

Prüfbericht - Nr.: 14008796 001		Seite 1 von 14	
Test Report No.		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 (Tx)		
Bezeichnung: Identification	iM402-B	Serien-Nr.: Serial No.	Engineering sample
Wareneingangs-Nr.: Receipt No.	050216004- 050216007	Eingangsdatum: Date of receipt	20.05.2004
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 C63.4-2003 CISPR 22:1997		
Prüfresultat: 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	Datum Date	Name Name
	Unterschrift Signature		Unterschrift Signature
Sonstiges: Other Aspects		FCCID: RKI-IM402-B	
Abkürzungen:	OK, Pass, P Fail, F N/A NT	Abbreviations:	OK, Pass, P Fail, F N/A NT
	= entspricht Prüfgrundlage = entspricht nicht Prüfgrundlage = nicht anwendbar = nicht getestet		= 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	plug-in radio device	plug-in radio 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 portable audio device 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:

- 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				
> 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: $64 \times 2.928 \times 10^{-3} = 187 \times 10^{-3}$ $\leq 400 \times 10^{-3} \text{ s}$ 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 : 3.9VDC from rechargeable battery
 Temperature : 23°C
 Humidity : 50%

Results

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

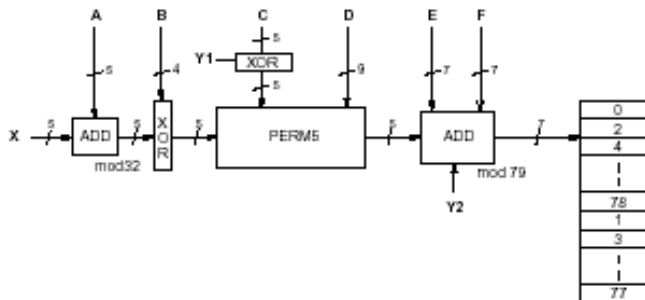
Frequency (MHz)	20 dB left (MHz)	20 dB right (MHz)	20dB bandwidth (MHz)
2402	0.412	0.412	0.824
2441	0.456	0.416	0.872
2480	0.404	0.412	0.816

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 |

```

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 : 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	0.02	3.52	3.50	1 / 30.0	Pass
2441	-0.89	3.65	2.76	1 / 30.0	Pass
2480	-1.12	3.60	2.48	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 2480MHz transmit frequency. The radio frequency power is –43.64dB 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	-46.24	-0.08	-46.16	Pass
2441	4875.420	-44.78	-1.19	-43.59	Pass

2480	4965.060	-46.83	-1.19	-45.64	Pass
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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 21-69.							
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
4803.920	44.32	33.40	3.53	32.87	0.33	48.71	74.0 / P
4803.980	39.87	33.40	3.53	32.87	0.33	44.26	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
1602.040	48.84	25.40	1.89	36.17	0.60	40.56	74.0 / P
1602.040	39.05	25.40	1.89	36.17	0.60	39.05	54.0 / A
4803.900	41.14	33.40	3.53	32.87	0.33	45.53	74.0 / P
4803.960	35.71	33.40	3.53	32.87	0.33	40.10	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
4881.920	44.84	33.40	3.53	32.87	0.33	49.23	74.0 / P
4881.900	41.28	33.40	3.53	32.87	0.33	45.67	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
1628.060	49.69	25.40	1.89	36.17	0.60	41.41	74.0 / P
1628.000	48.12	25.40	1.89	36.17	0.60	39.84	54.0 / A
4881.900	43.86	33.40	3.53	32.87	0.33	48.25	74.0 / P
4881.620	40.33	33.40	3.53	32.87	0.33	44.72	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
1654.000	46.80	25.40	1.89	36.17	0.60	38.52	74.0 / P
1654.000	45.03	25.40	1.89	36.17	0.60	36.75	54.0 / A
4960.020	45.45	33.40	3.53	32.87	0.33	49.84	74.0 / P
4959.920	42.23	33.40	3.53	32.87	0.33	46.62	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
4960.060	45.43	33.40	3.53	32.87	0.33	49.82	74.0 / P
4960.000	43.21	33.40	3.53	32.87	0.33	47.60	54.0 / A

Appendix 1

Test results

Disturbance Voltage on AC Mains

Date: 4 Apr 2005

EUT: iM402-B

Company: i.Tech Dynamic Ltd.

Humidity: 60%

Temperature: 23°C

Voltage supply: 3.9V from rechargeable battery

Test by: Sharon Li

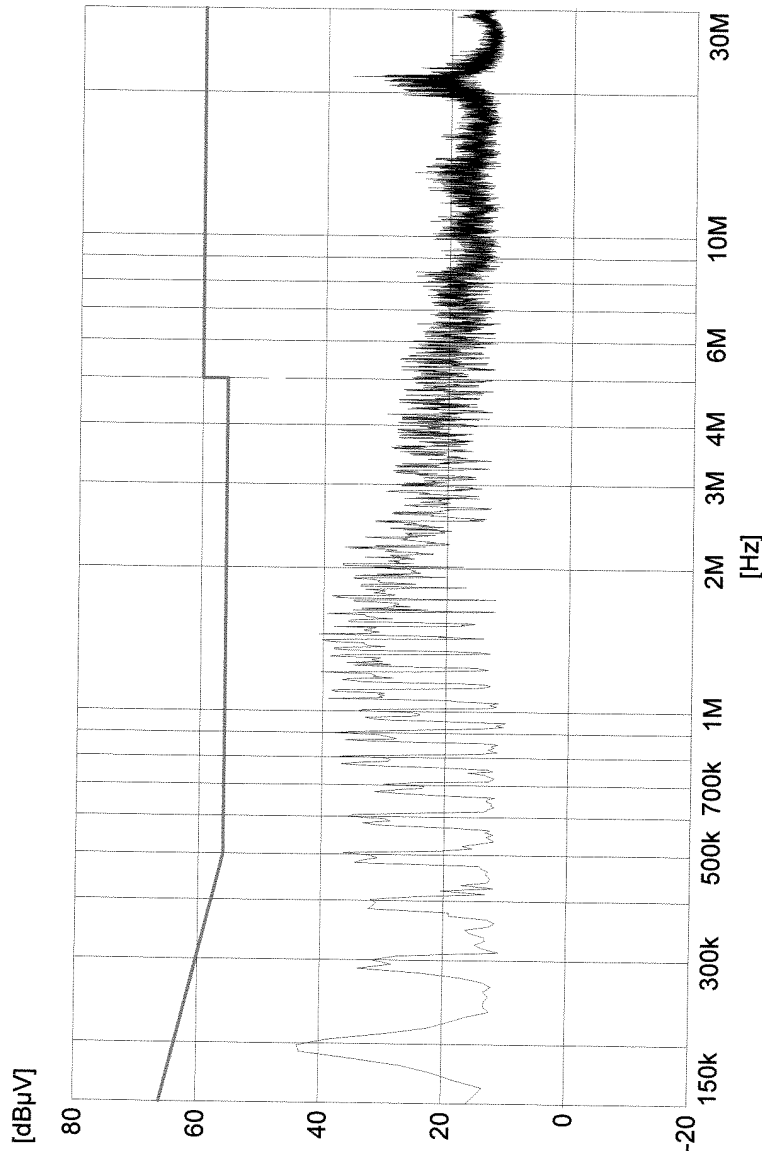
Op. mode: Charging

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

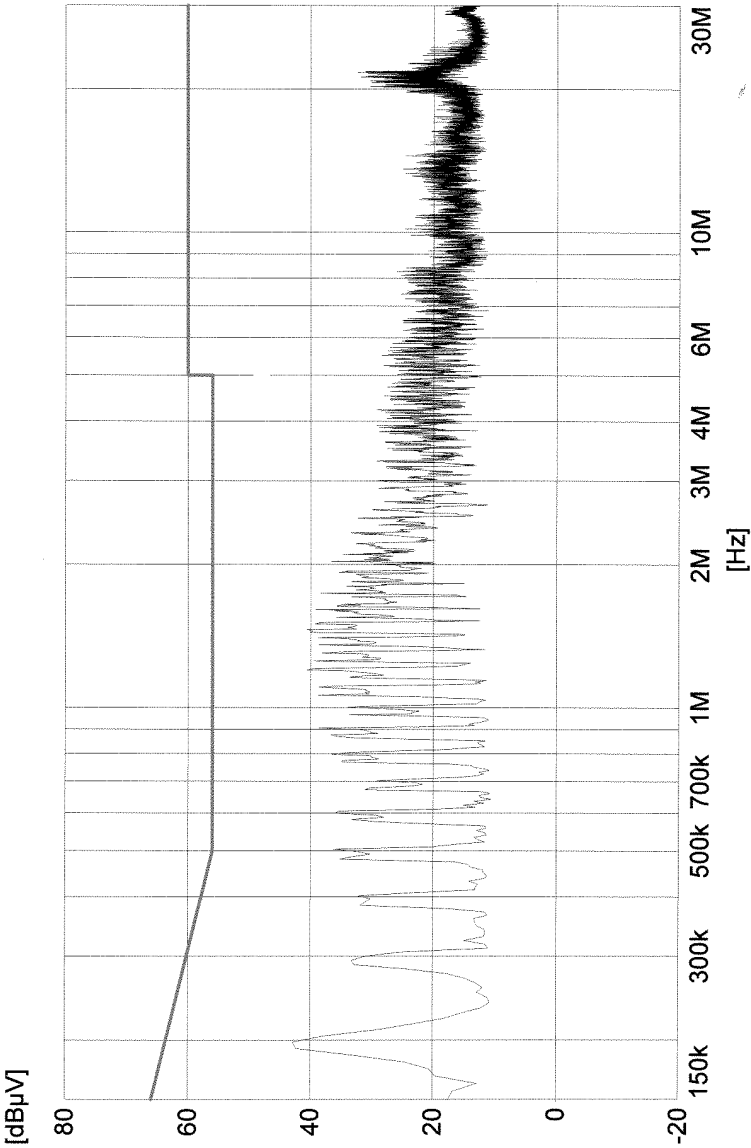
Frequency (MHz)	QP reading (dB μ V)	Av reading (dB μ V)	Results
0.198	41.8	30.0	Pass
1.104	36.0	15.2	Pass
1.458	37.3	16.2	Pass



MES TÜV040405E01.PK
LIM EN 55022 V QP
LIM EN 55022 V AV

100V
Rad Mesasores
charging 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



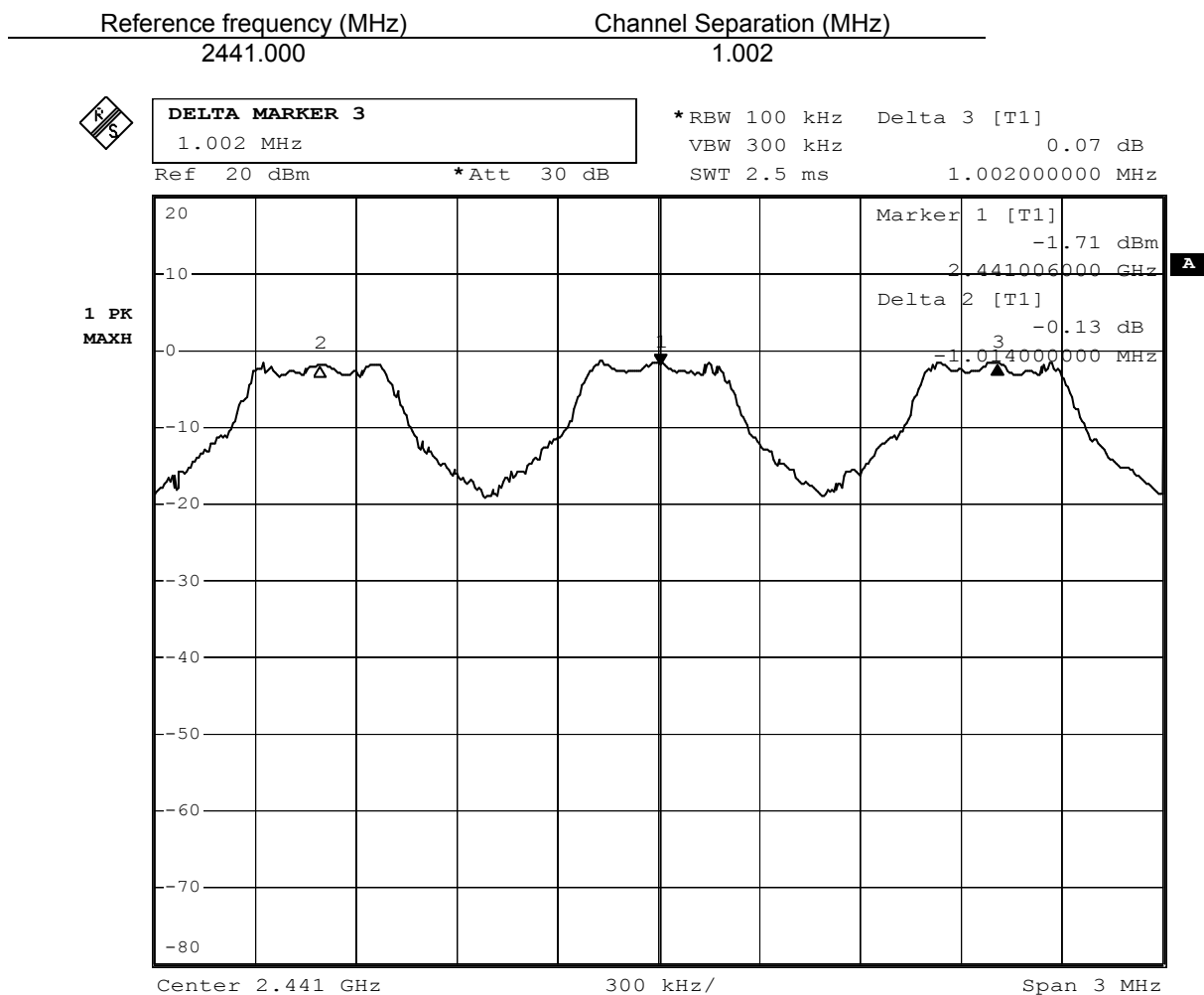
MES TUV040405B02.PK
LIM EN 55022 V QP
LIM EN 55022 V AV

Freq	QF	N	QF	N	L _{inf}
0.198	4.18	30.0	63.7	53.7	46
1.104	8.0	15.2	52	46	46
1.458	37.1	16.2	52	46	46

100V
IPal Accessories
charging mode
N

Carrier Frequency Separation

Date: 11 Mar 2005
 EUT: iM402-B
 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



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

Dwell Time

Date: 11 Mar 2005
 EUT: iM402-B
 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
2.928	64	$0.002928 \times 64 = 0.187$	Pass


DELTA MARKER 2

2.928 ms

Ref 20 dBm

* Att 30 dB

RBW 1 MHz

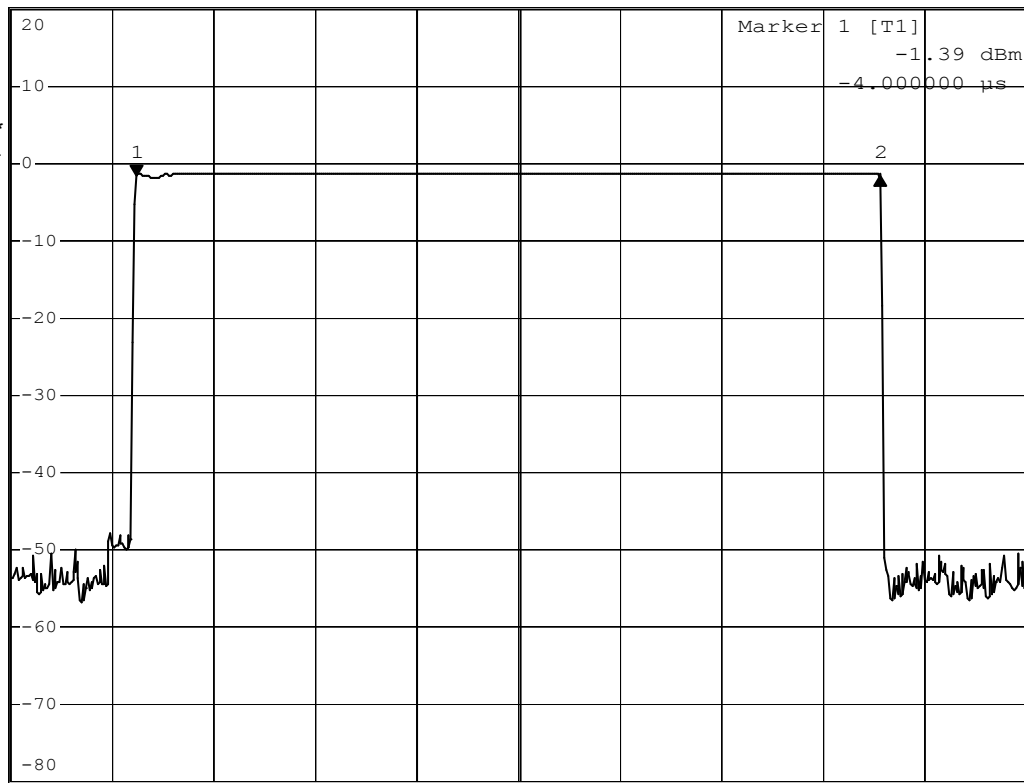
Delta 2 [T1]

* VBW 3 MHz

0.06 dB

SWT 4 ms

2.928000 ms

1 PK *
CLRWR

Center 2.441 GHz

400 μs/

Date: 16.MAR.2005 17:55:25



SWEEP TIME

31.6 s

RBW 1 MHz

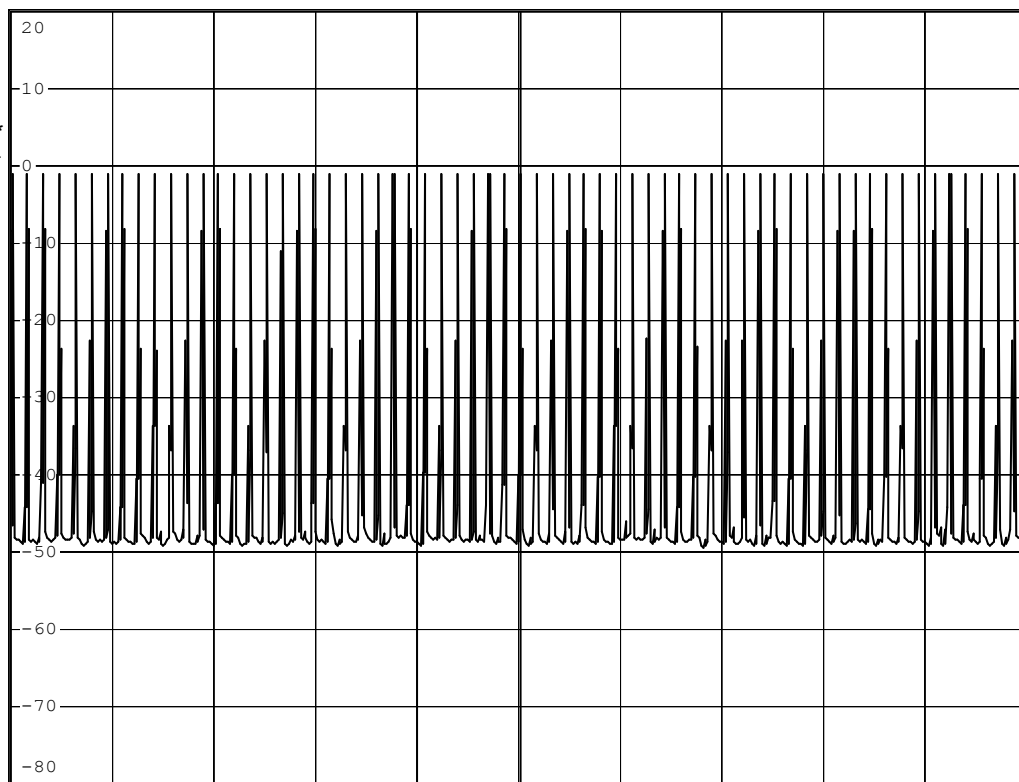
*VBW 3 MHz

Ref 20 dBm

*Att 30 dB

SWT 31.6 s

1 PK *
CLRWR



A
SGL

Center 2.441 GHz

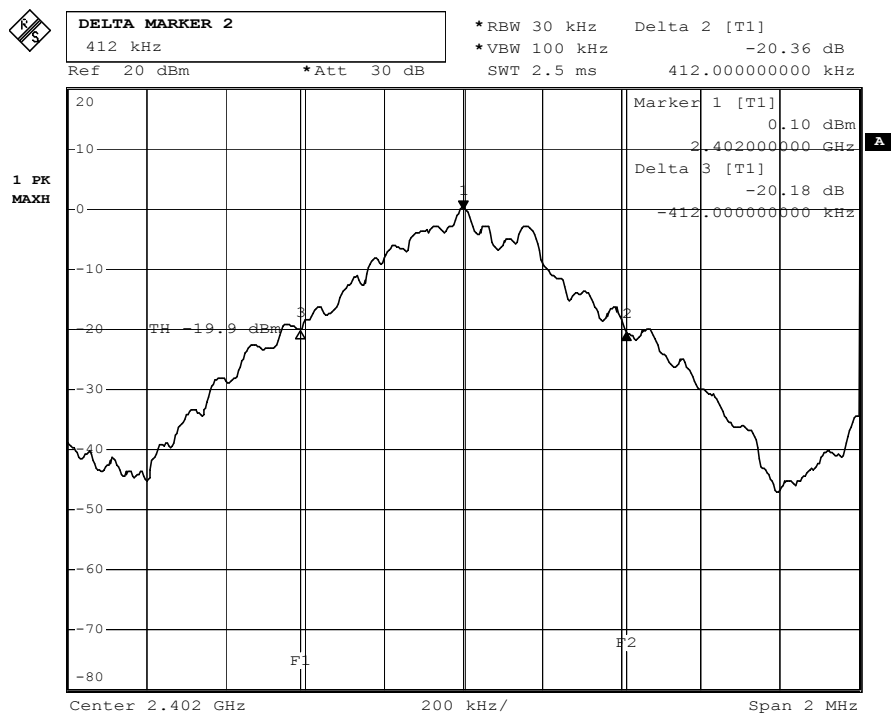
3.16 s/

Date: 11.MAR.2005 17:48:43

20dB Bandwidth

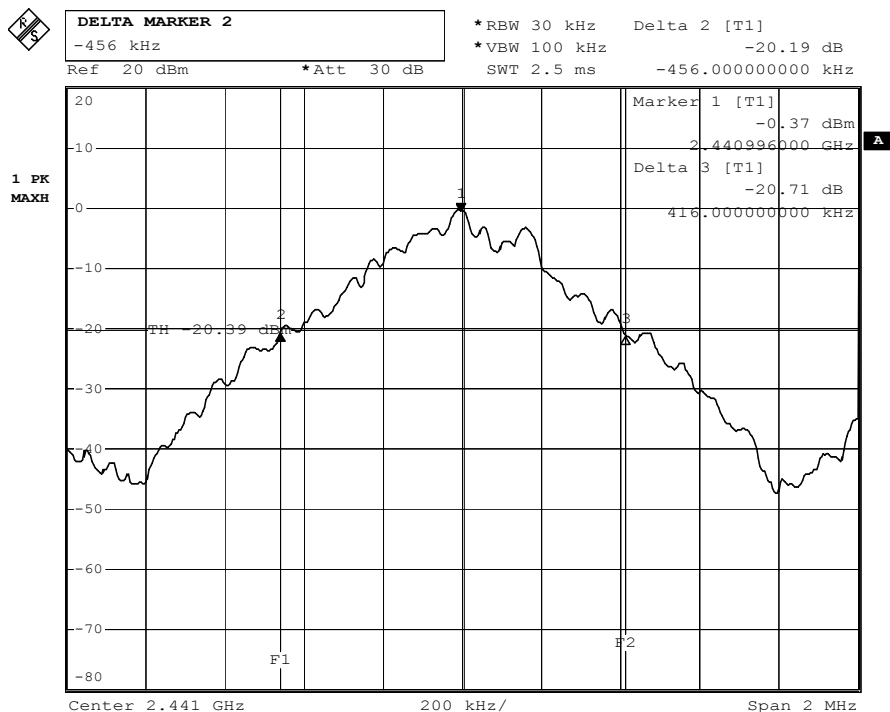
Date: 11 Mar 2005
 EUT: iM402-B
 Company: i.Tech Dynamic Ltd.
