Prüfbericht - Nr.: Test Report No.	**14006802 001**		**Seite 1 von 13** Page 1 of 13
Auftraggeber: Applicant	**IEA Electro-Acoustic Co., Ltd.** **Unit 2301-02, 23/F.** **Millennium City 3** **370 Kwun Tong Road, Kwun Tong** **Kowloon, Hong Kong**		
Gegenstand der Prüfung: Test item	**Bluetooth Carkit**		
Bezeichnung: Identification	**BTC-001**	**Serien-Nr.:** Serial No.	**Engineering sample**
Wareneingangs-Nr.: Receipt No.	**040726029**	**Eingangsdatum:** Date of receipt	**26.07.2004**
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 C63.4-2001** **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:			**kontrolliert** / reviewed by:		
27.08.2004	Hugo Wan		27.08.2004	Thomas Berns	
Datum Date	**Name** Name	**Unterschrift** Signature	**Datum** Date	**Name** Name	**Unterschrift** Signature

Sonstiges: Other Aspects	**FCCID: SFYBTC-001IEA**

Abkürzungen:	**OK, Pass, P**	**= entspricht Prüfgrundlage**	**Abbreviations:**	**OK, Pass, P**	**= passed**
	Fail, F	**= entspricht nicht Prüfgrundlage**		**Fail, F**	**= failed**
	N/A	**= nicht anwendbar**		**N/A**	**= not applicable**
	NT	**= nicht getestet**		**NT**	**= not tested**

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	Integral Antenna	Integral Antenna
Antenna gain (dBi)	2.0	
Power level	fix	
Type of equipment	stand alone, plug-in radio device	stand alone, plug-in radio device
Connection to public utility power line	No	
Nominal voltage	V_{nor}: 12 V	V_{nor}: 12 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 Handsfree Car Kit 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

None

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: Snap-In type antenna soldered to the circuit board b) Manufacturer and model no: N.A. c) Gain with reference to an isotropic radiator: 2.0 dBi
Verdict:	Pass

Subclause 15.207 – Conducted Emission	**N.A.**
Applicable only to equipment designed to be connected to the public utiliy power line.	

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	: 12VDC from AC/DC adapter
Temperature	: 23ºC
Humidity	: 54%
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.
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 : 12VDC from AC/DC adapter
Temperature : 23ºC
Humidity : 54%

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:

$$26 \times 2.936 \times 10^{-3} = 76.34 \times 10^{-3}\text{s}$$

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

For test protocols please refer to Appendix 1, page 3-4.

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 : 12VDC from AC/DC adapter
Temperature : 23ºC
Humidity : 54%

Results

For test protocols refer to Appendix 1, page 5-7.

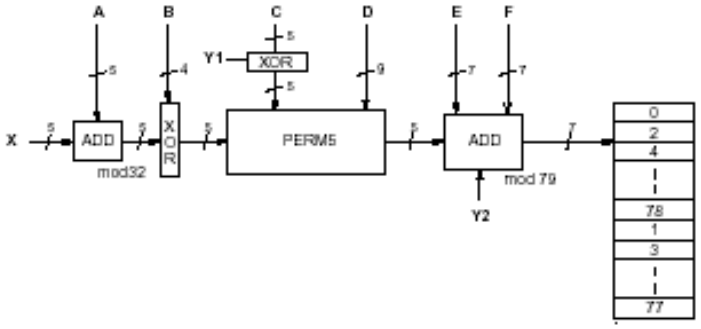
Frequency (MHz)	20 dB right (MHz)	20 dB left (MHz)	20dB bandwidth (MHz)
2402	0.492	0.448	0.940
2441	0.492	0.440	0.932
2480	0.496	0.444	0.940

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 : 12VDC from AC/DC adapter
Temperature : 23ºC
Humidity : 54%

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 – 2483.5MHz 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 8-10.

Frequency (MHz)	Maximum peak output power (dBm)	Cable attenuation (dB)	Output power (dBm)	Limit (W/dBm)	Verdict
2402	-1.80	4.30	2.50	0.125 / 21.0	Pass
2441	-1.98	4.15	2.17	0.125 / 21.0	Pass
2480	-2.33	4.50	2.17	0.125 / 21.0	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 : 12VDC from AC/DC adapter
Temperature : 23ºC
Humidity : 54%

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 11-13.

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 : 12VDC from AC/DC adapter
Temperature : 23ºC
Humidity : 54%

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 : 23ºC
Humidity : 54%

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 21-51.

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
No peak found	-	-	-	-	-	-	-

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
No peak found	-	-	-	-	-	-	-

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
No peak found	-	-	-	-	-	-	-

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
No peak found	-	-	-	-	-	-	-

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**
No peak found	-	-	-	-	-	-	-
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**
No peak found	-	-	-	-	-	-	-

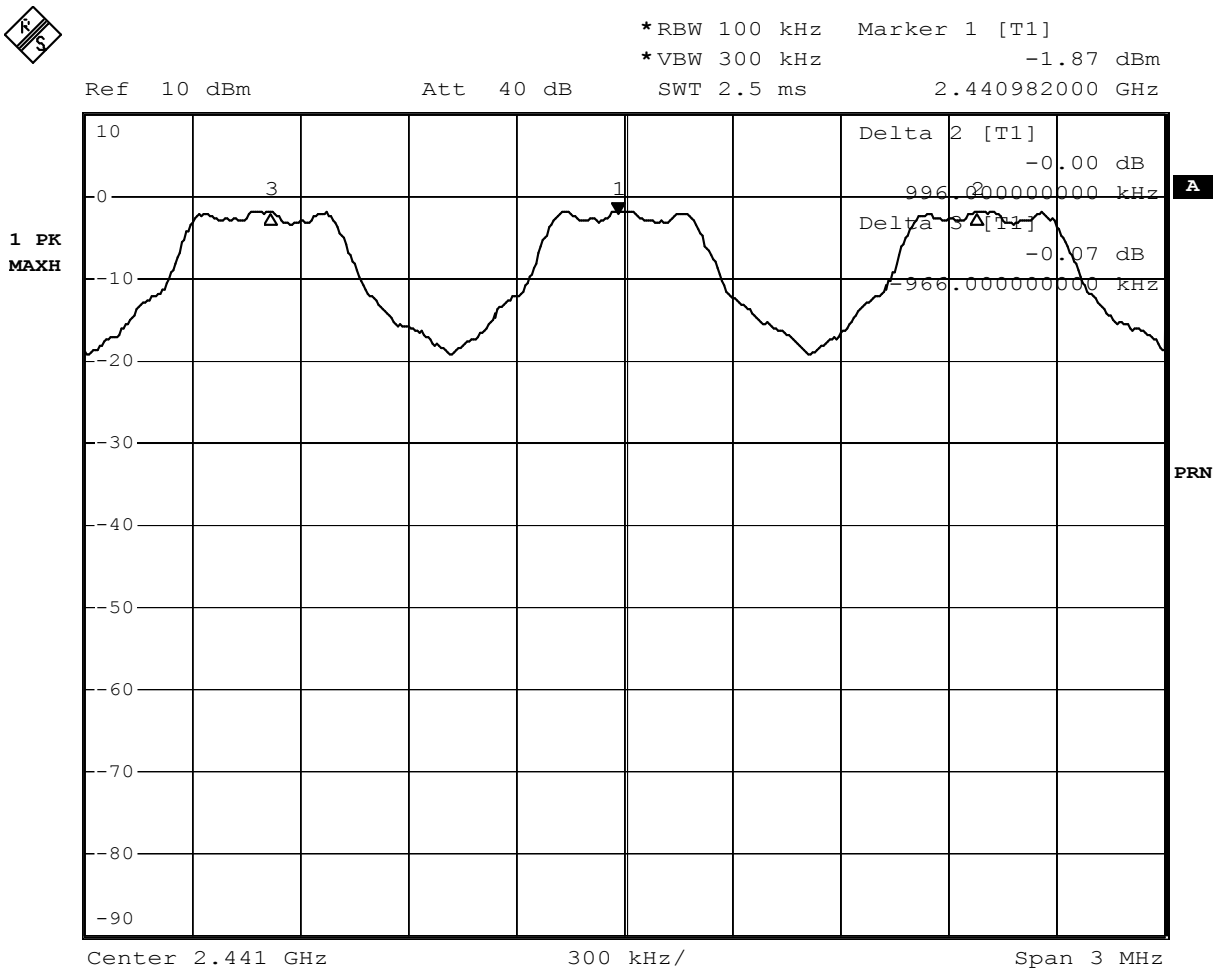
Appendix 1

Test results

Carrier Frequency Separation

Date: 13 Aug 2004
EUT: BTC-001
Company: IEA Electro-Acoustic Co., Ltd
Humidity: 54%
Temperature: 23ºC
Voltage supply: 12VDC from AC/DC adapter
Test by: Hugo Wan
Op. mode: Hopping on

Reference frequency (MHz)	Channel Separation (MHz)
2441.000	0.966

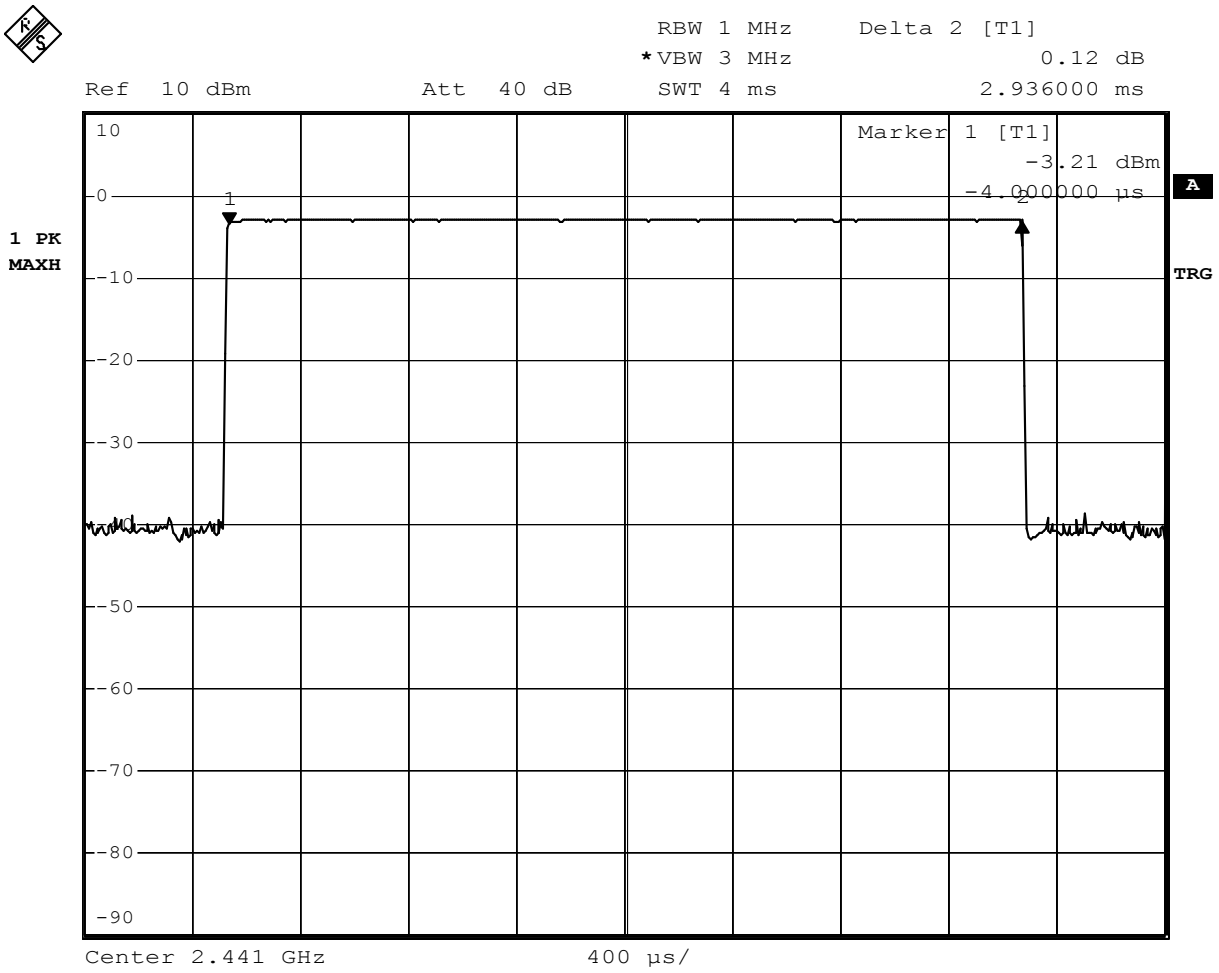


Date: 13.AUG.2004 15:57:27

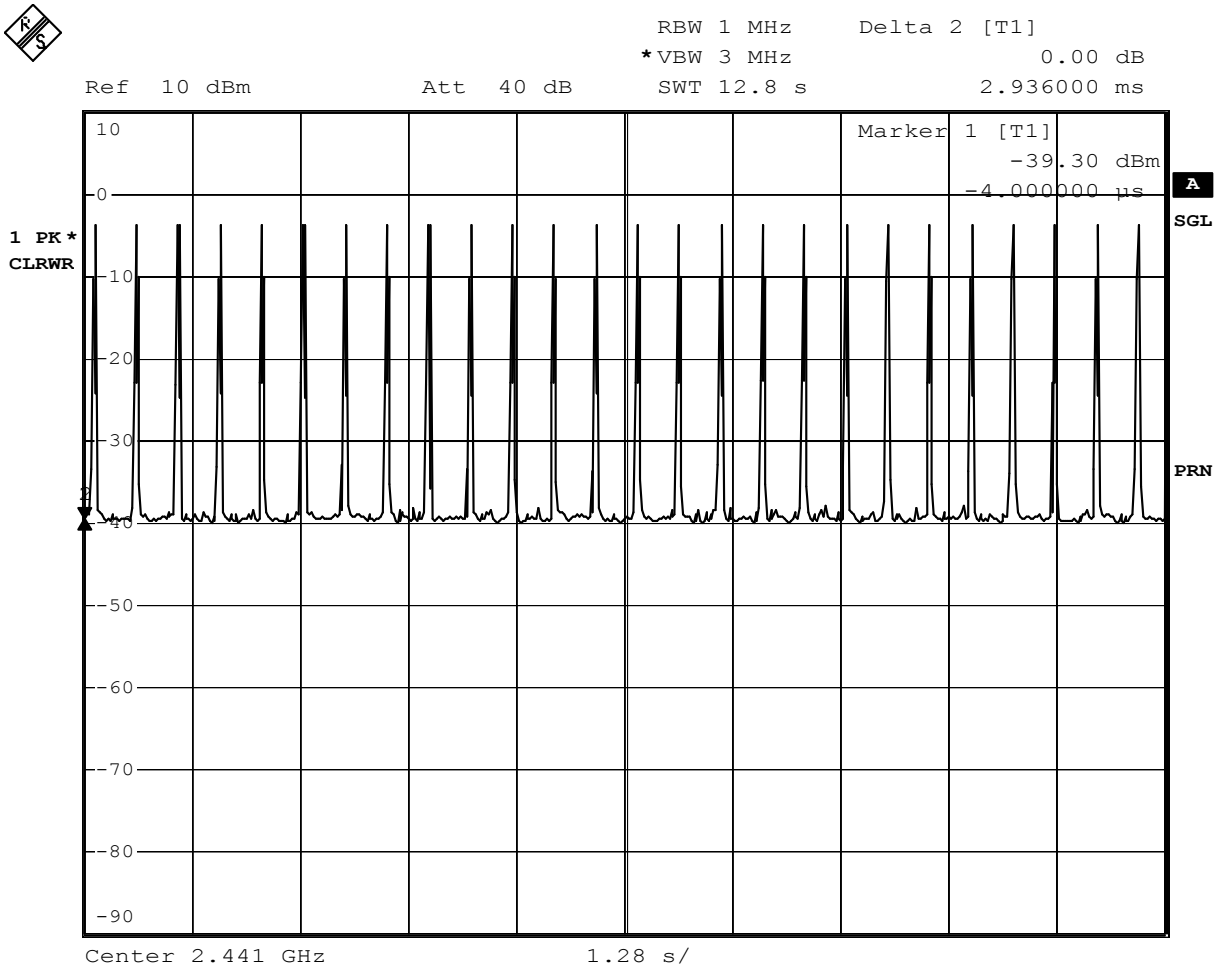
Dwell Time

Date: 13 Aug 2004
EUT: BTC-001
Company: IEA Electro-Acoustic Co., Ltd
Humidity: 54%
Temperature: 23ºC
Voltage supply: 12VDC from AC/DC adapter
Test by: Hugo Wan
Op. mode: Hopping on

Burst Duration (ms)	Number of hopping	Time of occupancy (s)	Results
2.936	26	0.002936 x 26 = 0.07634	Pass



