

**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 :	28940RET.002
Approved by (name / position & signature)	J.C. Soler / Consultant
Elaboration date	10/07/2009
Identification of item tested	GSM / UMTS PHONE
Brand name	---
Model and/or type reference	P7000
Serial number	IMEI: 0000
Other identification of the product	FCC ID: JYCP7000
Features	3.7 Li-ion rechargeable battery, GSM Quad band, UMTS bands II and V
Description	GSM / UMTS phone
Applicant	Pantech Co., Ltd.
Address..... :	Pantech Bldg, 1-2, DMC, Sangam-dong, Mapogo, 121-792 Seoul, Korea
CIF/NIF/Passport..... :	----
Contact person:	Mr. B.W. Kim
Telephone / Fax	Phone: + 82-(0) 2-2030-1200 Fax: + 82-(0) 2-2030-2519
e-mail:	---
Test samples supplier	Same as applicant
Manufacturer	Same as applicant

Test method requested	: See Standard		
Standard	: USA FCC Part 22 10-1-08 Edition / CANADA IC RSS-132 Issue 2, Sep. 2005: Clause 22.913/RSS-132 Clause 4.4: RF output power (conducted) Clause 2.1047/RSS-132 Clause 4.2: Modulation characteristics Clause 22.355/RSS-132 Clause 4.3: Frequency stability Clause 2.1049: Occupied Bandwidth Clause 22.917/RSS-132 Clause 4.5: Spurious emissions at antenna terminals USA FCC Part 24 10-1-08 Edition / CANADA IC RSS-133 Issue 5, Feb. 2009: Clause 24.232/RSS-133 Clause 6.4: RF output power (conducted) Clause 2.1047/RSS-133 Clause 6.2: Modulation characteristics Clause 24.235/RSS-133 Clause 6.3: Frequency stability Clause 2.1049: Occupied Bandwidth Clause 24.238/RSS-133 Clause 6.5: Spurious emissions at antenna terminals		
Test procedure	: 1. PEET003: Medidas conducidas de equipos radioeléctricos.		
Non-standardized test method	: N/A		
Used instrumentation			
		Last Cal.	Cal. due date
	1. Universal Radio communication Tester R&S CMU200	2009-02	2011-02
	2. Spectrum Analy zer R&S ESU40	2007-11	2009-11

Report template No. : FDT08_11

IMPORTANT: No parts of this report may be reproduced or quoted out of context, in any form or by any means, except in full, without the previous written permission of AT4 wireless, S.A.

INDEX

Competences and guarantees	4
General conditions	4
Uncertainty	4
Usage of samples.....	5
Testing period.....	5
Environmental conditions	5
Summary	6
Remarks and comments.....	6
Testing verdicts	6
APPENDIX A: Test results.....	8
APPENDIX B: Photographs	70

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 conjunction 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

<u>Control No.</u>	<u>Description</u>	<u>Model</u>	<u>Serial No.</u>	<u>Date of reception</u>
29994/40	Mobile phone	P7000	IMEI TAC: 01203300	03/07/2009
29994/51	RF Cable	---	---	03/07/2009
29994/16	Dummy battery	---	---	16/06/2009

- Sample M/01 has undergone the test(s) specified in subclause "Test method requested".

Testing period

The performed test started on 2009-07-08 and finished on. 2009-07-09.

The tests have been performed at AT4 wireless.

Environmental conditions

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

Temperature	Min. = 20 °C Max. = 24 °C
Relative humidity	Min. = 40 % Max. = 59 %
Air pressure	Min. = 1012 mbar Max. = 1018 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

1. 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.

2. Only conducted test was requested.

3. Test not requested.

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 ²		
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				NM ³

2, 3: See section "Remarks and comments"

FCC PART 24/IC RSS-133 PARAGRAPH	VERDICT			
	NA	P	F	NM
Clause 24.232/RSS-133 Clause 6.4: RF output power		P ²		
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				NM ³

2, 3: See section "Remarks and comments"

APPENDIX A: Test results

INDEX

TEST RESULTS FOR FCC PART 22 AND IC RSS-132	10
TEST CONDITIONS	10
RF Output Power (conducted).....	11
Modulation Characteristics.....	13
Frequency Stability.....	15
Occupied Bandwidth	18
Spurious emissions at antenna terminals	29
Spurious emissions at antenna terminals at Block Edges	36
TEST RESULTS FOR FCC PART 24 AND RSS-133	40
TEST CONDITIONS	40
RF Output Power (conducted).....	41
Modulation Characteristics.....	43
Frequency Stability.....	45
Occupied Bandwidth	48
Spurious emissions at antenna terminals	59
Spurious emissions at antenna terminals at Block Edges	66

TEST RESULTS FOR FCC PART 22 AND IC RSS-132

TEST CONDITIONS

Power supply (V):

$$V_{\text{nom}} = 3.8 \text{ Vdc}$$

$$V_{\text{max}} = 4.2 \text{ Vdc}$$

$$V_{\text{min}} = 3.5 \text{ Vdc}$$

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

Type of power supply = Rechargeable Li-ion battery

Type of antenna = internal antenna.

TEST FREQUENCIES:

GSM/GPRS AND EDGE MODULATION

Lowest channel (128): 824.2 MHz

Middle channel (190): 836.6 MHz

Highest channel (251): 848.8 MHz

WCDMA MODULATION

Lowest channel (4132): 826.4 MHz

Middle channel (4182): 836.4 MHz

Highest channel (4233): 846.6 MHz

RF Output Power (conducted)

SPECIFICATION

§2.1046 and 22.913.

METHOD

The average 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.

RESULTS

MAXIMUM AVERAGE OUTPUT POWER (CONDUCTED)

GSM MODULATION

Channel	Lowest	Middle	Highest
Maximum average power (dBm)	32.49	32.31	32.45
Maximum average power (W)	1.77	1.70	1.76
Measurement uncertainty (dB)	±0.5		

GPRS MODULATION

Channel	Lowest	Middle	Highest
Maximum average power (dBm)	32.1	32.5	32.4
Maximum average power (W)	1.62	1.78	1.74
Measurement uncertainty (dB)	±0.5		

EDGE MODULATION

Channel	Lowest	Middle	Highest
Maximum average power (dBm)	26.5	26.8	26.8
Maximum average power (W)	0.45	0.48	0.48
Measurement uncertainty (dB)	±0.5		

WCDMA MODULATION

Channel	Lowest	Middle	Highest
Maximum average power (dBm)	23.1	23.6	23.4
Maximum average power (W)	0.20	0.23	0.22
Measurement uncertainty (dB)	±0.5		

HSDPA MODULATION

Channel	Lowest	Middle	Highest
Maximum average power (dBm)	21.6	21.7	22.0
Maximum average power (W)	0.14	0.15	0.16
Measurement uncertainty (dB)	±0.5		

Modulation Characteristics

SPECIFICATION

§2.1047

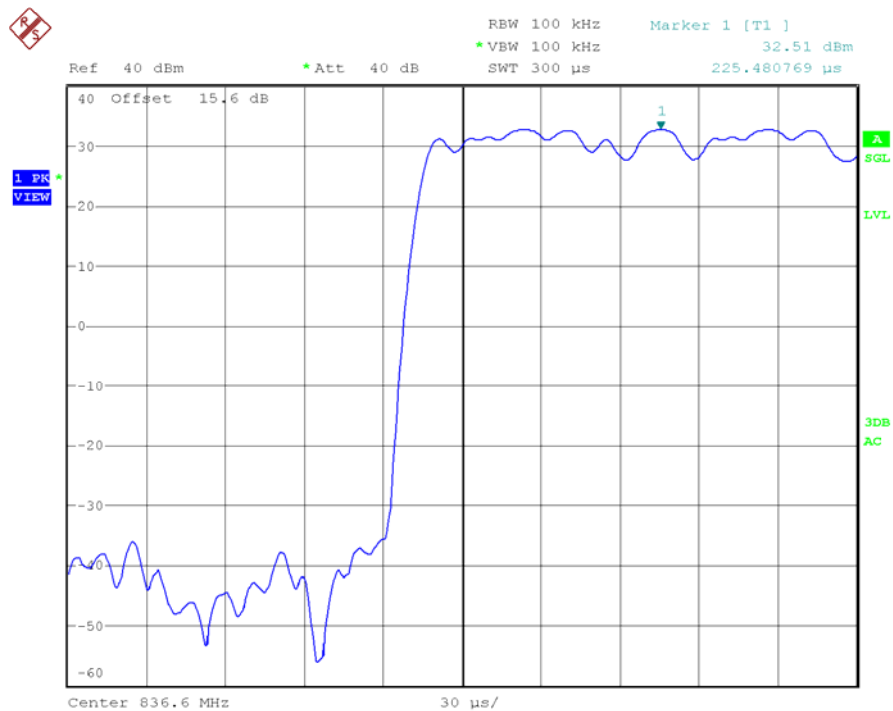
METHOD

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

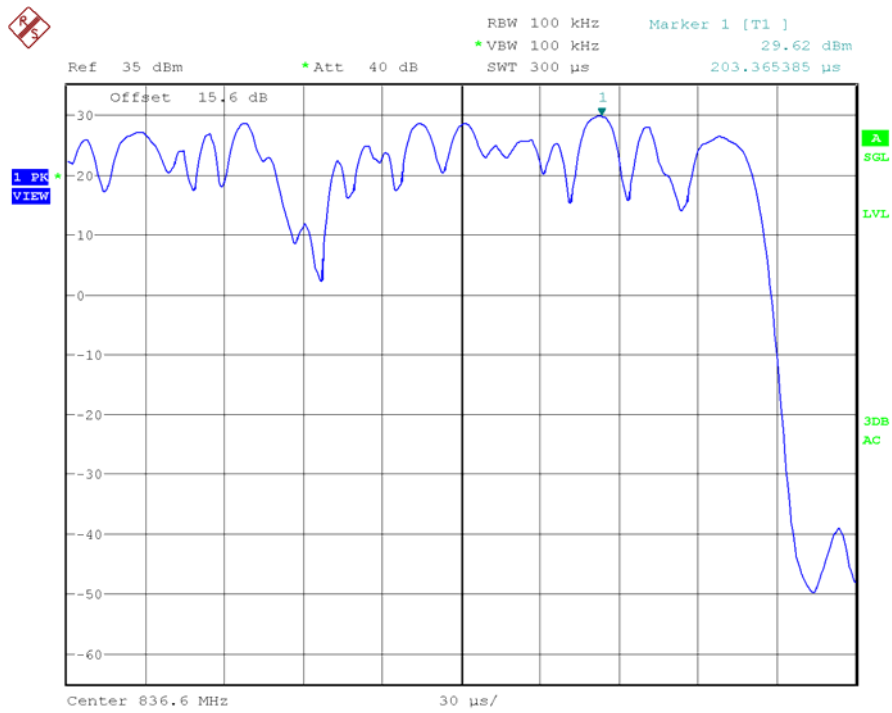
RESULTS

The following plot shows the modulation schemes in the EUT.

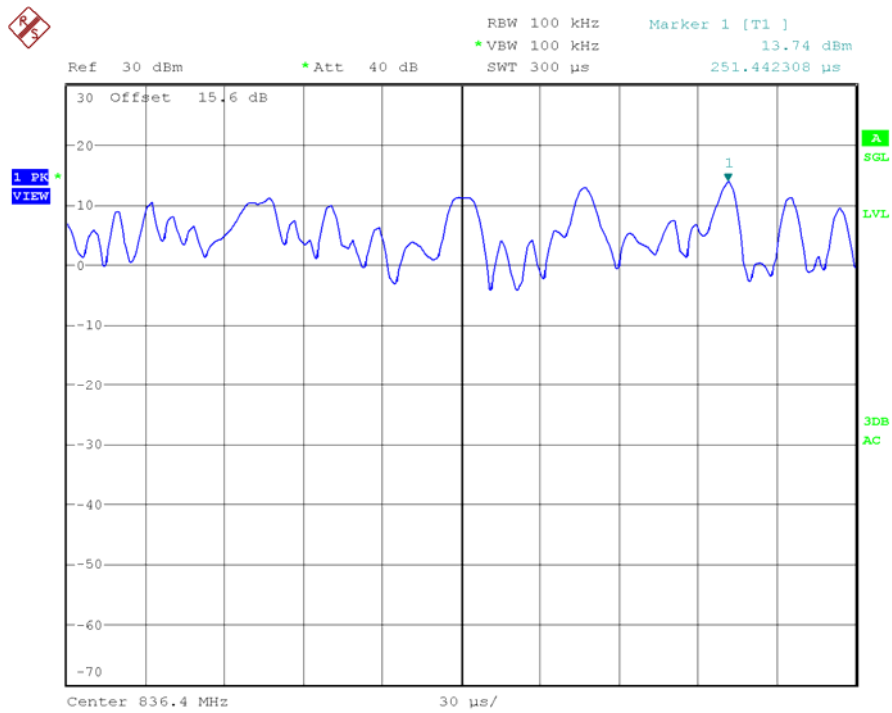
GSM/GPRS MODULATION



EDGE MODULATION



WCDMA MODULATION



Frequency Stability

SPECIFICATION

§2.1055 and §22.355

METHOD

The frequency tolerance measurements over temperature variations were made over the temperature range of -30°C to $+50^{\circ}\text{C}$. The EUT was placed inside a climatic chamber and the temperature was raised hourly in 10°C steps from -30°C up to $+50^{\circ}\text{C}$.

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

RESULTS

Frequency stability over temperature variations.

GSM/GPRS MODULATION

Temperature ($^{\circ}\text{C}$)	Frequency Error (Hz)	Frequency Error (ppm)	Frequency Error (%)
+50	-26	-0.0311	-0.00000311
+40	-10	-0.0120	-0.00000120
+30	2	0.0024	0.00000024
+20	-12	-0.0143	-0.00000143
+10	-16	-0.0191	-0.00000191
0	-3	-0.0036	-0.00000036
-10	-22	-0.0263	-0.00000263
-20	-6	-0.0072	-0.00000072
-30	-4	-0.0048	-0.00000048

EDGE MODULATION

Temperature (°C)	Frequency Error (Hz)	Frequency Error (ppm)	Frequency Error (%)
+50	-17	-0.0203	-0.00000203
+40	-15	-0.0179	-0.00000179
+30	-18	-0.0215	-0.00000215
+20	-21	-0.0251	-0.00000251
+10	-17	-0.0203	-0.00000203
0	1	0.0012	0.00000012
-10	1	0.0012	0.00000012
-20	6	0.0072	0.00000072
-30	24	0.0287	0.00000287

WCDMA MODULATION

Temperature (°C)	Frequency Error (Hz)	Frequency Error (ppm)	Frequency Error (%)
+50	0	0.0000	0.00000000
+40	14	0.0167	0.00000167
+30	1	0.0012	0.00000012
+20	1	0.0012	0.00000012
+10	6	0.0072	0.00000072
0	0	0.0000	0.00000000
-10	13	0.0155	0.00000155
-20	0	0.0000	0.00000000
-30	1	0.0012	0.00000012

Frequency stability over voltage variations.

GSM/GPRS MODULATION

Battery Supply voltage	Voltage (V)	Frequency Error (Hz)	Frequency Error (ppm)	Frequency Error (%)
Vmax	4.2	-22	-0.0263	-0.00000263
Vmin	3.5	-26	-0.0311	-0.00000311

EDGE MODULATION

Battery Supply voltage	Voltage (V)	Frequency Error (Hz)	Frequency Error (ppm)	Frequency Error (%)
Vmax	4.2	-38	-0.0454	-0.00000454
Vmin	3.5	-44	-0.0526	-0.00000526

WCDMA MODULATION

Battery Supply voltage	Voltage (V)	Frequency Error (Hz)	Frequency Error (ppm)	Frequency Error (%)
Vmax	4.2	-1	-0.0012	-0.00000012
Vmin	3.5	1	0.0012	0.00000012

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 determine the occupied bandwidth of the modulated emission for GPRS and EDGE modulation and 50 kHz for WCDMA modulation.

RESULTS

GSM/GPRS MODULATION

Channel	Lowest	Middle	Highest
99% Occupied bandwidth (kHz)	280.4	275.6	264.4
-26 dBc bandwidth (kHz)	314.1	317.3	310.9
Measurement uncertainty (kHz)	<±6.5		

EDGE MODULATION

Channel	Lowest	Middle	Highest
99% Occupied bandwidth (kHz)	282.1	285.3	280.5
-26 dBc bandwidth (kHz)	314.1	312.5	309.3
Measurement uncertainty (kHz)	<±6.5		

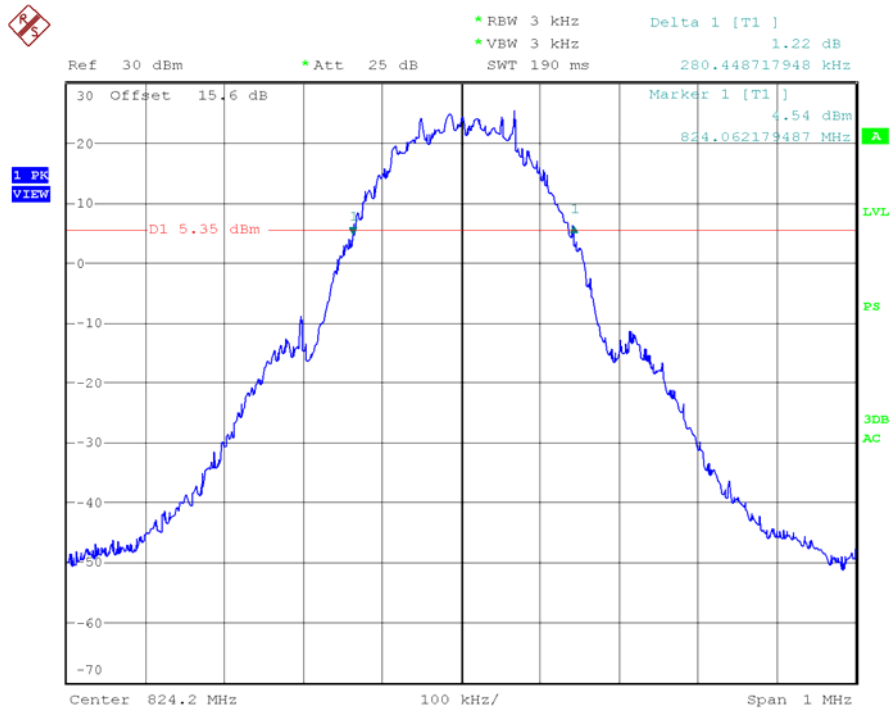
WCDMA MODULATION

Channel	Lowest	Middle	Highest
99% Occupied bandwidth (kHz)	4564	4577	4577
-26 dBc bandwidth (kHz)	4641	4654	4654
Measurement uncertainty (kHz)	<±52		

