



Inter**Lab**[®]

FCC Measurement/Technical Report on Bluetooth - WLAN transceiver ISID

Report Reference: MDE_Siem_0617_FCCe

Test Laboratory:

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Note:

The following test results relate only to the devices specified in this document. This report shall not be reproduced in parts without the written approval of the testing laboratory.

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0 Summary

0.1 Technical Report Summary

Type of Authorization

Certification for an Intentional Radiator (Frequency Hopping Spread Spectrum and Digital Device / Spread Spectrum).

Applicable FCC Rules

Prepared in accordance with the requirements of FCC Rules and Regulations as listed in 47 CFR Ch.1 (10-1-06 Edition).

The following parts and subparts are applicable to the results in this test report.

- Part 2, Subpart J - Equipment Authorization Procedures, Certification
- Part 15, Subpart C – Intentional Radiators

Note:

-

Summary Test Results:

The EUT complied with all performed tests as listed in chapter 0.2 Measurement Summary.

0.2 Measurement Summary

FCC Part 15, Subpart C

§15.35, §15.205, §15.209

Spurious radiated emissions

The measurement was performed according to ANSI C63.4

2003

OP-Mode	Setup	Port	Final Result
op-mode 5	Setup_01 / _02	Enclosure	passed
op-mode 8	Setup_01 / _02	Enclosure	passed
op-mode 10	Setup_01	Enclosure	passed
op-mode 11	Setup_01 / _02	Enclosure	passed

FCC Part 15, Subpart C

§15.35, §15.205, §15.209

Band edge compliance

The measurement was performed according to ANSI C63.4

2003

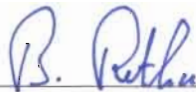
OP-Mode	Setup	Port	Final Result
op-mode 1	Setup_01	Enclosure	passed
op-mode 2	Setup_01	Enclosure	passed
op-mode 3	Setup_01	Enclosure	passed
op-mode 4	Setup_01	Enclosure	passed
op-mode 5	Setup_01	Enclosure	passed
op-mode 6	Setup_01	Enclosure	passed
op-mode 7	Setup_01	Enclosure	passed
op-mode 8	Setup_01	Enclosure	passed
op-mode 9	Setup_01	Enclosure	passed

The purpose of the test case and operating mode selection is evaluating of co-location effects.



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Responsible for
Accreditation Scope:



Responsible
for Test Report:





1 Administrative Data

1.1 Testing Laboratory

Company Name: 7 Layers AG
Address Borsigstr. 11
40880 Ratingen
Germany

This facility has been fully described in a report submitted to the FCC and accepted under the registration number 96716 .

The test facility is also accredited by the following accreditation organisation:
- Deutscher Akkreditierungs Rat DAR-Registration no. DAT-P-192/99-01

Responsible for Accreditation Scope: Dipl.-Ing. Bernhard Retka
Dipl.-Ing. Robert Machulec
Dipl.-Ing. Thomas Hoell

Report Template Version: 2007-07-25

1.2 Project Data

Responsible for testing and report: Dipl.-Ing. Andreas Petz
Date of Test(s): 2007-05-15 to 2007-06-01
Date of Report: 2007-07-31

1.3 Applicant Data

Company Name: Siemens AG
Address: Siemensallee 84
76187 Karlsruhe
Germany
Contact Person: Markus Rödle

1.4 Manufacturer Data

Company Name: please see applicant data
Address:
Contact Person:



2 Product labelling

2.1 FCC ID label

At the time of the report there was no FCC label available.

2.2 Location of the label on the EUT

see above



3 Test object Data

3.1 General EUT Description

Equipment under Test	Bluetooth and WLAN Transceiver
Type Designation:	ISID
Kind of Device:	Integrated Service Integration Display,
(optional)	WLAN/Bluetooth handheld device
Voltage Type:	AC
Voltage level:	115 V

General product description:

Bluetooth is a short-range radio link intended to be a cable replacement between portable and/or fixed electronic devices.

Bluetooth operates in the unlicensed ISM Band at 2.4 GHz. In the US a band of 83.5 MHz width is available. In this band, the Bluetooth technology defines 79 RF channels spaced 1 MHz (2402 - 2480 MHz). The actual RF channel is chosen from a pseudo-random hopping sequence through the 79 channels. A channel is occupied for a defined amount of time slots, with a nominal slot length of 625 μ s. The maximum dwell time on one channel is defined by the packet type and is 0.625 ms for DH1 packets, 1.875 ms for DH3 and 3.125 ms for DH5. The nominal hop rate is 1600 hops/s for DH1, 1600/3 for DH3 and 1600/5 for DH5. All frequencies are equally used. The maximum nominal average time of occupancy is 0.4 s within a period of 79*0.4 seconds.

WLAN Transceiver operating in the 2.4 GHz ISM band using Direct Sequence Spread Spectrum (DSSS) Modulation. The EUT supports the modes 802.11b (maximum data rate 11Mbps), 802.11g (maximum data rate 54Mbps) and 802.11n (maximum data rate = two times 54Mbps = 108Mbps distributed on two transmit antennas)

WLAN 5 GHz high performance WLAN equipment that is intended to operate in the frequency ranges 5 150 MHz to 5 350 MHz and 5 725 MHz to 5 825 MHz. The EUT supports the modes 802.11a (maximum data rate 54Mbps) and 802.11n (maximum data rate = two times 54Mbps = 108Mbps distributed on two transmit antennas)

The EUT provides the following ports:

Ports

Enclosure
AC Port (power line)

The main components of the EUT are listed and described in Chapter 3.2



3.2 EUT Main components

Type, S/N, Short Descriptions etc. used in this Test Report

Short Description	Equipment under Test	Type Designation	Serial No.	HW Status	SW Status	Date of Receipt
EUT A (Code: 01120d01) Remark: none	Bluetooth Transceiver	ISID	-	1.0	1.0	2007-04-16
EUT B (Code: 01120d02) Remark: The rated maximum RF output power of the Bluetooth transceiver is reduced acc. to the manufacturer's declaration (compared to EUT A).	Bluetooth Transceiver	ISID	-	1.0	1.0	2007-06-01

NOTE: The short description is used to simplify the identification of the EUT in this test report.

3.3 Ancillary Equipment

For the purposes of this test report, ancillary equipment is defined as equipment which is used in conjunction with the EUT to provide operational and control features to the EUT. It is necessary to configure the system in a typical fashion, as a customer would normally use it. But nevertheless Ancillary Equipment can influence the test results.

Short Description	Equipment under Test	Type Designation	HW Status	SW Status	Serial no.	FCC ID
-	-	-	-	-	-	-

3.4 EUT Setups

This chapter describes the combination of EUTs and ancillary equipment used for testing.

Setup No.	Combination of EUTs	Description
Setup_01	EUT A	setup for radiated measurements
Setup_02	EUT B	setup for radiated measurements

3.5 Operating Modes

This chapter describes the operating modes of the EUTs used for testing.

Op. Mode	Description of Operating Modes	Remarks
op-mode 1	EUT transmits on 2402 MHz (Bluetooth) and on 2412 MHz (WLAN, 802.11b)	Bluetooth: Loopback mode, max output power WLAN: local TX mode, max output power
op-mode 2	EUT transmits on 2480 MHz (Bluetooth) and on 2462 MHz (WLAN, 802.11b)	Bluetooth: Loopback mode, max output power WLAN: local TX mode, max output power
op-mode 3	EUT transmits on 2402 MHz (Bluetooth) and on 2412 MHz (WLAN, 802.11n)	Bluetooth: Loopback mode, max output power WLAN: local TX mode, max output power
op-mode 4	EUT transmits on 2480 MHz (Bluetooth) and on 2462 MHz (WLAN, 802.11n)	Bluetooth: Loopback mode, max output power WLAN: local TX mode, max output power
op-mode 5	EUT transmits on 2480 MHz (Bluetooth) and on 5190 MHz (WLAN, 802.11n)	Bluetooth: Loopback mode, max output power WLAN: local TX mode, max output power
op-mode 6	EUT transmits on 2480 MHz (Bluetooth) and on 5310 MHz (WLAN, 802.11n)	Bluetooth: Loopback mode, max output power WLAN: local TX mode, max output power
op-mode 7	EUT transmits on 2480 MHz (Bluetooth) and on 5755 MHz (WLAN, 802.11n)	Bluetooth: Loopback mode, max output power WLAN: local TX mode, max output power
op-mode 8	EUT transmits on 2480 MHz (Bluetooth) and on 5795 MHz (WLAN, 802.11n)	Bluetooth: Loopback mode, max output power WLAN: local TX mode, max output power
op-mode 9	EUT transmits on 2402 MHz (Bluetooth) and on 5190 MHz (WLAN, 802.11n)	Bluetooth: Loopback mode, max output power WLAN: local TX mode, max output power
op-mode 10	EUT transmits on 2402 MHz (Bluetooth) and on 2462 MHz (WLAN, 802.11n)	Bluetooth: Loopback mode, max output power WLAN: local TX mode, max output power
op-mode 11	EUT transmits on 2480 MHz (Bluetooth) and on 2412 MHz (WLAN, 802.11n)	Bluetooth: Loopback mode, max output power WLAN: local TX mode, max output power

4 Test Results

4.1 Spurious radiated emissions

Standard FCC Part 15, 10-1-06
Subpart C

The test was performed according to: ANSI C 63.4, 2003

4.1.1 Test Description

The test set-up was made in accordance to the general provisions of ANSI C 63.4-2003. The Equipment Under Test (EUT) was set up on a non-conductive table 1.0 x 2.0 m in the semi-anechoic chamber. The test was performed at the distance of 3 m between the EUT and the receiving antenna.

