

Prima Ricerca & Sviluppo Srl soggetta a direzione e coordinamento da parte della **Giovanni Maspero & C. S.p.A.** – C.I. 02634780130
Sede legale : 22100 Tavernola (CO) Via Conciliazione, 1 Cod. FISC. e N. R.I. CO 02635860139
Sede operativa : Laboratori Via Campagna, 92 22020 Faloppio fraz. Gaqqino (CO) Tel. +39 0313500011 Fax +39 031991309

EQUIPMENT UNDER TEST :
APPARECCHIO IN PROVA :

GSM TRACKING SYSTEM

mod. **TPA BMW MEX**

REFERENCE STANDARDS:
NORME DI RIFERIMENTO :

FCC RULES PART 22 and 24

Customer:

RICHIEDENTE:

- **Dept. / Firm :** **META SYSTEM S.p.A.**
Ente / Società':
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Fax :
- **E-mail:** Giorgio.maldini@metasystem.it

Site of test execution: Via Campagna, 92 - 22020 Gaggino Faloppio (CO) - Italy
Località esecuzione prove:

Date of test samples receipt: 15/10/20008
Data ricevimento campioni:

Date of start test: 17/10/2008
Data inizio prove:

Date of end test:09/03/2009
Data fine prove:

Witness to the test:
Presenti alle prove:

Signature of the engineers:
Firma esecutore prove:

Approvato da:
Approved by:

Nobody / Nessuno

A.Bortolotti / M.Maltempì

.....
Giovanni Molteni

The test results recorded in this Test Report are exclusively referred to the tested samples.

I risultati del presente rapporto di prova si riferiscono esclusivamente al campione sottoposto a prova.

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1. TECHNICAL INFORMATION OF EQUIPMENT UNDER TEST (EUT)

1.1 Identification

Brand name: META SYSTEM S.P.A.
Manufacturer: META SYSTEM S.P.A.
Equipment : GPS / GPRS Module
Model name : TPA BMW MEX
Country of manufacturer: ITALY

1.2 Technical data

FCC class: FCC RULES PART 22 and 24
FCC ID: -
Supply voltage: 12 Vdc
EUT standing: Car power supply
EUT single or system: Single
EUT dimensions : See photographic documentation
GSM module manufacturer: Telit Communications SpA
Module type : GE864 QUAD
Type of antenna : ☐ Integral ;
☒ External ;
☐ Dedicated
Frequency range TX - GSM 850 824.2 – 848.80 MHz
Frequency range TX - PCS 1850.2 – 1909.8 MHz
Frequency range RX – GSM 850 869.2 – 893.8 MHz
Frequency range RX – PCS 1930.2 – 1989.8 MHz
Antenna gain 840-960 MHz → 0,5dBi
1710 – 1990 MHz → 1dBi
Power supply 3,7 V
Operating mode Duplex
Type of modulation GMSK (GSM modulation)
Emission GXW
Software Fully GSM software Stack
Temperature range Operating: -30°C to +55°C
Storage: -30°C to +85°C

1.3 Modifications incorporated in E.U.T.

The following items are the modifications introduced in the equipment under test :

- None

1.4 Ports identification

This section contains descriptions of all signal ports and AC/DC power input/output ports, the length and the type of the cable provided by manufacturer needed for the tests.

Moreover it is specified if the ports are ever or optionally connected.

Port		Description	Connection
1	Enclosure	Plastic	Screw
2	AC power input/output ports	Port not present	----
3	DC power input/output ports	12Vdc	Cable
4	Signals ports	CanBus Auxiliary NA/C/NC contact	Cable
<i>Note: During the tests all cables must be what provided the manufacturer or the same that used in the real employment of the EUT.</i>			

1.5 Auxiliary equipment

- No auxiliary equipment

2. TEST CONDITIONS

2.1 Operating test modes and test conditions

The equipment has been tested according to the operative conditions described in the user/installation manual provided by the manufacturer and by following reference standards :

Reference Standard:

FCC Part 22, 24, 2

In the following table there are the operating conditions adopted during tests identified by an indicator (#..) at which has been referred the item “Operating condition of the equipment under test” of all technical sheets of the tests (see Section 4)

<i>Operating condition</i>	<i>Description</i>
<i>#1</i>	<i>Continuous transmissionat 850 frequency band</i>
<i>#2</i>	<i>Continuous transmissionat 1900 frequency band</i>

3. Summary of test results

3.1 Tests

Name of test	Paragraph	Result
RF Power Output	2.1046	Test passed
ERP, EIRP	22.913; 24.232	Test passed
Occupied Bandwidth	22.917(b)(d), 24.238, 2.1049	Test passed
Field Strength of Spurious Radiation	2.1053	Test passed
Conducted spurious emission	2.1051	Test passed
Emission limitations for cellular equipment (band edge test)	2.1051, 22.917, 24.938	Test passed

4. TEST RESULTS

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**TEST
1.****RF POWER OUTPUT**

**REFERENCE
DOCUMENT****FCC 2.1046 Measurements required: RF power output.**

Power output shall be measured at the RF output terminals when the transmitter is adjusted in accordance with the tune-up procedure to give the values of current and voltage on circuit elements as specified. The electrical characteristics of the radio frequency load attached to the output terminals when this test is made shall be stated.

FCC 22.913

The Effective Radiated Power (ERP) of mobile transmitters and auxiliary test transmitters must not exceed 7 Watts.

FCC 24.232

The equivalent Isotropic Radiated Power (EIRP) must not exceed 2 Watts.

2.1 Test procedure

The EUT was positioned on a non-conductive turntable, 0.8m above the ground plane on Semianechoic chamber. The radiated emission at the fundamental frequency was measured at 3m distance with a test antenna and spectrum analyzer. Worst case emission was recorded with the rotation of the turntable and the raising and lowering of the test antenna. ERP in frequency band 824.2-848.8 MHz, and EIRP in frequency band 1850.2-1909.8 MHz were measured using a substitution method. The EUT was replaced by half-wave dipole (824.2-848.8 MHz) or horn antenna (1850.2-1909.8 MHz) connected to a signal generator.

2.1.1 Substitution RF power measurement:

The applied substitution method follows ANSI/TIA/EIA-603, ANSI/TIA/EIA-102.CAAA or the appropriate ETSI rules respectively. The actual signal generated by the EUT can be determined by means of a substitution measurement in which a known signal source replaces the device to be measured.

The substitution antenna replaces the transmitter antenna at the same position and in vertical polarisation. The frequency of the signal generator shall be adjusted to the measurement frequency. The test antenna shall be raised or lowered, if necessary, to ensure that the maximum signal is still received. The input signal to the substitution antenna shall be adjusted in level until an equal or a known related level to that detected from the transmitter is obtained in the measurement receiver. If a fully anechoic chamber is used as test site in order to provide free space conditions there is no need to change the height of the antenna. The measurement will be repeated in horizontal position.

In order to make this kind of measurement more effective and to avoid subjective measurement faults ETS has installed automatic computer controlled measurement procedures. With the above described substitution method a test site is calibrated over the full frequency range which is used in suitable frequency steps. For a certain power level on the substitution antenna the received power over the whole frequency range is documented. All necessary antenna gains, cable losses, filter losses and amplifications of preamplifiers are taken in consideration. The summary of this calibration measurement performs a transducer factor that is related to the considered test site and a certain measurement distance. Differences of the radiated power levels of different test samples are determined by internal attenuation of the measurement receiver. The proper function of such test site will be maintained by short term plausibility checks and periodical re-calibration. Now the test sample will be putted on the table at the defined position and the radiated power will be received and documented by the measurement receiver. On test sites with ground plane the measurement antenna will be lowered and raised to maximum values at significant frequencies. For peak power measurements the sample is turned by the turntable over 360 degree in order to find the direction with the maximum radiation or to document the max reading with the MAXHOLD function during the rotation.

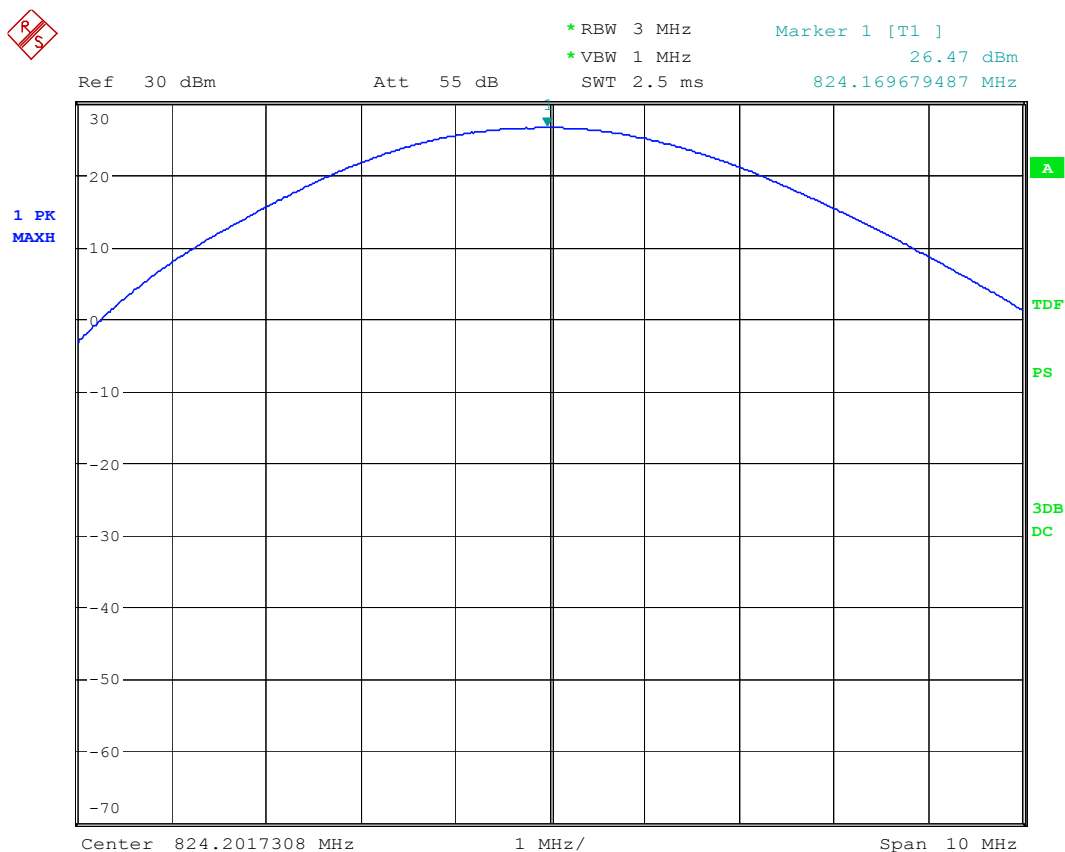
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2.2 Test Result

Conducted measurement

GSM 850		Power Control Level = 5
Channel	Frequency (MHz)	Output Power(dBm)
128	824.16	26.47
188	836.14	27.11
251	848,85	27.32

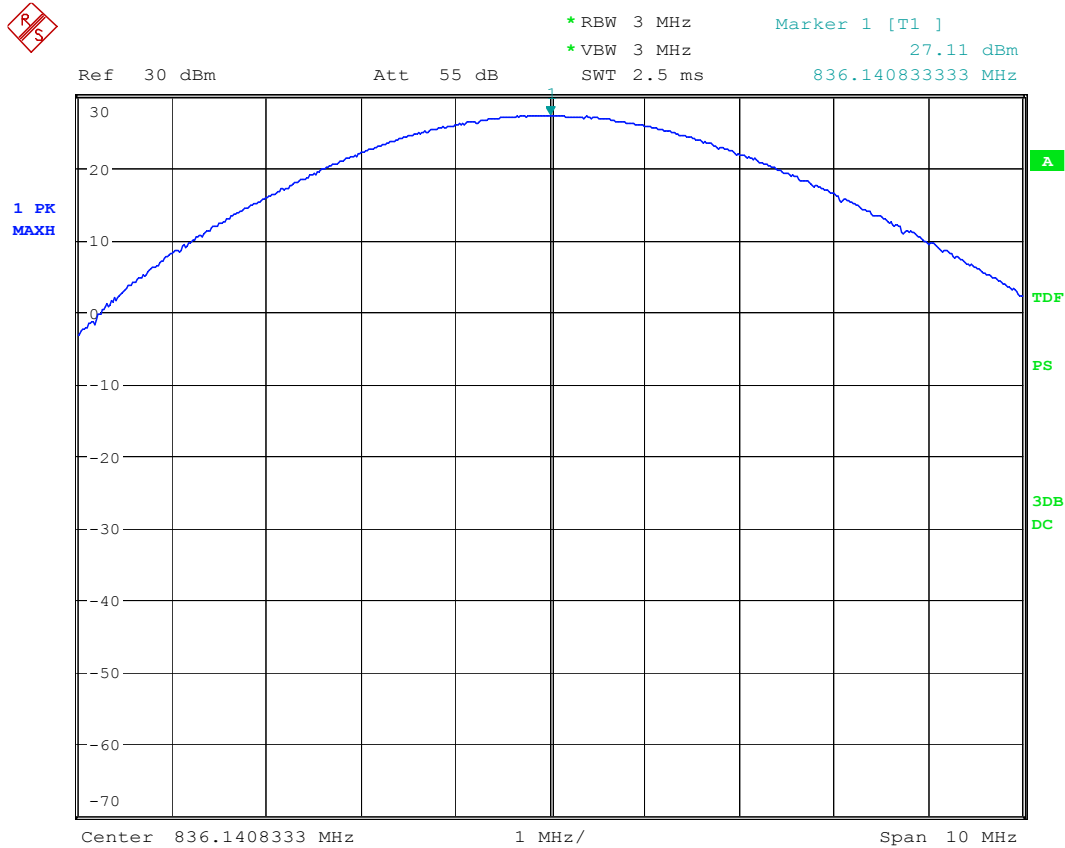
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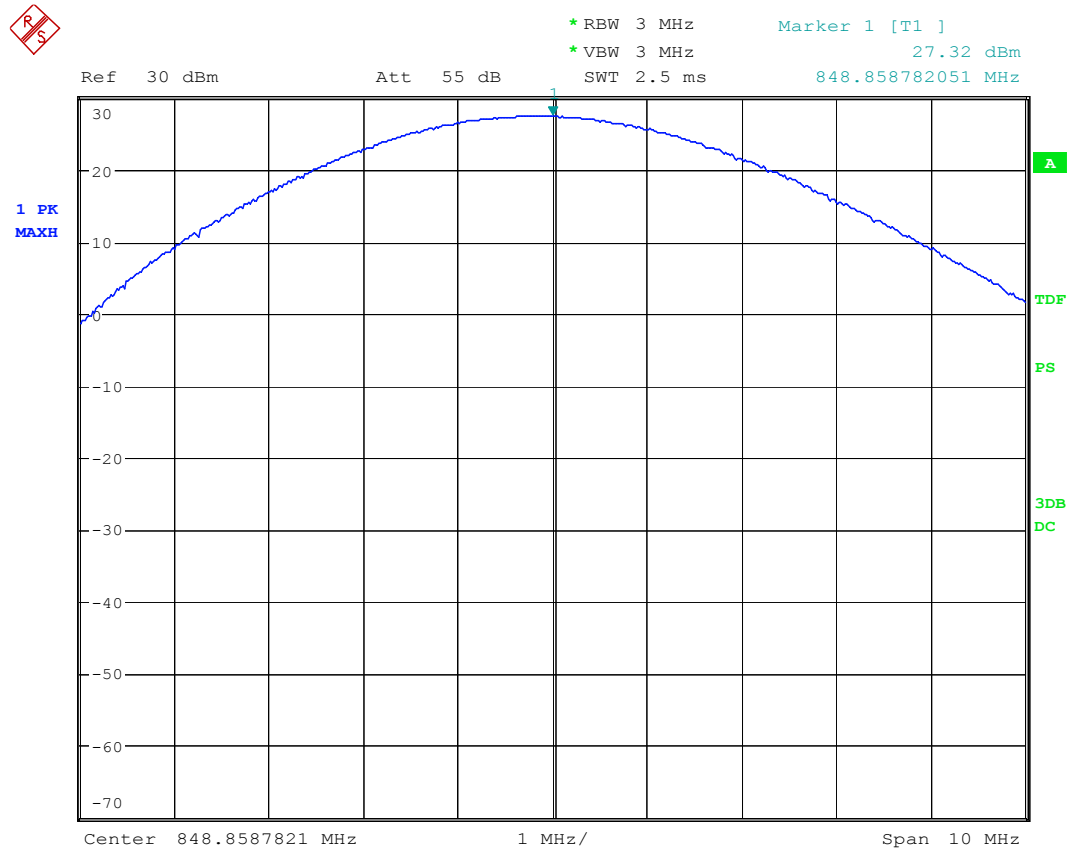
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Channel 251

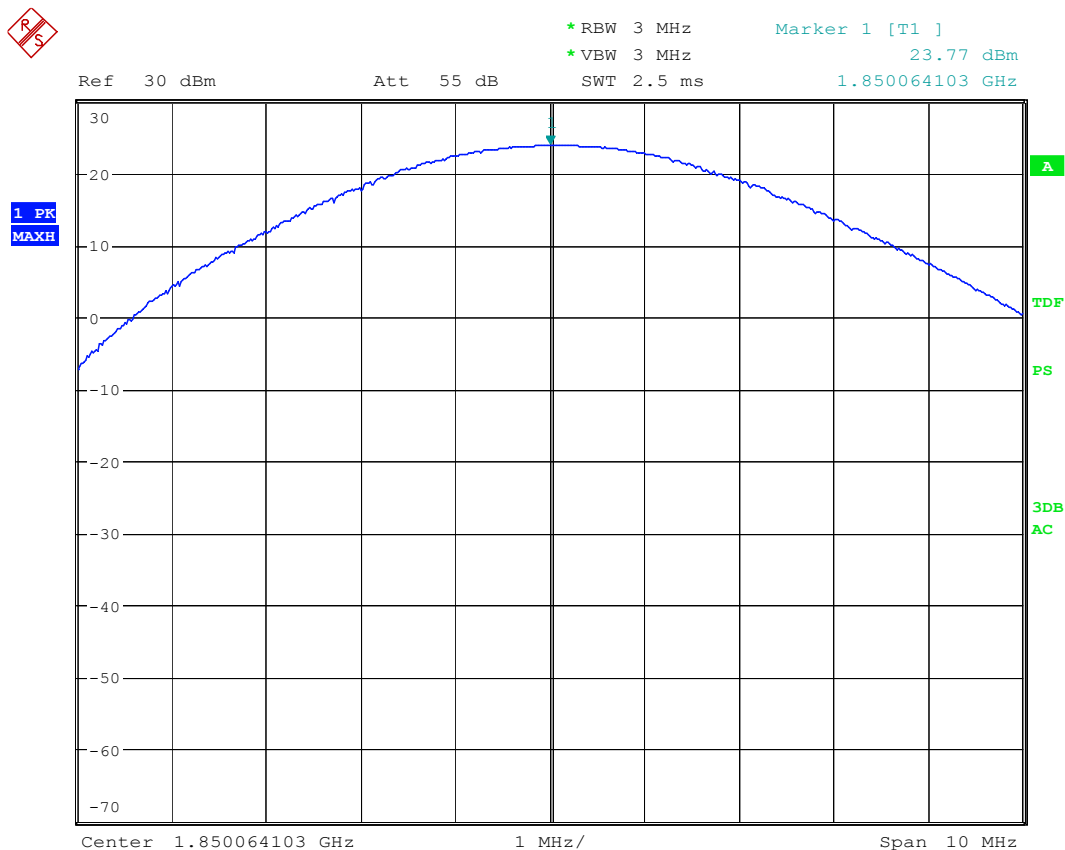


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PCS 1900		Power Control Level = 0
Channel	Frequency (MHz)	Output Power(dBm)
512	1850,064	23.77
661	1880,095	23.01
810	1909,849	23.03

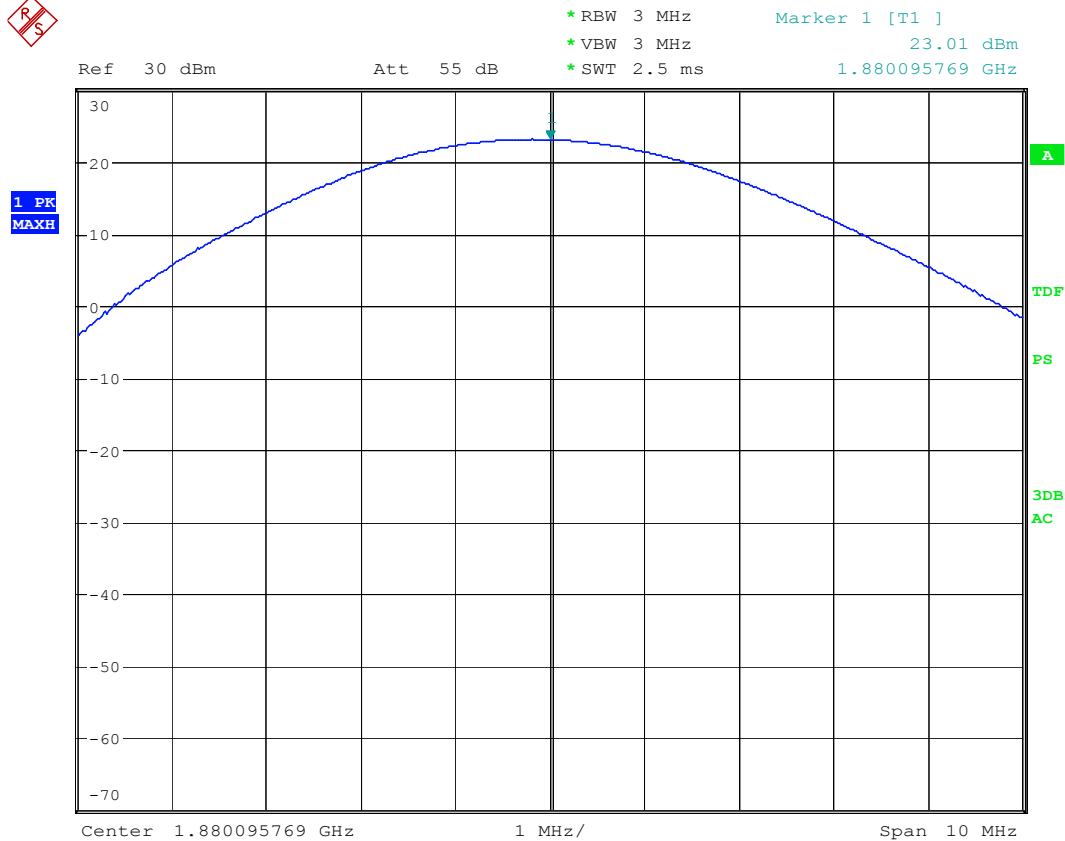
Ch 512



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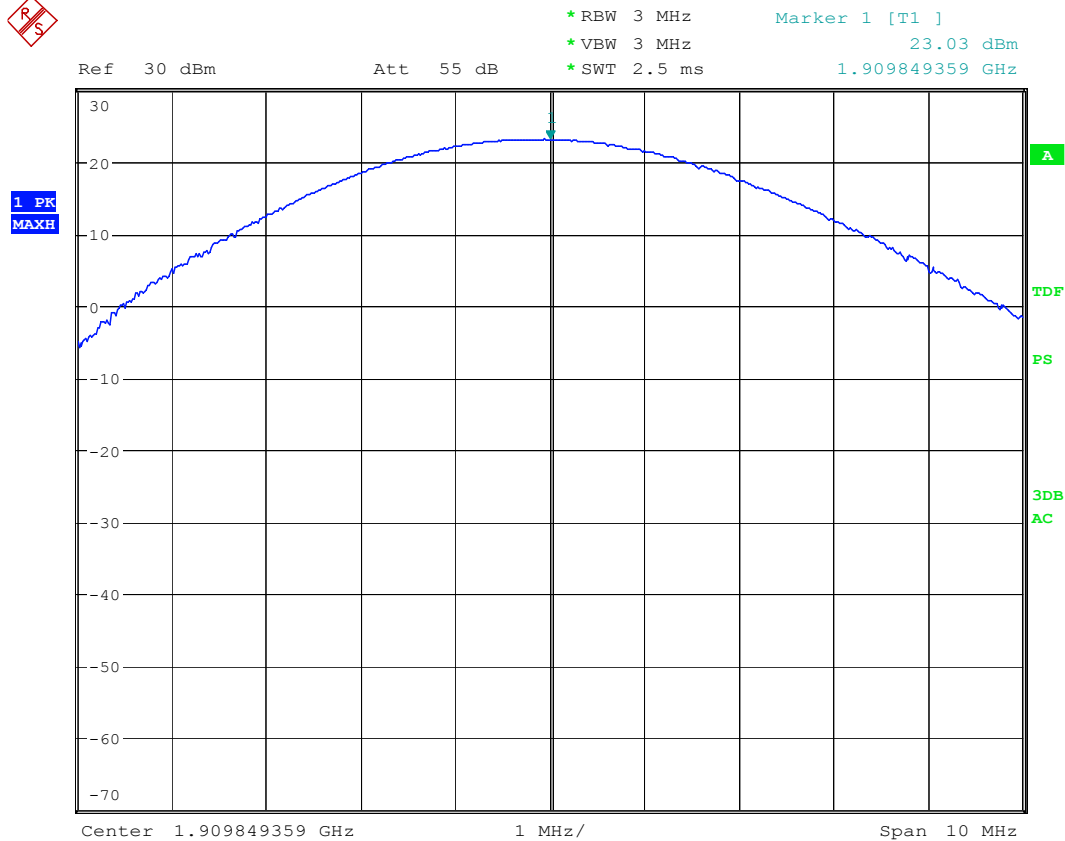
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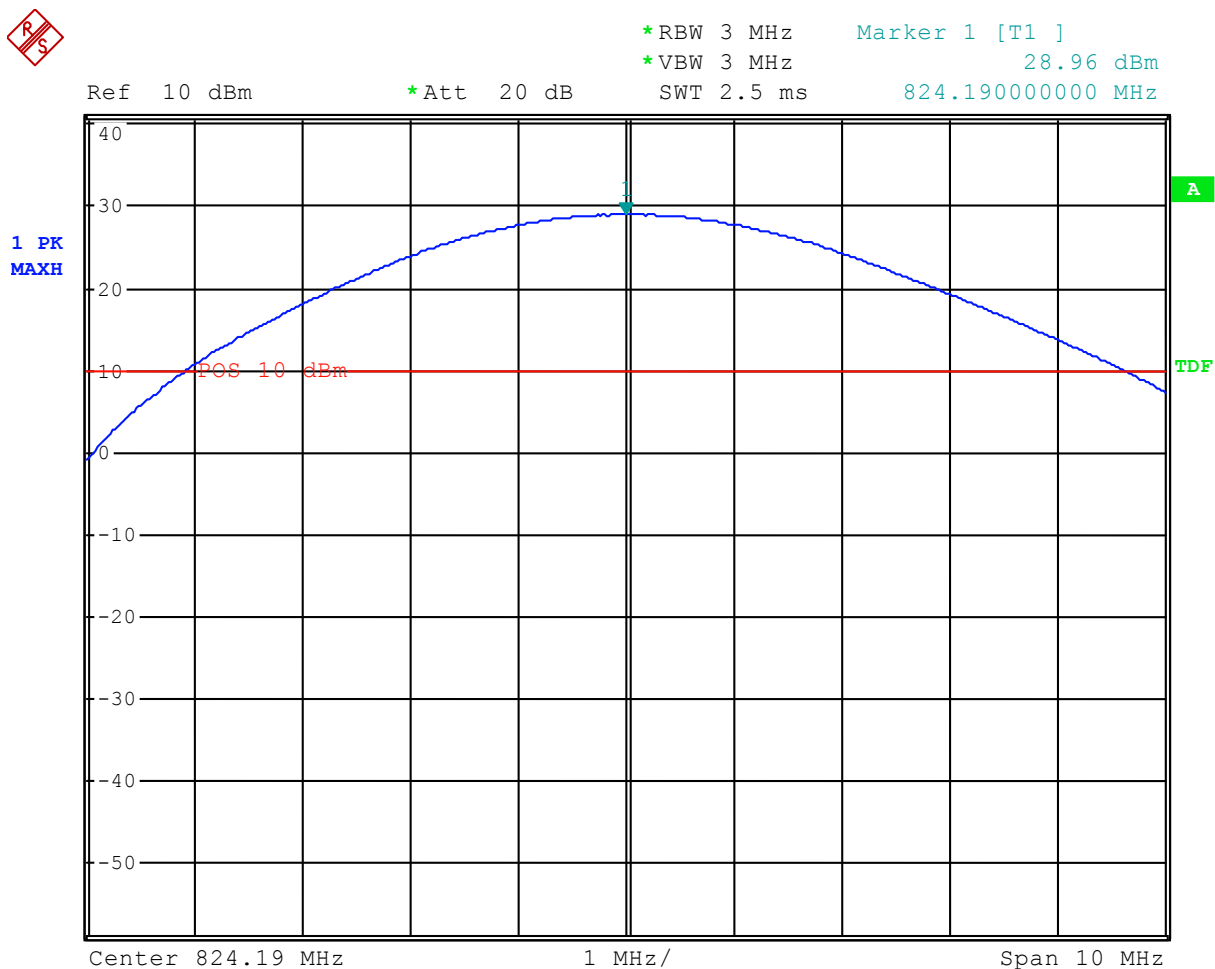
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Radiated measurement

