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

Document Number : FCC 19-0236-0

Product: IBM 11a/b/g Wireless LAN Mini PCI Adapter

measured with **IBM ThinkPad R50 Series**

FCC ID: ANO20030400LEG
IC: 349E-PH12127E

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
Shigeru Motoki

Signature: 

IBM Japan, Ltd.
EMC Engineering
LAB-S59
1623-14, Shimotsuruma,
Yamato-shi Kanagawa-ken 242, Japan
Phone: +81-46-215-2239
Fax: +81-46-273-7420
E-Mail: motokis@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 11a/b/g Wireless LAN Mini PCI Adapter
with
IBM ThinkPad R50 Series

FCC ID : ANO20030400LEG

August 15, 2003

This report concerns: (check one) Original Grant _____ Class I change _____ Class II change ___✓___ Equipment type: Wireless LAN device
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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.
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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

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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 11a/b/g Wireless LAN Mini PCI Adapter
FCC ID IC Certification Number	: ANO20030400LEG : 349E-PH12127E
SERIAL NUMBER	: A310037304
PYSICAL CONDITION	: Preproduction
KIND OF EQUIPMENT	: Personal computer with a IEEE802.11a, 11b & 11g Wireless LAN Mini-PCI Combo Card (Composite application)
TESTED DATE	: July 14, 16, 17, 18, 22, 23, 25, 28, 29 and August 7, 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 March 19, 2001 as number **IC 349E** for chamber #2, and 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 11a/b/g Wireless LAN Mini PCI Adapter (s/n A310037304)	FCC ID: ANO20030400LEG IC: 349E-PH12127E	**Applying equipment** IEEE802.11a/b/g Wireless LAN Mini-PCI Combo Card without antenna
ThinkPad R50 Series M/T 1829-38x (s/n ZZ-08189) M/T 1829-62x (s/n ZZ-08233)	N/A	IBM Notebook PC with built_in antenna CPU: Intel® Pentium® M Processor, 1.5GHz LCD: 14 inch CPU: Intel® Pentium® M Processor, 1.6GHz LCD: 15 inch
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 DTS (Digital Transmissions System) 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 : Transmit mode (TX):		Condition	Result
15.247(a)(2) **6.2.2(o)**	Bandwidth at 6 dB below	FCC requirement RSS-210 Issue5: Amendment	Conducted	Pass
– **5.9.1**	Occupied BW (Bandwidth at 20 dB below)	IC requirement		Pass
15.247(c) **6.2.2(o)(e1)**	Out of Band Emissions	The radiated emission in any 100kHz of outband shall be at least 20dB below the highest inband spectral density.		Pass
15.247(b)(3) **6.2.2(o)(b)**	Transmitter peak output power	Shall not exceed 1.0 W.		Pass
15.247(d) **6.2.2(o)(b)**	Transmitter power spectral Density	Shall not be greater than 8 dBm in any 3kHz band.		Pass
15.207 **6.2.2(o)(e3)** **/ 6.6**	AC Wireline Conducted Emissions 150kHz – 30MHz	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** **/6.2.2(o)(e3)** **/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 Table3.	Radiated (30MHz-1GHz)	Pass
			Radiated (1– 25GHz)	Pass

	Test Items : Receive mode (RX):			
15.207 **6.2.2(o)(e3)** **/ 7.4**	AC Wireline Conducted Emissions 150kHz – 30MHz	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 **6.2.1** **/6.2.2(o)(e3)** **/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 Table3.	Radiated (30MHz -1GHz)	Pass
			Radiated (1– 25GHz)	Pass

	Other requirements		Result
15.247(b)(4)(i) **–**	Antenna gain	Peak gain of the device : 1.84 dBi	N/A
15.203 **6.2.2(o)(e2)**	Unique antenna connector	The device employs an unique **electronic handshake** connector. Refer to “Confidential_E-Handshake.pdf (BIOS_Lock)” exhibit.	complies

C. Operation Mode of EUT

1. All tests were performed using the "Atheros Radio Test" program. This tool supports the continuous transmission mode for the testing purpose.
2. The following frequencies were chosen for the measurements of each 2.4GHz or 5.8GHz band.
   - 2412MHz (lowest), 2437MHz(middle), and 2462MHz (highest) for 2.4GHz band
   - 5745MHz (lowest), 5785MHz(middle), and 5825MHz (highest) for 5.8GHz band
3. 11Mbps, 18Mb/s, and 24Mbps transmission modes were selected for full testing as the worse case samplings. See "Chapter 3. Conducted Peak Output Power" as to the determination of measurement plots.
4. As for the RF receiving test, the middle channels (2437MHz or 5785MHz) were selected representatively.

Table-C Transmission mode of EUT (The measurement plots are shown in shading.)

Operation Frequency [GHz]	Rated output power (conducted) [dBm]										
	IEEE802.11b			**IEEE802.11g**							
	1/2M bps	5.5M bps	11M bps	6M bps	9M bps	12M bps	18M bps	24M bps	36M bps	18M bps	54M bps
2.412 (Ch. 1)	+17	+17	+17	+14	+14	+14	+14	+14	+14	13.5	11.5
2.417 (Ch. 2)	+17	+17	+17	+17	+17	+17	+17	+17	15.5	13.5	11.5
2.422 (Ch. 3)	+17	+17	+17	+17	+17	+17	+17	+17	15.5	13.5	11.5
2.427 (Ch. 4)	+17	+17	+17	+17	+17	+17	+17	+17	15.5	13.5	11.5
2.432 (Ch. 5)	+17	+17	+17	+17	+17	+17	+17	+17	15.5	13.5	11.5
2.437 (Ch. 6)	+17	+17	+17	+17	+17	+17	+17	+17	15.5	13.5	11.5
2.442 (Ch. 7)	+17	+17	+17	+17	+17	+17	+17	+17	15.5	13.5	11.5
2.447 (Ch. 8)	+17	+17	+17	+17	+17	+17	+17	+17	15.5	13.5	11.5
2.452 (Ch. 9)	+17	+17	+17	+17	+17	+17	+17	+17	15.5	13.5	11.5
2.457 (Ch. 10)	+17	+17	+17	+17	+17	+17	+17	+17	15.5	13.5	11.5
2.462 (Ch. 11)	+17	+17	+17	+14	+14	+14	+14	+14	+14	13.5	11.5
				IEEE802.11a							
5.745 (Ch.149)	N/A			+16	+16	+16	+16	+16	+15	+12	+10
5.765 (Ch.153)				+16	+16	+16	+16	+16	+15	+12	+10
5.785 (Ch.157)				+16	+16	+16	+16	+16	+15	+12	+10
5.805 (Ch.161)				+16	+16	+16	+16	+16	+15	+12	+10
5.825 (Ch.165)				+16	+16	+16	+16	+16	+15	+12	+10

D. Justification

The EUT was investigated for both the main (left) and the auxiliary (right) antennas for each Tx mode. The worse case data taken in this report represents the measurement result of the right antenna of 14 inch LCD model that has comparatively higher gain in 2.4GHz band and the left antenna of 15inch LCD model in 5.8GHz band as shown below.

Table-D Peak Antenna Gains of EUT

		14 inch LCD	15 inch LCD
2.4GHz band	Left Antenna gain	1.52 dBi (peak)	1.18 dBi (peak)
	Right Antenna gain	**1.84** dBi (peak)	1.71 dBi (peak)
5.8GHz band	Left Antenna gain	0.02 dBi (peak)	**1.78** dBi (peak)
	Right Antenna gain	0.19 dBi (peak)	1.51 dBi (peak)

And the columns marked with shading in the Table-C are the worst cases of each Tx mode for all measurement items. This test report represents the measurement results performed with those Tx modes.

E. Test Instruments

Table-E 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 (1 - 26.5GHz)	HP 8449B	3008A00582	06/11/03	1 year
Amplifier (26.5 - 40GHz)	Agilent 83051A	3950M00193	01/06/03	1 year
Spectrum Analyzer EMI Test Receiver	R&S ESI26	836119/003	05/01/03	1 year
Spectrum Analyzer	HP 8563E	3416A02248	08/14/02	1 year
Harmonic Mixer	Agilent 11970A	011269-001	07/19/03	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 (8.2- 12.4GHz)	EMCO 3160-7	1156	07/17/03	1 year
Horn Antenna (12.4- 18GHz)	EMCO 3160-8	1143	07/17/03	1 year
Horn Antenna (18- 26.5GHz)	EMCO 3160-9	0004-1202	07/17/03	1 year
Horn Antenna (26.5- 40GHz)	EMCO 3160-10	1175	07/17/03	1 year
LISN	EMCO 3825/2	1426	09/01/02	1 year
Power Meter	HP 437B	3043U03437	11/08/02	1 year
Power Sensor	HP 8481A	US41030582	11/08/02	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
Coaxial cables (1 – 18GHz):	Length:			
- Horn Ant <=> RF Amp.	6 m	- EM206SCO	09/05/02	1 year
- RF Amp.<=>Spectrum Analyzer(<12GHz)	16m	- GEM0101	03/27/03	1 year
- RF Amp.<=>Spectrum Analyzer(>12GHz)	3 m	- SF102-20166	09/05/02	1 year

Coaxial cables (18 – 40GHz):				
- Horn Ant <=> RF Amp.	3m	- SF102-20167	09/05/02	1 year
- RF Amp.<=>Spectrum Analyzer	1m	- SF102-21105	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

F. 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.

G. Temperature and Humidity

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

Prepared by T. Asano

H. 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. Bandwidth at 6 dB below

[FCC 15.247(a)(2)]

1.1 Test Procedure

The bandwidth at 6 dB down from the highest inband spectral density was measured with a spectrum analyzer connected to the antenna terminal, while EUT was operating in transmission mode at the appropriate center frequency.
The spectrum analyzer was set to :
RBW=100kHz, VBW=100kHz[*1], Span=30MHz, Sweep=suitable duration based on the EUT specification
*1: To be adjusted accordingly based on the spectrum stability

1.2 Test Instruments and Measurement Setup

Table 1-1 : 6 dB Bandwidth Test Instruments

Description	**Model**	**Serial Number**
Spectrum Analyzer EMI Test Receiver	R&S ESI26	836119/003
Coax cables: - Spectrum Analyzer <=> EUT	Length: Loss: 110 cm 1.3 dB (for 2.4GHz) 2.3 dB (for 5.8GHz)	

Notes: - R&S: Rohde & Schwarz

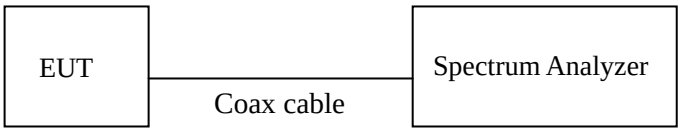


Figure 1: Measurement setup for 6dB bandwidth test

1.3 Measurement Results

Test Date: July 16, 2003

1.3.1 2.4GHz band DSSS mode

Table 1-2-1. 6dB bandwidth, 2.4GHz band DSSS mode, TX mode 1Mbps

Center Frequency (MHz)	Trace number	Lower frequency (MHz)	Upper frequency (MHz)	Bandwidth at 6 dB below (MHz)	Limit (MHz)
2412 (ch. 1)	Plot 1-1	2405.99	2418.10	12.11	> 0.5
2437 (ch. 6)	omitted	2430.96	2443.16	12.20	
2462 (ch. 11)	omitted	2455.96	2468.10	12.14	

Table 1-2-2. 6dB bandwidth, 2.4GHz band DSSS mode, TX mode 11Mbps

Center Frequency (MHz)	Trace number	Lower frequency (MHz)	Upper frequency (MHz)	Bandwidth at 6 dB below (MHz)	Limit (MHz)
2412 (ch. 1)	Plot 1-2	2406.47	2417.50	11.03	> 0.5
2437 (ch. 6)	omitted	2430.84	2442.80	11.96	
2462 (ch. 11)	omitted	2456.20	2467.62	11.42	

1.3.2 2.4GHz band OFDM mode

Table 1-2-3. 6dB bandwidth, 2.4GHz band OFDM mode, TX mode 6Mbps

Center Frequency (MHz)	Trace number	Lower frequency (MHz)	Upper frequency (MHz)	Bandwidth at 6 dB below (MHz)	Limit (MHz)
2412 (ch. 1)	omitted	2403.73	2420.39	16.66	> 0.5
2437 (ch. 6)	Plot 1-3	2428.73	2445.39	16.66	
2462 (ch. 11)	omitted	2453.73	2470.39	16.66	

Table 1-2-4. 6dB bandwidth, 2.4GHz band OFDM mode, TX mode 18Mbps

Center Frequency (MHz)	Trace number	Lower frequency (MHz)	Upper frequency (MHz)	Bandwidth at 6 dB below (MHz)	Limit (MHz)
2412 (ch. 1)	omitted	2403.73	2420.33	16.60	> 0.5
2437 (ch. 6)	Plot 1-4	2428.73	2445.33	16.60	
2462 (ch. 11)	omitted	2453.73	2470.33	16.60	

1.3.3 5.8GHz band OFDM mode

Table 1-2-5. 6dB bandwidth, 5.8GHz band OFDM mode, TX mode 6Mbps

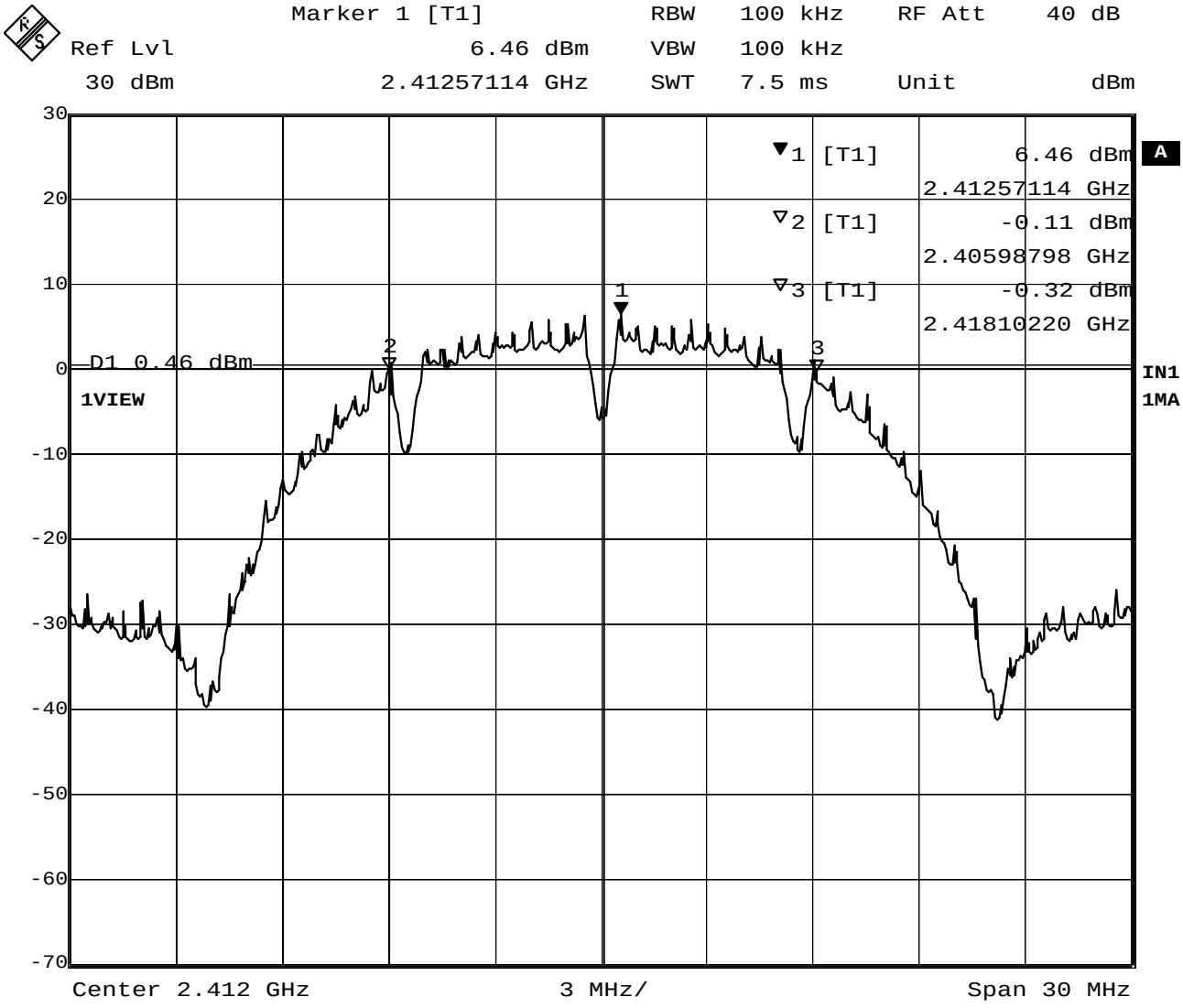
Center Frequency (MHz)	Trace number	Lower frequency (MHz)	Upper frequency (MHz)	Bandwidth at 6 dB below (MHz)	Limit (MHz)
5745 (ch. 149)	omitted	5736.73	5753.39	16.66	> 0.5
5785 (ch. 157)	Plot 1-5	5776.73	5793.39	16.66	
5825 (ch. 165)	omitted	5816.73	5833.39	16.66	

Table 1-2-6. 6dB bandwidth, 5.8GHz band OFDM mode, TX mode 24Mbps

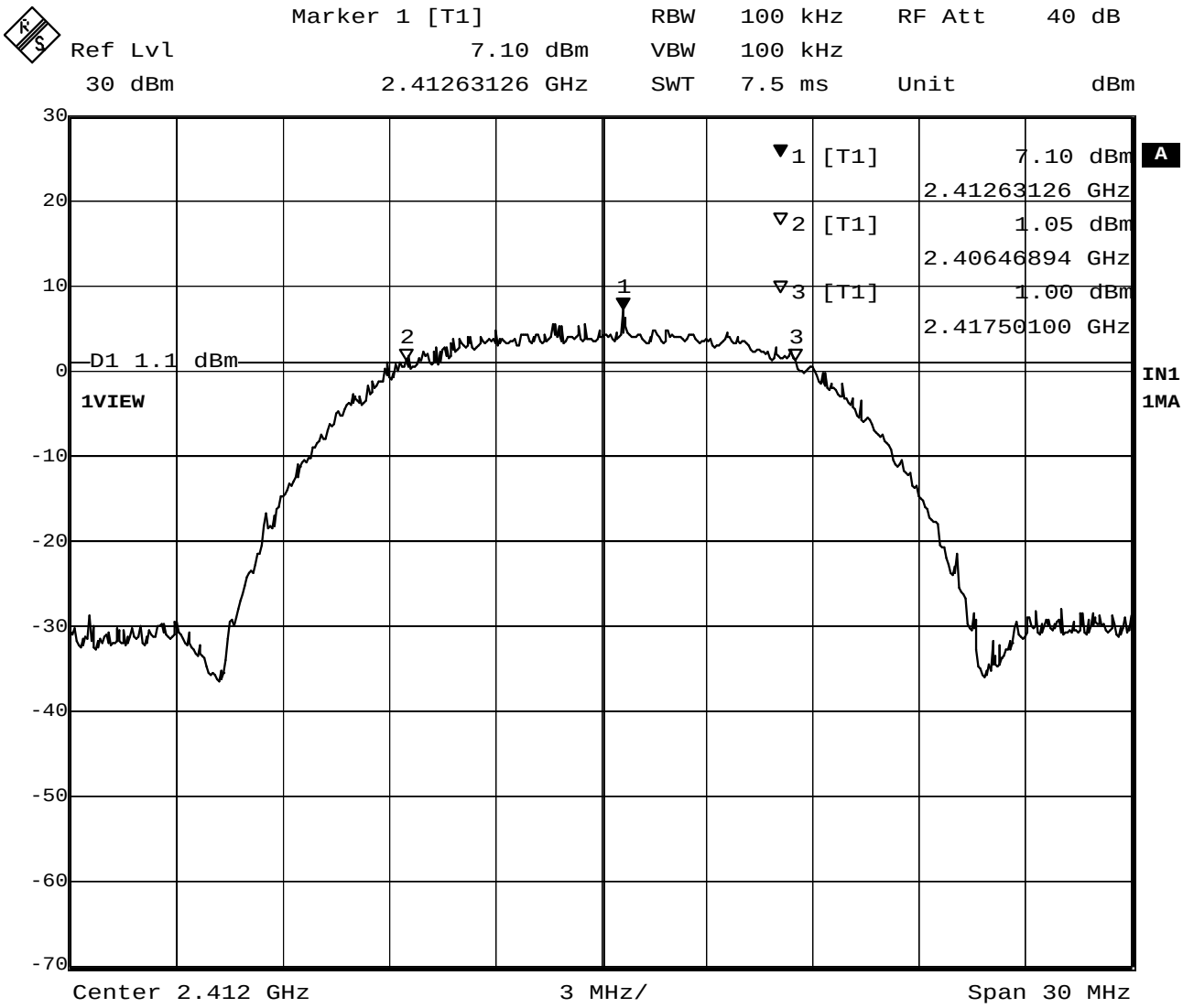
Center Frequency (MHz)	Trace number	Lower frequency (MHz)	Upper frequency (MHz)	Bandwidth at 6 dB below (MHz)	Limit (MHz)
5745 (ch. 149)	omitted	5736.73	5753.39	16.66	> 0.5
5785 (ch. 157)	Plot 1-6	5776.73	5793.39	16.66	
5825 (ch. 165)	omitted	5816.73	5833.39	16.66	

1.4 Trace Data of 6dB bandwidth

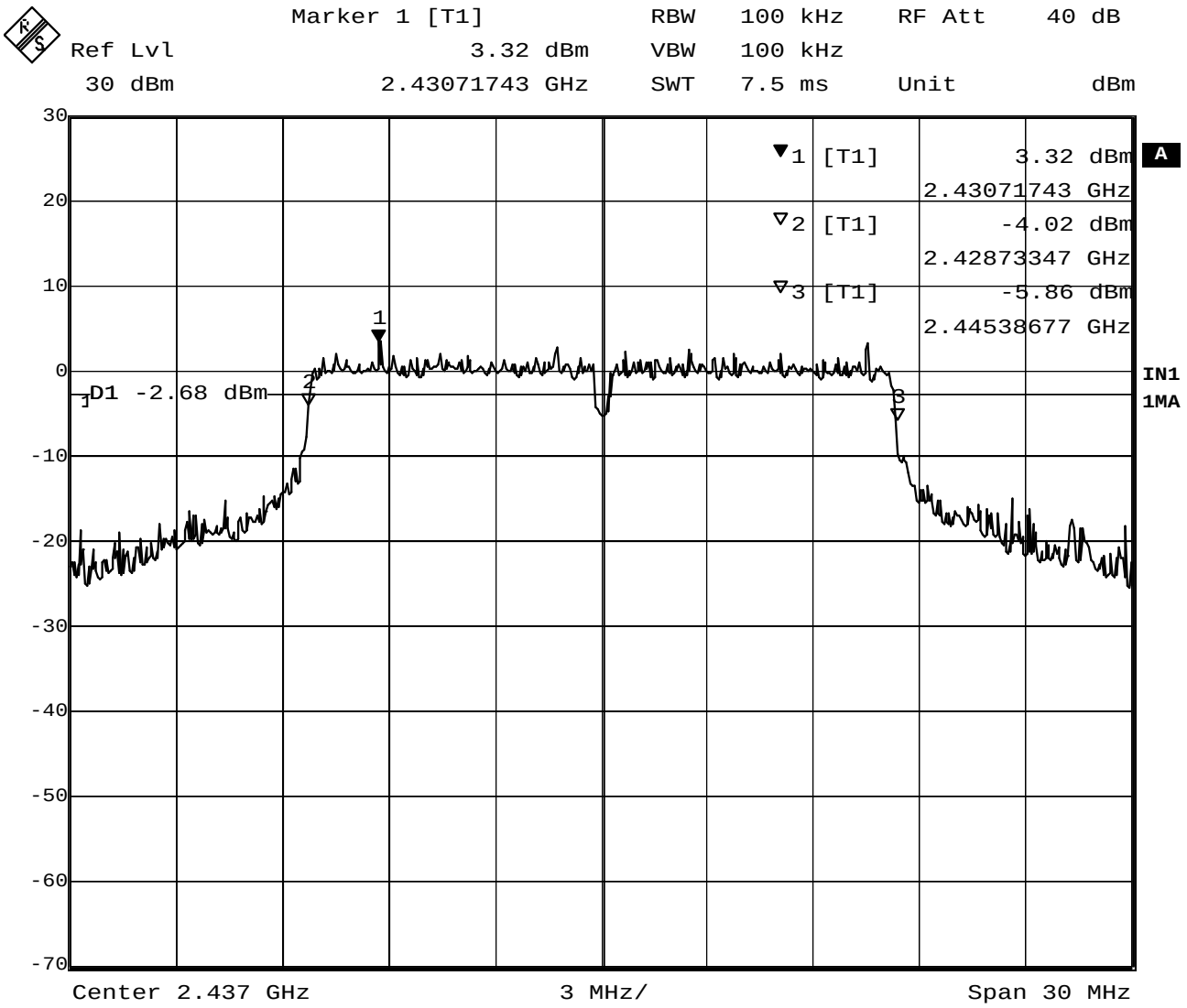
The plots are comparatively worse measurement cases in the tested Tx modes.



