

## TEST REPORT

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**EUT DESCRIPTION** Electronic card for Robotic Lawn Mower whit GSM Module

**EUT TRADEMARK** Husqvarna

**EUT MODEL** GPS\_MOW\_5

**REFERENCE STANDARDS :** 47 CFR FCC part 22, 24

**TEST REPORT NUMBER** FCCTR\_110442-1

**TEST REPORT ISSUE DATE** 15/04/2011

**TESTING LABORATORY** Prima Ricerca & Sviluppo S.r.l.  
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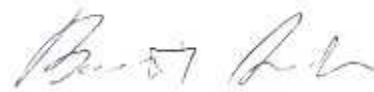

**TESTING LOCATION** As Above

**DATE OF TEST SAMPLE RECEIPT** 14/04/2011

**DATE OF TEST** 14-15/04/2011

**TESTED BY** Andrea Bortolotti

**APPROVED BY** Massimo Maltempì

*The test results reported in this test report shall refer only to the sample actually tested and shall not refer or be deemed to refer to bulk from which such a sample may be said to have been obtained.  
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## 1. TECHNICAL INFORMATION OF EQUIPMENT UNDER TEST (EUT)

### 1.1 Identification

**Brand name:** Husqvarna  
**Manufacturer:** ALGODUE ELETTRONICA SRL VIA PASSERINA 3/A - 28010 FONTANETO D'AGOGNA - NO  
**Equipment :** GSM-GPS CONTROL UNIT  
**Model name :** GPS\_MOW\_5  
**Country of manufacturer:** ITALY

### 1.2 Technical data

**FCC class:** FCC RULES PART 22 and 24  
**FCC ID:** ZAS-GPSMODULE  
**Supply voltage:** 18 Vdc  
**EUT standing:** floor  
**EUT single or system:** Single  
**EUT dimensions :** See photographic documentation  
**GSM module manufacturer** TELIT  
**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  
**Integral Antenna gain** 810 - 960 MHz → 1.5dBi  
1710 – 1990 MHz → 1.5dBi  
**GSM module Power supply** 3.22 – 4.5 Vdc (3,8 Vdc recommended)  
**Operating mode** Duplex  
**Type of modulation** GMSK (GSM modulation)  
**Emission** GXW  
**Software** Fully GSM software Stack  
**Temperature range** Operating: -40°C to +85°C  
Storage: -40°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	Free electronic card	Screw
2	AC power input/output ports	Port not present	----
3	DC power input/output ports	18Vdc	Cable
4	Signals ports		Cable

*Note: During the tests all cables must be what provided the manufacturer or the same that used in the real employment of the EUT.*

### 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)

<b><i>Operating condition</i></b>	<b><i>Description</i></b>
<b>#1</b>	<i>Continuous transmission at 850 frequency band</i>
<b>#2</b>	<i>Continuous transmission at 1900 frequency band</i>

### 3. Summary of test results

#### 3.1 Tests

Name of test	Paragraph	Result
Field Strength of Spurious Radiation	FCC 2.1053	Test passed
Effective Radiated Power	FCC 22.913	Test passed
Equivalent isotropic radiated Power	FCC 24.232	Test passed

## 4. TEST RESULTS

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**TEST  
1.**

**FIELD STRENGTH OF SPURIOUS RADIATION**

---

**REFERENCE  
DOCUMENT**

FCC Part. 2.1053

### 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

#### 5.2.1 GSM 850

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 § 22.917.

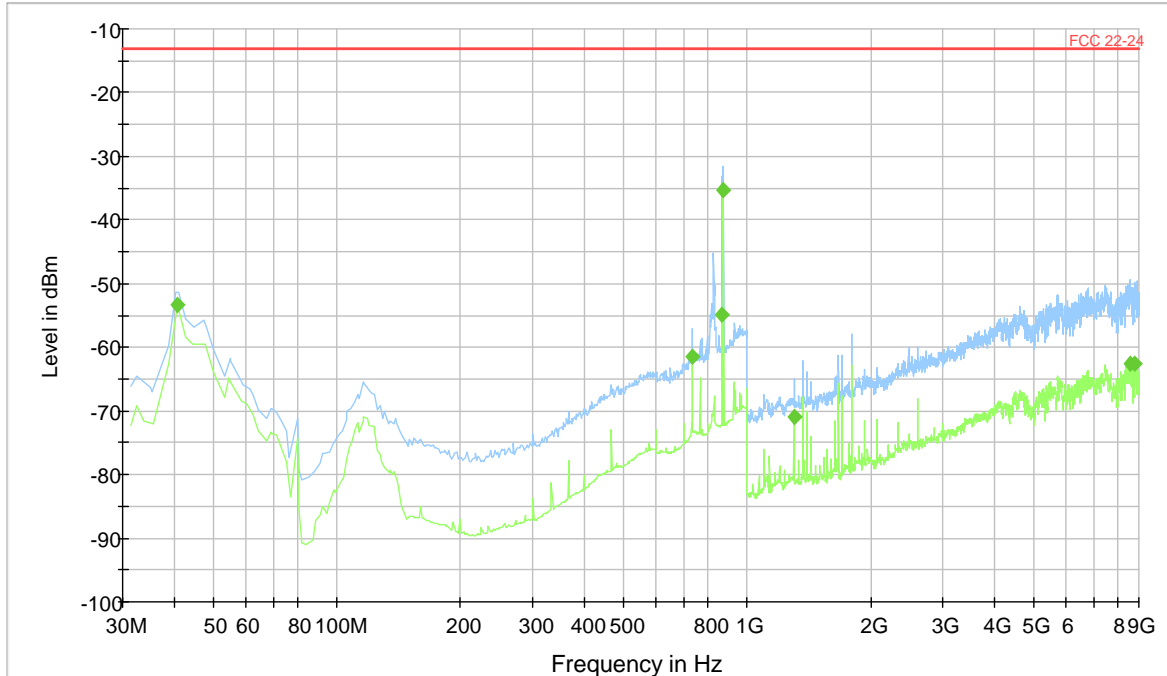




## GSM 850 (Channel 128)

Vertical polarization

Spurious emission ETSI\_FCC\_IC\_850

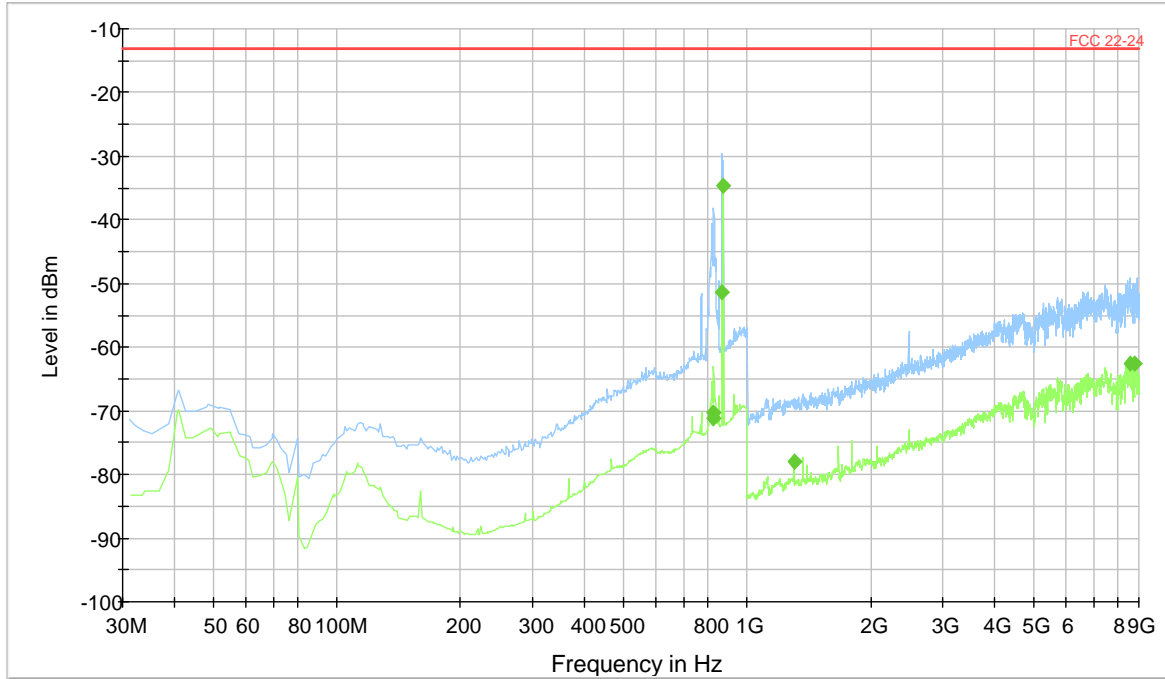


Frequency (MHz)	Average (dBm)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Comment
40.840000	-53.4	1000.0	100.000	100.0	V	180.0	-80.1	
733.320000	-61.5	1000.0	100.000	100.0	V	180.0	-67.1	
869.200000	-55.0	1000.0	100.000	100.0	V	89.0	-65.8	
875.600000	-35.3	1000.0	100.000	100.0	V	180.0	-65.7	
1300.000000	-71.0	1000.0	1000.000	100.0	V	180.0	-111.7	
8568.400000	-62.5	1000.0	1000.000	250.0	V	89.0	-90.6	
8796.000000	-62.6	1000.0	1000.000	100.0	V	89.0	-90.1	