GSM 850		Power Control Level = 5
Channel	Frequency (MHz)	ERP Output Power(dBm)
128	824.19	28.96
188	836,20	28.67
251	848,78	28.78

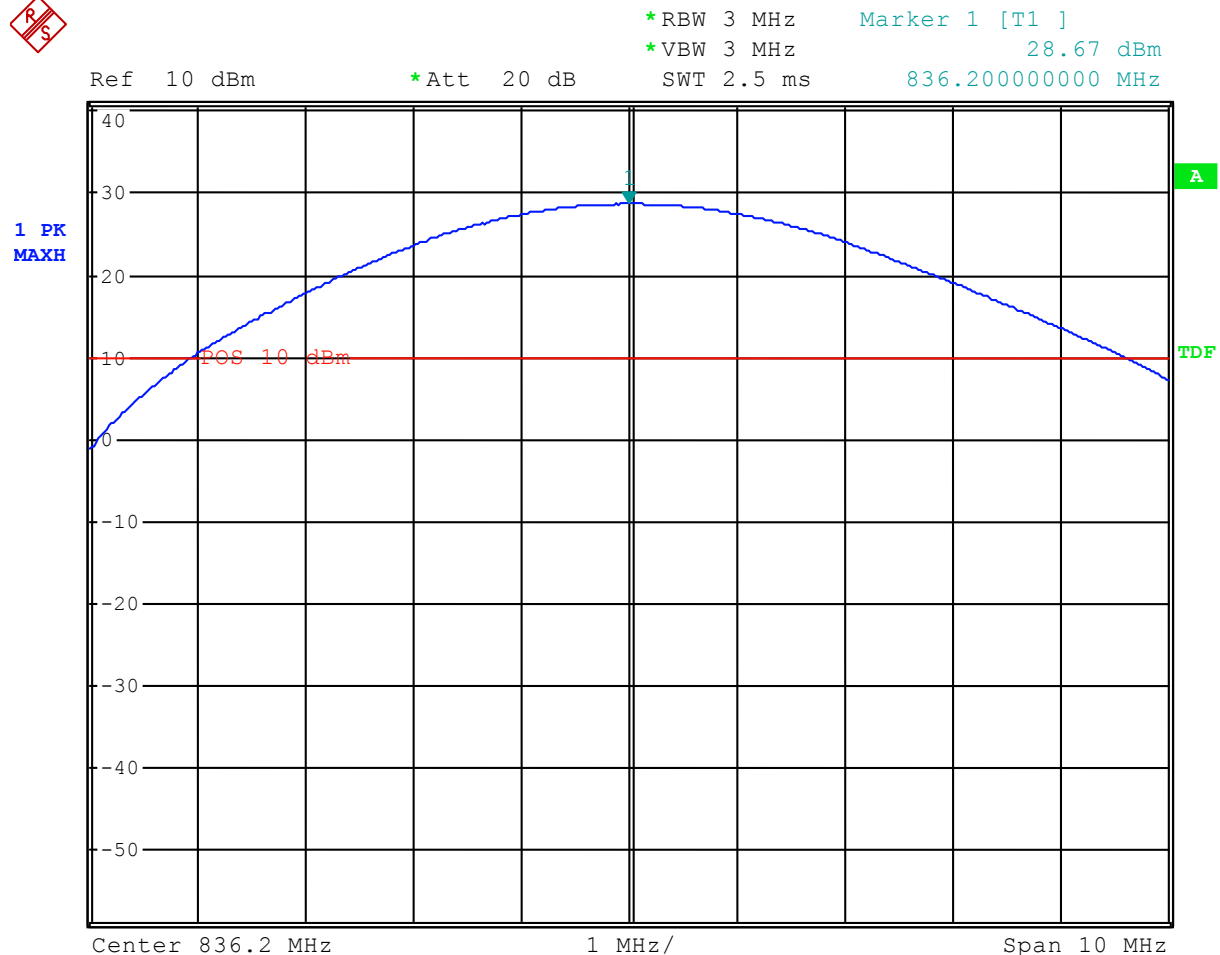
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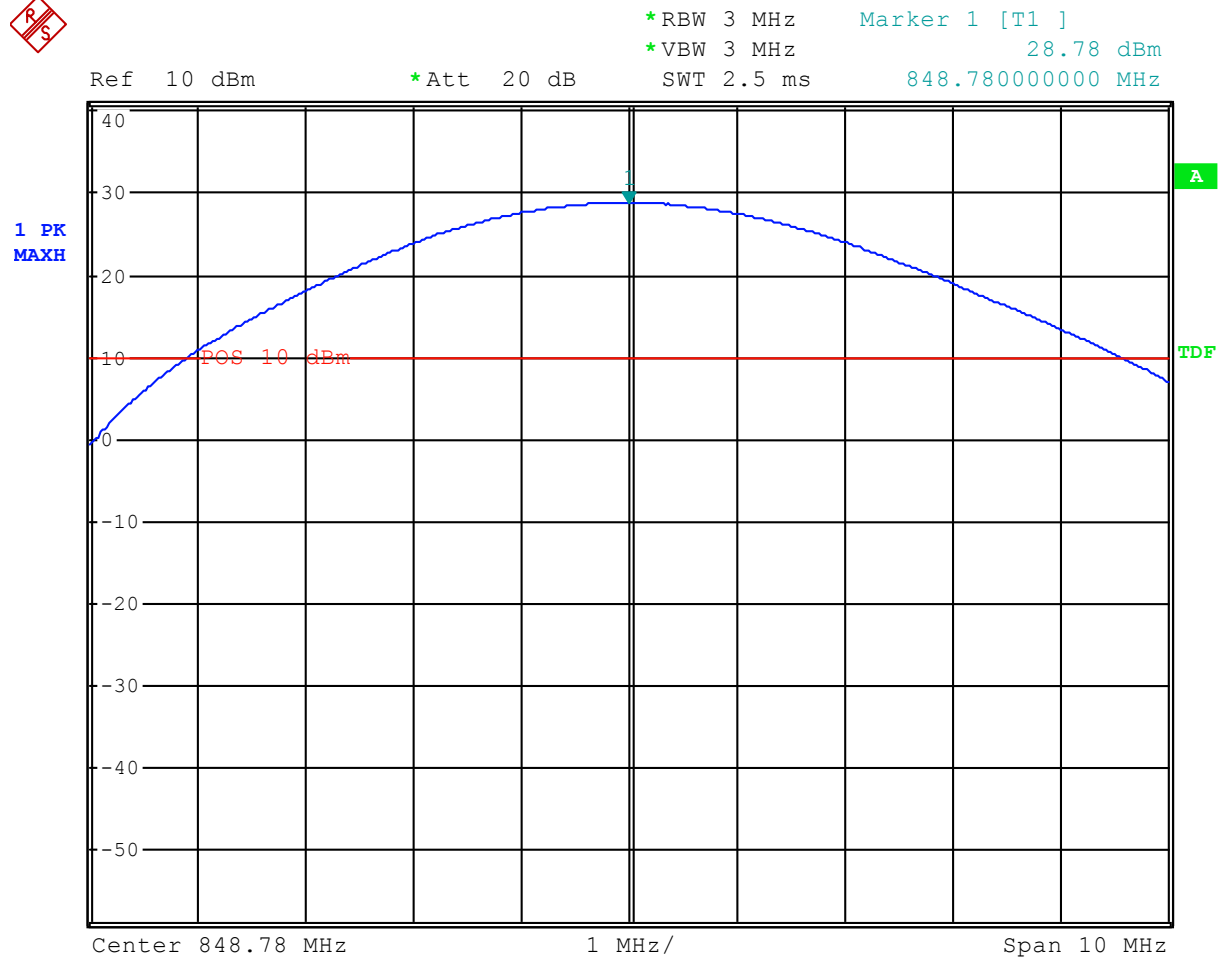
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Ch251



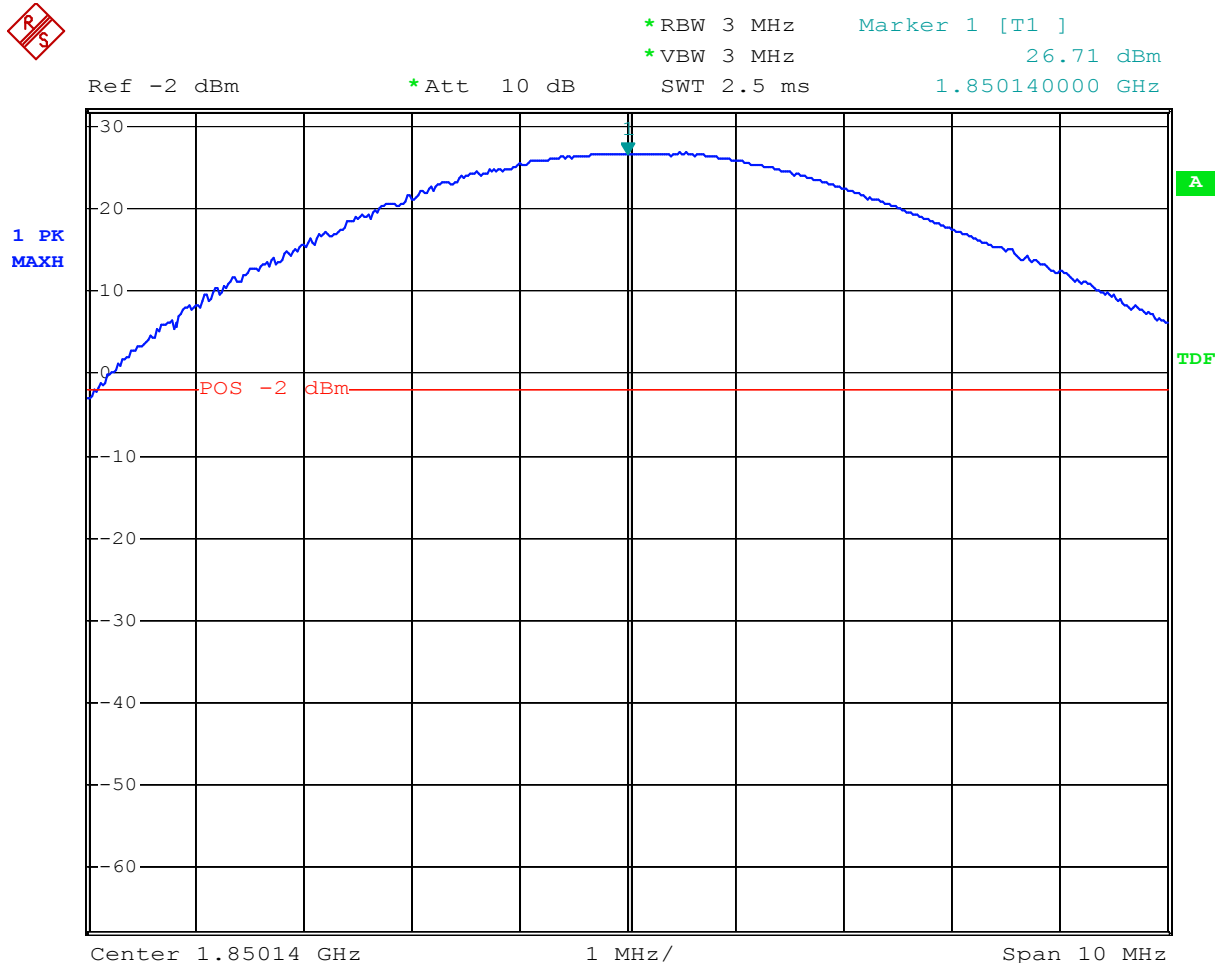
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PCS 1900

Channel	Frequency (MHz)	EIRP Output Power(dBm)
512	1850,176	26.71
661	1880,006	29.11
810	1909,700	28.91

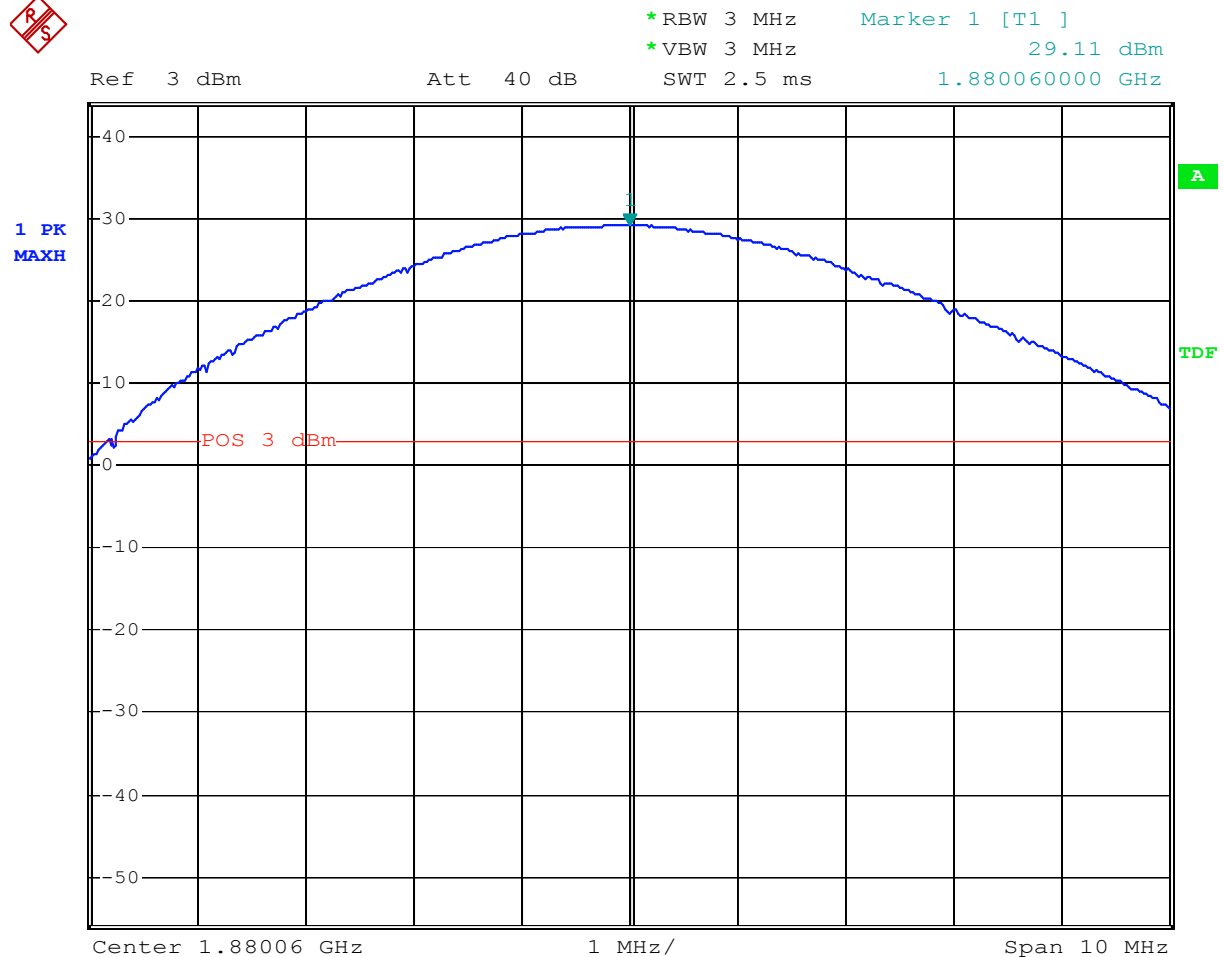
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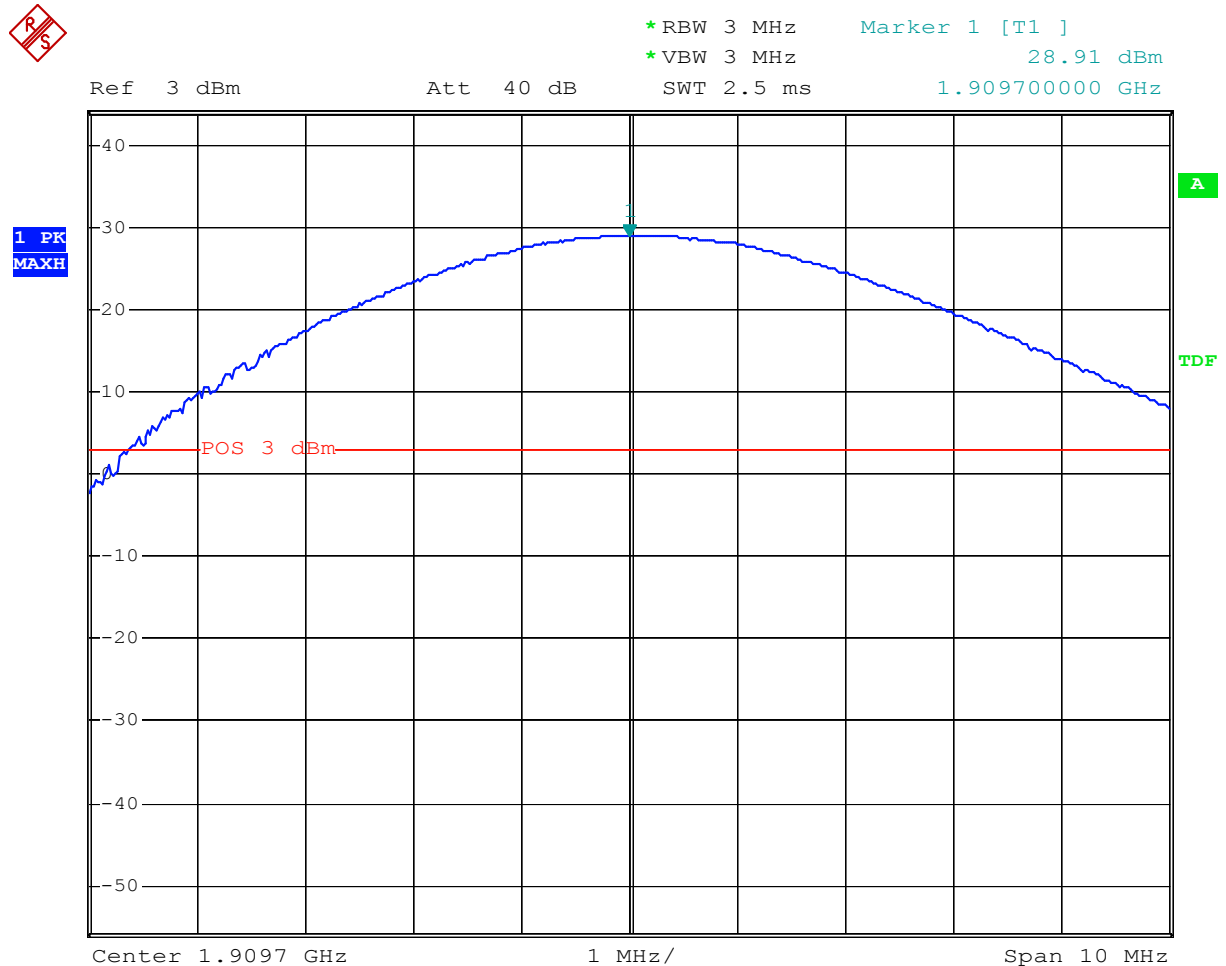
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Ch810



Date: 3.NOV.2008 11:55:41

**TEST
2.**

OCCUPIED BANDWIDTH

FCC Part. 22.917 (b)(d) ; FCC Part 24.238, FCC. 2.1049

**REFERENCE
DOCUMENT**

3.1 General

The occupied bandwidth, that is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power. The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

3.2 Test procedure

Adjust the settings of the Digital Radiocommunication Tester (DRT) to set the EUT to its maximum power at the required channel

The RF output of the transceiver was connected to the input of the spectrum analyzer through sufficient attenuation.

Set the spectrum analyzer to measure the 99% (-20 dB) occupied bandwidth. Record the value

Set the spectrum analyzer to measure the 99.5% (-26 dB) emission bandwidth. Record the value..

