

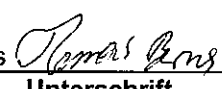
Prüfbericht - Nr.: Test Report No.	14008745 001		Seite 1 von 14 Page 1 of 14	
Auftraggeber: Applicant	i.Tech Dynamic Ltd. Room 1112, Metroplaza, Tower 2 223 Hing Fong Road Kwai Chung, N.T. Hong Kong			
Gegenstand der Prüfung: Test item	iM402 (Rx)			
Bezeichnung: Identification	iM402-A	Serien-Nr.: Serial No.	Engineering sample	
Wareneingangs-Nr.: Receipt No.	050307022- 050307028	Eingangsdatum: Date of receipt	07.03.2005	
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:		
11.04.2005	Hugo Wan		11.04.2005	Thomas Berns 
Datum Date	Name Name	Unterschrift Signature	Datum Date	Name Name
Sonstiges: Other Aspects		FCCID: RKI-IM402-A		
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 Chip Antenna	On-board Chip Antenna
Antenna gain (dBi)	2	
Power level	fix	
Type of equipment	stand alone device	stand alone device
Connection to public utility power line	Yes	
Nominal voltage	V _{nom} : 3.9 V	V _{nom} : 3.9 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 stereo headset 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: IT-PM5V/500mA
Serial number: 0688A0019460
Input: 100-240VAC, 100mA, 50-60Hz
Output: 5VDC, 500mA

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 chip 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	

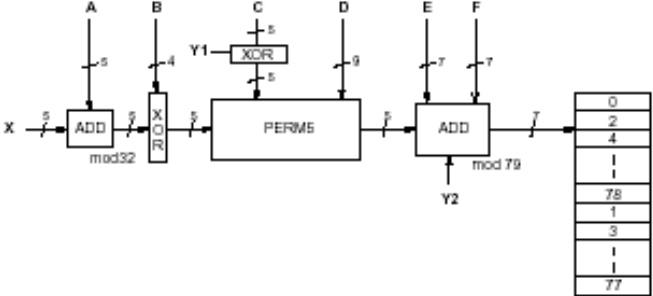
Subclause 15.207 – Disturbance Voltage on AC Mains						Pass
Test Port: AC mains input port of the charger Applied voltage: 100VAC Applicable only to equipment designed to be connected to the public utility power line. Mode of operation: Charging only						
Live measurement						
Frequency range (MHz)	Frequency (MHz)	Quasi-peak dBµV	Average dBµV	Limit QP (dBµV)	Limit AV (dBµV)	Verdict
0,15 – 0,5	0.198	41.5	29.7	66 - 56	56 - 46	Pass
> 0,5 - 5	0.774	36.9	18.9	56	46	Pass
	1.400	38.3	19.1			Pass
> 5 - 30	-	-	-	60	50	Pass
Neutral measurement						
Frequency range (MHz)	Frequency (MHz)	Quasi-peak dBµV	Average dBµV	Limit QP (dBµV)	Limit AV (dBµV)	Verdict
0,15 – 0,5	0.198	41.8	30.0	66 - 56	56 - 46	Pass
> 0,5 - 5	1.104	36.0	15.2	56	46	Pass
	1.458	37.3	16.2			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 2-4.

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 : 3.9VDC from 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 : 3.9VDC from rechargeable battery Temperature : 23°C Humidity : 50%	
Result: The screenshot in Appendix 1 page 7 shows the occurrence of a channel in a 31.6 s time period. In normal hopping mode Bluetooth is using 79 hopping channels only. The frequency was used 64 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: $0.4 \times 79 = 31.6\text{s}$ Limit calculation: $64 \times 2.920 \times 10^{-3} = 186.9 \times 10^{-3}$ $\leq 400.0 \times 10^{-3} \text{ s}$ 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 : 3.9VDC from 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	0.452	0.468	0.920
2441	0.452	0.472	0.924
2480	0.404	0.412	0.816

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 |

```

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 : 3.9VDC from 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	1.57	3.52	5.09	1 / 30.0	Pass
2441	1.56	3.65	5.21	1 / 30.0	Pass
2480	1.30	3.60	4.90	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 : 3.9VDC from 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 a peak found outside any 100 kHz bandwidth of the operating frequency band in the 2402MHz and 2480MHz transmit frequencies. The radio frequency power is as high as –40.84dB lower than the reference 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 : 3.9VDC from 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	4795.660	-39.80	2.03	-41.83	Pass
2441	807.660	-47.85	0.99	-48.84	Pass

	4875.420	-40.16	0.99	-41.15	Pass
2480	4955.180	-39.09	1.32	-40.41	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 : 3.9VDC from 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 All three transmit frequency modes comply with the field strength within the restricted bands. For test protocols refer to Appendix 1, page 21-75.							
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
1602.000	50.56	25.40	1.89	36.17	0.60	42.28	74.0 / P
1602.020	48.76	25.40	1.89	36.17	0.60	40.48	54.0 / A
4803.920	46.10	33.40	3.53	32.87	0.33	50.49	74.0 / P
4804.020	44.47	33.40	3.53	32.87	0.33	48.86	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
1602.000	54.56	25.40	1.89	36.17	0.60	46.28	74.0 / P
1601.980	53.75	25.40	1.89	36.17	0.60	45.47	54.0 / A
4803.960	47.65	33.40	3.53	32.87	0.33	52.04	74.0 / P
4803.940	46.25	33.40	3.53	32.87	0.33	50.64	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
1628.000	48.60	25.40	1.89	36.17	0.60	40.32	74.0 / P
1628.000	47.05	25.40	1.89	36.17	0.60	38.77	54.0 / A
4881.960	47.58	33.40	3.53	32.87	0.33	51.97	74.0 / P
4881.980	45.10	33.40	3.53	32.87	0.33	49.49	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
1627.980	56.13	25.40	1.89	36.17	0.60	47.85	74.0 / P
1627.960	55.69	25.40	1.89	36.17	0.60	47.41	54.0 / A
4882.100	45.99	33.40	3.53	32.87	0.33	50.38	74.0 / P
4882.000	44.12	33.40	3.53	32.87	0.33	48.51	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
1653.960	50.72	25.40	1.89	36.17	0.60	42.44	74.0 / P
1654.020	49.21	25.40	1.89	36.17	0.60	40.93	54.0 / A
4959.880	45.42	33.40	3.53	32.87	0.33	49.81	74.0 / P
4960.000	43.38	33.40	3.53	32.87	0.33	47.77	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
679.700	5.20	20.80	2.30	-	-	28.3	46.0 / QP
1654.080	56.49	25.40	1.89	36.17	0.60	48.21	74.0 / P
1654.020	55.82	25.40	1.89	36.17	0.60	47.54	54.0 / A
4959.760	45.57	33.40	3.53	32.87	0.33	49.96	74.0 / P
4960.000	43.52	33.40	3.53	32.87	0.33	47.91	54.0 / A

Appendix 1

Test results

Disturbance Voltage on AC Mains

Date: 4 Apr 2005

EUT: iM402-A

Company: i.Tech Dynamic Ltd.

Humidity: 60%

Temperature: 23°C

Voltage supply: 3.9V from rechargeable battery

Test by: Sharon Li

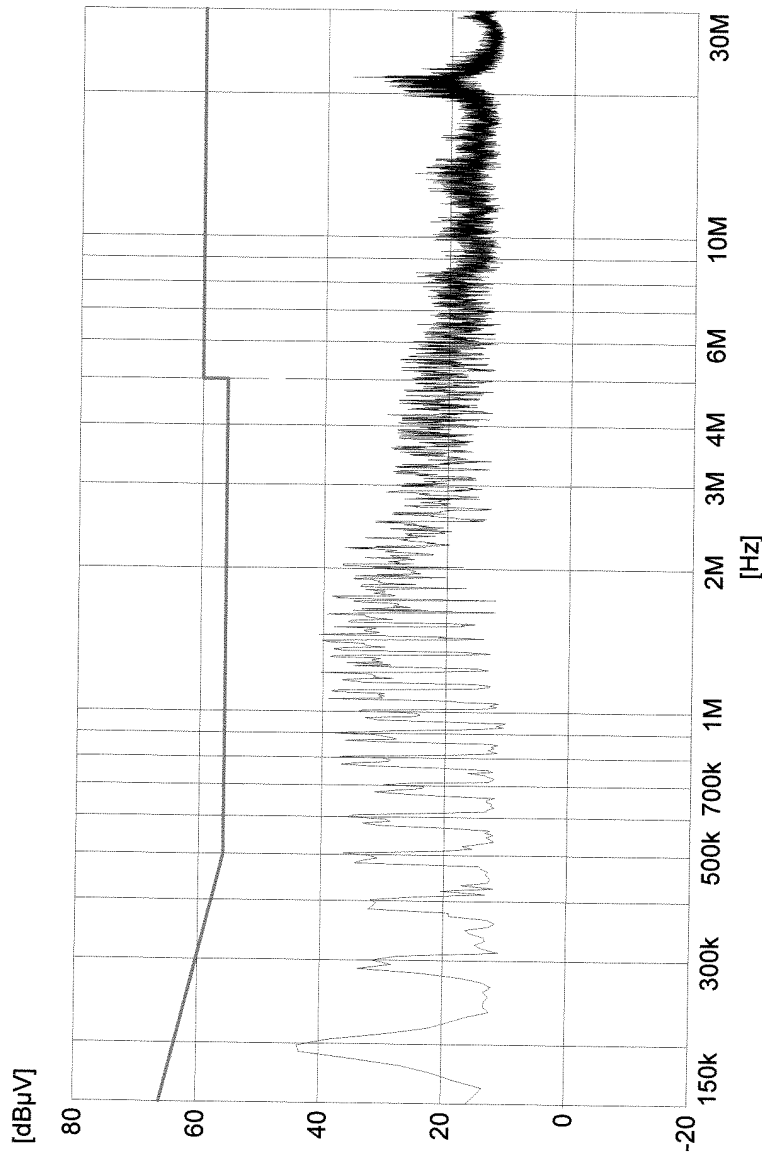
Op. mode: Charging

Live measurement

Frequency (MHz)	QP reading (dB μ V)	Av reading (dB μ V)	Results
0.198	41.5	29.7	Pass
0.774	36.9	18.9	Pass
1.400	38.3	19.1	Pass

Neutral measurement

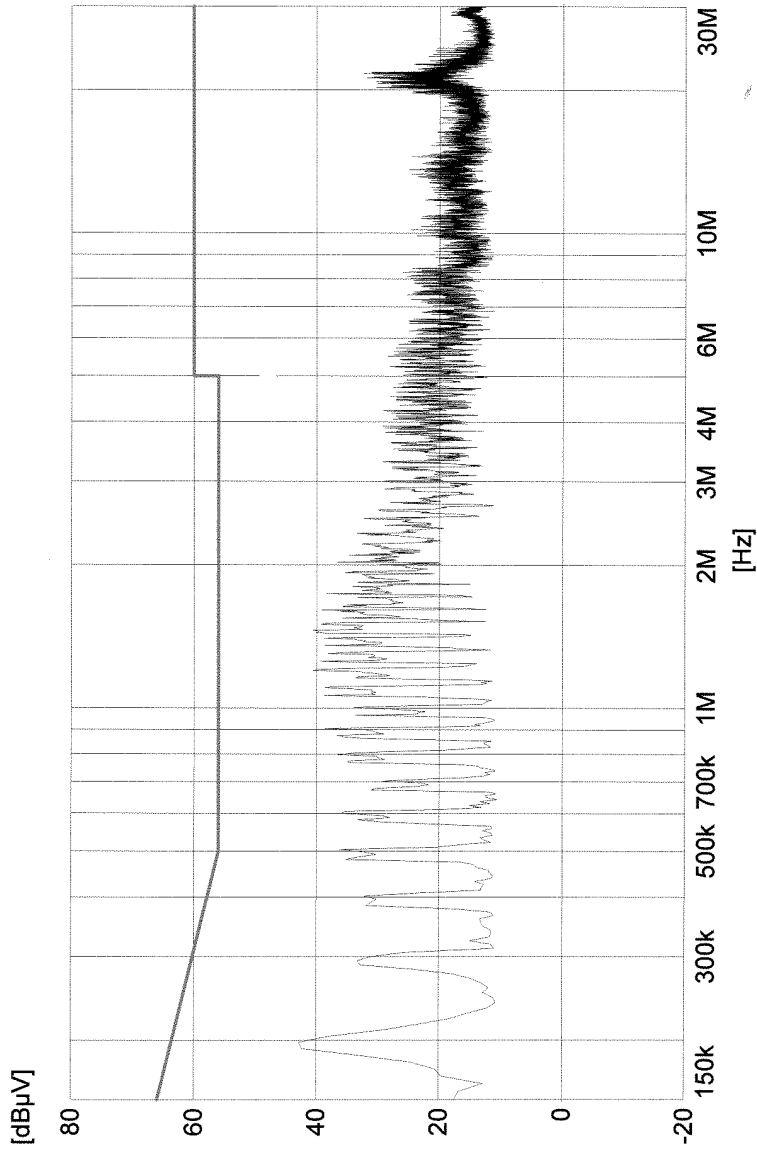
Frequency (MHz)	QP reading (dB μ V)	Av reading (dB μ V)	Results
0.198	41.8	30.0	Pass
1.104	36.0	15.2	Pass
1.458	37.3	16.2	Pass



MES TÜV040405B01.PK
LIM EN 55022 V QP
LIM EN 55022 V AV

100V
100V measures
changing mode
C1

Peak	CP	AV	Limit
0.188	41.5	29.7	63.7
0.774	36.9	18.9	56
1.3985	38.3	18.1	56



MES TÜV040405B02.PK
 LIM EN 55022 V QP
 LIM EN 55022 V AV

Freq	QF	N	CP	L _{unit}
0.198	41.8	30.0	63.7	53.7
1.104	8.0	15.2	52	46
1.458	37.3	16.2	52	46

100V
 Pal Accessories
 charging mode
 N

Carrier Frequency Separation

Date: 16 Mar 2005
 EUT: iM402-A
 Company: i.Tech Dynamic Ltd.
 Humidity: 50%
 Temperature: 23°C
 Voltage supply: 3.9VDC from rechargeable battery
 Test by: Sharon Li
 Op. mode: Hopping on

Reference frequency (MHz)

2441.000

Channel Separation (MHz)

1.002

**DELTA MARKER 3**

1.008 MHz

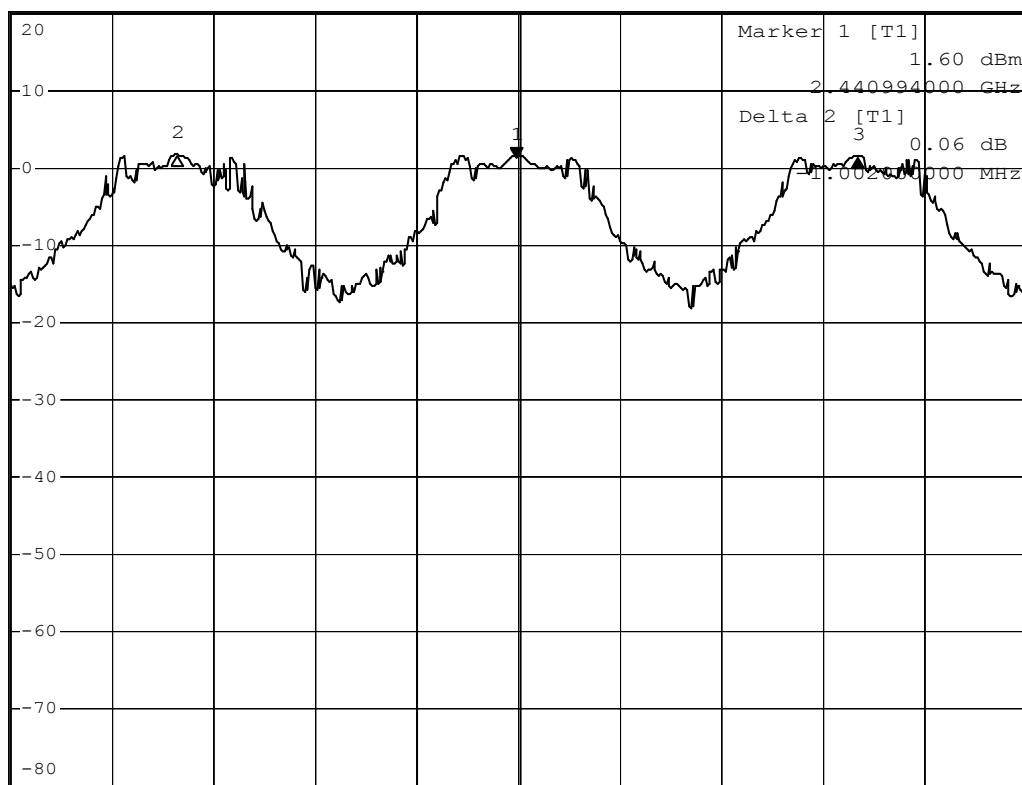
Ref 20 dBm

* Att 50 dB

RBW 100 kHz Delta 3 [T1]

VBW 300 kHz -0.07 dB

SWT 2.5 ms 1.008000000 MHz

1 PK
MAXH

Center 2.441 GHz

300 kHz/

Span 3 MHz

Date: 16.MAR.2005 11:53:16

Dwell Time

Date: 16 Mar 2005
 EUT: iM402-A
 Company: i.Tech Dynamic Ltd.
