Prüfbericht - Nr.: Test Report No.	**14007588 001**		**Seite 1 von 14** Page 1 of 14
Auftraggeber: Applicant	**LEM Industries** **Parc Medicis 650** **26 Av, Pepinieres** **94832 Fresnes Cedex** **FRANCE**		
Gegenstand der Prüfung: Test item	**LEM Evasio Professional Wireless Headset (Base)**		
Bezeichnung: Identification	**EVA-S-0000**	**Serien-Nr.:** Serial No.	**Engineering sample**
Wareneingangs-Nr.: Receipt No.	**041028016**	**Eingangsdatum:** Date of receipt	**28.10.2004**
Prüfort: Testing location	**TÜV Rheinland Hong Kong Ltd.** Room 8, 25th Floor, Skyline Tower, 39 Wang Kwong Road, Kowloon Bay Kowloon, Hong Kong **Hong Kong Productivity Council** HKPC Building, 78 Tat Chee Avenue, Kowloon, Hong Kong		
Prüfgrundlage: Test specification	**FCC Part 15 Subpart C** **ANSI C63.4-2003** **CISPR 22:1997**		
Prüfergebnis: Test Result	**Das vorstehend beschriebene Gerät wurde geprüft und entspricht oben genannter Prüfgrundlage.** The above mentioned product was tested and **passed**.		

geprüft / tested by:			**kontrolliert** / reviewed by:		
04.01.2005	Hugo Wan		04.01.2005	Thomas Berns	
Datum Date	**Name** Name	**Unterschrift** Signature	**Datum** Date	**Name** Name	**Unterschrift** Signature

Sonstiges: Other Aspects	**FCCID: SCYEVAB**

Abkürzungen:	**OK, Pass, P**	**= entspricht Prüfgrundlage**	**Abbreviations:**	**OK, Pass, P**	**= passed**
	Fail, F	**= entspricht nicht Prüfgrundlage**		**Fail, F**	**= failed**
	N/A	**= nicht anwendbar**		**N/A**	**= not applicable**
	NT	**= nicht getestet**		**NT**	**= not tested**

Dieser Prüfbericht bezieht sich nur auf das o.g. Prüfmuster und darf ohne Genehmigung der Prüfstelle nicht auszugsweise vervielfältigt werden. Dieser Bericht berechtigt nicht zur Verwendung eines Prüfzeichens.

This test report relates to the a. m. test sample. Without permission of the test center this test report is not permitted to be duplicate in extracts. This test report does not entitle to carry any safety mark on this or similar products.

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Product information

Manufacturers declarations

	Transmitter	Receiver
Operating frequency range	2402 - 2480 MHz	2402 - 2480 MHz
Type of modulation	FHSS modulation	FHSS modulation
Number of channels	79	79
Channel separation	1 MHz	1 MHz
Type of antenna	Integral Antenna	Integral Antenna
Antenna gain (dBi)	2	
Power level	fix	
Type of equipment	plug-in radio device	plug-in radio device
Connection to public utility power line	Yes	
Nominal voltage	V_{nor}: 110 VAC to AC/DC adaptor	V_{nor}: 110 VAC to AC/DC adaptor
Independent Operation Modes	Page scan Inquiry scan Connection state - ACL Link Connection state - SCO Link	

Product function and intended use

The test item is a Base (docking station) of a wireless headset system EVA-S-0000 based on the Bluetooth technology. LEM Evasio Professional Wireless Headset EVA-S-0000 consists of two units: Base Unit and Headset. Each of them contains a Bluetooth transceiver.

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, 79 RF channels spaced 1 MHz apart are defined.
The channel is represented by a pseudo-random hopping sequence through the 79 channels. The channel is divided into time slots, with a nominal slot length of 625 µs, where each slot corresponds to different RF hop frequencies. The nominal hop rate is 1600 hops/s. The symbol rate on the channel is 1 Ms/s.

Submitted documents

Circuit Diagram
PCB Layout
Block Diagram
User manual

Special accessories and auxiliary equipment

The product has been tested together with the following additional accessory:

1. Charger
   Model Number: Powy Travel Charger

List of Test and Measurement Instruments

	Kind of Equipment	Manufacturer	Type	S/N
☒	Test Receiver	Rohde & Schwarz	ESH-3	890173/033
☒	L/I/S/N	Rohde & Schwarz	ESH 3-Z5	849876/026
☐	Oscilloscope	HP	54713B	US34510455
☐	Test Receiver	Rohde & Schwarz	ESVP	882402/033
☐	Absorbing Clamp	Rohde & Schwarz	MDS-21	979 3/4
☒	Test Receiver	Rohde & Schwarz	ESVS30	842807/009
☒	Biconical Antenna	Rohde & Schwarz	HK116	841489/015
☒	Log.-Periodic Antenna	Rohde & Schwarz	HL223	841516/017
☐	Universal Power Analyzer	Voltech	PM3000A	9915
☐	Reference Impedance Network	Voltech	IEC 555 Standard	9946
☐	AC Power Source	California Instr.	4500L	HK51895
☐	Trip-Loop Antenna	Chase	LLA6142	1019
☒	Double Ridge Horn Antenna	EMCO	3115	9002-3351
☒	Double Ridge Horn Antenna	EMCO	3115	9002-3347
☐	RF Comms Test Set	HP	8920B	US36492628
☐	Spectrum Analyser + Tracking G.	HP	8596E	3639A00758
☐	Signal Generator	Rohde & Schwarz	SMY 01	844146/024
☐	Signal Generator	Rohde & Schwarz	SMY 01	844146/023
☐	BiLog Antenna	EMCO	3143	9607-1287
☐	Isotropic Field Probe	Holladay	HI-4422	90956
☐	Power Amplifier	Kalmus	757-LC	7620-1
☐	Power Amplifier	Kalmus	122-FC	7620-2
☐	Coupling Clamp	Schaffner	CDN 126	312
☐	Couple Device Network	Fischer	CDN-M2	9604
☒	Spectrum Analyzer	Rohde & Schwarz	FSP30	1093.4495K30
☐	Temperature Chamber	Binder	MK 240	9020-0028
☐	EFT,ESD,SURGE, DIPS tester	Schaffner	Best 96	IN3796-011
☐	Surge Generator	Schaffner	NSG650	280

Result FCC Part 15 – Subpart C

Subclause 15.203 – Antenna Information	**Pass**
Requirement:	No antenna other than that furnished by the responsible party shall be used with the device
Result:	Permanent attached antenna
Verdict:	Pass

Subclause 15.204 – Antenna Information	**Pass**

Requirement: Provide information for every antenna proposed for the use with the EUT

Result: a) Antenna type: Integral antenna soldered to the circuit board
b) Manufacturer and model no: N.A.
c) Gain with reference to an isotropic radiator: 2 dBi

Verdict: Pass

Subclause 15.207 – Disturbance Voltage on AC Mains **Pass**

Test Port: AC mains input port of the charger
Applied voltage: 110VAC
Applicable only to equipment designed to be connected to the public utiliy power line.

1) Mode of operation: Charging only

Live measurement

Frequency range (MHz)	Frequency (MHz)	Quasi-peak dBµV/m	Average dBµV/m	Limit QP (dBµV/m)	Limit AV (dBµV/m)	Verdict
0,15 – 0,5	0.168	55.0	40.5	66 - 56	56 - 46	Pass
	0.198	50.0	36.8			Pass
> 0,5 - 5	0.522	44.8	34.7	56	46	Pass
	3.132	49.3	43.5			Pass
> 5 - 30	-	-	-	60	50	Pass

Neutral measurement

Frequency range (MHz)	Frequency (MHz)	Quasi-peak dBµV/m	Average dBµV/m	Limit QP (dBµV/m)	Limit AV (dBµV/m)	Verdict
0,15 – 0,5	0.168	53.6	40.6	66 - 56	56 - 46	Pass
> 0,5 - 5	0.522	44.9	35.2	56	46	Pass
	3.138	49.0	43.5			Pass
> 5 - 30	-	-	-	60	50	Pass

2) Mode of operation: operating mode that Bluetooth SCO link exists between the Base Unit and the Headset.

Live measurement

Frequency range (MHz)	Frequency (MHz)	Quasi-peak dBµV/m	Average dBµV/m	Limit QP (dBµV/m)	Limit AV (dBµV/m)	Verdict
0,15 – 0,5	0.198	53.6	40.7	66 - 56	56 - 46	Pass
	0.390	50.2	41.8			Pass
> 0,5 - 5	0.522	47.8	37.9	56	46	Pass
	3.036	46.7	37.2			Pass
> 5 - 30	-	-	-	60	50	Pass

Neutral measurement

Frequency range (MHz)	Frequency (MHz)	Quasi-peak dBµV/m	Average dBµV/m	Limit QP (dBµV/m)	Limit AV (dBµV/m)	Verdict
0,15 – 0,5	0.258	49.9	39.7	66 - 56	56 - 46	Pass
> 0,5 - 5	0.516	48.1	38.5	56	46	Pass
	0.906	43.8	31.9			Pass
	3.072	46.2	36.2			Pass
> 5 - 30	-	-	-	60	50	Pass

Result: The radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150kHz to 30MHz does not exceed the limits. For test results plots refer to Appendix 1, page 2-6.

Verdict: Pass

Subclause 15.247 (a) – Carrier Frequency Separation **Pass**

Requirement: Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25kHz or the 20dB bandwidth of the hopping channel, whichever is greater.

Test Specification : FCC Part 15 Subpart A – Subclause 15.31
Mode of operation : Tx mode (hopping on), DH1 packet
Port of testing : Temporary antenna port
Detector : Peak
RBW/VBW : 100 kHz / 300 kHz
Supply voltage : 110VAC to AC/DC adapter
Temperature : 23ºC
Humidity : 50%

Result: The centre frequencies of the hopping channels are separated by more than the 20dB bandwidth. For test results plots refer to Appendix 1, page 7.

Verdict: Pass

Subclause 15.247 (a) – Time of Occupancy (Dwell Time)	Pass

Requirement: Frequency hopping systems in the 2400 – 2483.5 MHz band shall use at least 15 non-overlapping channels. The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed.

Test Specification : FCC Part 15 Subpart A – Subclause 15.31
Mode of operation : Tx mode (hopping on), DH5 packet
Port of testing : Temporary antenna port
Detector : Peak
RBW/VBW : 1 MHz / 3 MHz
Supply voltage : 110VAC to AC/DC adapter
Temperature : 23ºC
Humidity : 50%

Result: The screenshot in Appendix 1 page 9 shows the occurrence of a channel in a 12.8 s time period. In inquiry and page scan mode Bluetooth is using 32 hopping channels only. The frequency was used 26 times. The dwell time for the longest supported packet type is about 3 ms. As a result the average time of occupancy will not be greater than 400 ms.

i.e. Time period calculation:

$$0.4 \times 32 = 12.8\text{s}$$

Limit calculation:

$$26 \times 2.895 \times 10^{-3} = 75.27 \times 10^{-3}\text{s}$$
$$\leq 400 \times 10^{-3}\text{s}$$

For test protocols please refer to Appendix 1, page 8-9.

Verdict: Pass

Subclause 15.247 (a) – 20 dB Bandwidth	.

Requirement: Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25kHz or the 20dB bandwidth of the hopping channel, whichever is greater.

Test Specification : FCC Part 15 Subpart A – Subclause 15.31
Mode of operation : Tx mode (2402MHz, 2441MHz, 2480MHz), DH5 packet
Port of testing : Temporary antenna port
Detector : Peak
RBW/VBW : 30 kHz / 100 kHz
Supply voltage : 110VAC to AC/DC adapter
Temperature : 23ºC
Humidity : 50%

Results: For test protocols refer to Appendix 1, page 10-11.

Verdict: Pass

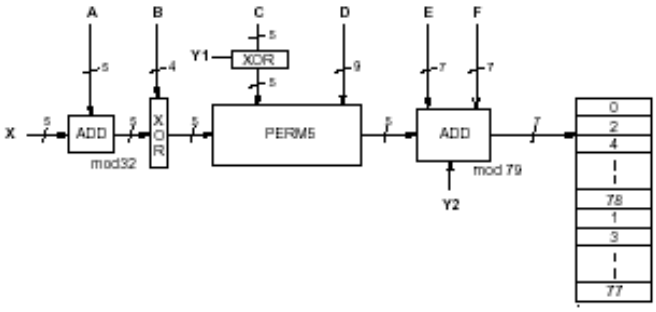
Frequency (MHz)	20 dB left (MHz)	20 dB right (MHz)	20dB bandwidth (MHz)

2402	0.484	0.480	0.964
2441	0.484	0.484	0.968
2480	0.488	0.476	0.964

Subclause 15.247 (a) – Hopping Sequence	**Pass**
Requirement: The hopping sequence is generated and provided with an example.	

Hopping sequence

The channel is represented by a pseudo-random hopping sequence hopping through the 79 RF channels. The hopping sequence is unique for the piconet and is determined by the Bluetooth device address of the master. The X input determines the phase in the 32-hop segment, whereas Y1 and Y2 selects between master-to-slave and slave-to-master transmission. The inputs A to D determine the ordering within the segment, the inputs E and F determine the mapping onto the hop frequencies.



Example data:

Hop sequence {k} for CONNECTION STATE:
CLK start: 0x0000010
ULAP: 0x00000000

```
#ticks:        00 02 | 04 06 | 08 0a | 0c 0e | 10 12 | 14 16 | 18 1a | 1c 1e |
-----------------------------------------------------------------------------------------
0x0000010:  08 66 | 10 70 | 12 19 | 14 23 | 16 01 | 18 05 | 20 33 | 22 37 |
0x0000030:  24 03 | 26 07 | 28 35 | 30 39 | 32 72 | 34 76 | 36 25 | 38 29 |
0x0000050:  40 74 | 42 78 | 44 27 | 46 31 | 48 09 | 50 13 | 52 41 | 54 45 |
0x0000070:  56 11 | 58 15 | 60 43 | 62 47 | 32 17 | 36 19 | 34 49 | 38 51 |
0x0000090:  40 21 | 44 23 | 42 53 | 46 55 | 48 33 | 52 35 | 50 65 | 54 67 |
0x00000b0:  56 37 | 60 39 | 58 69 | 62 71 | 64 25 | 68 27 | 66 57 | 70 59 |
0x00000d0:  72 29 | 76 31 | 74 61 | 78 63 | 01 41 | 05 43 | 03 73 | 07 75 |
0x00000f0:  09 45 | 13 47 | 11 77 | 15 00 | 64 49 | 66 53 | 68 02 | 70 06 |
0x0000110:  01 51 | 03 55 | 05 04 | 07 08 | 72 57 | 74 61 | 76 10 | 78 14 |
0x0000130:  09 59 | 11 63 | 13 12 | 15 16 | 17 65 | 19 69 | 21 18 | 23 22 |
0x0000150:  33 67 | 35 71 | 37 20 | 39 24 | 25 73 | 27 77 | 29 26 | 31 30 |
0x0000170:  41 75 | 43 00 | 45 28 | 47 32 | 17 02 | 21 04 | 19 34 | 23 36 |
0x0000190:  33 06 | 37 08 | 35 38 | 39 40 | 25 10 | 29 12 | 27 42 | 31 44 |
0x00001b0:  41 14 | 45 16 | 43 46 | 47 48 | 49 18 | 53 20 | 51 50 | 55 52 |
0x00001d0:  65 22 | 69 24 | 67 54 | 71 56 | 57 26 | 61 28 | 59 58 | 63 60 |
0x00001f0:  73 30 | 77 32 | 75 62 | 00 64 | 49 34 | 51 42 | 57 66 | 59 74 |
0x0000210:  53 36 | 55 44 | 61 68 | 63 76 | 65 50 | 67 58 | 73 03 | 75 11 |
0x0000230:  69 52 | 71 60 | 77 05 | 00 13 | 02 38 | 04 46 | 10 70 | 12 78 |
0x0000250:  06 40 | 08 48 | 14 72 | 16 01 | 18 54 | 20 62 | 26 07 | 28 15 |
0x0000270:  22 56 | 24 64 | 30 09 | 32 17 | 02 66 | 06 74 | 10 19 | 14 27 |
0x0000290:  04 70 | 08 78 | 12 23 | 16 31 | 18 03 | 22 11 | 26 35 | 30 43 |
0x00002b0:  20 07 | 24 15 | 28 39 | 32 47 | 34 68 | 38 76 | 42 21 | 46 29 |
0x00002d0:  36 72 | 40 01 | 44 25 | 48 33 | 50 05 | 54 13 | 58 37 | 62 45 |
0x00002f0:  52 09 | 56 17 | 60 41 | 64 49 | 34 19 | 36 35 | 50 51 | 52 67 |
0x0000310:  38 21 | 40 37 | 54 53 | 56 69 | 42 27 | 44 43 | 58 59 | 60 75 |
0x0000330:  46 29 | 48 45 | 62 61 | 64 77 | 66 23 | 68 39 | 03 55 | 05 71 |
0x0000350:  70 25 | 72 41 | 07 57 | 09 73 | 74 31 | 76 47 | 11 63 | 13 00 |
0x0000370:  78 33 | 01 49 | 15 65 | 17 02 | 66 51 | 70 67 | 03 04 | 07 20 |
0x0000390:  68 55 | 72 71 | 05 08 | 09 24 | 74 59 | 78 75 | 11 12 | 15 28 |
0x00003b0:  76 63 | 01 00 | 13 16 | 17 32 | 19 53 | 23 69 | 35 06 | 39 22 |
0x00003d0:  21 57 | 25 73 | 37 10 | 41 26 | 27 61 | 31 77 | 43 14 | 47 30 |
0x00003f0:  29 65 | 33 02 | 45 18 | 49 34 | 19 04 | 21 08 | 23 20 | 25 24 |
```

Subclause 15.247 (a) – Equal Hopping Frequency Use	**Pass**
Requirement:	Each of the transmitter's hopping channels is used equally on average.

Equal hopping frequency use

The EUT complies with the Bluetooth RF specifications. For details refer to the Bluetooth standard.

Subclause 15.247 (a) – Receiver Input Bandwidth	**Pass**
Requirement:	The associated receiver(s) complies with the requirement that its input bandwidth matches the bandwidth of the transmitted signal.
Receiver input bandwidth The receiver bandwidth is equal to the receiver bandwidth in the 79 hopping channel mode, which is 1 MHz. The receiver bandwidth was verified during Bluetooth RF conformance testing.	

Subclause 15.247 (a) – Receiver Hopping Capability	**Pass**
Requirement:	The associated receiver has the ability to shift frequencies in synchronisation with the transmitted signals.
Receiver hopping Capability The EUT complies with the Bluetooth RF specifications. For details refer to the Bluetooth standard.	

Subclause 15.247 (b) – Peak Output Power **Pass**

Test Specification : FCC Part 15 Subpart A – Subclause 15.31
Mode of operation : Tx mode (2402MHz, 2441MHz, 2480MHz), DH1 packet
Port of testing : Temporary antenna port
Detector : Peak
RBW/VBW : 1 MHz / 3 MHz
Supply voltage : 110VAC to AC/DC adapter
Temperature : 23ºC
Humidity : 50%

Requirement: For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 hopping channels, and all frequency hopping systems in the 5725-5850 MHz band: 1 Watt. For all other frequency hopping systems in the 2400 – 2483.5 MHz band: 0.125 Watts.

Result

All three transmit frequency modes comply with the maximum peak output power limit.

For test protocols please refer to Appendix 1, page 12-13.

Frequency (MHz)	Maximum peak output power (dBm)	Cable attenuation (dB)	Output power (dBm)	Limit (W/dBm)	Verdict
2402	1.95	3.52	5.47	1 / 30.0	Pass
2441	1.88	3.65	5.53	1 / 30.0	Pass
2480	1.85	3.60	5.45	1 / 30.0	Pass

Subclause 15.247 (b) – Band edge compliance	Pass

Test Specification : FCC Part 15 Subpart A – Subclause 15.31
Mode of operation : Tx mode (2402MHz, 2441MHz, 2480MHz), DH1 packet
Port of testing : Temporary antenna port
Detector : Peak
RBW/VBW : 300 kHz / 1 MHz
Supply voltage : 110VAC to AC/DC adapter
Temperature : 23ºC
Humidity : 50%

Requirement: In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement.

Result

There is no peak found outside any 100 kHz bandwidth of the operating frequency band in the three transmit frequency. All three transmit frequency modes comply with the limit stated in subclause 15.247(c).

For test protocols refer to Appendix 1, page 14-15.

Subclause 15.247 (c) – Spurious Conducted Emissions	Pass

Test Specification : FCC Part 15 Subpart A – Subclause 15.31
Mode of operation : Tx mode (2402MHz, 2441MHz, 2480MHz), DH1 packet
Port of testing : Temporary antenna port
Detector : Peak
RBW/VBW : 100 kHz / 300 kHz
Supply voltage : 110VAC to AC/DC adapter
Temperature : 23 ºC
Humidity : 50 %

Requirement: In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement.

Result

There is no peak found outside any 100kHz bandwidth of the operating frequency band in the three transmit frequency. All three transmit frequency modes comply with the limit stated in subclause 15.247(c).

For test protocols refer to Appendix 1, page 16-22.

Operating frequency (MHz)	Spurious frequency (MHz)	Spurious Level (dBm)	Reference value (dBm)	Delta (dB)	Verdict
2402	No peak found	-	-	-	Pass
2441	No peak found	-	-	-	Pass
2480	No peak found	-	-	-	Pass

Subclause 15.247 (c) – Spurious Radiated Emissions **Pass**

Test Specification : ANSI C63.4 - 2003
Mode of operation : Tx mode (2402MHz, 2441MHz, 2480MHz), DH1 packet
Port of testing : Enclosure
Detector : Peak
RBW/VBW : 100 kHz / 300 kHz for f < 1 GHz
1 MHz / 3 MHz for f > 1 GHz
Supply voltage : 110VAC to AC/DC adapter
Temperature : 23ºC
Humidity : 50%

Requirement: In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement.

Result

All three transmit frequency modes comply with the field strength within the restricted bands.

For test protocols refer to Appendix 1, page 23-53.