Measurements are to be performed with the EUT set to the low, middle and high channel of each frequency band

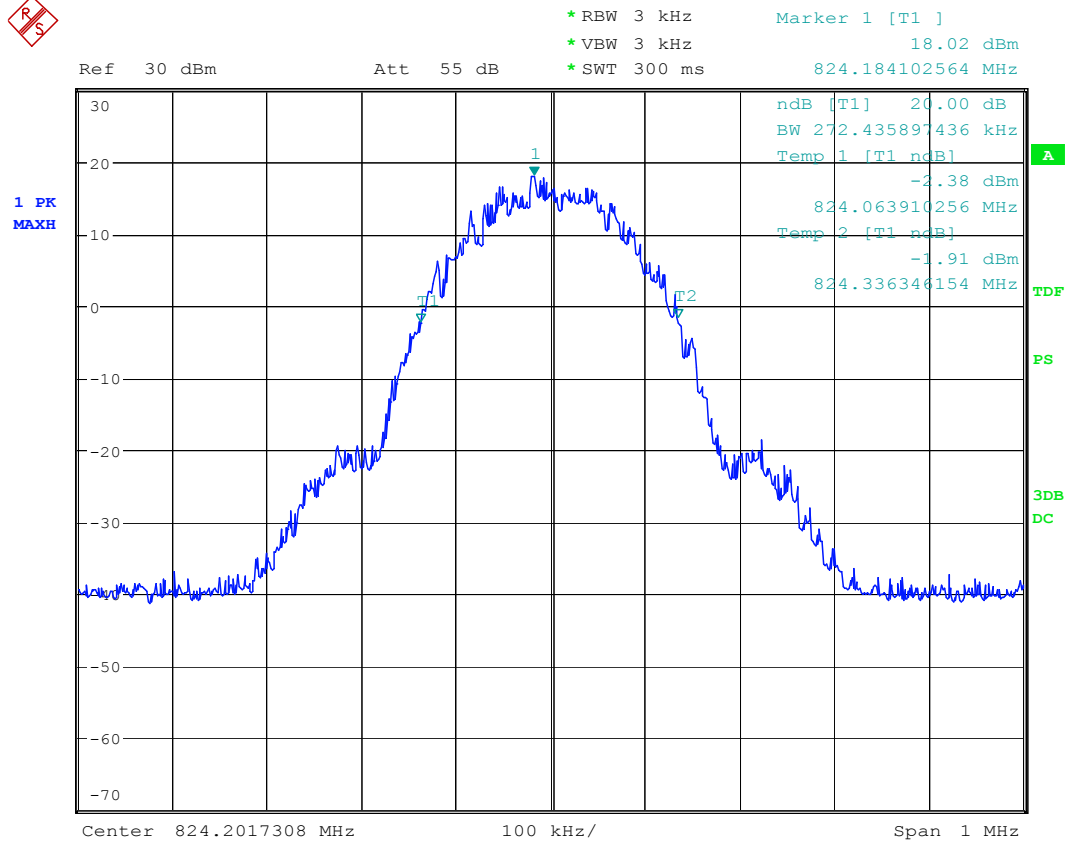
3.3 Test results

GSM 850

Channel	Occupied Channel Bandwidth –20dB (kHz)	Emission Bandwidth –26dB (kHz)
128	272.435	314.102
188	269.23	318.91
251	274.03	314.10

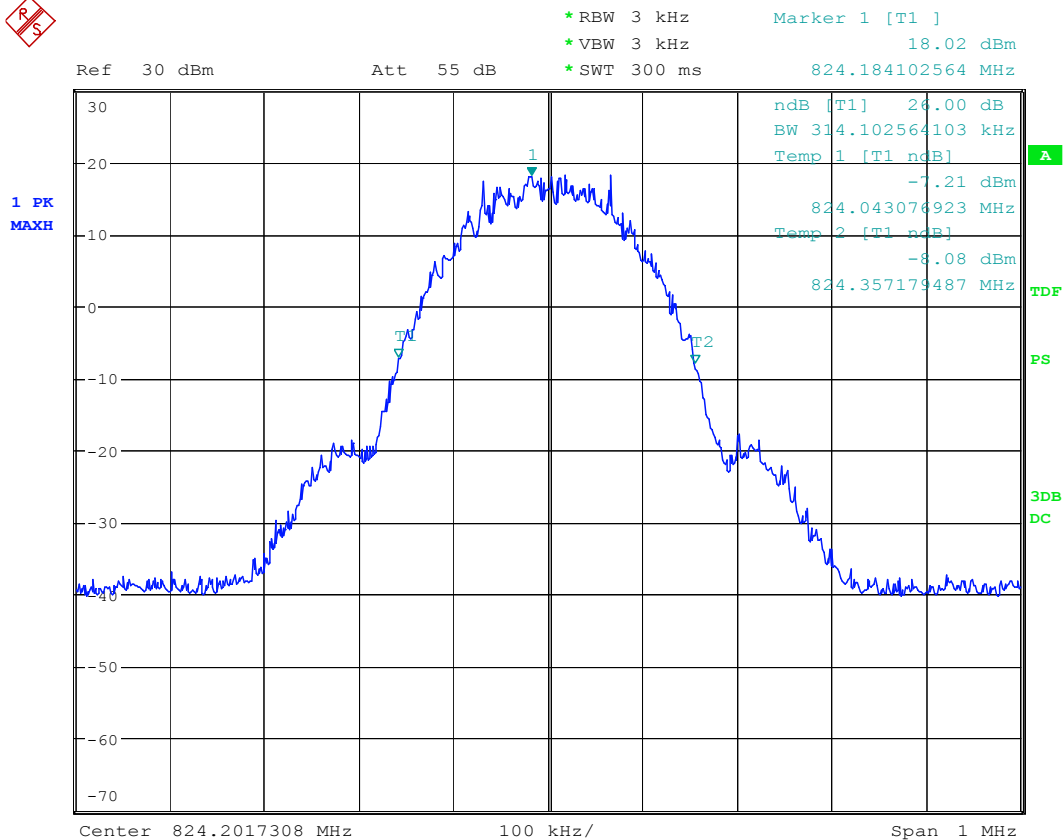
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Channel 128



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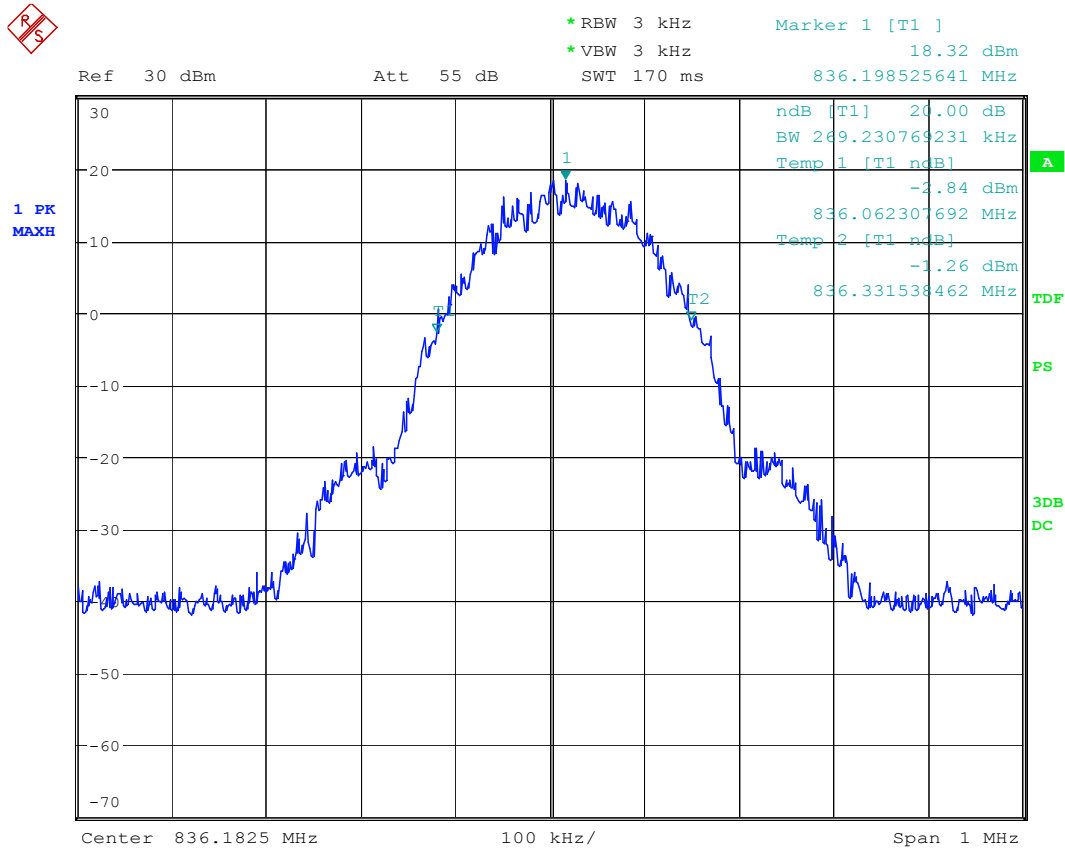
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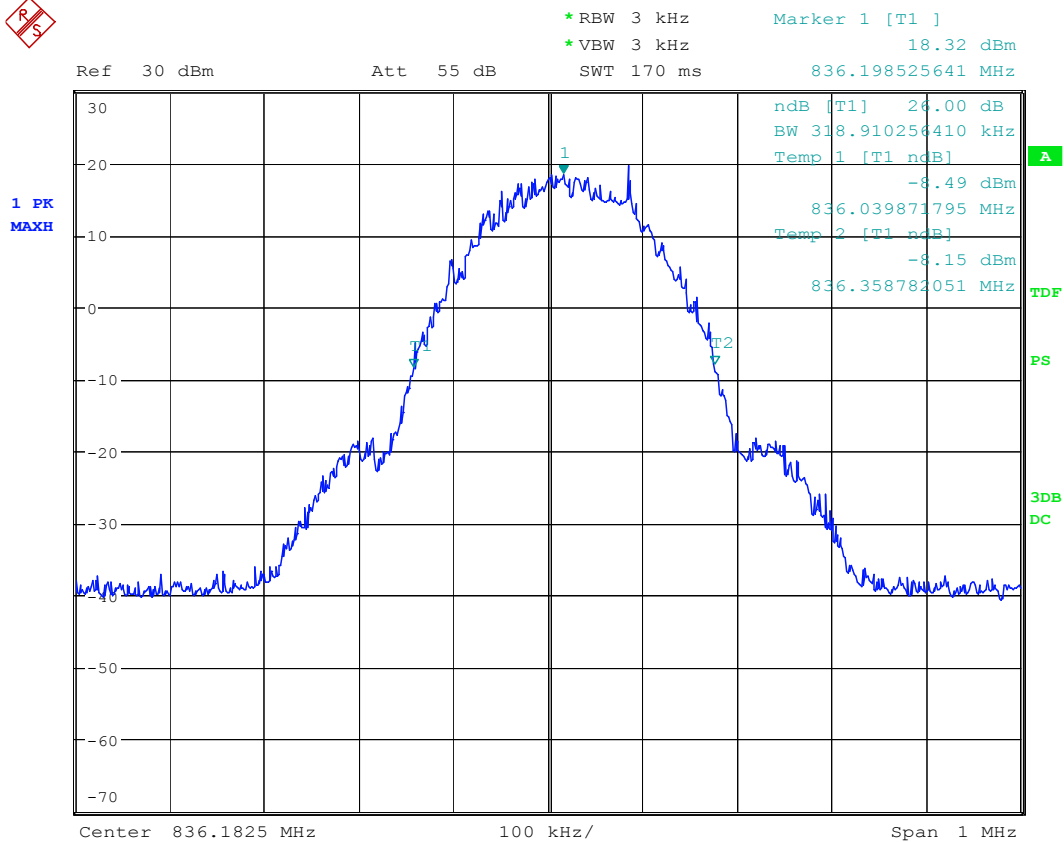
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Channel 188



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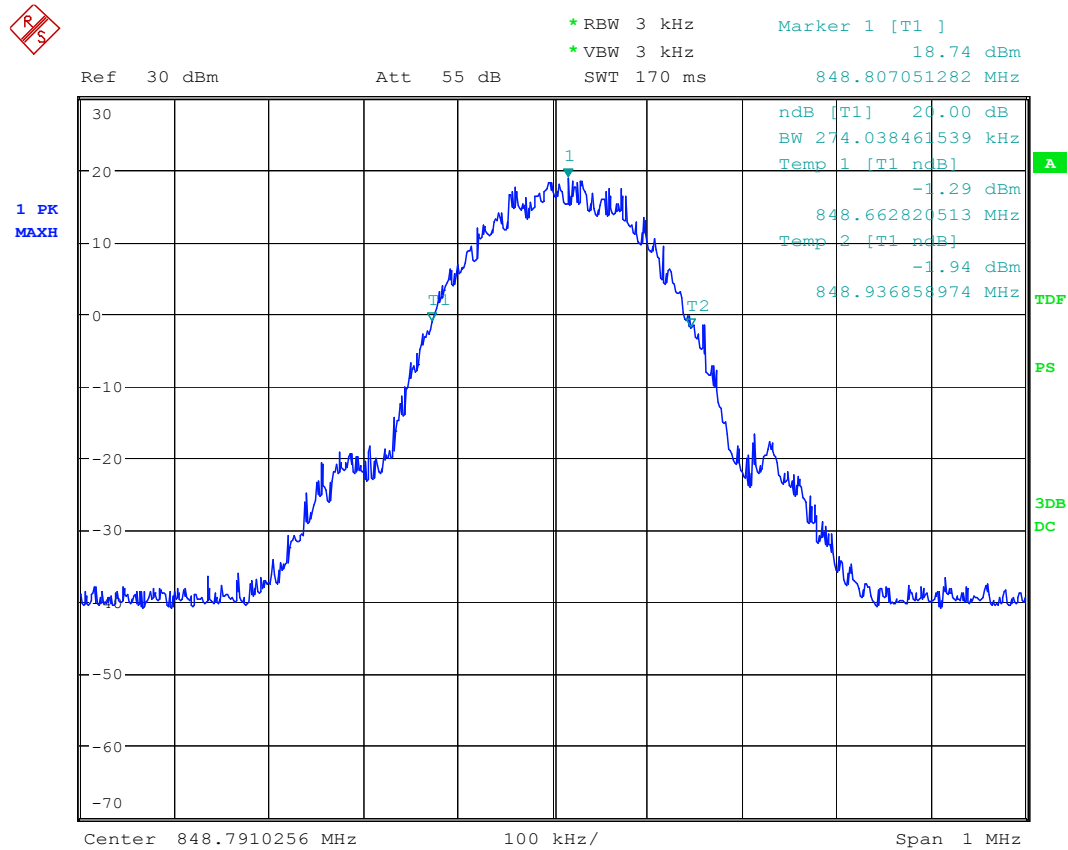
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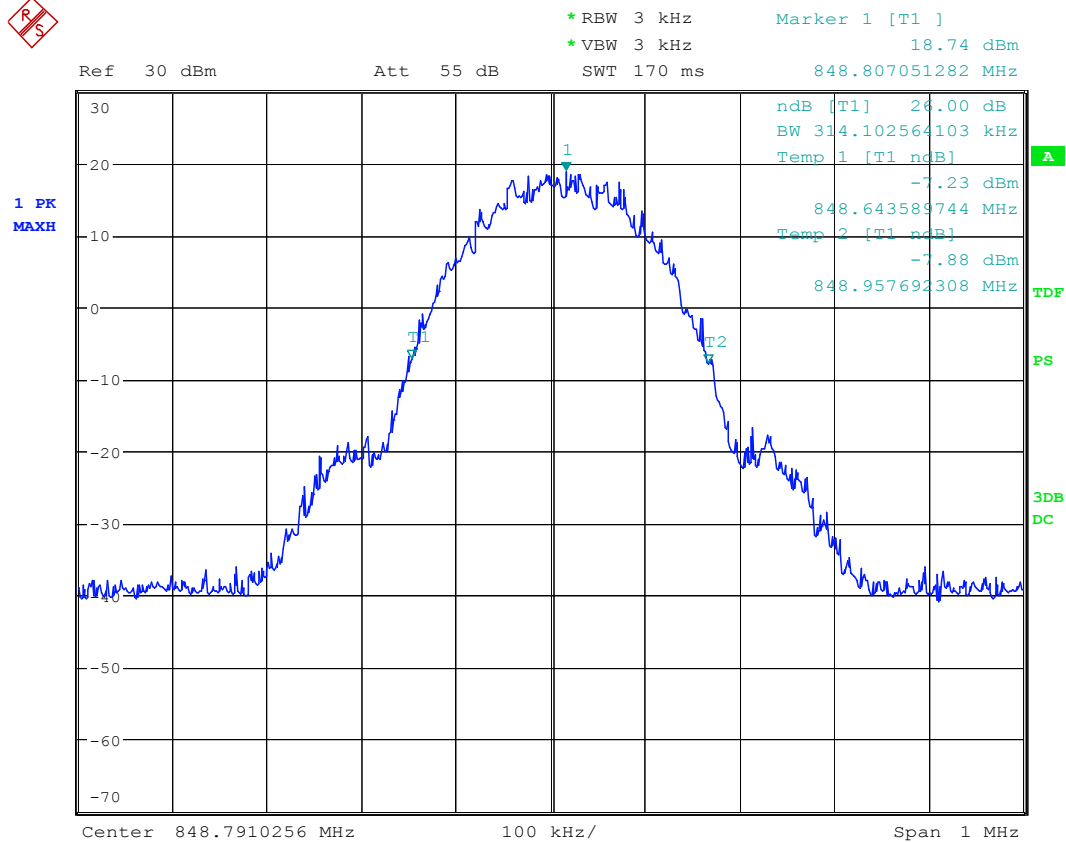
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Channel 251



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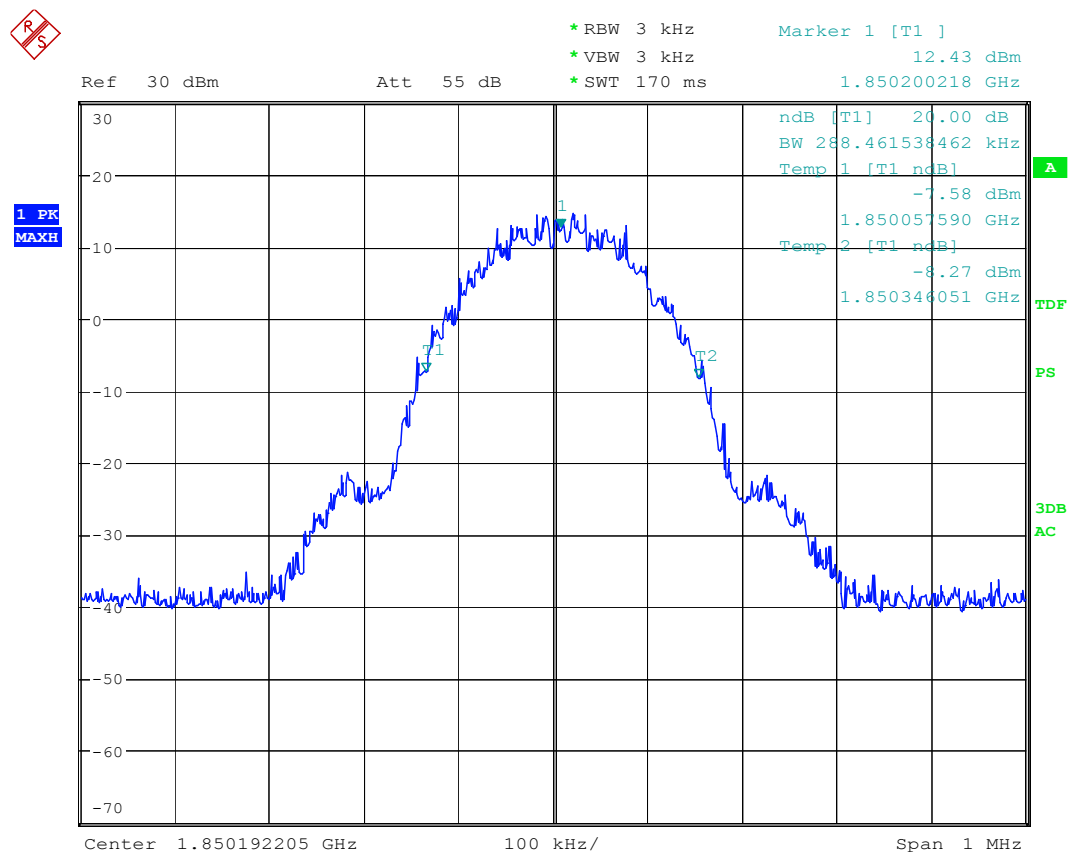
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PCS 1900

Channel	Occupied Channel Bandwidth –20dB (kHz)	Emission Bandwidth –26dB (kHz)
512	288.46	322.11
661	275.64	315.70
810	262.82	309.29

Ch512

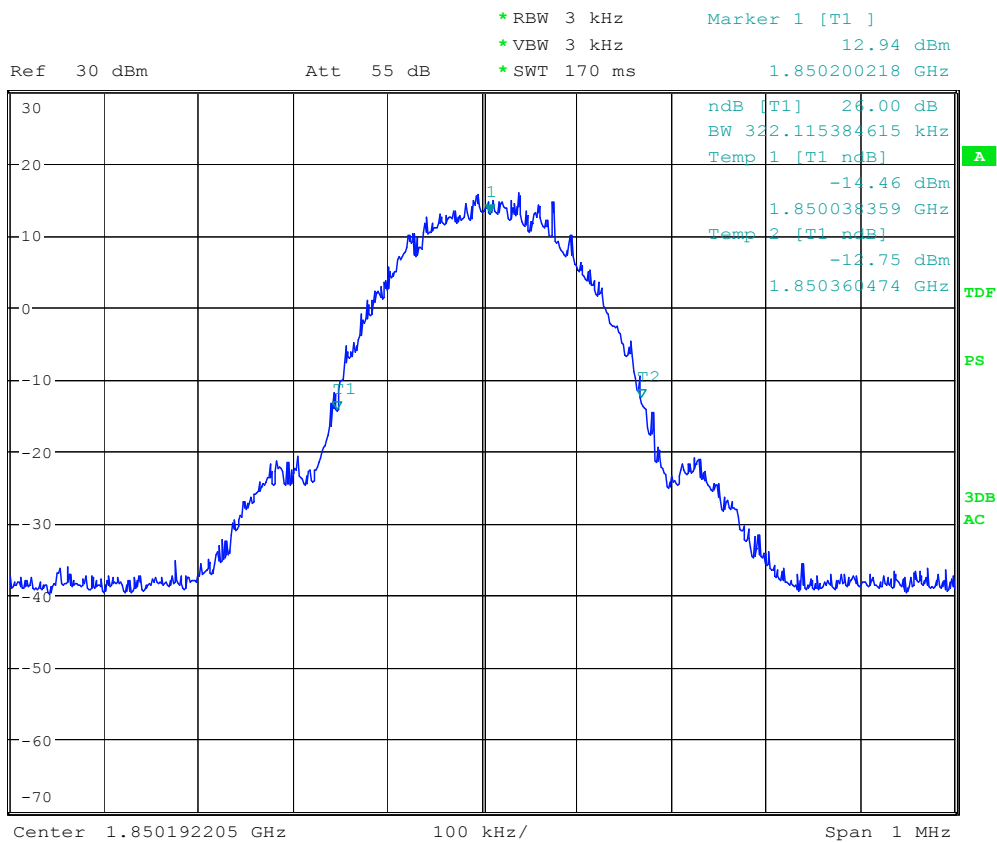


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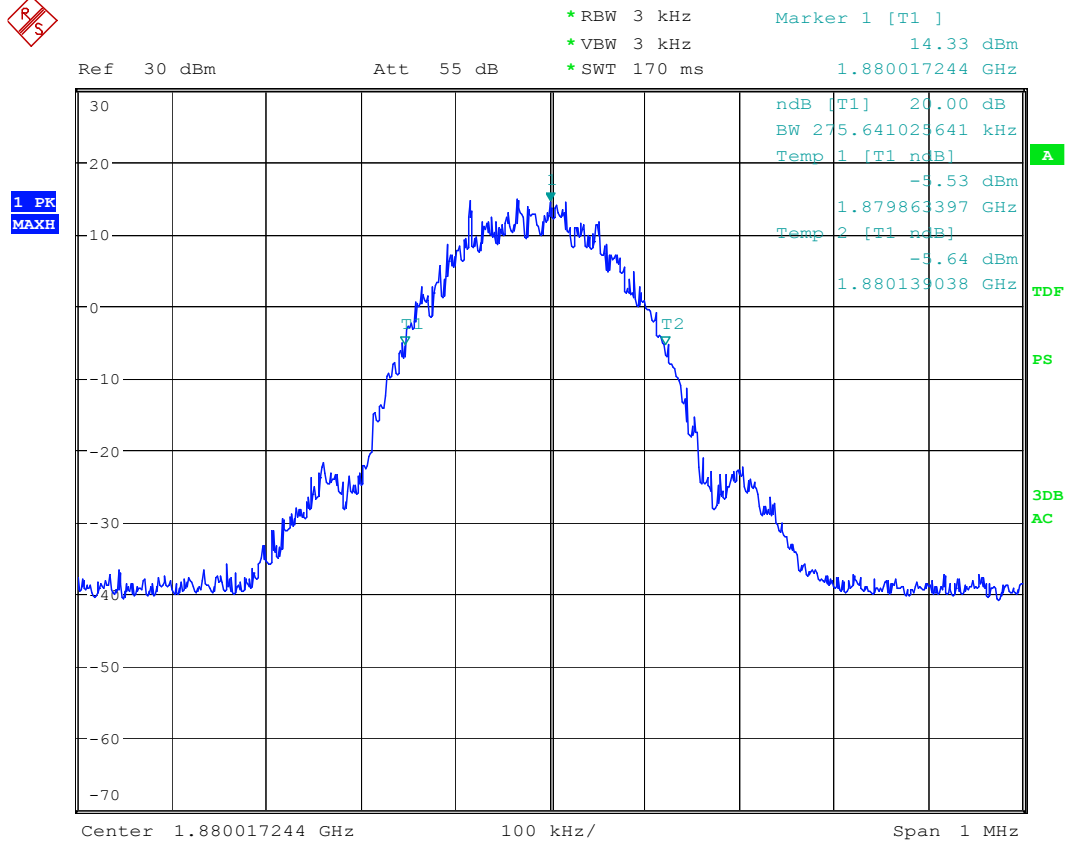
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Date: 21.OCT.2008 12:25:20

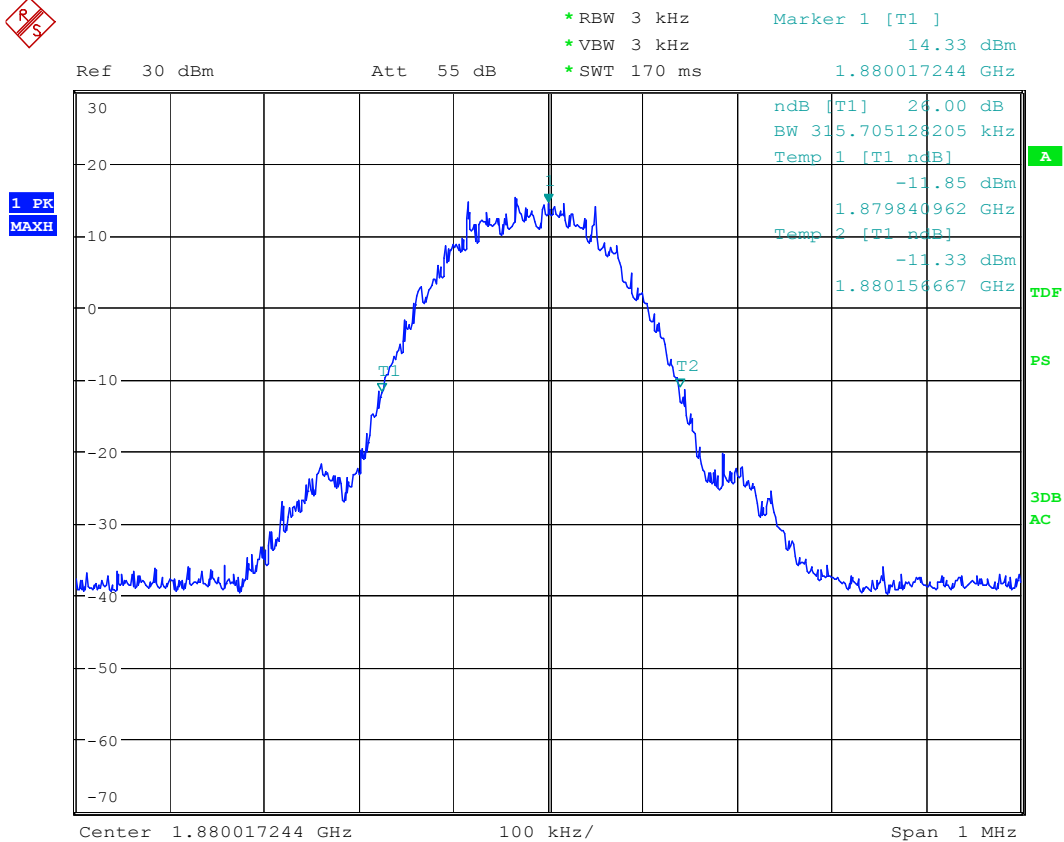
Prima Ricerca & Sviluppo Srl soggetta a direzione e coordinamento da parte della Giovanni Maspero & C. S.p.A. – C.I. 02634780130
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Ch661



