

Prüfbericht - Nr.: Test Report No.	14007521 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 PowBox		
Bezeichnung: Identification	C51-A04033-XX	Serien-Nr.: Serial No.	Engineering sample
Wareneingangs-Nr.: Receipt No.	041013033	Eingangsdatum: Date of receipt	13.10.2004
Prüfart: 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 C63.4-2001 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: 25.11.2004 Hugo Wan  Datum Name Unterschrift Date Name Signature		kontrolliert / reviewed by: 25.11.2004 Thomas Berns  Datum Name Unterschrift Date Name Signature	
Sonstiges: Other Aspects	FCCID: RKIC51-A04033-XX		
Abkürzungen: OK, Pass, P = entspricht Prüfgrundlage Fail, F = entspricht nicht Prüfgrundlage N/A = nicht anwendbar NT = nicht getestet	Abbreviations: OK, Pass, P = passed Fail, F = failed N/A = not applicable NT = not tested		
Dieser Prüfbericht bezieht sich nur auf das o.g. Prüfmuster und darf ohne Genehmigung der Prüfstelle nicht auszugsweise vervielfältigt werden. Dieser Bericht berechtigt nicht zur Verwendung eines Prüfzeichens. This test report relates to the a. m. test sample. Without permission of the test center this test report is not permitted to be duplicate in extracts. This test report does not entitle to carry any safety mark on this or similar products.			

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Product information

Manufacturers declarations

	Transmitter	Receiver
Operating frequency range	2402 - 2480 MHz	2402 - 2480 MHz
Type of modulation	FHSS modulation	FHSS modulation
Number of channels	79	79
Channel separation	1 MHz	1 MHz
Type of antenna	Dielectric Chip Antenna	Dielectric Chip Antenna
Antenna gain (dBi)	1.9	
Power level	fix	
Type of equipment	stand alone, plug-in radio device	stand alone, plug-in radio device
Connection to public utility power line	Yes	
Nominal voltage	V _{nom} : 3.7 V	V _{nom} : 3.7 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 Bluetooth Headset with MP3 player function 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
PCB Layout
Block Diagram
Bill of material
User manual

Special accessories and auxiliary equipment

- a) AC/DC adapter for charging
- b) Plug-in earphone

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 chip type antenna soldered to the circuit board b) Manufacturer and model no: N.A. c) Gain with reference to an isotropic radiator: 1.9 dBi	
Verdict:	Pass	

Subclause 15.207 – Disturbance Voltage on AC Mains						Pass
Test Port: AC mains input port of the charger						
Applicable only to equipment designed to be connected to the public utility power line.						
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	0.180	46.0	38.5	66 - 56	56 - 46	Pass
	0.300	44.9	41.8			Pass
	0.425	40.6	34.7			Pass
	0.486	40.1	32.4			Pass
> 0,5 - 5	0.666	40.6	34.9	56	46	Pass
> 5 - 30	No peak found	-	-	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	0.300	44.4	43.0	66 - 56	56 - 46	Pass
	0.486	39.4	33.6			Pass
> 0,5 - 5	0.666	40.5	35.3	56	46	Pass
	1.092	39.7	27.3			Pass
	3.309	40.3	31.2			Pass
> 5 - 30	no peak found	-	-	60	50	Pass
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 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 : 3.7VDC rechargeable battery 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 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 : 3.7VDC rechargeable battery Temperature : 23°C 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: $26 \times 2.944 \times 10^{-3} = 76.54 \times 10^{-3} \text{ s}$ $\leq 400 \times 10^{-3} \text{ s}$ 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 : 3.7VDC rechargeable battery
 Temperature : 23°C
 Humidity : 50%

Results

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

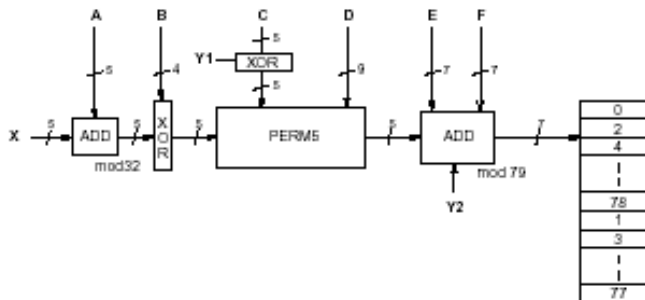
Frequency (MHz)	20 dB left (MHz)	20 dB right (MHz)	20dB bandwidth (MHz)
2402	0.460	0.468	0.928
2441	0.456	0.412	0.868
2480	0.456	0.460	0.916

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 : 3.7VDC rechargeable battery 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 10-11.					
Frequency (MHz)	Maximum peak output power (dBm)	Cable attenuation (dB)	Output power (dBm)	Limit (W/dBm)	Verdict
2402	-4.41	3.52	-0.89	1 / 30.0	Pass
2441	-4.44	3.65	-0.79	1 / 30.0	Pass
2480	-2.76	3.60	0.84	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 : 3.7VDC rechargeable battery 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 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 : 3.7VDC rechargeable battery 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 14-20.					
Operating frequency (MHz)	Spurious frequency (MHz)	Spurious Level (dBm)	Reference value (dBm)	Delta (dB)	Verdict
2402	No peak found	-	-	-	Pass
2441	No peak found	-	-	-	Pass
2480	No peak found	-	-	-	Pass

Subclause 15.247 (c) – Spurious Radiated Emissions							Pass
Test Specification : ANSI C63.4 - 1992 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 : 12VDC from car battery 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 21-63.							
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
120.000	13.8	12.30	0.80	-	-	26.9	43.5 / QP
150.000	12.0	14.30	0.90	-	-	27.2	43.5 / QP
330.000	11.0	14.10	1.40	-	-	26.5	
360.000	9.7	14.60	1.50	-	-	25.8	
1201.520	49.22	24.4	1.52	37.1	1.87	39.91	54.0 / P
1201.520	47.47	24.4	1.52	37.1	1.87	38.16	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
120.000	9.3	12.30	0.80	-	-	22.4	43.5 / QP
150.000	13.7	14.30	0.90	-	-	28.9	43.5 / QP
330.000	13.7	14.10	1.40	-	-	29.2	43.5 / QP
1201.520	49.45	24.4	1.52	37.1	1.87	40.14	54.0 / P
1201.520	47.88	24.4	1.52	37.1	1.87	38.57	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
120.000	14.5	12.30	0.80	-	-	27.6	43.5 / QP
150.000	12.6	14.30	0.90	-	-	27.8	43.5 / QP
268.596	9.2	11.50	1.30	-	-	22.0	54.0 / P
1221.020	49.52	24.4	1.52	37.1	1.87	40.21	
1220.980	46.66	24.4	1.52	37.1	1.87	37.35	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
120.000	9.7	12.30	0.80	-	-	22.8	43.5 / QP
150.000	13.6	14.30	0.90	-	-	28.8	43.5 / QP
330.000	14.7	14.10	1.40	-	-	30.2	43.5 / QP
1221.060	50.98	24.4	1.52	37.1	1.87	41.67	54.0 / P
1221.060	49.23	24.4	1.52	37.1	1.87	39.92	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
120.000	9.8	12.30	0.80	-	-	22.9	43.5 / QP
150.000	12.3	14.30	0.90	-	-	27.5	43.5 / QP
268.520	9.3	11.50	1.30	-	-	22.1	43.5 / QP
1240.520	49.11	24.4	1.52	37.1	1.87	39.80	43.5 / QP
1240.460	46.31	24.4	1.52	37.1	1.87	37.00	54.0 / P
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
120.000	9.9	12.30	0.80	-	-	23.0	43.5 / QP
150.000	14.5	14.30	0.90	-	-	29.7	43.5 / QP
330.000	14.6	14.10	1.40	-	-	30.1	43.5 / QP
1240.500	51.58	24.4	1.52	37.1	1.87	42.27	43.5 / QP
1240.540	49.41	24.4	1.52	37.1	1.87	40.10	54.0 / P

Appendix 1

Test results

Disturbance Voltage on AC Mains

Date: 29 Oct 2004
EUT: Bluetooth PowBox
Company: i.Tech Dynamic Ltd.
Humidity: 60%
Temperature: 23°C
Voltage supply: 3.7V rechargeable battery
Test by: Hugo Wan
Op. mode: Charging

Live measurement

Frequency (MHz)	QP reading (dBµV)	Av reading (dBµV)	Results
0.180	46.0	38.5	Pass
0.300	44.9	41.8	Pass
0.425	40.6	34.7	Pass
0.486	40.1	32.4	Pass
0.666	40.6	34.9	Pass

Neutral measurement

Frequency (MHz)	QP reading (dBµV)	Av reading (dBµV)	Results
0.300	44.4	43.0	Pass
0.486	39.4	33.6	Pass
0.666	40.5	35.3	Pass
1.092	39.7	27.3	Pass
3.309	40.3	31.2	Pass

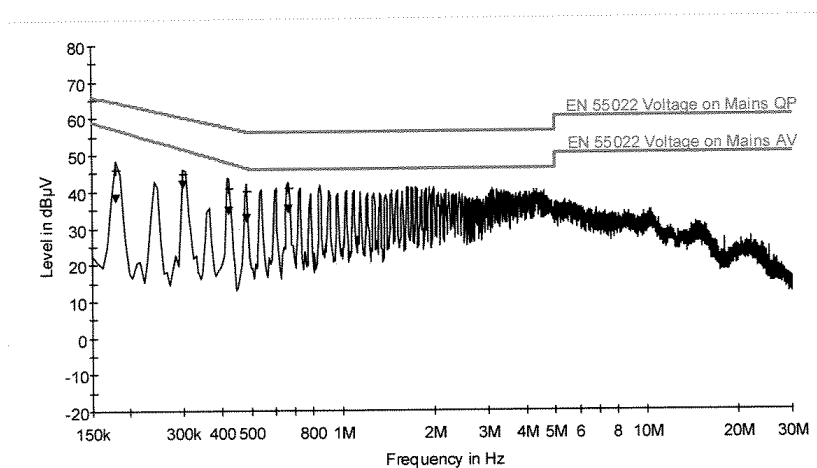
TUV Rheinland Hong Kong Limited

Conducted Emission

Test Information

EUT Name: I.Tech
Serial Number: PowBOX
Test Description: EN55022
Operating Conditions: Charging (110V)
Operator Name:
Comment:
Description: L

CE (EN55022)



Result Table Single

Frequency (MHz)	QuasiPeak (dBµV)	Average (dBµV)
0.180000	46.0	38.5
0.300000	44.9	41.8
0.425200	40.6	34.7
0.486000	40.1	32.4
0.666000	40.6	34.9

29/10/2004

3:13:49 PM

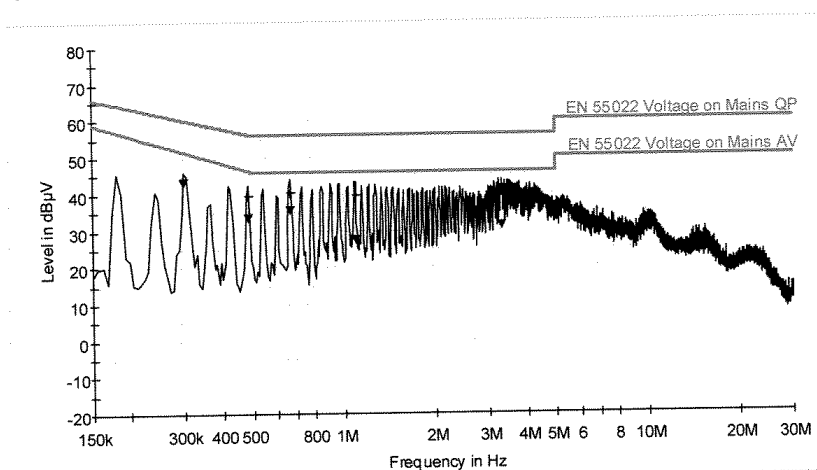
TUV Rheinland Hong Kong Limited

Conducted Emission

Test Information

EUT Name:	I.Tech
Serial Number:	PowBOX
Test Description:	EN55022
Operating Conditions:	Charging (110V)
Operator Name:	
Comment:	
Description	N

CE (EN55022)



Result Table Single

Frequency (MHz)	QuasiPeak (dBµV)	Average (dBµV)
0.300000	44.4	43.0
0.486000	39.4	33.6
0.666000	40.5	35.3
3.309000	40.3	31.2
1.092000	39.7	27.3

29/10/2004

3:24:54 PM

Carrier Frequency Separation

Date: 2 Nov 2004
 EUT: Bluetooth PowBox
 Company: i.Tech Dynamic Ltd.
 Humidity: 50%
 Temperature: 23°C
 Voltage supply: 3.7VDC rechargeable battery
 Test by: Hugo Wan
 Op. mode: Hopping on

Reference frequency (MHz)

2441.000

Channel Separation (MHz)

1.002

**MARKER 1**

2.441 GHz

Ref 10 dBm

Att 40 dB

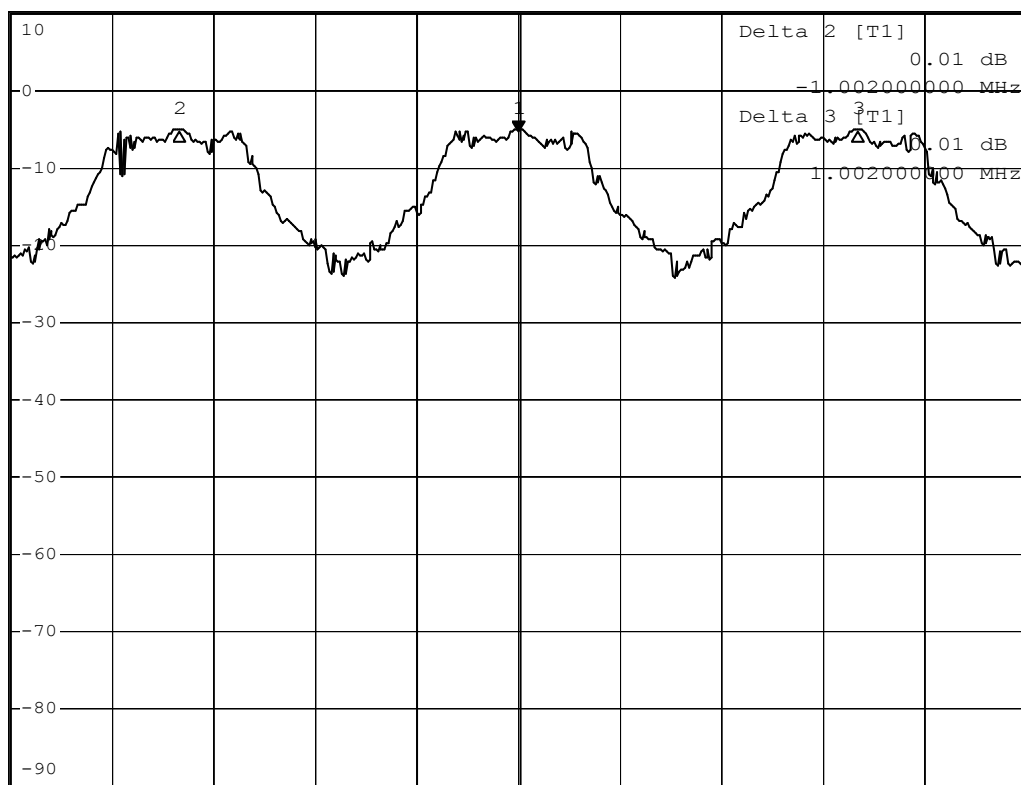
RBW 100 kHz Marker 1 [T1]

VBW 300 kHz

-5.08 dBm

SWT 2.5 ms

2.441000000 GHz

1 PK
MAXH

Center 2.441 GHz

300 kHz/

Span 3 MHz

Date: 2.NOV.2004 18:15:50

Dwell Time

Date: 2 Nov 2004
 EUT: Bluetooth PowBox
 Company: i.Tech Dynamic Ltd.
 Humidity: 50%
 Temperature: 23°C
 Voltage supply: 3.7VDC rechargeable battery
 Test by: Hugo Wan
 Op. mode: Hopping on

Burst Duration (ms)	Number of hopping	Time of occupancy (s)	Results
2.944	26	$0.002944 \times 26 = 0.07654$	Pass


MARKER 1
-8 μ s

Ref 10 dBm

*Att 30 dB

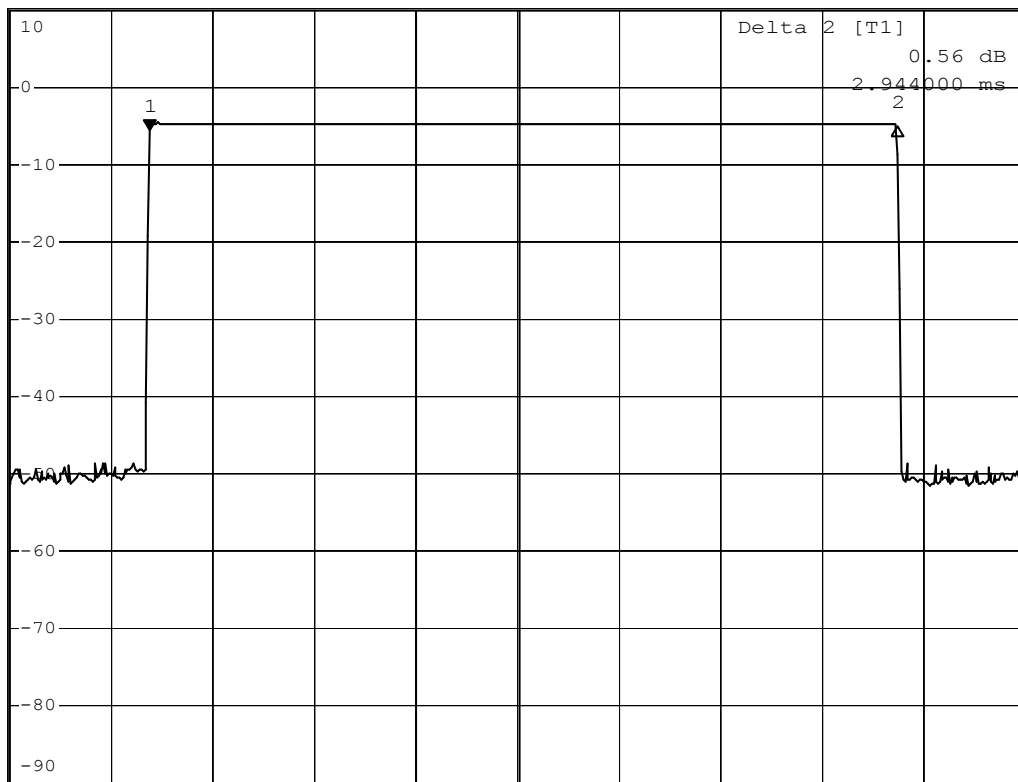
RBW 1 MHz

Marker 1 [T1]

