

Prüfbericht - Nr.: Test Report No.	14007694 001		Seite 1 von 15 Page 1 of 15	
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	Wireless Multimedia USB Dongle			
Bezeichnung: Identification	C51-A04092-XX	Serien-Nr.: Serial No.	Engineering sample	
Wareneingangs-Nr.: Receipt No.	041101007	Eingangsdatum: Date of receipt	01.11.2004	
Prüfört: 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:		
01.03.2005	Hugo Wan	01.03.2005	Thomas Berns	
Datum Date	Name Name	Datum Date	Name Name	Unterschrift Signature
Sonstiges: Other Aspects		FCCID: RKIC51-A04092-XX		
Abkürzungen:	OK, Pass, P Fail, F N/A NT	= entspricht Prüfgrundlage = entspricht nicht Prüfgrundlage = nicht anwendbar = nicht getestet	Abbreviations:	OK, Pass, P Fail, F N/A NT = passed = failed = not applicable = not tested
Dieser Prüfbericht bezieht sich nur auf das o.g. Prüfmuster und darf ohne Genehmigung der Prüfstelle nicht auszugsweise vervielfältigt werden. Dieser Bericht berechtigt nicht zur Verwendung eines Prüfzeichens. This test report relates to the a. m. test sample. Without permission of the test center this test report is not permitted to be duplicate in extracts. This test report does not entitle to carry any safety mark on this or similar products.				

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Product information

Manufacturers declarations

	Transmitter	Receiver
Operating frequency range	2402 - 2480 MHz	2402 - 2480 MHz
Type of modulation	FHSS modulation	FHSS modulation
Number of channels	79	79
Channel separation	1 MHz	1 MHz
Type of antenna	On board PCB Antenna	On board PCB Antenna
Antenna gain (dBi)	2	
Power level	fix	
Type of equipment	plug-in radio device	plug-in radio device
Connection to public utility power line	No	No
Nominal voltage	V _{nom} : 5 V	V _{nom} : 5 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 multimedia USB dongle 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

In order to setup a normal operation of the Wireless Multimedia USB Dongle, the following equipments were used for the testing as a reference configuration:

1. i.Tech Dynamic Ltd. – Bluetooth Stereo Clip Headset (for setup of SCO link)
Serial number: Engineering sample
TUV Sample number: 041117014
2. Laptop Computer: Toshiba Portege 4010
Model number: PP401T-0TEL9
Serial number: 92015403J
Voltage supply: DC 15V
3. Laptop Computer AC Adaptor
Model number: ADP-45XH
Input: 100-240V~ 1.2A, 50-60Hz
Output: 15V, 3A

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: On board PCB antenna soldered to the circuit board b) Manufacturer and model no: N.A. c) Gain with reference to an isotropic radiator: 2 dBi	
Verdict:	Pass	

Subclause 15.207 – Disturbance Voltage on AC Mains						Pass
Test Port: Laptop Computer AC Adaptor Applied voltage: 100VAC Applicable only to equipment designed to be connected to the public utility power line. Mode of operation: Normal operation Bluetooth SCO link existed between EUT and Bluetooth Stereo Clip Headset						
Live measurement						
Frequency range (MHz)	Frequency (MHz)	Quasi-peak dB μ V/m	Average dB μ V/m	Limit QP (dB μ V/m)	Limit AV (dB μ V/m)	Verdict
0,15 – 0,5	0.194	48.6	40.4	66 - 56	56 - 46	Pass
	0.258	44.4	35.2			Pass
	0.324	38.8	36.4			Pass
> 0,5 - 5	4.986	23.1	21.9	56	46	Pass
> 5 - 30	-	-	-	60	50	Pass
Neutral measurement						
Frequency range (MHz)	Frequency (MHz)	Quasi-peak dB μ V/m	Average dB μ V/m	Limit QP (dB μ V/m)	Limit AV (dB μ V/m)	Verdict
0,15 – 0,5	0.194	46.3	38.2	66 - 56	56 - 46	Pass
	0.258	42.8	34.7			Pass
	0.324	38.0	34.3			Pass
	0.389	29.0	24.4			Pass
> 0,5 - 5	-	-	-	56	46	Pass
> 5 - 30	-	-	-	60	50	Pass

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

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 : 5.0VDC from USB port Temperature : 23°C Humidity : 50%	
Result: The centre frequencies of the hopping channels are separated by more than the 20dB bandwidth. For test results plots refer to Appendix 1, page 7.	
Verdict: Pass	

Subclause 15.247 (a) – Time of Occupancy (Dwell Time)	Pass
Requirement: Frequency hopping systems in the 2400 – 2483.5 MHz band shall use at least 15 non-overlapping channels. The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed.	
Test Specification : FCC Part 15 Subpart A – Subclause 15.31 Mode of operation : Tx mode (hopping on), DH5 packet Port of testing : Temporary antenna port Detector : Peak RBW/VBW : 1 MHz / 3 MHz Supply voltage : 5.0VDC from USB port Temperature : 23°C Humidity : 50%	
Result: The screenshot in Appendix 1 page 9 shows the occurrence of a channel in a 12.8 s time period. In inquiry and page scan mode Bluetooth is using 32 hopping channels only. The frequency was used 26 times. The dwell time for the longest supported packet type is about 3 ms. As a result the average time of occupancy will not be greater than 400 ms. i.e. Time period calculation: $0.4 \times 32 = 12.8\text{s}$ Limit calculation: $26 \times 2.940 \times 10^{-3} = 76.44 \times 10^{-3}$ $\leq 400 \times 10^{-3} \text{ s}$ For test protocols please refer to Appendix 1, page 8-9. Verdict: Pass	

Subclause 15.247 (a) – 20 dB Bandwidth

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

Test Specification : FCC Part 15 Subpart A – Subclause 15.31
 Mode of operation : Tx mode (2402MHz, 2441MHz, 2480MHz), DH5 packet
 Port of testing : Temporary antenna port
 Detector : Peak
 RBW/VBW : 30 kHz / 100 kHz
 Supply voltage : 5.0VDC from USB port
 Temperature : 23°C
 Humidity : 50%

Results

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

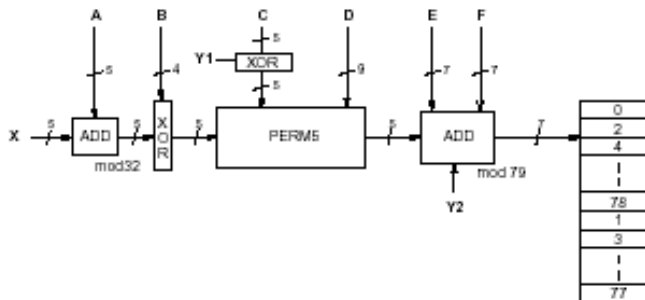
Frequency (MHz)	20 dB left (MHz)	20 dB right (MHz)	20dB bandwidth (MHz)
2402	0.456	0.472	0.928
2441	0.460	0.464	0.924
2480	0.456	0.464	0.920

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 |

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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 |

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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 : 5.0VDC from USB port Temperature : 23°C Humidity : 50%					
Requirement: For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 hopping channels, and all frequency hopping systems in the 5725-5850 MHz band: 1 Watt. For all other frequency hopping systems in the 2400 – 2483.5 MHz band: 0.125 Watts.					
Result All three transmit frequency modes comply with the maximum peak output power limit. For test protocols please refer to Appendix 1, page 12-13.					
Frequency (MHz)	Maximum peak output power (dBm)	Cable attenuation (dB)	Output power (dBm)	Limit (W/dBm)	Verdict
2402	2.28	3.52	5.80	1 / 30.0	Pass
2441	1.75	3.65	5.40	1 / 30.0	Pass
2480	1.55	3.60	5.15	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 : 5.0VDC from USB port Temperature : 23°C Humidity : 50%		
Requirement: In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement.		
Result There is no peak found outside any 100 kHz bandwidth of the operating frequency band in the three transmit frequency. All three transmit frequency modes comply with the limit stated in subclause 15.247(c). For test protocols refer to Appendix 1, page 14-15.		

Subclause 15.247 (c) – Spurious Conducted Emissions		Pass			
Test Specification : FCC Part 15 Subpart A – Subclause 15.31 Mode of operation : Tx mode (2402MHz, 2441MHz, 2480MHz), DH1 packet Port of testing : Temporary antenna port Detector : Peak RBW/VBW : 100 kHz / 300 kHz Supply voltage : 5.0VDC from USB port Temperature : 23 °C Humidity : 50 %					
Requirement:	In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement.				
Result There is no peak found outside any 100kHz bandwidth of the operating frequency band in the three transmit frequency. All three transmit frequency modes comply with the limit stated in subclause 15.247(c). For test protocols refer to Appendix 1, page 16-22.					
Operating frequency (MHz)	Spurious frequency (MHz)	Spurious Level (dBm)	Reference value (dBm)	Delta (dB)	Verdict
2402	1186.520	-52.49	-11.09	-41.40	Pass
	4795.660	-53.08	-11.09	-41.99	Pass
2441	1206.460	-51.20	-11.82	-39.38	Pass

	4875.420	-52.47	-11.82	-40.65	Pass
2480	1226.400	-51.65	-12.42	-39.23	Pass
	4955.180	-51.17	-12.42	-38.75	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 : 5.0VDC from USB port Temperature : 23°C Humidity : 50%							
Requirement:		In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement.					
Result All three transmit frequency modes comply with the field strength within the restricted bands. For test protocols refer to Appendix 1, page 23-74.							
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
32.120	7.70	17.30	0.40	-	-	25.40	43.5 / QP
55.040	13.50	17.30	0.40	-	-	25.10	43.5 / QP
76.340	15.40	9.70	0.60	-	-	25.70	43.5 / QP
498.020	13.50	17.60	2.00	-	-	33.10	43.5 / QP
597.500	14.40	19.10	2.10	-	-	35.60	43.5 / QP
632.900	9.40	19.60	2.20	-	-	31.20	43.5 / QP
4803.920	48.54	33.40	3.53	32.87	0.33	52.93	74.0 / P
	47.40					51.79	54.0 / A
1296.520	50.04	25.40	1.89	36.17	0.60	41.76	74.0 / P
	42.91					34.63	54.0 / A
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
54.740	6.80	15.00	0.40	-	-	22.20	43.5 / QP
108.020	20.10	11.60	0.80	-	-	32.50	43.5 / QP
162.740	11.90	14.70	0.90	-	-	27.50	43.5 / QP
200.483	15.30	10.20	1.10	-	-	26.60	43.5 / QP
432.020	19.40	16.60	1.90	-	-	37.90	43.5 / QP
561.260	12.10	18.10	2.10	-	-	32.30	43.5 / QP
1097.860	48.54	24.40	1.52	37.10	1.87	39.23	74.0 / P

	42.30					32.99	54.0 / A
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
32.300	7.30	17.30	0.40	-	-	25.00	43.5 / QP
55.100	12.70	11.00	0.60	-	-	24.30	43.5 / QP
75.740	15.10	9.70	0.60	-	-	25.40	43.5 / QP
497.900	14.10	17.60	2.00	-	-	33.70	43.5 / QP
597.860	15.00	19.10	2.10	-	-	36.20	43.5 / QP
697.580	9.00	20.70	2.30	-	-	32.00	43.5 / QP
4881.680	47.25	33.40	3.53	32.87	0.33	51.64	74.0 / P
	46.08					50.47	54.0 / A
1297.700	49.74	25.40	1.89	36.17	0.60	41.46	74.0 / P
	41.96					33.68	54.0 / A
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
60.020	11.40	11.00	0.60	-	-	23.00	43.5 / QP
108.020	20.10	11.60	0.80	-	-	32.50	43.5 / QP
162.800	12.50	14.70	0.90	-	-	28.10	43.5 / QP
432.080	13.30	16.60	1.90	-	-	31.80	43.5 / QP
561.260	15.40	18.10	2.10	-	-	35.60	43.5 / QP
631.040	8.40	19.60	2.20	-	-	30.20	43.5 / QP
1096.520	48.35	24.40	1.52	37.10	1.87	39.04	74.0 / P
	44.06					34.75	54.0 / A
4881.670	48.64	33.40	3.53	32.87	0.33	53.03	74.0 / P
	47.26					51.65	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
32.300	7.90	17.30	0.40	-	-	25.60	43.5 / QP
54.620	10.70	12.90	0.50	-	-	24.10	43.5 / QP
76.100	15.30	9.70	0.60	-	-	25.60	43.5 / QP
497.960	11.80	17.60	2.00	-	-	31.40	43.5 / QP
599.420	12.40	19.10	2.10	-	-	33.60	43.5 / QP
697.040	9.30	20.70	2.30	-	-	32.30	43.5 / QP
1297.790	48.12	25.40	1.89	36.17	0.60	39.84	74.0 / P
	40.16					31.88	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
60.080	10.20	11.00	0.60	-	-	21.80	43.5 / QP
108.020	20.10	11.60	0.80	-	-	32.50	43.5 / QP
161.420	10.60	14.70	0.90	-	-	26.20	43.5 / QP
432.020	13.60	16.60	1.90	-	-	32.10	43.5 / QP
561.200	14.60	18.10	2.10	-	-	34.80	43.5 / QP
632.900	8.70	19.60	2.20	-	-	30.50	43.5 / QP
1095.680	48.18	24.40	1.52	37.10	1.87	38.87	74.0 / P
	44.49					35.18	54.0 / A
4959.600	46.28	33.40	3.53	32.87	0.33	50.67	74.0 / P
	45.05					49.44	54.0 / A

Appendix 1

Test results

Disturbance Voltage on AC Mains

Date: 03 Feb 2005
EUT: Wireless Multimedia USB Dongle
Company: i.Tech Dynamic Ltd.
Humidity: 60%
Temperature: 23°C
Voltage supply: 5.0VDC from USB port
Test by: Hugo Wan
Op. mode: Normal operation

Live measurement

Frequency (MHz)	QP reading (dBµV)	Av reading (dBµV)	Results
0.194	48.6	40.4	Pass
0.258	44.4	35.2	Pass
0.324	38.8	36.4	Pass
4.986	23.1	21.9	Pass

Neutral measurement

Frequency (MHz)	QP reading (dBµV)	Av reading (dBµV)	Results
0.194	46.3	38.2	Pass
0.258	42.8	34.7	Pass
0.324	38.0	34.3	Pass
0.389	29.0	24.4	Pass

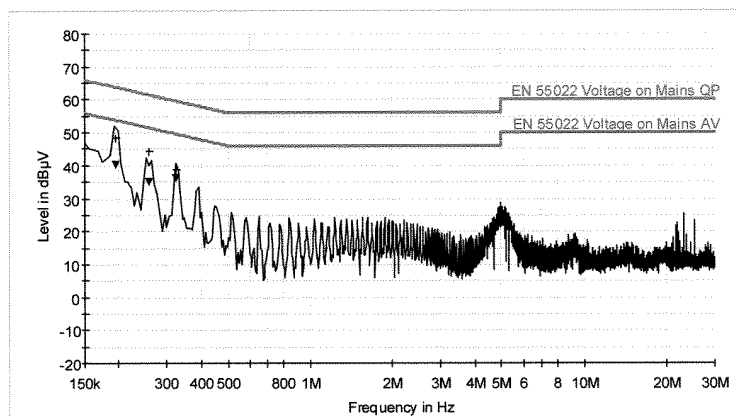
TUV Rheinland Hong Kong Limited

Conducted Emission

Test Information

EUT Name: I Tech Dynamic
Serial Number: Wireless Multimedia USB Dongle
Test Description: EN55022
Operating Conditions: ON (Operating)
Operator Name: LIW
Comment: 100V
Description: L1

CE (EN55022)



Result Table Single

Frequency (MHz)	QuasiPeak (dBµV)	Average (dBµV)
0.193620	48.6	40.4
0.257890	44.4	35.2
0.324000	38.8	36.4
4.986000	23.1	21.9

03/02/2005

3:14:44 PM

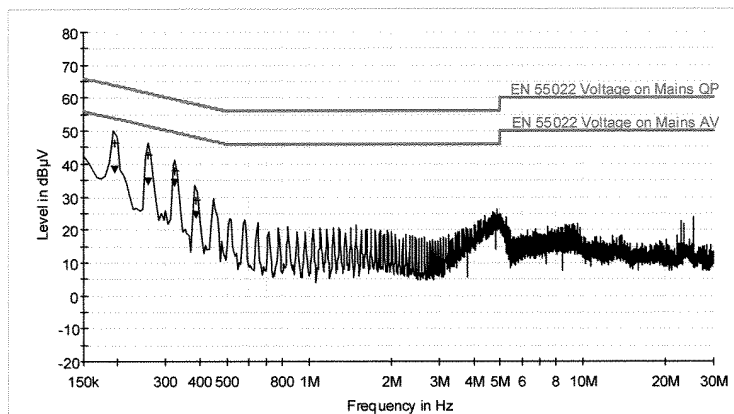
TÜV Rheinland Hong Kong Limited

Conducted Emission

Test Information

EUT Name: i Tech Dynamic
Serial Number: Wireless Multimedia USB Dongle
Test Description: EN55022
Operating Conditions: ON (Operating)
Operator Name: LIW
Comment: 100V
Description: N

CE (EN55022)



Result Table Single

Frequency (MHz)	QuasiPeak (dBµV)	Average (dBµV)
0.193970	46.3	38.2
0.258000	42.8	34.7
0.324000	38.0	34.3
0.388510	29.0	24.4

03/02/2005

3:21:44 PM

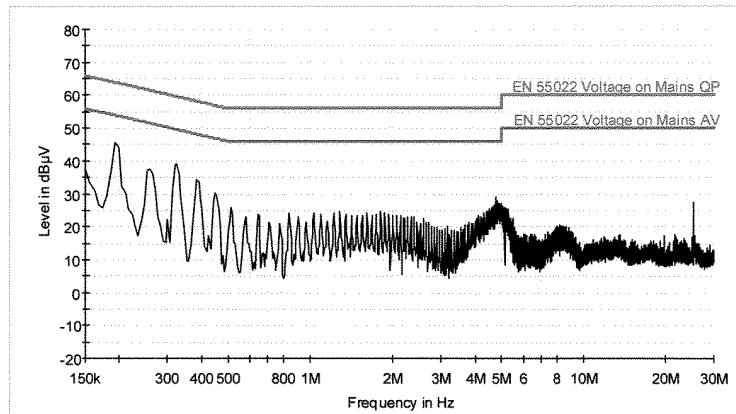
TÜV Rheinland Hong Kong Limited

Conducted Emission

Test Information

EUT Name:	Toshiba Laptop
Serial Number:	
Test Description:	EN 55022
Operating Conditions:	ON
Operator Name:	
Comment:	100 V I/P
Description	L1

CE (EN55022)



03/02/2005

11:22:07 AM

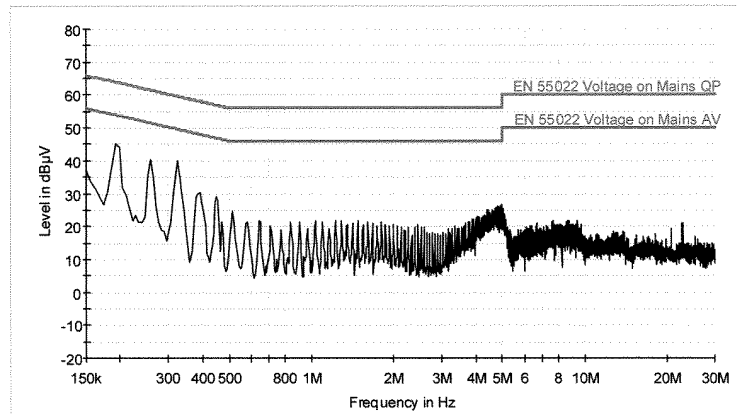
TÜV Rheinland Hong Kong Limited

Conducted Emission

Test Information

EUT Name:	Toshiba Laptop
Serial Number:	
Test Description:	EN55022
Operating Conditions:	ON
Operator Name:	
Comment:	100 V I/P
Description:	N - background

CE (EN55022)

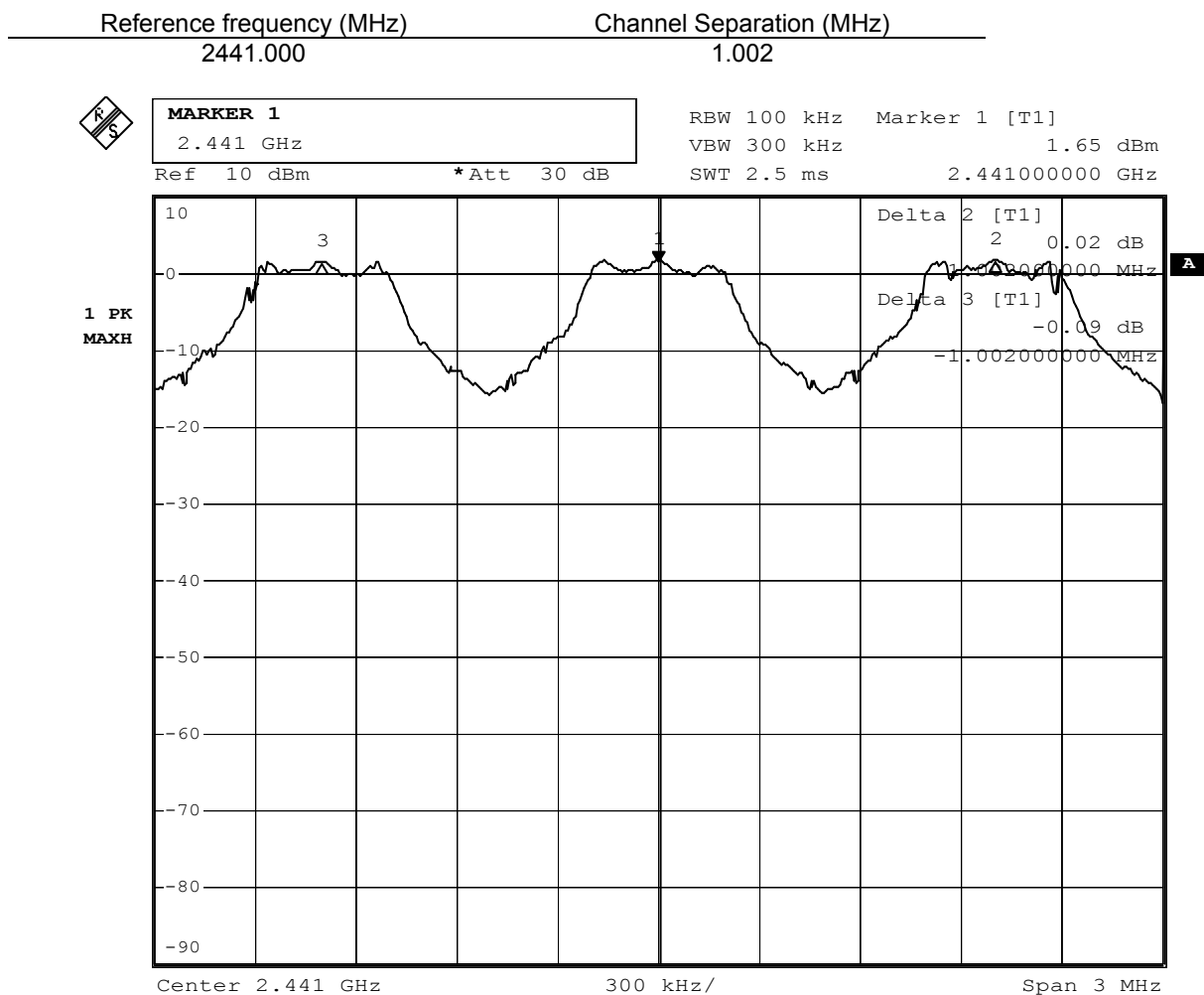


02/02/2005

5:18:37 PM

Carrier Frequency Separation

Date: 18 Nov 2004
EUT: Wireless Multimedia USB Dongle
Company: i.Tech Dynamic Ltd.
Humidity: 60%
Temperature: 23°C
Voltage supply: 5.0VDC from USB port
Test by: Hugo Wan
Op. mode: Hopping on