 Humidity: 50%
 Temperature: 23°C
 Voltage supply: 3.9VDC from rechargeable battery
 Test by: Sharon Li
 Op. mode: TX mode, DH5 with PRBS9 payload

Tx frequency (MHz)	Δf_L (MHz)	Δf_H (MHz)	$ \Delta f_H + \Delta f_L $ (MHz)	Results
2402	0.412	0.412	0.824	Pass
2441	0.456	0.416	0.872	Pass
2480	0.404	0.412	0.816	Pass



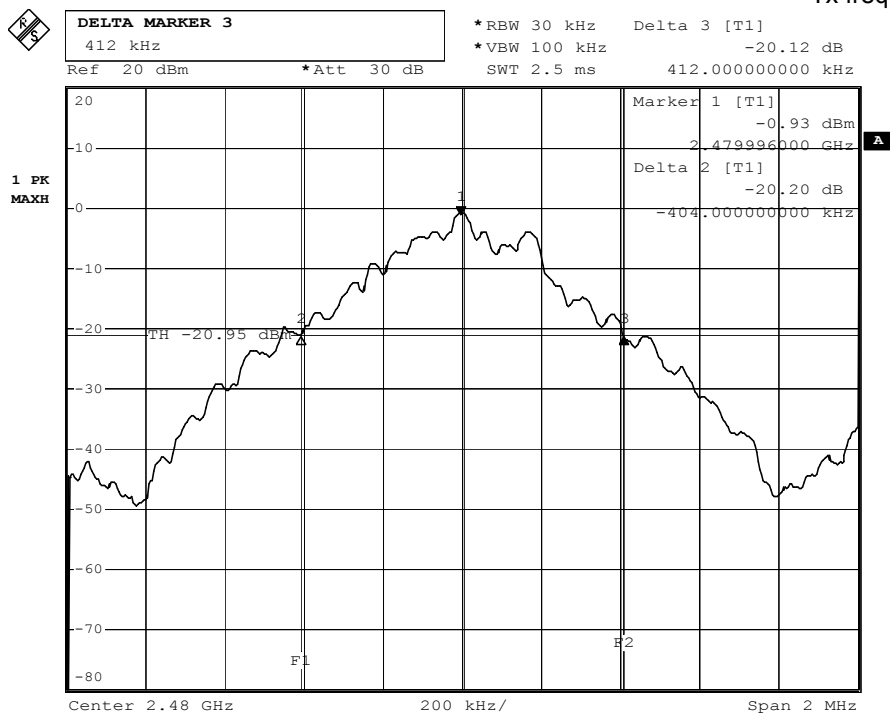
Date: 11.MAR.2005 17:54:14

Tx frequency: 2402MHz



Date: 11.MAR.2005 18:10:05

Tx frequency: 2441MHz



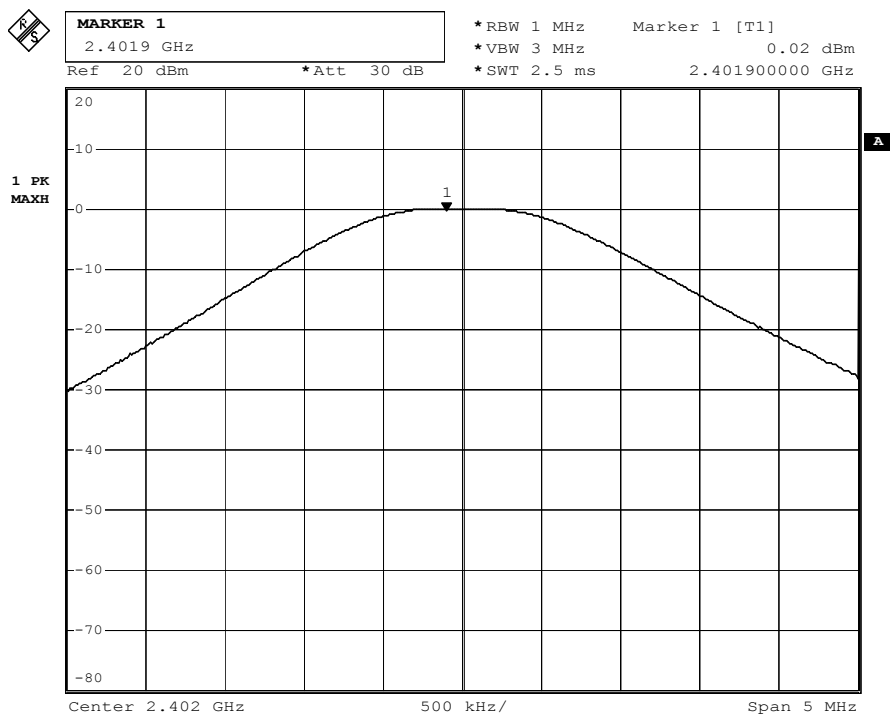
Date: 11.MAR.2005 18:04:16

Tx frequency: 2480MHz

Peak Output Power

Date: 11 Mar 2005
 EUT: iM402-B
 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	0.02	3.52	3.50	Pass
2441	-0.89	3.65	2.76	Pass
2480	-1.12	3.60	2.48	Pass



Date: 11.MAR.2005 18:12:36

Tx frequency: 2402MHz

**MARKER 1**

2.44082 GHz

Ref 20 dBm

*Att 30 dB

*RBW 1 MHz

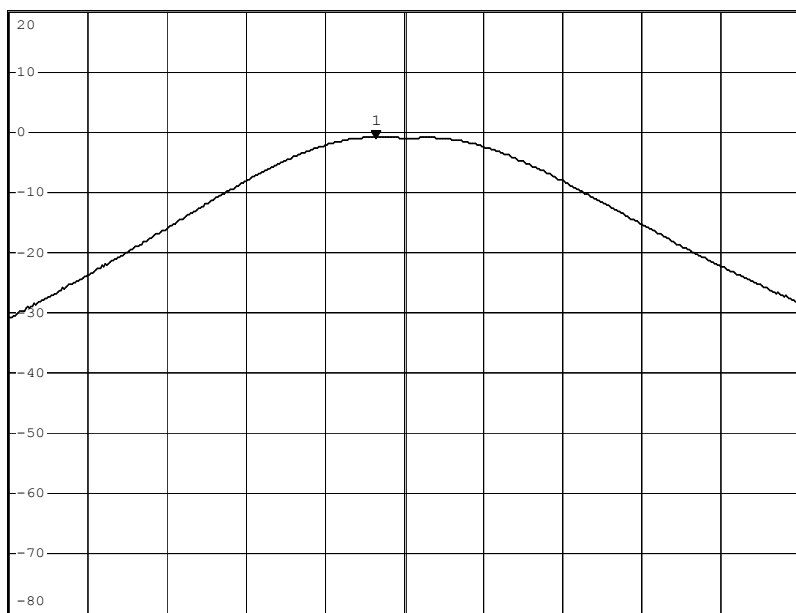
*VBW 3 MHz

*SWT 2.5 ms

Marker 1 [T1]

-0.89 dBm

2.440820000 GHz

1 PK
MAXH

Date: 11.MAR.2005 18:13:41

Tx frequency: 2441MHz

**MARKER 1**

2.47982 GHz

Ref 20 dBm

*Att 30 dB

*RBW 1 MHz

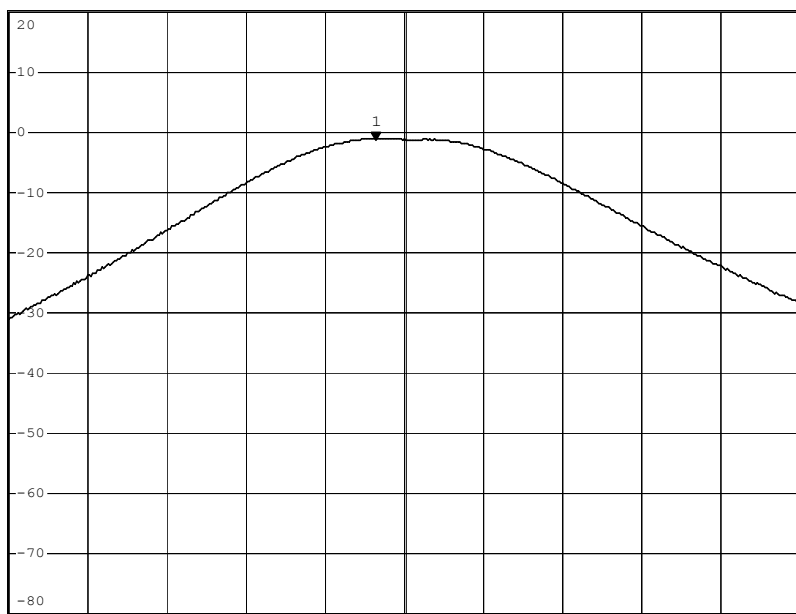
*VBW 3 MHz

*SWT 2.5 ms

Marker 1 [T1]

-1.12 dBm

2.479820000 GHz

1 PK
MAXH

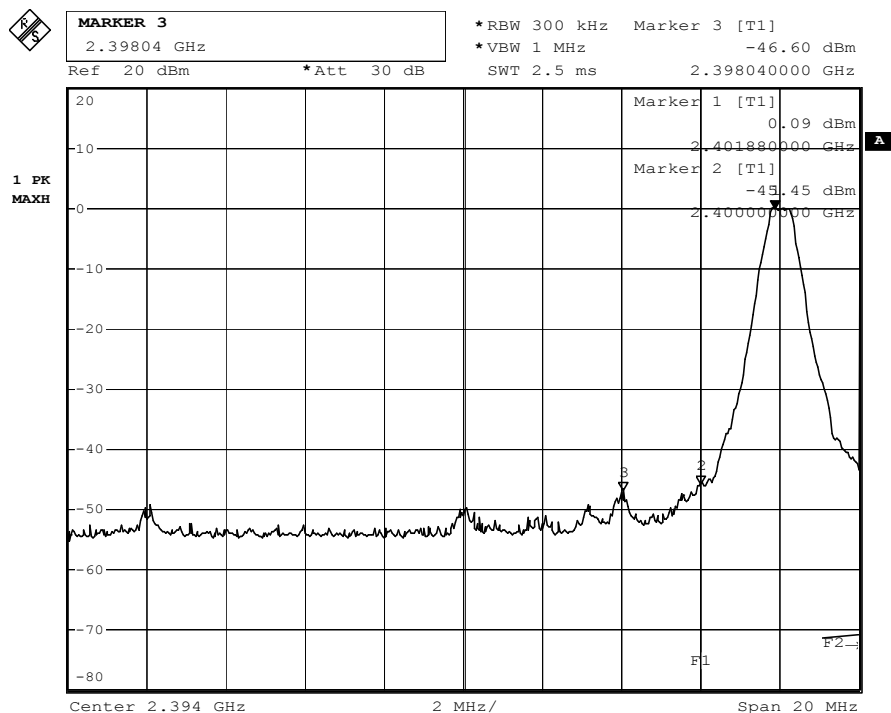
Date: 11.MAR.2005 18:14:28

Tx frequency: 2480MHz

Band Edge Compliance

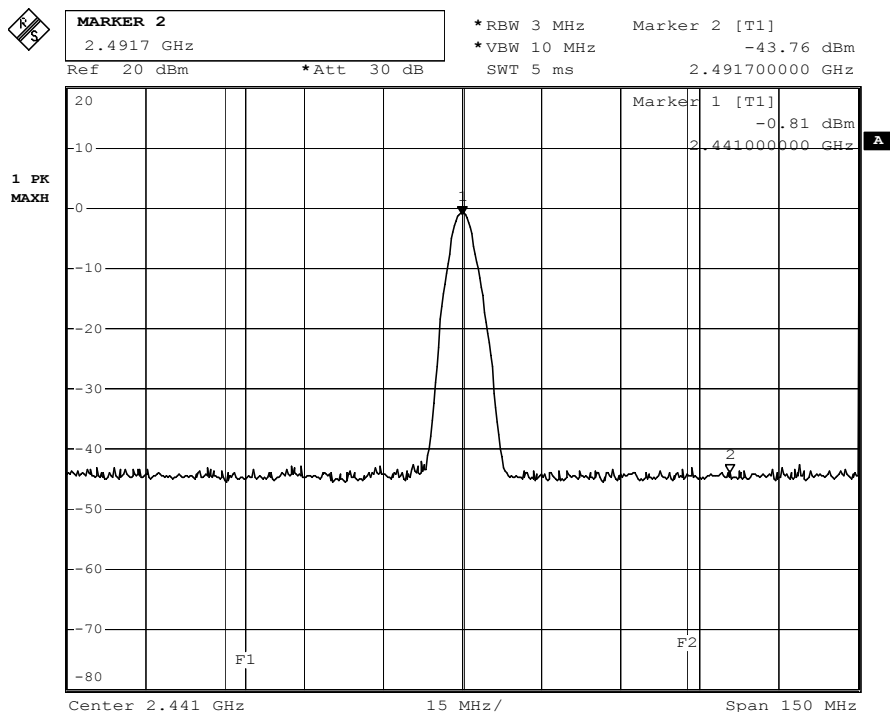
Date: 11 Mar 2005
 EUT: iM402-B
 Company: i.Tech Dynamic Ltd.