VBW 3 MHz

-5.36 dBm

SWT 4 ms

-8.000000 μ s1 PK
MAXH

Center 2.441 GHz

400 μ s/

Date: 2.NOV.2004 18:20:41



RBW 1 MHz

VBW 3 MHz

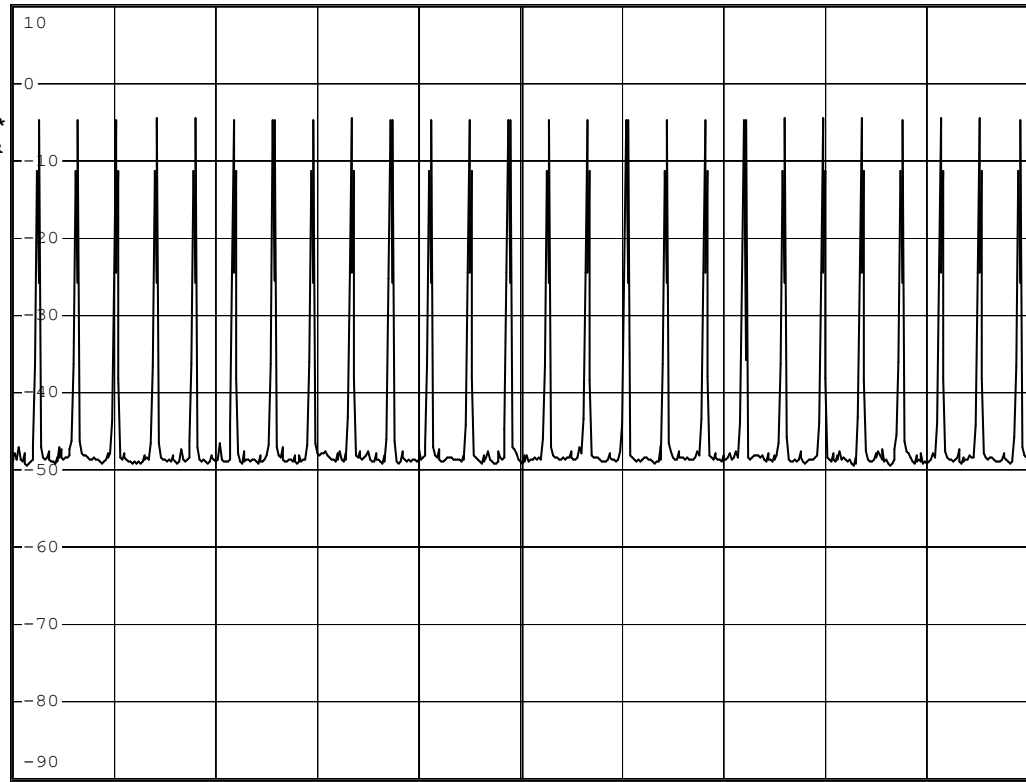
SWT 12.8 s

Ref 10 dBm

*Att 30 dB

1 PK *
CLRWR

A
SGL



Center 2.441 GHz

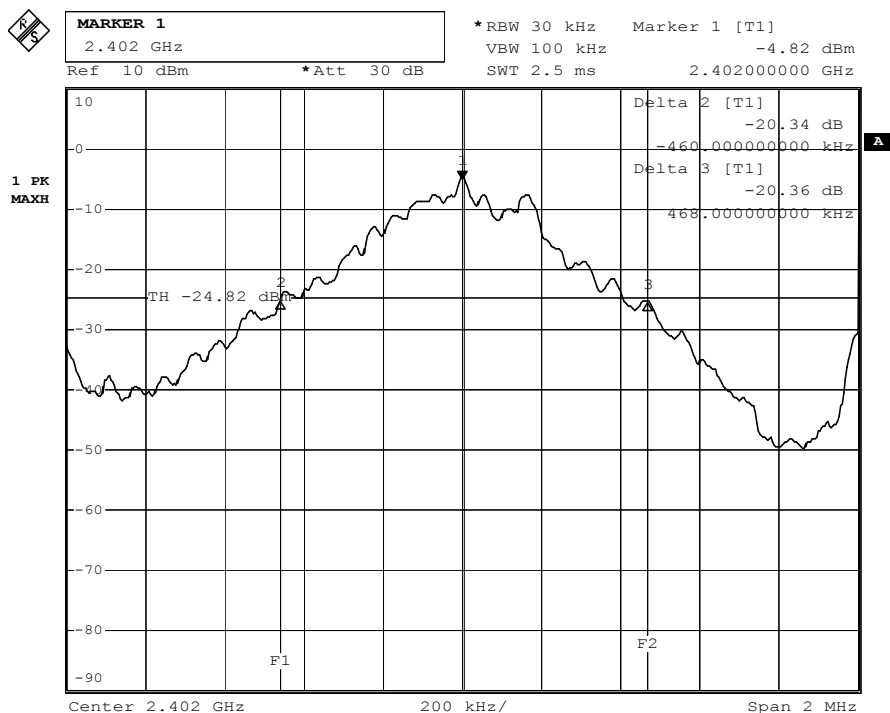
1.28 s/

Date: 2.NOV.2004 18:21:45

20dB Bandwidth

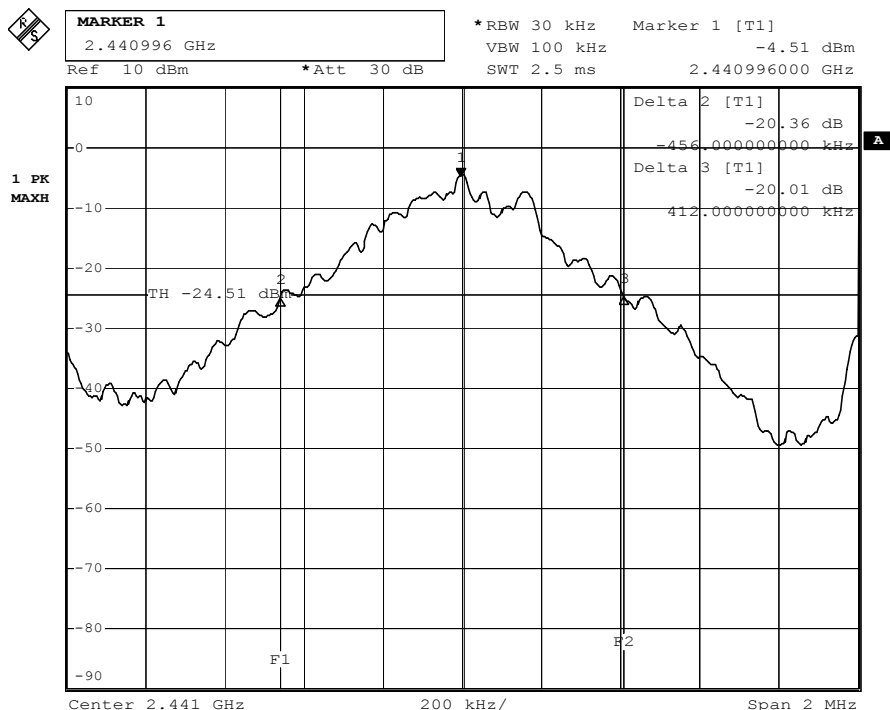
Date: 2 Nov 2004
 EUT: Bluetooth PowBox
 Company: i.Tech Dynamic Ltd.
 Humidity: 50%
 Temperature: 23°C
 Voltage supply: 3.7VDC rechargeable battery
 Test by: Hugo Wan
 Op. mode: TX mode, DH5 with PRBS9 payload

Tx frequency (MHz)	Δf_L (MHz)	Δf_H (MHz)	$ \Delta f_H + \Delta f_L $ (MHz)	Results
2402	0.460	0.468	0.928	Pass
2441	0.456	0.412	0.868	Pass
2480	0.456	0.460	0.916	Pass



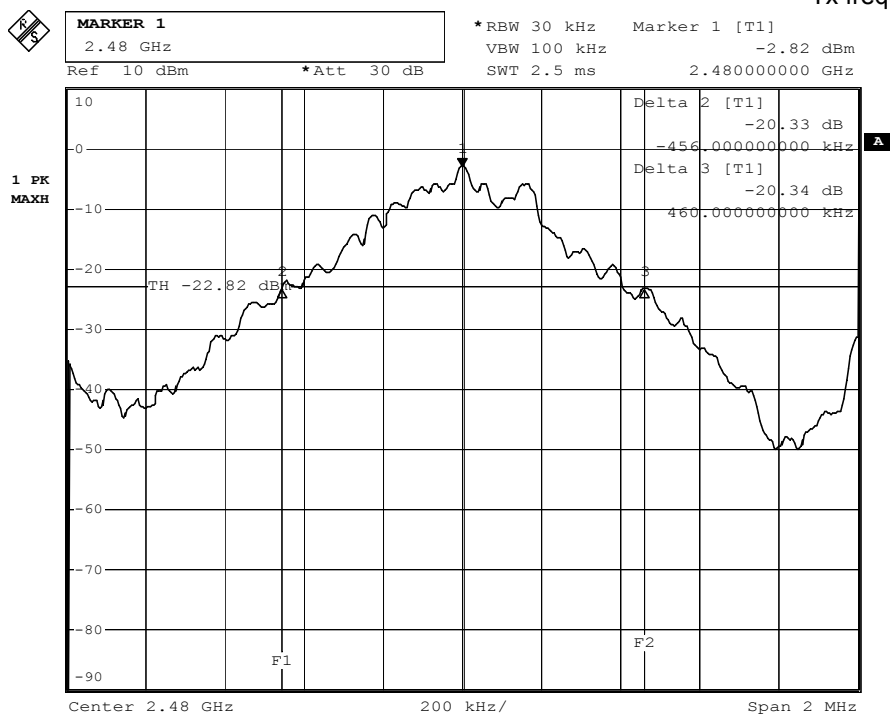
Date: 2.NOV.2004 18:24:05

Tx frequency: 2402MHz



Date: 2.NOV.2004 18:29:05

Tx frequency: 2441MHz



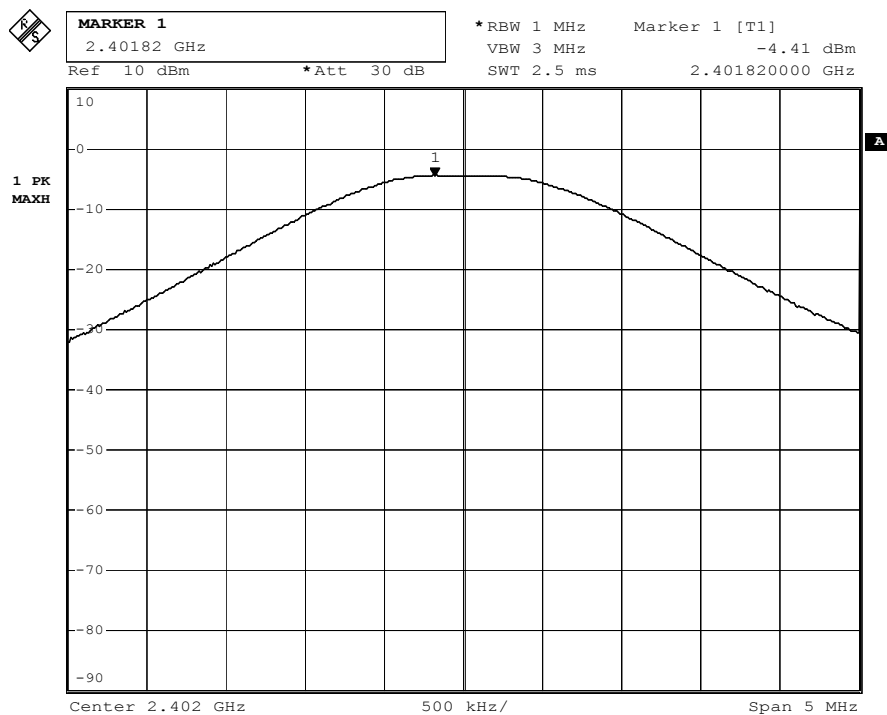
Date: 2.NOV.2004 18:30:45

Tx frequency: 2480MHz

Peak Output Power

Date: 2 Nov 2004
 EUT: Bluetooth PowBox
 Company: i.Tech Dynamic Ltd.
 Humidity: 50%
 Temperature: 23°C
 Voltage supply: 3.7VDC 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	-4.41	3.52	-0.89	Pass
2441	-4.44	3.65	-0.79	Pass
2480	-2.76	3.60	0.84	Pass



Date: 2.NOV.2004 18:32:45

Tx frequency: 2402MHz

**MARKER 1**

2.44085 GHz

Ref 10 dBm

*Att 30 dB

*RBW 1 MHz

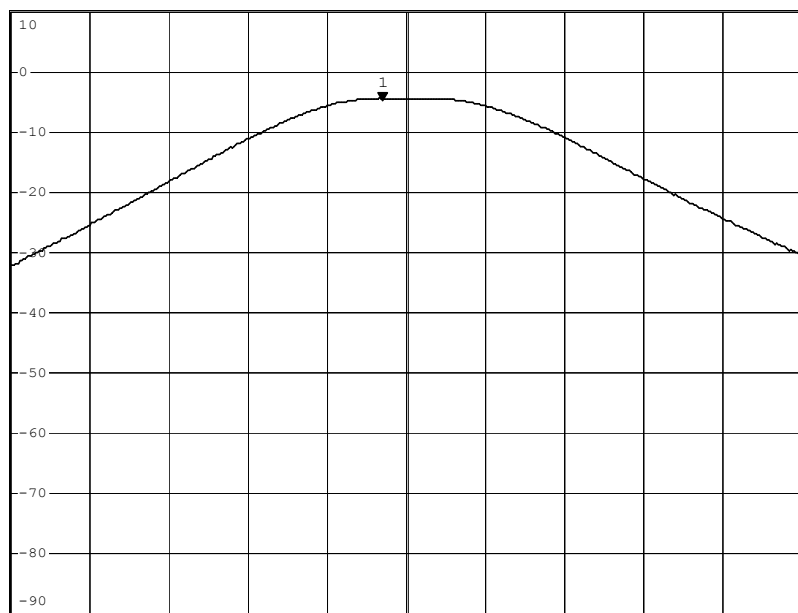
VBW 3 MHz

SWT 2.5 ms

Marker 1 [T1]

-4.44 dBm

2.440850000 GHz

1 PK
MAXH

Date: 2.NOV.2004 18:33:15

Tx frequency: 2441MHz

**MARKER 1**

2.47982 GHz

Ref 10 dBm

*Att 30 dB

*RBW 1 MHz

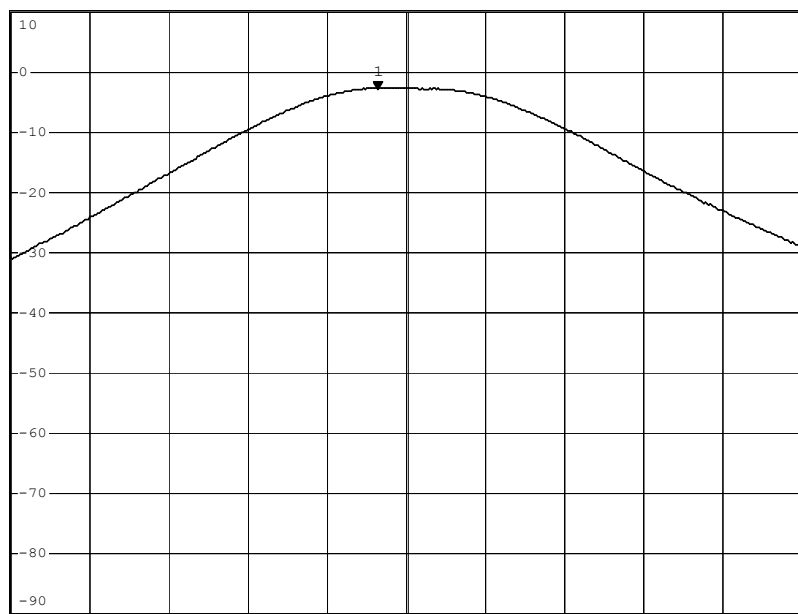
VBW 3 MHz

SWT 2.5 ms

Marker 1 [T1]

-2.76 dBm

2.479820000 GHz

1 PK
MAXH

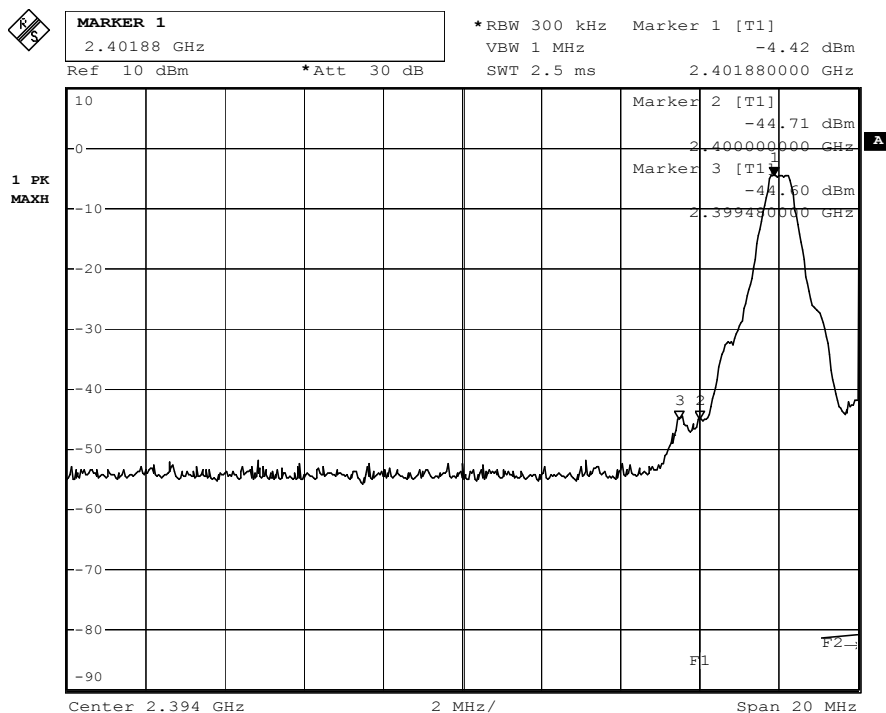
Date: 2.NOV.2004 18:32:06

Tx frequency: 2480MHz

Band Edge Compliance

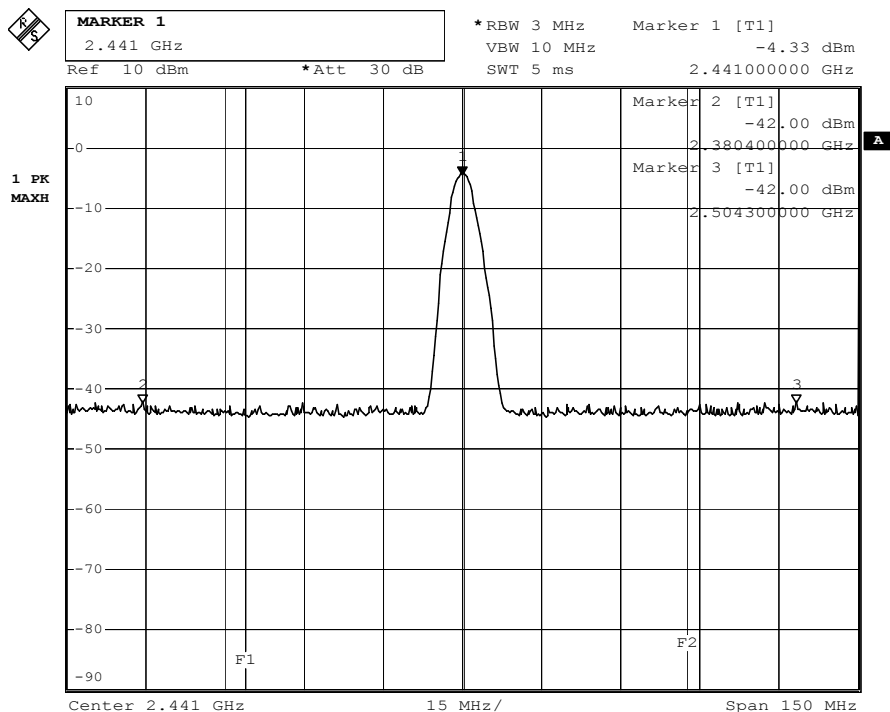
Date: 2 Nov 2004
 EUT: Bluetooth PowBox
 Company: i.Tech Dynamic Ltd.
 Humidity: 50%
 Temperature: 23°C
 Voltage supply: 3.7VDC rechargeable battery
 Test by: Hugo Wan
 Op. mode: TX mode, DH1 with PRBS9 payload

Tx Frequency (MHz)	Peak in band Power level (dBm)	RF power outside 100kHz BW (MHz)	RF power difference outside 100kHz BW (dB)	Results
2402	-4.42	No Peak	-	Pass
2480	-2.76	No Peak	-	Pass