Tx frequency 2402MHz Vertical Polarization

Freq MHz	Reading dBuV	AF dB(1/m)	Cable att. dB	Pre–amp dB	Filter att. dB	Level dBuV/m	Limit/ Detector dBuV/m
No peak found	-	-	-	-	-	-	-

Tx frequency 2402MHz Horizontal Polarization

Freq MHz	Reading dBuV	AF dB(1/m)	Cable att. dB	Pre–amp dB	Filter att. dB	Level dBuV/m	Limit/ Detector dBuV/m
No peak found	-	-	-	-	-	-	-

Tx frequency 2441MHz Vertical Polarization

Freq MHz	Reading dBuV	AF dB(1/m)	Cable att. dB	Pre–amp dB	Filter att. dB	Level dBuV/m	Limit/ Detector dBuV/m
No peak found	-	-	-	-	-	-	-

Tx frequency 2441MHz Horizontal Polarization

Freq MHz	Reading dBuV	AF dB(1/m)	Cable att. dB	Pre–amp dB	Filter att. dB	Level dBuV/m	Limit/ Detector dBuV/m
No peak found	-	-	-	-	-	-	-

Tx frequency 2480MHz Vertical Polarization

Freq MHz	Reading dBuV	AF dB(1/m)	Cable att. dB	Pre–amp dB	Filter att. dB	Level dBuV/m	Limit/ Detector dBuV/m
No peak found	-	-	-	-	-	-	-

Tx frequency 2480MHz				Horizontal Polarization			
Freq MHz	**Reading dBuV**	**AF dB(1/m)**	**Cable att. dB**	**Pre–amp dB**	**Filter att. dB**	**Level dBuV/m**	**Limit/ Detector dBuV/m**
No peak found	-	-	-	-	-	-	-

Appendix 1

Test results

Disturbance Voltage on AC Mains

Date: 21 Dec 2004
EUT: LEM Evasio Professional Wireless Headset (Base Unit)
Company: LEM Industries
Humidity: 50%
Temperature: 23ºC
Voltage supply: 110VAC to AC/DC adapter
Test by: Hugo Wan

Op. mode: Charging only

Live measurement

Frequency (MHz)	QP reading (dBµV)	Av reading (dBµV)	Results
0.168	55.0	40.5	Pass
0.198	50.0	36.8	Pass
0.522	44.8	34.7	Pass
3.132	49.3	43.5	Pass

Neutral measurement

Frequency (MHz)	QP reading (dBµV)	Av reading (dBµV)	Results
0.168	53.6	40.6	Pass
0.522	44.9	35.2	Pass
3.138	49.0	43.5	Pass

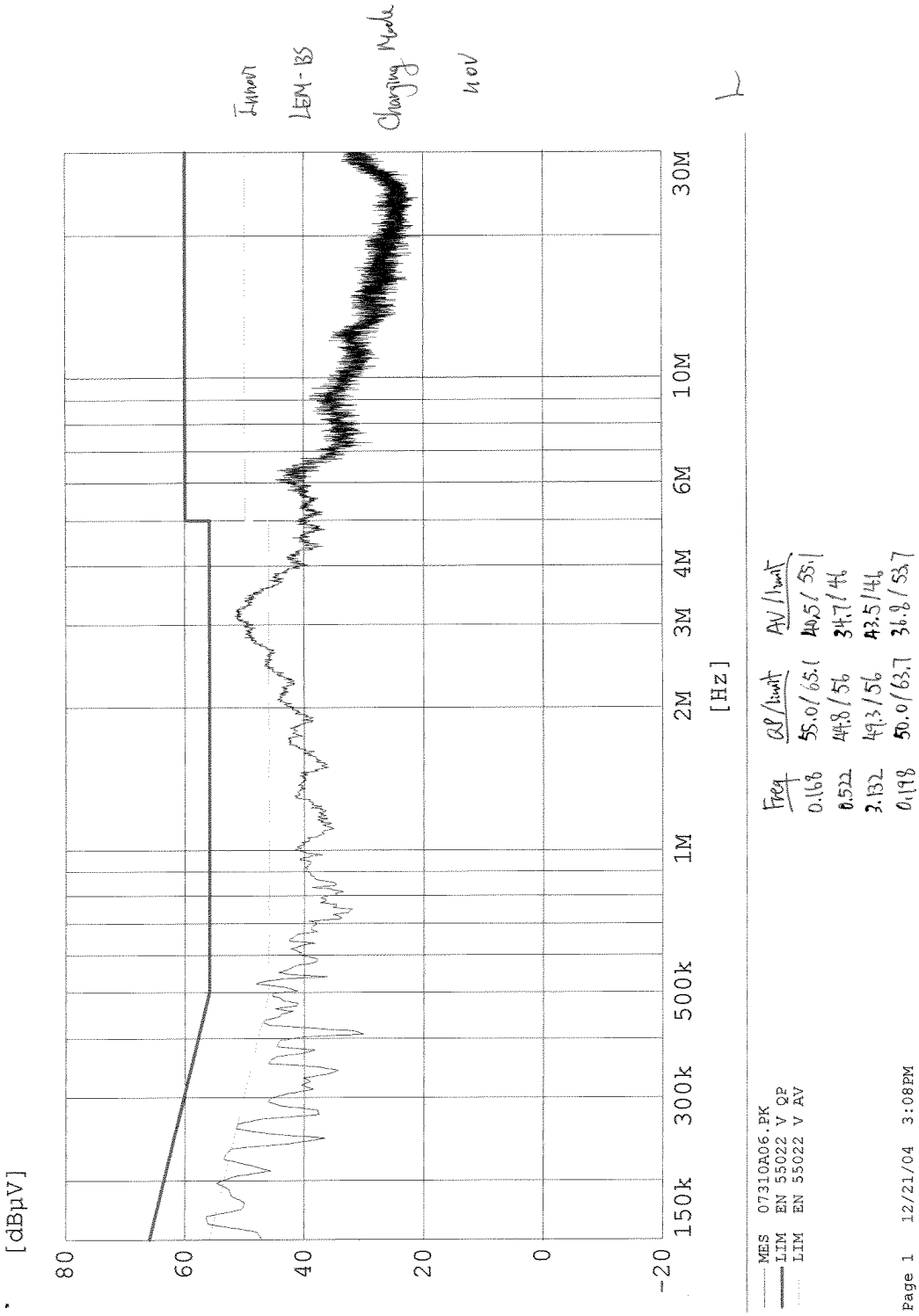
Op. mode: Operating

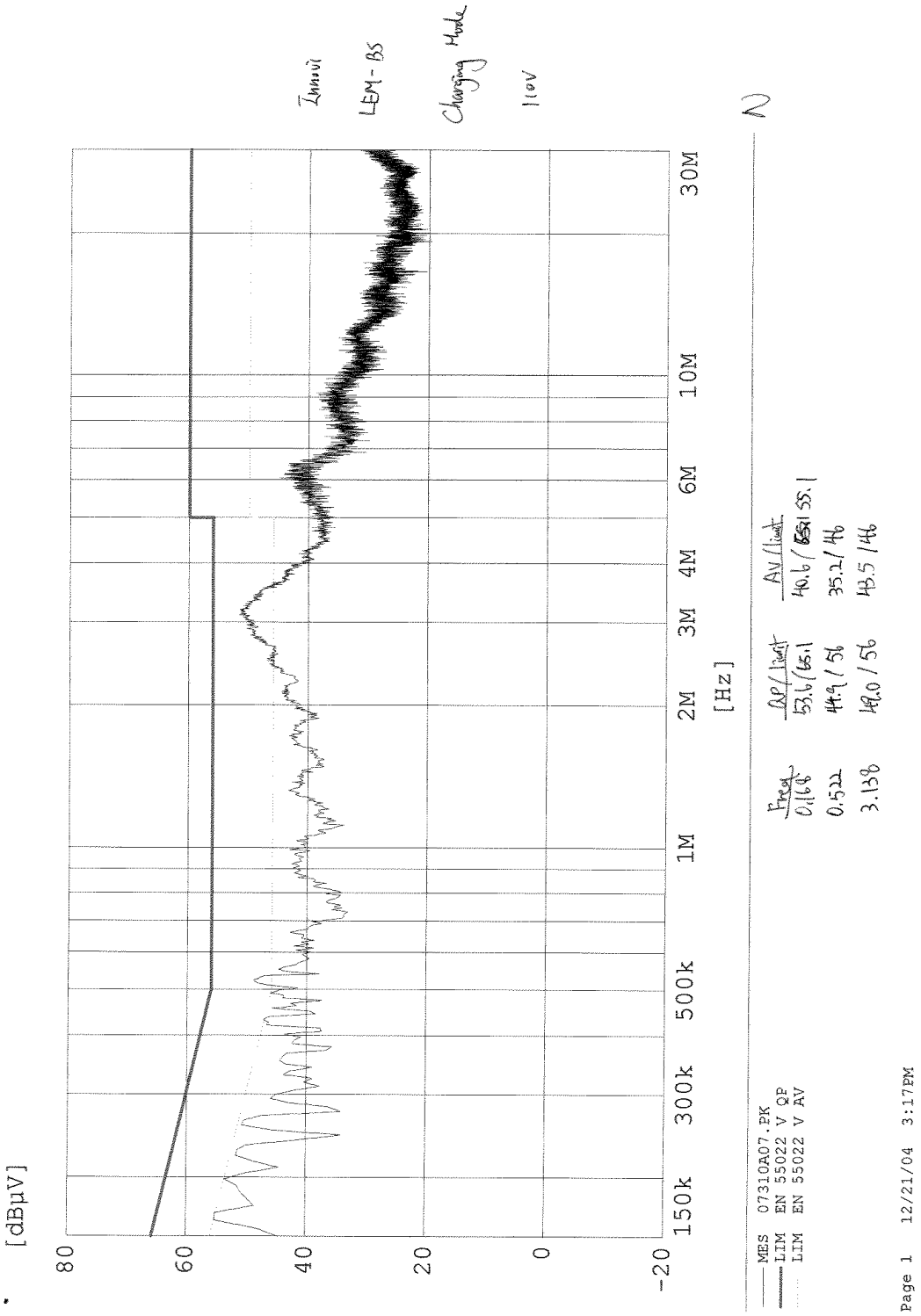
Live measurement

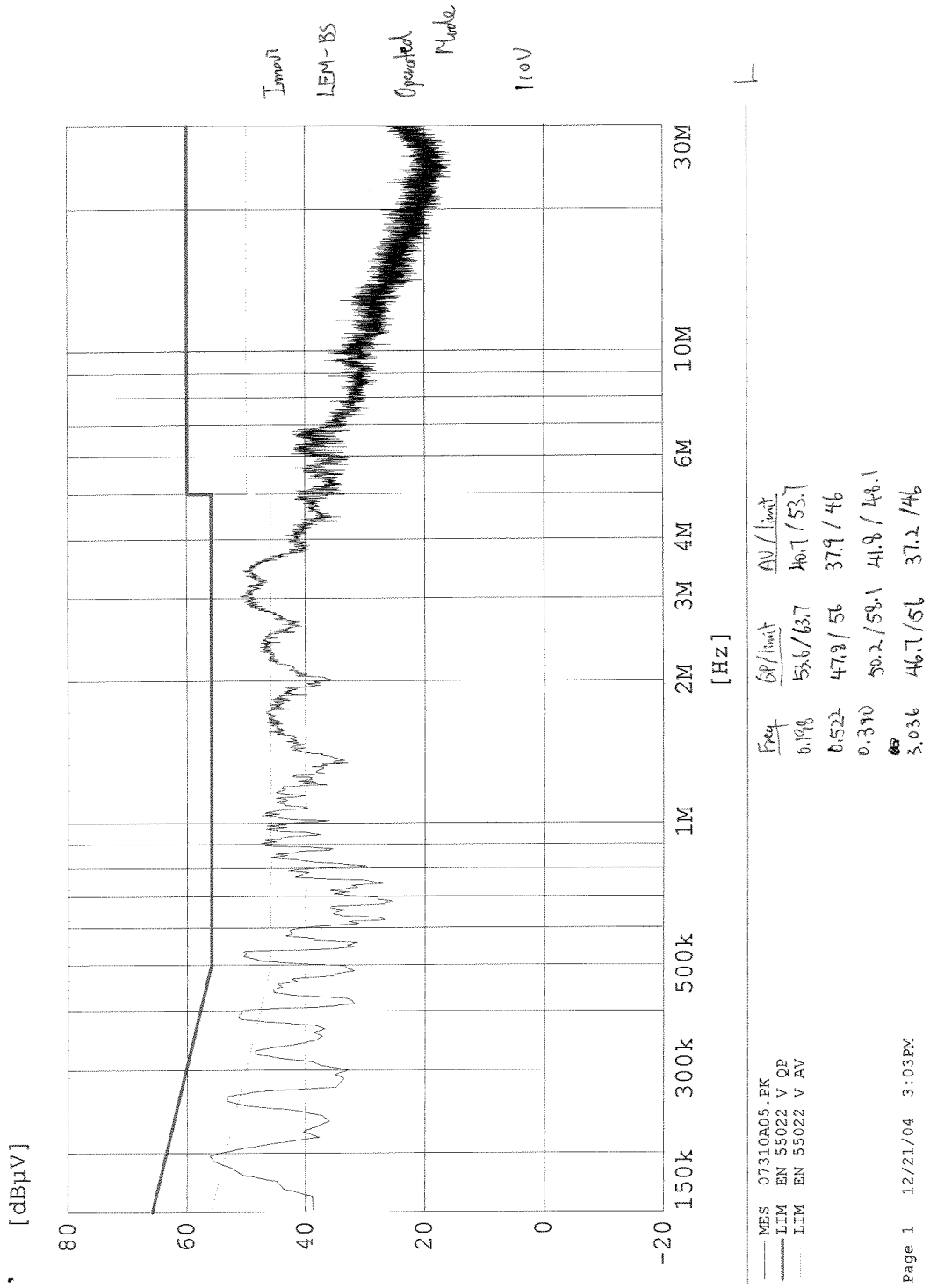
Frequency (MHz)	QP reading (dBµV)	Av reading (dBµV)	Results
0.198	53.6	40.7	Pass
0.390	50.2	41.8	Pass
0.522	47.8	37.9	Pass
3.036	46.7	37.2	Pass

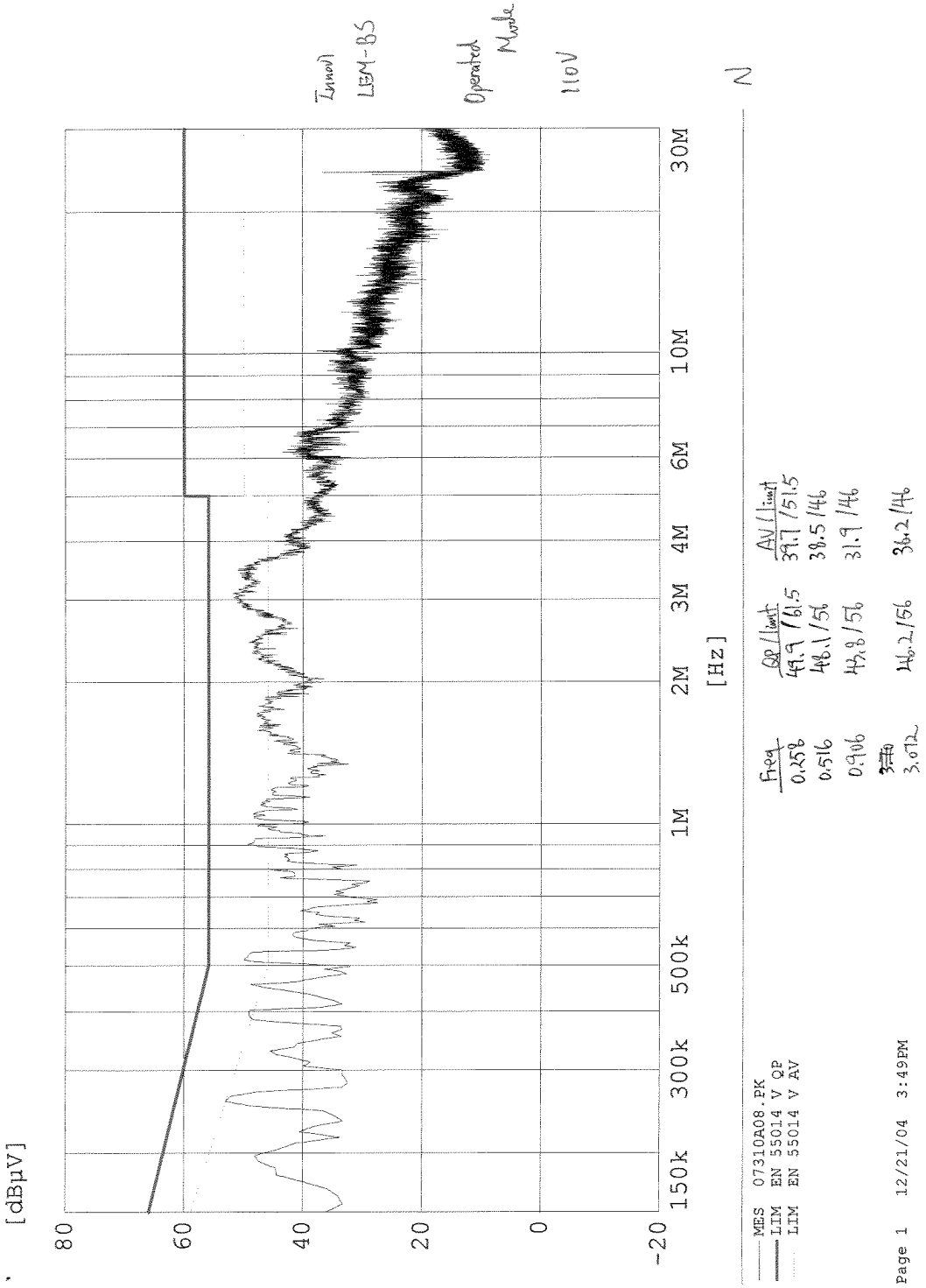
Neutral measurement

Frequency (MHz)	QP reading (dBµV)	Av reading (dBµV)	Results
0.258	49.9	39.7	Pass
0.516	48.1	38.5	Pass
0.906	43.8	31.9	Pass
3.072	46.2	36.2	Pass


Innovi
LEM-BS
Charging Mode
40V
[dBµV]
80
60
40
20
0
-20
150k
300k
500k
1M
2M
3M
4M
6M
10M
30M
[Hz]
MES 07310A06.PK
LIM EN 55022 V QP
LIM EN 55022 V AV
Freq QP/limit AV/limit
0.168 55.0/65.1 40.5/55.1
0.522 44.8/56 34.7/46
3.132 49.3/56 43.5/46
0.198 50.0/63.7 36.8/53.7
Page 1 12/21/04 3:08PM


Innovi
LEM-BS
Charging Mode
110V
N
[dBµV]
80
60
40
20
0
-20
150k
300k
500k
1M
2M
3M
4M
6M
10M
30M
[Hz]
Freq
0.168
0.522
3.138
QP/limit
53.6/65.1
44.9/56
49.0/56
AV/limit
40.6/55.1
35.2/46
43.5/46
MES 07310A07.PK
LIM EN 55022 V QP
LIM EN 55022 V AV
Page 1 12/21/04 3:17PM

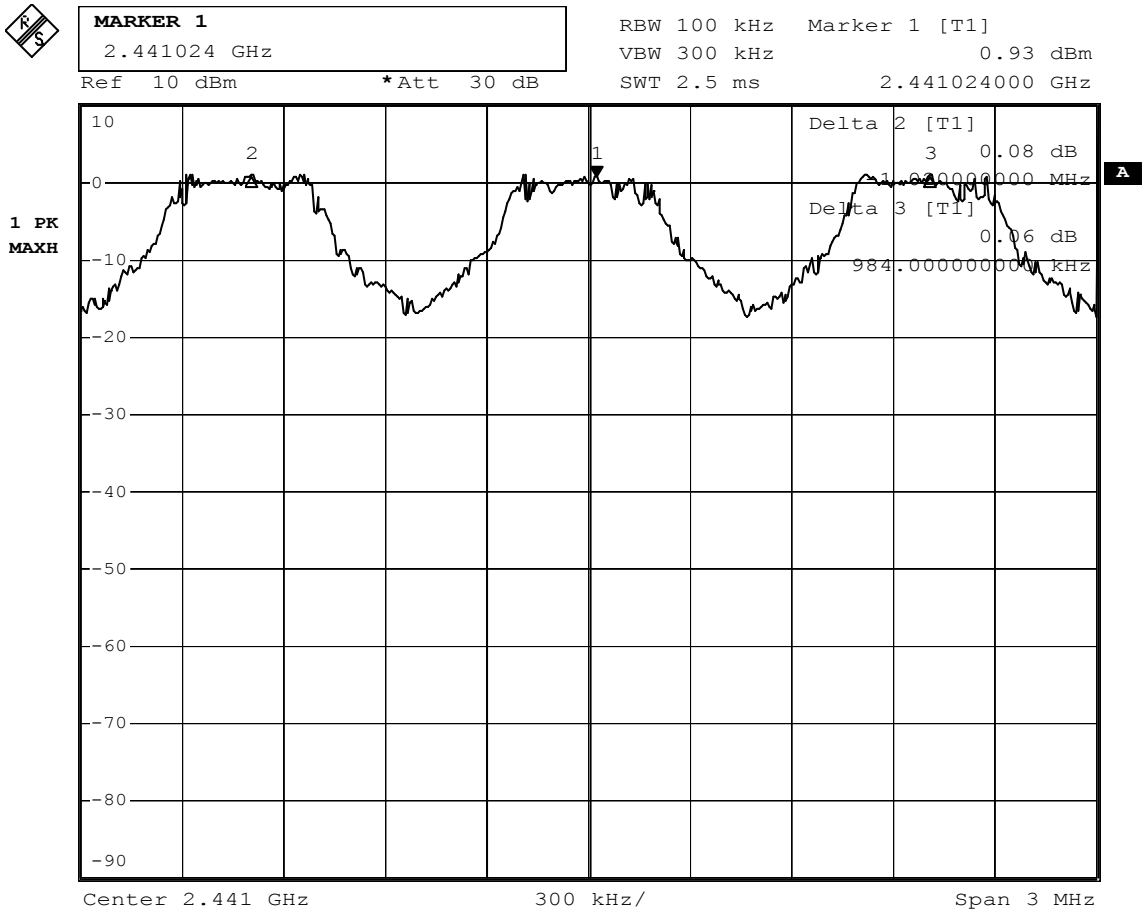

Inmart
LEM-BS
Operated
Mode
110V
[dBµV]
80
60
40
20
0
-20
150k
300k
500k
1M
2M
3M
4M
6M
10M
30M
[Hz]
MES 07310A05.PK
LIM EN 55022 V QP
LIM EN 55022 V AV
Freq QP/limit AV/limit
0.198 53.6/63.7 40.7/53.7
0.522 47.8/56 37.9/46
0.390 50.2/58.1 41.8/48.1
3.036 46.7/56 37.2/46
Page 1 12/21/04 3:03PM


