CETECOM ICT Services GmbH

Radio Satelite Communication
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Accredited Testing Laboratory

DAR-Registration number:
TTI-P-G 166/98-00

Test report no.: 2-2509-E/01
FCC Part15.247/CANADA RSS-210

Bluetooth module

Table of Contents

1 General information

1.1 Notes

The test results of this test report relate exclusively to the test item specified in 1.5. The CETECOM ICT Services GmbH does not assume responsibility for any conclusions and generalisations drawn from the test results with regard to other specimens or samples of the type of the equipment represented by the test item. The test report may only be reproduced or published in full. Reproduction or publication of extracts from the report requires the prior written approval of the CETECOM ICT Services GmbH.

1.2 Testing laboratory

CETECOM ICT Services GmbH
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Internet : www.cetecom.de

Accredited testing laboratory
DAR-registration number : TTI-P-G 166/98-20

Equipment under test : Bluetooth module
Ambient temperature : 23° C
Relative humidity : 47%

1.3 Details of applicant

Name : **Technology & Quality Management Division,**
Toshiba Corporation, Digital Media Network Company
Street : **1-1-1 Shibaura**
City : **Minarto-ku, Tokyo 198-8001**
Country : **Japan**
Telephone: **+81 (3) 3457 2565**
Telefax : **+81 (3) 5444 9404**
Contact : **Mr. Hideo Abe**
Telephone: **+81 (3) 3457 2565**

1.4 Application details

Date of receipt of application : 23.04.01
Date of receipt of test item : 23.04.01
Date of test : 24.04. – 26.04.01

1.5 Test item

Type of equipment	:	**Bluetooth module for integration into PC`s**
Type designation	:	
Manufacturer	:	- applicant -
Street	:	
City	:	
Country	:	
Serial number	:	
Additional informations: :		
Frequency	:	2402 – 2480 MHz
Type of modulation	:	1M00FXD (FHSS) Ch.Sep. : 1 MHz
Number of channels	:	79
Antenna	:	integral antenna
Power supply	:	5.0 DC powered by USB port
Output power cond.	:	1 mW
Type of equipment	:	Class B
Temperature range	:	+5°C - +35°C

1.6 Test standards: FCC Part 15 §15.247

Equipment under test : Bluetooth module
Ambient temperature : 23° C
Relative humidity : 47%

2 Technical test

2.1 Summary of test results

For the measurements, the module was powered by a Toshiba laptop Satellite 4600 Pro or an external PCB test board.
The radiated measurements were performed with the antenna positioned outside and inside the laptop.
The radiated measurements were performed horizontal, vertical results are about 6 dB lower over the complete frequency range.
The antenna gain measurement was performed by the difference between conducted and radiated output measurement.
The conducted power measurement was performed by a temporary added coax adapter.
All measurement settings are according to FCC 15.35, 15.205, 15.209, 15.247 and the „Measurement guidelines for FHSS systems“.

No deviations from the technical specification(s) were ascertained in the course of the tests performed.
The product fullfills also the requirements for CANADA RSS-210.

Technical responsibility for area of testing :

Date	Section	Name	Signature
05.06.2001	RSC 8414	Ames H.	H. Ames

Technical responsibility for area of testing :

Date	Section	Name	Signature
05.06.2001	RSC8412	Hausknecht D.	D. Hausknecht

Equipment under test : Bluetooth module
Ambient temperature : 23° C
Relative humidity : 47%

2.2 Testreport

TEST REPORT

Testreport no. : 2-2509-E/01

Equipment under test : Bluetooth module
Ambient temperature : 23° C
Relative humidity : 47%

TEST REPORT REFERENCE

LIST OF MEASUREMENTS

Equipment under test : Bluetooth module
Ambient temperature : 23° C
Relative humidity : 47%

Antenna Gain **SUBCLAUSE § 15.204**

The antenna gain of the complete system is calculated by the difference of conducted power of the module and the radiated power in EIRP.

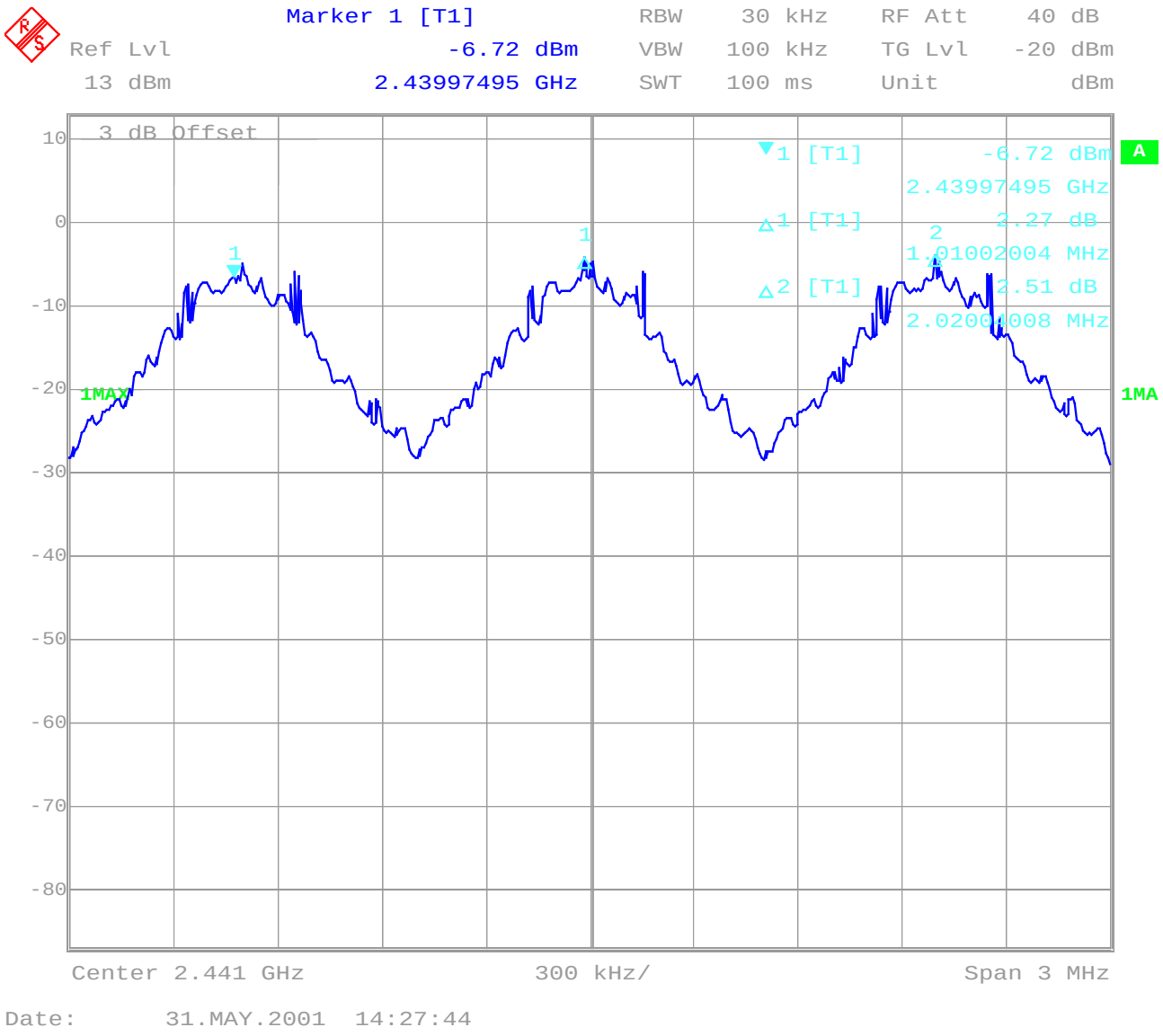
	low channel	mid channel	high channel
Conducted power	-2.99 dBm	-3.19 dBm	-2.7dBm
Radiated power (antenna outside)	-1.94 dBm	-2.07 dBm	-1.61 dBm
Gain	+1.05 dBm	+1.12 dBm	+1.09 dBm
Radiated power (antenna inside laptop)	-6.2 dBm	-6.3 dBm	-6.5 dBm
Gain	-3.21 dB	-3.11 dB	-3.8 dB

The calculated antenna gain is between –3.11 and –3.8 dB for the build-in antenna
And between +1.05 and +1.12 dB for the stand-alone antenna outside housing.

When the module and the dedicated antenna are met in a computer, the radiated power is lower because of metallic parts near the antennas.

Equipment under test : Bluetooth module
Ambient temperature : 23° C
Relative humidity : 47%

Carrier frequency separation §15.247(a)



REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
(for reference numbers see test equipment listing)
17 - 24

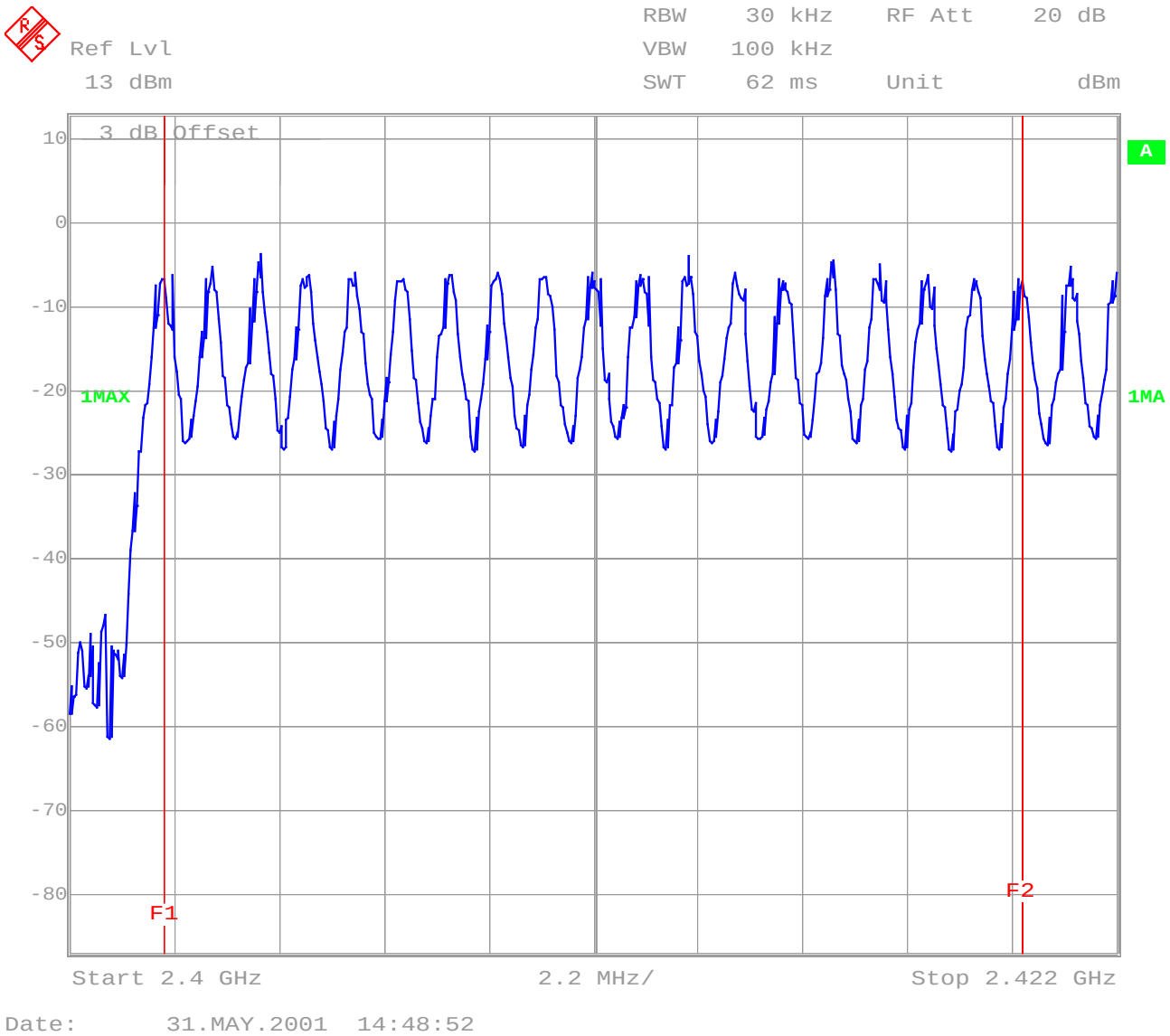
Equipment under test : Bluetooth module
Ambient temperature : 23° C
Relative humidity : 47%

Number of hopping channels **§15.247(a)**

The number of hopping channels is 79.

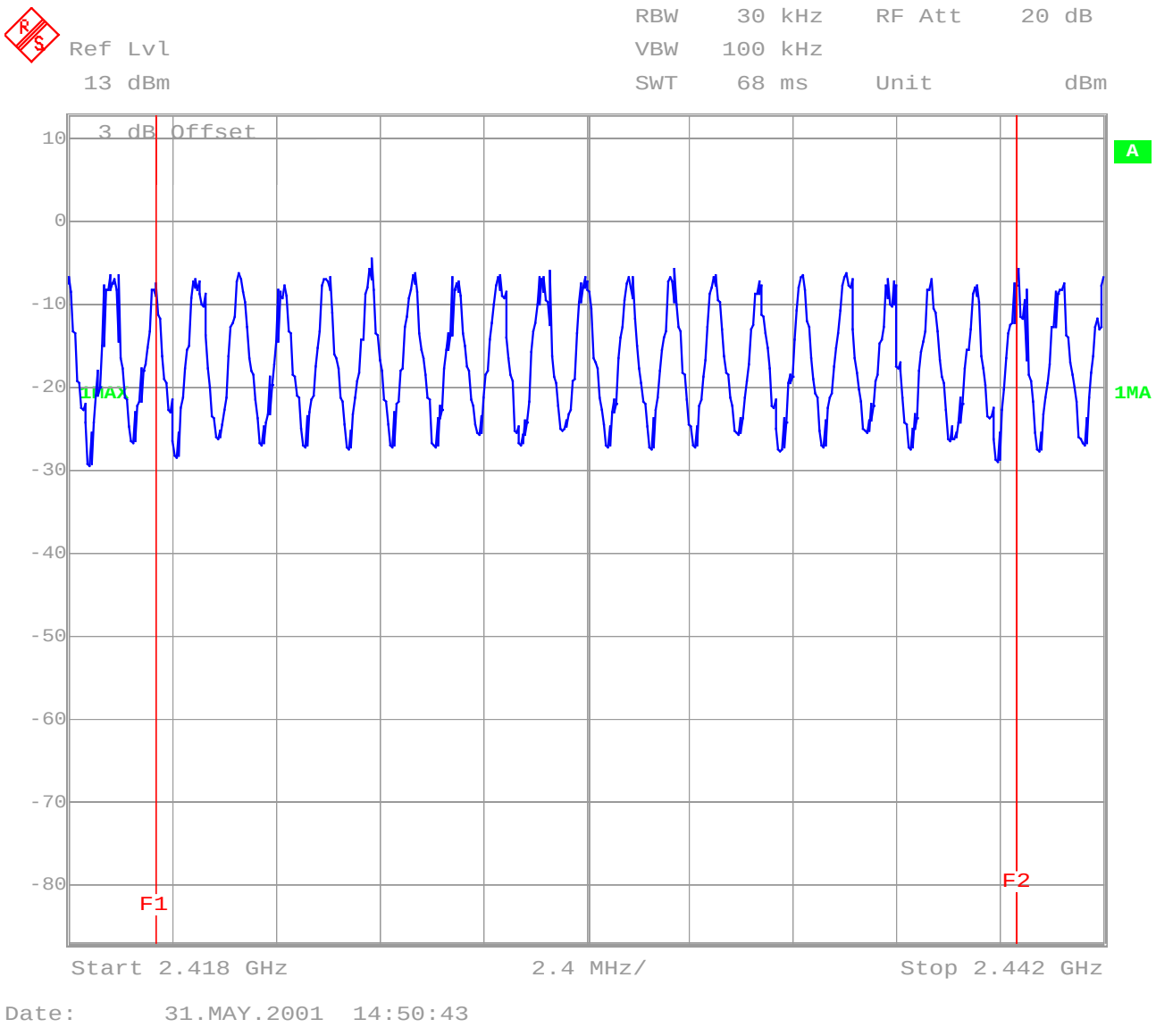
The next 4 plots shows the number.
The right red line corresponds to the left red line from the next plot.

Plot 1:



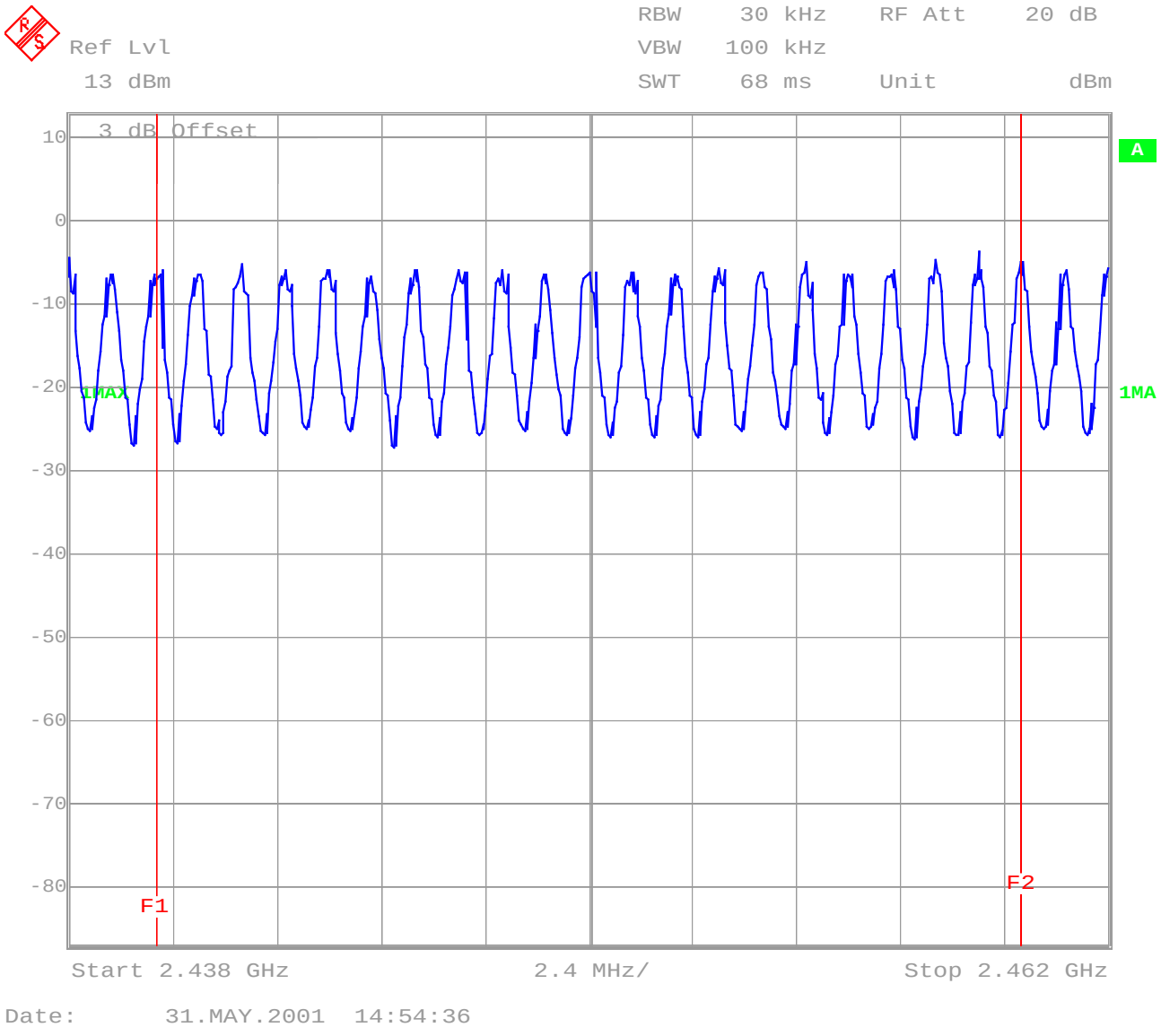
Equipment under test : Bluetooth module
Ambient temperature : 23° C
Relative humidity : 47%

Plot 2:



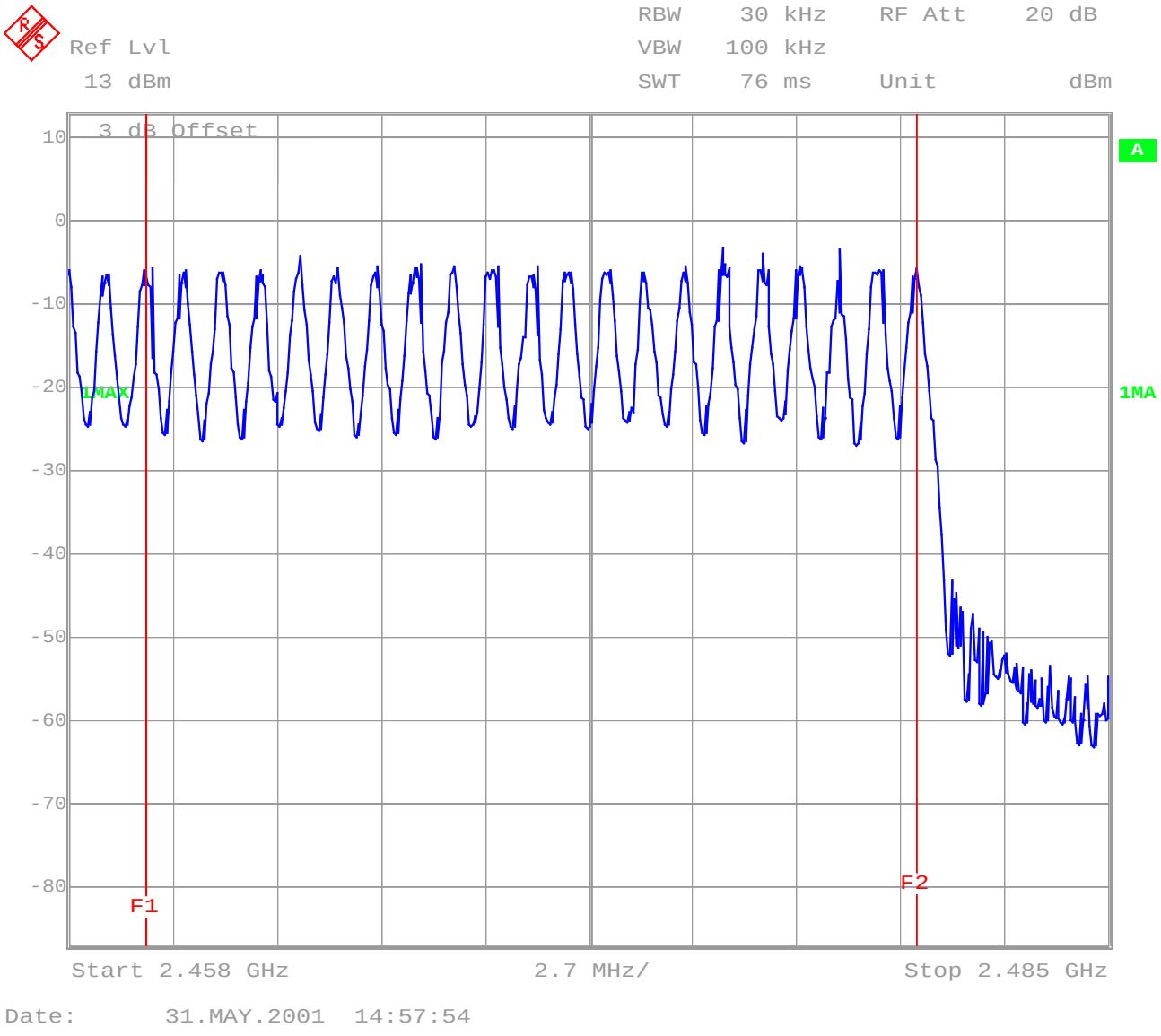
Equipment under test : Bluetooth module
Ambient temperature : 23° C
Relative humidity : 47%

Plot 3:



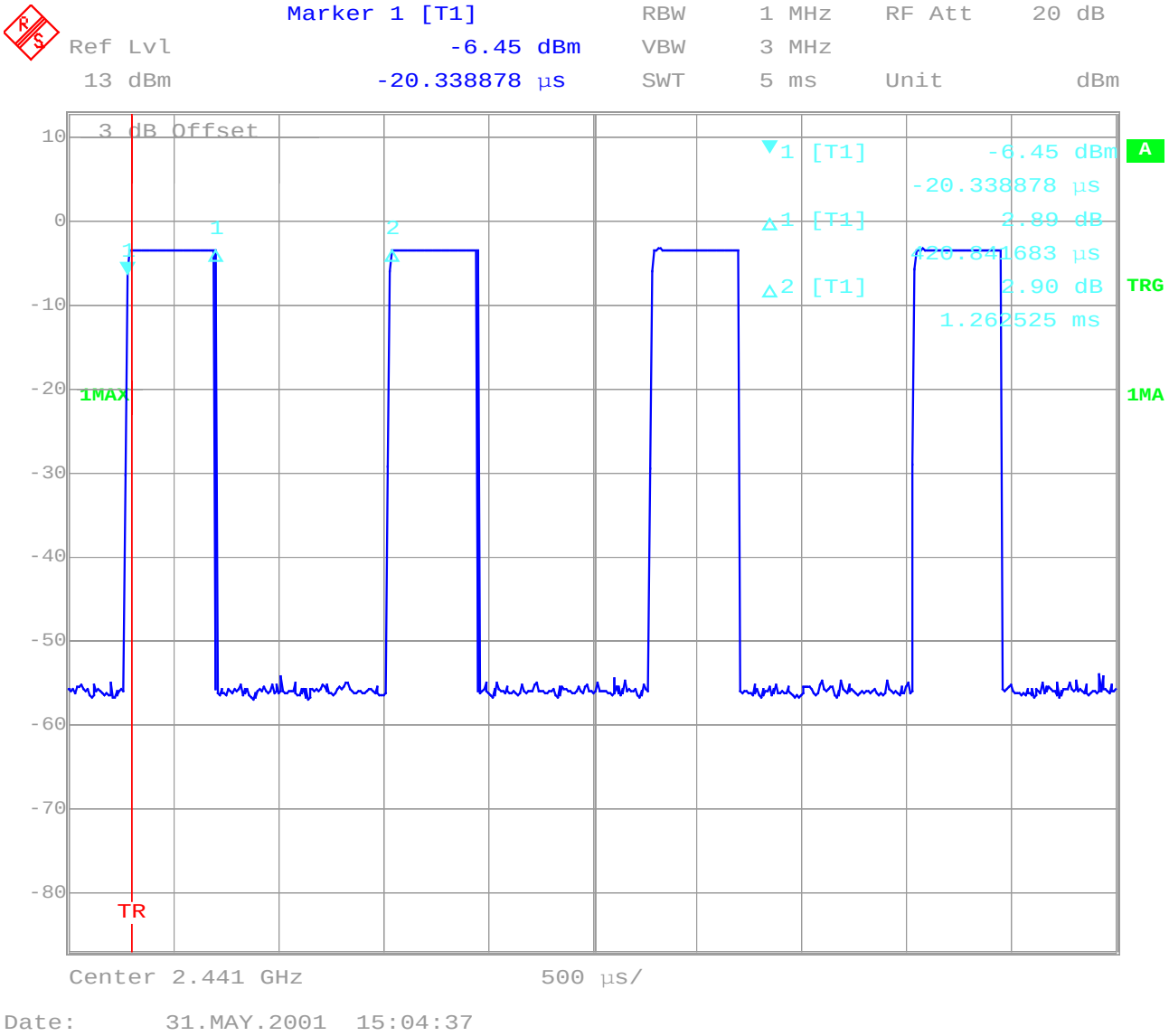
Equipment under test : Bluetooth module
Ambient temperature : 23° C
Relative humidity : 47%

Plot 4:



Equipment under test : Bluetooth module
Ambient temperature : 23° C
Relative humidity : 47%
Time of occupancy (dwell time) for DH1 **§15.247(a)**