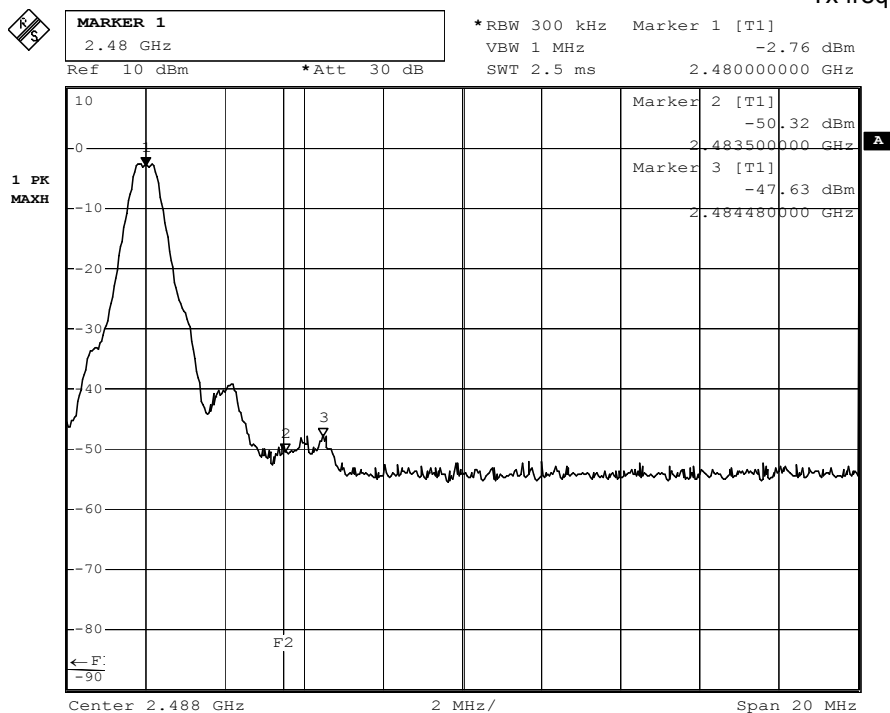
Date: 2.NOV.2004 18:35:54

Tx frequency: 2402MHz



Date: 2.NOV.2004 18:34:37

Tx frequency: 2441MHz



Date: 2.NOV.2004 18:37:15

Tx frequency: 2480MHz

Spurious Emissions - Conducted

Date: 2 Nov 2004
EUT: Bluetooth PowBox
Company: i.Tech Dynamic Ltd.
Humidity: 50%
Temperature: 23°C
Voltage supply: 3.7VDC rechargeable battery
Test by: Hugo Wan
Op. mode: TX mode, DH1 with PRBS9 payload

Tx frequency : 2402MHz

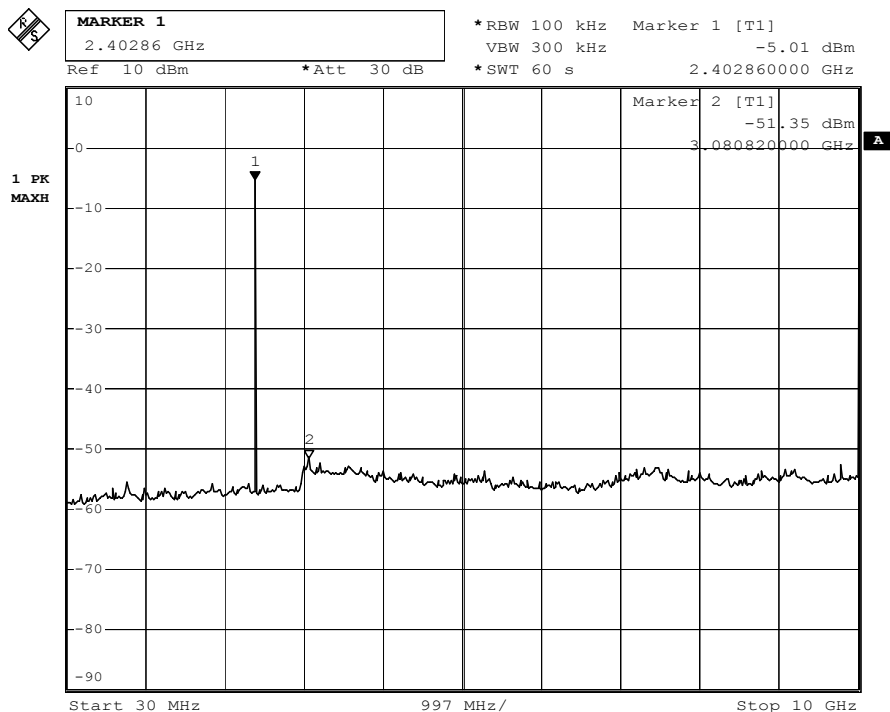
Spurious Frequency (MHz)	Power level (dBm)	Reference value (dBm)	Delta to reference level (dB)	Results
No peak found	-	-	-	Pass

Tx frequency : 2441MHz

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

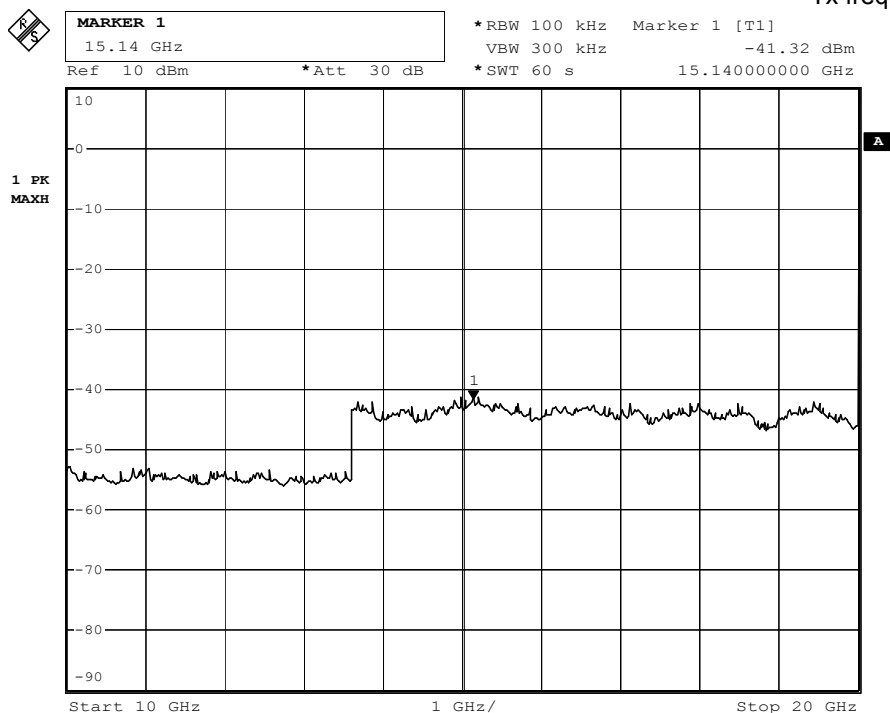
Tx frequency : 2480MHz

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



Date: 2.NOV.2004 19:24:02

Tx frequency: 2402MHz



Date: 2.NOV.2004 19:01:49

Tx frequency: 2402MHz



MARKER 1

22.96 GHz

Ref 10 dBm

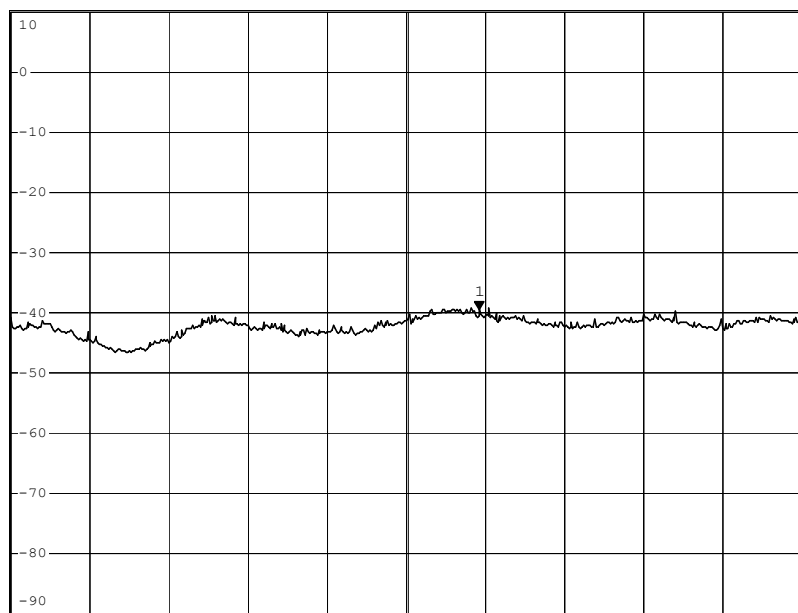
*Att 30 dB

*RBW 100 kHz Marker 1 [T1]

VBW 300 kHz -39.10 dBm

*SWT 60 s 22.96000000 GHz

1 PK
MAXH



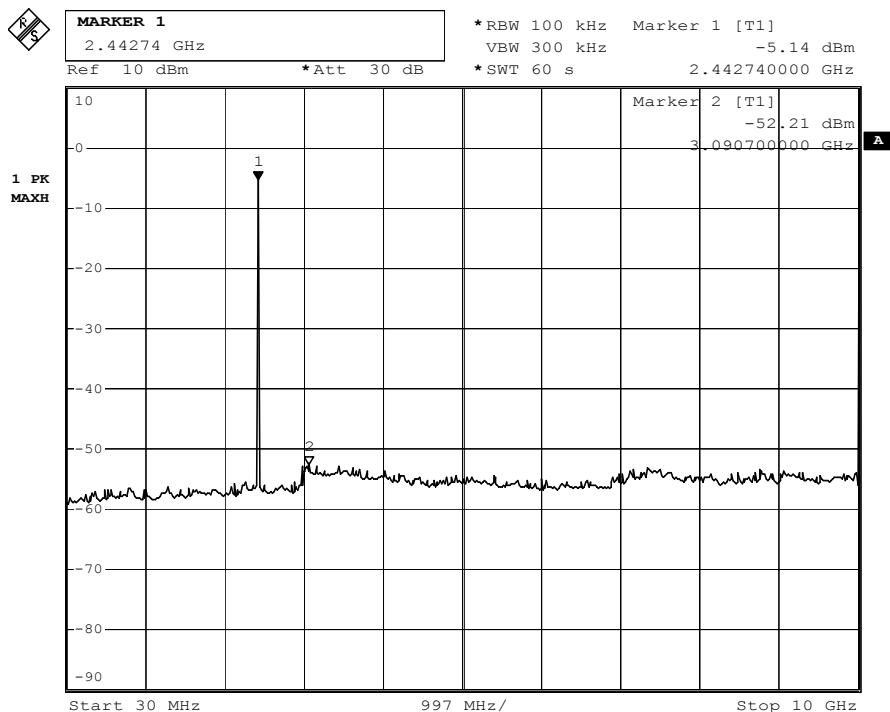
Start 20 GHz

500 MHz/

Stop 25 GHz

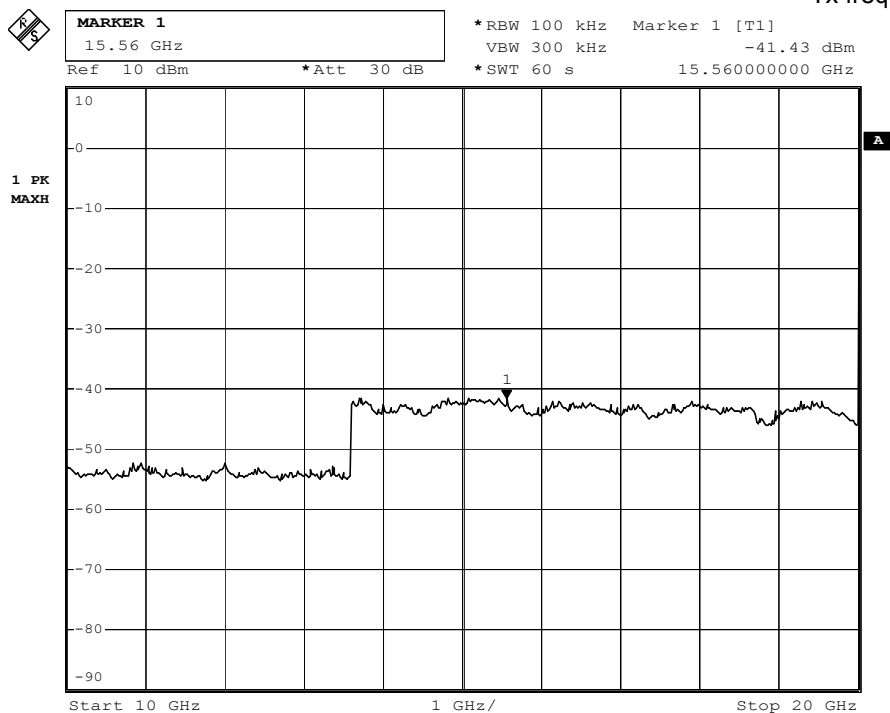
Date: 2.NOV.2004 19:15:09

Tx frequency: 2402MHz



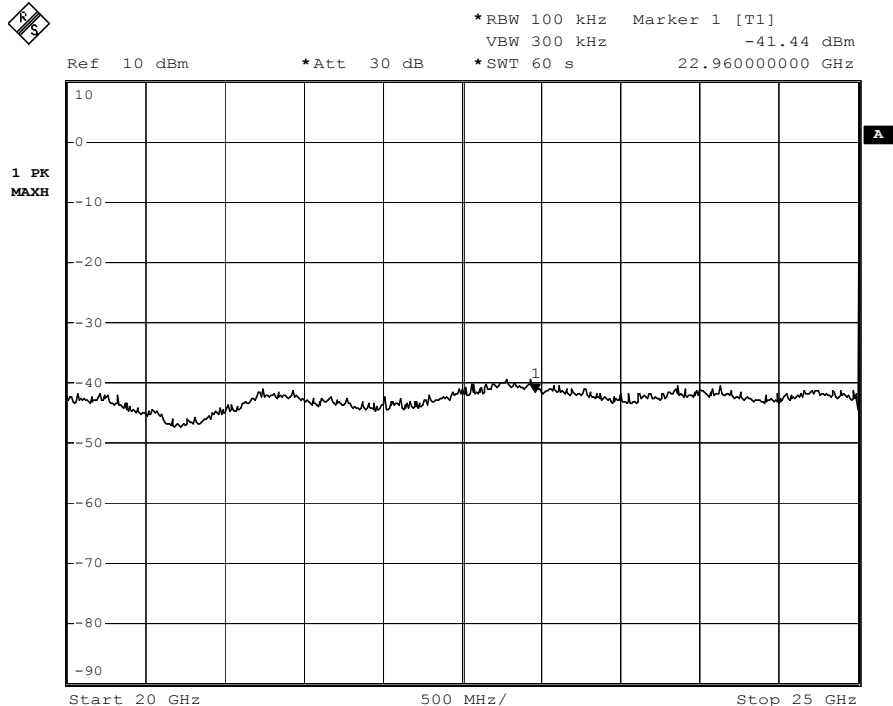
Date: 2.NOV.2004 19:26:46

Tx frequency: 2441MHz



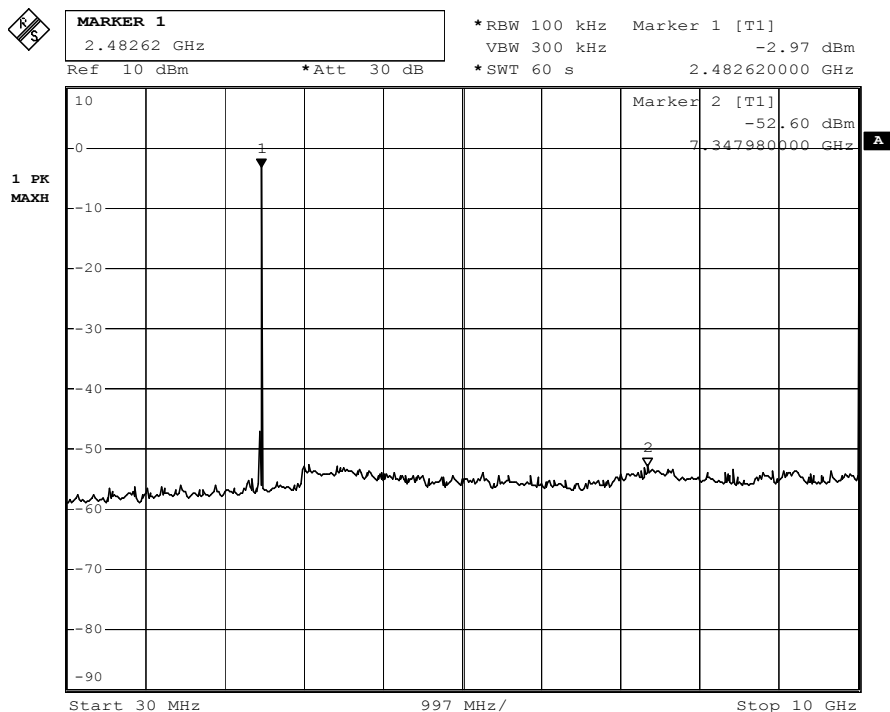
Date: 2.NOV.2004 18:59:36

Tx frequency: 2441MHz



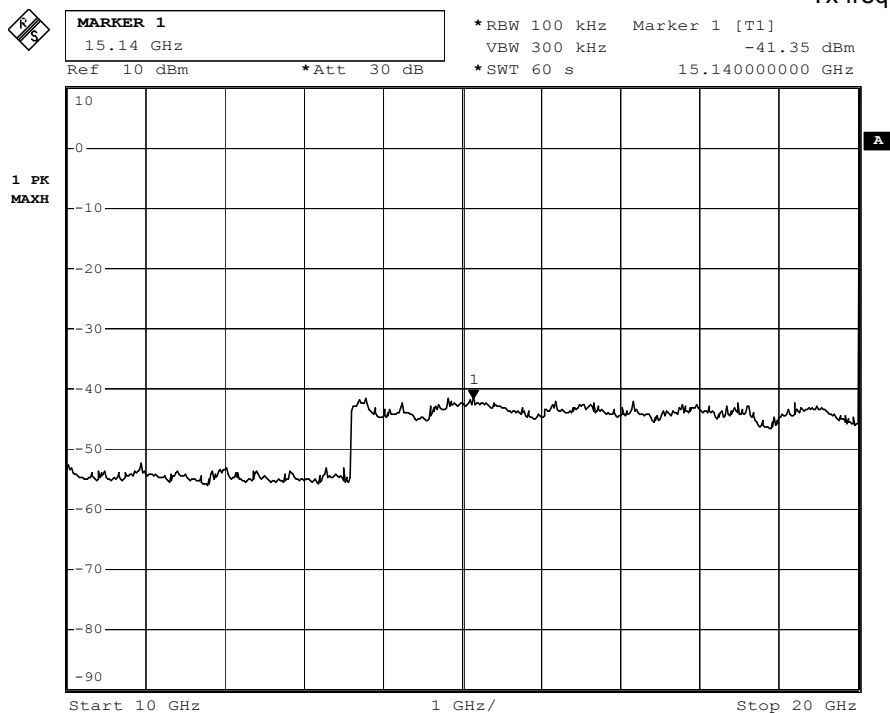
Date: 2.NOV.2004 19:17:33

Tx frequency: 2441MHz



Date: 2.NOV.2004 18:43:35

Tx frequency: 2480MHz



Date: 2.NOV.2004 18:47:11

Tx frequency: 2480MHz



MARKER 1

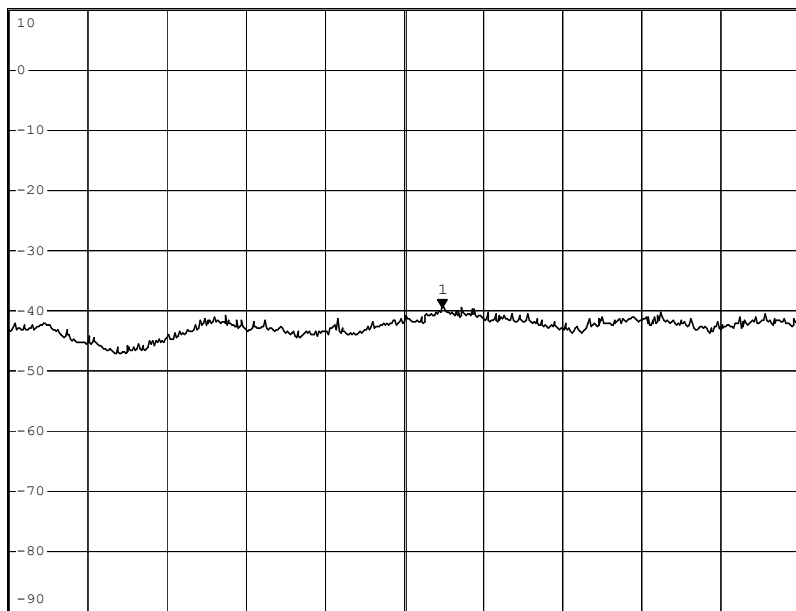
22.74 GHz

*RBW 100 kHz Marker 1 [T1]
 VBW 300 kHz -39.32 dBm
 *SWT 60 s 22.74000000 GHz

Ref 10 dBm

*Att 30 dB

1 PK
 MAXH



Start 20 GHz

500 MHz/

Stop 25 GHz

Date: 2.NOV.2004 19:21:04

Tx frequency: 2480MHz

Spurious Emissions - Radiated

Date: 3 Nov 2004

EUT: Bluetooth PowBox

Company: i.Tech Dynamic Ltd.