Tunnel
LEM-B5
Operated Mode
110V
N
[dBµV]
80
60
40
20
0
-20
150k
300k
500k
1M
2M
3M
4M
6M
10M
30M
[Hz]
MES 07310A08.PK
LIM EN 55014 V QP
LIM EN 55014 V AV
Freq
0.258
0.516
0.906
3.072
QP/limit
49.9/61.5
48.1/56
43.8/56
46.2/56
AV/limit
39.7/51.5
38.5/46
31.9/46
36.2/46
Page 1 12/21/04 3:49PM

Carrier Frequency Separation

Date: 29 Nov 2004
EUT: LEM Evasio Professional Wireless Headset (Base Unit)
Company: LEM Industries
Humidity: 50%
Temperature: 23ºC
Voltage supply: 110VAC to AC/DC adapter
Test by: Hugo Wan
Op. mode: Hopping on

Reference frequency (MHz)	Channel Separation (MHz)
2441.000	0.984

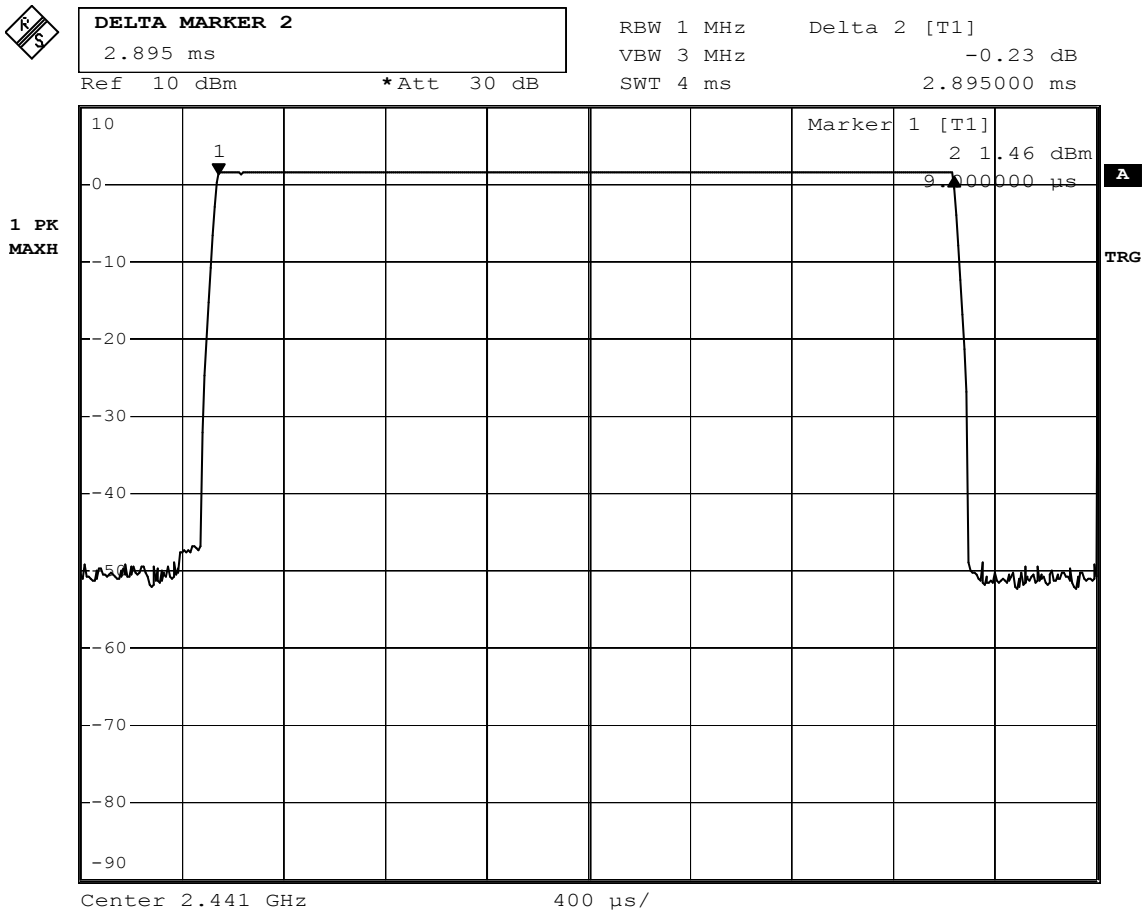


Date: 29.NOV.2004 15:26:20

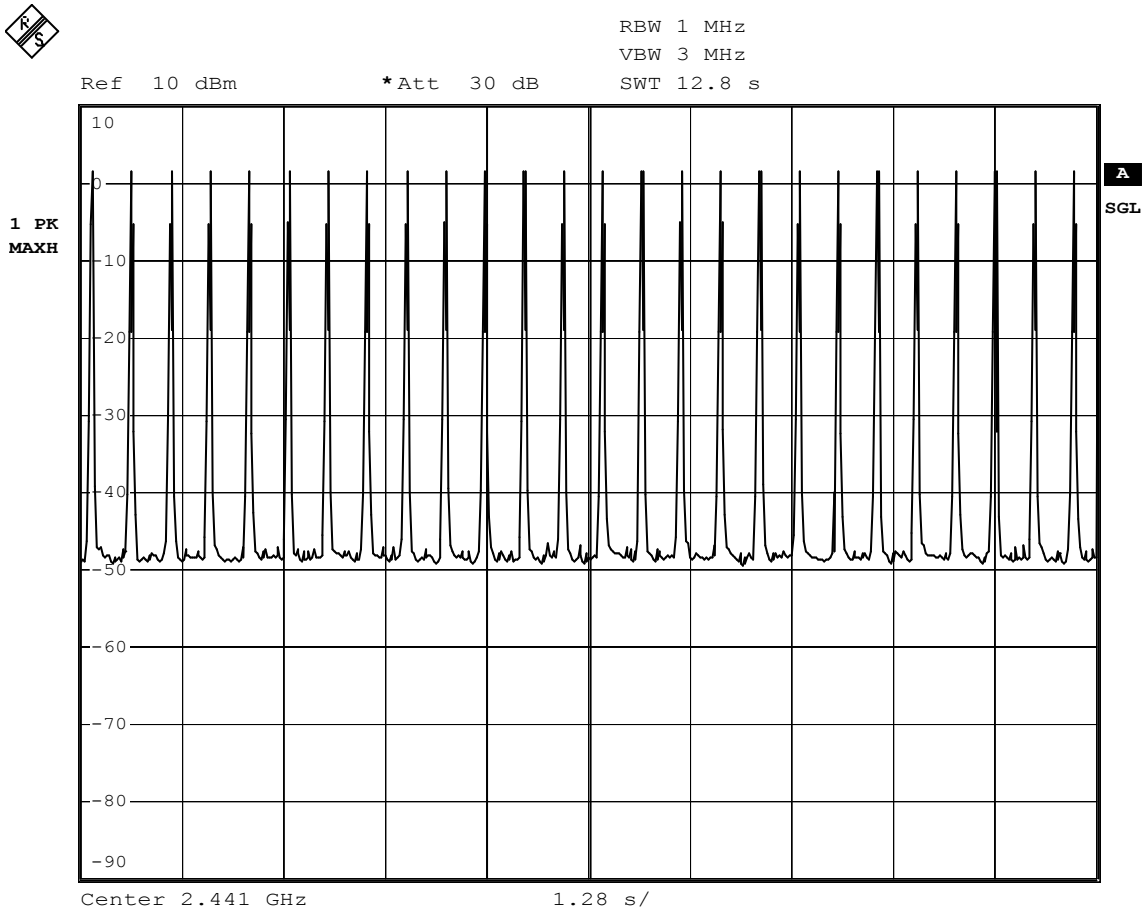
Dwell Time

Date: 29 Nov 2004
EUT: LEM Evasio Professional Wireless Headset (Base Unit)
Company: LEM Industries
Humidity: 50%
Temperature: 23ºC
Voltage supply: 110VAC to AC/DC adapter
Test by: Hugo Wan
Op. mode: Hopping on

Burst Duration (ms)	Number of hopping	Time of occupancy (s)	Results
2.895	26	0.002895 x 26 = 0.07527	Pass



Date: 29.NOV.2004 15:28:23

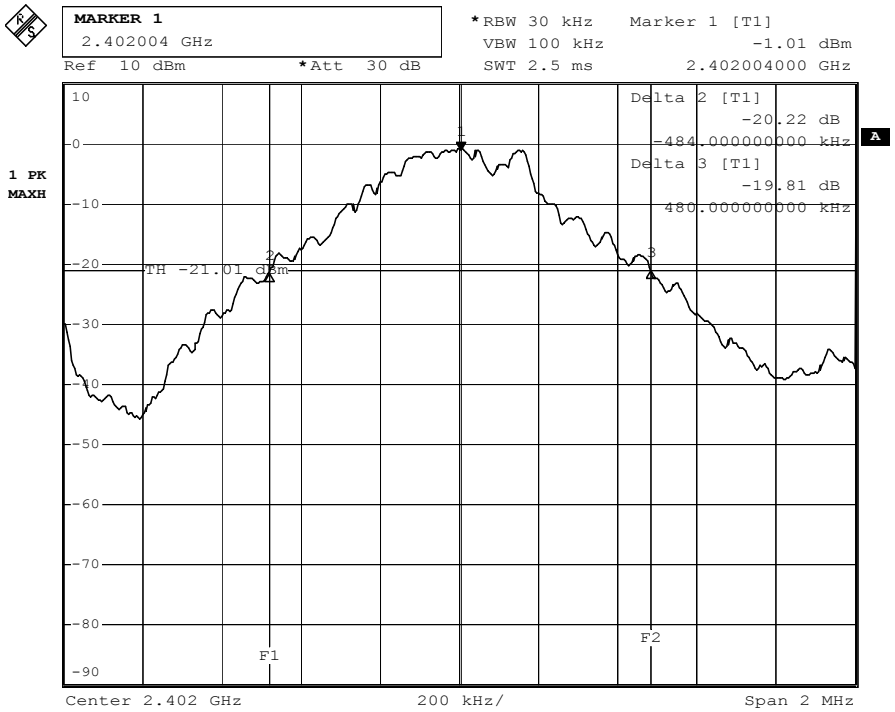


Date: 29.NOV.2004 15:28:58

20dB Bandwidth

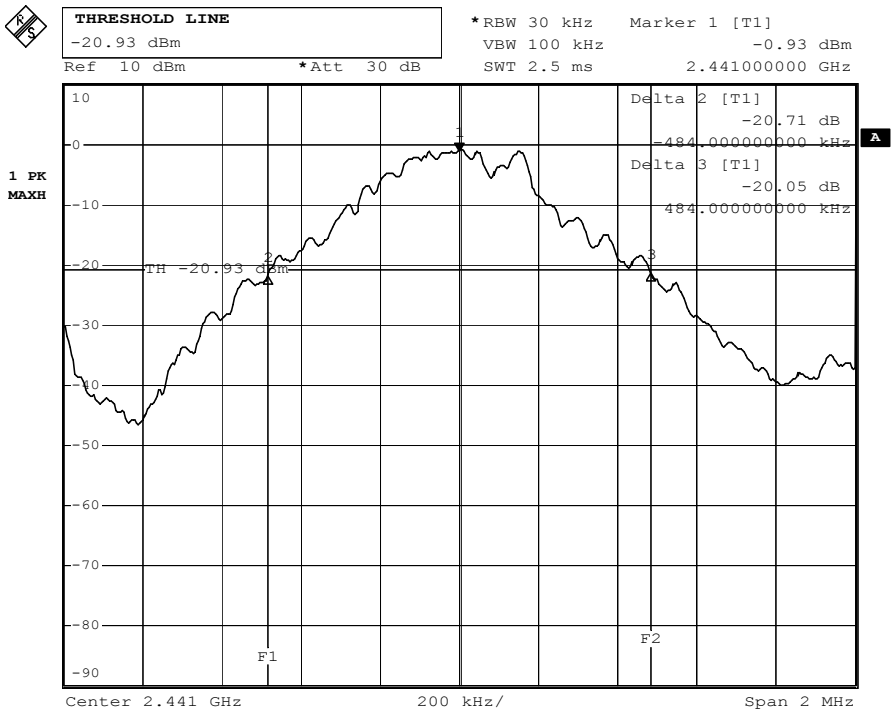
Date: 29 Nov 2004
EUT: LEM Evasio Professional Wireless Headset (Base Unit)
Company: LEM Industries
Humidity: 50%
Temperature: 23ºC
Voltage supply: 110VAC to AC/DC adapter
Test by: Hugo Wan
Op. mode: TX mode, DH5 with PRBS9 payload

Tx frequency (MHz)	Δf_L (MHz)	Δf_H (MHz)	$\lvert\Delta f_H\rvert+\lvert\Delta f_L\rvert$ (MHz)	Results
2402	0.484	0.480	0.964	Pass
2441	0.484	0.484	0.968	Pass
2480	0.488	0.476	0.964	Pass



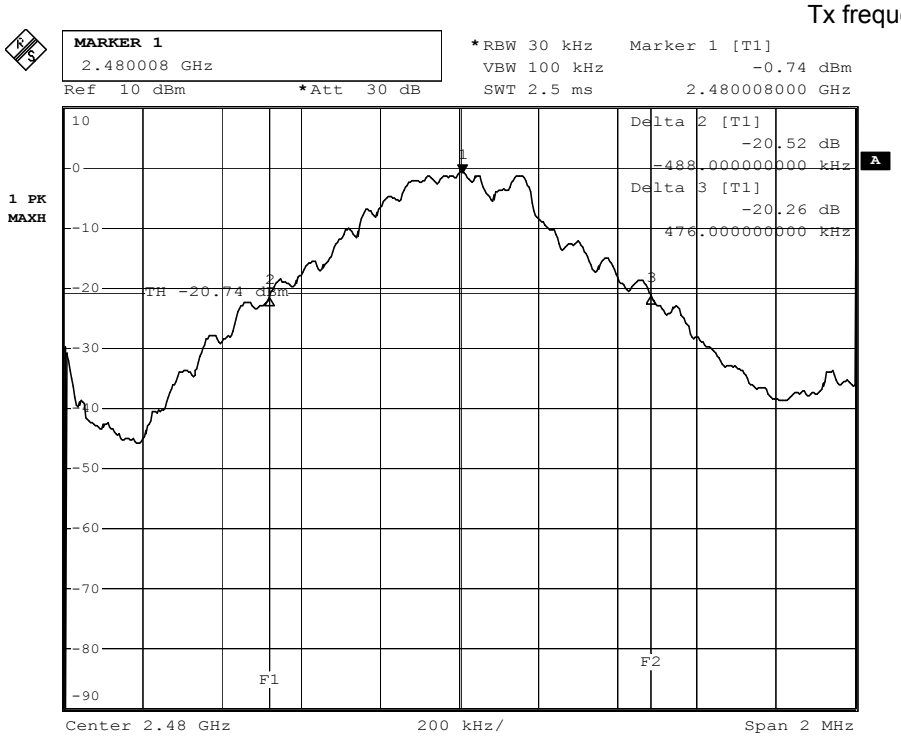
Date: 29.NOV.2004 15:32:35

Tx frequency: 2402MHz



Date: 29.NOV.2004 15:34:42

Tx frequency: 2441MHz



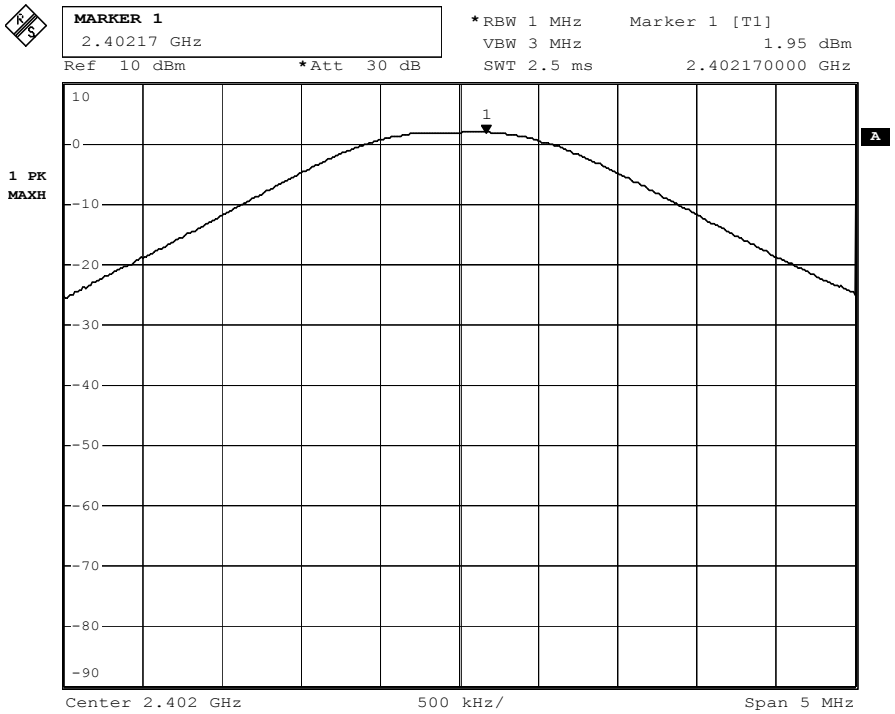
Date: 29.NOV.2004 15:37:58

Tx frequency: 2480MHz

Peak Output Power

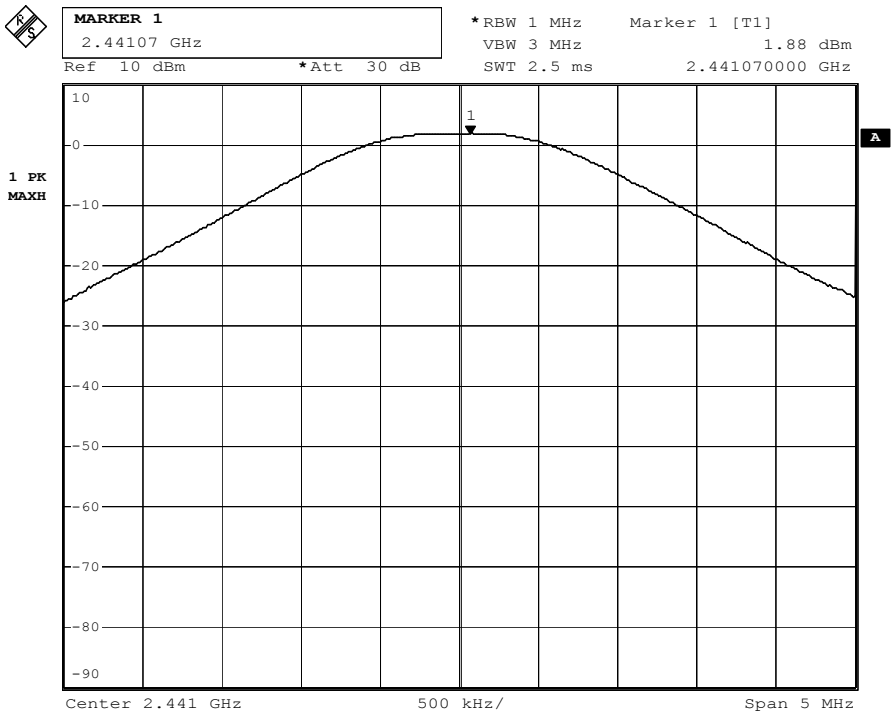
Date: 29 Nov 2004
EUT: LEM Evasio Professional Wireless Headset (Base Unit)
Company: LEM Industries
Humidity: 50%
Temperature: 23ºC
Voltage supply: 110VAC to AC/DC adapter
Test by: Hugo Wan
Op. mode: TX mode, DH1 with PRBS9 payload

Tx Frequency (MHz)	Power P_{PK} (dBm)	Cable Attenuation (dB)	Actual Peak Power (dBm)	Results
2402	1.95	3.52	5.47	Pass
2441	1.88	3.65	5.53	Pass
2480	1.85	3.60	5.45	Pass