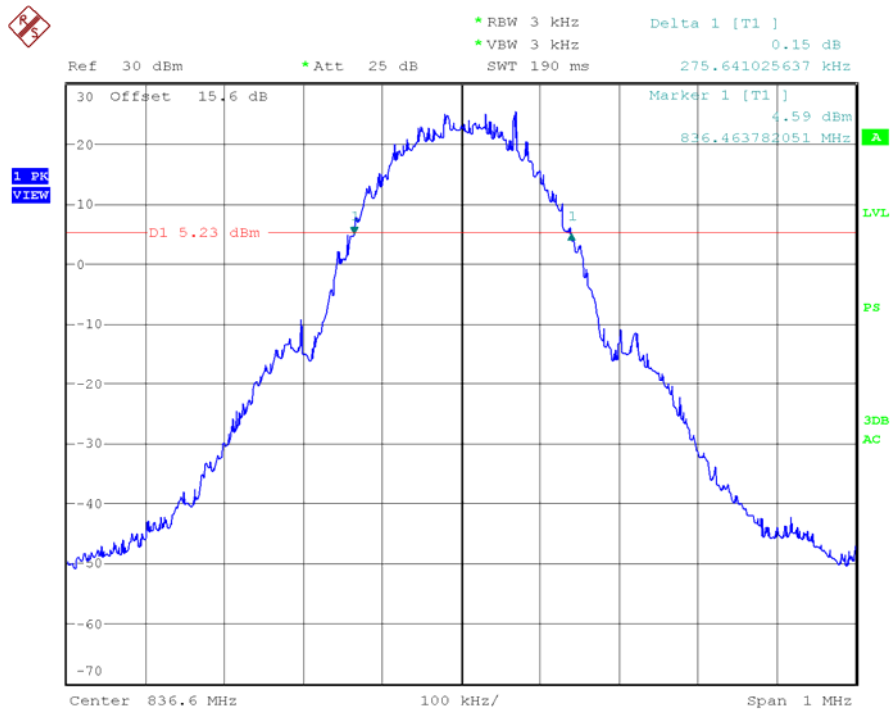
99% OCCUPIED BANDWIDTH

GSM/GPRS MODULATION

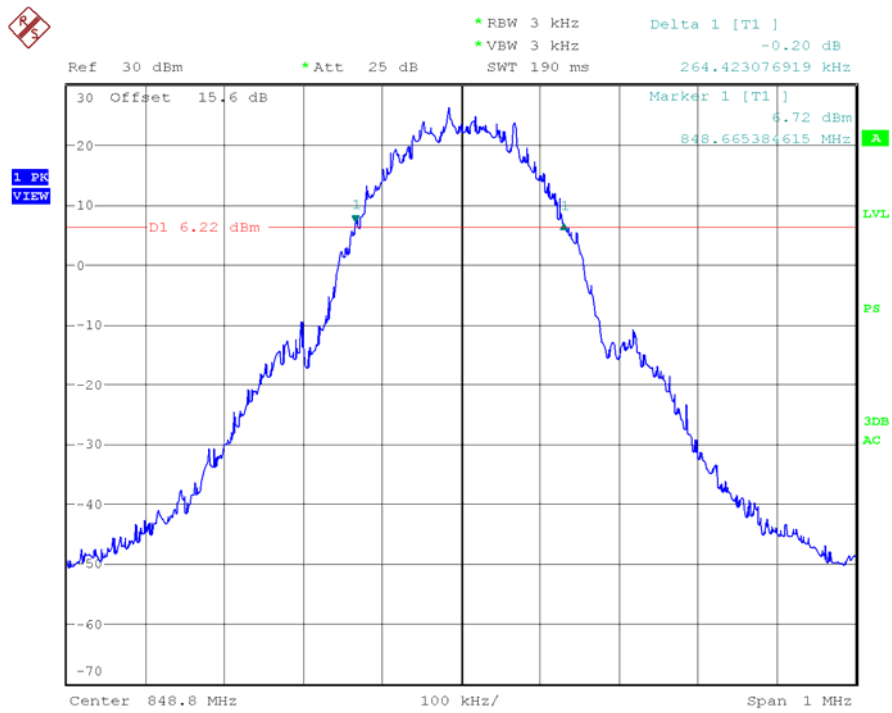
Lowest Channel



Middle Channel

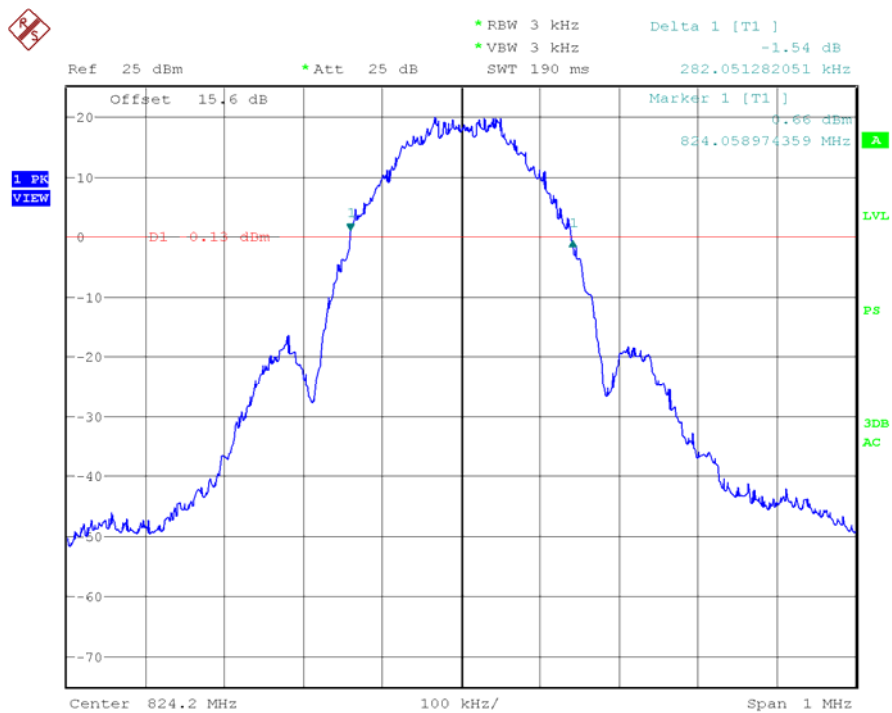


Highest Channel

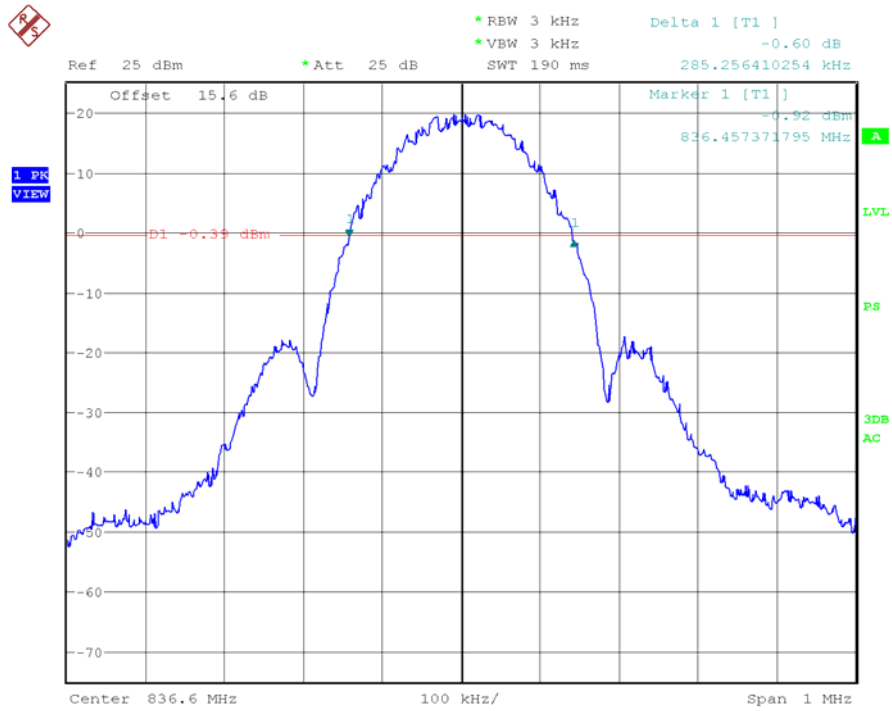


EDGE MODULATION

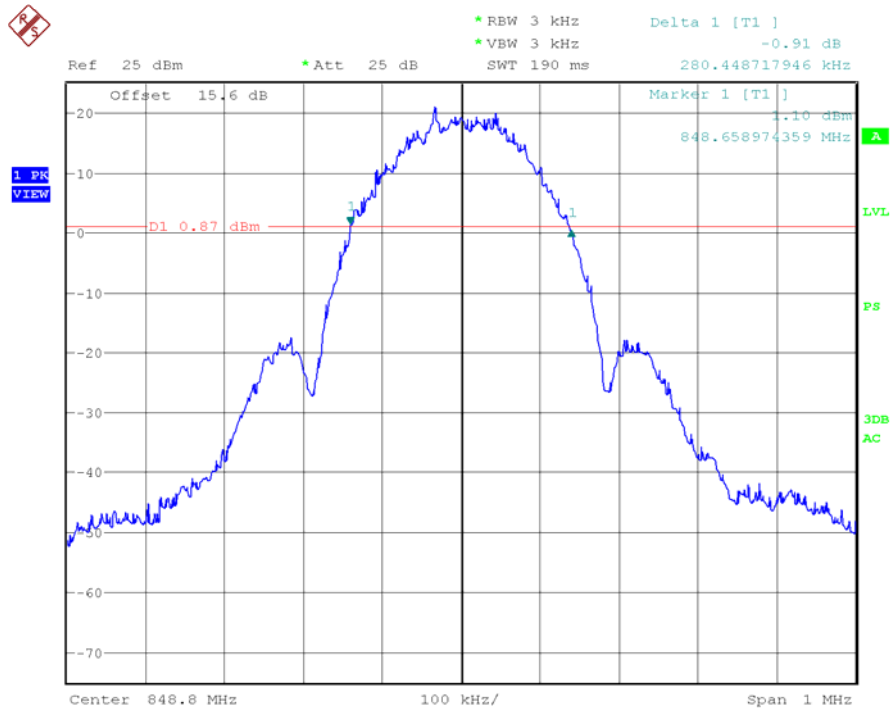
Lowest Channel



Middle Channel

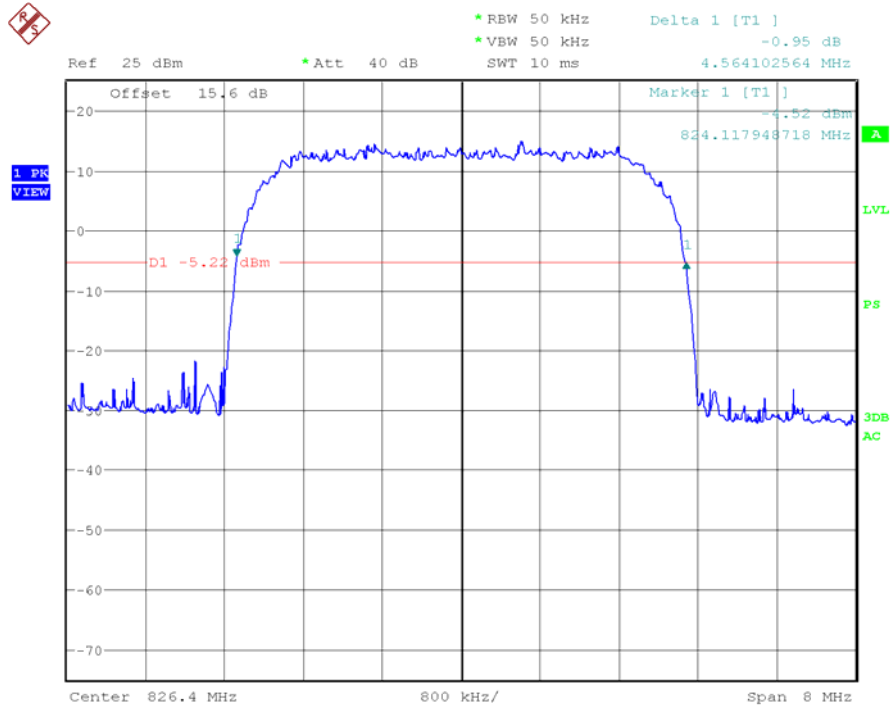


Highest Channel

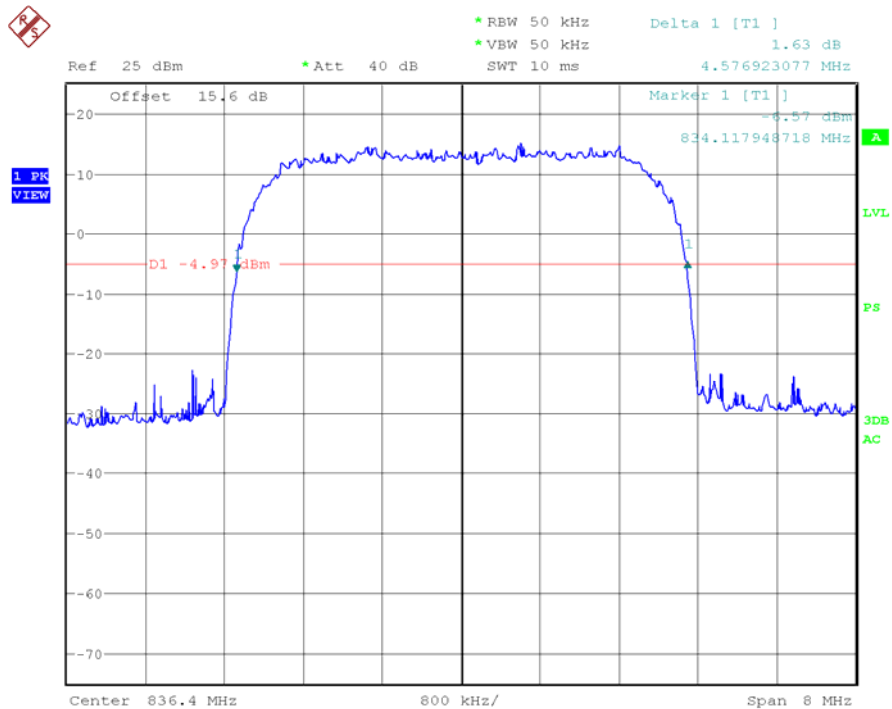


WCDMA MODULATION

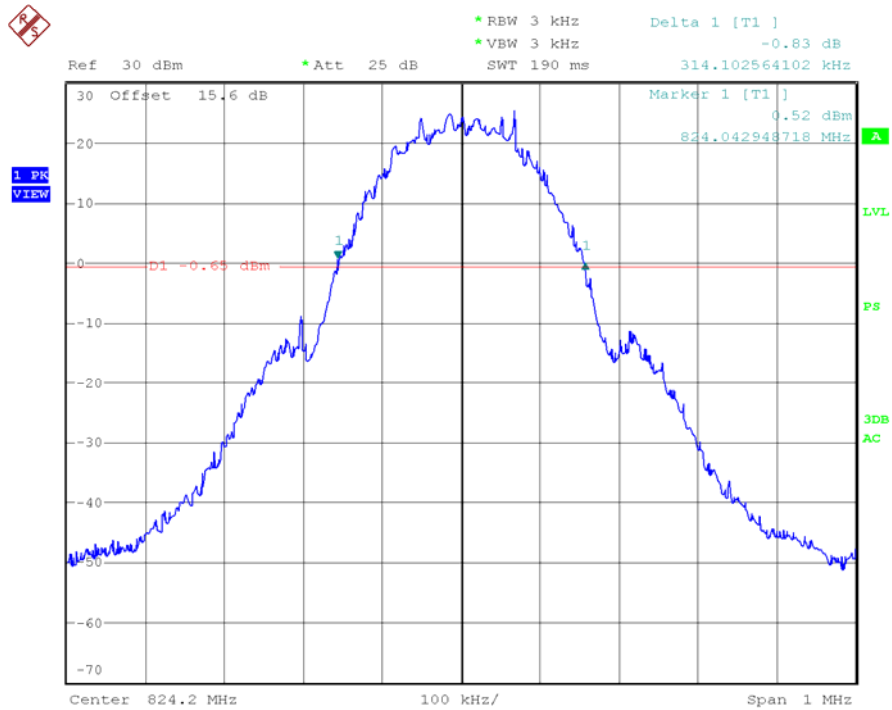
Lowest Channel



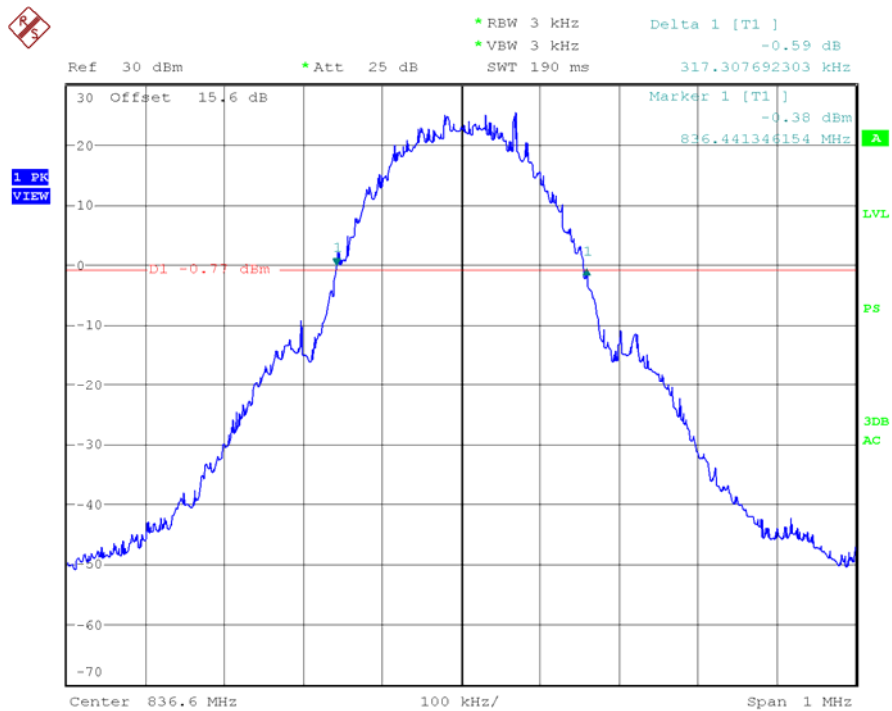
Middle Channel



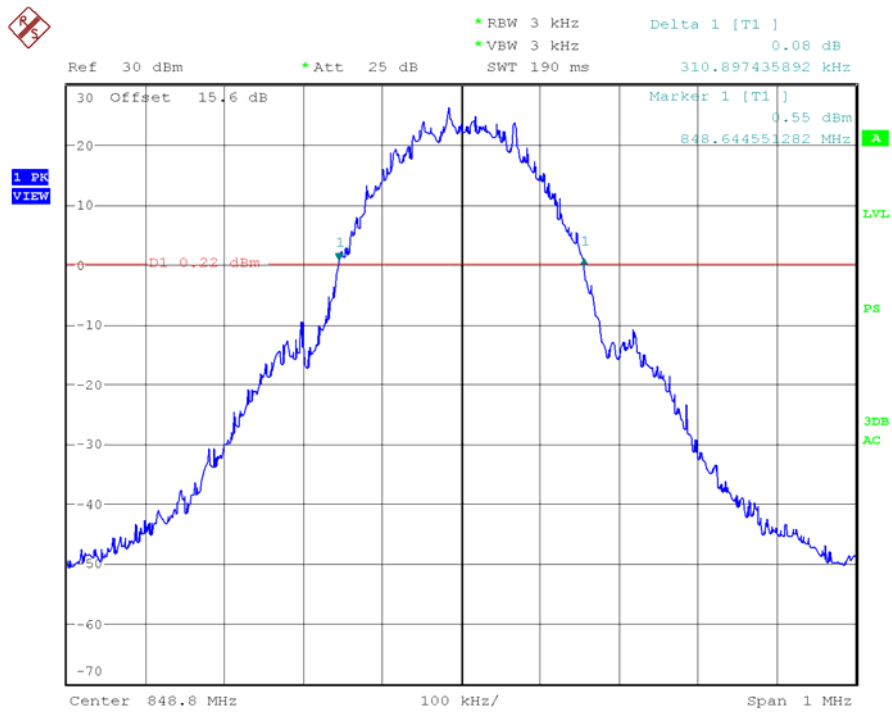
-26 dBc BANDWIDTH
 GSM/GPRS MODULATION
 Lowest Channel