Voltage supply: 3.7VDC rechargeable battery

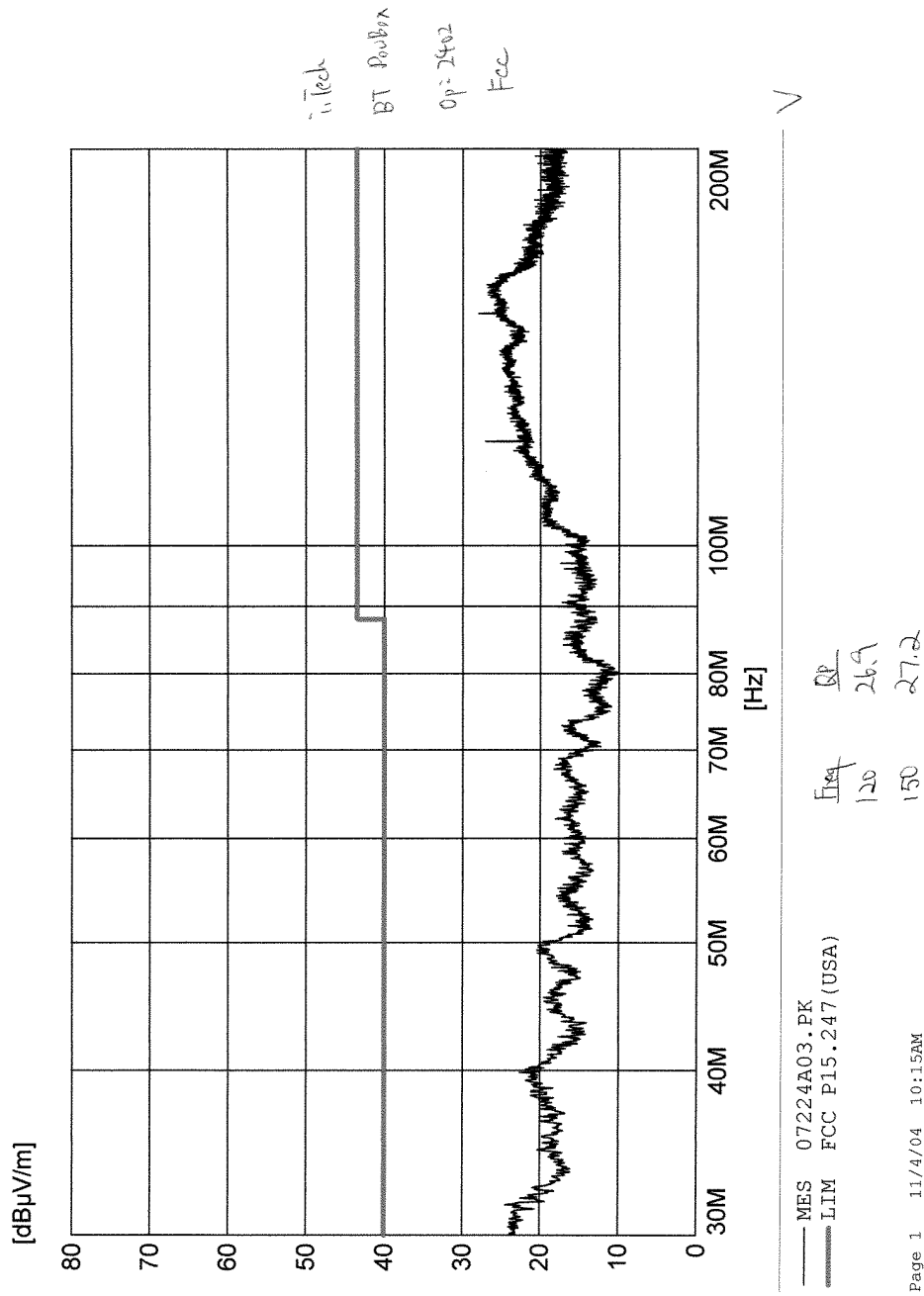
Test by: Hugo Wan

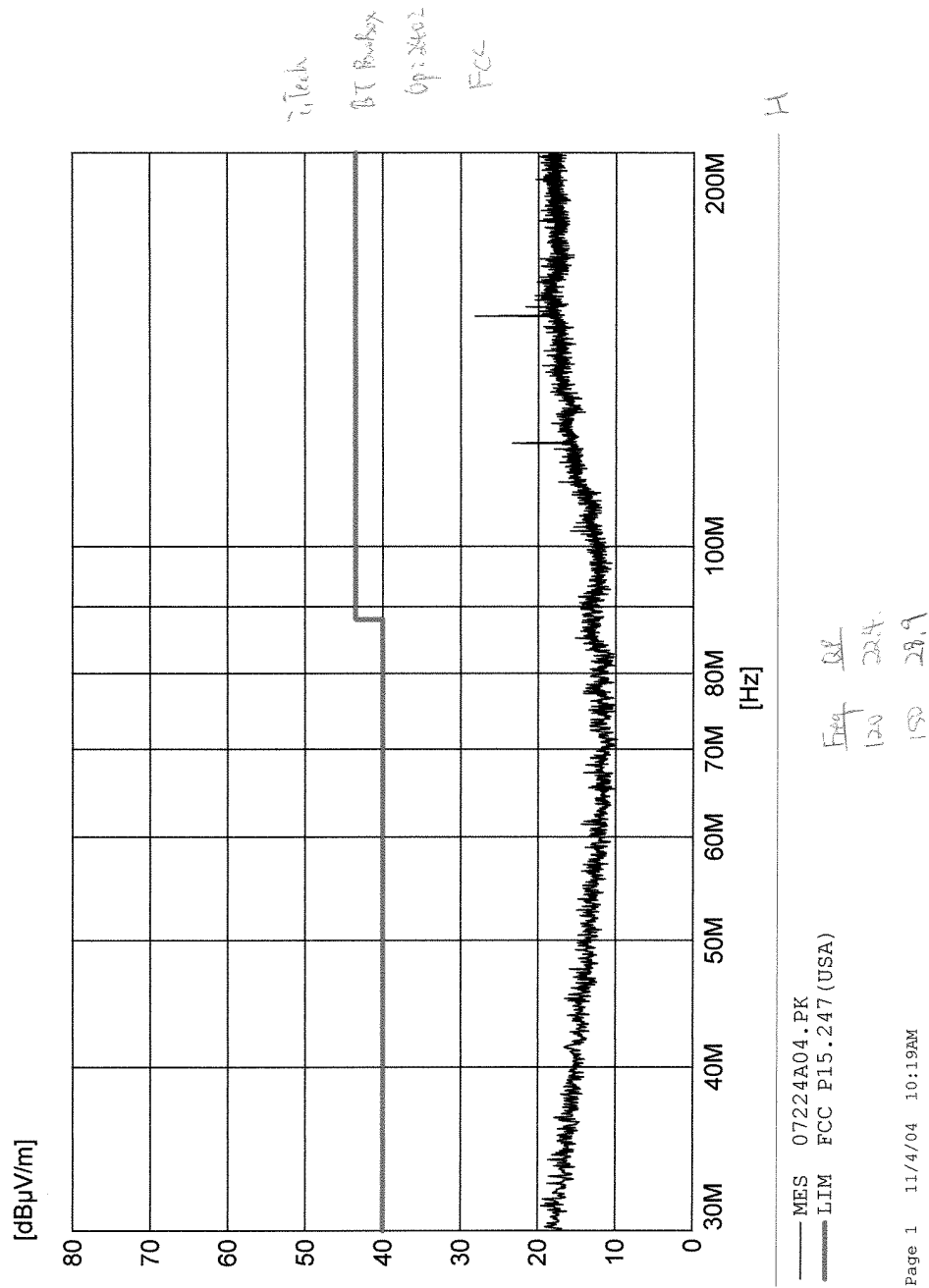
Op. mode: TX mode, DH1 with PRBS9 payload

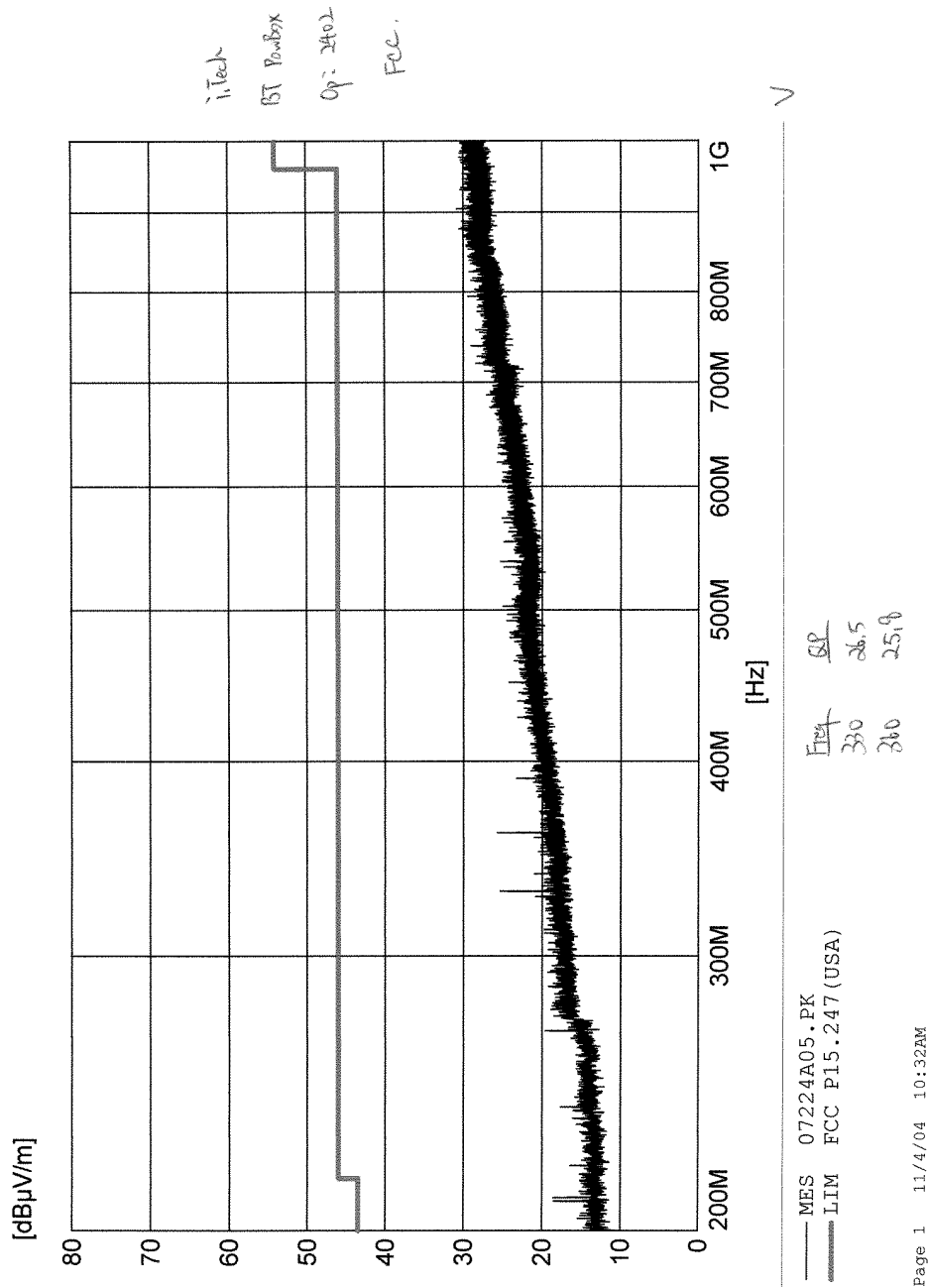
Tx frequency (MHz)	Polarization	Spurious Frequency (MHz)	Power Level (dBuV/m)	Detector (P/QP/A)
2402	V	120.000	26.9	QP
2402	V	150.000	27.2	QP
2402	V	330.000	26.5	QP
2402	V	360.000	25.8	QP
2402	V	1201.520	39.91	PK
2402	V	1201.520	38.16	AV
2402	H	120.000	22.4	QP
2402	H	150.000	28.9	QP
2402	H	330.000	29.2	QP
2402	H	1201.520	40.14	PK
2402	H	1201.520	38.57	AV

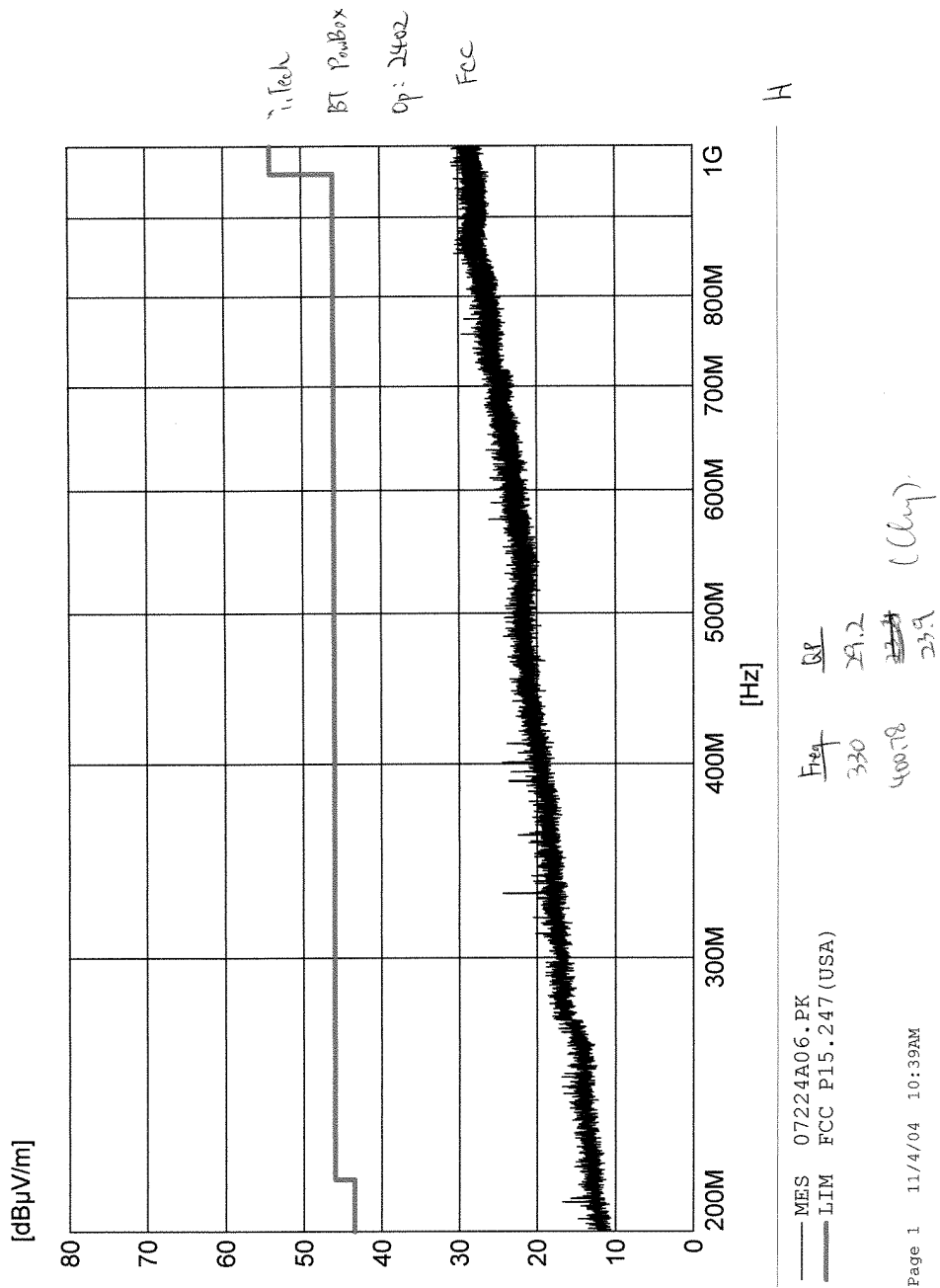
Tx frequency (MHz)	Polarization	Spurious Frequency (MHz)	Power Level (dBuV/m)	Detector (P/QP/A)
2441	V	120.000	27.6	QP
2441	V	150.000	27.8	QP
2441	V	268.596	22.0	QP
2441	V	1221.020	40.21	PK
2441	V	1220.980	37.35	AV
2441	H	120.000	22.8	QP
2441	H	150.000	28.8	QP
2441		330.000	30.2	QP
2441	H	1221.060	41.67	PK
2441	H	1221.060	39.92	AV

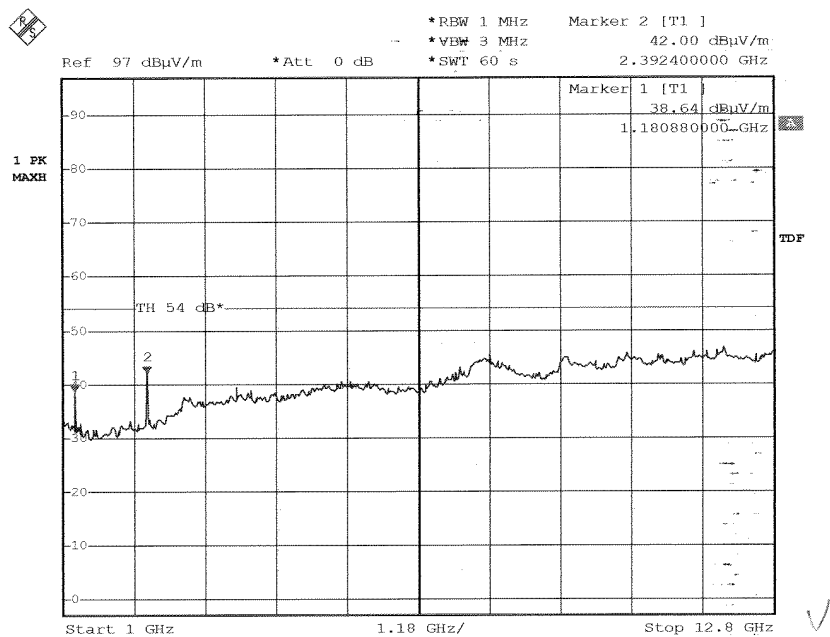
Tx frequency (MHz)	Polarization	Spurious Frequency (MHz)	Power Level (dBuV/m)	Detector (P/QP/A)
2480	V	120.000	22.9	QP
2480	V	150.000	27.5	QP
2480	V	268.520	22.1	QP
2480	V	1240.520	39.80	PK
2480	V	1240.460	37.00	AV
2480	H	120.000	23.0	QP
2480	H	150.000	29.7	QP
2480	H	330.000	30.1	QP
2480	H	1240.500	42.27	PK
2480	H	1240.540	40.10	AV