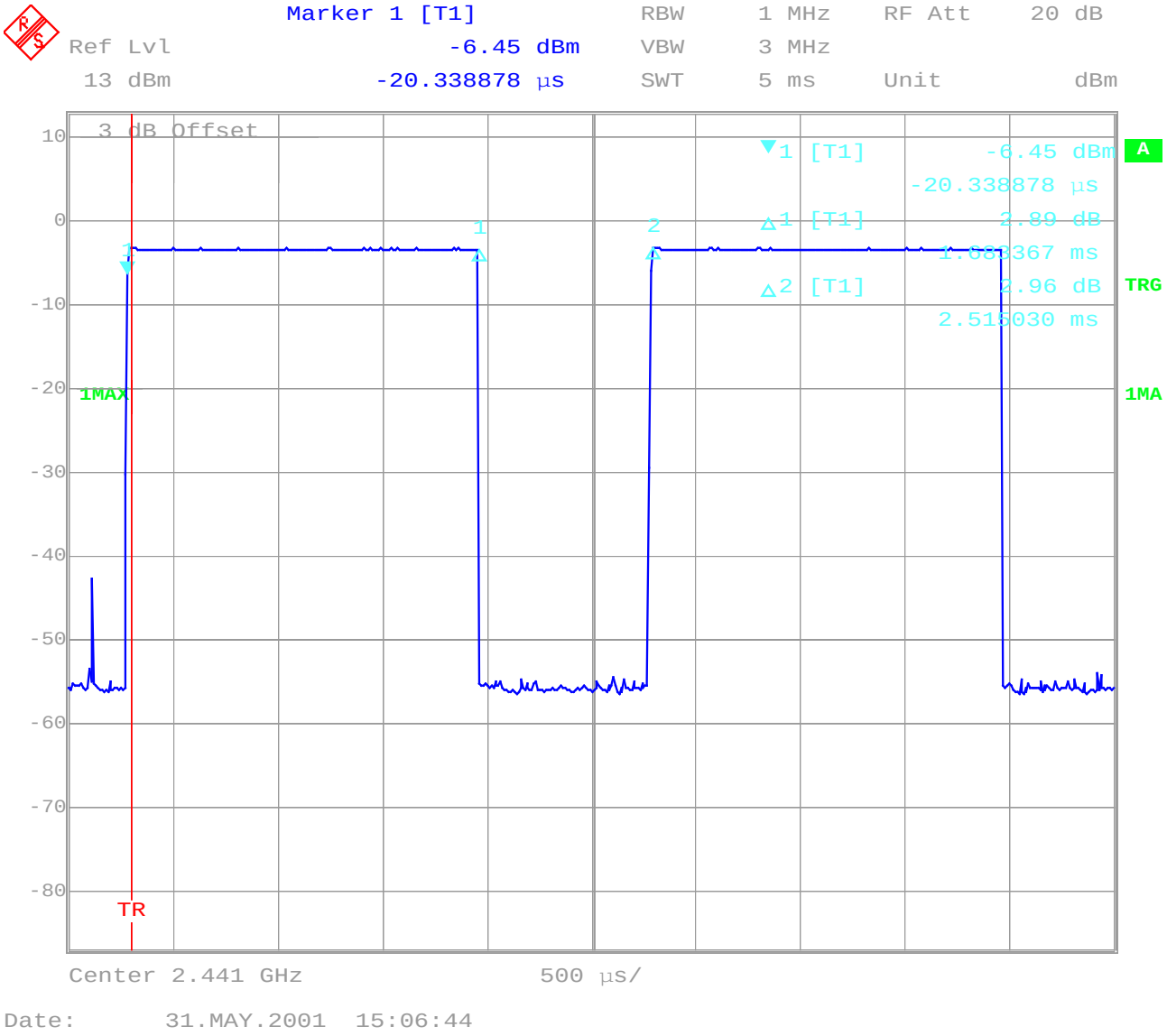
The system makes worst case 1600 hops per second or 1 time slot has a length of 625µs with 79 channels. A DH1 Packet need 1 time slot for transmitting and 1 time slot for receiving. Then the system makes worst case 800 hops per second with 79 channels. So you have each channel 10.13 times per second and so for 30 seconds you have 303.9 times of appearence .
Each tx-time per appearence is 475 µs.
<u>So we have 303.9 * 420 µs = 127.6ms per 30 seconds.</u>



Equipment under test : Bluetooth module
Ambient temperature : 23° C
Relative humidity : 47%

Time of occupancy (dwell time) for DH3 **§15.247(a)**

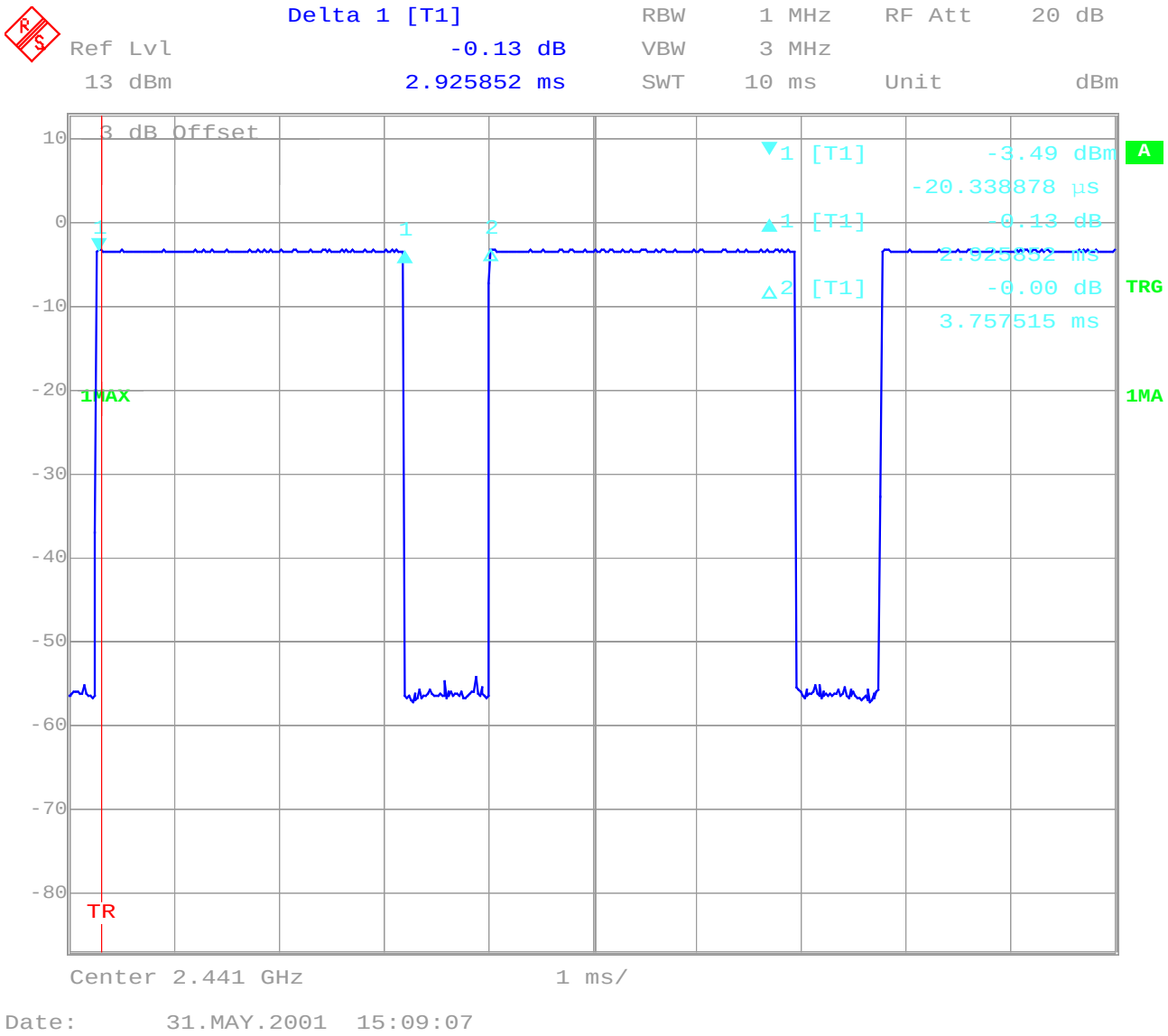
A DH3 Packets need 3 time slots for transmit and 1 for receicing, then the system makes worst case 400 hops per second with 79 channels. So you have each channel 5.1 times per second and so for 30 seconds you have 153 times of appearence .
Each tx-time per appearence is 1.73 ms.
<u>So we have 153 * 1.68 ms = 257.04 ms per 30 seconds.</u>



Equipment under test : Bluetooth module
Ambient temperature : 23° C
Relative humidity : 47%

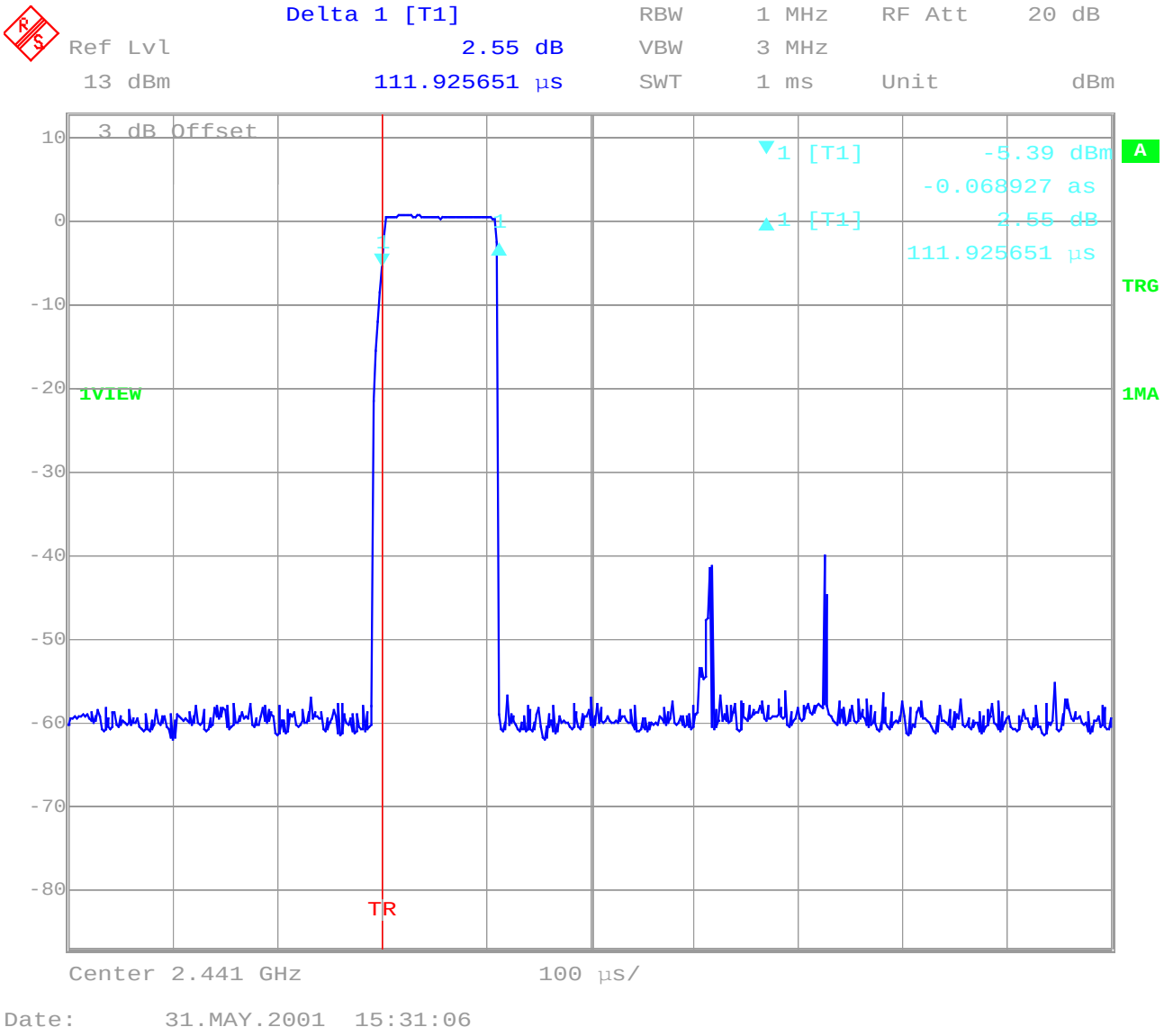
Time of occupancy (dwell time) for DH5 **§15.247(a)**

At DH5 Packets you need 5 time slots for transmit and 1 for receicing,then the system makes worst case 266,7 hops per second with 79 channels. So you have each channel 3.36 times per second and so for 30 seconds you have 100,8 times of appearence .
Each tx-time per appearence is 3.7 ms.
So we have 100,8 * 3.76ms = 379 ms per 30 seconds.



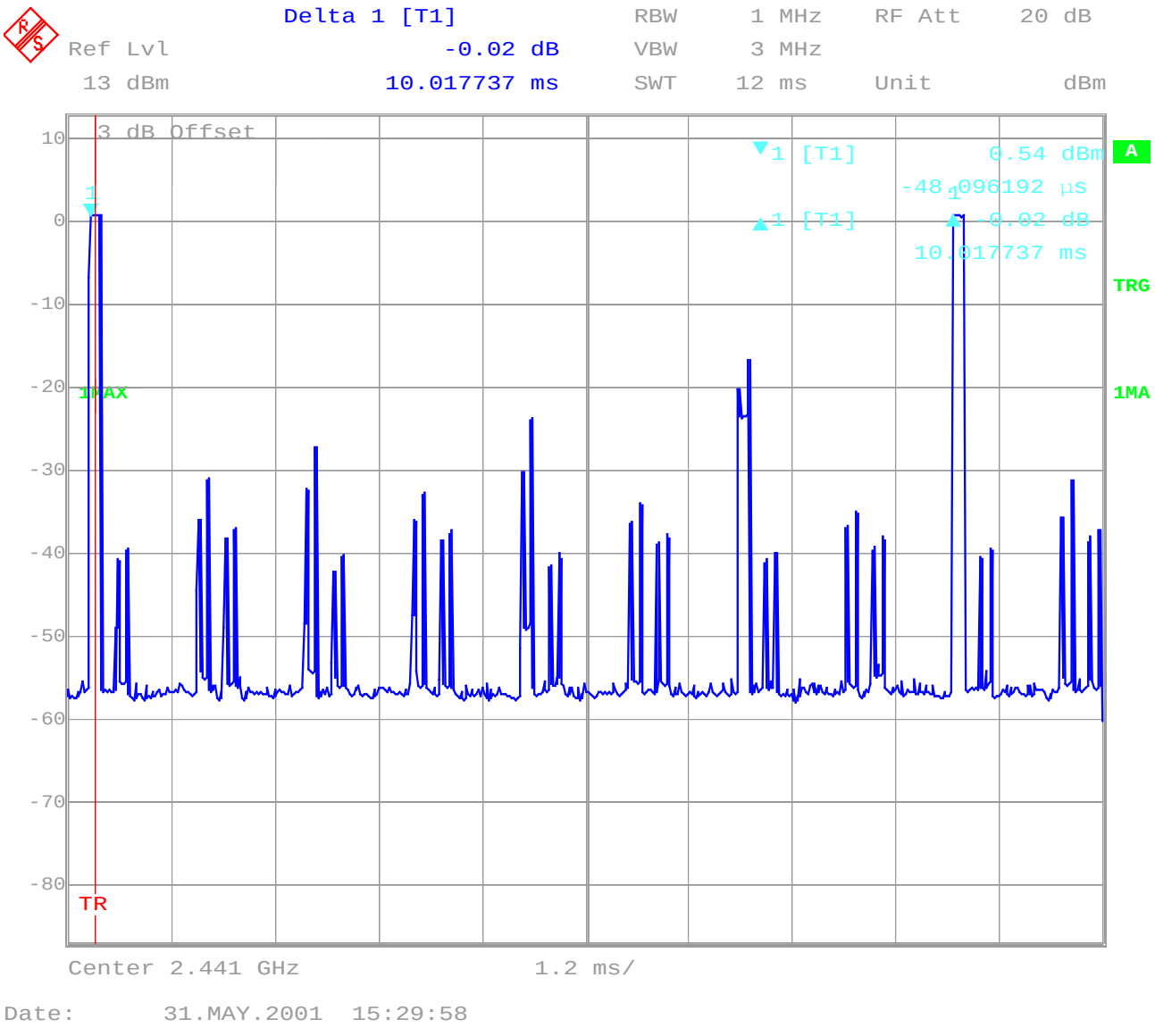
Equipment under test : Bluetooth module
Ambient temperature : 23° C
Relative humidity : 47%
Time of occupancy (dwell time) for page mode §15.247(a)
At paging mode the system makes first hoping with 16 channels. One sequence(called train A) lasts 10 ms. Every 1.28s frequencies change and a second train A starts with different freqencies. After max 7*1.28 s 16 new more distance frequencies (Train B) are used.
So we have in the worst case (same frequency is in every train) the following time scedule.
First: 7*128*10ms. For the next 7 seconds train B with other frequencies.
Then train A and B changes frequently.
⇨ **so we have 7*112*180µs, then 8.96 s other frequencies, then again 7*112*180µs**
⇨ **together in30 s maximal 2 sequences =>maximal 0,282 s per 30 second period.**

Page mode (TX-on time)



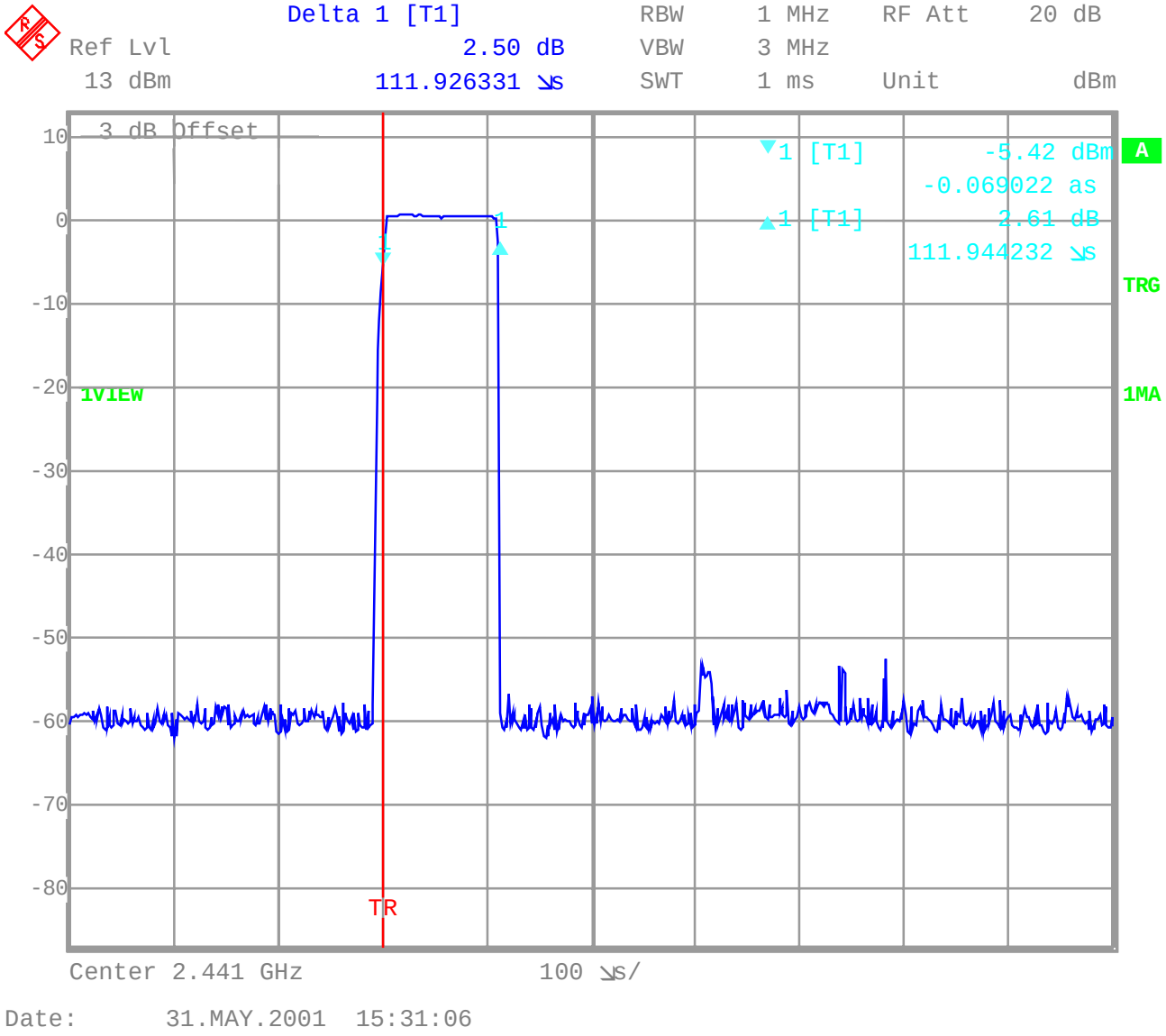
Equipment under test : Bluetooth module
Ambient temperature : 23° C
Relative humidity : 47%

Page mode (complete sequence)



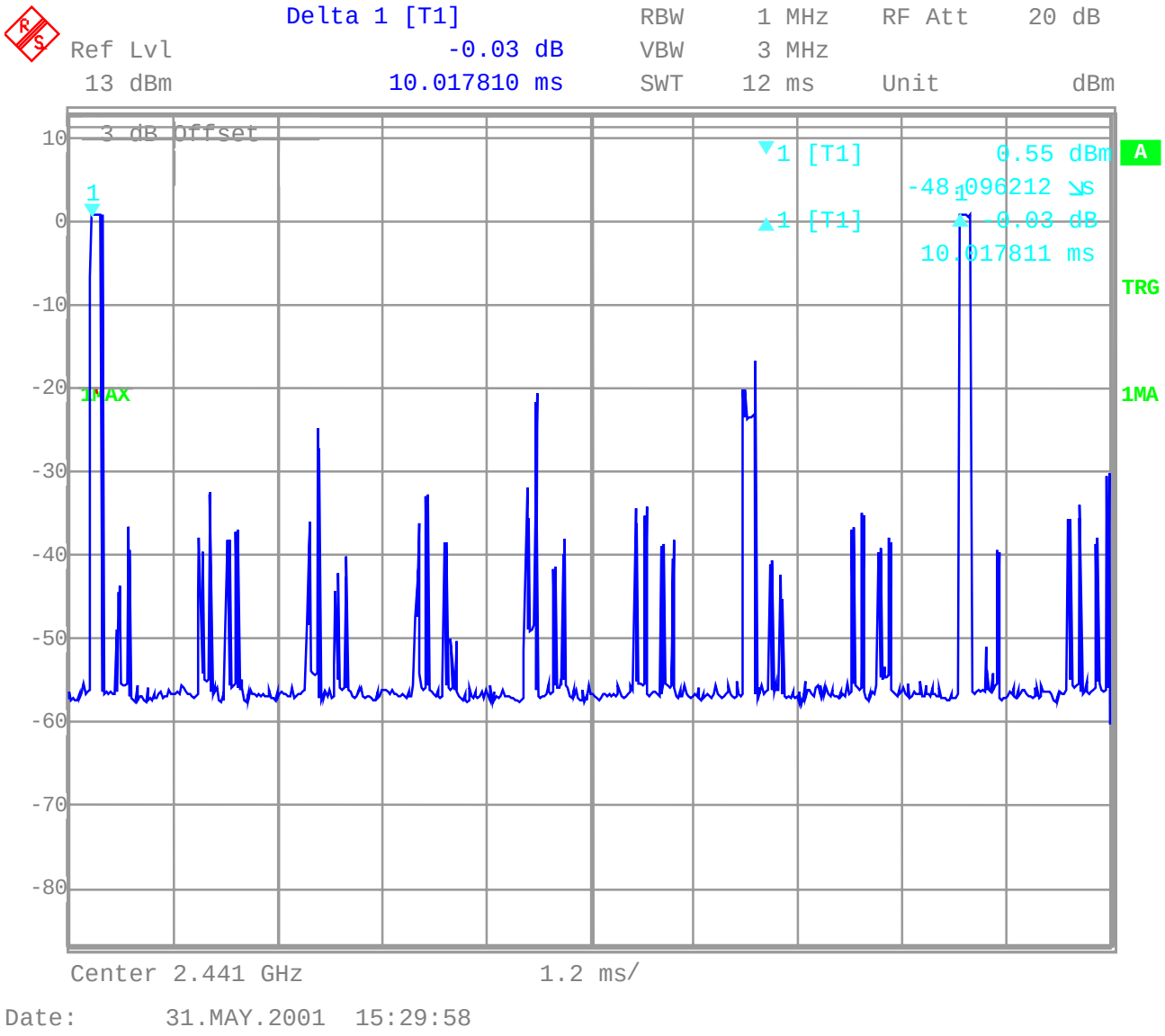
Equipment under test : Bluetooth module
Ambient temperature : 23° C
Relative humidity : 47%
Time of occupancy (dwell time) for inquiry mode §15.247(a)
At inquiry mode the system uses the same timing as in page mode
⇨ **so we have 7*112*180µs, then 8.96 s other frequencies, then again 7*112*180µs**
⇨ **together in30 s maximal 2 sequences =>maximal 0,282 s per 30 second period.**

Inquiry mode (TX-on time)



Equipment under test : Bluetooth module
Ambient temperature : 23° C
Relative humidity : 47%

Inquiry mode (complete sequence)



Equipment under test : Bluetooth module
Ambient temperature : 23° C
Relative humidity : 47%

Spectrum Bandwith of a FHSS System

§15.247(a)

20 dB bandwidth

TEST CONDITIONS		20 dB BANDWIDTH (kHz)		
Frequency (MHz)		2402	2441	2480
T_{nom}(23)° C	V_{nom}(5.0)V	763.527	769.539	811.623
Measurement uncertainty		±1kHz		

RBW / VBW as provided in the „Measurement Guidelines“ (DA 00-705, March 30, 2000)

LIMIT **SUBCLAUSE §15.247(a) (1)**

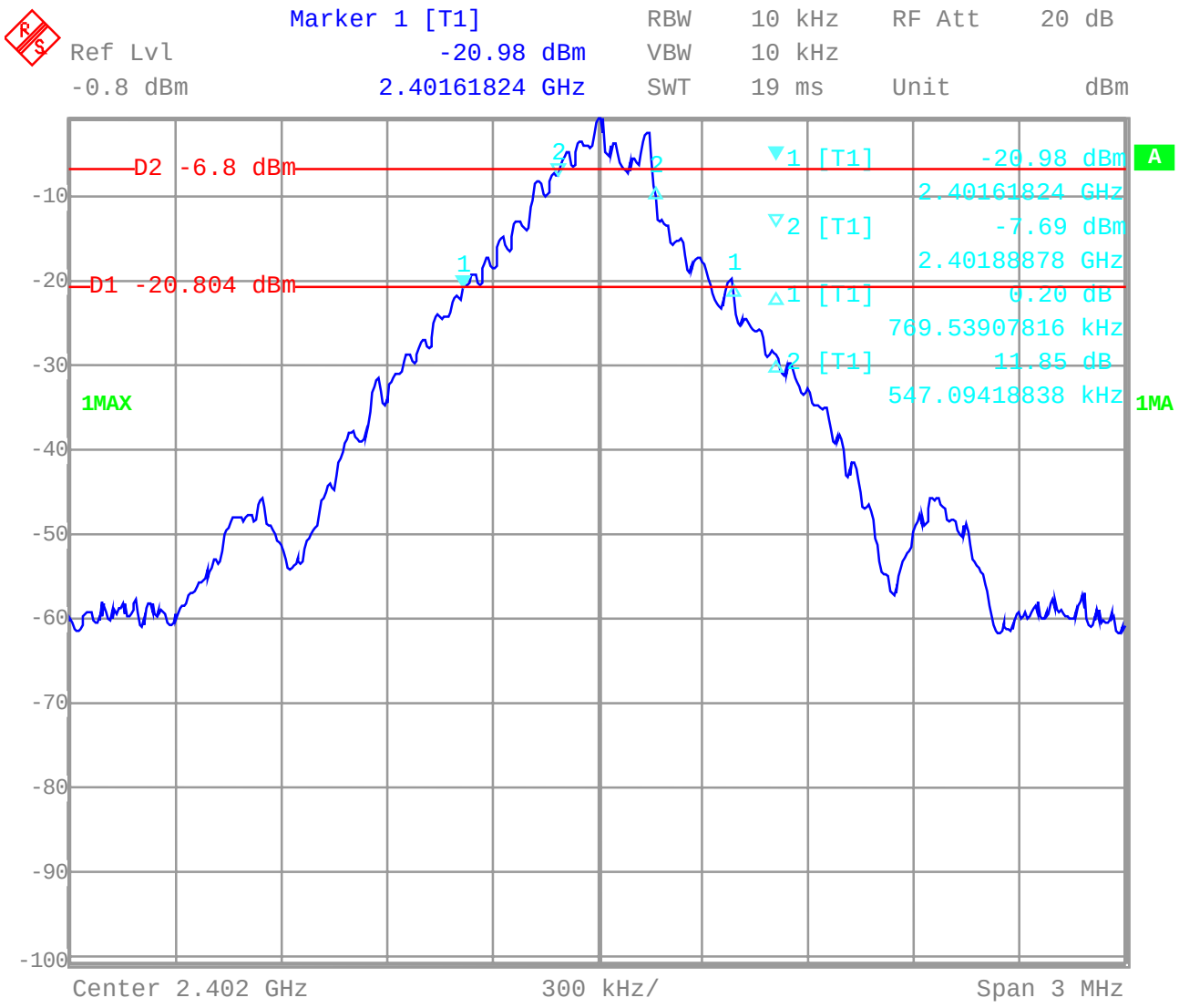
The maximum 20dB bandwith shall be at maximum 1000 KHz