Date: 18.NOV.2004 18:54:51

Dwell Time

Date: 18 Nov 2004
 EUT: Wireless Multimedia USB Dongle
 Company: i.Tech Dynamic Ltd.
 Humidity: 60%
 Temperature: 23°C
 Voltage supply: 5.0VDC from USB port
 Test by: Hugo Wan
 Op. mode: Hopping on

Burst Duration (ms)	Number of hopping	Time of occupancy (s)	Results
2.940	26	$0.002940 \times 26 = 0.07644$	Pass



DELTA MARKER 2

2.94 ms

Ref 10 dBm

*Att 30 dB

RBW 1 MHz

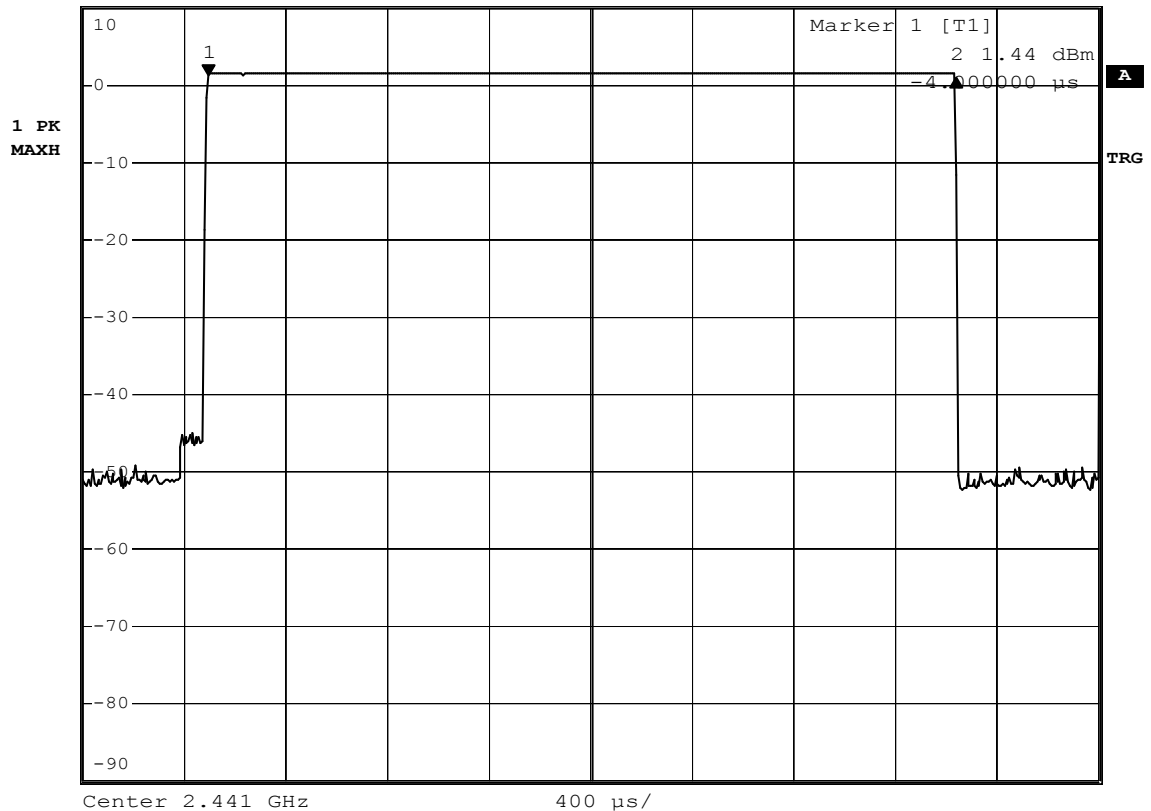
Delta 2 [T1]

VBW 3 MHz

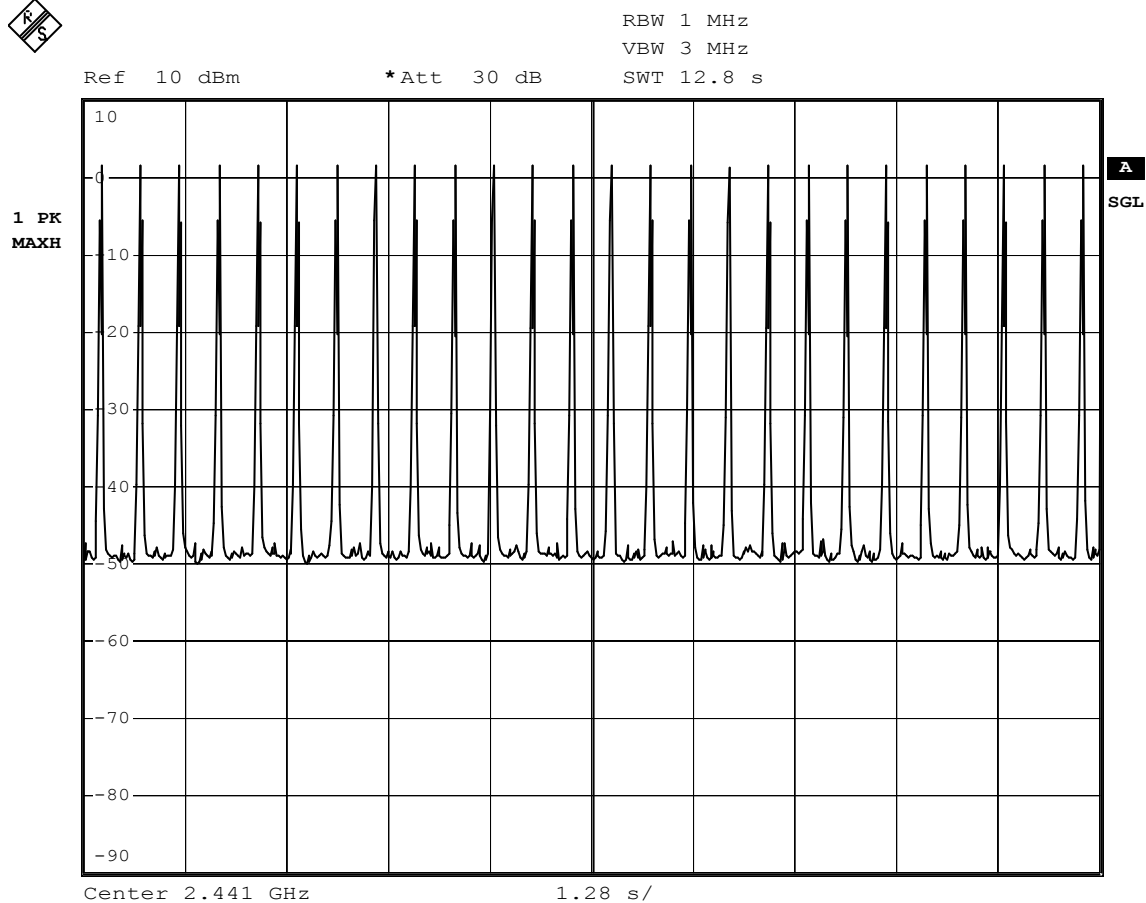
-0.34 dB

SWT 4 ms

2.940000 ms



Date: 18.NOV.2004 18:57:11

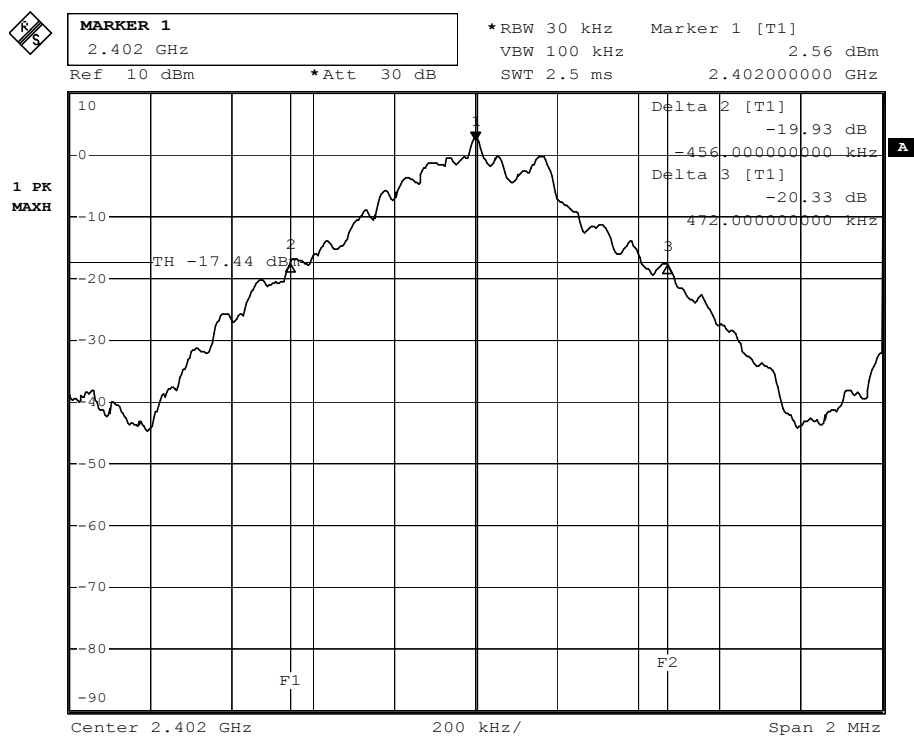


Date: 18.NOV.2004 18:57:51

20dB Bandwidth

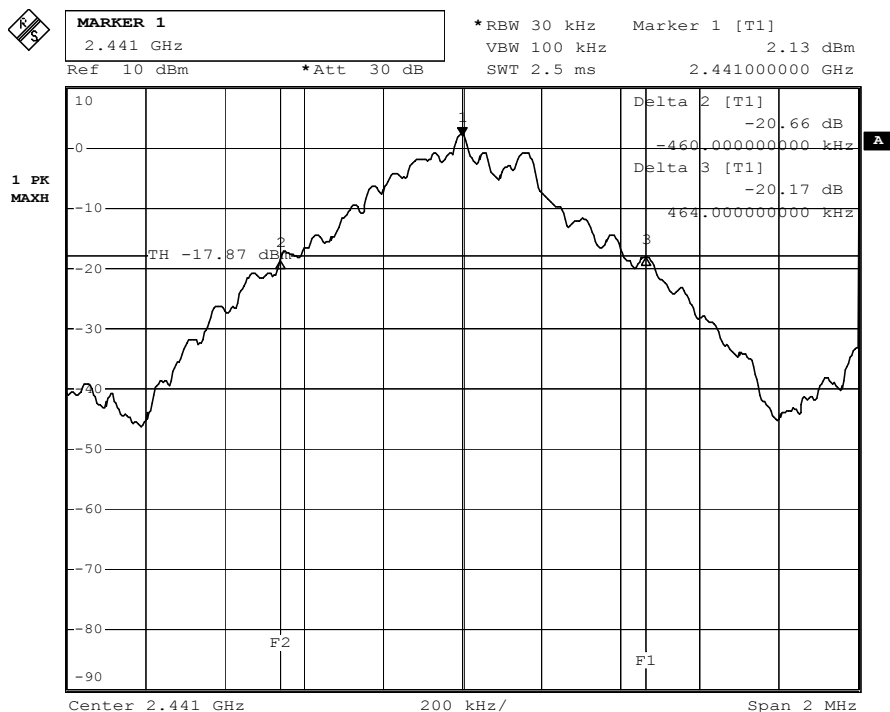
Date: 18 Nov 2004
 EUT: Wireless Multimedia USB Dongle
 Company: i.Tech Dynamic Ltd.
 Humidity: 60%
 Temperature: 23°C
 Voltage supply: 5.0VDC from USB port
 Test by: Hugo Wan
 Op. mode: TX mode, DH5 with PRBS9 payload

Tx frequency (MHz)	Δf_L (MHz)	Δf_H (MHz)	$ \Delta f_H + \Delta f_L $ (MHz)	Results
2402	0.456	0.472	0.928	Pass
2441	0.460	0.464	0.924	Pass
2480	0.456	0.464	0.920	Pass



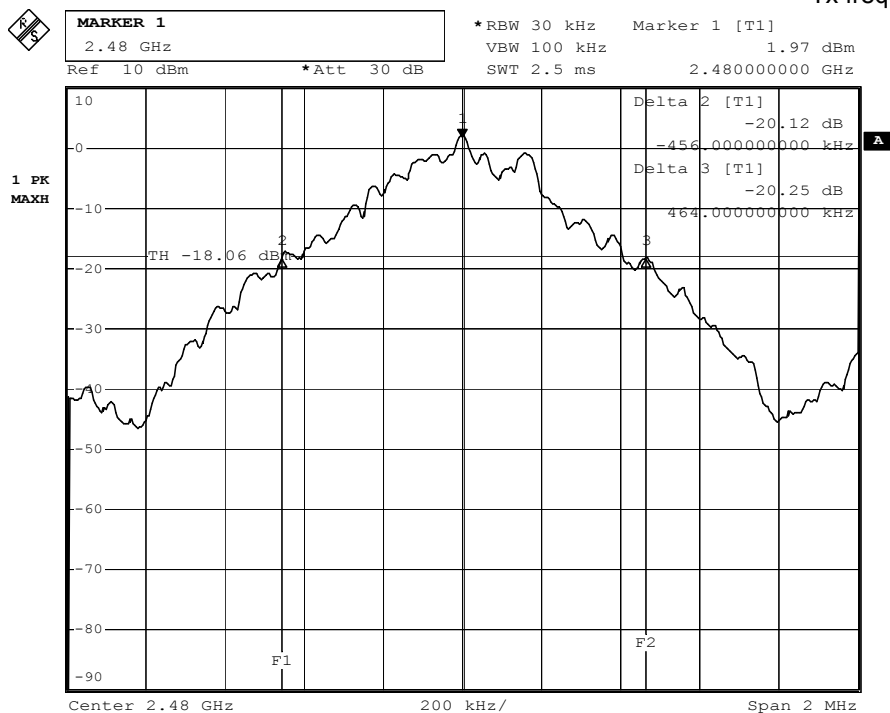
Date: 18.NOV.2004 19:00:53

Tx frequency: 2402MHz



Date: 18.NOV.2004 19:03:48

Tx frequency: 2441MHz



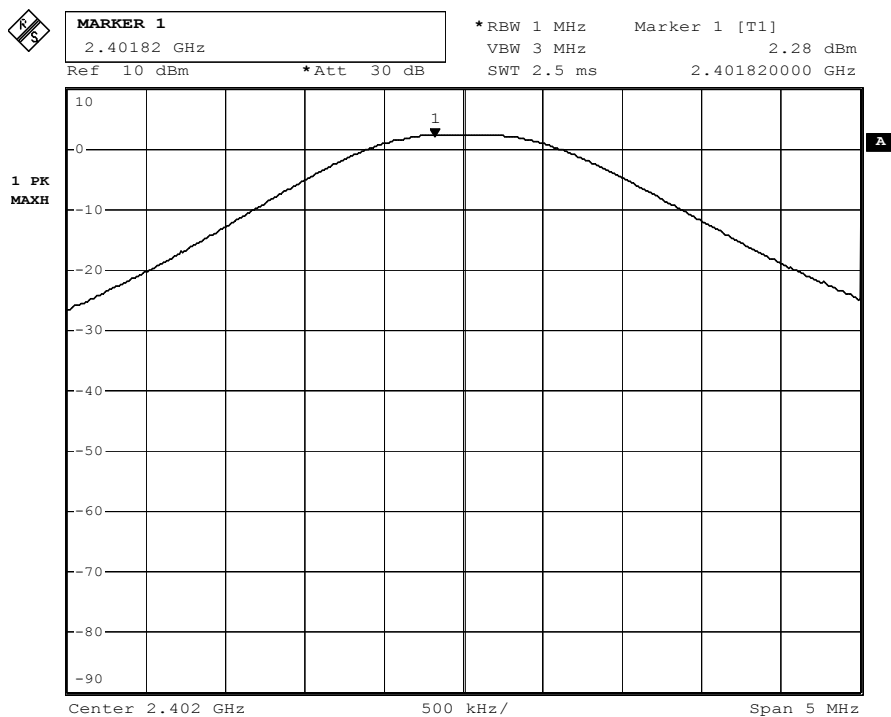
Date: 18.NOV.2004 19:05:28

Tx frequency: 2480MHz

Peak Output Power

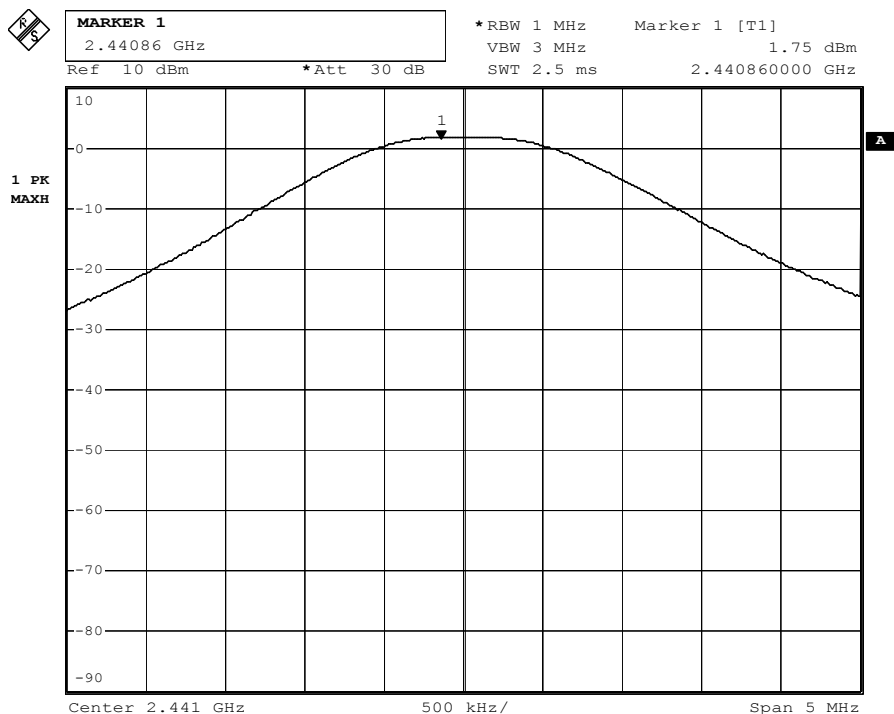
Date: 18 Nov 2004
 EUT: Wireless Multimedia USB Dongle
 Company: i.Tech Dynamic Ltd.
 Humidity: 60%
 Temperature: 23°C
 Voltage supply: 5.0VDC from USB port
 Test by: Hugo Wan
 Op. mode: TX mode, DH1 with PRBS9 payload

Tx Frequency (MHz)	Power P _{PK} (dBm)	Cable Attenuation (dB)	Actual Peak Power (dBm)	Results
2402	2.28	3.52	5.80	Pass
2441	1.75	3.65	5.40	Pass
2480	1.55	3.60	5.15	Pass



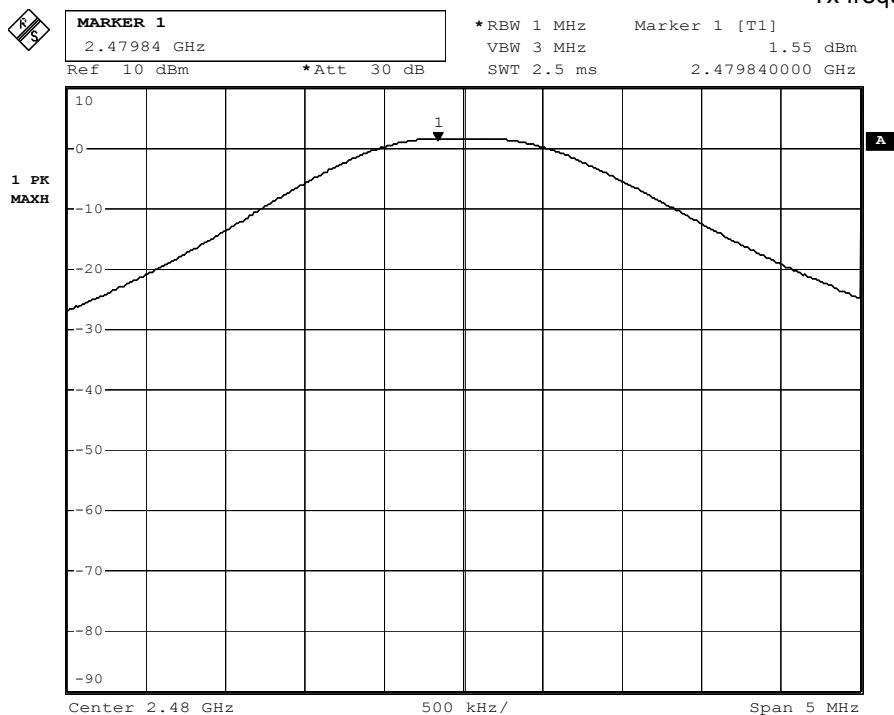
Date: 18.NOV.2004 19:07:46

Tx frequency: 2402MHz



Date: 18.NOV.2004 19:07:00

Tx frequency: 2441MHz



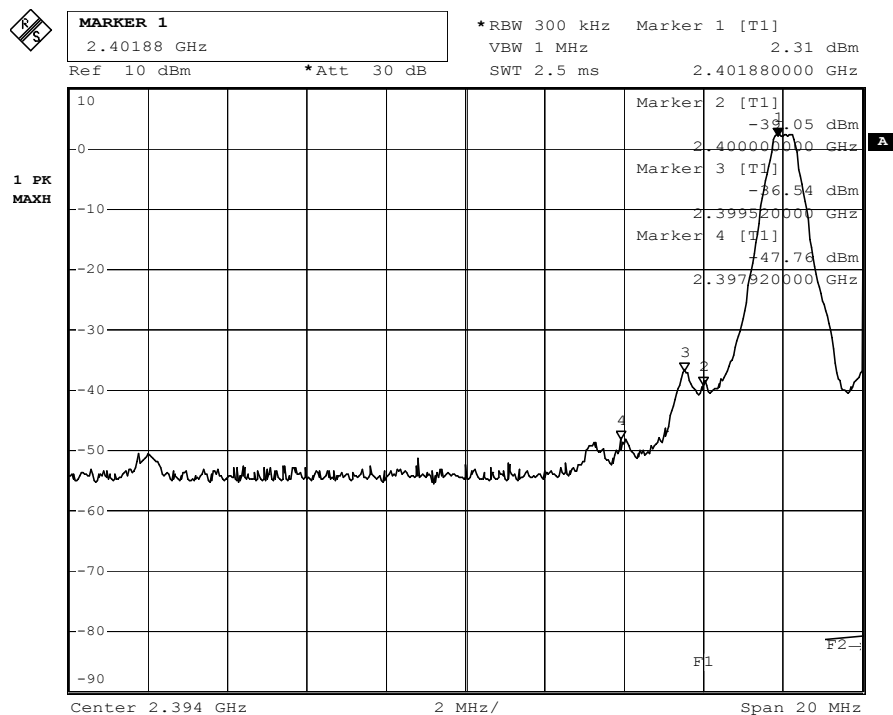
Date: 18.NOV.2004 19:06:28

Tx frequency: 2480MHz

Band Edge Compliance

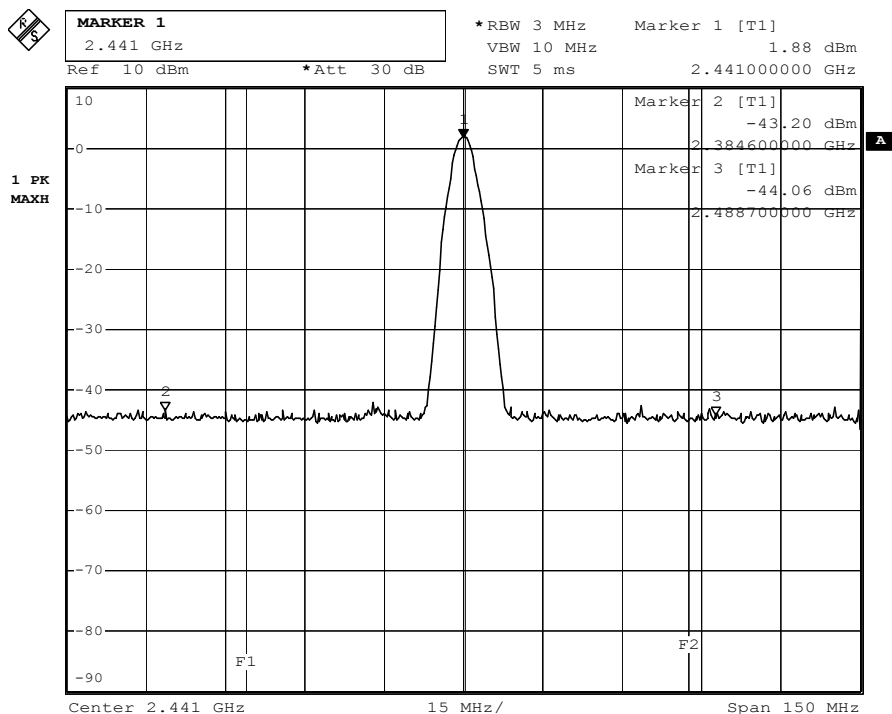
Date: 18 Nov 2004
 EUT: Wireless Multimedia USB Dongle
 Company: i.Tech Dynamic Ltd.
 Humidity: 60%
 Temperature: 23°C
 Voltage supply: 5.0VDC from USB port
 Test by: Hugo Wan
 Op. mode: TX mode, DH1 with PRBS9 payload