Date: 21.OCT.2008 12:31:16

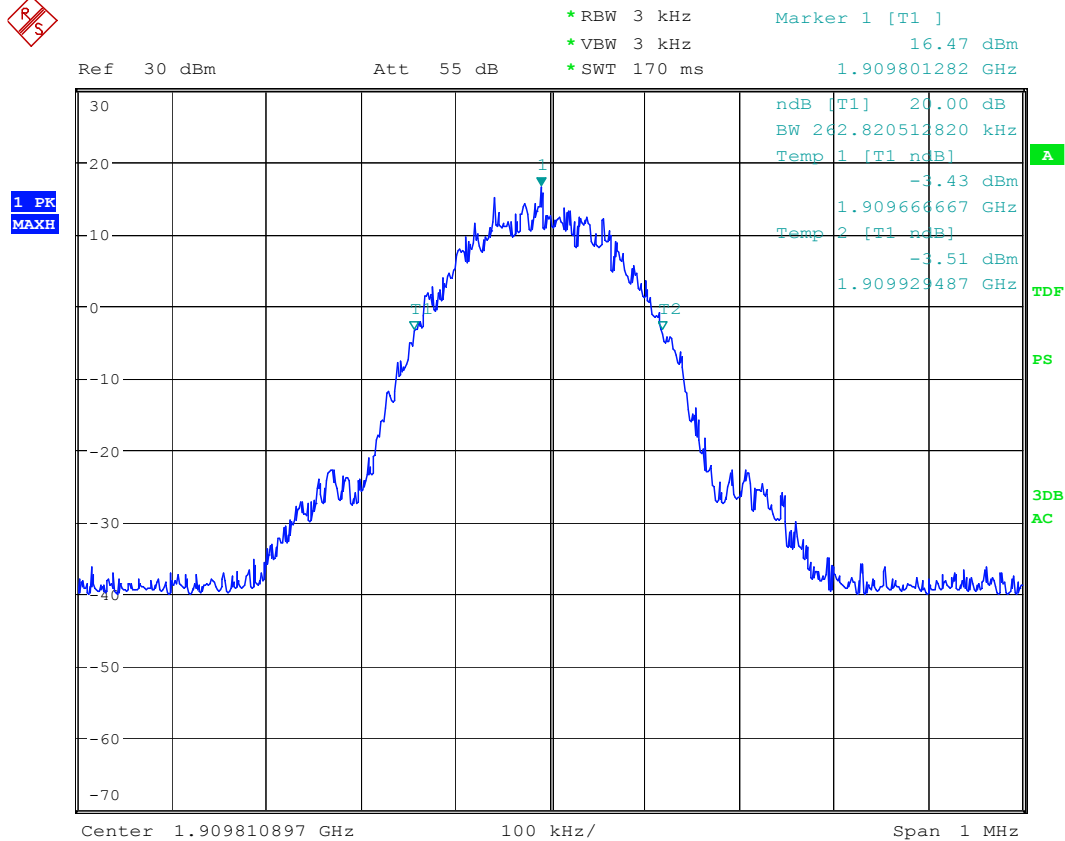
Prima Ricerca & Sviluppo Srl soggetta a direzione e coordinamento da parte della Giovanni Maspero & C. S.p.A. – C.I. 02634780130
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Date: 21.OCT.2008 12:31:58

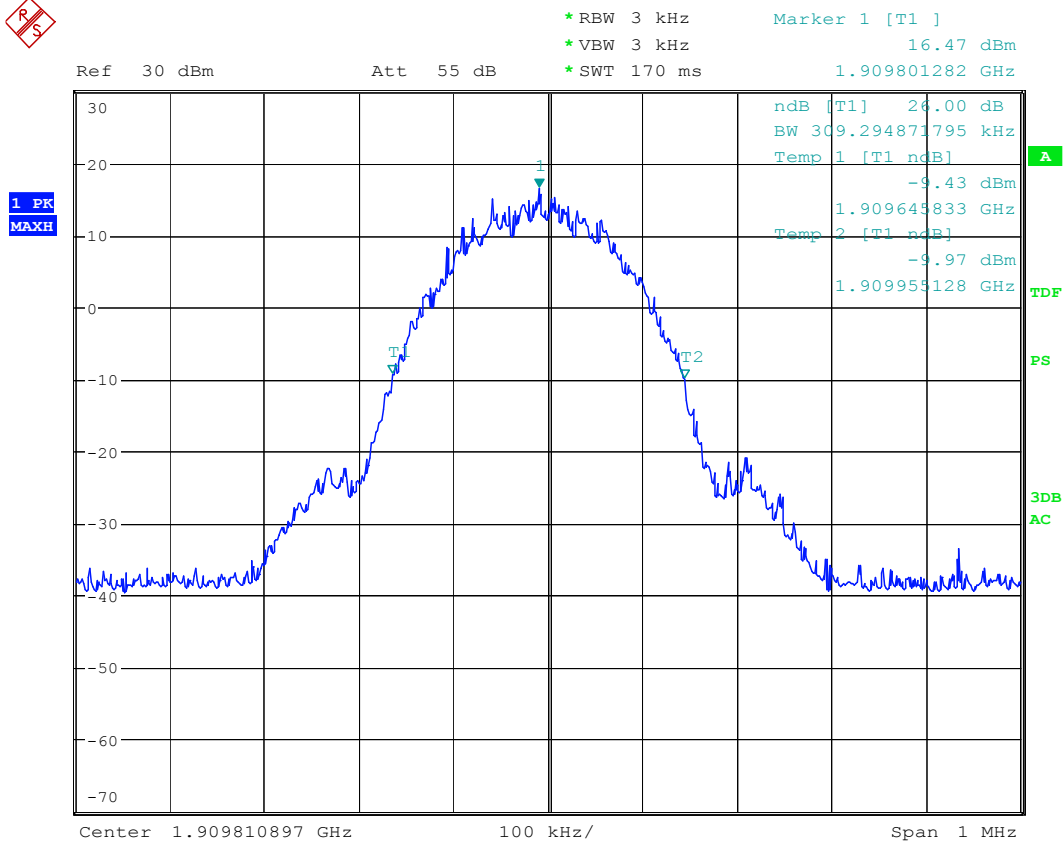
Prima Ricerca & Sviluppo Srl soggetta a direzione e coordinamento da parte della Giovanni Maspero & C. S.p.A. – C.I. 02634780130
Sede legale : 22100 Tavernola (CO) Via Conciliazione, 1 Cod. FISC. e N. R.I. CO 02635860139
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CH810



Date: 21.OCT.2008 12:37:10

Prima Ricerca & Sviluppo Srl soggetta a direzione e coordinamento da parte della Giovanni Maspero & C. S.p.A. – C.I. 02634780130
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Date: 21.OCT.2008 12:37:46

**TEST
3.**

FREQUENCY STABILITY

**REFERENCE
DOCUMENT**

FCC Part. 24.235, "Hand carried, battery powered equipment" Section 2.1055(d)(2) applies

This transceiver is specified to operate with an input voltage of between 3.2VDC and 4.5VDC, with a nominal voltage of 3.7VDC.

FREQUENCY STABILITY (GSM-850) ch188 836,18MHz

FREQ ERROR VS. VOLTAGE

Voltage (VDC)	Frequency Error (Hz)	Frequency Error (ppm)
10	-11	0,013149
13,5	-21	0,025102

FREQ ERROR vs. TEMPERATURE

TEMPERATURE (°C)	Frequency Error (Hz)	Frequency Error (ppm)
-30	-31	0,037056
-20	-15	0,01793
-10	-13	0,01554
0	-12	0,01434
+10	-6	0,00717
+20	-2	0,00239
+30	10	0,011953
+40	-10	0,011953
+50	11	0,013149

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FREQUENCY STABILITY (PCS-1900) 661 1880,24

FREQ ERROR VS. VOLTAGE

Voltage (VDC)	Frequency Error (Hz)	Frequency Error (ppm)
10	-14	0,007446
13,5	-17	0,009041

FREQ ERROR vs. TEMPERATURE

TEMPERATURE (°C)	Frequency Error (Hz)	Frequency Error (ppm)
-30	-21	0,011169
-20	-12	0,006382
-10	-12	0,006382
0	-10	0,005318
+10	-9	0,004787
+20	-10	0,005318
+30	12	0,006382
+40	15	0,007978
+50	17	0,009041

**TEST
4.****FIELD STRENGTH OF SPURIOUS RADIATION**

FCC Part. 2.1053

**REFERENCE
DOCUMENT****5.1 Test procedure**

The EUT was positioned on a non-conductive turntable, 0.8m above the ground plane. The radiated emission at the fundamental frequency was measured at 3m distance with a test antenna and spectrum analyzer. Worst case emission was recorded with the rotation of the turntable and the raising and lowering of the test antenna. ERP was measured using a substitution method. The EUT was replaced by horn antenna connected to a signal generator. The frequency range up to tenth harmonic was investigated.

5.2 Test results

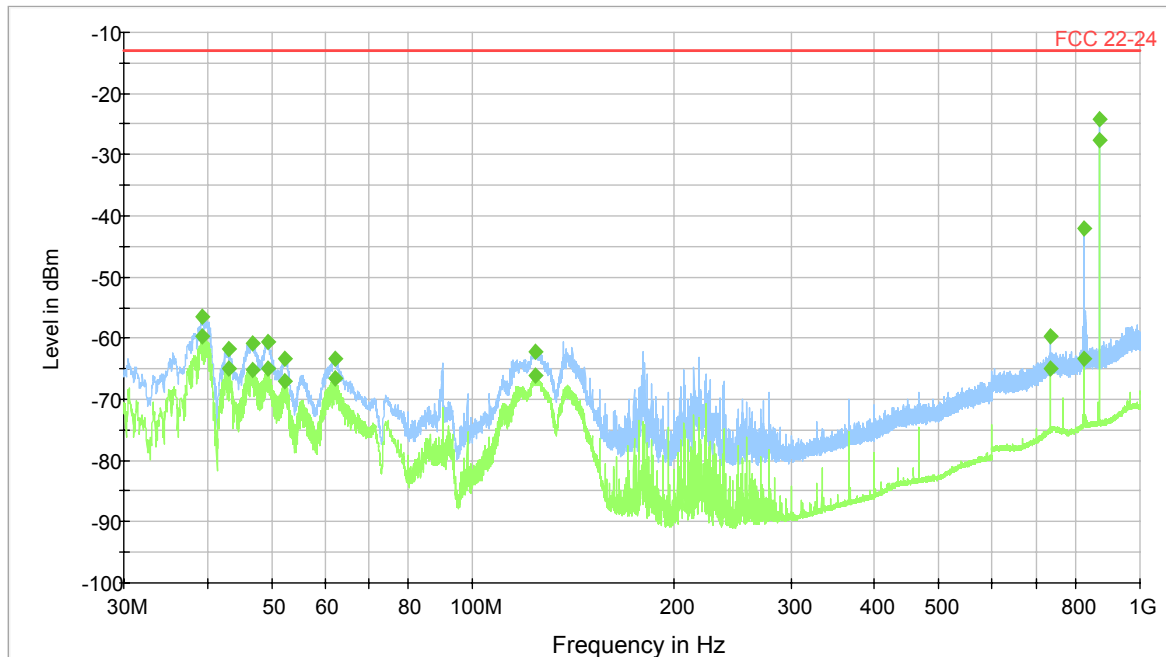
The radiated spurious emissions were measured for channel 128, channel 188 and channel 251, respectively the upper, center, and lower frequencies of the US GSM band (824,2MHz, 836,5MHz and 848,8 MHz). The measurement diagrams show that all significant spurs are well below the limit line. The measurements of the spurious emissions at the equipment output terminals were performed pursuant to § 2.1053 in order to verify that any emissions are below the limits given by § 24.238.

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GSM 850 (Channel 128)

Vertical polarization

Spurious emission ETSI_FCC_IC

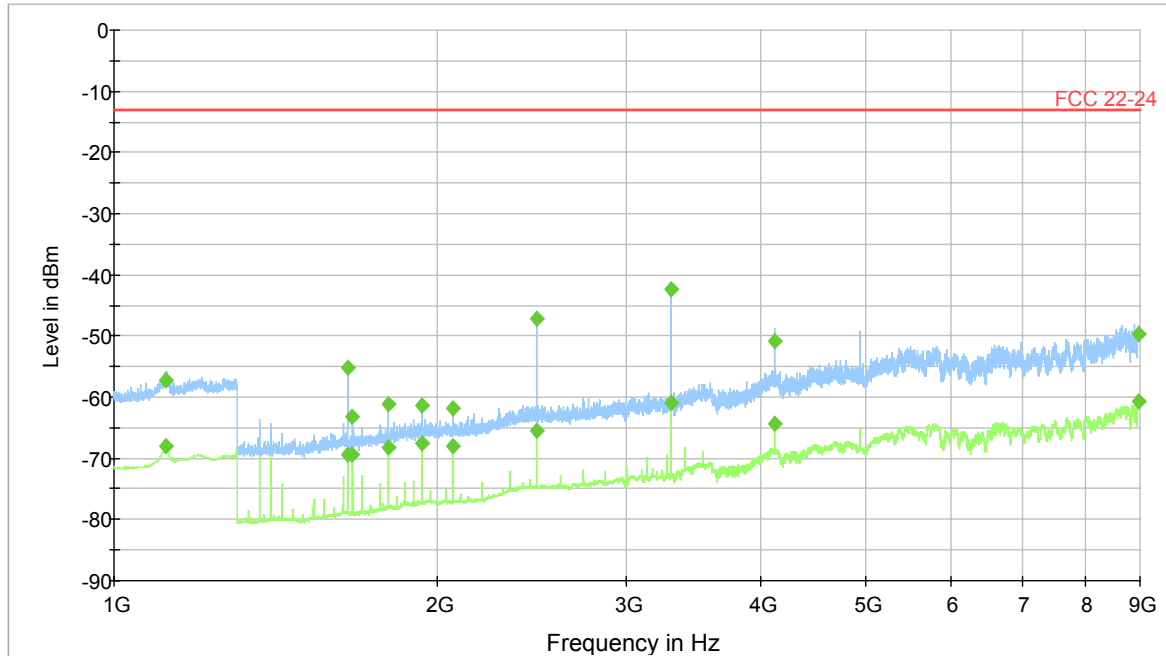


— FCC 22-24.LimitLine — Preview Result 1 — Preview Result 2 ◆ Final Result 2 ◆ Final Result 2 +

Frequency (MHz)	MaxPeak-MaxHold (dBm)	Average-MaxHold (dBm)	Antenna height (cm)	Polarity	Turntable position (deg)
39.400000	-56.4	-59.8	100.0	V	180.0
43.000000	-61.8	-65.0	100.0	V	180.0
46.720000	-60.9	-65.3	100.0	V	1.0
49.240000	-60.6	-65.0	100.0	V	1.0
52.360000	-63.4	-66.9	100.0	V	180.0
62.200000	-63.3	-66.6	100.0	V	1.0
123.840000	-62.2	-66.1	100.0	V	1.0
733.320000	-59.7	-65.0	100.0	V	1.0
824.320000	-42.1	-63.4	250.0	V	1.0
869.200000	-24.2	-27.7	250.0	V	180.0

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Spurious emission ETSI_FCC_IC



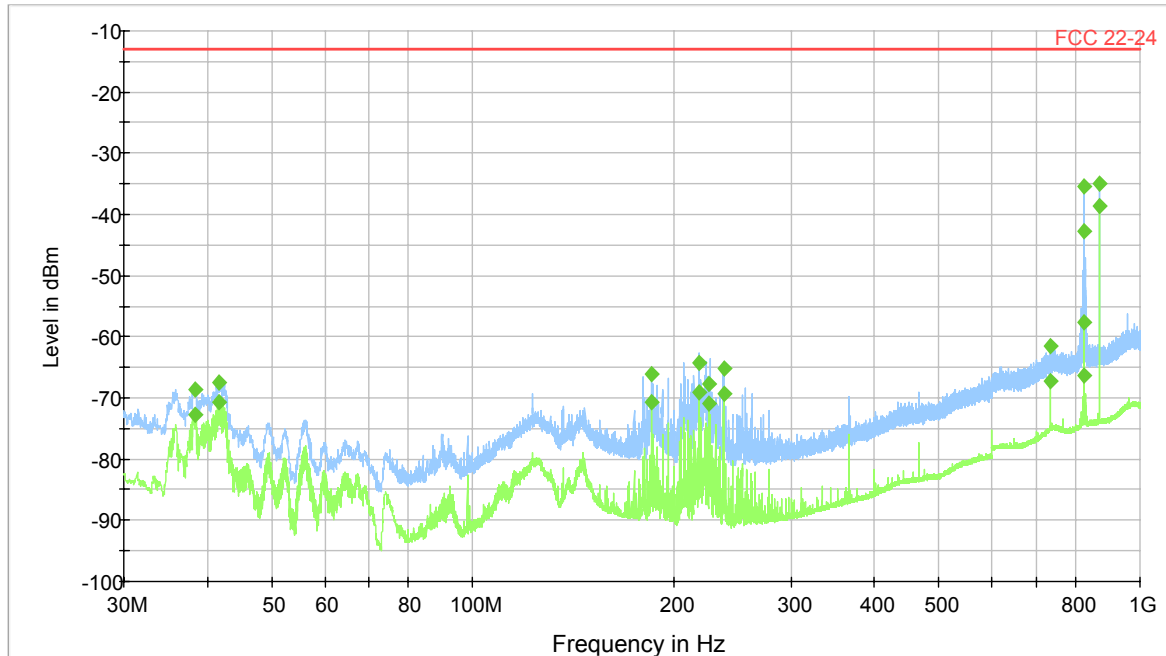
— FCC 22-24.LimitLine — Preview Result 1 — Preview Result 2 ◆ Final Result 2 ◆ Final Result 2 +

Frequency (MHz)	MaxPeak-MaxHold (dBm)	Average-MaxHold (dBm)	Antenna height (cm)	Polarity	Turntable position (deg)
1118.80000	-57.1	-68.1	250.0	V	180.0
1648.40000	-55.3	-69.5	100.0	V	1.0
1666.80000	-63.2	-69.3	100.0	V	1.0
1800.00000	-61.1	-68.1	100.0	V	1.0
1933.20000	-61.3	-67.6	100.0	V	1.0
2066.80000	-61.7	-67.9	100.0	V	180.0
2472.80000	-47.2	-65.5	250.0	V	1.0
3296.80000	-42.4	-60.8	250.0	V	1.0
4121.20000	-50.9	-64.4	250.0	V	1.0
8978.00000	-49.8	-60.7	250.0	V	180.0

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Horizontal Polarization

Spurious emission ETSI_FCC_IC

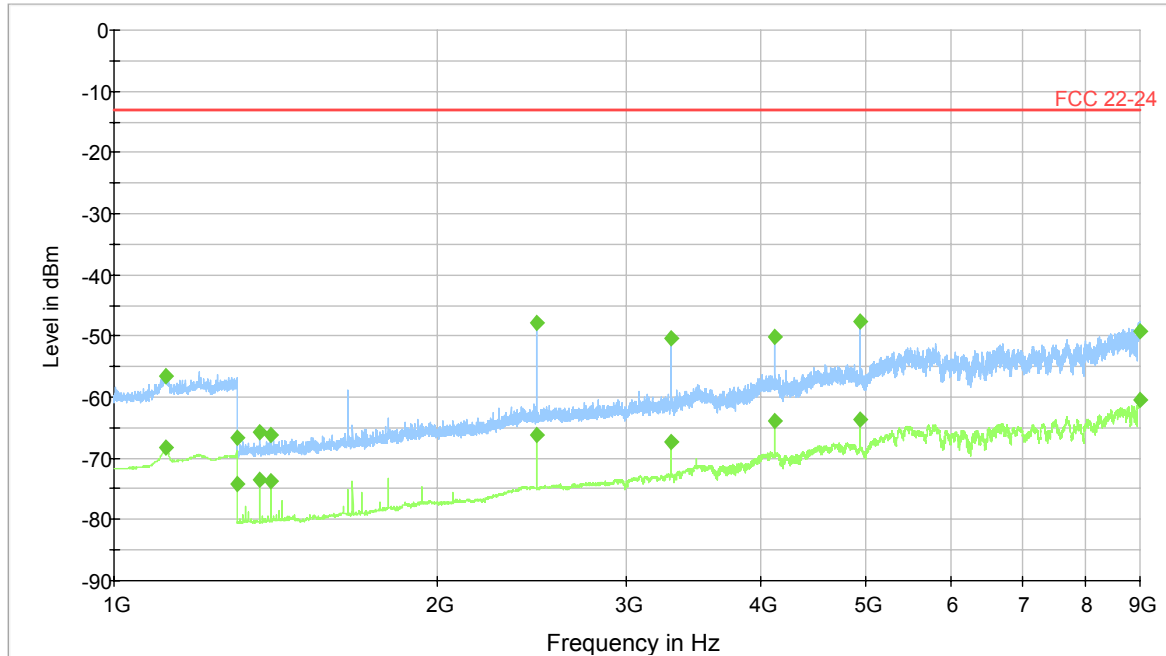


— FCC 22-24.LimitLine — Preview Result 1 — Preview Result 2 ◆ Final Result 2 ◆ Final Result 2 +

Frequency (MHz)	MaxPeak-MaxHold (dBm)	Average-MaxHold (dBm)	Antenna height (cm)	Polarity	Turntable position (deg)
38.320000	-68.5	-72.7	250.0	H	1.0
41.680000	-67.5	-70.6	250.0	H	1.0
184.920000	-66.2	-70.6	250.0	H	180.0
218.400000	-64.3	-69.2	100.0	H	1.0
226.200000	-67.7	-71.0	250.0	H	1.0
237.720000	-65.2	-69.3	100.0	H	1.0
733.320000	-61.6	-67.4	250.0	H	1.0
823.200000	-42.8	-66.4	100.0	H	180.0
824.320000	-35.4	-57.6	100.0	H	180.0
869.240000	-35.0	-38.5	250.0	H	180.0

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Spurious emission ETSI_FCC_IC



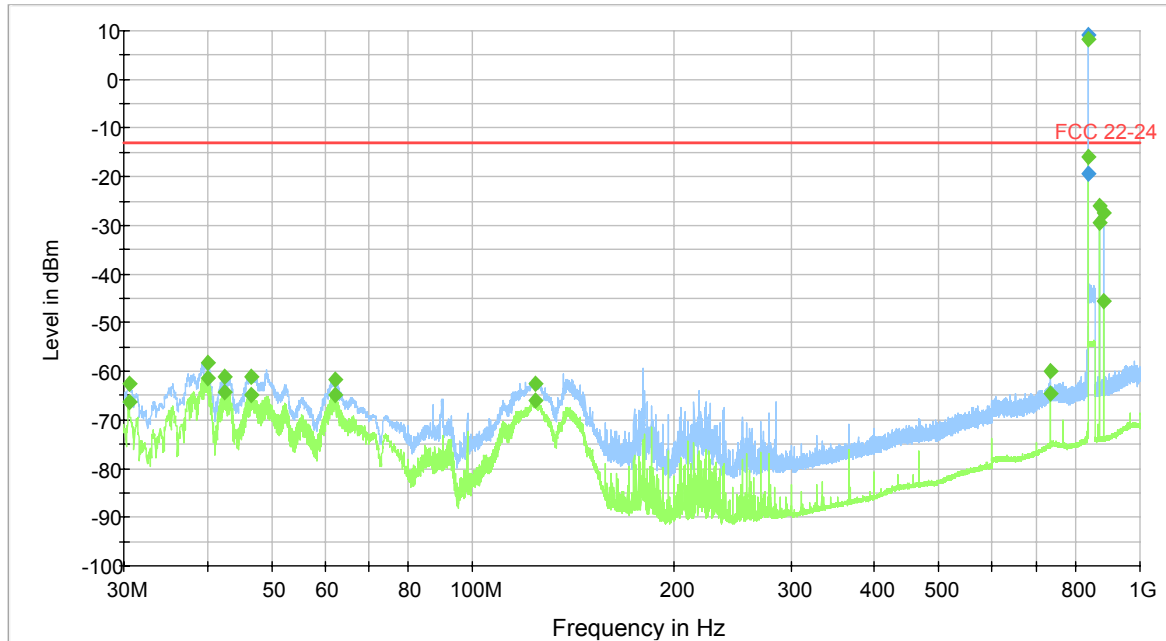
— FCC 22-24.LimitLine — Preview Result 1 — Preview Result 2 ◆ Final Result 2 ◆ Final Result 2 +

Frequency (MHz)	MaxPeak-MaxHold (dBm)	Average-MaxHold (dBm)	Antenna height (cm)	Polarity	Turntable position (deg)
1118.40000	-56.6	-68.2	250.0	H	1.0
1300.00000	-66.6	-74.2	100.0	H	0.0
1366.80000	-65.8	-73.5	100.0	H	0.0
1400.00000	-66.2	-73.7	250.0	H	0.0
2472.80000	-47.9	-66.1	250.0	H	0.0
3296.80000	-50.5	-67.3	100.0	H	180.0
4121.20000	-50.1	-63.9	250.0	H	0.0
4944.80000	-47.7	-63.6	100.0	H	180.0
8995.20000	-49.3	-60.5	100.0	H	180.0

GSM 850 (Channel 188)

Vertical polarization

Spurious emission ETSI_FCC_IC

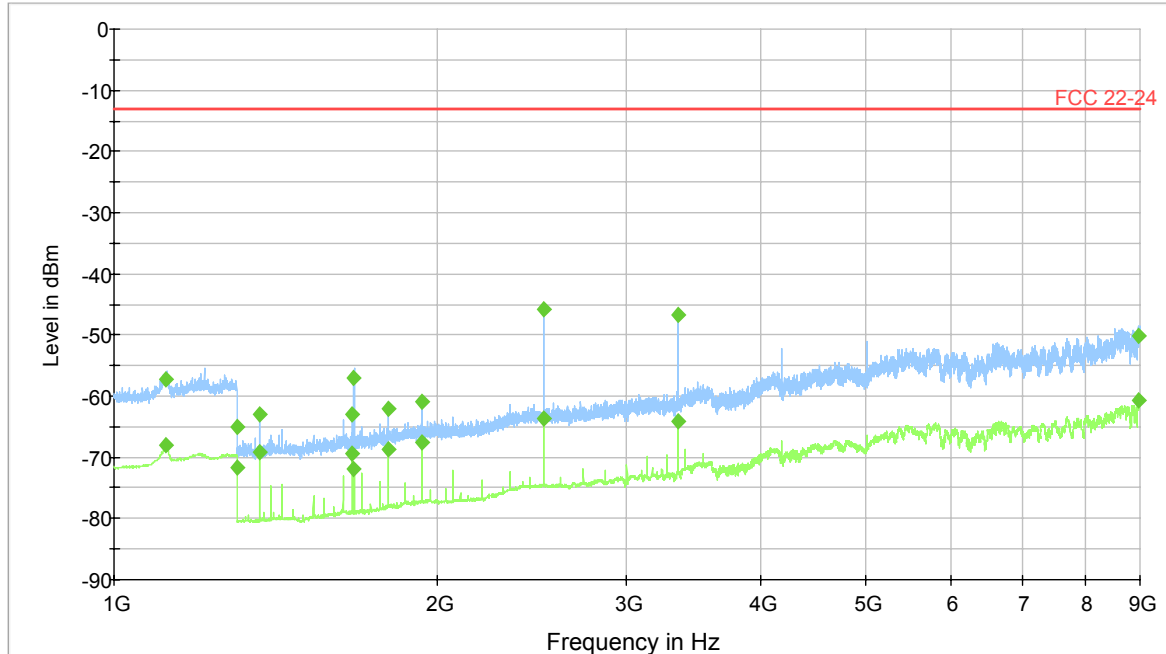


◆ FCC 22-24.LimitLine
◆ Final Result 1 +
◆ Preview Result 1
◆ Final Result 2
◆ Preview Result 2
◆ Final Result 2 +
◆ Final Result 1