Date: 13.AUG.2004 16:24:43

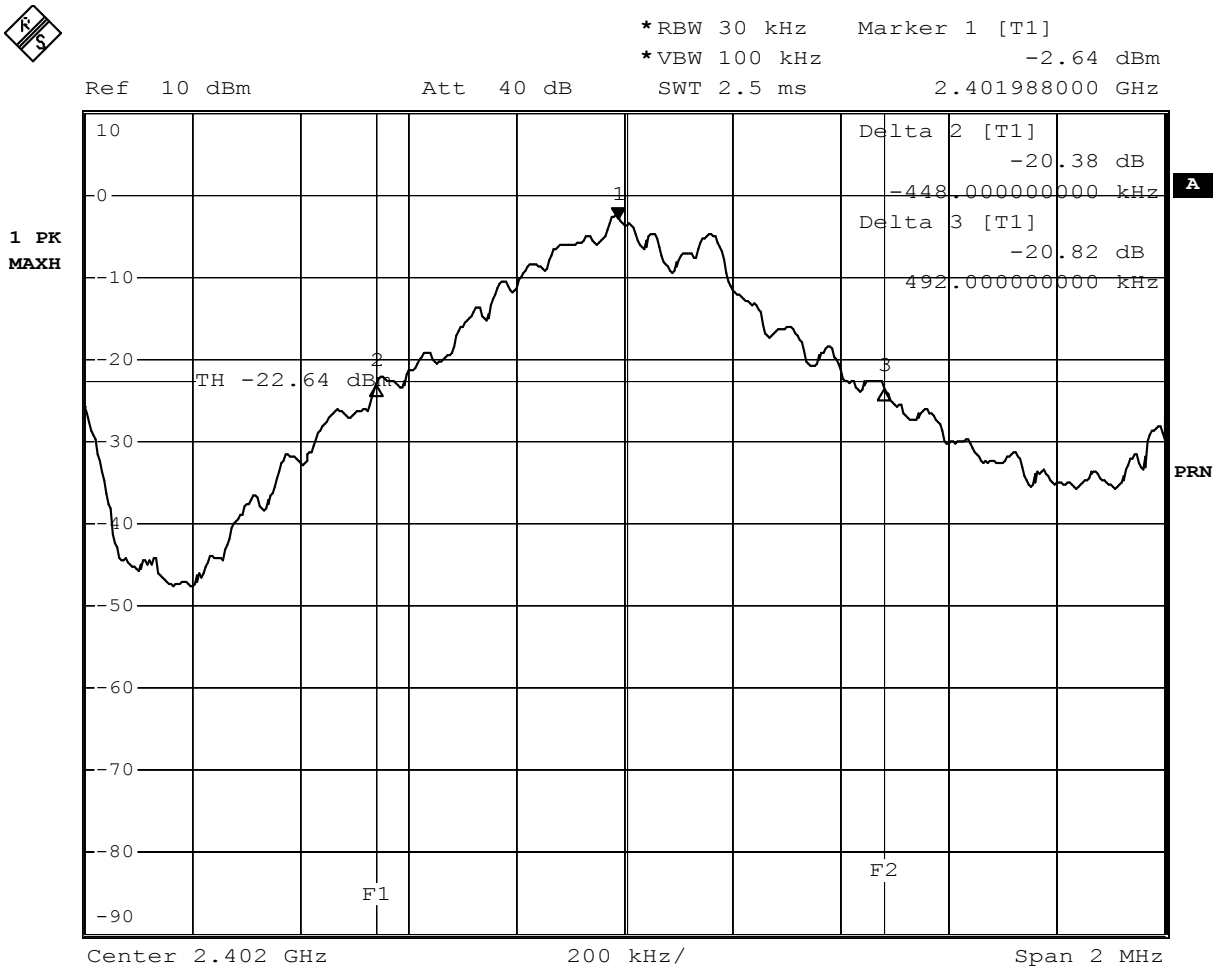


Date: 13.AUG.2004 16:25:47

20dB Bandwidth

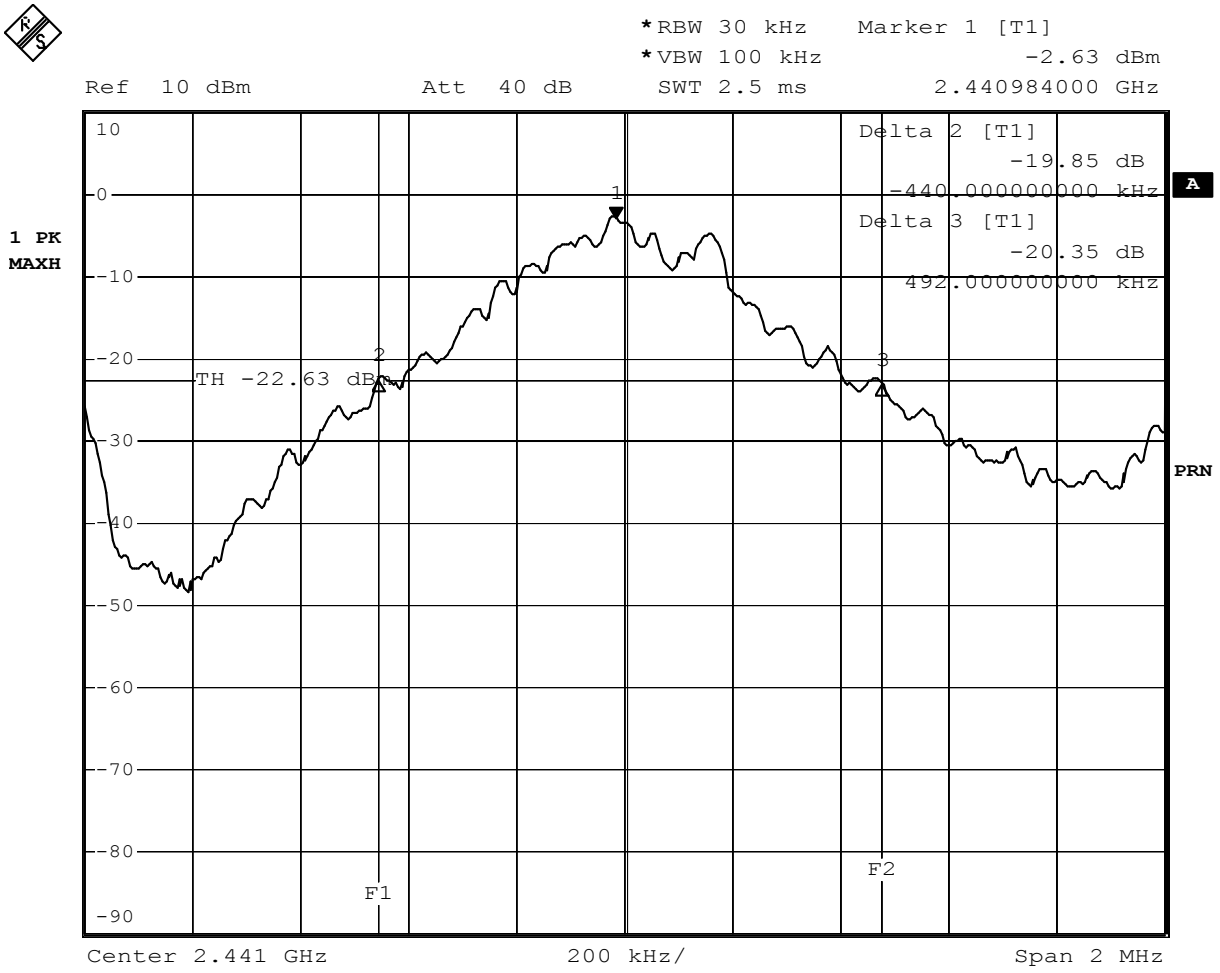
Date: 13 Aug 2004
EUT: BTC-001
Company: IEA Electro-Acoustic Co., Ltd
Humidity: 54%
Temperature: 23ºC
Voltage supply: 12VDC from AC/DC adapter
Test by: Hugo Wan
Op. mode: TX mode, DH5 with PRBS9 payload

Tx frequency (MHz)	Δf_L (MHz)	Δf_H (MHz)	$\lvert\Delta f_H\rvert+\lvert\Delta f_L\rvert$ (MHz)	Results
2402	-0.448	0.492	0.940	Pass
2441	-0.440	0.492	0.932	Pass
2480	-0.444	0.496	0.940	Pass



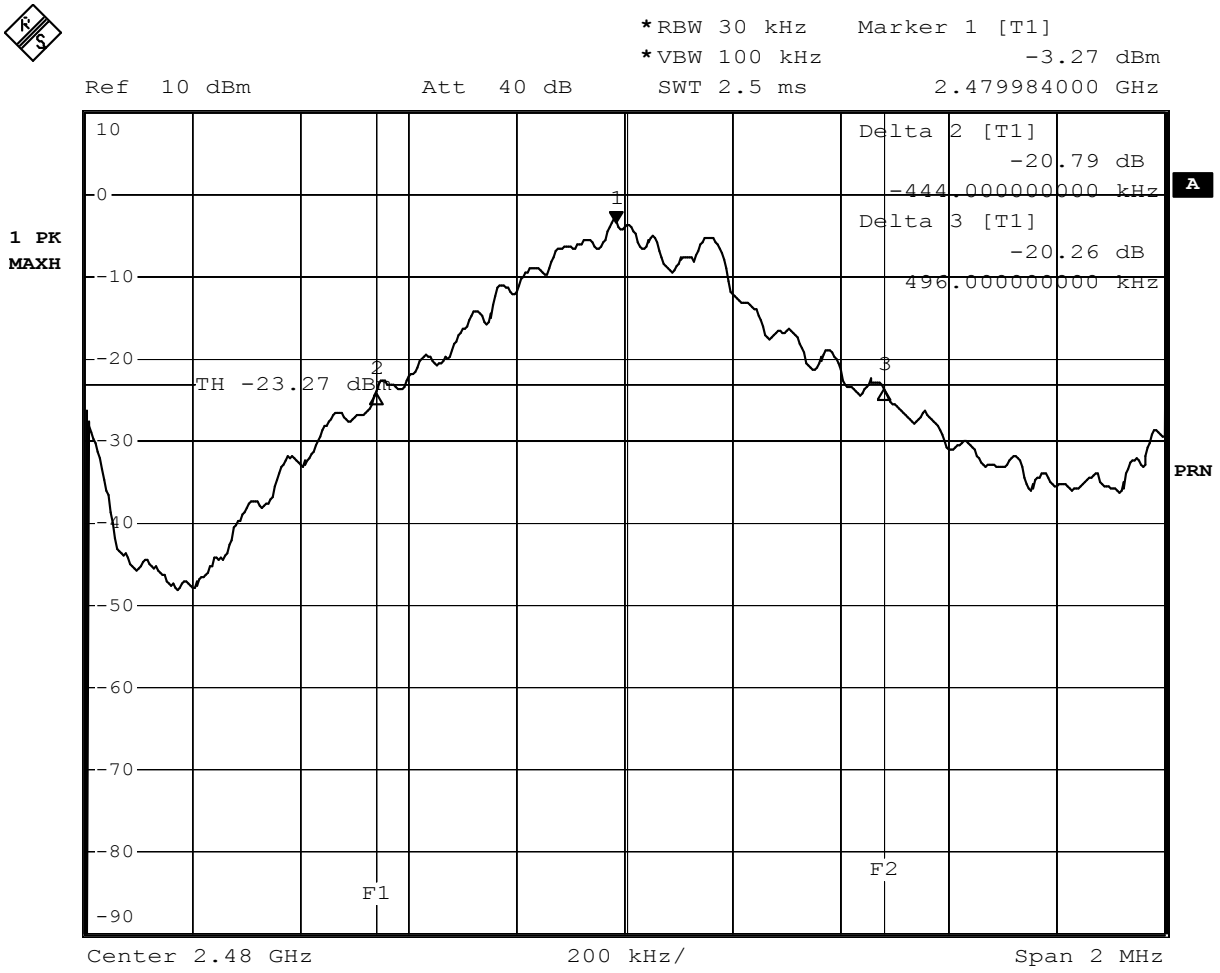
Date: 13.AUG.2004 16:41:11

Tx frequency: 2402MHz



Date: 13.AUG.2004 16:38:58

Tx frequency: 2441MHz



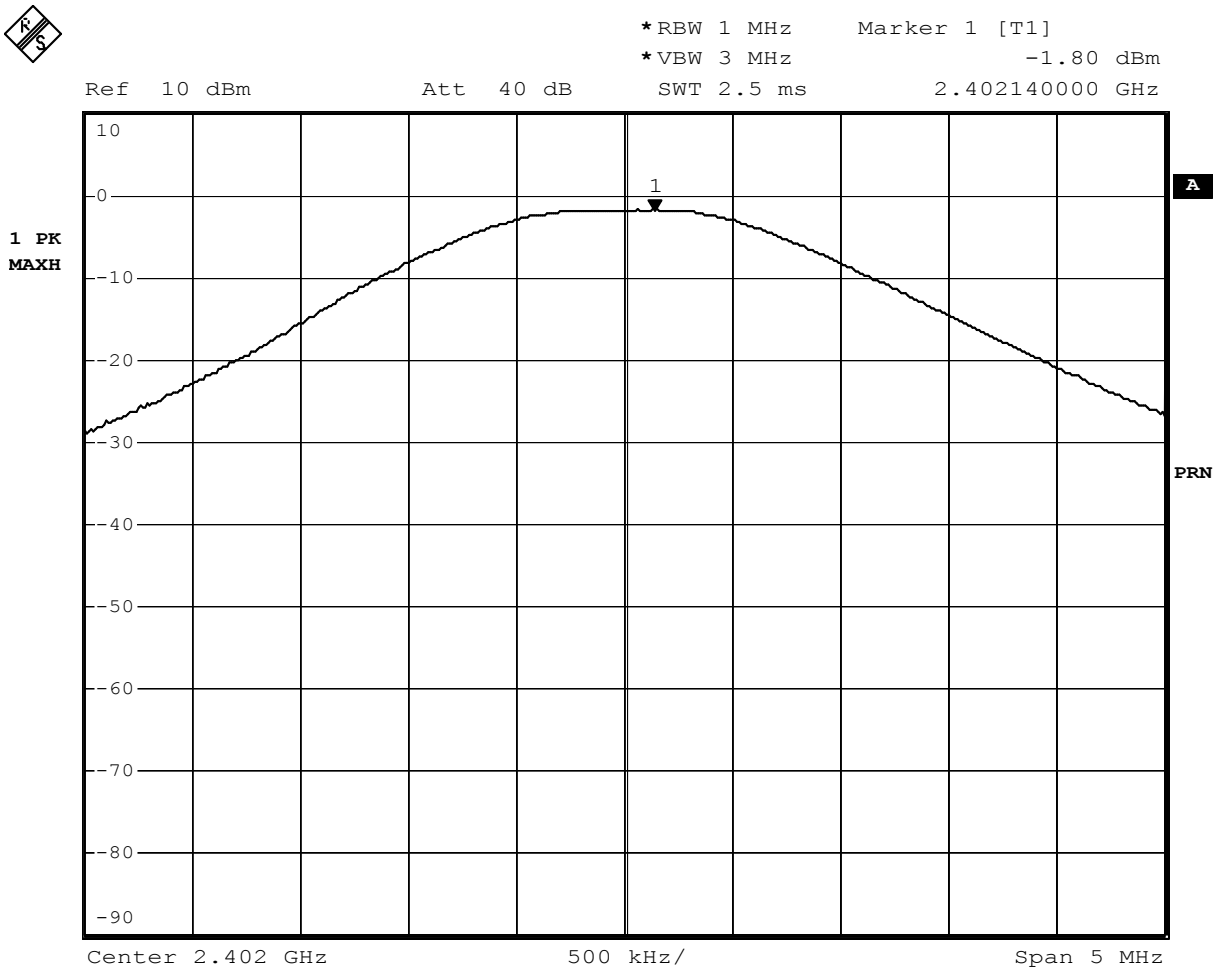
Date: 13.AUG.2004 16:37:04

Tx frequency: 2480MHz

Peak Output Power

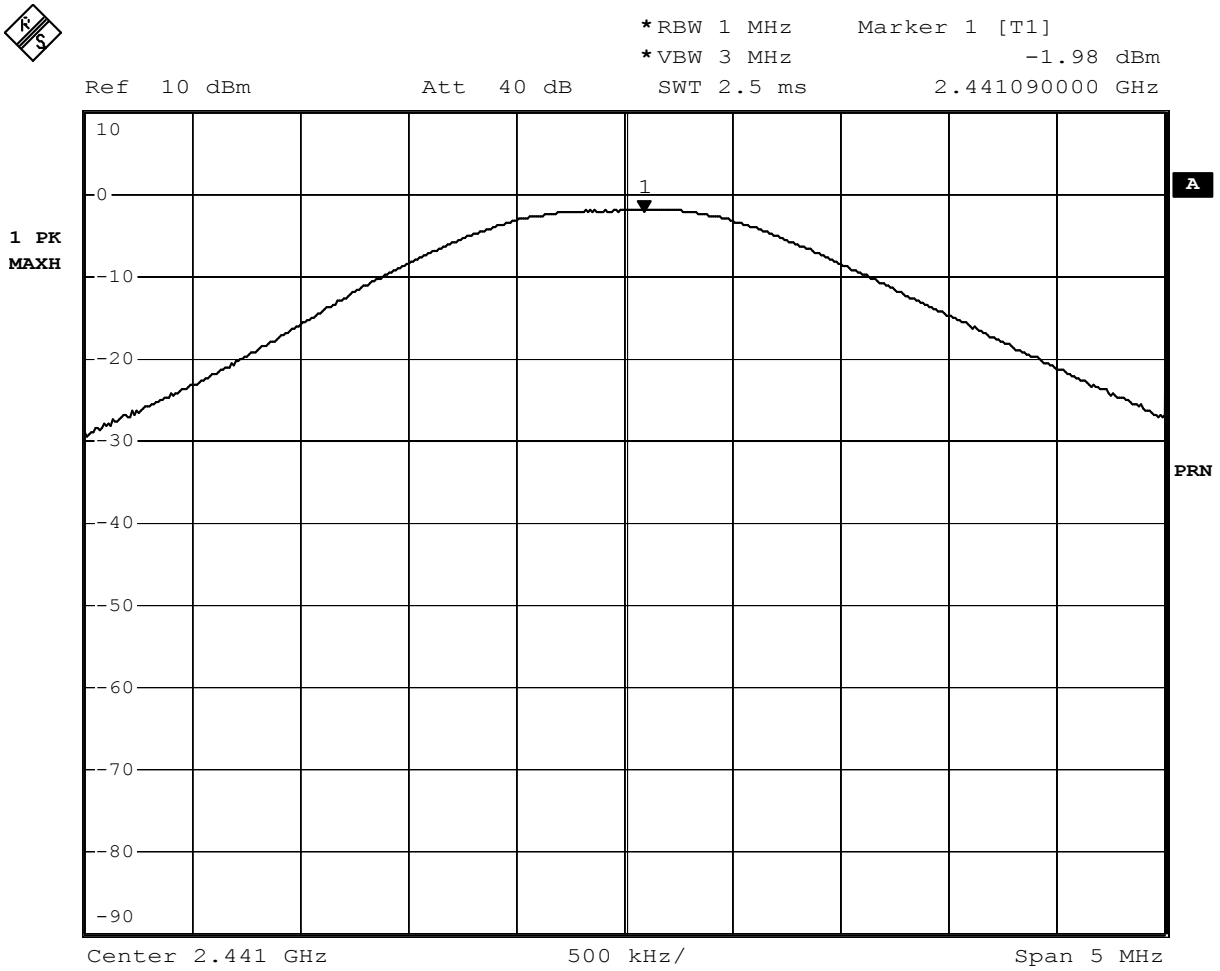
Date: 13 Aug 2004
EUT: BTC-001
Company: IEA Electro-Acoustic Co., Ltd
Humidity: 54%
Temperature: 23ºC
Voltage supply: 12VDC from AC/DC adapter
Test by: Hugo Wan
Op. mode: TX mode, DH1 with PRBS9 payload

Tx Frequency (MHz)	Cable Attenuation (dB)	Power P_{PK} (dBm)	Actual Peak Power (dBm)	Results
2402	4.30	-1.80	2.50	Pass
2441	4.15	-1.98	2.17	Pass
2480	4.50	-2.33	2.17	Pass