The radiated emissions measurements were made in a typical installation configuration. The measurement procedure is implemented into the EMI test software ES-K1 from R&S.

1. Measurement up to 30 MHz

The test set-up was made in accordance to the general provisions of ANSI C 63.4-2003. The Equipment Under Test (EUT) was set up on a non-conductive table in the anechoic chamber.

The radiated emissions measurements were made in a typical installation configuration. The measurement procedure is implemented into the EMI test software ES-K1 from R&S. The Loop antenna HFH2-Z2 is used.

Step 1: pre measurement

- Anechoic chamber
- Antenna distance: 10m
- Detector: Peak-Maxhold
- Frequency range: 0.009 - 0.15 and 0.15 – 30 MHz
- Frequency steps: 0.1 kHz and 5 kHz
- IF-Bandwidth: 0.2 kHz and 10 kHz
- Measuring time / Frequency step: 100 ms

Intention of this step is, to determine the radiated EMI-profile of the EUT. Afterwards the relevant emissions for the final measurement are identified.

Step 2: final measurement

For the relevant emissions determined in step 1, an additional measurement with the following settings will be performed. Intention of this step is to find the maximum emission level.

- Open area test side
- Antenna distance: according to the Standard
- Detector: Quasi-Peak
- Frequency range: 0.009 – 30 MHz
- Frequency steps: measurement at frequencies detected in step 1
- IF-Bandwidth: 200 Hz - 10 kHz
- Measuring time / Frequency step: 100 ms

2. Measurement above 30 MHz and up to 1 GHz

Step 1: Preliminary scan

Preliminary test to identify the highest amplitudes relative to the limit.

Settings for step 1:

- Detector: Peak-Maxhold
- Frequency range: 30 – 1000 MHz
- Frequency steps: 60 kHz

- IF-Bandwidth: 120 kHz
- Measuring time / Frequency step: 100 μ s
- Turntable angle range: -180 to 180 $^{\circ}$
- Turntable step size: 90°
- Height variation range: 1 – 3m
- Height variation step size: 2m
- Polarisation: Horizontal + Vertical

Intention of this step is, to determine the radiated EMI-profile of the EUT. Afterwards the relevant emissions for the final measurement are identified.

Step 2: second measurement

For the relevant emissions determined in step 1, an additional measurement with the following settings will be performed. Intention of this step is, to find out the approximate turntable angle and antenna height for each frequency.

- Detector: Peak – Maxhold
- Measured frequencies: in step 1 determined frequencies
- IF – Bandwidth: 120 kHz
- Measuring time: 100ms
- Turntable angle range: -180 to 180 $^{\circ}$
- Turntable step size: 45°
- Height variation range: 1 – 4m
- Height variation step size: 0.5m
- Polarisation: horizontal + vertical

After this step the EMI test system has determined the following values for each frequency (of step 1):

- Frequency
- Azimuth value (of turntable)
- Antenna height

The last two values have now the following accuracy:

- Azimuth value (of turntable): 45°
- Antenna height: 0.5m

Step 3: final measurement

In this step the accuracy of the turntable azimuth and antenna height will be improved. This is necessary to find out the maximum value of every frequency.

For each frequency the turntable azimuth and antenna height, which was determined in step 3, will be adjusted. The turntable azimuth will be slowly varied by $\pm 22.5^{\circ}$ around this value. During this action the value of emission is continuously measured. The turntable azimuth at the highest emission will be recorded and adjusted. In this position the antenna height is also slowly varied by ± 25 cm around the antenna height determined in step 3. During this action the value of emission is also continuously measured. The antenna height of the highest emission will also be recorded and adjusted.

- Detector: Peak – Maxhold
- Measured frequencies: in step 1 determined frequencies
- IF – Bandwidth: 120 kHz
- Measuring time: 100ms
- Turntable angle range: -22.5° to $+ 22.5^{\circ}$ around the value determined in step 2
- Height variation range: -0.25m to + 0.25m around the value determined in step 2

Step 4: final measurement with QP detector

With the settings determined in step 3, the final measurement will be performed:

EMI receiver settings for step 4:

- Detector: Quasi-Peak(< 1GHz)
- Measured frequencies: in step 1 determined frequencies
- IF – Bandwidth: 120 kHz
- Measuring time: 1s

3. Measurement above 1GHz

The following modifications apply to the measurement procedure for the frequency range above 1 GHz:

The measurement distance was reduced to 1m. The results were extrapolated by the extrapolation factor of 20 dB/decade (inverse linear distance for field strength measurements, inverse linear-distance squared for the power reference level measurements). Due to the fact that in this frequency range a double ridged wave guided horn antenna (up to 18 GHz) and a horn antenna (18-25 GHz) are used, the steps 2-4 are omitted. Step 1 was performed with one height of the receiving antenna only.

EMI receiver settings:

- Detector: Peak, Average
- RBW = VBW = 100 kHz

After the measurement a plot will be generated which contains a diagram with the results of the preliminary scan and a chart with the frequencies and values of the results of the final measurement.

4.1.2 Test Requirements / Limits

FCC §15.205 (b)

“Except as provided in paragraphs (d) and (e) of this section, the field strength of emissions appearing within these frequency bands shall not exceed the limits shown in § 15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in § 15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000 MHz, compliance with the emission limits in § 15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in § 15.35 apply to these measurements.”

FCC §15.209 (a)

“Except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:”

FCC §15.209, Radiated Emission Limits

Frequency in MHz	Limit (µV/m)	Measurement distance (m)	Limit(dBµV/m @10m)
0.009 – 0.49	2400/F(kHz)	300	Limit (dBµV/m)+30dB
0.49 – 1.705	24000/F(kHz)	30	Limit (dBµV/m)+10dB
1.705 - 30	30	30	Limit (dBµV/m)+10dB

Frequency in MHz	Limit (µV/m)	Measurement distance (m)	Limit (dBµV/m)
30 - 88	100	3	40.0
88 - 216	150	3	43.5
216 - 960	200	3	46.0
above 960	500	3	54.0

FCC §15.35(b)

“..., there is also a limit on the radio frequency emissions, as measured using instrumentation with a peak detector function, corresponding to 20 dB above the maximum permitted average limit....

Used conversion factor: $\text{Limit (dBµV/m)} = 20 \log (\text{Limit (µV/m)}/1\mu\text{V/m})$ ”

4.1.3 Test Protocol

Temperature: 25 °C
 Air Pressure: 1010-1017 hPa
 Humidity: 36-37 %

Op. Mode	Setup	Port
op-mode 5	Setup_01 / _02	Enclosure

Polarisation	Frequency MHz	Corrected value dBµV/m			Limit dBµV/m	Limit dBµV/m	Limit dBµV/m	Delta to limit dB	Delta to limit dB
		QP	Peak	AV	QP	Peak	AV	QP/Peak	AV
Vertical + horizontal	2484		63.1	46.1		74.0	54.0	10.9	7.9
	7440		68.9	52.7		74.0	54.0	5.1	1.3
	15551		69.6	48.1		74.0	54.0	4.4	5.9

Remark: No (further) spurious emissions in the range 20 dB below the limit found.
 The frequency range 8 to 25 GHz was tested with setup_01,
 the frequency range 1 to 8 GHz was tested with setup_02.

Op. Mode	Setup	Port
op-mode 8	Setup_01 / _02	Enclosure

Polarisation	Frequency MHz	Corrected value dBµV/m			Limit dBµV/m	Limit dBµV/m	Limit dBµV/m	Delta to limit dB	Delta to limit dB
		QP	Peak	AV	QP	Peak	AV	QP/Peak	AV
Vertical + horizontal	2484		64.1	46.0		74.0	54.0	9.9	8.0
	7440		68.6	50.5		74.0	54.0	5.4	3.5
	11574		60.0	42.1		74.0	54.0	14.0	11.9

Remark: No (further) spurious emissions in the range 20 dB below the limit found.
 The frequency range 8 to 25 GHz was tested with setup_01,
 the frequency range 1 to 8 GHz was tested with setup_02.

Op. Mode	Setup	Port
op-mode 10	Setup_01	Enclosure

Polarisation	Frequency MHz	Corrected value dBµV/m			Limit dBµV/m	Limit dBµV/m	Limit dBµV/m	Delta to limit dB	Delta to limit dB
		QP	Peak	AV	QP	Peak	AV	QP/Peak	AV
Vertical + horizontal	1068		42.0	34.4		74.0	54.0	32.0	19.6
	2349		51.0	34.5		74.0	54.0	23.0	19.5
	2386		51.2	39.2		74.0	54.0	22.5	14.8
	2484		55.1	35.7		74.0	54.0	18.9	18.3
	12010		55.9	39.5		74.0	54.0	18.1	14.5

Remark: No (further) spurious emissions in the range 20 dB below the limit found.