Horizontal Polarization

Spurious emission ETSI\_FCC\_IC\_850



Frequency (MHz)	Average (dBm)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Comment
828.920000	-70.4	1000.0	100.000	250.0	H	0.0	-66.3	
829.080000	-71.3	1000.0	100.000	250.0	H	0.0	-66.3	
869.200000	-51.3	1000.0	100.000	100.0	H	180.0	-65.8	
875.600000	-34.7	1000.0	100.000	100.0	H	180.0	-65.7	
1300.000000	-78.1	1000.0	1000.000	250.0	H	90.0	-111.7	
8568.000000	-62.5	1000.0	1000.000	250.0	H	180.0	-90.6	
8796.400000	-62.7	1000.0	1000.000	250.0	H	1.0	-90.1	



**PRIMA**

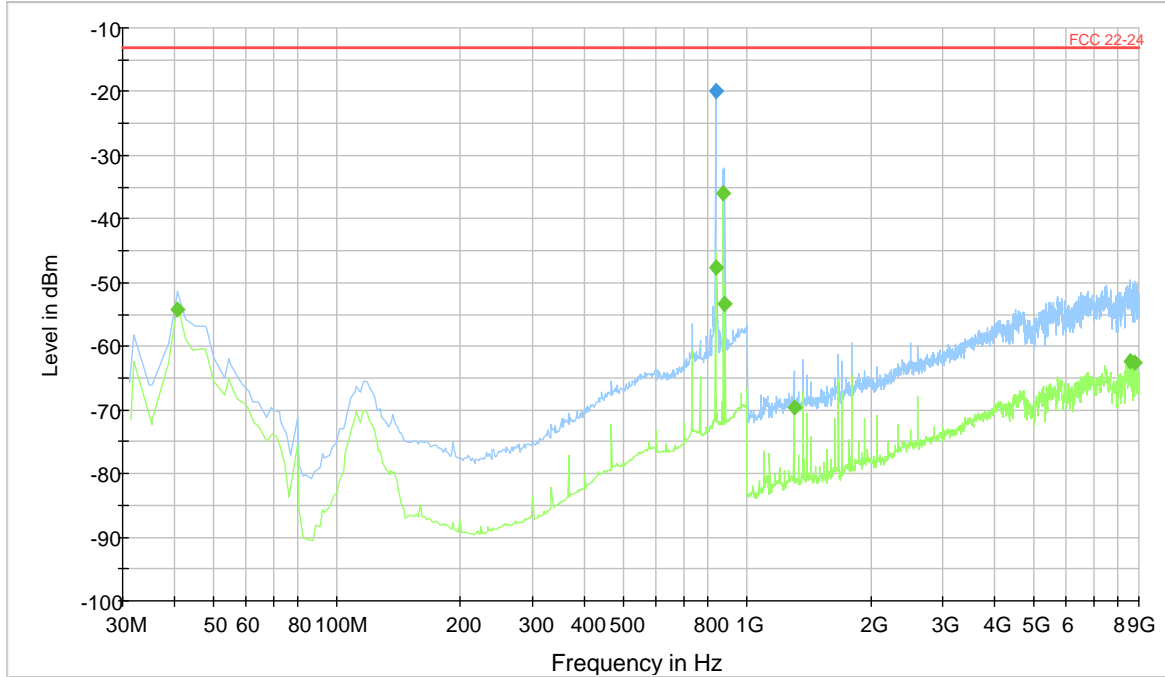
RICERCA & SVILUPPO

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GSM 850 (Channel 188)

Vertical polarization

Spurious emission ETSI\_FCC\_IC\_850



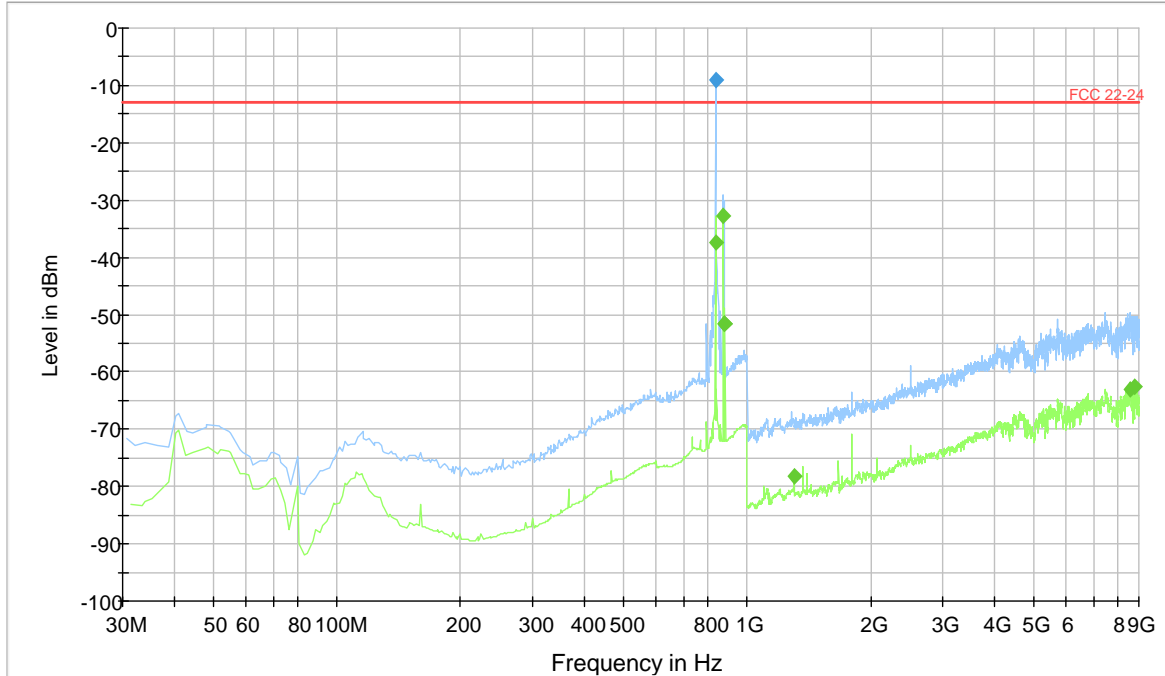
Frequency (MHz)	MaxPeak (dBm)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBm)
836.120000	-19.9	1000.0	100.000	250.0	V	89.0	-66.2	6.90	-13.00

Frequency (MHz)	Average (dBm)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Comment
40.840000	-54.3	1000.0	100.000	100.0	V	180.0	-80.1	
836.120000	-47.6	1000.0	100.000	250.0	V	89.0	-66.2	
875.600000	-36.0	1000.0	100.000	100.0	V	180.0	-65.7	
881.240000	-53.4	1000.0	100.000	100.0	V	180.0	-65.7	
1300.000000	-69.6	1000.0	1000.000	100.0	V	180.0	-111.7	
8568.400000	-62.4	1000.0	1000.000	250.0	V	0.0	-90.6	
8785.600000	-62.6	1000.0	1000.000	100.0	V	0.0	-90.1	



