Emission Test Report
Standard: FCC Part 15 Subpart C / IC RSS-210
Class II Permissive change

Document Number : FCC 19-0239-0

Product: IBM integrated Bluetooth with 56K Modem

measured with **IBM ThinkPad R50 Series**

FCC ID: ANO20020100MTN
IC: 349E-BMDC200

August 15, 2003

Prepared :
EMC R&D Staff Engineer
Takeshi Asano
Signature:
IBM Japan, Ltd.
EMC Engineering
LAB-S59
1623-14, Shimotsuruma,
Yamato-shi Kanagawa-ken 242, Japan
Phone: +81-46-215-4779
Fax: +81-46-273-7420
E-Mail: asano@jp.ibm.com

Reviewed and Checked :
EMC R&D Staff Engineer
Toshiya Murota
Signature:
IBM Japan, Ltd.
EMC Engineering
LAB-S59
1623-14, Shimotsuruma,
Yamato-shi Kanagawa-ken 242, Japan
Phone: +81-46-215-6574
Fax: +81-46-273-7420
E-Mail: murota@jp.ibm.com

Approved :
Manager, EMC Engineering
/ NVLAP signatory
Akihisa Sakurai
Signature:
IBM Japan, Ltd.
EMC Engineering
LAB-S59
1623-14, Shimotsuruma,
Yamato-shi Kanagawa-ken 242, Japan
Phone: +81-46-215-2613
Fax: +81-46-273-7420
E-Mail: akihisa@jp.ibm.com

MEASUREMENT / TECHNICAL REPORT – Part 15 Subpart C
(Intentional Radiator)

IBM integrated Bluetooth with 56K Modem
with
ThinkPad R50 Series

FCC ID : ANO20020100MTN

August 15, 2003

This report concerns: (check one) Original Grant _____ Class I change _____ Class II change ___✓___ Equipment type: Bluetooth modular device
This report shall not be reproduced except in full, without the written permission of this test lab.
The measurement results contained in this report relate only to the item which was tested.
Measurement procedure used is ANSI C63.4-2000 unless otherwise specified. Other test procedure: _____
The FCC has issued provisional acceptance of this test laboratory for Declaration of Conformity testing per letter dated 1997.
APPLICANT ANTI-DRUG ABUSE CERTIFICATION: By checking yes, the applicant certifies that, in the case of an individual applicant, he or she is not subject to a denial of federal benefits, that includes FCC benefits, pursuant to Section 5301 of the Anti-Drug Abuse of 1988, 21 U.S.C. 853(a), or, in the case of a non-individual applicant (e.g. corporation, partnership or other unincorporated association), no party to the application is subject to a denial of federal benefits, that includes FCC benefits, pursuant to that section. For the definition of a "party" for these purposes, see 47 CFR 1.2002(b). (Yes) or No
"Report shall not be reproduced except in full, without the written approval of the laboratory" "the report must not be used by the client to claim product endorsement by NVLAP or any agency of the US government"
Prepared by: Takeshi Asano IBM Japan Corporation, Yamato EMC Enginnering LAB-S59, 1623-14, Shimotsuruma, Yamato-shi Kanagawa-ken 242-8502, Japan Tel: +81-46-215-4779 Fax: +81-46-273-7420

- Index -

A. General Information

APPLICANT	: IBM Japan, Ltd.
TEST SITE	: IBM Japan, Ltd., Yamato Semi-anechoic chamber #1
TEST SITE ADDRESS	: 1623 – 14 Shimotsuruma, Yamato-shi, Kanagawa 242-8502 Japan Tel: +81-46-215-4779, Fax: +81-46-273-7420
REGULATION	: FCC Part 15 Subpart C Industry Canada RSS-210 (Issue No.5)
MODEL NAME	: IBM Integrated Bluetooth with 56K Modem
FCC ID IC Certification Number	: ANO20020100MTN : 349E-BMDC200
SERIAL NUMBER	: 7A1-SIV133
PYSICAL CONDITION	: Preproduction
KIND OF EQUIPMENT	: DTS: Bluetooth modular device
TESTED DATE	: July 31, August 5, 6, 7 and 8, 2003

A.1 Test Methodology

Both conducted and radiated testing were performed according to the procedures in ANSI C63.4-2000.
Radiated testing was performed at an antenna to EUT distance of 3 meters.

A.2 Test Facility / NVLAP Accreditation

The semi-anechoic chamber #1 used to correct the data are located in Yamato Laboratory, IBM Japan.

- This facility has been fully described in a report dated September 1998, submitted to the FCC office, and accepted in a letter, dated Nov. 2,1998(31040/SIT).
- IBM Yamato EMC Engineering is recognized under the National Voluntary Laboratory Accreditation Program for satisfactory compliance with Criteria established in Title 15, Part 285 Code of Federal Regulations.(NVLAP Lab code: 200198-0)
- This facility is accepted by **Industry Canada** in a letter dated January 25, 2002 as number **IC 4221** for chamber #1.

A.3 EUT details

Table A EUT details

Model and S/N	**FCC ID** **IC Certification Number**	**Description**
IBM Integrated Bluetooh with 56K Modem (s/n 7A1-SIV133)	FCC ID: ANO20020100MTN IC:349E-BMDC200	**Applying modular transmitter** Built_in type Bluetooth card without antenna
IBM ThinkPad R50 Series M/T 1829-62x (s/n ZZ-08233)	N/A	Host equipment IBM Notebook PC with built_in antenna CPU: Intel® Pentium® M Processor, 1.6GHz
P/N 02K6746	N/A	Universal AC adapter 72W, Unshielded power cord

B. Summary of Test Results

Table-B presents the list of the measurement items for Spread Spectrum, Direct Sequence devices under FCC Part 15 Subpart C and Industry Canada RSS-210.
The section numbers of upper portion are showing FCC number, and the other (lower) ones are for IC.

Table-B List of the measurements

Section(s)	Test Items		Condition	Result
	Transmit mode (TX):			
15.247(a)(1) **6.2.2(o)(a1)**	Carrier Frequency Separation	min. 25 kHz	Conducted	Pass
15.247(a)(1)(iii) **6.2.2(o)(a3)**	Number of Hopping Frequencies	at least 15 non-overlapping channels		Pass
	Dwell Time	0.4 seconds within a 31.6 second (79 hops × 0.4sec) period		Pass
15.247(f) **6.2.2 (o)(c2)(6)**	Dwell Time of Hybrid mode	0.4 seconds within a 12.8 second (32 hops × 0.4sec) period		Pass
– **5.9.1 / 5.9.2**	Occupied bandwidth, and Designation of Emissions	IC requirement.		N/A
15.247(b)(1) **6.2.2(o)(a3)**	Peak output power	Shall not exceed 1.0 W.		Pass
15.247(c) **6.2.2 (o) (e1)**	Conducted spurious (Out of Band Emissions), and Bandedge compliance	The radiated emission to any 100 kHz of outband shall be at least 20 dB below the highest inband spectral density.		Pass Pass
15.247(f) **6.2.2 (o)(c2)(7)**	Transmitter power spectral density of Hybrid mode	Shall not be greater than 8 dBm in any 3 kHz band.		Pass
15.207 **6.6**	AC Wireline Conducted emissions 150 kHz – 30 MHz	Class B: Freq.(MHz) QP(dBμV) Ave.(dBμV) 0.15 - 0.5 66 - 56 56 - 46 0.5 - 5 56 46 5 - 30 60 50		Pass
15.205 / 209 **6.2.1 / 6.3**	General Field Strength Limits (Restricted Bands and Radiated Emission Limits)	Shall not exceed the limits specified in FCC 15.209, or RSS-210, Table 3.	Radiated (30M -1GHz)	Pass
			Radiated (1G –25GHz)	Pass

	Receive mode (RX):			
15.207 **7.4**	AC Wireline Conducted Emissions 150 kHz – 30 MHz	Class B: Freq.(MHz) QP(dBμV) Ave.(dBμV) 0.15 - 0.5 66 - 56 56 - 46 0.5 - 5 56 46 5 - 30 60 50	Conducted	Pass
15.205 / 209 **7.3**	General Field Strength Limits (Restricted Bands and Radiated Emission Limits)	Shall not exceed the limits specified in FCC 15.209, or RSS-210, Table 3.	Radiated (30M -1GHz)	Pass
			Radiated (1G –25GHz)	Pass

	Other requirements		Result
15.247(b)(4)(i) –	Antenna gain	Peak gain of the device : 2.16 dBi	N/A
15.203 6.2.2(o)(e2)	Unique antenna connector	The device employs an unique electronic connector. Refer to "Confidential_BIOS_Lock" exhibit.	complies

C. Operation Mode of EUT

All tests were performed using the "BlueTest version 1.4" and "BlueChat version 2.2".

Hopping channels

The applying wireless card is designed to the Bluetooth Standard. The lowest hopping frequency is 2402MHz, and the highest one 2480MHz. Total 79 hopping channels are used with each 1MHz of channel spacing.

Ch.	Operation Frequency [GHz]
1	2.402
2	2.403
3	2.404
4	2.405
5	2.406
6	2.407
7	2.408
8	2.409
9	2.410
10	2.411
11	2.412
12	2.413
13	2.414
14	2.415
15	2.416
16	2.417
17	2.418
18	2.419
19	2.420
20	2.421

Ch.	Operation Frequency [GHz]
21	2.422
22	2.423
23	2.424
24	2.425
25	2.426
26	2.427
27	2.428
28	2.429
29	2.430
30	2.431
31	2.432
32	2.433
33	2.434
34	2.435
35	2.436
36	2.437
37	2.438
38	2.439
39	2.440
40	2.441

Ch.	Operation Frequency [GHz]
41	2.442
42	2.443
43	2.444
44	2.445
45	2.446
46	2.447
47	2.448
48	2.449
49	2.450
50	2.451
51	2.452
52	2.453
53	2.454
54	2.455
55	2.456
56	2.457
57	2.458
58	2.459
59	2.460
60	2.461

Ch.	Operation Frequency [GHz]
61	2.462
62	2.463
63	2.464
64	2.465
65	2.466
66	2.467
67	2.468
68	2.469
69	2.470
70	2.471
71	2.472
72	2.473
73	2.474
74	2.475
75	2.476
76	2.477
77	2.478
78	2.479
79	2.480

Test Frequencies (Section 15.31m)

In line with the Section 15.31(m) of Public Notice DA 00-705 dated March/30/2000, some measurements are performed at the highest, middle, and lowest available channels with the hopping function disabled. (i.e. at **2402MHz, 2441MHz** and **2480MHz**)

Unless otherwise specified the above condition, the test was performed while EUT had its hopping function enabled.

D. Test Instruments

Table-D List of Measuring Instruments

Description	Model	Serial Number	Calibration Date	Calibration Interval
Computer	IBM 6868-30J	97-901X3	N/A	N/A
Computer	IBM 6589-13J	97-15613	N/A	N/A
Spectrum Analyzer (100Hz-1.5GHz)	HP 85680B	2601A02634	08/28/02	1 year
Spectrum Analyzer (100Hz-1.5GHz)	HP 85680B	2841A04242	10/30/02	1 year
Spectrum Analyzer (100Hz-1.5GHz)	HP 85680B	2732A03651	02/28/03	1 year
Spectrum Analyzer Display	HP 85662A	2542A12308	08/28/02	1 year
Spectrum Analyzer Display	HP 85662A	2816A16827	10/30/02	1 year
Spectrum Analyzer Display	HP 85662A	2648A15255	02/28/03	1 year
Quasi-Peak Adapter	HP 85650A	2043A00062	08/28/02	1 year
Quasi-Peak Adapter	HP 85650A	2521A00968	02/28/03	1 year
Quasi-Peak Adapter	HP 85650A	2811A01126	10/30/02	1 year
Amplifier (100KHz - 1.3GHz)				
- for 30-200MHz	HP 8447D	2805A02919	04/14/03	1 year
- for 200-1000MHz	HP 8447D	2727A05190	04/14/03	1 year
Amplifier (1GHz - 26.5GHz)	HP 8449B	3008A00582	06/11/03	1 year
Spectrum Analyzer EMI Test Receiver	R&S ESI26	836119/003	05/01/03	1 year
Receiver (9kHz-30MHz)	R&S ESH3	891806/012	10/07/02	1 year
Receiver (20MHz-1.3GHz)	R&S ESVP	892111/030	03/17/03	1 year
Biconical Antenna (30-200MHz)	EMCO 3108	2536	04/23/03	1 year
Log-Periodic Antenna (200-1000MHz)	EMCO 3146	2849	04/23/03	1 year
Horn Antenna (1- 18GHz)	EMCO 3115	9903-5774	07/17/03	1 year
Horn Antenna (3.95- 5.85GHz)	EMCO 3160-5	1099	07/17/03	1 year
Horn Antenna (5.85- 8.20GHz)	EMCO 3160-6	9712-1044	07/17/03	1 year
Horn Antenna (18- 26.5GHz)	EMCO 3160-9	0004-1202	07/17/03	1 year
LISN	EMCO 3825/2	1426	09/01/02	1 year
Switch/control unit	HP 3488A	2719A17226	N/A	N/A
		2719A17228	N/A	N/A
Plotter	HP 7550A	2631A33619	N/A	N/A
SF106 cables:	Length:			
- Horn Ant <=> RF Amp.	6 m	- EM206SCO	09/05/02	1 year
- RF Amp.<=>Spectrum Analyzer	16m	- GEM0101	09/05/02	1 year
N-Coax cables:				
- Bi-coni Ant <=> 10m Cable	9 m	- EM103L01	04/14/03	1 year
- 10m Cable <=> Shield Panel	10 m	- EM103L02	04/14/03	1 year
- Shield Panel <=> RF Amp	7 m	- EM103L03	04/14/03	1 year
- RF Amp <=> Power Splitter	0.5m	- EM103L04	04/14/03	1 year
- Log-peri Ant <=> 10m Cable	9 m	- EM103H01	04/14/03	1 year
- 10m Cable <=> Shield Panel	10 m	- EM103H02	04/14/03	1 year
- Shield Panel <=> RF Amp	7 m	- EM103H03	04/14/03	1 year

- RF Amp <=> Power Splitter	0.5m	- EM103H04	04/14/03	1 year
Coax cables:				
- Lisn-L <=> SW/Con.unit (SW100)	4 m	- EMIC-L	04/14/03	1 year
- Lisn-N <=> SW/Con.unit (SW101)	4 m	- EMIC-N	04/14/03	1 year
- SW/Con.unit <=> RCVR (Input)	1 m	- EMIC-R	04/14/03	1 year
- SW/Con.unit<=> Spe Ana.(Signal In)	1 m	- EMIC-S	04/14/03	1 year
- Power Splitter <=> SW/Con.unit (SW110)	1 m	- EM103L05	04/14/03	1 year
- Power Splitter <=> SW/Con.unit (SW300)	1 m	- EM103L06	04/14/03	1 year
- Power Splitter <=> SW/Con.unit (SW100)	1 m	- EM103H05	04/14/03	1 year
- Power Splitter <=> SW/Con.unit (SW301)	1 m	- EM103H06	04/14/03	1 year
- SW/Con.unit <=> Receiver (Input)	2 m	- EM1RCV	04/14/03	1 year
- SW/Con.unit <=> Spe Ana.(Signal In) for 30- 200MHz	2 m	- EM1SPL	04/14/03	1 year
- SW/Con.unit <=> Spe Ana.(Signal In) for 200-1000MHz	2 m	- EM1SPH	04/14/03	1 year

Notes.

- The above equipment calibration is traceable to National standards.
- HP: Hewlett Packard, R&S: Rohde & Schwarz

E. Measurement Uncertainty

Uncertainties of the both, the Yamato EMI radiated test facilities (EMI chambers, #1 and #2) and the Yamato EMI conducted test facility are derived with the NIS 81 " Treatment of uncertainty in EMC measurements" 1994.

Estimated site uncertainty values are as follows.

EMI chamber #1 : 4.39dB
EMI chamber #2 : 4.40dB
EMI conducted measurement system : 2.4dB

Detail should be referred to "Treatment of Uncertainty, Calculations and Policy" report, document number TCR 10-0015.

F. Temperature and Humidity

The temperature is controlled within range of 17° to 28°.
The relative humidity is controlled within range of 40% to 70%.

G. Related Submittal(s)/Grant(s)/Notes

The host unit with full peripheral devices including the applying modular as an unintentional radiator is classified as a Digital Device under the FCC Part 15 Subpart B or the Industry Canada Class B Emission Compliance (ICES-003), and subject to DoC.

1. Carrier Frequency Separation

[FCC 15.247(a)(1), RSS-210 6.2.2(o)(a1)]

1.1 Test Procedure

- The carrier frequency separation was measured with a spectrum analyzer connected to the antenna terminal, while EUT had its hopping function enabled.
- The spectrum analyzer was set to :
  Span = 3 MHz (wide enough to capture the peaks of two adjacent channels),
  Resolution Bandwidth (RBW) = 30 kHz (1% of the span or more),
  Video Bandwidth (VBW) = 30 kHz (= RBW or more), Sweep = auto,
  Detector function = peak, Trace = max hold
- After the trace being stable, the reading value between the peaks of the adjacent channels using the marker-delta function was recorded as the measurement results.

1.2 Test Instruments and Measurement Setup

Table 1-1 : Test Instruments

Description	**Model**	**Serial Number**
Spectrum Analyzer EMI Test Receiver	R&S ESI26	836119/003
Coax cables: - Spectrum Analizer <=> EUT	Length: Loss: 110 cm 1.3 dB	

Notes: - R&S : Rohde & Schwarz

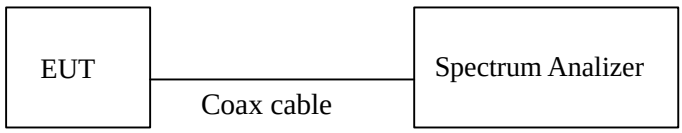


Figure 1: Measurement setup for the carrier frequency separation

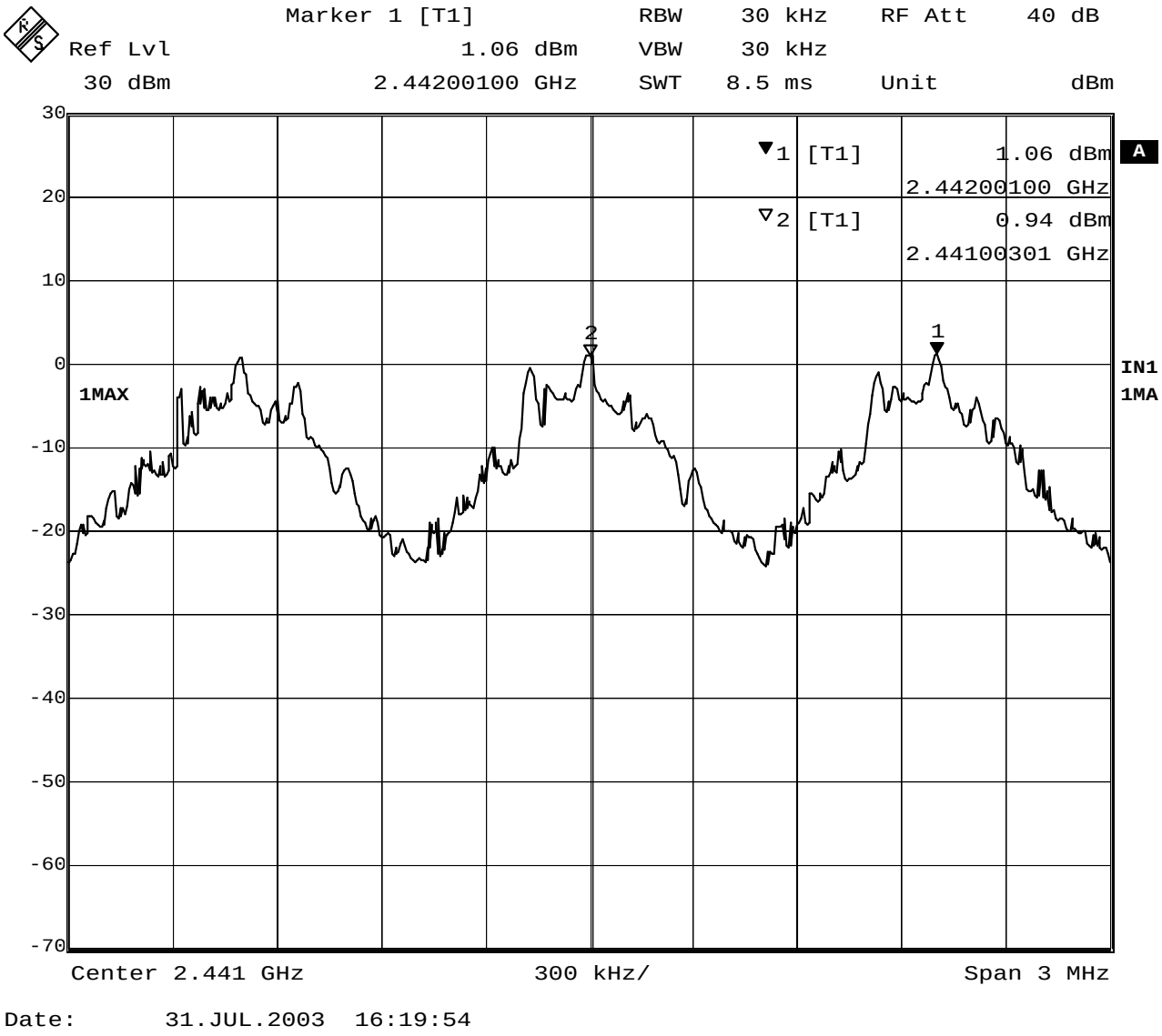
1.3 Measurement Results

Test Date: July 31, 2003

Table 1-2. Carrier Frequency Separation, TX hopping mode

Frequency of marker #1 (MHz)	Frequency of marker #2 (MHz)	Carrier Frequency Separation (KHz)	Note
2442.00	2441.00	1000	Min. 25 kHz

1.4 Trace Data



Plot 1-1. Carrier Frequency Separation

2. Number of Hopping Frequencies

[FCC 15.247(a)(1)(iii), RSS-210 6.2.2(o)(a3)]

2.1 Test Procedure

- The number of hopping frequencies was measured with a spectrum analyzer connected to the antenna terminal, while EUT had its hopping function enabled.
- To get higher resolution, four frequency ranges within the 2400 - 2483.5 MHz FH band were examined.
- The spectrum analyzer was set to :

Frequency range 1: Start = 2389.5 MHz, Stop = 2414.5 MHz
2: Start = 2414.5 MHz, Stop = 2439.5 MHz
3: Start = 2439.5 MHz, Stop = 2464.5 MHz
4: Start = 2464.5 MHz, Stop = 2489.5 MHz

RBW ≥ 1% of the span, VBW ≥ RBW, Sweep = auto, Detector function = peak, Trace = max hold

2.2 Test Instruments and Measurement Setup

Same as the Chapter 1(Table 1-1 & Figure 1).