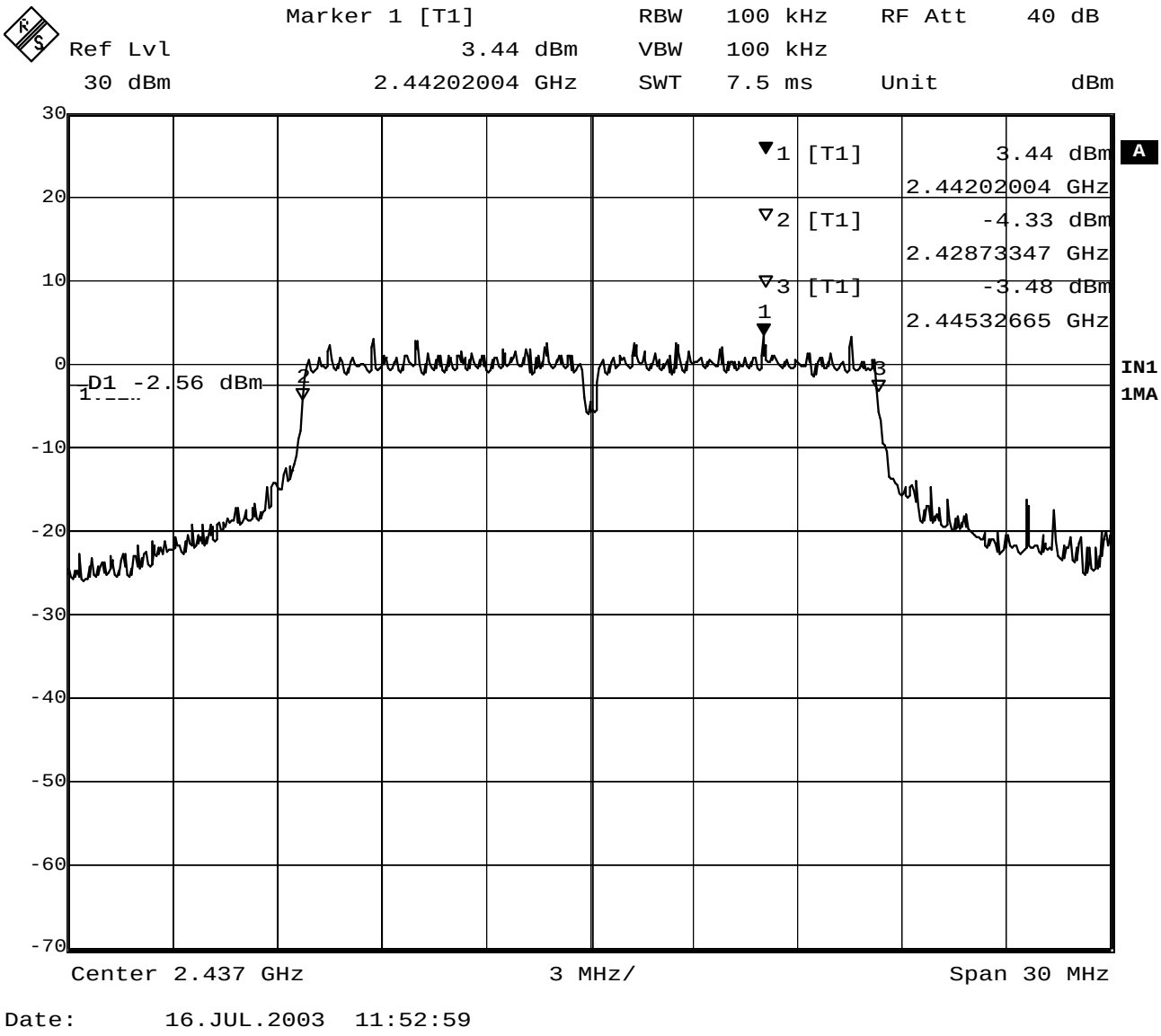
Plot 1-1. 6dB BW at 2412MHz, (DSSS, 1Mbps)



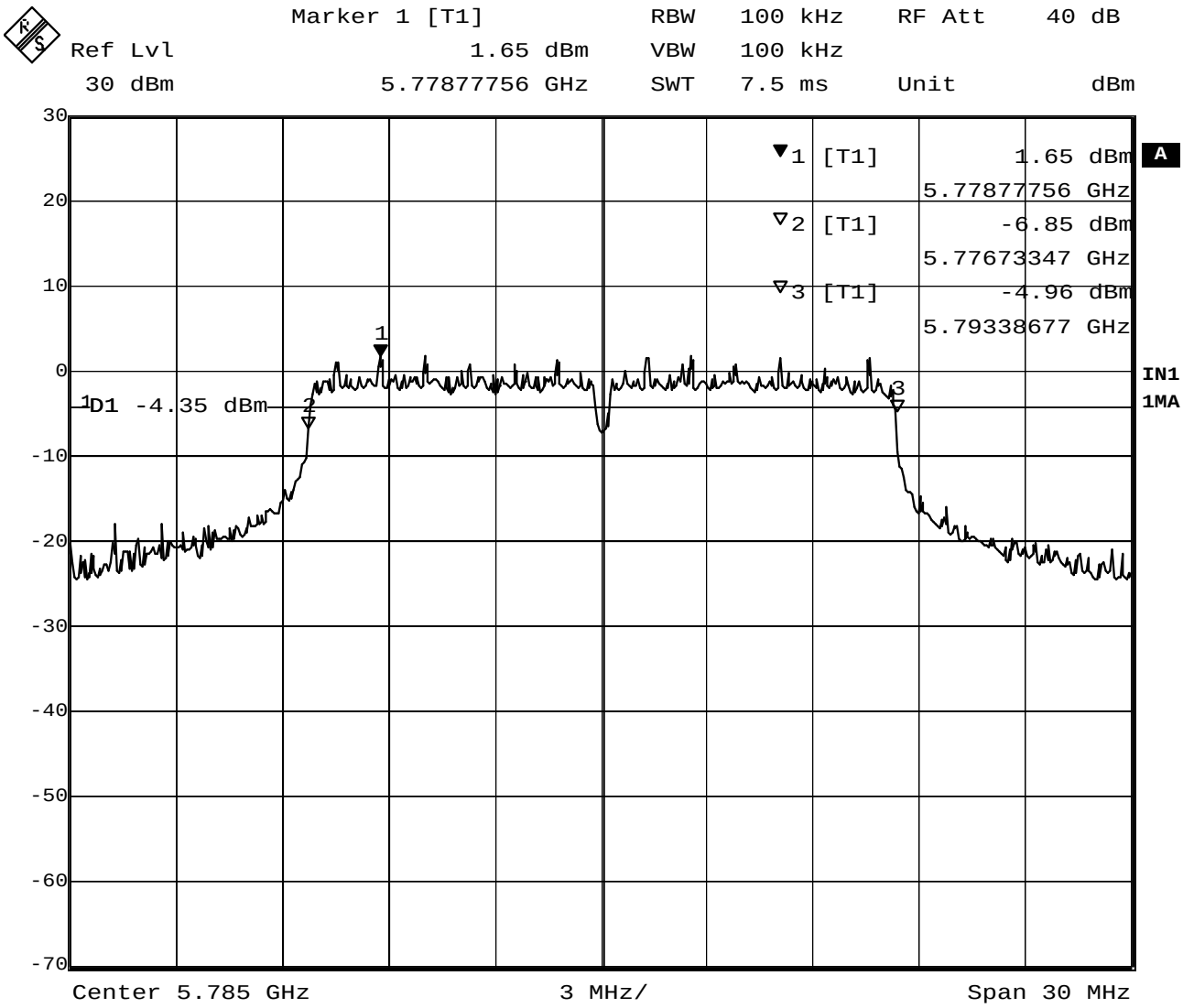
Plot 1-2. 6dB BW at 2412MHz (DSSS, 11Mbps)



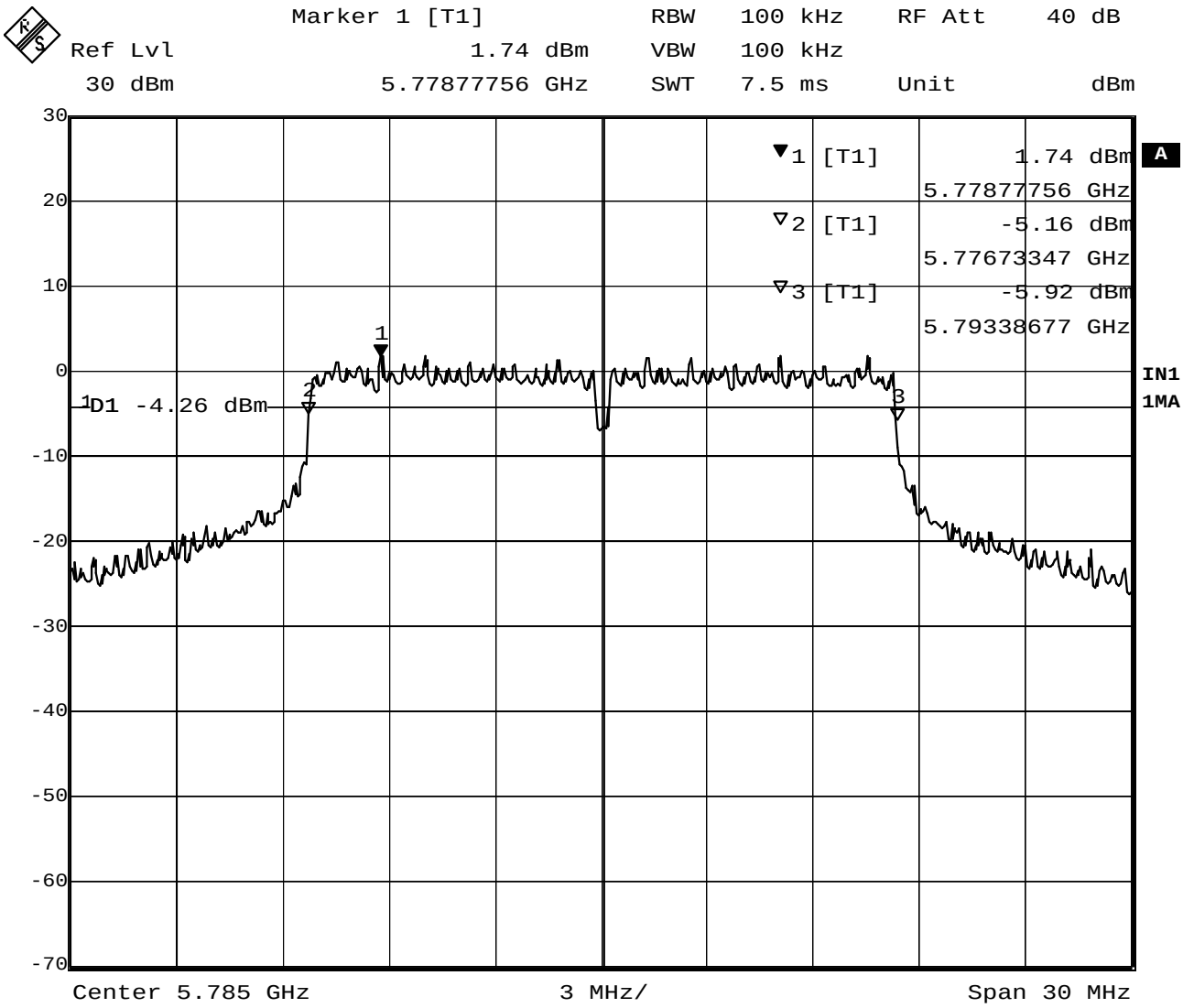
Plot 1-3. 6dB BW at 2437MHz (OFDM, 6Mbps)



Plot 1-4. 6dB BW at 2437MHz (OFDM, 18Mbps)



Plot 1-5. 6dB BW at 5785MHz (OFDM, 6Mbps)



Plot 1-6. 6dB BW at 5785MHz (OFDM, 24Mbps)

2. Occupied Bandwidth (20 dB Bandwidth)

[RSS-210 5.9.1]

2.1 Test Procedure

The bandwidth at 20 dB down from the highest inband spectral density was measured with a spectrum analyzer connected to the antenna terminal, while EUT was operating in transmission mode at the appropriate center frequency.

The spectrum analyzer was set to:

RBW=100kHz, VBW=100kHz*1, Span=50MHz, Sweep= suitable duration based on the EUT specification

*1: To be adjusted accordingly based on the spectrum stability

2.2 Test Instruments and Measurement Setup

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

2.3 Measurement Results

note) The transmission speed rate for the measurement was determined based on the results of previous 6 dB bandwidth measurement. The worse cases were selected representatively.

Test Date: July 16, 2003

2.3.1 2.4GHz band DSSS mode

Table 2-2-1. Occupied bandwidth, 2.4GHz band DSSS mode, TX 11Mbps

Center Frequency (MHz)	Trace number	Lower frequency (MHz)	Upper frequency (MHz)	Bandwidth at 20 dB below (MHz)
2412 (ch. 1)	omitted	2403.15	2420.99	17.84
2437 (ch. 6)	Plot 2-1	2428.13	2445.94	17.81
2462 (ch. 11)	omitted	2453.03	2470.99	17.96

2.3.2 2.4GHz band OFDM mode

Table 2-2-2. Occupied bandwidth, 2.4GHz band OFDM mode, TX 18Mbps

Center Frequency (MHz)	Trace number	Lower frequency (MHz)	Upper frequency (MHz)	Bandwidth at 20 dB below (MHz)
2412 (ch. 1)	omitted	2402.63	2421.67	19.04
2437 (ch. 6)	omitted	2427.43	2446.52	19.09
2462 (ch. 11)	Plot 2-2	2452.83	2471.07	18.24

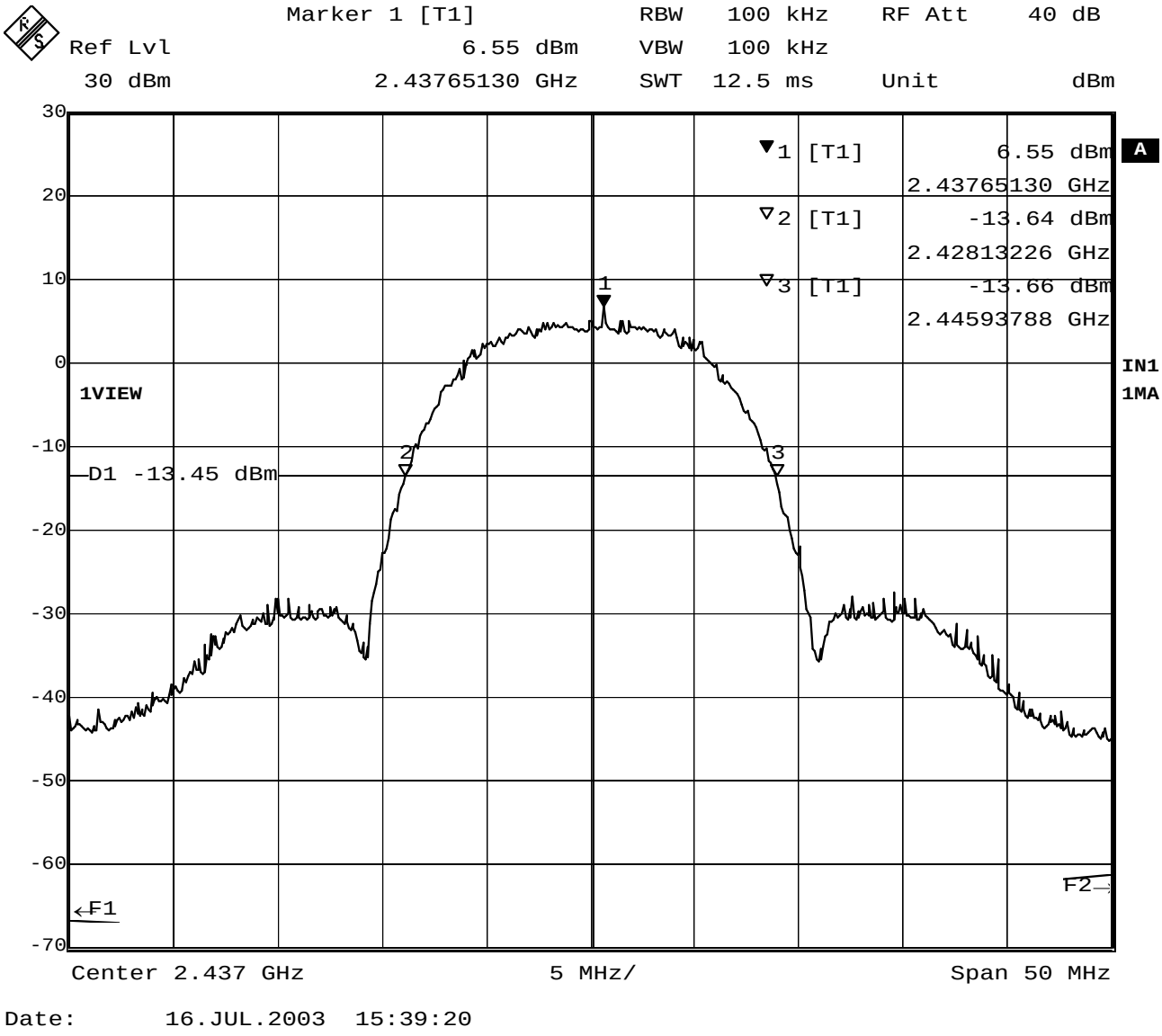
2.3.3 5.8GHz band OFDM mode

Table 2-2-3. Occupied bandwidth, 5.8GHz band OFDM mode, TX 24Mbps

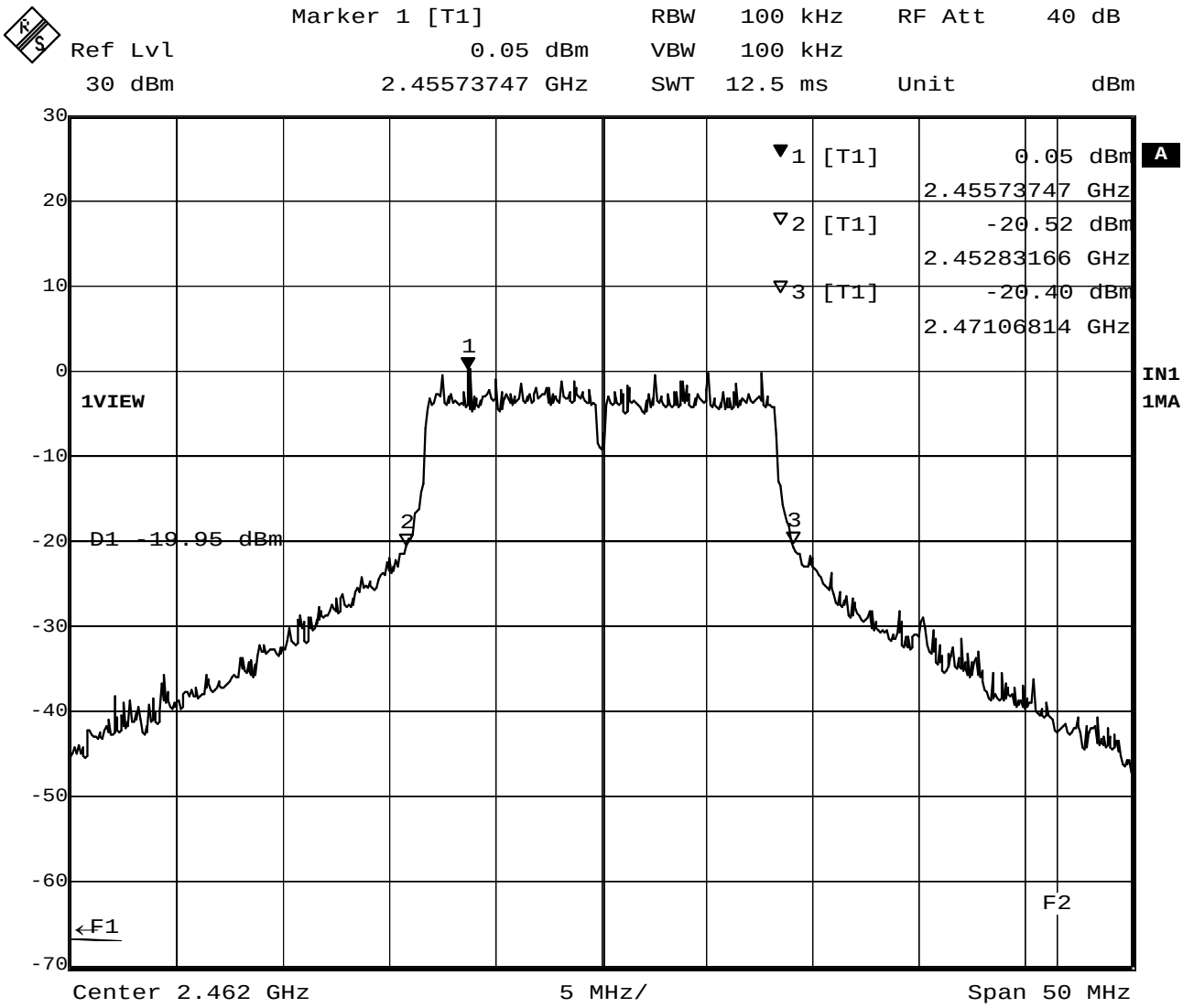
Center Frequency (MHz)	Trace number	Lower frequency (MHz)	Upper frequency (MHz)	Bandwidth at 20 dB below (MHz)
5745 (ch. 149)	Plot 2-3	5735.03	5754.37	19.34
5785 (ch. 157)	omitted	5775.23	5794.67	19.44
5825 (ch. 165)	omitted	5814.93	5834.67	19.74

2.4 Trace Data of Occupied Bandwidth

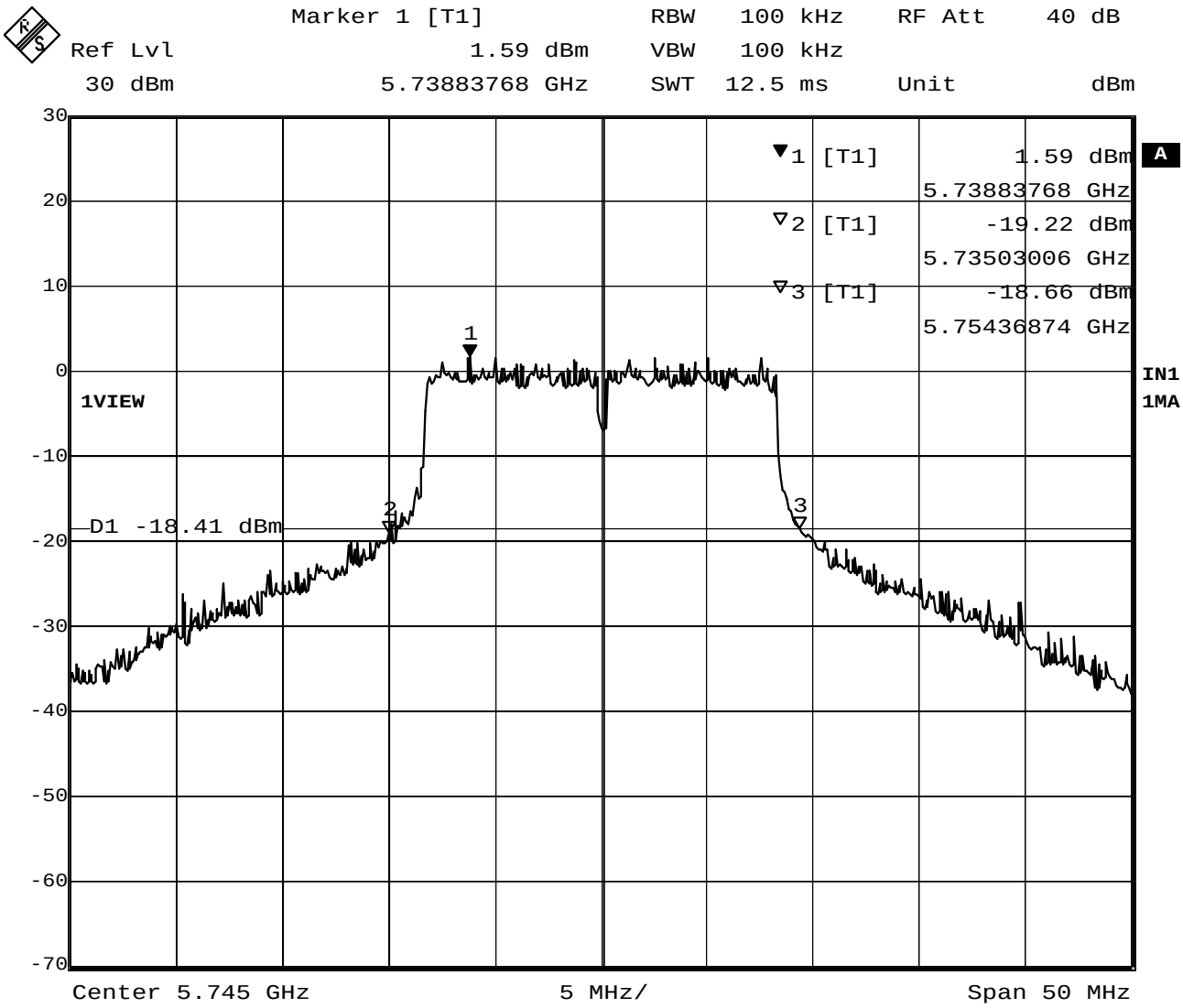
Comparatively worse measurement plots of each Tx mode are selected.



Plot 2-1. 20dB BW at 2437MHz (DSSS, 11Mbps)



Plot 2-2. 20dB BW at 2462MHz (OFDM, 18Mbps)



Plot 2-3. 20dB BW at 5745MHz (OFDM, 24Mbps)

3. Conducted Peak Output Power

[FCC 15.247(b)(3), RSS-210 6.2.2(o)(b)]

The test was performed with two kinds of measurement methods using power meter or spectrum analyzer.

3.1 Test Procedure

3.1.1 Power Meter measurement method

- A transmitter antenna terminal of EUT was connected to the input of a RF power sensor.
- Measurement was performed while EUT was operating in continuous transmission mode at the appropriate center frequencies. i.e. the lowest, middle, and highest frequencies of each 2.4GHz or 5.8GHz band.

Table 3-1 : Test Instruments of power meter method

Description	**Model**	**Serial Number**
Power Meter	HP 437B	3043U03437
Power Sensor	HP 8481A	US41030582
Coax cables: - Power Sensor <=> EUT	Length: Loss: 20 cm 0.7dB (for 2.4GHz) 1.3dB (for 5.8GHz)	

Notes: - HP: Hewlett Packard

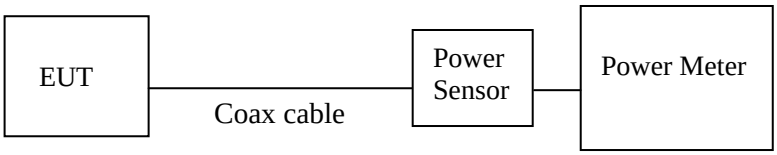


Figure 3-1: Measurement setup of power meter method

3.1.2 Spectrum Analyzer measurement method

The spectrum analyzer was connected to the antenna terminal, while EUT was operating in continuous transmission mode (shown in the Chapter C) at the appropriate center frequencies.

The spectrum analyzer was set to :
VBW= 30kHz, RBW=1MHz,
Span=30-40MHz encompassing the entire 6 dB emission bandwidth of the transmission signal,
Mode= sample detector, Trigger= free run

The band power measurement function was used to measure the peak power of each transmission mode selected by the step 3.1.1. The analyzer computed the peak power by integrating the spectrum across the 6 dB emission bandwidth given by the previous chapter.

The test instruments and setup configuration are the same as the Table 1-1 and Figure 1.

3.2 Measurement Results

Test Date: July 14 and 16, 2003

Table 3-2-1. Power meter measurement results

Operation Frequency [GHz]	Rated output power (conducted) [dBm]									
	DSSS		OFDM							
	1 / 2M bps	5.5/11M bps	6M bps	9M bps	12M bps	18M bps	24M bps	36M bps	48M bps	54M bps
2.412 (Aux)	16.37	**16.40**	13.44	13.45	13.48	**13.50**	13.39	13.33	-	-
Specification	17		14						13.5	11.5
2.437 (Aux)	16.30	**16.33**	16.11	16.14	16.16	**16.20**	16.10	-	-	-
Specification	17		17					15.5	13.5	11.5
2.462 (Aux)	16.16	**16.20**	12.91	12.93	13.01	**13.06**	12.89	12.69	-	-
Specification	17		14						13.5	11.5
5.745 (Main)	N/A		14.95	14.95	14.95	14.95	**14.96**	-	-	-
Specification			16					15	12	10
5.785 (Main)	N/A		15.21	15.22	15.22	15.22	**15.23**	-	-	-
Specification			16					15	12	10
5.825 (Main)	N/A		14.63	14.65	14.68	14.70	**14.75**	-	-	-
specification			16					15	12	10

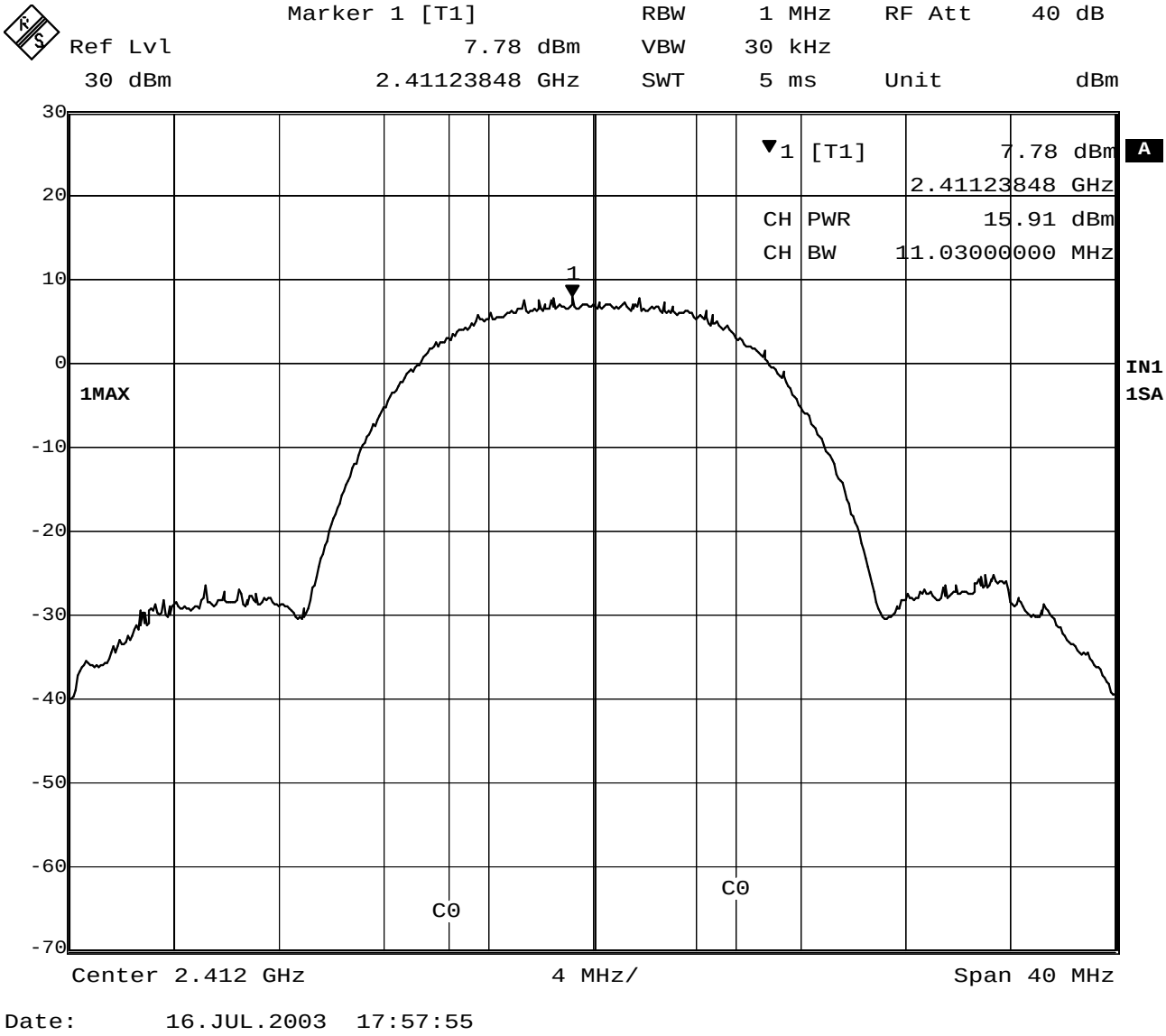
[Calculation table]