Op. Mode **Setup** **Port**
 op-mode 11 Setup_01 / _02 Enclosure

Polarisation	Frequency MHz	Corrected value dBµV/m			Limit dBµV/m	Limit dBµV/m	Limit dBµV/m	Delta to limit dB	Delta to limit dB
		QP	Peak	AV	QP	Peak	AV	QP/Peak	AV
Vertical + horizontal	2484		62.9	45.0		74.0	54.0	11.1	9.0
	7440		68.9	52.5		74.0	54.0	5.1	1.5

Remark: No (further) spurious emissions in the range 20 dB below the limit found.
 The frequency range 8 to 25 GHz was tested with setup_01,
 the frequency range 1 to 8 GHz was tested with setup_02.

The measurements were performed in the frequency range 1 to 25 GHz.

4.1.4 Test result: Spurious radiated emissions

FCC Part 15, Subpart C	Op. Mode	Result
	op-mode 5	passed
	op-mode 8	passed
	op-mode 10	passed
	op-mode 11	passed



4.2 Band edge compliance

Standard FCC Part 15, 10-1-06
Subpart C

The test was performed according to: ANSI C 63.4, 2003

4.2.1 Test Description

The test set-up was made in accordance to the general provisions of ANSI C 63.4-2003. The Equipment Under Test (EUT) was placed inside FAC (fully anechoic chamber) to perform the measurements. The radiated emissions measurements were made in a typical installation configuration.

The measurement was carry out with a spectrum analyse, cable and horn antenna in a distance of 1 m using peak detector.

The measurement was performed at the lowest and highest band edges of the used ISM bands:

- 2400MHz
- 2483.5MHz

- 5150MHz
- 5350MHz
- 5725MHz
- 5825MHz

4.2.2 Test Requirements / Limits

For the measurement at the band edges the limit is specified in §15.209.

Frequency in MHz	Limit (µV/m)	Measurement distance (m)	Limit(dBµV/m @10m)
0.009 – 0.49	2400/F(kHz)	300	Limit (dBµV/m)+30dB
0.49 – 1.705	24000/F(kHz)	30	Limit (dBµV/m)+10dB
1.705 - 30	30	30	Limit (dBµV/m)+10dB

Frequency in MHz	Limit (µV/m)	Measurement distance (m)	Limit (dBµV/m)
30 - 88	100	3	40.0
88 - 216	150	3	43.5
216 - 960	200	3	46.0
above 960	500	3	54.0

“In the emission table above, the tighter limit applies at the band edges.”

FCC §15.35(b)

“..., there is also a limit on the radio frequency emissions, as measured using instrumentation with a peak detector function, corresponding to 20 dB above the maximum permitted average limit...”

Used conversion factor: $\text{Limit (dB}\mu\text{V/m)} = 20 \log (\text{Limit } (\mu\text{V/m})/1\mu\text{V/m})$ ”

4.2.3 Test Protocol

4.2.3.1 Lower band edge

Temperature: 26 °C
 Air Pressure: 1020 hPa
 Humidity: 38 %

Op. Mode	Setup	Port
op-mode 1	Setup_01	Enclosure

Frequency MHz	Corrected value dB μ V/m	Limit dB μ V/m	Delta to limit dB
2400.00	64.40	74	9.60

Remark: Please see annex for the measurement plot.

Op. Mode	Setup	Port
op-mode 3	Setup_01	Enclosure

Frequency MHz	Corrected value dB μ V/m	Limit dB μ V/m	Delta to limit dB
2400.00	62.86	74	11.14

Remark: Please see annex for the measurement plot.

Op. Mode	Setup	Port
op-mode 5	Setup_01	Enclosure

Frequency MHz	Corrected value dB μ V/m	Limit dB μ V/m	Delta to limit dB
5150.00	64.16	74	9.84

Remark: Please see annex for the measurement plot.

Op. Mode	Setup	Port
op-mode 7	Setup_01	Enclosure

Frequency MHz	Corrected value dB μ V/m	Limit dB μ V/m	Delta to limit dB
5725.00	63.90	74	10.10

Remark: Please see annex for the measurement plot.

Op. Mode	Setup	Port
op-mode 9	Setup_01	Enclosure

Frequency MHz	Corrected value dB μ V/m	Limit dB μ V/m	Delta to limit dB
2400.00	62.48	74	11.52

Remark: Please see annex for the measurement plot.

4.2.3.2 Higher band edge

Temperature: 26 °C
 Air Pressure: 1020 hPa
 Humidity: 38 %

Op. Mode	Setup	Port
op-mode 2	Setup_01	Enclosure

Frequency MHz	Corrected value dB μ V/m	Limit dB μ V/m	Delta to limit dB
2483.50	62.03	74	11.97

Remark: Please see annex for the measurement plot.

Op. Mode	Setup	Port
op-mode 4	Setup_01	Enclosure

Frequency MHz	Corrected value dB μ V/m	Limit dB μ V/m	Delta to limit dB
2483.50	61.67	74	12.33

Remark: Please see annex for the measurement plot.

Op. Mode	Setup	Port
op-mode 6	Setup_01	Enclosure

Frequency MHz	Corrected value dB μ V/m	Limit dB μ V/m	Delta to limit dB
5350.00	65.81	74	8.19

Remark: Please see annex for the measurement plot.

Op. Mode	Setup	Port
op-mode 8	Setup_01	Enclosure

Frequency MHz	Corrected value dB μ V/m	Limit dB μ V/m	Delta to limit dB
5825.00	64.55	74	9.45

Remark: Please see annex for the measurement plot.

Op. Mode	Setup	Port
op-mode 5	Setup_01	Enclosure

Frequency MHz	Corrected value dB μ V/m	Limit dB μ V/m	Delta to limit dB
2483.50	61.90	74	12.10

Remark: Please see annex for the measurement plot.



4.2.4 Test result: Band edge compliance

FCC Part 15, Subpart C	Op. Mode	Result
	op-mode 1	passed
	op-mode 2	passed
	op-mode 3	passed
	op-mode 4	passed
	op-mode 5	passed
	op-mode 6	passed
	op-mode 7	passed
	op-mode 8	passed
	op-mode 9	passed

5 Test Equipment

EUT Digital Signalling System

Equipment	Type	Serial No.	Manufacturer
Digital Radio Communication Tester	CMD 55	831050/020	Rohde & Schwarz
Signalling Unit for Bluetooth Spurious Emissions	PTW60	100004	Rohde & Schwarz
Universal Radio Communication Tester	CMU 200	102366	Rohde & Schwarz

EMI Test System

Equipment	Type	Serial No.	Manufacturer
Comparison Noise Emitter	CNE III	99/016	York
EMI Analyzer	ESI 26	830482/004	Rohde & Schwarz
Signal Generator	SMR 20	846834/008	Rohde & Schwarz

EMI Radiated Auxiliary Equipment

Equipment	Type	Serial No.	Manufacturer
Antenna mast 4m	MA 240	240/492	HD GmbH H. Deisel
Biconical dipole	VUBA 9117	9117108	Schwarzbeck
Broadband Amplifier 18MHz-26GHz	JS4-18002600-32	849785	Miteq
Broadband Amplifier 30MHz-18GHz	JS4-00101800-35	896037	Miteq
Broadband Amplifier 45MHz-27GHz	JS4-00102600-42	619368	Miteq
Cable "ESI to EMI Antenna"	EcoFlex10	W18.01-2 + W38.01-2	Kabel Kusch
Cable "ESI to Horn Antenna"	UFB311A + UFB293C	W18.02-2 + W38.02-2	Rosenberger-Microcoax
Double-ridged horn	HF 906	357357/002	Rohde & Schwarz
Double-ridged horn	HF 906	357357/001	Rohde & Schwarz
High Pass Filter	5HC3500/12750-1.2-KK	200035008	Trilithic
High Pass Filter	5HC2700/12750-1.5-KK	9942012	Trilithic
High Pass Filter	4HC1600/12750-1.5-KK	9942011	Trilithic
KUEP pre amplifier	Kuep 00304000	001	7layers
Log.-per. Antenna	HL 562 Ultralog	830547/003	Rohde & Schwarz
Loop Antenna	HFH2-Z2	829324/006	Rohde & Schwarz
Pyramidal Horn Antenna 26.5 GHz	Model 3160-09	9910-1184	EMCO

EMI Conducted Auxiliary Equipment

Equipment	Type	Serial No.	Manufacturer
Cable "LISN to ESI"	RG214	W18.03+W48.03	Huber+Suhner
Two-Line V-Network	ESH 3-Z5	828304/029	Rohde & Schwarz
Two-Line V-Network	ESH 3-Z5	829996/002	Rohde & Schwarz