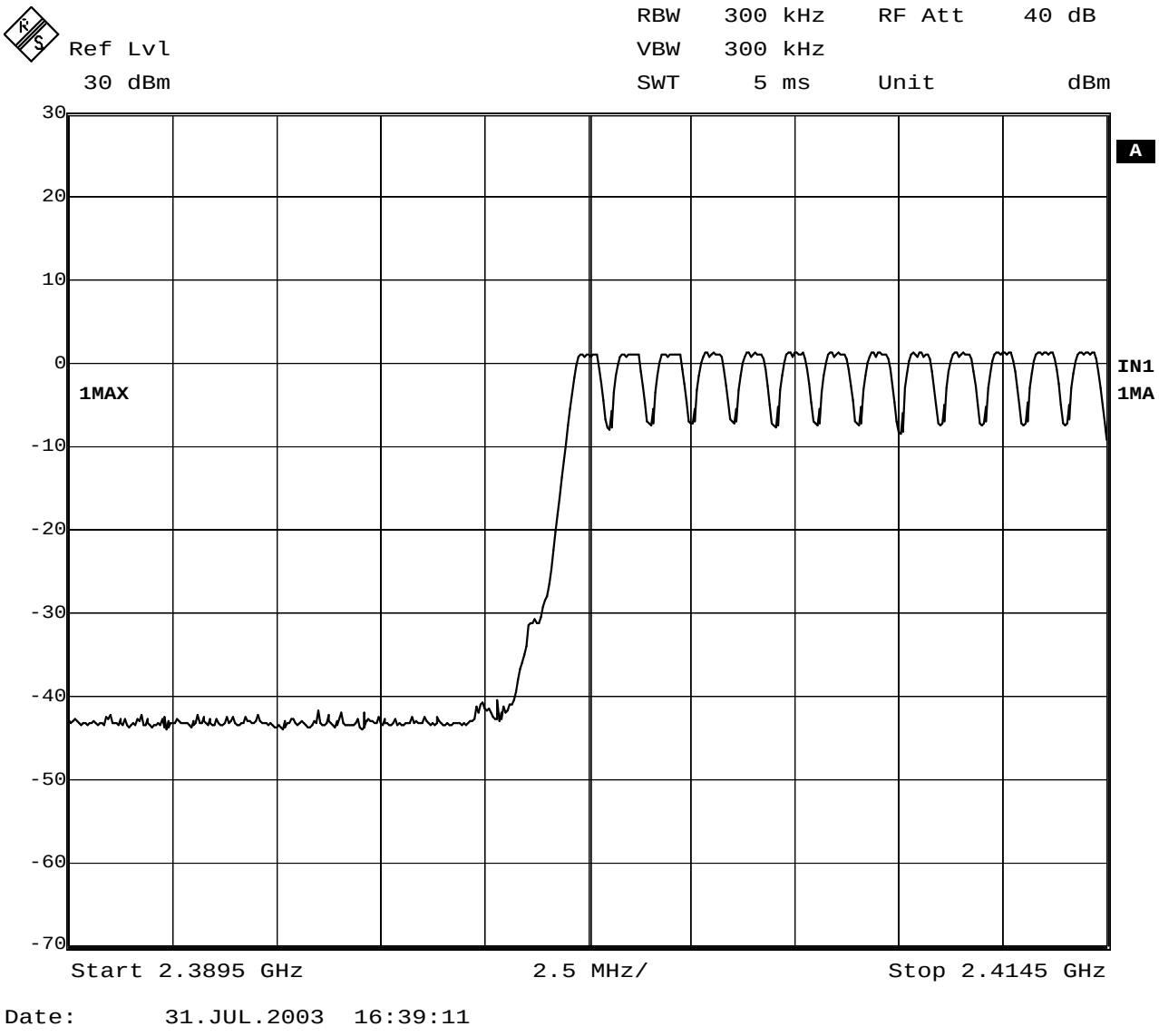
2.3 Measurement Results

Test Date: July 31, 2003

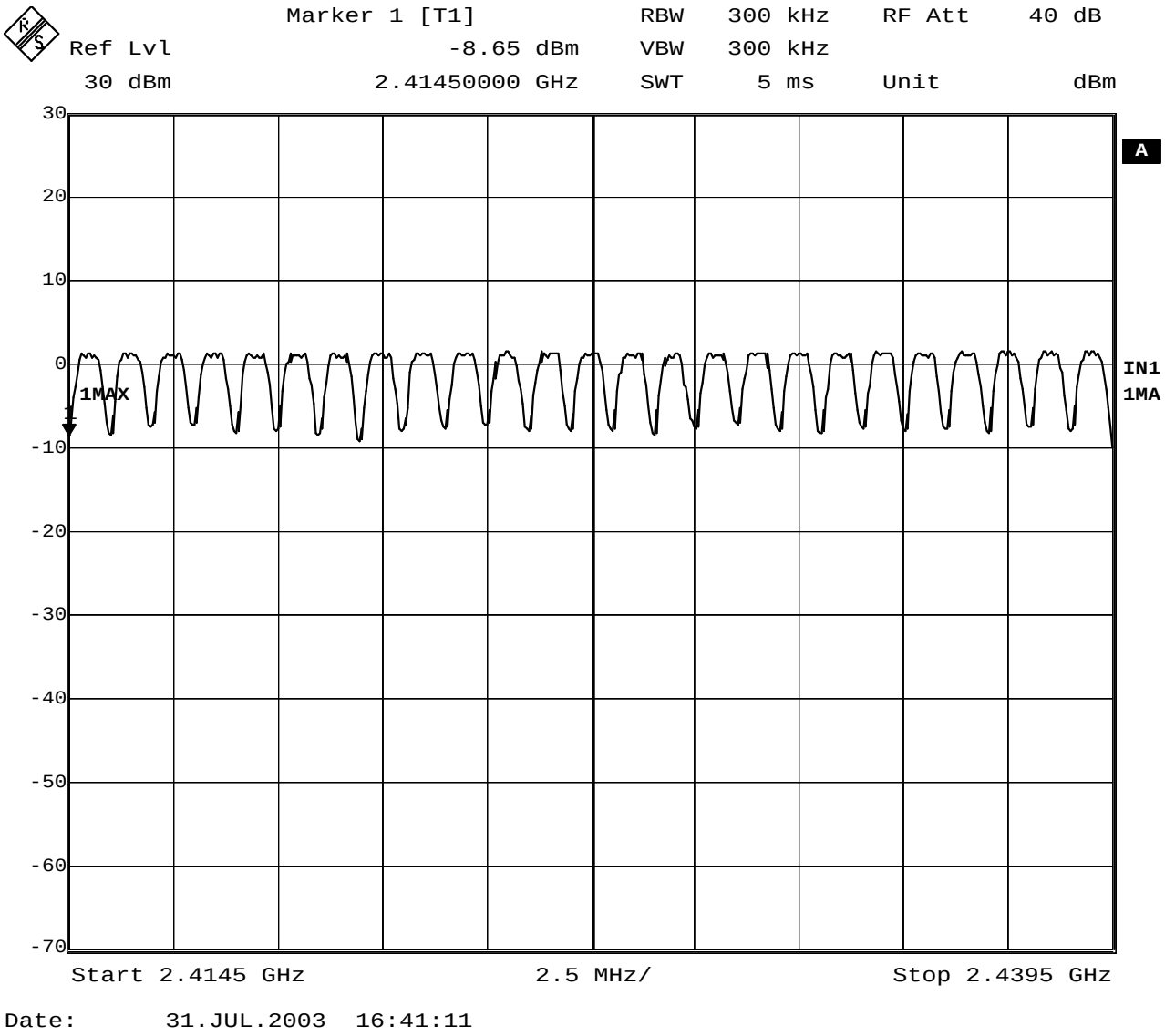
Table 2. Number of Hopping Frequencies, TX hopping mode

Total number of Hopping Channels	Note
79	at least 15 non-overlapping channels

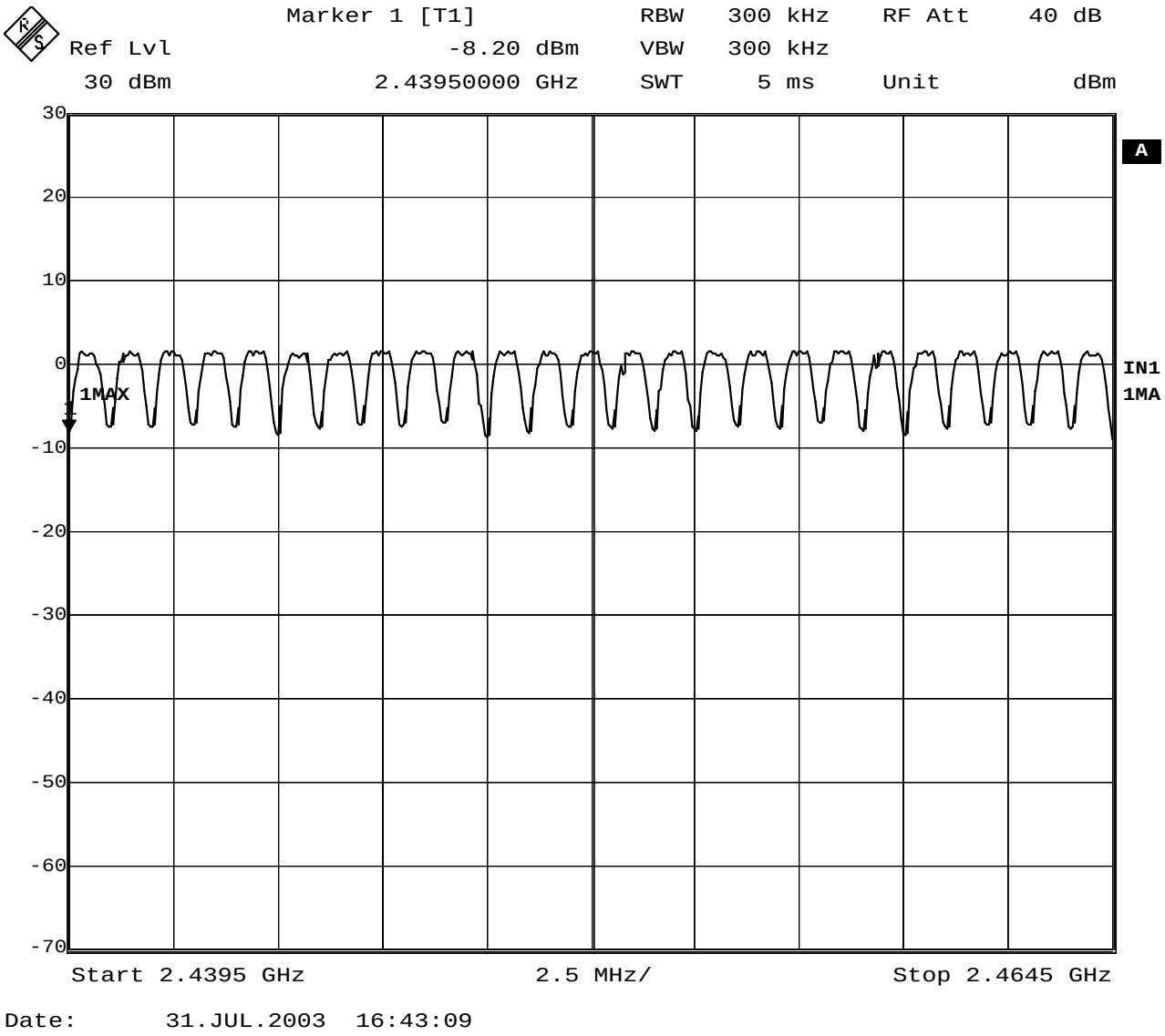
2.4 Trace Data



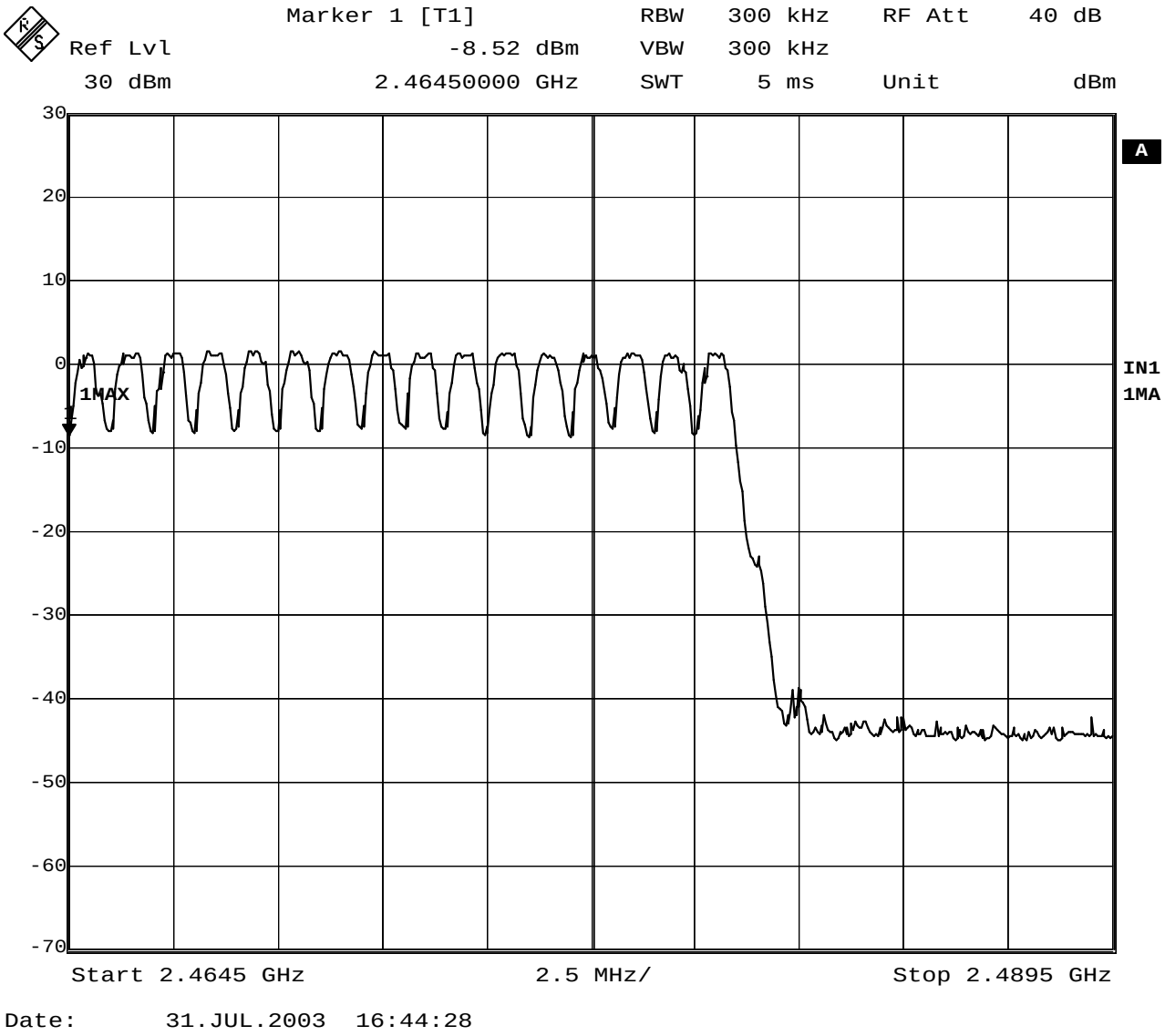
Plot 2-1. Number of Hopping Frequencies (range 1)



Plot 2-2. Number of Hopping Frequencies (range 2)



Plot 2-3. Number of Hopping Frequencies (range 3)



Plot 2-4. Number of Hopping Frequencies (range 4)

3. Occupied Bandwidth (20 dB Bandwidth)
[RSS-210 5.9.1]

3.1 Test Procedure

- The bandwidth at 20 dB below the highest inband spectral density was measured with a spectrum analyzer connected to the antenna terminal, while EUT had its hopping function disabled at the highest, middle and the lowest available channels.
- The spectrum analyzer was set to :
  - Center frequency = the highest, middle and the lowest channels,
  - Span : approximately 2 or 3 times of the 20 dB bandwidth = 2 MHz
  - RBW : 1% of the 20 dB bandwidth or more = 10 kHz
  - VBW : equal to RBW or more = 30 kHz
  - Sweep = auto, Detector function = peak, Trace = max hold
- After the trace being stable. Use the marker-to-peak function to set the marker to the peak of the emission. Use the marker-delta function to measure 20 dB down one side of the emission. Reset the marker-delta function, and move the marker to the other side of the emission, until it is (as close as possible to) even with the reference marker level. The marker-delta reading at this point is the 20 dB bandwidth of the emission.

3.2 Test Instruments and Measurement Setup

Same as the Chapter 1(Table 1-1 & Figure 1).

3.3 Measurement Results

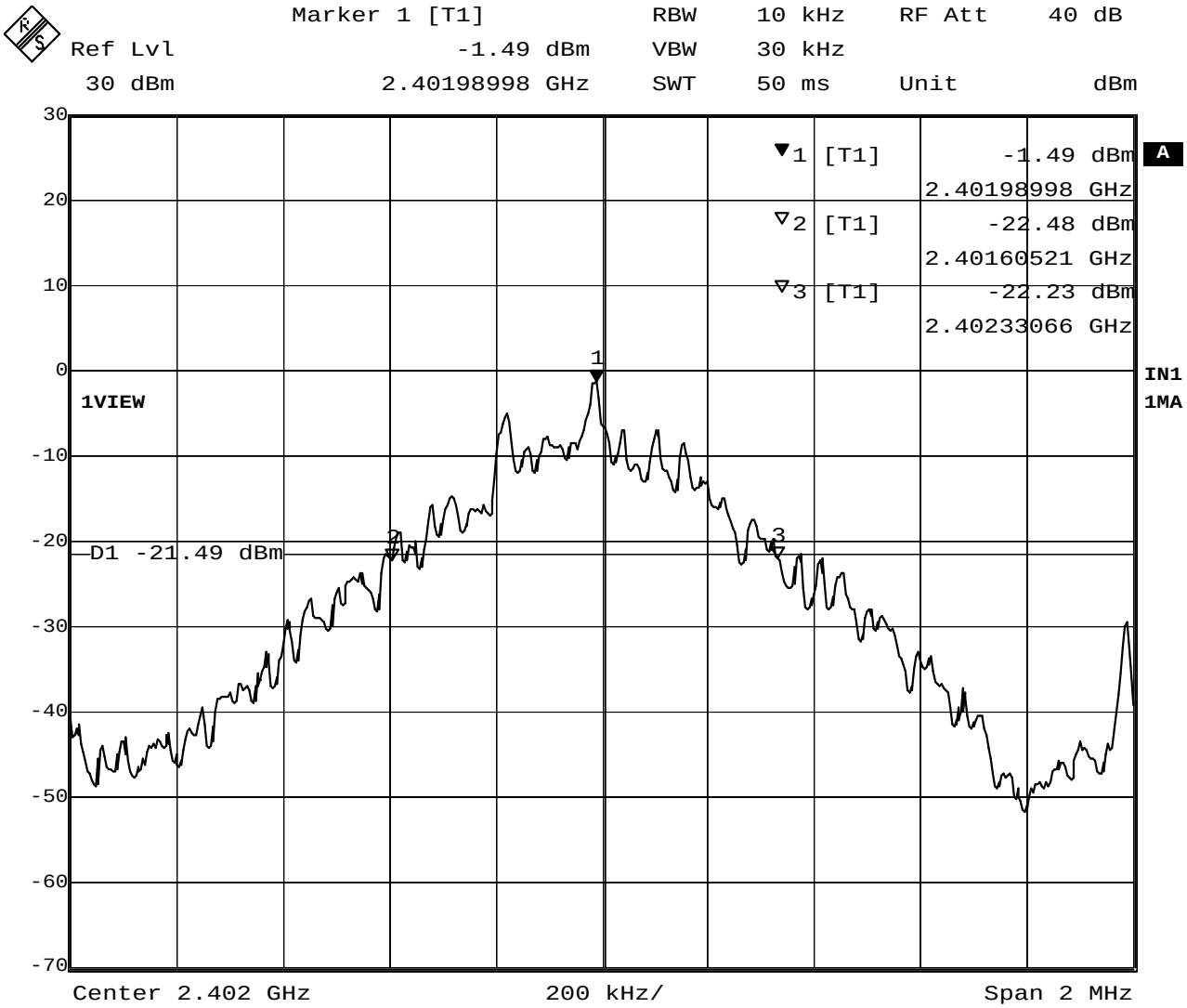
Test Date: July 31, 2003

Table 3. 20dB Bandwidth

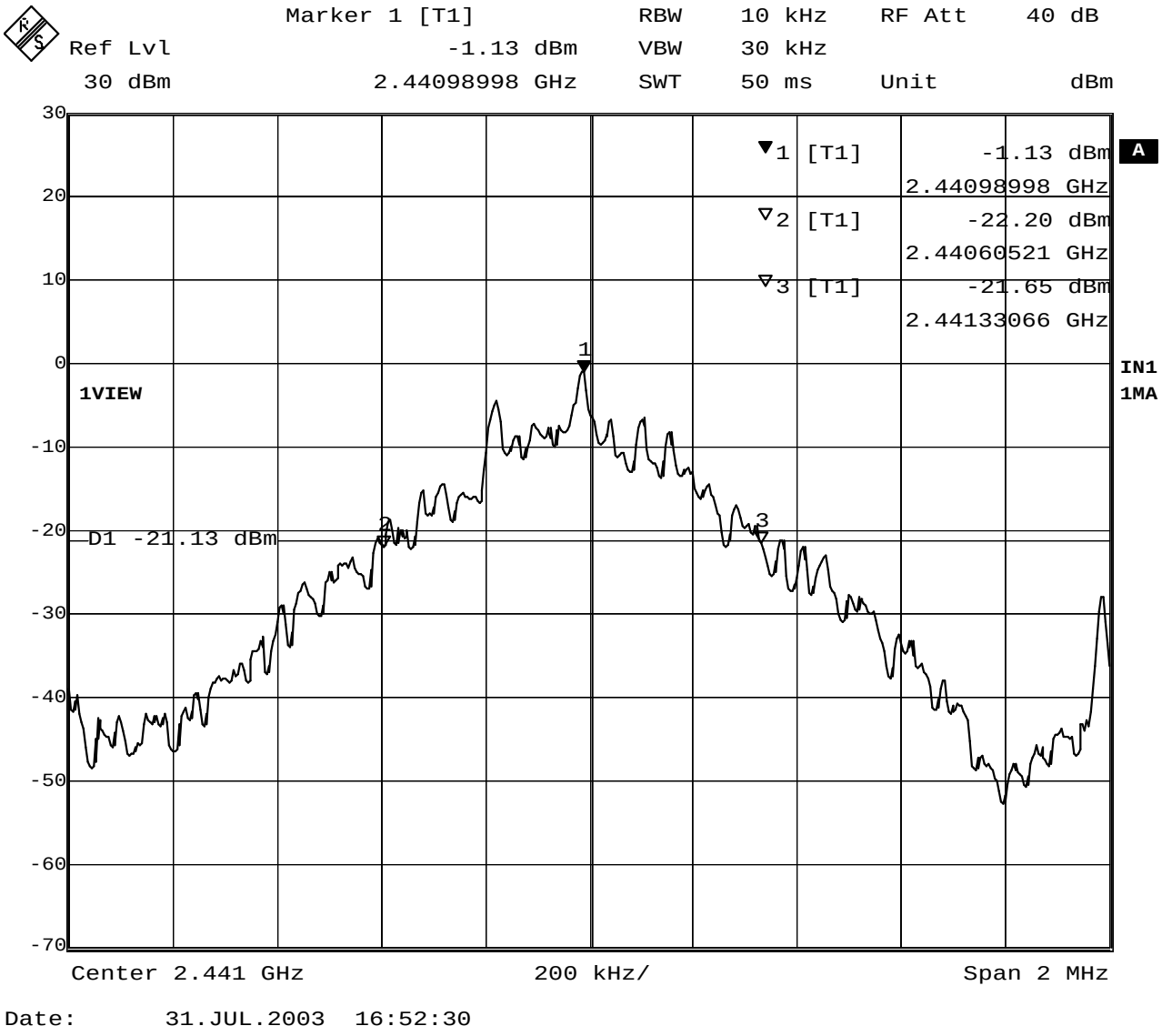
	FCC		IC	
	N/A	N/A	Measured 20 dB Bandwidth (MHz)	Limit
Tx at the lowest ch. (2402 MHz)*1			0.725	N/A
Tx at the middle ch.(2441 MHz)*1			0.725	
Tx at the highest ch.(2480 MHz)*1			0.725	
Inquiry			0.625	
Paging			0.675	

*1 : The measurement was performed at the highest, middle and lowest available channels.

