

Prüfbericht - Nr.: 14004640 001 <i>Test Report No.</i>		Seite 1 von 19 Page 1 of 19	
Auftraggeber: <i>Client:</i>		i.Tech Dynamic Limited Room 1112, Metroplaza Tower 2, 223 Hing Fong Road Kwai Chung N.T., Hong Kong	
Gegenstand der Prüfung: Bluetooth Clip <i>Test item:</i>			
Bezeichnung: C51-A03024-AA <i>Identification:</i>		Serien-Nr.: Engineering sample <i>Serial No.</i>	
FCCID: RKIC51-A03024-AA			
Wareneingangs-Nr.: 031008047 <i>Receipt No.:</i>		Eingangsdatum: 8.10.2003 <i>Date of receipt:</i>	
Prüfort: <i>Testing location:</i>		Refer to section 4.1	
Prüfgrundlage: <i>Test specification:</i>		FCC Part 15, Subpart C ANSI C63.4-1992 CISPR 22:1997	
Prüfergebnis: <i>Test Result</i>		Der vorstehend beschriebene Prüfgegenstand wurde geprüft und entspricht oben genannter Prüfgrundlage. The a. m. test item passed.	
geprüft / tested by: Hugo Wan		kontrolliert / reviewed by Stephan Wald	
 16.10.2003 Datum Date  16.10.2003 Datum Date		 Unterschrift Signature  Unterschrift Signature	
Sonstiges / Other Aspects:			
Abkürzungen: OK, Pass = entspricht Prüfgrundlage Fail = entspricht nicht Prüfgrundlage N/A = nicht anwendbar Abbreviations: OK, Pass = passed Fail = failed N/A = not applicable			
Dieser Prüfbericht bezieht sich nur auf den o.g. Prüfgegenstand 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 item. Without permission of the test center this test report is not permitted to be duplicated in extracts. This test report does not entitle to carry any test mark on this or similar products. Authorized format 16.12.1996, R.M.			

1 Test Summary

7.1.1 ANTENNA CONNECTOR SUBCLAUSE 15.203

7.1.2 ANTENNA TYPE SUBCLAUSE 15.204

7.1.3 DISTURBANCE VOLTAGE ON AC MAINS SUBCLAUSE 15.207(A)

RESULT: Pass

Limit Subclause 15.207(a)

7.1.4 CARRIER FREQUENCY SEPERATION SUBCLAUSE 15.247(A)(1)

RESULT: Pass

Limit Subclause 15.247(a)(1)

7.1.5 DWELL TIME SUBCLAUSE 15.247(A)(1)(III)

RESULT: Pass

Limit Subclause 15.247(a)(1)(iii)

7.1.6 20dB BANDWIDTH SUBCLAUSE 15.247(A)(1)

7.1.7 HOPPING SEQUENCE SUBCLAUSE 15.247(A)(1)

7.1.8 RECEIVER INPUT BANDWIDTH SUBCLAUSE 15.247(A)(1)

7.1.9 PEAK OUTPUT POWER SUBCLAUSE 15.247(B)(1)

RESULT: Pass

Limit Subclause 15.247(b)(1)

7.1.10 BAND EDGE COMPLIANCE SUBCLAUSE 15.247(C)

RESULT: Pass

Limit Subclause 15.247(c)

7.1.11 SPURIOUS CONDUCTED EMISSIONS SUBCLAUSE 15.247(C)

RESULT: Pass

Limit Subclause 15.247(c)

7.1.12 SPURIOUS RADIATED EMISSIONS SUBCLAUSE 15.247(C)

RESULT: Pass

Limit Subclause 15.247(c)

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3 General Remarks

3.1 Complementary Materials

All attachments are integral parts of this test report. This applies especially to the following appendix:

Appendix 1: Test Results

Appendix 2: Test Setup

Appendix 3: EUT Photos

Appendix 4: FCCID Label, Block Diagram and Schematics

4 Test Sites

4.1 Test Facilities

Hong Kong Productivity Council
HKPC Building
78 Tat Chee Avenue
Kowloon
Hong Kong

4.2 List of Test and Measurement Instruments

Table 1: List of Test and Measurement Equipment

	Kind of Equipment	Manufacturer	Type	S/N
☒	Test Receiver	Rohde & Schwarz	ESHS30	847115/005
☒	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	3116	9002-3347
☐	RF Comms Test Set	HP	8920B	US36492628
☐	Spectrum Analyser + Tracking Gen.	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

5 General Product Information

5.1 Product Function and Intended Use

The submitted sample is a Bluetooth Headset which is a portable handsfree communication device built on Bluetooth wireless technology.

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 1MHz 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 625µs, 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.

5.2 Ratings and System Details

	Receiver	Transmitter
Frequency range	: 2402 - 2480MHz	2402 - 2480MHz
Number of channels	: 79	79
Channel separation	: 1MHz	1MHz
Type of antenna	: Ceramic type antenna	Ceramic type antenna
Power supply	: 3.9V Lithium Battery supply	3.9V Lithium Battery supply

5.3 Independent Operation Modes

- a) Inquiry scan
- b) Page scan
- c) Connection state:
 - ACL link
 - SCO link

For further information, please refer to the user manual.

5.4 Submitted Documents

Schematics
Block Diagram
PCB Layout
User manual

6 Test Set-up and Operation Mode

6.1 Principle of Configuration Selection

Emission: The equipment under test (EUT) was configured to measure its highest possible radiation level. The test modes were adapted accordingly in reference to the instructions for use.

6.2 Test Operation and Test Software

Refer to Test set-up in chapter 7.

6.3 Special Accessories and Auxiliary Equipment

The EUT was not tested together with any additional accessories.

7 Test Results

7.1.1 Antenna connector

Subclause 15.203

The antenna is permanently attached on the PCB.

7.1.2 Antenna type

Subclause 15.204

The EUT has a ceramic type antenna soldered to the circuit board. The antenna gain is 1.9dBi.

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7.1.3 Disturbance voltage on AC mains

Subclause 15.207(a)

RESULT:

Pass

Test Specification : CISPR 22: 1997
 Mode of operation : Charging mode
 Port of testing : AC power port of the charger of the EUT
 Supply voltage : AC 110V
 Temperature : 27°C
 Humidity : 54%

For Live measurement

Frequency	QP reading	QP limit	Av reading	Av limit
MHz	dB μ V	dB μ V	dB μ V	dB μ V
0.150	51.00	66 – 56*	36.90	56 – 46*

For Neutral measurement

Frequency	QP reading	QP limit	Av reading	Av limit
MHz	dB μ V	dB μ V	dB μ V	dB μ V
0.150	36.10	66 – 56*	6.70	56 – 46*

* Decreases with the logarithm of the frequency.

The radio frequency voltage conducted back onto the Live and the Neutral power lines complies with the limits.

For test results refer to Appendix 1, page 1-3

Limit

Subclause 15.207(a)

For an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table, as measured using a 50 μ H/50 ohms line impedance stabilization network (LISN).

Frequency of Emission (Mhz)	Conducted Limit (dB μ V)	
	Quasi-peak	Average
0.15-0.5	66-56*	56-46*
0.5-5	56	46
5-30	60	50

* Decreases with the logarithm of the frequency.

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7.1.4 Carrier frequency separation

Subclause 15.247(a)(1)

RESULT:

Pass

Test specification	:	FCC § 15.31
Mode of operation	:	Tx mode (hopping on), DH1 packet
Port of testing	:	Temporary antenna port
Detector	:	PK
RBW/VBW	:	100kHz/300kHz
Supply voltage	:	3.9V DC supply
Temperature	:	22°C
Humidity	:	55%

The centre frequencies of the hopping channels are separated by more than the 20dB bandwidth.
For test results refer to Appendix 1, page 4

Limit

Subclause 15.247(a)(1)

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.

7.1.5 Dwell time

Subclause 15.247(a)(1)(iii)

RESULT:

Pass

Test specification	:	FCC § 15.31
Mode of operation	:	Tx mode (2441MHz), DH5 packet
Port of testing	:	Temporary antenna port
Detector	:	PK
RBW/VBW	:	1MHz/3MHz
Supply voltage	:	3.9V DC supply
Temperature	:	22°C
Humidity	:	55%

The screenshot in Appendix1 P.6 shows the occurrence of a channel in a 12.8s time period. In inquiry and page scan mode Bluetooth is using 32 hopping channels only. The frequency was used 27 times. The dwell time for the longest supported packet type is about 3ms. As a result the average time of occupancy will not be greater than 400ms.

i.e. Time period calculation:
 $0.4 \times 32 = 12.8\text{s}$

Limit calculation:
 $27 \times 2.944 \times 10^{-3} = 79.490 \times 10^{-3} \text{ s}$
 $\leq 400 \times 10^{-3} \text{ s}$

For test results please refer to Appendix 1, page 5-6.

Limit

Subclause 15.247(a)(1)(iii)

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.

7.1.6 20dB bandwidth

Subclause 15.247(a)(1)

Test specification : FCC § 15.31
Mode of operation : Tx mode (2402MHz, 2441MHz, 2480MHz), DH5 packet
Port of testing : Temporary antenna port
Detector : PK
RBW/VBW : 30kHz/100kHz
Supply voltage : 3.9V DC supply
Temperature : 22°C
Humidity : 55%

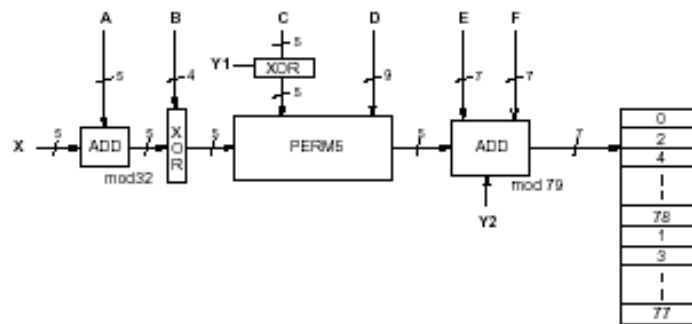
20dB bandwidth (MHz)		
2402	2441	2480
(0.468)-(-0.432) = 0.900	(0.464)-(-0.448) = 0.912	(0.456)-(-0.452) = 0.908

For test results refer to Appendix 1, page 7-9.

7.1.7 Hopping sequence

Subclause 15.247(a)(1)

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	64 25	66 19	68 49	70 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

7.1.8 Receiver input bandwidth

Subclause 15.247(a)(1)

The receiver bandwidth is equal to the receiver bandwidth in the 79 hopping channel mode, which is 1 MHz. The receiver bandwidth is indirectly verified during Bluetooth RF conformance testing.

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7.1.9 Peak output power

Subclause 15.247(b)(1)

RESULT:

Pass

Test specification : FCC § 15.31
 Mode of operation : Tx mode (2402MHz, 2441MHz, 2480MHz), DH1 packet
 Port of testing : Temporary antenna port
 Detector : PK
 RBW/VBW : 1MHz/3MHz
 Supply voltage : 3.9V DC supply
 Temperature : 22°C
 Humidity : 55%

Frequency (MHz)	Maximum peak output power (dBm)	Cable attenuation (dB)	Actual value (dBm)
2402	0.43	4.30	4.73
2441	0.35	4.15	4.50
2480	-0.11	4.50	4.39

All three transmit frequency modes comply with the maximum peak output power limit.
 For test results refer to Appendix 1, page 10-12

Limit

Subclause 15.247(b)(1)

Frequency range	RF output power
2.400-2.483,5MHz	0.125W (21.0dBm)

7.1.10 Band edge compliance

Subclause 15.247(c)

RESULT:

Pass

Test specification	:	FCC § 15.31
Mode of operation	:	Tx mode (2402MHz, 2441MHz, 2480MHz), DH1 packet
Port of testing	:	Temporary antenna port
Detector	:	PK
RBW/VBW	:	300kHz/1.0MHz
Supply voltage	:	3.9V DC supply
Temperature	:	22°C
Humidity	:	55%

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 results refer to Appendix 1, page 13-15

Limit

Subclause 15.247(c)

In any 100kHz 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 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement.

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7.1.11 Spurious conducted emissions

Subclause 15.247(c)

RESULT:

Pass

Test specification : FCC § 15.31
 Mode of operation : Tx mode (2402MHz, 2441MHz, 2480MHz), DH1 packet
 Port of testing : Temporary antenna port
 Detector : PK
 RBW/VBW : 100kHz/300kHz
 Supply voltage : 3.9V DC supply
 Temperature : 22°C
 Humidity : 55%

Operating frequency : 2402MHz

Spurious Frequency (MHz)	Power level (dBm)	Reference value (dBm)	Delta to reference level (dB)
-	-	-	-

Operating frequency : 2441MHz

Spurious Frequency (MHz)	Power level (dBm)	Reference value (dBm)	Delta to reference level (dB)
-	-	-	-

Operating frequency : 2480MHz

Spurious Frequency (MHz)	Power level (dBm)	Reference value (dBm)	Delta to reference level (dB)
-	-	-	-

All three transmit frequency modes comply with the 20dB limit stated in subclause 15.247(c).
 For test results refer to Appendix 1, page 16-25

Limit

Subclause 15.247(c)

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.

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7.1.12 Spurious radiated emissions

Subclause 15.247(c)

RESULT:

Pass

Test specification : ANSI C63.4 - 1992
Mode of operation : Tx mode (2402MHz, 2441MHz, 2480MHz), DH1 packet
Port of testing : Enclosure
Measurement Location: 10m Semi Anechoic Chamber
Measurement Distance: 3m
Measurement BW : 1 MHz
Supply voltage : 4.5V DC

Tx frequency 2402MHz, Polarization Vertical

Freq	Reading	AF	Cable att.	Pre -amp	Filter att.	Level	Limit/ Detector
GHz	dBuV	dB(1/m)	dB	dB	dB	dBuV/m	dBuV/m
-	-	-	-	-	-	-	-

Tx frequency 2402MHz, Polarization Horizontal

Freq	Reading	AF	Cable att.	Pre -amp	Filter att.	Level	Limit/ Detector
GHz	dBuV	dB(1/m)	dB	dB	dB	dBuV/m	dBuV/m
-	-	-	-	-	-	-	-

Tx frequency 2441MHz, Polarization Vertical

Freq	Reading	AF	Cable att.	Pre -amp	Filter att.	Level	Limit/ Detector
GHz	dBuV	dB(1/m)	dB	dB	dB	dBuV/m	dBuV/m
-	-	-	-	-	-	-	-

Tx frequency 2441MHz, Polarization Horizontal

Freq	Reading	AF	Cable att.	Pre -amp	Filter att.	Level	Limit/ Detector
GHz	dBuV	dB(1/m)	dB	dB	dB	dBuV/m	dBuV/m
-	-	-	-	-	-	-	-

Tx frequency 2480MHz, Polarization Vertical

Freq	Reading	AF	Cable att.	Pre -amp	Filter att.	Level	Limit/ Detector
GHz	dBuV	dB(1/m)	dB	dB	dB	dBuV/m	dBuV/m
-	-	-	-	-	-	-	-

Tx frequency 2480MHz, Polarization Horizontal

Freq	Reading	AF	Cable att.	Pre -amp	Filter att.	Level	Limit/ Detector
GHz	dBuV	dB(1/m)	dB	dB	dB	dBuV/m	dBuV/m
-	-	-	-	-	-	-	-

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

Limit

Subclause 15.247(c)

In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)).

Field strength limits within the restricted bands using average detector:

Frequency (MHz)	Field strength (microvolts/meter)	Field strength (dB μ V/m)	Measurement distance (meters)
30-88	100	$20 \cdot \log(100) = 40.0$	3
88-216	150	$20 \cdot \log(150) = 43.5$	3
216-960	200	$20 \cdot \log(200) = 46.0$	3
960-2500	500	$20 \cdot \log(500) = 54.0$	3

According to section 15.35(b), on any frequency or frequencies above 1000 MHz the radiated limits shown are based upon the use of measurement instrumentation employing an average detector function. When average radiated emission measurements are specified in this part, including emission measurements below 1000 MHz, there also is 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 for the frequency being investigated.

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Disturbance Voltage on AC Mains

Date: 9 Oct 2003

EUT: Bluetooth Headset Clip (C51-A03024-AA)

Company: i.Tech Dynamic Ltd.

Humidity: 54%

Temperature: 27°C

Voltage supply: 110V

Test by: Hugo Wan

Op. mode: Charging mode

Live measurement

Frequency (MHz)	QP reading (dBμV)	Av reading (dBμV)	Results
0.150	51.00	36.90	Pass

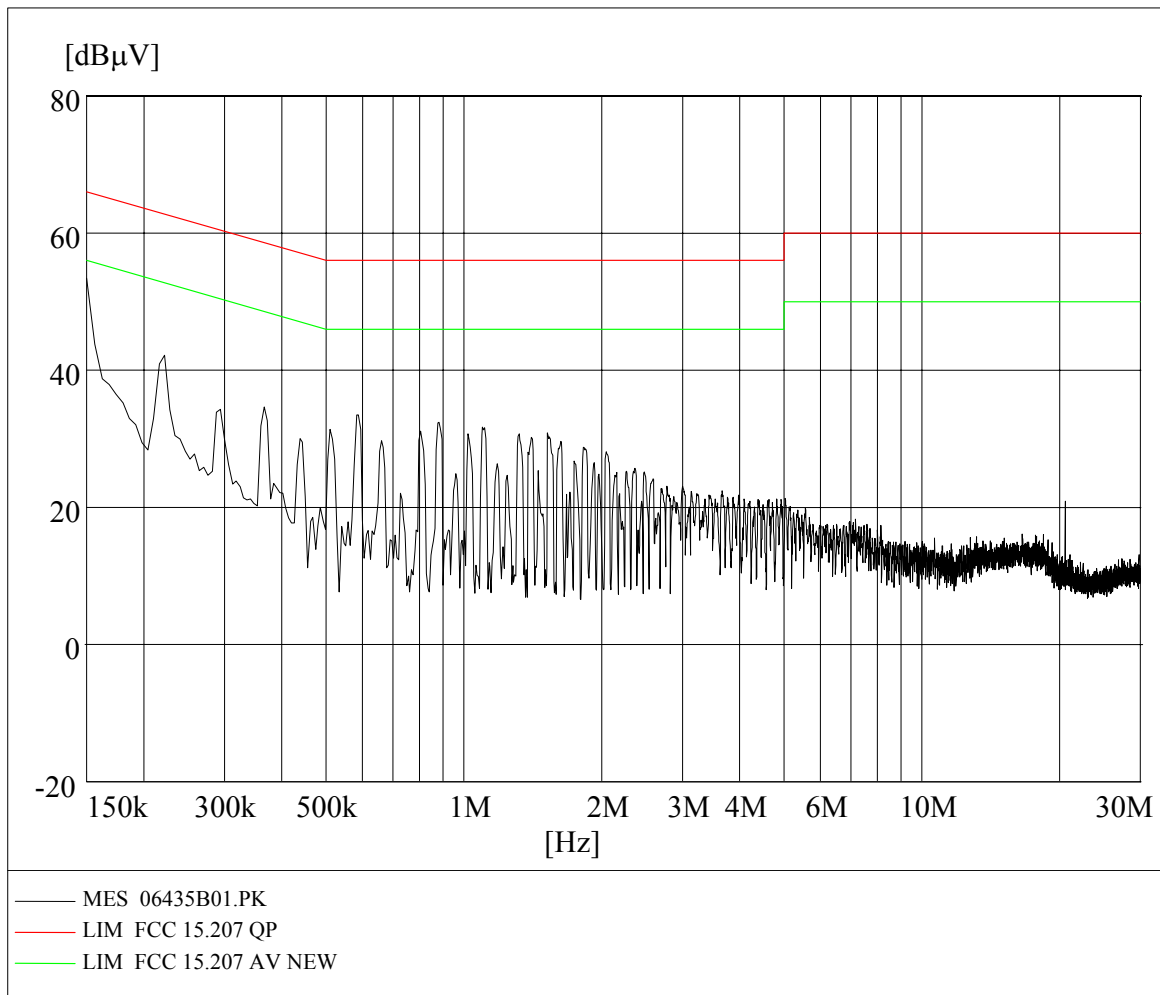
Neutral measurement

Frequency (MHz)	QP reading (dBμV)	Av reading (dBμV)	Results
0.150	36.10	6.70	Pass