Tx Frequency (MHz)	Peak in band Power level (dBm)	RF power outside 100kHz BW (MHz)	RF power difference outside 100kHz BW (dB)	Results
2402	2.31	No Peak	-	Pass
2480	1.57	No Peak	-	Pass



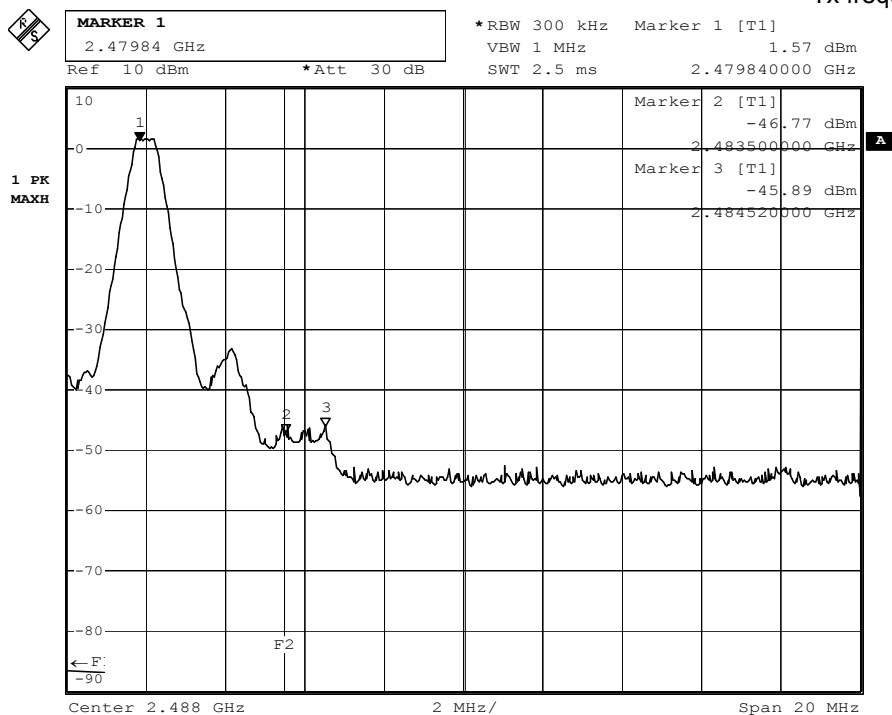
Date: 18.NOV.2004 19:09:48

Tx frequency: 2402MHz



Date: 18.NOV.2004 19:11:46

Tx frequency: 2441MHz



Date: 18.NOV.2004 19:10:49

Tx frequency: 2480MHz

Spurious Emissions - Conducted

Date: 18 Nov 2004
 EUT: Wireless Multimedia USB Dongle
 Company: i.Tech Dynamic Ltd.
 Humidity: 60%
 Temperature: 23°C
 Voltage supply: 5.0VDC from USB port
 Test by: Hugo Wan
 Op. mode: TX mode, DH1 with PRBS9 payload

Tx frequency : 2402MHz

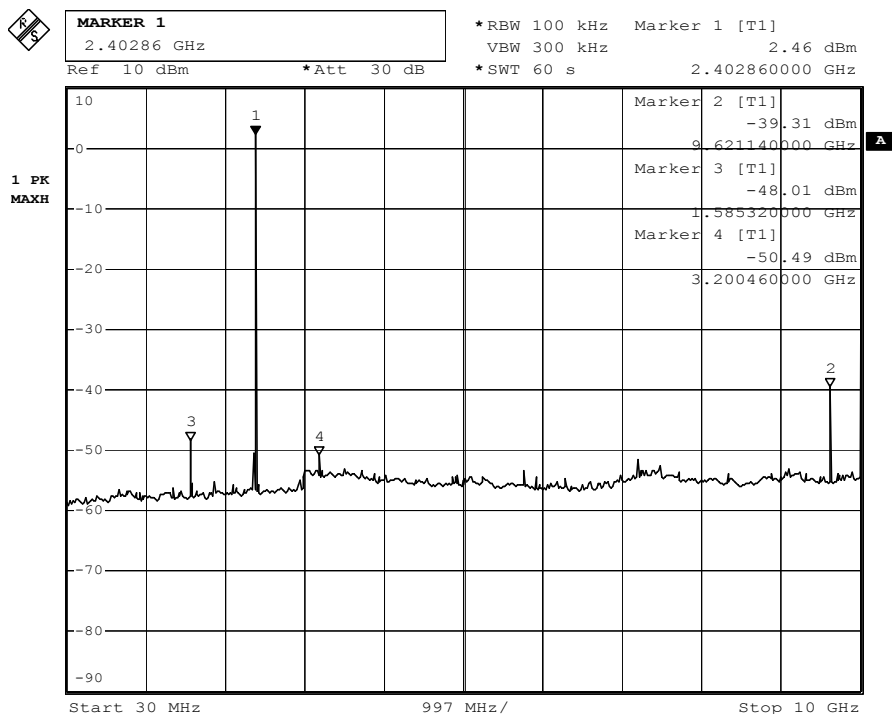
Spurious Frequency (MHz)	Power level (dBm)	Reference value (dBm)	Delta to reference level (dB)	Results
1186.520	-52.49	-11.09	-41.40	Pass
4795.660	-53.08	-11.09	-41.99	Pass

Tx frequency : 2441MHz

Spurious Frequency (MHz)	Power level (dBm)	Reference value (dBm)	Delta to reference level (dB)	Results
1206.460	-51.20	-11.82	-39.38	Pass
4875.420	-52.47	-11.82	-40.65	Pass

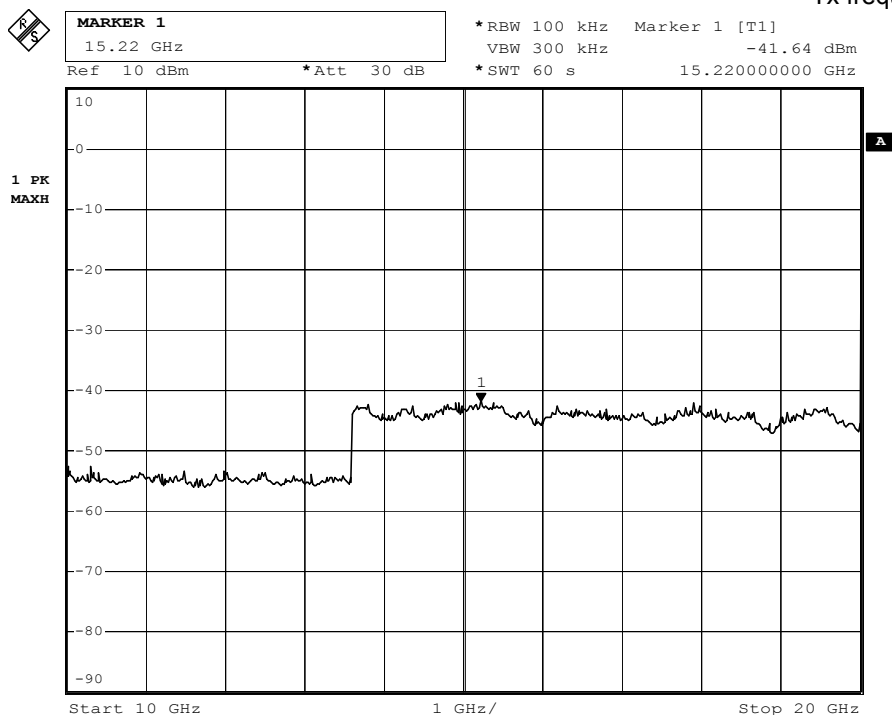
Tx frequency : 2480MHz

Spurious Frequency (MHz)	Power level (dBm)	Reference value (dBm)	Delta to reference level (dB)	Results
1226.400	-51.65	-12.42	-39.23	Pass
4955.180	-51.17	-12.42	-38.75	Pass



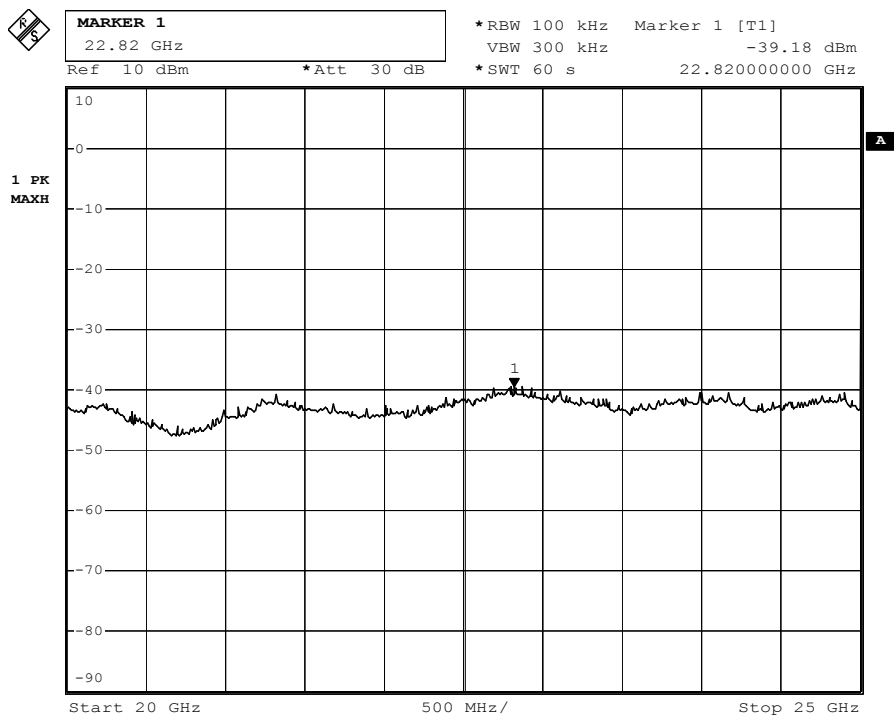
Date: 18.NOV.2004 19:21:14

Tx frequency: 2402MHz



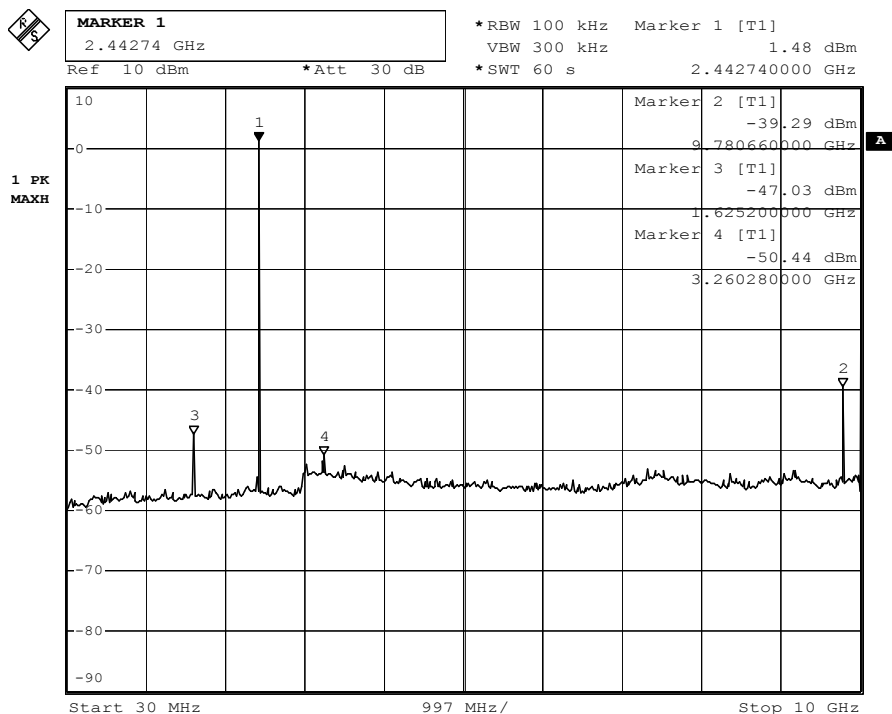
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Tx frequency: 2402MHz



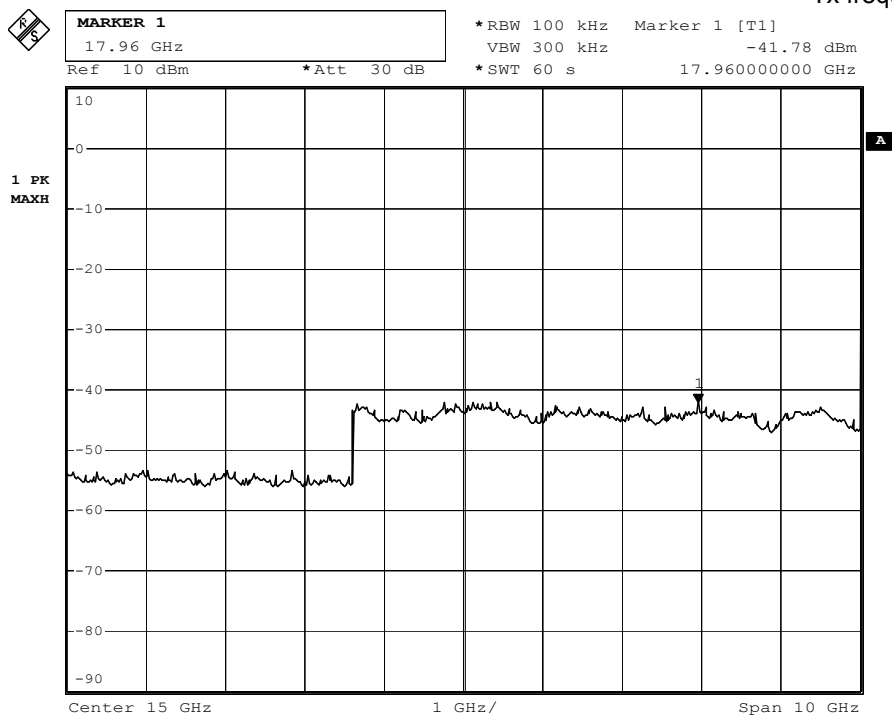
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Tx frequency: 2402MHz



Date: 18.NOV.2004 19:50:37

Tx frequency: 2441MHz



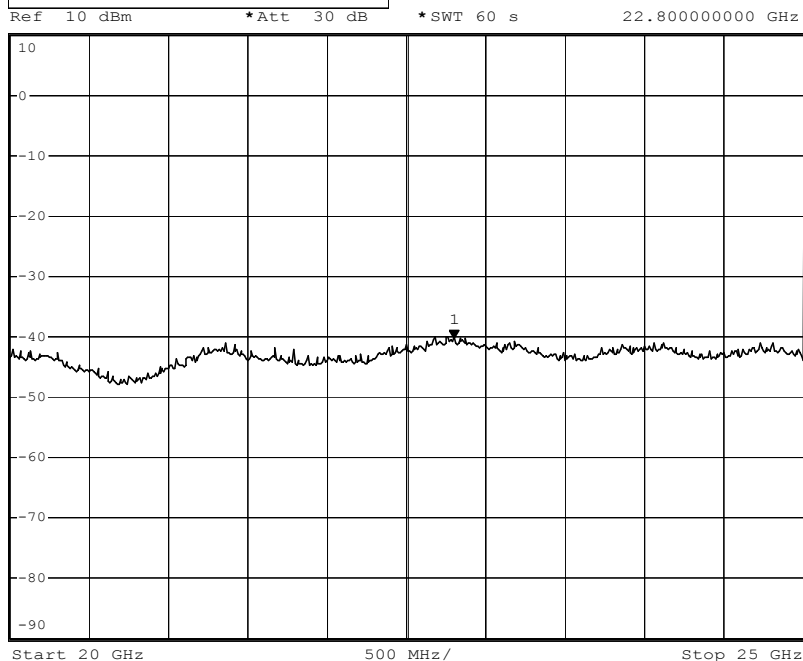
Date: 18.NOV.2004 19:38:48

Tx frequency: 2441MHz



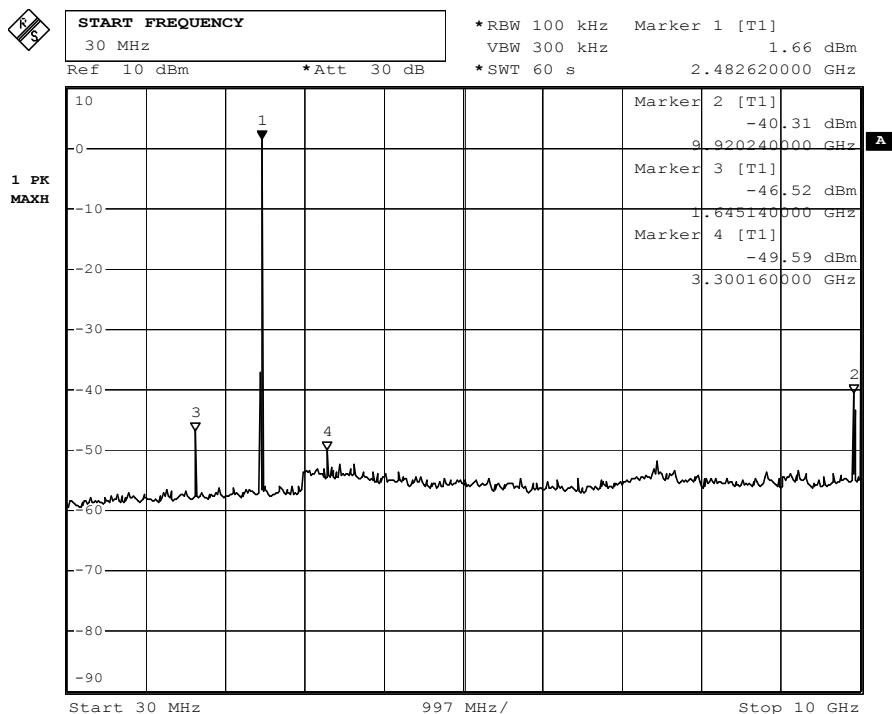
MARKER 1
22.8 GHz

*RBW 100 kHz Marker 1 [T1]
VBW 300 kHz -39.95 dBm
*SWT 60 s 22.800000000 GHz



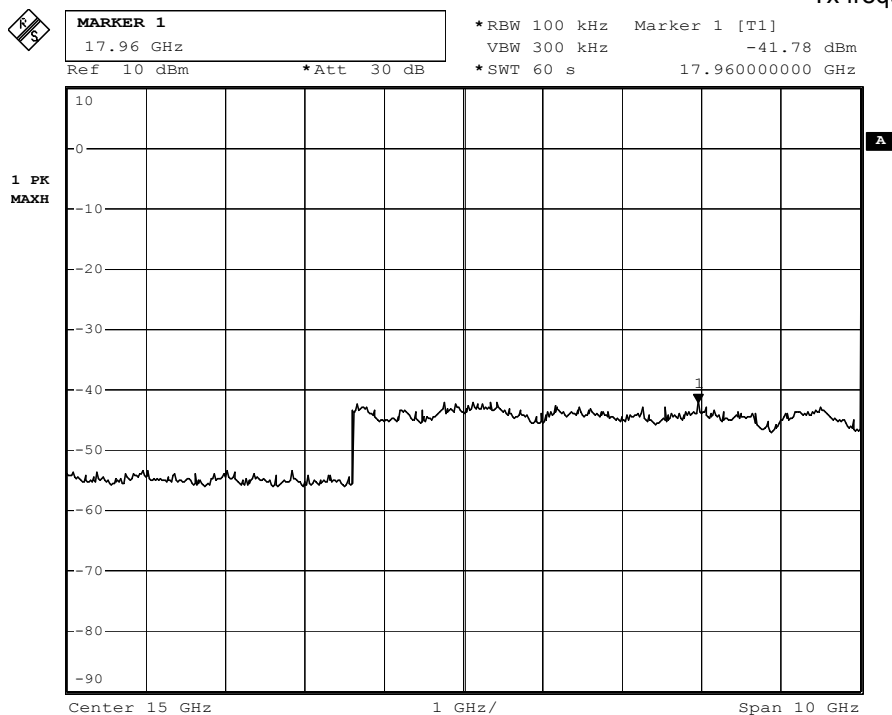
Date: 18.NOV.2004 19:33:43

Tx frequency: 2441MHz



Date: 18.NOV.2004 19:46:31

Tx frequency: 2480MHz



Date: 18.NOV.2004 19:38:48

Tx frequency: 2480MHz



MARKER 1

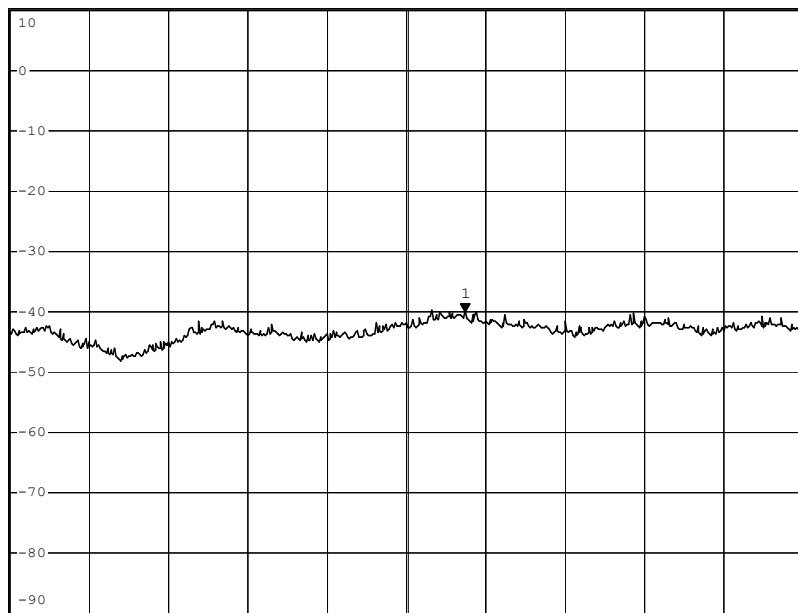
22.87 GHz

*RBW 100 kHz Marker 1 [T1]
 VBW 300 kHz -39.73 dBm
 *SWT 60 s 22.87000000 GHz

Ref 10 dBm

*Att 30 dB

1 PK
 MAXH



Start 20 GHz

500 MHz/

Stop 25 GHz

Date: 18.NOV.2004 19:36:00

Tx frequency: 2480MHz

Spurious Emissions - Radiated

Date: 19 Nov 2004

EUT: Wireless Multimedia USB Dongle

Company: i.Tech Dynamic Ltd.