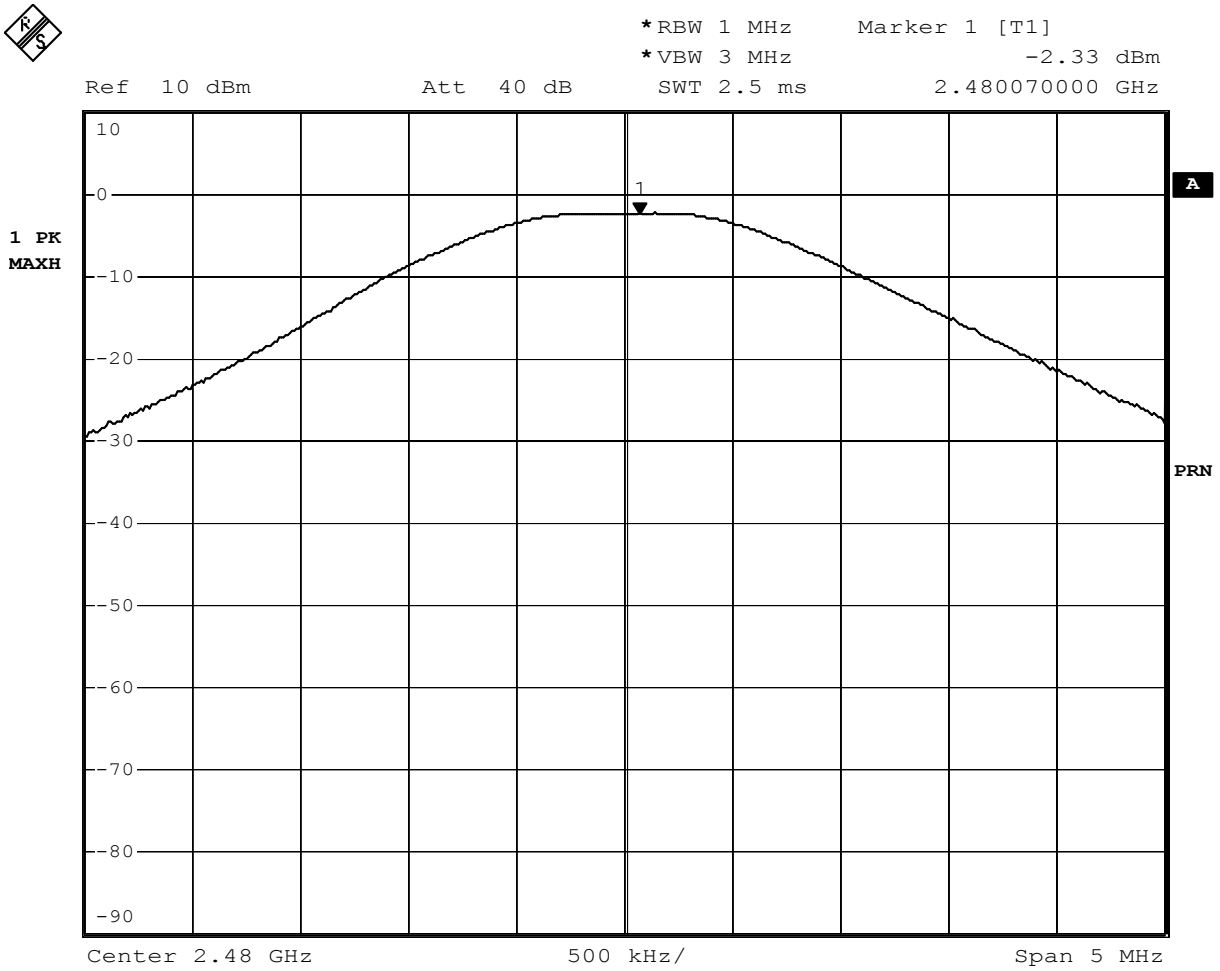
Date: 13.AUG.2004 16:55:19

Tx frequency: 2402MHz



Date: 13.AUG.2004 16:56:05

Tx frequency: 2441MHz



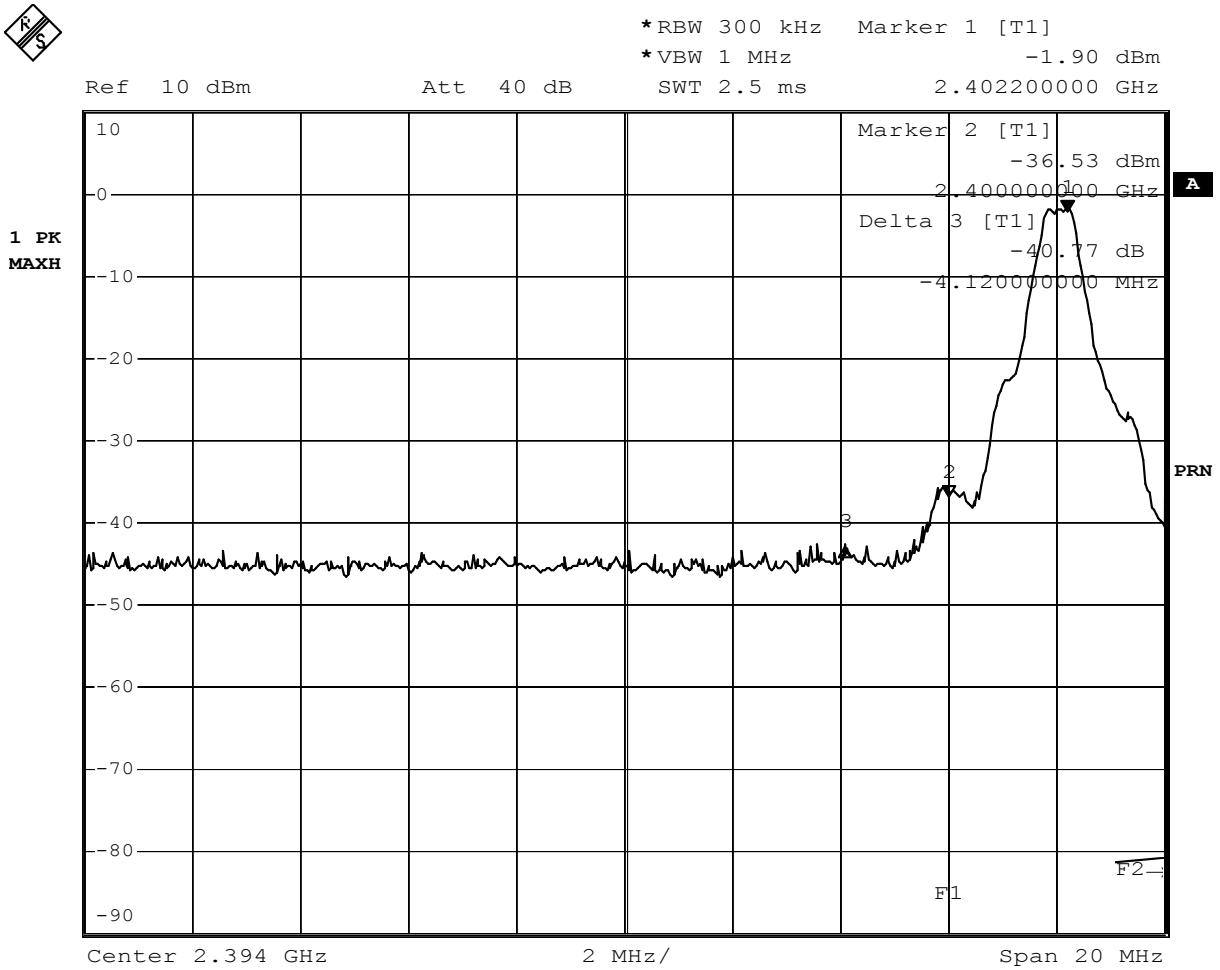
Date: 13.AUG.2004 16:56:48

Tx frequency: 2480MHz

Band Edge Compliance

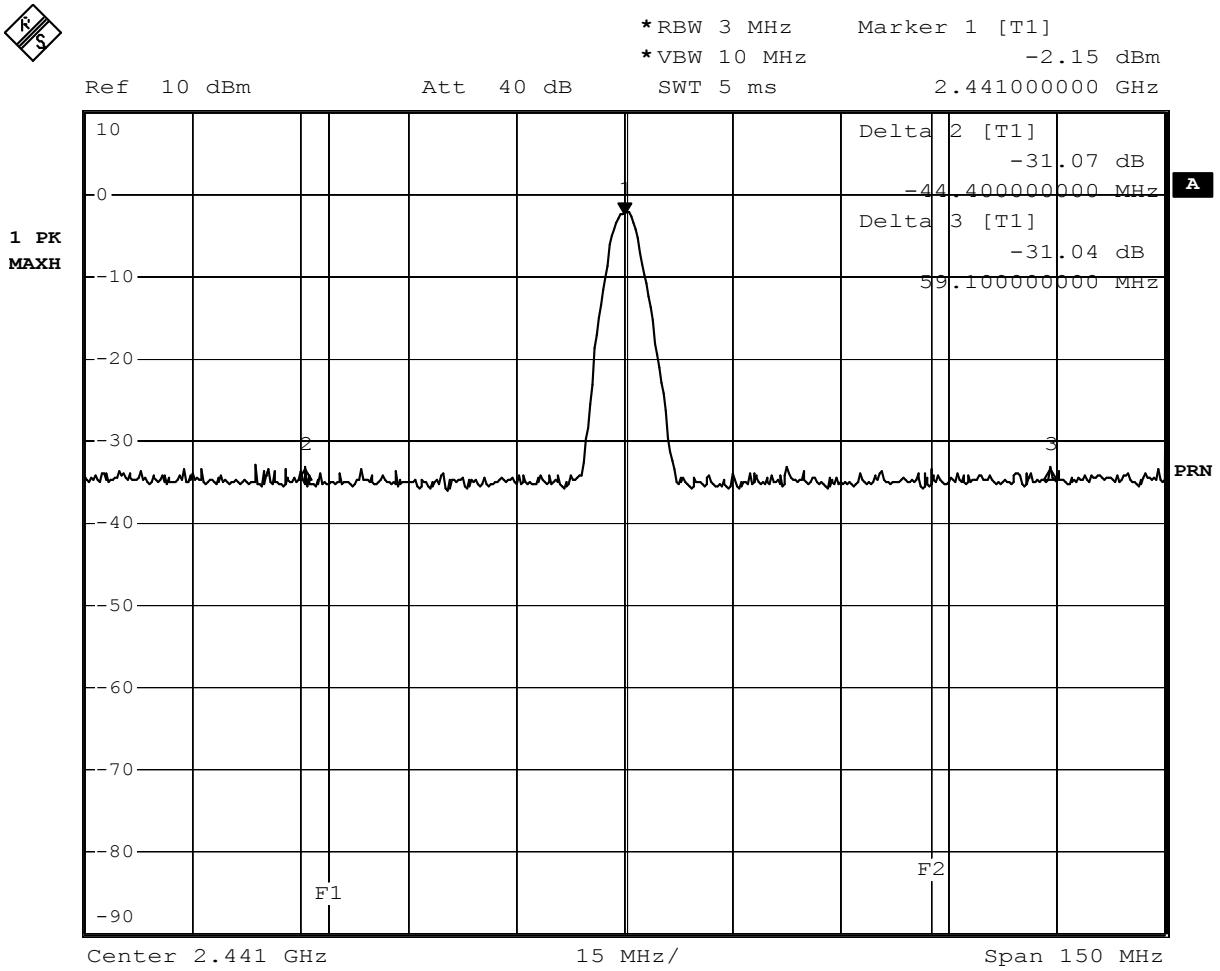
Date: 13 Aug 2004
EUT: BTC-001
Company: IEA Electro-Acoustic Co., Ltd
Humidity: 54%
Temperature: 23ºC
Voltage supply: 12VDC from AC/DC adapter
Test by: Hugo Wan
Op. mode: TX mode, DH1 with PRBS9 payload

Tx Frequency (MHz)	Peak in band Power level (dBm)	RF power outside 100kHz BW (MHz)	RF power difference outside 100kHz BW (dB)	Results
2402	-1.90	No Peak	-	Pass
2480	-2.21	No Peak	-	Pass



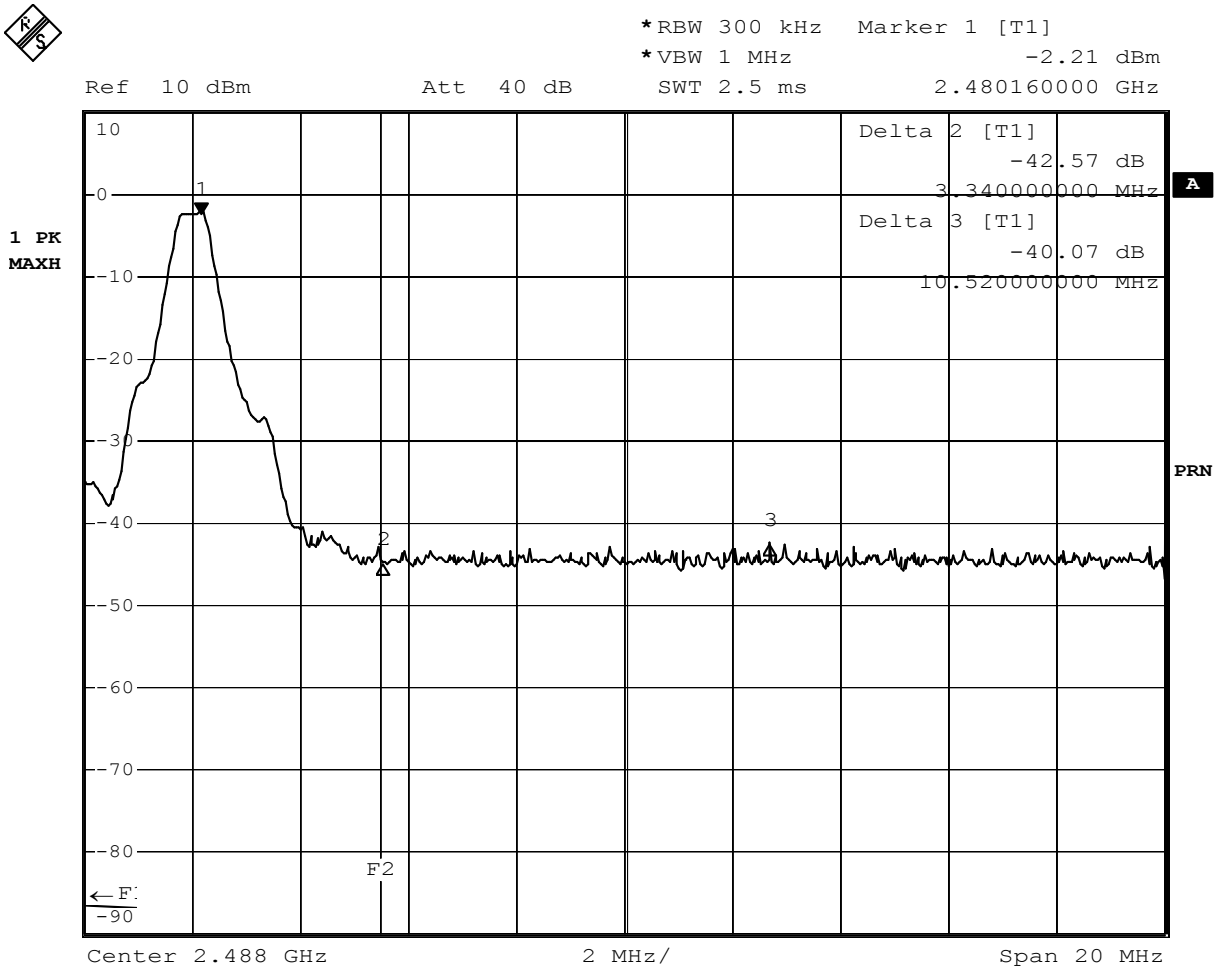
Date: 13.AUG.2004 17:02:28

Tx frequency: 2402MHz



Date: 13.AUG.2004 17:01:07

Tx frequency: 2441MHz



Date: 13.AUG.2004 16:59:49

Tx frequency: 2480MHz

Spurious Emissions - Conducted

Date: 13 Aug 2004
EUT: BTC-001
Company: IEA Electro-Acoustic Co., Ltd
Humidity: 54%
Temperature: 23ºC
Voltage supply: 12VDC from AC/DC adapter
Test by: Hugo Wan
Op. mode: TX mode, DH1 with PRBS9 payload

Tx frequency : 2402MHz

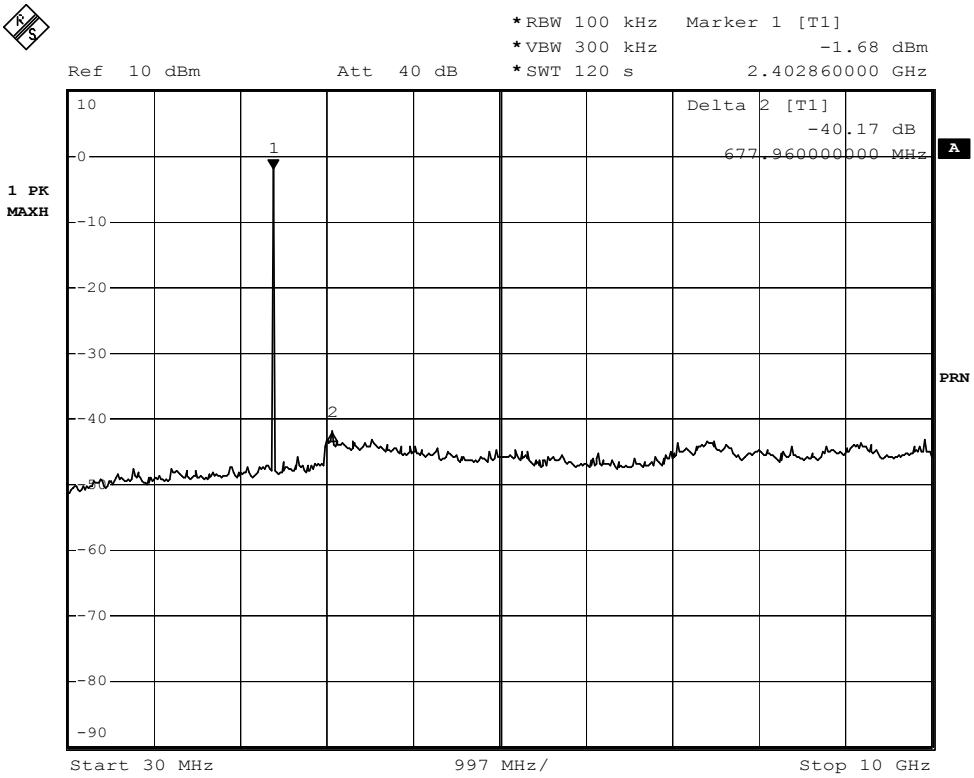
Spurious Frequency (MHz)	Power level (dBm)	Reference value (dBm)	Delta to reference level (dB)	Results
No peak found	-	-	-	Pass

