

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. Gaggino (CO) Tel. +39 03135000.11 Fax +39 031991309

EQUIPMENT UNDER TEST :  
APPARECCHIO IN PROVA :

PROGRAMMABLE INSPECTOR WITH GSM WISMO  
Q2426B WITH FUNCTION OF ALARM AIR CONTACT

REFERENCE STANDARDS:  
NORME DI RIFERIMENTO :

FCC RULES PART 22 and 24  
MODEL: AIR CONTACT

**Customer:**

*RICHIEDENTE:*

- **Dept. / Firm :** ATLAS COPCO AIRPOWER NV  
*Ente / Società:*
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*Telefono :* *Fax :*

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

**Date of test samples receipt:** 07/12/2006 **Date of start test:** 07/12/2006  
*Data ricevimento campioni:* *Data inizio prove:*

**Date of end test:** 15/12/2006  
*Data fine prove:*

**Witness to the test:**  
Presenti alle prove:

Nobody / Nessuno

**Signature of the engineers:**  
Firma esecutore prove:



Luca Casiraghi

**Signature of the Laboratory Director:**  
Firma Direttore Laboratori:



Massimo Maltempi

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: ATLAS COPCO AIRPOWER NV  
Manufacturer: PRIMA ELECTRONIC S.P.A.  
Equipment : GSM / GPRS Module  
Model name : AIR CONTACT  
Country of manufacturer: ITALY

### **1.2 Technical data**

FCC class: FCC RULES PART 22 and 24  
FCC ID: UXQAIRCONTACT  
Supply voltage: 100-240V 50-60Hz 10VA  
EUT standing: Wall  
EUT single or system: Single  
EUT dimensions : 130 x 55 x 120 mm  
GSM module manufacturer WAVECOM  
Module type : WISMO Q2426B  
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 -1 dBi  
Power supply 3.7 V  
Operating mode Duplex  
Type of modulation GMSK (GSM modulation)  
Emission GXW  
Software Fully GSM software Stack  
Temperature range Operating: -20°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	100-240 Vac, 50-60 Hz , 10 VA	CONNECTOR
3	DC power input/output ports	NOT PRESENT	-----
4	Signals ports	Serial 232 port	Connector D-SUB 9 Pin male
5	Telecomm. Ports	CAN OPEN	Connector D-SUB 9 Pin Female

*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><i>#1</i></b>	<b><i>Continuous transmission</i></b>

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### 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
Emission in Receiver Critical Band	22.917(f)	Test passed
Field Strength of Spurious Radiation	2.1053	Test passed

## 4. TEST RESULTS

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Occupied Bandwidth.....	11
Emission in Receiver Critical Band.....	12
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**TEST  
1.**

**RF Power Output**

**REFERENCE  
DOCUMENT**

FCC Part. 2.1046

**1.1 Test procedure**

The transmitter output was connected to a calibrated coaxial attenuator, the other end of which was connected to a spectrum analyzer. Transmitter output was read off the spectrum analyzer in dBm. The power output at the transmitter antenna port was determined by adding the value of the attenuator to the spectrum analyzer reading. An Rohde & Schwarz power meter was also used to measure the RF power. Tests were performed at three frequencies (low, middle, and high channels) and on all power levels, which can be setup on the transmitters.

**1.2 Test Result**

**PCS 1900**

Channel	Peak Output Power (dBm)
512	27.35
661	28.02
810	28.55

**GSM 850**

Channel	Peak Output Power (dBm)
128	29.21
188	28.35
251	29.08

Note: See attached diagram in appendix 1.



**TEST  
2.****Radiated Power**

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**REFERENCE  
DOCUMENT**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

### PCS 1900

Channel	Peak Output Power (dBm)
512	29.02
661	29.20
810	29.34

### GSM 850

Channel	Peak Output Power (dBm)
128	24.55
188	24.18
251	25.40

Note: See attached diagram in appendix 2.

**TEST  
3.**

**Occupied Bandwidth**

**REFERENCE  
DOCUMENT**

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

**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**

The RF output of the transceiver was connected to the input of the spectrum analyzer through sufficient attenuation. Occupied Bandwidth was measured with a occupied bandwidth function of the analyzer. To find the Emission Bandwidth (-26 dB) the delta markers were set -26 dB below transmitter power.

**3.3 Test results**

**PCS 1900**

Channel	Occupied Channel Bandwidth (kHz)	Emission Bandwidth (kHz)
512	256	304
661	254	302
810	250	298

**GSM 850**

Channel	Occupied Channel Bandwidth (kHz)	Emission Bandwidth (kHz)
128	260	298
188	252	284
251	254	294

Note: See attached diagram in appendix 3.

**TEST  
4.****Emission in Receiver Critical Band****REFERENCE  
DOCUMENT**

FCC Part. 22.917 (f)

**4.1 Test procedure**

Testing was performed with the EUT connected to a 6 dB attenuator, 6 dB splitter, filter bank and then the EMI receiver. The base station simulator was connected to the other port of the splitter to establish a call. Filters were introduced to reduce or eliminate spurious emission, which could be generated internally in the EMI receiver.

**4.2 Test results**

Channel	Frequency Range (MHz)	Worst Emission (dBm)	FCC Limits (dBm)	Test Result
128	869-894	-85.09	-80	-5.08
189	869-894	-84.47	-80	-4.47
251	869-894	-84.72	-80	-4.72

### TEST 5.

## 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

The radiated spurious emissions were measured for channel 512, channel 661 and channel 810, respectively the upper, center, and lower frequencies of the USPCS band (1850.2 MHz, 1880.0 MHz and 1909.8 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.

### PCS 1900 (Channel 512)

Frequency (MHz)	Level (dBm)	Polarization	Limit (dBm)	Result
197.922	-50.58	Vertical	-13	-37.58
45.433	-50.17	Horizontal	-13	-37.17
986.724	-38.42	Vertical	-13	-25.42
3947.823	-21.74	Vertical	-13	-8.74
4000.000	-21.62	Horizontal	-13	-8.62
7404.043	-22.09	Vertical	-13	-9.09
11102.000	-39.03	Vertical	-13	-26.03
14807.005	-24.33	Vertical	-13	-11.33
24526.005	-28.97	Horizontal	-13	-15.97

### PCS 1900 (Channel 661)

Frequency (MHz)	Level (dBm)	Polarization	Limit (dBm)	Result
192.482	-50.87	Vertical	-13	-37.87
36.438	-49.58	Vertical	-13	-36.58
978.662	-37.88	Horizontal	-13	-24.88
857.774	-36.07	Vertical	-13	-23.07
3995.072	-20.41	Horizontal	-13	-7.41
3530.000	-21.45	Vertical	-13	-8.45
7520.000	-25.59	Horizontal	-13	-12.59
11280.000	-39.37	Vertical	-13	-26.37
15040.000	-22.24	Vertical	-13	-9.24
24479.000	-28.03	Horizontal	-13	-15.03

### PCS 1900 (Channel 810)

Frequency (MHz)	Level (dBm)	Polarization	Limit (dBm)	Result
198.827	-50.95	Vertical	-13	-37.95
45.863	-50.24	Vertical	-13	-37.24
928.384	-38.12	Horizontal	-13	-25.12
835.623	-38.85	Vertical	-13	-25.85
3994.003	-20.98	Horizontal	-13	-7.98
7640.283	-15.10	Vertical	-13	-2.10
9551.000	-20.44	Horizontal	-13	-7.44
11642.000	-35.42	Vertical	-13	-22.42
15280.000	-29.50	Vertical	-13	-16.50
24536.000	-28.95	Horizontal	-13	-15.95
26000.000	-27.21	Horizontal	-13	-14.21

### GSM 850 (Channel 128)

Frequency (MHz)	Level (dBm)	Polarization	Limit (dBm)	Result
194.711	-51.75	Vertical	-13	-38.75
43.600	-50.42	Horizontal	-13	-34.42
824.000	-17.08	Vertical	-13	-4.08
1635.000	-18.68	Vertical	-13	-5.68
3530.000	-22.62	Horizontal	-13	-9.62
7622.000	-46.10	Horizontal	-13	-33.10
11173.000	-40.84	Vertical	-13	-27.84

### GSM 850 (Channel 188)

Frequency (MHz)	Level (dBm)	Polarization	Limit (dBm)	Result
188.856	-52.28	Vertical	-13	-37.28
47.370	-50.84	Vertical	-13	-37.84
996.653	-39.10	Horizontal	-13	-26.10
850.520	-27.49	Horizontal	-13	-14.49
1677.000	-23.05	Vertical	-13	-10.05
7529.000	-45.95	Vertical	-13	-32.95
10787.000	-41.68	Horizontal	-13	-28.68
10800.000	-41.18	Vertical	-13	-28.18

### GSM 850 (Channel 251)

Frequency (MHz)	Level (dBm)	Polarization	Limit (dBm)	Result
83.682	-51.98	Vertical	-13	-38.98
-37.557	-51.56	Horizontal	-13	-38.56
849.000	-18.43	Vertical	-13	-5.43
1703.000	-16.11	Vertical	-13	-3.11
3973.000	-22.91	Horizontal	-13	-9.09
7564.000	-46.18	Vertical	-13	-33.18
10738.000	-41.23	Vertical	-13	-28.23
10756.000	-41.33	Horizontal	-13	-28.33

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## 5. LIST OF EQUIPMENT USED

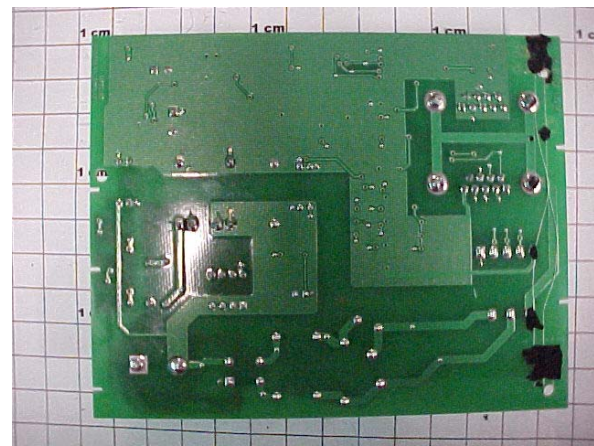
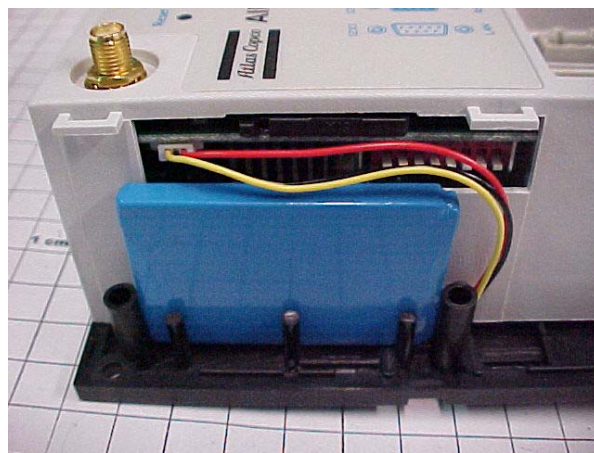
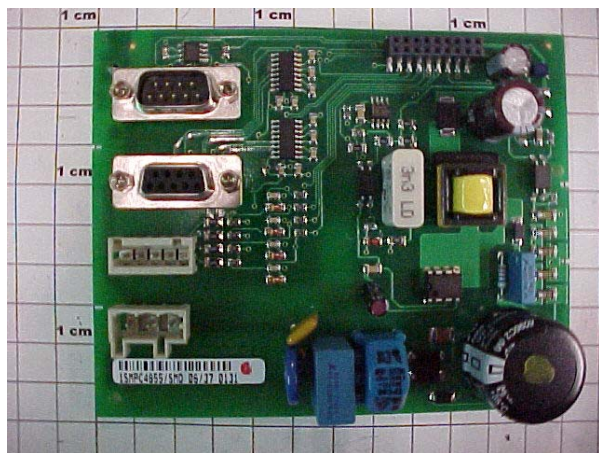
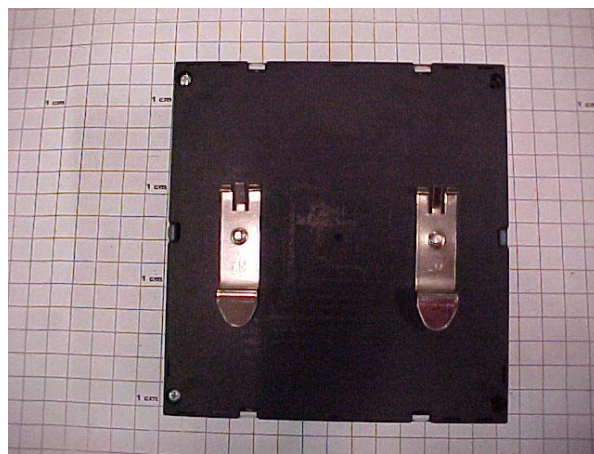
Description	Manufacturer	Model No.
Semianechoic chamber (CISPR 16-1 :1993)	Siemens+Matsushita	B84117-D6019-T232
EMI receiver	Rohde & Schwarz	ESMI (15Hz-26.5GHz)
Antenna	Chase	CBL 6111 A
Wireless communications test set	Agilent	8960 series 10 (E5515C)
Log periodic antenna	Rohde & Schwarz	HL 025 (1 – 18 GHz)
Spectrum Analyzer	Rohde & Schwarz	FSP ( 9kHz – 40 GHz)
Signal generator	Rohde & Schwarz	SMP 04 (10 MHz – 40 GHz)
Horn Antenna BBHA 9170	Schaffner	SHF-EHF (15 GHz – 35 GHz)
Conical log spiral antenna	Antenna Research Ass.	CLS-110A
Preamplifier	Bonn	118M



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## 6 .PHOTOGRAPHIC DOCUMENTATION