6 dB bandwidth

TEST CONDITIONS		6 dB BANDWIDTH (kHz)		
Frequency (MHz)		2402	2441	2480
T_{nom}(23)° C	V_{nom}(5.0)V	276.553	270.541	294.589
Measurement uncertainty		±1kHz		

Equipment under test : Bluetooth module
Ambient temperature : 23° C
Relative humidity : 47%
Spectrum Bandwith of a FHSS System **§15.247(a)**
20 dB bandwidth

Channel 1



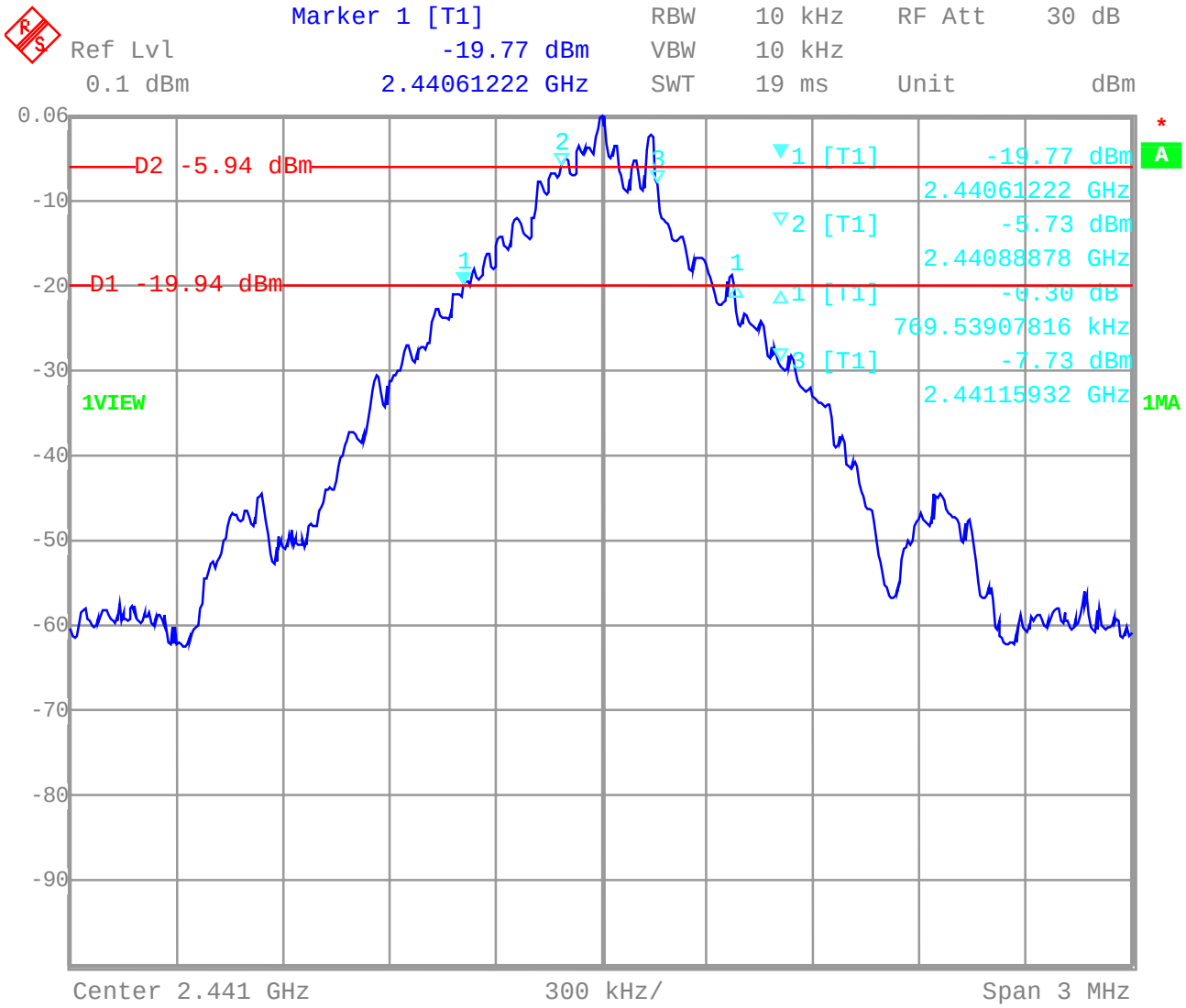
Equipment under test : Bluetooth module
Ambient temperature : 23° C
Relative humidity : 47%

Spectrum Bandwith of a FHSS System

§15.247(a)

20 dB bandwidth

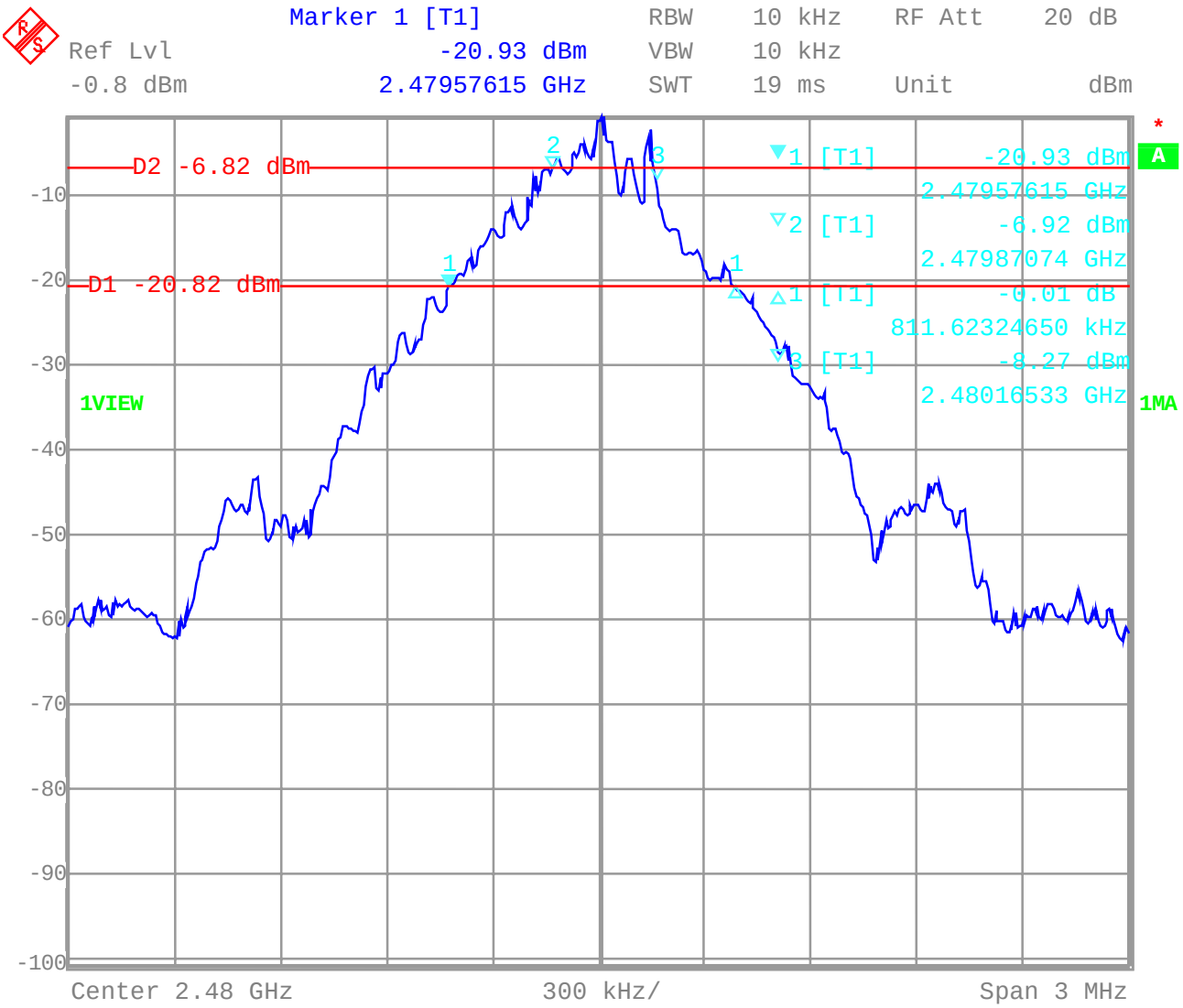
Channel 2



Equipment under test : Bluetooth module
Ambient temperature : 23° C
Relative humidity : 47%

Spectrum Bandwith of a FHSS System **§15.247(a)**
20 dB bandwidth

Channel 3:



Equipment under test : Bluetooth module
Ambient temperature : 23° C
Relative humidity : 47%

MAXIMUM PEAK OUTPUT POWER (CONDUCTED) **SUBCLAUSE § 15.247 (b) (1)**

TEST CONDITIONS		MAXIMUM PEAK OUTPUT POWER (mW)		
Frequency (MHz)		2402	2442	2481
T_{nom}(23)° C	V_{nom}(5.0)V	0.50 AV : -3.2 dB	0.48 AV : -3.3 dB	0.53 AV : -3.2 dB
Maximum deviation from output power under extreme test conditions (dBc)		0.5	0.5	0.5
Measurement uncertainty		±3dB		

RBW/VBW : 3 MHz

LIMIT **SUBCLAUSE § 15.247 (b) (1)**

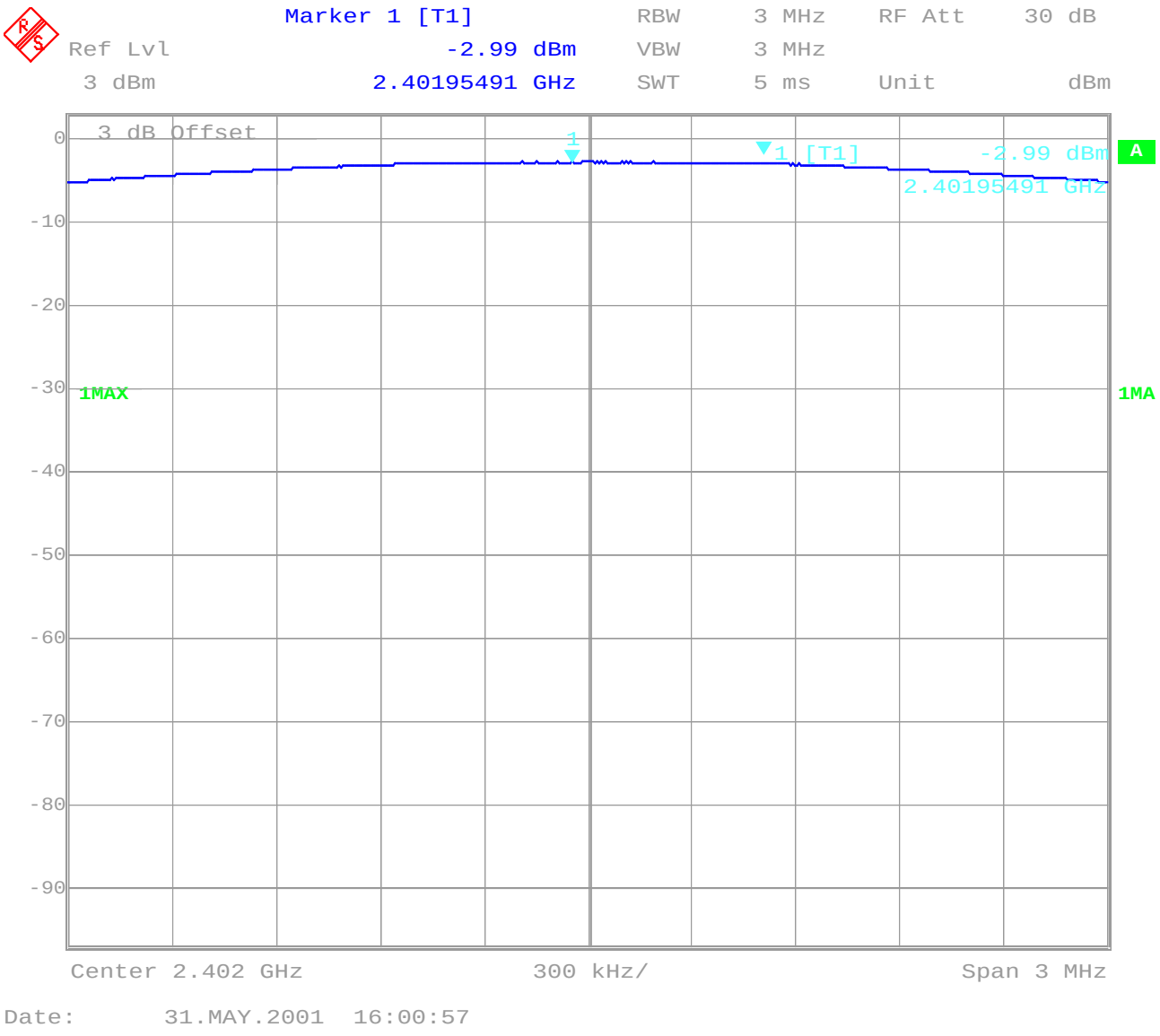
Frequency range	RF power output
2400-2483.5 MHz	1.0 Watt

Equipment under test : Bluetooth module
Ambient temperature : 23° C
Relative humidity : 47%

MAXIMUM PEAK OUTPUT POWER (CONDUCTED)

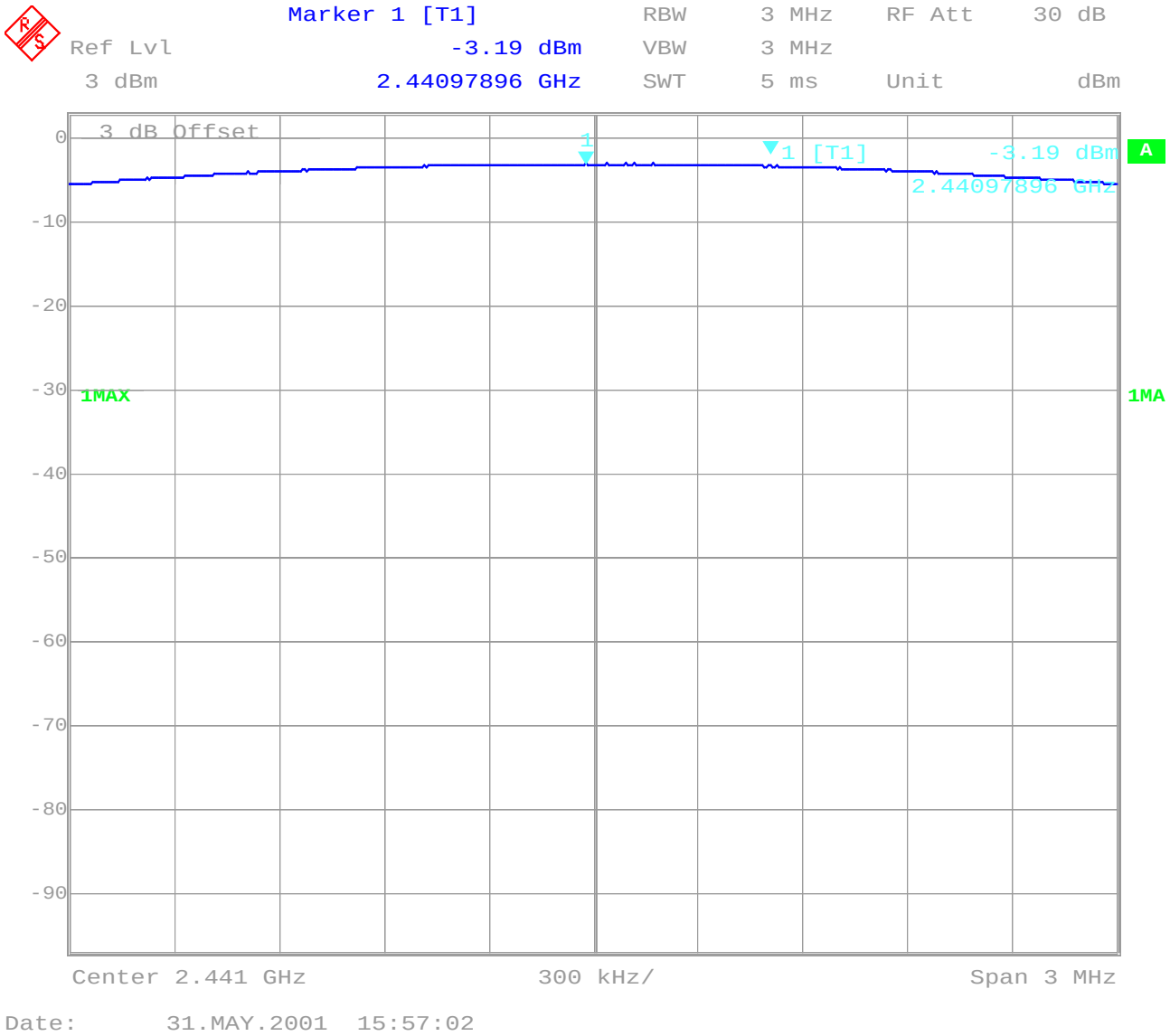
SUBCLAUSE § 15.247 (b) (1)

low channel



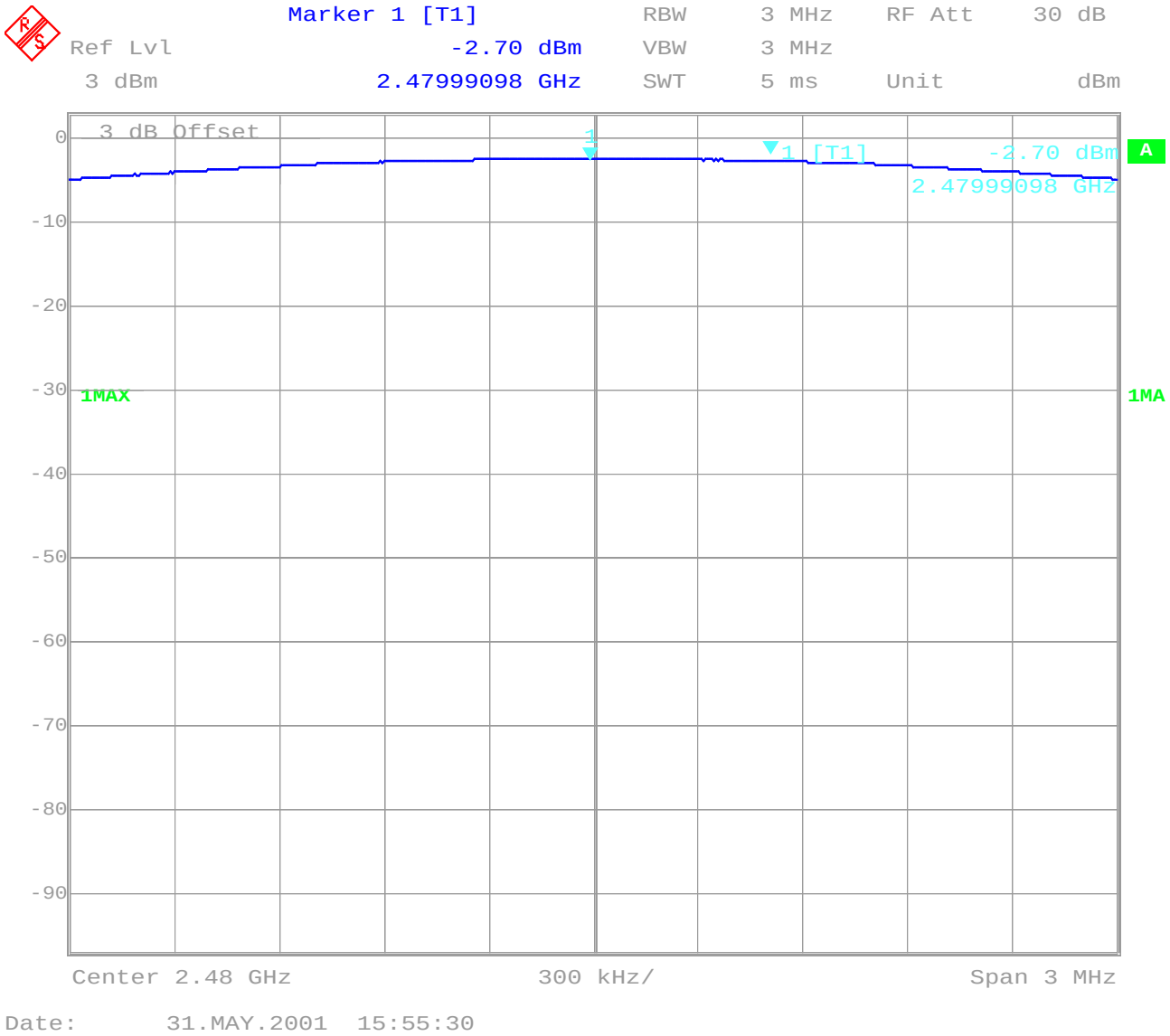
Equipment under test : Bluetooth module
Ambient temperature : 23° C
Relative humidity : 47%
MAXIMUM PEAK OUTPUT POWER (CONDUCTED) **SUBCLAUSE § 15.247 (b) (1)**

mid channel



Equipment under test : Bluetooth module
Ambient temperature : 23° C
Relative humidity : 47%
MAXIMUM PEAK OUTPUT POWER (CONDUCTED) **SUBCLAUSE § 15.247 (b) (1)**

high channel



Equipment under test : Bluetooth module
Ambient temperature : 23° C
Relative humidity : 47%

MAXIMUM PEAK OUTPUT POWER (RADIATED) **SUBCLAUSE § 15.247 (b) (1)**

TEST CONDITIONS		MAXIMUM PEAK OUTPUT POWER (mW) (Antenna build-in into laptop)		
Frequency (MHz)		2402	2441	2480
T_{nom}(23)° C	V_{nom}(5.0)V	0.24	0.23	0.22
Maximum deviation from output power under extreme test conditions (dBc)				
Measurement uncertainty		±3dB		

TEST CONDITIONS		MAXIMUM PEAK OUTPUT POWER (mW) (Antenna external)		
Frequency (MHz)		2402	2441	2480
T_{nom}(23)° C	V_{nom}(5.0)V	0.64	0.62	0.77
Maximum deviation from output power under extreme test conditions (dBc)				
Measurement uncertainty		±3dB		

RBW/VBW : 3 MHz

Measured at a distance of 3m

LIMIT **SUBCLAUSE § 15.247 (b) (1)**

Frequency range	RF power output
2400-2483.5 MHz	1.0 Watt

REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
(for reference numbers see test equipment listing)
17 - 24

Equipment under test : Bluetooth module
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Relative humidity : 47%

Equipment under test : Bluetooth module
Ambient temperature : 23° C
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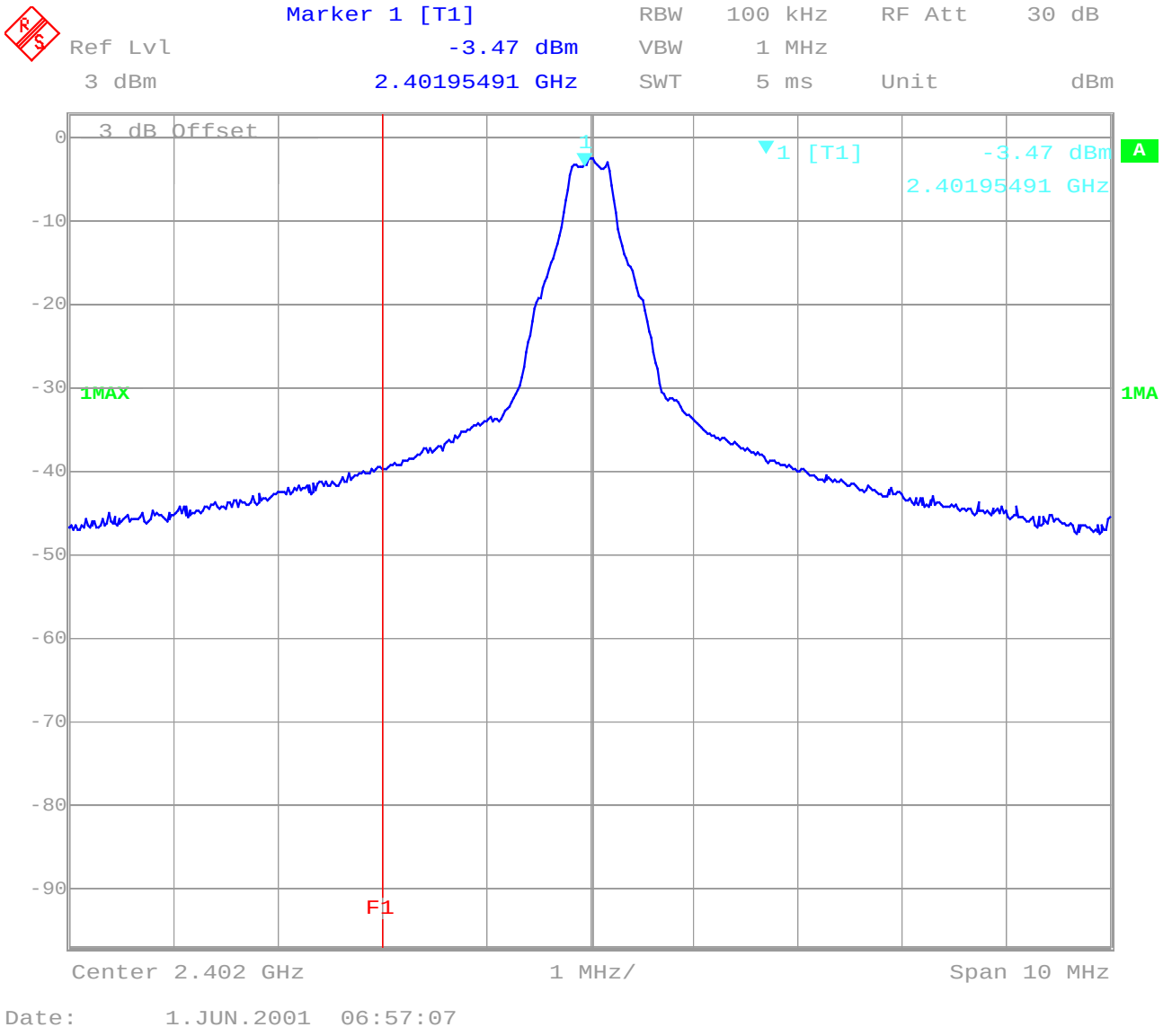
Band-edge compliance of conducted emissions §15.247 (c)

low frequency section (hopping off)