Tx frequency : 2441MHz

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

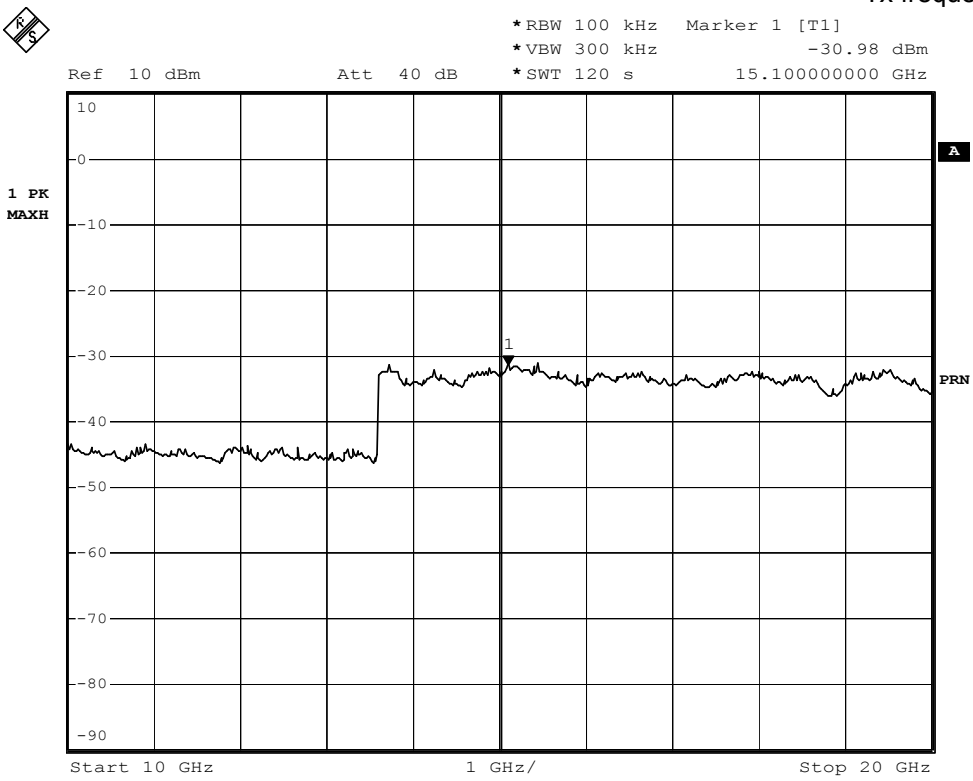
Tx frequency : 2480MHz

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



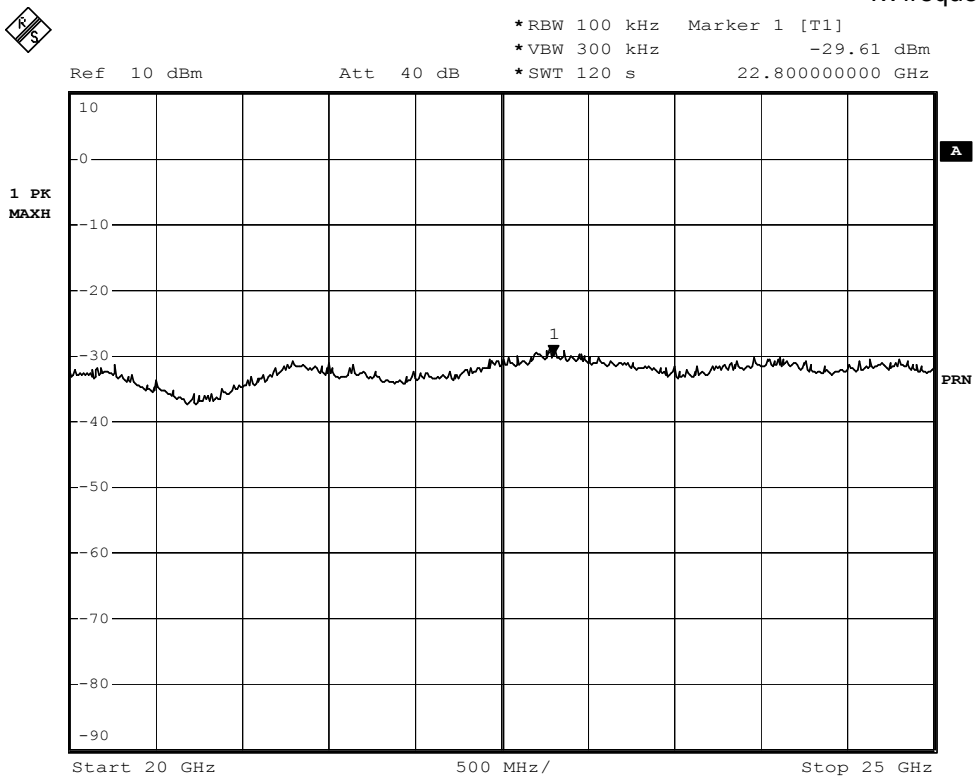
Date: 13.AUG.2004 18:28:30

Tx frequency: 2402MHz



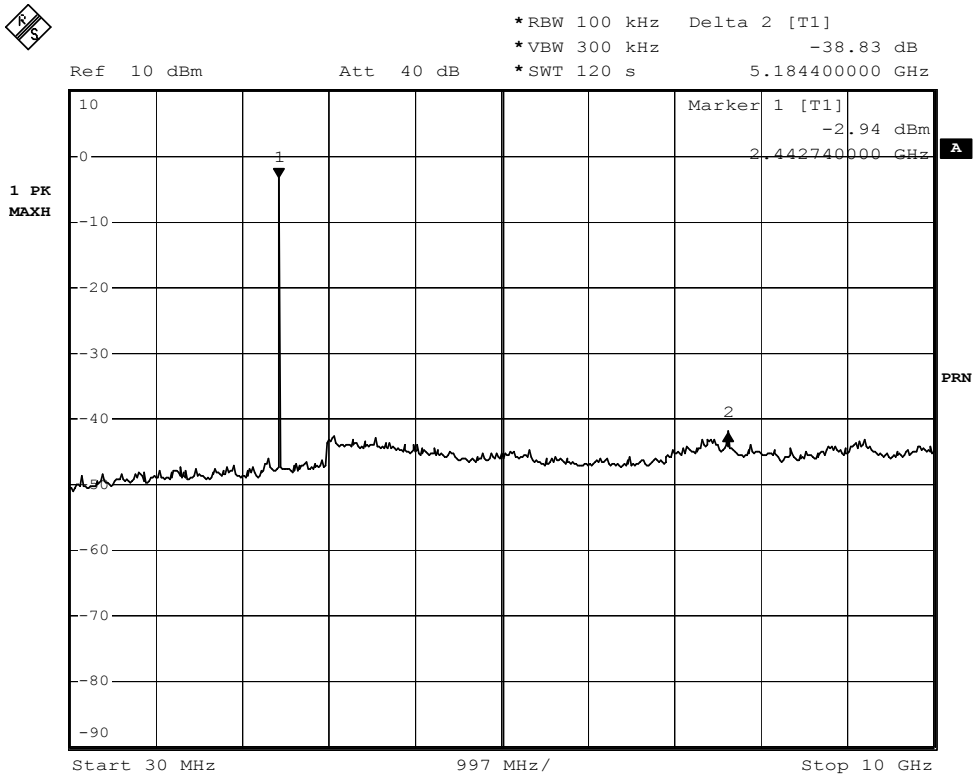
Date: 17.AUG.2004 17:56:02

Tx frequency: 2402MHz



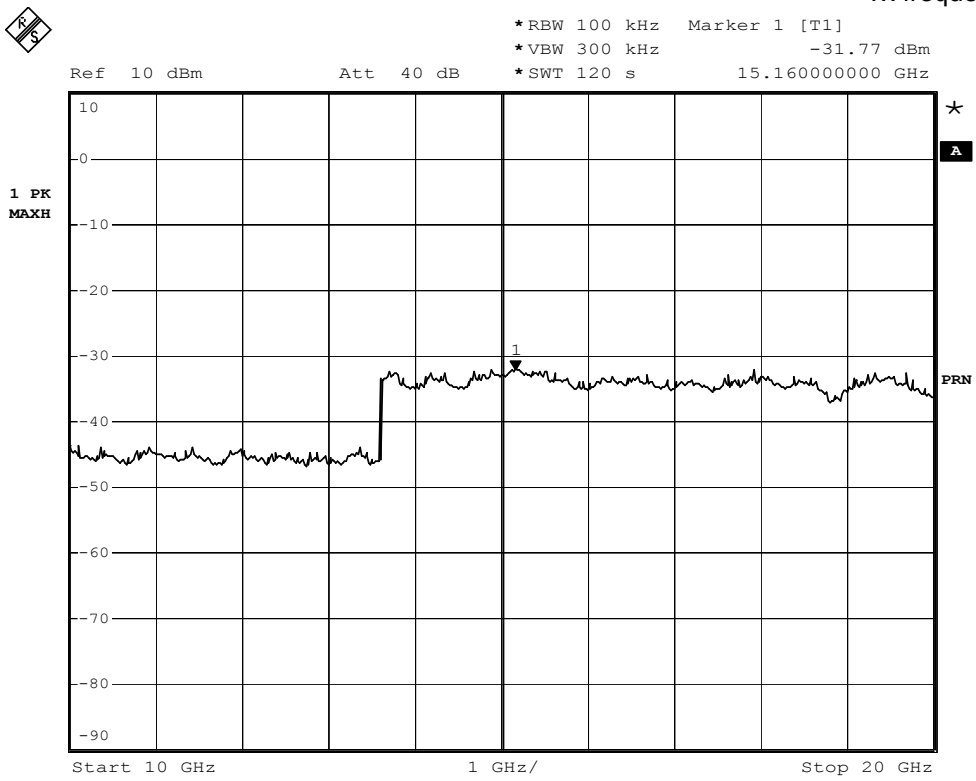
Date: 17.AUG.2004 18:11:25

Tx frequency: 2402MHz



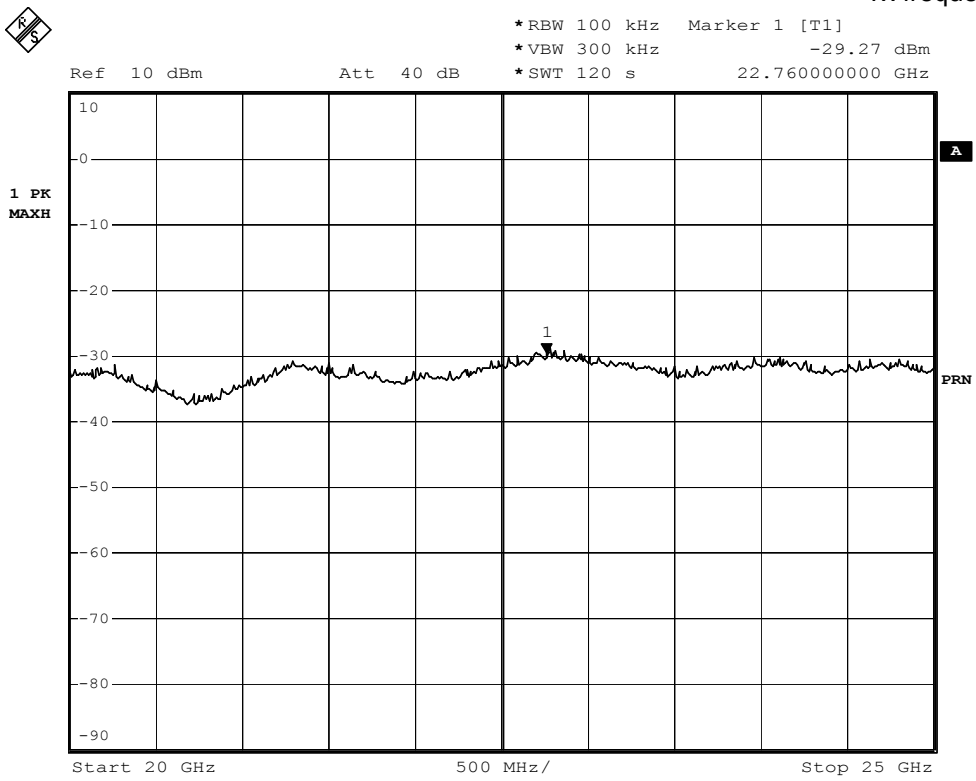
Date: 13.AUG.2004 18:56:22

Tx frequency: 2441MHz



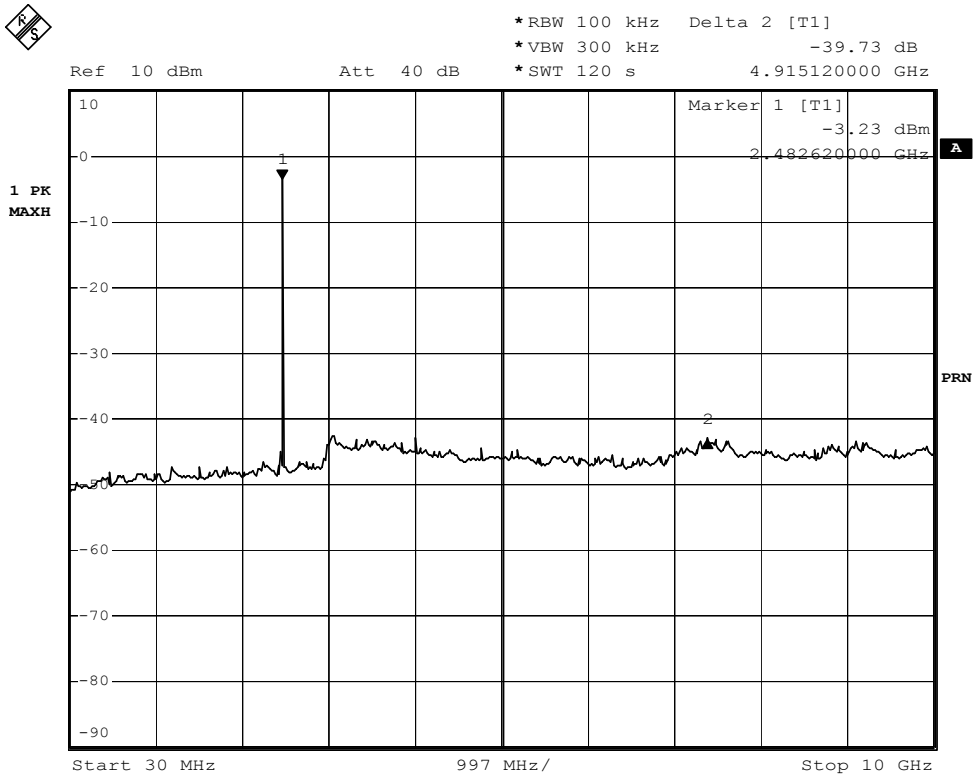
Date: 17.AUG.2004 18:00:04

Tx frequency: 2441MHz



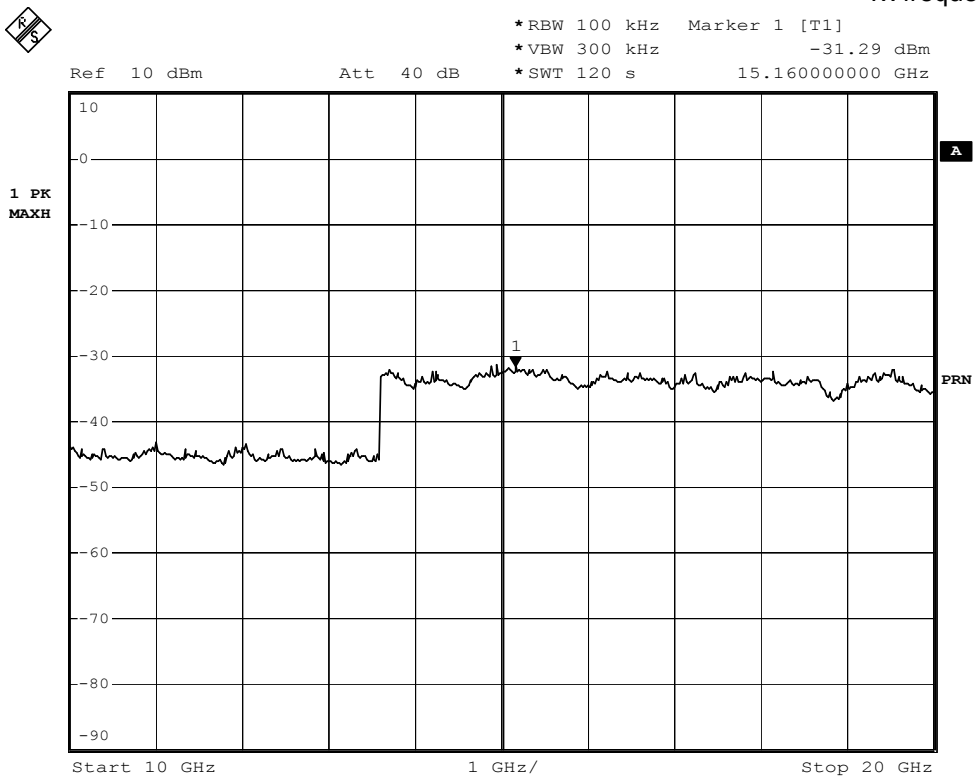
Date: 17.AUG.2004 18:11:09

Tx frequency: 2441MHz



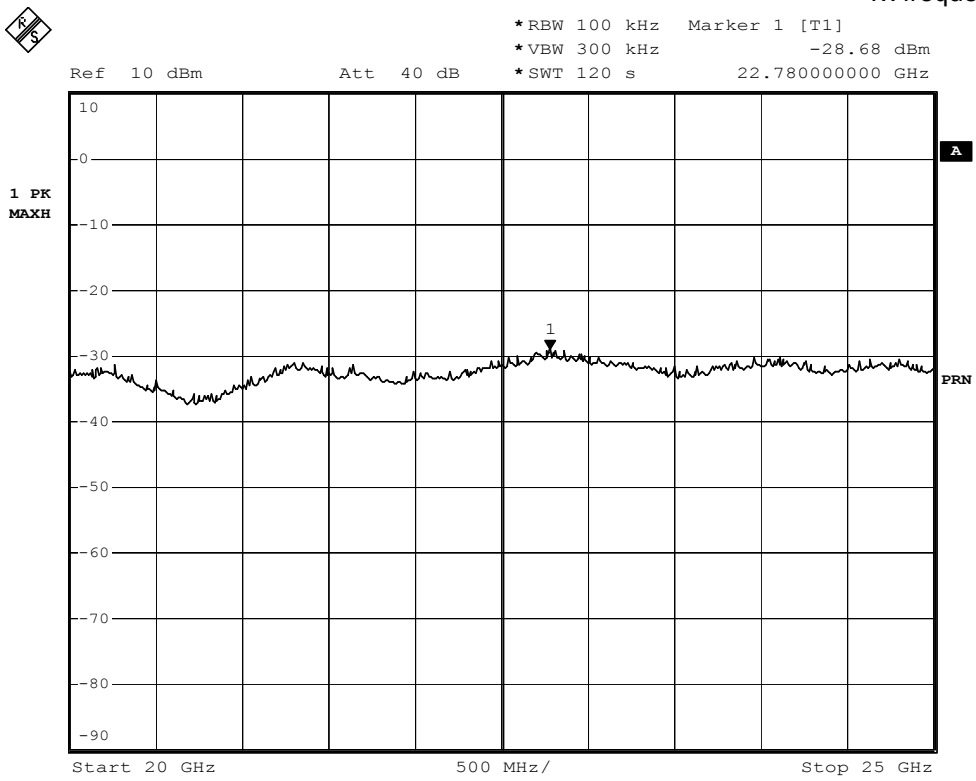
Date: 13.AUG.2004 19:19:19

Tx frequency: 2480MHz



Date: 17.AUG.2004 18:06:10

Tx frequency: 2480MHz



Date: 17.AUG.2004 18:10:42

Tx frequency: 2480MHz

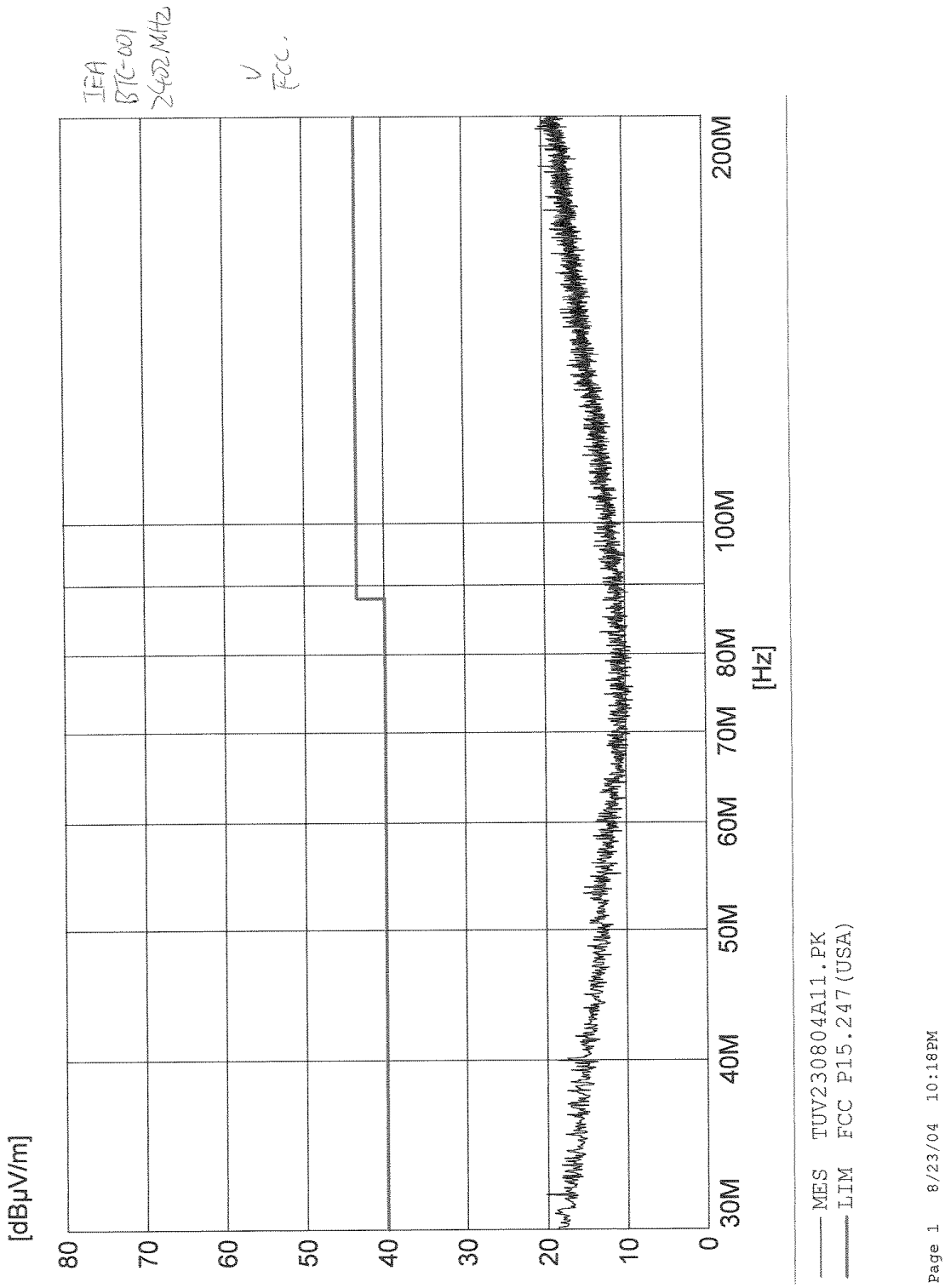
Spurious Emissions - Radiated

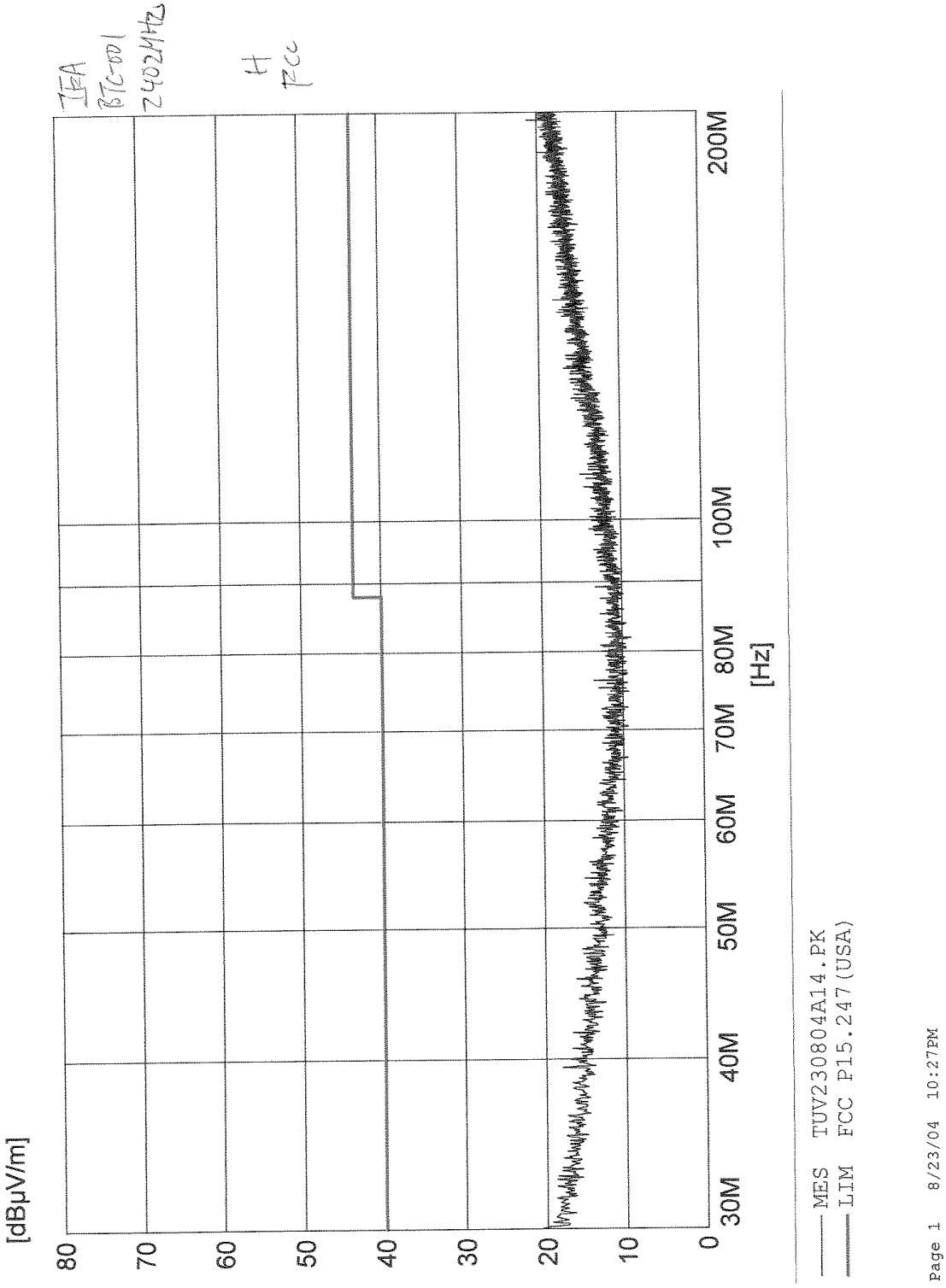
Date: 23 Aug 2004
EUT: BTC-001
Company: IEA Electro-Acoustic Co., Ltd
Voltage supply: 12VDC from AC/DC adapter
Test by: Hugo Wan
Op. mode: TX mode, DH1 with PRBS9 payload