Frequency (MHz)	MaxPeak-MaxHold (dBm)	Average-MaxHold (dBm)	Antenna height (cm)	Polarity	Turntable position (deg)
30.600000	-62.4	-66.2	100.0	V	1.0
40.120000	-58.2	-61.3	100.0	V	180.0
42.560000	-61.1	-64.3	100.0	V	180.0
46.640000	-61.2	-64.9	100.0	V	1.0
62.080000	-61.6	-65.0	100.0	V	1.0
124.200000	-62.4	-66.1	100.0	V	1.0
733.320000	-60.0	-64.6	100.0	V	1.0
836.160000	8.2	-16.0	100.0	V	1.0
869.200000	-26.0	-29.6	100.0	V	1.0
881.240000	-27.3	-45.5	100.0	V	180.0

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Spurious emission ETSI_FCC_IC



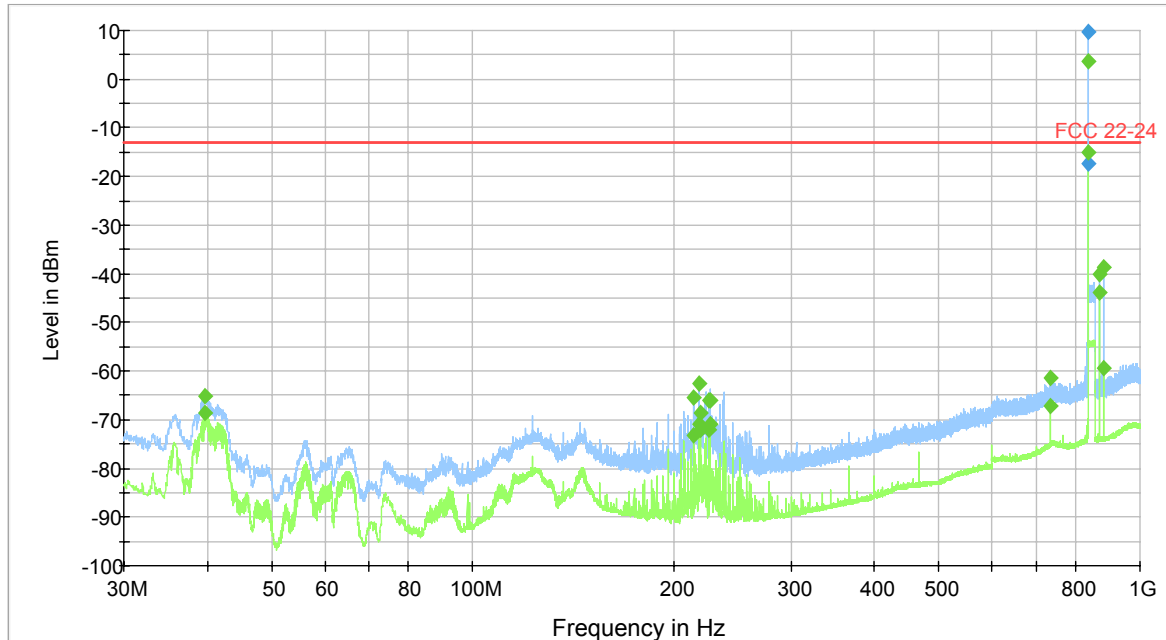
— FCC 22-24.LimitLine — Preview Result 1 — Preview Result 2 ◆ Final Result 2 ◆ Final Result 2 +

Frequency (MHz)	MaxPeak-MaxHold (dBm)	Average-MaxHold (dBm)	Antenna height (cm)	Polarity	Turntable position (deg)
1118.80000	-57.2	-68.1	100.0	V	1.0
1300.00000	-65.1	-71.6	100.0	V	1.0
1366.80000	-62.9	-69.1	100.0	V	1.0
1666.80000	-63.0	-69.5	100.0	V	1.0
1672.00000	-57.0	-71.8	100.0	V	1.0
1800.00000	-62.1	-68.8	100.0	V	1.0
1933.20000	-60.9	-67.6	100.0	V	1.0
2508.40000	-45.7	-63.6	100.0	V	1.0
3344.80000	-46.8	-64.2	250.0	V	1.0
8975.60000	-50.2	-60.7	100.0	V	1.0

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Horizontal polarization

Spurious emission ETSI_FCC_IC

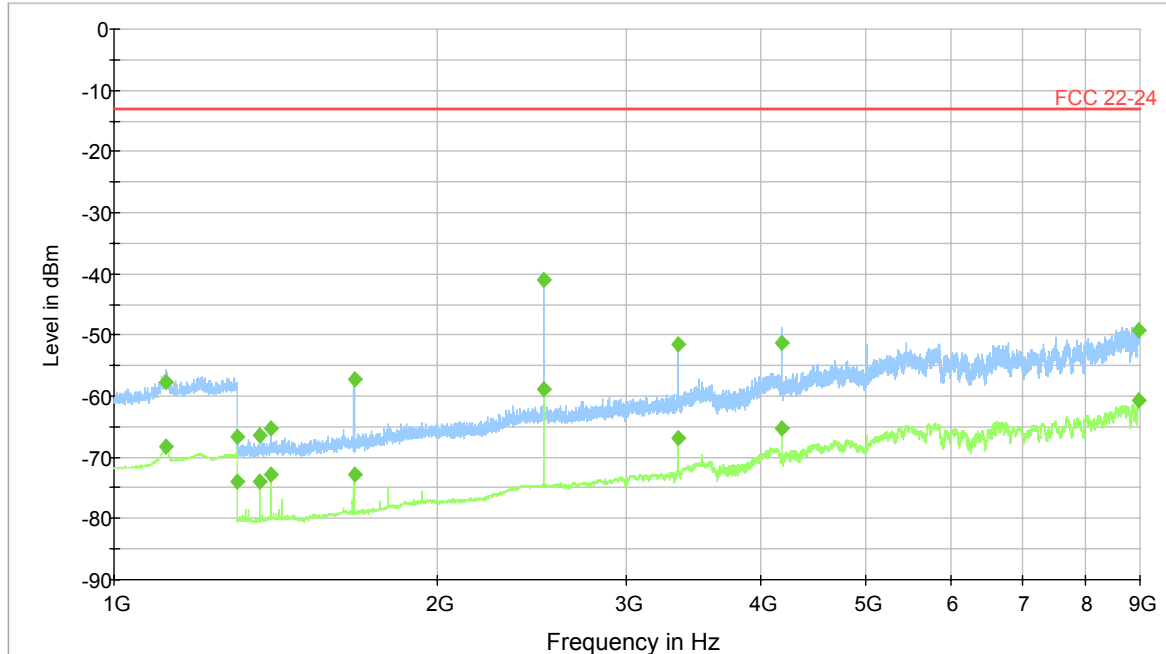


◆ FCC 22-24.LimitLine
◆ Final Result 1 +
◆ Preview Result 1
◆ Final Result 2
◆ Preview Result 2
◆ Final Result 2 +
◆ Final Result 1

Frequency (MHz)	MaxPeak-MaxHold (dBm)	Average-MaxHold (dBm)	Antenna height (cm)	Polarity	Turntable position (deg)
39.760000	-65.1	-68.5	250.0	H	1.0
214.720000	-65.4	-73.2	100.0	H	1.0
218.360000	-62.5	-70.9	100.0	H	1.0
219.920000	-68.5	-71.9	250.0	H	1.0
226.200000	-65.9	-72.0	100.0	H	1.0
227.240000	-65.9	-70.9	250.0	H	1.0
733.320000	-61.4	-67.2	250.0	H	1.0
836.200000	3.6	-15.1	100.0	H	1.0
869.200000	-40.2	-44.0	100.0	H	1.0
881.200000	-38.8	-59.3	100.0	H	1.0

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Spurious emission ETSI_FCC_IC



— FCC 22-24.LimitLine — Preview Result 1 — Preview Result 2 ◆ Final Result 2 ◆ Final Result 2 +

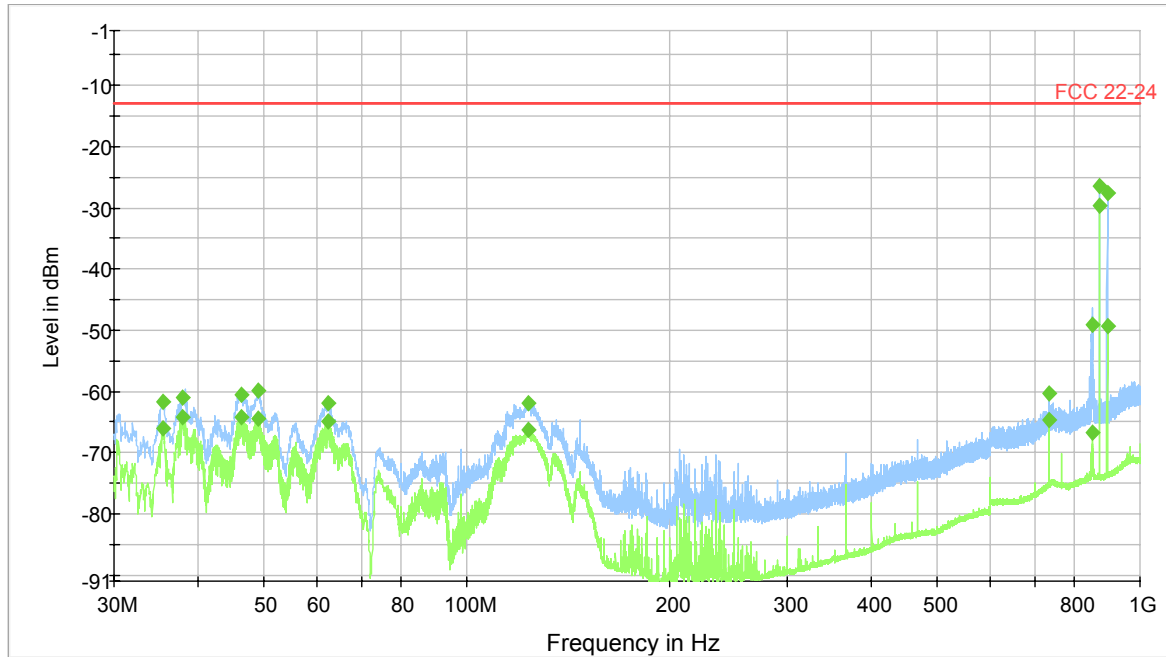
Frequency (MHz)	MaxPeak-MaxHold (dBm)	Average-MaxHold (dBm)	Antenna height (cm)	Polarity	Turntable position (deg)
1118.80000	-57.7	-68.2	100.0	H	1.0
1300.00000	-66.6	-73.9	100.0	H	1.0
1366.80000	-66.5	-73.9	250.0	H	1.0
1400.00000	-65.3	-72.7	250.0	H	1.0
1672.40000	-57.3	-72.8	100.0	H	1.0
2508.40000	-40.9	-58.8	250.0	H	1.0
3345.20000	-51.4	-66.8	250.0	H	1.0
4181.20000	-51.4	-65.2	100.0	H	1.0
8975.60000	-49.3	-60.8	250.0	H	1.0

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GSM 850 (Channel 251)

Vertical polarization

Spurious emission ETSI_FCC_IC

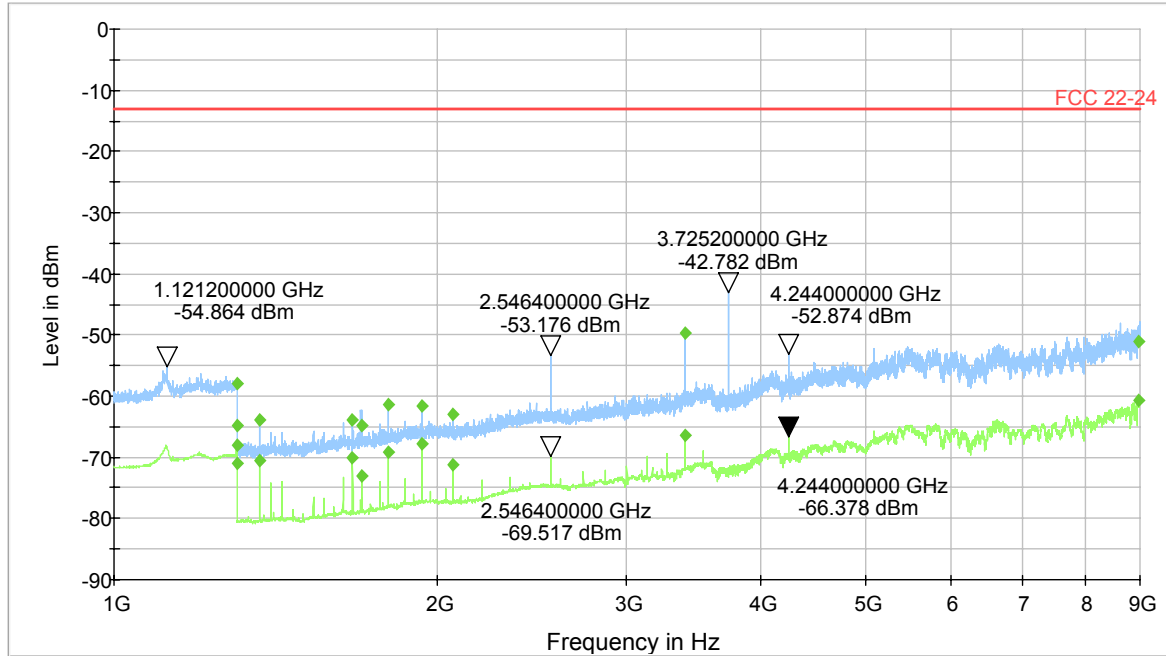


— FCC 22-24.LimitLine — Preview Result 1 — Preview Result 2 ◆ Final Result 2 ◆ Final Result 2 +

Frequency (MHz)	MaxPeak-MaxHold (dBm)	Average-MaxHold (dBm)	Antenna height (cm)	Polarity	Turntable position (deg)
35.520000	-61.7	-66.1	100.0	V	1.0
38.000000	-61.0	-64.1	100.0	V	1.0
46.280000	-60.5	-64.2	100.0	V	1.0
49.160000	-59.8	-64.5	100.0	V	1.0
62.360000	-61.9	-64.9	100.0	V	1.0
123.360000	-61.9	-66.2	100.0	V	1.0
733.320000	-60.2	-64.6	100.0	V	1.0
849.040000	-49.1	-66.8	250.0	V	1.0
869.200000	-26.3	-29.7	100.0	V	1.0
893.800000	-27.6	-49.3	100.0	V	1.0

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Spurious emission ETSI_FCC_IC



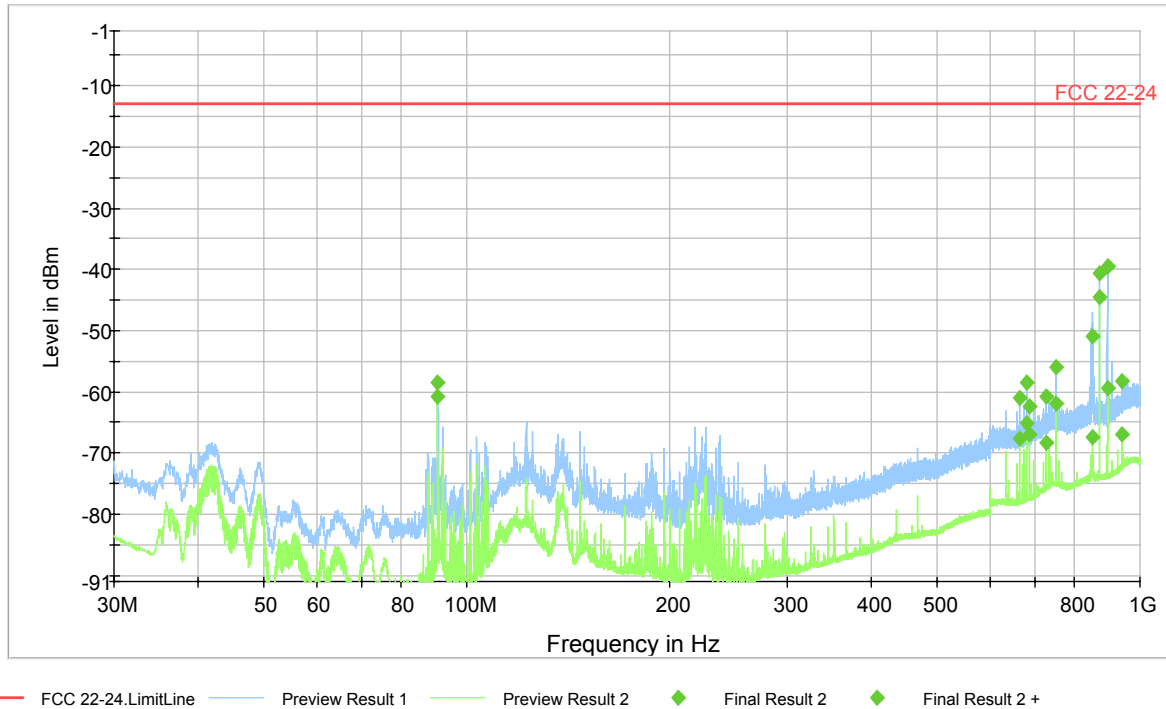
— FCC 22-24.LimitLine — Preview Result 1 — Preview Result 2 ◆ Final Result 2 ◆ Final Result 2 +

Frequency (MHz)	MaxPeak-MaxHold (dBm)	Average-MaxHold (dBm)	Antenna height (cm)	Polarity	Turntable position (deg)
1300.00000	-57.8	-68.0	100.0	V	1.0
1300.00000	-64.7	-71.0	100.0	V	1.0
1366.80000	-63.9	-70.5	100.0	V	1.0
1666.80000	-63.9	-70.1	100.0	V	1.0
1700.00000	-64.9	-73.1	100.0	V	1.0
1800.00000	-61.4	-69.2	100.0	V	1.0
1933.20000	-61.6	-67.7	100.0	V	1.0
2066.80000	-62.9	-71.1	100.0	V	1.0
3395.20000	-49.8	-66.3	250.0	V	1.0
8975.20000	-51.0	-60.7	100.0	V	1.0

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Horizontal polarization

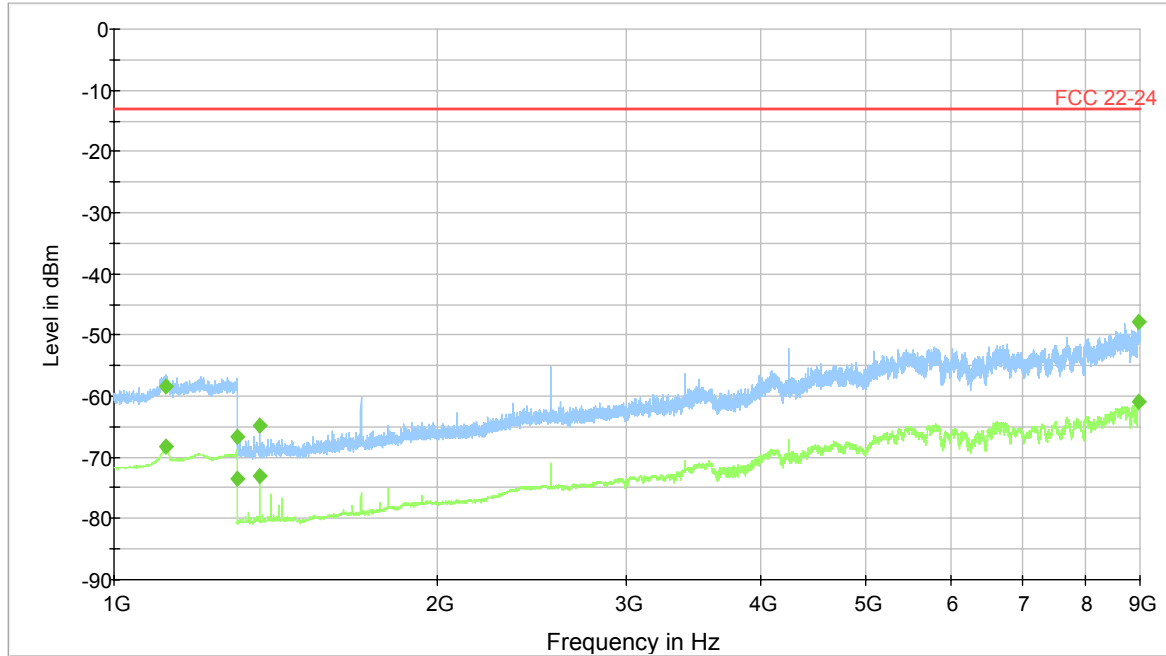
Spurious emission ETSI_FCC_IC



Frequency (MHz)	MaxPeak-MaxHold (dBm)	Average-ClearWrite (dBm)	Average-MaxHold (dBm)	Antenna height (cm)	Polarity	Turntable position (deg)
90.720000	-58.5	-60.8	-60.8	100.0	H	1.0
663.240000	-61.0	-67.7	-67.7	250.0	H	1.0
679.240000	-58.5	-65.1	-65.1	100.0	H	1.0
684.760000	-62.3	-67.0	-67.0	100.0	H	1.0
727.240000	-60.9	-68.3	-68.3	100.0	H	1.0
751.240000	-55.9	-61.9	-61.9	100.0	H	1.0
849.000000	-51.0	-67.5	-67.5	100.0	H	1.0
869.200000	-40.7	-44.6	-44.6	100.0	H	1.0
893.800000	-39.6	-59.5	-59.5	100.0	H	1.0
941.800000	-58.3	-67.0	-67.0	100.0	H	1.0

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Spurious emission ETSI_FCC_IC



— FCC 22-24.LimitLine — Preview Result 1 — Preview Result 2 ◆ Final Result 2 ◆ Final Result 2 +

Frequency (MHz)	MaxPeak-MaxHold (dBm)	Average-ClearWrite (dBm)	Average-MaxHold (dBm)	Antenna height (cm)	Polarity	Turntable position (deg)
1118.40000	-58.3	-68.2	-68.2	250.0	H	1.0
1300.00000	-66.6	-73.5	-73.5	100.0	H	1.0
1366.80000	-64.7	-73.1	-73.1	100.0	H	1.0
8975.60000	-47.9	-60.8	-60.8	100.0	H	1.0

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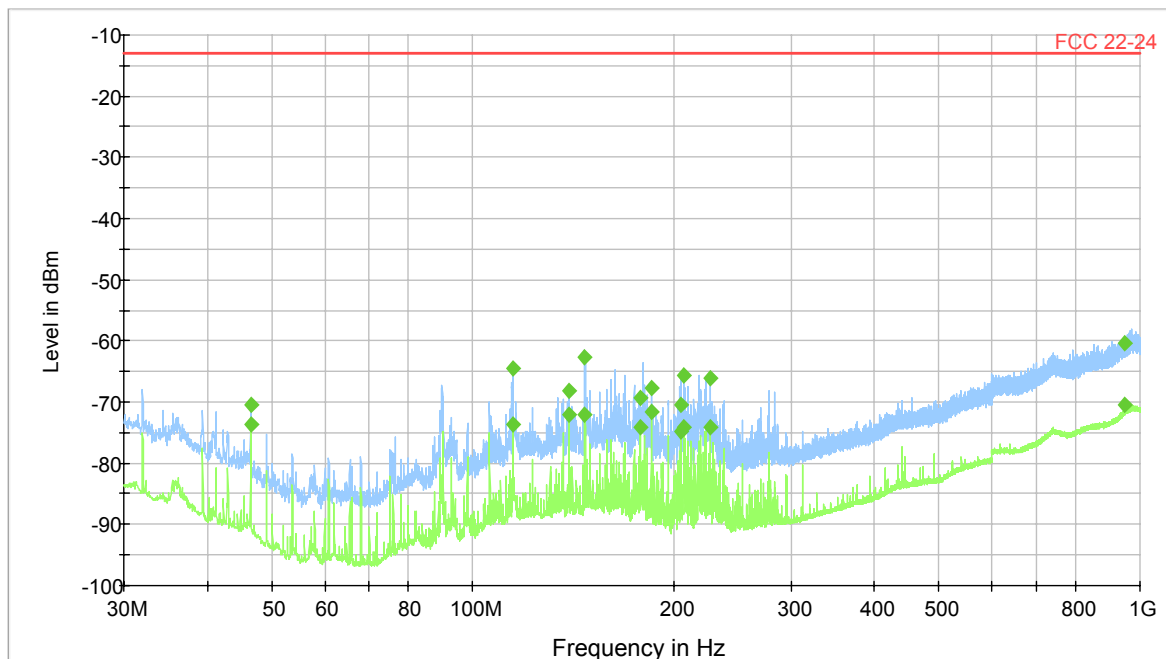
PCS 1900

The radiated spurious emissions were measured for channel 512, channel 661 and channel 810, respectively the upper, center, and lower frequencies of the US PCS band (1850.2 MHz, 1880.0 MHz and 1909.8 MHz). The measurement show that all significant spurs are well below the limit line. The measurements of the spurious emissions at the equipment output terminals were performed pursuant to § 2.1053 in order to verify that any emissions are below the limits given by § 24.238.