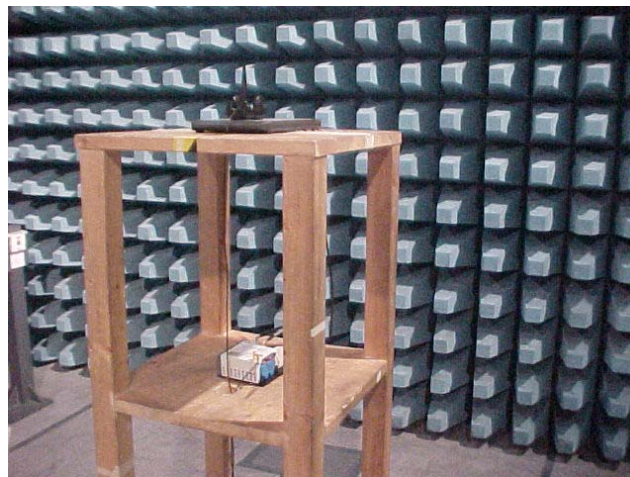
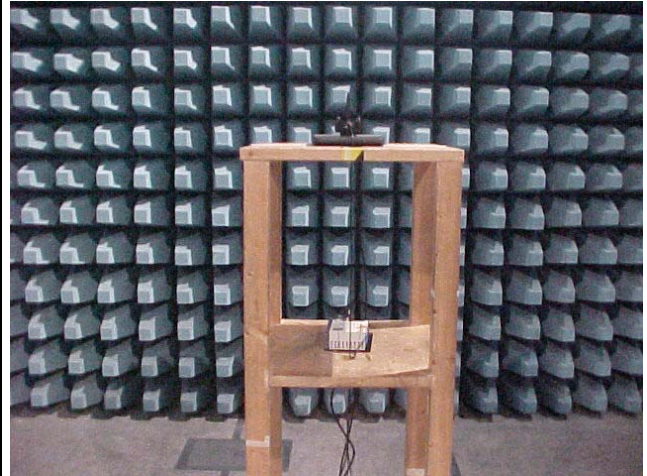
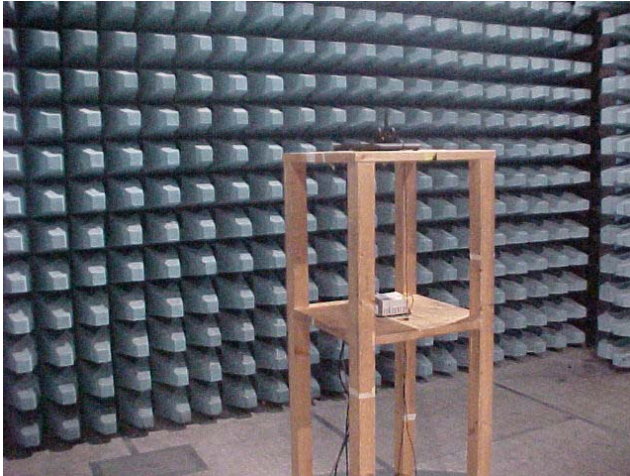
PHOTO N° 1 –EUT IDENTIFICATION





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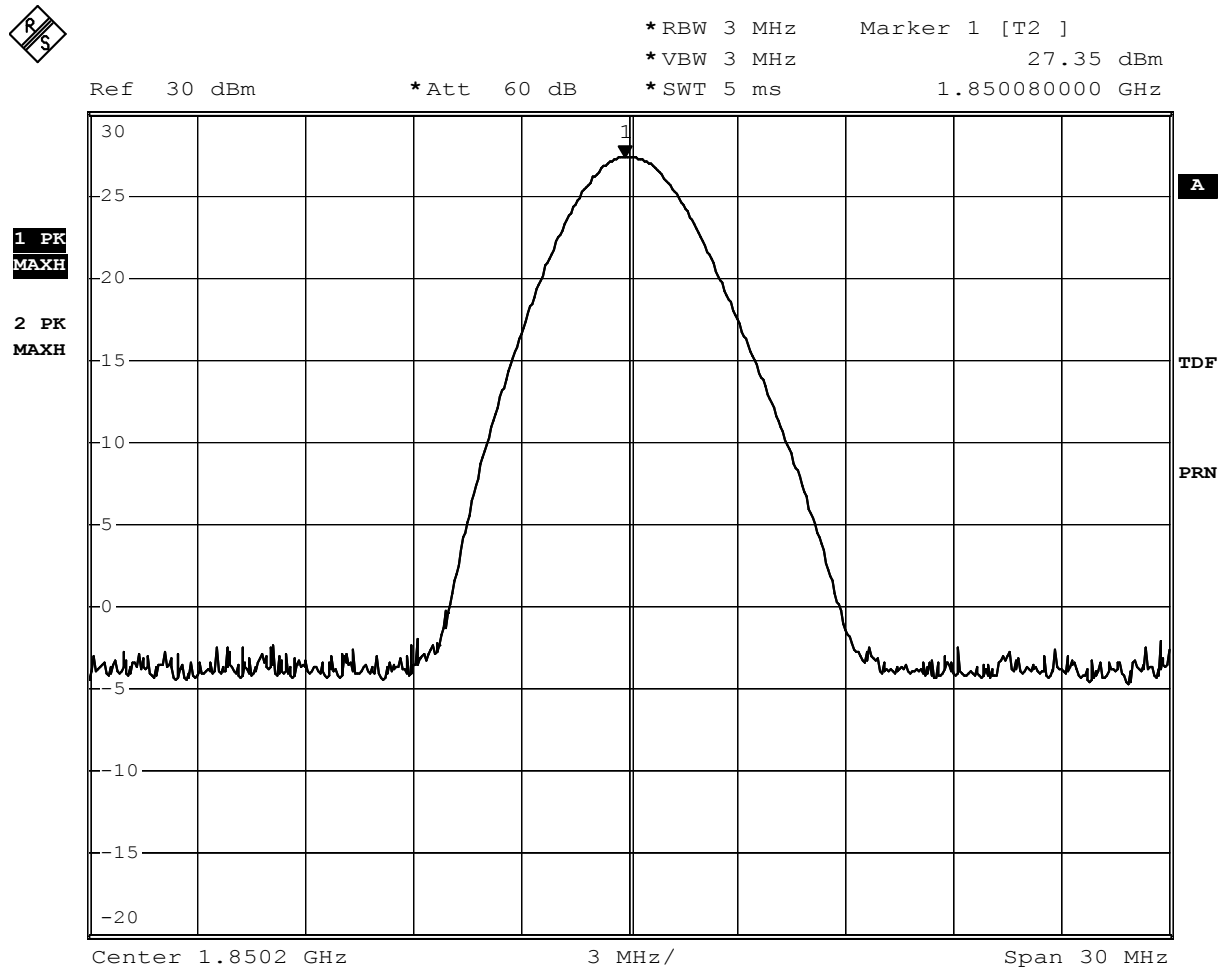
**PHOTO N° 2 –SETUP FIELD STRENGTH OF SPURIOUS RADIATION**



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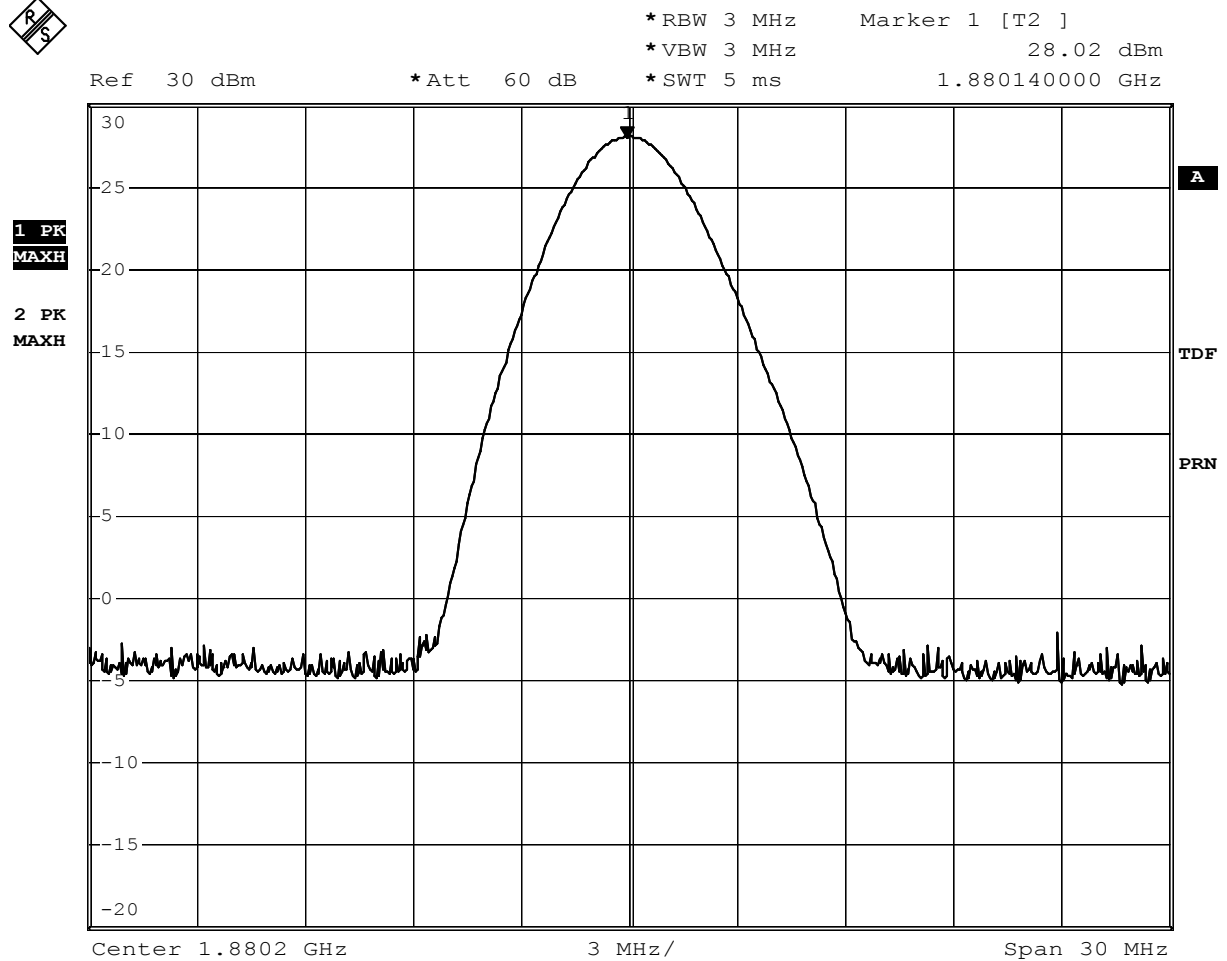
## 7. APPENDIX

