

Prüfbericht - Nr.:

14005409 001

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Test Report No.

Auftraggeber:

Canhold International Ltd.

Client:

Flat 4, 13/F, Block 4, Tai Ping Industrial Centre

51A Ting Kok Road

Tai Po, N.T.

Hong Kong

Gegenstand der Prüfung:

Plug-in Bluetooth Handsfree Car Kit

Test item:

Bezeichnung: HF0081

Serien-Nr.:

Engineering sample

Identification: FCCID: RRS0081

Serial No.

Wareneingangs-Nr.: 040211010

Eingangsdatum: 11.02.2004

Receipt No.:

Date of receipt:

Prüfart:

Refer to section 4.1

Testing location:

Prüfgrundlage:

FCC Part 15, Subpart C

Test specification:

ANSI C63.4-2001

CISPR 22:1997

Prüfergebnis:

Der vorstehend beschriebene Prüfgegenstand wurde geprüft und entspricht oben genannter Prüfgrundlage.

Test Result

The a. m. test item passed.

geprüft / tested by:

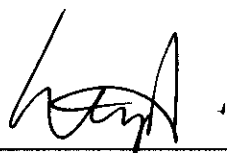
kontrolliert / reviewed by

Hugo Wan

Thomas Berns

25.02.2004

Datum
Date



Unterschrift
Signature

25.02.2004

Datum
Date



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, Schematics and User Manual

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 Plug-in Bluetooth Handsfree Car Kit based on the Bluetooth 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	: Inverted F type antenna	Inverted F type antenna
Power supply	: 12V DC from car battery	12V DC from car battery

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 product did not test with any additional accessory.

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 an Inverted F type antenna soldered to the circuit board. The antenna gain is 0dBi.

7.1.3 Disturbance voltage on AC mains

Subclause 15.207(a)

RESULT:

N/A

The EUT does not have AC mains port for power supply connection. This test case is not applicable.

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)
Port of testing	:	Temporary antenna port
Detector	:	PK
RBW/VBW	:	100kHz/300kHz
Supply voltage	:	12VDC from AC/DC adapter
Temperature	:	21°C
Humidity	:	60%

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

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 (Hopping on)
Port of testing	:	Temporary antenna port
Detector	:	PK
RBW/VBW	:	1MHz/3MHz
Supply voltage	:	12VDC from AC/DC adapter
Temperature	:	21°C
Humidity	:	60%

The screenshot in Appendix1 P.3 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 26 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:
 $0.4 \times 32 = 12.8s$

Limit calculation:
 $26 \times 2.936 \times 10^{-3} = 76.34 \times 10^{-3} s$
 $\leq 400 \times 10^{-3} s$

For test results please refer to Appendix 1, page 2-3.

Limit

Subclause15.247(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)
Port of testing	:	Temporary antenna port
Detector	:	PK
RBW/VBW	:	30kHz/100kHz
Supply voltage	:	12VDC from AC/DC adapter
Temperature	:	21°C
Humidity	:	60%

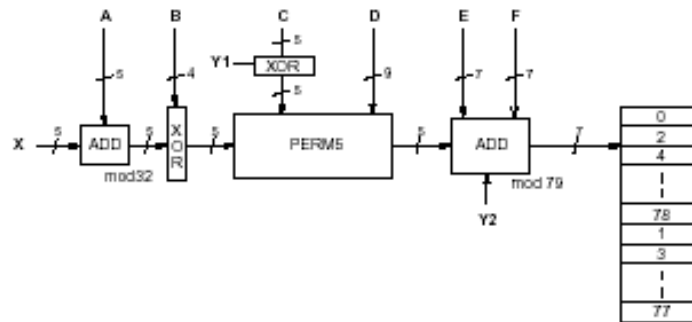
Tx frequency (MHz)	Δf_L (MHz)	Δf_H (MHz)	$ \Delta f_H + \Delta f_L $ (MHz)
2402	-0.464	0.488	0.952
2441	-0.456	0.484	0.940
2480	-0.464	0.480	0.944

For test results, please refer to Appendix 1, page 4-6.

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)
 Port of testing : Temporary antenna port
 Detector : PK
 RBW/VBW : 1MHz/3MHz
 Supply voltage : 12VDC from AC/DC adapter
 Temperature : 21°C
 Humidity : 60%

Frequency (MHz)	Maximum peak output power (dBm)	Cable attenuation (dB)	Actual value (dBm)
2402	-3.46	4.30	0.84
2441	-4.05	4.15	0.10
2480	-4.37	4.50	0.13

All three transmit frequency modes comply with the maximum peak output power limit.
 For test results refer to Appendix 1, page 7-9

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)
Port of testing	:	Temporary antenna port
Detector	:	PK
RBW/VBW	:	300kHz/1.0MHz
Supply voltage	:	12VDC from AC/DC adapter
Temperature	:	21°C
Humidity	:	60%

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 10-12.

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)
 Port of testing : Temporary antenna port
 Detector : PK
 RBW/VBW : 100kHz/300kHz
 Supply voltage : 12VDC from AC/DC adapter
 Temperature : 21°C
 Humidity : 60%

Operating frequency : 2402MHz

Spurious Frequency (MHz)	Power level (dBm)	Reference value (dBm)	Delta to reference level (dB)
No Peak Found	-	-	-

Operating frequency : 2441MHz

Spurious Frequency (MHz)	Power level (dBm)	Reference value (dBm)	Delta to reference level (dB)
No Peak Found	-	-	-

Operating frequency : 2480MHz

Spurious Frequency (MHz)	Power level (dBm)	Reference value (dBm)	Delta to reference level (dB)
No Peak Found	-	-	-

All three transmit frequency modes comply with the 20dB limit stated in subclause 15.247(c).
 For test results refer to Appendix 1, page 13-22.

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 - 2001
Mode of operation : Tx mode (2402MHz, 2441MHz, 2480MHz)
Port of testing : Enclosure
Measurement Location: 10m Semi Anechoic Chamber
Measurement Distance: 3m
Measurement BW : 1 MHz
Supply voltage : 12VDC from car battery

Tx frequency 2402MHz, Polarization Vertical

Freq	Reading	AF	Cable att.	Pre -amp	Filter att.	Level	Limit/ Detector
MHz	dBuV	dB(1/m)	dB	dB	dB	dBuV/m	dBuV/m
32.000	4.40	17.30	0.30	-	-	22.00	43.5 / QP
128.000	11.20	13.00	0.90	-	-	25.10	43.5 / QP
262.160	18.60	11.50	1.10	-	-	31.20	43.5 / QP
1201.540	54.68	24.40	1.52	37.10	1.87	45.37	54.0 / A
4804.020	45.49	33.40	3.53	32.87	0.33	49.88	54.0 / A

Tx frequency 2402MHz, Polarization Horizontal

Freq	Reading	AF	Cable att.	Pre -amp	Filter att.	Level	Limit/ Detector
MHz	dBuV	dB(1/m)	dB	dB	dB	dBuV/m	dBuV/m
111.980	9.30	11.60	0.80	-	-	21.70	43.5 / QP
208.003	17.30	10.20	1.10	-	-	28.60	43.5 / QP
1201.500	48.47	24.40	1.52	37.10	1.87	39.16	54.0 / A
4803.900	42.84	33.40	3.53	32.87	0.33	47.23	54.0 / A

Tx frequency 2441MHz, Polarization Vertical

Freq	Reading	AF	Cable att.	Pre -amp	Filter att.	Level	Limit/ Detector
MHz	dBuV	dB(1/m)	dB	dB	dB	dBuV/m	dBuV/m
128.000	10.70	13.00	0.90	-	-	24.60	43.5 / QP
176.000	2.90	15.60	1.00	-	-	19.50	43.5 / QP
262.150	18.80	11.50	1.10	-	-	31.40	43.5 / QP
1220.940	55.59	24.40	1.52	37.10	1.87	46.28	54.0 / A
4882.000	47.14	33.40	3.53	32.87	0.33	51.53	54.0 / A

Tx frequency 2441MHz, Polarization Horizontal

Freq	Reading	AF	Cable att.	Pre -amp	Filter att.	Level	Limit/ Detector
MHz	dBuV	dB(1/m)	dB	dB	dB	dBuV/m	dBuV/m
112.000	8.90	11.60	0.80	-	-	21.30	43.5 / QP
160.040	4.70	14.70	0.90	-	-	20.30	43.5 / QP
208.001	15.80	10.20	1.10	-	-	27.10	43.5 / QP

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1221.020	55.50	24.40	1.52	37.10	1.87	46.19	54.0 / A
4882.020	46.51	33.40	3.53	32.87	0.33	50.90	54.0 / A

Tx frequency 2480MHz, Polarization Vertical

Freq	Reading	AF	Cable att.	Pre -amp	Filter att.	Level	Limit/ Detector
MHz	dBuV	dB(1/m)	dB	dB	dB	dBuV/m	dBuV/m
112.000	9.20	11.60	0.80	-	-	21.60	43.5 / QP
175.997	2.70	15.60	1.00	-	-	19.30	43.5 / QP
208.000	14.50	10.20	1.10	-	-	25.80	43.5 / QP
262.160	19.20	11.50	1.10	-	-	31.80	43.5 / QP
1240.480	51.60	24.40	1.52	37.10	1.87	42.30	54.0 / A
4959.800	47.39	33.40	3.53	32.87	0.33	51.78	54.0 / A

Tx frequency 2480MHz, Polarization Horizontal

Freq	Reading	AF	Cable att.	Pre -amp	Filter att.	Level	Limit/ Detector
MHz	dBuV	dB(1/m)	dB	dB	dB	dBuV/m	dBuV/m
175.994	0.90	15.60	1.00	-	-	17.50	43.5 / QP
208.000	16.20	10.20	1.10	-	-	27.50	43.5 / QP
4959.700	40.76	33.40	3.53	32.87	0.33	45.15	54.0 / A

All three transmit frequency modes comply with the field strength within the restricted bands.
For test results refer to Appendix 1, page 23-64.

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 (dBμV/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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Carrier Frequency Separation

Date: 17 Feb 2003
 EUT: HF0081
 Company: Canhold International Ltd.
 Humidity: 60%
 Temperature: 21°C
 Voltage supply: 12VDC from AC/DC adapter
 Test by: Hugo Wan
 Op. mode: Hopping on

Reference frequency (MHz)
2441.000

Channel Separation (MHz)
0.990

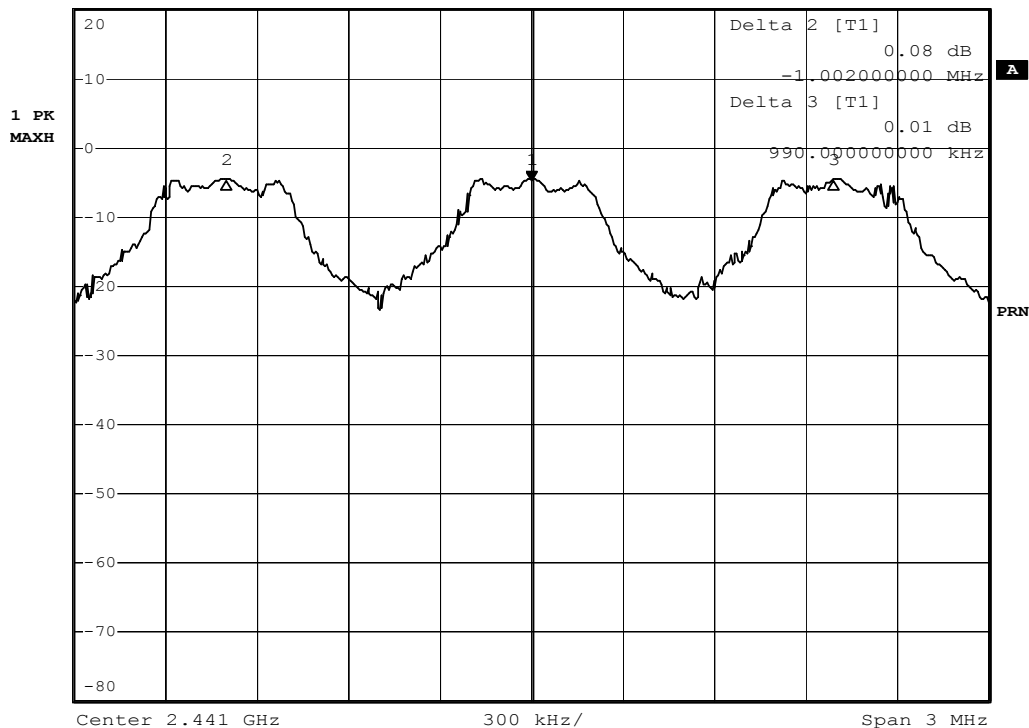


*RBW 100 kHz Marker 1 [T1]
 *VBW 300 kHz -4.62 dBm
 SWT 2.5 ms 2.441000000 GHz

Ref 20 dBm

*Att 30 dB

2.441000000 GHz



Date: 17.FEB.2004 09:51:40

Prüfbericht - Nr.:
 Test Report No.

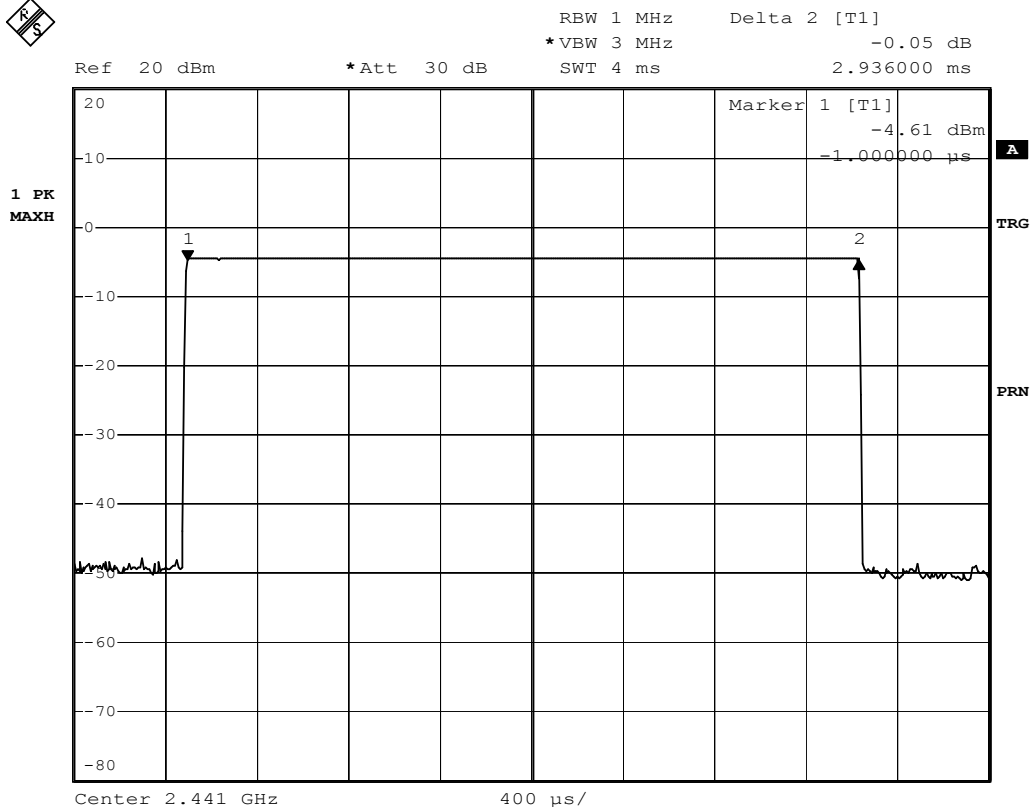
14005409 001

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Dwell Time

Date: 17 Feb 2003
 EUT: HF0081
 Company: Canhold International Ltd.
 Humidity: 60%
 Temperature: 21°C
 Voltage supply: 12VDC from AC/DC adapter
 Test by: Hugo Wan
 Op. mode: Hopping on

Burst Duration (ms)	Number of hopping	Time of occupancy (s)	Results
2.936	26	$0.002936 \times 26 =$ 0.07634	Pass

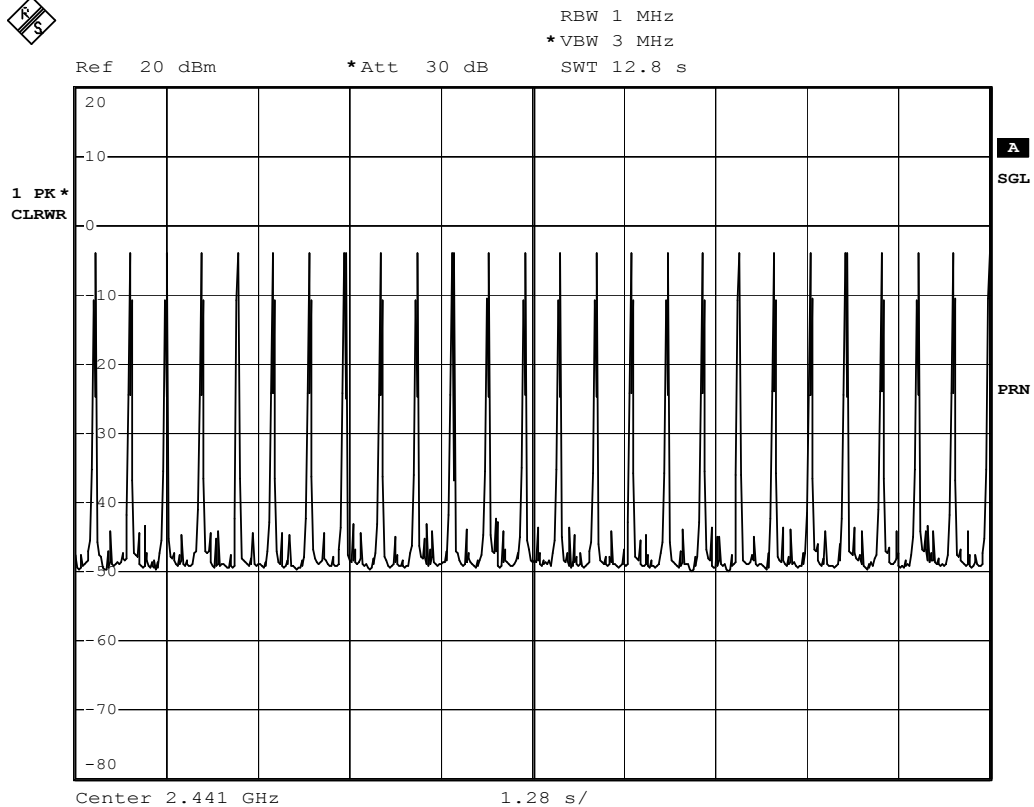


Date: 17.FEB.2004 10:01:43

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Date: 17.FEB.2004 10:06:13

Prüfbericht - Nr.:
 Test Report No.