## Horizontal polarization

Spurious emission ETSI\_FCC\_IC\_850



Frequency (MHz)	MaxPeak (dBm)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBm)
836.120000	-9.1	1000.0	100.000	100.0	H	180.0	-66.2	-3.90	-13.00

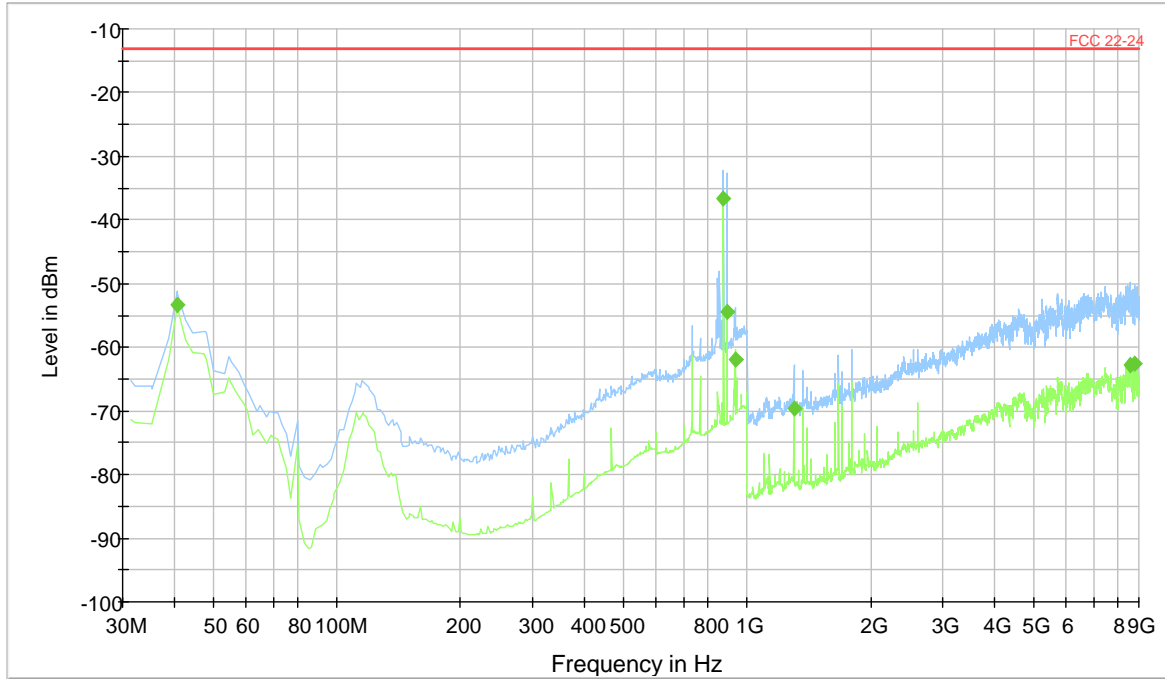
Frequency (MHz)	Average (dBm)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Comment
836.120000	-37.4	1000.0	100.000	100.0	H	1.0	-66.2	
881.200000	-51.6	1000.0	100.000	100.0	H	180.0	-65.7	
875.600000	-32.7	1000.0	100.000	100.0	H	180.0	-65.7	
881.200000	-51.6	1000.0	100.000	100.0	H	180.0	-65.7	
1300.000000	-78.3	1000.0	1000.000	250.0	H	89.0	-111.7	
8568.000000	-63.0	1000.0	1000.000	100.0	H	0.0	-90.6	
8796.400000	-62.6	1000.0	1000.000	100.0	H	0.0	-90.1	



## GSM 850 (Channel 251)

### Vertical polarization

Spurious emission ETSI\_FCC\_IC\_850

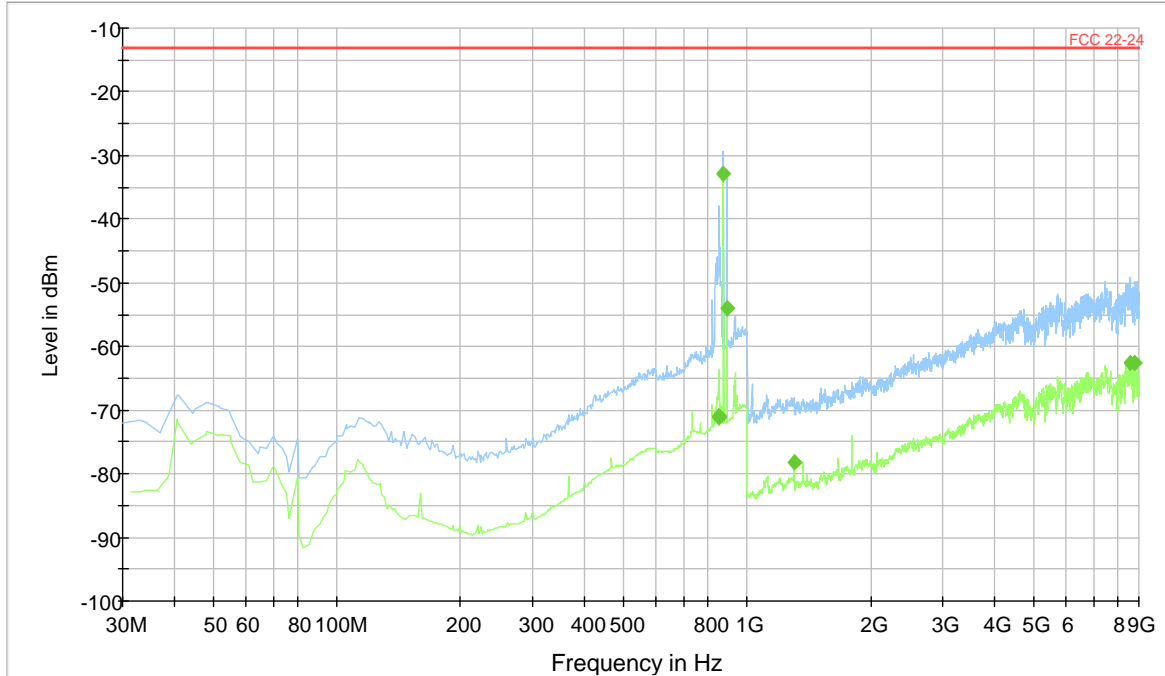


Frequency (MHz)	Average (dBm)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Comment
40.720000	-53.3	1000.0	100.000	100.0	V	180.0	-80.0	
875.600000	-36.5	1000.0	100.000	100.0	V	89.0	-65.7	
893.800000	-54.4	1000.0	100.000	100.0	V	180.0	-65.6	
935.400000	-62.0	1000.0	100.000	100.0	V	1.0	-64.3	
1300.000000	-69.7	1000.0	1000.000	100.0	V	180.0	-111.7	
8568.400000	-62.8	1000.0	1000.000	100.0	V	89.0	-90.6	
8796.000000	-62.6	1000.0	1000.000	100.0	V	89.0	-90.1	



## Horizontal polarization

### Spurious emission ETSI\_FCC\_IC\_850



Frequency (MHz)	Average (dBm)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Comment
853.360000	-71.0	1000.0	100.000	100.0	H	1.0	-66.0	
853.680000	-71.2	1000.0	100.000	100.0	H	180.0	-66.0	
875.600000	-33.0	1000.0	100.000	100.0	H	180.0	-65.7	
893.840000	-54.0	1000.0	100.000	100.0	H	180.0	-65.6	
1300.000000	-78.3	1000.0	1000.000	250.0	H	90.0	-111.7	
8568.400000	-62.6	1000.0	1000.000	250.0	H	0.0	-90.6	
8796.000000	-62.6	1000.0	1000.000	250.0	H	0.0	-90.1	