 Humidity: 50%
 Temperature: 23°C
 Voltage supply: 3.9VDC from rechargeable battery
 Test by: Sharon Li
 Op. mode: Hopping on

Burst Duration (ms)	Number of hopping	Time of occupancy (s)	Results
2.920	64	$0.002920 \times 64 =$ 0.1869	Pass



DELTA MARKER 2

2.92 ms

Ref 20 dBm

*Att 30 dB

RBW 1 MHz

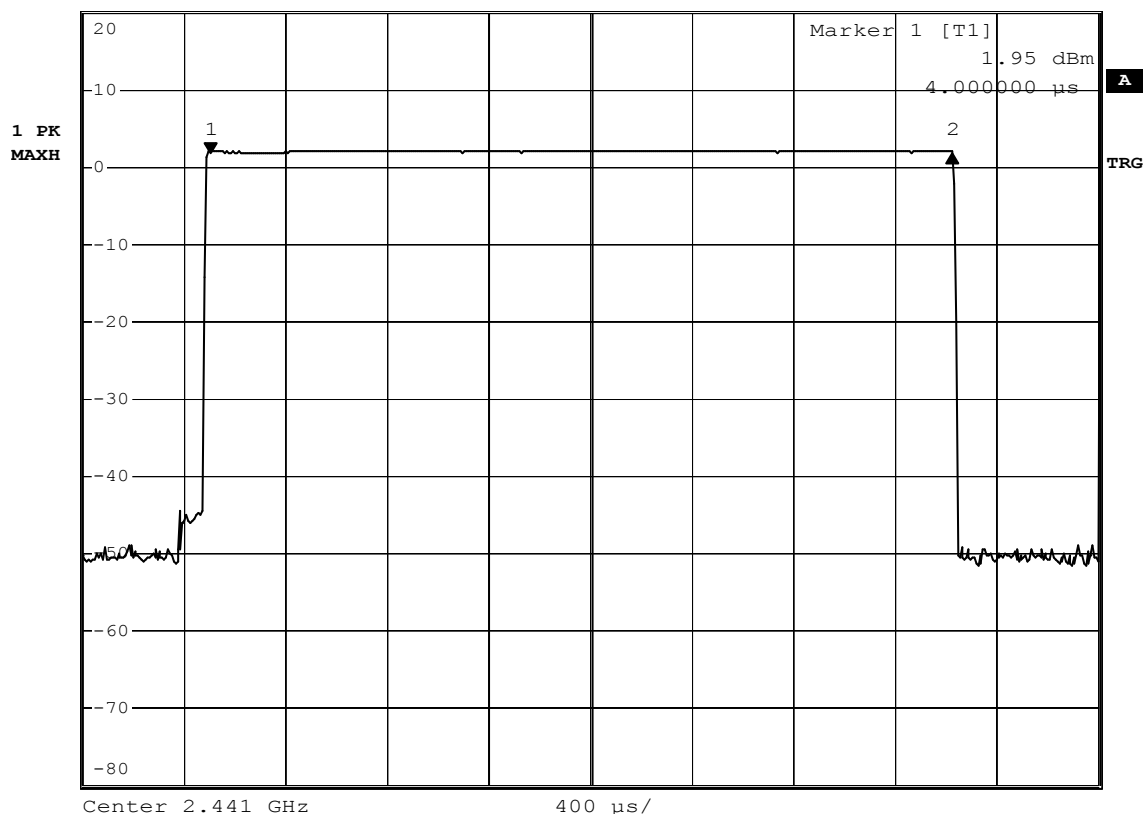
Delta 2 [T1]

*VBW 3 MHz

-0.04 dB

SWT 4 ms

2.920000 ms



Date: 16.MAR.2005 12:03:59



SWEEP TIME

31.6 s

RBW 1 MHz

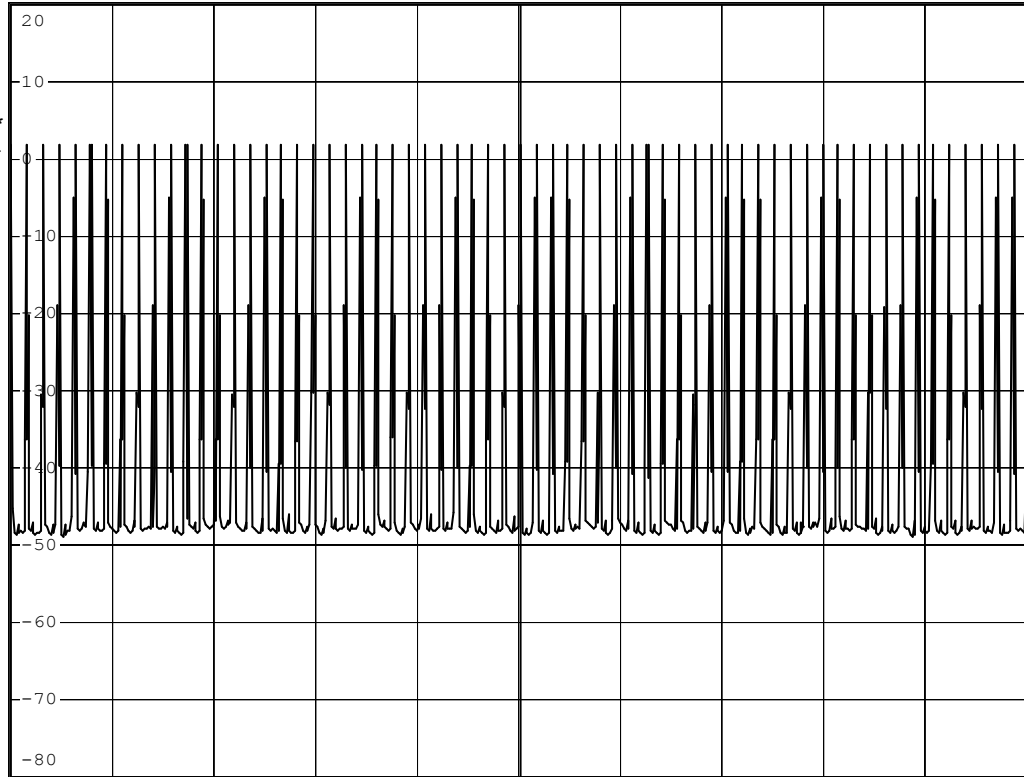
*VBW 3 MHz

Ref 20 dBm

*Att 30 dB

SWT 31.6 s

1 PK *
CLRWR



A
SGL

Center 2.441 GHz

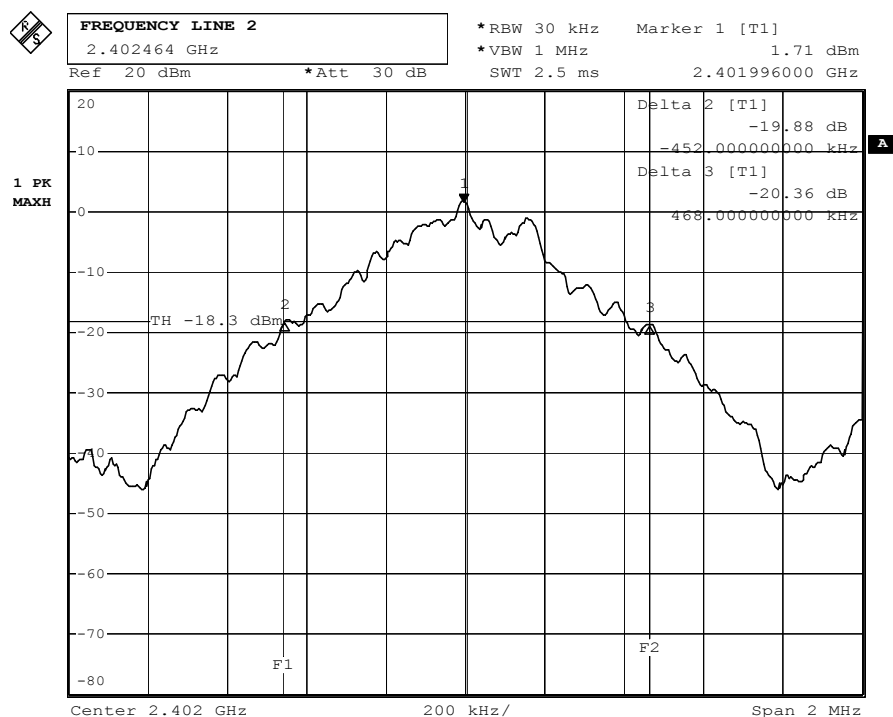
3.16 s/

Date: 16.MAR.2005 12:01:04

20dB Bandwidth

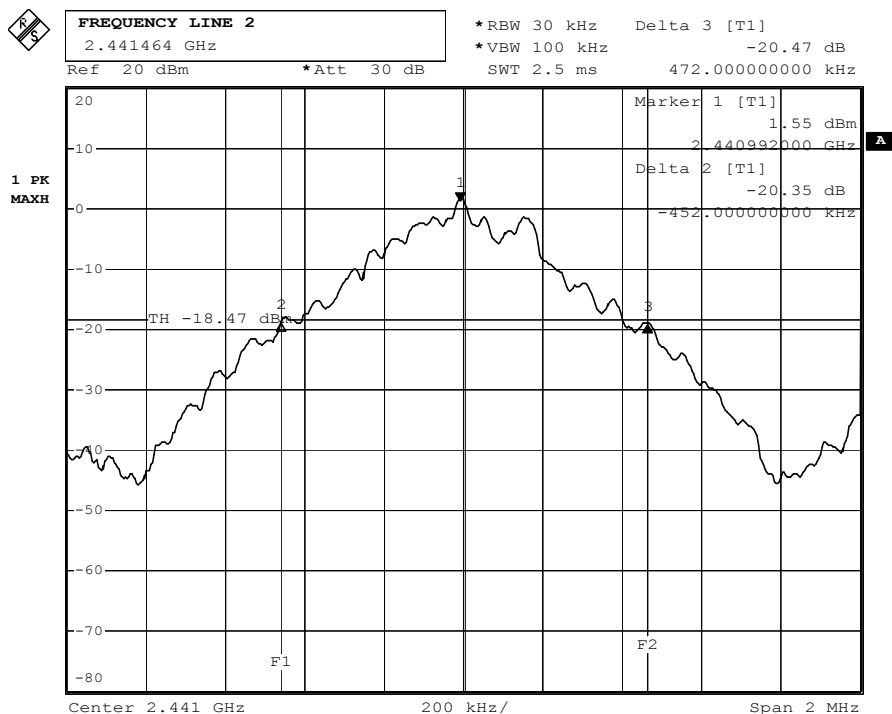
Date: 16 Mar 2005
 EUT: iM402-A
 Company: i.Tech Dynamic Ltd.
 Humidity: 50%
 Temperature: 23°C
 Voltage supply: 3.9VDC from rechargeable battery
 Test by: Sharon Li
 Op. mode: TX mode, DH5 with PRBS9 payload

Tx frequency (MHz)	Δf_L (MHz)	Δf_H (MHz)	$ \Delta f_H + \Delta f_L $ (MHz)	Results
2402	0.452	0.468	0.920	Pass
2441	0.452	0.472	0.924	Pass
2480	0.404	0.412	0.816	Pass



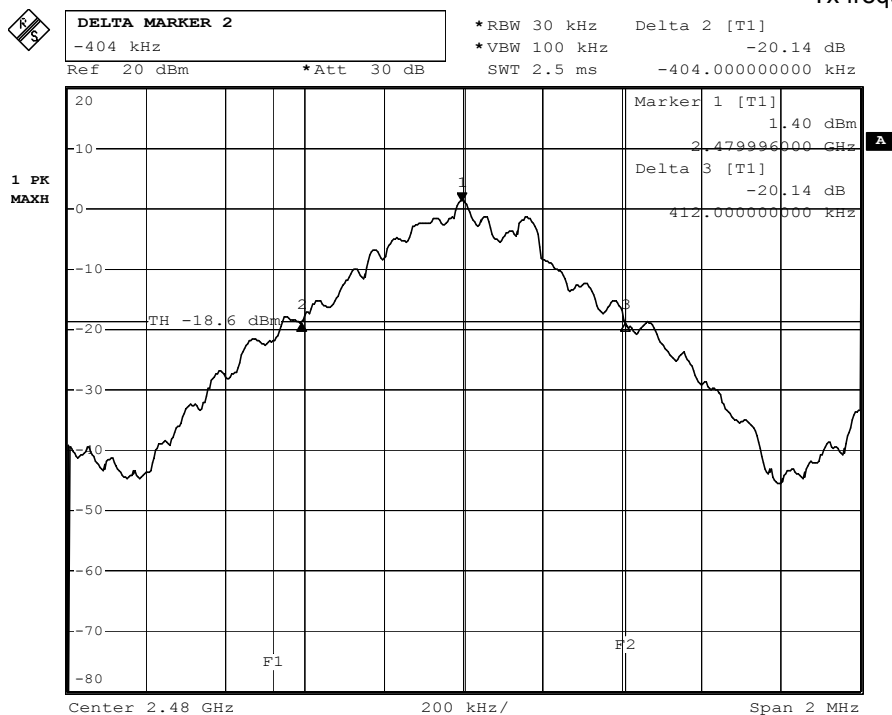
Date: 16.MAR.2005 17:31:42

Tx frequency: 2402MHz



Date: 16.MAR.2005 17:39:43

Tx frequency: 2441MHz



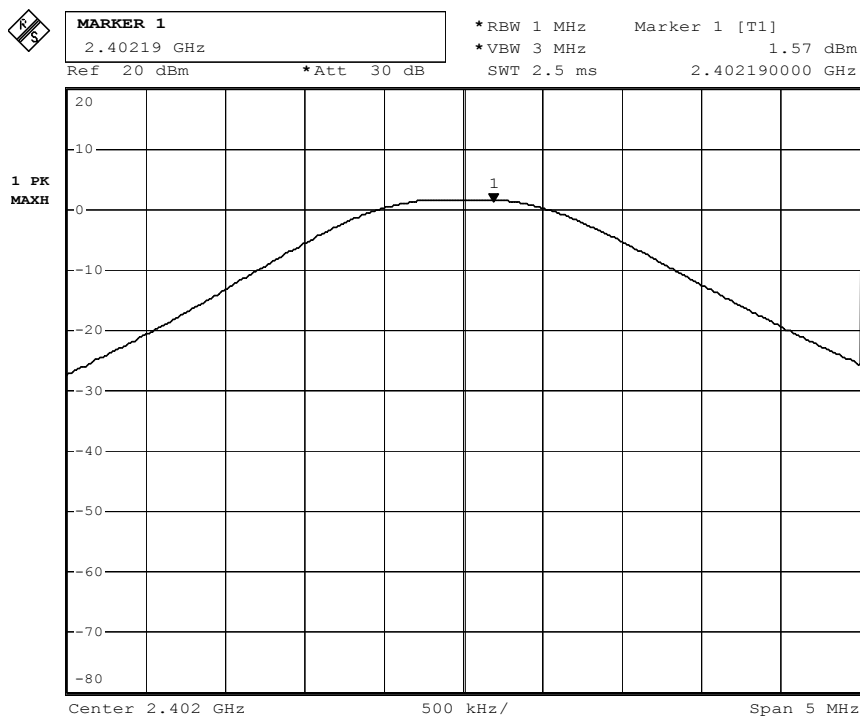
Date: 16.MAR.2005 14:22:12

Tx frequency: 2480MHz

Peak Output Power

Date: 16 Mar 2005
 EUT: iM402-A
 Company: i.Tech Dynamic Ltd.
 Humidity: 50%
 Temperature: 23°C
 Voltage supply: 3.9VDC from rechargeable battery
 Test by: Sharon Li
 Op. mode: TX mode, DH1 with PRBS9 payload

Tx Frequency (MHz)	Power P _{PK} (dBm)	Cable Attenuation (dB)	Actual Peak Power (dBm)	Results
2402	1.57	3.52	5.09	Pass
2441	1.56	3.65	5.21	Pass
2480	1.30	3.60	4.90	Pass



Date: 16.MAR.2005 14:24:00

Tx frequency: 2402MHz

**MARKER 1**

2.44081 GHz

Ref 20 dBm

*Att 30 dB

*RBW 1 MHz

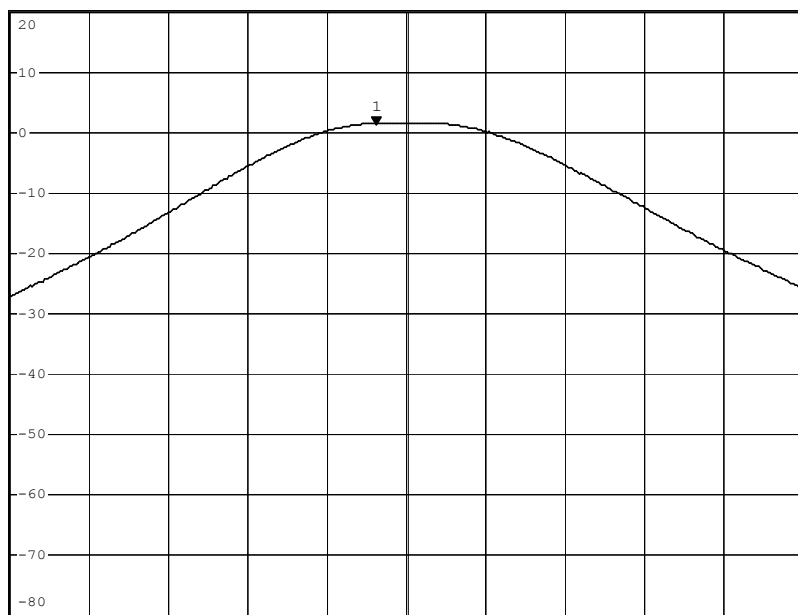
*VBW 3 MHz

SWT 2.5 ms

Marker 1 [T1]

1.56 dBm

2.440810000 GHz

1 PK
MAXH

Date: 16.MAR.2005 14:26:51

Tx frequency: 2441MHz

**MARKER 1**

2.47984 GHz

Ref 20 dBm

*Att 30 dB

*RBW 1 MHz

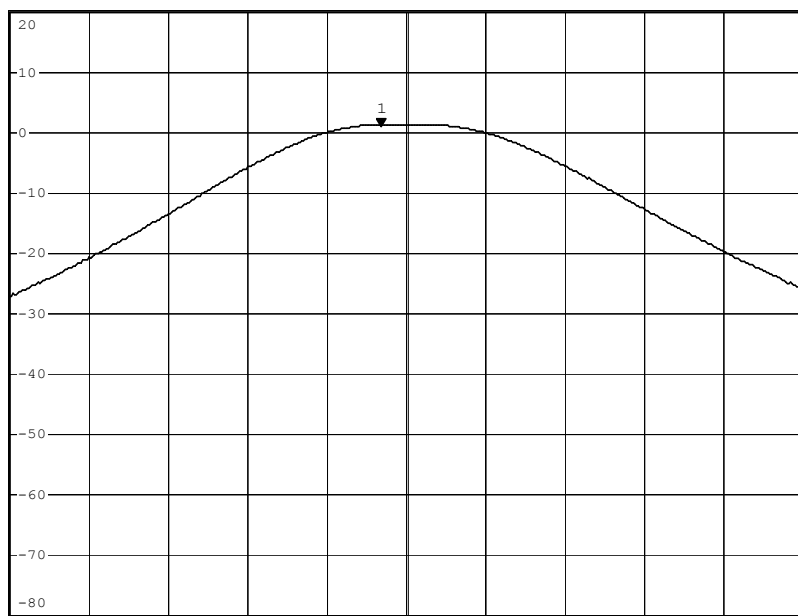
*VBW 3 MHz

SWT 2.5 ms

Marker 1 [T1]

1.30 dBm

2.479840000 GHz

1 PK
MAXH

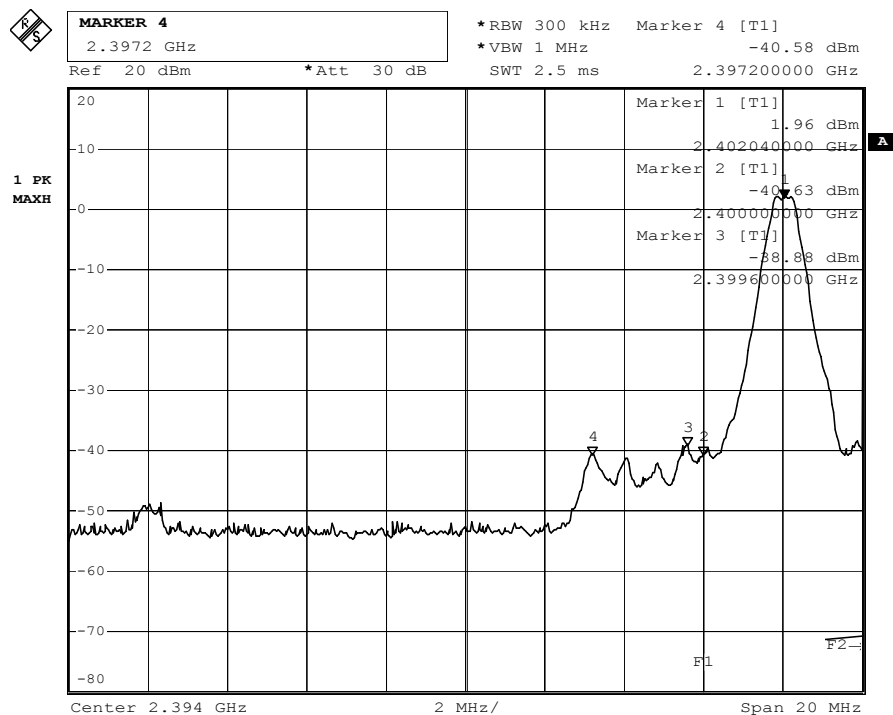
Date: 16.MAR.2005 14:27:51

Tx frequency: 2480MHz

Band Edge Compliance

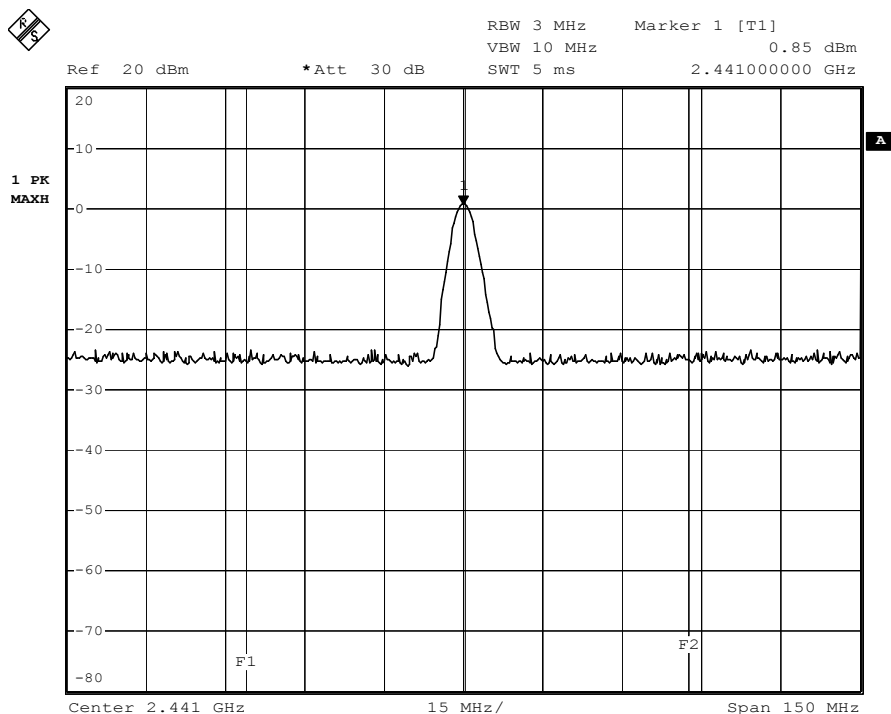
Date: 16 Mar 2005
 EUT: iM402-A
 Company: i.Tech Dynamic Ltd.
 Humidity: 50%
 Temperature: 23°C
 Voltage supply: 3.9VDC from rechargeable battery
 Test by: Sharon Li
 Op. mode: TX mode, DH1 with PRBS9 payload

Tx Frequency (MHz)	Peak in band Power level (dBm)	RF power outside 100kHz BW (MHz)	RF power difference outside 100kHz BW (dB)	Results
2402	1.96	2399.600	-40.84	Pass
2480	1.75	2483.920	-43.36	Pass



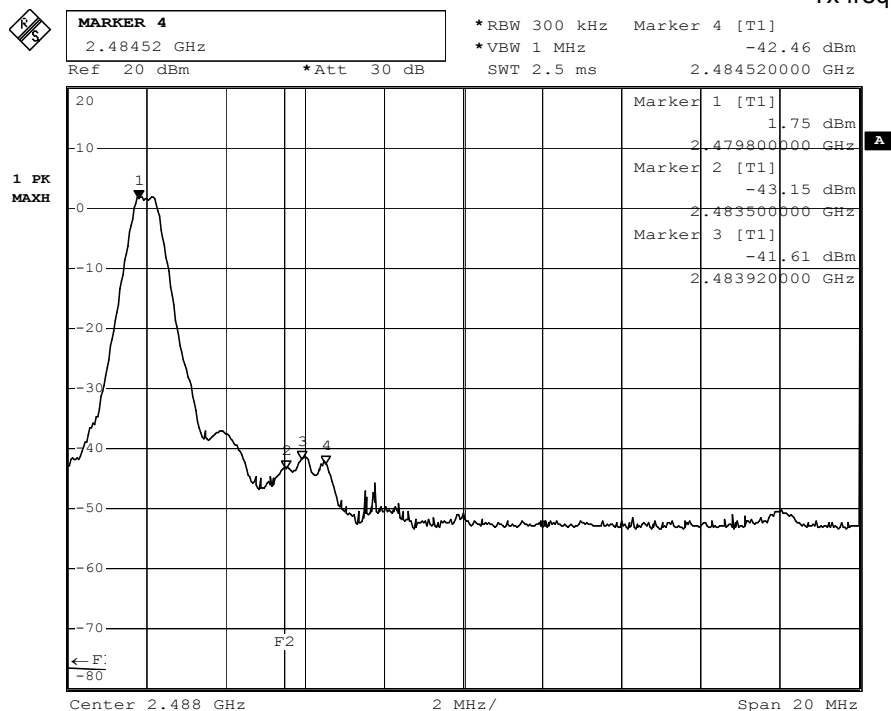
Date: 16.MAR.2005 14:35:19

Tx frequency: 2402MHz



Date: 16.MAR.2005 15:25:14

Tx frequency: 2441MHz



Date: 1.APR.2005 18:53:25

Tx frequency: 2480MHz

Spurious Emissions - Conducted

Date: 16 Mar 2005
EUT: iM402-A
Company: i.Tech Dynamic Ltd.