Middle Channel

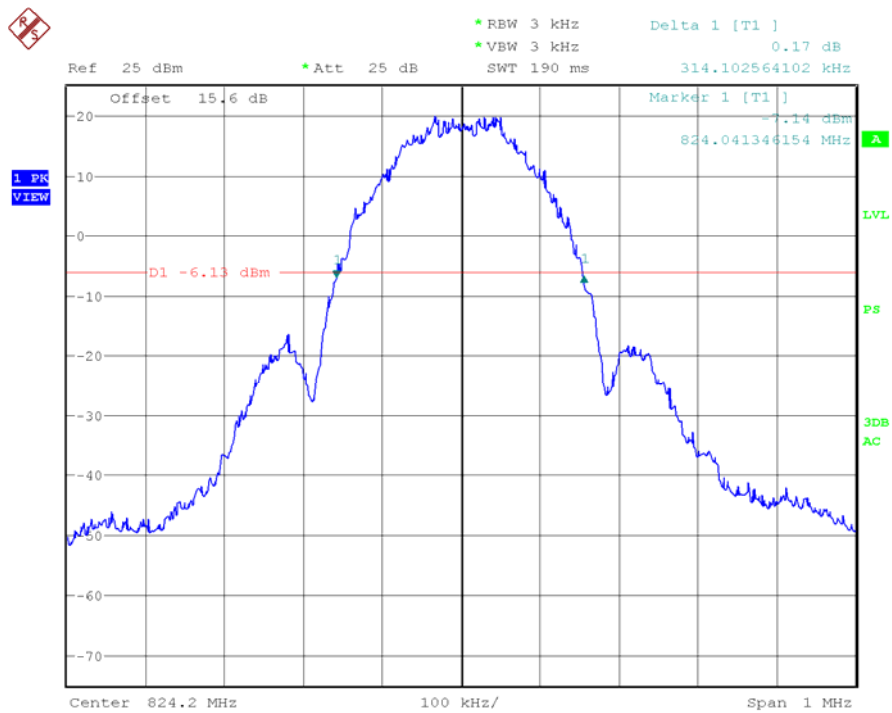


Highest Channel

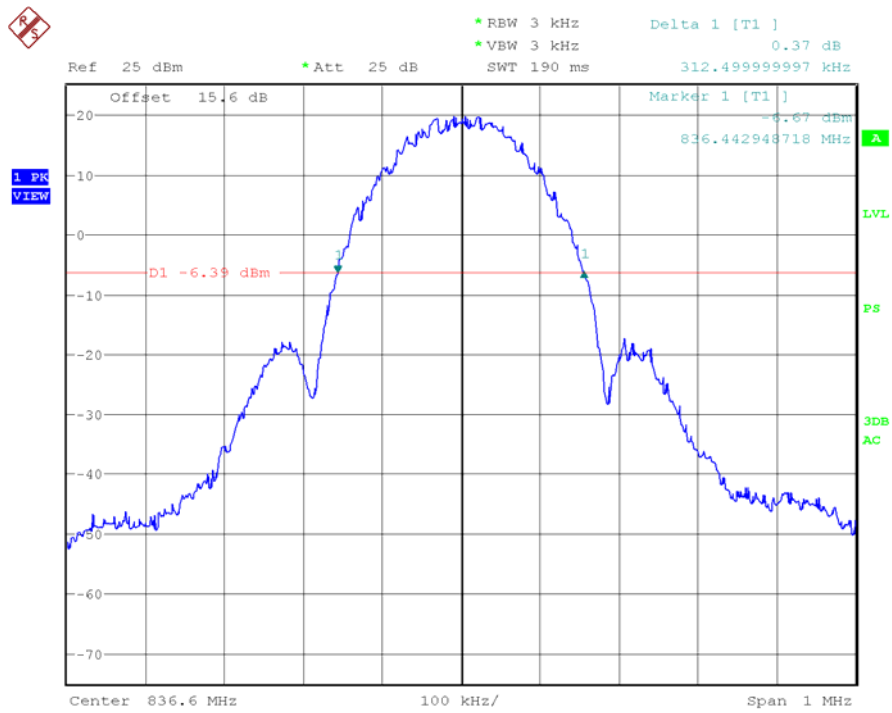


EDGE MODULATION

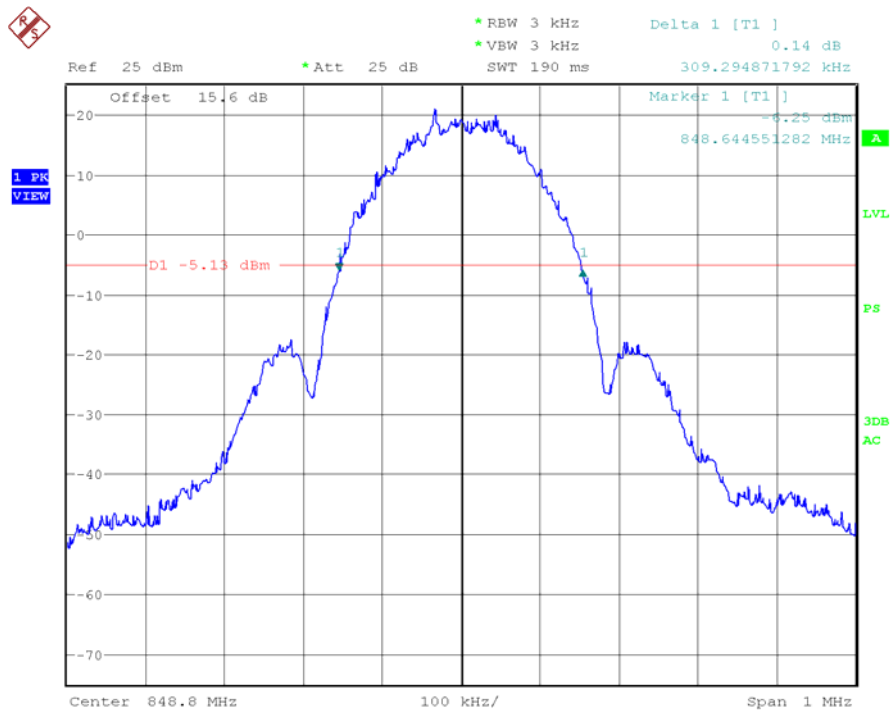
Lowest Channel



Middle Channel

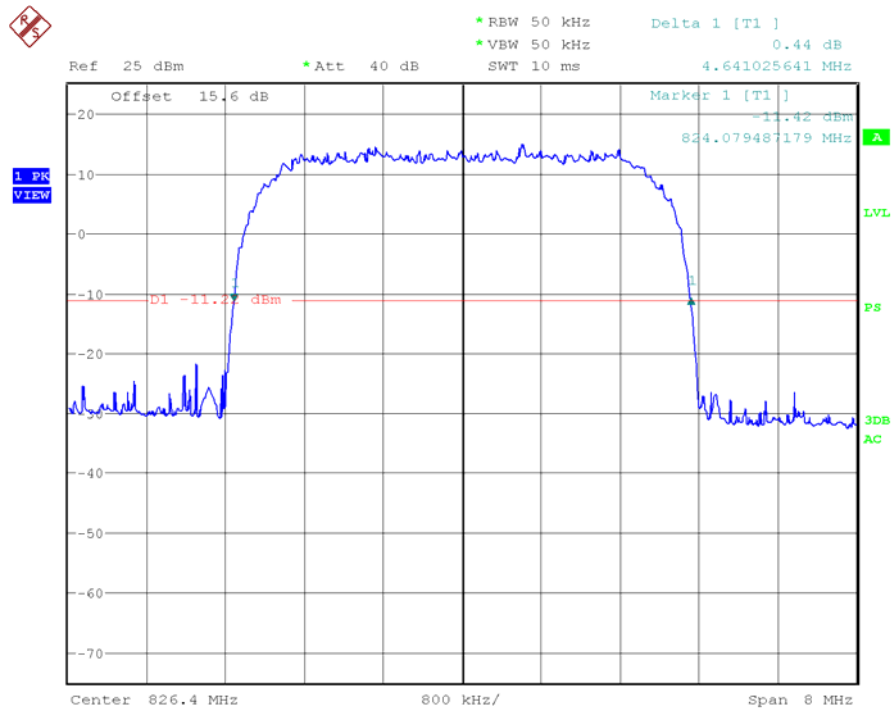


Highest Channel

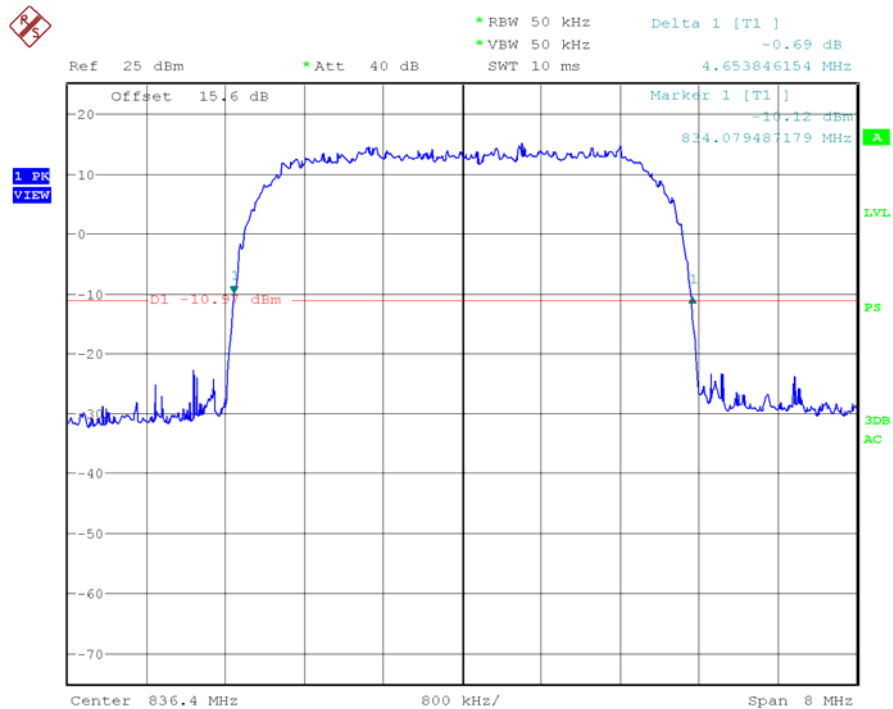


WCDMA MODULATION

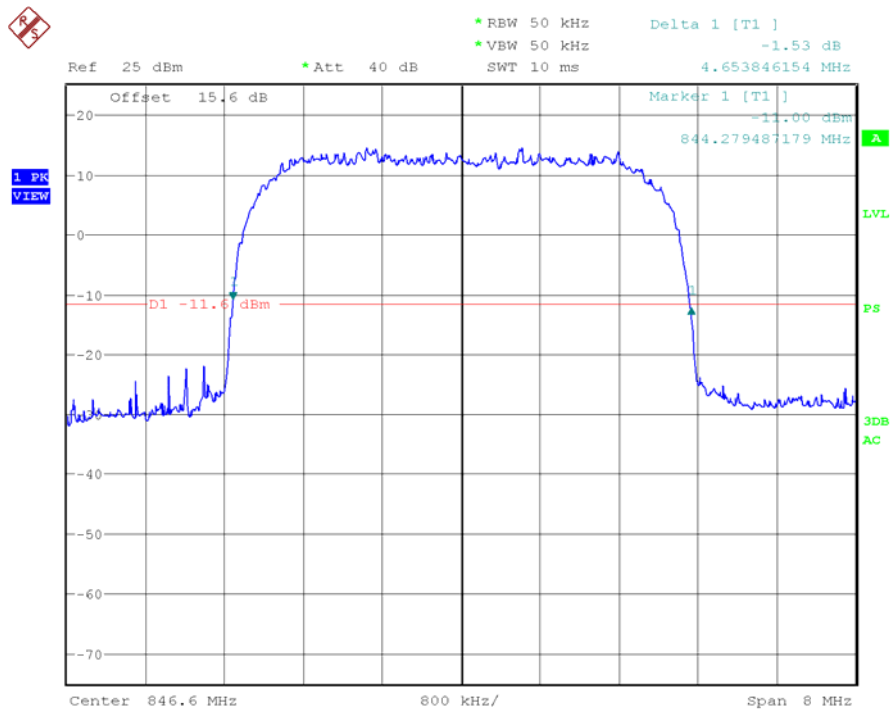
Lowest Channel



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

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

RESULTS (see plots in next pages)

GSM/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.

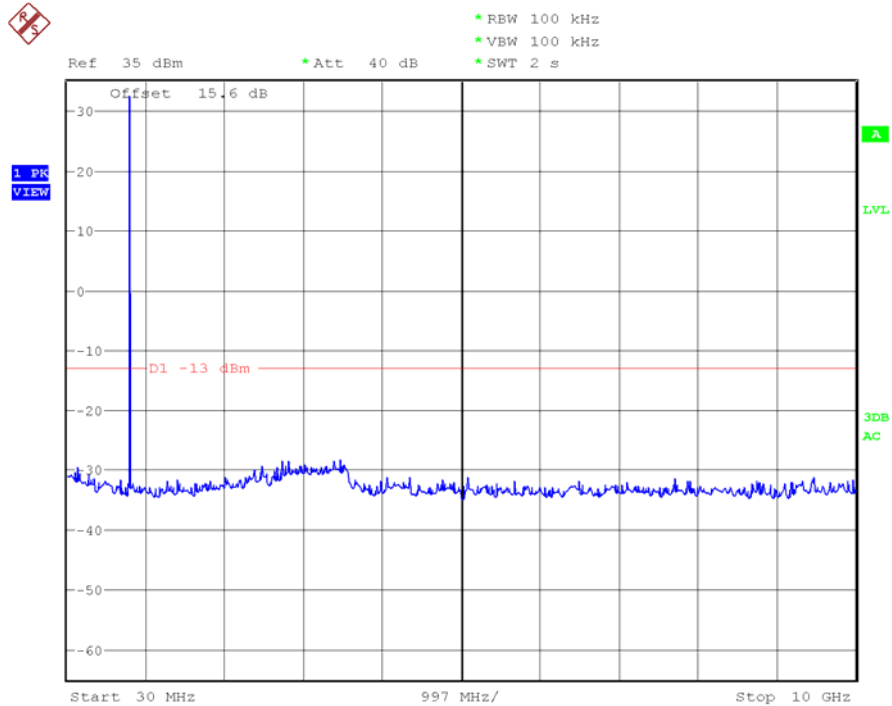
3. CHANNEL: HIGHEST

No spurious signals were found in all the range.

Verdict: PASS

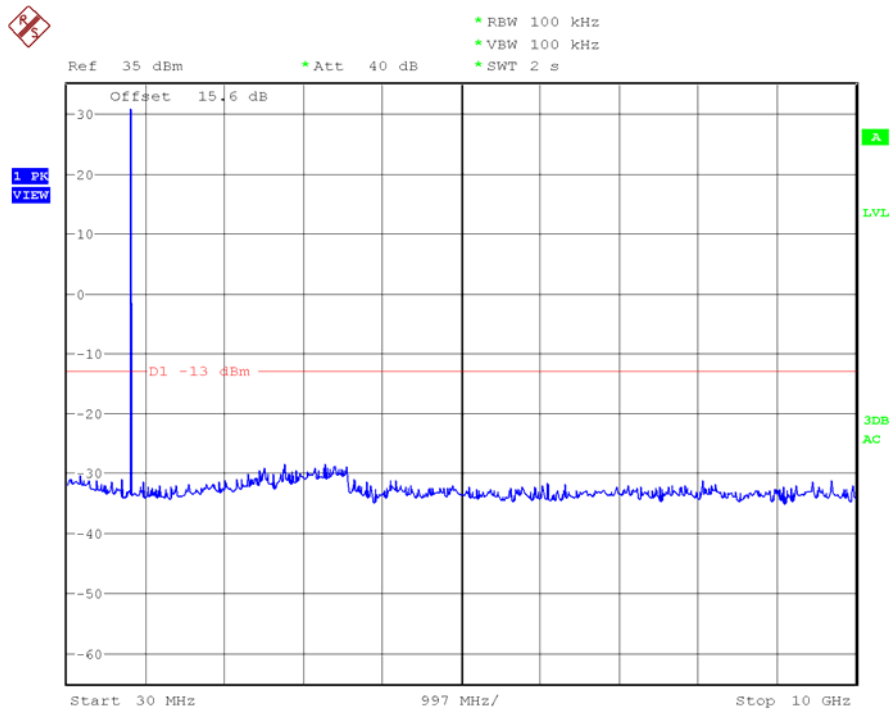
GSM/GPRS MODULATION

1. CHANNEL: LOWEST



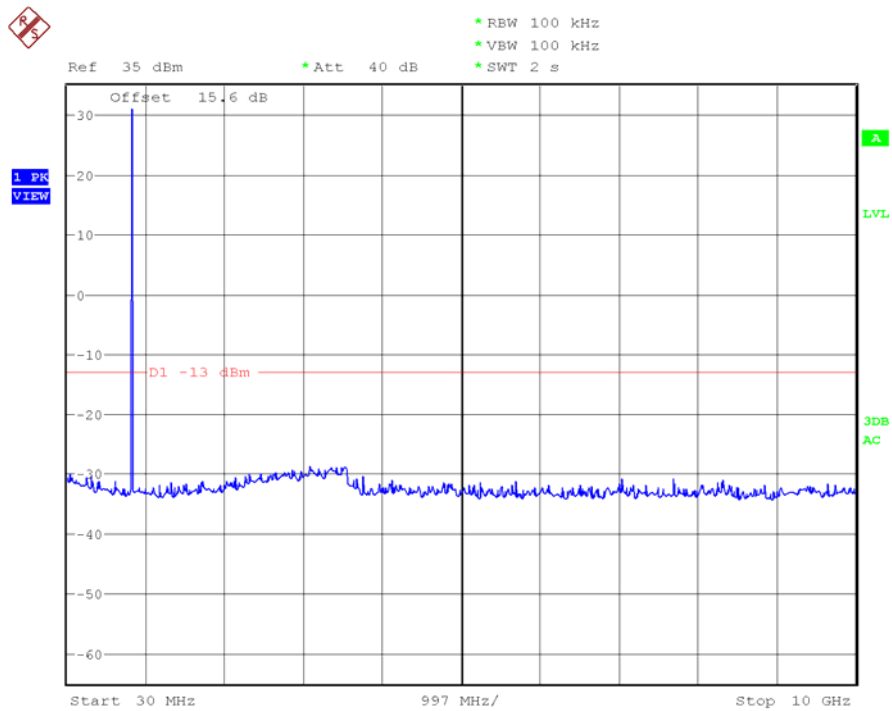
Note: The peak above the limit is the carrier frequency.

2. CHANNEL: MIDDLE



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

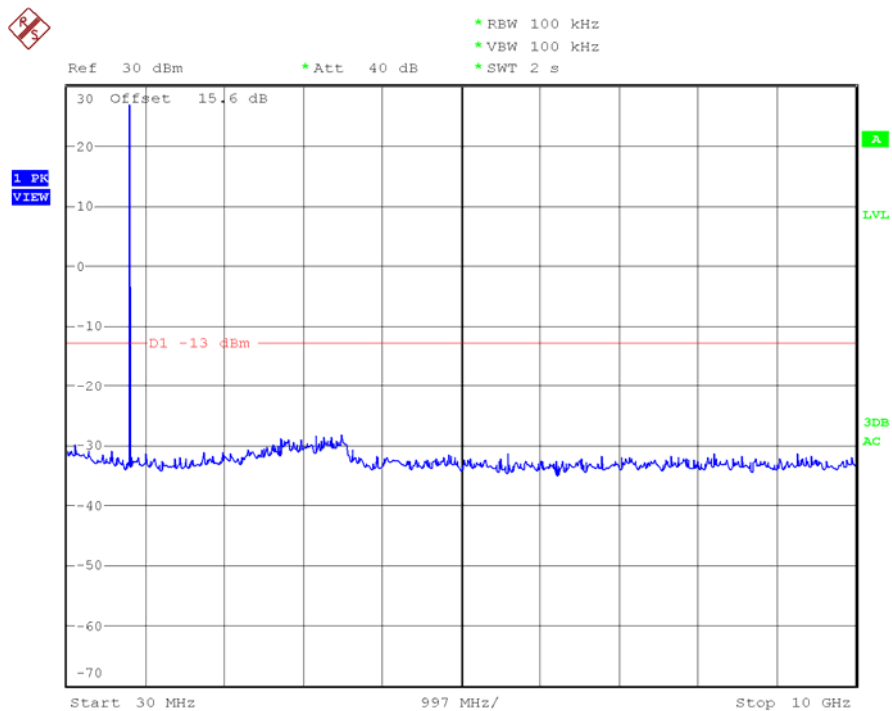
3. CHANNEL: HIGHEST



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

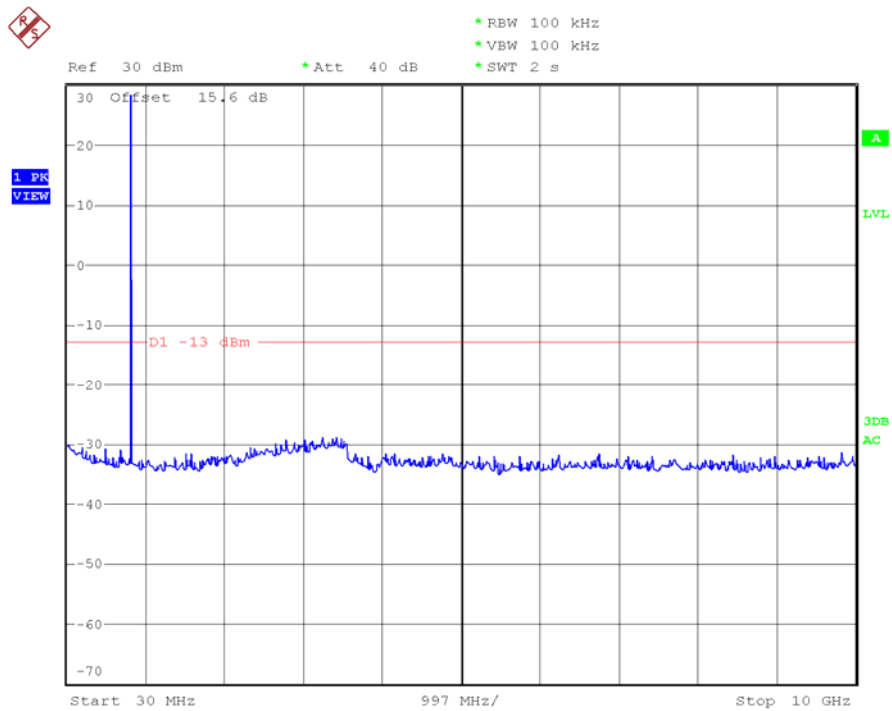
EDGE MODULATION

1. CHANNEL: LOWEST



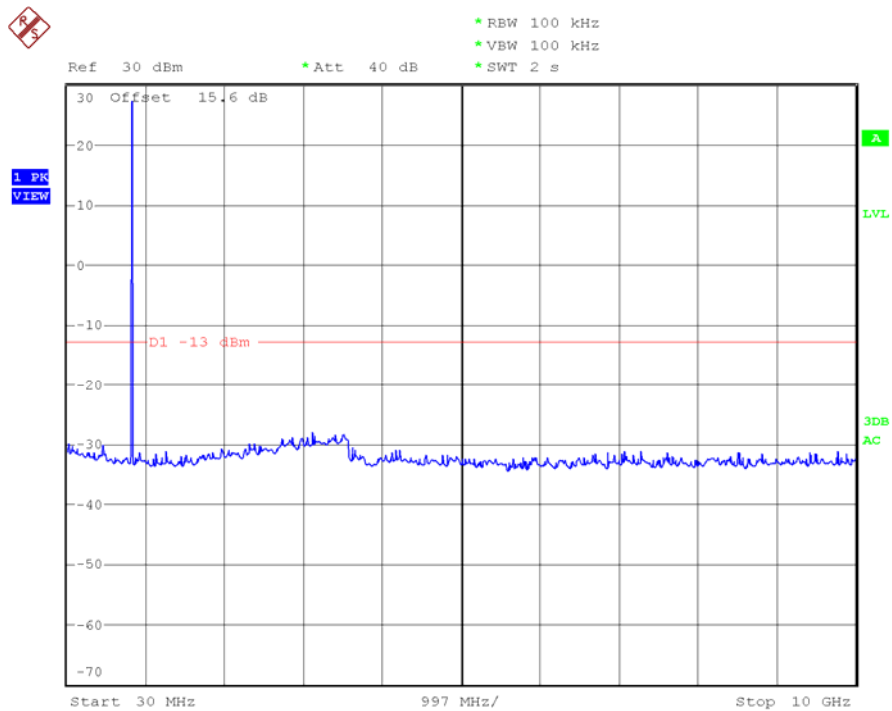
Note: The peak above the limit is the carrier frequency.