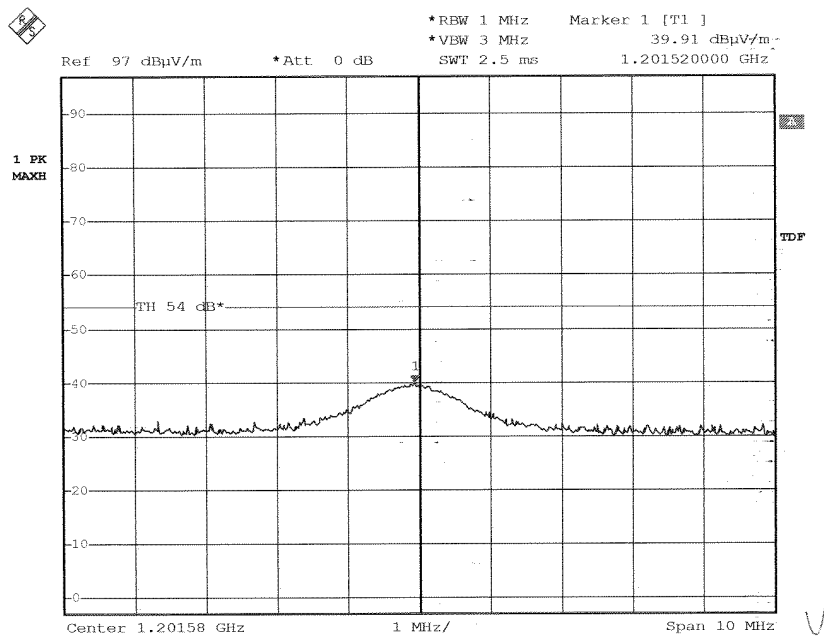






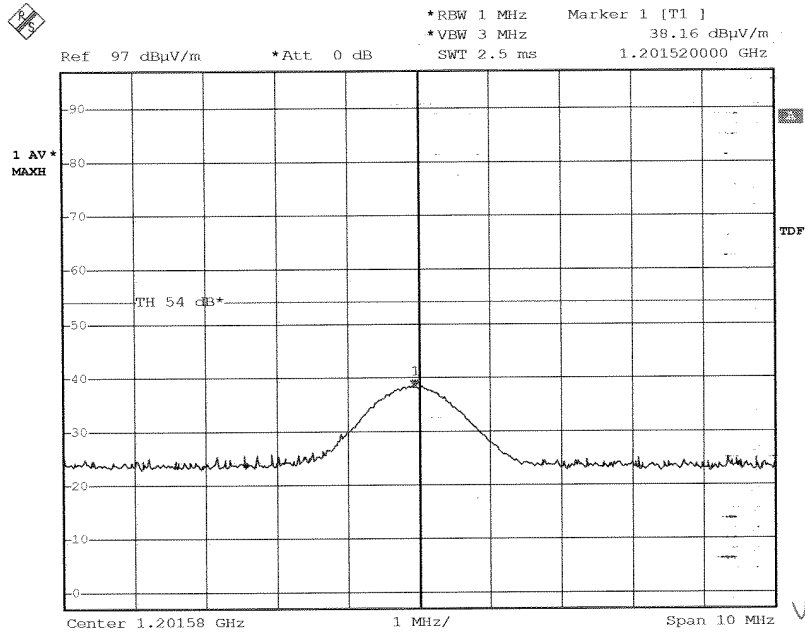
Date: 3.NOV.2004 14:45:52

iTech
 BT PawBox
 Op: 2402
 FCC



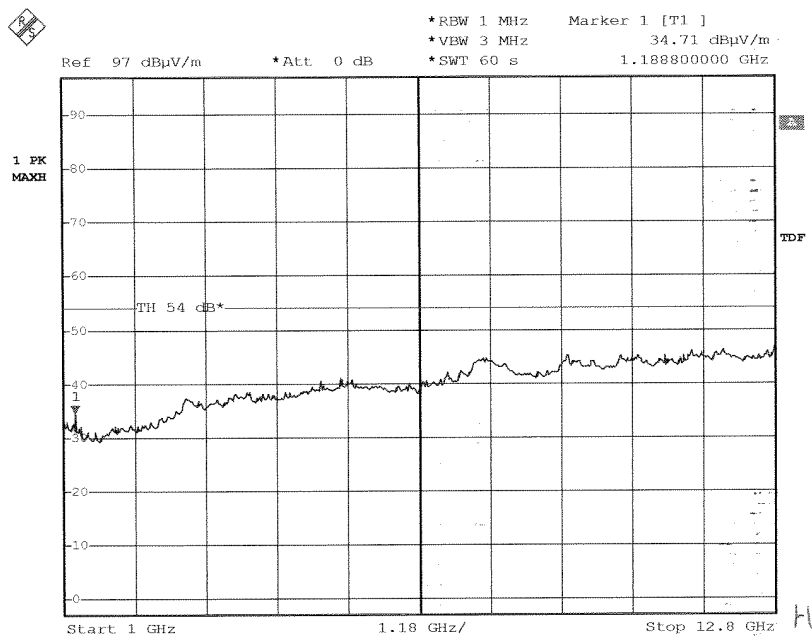
Date: 3.NOV.2004 14:51:17

i.Tech
BT PowBox
Op: 2402.
FCC



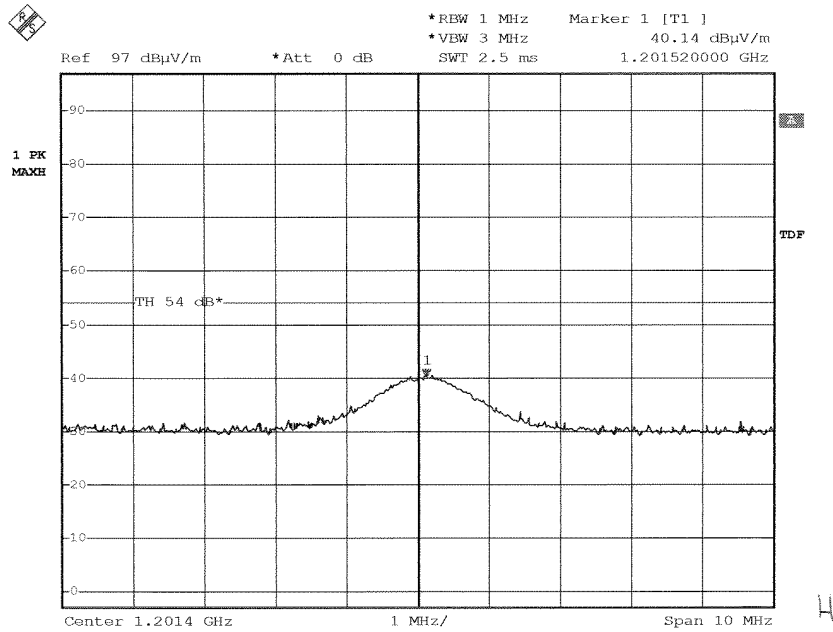
Date: 3.NOV.2004 14:53:30

iTech
BT Powerbox
Op: 2402
FCC



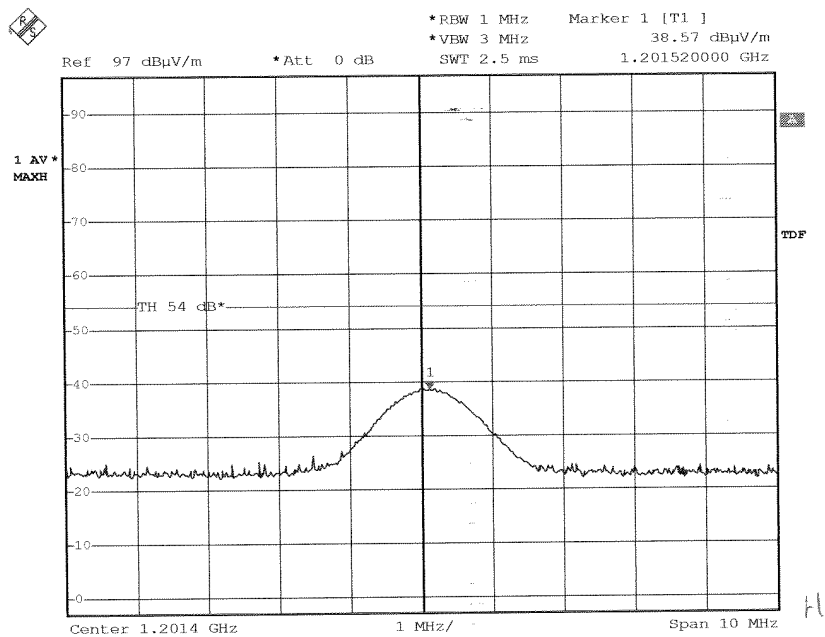
Date: 3.NOV.2004 15:17:31

iitech
 BT Powbox
 Opid402
 FCC



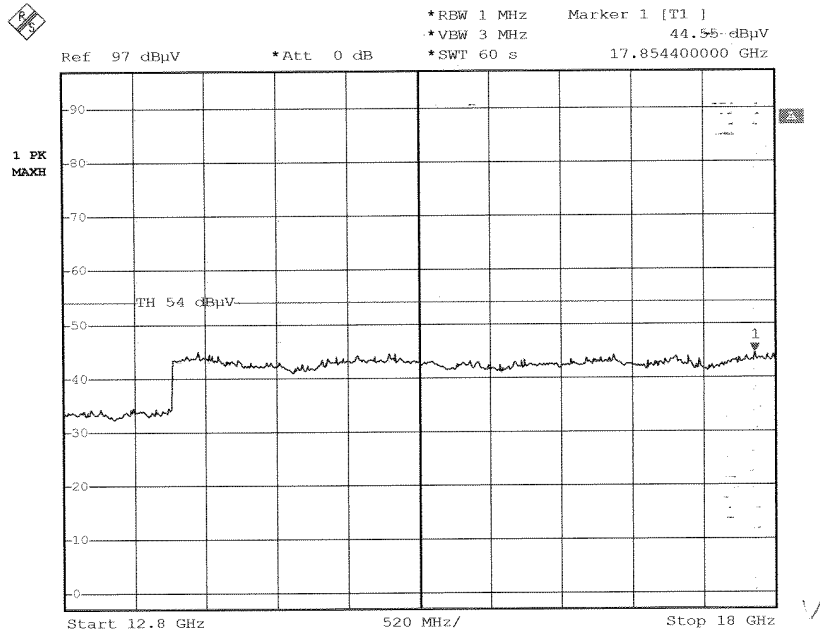
Date: 3.NOV.2004 15:21:05

i.Tech
BT PowBox
Opial402
Fcc



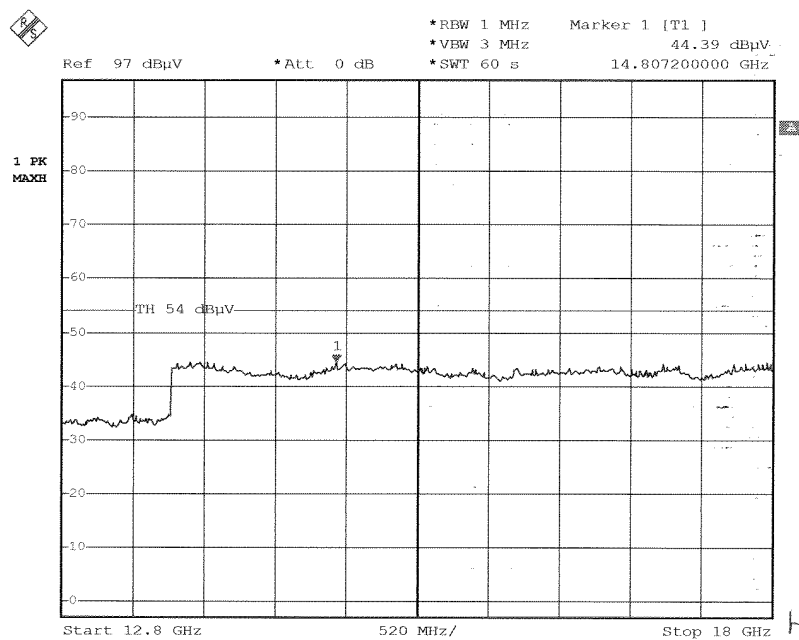
Date: 3.NOV.2004 15:22:43

i.Tech
 BT Router
 Op: 2402
 FCC



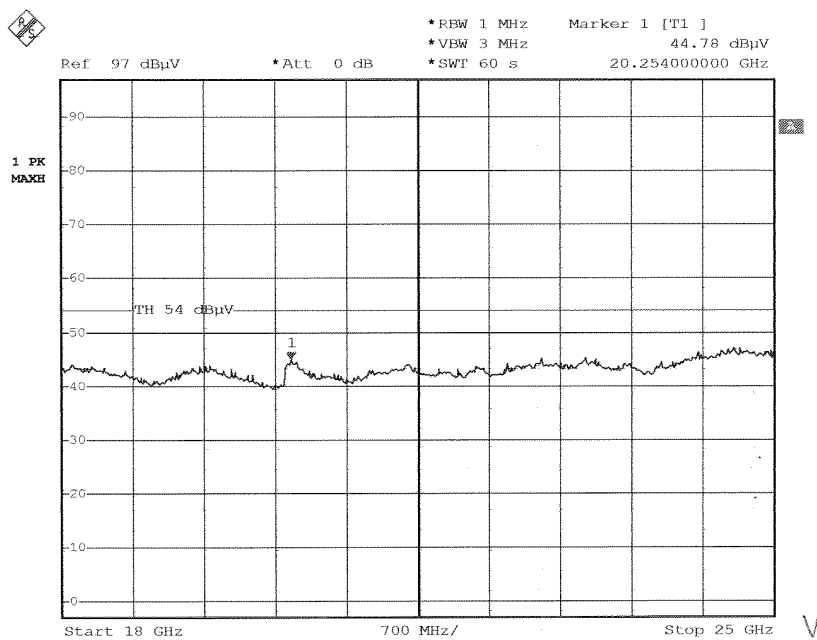
Date: 3.NOV.2004 15:05:37

iTech
BT Power
Op: 2402
FCC



Date: 3.NOV.2004 15:08:32

i.Tech
BT PaulBox
Spi2402
FCC



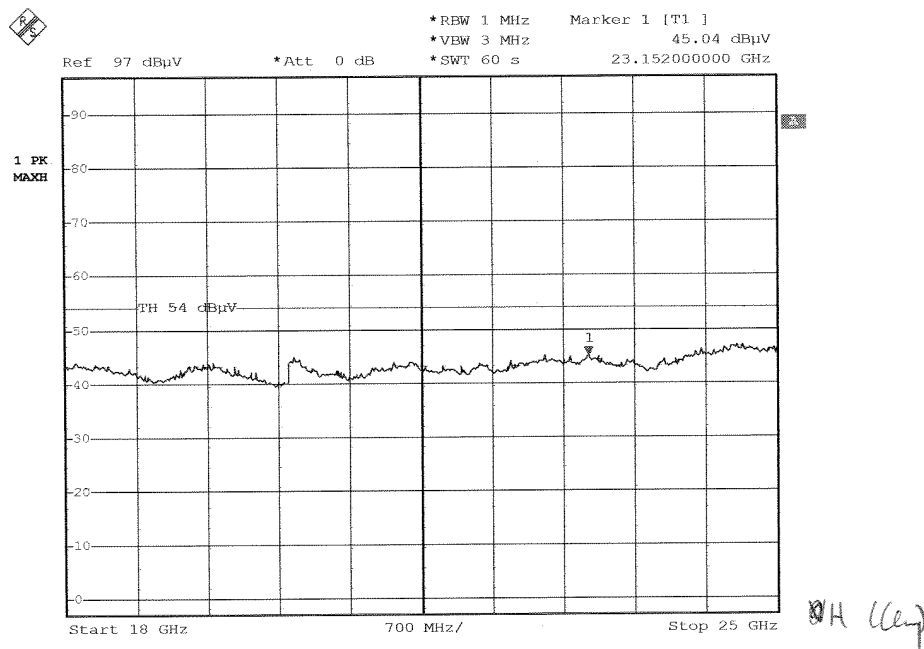
Date: 3.NOV.2004 16:31:28

i.Tech

BT PowBox

Opizs02

Fcc.