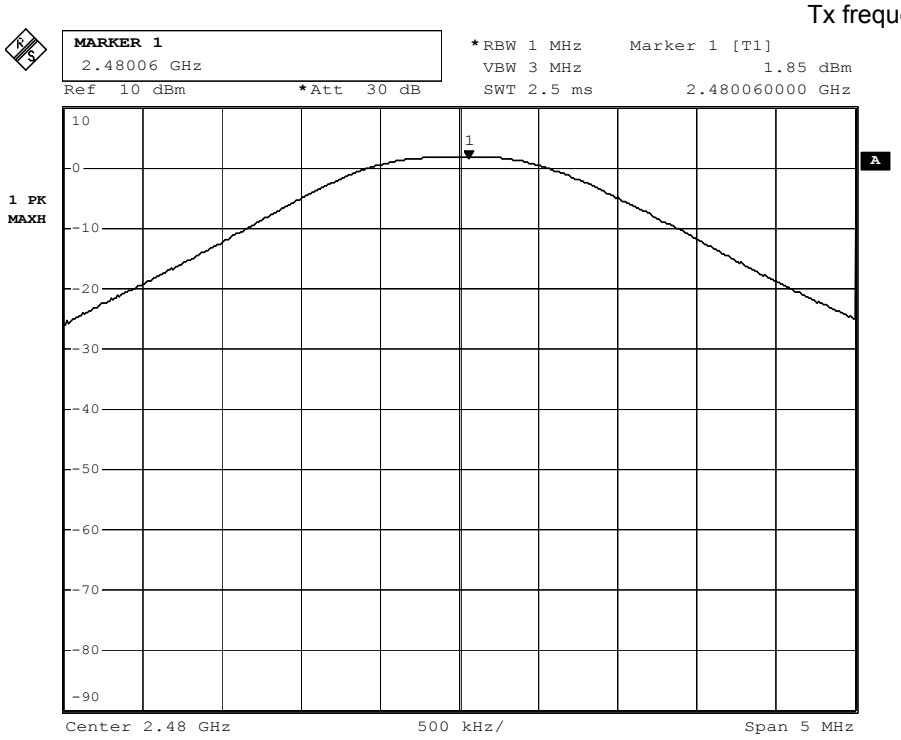
Date: 29.NOV.2004 15:39:11

Tx frequency: 2402MHz



Date: 29.NOV.2004 15:39:53

Tx frequency: 2441MHz



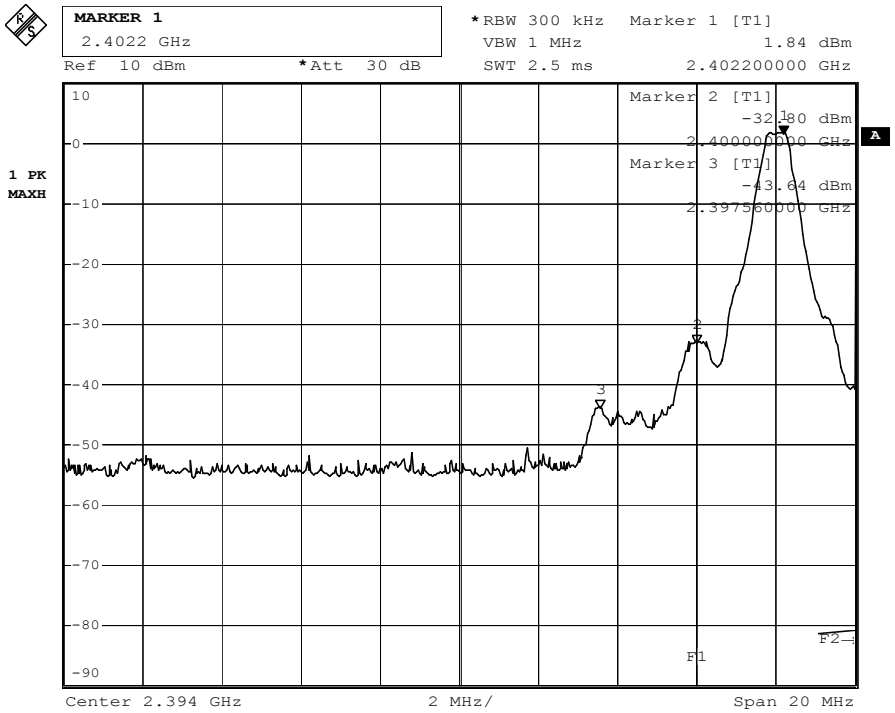
Date: 29.NOV.2004 15:40:24

Tx frequency: 2480MHz

Band Edge Compliance

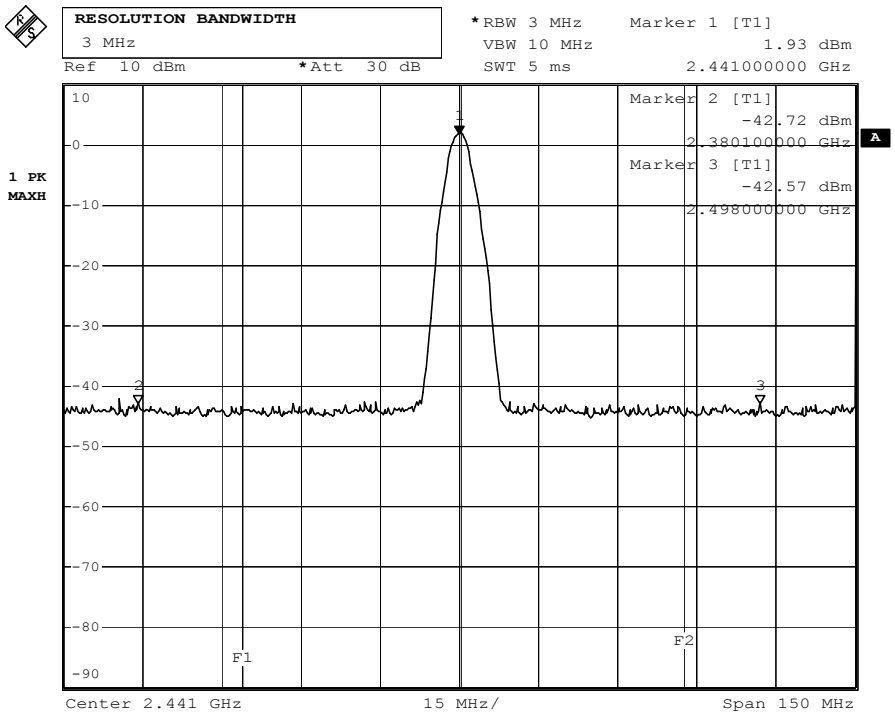
Date: 29 Nov 2004
EUT: LEM Evasio Professional Wireless Headset (Base Unit)
Company: LEM Industries
Humidity: 50%
Temperature: 23ºC
Voltage supply: 110VAC to AC/DC adapter
Test by: Hugo Wan
Op. mode: TX mode, DH1 with PRBS9 payload

Tx Frequency (MHz)	Peak in band Power level (dBm)	RF power outside 100kHz BW (MHz)	RF power difference outside 100kHz BW (dB)	Results
2402	1.84	No Peak	-	Pass
2480	1.71	No Peak	-	Pass



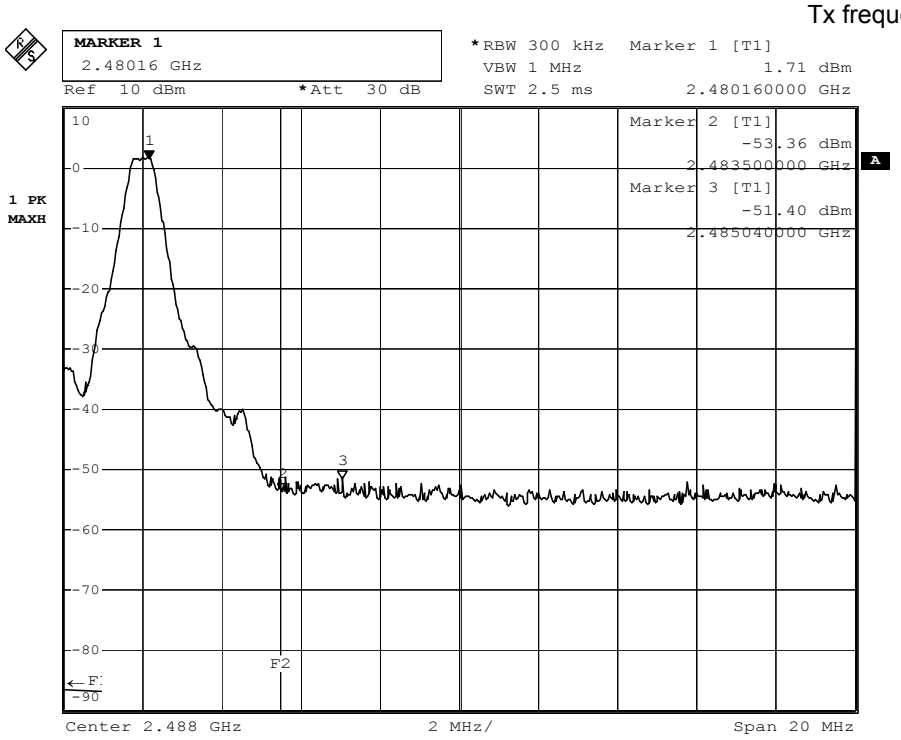
Date: 29.NOV.2004 15:43:52

Tx frequency: 2402MHz



Date: 29.NOV.2004 15:42:31

Tx frequency: 2441MHz



Date: 29.NOV.2004 15:41:14

Tx frequency: 2480MHz

Spurious Emissions - Conducted

Date: 29 Nov 2004
EUT: LEM Evasio Professional Wireless Headset (Base Unit)
Company: LEM Industries
Humidity: 50%
Temperature: 23ºC
Voltage supply: 110VAC to AC/DC adapter
Test by: Hugo Wan
Op. mode: TX mode, DH1 with PRBS9 payload

Tx frequency : 2402MHz

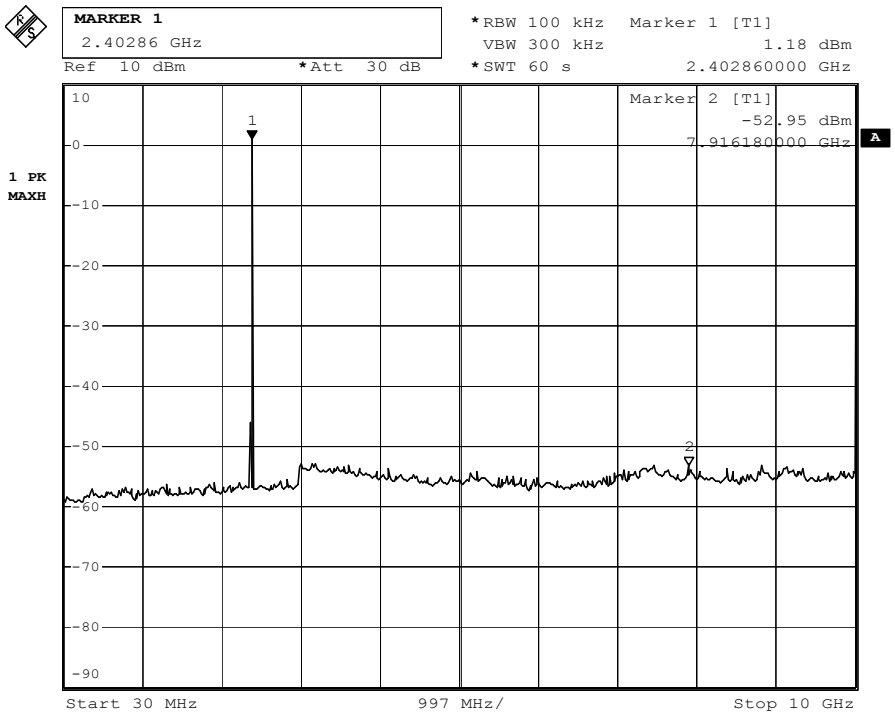
Spurious Frequency (MHz)	Power level (dBm)	Reference value (dBm)	Delta to reference level (dB)	Results
No peak found	-	-	-	Pass

Tx frequency : 2441MHz

Spurious Frequency (MHz)	Power level (dBm)	Reference value (dBm)	Delta to reference level (dB)	Results
No peak found	-	-	-	Pass

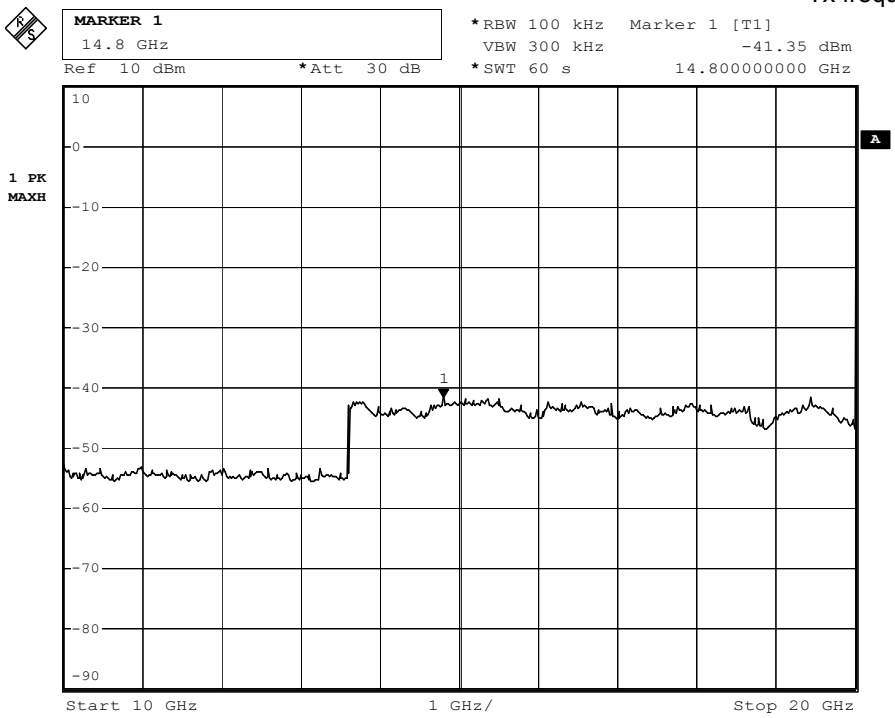
Tx frequency : 2480MHz

Spurious Frequency (MHz)	Power level (dBm)	Reference value (dBm)	Delta to reference level (dB)	Results
No peak found	-	-	-	Pass