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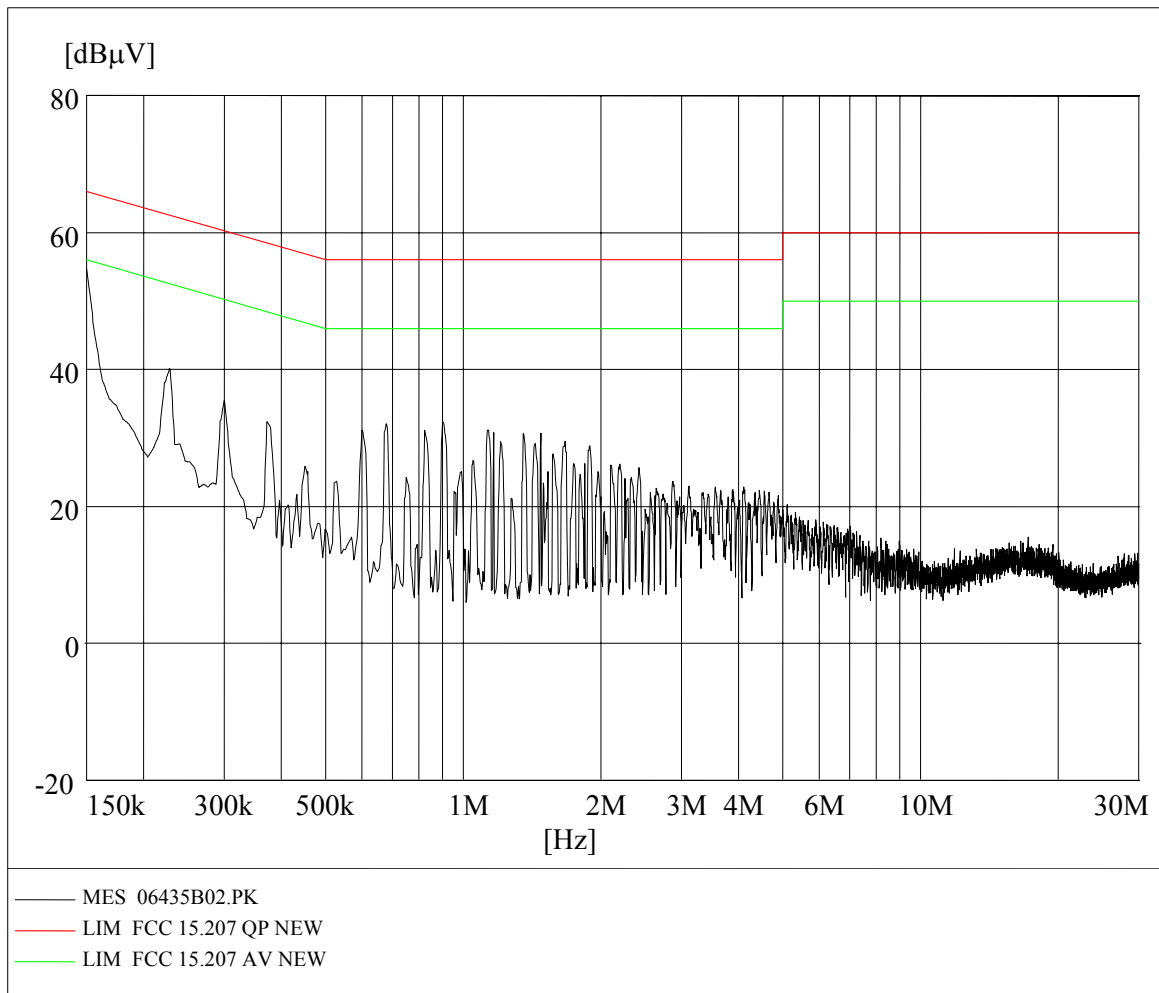


Live terminal

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Neutral terminal

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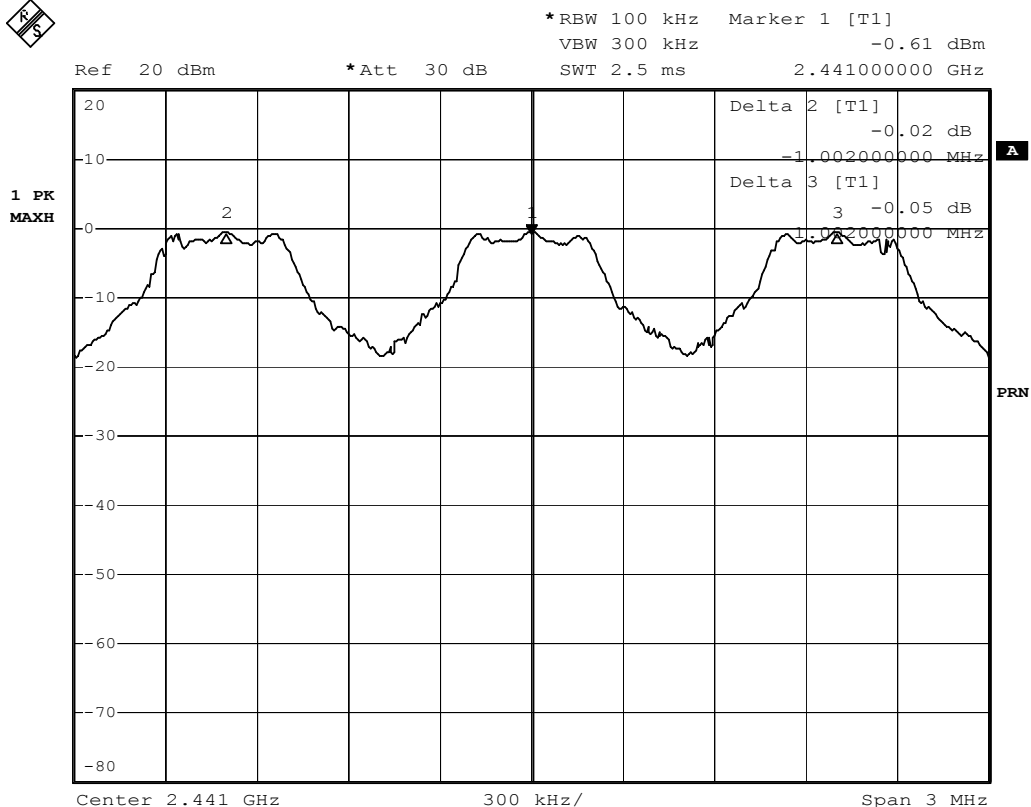
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Carrier Frequency Separation

Date: 8 Oct 2003
 EUT: Bluetooth Headset Clip (C51-A03024-AA)
 Company: i.Tech Dynamic Ltd.
 Humidity: 55%
 Temperature: 22°C
 Voltage supply: 3.9V
 Test by: Hugo Wan
 Op. mode: Hopping on

Reference frequency (MHz)	Channel Separation (MHz)	Results
2441.000	1.002	Pass



Date: 8.OCT.2003 17:25:20

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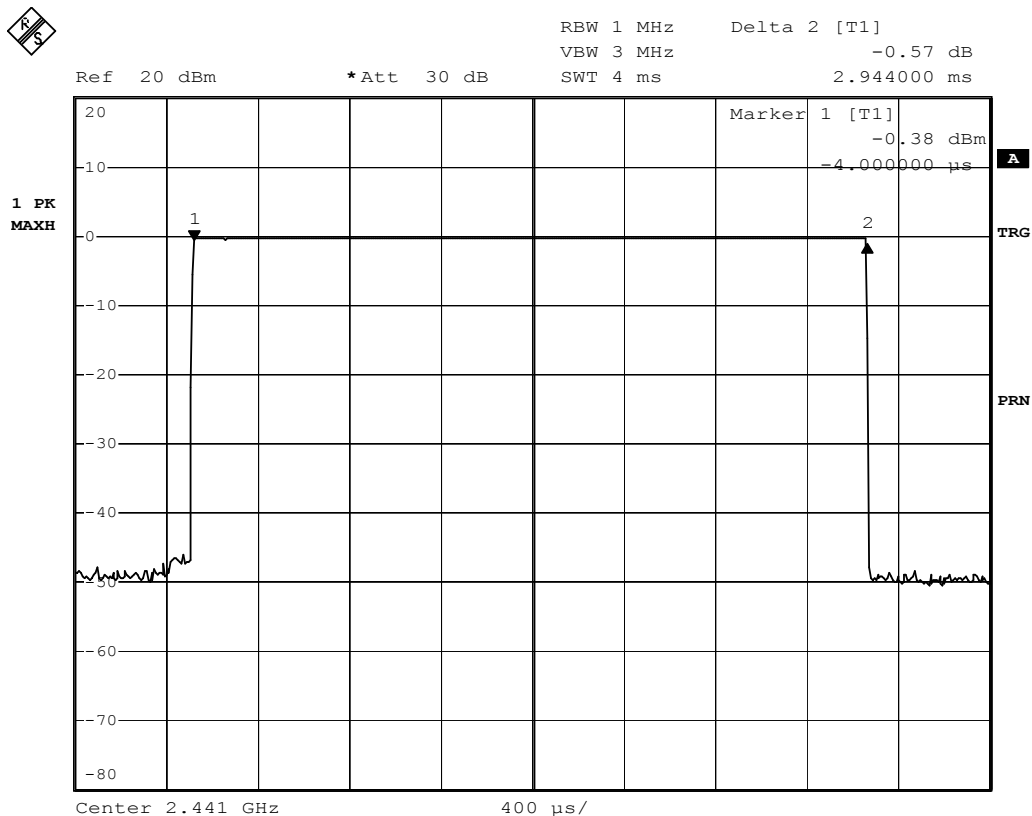
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Dwell Time

Date: 8 Oct 2003
 EUT: Bluetooth Headset Clip (C51-A03024-AA)
 Company: i.Tech Dynamic Ltd.
 Humidity: 55%
 Temperature: 22°C
 Voltage supply: 3.9V
 Test by: Hugo Wan
 Op. mode: Hopping on

Burst Duration (ms)	Number of hopping	Time of occupancy (s)	Results
2.944	27	$0.002944 \times 27 =$ 0.07949	Pass

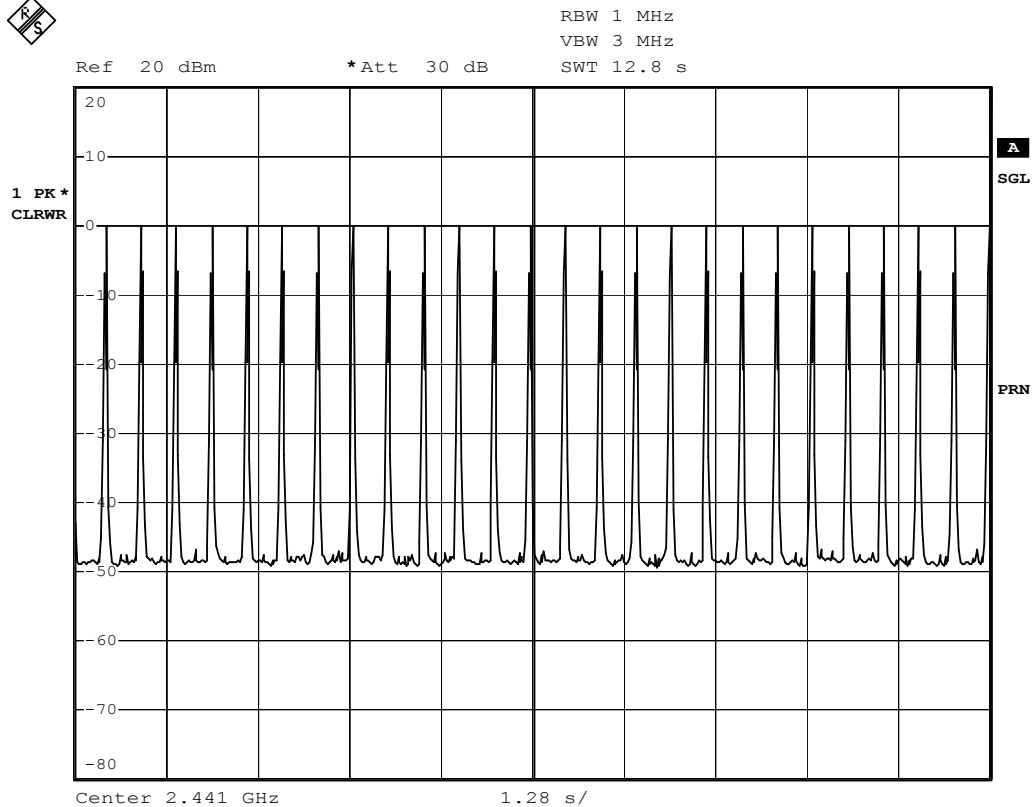


Date: 8.OCT.2003 17:31:13

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Date: 8.OCT.2003 17:32:49

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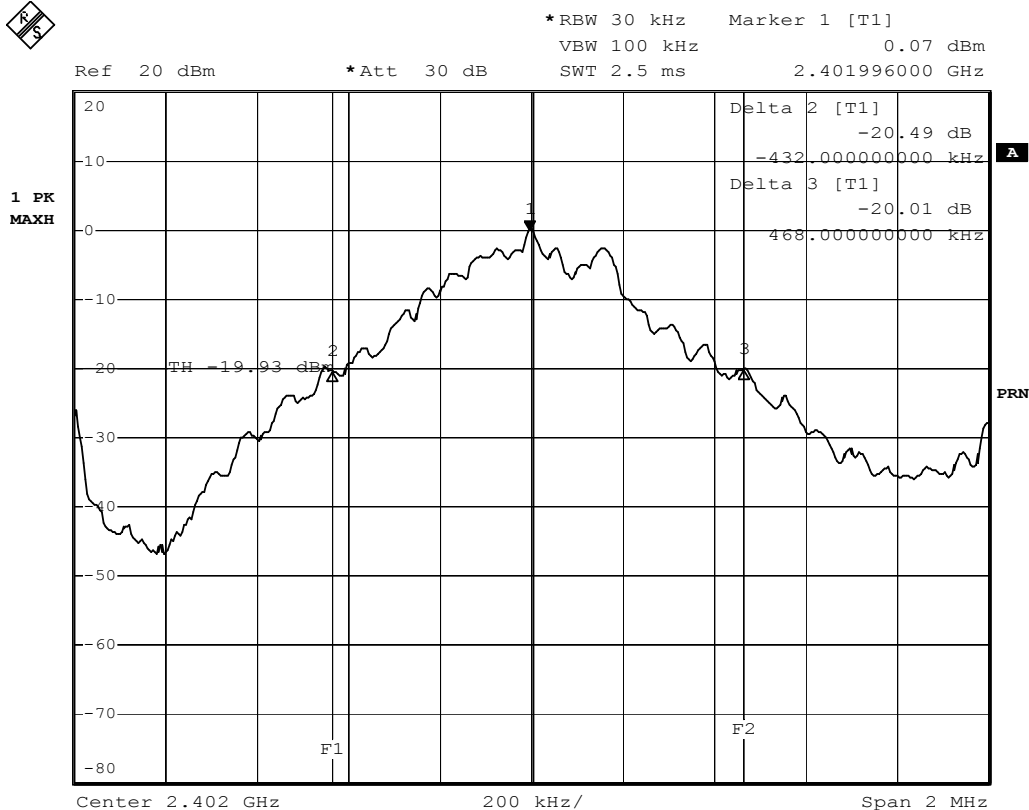
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20dB Bandwidth

Date: 8 Oct 2003
 EUT: Bluetooth Headset Clip (C51-A03024-AA)
 Company: i.Tech Dynamic Ltd.
 Humidity: 55%
 Temperature: 22°C
 Voltage supply: 3.9V
 Test by: Hugo Wan
 Op. mode: TX mode, DH5 with PRBS9 payload

Tx frequency (MHz)	Δf_L (MHz)	Δf_H (MHz)	$ \Delta f_H + \Delta f_L $ (MHz)	Results
2402	-0.432	0.468	0.900	Pass
2441	-0.448	0.464	0.912	Pass
2480	-0.452	0.456	0.908	Pass



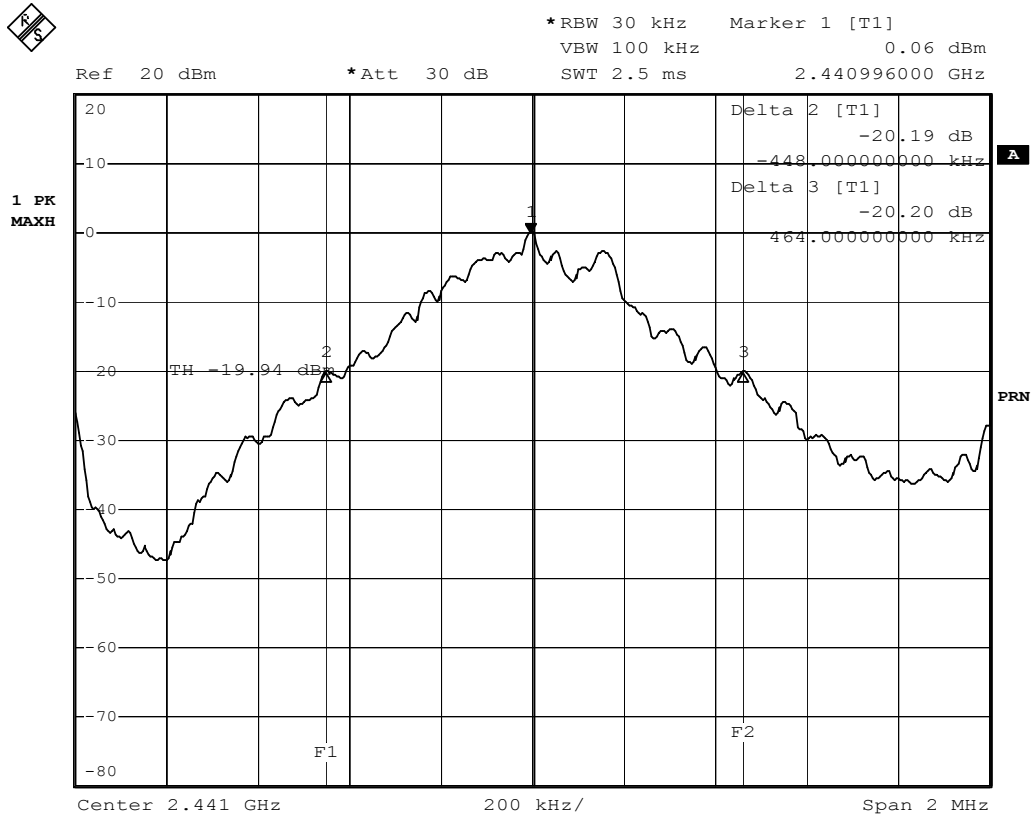
Date: 8.OCT.2003 17:38:08

Tx frequency: 2402MHz

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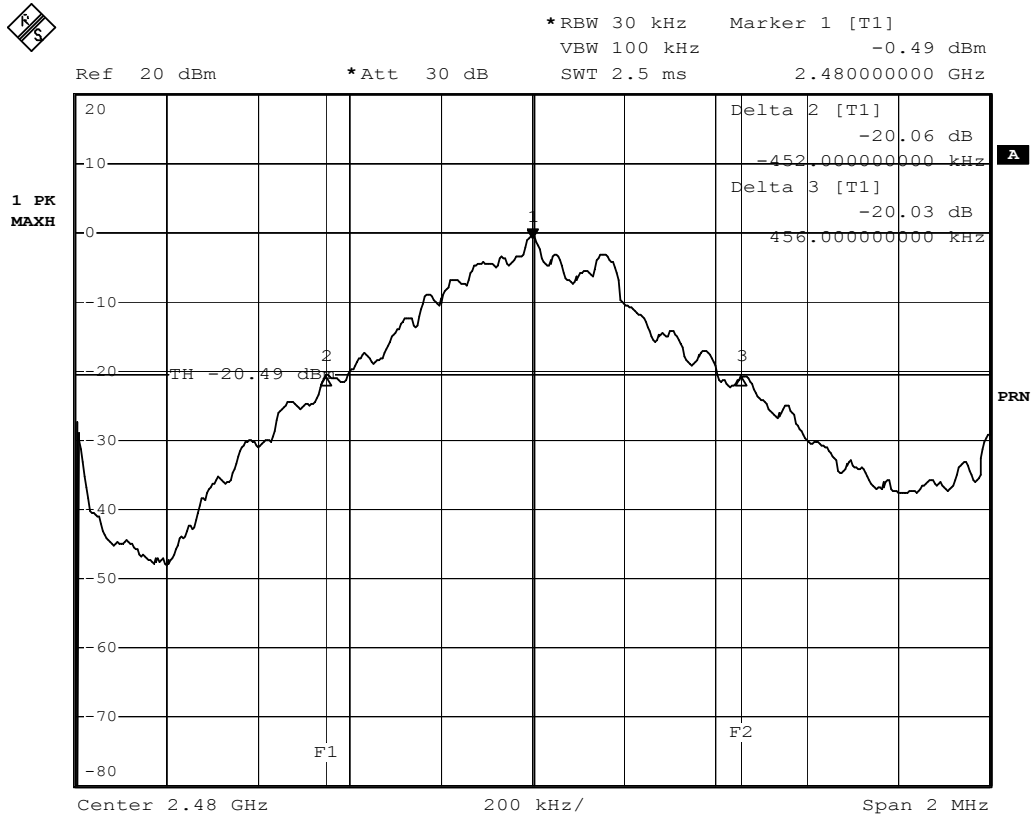
Date: 8.OCT.2003 17:40:28

