

**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**

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**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: <u>Wireless LAN device</u>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |             |
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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.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |             |
| <b>APPLICANT ANTI-DRUG ABUSE CERTIFICATION:</b><br>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).<br><div style="text-align: center;">(Yes) or No</div> |             |
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## A. General Information

APPLICANT : IBM Japan, Ltd.  
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 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 : ANO20030400LEG  
 IC Certification Number : 349E-PH12127E  
 SERIAL NUMBER : A310037304  
 PHYSICAL 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<br>IC Certification Number           | Description                                                                                                                                                   |
|-----------------------------------------------------------------------------------------|---------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------|
| IBM 11a/b/g Wireless LAN Mini PCI Adapter<br>(s/n A310037304)                           | FCC ID: ANO20030400LEG<br>IC: 349E-PH12127E | <b>Applying equipment</b><br>IEEE802.11a/b/g Wireless LAN Mini-PCI Combo Card without antenna                                                                 |
| ThinkPad R50 Series<br>M/T 1829-38x<br>(s/n ZZ-08189)<br>M/T 1829-62x<br>(s/n ZZ-08233) | N/A                                         | IBM Notebook PC with built_in antenna<br>CPU: Intel® Pentium® M Processor, 1.5GHz<br>LCD: 14 inch<br>CPU: Intel® Pentium® M Processor, 1.6GHz<br>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 |
|----------------------------------------------------------------------------|-------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|--------|
| <b>15.247(a)(2)</b><br><b>6.2.2(o)</b>                                     | Bandwidth at 6 dB below                                                       | FCC requirement<br>RSS-210 Issue5: Amendment                                                                                                | Conducted             | Pass   |
| –<br><b>5.9.1</b>                                                          | Occupied BW (Bandwidth at 20 dB below)                                        | IC requirement                                                                                                                              |                       | Pass   |
| <b>15.247(c)</b><br><b>6.2.2(o)(e1)</b>                                    | Out of Band Emissions                                                         | The radiated emission in any 100kHz of outband shall be at least 20dB below the highest inband spectral density.                            |                       | Pass   |
| <b>15.247(b)(3)</b><br><b>6.2.2(o)(b)</b>                                  | Transmitter peak output power                                                 | Shall not exceed 1.0 W.                                                                                                                     |                       | Pass   |
| <b>15.247(d)</b><br><b>6.2.2(o)(b)</b>                                     | Transmitter power spectral Density                                            | Shall not be greater than 8 dBm in any 3kHz band.                                                                                           |                       | Pass   |
| <b>15.207</b><br><b>6.2.2(o)(e3)</b><br><b>/ 6.6</b>                       | AC Wireline Conducted Emissions<br>150kHz – 30MHz                             | Class B:<br>Freq.(MHz) QP(dBμV) Ave.(dBμV)<br>0.15 - 0.5    66 - 56    56 - 46<br>0.5   - 5       56       46<br>5   - 30       60       50 |                       | Pass   |
| <b>15.205 / 209</b><br><b>6.2.1</b><br><b>/6.2.2(o)(e3)</b><br><b>/6.3</b> | 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):                                               |                                                                                                                                             |                        |      |
|----------------------------------------------------------------------------|-------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------|------------------------|------|
| <b>15.207</b><br><b>6.2.2(o)(e3)</b><br><b>/ 7.4</b>                       | AC Wireline Conducted Emissions<br>150kHz – 30MHz                             | Class B:<br>Freq.(MHz) QP(dBμV) Ave.(dBμV)<br>0.15 - 0.5    66 - 56    56 - 46<br>0.5   - 5       56       46<br>5   - 30       60       50 | Conducted              | Pass |
| <b>15.205 / 209</b><br><b>6.2.1</b><br><b>/6.2.2(o)(e3)</b><br><b>/7.3</b> | 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   |
|--------------------------------------|--------------------------|----------------------------------------------------------------------------------------------------------------------------------|----------|
| <b>15.247(b)(4)(i)</b><br>–          | Antenna gain             | Peak gain of the device : 1.84 dBi                                                                                               | N/A      |
| <b>15.203</b><br><b>6.2.2(o)(e2)</b> | Unique antenna connector | The device employs an unique <b>electronic handshake</b> 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 | <b>1.84 dBi (peak)</b> | 1.71 dBi (peak)        |
| 5.8GHz band | Left Antenna gain  | 0.02 dBi (peak)        | <b>1.78 dBi (peak)</b> |
|             | 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%.

## **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<sup>\*1</sup>, 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:<br>- Spectrum Analyzer <=> EUT | Length: 110 cm      Loss: 1.3 dB (for 2.4GHz)<br>2.3 dB (for 5.8GHz) |               |

Notes: - R&S: Rohde & Schwarz

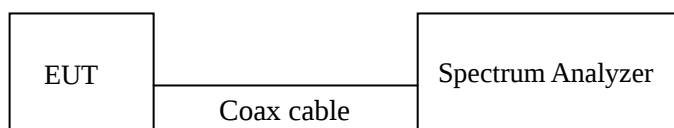


Figure 1: Measurement setup for 6dB bandwidth test

## 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

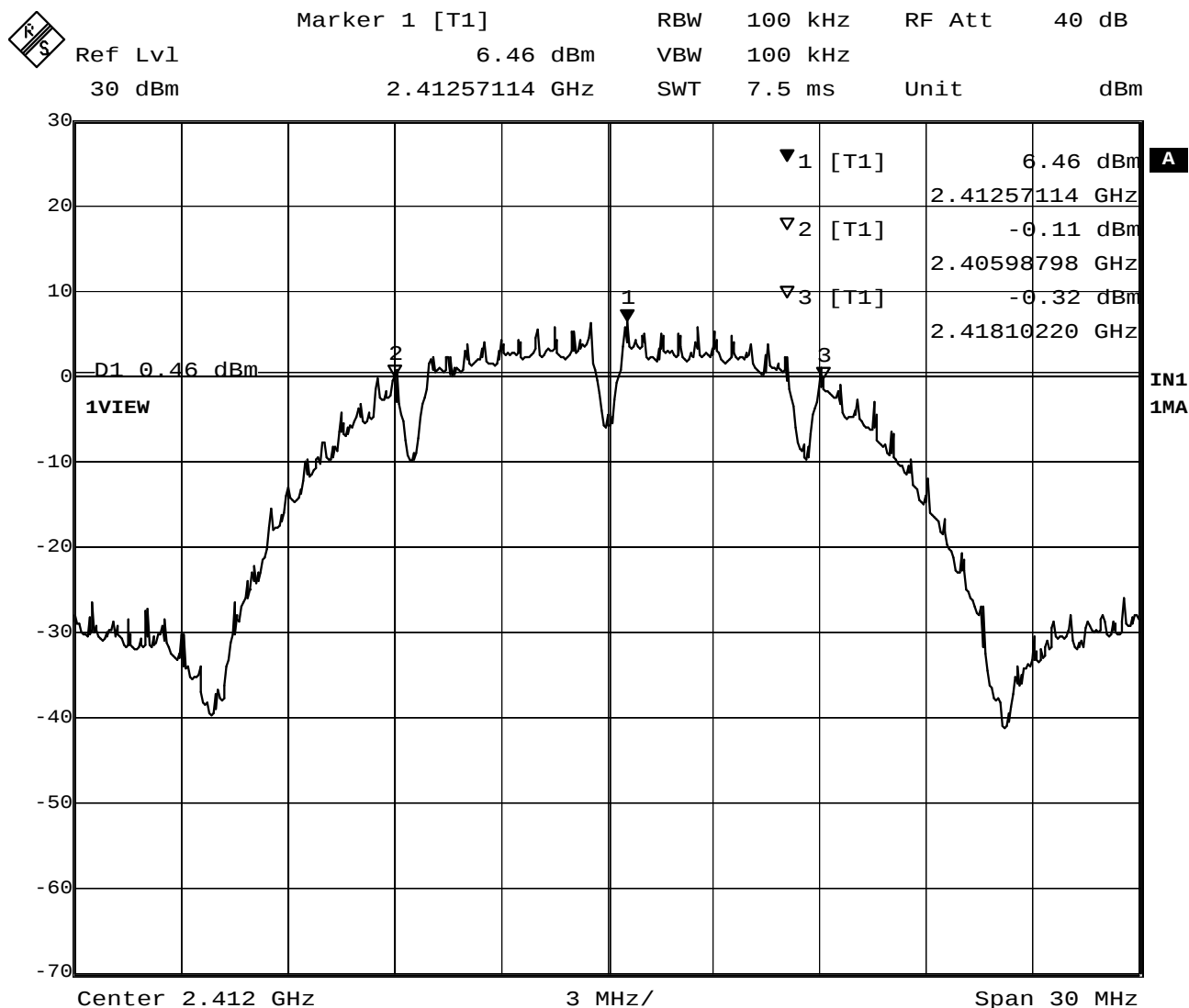
| Center Frequency (MHz) | Trace number | Lower frequency (MHz) | Upper frequency (MHz) | Bandwidth at 6 dB below (MHz) | Limit (MHz) |
|------------------------|--------------|-----------------------|-----------------------|-------------------------------|-------------|
| 5745 (ch. 149)         | omitted      | 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.

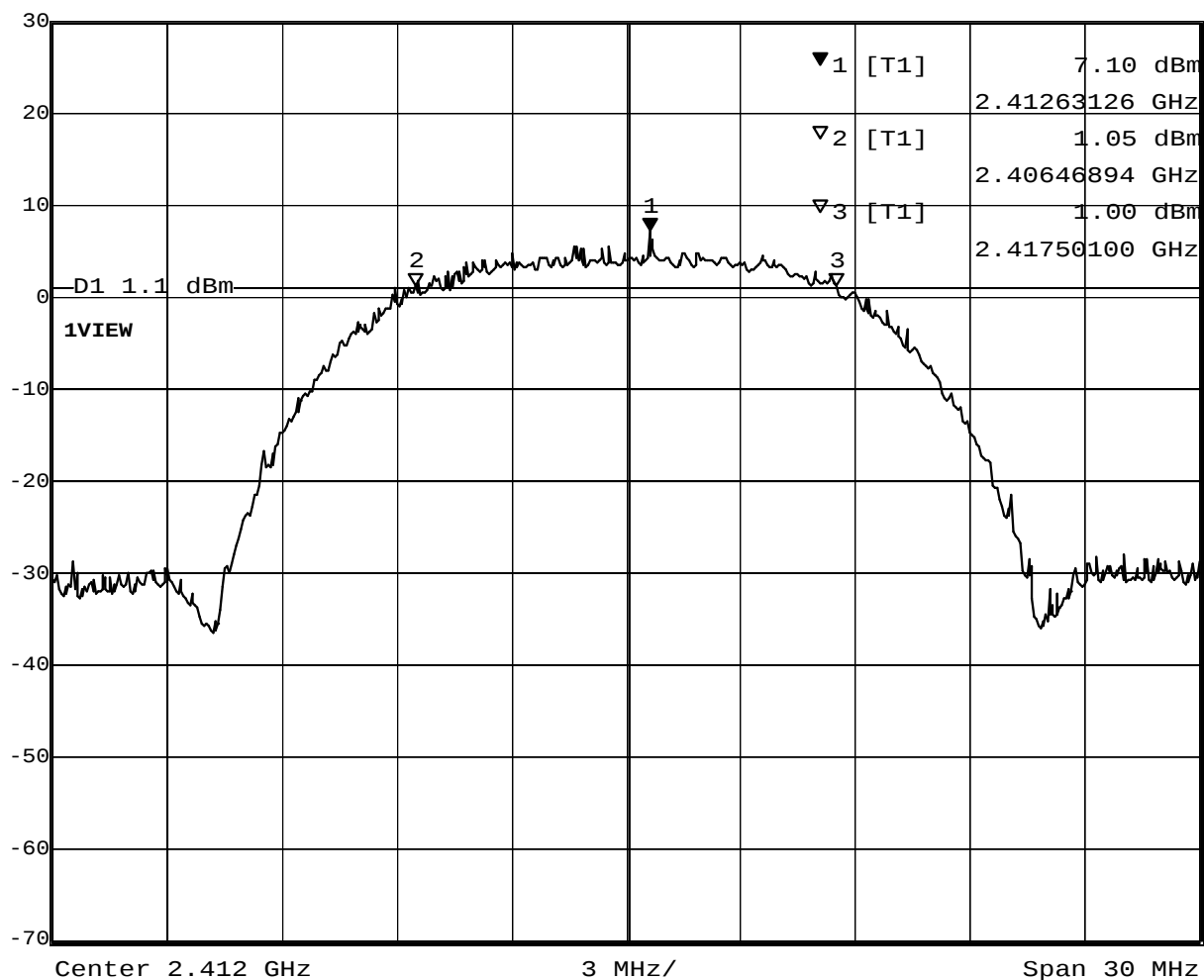


Date: 16.JUL.2003 11:23:51

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



Marker 1 [T1] RBW 100 kHz RF Att 40 dB  
Ref Lvl 7.10 dBm VBW 100 kHz  
30 dBm 2.41263126 GHz SWT 7.5 ms Unit dBm

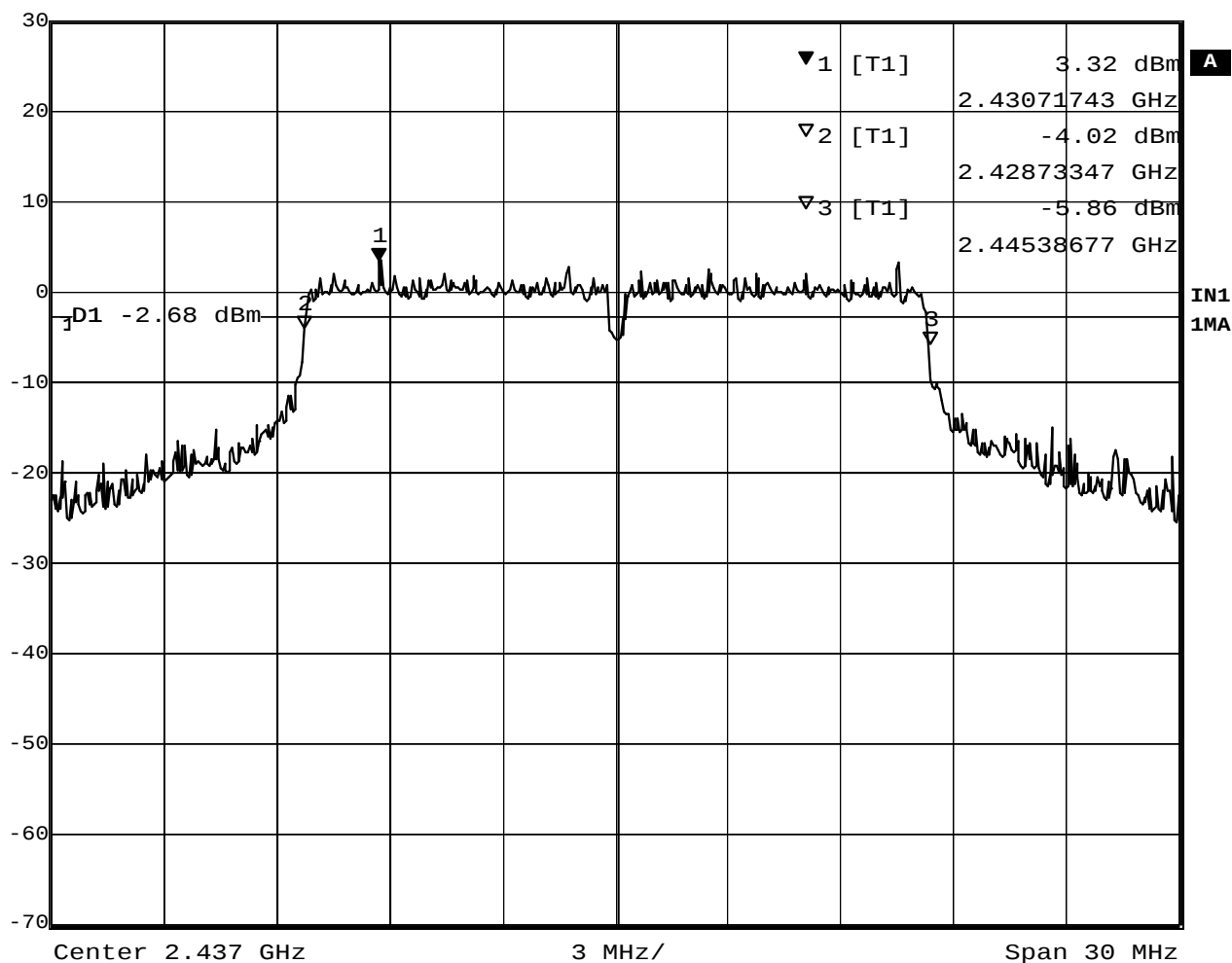


Date: 16.JUL.2003 11:21:33

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



Marker 1 [T1] RBW 100 kHz RF Att 40 dB  
Ref Lvl 3.32 dBm VBW 100 kHz  
30 dBm 2.43071743 GHz SWT 7.5 ms Unit dBm