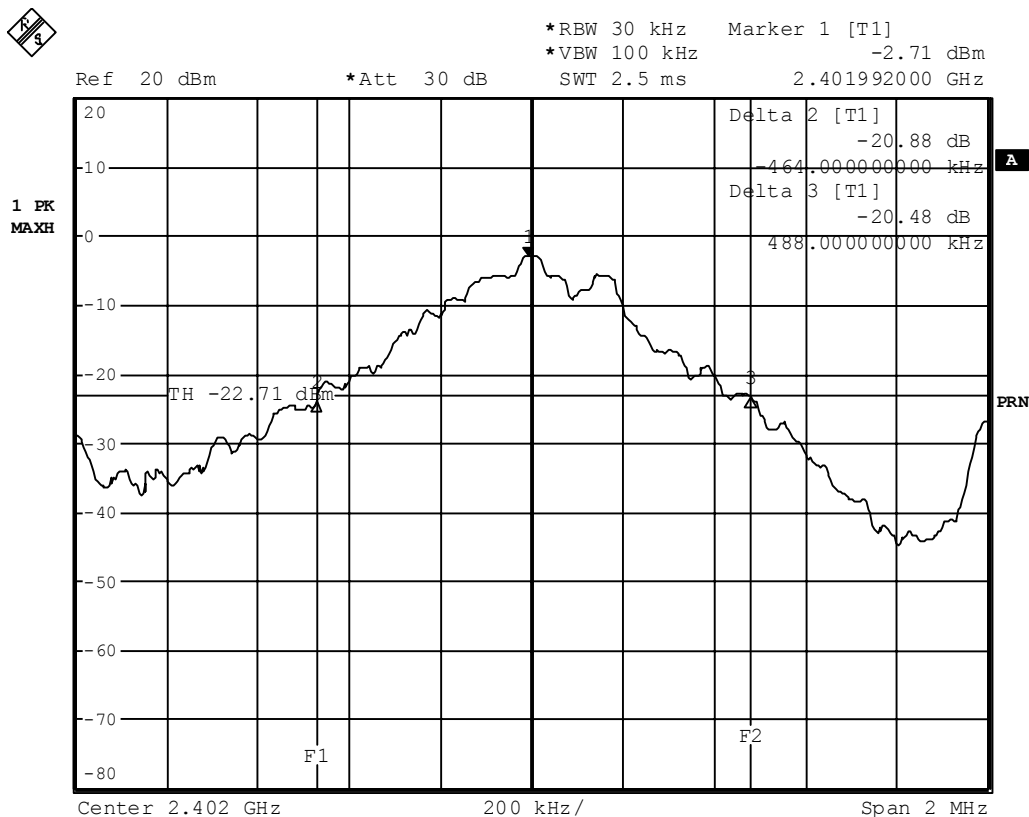
14005409 001

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20dB Bandwidth

Date: 17 Feb 2003
 EUT: HF0081
 Company: Canhold International Ltd.
 Humidity: 60%
 Temperature: 21°C
 Voltage supply: 12VDC from AC/DC adapter
 Test by: Hugo Wan
 Op. mode: TX mode

Tx frequency (MHz)	Δf_L (MHz)	Δf_H (MHz)	$ \Delta f_H + \Delta f_L $ (MHz)	Results
2402	-0.464	0.488	0.952	Pass
2441	-0.456	0.484	0.940	Pass
2480	-0.464	0.480	0.944	Pass



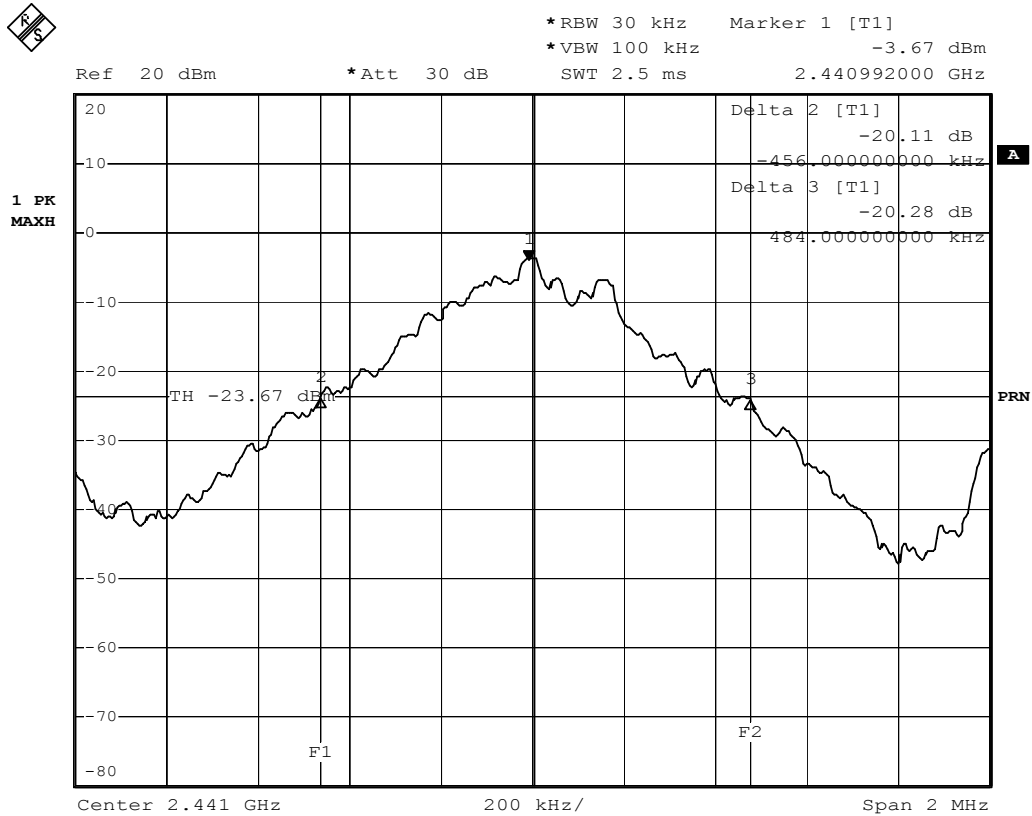
Date: 17.FEB.2004 10:17:12

Tx frequency: 2402MHz

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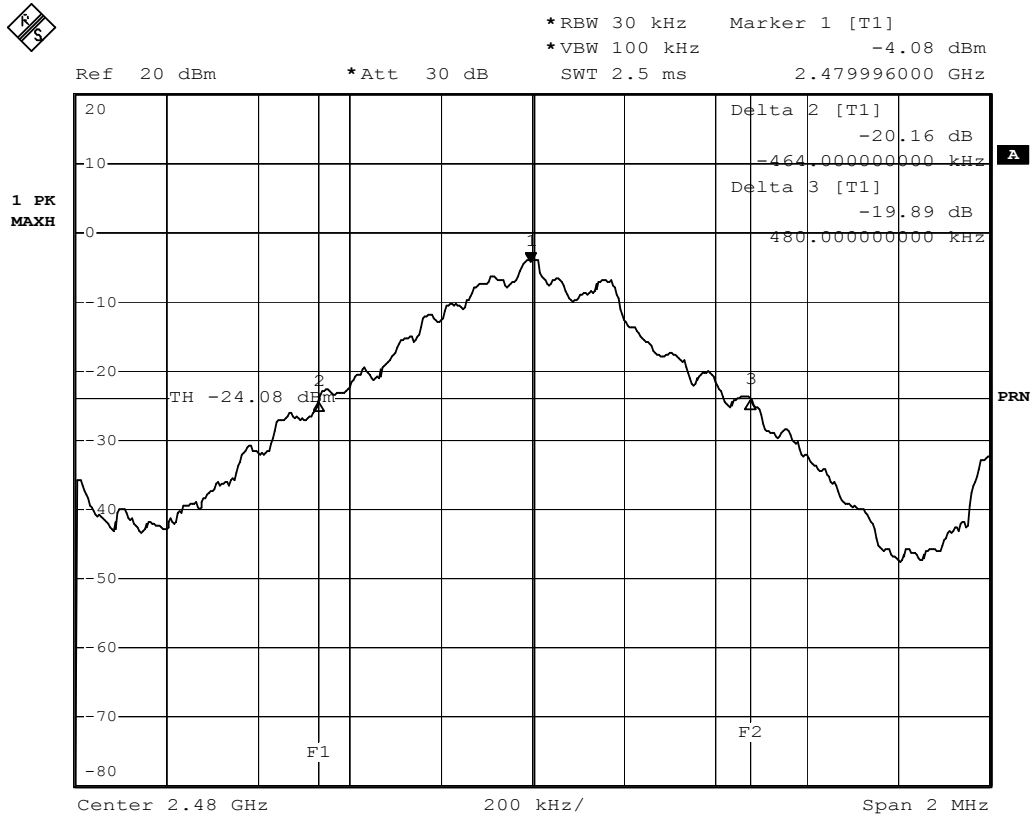
Date: 17.FEB.2004 10:19:40

Tx frequency: 2441MHz

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Date: 17.FEB.2004 10:22:51

Tx frequency: 2480MHz

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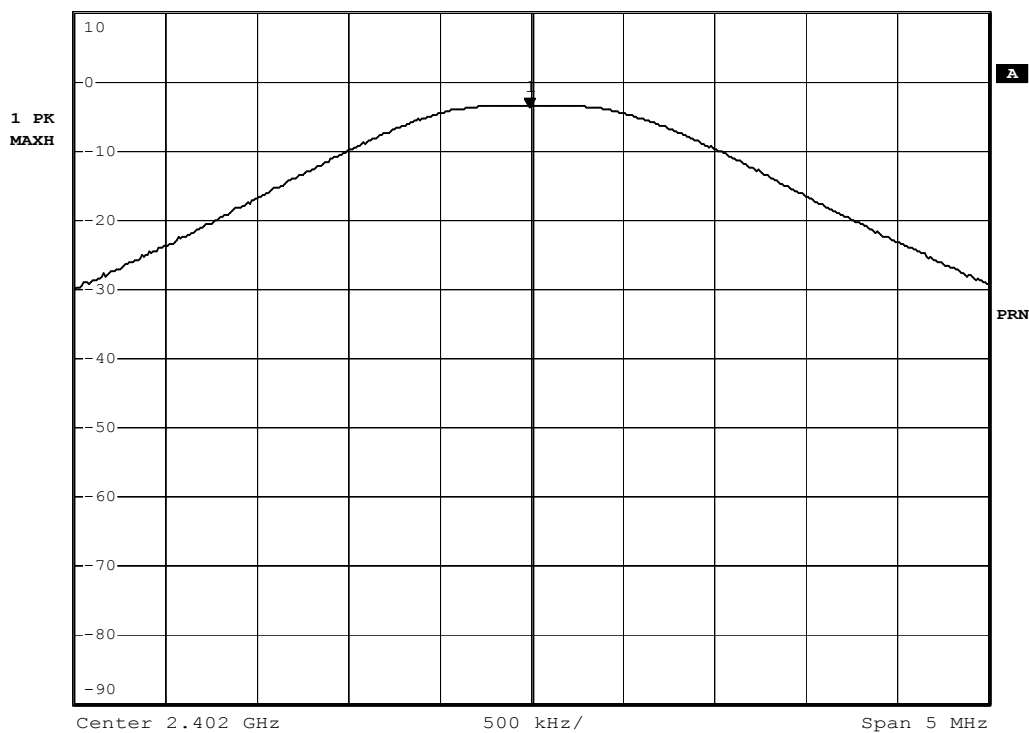
Peak Output Power

Date: 17 Feb 2003
 EUT: HF0081
 Company: Canhold International Ltd.
 Humidity: 60%
 Temperature: 21°C
 Voltage supply: 12VDC from AC/DC adapter
 Test by: Hugo Wan
 Op. mode: TX mode

Tx Frequency (MHz)	Cable Attenuation (dB)	Power P _{PK} (dBm)	Actual Peak Power (dBm)	Results
2402	4.30	-3.46	0.84	Pass
2441	4.15	-4.05	0.10	Pass
2480	4.50	-4.37	0.13	Pass



*RBW 1 MHz Marker 1 [T1]
 *VBW 3 MHz -3.46 dBm
 Ref 10 dBm *Att 30 dB SWT 2.5 ms 2.401990000 GHz



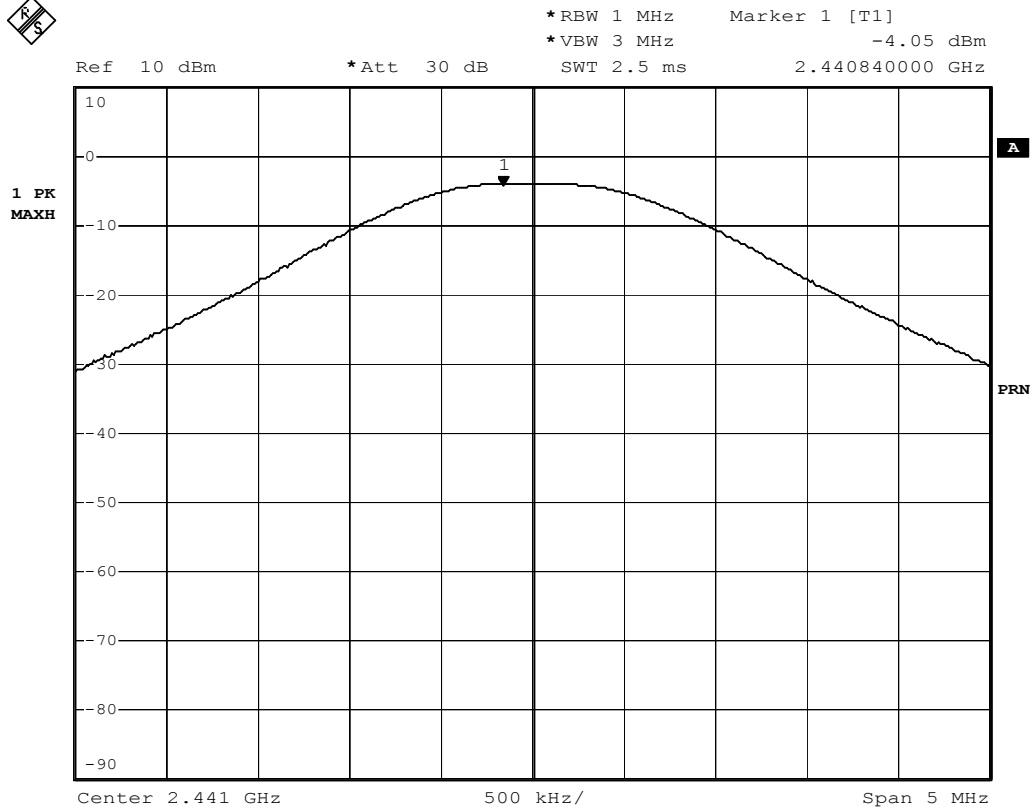
Date: 17.FEB.2004 10:29:52

Tx frequency: 2402MHz

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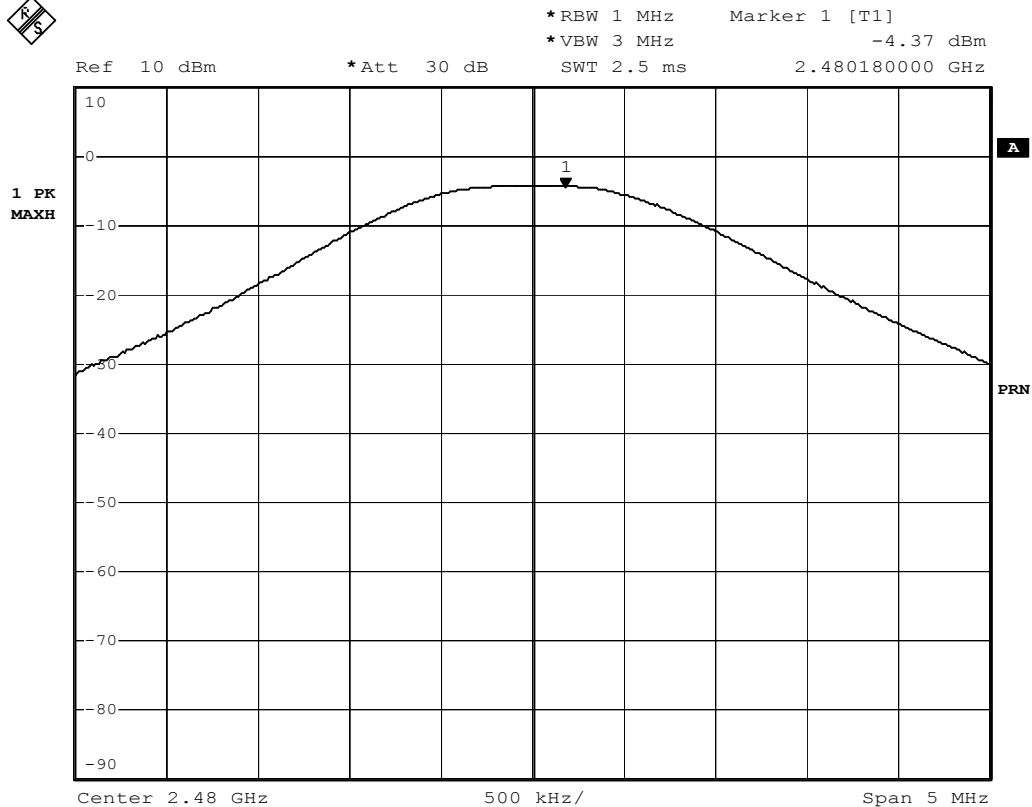
Date: 17.FEB.2004 10:28:25

Tx frequency: 2441MHz

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Date: 17.FEB.2004 10:27:15

Tx frequency: 2480MHz

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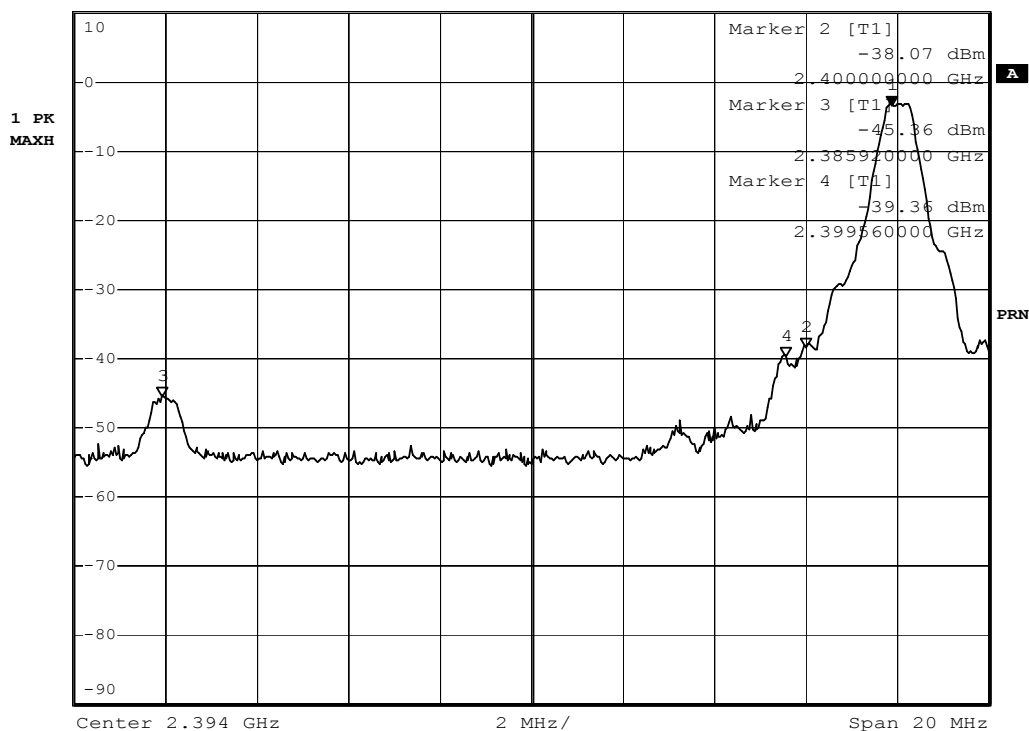
Band Edge Compliance

Date: 17 Feb 2003
 EUT: HF0081
 Company: Canhold International Ltd.
 Humidity: 60%
 Temperature: 21°C
 Voltage supply: 12VDC from AC/DC adapter
 Test by: Hugo Wan
 Op. mode: TX mode

Tx Frequency (MHz)	Peak in band Power level (dBm)	RF power outside 100kHz BW (dBm)	RF power difference outside 100kHz BW (dB)	Results
2402	-3.31	-45.36	-42.05	Pass
2480	-4.10	-47.23	-43.13	Pass



*RBW 300 kHz Marker 1 [T1]
 *VBW 1 MHz -3.31 dBm
 Ref 10 dBm *Att 30 dB SWT 2.5 ms 2.401880000 GHz



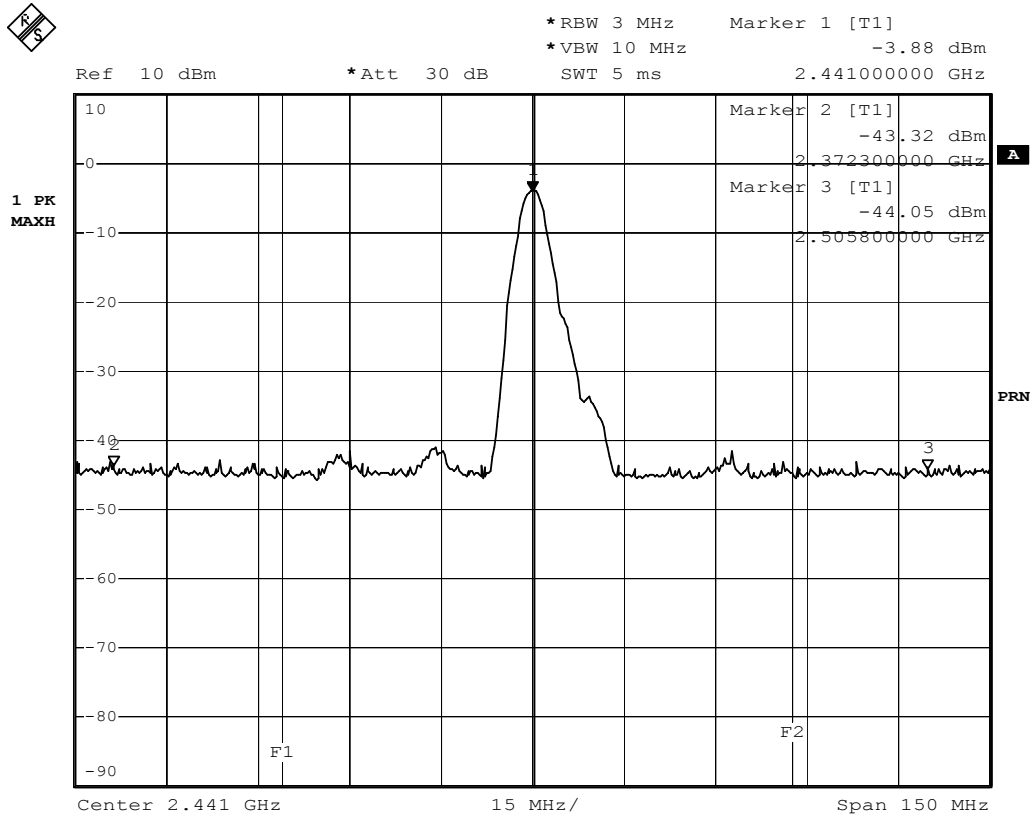
Date: 17.FEB.2004 10:33:42

Tx frequency: 2402MHz

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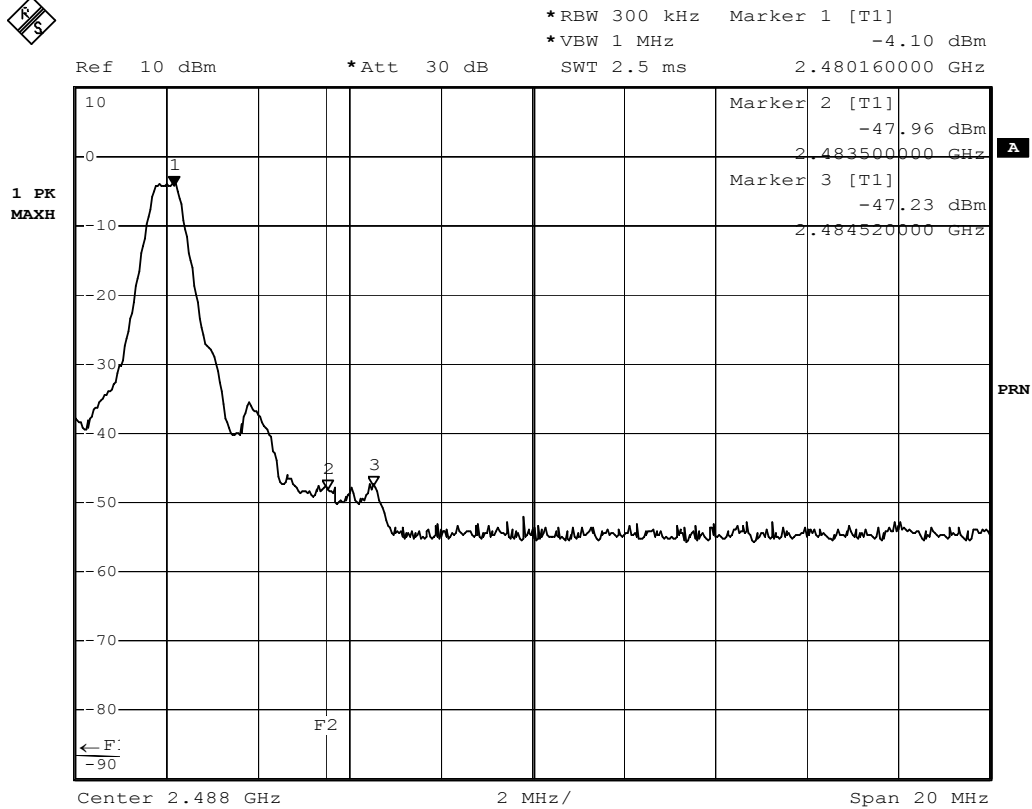
Date: 17.FEB.2004 10:37:34

Tx frequency: 2441MHz

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Date: 17.FEB.2004 10:35:15

Tx frequency: 2480MHz

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Test Report No.