Measured Frequency (MHz)	Power Meter Reading (dBm)	Cable Loss (dB)	**Results** (dBm)	Limit		Peak antenna gain of EUT (dBi)	EIRP (dBm)	IC limit (dBm)
				FCC (dBm)	IC (dBm)			
2412 (DSSS)	**16.40**	0.7	**17.10**	30	30	-	-	N/A
2437 (DSSS)	**16.33**	0.7	**17.03**					
2462 (DSSS)	**16.20**	0.7	**16.90**					
2412 (OFDM)	**13.50**	0.7	**14.20**					
2437 (OFDM)	**16.20**	0.7	**16.90**					
2462 (OFDM)	**13.06**	0.7	**13.76**					
5745 (OFDM)	**14.96**	1.3	**16.26**			1.78	**18.04**	36
5785 (OFDM)	**15.23**	1.3	**16.53**				**18.31**	
5825 (OFDM)	**14.75**	1.3	**16.05**				**17.83**	

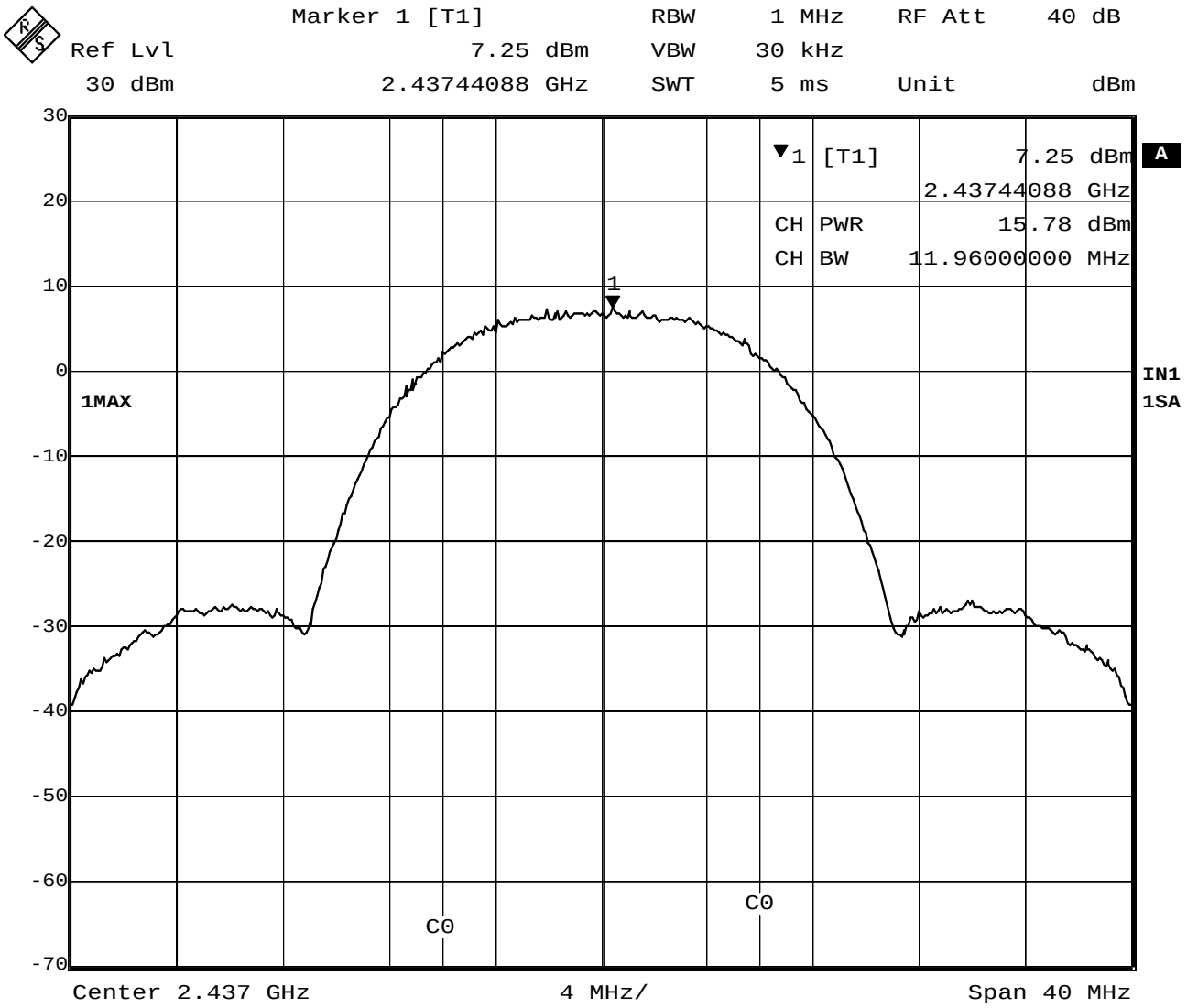
Table 3-2-2. Spectrum analyzer measurement results

Measured Frequency (MHz)	Analyzer reading (dBm)	Trace number	Cable Loss (dB)	**Results** (dBm)	Limit		Peak antenna gain of EUT (dBi)	EIRP (dBm)	IC limit (dBm)
					FCC (dBm)	IC (dBm)			
2412 (DSSS)	15.91	Plot 3-1	1.3	**17.21**	30	30	-	-	N/A
2437 (DSSS)	15.78	Plot 3-2	1.3	**17.08**					
2462 (DSSS)	15.67	Plot 3-3	1.3	**16.97**					
2412 (OFDM)	12.95	Plot 3-4	1.3	**14.25**					
2437 (OFDM)	15.76	Plot 3-5	1.3	**17.06**					
2462 (OFDM)	12.58	Plot 3-6	1.3	**13.88**					
5745 (OFDM)	14.00	Plot 3-7	2.3	**16.30**			1.78	**18.08**	36
5785 (OFDM)	14.16	Plot 3-8	2.3	**16.46**				**18.24**	
5825 (OFDM)	14.11	Plot 3-9	2.3	**16.41**				**18.19**	

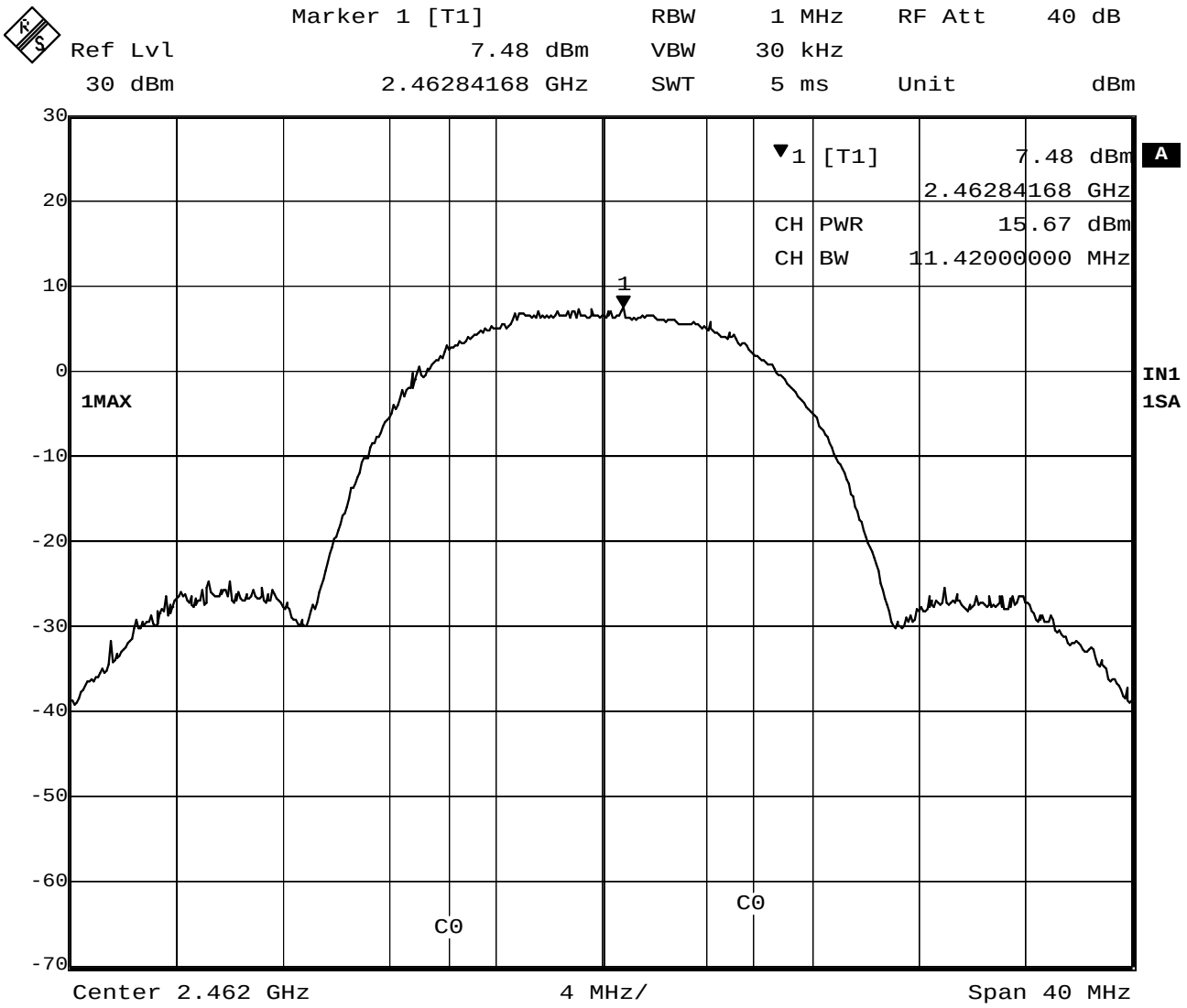
3.4 Trace Data of Conducted Peak Output Power



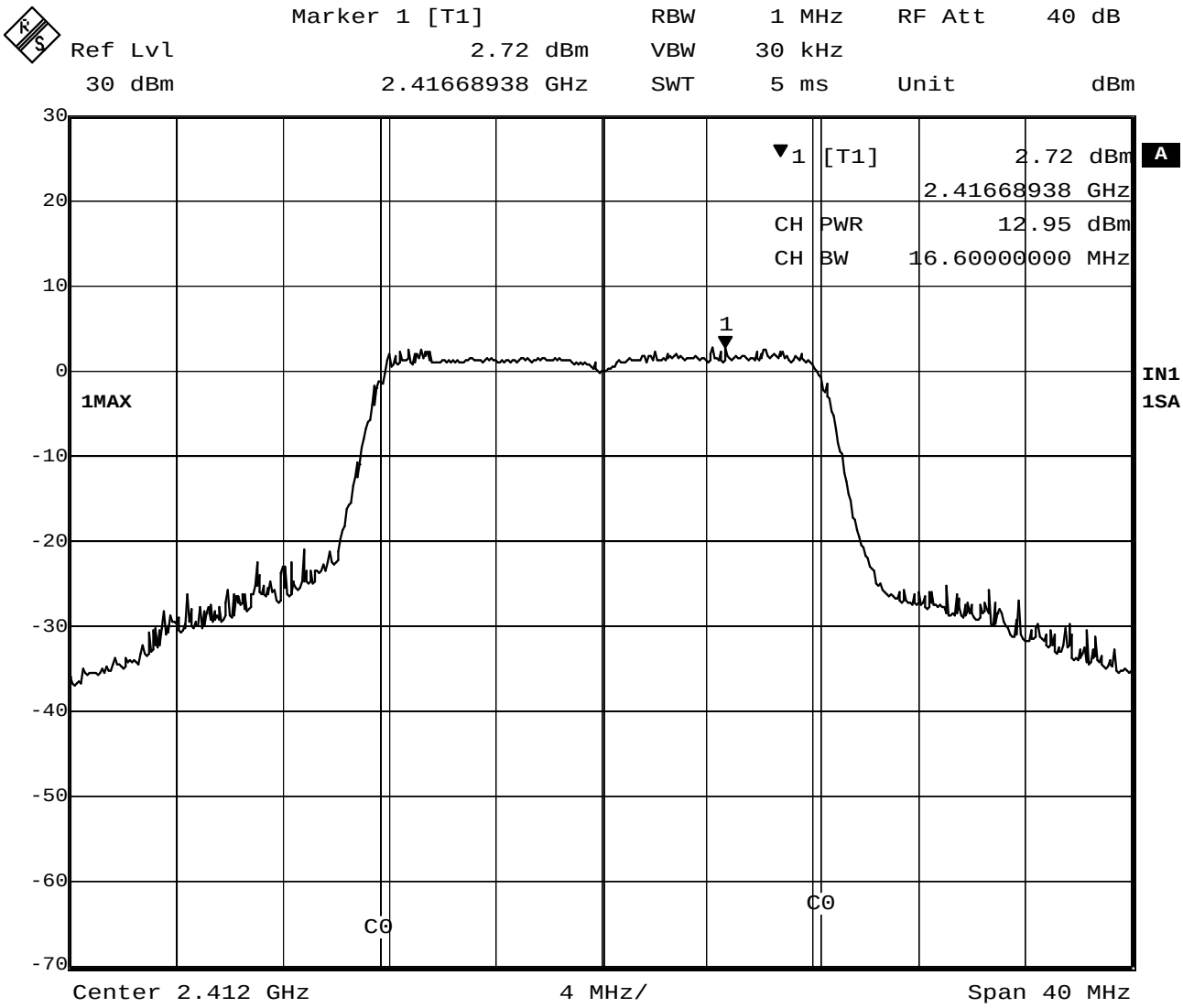
Plot 3-1. Conducted Peak Output Power of 2412MHz (DSSS, 11Mbps)



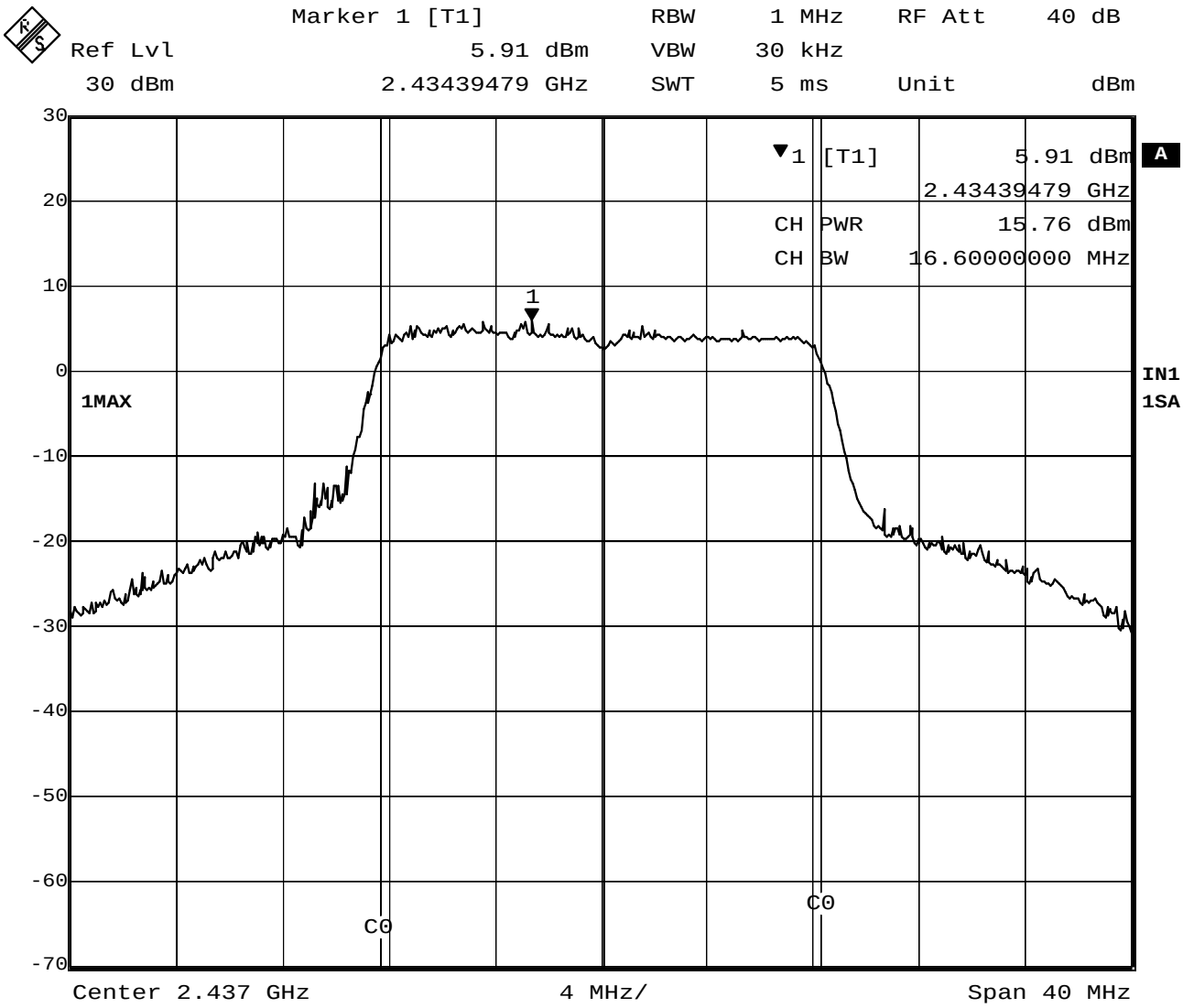
Plot 3-2. Conducted Peak Output Power of 2437MHz (DSSS, 11Mbps)



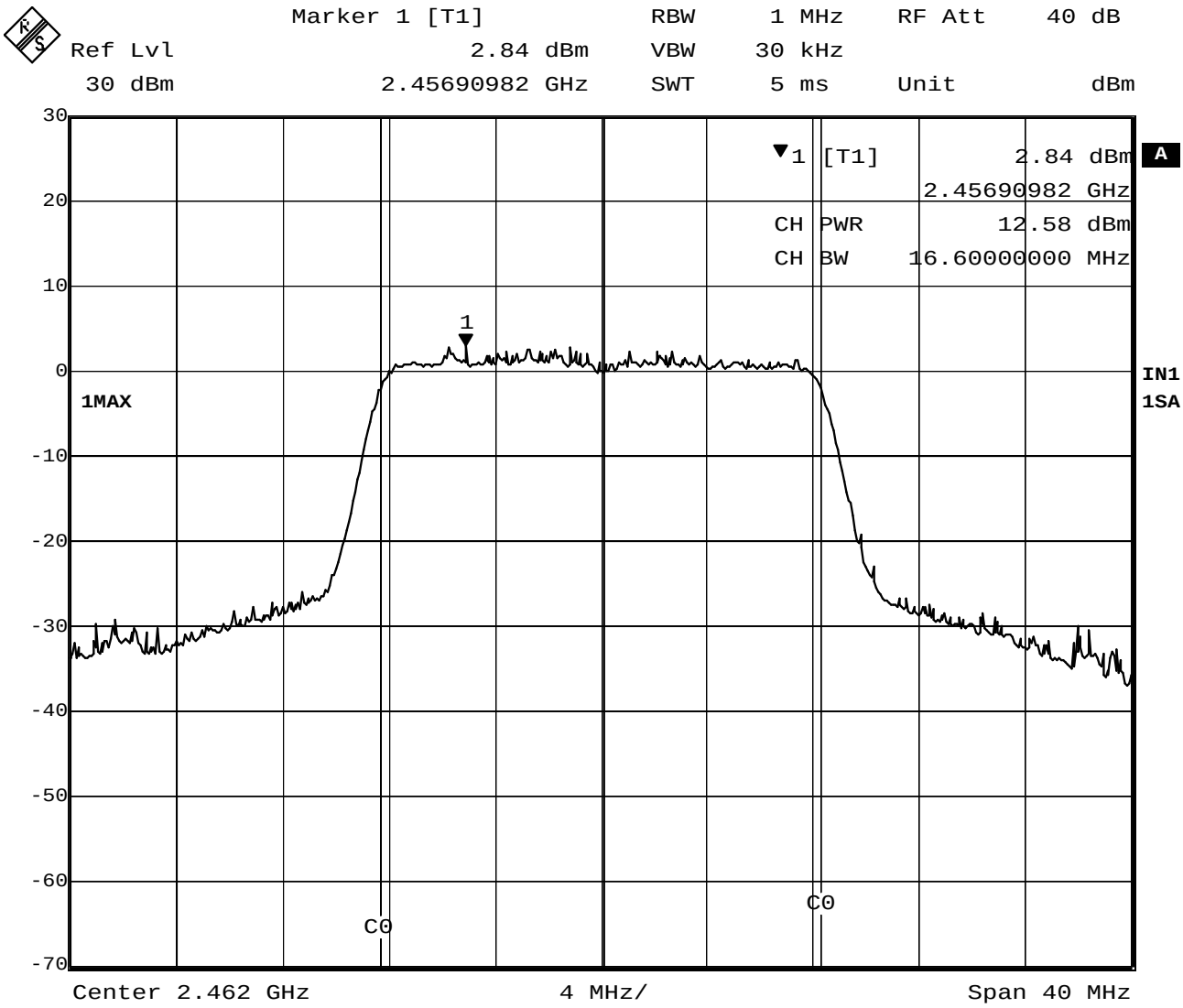
Plot 3-3. Conducted Peak Output Power of 2462MHz (DSSS, 11Mbps)



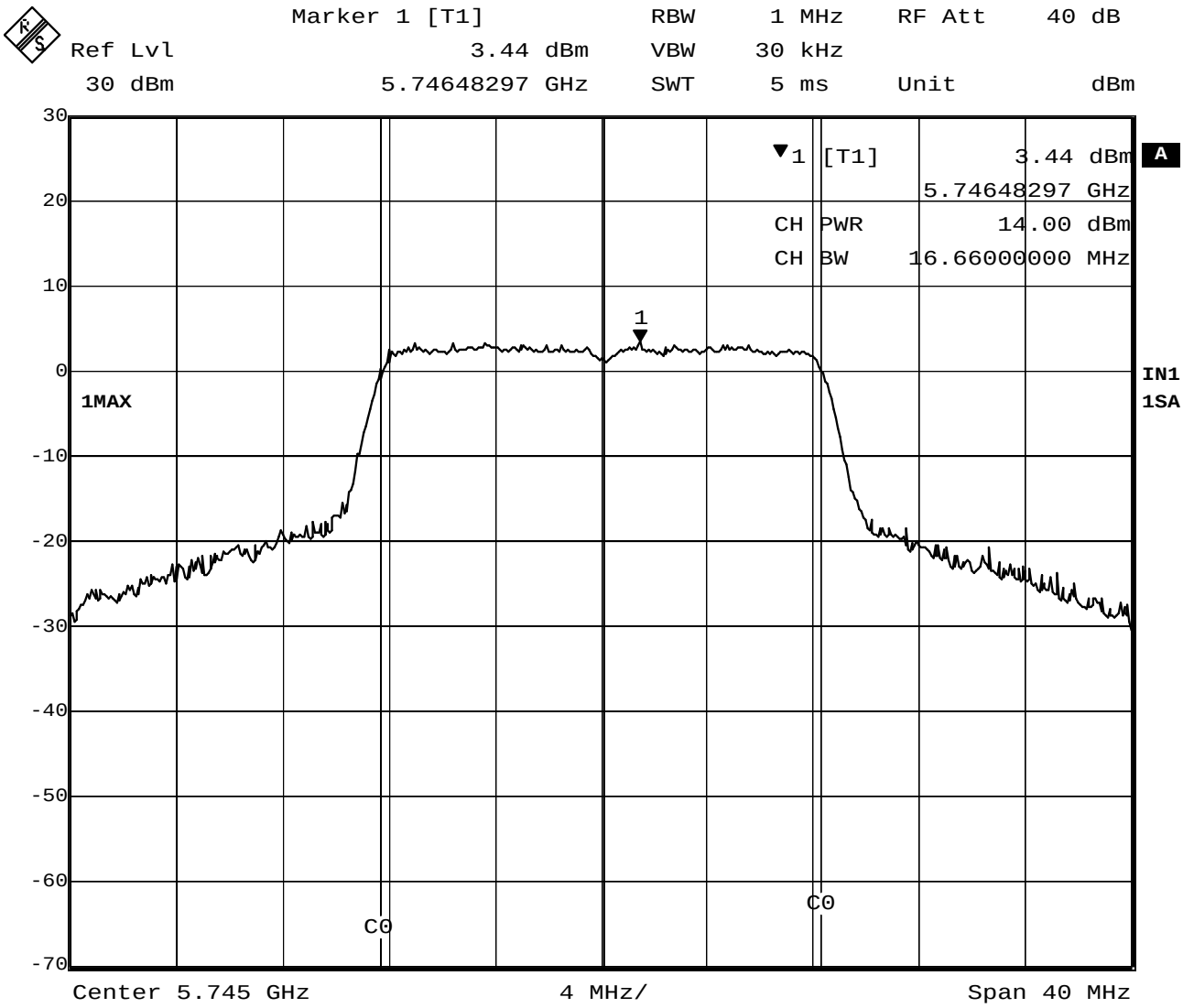
Plot 3-4. Conducted Peak Output Power of 2412MHz (OFDM, 18Mbps)



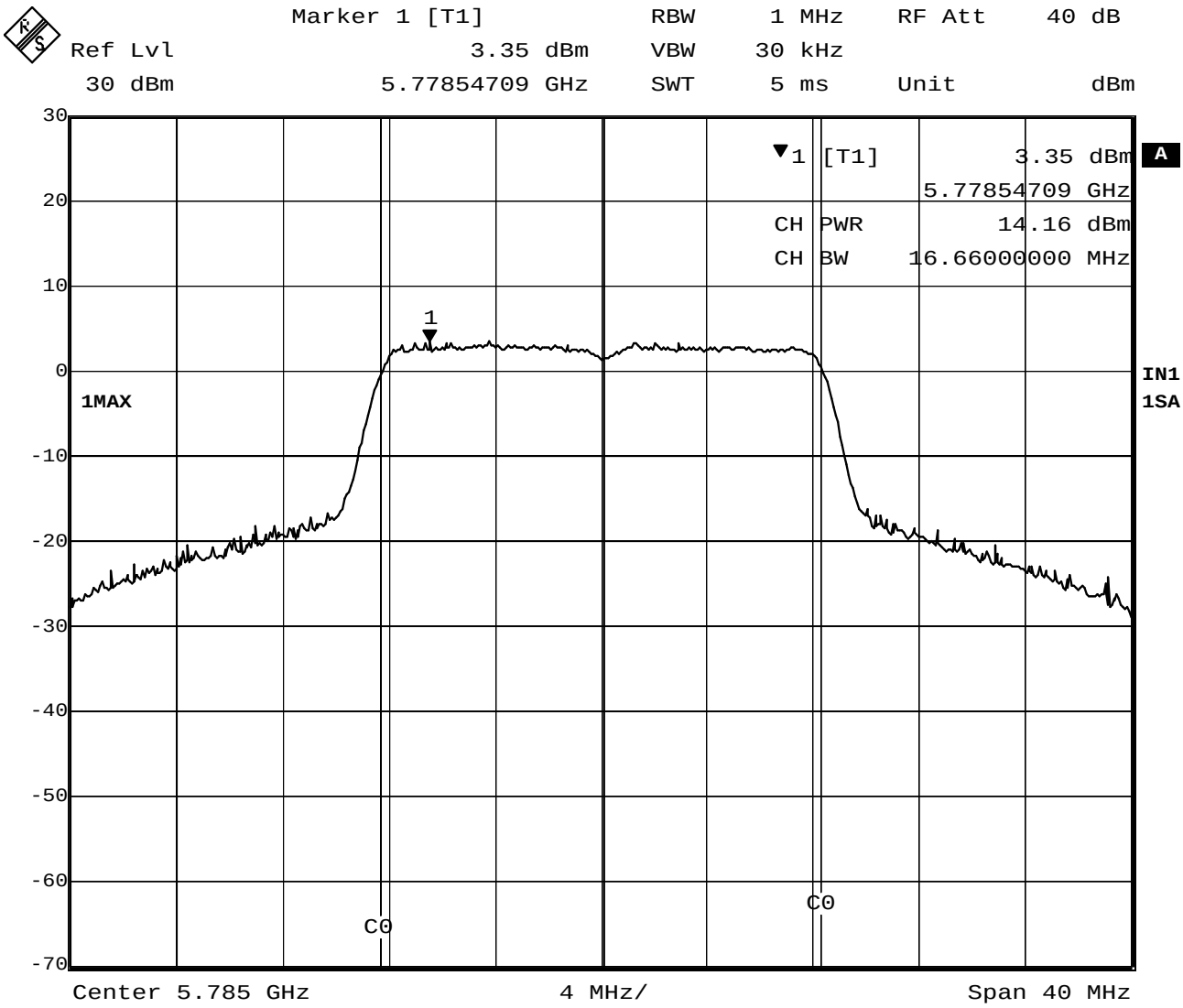
Plot 3-5. Conducted Peak Output Power of 2437MHz (OFDM, 18Mbps)