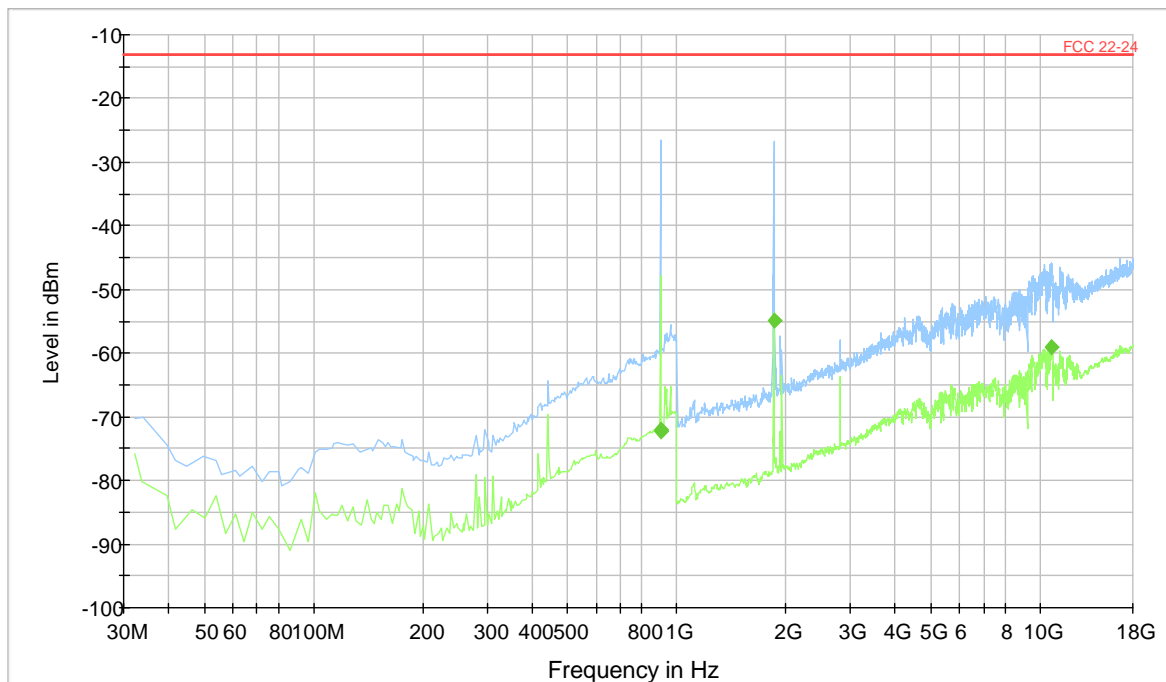
## PCS 1900

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\_1900

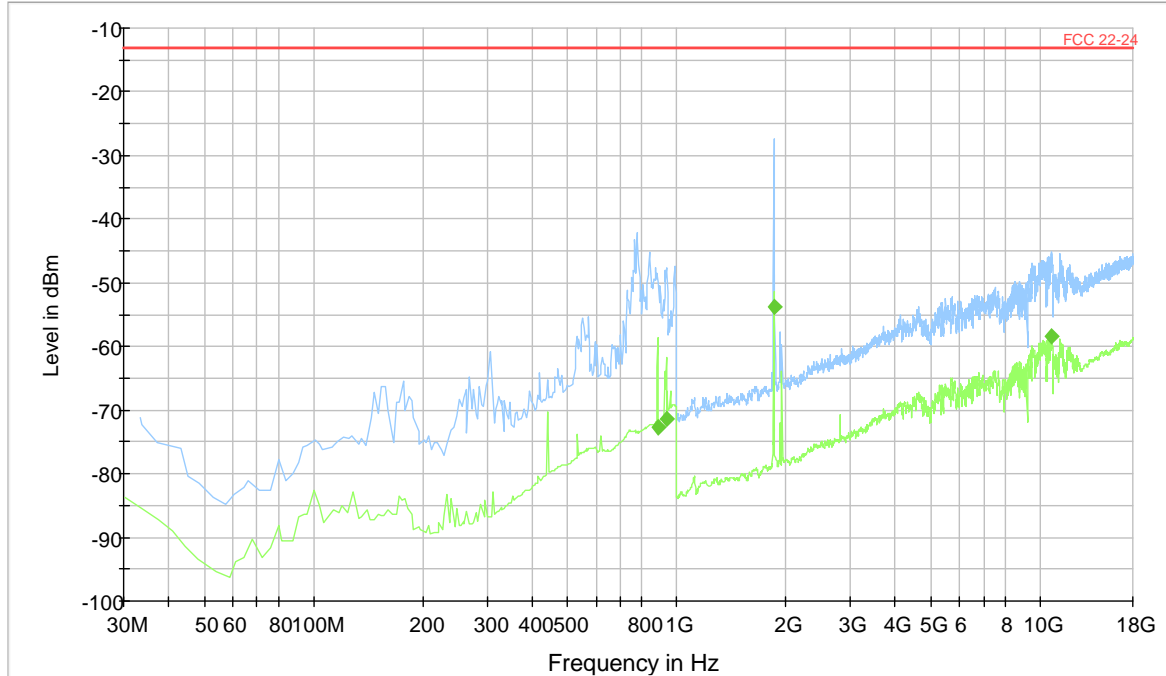


Frequency (MHz)	Average (dBm)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Comment
901.440000	-72.1	5.0	100.000	219.0	V	70.0	-65.5	
903.200000	-72.4	5.0	100.000	219.0	V	86.0	-65.4	
1850.000000	-55.0	5.0	1000.000	250.0	V	90.0	-108.6	
10778.000000	-59.1	5.0	1000.000	100.0	V	206.0	-84.2	



## Horizontal polarization

### Spurious emission ETSI\_FCC\_IC\_1900



Frequency (MHz)	Average (dBm)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Comment
885.400000	-72.8	5.0	100.000	219.0	H	84.0	-65.6	
935.400000	-71.3	5.0	100.000	100.0	H	116.0	-64.3	
1850.400000	-53.9	5.0	1000.000	227.0	H	1.0	-108.6	
10778.800000	-58.3	5.0	1000.000	100.0	H	116.0	-84.2	