REFERENCE NUMBER(S) OF TEST EQUIPMENT USED
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Equipment under test : Bluetooth module
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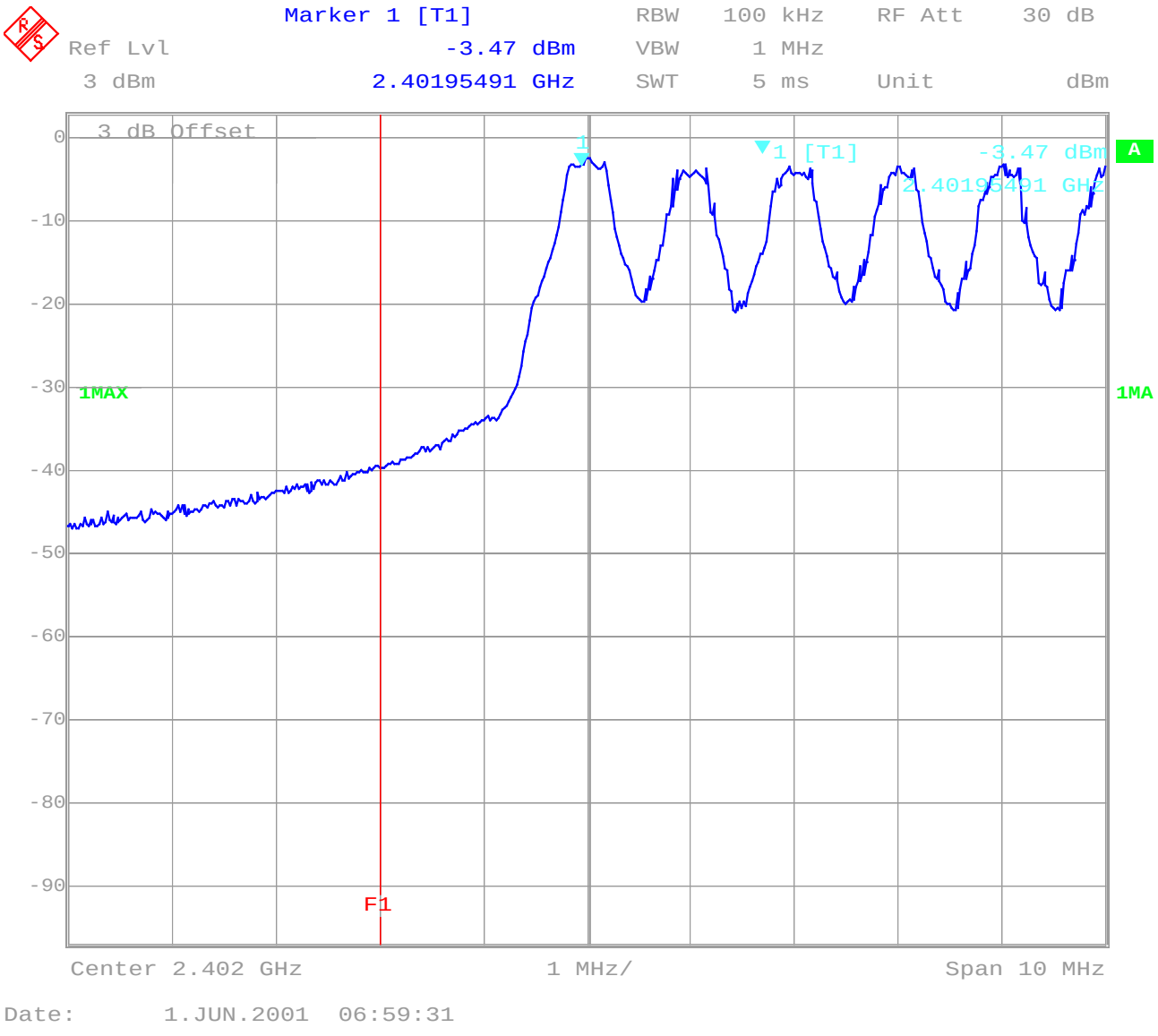
Band-edge compliance of conducted emissions **§15.247 (c)**

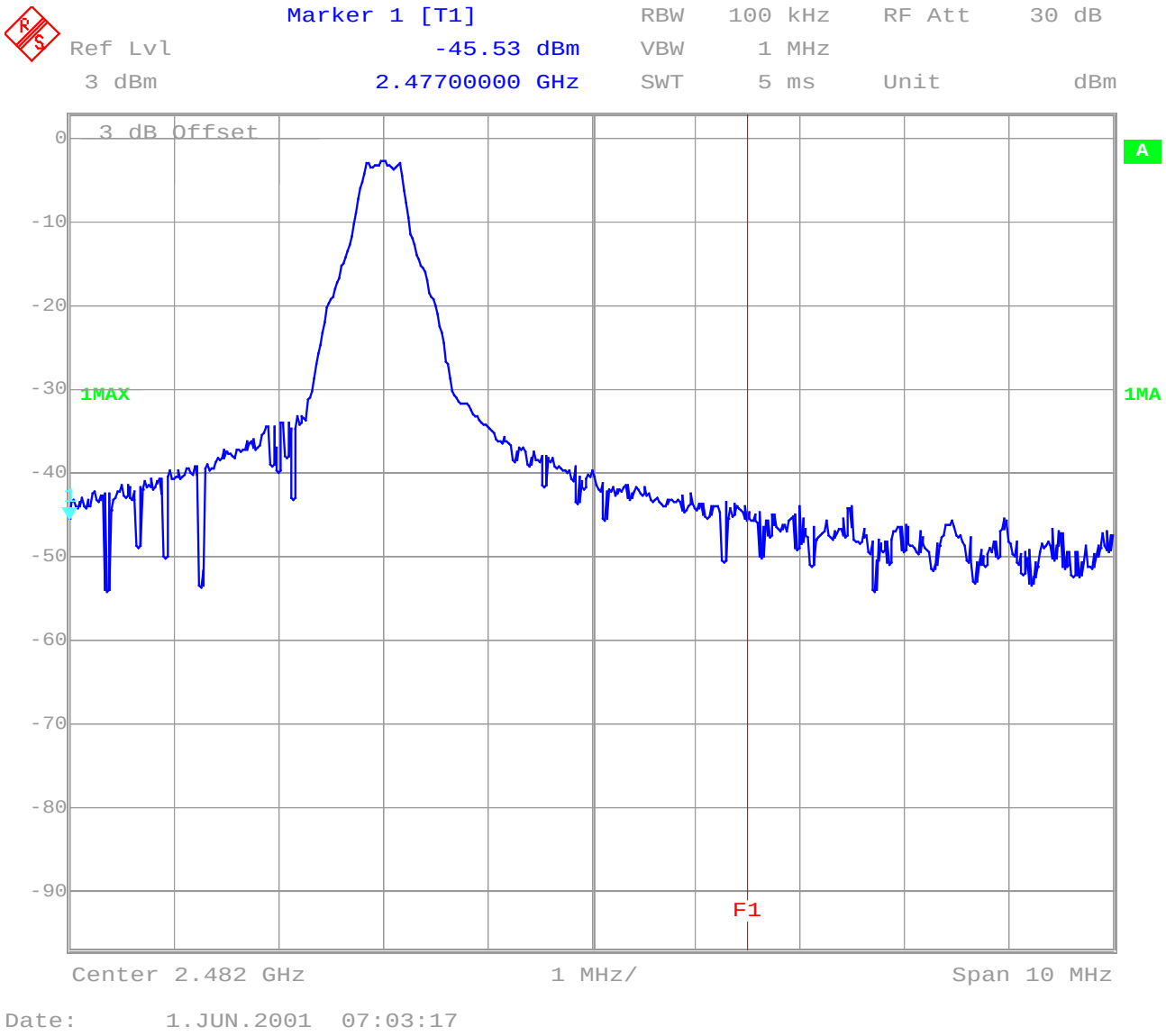
low frequency section (hopping on)



Equipment under test : Bluetooth module
Ambient temperature : 23° C
Relative humidity : 47%

Band-edge compliance of conducted emissions §15.247 (c)

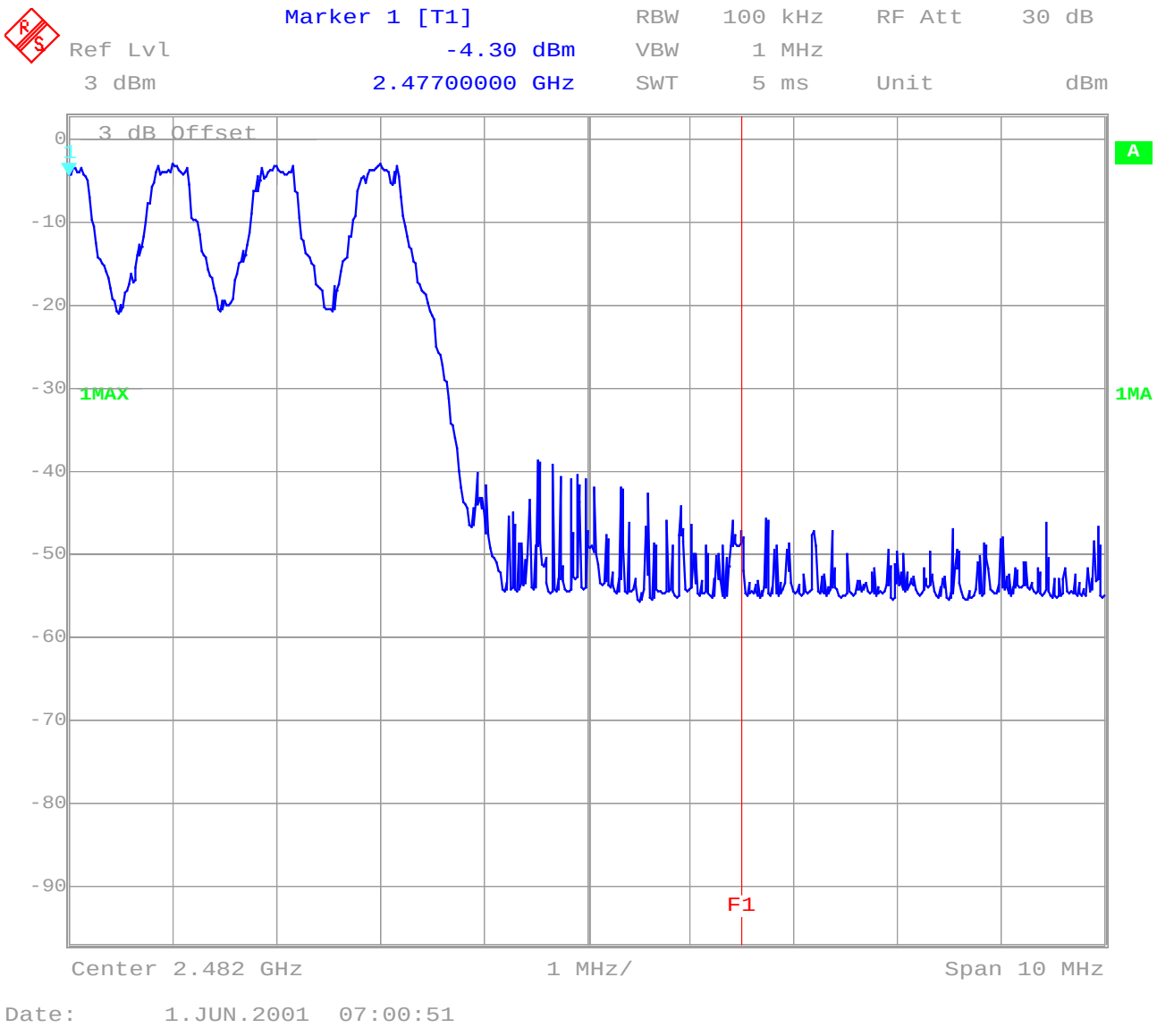
high frequency section (hopping off)



Equipment under test : Bluetooth module
Ambient temperature : 23° C
Relative humidity : 47%

Band-edge compliance of conducted emissions §15.247 (c)

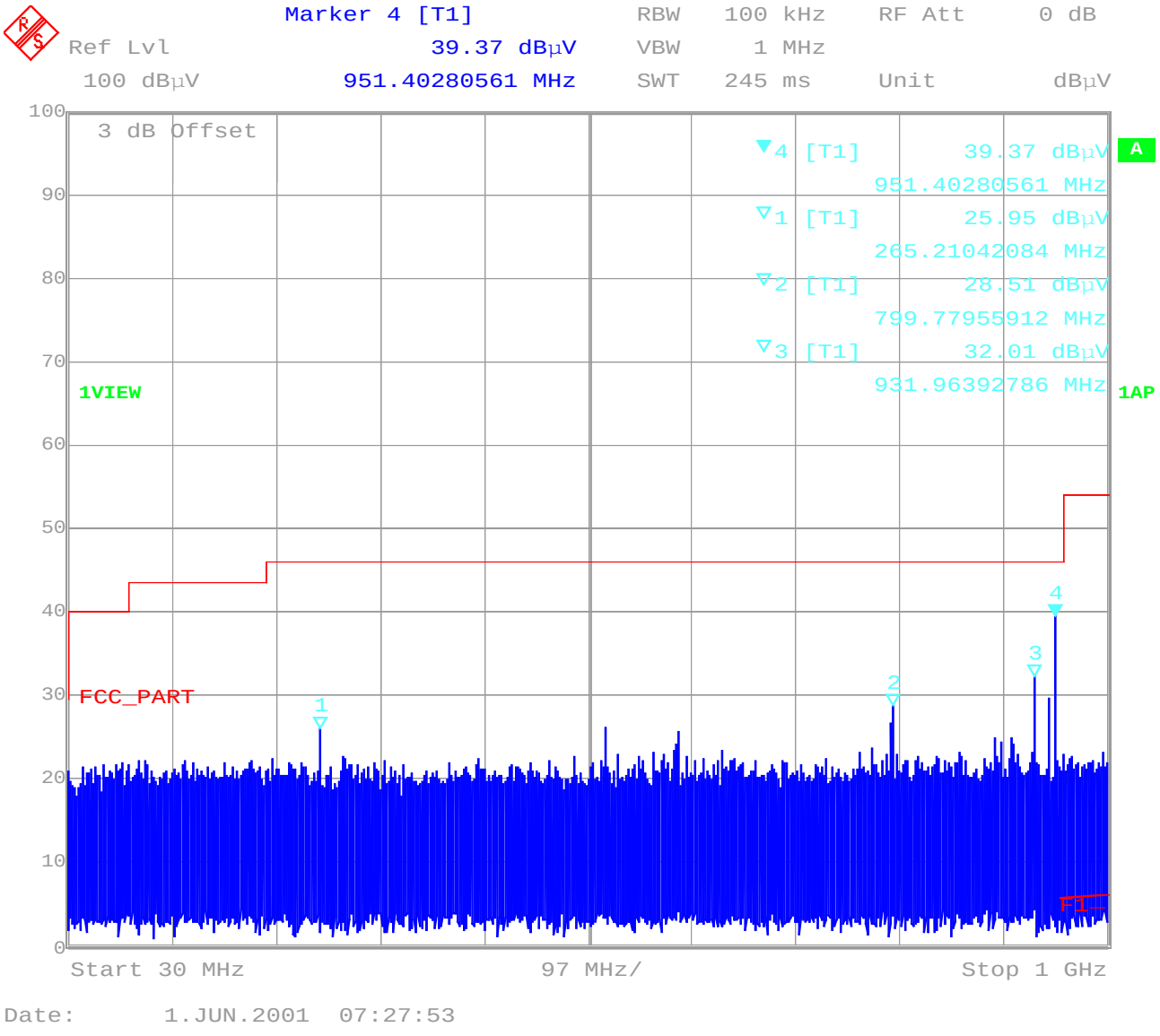
high frequency section (hopping on)



Equipment under test : Bluetooth module
Ambient temperature : 23° C
Relative humidity : 47%
SPURIOUS EMISSION **§ 15.247 (c) (1)**
CONDUCTED

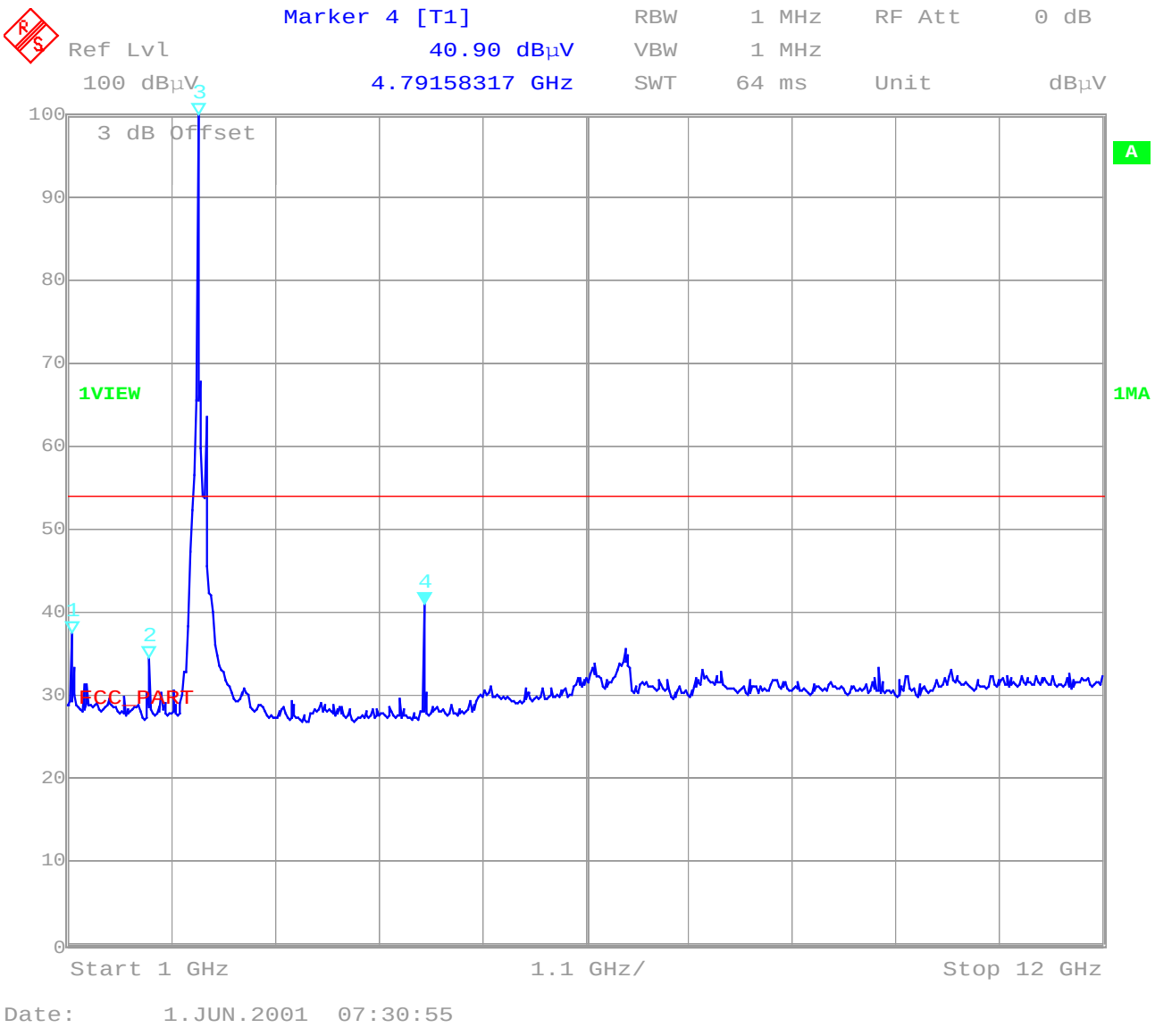
All unwanted conducted emissions are > 20 dBc.

Low channel



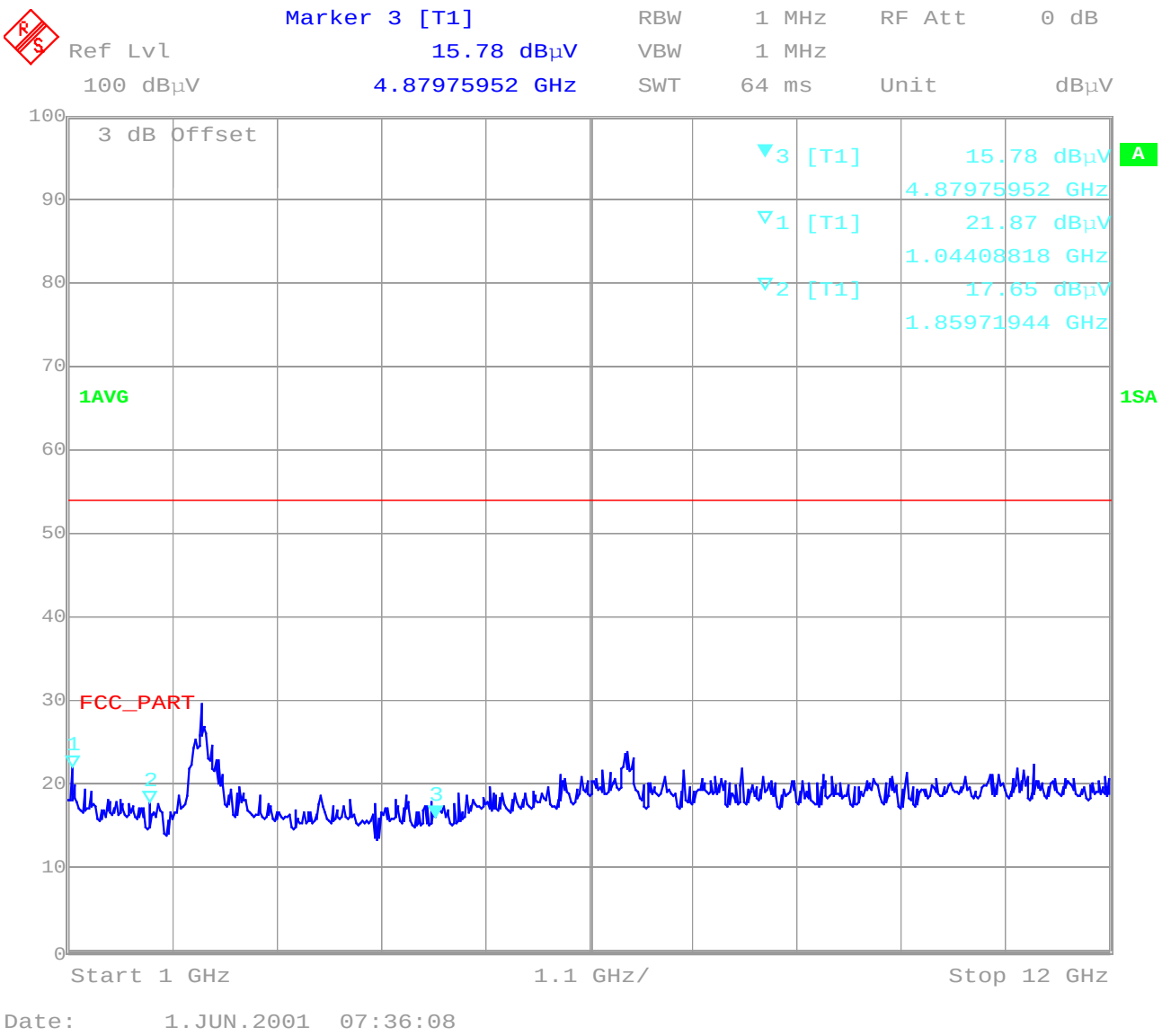
Equipment under test : Bluetooth module
Ambient temperature : 23° C
Relative humidity : 47%
SPURIOUS EMISSION **§ 15.247 (c) (1)**
CONDUCTED

Low channel (peak)



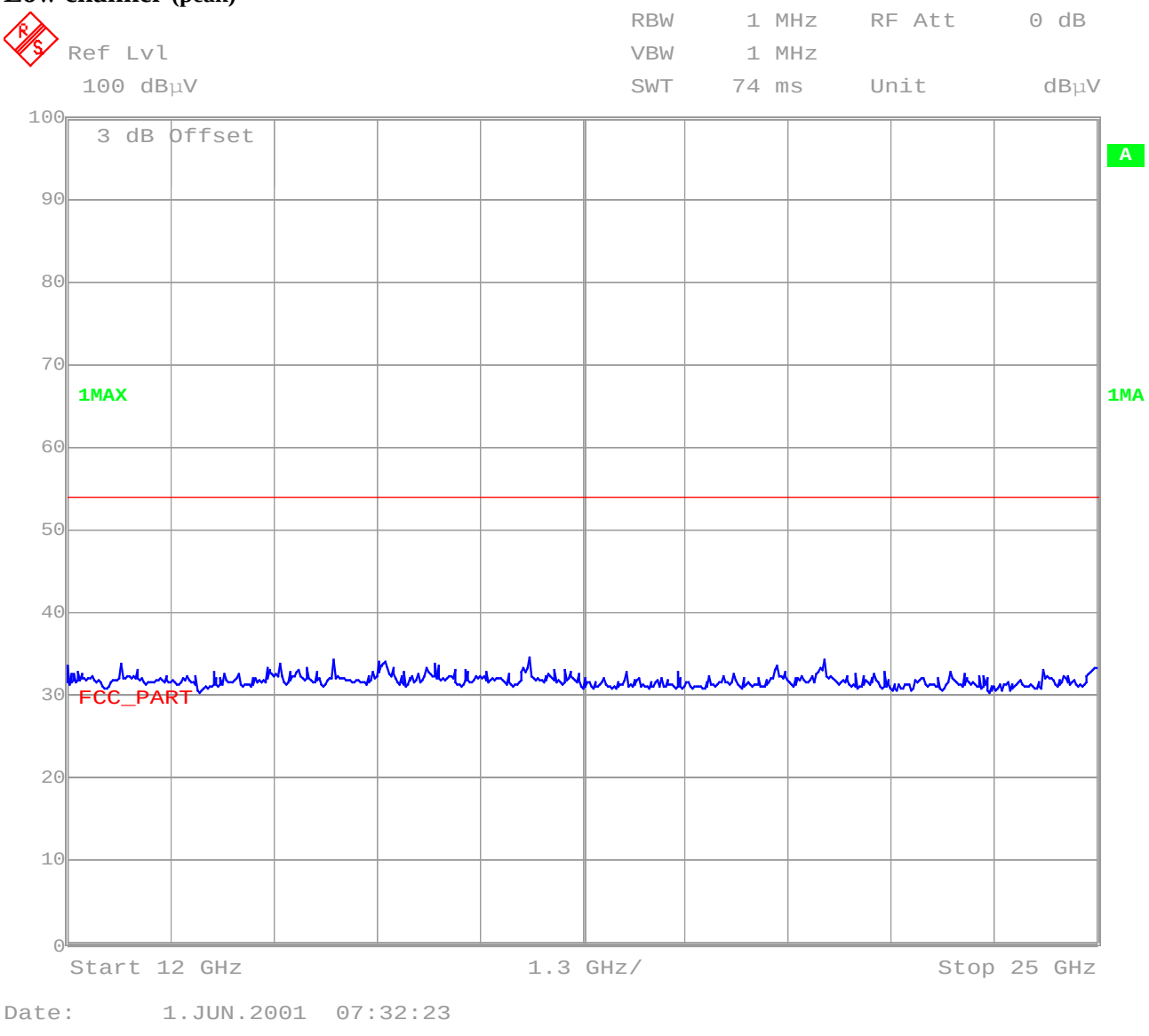
Equipment under test : Bluetooth module
Ambient temperature : 23° C
Relative humidity : 47%
SPURIOUS EMISSION **§ 15.247 (c) (1)**
CONDUCTED

Low channel (average)



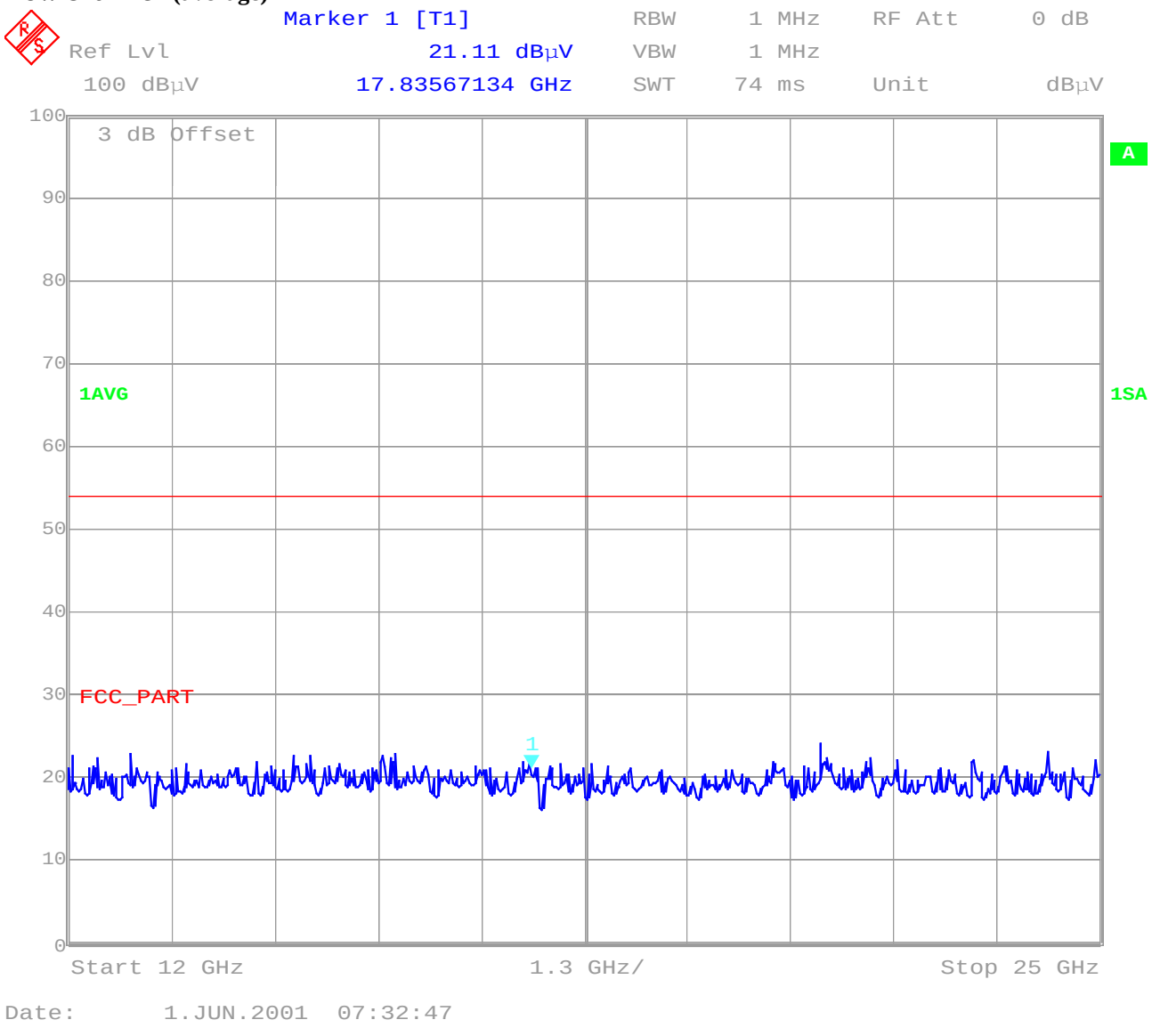
Equipment under test : Bluetooth module
Ambient temperature : 23° C
Relative humidity : 47%
SPURIOUS EMISSION **§ 15.247 (c) (1)**
CONDUCTED