 Humidity: 50%
 Temperature: 23°C
 Voltage supply: 3.9VDC from rechargeable battery
 Test by: Sharon Li
 Op. mode: TX mode, DH1 with PRBS9 payload

Tx Frequency (MHz)	Peak in band Power level (dBm)	RF power outside 100kHz BW (MHz)	RF power difference outside 100kHz BW (dB)	Results
2402	0.09	No Peak	-	Pass
2480	-1.10	2484.480	-43.64	Pass



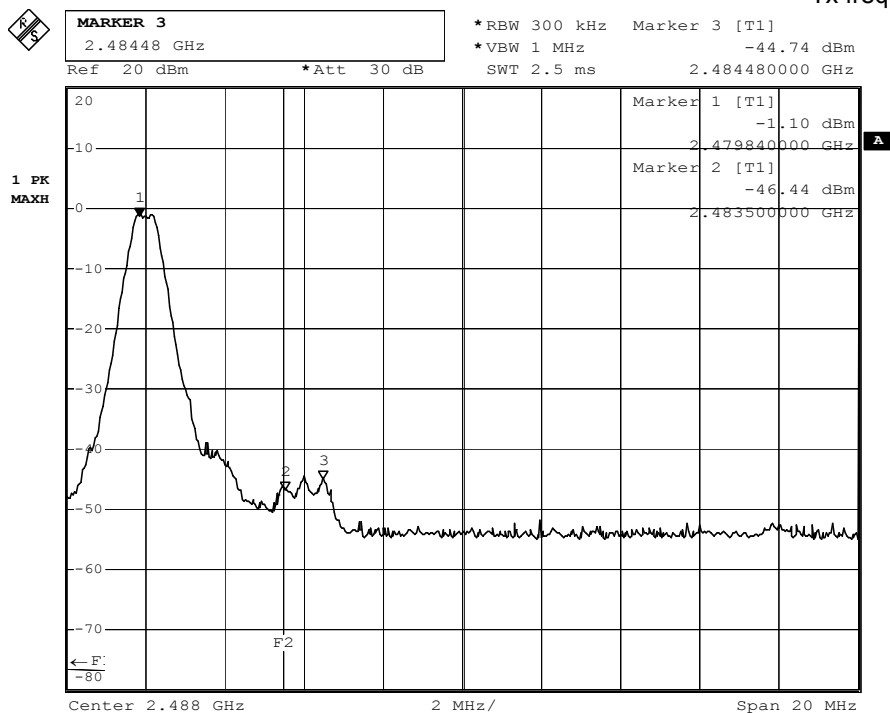
Date: 11.MAR.2005 18:17:05

Tx frequency: 2402MHz



Date: 11.MAR.2005 18:18:38

Tx frequency: 2441MHz



Date: 11.MAR.2005 18:20:28

Tx frequency: 2480MHz

Spurious Emissions - Conducted

Date: 11 Mar 2005
EUT: iM402-B
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

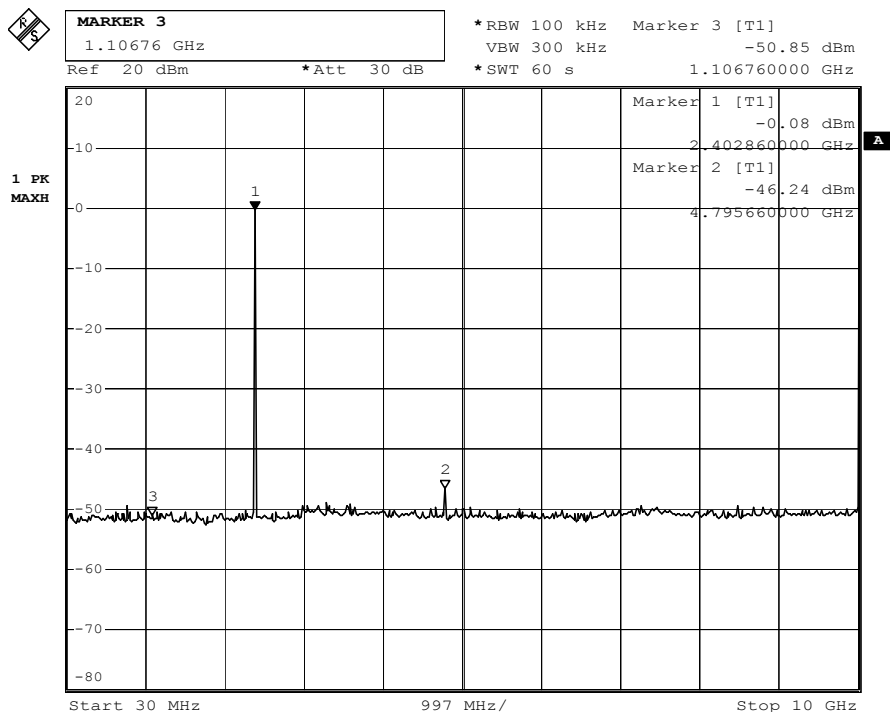
Spurious Frequency (MHz)	Power level (dBm)	Reference value (dBm)	Delta to reference level (dB)	Results
4795.660	-46.24	-0.08	-46.16	Pass

Tx frequency : 2441MHz

Spurious Frequency (MHz)	Power level (dBm)	Reference value (dBm)	Delta to reference level (dB)	Results
4875.420	-44.78	-1.19	-43.59	Pass

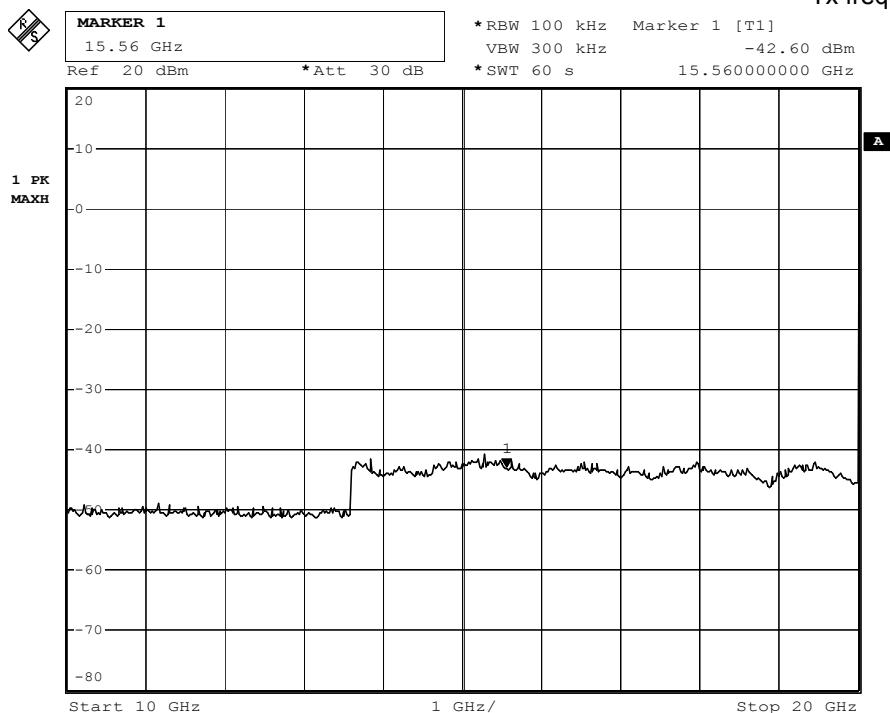
Tx frequency : 2480MHz

Spurious Frequency (MHz)	Power level (dBm)	Reference value (dBm)	Delta to reference level (dB)	Results
4965.060	-46.83	-1.19	-45.64	Pass



Date: 14.MAR.2005 10:12:06

Tx frequency: 2402MHz



Date: 14.MAR.2005 10:02:12

Tx frequency: 2402MHz



MARKER 1

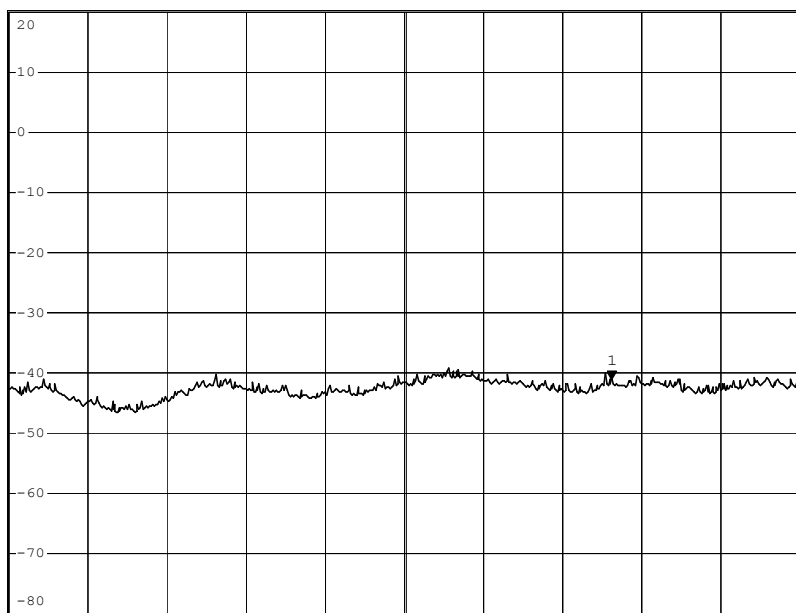
23.81 GHz

*RBW 100 kHz Marker 1 [T1]
 VBW 300 kHz -40.87 dBm
 *SWT 60 s 23.81000000 GHz

Ref 20 dBm

*Att 30 dB

1 PK
 MAXH



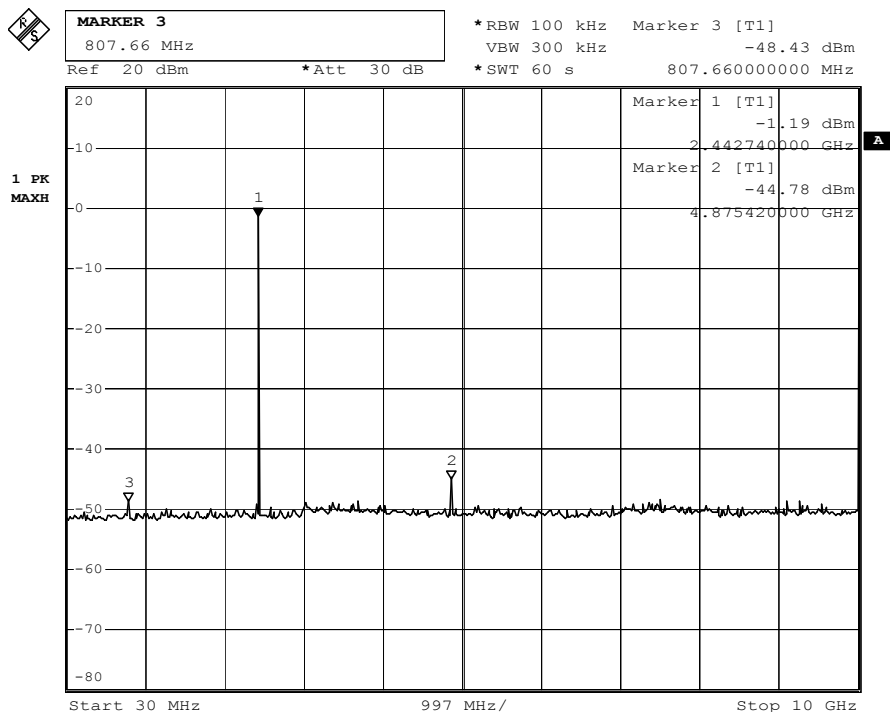
Start 20 GHz

500 MHz/

Stop 25 GHz

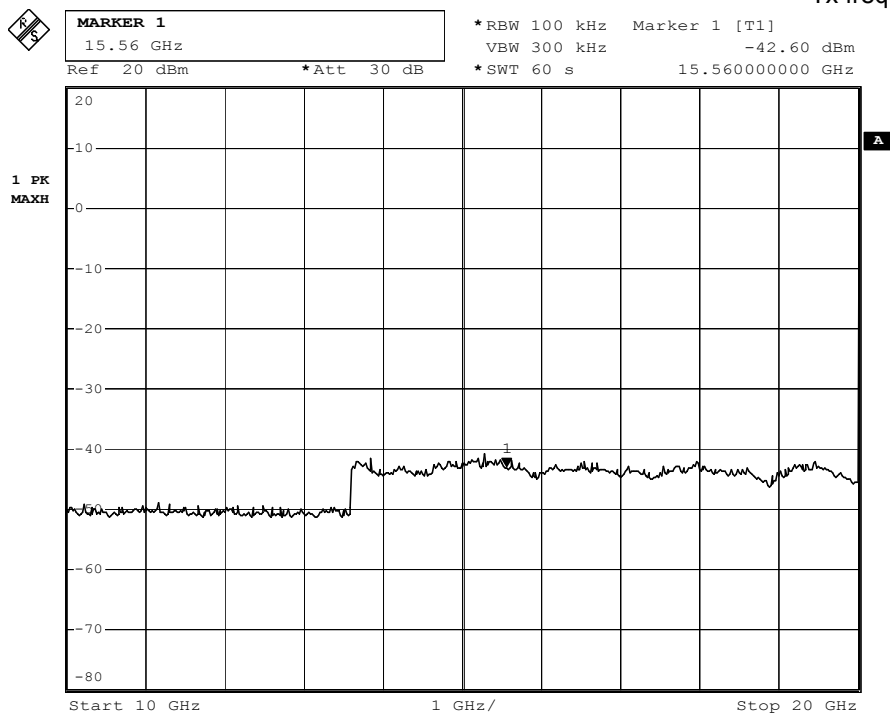
Date: 14.MAR.2005 09:58:34

Tx frequency: 2402MHz



Date: 14.MAR.2005 10:08:46

Tx frequency: 2441MHz



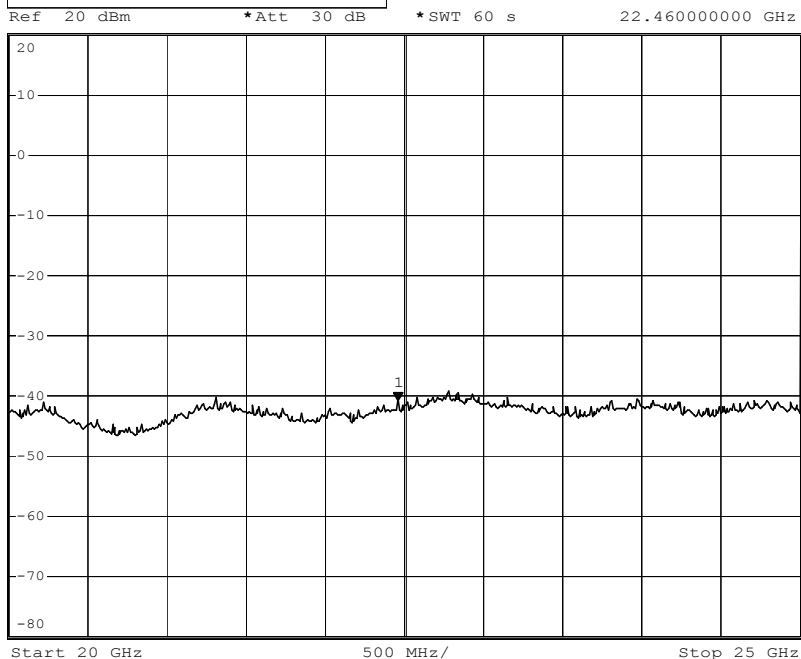
Date: 14.MAR.2005 10:02:12

Tx frequency: 2441MHz



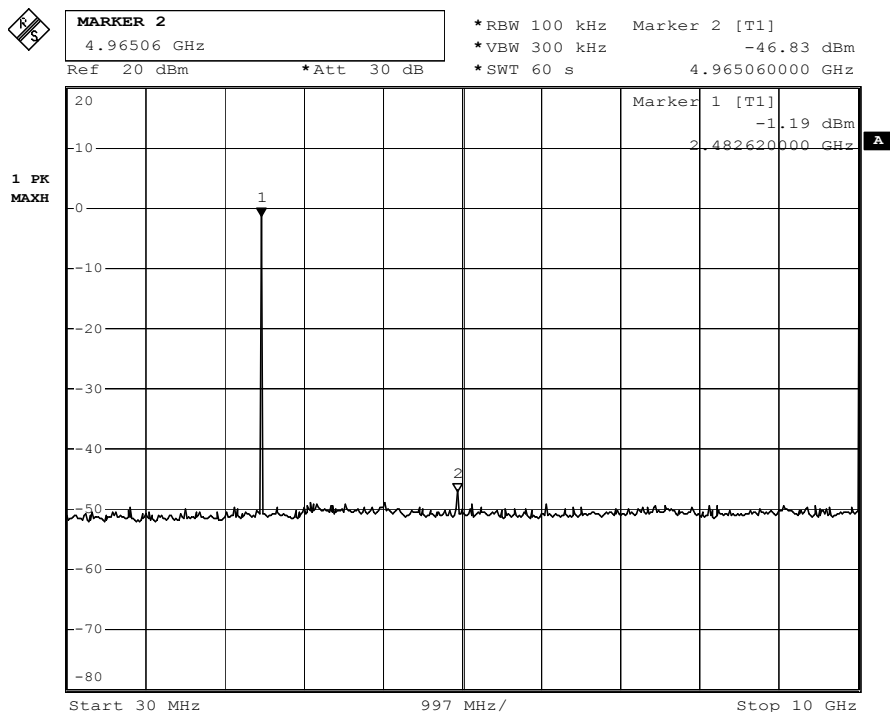
MARKER 1
22.46 GHz

*RBW 100 kHz Marker 1 [T1]
VBW 300 kHz -40.47 dBm
*SWT 60 s 22.46000000 GHz



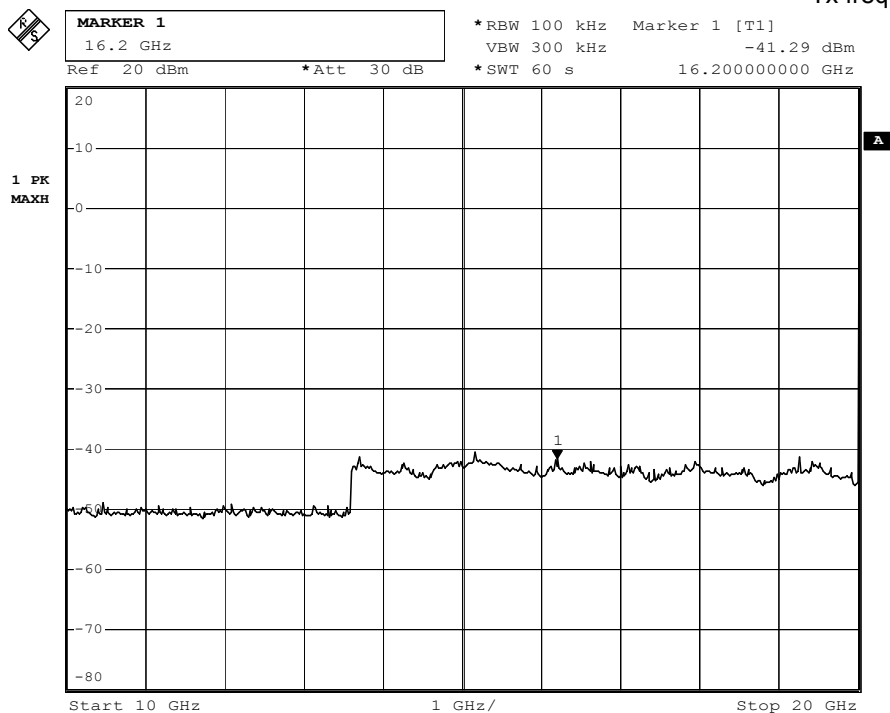
Date: 14.MAR.2005 09:58:08

Tx frequency: 2441MHz



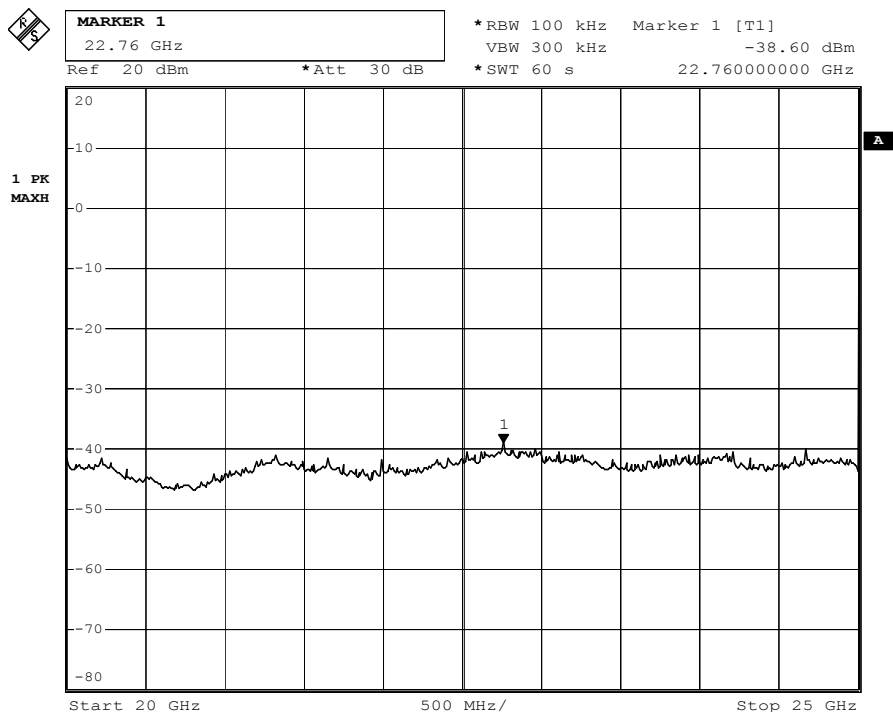
Date: 11.MAR.2005 18:25:26

Tx frequency: 2480MHz



Date: 14.MAR.2005 09:53:09

Tx frequency: 2480MHz



Date: 14.MAR.2005 09:55:06

Tx frequency: 2480MHz

Spurious Emissions - Radiated

Date: 1 Mar 2005

EUT: iM402-B

Company: i.Tech Dynamic Ltd.