Auxiliary Test Equipment

Equipment	Type	Serial No.	Manufacturer
Broadband Resist. Power Divider N	1506A / 93459	LM390	Weinschel
Broadband Resist. Power Divider SMA	1515 / 93459	LN673	Weinschel
Digital Multimeter 01	Voltcraft M-3860M	IJ096055	Conrad
Digital Multimeter 02	Voltcraft M-3860M	IJ095955	Conrad
Digital Oscilloscope	TDS 784C	B021311	Tektronix
Fibre optic link Satellite	FO RS232 Link	181-018	Pontis
Fibre optic link Transceiver	FO RS232 Link	182-018	Pontis
I/Q Modulation Generator	AMIQ-B1	832085/018	Rohde & Schwarz
Notch Filter ultra stable	WRCA800/960-6E	24	Wainwright
Spectrum Analyzer 9 kHz to 3 GHz	FSP3	838164/004	Rohde & Schwarz
Temperature Chamber	VT 4002	58566002150010	Vötsch
Temperature Chamber	KWP 120/70	59226012190010	Weiss
ThermoHygro Datalogger 03	Opus10 THI (8152.00)	7482	Lufft Mess- und Regeltechnik GmbH

Anechoic Chamber

Equipment	Type	Serial No.	Manufacturer
Air Compressor (pneumatic) Controller	CO 2000	CO2000/328/12470406 /L	Atlas Copco Innco innovative constructions GmbH
EMC Camera	CE-CAM/1		CE-SYS
EMC Camera for observation of EUT	CCD-400E	0005033	Mitsubishi
Filter ISDN	B84312-C110-E1		Siemens&Matsushita
Filter telephone systems / modem	B84312-C40-B1		Siemens&Matsushita
Filter Universal 1A	B84312-C30-H3		Siemens&Matsushita
Fully/Semi AE Chamber	10.58x6.38x6		Frankonia
Turntable	DS 420S	420/573/99	HD GmbH, H. Deisel
Valve Control Unit (pneum.)	VE 615P	615/348/99	HD GmbH, H. Deisel



*7 layers Bluetooth Full RF Test
Solution*

*Bluetooth RF Conformance
Test System TS8960*

Equipment	Type	Serial No.	Manufacturer
10 MHz Reference	MFS	5489/001	Efratom
Power Meter 832025/059	NRVD	832025/059	Rohde & Schwarz
Power Sensor A 832279/013	NRV-Z1	832279/013	Rohde & Schwarz
Power Sensor B 832279/015	NRV-Z1	832279/015	Rohde & Schwarz
Power Supply	E3632A	MY40003776	Agilent
Power Supply	PS-2403D	-	Conrad
RF Step Attenuator 833695/001	RSP	833695/001	Rohde & Schwarz
Rubidium Frequency Normal	MFS	002	Efratom
Signal Analyzer FS1Q26 832695/007	FS1Q26	832695/007	Rohde & Schwarz
Signal Generator 833680/003	SMP 03	833680/003	Rohde & Schwarz
Signal Generator A 834344/002	SMIQ03B	834344/002	Rohde & Schwarz
Signal Generator B 832870/017	SMIQ03B	832870/017	Rohde & Schwarz
Signal Switching and Conditioning Unit	SSCU	338826/005	Rohde & Schwarz
Signalling Unit PTW60 838312/014	PTW60 for TS8960	838312/014	Rohde & Schwarz
System Controller 829323/008	PSM12	829323/008	Rohde & Schwarz

6 Photo Report

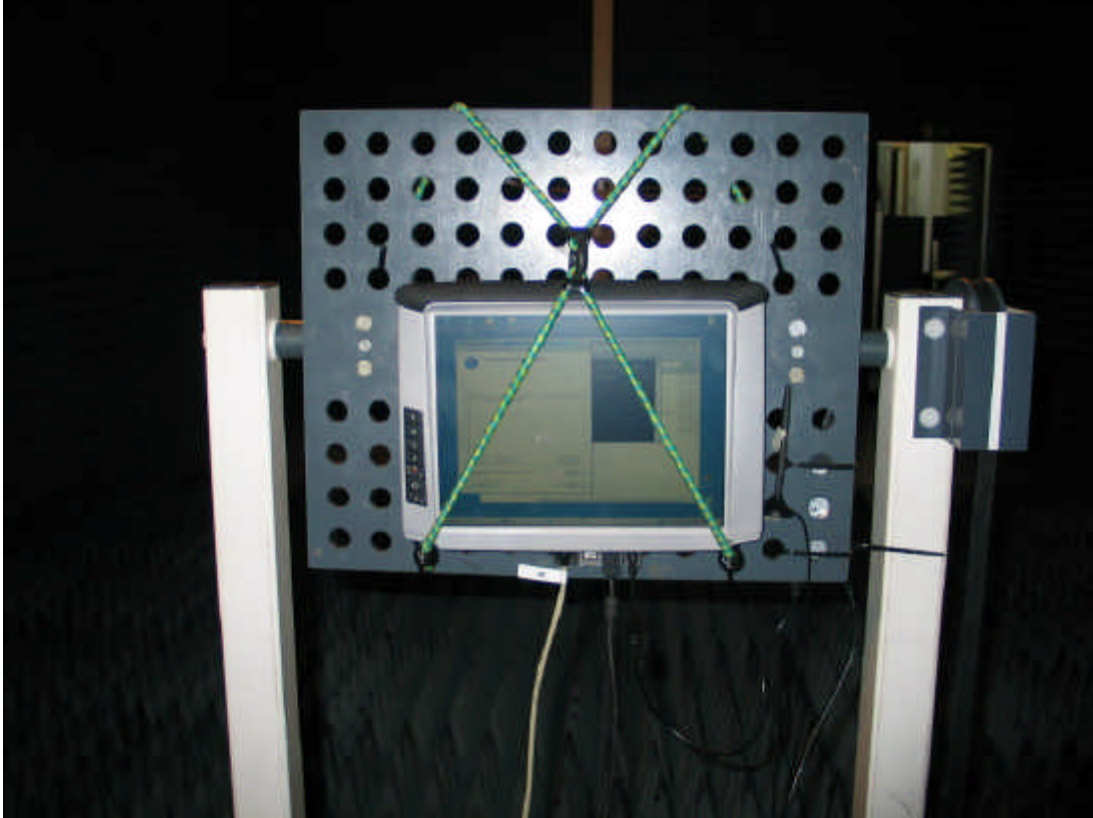
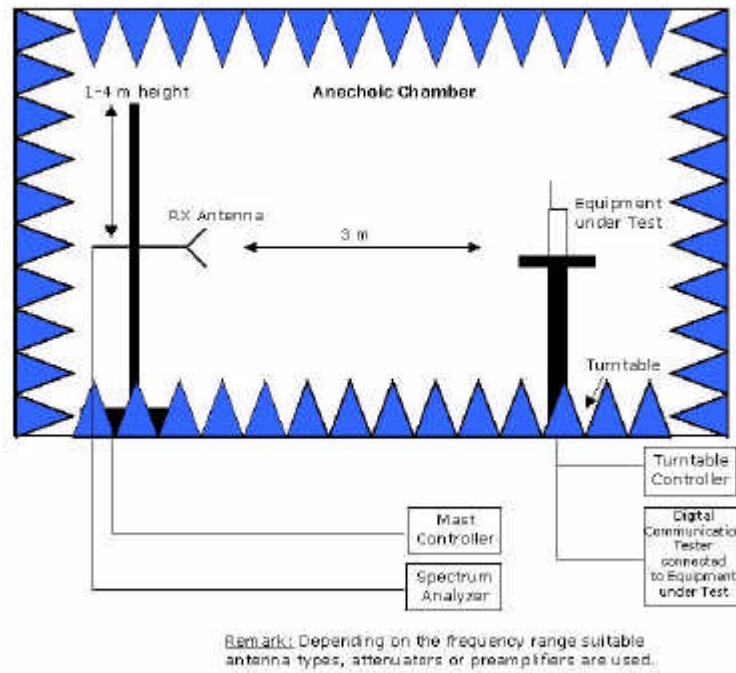


Photo 1: Test setup for radiated measurements

7 Setup Drawings




Drawing 1: Setup in the Anechoic chamber. For measurements below 1 GHz the ground was replaced by a conducting ground plane.