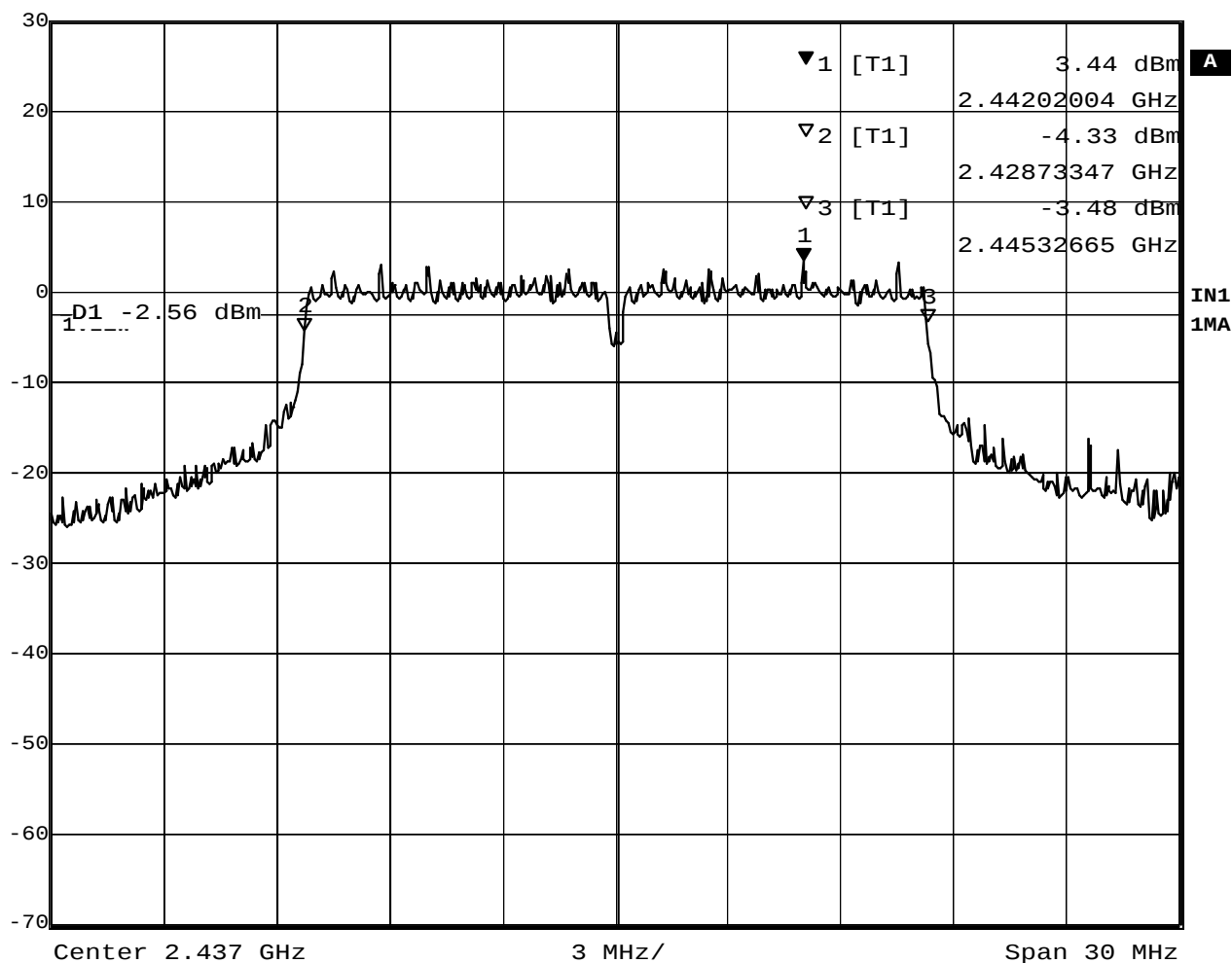


Date: 16.JUL.2003 11:59:47

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



Marker 1 [T1] RBW 100 kHz RF Att 40 dB  
Ref Lvl 3.44 dBm VBW 100 kHz  
30 dBm 2.44202004 GHz SWT 7.5 ms Unit dBm

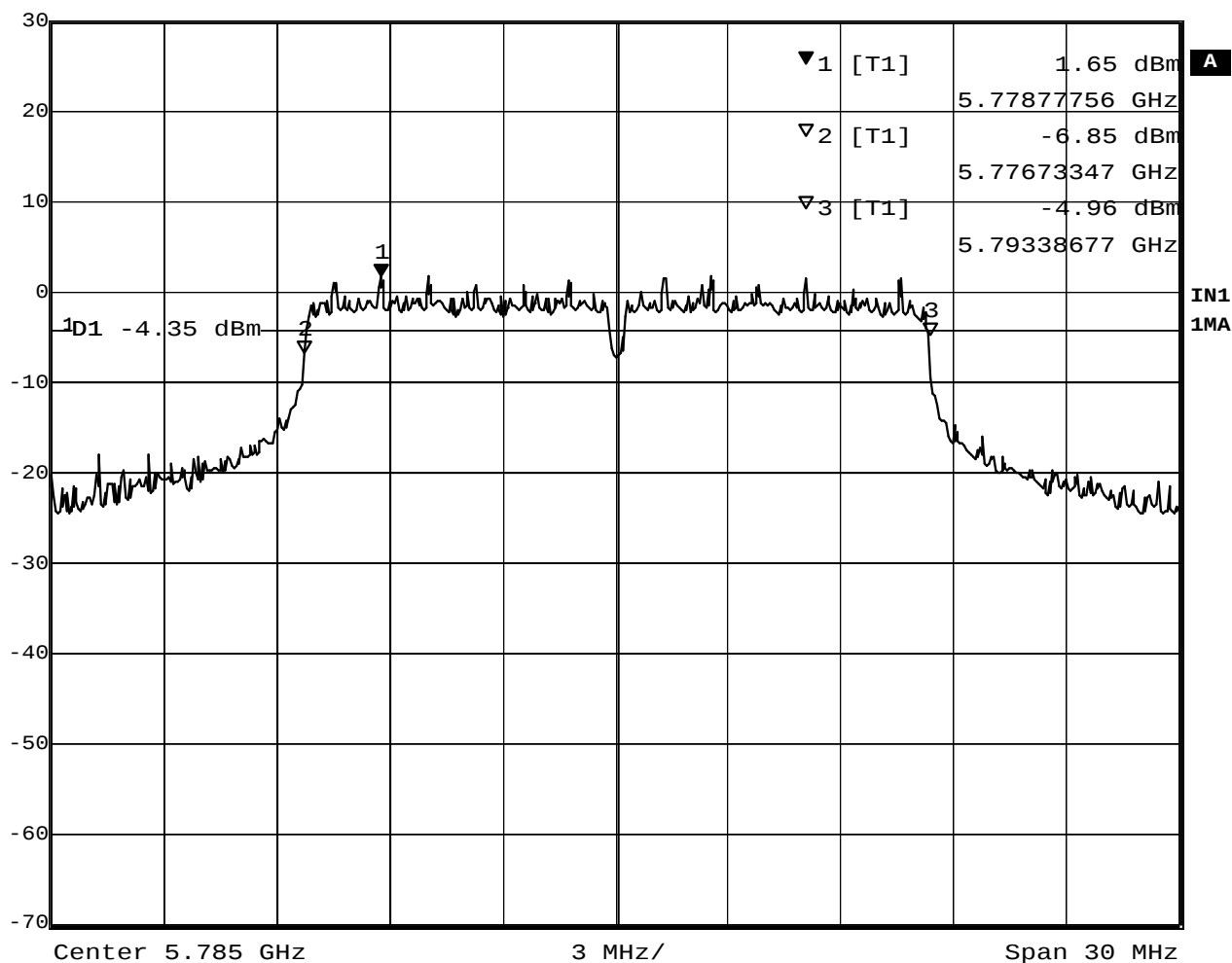


Date: 16.JUL.2003 11:52:59

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



Marker 1 [T1] RBW 100 kHz RF Att 40 dB  
Ref Lvl 1.65 dBm VBW 100 kHz  
30 dBm 5.77877756 GHz SWT 7.5 ms Unit dBm

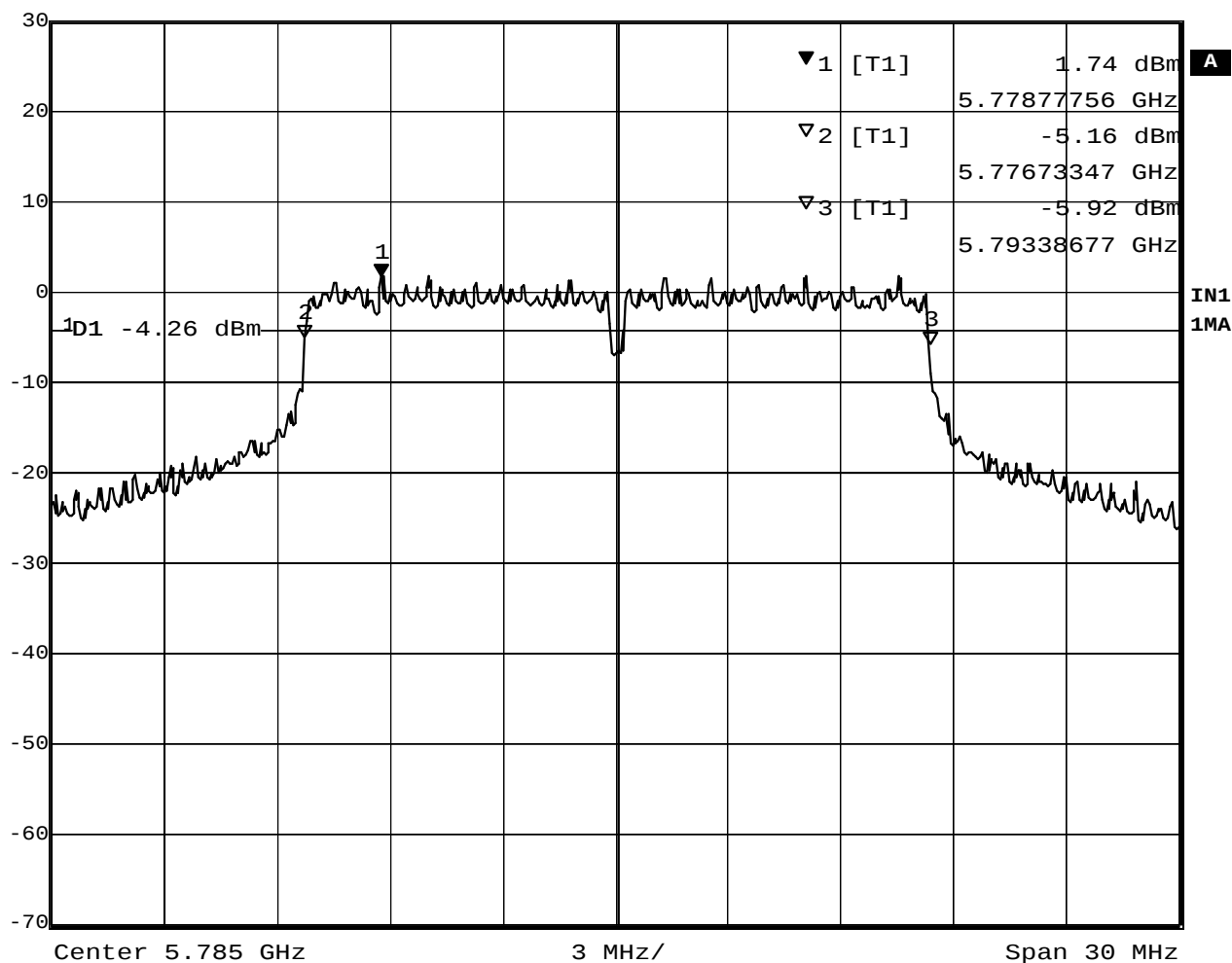


Date: 16.JUL.2003 14:37:53

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



Marker 1 [T1] RBW 100 kHz RF Att 40 dB  
Ref Lvl 1.74 dBm VBW 100 kHz  
30 dBm 5.77877756 GHz SWT 7.5 ms Unit dBm



Date: 16.JUL.2003 14:26:30

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<sup>\*1</sup>, 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                          |

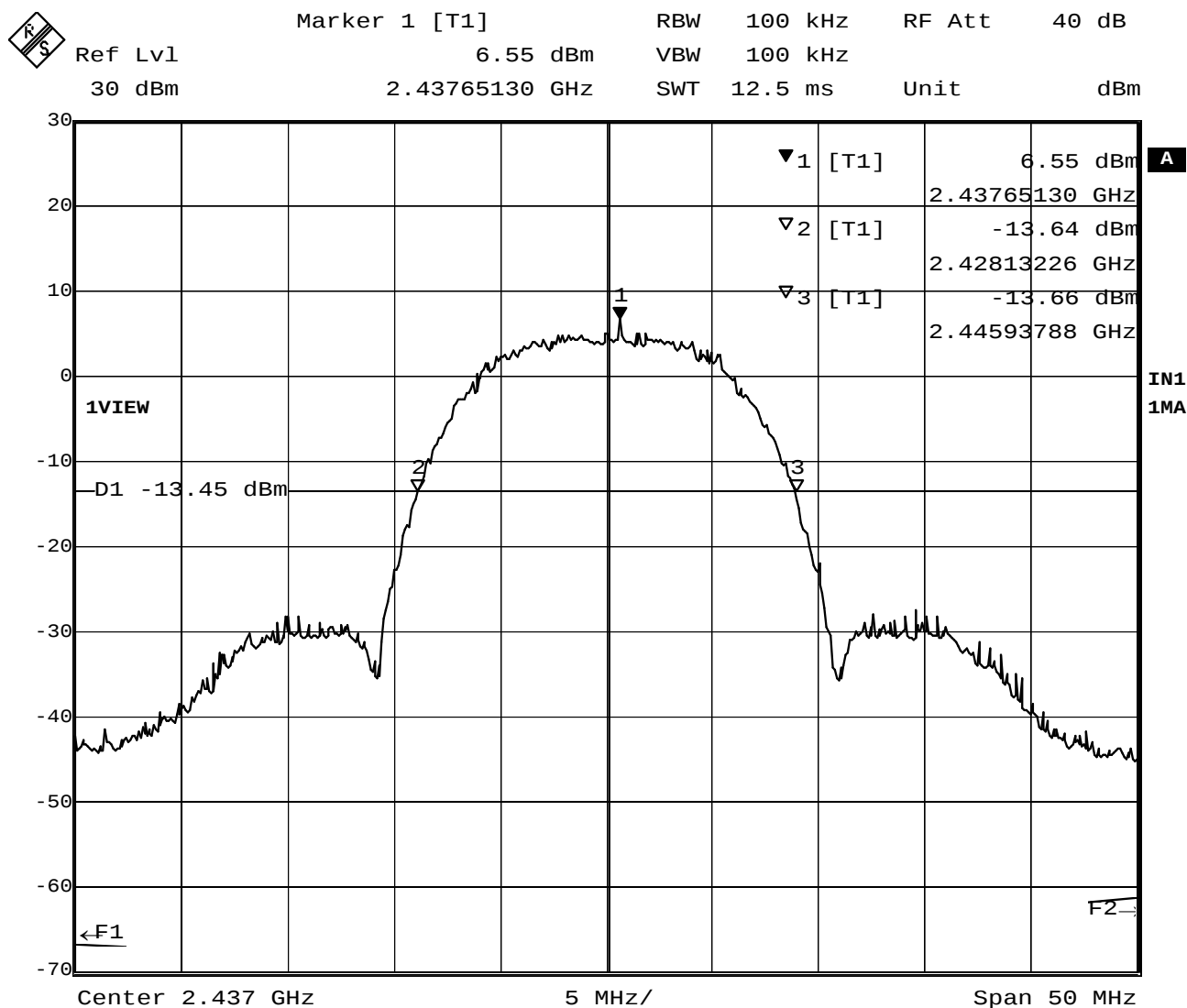
#### 2.3.3 5.8GHz band OFDM mode

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.