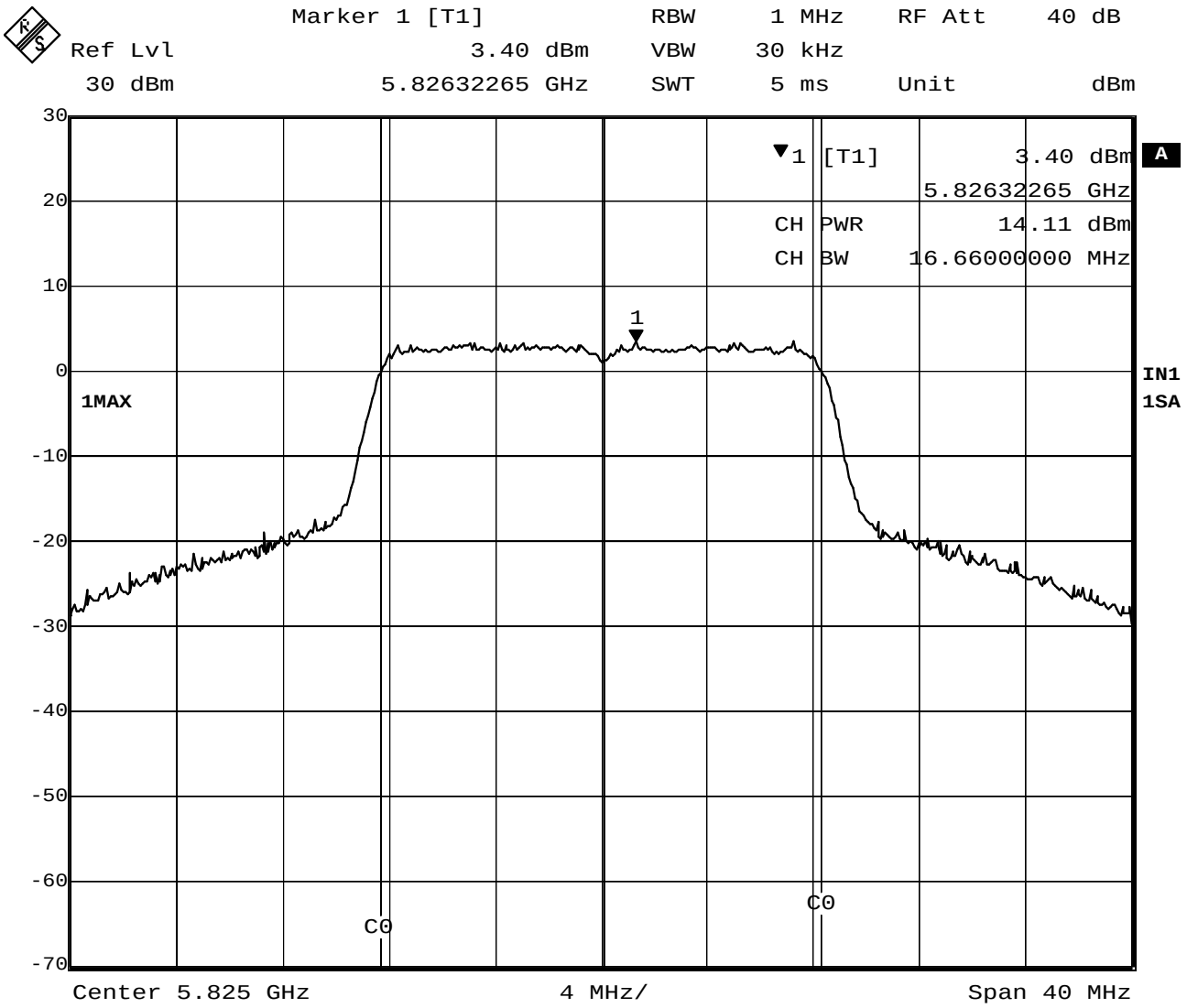
Plot 3-6. Conducted Peak Output Power of 2462MHz (OFDM, 18Mbps)



Plot 3-7. Conducted Peak Output Power of 5745MHz (OFDM, 24Mbps)



Plot 3-8. Conducted Peak Output Power of 5785MHz (OFDM, 24Mbps)



Plot 3-9. Conducted Peak Output Power of 5825MHz (OFDM, 24Mbps)

4. Out of Band Emissions

[FCC 15.247(c), RSS-210 6.2.2(o)(e1)]

4.1 Test Procedure

The outband emissions in any 100kHz bandwidth was measured with a spectrum analyzer connected to the antenna terminal, while EUT was operating in transmission mode at the appropriate center frequency. The spectrum analyzer was set to:
RBW=100kHz, VBW=100kHz[*1], Span=100MHz, Sweep= suitable duration based on the EUT specification
*1: To be adjusted accordingly based on the spectrum stability

4.2 Test Instruments and Measurement Setup

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

4.3 Measurement Results

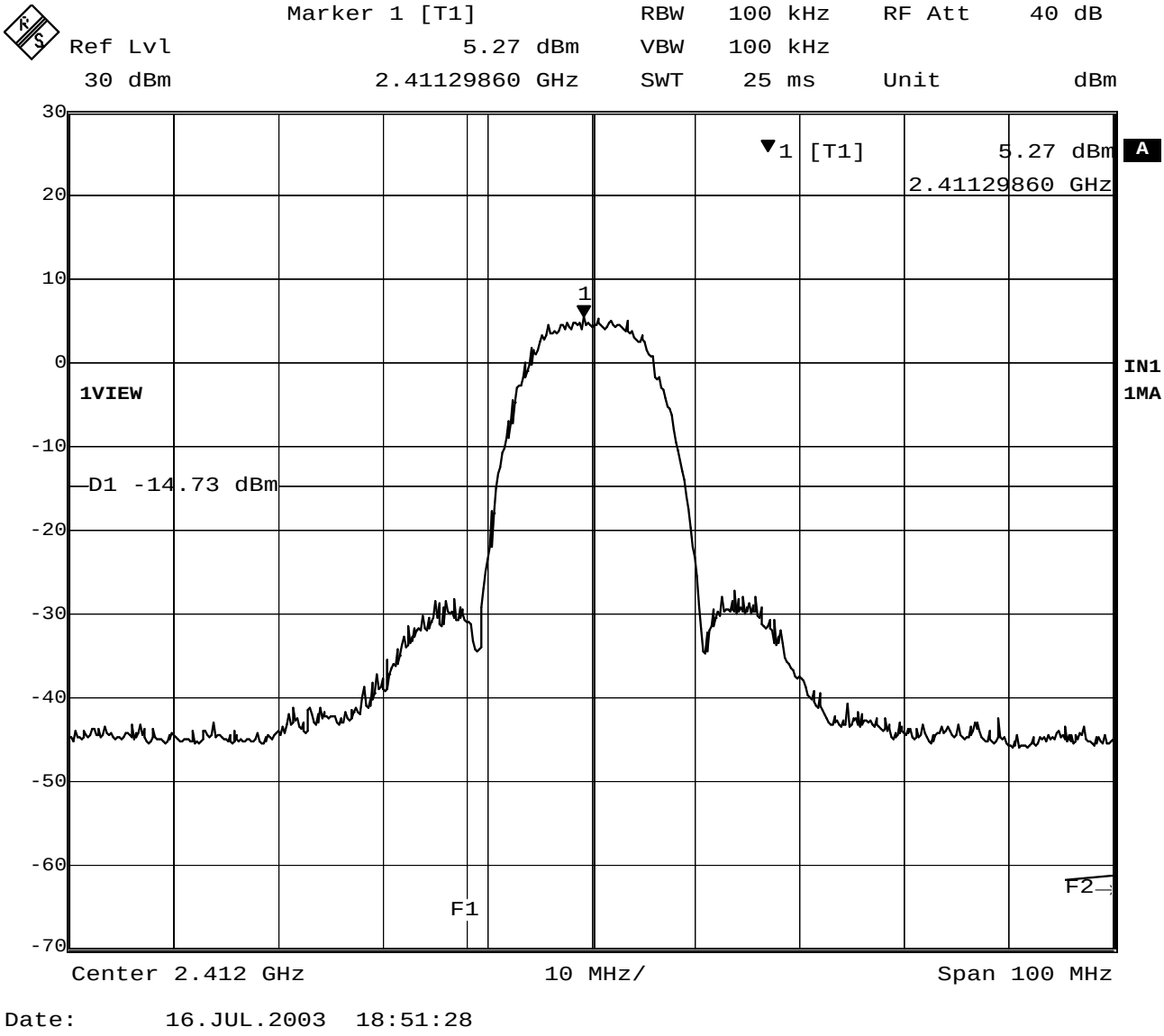
All conducted emission in any 100kHz bandwidth outside of the spread spectrum band was at least 20dB lower than the highest inband spectral density.

The measurement was performed with the worst cases (i.e. the highest conducted peak power) of each transmission mode based on the results of previous conducted peak power measurement.

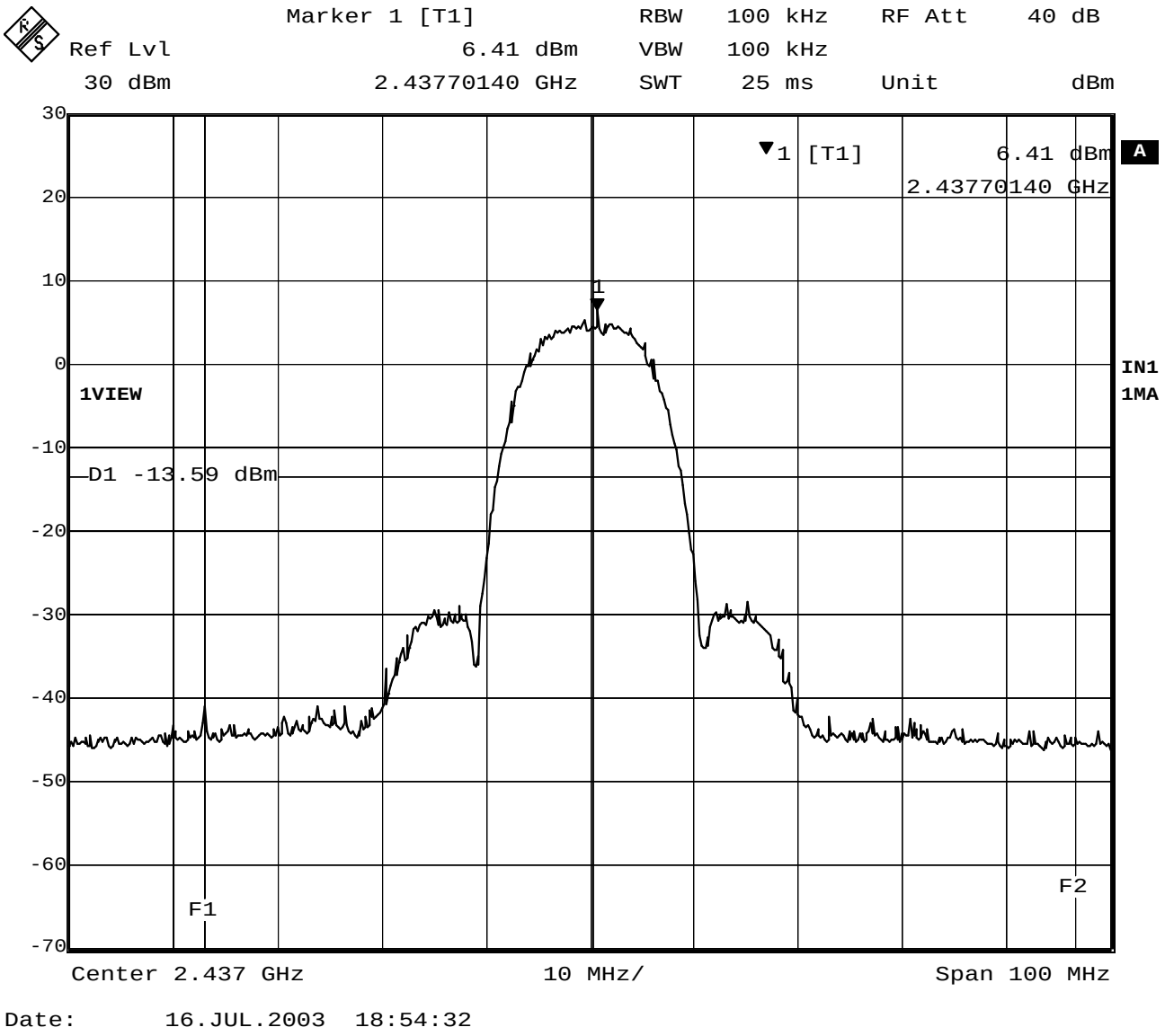
Test Date: July 16, 2003 : See the following plots.

Center Frequency (MHz)			Trace number
2412 (ch. 1)	DSSS	11Mbps	Plot 4-1
2437 (ch. 6)			Plot 4-2
2462 (ch. 11)			Plot 4-3
2412 (ch. 1)	OFDM	18Mbps	Plot 4-4
2437 (ch. 6)			Plot 4-5
2462 (ch. 11)			Plot 4-6
5745 (ch. 149)		24Mbps	Plot 4-7
5785 (ch. 157)			Plot 4-8
5825 (ch. 165)			Plot 4-9

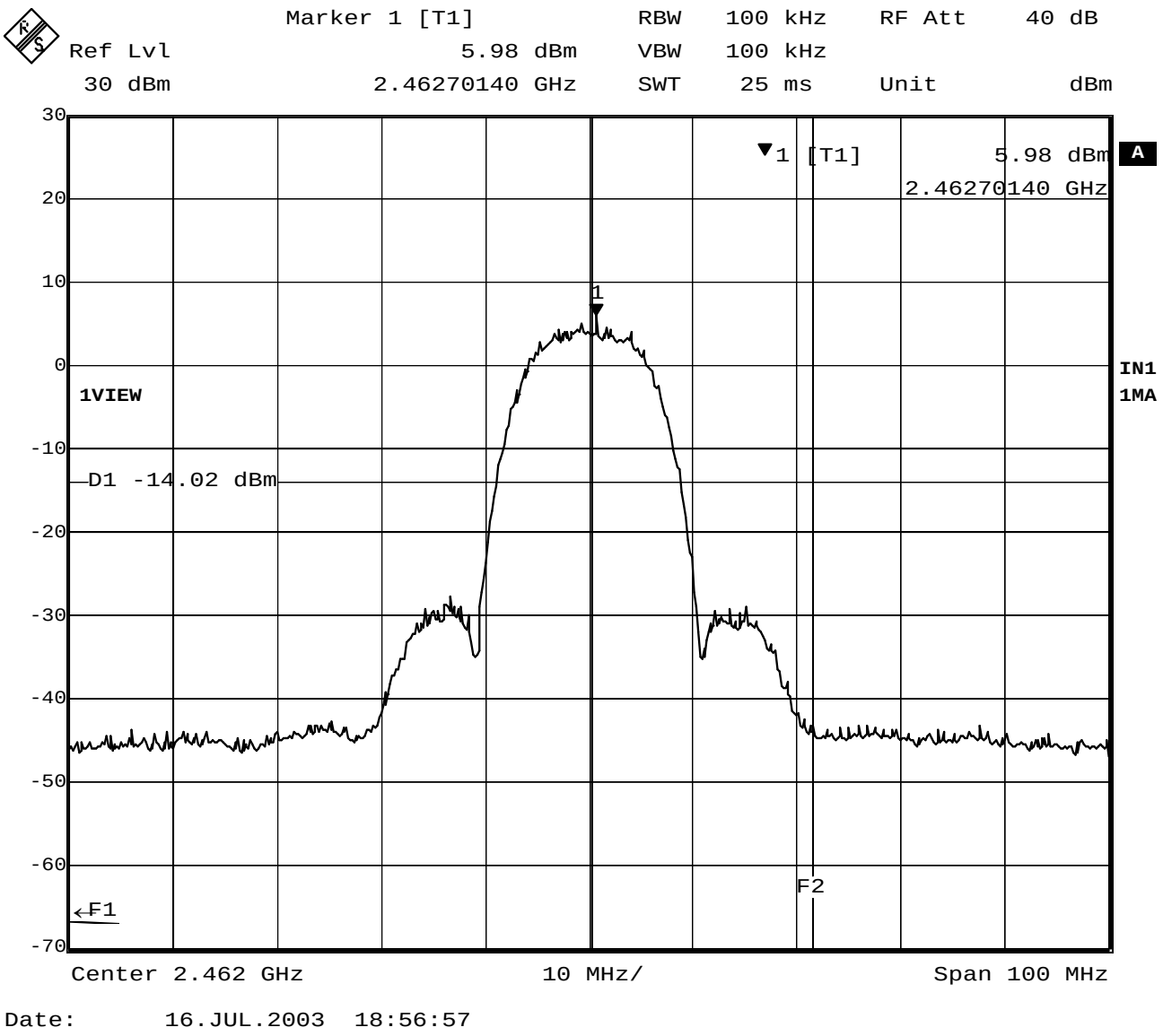
4.4 Trace Data of Out of Band Emissions



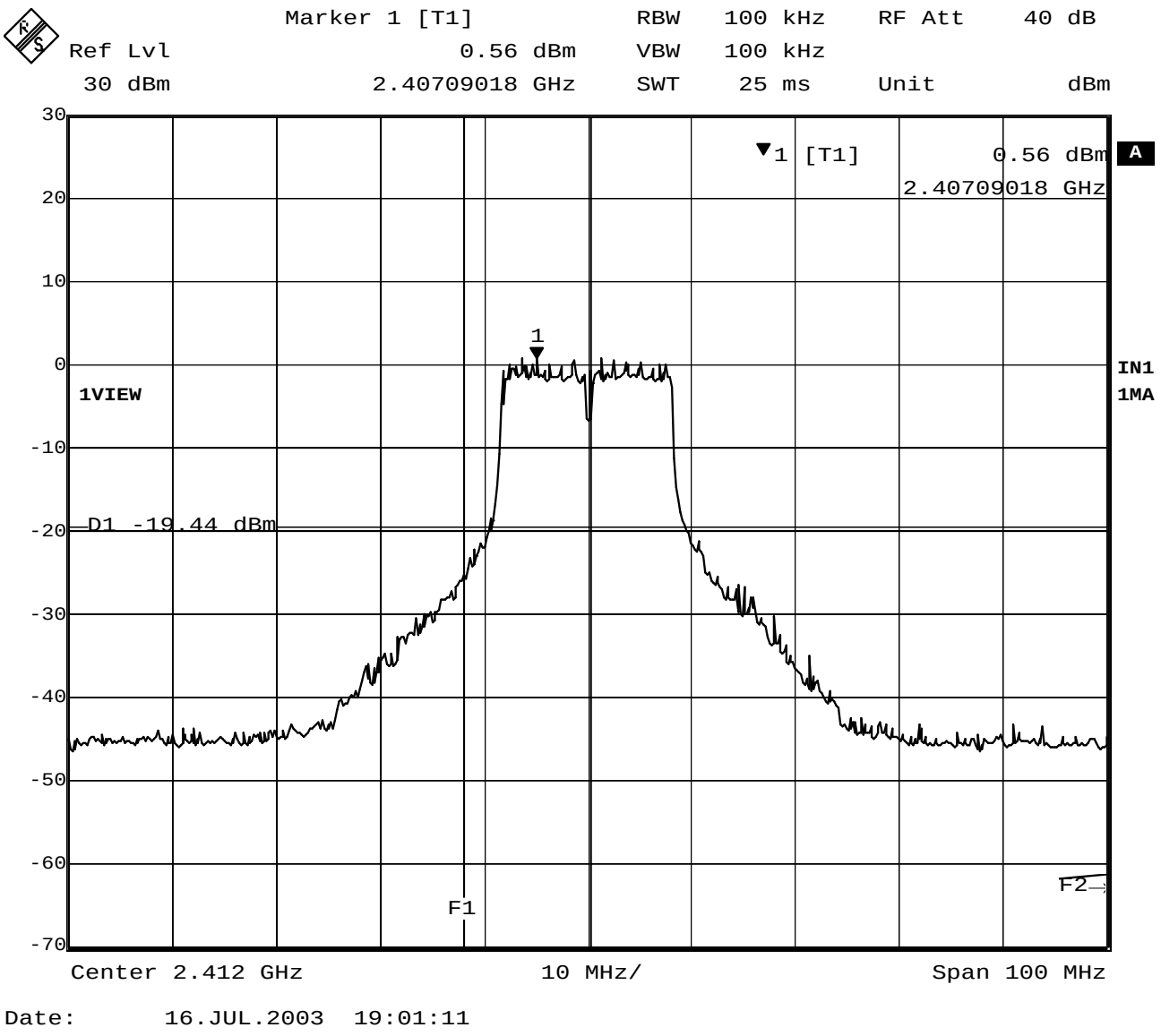
Plot 4-1. Out of band emissions around 2412MHz (DSSS, 11Mbps)



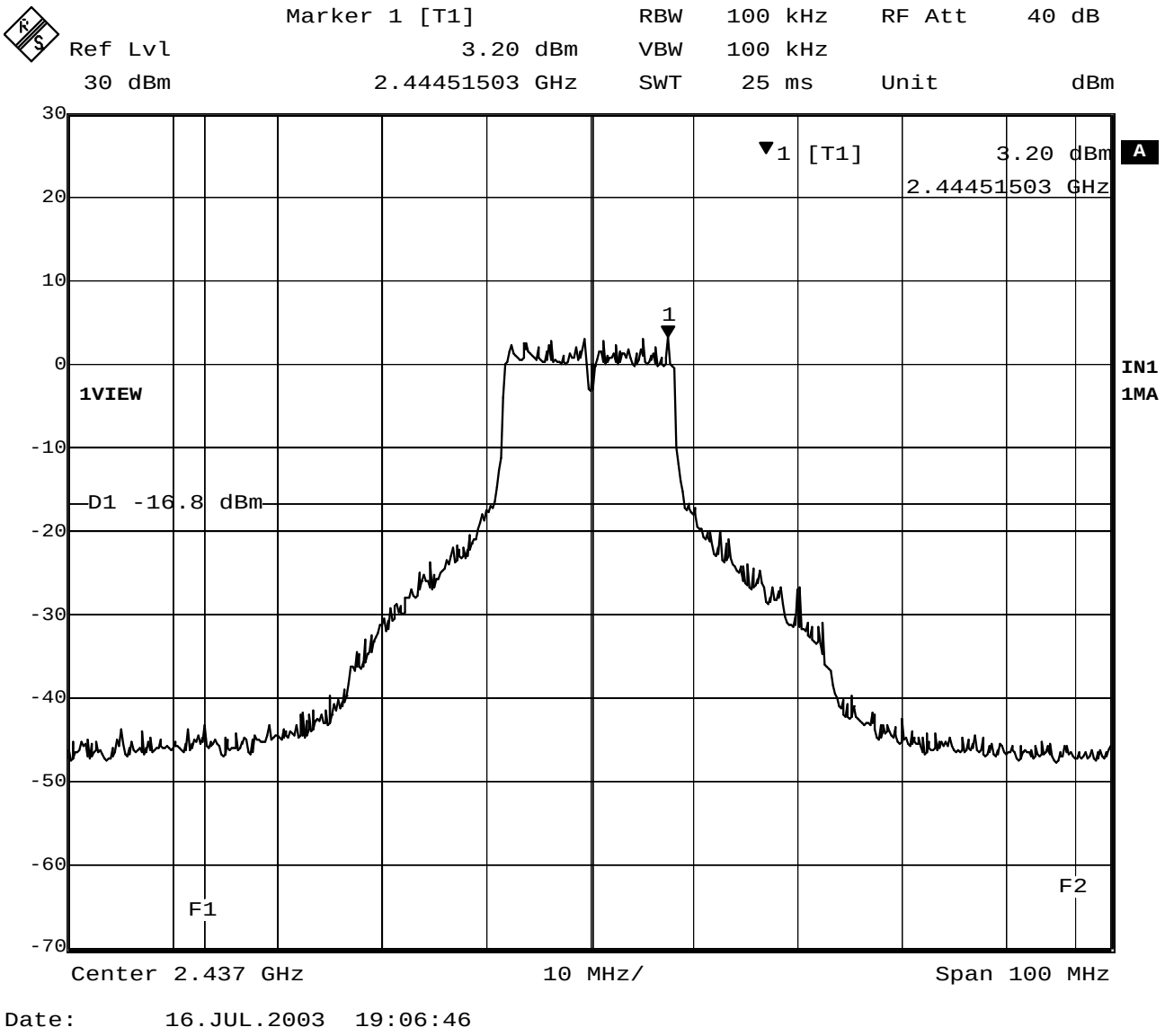
Plot 4-2. Out of band emissions around 2437MHz (DSSS, 11Mbps)



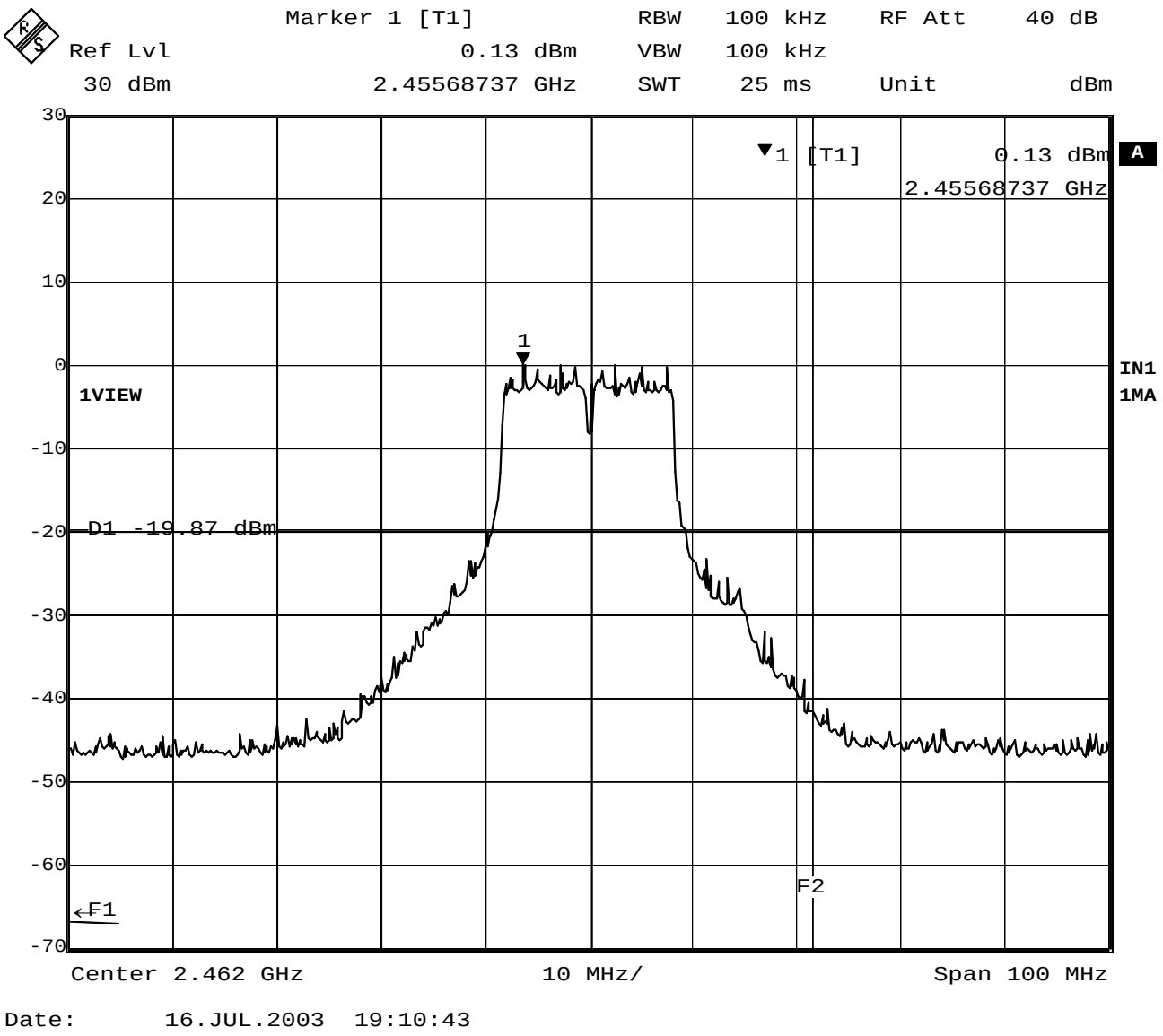
Plot 4-3. Out of band emissions around 2462MHz (DSSS, 11Mbps)