PCS 1900 (Channel 512)

Vertical polarization

Spurious emission ETSI_FCC_IC

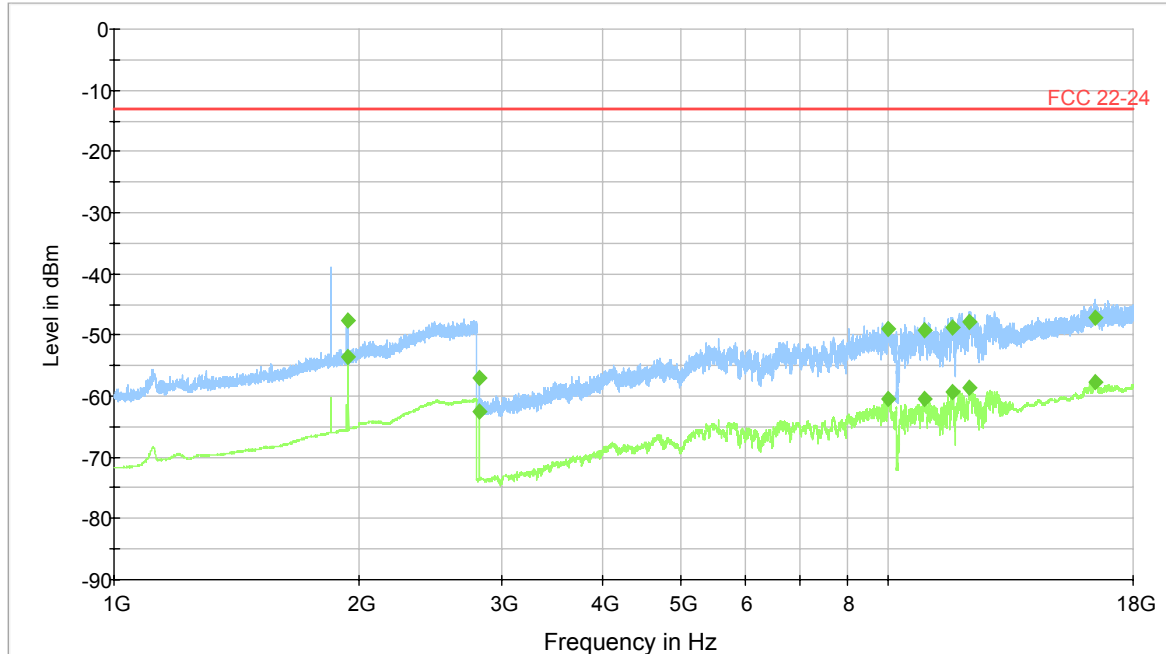


— FCC 22-24.LimitLine — Preview Result 1 — Preview Result 2 ◆ Final Result 2 ◆ Final Result 2 +

Frequency (MHz)	MaxPeak-MaxHold (dBm)	Average-MaxHold (dBm)	Antenna height (cm)	Polarity	Turntable position (deg)
46.520000	-70.4	-73.6	100.0	V	-1.0
114.920000	-64.6	-73.7	100.0	V	181.0
139.480000	-68.3	-72.1	100.0	V	-1.0
147.320000	-62.7	-72.0	100.0	V	-1.0
178.160000	-69.4	-74.1	250.0	V	181.0
184.920000	-67.7	-71.5	250.0	V	181.0
205.280000	-70.5	-74.7	100.0	V	-1.0
206.880000	-65.7	-74.1	100.0	V	181.0
227.240000	-66.1	-74.1	100.0	V	181.0
948.640000	-60.3	-70.5	100.0	V	-1.0

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Spurious emission ETSI_FCC_IC



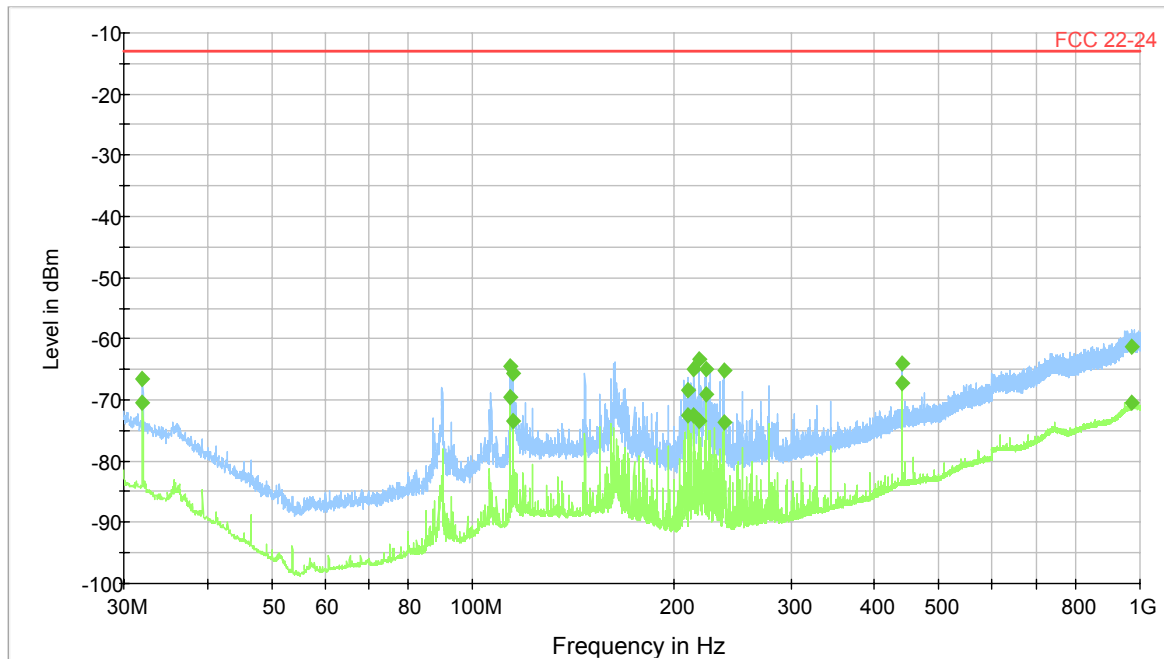
— FCC 22-24.LimitLine — Preview Result 1 — Preview Result 2 ◆ Final Result 2 ◆ Final Result 2 +

Frequency (MHz)	MaxPeak-MaxHold (dBm)	Average-MaxHold (dBm)	Antenna height (cm)	Polarity	Turntable position (deg)
1944.000000	-47.6	-53.6	100.0	V	181.0
2816.000000	-57.1	-62.5	100.0	V	181.0
8975.200000	-49.1	-60.4	100.0	V	-1.0
9960.000000	-49.3	-60.4	100.0	V	-1.0
10789.600000	-48.8	-59.3	100.0	V	-1.0
11309.200000	-47.8	-58.6	100.0	V	-1.0
16142.000000	-47.1	-57.8	100.0	V	-1.0

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Horizontal polarization

Spurious emission ETSI_FCC_IC

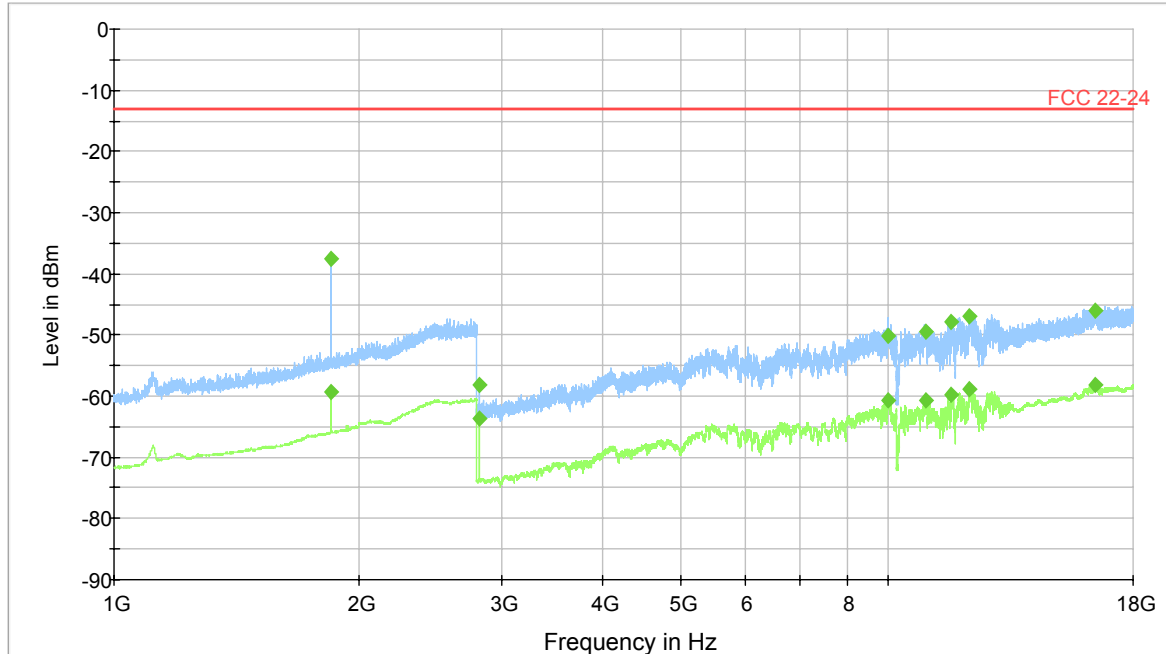


— FCC 22-24.LimitLine — Preview Result 1 — Preview Result 2 ◆ Final Result 2 ◆ Final Result 2 +

Frequency (MHz)	MaxPeak-MaxHold (dBm)	Average-MaxHold (dBm)	Antenna height (cm)	Polarity	Turntable position (deg)
32.000000	-66.5	-70.5	250.0	H	0.0
113.720000	-64.5	-69.6	250.0	H	0.0
114.920000	-65.7	-73.5	250.0	H	0.0
210.560000	-68.4	-72.5	100.0	H	0.0
214.720000	-64.9	-72.5	100.0	H	0.0
218.360000	-63.5	-73.5	100.0	H	0.0
223.600000	-65.0	-69.1	100.0	H	0.0
237.680000	-65.1	-73.7	100.0	H	0.0
440.000000	-64.1	-67.4	250.0	H	180.0
972.960000	-61.4	-70.4	250.0	H	180.0

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Spurious emission ETSI_FCC_IC



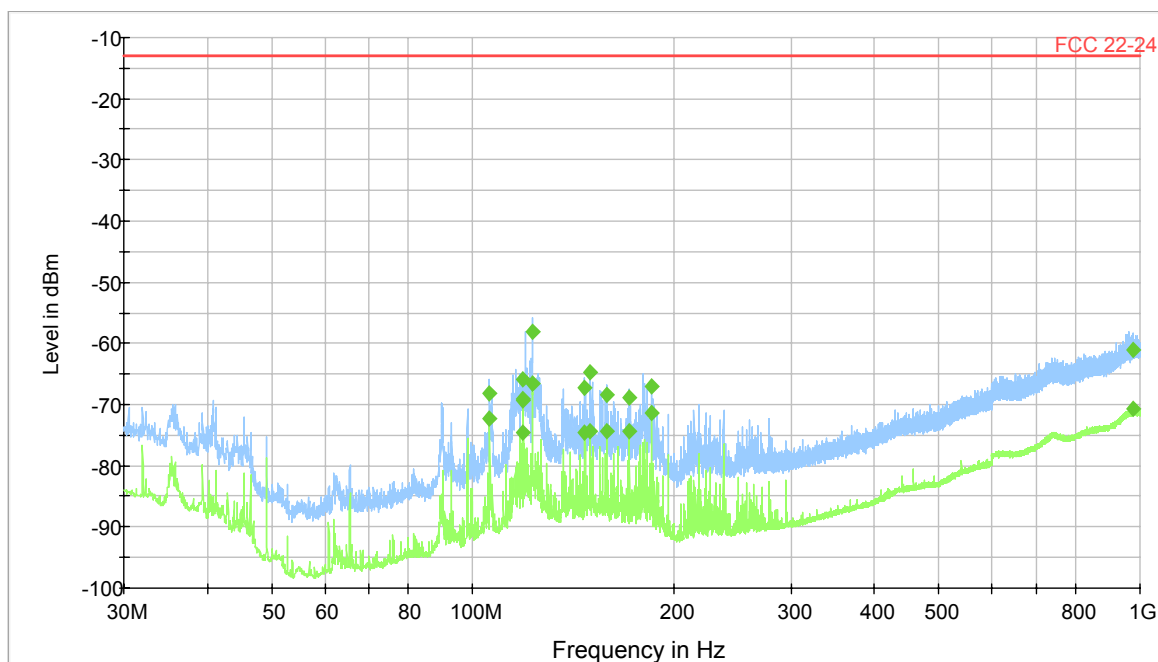
— FCC 22-24.LimitLine — Preview Result 1 — Preview Result 2 ◆ Final Result 2 ◆ Final Result 2 +

Frequency (MHz)	MaxPeak-MaxHold (dBm)	Average-MaxHold (dBm)	Antenna height (cm)	Polarity	Turntable position (deg)
1850.400000	-37.5	-59.4	150.0	H	1.0
2816.000000	-58.1	-63.6	150.0	H	1.0
8976.400000	-50.3	-60.6	150.0	H	1.0
9984.400000	-49.4	-60.7	150.0	H	180.0
10761.200000	-47.9	-59.7	150.0	H	1.0
11308.000000	-46.9	-58.8	150.0	H	180.0
16147.600000	-46.0	-58.2	150.0	H	1.0

PCS 1900 (Channel 661)

Vertical polarization

Spurious emission ETSI_FCC_IC

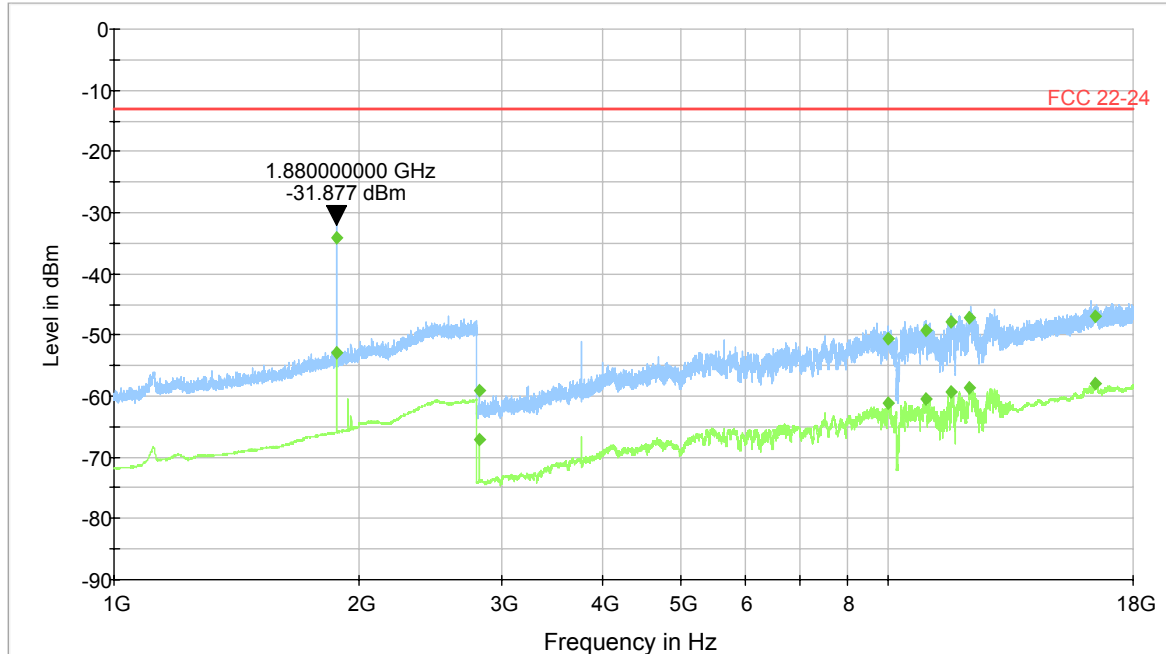


— FCC 22-24.LimitLine — Preview Result 1 — Preview Result 2 ◆ Final Result 2 ◆ Final Result 2 +

Frequency (MHz)	MaxPeak-MaxHold (dBm)	Average-MaxHold (dBm)	Antenna height (cm)	Polarity	Turntable position (deg)
106.080000	-68.1	-72.3	100.0	V	1.0
118.640000	-69.0	-74.5	100.0	V	1.0
119.120000	-65.8	-69.4	100.0	V	1.0
122.800000	-58.0	-66.5	100.0	V	1.0
147.320000	-67.3	-74.6	100.0	V	1.0
149.920000	-64.8	-74.4	100.0	V	1.0
158.840000	-68.5	-74.4	100.0	V	1.0
171.880000	-68.8	-74.3	100.0	V	1.0
184.920000	-67.0	-71.3	100.0	V	1.0
974.400000	-61.1	-70.7	250.0	V	1.0

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Spurious emission ETSI_FCC_IC



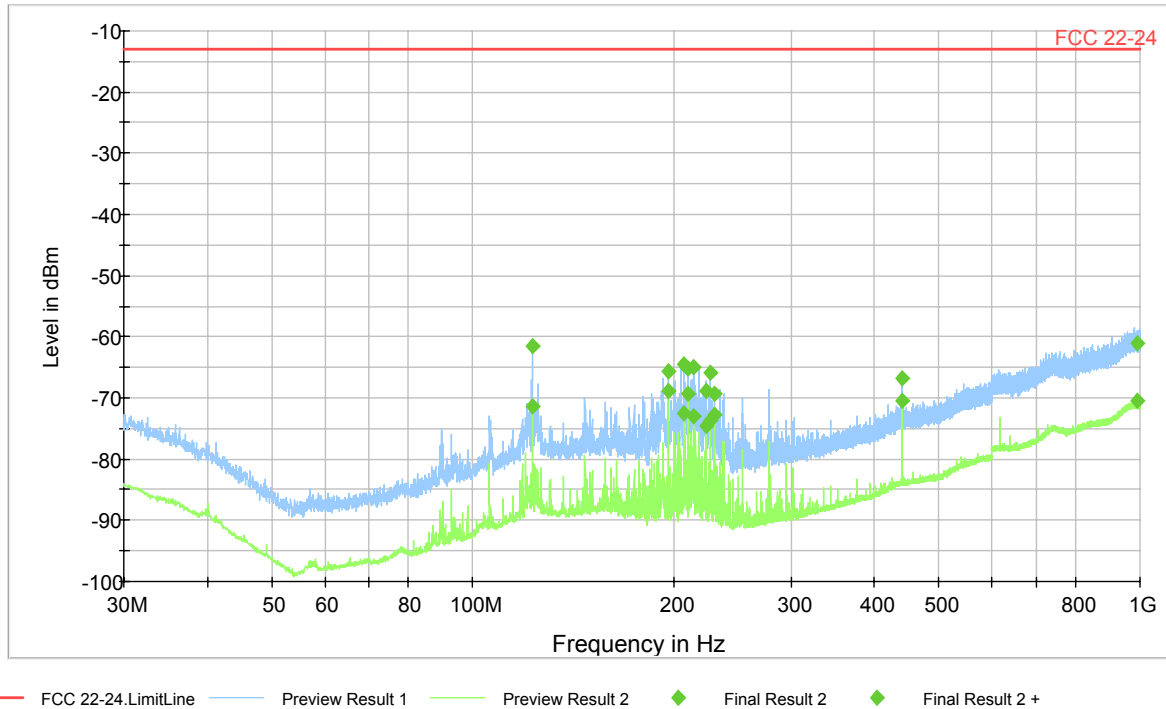
— FCC 22-24.LimitLine — Preview Result 1 — Preview Result 2 ◆ Final Result 2 ◆ Final Result 2 +

Frequency (MHz)	MaxPeak-MaxHold (dBm)	Average-MaxHold (dBm)	Antenna height (cm)	Polarity	Turntable position (deg)
1879.600000	-34.0	-52.9	100.0	V	1.0
2816.000000	-59.2	-67.1	100.0	V	1.0
8995.600000	-50.6	-61.3	250.0	V	1.0
9983.600000	-49.3	-60.5	250.0	V	1.0
10760.800000	-48.0	-59.4	100.0	V	180.0
11308.400000	-47.2	-58.7	100.0	V	1.0
16146.800000	-46.9	-58.0	100.0	V	1.0

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Horizontal polarization

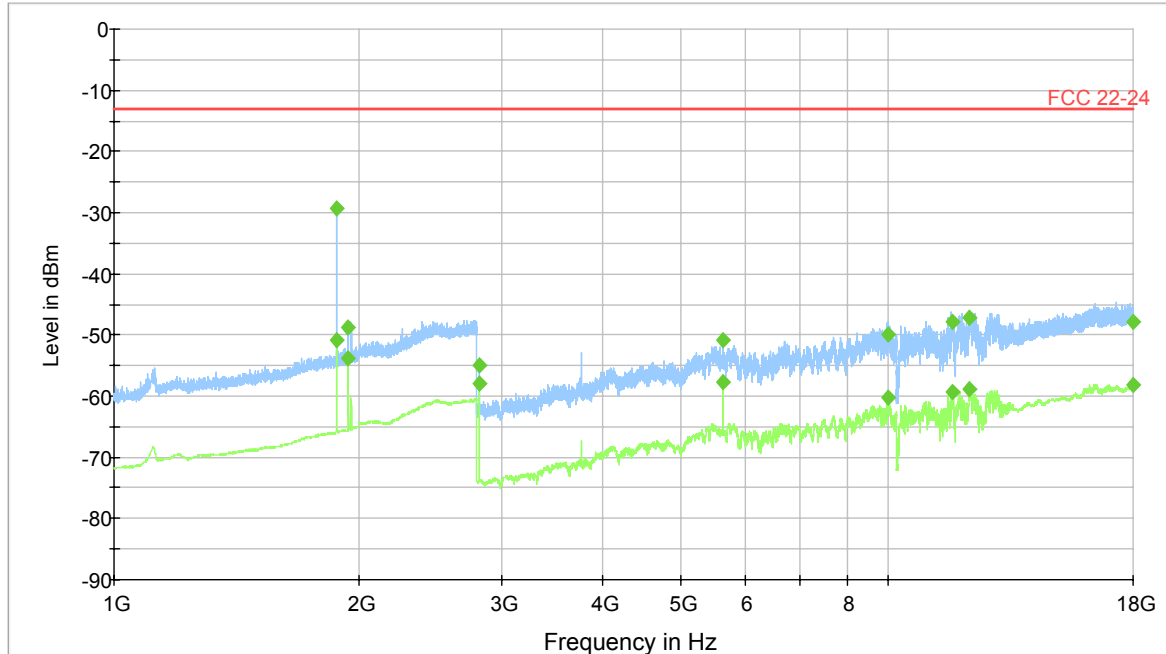
Spurious emission ETSI_FCC_IC



Frequency (MHz)	MaxPeak-MaxHold (dBm)	Average-MaxHold (dBm)	Antenna height (cm)	Polarity	Turntable position (deg)
122.760000	-61.4	-71.4	250.0	H	1.0
196.400000	-65.6	-68.9	100.0	H	1.0
206.880000	-64.5	-72.5	100.0	H	1.0
210.520000	-65.3	-69.4	100.0	H	1.0
214.680000	-64.9	-73.0	100.0	H	1.0
223.560000	-68.9	-74.6	100.0	H	1.0
227.240000	-65.9	-73.7	100.0	H	1.0
230.760000	-69.3	-72.7	250.0	H	1.0
440.000000	-66.8	-70.4	250.0	H	1.0
988.000000	-61.1	-70.5	100.0	H	1.0

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Spurious emission ETSI_FCC_IC



— FCC 22-24.LimitLine — Preview Result 1 — Preview Result 2 ◆ Final Result 2 ◆ Final Result 2 +

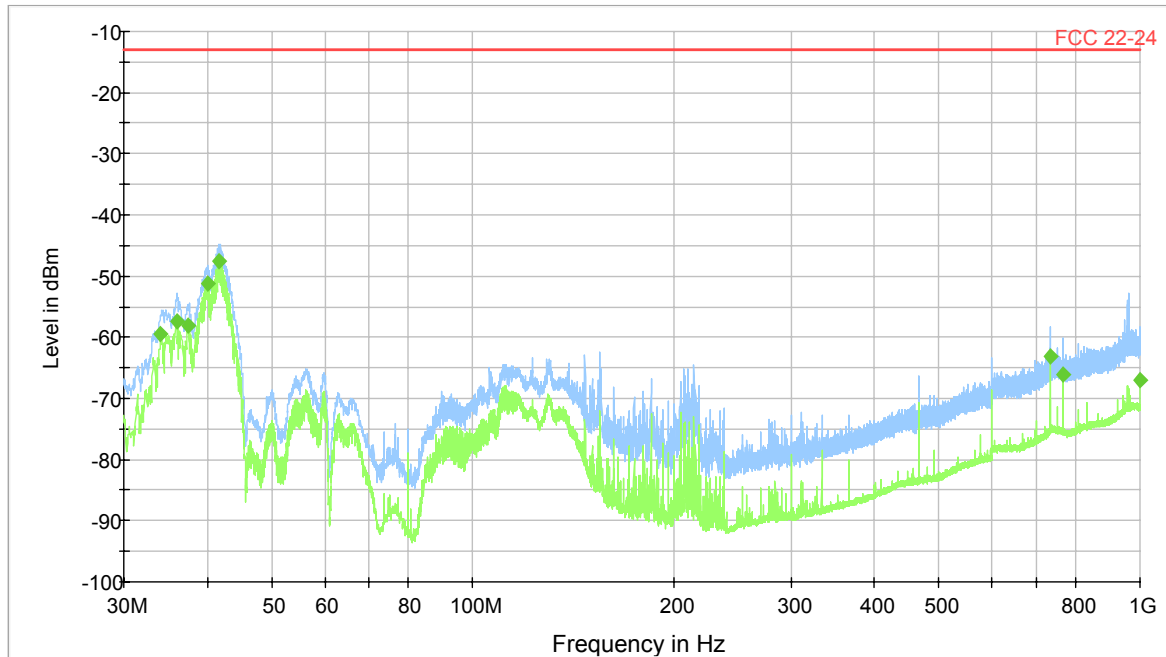
Frequency (MHz)	MaxPeak-MaxHold (dBm)	Average-MaxHold (dBm)	Antenna height (cm)	Polarity	Turntable position (deg)
1880.000000	-29.3	-50.9	250.0	H	1.0
1944.000000	-48.7	-53.9	100.0	H	180.0
2816.000000	-54.8	-58.0	100.0	H	1.0
5632.000000	-50.8	-57.6	100.0	H	1.0
8978.400000	-49.8	-60.3	100.0	H	1.0
10789.600000	-47.9	-59.4	250.0	H	1.0
11307.200000	-47.3	-58.8	250.0	H	180.0
17983.600000	-47.8	-58.1	250.0	H	1.0

