Prüfbericht - Nr.: Test Report No.	**14007527 001**	**Seite 1 von 14** Page 1 of 14
Auftraggeber: Applicant	**i.Tech Dynamic Ltd.** **Room 1112, Metroplaza, Tower 2** **223 Hing Fong Road** **Kwai Chung, N.T.** **Hong Kong**	
Gegenstand der Prüfung: Test item	**Bluetooth Virtual Keyboard**	
Bezeichnung: Identification	**C51-A04031-XX**	**Serien-Nr.:** Serial No. **Engineering sample**
Wareneingangs-Nr.: Receipt No.	**050117059**	**Eingangsdatum:** Date of receipt **17.01.2005**
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:		
24.01.2005	Hugo Wan		24.01.2005	Thomas Berns	
Datum Date	**Name** Name	**Unterschrift** Signature	**Datum** Date	**Name** Name	**Unterschrift** Signature

Sonstiges: **FCCID: RKIC51-C04031-XX**
Other Aspects

Abkürzungen:			**Abbreviations:**		
	OK, Pass, P	**= entspricht Prüfgrundlage**		**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**

Table of Content

Appendix 4 – Product documentation ..... 9 pages

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	Dielectric Antenna	Dielectric Antenna
Antenna gain (dBi)	1.65	
Power level	fix	
Type of equipment	stand alone	stand alone
Connection to public utility power line	Yes	
Nominal voltage	V_{nor}: 3.6 V	V_{nor}: 3.6 V
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 Wireless Keyboard 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 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
Block Diagram
Bill of material
User manual

Special accessories and auxiliary equipment

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

1. AC/DC Power adaptor
   Model number: IT03024UK
   Input: 100-240VAC
   Output: 5.0VDC 200mA

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: Dielectric Antenna soldered to the circuit board b) Manufacturer and model no: N.A. c) Gain with reference to an isotropic radiator: 1.65 dBi
Verdict:	Pass

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

Test Port: AC mains input port of the charger
Applied voltage: 100VAC
Applicable only to equipment designed to be connected to the public utiliy power line.

Mode of operation: Operating mode

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	0.150	38.3	20.6	66 - 56	56 - 46	Pass
	0.174	26.5	1.5			Pass
	0.216	29.4	8.9			Pass
	0.258	26.5	7.4			Pass
	0.384	22.8	2.9			Pass
> 0,5 - 5	-	-	-	56	46	Pass
> 5 - 30	18.432	37.4	32.4	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	0.150	34.7	14.2	66 - 56	56 - 46	Pass
	0.192	32.6	11.3			Pass
	0.222	26.2	4.8			Pass
	0.312	23.2	0.9			Pass

> 0,5 - 5	1.206	26.2	9.1	56	46	Pass
> 5 - 30	18.432	35.4	31.0	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 2-4.

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 : 3.6VDC from rechargeable battery
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 5.

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 : 3.6VDC from rechargeable battery
Temperature : 23ºC
Humidity : 50%

Result: The screenshot in Appendix 1 page 4 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:

$$42 \times 2.968 \times 10^{-3} = 124.7 \times 10^{-3}\text{s}$$

$$\leq 400 \times 10^{-3}\text{s}$$

For test protocols please refer to Appendix 1, page 6-7.

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 : 3.6VDC from rechargeable battery
Temperature : 23ºC
Humidity : 50%

Results

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

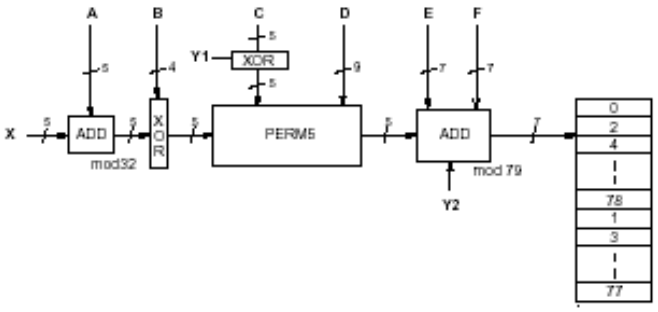
Frequency (MHz)	20 dB left (MHz)	20 dB right (MHz)	20dB bandwidth (MHz)
2402	0.380	0.352	0.732
2441	0.388	0.356	0.744
2480	0.388	0.352	0.740

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 : 3.6VDC from rechargeable battery
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 10-11.

Frequency (MHz)	Maximum peak output power (dBm)	Cable attenuation (dB)	Output power (dBm)	Limit (W/dBm)	Verdict
2402	-5.29	3.52	-1.77	1 / 30.0	Pass
2441	-5.31	3.65	-1.66	1 / 30.0	Pass
2480	-4.56	3.60	-0.96	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 : 3.6VDC from rechargeable battery
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 12-13.

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 : 3.6VDC from rechargeable battery
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 14-20.

Operating frequency (MHz)	Spurious frequency (MHz)	Spurious Level (dBm)	Reference value (dBm)	Delta (dB)	Verdict
2402	4805.540	-52.02	-5.91	-46.11	Pass
2441	4875.420	-50.94	-5.50	-45.44	Pass
2480	4955.180	-52.92	-4.37	-48.55	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 : 3.6VDC from rechargeable battery
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 21-59.

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
368.639	20.30	14.60	1.50	-	-	36.4	46.0 / QP
377.000	9.80	14.80	1.50	-	-	26.1	46.0 / QP

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
368.639	26.90	14.60	1.50	-	-	43.00	46.0 / QP
350.200	16.50	14.60	1.50	-	-	32.60	46.0 / QP

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**
268.639	15.50	11.50	1.10	-	-	28.10	46.0 / QP
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**
368.640	40.70	14.60	1.50	-	-	40.70	46.0 / QP
4881.860	38.55	33.40	3.53	32.87	0.33	42.94	74.0 / P
4882.060	35.21	33.40	3.53	32.87	0.33	39.60	54.0 / A
9764.085	36.59	38.00	5.40	33.85	0.48	46.62	74.0 / P
9763.965	26.87	38.00	5.40	33.85	0.48	36.90	54.0 / A
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**
368.641	18.70	14.60	1.50	-	-	34.80	46.0 / QP
4959.940	40.96	33.40	3.53	32.87	0.33	45.35	74.0 / P
4959.780	38.66	33.40	3.53	32.87	0.33	43.05	54.0 / A
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**
350.209	23.90	14.60	1.50	-	-	40.00	46.0 / QP
4959.880	38.67	33.40	3.53	32.87	0.33	43.06	74.0 / P
4959.940	35.94	33.40	3.53	32.87	0.33	40.33	54.0 / A

Appendix 1

Test results

Disturbance Voltage on AC Mains

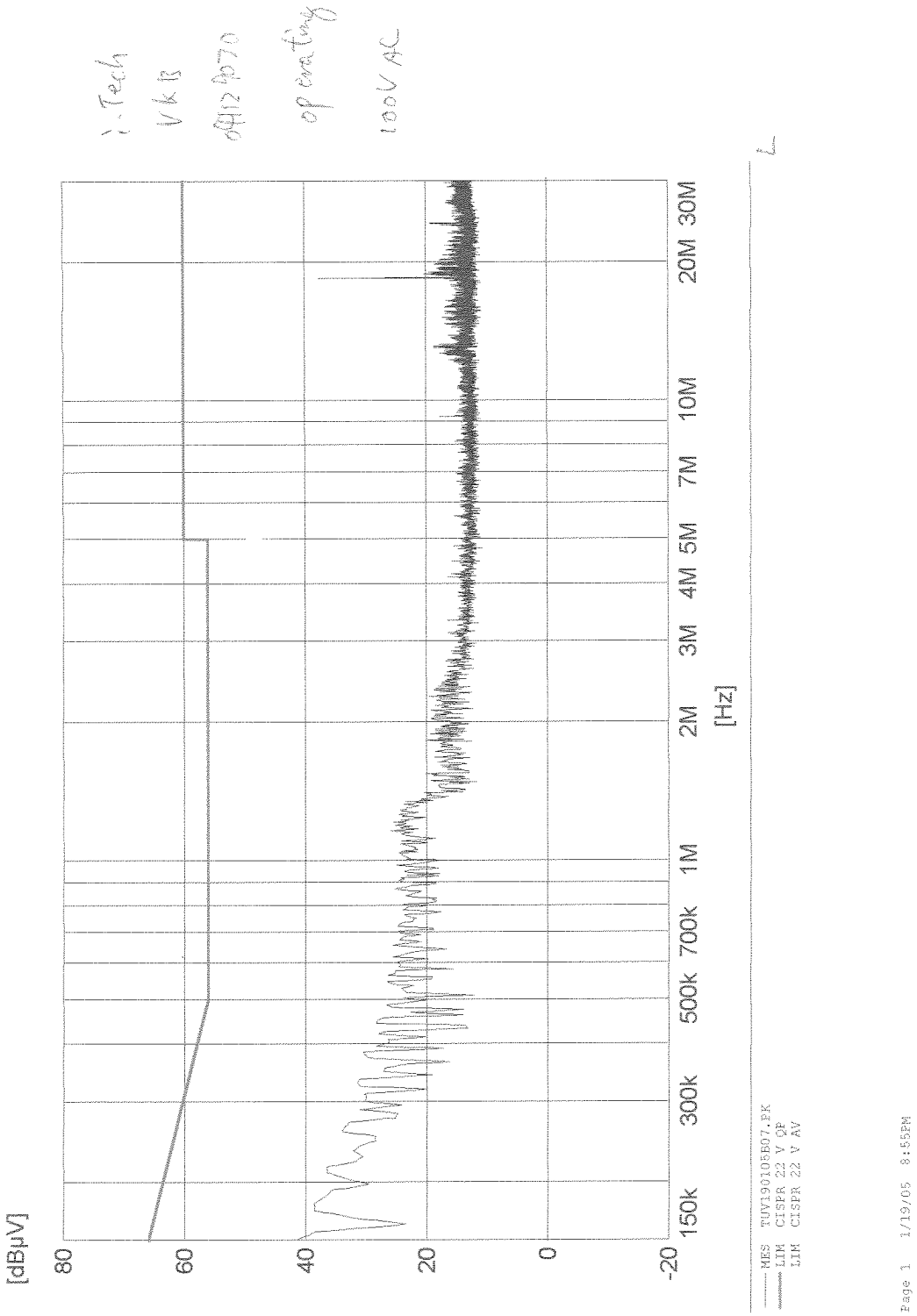
Date: 19 Jan 2005
EUT: Bluetooth Virtual Keyboard
Company: i.Tech Dynamic Ltd.
Humidity: 60%
Temperature: 23ºC
Voltage supply: 3.6VDC from rechargeable battery
Test by: Hugo Wan
Op. mode: Charging

Live measurement

Frequency (MHz)	QP reading (dBµV)	Av reading (dBµV)	Results
0.150	38.3	20.6	Pass
0.174	26.5	1.5	Pass
0.216	29.4	8.9	Pass
0.258	26.5	7.4	Pass
0.384	22.8	2.9	Pass
18.432	37.4	32.4	Pass

Neutral measurement

Frequency (MHz)	QP reading (dBµV)	Av reading (dBµV)	Results
0.150	34.7	14.2	Pass
0.192	32.6	11.3	Pass
0.222	26.2	4.8	Pass
0.312	23.2	0.9	Pass
1.206	26.2	9.1	Pass
18.432	35.4	31.0	Pass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40
20
0
-20
150k
300k
500k
700k
1M
2M
3M
4M
5M
7M
10M
20M
30M
[Hz]
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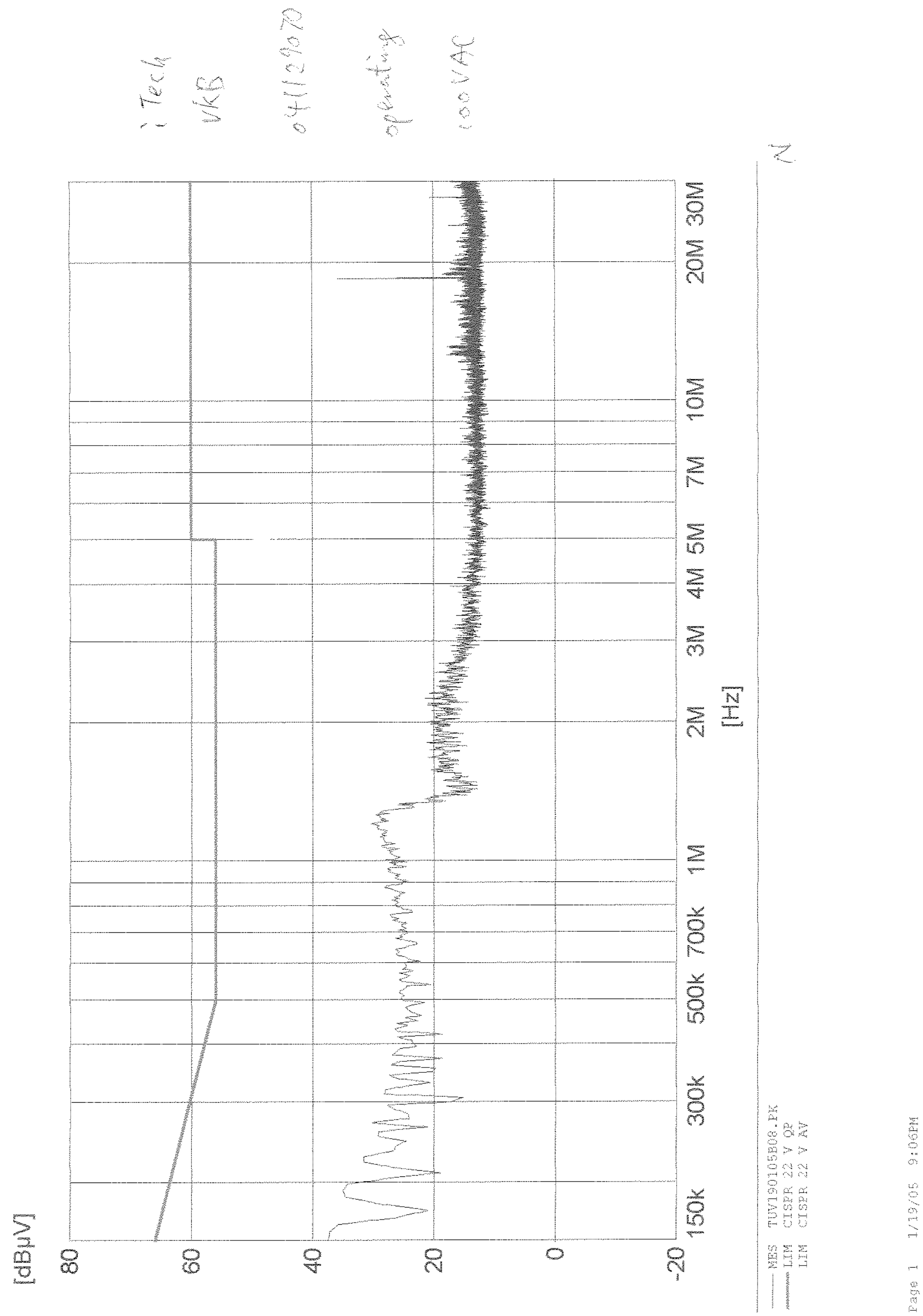
LIM CISPR 22 V QP
LIM CISPR 22 V AV
Page 1 1/19/05 8:55PM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40
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0
-20
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300k
500k
700k
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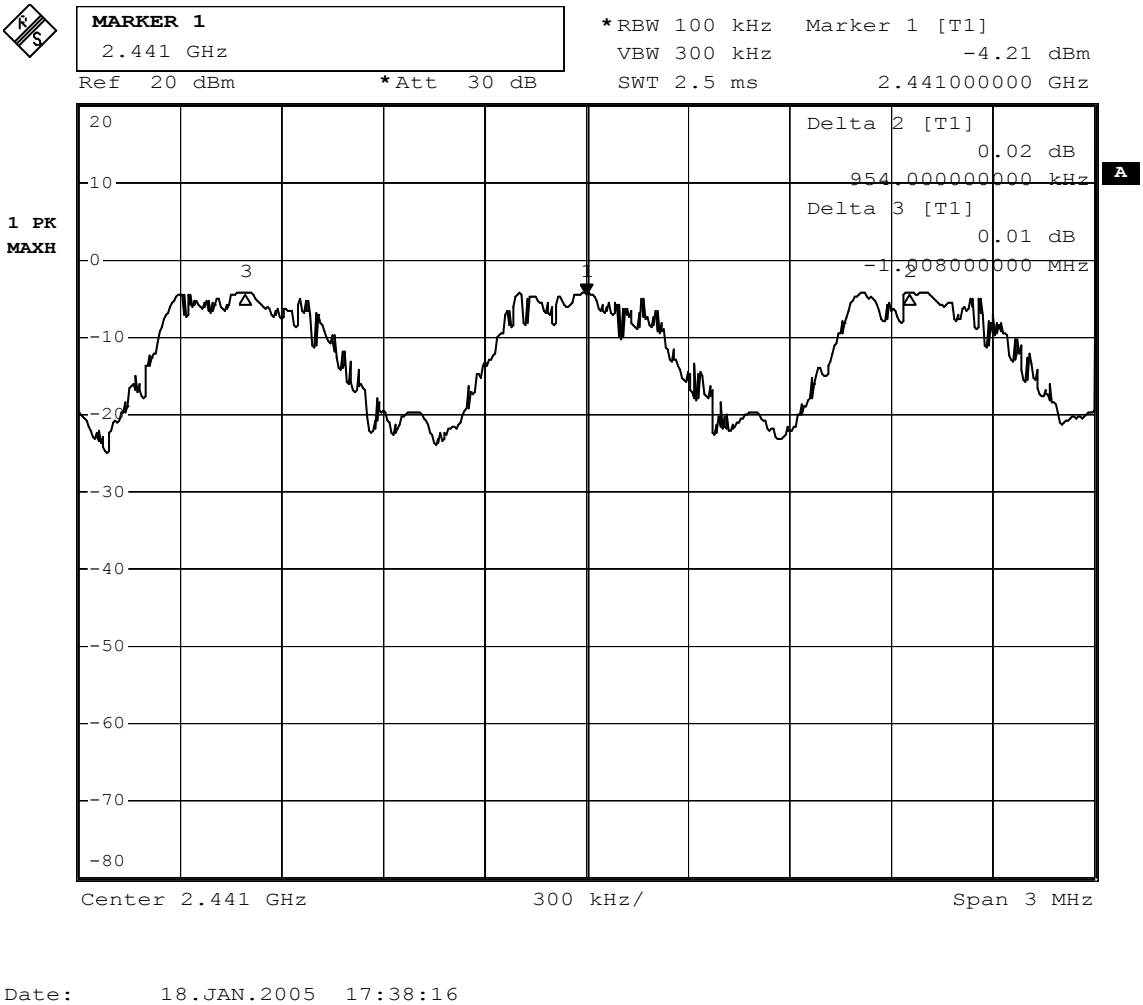
2M
3M
4M
5M
7M
10M
20M
30M
[Hz]
MES TUV190105B08.PK
LIM CISPR 22 V QP
LIM CISPR 22 V AV
Page 1 1/19/05 9:06PM

Carrier Frequency Separation

Date: 18 Jan 2005
EUT: Bluetooth Virtual Keyboard
Company: i.Tech Dynamic Ltd.
Humidity: 60%
Temperature: 23ºC
Voltage supply: 3.6VDC from rechargeable battery
Test by: Hugo Wan
Op. mode: Hopping on