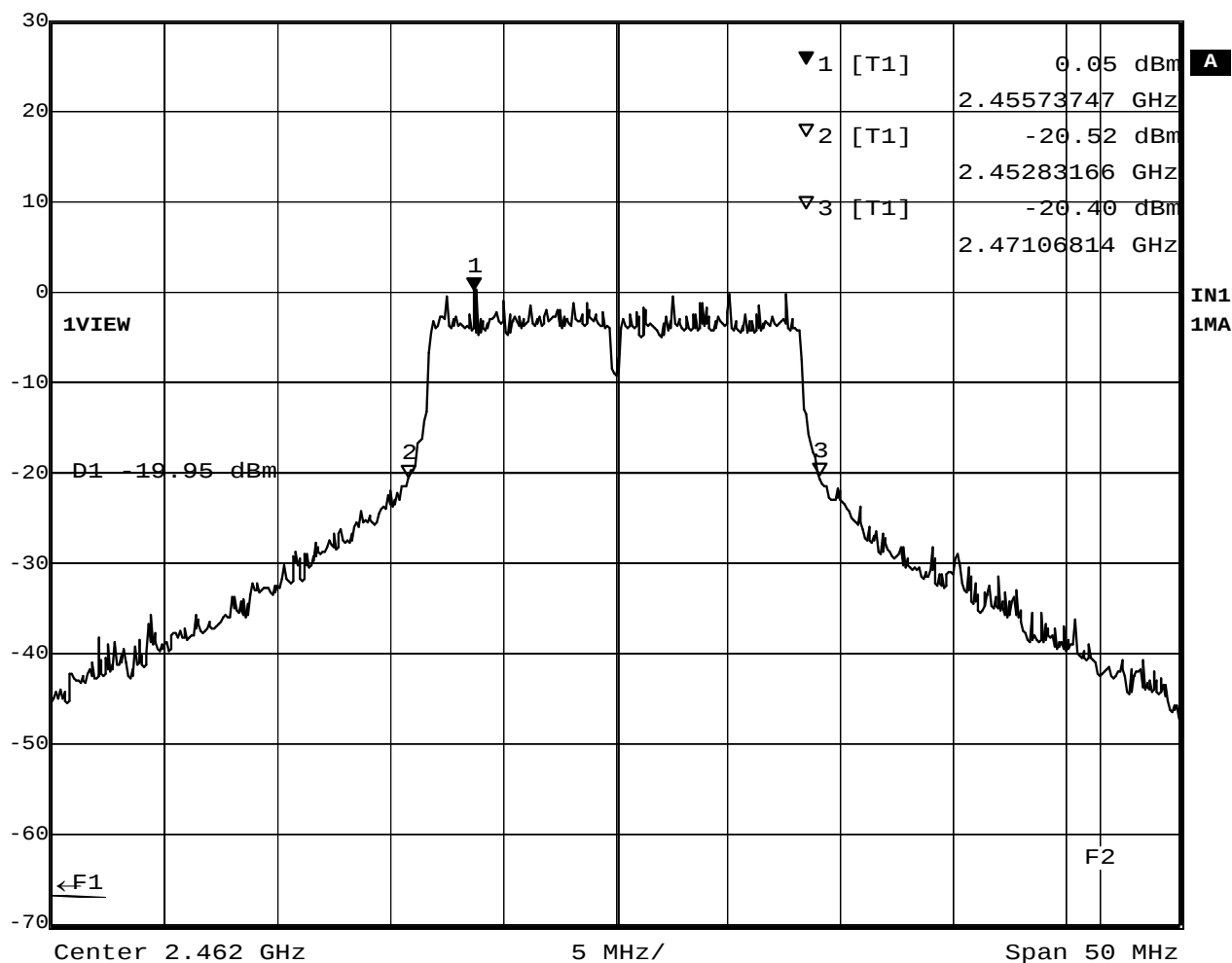


Date: 16.JUL.2003 15:39:20

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



Marker 1 [T1] RBW 100 kHz RF Att 40 dB  
Ref Lvl 0.05 dBm VBW 100 kHz  
30 dBm 2.45573747 GHz SWT 12.5 ms Unit dBm

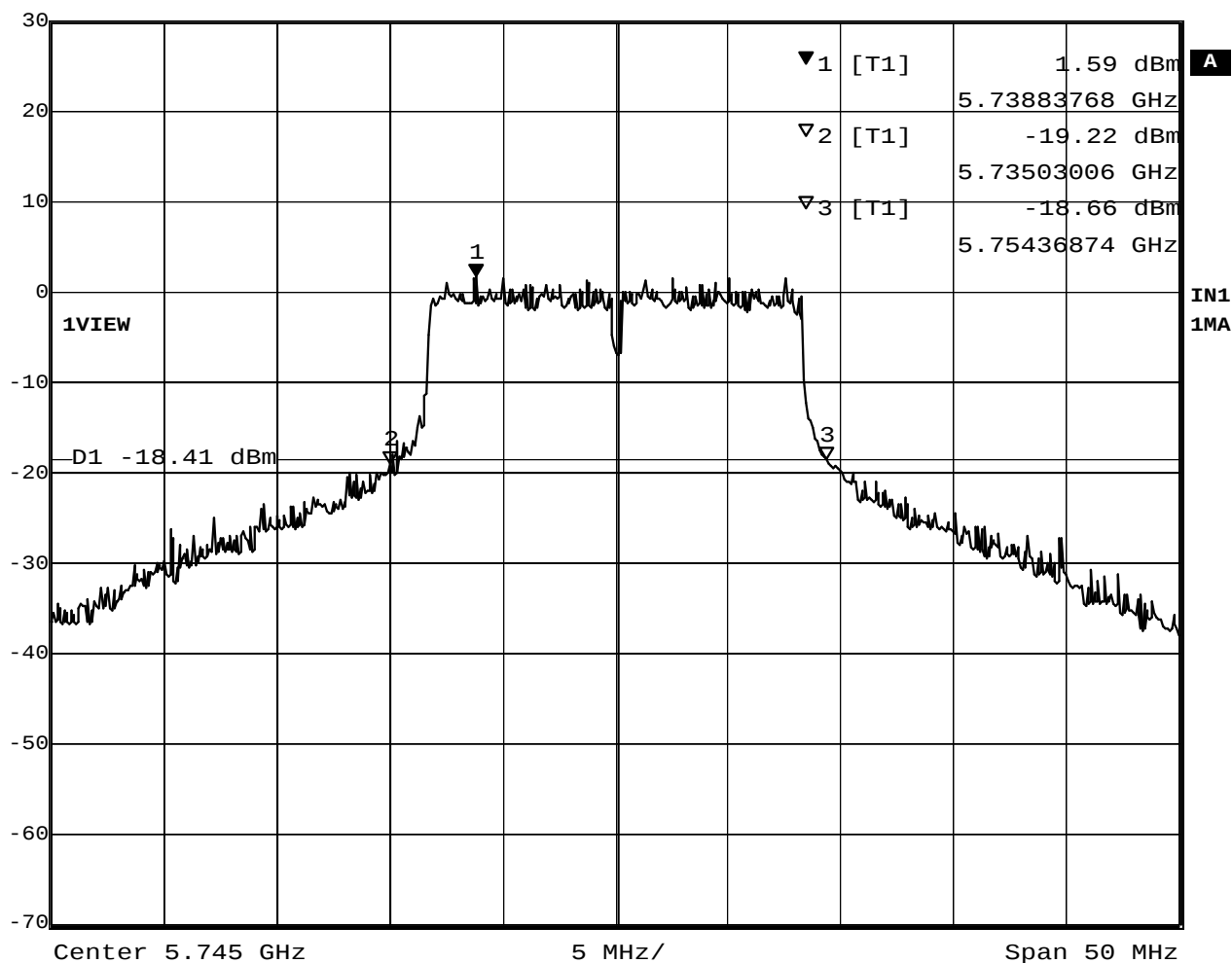


Date: 16.JUL.2003 16:32:04

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



Marker 1 [T1] RBW 100 kHz RF Att 40 dB  
Ref Lvl 1.59 dBm VBW 100 kHz  
30 dBm 5.73883768 GHz SWT 12.5 ms Unit dBm



Date: 16.JUL.2003 16:49:25

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:<br>- Power Sensor <=> EUT | Length: 20 cm<br>Loss: 0.7dB (for 2.4GHz)<br>1.3dB (for 5.8GHz) |               |

Notes: - HP: Hewlett Packard

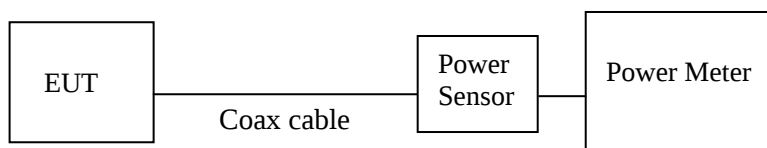


Figure 3-1: Measurement setup of power meter method

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

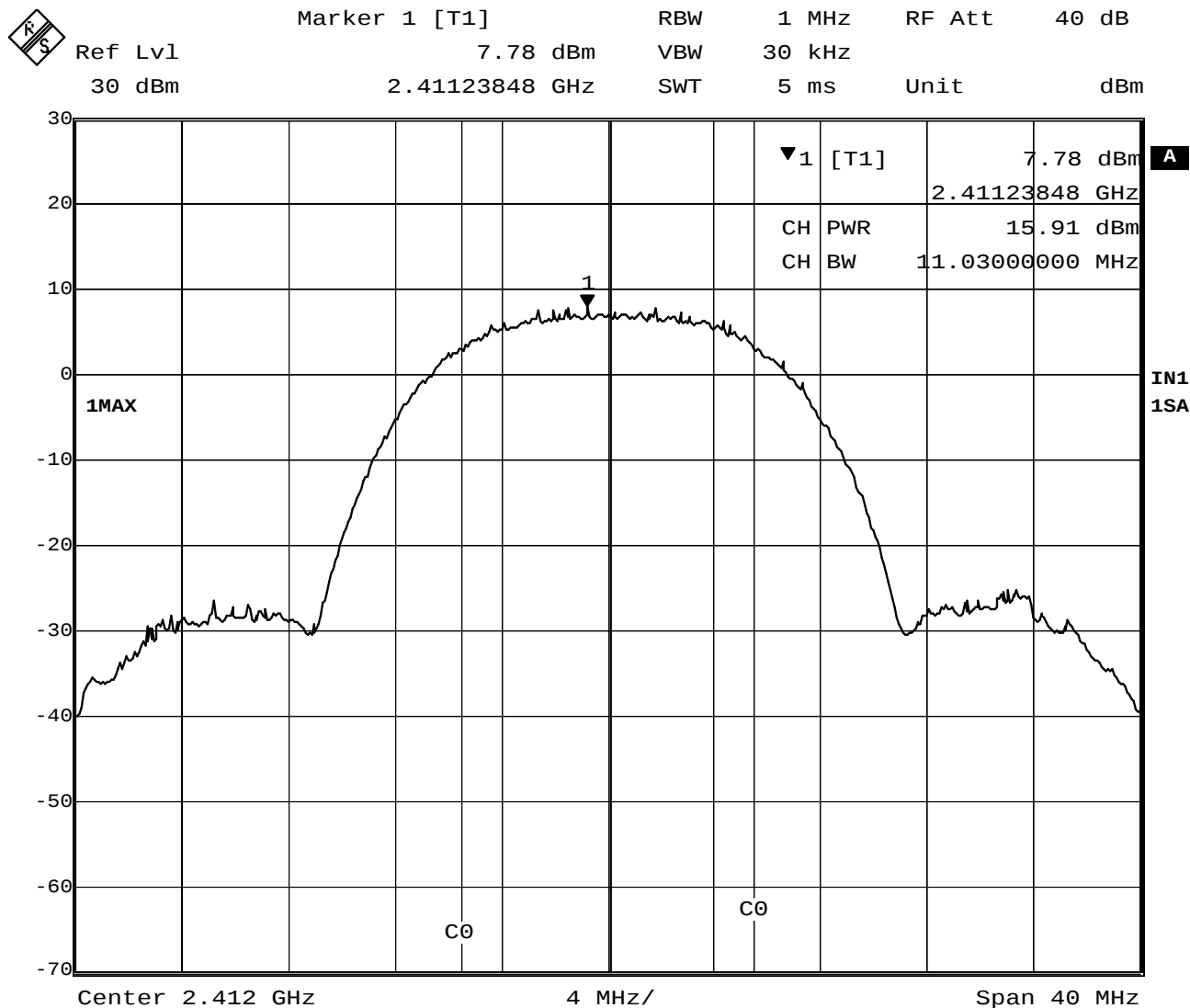
[ Calculation table ]

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

Table 3-2-2. Spectrum analyzer measurement results

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

### 3.4 Trace Data of Conducted Peak Output Power

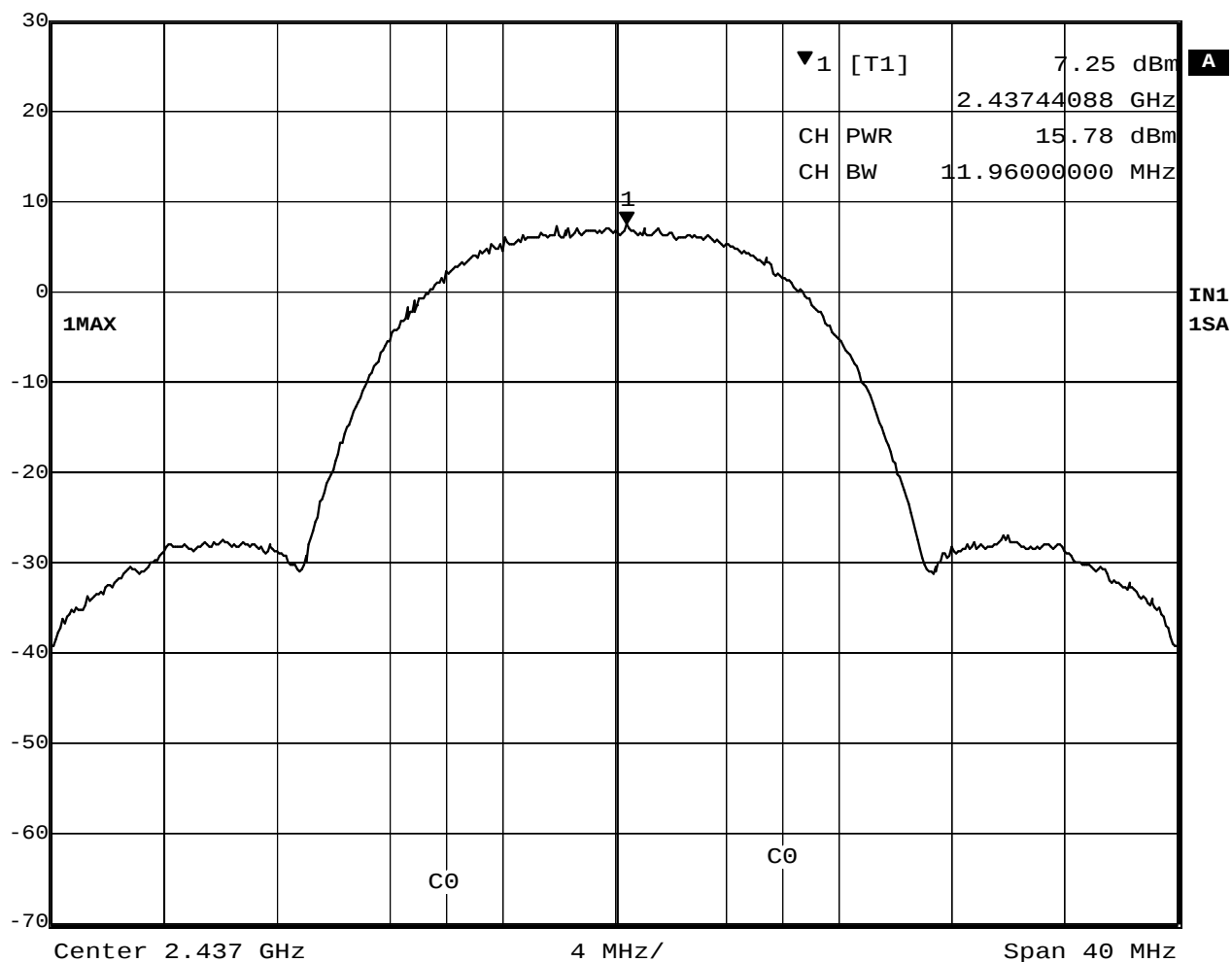


Date: 16.JUL.2003 17:57:55

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



Marker 1 [T1] RBW 1 MHz RF Att 40 dB  
Ref Lvl 7.25 dBm VBW 30 kHz  
30 dBm 2.43744088 GHz SWT 5 ms Unit dBm