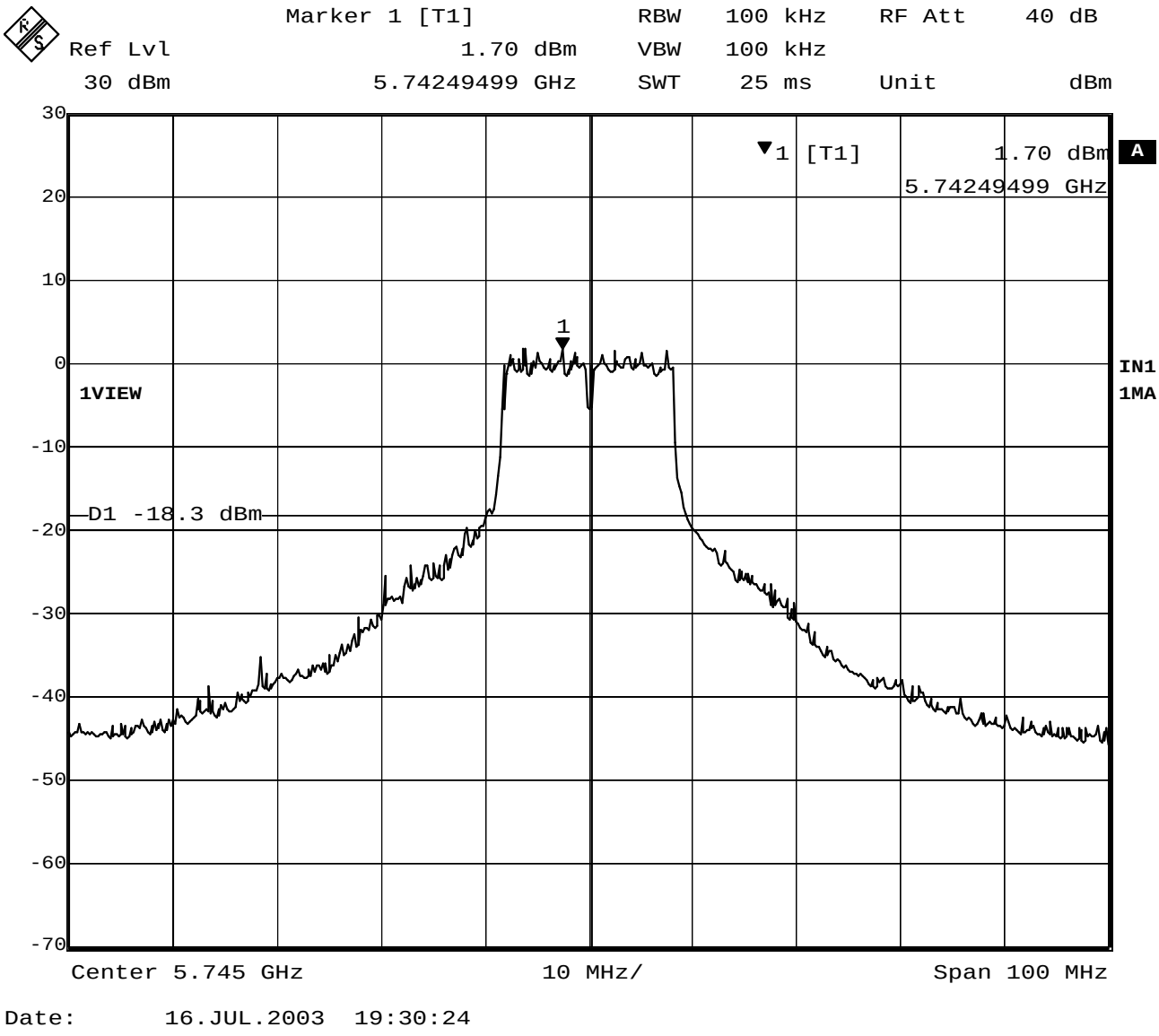
Plot 4-4. Out of band emissions around 2412MHz (OFDM, 18Mbps)



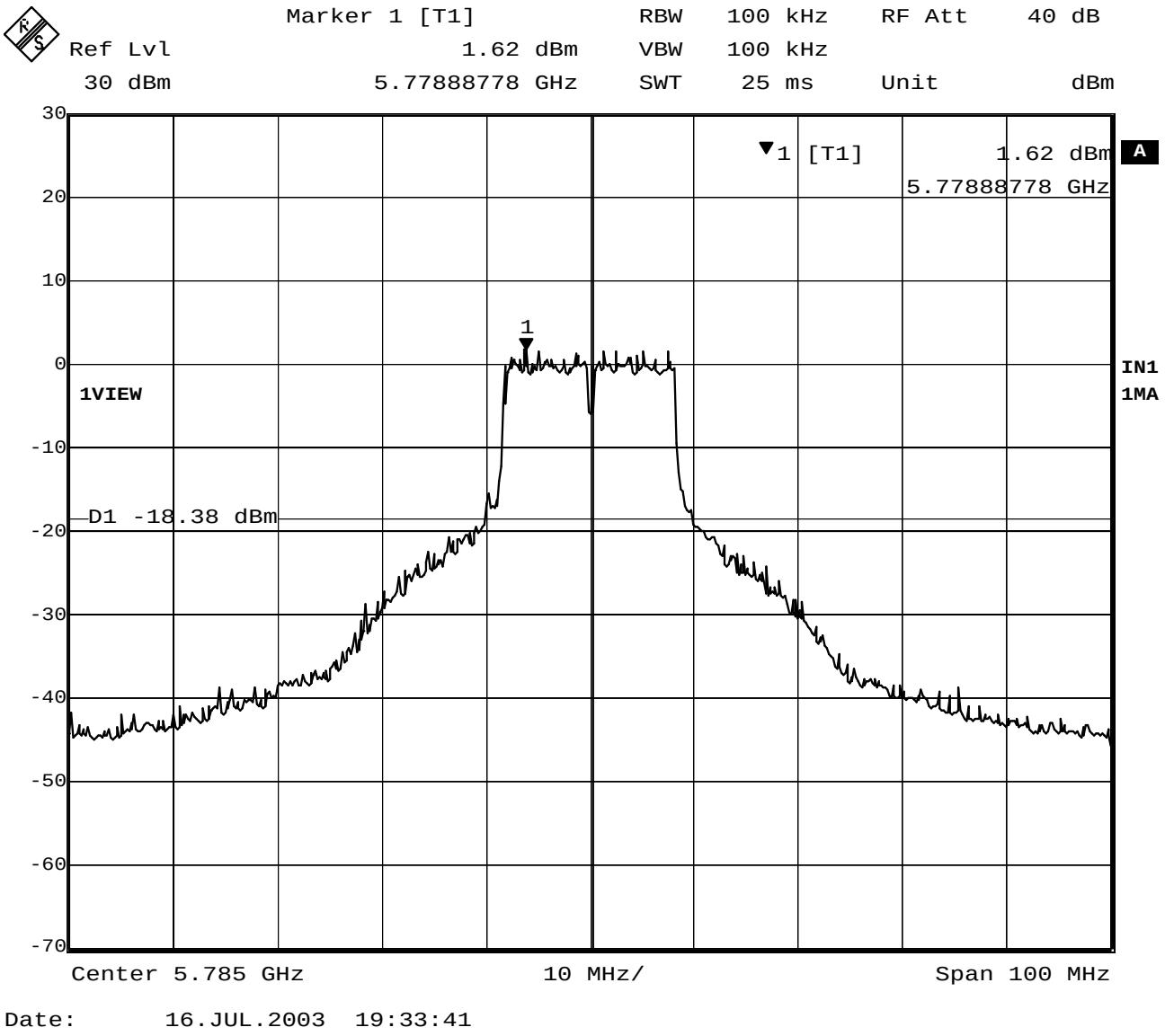
Plot 4-5. Out of band emissions around 2437MHz (OFDM, 18Mbps)



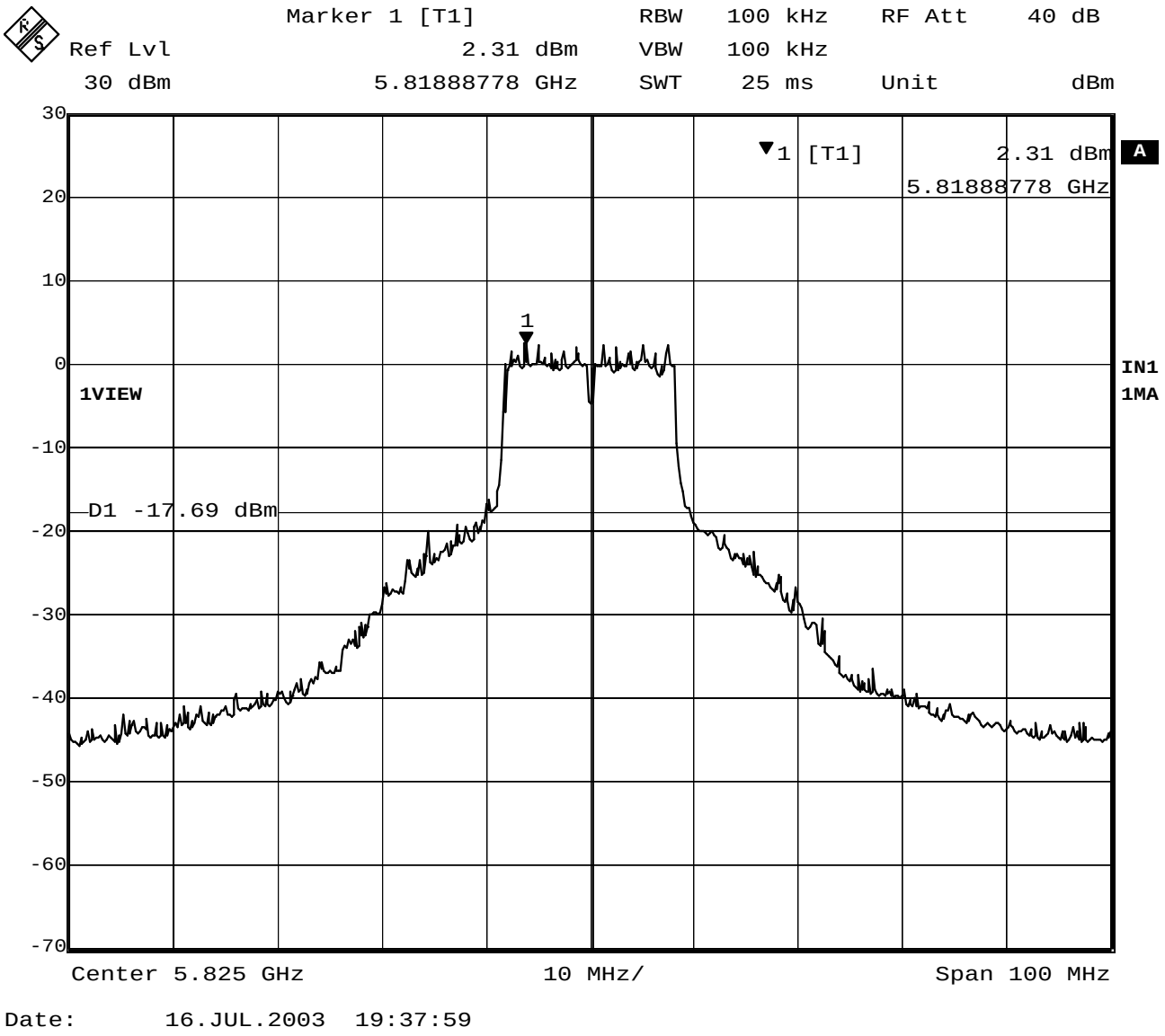
Plot 4-6. Out of band emissions around 2462MHz (OFDM, 18Mbps)



Plot 4-7. Out of band emissions around 5745MHz (OFDM, 24Mbps)



Plot 4-8. Out of band emissions around 5785MHz (OFDM, 24Mbps)



Plot 4-9. Out of band emissions around 5825MHz (OFDM, 24Mbps)

5. Peak Power Spectral Density

[FCC 15.247(d), RSS-210 6.2.2(o)(b)]

5.1 Test Procedure

The peak power density is measured with a spectrum analyzer connected to the antenna terminal, while EUT is operating in transmission mode at the appropriate center frequencies of each 2.4GHz or 5.8GHz band.
The spectrum analyzer is set to:
RBW= 3kHz, VBW=100kHz, Span=10MHz(for 2.4GHz band) or 20MHz(for 5.8GHz band),
Sweep=2.8 seconds

5.2 Test Instruments and Measurement Setup

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

5.3 Measurement Results

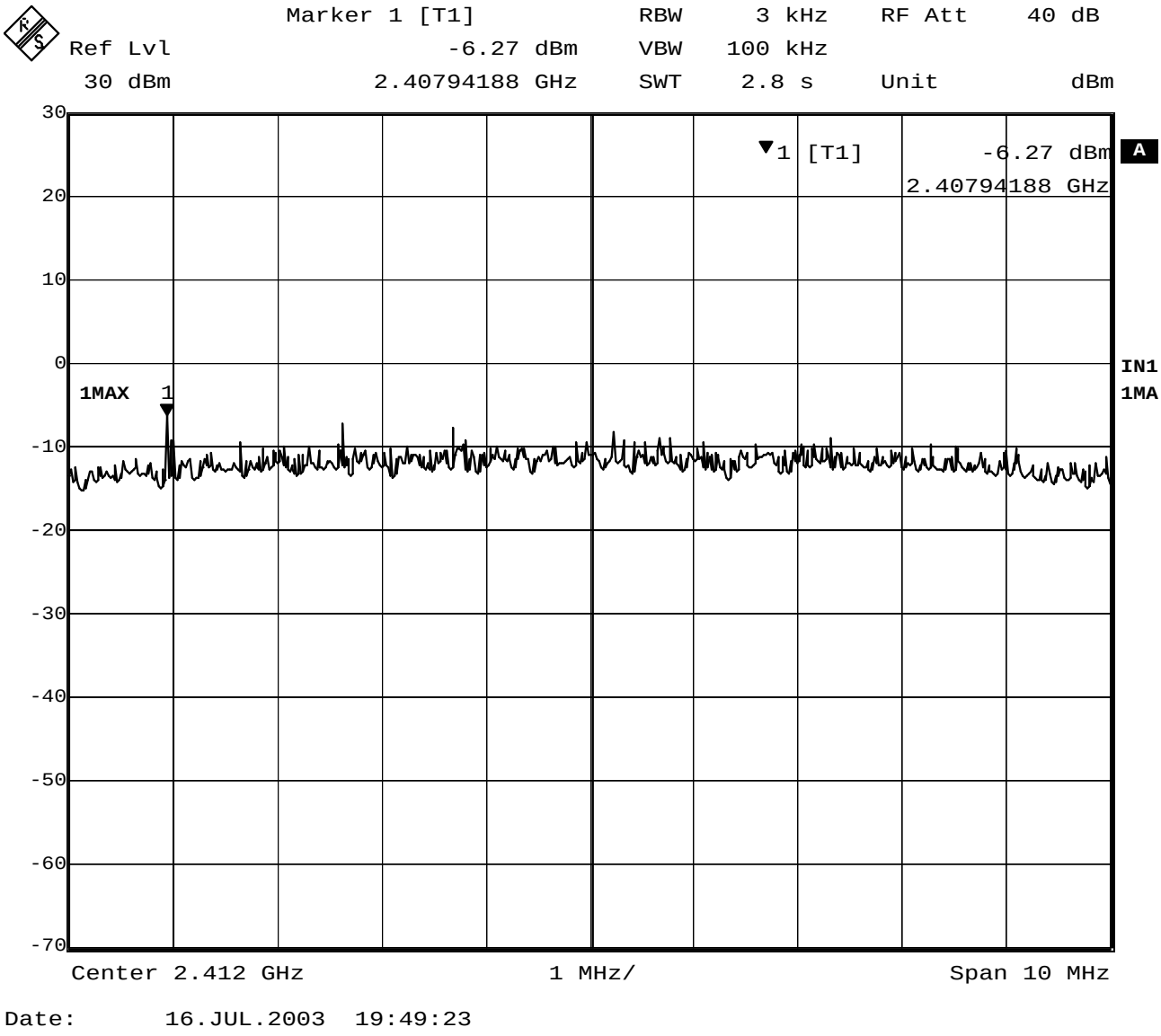
The measurement was performed with the worst cases (i.e. the highest conducted peak power) of each transmission mode based on the results of the Chapter 3, “Conducted Peak Output Power” measurement.

Test Date: July 16, 2003

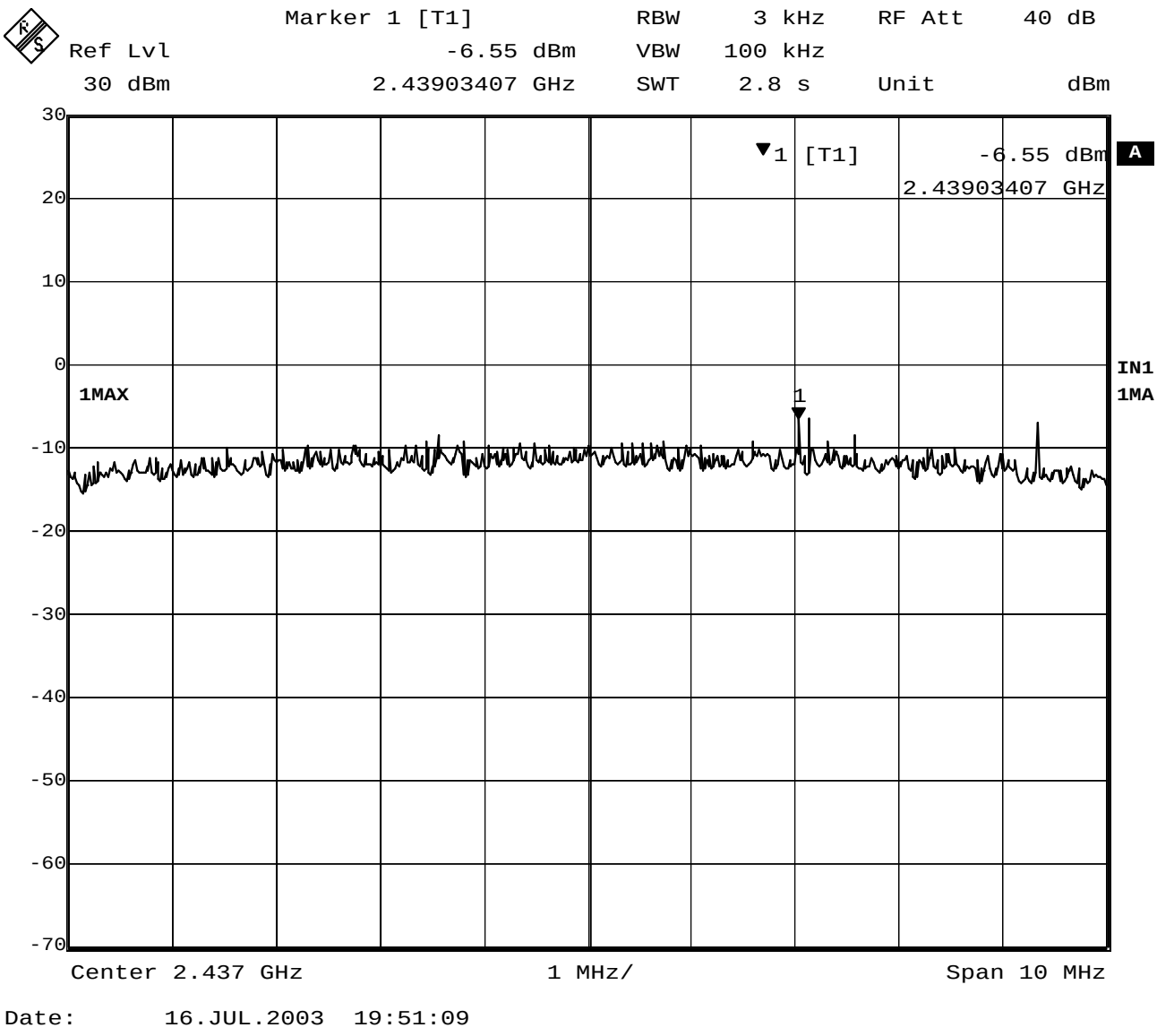
Table 5-1. Peak Power Spectrum Density, TX mode

		Ch No.	Frequency (MHz)	**Analyzer Reading** (dBm)	Trace number	Cable loss (dB)	**Result** (dBm)	Limit (dBm)	Margin (dB)
DSSS	2.4GHz 11Mbps	1	2407.94	-6.27	Plot 5-1	1.3	- 5.0	8.0	13.0
		6	2439.03	-6.55	Plot 5-2	1.3	- 5.3	8.0	13.3
		11	2464.03	-7.03	Plot 5-3	1.3	- 5.7	8.0	13.7
OFDM	2.4GHz 18Mbps	1	2412.31	-11.33	Plot 5-4	1.3	-10.0	8.0	18.0
		6	2433.86	-8.52	Plot 5-5	1.3	- 7.2	8.0	15.2
		11	2465.46	-12.04	Plot 5-6	1.3	-10.7	8.0	18.7
	5.8GHz 24Mbps	149	5740.38	-11.73	Plot 5-7	2.3	- 9.4	8.0	17.4
		157	5787.54	-11.70	Plot 5-8	2.3	- 9.4	8.0	17.4
		165	5826.31	-11.39	Plot 5-9	2.3	- 9.1	8.0	17.1

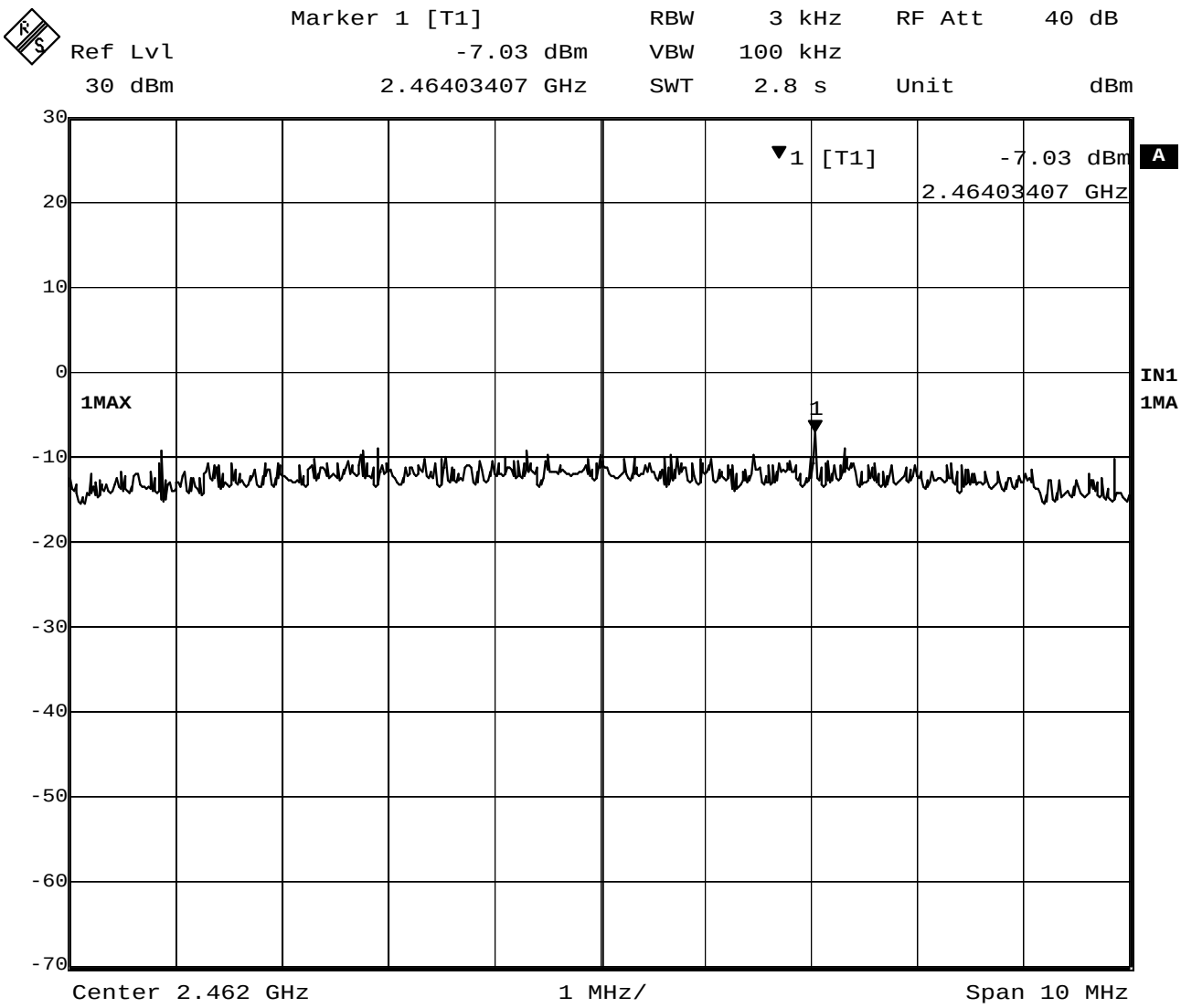
5.4 Trace Data of Peak Power Spectral Density



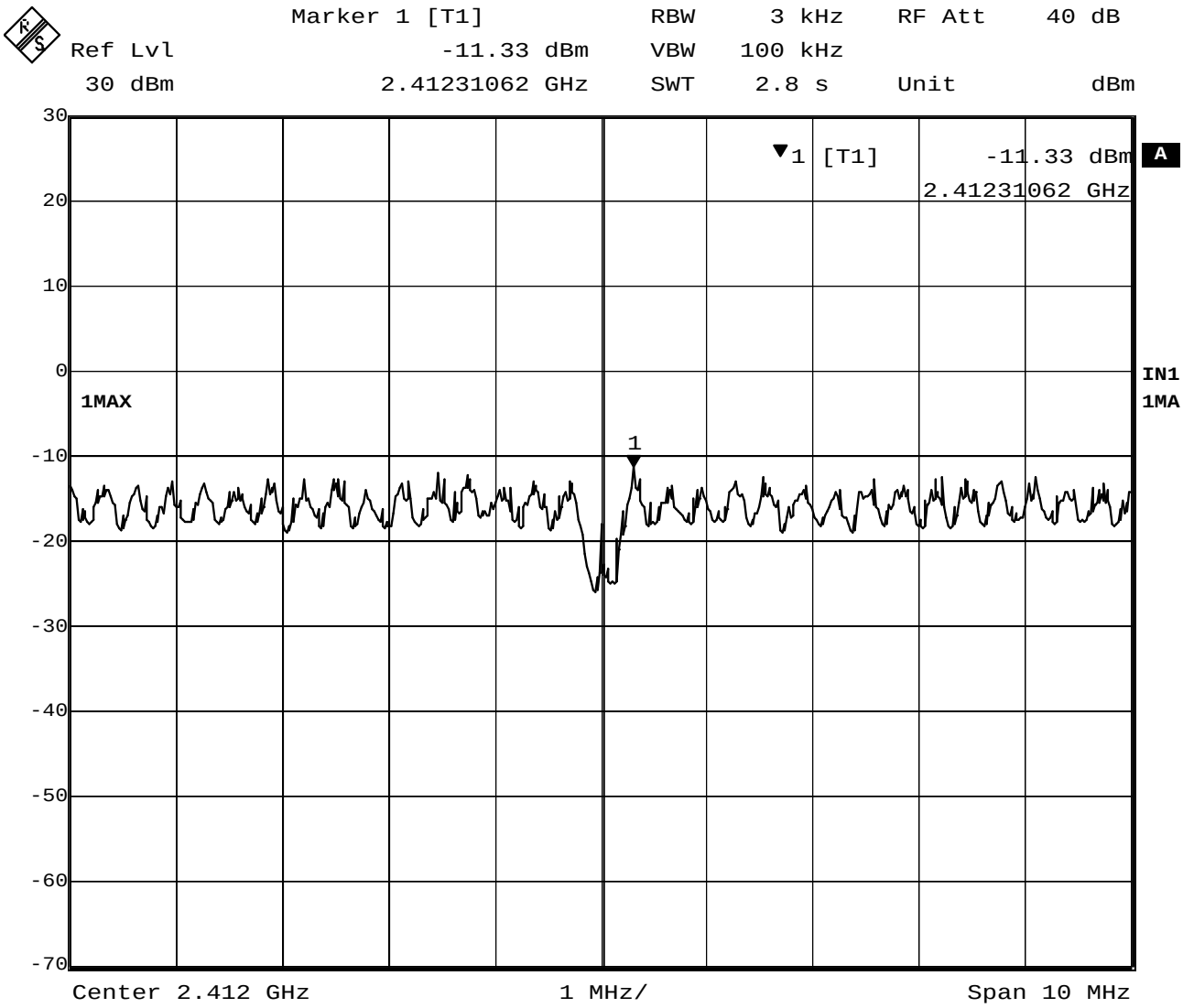
Plot 5-1. Peak Power Spectral Density of 2412MHz (DSSS, 11Mbps)