Low channel (peak)



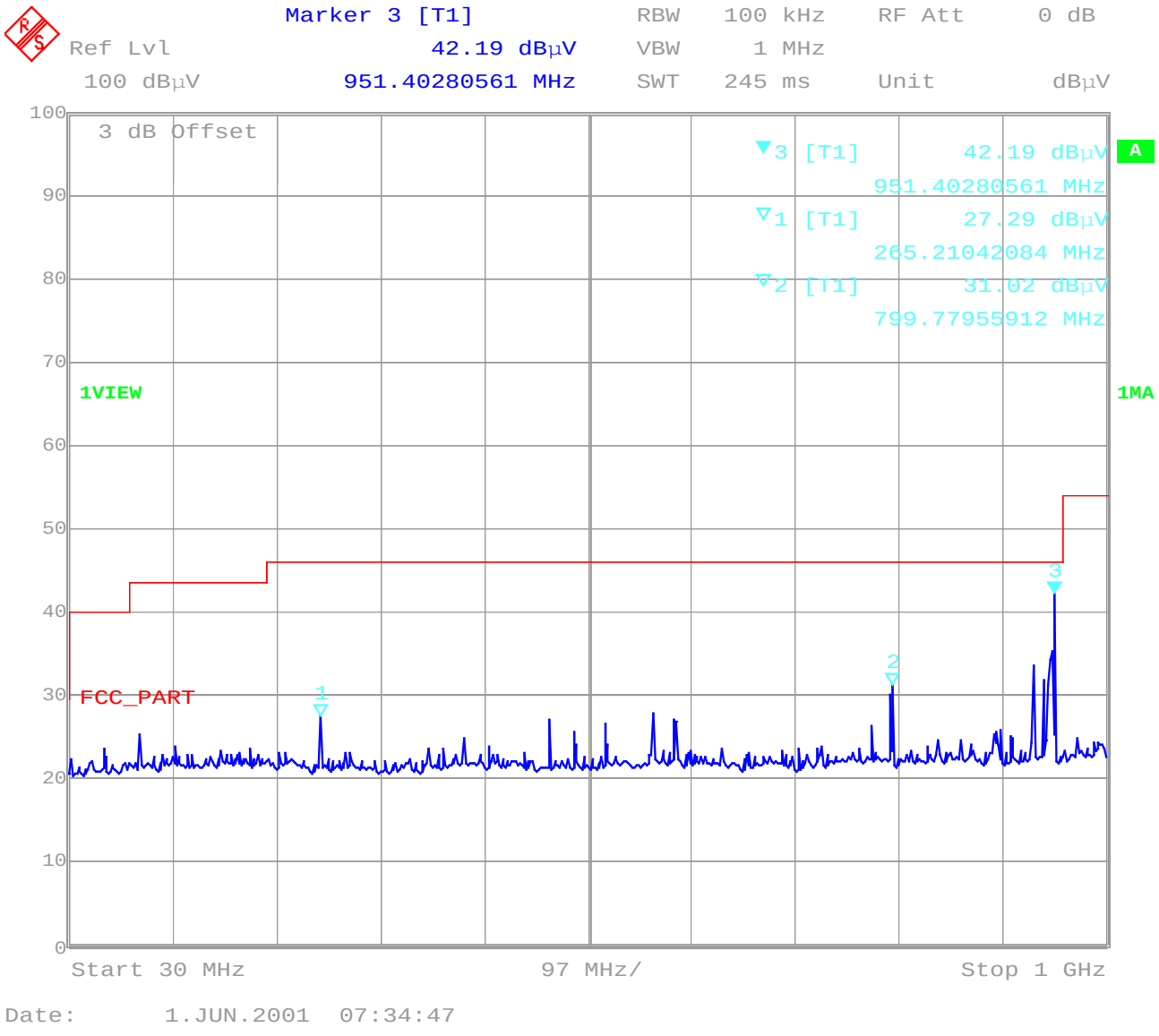
Equipment under test : Bluetooth module
Ambient temperature : 23° C
Relative humidity : 47%
SPURIOUS EMISSION **§ 15.247 (c) (1)**
CONDUCTED

Low channel (average)



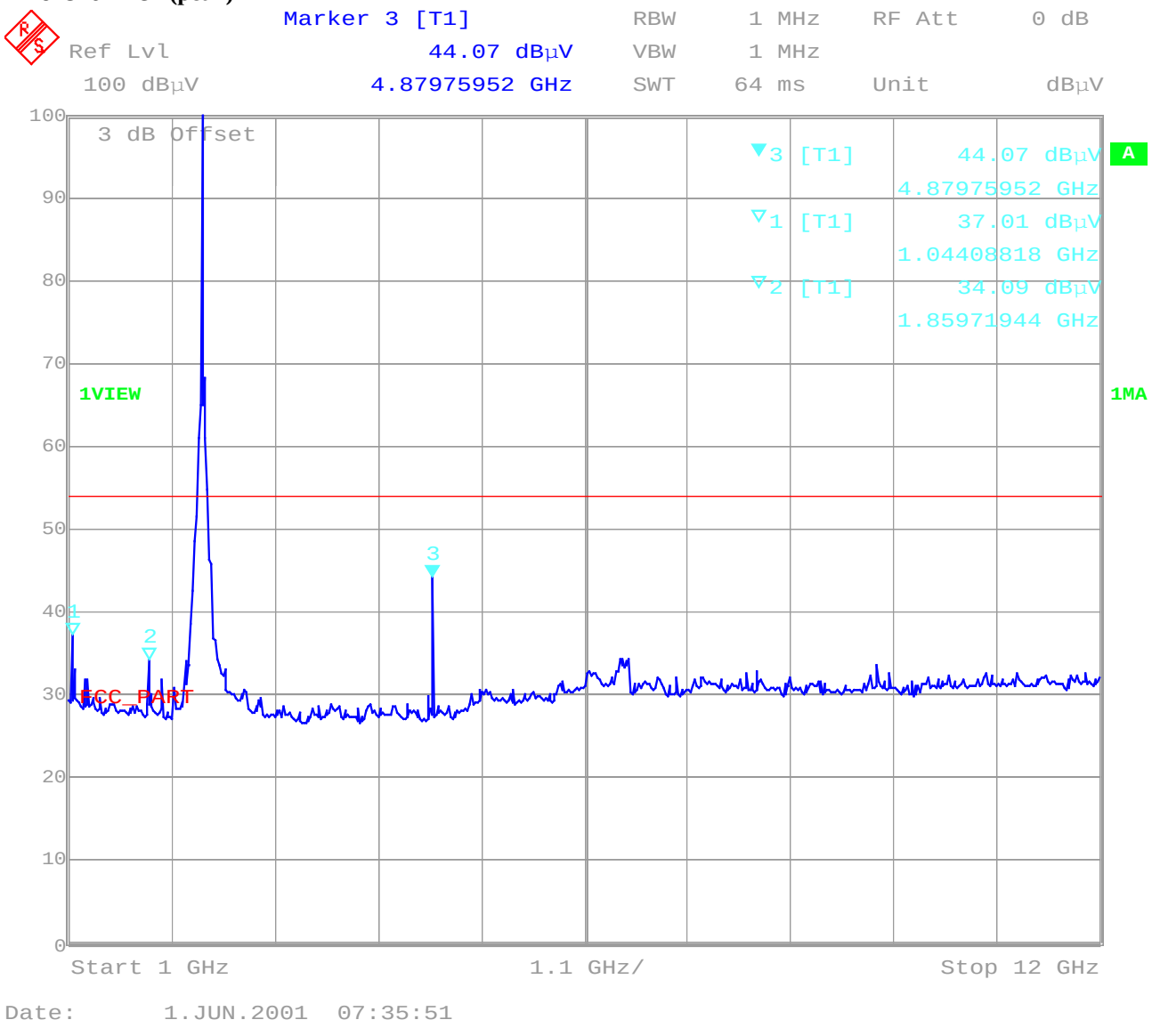
Equipment under test : Bluetooth module
Ambient temperature : 23° C
Relative humidity : 47%
SPURIOUS EMISSION **§ 15.247 (c) (1)**
CONDUCTED

Mid channel



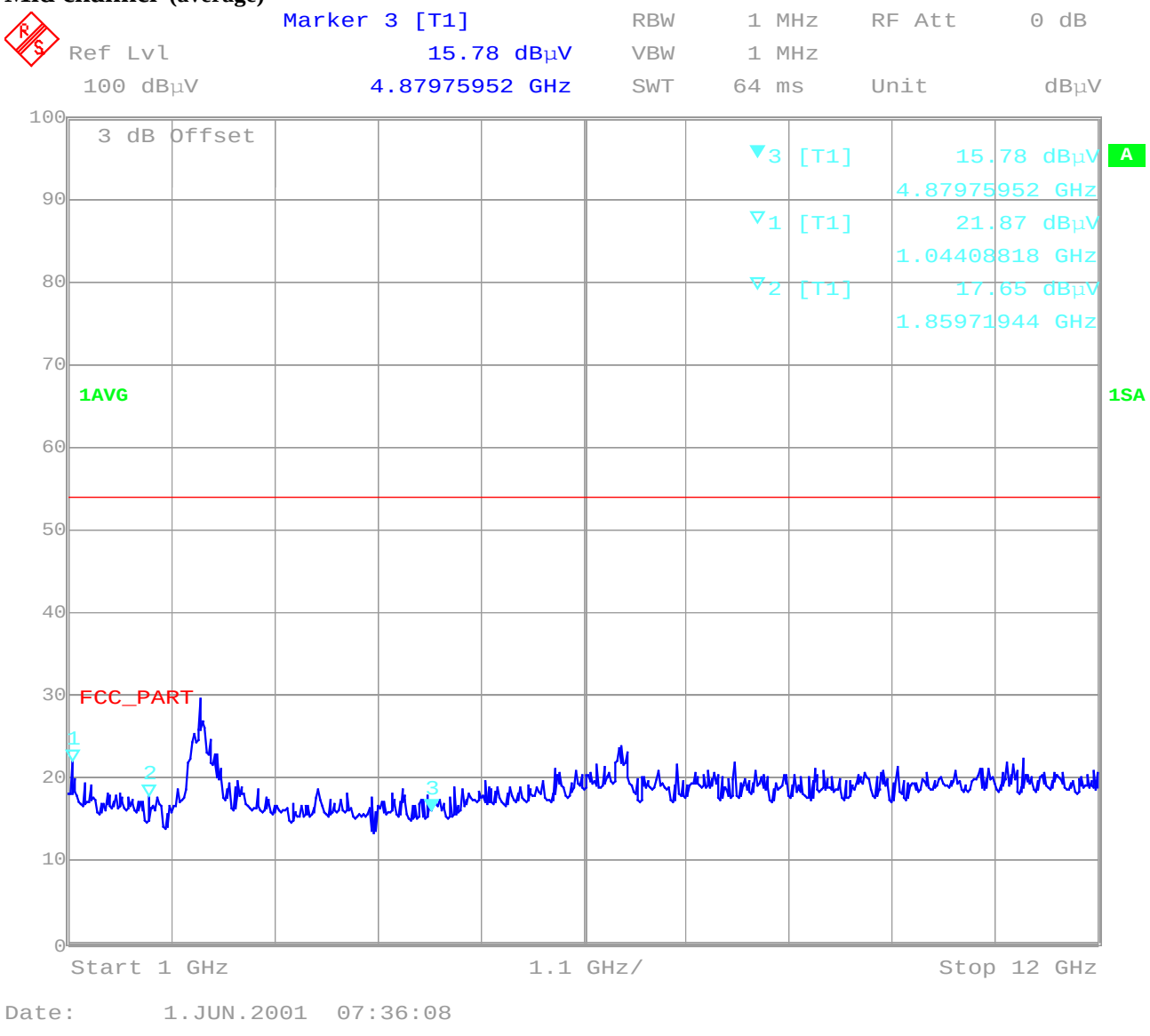
Equipment under test : Bluetooth module
Ambient temperature : 23° C
Relative humidity : 47%
SPURIOUS EMISSION **§ 15.247 (c) (1)**
CONDUCTED

Mid channel (peak)



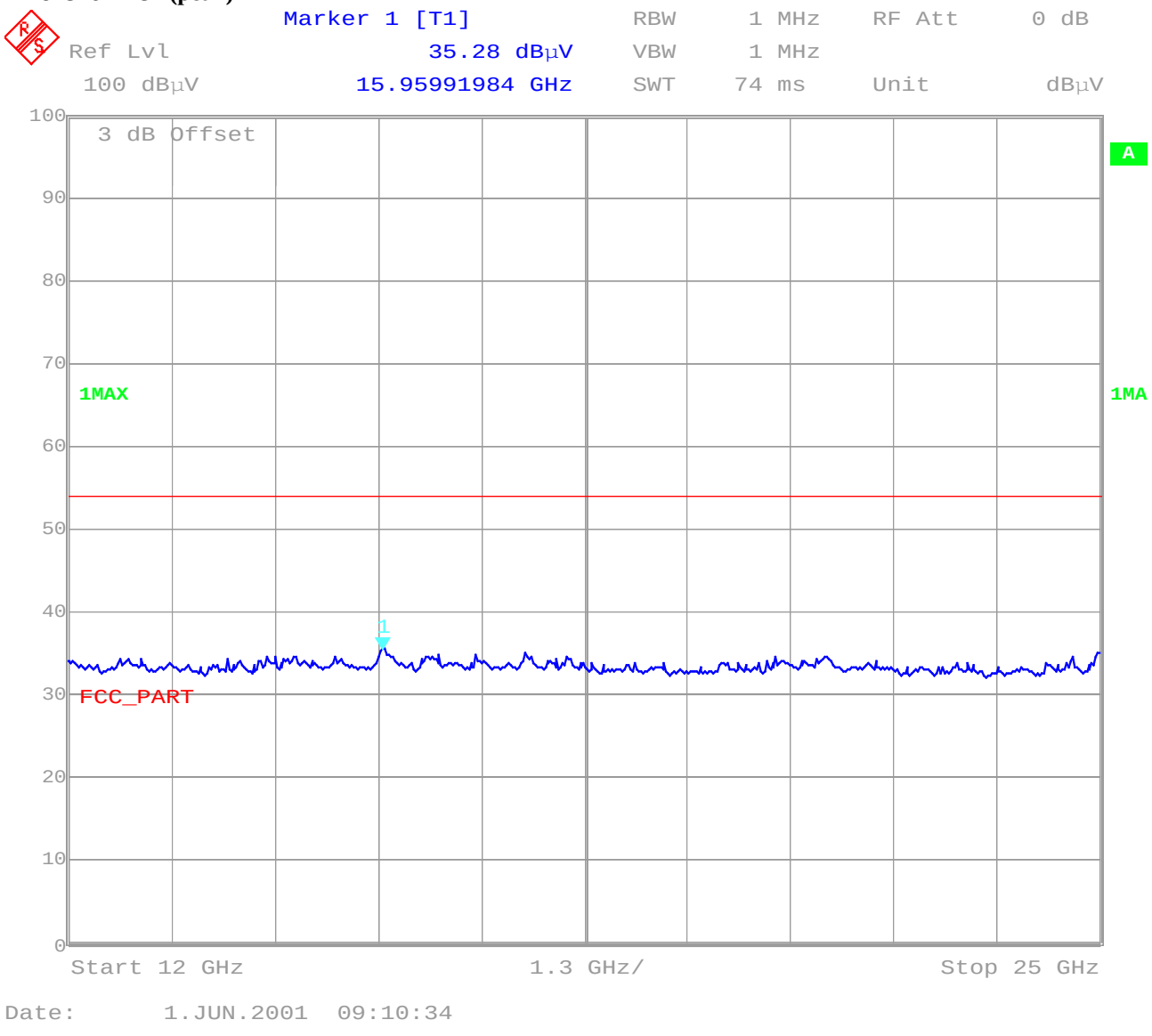
Equipment under test : Bluetooth module
Ambient temperature : 23° C
Relative humidity : 47%
SPURIOUS EMISSION **§ 15.247 (c) (1)**
CONDUCTED

Mid channel (average)



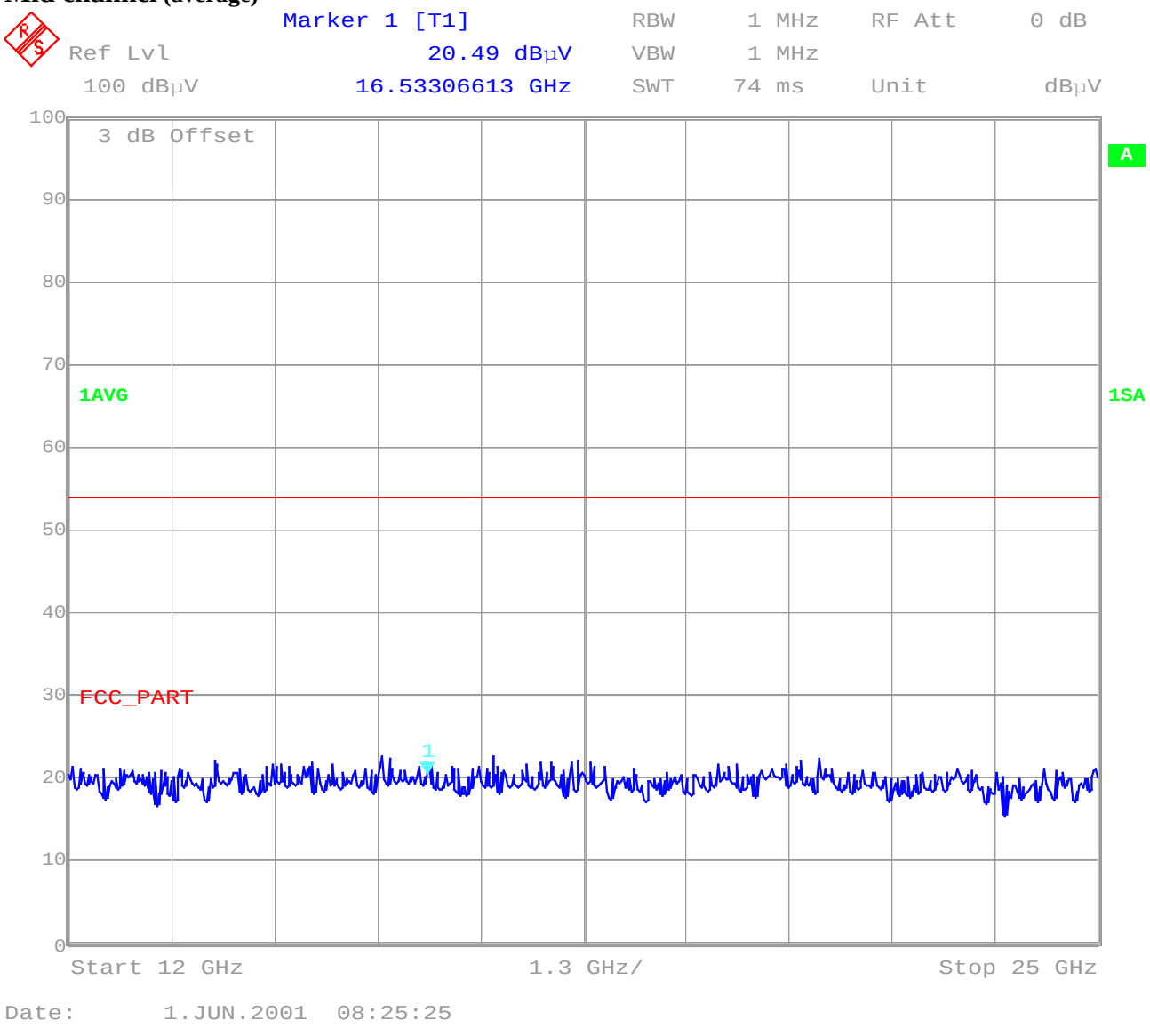
Equipment under test : Bluetooth module
Ambient temperature : 23° C
Relative humidity : 47%
SPURIOUS EMISSION **§ 15.247 (c) (1)**
CONDUCTED

Mid channel (peak)



Equipment under test : Bluetooth module
Ambient temperature : 23° C
Relative humidity : 47%
SPURIOUS EMISSION **§ 15.247 (c) (1)**
CONDUCTED

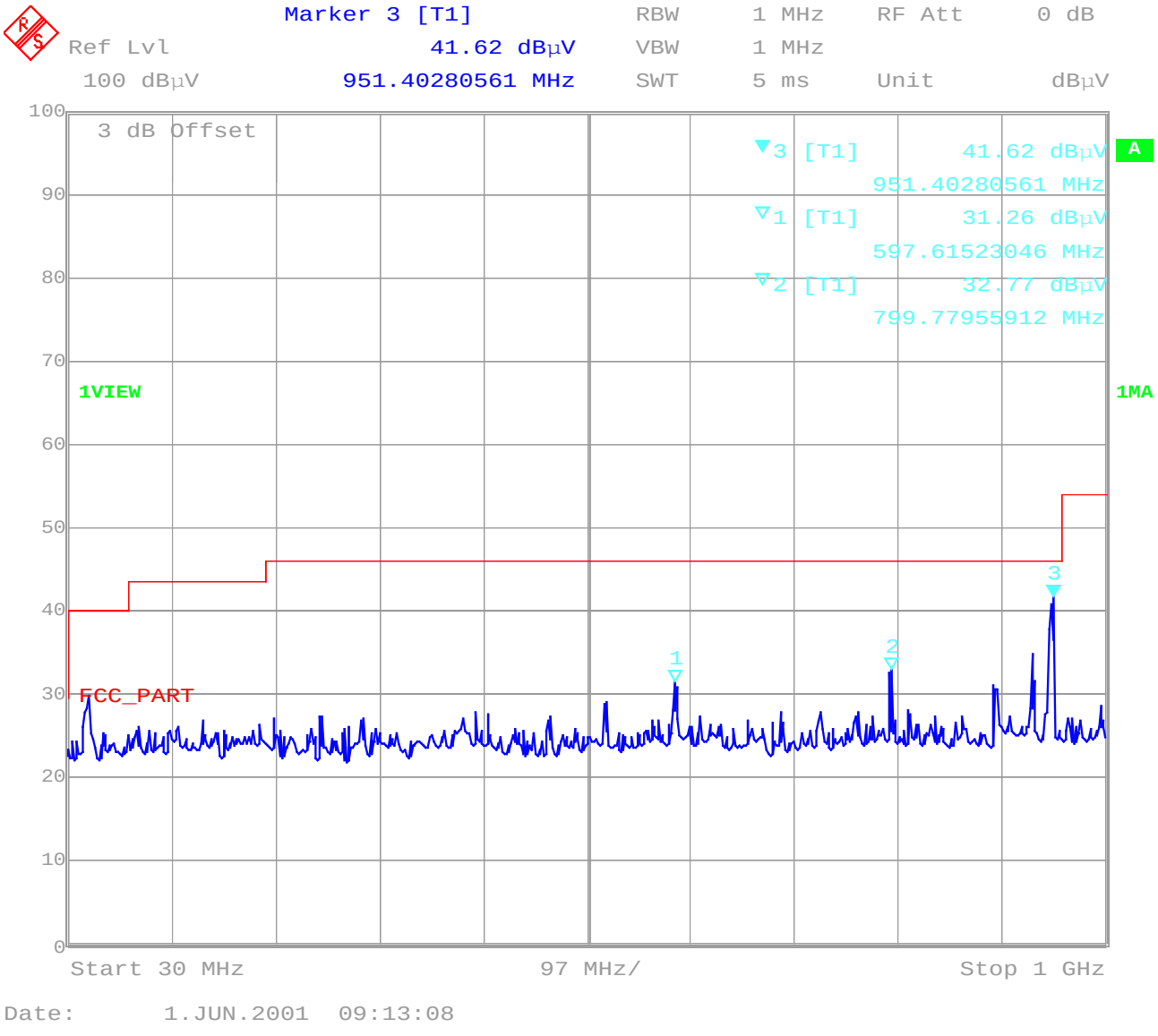
Mid channel (average)



Equipment under test : Bluetooth module
Ambient temperature : 23° C
Relative humidity : 47%

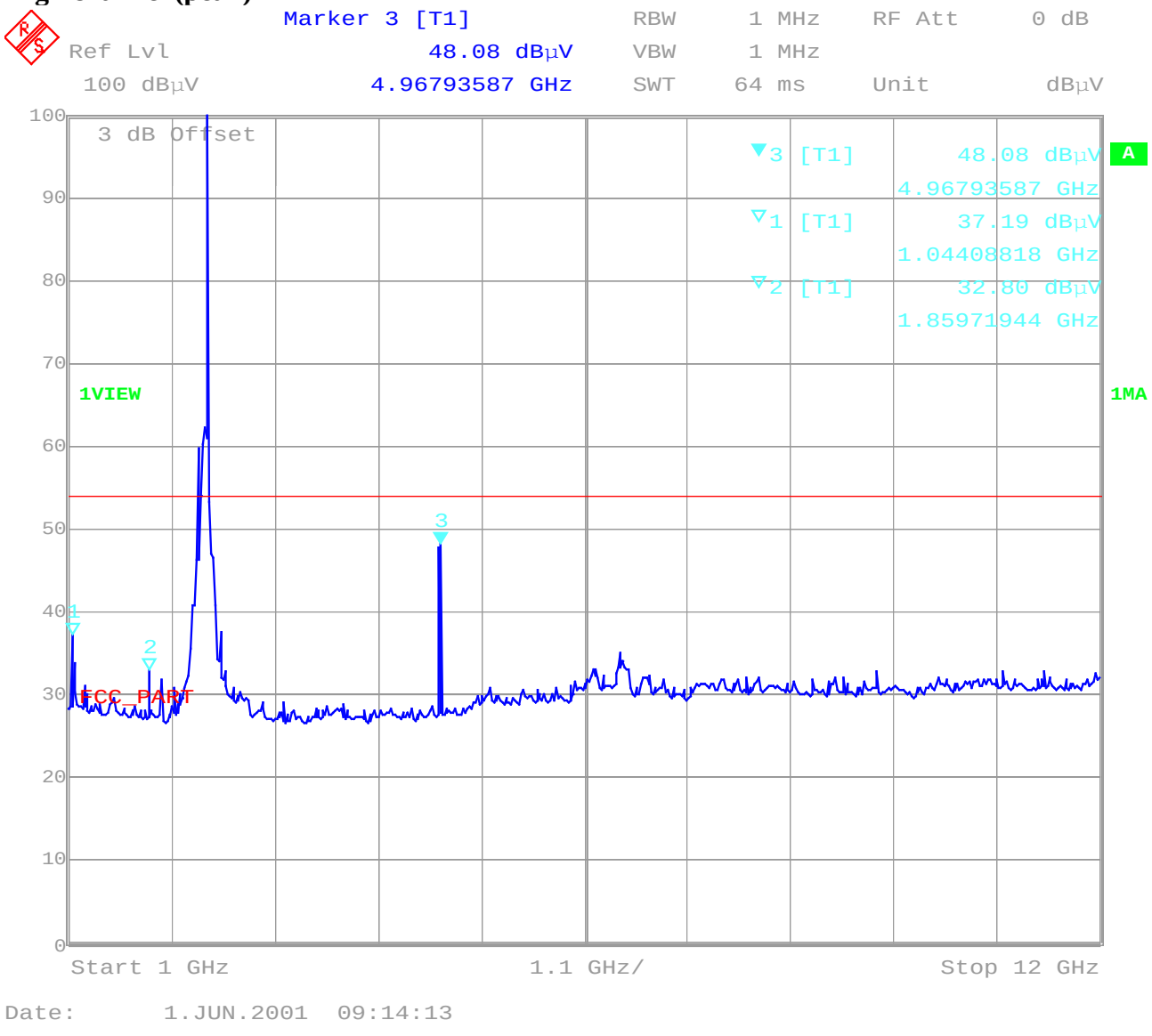
SPURIOUS EMISSION **§ 15.247 (c) (1)**
CONDUCTED