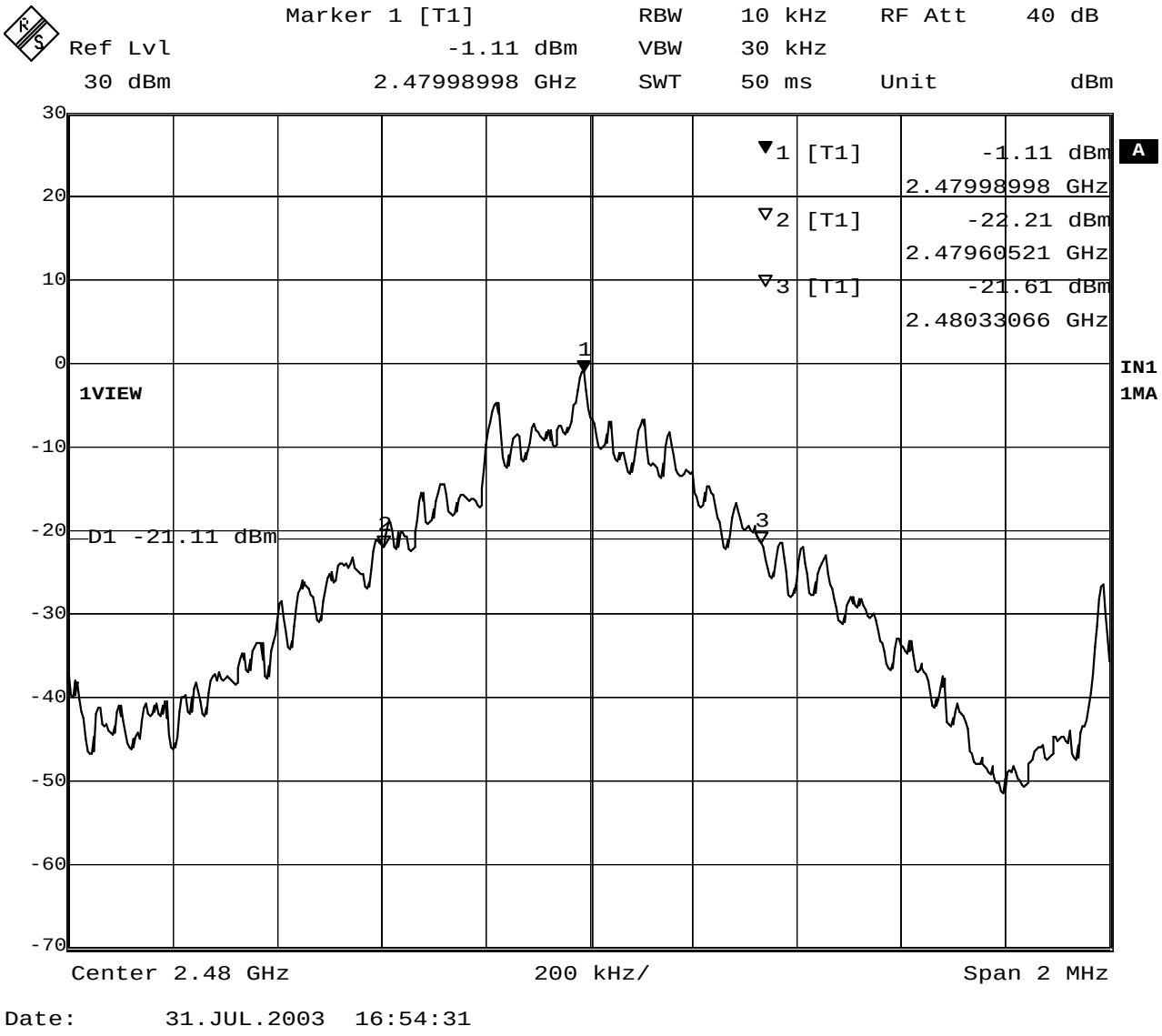
3.4 Trace Data



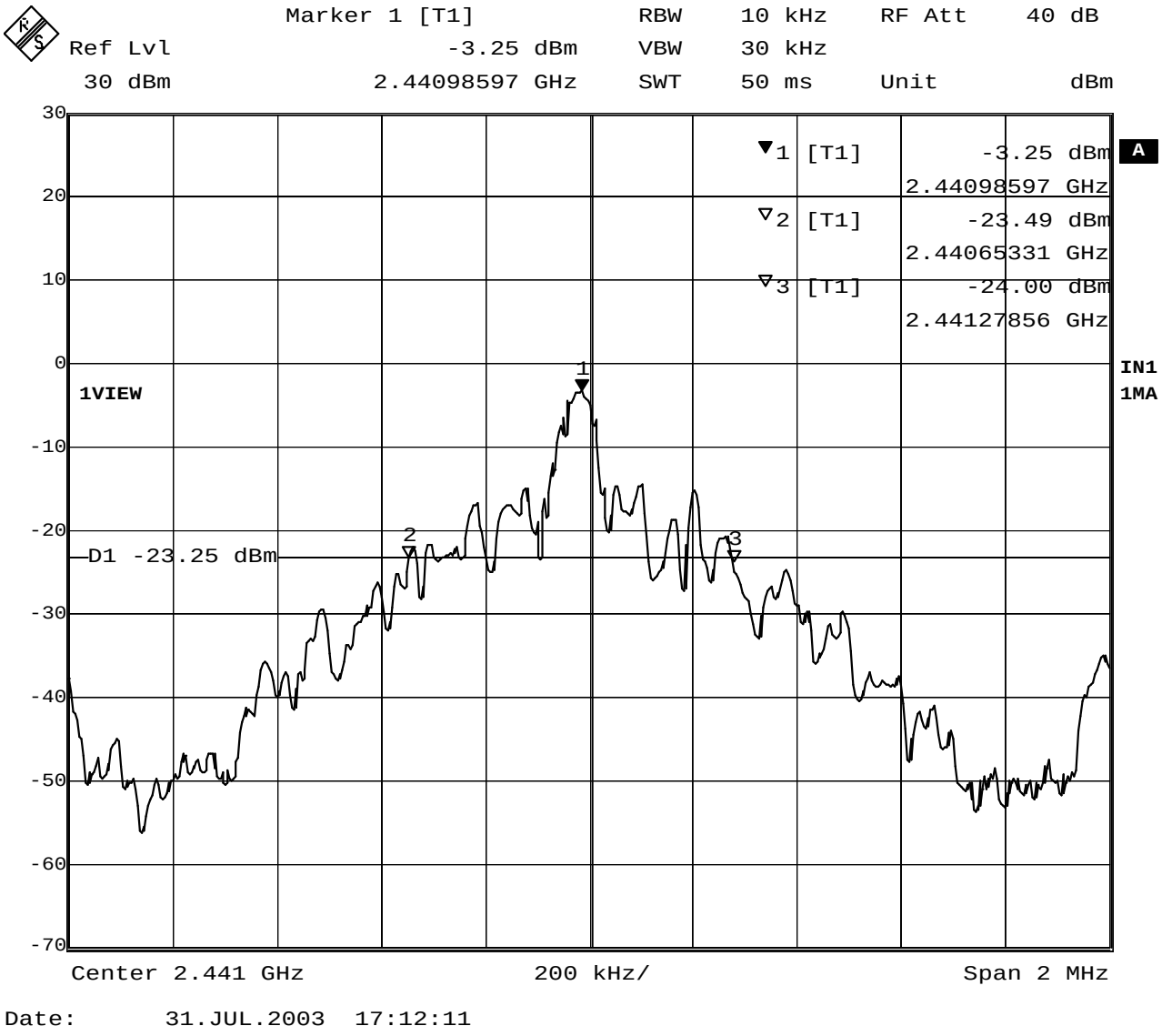
Plot 3-1. 20 dB Bandwidth (TX on 2402MHz)



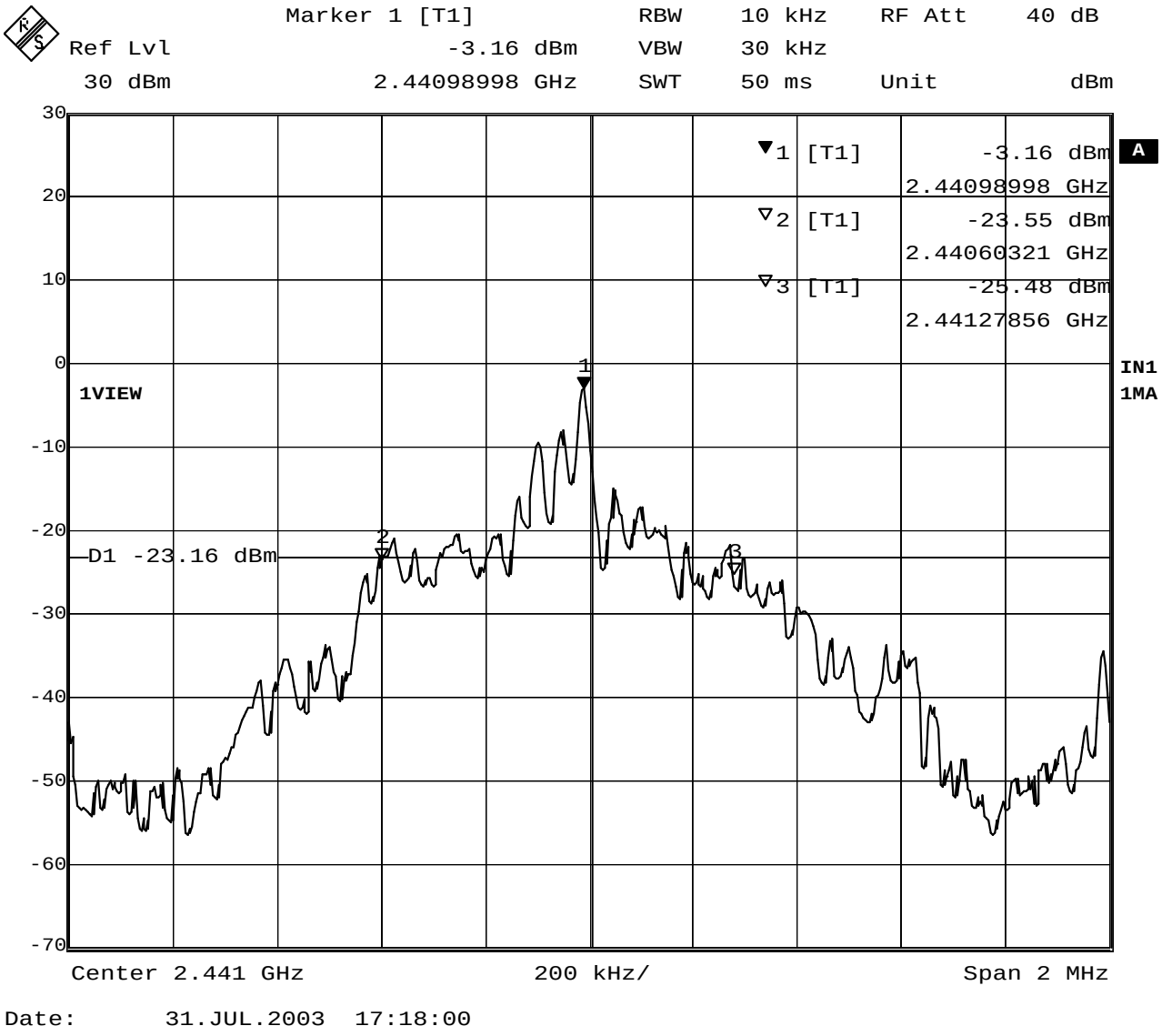
Plot 3-2. 20 dB Bandwidth (TX on 2441MHz)



Plot 3-3. 20 dB Bandwidth (TX on 2480MHz)



Plot 3-4. 20 dB Bandwidth (Inquiry)



Plot 3-5. 20 dB Bandwidth (Paging)

4. Time of Occupancy (Dwell Time)

[FCC 15.247(a)(1)(iii)/15.247(f), RSS-210 6.2.2(o)(a3)/6.2.2(o)(c2)(6)]

4.1 Test Procedure

- The dwell time was measured with a spectrum analyzer connected to the antenna terminal, while EUT had its hopping function enabled.

- The spectrum analyzer was set to :
  Center Frequency: 2441MHz (for Inquiry / Data Transmission), 2442MHz (for Paging)
  RBW = 500 kHz, VBW = 500 kHz (= RBW or more), Span = zero,
  Detector function = peak, Trace = max hold,
  Sweep : Inquiry ; 300 μs for Burst duration plots, 100 ms for Repetition rate plots
  Paging ; 300 μs for Burst duration plots, 100 ms for Repetition rate plots
  Data transmission ; 1 ms for Burst duration plots, 500 ms for Repetition rate plots

4.2 Test Instruments and Measurement Setup

Same as the Chapter 1(Table 1-1 & Figure 1).

4.3 Measurement Results

Test Date: July 31, 2003

Table 4. Time of Occupancy (Dwell Time)

Hopping phase	Burst duration in one hop (μs) *1	Repetition rate on one channel *2	Dwell Time (mS) *1 × *2	Limit
Inquiry	149.70	1280	191.62	less than 400 mS in 12.8[*3] seconds period
Paging	149.10	640	95.42	
Data transmission	452.91	316	143.12	less than 400 mS in 31.6[*4] seconds period

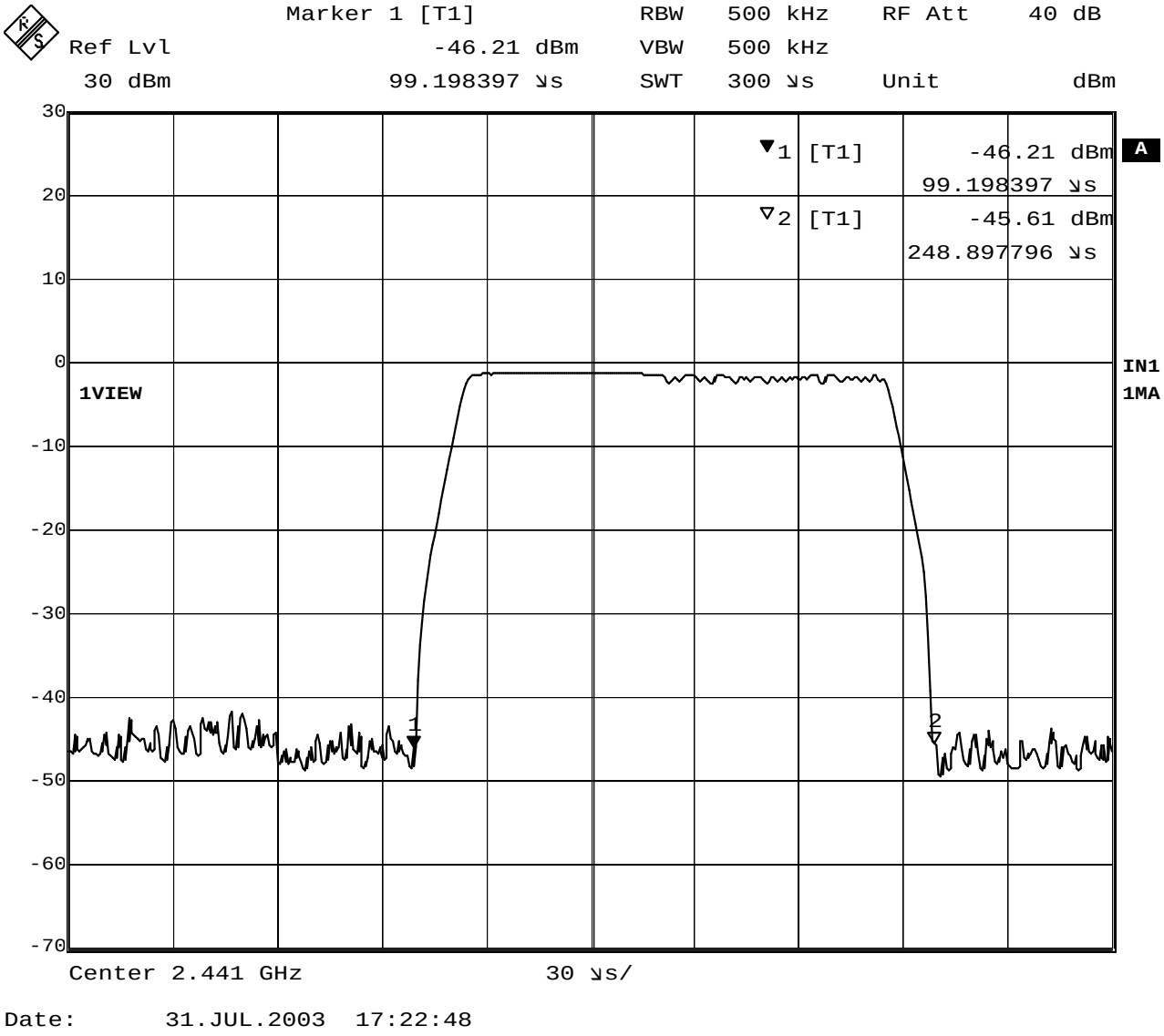
***1 :** attached measurement plot

***2** : - (number of hops in measurement plot 4-2=10) × 12800 ms / 100 ms for Inquiry
- (number of hops in measurement plot 4-4 = 5) × 12800 ms / 100 ms for Paging
- (number of hops in measurement plot 4-6 = 5) × 31600 ms / 500 ms for Data transmission

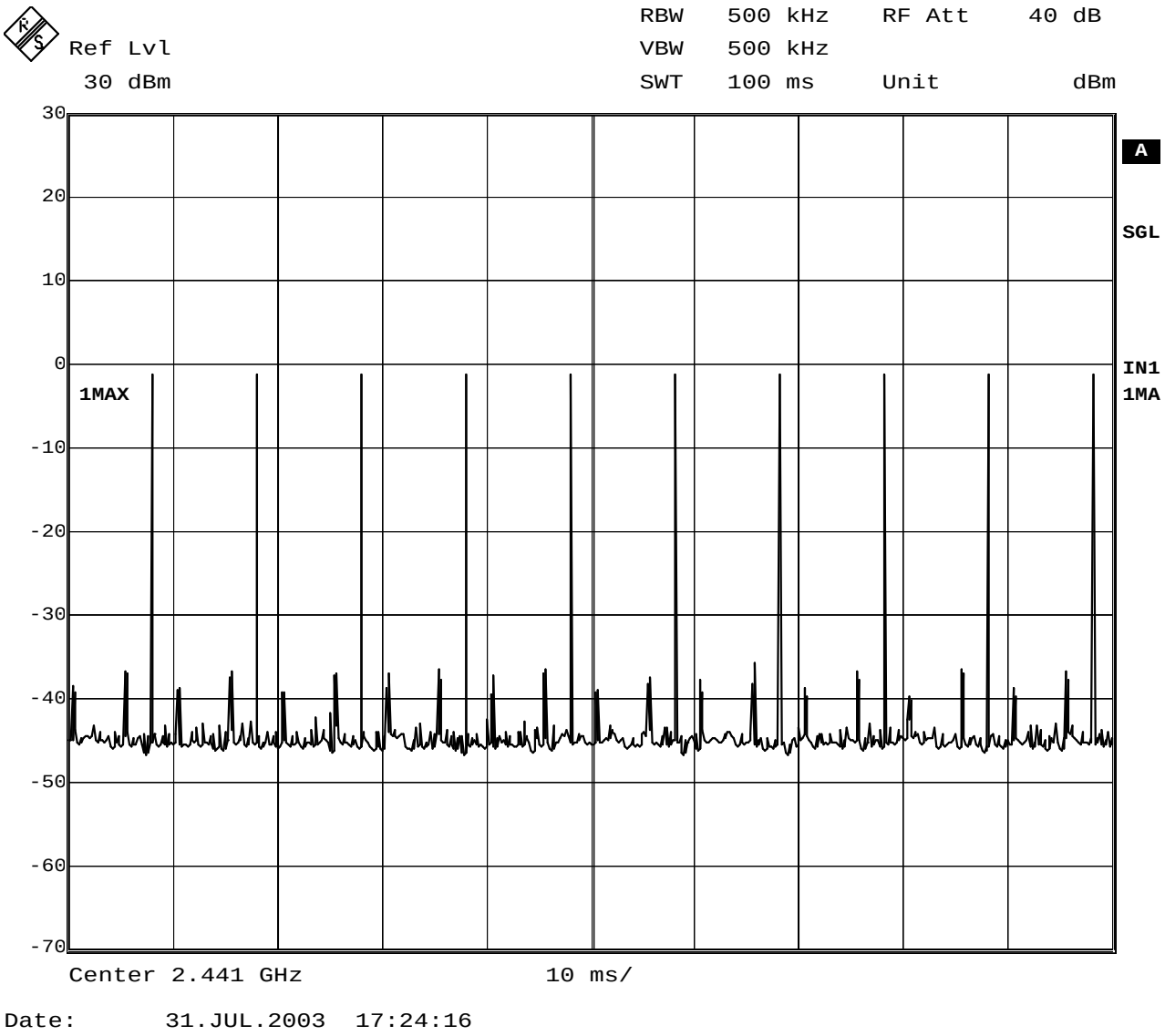
***3** : 32 hops (Bluetooth Standard) × 0.4sec