Spurious Emissions - Conducted

Date: 17 Feb 2003

EUT: HF0081

Company: Canhold International Ltd.

Humidity: 60%

Temperature: 21°C

Voltage supply: 12VDC from AC/DC adapter

Test by: Hugo Wan

Op. mode: TX mode

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

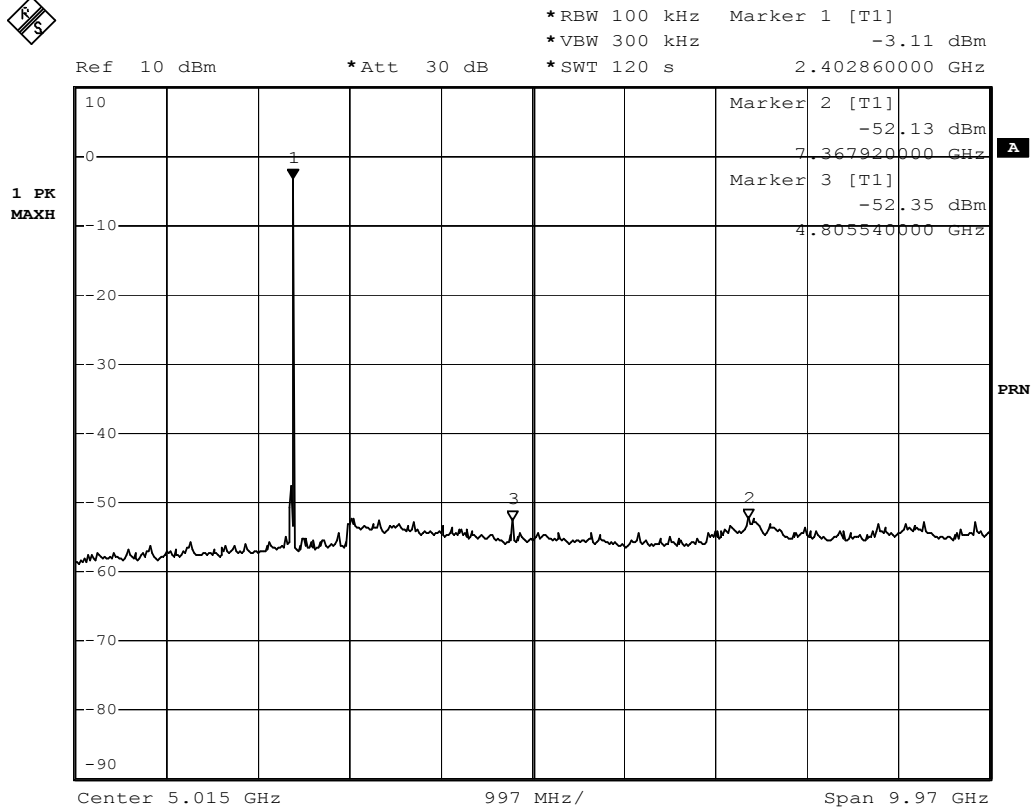
Tx frequency : 2480MHz

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

Prüfbericht - Nr.:
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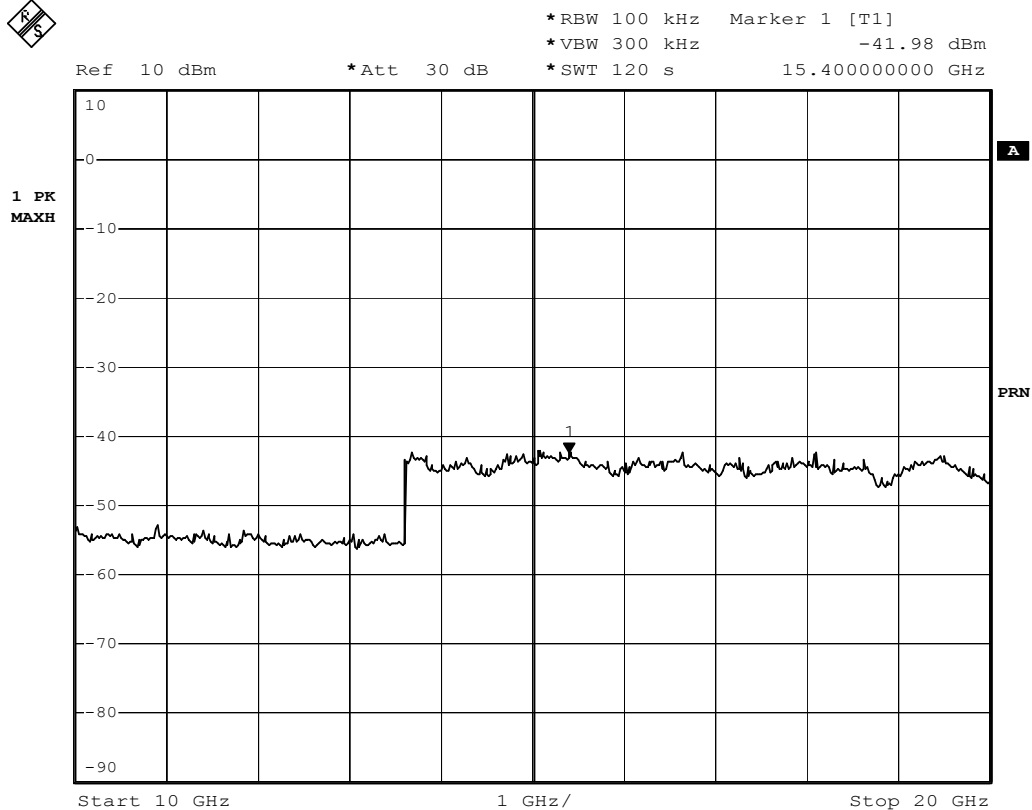
Date: 17.FEB.2004 10:51:24

Tx frequency: 2402MHz

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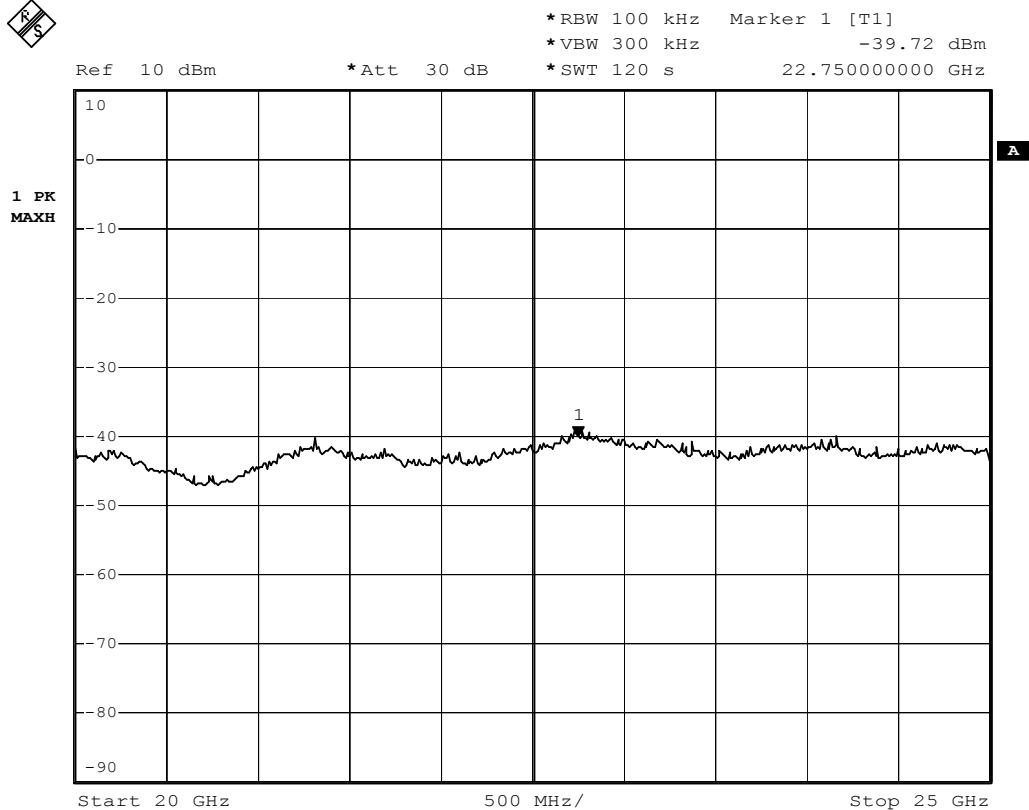
Date: 17.FEB.2004 10:54:59

Tx frequency: 2402MHz

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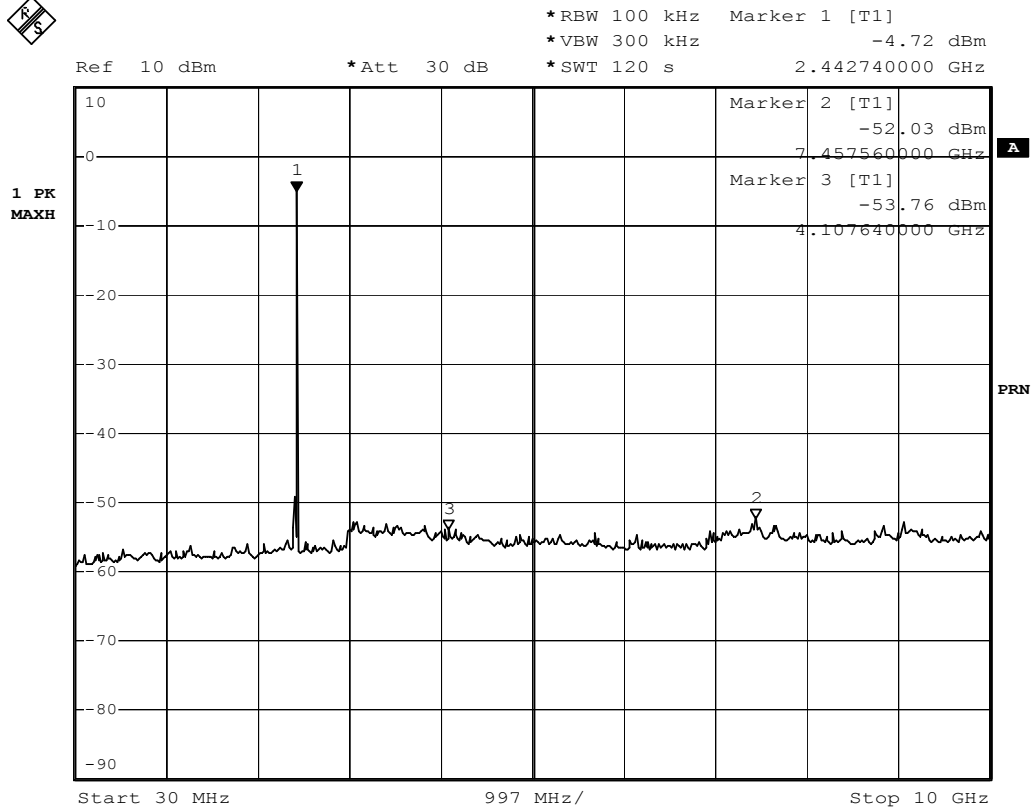
Date: 17.FEB.2004 11:04:26

Tx frequency: 2402MHz

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Date: 17.FEB.2004 12:03:06

Tx frequency: 2441MHz

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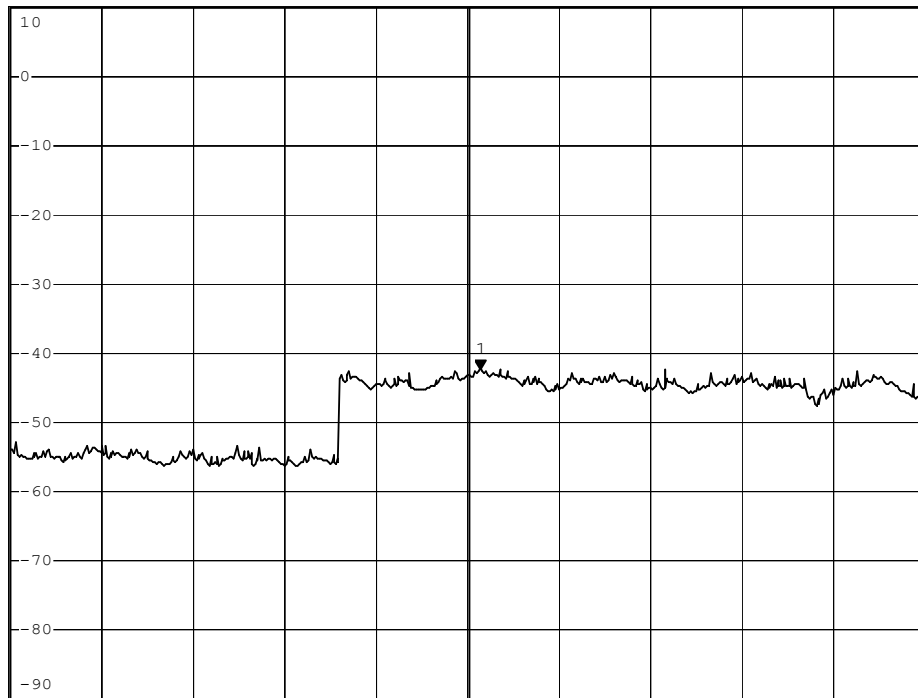


*RBW 100 kHz Marker 1 [T1]
*VBW 300 kHz -42.01 dBm
*SWT 120 s 15.140000000 GHz

Ref 10 dBm

*Att 30 dB

1 PK
MAXH



A

PRN

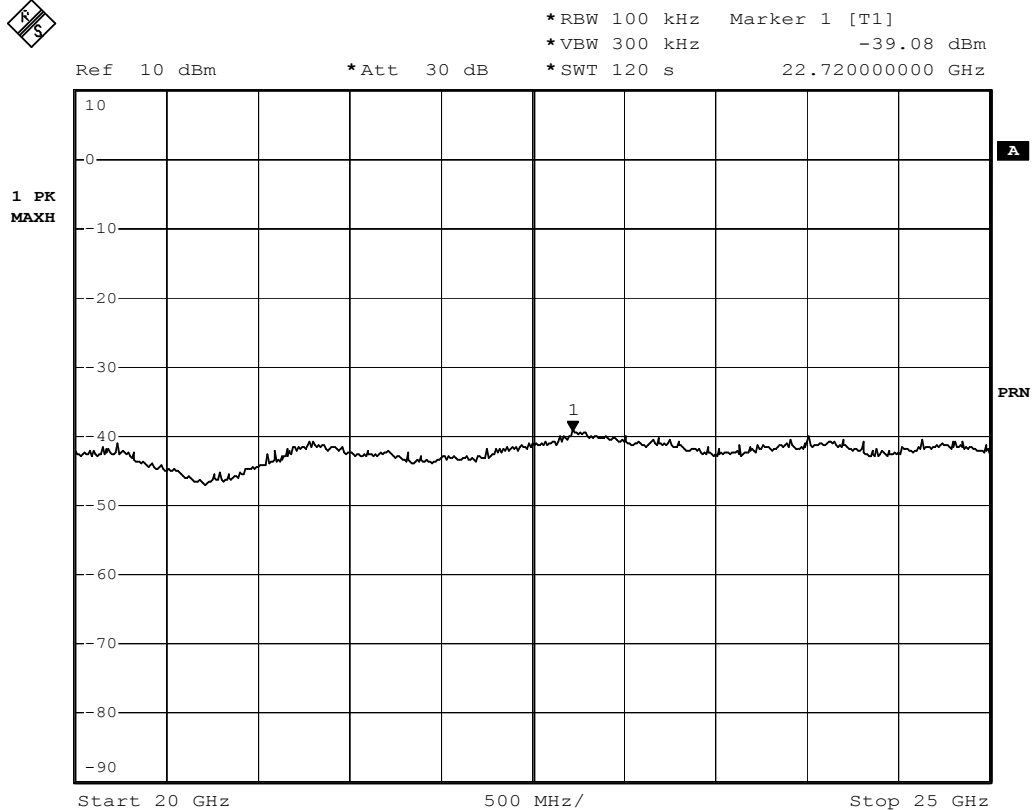
Date: 17.FEB.2004 11:11:44

Tx frequency: 2441MHz

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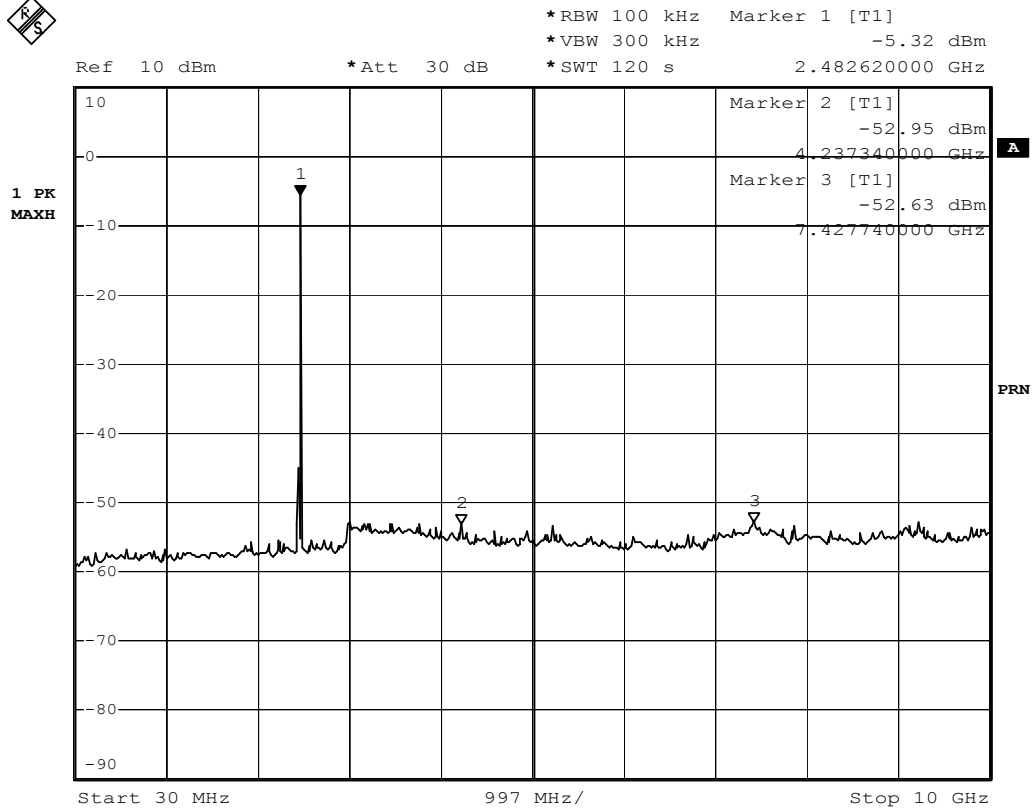
Date: 17.FEB.2004 11:43:08

Tx frequency: 2441MHz

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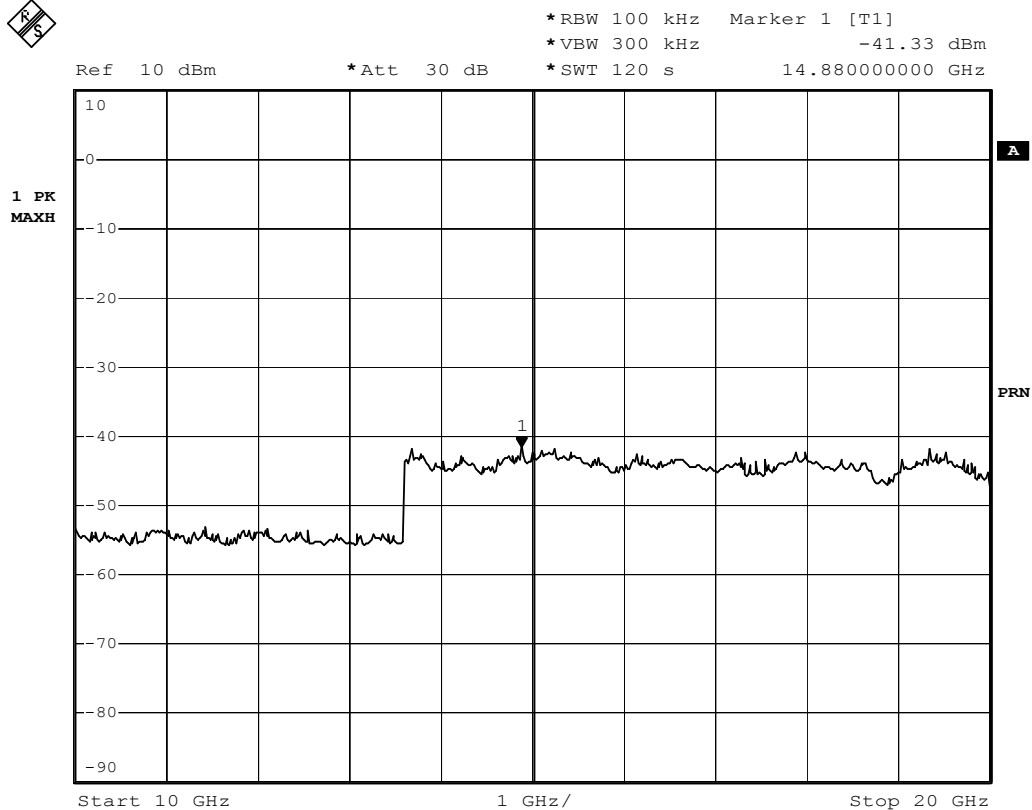
Date: 17.FEB.2004 11:57:44