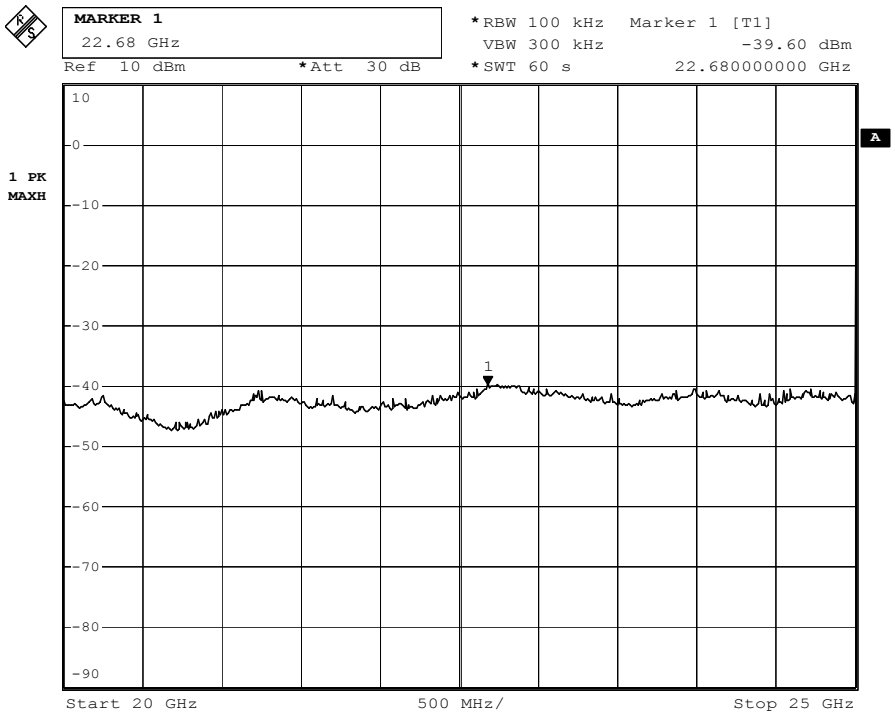
Date: 29.NOV.2004 15:54:15

Tx frequency: 2402MHz



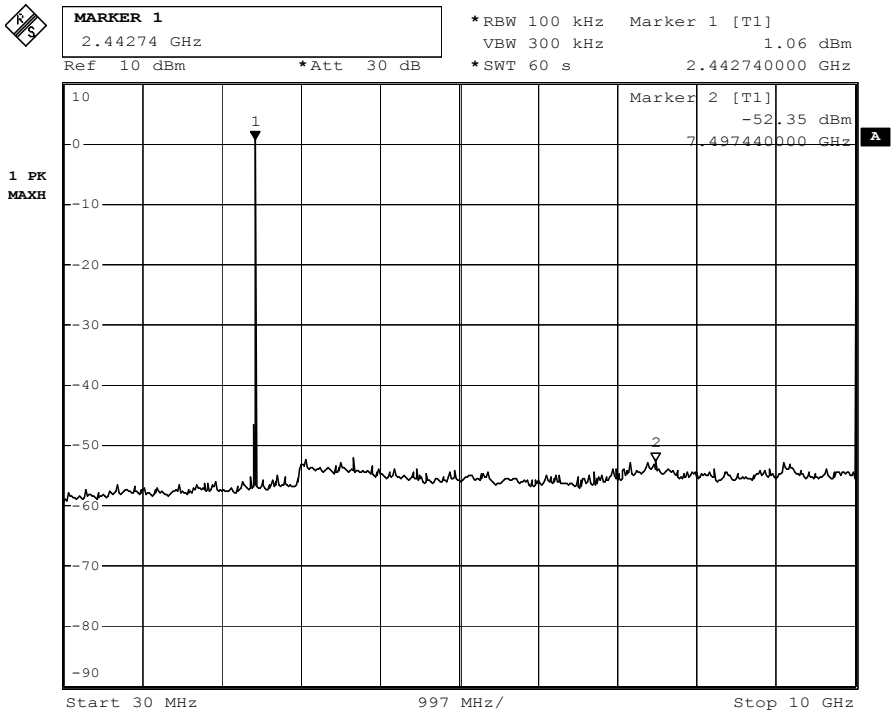
Date: 29.NOV.2004 15:59:17

Tx frequency: 2402MHz



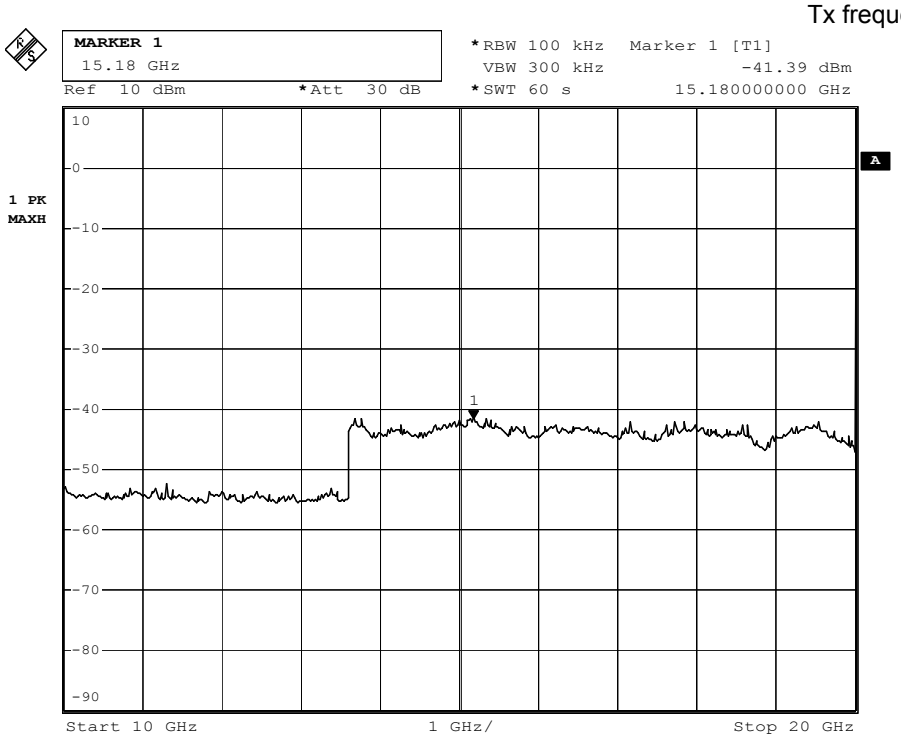
Date: 29.NOV.2004 16:03:59

Tx frequency: 2402MHz



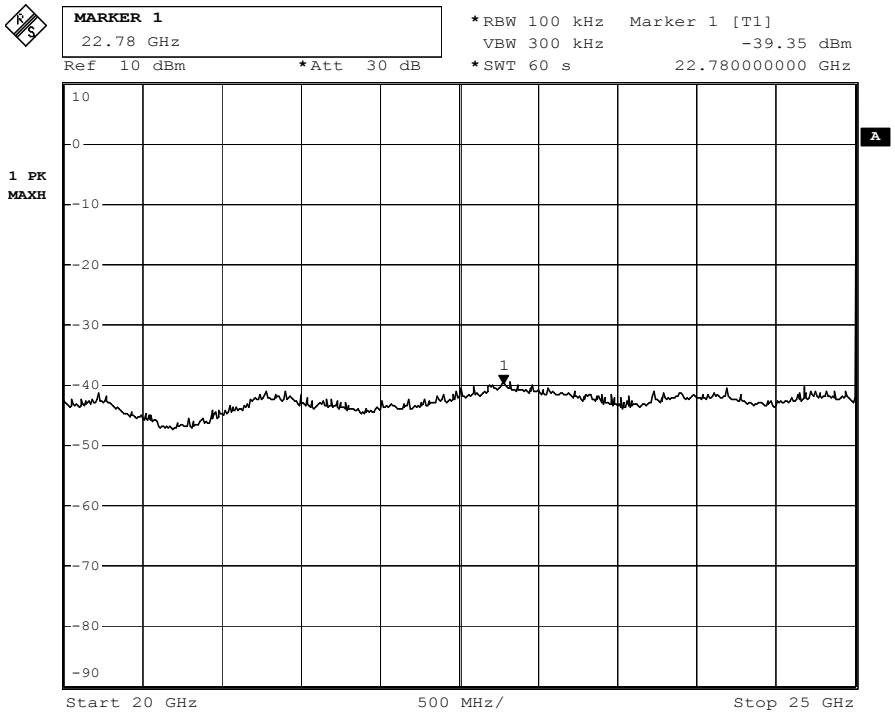
Date: 29.NOV.2004 16:07:51

Tx frequency: 2441MHz



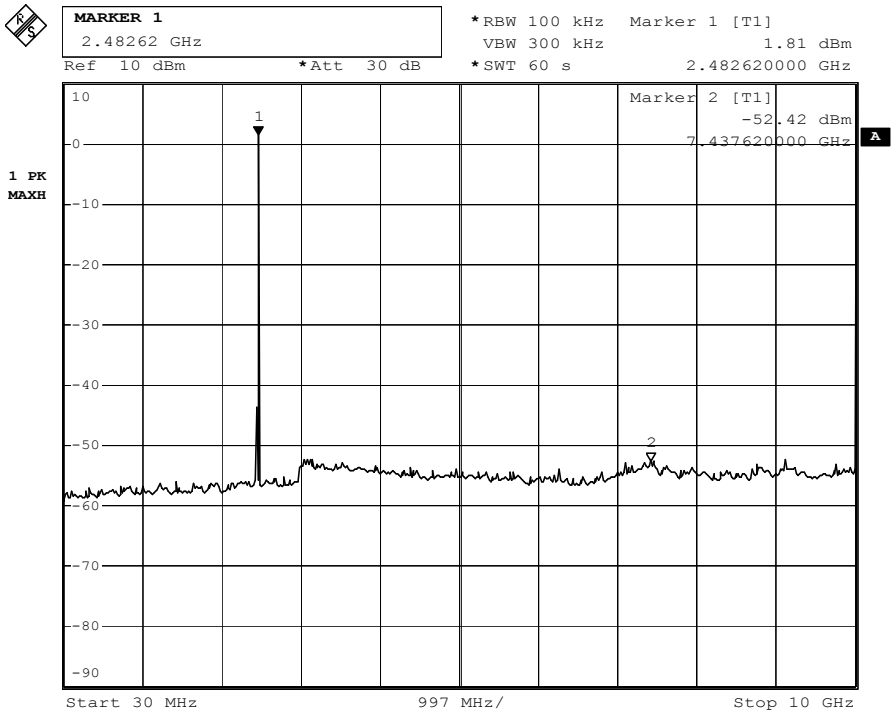
Date: 29.NOV.2004 16:12:57

Tx frequency: 2441MHz



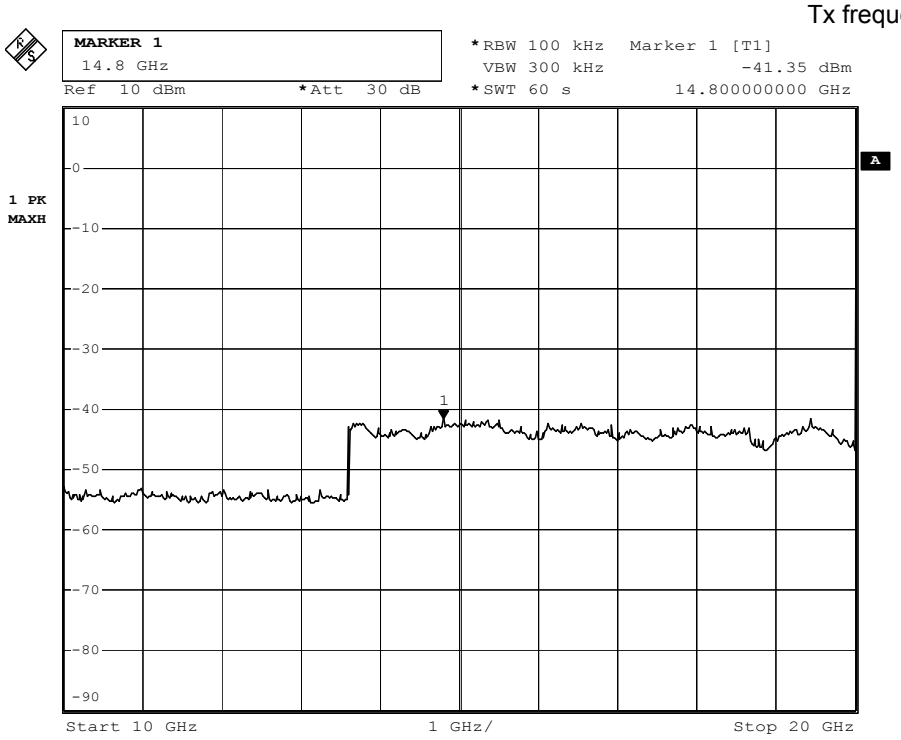
Date: 29.NOV.2004 16:15:54

Tx frequency: 2441MHz



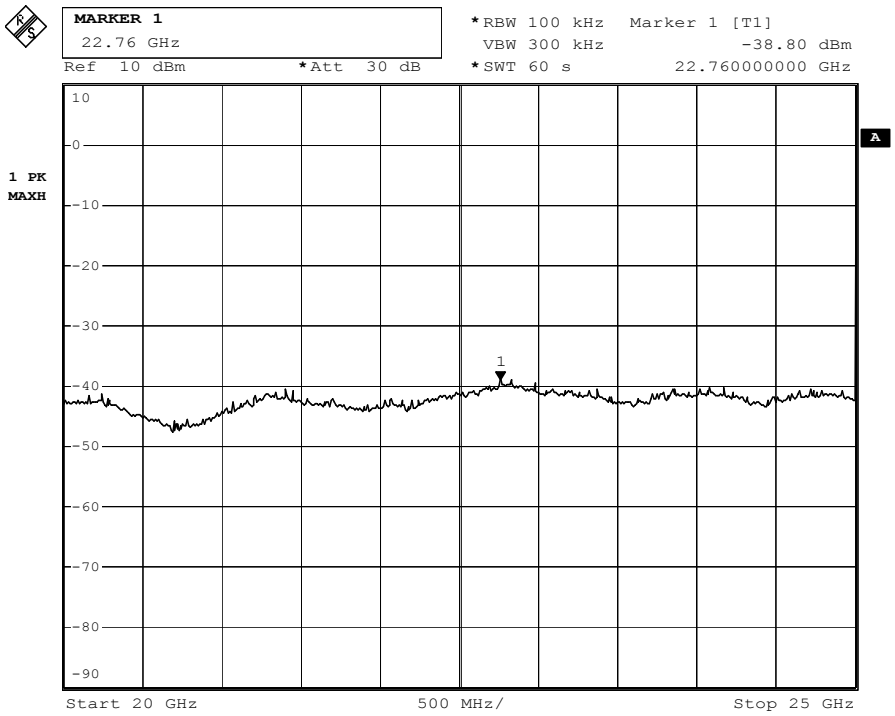
Date: 29.NOV.2004 18:15:23

Tx frequency: 2480MHz



Date: 29.NOV.2004 15:59:17

Tx frequency: 2480MHz



Date: 29.NOV.2004 16:24:14

Tx frequency: 2480MHz

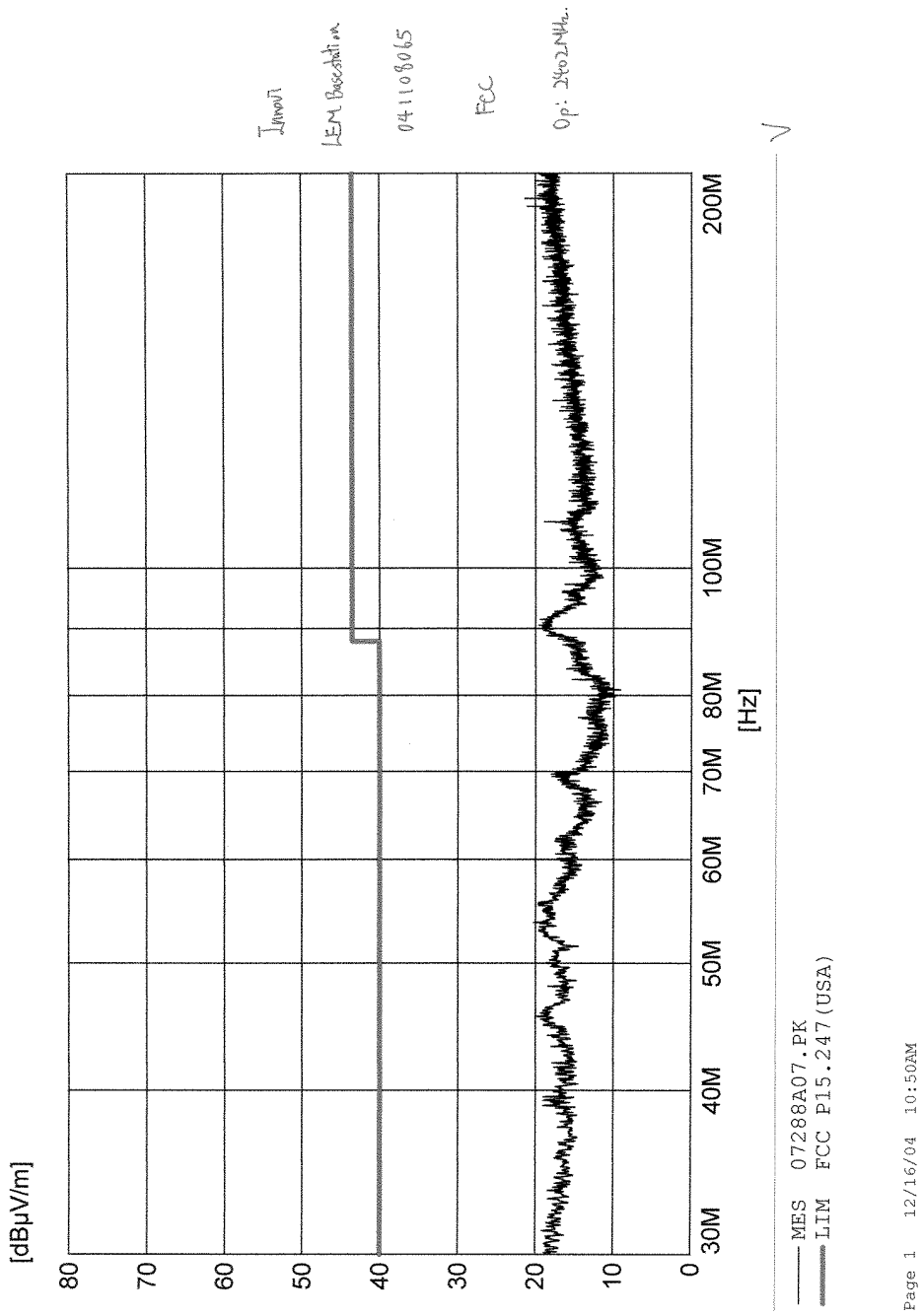
Spurious Emissions – Radiated

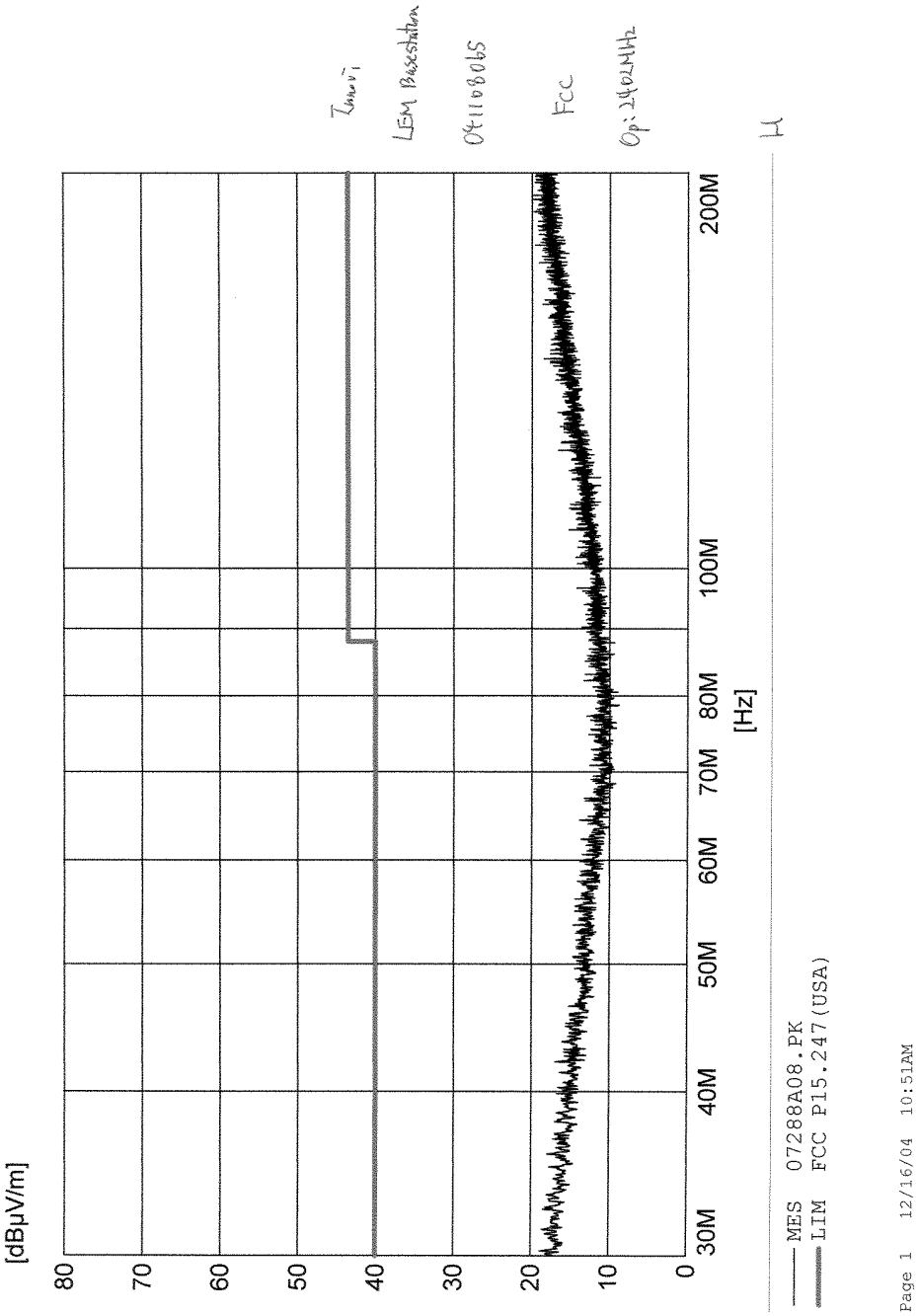
Date: 16 Dec 2004
EUT: LEM Evasio Professional Wireless Headset (Base Unit)
Company: LEM Industries
Voltage supply: 110VAC to AC/DC adapter
Test by: Hugo Wan
Op. mode: TX mode, DH1 with PRBS9 payload

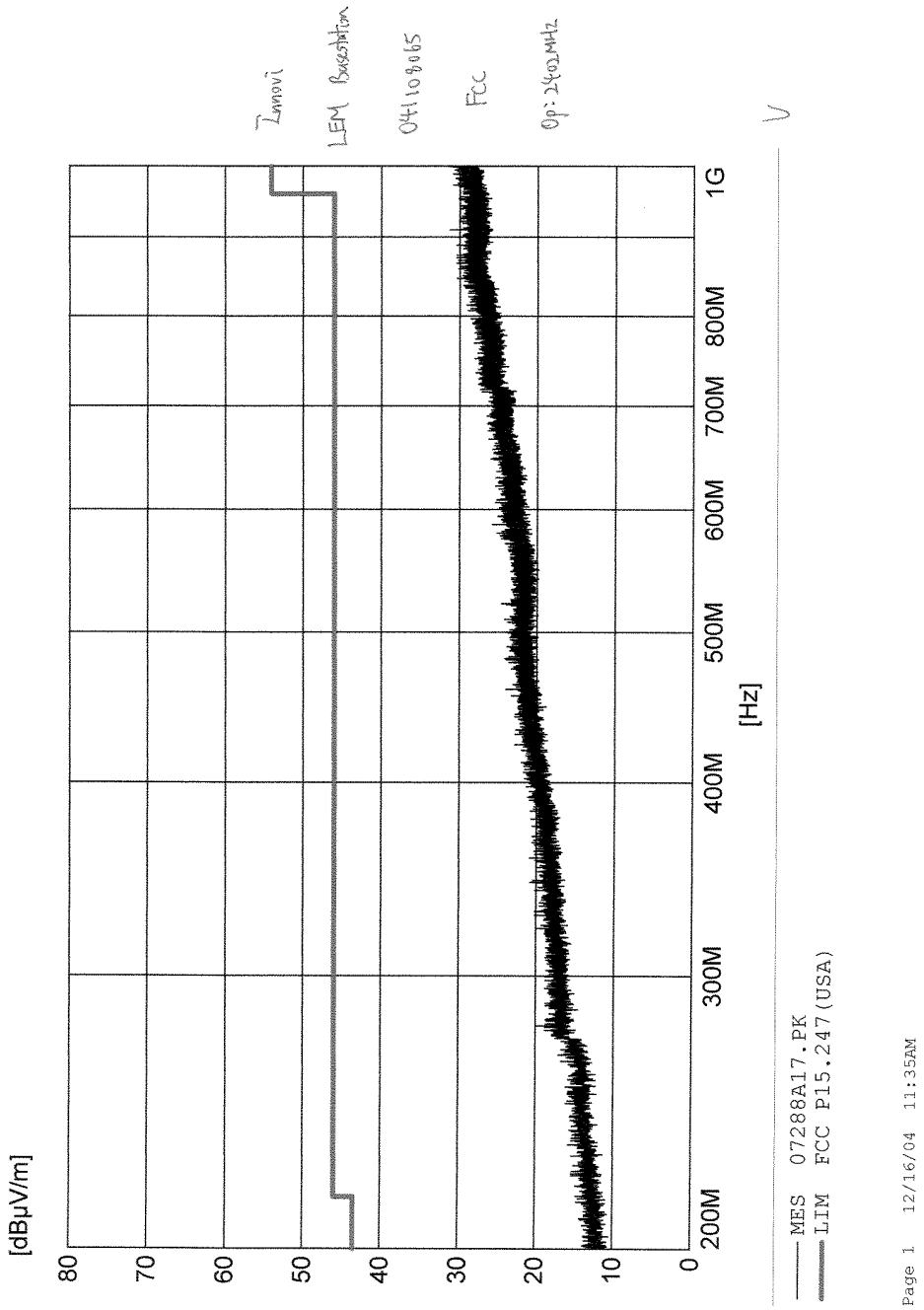
Tx frequency (MHz)	Polarization	Spurious Frequency (MHz)	Power Level (dBuV/m)	Detector (P/QP/A)
2402	V / H	No peak found	-	-

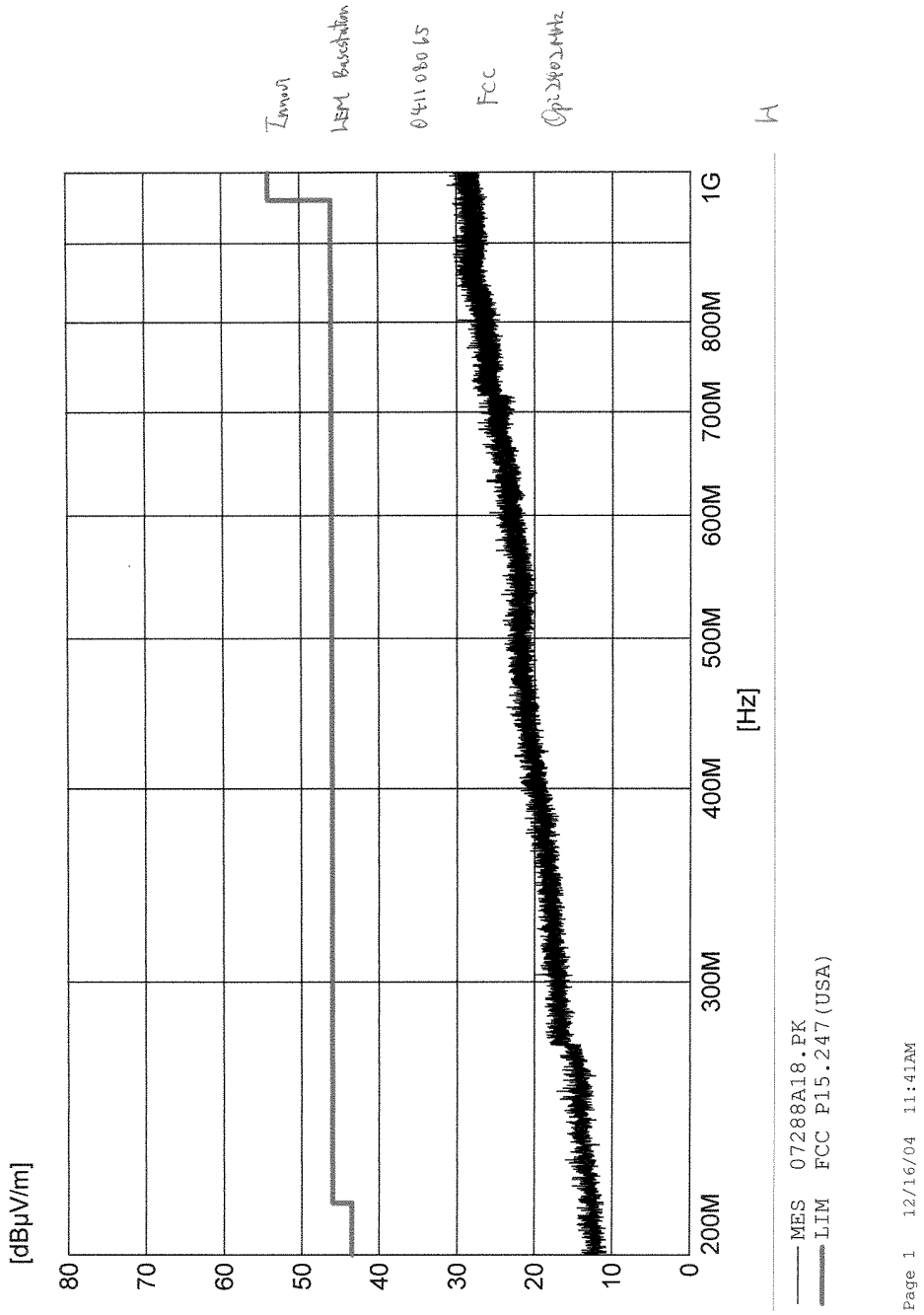
Tx frequency (MHz)	Polarization	Spurious Frequency (MHz)	Power Level (dBuV/m)	Detector (P/QP/A)
2441	V / H	No peak found	-	-