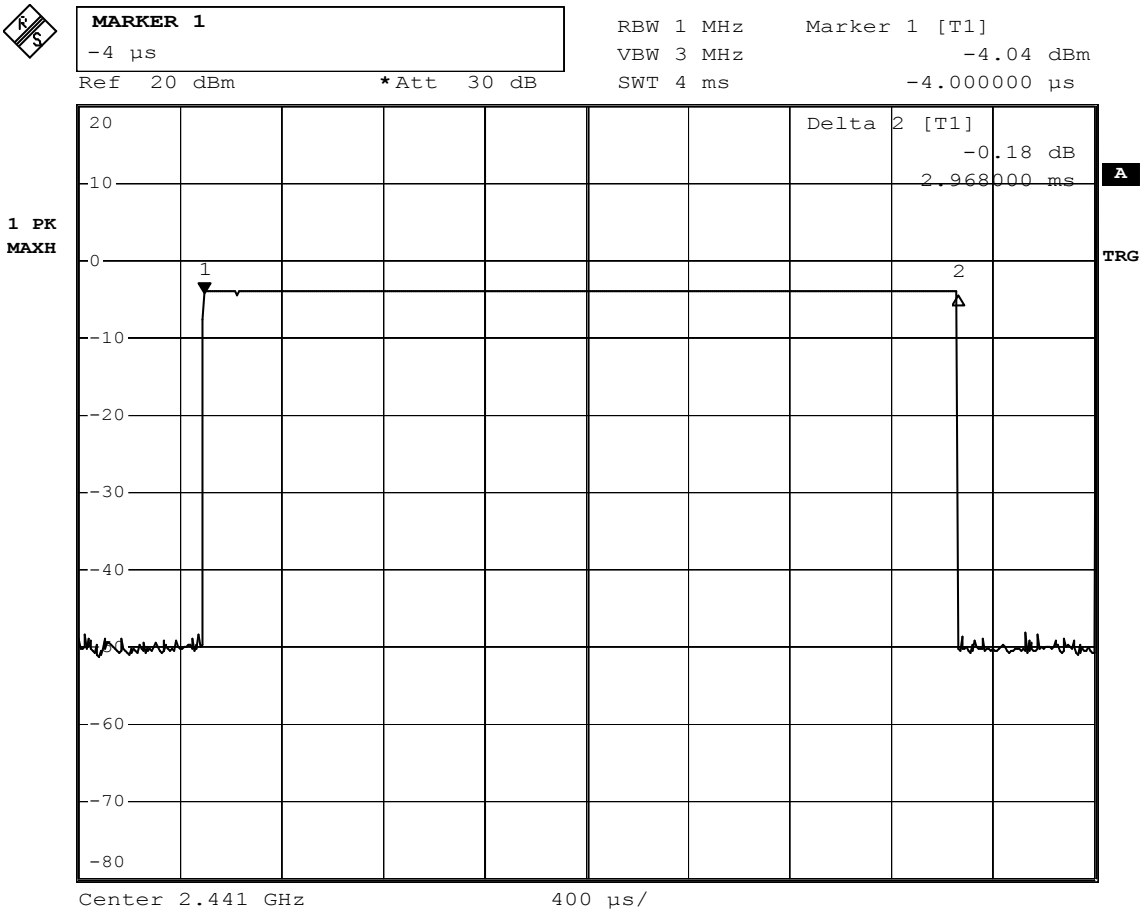
Reference frequency (MHz)	Channel Separation (MHz)
2441.000	0.954



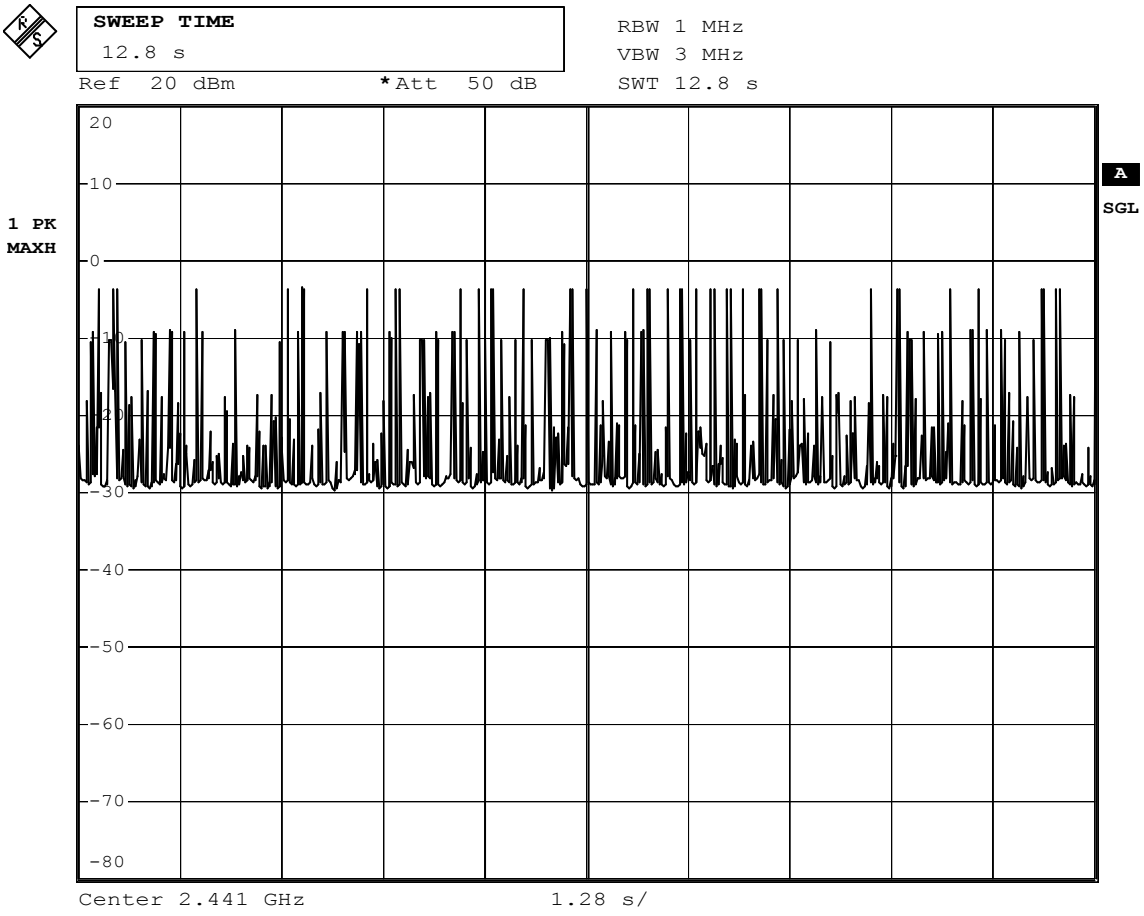
Dwell Time

Date: 18 Jan 2005
EUT: Bluetooth Virtual Keyboard
Company: i.Tech Dynamic Ltd.
Humidity: 60%
Temperature: 23ºC
Voltage supply: 3.6VDC from rechargeable battery
Test by: Hugo Wan
Op. mode: Hopping on

Burst Duration (ms)	Number of hopping	Time of occupancy (s)	Results
2.968	42	0.002968 x 42 = 0.1247	Pass



Date: 18.JAN.2005 17:44:30

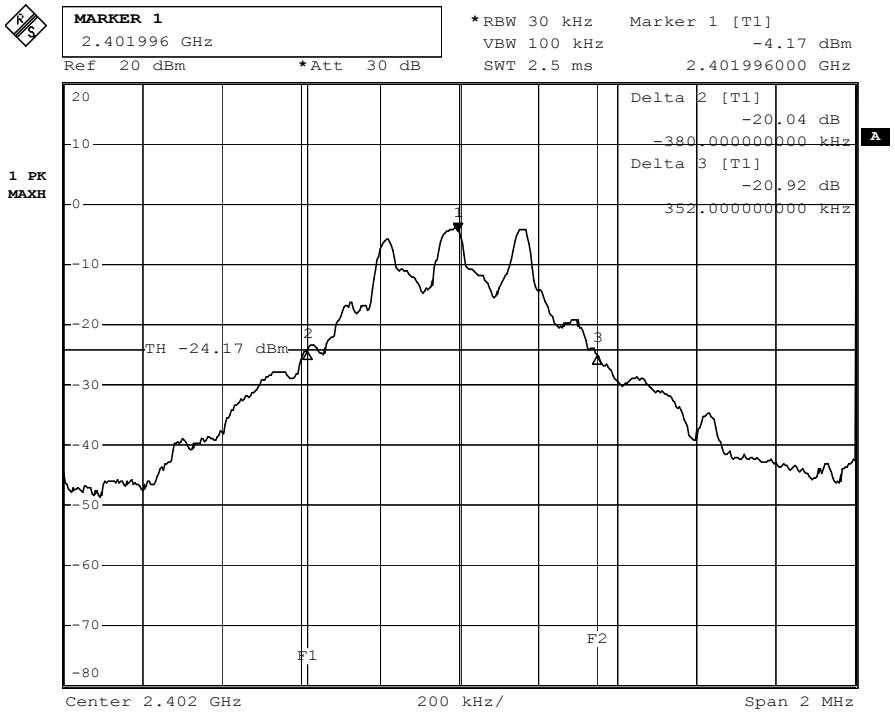


Date: 18.JAN.2005 17:48:48

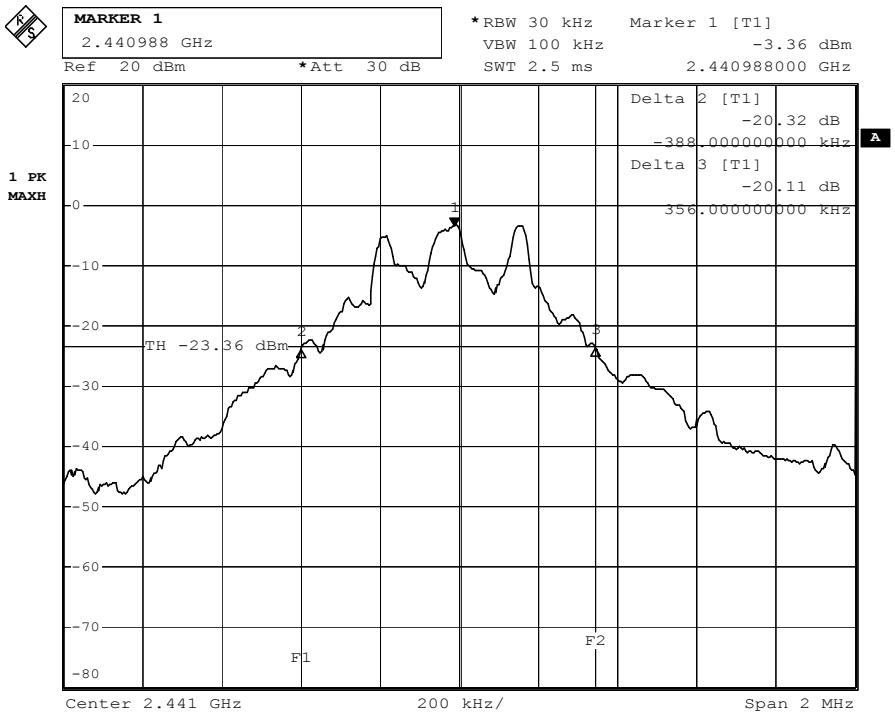
20dB Bandwidth

Date: 18 Jan 2005
EUT: Bluetooth Virtual Keyboard
Company: i.Tech Dynamic Ltd.
Humidity: 60%
Temperature: 23ºC
Voltage supply: 3.6VDC from rechargeable battery
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	0.380	0.352	0.732	Pass
2441	0.388	0.356	0.744	Pass
2480	0.388	0.352	0.740	Pass

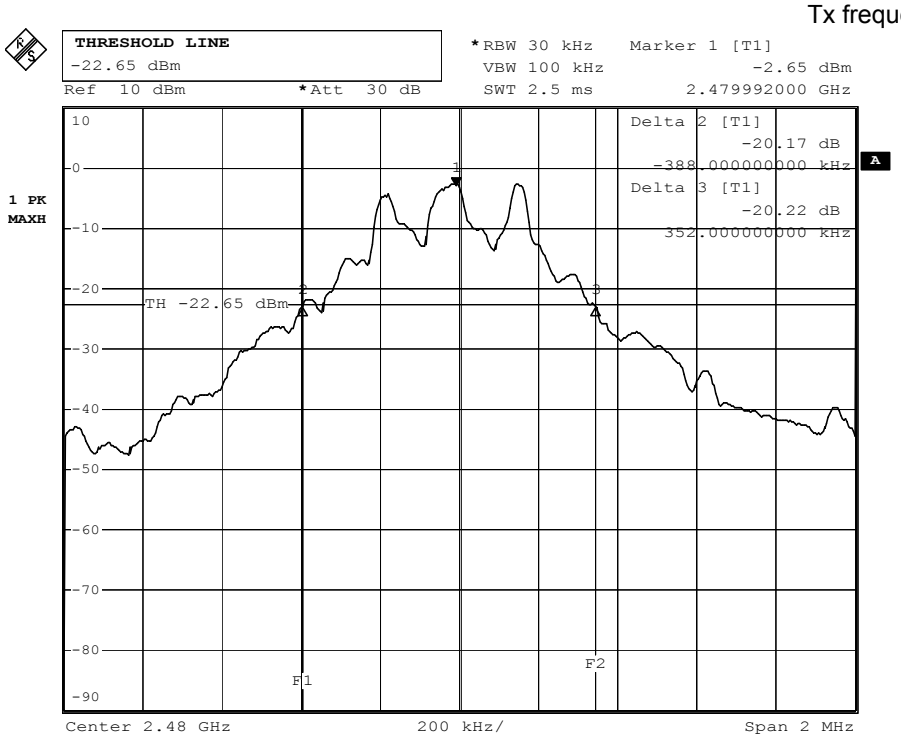


Tx frequency: 2402MHz



Date: 18.JAN.2005 17:58:35

Tx frequency: 2441MHz



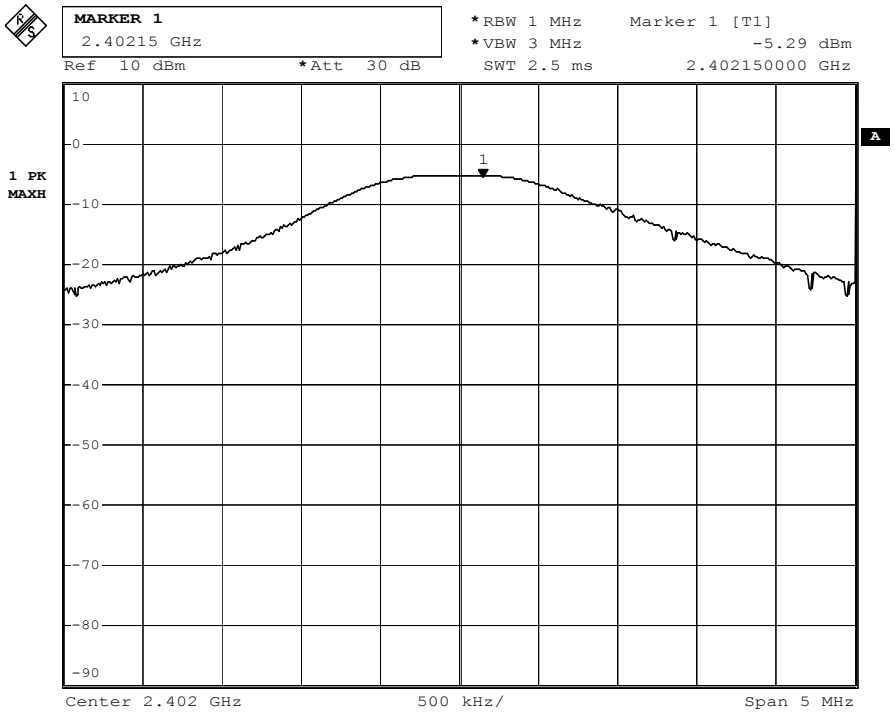
Date: 18.JAN.2005 18:01:37

Tx frequency: 2480MHz

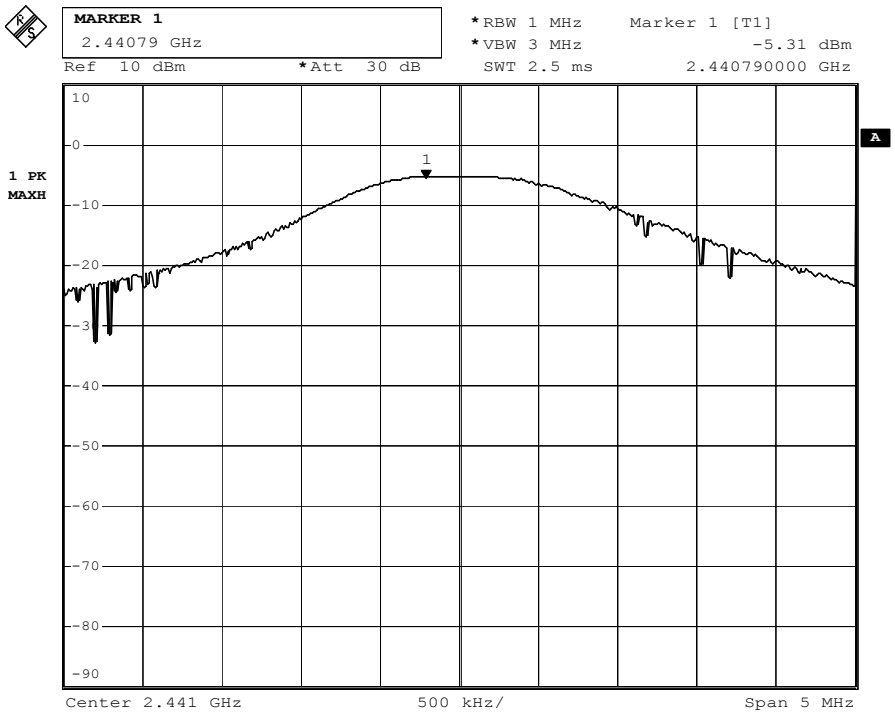
Peak Output Power

Date: 19 Jan 2005
EUT: Bluetooth Virtual Keyboard
Company: i.Tech Dynamic Ltd.
Humidity: 60%
Temperature: 23ºC
Voltage supply: 3.6VDC from rechargeable battery
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	-5.29	3.52	-1.77	Pass
2441	-5.31	3.65	-1.66	Pass
2480	-4.56	3.60	-0.96	Pass

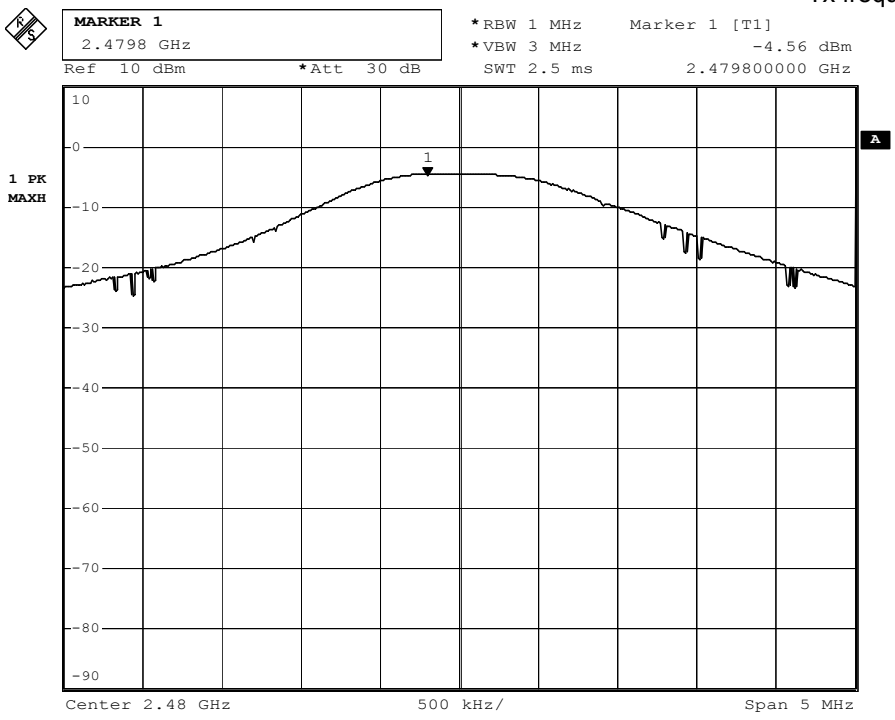


Tx frequency: 2402MHz



Date: 19.JAN.2005 11:22:46

Tx frequency: 2441MHz



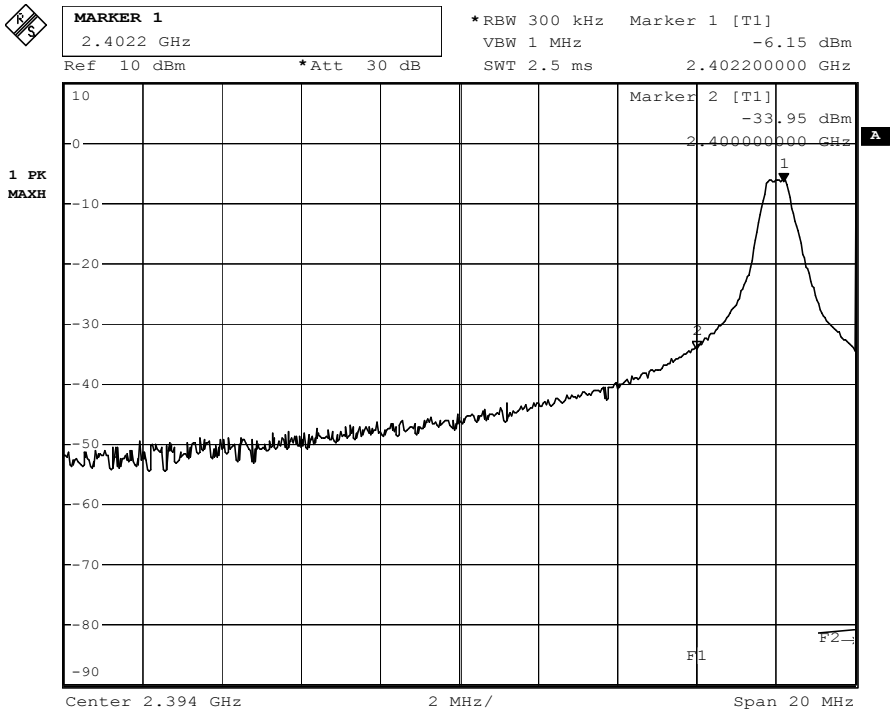
Date: 19.JAN.2005 11:24:09

Tx frequency: 2480MHz

Band Edge Compliance

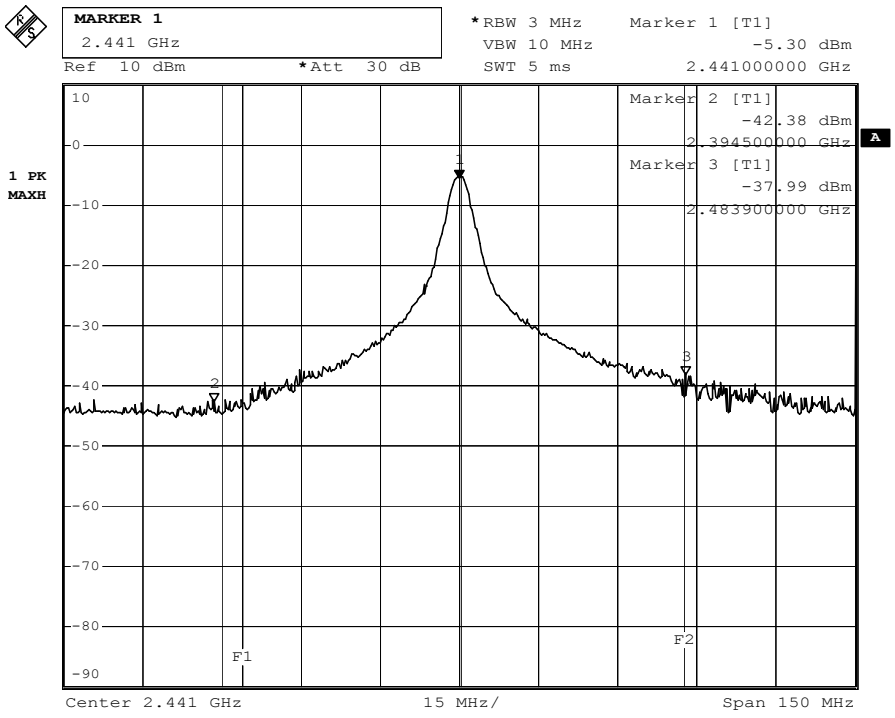
Date: 19 Jan 2005
EUT: Bluetooth Virtual Keyboard
Company: i.Tech Dynamic Ltd.
Humidity: 60%
Temperature: 23ºC
Voltage supply: 3.6VDC from rechargeable battery
Test by: Hugo Wan
Op. mode: TX mode, DH1 with PRBS9 payload