Voltage supply: 5.0VDC from USB port

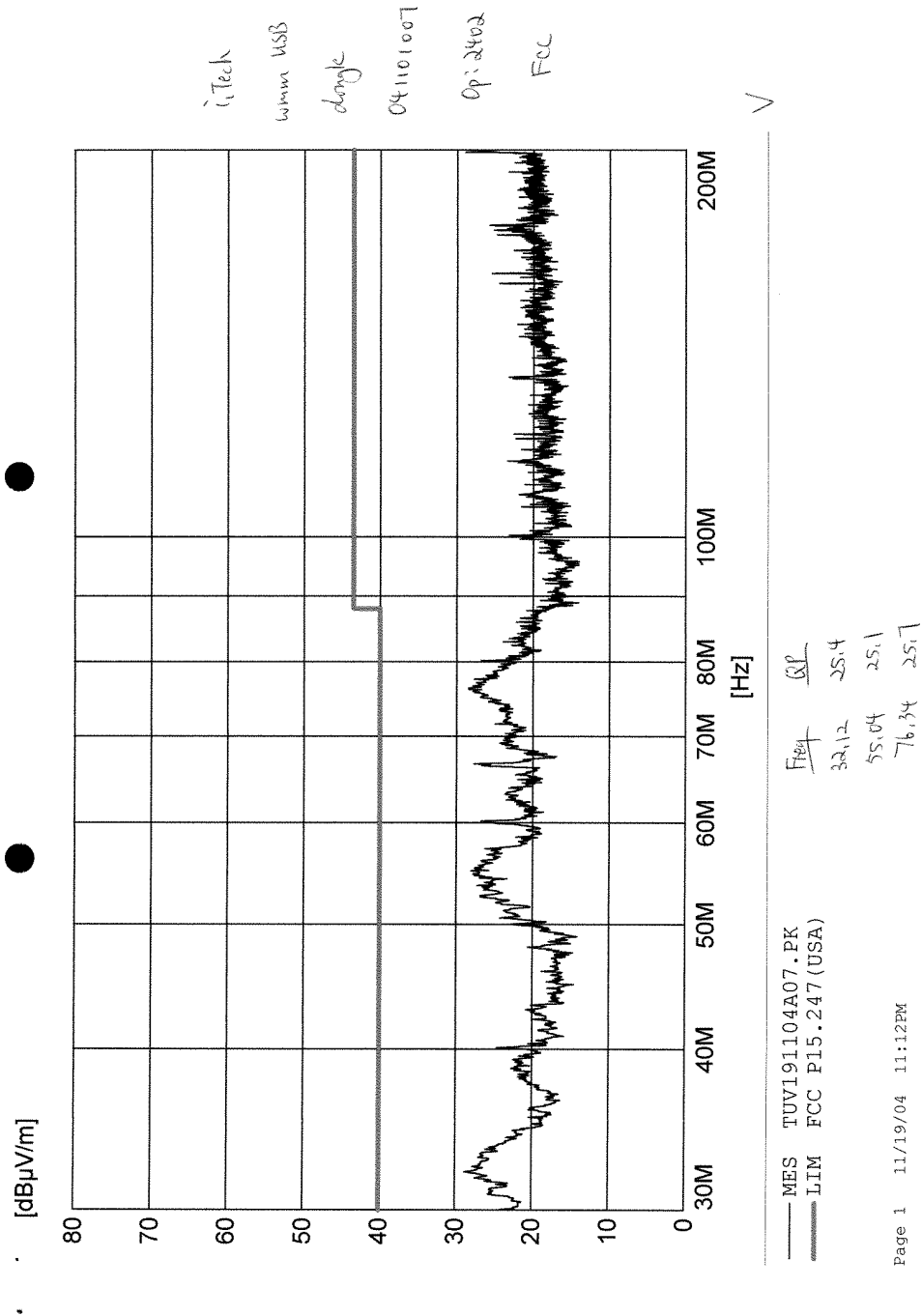
Test by: Hugo Wan

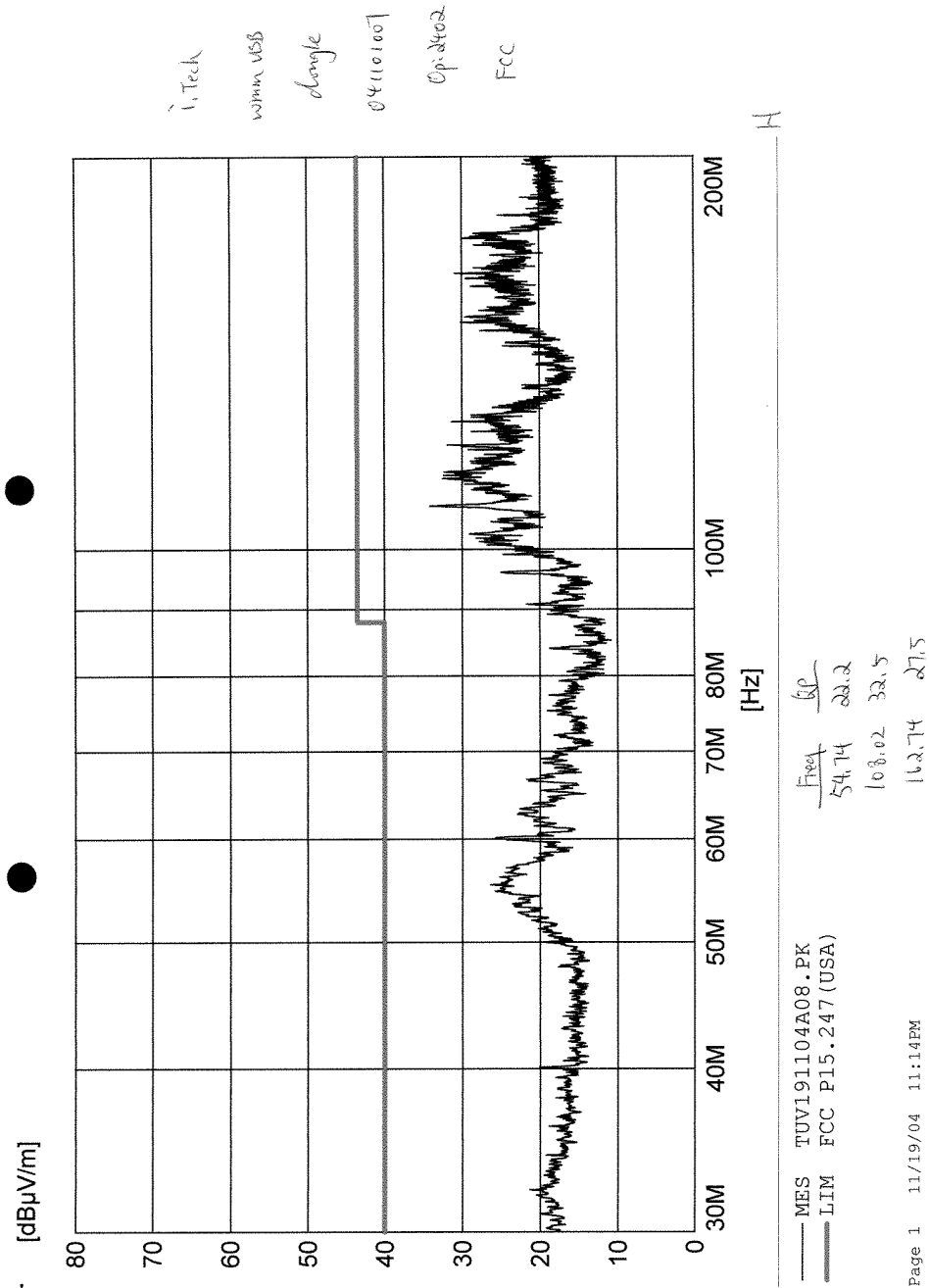
Op. mode: TX mode, DH1 with PRBS9 payload

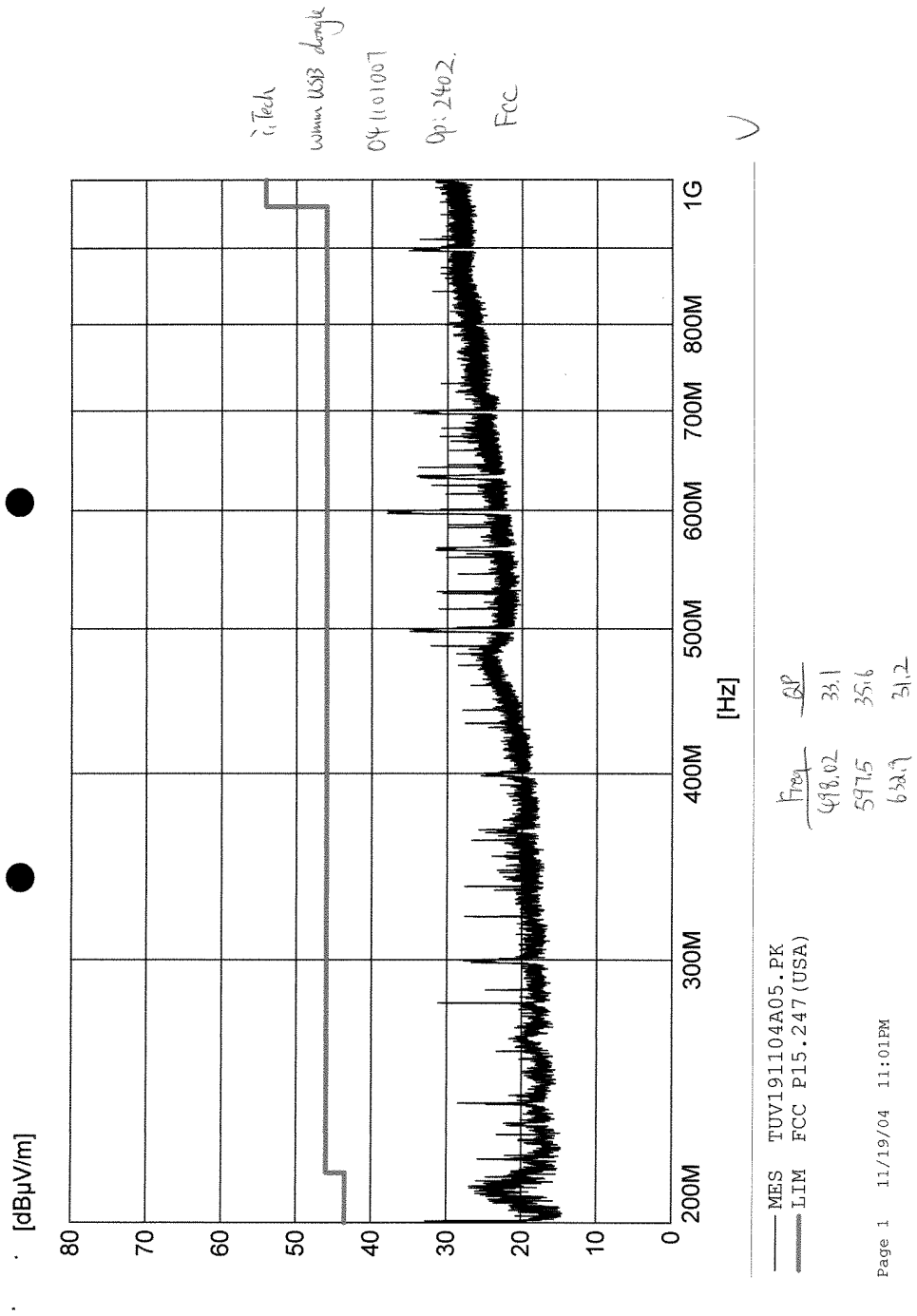
Tx frequency (MHz)	Polarization	Spurious Frequency (MHz)	Power Level (dBuV/m)	Detector (P/QP/A)
2402	V	32.120	25.40	QP
		55.040	25.10	QP
		76.340	25.70	QP
		498.020	33.10	QP
		597.500	35.60	QP
		632.900	31.20	QP
		4803.920	52.93 / 51.79	P / A
		1296.520	41.76 / 34.63	P / A
	H	54.740	22.20	QP
		108.020	32.50	QP
		162.740	27.50	QP
		200.483	26.60	QP
		432.020	37.90	QP
		561.260	32.30	QP
		1097.860	39.23 / 32.99	P / A

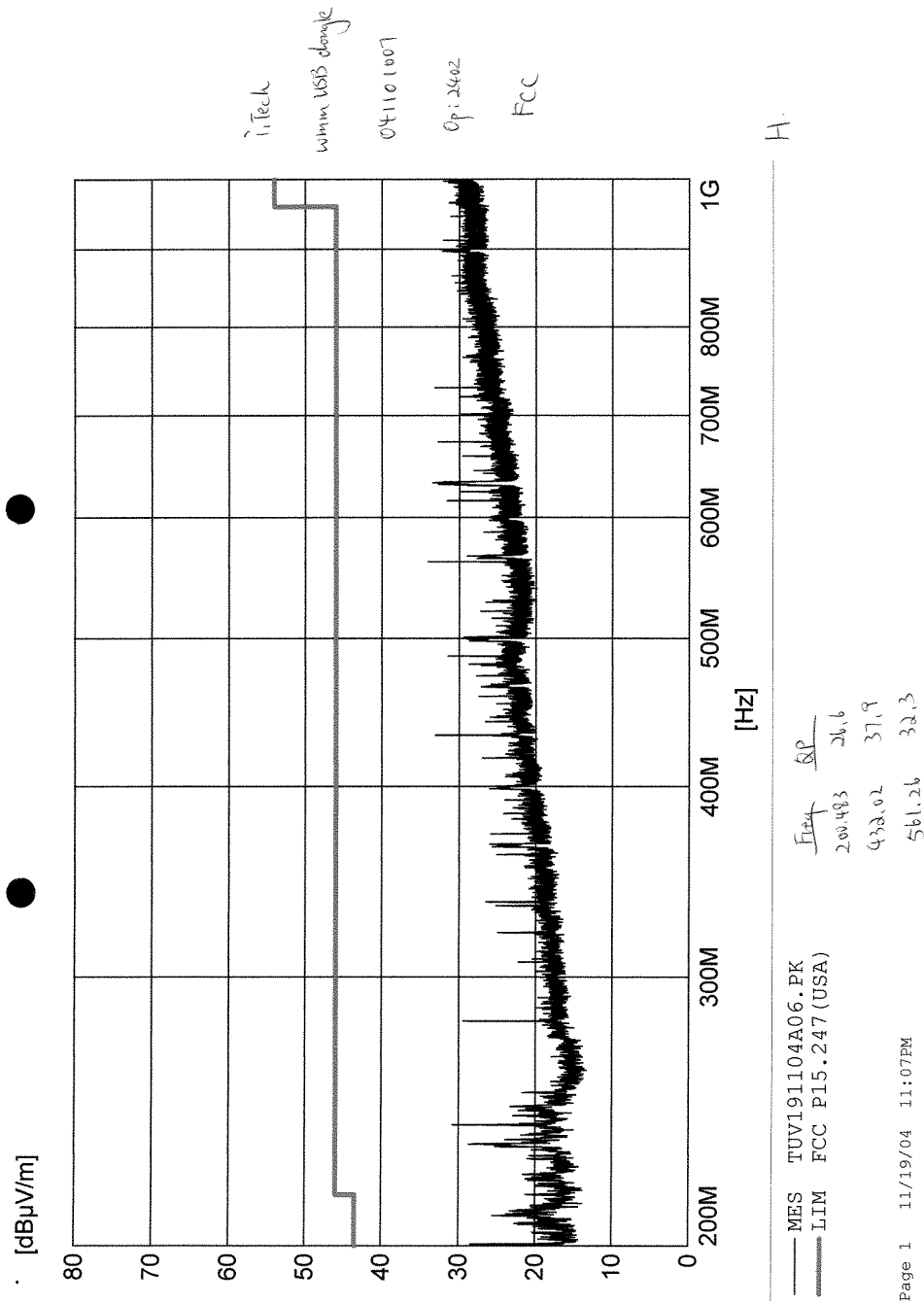
Tx frequency (MHz)	Polarization	Spurious Frequency (MHz)	Power Level (dBuV/m)	Detector (P/QP/A)
2441	V	32.300	25.00	QP
		55.100	24.30	QP
		75.740	25.40	QP
		497.900	33.70	QP
		597.860	36.20	QP
		697.580	32.00	QP
		4881.680	51.64 / 50.47	P / A
		1297.700	41.46 / 33.68	P / A
	H	60.020	23.00	QP
		108.020	32.50	QP
		162.800	28.10	QP
		432.080	31.80	QP
		561.260	35.60	QP
		631.040	30.20	QP
		1096.520	39.04 / 34.75	P / A
		4881.670	53.03 / 51.65	P / A

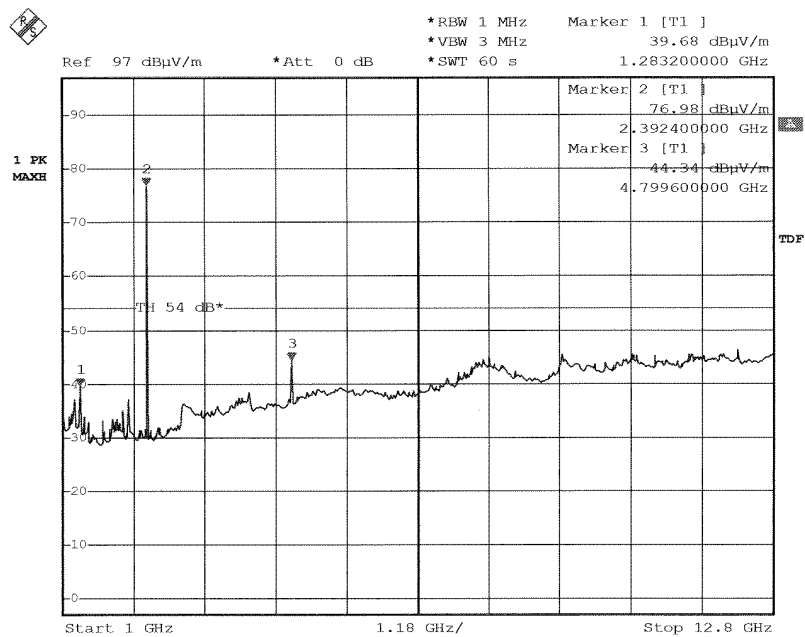
Tx frequency (MHz)	Polarization	Spurious Frequency (MHz)	Power Level (dBuV/m)	Detector (P/QP/A)
2480	V	32.300	25.60	QP
		54.620	24.10	QP
		76.100	25.60	QP
		497.960	31.40	QP
		599.420	33.60	QP
		697.040	32.30	QP
		1297.790	39.84 / 31.88	P / A
	H	60.080	21.80	QP
		108.020	32.50	QP
		161.420	26.20	QP
		432.020	32.10	QP
		561.200	34.80	QP
		632.900	30.50	QP
		1095.680	38.87 / 35.18	P / A
		4959.600	50.67 / 49.44	P / A