### APPENDIX 1: RF POWER OUTPUT



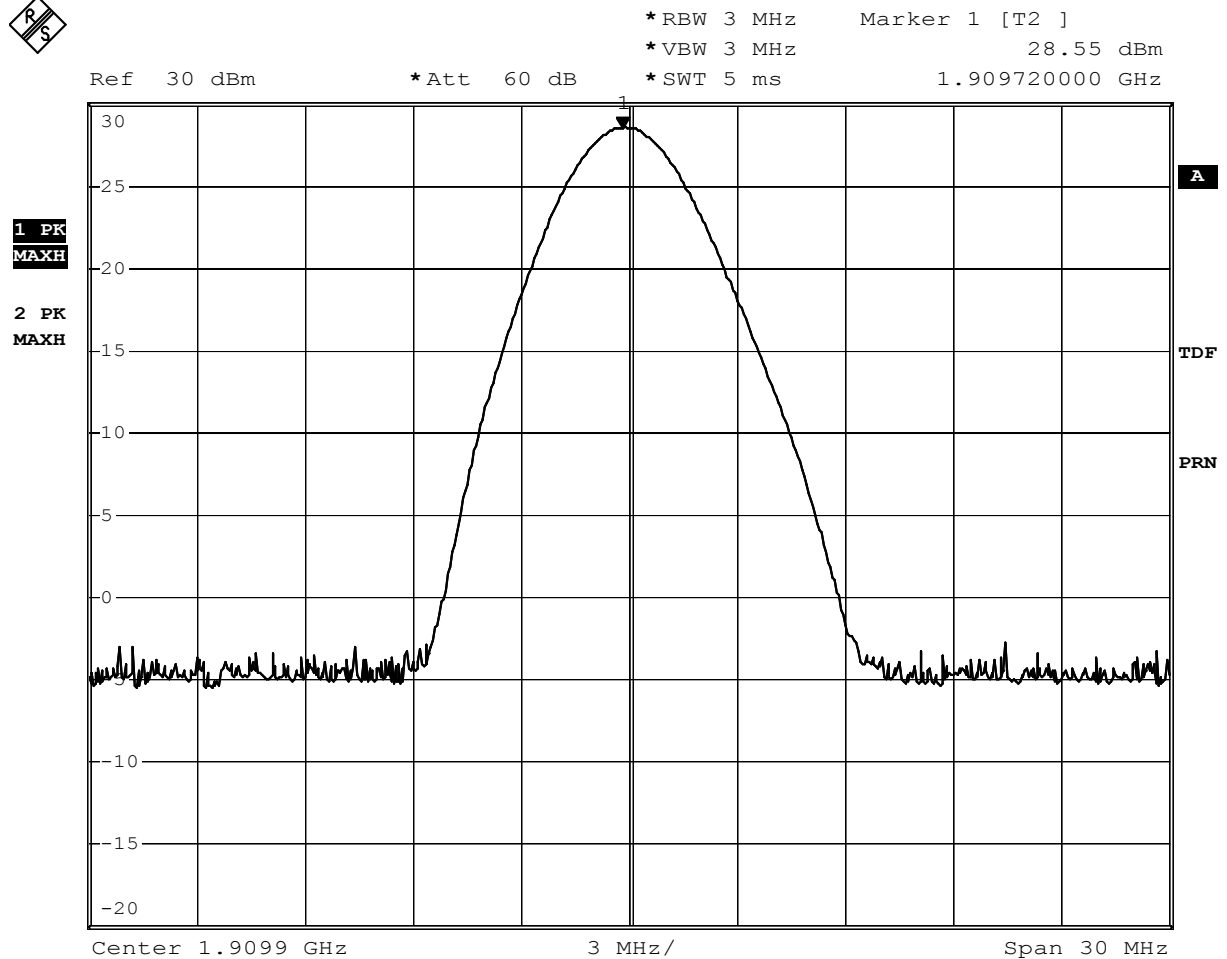
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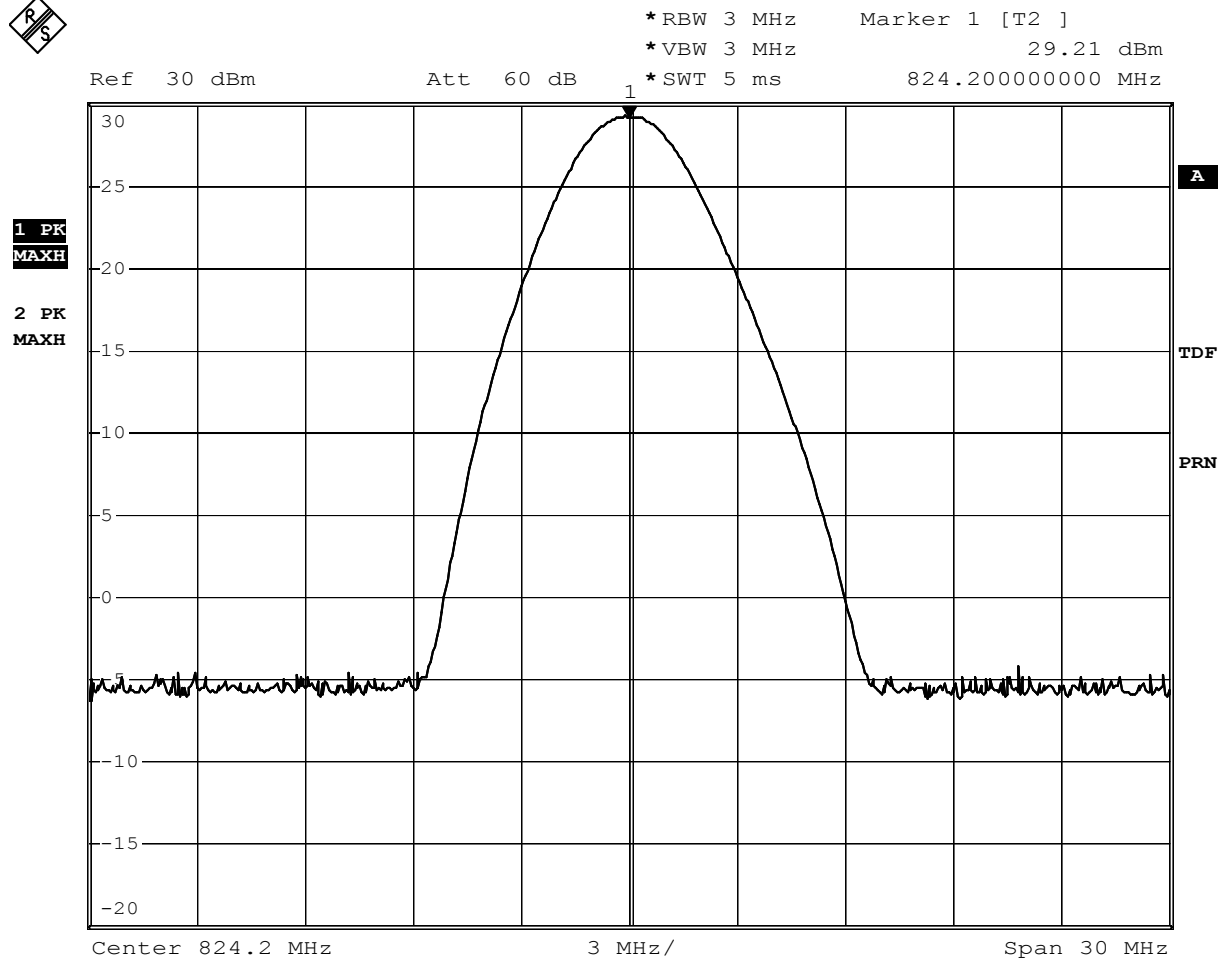
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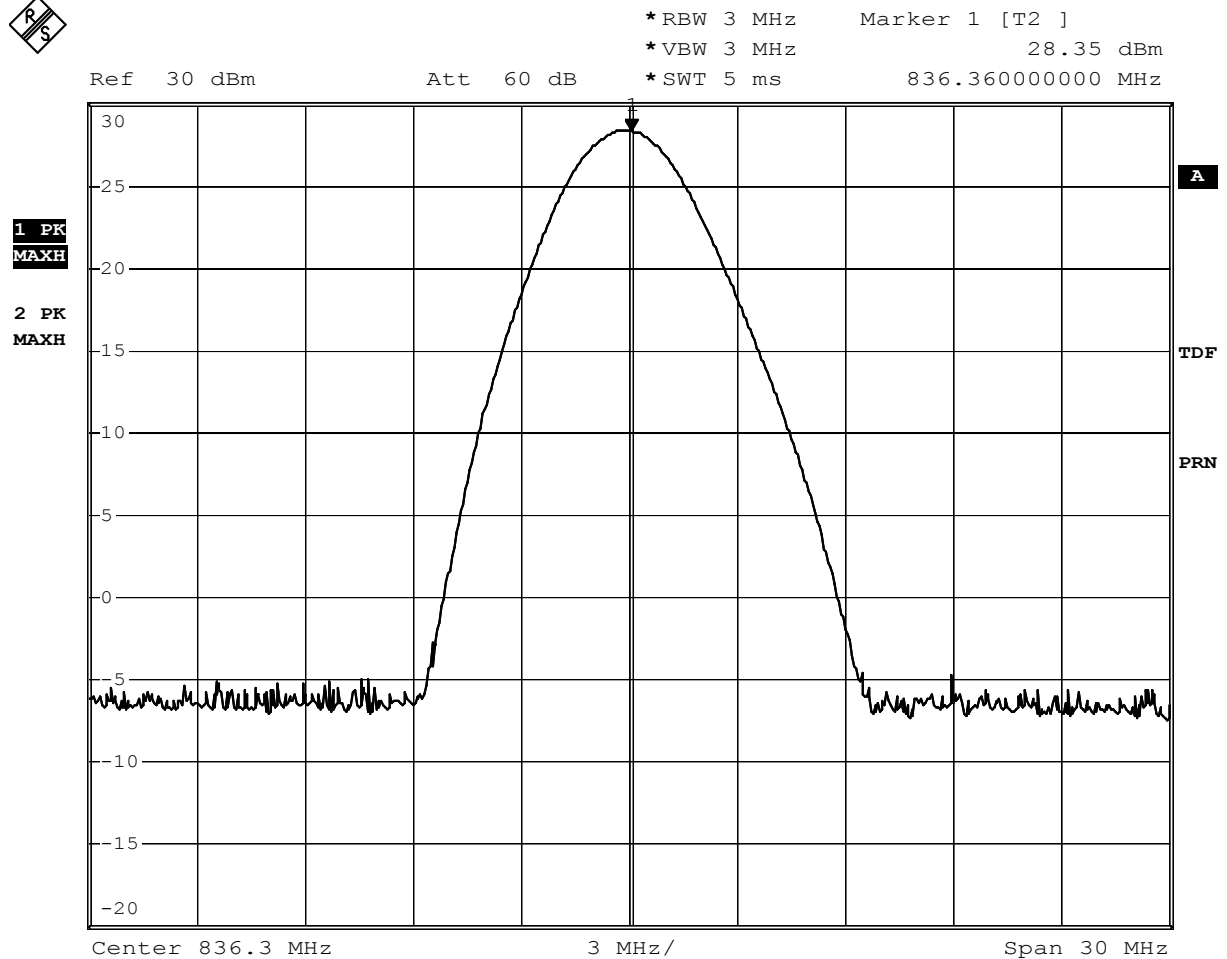
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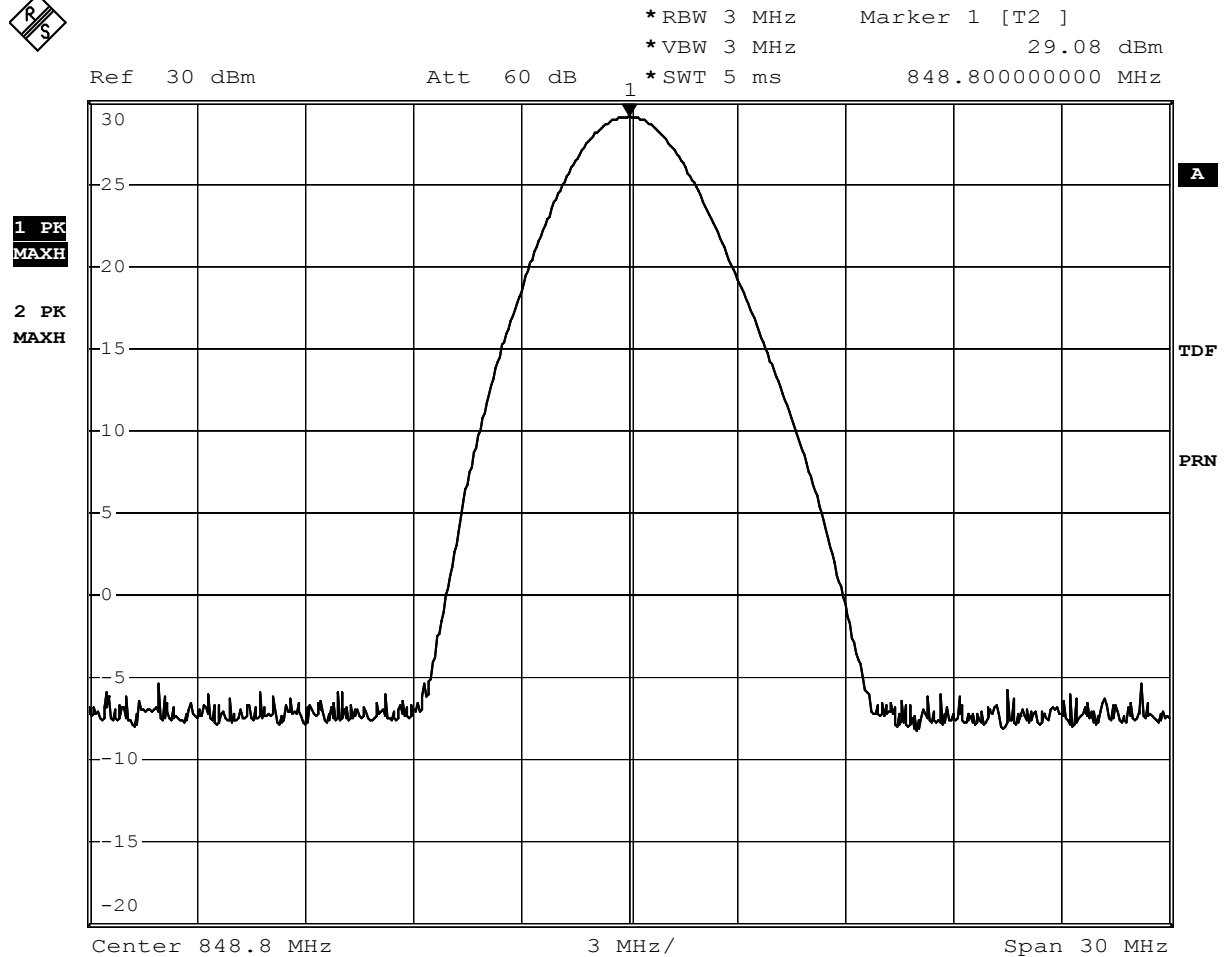
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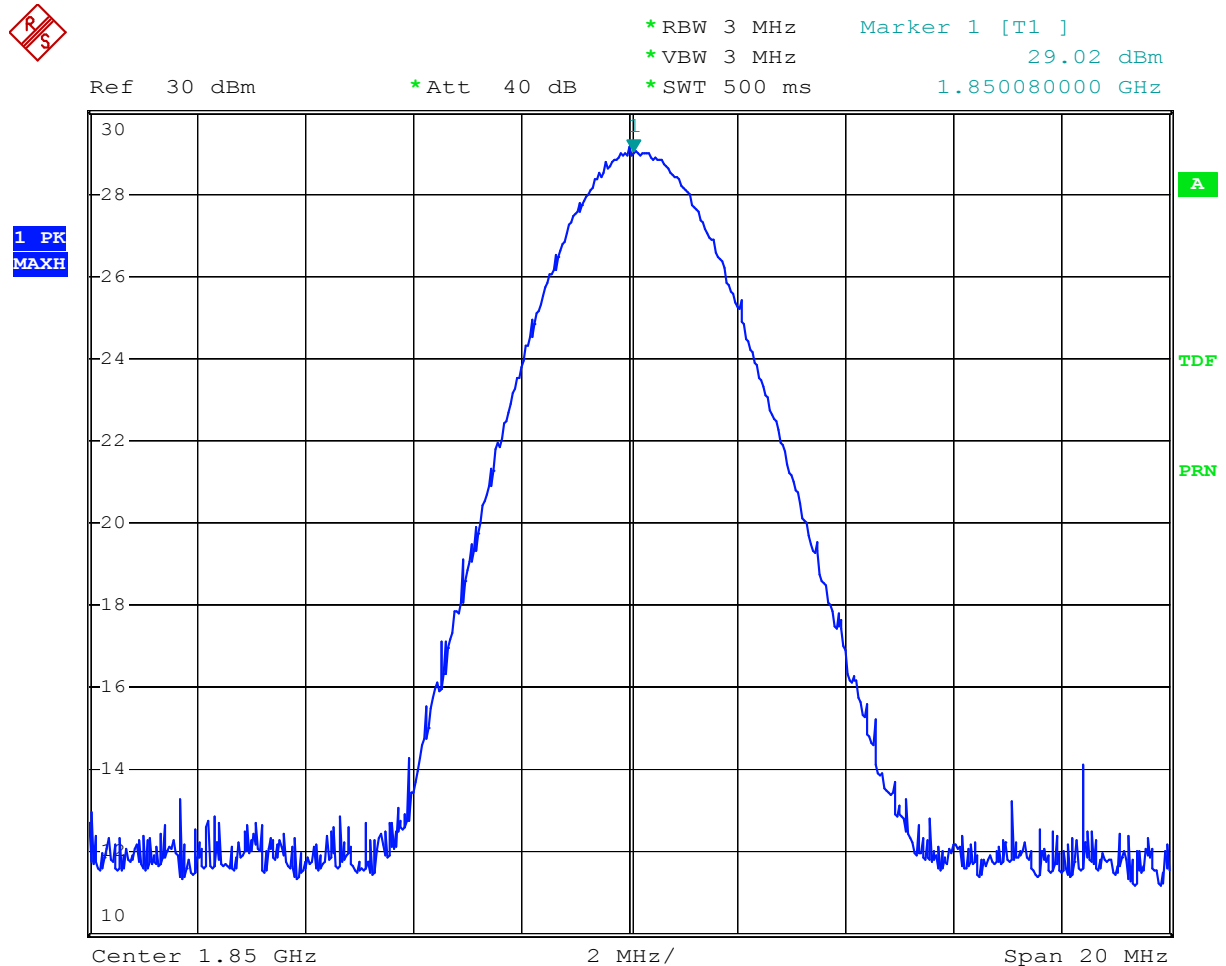