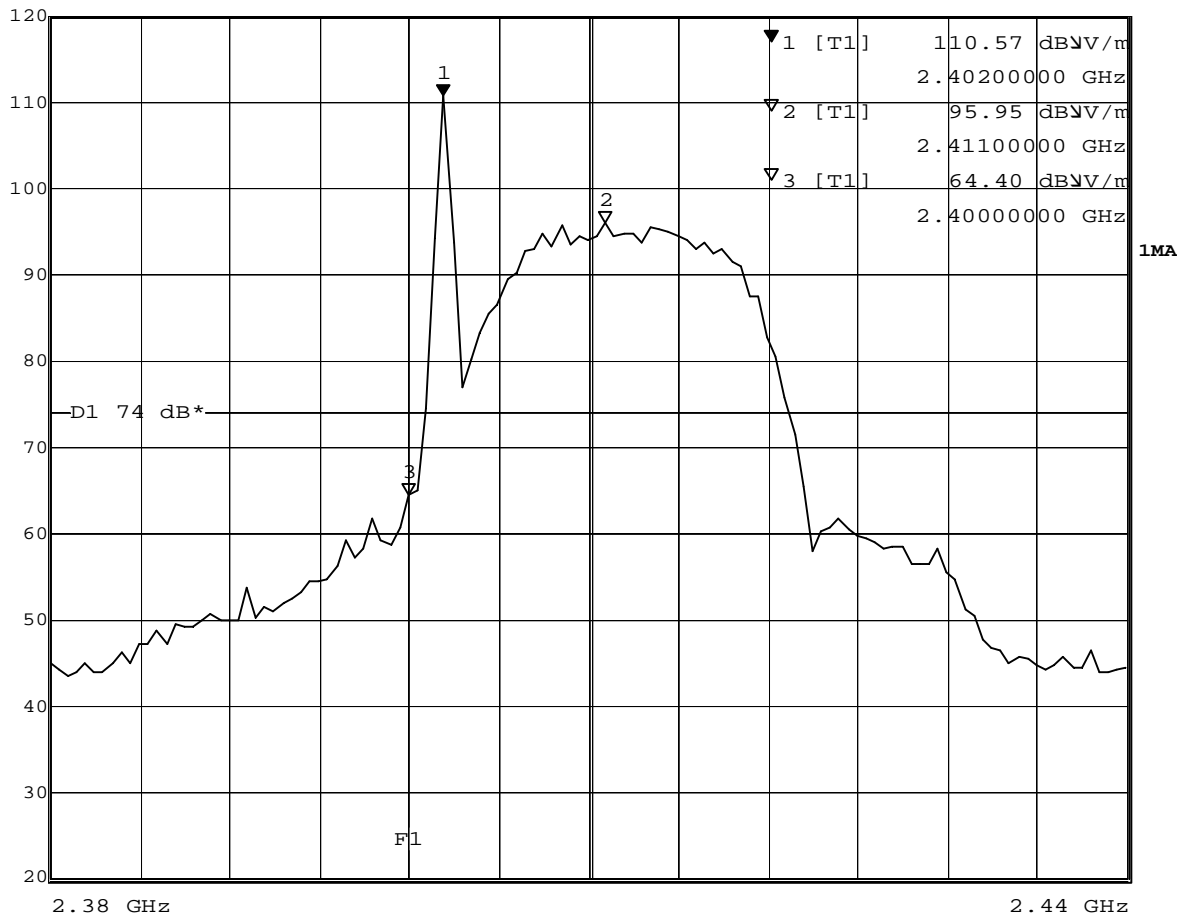
8 Annex measurement plots

8.1 Band edge compliance

Op. Mode

op-mode 1

	Marker 1 [T1]	Det	AV Trd	ES-K1
	Att 10 dB AUTO	110.57 dB μ V/m	ResBW 100 kHz	
	INPUT 1	2.40200000 GHz	Meas T 100 ms Unit	dB μ V/m

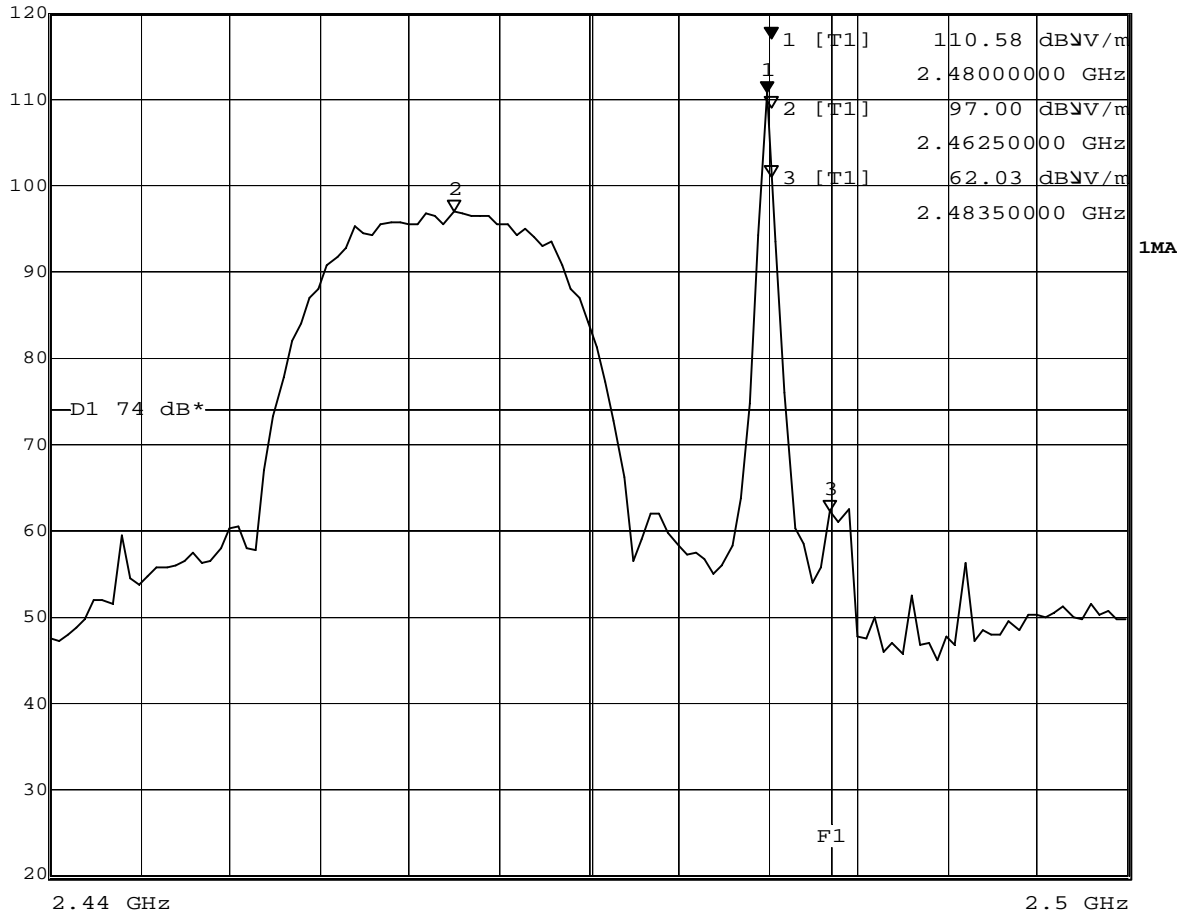


Date: 15.MAY.2007 09:05:31

Op. Mode

op-mode 2

	Att 20 dB AUTO	Marker 1 [T1]	Det	AV Trd	ES-K1
	INPUT 1	2.48000000 GHz	110.58 dBV/m	ResBW 100 kHz	
			Meas T	100 ms Unit	dBV/m

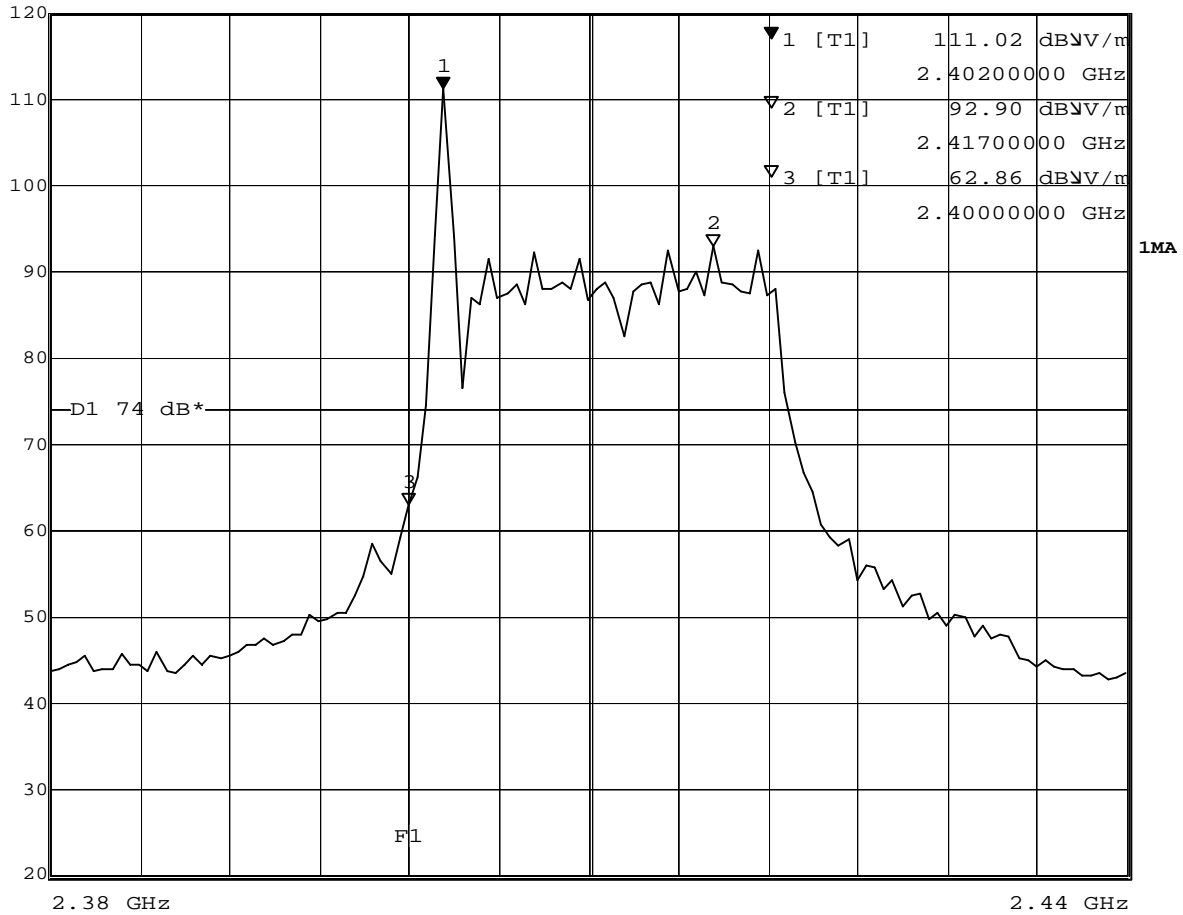


Date: 15.MAY.2007 09:46:03

Op. Mode

op-mode 3


	Marker 1 [T1]	Det	AV Trd	ES-K1
	Att 20 dB AUTO	111.02 dBV/m	ResBW 100 kHz	
	INPUT 1	2.40200000 GHz	Meas T 100 ms Unit	dBV/m