Tx frequency: 2480MHz

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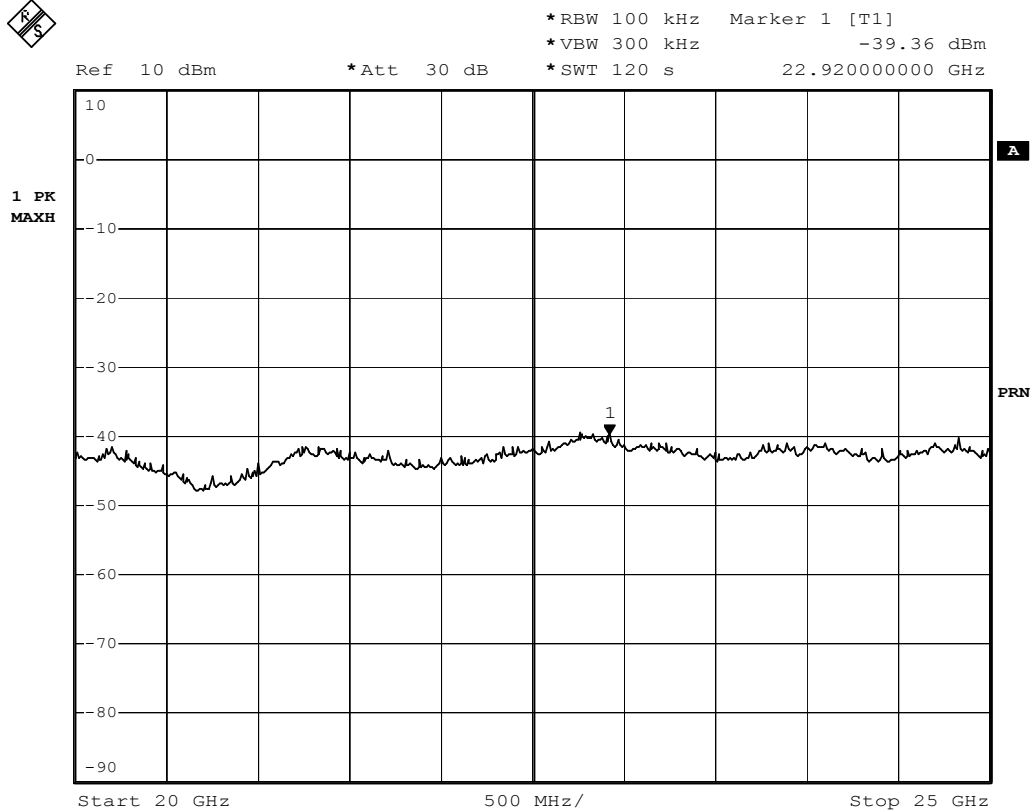
Date: 17.FEB.2004 11:52:37

Tx frequency: 2480MHz

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Date: 17.FEB.2004 11:47:51

Tx frequency: 2480MHz

Prüfbericht - Nr.:

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Test Report No.

Spurious Emissions - Radiated

Date: 23 Feb 2004

EUT: HF0081

Company: Canhold International Ltd.

Voltage supply: 12VDC from car battery

Humidity: 54%

Temperature: 22°C

Test by: Hugo Wan

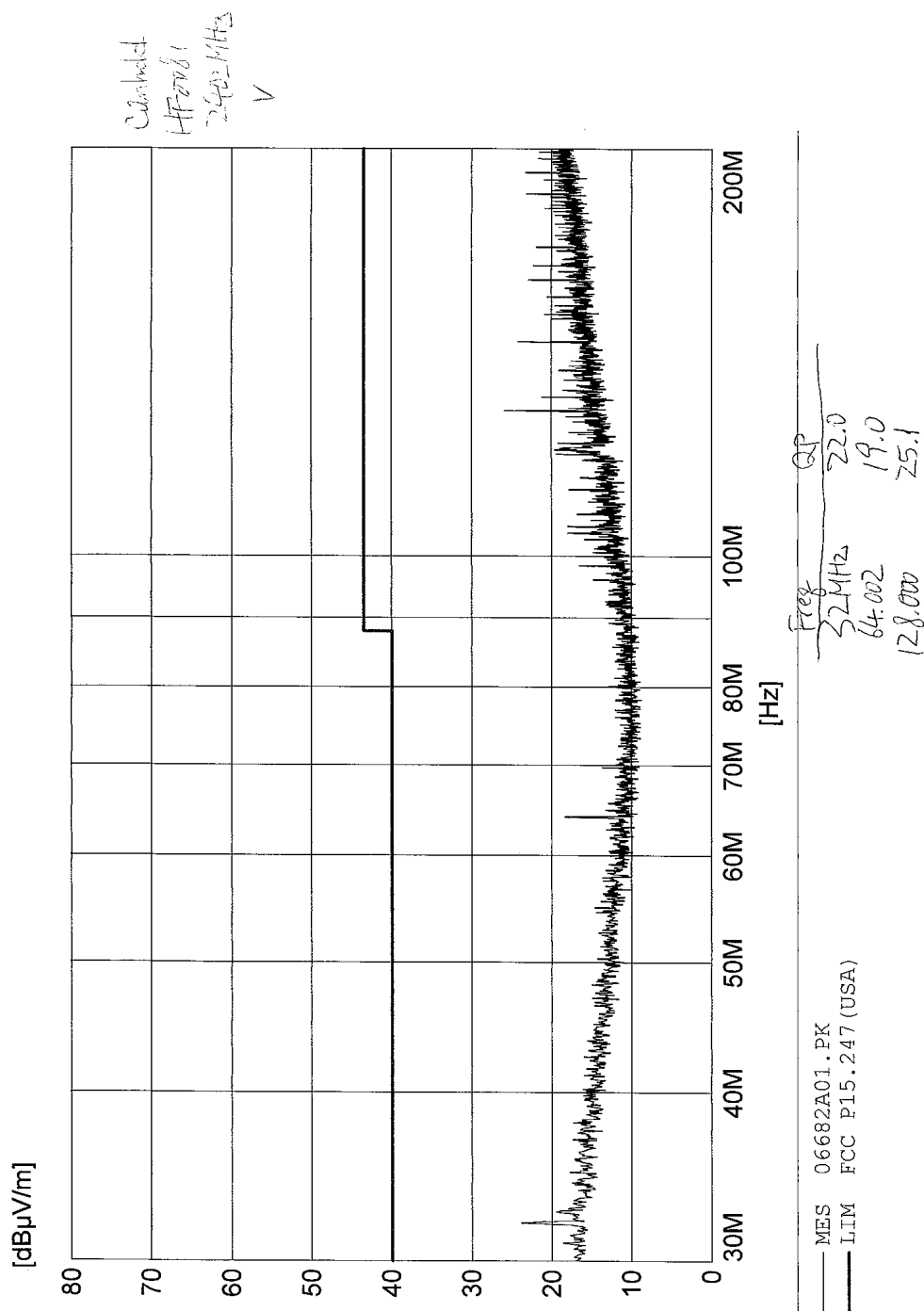
Op. mode: TX mode

Tx frequency (MHz)	Polarization	Spurious Frequency (MHz)	Power Level (dBuV/m)	Detector (P/QP/A)
2402	V	32.000	22.00	QP
2402	V	128.000	25.10	QP
2402	V	262.160	31.20	QP
2402	V	1201.540	45.37	A
2402	V	4804.020	49.88	A
2402	H	111.980	21.70	QP
2402	H	208.003	28.60	QP
2402	H	1201.500	39.16	A
2402	H	4803.900	47.23	A
Tx frequency (MHz)	Polarization	Spurious Frequency (MHz)	Power Level (dBuV/m)	Detector (P/QP/A)
2441	V	128.000	24.60	QP
2441	V	176.000	19.50	QP
2441	V	262.150	31.40	QP
2441	V	1220.940	46.28	A
2441	V	4882.000	51.53	A
2441	H	112.000	21.30	QP
2441	H	160.040	20.30	QP
2441	H	208.001	27.10	QP
2441	H	1221.020	46.19	A
2441	H	4882.020	50.90	A
Tx frequency (MHz)	Polarization	Spurious Frequency (MHz)	Power Level (dBuV/m)	Detector (P/QP/A)
2480	V	112.000	21.60	QP
2480	V	175.997	19.30	QP
2480	V	208.000	25.80	QP
2480	V	262.160	31.80	QP
2480	V	1240.480	42.30	A
2480	V	4959.800	51.78	A
2480	H	175.994	17.50	QP
2480	H	208.000	27.50	QP
2480	H	4959.700	45.15	A

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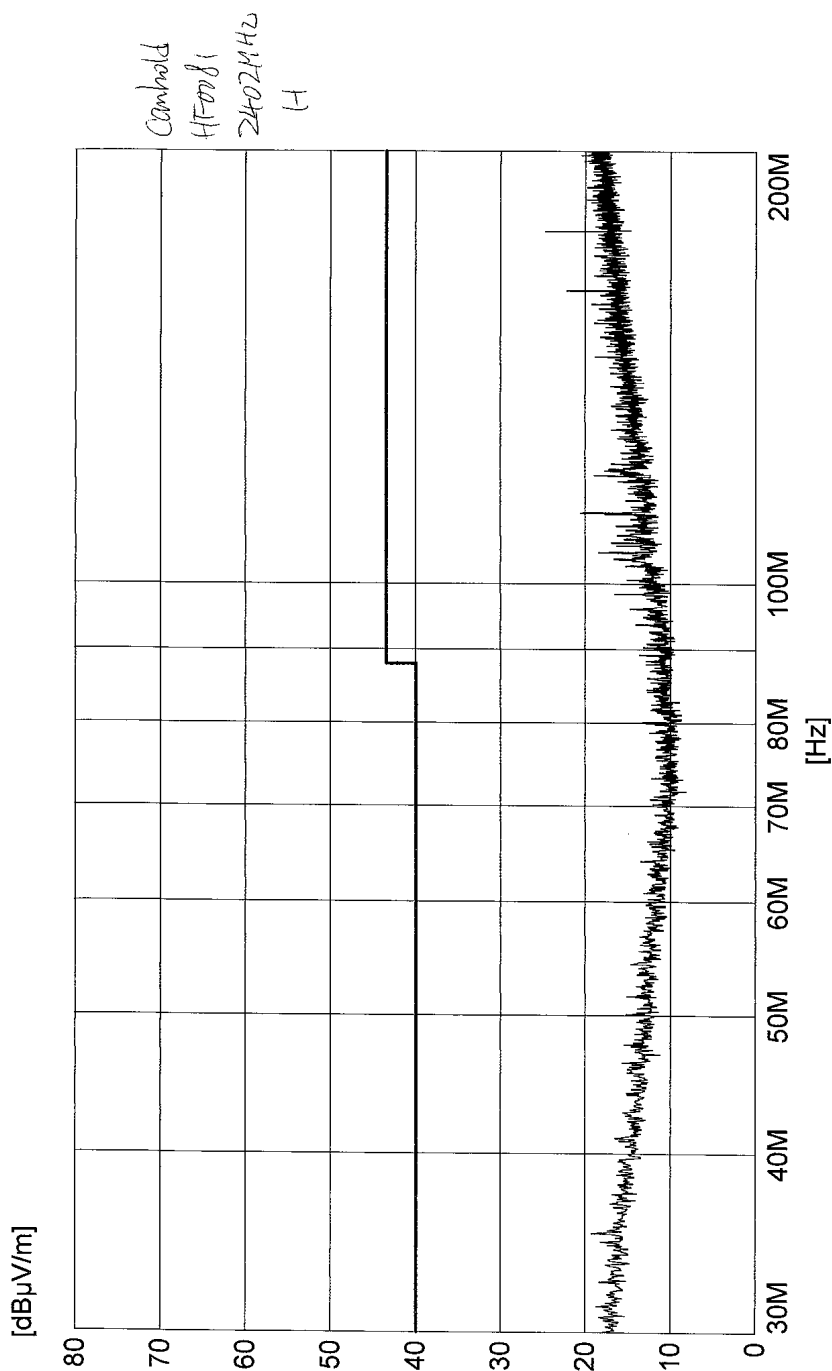
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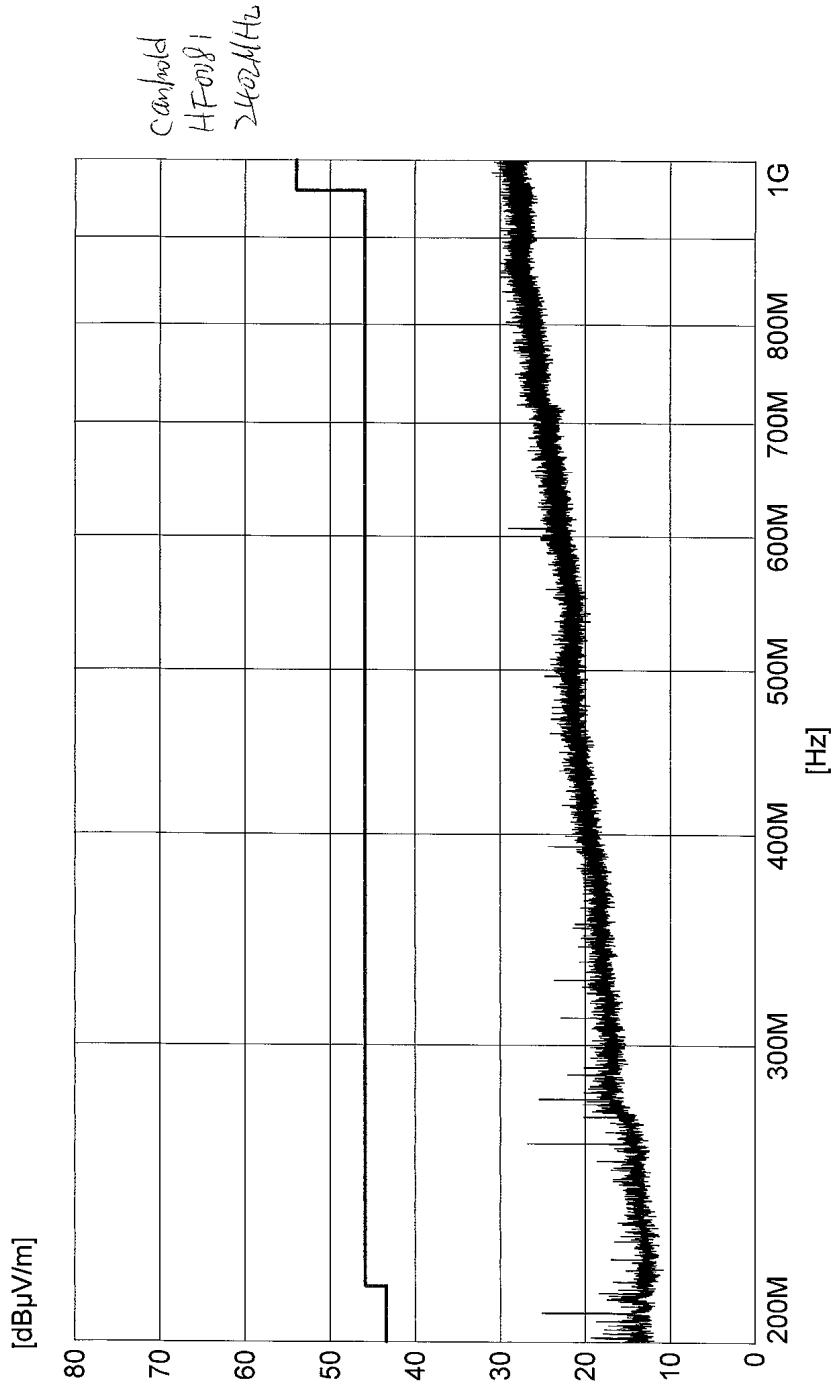


— MES	06682A02.PK		
— LIM	FCC P15.247 (USA)		
		Freq (MHz)	QP
		111.980	21.7
		175.940	16.6

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— MES 06682A11.PK
 — LIM FCC P15.247 (USA)

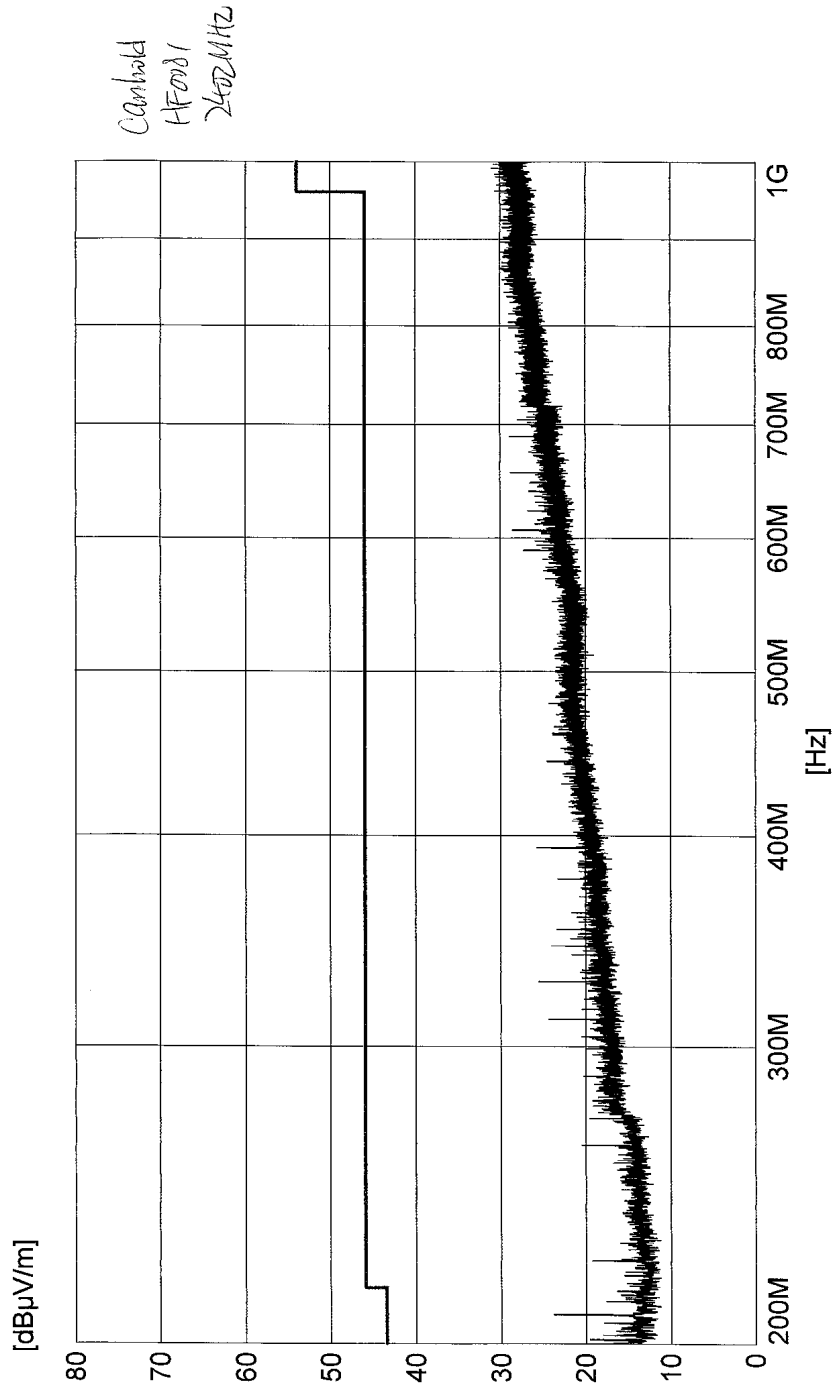
Freq 262.16
 W 31.2

Vent.