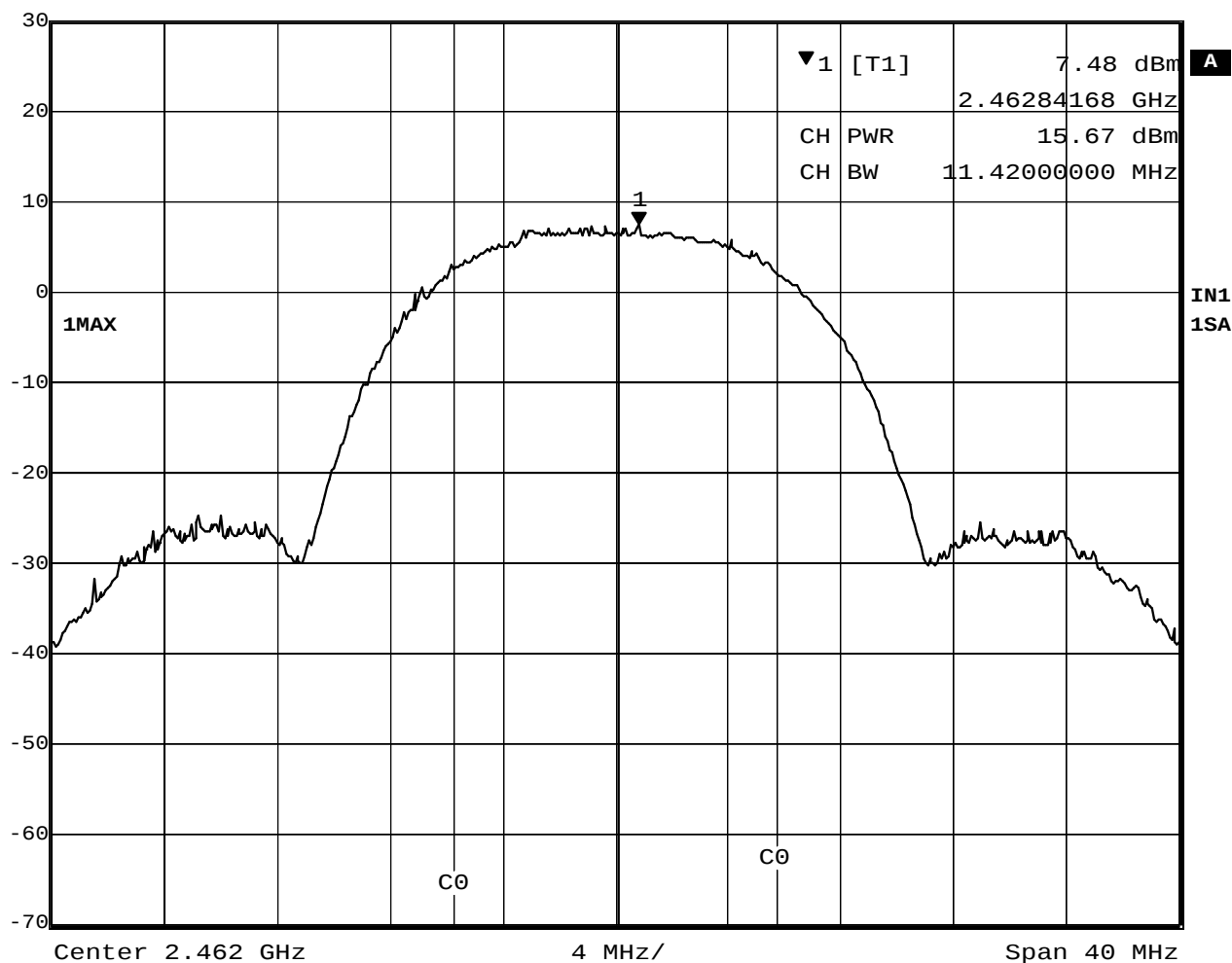


Date: 16.JUL.2003 17:59:12

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



Marker 1 [T1] RBW 1 MHz RF Att 40 dB  
Ref Lvl 7.48 dBm VBW 30 kHz  
30 dBm 2.46284168 GHz SWT 5 ms Unit dBm

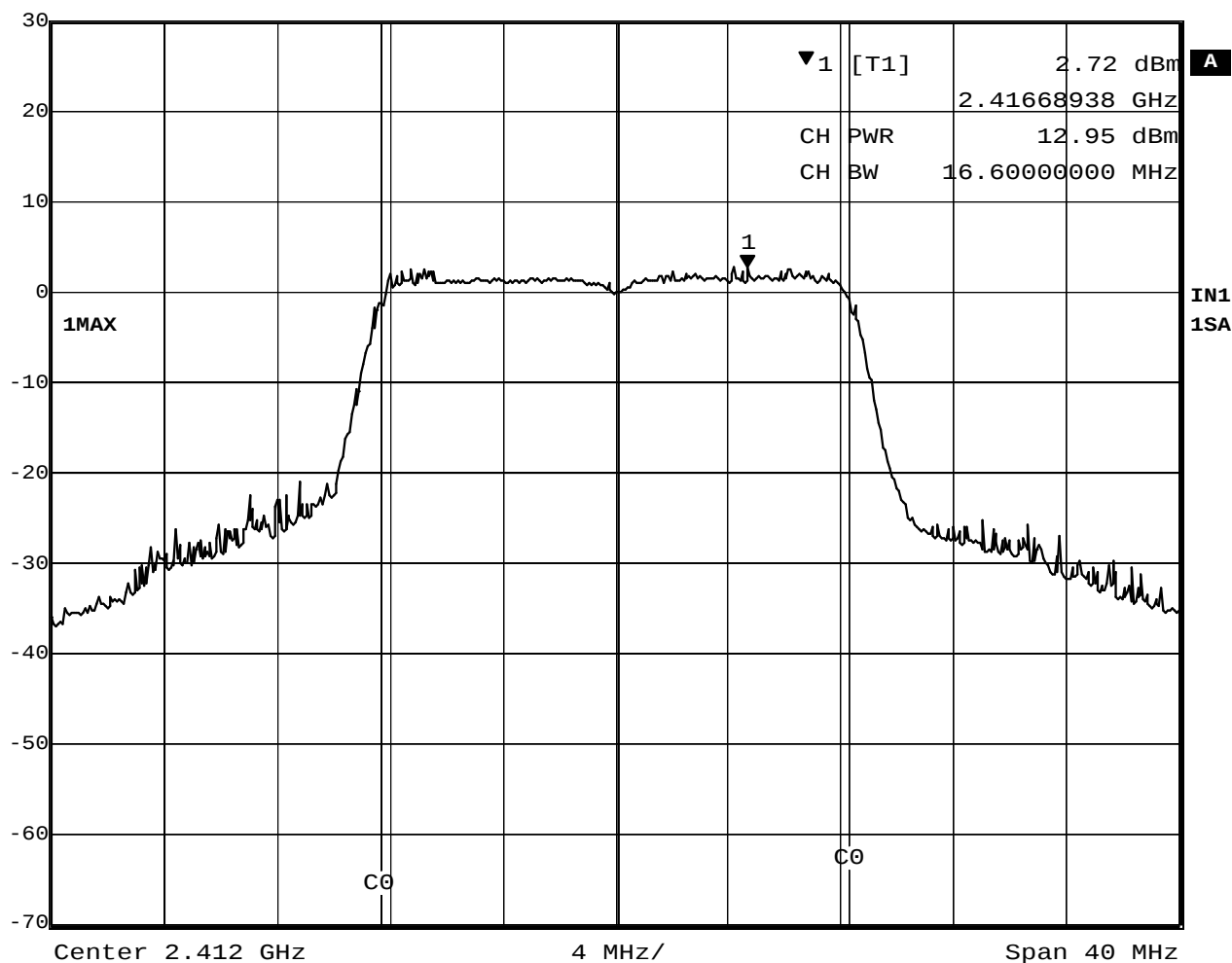


Date: 16.JUL.2003 18:02:20

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



Marker 1 [T1] RBW 1 MHz RF Att 40 dB  
Ref Lvl 2.72 dBm VBW 30 kHz  
30 dBm 2.41668938 GHz SWT 5 ms Unit dBm

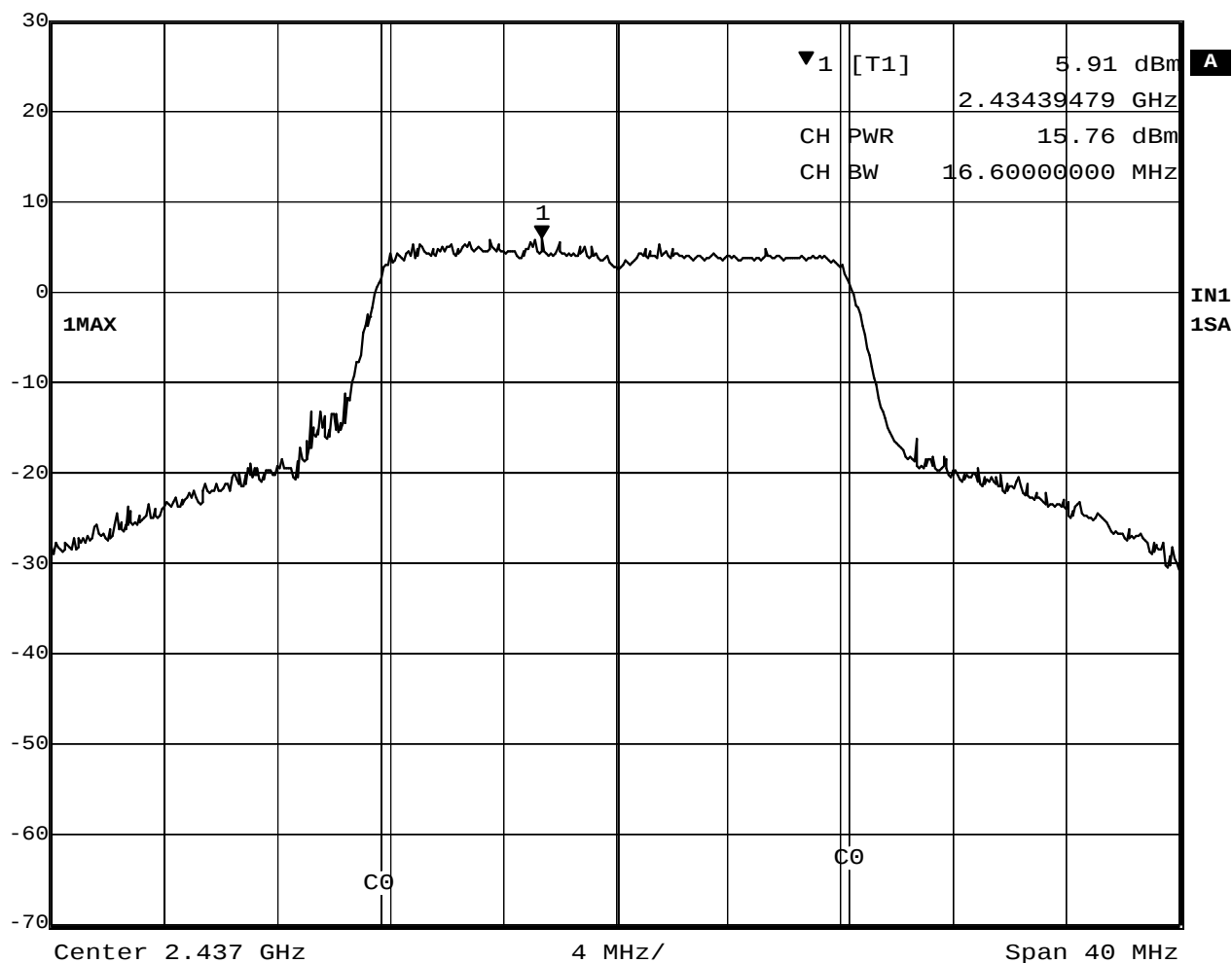


Date: 16.JUL.2003 18:09:10

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



Marker 1 [T1] RBW 1 MHz RF Att 40 dB  
Ref Lvl 5.91 dBm VBW 30 kHz  
30 dBm 2.43439479 GHz SWT 5 ms Unit dBm

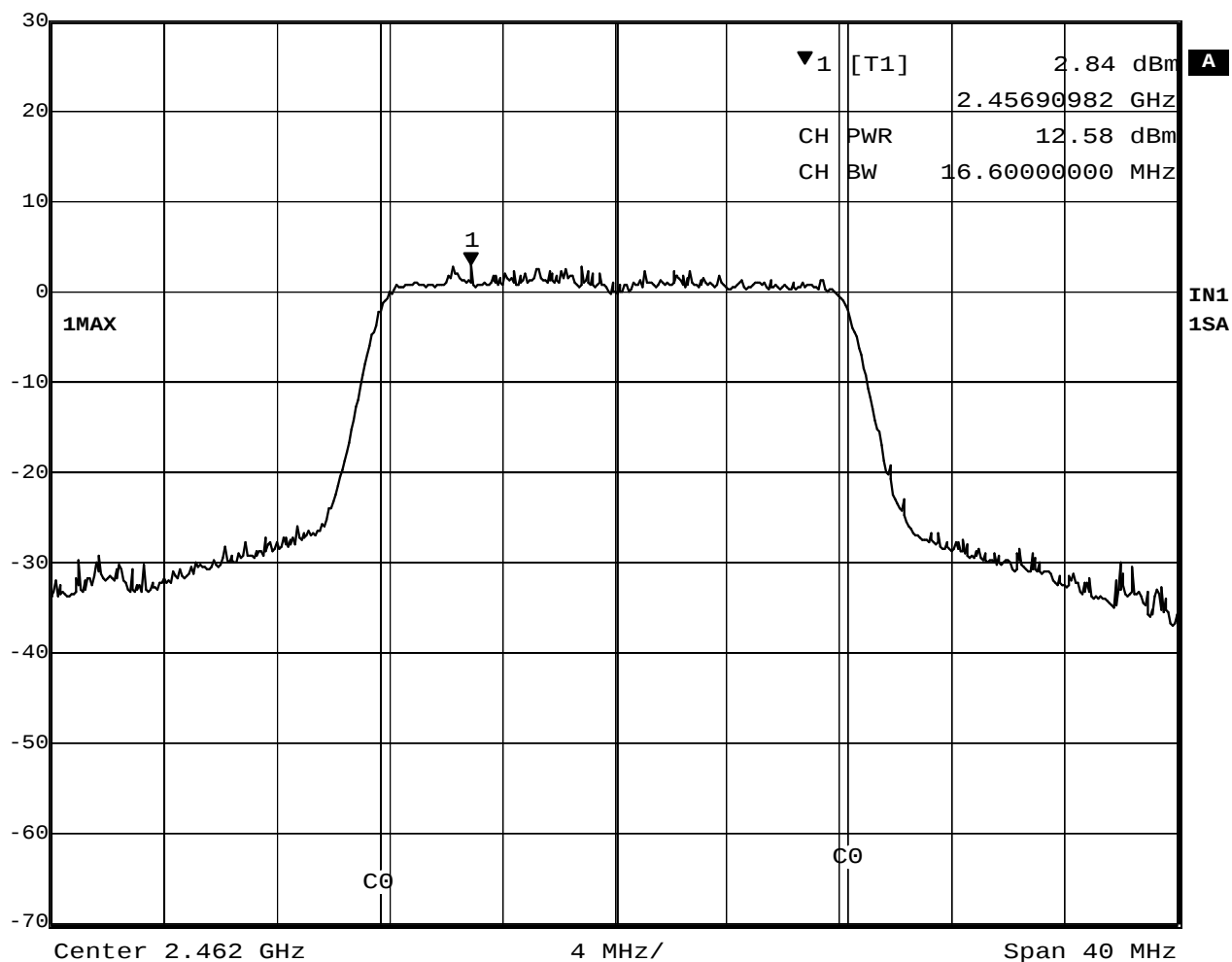


Date: 16.JUL.2003 18:11:25

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



Marker 1 [T1] RBW 1 MHz RF Att 40 dB  
Ref Lvl 2.84 dBm VBW 30 kHz  
30 dBm 2.45690982 GHz SWT 5 ms Unit dBm