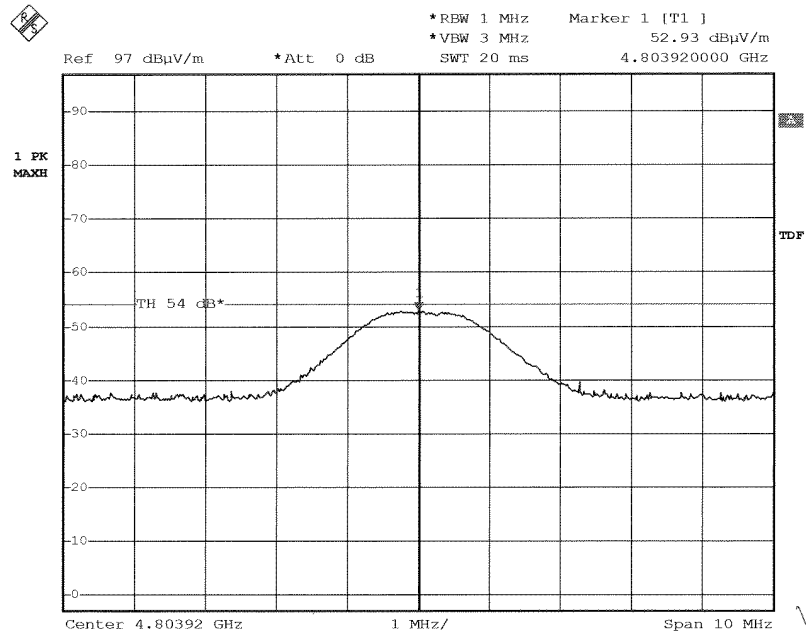






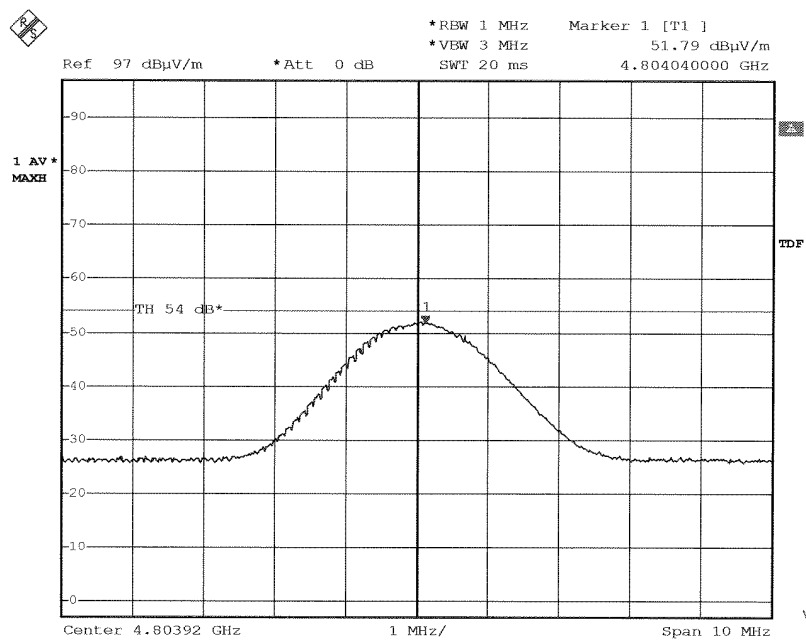
Date: 19.NOV.2004 18:41:33

iTech
 wimm USB dongle
 041101007 Op. 2402 MHz
 FCC



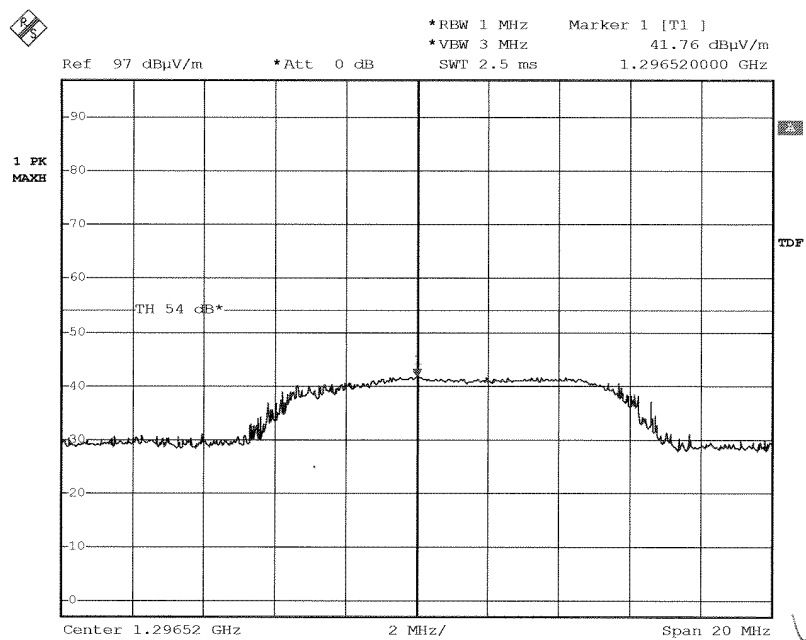
Date: 19.NOV.2004 18:56:46

i.Tech
 www USB dongle
 041101007 Op: 2402 MHz
 FCC



Date: 19.NOV.2004 18:58:37

iTech
 www USB dongle
 041101007 0p2402MHz
 FCC



Date: 19.NOV.2004 18:50:56

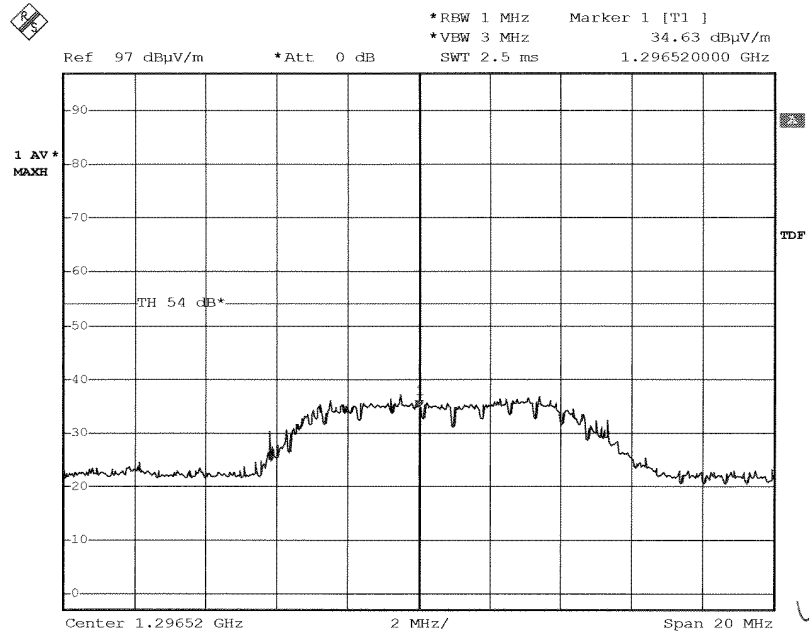
i.Tech

www USB dongle

041101007

Op: 2402MHz

FCC



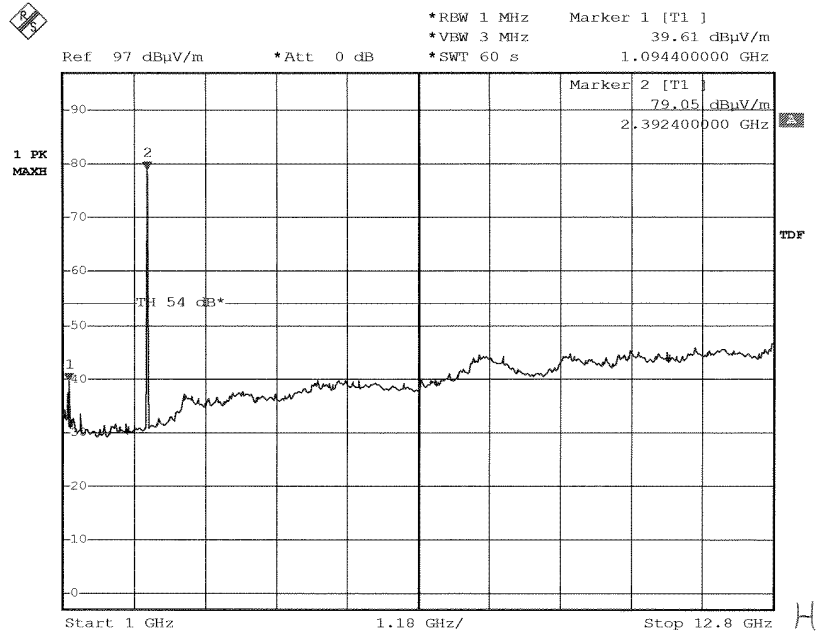
Date: 19.NOV.2004 18:51:53

i.Tech

wmm USB dongle

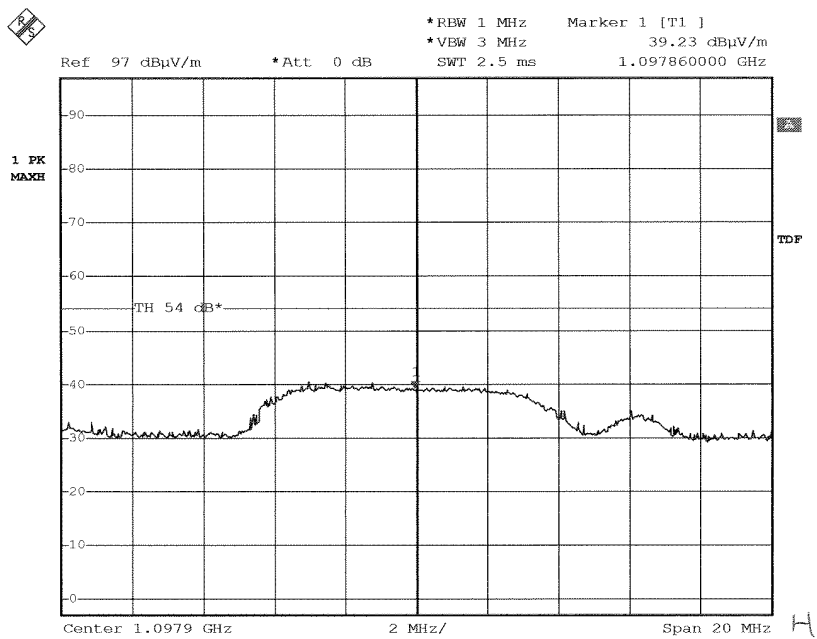
041101007

FCC Op. 2402 MHz.



Date: 19.NOV.2004 19:02:37

irTech
 wmm USB dongle
 041101007 Op: 2402 MHz
 FCC



Date: 19.NOV.2004 19:09:13

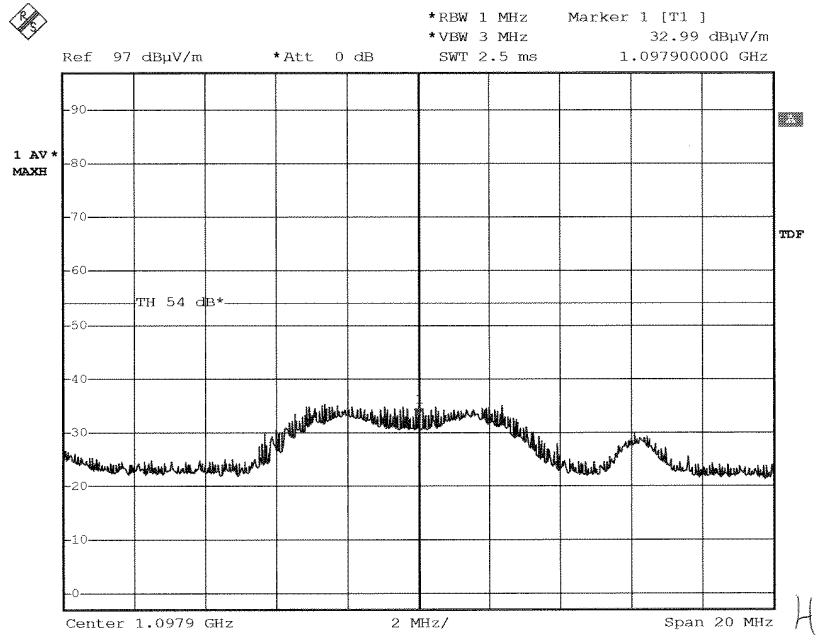
iTech

wmm USB dongle

041101007

Op: 2402 MHz

FCC



Date: 19.NOV.2004 19:11:12

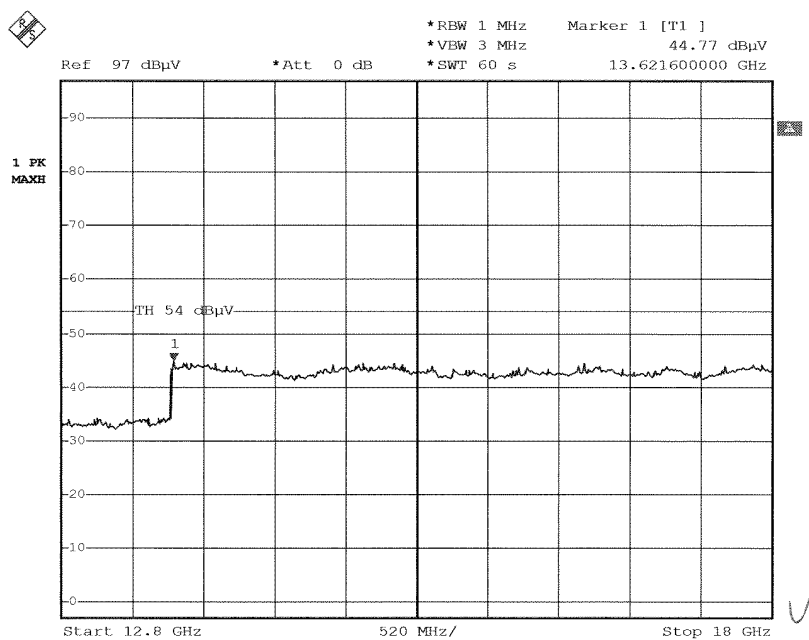
iTech

wmm USB dongle

041101007

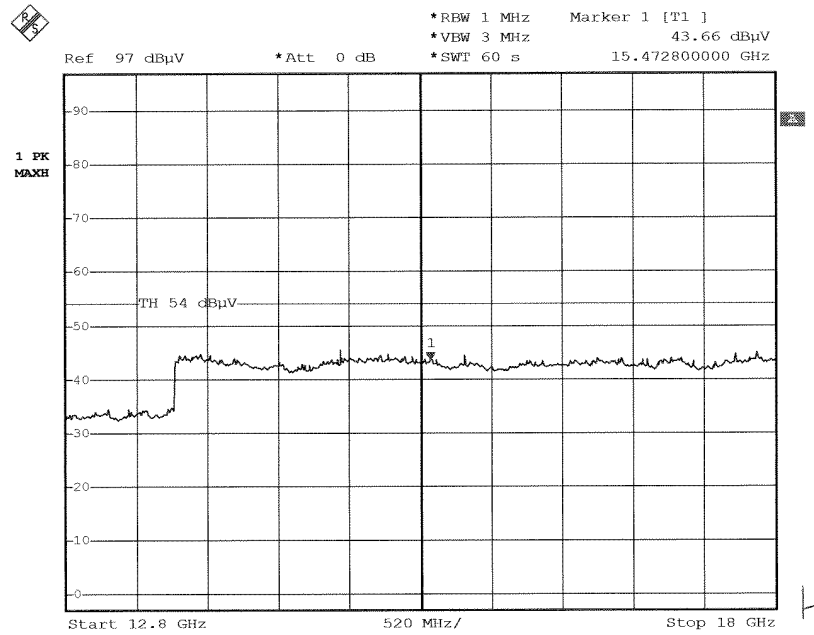
Op: 2402 MHz

FCC



Date: 19.NOV.2004 20:17:58

iTech
wmm usb dongle
041101007 Op: 2402
FCC



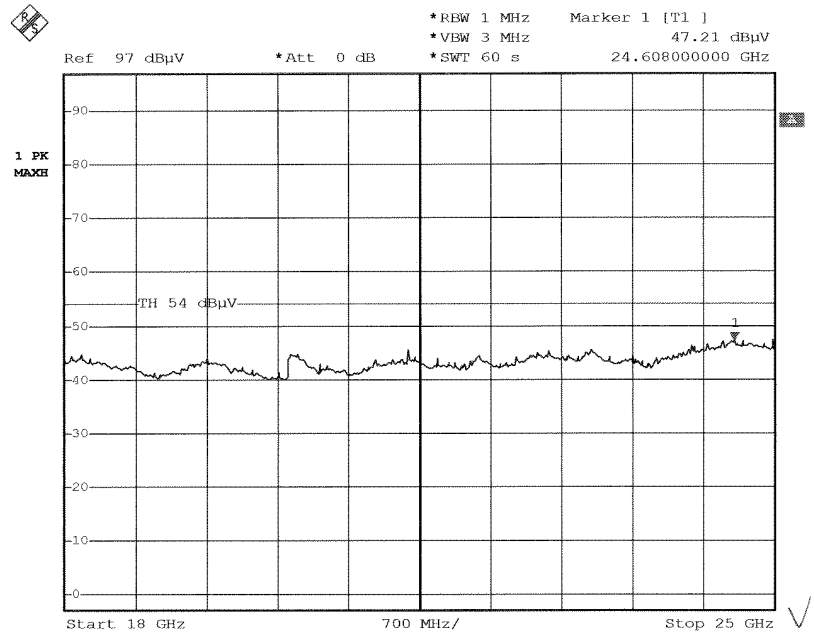
Date: 19.NOV.2004 20:23:24

i.Tech

wmm USB dongle

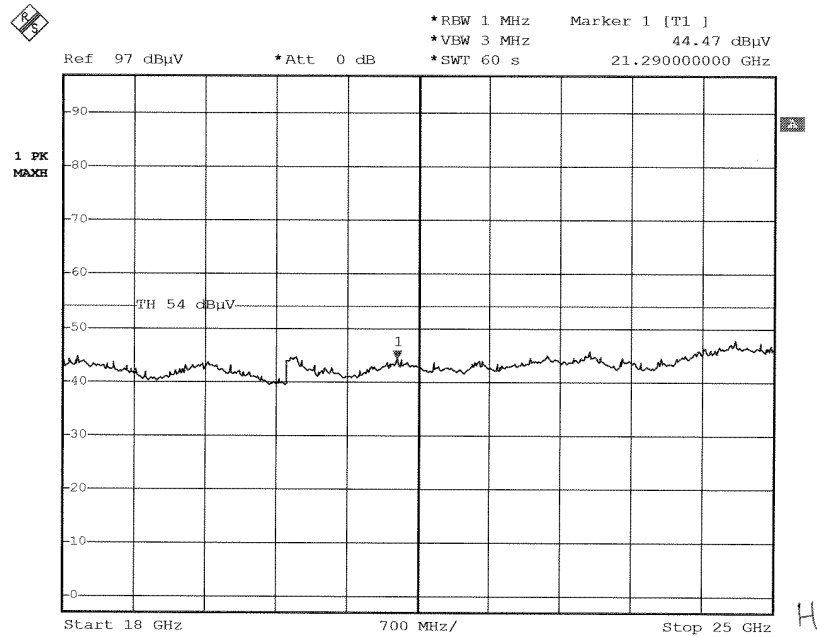
041101007 Op: 2402

FCC



Date: 19.NOV.2004 21:52:36

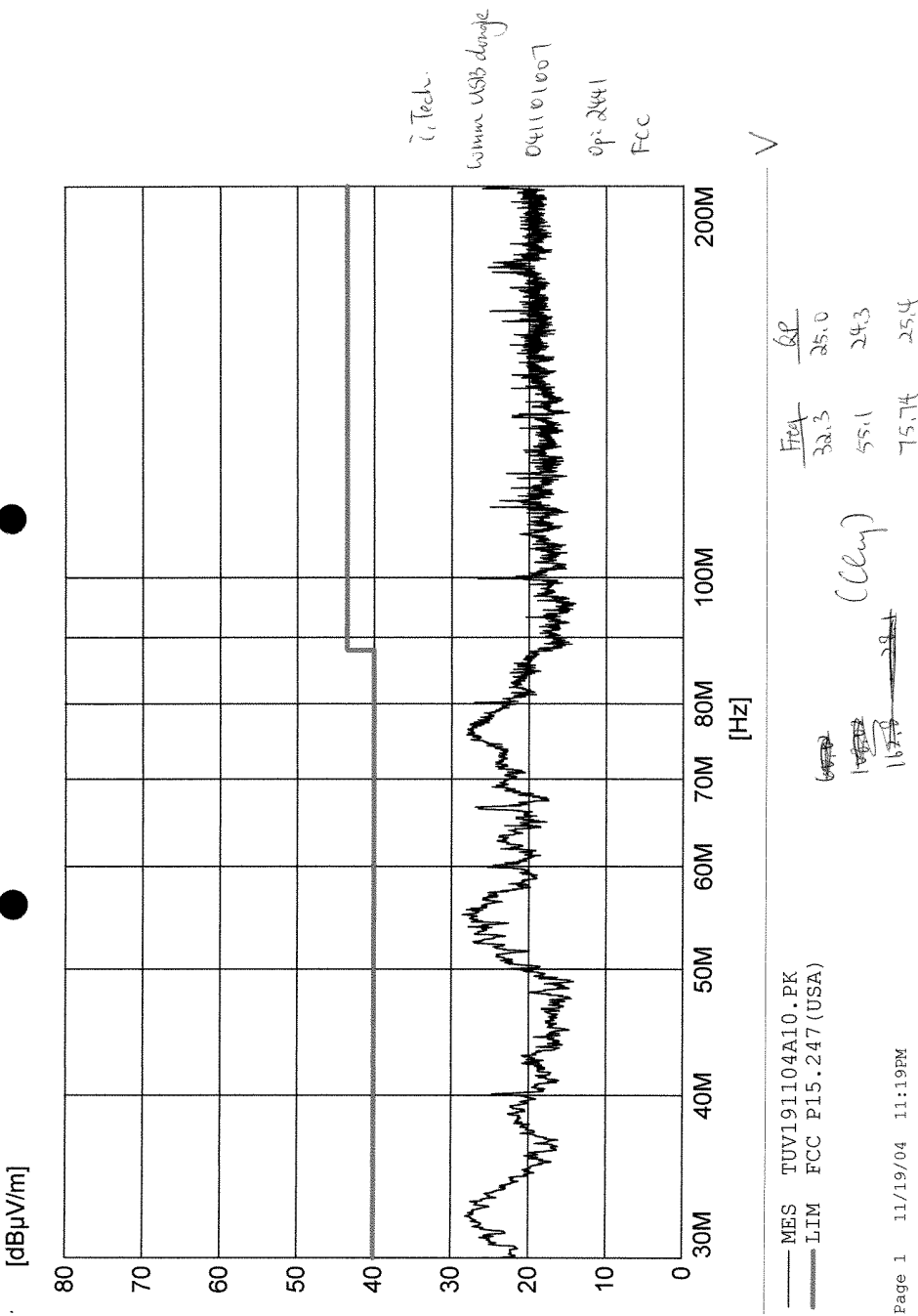
iTech
wmm USB dongle
041101007
Op: 2402
Fcc