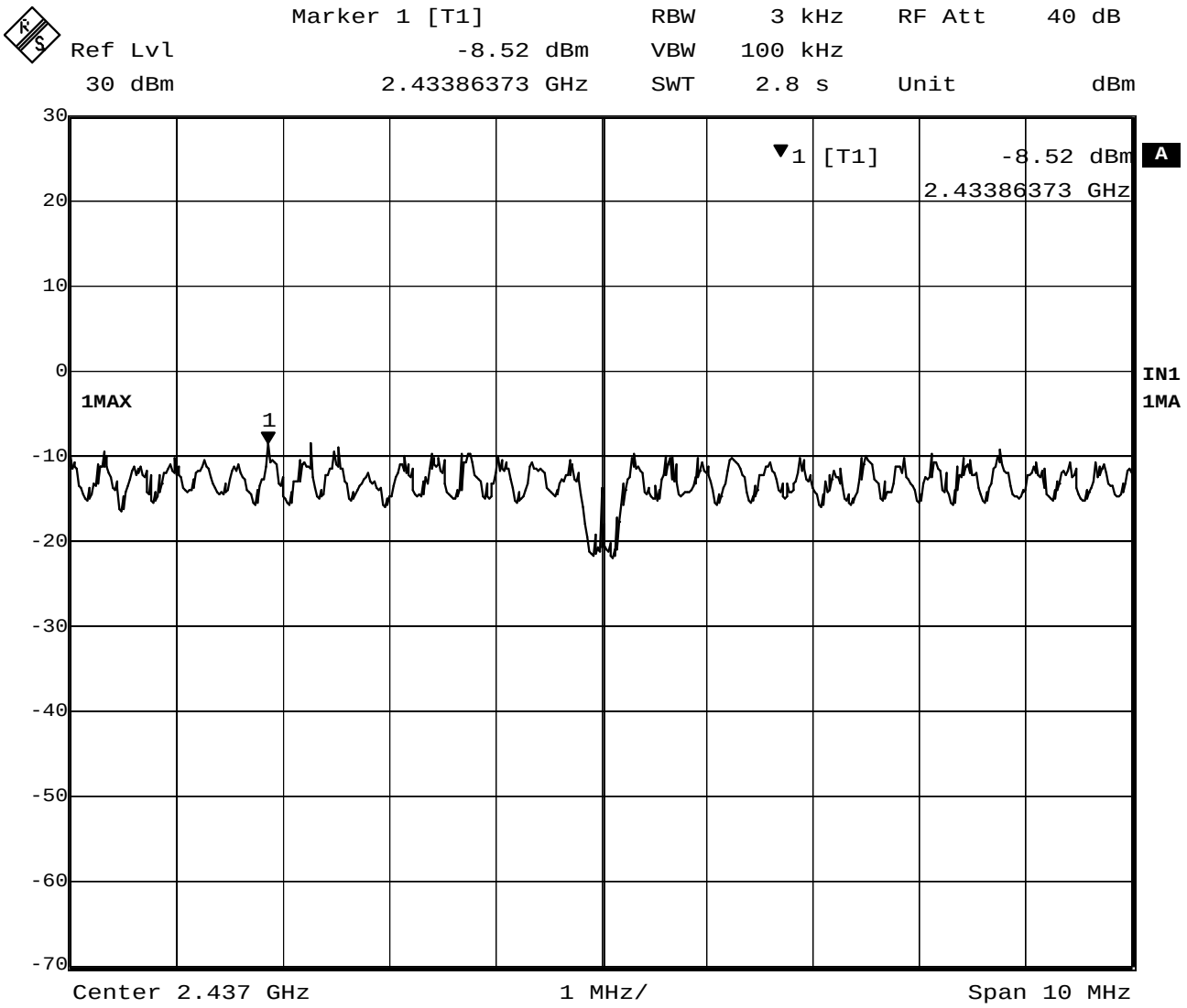
Plot 5-2. Peak Power Spectral Density of 2437MHz (DSSS, 11Mbps)



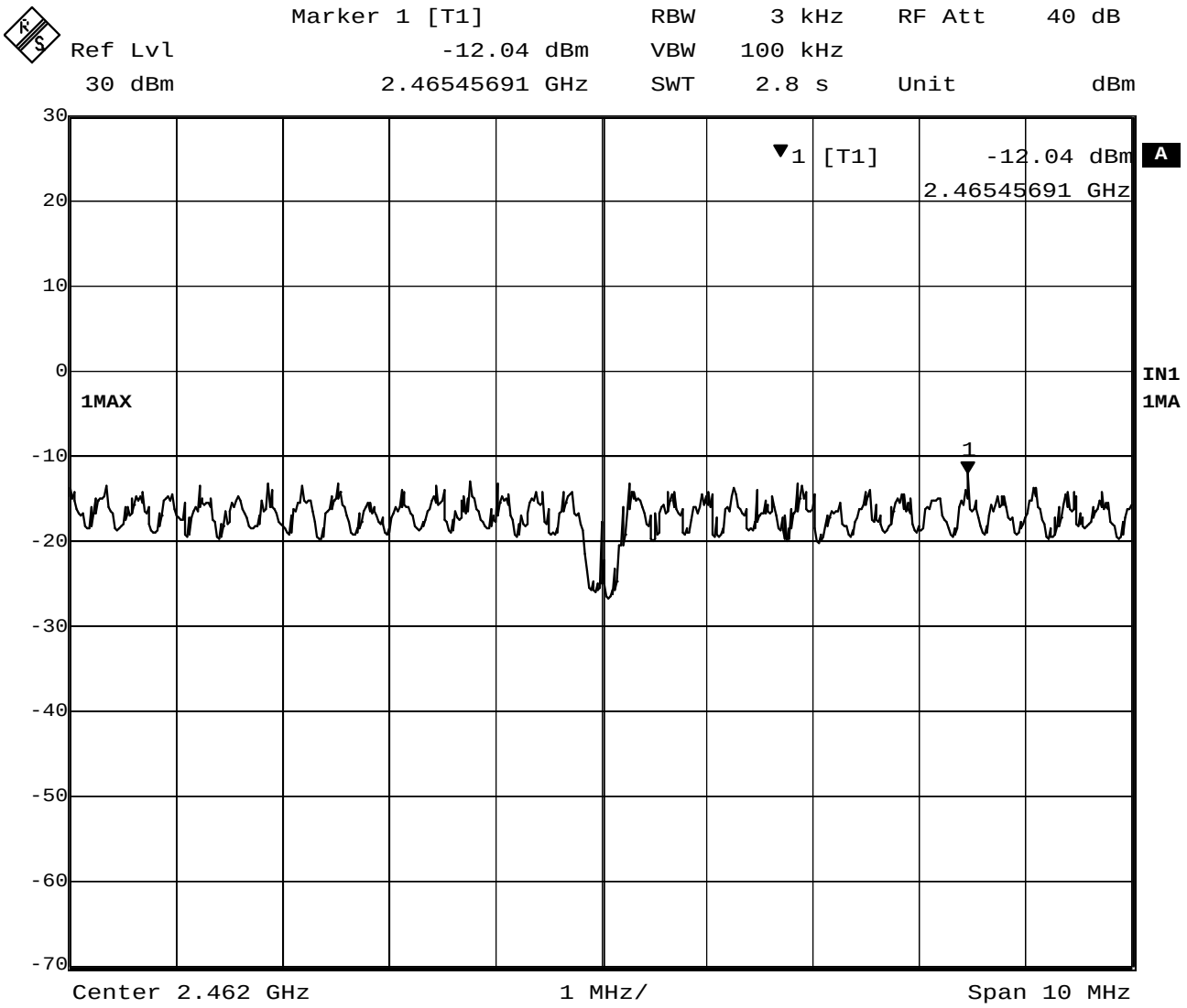
Plot 5-3. Peak Power Spectral Density of 2462MHz (DSSS, 11Mbps)



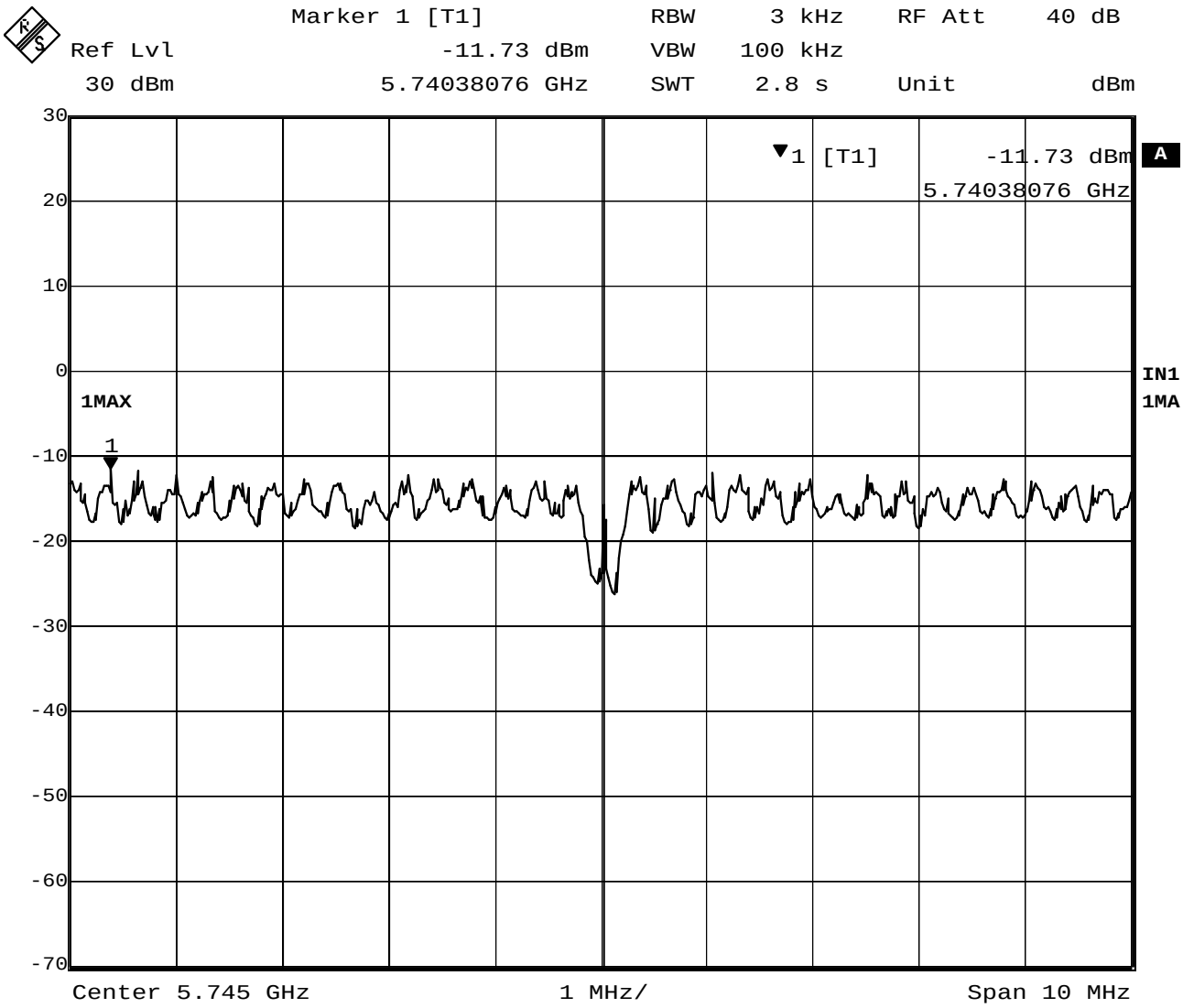
Plot 5-4. Peak Power Spectral Density of 2412MHz (OFDM, 18Mbps)



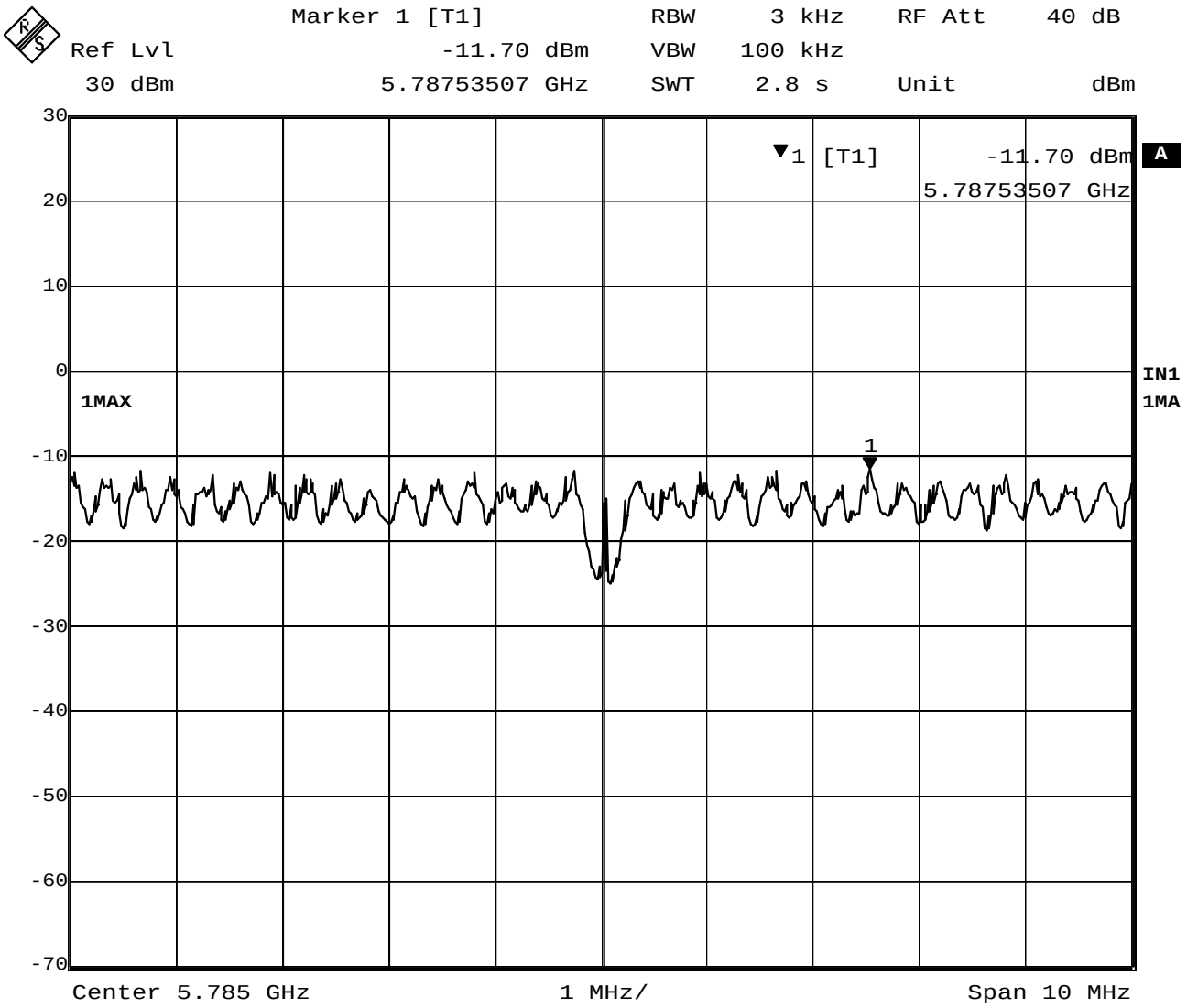
Plot 5-5. Peak Power Spectral Density of 2437MHz (OFDM, 18Mbps)



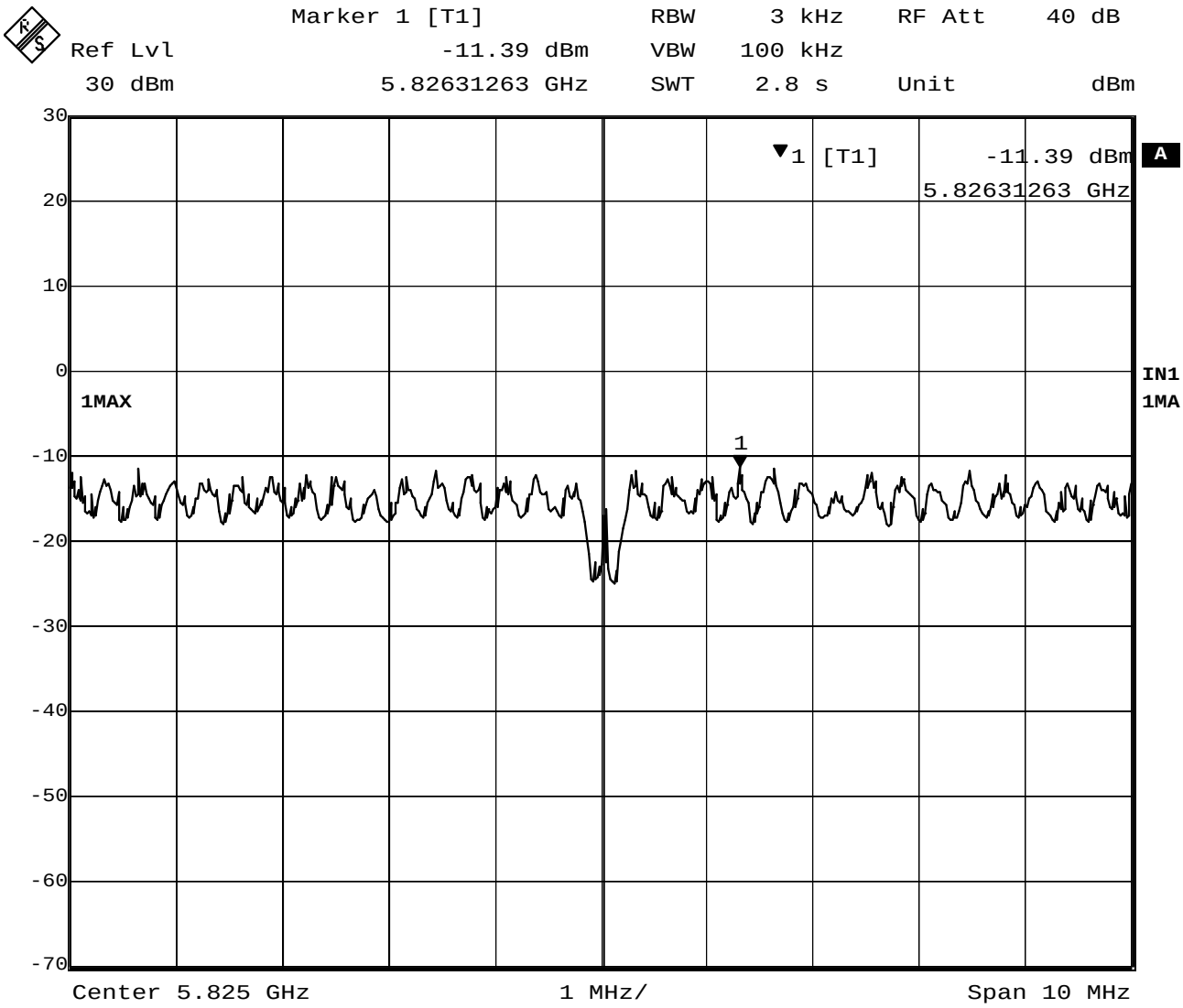
Plot 5-6. Peak Power Spectral Density of 2462MHz (OFDM, 18Mbps)



Plot 5-7. Peak Power Spectral Density of 5745MHz (OFDM, 24Mbps)



Plot 5-8. Peak Power Spectral Density of 5785MHz (OFDM, 24Mbps)



Plot 5-9. Peak Power Spectral Density of 5825MHz (OFDM, 24Mbps)

6. AC WIRELINE CONDUCTED EMISSIONS (150KHz – 30MHz)

[FCC 15.207, RSS-210 6.6 / 7.4]

6.1 Test Procedure

The conducted emissions are measured in the IBM shielded room with a spectrum analyzer in peak hold. Emissions closest to the limit are measured in the quasi-peak mode (QP) with the tuned receiver using a bandwidth of 9KHz. The emissions are maximized further by cable manipulation. The highest emissions relative to the limit are listed.

6.2 Test Instruments and Measurement Setup

Table 6-1. 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

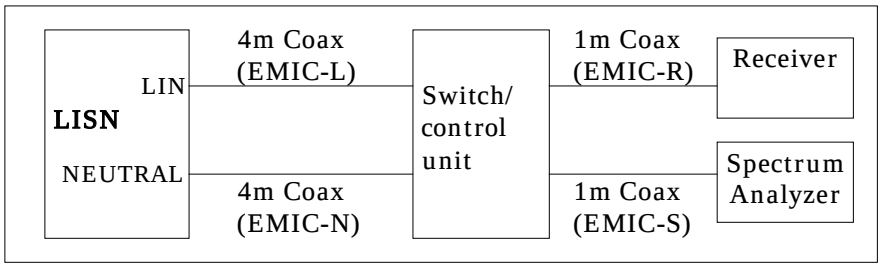


Figure 6. Cables for Conducted Emission Test

6.3 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)

6.4 Measurement Results

The EUT was found to comply to the limits of FCC Part 15 Subpart C and RSS-210 with a margin of 14.6dB. The 6 highest emissions relative to the limits are reported.

Test Date: July 28 and 29, 2003

6.3.1 EUT in 2.4GHz DSSS transmission mode

Table 6-2-1. Ch.1 (2412MHz) **TX** mode 11Mbps

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)			
0.2097	48.0	0.4	48.4	37.8	0.4	38.2	63.2	53.2	Line
0.2796	41.4	0.5	41.9	33.9	0.5	34.4	60.8	50.8	Neutral
0.3476	34.6	0.5	35.1	29.9	0.5	30.4	59.0	49.0	Neutral
0.4174	34.6	0.5	35.1	28.1	0.5	28.6	57.5	47.5	Neutral
0.5567	26.0	0.5	26.5	21.0	0.5	21.5	56.0	46.0	Neutral
4.0493	27.9	0.6	28.5	22.4	0.6	23.0	56.0	46.0	Line

Table 6-2-2. Ch.6 (2437MHz) **TX** mode 11Mbps

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	44.5	0.4	44.9	34.3	0.4	34.7	63.3	53.3	Line
0.2758	37.0	0.5	37.5	30.5	0.5	31.0	60.9	50.9	Neutral
0.3477	33.5	0.5	34.0	28.5	0.5	29.0	59.0	49.0	Neutral
0.4190	36.0	0.5	36.5	31.6	0.5	32.1	57.5	47.5	Neutral
0.6298	27.0	0.5	27.5	23.5	0.5	24.0	56.0	46.0	Neutral
5.8699	38.8	0.6	39.4	27.2	0.6	27.8	60.0	50.0	Neutral

Table 6-2-3. Ch.11 (2462MHz) **TX** mode 11Mbps

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	44.0	0.4	44.4	33.3	0.4	33.7	63.3	53.3	Neutral
0.2807	38.5	0.5	39.0	32.1	0.5	32.6	60.8	50.8	Line
0.3492	35.3	0.5	35.8	31.7	0.5	32.2	59.0	49.0	Neutral
0.4187	35.9	0.5	36.4	31.9	0.5	32.4	57.5	47.5	Neutral
0.6268	26.3	0.5	26.8	23.0	0.5	23.5	56.0	46.0	Neutral
5.8684	37.0	0.6	37.6	24.9	0.6	25.5	60.0	50.0	Neutral

Table 6-2-4. Ch. 6 (2437MHz) **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)			
0.2116	44.7	0.4	45.1	37.3	0.4	37.7	63.1	53.1	Neutral
0.2795	39.7	0.5	40.2	31.9	0.5	32.4	60.8	50.8	Neutral
0.3499	37.3	0.5	37.8	30.3	0.5	30.8	59.0	49.0	Neutral
0.4881	31.5	0.5	32.0	27.0	0.5	27.5	56.2	46.2	Neutral
0.6303	26.9	0.5	27.4	24.0	0.5	24.5	56.0	46.0	Neutral
4.0672	30.6	0.6	31.2	24.8	0.6	25.4	56.0	46.0	Line

6.3.2 EUT in 2.4GHz OFDM transmission mode

Table 6-2-5. Ch.1 (2412MHz) **TX** mode 18Mbps

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	43.3	0.4	43.7	33.2	0.4	33.6	63.2	53.2	Line
0.2816	38.1	0.5	38.6	32.2	0.5	32.7	60.8	50.8	Line
0.3478	33.6	0.5	34.1	30.1	0.5	30.6	59.0	49.0	Neutral
0.4207	35.7	0.5	36.2	32.3	0.5	32.8	57.4	47.4	Neutral
0.6265	25.2	0.5	25.7	21.9	0.5	22.4	56.0	46.0	Neutral
5.8777	38.1	0.6	38.7	26.9	0.6	27.5	60.0	50.0	Neutral

Table 6-2-6. Ch.6 (2437MHz) **TX** mode 18Mbps

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)			
0.2105	44.1	0.4	44.5	33.3	0.4	33.7	63.2	53.2	Line
0.2759	35.2	0.5	35.7	29.3	0.5	29.8	60.9	50.9	Neutral
0.3471	32.7	0.5	33.2	28.7	0.5	29.2	59.0	49.0	Neutral
0.4209	35.3	0.5	35.8	31.6	0.5	32.1	57.4	47.4	Neutral
0.6276	26.5	0.5	27.0	23.3	0.5	23.8	56.0	46.0	Neutral
5.8758	37.4	0.6	38.0	23.5	0.6	24.1	60.0	50.0	Line

Table 6-2-7. Ch.11 (2462MHz) **TX** mode 18Mbps

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)			
0.2114	44.0	0.4	44.4	34.5	0.4	34.9	63.2	53.2	Neutral
0.2810	38.2	0.5	38.7	32.5	0.5	33.0	60.8	50.8	Neutral
0.3500	34.7	0.5	35.2	31.4	0.5	31.9	59.0	49.0	Neutral
0.4198	35.9	0.5	36.4	32.4	0.5	32.9	57.5	47.5	Neutral
0.6299	27.3	0.5	27.8	23.9	0.5	24.4	56.0	46.0	Neutral
6.0877	37.3	0.6	37.9	25.9	0.6	26.5	60.0	50.0	Line

Table 6-2-8. Ch.6 (2437MHz) **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)			
0.2097	45.2	0.4	45.6	37.7	0.4	38.1	63.2	53.2	Line
0.2802	39.5	0.5	40.0	32.2	0.5	32.7	60.8	50.8	Neutral
0.3494	38.0	0.5	38.5	31.8	0.5	32.3	59.0	49.0	Neutral
0.4894	32.6	0.5	33.1	29.1	0.5	29.6	56.2	46.2	Neutral
0.5598	28.2	0.5	28.7	22.7	0.5	23.2	56.0	46.0	Neutral
0.6995	26.8	0.5	27.3	23.3	0.5	23.8	56.0	46.0	Neutral

6.3.3 EUT in 5.8GHz OFDM transmission mode

Table 6-2-9. Ch.149 (5745MHz) **TX** mode 24Mbps

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)			
0.2098	44.9	0.4	45.3	35.7	0.4	36.1	63.2	53.2	Neutral
0.2817	39.2	0.5	39.7	33.3	0.5	33.8	60.8	50.8	Line
0.3505	33.0	0.5	33.5	27.0	0.5	27.5	59.0	49.0	Neutral
0.4181	34.9	0.5	35.4	31.5	0.5	32.0	57.5	47.5	Line
0.6307	26.1	0.5	26.6	23.0	0.5	23.5	56.0	46.0	Line
5.8089	36.4	0.6	37.0	22.4	0.6	23.0	60.0	50.0	Line

Table 6-2-10 Ch.157 (5785MHz) **TX** mode 24Mbps

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)			
0.2095	45.1	0.4	45.5	36.0	0.4	36.4	63.2	53.2	Neutral
0.2810	39.6	0.5	40.1	33.1	0.5	33.6	60.8	50.8	Neutral
0.3513	32.7	0.5	33.2	26.8	0.5	27.3	58.9	48.9	Neutral
0.4185	35.3	0.5	35.8	31.7	0.5	32.2	57.5	47.5	Line
0.4896	25.8	0.5	26.3	21.7	0.5	22.2	56.2	46.2	Neutral
0.6277	25.4	0.5	25.9	22.4	0.5	22.9	56.0	46.0	Line

Table 6-2-11 Ch.165 (5825MHz) **TX** mode 24Mbps

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)			
0.2104	45.0	0.4	45.4	35.9	0.4	36.3	63.2	53.2	Neutral
0.2780	39.4	0.5	39.9	32.7	0.5	33.2	60.9	50.9	Line
0.3489	33.4	0.5	33.9	26.5	0.5	27.0	59.0	49.0	Neutral
0.4182	35.4	0.5	35.9	31.5	0.5	32.0	57.5	47.5	Line
0.6271	25.0	0.5	25.5	22.0	0.5	22.5	56.0	46.0	Line
5.8079	38.1	0.6	38.7	24.1	0.6	24.7	60.0	50.0	Line

Table 6-2-12 Ch.157 (5785MHz) **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)			
0.2102	45.3	0.4	45.7	37.9	0.4	38.3	63.2	53.2	Line
0.2795	39.3	0.5	39.8	32.0	0.5	32.5	60.8	50.8	Line
0.3493	37.5	0.5	38.0	30.8	0.5	31.3	59.0	49.0	Neutral
0.4890	31.8	0.5	32.3	28.3	0.5	28.8	56.2	46.2	Line
0.7002	27.0	0.5	27.5	23.3	0.5	23.8	56.0	46.0	Line
6.0311	38.5	0.6	39.1	25.7	0.6	26.3	60.0	50.0	Neutral

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

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

7.1 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 emissions are recorded with a spectrum analyzer in peak hold mode. 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 120kHz. The highest emissions relative to the limit are listed.