2. CHANNEL: MIDDLE



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

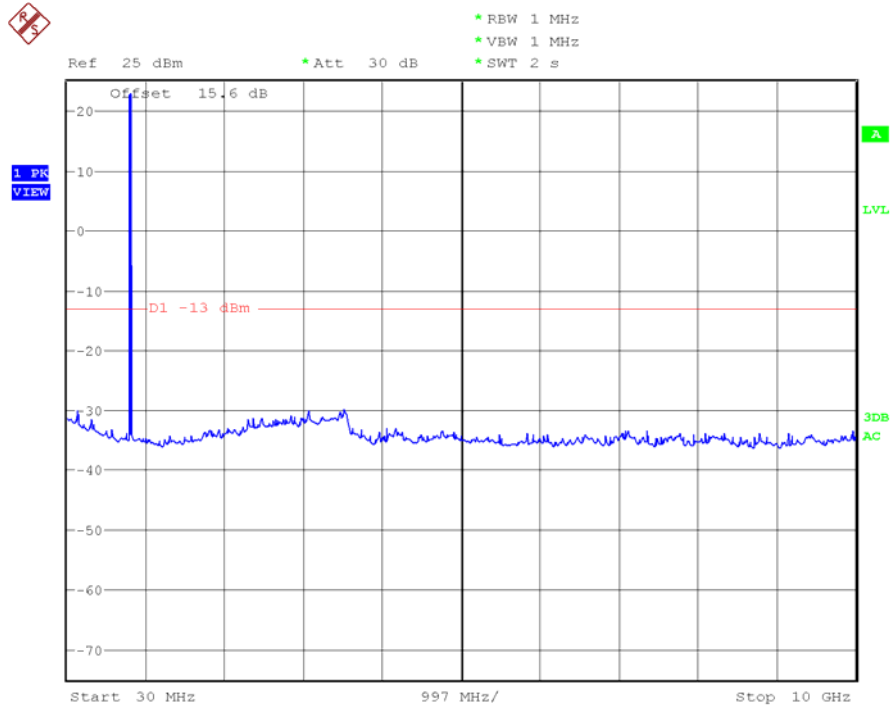
3. CHANNEL: HIGHEST



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

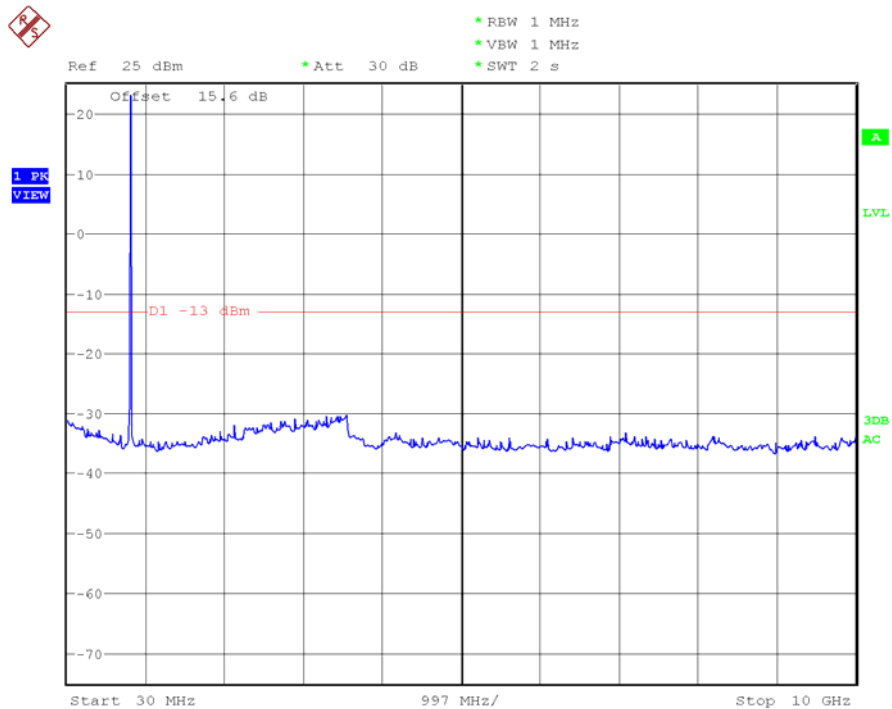
WCDMA MODULATION

1. CHANNEL: LOWEST



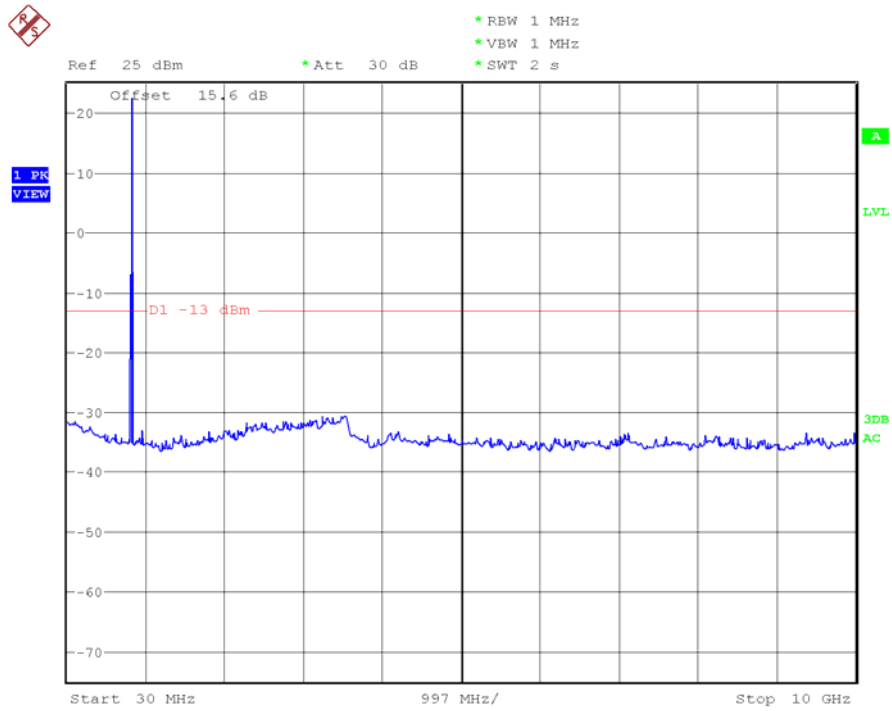
Note: The peak above the limit is the carrier frequency.

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.

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 kHz was used for GSM/GPRS and EDGE modulations and 50 kHz for WCDMA modulation.

Measurement Limit:

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

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

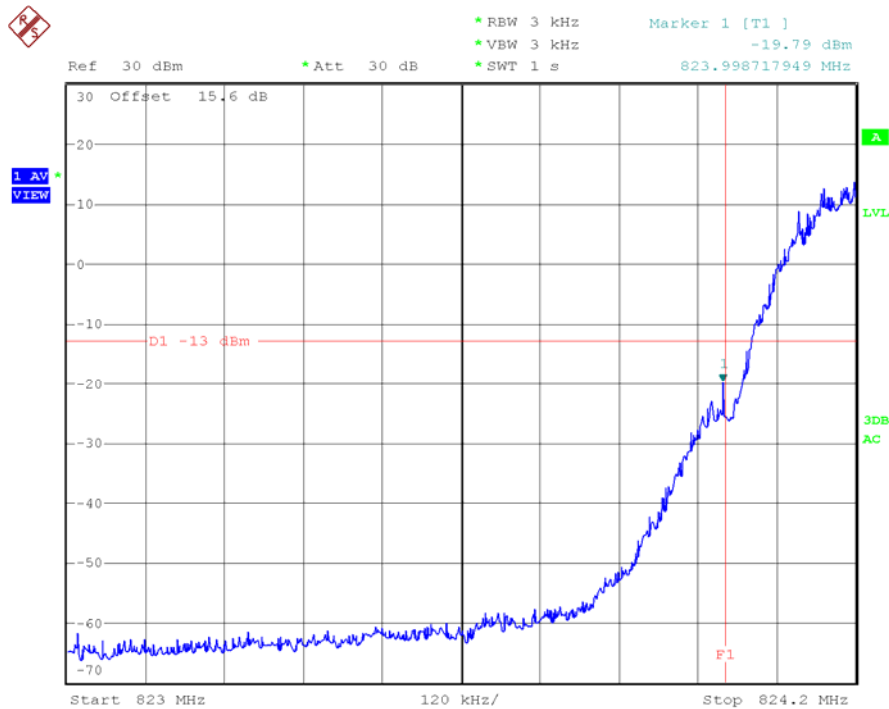
$$P_o \text{ (dBm)} - [43 + 10 \log (P_o \text{ in mwatts}) - 30] = -13 \text{ dBm}$$

RESULTS (see plots in next pages)

MODULATION	Maximum level at lowest Block Edge (dBm)	Maximum level at highest Block Edge (dBm)
GSM/GPRS	-19.79	-22.98
EDGE	-24.67	-25.94
WCDMA	-35.01	-33.23

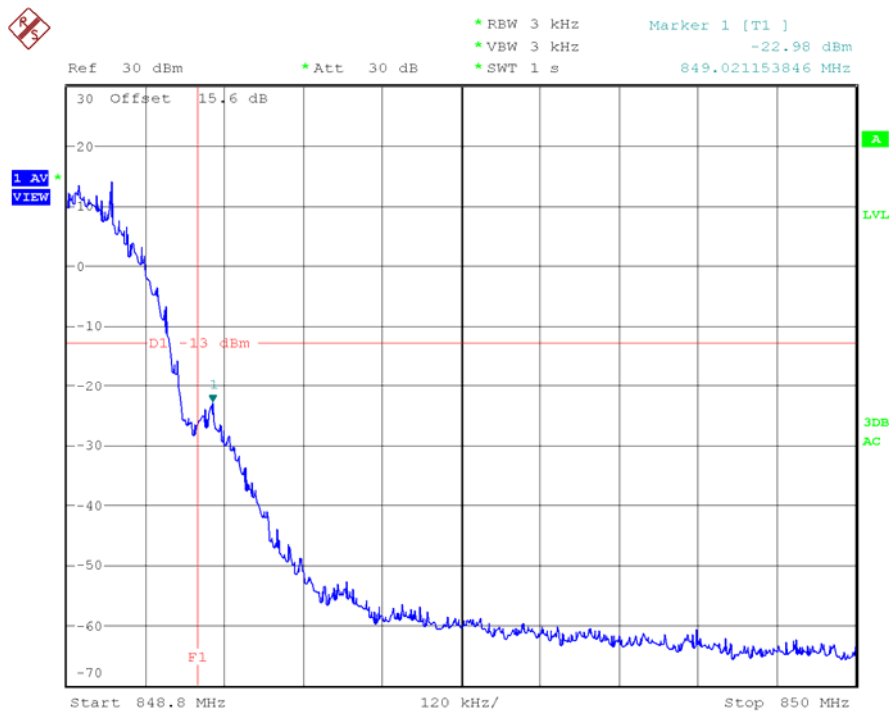
Measurement uncertainty = ± 1.57 dB.

GSM/GPRS MODULATION
CHANNEL LOWEST



NOTE: The equipment transmits at the maximum output power

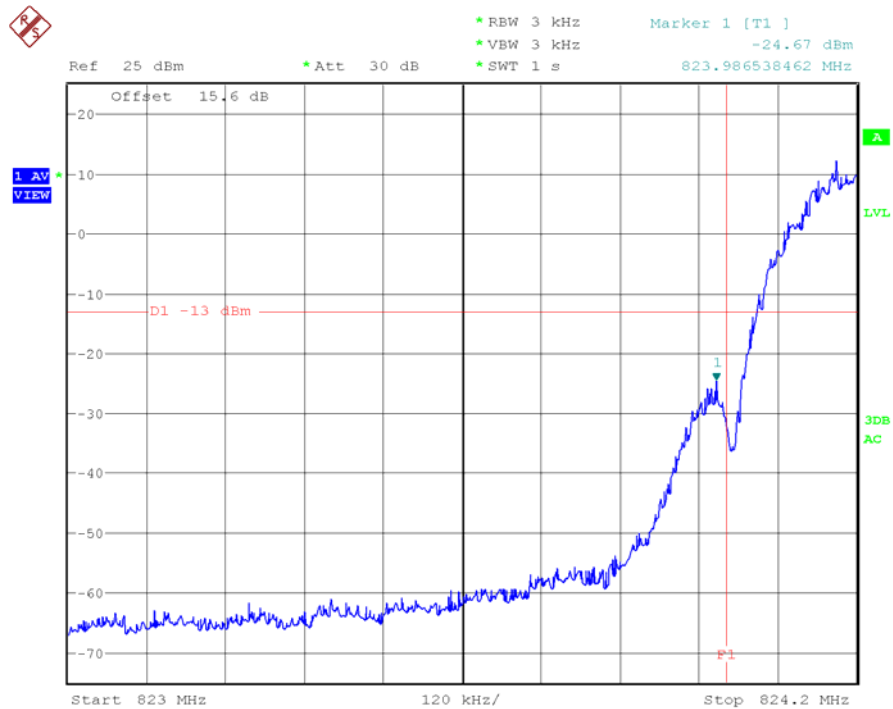
CHANNEL HIGHEST



NOTE: The equipment transmits at the maximum output power

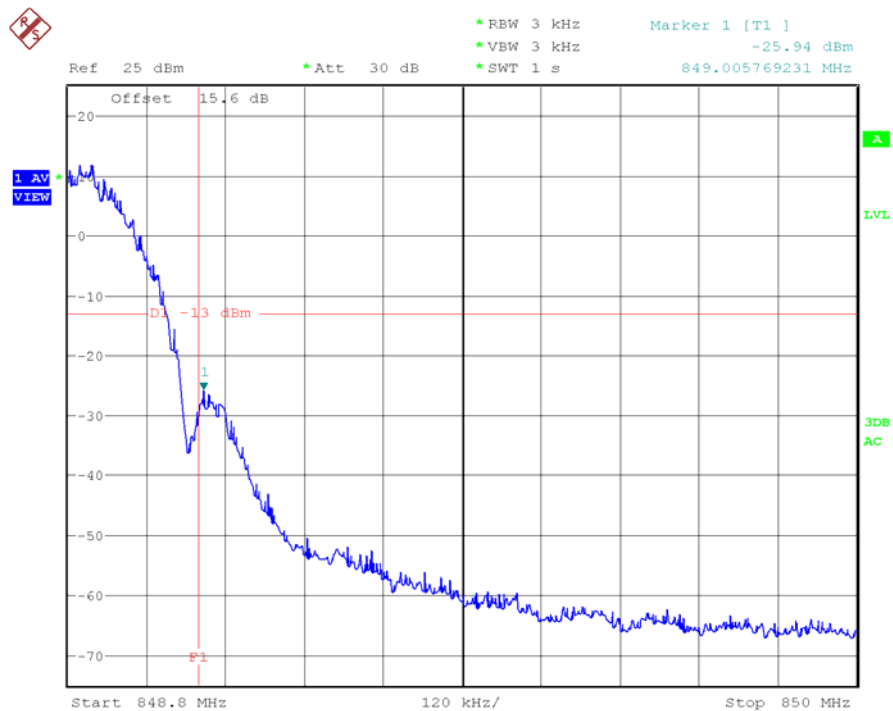
Verdict: PASS

EDGE MODULATION
CHANNEL LOWEST



NOTE: The equipment transmits at the maximum output power

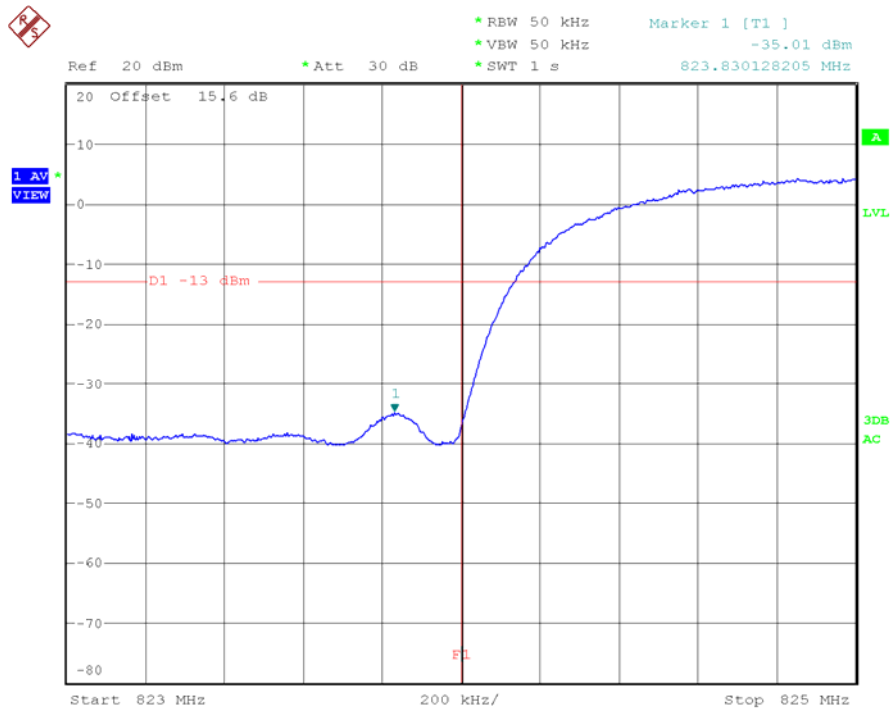
CHANNEL HIGHEST



NOTE: The equipment transmits at the maximum output power

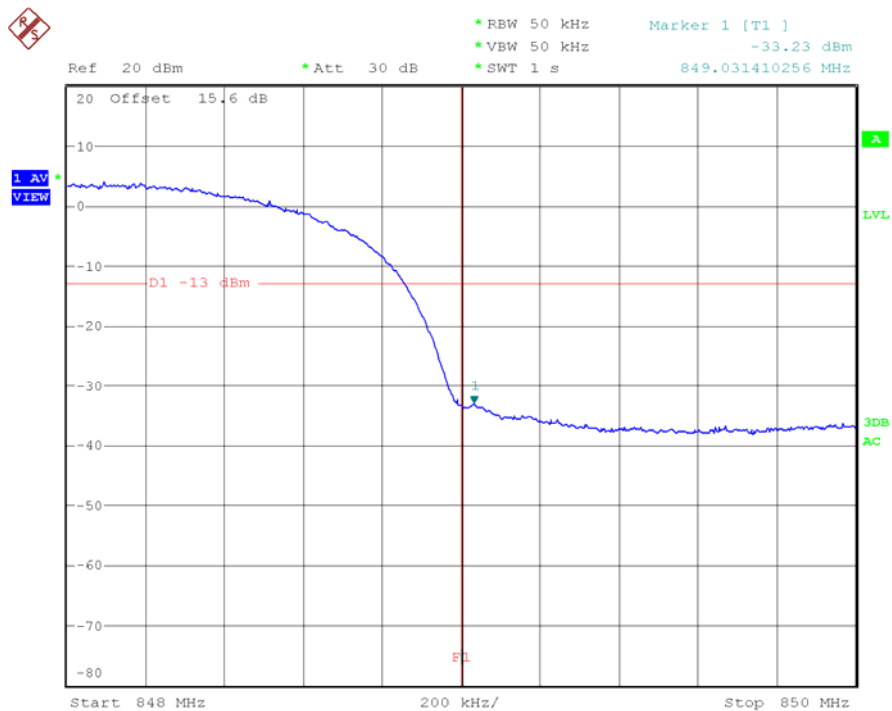
Verdict: PASS

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

TEST RESULTS FOR FCC PART 24 AND RSS-133

TEST CONDITIONS

Power supply (V):

$$V_{\text{nom}} = 3.8 \text{ Vdc}$$

$$V_{\text{max}} = 4.2 \text{ Vdc}$$

$$V_{\text{min}} = 3.5 \text{ Vdc}$$

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

Type of power supply = Rechargeable Li-ion battery

Type of antenna = external connectable antenna structure for Laptop computer

TEST FREQUENCIES:

GSM/GPRS AND EDGE MODULATION

Lowest channel (512): 1850.2 MHz

Middle channel (662): 1880.2 MHz

Highest channel (810): 1909.8 MHz

WCDMA MODULATION

Lowest channel (9262): 1852.4 MHz

Middle channel (9400): 1880.0 MHz

Highest channel (9538): 1907.6 MHz

RF Output Power (conducted)

SPECIFICATION

§2.1046 and 24.232

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.