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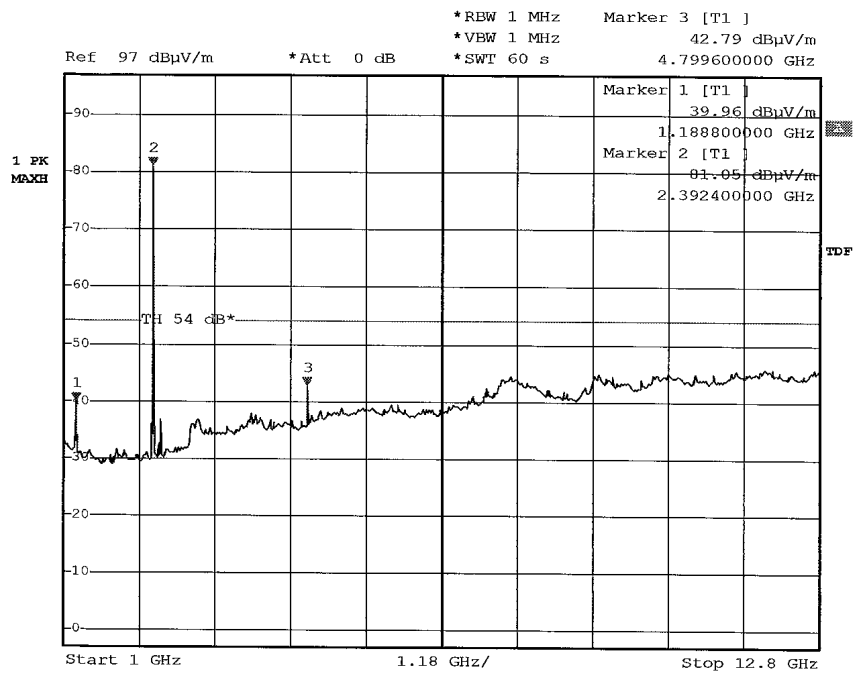


— MES 06682A12.PK
 — LIM FCC P15.247 (USA)

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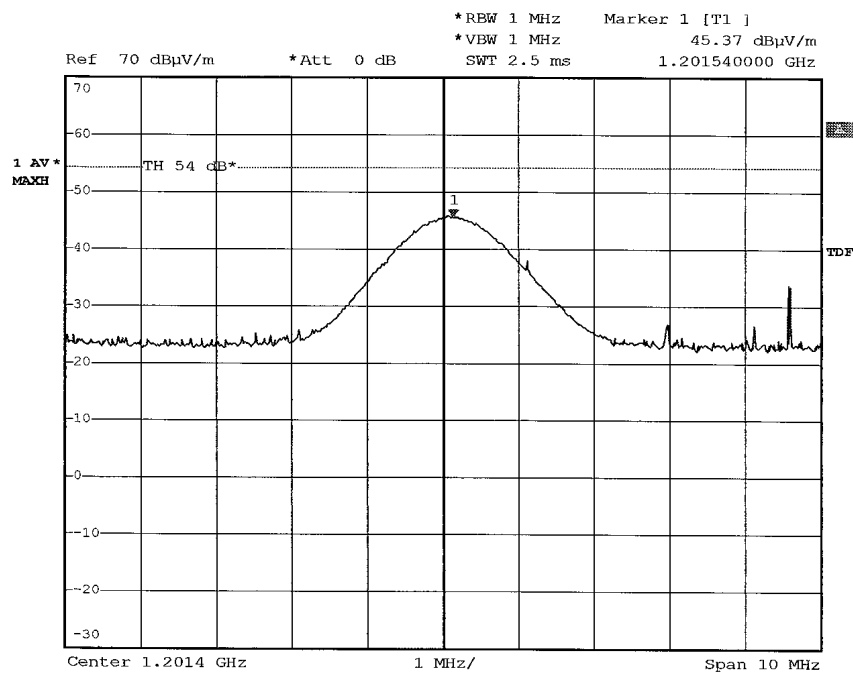
Date: 19.FEB.2004 11:14:19

Canhold
 R/F0081
 2402 MHz
 vert.

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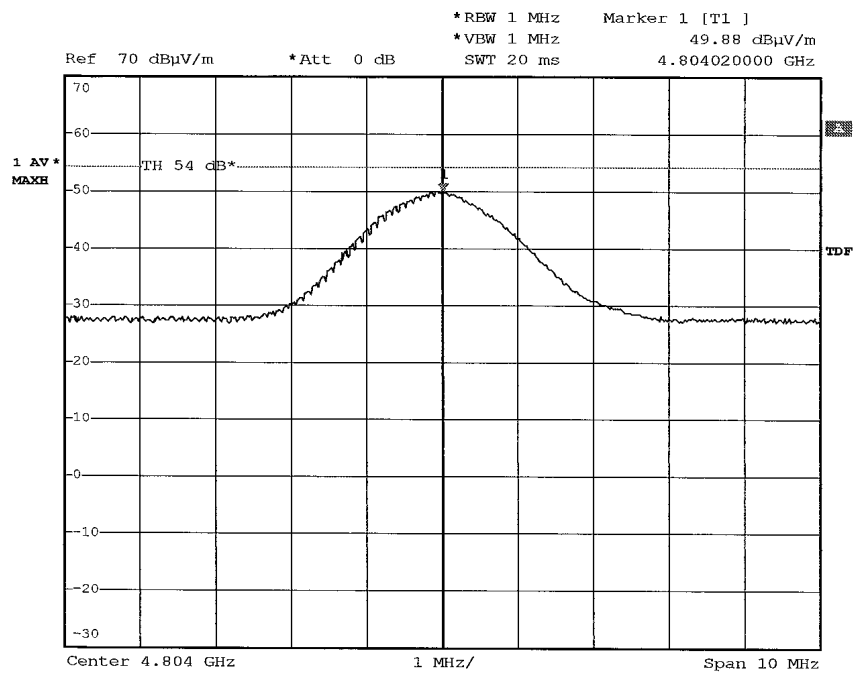
Date: 19.FEB.2004 11:21:54

Canhold
HF0081
242MHz
vert

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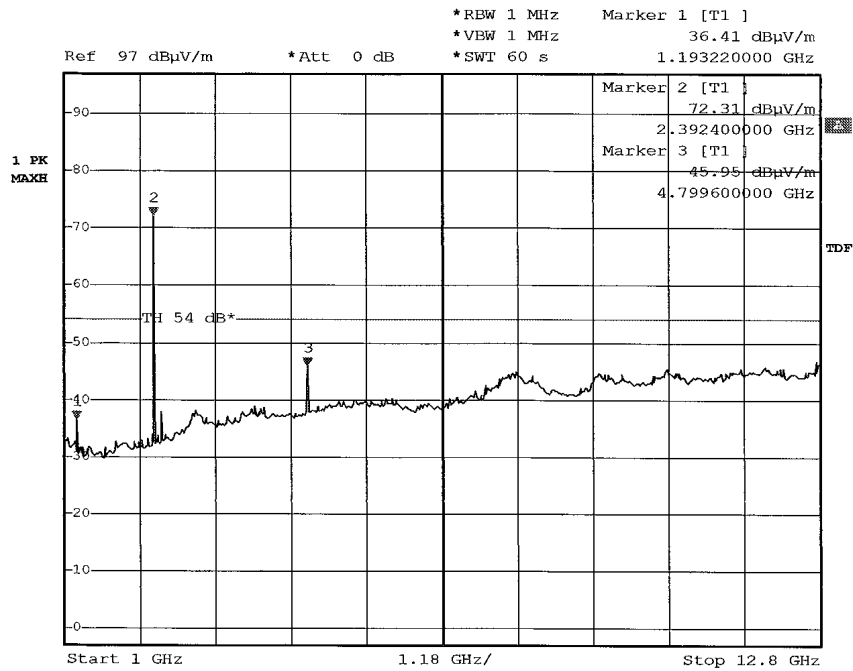
Date: 19.FEB.2004 11:27:13

Can hold
 HFord
 240MHz
 vert

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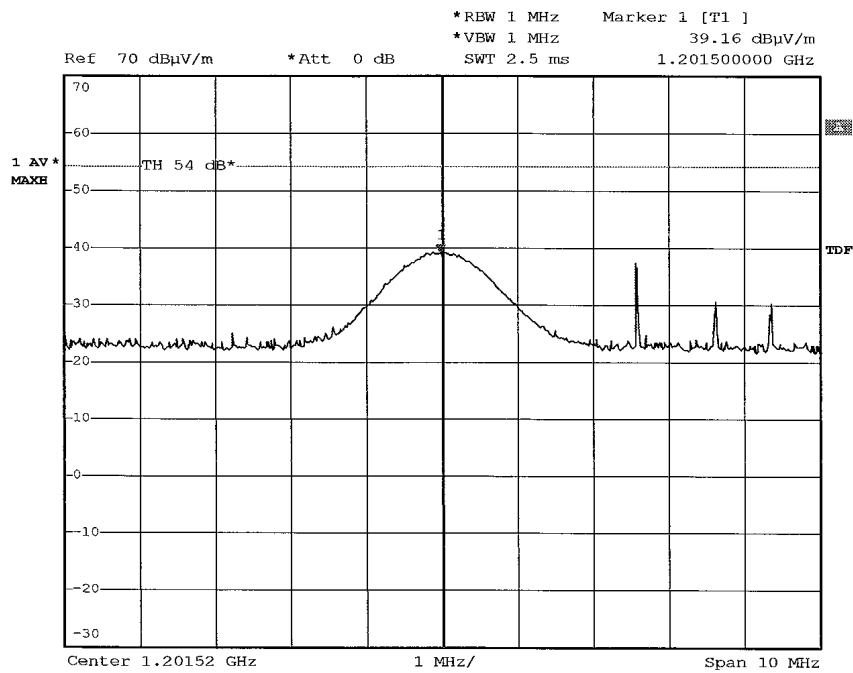
Date: 19.FEB.2004 11:33:46

Canhold
 HF0081
 2402MHz
 Hbr:

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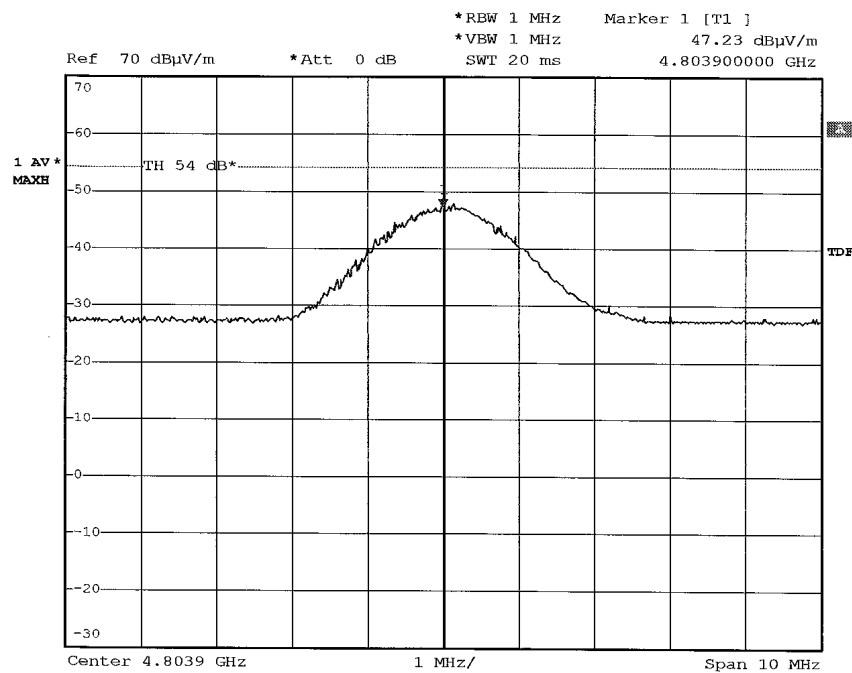
Date: 19.FEB.2004 11:35:46

Canhold
HF0081
240MHz
170i

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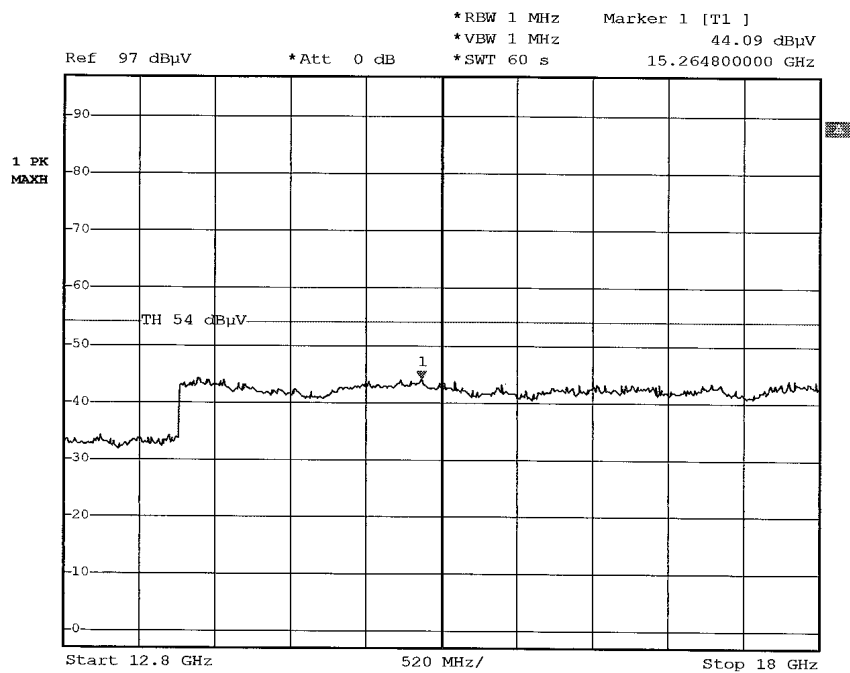
Date: 19.FEB.2004 11:41:51

Canhold
 HF0081
 2402MHz
 Hori

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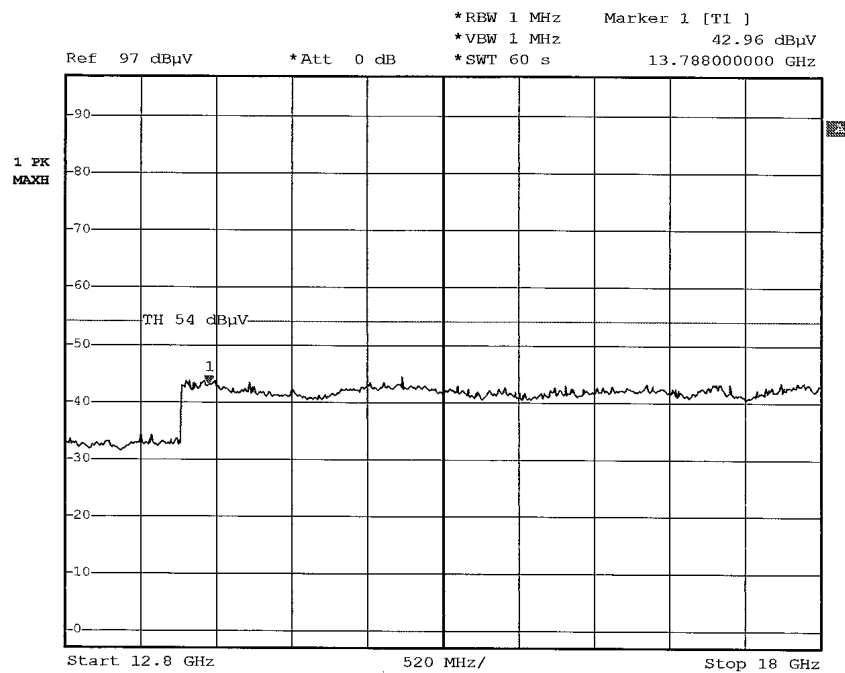
Date: 19.FEB.2004 12:25:20

Canhold
HF0081
2402MHz
Vert.

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Date: 19.FEB.2004 12:22:04

Canhold
HFord1
2402MHz
Hori

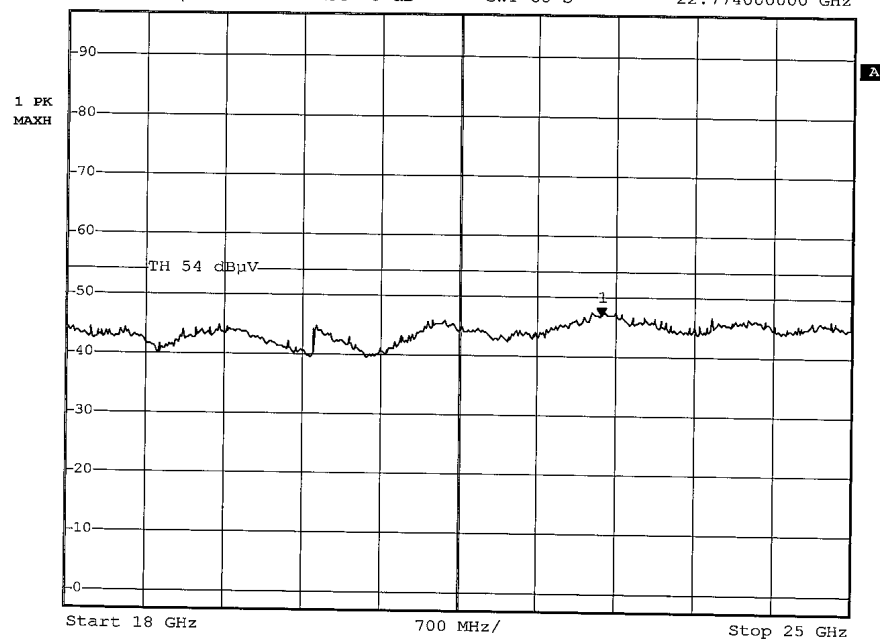
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Ref 97 dBµV *Att 0 dB *RBW 1 MHz Marker 1 [T1]
*VBW 1 MHz 47.01 dBµV
*SWT 60 s 22.77400000 GHz



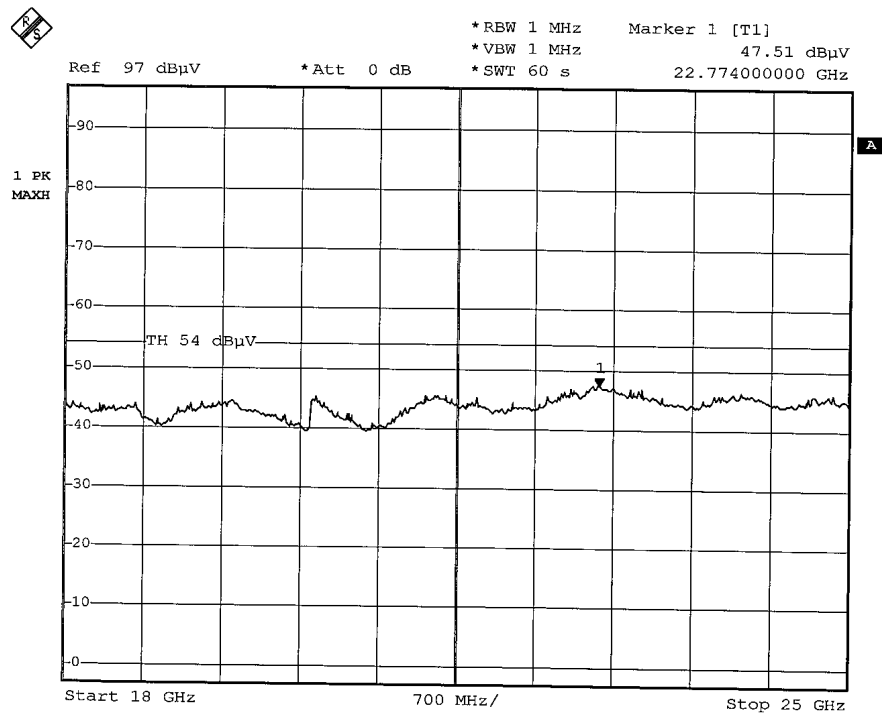
Date: 23.FEB.2004 11:01:10

Canhold
HF081
2402MHz
Vert.