Humidity: 50%
Temperature: 23°C
Voltage supply: 3.9VDC from rechargeable battery
Test by: Sharon Li
Op. mode: TX mode, DH1 with PRBS9 payload

Tx frequency : 2402MHz

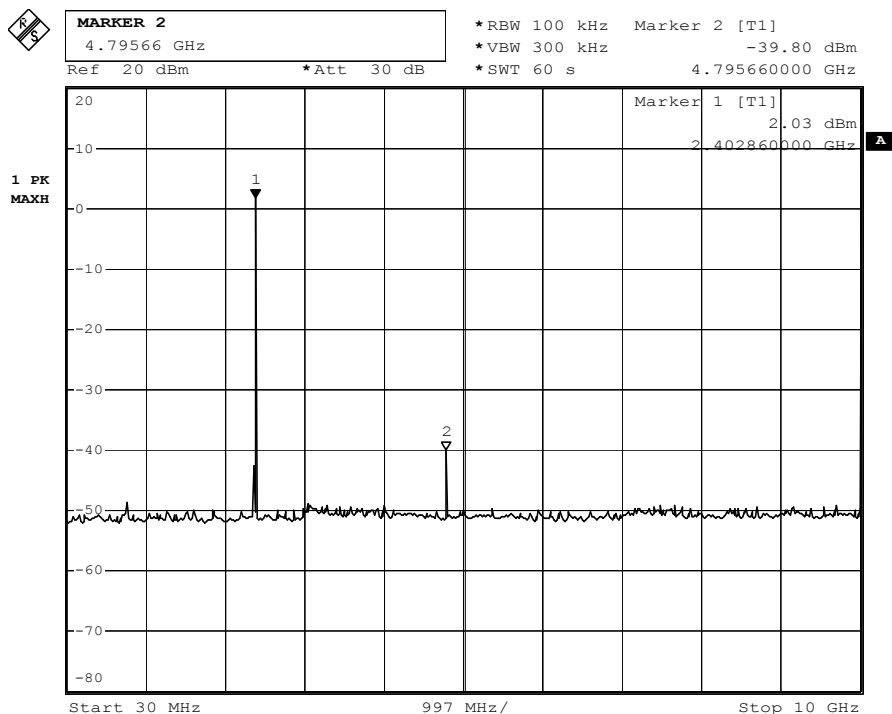
Spurious Frequency (MHz)	Power level (dBm)	Reference value (dBm)	Delta to reference level (dB)	Results
4795.660	-39.80	2.03	-41.83	Pass

Tx frequency : 2441MHz

Spurious Frequency (MHz)	Power level (dBm)	Reference value (dBm)	Delta to reference level (dB)	Results
807.660	-47.85	0.99	-48.84	Pass
4875.420	-40.16	0.99	-41.15	Pass

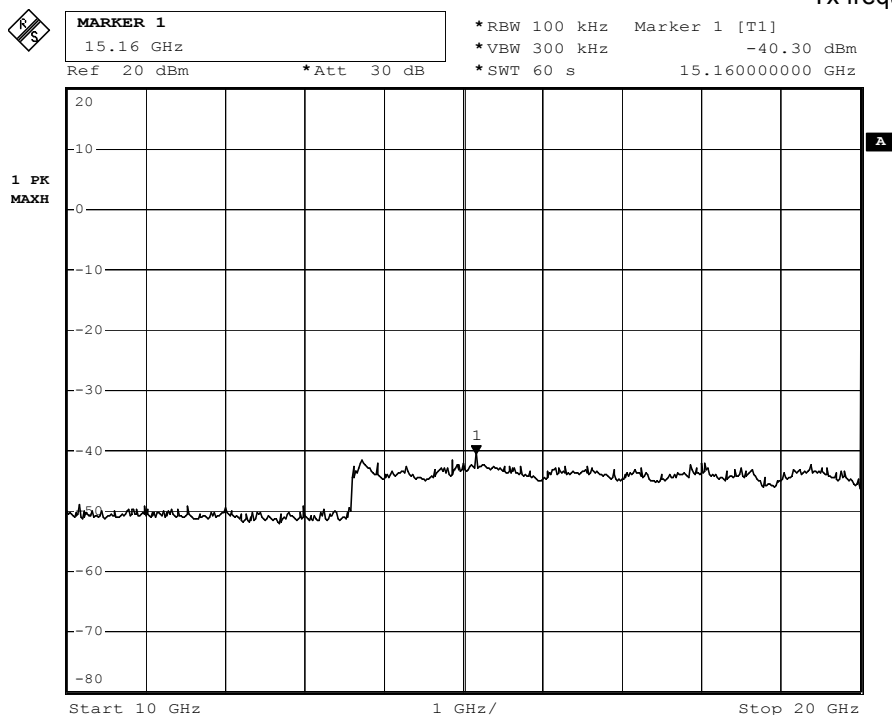
Tx frequency : 2480MHz

Spurious Frequency (MHz)	Power level (dBm)	Reference value (dBm)	Delta to reference level (dB)	Results
4955.180	-39.09	1.32	-40.41	Pass



Date: 16.MAR.2005 14:47:35

Tx frequency: 2402MHz



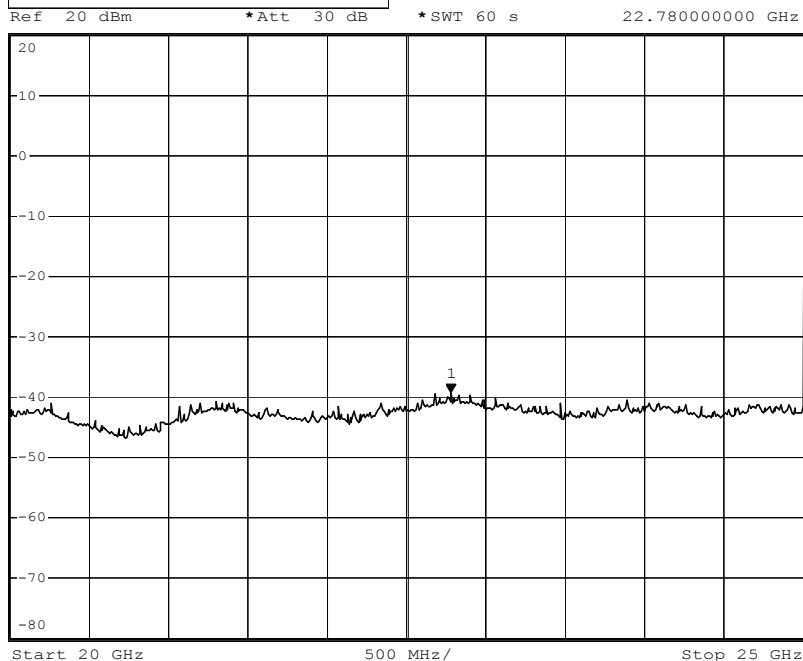
Date: 16.MAR.2005 14:49:19

Tx frequency: 2402MHz



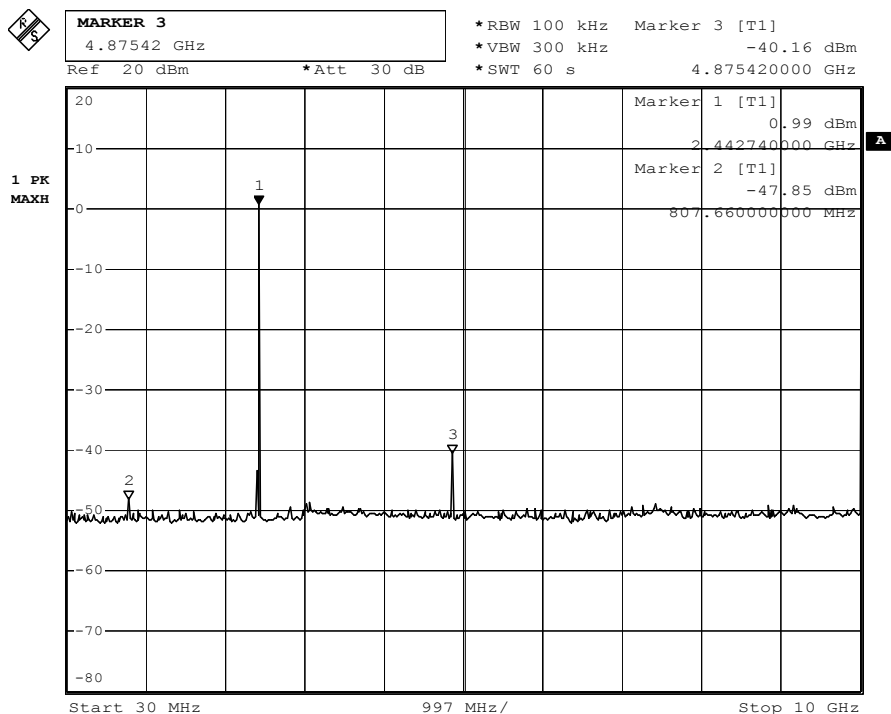
MARKER 1
22.78 GHz

*RBW 100 kHz Marker 1 [T1]
*VBW 300 kHz -38.81 dBm
*SWT 60 s 22.78000000 GHz



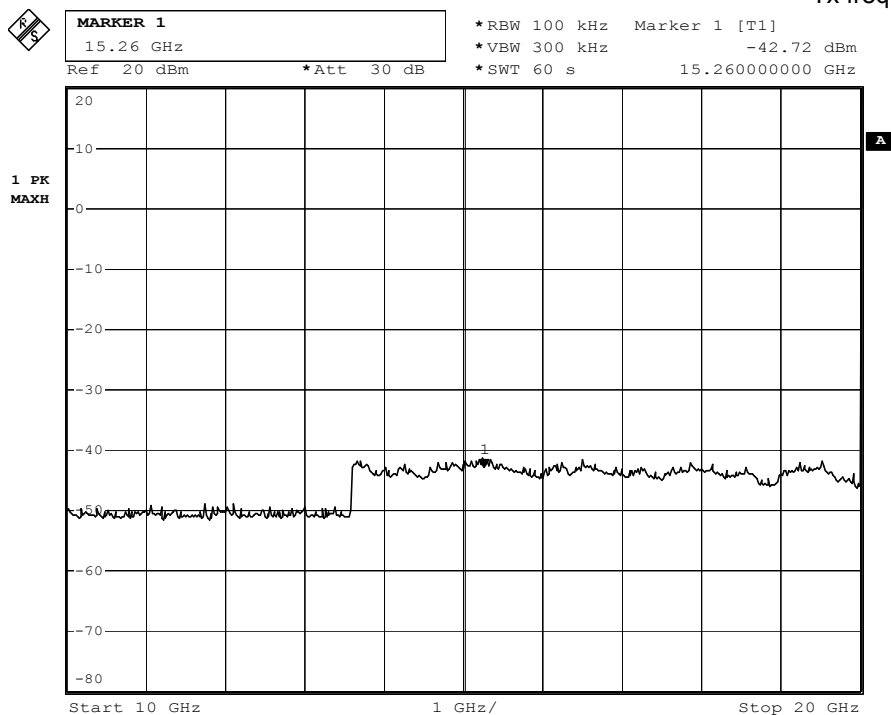
Date: 16.MAR.2005 14:51:17

Tx frequency: 2402MHz



Date: 16.MAR.2005 14:40:06

Tx frequency: 2441MHz



Date: 16.MAR.2005 14:43:01

Tx frequency: 2441MHz



MARKER 1

21.22 GHz

Ref 20 dBm

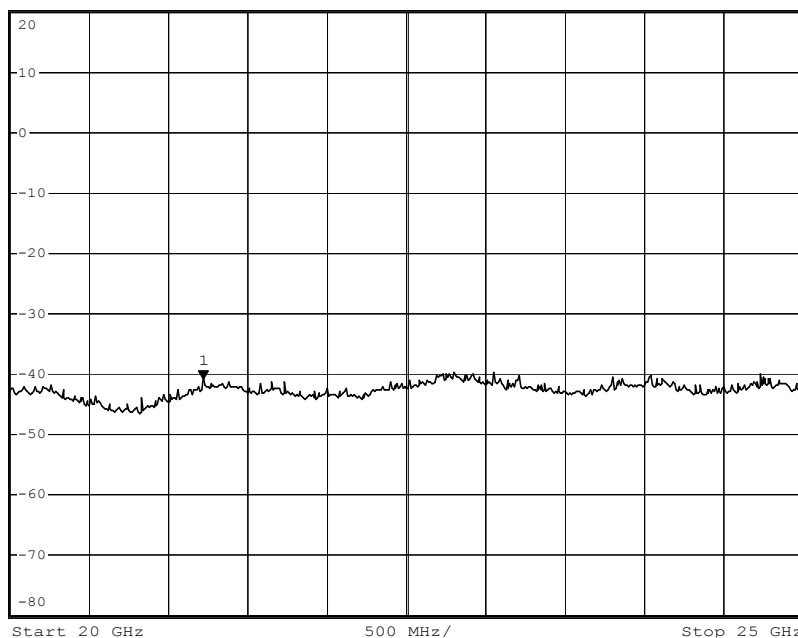
*Att 30 dB

*RBW 100 kHz Marker 1 [T1]

*VBW 300 kHz -40.52 dBm

*SWT 60 s 21.22000000 GHz

1 PK
MAXH



Date: 16.MAR.2005 14:44:50

Tx frequency: 2441MHz

**MARKER 2**

4.95518 GHz

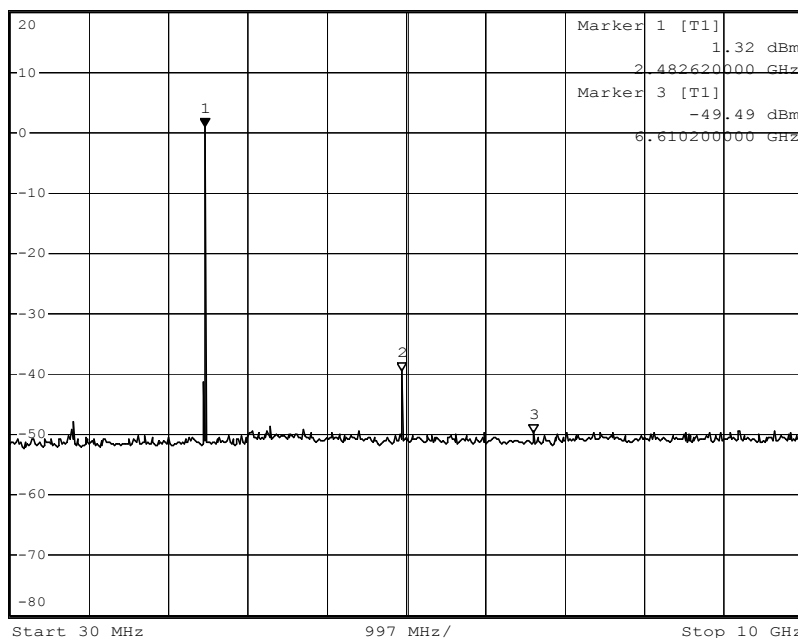
Ref 20 dBm

*Att 30 dB

*RBW 100 kHz Marker 2 [T1]

*VBW 300 kHz -39.09 dBm

*SWT 60 s 4.955180000 GHz

1 PK
MAXH

Date: 16.MAR.2005 14:55:19

Tx frequency: 2480MHz

**MARKER 1**

15.24 GHz

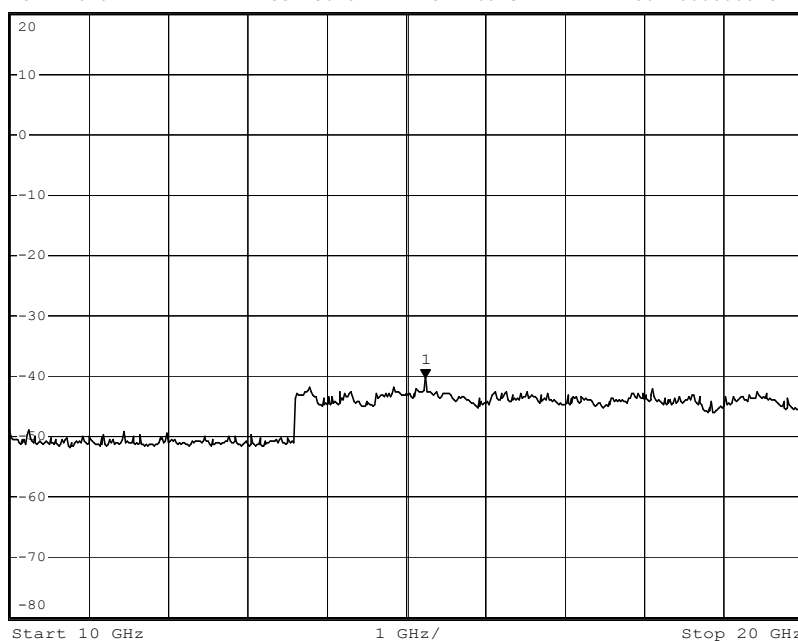
Ref 20 dBm

*Att 30 dB

*RBW 100 kHz Marker 1 [T1]

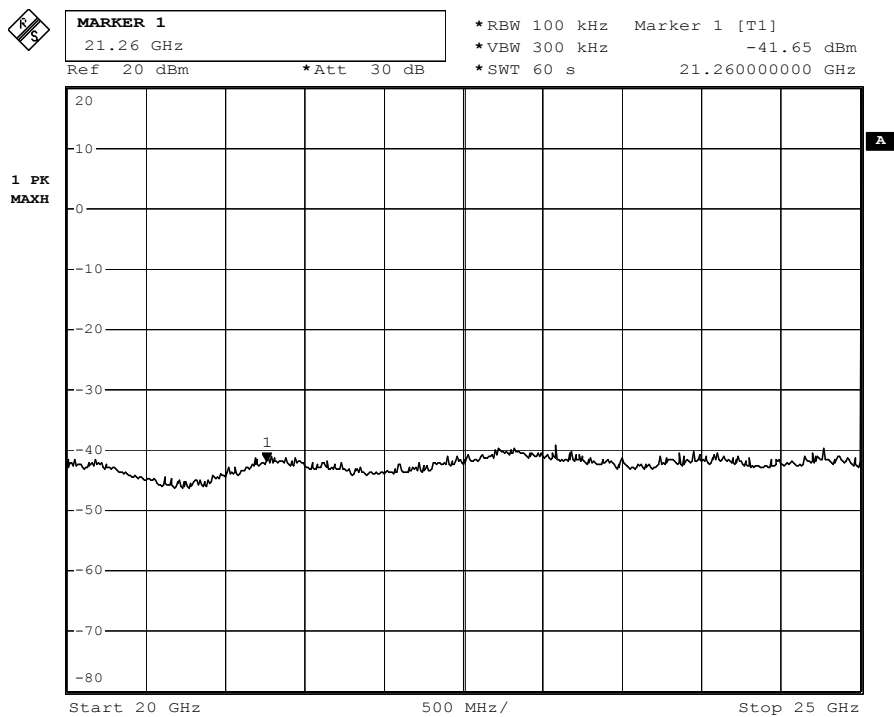
*VBW 300 kHz -40.07 dBm

*SWT 60 s 15.240000000 GHz

1 PK
MAXH

Date: 16.MAR.2005 15:00:45

Tx frequency: 2480MHz



Date: 16.MAR.2005 15:03:30

Tx frequency: 2480MHz

Spurious Emissions - Radiated

Date: 1 Mar 2005

EUT: iM402-A

Company: i.Tech Dynamic Ltd.