Tx Frequency (MHz)	Peak in band Power level (dBm)	RF power outside 100kHz BW (MHz)	RF power difference outside 100kHz BW (dB)	Results
2402	-6.15	No Peak	-	Pass
2480	-4.11	No Peak	-	Pass

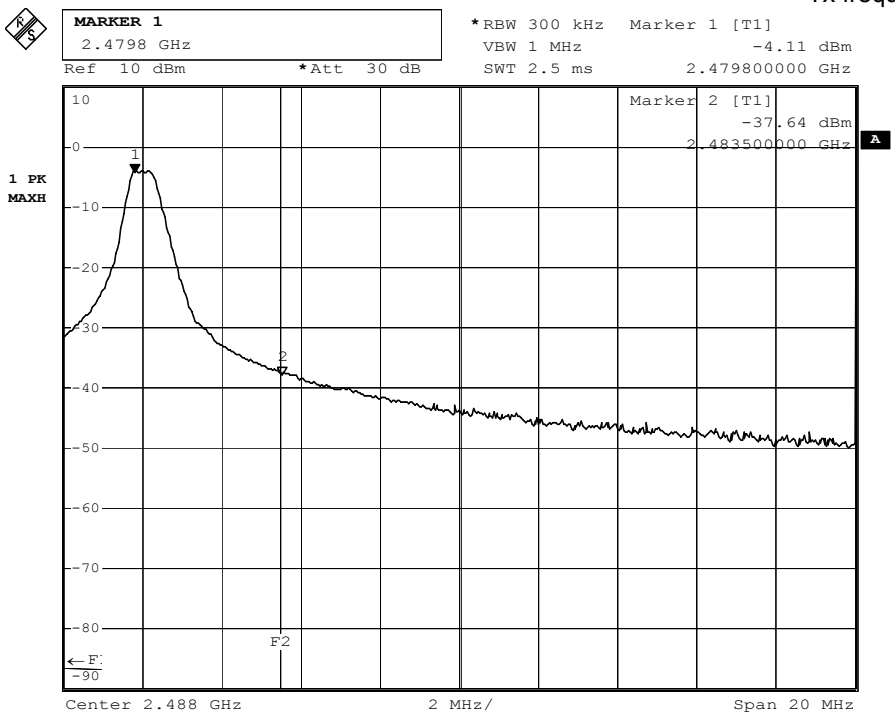


Date: 19.JAN.2005 11:40:25

Tx frequency: 2402MHz



Tx frequency: 2441MHz



Tx frequency: 2480MHz

Spurious Emissions - Conducted

Date: 19 Jan 2005
EUT: Bluetooth Virtual Keyboard
Company: i.Tech Dynamic Ltd.
Humidity: 60%
Temperature: 23ºC
Voltage supply: 3.6VDC from rechargeable battery
Test by: Hugo Wan
Op. mode: TX mode, DH1 with PRBS9 payload

Tx frequency : 2402MHz

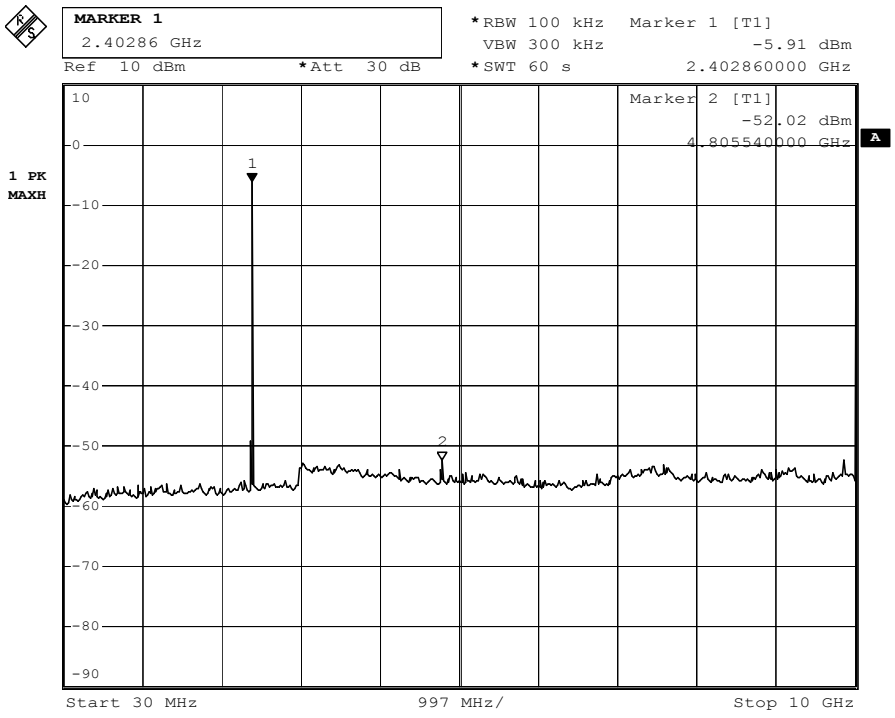
Spurious Frequency (MHz)	Power level (dBm)	Reference value (dBm)	Delta to reference level (dB)	Results
4805.540	-52.02	-5.91	-46.11	Pass

Tx frequency : 2441MHz

Spurious Frequency (MHz)	Power level (dBm)	Reference value (dBm)	Delta to reference level (dB)	Results
4875.420	-50.94	-5.50	-45.44	Pass

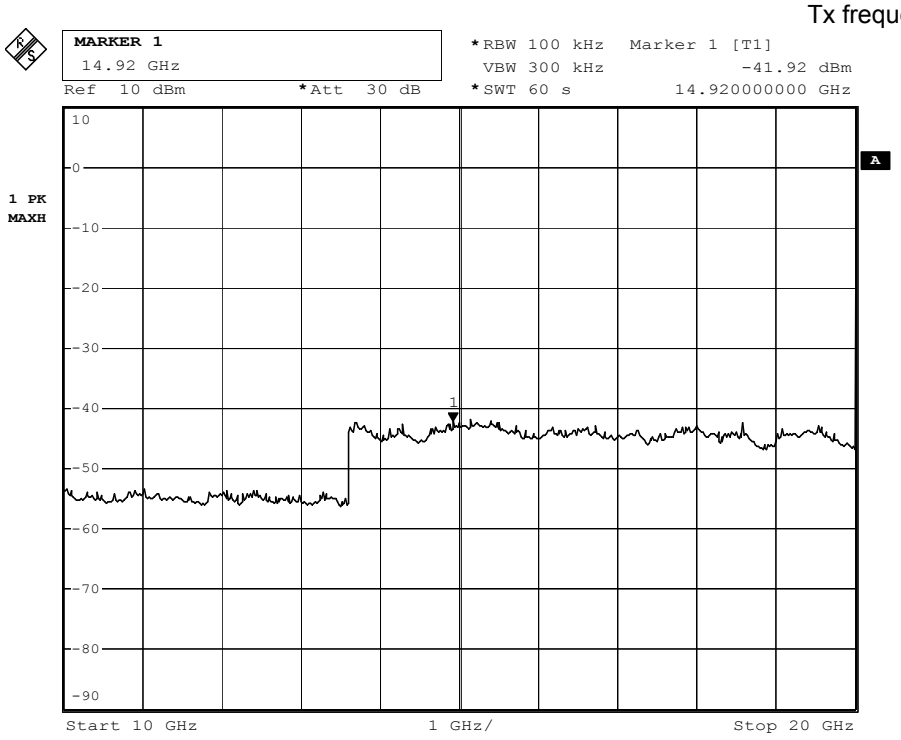
Tx frequency : 2480MHz

Spurious Frequency (MHz)	Power level (dBm)	Reference value (dBm)	Delta to reference level (dB)	Results
4955.180	-52.92	-4.37	-48.55	Pass