Voltage supply: 3.9VDC from rechargeable battery

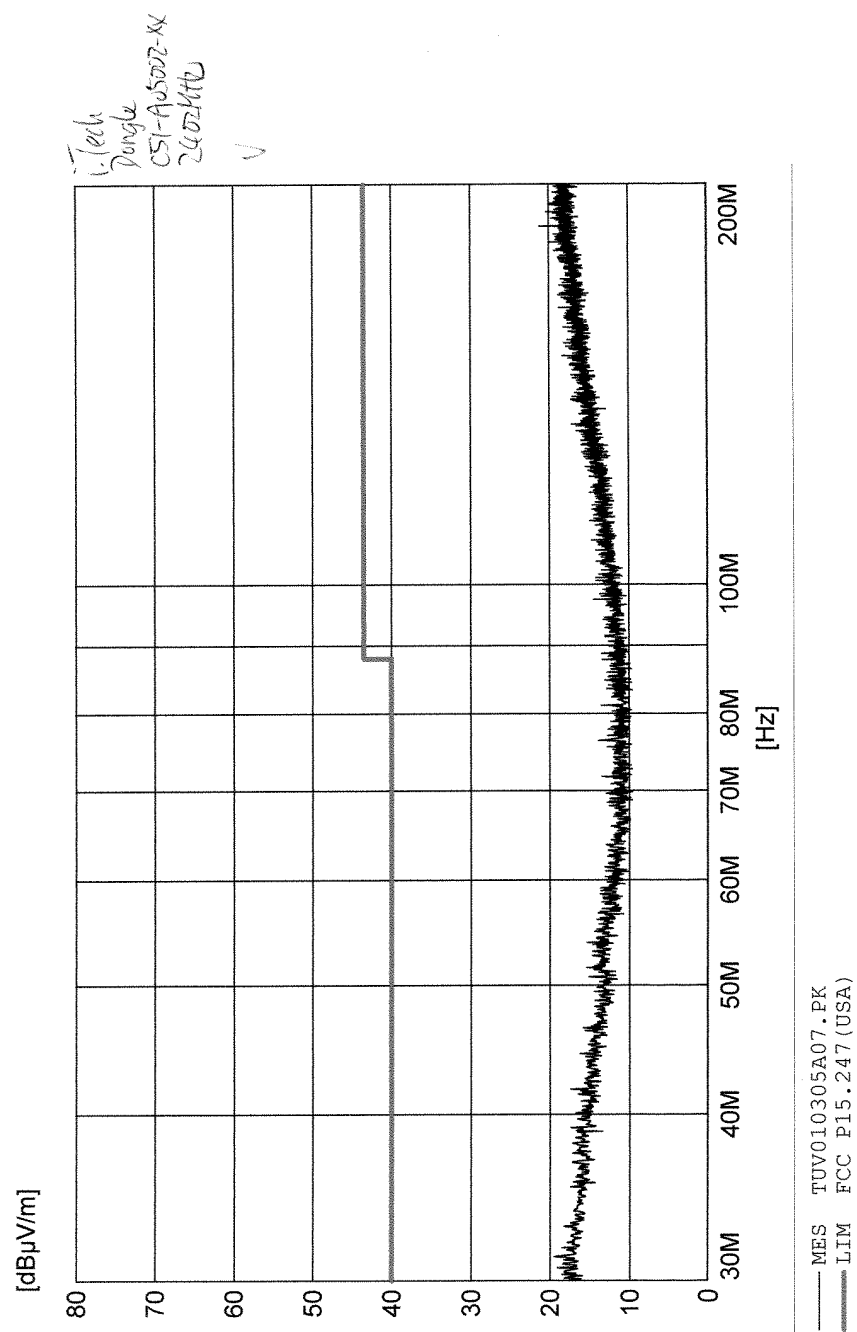
Test by: Sharon Li

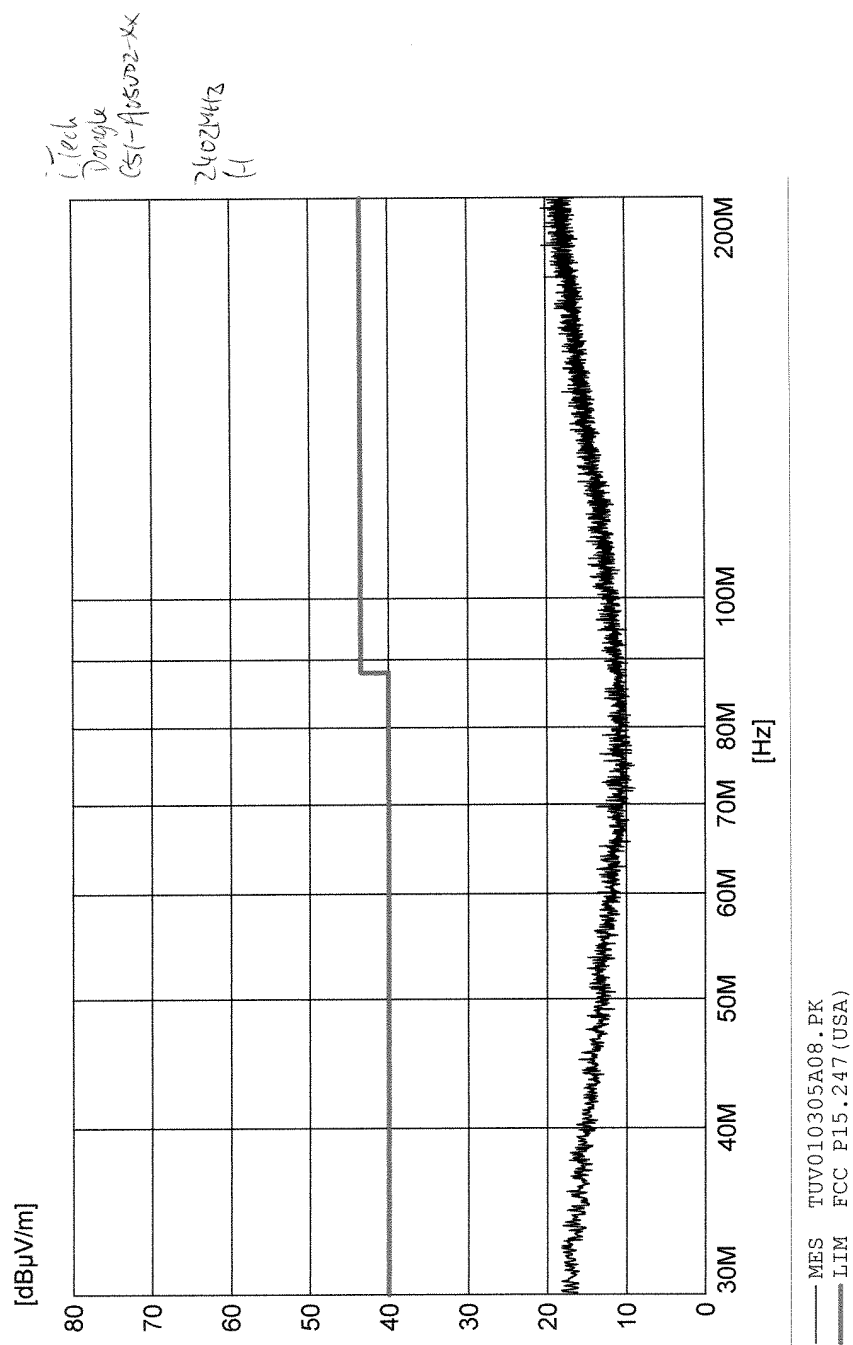
Op. mode: TX mode, DH1 with PRBS9 payload

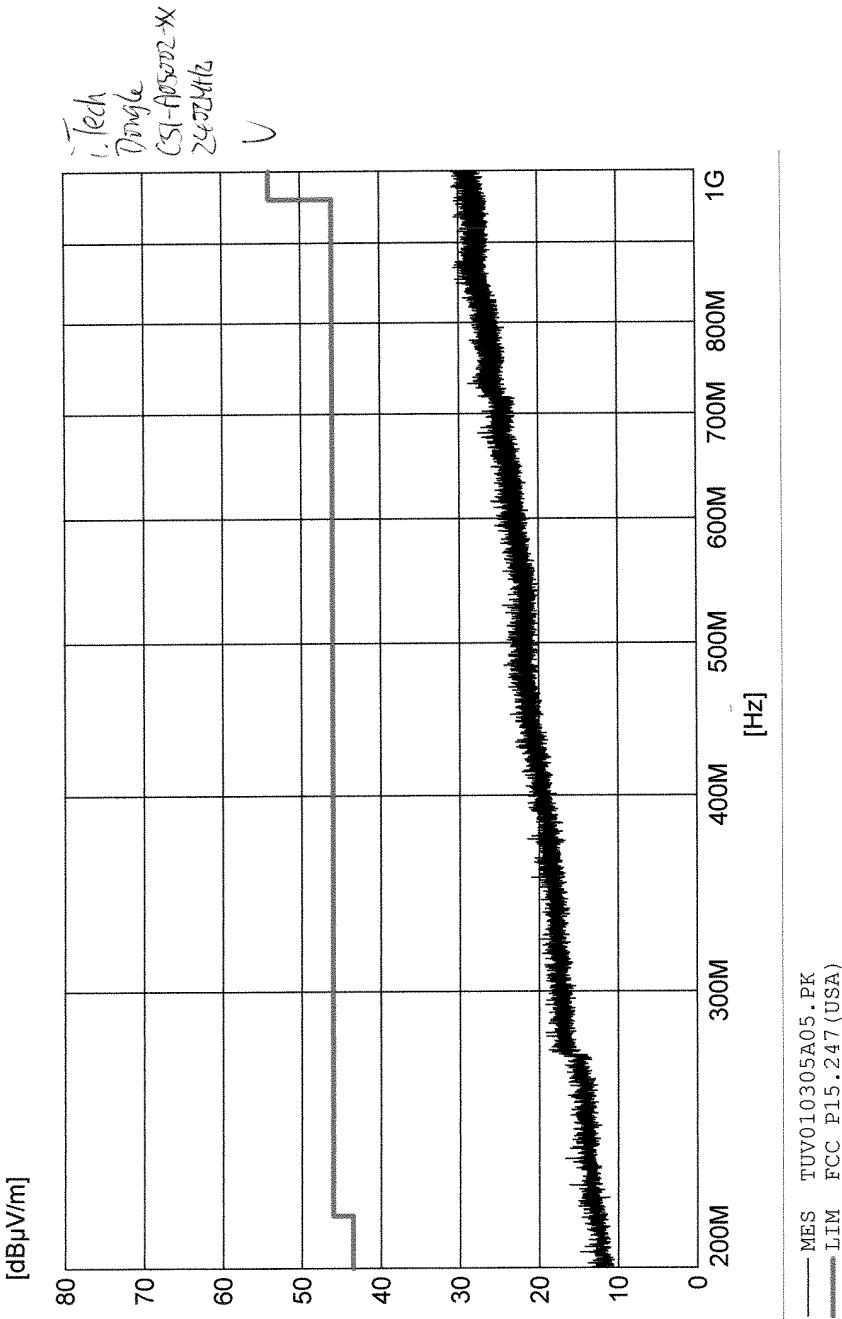
Tx frequency (MHz)	Polarization	Spurious Frequency (MHz)	Power Level (dBuV/m)	Detector (P/QP/A)
2402	V	4803.920	48.71	P
2402	V	4803.980	44.26	A
2402	H	1602.040	40.56	P
2402	H	1602.040	39.05	A
2402	H	4803.900	45.53	P
2402	H	4803.960	40.10	A

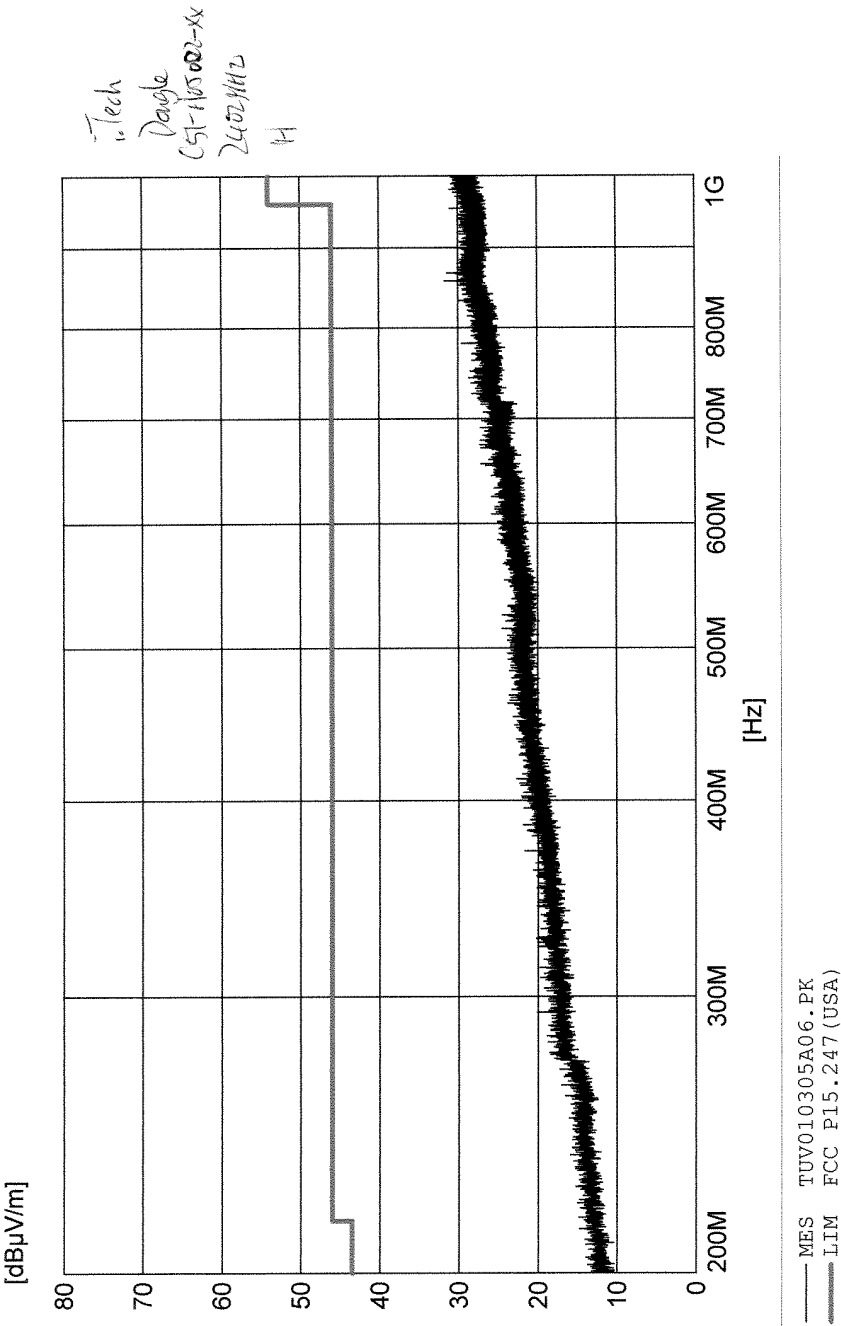
Tx frequency (MHz)	Polarization	Spurious Frequency (MHz)	Power Level (dBuV/m)	Detector (P/QP/A)
2441	V	4881.920	49.23	P
2441	V	4881.900	45.67	A
2441	H	1628.060	41.41	P
2441	H	1628.000	39.84	A
2441	H	4881.900	48.25	P
2441	H	4881.620	44.72	A

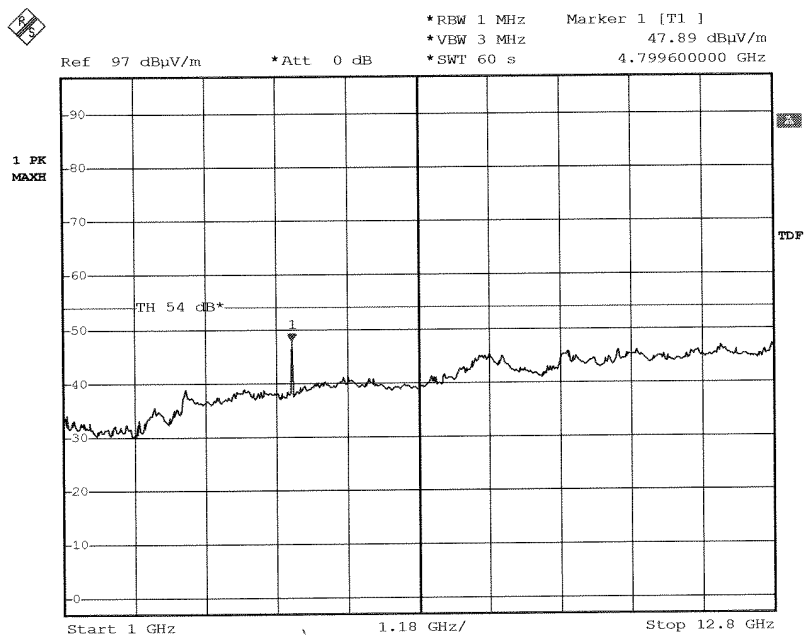
Tx frequency (MHz)	Polarization	Spurious Frequency (MHz)	Power Level (dBuV/m)	Detector (P/QP/A)
2480	V	1654.000	38.52	P
2480	V	1654.000	36.75	A
2480	V	4960.020	49.84	P
2480	V	4959.920	46.62	A
2480	H	4960.060	49.82	P
2480	H	4960.000	47.60	A





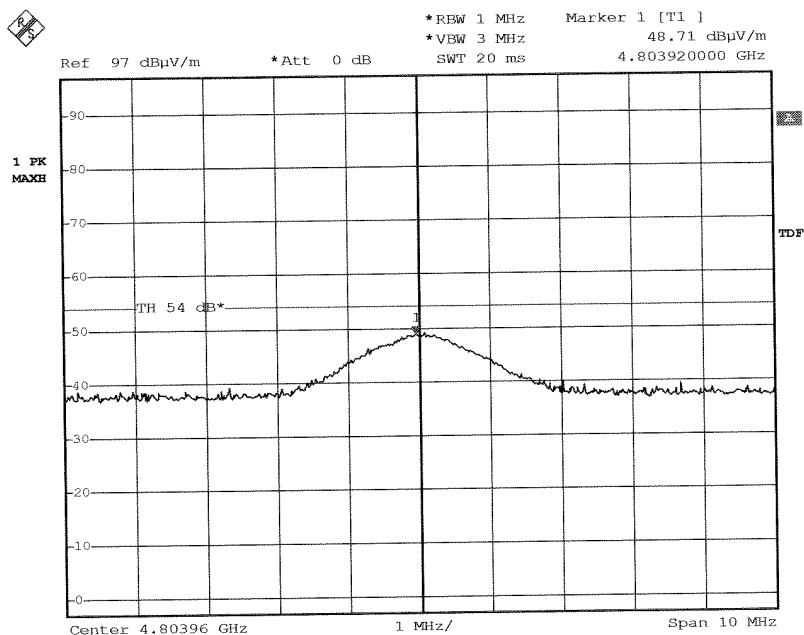






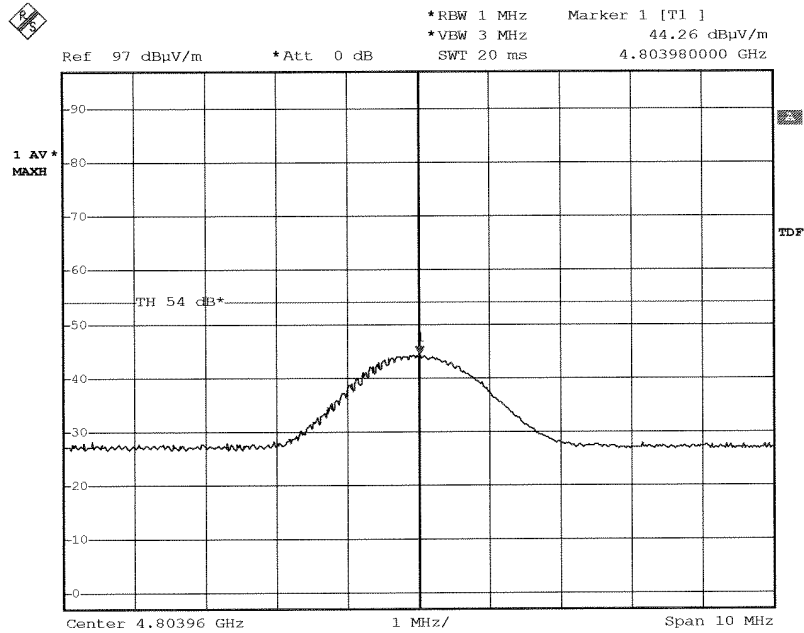
Date: 1.MAR.2005 16:47:35

i.Tech
Dongle
C51-A05002-XX
240MHz
2.4GHz filter applied
V



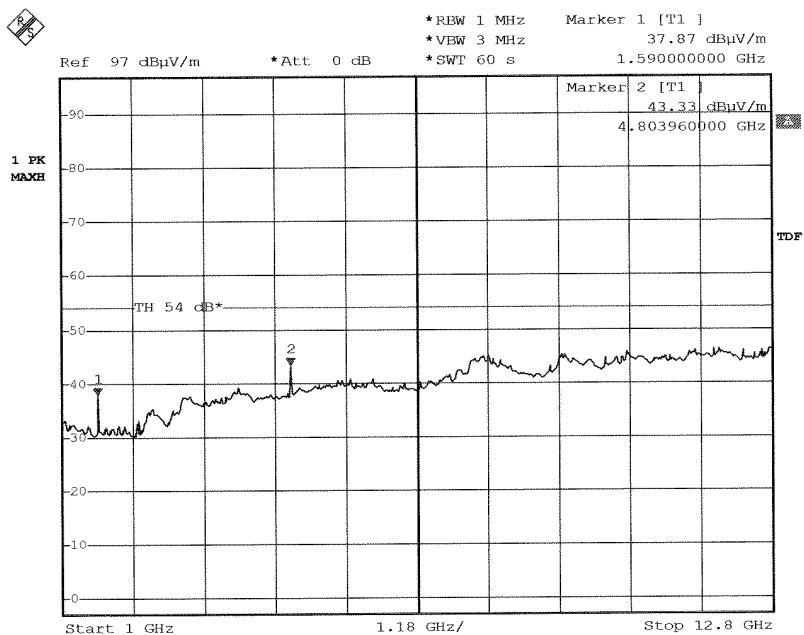
Date: 1.MAR.2005 16:50:28

i.tech
 Dongle
 CSI-A05002-XX
 24021112
 2.4G After
 V



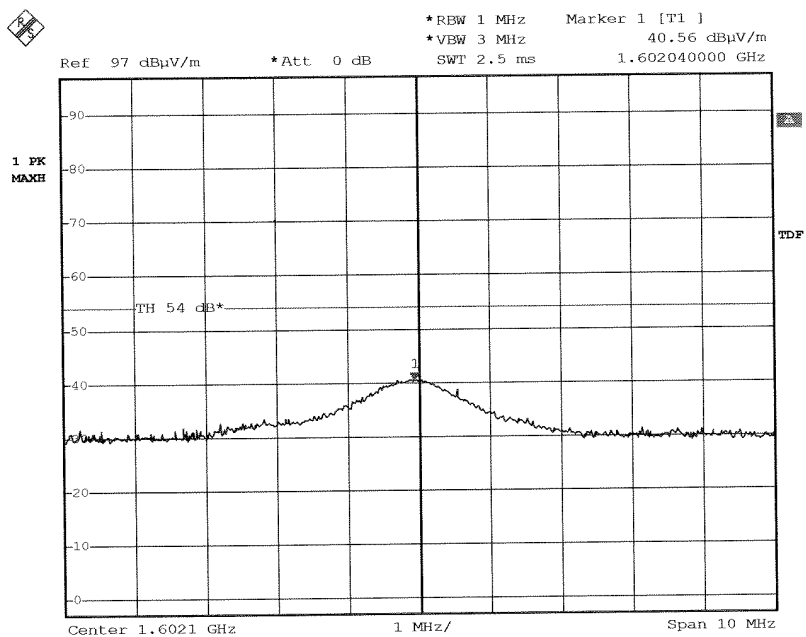
Date: 1.MAR.2005 16:51:22

i.Tech
 Dongle
 CS1-A05002-Xx
 2402MHz
 2.4GHz filter
 V



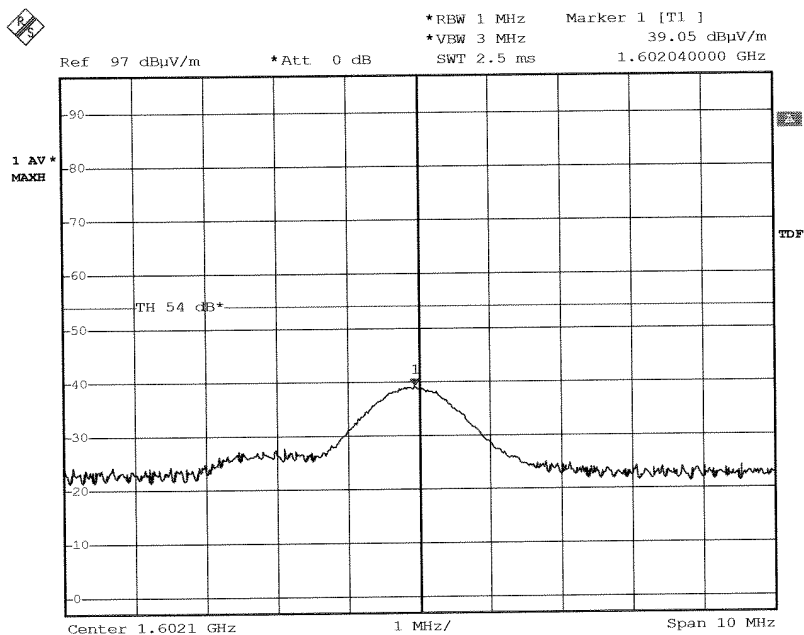
Date: 1.MAR.2005 17:10:37

i.Tech
 Dangle
 G51-A05002-X
 2402MHz
 H
 24GHz filter applied.