Voltage supply: 3.9VDC from rechargeable battery

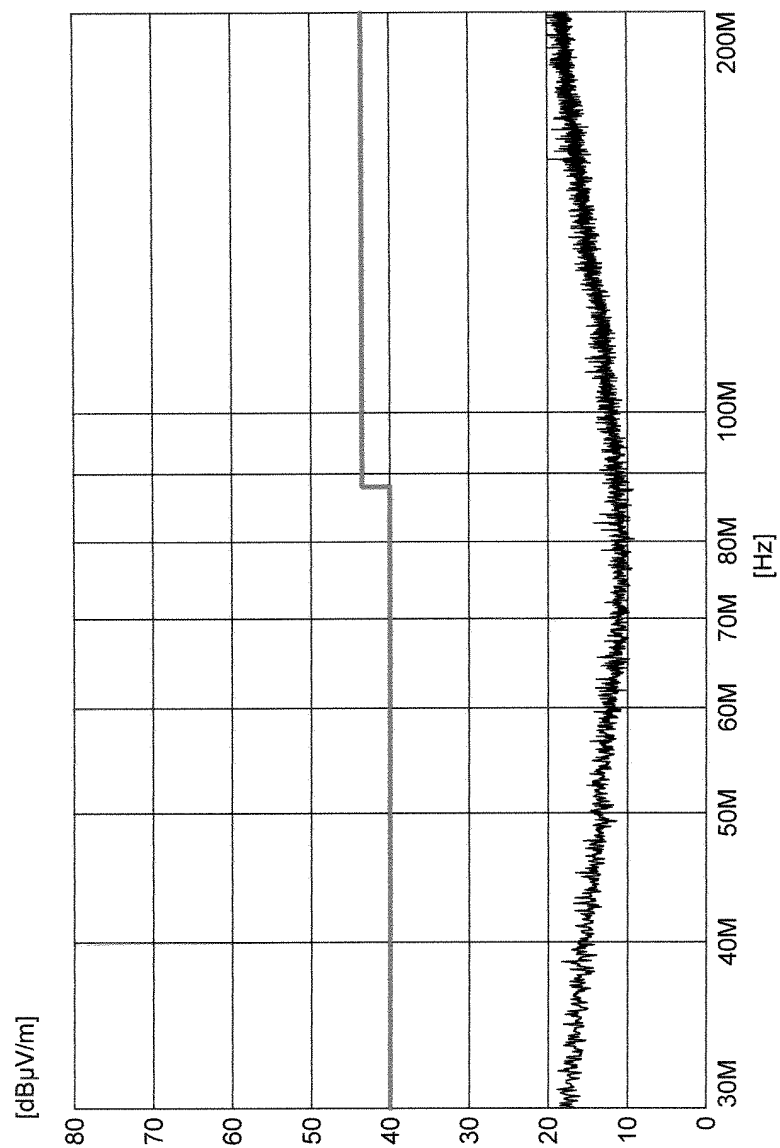
Test by: Sharon Li

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	1602.000	42.28	P
2402	V	1602.020	40.48	A
2402	V	4803.920	50.49	P
2402	V	4804.020	48.86	A
2402	H	1602.000	46.28	P
2402	H	1601.980	45.47	A
2402	H	4803.960	52.04	P
2402	H	4803.940	50.64	A

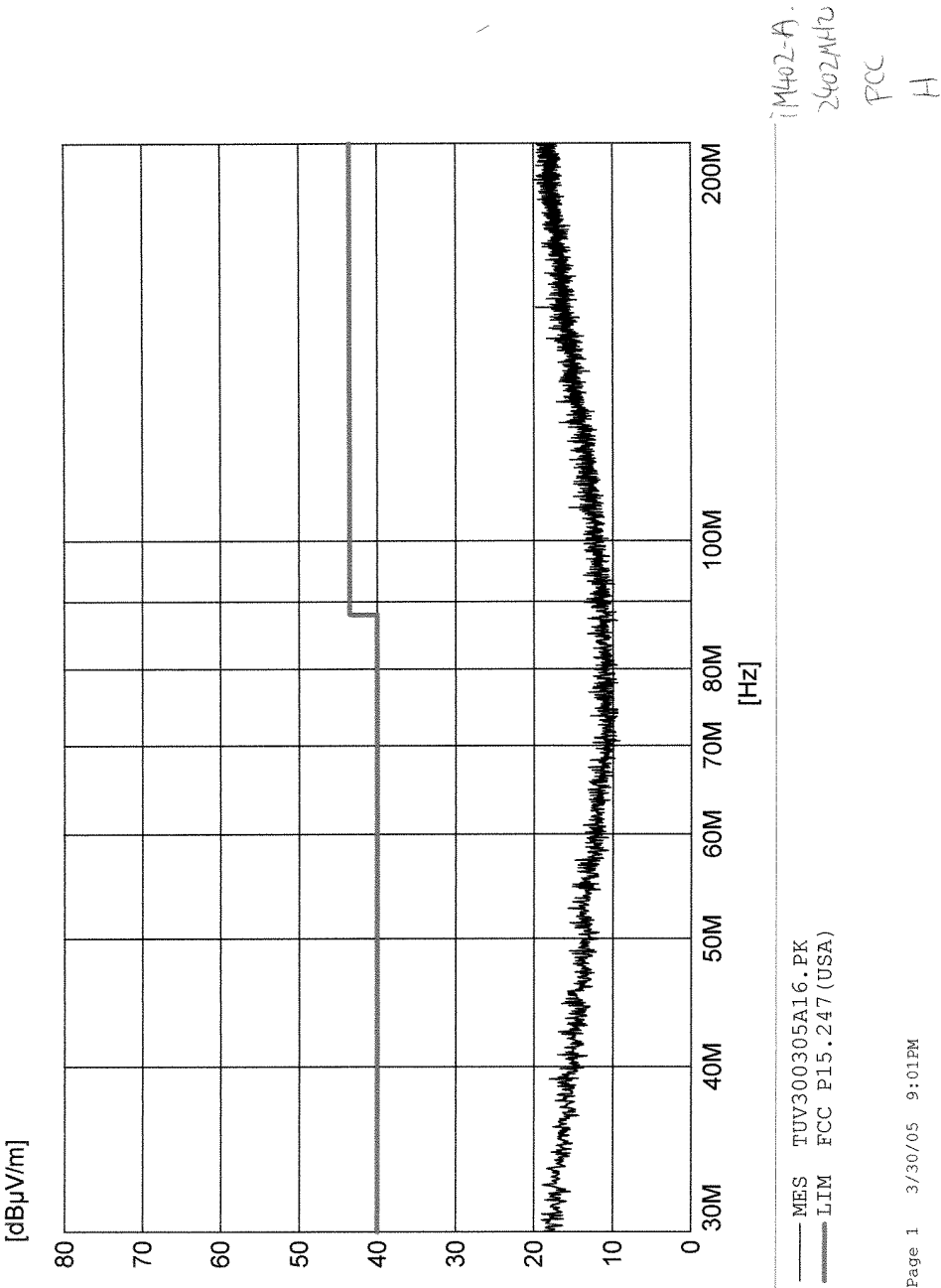
Tx frequency (MHz)	Polarization	Spurious Frequency (MHz)	Power Level (dBuV/m)	Detector (P/QP/A)
2441	V	1628.000	40.32	P
2441	V	1628.000	38.77	A
2441	V	4881.960	51.97	P
2441	V	4881.980	49.49	A
2441	H	1627.980	47.85	P
2441	H	1627.960	47.41	A
2441	H	4882.100	50.38	P
2441	H	4882.000	48.51	A

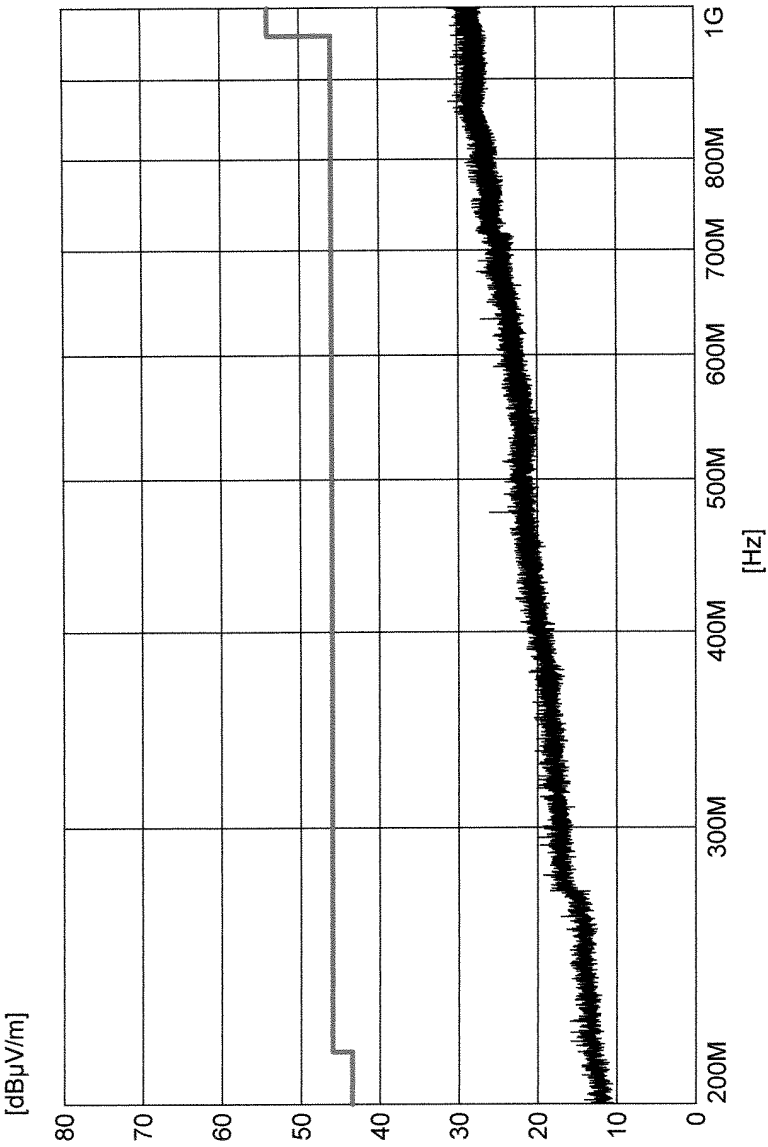
Tx frequency (MHz)	Polarization	Spurious Frequency (MHz)	Power Level (dBuV/m)	Detector (P/QP/A)
2480	V	1653.960	42.44	P
2480	V	1654.020	40.93	A
2480	V	4959.880	49.81	P
2480	V	4960.000	47.77	A
2480	H	679.700	28.3	QP
2480	H	1654.080	48.21	P
2480	H	1654.020	47.54	A
2480	H	4959.760	49.96	P
2480	H	4960.000	47.91	A



— MES TUV300305A15.PK
 --- LIM FCC P15.247 (USA)

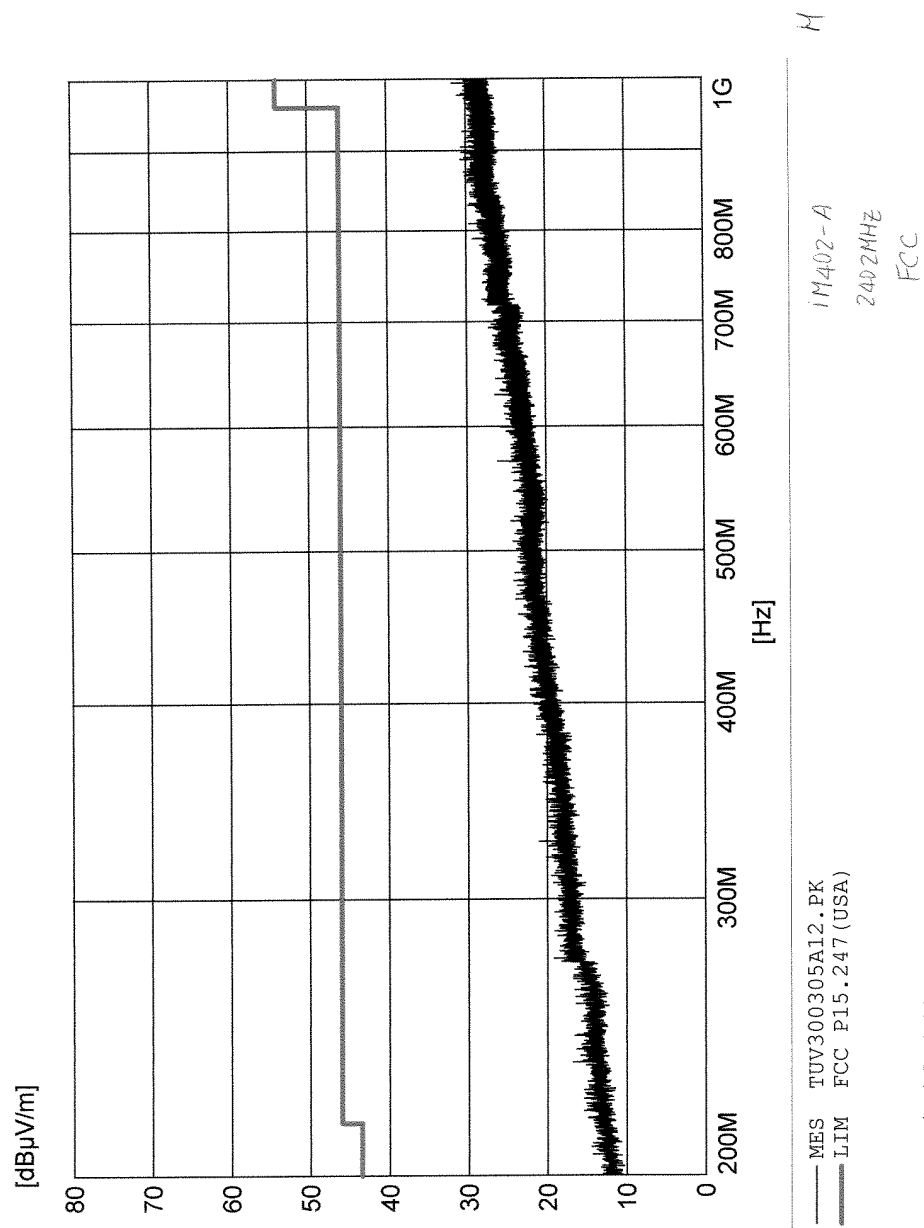
IM402-A
 2402MHz
 V
 FCC

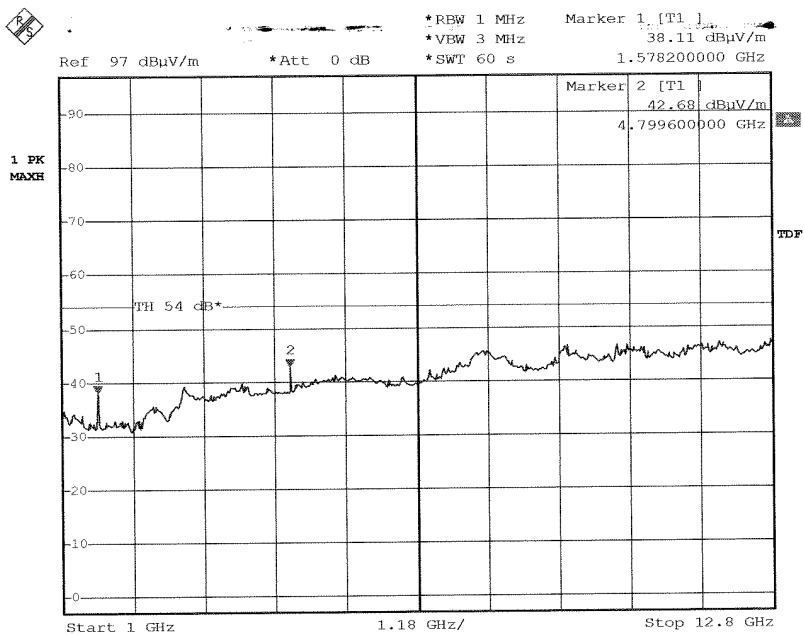




✓

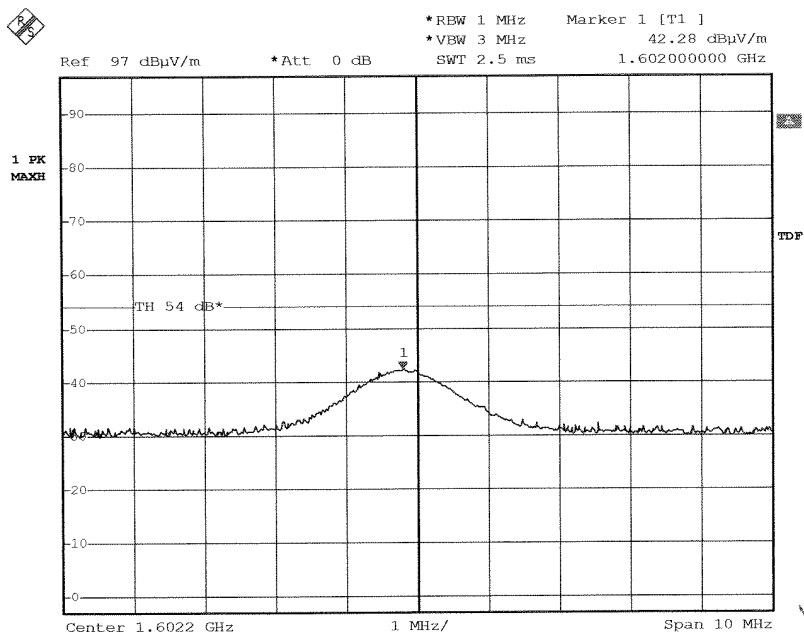
Attest
14402-A
2402 MHz
FCC





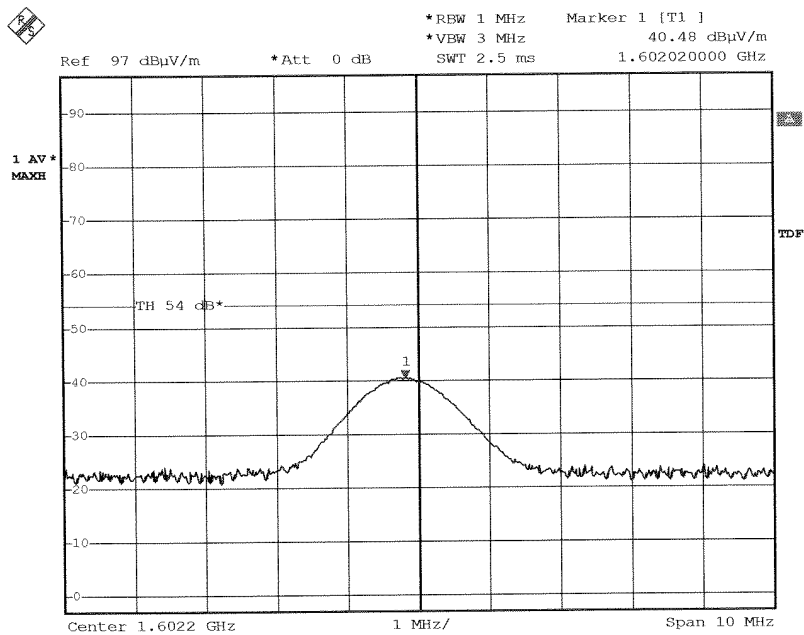
Date: 17.MAR.2005 10:20:00

itech
iM402-A
2402
FCC
2.4 G Filter.



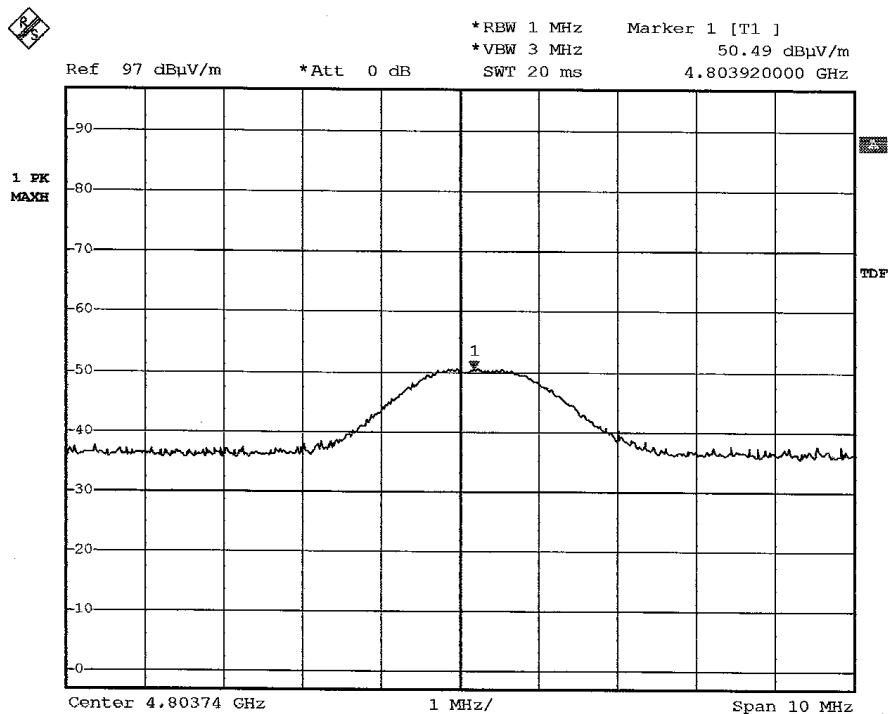
Date: 17.MAR.2005 10:25:46

i.Tech
iM402-A
2402
FCC
24GHz Filter.



