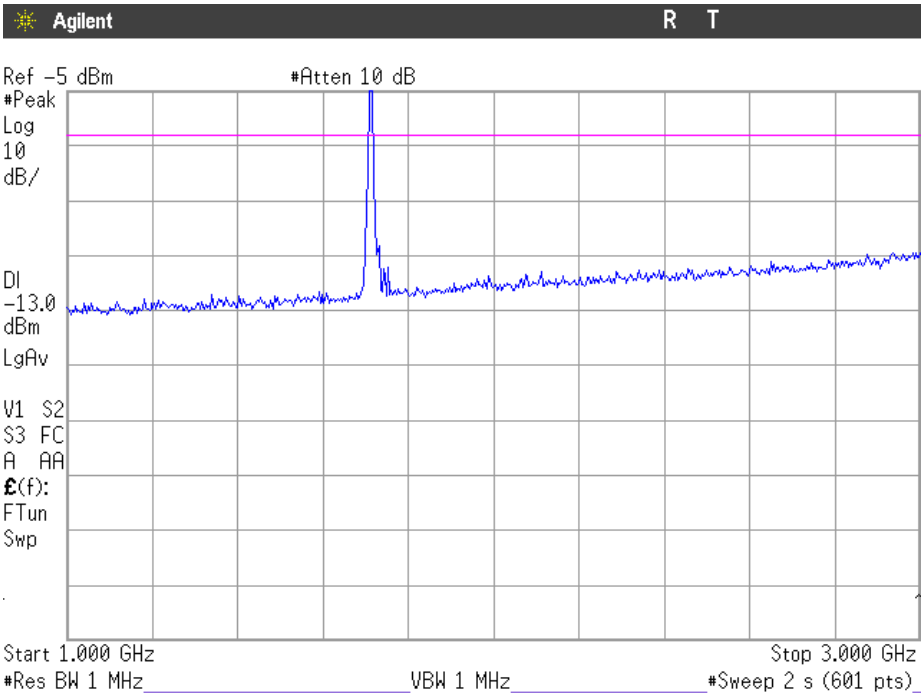
FREQUENCY RANGE 30 MHz-1000 MHz.



(This plot is valid for all three channels).

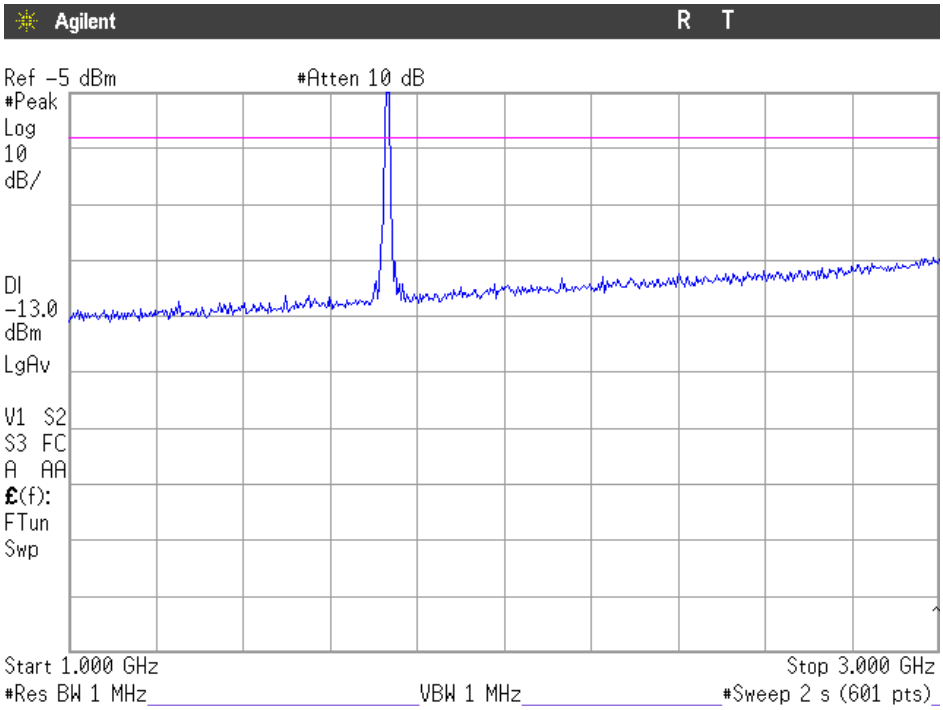
FREQUENCY RANGE 1 GHz to 3 GHz.