7.2 Test Instruments and Measurement Setup

Table 7-1 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

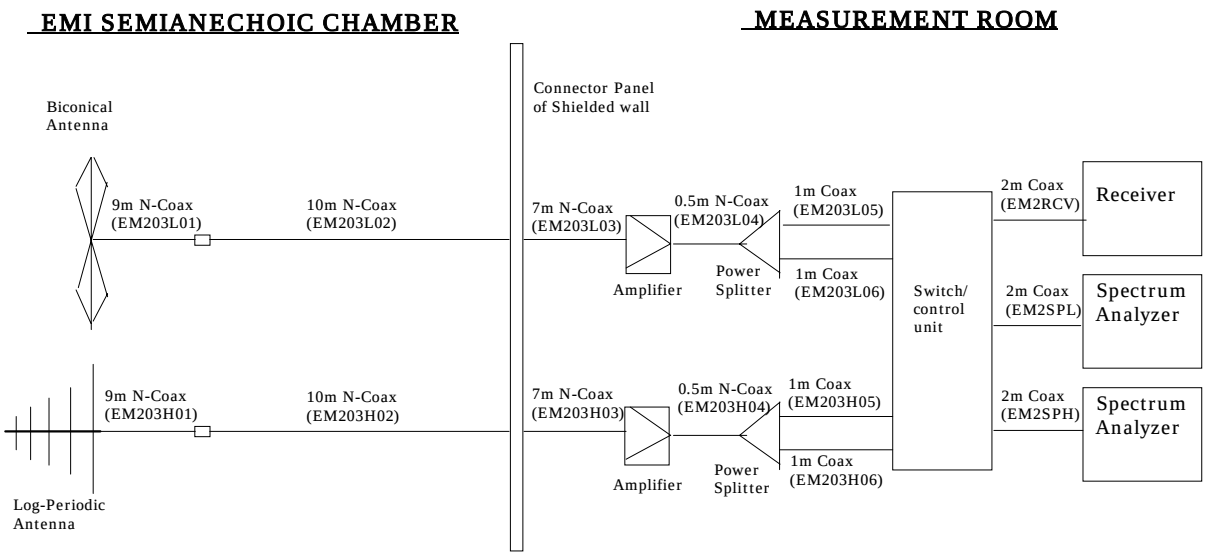


Figure 7 Cables for Radiated Emission Test

7.3 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 = 35.3dBμV/m

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

Level(dBμV/m) = 20 $\times$ Log(Level(μV/m))

40dBμV/m = 100μV/m
48dBμV/m = 250μV/m

7.4 Measurement Results

The EUT was found to comply to the limits of FCC Part 15 Subpart C and RSS-210 with a margin of 2.0 dB at 30MHz - 1000MHz band.
The 6 highest emissions relative to the limits are reported.

Test Date: July 23 and 25, 2003

7.4.1 EUT in 2.4GHz DSSS transmission mode

Table 7-2-1. Ch.1 (2412MHz) **TX** mode 11Mbps

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)
32.912	V	31.5	12.8	-18.8	25.5	40.0	18.8	100
171.331	H	41.1	12.5	-16.2	37.4	43.5	74.1	150
200.454	V	34.2	11.4	-12.6	33.0	43.5	44.7	150
465.327	V	34.0	16.8	-13.8	37.0	46.0	70.8	200
729.015	V	34.0	21.1	-11.1	44.0	46.0	158.5	200
911.269	V	22.1	22.8	-9.0	35.9	46.0	62.4	200

Table 7-2-2. Ch.6 (2437MHz) **TX** mode 11Mbps

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)
171.585	H	42.3	12.5	-16.2	38.6	43.5	85.1	150
200.454	H	35.0	11.4	-12.6	33.8	43.5	49.0	150
386.589	V	33.5	14.9	-14.1	34.3	46.0	51.9	200
455.072	V	30.4	16.5	-13.8	33.1	46.0	45.2	200
466.342	V	29.5	16.8	-13.7	32.6	46.0	42.7	200
729.016	V	32.8	21.1	-11.1	42.8	46.0	138.0	200

Table 7-2-3. Ch.11 (2462MHz) **TX** mode 11Mbps

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	H	43.4	12.5	-16.2	39.7	43.5	96.6	150
200.454	H	37.6	11.4	-12.6	36.4	43.5	66.1	150
364.507	V	35.4	14.4	-13.6	36.2	46.0	64.6	200
386.589	V	33.7	14.9	-14.1	34.5	46.0	53.1	200
455.072	V	32.0	16.5	-13.8	34.7	46.0	54.3	200
729.016	V	32.6	21.1	-11.1	42.6	46.0	134.9	200

Table 7-2-4. Ch.6 (2437MHz) **RX** 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)
171.817	H	43.3	12.5	-16.2	39.6	43.5	95.5	150
200.454	H	37.8	11.4	-12.6	36.6	43.5	67.6	150
386.589	V	34.1	14.9	-14.1	34.9	46.0	55.6	200
465.745	V	33.0	16.8	-13.7	36.1	46.0	63.8	200
729.016	V	32.5	21.1	-11.1	42.5	46.0	133.4	200
911.269	V	24.6	22.8	-9.0	38.4	46.0	83.2	200

7.4.2 EUT in 2.4GHz OFDM transmission mode

Table 7-2-5. Ch.1 (2412MHz) **TX** mode 18Mbps

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)
32.719	V	32.8	12.8	-18.9	26.7	40.0	21.6	100
171.818	H	43.4	12.5	-16.2	39.7	43.5	96.6	150
200.454	H	37.4	11.4	-12.6	36.2	43.5	64.6	150
386.590	V	34.5	14.9	-14.1	35.3	46.0	58.2	200
455.072	V	34.2	16.5	-13.8	36.9	46.0	70.0	200
729.015	H	31.0	21.1	-11.1	41.0	46.0	112.2	200

Table 7-2-6. Ch.6 (2437MHz) **TX** mode 18Mbps

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)
32.576	V	33.4	12.8	-18.9	27.3	40.0	23.2	100
32.646	V	32.9	12.8	-18.9	26.8	40.0	21.9	100
171.818	H	43.3	12.5	-16.2	39.6	43.5	95.5	150
200.454	H	38.1	11.4	-12.6	36.9	43.5	70.0	150
454.884	V	33.1	16.5	-13.8	35.8	46.0	61.7	200
729.016	H	30.7	21.1	-11.1	40.7	46.0	108.4	200

Table 7-2-7. Ch.11 (2462MHz) **TX** mode 18Mbps

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)
32.438	V	32.7	12.9	-18.8	26.8	40.0	21.9	100
171.818	H	43.7	12.5	-16.2	40.0	43.5	100.0	150
200.454	H	38.1	11.4	-12.6	36.9	43.5	70.0	150
386.589	V	33.5	14.9	-14.1	34.3	46.0	51.9	200
455.072	V	34.3	16.5	-13.8	37.0	46.0	70.8	200
729.016	V	33.2	21.1	-11.1	43.2	46.0	144.5	200

Table 7-2-8. Ch.6 (2437MHz) **RX** 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)
33.060	V	34.5	12.8	-18.7	28.6	40.0	26.9	100
171.817	H	44.4	12.5	-16.2	40.7	43.5	108.4	150
200.454	V	37.1	11.4	-12.6	35.9	43.5	62.4	150
455.072	V	34.6	16.5	-13.8	37.3	46.0	73.3	200
465.915	H	33.0	16.8	-13.7	36.1	46.0	63.8	200
729.015	H	29.9	21.1	-11.1	39.9	46.0	98.9	200

7.4.3 EUT in 5.8GHz OFDM transmission mode

Table 7-2-9. Ch.149 (5745MHz) **TX** mode 24Mbps

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)
32.995	V	36.4	12.8	-18.8	30.4	40.0	33.1	100
266.684	H	34.9	12.3	-14.4	32.8	46.0	43.7	200
360.774	V	33.4	14.4	-13.5	34.3	46.0	51.9	200
386.587	V	34.2	14.9	-14.1	35.0	46.0	56.2	200
729.015	V	32.2	21.1	-11.1	42.2	46.0	128.8	200
911.268	V	24.2	22.8	-9.0	38.0	46.0	79.4	200

Table 7-2-10 Ch.157 (5785MHz) **TX** mode 24Mbps

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)
33.322	V	35.4	12.8	-18.7	29.5	40.0	29.9	100
169.792	H	38.0	12.5	-16.3	34.2	43.5	51.3	150
200.453	H	36.4	11.4	-12.6	35.2	43.5	57.5	150
360.785	V	33.7	14.4	-13.5	34.6	46.0	53.7	200
386.587	V	33.8	14.9	-14.1	34.6	46.0	53.7	200
729.015	V	33.7	21.1	-11.1	43.7	46.0	153.1	200

Table 7-2-11 Ch.165 (5825MHz) **TX** mode 24Mbps

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)
33.324	V	34.9	12.8	-18.7	29.0	40.0	28.2	100
200.453	H	35.9	11.4	-12.6	34.7	43.5	54.3	150
364.510	V	37.2	14.4	-13.6	38.0	46.0	79.4	200
386.587	V	34.2	14.9	-14.1	35.0	46.0	56.2	200
729.015	V	32.9	21.1	-11.1	42.9	46.0	139.6	200
911.268	V	24.5	22.8	-9.0	38.3	46.0	82.2	200

Table 7-2-12 Ch.157 (5785MHz) **RX** 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)
168.361	H	39.3	12.5	-16.3	35.5	43.5	59.6	150
200.453	H	36.1	11.4	-12.6	34.9	43.5	55.6	150
364.508	H	37.1	14.4	-13.6	37.9	46.0	78.5	200
457.014	V	32.6	16.6	-13.8	35.4	46.0	58.9	200
729.015	V	33.0	21.1	-11.1	43.0	46.0	141.3	200
911.268	V	24.9	22.8	-9.0	38.7	46.0	86.1	200

8. RESTRICTED BANDS RADIATIONS (1GHz – 40GHz)

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

8.1 Test Procedure

Radiated emissions were measured in the frequency range with 1 GHz to 40GHz in transmitting mode and 1 GHz to 25GHz in receiving mode. All tests were performed in the semi-anechoic chamber at a 3-meter distance (except for the frequency range with 18 GHz to 40 GHz where test distance was reduced to 1 meter) on both horizontal and vertical polarities. The antenna was also scanned in height. The emissions are recorded with a spectrum analyzer in peak hold mode. 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 resolution bandwidth of 1MHz / video bandwidth of 1MHz, and the average setting mode with the tuned spectrum analyzer using resolution bandwidth of 1MHz / video bandwidth of 100Hz or 10Hz. The highest emissions relative to the limit are listed.

8.2 Test Instruments and Measurement Setup

Table 8 Radiated Emission Test Instrumentation (1GHz – 40GHz)

Description	**Model**	**Serial Number**
Spectrum Analyzer EMI Test Receiver	R&S ESI26	836119/003
Spectrum Analyzer	HP 8563E	3416A02248
Harmonic Mixer (26.5 – 40GHz)	Agilent 11970A	011269-001
Amplifier (1 - 26.5GHz)	HP 8449B	3008A00582
Amplifier (26.5 – 40GHz)	Agilent 83051A	3950M00193
Horn Antenna (1 - 18GHz)	EMCO 3115	9903-5774
Horn Antenna (3.95 – 5.85GHz)	EMCO 3160-5	1099
Horn Antenna (5.85 – 8.2GHz)	EMCO 3160-6	9712-1044
Horn Antenna (8.2 – 12.4GHz)	EMCO 3160-7	1158
Horn Antenna (12.4 – 18GHz)	EMCO 3160-8	1143
Horn Antenna (18 - 26.5GHz)	EMCO 3160-9	0004-1202
Horn Antenna (26.5 - 40GHz)	EMCO 3160-10	1175
Coaxial cables: - Horn Ant <=> RF Amp. (1-18GHz) - RF Amp.<=>Spectrum Analyzer (1-12.4GHz) - RF Amp.<=>Spectrum Analyzer (12.4-18GHz) - Horn Ant <=> RF Amp. (18-40GHz) - RF Amp.<=>Spectrum Analyzer (18-40GHz)	Length: 6 m 16 m 3m 3m 1m	 - EM206SCO - GEM0101 - SF102-20166 - SF102-20167 - SF102-21105

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

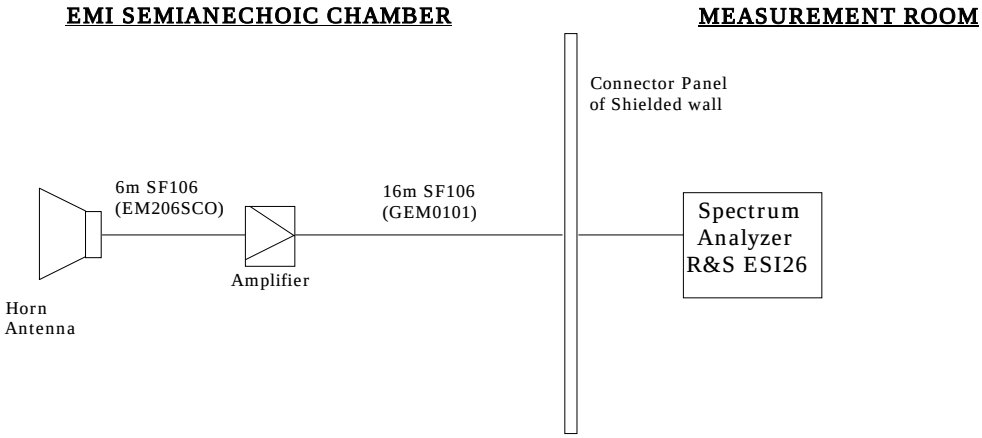


Figure 8-1. Cables for Radiated Emission Test (1 – 12.4 GHz)

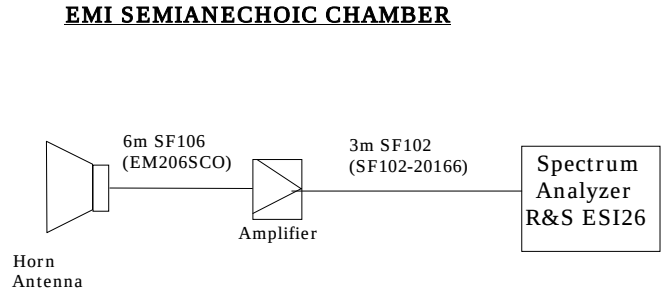


Figure 8-2. Cables for Radiated Emission Test (12.4 - 18GHz)

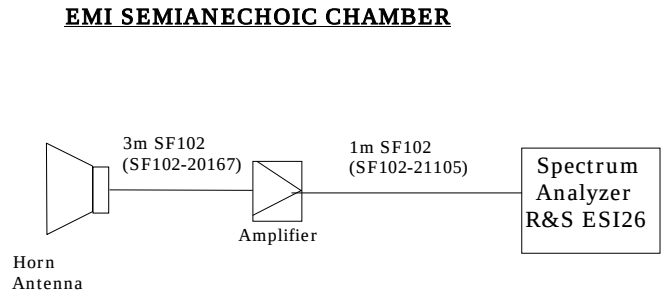


Figure 8-3. Cables for Radiated Emission Test (18 - 26.5GHz)

EMI SEMIANECHOIC CHAMBER

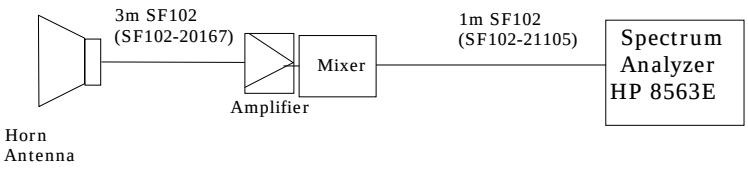


Figure 8-4. Cables for Radiated Emission Test (26.5 - 40GHz)

8.3 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 × Log (Level(μV/m))
40 dBμV/m = 100 μV/m
48 dBμV/m = 250 μV/m

8.4 Measurement Results

The EUT was found to comply to the limits of FCC Part 15 Subpart C and RSS-210 with a margin of 2.1 dB. The measurement was done for the frequency range of 1 GHz to 40 GHz in TX mode and 1 GHz to 25GHz in RX mode.

Test Date: July 17, 18, 22, 25 and August 7, 2003

8.4.1 EUT in 2.4GHz DSSS transmission mode

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

Table 8-2-1. Ch.1 (2412MHz) **TX** mode 11Mbps

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										
2.414	H	110.0	101.4	28.3	-29.6	0.0	108.7	OB*	100.1	OB*
Adjacent RB										
2.368	H	56.8	46.1	28.1	-29.6	0.0	55.3	74.0	44.6	54.0
2.390	H	63.4	53.0	28.2	-29.6	0.0	62.0	74.0	51.6	54.0
1.067	V	49.0	-	24.6	-32.0	0.0	41.6	74.0	-	54.0
1.094	V	53.7	-	24.4	-31.9	0.0	46.2	74.0	-	54.0
1.199	V	49.6	-	25.2	-31.6	0.0	43.2	74.0	-	54.0
1.459	V	48.1	-	25.2	-31.3	0.0	42.0	74.0	-	54.0
2.284	H	51.4	-	27.8	-29.8	0.0	49.4	74.0	-	54.0
2.351	H	53.1	-	28.1	-29.6	0.0	51.6	74.0	-	54.0
4.824	V	53.1	-	27.0	-27.1	0.0	53.0	74.0	-	54.0

Table 8-2-2. Ch.6 (2437MHz) **TX** mode 11Mbps

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										
2.438	H	109.8	101.7	28.4	-29.6	0.0	108.6	OB*	100.5	OB*
Adjacent RB										
2.375	H	54.8	-	28.2	-29.6	0.0	53.4	74.0	-	54.0
2.390	H	54.7	-	28.2	-29.6	0.0	53.3	74.0	-	54.0
2.484	H	57.4	45.9	28.4	-29.6	0.0	56.2	74.0	44.7	54.0
1.067	V	48.0	-	24.6	-32.0	0.0	40.6	74.0	-	54.0
1.094	V	54.1	-	24.4	-31.9	0.0	46.6	74.0	-	54.0
1.199	V	51.7	-	25.2	-31.6	0.0	45.3	74.0	-	54.0
1.459	V	47.9	-	25.2	-31.3	0.0	41.8	74.0	-	54.0
2.272	H	53.3	-	27.8	-29.8	0.0	51.3	74.0	-	54.0
2.337	H	52.5	-	28.1	-29.6	0.0	51.0	74.0	-	54.0
4.876	V	49.3	-	27.0	-27.0	0.0	49.3	74.0	-	54.0
7.314	V	39.7	-	29.8	-24.8	0.0	44.7	74.0	-	54.0

Table 8-2-3. Ch.11 (2462MHz) **TX** mode 11Mbps

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										
2.462	H	109.6	101.4	28.4	-29.6	0.0	108.4	OB*	100.2	OB*
Adjacent RB										
2.484	H	61.4	50.3	28.4	-29.6	0.0	60.2	74.0	49.1	54.0
2.488	H	63.1	51.6	28.4	-29.6	0.0	61.9	74.0	50.4	54.0
1.067	V	52.7	-	24.6	-32.0	0.0	45.3	74.0	-	54.0
1.094	V	54.5	-	24.4	-31.9	0.0	47.0	74.0	-	54.0
1.199	V	50.1	-	25.2	-31.6	0.0	43.7	74.0	-	54.0
1.459	V	48.8	-	25.2	-31.3	0.0	42.7	74.0	-	54.0
2.272	H	52.6	-	27.8	-29.8	0.0	50.6	74.0	-	54.0
2.337	H	53.0	-	28.1	-29.6	0.0	51.5	74.0	-	54.0
4.926	V	51.7	-	27.0	-27.0	0.0	51.7	74.0	-	54.0
7.389	V	41.0	-	29.8	-24.9	0.0	45.9	74.0	-	54.0

Table 8-2-4. Ch.6 (2437MHz) **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	48.5	-	24.6	-32.0	0.0	41.1	74.0	-	54.0
1.094	V	53.6	-	24.4	-31.9	0.0	46.1	74.0	-	54.0
1.199	V	47.9	-	25.2	-31.6	0.0	41.5	74.0	-	54.0
1.459	V	47.5	-	25.2	-31.3	0.0	41.4	74.0	-	54.0

8.4.2 EUT in 2.4GHz OFDM transmission mode

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

Table 8-2-5. Ch.1 (2412MHz) **TX** mode 18Mbps

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										
2.417	H	107.2	95.8	28.3	-29.6	0.0	105.9	OB*	94.5	OB*
Adjacent RB										
2.368	H	54.2	-	28.1	-29.6	0.0	52.7	74.0	-	54.0
2.390	H	72.6	52.9	28.2	-29.6	0.0	71.2	74.0	51.5	54.0
1.094	V	53.3	-	24.4	-31.9	0.0	45.8	74.0	-	54.0
1.301	V	52.7	-	25.9	-31.4	0.0	47.2	74.0	-	54.0
1.459	V	48.5	-	25.2	-31.3	0.0	42.4	74.0	-	54.0
2.273	H	51.0	-	27.8	-29.8	0.0	49.0	74.0	-	54.0
2.336	H	51.5	-	28.1	-29.6	0.0	50.0	74.0	-	54.0
4.824	V	49.0	-	27.0	-27.1	0.0	48.9	74.0	-	54.0

Table 8-2-6. Ch.6 (2437MHz) **TX** mode 18Mbps

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										
2.442	H	110.7	98.7	28.4	-29.6	0.0	109.5	OB*	97.5	OB*
Adjacent RB										
2.380	H	55.8	44.4	28.2	-29.6	0.0	54.4	74.0	43.0	54.0
2.484	H	59.2	46.9	28.4	-29.6	0.0	58.0	74.0	45.7	54.0
2.496	H	59.5	47.4	28.4	-29.6	0.0	58.3	74.0	46.2	54.0
1.066	V	50.3	-	24.6	-32.0	0.0	42.9	74.0	-	54.0
1.094	V	53.6	-	24.4	-31.9	0.0	46.1	74.0	-	54.0
1.467	V	48.1	-	25.2	-31.3	0.0	42.0	74.0	-	54.0
2.272	H	53.0	-	27.8	-29.8	0.0	51.0	74.0	-	54.0
2.336	H	50.3	-	28.1	-29.6	0.0	48.8	74.0	-	54.0
2.369	H	54.7	-	28.1	-29.6	0.0	53.2	74.0	-	54.0
4.876	V	44.7	-	27.0	-27.0	0.0	44.7	74.0	-	54.0
7.313	V	39.8	-	29.8	-24.8	0.0	44.8	74.0	-	54.0

Table 8-2-7. Ch.11 (2462MHz) **TX** mode 18Mbps

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										
2.469	H	107.8	95.8	28.4	-29.6	0.0	106.6	OB*	94.6	OB*
Adjacent RB										
2.484	H	69.3	53.1	28.4	-29.6	0.0	68.1	74.0	51.9	54.0
2.496	H	62.2	49.0	28.4	-29.6	0.0	61.0	74.0	47.8	54.0
1.094	V	53.6	-	24.4	-31.9	0.0	46.1	74.0	-	54.0
1.180	V	47.5	-	25.2	-31.6	0.0	41.1	74.0	-	54.0
1.459	V	49.1	-	25.2	-31.3	0.0	43.0	74.0	-	54.0
2.272	H	51.4	-	27.8	-29.8	0.0	49.4	74.0	-	54.0
2.336	H	52.4	-	28.1	-29.6	0.0	50.9	74.0	-	54.0
2.369	H	50.6	-	28.1	-29.6	0.0	49.1	74.0	-	54.0
4.928	V	44.9	-	27.0	-27.0	0.0	44.9	74.0	-	54.0
7.386	V	39.4	-	29.8	-24.9	0.0	44.3	74.0	-	54.0

Table 8-2-8. Ch.6 (2437MHz) **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)***
1.094	V	52.2	-	24.4	-31.9	0.0	44.7	74.0	-	54.0
1.301	V	48.2	-	25.2	-31.6	0.0	41.8	74.0	-	54.0
1.467	V	47.3	-	25.2	-31.3	0.0	41.2	74.0	-	54.0

8.4.3 EUT in 5.8GHz OFDM transmission mode

*Note: OB means “operation band” (5725-5850MHz); in this case limit is 1W (measured conducted with power meter)

Table 8-2-9. Ch.149 (5745MHz) **TX** mode 24Mbps

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										
5.751	H	102.3	90.6	34.2	-25.9	0.0	110.6	OB*	98.9	OB*
1.066	V	50.2	-	24.6	-32.0	0.0	42.8	74.0	-	54.0
1.094	V	50.5	-	24.4	-31.9	0.0	43.0	74.0	-	54.0
1.200	V	50.2	-	25.2	-31.6	0.0	43.8	74.0	-	54.0
5.353	H	47.9	37.0	33.9	-26.3	0.0	55.5	74.0	44.6	54.0
5.416	H	48.9	37.5	34.1	-26.2	0.0	56.8	74.0	45.4	54.0
11.495	H	34.8	-	33.5	-20.1	0.0	48.2	74.0	-	54.0

Table 8-2-10 Ch.157 (5785MHz) **TX** mode 24Mbps

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										
5.790	H	100.9	88.5	34.2	-25.9	0.0	109.2	OB*	96.8	OB*
1.066	V	53.3	-	24.6	-32.0	0.0	45.9	74.0	-	54.0
1.094	V	51.0	-	24.4	-31.9	0.0	43.5	74.0	-	54.0
1.158	V	56.7	-	24.6	-31.7	0.0	49.6	74.0	-	54.0
1.200	V	51.4	-	25.2	-31.6	0.0	45.0	74.0	-	54.0
5.381	H	48.4	37.0	33.9	-26.3	0.0	56.0	74.0	44.6	54.0
11.571	H	35.4	-	33.5	-20.1	0.0	48.8	74.0	-	54.0

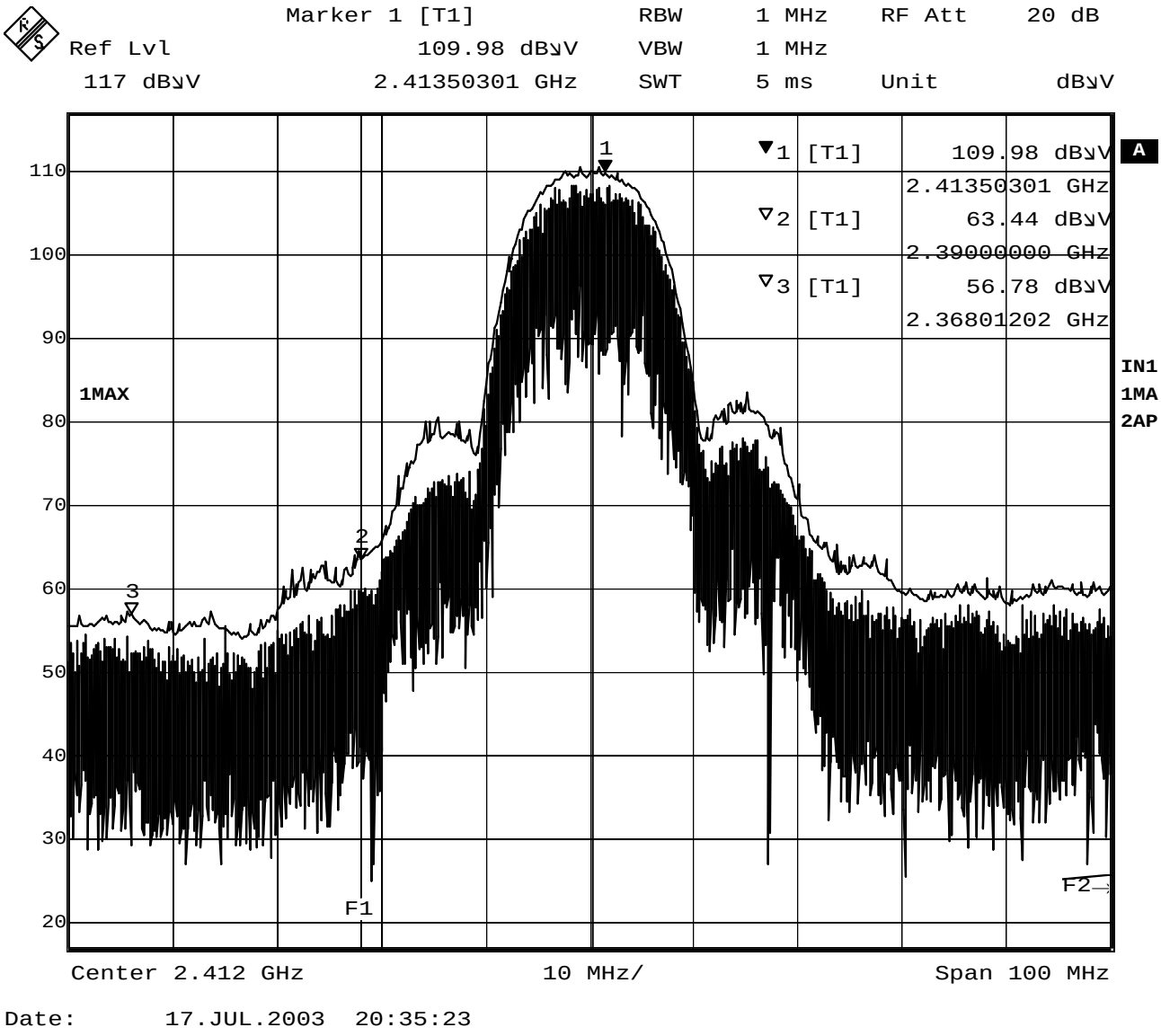
Table 8-2-11 EUT: Ch.165 (5825MHz) **TX** mode 24Mbps