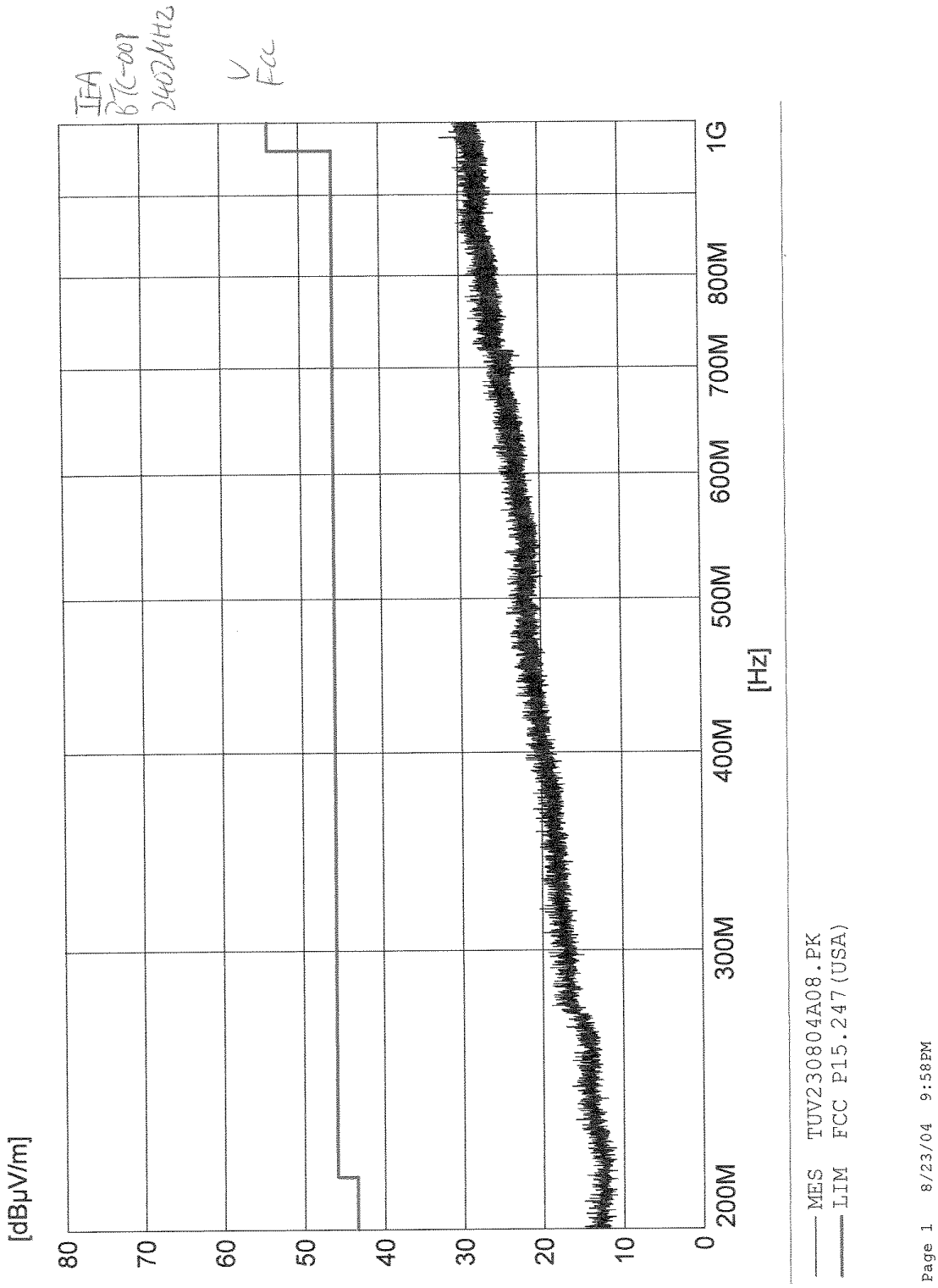
Tx frequency (MHz)	Polarization	Spurious Frequency (MHz)	Power Level (dBuV/m)	Detector (P/QP/A)
2402	-	No peak found	-	-

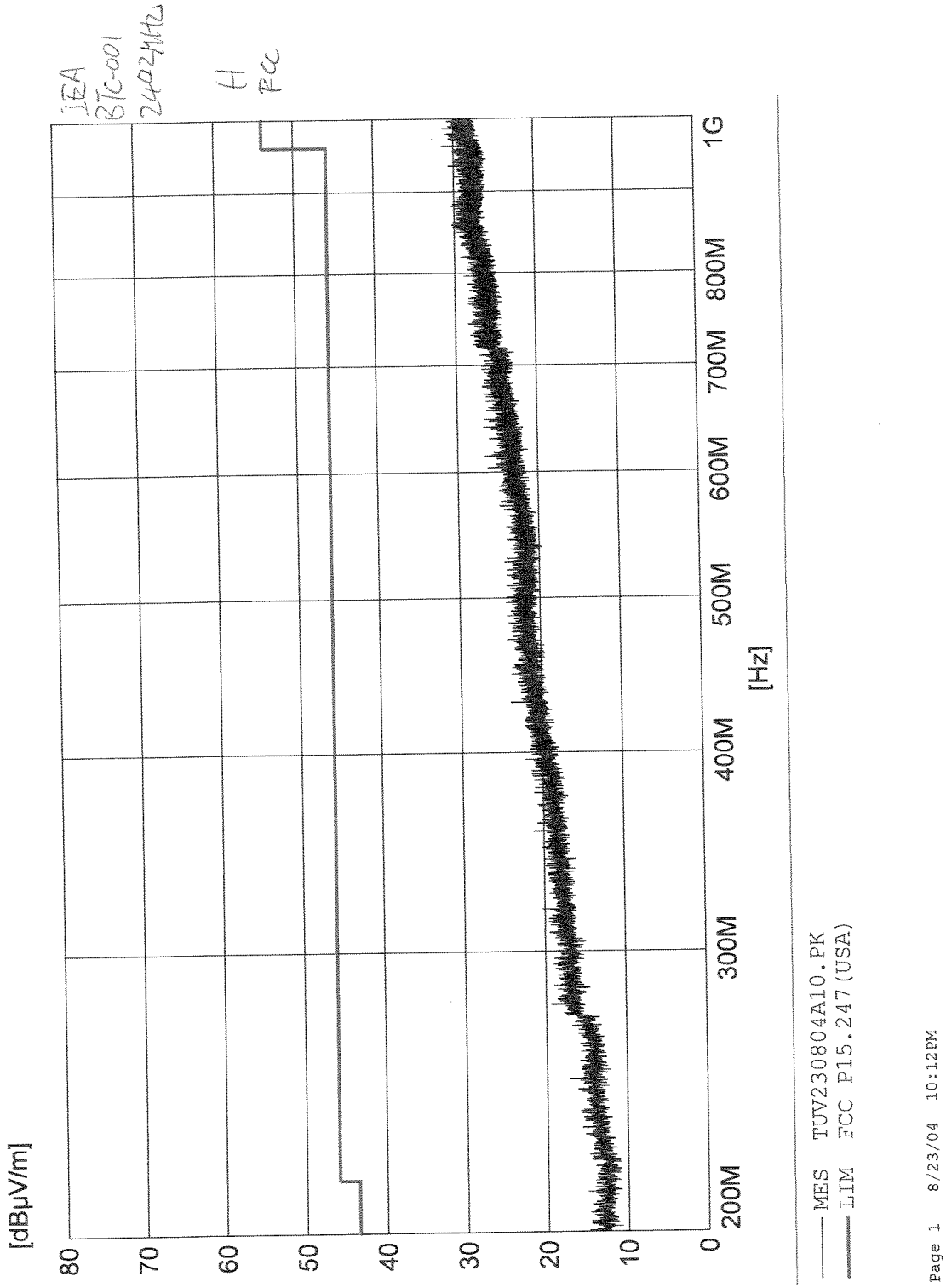
Tx frequency (MHz)	Polarization	Spurious Frequency (MHz)	Power Level (dBuV/m)	Detector (P/QP/A)
2441	-	No peak found	-	-

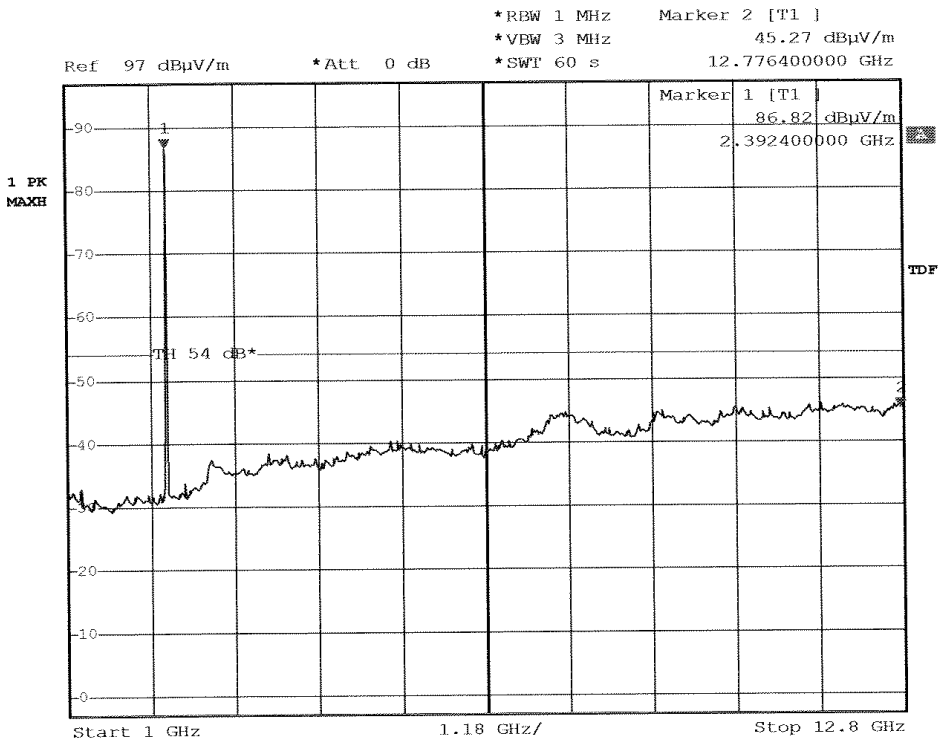
Tx frequency (MHz)	Polarization	Spurious Frequency (MHz)	Power Level (dBuV/m)	Detector (P/QP/A)
2480	-	No peak found	-	-


IEA
BTC-001
2402 MHz
V
FCC.
[dBµV/m]
80
70
60
50
40
30
20
10
0
30M
40M
50M
60M
70M
80M
100M
200M
[Hz]
MES TUV230804A11.PK
LIM FCC P15.247(USA)
Page 1 8/23/04 10:18PM


IEA
BTC-001
2402MHz
H
FCC
[dBµV/m]
80
70
60
50
40
30
20
10
0
30M
40M
50M
60M
70M
80M
100M
200M
[Hz]
MES TUV230804A14.PK
LIM FCC P15.247(USA)
Page 1 8/23/04 10:27PM


TEA
BTC-001
2402MHz
V
FCC
[dBµV/m]
80
70
60
50
40
30
20
10
0
200M
300M
400M
500M
600M
700M
800M
1G
[Hz]
MES TUV230804A08.PK
LIM FCC P15.247(USA)
Page 1 8/23/04 9:58PM

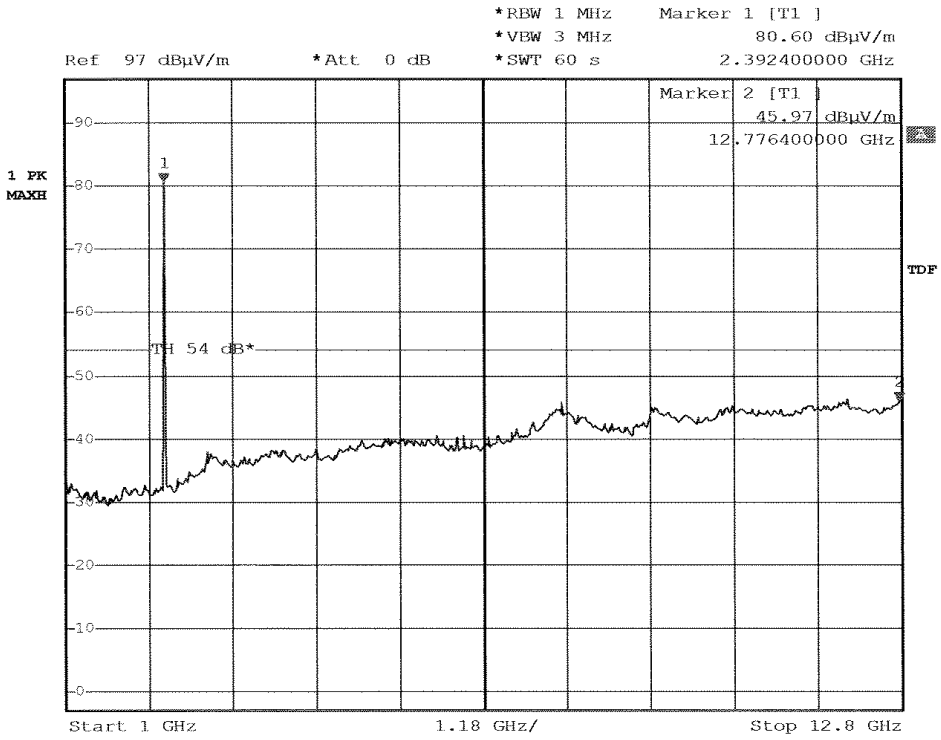

JEA
BTC-001
2402MHz
H
FCC
[dBµV/m]
80
70
60
50
40
30
20
10
0
200M
300M
400M
500M
600M
700M
800M
1G
[Hz]
MES TUV230804A10.PK
LIM FCC P15.247(USA)
Page 1 8/23/04 10:12PM