Date: 17.MAR.2005 10:26:22

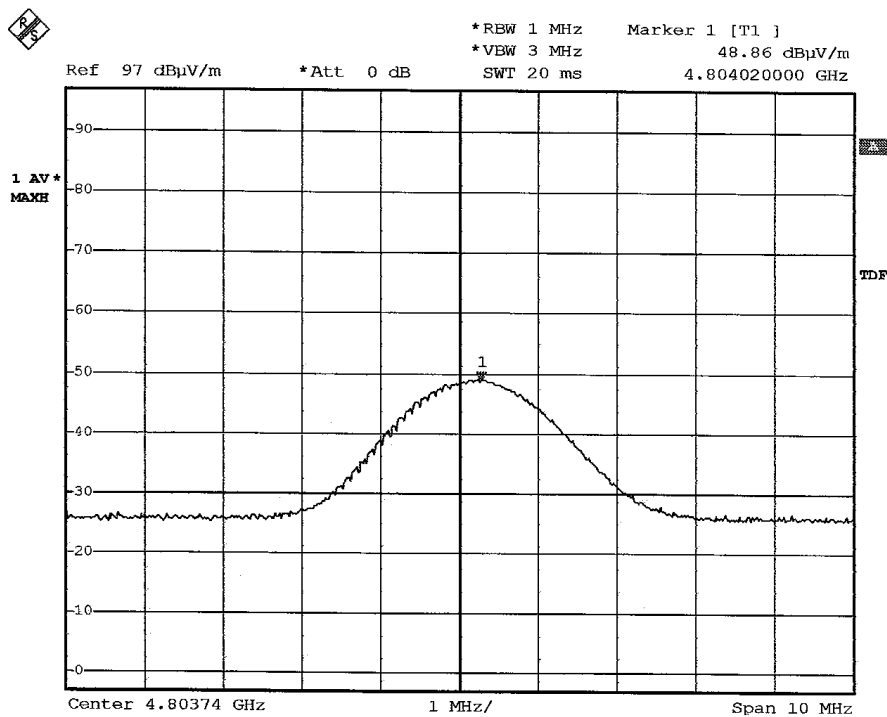
iTech
iM402-A
2402
FCC
24G Filter



Date: 6.APR.2005 22:57:58

i.Tech
 iM402-A

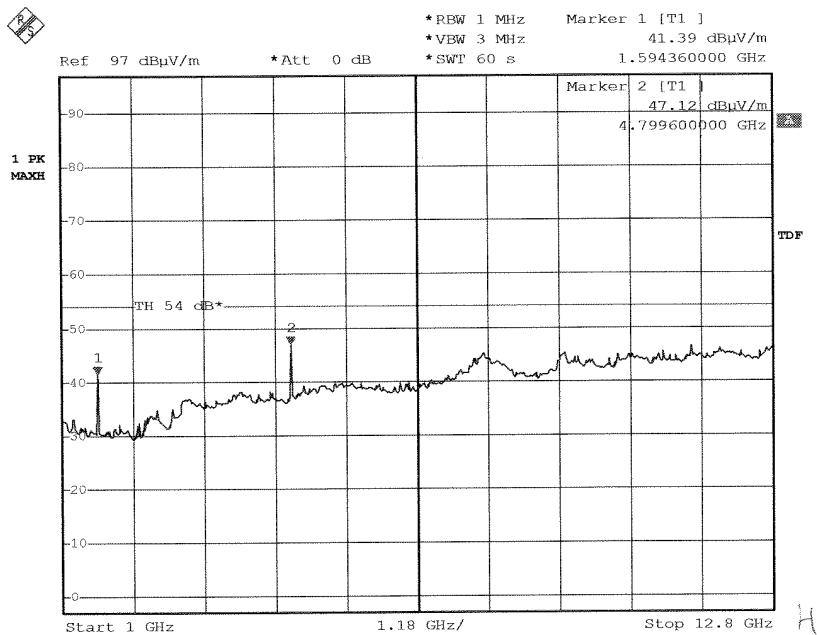
V
 2402MHz



Date: 6.APR.2005 22:59:24

i.Tech
IM402-A

AV
2402MHz



Date: 17.MAR.2005 10:36:54

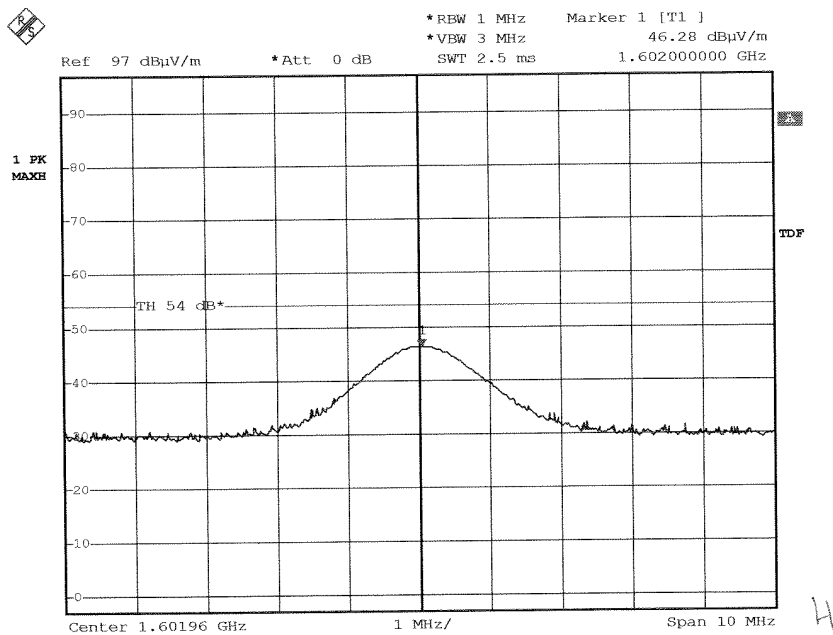
iTech

iM402-A

2402

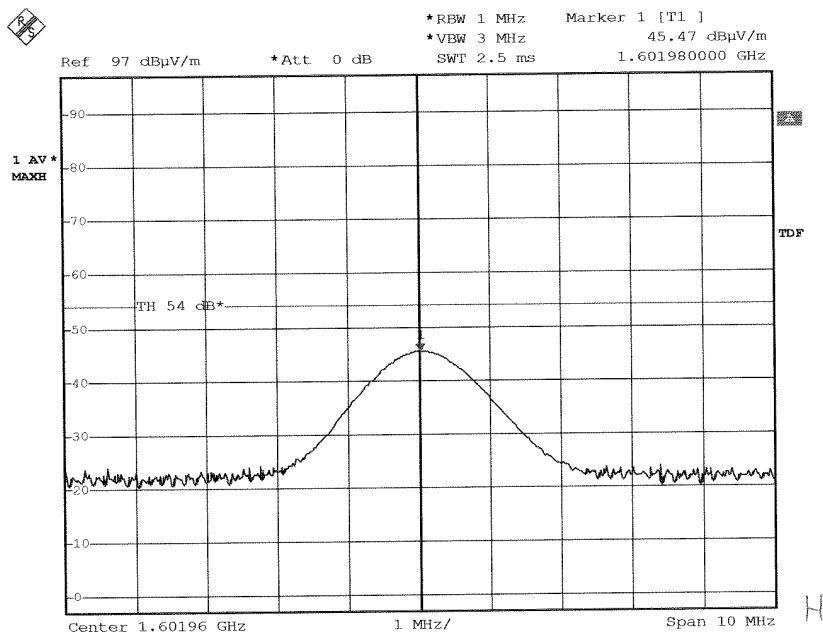
Fcc

2.4G Filter



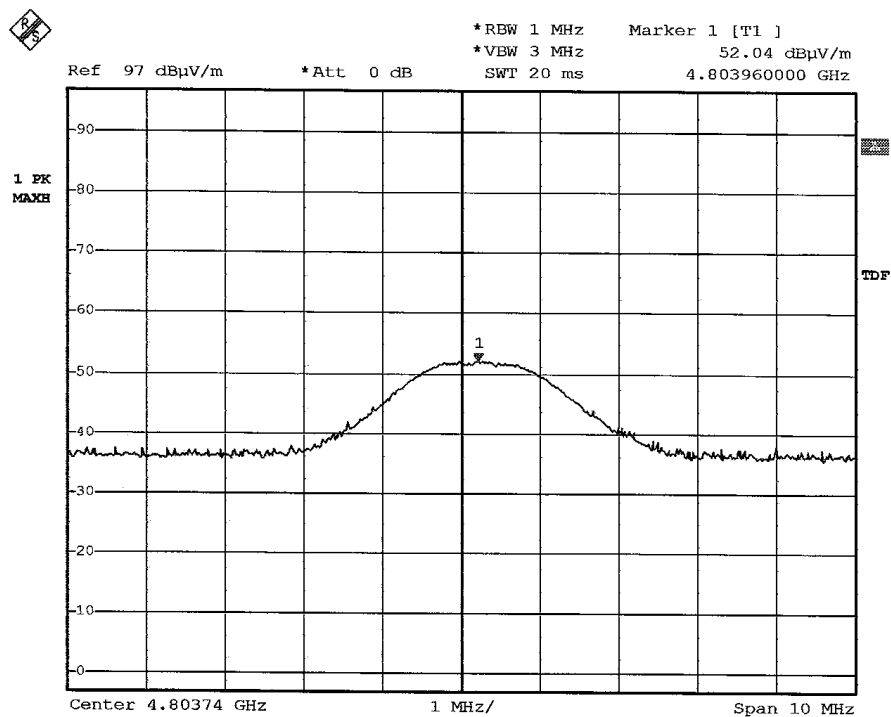
Date: 17.MAR.2005 10:42:08

iTech
IM402-A
2402
FCC
24G Filter



Date: 17.MAR.2005 10:44:13

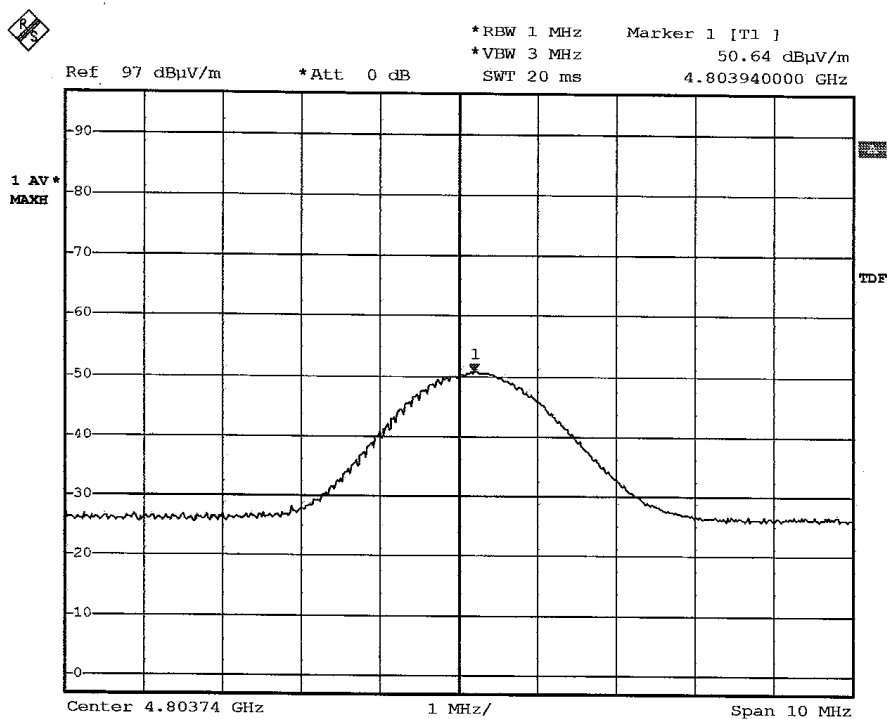
iTech
 iM402-A
 2402
 FCC
 24G Filter



Date: 6.APR.2005 23:04:56

i.Ted
IM402-A

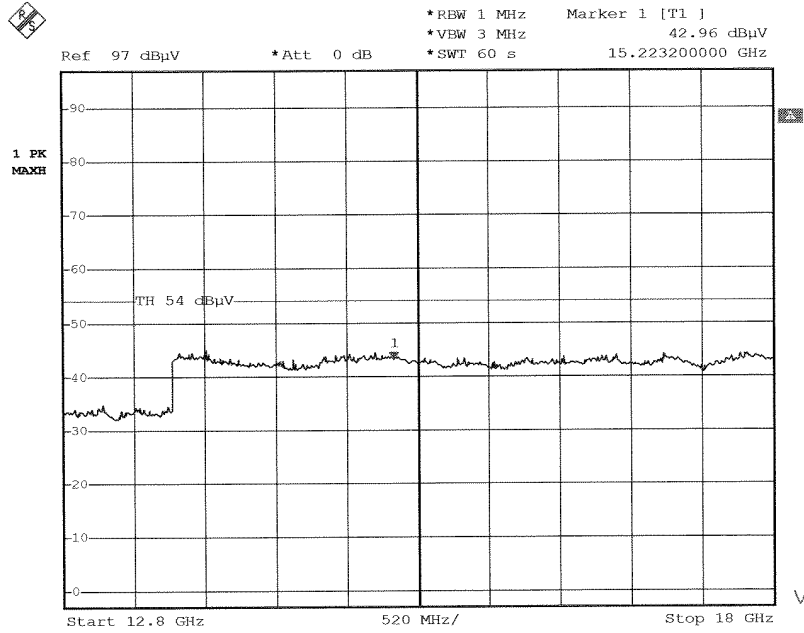
2402MHz



Date: 6.APR.2005 23:05:22

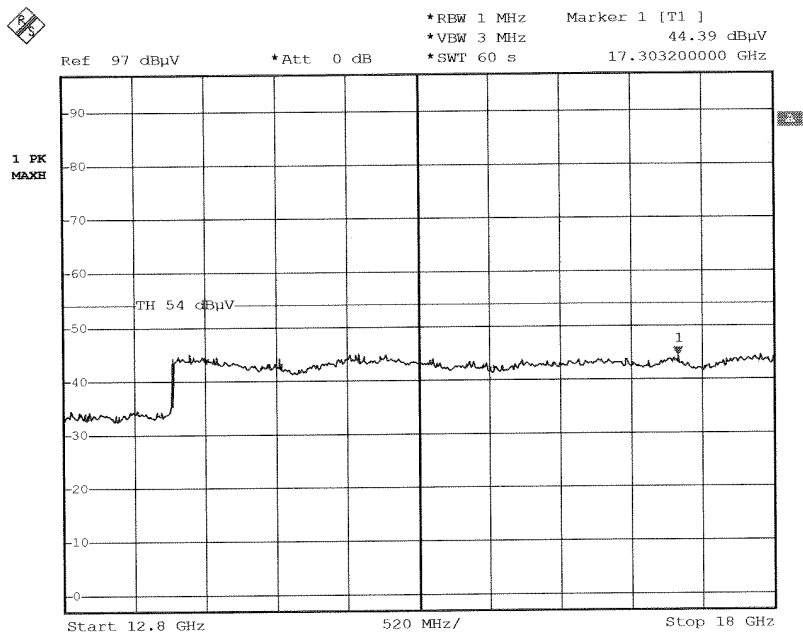
i.Tech
iM402-A

H
2402MHz



Date: 17.MAR.2005 10:57:50

iTech
iM402-A
2402
FCC



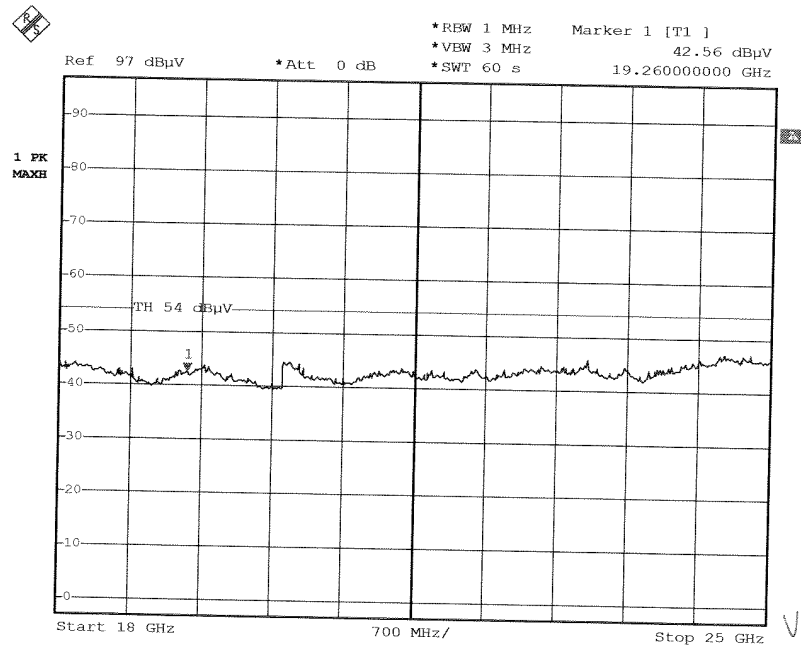
Date: 17.MAR.2005 10:54:52

i.Tech

M402-A

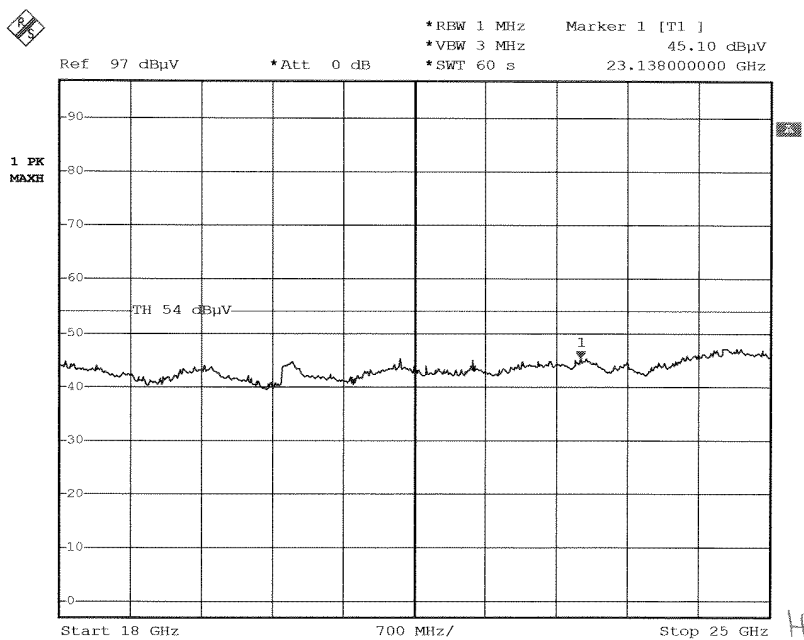
2402

Fcc



Date: 17.MAR.2005 11:12:00

TiTech
CM402-A
2402
FCC



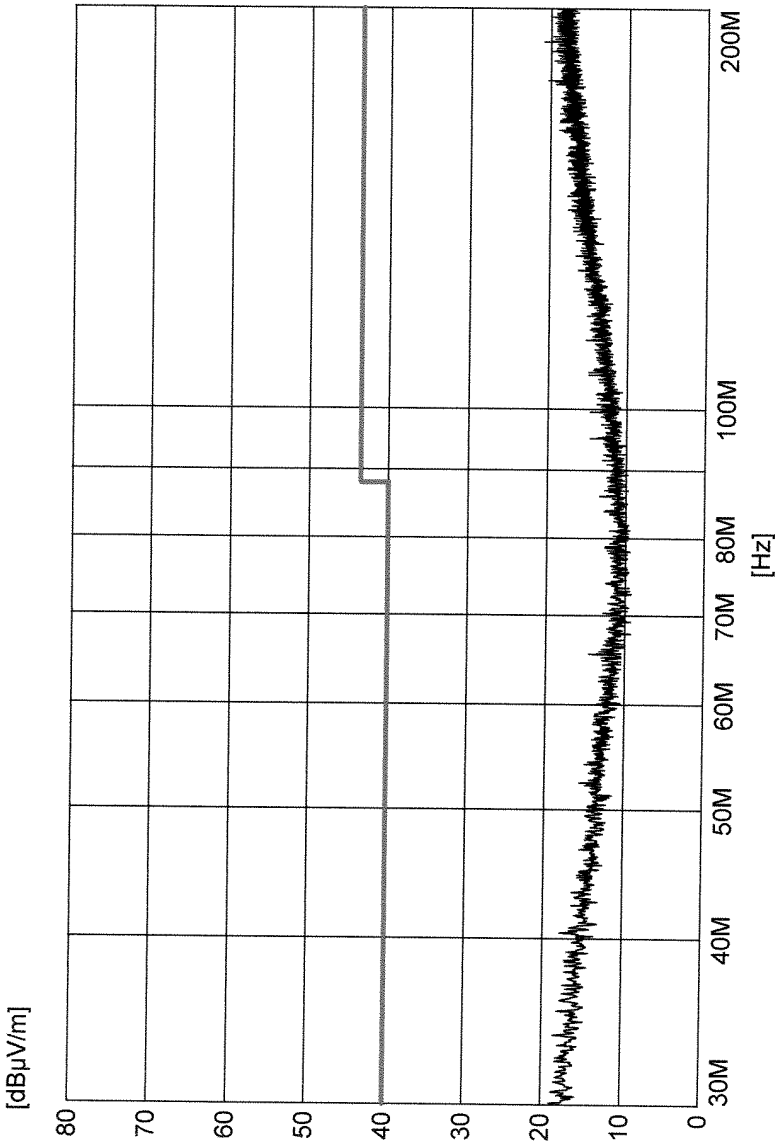
Date: 17.MAR.2005 11:09:26

iTech

IM402-A

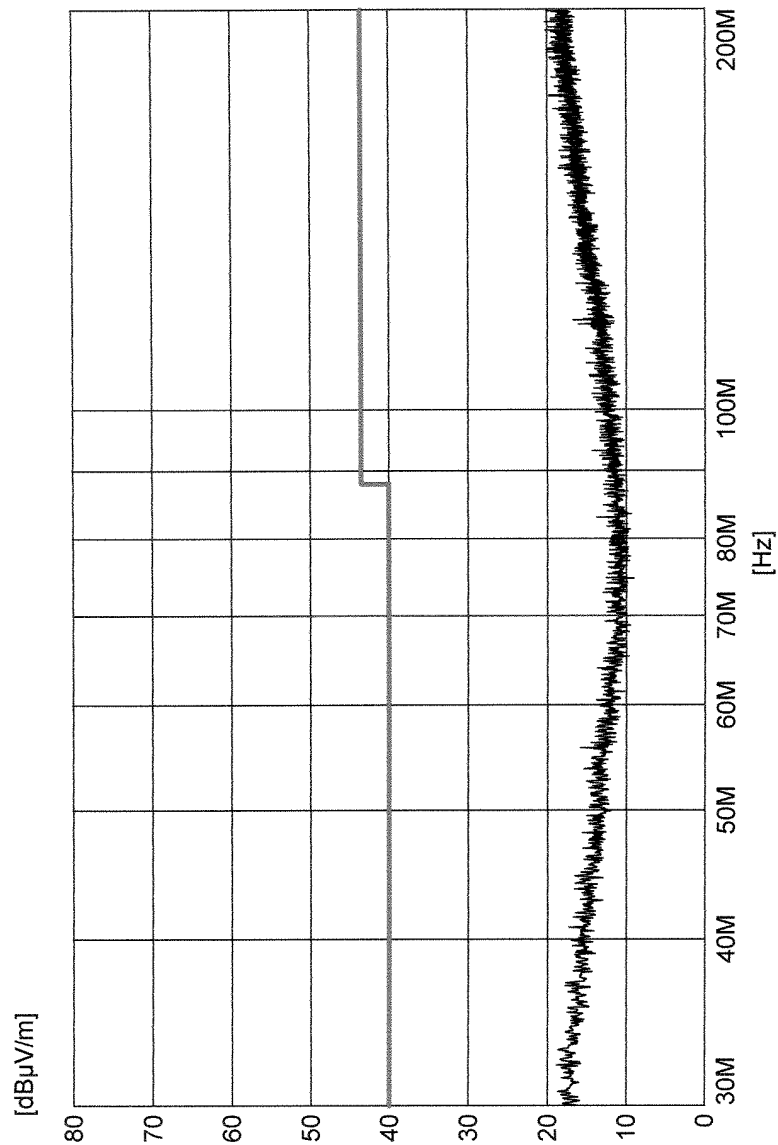
2402

FCC



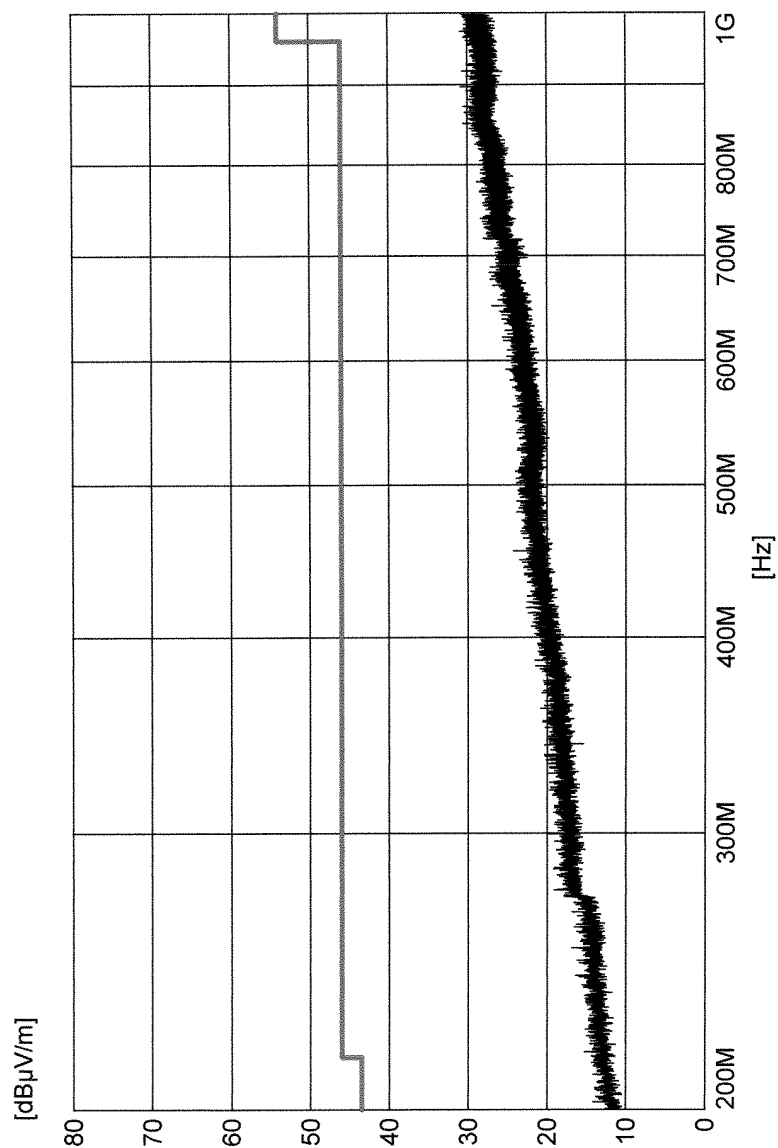
iM402-A
2401MHz
✓
FCC