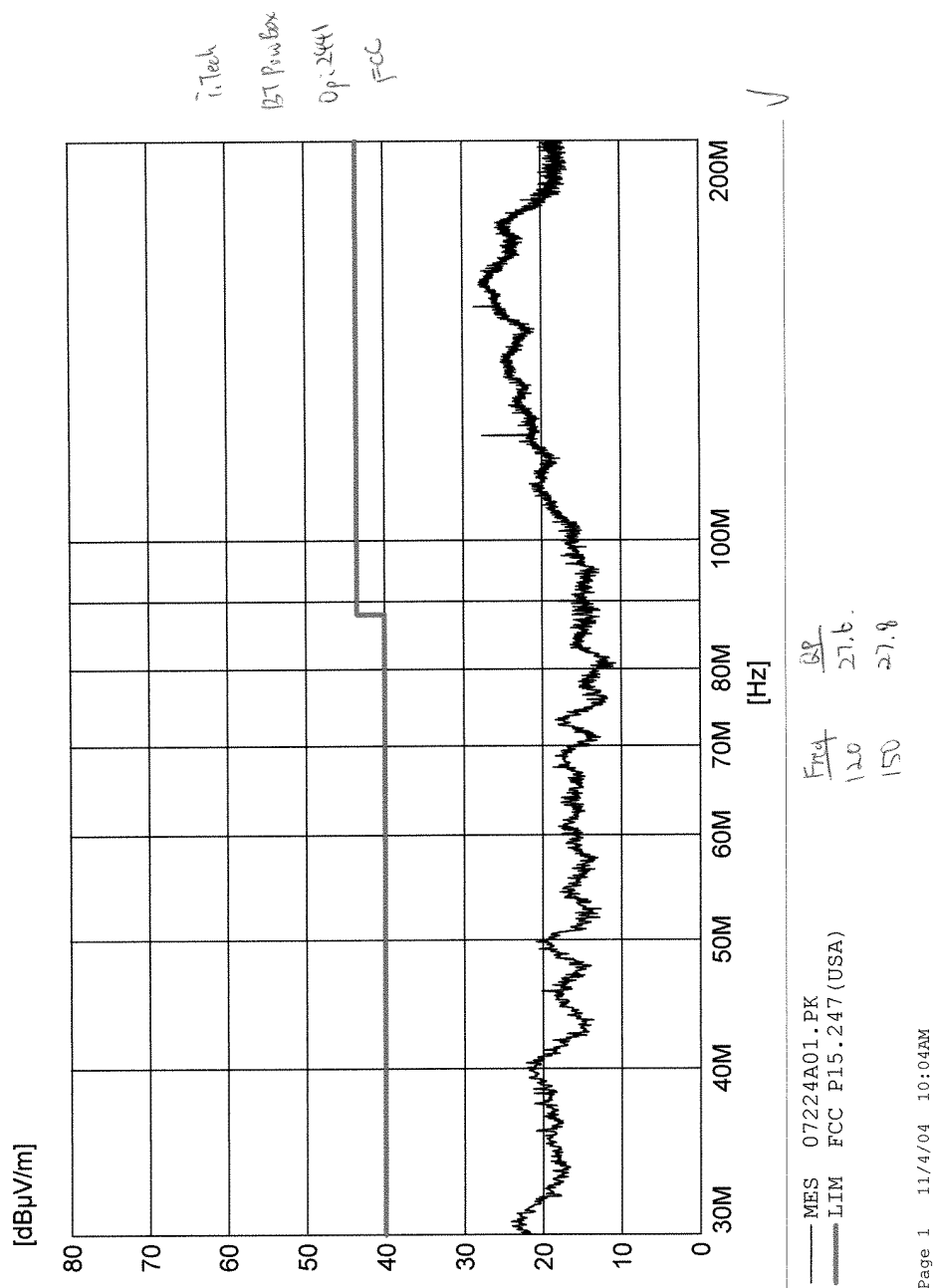
Date: 3.NOV.2004 16:32:37

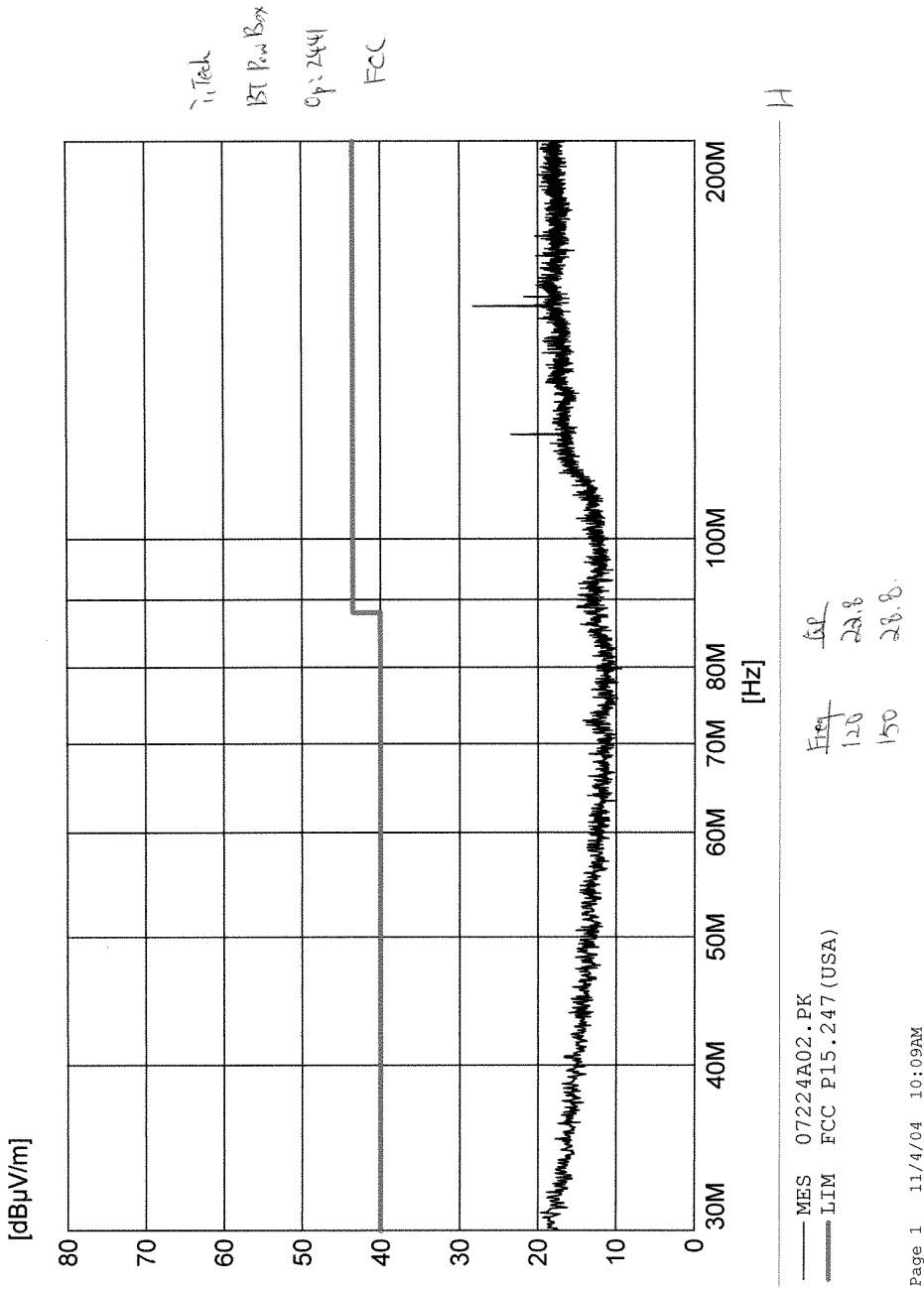
i.Tech

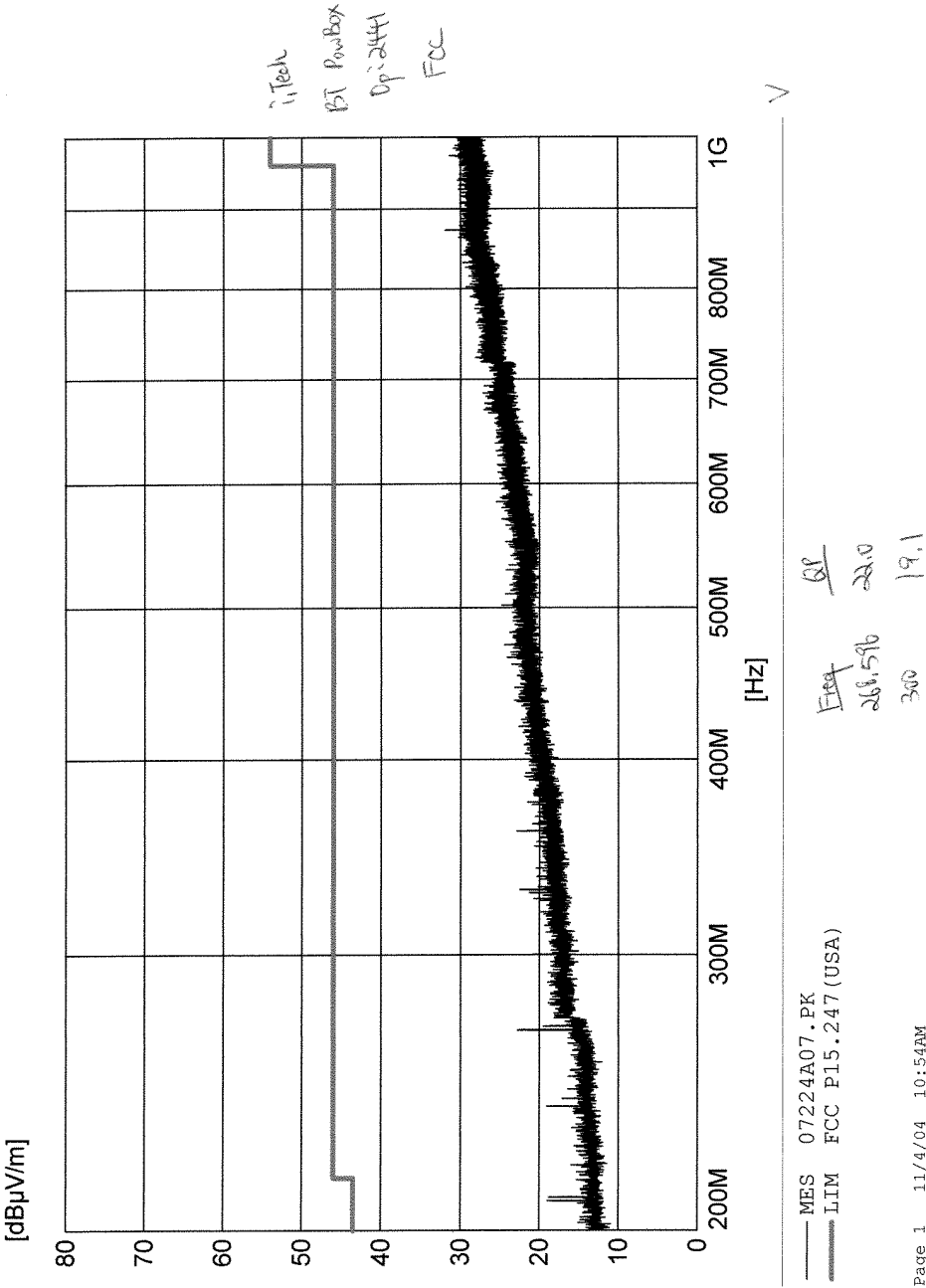
BT PowerBox

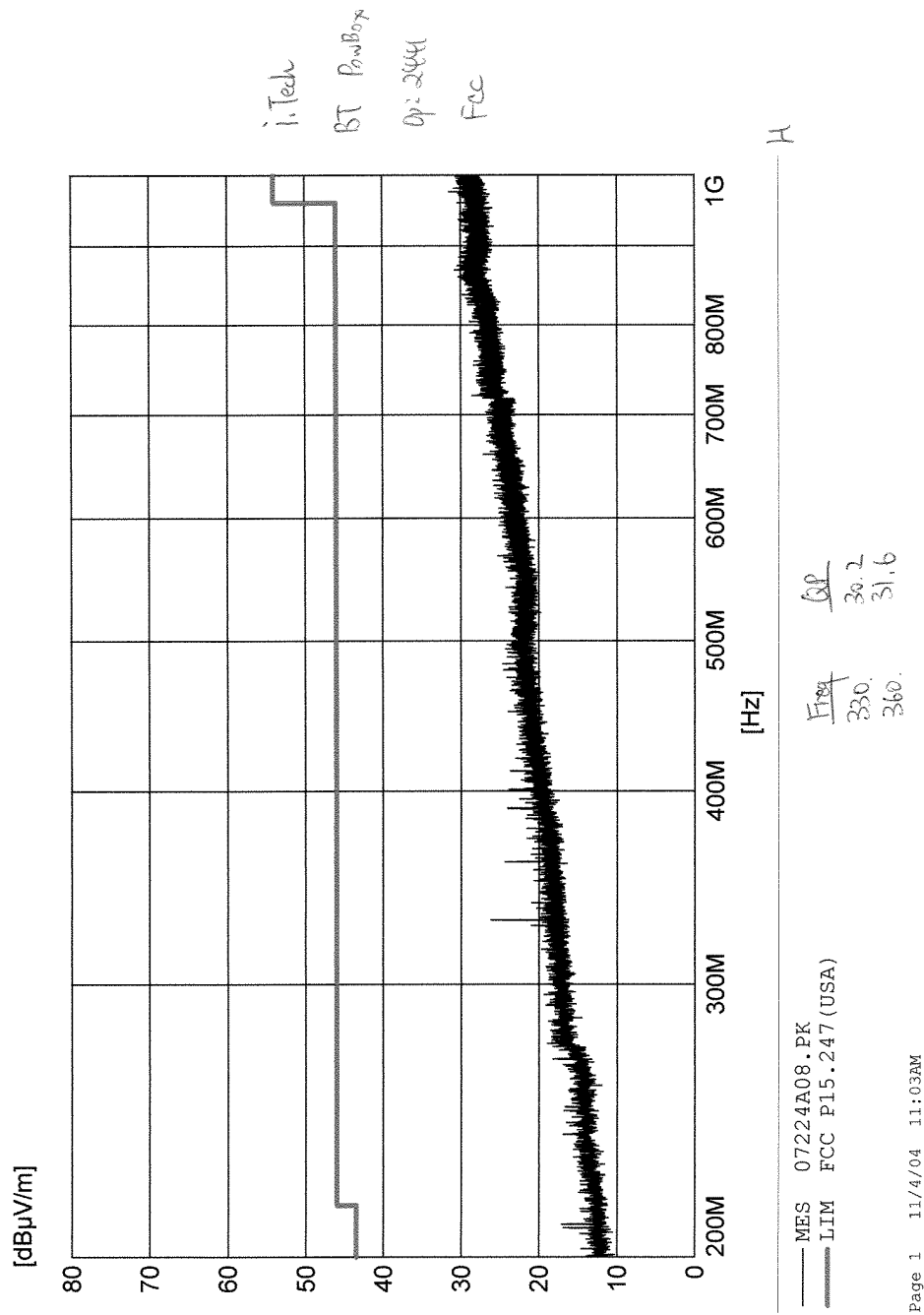
Op: 2402

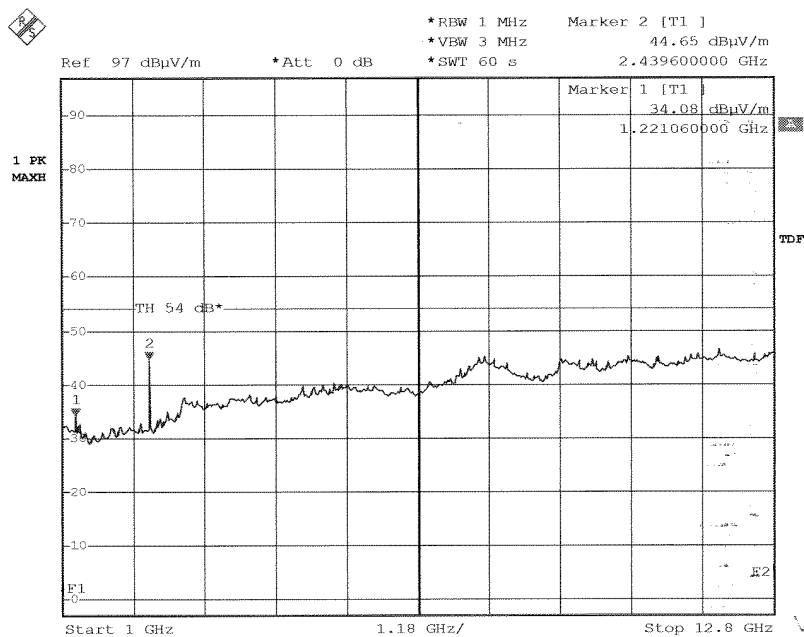
FCC











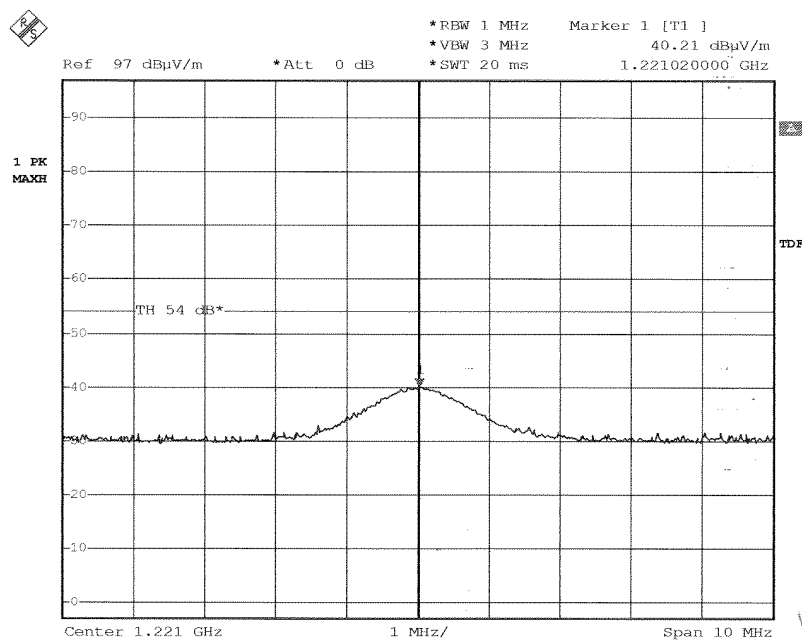
Date: 3.NOV.2004 15:35:47

i.Tech

BT PowBox

Op: 2441

FCC.