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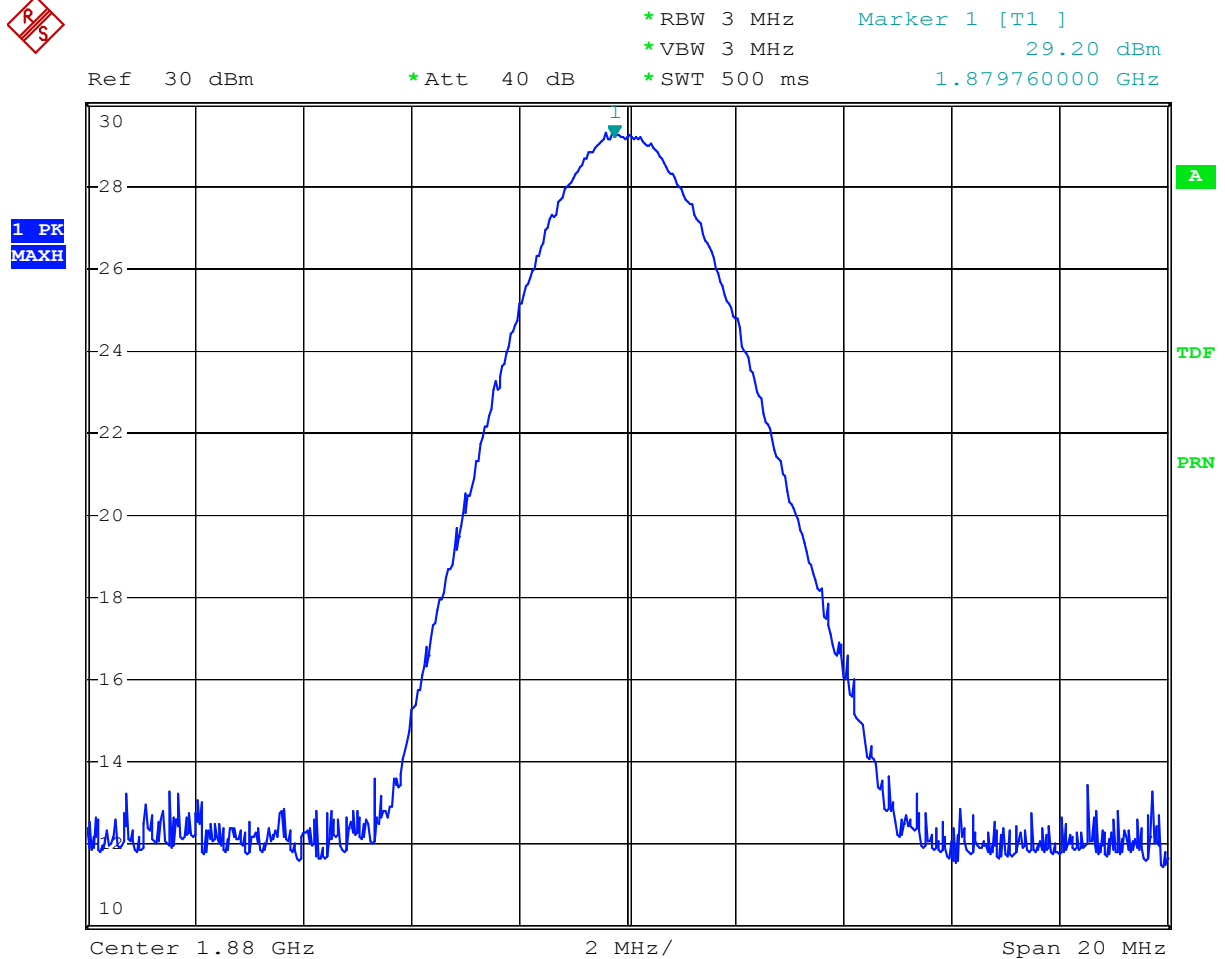
Prima Ricerca & Sviluppo Srl soggetta a direzione e coordinamento da parte della Giovanni Maspero & C. S.p.A. – C.I. 02634780130  
Sede legale : 22100 Tavernola (CO) Via Conciliazione, 1 Cod. FISC. e N. R.I. CO 02635860139  
Sede operativa : Laboratori Via Campagna, 92 22020 Faloppio fraz. Gaggino (CO) Tel. +39 03135000.11 Fax +39 031991309

## APPENDIX 2: ERP, EIRP



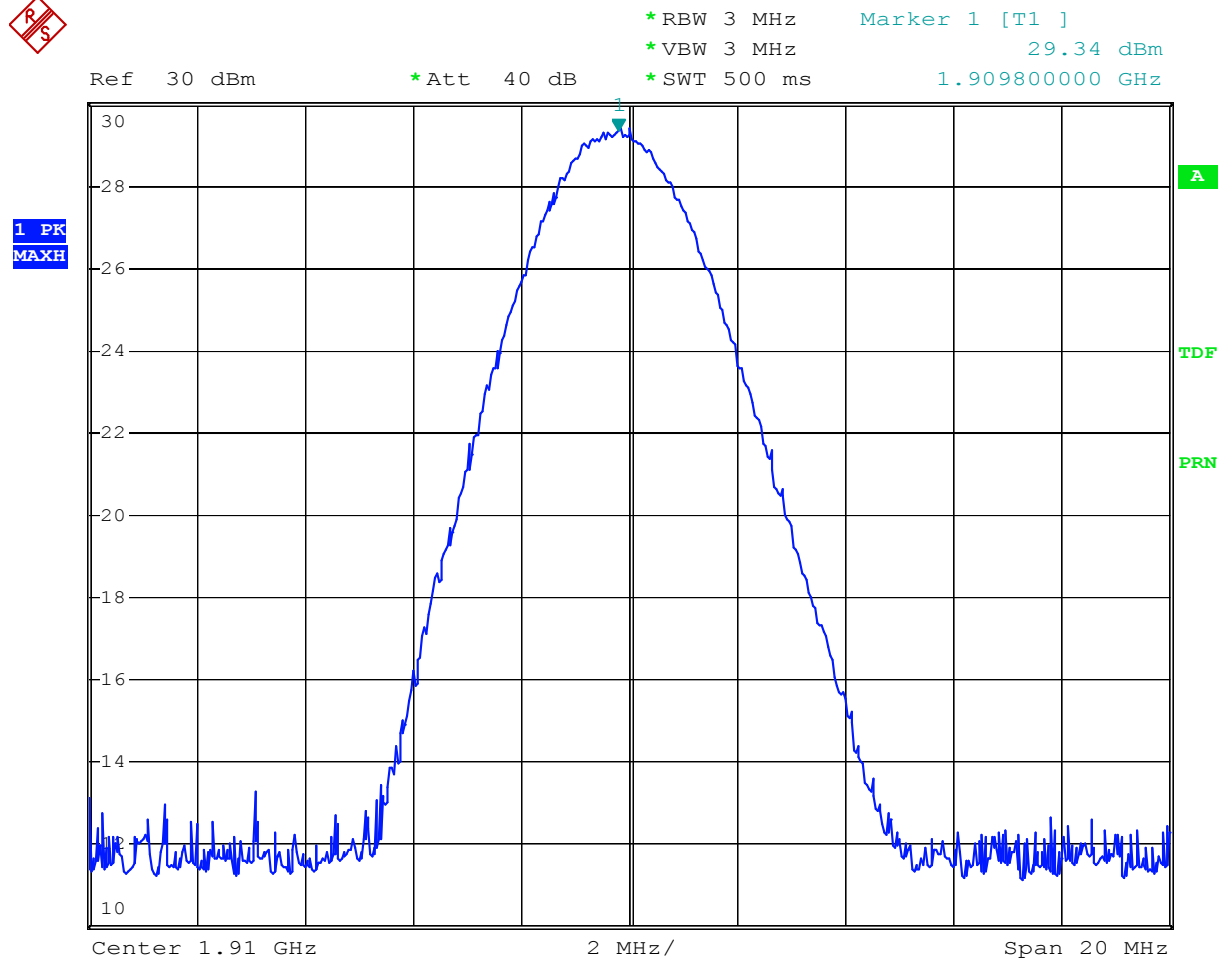
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Sede legale : 22100 Tavernola (CO) Via Conciliazione, 1 Cod. FISC. e N. R.I. CO 02635860139  
Sede operativa : Laboratori Via Campagna, 92 22020 Faloppio fraz. Gaggino (CO) Tel. +39 03135000.11 Fax +39 031991309



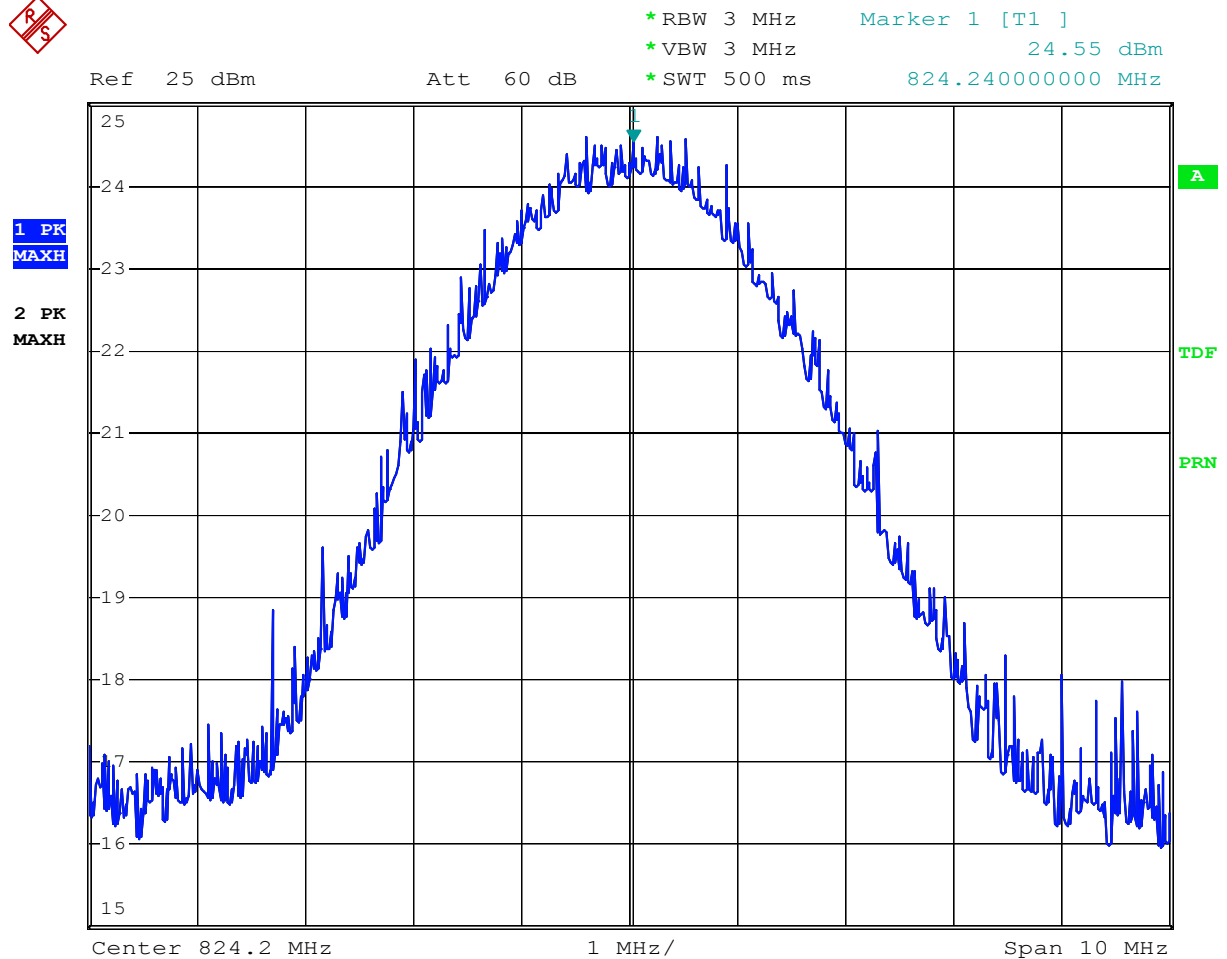
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Sede legale : 22100 Tavernola (CO) Via Conciliazione, 1 Cod. FISC. e N. R.I. CO 02635860139  
Sede operativa : Laboratori Via Campagna, 92 22020 Faloppio fraz. Gaggino (CO) Tel. +39 03135000.11 Fax +39 031991309