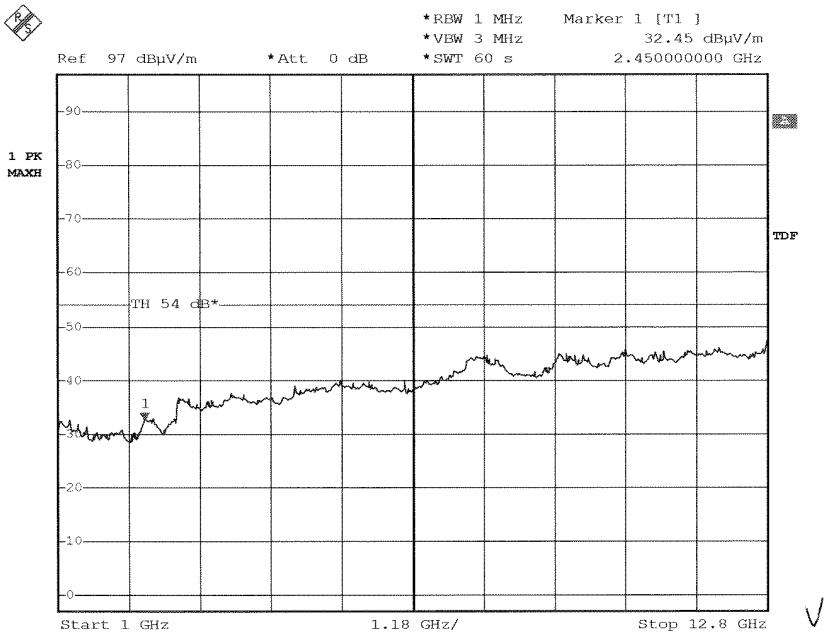
Tx frequency (MHz)	Polarization	Spurious Frequency (MHz)	Power Level (dBuV/m)	Detector (P/QP/A)
2480	V / H	No peak found	-	-


Innovi
LEM Basestation
041108065
FCC
Op: 2402MHz.
[dBµV/m]
80
70
60
50
40
30
20
10
0
30M
40M
50M
60M
70M
80M
100M
200M
[Hz]
MES 07288A07.PK
LIM FCC P15.247(USA)
Page 1 12/16/04 10:50AM


[dBµV/m]
80
70
60
50
40
30
20
10
0
30M
40M
50M
60M
70M
80M
100M
200M
[Hz]
MES 07288A08.PK
LIM FCC P15.247(USA)
Page 1 12/16/04 10:51AM


Lenovo
LEM Basestation
041108065
FCC
Op: 2402MHz
V
[dBµV/m]
80
70
60
50
40
30
20
10
0
200M
300M
400M
500M
600M
700M
800M
1G
[Hz]
MES 07288A17.PK
LIM FCC P15.247(USA)
Page 1 12/16/04 11:35AM


Innovi
LEM Basestation
0411 08065
FCC
Op: 2402MHz
H
[dBµV/m]
80
70
60
50
40
30
20
10
0
200M
300M
400M
500M
600M
700M
800M
1G
[Hz]
MES 07288A18.PK
LIM FCC P15.247(USA)
Page 1 12/16/04 11:41AM



Date: 7.DEC.2004 11:24:30

Innovi

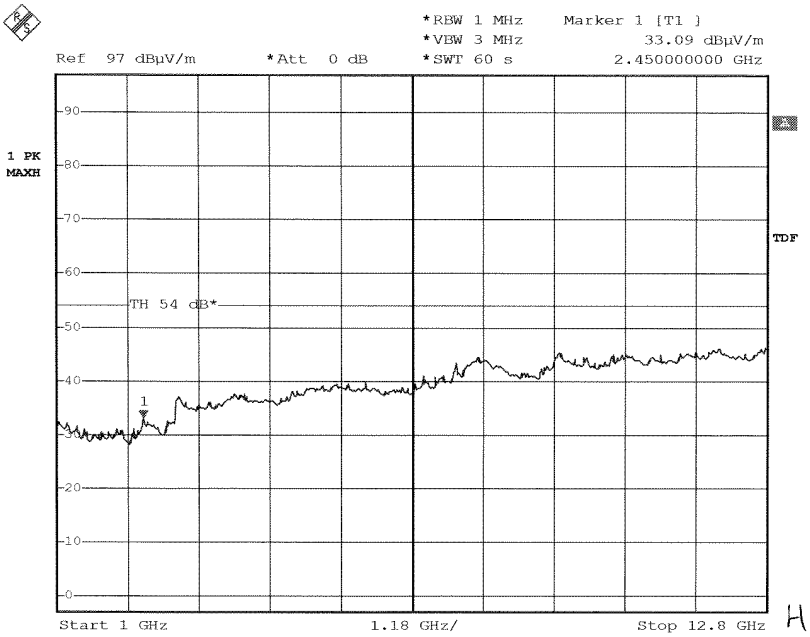
LEM Basestation

041108065

FCC

Op Mode : 2402.

(2.4 GHz band stop filter applied)



Date: 7.DEC.2004 11:27:13

Innovi

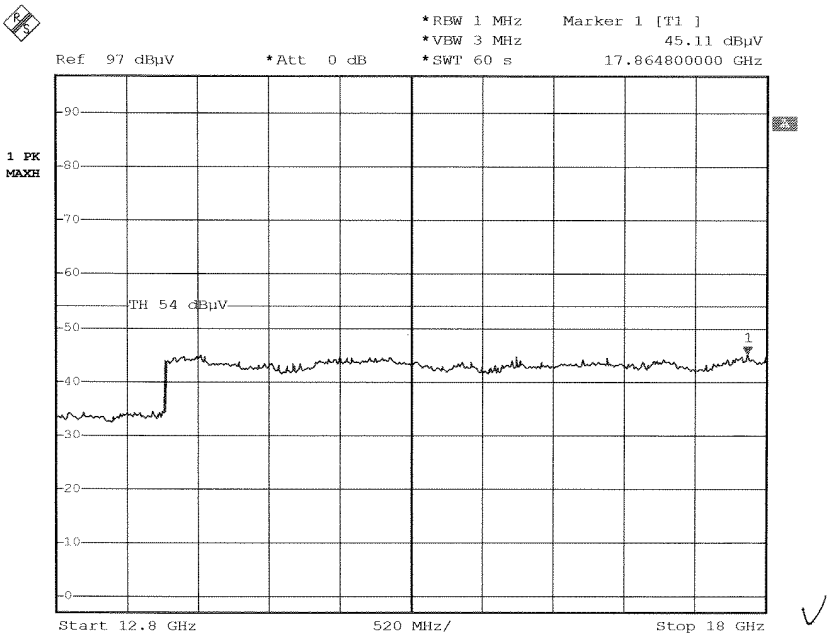
LEM Basestation

04110806S

FCC

Op: 2402

(2.4 GHz band stop filter applied)