Prüfbericht - Nr.:
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14005409 001

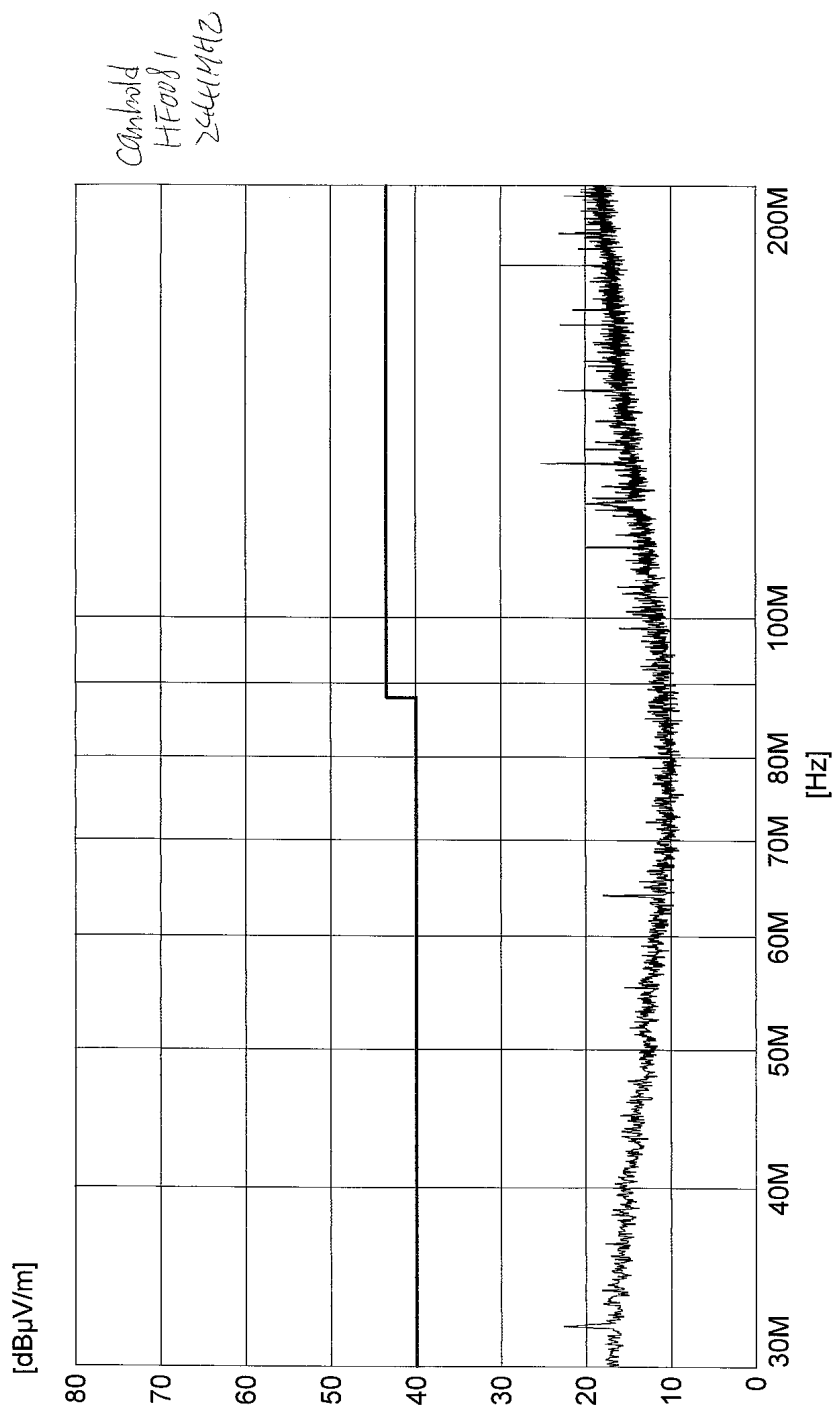
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Date: 23.FEB.2004 10:57:30

Canhold
HF0081
2402 MHz
Hori

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—MES 06682A04.PK
—LIM FCC P15.247 (USA)

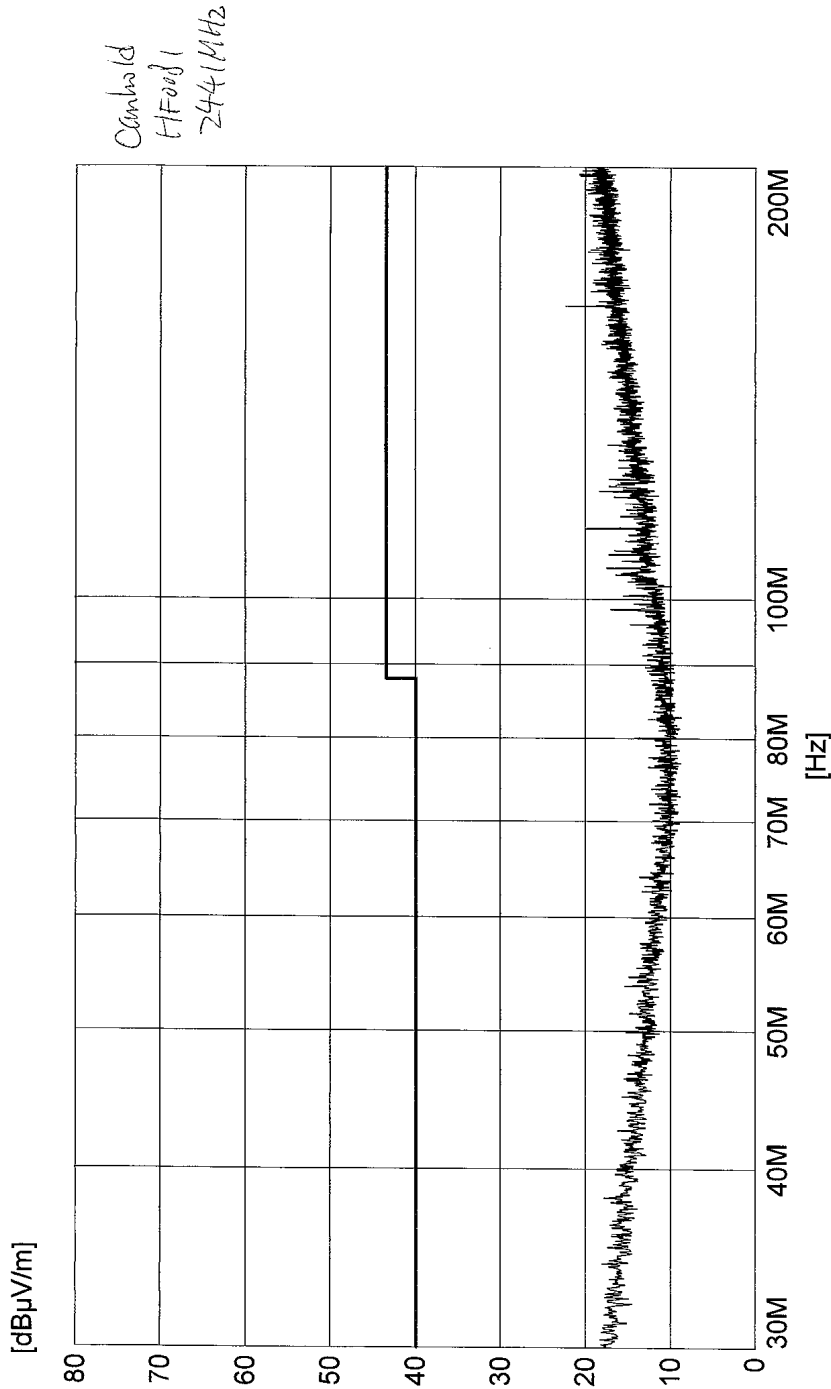
<u>Prez</u>	128.0	ap	24.6
	176.0		19.5

sent.

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— MES 06682A03.PK
— LIM FCC P15.247 (USA)

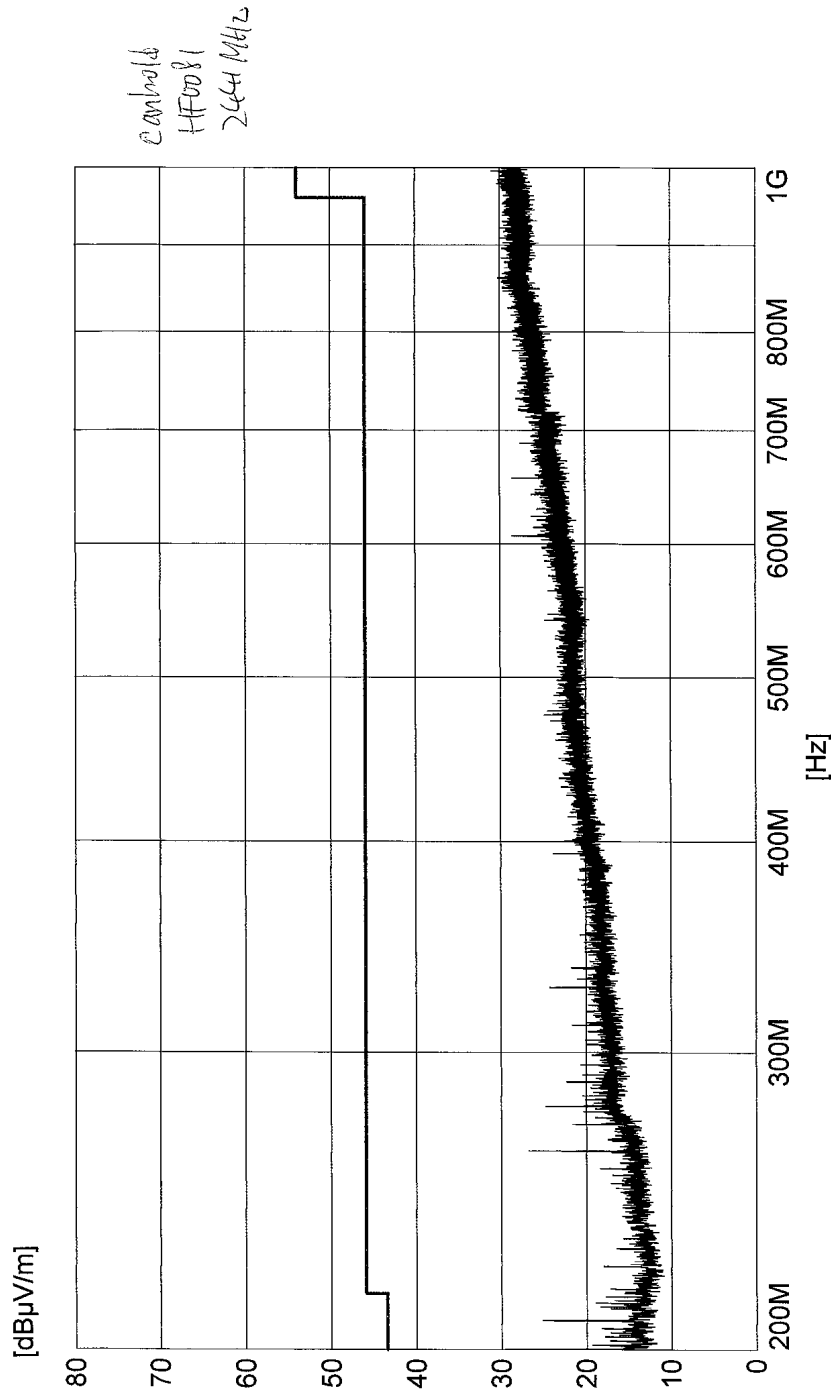
Freq. off
112.0 21.3
160.04 20.3

Hen.

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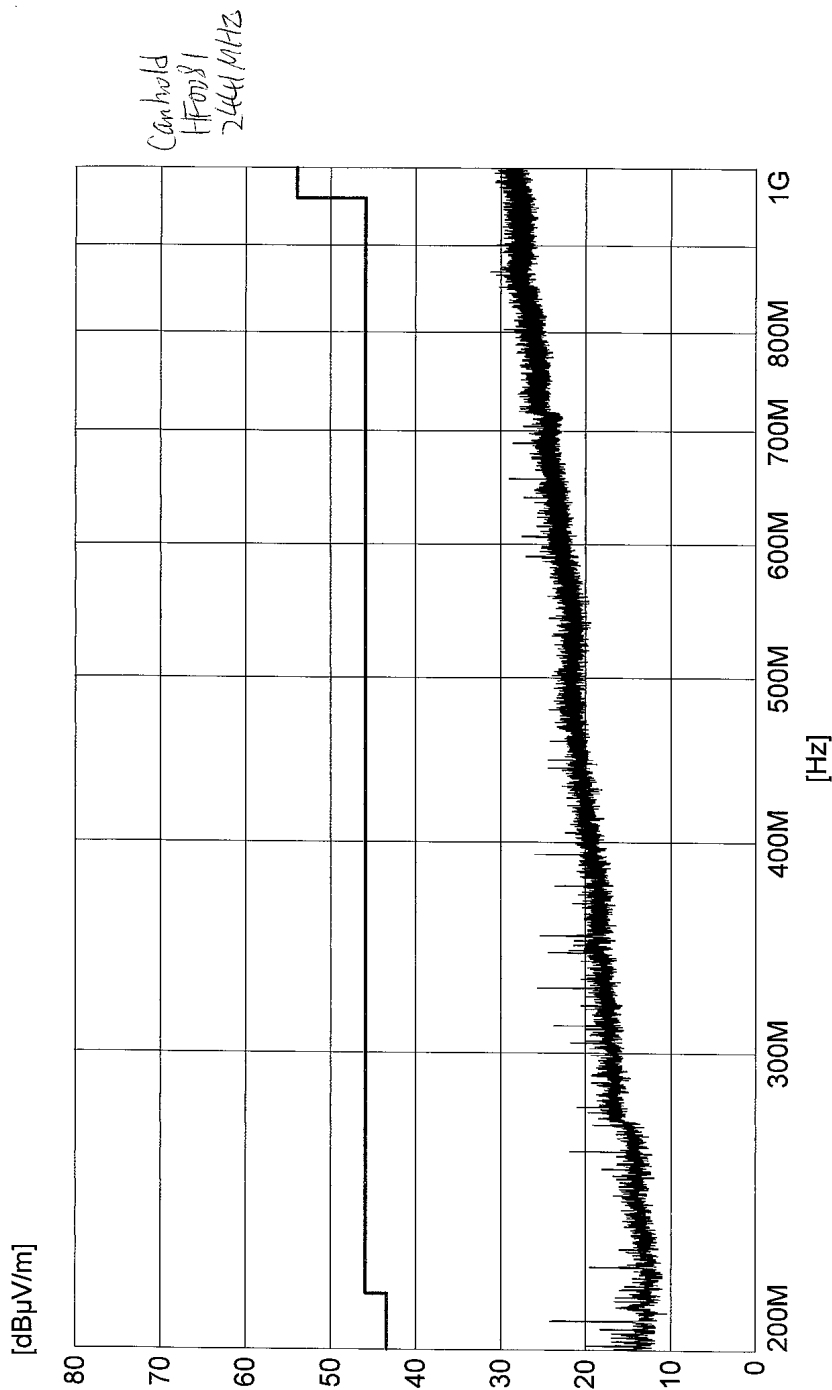
MES 06682A10.PK
 LIM FCC P15.247 (USA)

vert

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— MES 0668209.PK
 — LIM FCC P15.247 (USA)

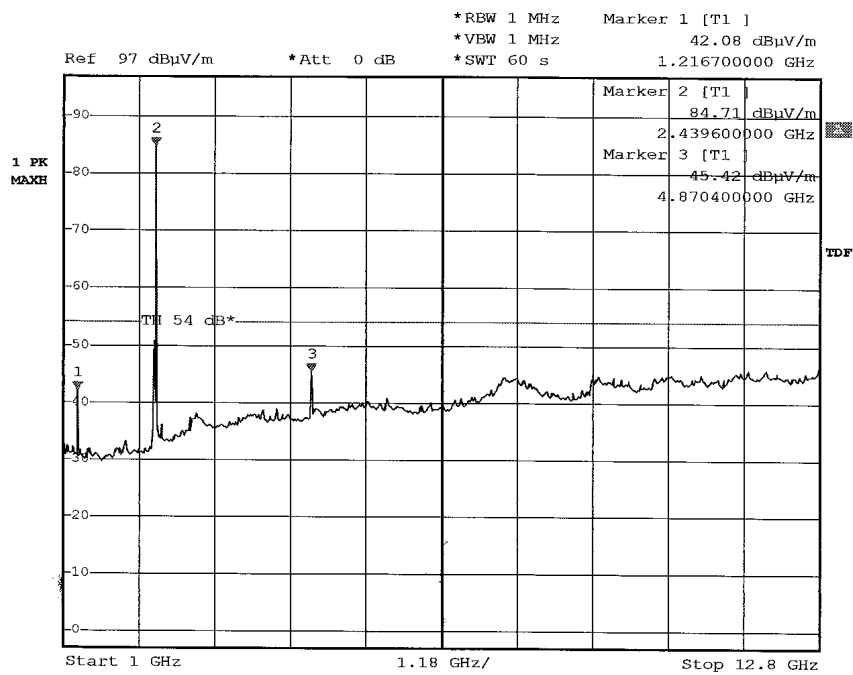
*Freq QP
 200.000 27.1*

Hori

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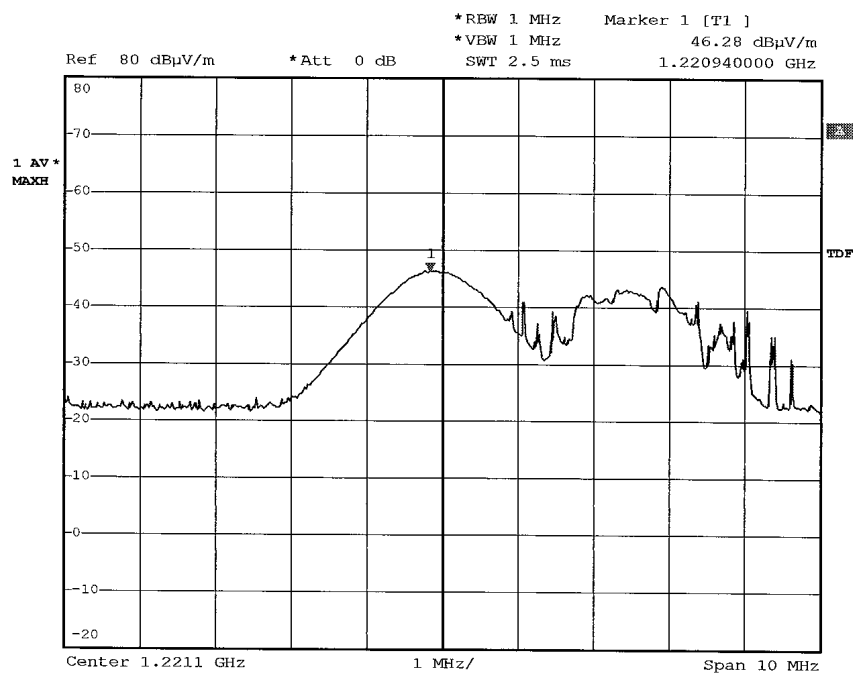
Date: 19.FEB.2004 11:46:31

can hold
 17F0031
 2541MHz
 Vert.

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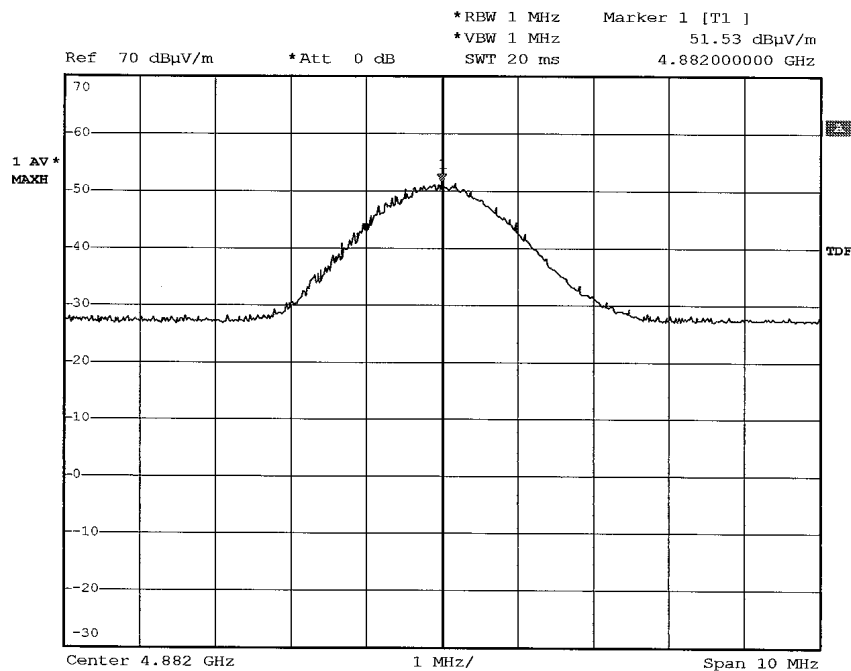
Date: 19.FEB.2004 11:48:22

canhold
 HF0081
 244MHz
 Vert.

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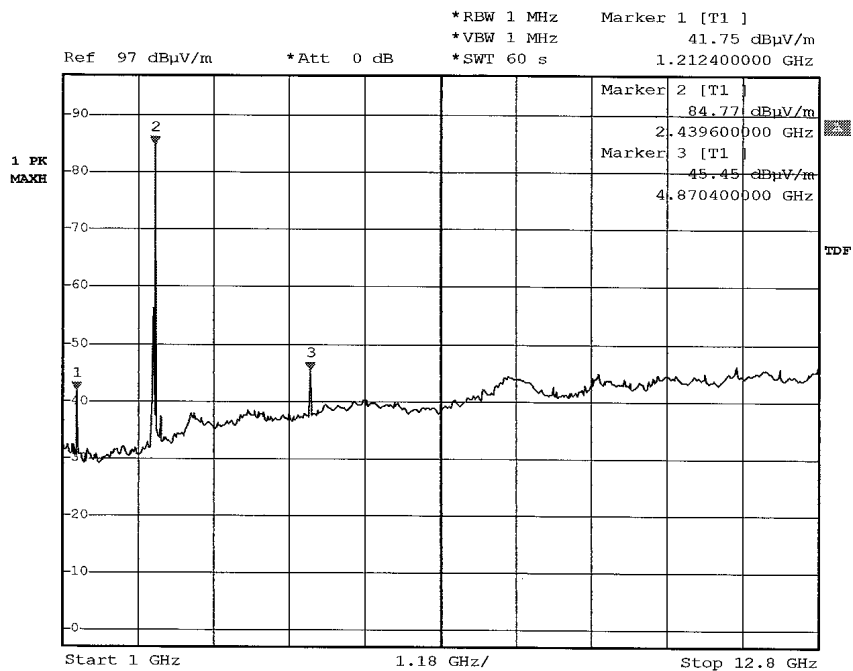
Date: 19.FEB.2004 11:52:15

*Canhold
 HF0081
 244 MHz
 vert.*

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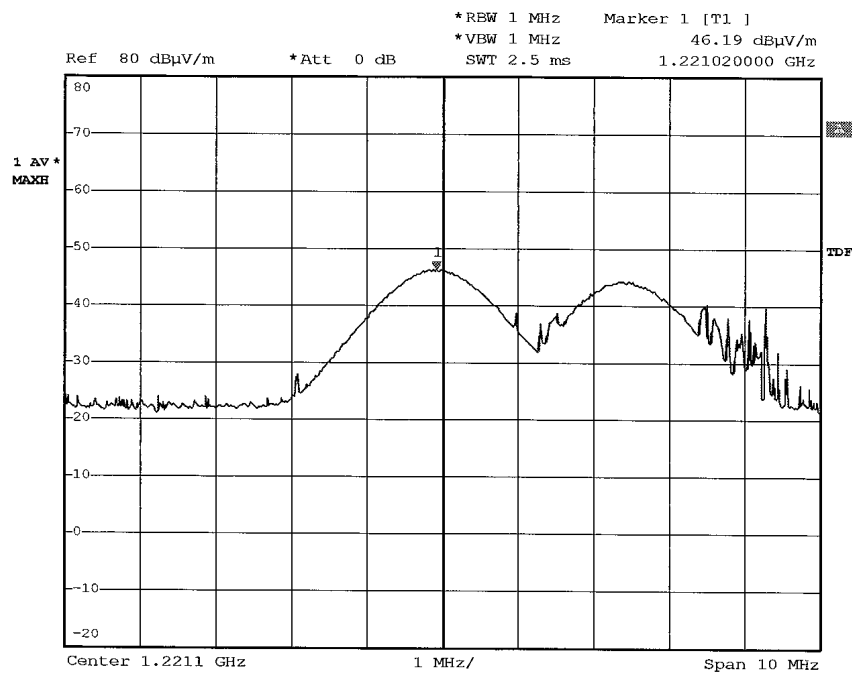
Date: 19.FEB.2004 11:56:10