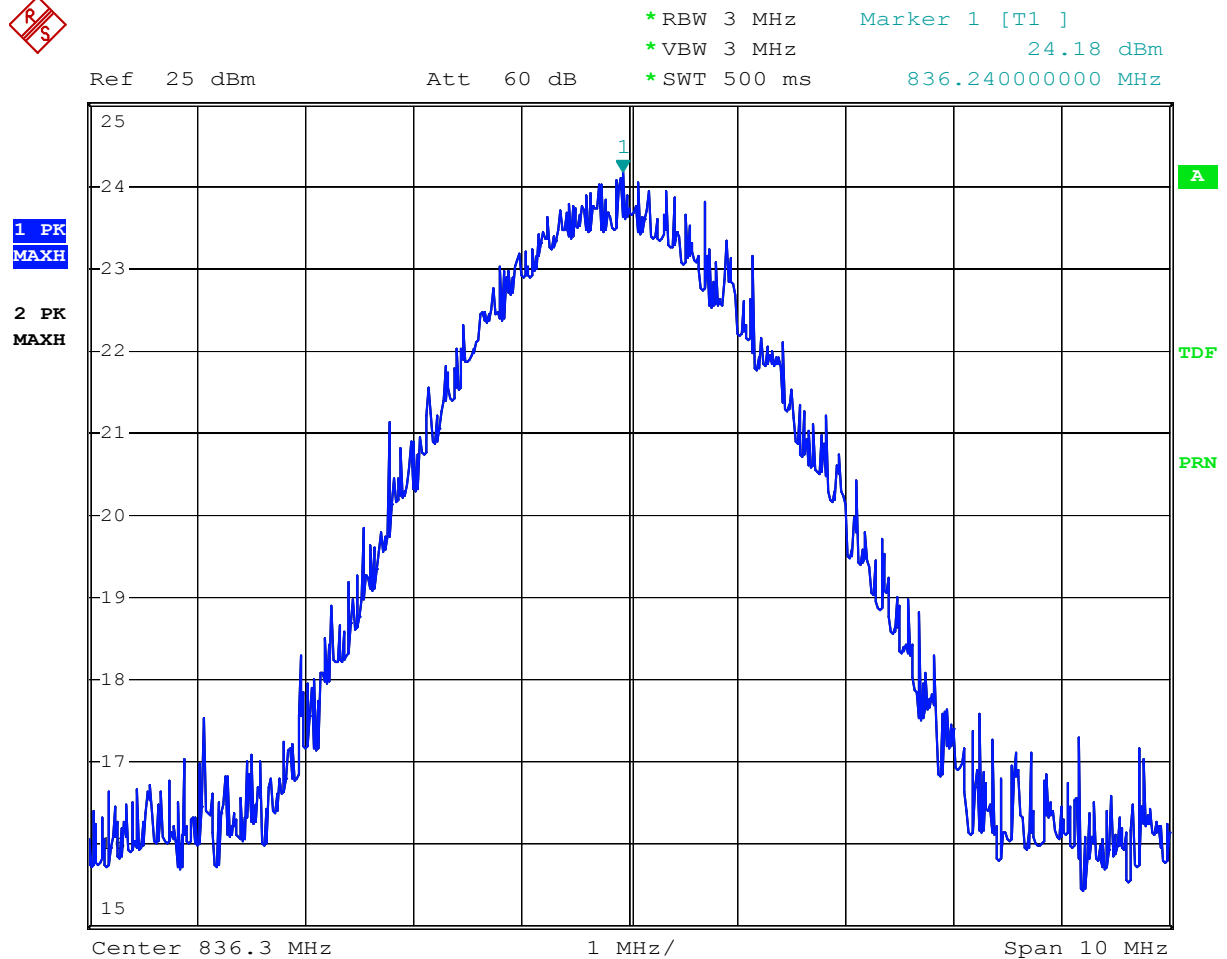
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Prima Ricerca & Sviluppo Srl soggetta a direzione e coordinamento da parte della Giovanni Maspero & C. S.p.A. – C.I. 02634780130  
Sede legale : 22100 Tavernola (CO) Via Conciliazione, 1 Cod. FISC. e N. R.I. CO 02635860139  
Sede operativa : Laboratori Via Campagna, 92 22020 Faloppio fraz. Gaggino (CO) Tel. +39 03135000.11 Fax +39 031991309



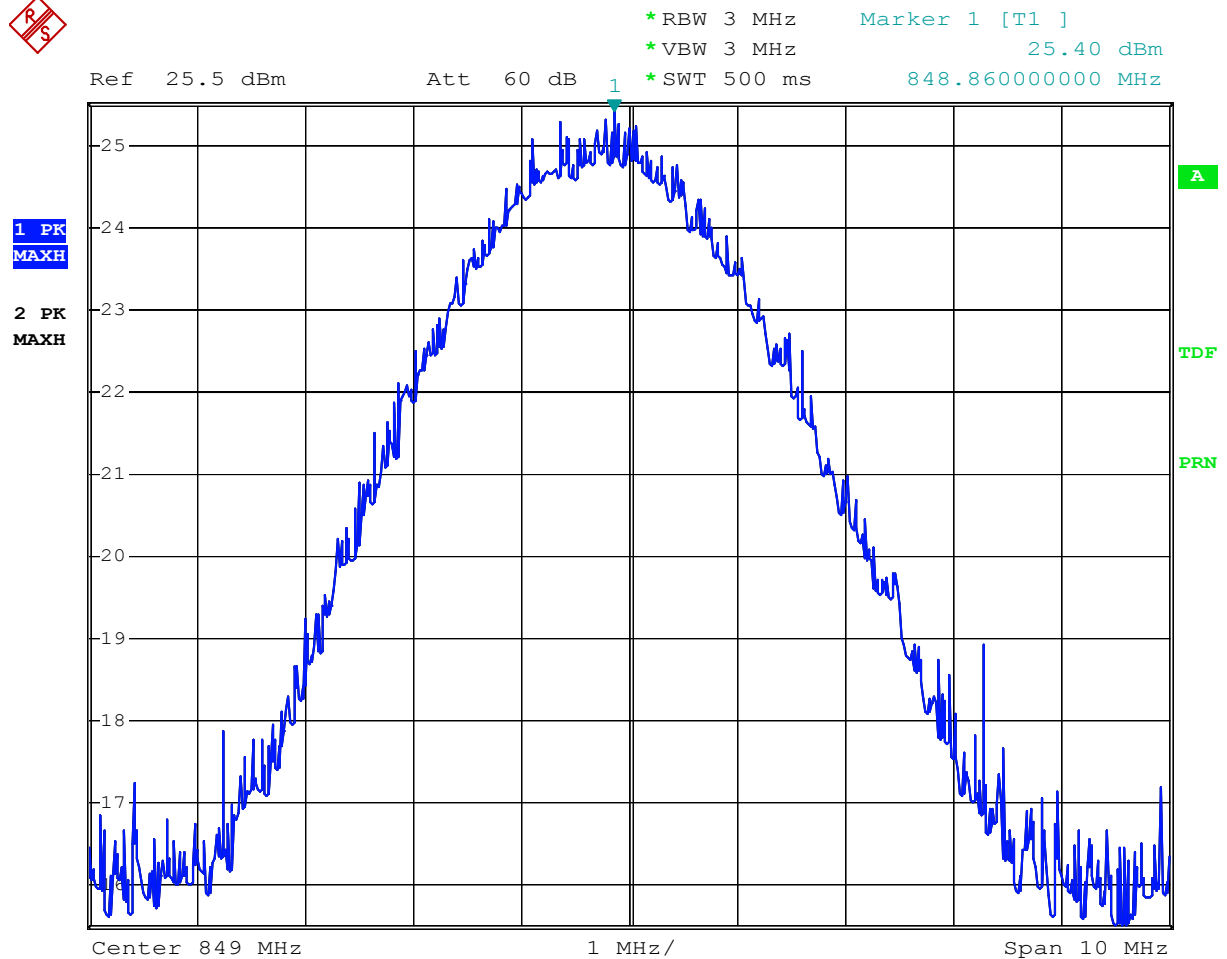
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Sede legale : 22100 Tavernola (CO) Via Conciliazione, 1 Cod. FISC. e N. R.I. CO 02635860139  
Sede operativa : Laboratori Via Campagna, 92 22020 Faloppio fraz. Gaggino (CO) Tel. +39 03135000.11 Fax +39 031991309



Date: 13.DEC.2006 07:04:49

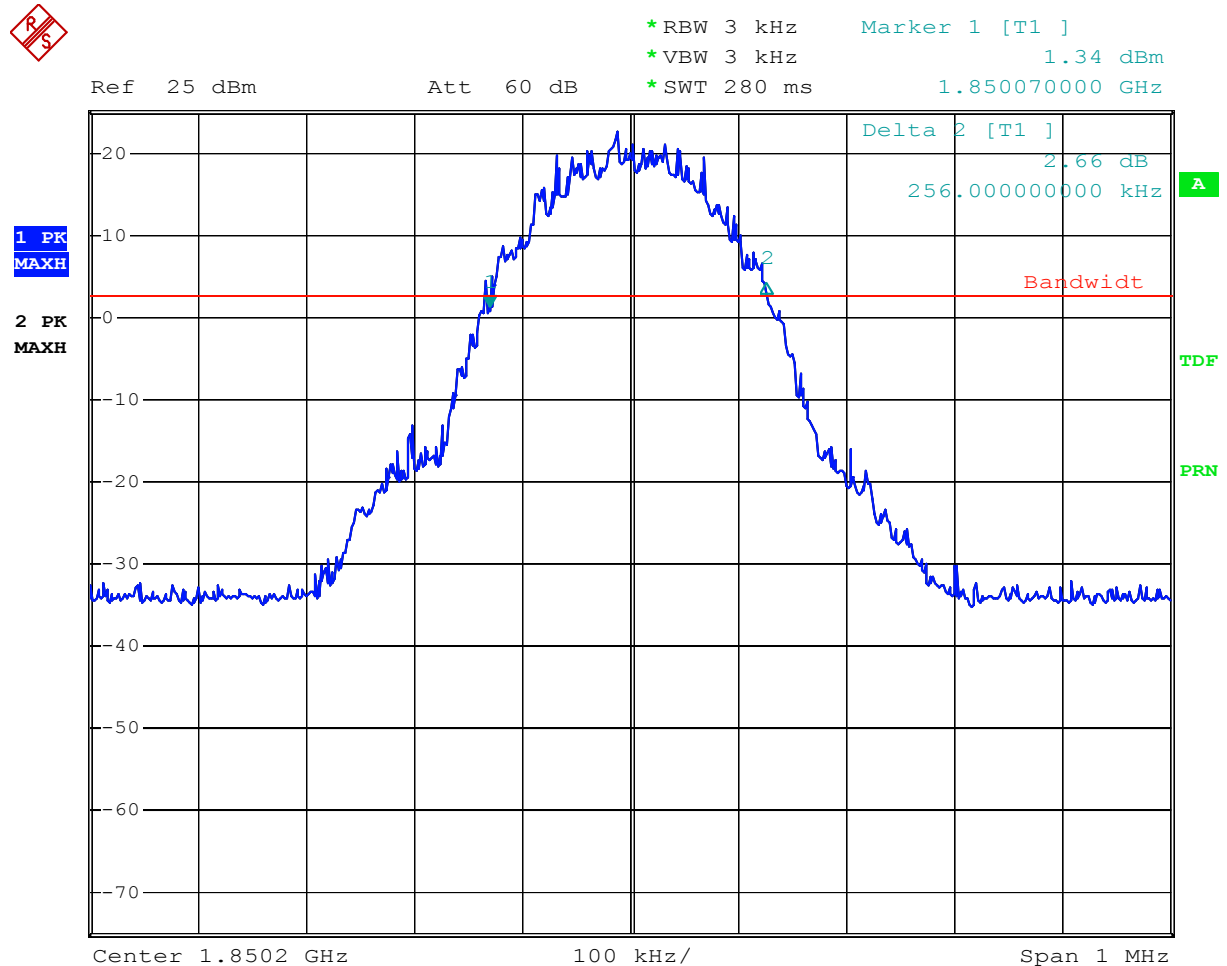
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Sede legale : 22100 Tavernola (CO) Via Conciliazione, 1 Cod. FISC. e N. R.I. CO 02635860139  
Sede operativa : Laboratori Via Campagna, 92 22020 Faloppio fraz. Gaggino (CO) Tel. +39 03135000.11 Fax +39 031991309



Date: 13.DEC.2006 07:07:05

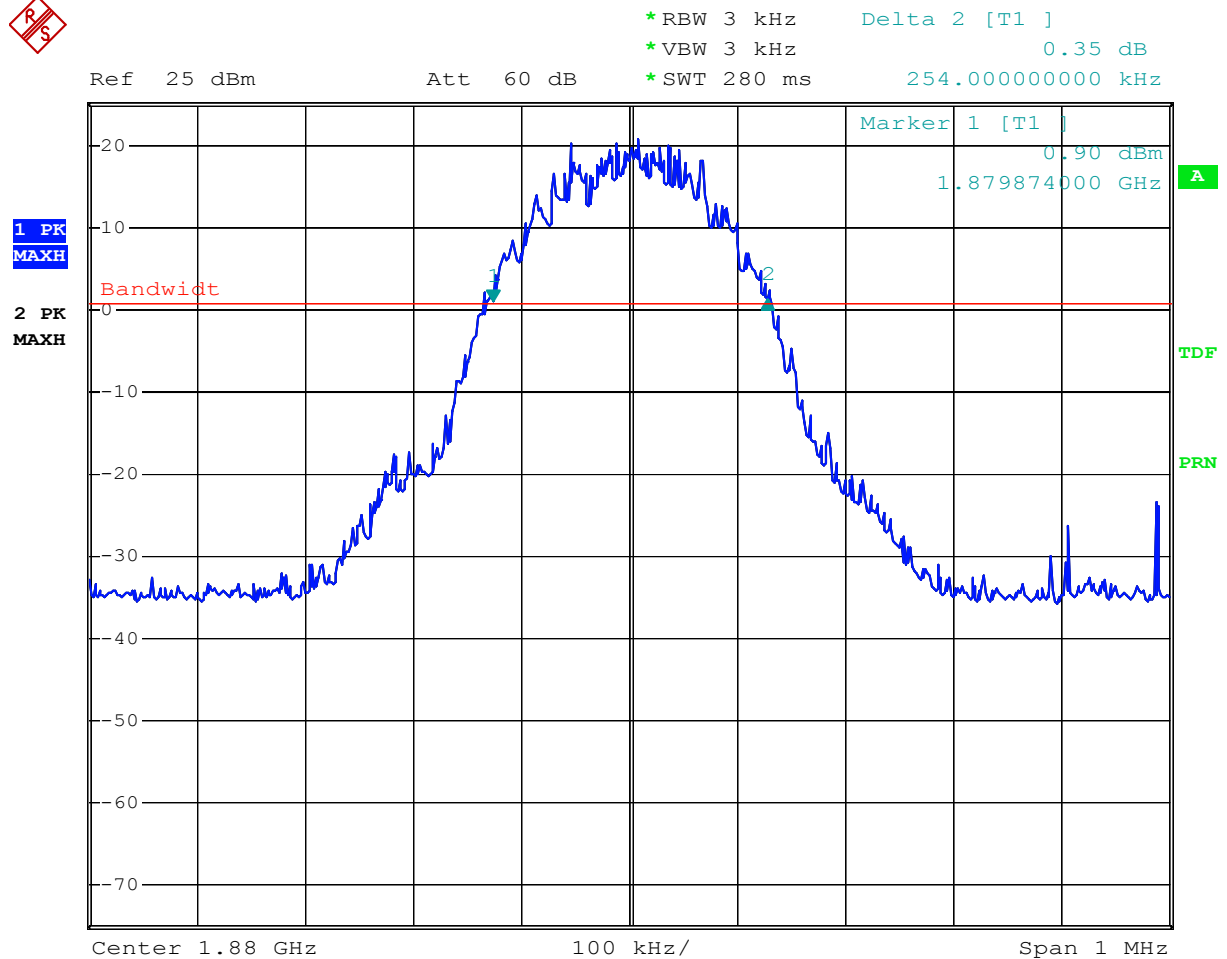
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Sede legale : 22100 Tavernola (CO) Via Conciliazione, 1 Cod. FISC. e N. R.I. CO 02635860139  
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### APPENDIX 3: OCCUPIED BANDWIDTH