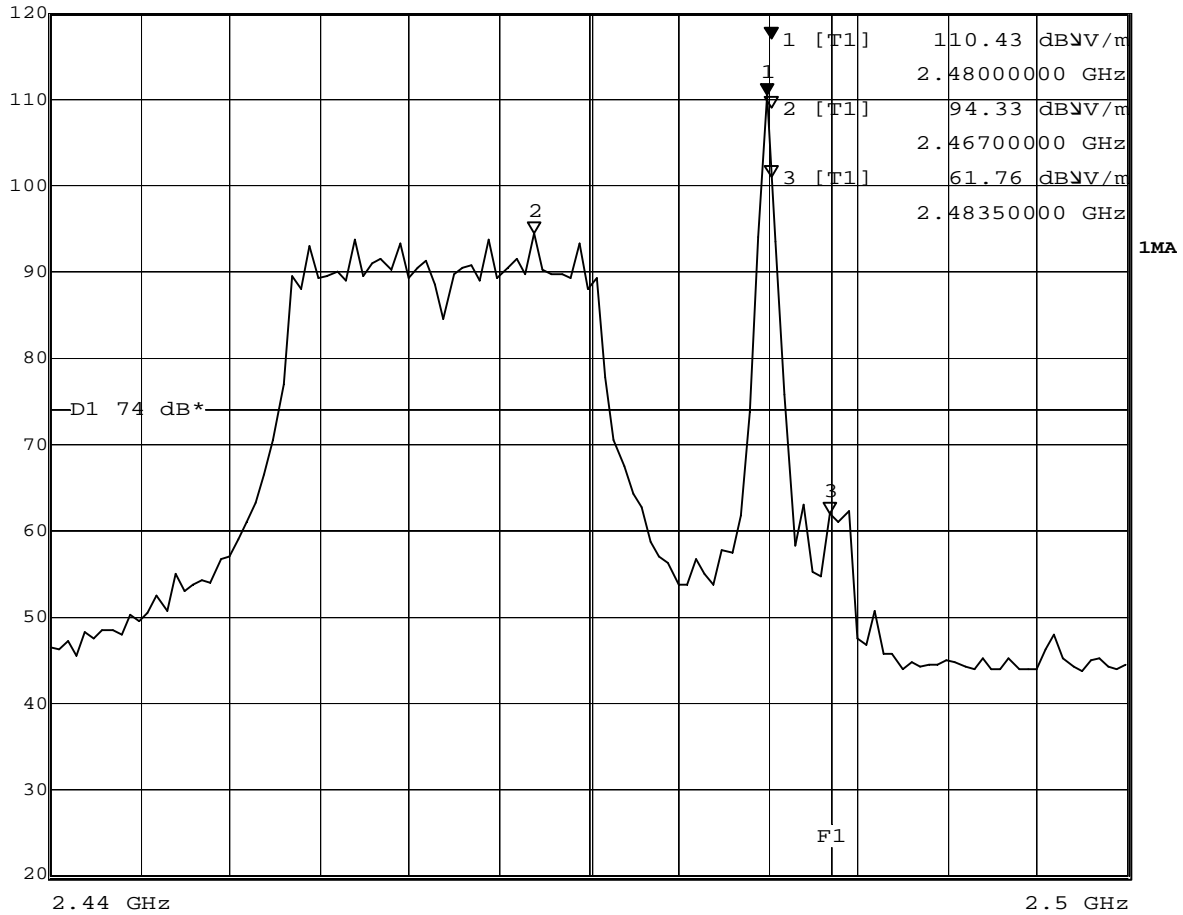


Date: 14.MAY.2007 12:50:39

Op. Mode

op-mode 4


	Att 10 dB AUTO	Marker 1 [T1]	Det	AV Trd	ES-K1
	INPUT 1	2.48000000 GHz	110.43 dB μ V/m	ResBW 100 kHz	
			Meas T	100 ms Unit	dB μ V/m

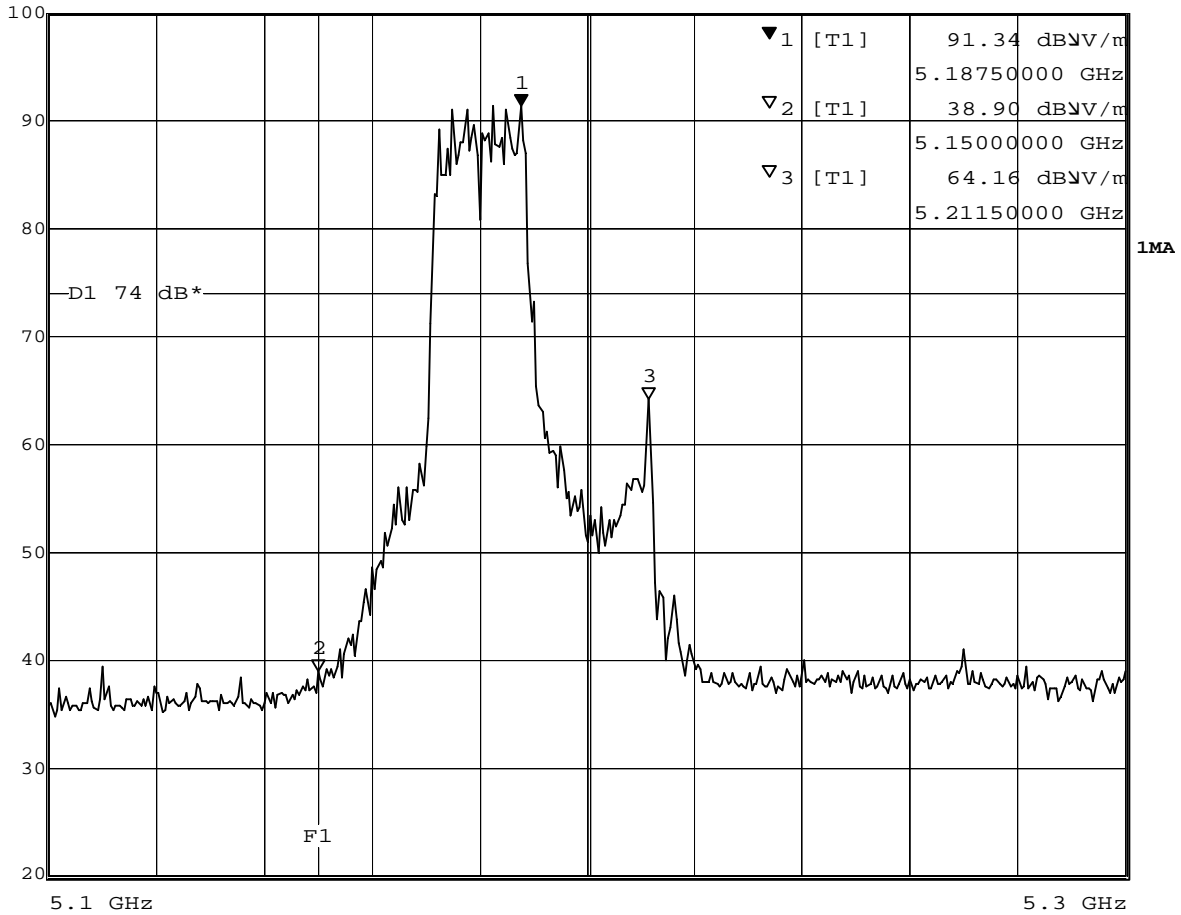


Date: 14.MAY.2007 13:24:04

Op. Mode

op-mode 5

	Att 10 dB AUTO	Marker 1 [T1]	Det	AV Trd	ES-K1
	INPUT 1	5.18750000 GHz	91.34 dBV/m	ResBW 100 kHz	
				Meas T 100 ms Unit	dBV/m