***4** : 79 hops (Bluetooth Standard) × 0.4sec

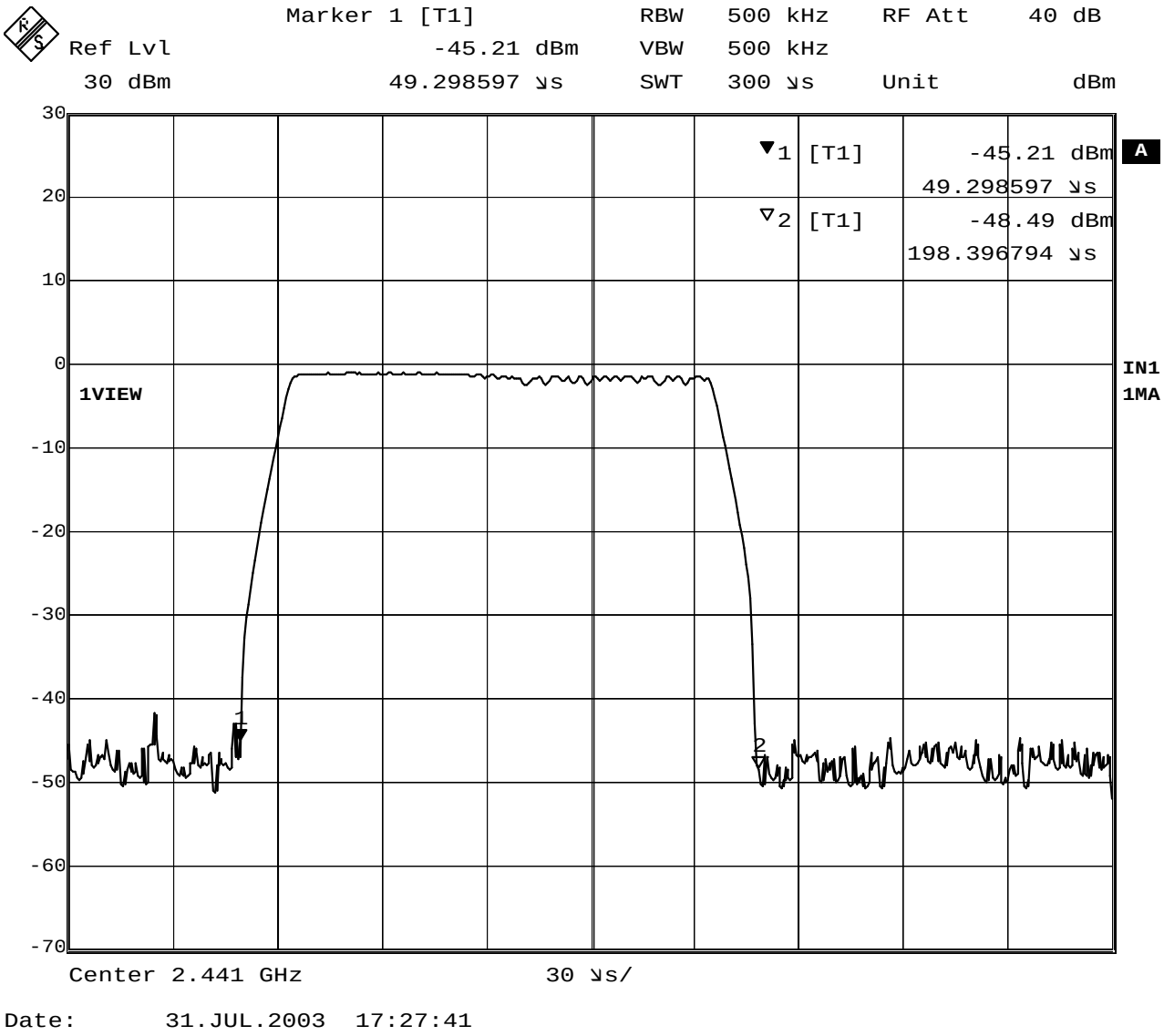
4.4 Trace Data



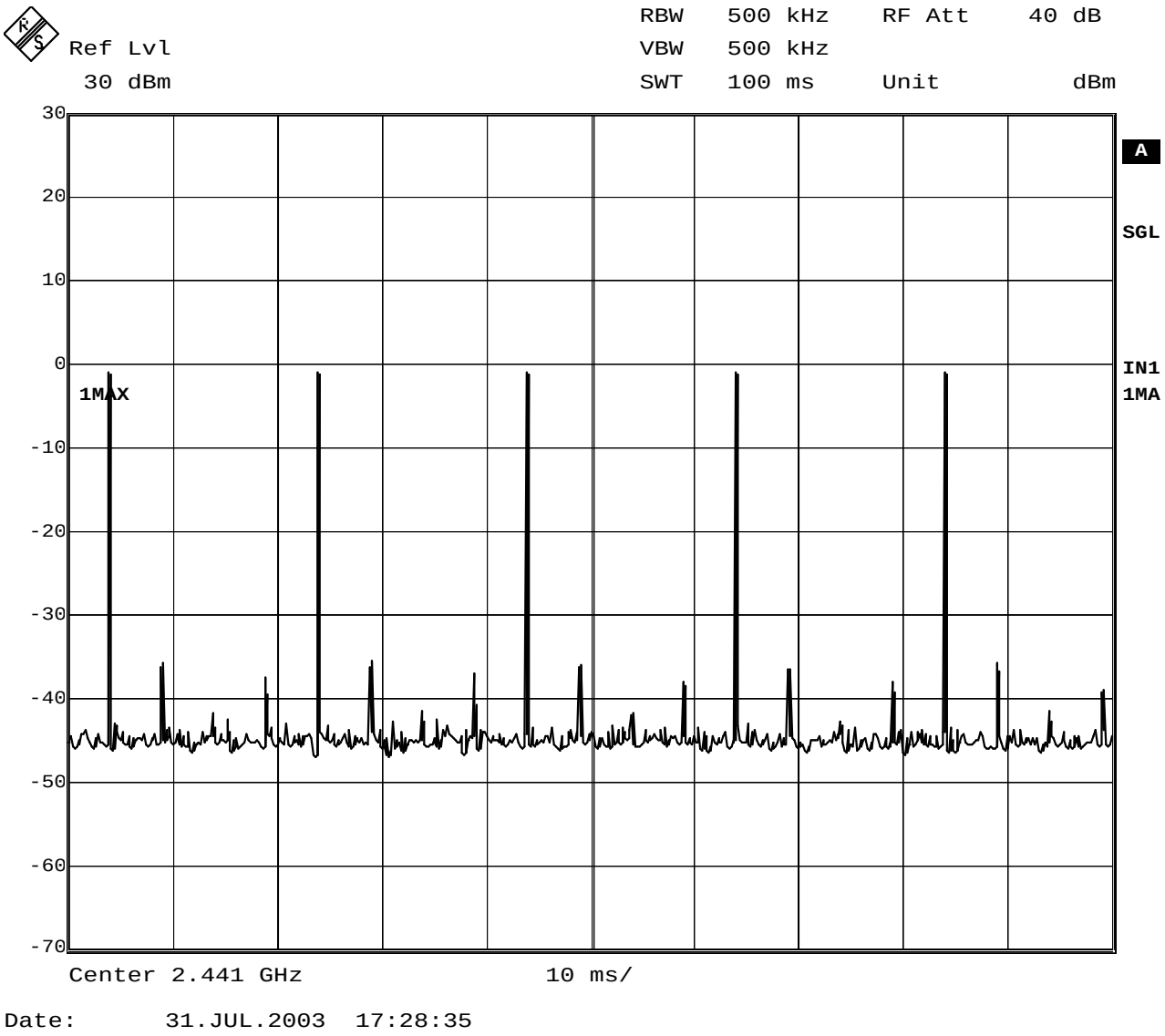
Plot 4-1. Time of Occupancy (Inquiry, Burst duration)



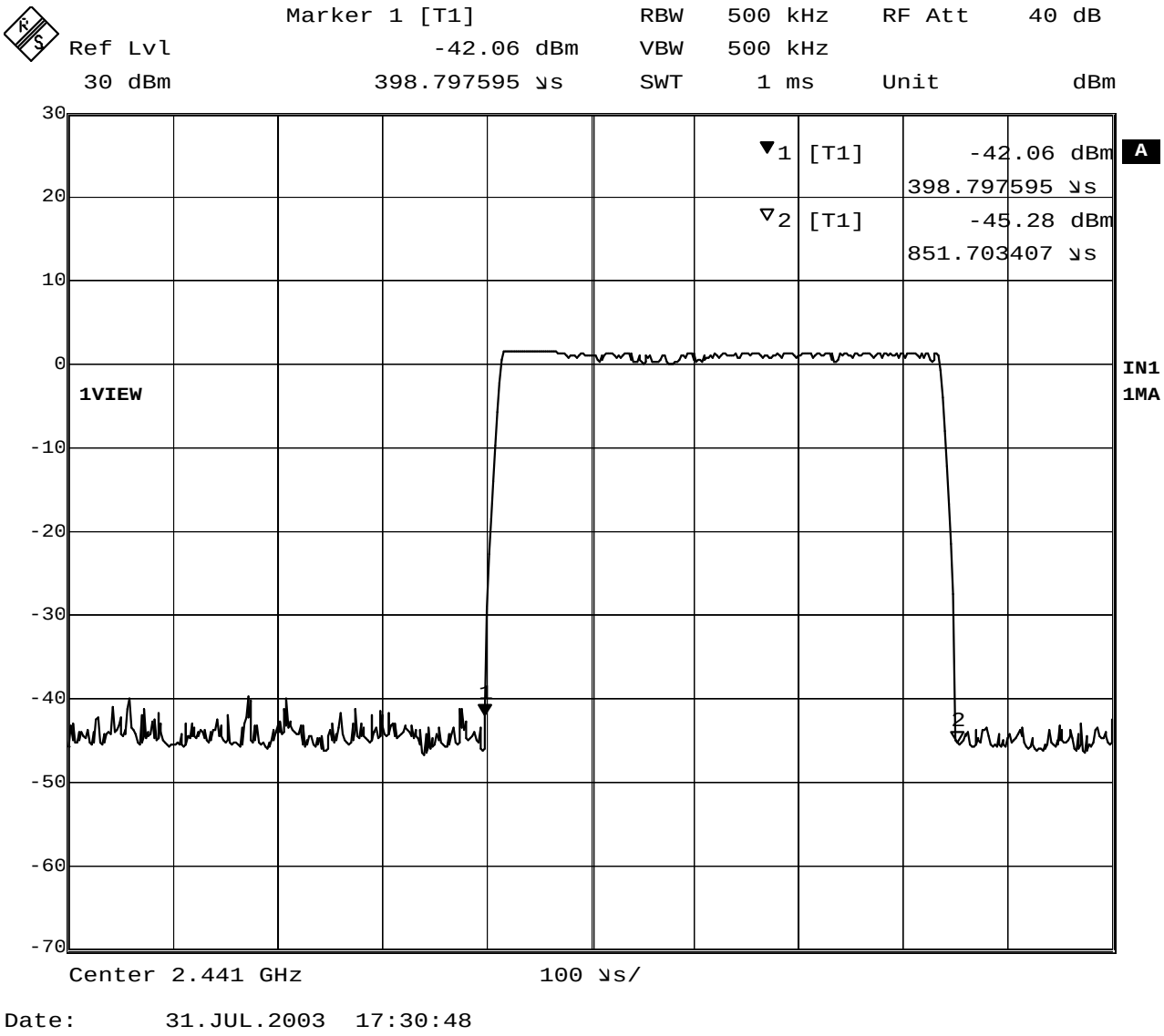
Plot 4-2. Time of Occupancy (Inquiry, Repetition rate)



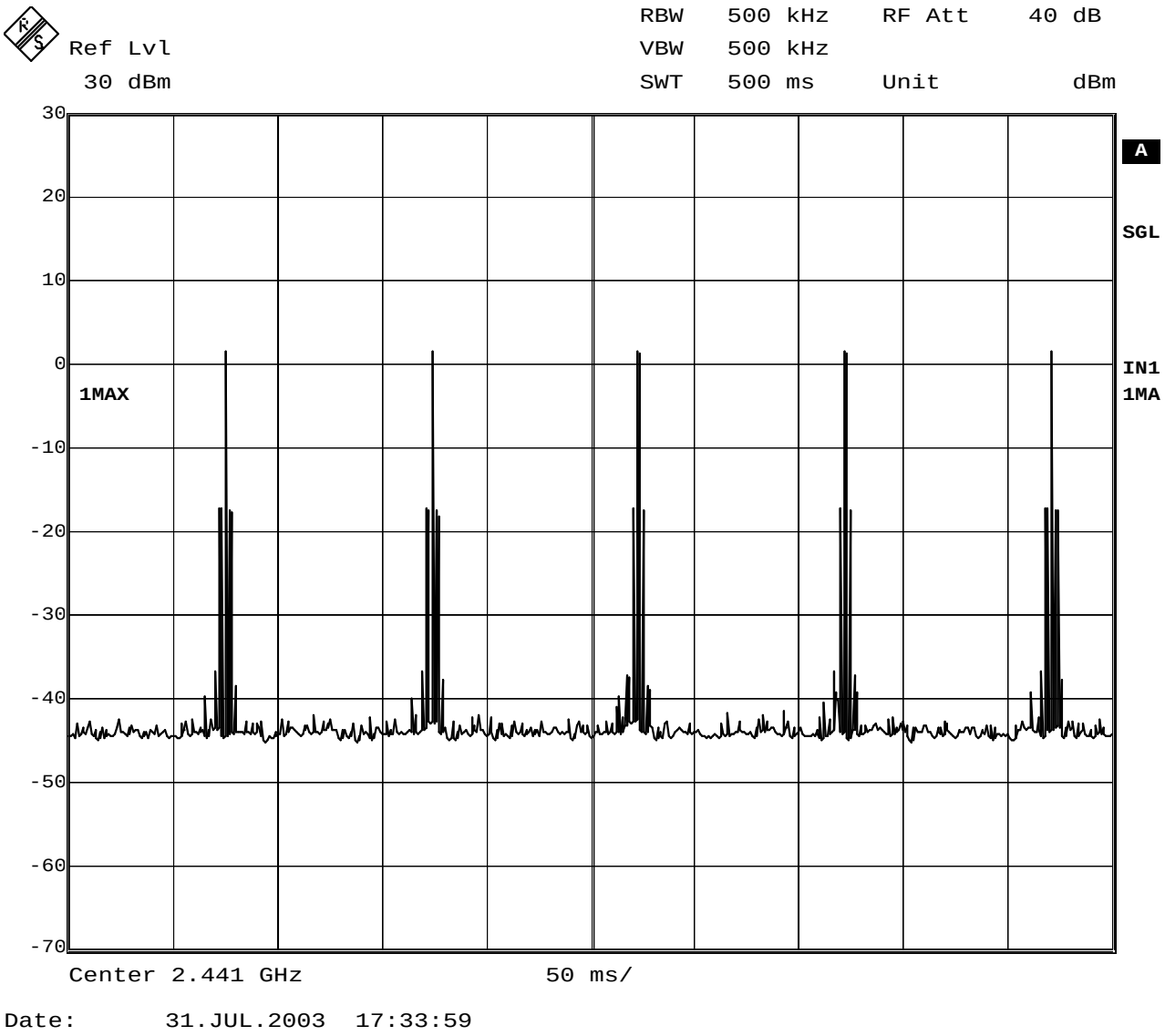
Plot 4-3. Time of Occupancy (Paging, Burst duration)



Plot 4-4. Time of Occupancy (Paging, Repetition rate)



Plot 4-5. Time of Occupancy (Data transmission, Burst duration)



Plot 4-6. Time of Occupancy (Data transmission, Repetition rate)

5. Peak Output Power
[FCC 15.247(b)(1), RSS-210 6.2.2(o)(a3)]

5.1 Test Procedure

- The peak output power is measured with a spectrum analyzer connected to the antenna terminal, while EUT had its hopping function disabled at the highest, middle and the lowest available channels.
- The spectrum analyzer is set to :
  - Center frequency = the highest, middle and the lowest channels,
  - Span : approximately 5 times of the 20 dB bandwidth = 5 MHz (3 MHz for Inquiry/Paging)
  - RBW : greater than the 20 dB bandwidth of the emission being measured = 1 MHz
  - VBW : equal to RBW or more = 3 MHz
  - Sweep = auto, Detector function = peak, Trace = max hold
- Allow the trace to stabilize. Use the marker-to-peak function to set the marker to the peak of the emission. The indicated level is the peak output power.

5.2 Test Instruments and Measurement Setup

Same as the Chapter 1(Table 1-1 & Figure 1).