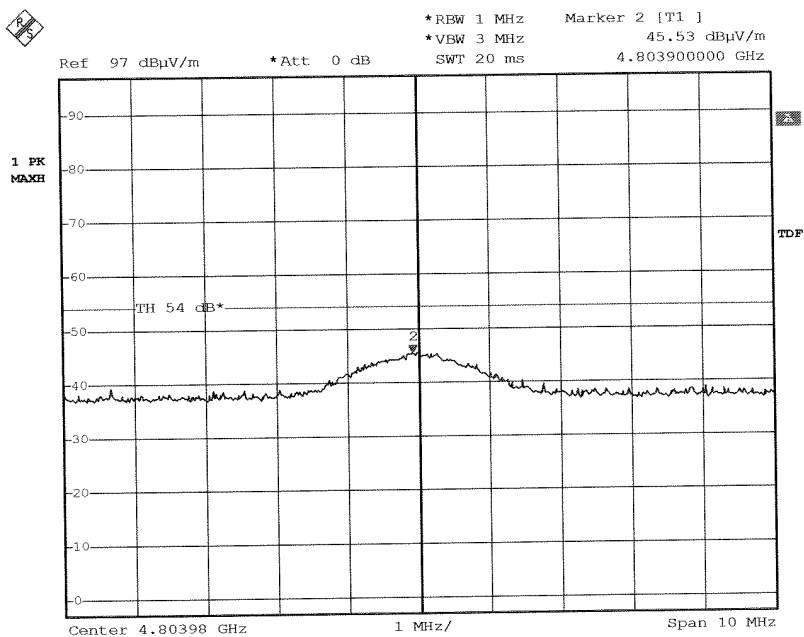


Date: 1.MAR.2005 16:58:40

i.Tech
Dangle
CS1-A05002-XX
240MHz
H

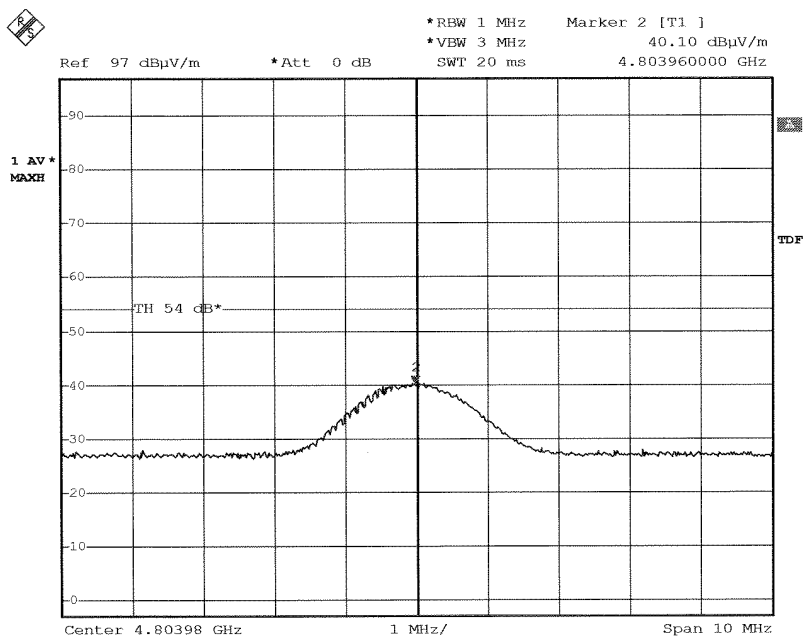


Date: 1.MAR.2005 17:00:15



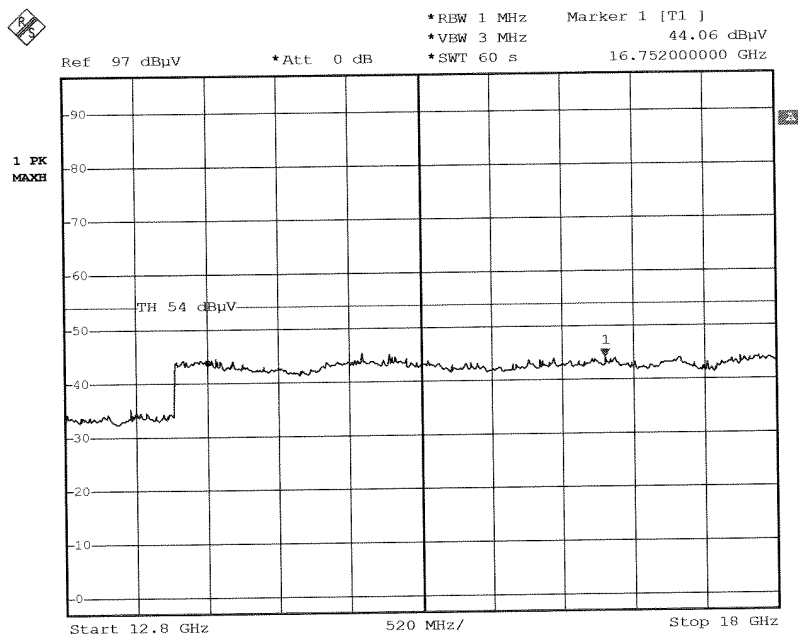
Date: 1.MAR.2005 17:05:36

i.Tech
Dongle
CS1-A05002-XX
24021113
H



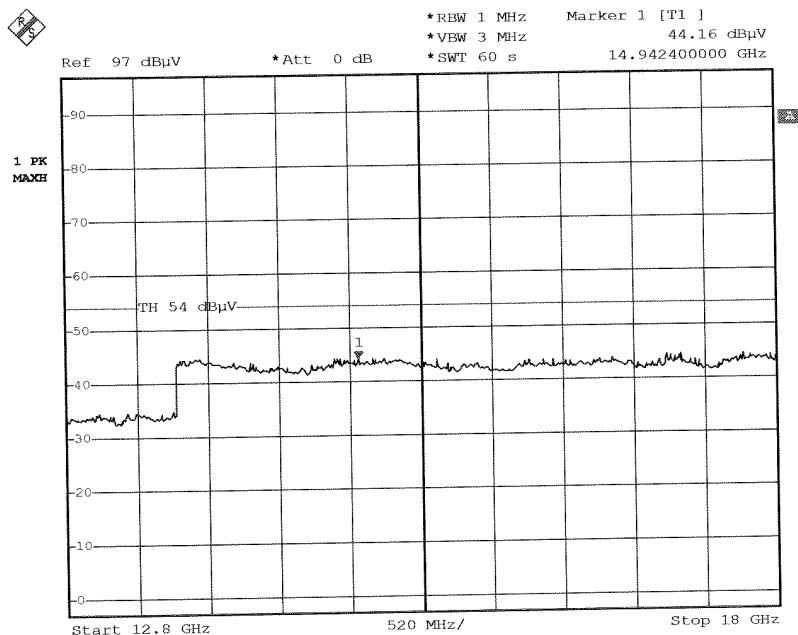
Date: 1.MAR.2005 17:07:03

i. tech
Dongle
CS1-A05002-XX
2402MHz
H



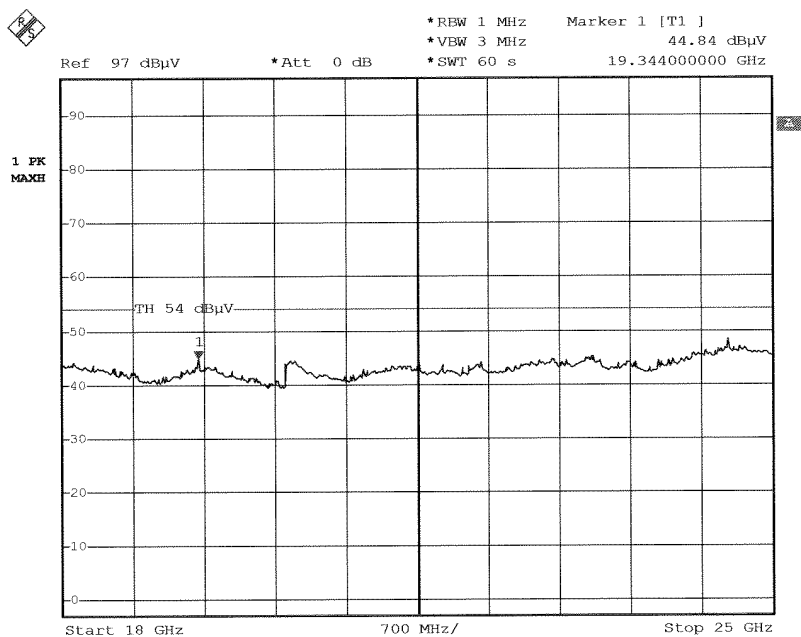
Date: 1.MAR.2005 17:55:40

i. Tech
Dongle
C51-A05002-XX
Σ400MHz
✓



Date: 1.MAR.2005 17:52:20

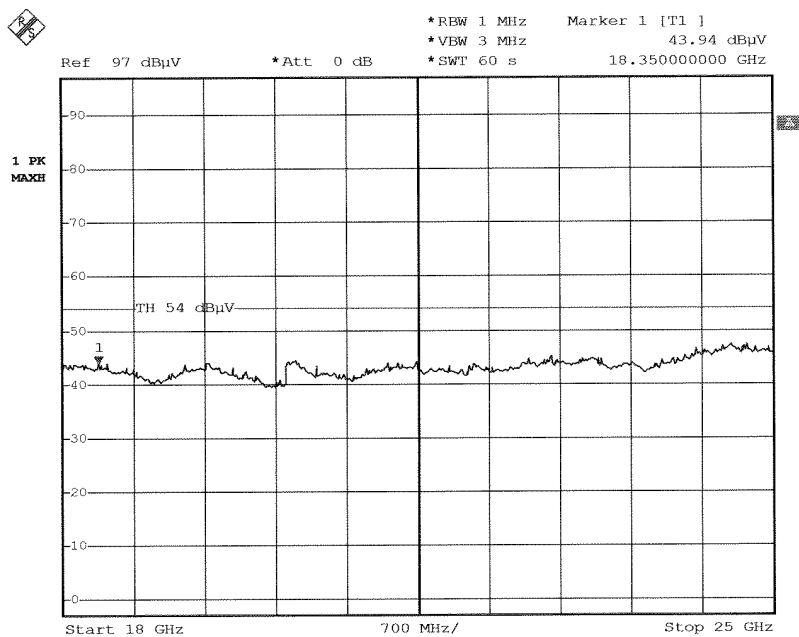
i. tech
 Dongle
 CSI-H05002-XX
 24024Hz
 H.



Date: 1.MAR.2005 18:35:26

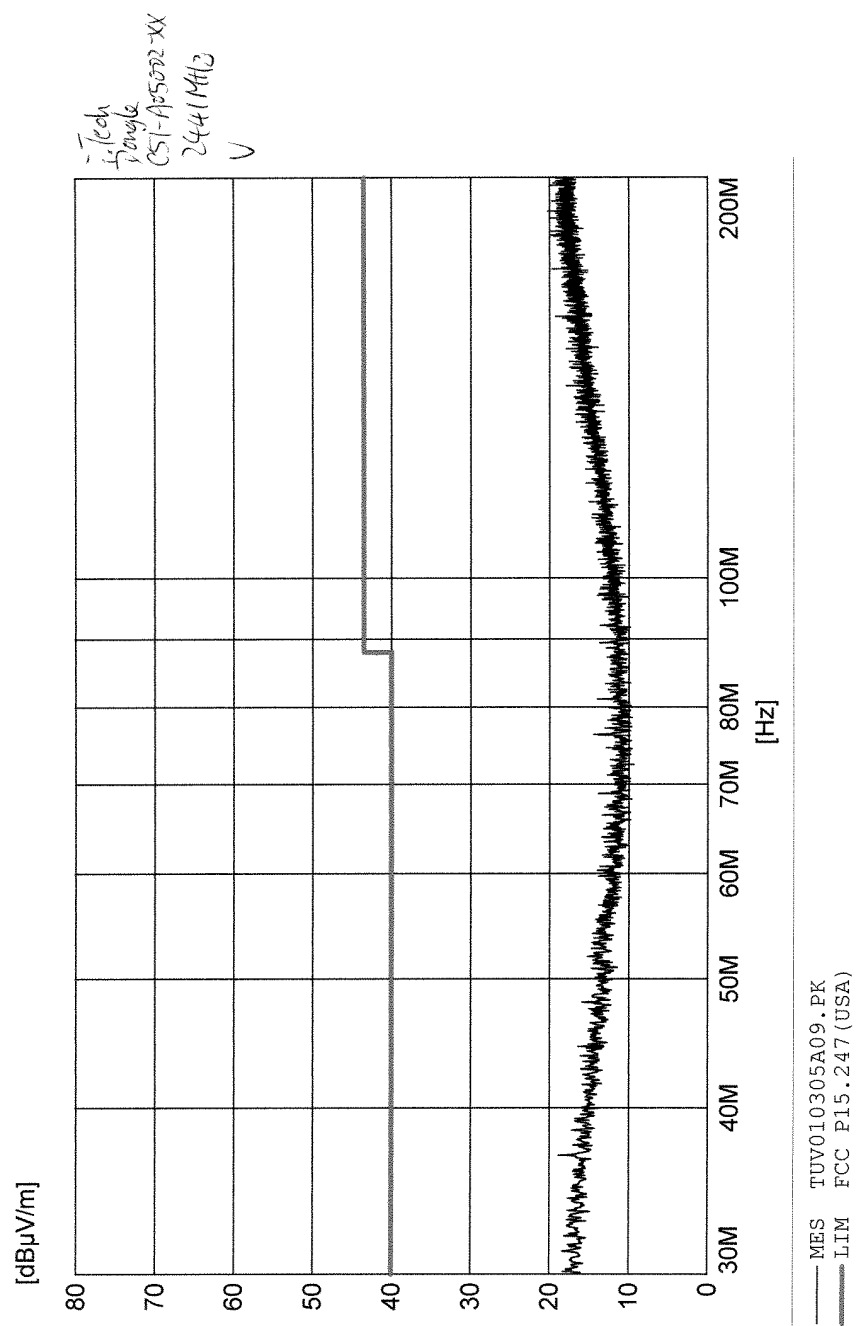
i.tech
Dongle
CS1-A05002-XX
2402MHz

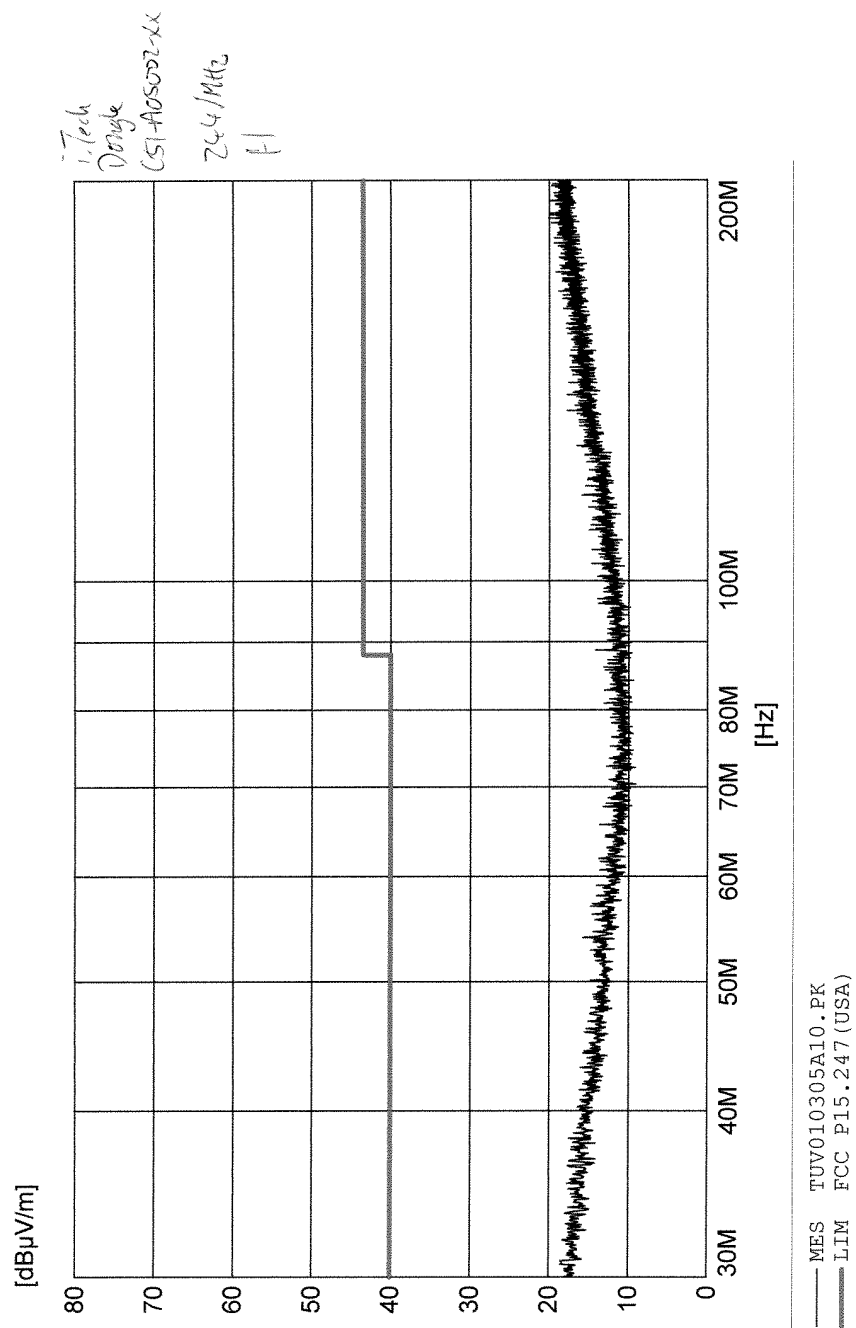
V

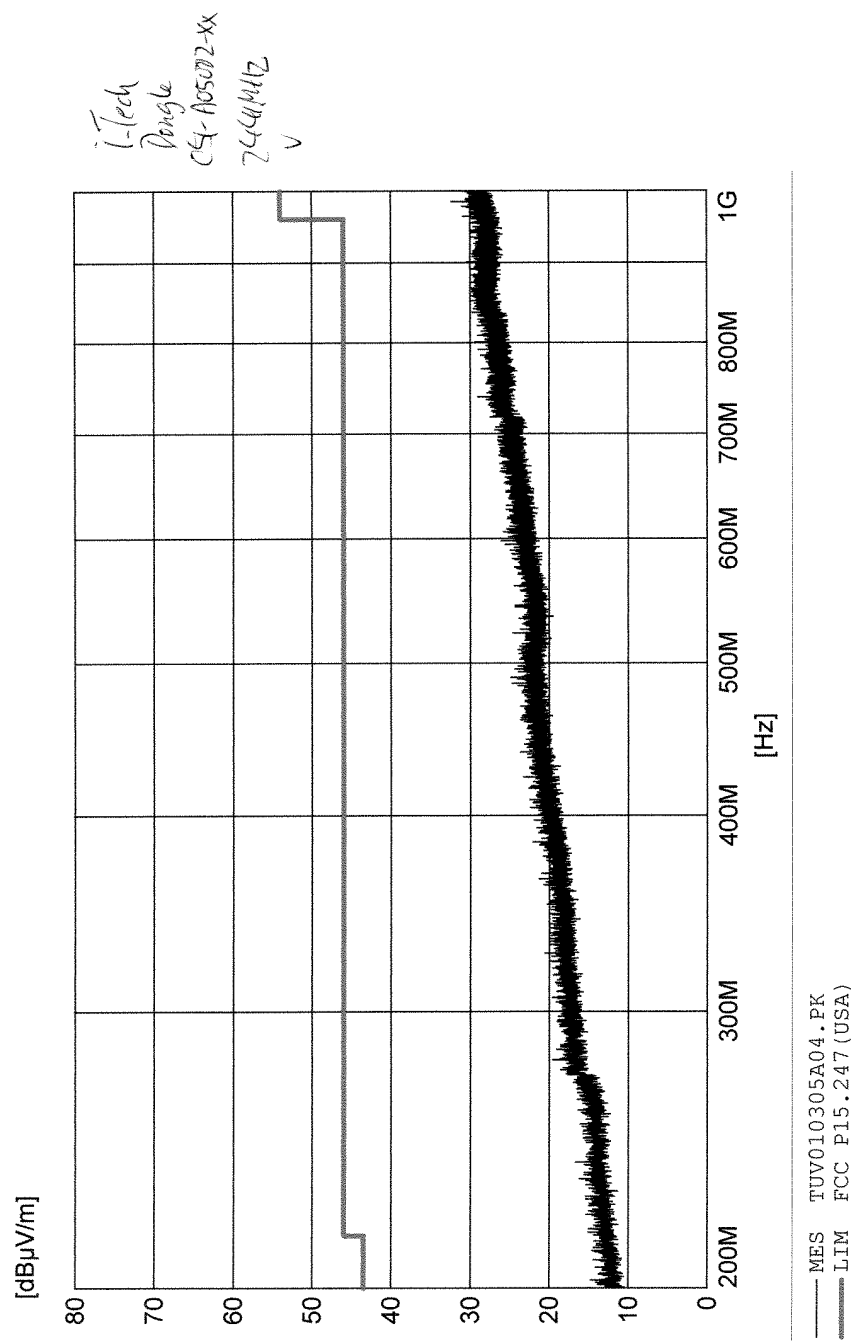


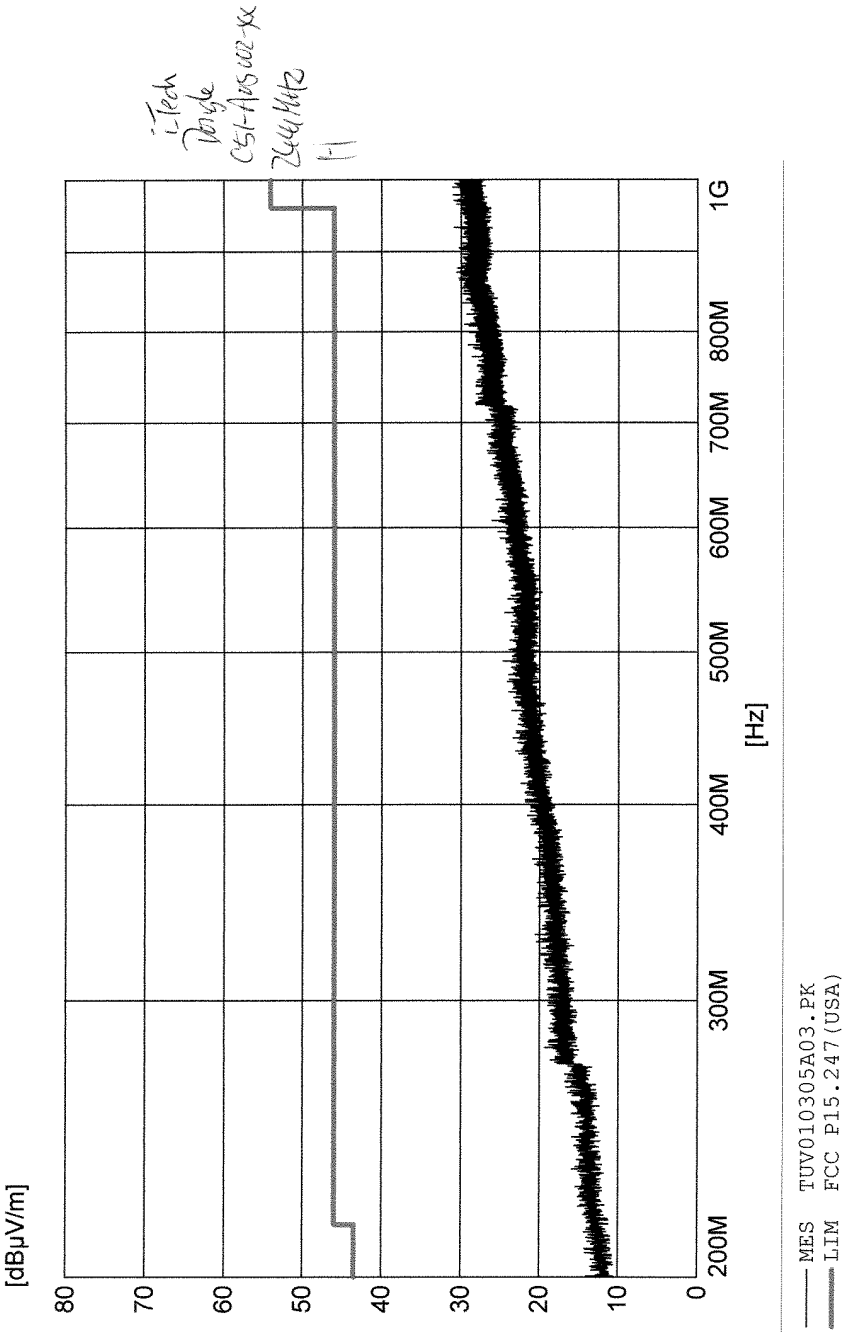
Date: 1.MAR.2005 18:40:42

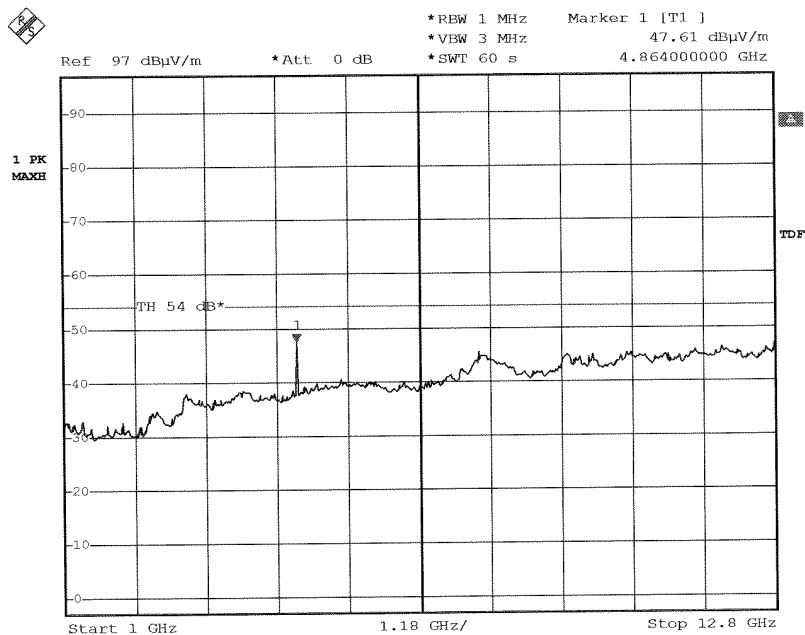
i.Tech
Dongle
CS1-A05002-VX
2402MHz
H