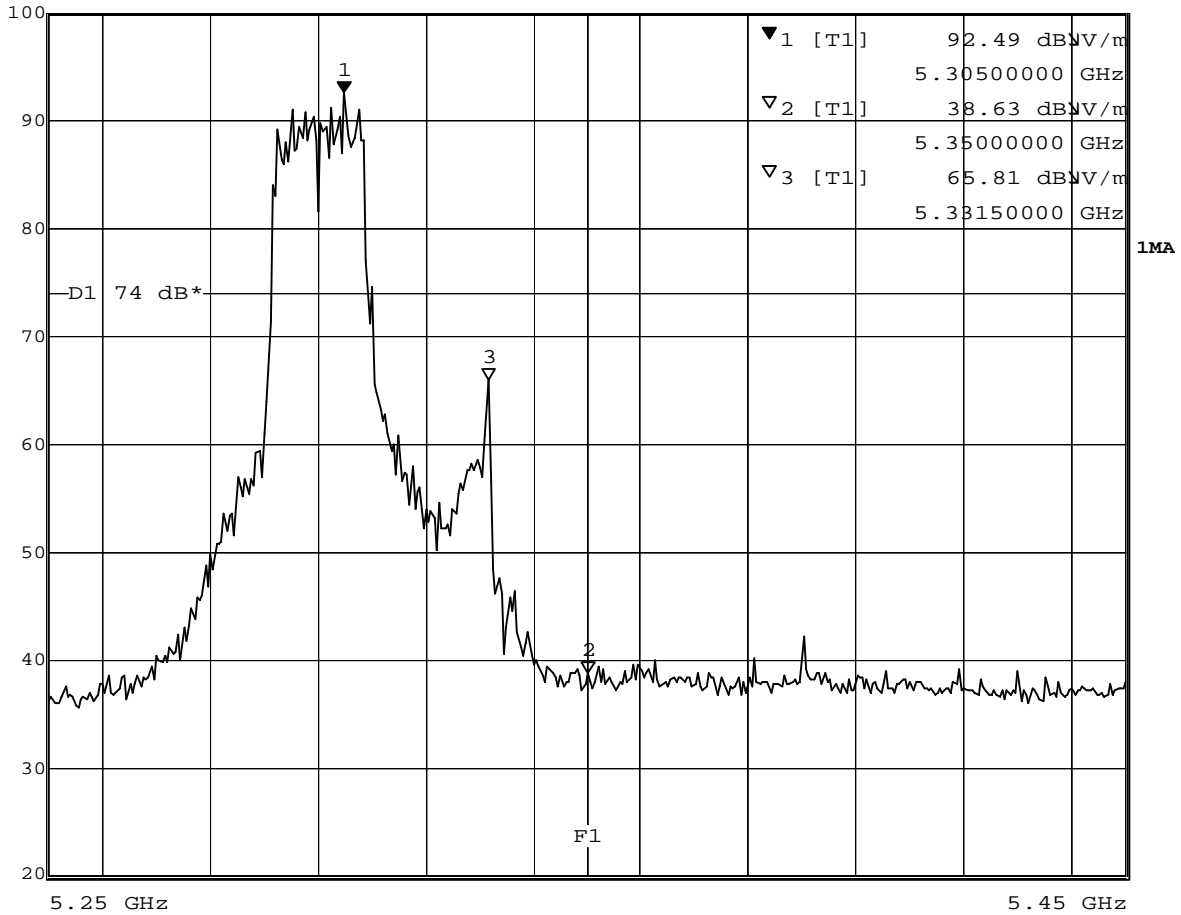


Date: 15.MAY.2007 13:09:12

Op. Mode

op-mode 6

	Att 10 dB AUTO	Marker 1 [T1]	Det	AV Trd	ES-K1
	INPUT 1	5.30500000 GHz	92.49 dBV/m	ResBW 100 kHz	
				Meas T 100 ms Unit	dBV/m

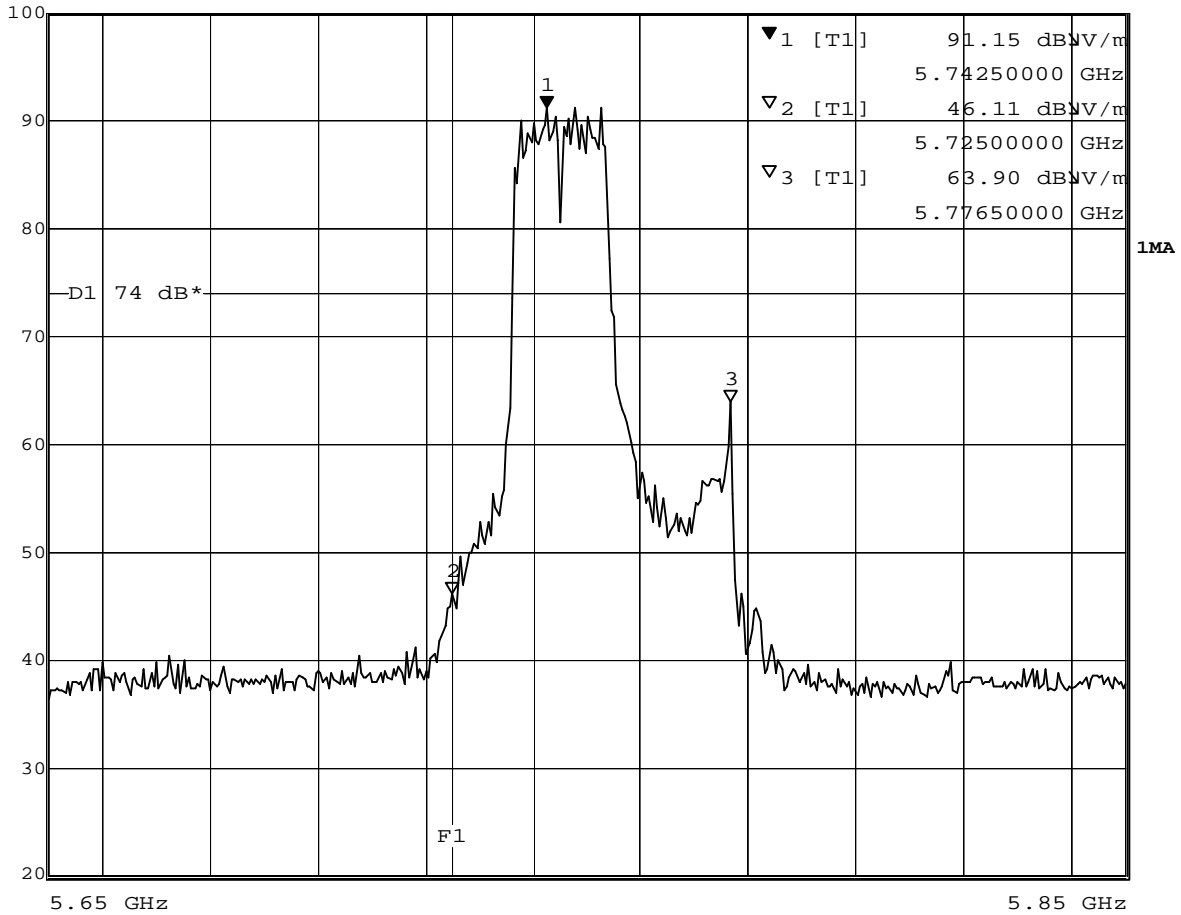


Date: 15.MAY.2007 12:48:18

Op. Mode

op-mode 7

	Marker 1 [T1]	Det	AV Trd	ES-K1
	Att 10 dB AUTO	91.15 dBV/m	ResBW 100 kHz	
	INPUT 1	5.74250000 GHz	Meas T 100 ms Unit	dBV/m