Canhold
 HF0081
 2441 MHz
 Hori

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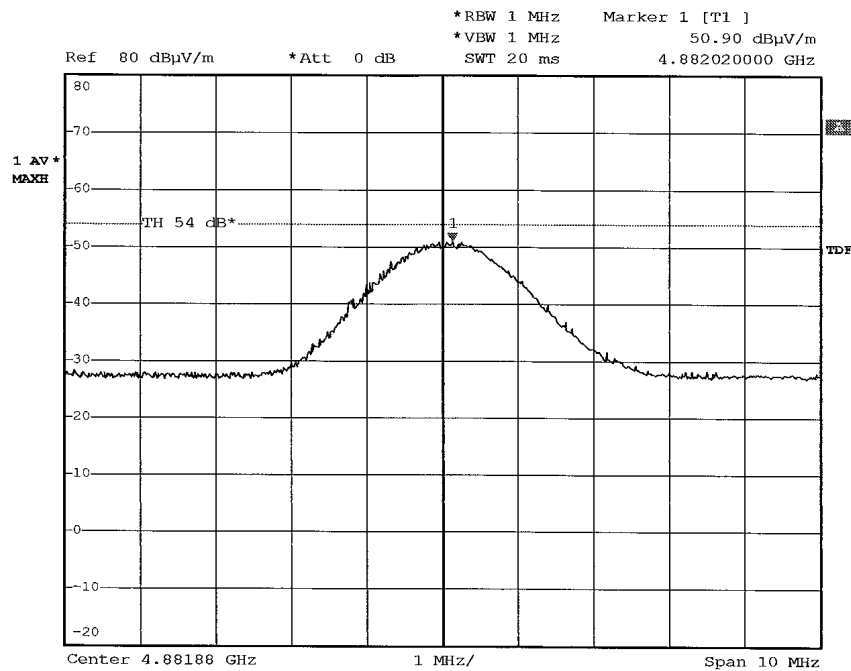
Date: 19.FEB.2004 11:58:15

Canhold
HF0081
264MHz
Hör:

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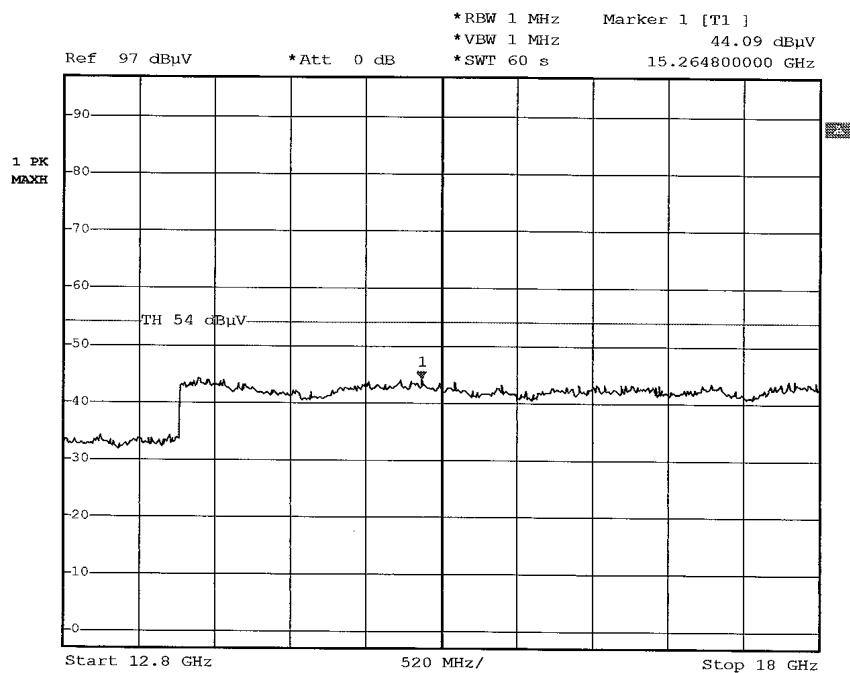
Date: 19.FEB.2004 11:59:52

Canhold
 HF0081
 2441 MHz
 Hori

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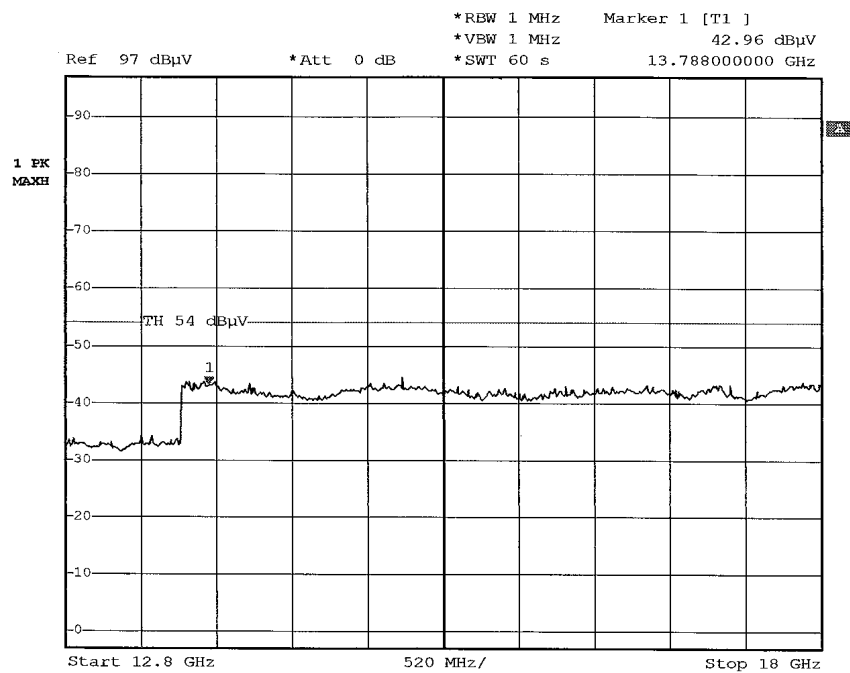
Date: 19.FEB.2004 12:25:04

Canhold
 HFO81
 246MHz
 vert.

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Date: 19.FEB.2004 12:21:55

Canbold
HFO81
244 MHz
Hori

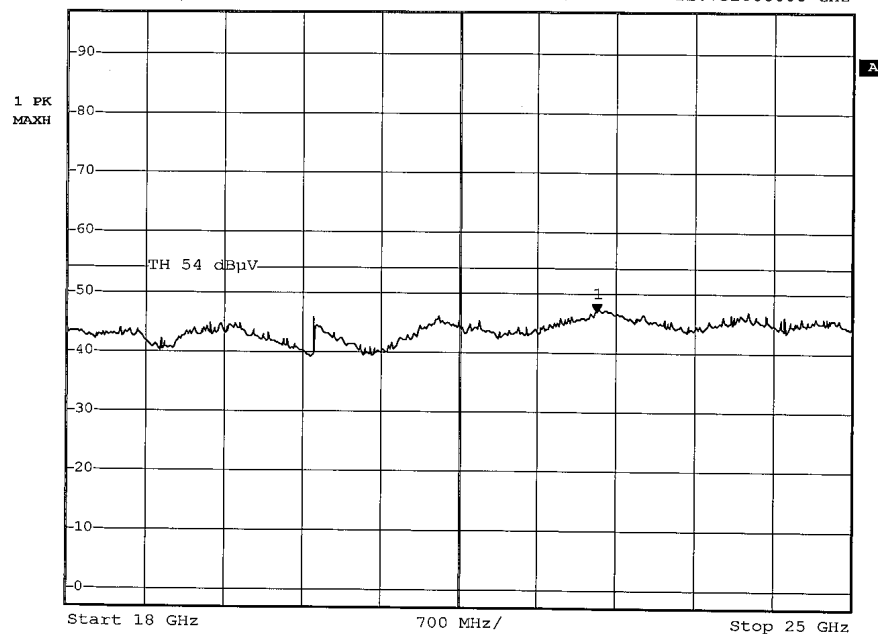
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Ref 97 dBµV *Att 0 dB *RBW 1 MHz Marker 1 [T1]
*VBW 1 MHz 47.01 dBµV
*SWT 60 s 22.73200000 GHz



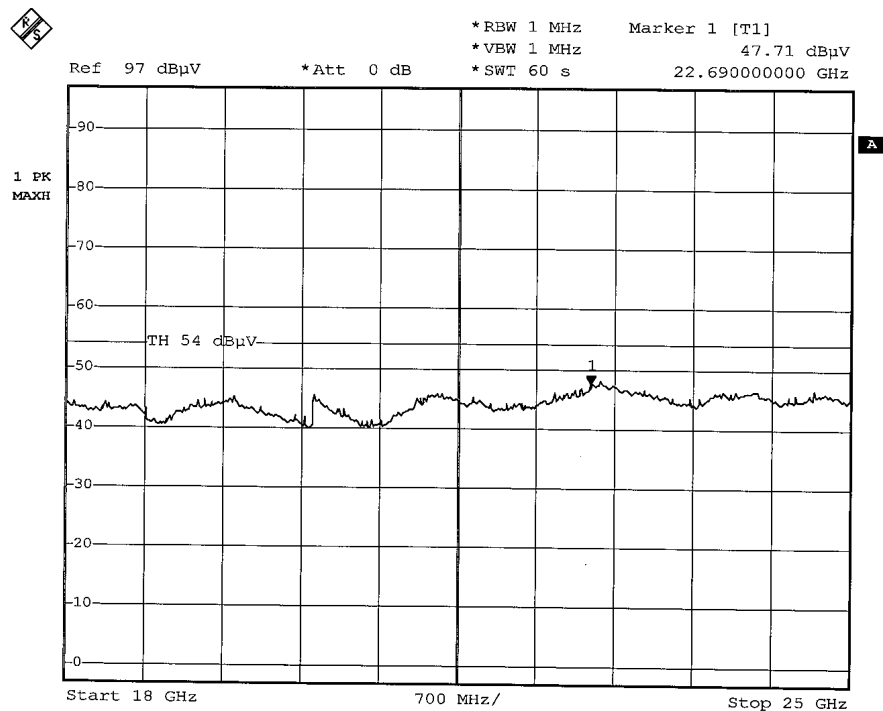
Date: 23.FEB.2004 11:13:41

Canhold
HF0081
2441 MHz
Vert.

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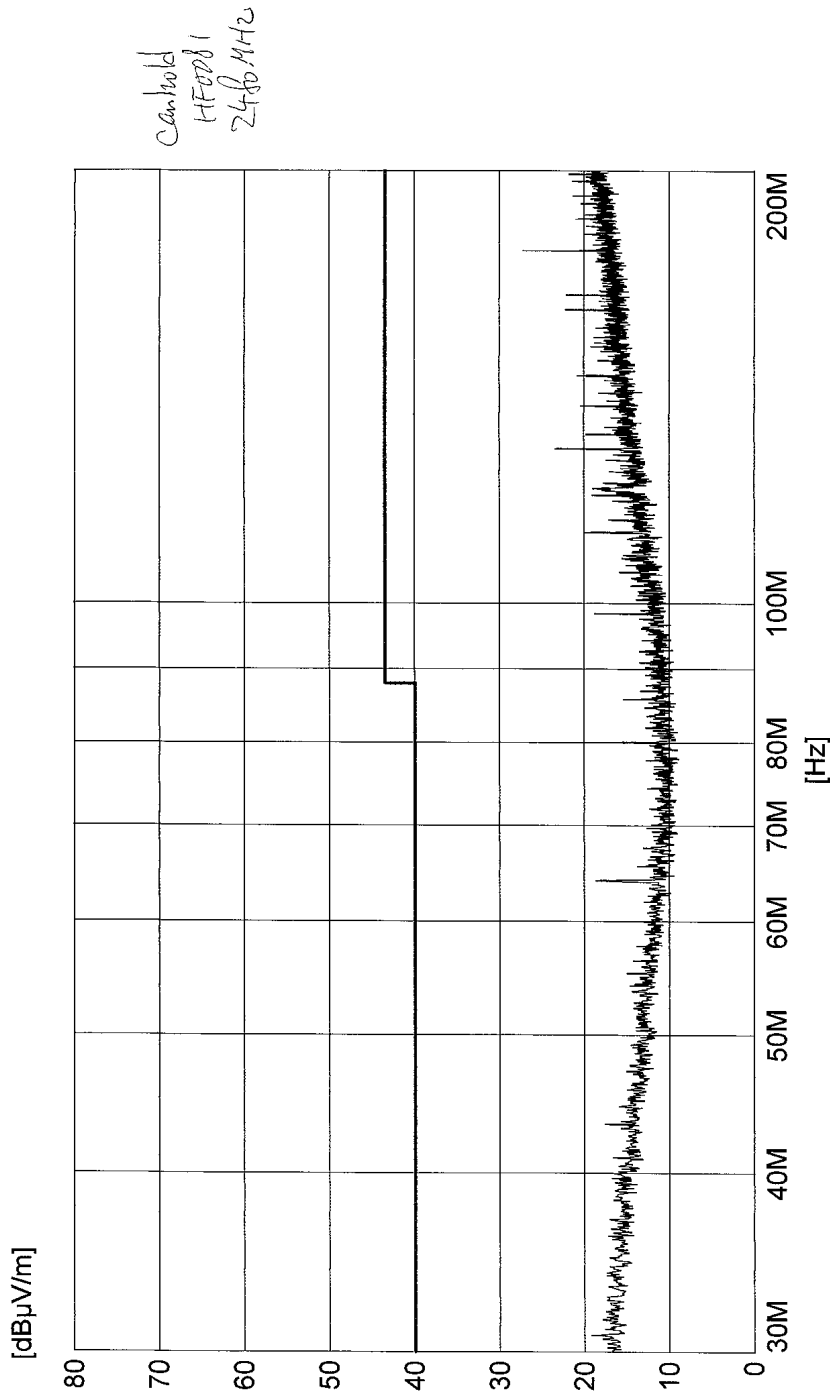
Date: 23.FEB.2004 11:10:15

Canhold
 HF081
 2441 MHz
 Hoxi

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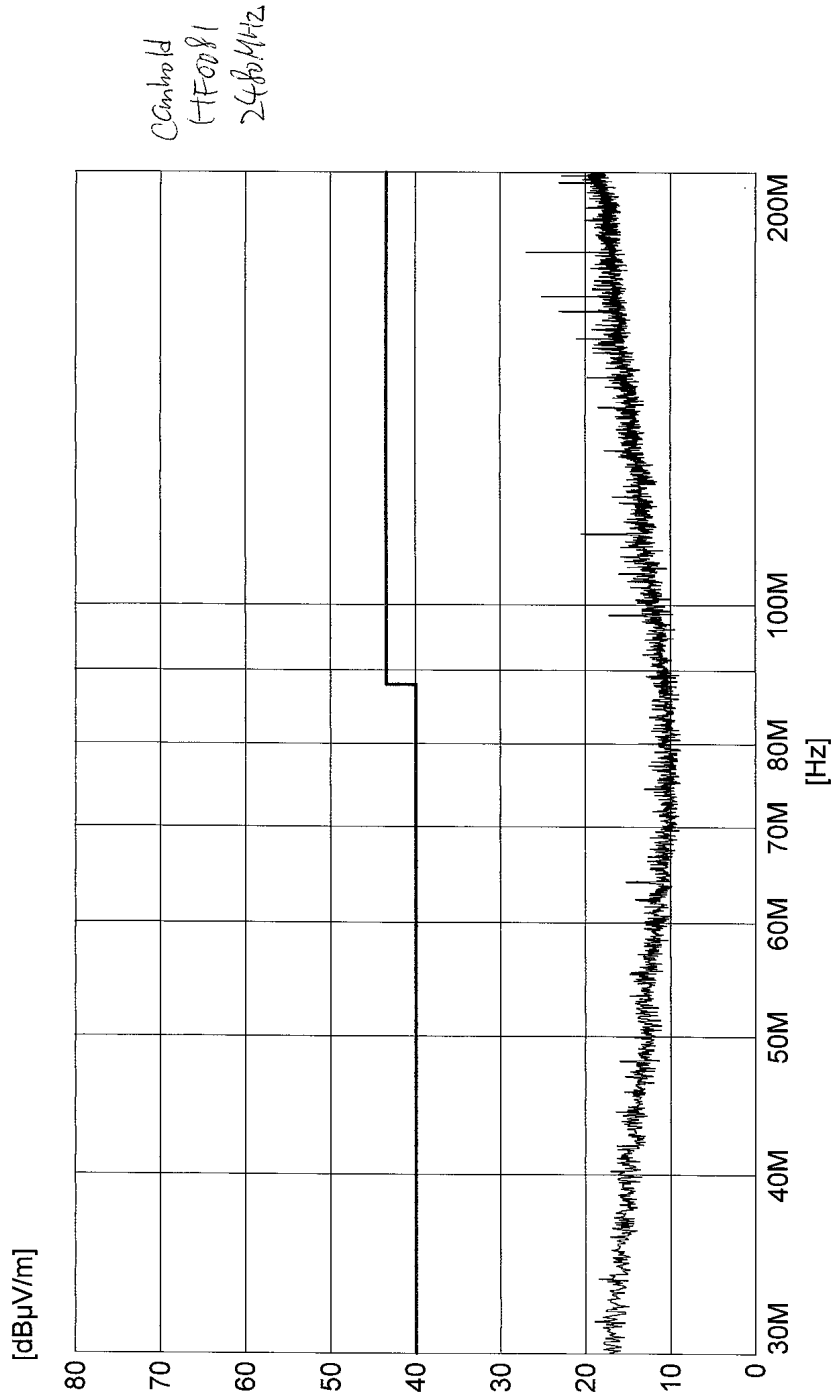
— MES 06682A05.PK
 — LIM FCC P15.247 (USA)

Freq QP
 112.000 21.6
 175.997 19.3

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MES 06682A06.PK
 LIM FCC P15.247 (USA)