Tx frequency: 2441MHz

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Date: 8.OCT.2003 17:42:12

Tx frequency: 2480MHz

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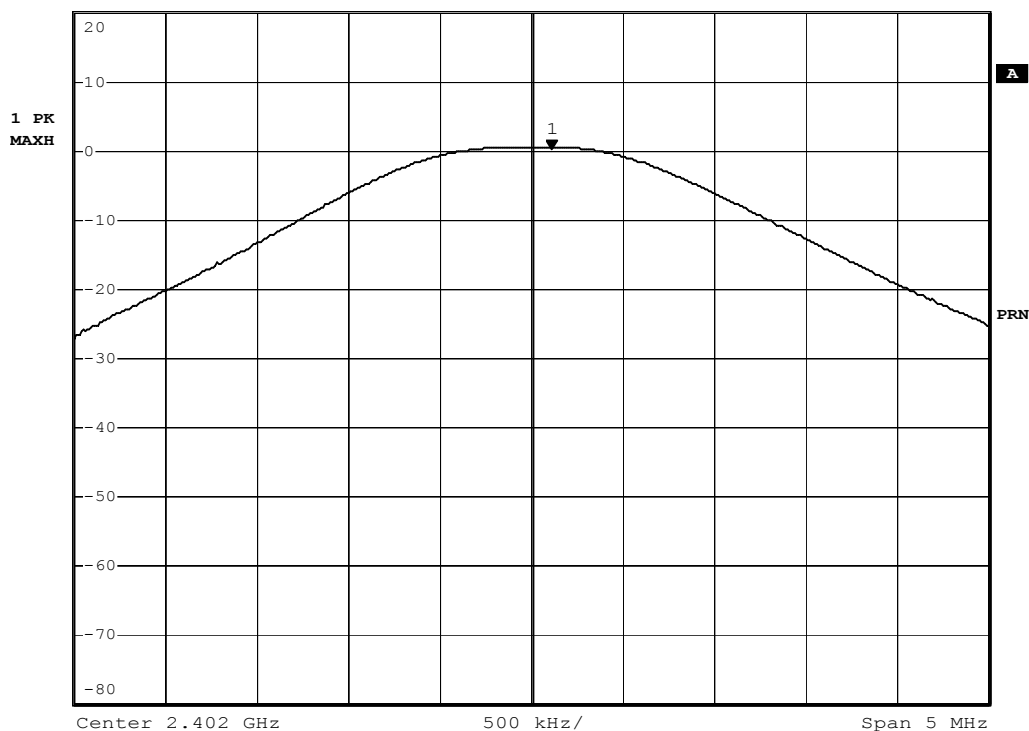
Peak Output Power

Date: 8 Oct 2003
 EUT: Bluetooth Headset Clip (C51-A03024-AA)
 Company: i.Tech Dynamic Ltd.
 Humidity: 55%
 Temperature: 22°C
 Voltage supply: 3.9V
 Test by: Hugo Wan
 Op. mode: TX mode, DH1 with PRBS9 payload

Tx Frequency (MHz)	Cable Attenuation (dB)	Power P _{PK} (dBm)	Actual Peak Power (dBm)	Results
2402	4.30	0.43	4.73	Pass
2441	4.15	0.35	4.50	Pass
2480	4.50	-0.11	4.39	Pass



*RBW 1 MHz Marker 1 [T1]
 VBW 3 MHz 0.43 dBm
 Ref 20 dBm *Att 30 dB SWT 2.5 ms 2.402110000 GHz



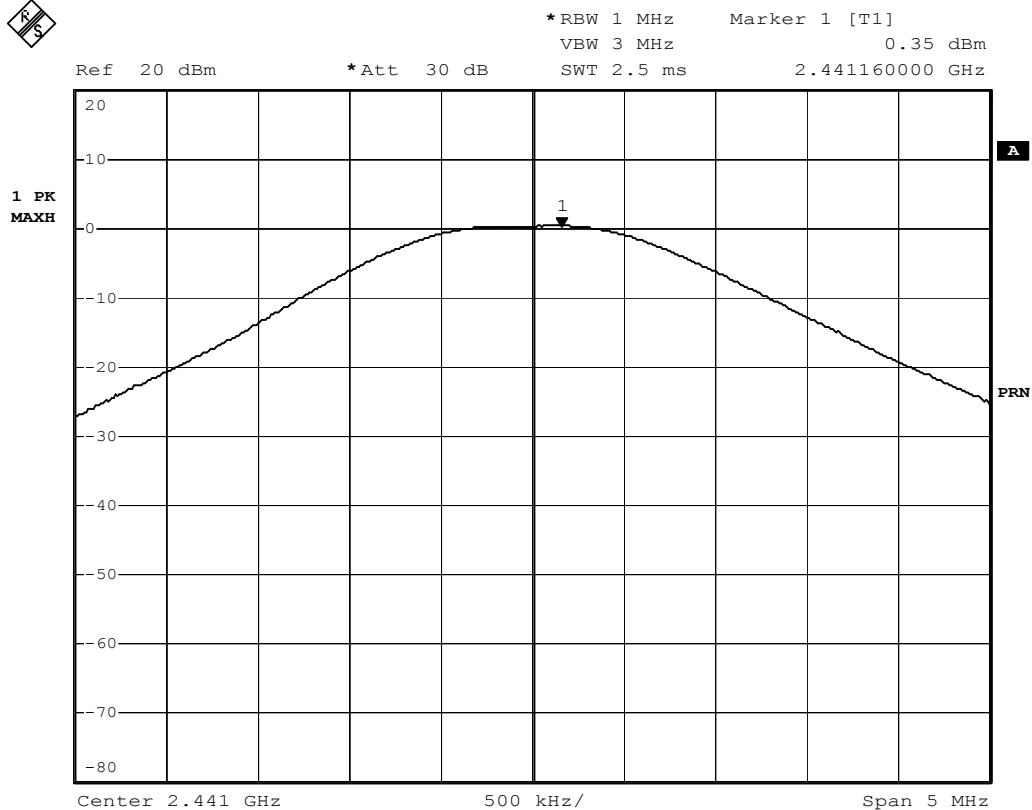
Date: 8.OCT.2003 14:55:57

Tx frequency: 2402MHz

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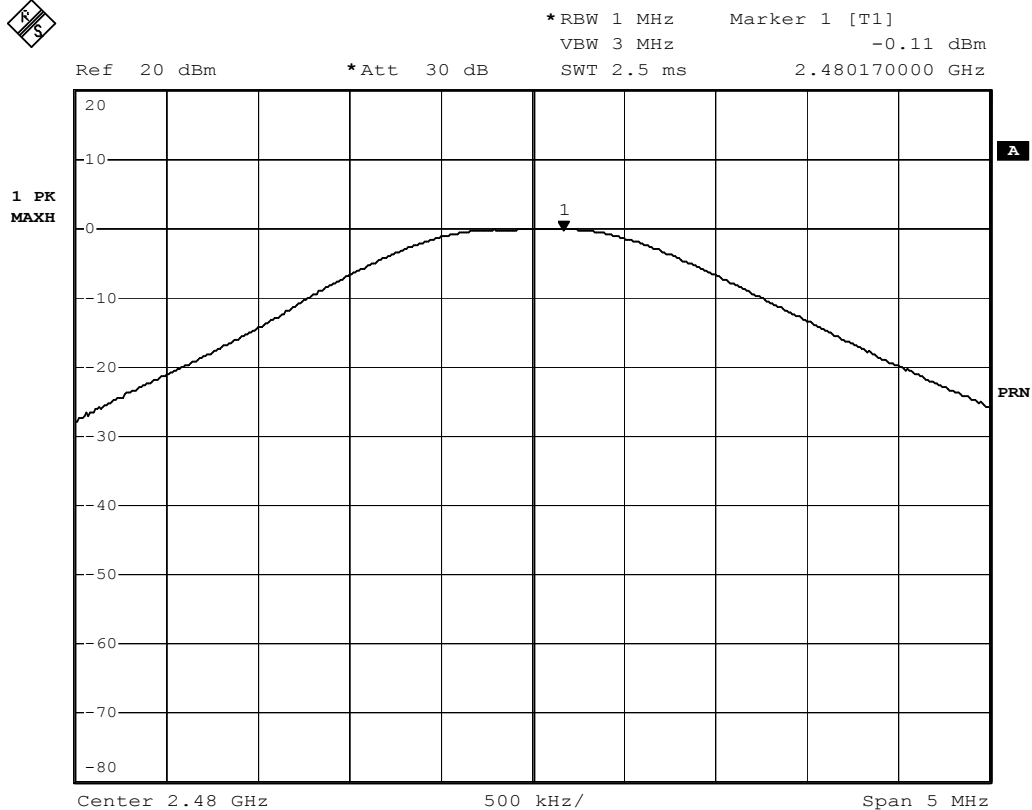
Date: 8.OCT.2003 14:58:00

Tx frequency: 2441MHz

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Date: 8.OCT.2003 14:58:42

Tx frequency: 2480MHz

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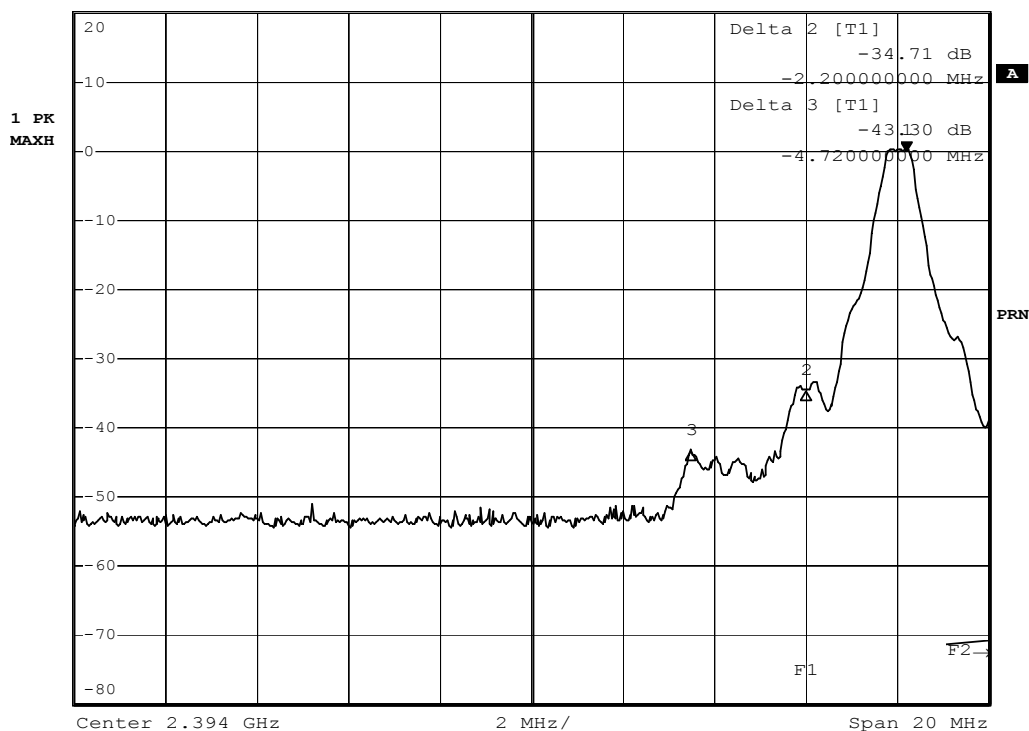
Band Edge Compliance

Date: 8 Oct 2003
 EUT: Bluetooth Headset Clip (C51-A03024-AA)
 Company: i.Tech Dynamic Ltd.
 Humidity: 55%
 Temperature: 22°C
 Voltage supply: 3.9V
 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	0.23	No Peak	-	Pass
2480	-0.42	No Peak	-	Pass



*RBW 300 kHz Marker 1 [T1]
 VBW 1 MHz 0.23 dBm
 Ref 20 dBm *Att 30 dB SWT 2.5 ms 2.402200000 GHz



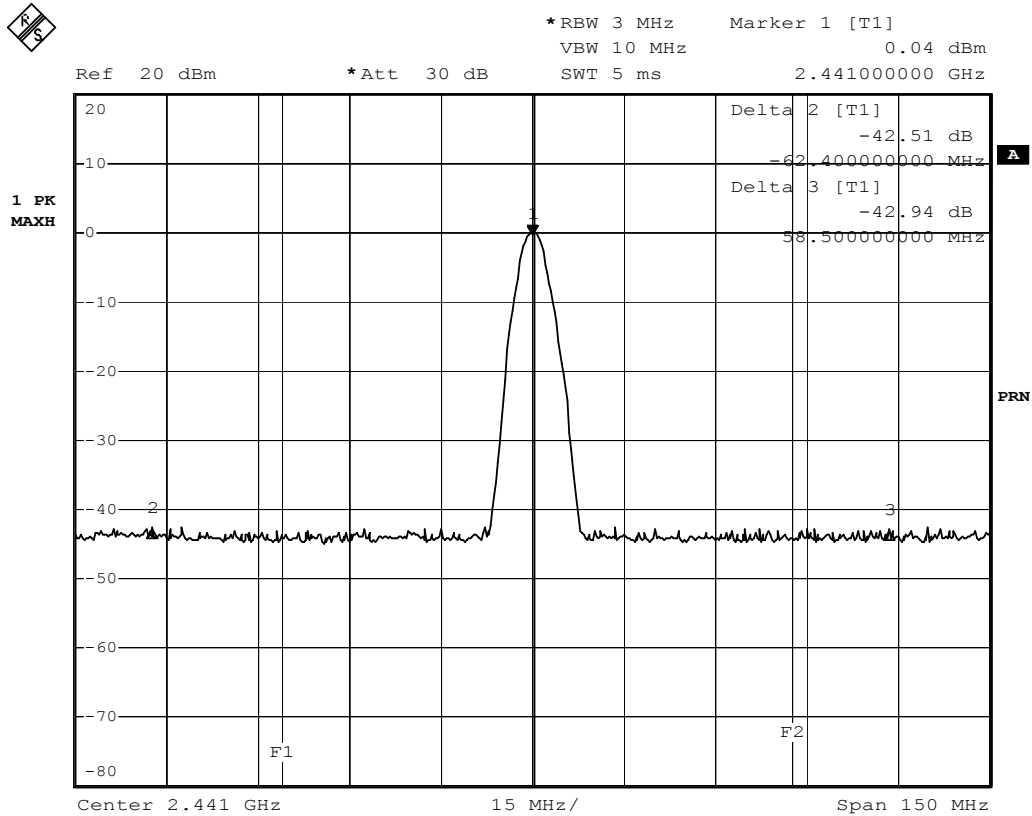
Date: 8.OCT.2003 15:04:48

Tx frequency: 2402MHz

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Date: 8.OCT.2003 15:06:05

Tx frequency: 2441MHz

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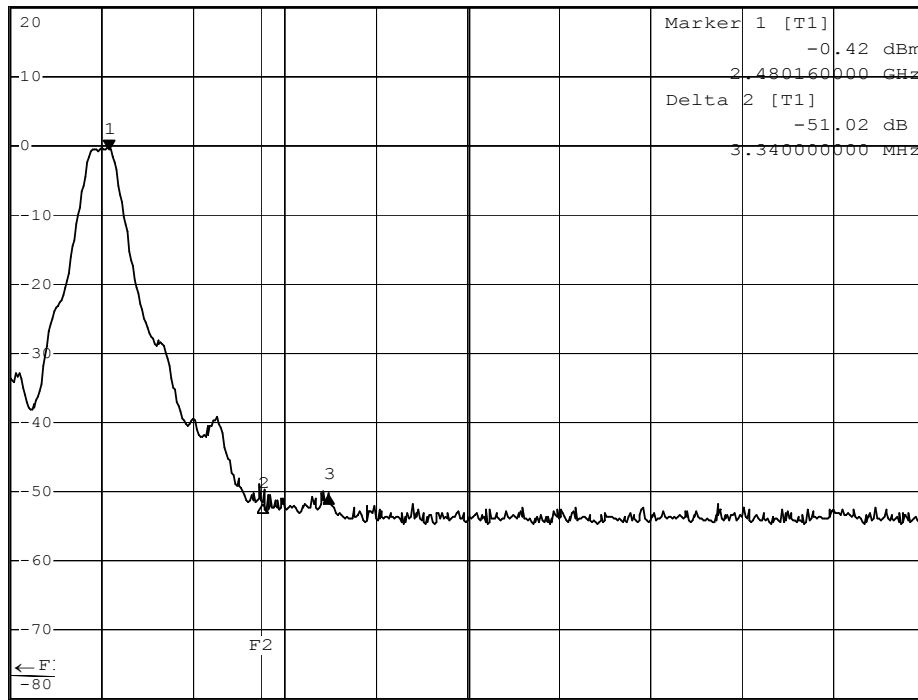


*RBW 300 kHz Delta 3 [T1]
 VBW 1 MHz -49.87 dB
 SWT 2.5 ms 4.800000000 MHz

Ref 20 dBm

*Att 30 dB

1 PK
 MAXH



Center 2.488 GHz

2 MHz/

Span 20 MHz

Date: 8.OCT.2003 15:08:00

Tx frequency: 2480MHz

Prüfbericht - Nr.:

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Spurious Emissions - Conducted

Date: 8 Oct 2003
EUT: Bluetooth Headset Clip (C51-A03024-AA)
Company: i.Tech Dynamic Ltd.
Humidity: 55%
Temperature: 22°C
Voltage supply: 3.9V
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