5.3 Measurement Results

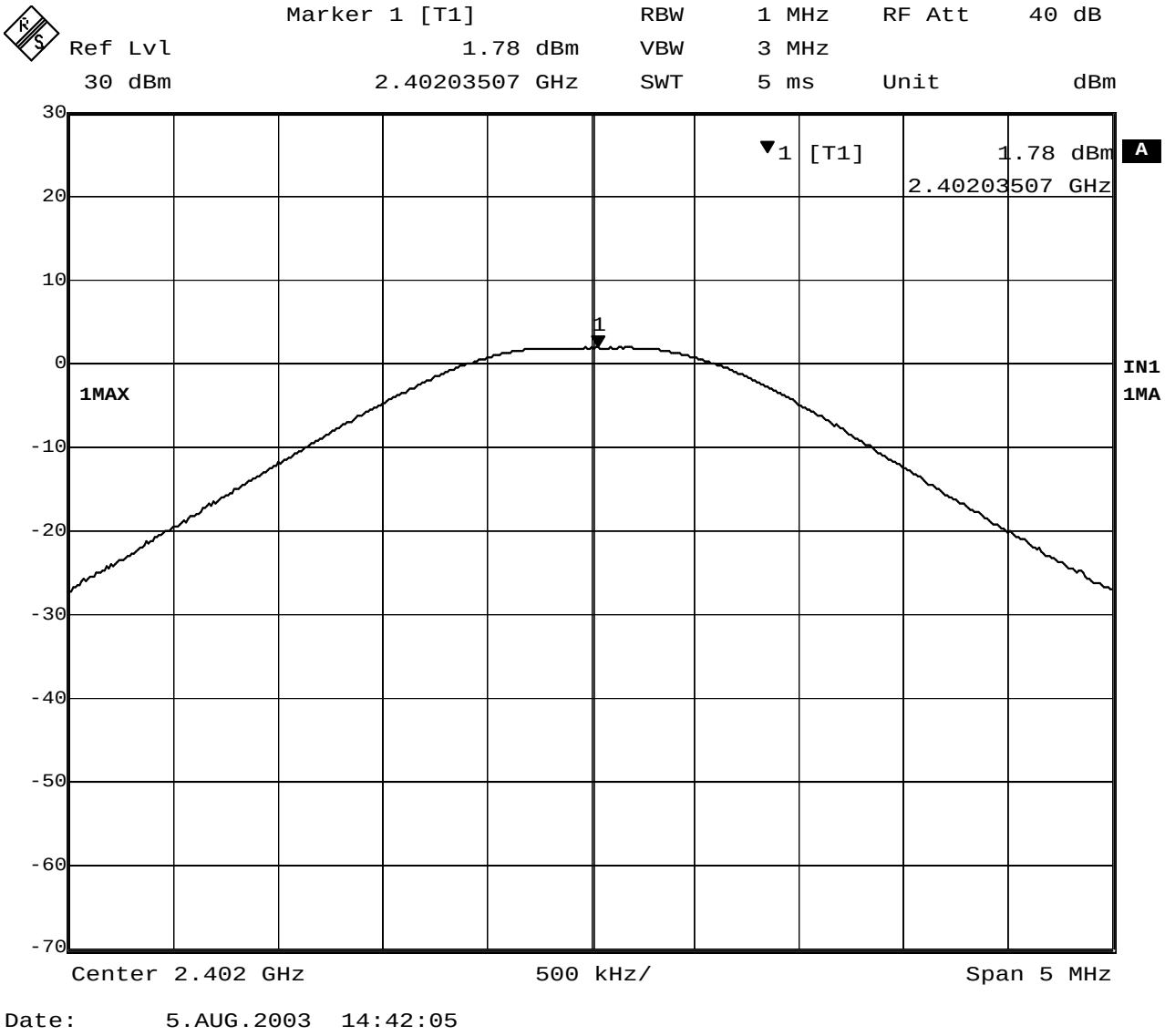
Test Date: August 5, 2003

Table 5. Peak Output Power

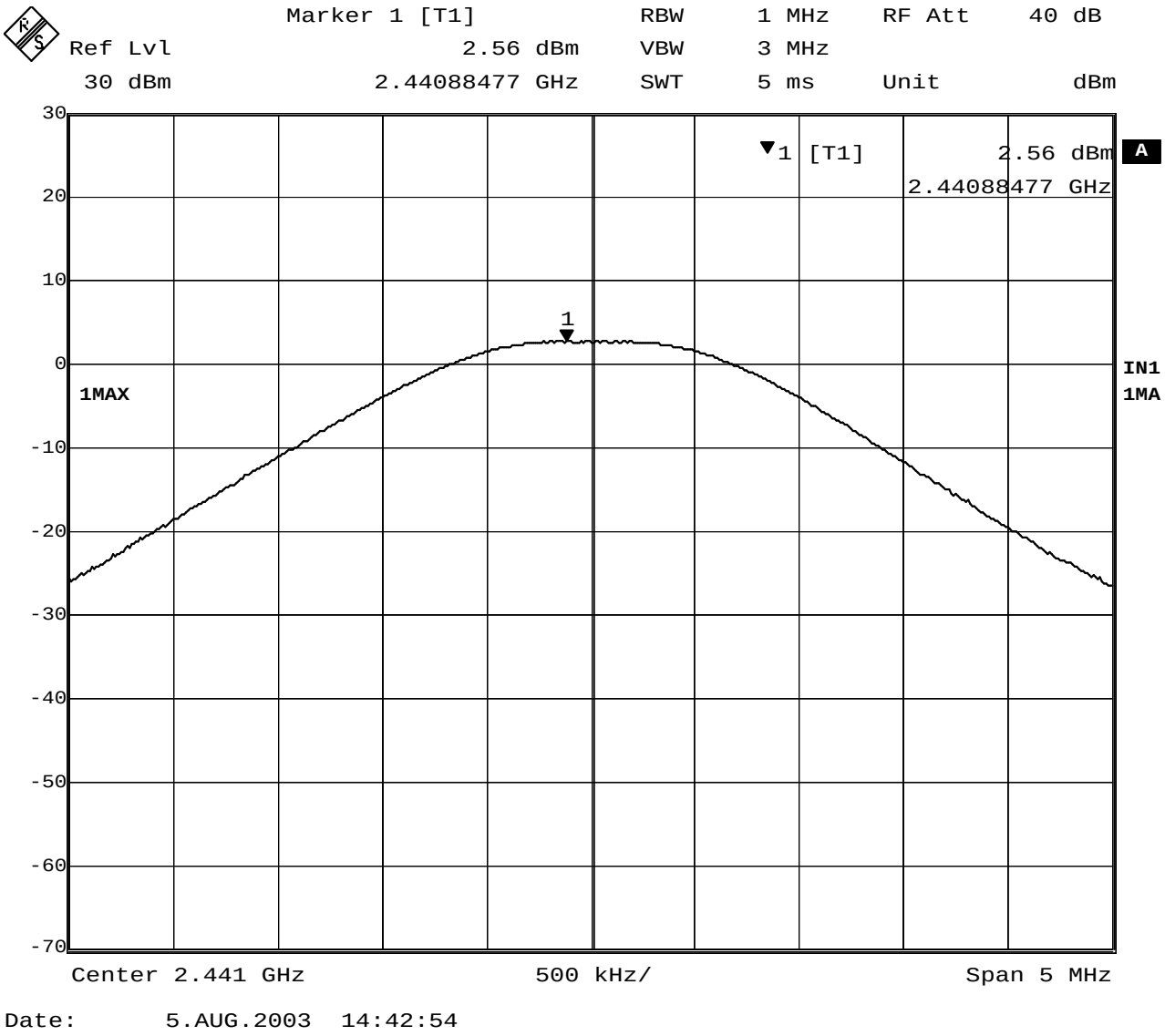
Measured Frequency (MHz)	Analyzer Reading (dBm)	Cable Loss (dB)	Results		Limit [1W] (dBm)	Margin (dB)
			(dBm)	(W)		
2402 (ch. 1) *1	1.78	1.3	3.1	0.00204	30.0	26.9
2441 (ch. 40) *1	2.56	1.3	3.9	0.00245	30.0	26.1
2480 (ch. 79) *1	1.83	1.3	3.1	0.00204	30.0	26.9
Inquiry (ch. 40)	0.21	1.3	1.5	0.00141	30.0	28.5
Paging (ch. 41)	0.23	1.3	1.5	0.00141	30.0	28.5

*1 : In line with Section 15.31(m) of Public Notice DA 00-705 dated March 30, 2000, the measurement was performed at the highest, middle and lowest available channels.

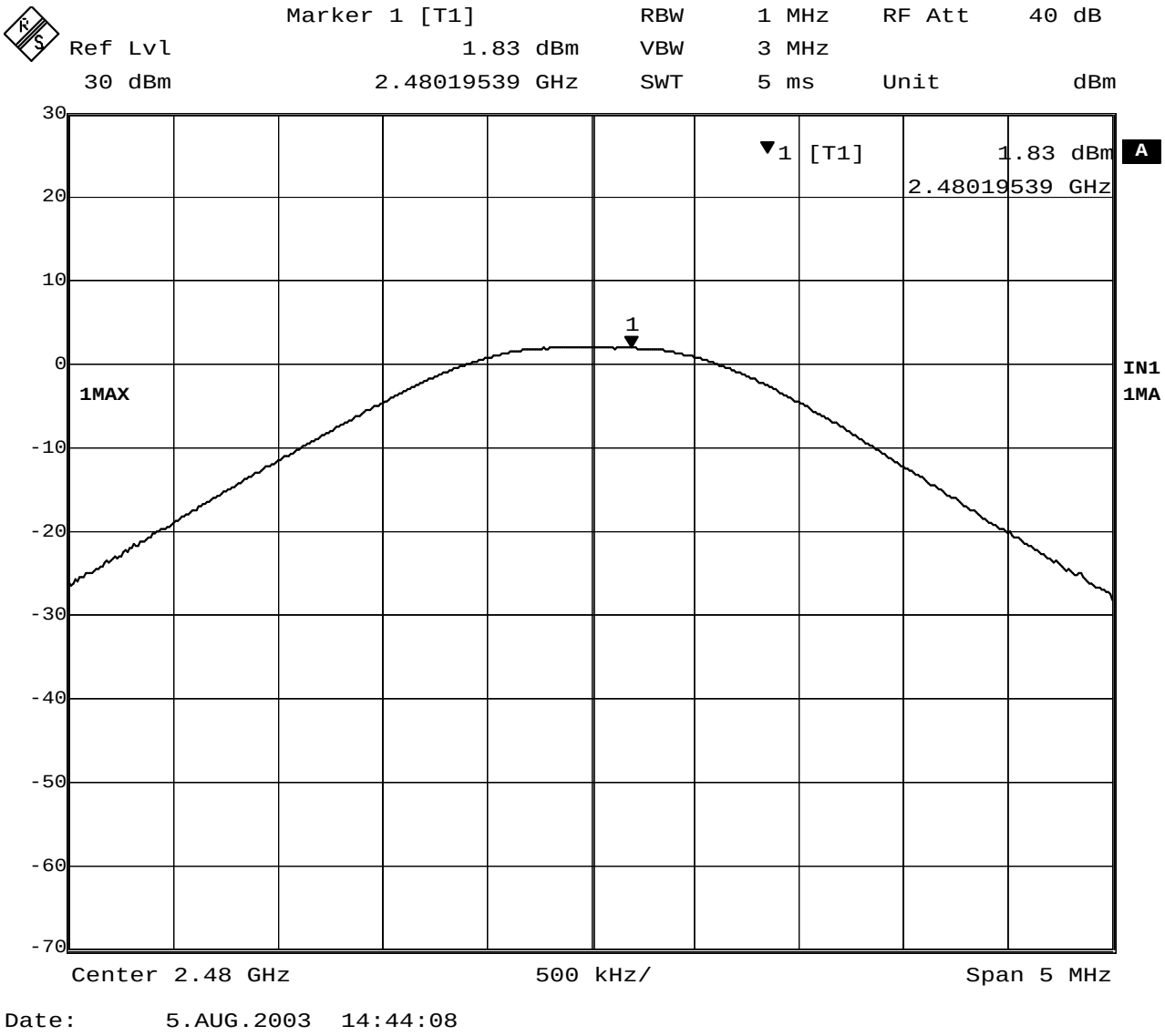
5.4 Trace Data



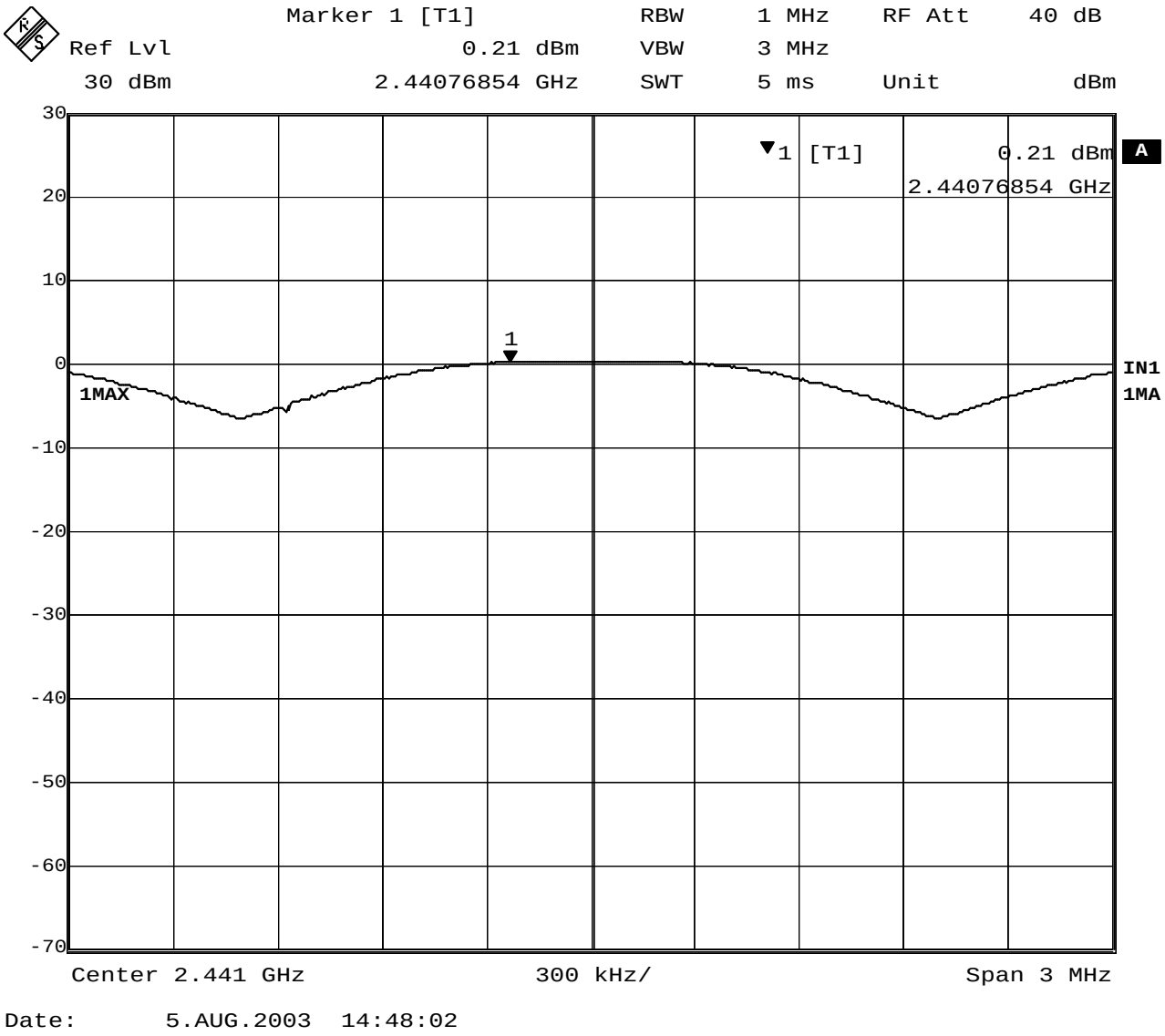
Plot 5-1. Peak Output Power (TX on 2402MHz)



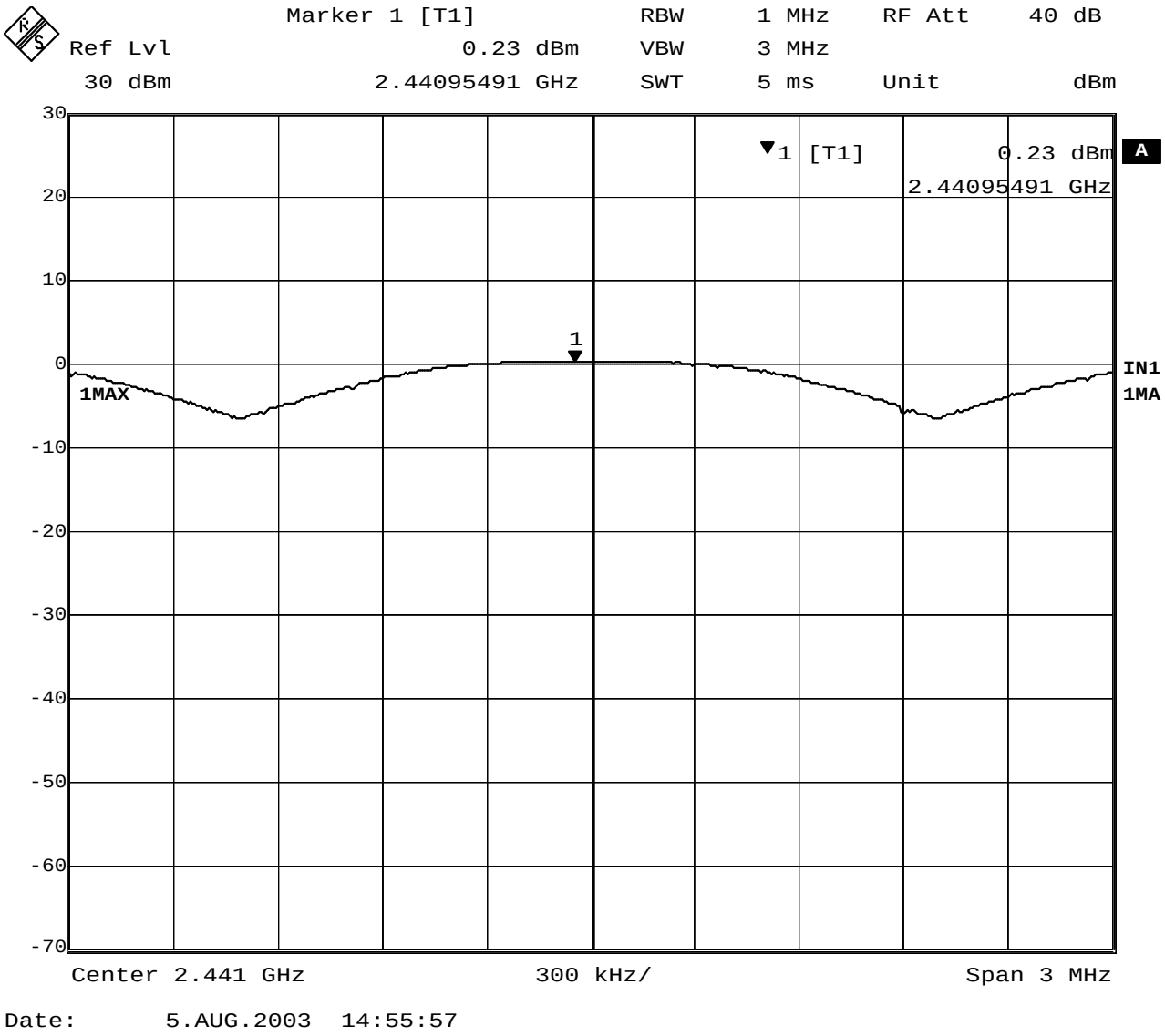
Plot 5-2. Peak Output Power (TX on 2441MHz)



Plot 5-3. Peak Output Power (TX on 2480MHz)



Plot 5-4. Peak Output Power (Inquiry)



Plot 5-5. Peak Output Power (Paging)

6. Band-edge

[FCC 15.247(c) regarding FCC Public Notice DA 00-705 dated March 30, 2000 **]**

6.1 Test Procedure

- The bandwidth at 20 dB down from the highest inband spectral density is measured with a spectrum analyzer connected to the antenna terminal, while EUT had its hopping function disabled at the highest, middle and the lowest available channels.
- The spectrum analyzer is set to :
  - Center frequency = the highest, middle and the lowest channels,
  - Span = 8 MHz
  - RBW : 1% of span or more = 100 kHz
  - VBW : equal to RBW or more = 100 kHz
  - Sweep = auto, Detector function = peak, Trace = max hold
- After the trace being stable. Set the marker on the emission at the bandedge, or on the highest spurious emission outside of the operation band, if this level is greater than that at the bandedge. Use the marker-to-peak function to set the marker to the peak of the emission. Read and record both values, then confirm the delta of both values is at least 20 dB.

6.2 Test Instruments and Measurement Setup

Same as the Chapter 1(Table 1-1 & Figure 1).

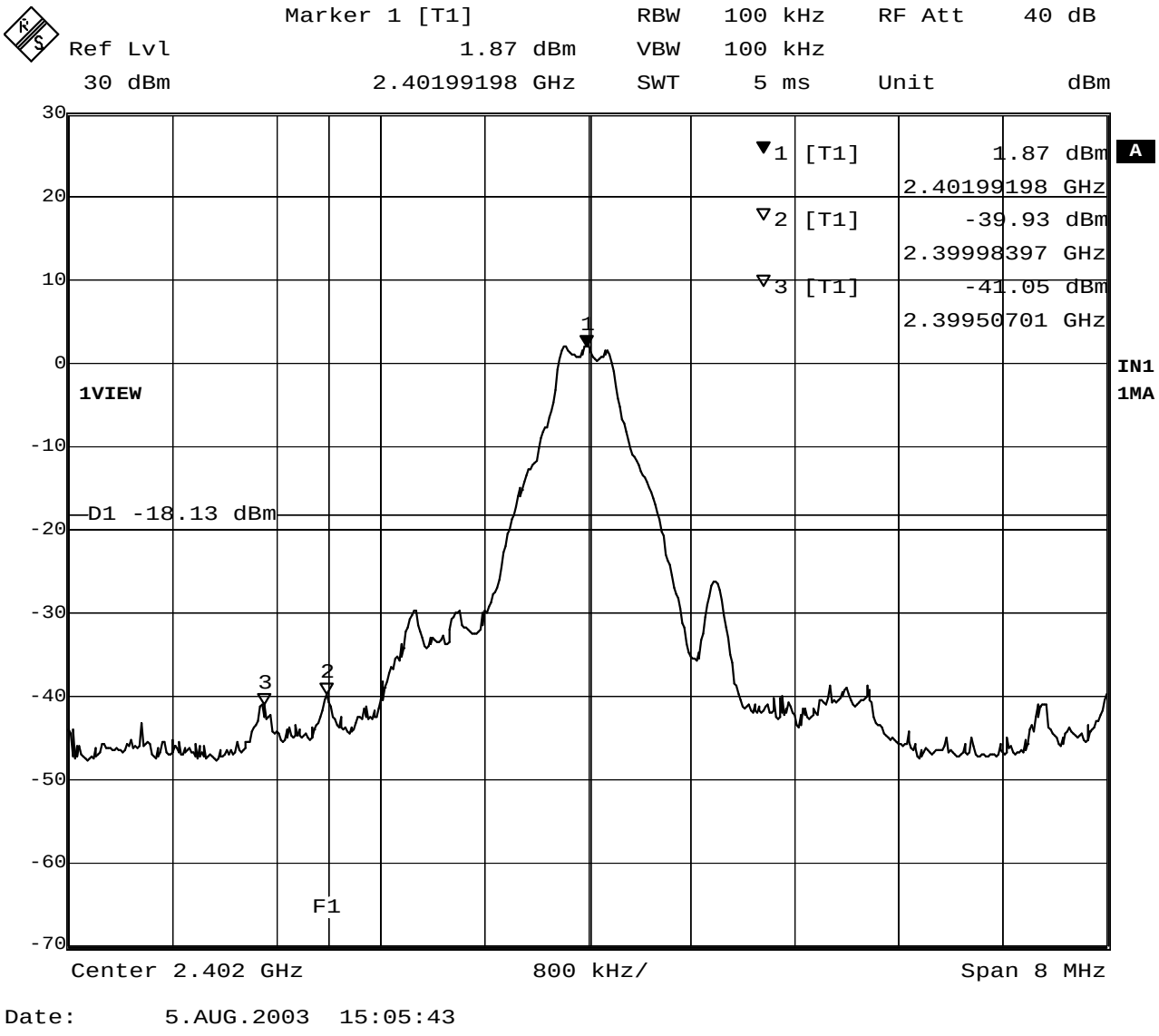
6.3 Measurement Results

Test Date: August 5, 2003

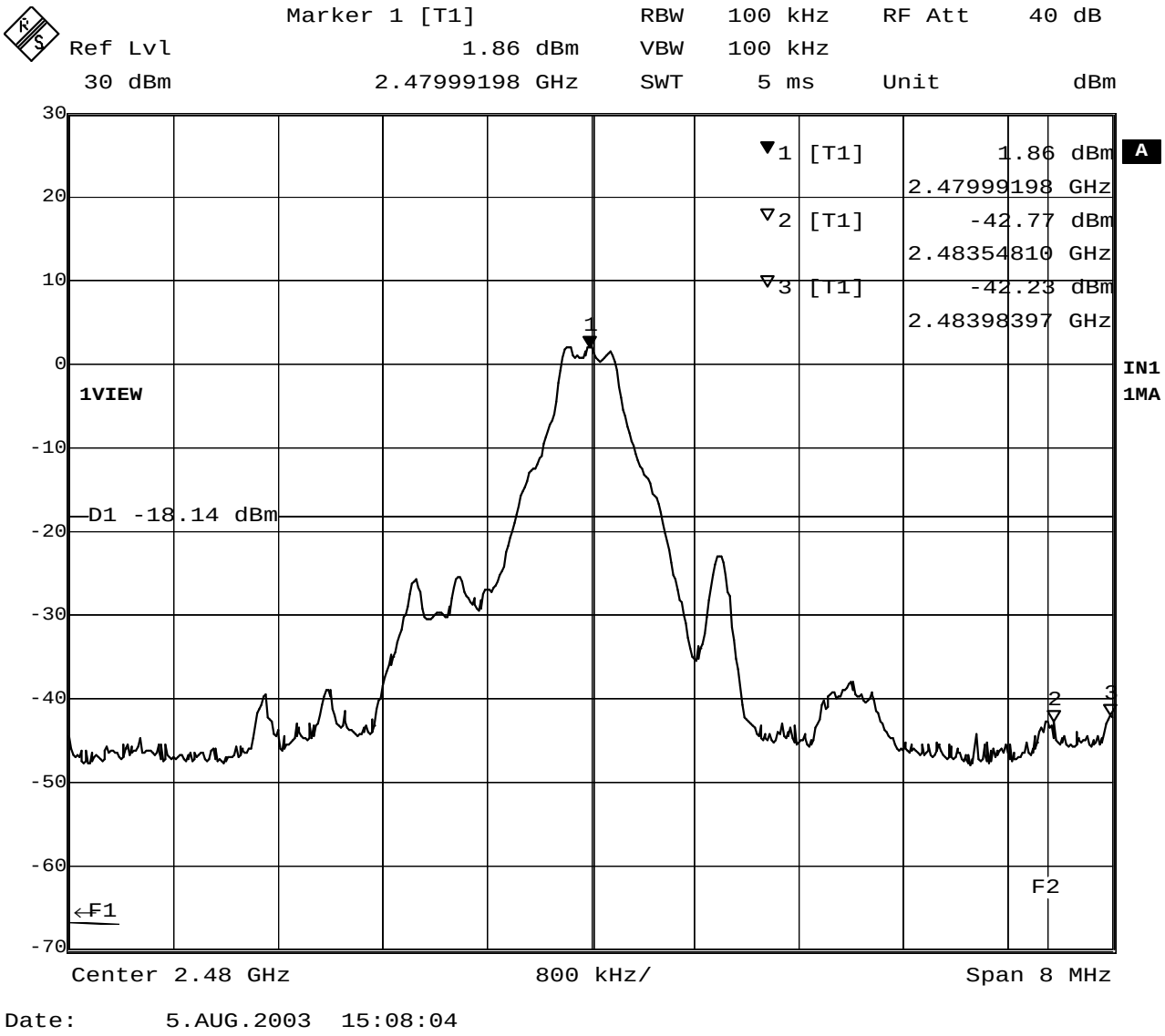
Table 6. Band-edge

Center Frequency (MHz)	Peak power of operation band (dBm)	Emission level at bandedge or outside of operation band (dBm)	delta (dB)	limit (dB)
2402 (ch. 1)	1.87	-39.93	41.80	> 20
2480 (ch. 79)	1.86	-42.23	44.09	

6.4 Trace Data



Plot 6-1. Band-edge (TX on 2402MHz)



Plot 6-2. Band-edge (TX on 2480MHz)

7. Out of Band Emissions
[FCC 15.247(c), RSS-210 6.2.2(o)(e1)]

7.1 Test Procedure

- The out of band emissions is measured with a spectrum analyzer connected to the antenna terminal, while EUT had its hopping function disabled at the highest, middle and the lowest available channels.
- The spectrum analyzer is set to :
  - Center frequency = the highest, middle and the lowest channels
  - Span : 100 MHz
  - RBW : 100 kHz
  - VBW : 100 kHz
  - Sweep = auto, Detector function = peak, Trace = max hold

- After the trace being stable. Use the marker-to-peak function to set the marker to the peak of the inband emission. Use the marker-delta function to measure 20 dB down the peak of the inband emission.