— MES TUV300305A17.PK
— LIM FCC P15.247 (USA)



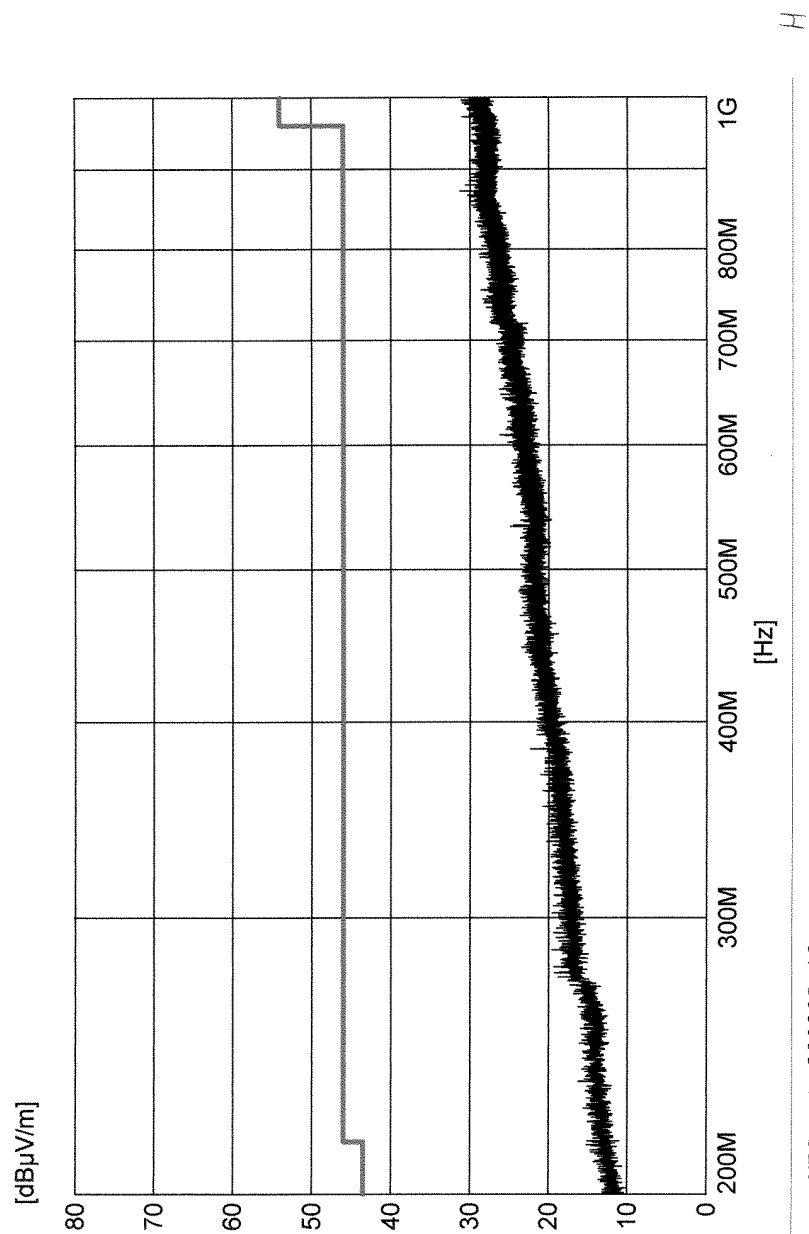
1M402-A
2491MHz
H
FCC

— MES TUV300305A18.PK
— LIM FCC P15.247 (USA)

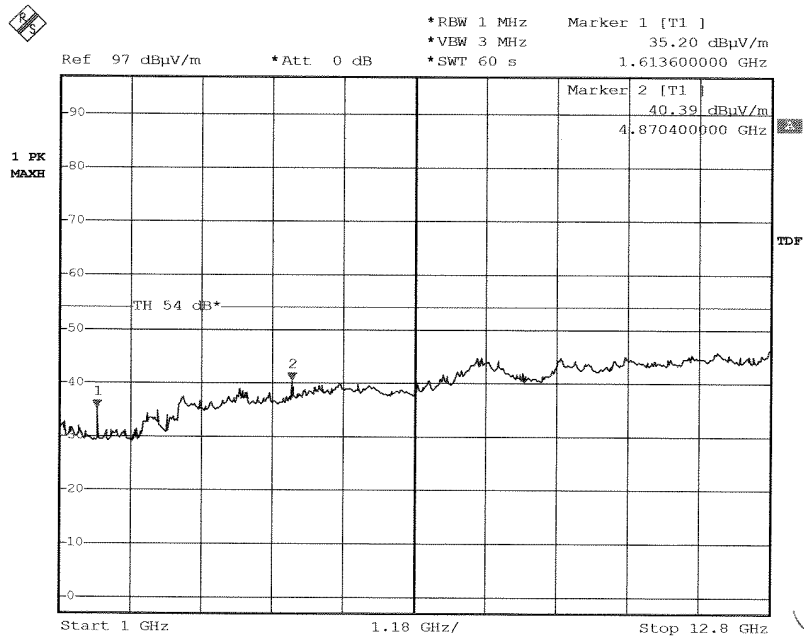


— MES TUV300305A14.PK
 — LIM FCC P15.247 (USA)

IM402-A
 264MHz
 FCC
 V

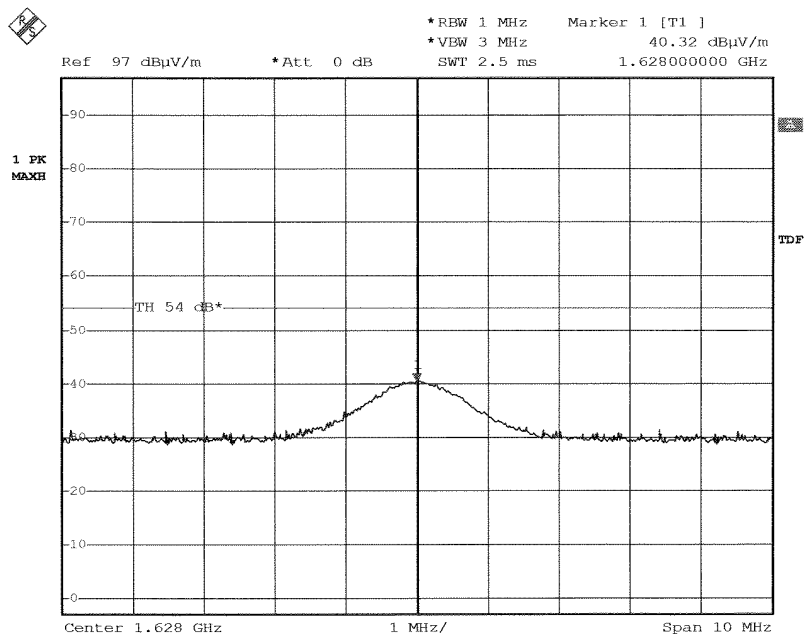


— MES TUV300305A13.PK
 — LIM FCC P15.247 (USA)



Date: 17.MAR.2005 11:16:24

i.Tech
 iM402-A
 2441
 FCC
 2.4G Filter



Date: 17.MAR.2005 11:21:07

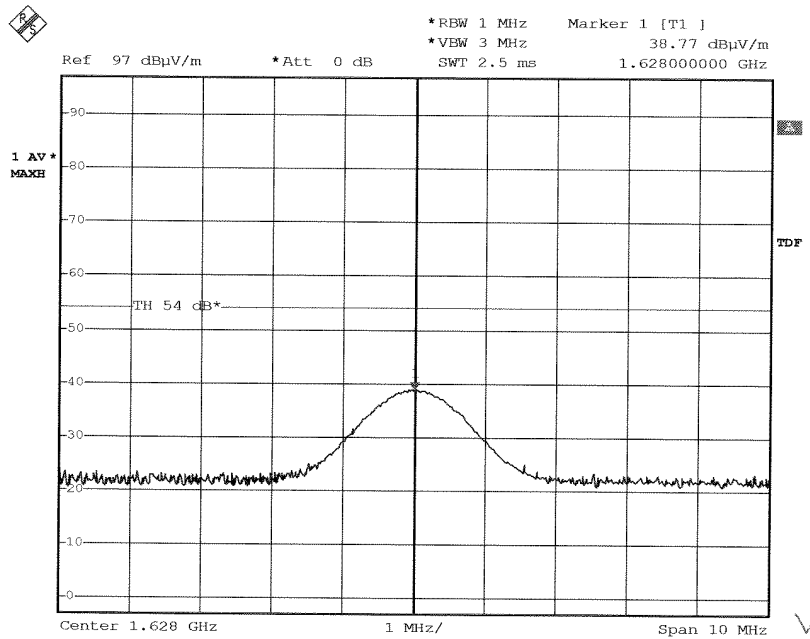
iTech

iM402-A

2441

Fcc

2.4G Filter



Date: 17.MAR.2005 11:21:41

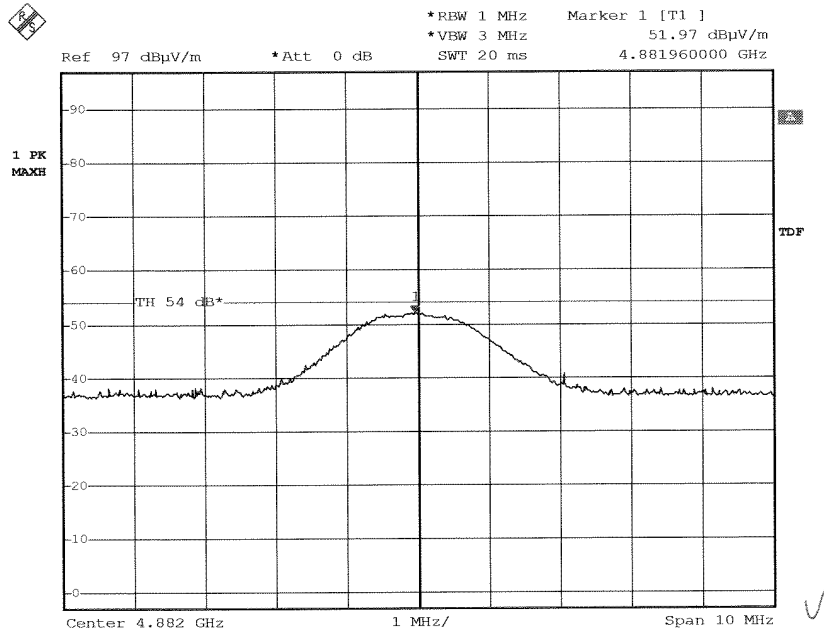
iTech

IM402-A

2441

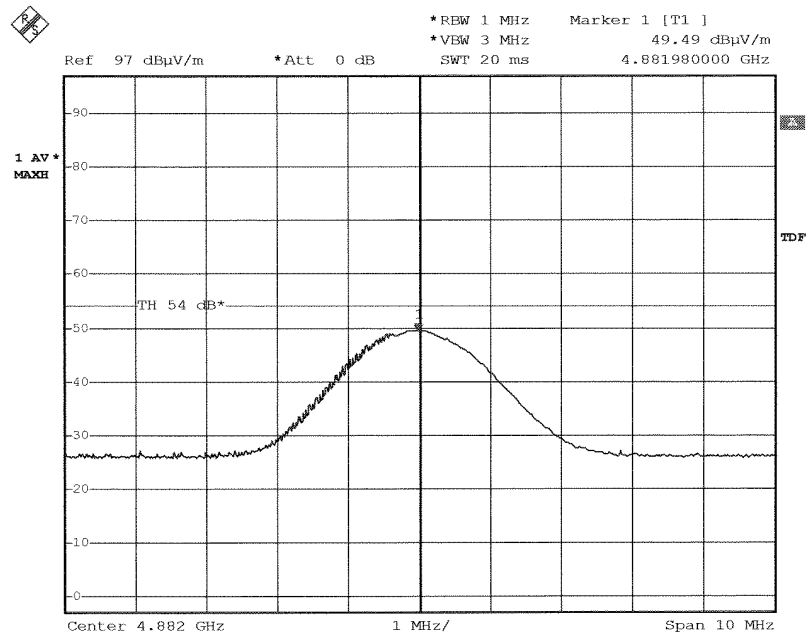
FCC

2461 Filter



Date: 17.MAR.2005 11:27:04

iTeck
IM402-13
244)
FCC
2.4G Filter

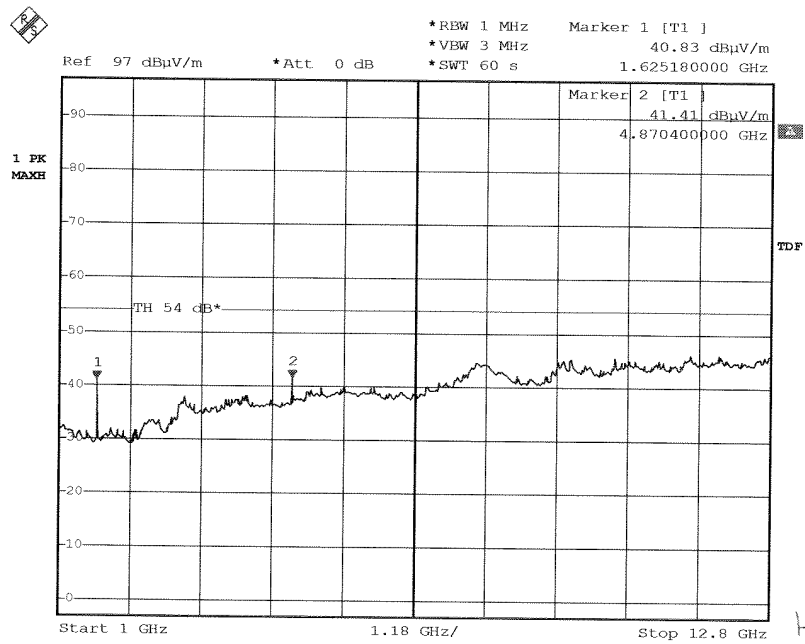


Date: 17.MAR.2005 11:27:30

i.Tech
14402-13
2441

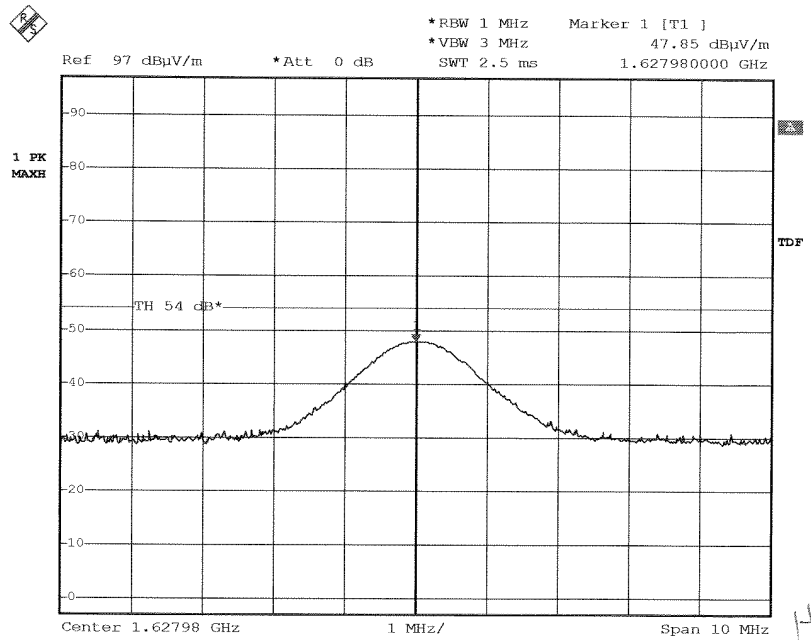
FCC

2.4G Filter



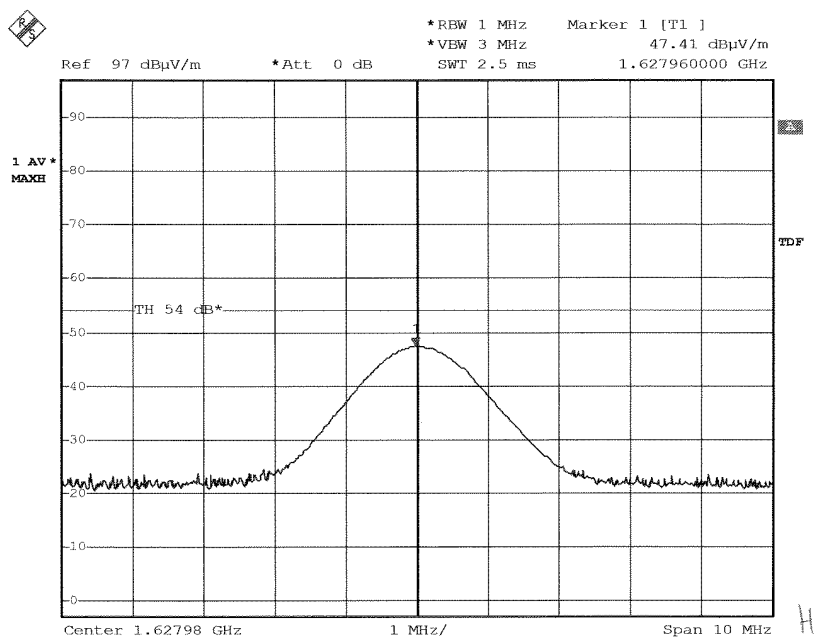
Date: 17.MAR.2005 11:34:55

in Tech
 14402-A
 2441
 FCC
 2461 filter



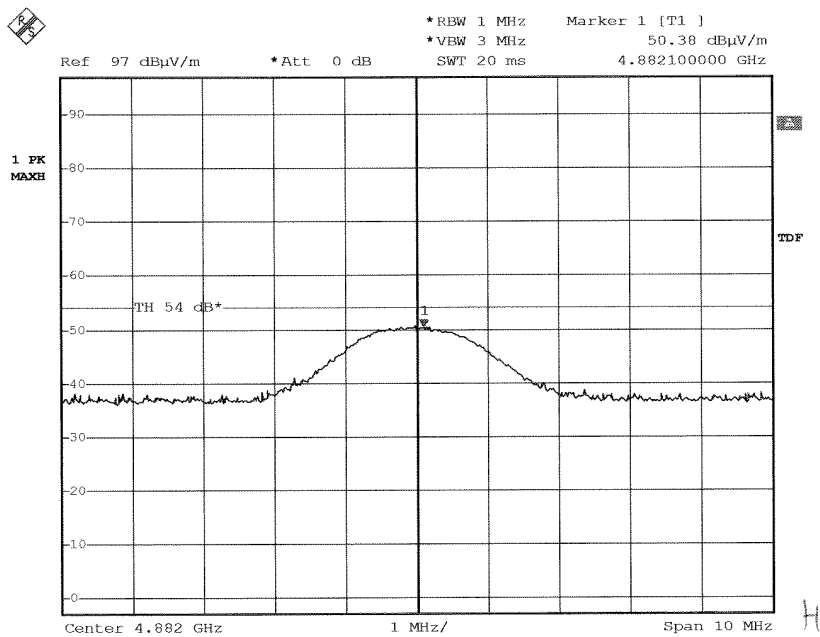
Date: 17.MAR.2005 11:38:59

i.Tech
 iM402-A
 2441
 FCC



Date: 17.MAR.2005 11:39:33

iTech
 IM402-A
 244
 FCC

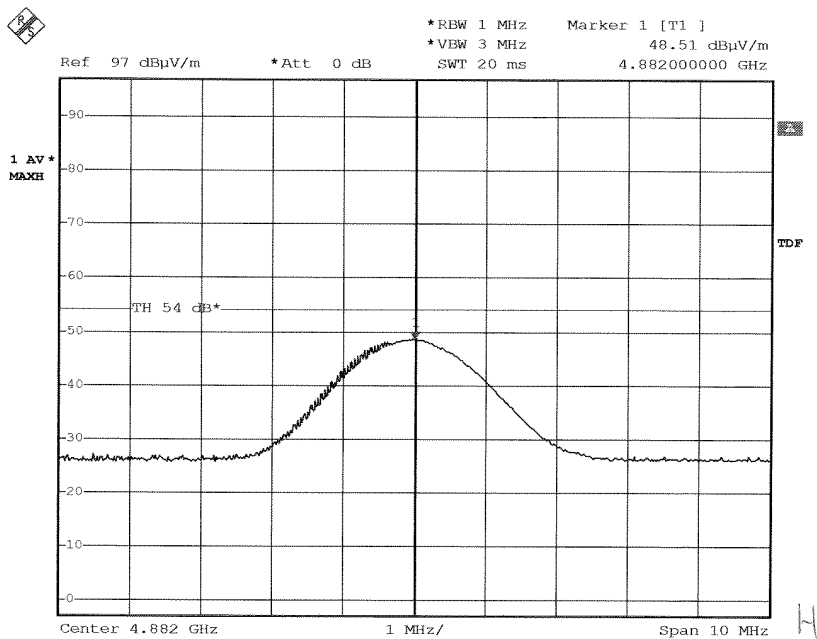


Date: 17.MAR.2005 11:43:45

iTech