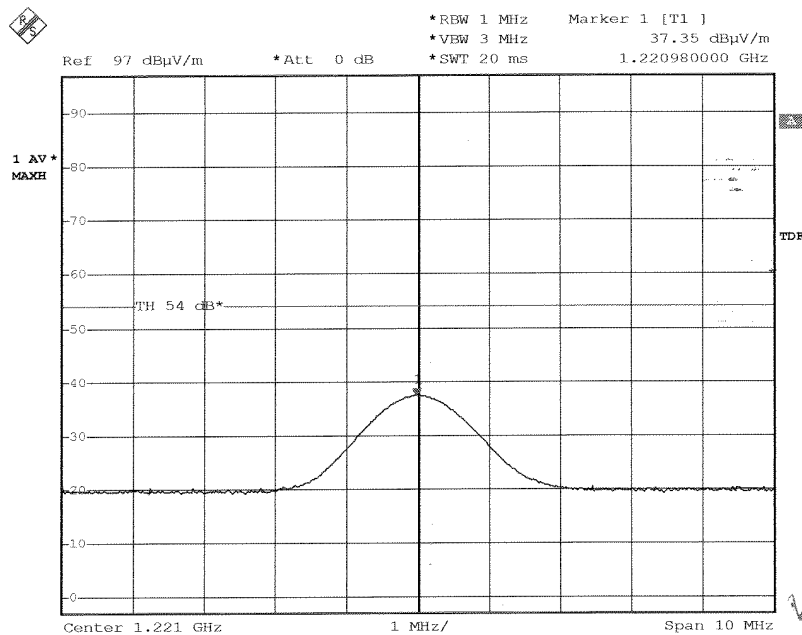
Date: 3.NOV.2004 15:39:18

i.Tech

BT PowBox

Op: 2441

FCL



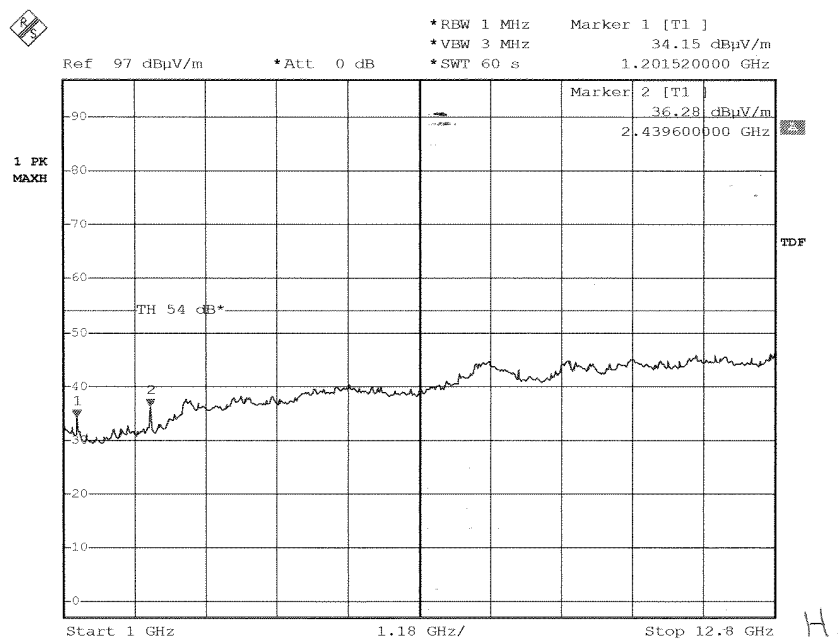
Date: 3.NOV.2004 15:40:59

iTech

BT Powbox

Op: 2444

FCC



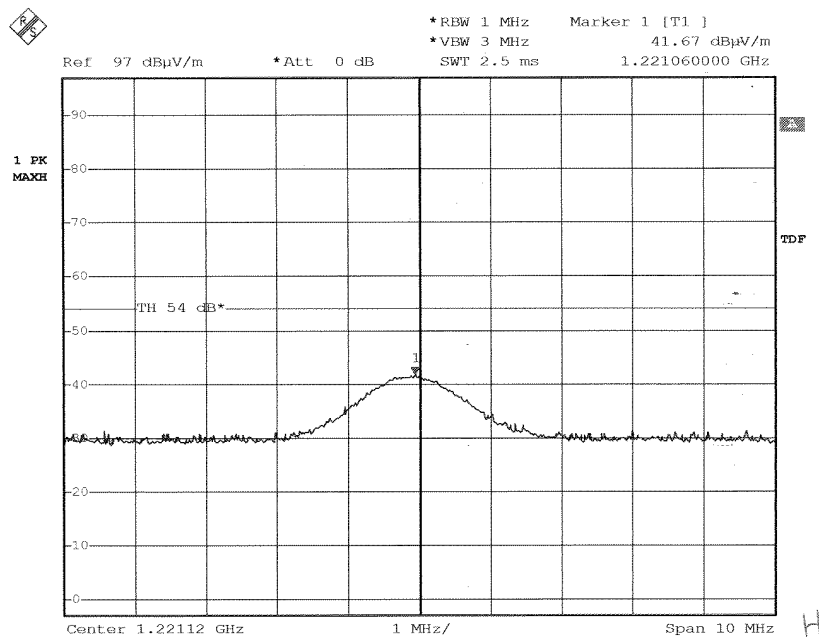
Date: 3.NOV.2004 15:27:52

i.Tech

BT PowBox

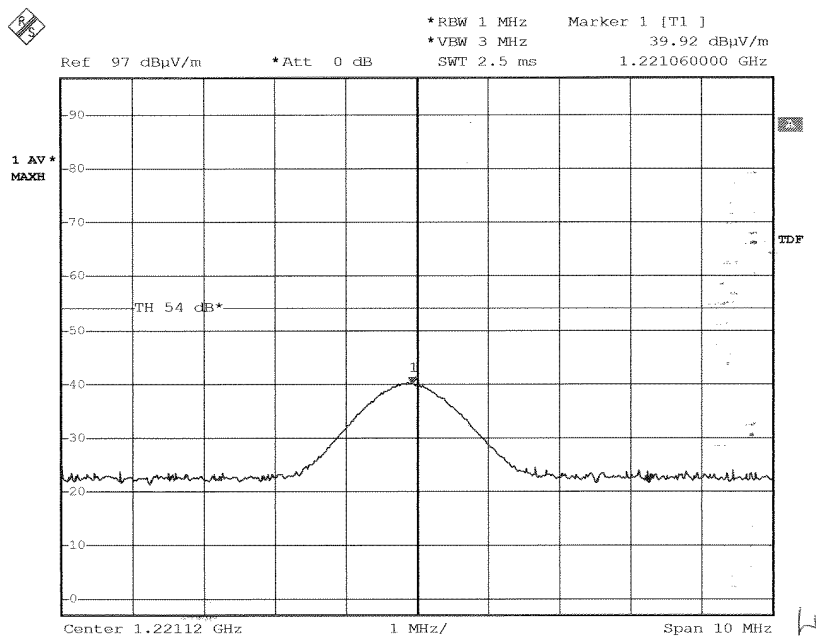
Op: 2441

FCC



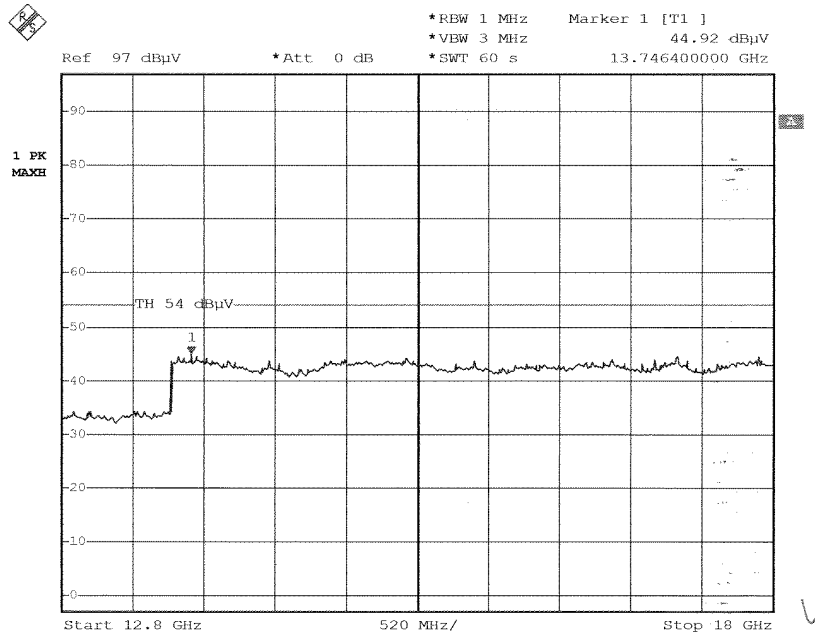
Date: 3.NOV.2004 15:30:41

i.Tech
 BT PowBox
 Opix44
 FCC



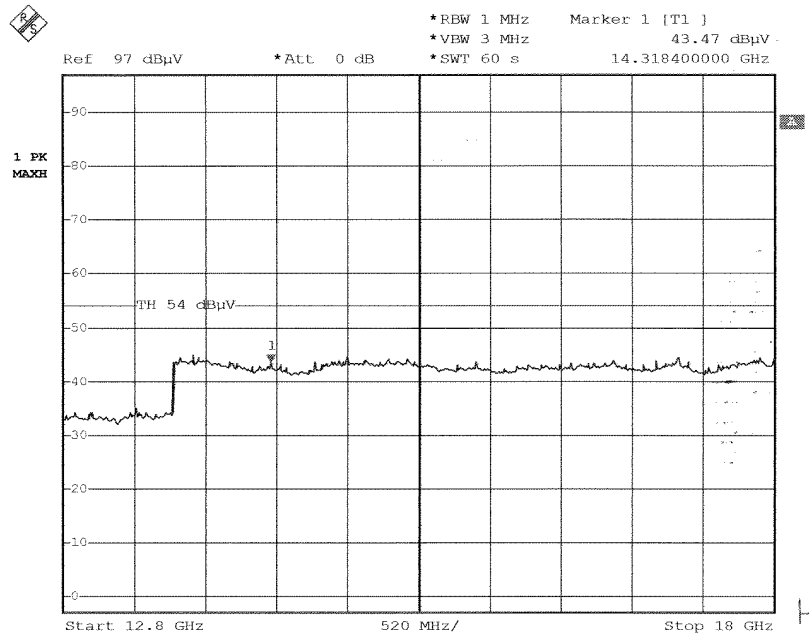
Date: 3.NOV.2004 15:31:42

i.Tech
BT Power Box
Op: 2441
FCC



Date: 3.NOV.2004 15:44:41

iTech
BT PowerBox
Op:244
FCC



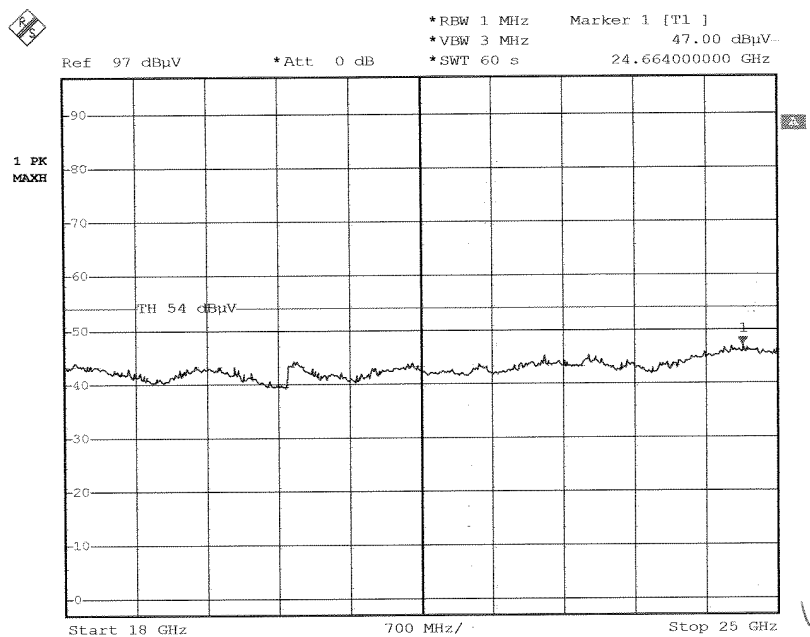
Date: 3.NOV.2004 15:45:53

i.Tech

BT PowBox

Op: 2041

Fcc



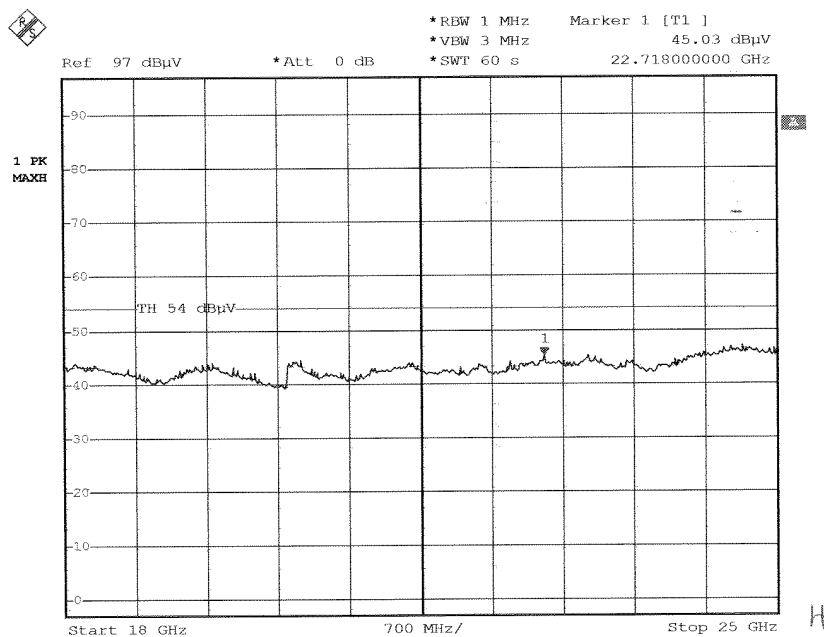
Date: 3.NOV.2004 16:29:20

i. Tech

BT Power

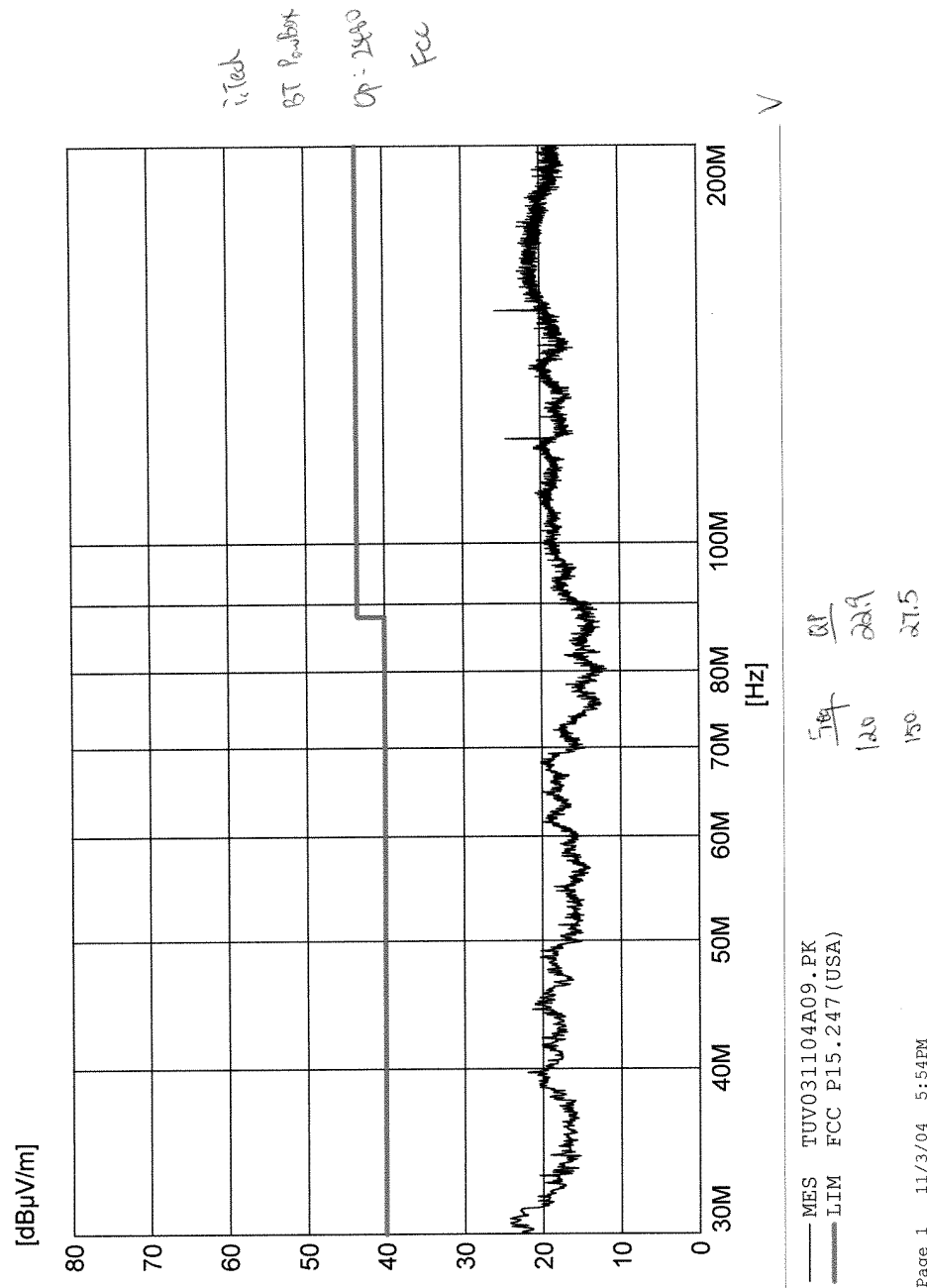
Op: 2441

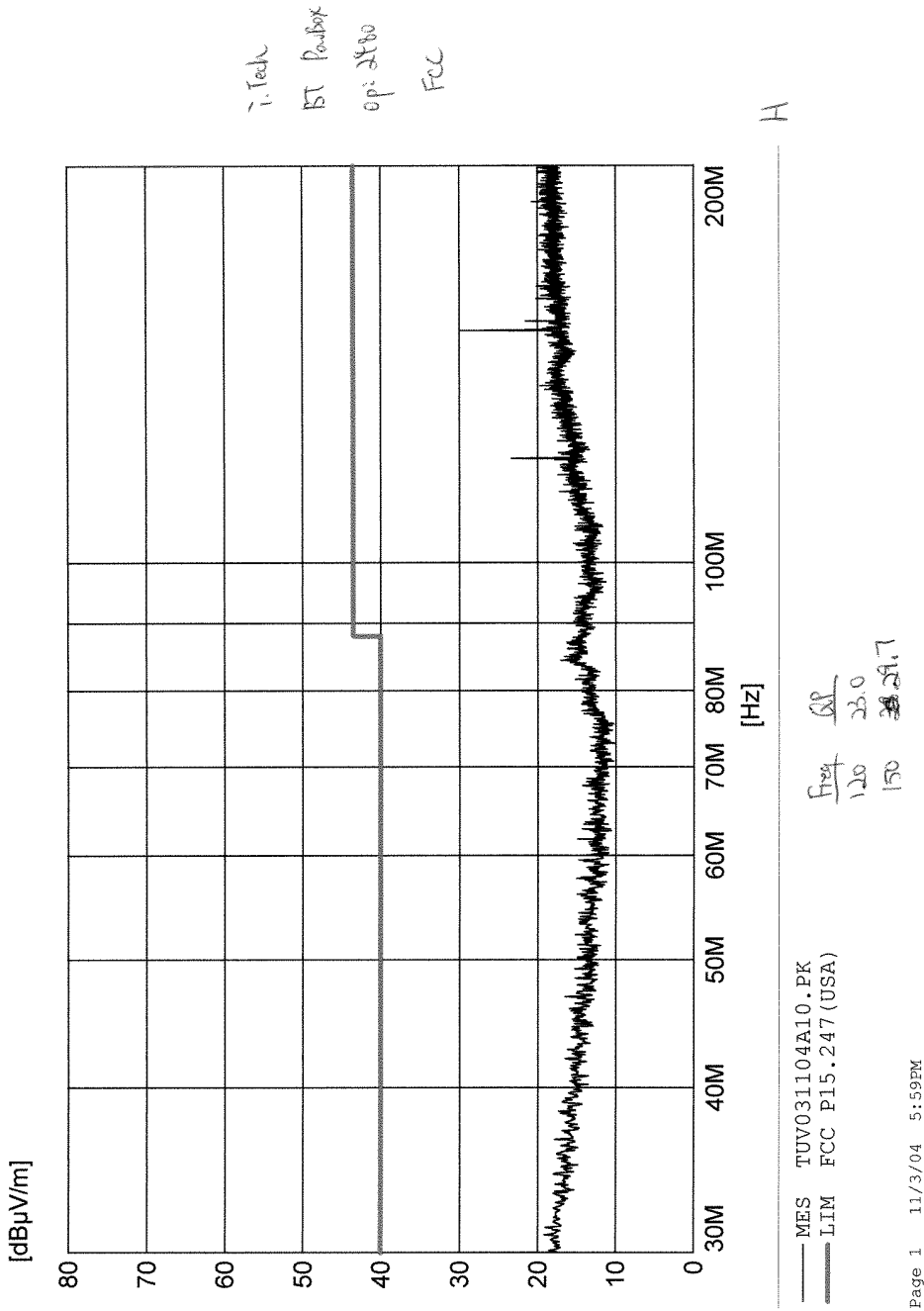
FCC

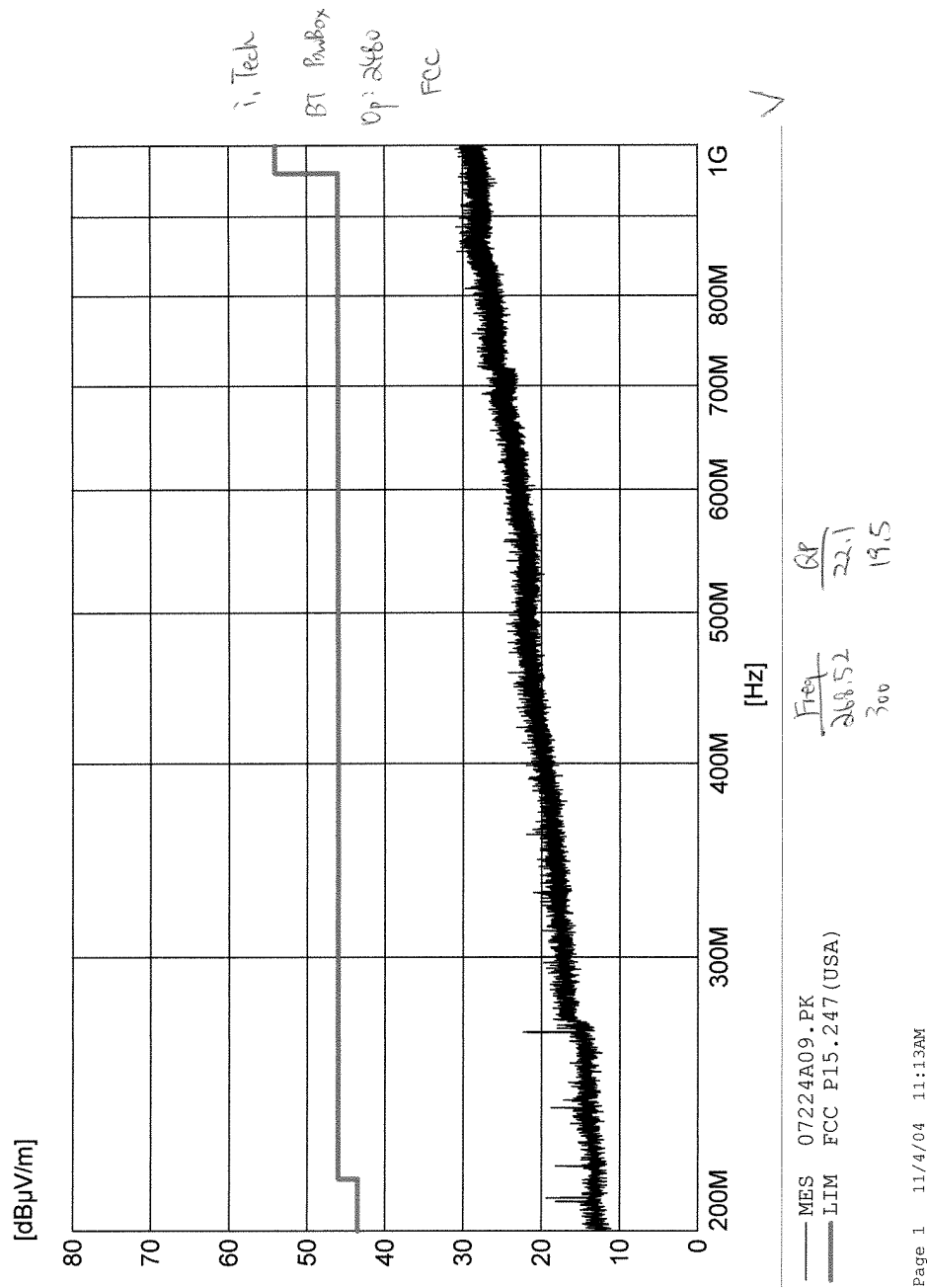


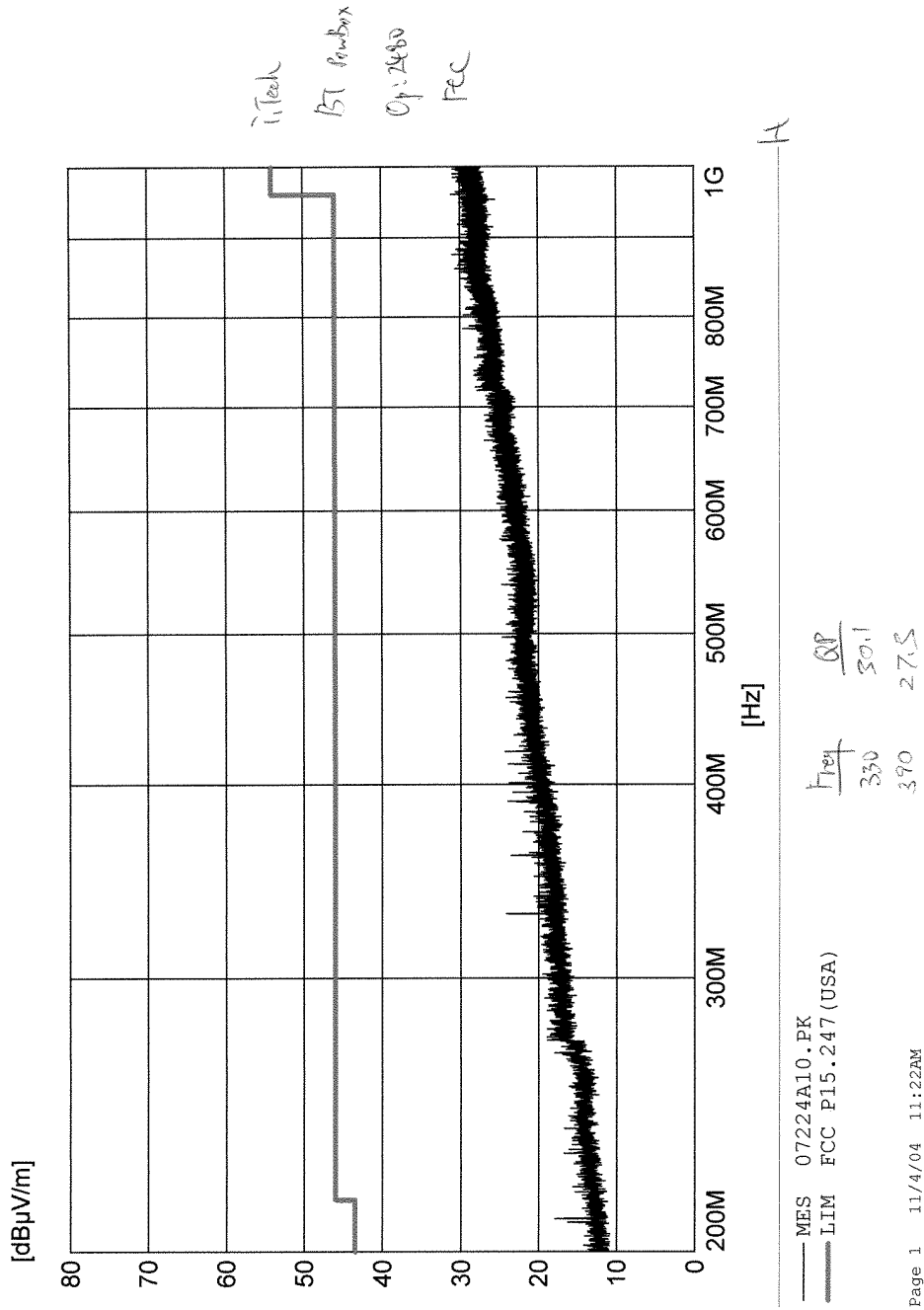
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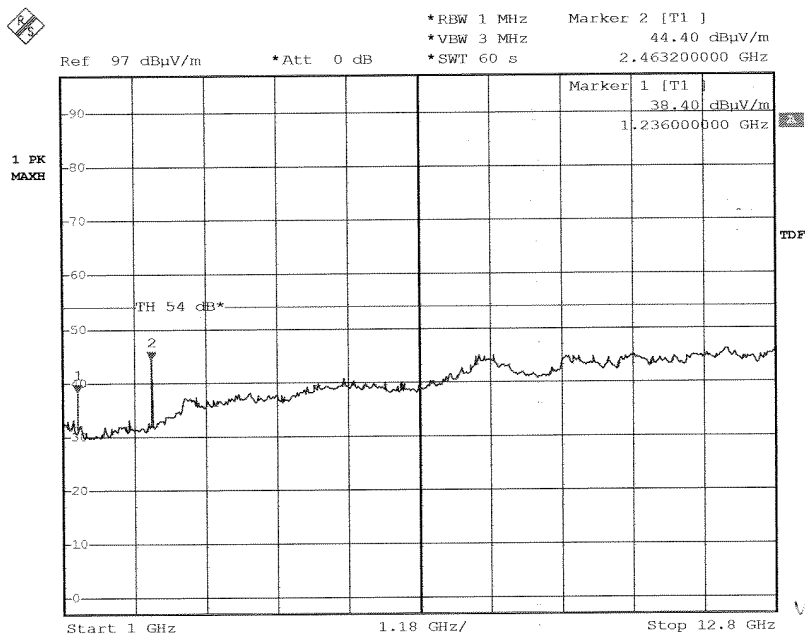
iTech
BT PowerBox
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FCC





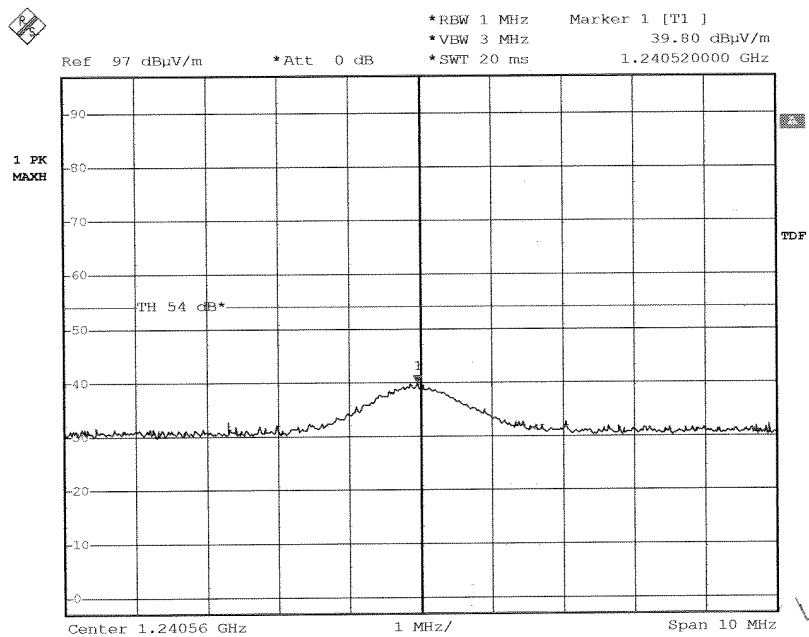






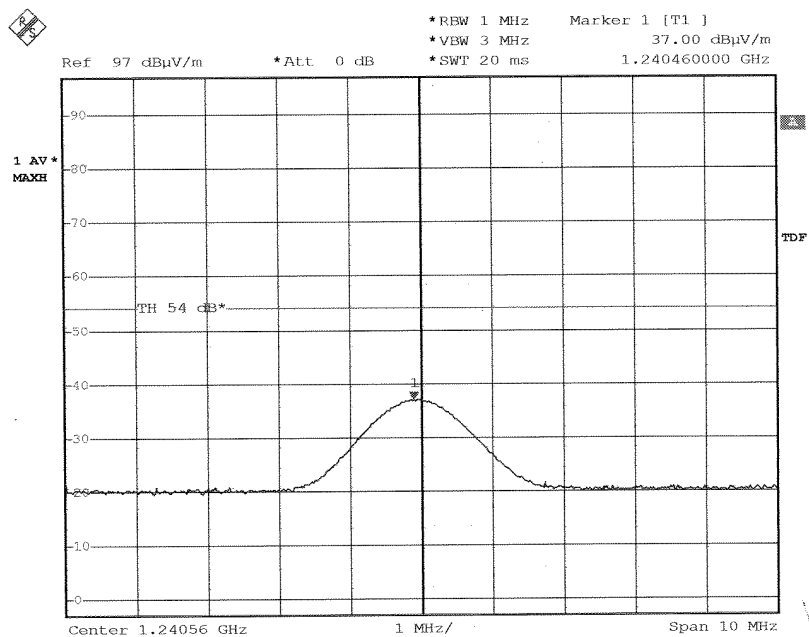