7.2 Test Instruments and Measurement Setup

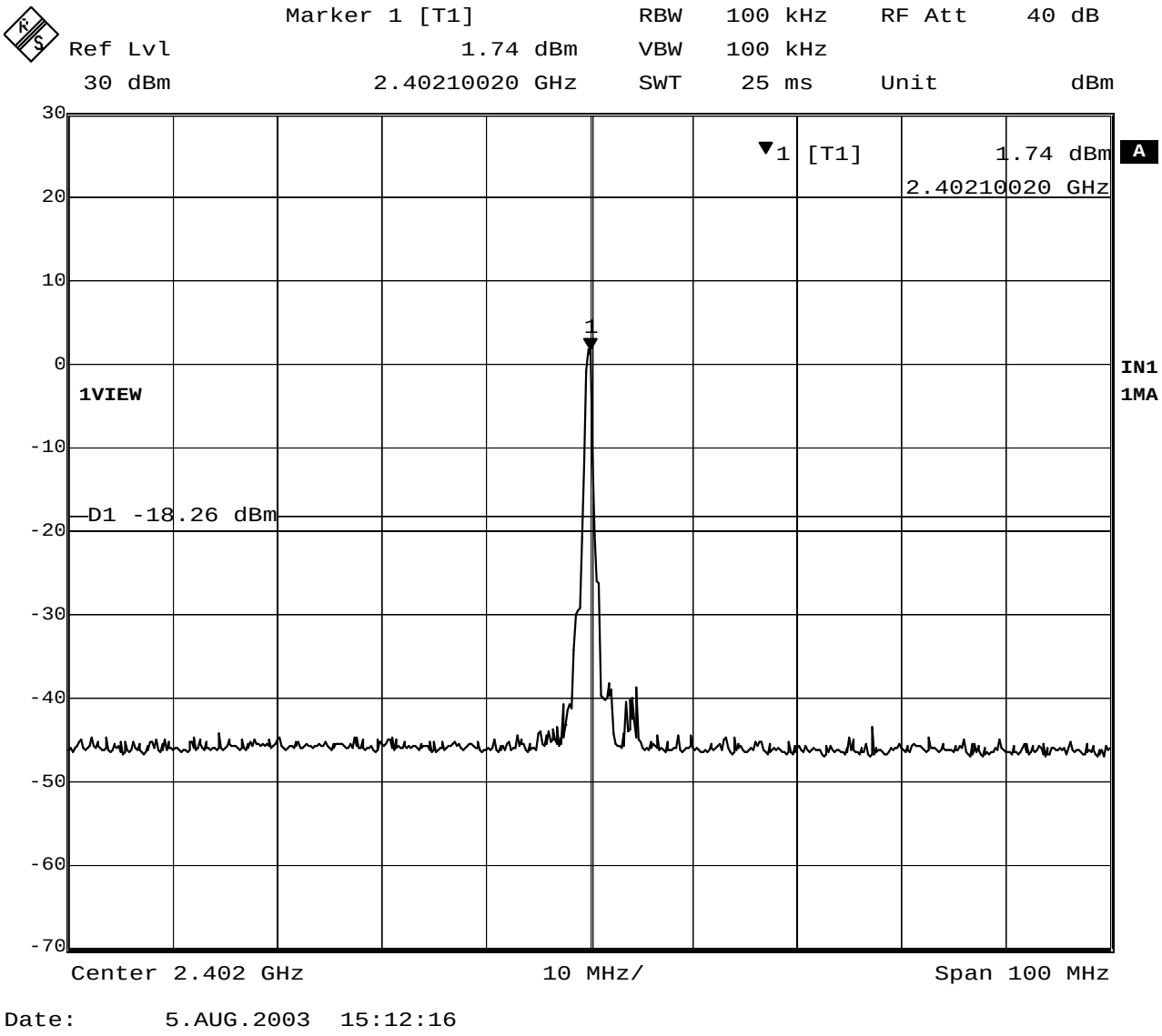
Same as the Chapter 1(Table 1-1 & Figure 1).

7.3 Measurement Results

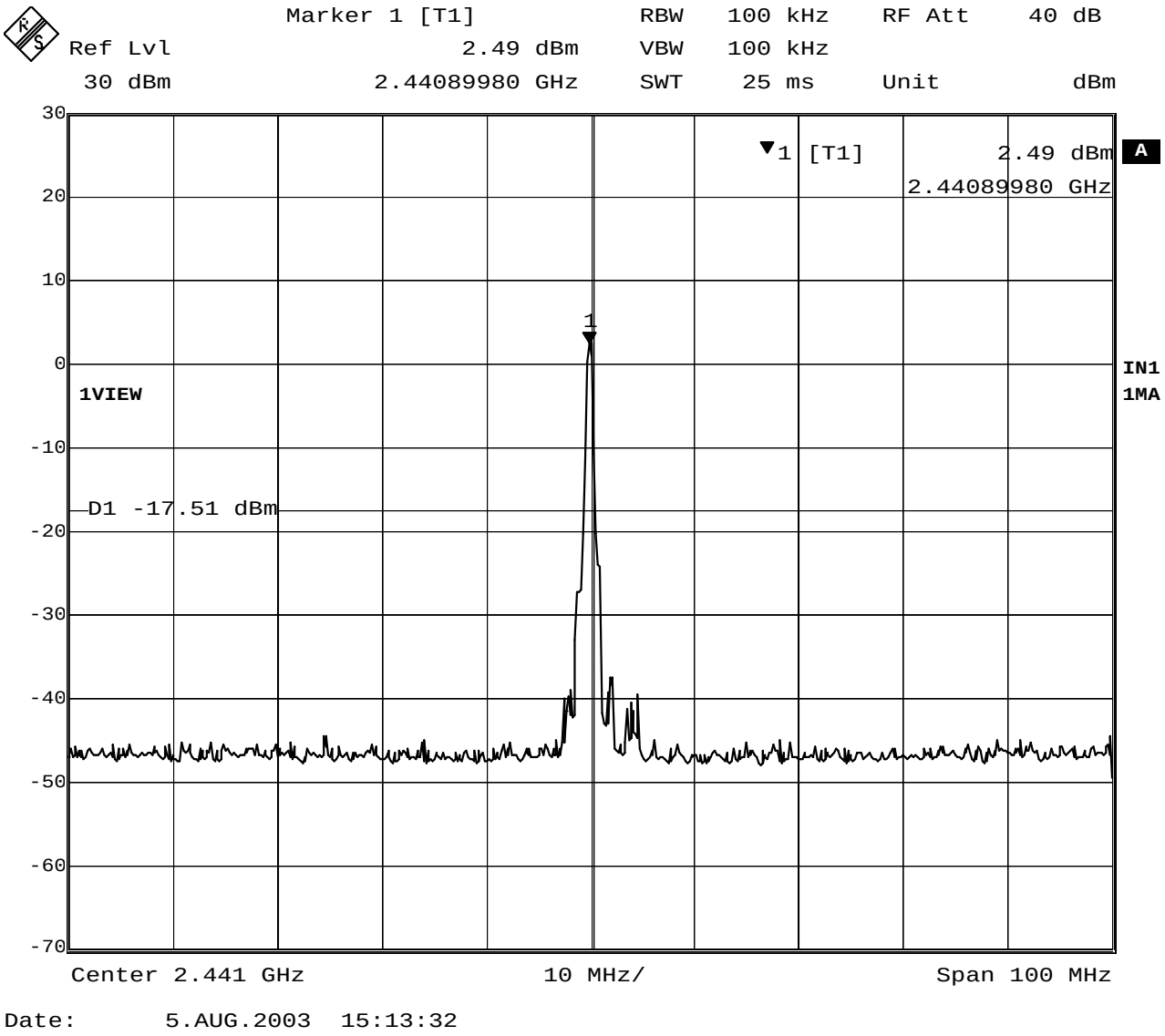
All conducted emission in any 100 kHz bandwidth outside of the spread spectrum band was at least 20dB lower than the highest inband spectral density. Therefore the applying equipment meets the requirement.

Test Date: August 5, 2003

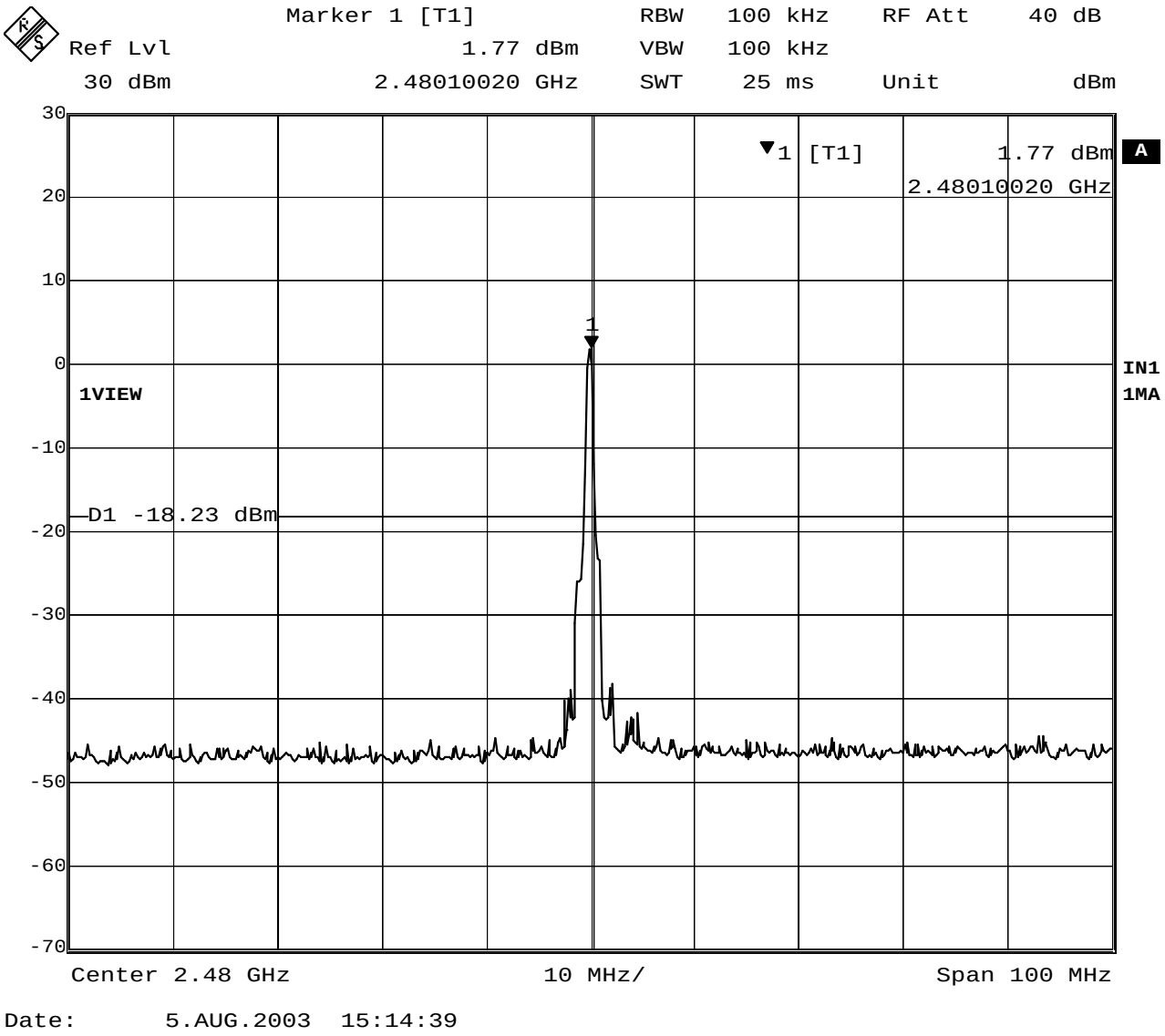
7.4 Trace Data



Plot 7-1. Out of Band Emissions (TX on 2402MHz)



Plot 7-2. Out of Band Emissions (TX on 2441MHz)



Plot 7-3. Out of Band Emissions (TX on 2480MHz)

8. Transmitter Power Spectral Density of Hybrid mode

[FCC 15.247(f), RSS-210 6.2.2(o)(c2)(7)]

8.1 Test Procedure

The peak power density is measured with a spectrum analyzer connected to the antenna terminal, while EUT had been operating in Inquiry and Paging mode.
The spectrum analyzer is set to:
Center Frequency = middle channel, RBW = 3 kHz, VBW = 3 kHz, Span = 2 MHz, Sweep = auto

8.2 Test Instruments and Measurement Setup

Same as the Chapter 1(Table 1-1 & Figure 1).

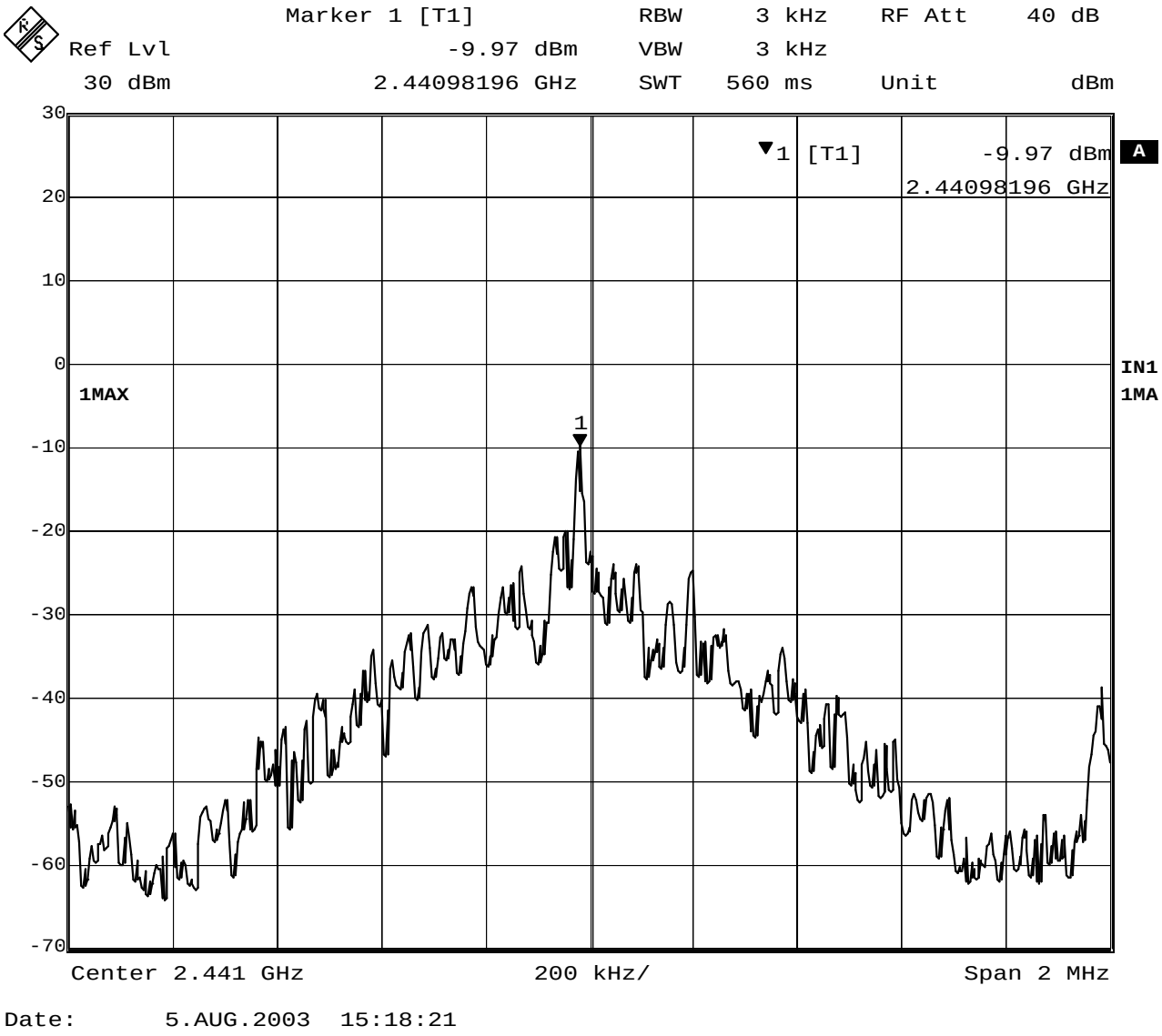
8.3 Measurement Results

Test Date: August 5, 2003

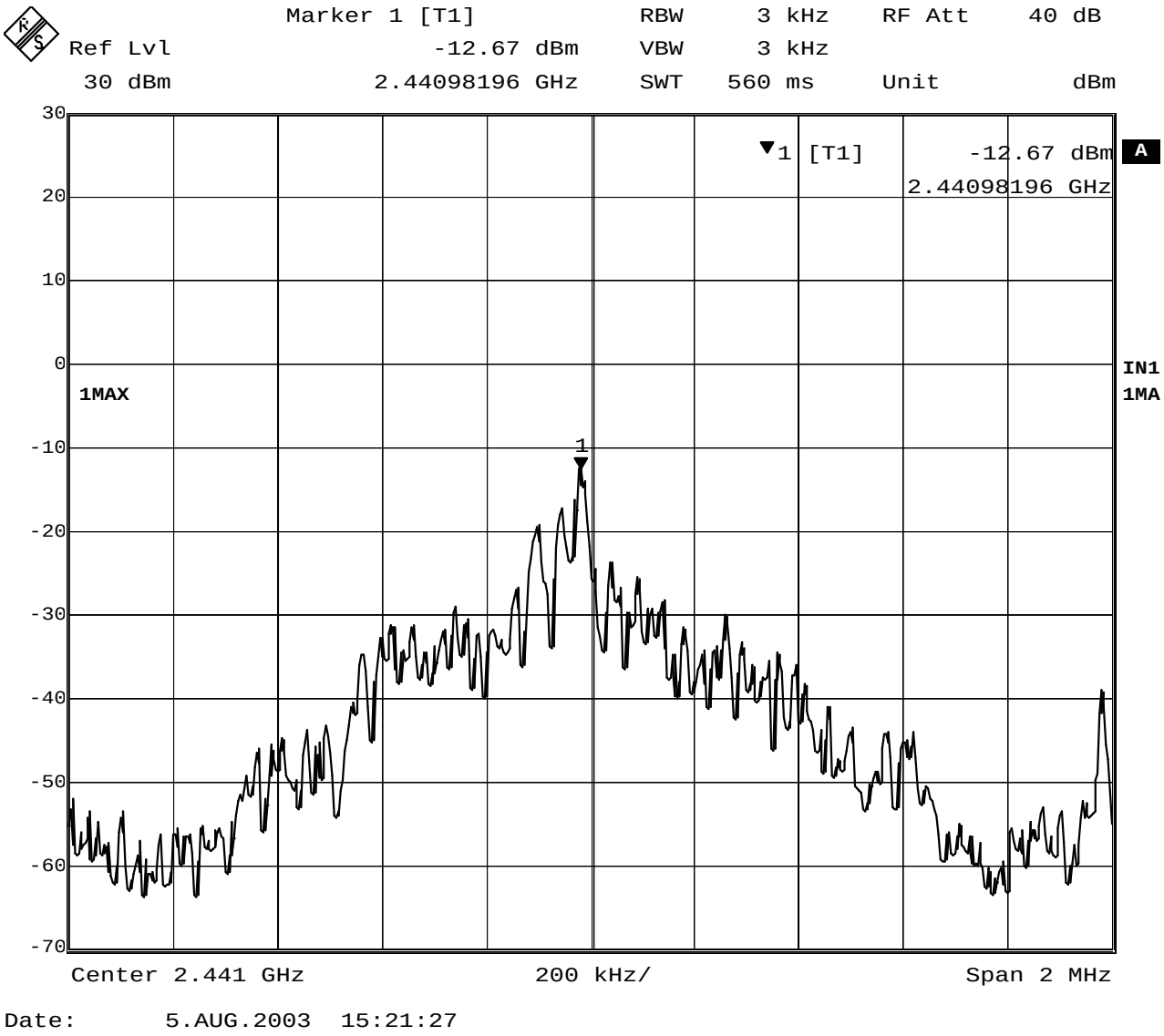
Table 8. Transmitter Power Spectral Density

EUT Operation mode	Measured Frequency (MHz)	Spectrum Analyzer Reading (dBm)	Cable loss (dB)	Result (dBm)	Limit (dBm)	Margin (dB)
Inquiry	2440.98	- 10.0	1.3	-8.7	8.0	16.7
Paging	2440.98	- 12.7	1.3	-11.4	8.0	19.4

8.4 Trace Data



Plot 8-1. Transmitter Power Spectral Density (Inquiry)



Plot 8-2. Transmitter Power Spectral Density (Paging)

9. AC WIRELINE CONDUCTED EMISSIONS (150 kHz – 30 MHz)
[FCC 15.207, RSS-210 6.6 / 7.4]

9.1 Test Procedure

The conducted emissions are measured in the IBM shielded room with a spectrum analyzer in peak hold. While the measurement, EUT had its hopping function disabled at the highest, middle and lowest available channels in line with Section 15.31(m) of Public Notice DA 00-705 dated March 30, 2000. Emissions closest to the limit are measured in the quasi-peak mode (QP) with the tuned receiver using a bandwidth of 9 kHz. The emissions are maximized further by cable manipulation and Exerciser operation. The highest emissions relative to the limit are listed.