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										
5.829	H	101.4	89.6	34.0	-25.9	0.0	109.5	OB*	97.7	OB*
1.066	V	50.0	-	24.6	-32.0	0.0	42.6	74.0	-	54.0
1.094	V	50.5	-	24.4	-31.9	0.0	43.0	74.0	-	54.0
1.164	H	52.2	-	24.6	-31.7	0.0	45.1	74.0	-	54.0
1.200	V	51.3	-	25.2	-31.6	0.0	44.9	74.0	-	54.0
5.381	H	48.9	37.1	33.9	-26.3	0.0	56.5	74.0	44.7	54.0
11.653	H	35.1	-	33.6	-20.0	0.0	48.7	74.0	-	54.0

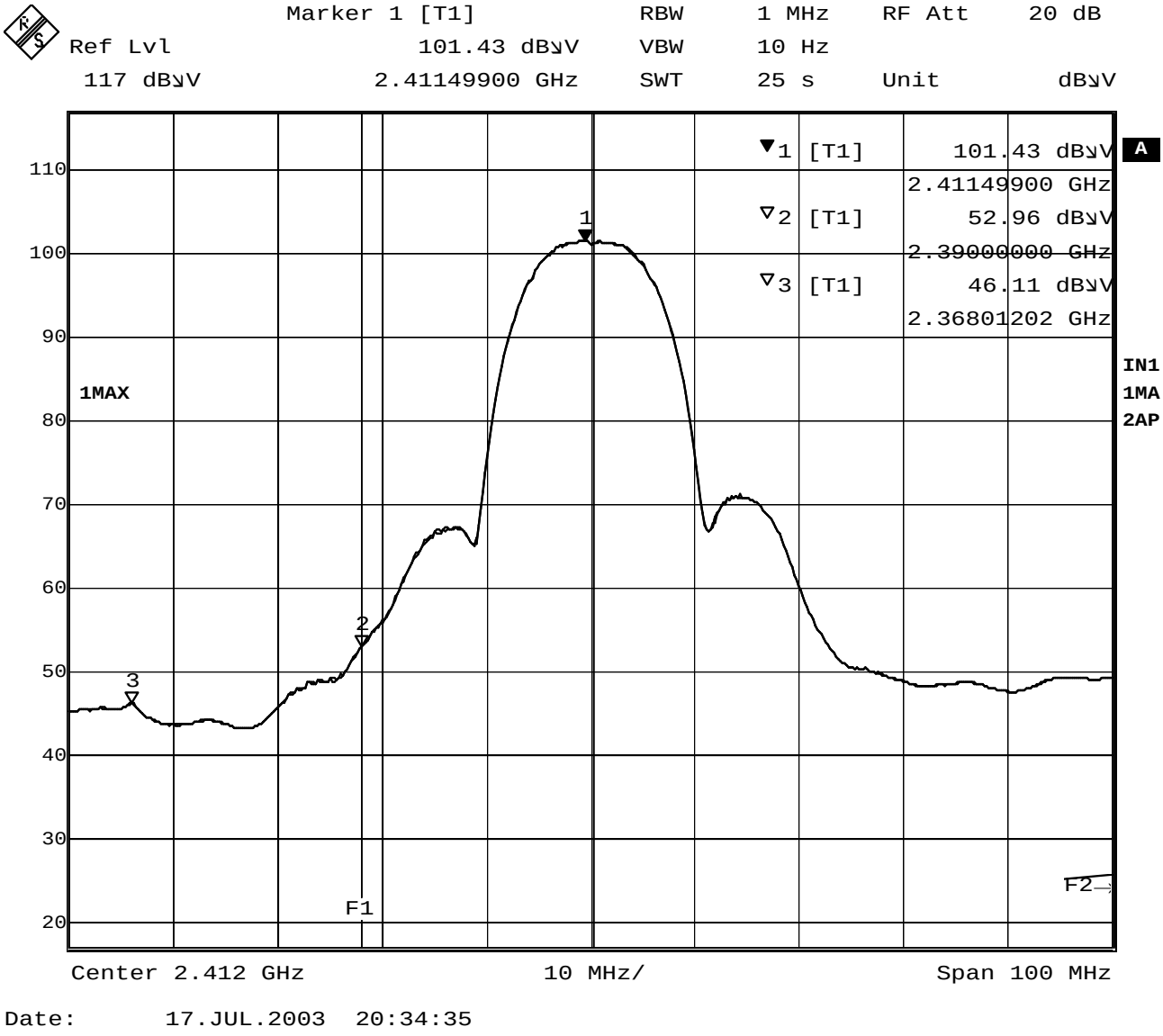
Table 8-2-12 Ch.157 (5785MHz) **RX** mode

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)***
1.066	V	53.2	-	24.6	-32.0	0.0	45.8	74.0	-	54.0
1.094	V	50.6	-	24.4	-31.9	0.0	43.1	74.0	-	54.0
1.200	V	48.8	-	25.2	-31.6	0.0	42.4	74.0	-	54.0

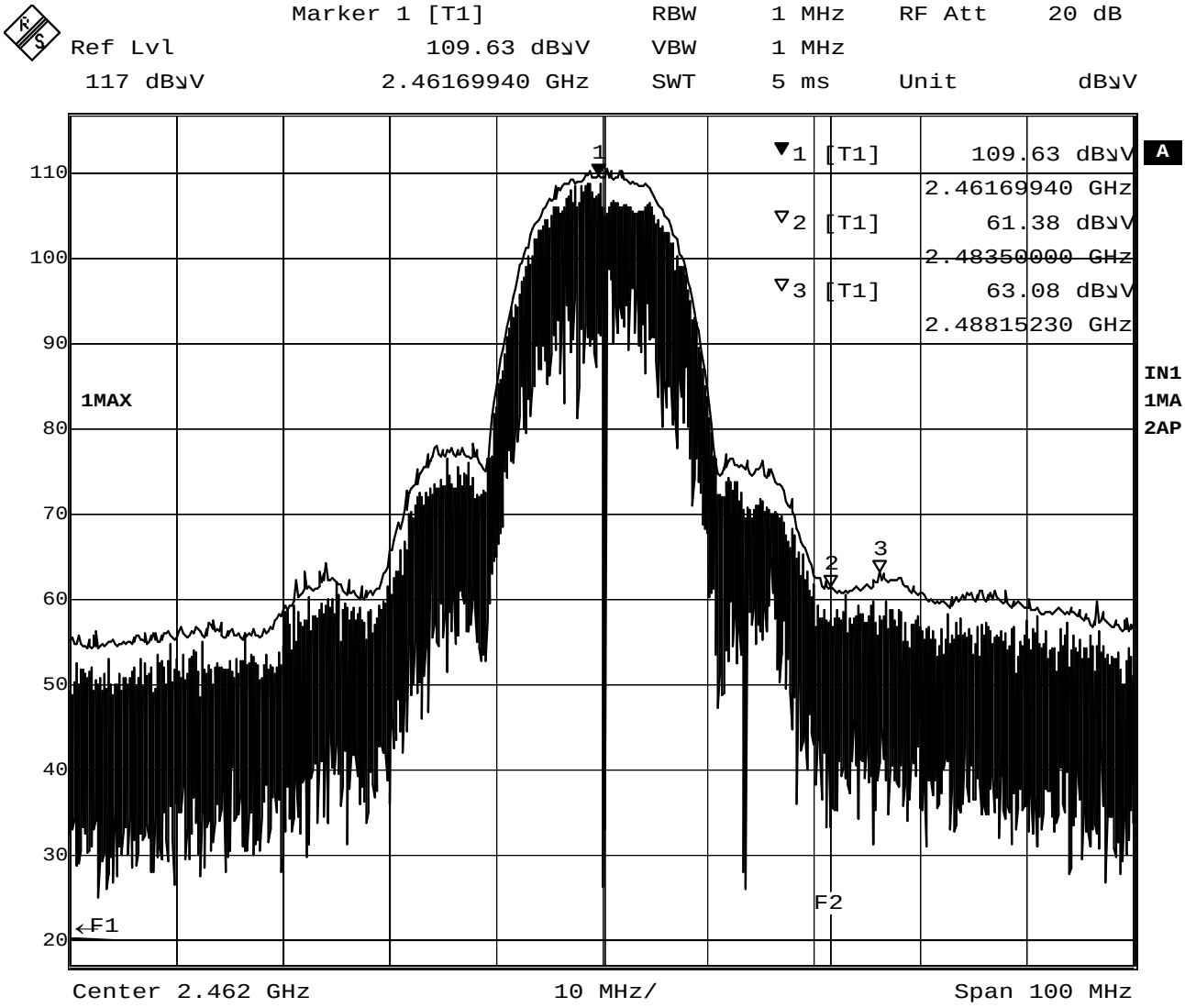
8.5 Measurement plots of adjacent restricted band



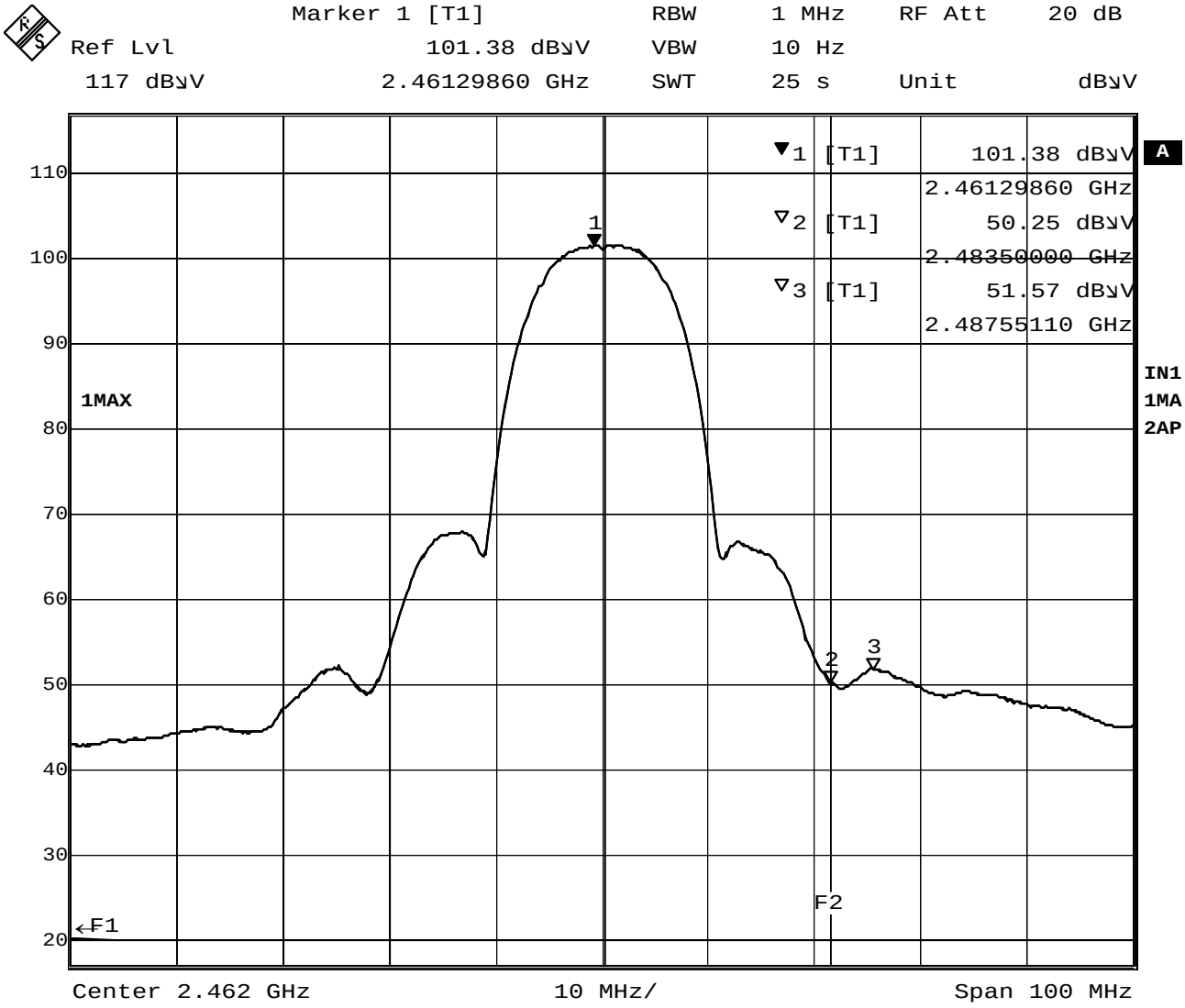
Plot 8-1 Ch.1 2412MHz TX, DSSS 11Mbps (Peak)



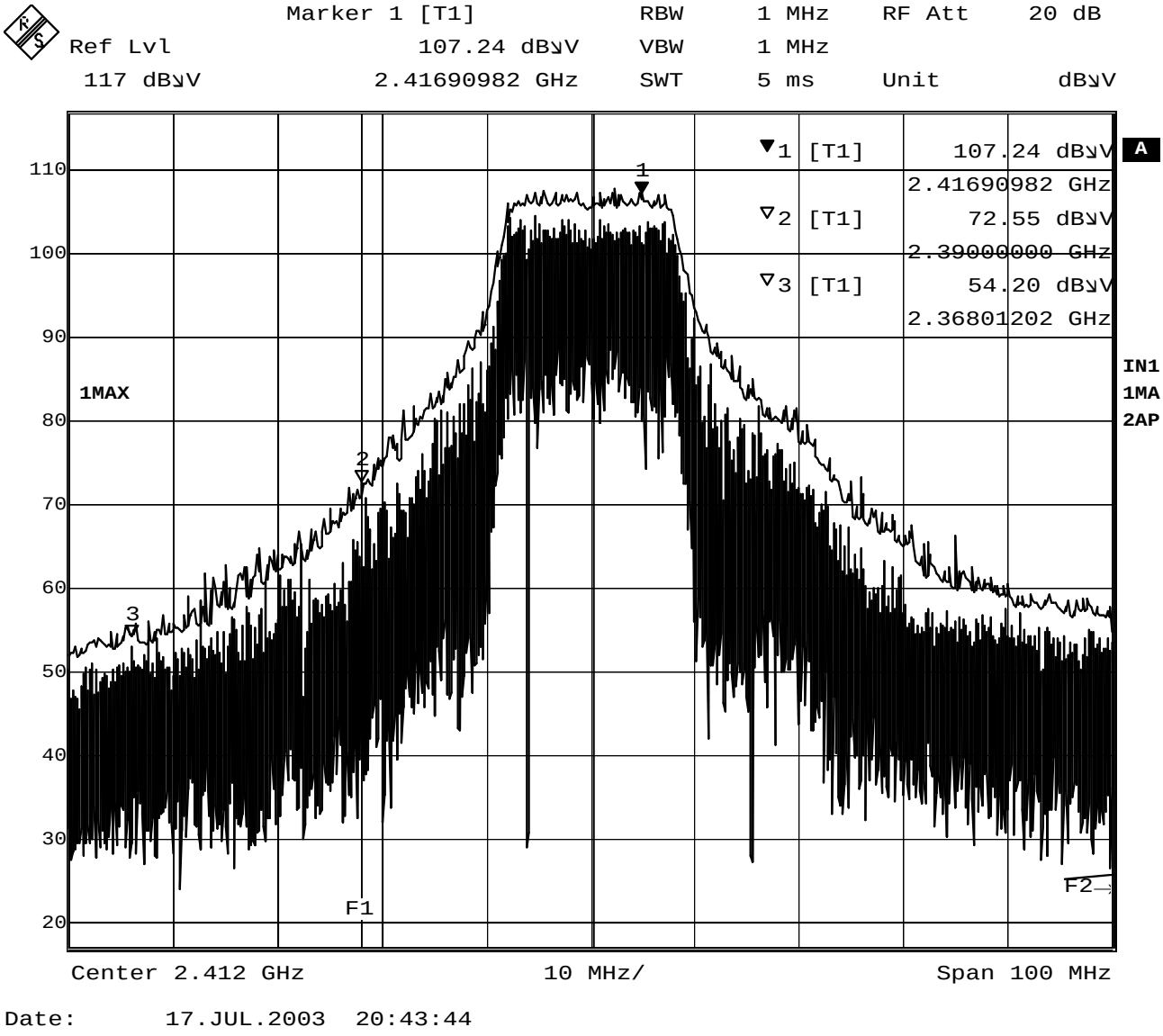
Plot 8-2 Ch.1 2412MHz TX, DSSS 11Mbps (Average)



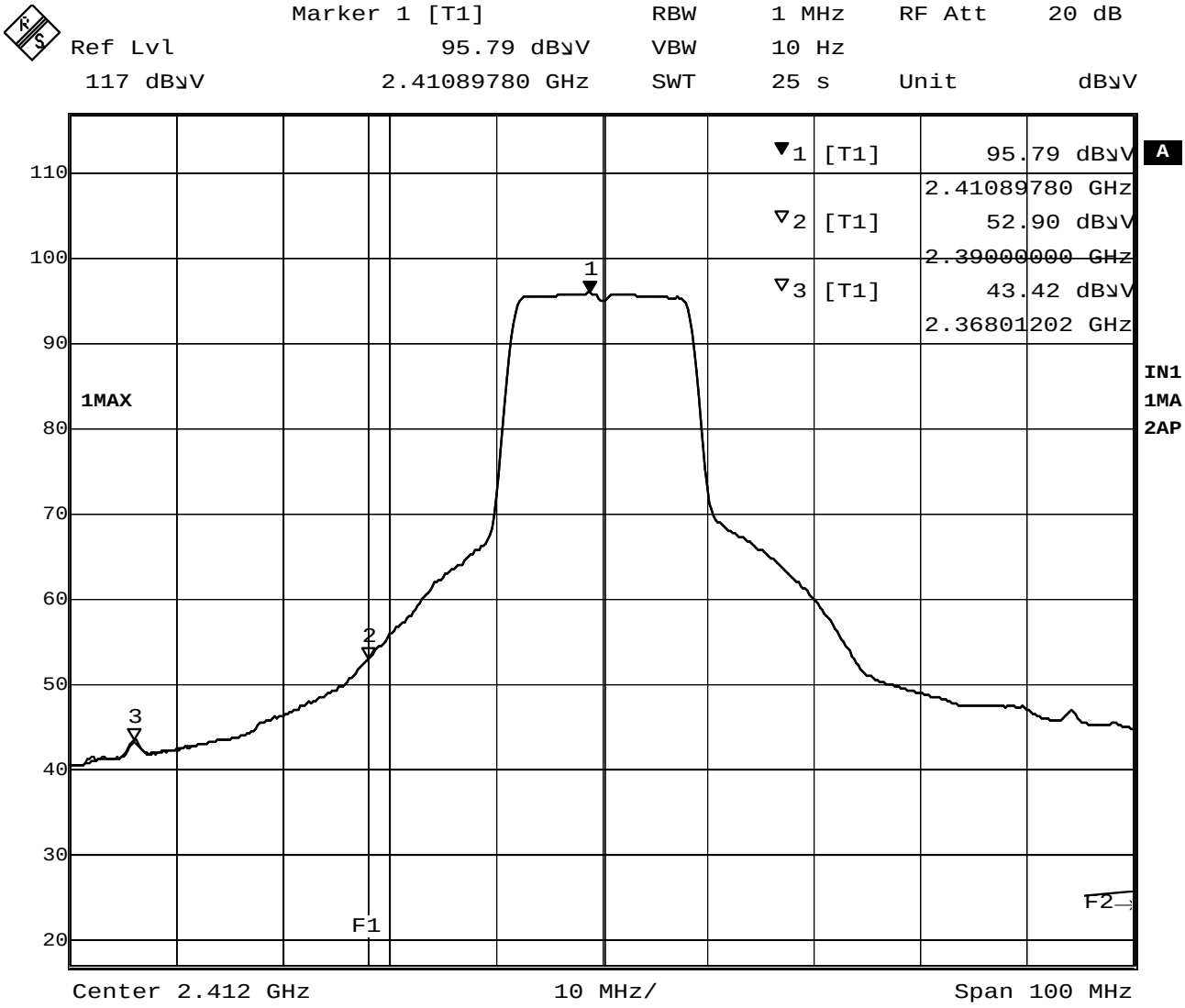
Plot 8-3 Ch.11 2462MHz TX, DSSS 11Mbps (Peak)



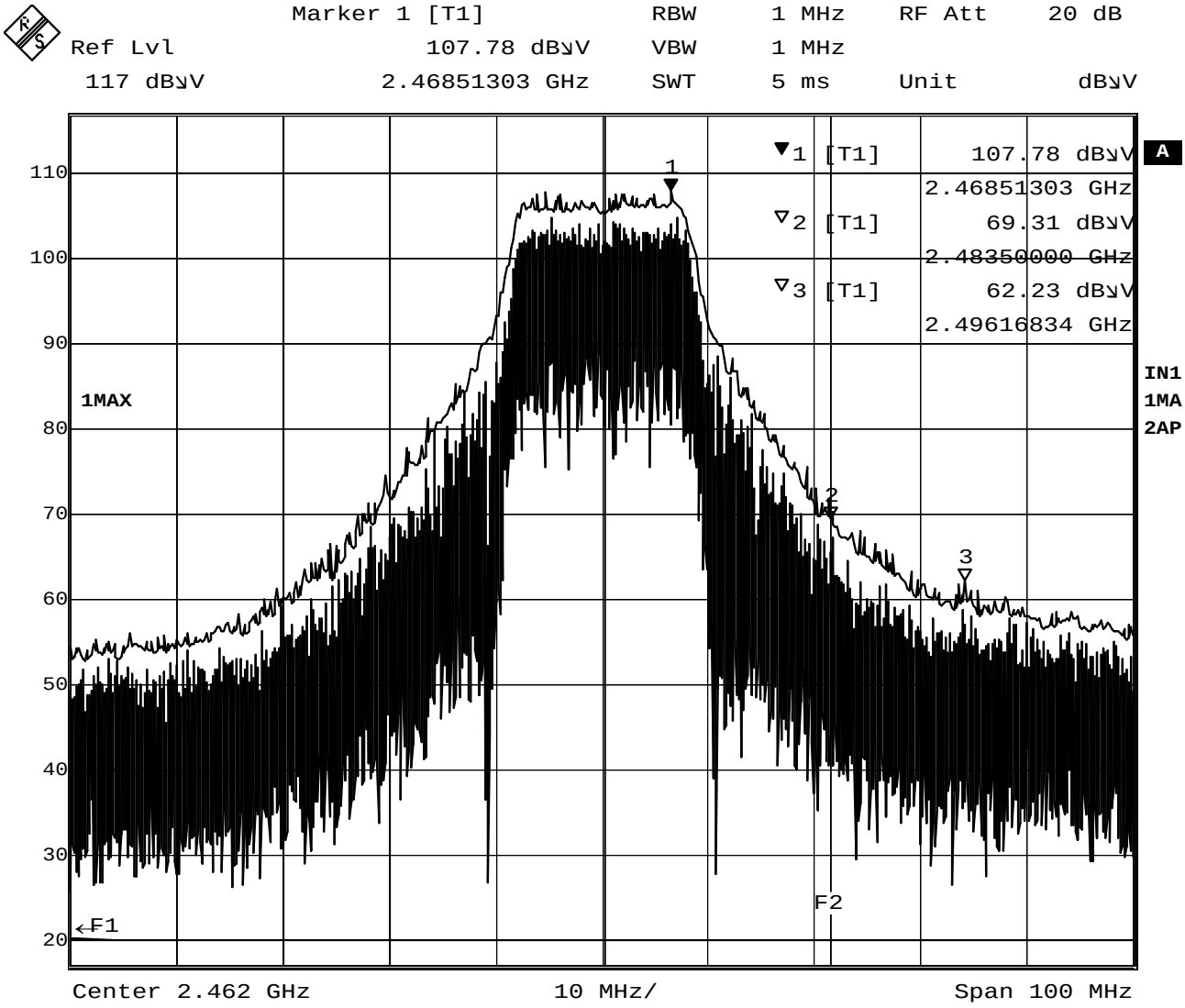
Plot 8-4 Ch.11 2462MHz TX, DSSS 11Mbps (Average)



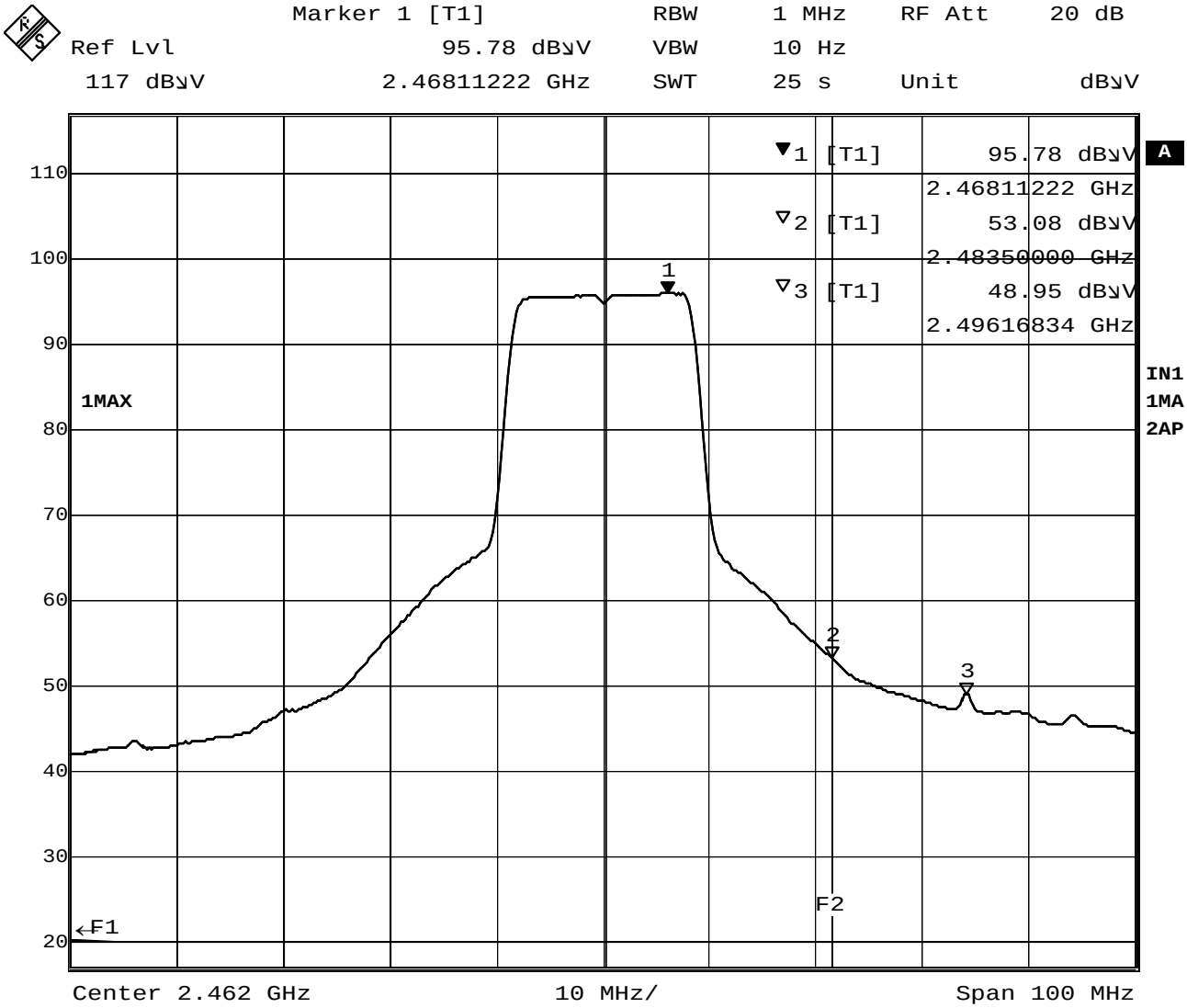
Plot 8-5 Ch.1 2412MHz TX, OFDM 18Mbps (Peak)



Plot 8-6 Ch.1 2412MHz TX, OFDM 18Mbps (Average)



Plot 8-7 Ch.11 2462MHz TX, OFDM 18Mbps (Peak)



Plot 8-8 Ch.11 2462MHz TX, OFDM 18Mbps (Average)