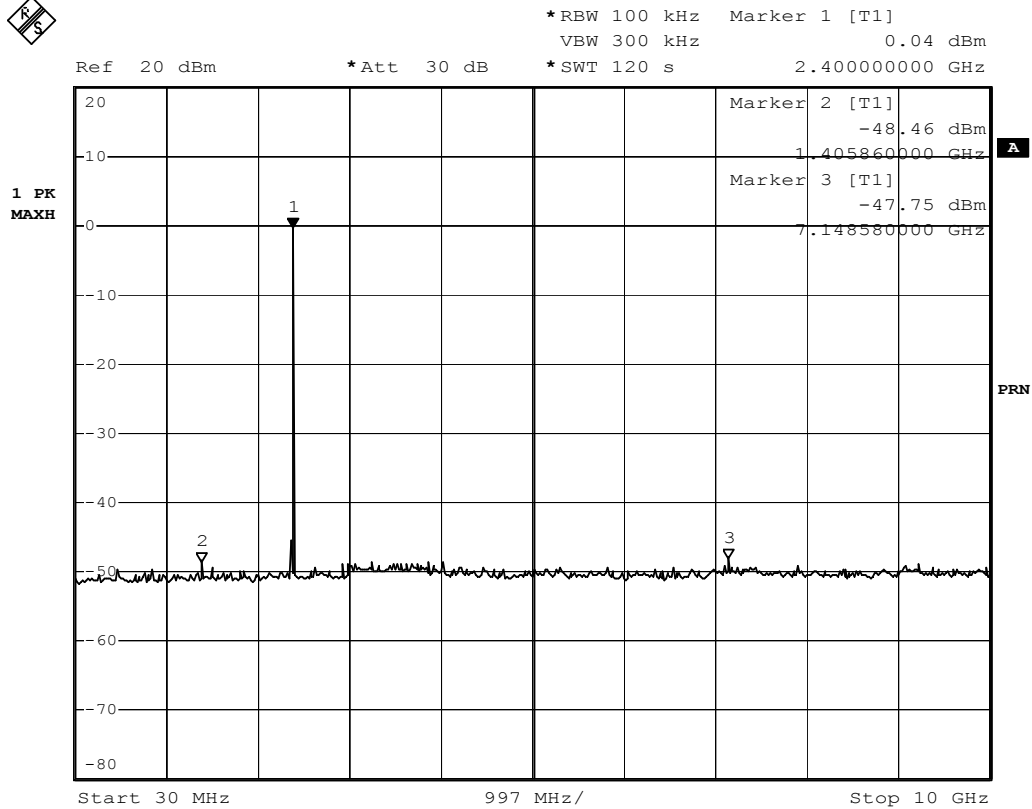
Tx frequency : 2480MHz

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

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Date: 8.OCT.2003 15:23:49

Tx frequency: 2402MHz

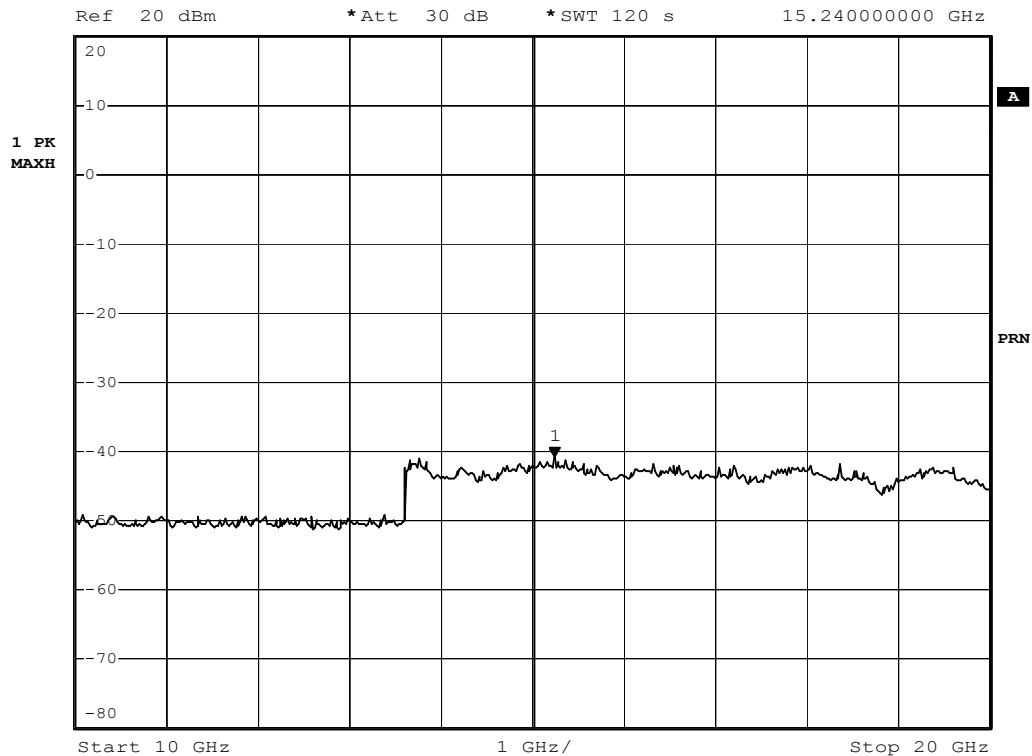
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*RBW 100 kHz Marker 1 [T1]
 VBW 300 kHz -40.40 dBm
 *Att 30 dB *SWT 120 s 15.240000000 GHz



Date: 8.OCT.2003 15:28:06

Tx frequency: 2402MHz

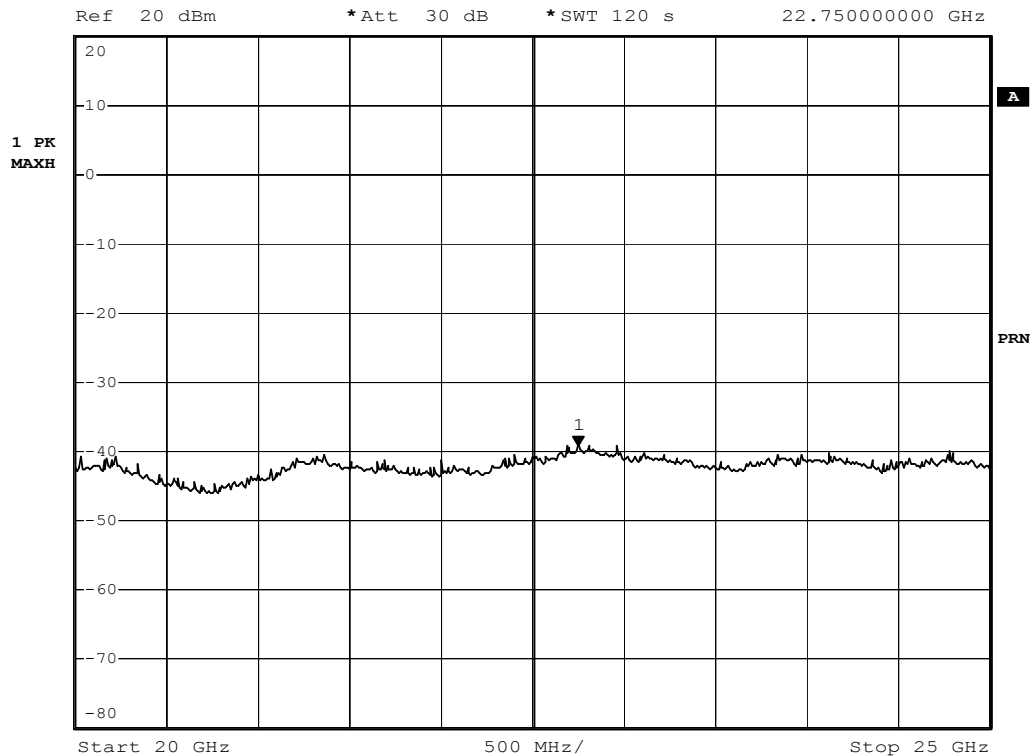
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*RBW 100 kHz Marker 1 [T1]
 VBW 300 kHz -38.83 dBm
 *Att 30 dB *SWT 120 s 22.750000000 GHz



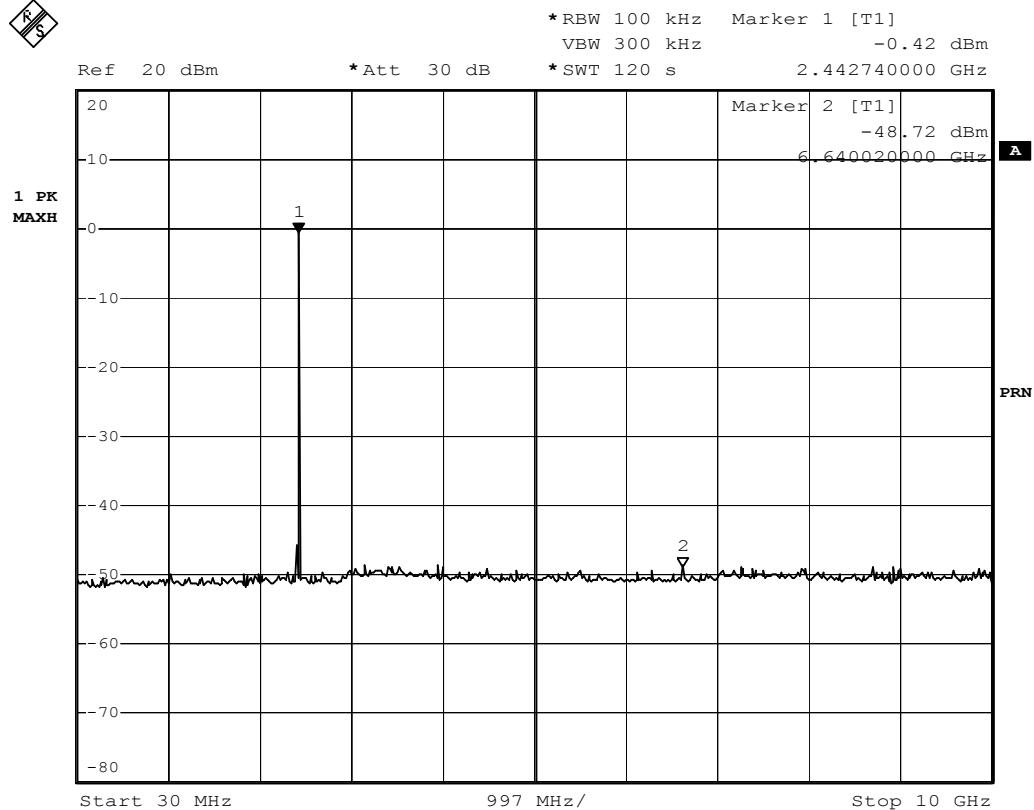
Date: 8.OCT.2003 15:32:13

Tx frequency: 2402MHz

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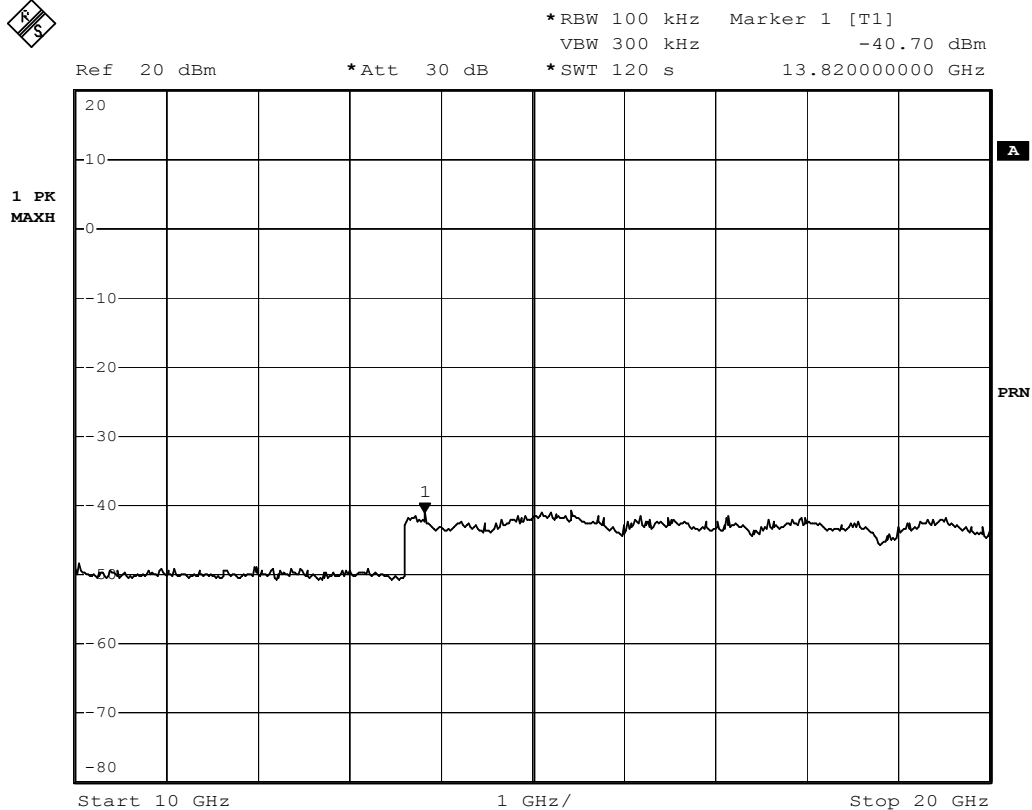
Date: 8.OCT.2003 16:47:30

Tx frequency: 2441MHz

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Date: 8.OCT.2003 16:58:05

Tx frequency: 2441MHz

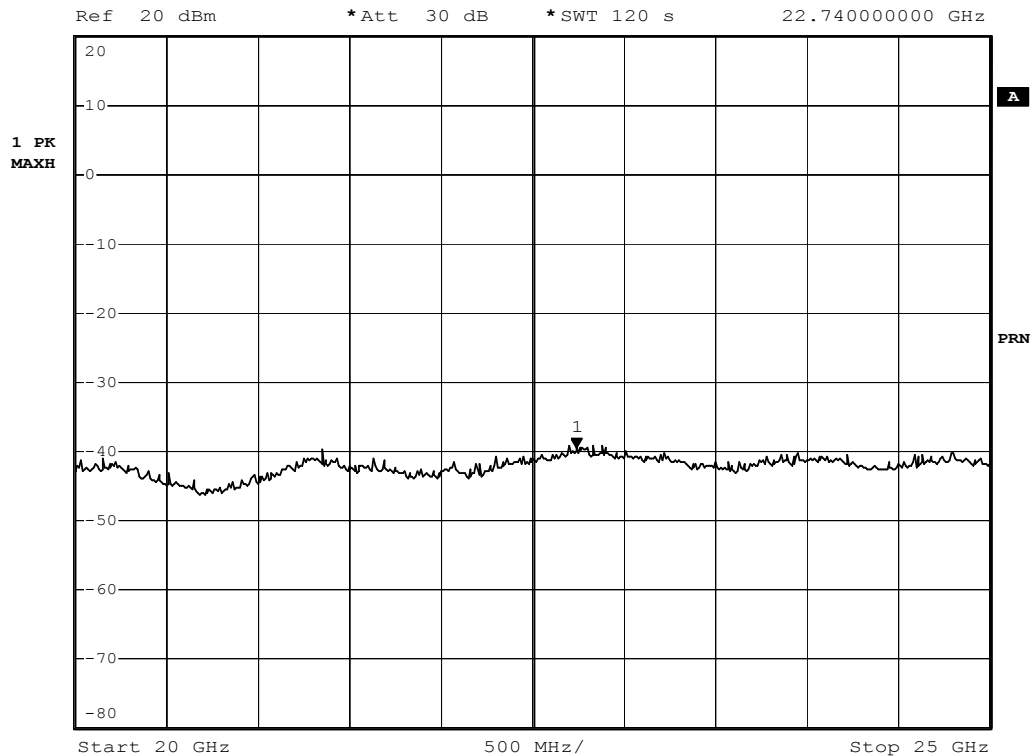
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*RBW 100 kHz Marker 1 [T1]
 VBW 300 kHz -39.11 dBm
 *Att 30 dB *SWT 120 s 22.74000000 GHz



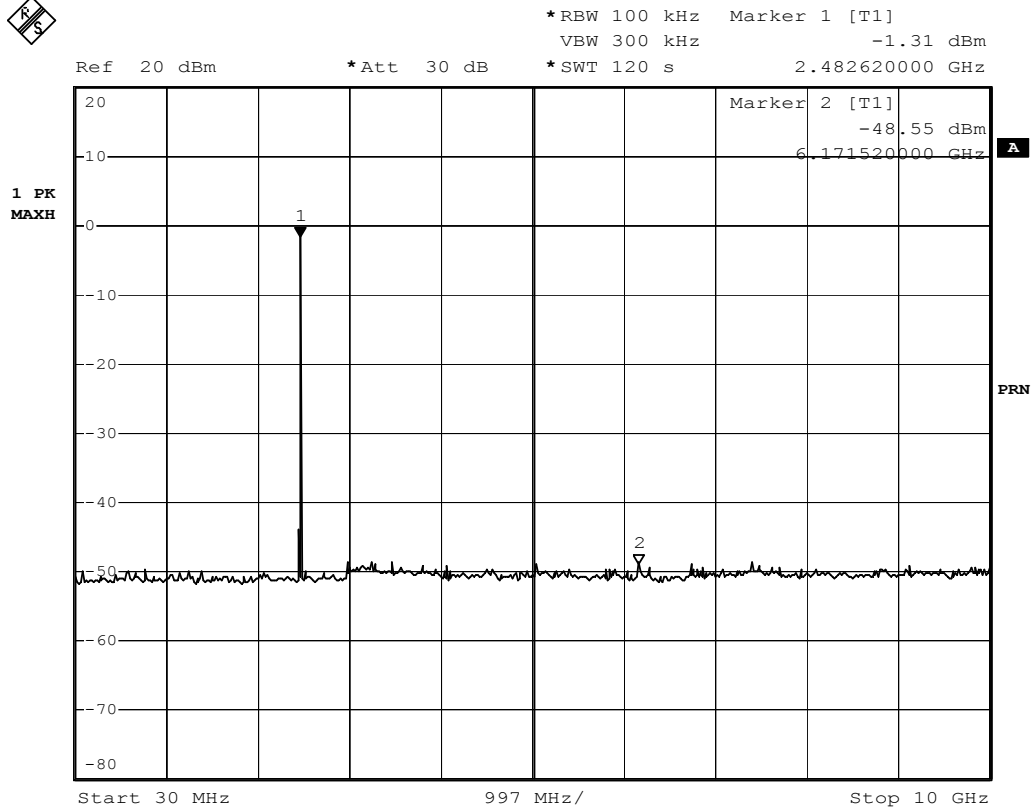
Date: 8.OCT.2003 17:02:23

Tx frequency: 2441MHz

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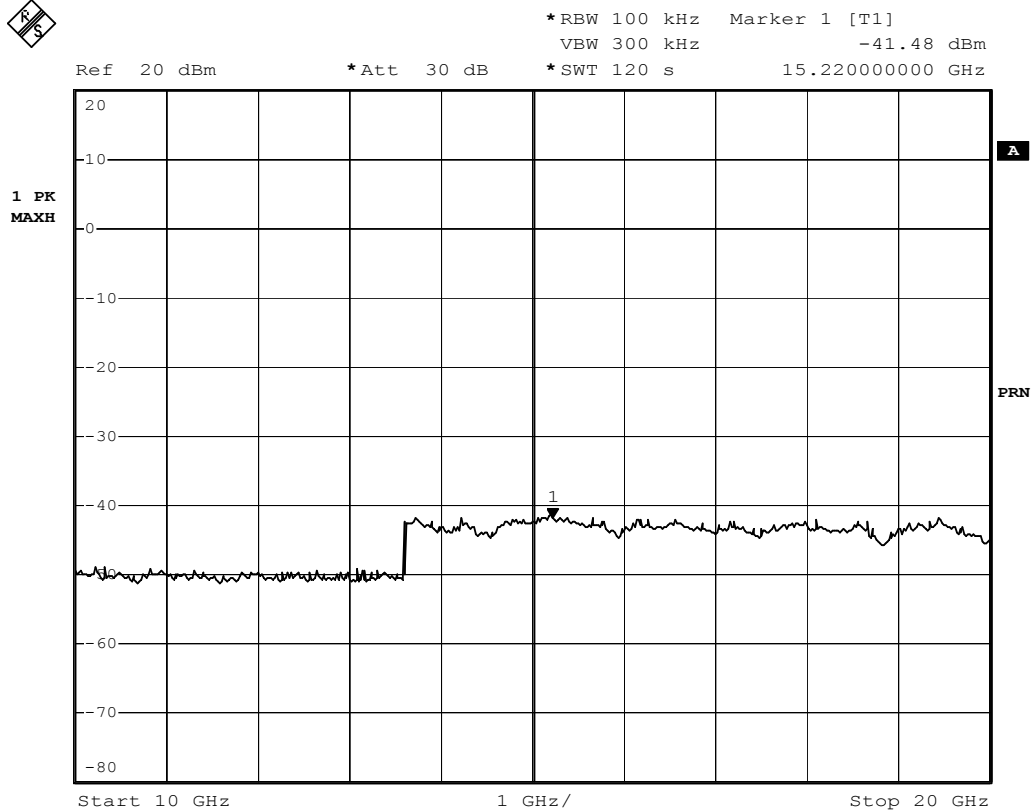
Date: 8.OCT.2003 17:16:03

Tx frequency: 2480MHz

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Date: 8.OCT.2003 17:11:26

Tx frequency: 2480MHz

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*RBW 100 kHz Marker 1 [T1]
 VBW 300 kHz -39.60 dBm
 *Att 30 dB
 *SWT 120 s 22.81000000 GHz

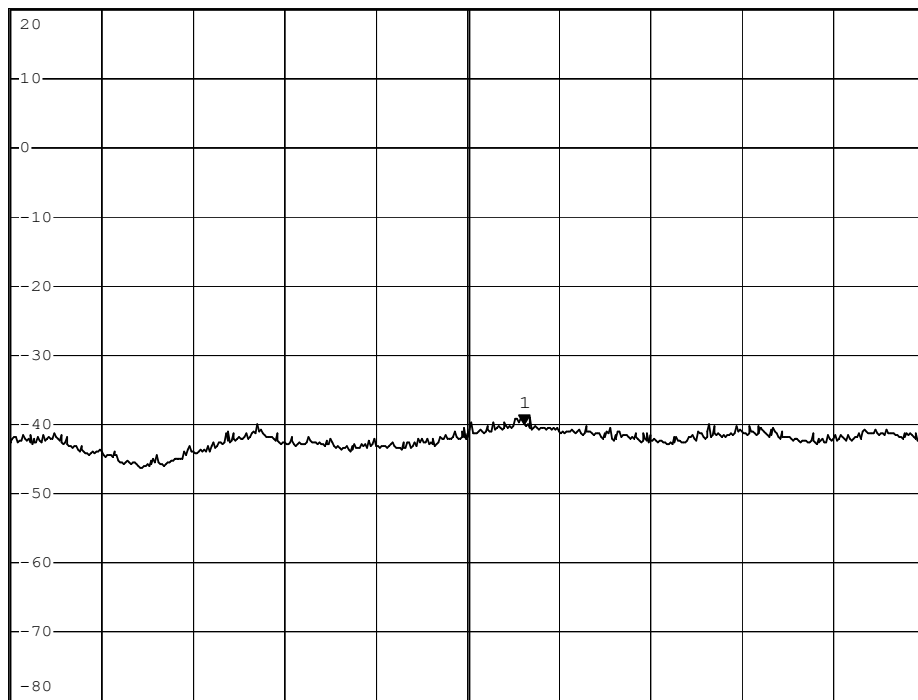
Ref 20 dBm

*Att 30 dB

*SWT 120 s

22.81000000 GHz

1 PK
 MAXH



Start 20 GHz

500 MHz/

Stop 25 GHz

Date: 8.OCT.2003 17:06:58

Tx frequency: 2480MHz

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Spurious Emissions - Radiated

Date: 30 Jul 2003

EUT: Bluetooth Headset Clip (C51-A03024-AA)

Company: i.Tech Dynamic Ltd.