Date: 23.AUG.2004 20:51:25

IEA
BTC-001
2402MHz

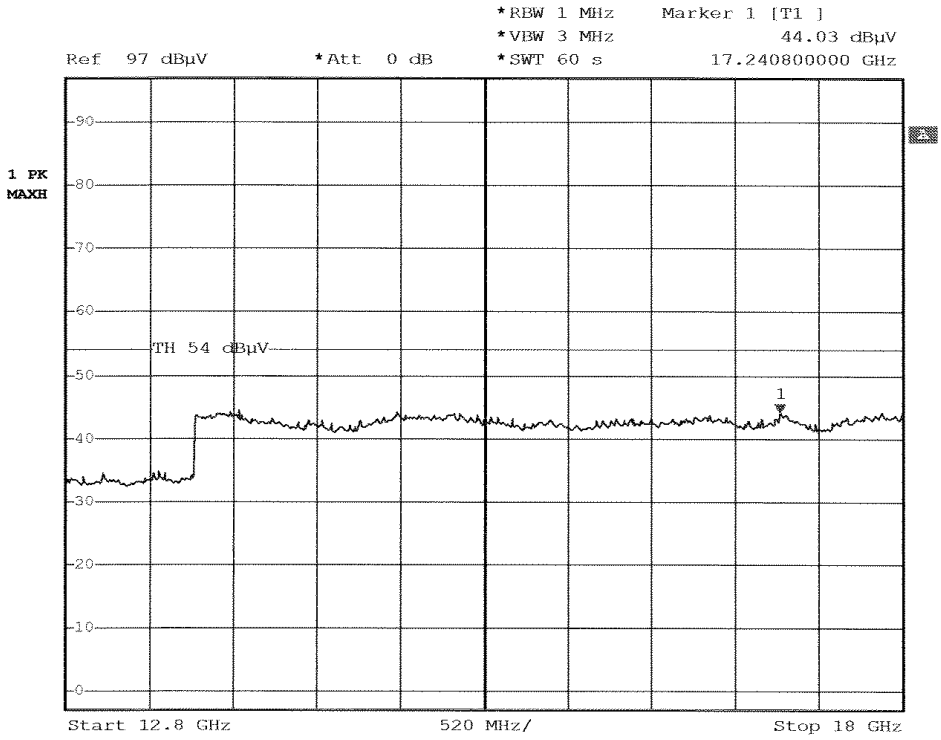
V
FCC



Date: 23.AUG.2004 20:53:54

IEA
BTC-001
2402MHz

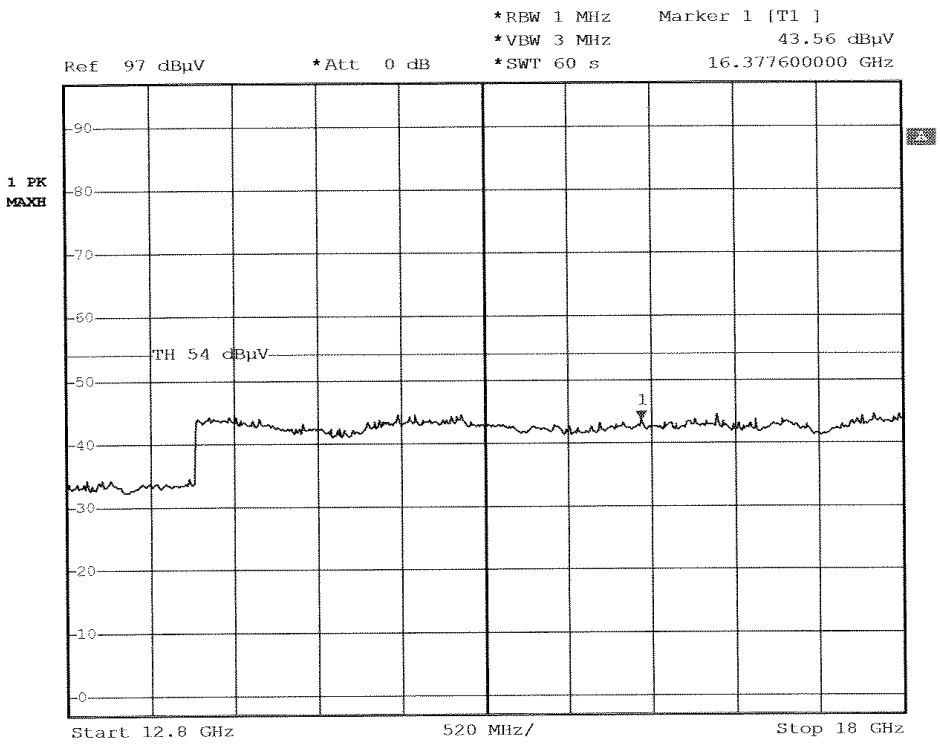
H
FCC



Date: 23.AUG.2004 21:00:09

TEA
BTC-001
2402MHz

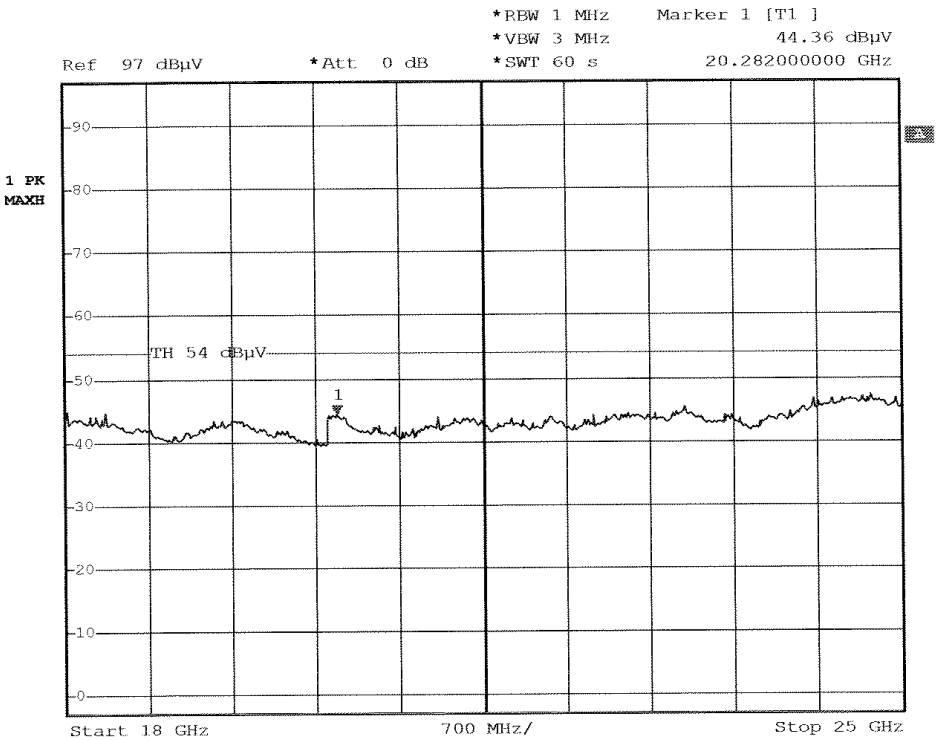
✓
FCC



Date: 23.AUG.2004 20:57:29

IEA
BTC-001
2402MHz

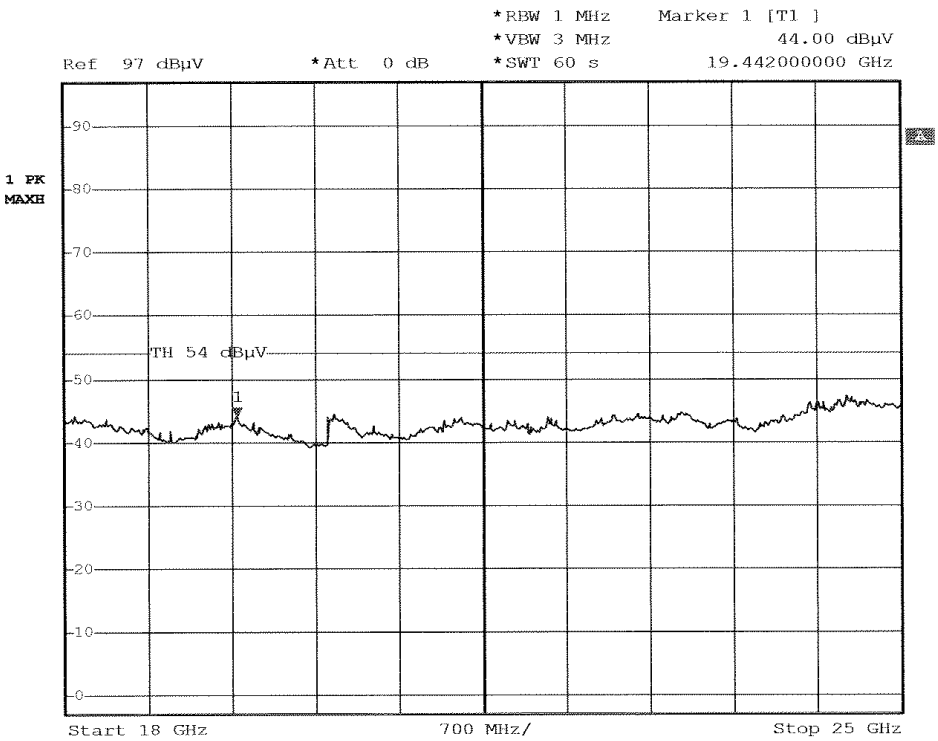
H
FCC



Date: 16.AUG.2004 22:33:33

IEA
BTC-001
2402MHz

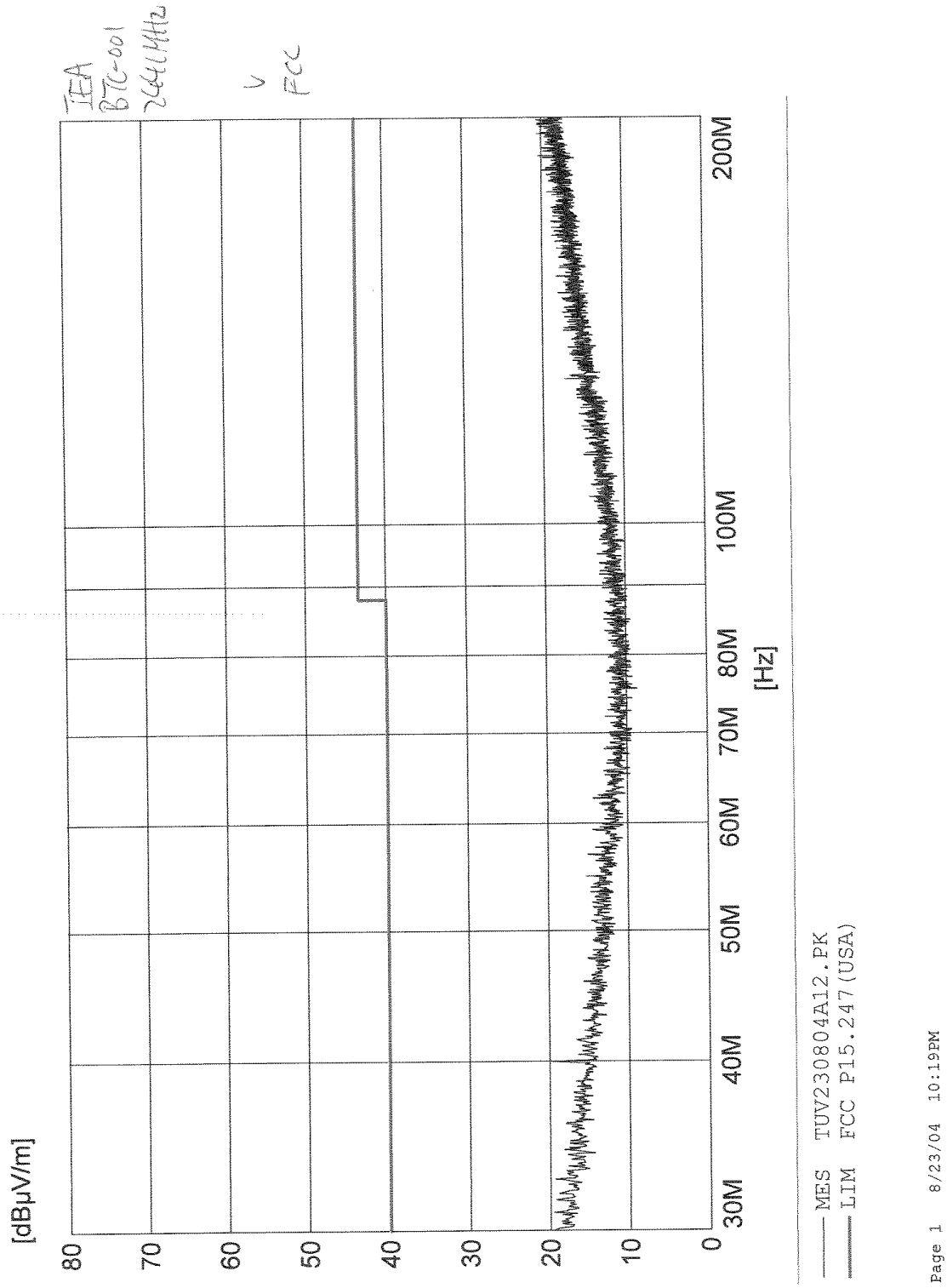
V

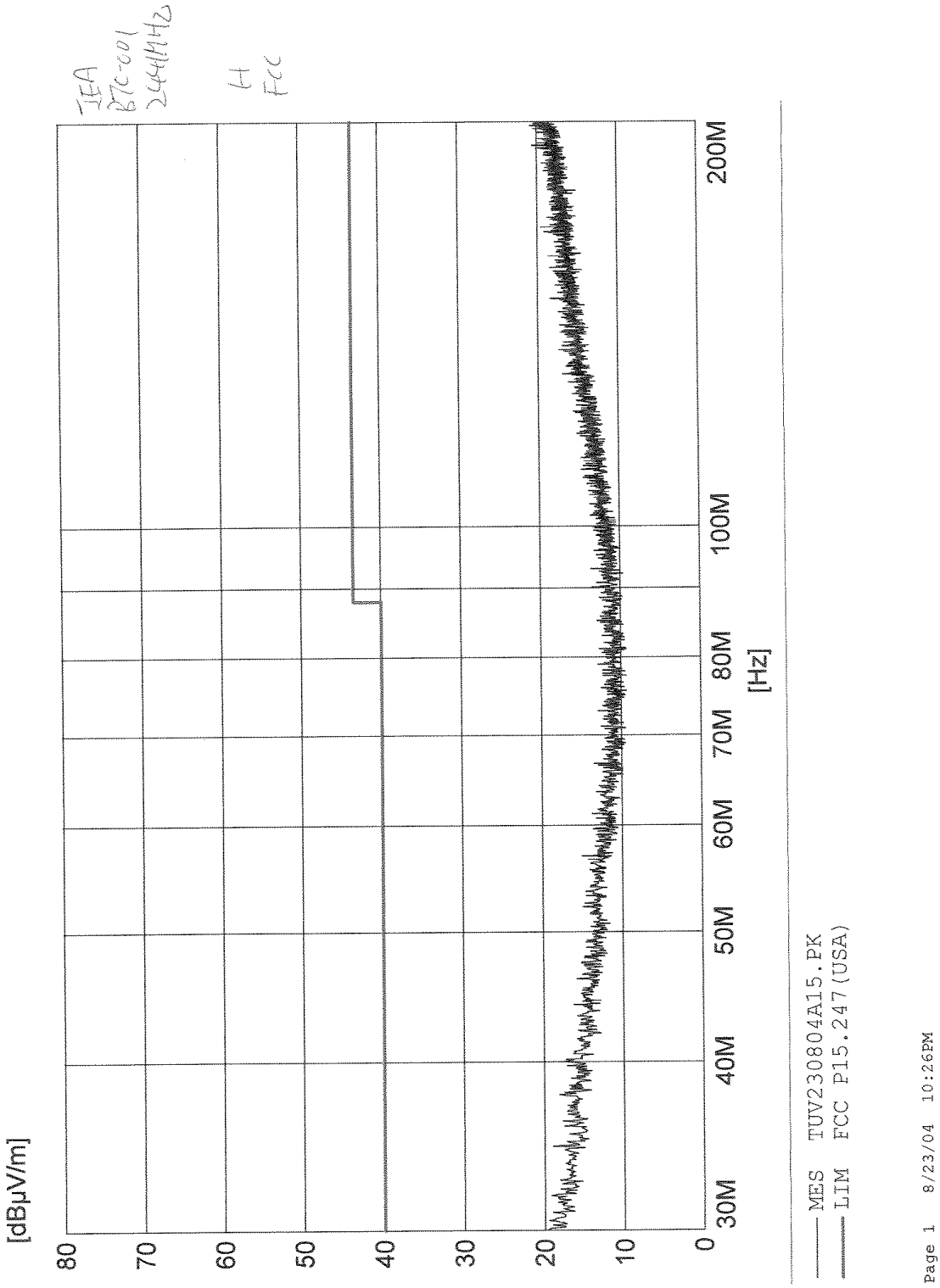


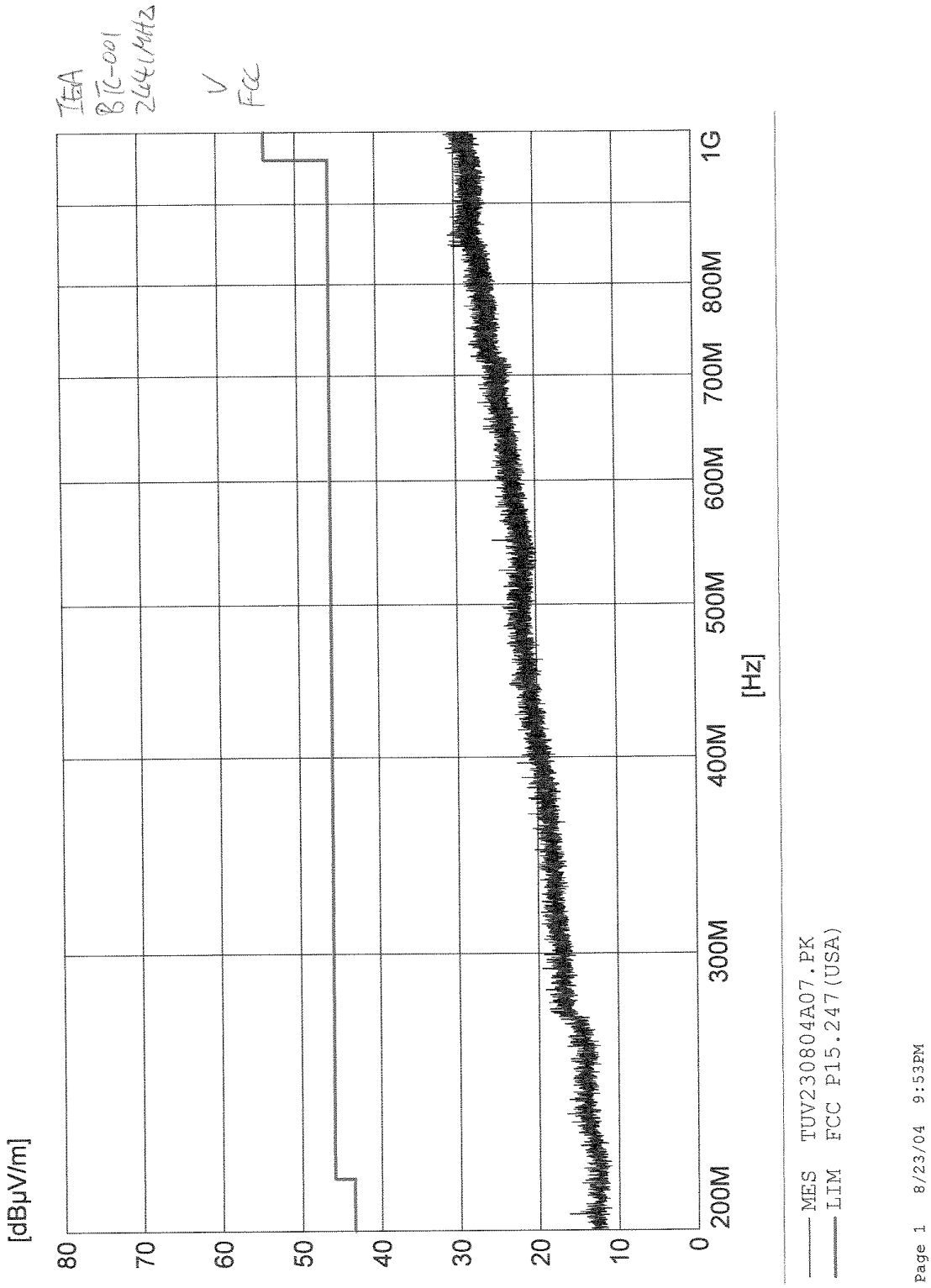
Date: 16.AUG.2004 22:37:17

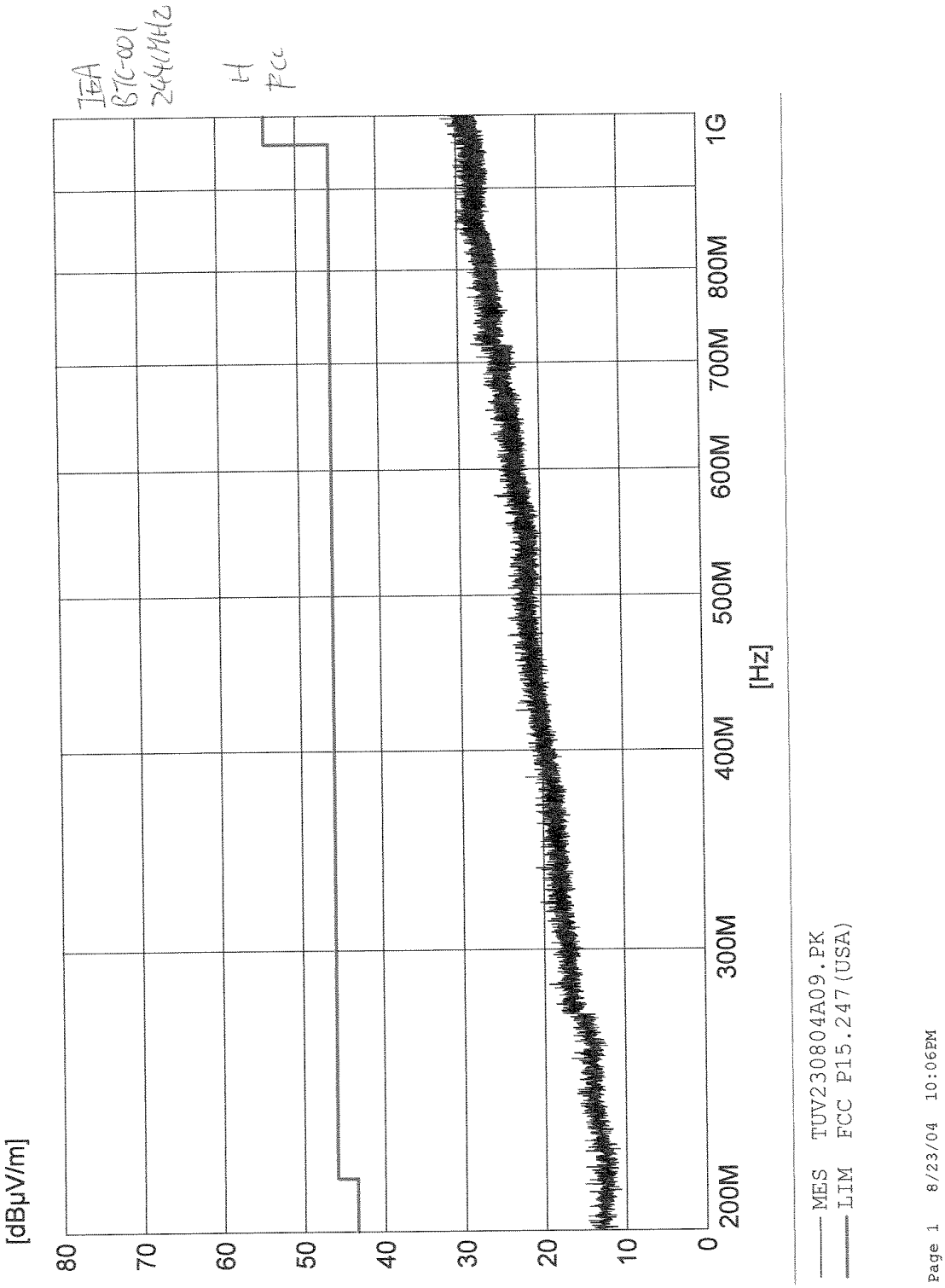
IEA
BTC-001
2402MHz

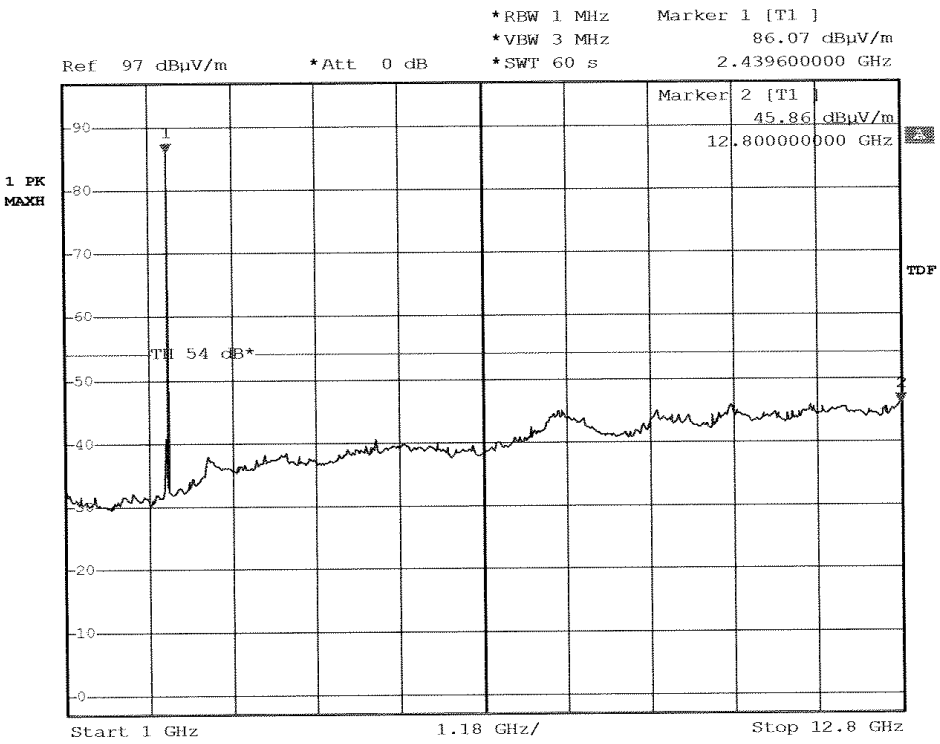
H


IEA
BTC-001
2441MHz
V
FCC
[dBµV/m]
80
70
60
50
40
30
20
10
0
30M
40M
50M
60M
70M
80M
100M
200M
[Hz]
MES TUV230804A12.PK
LIM FCC P15.247(USA)
Page 1 8/23/04 10:19PM


IEA
B7c-001
2441MHz
H
FCC
[dBµV/m]
80
70
60
50
40
30
20
10
0
30M
40M
50M
60M
70M
80M
100M
200M
[Hz]
MES TUV230804A15.PK
LIM FCC P15.247(USA)
Page 1 8/23/04 10:26PM


IEA
BTC-001
2441MHz
V
FCC
[dBµV/m]
80
70
60
50
40
30
20
10
0
200M
300M
400M
500M
600M
700M
800M
1G
[Hz]
MES TUV230804A07.PK
LIM FCC P15.247(USA)
Page 1 8/23/04 9:53PM