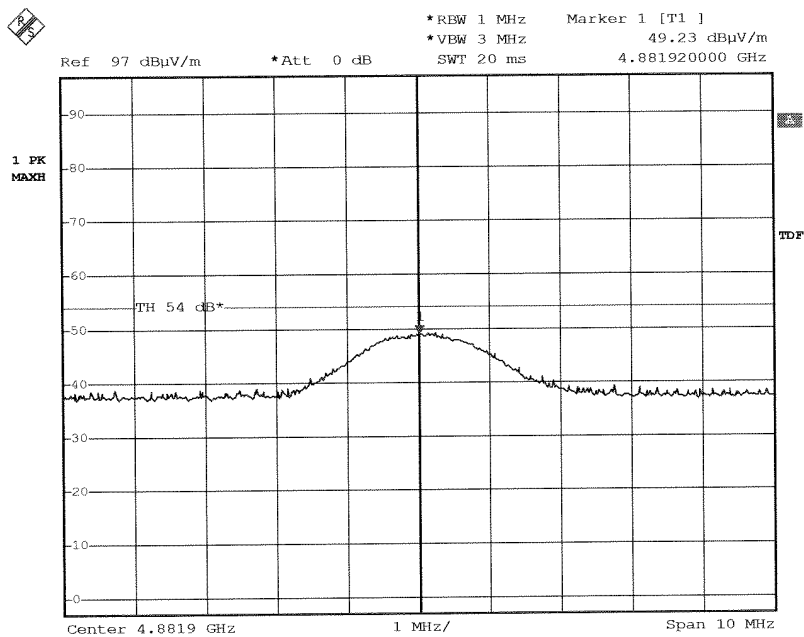






Date: 1.MAR.2005 17:33:35

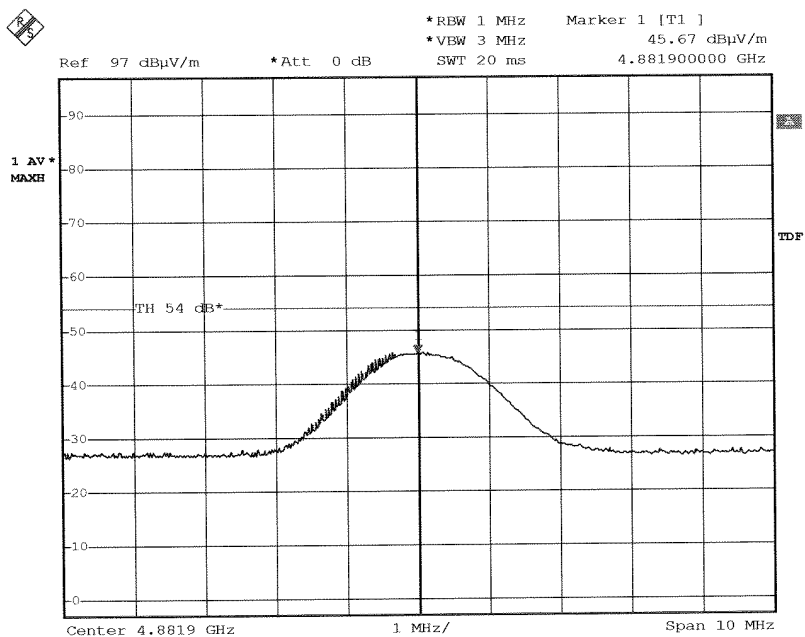
i. tech
Dongle
CSI-A05002 XX
2641MHz
V
2.4GHz filter



Date: 1.MAR.2005 17:36:23

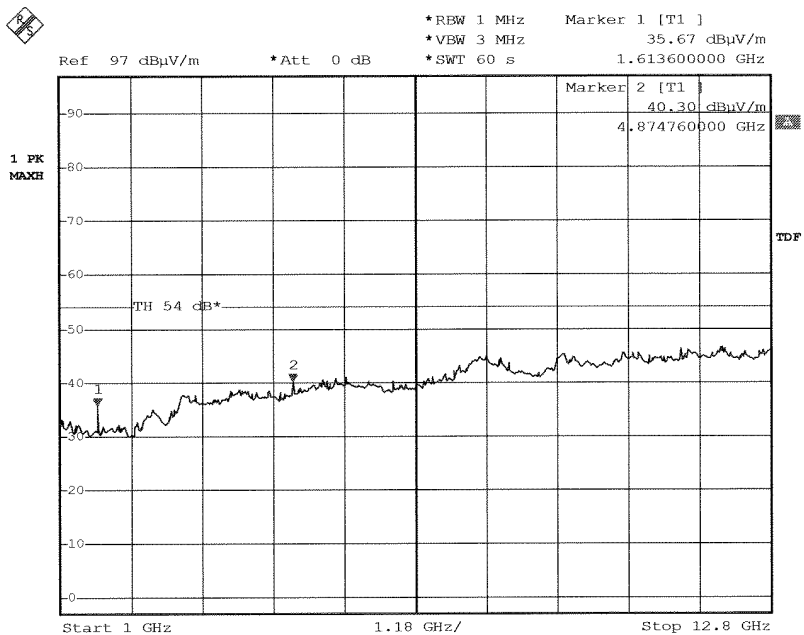
i.Tech
Dangle
CST-A05002-KX
244MHz

V



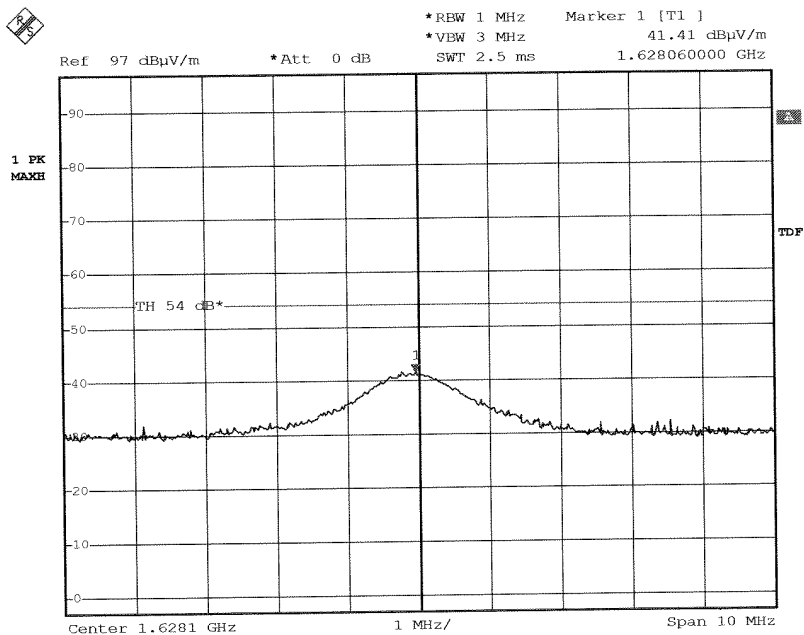
Date: 1.MAR.2005 17:36:59

i.Tech
Dongle
CIS1-A05002-XX
2004/11/17
✓



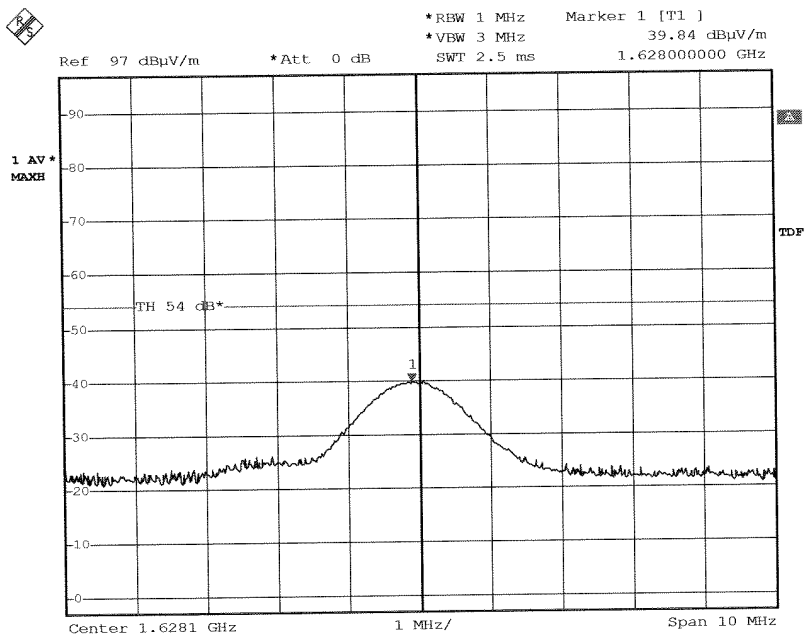
Date: 1.MAR.2005 17:14:27

i. Tech
 Dongle
 CSI-A05002-XX
 2441MHz
 H
 2.4GHz filter applied



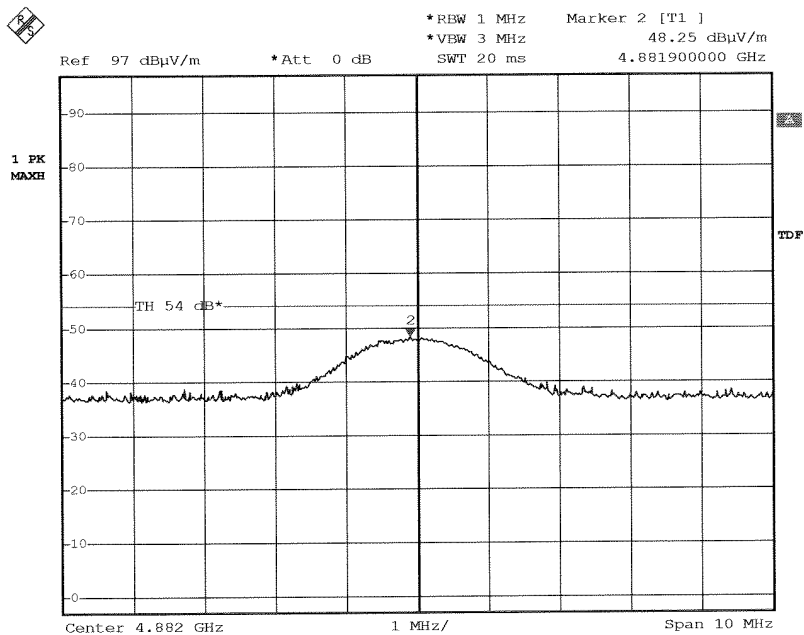
Date: 1.MAR.2005 17:17:28

i. Tech
 Tonge
 CSI-P05002-Xx
 244/4Hz
 14



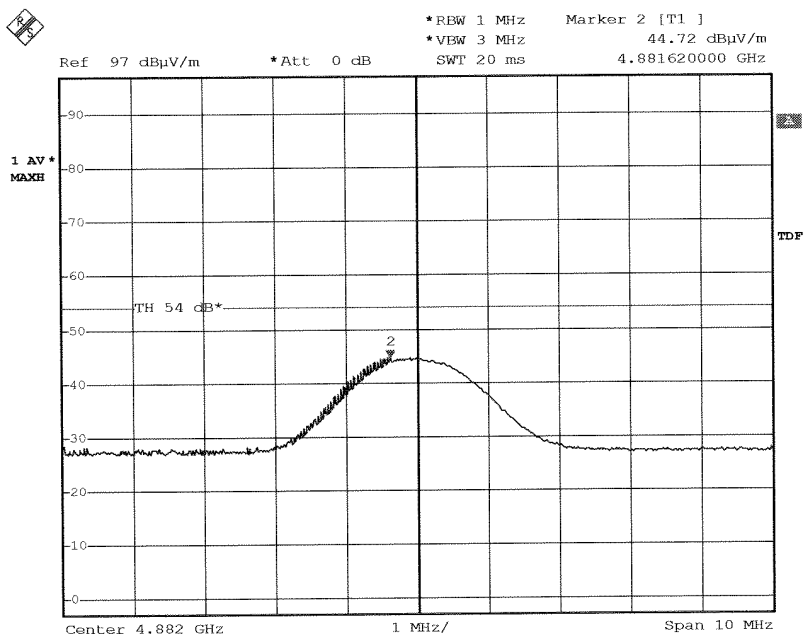
Date: 1.MAR.2005 17:18:01

i.Tech
 Dongle
 GSI-A05002-XX
 244MHz
 1+



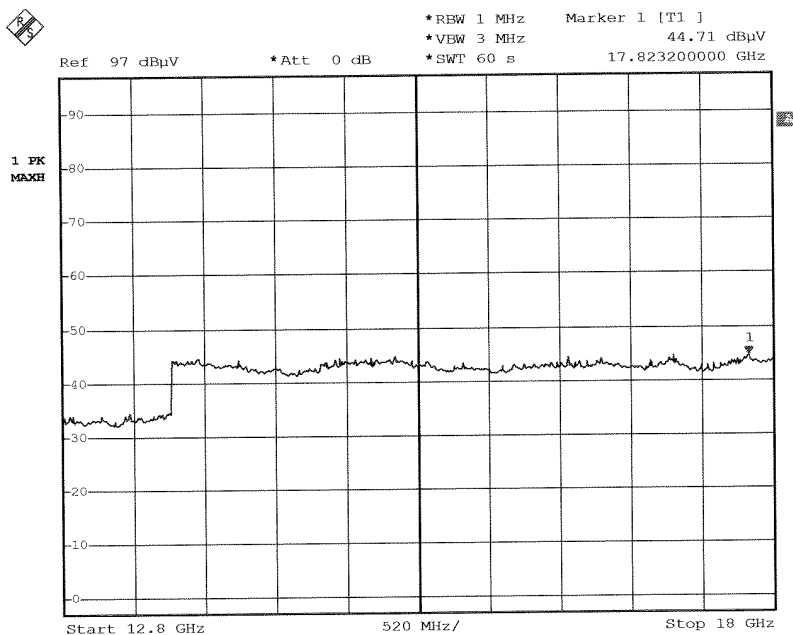
Date: 1.MAR.2005 17:22:37

i. Tech
 Dongle
 CJI-A0502-XX
 244MHz
 H



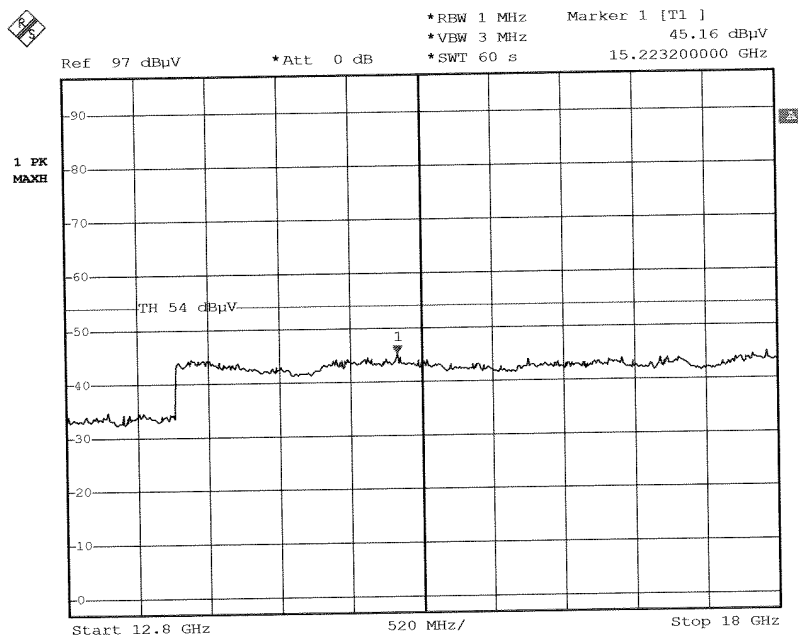
Date: 1.MAR.2005 17:22:02

i-Tech
 Dongle
 CS1-A05002XX
 244MHz