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PCS 1900 (Channel 810)

Vertical polarization

Spurious emission ETSI_FCC_IC_1900

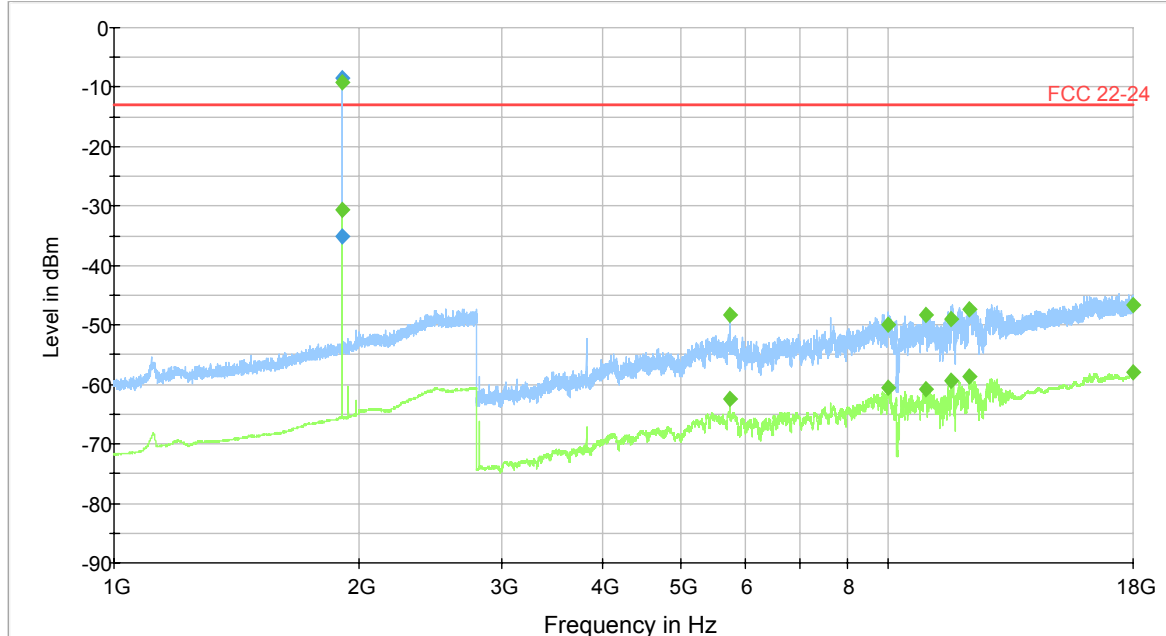


— FCC 22-24.LimitLine — Preview Result 1 — Preview Result 2 ◆ Final Result 2

Frequency (MHz)	Average (dBm)	Meas. Time (ms)	Bandwidth (kHz)	Antenna height (cm)	Polarity	Turntable position (deg)	Corr. (dB)	Comment
34.080000	-59.5	5.000	100.000	100.0	V	-1.0	-76.8	
36.040000	-57.4	5.000	100.000	100.0	V	-1.0	-77.8	
37.480000	-58.2	5.000	100.000	100.0	V	-1.0	-78.5	
40.000000	-51.3	5.000	100.000	100.0	V	-1.0	-79.8	
41.680000	-47.5	5.000	100.000	100.0	V	-1.0	-80.9	
733.320000	-63.1	5.000	100.000	100.0	V	-1.0	-67.9	
766.640000	-66.1	5.000	100.000	100.0	V	-1.0	-68.2	
999.960000	-67.0	5.000	100.000	100.0	V	-1.0	-64.2	

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Spurious emission ETSI_FCC_IC



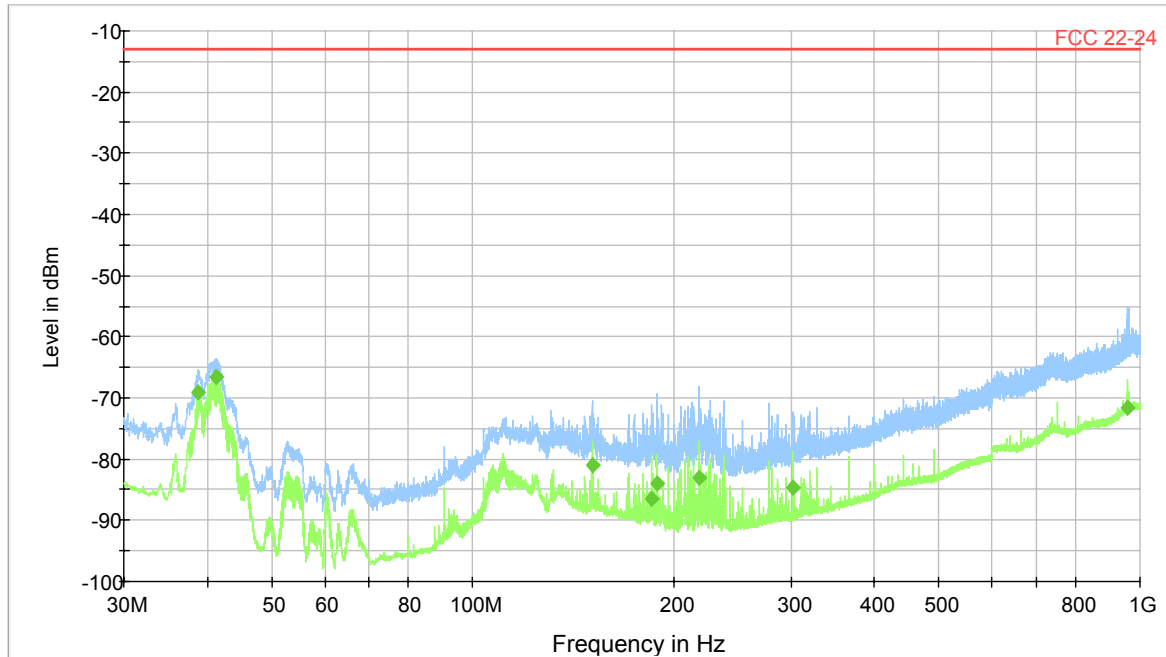
— FCC 22-24.LimitLine — Preview Result 1 — Preview Result 2 — Final Result 1
◆ Final Result 1 + ◆ Final Result 2 ◆ Final Result 2 +

Frequency (MHz)	MaxPeak-MaxHold (dBm)	Average-MaxHold (dBm)	Antenna height (cm)	Polarity	Turntable position (deg)
1909.600000	-9.2	-30.5	100.0	V	180.0
5729.600000	-48.3	-62.5	100.0	V	180.0
8994.400000	-49.9	-60.7	100.0	V	1.0
10014.400000	-48.3	-60.7	250.0	V	1.0
10760.800000	-49.0	-59.4	100.0	V	1.0
11308.400000	-47.4	-58.6	250.0	V	1.0
17984.000000	-46.5	-58.1	250.0	V	1.0

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Horizontal polarization

Spurious emission ETSI_FCC_IC_1900

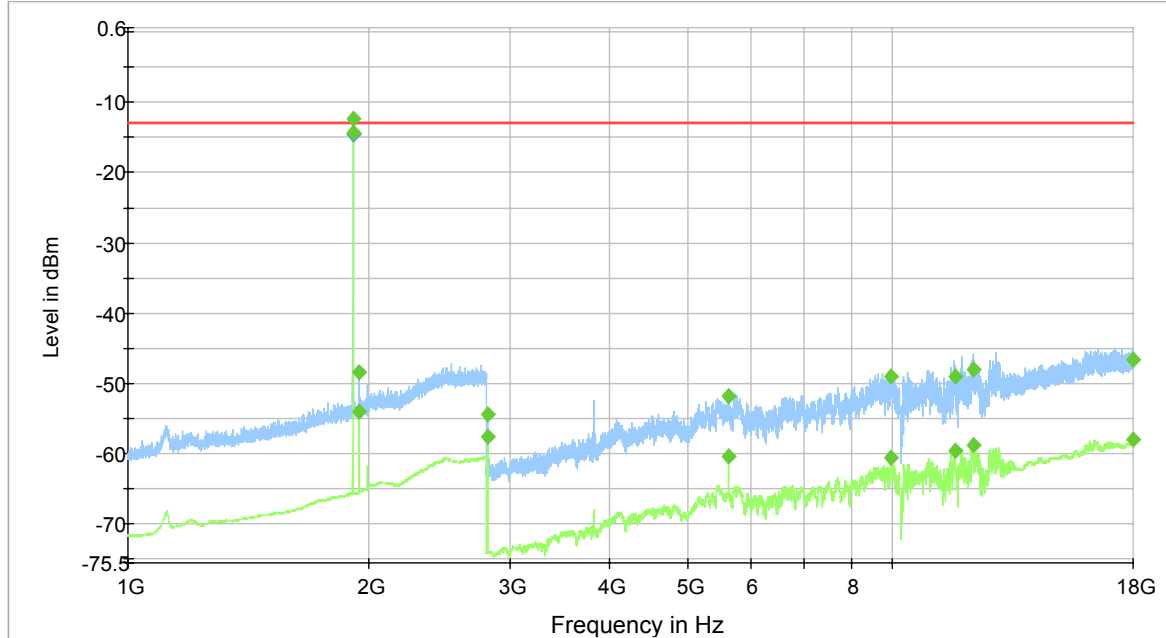


— FCC 22-24.LimitLine — Preview Result 1 — Preview Result 2 ◆ Final Result 2

Frequency (MHz)	Average (dBm)	Meas. Time (ms)	Bandwidth (kHz)	Antenna height (cm)	Polarity	Turntable position (deg)	Corr. (dB)	Comment
38.680000	-69.1	5.000	100.000	100.0	H	-1.0	-79.2	
41.320000	-66.5	5.000	100.000	100.0	H	-1.0	-80.6	
151.000000	-80.9	5.000	100.000	100.0	H	-1.0	-79.2	
184.920000	-86.4	5.000	100.000	100.0	H	-1.0	-81.4	
188.600000	-83.9	5.000	100.000	100.0	H	-1.0	-81.8	
218.360000	-83.0	5.000	100.000	100.0	H	-1.0	-82.4	
302.480000	-84.5	5.000	100.000	100.0	H	-1.0	-80.1	
959.240000	-71.5	5.000	100.000	100.0	H	-1.0	-64.3	

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Spurious emission ETSI_FCC_IC



◆ FCC 22-24.LimitLine ◆ Preview Result 1 ◆ Preview Result 2 ◆ Final Result 1
◆ Final Result 1 + ◆ Final Result 2 ◆ Final Result 2 +

Frequency (MHz)	MaxPeak-MaxHold (dBm)	Average-MaxHold (dBm)	Antenna height (cm)	Polarity	Turntable position (deg)
1910.000000	-14.3	-12.3	100.0	H	180.0
1944.000000	-48.3	-53.9	100.0	H	180.0
2816.000000	-54.4	-57.6	100.0	H	1.0
5632.000000	-51.8	-60.3	100.0	H	1.0
8978.800000	-49.1	-60.5	100.0	H	1.0
10789.600000	-49.1	-59.5	100.0	H	181.0
11364.400000	-48.0	-58.8	100.0	H	1.0
17984.000000	-46.7	-58.1	250.0	H	1.0

**TEST
5.**

CONDUCTED SPURIOUS EMISSION

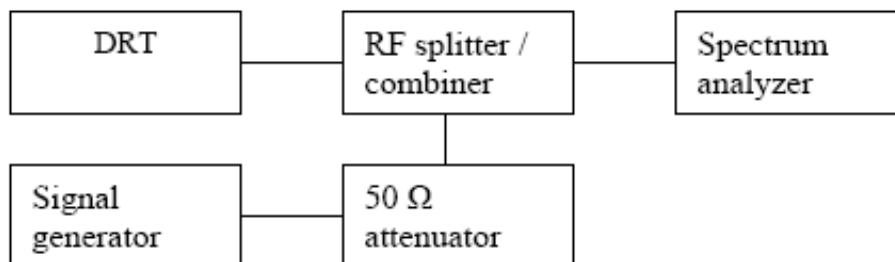
REFERENCE RSS-133, Issue 3, Section 4.4

DOCUMENT RSS-132, Issue 2 Section 4.5

FCC 2.1051 Measurements required: Spurious emissions at antenna terminals.

The radio frequency voltage or power generated within the equipment and appearing on a spurious frequency shall be checked at the equipment output terminals when properly loaded with a suitable artificial antenna. Curves or equivalent data shall show the magnitude of each harmonic and other spurious emission that can be detected when the equipment is operated under the conditions specified in FCC 2.1049 as appropriate. The magnitude of spurious emissions which are attenuated more than 20 dB below the permissible value need not be specified.

5.2 Test procedure



Connect the equipment as shown in the above diagram.

Set the spectrum analyzer to measure peak hold with the required settings. Set the signal generator to a known output power and record the path loss in dB (**LOSS**) for frequencies up to the tenth harmonic of the EUT's carrier frequency. **LOSS** = Generator Output Power (dBm) – Analyzer reading (dBm).

Replace the signal generator with the EUT. Adjust the settings of the Digital Radiocommunication Tester (DRT) to set the EUT to its maximum power at the required channel.

Set the spectrum analyzer to measure peak hold with the required settings. Offset the spectrum analyzer reference level by the path loss measured above.

5.2 Test results

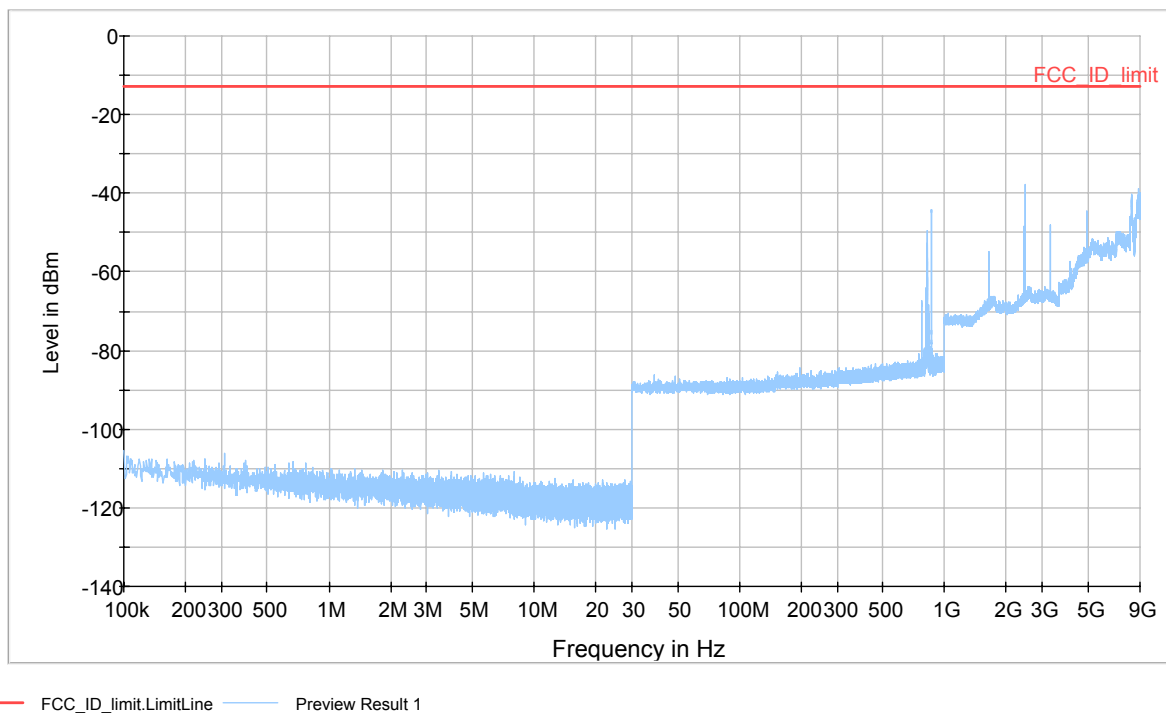
GSM 850

The conducted spurious emissions were measured for channel 128 and channel 251, respectively the upper, center, and lower frequencies of the US GSM band (824,2MHz, 836,5MHz and 848,8 MHz). The measurement diagrams show that all significant spurs are well below the limit line. The measurements of the spurious emissions at the equipment output terminals were performed pursuant to § 2.1053 in order to verify that any emissions are below the limits given by § 24.238.

Channel 128

band	Resolution bandwidth
100KHz - 30MHz	10 KHz
30MHz - 1000MHz	100 KHz
1GHz – 9GHz	1000 KHz

EMI delta cond

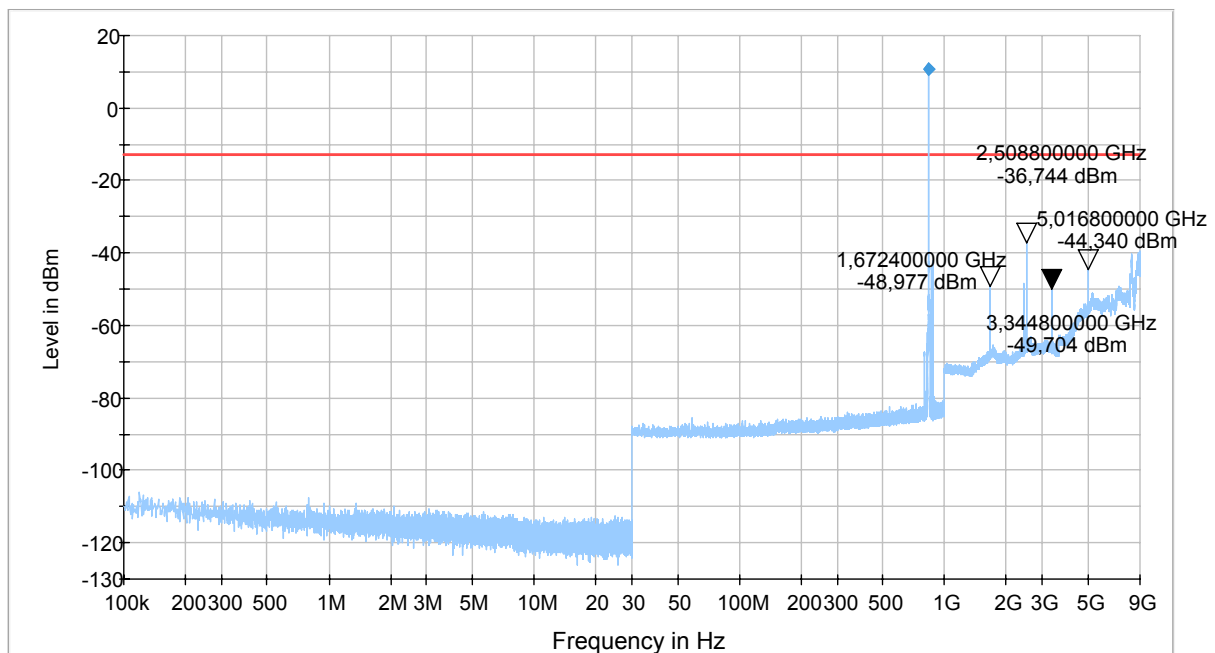


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Channel 188

band	Resolution bandwidth
100KHz - 30MHz	10 KHz
30MHz - 1000MHz	100 KHz
1GHz – 9GHz	1000 KHz

EMI delta cond



— FCC_ID_limit.LimitLine — Preview Result 1 ◆ Final Result 1 ◆ Final Measurement Result 1

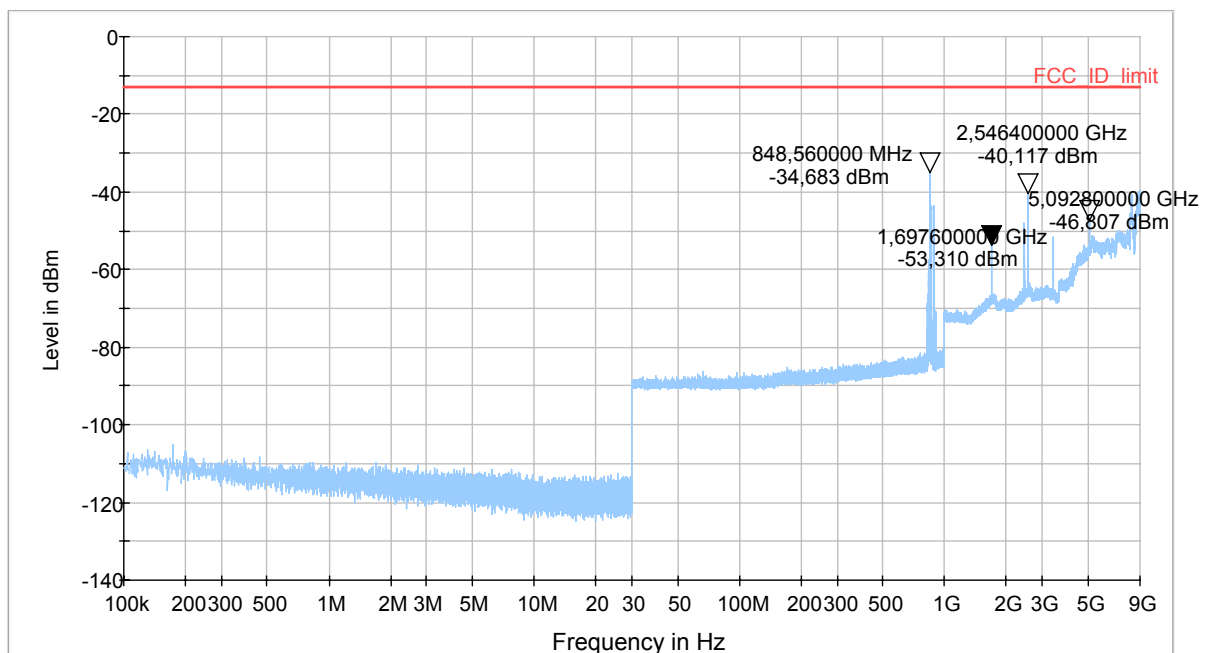
Frequency (MHz)	MaxPeak-ClearWrite (dBm)	Line	Corr. (dB)	Margin (dB)	Limit (dBm)	Comment
836.120000	10.8		-97.1	-23.8	-13.0	

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Channel 251

band	Resolution bandwidth
100KHz - 30MHz	10 KHz
30MHz - 1000MHz	100 KHz
1GHz – 9GHz	1000 KHz

EMI delta cond



FCC_ID_limit.LimitLine Preview Result 1

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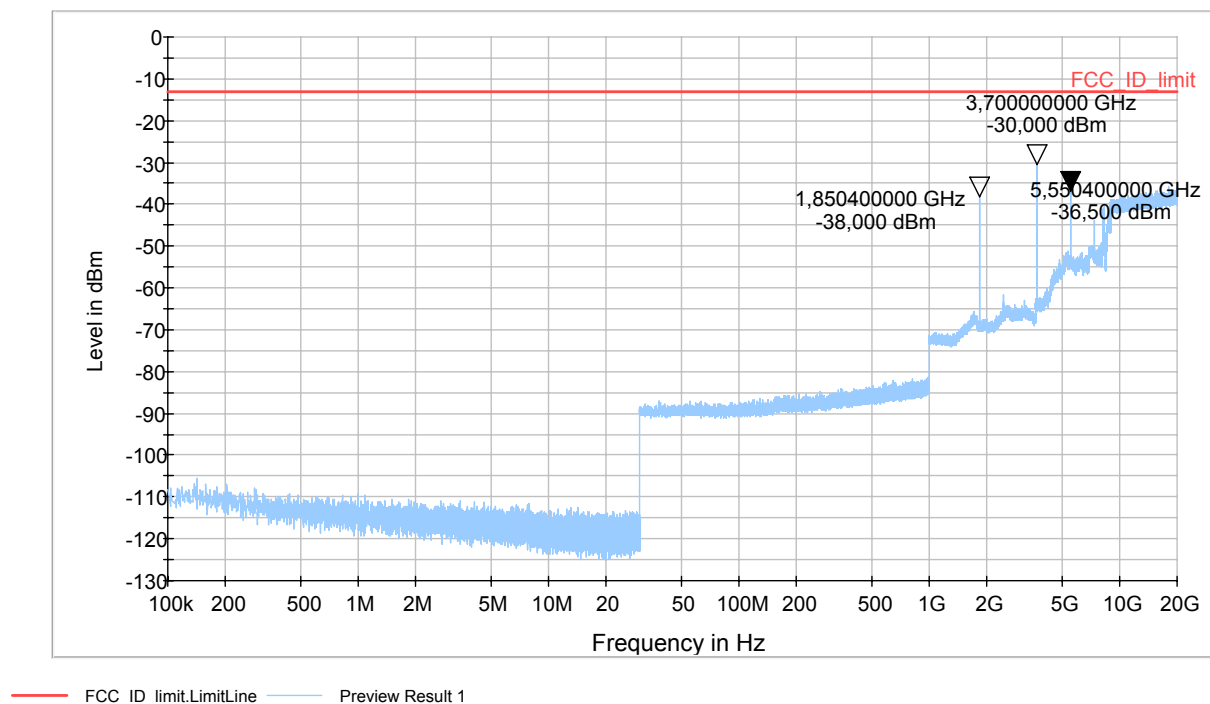
PCS 1900

The conducted spurious emissions were measured for channel 512, channel 661, of the US PCS band. The measurement show that all significant spurs are well below the limit line. The measurements of the spurious emissions at the equipment output terminals were performed pursuant to § 2.1053 in order to verify that any emissions are below the limits given by § 24.238.