RESULTS

MAXIMUM OUTPUT POWER (CONDUCTED).

GSM MODULATION

Channel	Lowest	Middle	Highest
Maximum average power (dBm)	29.20	29.29	28.87
Maximum average power (W)	0.83	0.85	0.77
Measurement uncertainty (dB)	±0.5		

GPRS MODULATION

Channel	Lowest	Middle	Highest
Maximum average power (dBm)	29.2	29.3	28.8
Maximum average power (W)	0.83	0.85	0.76
Measurement uncertainty (dB)	±0.5		

EDGE MODULATION

Channel	Lowest	Middle	Highest
Maximum average power (dBm)	25.6	25.8	25.4
Maximum average power (W)	0.36	0.38	0.35
Measurement uncertainty (dB)	±0.5		

WCDMA MODULATION

Channel	Lowest	Middle	Highest
Maximum average power (dBm)	23.2	23.3	23.4
Maximum average power (W)	0.21	0.21	0.22
Measurement uncertainty (dB)	±0.5		

HSDPA MODULATION

Channel	Lowest	Middle	Highest
Maximum average power (dBm)	21.9	22.0	21.9
Maximum average power (W)	0.15	0.16	0.15
Measurement uncertainty (dB)	±0.5		

Modulation Characteristics

SPECIFICATION

§2.1047

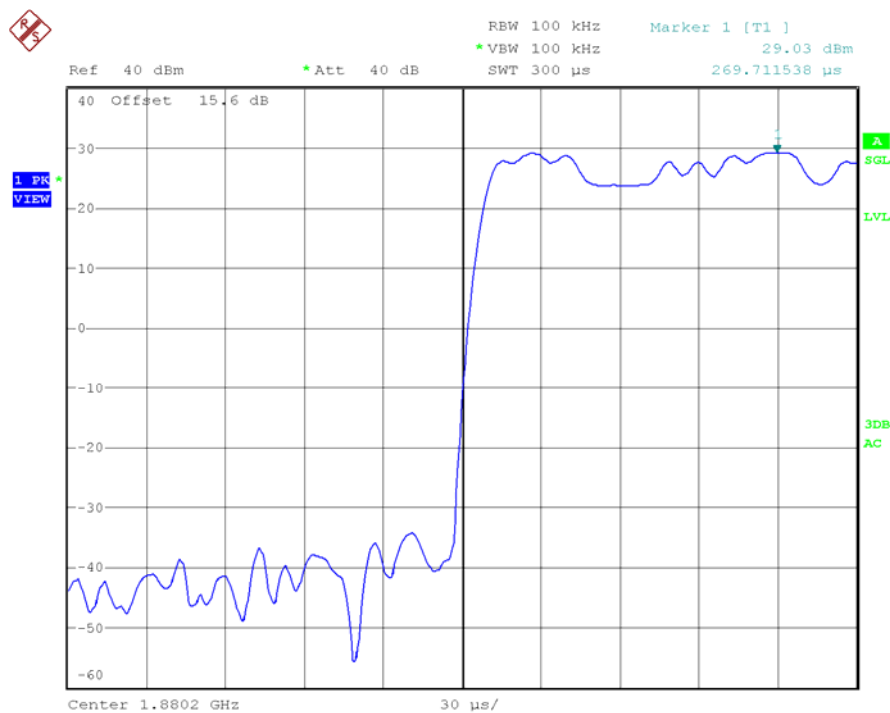
METHOD

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

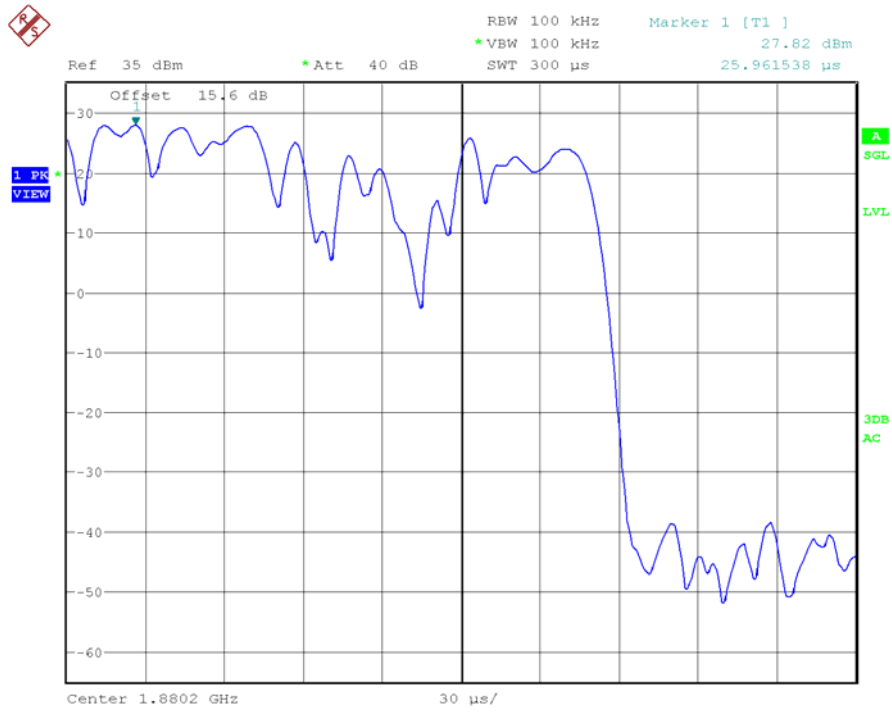
RESULTS

The following plot shows the modulation schemes in the EUT.

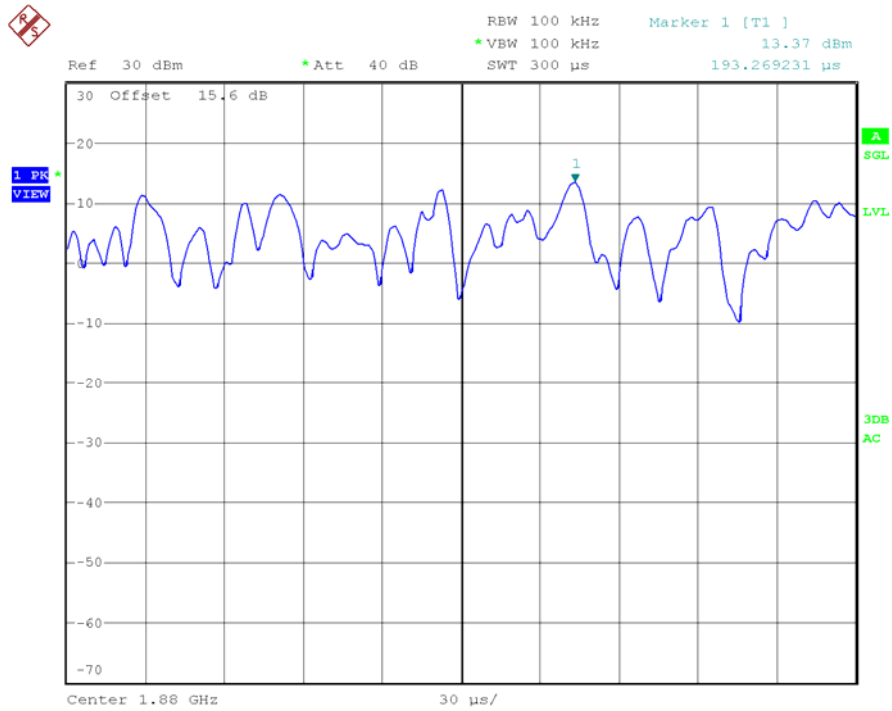
GSM/GPRS MODULATION



EDGE MODULATION



WCDMA MODULATION



Frequency Stability

SPECIFICATION

§2.1055 and 24.235

METHOD

The frequency tolerance measurements over temperature variations were made over the temperature range of -30°C to $+50^{\circ}\text{C}$. The EUT was placed inside a climatic chamber and the temperature was raised hourly in 10°C steps from -30°C up to $+50^{\circ}\text{C}$.

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

RESULTS

Frequency stability over temperature variations.

GSM/GPRS MODULATION

Temperature ($^{\circ}\text{C}$)	Frequency Error (Hz)	Frequency Error (ppm)	Frequency Error (%)
+50	42	0.0223	0.00000223
+40	68	0.0362	0.00000362
+30	53	0.0282	0.00000282
+20	44	0.0234	0.00000234
+10	37	0.0197	0.00000197
0	31	0.0165	0.00000165
-10	22	0.0117	0.00000117
-20	25	0.0133	0.00000133
-30	35	0.0186	0.00000186

EDGE MODULATION

Temperature (°C)	Frequency Error (Hz)	Frequency Error (ppm)	Frequency Error (%)
+50	40	0.0213	0.00000213
+40	44	0.0234	0.00000234
+30	7	0.0037	0.00000037
+20	-2	-0.0011	-0.00000011
+10	22	0.0117	0.00000117
0	30	0.0160	0.00000160
-10	29	0.0154	0.00000154
-20	25	0.0133	0.00000133
-30	-37	-0.0197	-0.00000197

WCDMA MODULATION

Temperature (°C)	Frequency Error (Hz)	Frequency Error (ppm)	Frequency Error (%)
+50	-2	-0.0011	-0.00000011
+40	0	0.0000	0.00000000
+30	-1	-0.0005	-0.00000005
+20	1	0.0005	0.00000005
+10	-2	-0.0011	-0.00000011
0	1	0.0005	0.00000005
-10	2	0.0011	0.00000011
-20	2	0.0011	0.00000011
-30	1	0.0005	0.00000005

Frequency stability over voltage variations.

GSM/GPRS MODULATION

Battery Supply voltage	Voltage (V)	Frequency Error (Hz)	Frequency Error (ppm)	Frequency Error (%)
Vmax	4.2	40	0.0213	0.00000213
Vmin	3.5	46	0.0245	0.00000245

EDGE MODULATION

Battery Supply voltage	Voltage (V)	Frequency Error (Hz)	Frequency Error (ppm)	Frequency Error (%)
Vmax	4.2	-4	-0.0021	-0.00000021
Vmin	3.5	2	0.0011	0.00000011

WCDMA MODULATION

Battery Supply voltage	Voltage (V)	Frequency Error (Hz)	Frequency Error (ppm)	Frequency Error (%)
Vmax	4.2	0	0.0000	0
Vmin	3.5	3	0.0016	3

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 determine the occupied bandwidth of the modulated emission for GSM/GPRS and EDGE modulation and 50 kHz for WCDMA modulation.

RESULTS

GSM/GPRS MODULATION

Channel	Lowest	Middle	Highest
99% Occupied bandwidth (kHz)	272.4	282.0	274.0
-26 dBc bandwidth (kHz)	306.1	318.9	314.1
Measurement uncertainty (kHz)	<±6.5		

EDGE MODULATION

Channel	Lowest	Middle	Highest
99% Occupied bandwidth (kHz)	282.0	286.9	282.0
-26 dBc bandwidth (kHz)	312.5	312.5	315.7
Measurement uncertainty (kHz)	<±6.5		

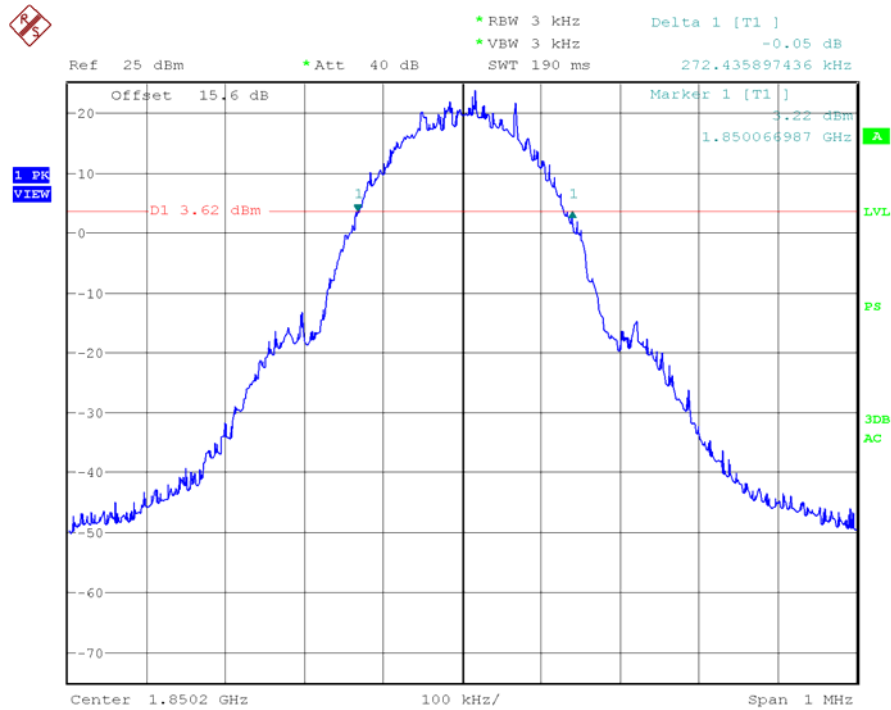
WCDMA MODULATION

Channel	Lowest	Middle	Highest
99% Occupied bandwidth (kHz)	4564	4564	4654
-26 dBc bandwidth (kHz)	4654	4641	4641
Measurement uncertainty (kHz)	<±52		