Date: 12.DEC.2006 11:38:04

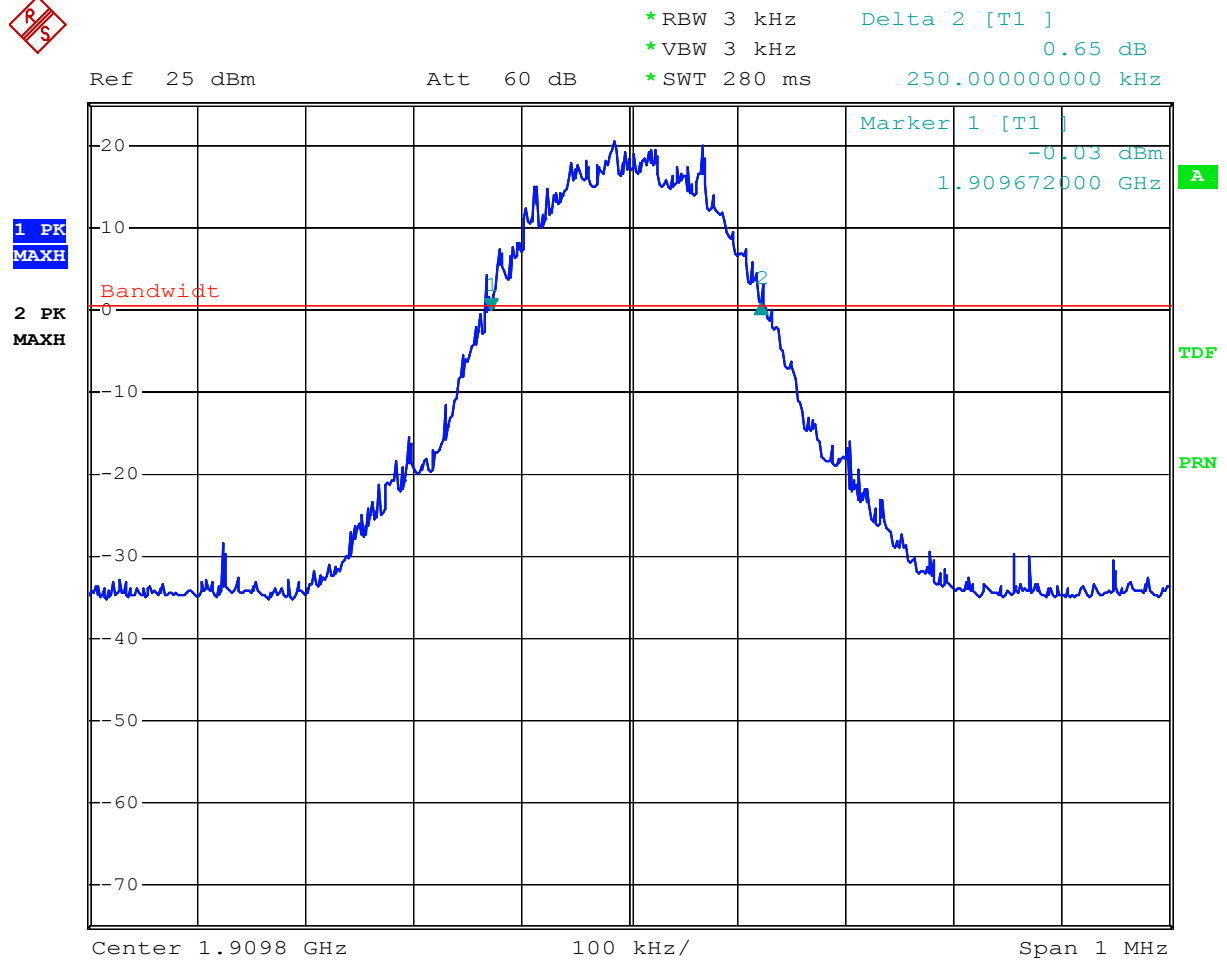
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Sede legale : 22100 Tavernola (CO) Via Conciliazione, 1 Cod. FISC. e N. R.I. CO 02635860139  
Sede operativa : Laboratori Via Campagna, 92 22020 Faloppio fraz. Gaggino (CO) Tel. +39 03135000.11 Fax +39 031991309



Date: 12.DEC.2006 11:45:16

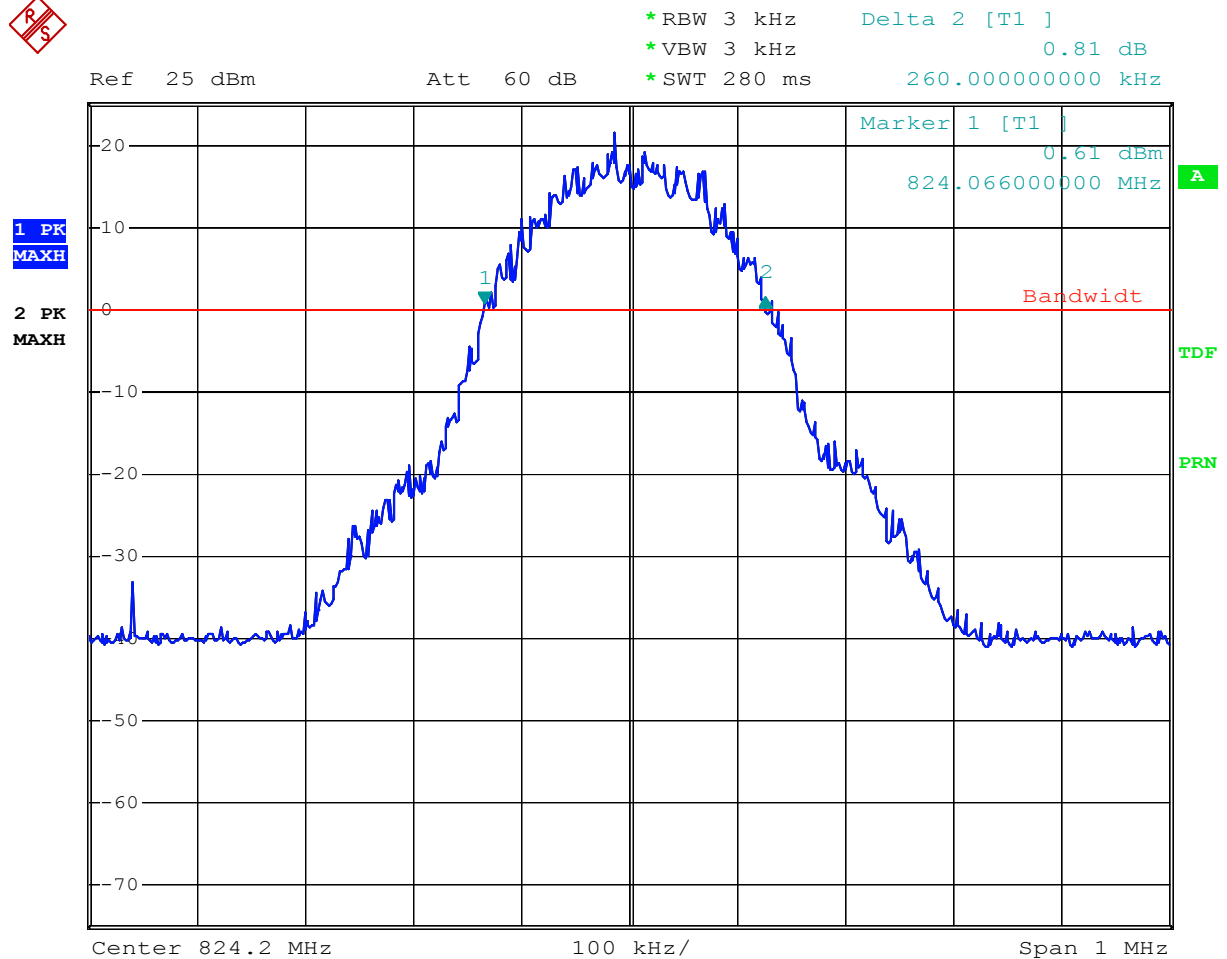


Prima Ricerca & Sviluppo Srl soggetta a direzione e coordinamento da parte della Giovanni Maspero & C. S.p.A. – C.I. 02634780130  
Sede legale : 22100 Tavernola (CO) Via Conciliazione, 1 Cod. FISC. e N. R.I. CO 02635860139  
Sede operativa : Laboratori Via Campagna, 92 22020 Faloppio fraz. Gaggino (CO) Tel. +39 03135000.11 Fax +39 031991309



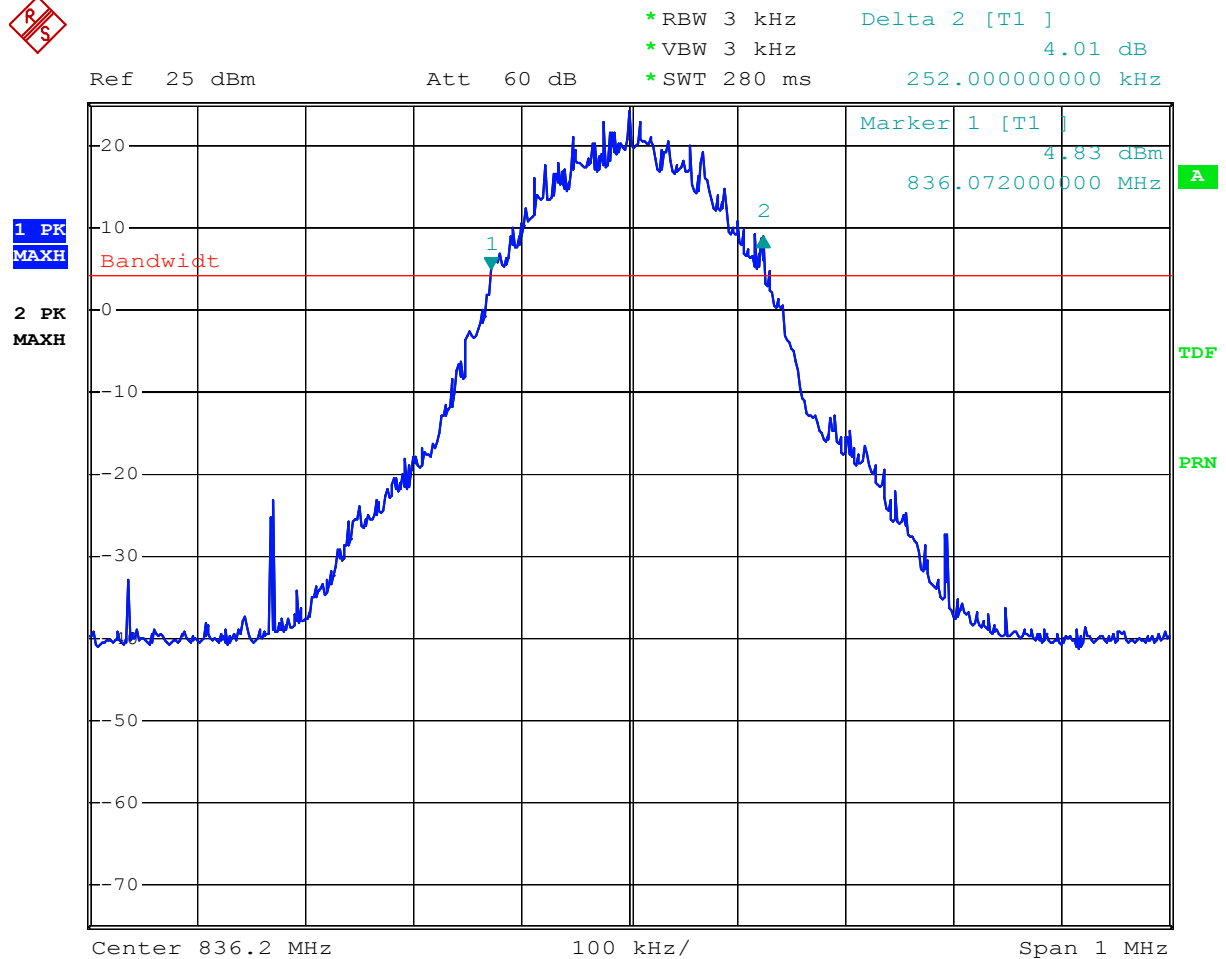
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Sede legale : 22100 Tavernola (CO) Via Conciliazione, 1 Cod. FISC. e N. R.I. CO 02635860139  
Sede operativa : Laboratori Via Campagna, 92 22020 Faloppio fraz. Gaggino (CO) Tel. +39 03135000.11 Fax +39 031991309