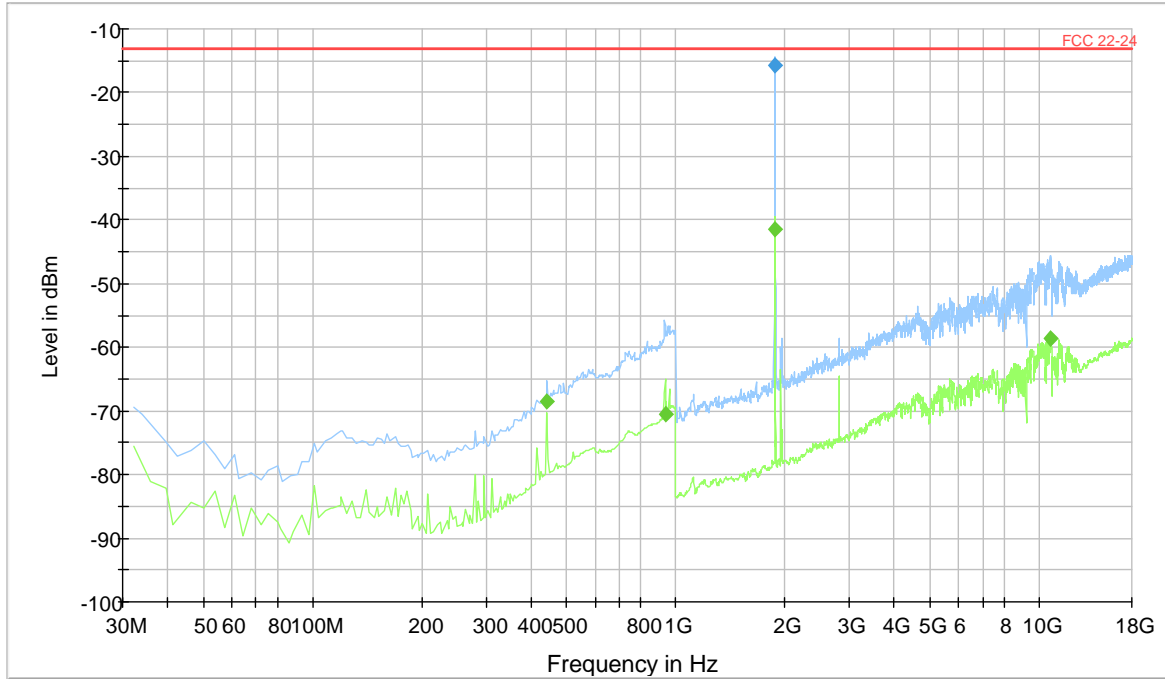




## PCS 1900 (Channel 661)

### Vertical polarization

Spurious emission ETSI\_FCC\_IC\_1900



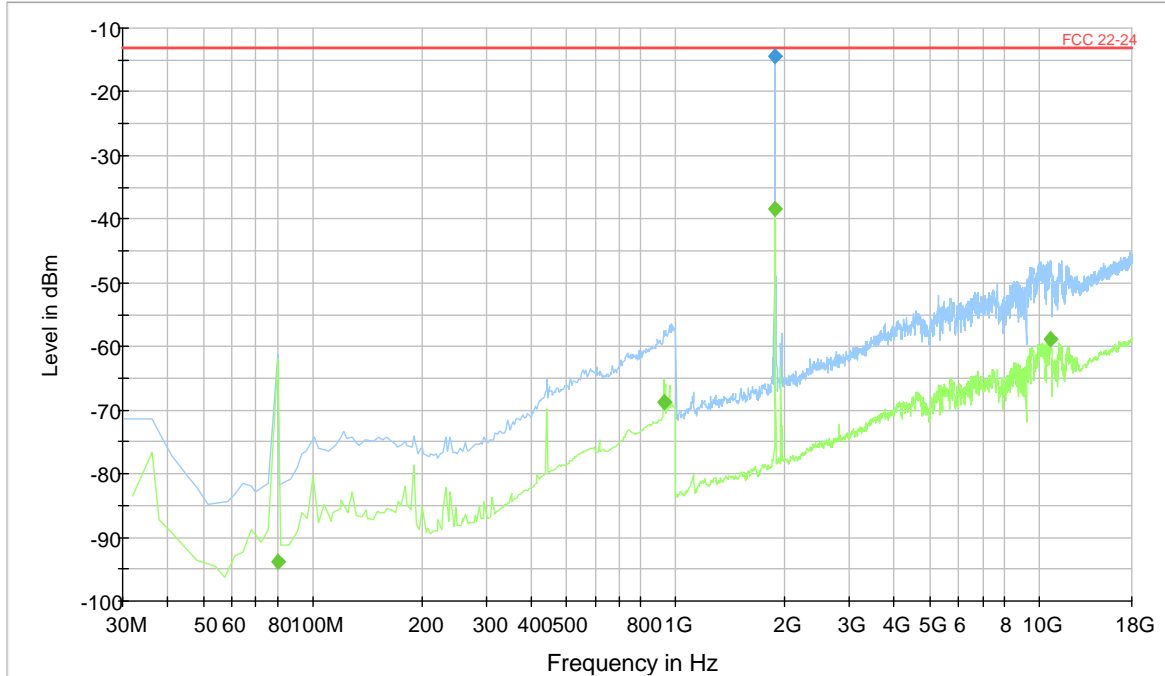
Frequency (MHz)	MaxPeak (dBm)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBm)
1880.000000	-15.8	5.0	1000.000	227.0	V	90.0	-108.4	2.80	-13.00

Frequency (MHz)	Average (dBm)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Comment
440.000000	-68.5	5.0	100.000	125.0	V	201.0	-74.2	
935.400000	-70.4	5.0	100.000	251.0	V	206.0	-64.3	
1880.000000	-41.6	5.0	1000.000	227.0	V	84.0	-108.4	
10778.400000	-58.6	5.0	1000.000	227.0	V	18.0	-84.2	



## Horizontal polarization

Spurious emission ETSI\_FCC\_IC\_1900



Frequency (MHz)	MaxPeak (dBm)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBm)
1880.000000	-14.3	5.0	1000.000	227.0	H	1.0	-108.4	1.30	-13.00

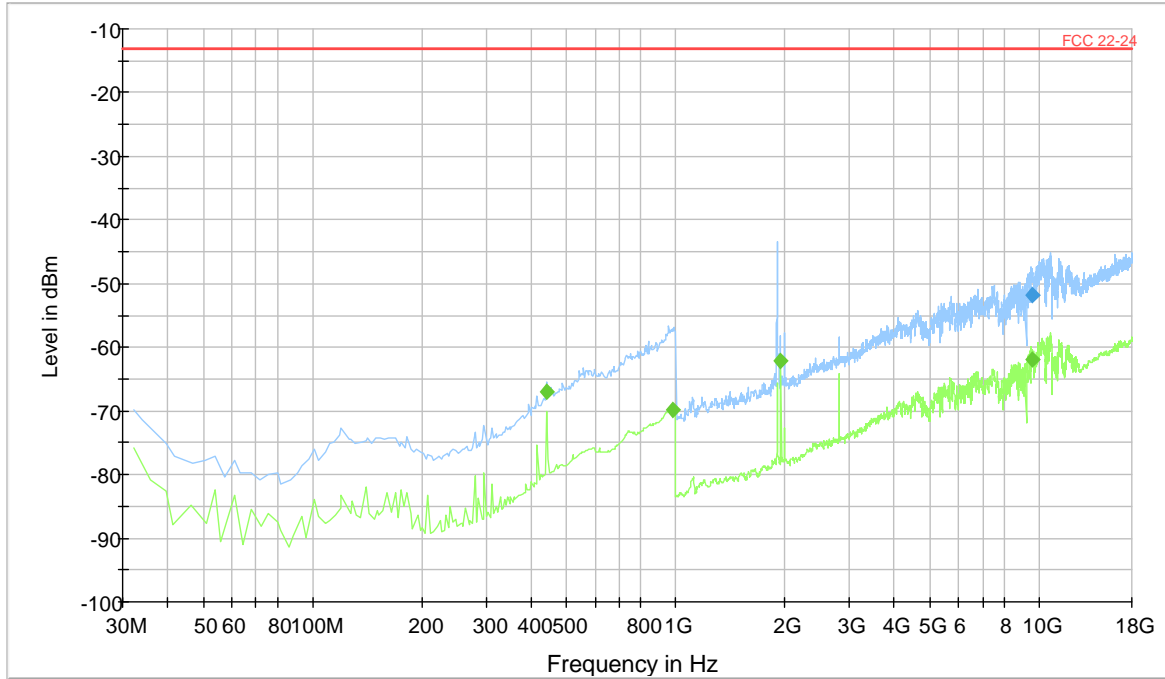
Frequency (MHz)	Average (dBm)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Comment
80.000000	-93.7	5.0	100.000	125.0	H	116.0	-85.3	
925.800000	-68.8	5.0	100.000	226.0	H	160.0	-64.7	
1880.000000	-38.4	5.0	1000.000	227.0	H	3.0	-108.4	
10778.400000	-58.8	5.0	1000.000	272.0	H	0.0	-84.2	