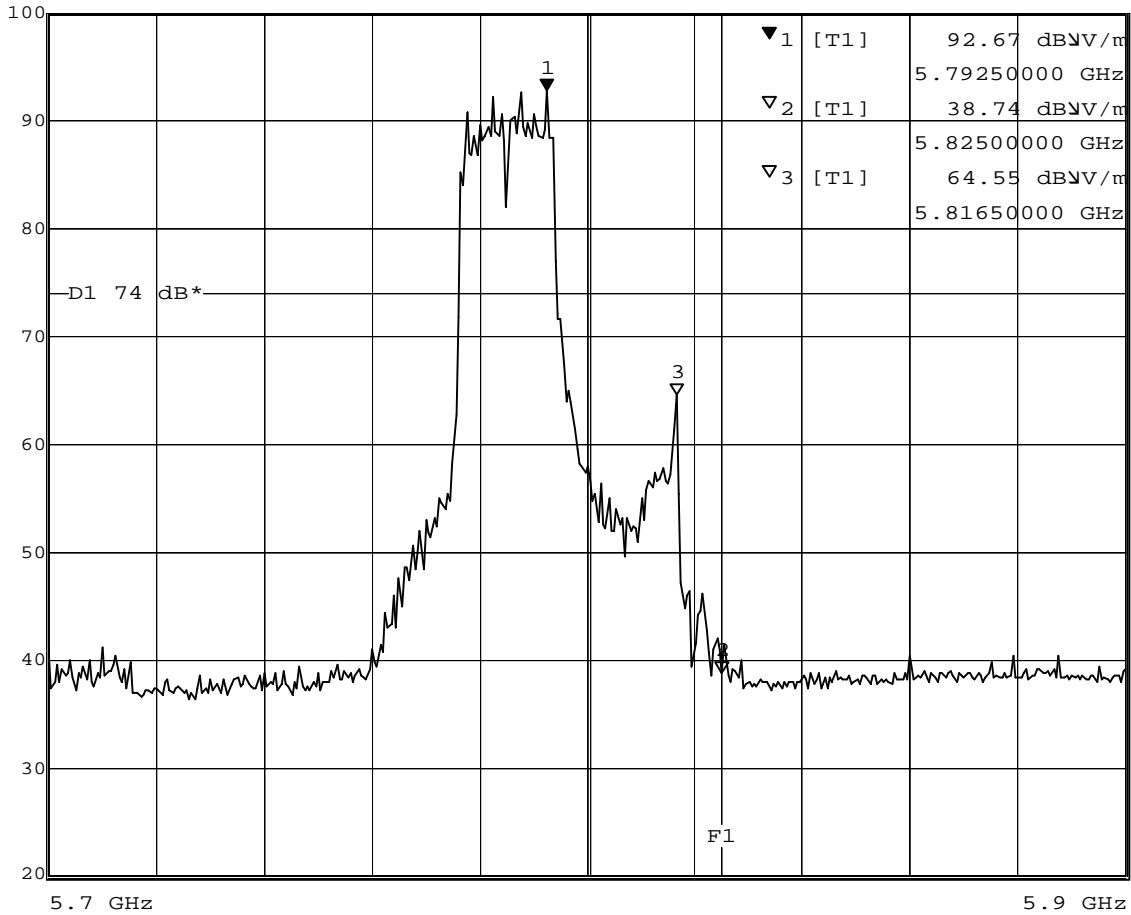


Date: 15.MAY.2007 12:26:05

Op. Mode

op-mode 8

	Att 10 dB AUTO	Marker 1 [T1]	Det	AV Trd	ES-K1
	INPUT 1	5.79250000 GHz	92.67 dB μ V/m	ResBW 100 kHz	
			Meas T	100 ms Unit	dB μ V/m

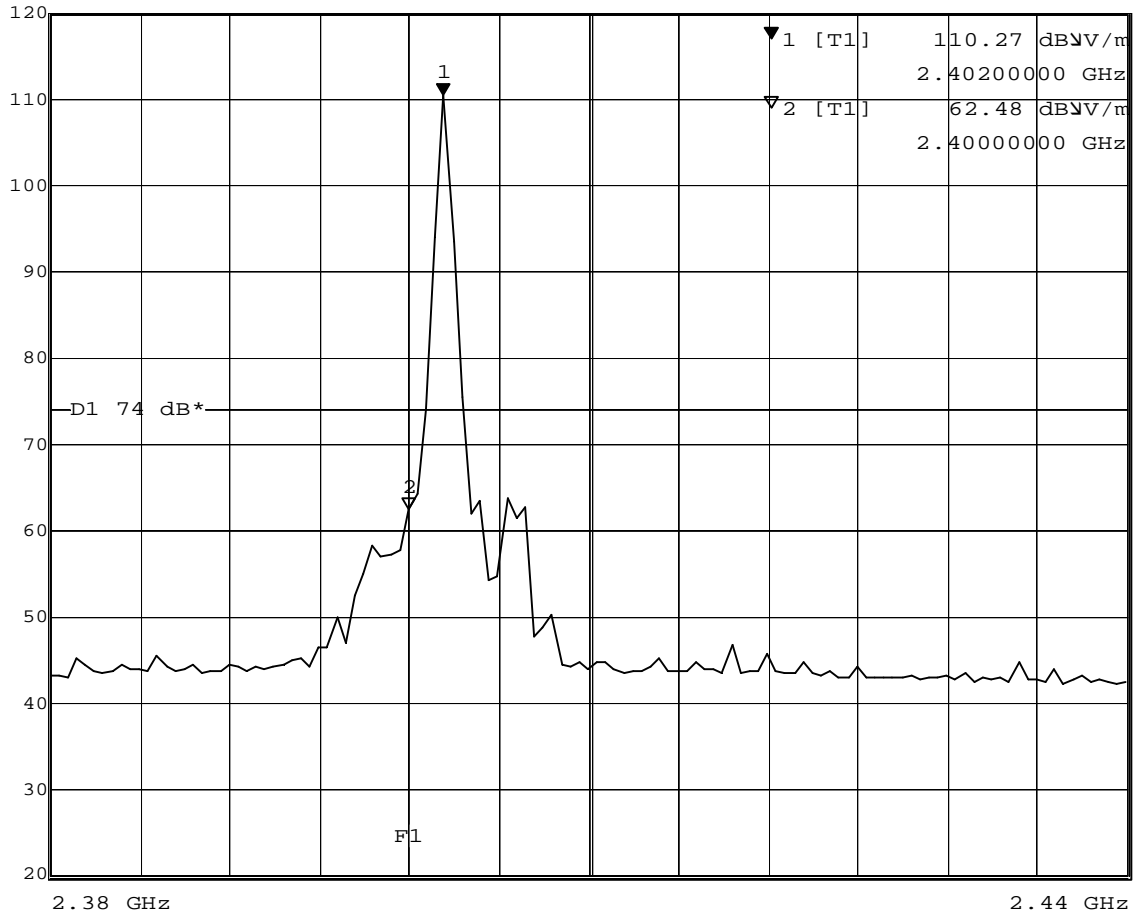


Date: 15.MAY.2007 13:34:53

Op. Mode

op-mode 9


	Att 10 dB AUTO	Marker 1 [T1]	Det	AV Trd	ES-K1
	INPUT 1	110.27 dB μ V/m	ResBW	100 kHz	
		2.40200000 GHz	Meas T	100 ms Unit	dB μ V/m

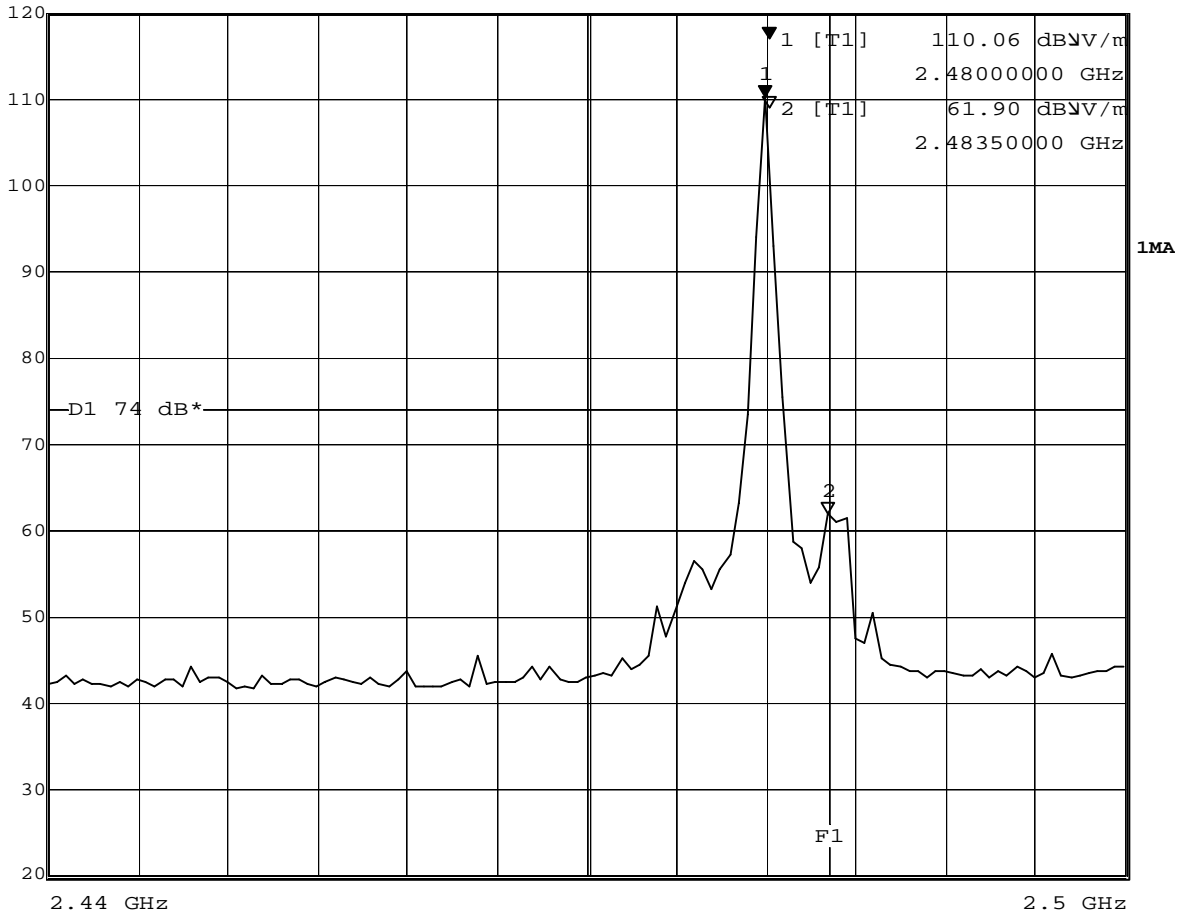


Date: 15.MAY.2007 10:42:19

Op. Mode

op-mode 5

	Marker 1 [T1]	Det	AV Trd	ES-K1
	Att 10 dB AUTO	110.06 dB μ V/m	ResBW 100 kHz	
	INPUT 1	2.48000000 GHz	Meas T 100 ms Unit	dB μ V/m



Date: 15.MAY.2007 10:13:49