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2441

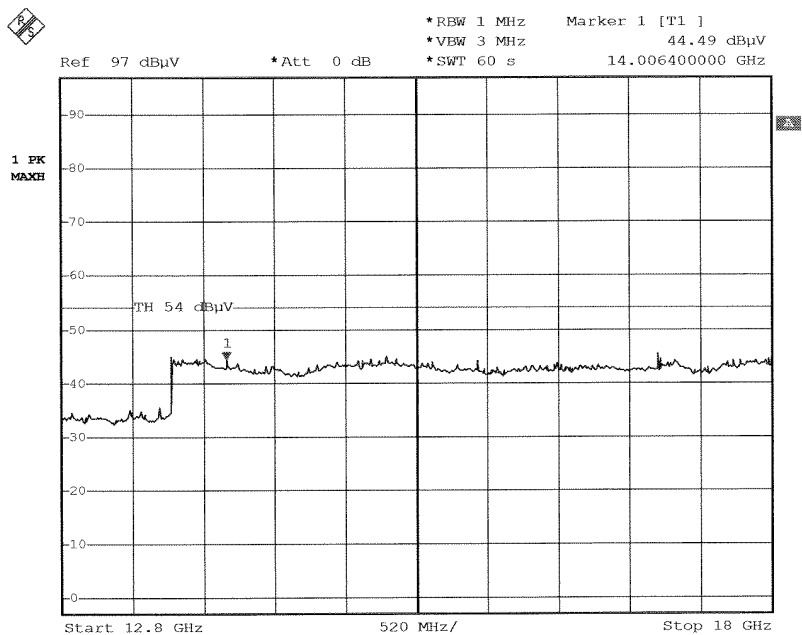
FCC

2.4 G Filter



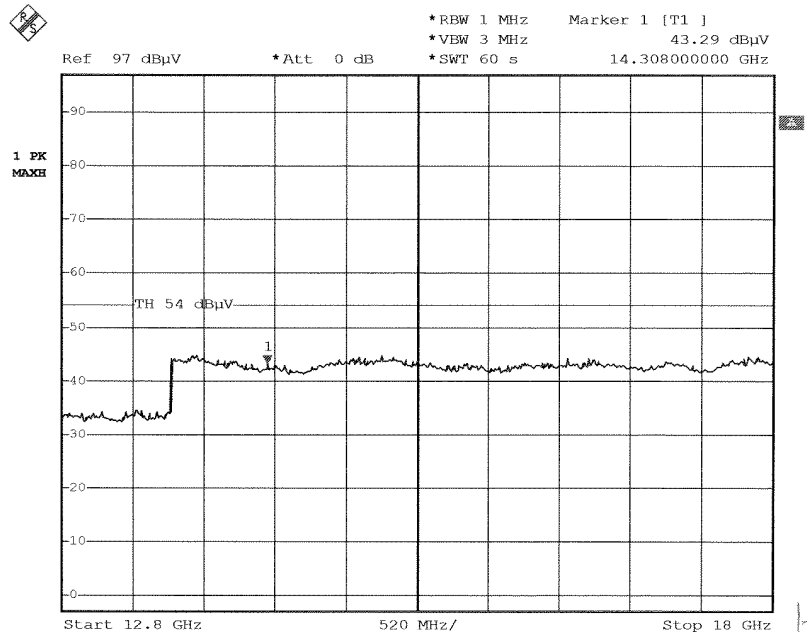
Date: 17.MAR.2005 11:44:20

iTech
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 2441
 FCC
 2.4G Filter



Date: 17.MAR.2005 11:01:31

iTech
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 2441
 FCC



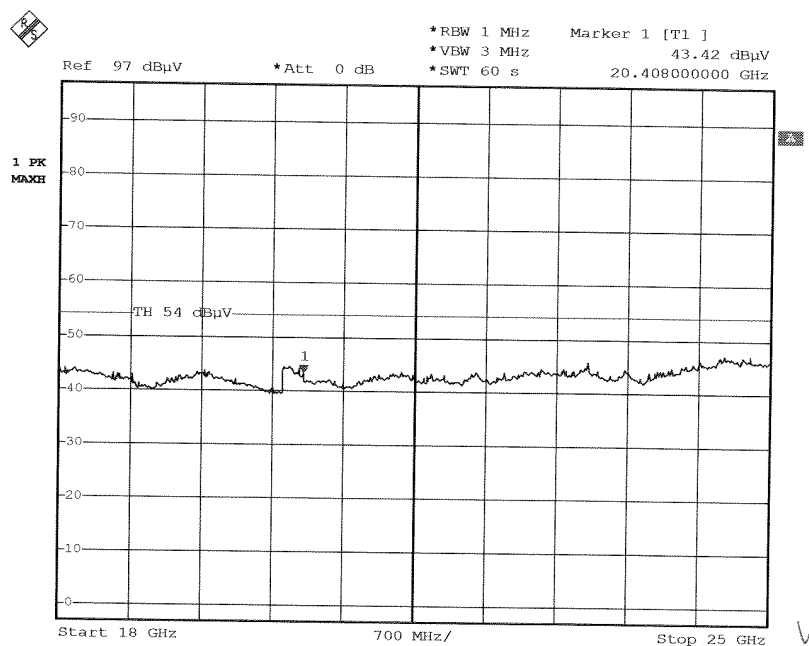
Date: 17.MAR.2005 11:04:31

iTech

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2441

Fec



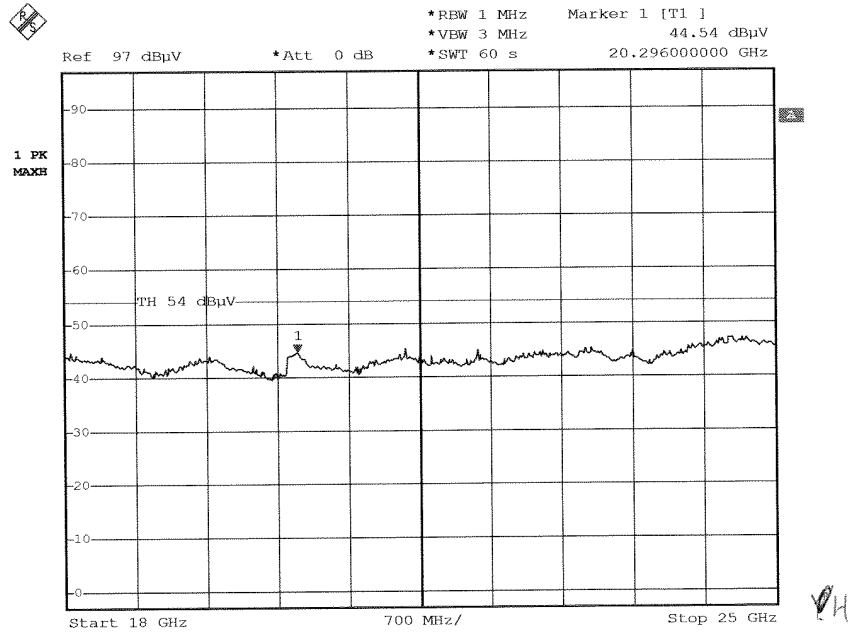
Date: 17.MAR.2005 11:12:20

iTech

IM402-A

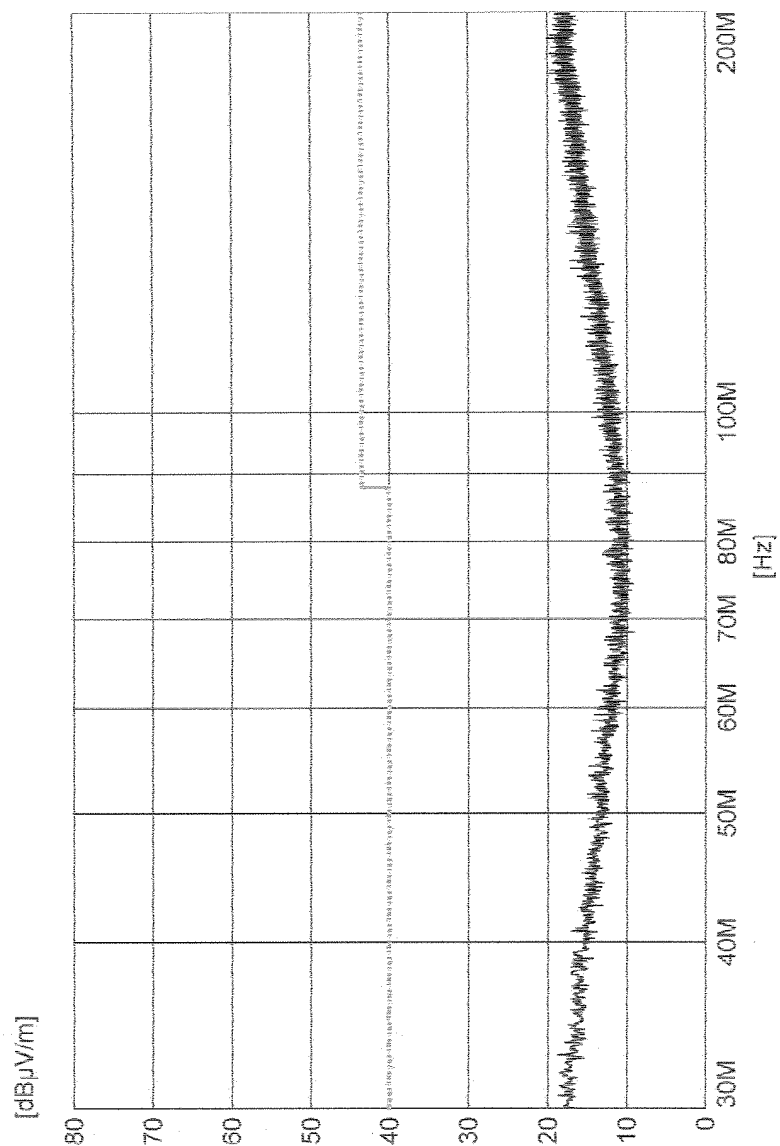
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FCC



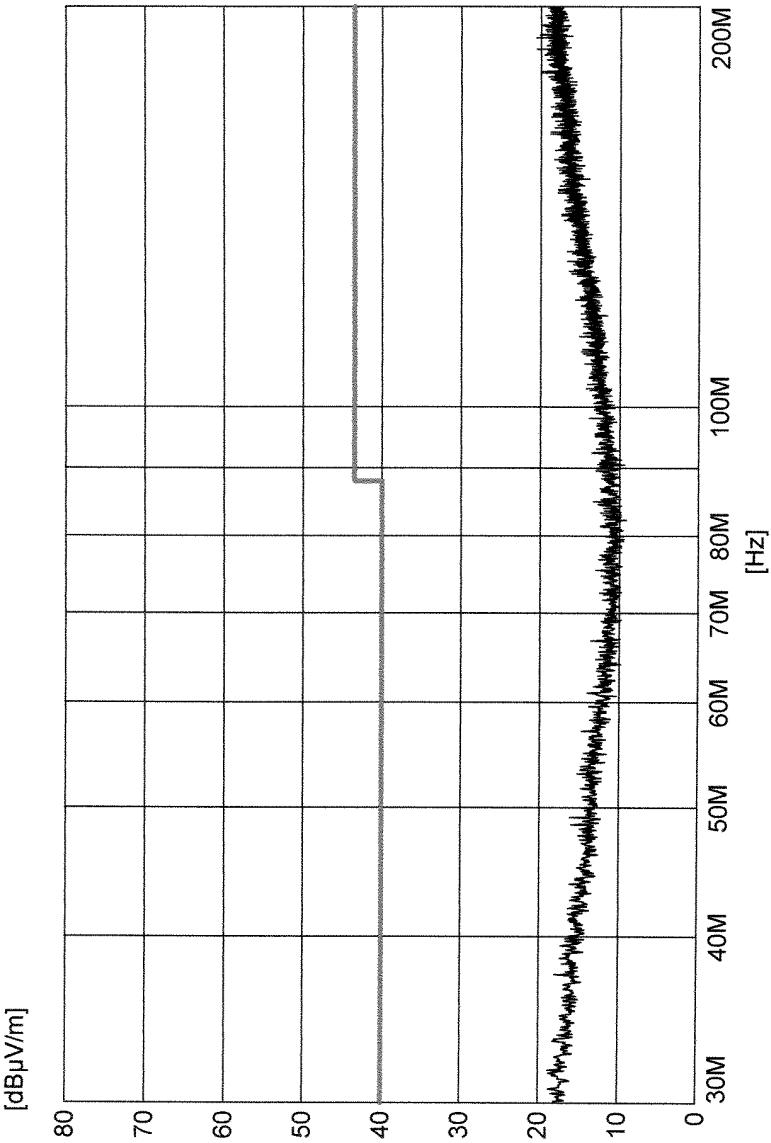
Date: 17.MAR.2005 11:08:42

i.Tech
N402-A
2441
FCL



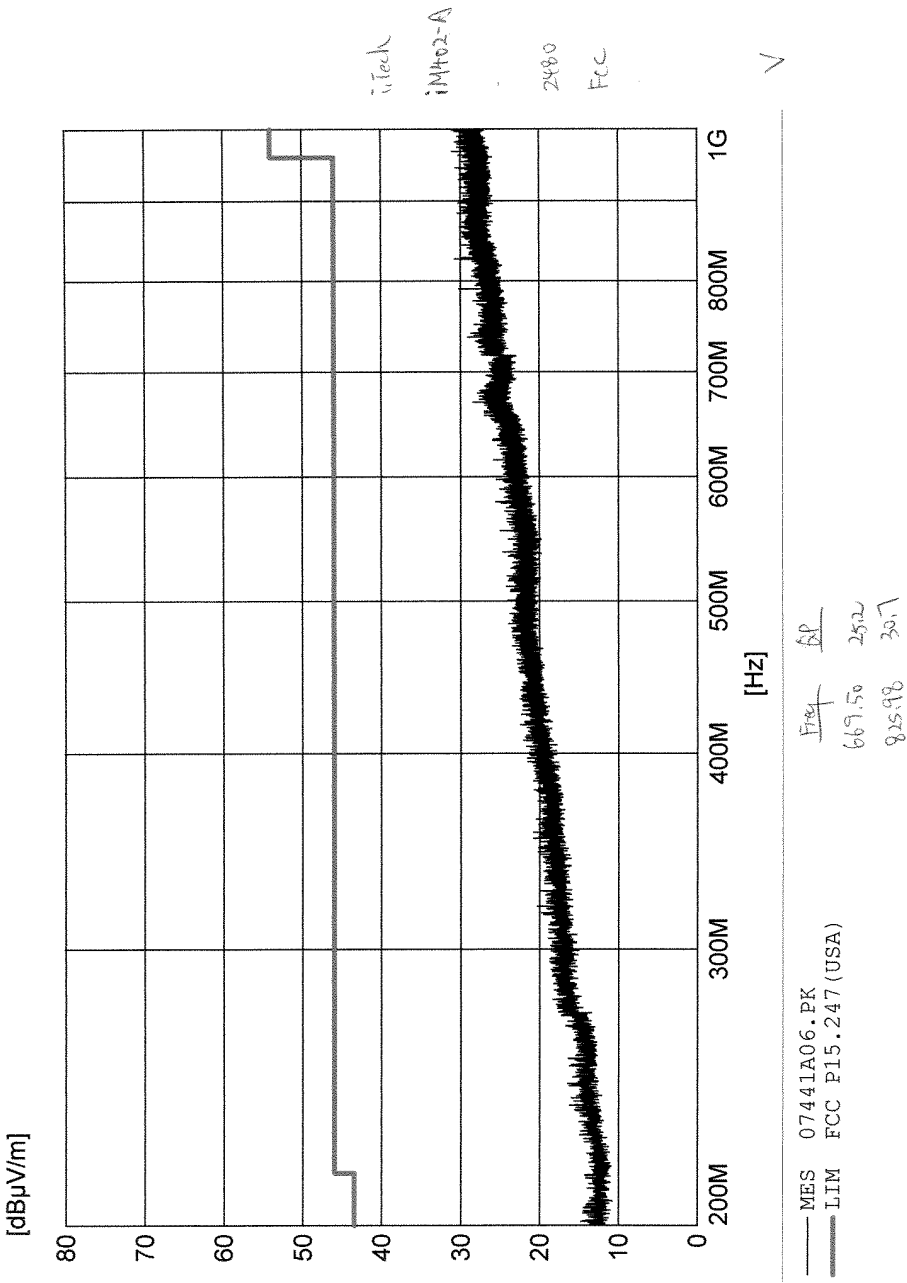
i H402-A
2480MHz
✓
FCC

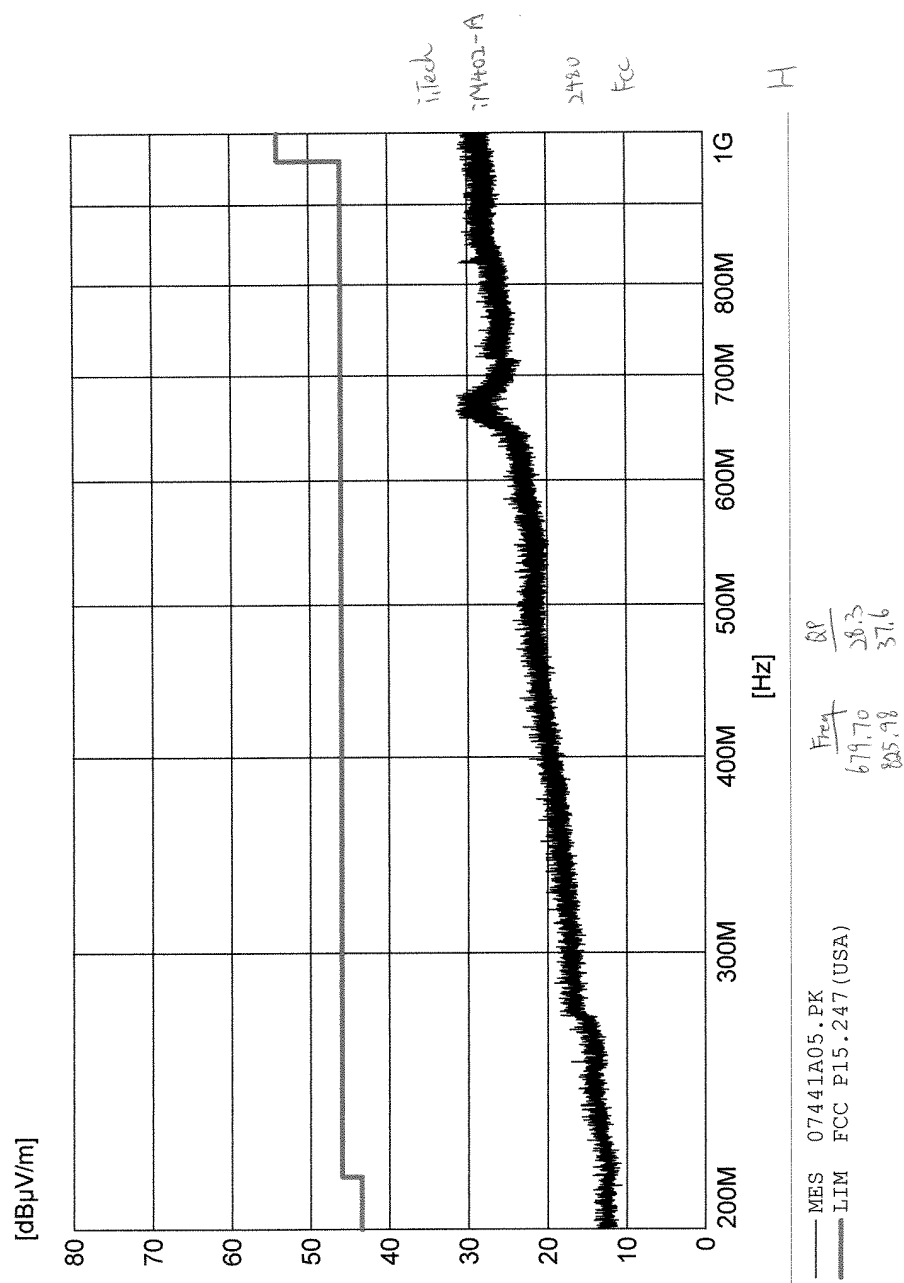
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LIM FCC P15.247(USA)

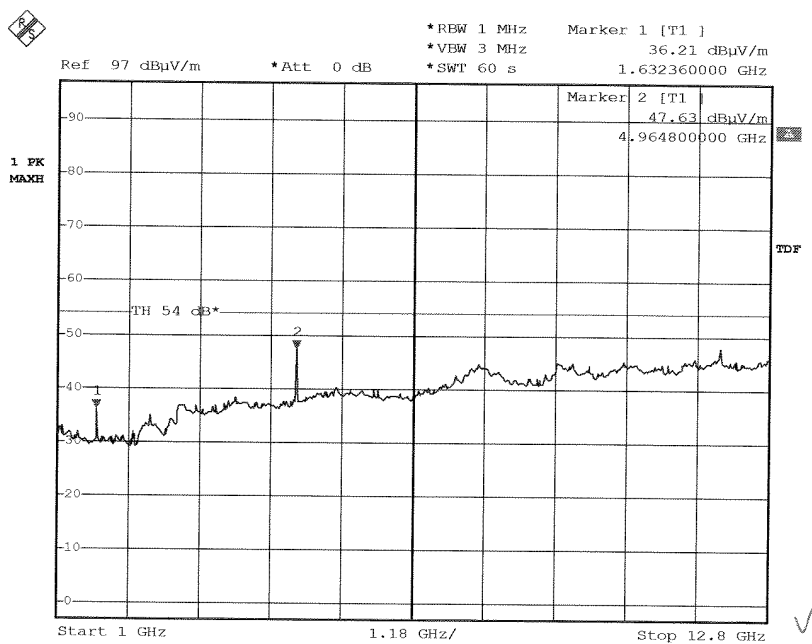


i M402-A
2480MHz
H
FCC

MES TUV300305A19.PK
LIM FCC P15.247 (USA)







Date: 17.MAR.2005 12:06:26

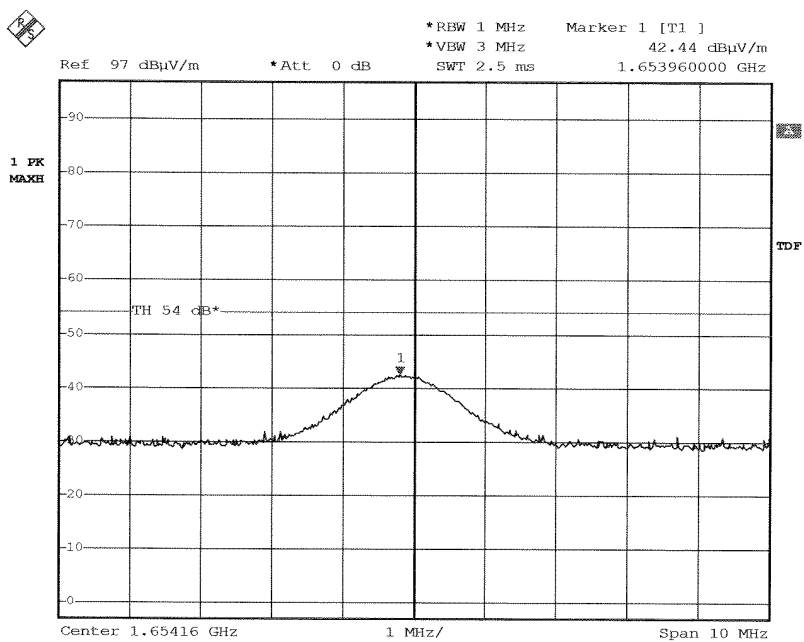
i.Tech

IM402-A

2480

FCC

24G Filter



Date: 17.MAR.2005 12:11:23

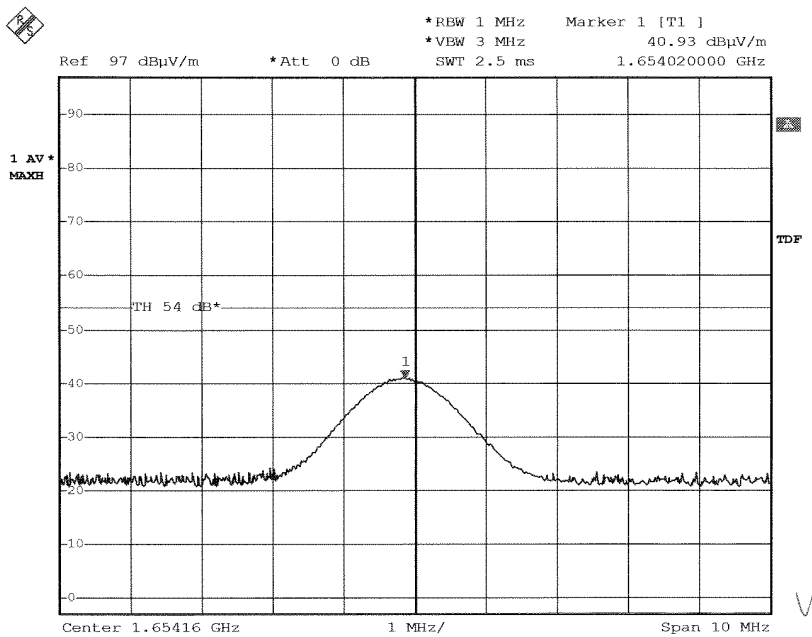
iTech