## PCS 1900 (Channel 810)

### Vertical polarization

Spurious emission ETSI\_FCC\_IC\_1900



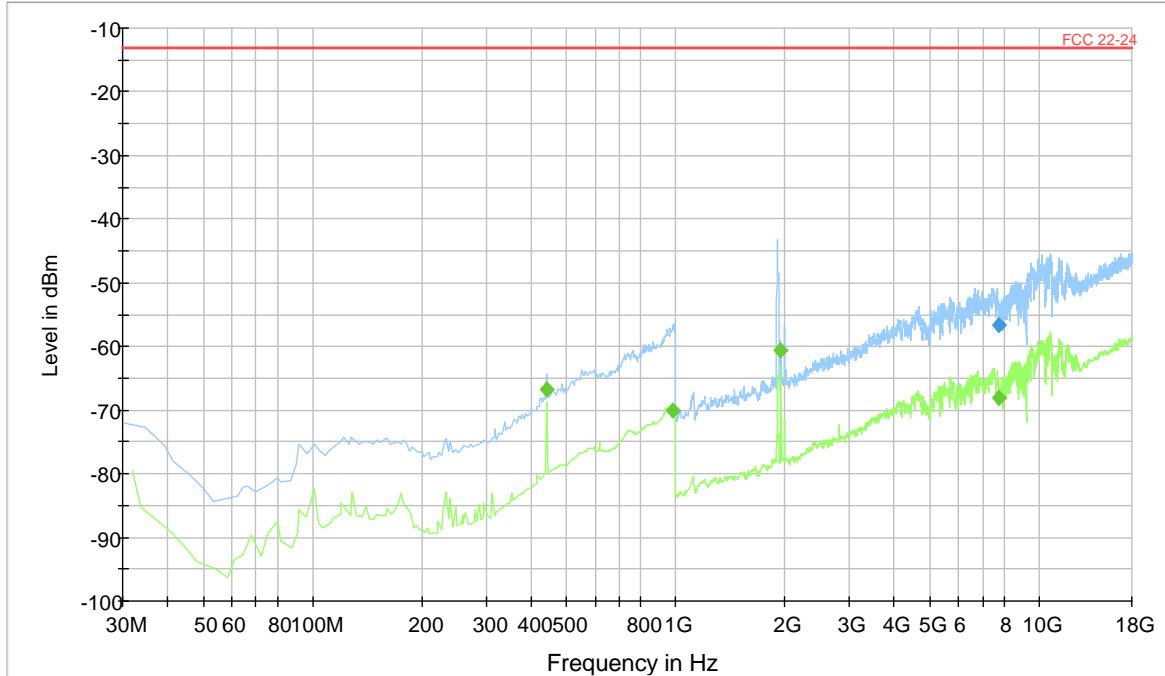
Frequency (MHz)	MaxPeak (dBm)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBm)
9583.600000	-51.8	5.0	1000.000	226.0	V	192.0	-87.2	38.80	-13.00

Frequency (MHz)	Average (dBm)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Comment
440.000000	-67.1	5.0	100.000	125.0	V	201.0	-74.2	
981.120000	-69.7	5.0	100.000	125.0	V	159.0	-63.2	
1948.000000	-62.0	5.0	1000.000	251.0	V	104.0	-108.1	
9581.600000	-61.9	5.0	1000.000	273.0	V	176.0	-87.2	



## Horizontal polarization

Spurious emission ETSI\_FCC\_IC\_1900



Frequency (MHz)	MaxPeak (dBm)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBm)
7762.400000	-56.6	5.0	1000.000	100.0	H	1.0	-92.7	43.60	-13.00

Frequency (MHz)	Average (dBm)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Comment
440.000000	-66.8	5.0	100.000	125.0	H	160.0	-74.2	
980.840000	-70.0	5.0	100.000	100.0	H	21.0	-63.2	
1948.000000	-60.6	5.0	1000.000	100.0	H	176.0	-108.1	
7762.400000	-68.1	5.0	1000.000	125.0	H	21.0	-92.7	

**TEST  
2.**

**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:**

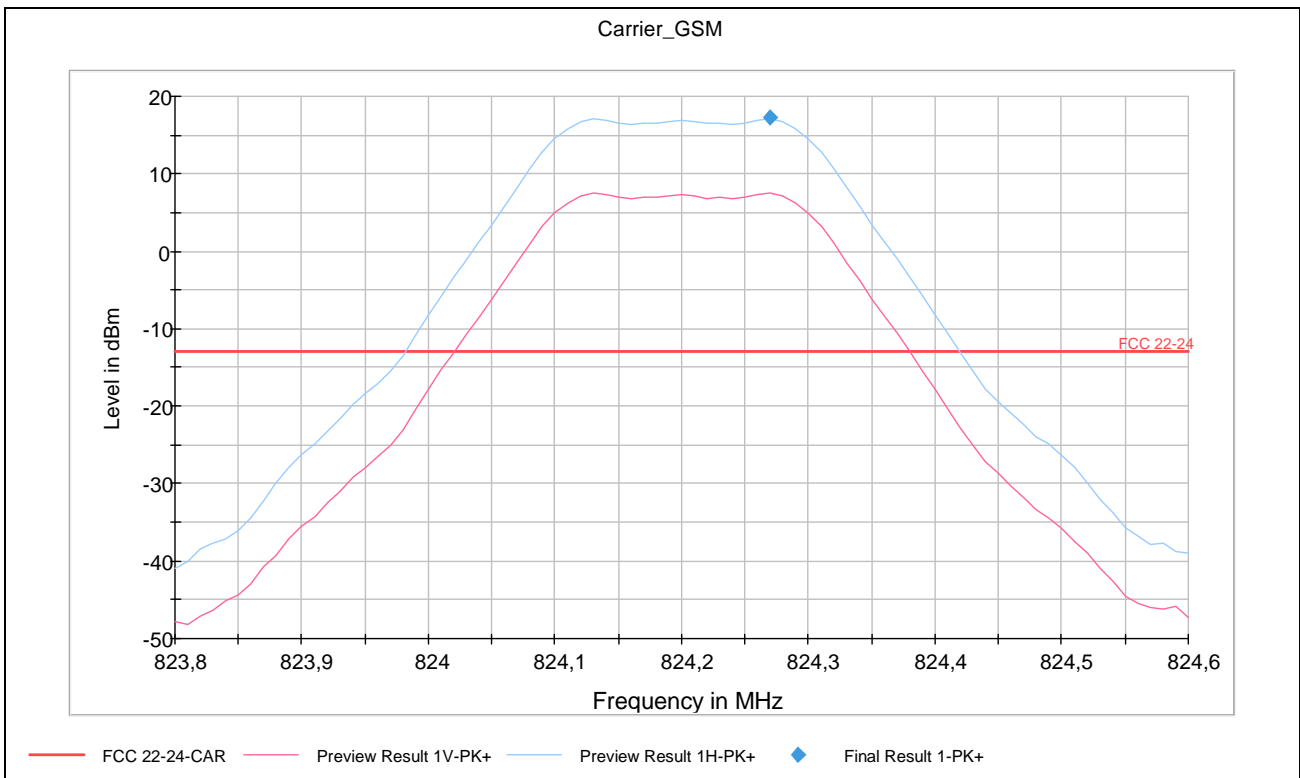
The applied substitution method follows ANSI/TIA/EIA-603, ANSI/TIA/EIA-102.CAAA or the appropriate ETSI rules respectively. The actual signal generated by the EUT can be determined by means of a substitution measurement in which a known signal source replaces the device to be measured.