Date: 7.DEC.2004 11:54:20

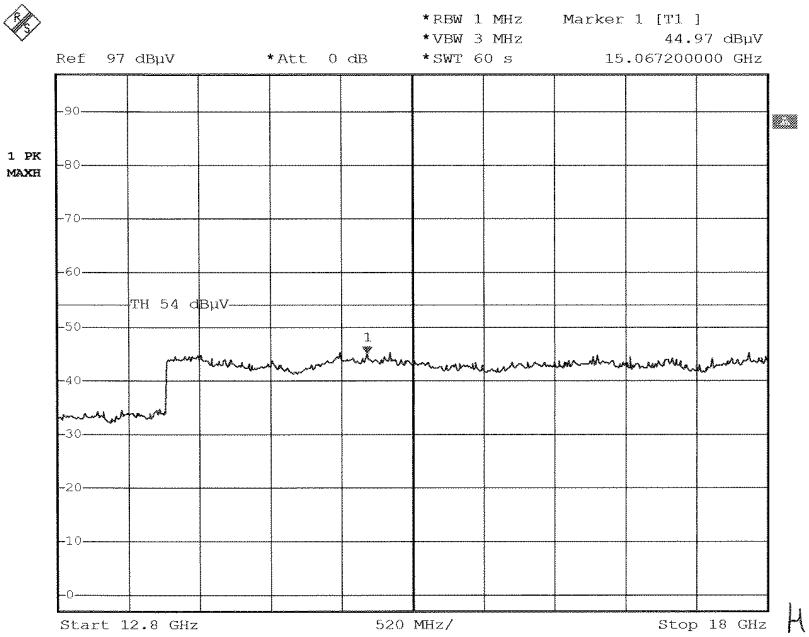
Innovi

LEM Basestation

04110806s

FCC

Op: 24e2



Date: 7.DEC.2004 11:47:27

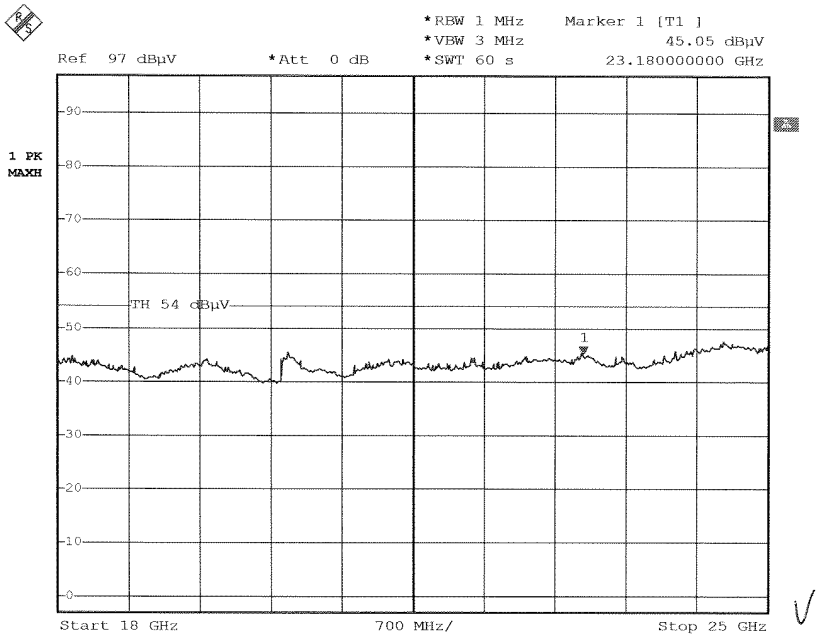
Innovi

LEM Basestation

04110806 5

FCC

Op: 2402



Date: 7.DEC.2004 12:08:32

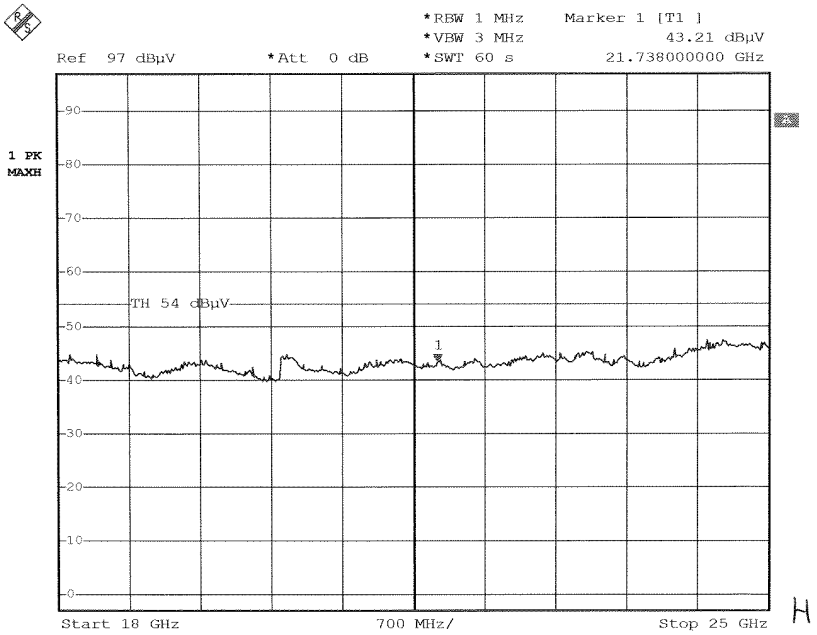
Innovi

LEM Basestation

04110806b

FCC

Op: 2402



Date: 7.DEC.2004 12:12:45

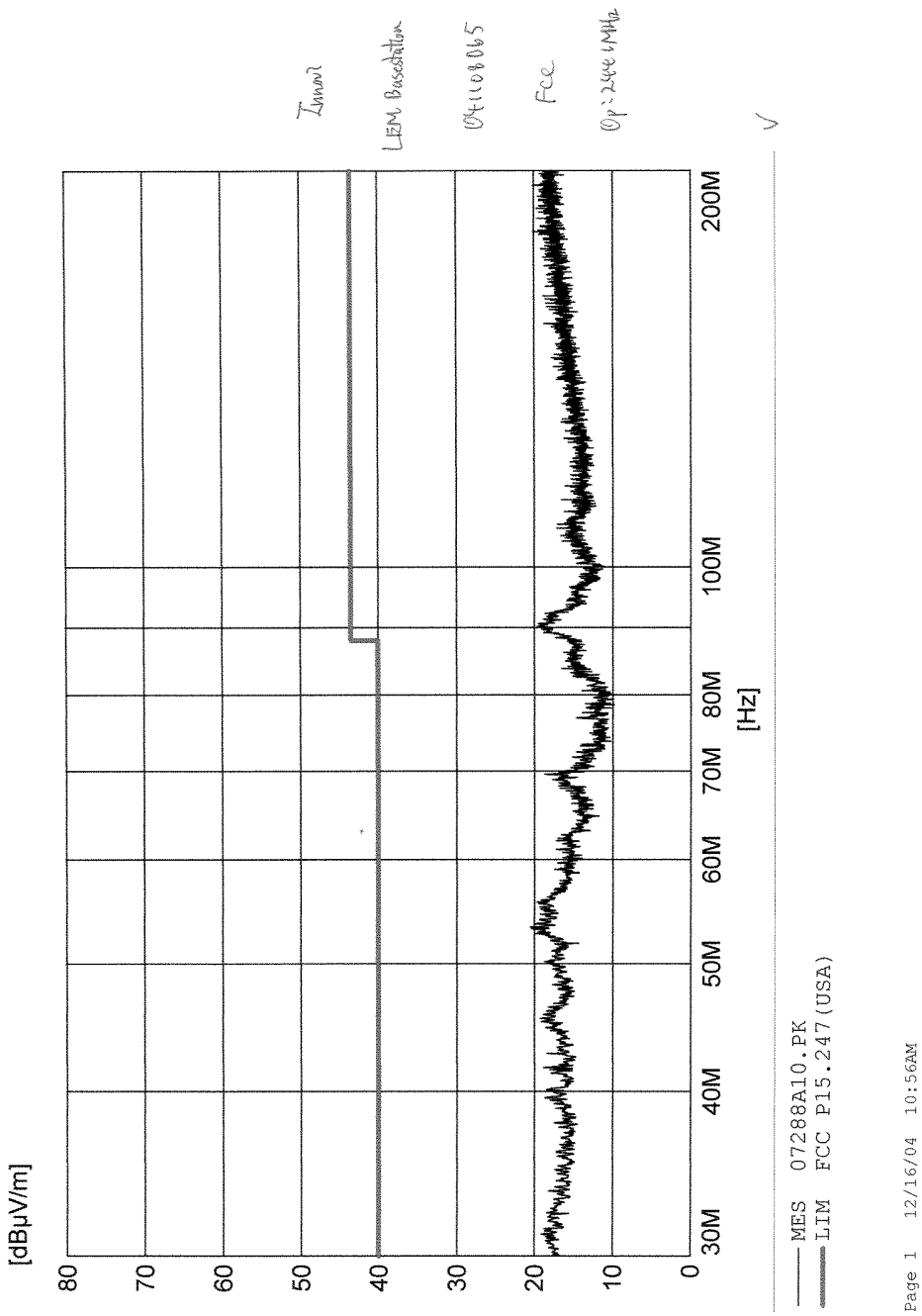
Inner

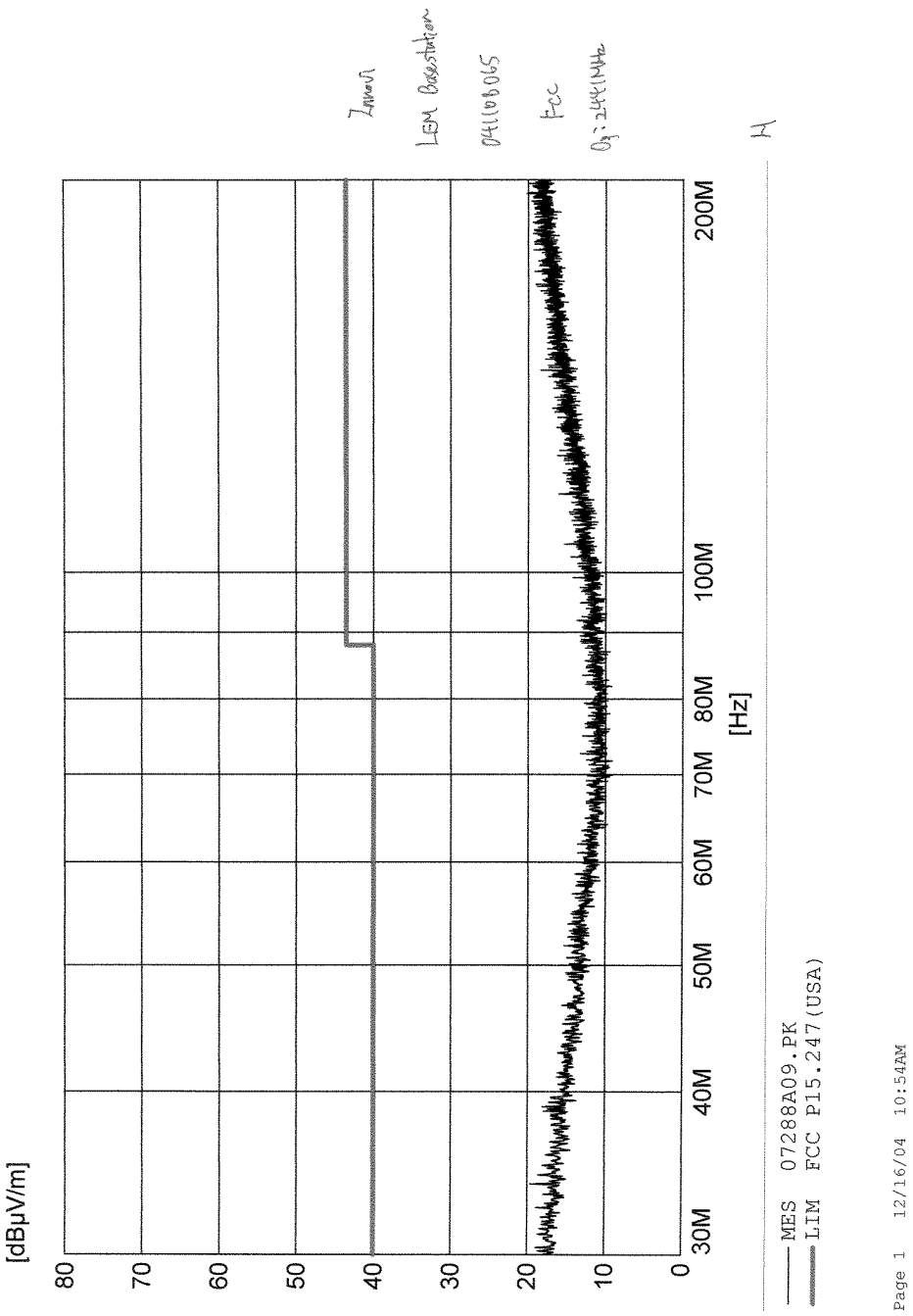
LEM Basestation

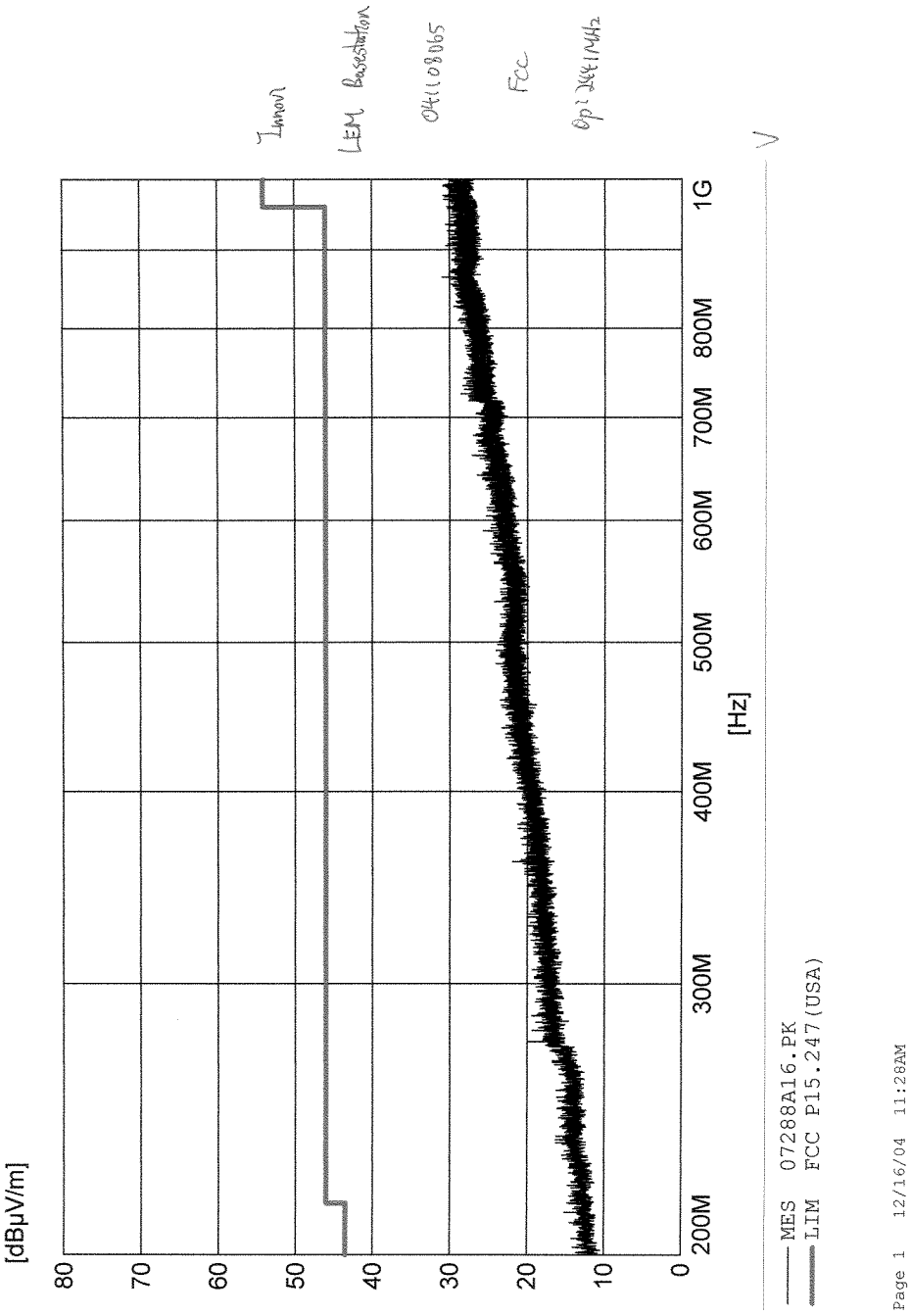
04110806b

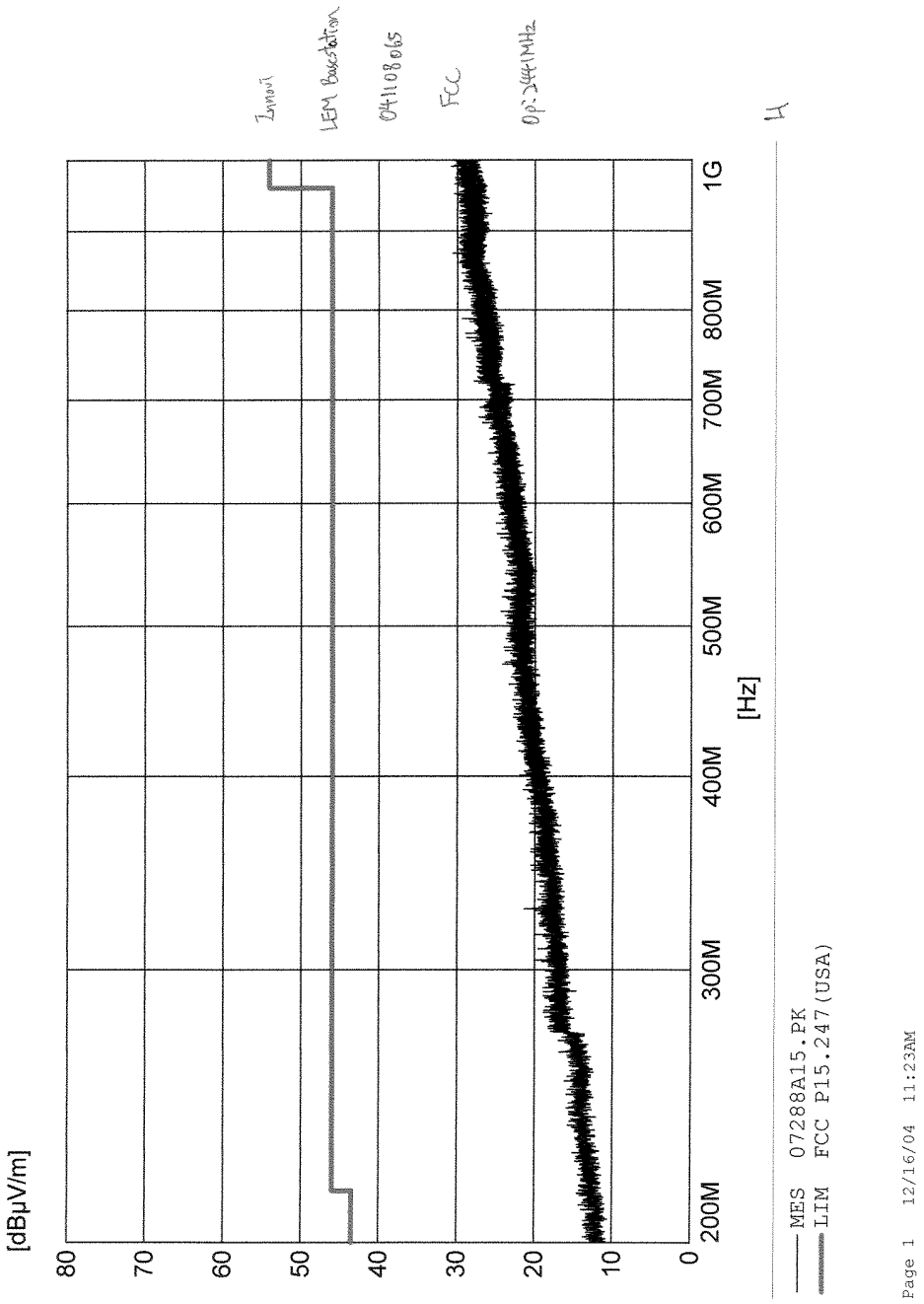
FCC

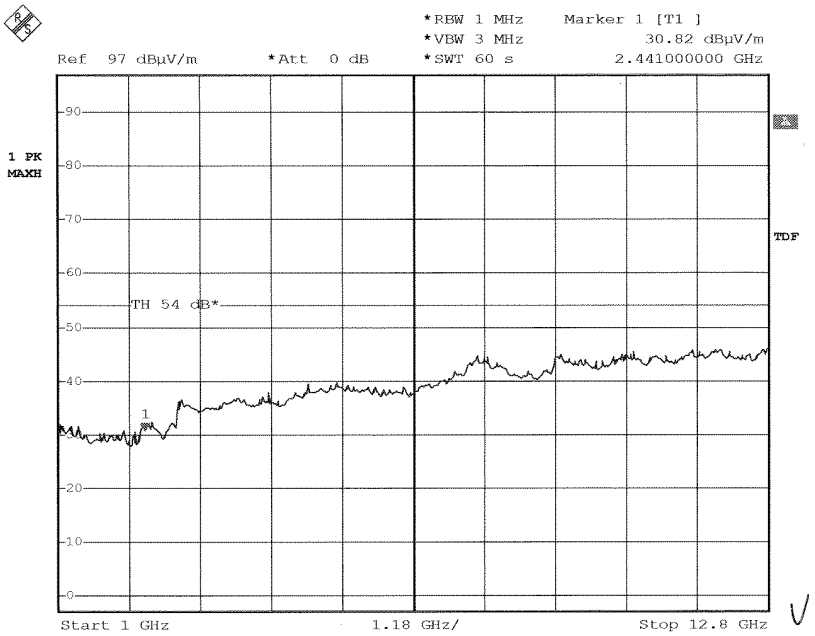
Op: 24002


Innovi
LEM Basestation
Op: 2441MHz
[dBµV/m]
80
70
60
50
40
30
20
10
0
30M
40M
50M
60M
70M
80M
100M
200M
[Hz]
MES 07288A10.PK
LIM FCC P15.247(USA)
Page 1 12/16/04 10:56AM


Zimmer
LEM Basestation
04110B065
FCC
Oy: 2441MHz
H
[dBµV/m]
80
70
60
50
40
30
20
10
0
30M
40M
50M
60M
70M
80M
100M
200M
[Hz]
MES 07288A09.PK
LIM FCC P15.247(USA)
Page 1 12/16/04 10:54AM


Innovi
LEM Basestation
041108065
FCC
Op: 2441MHz
V
[dBµV/m]
80
70
60
50
40
30
20
10
0
200M
300M
400M
500M
600M
700M
800M
1G
[Hz]
MES 07288A16.PK
LIM FCC P15.247(USA)
Page 1 12/16/04 11:28AM


Innovi
LEM Basestation
041108065
FCC
Opi 2441MHz
H
[dBµV/m]
80
70
60
50
40
30
20
10
0
200M
300M
400M
500M
600M
700M
800M
1G
[Hz]
MES 07288A15.PK
LIM FCC P15.247(USA)
Page 1 12/16/04 11:23AM



Innovi

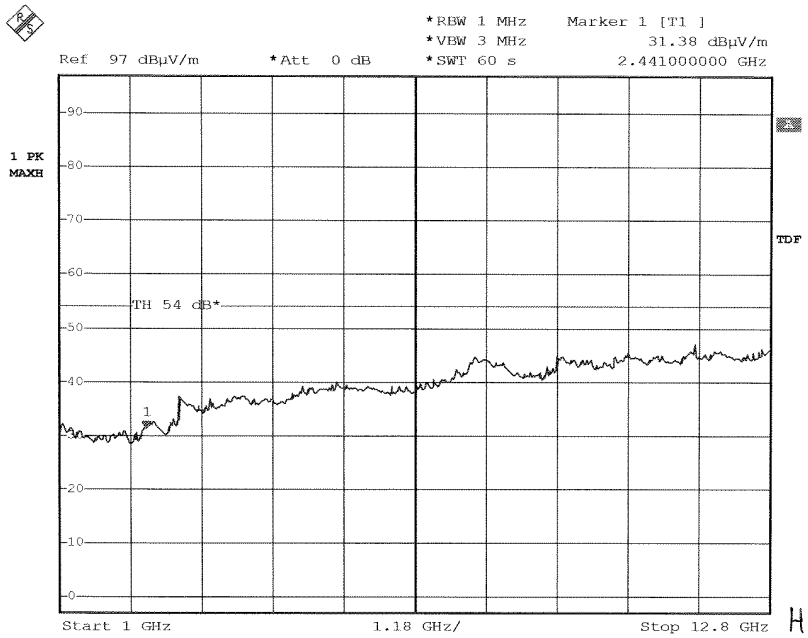
LEM Basestation

041108065

FCC

Op: 2441.

(2.4 GHz band stop filter applied)



Date: 7.DEC.2004 11:31:38

Innovi

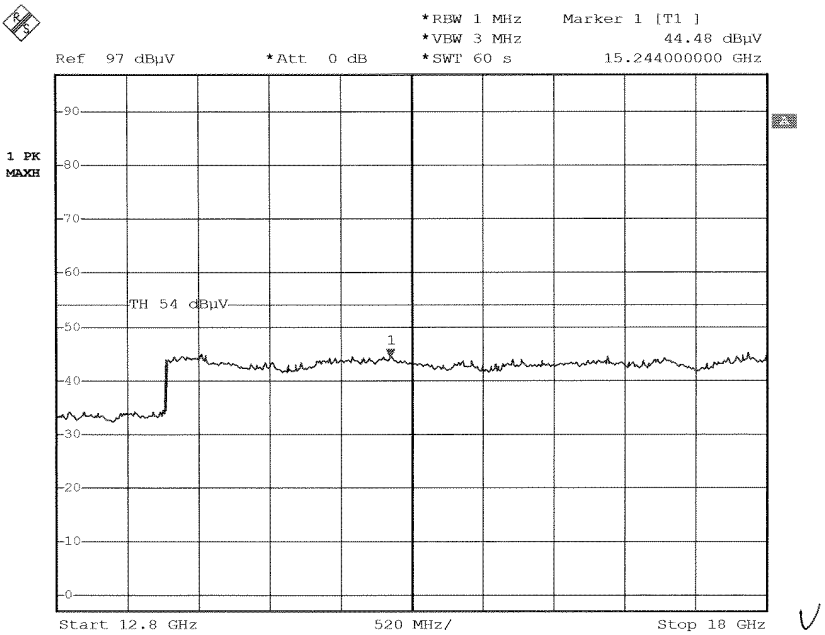
LEM Basestation

041108065

FCC

Op: 2441

(2.4GHz band stop filter applied)



Date: 7.DEC.2004 11:53:02

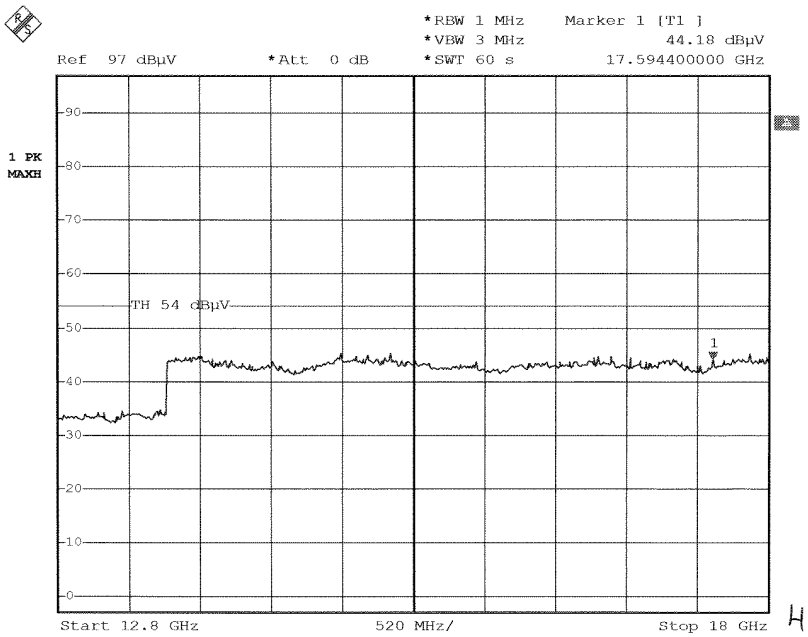
Innovi

LEM Basestation

041108065

FCC

Op: 2441



Date: 7.DEC.2004 11:48:39

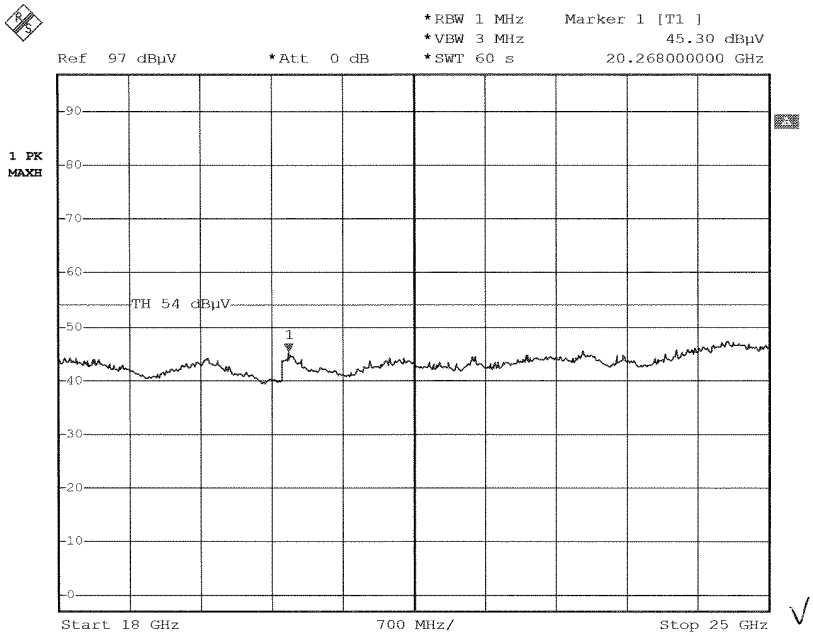
Innovi

LEM Basestation

041108065

Fcc

Op: 2441.



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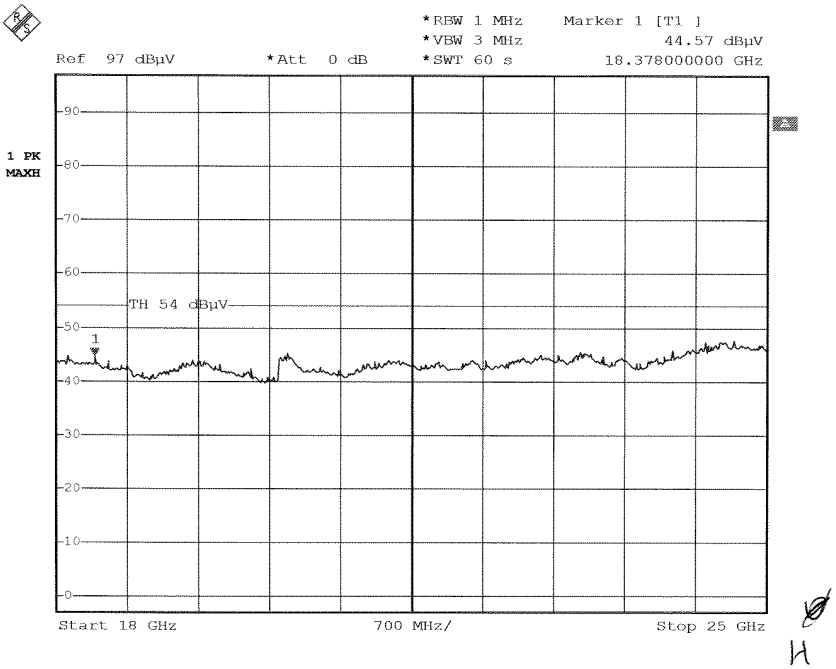
Innovi