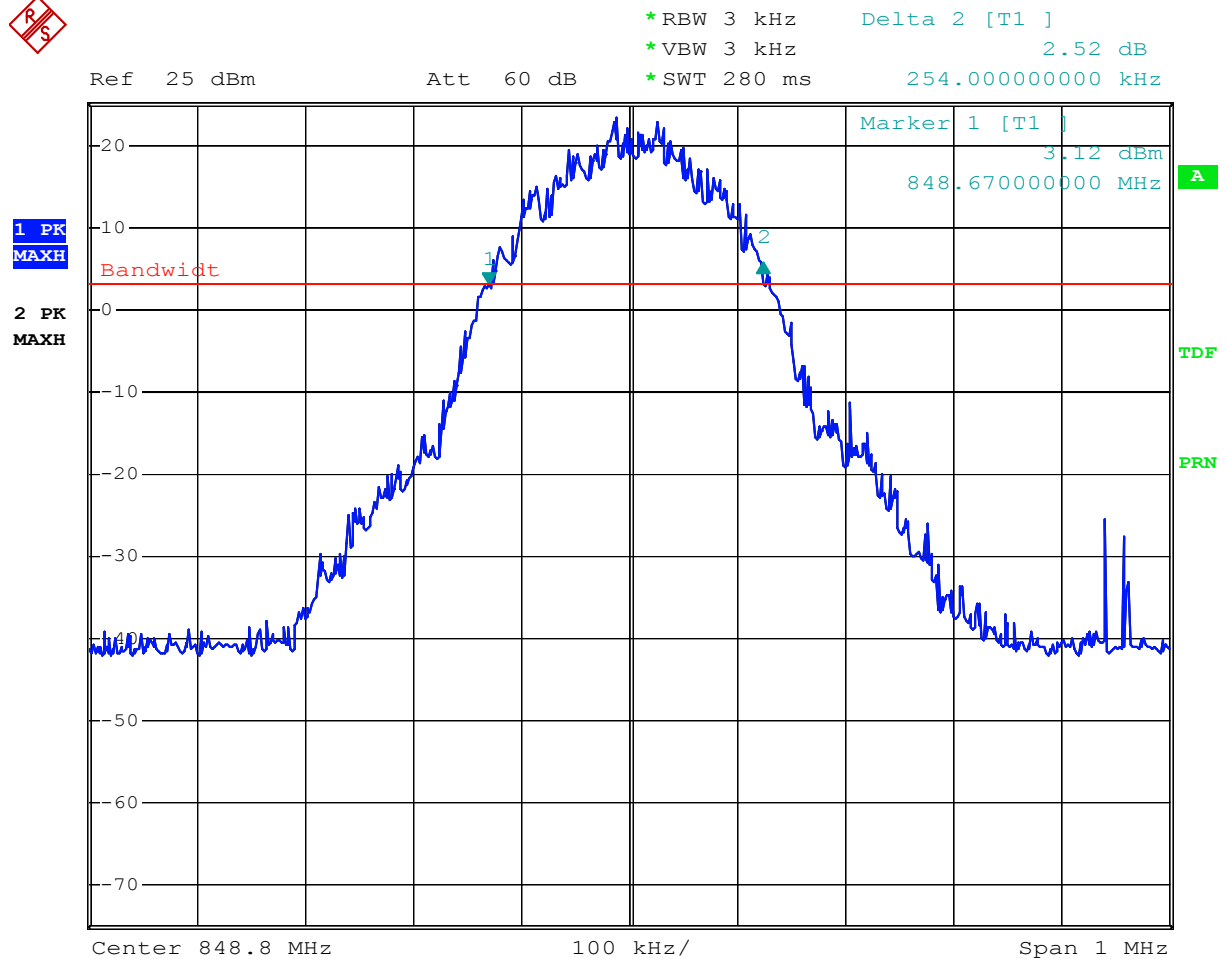
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Sede legale : 22100 Tavernola (CO) Via Conciliazione, 1 Cod. FISC. e N. R.I. CO 02635860139  
Sede operativa : Laboratori Via Campagna, 92 22020 Faloppio fraz. Gaggino (CO) Tel. +39 03135000.11 Fax +39 031991309



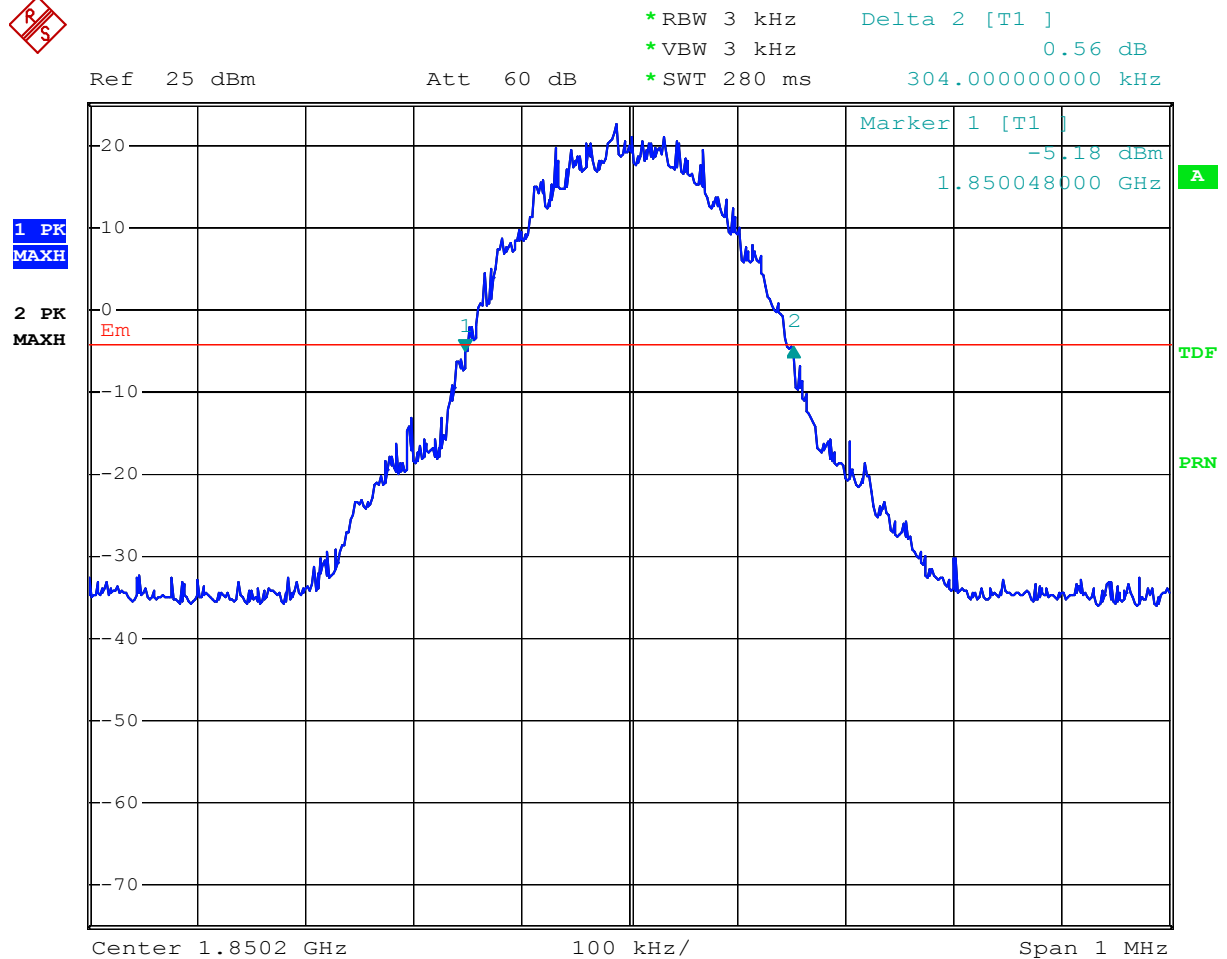
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Sede legale : 22100 Tavernola (CO) Via Conciliazione, 1 Cod. FISC. e N. R.I. CO 02635860139  
Sede operativa : Laboratori Via Campagna, 92 22020 Faloppio fraz. Gaggino (CO) Tel. +39 03135000.11 Fax +39 031991309



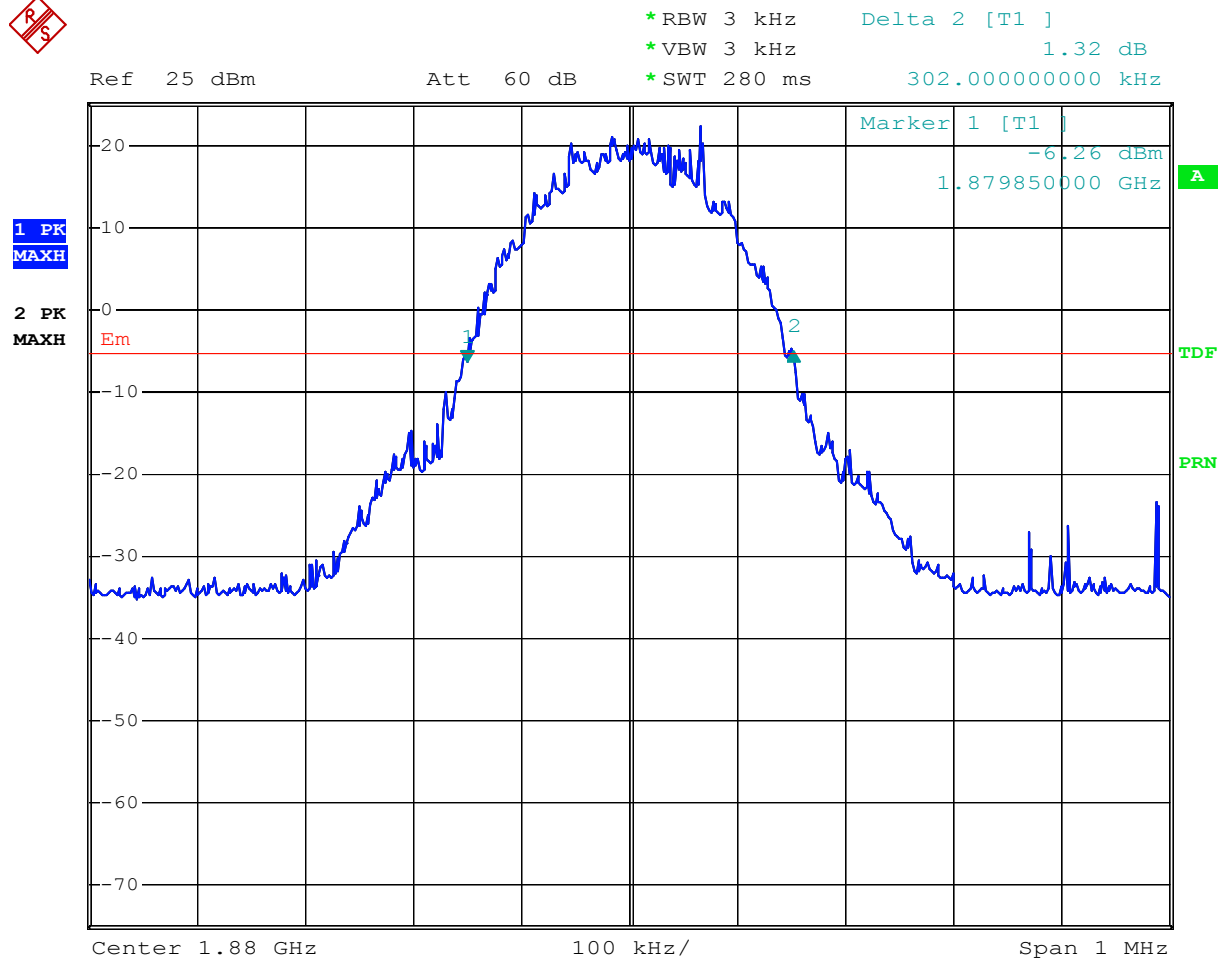
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Sede legale : 22100 Tavernola (CO) Via Conciliazione, 1 Cod. FISC. e N. R.I. CO 02635860139  
Sede operativa : Laboratori Via Campagna, 92 22020 Faloppio fraz. Gaggino (CO) Tel. +39 03135000.11 Fax +39 031991309



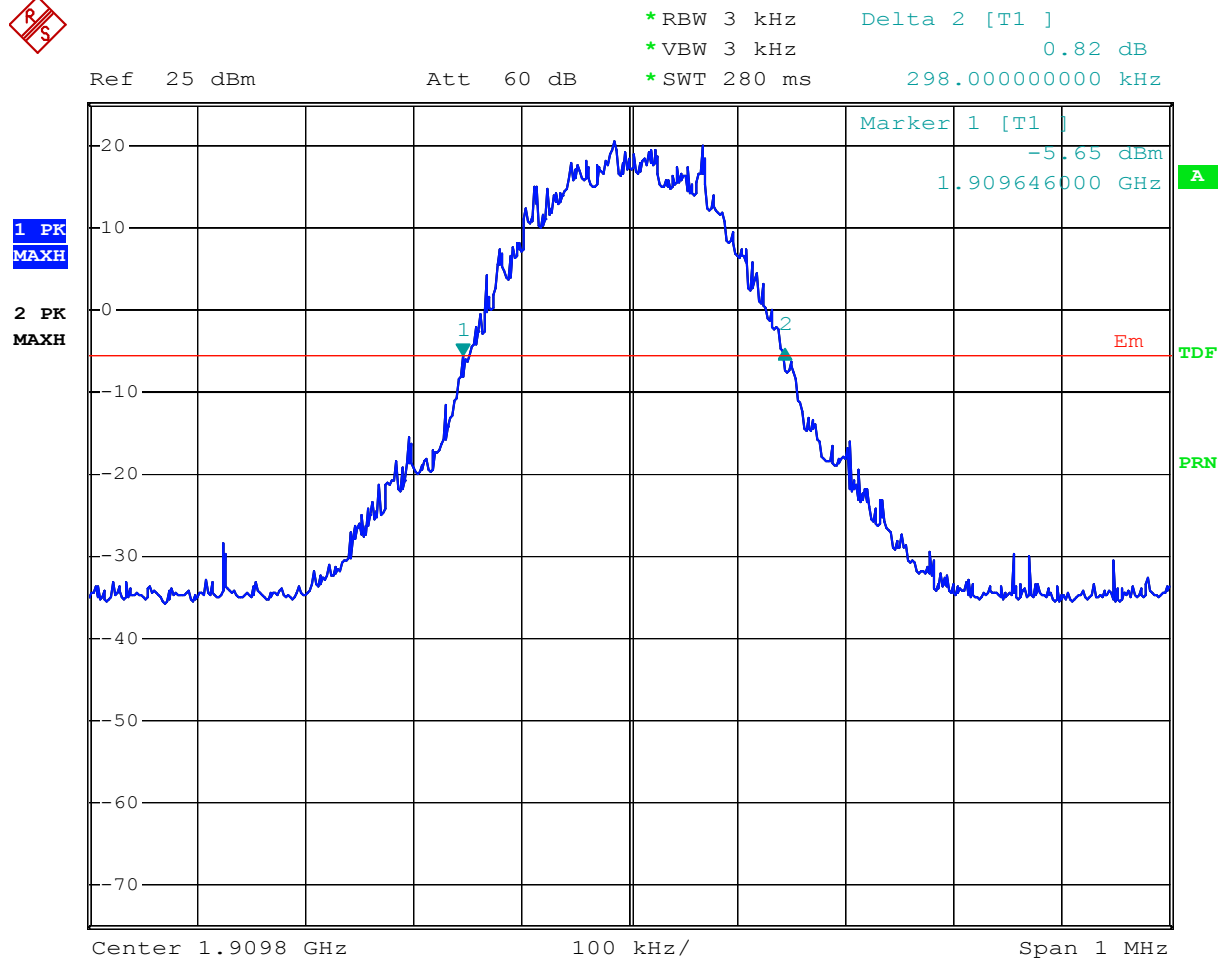
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Sede legale : 22100 Tavernola (CO) Via Conciliazione, 1 Cod. FISC. e N. R.I. CO 02635860139  
Sede operativa : Laboratori Via Campagna, 92 22020 Faloppio fraz. Gaggino (CO) Tel. +39 03135000.11 Fax +39 031991309