9.2 Test Instruments and Measurement Setup

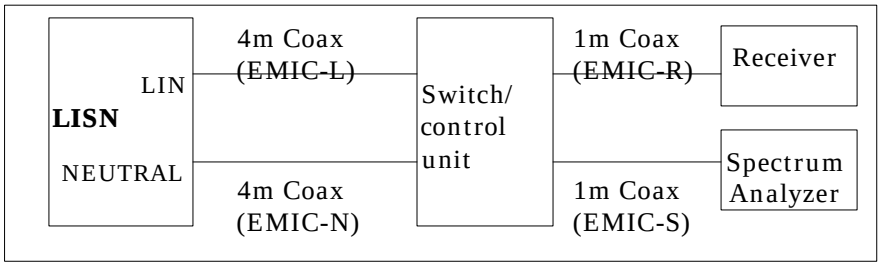


Figure 9. Cables for Conducted Emission Test

Table 9-1. Conducted Emission Test Instrumentation

Description	**Model**	**Serial Number**
Computer	IBM 6589-13J	97-15613
Spectrum Analyzer (100Hz-1.5GHz)	HP 85680B	2601A02634
Spectrum Analyzer Display	HP 85662A	2542A12308
Quasi-Peak Adapter	HP 85650A	2043A00062
Receiver (9kHz-30MHz)	R&S ESH3	891806/012
LISN	EMCO 3825/2	1426
Switch/control unit	HP 3488A	2719A17228
Plotter	HP 7550A	2631A33619
Coax cables: - Lisn-L <=> SW/Con.unit (SW100) - Lisn-N <=> SW/Con.unit (SW101) - SW/Con.unit <=> RCVR (Input) - SW/Con.unit<=> Spe Ana.(Signal In)	Length: 4 m 4 m 1 m 1 m	 - EMIC-L - EMIC-N - EMIC-R - EMIC-S

Notes: - HP: Hewlett Packard, R&S: Rohde & Schwarz

9.3 Powerline Voltage Calculation

The powerline voltage is calculated by adding insertion losses of LISN, Cable, Switch control unit and Pulse limiter to the measured reading. All factors are included in the reported data.

PV = R + CORR

where:

PV = Powerline Voltage (dBµV)
R = Measured Receiver Input Amplitude (dBµV)
CORR = Correction Factor (dB) = LL+CL+SWL+PLL
LL = Insertion loss of LISN (dB)
CL = Insertion loss of Cable (dB)
SWL = Insertion loss of Switch control unit (dB)
PLL = Insertion loss of Pulse Limiter (dB)

Given a Receiver input reading of 50.0 dBµV, LISN loss of 0.6 dB, Cable loss of 0.1dB, Switch control unit loss of 0.1dB and Pulse limiter loss of 0.2dB. The Powerline Voltage of the measured emission is:

CORR = 0.6 + 0.1 + 0.1 + 0.2 = 1.0 (dB)
PV = 50.0 + 1.0 = 51.0 (dBµV)

9.4 Measurement Results

The EUT was found to comply to the limits of FCC Part 15 Subpart C and RSS-210 with a margin of 14.1dB. The 6 highest emissions relative to the limits are reported.

Test Date: August 8, 2003

1) EUT in transmission mode

Table 9-2-1. Ch.1 (2402MHz), **Tx** mode

Frequency (MHz)	QP			AV			CISPR22 QP Limit (dBμV)	CISPR22 AV Limit (dBμV)	Phase
	Measured Reading (dBμV)	Corr. Factor (dB)	Powerline Voltage (dBμV)	Measured Reading (dBμV)	Corr. Factor (dB)	Powerline Voltage (dBμV)			
0.2083	47.7	0.4	48.1	38.8	0.4	39.2	63.3	53.3	Line
0.2778	41.2	0.5	41.7	34.3	0.5	34.8	60.9	50.9	Line
0.3485	36.8	0.5	37.3	32.2	0.5	32.7	59.0	49.0	Line
0.4178	30.7	0.5	31.2	26.3	0.5	26.8	57.5	47.5	Line
0.4873	30.4	0.5	30.9	23.1	0.5	23.6	56.2	46.2	Line
5.8024	34.6	0.6	35.2	22.4	0.6	23.0	60.0	50.0	Neutral

Table 9-2-2. Ch.40 (2441MHz) , **Tx** mode

Frequency (MHz)	QP			AV			CISPR22 QP Limit (dBμV)	CISPR22 AV Limit (dBμV)	Phase
	Measured Reading (dBμV)	Corr. Factor (dB)	Powerline Voltage (dBμV)	Measured Reading (dBμV)	Corr. Factor (dB)	Powerline Voltage (dBμV)			
0.2084	45.6	0.4	46.0	35.8	0.4	36.2	63.3	53.3	Neutral
0.2781	40.3	0.5	40.8	33.5	0.5	34.0	60.9	50.9	Line
0.3502	32.9	0.5	33.4	26.2	0.5	26.7	59.0	49.0	Line
0.4873	26.3	0.5	26.8	20.5	0.5	21.0	56.2	46.2	Line
0.6270	24.9	0.5	25.4	20.9	0.5	21.4	56.0	46.0	Line
5.8021	37.6	0.6	38.2	23.8	0.6	24.4	60.0	50.0	Line

Table 9-2-3. Ch.79 (2480MHz) , **Tx** mode

Frequency (MHz)	QP			AV			CISPR22 QP Limit (dBμV)	CISPR22 AV Limit (dBμV)	Phase
	Measured Reading (dBμV)	Corr. Factor (dB)	Powerline Voltage (dBμV)	Measured Reading (dBμV)	Corr. Factor (dB)	Powerline Voltage (dBμV)			
0.2091	45.1	0.4	45.5	35.1	0.4	35.5	63.2	53.2	Neutral
0.2772	38.9	0.5	39.4	32.5	0.5	33.0	60.9	50.9	Line
0.3490	32.9	0.5	33.4	24.7	0.5	25.2	59.0	49.0	Neutral
0.4196	34.6	0.5	35.1	30.0	0.5	30.5	57.5	47.5	Line
0.6284	26.5	0.5	27.0	23.1	0.5	23.6	56.0	46.0	Line
5.8707	35.7	0.6	36.3	24.3	0.6	24.9	60.0	50.0	Line

2) EUT in receiving mode

Table 9-2-4. **RX** mode

Frequency (MHz)	QP			AV			CISPR22 QP Limit (dBμV)	CISPR22 AV Limit (dBμV)	Phase
	Measured Reading (dBμV)	Corr. Factor (dB)	Powerline Voltage (dBμV)	Measured Reading (dBμV)	Corr. Factor (dB)	Powerline Voltage (dBμV)			
0.2079	43.6	0.4	44.0	33.2	0.4	33.6	63.3	53.3	Neutral
0.2774	38.1	0.5	38.6	32.0	0.5	32.5	60.9	50.9	Line
0.3477	31.4	0.5	31.9	28.1	0.5	28.6	59.0	49.0	Neutral
0.4188	35.3	0.5	35.8	31.6	0.5	32.1	57.5	47.5	Line
0.6295	26.5	0.5	27.0	22.9	0.5	23.4	56.0	46.0	Line
5.8028	37.5	0.6	38.1	26.8	0.6	27.4	60.0	50.0	Neutral

10. RESTRICTED BANDS RADIATIONS (30 MHz – 1 GHz)

[FCC 15.205 / 209, RSS-210 6.2.1 / 6.3 / 7.3]

10.1 Test Procedure

Preliminary radiated emissions are measured in the semi-anechoic chamber at a 3 meter distance on every azimuth in both horizontal and vertical polarity. The antennas are also scanned in height. The identified emissions are further maximized by a cable manipulation. Emissions closest to the limits are measured in the quasi-peak mode with the tuned receiver using a bandwidth of 120 kHz. The highest emissions relative to the limit are listed.
While the measurement, EUT had its hopping function disabled at the highest, middle and lowest available channels in line with Section 15.31(m) of Public Notice DA 00-705 dated March 30, 2000.

10.2 Test Instruments and Measurement Setup

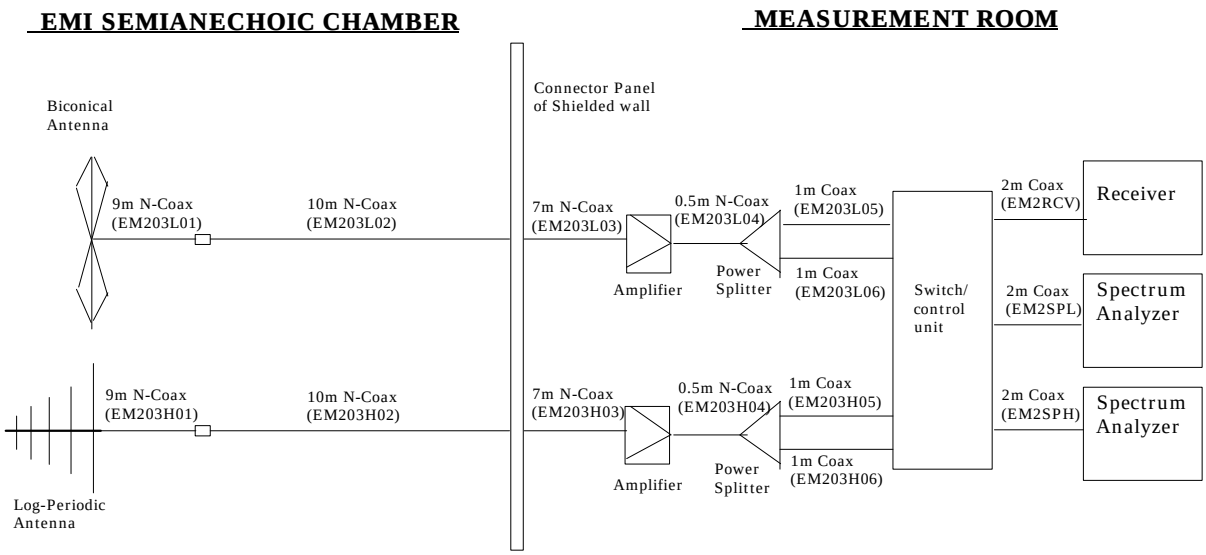


Figure 10 Cables for Radiated Emission Test

Table 10-1 Radiated Emission Test Instrumentation

Description	**Model**	**Serial Number**
Computer	IBM 6868-30J	97-901X3
Spectrum Analyzer (100Hz-1.5GHz) for 30-200MHz	HP 85680B	2732A03651
Spectrum Analyzer Display for 30-200MHz	HP 85662A	2648A15255
Quasi-Peak Adapter for 30-200MHz	HP 85650A	2521A00968
Spectrum Analyzer (100Hz-1.5GHz) for 200-1000MHz	HP 85680B	2841A04242
Spectrum Analyzer Display for 200-1000MHz	HP 85662A	2816A16827
Quasi-Peak Adapter for 200-1000MHz	HP 85650A	2811A01126
Amplifier (100KHz-1.3GHz) - for 30-200MHz - for 200-1000MHz	 HP 8447D HP 8447D	 2805A02919 2727A05190
Biconical Antenna (30-200MHz)	EMCO 3108	2536
Log-Periodic Antenna (200-1000MHz)	EMCO 3146	2849
Receiver (20MHz-1.3GHz)	R&S ESVP	892111/030
Switch/control unit	HP 3488A	2719A17226
N-Coax cables: - Bi-coni Ant <=> 10m Cable - 10m Cable <=> Shield Panel - Shield Panel <=> RF Amp - RF Amp <=> Power Splitter - Log-peri Ant <=> 10m Cable - 10m Cable <=> Shield Panel - Shield Panel <=> RF Amp - RF Amp <=> Power Splitter	Length: 9 m 10 m 7 m 0.5m 9 m 10 m 7 m 0.5m	 - EM103L01 - EM103L02 - EM103L03 - EM103L04 - EM103H01 - EM103H02 - EM103H03 - EM103H04
Coax cables: - Power Splitter <=> SW/Con.unit (SW110) - Power Splitter <=> SW/Con.unit (SW300) - Power Splitter <=> SW/Con.unit (SW100) - Power Splitter <=> SW/Con.unit (SW301) - SW/Con.unit <=> Receiver (Input) - SW/Con.unit <=> Spe Ana.(Signal In) for 30- 200MHz - SW/Con.unit <=> Spe Ana.(Signal In) for 200-1000MHz	 1 m 1 m 1 m 1 m 2 m 2 m 2 m	 - EM103L05 - EM103L06 - EM103H05 - EM103H06 - EM1RCV - EM1SPL - EM1SPH

Notes: HP: Hewlett Packard, R&S: Rohde & Schwarz

10.3 Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Loss, and subtracting Amplifier Gain from the measured reading. In this test facility, the Antenna Factor, Cable Loss, and Amplifier Gains are loaded into the Rohde & Schwarz Receiver and the corrected field strength can be read directly on the receiver. All factors are included in the reported data.

$$FS = R + AF + CORR$$

where:

FS	=	Field Strength
R	=	Measured Receiver Input Amplitude
AF	=	Antenna Factor
CORR	=	Correction Factor = CL - AG
CL	=	Cable Loss
AG	=	Amplifier Gain

For example:
Given a Receiver input reading of 51.5dBμV; Antenna Factor of 8.5dB/m; Cable Loss of 1.3dB; and an Amplifier Gain of 26dB. The Field Strength of the measured emission is:

$$FS = 51.5 + 8.5 + 1.3 - 26.0 = 35.3 dB\mu V/m$$

Conversion between dBμV/m (or dBμV) and μV/m (or μV) are done as:

$$Level(dB\mu V/m) = 20 \times Log(Level(\mu V/m))$$

40dBμV/m = 100μV/m
48dBμV/m = 250μV/m

10.4 Measurement Results

The EUT was found to comply to the limits of FCC Part 15 Subpart C and RSS-210 with a margin of 1.9 dB at 30 – 1000 MHz band. The 6 highest emissions relative to the limits are reported.

Test Date: August 6, 2003

Table 10-2-1. Ch.1 (2402MHz) **TX** mode

Frequency (MHz)	Polarity (H/V)	Measured (dBμV)	Antenna Factor (dB/m)	Corr. Factor (dB)	Field Strength (dBμV/m)	Limit (dBμV/m)	Field Strength (μV/m)	Limit (μV/m)
60.483	V	37.6	9.1	-18.1	28.6	40.0	26.9	100
166.160	V	33.2	12.5	-16.3	29.4	43.5	29.5	150
202.167	H	42.1	11.3	-13.7	39.7	43.5	96.6	150
364.508	V	38.0	14.4	-13.6	38.8	46.0	87.1	200
386.587	V	35.1	14.9	-14.1	35.9	46.0	62.4	200
729.015	V	33.9	21.1	-11.1	43.9	46.0	156.7	200

Table 10-2-2. Ch.40 (2441MHz) **TX** mode

Frequency (MHz)	Polarity (H/V)	Measured (dBμV)	Antenna Factor (dB/m)	Corr. Factor (dB)	Field Strength (dBμV/m)	Limit (dBμV/m)	Field Strength (μV/m)	Limit (μV/m)
61.301	V	36.9	9.1	-18.1	27.9	40.0	24.8	100
166.086	H	34.8	12.5	-16.3	31.0	43.5	35.5	150
204.241	H	43.6	11.3	-14.0	40.9	43.5	110.9	150
386.587	V	35.1	14.9	-14.1	35.9	46.0	62.4	200
466.366	V	28.3	16.8	-13.7	31.4	46.0	37.2	200
729.015	V	33.4	21.1	-11.1	43.4	46.0	147.9	200

Table 10-2-3. Ch.79 (2480MHz) **TX** mode

Frequency (MHz)	Polarity (H/V)	Measured (dBμV)	Antenna Factor (dB/m)	Corr. Factor (dB)	Field Strength (dBμV/m)	Limit (dBμV/m)	Field Strength (μV/m)	Limit (μV/m)
62.095	V	35.9	9.1	-18.1	26.9	40.0	22.1	100
171.817	V	35.5	12.5	-16.2	31.8	43.5	38.9	150
202.897	H	42.8	11.3	-14.0	40.1	43.5	101.2	150
364.507	V	37.8	14.4	-13.6	38.6	46.0	85.1	200
386.587	V	35.8	14.9	-14.1	36.6	46.0	67.6	200
729.014	V	32.1	21.1	-11.1	42.1	46.0	127.4	200

Table 10-2-4. Ch.40 (2441MHz)

Frequency (MHz)	Polarity (H/V)	Measured (dBμV)	Antenna Factor (dB/m)	Corr. Factor (dB)	Field Strength (dBμV/m)	Limit (dBμV/m)	Field Strength (μV/m)	Limit (μV/m)
171.817	V	38.6	12.5	-16.2	34.9	43.5	55.6	150
200.453	V	38.6	11.4	-12.6	37.4	43.5	74.1	150
272.381	V	36.2	12.7	-14.2	34.7	46.0	54.3	200
364.508	V	37.5	14.4	-13.6	38.3	46.0	82.2	200
729.015	V	34.1	21.1	-11.1	44.1	46.0	160.3	200
911.268	V	25.2	22.8	-9.0	39.0	46.0	89.1	200

Prepared by T. Asano

11. RESTRICTED BANDS RADIATIONS (1 GHz – 25 GHz)

[FCC 15.205 / 209, RSS-210 6.2.1 / 6.3 / 7.3]

11.1 Test Procedure

Radiated emissions were measured in the frequency range with 1 to 25 GHz in transmitting mode and 1 to 12.5 GHz in receiving mode. All tests were performed in the semi-anechoic chamber at a 3-meter distance (except for the frequency range with 18 to 25 GHz where test distance was reduced to 1 meter) on both horizontal and vertical polarities. The antenna was also scanned in height. The identified emissions are further maximized as a function of cable manipulation, azimuth, and antenna height. The emissions closest to the limits are measured in the peak mode with the tuned spectrum analyzer using a bandwidth of 1MHz and the average setting mode with the tuned spectrum analyzer using resolution bandwidth of 1 MHz / video bandwidth of 1 kHz or 100 Hz. The highest emissions relative to the limit are listed.
While the measurement, EUT had its hopping function disabled at the highest, middle and lowest available channels in line with Section 15.31(m) of Public Notice DA 00-705 dated March 30, 2000.

11.2 Test Instruments and Measurement

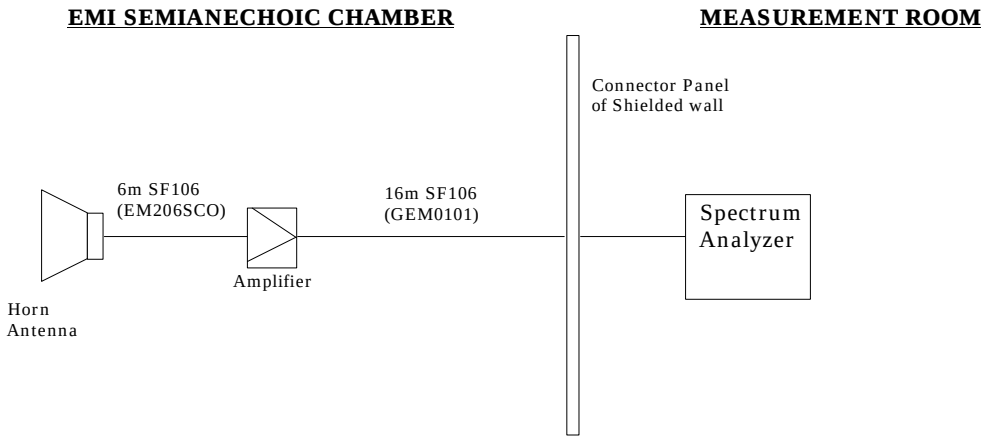


Figure 11-1. Cables for Radiated Emission Test (1 – 18GHz)

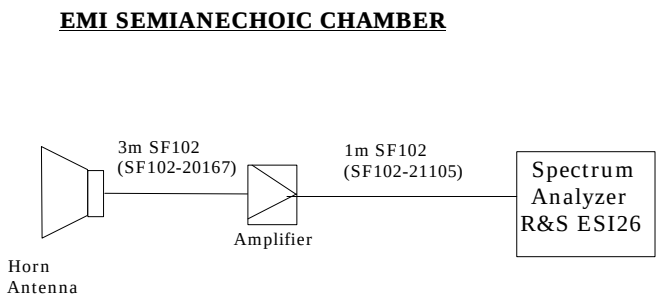


Figure 11-2. Cables for Radiated Emission Test (18 - 25GHz)

Table 11 Radiated Emission Test Instrumentation (1 – 25 GHz)

Description	**Model**	**Serial Number**
Spectrum Analyzer EMI Test Receiver	R&S ESI26	836119/003
Amplifier (1 - 26.5GHz)	HP 8449B	3008A00582
Horn Antenna (1- 18GHz)	EMCO 3115	9903-5774
Horn Antenna (3.95 – 5.85GHz)	EMCO 3160-5	1099
Horn Antenna (5.85 – 8.20GHz)	EMCO 3160-6	9712-1044
Horn Antenna (18- 26.5GHz)	EMCO 3160-9	0004-1202
Coaxial cables: - Horn Ant <=> RF Amp. (1-18GHz) - RF Amp.<=>Spectrum Analyzer (1-18GHz) - Horn Ant <=> RF Amp. (18-25GHz) - RF Amp.<=>Spectrum Analyzer (18-25GHz)	Length: 6 m 16 m 3m 1m	 - EM206SCO - GEM0101 - SF102-20167 - SF102-21105

Notes: HP: Hewlett Packard, R&S: Rohde & Schwarz

11.3 Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Loss, and subtracting Amplifier Gain from the measured reading. All factors are included in the reported data.