CHANNEL: LOWEST



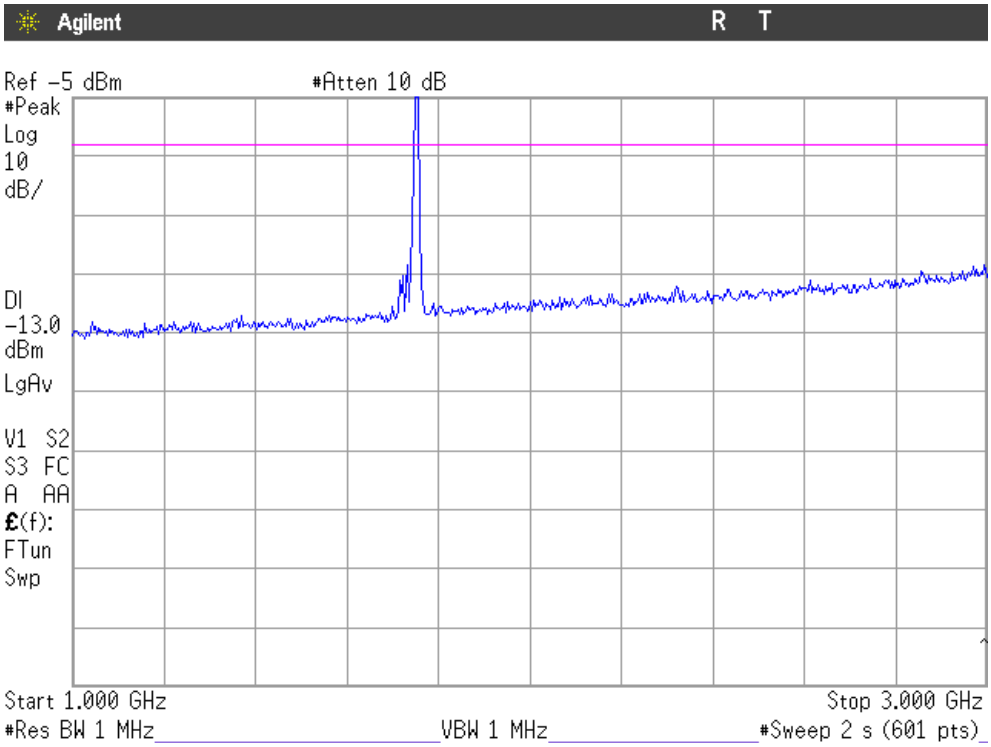
Note: The peak above the limit is the carrier frequency.