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i.Tech
BT Power
Op. 2460
FCC



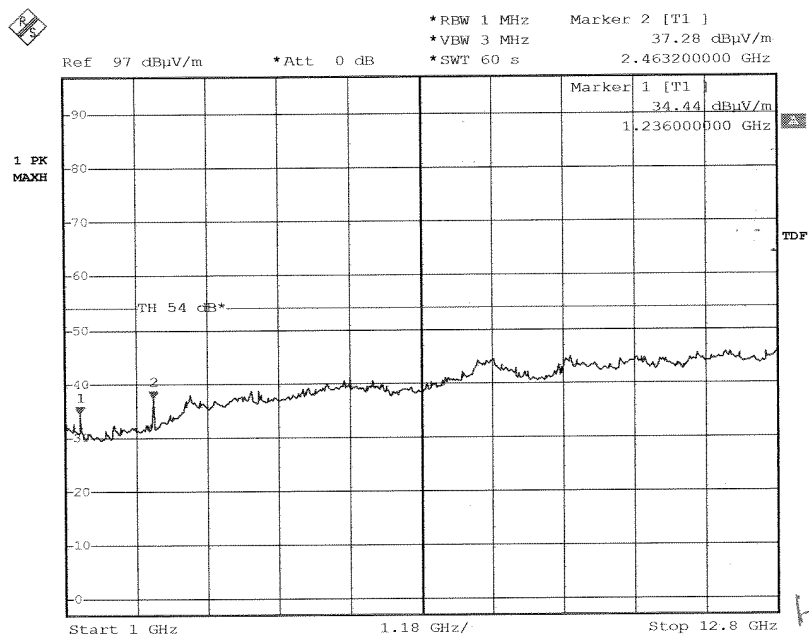
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iTech
 BT PowBox
 Op2460
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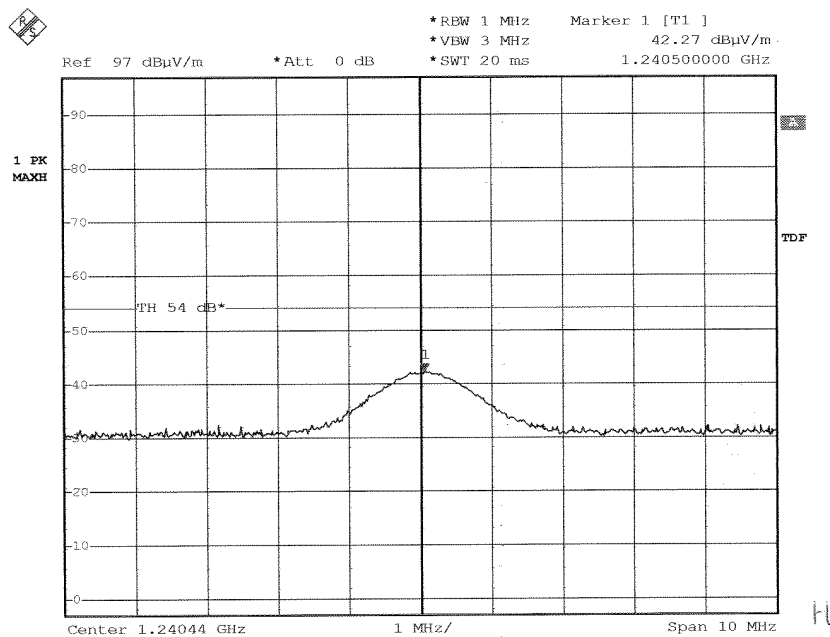
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i.Tech
 B7 Power
 Op: 2480
 FCC



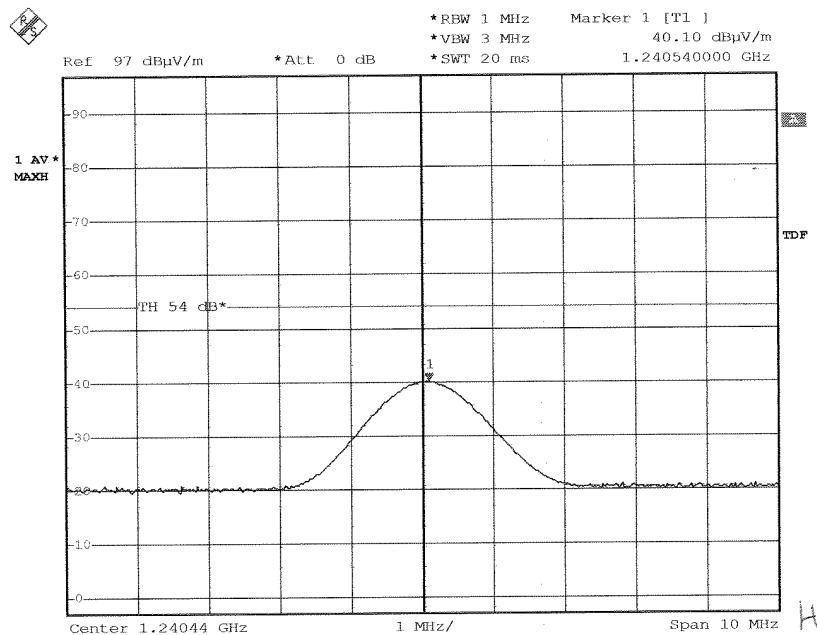
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i.Tech
 BT PowerBox
 Opi 2480
 FCC



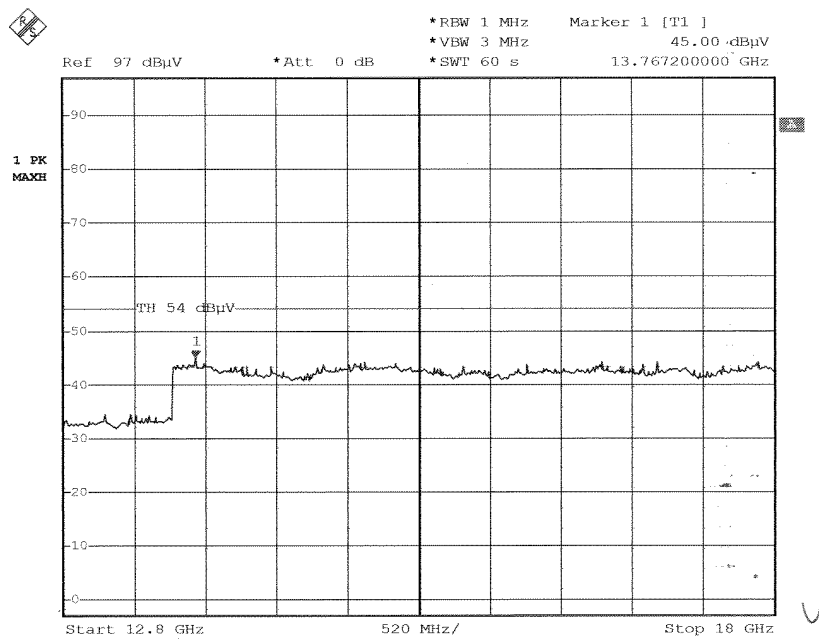
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i.Tech
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FCC



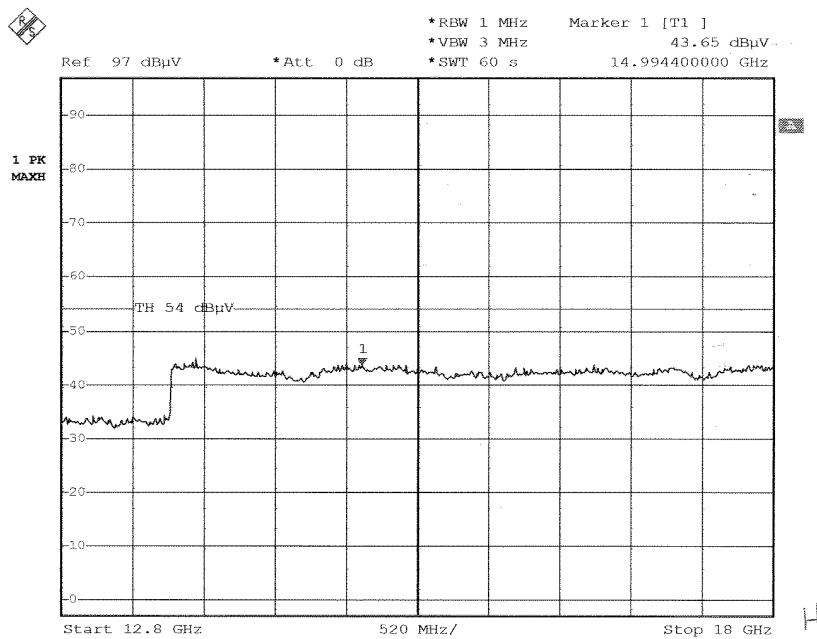
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i.Tech
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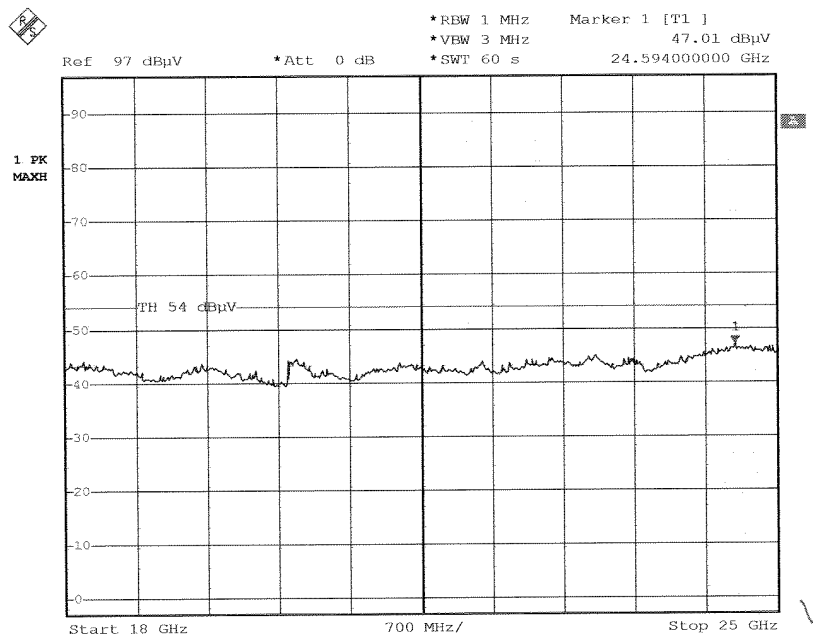
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iTech
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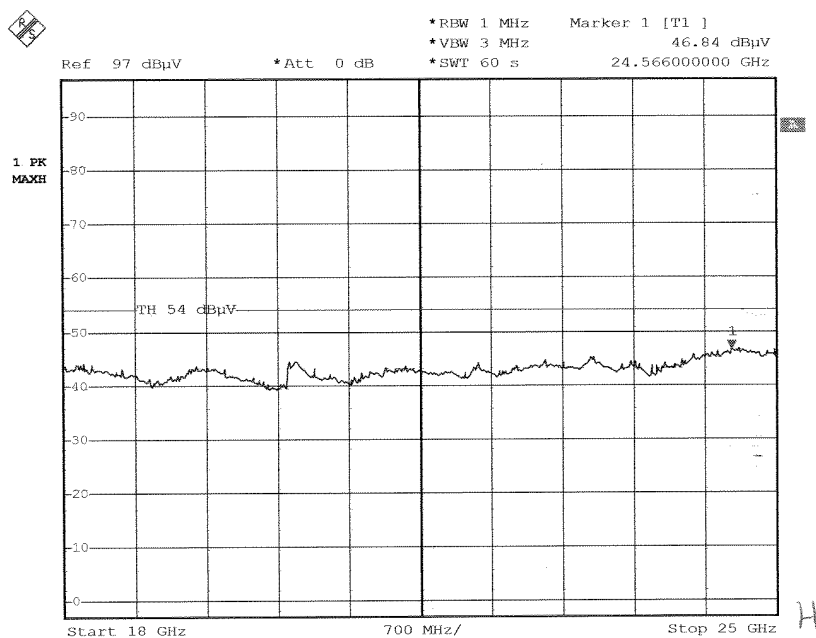
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Tech
 BT Power
 Op: 2400
 FCC



Date: 3.NOV.2004 16:22:26

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Fcc.



Date: 3.NOV.2004 16:25:18

i.Tech

BT PaulBox

Op: 2490

FCC