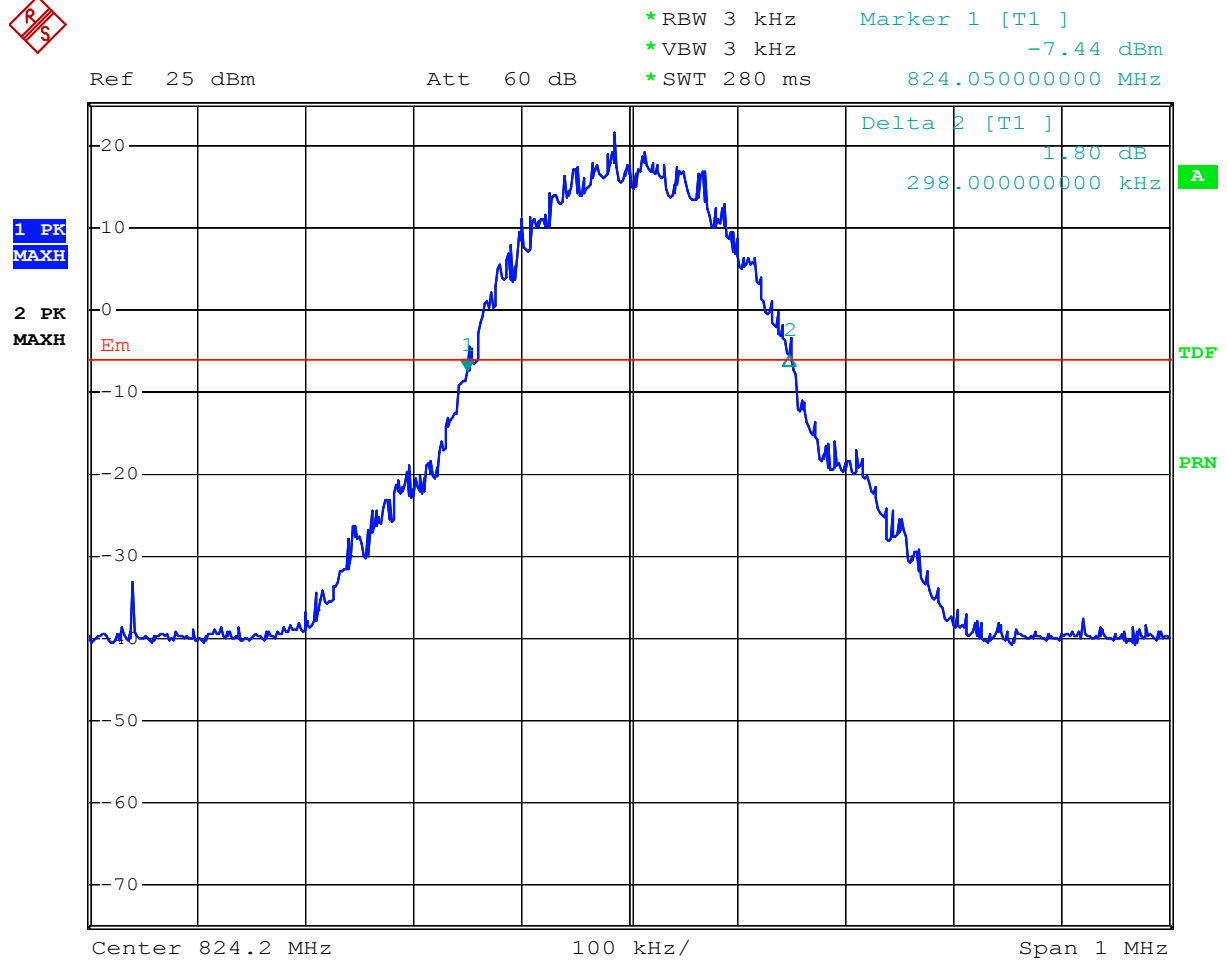
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Sede legale : 22100 Tavernola (CO) Via Conciliazione, 1 Cod. FISC. e N. R.I. CO 02635860139  
Sede operativa : Laboratori Via Campagna, 92 22020 Faloppio fraz. Gaggino (CO) Tel. +39 03135000.11 Fax +39 031991309



Date: 12.DEC.2006 11:56:15

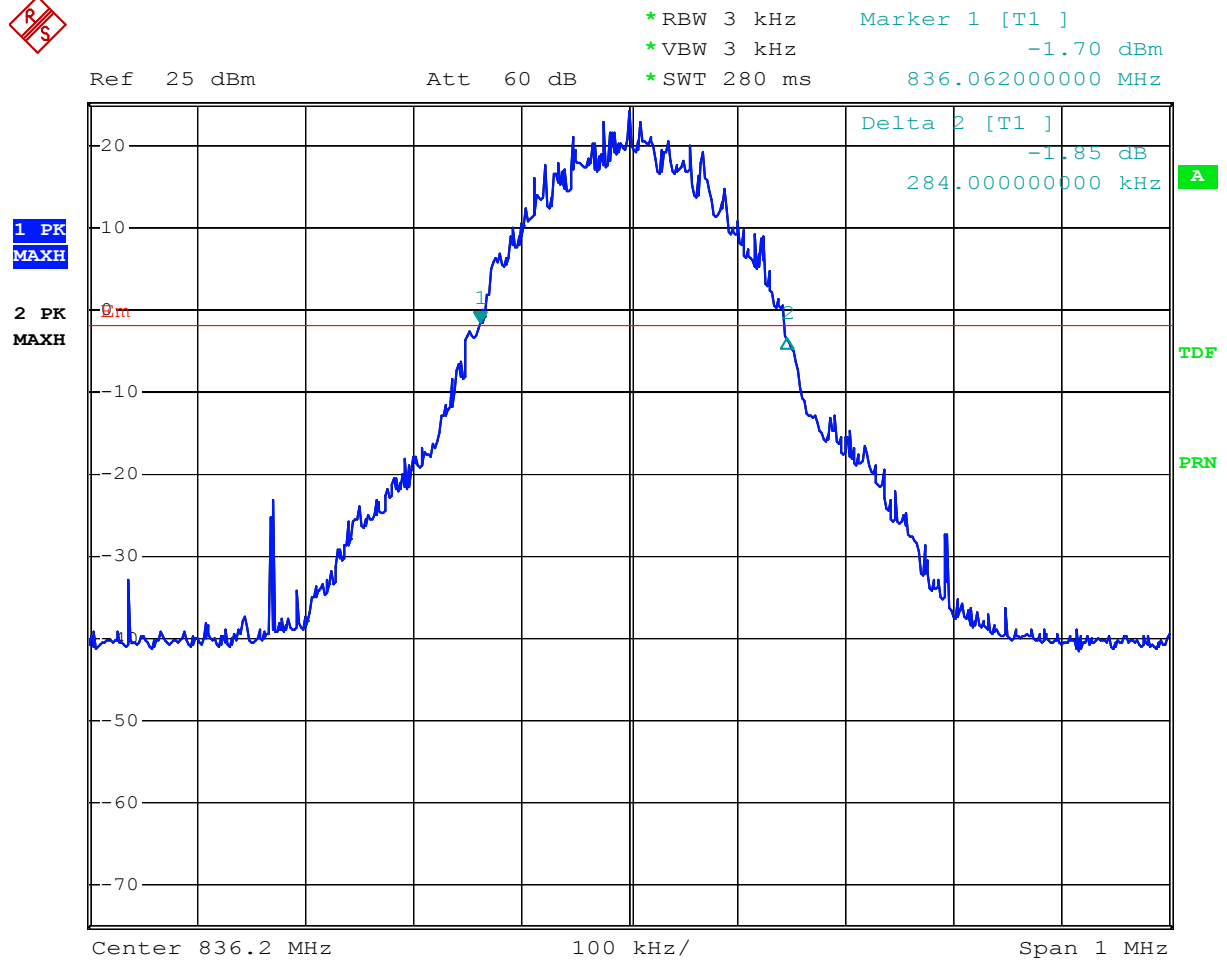
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Sede operativa : Laboratori Via Campagna, 92 22020 Faloppio fraz. Gaggino (CO) Tel. +39 03135000.11 Fax +39 031991309



Date: 12.DEC.2006 10:37:40

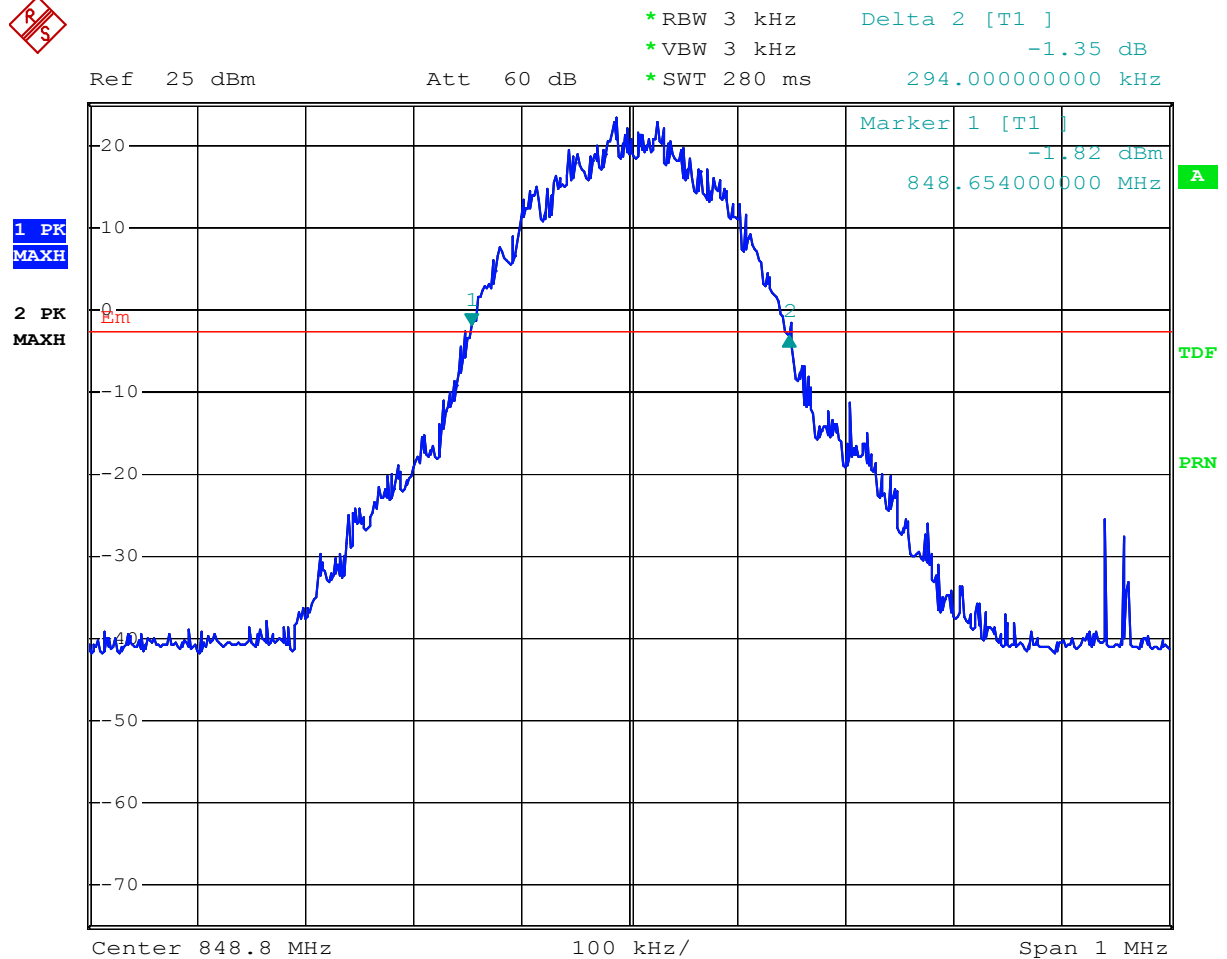


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Sede operativa : Laboratori Via Campagna, 92 22020 Faloppio fraz. Gaggino (CO) Tel. +39 03135000.11 Fax +39 031991309



Date: 12.DEC.2006 10:49:42

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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Sede operativa : Laboratori Via Campagna, 92 22020 Faloppio fraz. Gaggino (CO) Tel. +39 03135000.11 Fax +39 031991309



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