FS = R + AF + CORR - FO

where:

FS = Field Strength
R = Measured Spectrum analyzer Input Amplitude
AF = Antenna Factor
CORR = Correction Factor = CL-AG
CL = Cable Loss
AG = Amplifier Gain
FO = Distance Falloff Factor

For example:

Given a Spectrum Analyzer input reading of 51.5 dBμV; Antenna Factor of 8.5 dB/m; Cable Loss of 1.3 dB;

Falloff Factor of 0 dB; and an Amplifier Gain of 26 dB. The Field Strength of the measured emission is:

FS = 51.5 + 8.5 + 1.3 – 26 – 0.0 = 35.6 dBμV/m

Conversions between dBμV/m (or dBμV) and μV/m (or μV) are done as :

Level(dBμV/m) = 20 X Log (Level(μV/m))
40 dBμV/m = 100 μV/m
48 dBμV/m = 250 μV/m

11.4 Measurement Results

The EUT was found to comply to the limits of FCC Part 15 Subpart C and RSS-210 with a margin of 6.4dB. The measurement was done for the frequency range of 1 to 25 GHz in TX mode and 1 to 12.5 GHz in RX mode.

Test Date: August 6 and 7, 2003

Table 11-2-1. Ch.1 (2402MHz), **TX** mode

Frequency (GHz)	Polarity (H/V)	Measured (dBμV) ***(peak)***	Measured (dBμV) ***(average)***	Antenna Factor (dB/m)	Corr. Factor (dB)	Falloff Factor (dB)	Field Strength (dBμV/m) ***(peak)***	FCC Limit (dBμV/m) ***(peak)***	Field Strength (dBμV/m) ***(average)***	FCC Limit (dBμV/m) ***(average)***
Inband										
2.402	V	100.3	95.9	28.3	-29.6	0.0	99.0	OB*	94.6	OB*
Adjacent RB										
2.386	V	49.5	-	28.2	-29.6	0.0	48.1	74.0	-	54.0
2.390	V	46.8	-	28.2	-29.6	0.0	45.4	74.0	-	54.0
1.094	V	52.3	-	24.4	-31.9	0.0	44.8	74.0	-	54.0
1.160	V	49.6	-	24.6	-31.8	0.0	42.4	74.0	-	54.0
1.201	V	48.3	-	25.2	-31.6	0.0	41.9	74.0	-	54.0

*Note: OB means “operation band” (2400-2483.5MHz); in this case limit is 1W (measured conducted with power meter).

Table 11-2-2. Ch.40 (2441MHz) , **TX** mode

Frequency (GHz)	Polarity (H/V)	Measured (dBμV) ***(peak)***	Measured (dBμV) ***(average)***	Antenna Factor (dB/m)	Corr. Factor (dB)	Falloff Factor (dB)	Field Strength (dBμV/m) ***(peak)***	FCC Limit (dBμV/m) ***(peak)***	Field Strength (dBμV/m) ***(average)***	FCC Limit (dBμV/m) ***(average)***
Inband										
2.441	V	98.6	94.2	28.4	-29.6	0.0	97.4	OB*	93.0	OB*
Adjacent RB										
2.390	V	47.7	-	28.2	-29.6	0.0	46.3	74.0	-	54.0
2.484	V	48.1	-	28.4	-29.6	0.0	46.9	74.0	-	54.0
1.066	V	51.6	-	24.6	-32.0	0.0	44.2	74.0	-	54.0
1.094	V	52.5	-	24.4	-31.9	0.0	45.0	74.0	-	54.0
1.201	V	51.4	-	25.2	-31.6	0.0	45.0	74.0	-	54.0
7.323	V	38.4	-	29.8	-24.8	0.0	43.4	74.0	-	54.0

*Note: OB means “operation band” (2400-2483.5MHz); in this case limit is 1W (measured conducted with power meter).

Table 11-2-3. Ch.79 (2480MHz) , **TX** mode

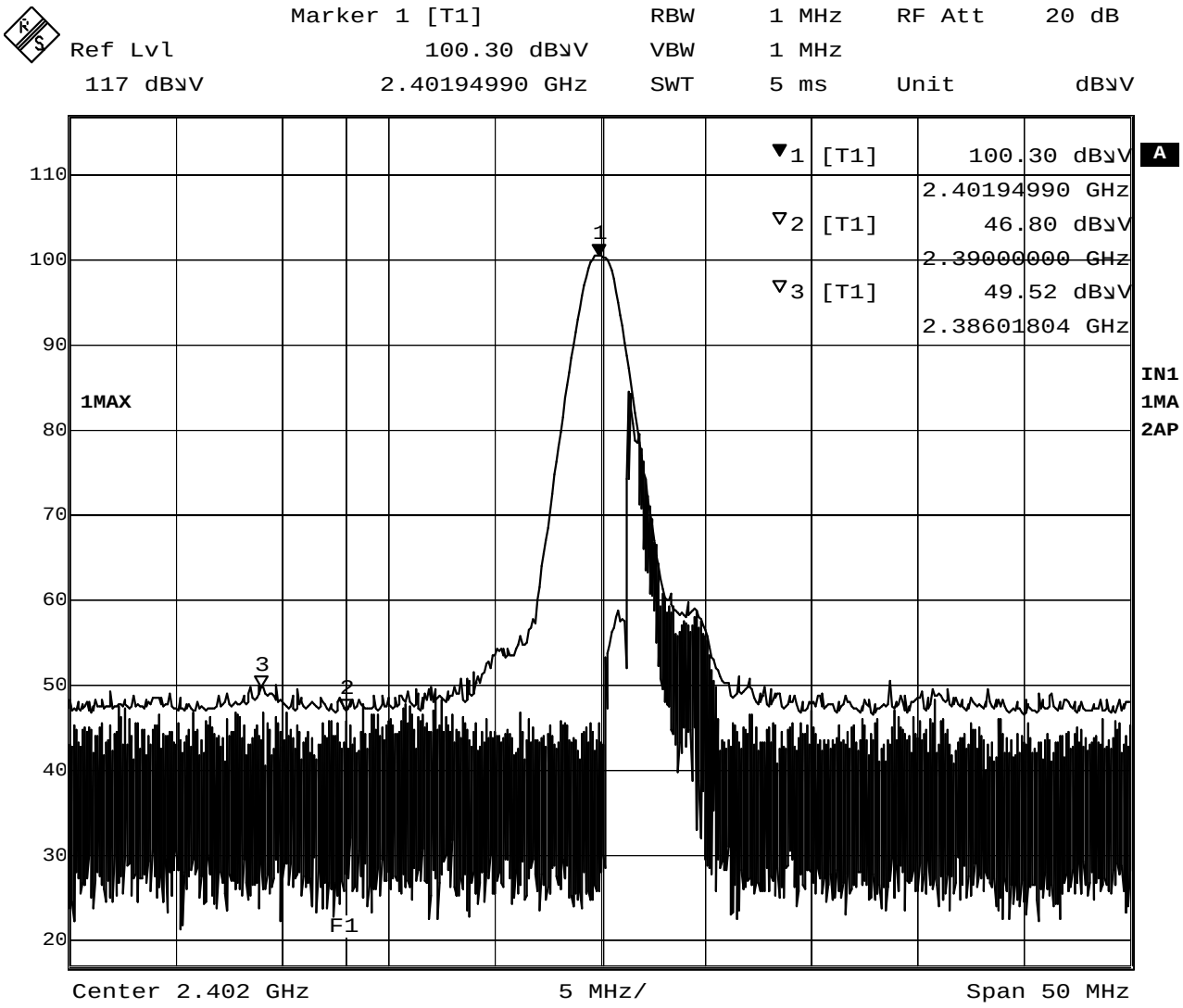
Frequency (GHz)	Polarity (H/V)	Measured (dBμV) ***(peak)***	Measured (dBμV) ***(average)***	Antenna Factor (dB/m)	Corr. Factor (dB)	Falloff Factor (dB)	Field Strength (dBμV/m) ***(peak)***	FCC Limit (dBμV/m) ***(peak)***	Field Strength (dBμV/m) ***(average)***	FCC Limit (dBμV/m) ***(average)***
Inband										
2.480	V	98.4	94.1	28.4	-29.6	0.0	97.2	OB*	92.9	OB*
Adjacent RB										
2.484	V	57.2	48.8	28.4	-29.6	0.0	56.0	74.0	47.6	54.0
2.488	V	50.1	-	28.4	-29.6	0.0	48.9	74.0	-	54.0
1.094	V	52.0	-	24.4	-31.9	0.0	44.5	74.0	-	54.0
1.160	V	49.3	-	24.6	-31.8	0.0	42.1	74.0	-	54.0
1.201	V	48.7	-	25.2	-31.6	0.0	42.3	74.0	-	54.0
7.441	V	38.8	-	29.8	-24.9	0.0	43.7	74.0	-	54.0

*Note: OB means “operation band” (2400-2483.5MHz); in this case limit is 1W (measured conducted with power meter).

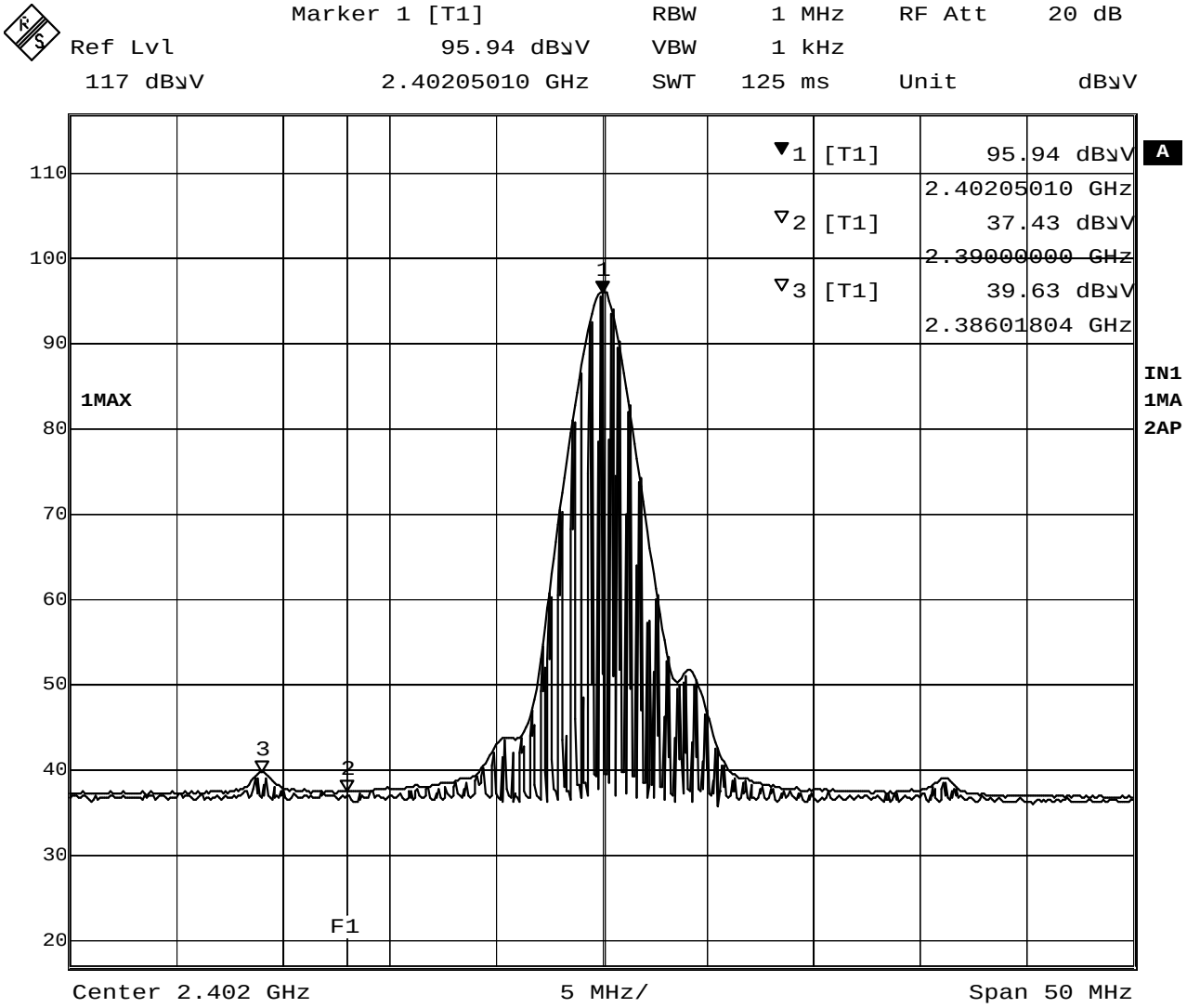
Table 11-2-4. Ch.40 (2441MHz), **RX** mode

Frequency (GHz)	Polarity (H/V)	Measured (dBμV) ***(peak)***	Measured (dBμV) ***(average)***	Antenna Factor (dB/m)	Corr. Factor (dB)	Falloff Factor (dB)	Field Strength (dBμV/m) ***(peak)***	FCC Limit (dBμV/m) ***(peak)***	Field Strength (dBμV/m) ***(average)***	FCC Limit (dBμV/m) ***(average)***
1.067	V	48.1	-	24.6	-32.0	0.0	40.7	74.0	-	54.0
1.094	V	51.4	-	24.4	-31.9	0.0	43.9	74.0	-	54.0
1.201	V	48.2	-	25.2	-31.6	0.0	41.8	74.0	-	54.0

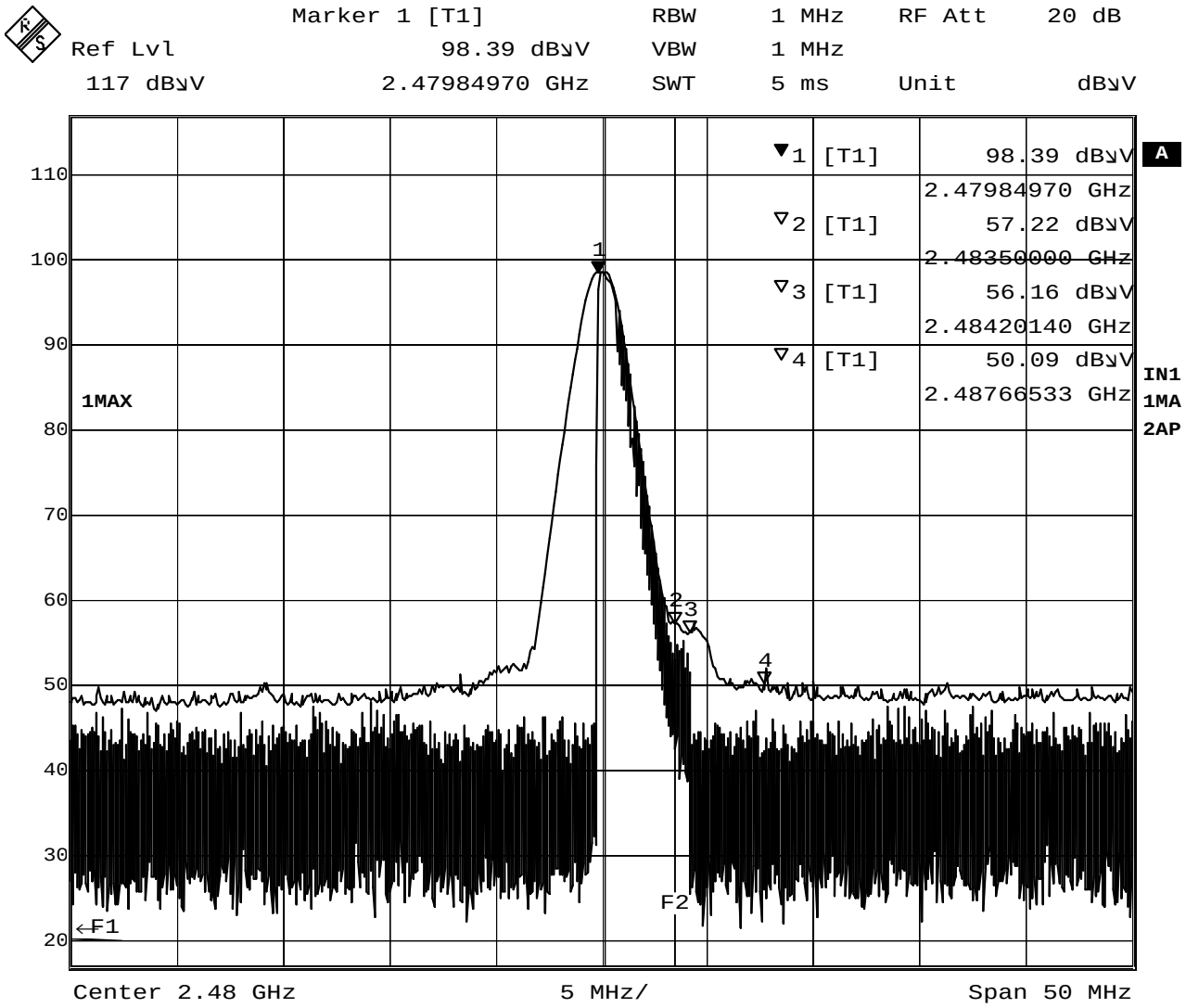
11.5 Measurement plots for adjacent restricted band



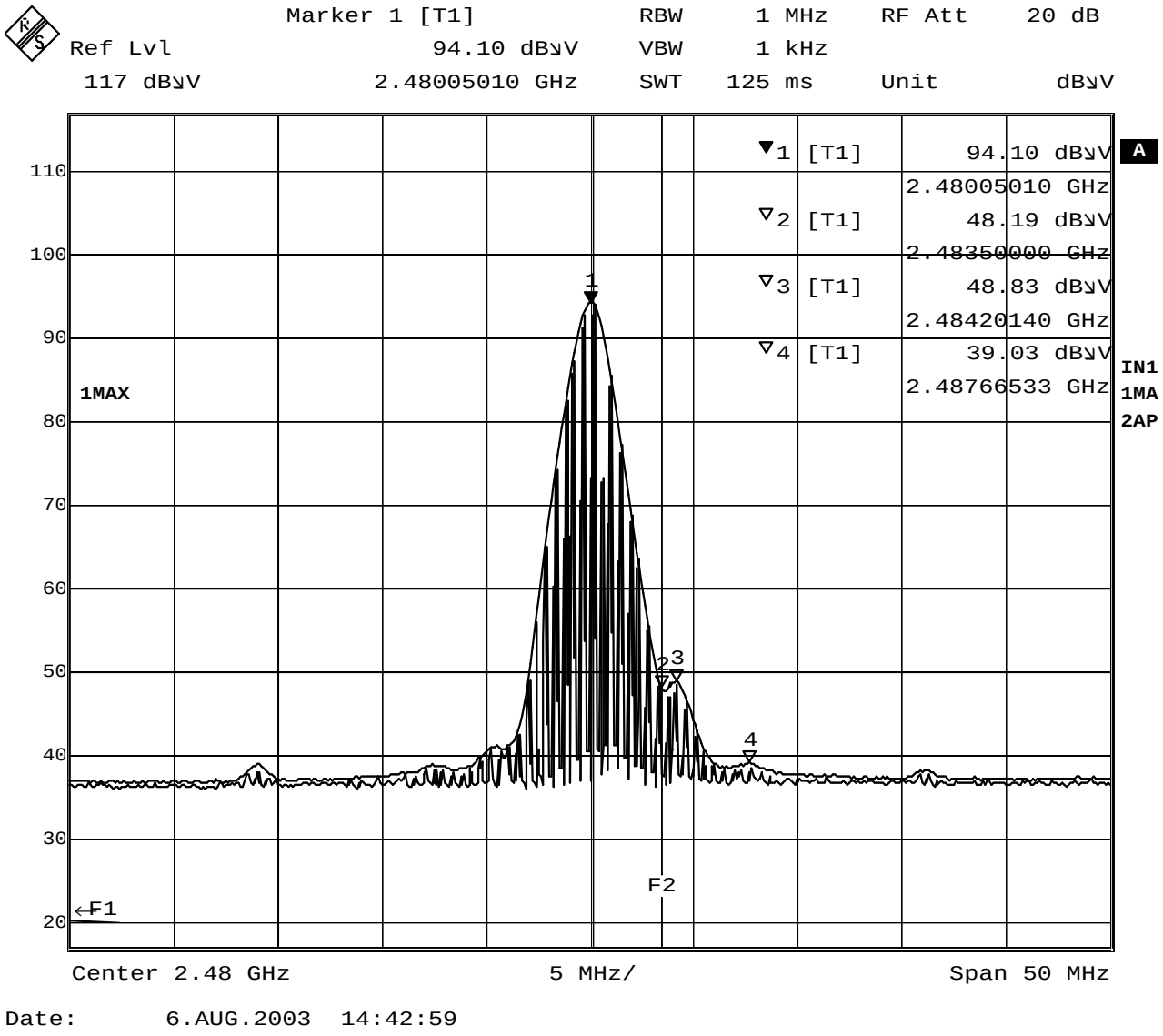
Plot 11-2-1 Ch.1 2402MHz TX (Peak)



Plot 11-2-2 Ch.1 2402MHz TX (Average)



Plot 11-2-3 Ch.79 2480MHz TX (Peak)



Plot 11-2-4 Ch.79 2480MHz TX (Average)