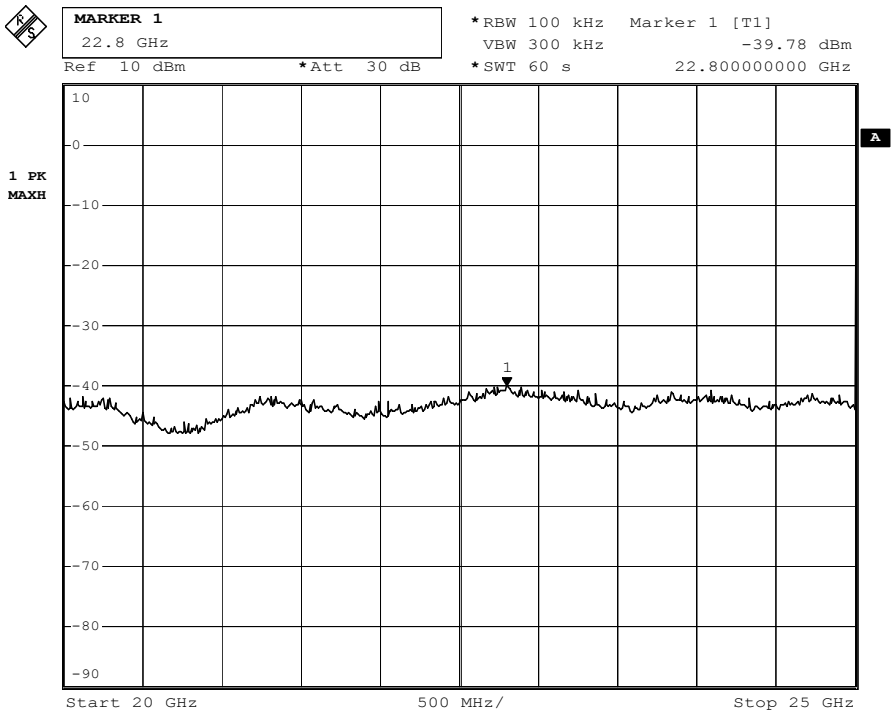
Date: 19.JAN.2005 11:46:38

Tx frequency: 2402MHz



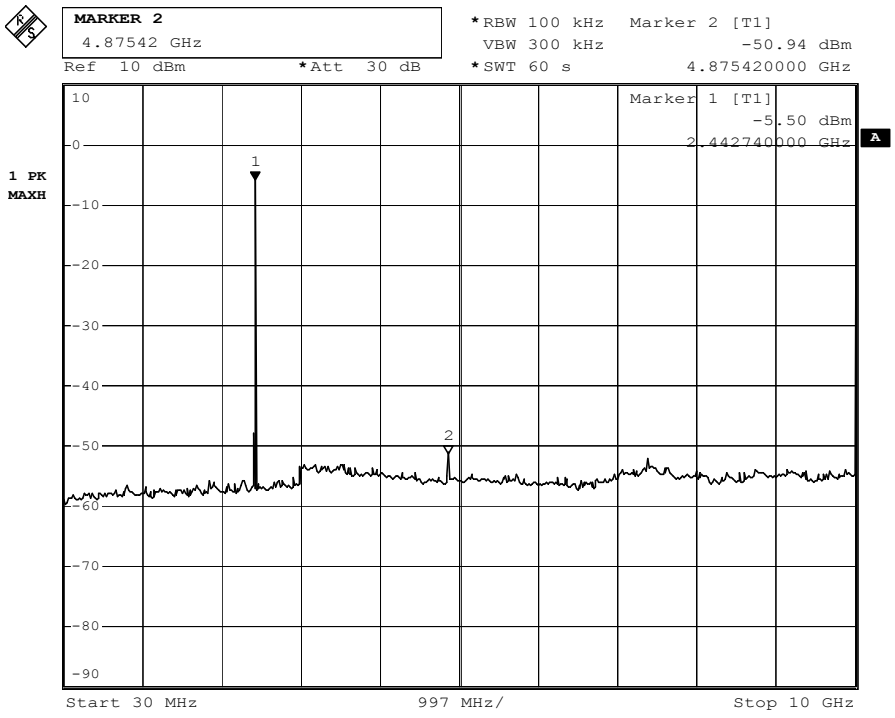
Date: 19.JAN.2005 11:50:25

Tx frequency: 2402MHz



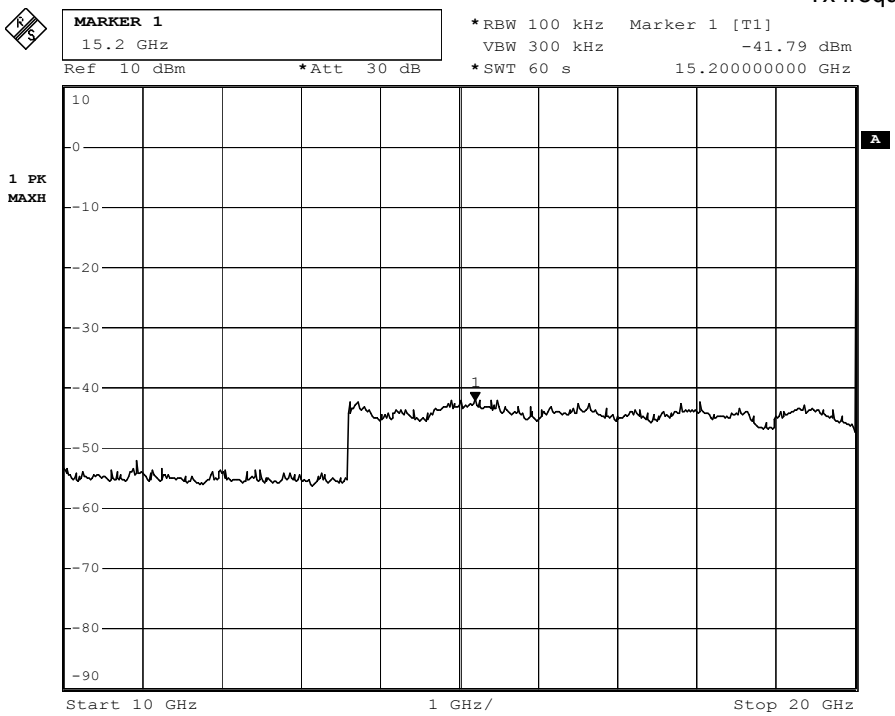
Date: 19.JAN.2005 11:51:44

Tx frequency: 2402MHz



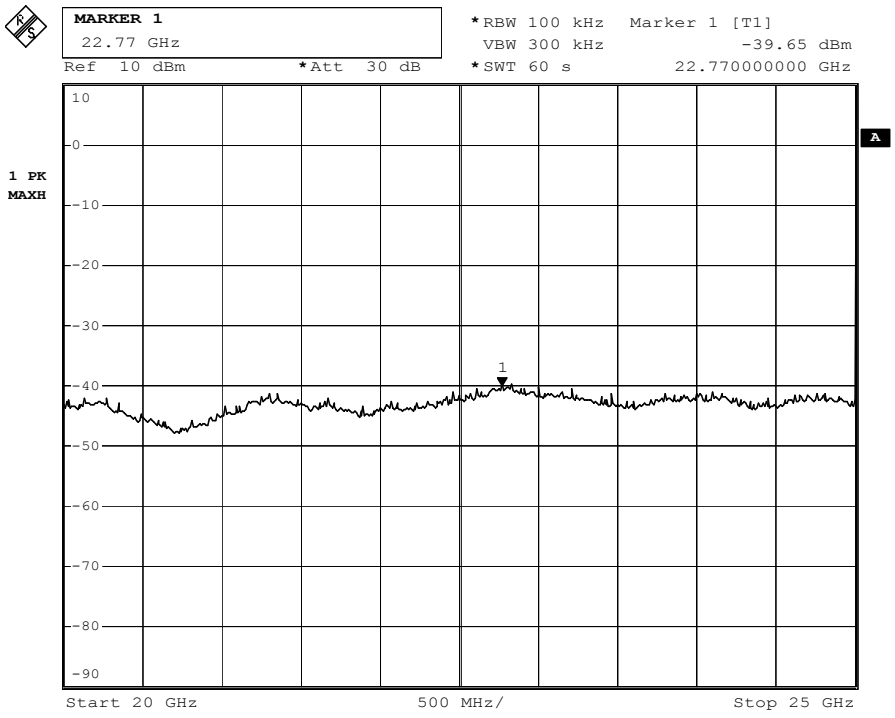
Date: 19.JAN.2005 13:57:30

Tx frequency: 2441MHz



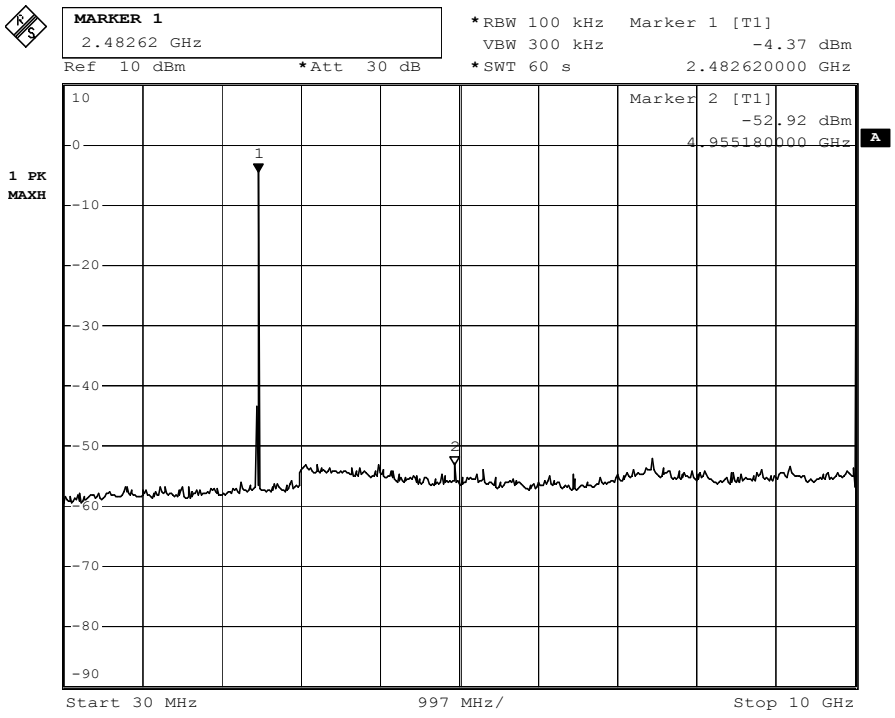
Date: 19.JAN.2005 13:48:20

Tx frequency: 2441MHz



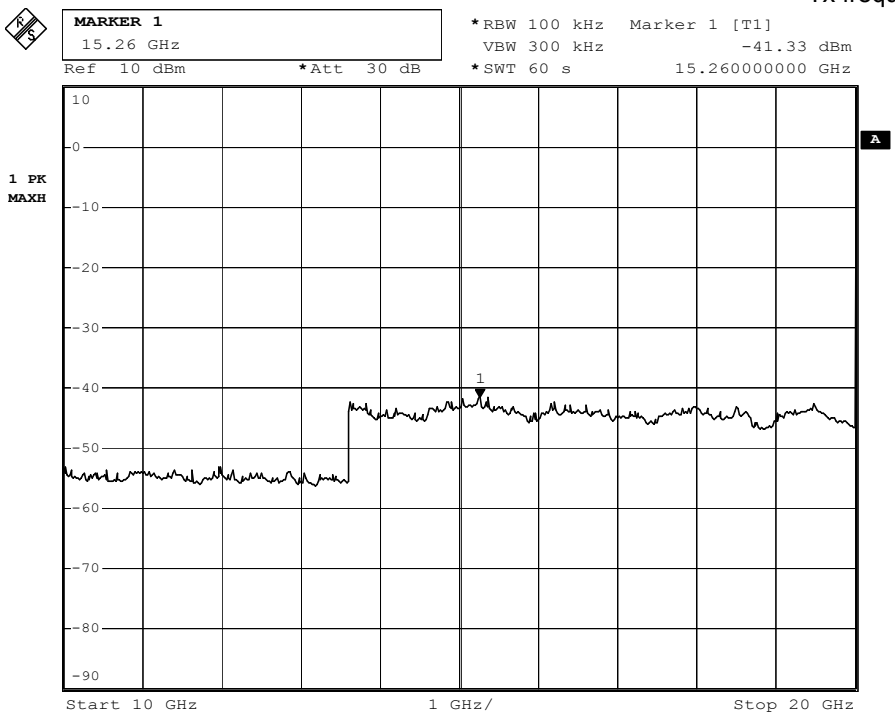
Date: 19.JAN.2005 13:46:01

Tx frequency: 2441MHz



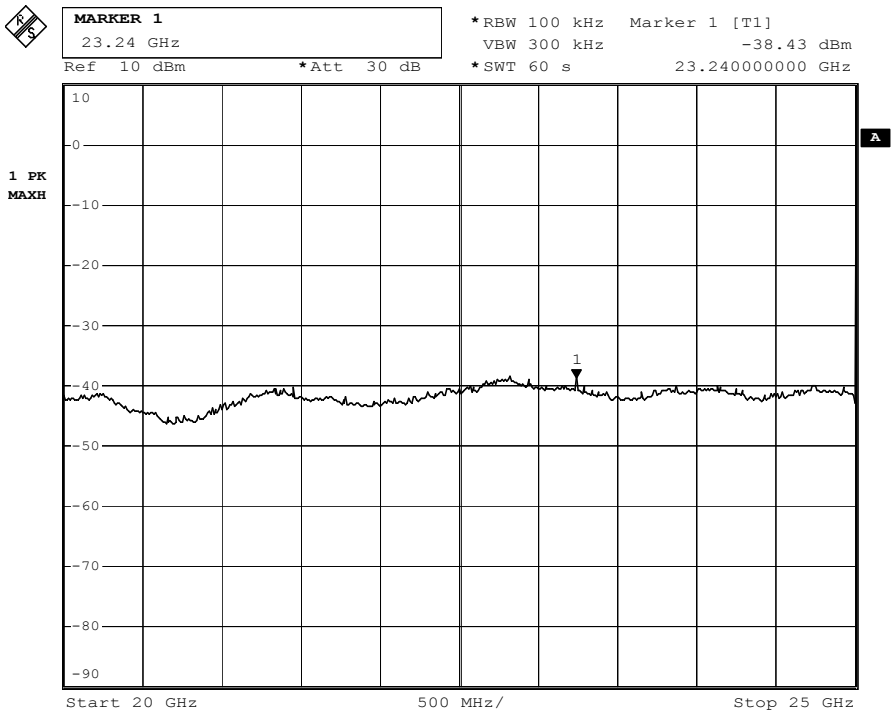
Date: 19.JAN.2005 14:00:49

Tx frequency: 2480MHz



Date: 19.JAN.2005 13:50:52

Tx frequency: 2480MHz



Date: 19.JAN.2005 13:43:36

Tx frequency: 2480MHz

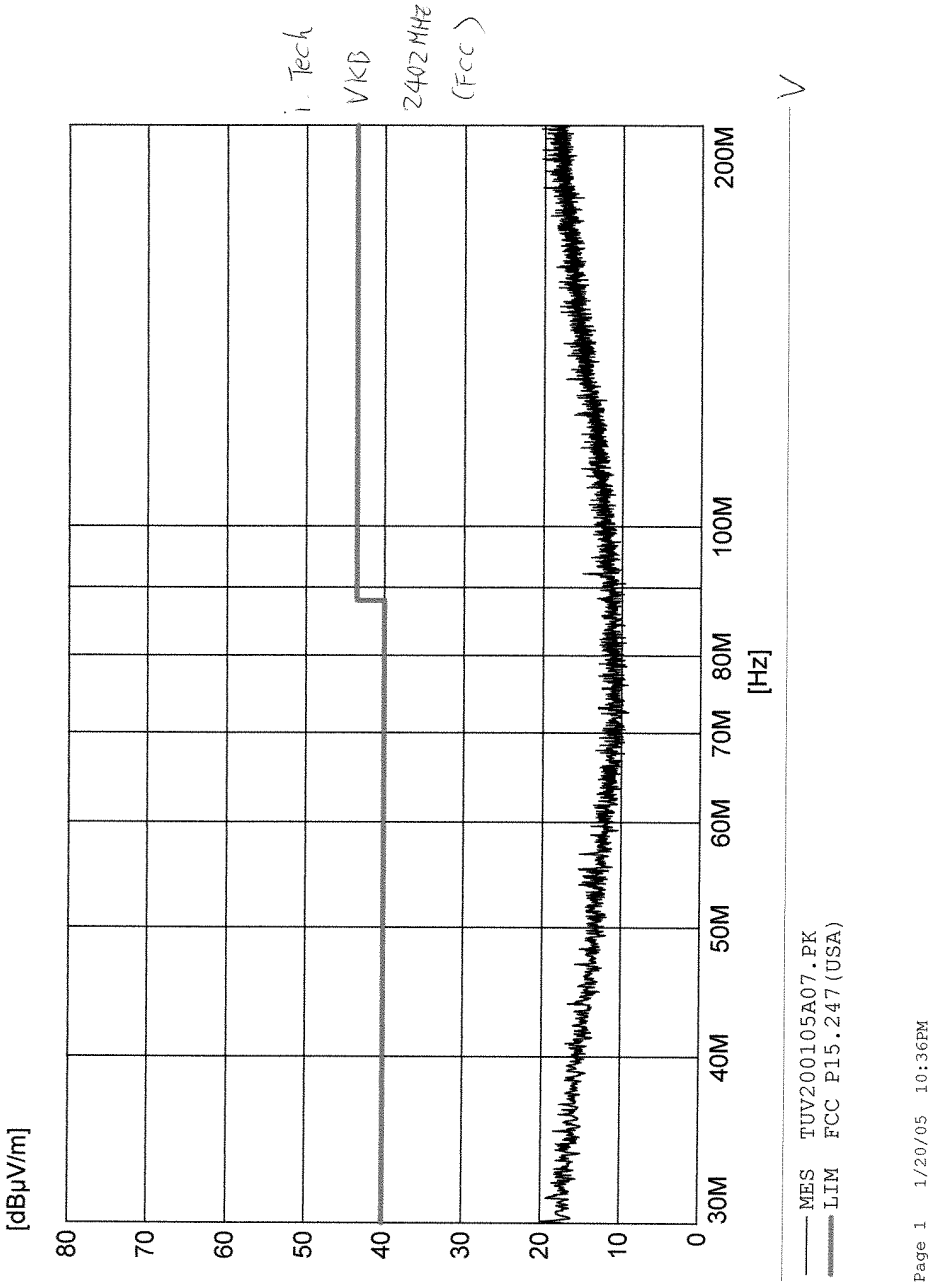
Spurious Emissions - Radiated

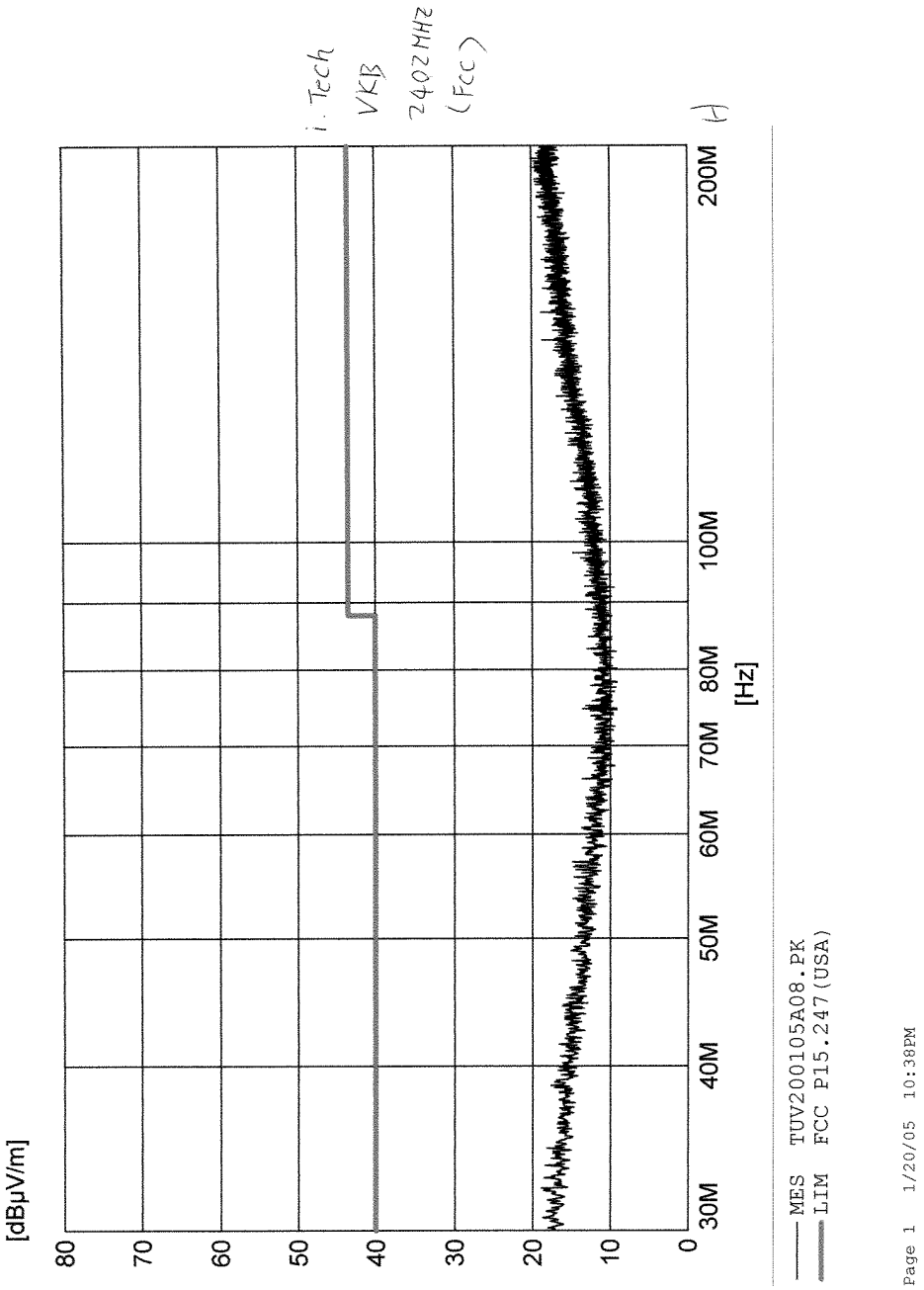
Date: 20 Jan 2005
EUT: Bluetooth Virtual Keyboard
Company: i.Tech Dynamic Ltd.
Voltage supply: 3.6VDC from rechargeable battery
Test by: Hugo Wan
Op. mode: TX mode, DH1 with PRBS9 payload

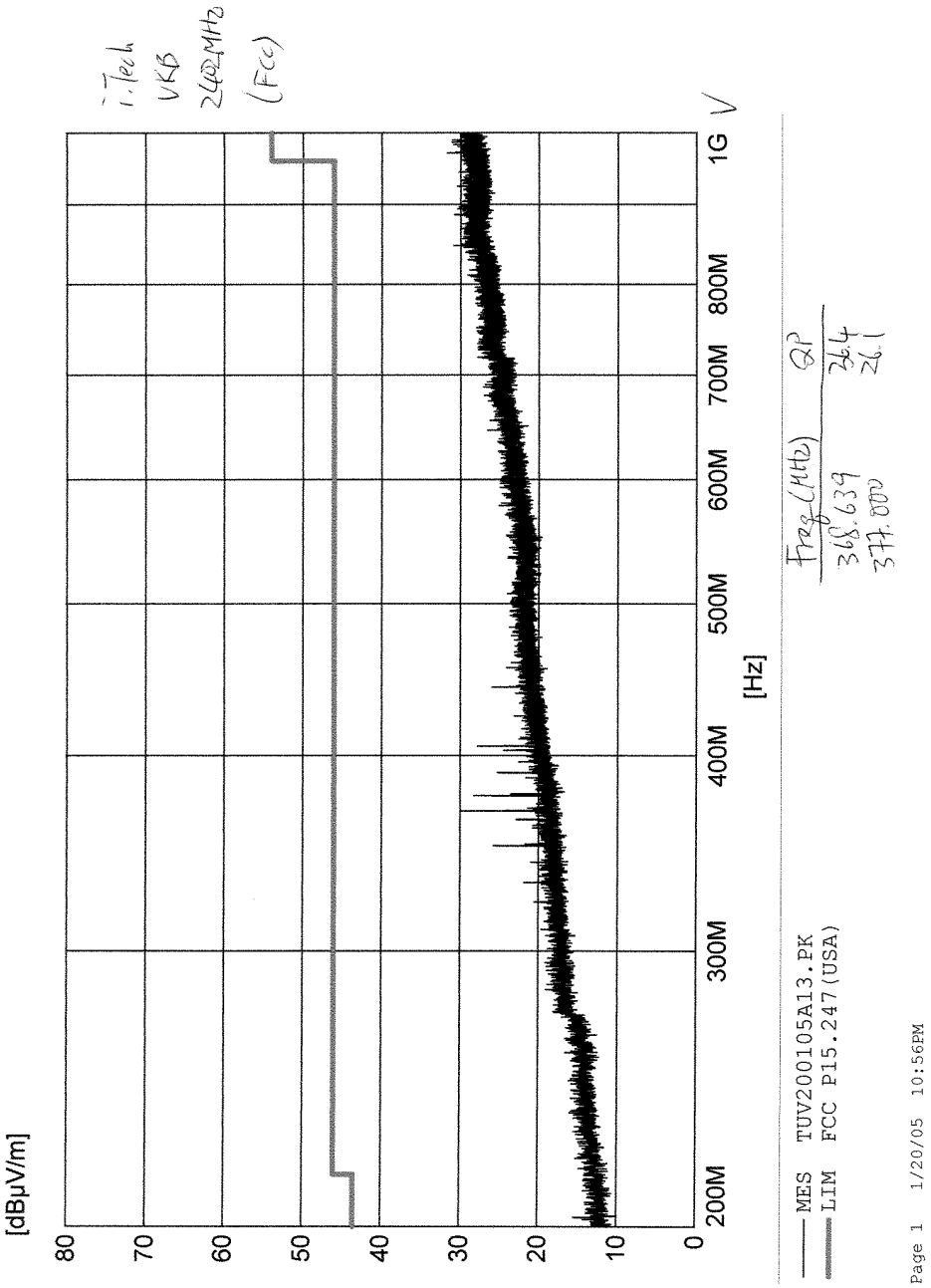
Tx frequency (MHz)	Polarization	Spurious Frequency (MHz)	Power Level (dBuV/m)	Detector (P/QP/A)
2402	V	368.639	36.40	QP
2402	V	377.000	26.10	QP
2402	H	368.639	43.00	QP
2402	H	350.200	32.60	QP

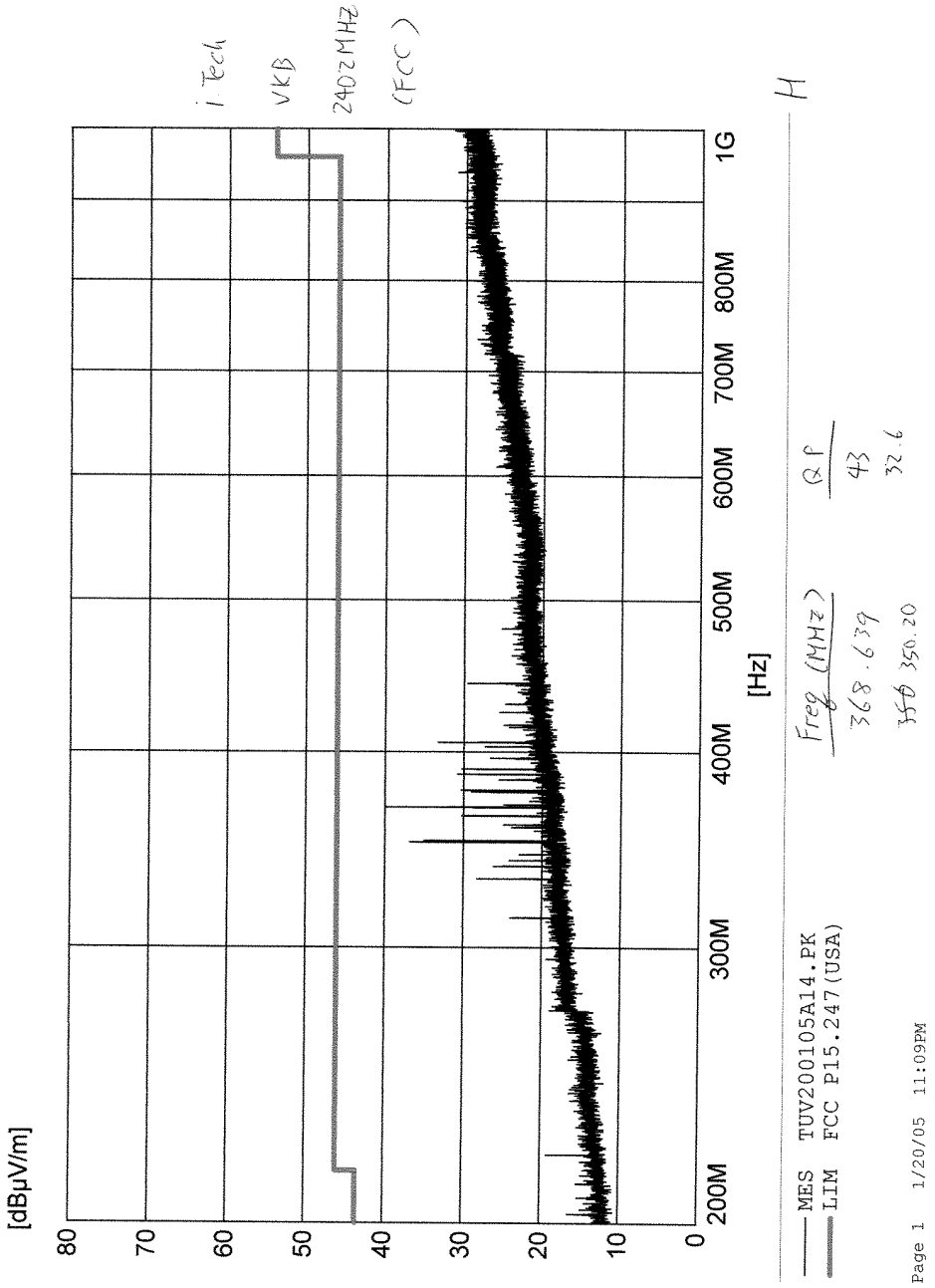
Tx frequency (MHz)	Polarization	Spurious Frequency (MHz)	Power Level (dBuV/m)	Detector (P/QP/A)
2441	V	368.639	28.10	QP
2441	H	368.640	40.70	QP
2441	H	4881.860	42.94	P
2441	H	4882.060	39.60	A
2441	H	9764.085	46.62	P
2441	H	9763.965	36.90	A