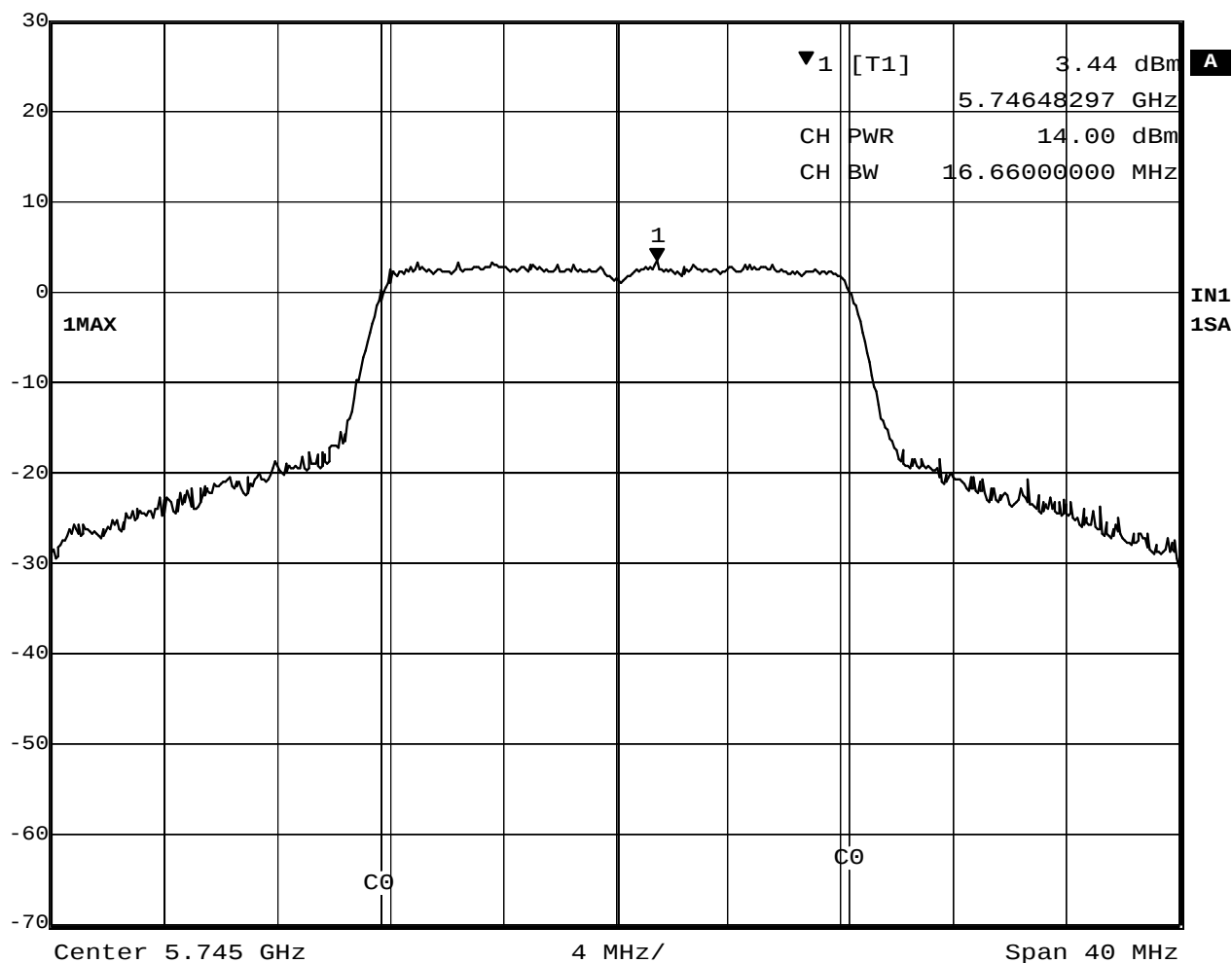


Date: 16.JUL.2003 18:19:14

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



Marker 1 [T1] RBW 1 MHz RF Att 40 dB  
Ref Lvl 3.44 dBm VBW 30 kHz  
30 dBm 5.74648297 GHz SWT 5 ms Unit dBm

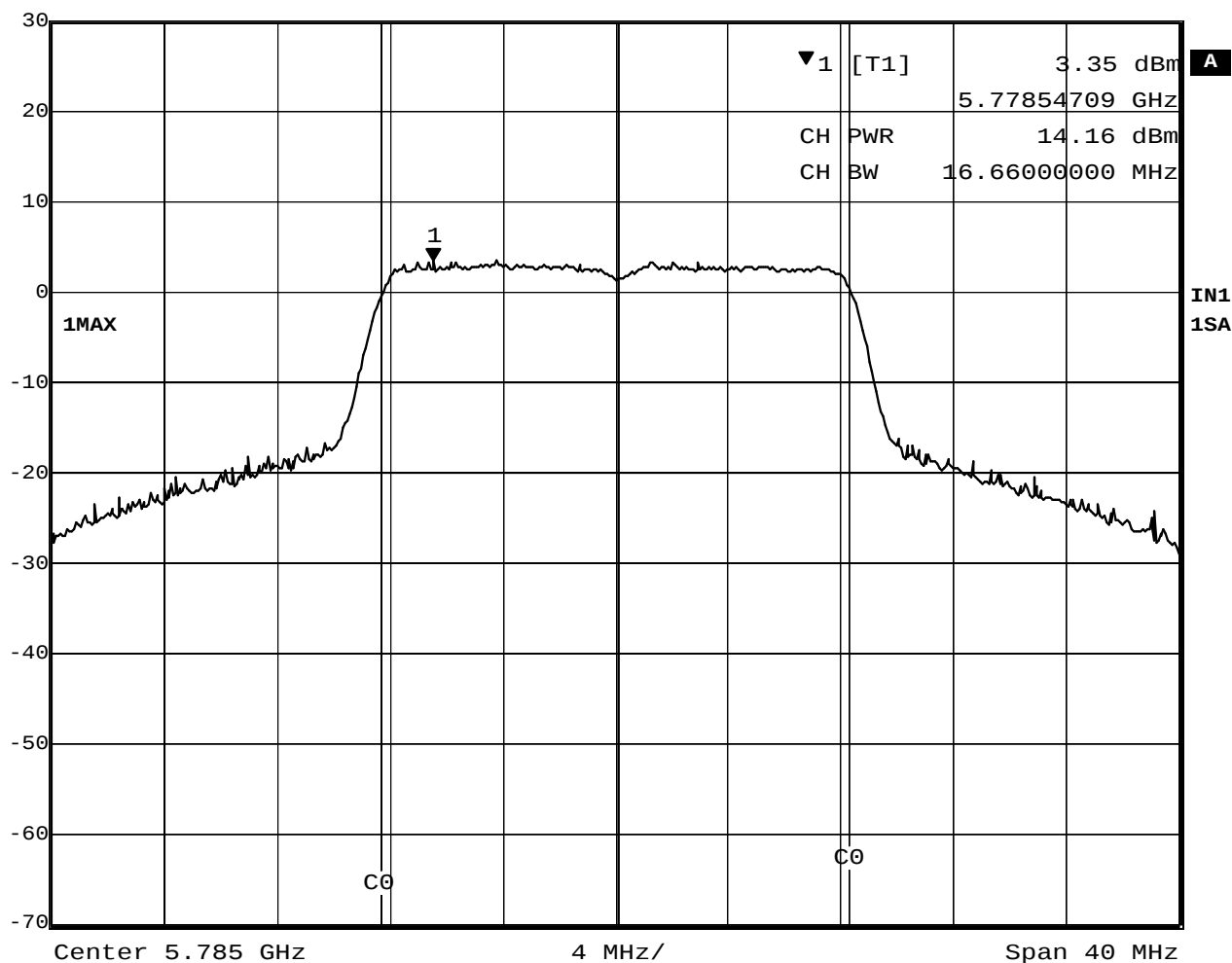


Date: 16.JUL.2003 18:28:30

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



Marker 1 [T1] RBW 1 MHz RF Att 40 dB  
Ref Lvl 3.35 dBm VBW 30 kHz  
30 dBm 5.77854709 GHz SWT 5 ms Unit dBm

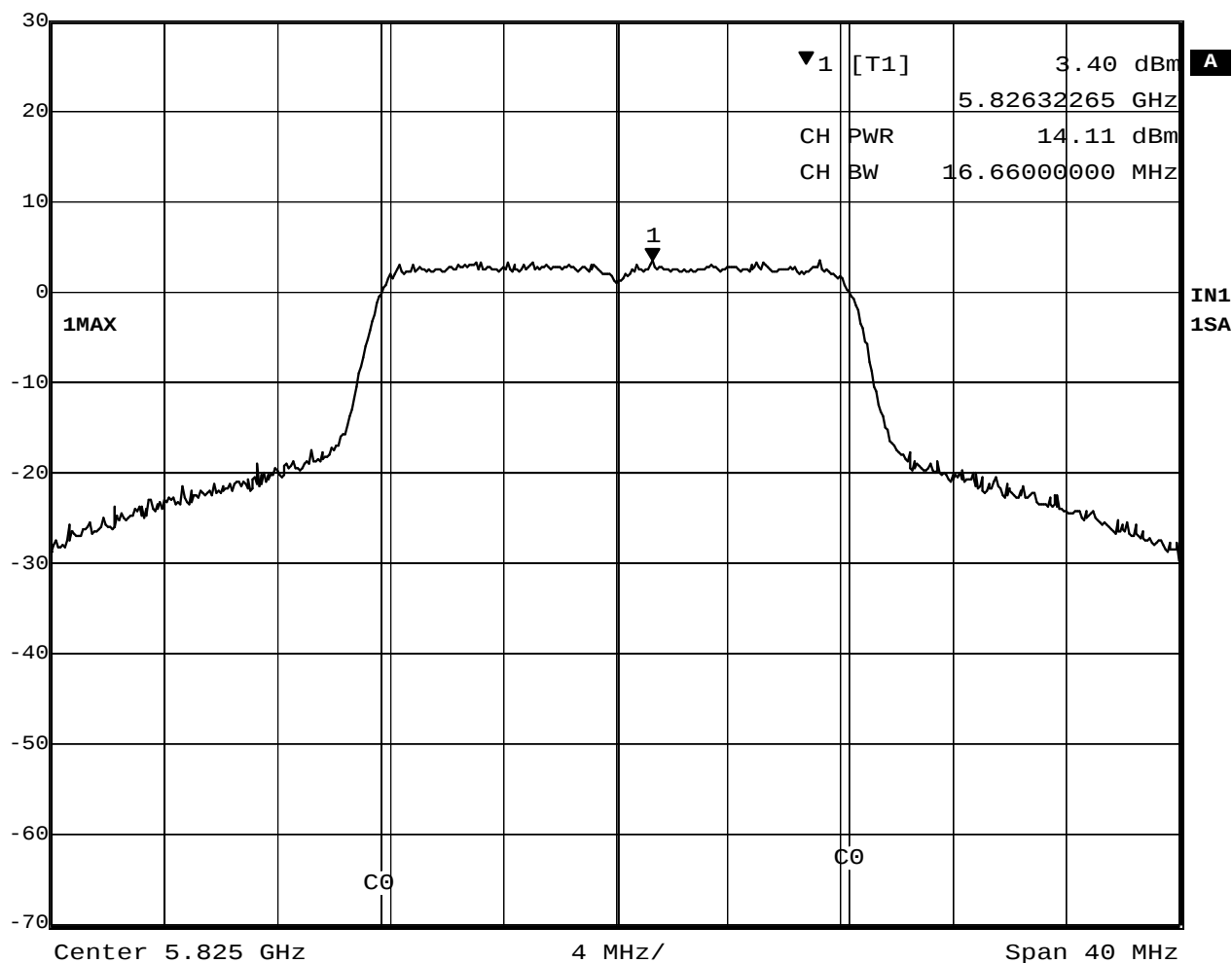


Date: 16.JUL.2003 18:40:43

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



Marker 1 [T1] RBW 1 MHz RF Att 40 dB  
Ref Lvl 3.40 dBm VBW 30 kHz  
30 dBm 5.82632265 GHz SWT 5 ms Unit dBm



Date: 16.JUL.2003 18:44:24

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<sup>\*1</sup>, 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

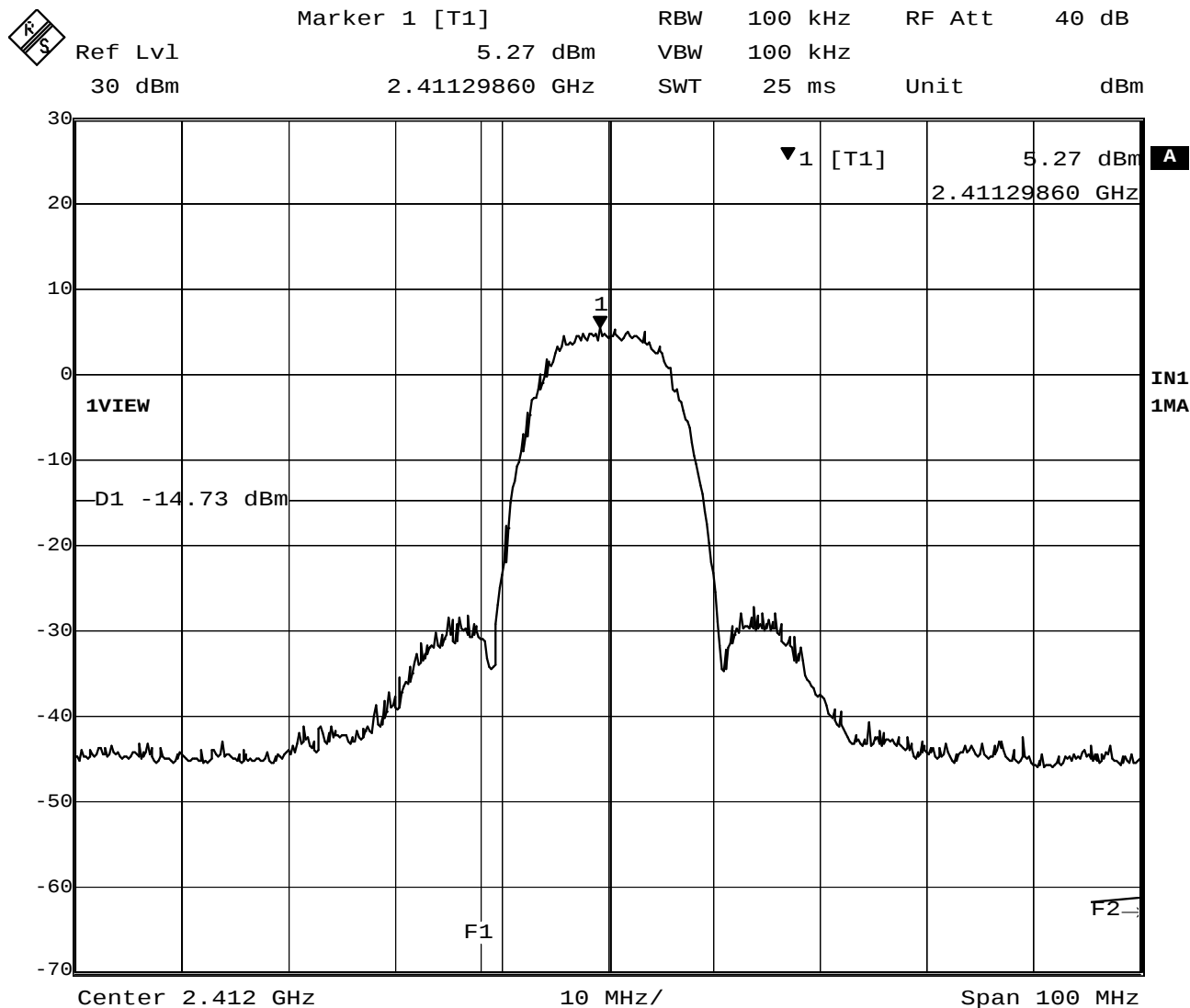
All conducted emission in any 100kHz bandwidth outside of the spread spectrum band was at least 20dB lower than the highest inband spectral density.

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<br>(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

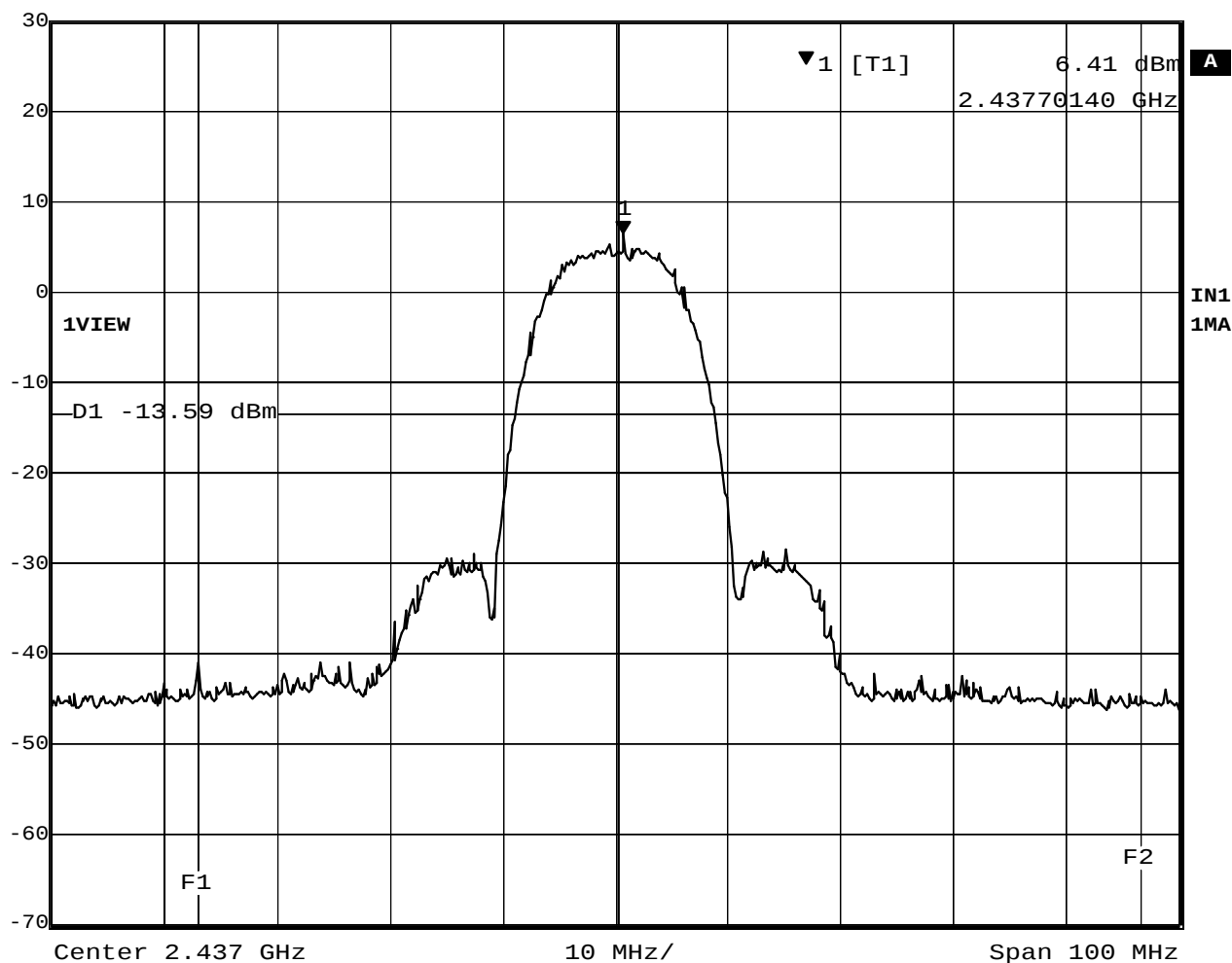


Date: 16.JUL.2003 18:51:28

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



Marker 1 [T1] RBW 100 kHz RF Att 40 dB  
Ref Lvl 6.41 dBm VBW 100 kHz  
30 dBm 2.43770140 GHz SWT 25 ms Unit dBm