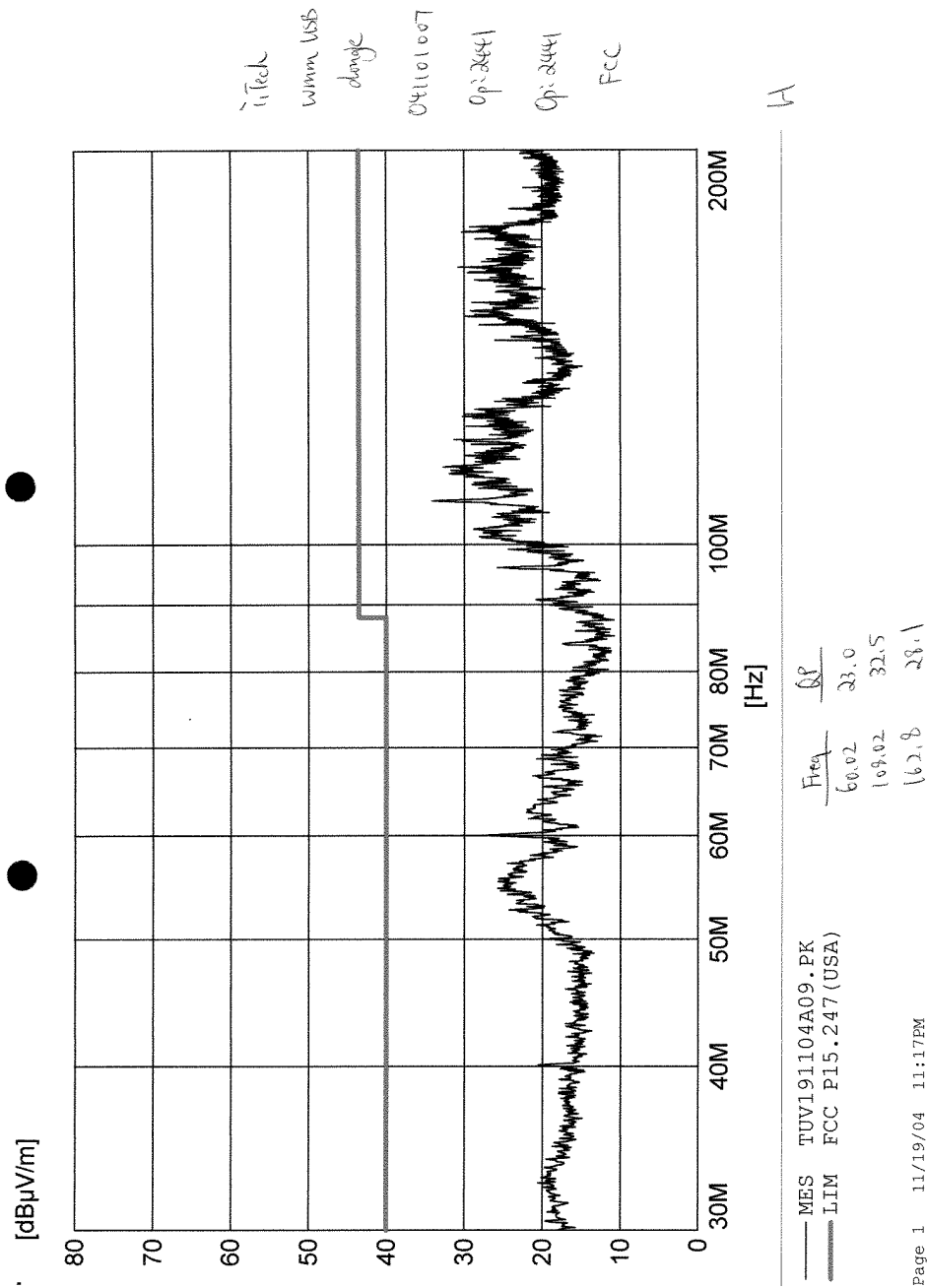


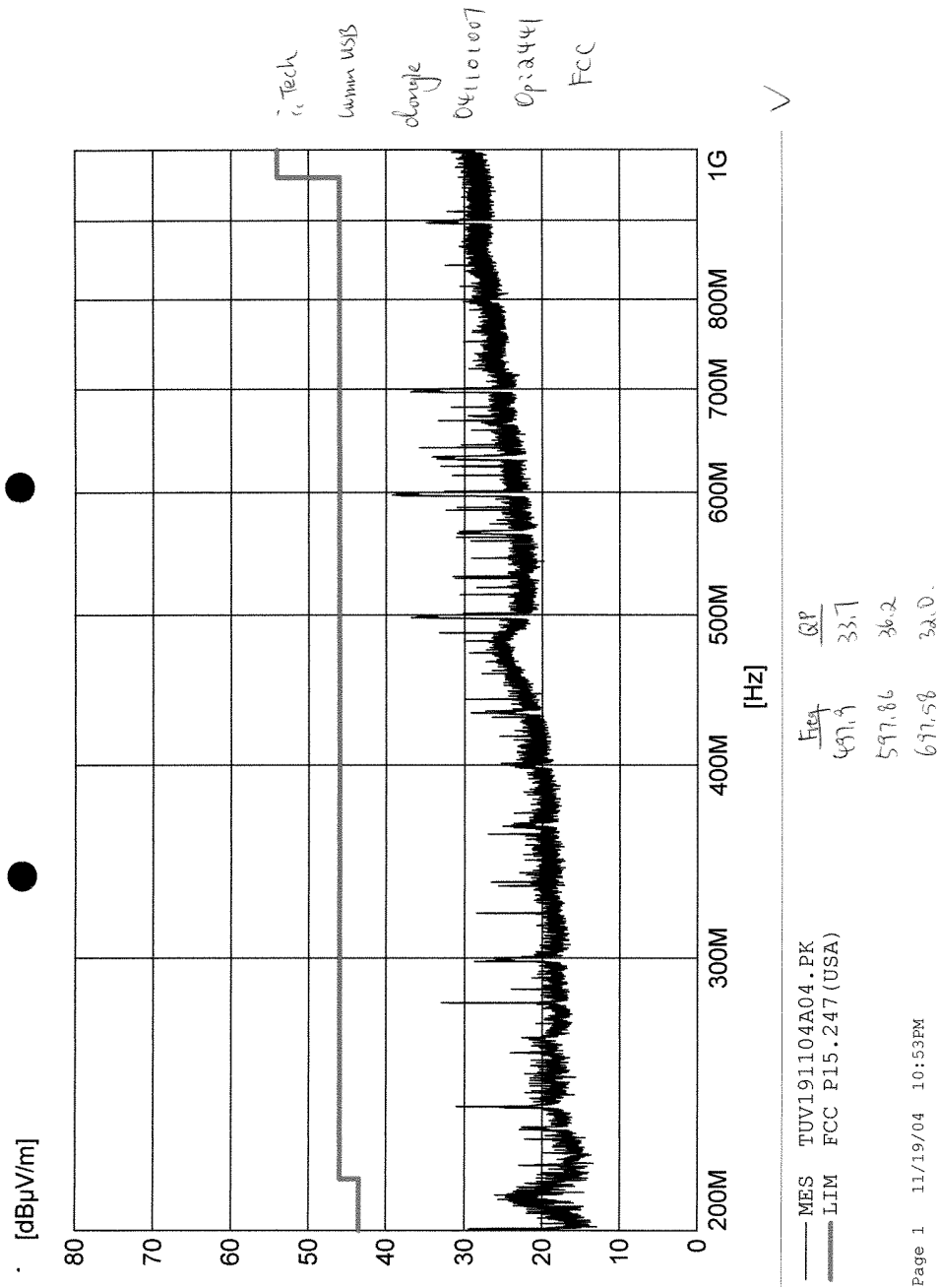
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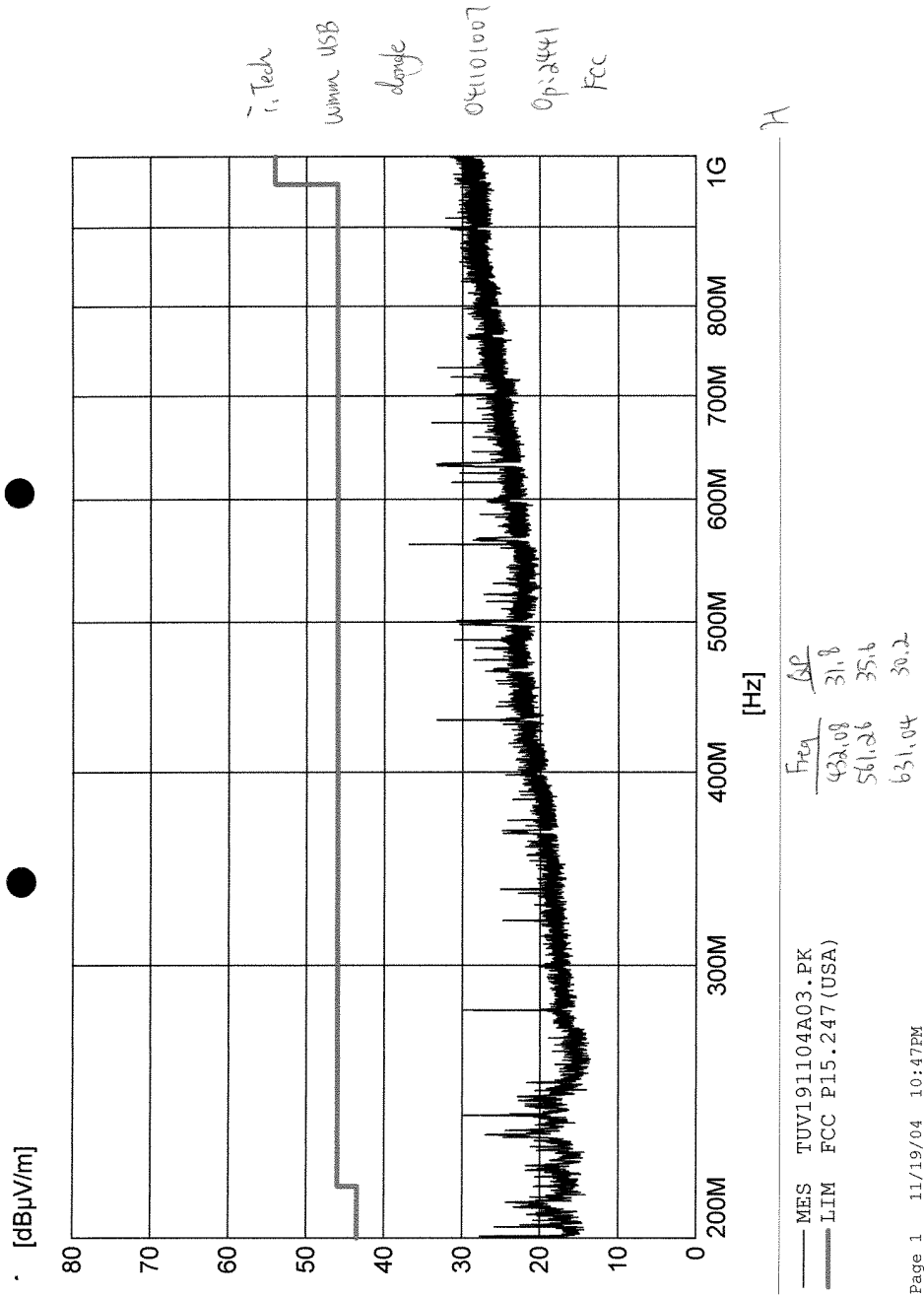
iTech
 wmm USB dongle
 041101007

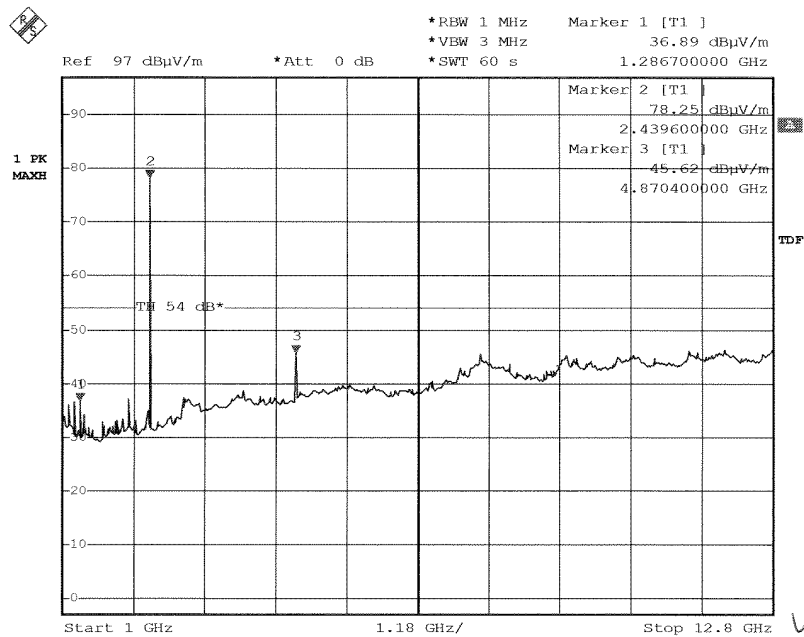
Op: 2402
 FCC





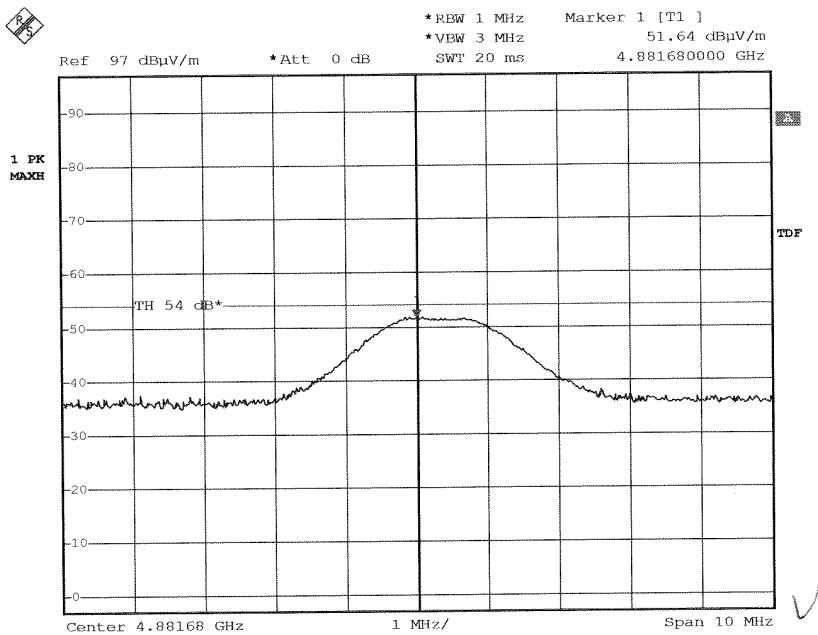






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iTech
wmm USB dongle
041101007 Op: 2441 MHz
FCC



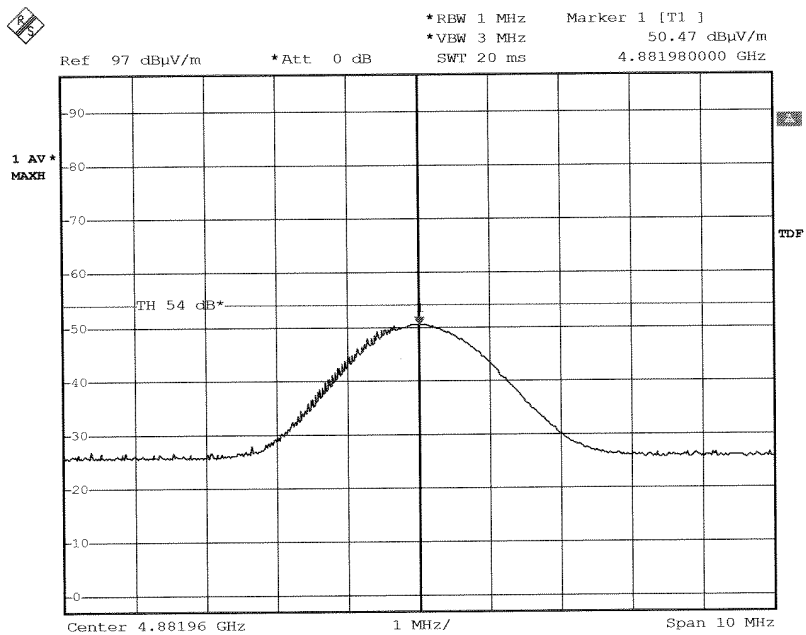
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i.Tech

www USB dongle

041101007 Op: 2441 MHz

FCC



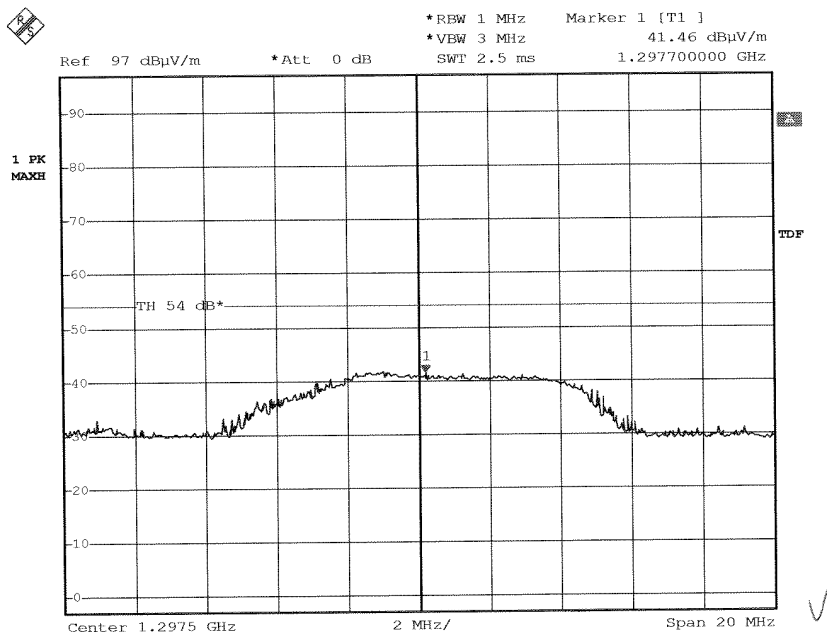
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iTech

wmm USB dongle

041101007 Op: 2441 MHz

Fcc



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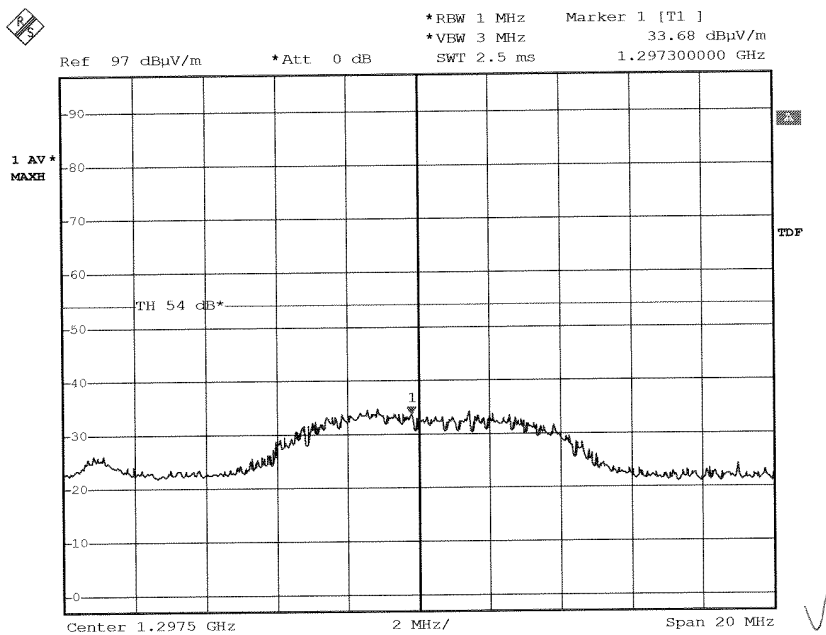
i.Tech

wmm USB dongle

041101001

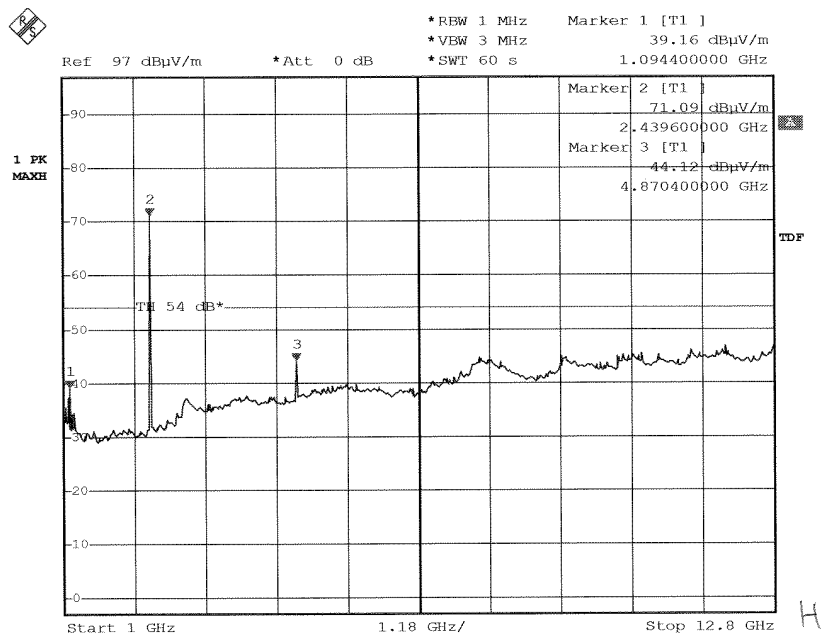
Op: 2441 MHz

Fcc



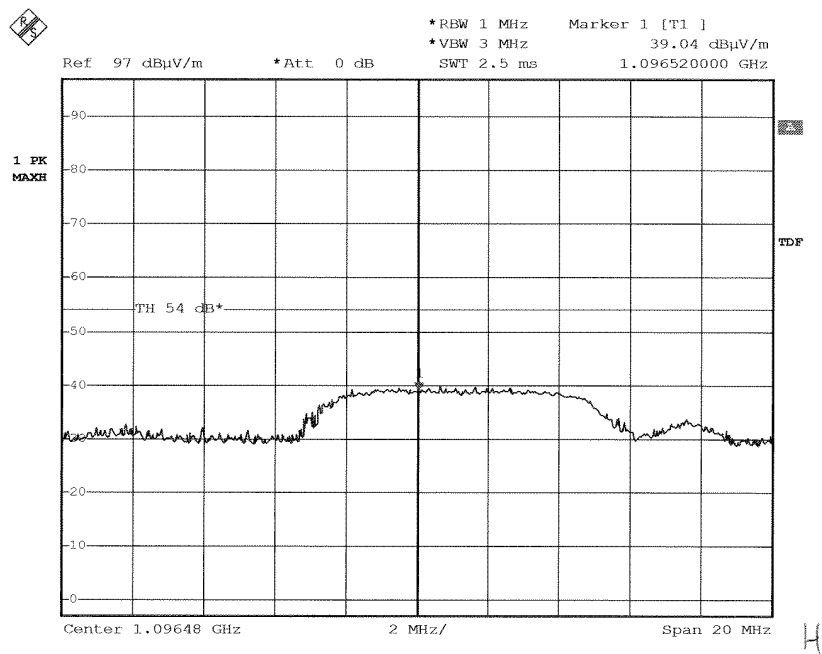
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iTech
 www USB dongle
 041101007 Op: 2441 MHz
 FCC



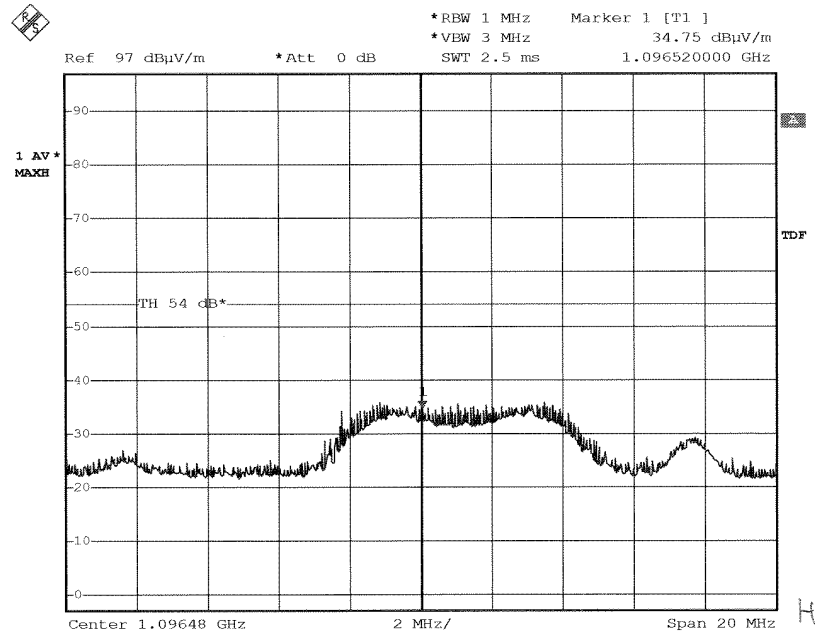
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iTech
wmm USB dongle
041101007 Op:2441 MHz
FCC.