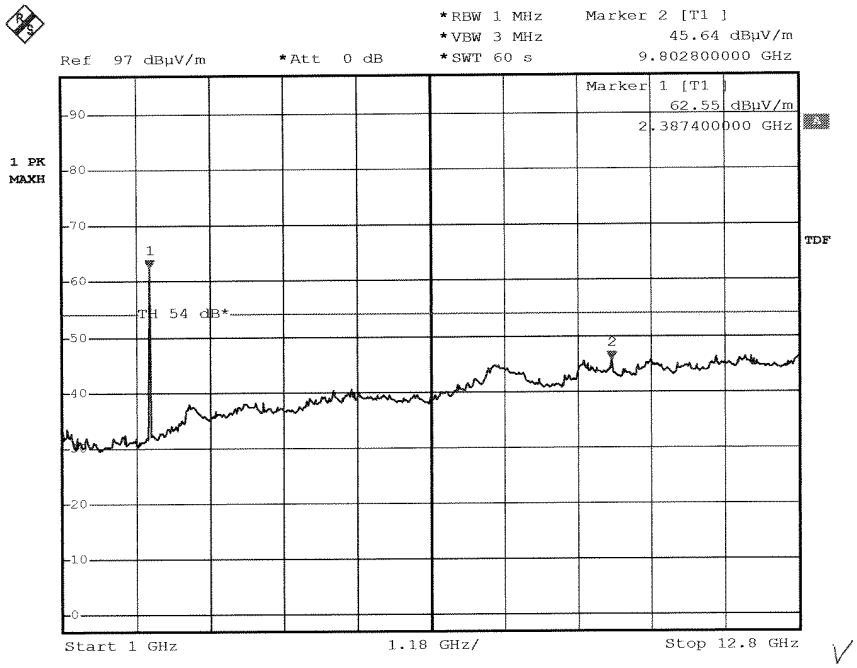
Tx frequency (MHz)	Polarization	Spurious Frequency (MHz)	Power Level (dBuV/m)	Detector (P/QP/A)
2480	V	368.641	34.80	QP
2480	V	4959.940	45.35	P
2480	V	4959.780	43.05	A
2480	H	350.209	40.00	QP
2480	H	4959.880	43.06	P
2480	H	4959.940	40.33	A


i. Tech
VKB
2402 MHz
(FCC)
V
[dBµV/m]
80
70
60
50
40
30
20
10
0
30M
40M
50M
60M
70M
80M
100M
200M
[Hz]
MES TUV200105A07.PK
LIM FCC P15.247(USA)
Page 1 1/20/05 10:36PM


i. Tech
VKB
2402 MHz
(Fcc)
[dBµV/m]
80
70
60
50
40
30
20
10
0
30M
40M
50M
60M
70M
80M
100M
200M
[Hz]
MES TUV200105A08.PK
LIM FCC P15.247(USA)
Page 1 1/20/05 10:38PM


i.Tech
VKB
240MHz
(FCC)
[dBµV/m]
80
70
60
50
40
30
20
10
0
200M
300M
400M
500M
600M
700M
800M
1G
[Hz]
V
Freq (MHz)
368.639
377.000
QP
26.4
26.1
MES TUV200105A13.PK
LIM FCC P15.247(USA)
Page 1 1/20/05 10:56PM


i Tech
VKB
2402MHz
(FCC)
H
[dBµV/m]
80
70
60
50
40
30
20
10
0
200M
300M
400M
500M
600M
700M
800M
1G
[Hz]
MES TUV200105A14.PK
LIM FCC P15.247(USA)
Freq (MHz)
368.639
350.20
Q P
43
32.6
Page 1 1/20/05 11:09PM



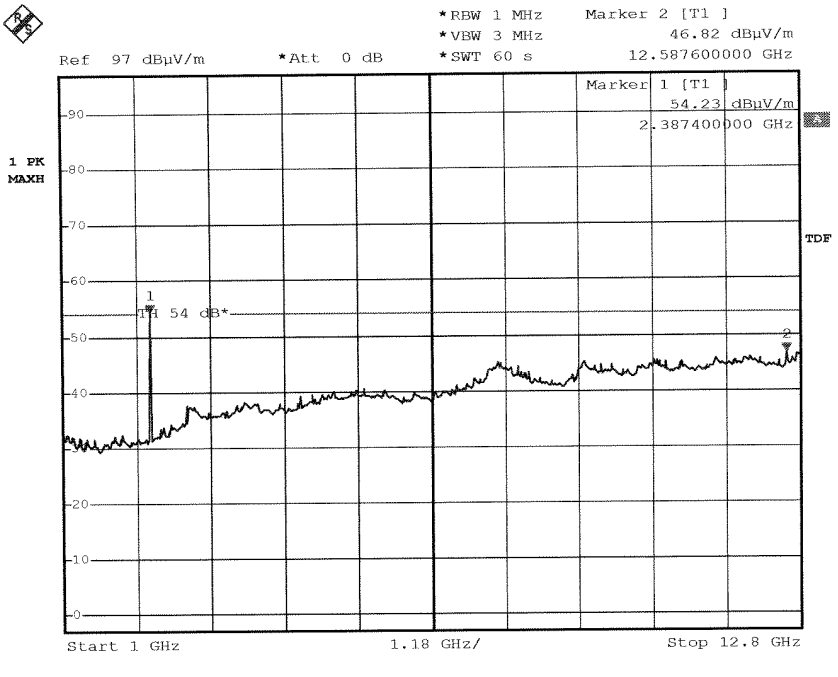
V

Date: 20.JAN.2005 08:58:52

1. Tech

VKB

2402MHz (FCC)



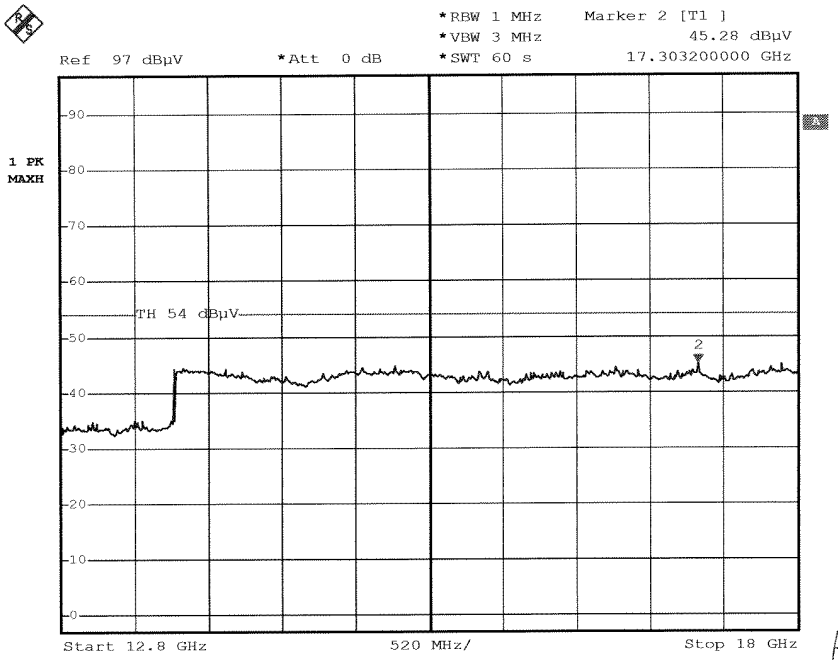
H

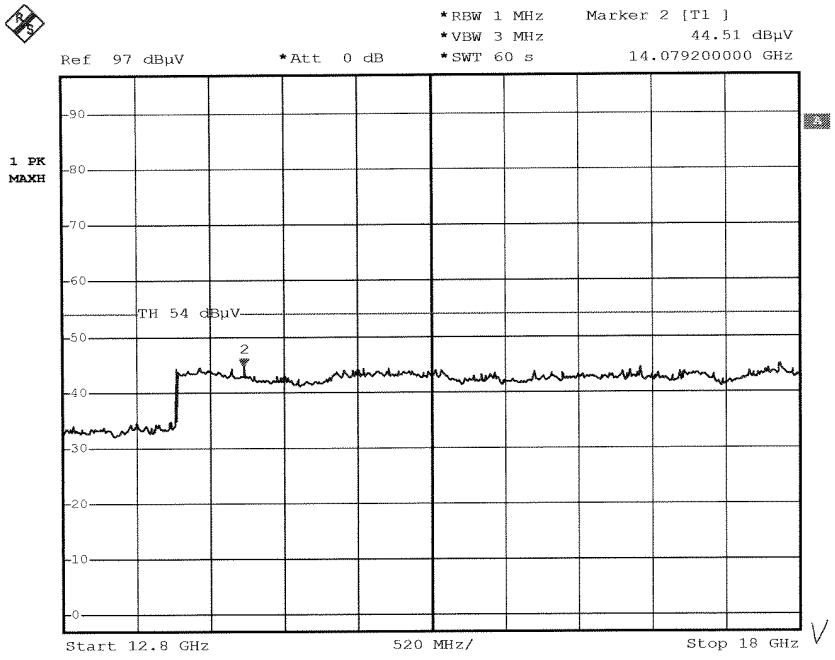
Date: 20.JAN.2005 08:51:14

i. Tech

VKB

2402 MHz (FCC)


*RBW 1 MHz
*VBW 3 MHz
*SWT 60 s
Marker 2 [T1]
45.28 dBµV
17.303200000 GHz
Ref 97 dBµV
*Att 0 dB
1 PK
MAXH
TH 54 dBµV
2
Start 12.8 GHz
520 MHz/
Stop 18 GHz
H
Date: 20.JAN.2005 10:19:48
i.Tech
VKB
2402 MHz
(Fcc)



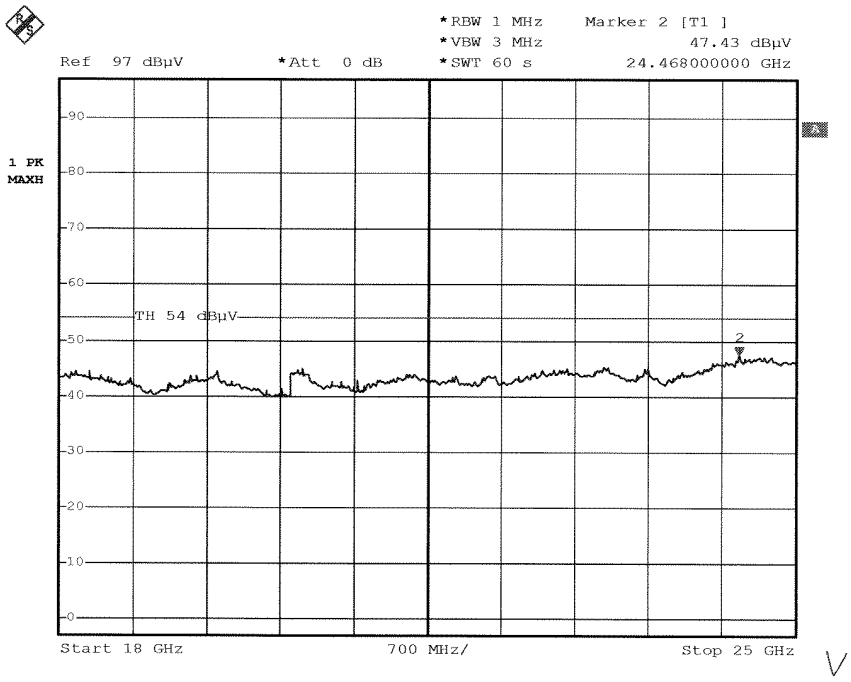
Date: 20.JAN.2005 10:17:29

i. Tech

V kB

2402 MHz

(Fcc)



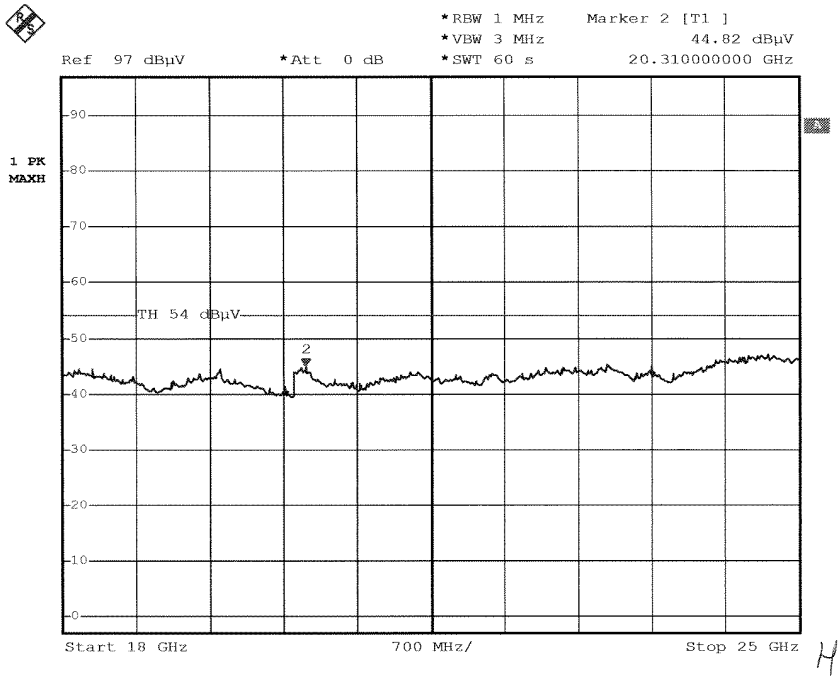
Date: 20.JAN.2005 10:25:17

i. Tech

VKB

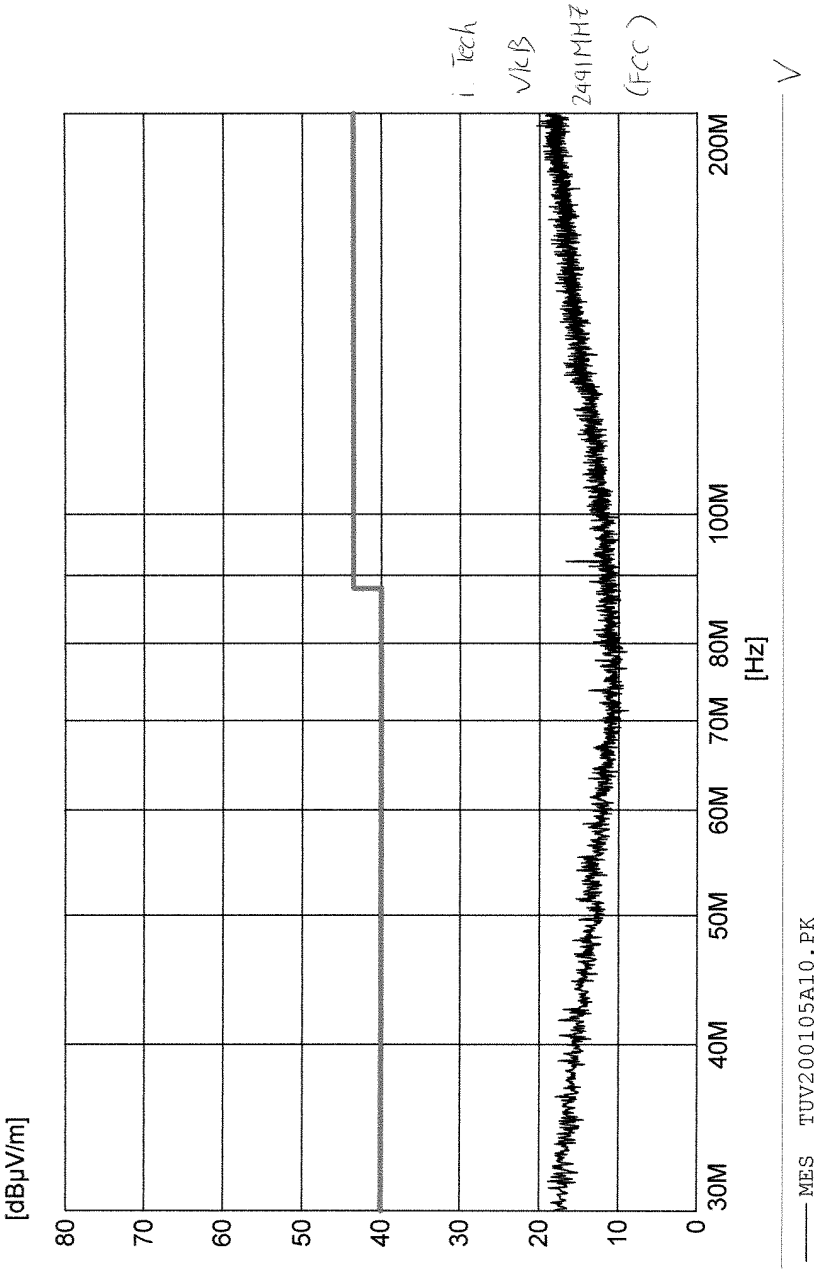
2402MHz

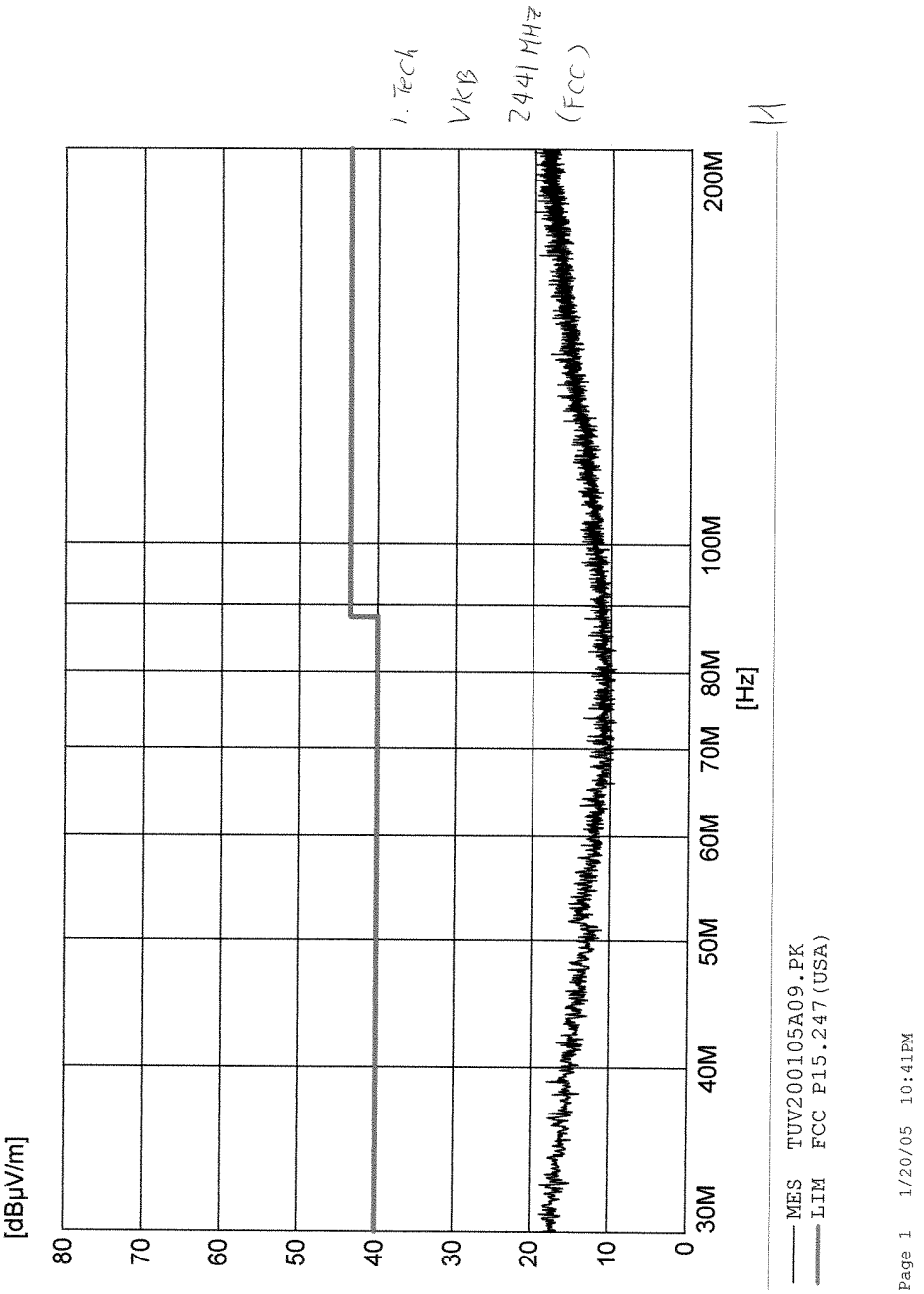
(FCC)