High channel



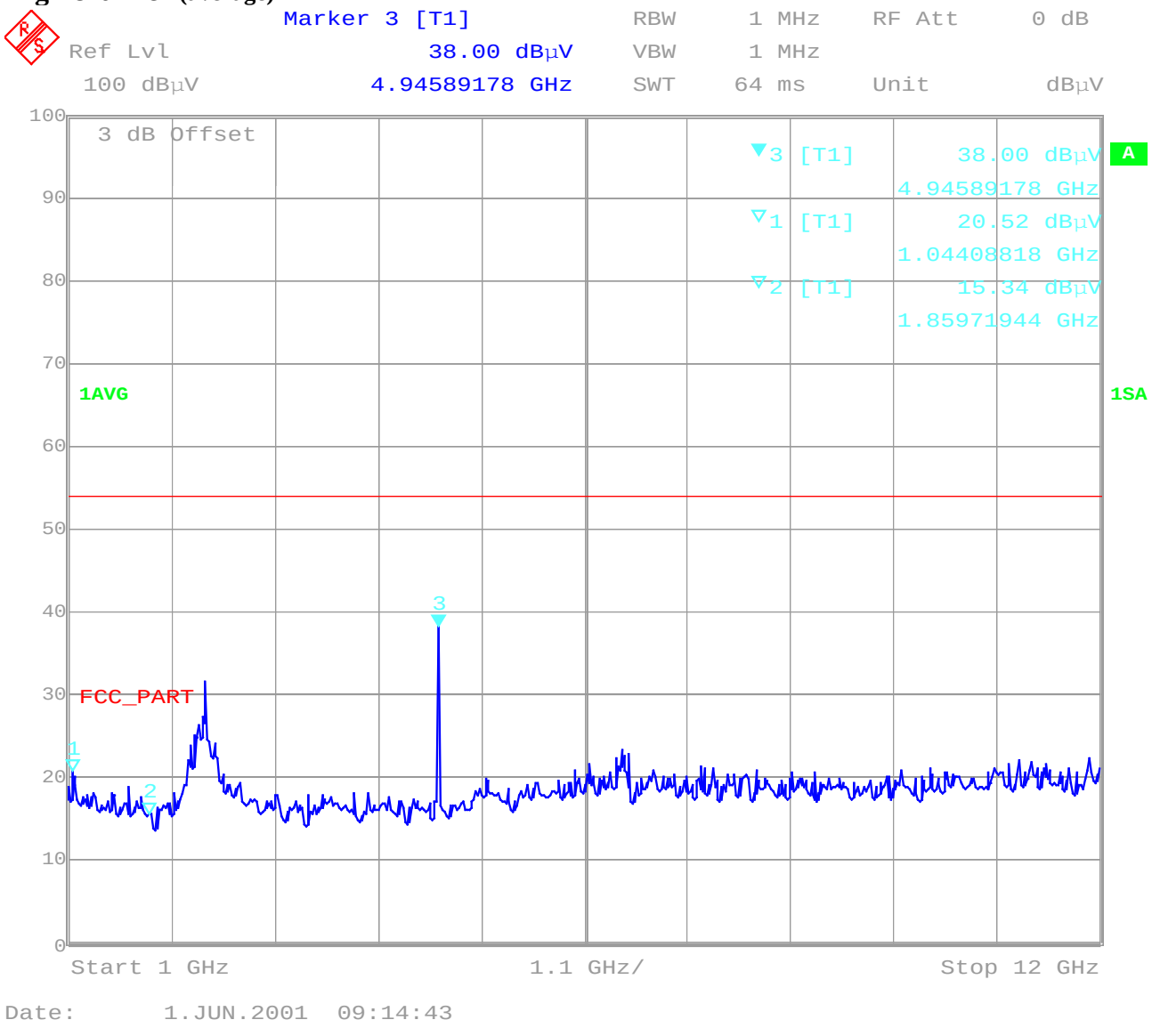
Equipment under test : Bluetooth module
Ambient temperature : 23° C
Relative humidity : 47%
SPURIOUS EMISSION **§ 15.247 (c) (1)**
CONDUCTED

High channel (peak)



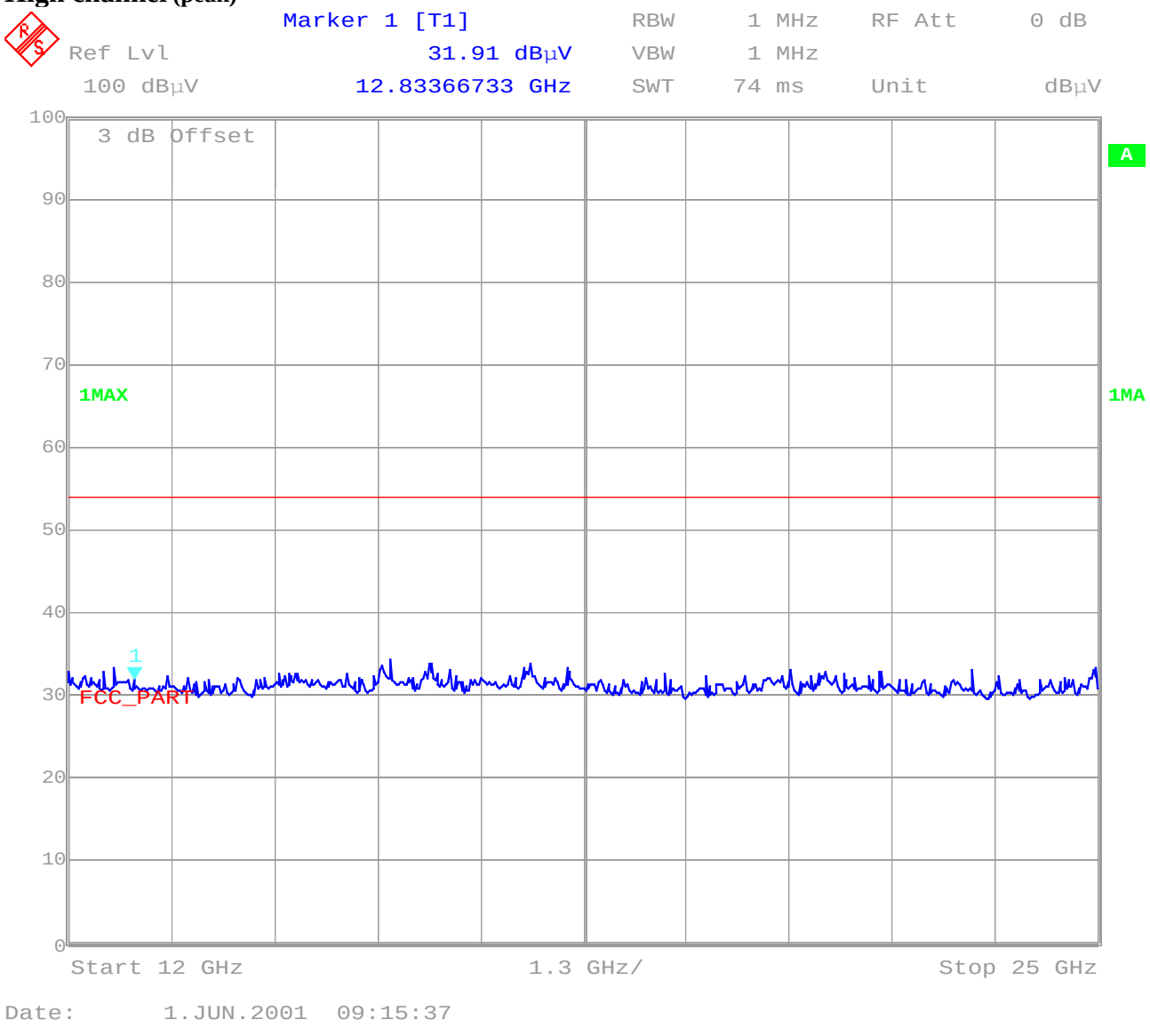
Equipment under test : Bluetooth module
Ambient temperature : 23° C
Relative humidity : 47%
SPURIOUS EMISSION **§ 15.247 (c) (1)**
CONDUCTED

High channel (average)



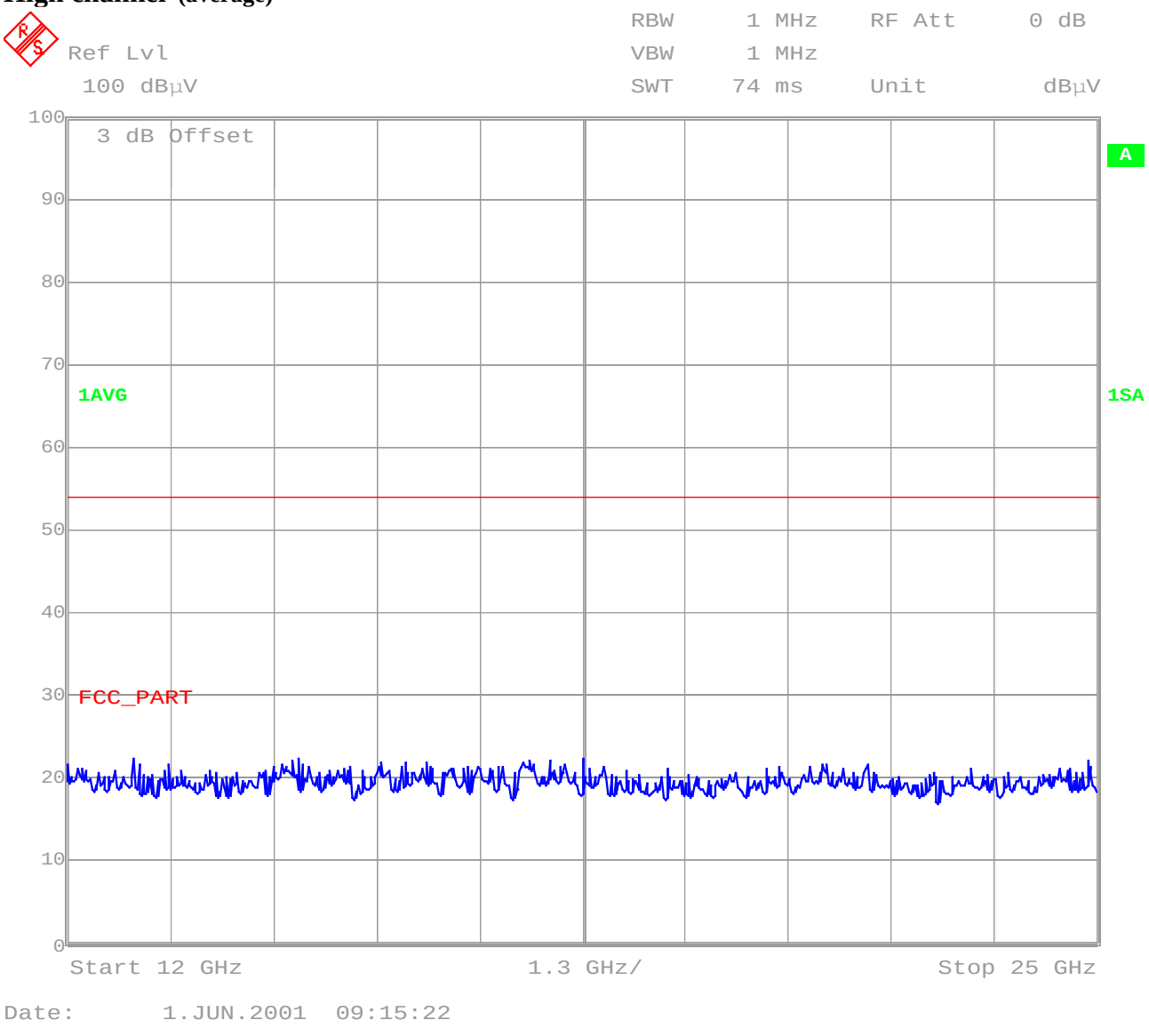
Equipment under test : Bluetooth module
Ambient temperature : 23° C
Relative humidity : 47%
SPURIOUS EMISSION **§ 15.247 (c) (1)**
CONDUCTED

High channel (peak)



Equipment under test : Bluetooth module
Ambient temperature : 23° C
Relative humidity : 47%
SPURIOUS EMISSION **§ 15.247 (c) (1)**
CONDUCTED

High channel (average)



Equipment under test : Bluetooth module
Ambient temperature : 23° C
Relative humidity : 47%

SPURIOUS EMISSION (radiated) § 15.247 (c) (1)

EMISSION LIMITATIONS					
f (MHz)	polari-zation	amplitude of emission (dBµV/m) PEAK	amplitude of emission (dBµV/m) QUASI PEAK	limit max. allowed emmision power (dBµV/m)	results
low channel					
260.92	horizontal		35.3	46.0	complies
mid channel					
260.92	horizontal		35.3	46.0	complies
high channel					
260.92	horizontal		34.1	46.0	complies
600.4	horizontal		36.4	46.0	complies
Measurement uncertainty		± 3dB			

Vertical measurments were more than 6 dB lower

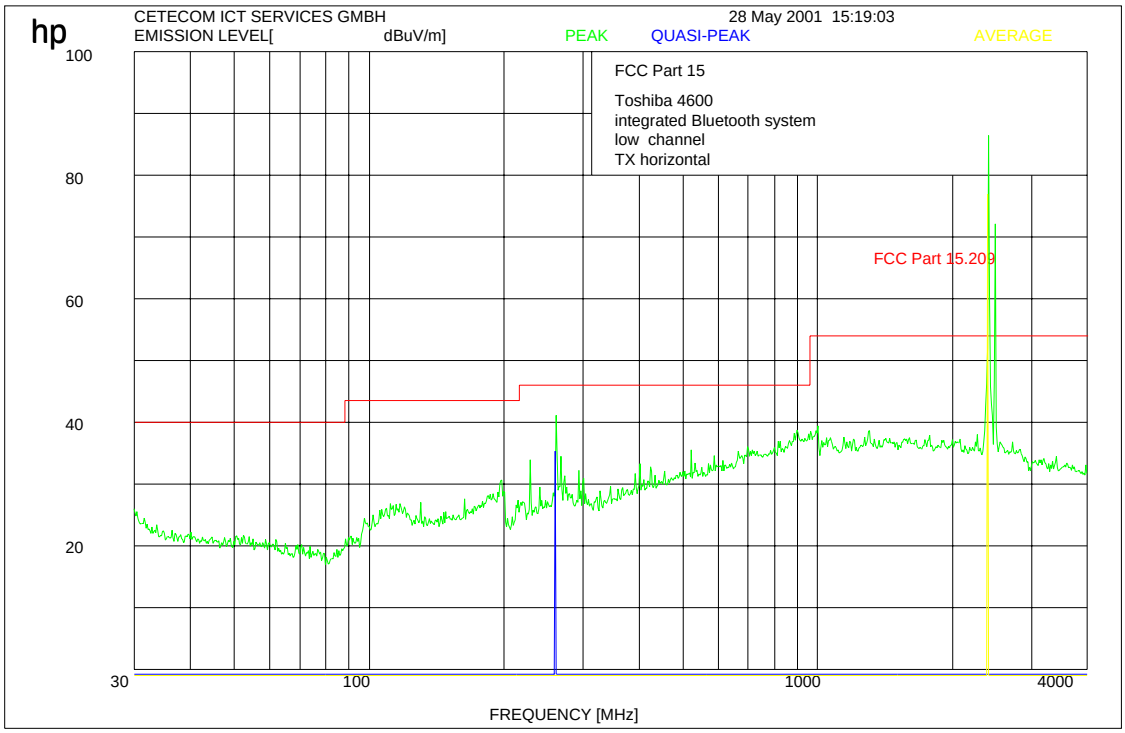
LIMITS SUBCLAUSE § 15.247 (c)

In any 100 kHz bandwidth outside the frequency band at least 20dB below the highest level of the desired power. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

Equipment under test : Bluetooth module
Ambient temperature : 23° C
Relative humidity : 47%

EMISSION LIMITATIONS- Radiated **§ 15.247 (c) (1)**

low channel up to 4 GHz

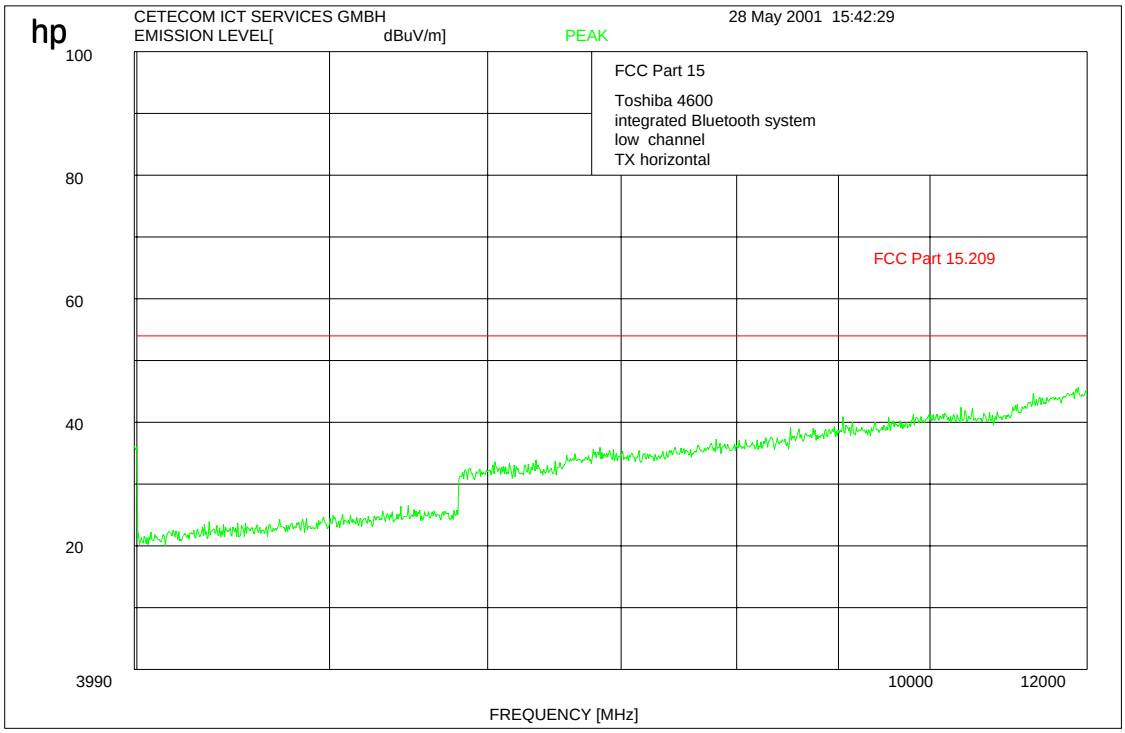


This is only a scan.
Measurements were performed by main with 100/120 kHz BW for CISPR Quasipeak below 1 GHz, with 1MHz RBW/VBW at average and peak over 1 GHz.

Equipment under test : Bluetooth module
Ambient temperature : 23° C
Relative humidity : 47%

EMISSION LIMITATIONS- Radiated **§ 15.247 (c) (1)**

low channel up to 12 GHz

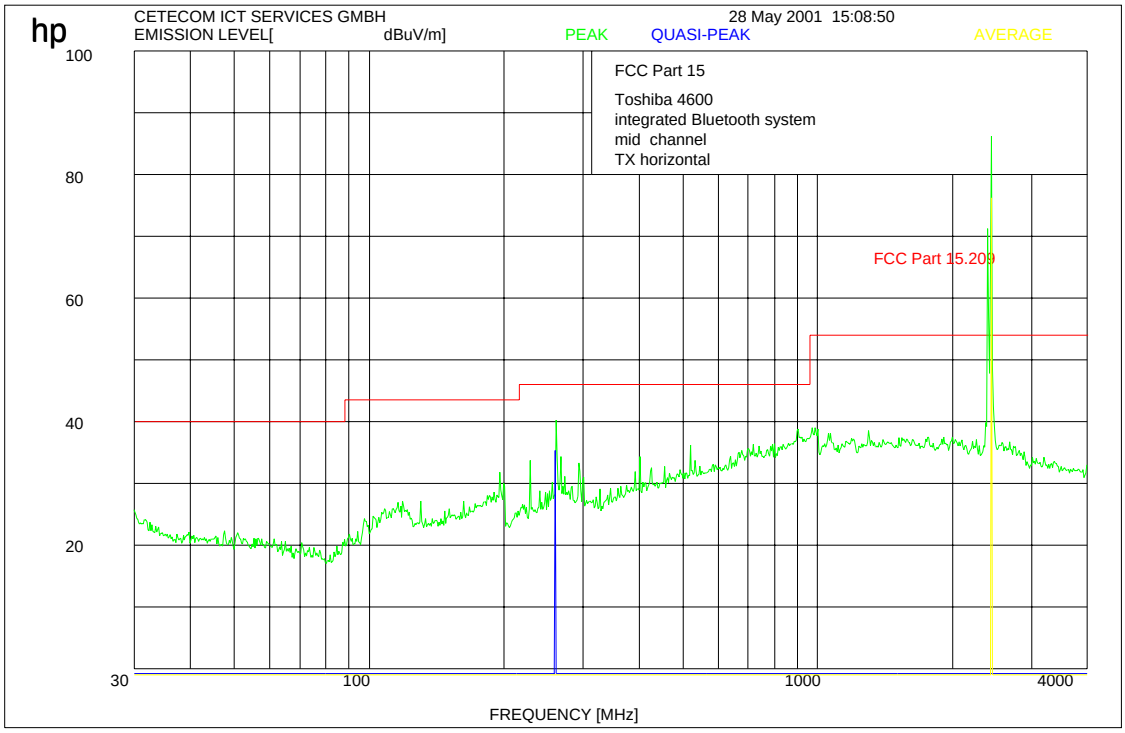


This is only a scan.
Measurements were performed by main with 100/120 kHz BW for CISPR Quasipeak below 1 GHz, with 1MHz RBW/VBW at average and peak over 1 GHz.

Equipment under test : Bluetooth module
Ambient temperature : 23° C
Relative humidity : 47%

EMISSION LIMITATIONS- Radiated **§ 15.247 (c) (1)**

mid channel up to 4 GHz

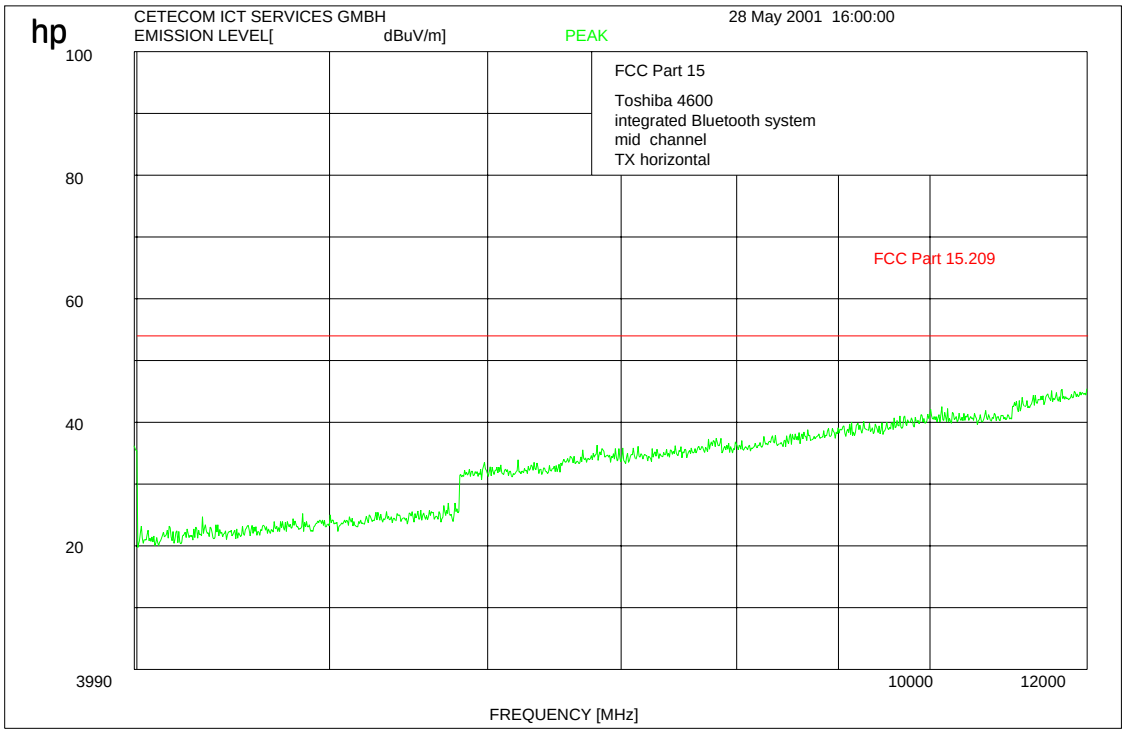


This is only a scan.
Measurements were performed by main with 100/120 kHz BW for CISPR Quasipeak below 1 GHz, with 1MHz RBW/VBW at average and peak over 1 GHz.

Equipment under test : Bluetooth module
Ambient temperature : 23° C
Relative humidity : 47%

EMISSION LIMITATIONS- Radiated **§ 15.247 (c) (1)**

mid channel up to 12 GHz

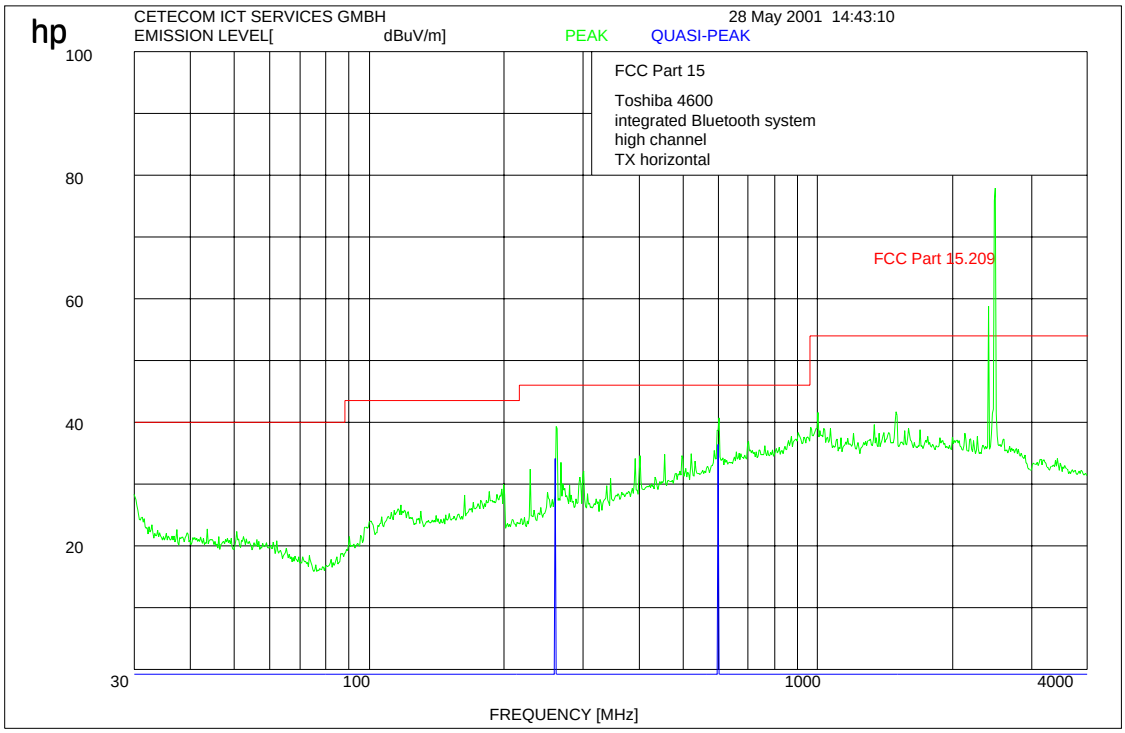


This is only a scan.
Measurements were performed by main with 100/120 kHz BW for CISPR Quasipeak below 1 GHz, with 1MHz RBW/VBW at average and peak over 1 GHz.