LEM Basestation

041108065

FCC

Op: 2441



Date: 7.DEC.2004 12:14:06

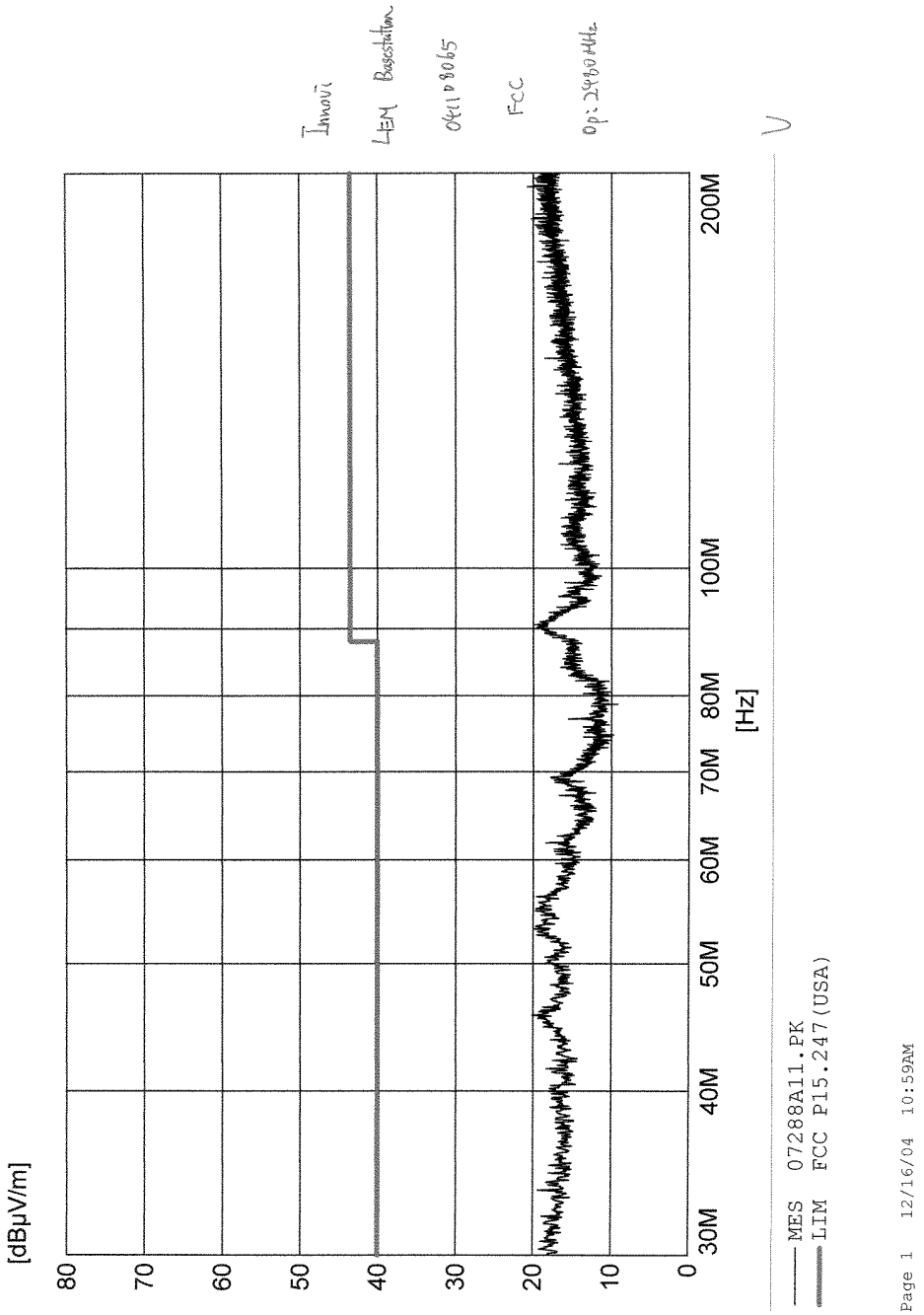
Innovi

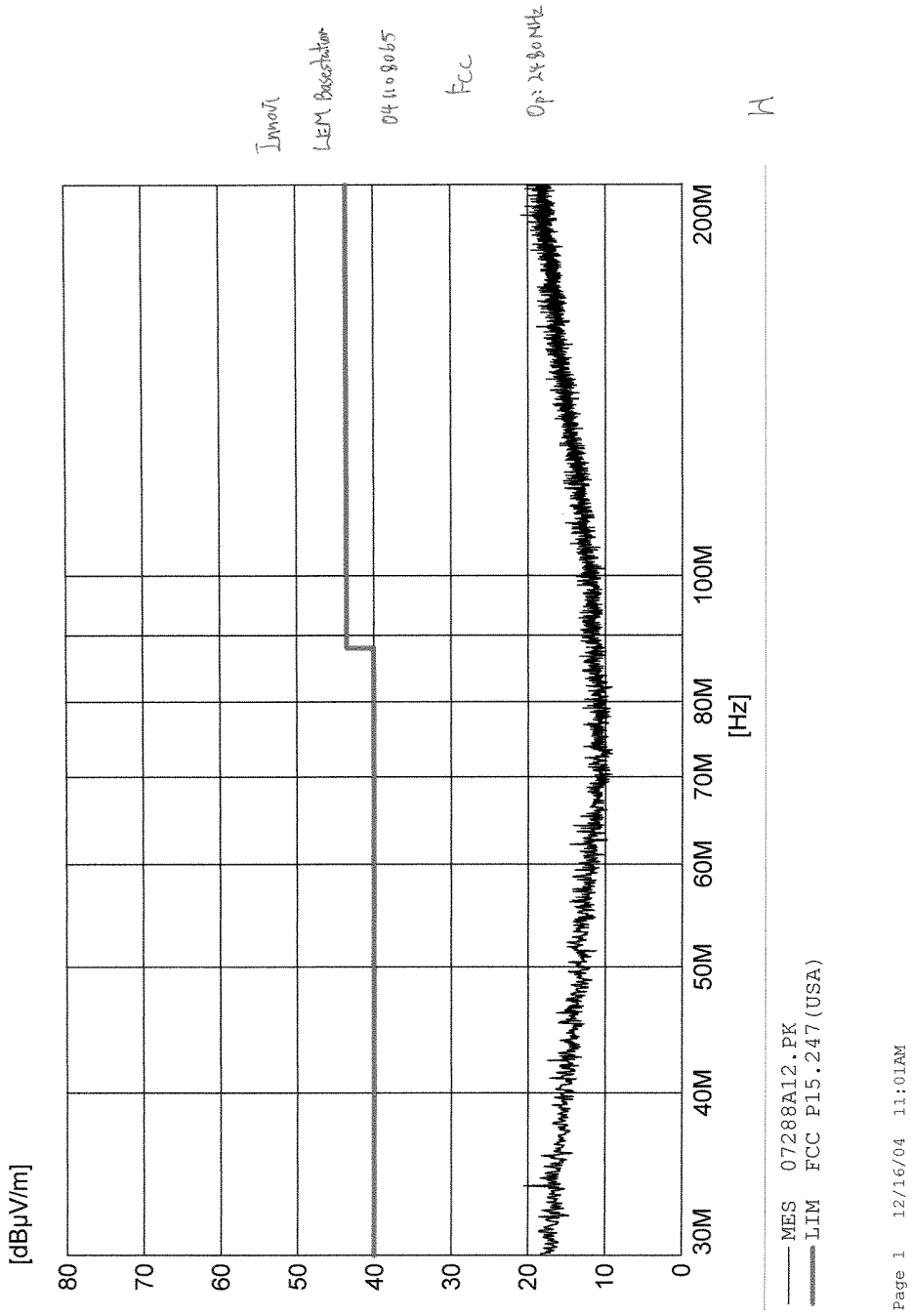
LEM Basestation

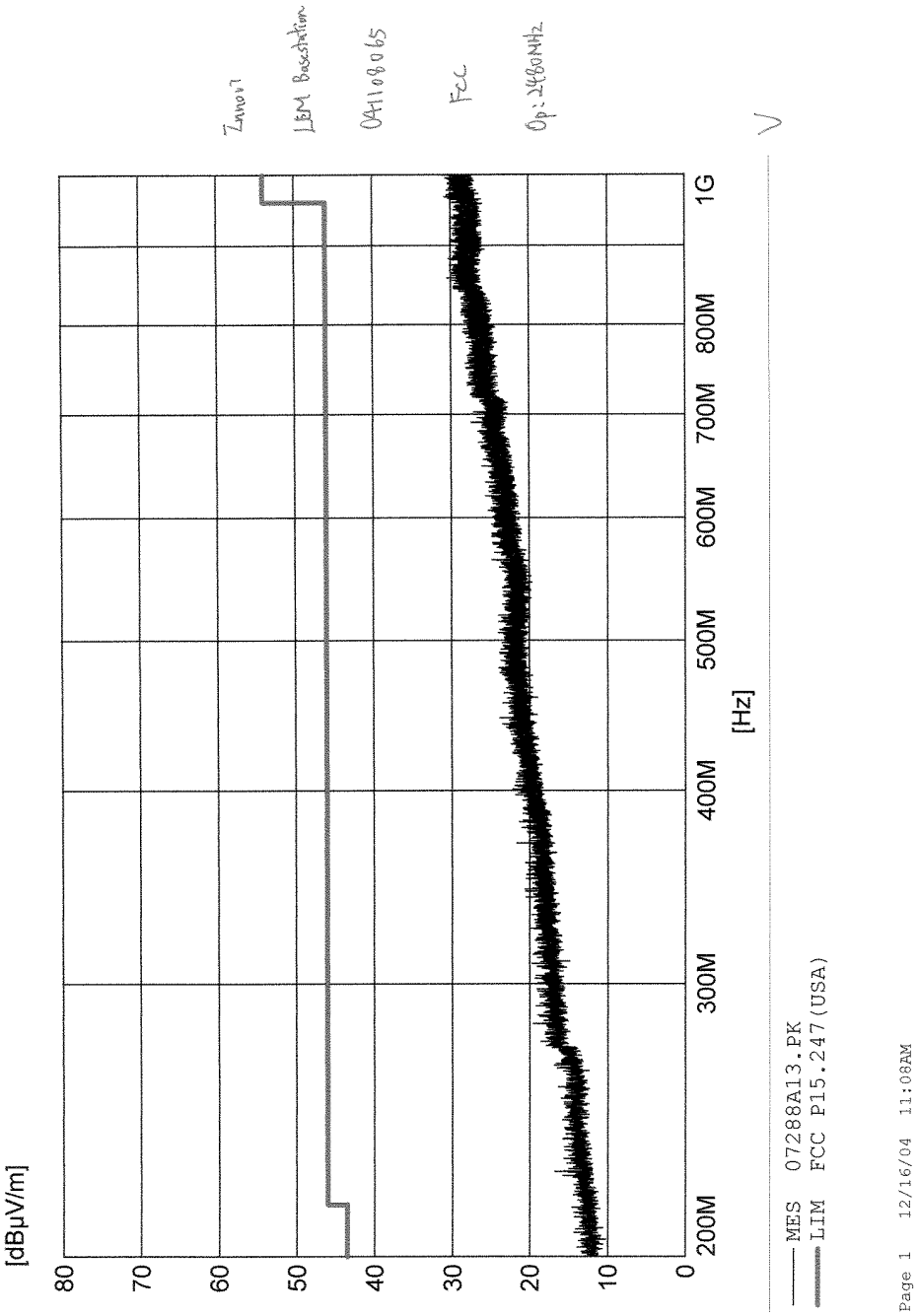
041108065

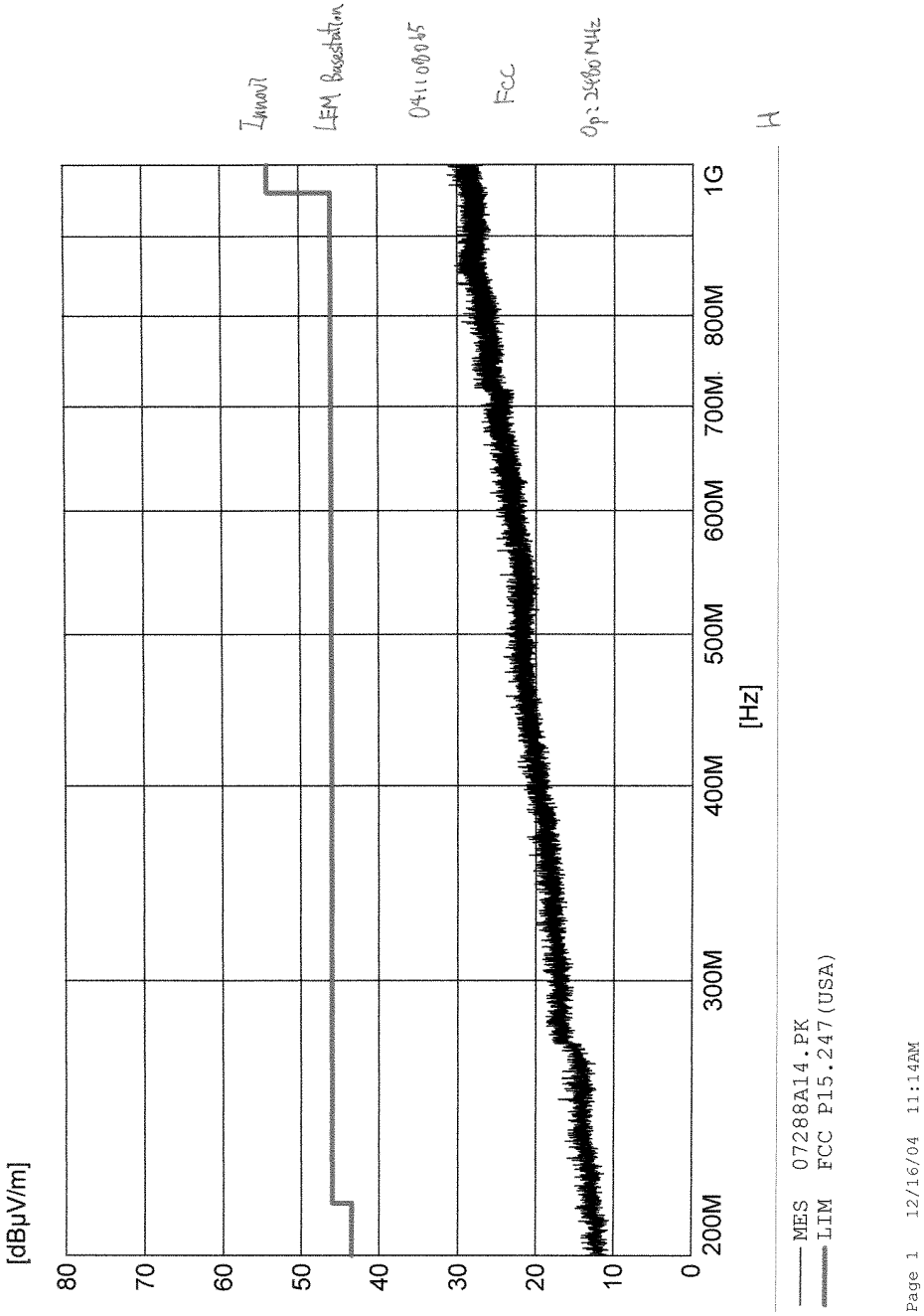
FCC

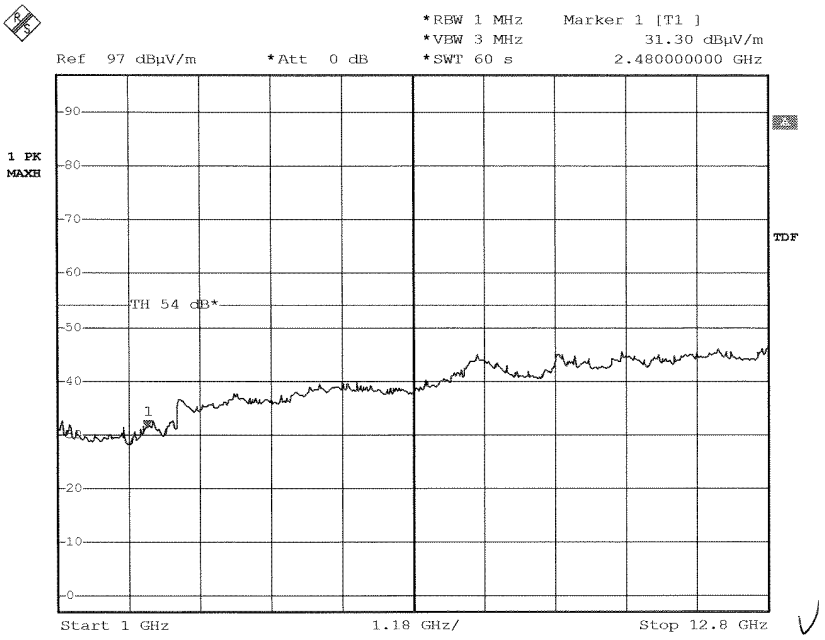
Op: 2441.


Innovi
LEM Basestation
FCC
V
[dBµV/m]
80
70
60
50
40
30
20
10
0
30M
40M
50M
60M
70M
80M
100M
200M
[Hz]
MES 07288A11.PK
LIM FCC P15.247(USA)
Page 1 12/16/04 10:59AM


Innovi
LEM Basestation
04 11 0065
FCC
Op: 2480 MHz
H
[dBµV/m]
80
70
60
50
40
30
20
10
0
30M
40M
50M
60M
70M
80M
100M
200M
[Hz]
MES 07288A12.PK
LIM FCC P15.247(USA)
Page 1 12/16/04 11:01AM


Zmnor
LEM Basestation
04110806 5
FCC
Op: 2480MHz
V
[dBµV/m]
80
70
60
50
40
30
20
10
0
200M
300M
400M
500M
600M
700M
800M
1G
[Hz]
MES 07288A13.PK
LIM FCC P15.247(USA)
Page 1 12/16/04 11:08AM


Innovi
LEM Basestation
04110805
FCC
Op: 2480 MHz
H
[dBµV/m]
80
70
60
50
40
30
20
10
0
200M
300M
400M
500M
600M
700M
800M
1G
[Hz]
MES 07288A14.PK
LIM FCC P15.247(USA)
Page 1 12/16/04 11:14AM



Date: 7.DEC.2004 11:40:25

Innovi

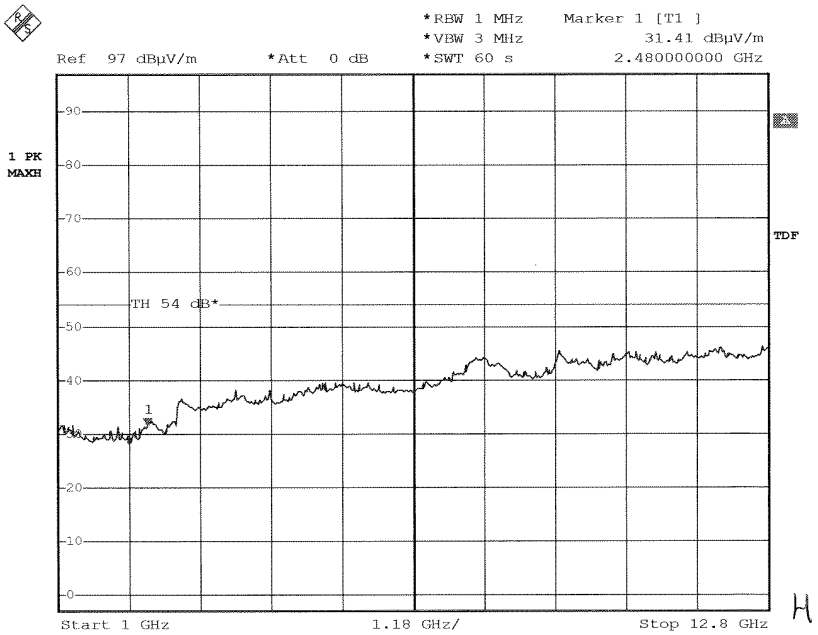
LEM Basestation

04110806S

FCC

Op. Mode : 2680

(2.4 GHz band stop filter applied)



Date: 7.DEC.2004 11:42:37

Innovi

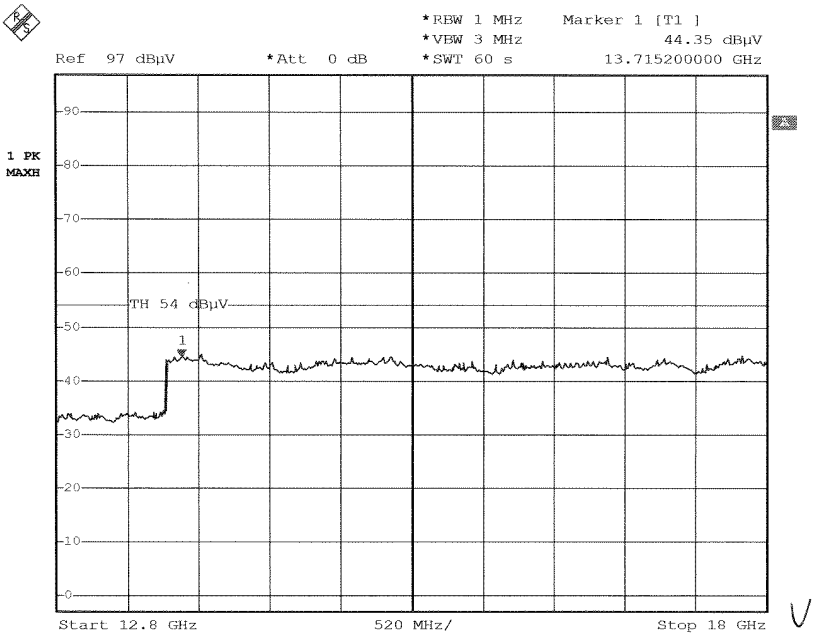
LEM Basestation

041108065

FCC

Op Mode: 2480

(2.4 GHz band stop filter applied)



Date: 7.DEC.2004 11:51:19

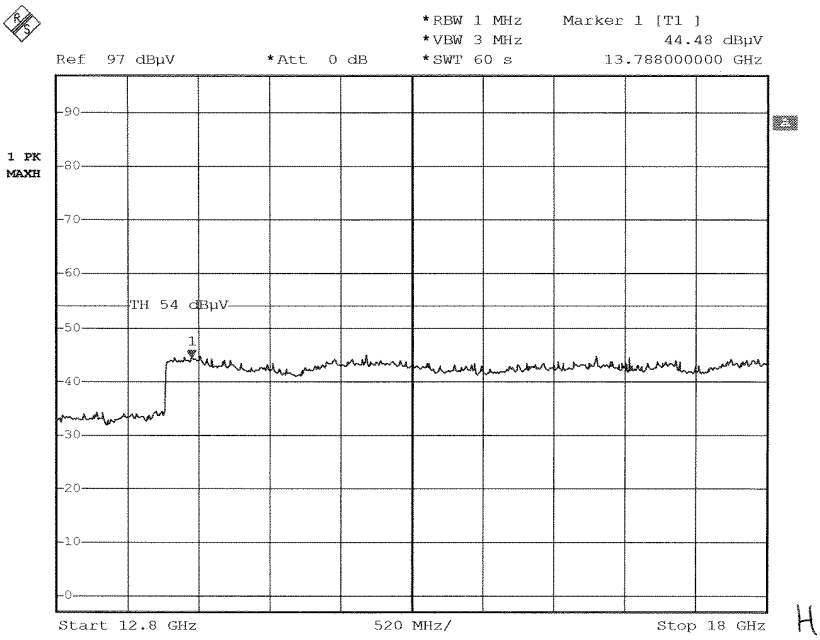
Innovi

LEM Basestation

04110806S

FCC

Op:2480



Date: 7.DEC.2004 11:46:09

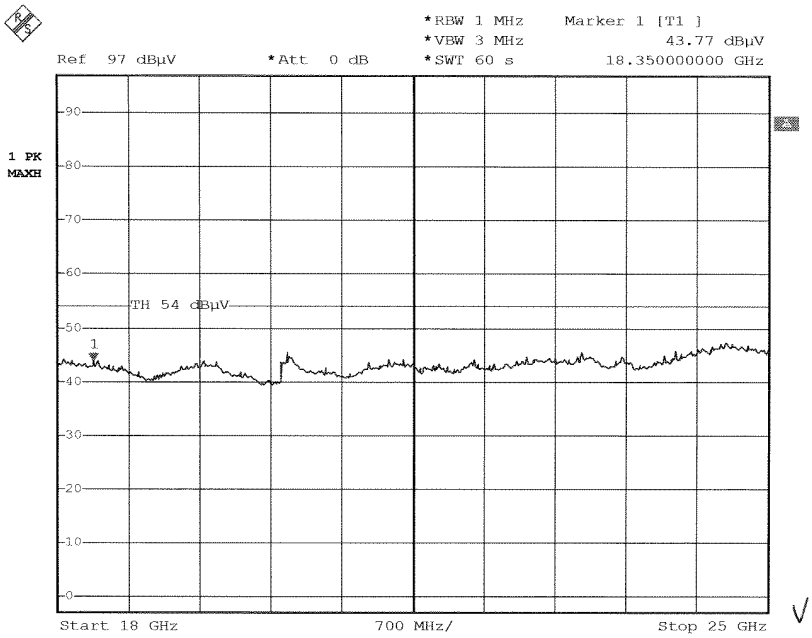
Innovi

LEM Basestation

041108065

FCC

Op: 2460.



Date: 7.DEC.2004 12:06:07

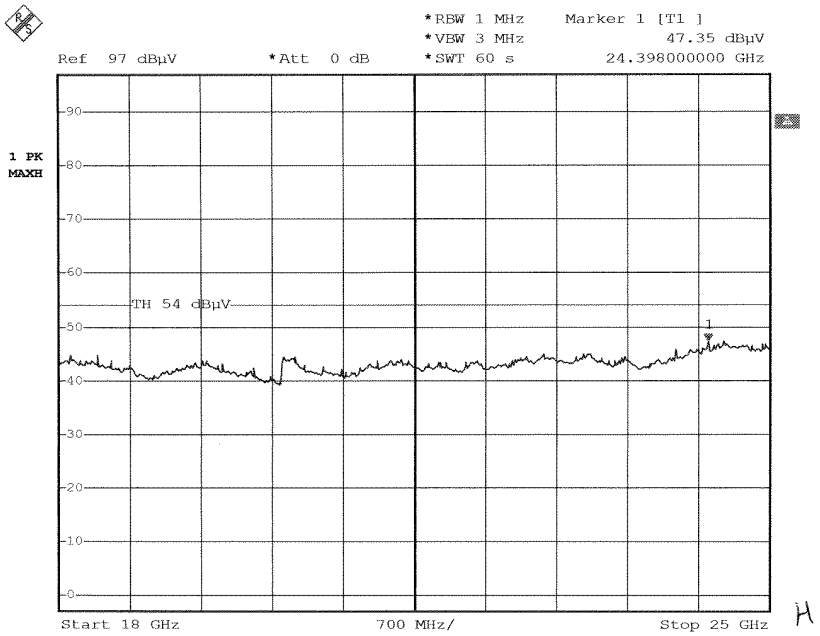
Innovi

LEM Basestation

041108065

FCC

Op: 2480



Date: 7.DEC.2004 12:11:08

Innovi

LEM Basestation

041108065

FCC

Op:2480