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2480

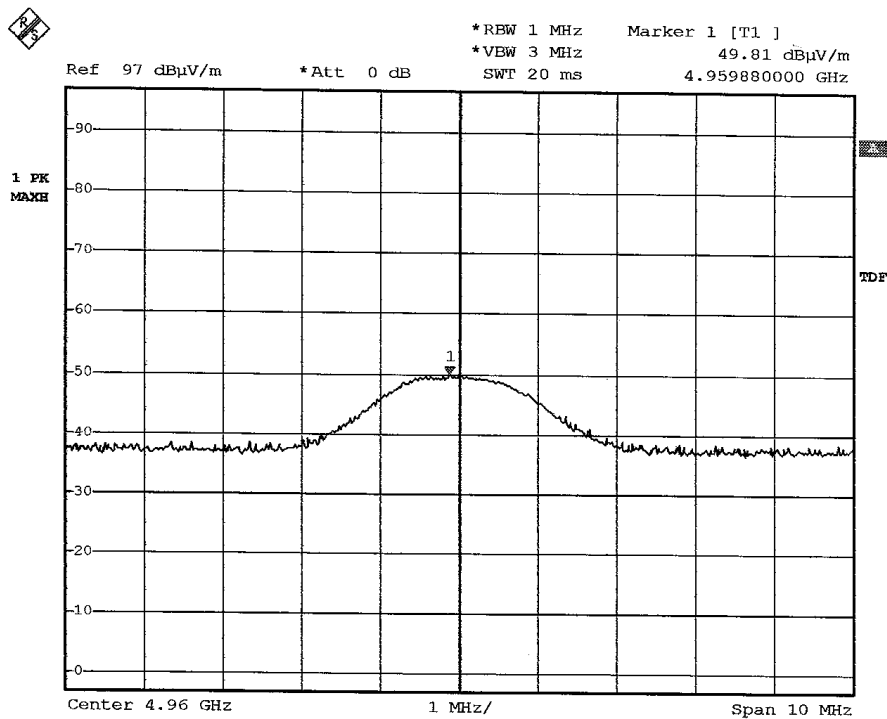
Fcc

2.4G Filter



Date: 17.MAR.2005 12:12:30

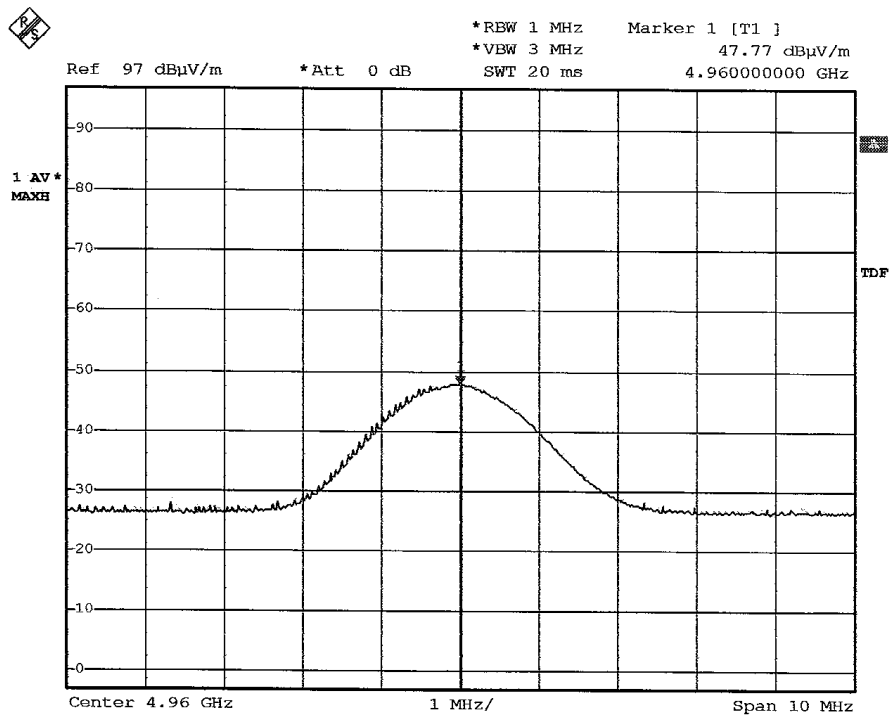
iTech
iM402-A
2480
fcc
246 Filter



Date: 6.APR.2005 22:52:50

i.Tech
iM402-A

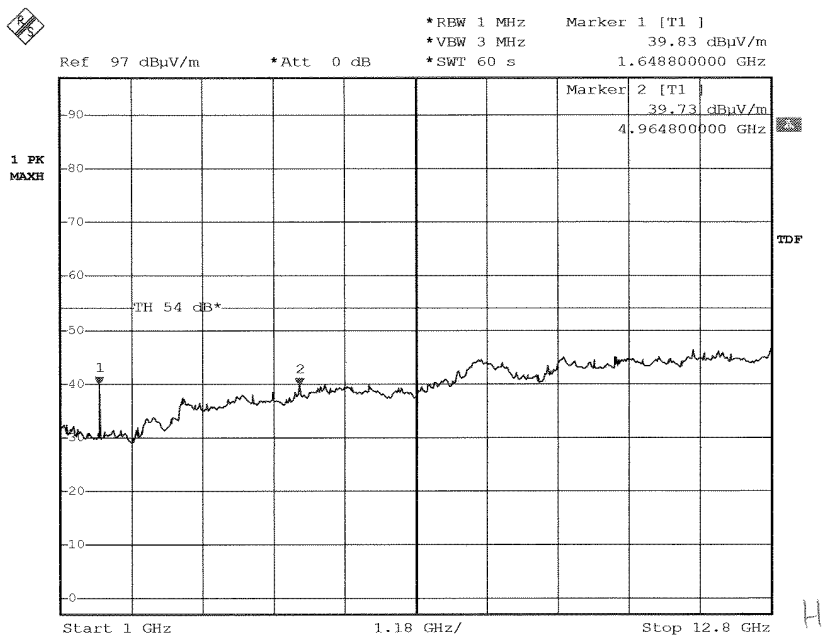
V
2480 MHz



Date: 6.APR.2005 22:53:23

i.Tech
iM402-A

✓
2480MHz



Date: 17.MAR.2005 11:52:49

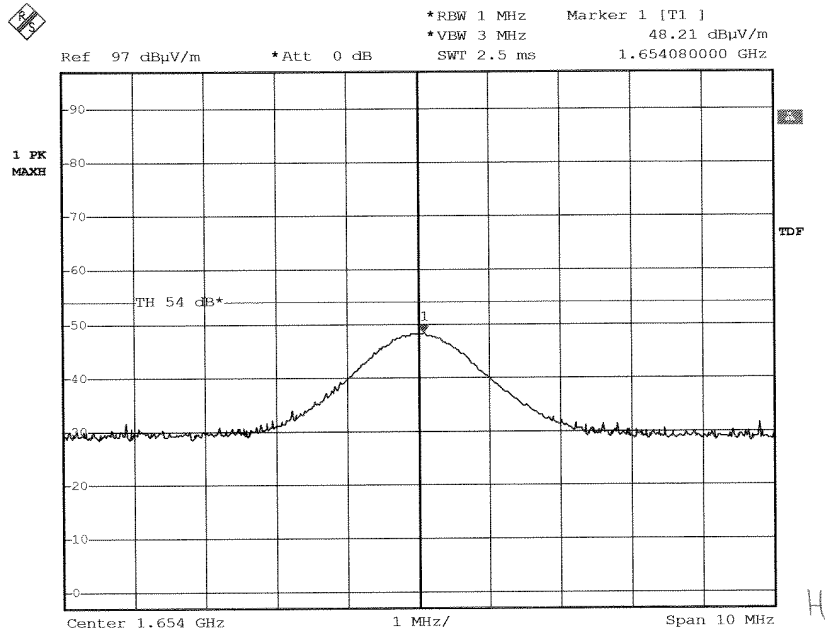
iTech

im462-A

2460

Fec

2.4G Filter



Date: 17.MAR.2005 11:55:42

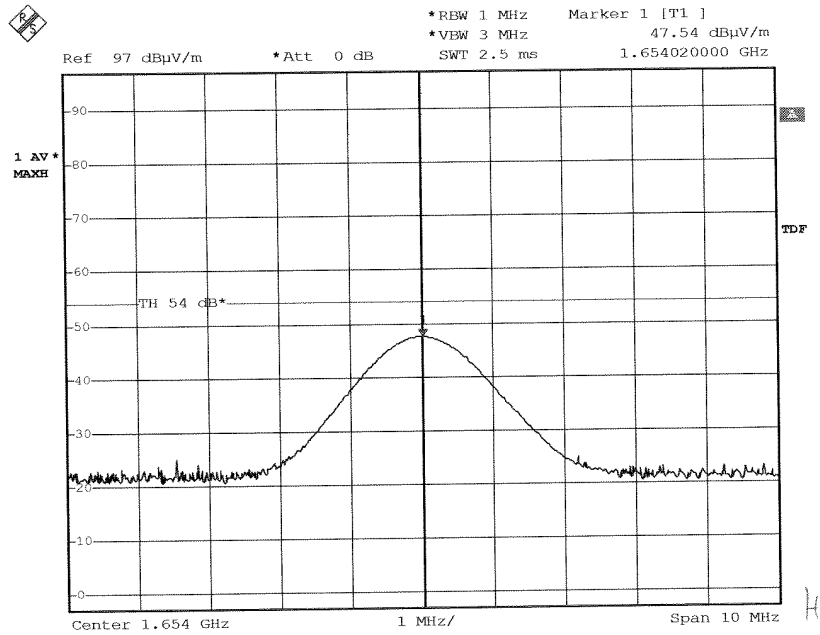
iTech

IM402-A

2480

Fcc

24GHz Filter



Date: 17.MAR.2005 11:57:02

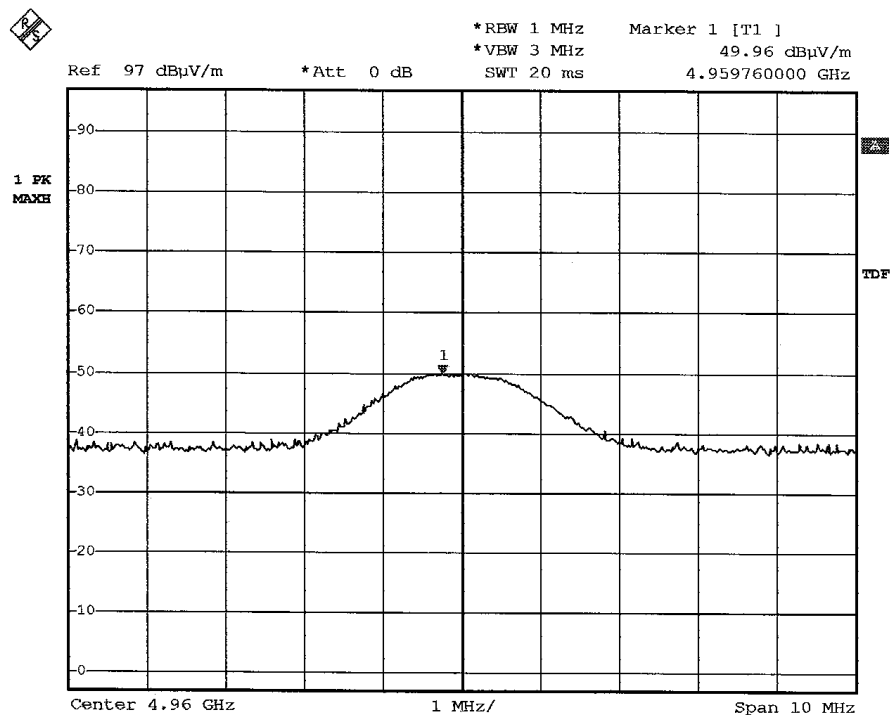
inTech

IM402-A

2980

FCC

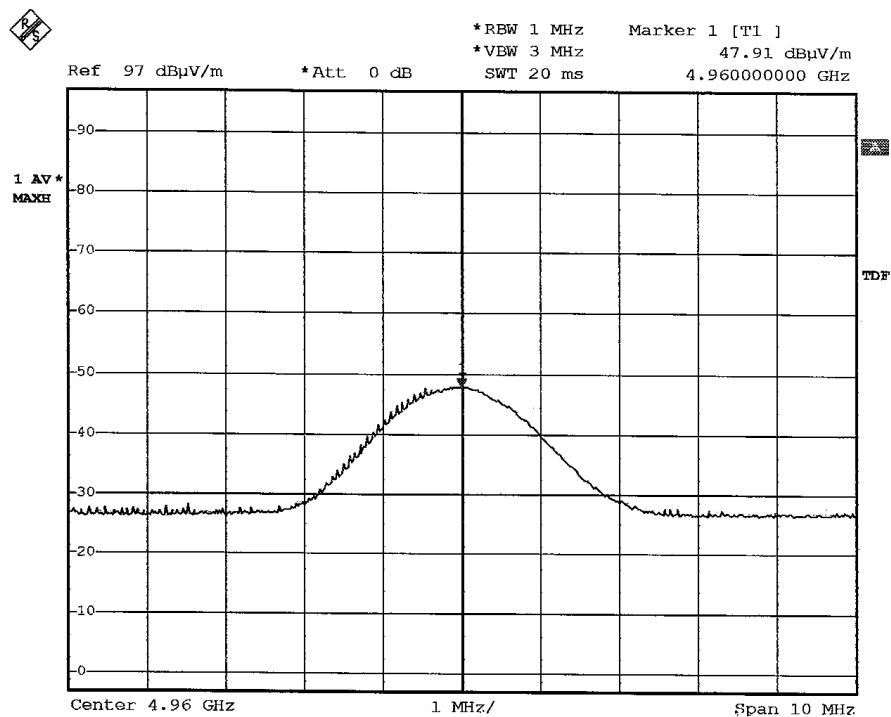
2.4G Filter



Date: 6.APR.2005 22:47:37

i.Tech
iM402-A

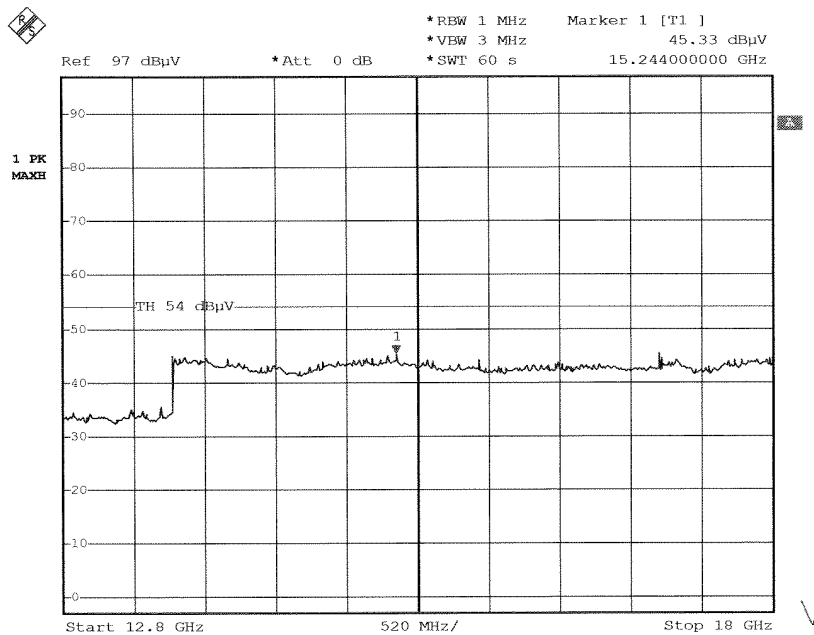
H
2480MHz



Date: 6.APR.2005 22:48:10

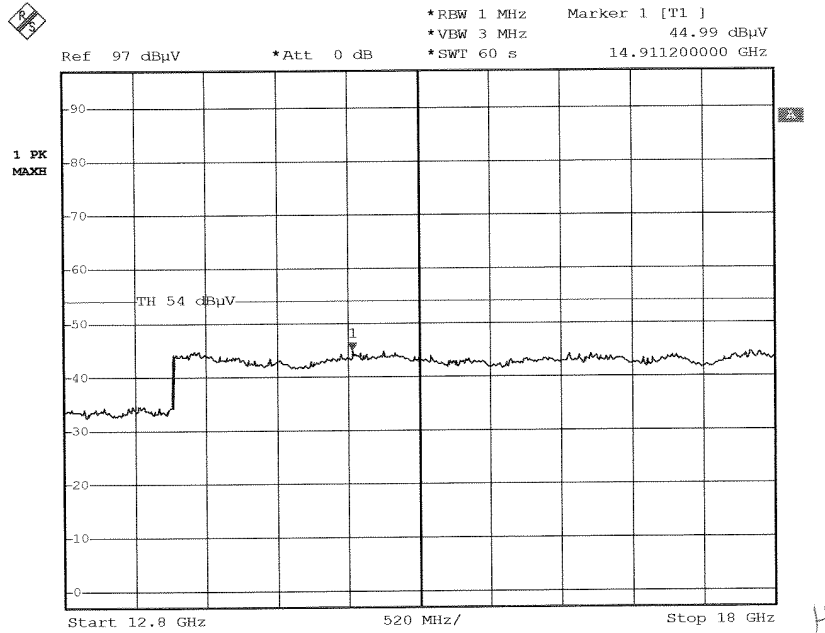
i.Tech
i.M402-A

H
2480MHz



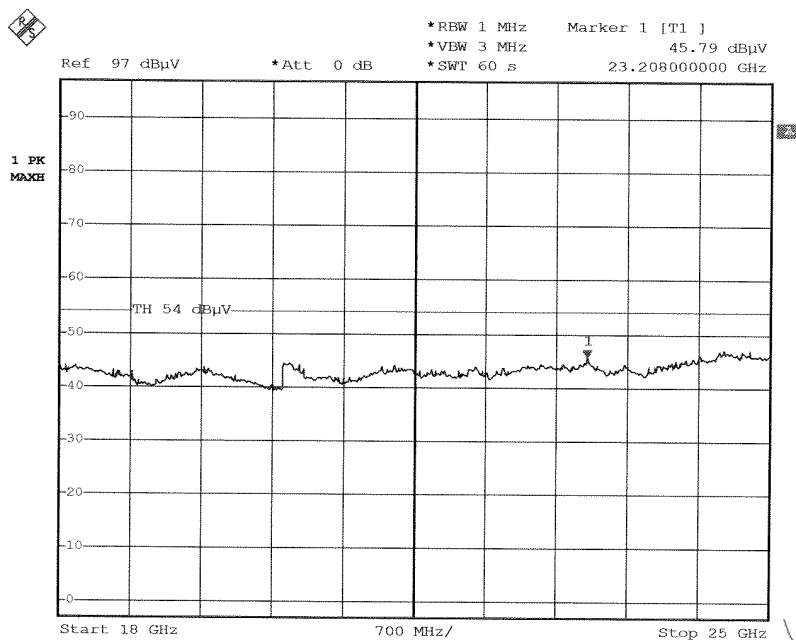
Date: 17.MAR.2005 11:02:06

iTech
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 2480
 FCC



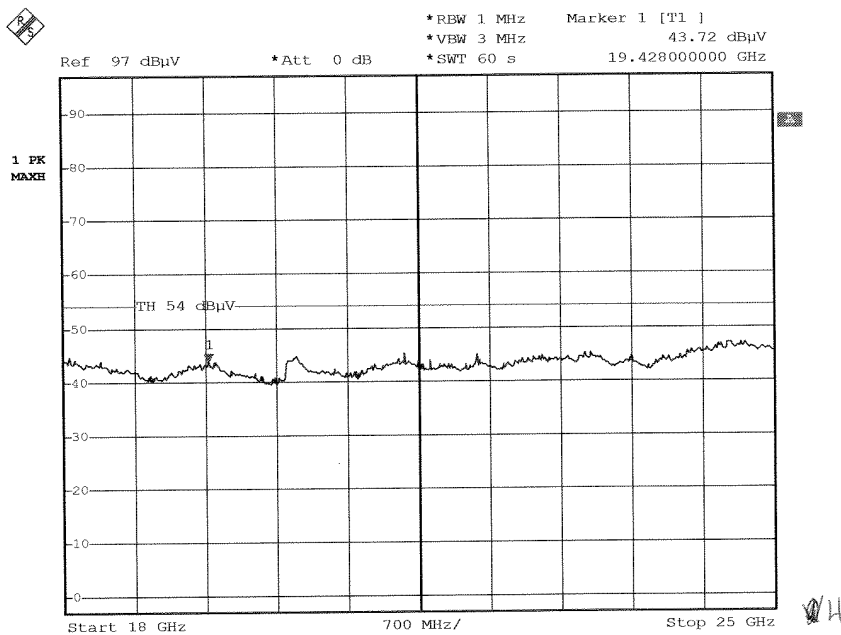
Date: 17.MAR.2005 11:05:32

iTech
iM402-A
2480
FCC.



Date: 17.MAR.2005 11:12:50

i.Tech
 M402-A
 2460
 FCC



Date: 17.MAR.2005 11:08:11

iTech
 iM402-A
 2480
 FCC