Date: 19.NOV.2004 19:38:26

iTech
 www USB dongle
 041101007 Op=2441MHz
 FCC



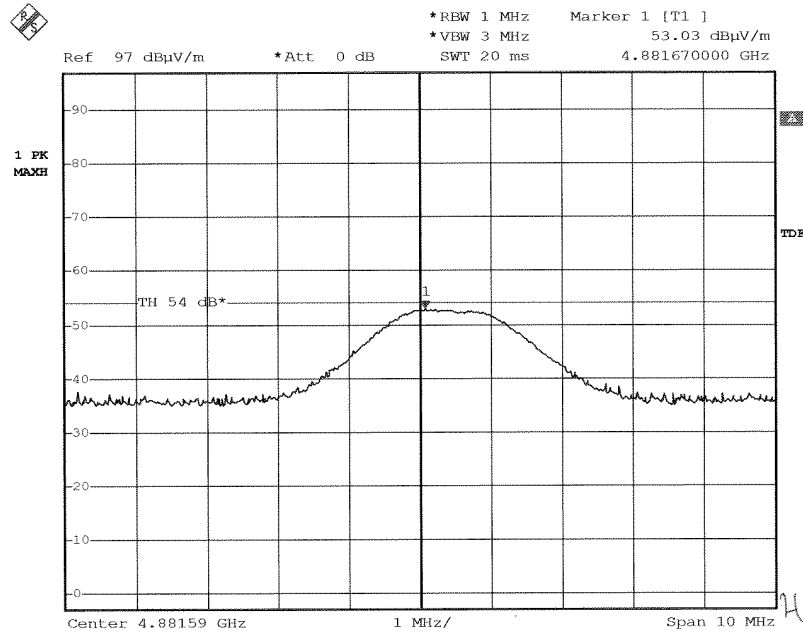
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i, Tech

www USB dongle

041101007 Op: 2441 MHz

Fcc

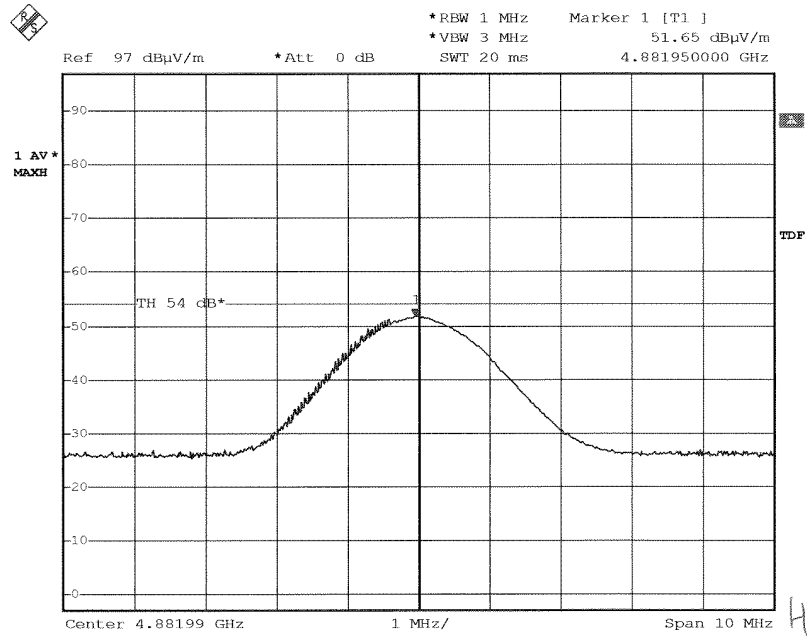


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iTech
wmm USB dongle

041101007 Op: 2441 MHz

FCC.



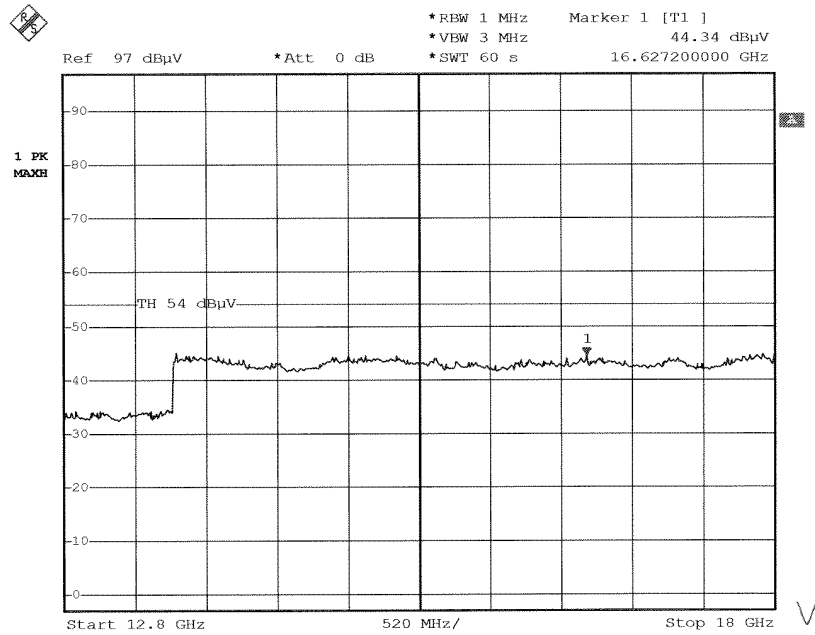
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iTech

www USB dongle

041101007 Op: 2441 MHz

Fcc.



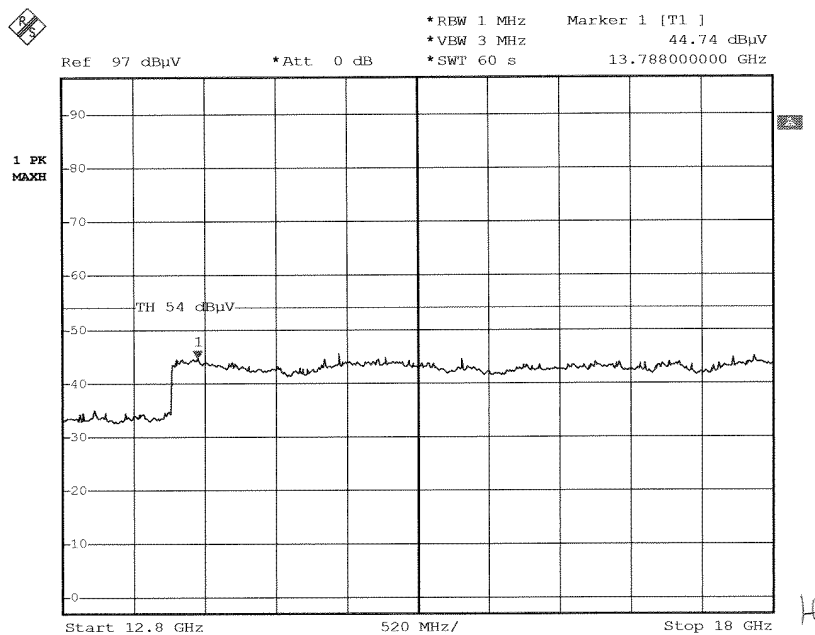
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iTech

wmm USB dongle

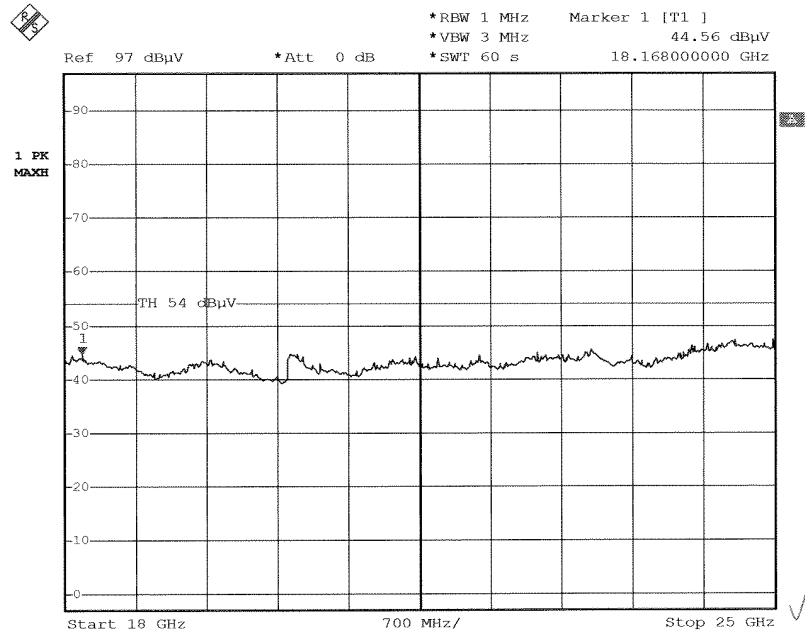
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FCC



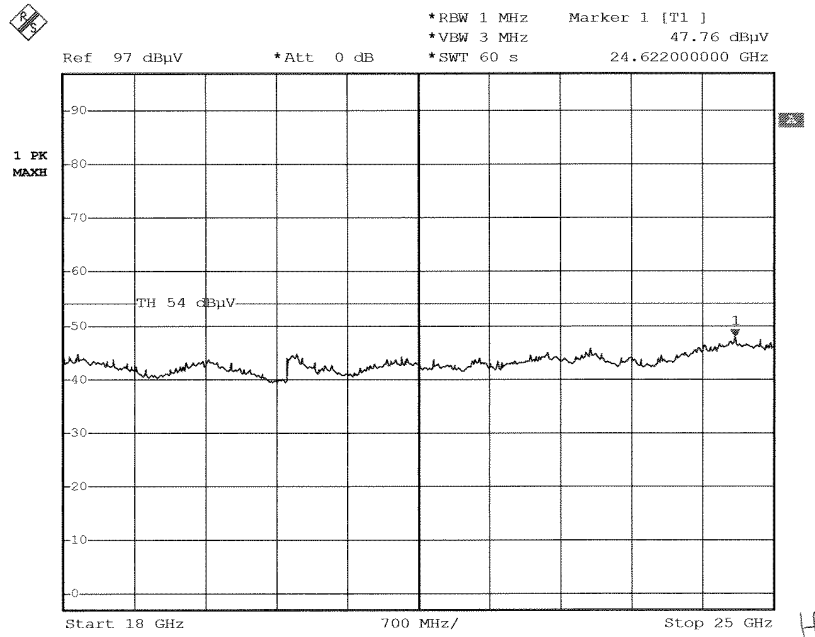
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i.Tech
wmm USB dongle
041101007 Op:2441
FCC



Date: 19.NOV.2004 21:51:03

iTech
wmm USB dongle
041101007
Op: 2441
FCC



Date: 19.NOV.2004 21:55:42

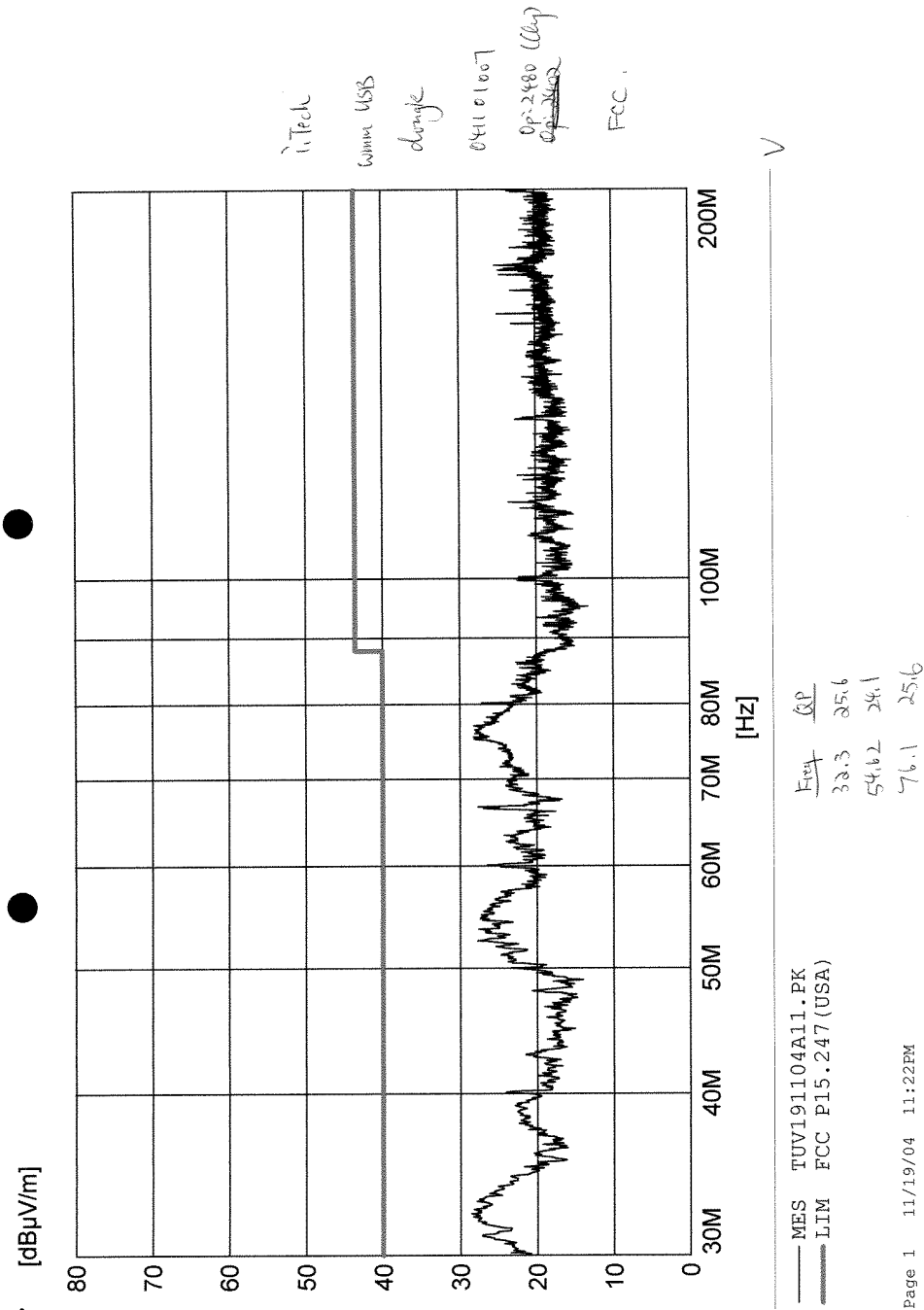
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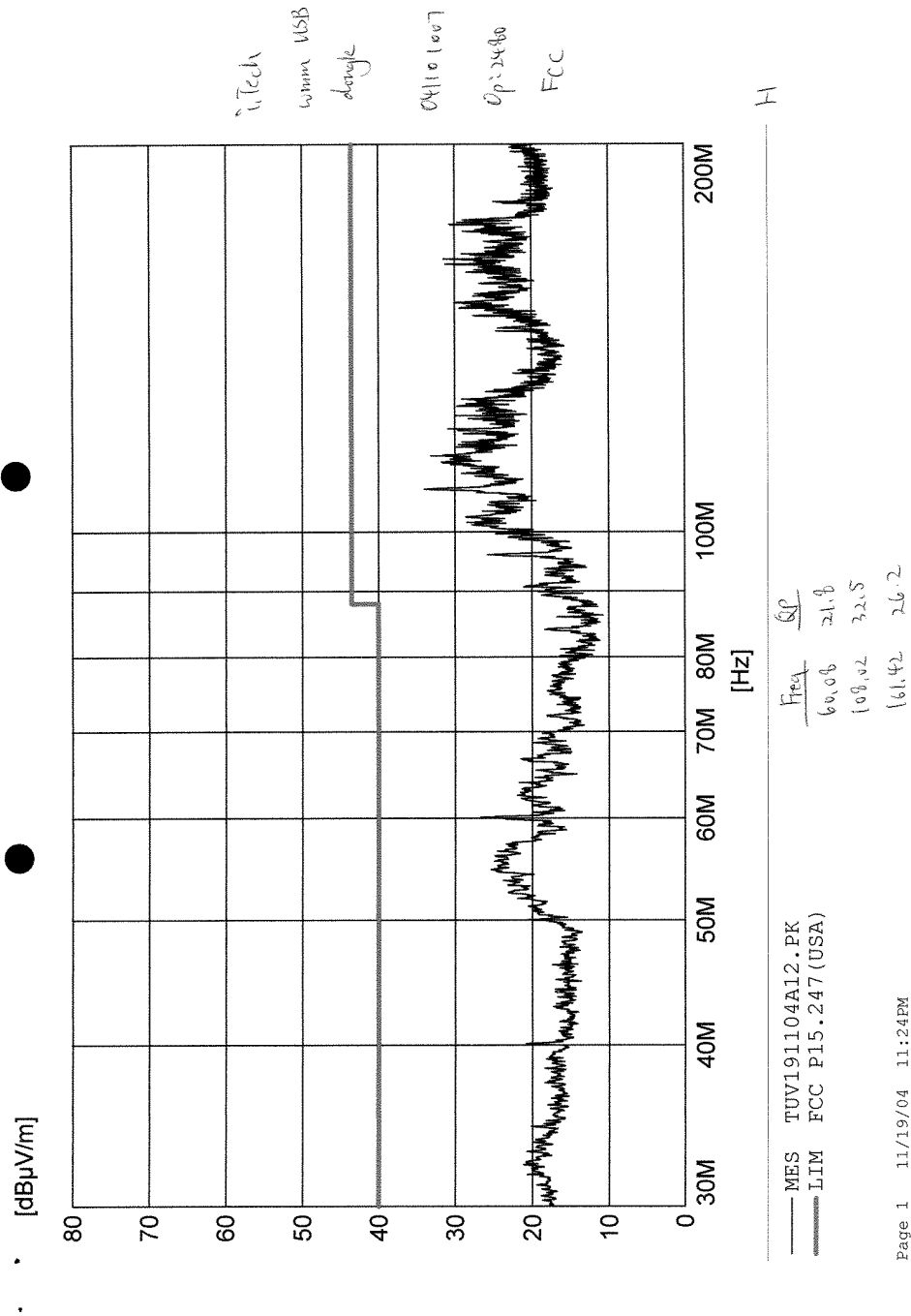
Wmm USB dongle