Channel 512

band	Resolution bandwidth
100KHz - 30MHz	10 KHz
30MHz - 1000MHz	100 KHz
1GHz – 18GHz	1000 KHz

EMI delta cond18

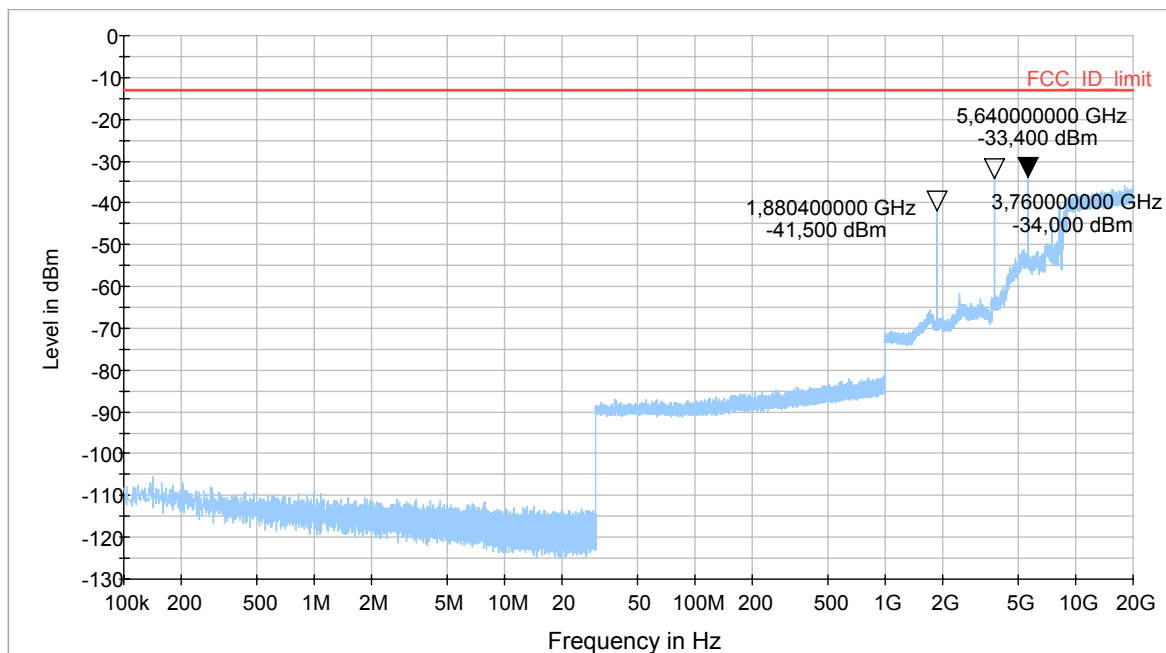


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Channel 660

band	Resolution bandwidth
100KHz - 30MHz	10 KHz
30MHz - 1000MHz	100 KHz
1GHz – 18GHz	1000 KHz

EMI delta cond18



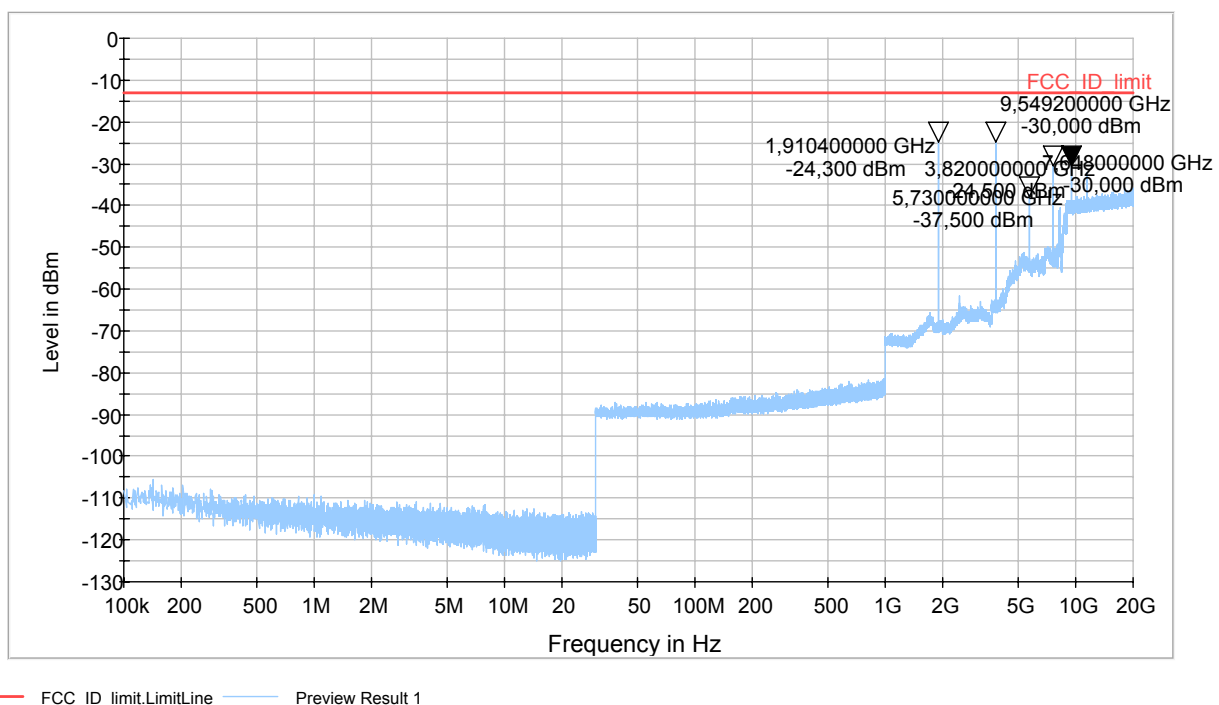
— FCC_ID_limit.LimitLine — Preview Result 1

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Channel 810

band	Resolution bandwidth
100KHz - 30MHz	10 KHz
30MHz - 1000MHz	100 KHz
1GHz – 18GHz	1000 KHz

EMI delta cond18



**TEST
6.****EMISSION LIMITATIONS FOR CELLULAR EQUIPMENT
(BAND EDGE TEST)**

**REFERENCE
DOCUMENT**

FCC 2.1051
FCC 22.917
FCC 24.938

6.1 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:

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

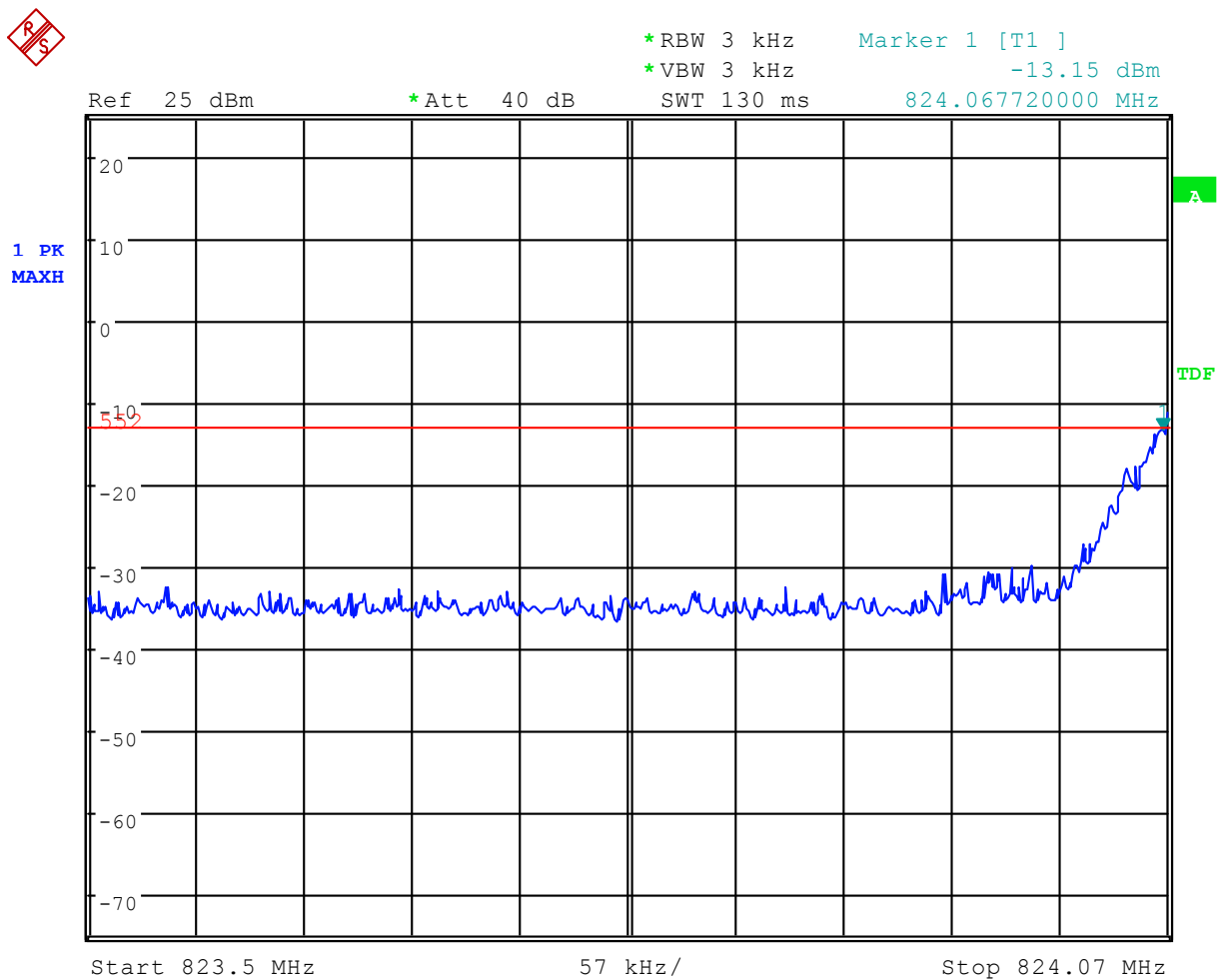
6.2 Measurement procedure.

As indicated in FCC part 22, in the 1 MHz bands immediately outside and adjacent to the frequency block 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.

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Specification 2.1051 and 22.917

LOWEST CHANNEL (824.2MHz)



Date: 9.MAR.2009 12:41:40

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HIGHEST CHANNEL (848.8MHz)

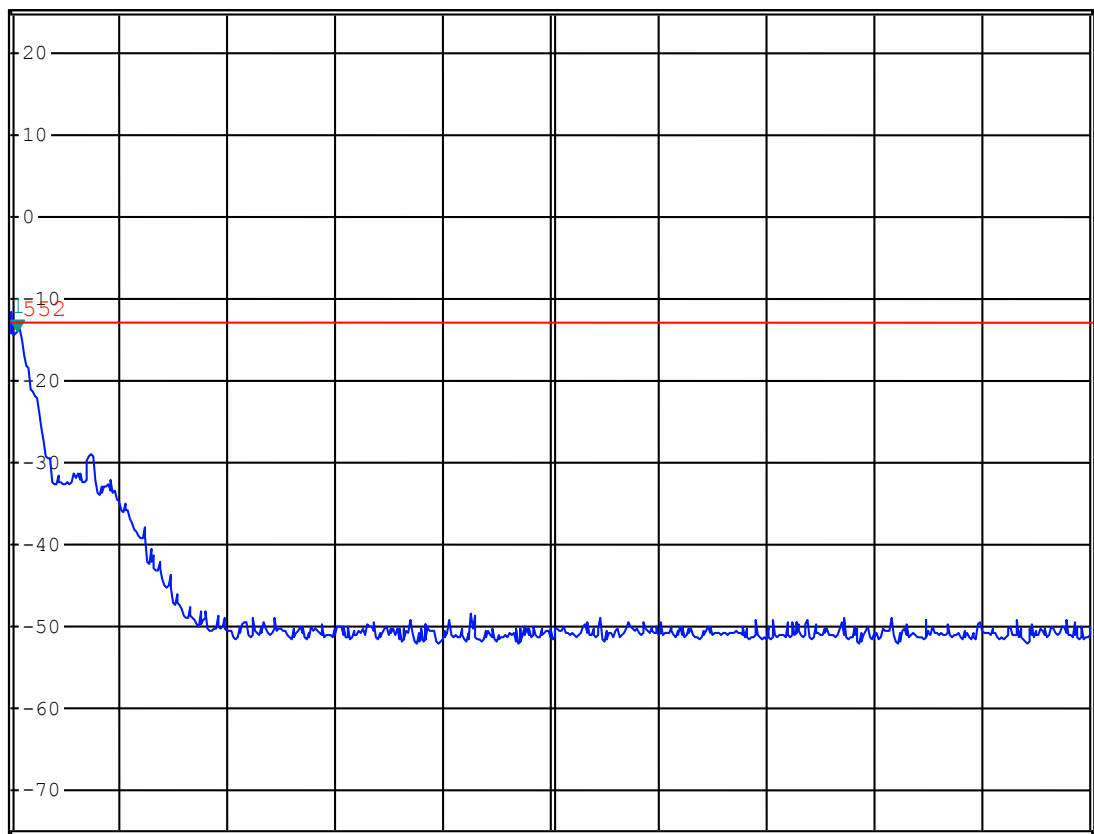


*RBW 3 kHz Marker 1 [T1]
*VBW 3 kHz -13.88 dBm
*SWT 215 ms 848.945760000 MHz

Ref 25 dBm

*Att 40 dB

1 PK
MAXH



Start 848.94 MHz

106 kHz/

Stop 850 MHz

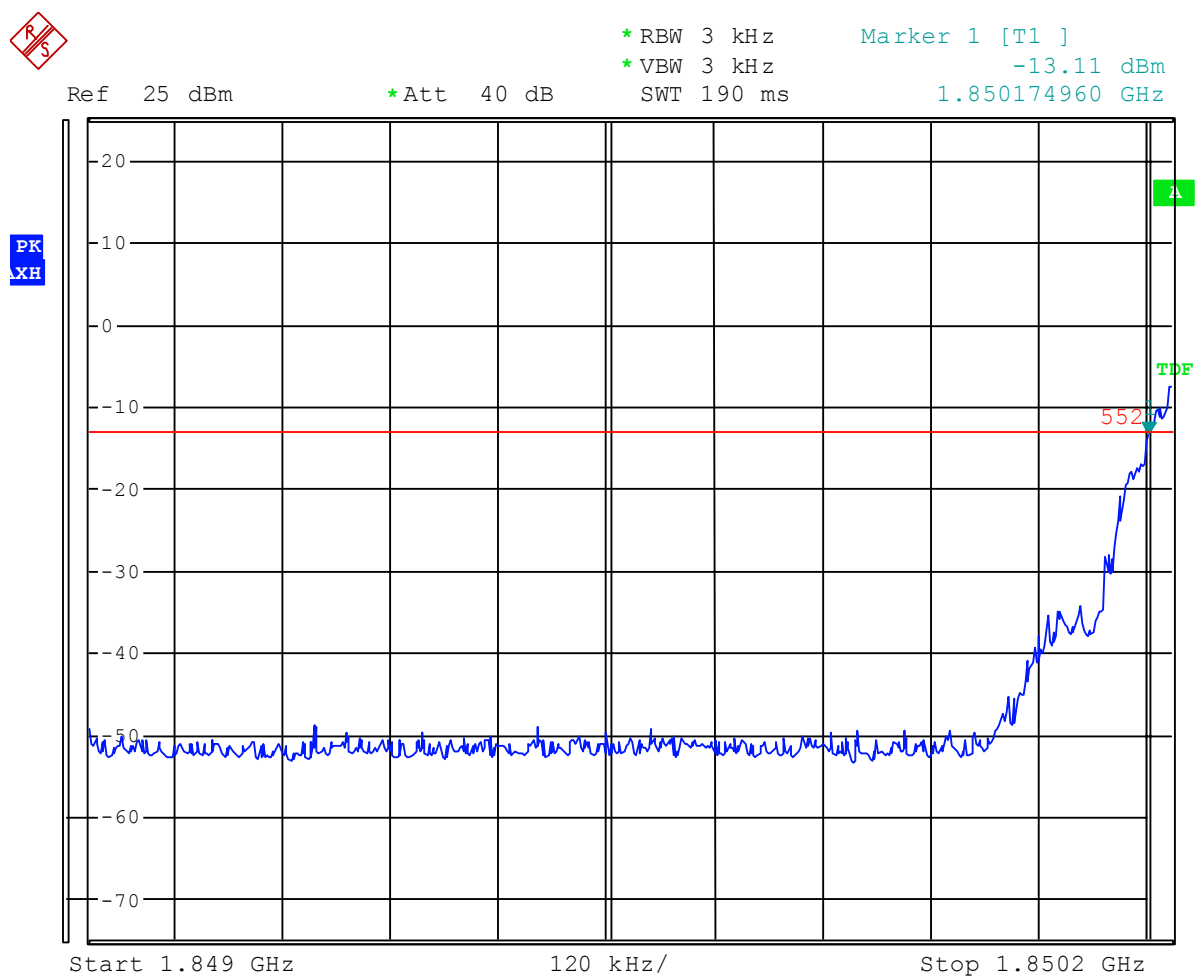
A

TDF

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Specification 2.1051 and 24.938

LOWEST CHANNEL (1850.2MHz)



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HIGHEST CHANNEL (1909.8MHz)

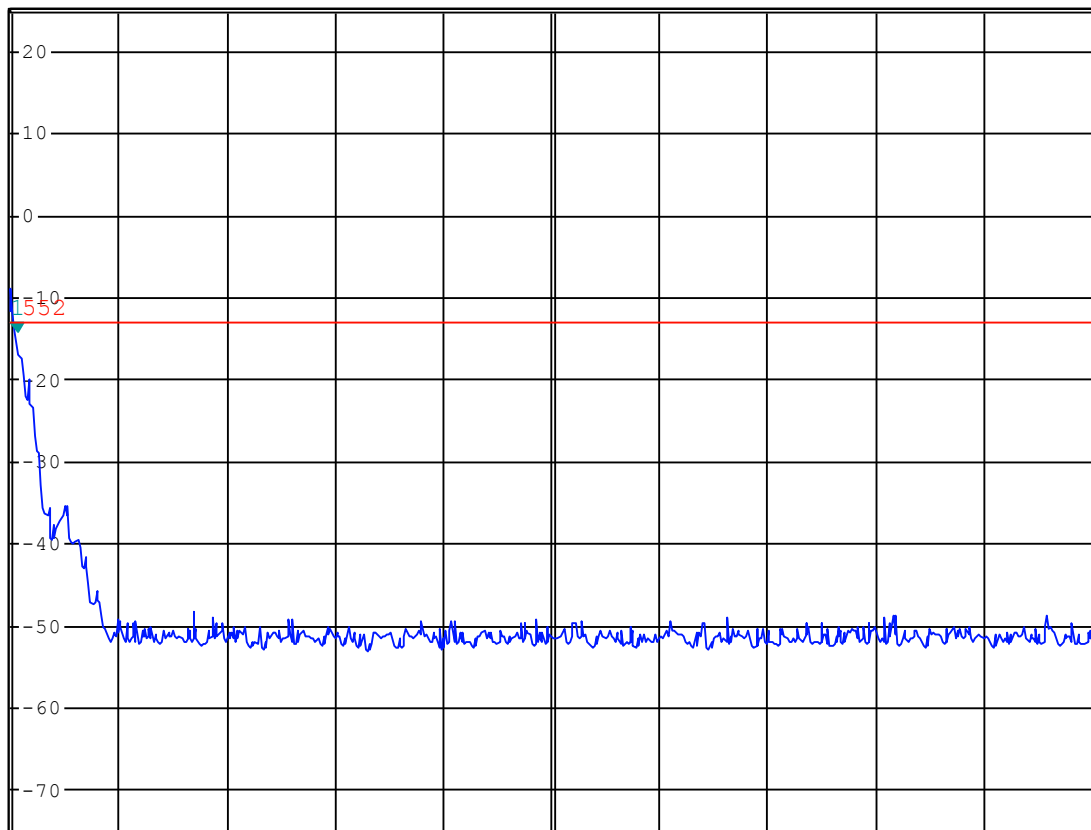


*RBW 3 kHz Marker 1 [T1]
*VBW 3 kHz -14.23 dBm
SWT 235 ms 1.908924180 GHz

Ref 25 dBm

*Att 40 dB

1 PK
MAXH



Start 1.90891 GHz

209 kHz/

Stop 1.911 GHz

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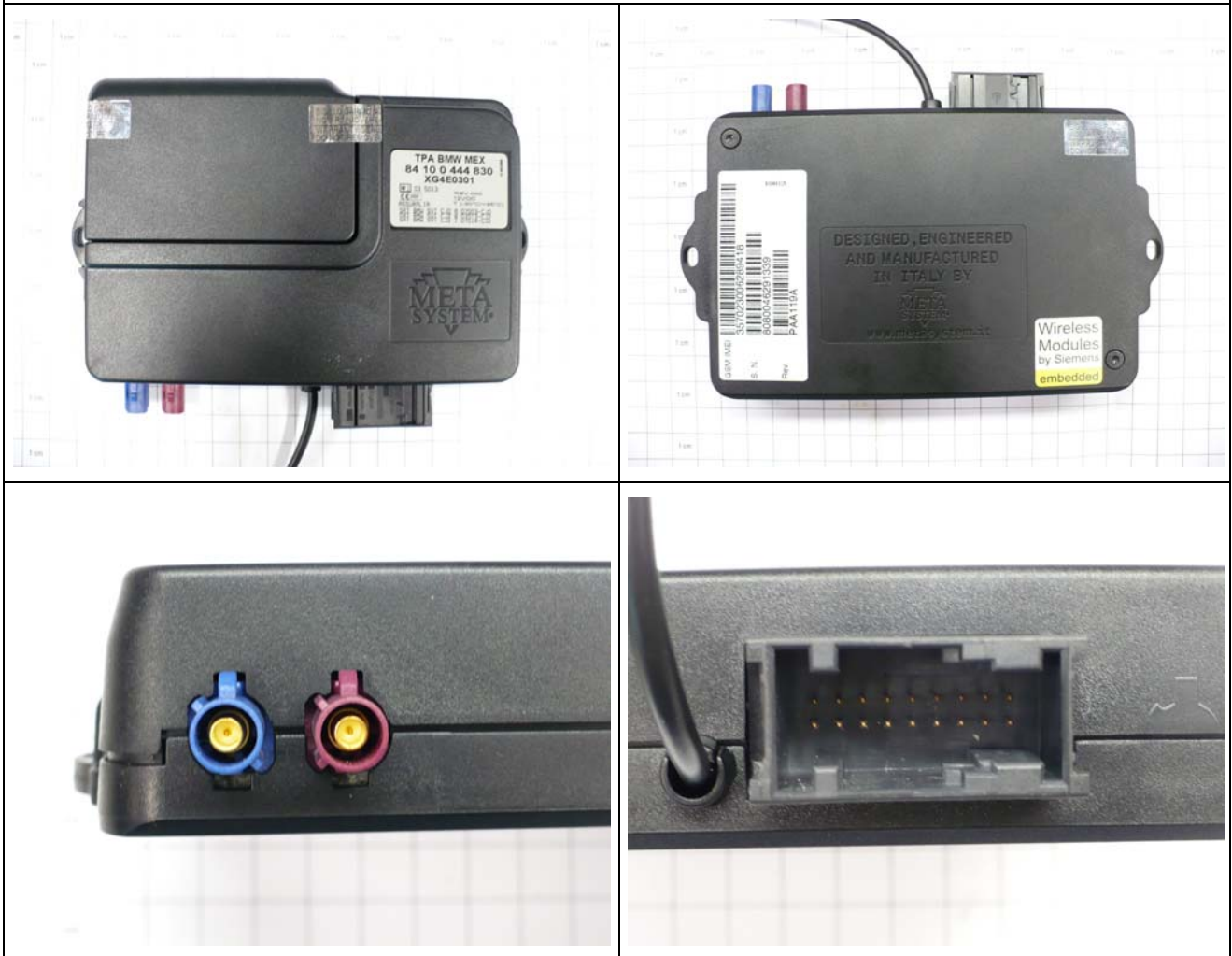
5. LIST OF EQUIPMENT USED

EQUIPMENT	MANUFACTURER	MODEL	SERIAL N.	CAL. DUE
RF SEMI-ANECHOIC CHAMBER (CSSA)	SIEMENS	B83117-D6019-T232	003-005-134/94C	APR.2010
EMI TEST RECEIVER 20HZ 40GHZ	ROHDE & SCHWARZ	ESU40	100111	JUL.2009
NOCH FILTER	WAINWRIGHT	WRCD 1700/2000	32	OCT 2009
NOCH FILTER	WAINWRIGHT	WRCA 800/960	15	OCT 2009
HIGH PASS FILTER	WAINWRIGHT	WHK 1,3/15G	9	OCT 2009
HIGH PASS FILTER	WAINWRIGHT	WHK 2,8/18G	1	OCT 2009
BILOG ANTENNA	CHASE	CBL6111A	1798	JUL.2009
LOW NOISE PREAMPLIFIER 18-40 GHz	BONN ELEKTRONIK	BLMA 1840-1A	087084B	AGO.2009
LOW NOISE PREAMPLIFIER 1-18GHz	BONN ELEKTRONIK	BLMA 0118-M	087084A	AGO.2009
LOG PERIODIC ANTENNA BROAD BAND 1-18 GHz	ROHDE & SCHWARZ	HL025	350380/007	DEC.2009
SPECTRUM ANALYZER	ROHDE & SCHWARZ	FSP40	100038	FEB.2010
CONICAL LOG SPIRAL ANTENNA	ANTENNA RESEARCH ASSOC., INC.	CLS-110/A	1003	AGO.2009
HORN ANTENNA	SCHAFFNER	BBHA 9170	111	-
RF SIGNAL GENERATOR 10MHZ - 40 GHz	ROHDE & SCHWARZ	SMP 04	825007/005	JUL 2009
WIRELESS COMMUNICATIONS TEST SET	AGILENT	8960 SERIES 10	E5515C	-

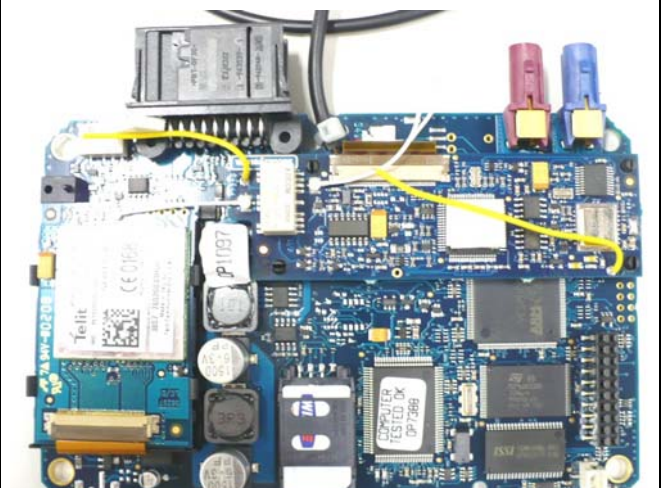
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6 .PHOTOGRAPHIC DOCUMENTATION

PHOTO N° 1 –EUT IDENTIFICATION



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PHOTO N° 2 –SETUP FIELD STRENGTH OF SPURIOUS RADIATION