 H



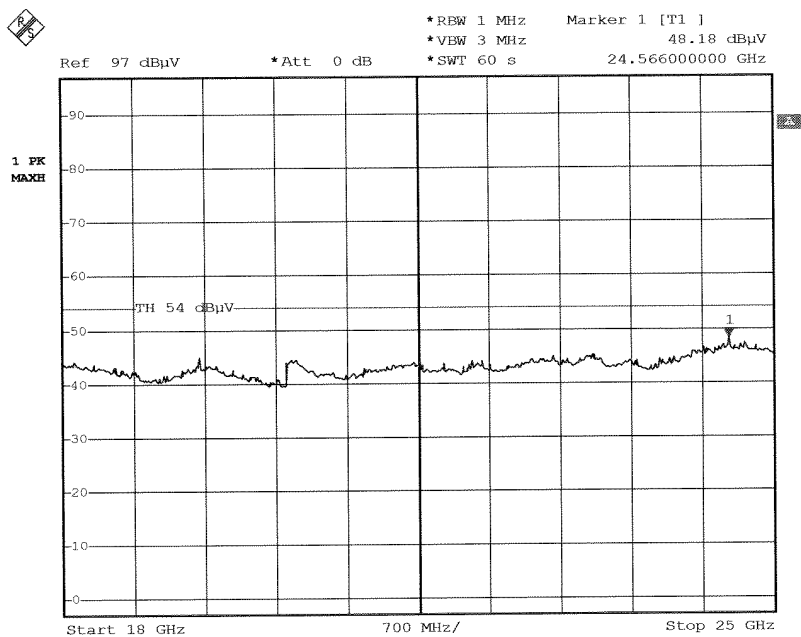
Date: 1.MAR.2005 17:44:54

iTech
Dongle
CS1-A05002-XX
246MHz
V



Date: 1.MAR.2005 17:47:27

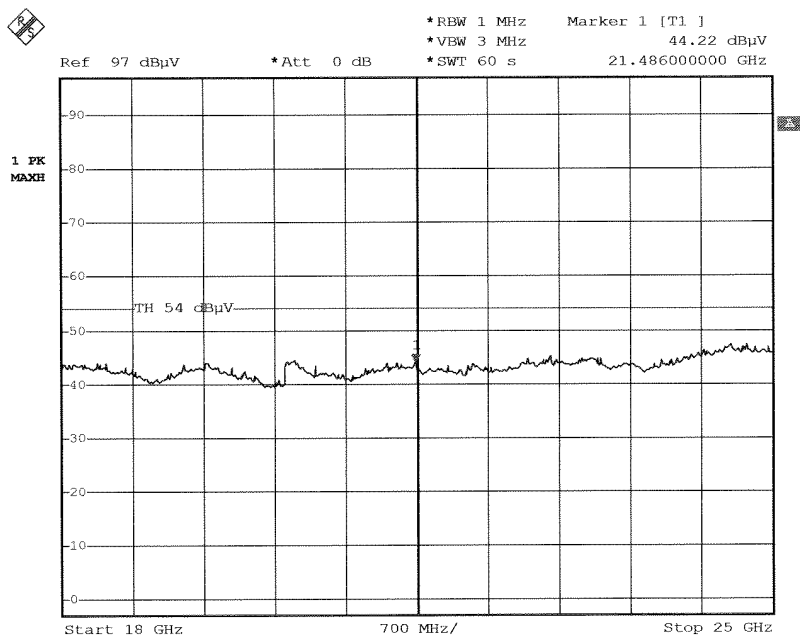
Handwritten:
i, tech
Dangle
CS 1-A05002-xx
2441 MHz
H



Date: 1.MAR.2005 18:36:45

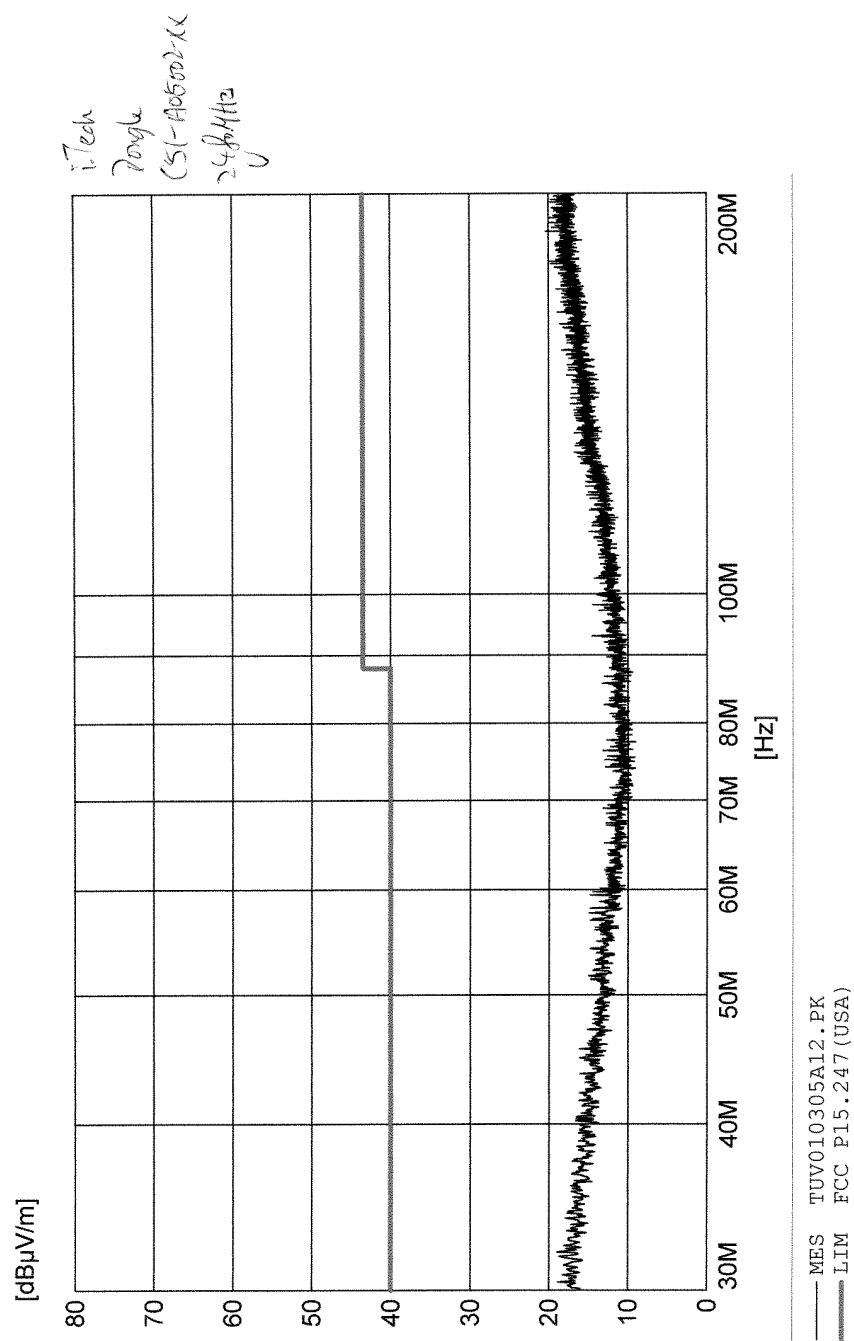
i.Tech
 Dongle
 CS1-A05002-KX
 2441MHz

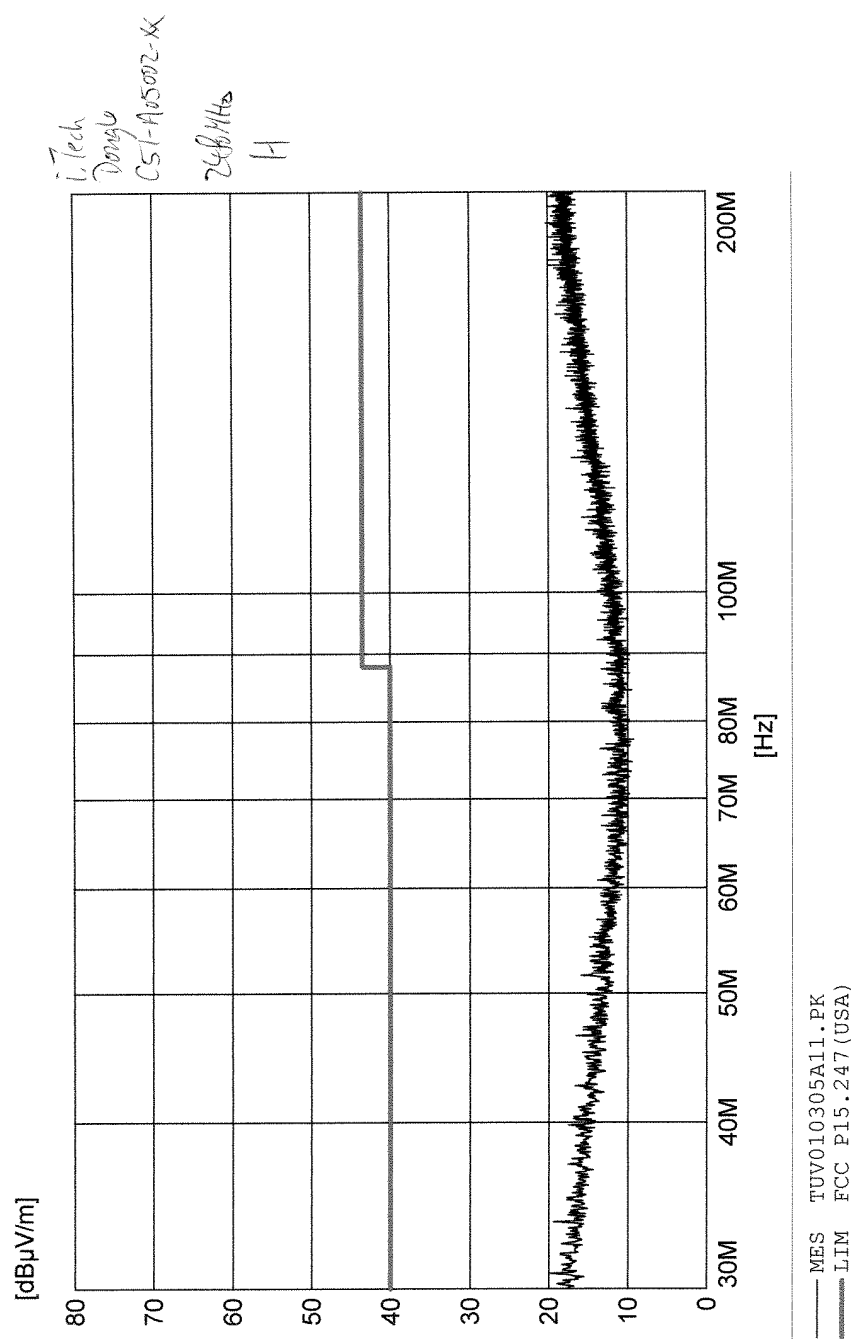
✓

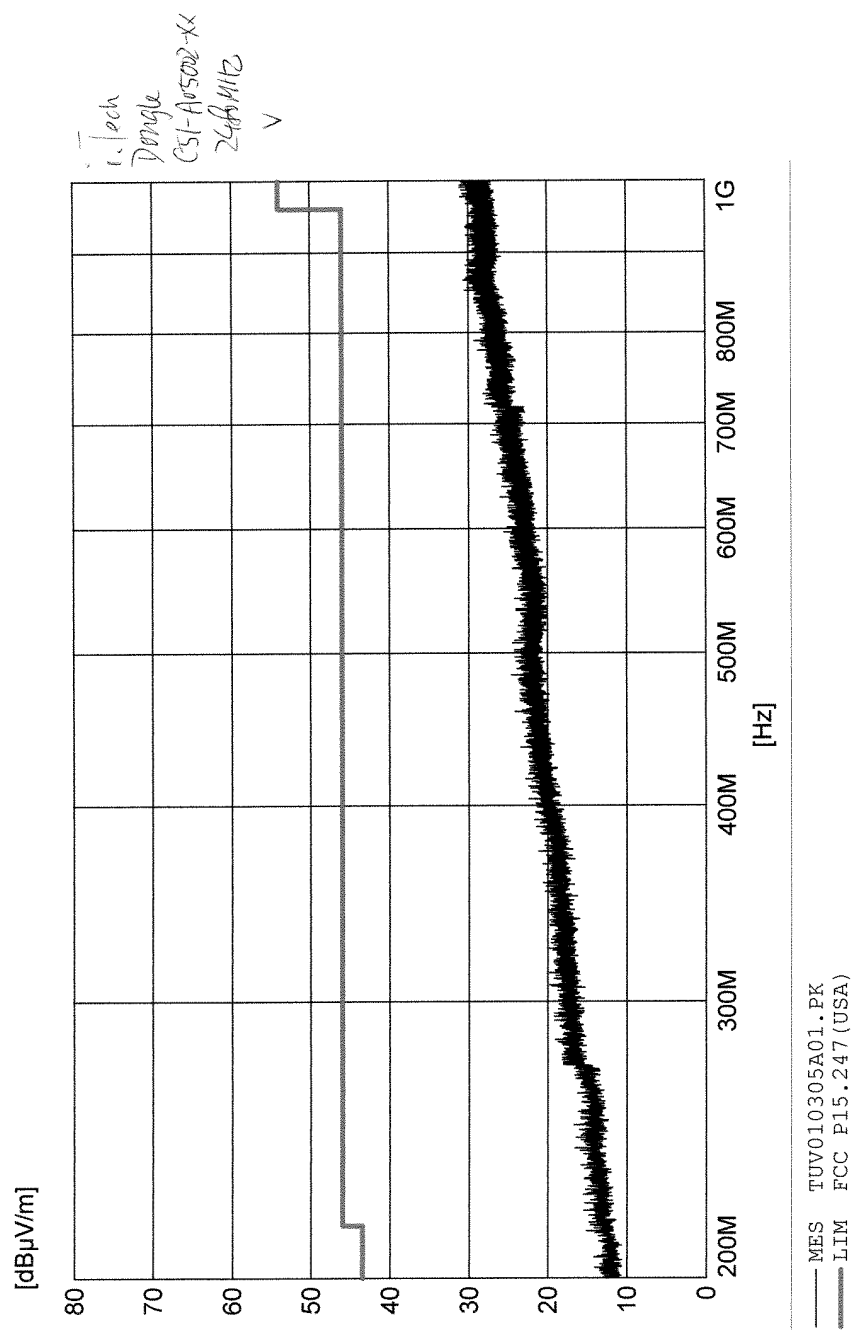


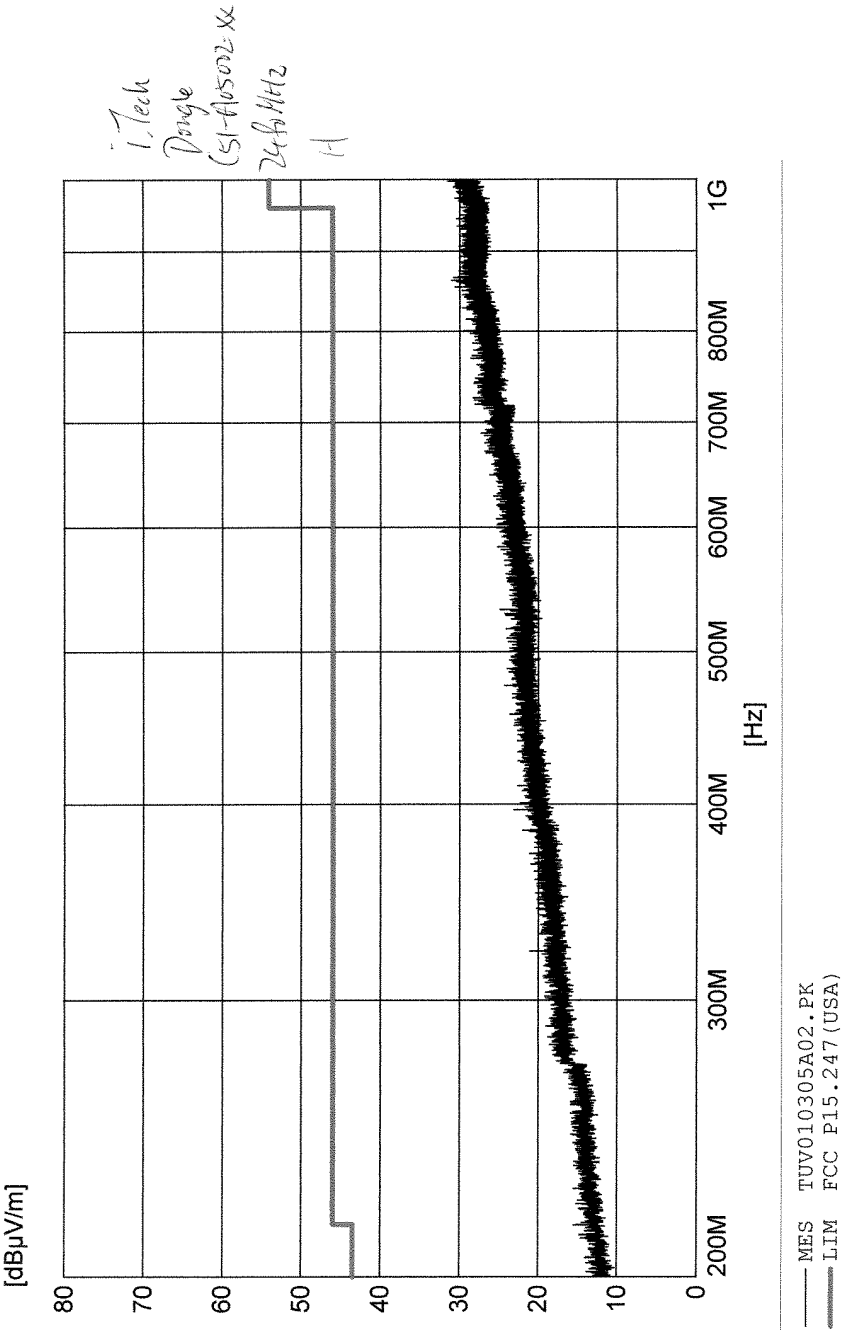
Date: 1.MAR.2005 18:39:59

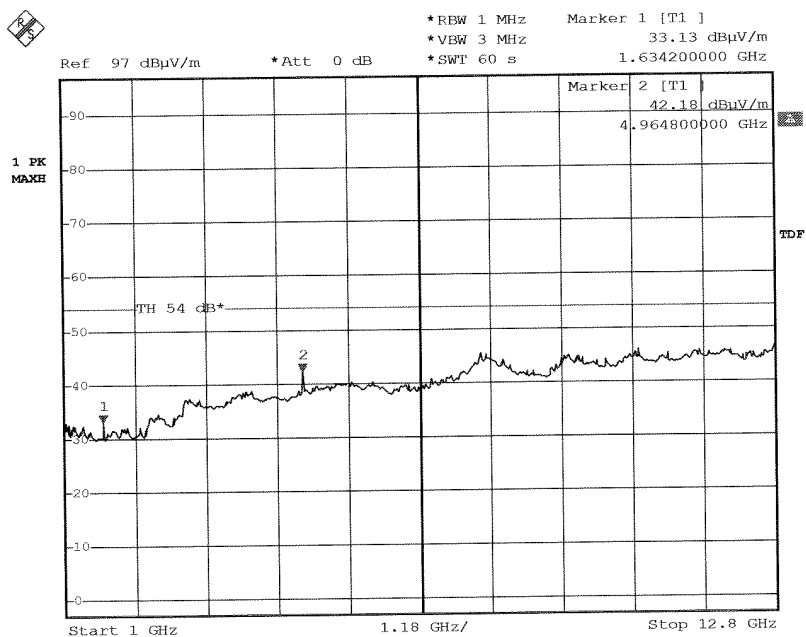
1. Tech
 Dongle
 CSI-A05002-KX
 2441 MHz
 H





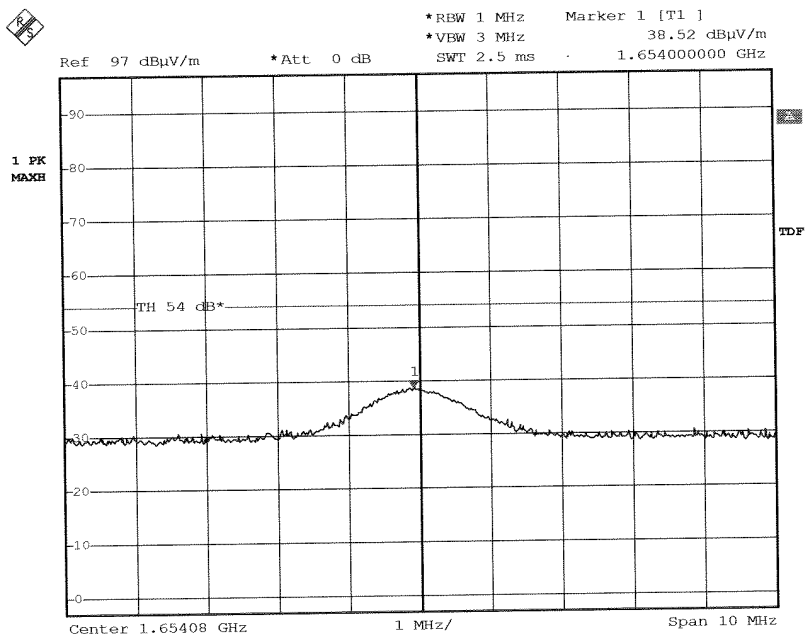






Date: 1.MAR.2005 18:17:22

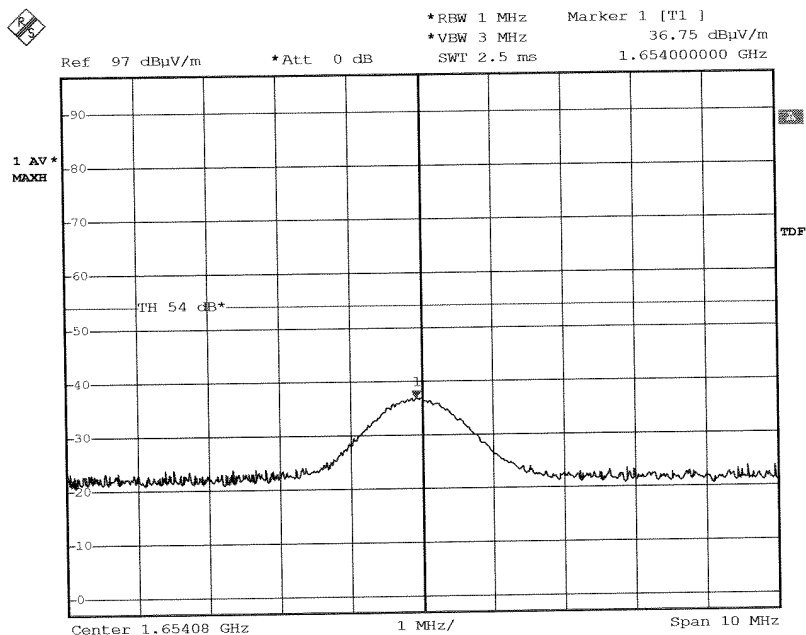
File
 Dongle
 C51-A05002-KX
 24MHz
 ✓



Date: 1.MAR.2005 18:20:08

i.Tech
Dongle
CS1-A025002-KX
2480MHz

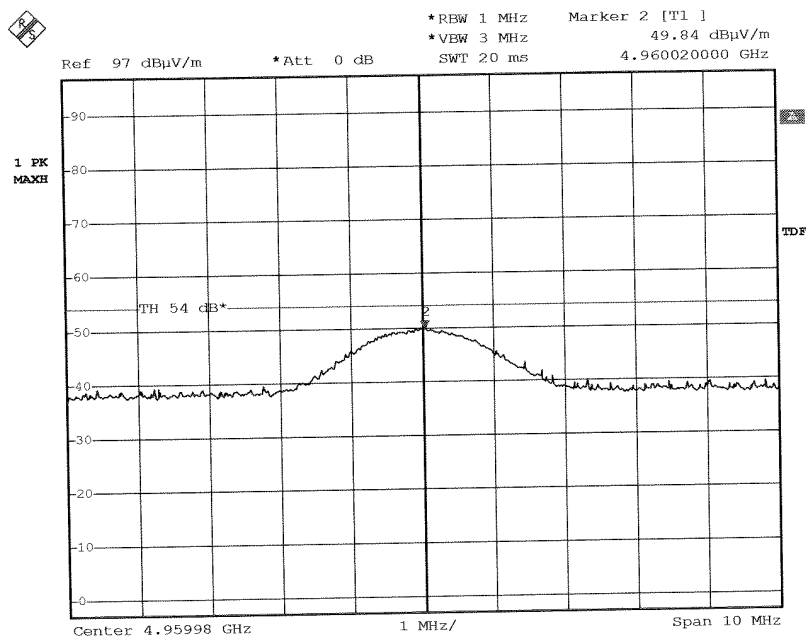
V



Date: 1.MAR.2005 18:20:52

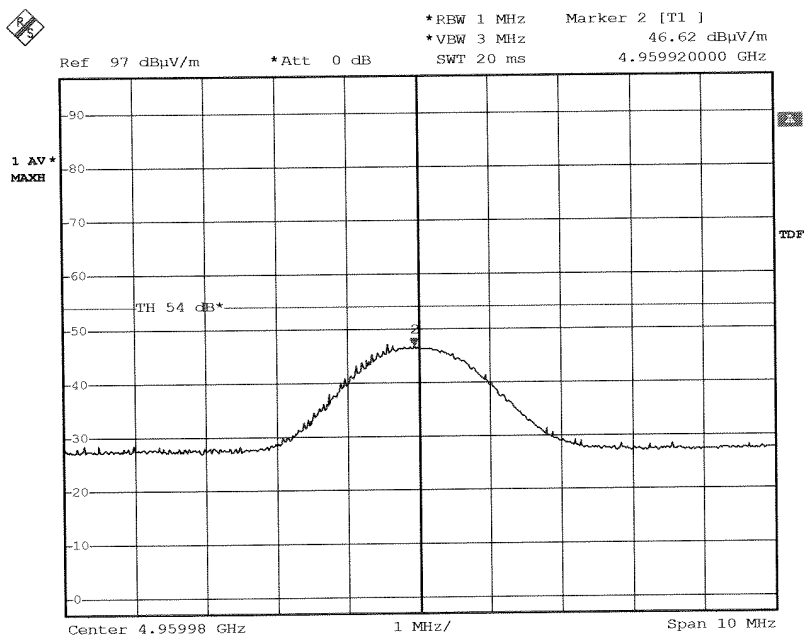
i, Ted
Dongle
C51-A05002-XX
240 MHz

V