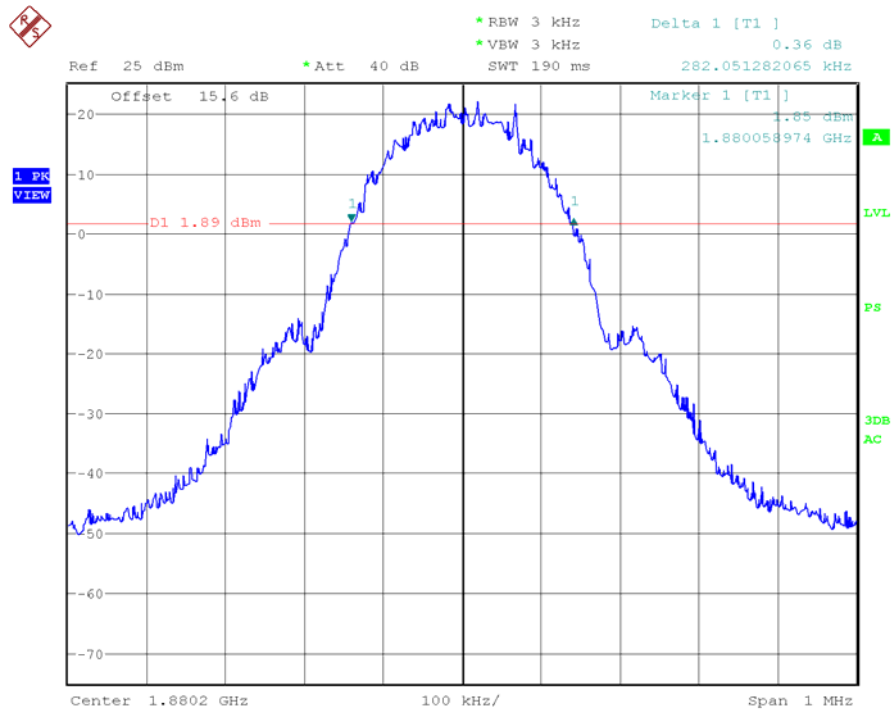
99% OCCUPIED BANDWIDTH

GSM/GPRS MODULATION

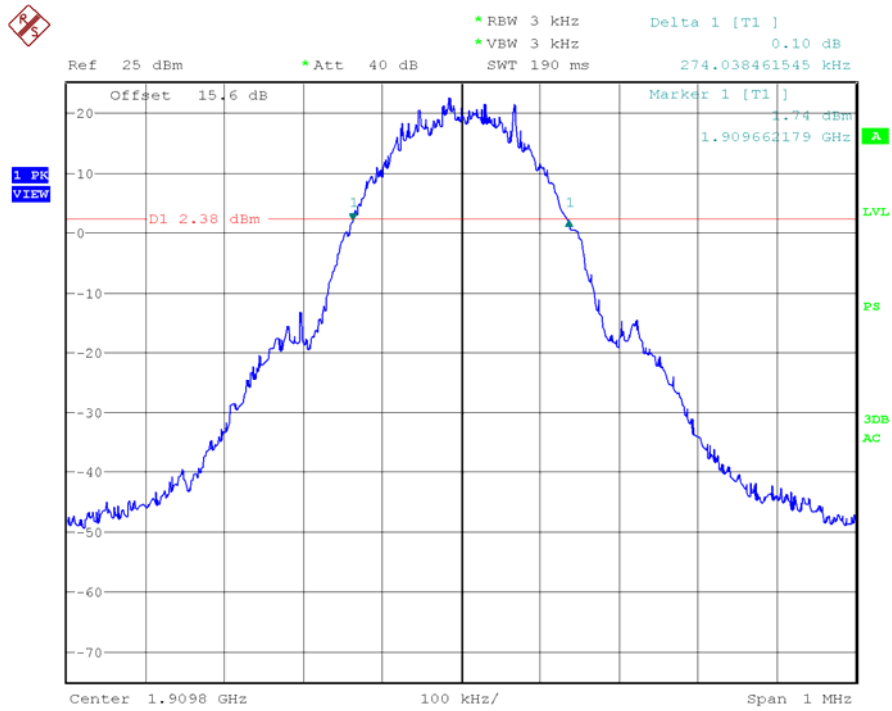
Lowest Channel



Middle Channel

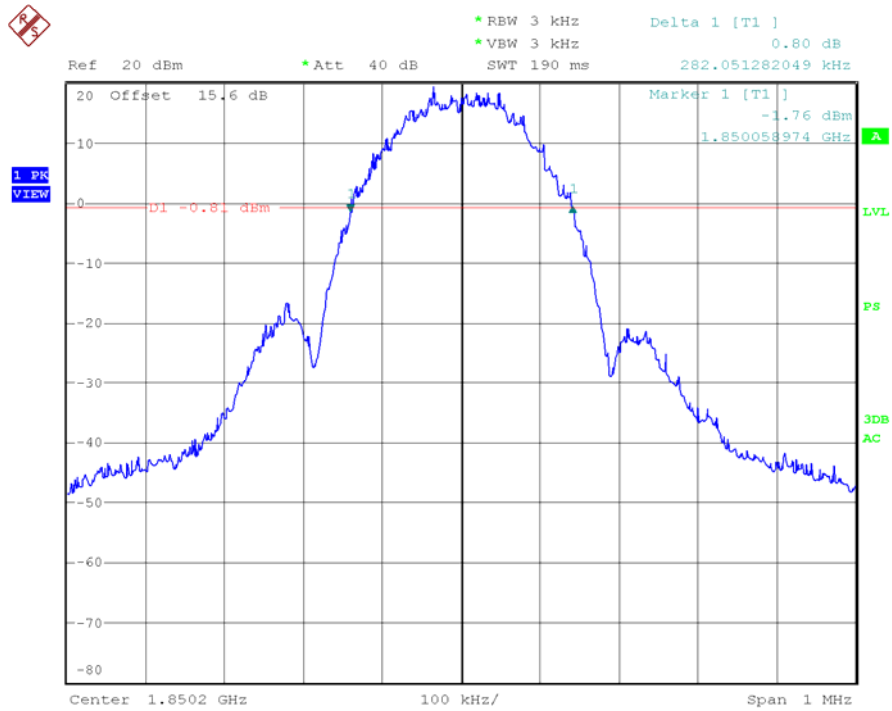


Highest Channel

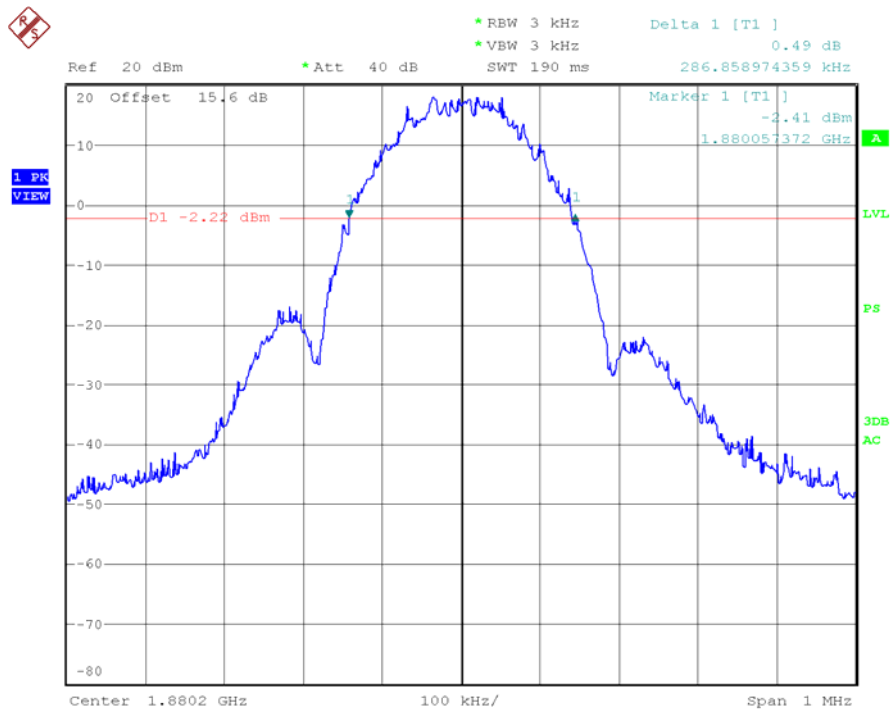


EDGE MODULATION

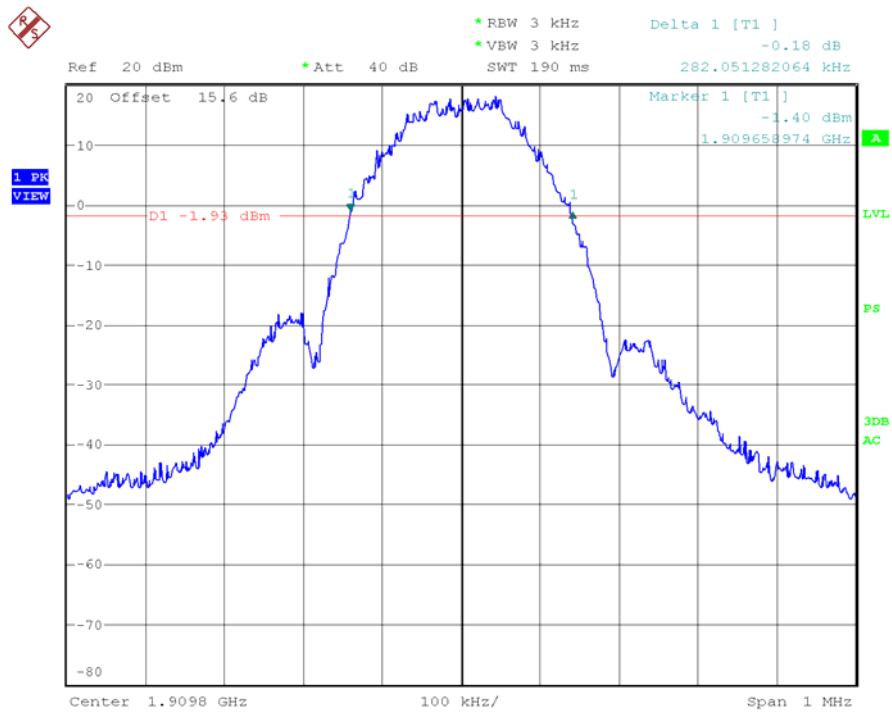
Lowest Channel



Middle Channel

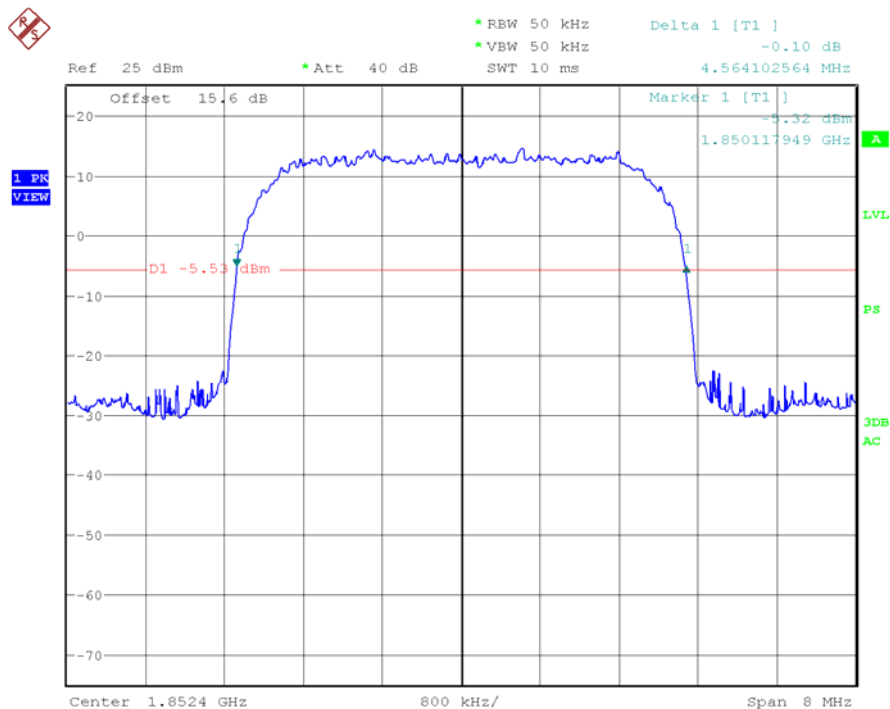


Highest Channel

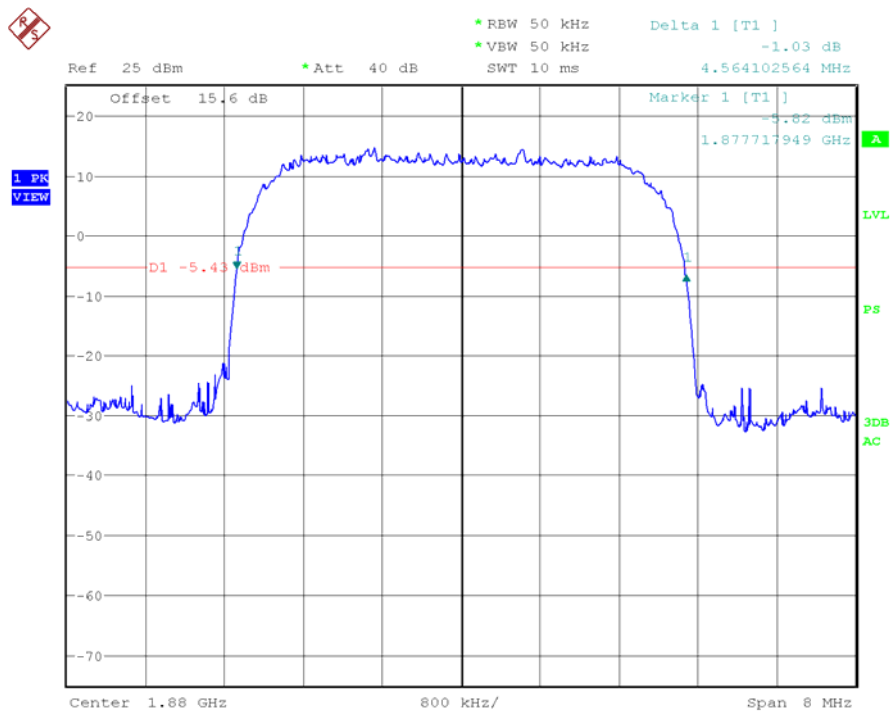


WCDMA MODULATION

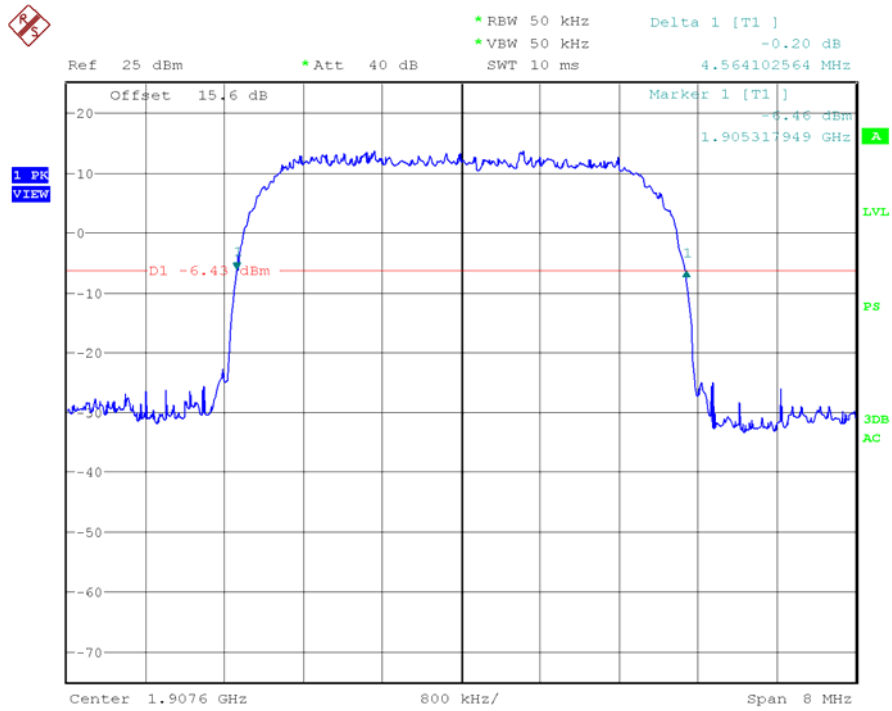
Lowest Channel



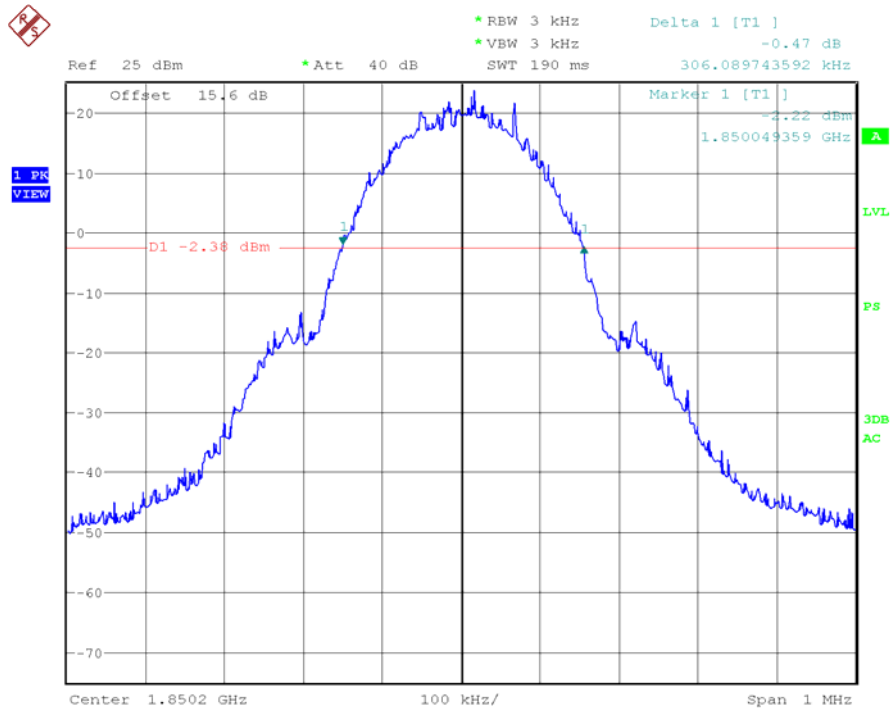
Middle Channel



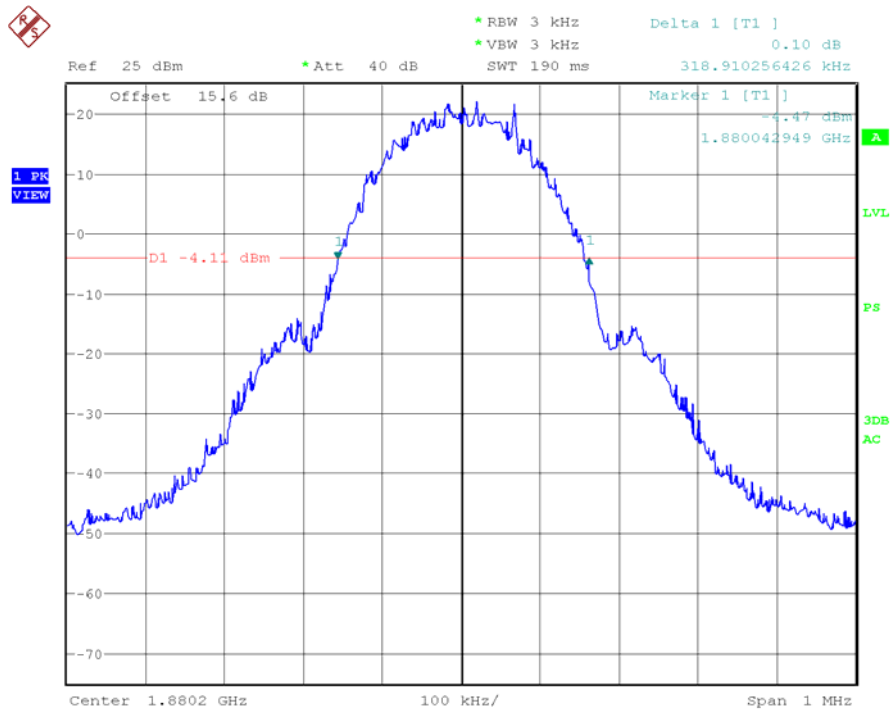
Highest Channel



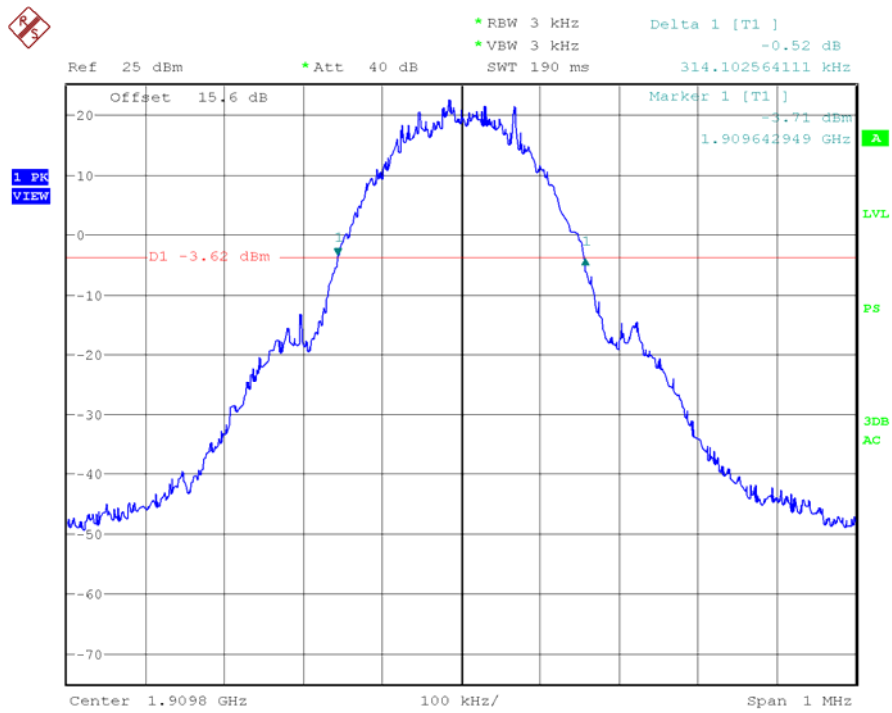
-26 dBc BANDWIDTH
 GSM/GPRS MODULATION
 Lowest Channel