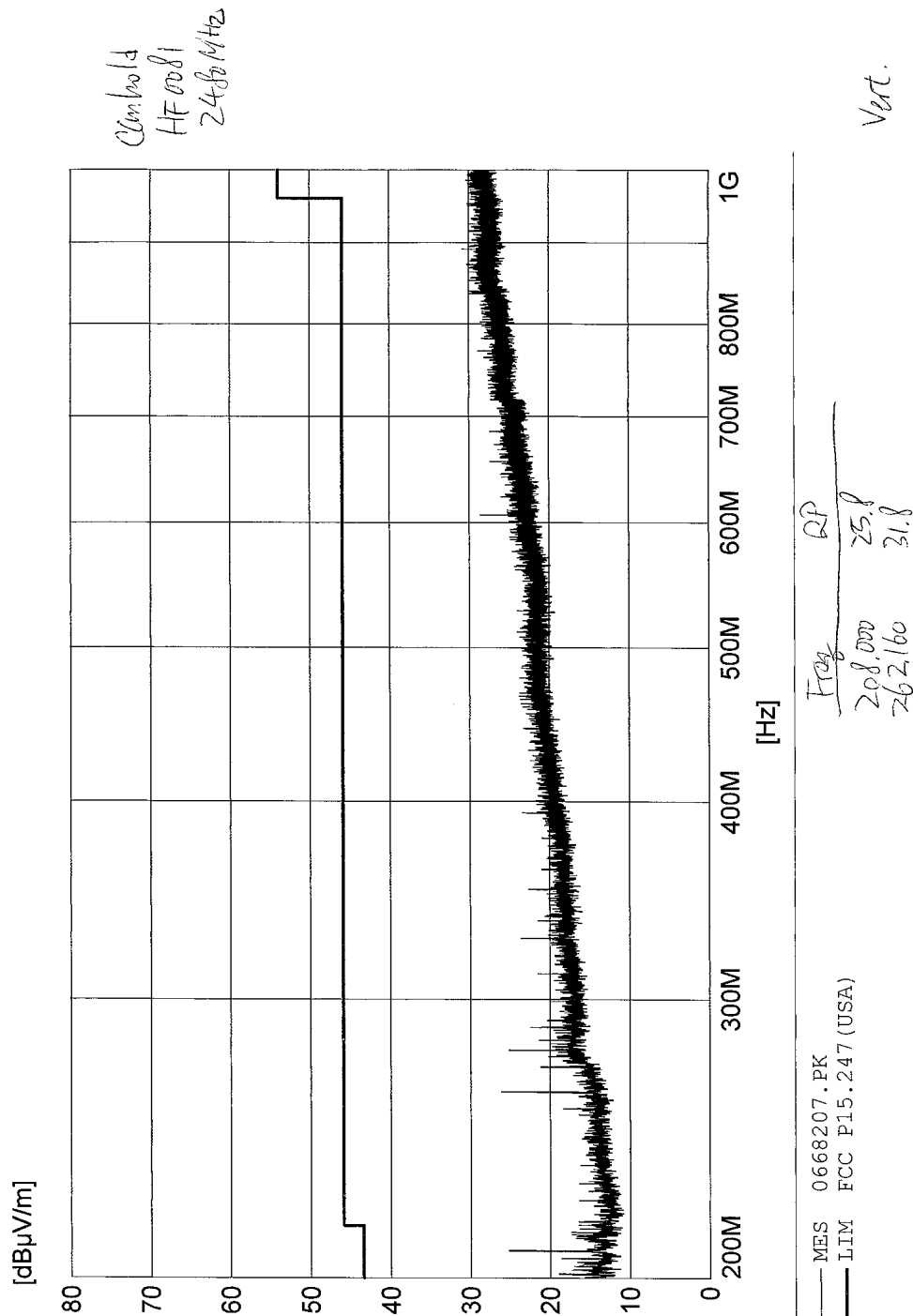
175.494 17.5
 160i

Freq QP

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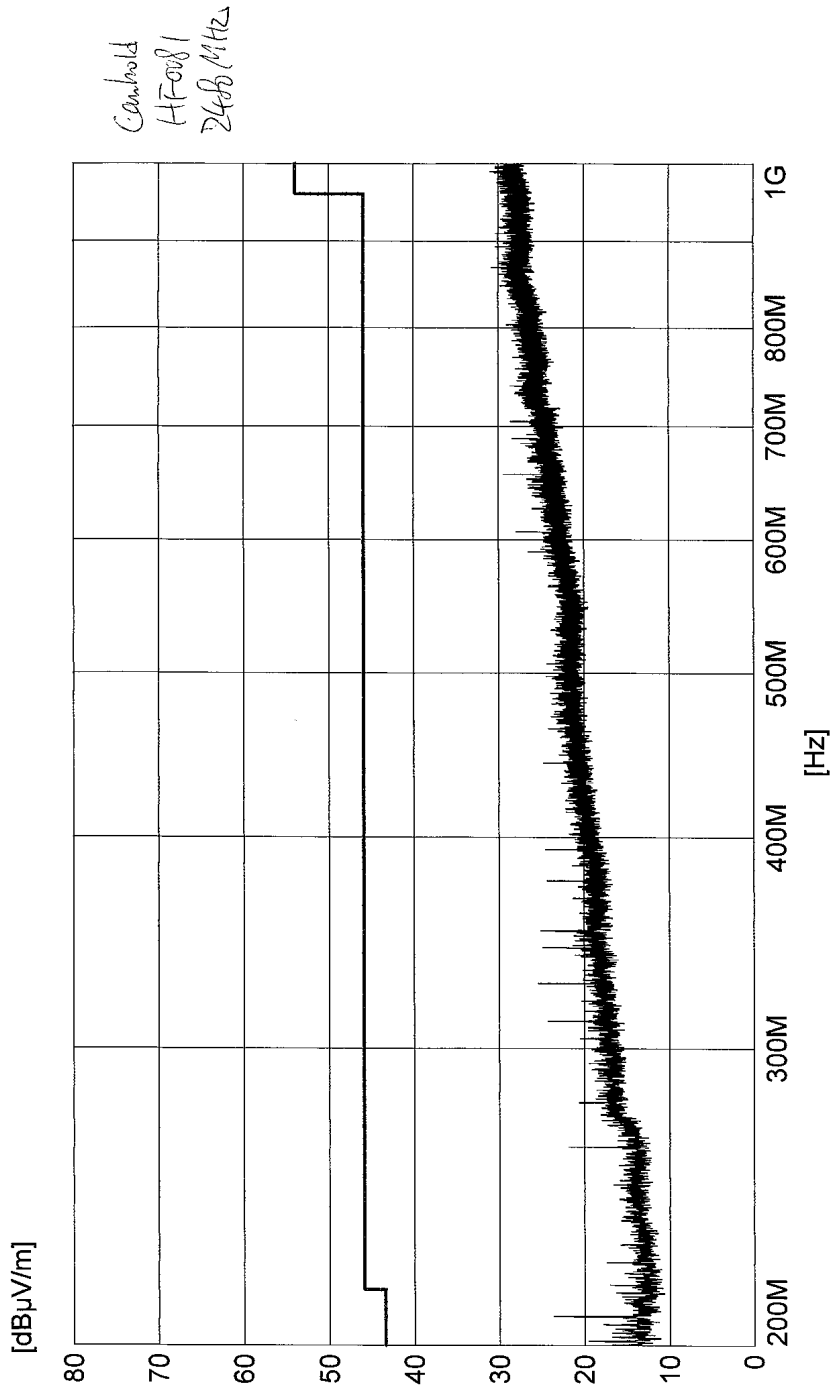
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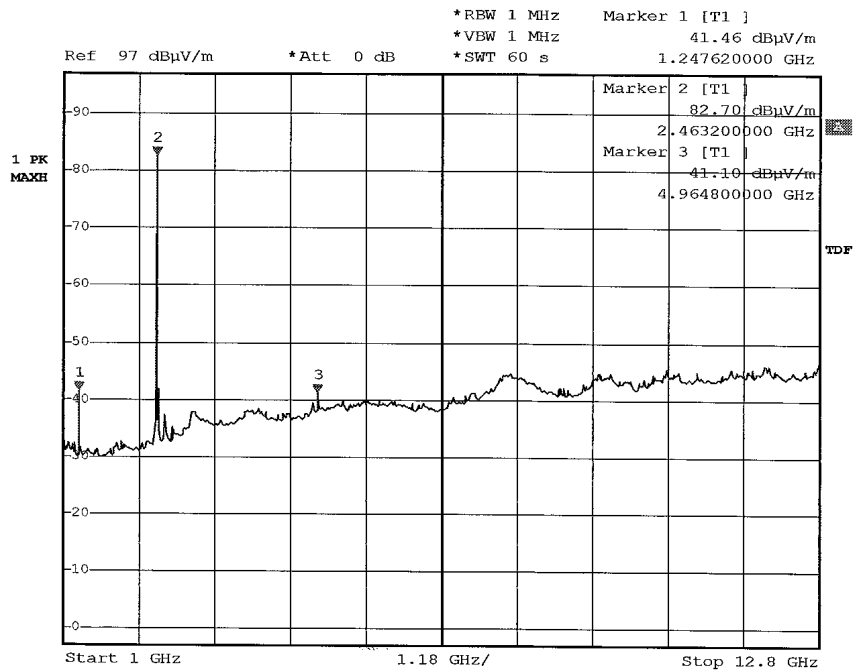


— MES 0668208.PK
 — LIM FCC P15.247 (USA)

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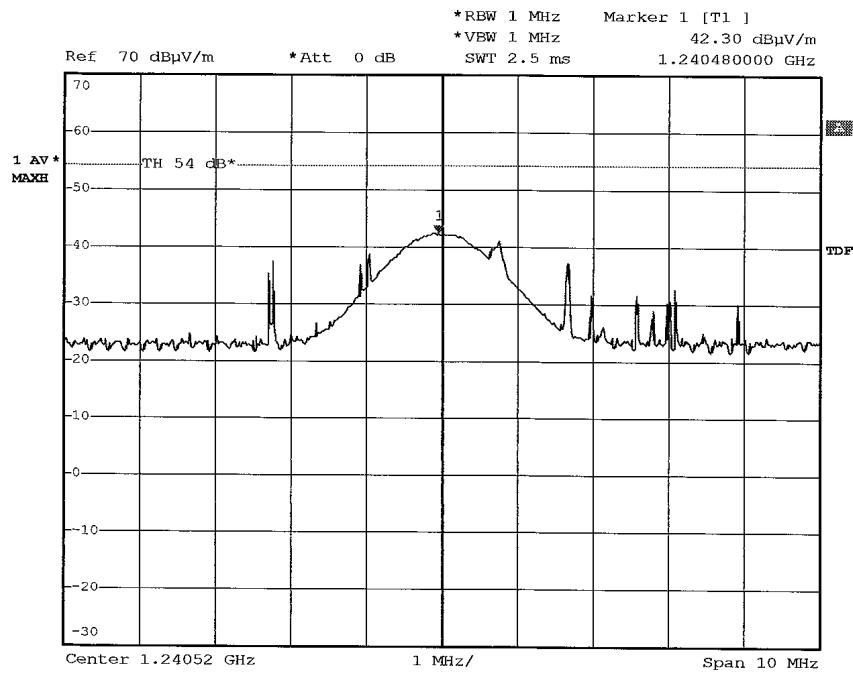
Date: 19.FEB.2004 12:04:45

canhold
 HF0081
 2480MHz
 vert.

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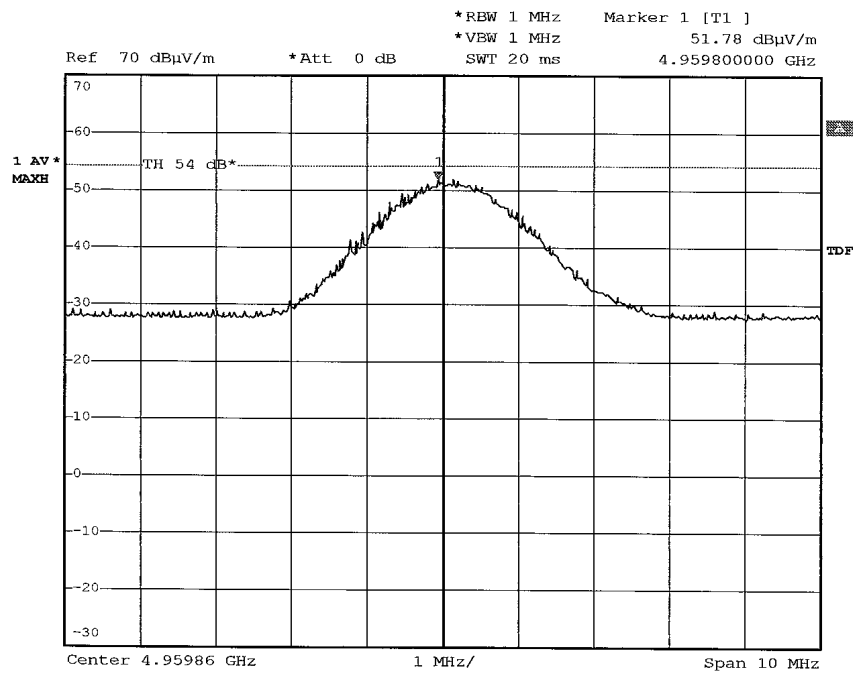
Date: 19.FEB.2004 12:07:15

Canbold
 HF081
 246 MHz
 Vert.

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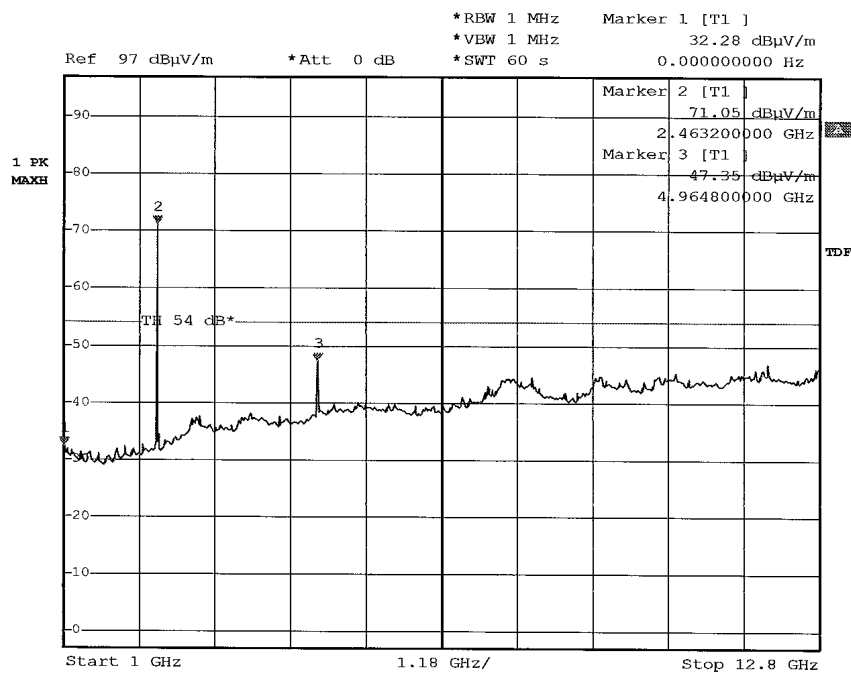
Date: 19.FEB.2004 12:09:24

Canhold
HF0081
2466 MHz
vert.

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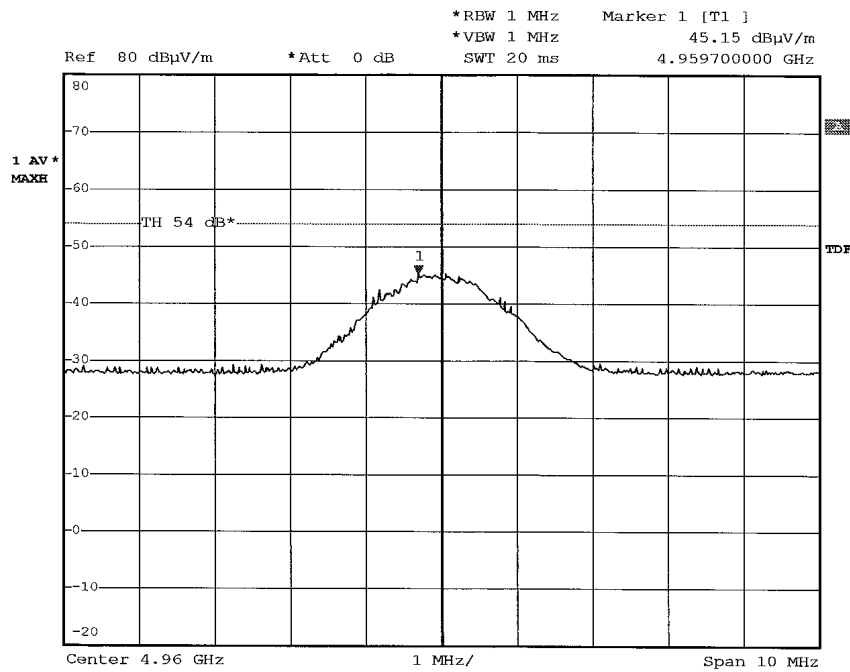
Date: 19.FEB.2004 12:12:57

Canhold
 HFox81
 2480 MHz
 Mori

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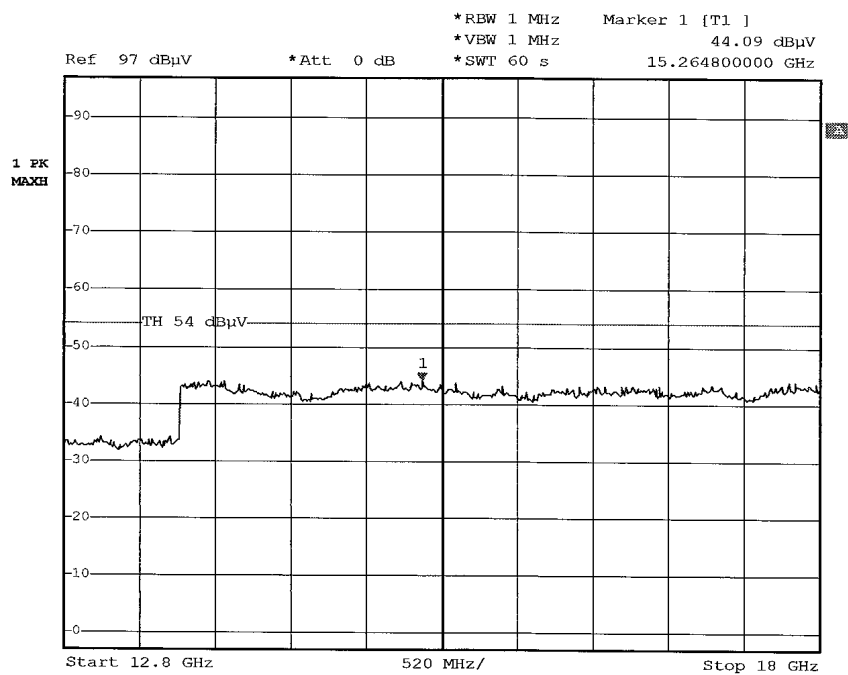
Date: 19.FEB.2004 12:16:16

canku/d
 HFO081
 2480 MHz
 Hori

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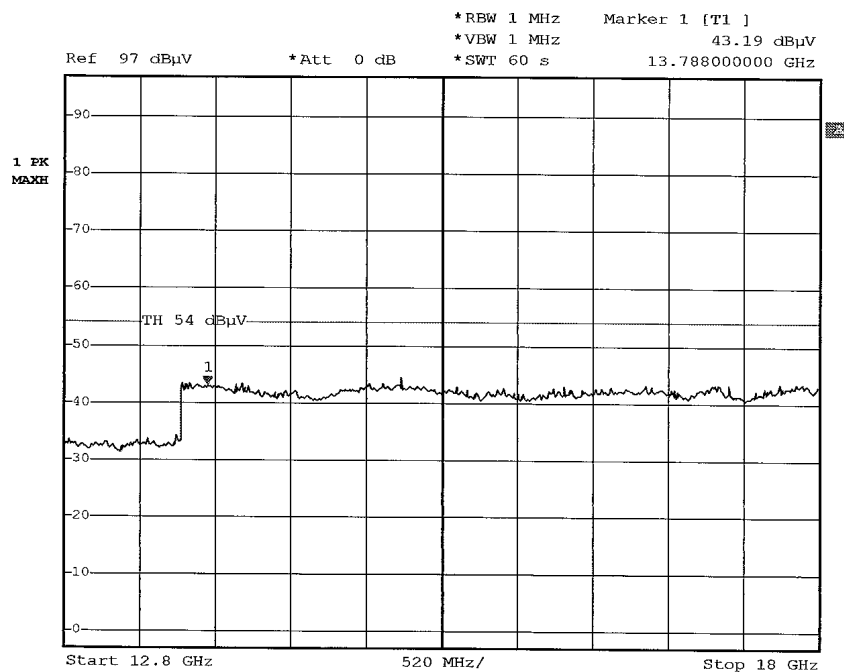
Date: 19.FEB.2004 12:24:56

canhold
175081
2480 MHz
vert.

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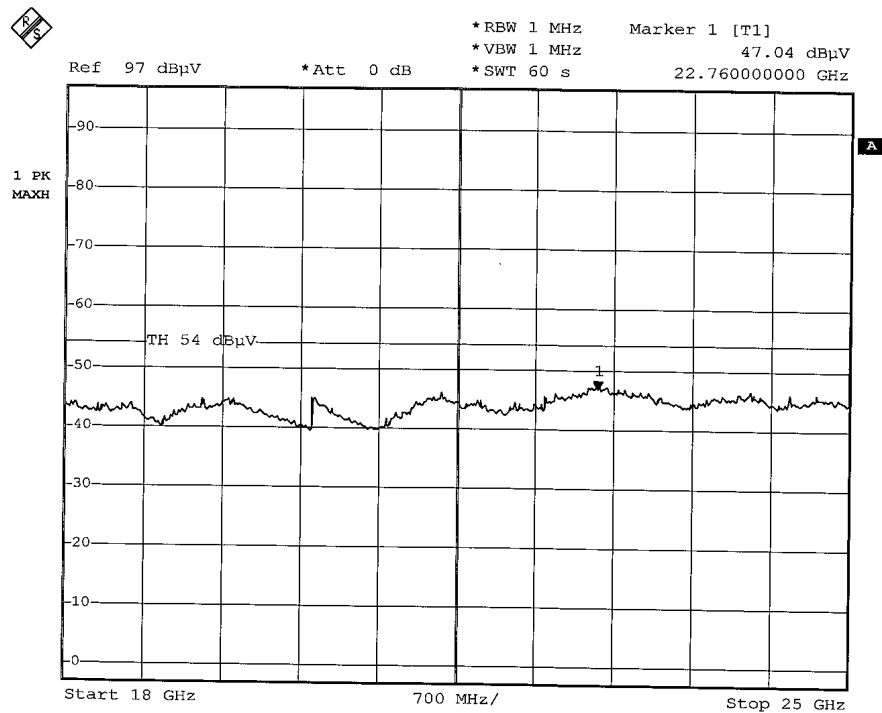
Date: 19.FEB.2004 12:22:21

Canhold
HF0081
2480 MHz
Fbri

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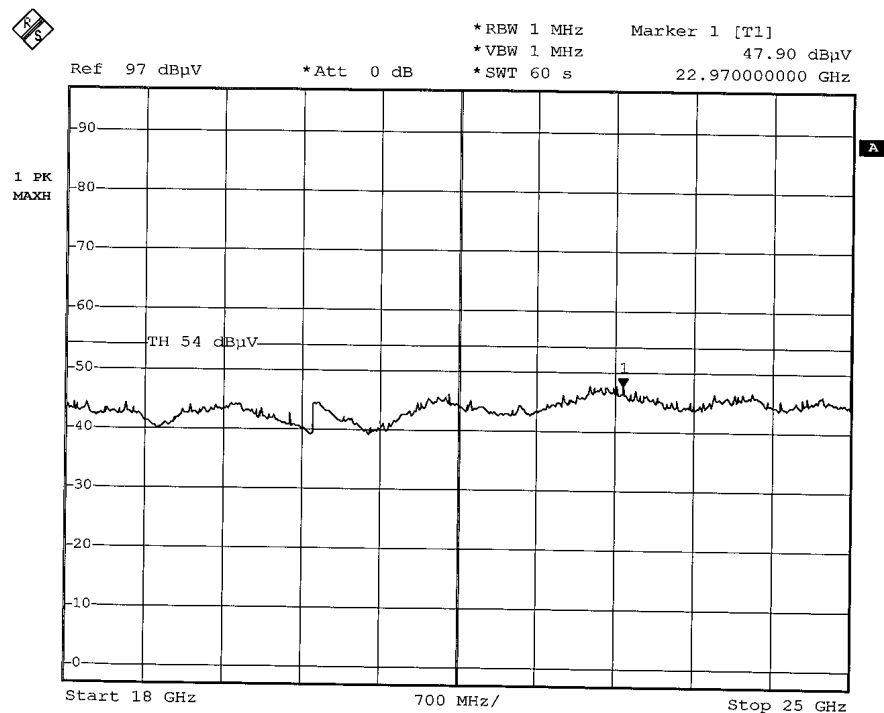
Date: 23.FEB.2004 11:19:07

*can hold
 HF0081
 2480 MHz
 Vert.*

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Date: 23.FEB.2004 11:15:48

Canhold
HFop81
2480 MHz
Hori