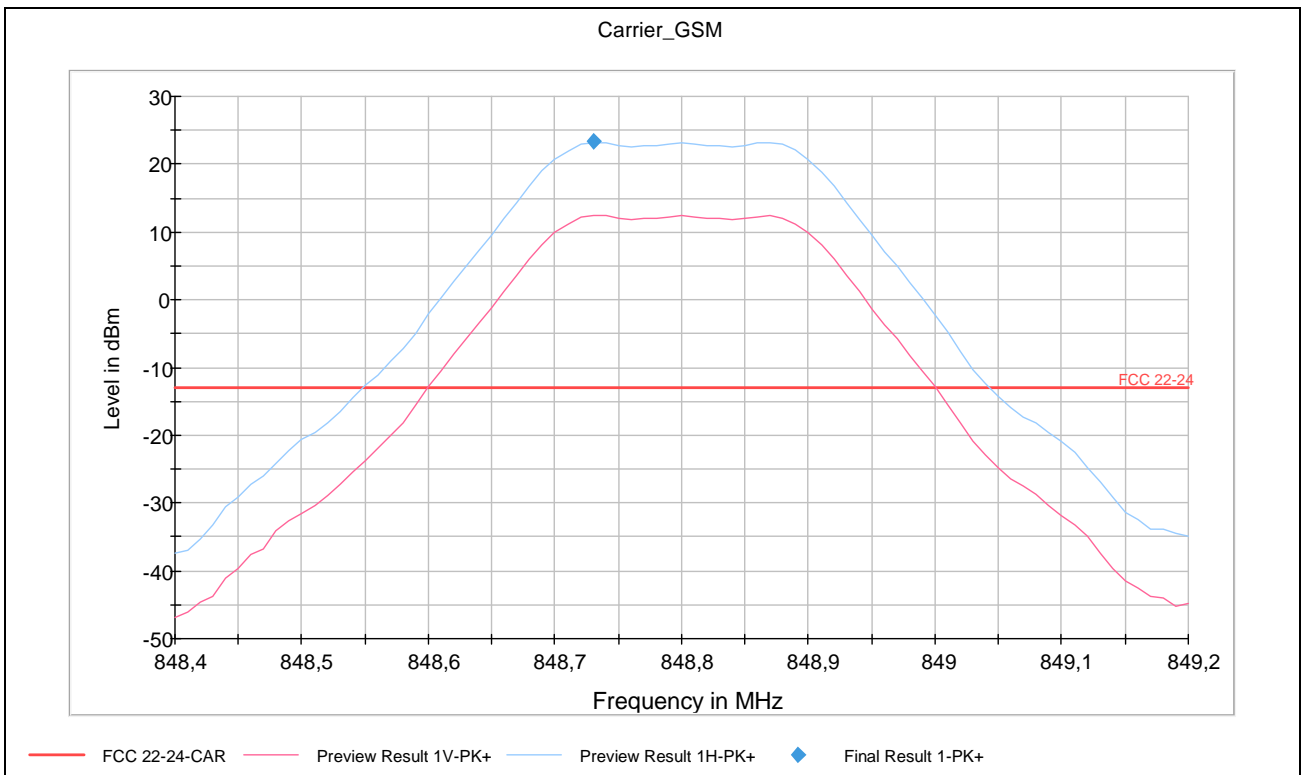
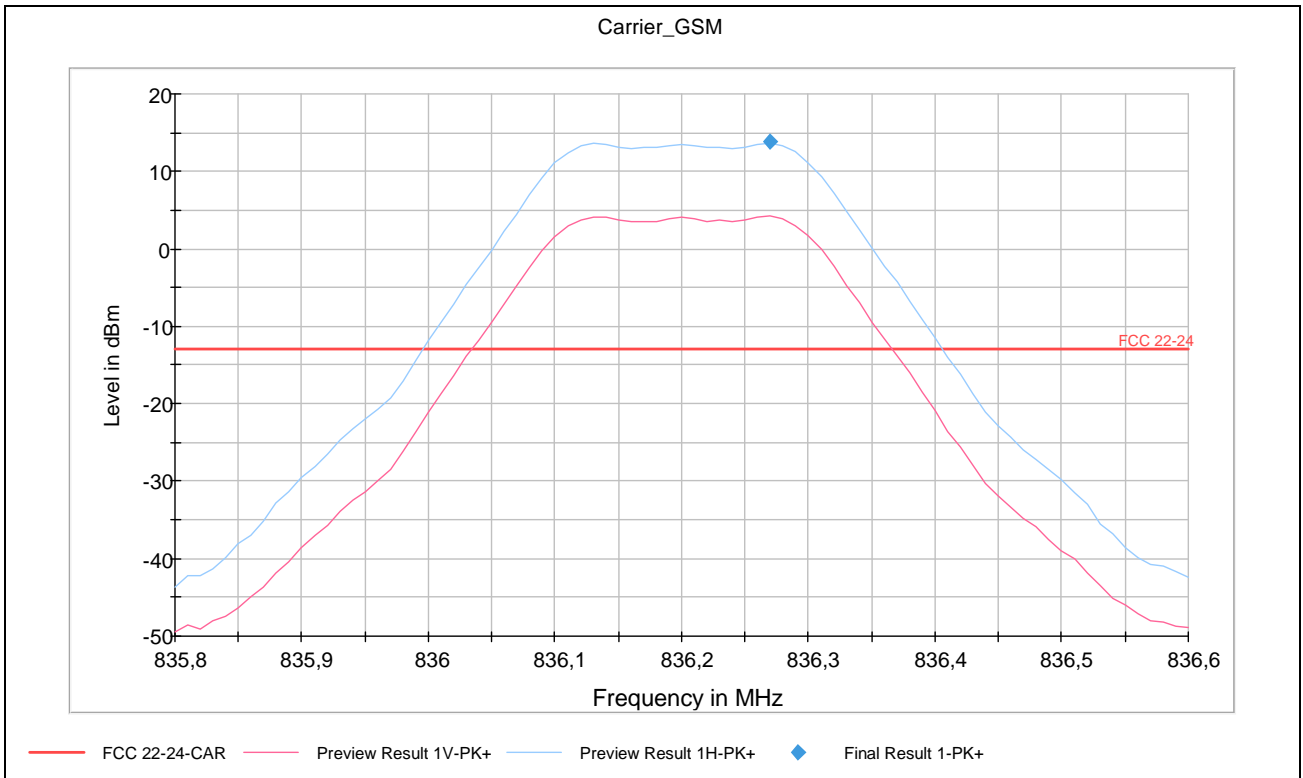
The substitution antenna replaces the transmitter antenna at the same position and in vertical polarisation. The frequency of the signal generator shall be adjusted to the measurement frequency. The test antenna shall be raised or lowered, if necessary, to ensure that the maximum signal is still received. 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.

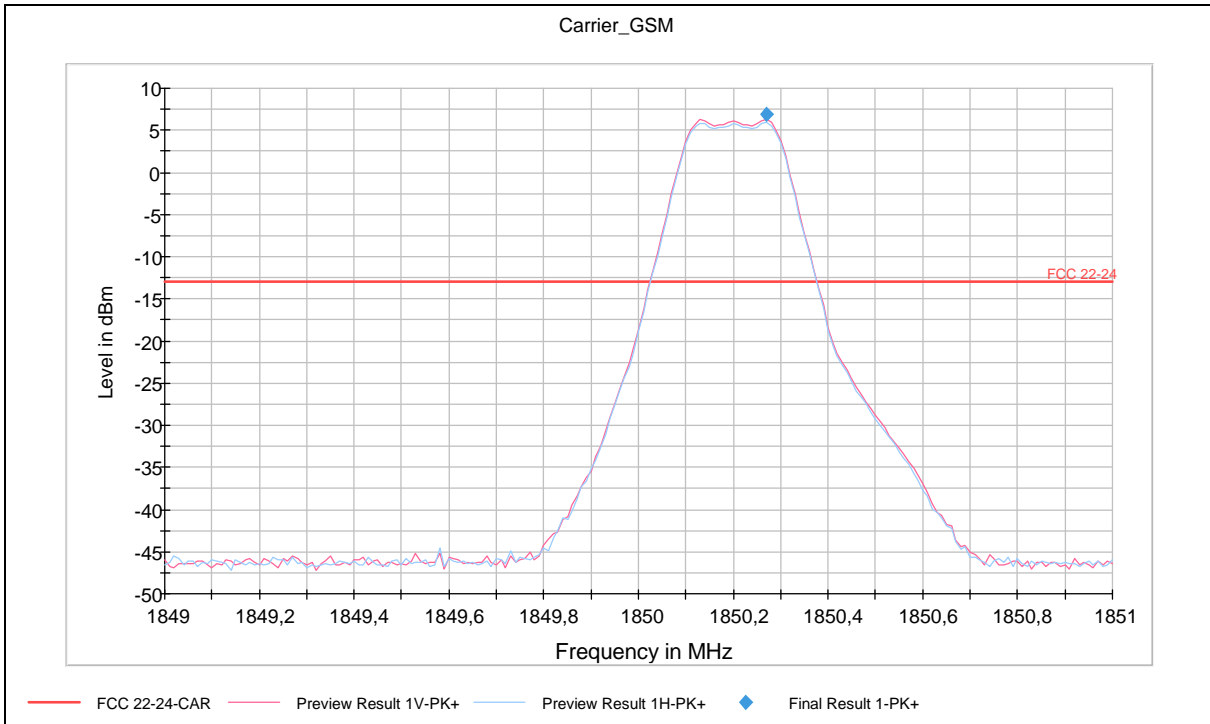
2.2 Test Result

GSM 850		Power Control Level = 5	
Channel	Frequency (MHz)	ERP Output Power(dBm)	
128	824,12	17.30	
188	836,58	13.80	
251	848,798	23.30	