Voltage supply: 3.9V

Test by: Hugo Wan

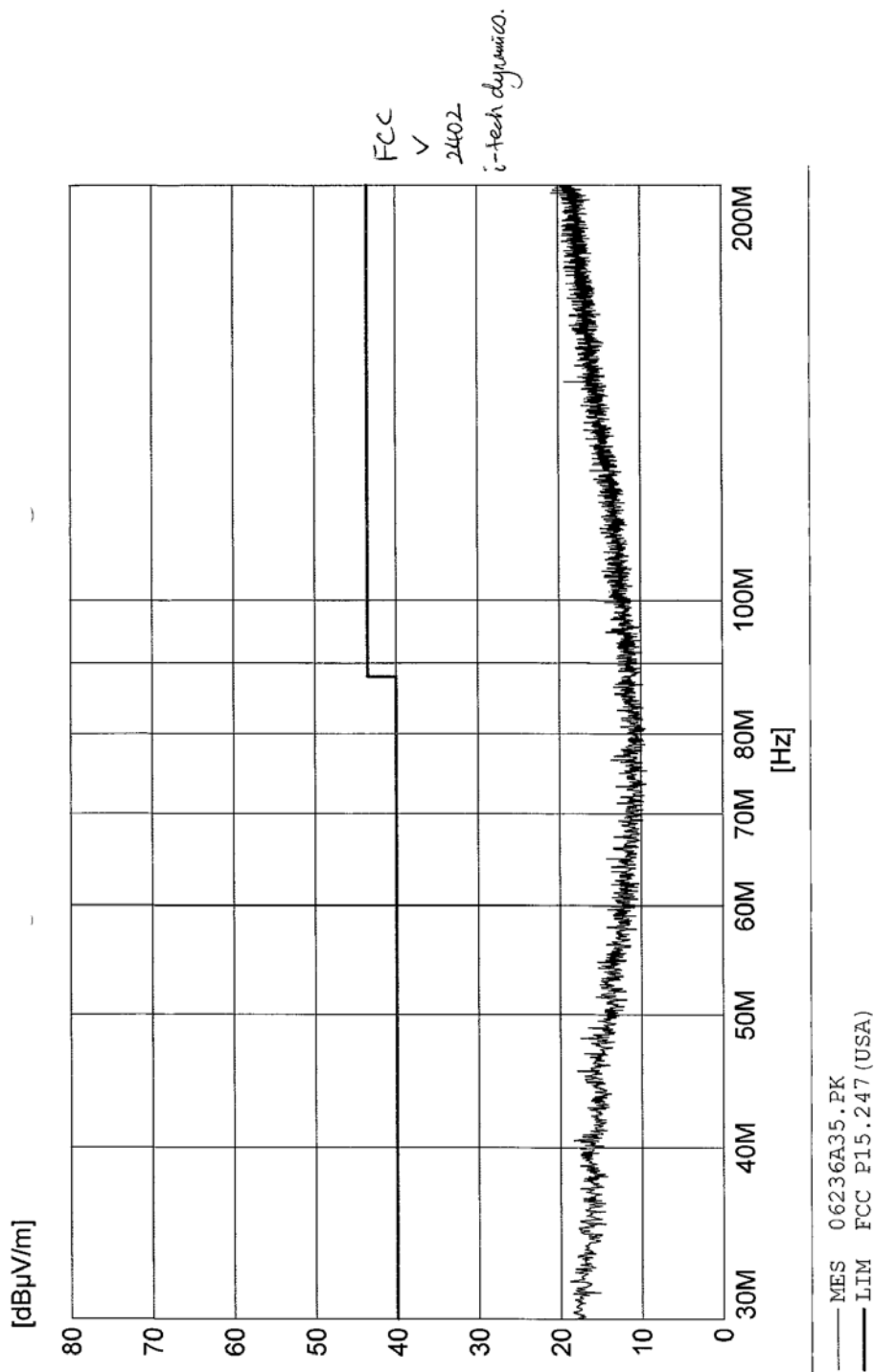
Op. mode: TX mode, DH1 with PRBS9 payload

Tx frequency (MHz)	Polarization	Spurious Frequency (MHz)	Power Level (dBuV/m)	Detector (P/QP/A)
2402	-	No Peak	-	-
Tx frequency (MHz)	Polarization	Spurious Frequency (MHz)	Power Level (dBuV/m)	Detector (P/QP/A)
2441	-	No Peak	-	-
Tx frequency (MHz)	Polarization	Spurious Frequency (MHz)	Power Level (dBuV/m)	Detector (P/QP/A)
2480	-	No Peak	-	-

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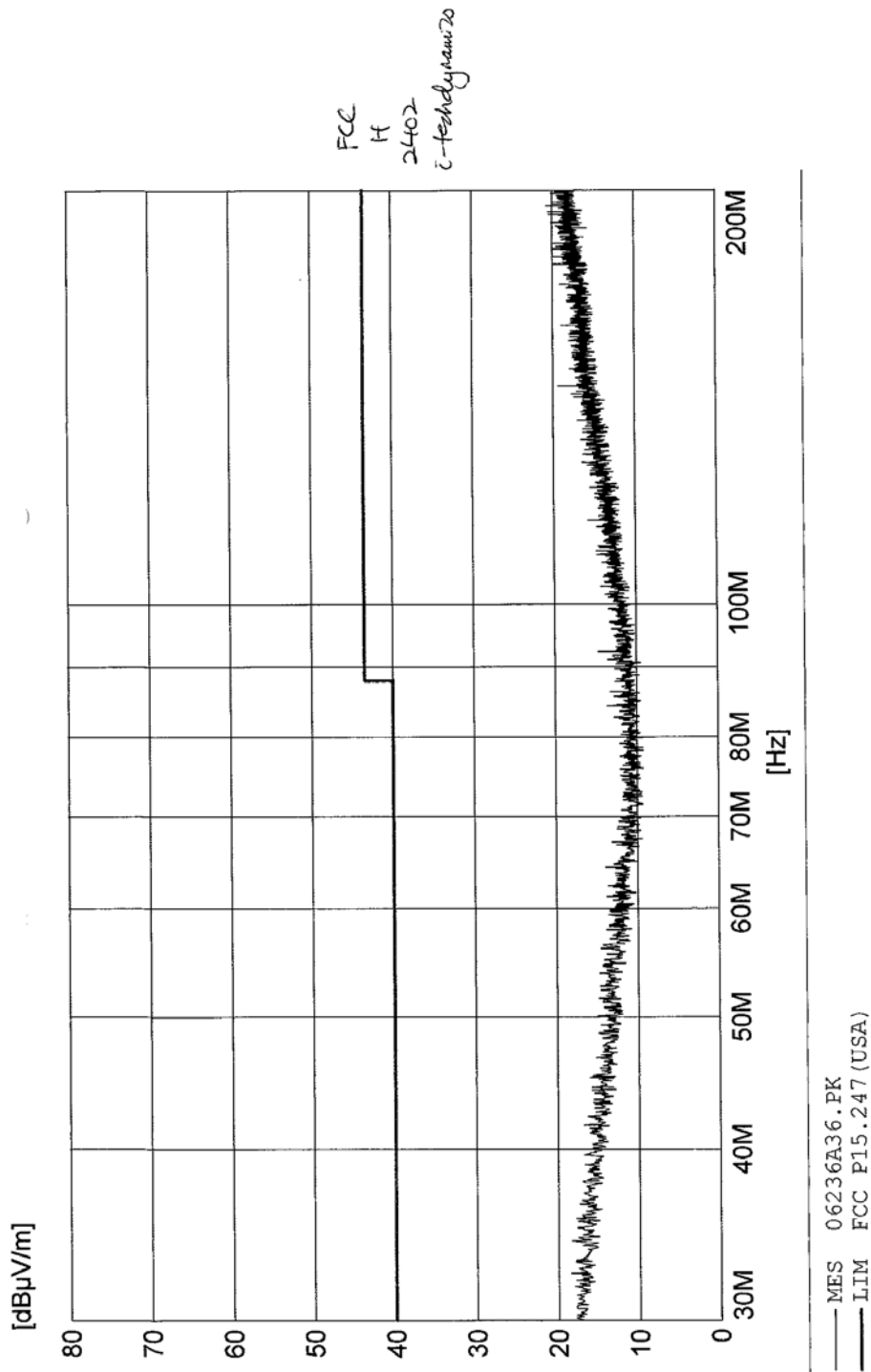
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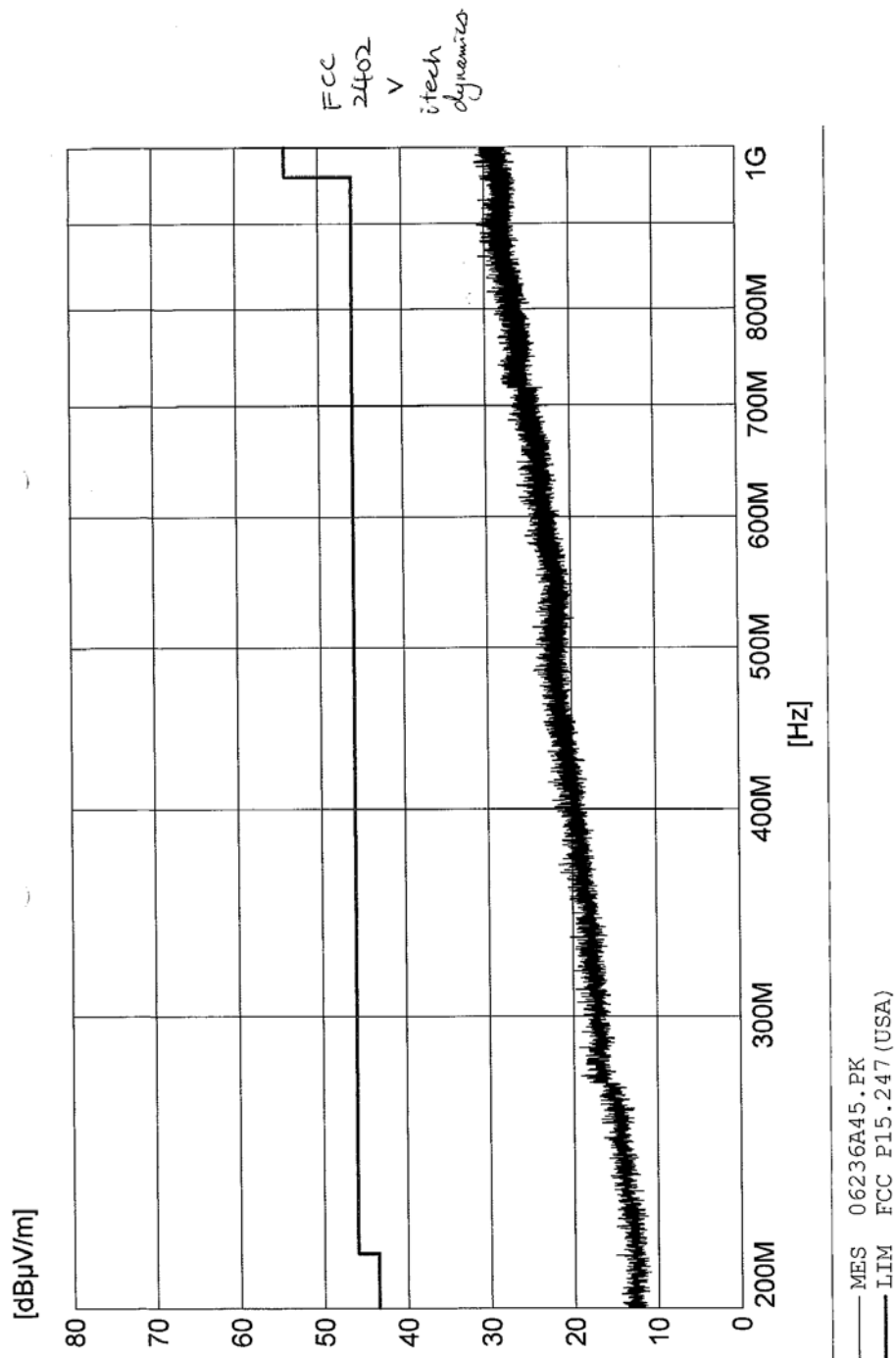
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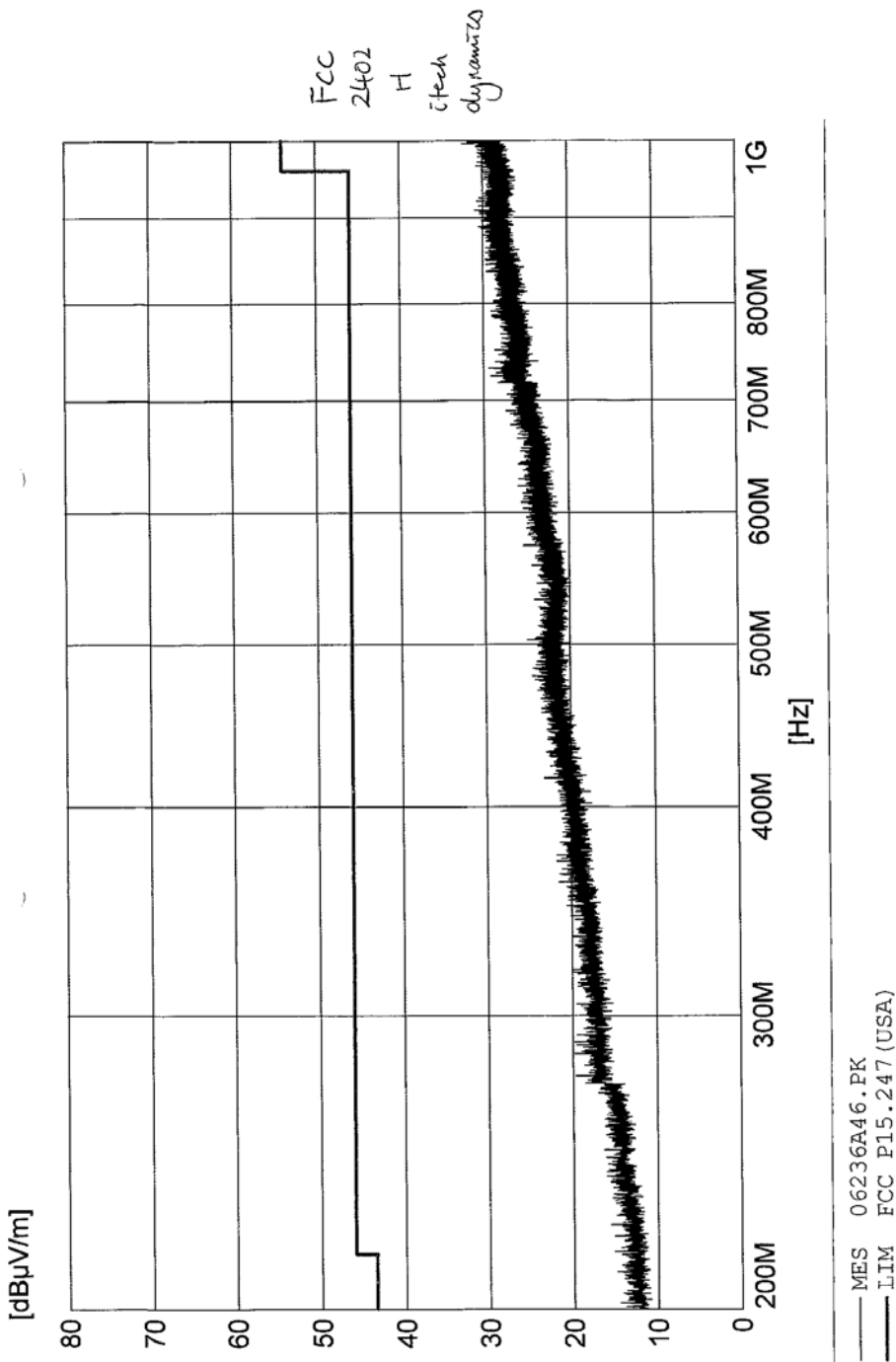
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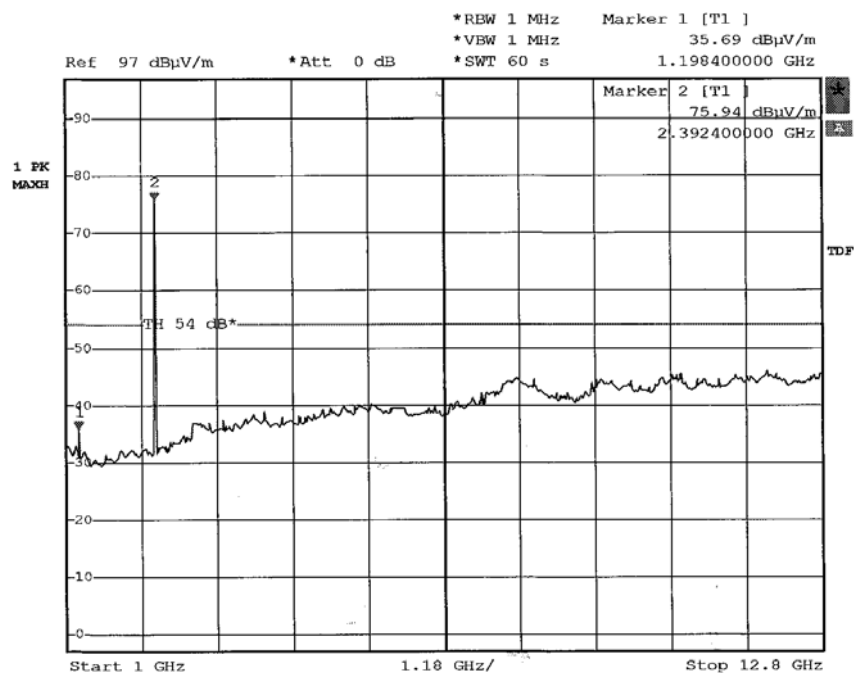
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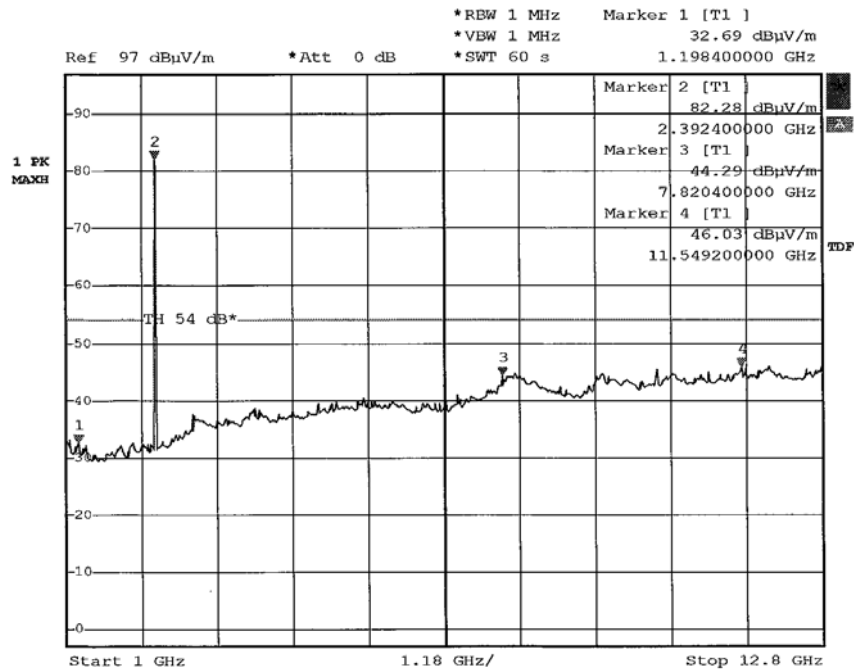
Date: 30.JUL.2003 21:21:46

FCC
 2402
 V
 i tech dynamics.