Middle Channel

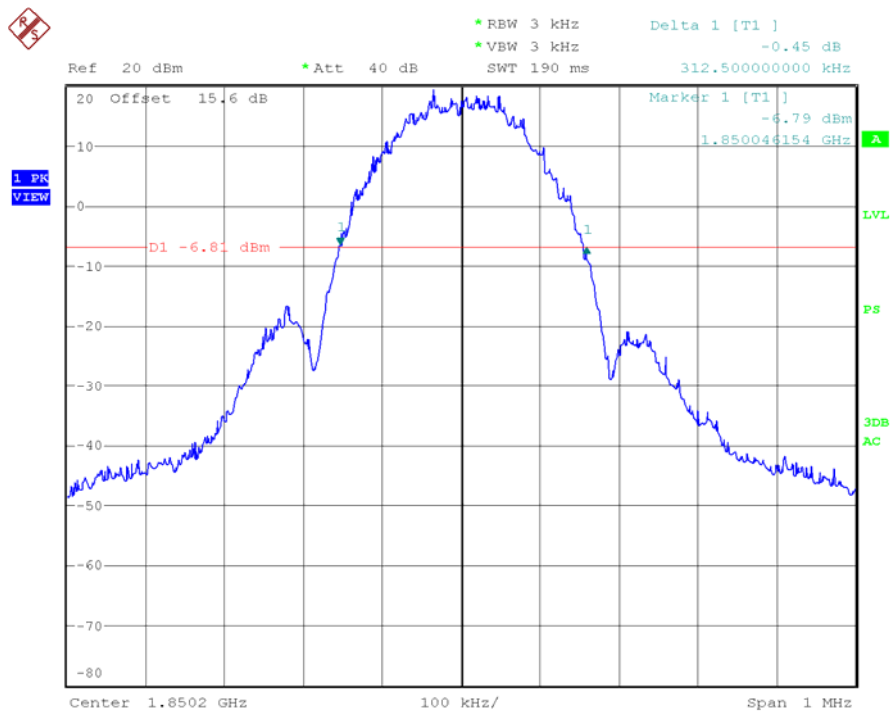


Highest Channel

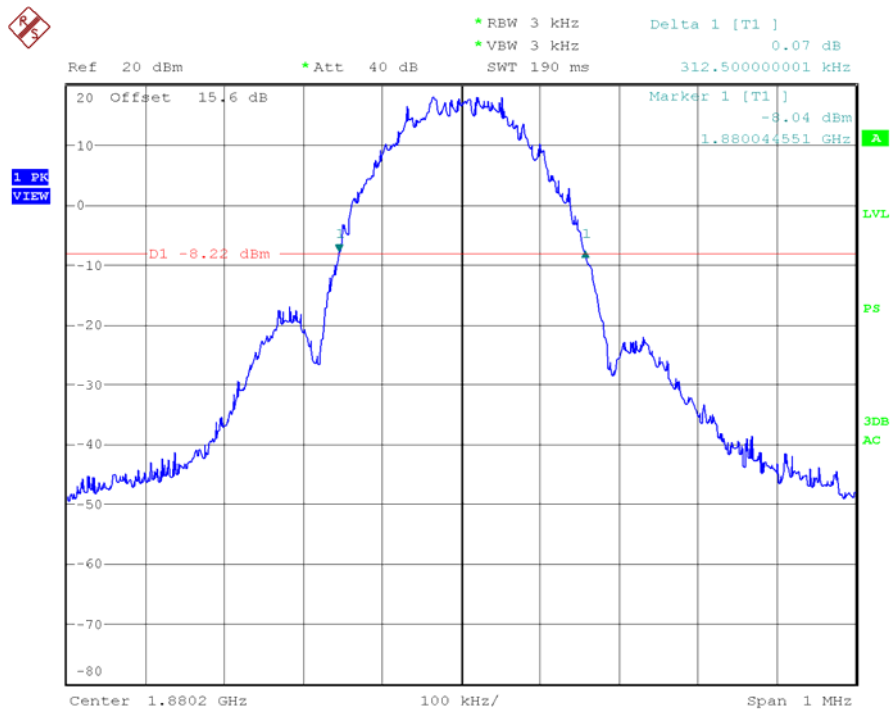


EDGE MODULATION

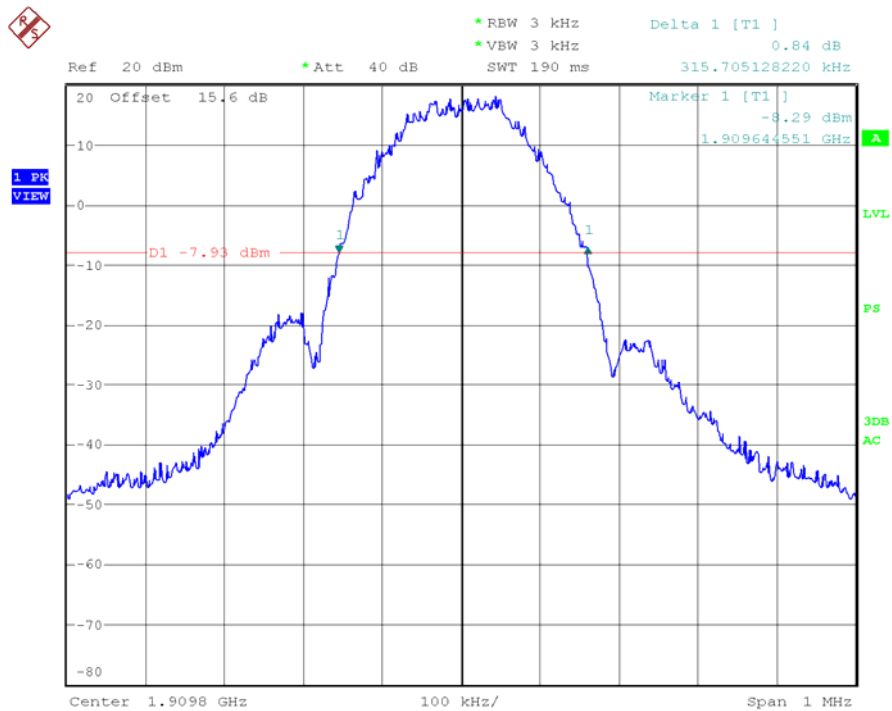
Lowest Channel



Middle Channel

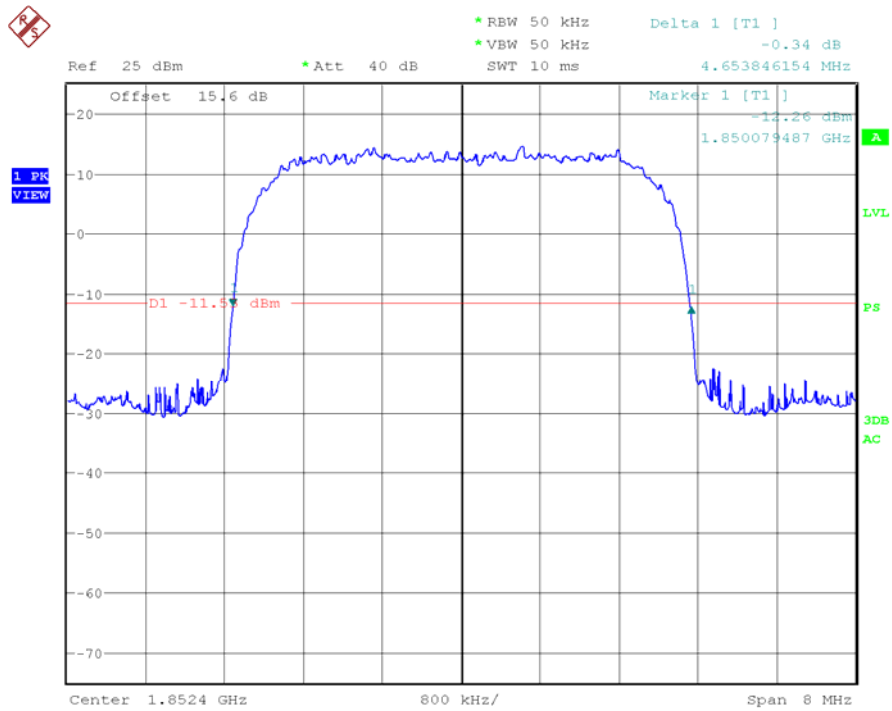


Highest Channel

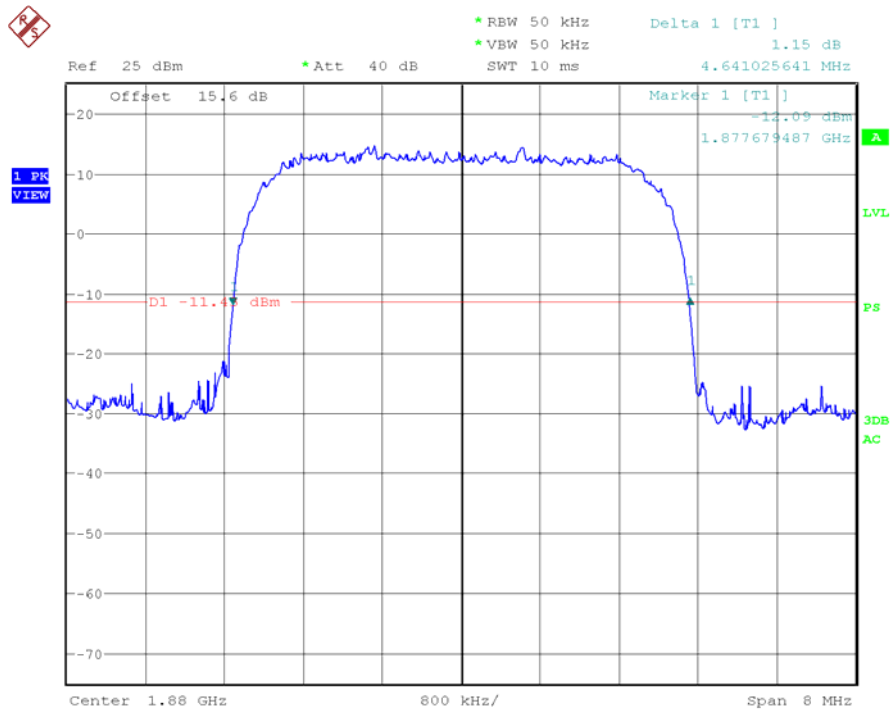


WCDMA MODULATION

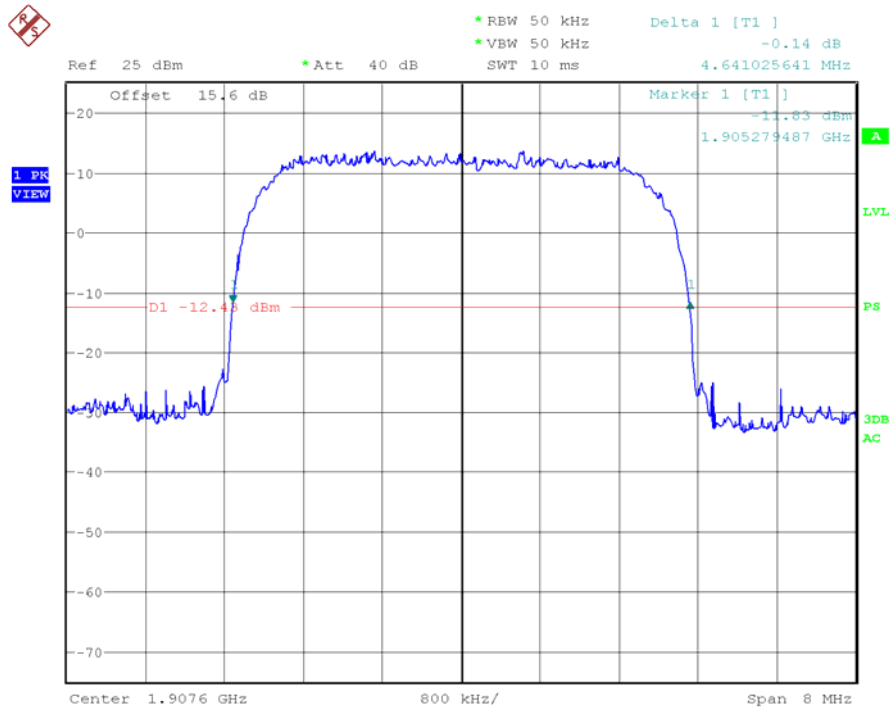
Lowest Channel



Middle Channel



Highest Channel



Spurious emissions at antenna terminals

SPECIFICATION

§2.1051 and §24.238

METHOD

The EUT RF output connector was connected to an spectrum analyser using an 50 ohm attenuator and the resolution bandwidth of the spectrum analyser was set to 1 MHz. The spectrum was investigated from 30 MHz to 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 P_o transmitting power, the specified minimum attenuation becomes $43+10\log (P_o)$, and the level in dBm relative P_o becomes:

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

RESULTS (see plots in next pages)

GSM/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.

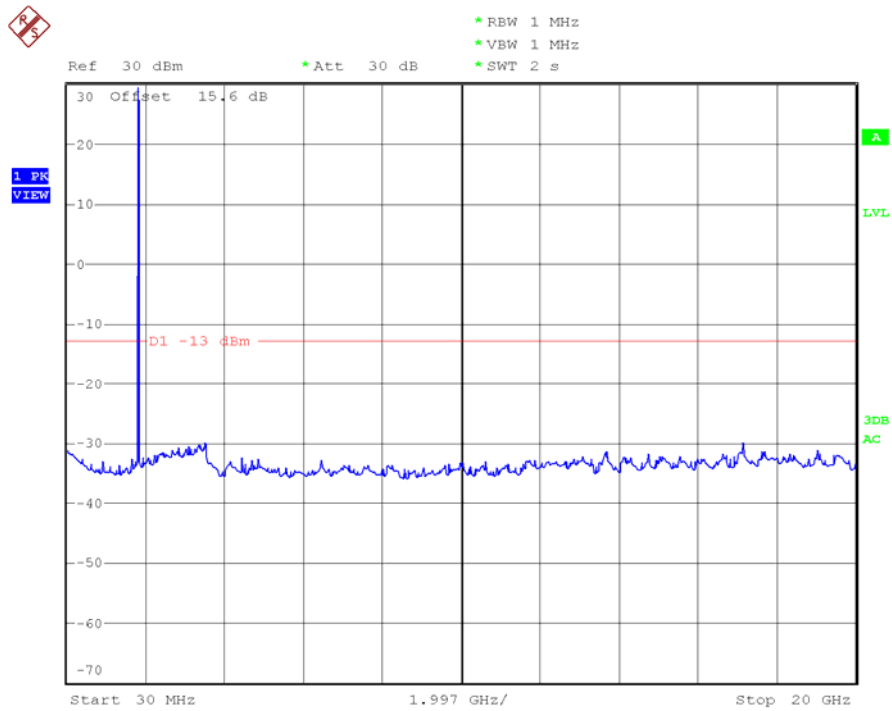
3. CHANNEL: HIGHEST

No spurious signals were found in all the range.

Verdict: PASS

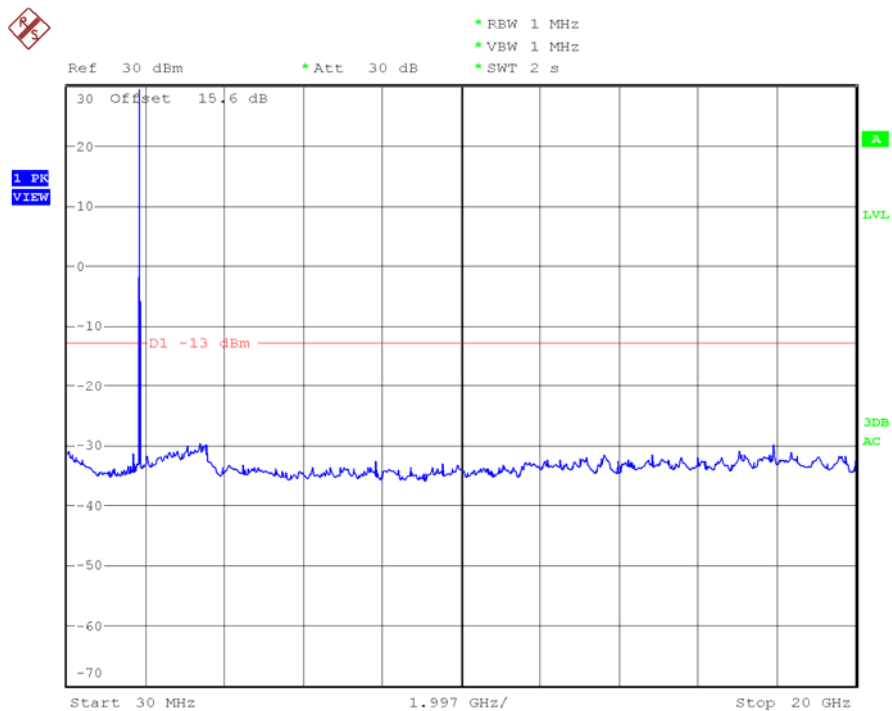
GSM/GPRS MODULATION

1. CHANNEL: LOWEST



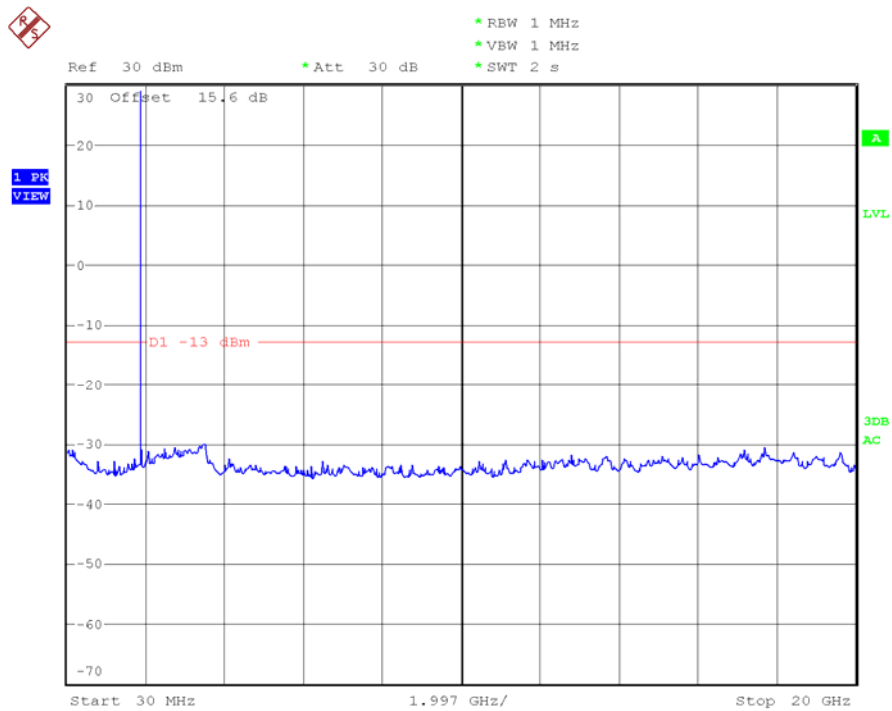
Note: The peak above the limit is the carrier frequency.

2. CHANNEL: MIDDLE



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

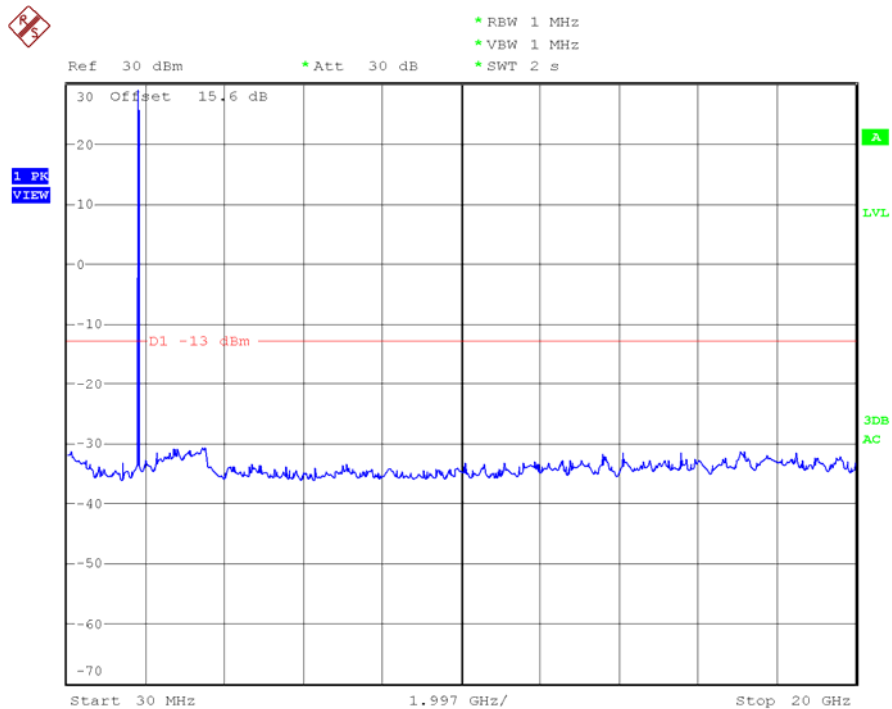
3. CHANNEL: HIGHEST



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

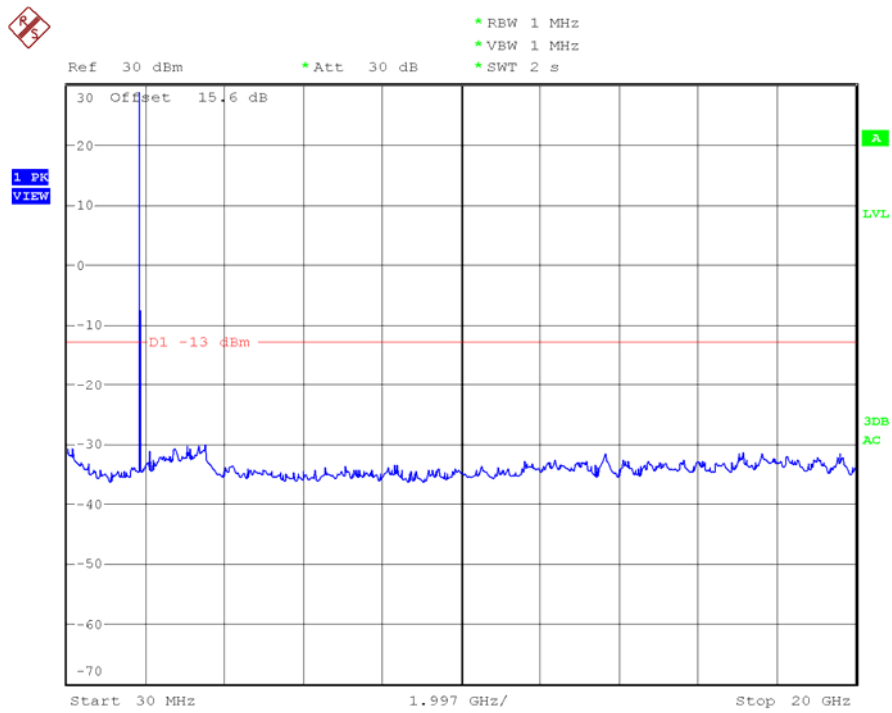
EDGE MODULATION

1. CHANNEL: LOWEST



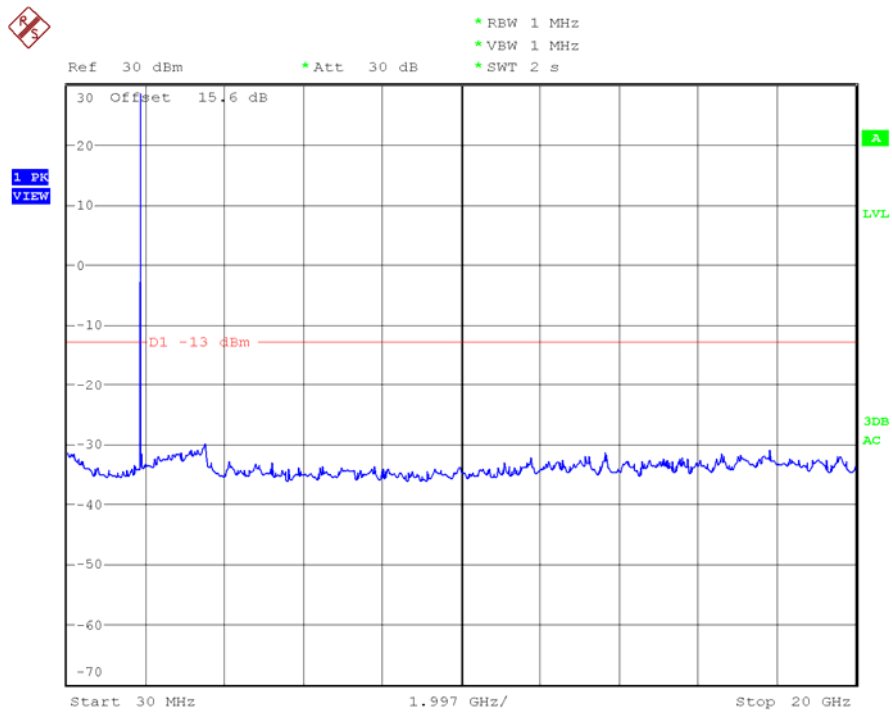
Note: The peak above the limit is the carrier frequency.