Equipment under test : Bluetooth module
Ambient temperature : 23° C
Relative humidity : 47%

EMISSION LIMITATIONS- Radiated **§ 15.247 (c) (1)**

high channel up to 4 GHz

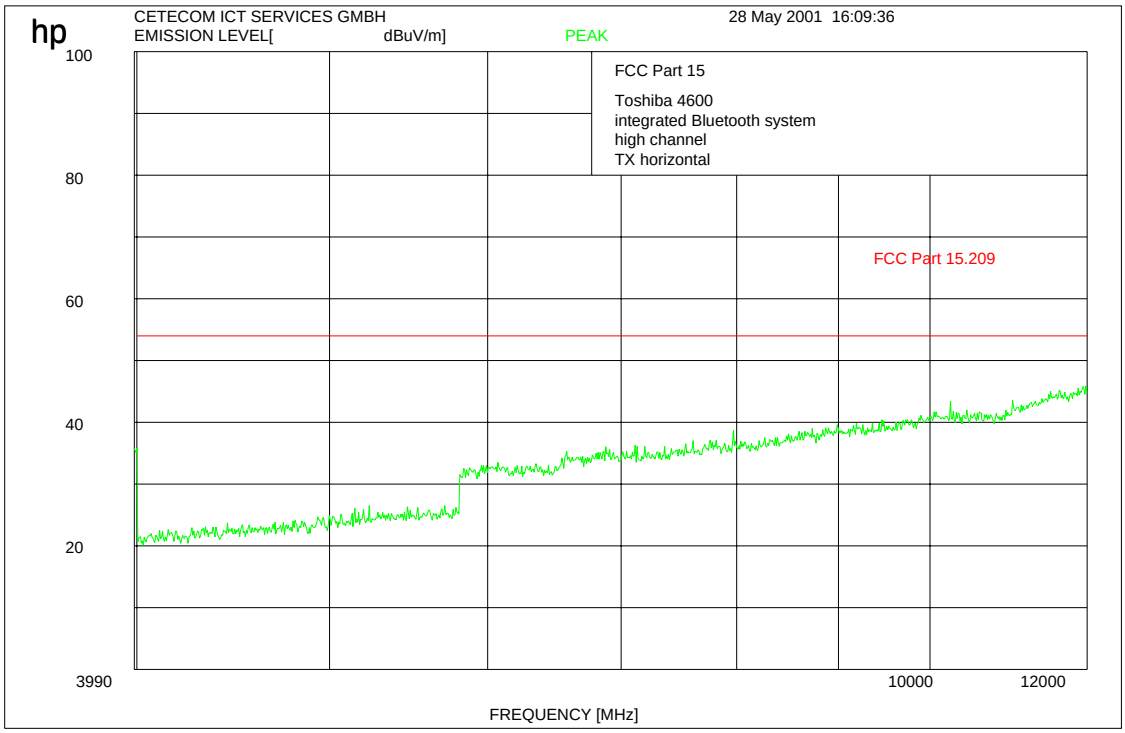


This is only a scan.
Measurements were performed by main with 100/120 kHz BW for CISPR Quasipeak below 1 GHz, with 1MHz RBW/VBW at average and peak over 1 GHz.

Equipment under test : Bluetooth module
Ambient temperature : 23° C
Relative humidity : 47%

EMISSION LIMITATIONS- Radiated **§ 15.247 (c) (1)**

high channel up to 12 GHz

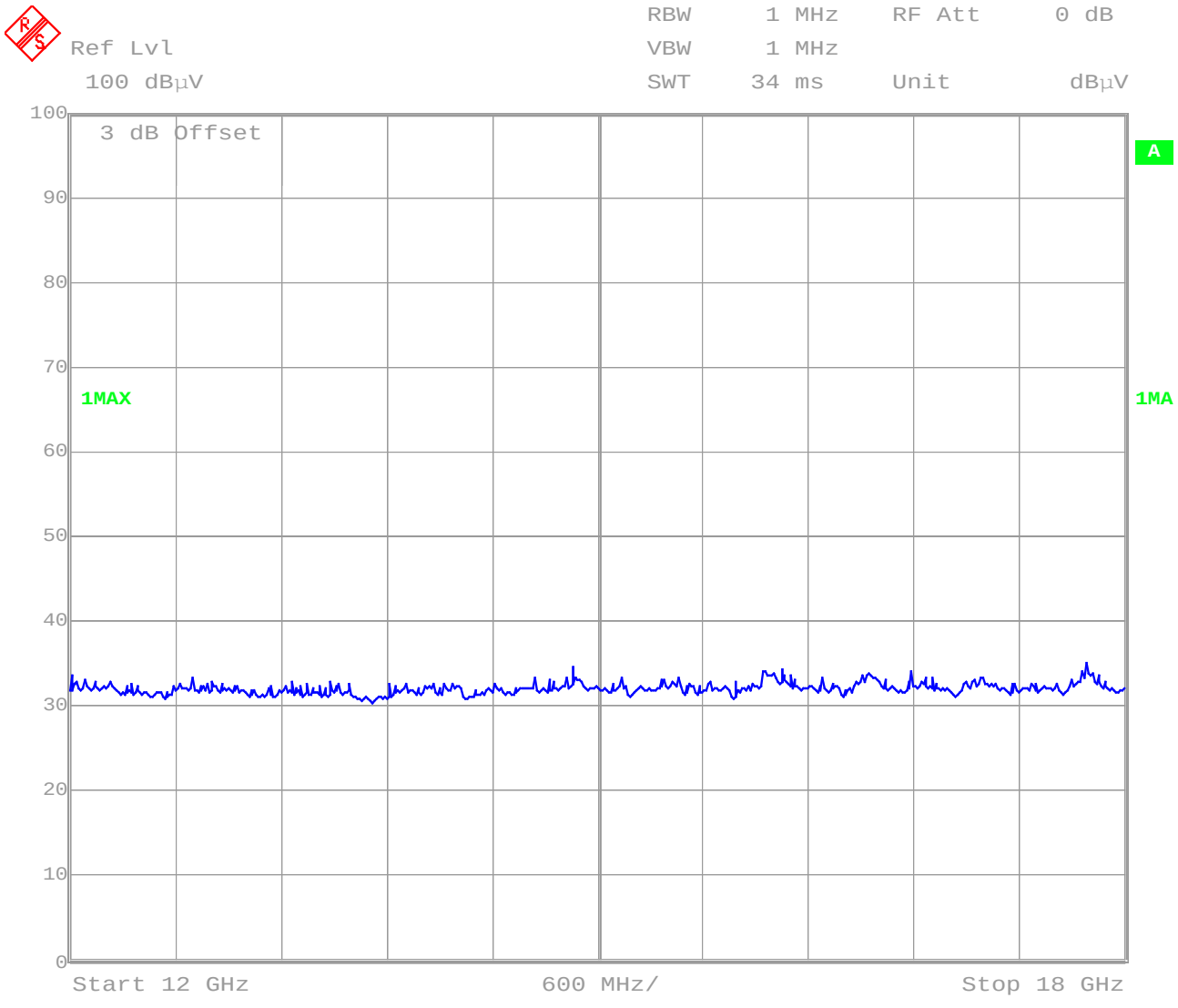


This is only a scan.
Measurements were performed by main with 100/120 kHz BW for CISPR Quasipeak below 1 GHz, with 1MHz RBW/VBW at average and peak over 1 GHz.

Equipment under test : Bluetooth module
Ambient temperature : 23° C
Relative humidity : 47%

EMISSION LIMITATIONS (Transmitter) CLAUSE § 15.247 (c) (1)

Channel 1-3 (this is valid for all 3 channels)
Peak

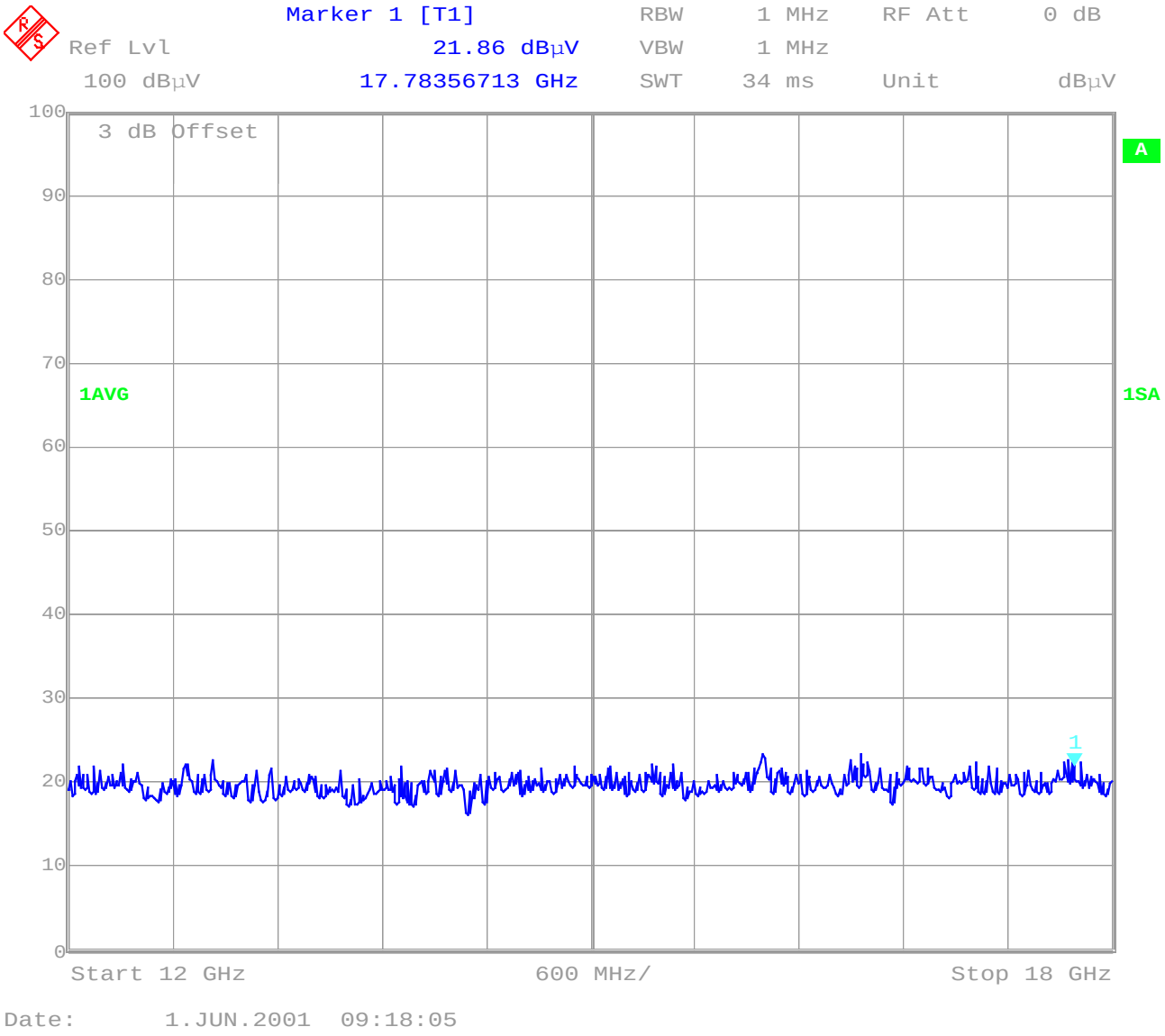


LIMITS **SUBCLAUSE § 15.247 (c)**

In any 100 kHz bandwidth outside the frequency band at least 20dB below the highest level of the desired power. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

Equipment under test : Bluetooth module
Ambient temperature : 23° C
Relative humidity : 47%

EMISSION LIMITATIONS (Transmitter) CLAUSE § 15.247 (c) (1)
Channel 1-3 (this is valid for all 3 channels)
Average



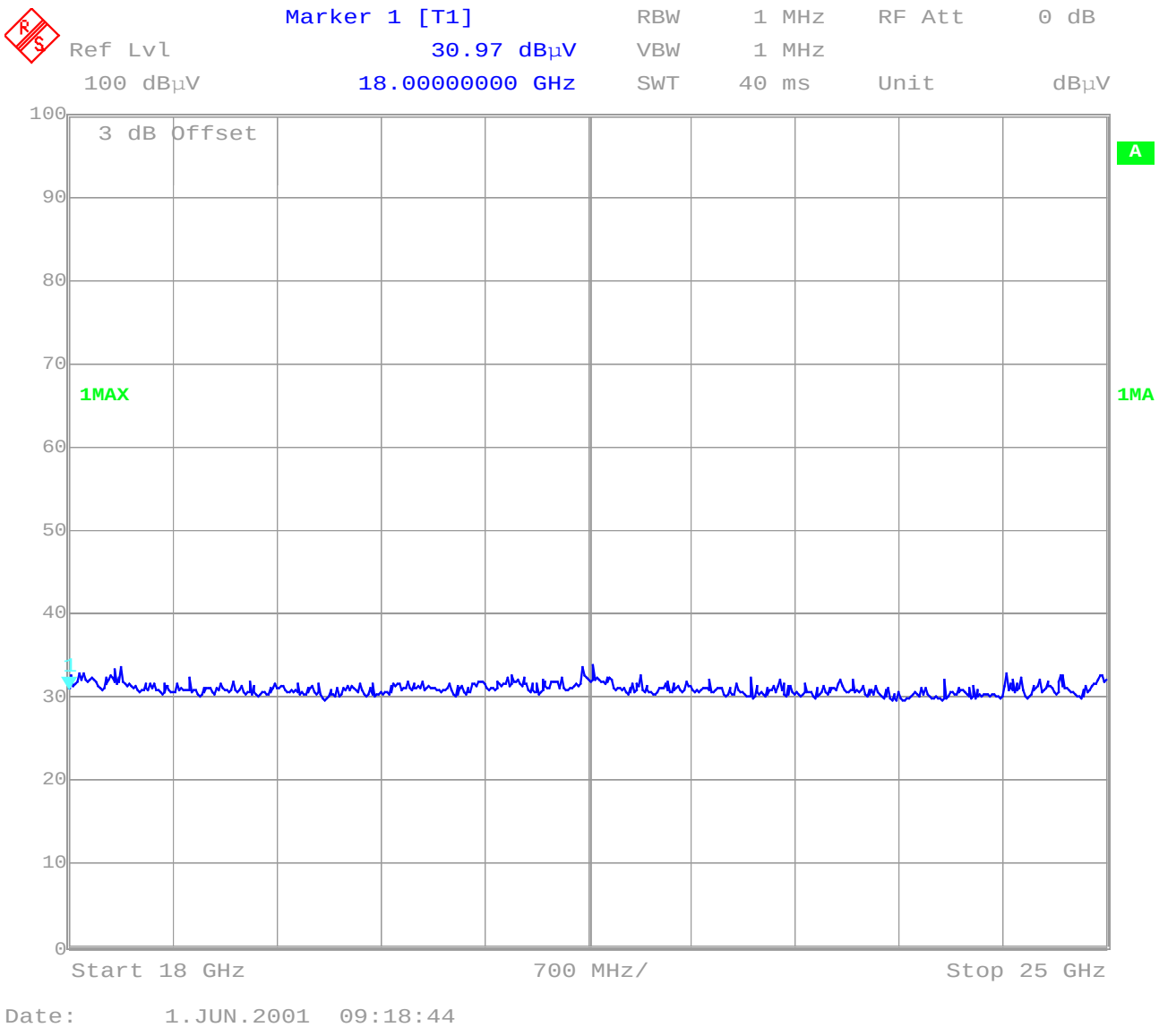
LIMITS **SUBCLAUSE § 15.247 (c)**

In any 100 kHz bandwidth outside the frequency band at least 20dB below the highest level of the desired power. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

Equipment under test : Bluetooth module
Ambient temperature : 23° C
Relative humidity : 47%

EMISSION LIMITATIONS (Transmitter) CLAUSE § 15.247 (c) (1)

Channel 1-3 (this is valid for all 3 channels)
Peak

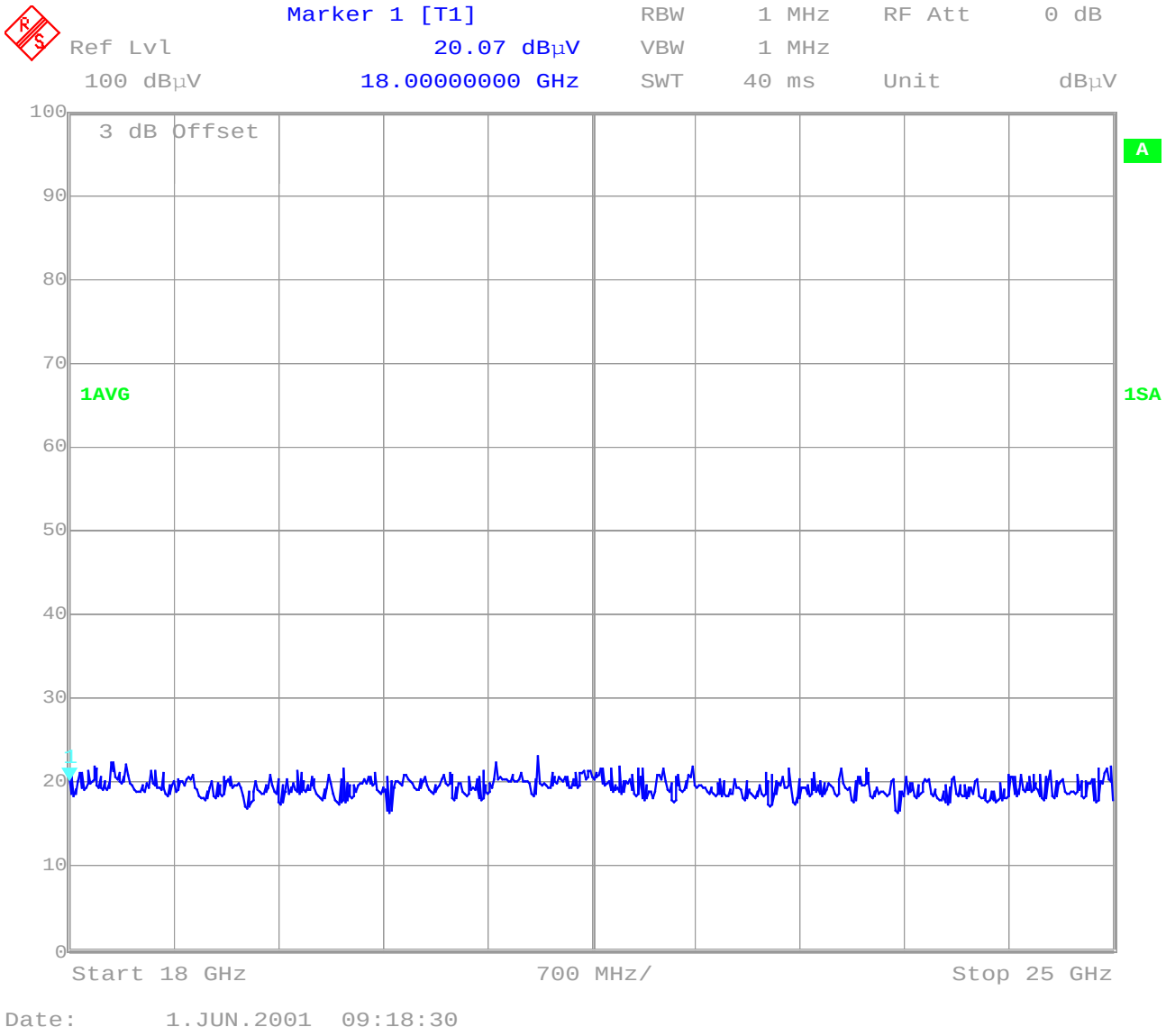


LIMITS **SUBCLAUSE § 15.247 (c)**

In any 100 kHz bandwidth outside the frequency band at least 20dB below the highest level of the desired power. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

Equipment under test : Bluetooth module
Ambient temperature : 23° C
Relative humidity : 47%

EMISSION LIMITATIONS (Transmitter) CLAUSE § 15.247 (c) (1)
Channel 1-3 (this is valid for all 3 channels)
Average

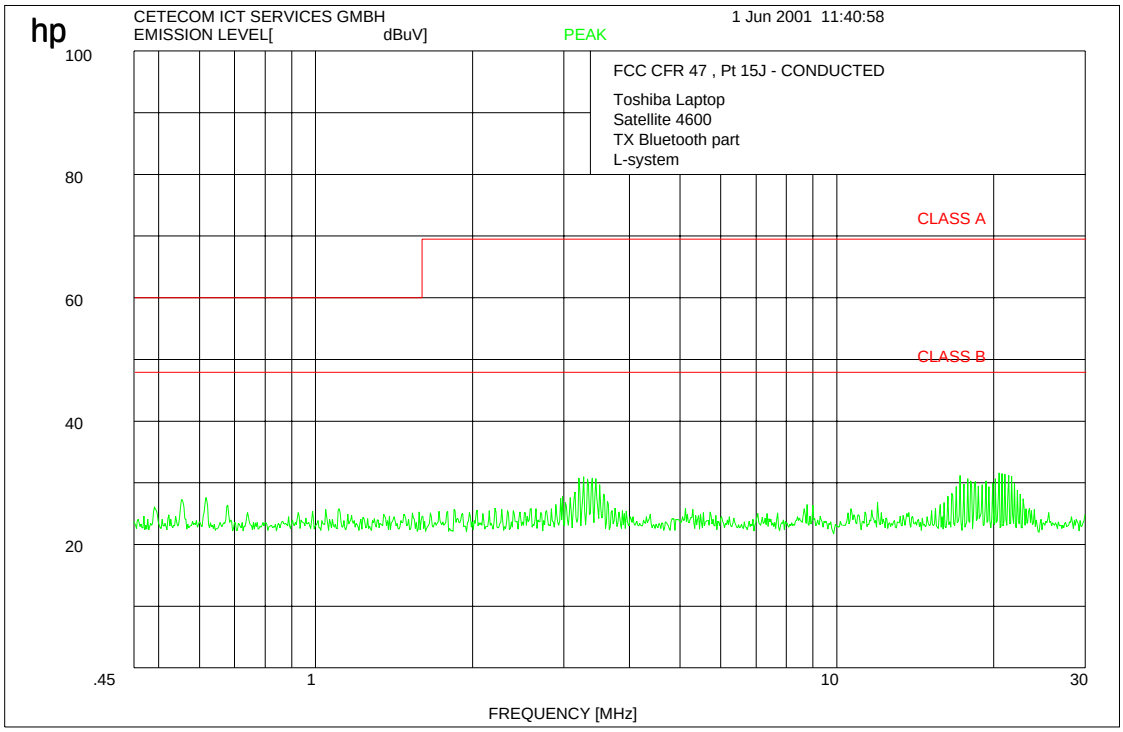


LIMITS **SUBCLAUSE § 15.247 (c)**

In any 100 kHz bandwidth outside the frequency band at least 20dB below the highest level of the desired power. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

Equipment under test : Bluetooth module
Ambient temperature : 23° C
Relative humidity : 47%
Conducted emissions **§ 15.107/207**
Measured with AC/DC power adapter

L1-system

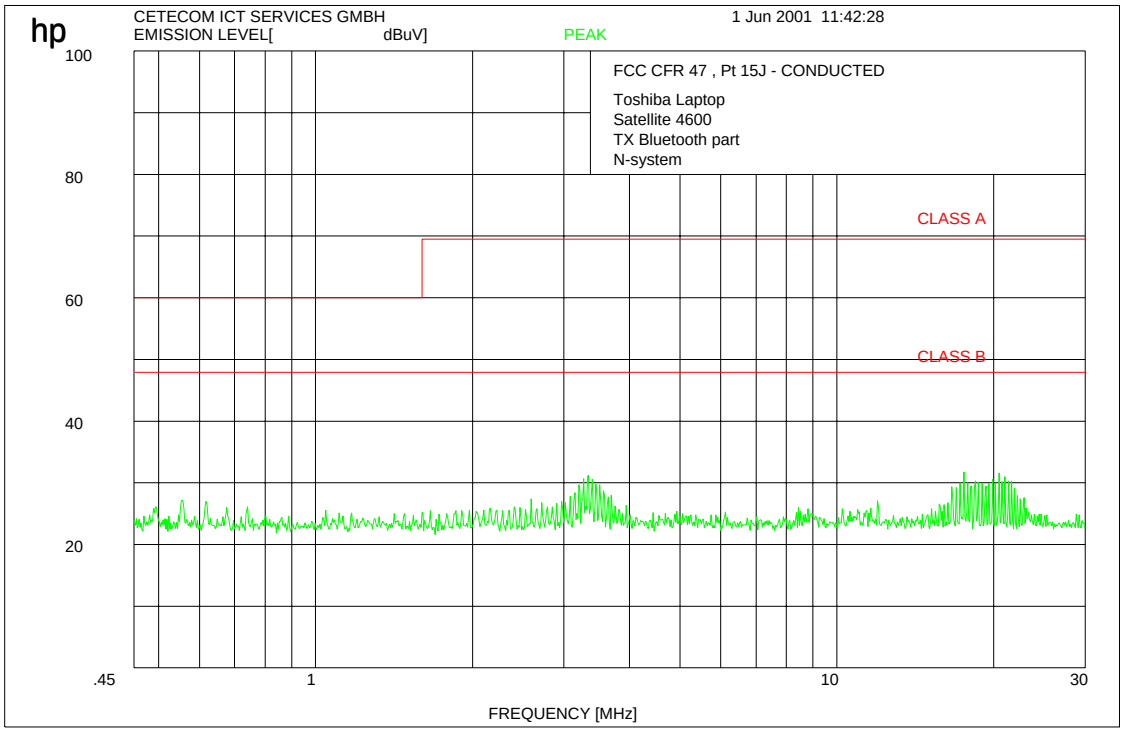


Technical specification : 15.207 (Revised as of October 1, 1991)
Limit

0.45 to 30 MHz	250 µV / 47.96 dBµV

Equipment under test : Bluetooth module
Ambient temperature : 23° C
Relative humidity : 47%
Conducted emissions **§ 15.107/207**
Measured with AC/DC power adapter