CHANNEL: MIDDLE



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

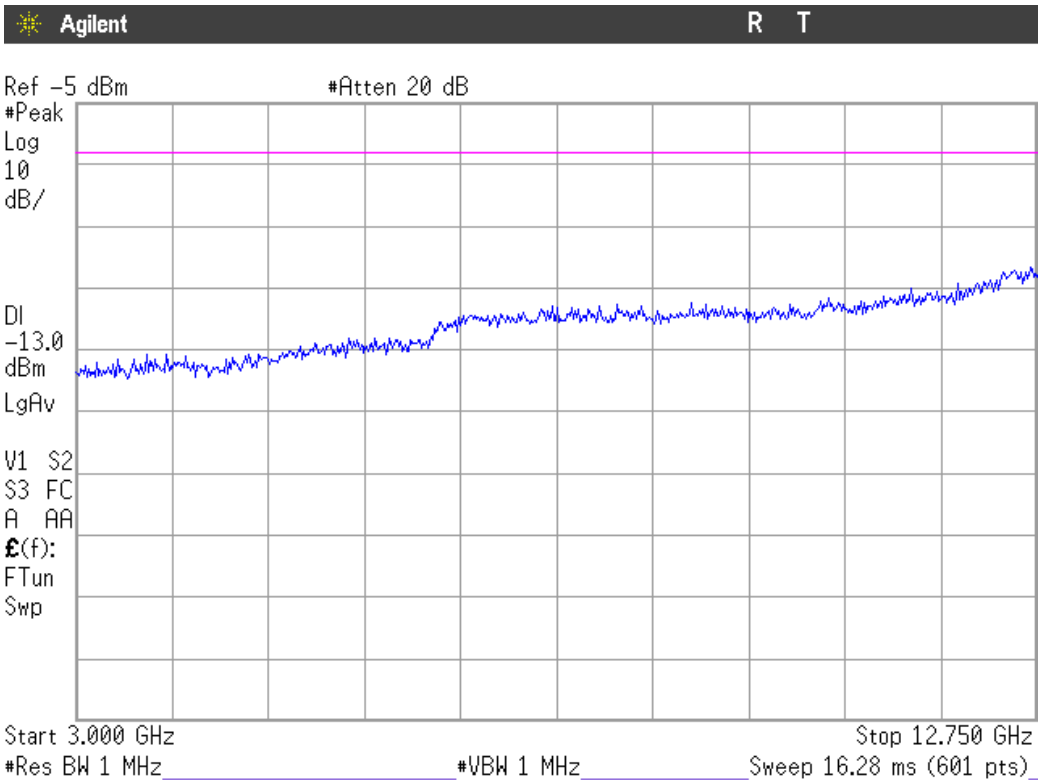
CHANNEL: HIGHEST



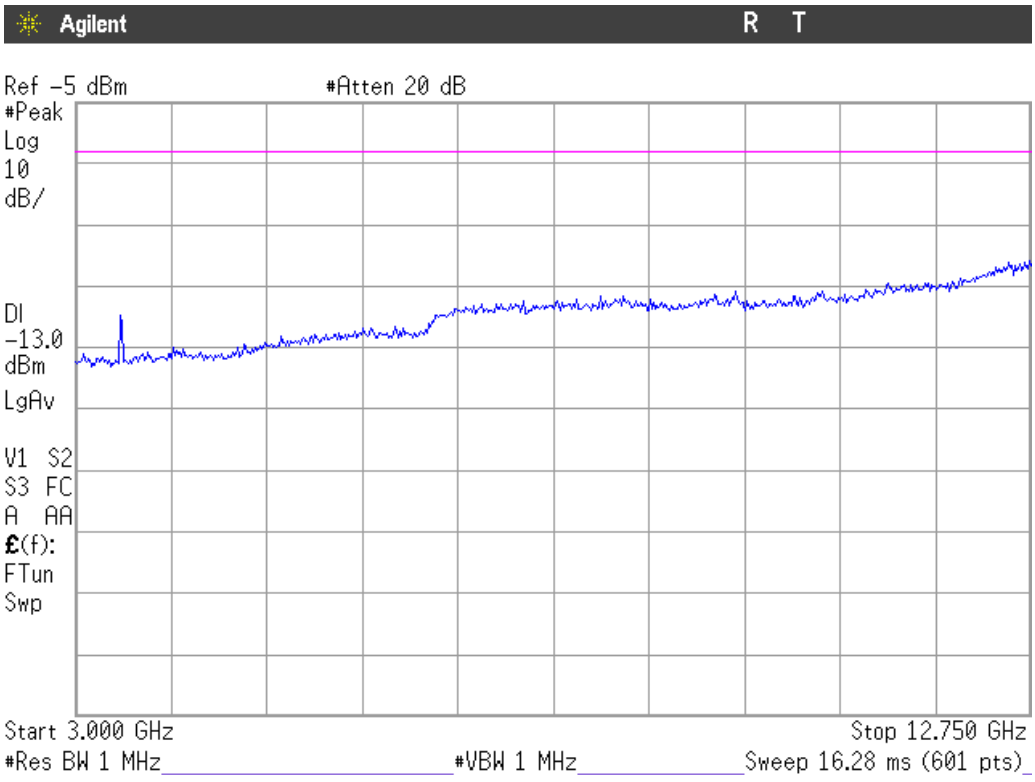
Note: The peak above the limit is the carrier frequency.

FREQUENCY RANGE 3 GHz to 12.75 GHz.