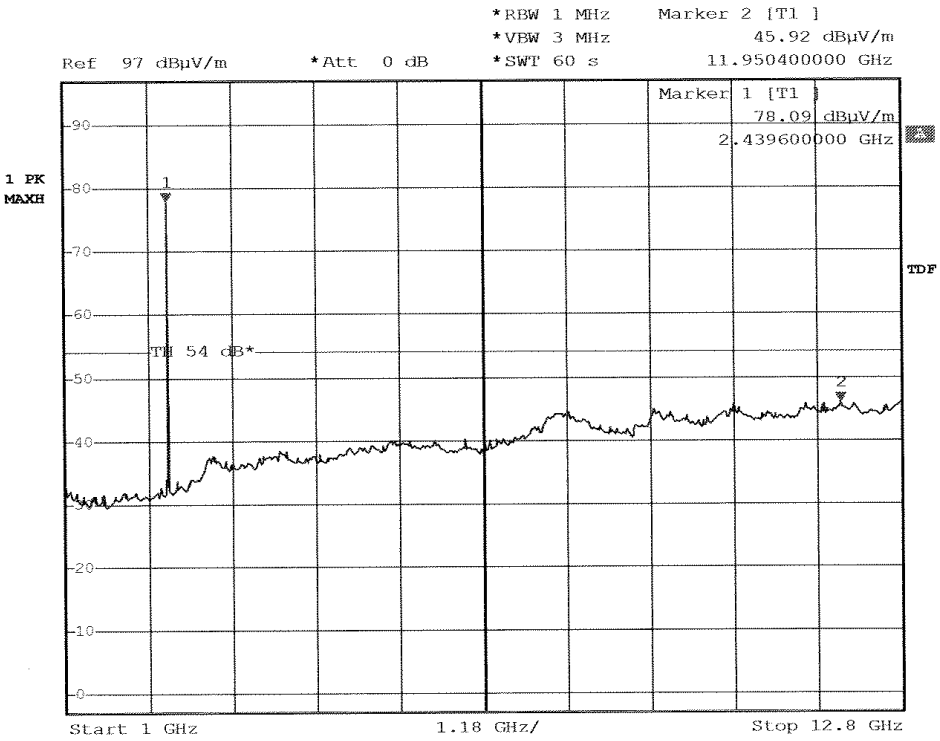

ITA
BTC-001
244MHz
H
Pcc
[dBµV/m]
80
70
60
50
40
30
20
10
0
200M
300M
400M
500M
600M
700M
800M
1G
[Hz]
MES TUV230804A09.PK
LIM FCC P15.247(USA)
Page 1 8/23/04 10:06PM