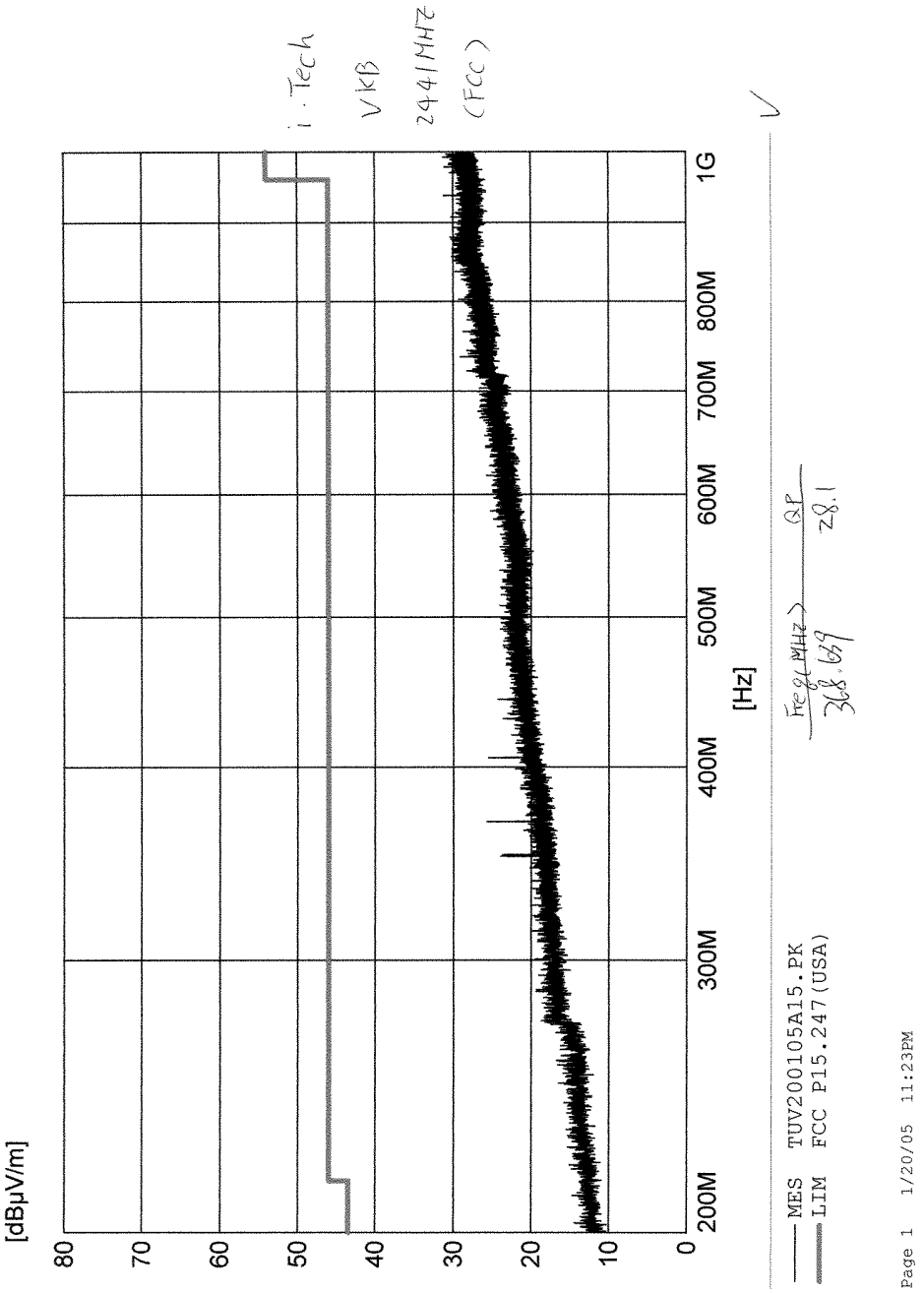


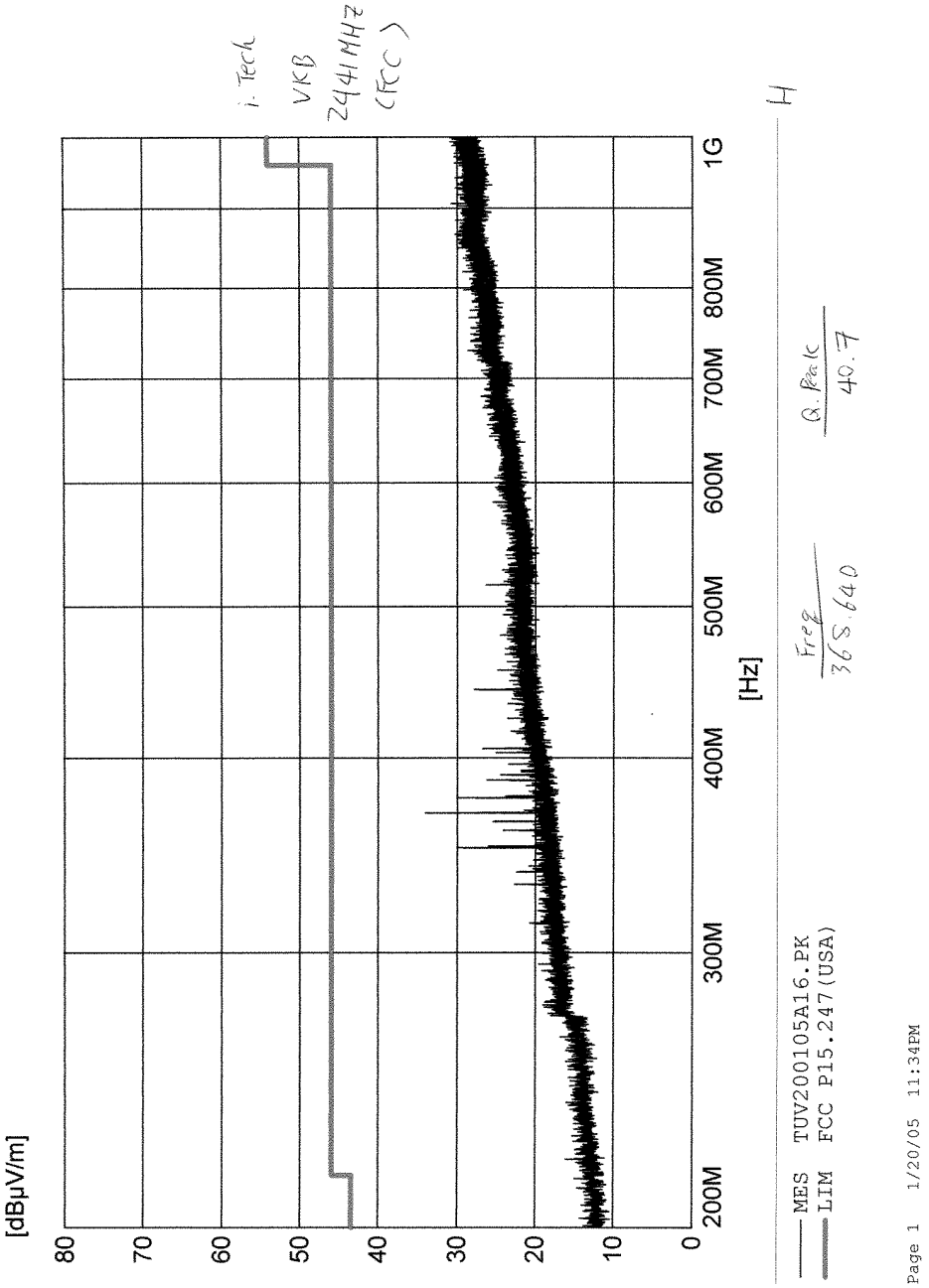
Date: 20.JAN.2005 10:22:18

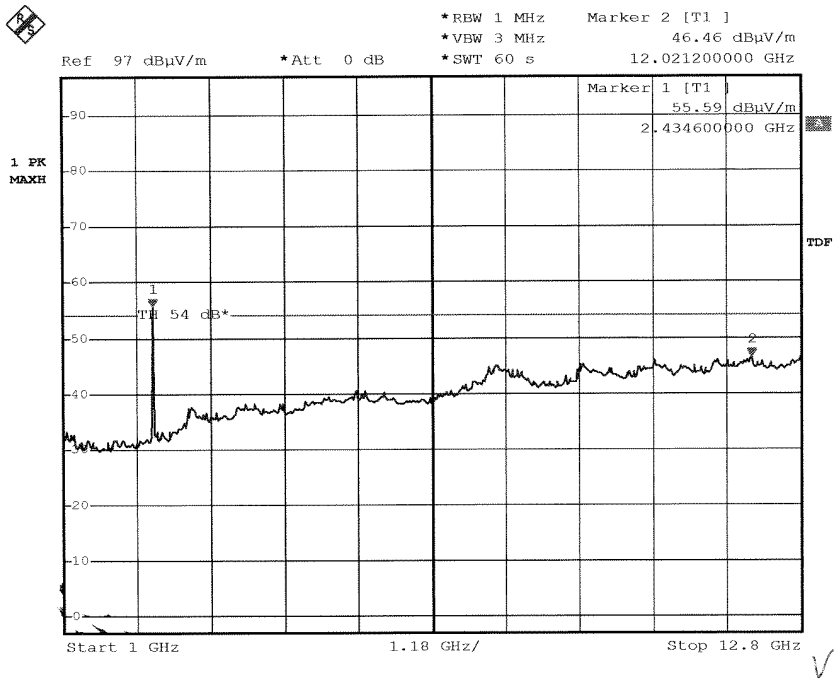
1. Tech
VKB
2402MHz
(FCC)


i Tech
VLB
2491MHz
(FCC)
V
[dBµV/m]
80
70
60
50
40
30
20
10
0
30M
40M
50M
60M
70M
80M
100M
200M
[Hz]
MES TUV200105A10.PK
LIM FCC P15.247(USA)
Page 1 1/20/05 10:43PM


1. Tech
VKB
2441 MHz
(FCC)
H
[dBµV/m]
80
70
60
50
40
30
20
10
0
30M
40M
50M
60M
70M
80M
100M
200M
[Hz]
MES TUV200105A09.PK
LIM FCC P15.247(USA)
Page 1 1/20/05 10:41PM


i-Tech
VKB
2441MHz
(FCC)
V
[dBµV/m]
80
70
60
50
40
30
20
10
0
200M
300M
400M
500M
600M
700M
800M
1G
[Hz]
MES TUV200105A15.PK
LIM FCC P15.247(USA)
Page 1 1/20/05 11:23PM


i. Tech
VKB
2441MHz
(FCC)
H
[dBµV/m]
80
70
60
50
40
30
20
10
0
200M
300M
400M
500M
600M
700M
800M
1G
[Hz]
Freq
36S 640
Q. Peak
40.7
MES TUV200105A16.PK
LIM FCC P15.247(USA)
Page 1 1/20/05 11:34PM

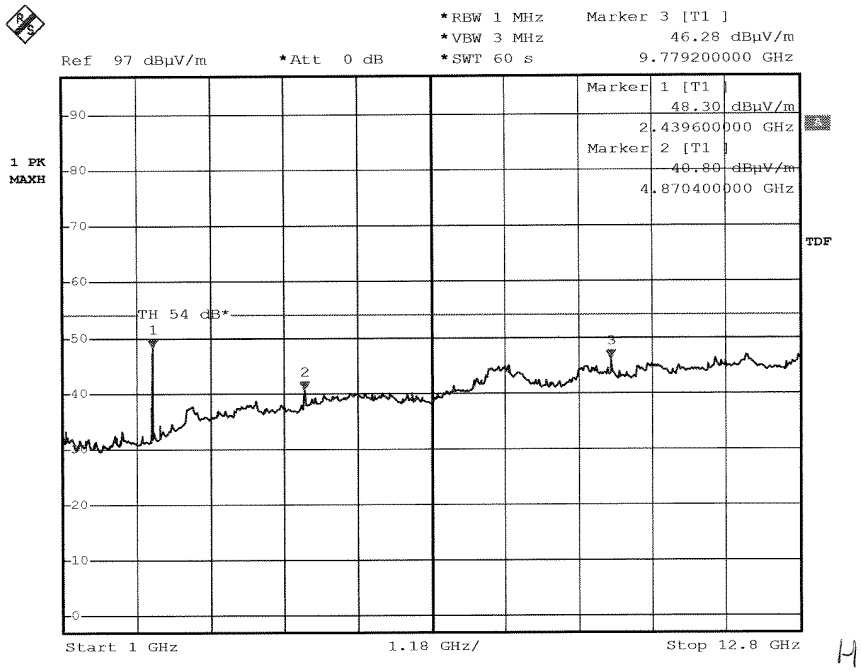


Date: 20.JAN.2005 08:55:24

i. Tech

VKB

2441 MHz (FCC)

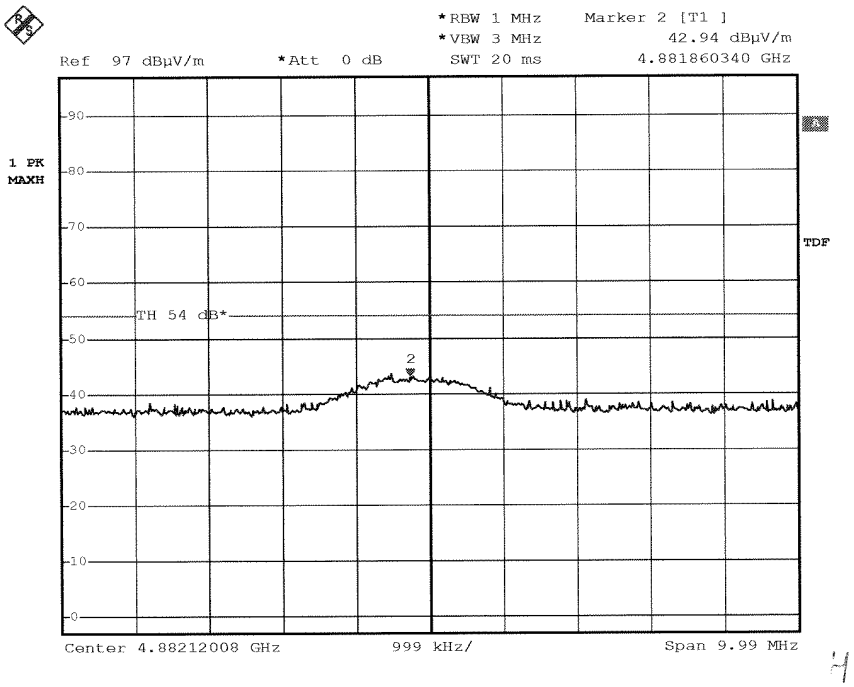


H

1. Tech

VKB

2441 MHz (FCC)

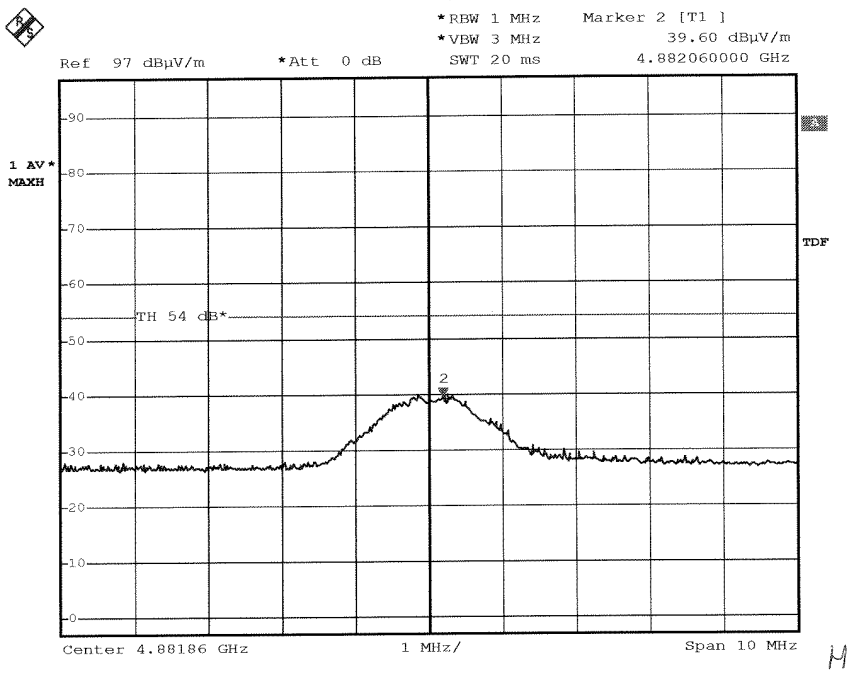


4

i. Tech

VKB

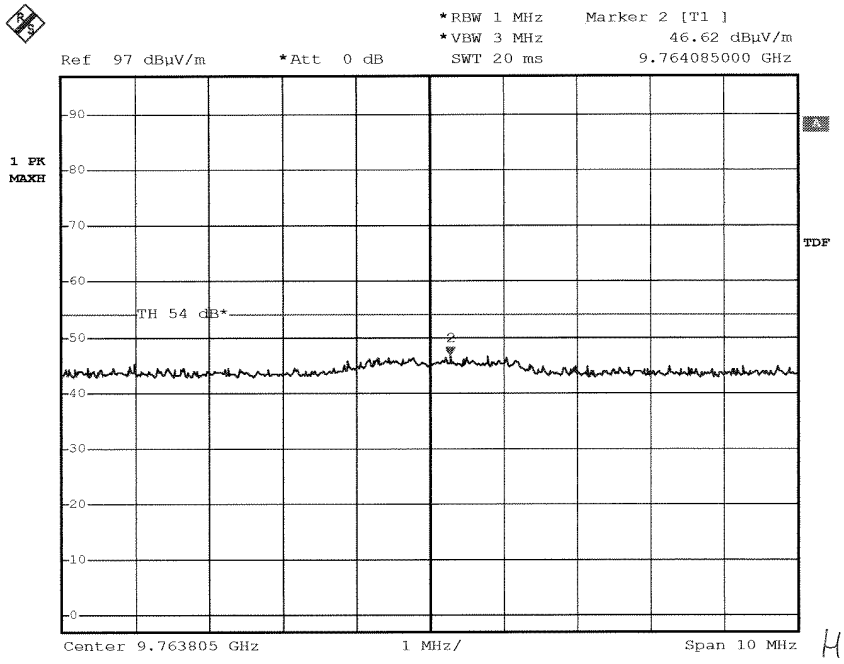
2441 MHz (FCC)



i. Tech

VKB

2441 MHz (FCC)

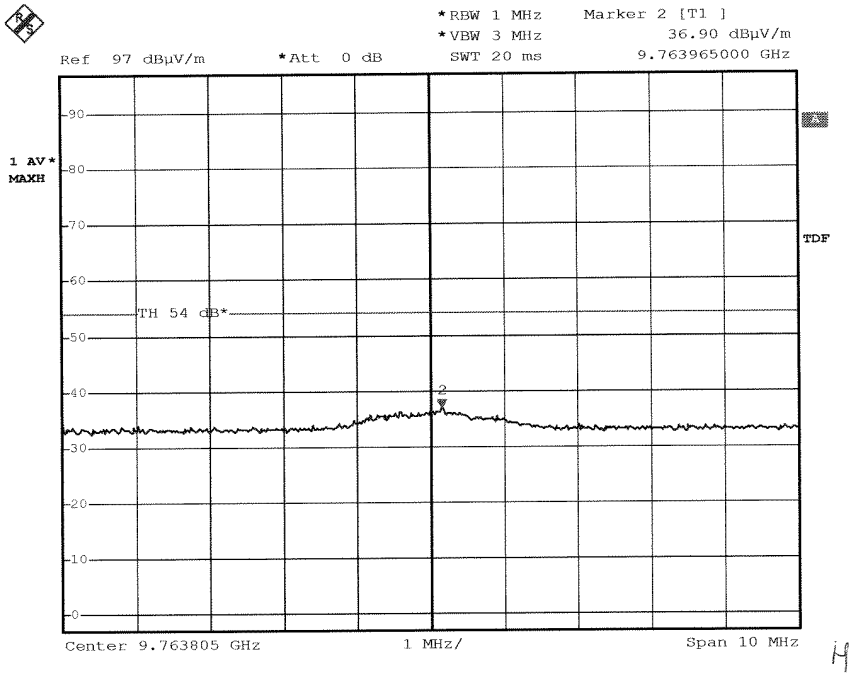


Date: 20.JAN.2005 09:38:48

1. Tech

VKB

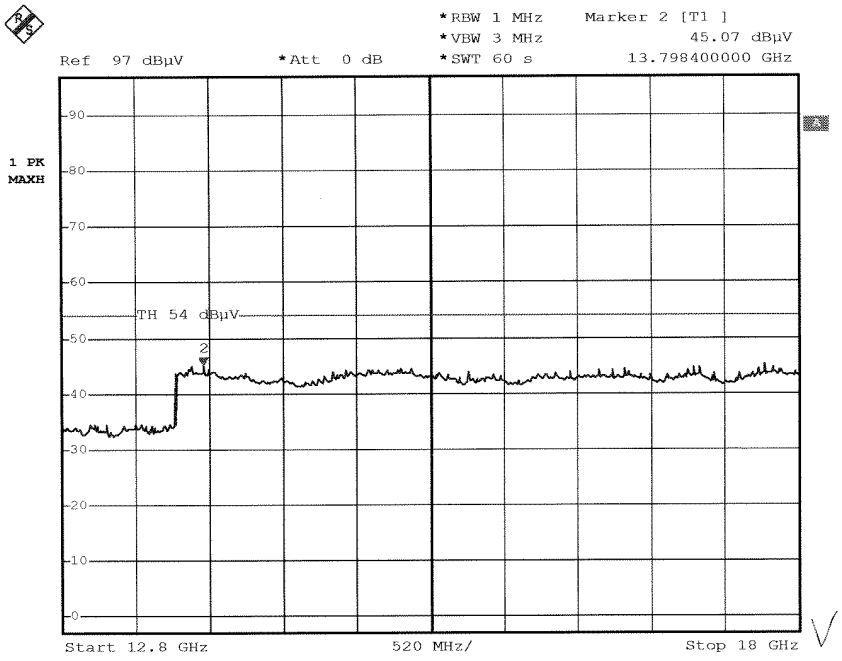
2441 MHz (FCC)



i Tech

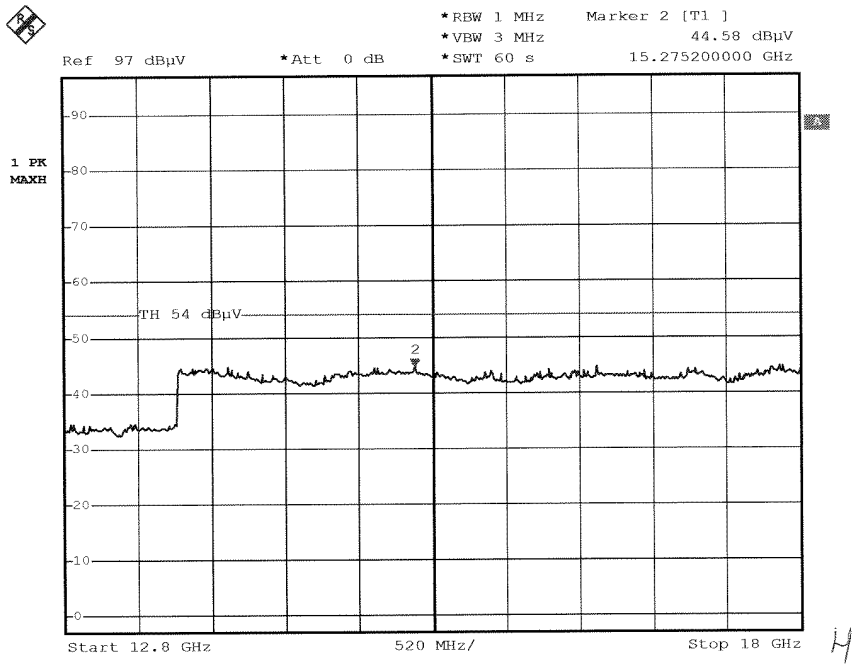
VKB

2441 MHz (FCC)



Date: 20.JAN.2005 10:14:10

i. Tech
VKB
2441 MHz
(Fcc)