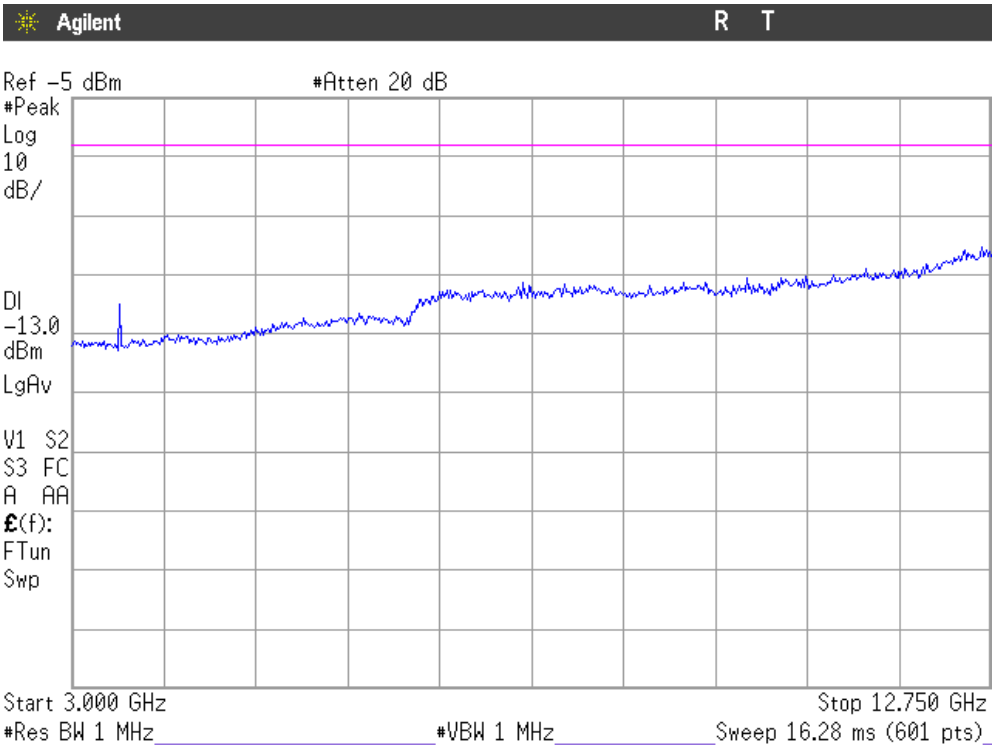
CHANNEL: LOWEST



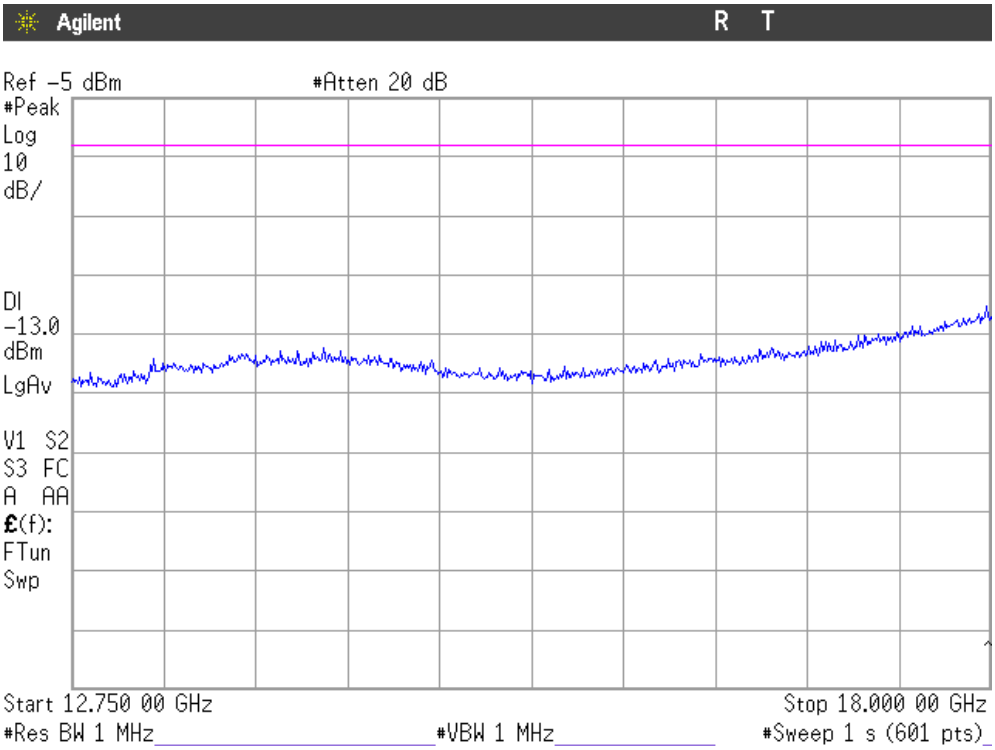
CHANNEL: MIDDLE



CHANNEL: HIGHEST



FREQUENCY RANGE 12.75 GHz TO 18 GHz.



(This plot is valid for all three channels).