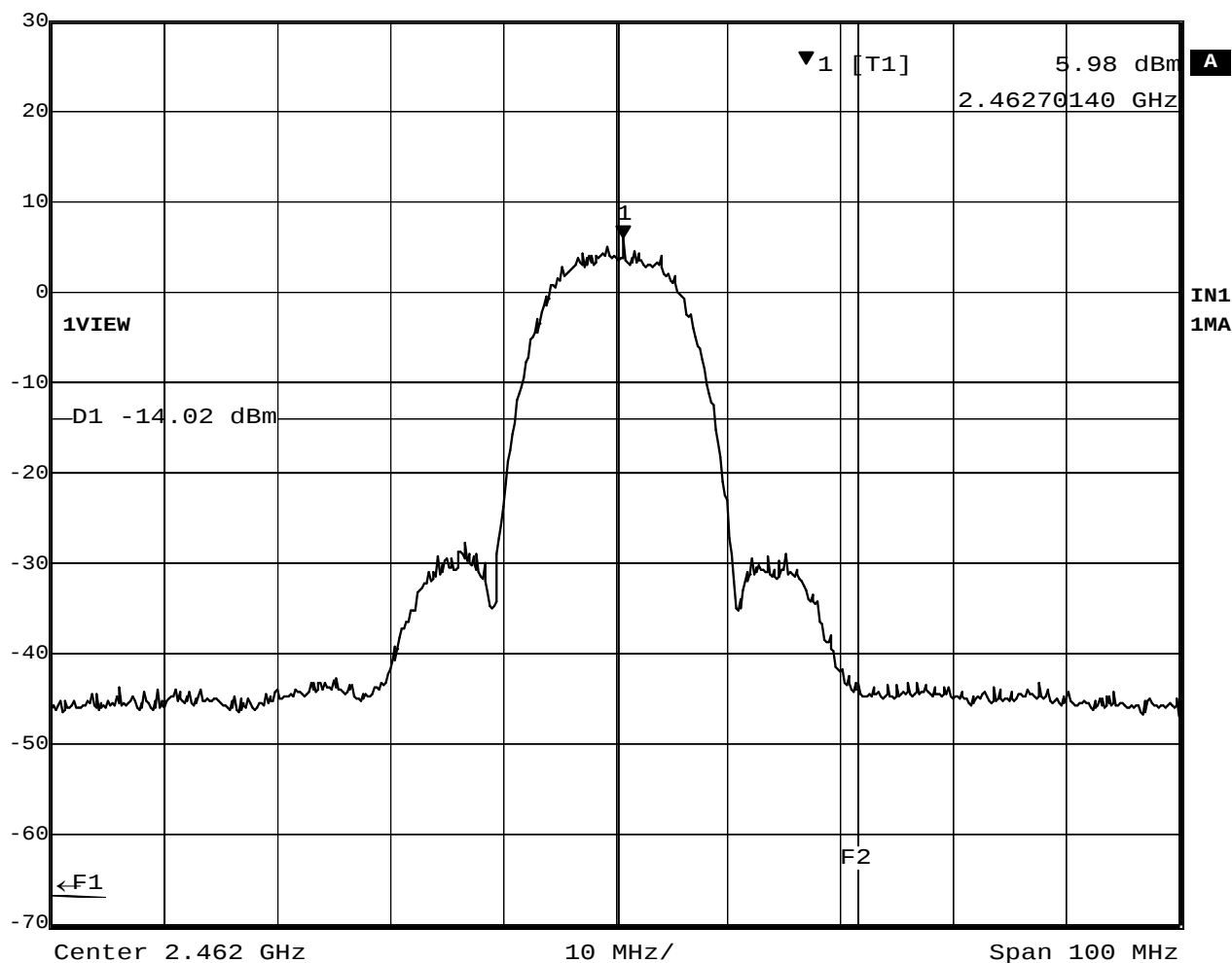


Date: 16.JUL.2003 18:54:32

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



Marker 1 [T1] RBW 100 kHz RF Att 40 dB  
Ref Lvl 5.98 dBm VBW 100 kHz  
30 dBm 2.46270140 GHz SWT 25 ms Unit dBm

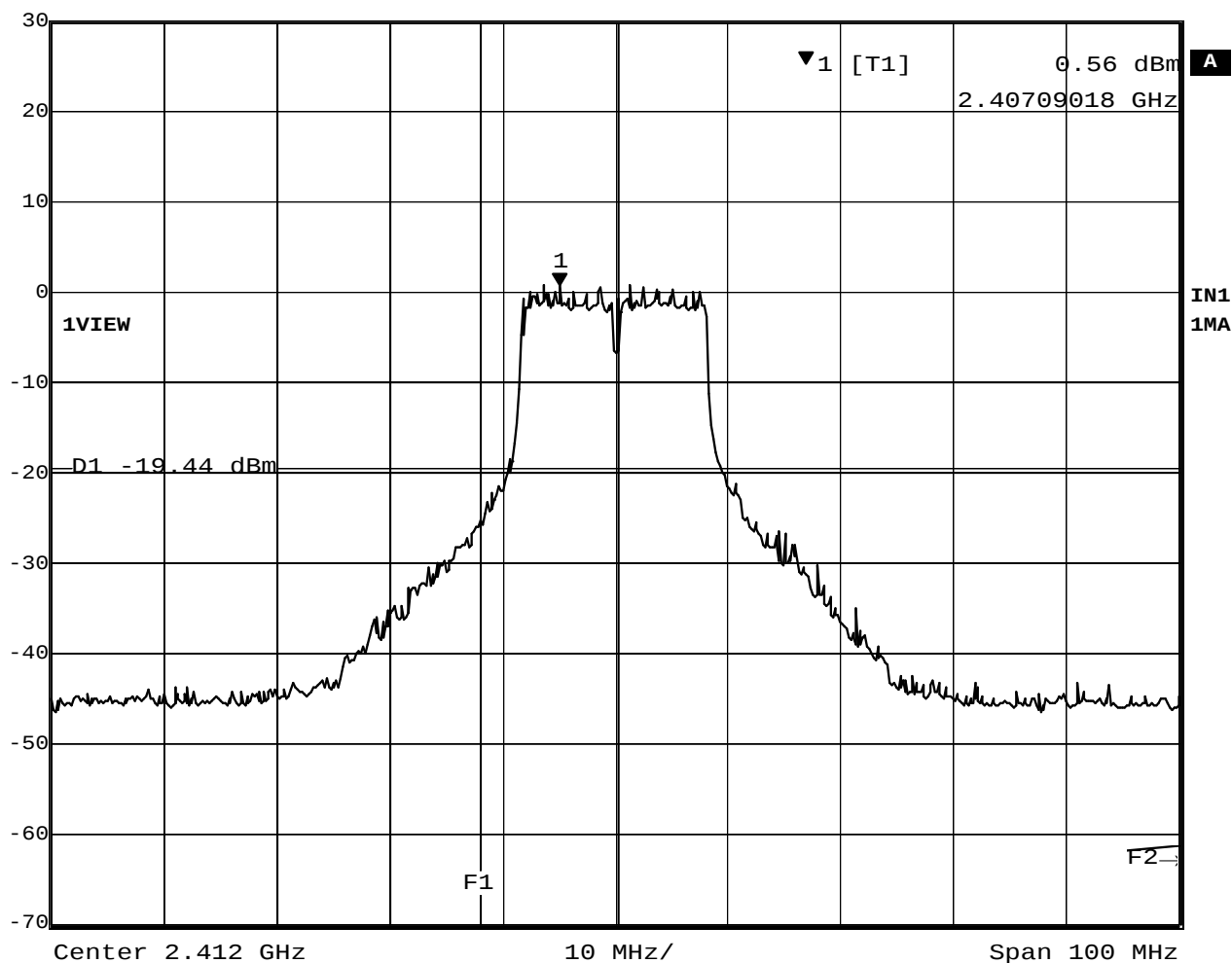


Date: 16.JUL.2003 18:56:57

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



Marker 1 [T1] RBW 100 kHz RF Att 40 dB  
Ref Lvl 0.56 dBm VBW 100 kHz  
30 dBm 2.40709018 GHz SWT 25 ms Unit dBm

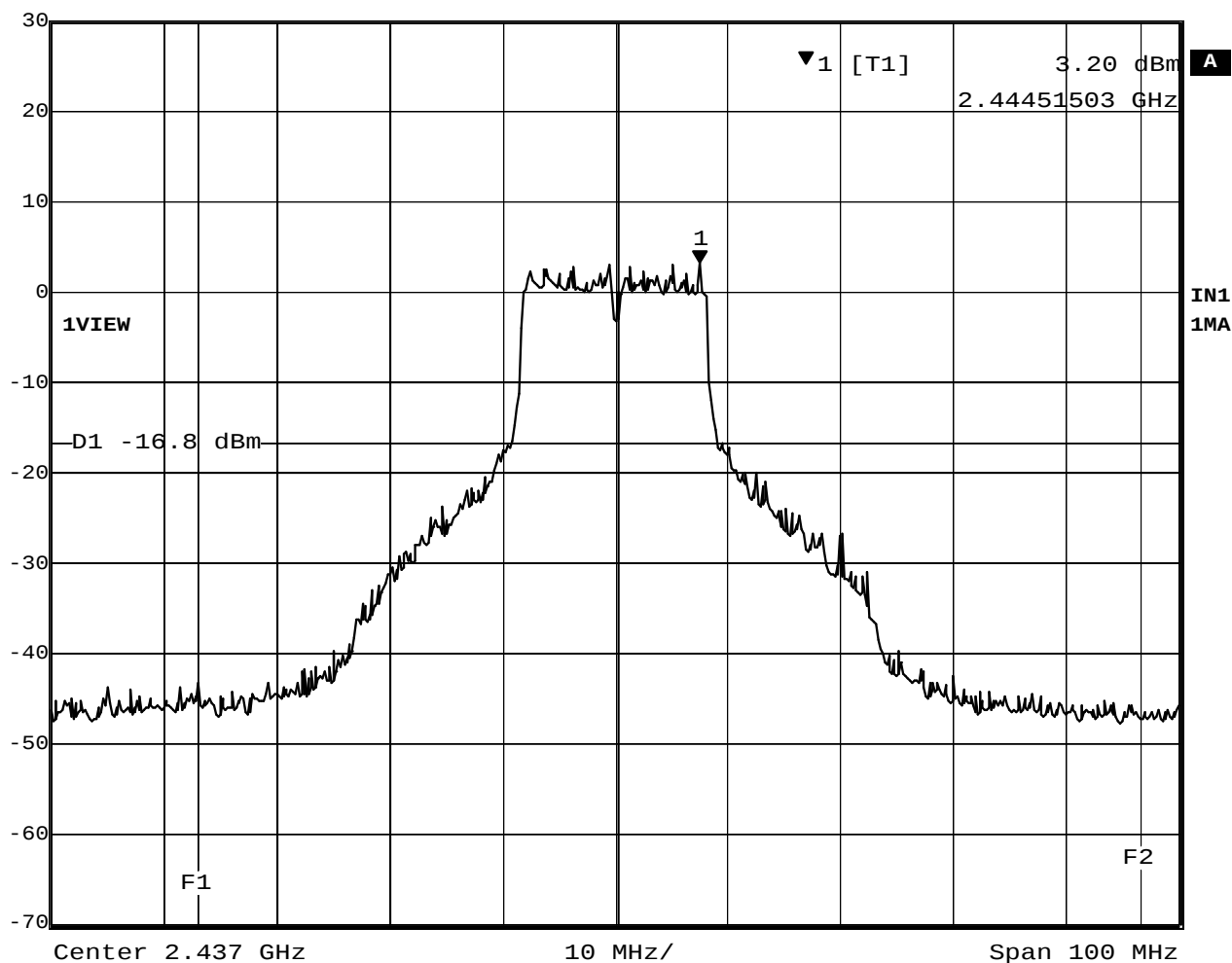


Date: 16.JUL.2003 19:01:11

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



Marker 1 [T1] RBW 100 kHz RF Att 40 dB  
Ref Lvl 3.20 dBm VBW 100 kHz  
30 dBm 2.44451503 GHz SWT 25 ms Unit dBm

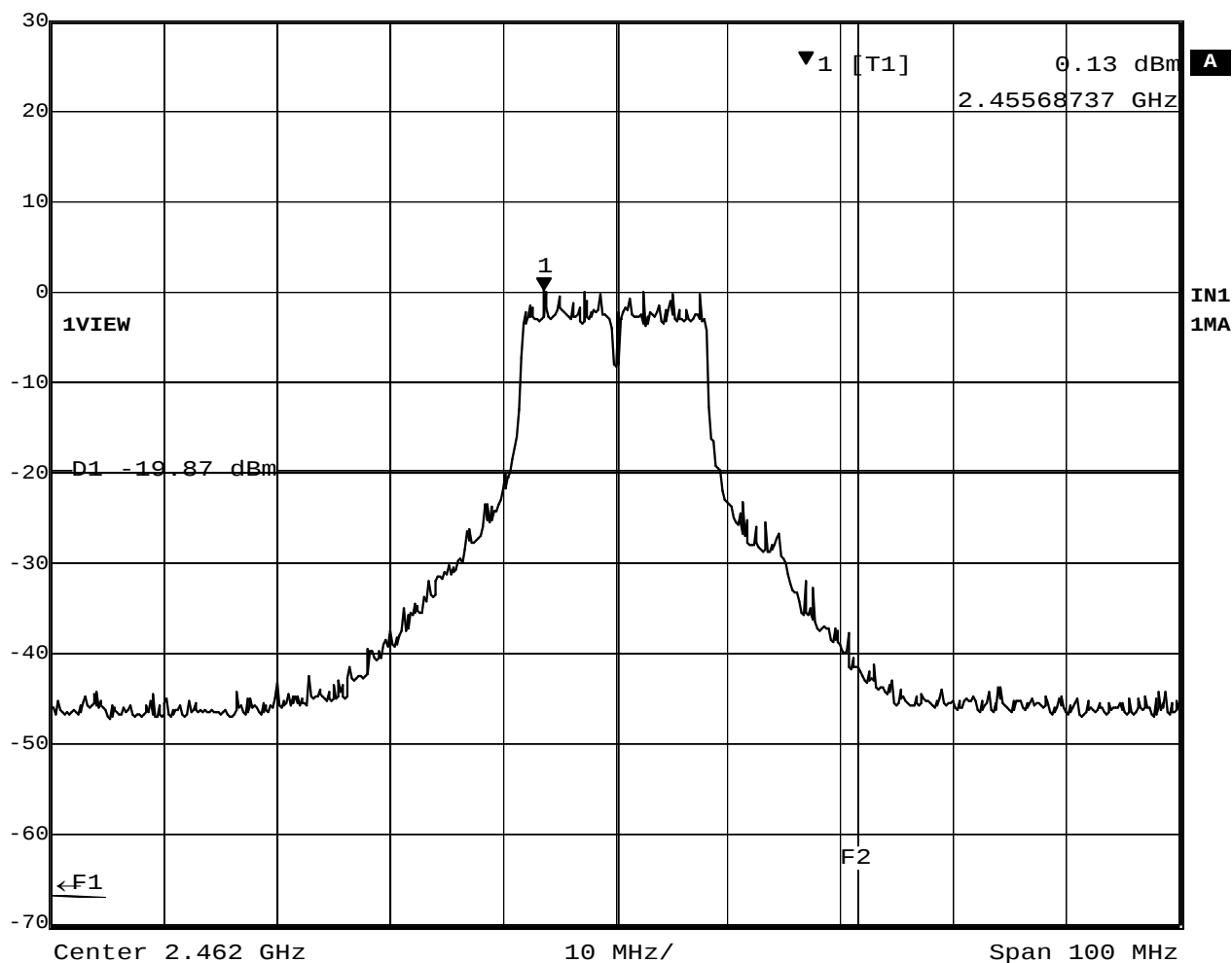


Date: 16.JUL.2003 19:06:46

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



Marker 1 [T1] RBW 100 kHz RF Att 40 dB  
Ref Lvl 0.13 dBm VBW 100 kHz  
30 dBm 2.45568737 GHz SWT 25 ms Unit dBm