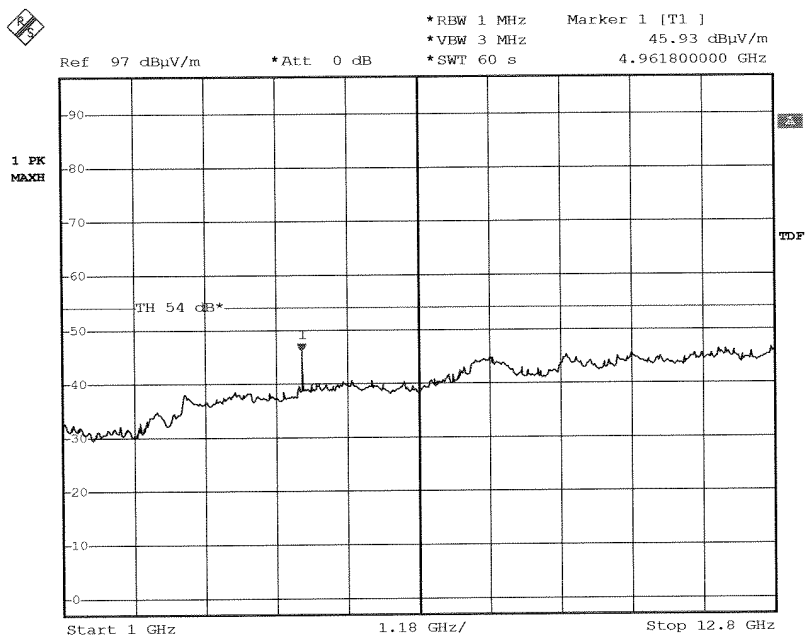
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iTech
Dongle
CS1-A05002-xx
2480MHz
V



Date: 1.MAR.2005 18:25:22

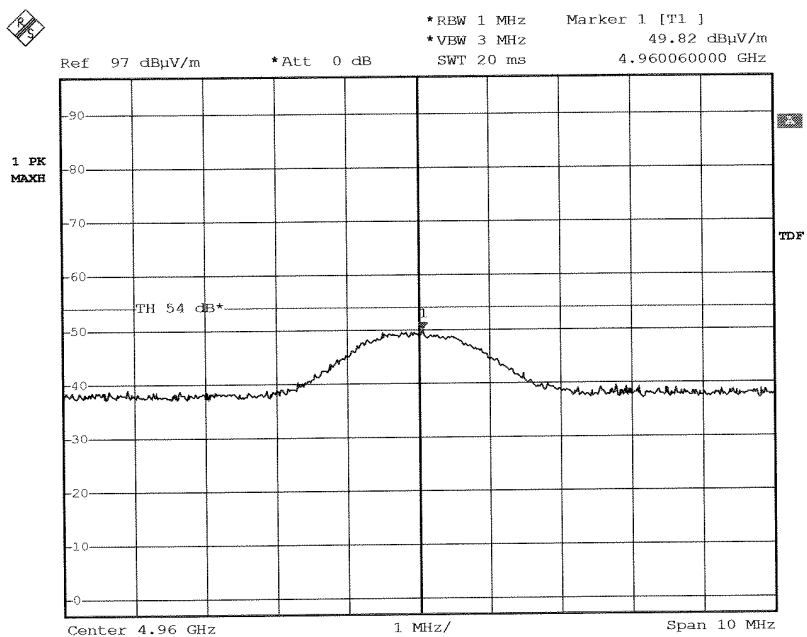
L.Tech
 Dongle
 CS1-A05002-XX
 248MHz
 V



Date: 1.MAR.2005 18:14:30

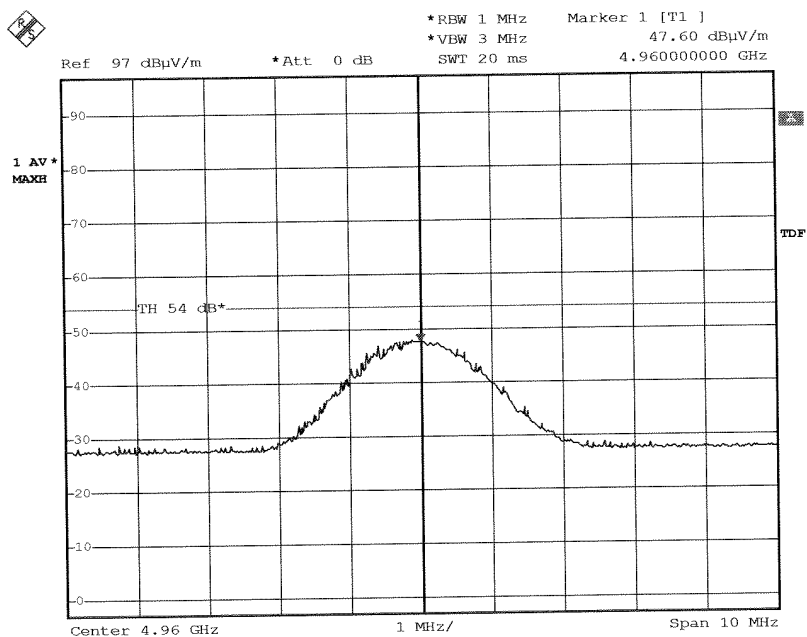
7
Tech
Single
CS1-A05002-KK
246 MHz

H



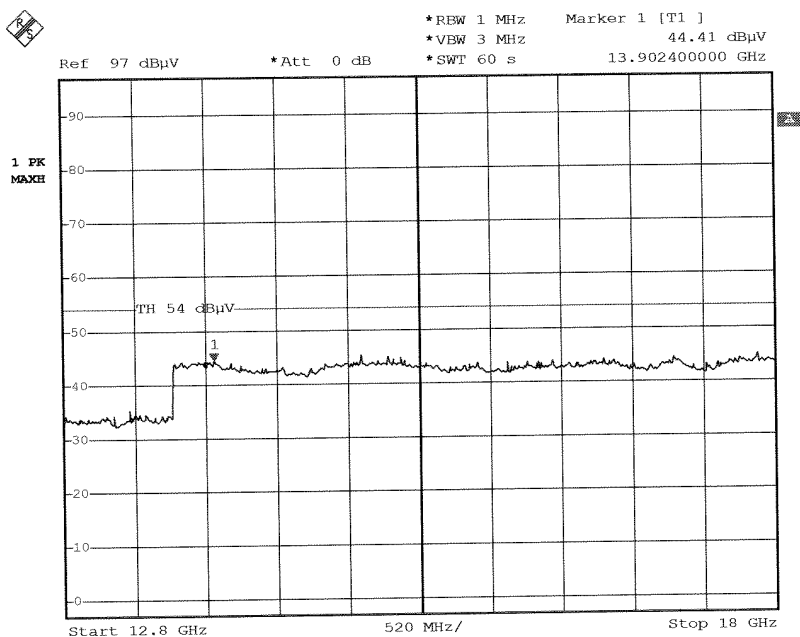
Date: 1.MAR.2005 18:03:54

i.Tech
 Dingle
 CS1-A05002-XX
 2480MHz
 ✓



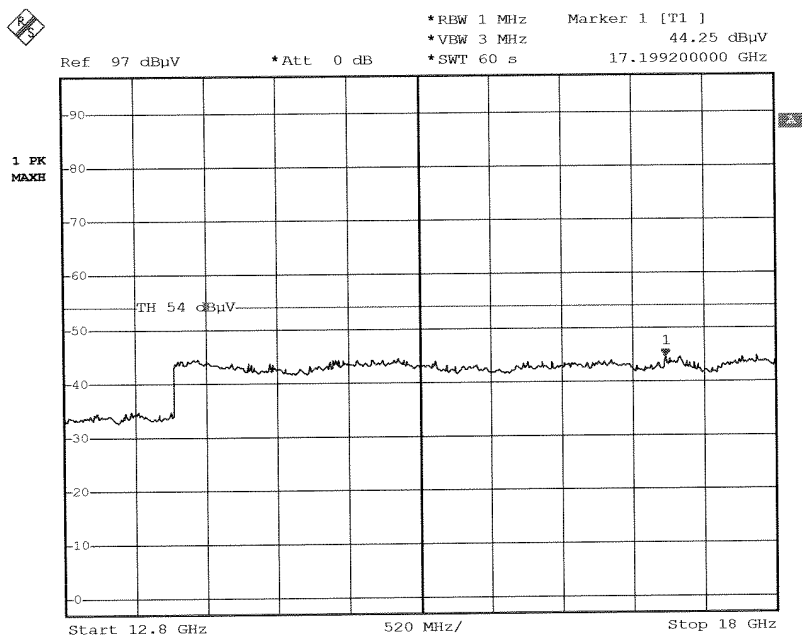
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i. Tech
 Dongle
 CS1-A05002-KX
 248MHz
 V



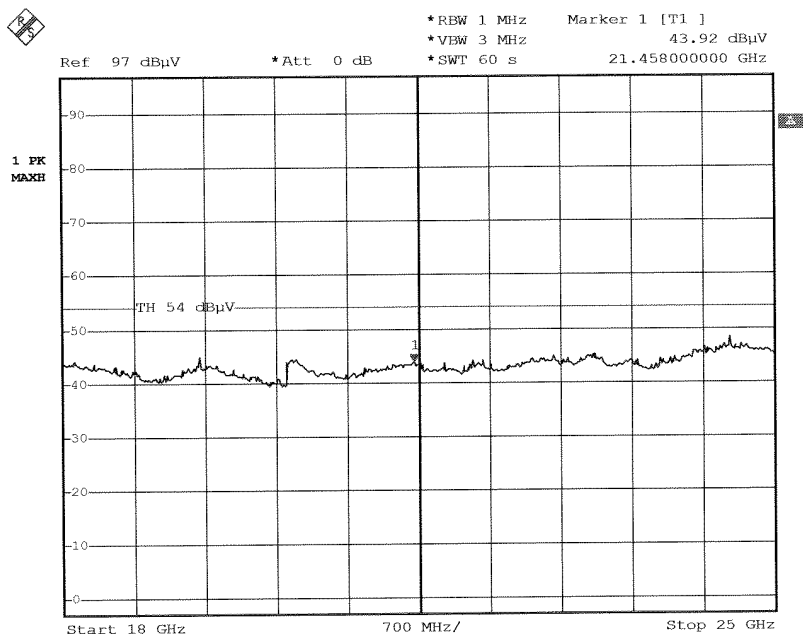
Date: 1.MAR.2005 17:56:37

i.Tech
Dongle
CRI-A05 002-KX
24 to 1140
V



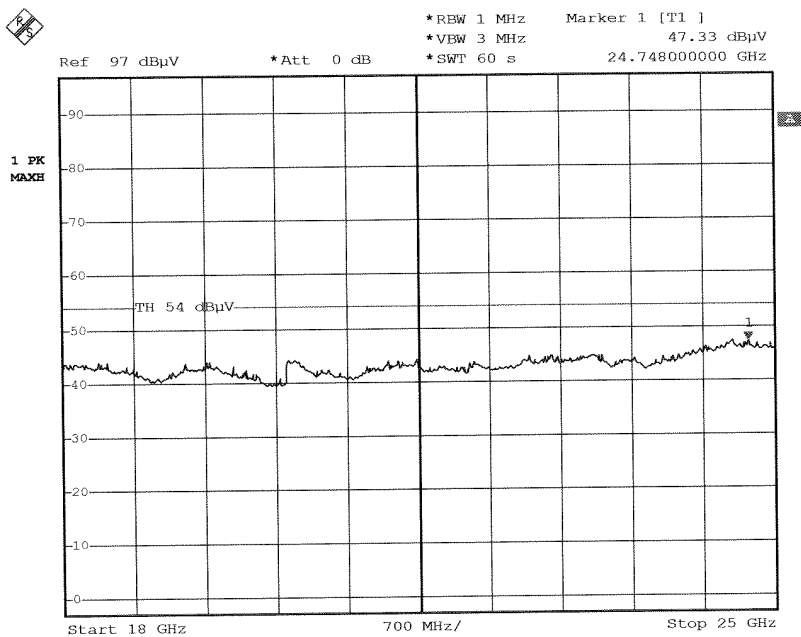
Date: 1.MAR.2005 17:53:12

i.Tech
 Dongle
 CSI-A05002-X
 24.80/1112
 H



Date: 1.MAR.2005 18:36:01

i. Tech
 Dongle
 CS1-A05002-XX
 248 MHz
 V



Date: 1.MAR.2005 18:39:22

i.Tech
 Dongle
 CSI-A05002-XX
 2480 MHz
 H