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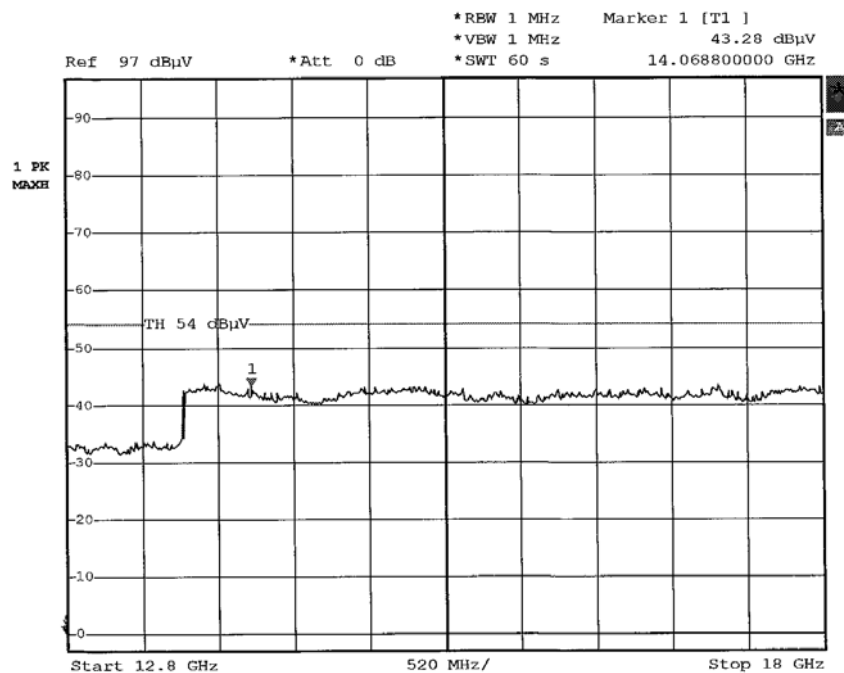
Date: 30.JUL.2003 21:24:31

FCC
 2402
 H
 etech dynamics

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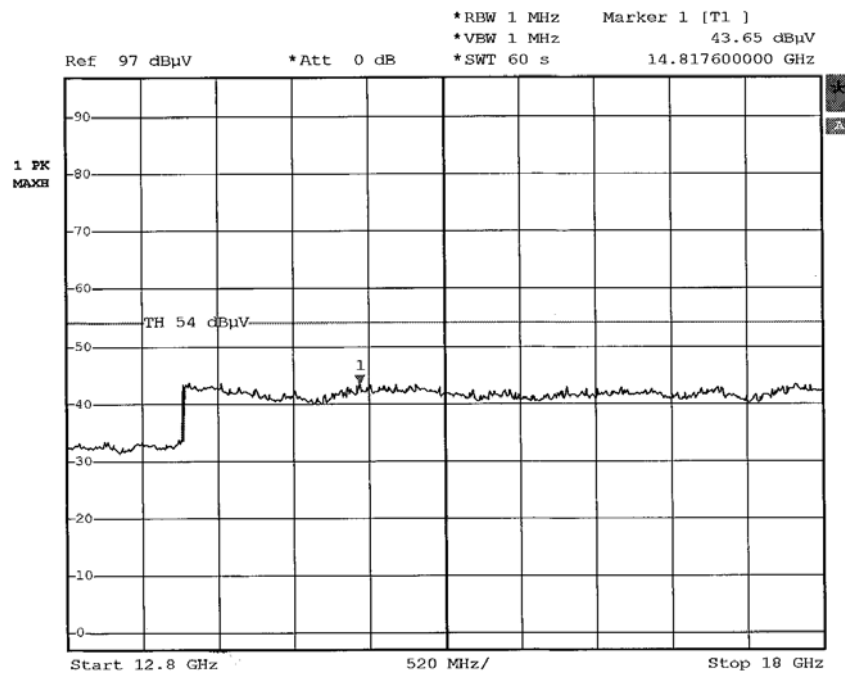
Date: 30.JUL.2003 21:49:34

FCC
 2402
 V
 itechdynamics

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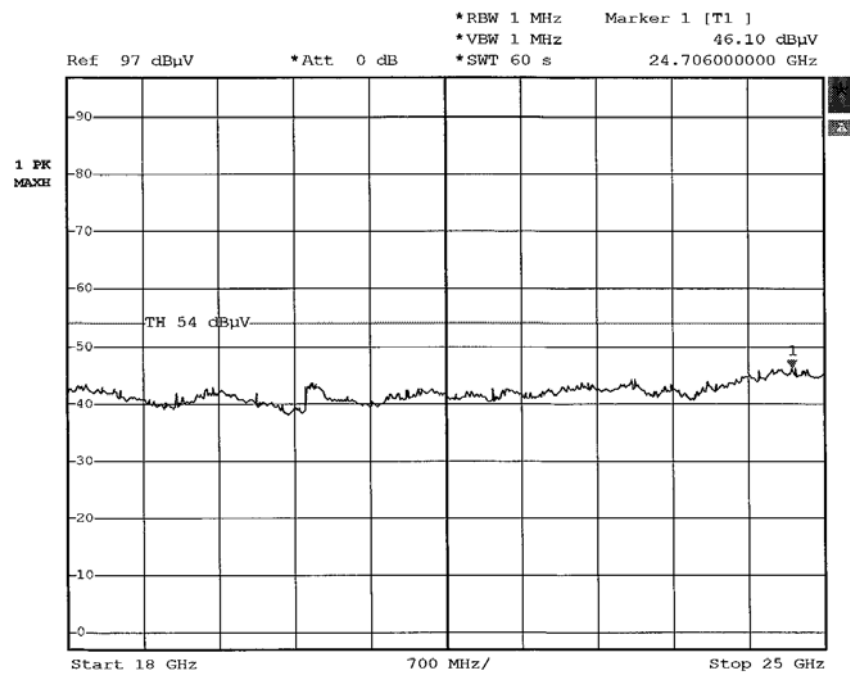
Date: 30.JUL.2003 21:50:59

FCC
2402
H
iTech dynamics

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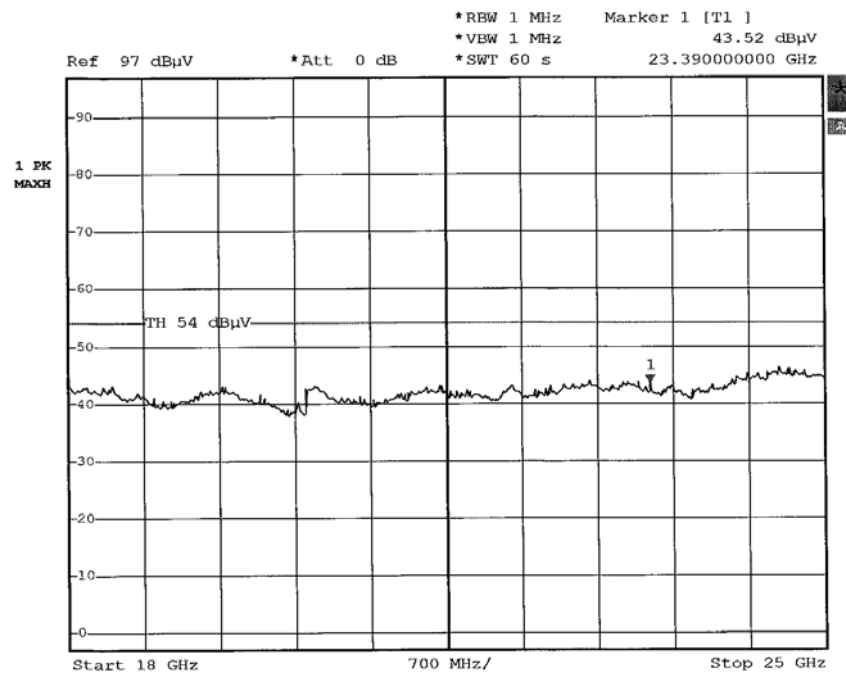
Date: 30.JUL.2003 22:02:40

FCC
2402
V
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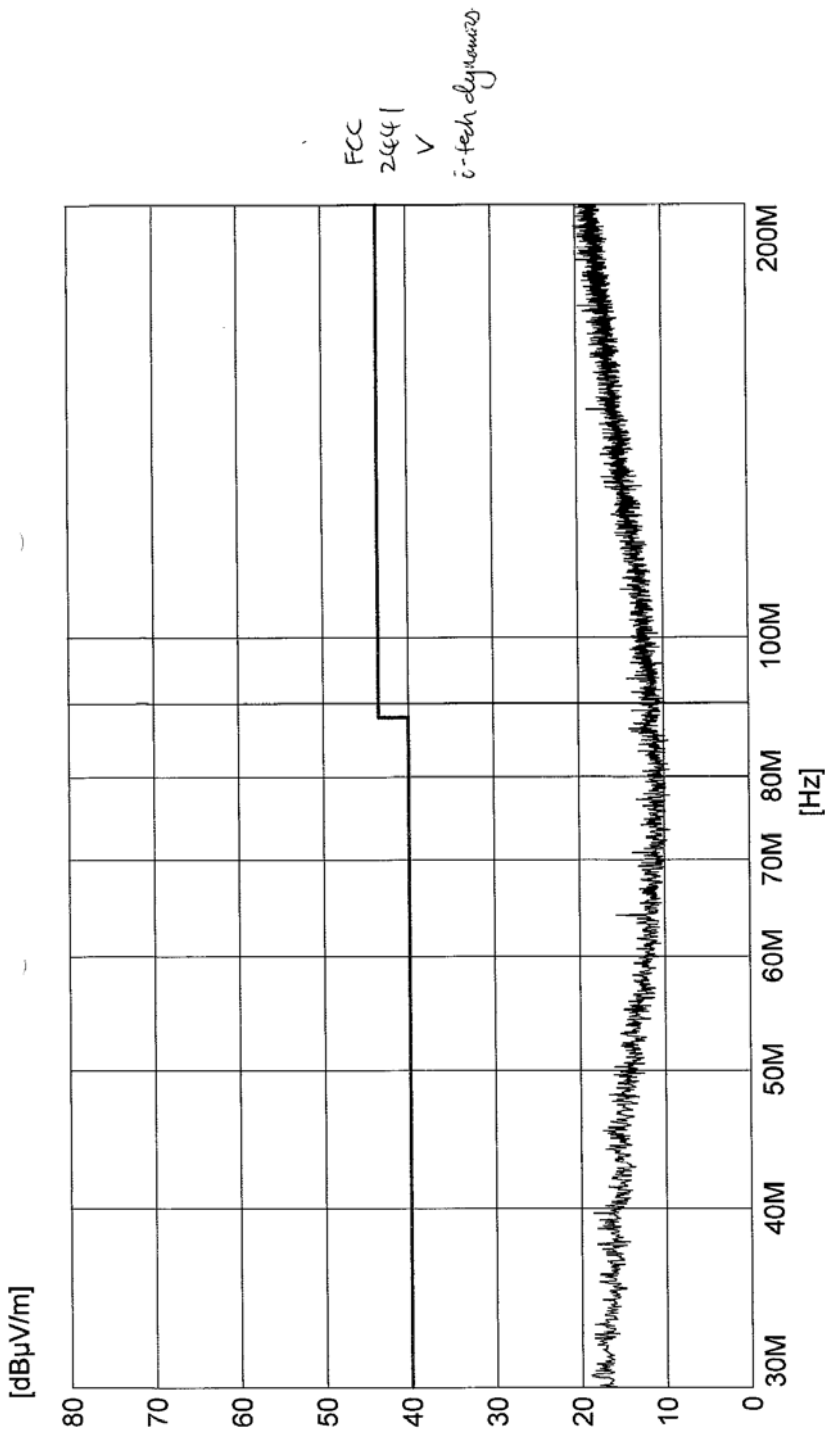
Date: 30.JUL.2003 22:01:17

FCC
2402
H
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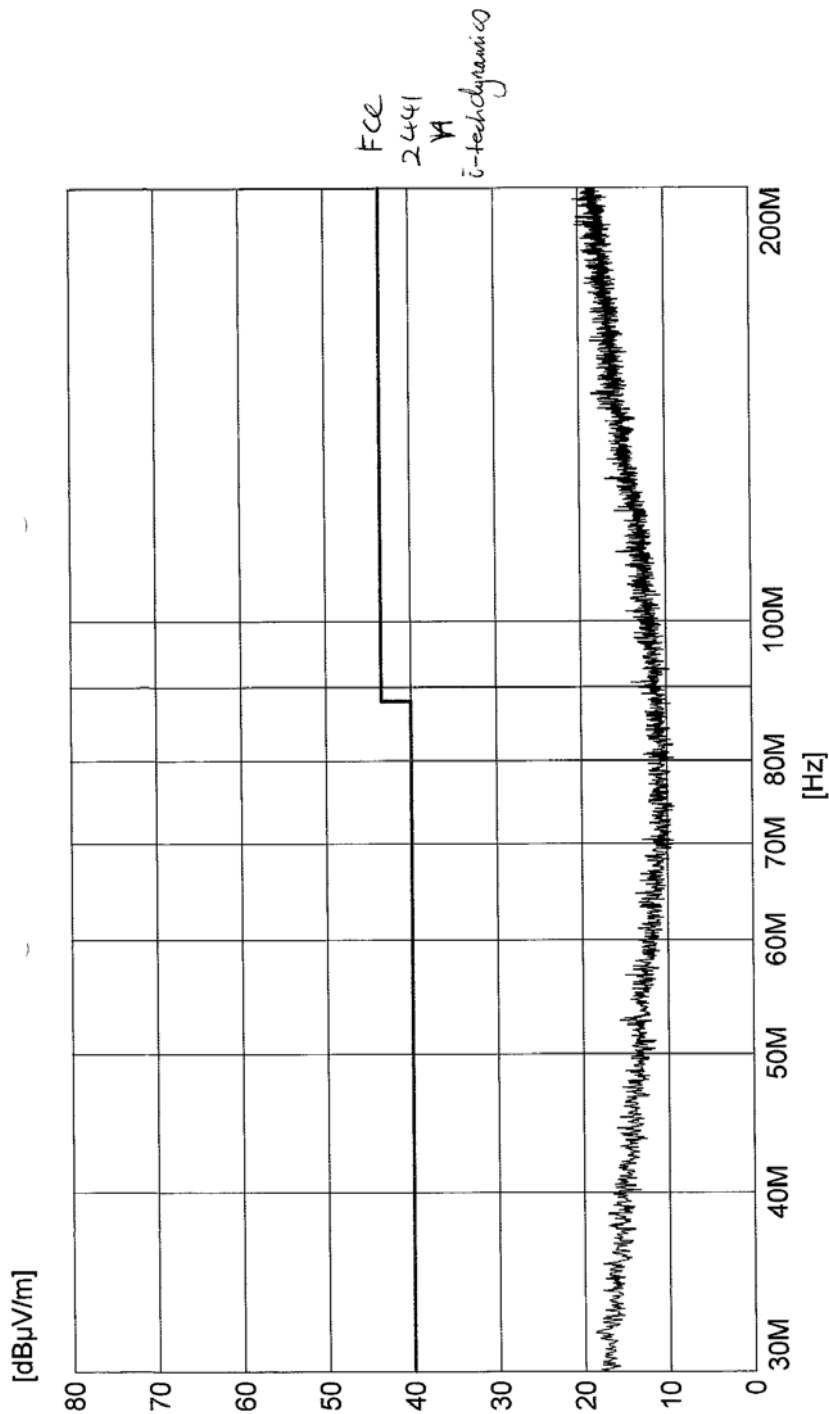


MES 06236A38.PK
LIM FCC P15.247 (USA)