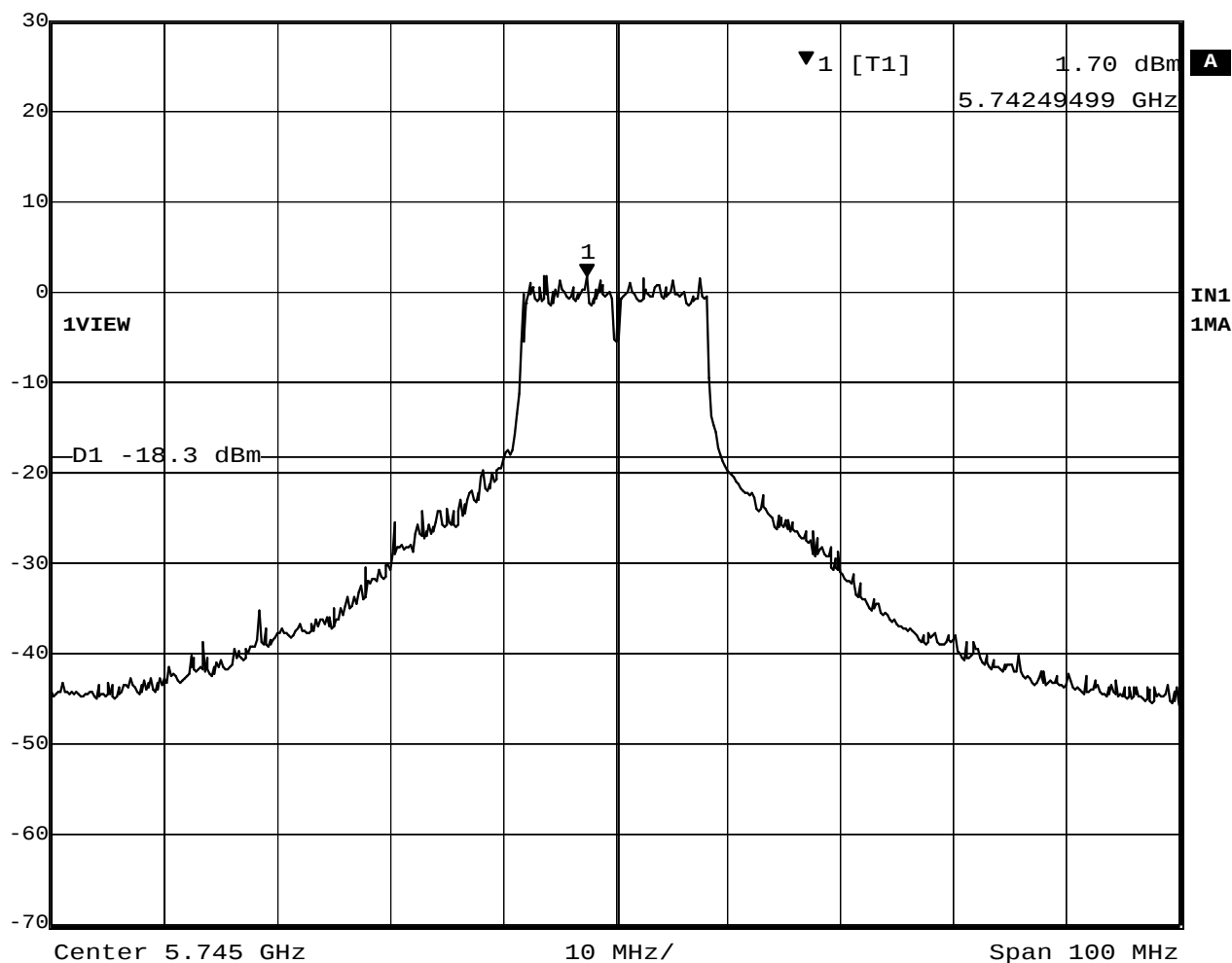


Date: 16.JUL.2003 19:10:43

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



Marker 1 [T1] RBW 100 kHz RF Att 40 dB  
Ref Lvl 1.70 dBm VBW 100 kHz  
30 dBm 5.74249499 GHz SWT 25 ms Unit dBm

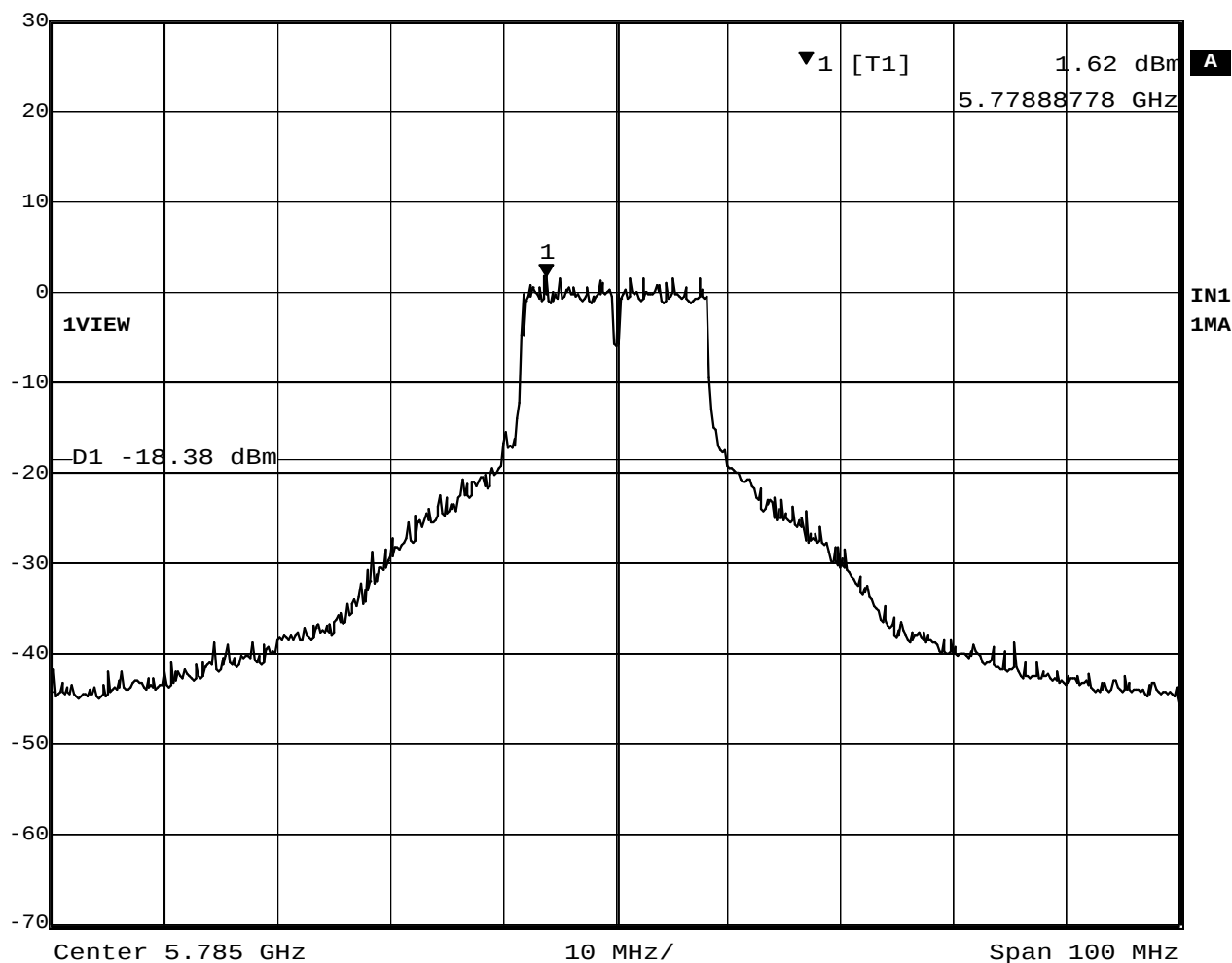


Date: 16.JUL.2003 19:30:24

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



Marker 1 [T1] RBW 100 kHz RF Att 40 dB  
Ref Lvl 1.62 dBm VBW 100 kHz  
30 dBm 5.77888778 GHz SWT 25 ms Unit dBm

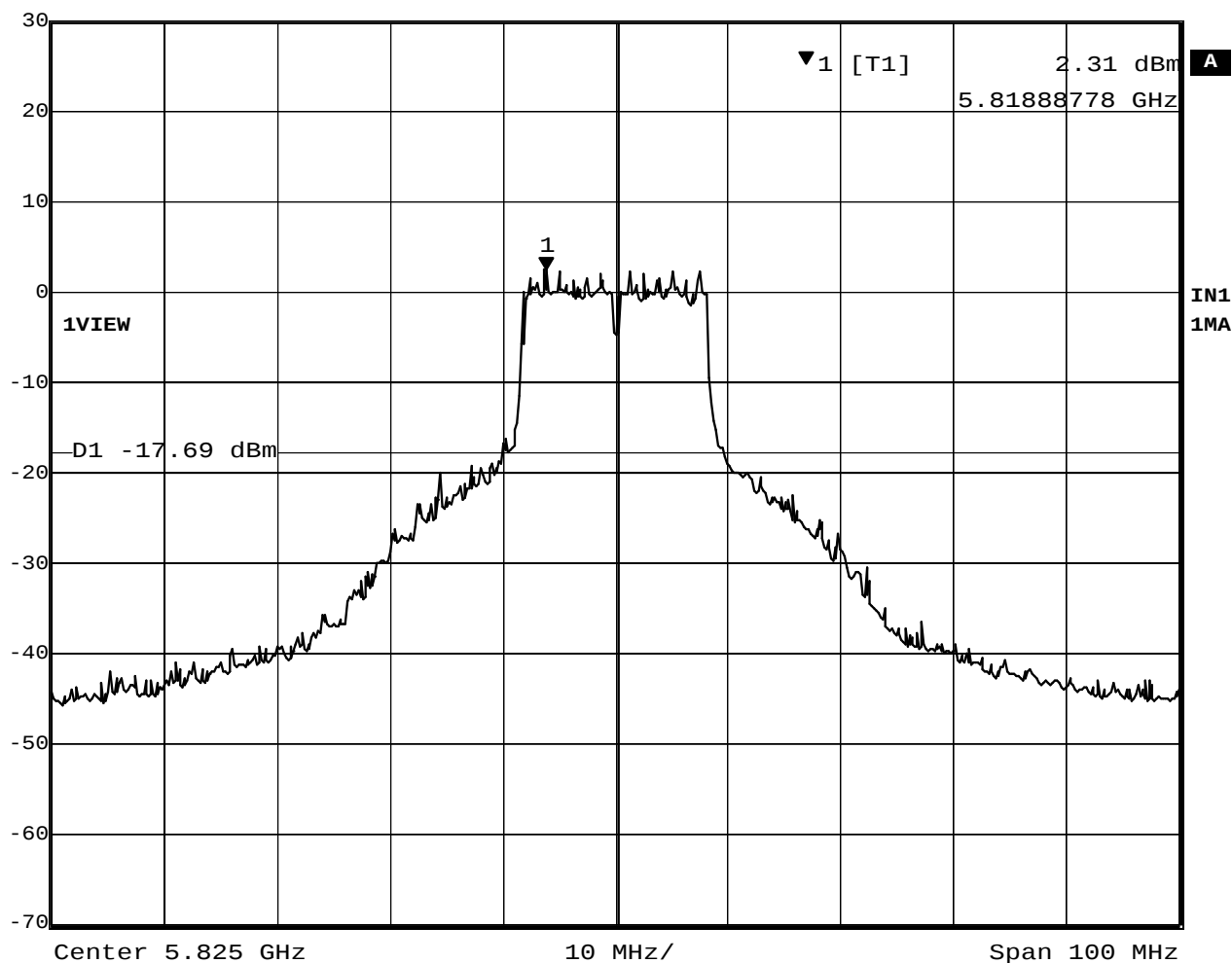


Date: 16.JUL.2003 19:33:41

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



|         |                |     |         |        |       |
|---------|----------------|-----|---------|--------|-------|
| Ref Lvl | Marker 1 [T1]  | RBW | 100 kHz | RF Att | 40 dB |
| 30 dBm  | 2.31 dBm       | VBW | 100 kHz |        |       |
|         | 5.81888778 GHz | SWT | 25 ms   | Unit   | dBm   |



Date: 16.JUL.2003 19:37:59

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

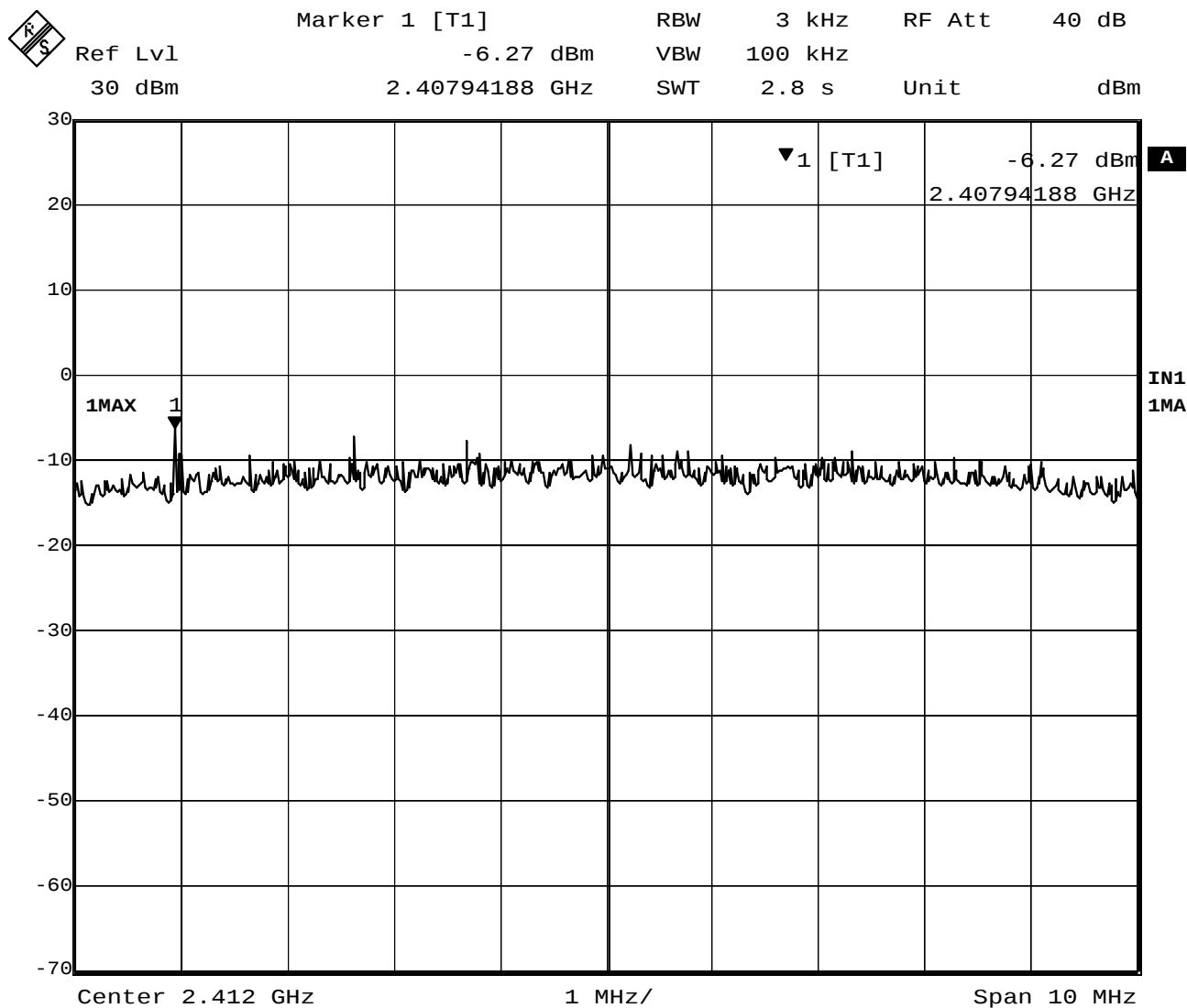
The measurement was performed with the worst cases (i.e. the highest conducted peak power) of each transmission mode based on the results of the Chapter 3, “Conducted Peak Output Power” measurement.