2. CHANNEL: MIDDLE



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

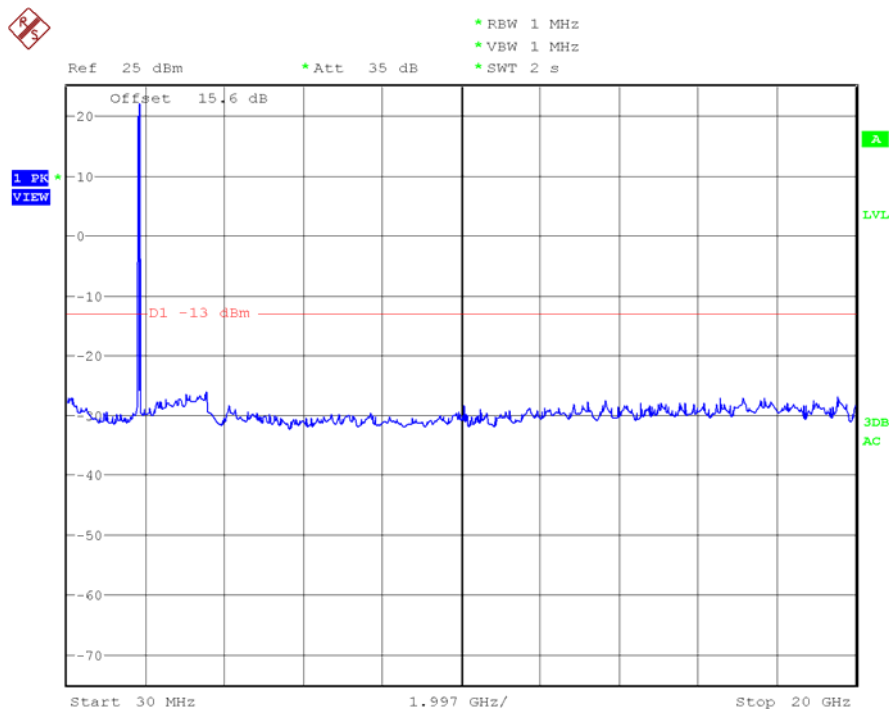
3. CHANNEL: HIGHEST



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

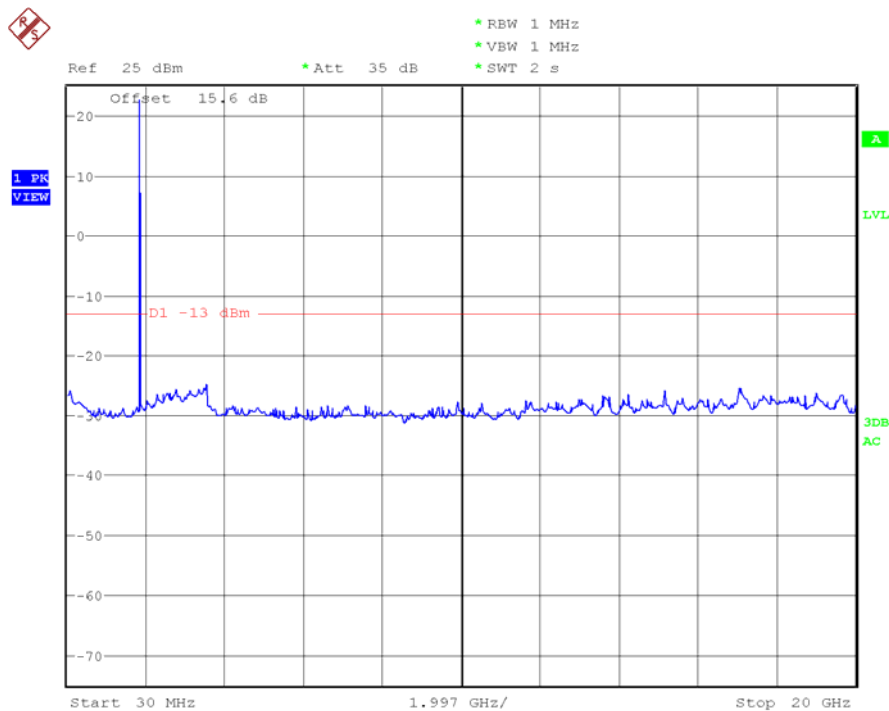
WCDMA MODULATION

1. CHANNEL: LOWEST



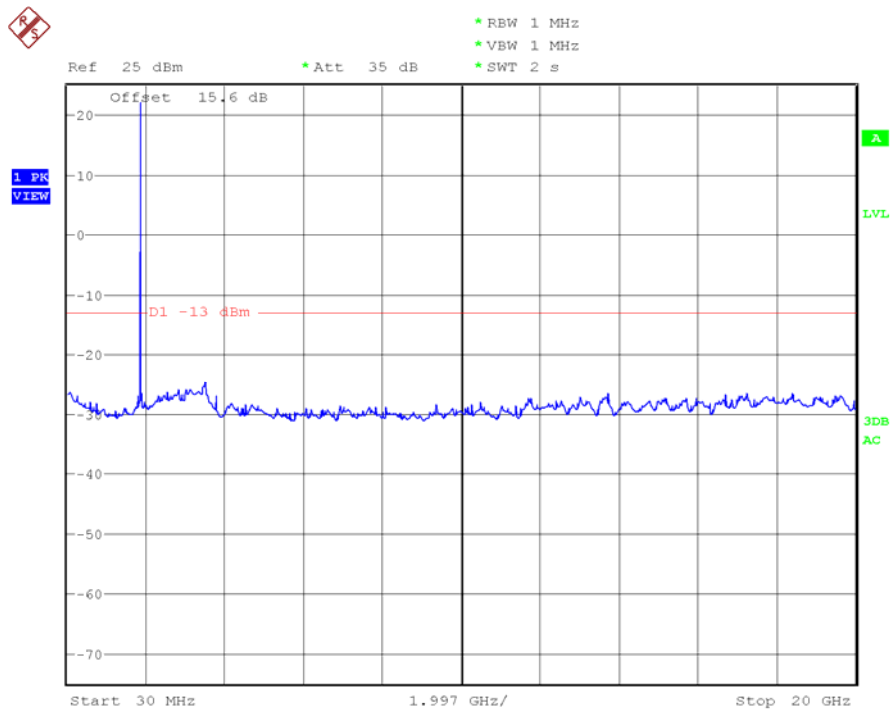
Note: The peak above the limit is the carrier frequency.

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.

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 3 kHz was used for GSM/GPRS and EDGE modulations and 50 kHz for WCDMA modulation.

Measurement Limit:

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

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

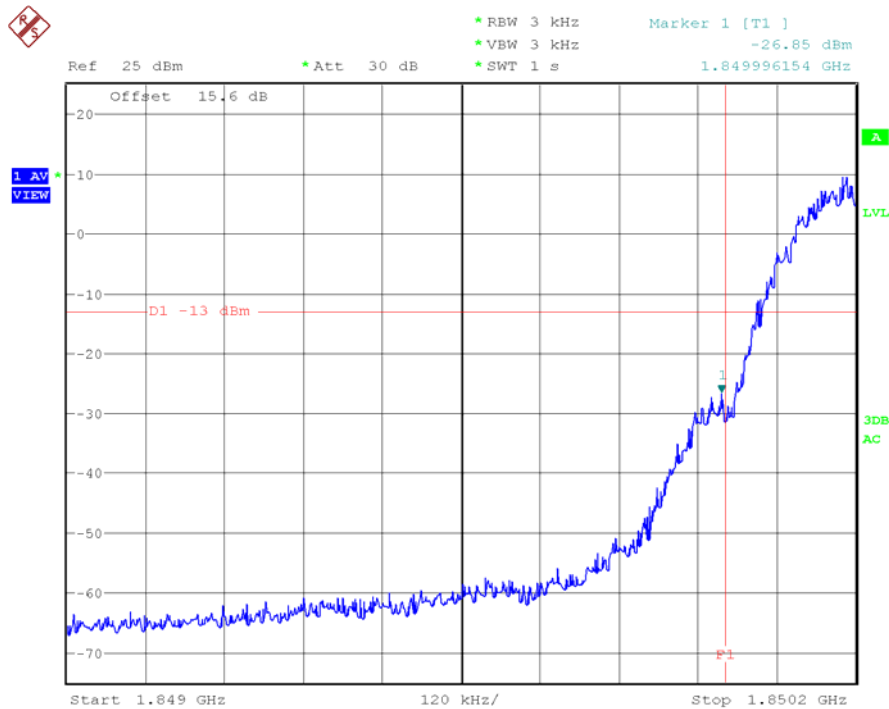
$$P_o \text{ (dBm)} - [43 + 10 \log (P_o \text{ in mwatts}) - 30] = - 13 \text{ dBm}$$

RESULTS (see plots in next pages)

MODULATION	Maximum level at lowest Block Edge (dBm)	Maximum level at highest Block Edge (dBm)
GSM/GPRS	-26.85	-26.38
EDGE	-28.53	-32.04
WCDMA	-32.66	-35.03

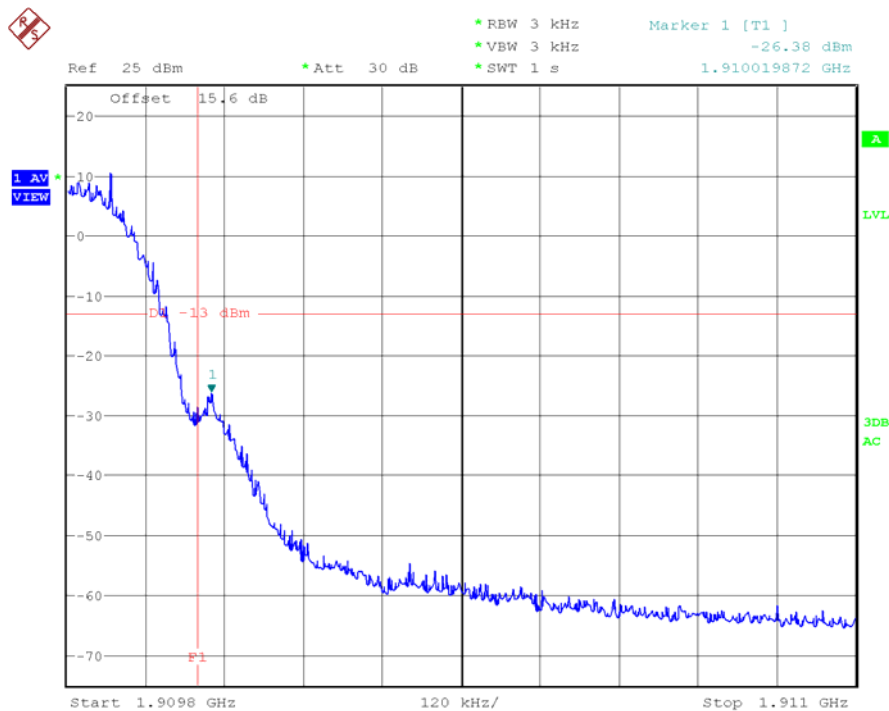
Measurement uncertainty = ± 1.57 dB.

GSM/GPRS MODULATION
CHANNEL LOWEST



NOTE: The equipment transmits at the maximum output power

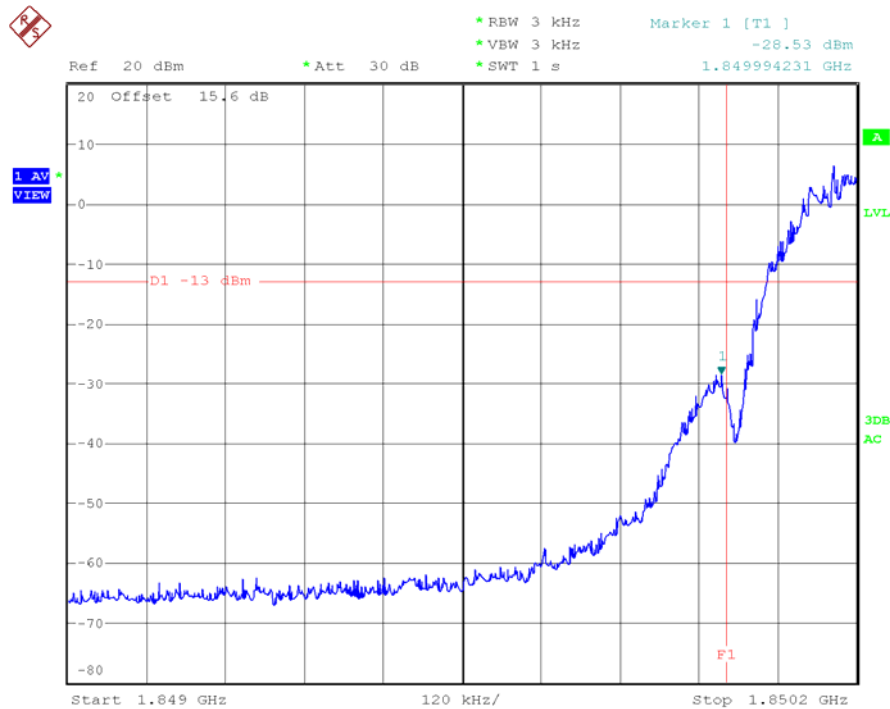
CHANNEL HIGHEST



NOTE: The equipment transmits at the maximum output power

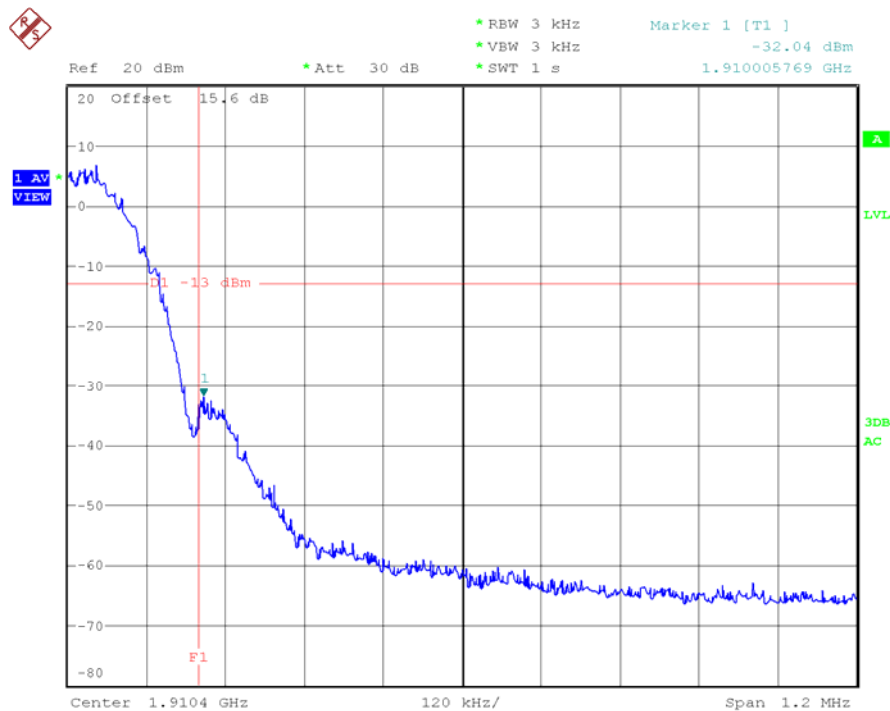
Verdict: PASS

EDGE MODULATION
CHANNEL LOWEST



NOTE: The equipment transmits at the maximum output power

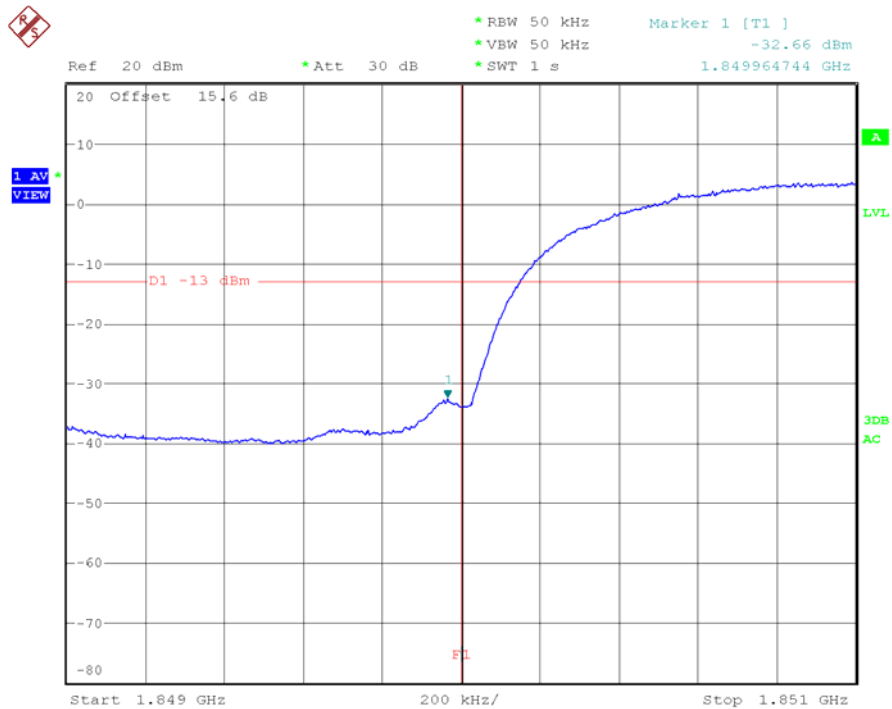
CHANNEL HIGHEST



NOTE: The equipment transmits at the maximum output power

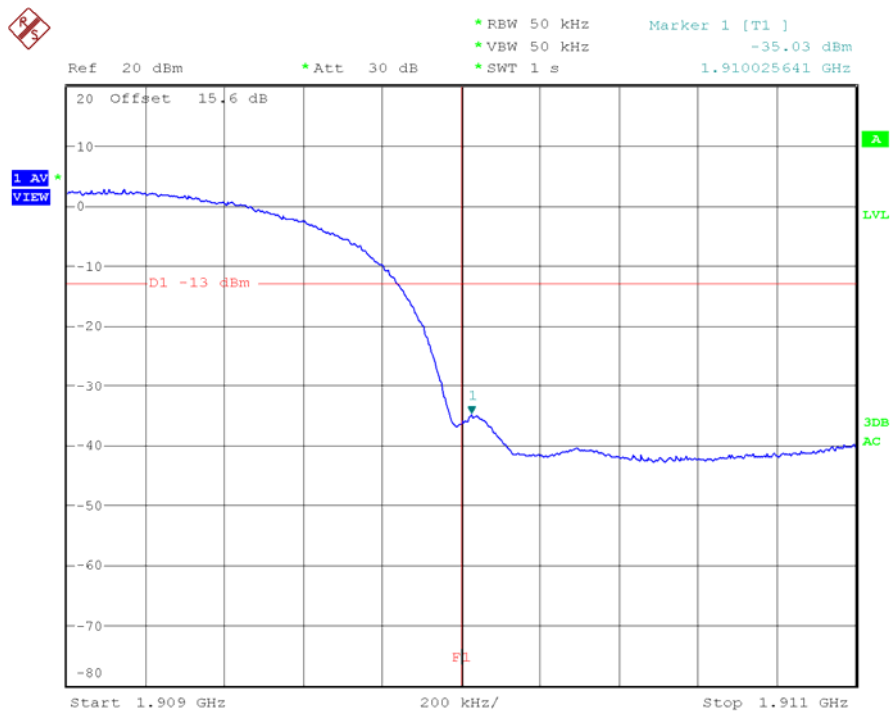
Verdict: PASS

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