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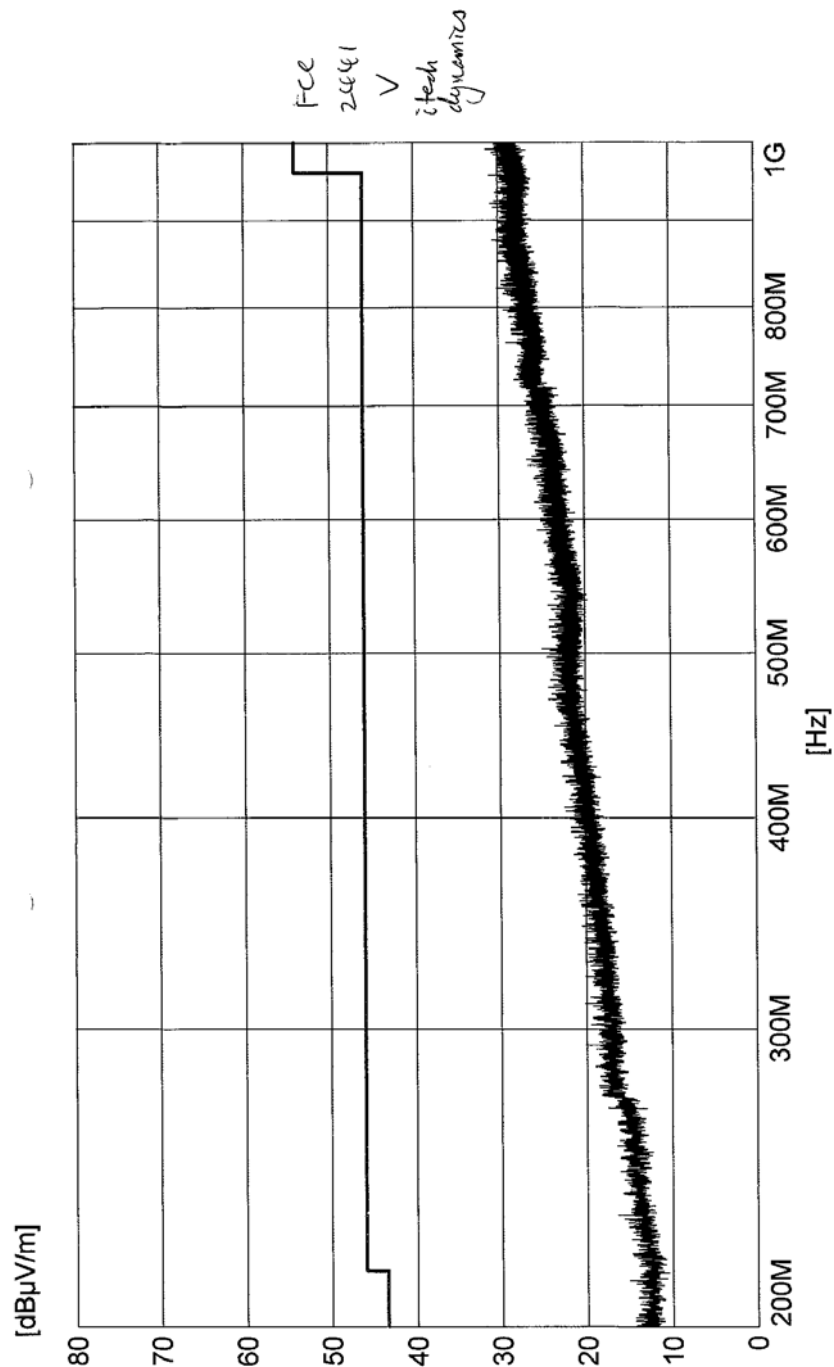
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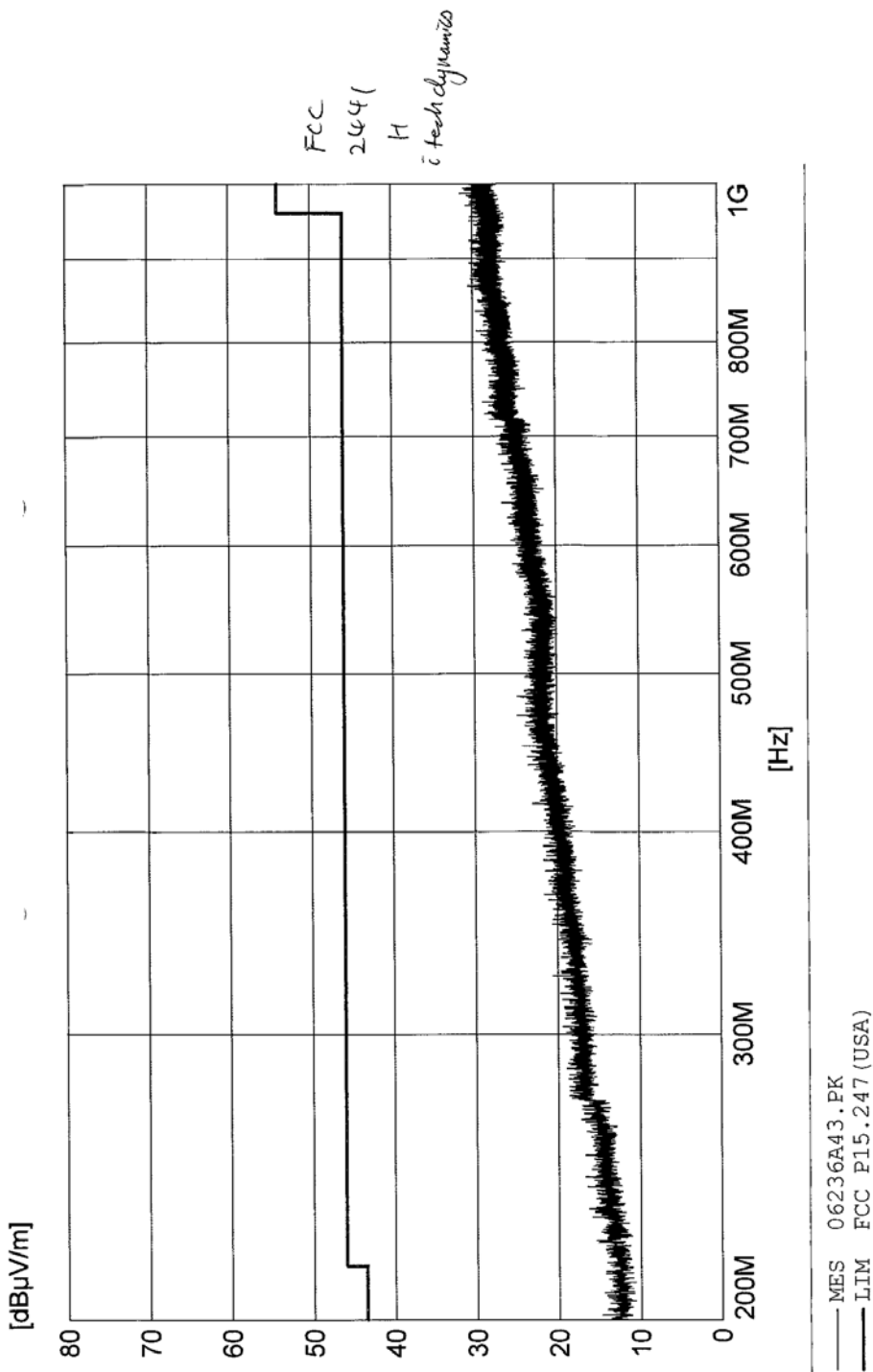
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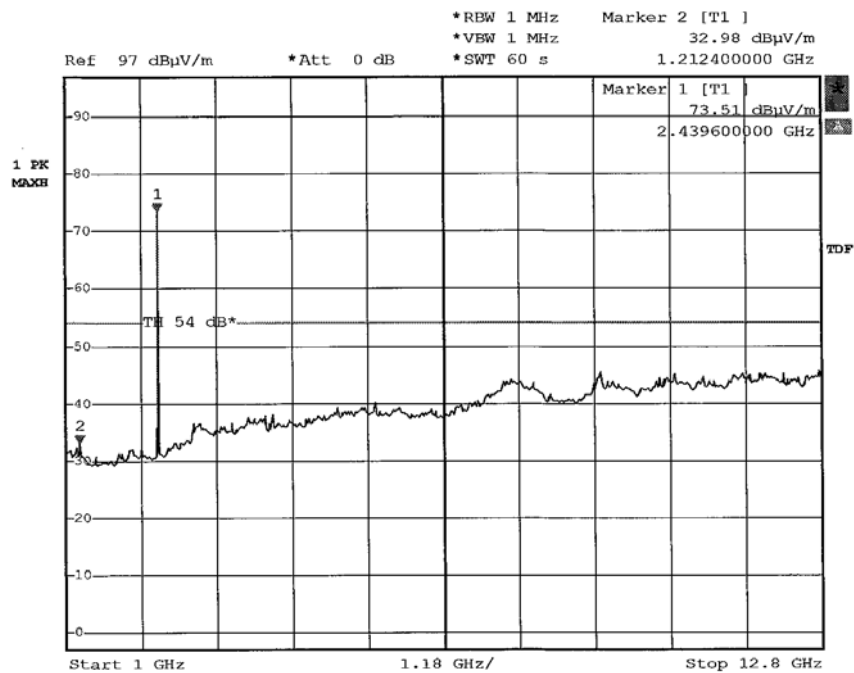
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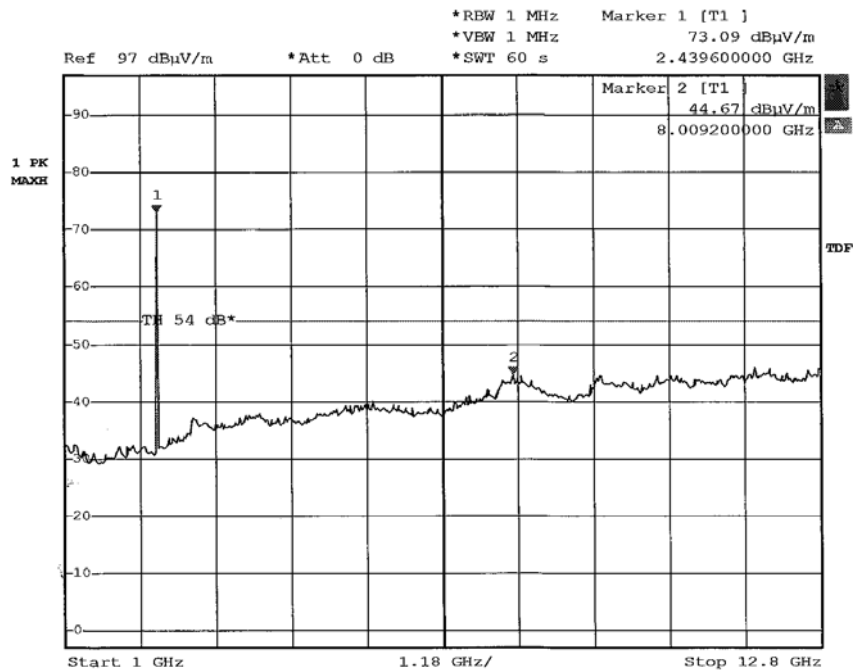
Date: 30.JUL.2003 21:29:24

FCC
 2441
 V
 i-tech dynamics

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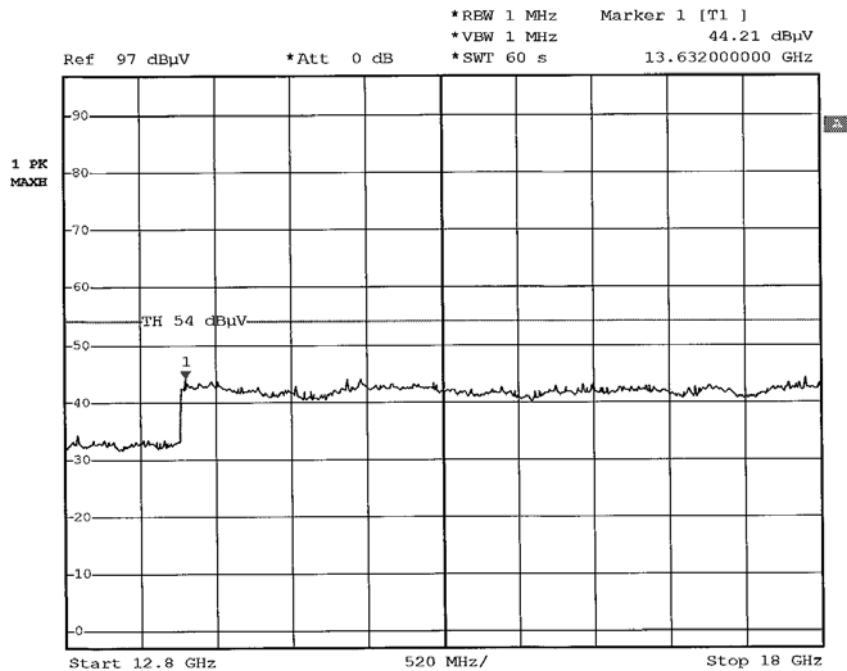
Date: 30.JUL.2003 21:28:06

FCC
 2441
 H
 eTech dynamics

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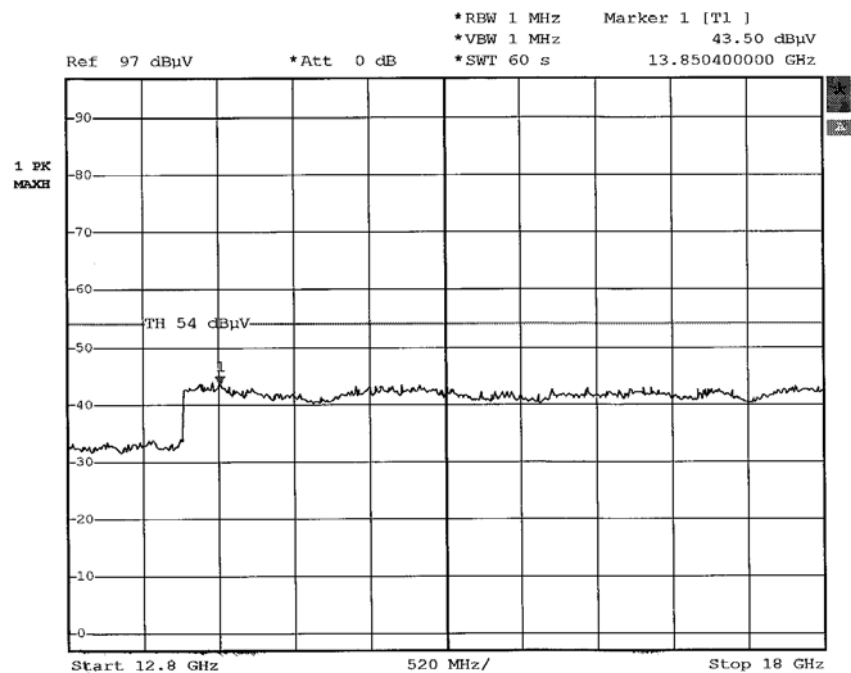
Date: 30.JUL.2003 21:46:11

FCC
2441
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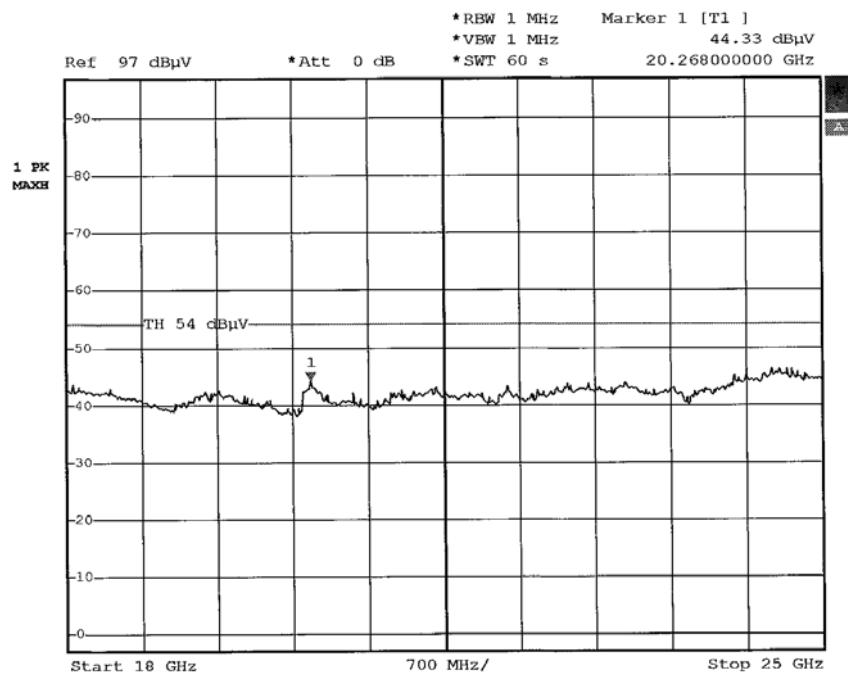
Date: 30.JUL.2003 21:43:52

fcc
 2441
 H
 iTech dynamics

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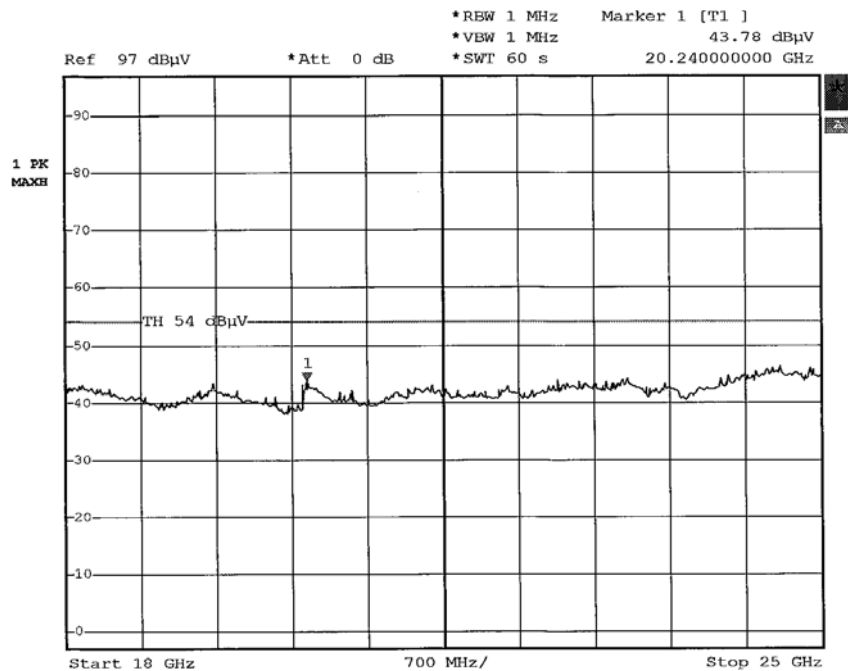
Date: 30.JUL.2003 22:06:32

FCC
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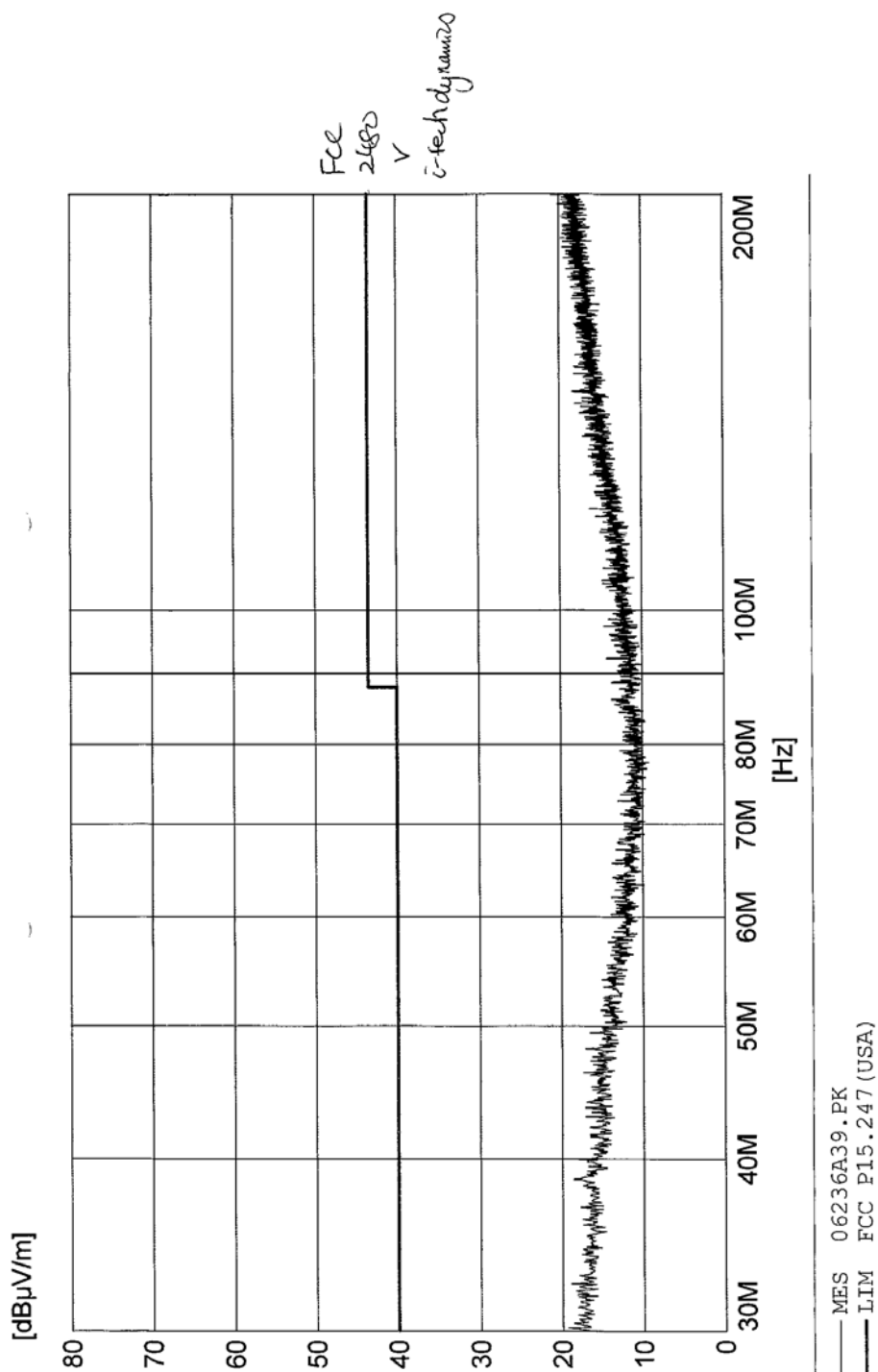
Date: 30.JUL.2003 22:07:46

fcc
2441
H
i tech dynamics

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 Test Report No.