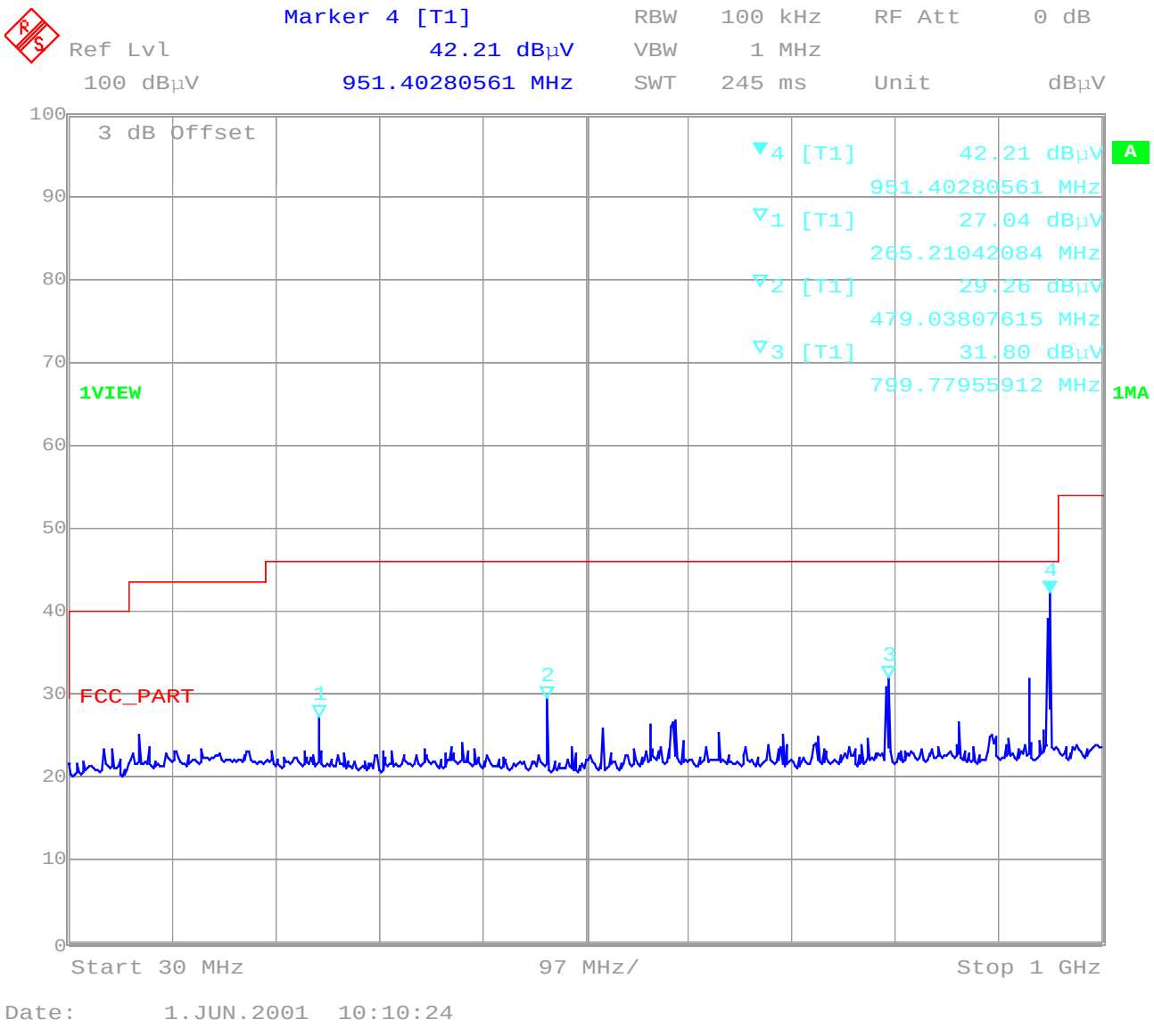
N-system



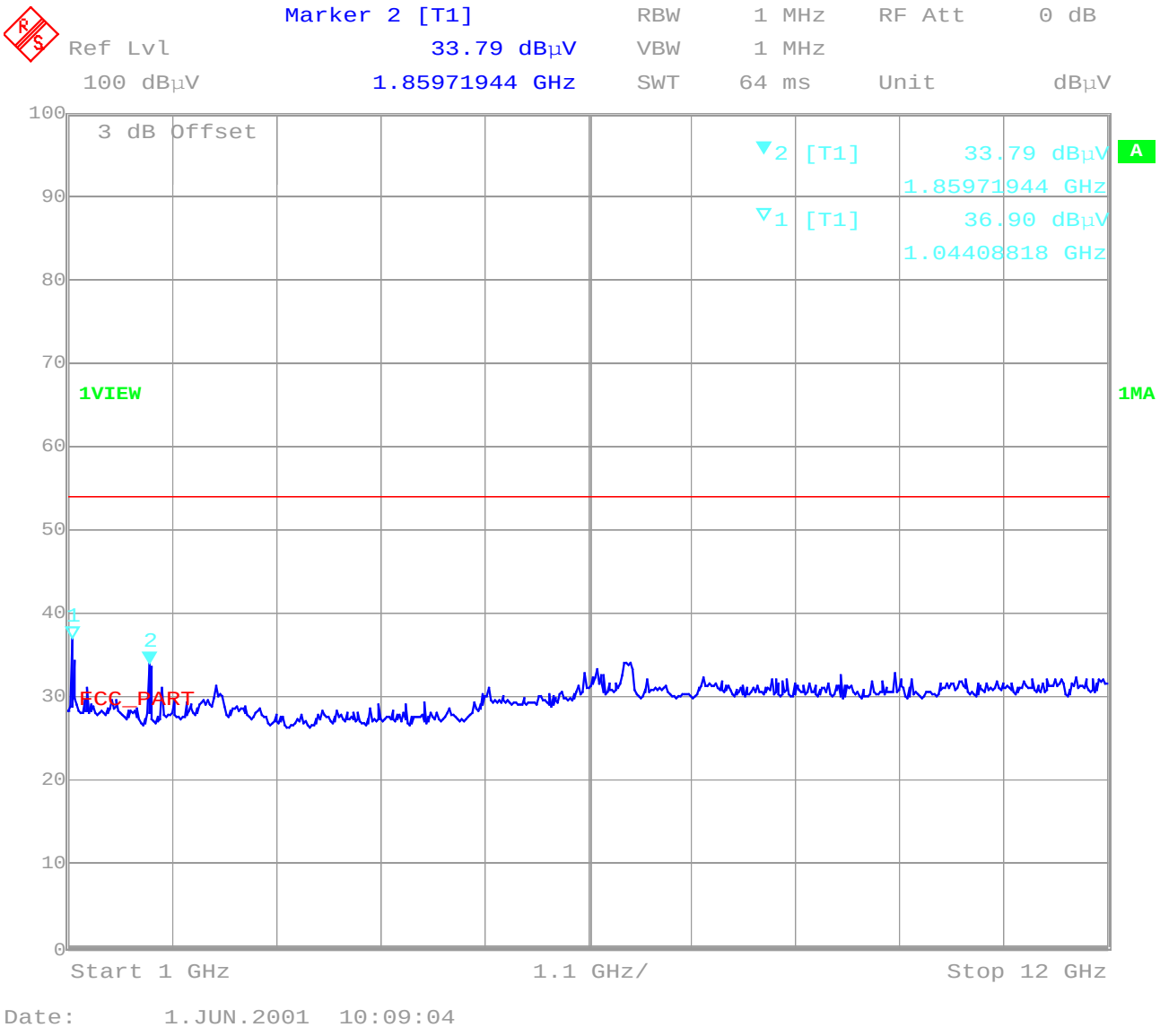
Technical specification : 15.207 (Revised as of October 1, 1991)
Limit

0.45 to 30 MHz	250 µV / 47.96 dBµV

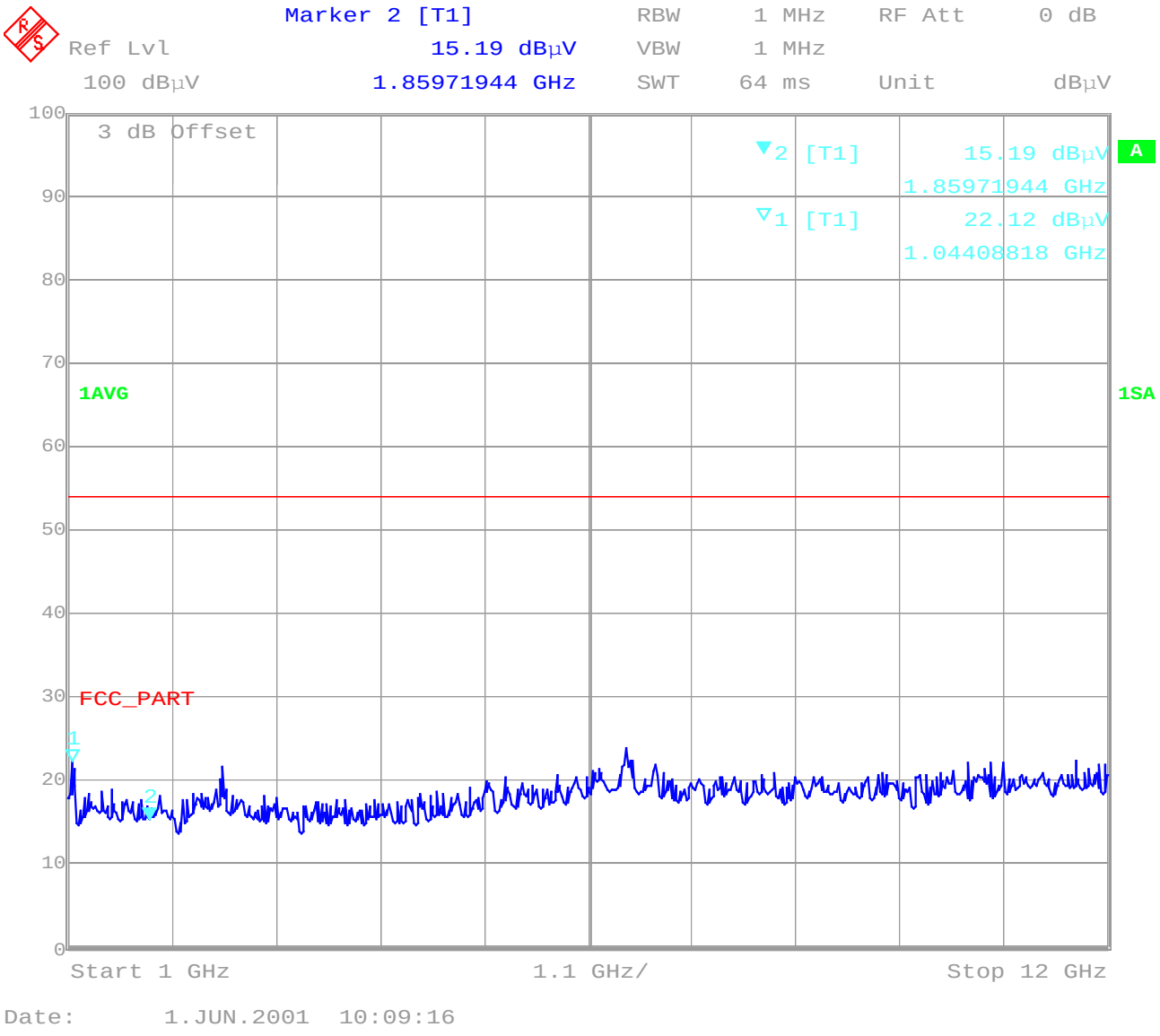
Equipment under test : Bluetooth module
Ambient temperature : 23° C
Relative humidity : 47%
EMISSION LIMITATIONS- Conducted **§ 15.247 (c) (1)**
Receiver
All peaks found in Receiving mode are < limit.



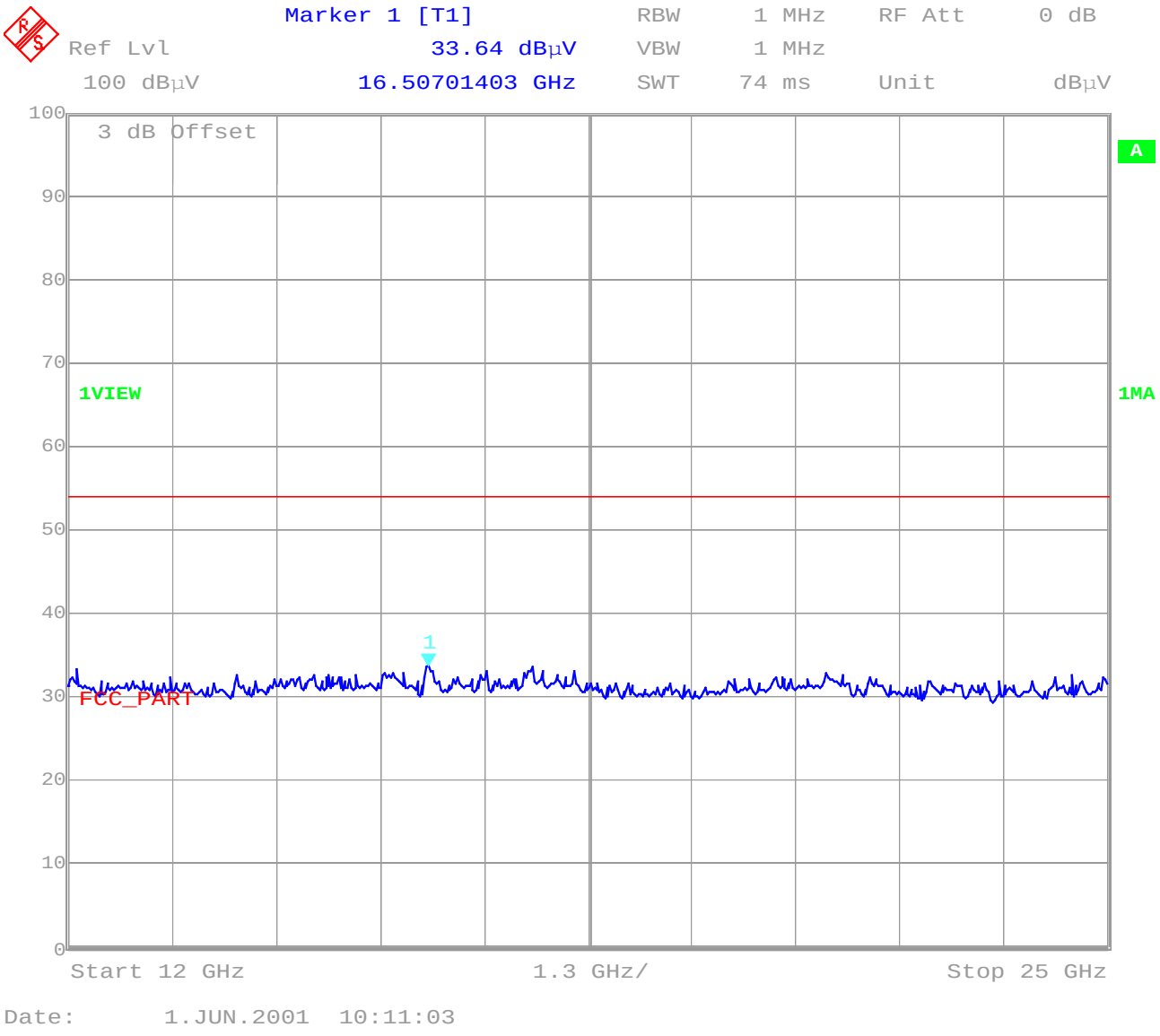
Equipment under test : Bluetooth module
Ambient temperature : 23° C
Relative humidity : 47%
EMISSION LIMITATIONS- Conducted **§ 15.247 (c) (1)**
Receiver 1-12 GHz peak



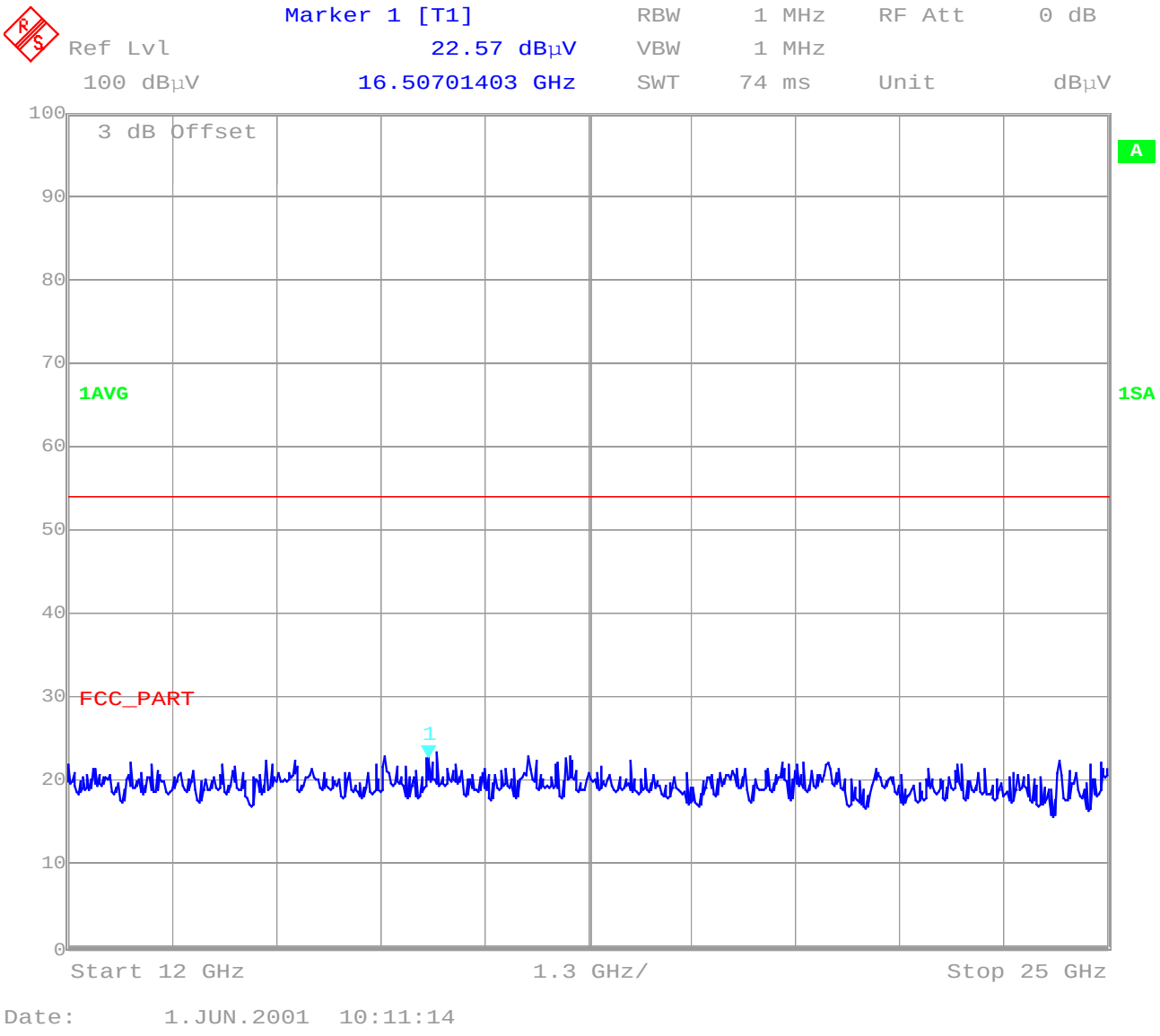
Equipment under test : Bluetooth module
Ambient temperature : 23° C
Relative humidity : 47%
EMISSION LIMITATIONS- Conducted **§ 15.247 (c) (1)**
Receiver 1-12 GHz average



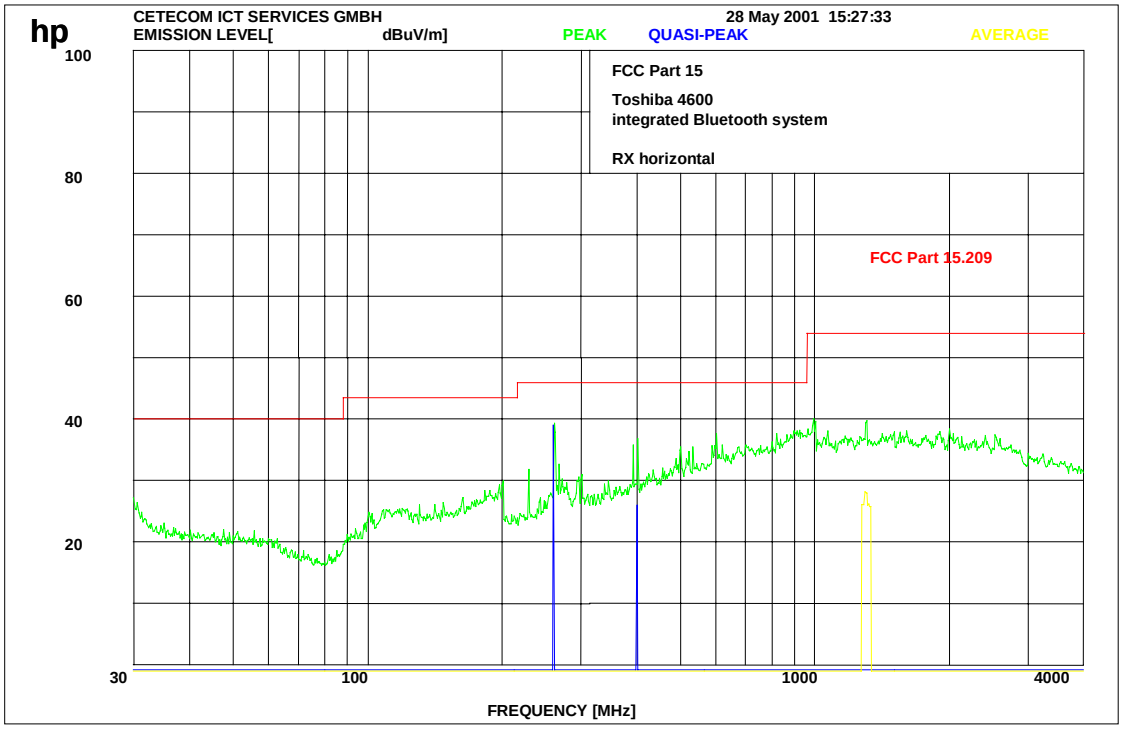
Equipment under test : Bluetooth module
Ambient temperature : 23° C
Relative humidity : 47%
EMISSION LIMITATIONS- Conducted **§ 15.247 (c) (1)**
Receiver 12-25 GHz peak



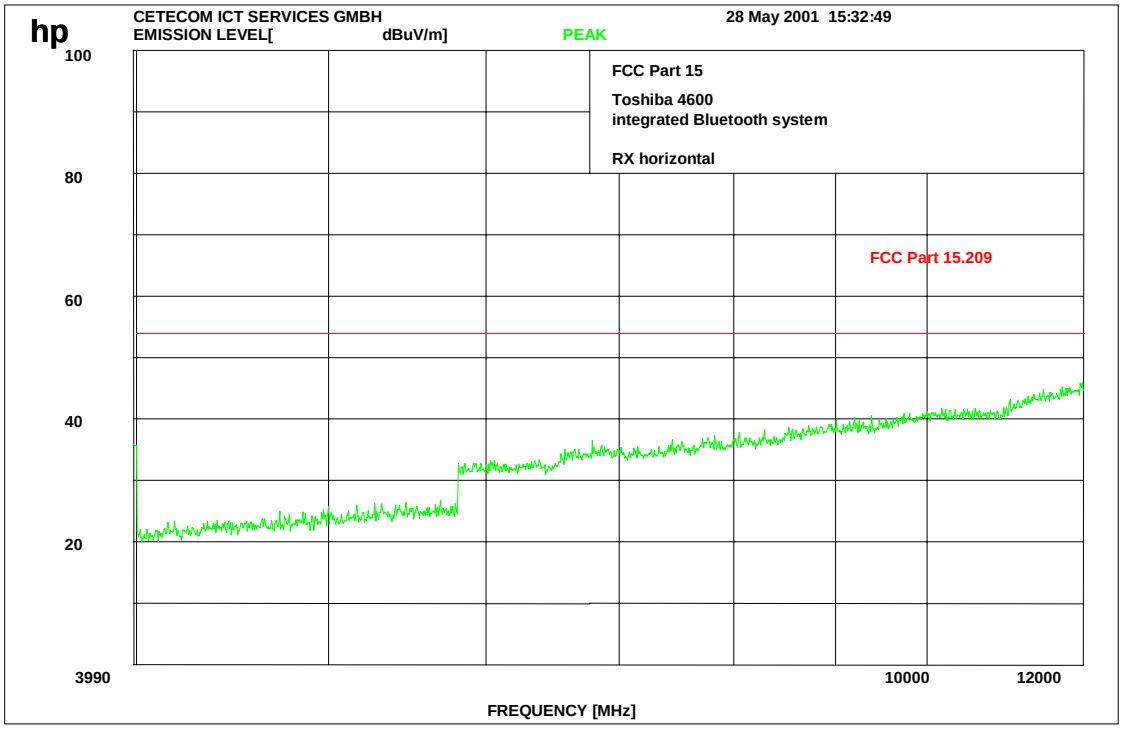
Equipment under test : Bluetooth module
Ambient temperature : 23° C
Relative humidity : 47%
EMISSION LIMITATIONS- Conducted **§ 15.247 (c) (1)**
Receiver 12-25 GHz average



Equipment under test : Bluetooth module
Ambient temperature : 23° C
Relative humidity : 47%
EMISSION LIMITATIONS- Radiated **§ 15.247 (c) (1)**
Receiver



Equipment under test : Bluetooth module
Ambient temperature : 23° C
Relative humidity : 47%
EMISSION LIMITATIONS- Radiated **§ 15.247 (c) (1)**
Receiver



The measurements were performed up to 25 GHz.
There were no peaks found.

Equipment under test : Bluetooth module
Ambient temperature : 23° C
Relative humidity : 47%

TEST EQUIPMENT AND ANCILLARIES USED FOR TESTS

To simplify the identification on each page of the test equipment used, on each page of the test report, each item of test equipment and ancillaries such as cables are identified (numbered) by the Test Laboratory, below.

No	Instrument/Ancillary	Type	Manufacturer	Serial No.
01	Spectrum Analyzer	8566 A	Hewlett-Packard	1925A00257
02	Analyzer Display	8566 A	Hewlett-Packard	1925A00860
03	Oscilloscope	7633	Tektronix	230054
04	Radio Analyzer	CMTA 54	Rohde & Schwarz	894 043/010
05	System Power Supply	6038 A	Hewlett-Packard	2848A07027
06	Signal Generator	8111 A	Hewlett-Packard	2215G00867
07	Signal Generator	8662 A	Hewlett-Packard	2224A01012
08	Funktionsgenerator	AFGU	Rohde & Schwarz	862 480/032
09	Regeltrenntrafo	MPL	Erfi	91350
10	Netznachbildung	NNLA 8120	Schwarzbeck	8120331
11	Relais-Matrix	PSU	Rohde & Schwarz	893 285/020
12	Power-Meter	436 A	Hewlett-Packard	2101A12378
13	Power-Sensor	8484 A	Hewlett-Packard	2237A10156
14	Power-Sensor	8482 A	Hewlett-Packard	2237A00616
15	Modulationsmeter	9008	Racal-Dana	2647
16	Frequenzzähler	5340 A	Hewlett-Packard	1532A03899
17	Absorber Schirmkabine	---	MWB	87400/002
18	Spectrum Analyzer	85660 B	Hewlett-Packard	2747A05306
19	Analyzer Display	85662 A	Hewlett-Packard	2816A16541
20	Quasi Peak Adapter	85650 A	Hewlett-Packard	2811A01131
21	RF-Preselector	85685 A	Hewlett-Packard	2833A00768
22	Biconical Antenne	3104	Emco	3758
23	Log. Per. Antenne	3146	Emco	2130
24	Double Ridge Horn	3115	Emco	3088
25	EMI-Testreceiver	ESAI	Rohde & Schwarz	863 180/013
26	EMI-Analyzer-Display	ESAI-D	Rohde & Schwarz	862 771/008
27	Biconical Antenne	HK 116	Rohde & Schwarz	888 945/013
28	Log. Per. Antenne	HL 223	Rohde & Schwarz	825 584/002
29	Relais-Switch-Unit	RSU	Rohde & Schwarz	375 339/002
30	Highpass	HM985955	FSY Microwave	001
31	Amplifier	P42-GA29	Tron-Tech	B 23602
32	Absorber Schirmkabine		Frankonia	
33	Steuerrechner	PSM 7	Rohde & Schwarz	834 621/004
34	EMI Test Reciever	ESMI	Rohde & Schwarz	827 063/010
35	EMI Test Receiver	Display	Rohde & Schwarz	829 808/010

Equipment under test : Bluetooth module
Ambient temperature : 23° C
Relative humidity : 47%
TEST EQUIPMENT AND ANCILLARIES USED FOR TESTS
To simplify the identification on each page of the test equipment used, on each page of the test report, each item of test equipment and ancillaries such as cables are identified (numbered) by the Test Laboratory, below.

No	Instrument/Ancillary	Type	Manufacturer	Serial No.
36	Controler	HD 100	Deisel	100/322/93
37	Relais Matrix	PSN	Rohde & Schwarz	829 065/003
38	Control Unit	GB 016 A2	Rohde & Schwarz	344 122/008
39	Relais Switch Unit	RSU	Rohde & Schwarz	316 790/001
40	Power Supply	6032A	Hewlett Packard	2846A04063
41	Spektrum Monitor	EZM	Rohde & Schwarz	883 720/006
42	Meßempfänger	ESH 3	Rohde & Schwarz	890 174/002
43	Meßempfänger	ESVP	Rohde & Schwarz	891 752/005
44	Biconi Ant. 20-300MHz	HK 116	Rohde & Schwarz	833 162/011
45	Logper Ant. 0.3-1 GHz	HL 223	Rohde & Schwarz	832 914/010
46	Amplifier 0.1-4 GHz	AFS4	Miteq Inc.	206461
47	Logper Ant. 1-18 GHz	HL 024 A2	Rohde & Schwarz	342 662/002
48	Polarisationsnetzwerk	HL 024 Z1	Rohde & Schwarz	341 570/002
49	Double Ridge G Horn Antenne 1-26.5 GHz	3115	EMCO	9107-3696
50	Microw. Sys. Amplifier 0.5- 26.5 GHz	8317A	Hewlett Packard	3123A00105
51	Spectrum Analyzer	8562A	Hewlett Packard	2809AO2682
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