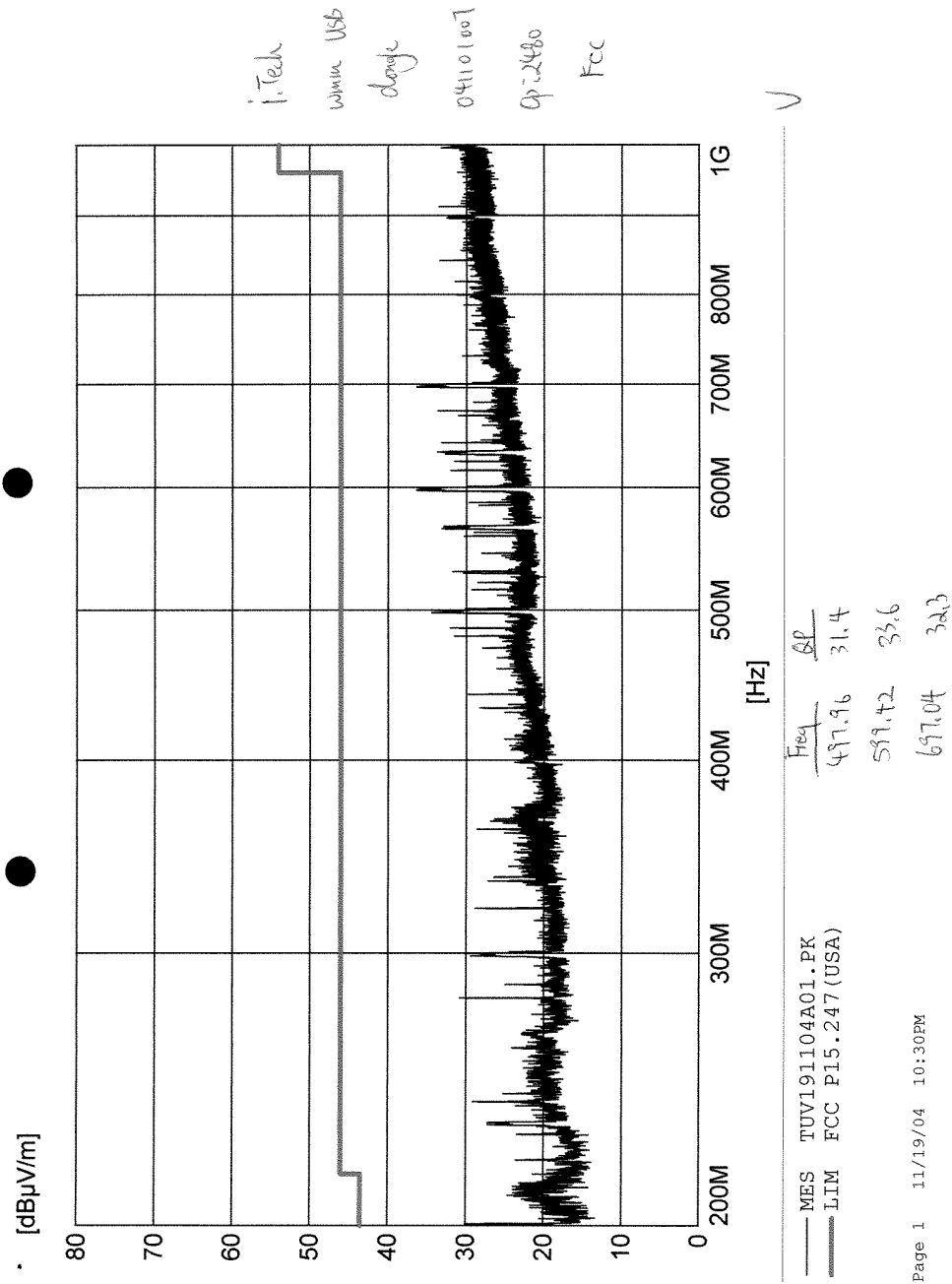
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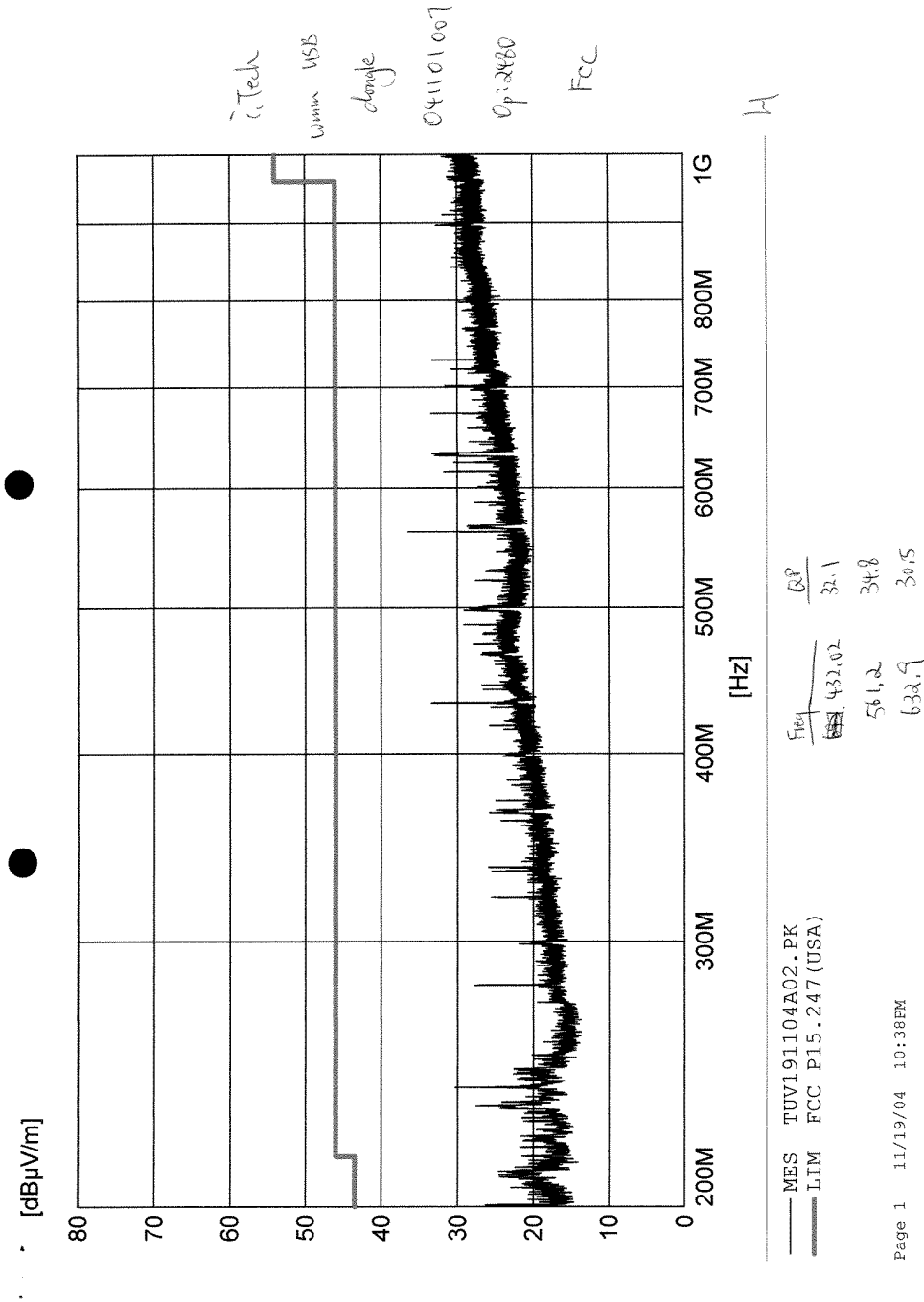
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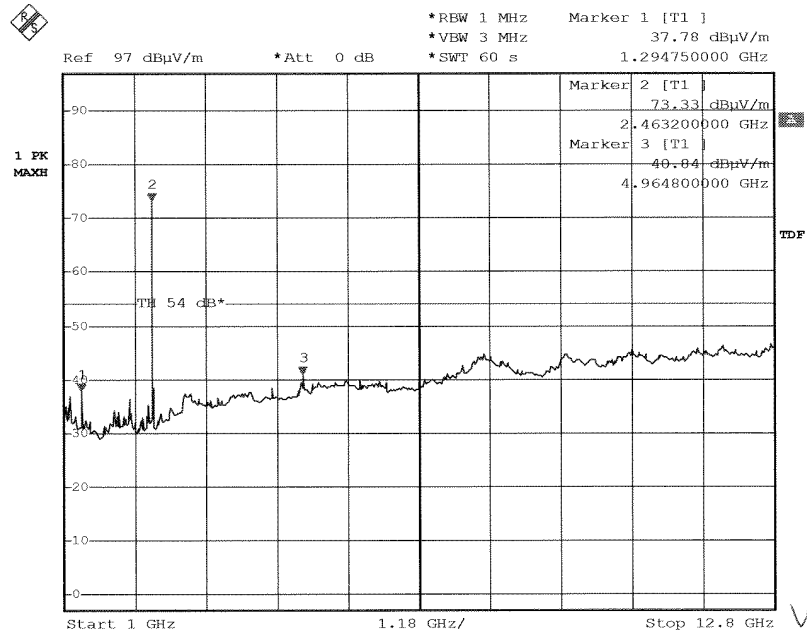
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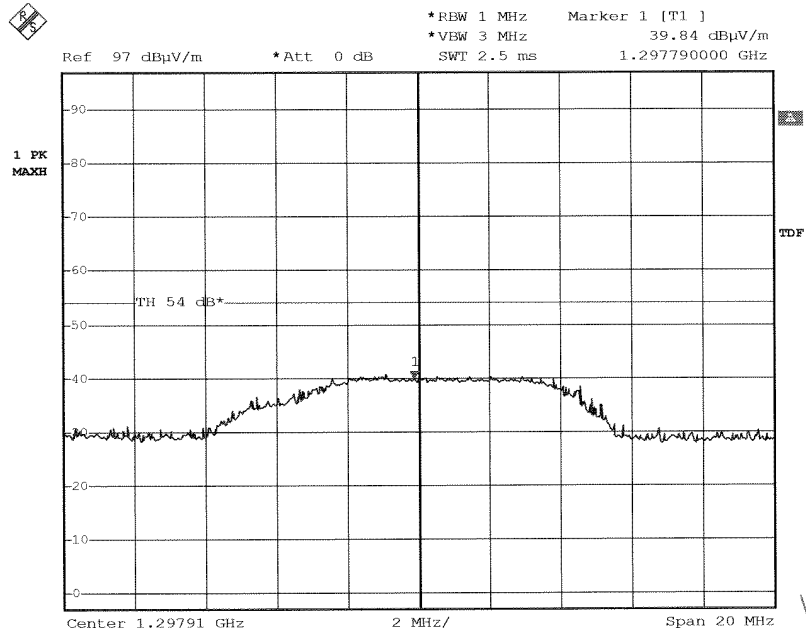
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iTech

www USB dongle

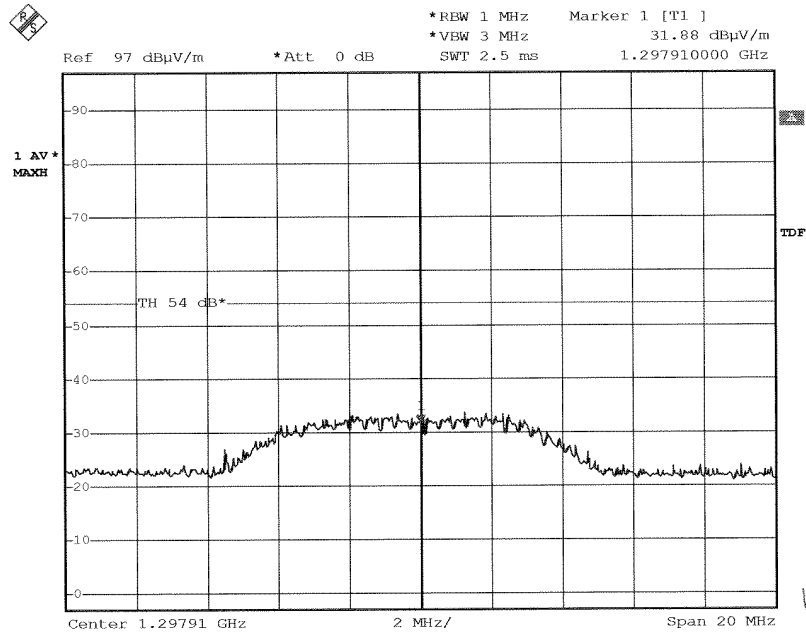
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FCC



Date: 19.NOV.2004 19:53:32

iTech
wmm USB dongle
041101007 Op12420
FCC



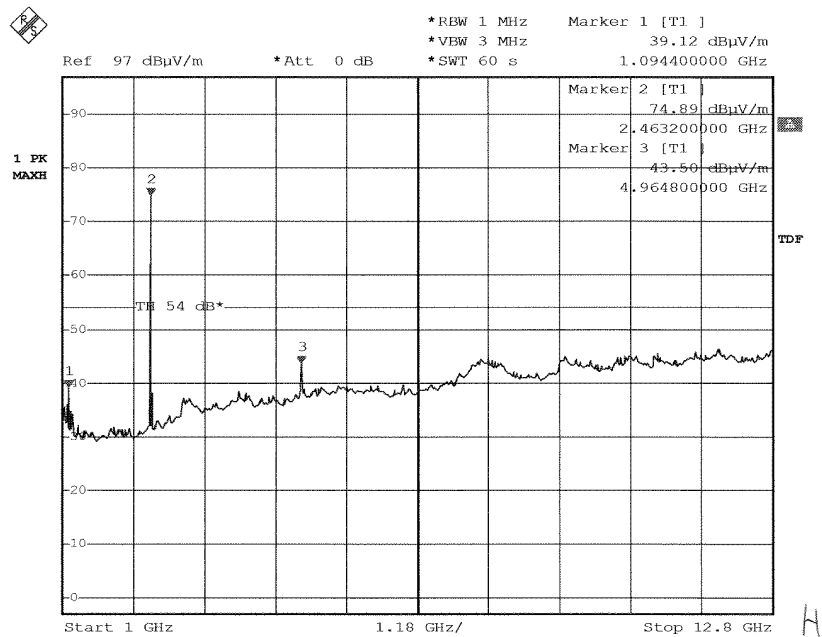
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iTech

wmm USB dongle

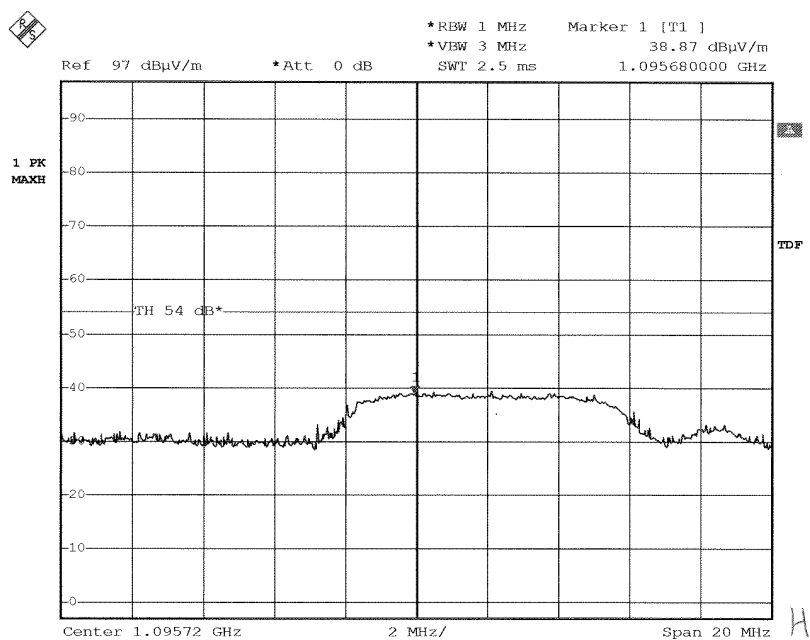
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FCC.



Date: 19.NOV.2004 20:03:31

iTech
 wlan USB dongle
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 FCC



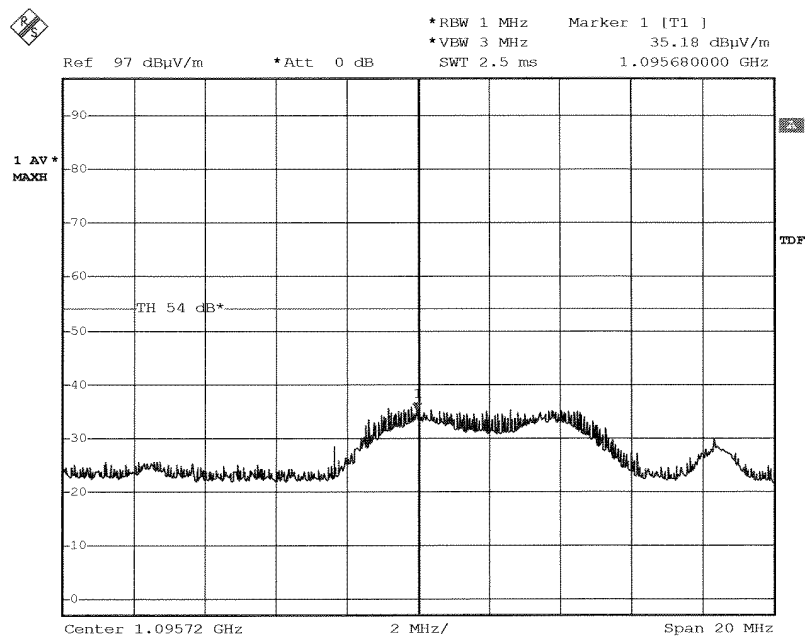
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iTech

wmm USB dongle

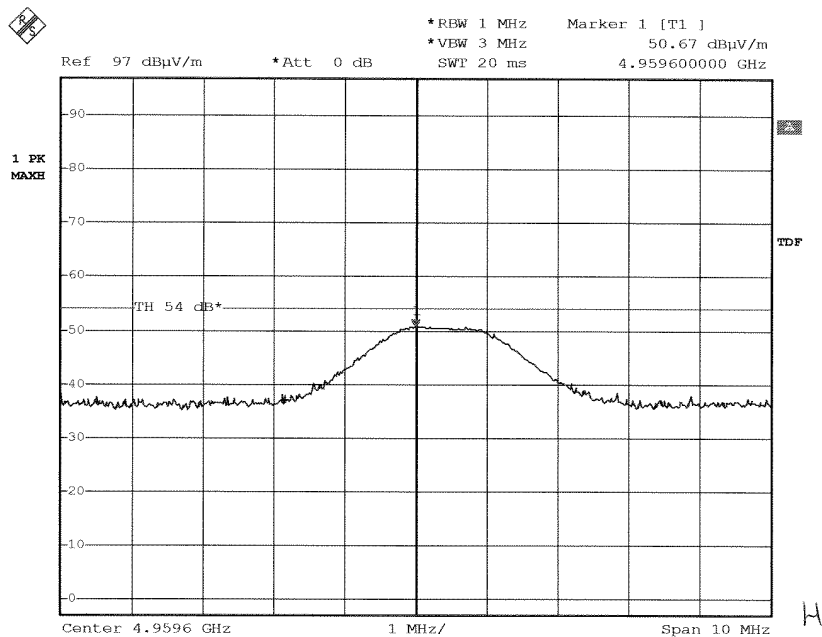
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FCC



Date: 19.NOV.2004 20:08:30

iTech
 winn USB dongle
 041101007 op:2460
 FCC



Date: 19.NOV.2004 20:12:15

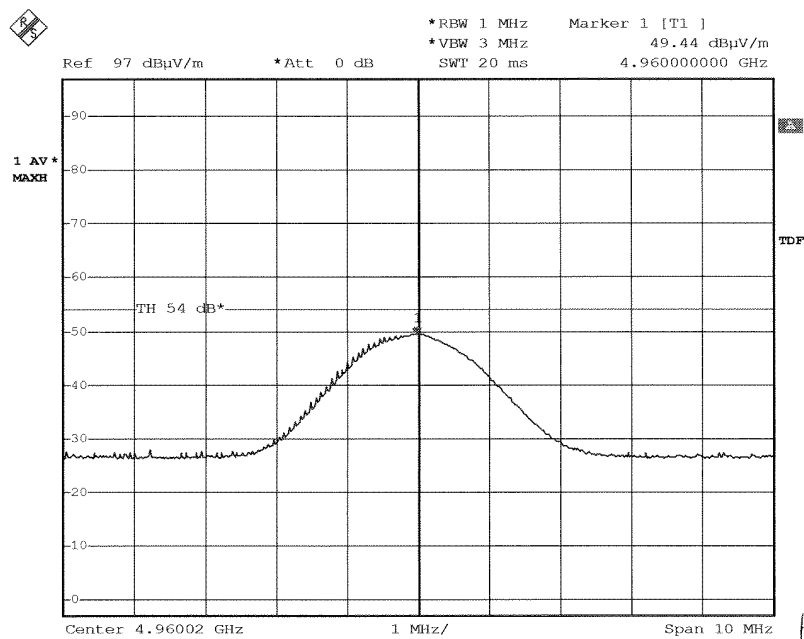
i.Tech

wmm USB dongle

041101007

Op: 2460

FCC



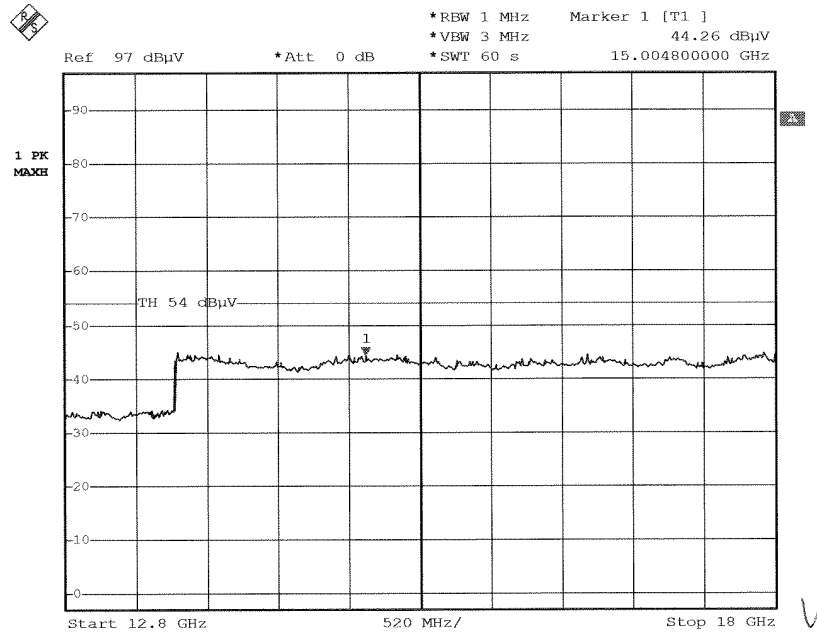
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iTech

wmm USB dongle

041101007 Op:2480

FCC



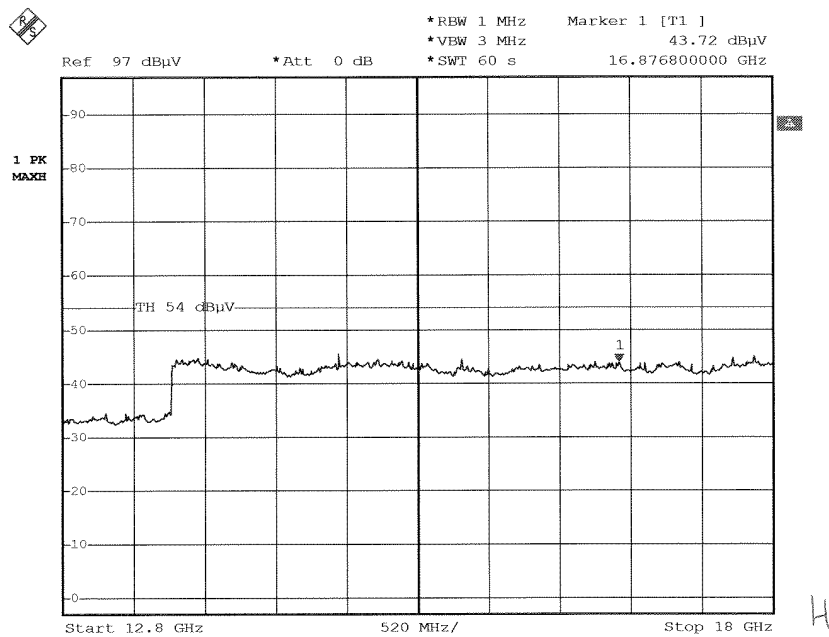
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iTech

wmm USB dongle

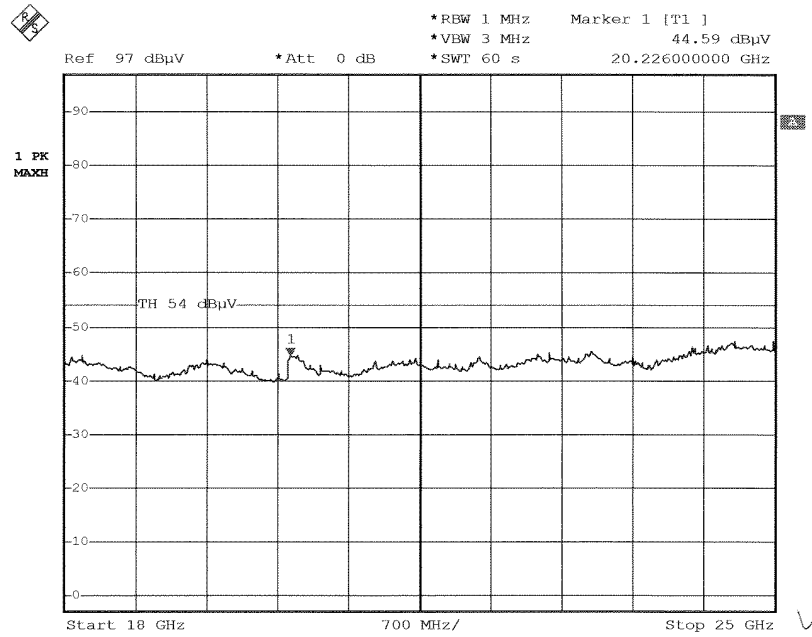
041101007 Op: 2480

FCC.



Date: 19.NOV.2004 20:22:42

i.Tech
www USB dongle
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FCC.



Date: 19.NOV.2004 21:51:45

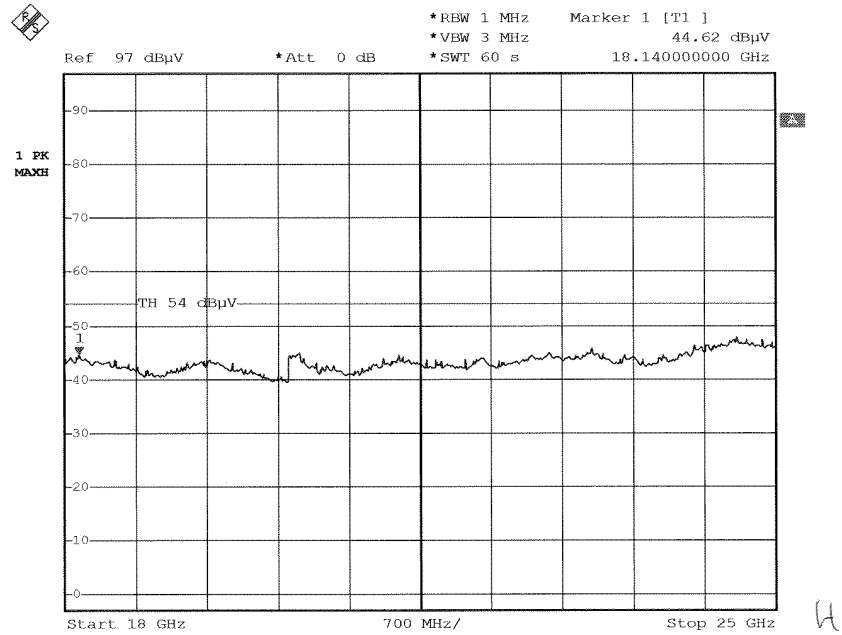
i.Tech

www USB dongle

041101007

Op: 2480

FCC



Date: 19.NOV.2004 21:57:33

i.Tech

wmm USB dongle

041101007.

Op: 2460

FCC