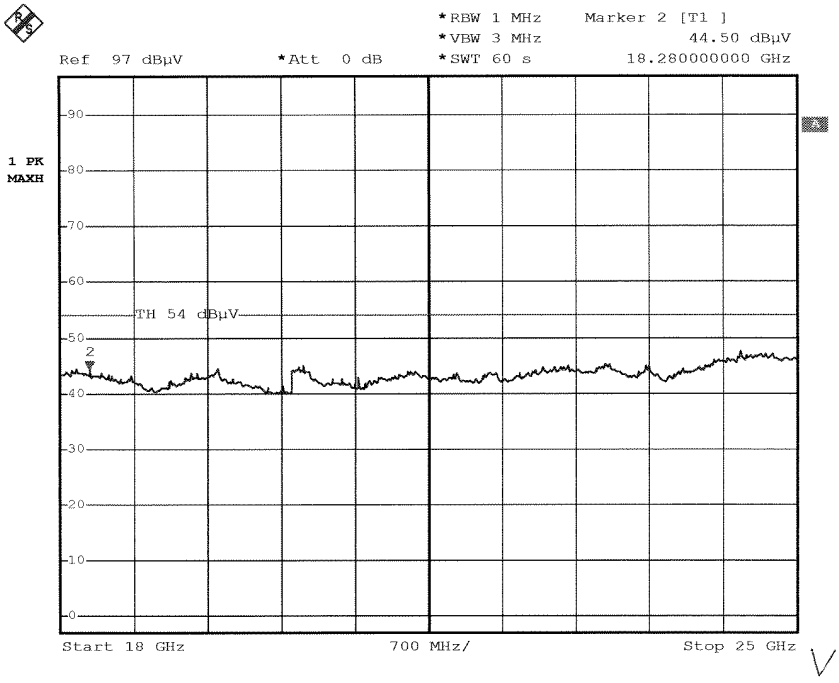
Date: 20.JAN.2005 10:11:35

i. Tech

VKB

2441 MHz

(Fcc)



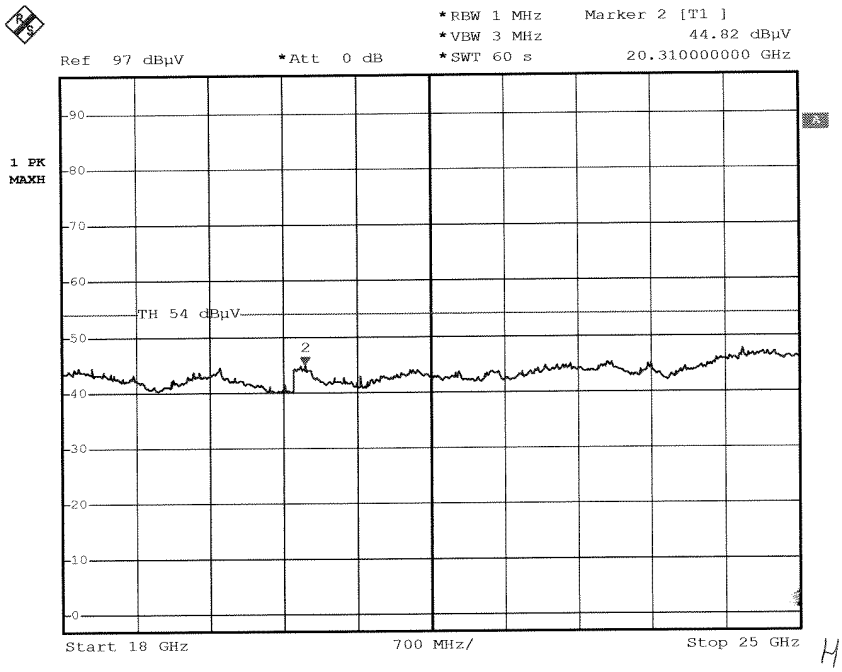
Date: 20.JAN.2005 10:26:10

i. Tech

VkD

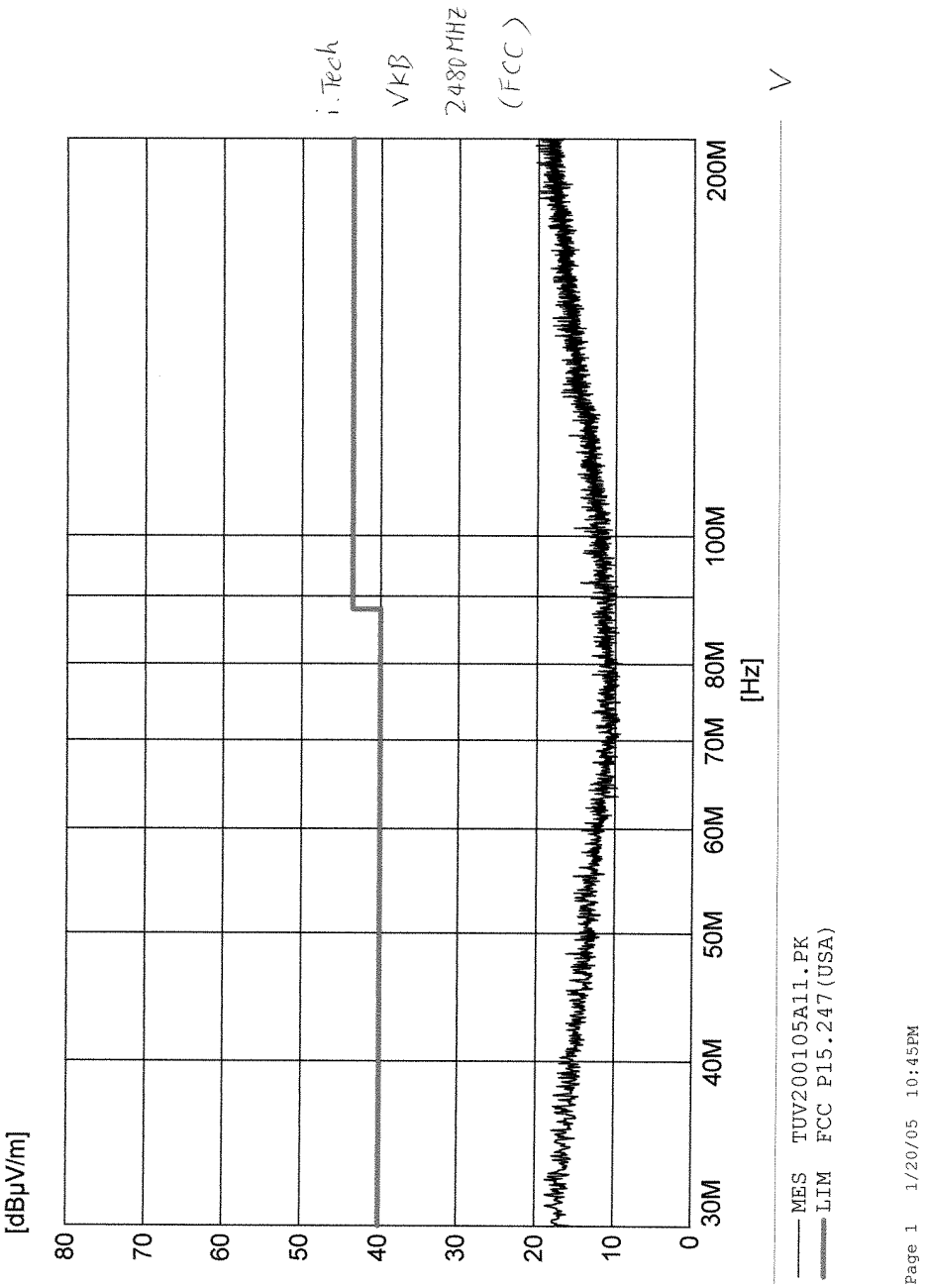
2491 MHz

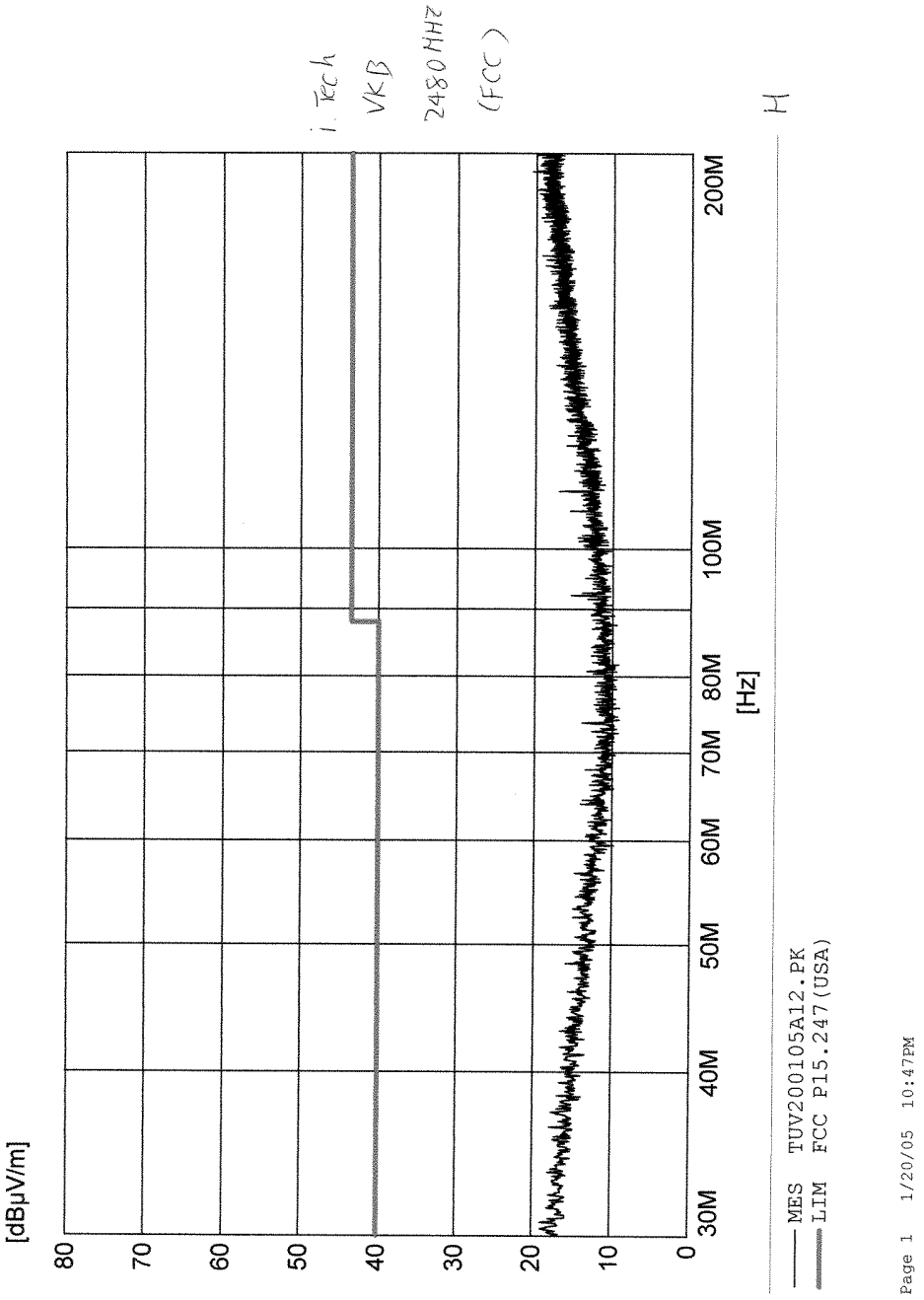
(FCC)

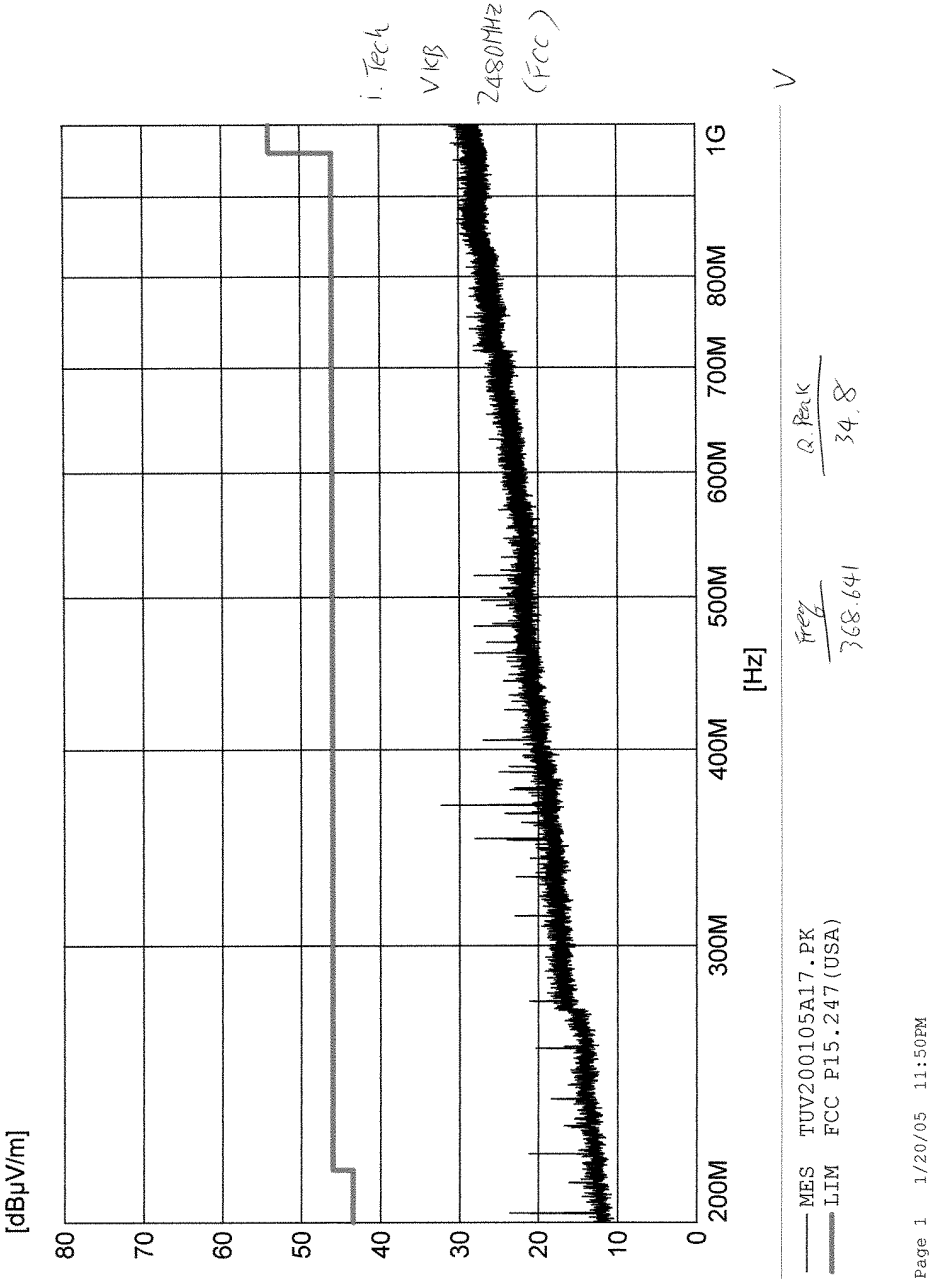


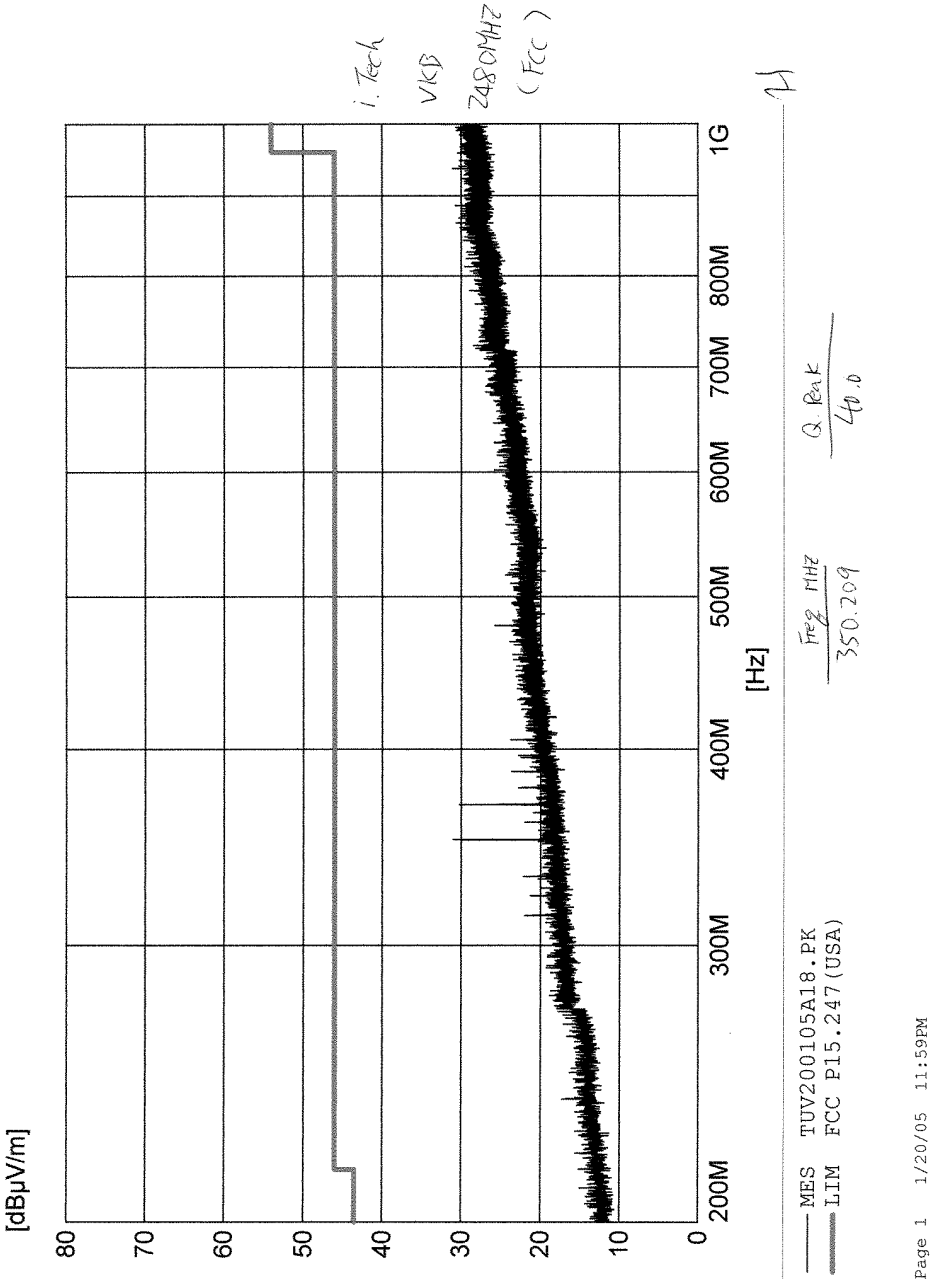
Date: 20.JAN.2005 10:25:42

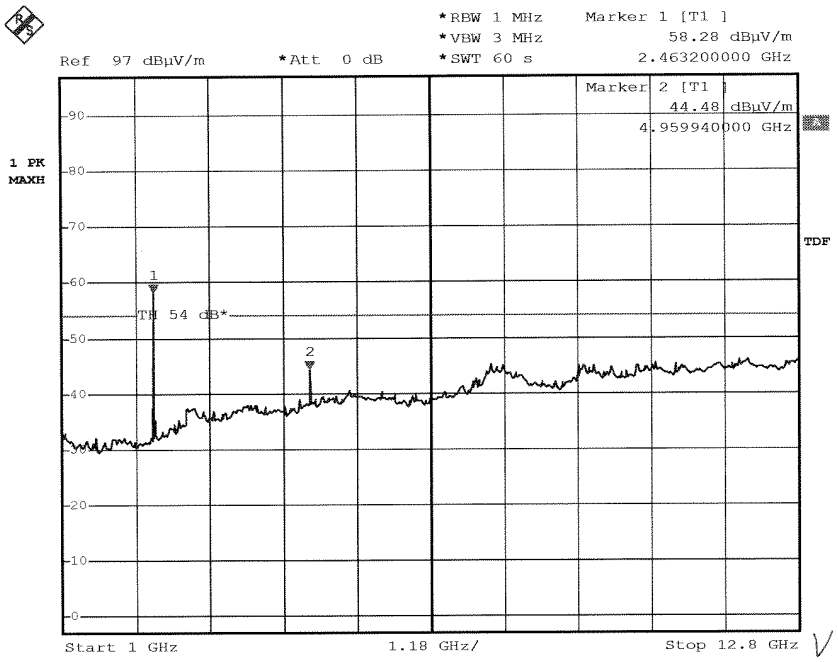
i Tech
VKB
2441 MHz
(FCC)


i.Tech
VKB
2480MHz
(FCC)
V
[dBµV/m]
80
70
60
50
40
30
20
10
0
30M
40M
50M
60M
70M
80M
100M
200M
[Hz]
MES TUV200105A11.PK
LIM FCC P15.247(USA)
Page 1 1/20/05 10:45PM


i. Tech
VKB
2480 MHz
(FCC)
H
[dBµV/m]
80
70
60
50
40
30
20
10
0
30M
40M
50M
60M
70M
80M
100M
200M
[Hz]
MES TUV200105A12.PK
LIM FCC P15.247(USA)
Page 1 1/20/05 10:47PM