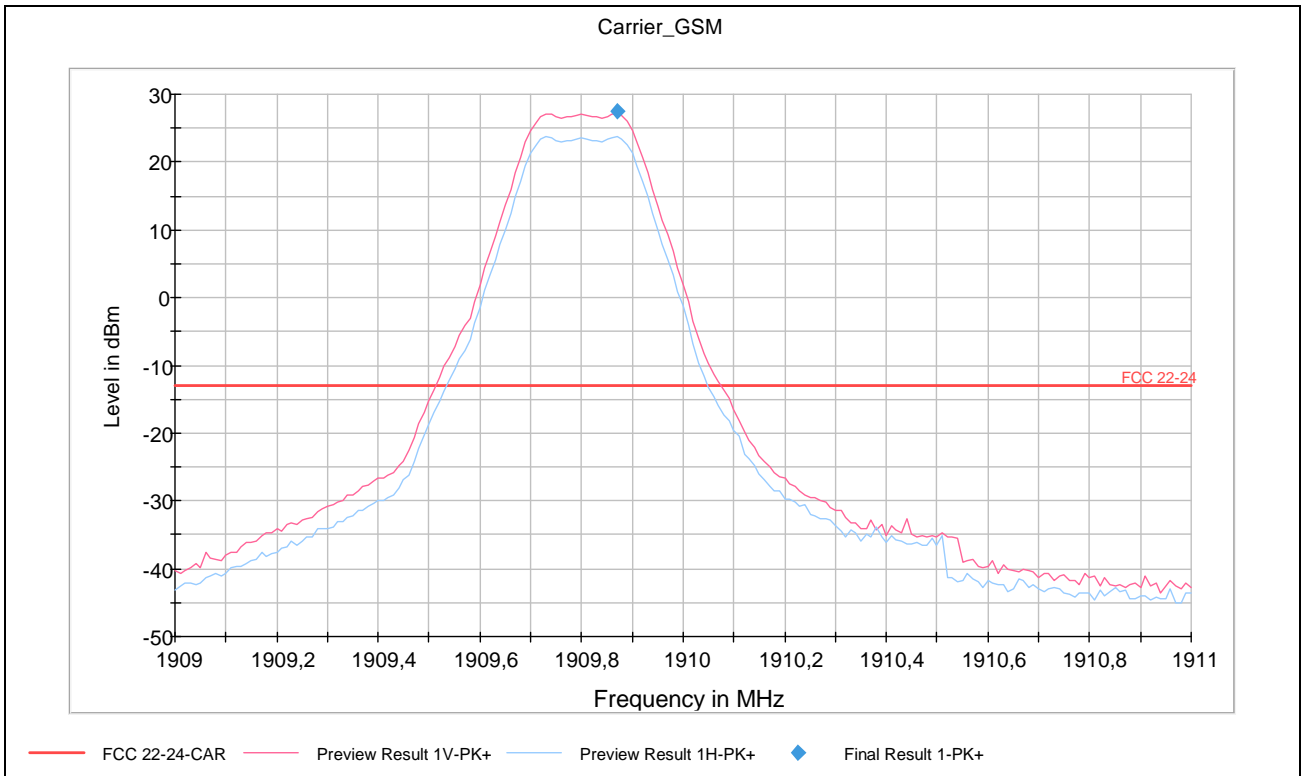
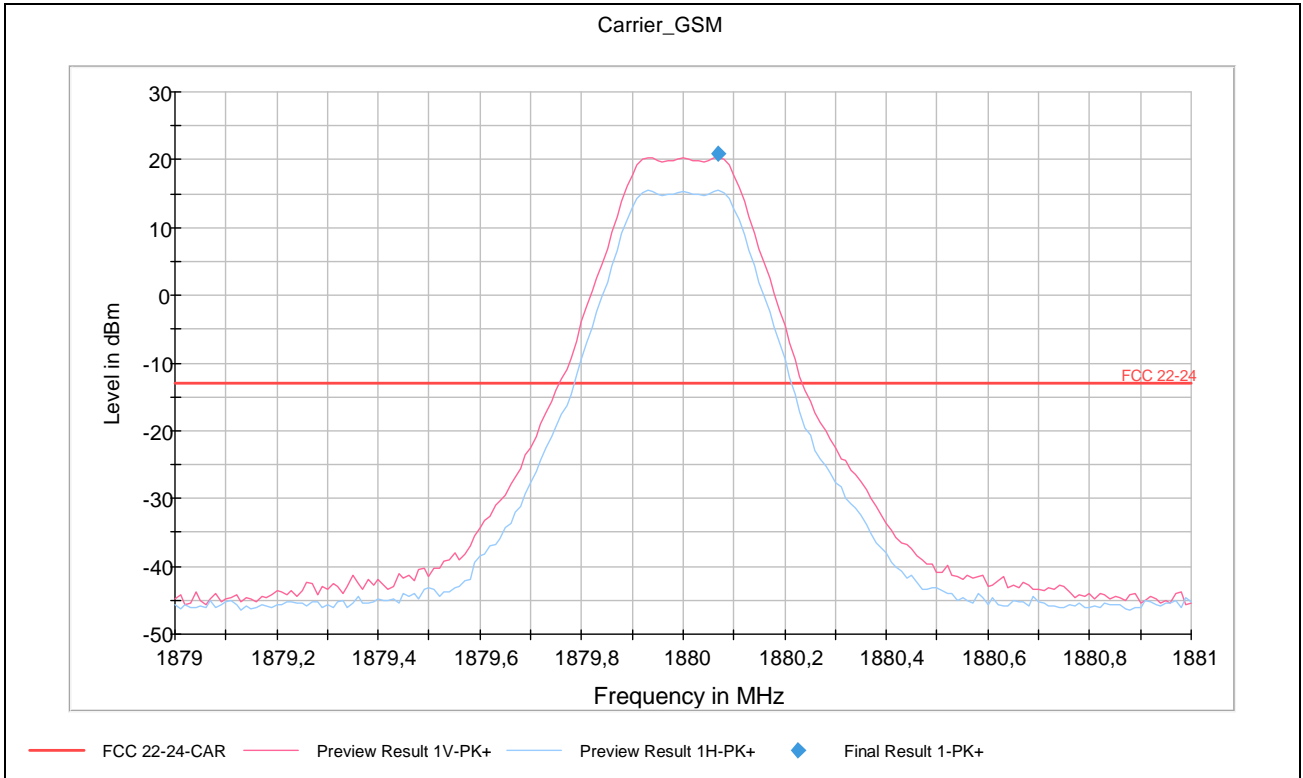




PCS 1900		Power Control Level = 0
Channel	Frequency (MHz)	EIRP Output Power(dBm)
512	1850,335	6.80
661	1880,24	21.00
810	1909,738	27.50







## 5. LIST OF EQUIPMENT USED

EQUIPMENT	MANUFACTURER	MODEL	SERIAL N.	CAL. DUE
EMI TEST RECEIVER 20HZ 40GHZ	ROHDE & SCHWARZ	esu40	100111	Aug.2011
ARTIFICIAL MAINS NETWORK	ROHDE & SCHWARZ	ESH 2 - Z5	841887/011	Sept.2011
ABSORBING CLAMP	ROHDE & SCHWARZ	MDS21	840031/005	Jul .2011
RF SEMI-ANECHOIC CHAMBER (CSSA)	Siemens	B83117-D6019-T232	003-005-134/94C	Apr.2011
BILOG ANTENNA	CHASE	CBL6111A	1798	jul.2011
BILOG ANTENNA	CHASE	CBL6111C	2717	jul.2011
LOG PERIODIC ANTENNA BROAD BAND 1-26 GHZ	ROHDE & SCHWARZ	HL050	350380/007	Dec.2011
NOCH FILTER	WAINWRIGHT	WRCD 1700/2000	32	Oct 2011
NOCH FILTER	WAINWRIGHT	WRCA 800/960	15	Oct 2011
HIGH PASS FILTER	WAINWRIGHT	WHK 1,3/15G	9	Oct 2011
HIGH PASS FILTER	WAINWRIGHT	WHK 2,8/18g	1	Oct 2011
WIRELESS COMMUNICATIONS TEST SET	AGILENT	8960 SERIES 10	E5515C	Jun 2011
LOW NOISE PREAMPLIFIER 18-40 GHZ	BONN ELEKTRONIK	BLMA 1840-1A	087084B	Sept.2011
LOW NOISE PREAMPLIFIER 1-18GHZ	BONN ELEKTRONIK	BLMA 0118-M	087084A	Sept.2011



**6 .Photographic documentation**

**PHOTO N°1 –EUT IDENTIFICATION**



PHOTO N°2 –SETUP Field Strength of Spurious Radiation