14004640 001

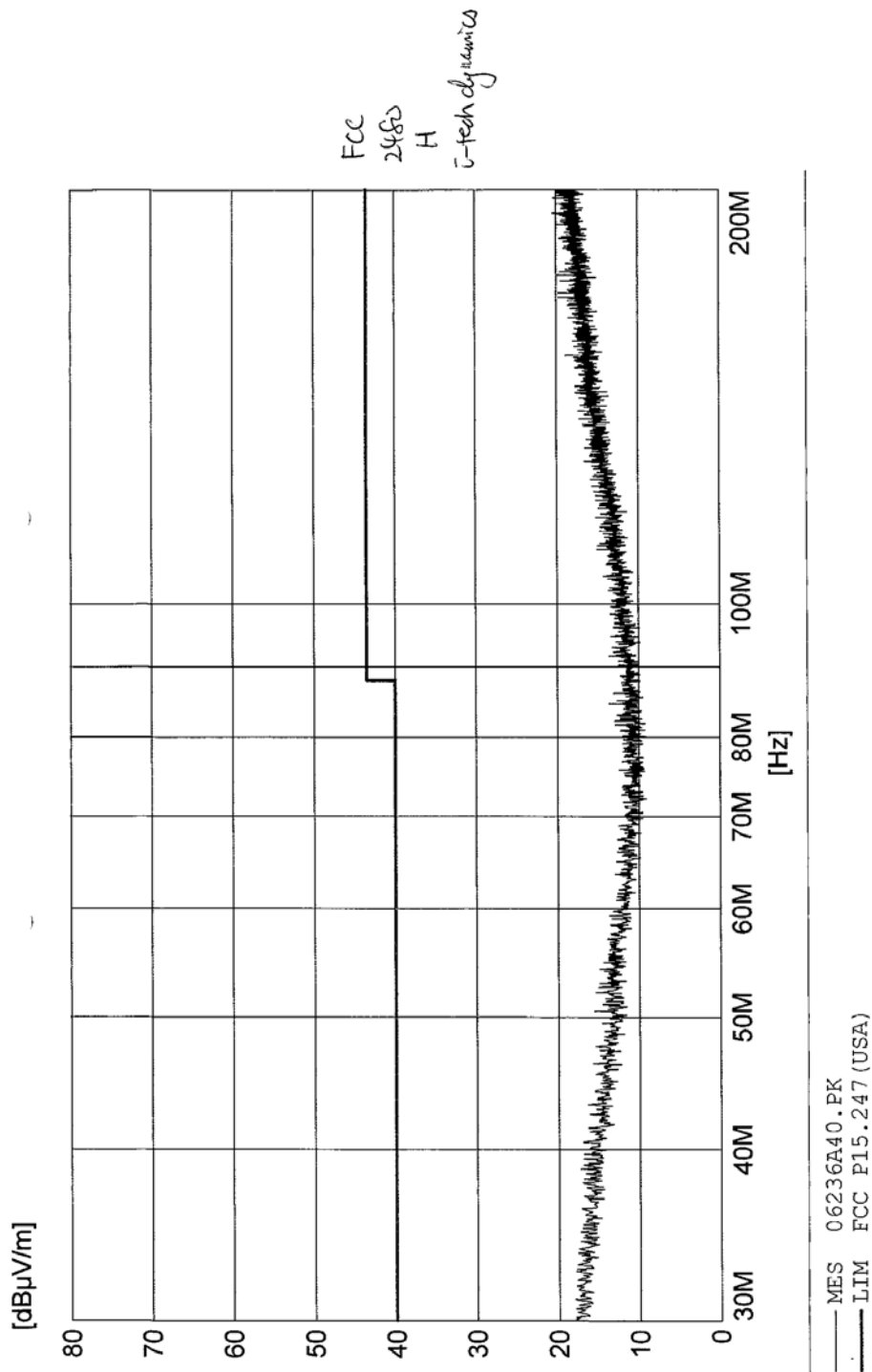
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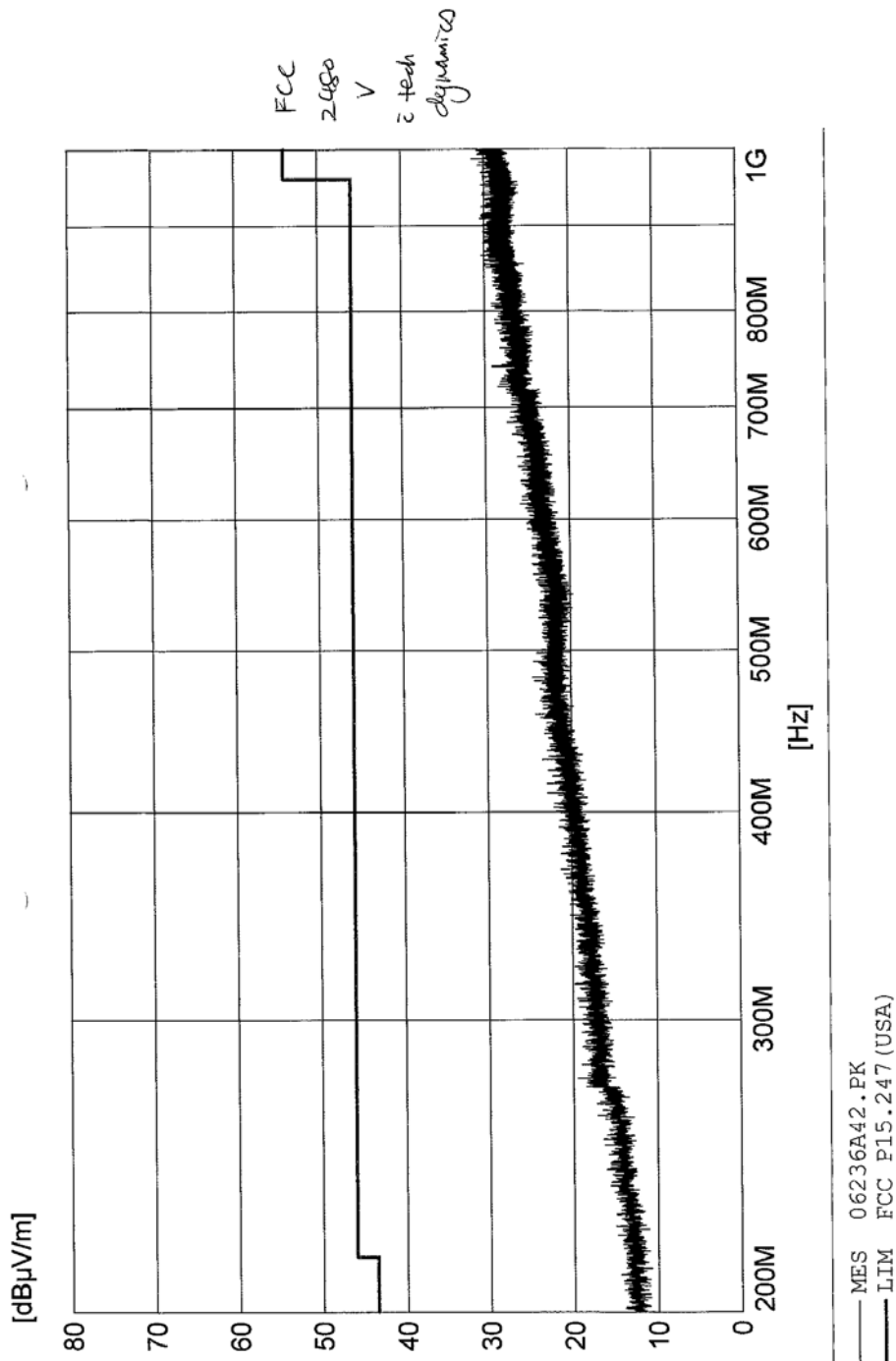
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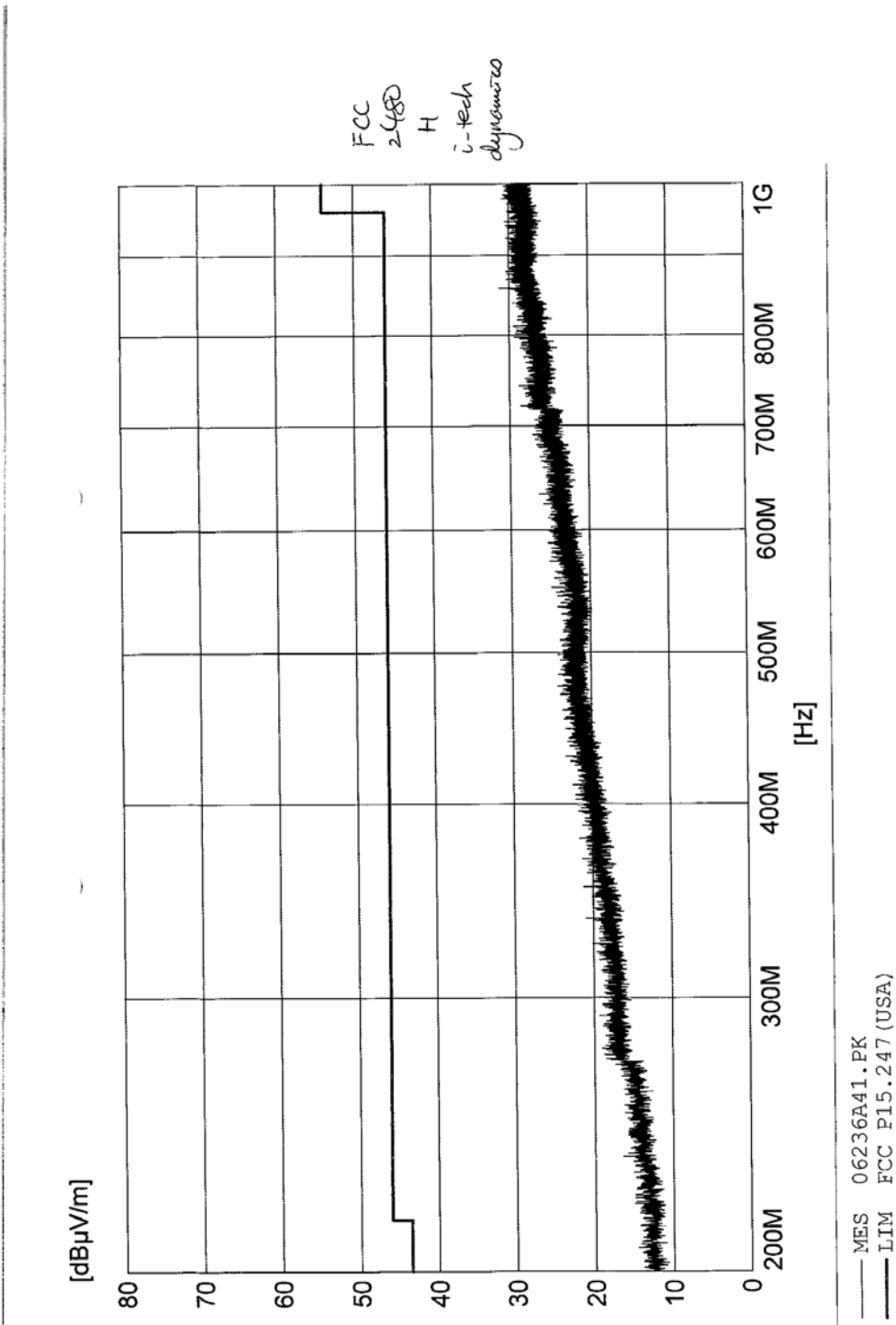
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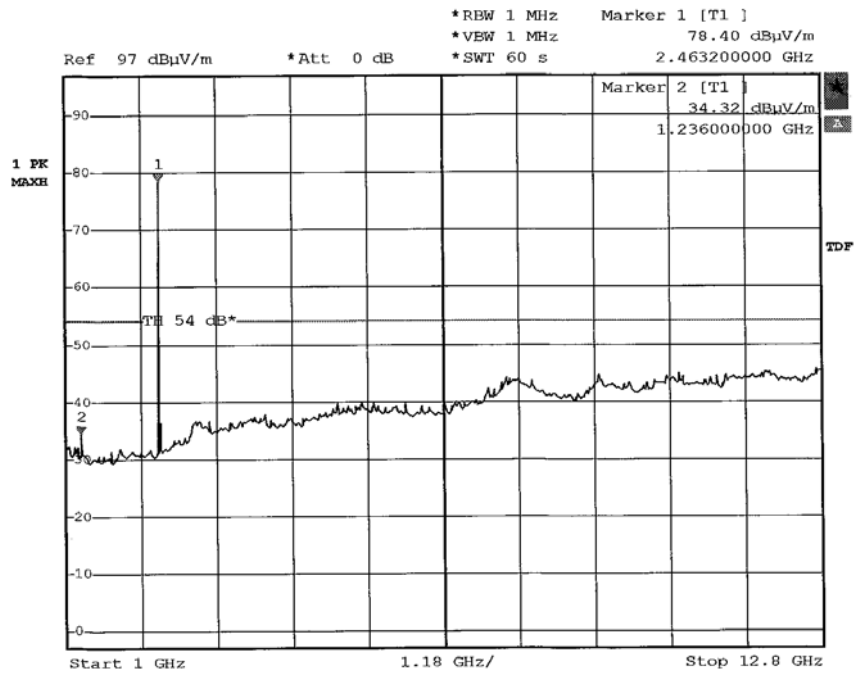
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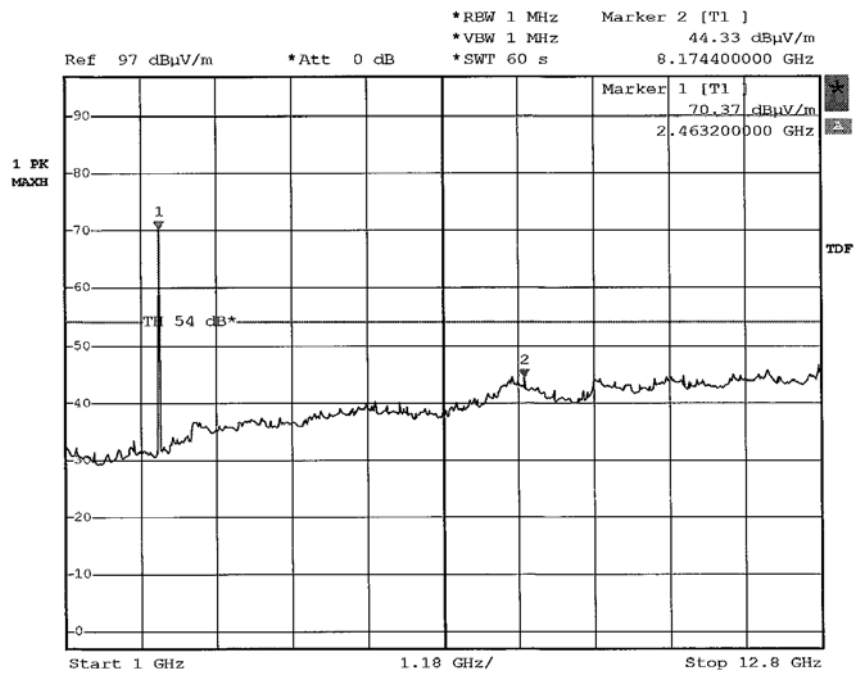
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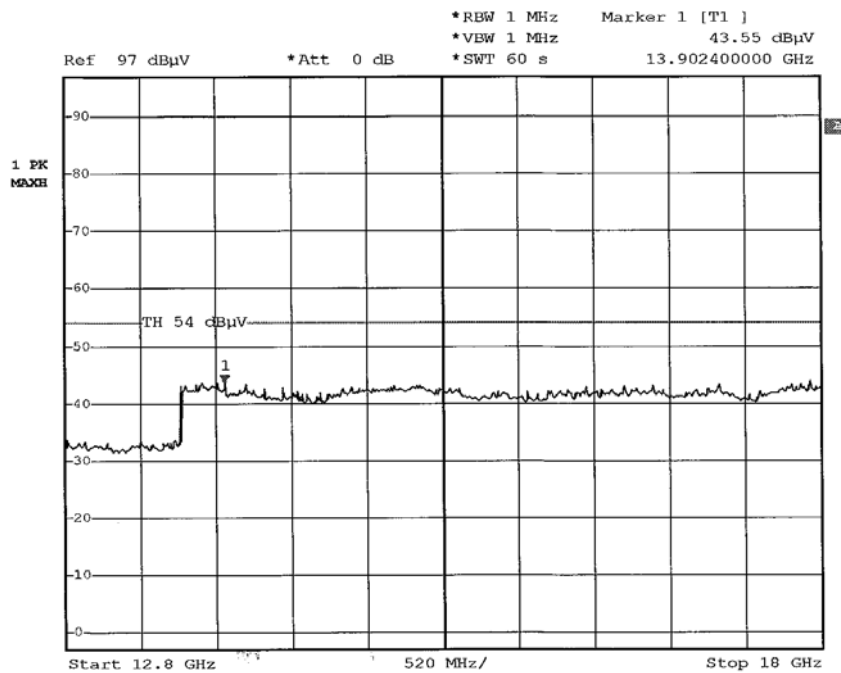
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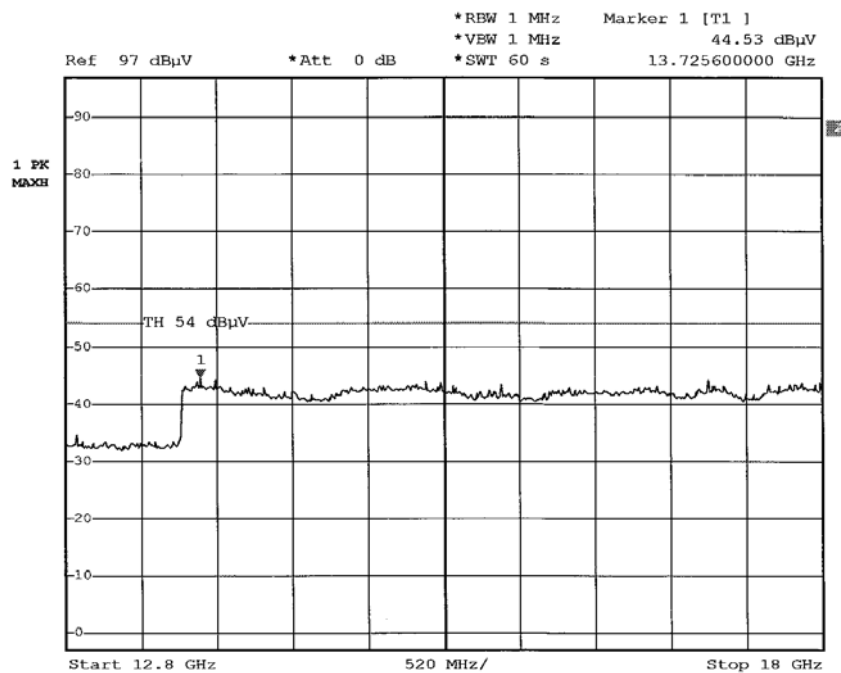
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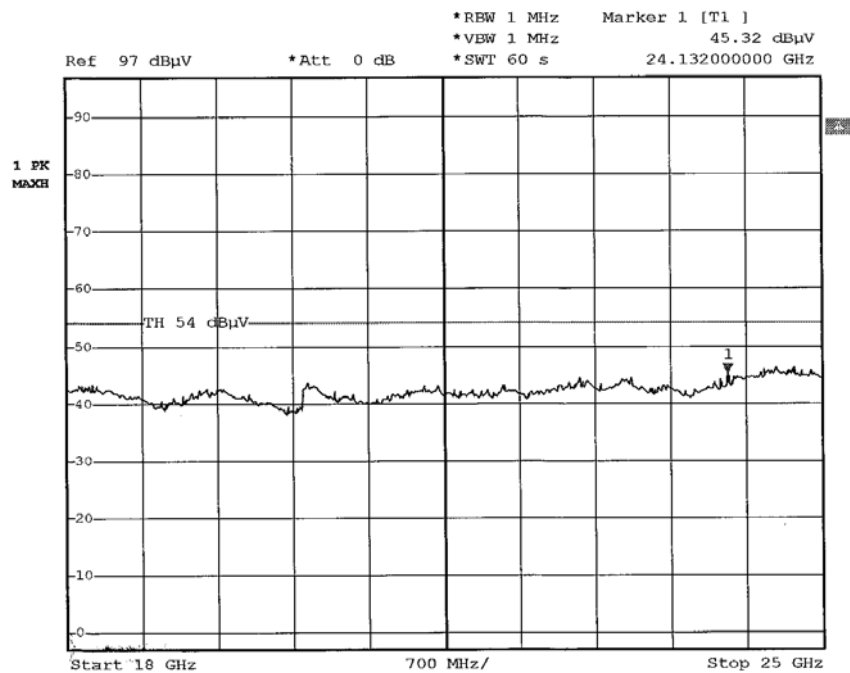
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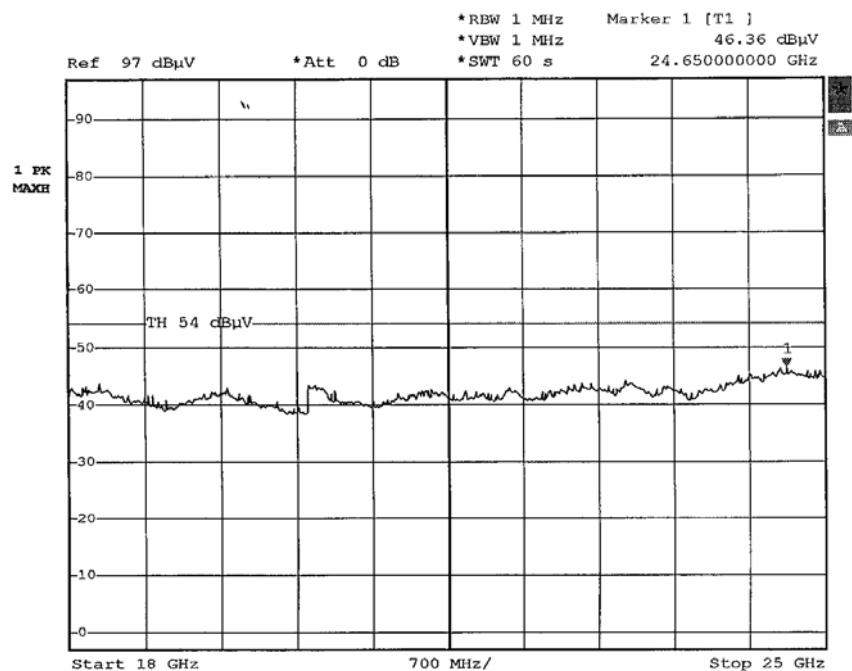
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Date: 30.JUL.2003 22:10:26

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