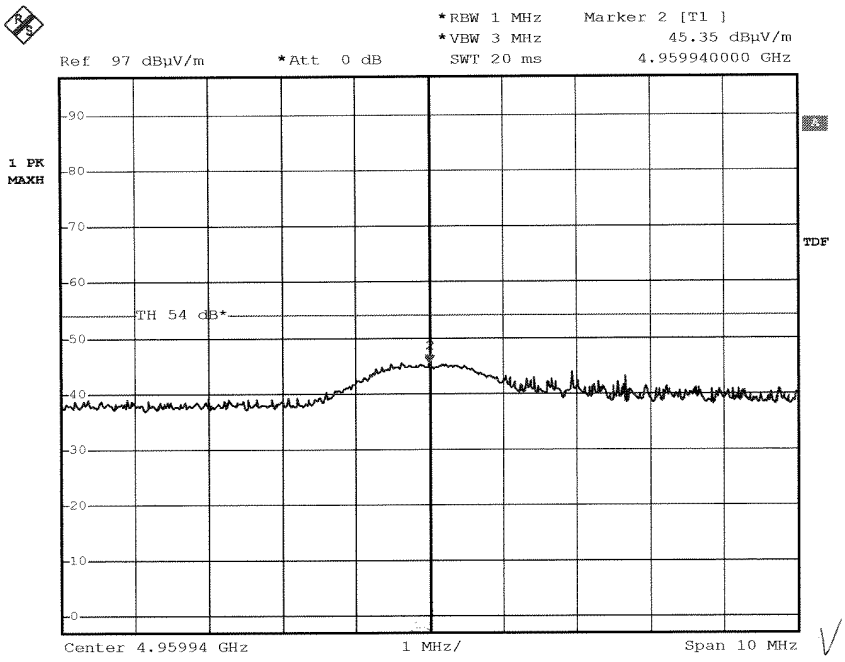

i. Tech
V KB
2480MHz
(FCC)
V
[dBµV/m]
80
70
60
50
40
30
20
10
0
200M
300M
400M
500M
600M
700M
800M
1G
[Hz]
freq
368.641
Q Peak
34.8
MES TUV200105A17.PK
LIM FCC P15.247(USA)
Page 1 1/20/05 11:50PM


i. Tech
VKB
2480MHz
(FCC)
[dBµV/m]
80
70
60
50
40
30
20
10
0
200M
300M
400M
500M
600M
700M
800M
1G
[Hz]
Freq MHz
350.209
Q. Peak
40.0
MES TUV200105A18.PK
LIM FCC P15.247(USA)
Page 1 1/20/05 11:59PM



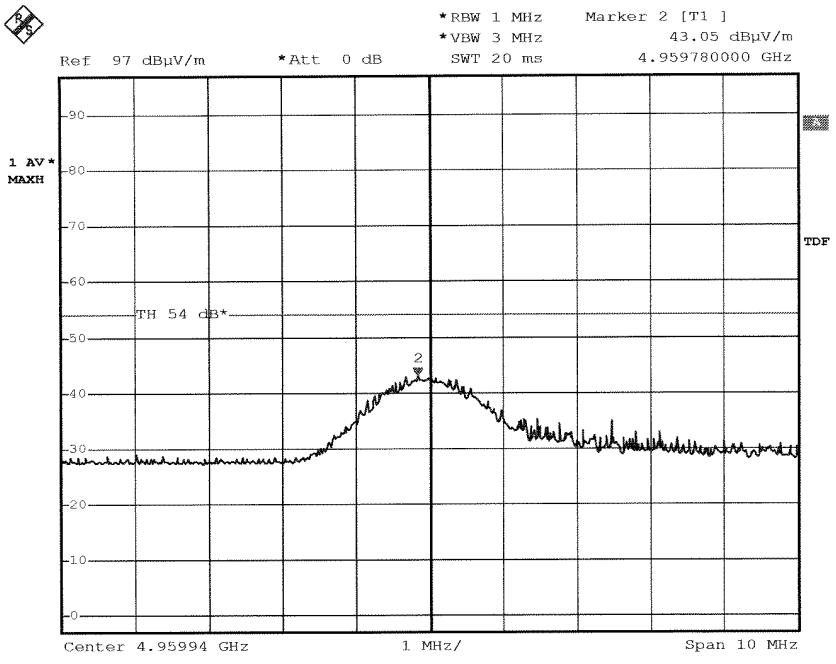
Date: 20.JAN.2005 09:58:41

1. Tech
VKB
2480MHz
(FCC)



Date: 20.JAN.2005 10:00:45

i. Tech
VKB
2480MHz
(FCC)



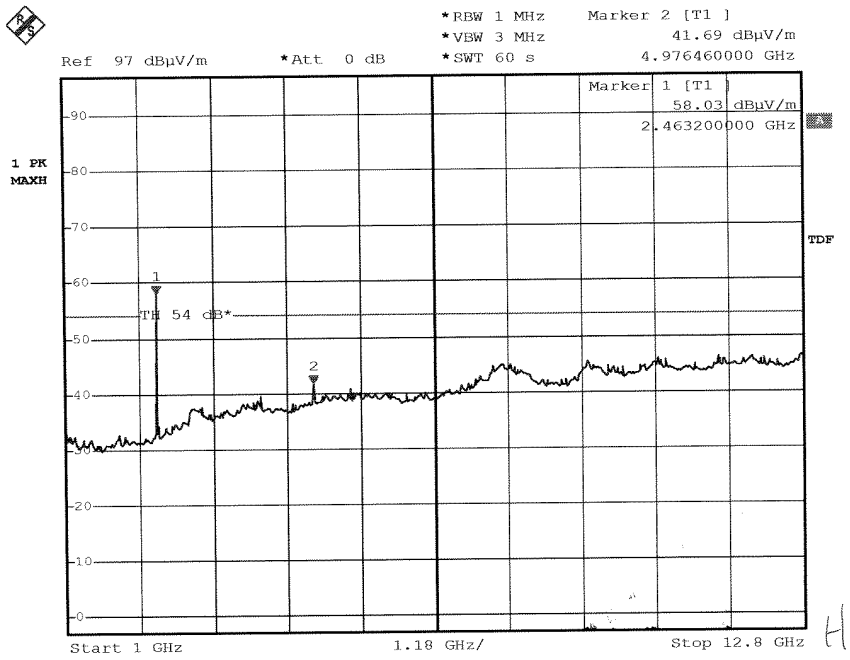
Date: 20.JAN.2005 10:01:42

i.Tech

VKB

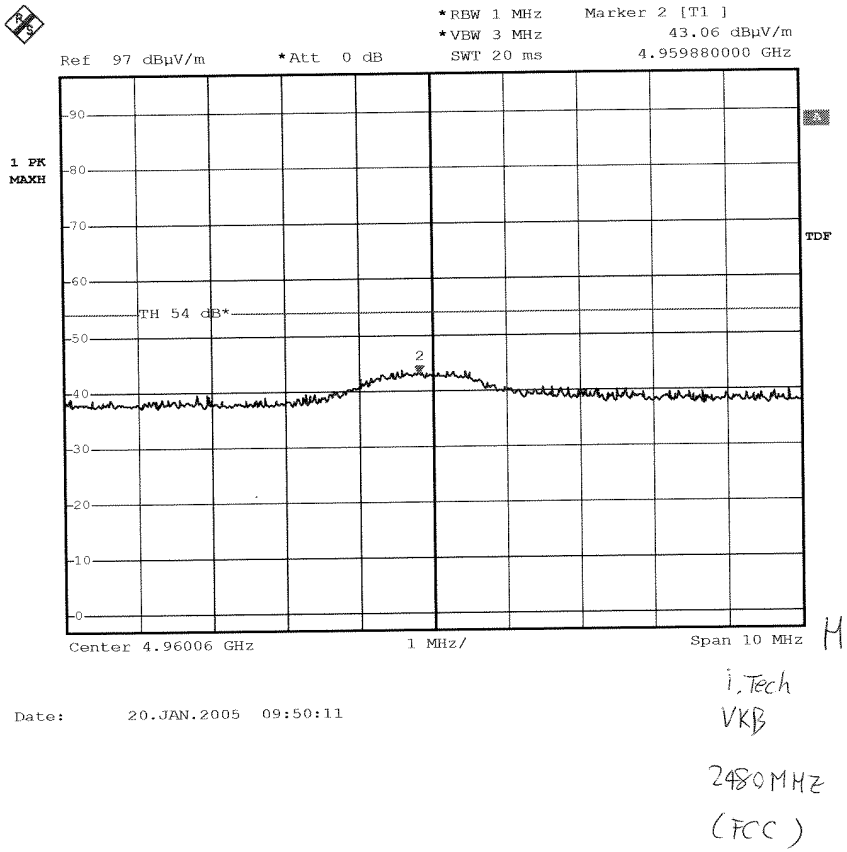
2480MHz

(Fcc)



Date: 20.JAN.2005 09:46:56

i.Tech
VKB
2480MHz
(FCC)



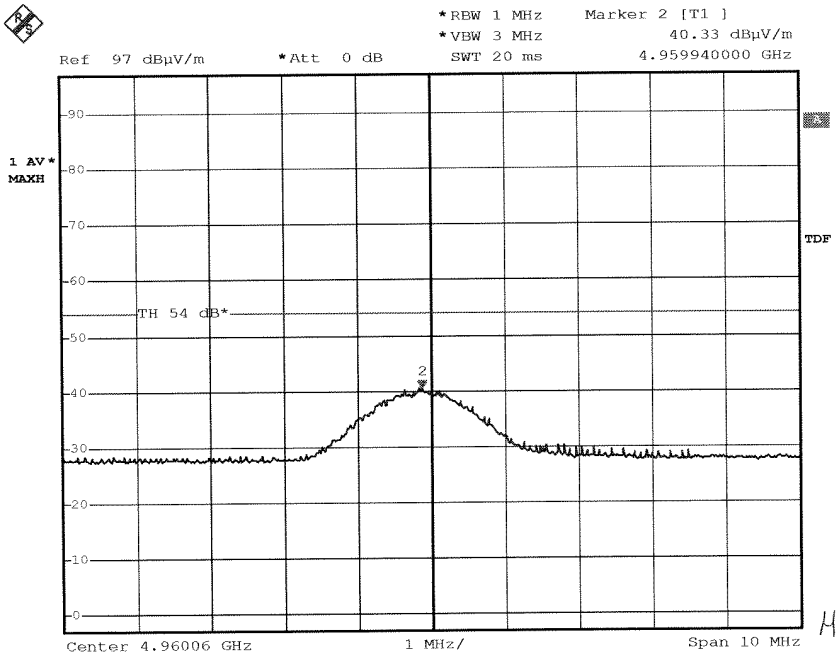
H

i.Tech

VKB

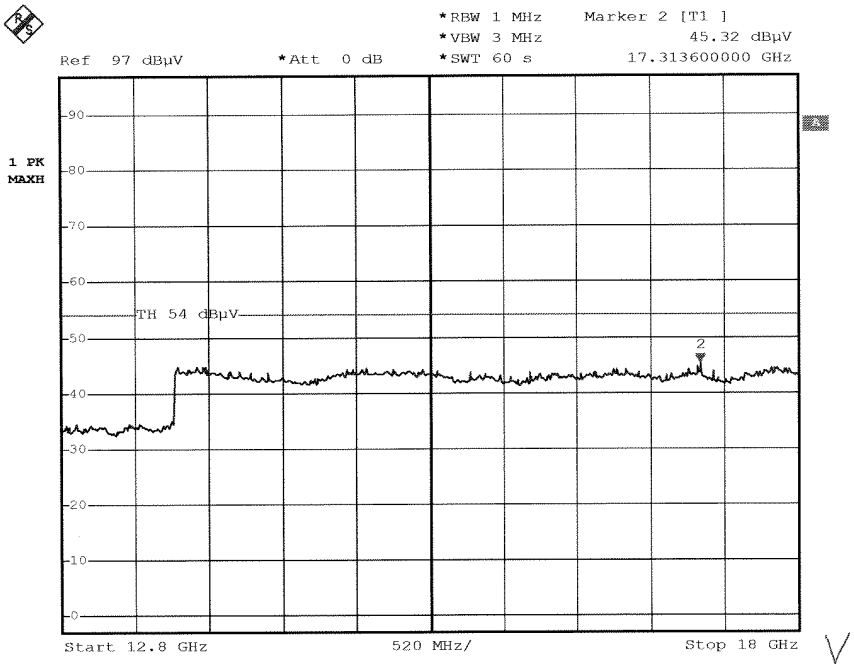
2480MHz

(FCC)



Date: 20.JAN.2005 09:52:14

1 Tech
VKB
2480 MHz
(Fcc)



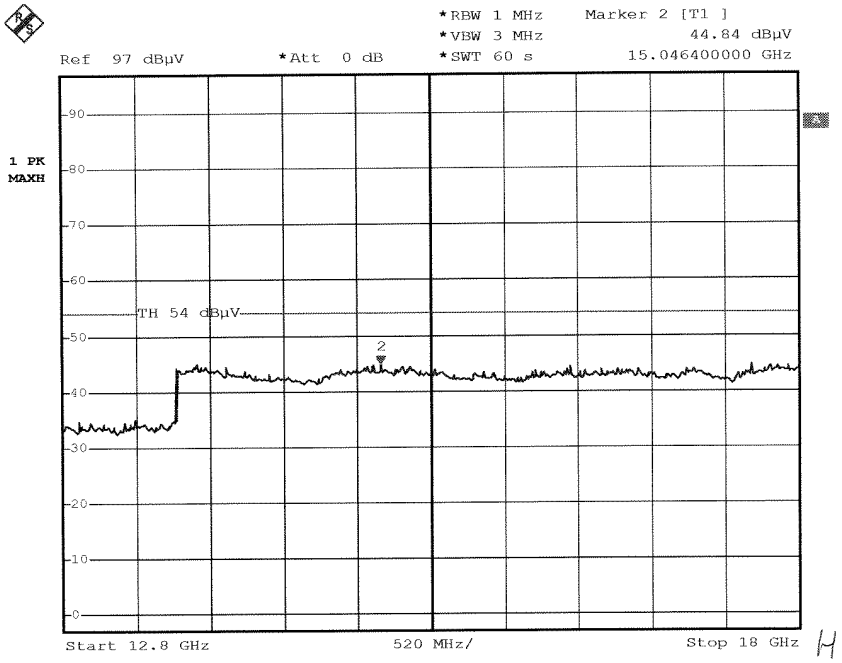
Date: 20.JAN.2005 10:05:17

i.Tech

VKB

2480 MHz

(FCC)



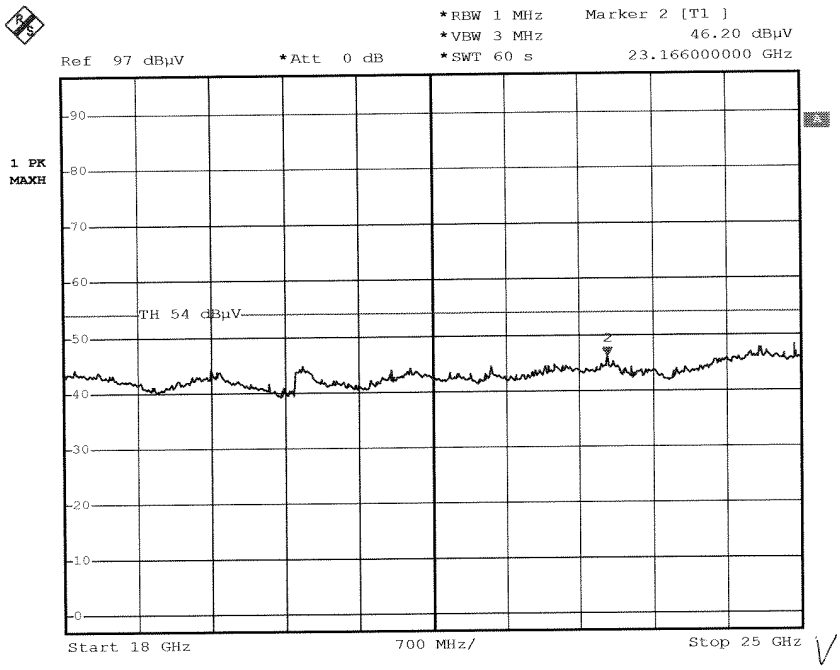
Date: 20.JAN.2005 10:08:22

i. Tech

VKB

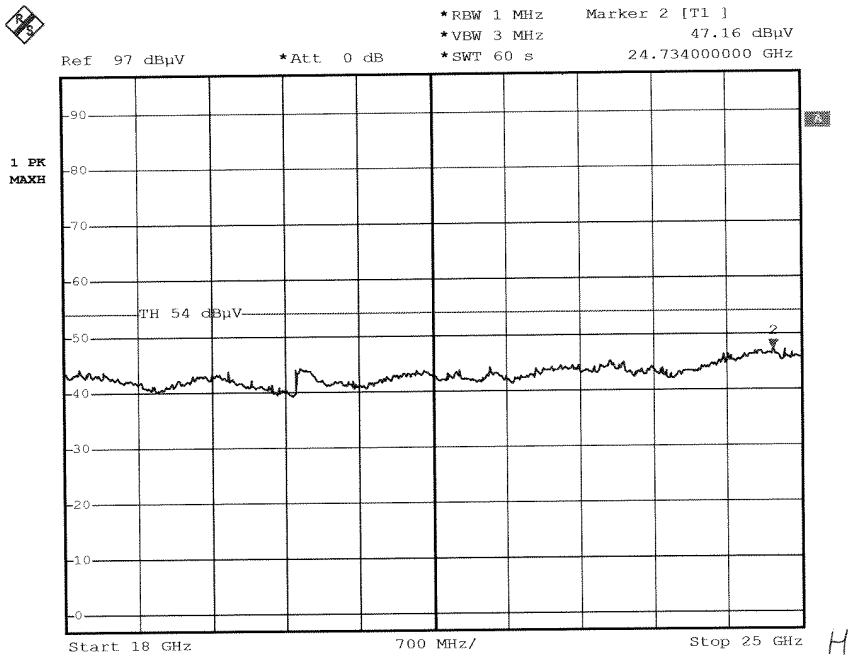
2480 MHz

(FCC)



Date: 20.JAN.2005 10:29:26

i. Tech
VKB
2480MHz
(Fcc)



Date: 20.JAN.2005 10:28:31

1. Tech
VKB
2480 MHz
(Fcc)