Date: 23.AUG.2004 21:06:16

IFA
BTC-001
2441 MHz

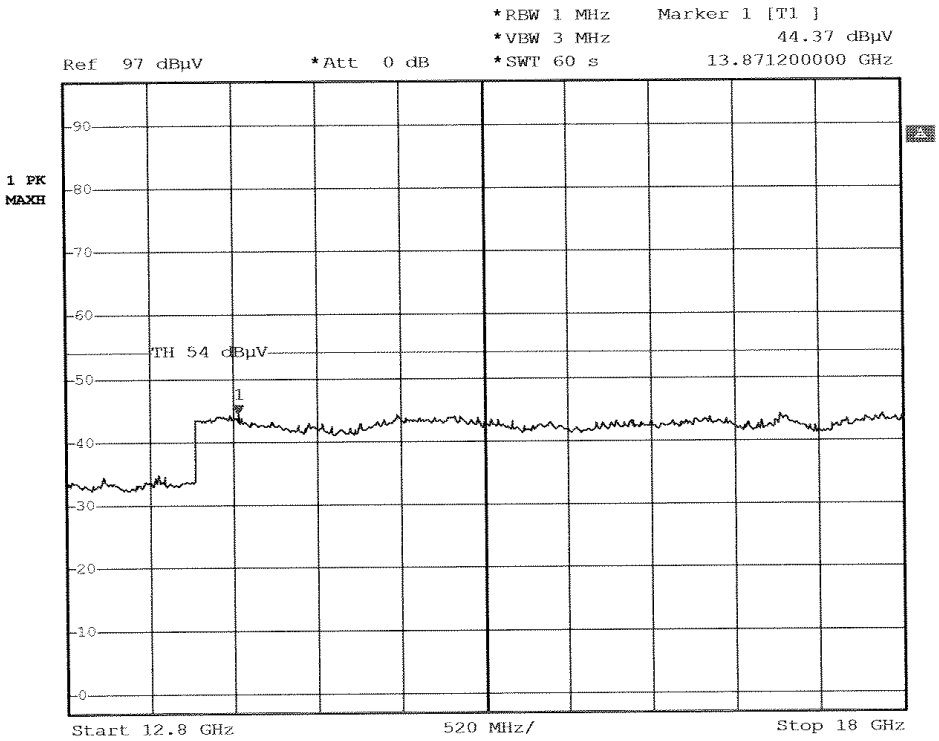
V
FCC



Date: 23.AUG.2004 21:08:42

IEA
BTC-001
2441MHz

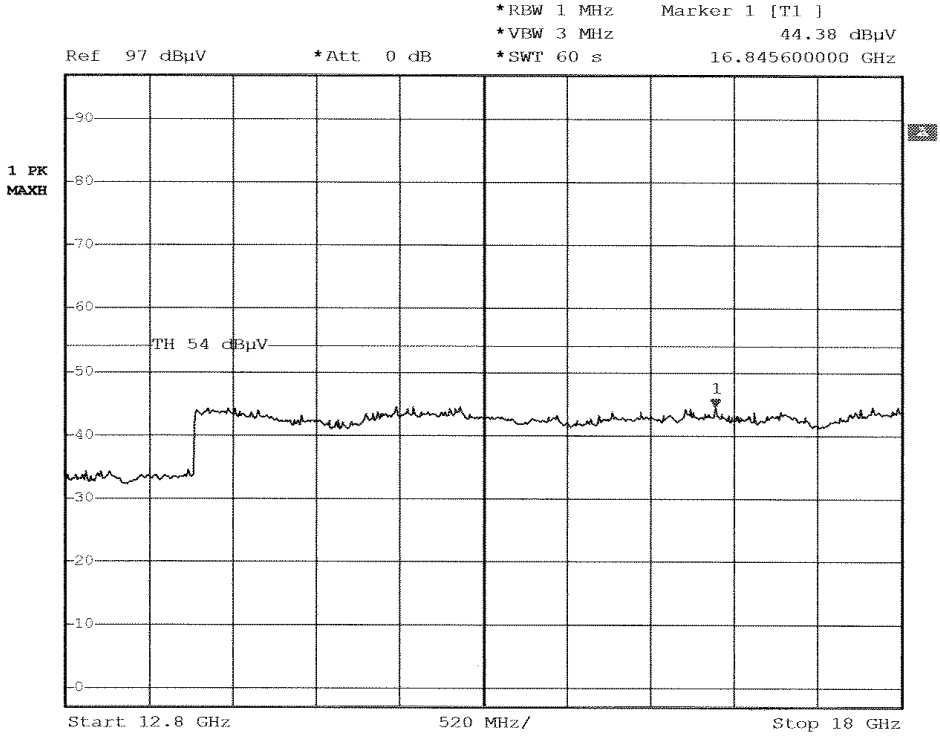
H
FCC



Date: 23.AUG.2004 21:00:00

IEA
BTC-001
2441MHz

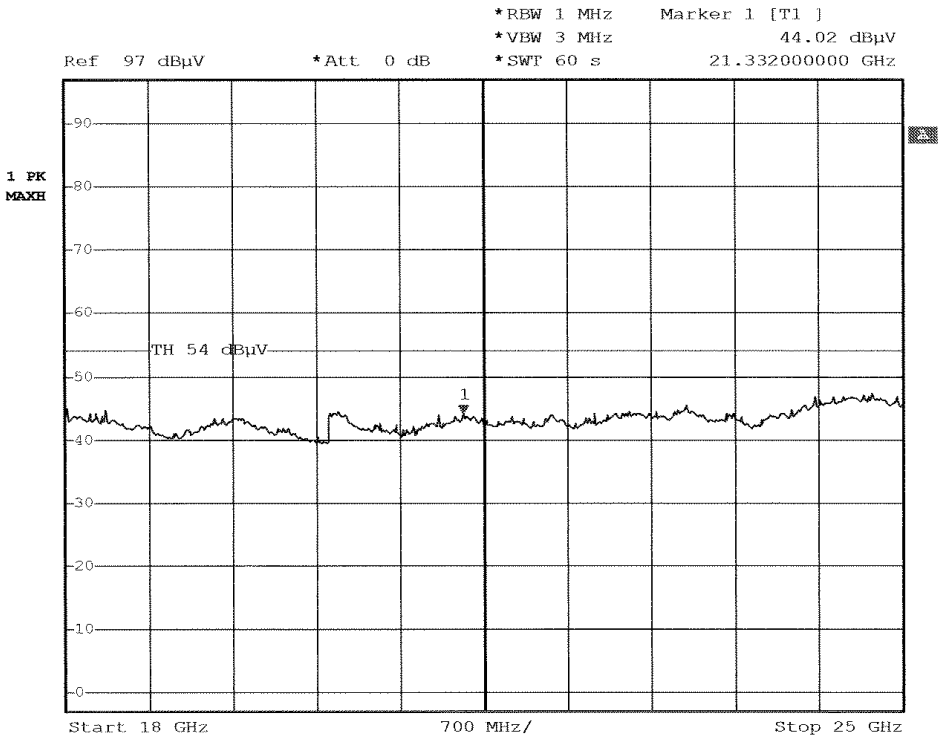
V
FCC



Date: 23.AUG.2004 20:57:48

IEA
BTC-001
2441MHz

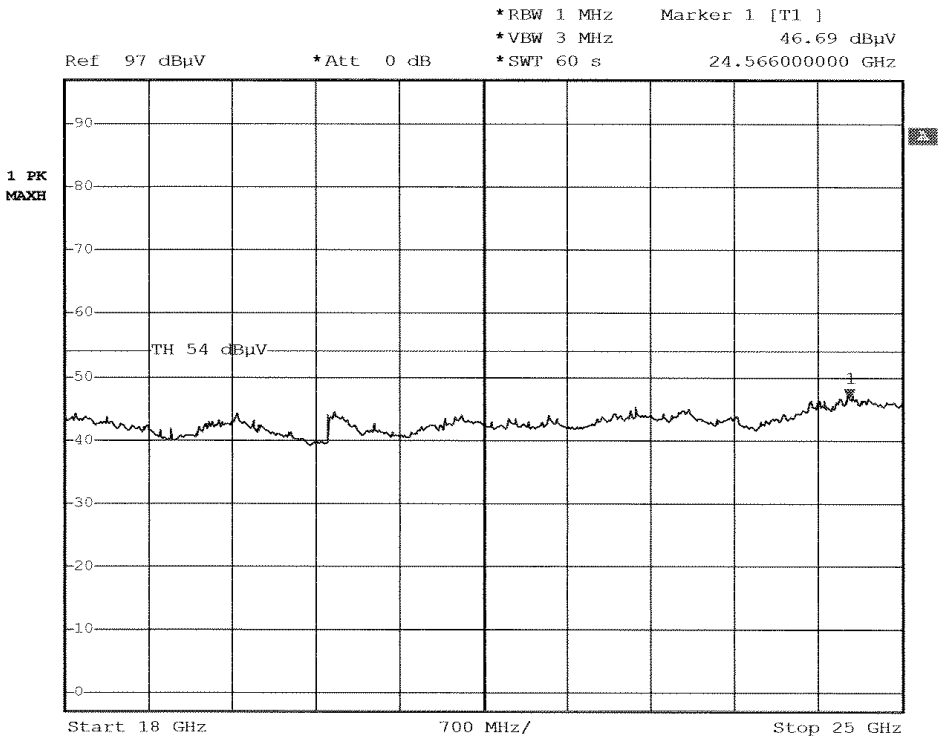
H
FCC



Date: 16.AUG.2004 22:33:43

IEA
BTC-001
2441 MHz

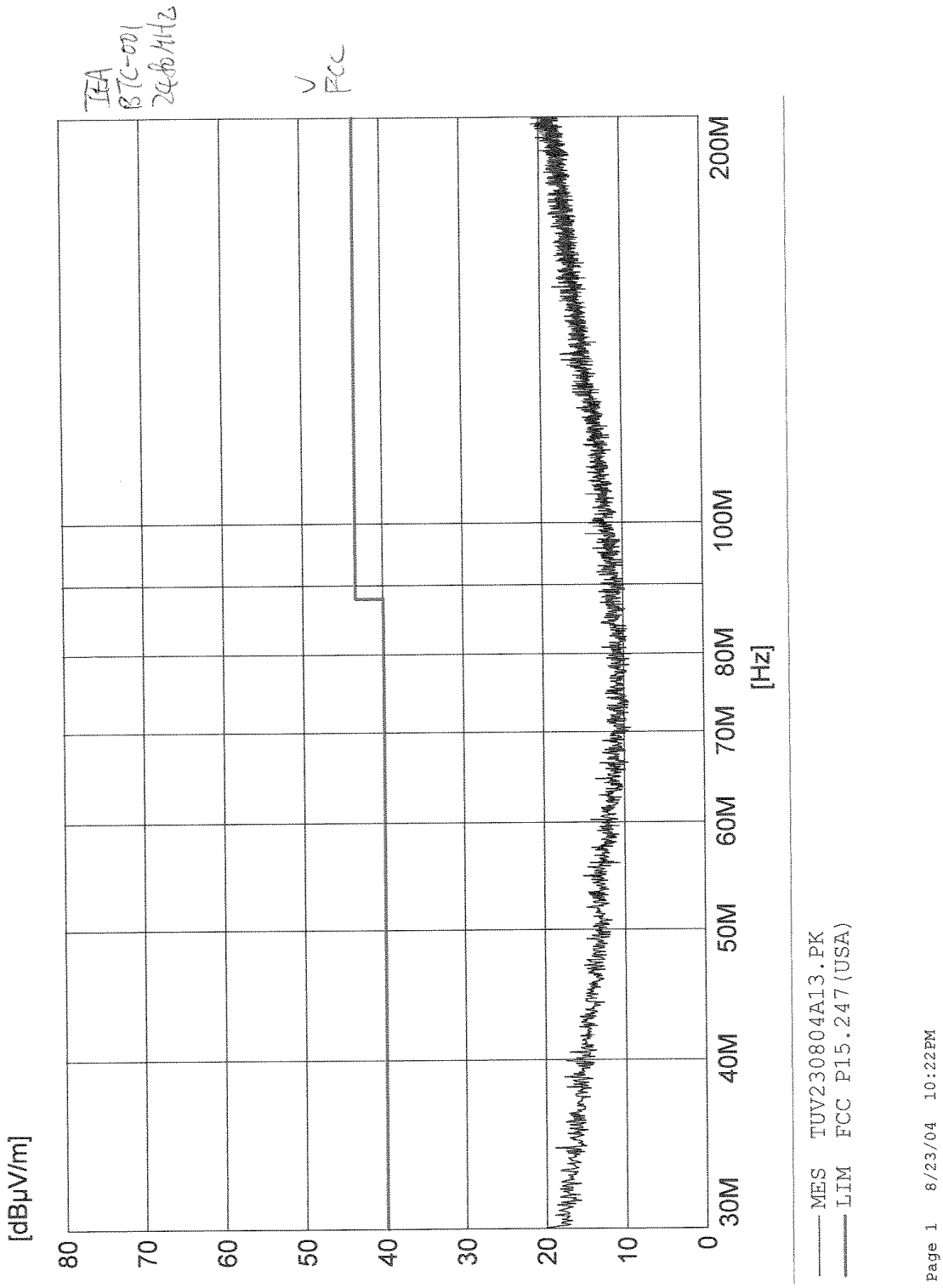
√

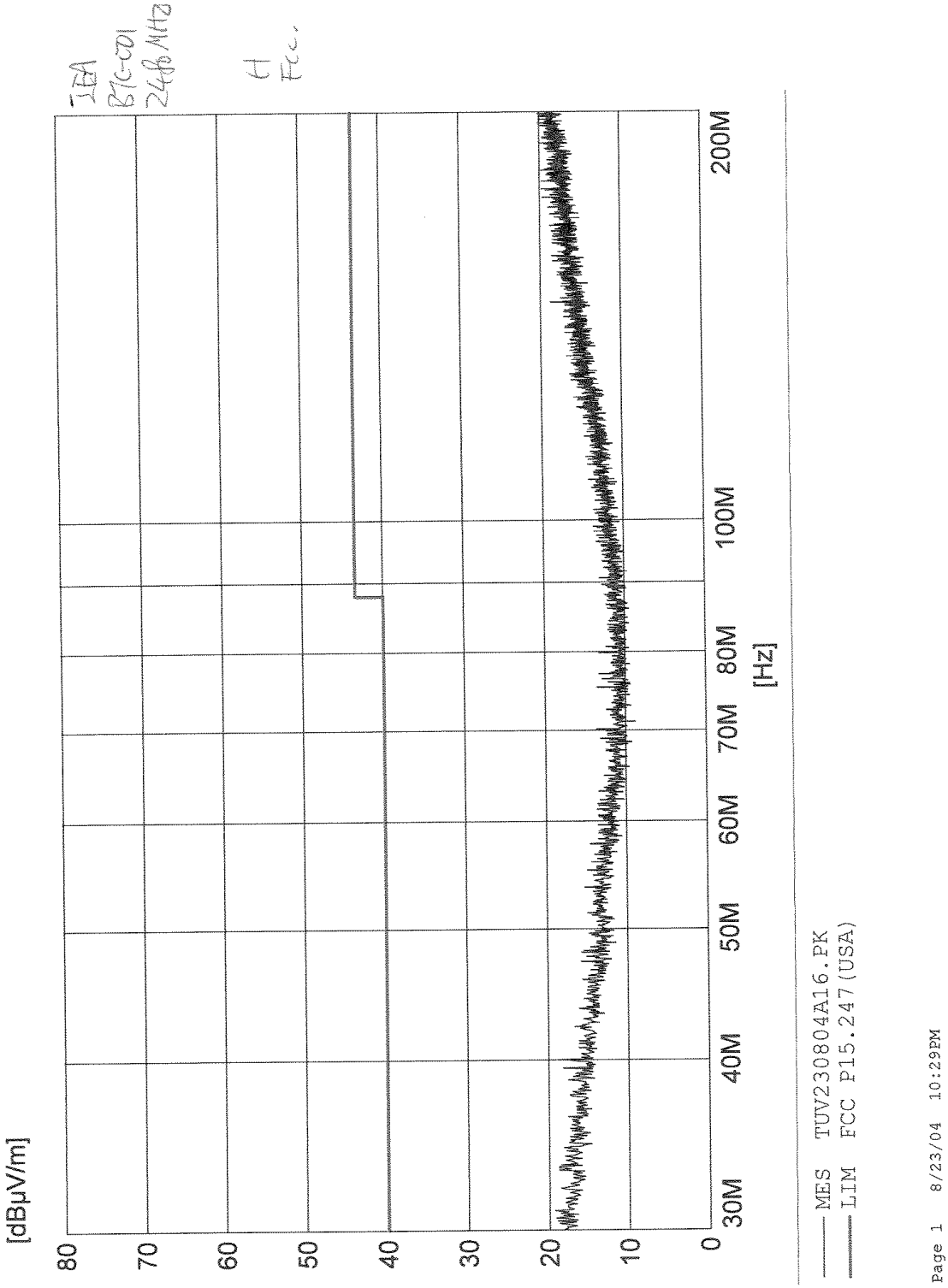


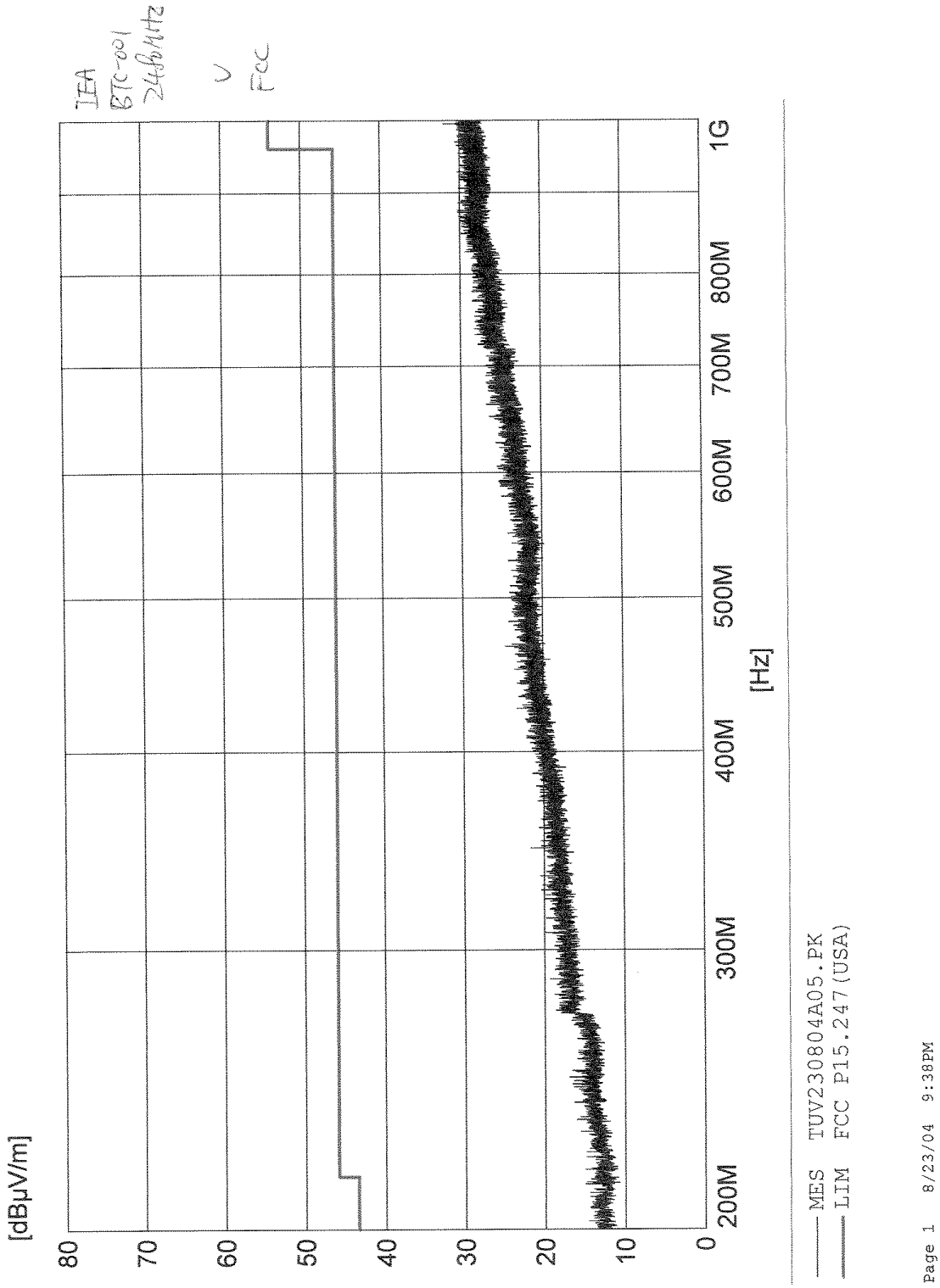
Date: 16.AUG.2004 22:37:32

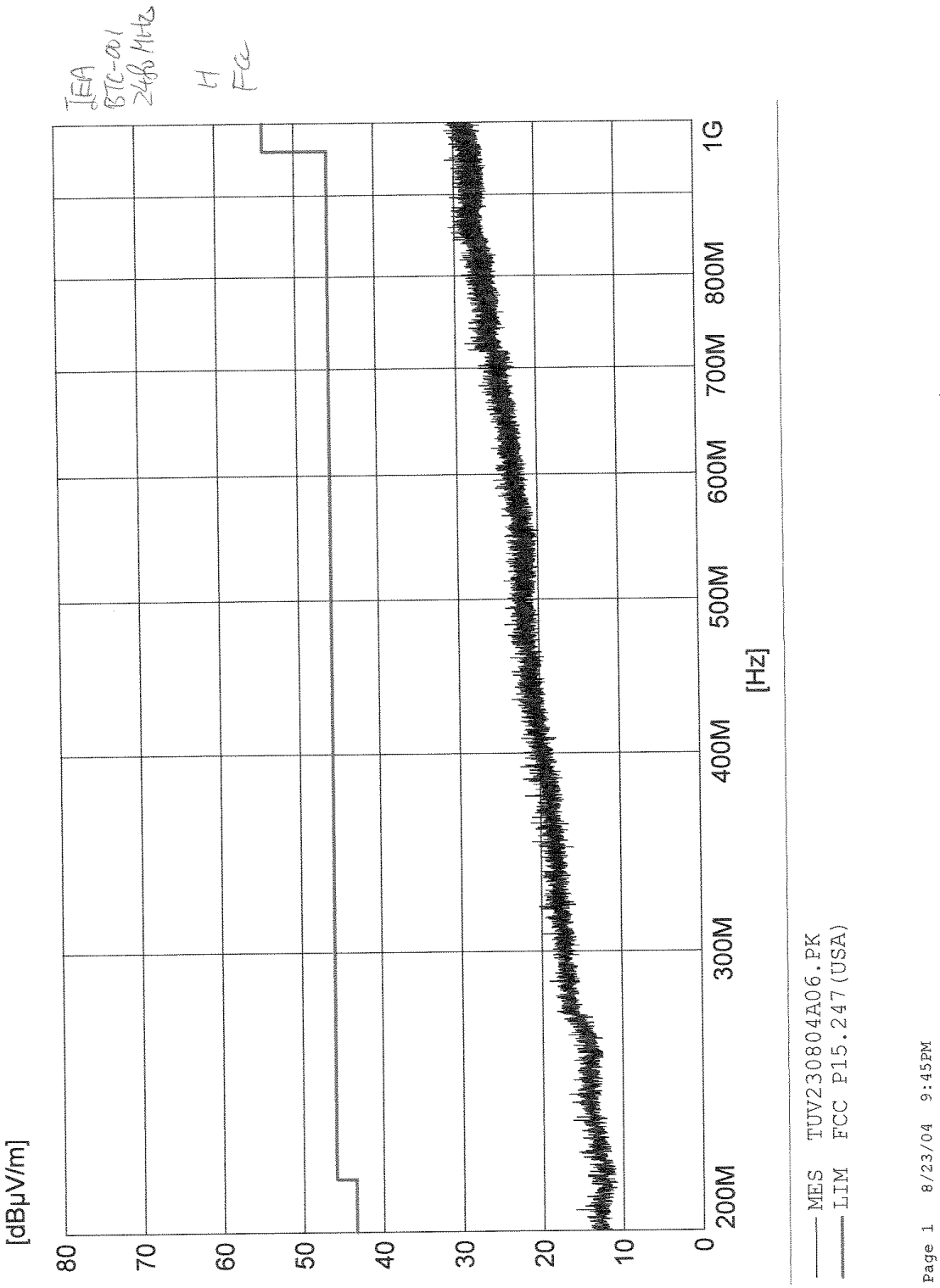
IEA
BTC-001
2441 MHz

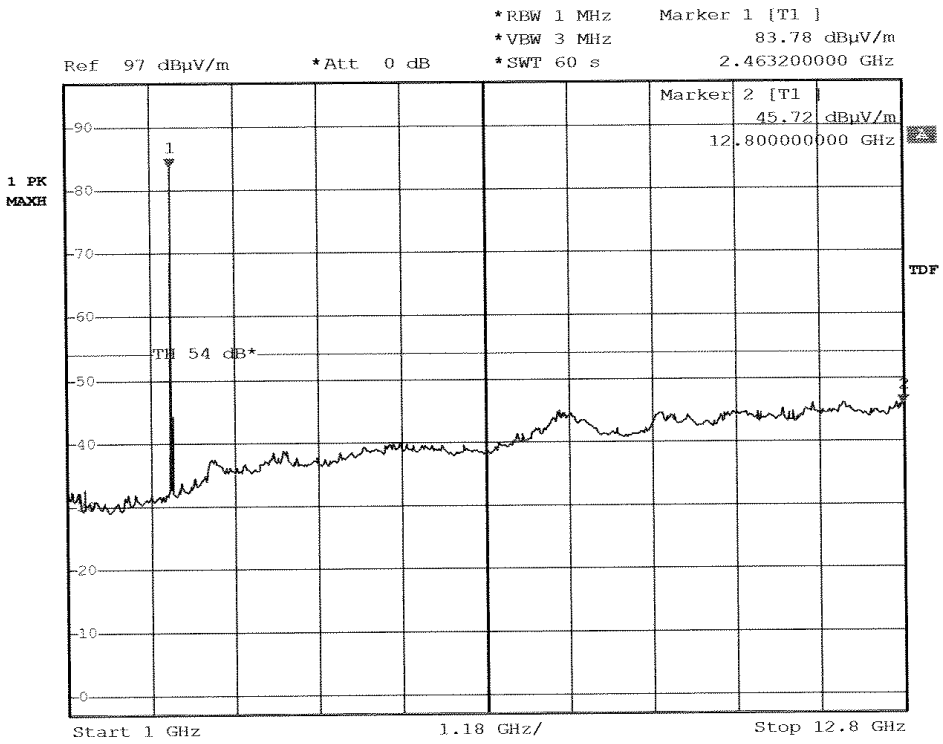
H


ITA
BTC-001
2466MHz
V
FCC
[dBµV/m]
80
70
60
50
40
30
20
10
0
30M
40M
50M
60M
70M
80M
100M
200M
[Hz]
MES TUV230804A13.PK
LIM FCC P15.247(USA)
Page 1 8/23/04 10:22PM


IEA
BTC-001
24fb MHz
H
Fcc.
[dBµV/m]
80
70
60
50
40
30
20
10
0
30M
40M
50M
60M
70M
80M
100M
200M
[Hz]
MES TUV230804A16.PK
LIM FCC P15.247(USA)
Page 1 8/23/04 10:29PM


IEA
BTC-001
2.4GHz
V
FCC
[dBµV/m]
80
70
60
50
40
30
20
10
0
200M
300M
400M
500M
600M
700M
800M
1G
[Hz]
MES TUV230804A05.PK
LIM FCC P15.247(USA)
Page 1 8/23/04 9:38PM

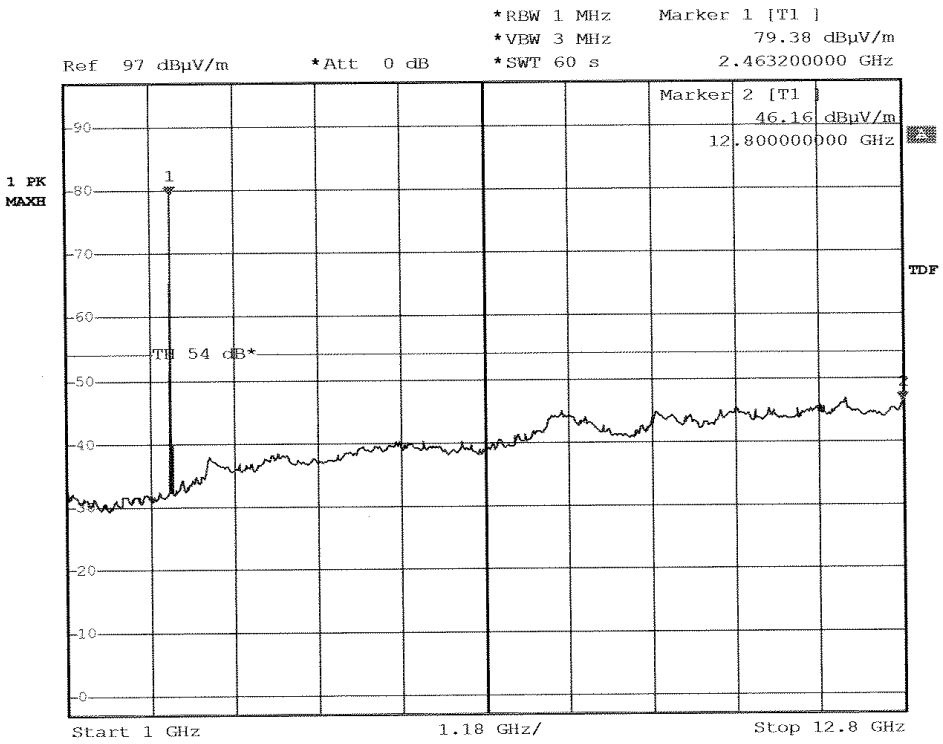

IEA
BTC-001
2483 MHz
H
FCC
[dBµV/m]
80
70
60
50
40
30
20
10
0
200M
300M
400M
500M
600M
700M
800M
1G
[Hz]
MES TUV230804A06.PK
LIM FCC P15.247(USA)
Page 1 8/23/04 9:45PM



Date: 23.AUG.2004 21:21:52

IEA
BTC-001
2480MHz

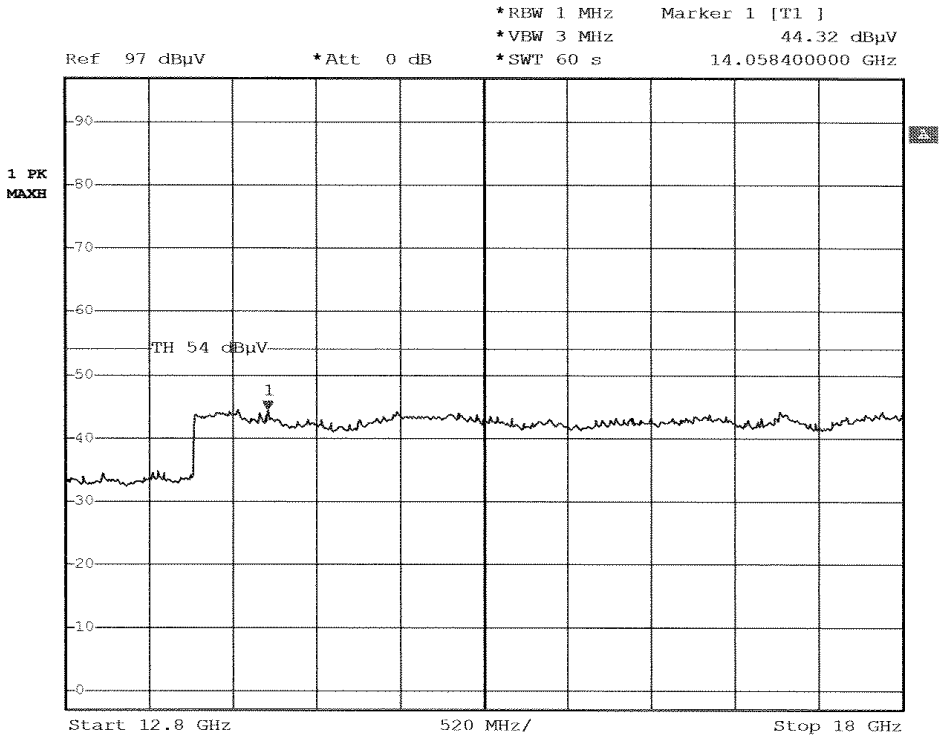
V
FCC



Date: 23.AUG.2004 21:16:27

IEA
BTC-001
2480 MHz

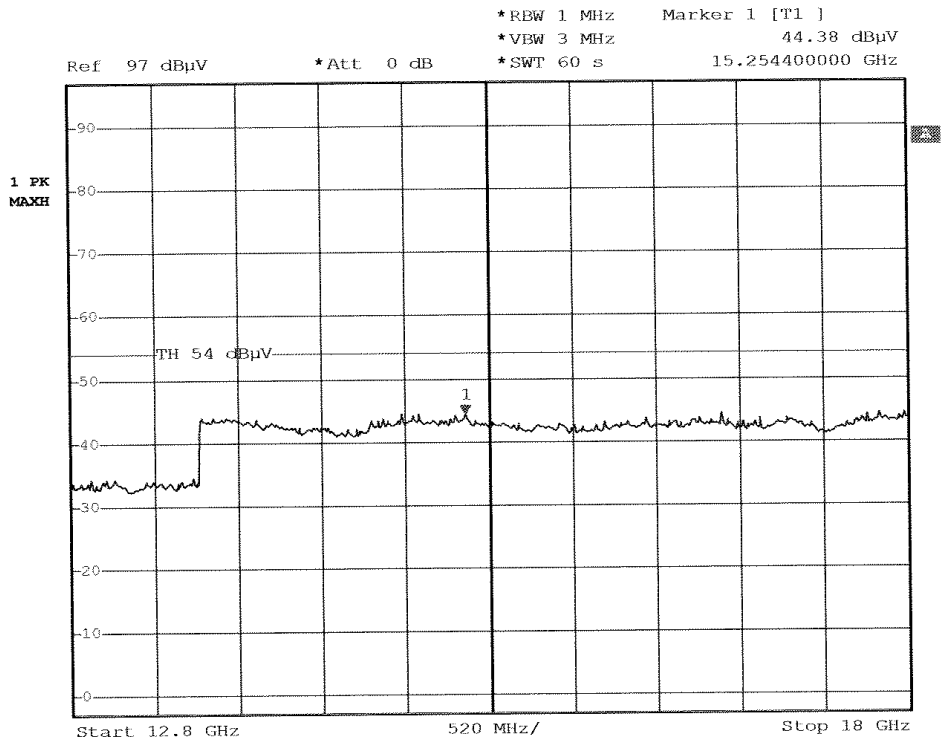
H
FCC



Date: 23.AUG.2004 21:00:25

IBA
BTC-001
2480 MHz

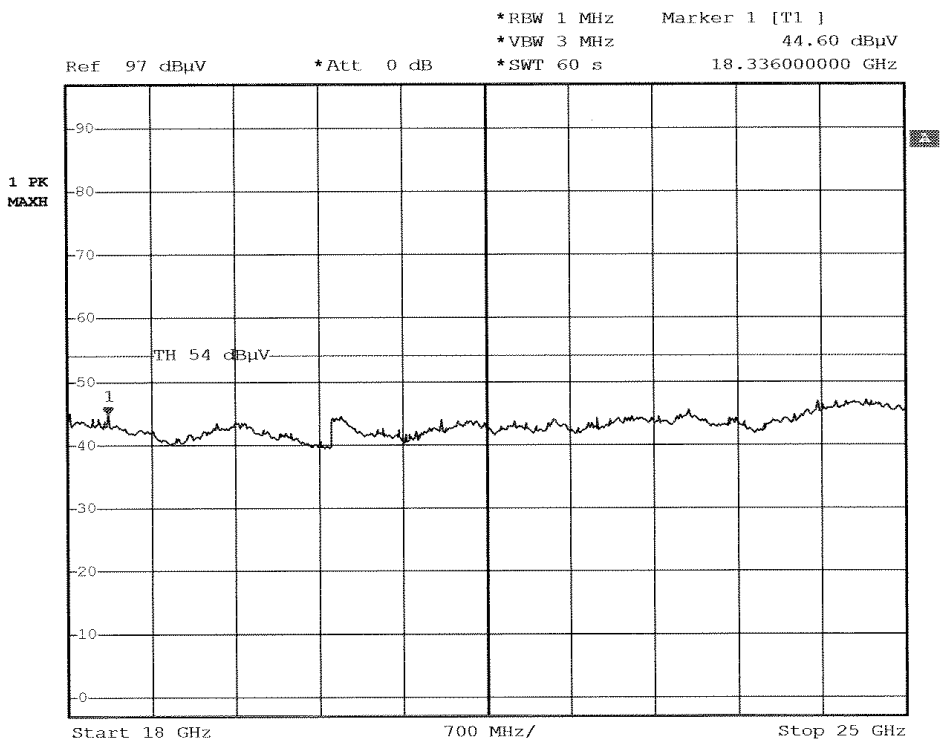
V
FCC



Date: 23.AUG.2004 20:57:02

IEA
BTC-001
2480MHz

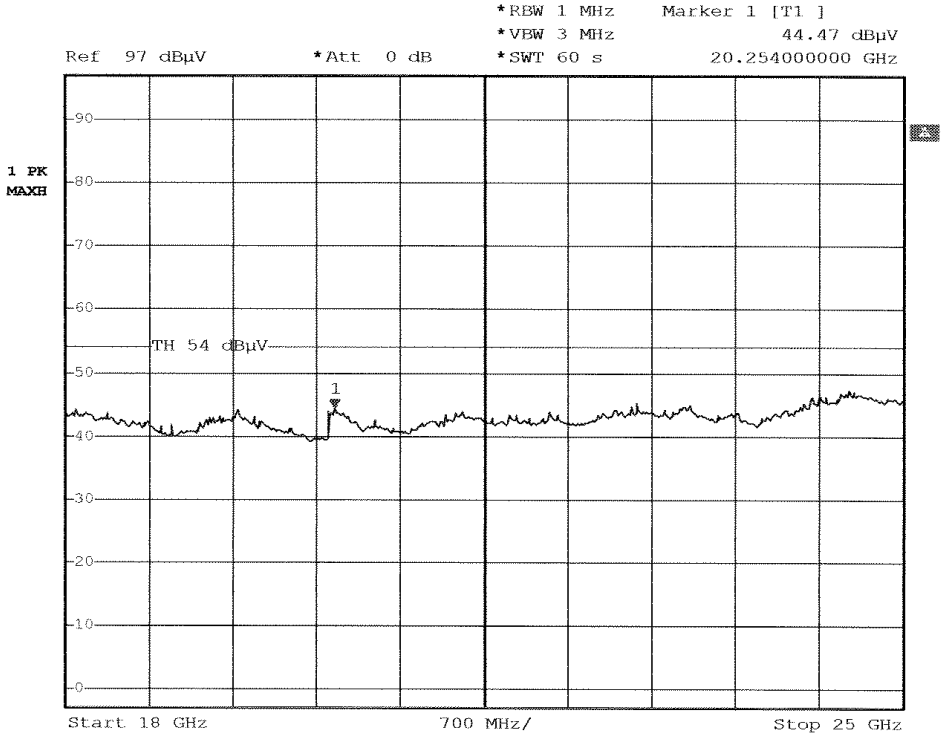
H
FCC



Date: 16.AUG.2004 22:33:06

IEA
BTC-001
24.60 MHz

V



Date: 16.AUG.2004 22:37:42

IEA
B7C-001
24 to MHz

H