Test Date: July 16, 2003

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

| Ch No. |                  |     | Frequency<br>(MHz) | Analyzer<br>Reading<br>(dBm) | Trace<br>number | Cable<br>loss<br>(dB) | Result<br>(dBm) | Limit<br>(dBm) | Margin<br>(dB) |
|--------|------------------|-----|--------------------|------------------------------|-----------------|-----------------------|-----------------|----------------|----------------|
| DSSS   | 2.4GHz<br>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<br>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<br>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

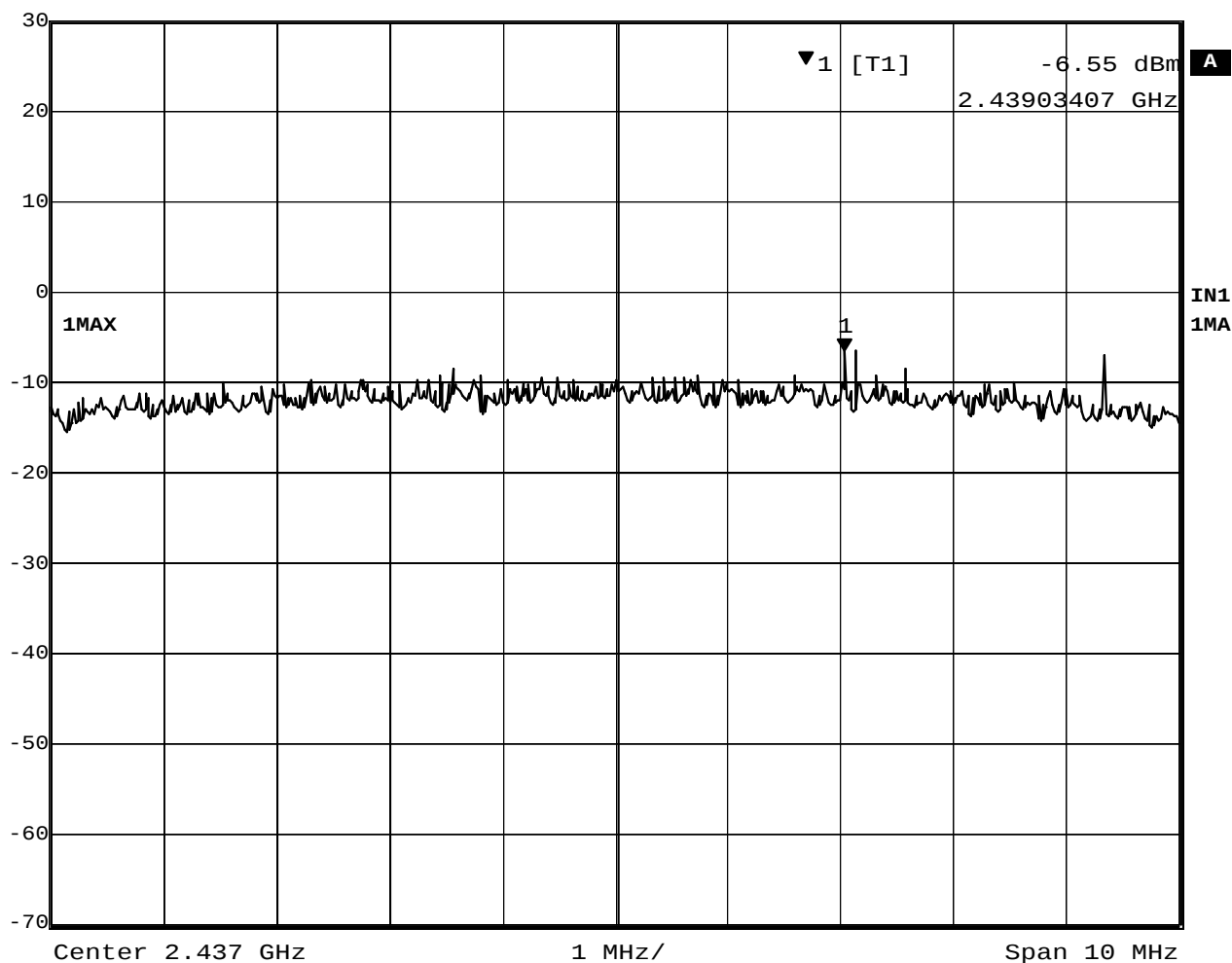


Date: 16.JUL.2003 19:49:23

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



Marker 1 [T1] RBW 3 kHz RF Att 40 dB  
Ref Lvl -6.55 dBm VBW 100 kHz  
30 dBm 2.43903407 GHz SWT 2.8 s Unit dBm

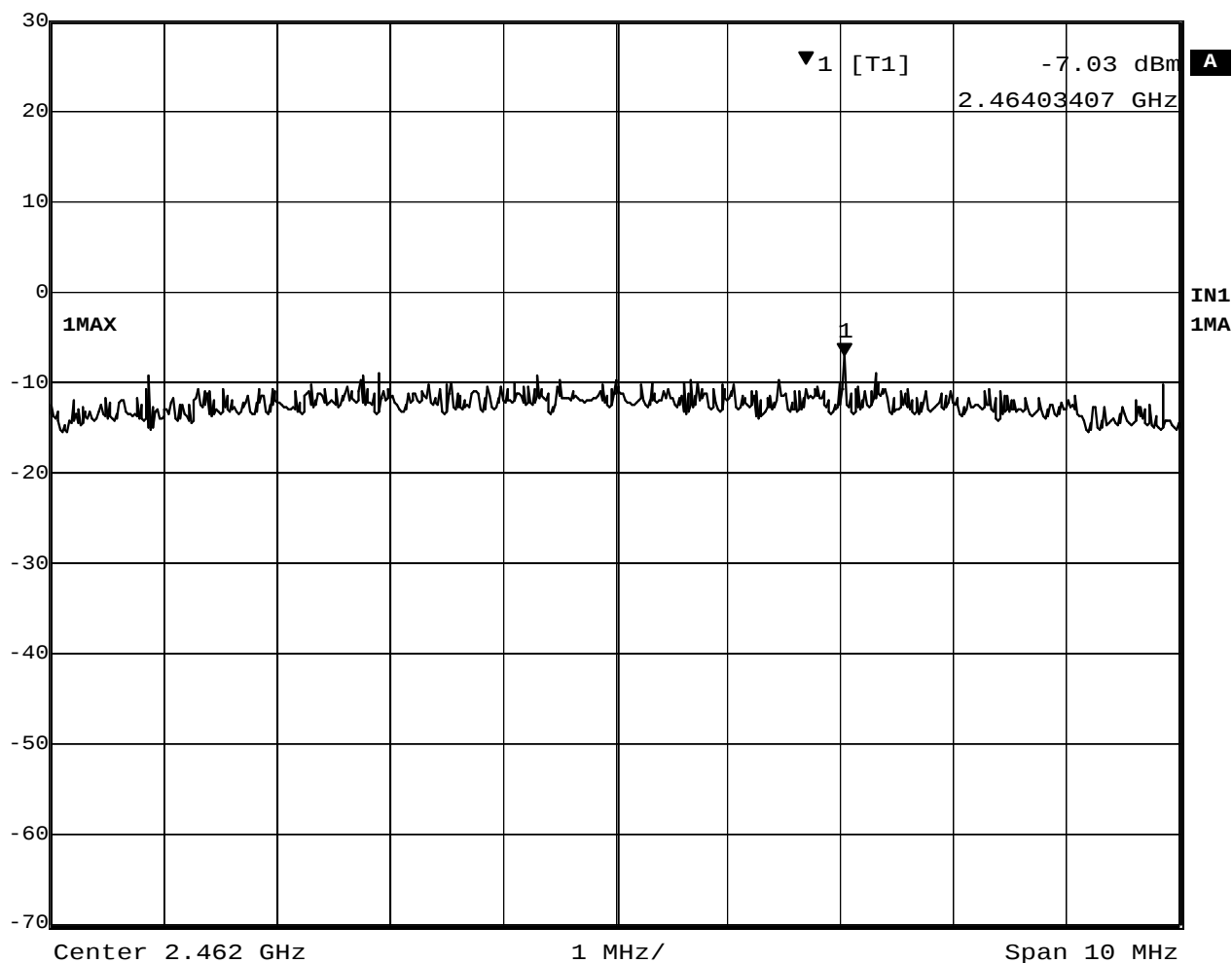


Date: 16.JUL.2003 19:51:09

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



|         |                |     |         |        |       |
|---------|----------------|-----|---------|--------|-------|
| Ref Lvl | Marker 1 [T1]  | RBW | 3 kHz   | RF Att | 40 dB |
| 30 dBm  | -7.03 dBm      | VBW | 100 kHz |        |       |
|         | 2.46403407 GHz | SWT | 2.8 s   | Unit   | dBm   |

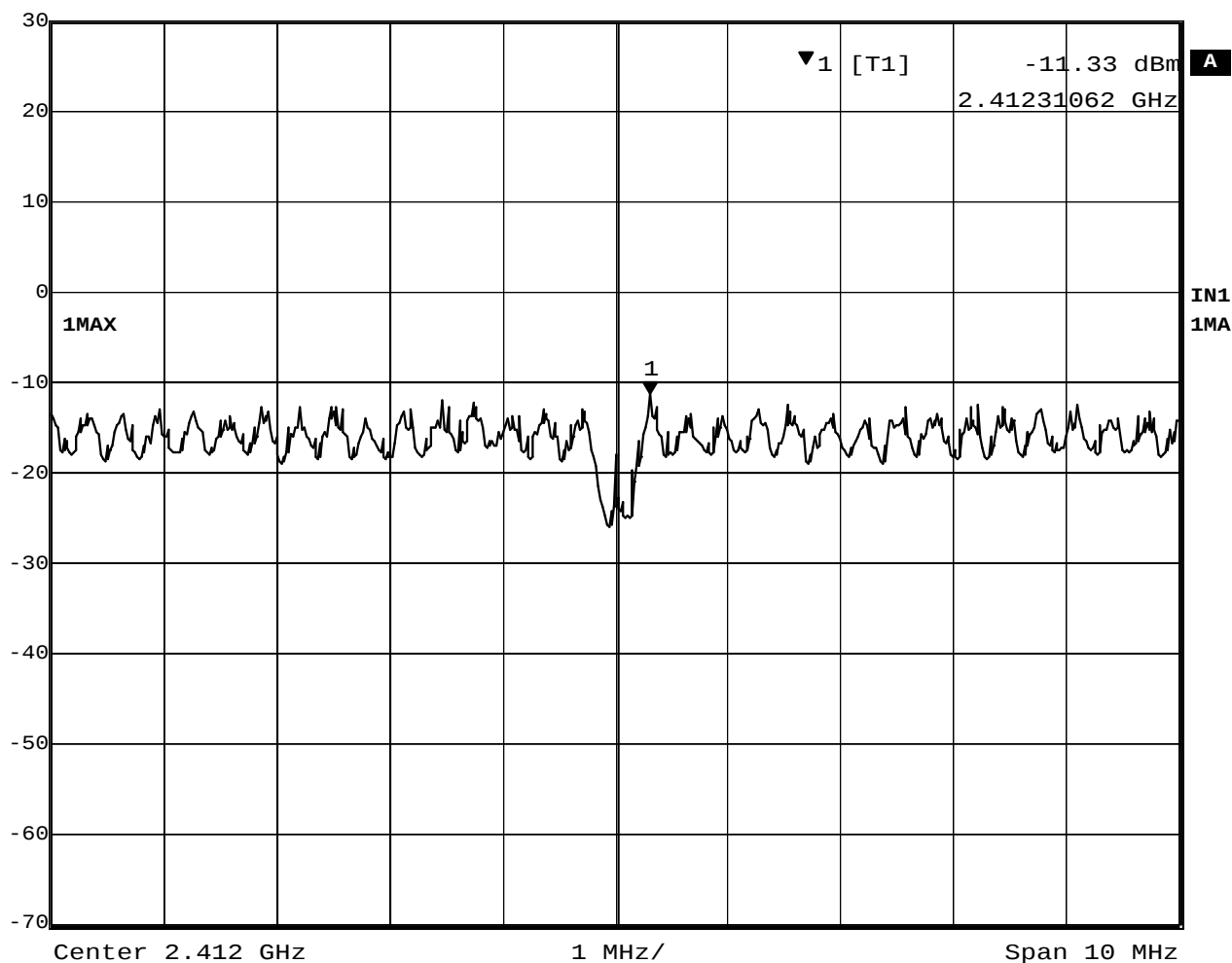


Date: 16.JUL.2003 19:52:50

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



Marker 1 [T1] RBW 3 kHz RF Att 40 dB  
Ref Lvl -11.33 dBm VBW 100 kHz  
30 dBm 2.41231062 GHz SWT 2.8 s Unit dBm

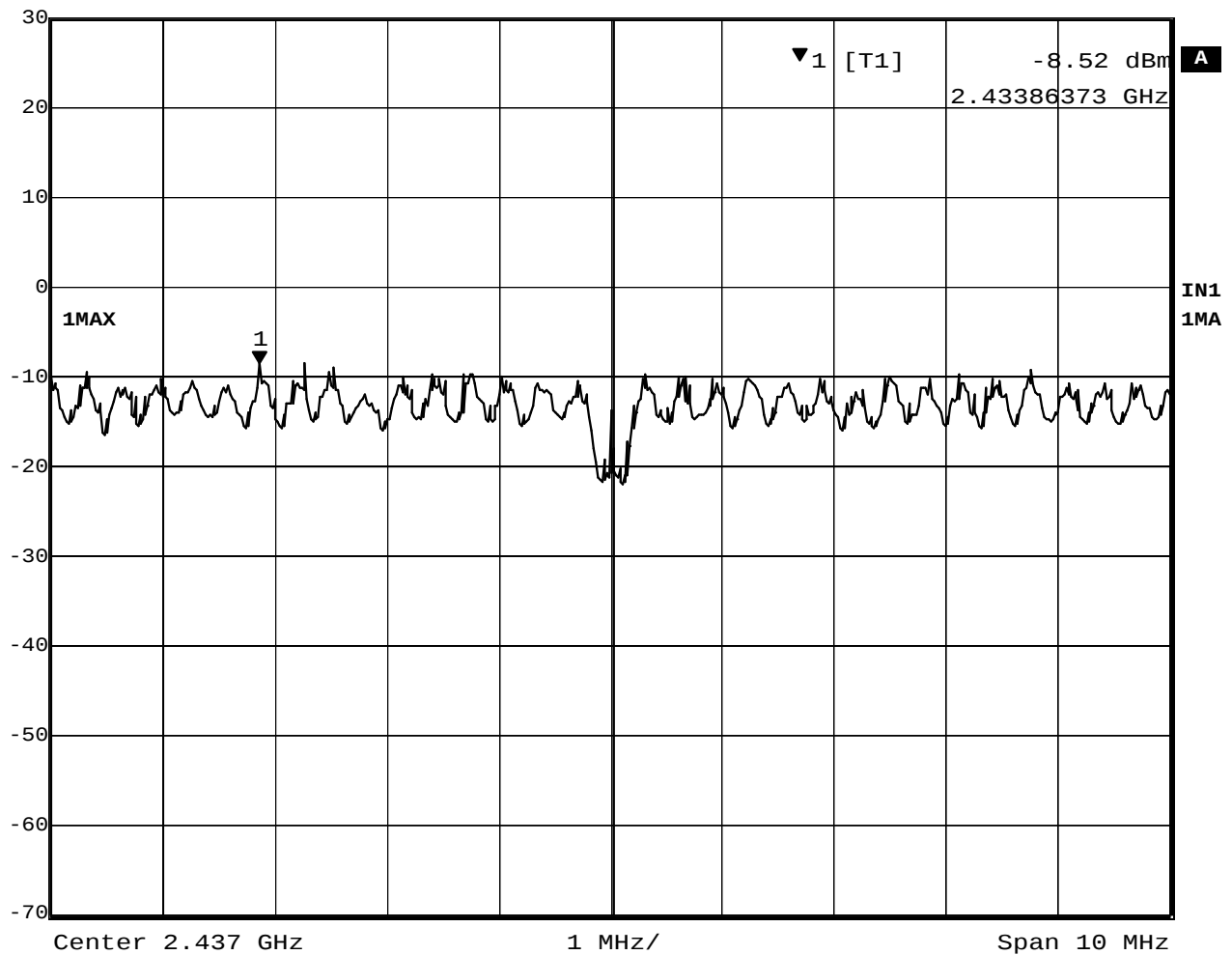


Date: 16.JUL.2003 19:58:38

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



|         |                |     |         |        |       |
|---------|----------------|-----|---------|--------|-------|
| Ref Lvl | Marker 1 [T1]  | RBW | 3 kHz   | RF Att | 40 dB |
| 30 dBm  | -8.52 dBm      | VBW | 100 kHz |        |       |
|         | 2.43386373 GHz | SWT | 2.8 s   | Unit   | dBm   |

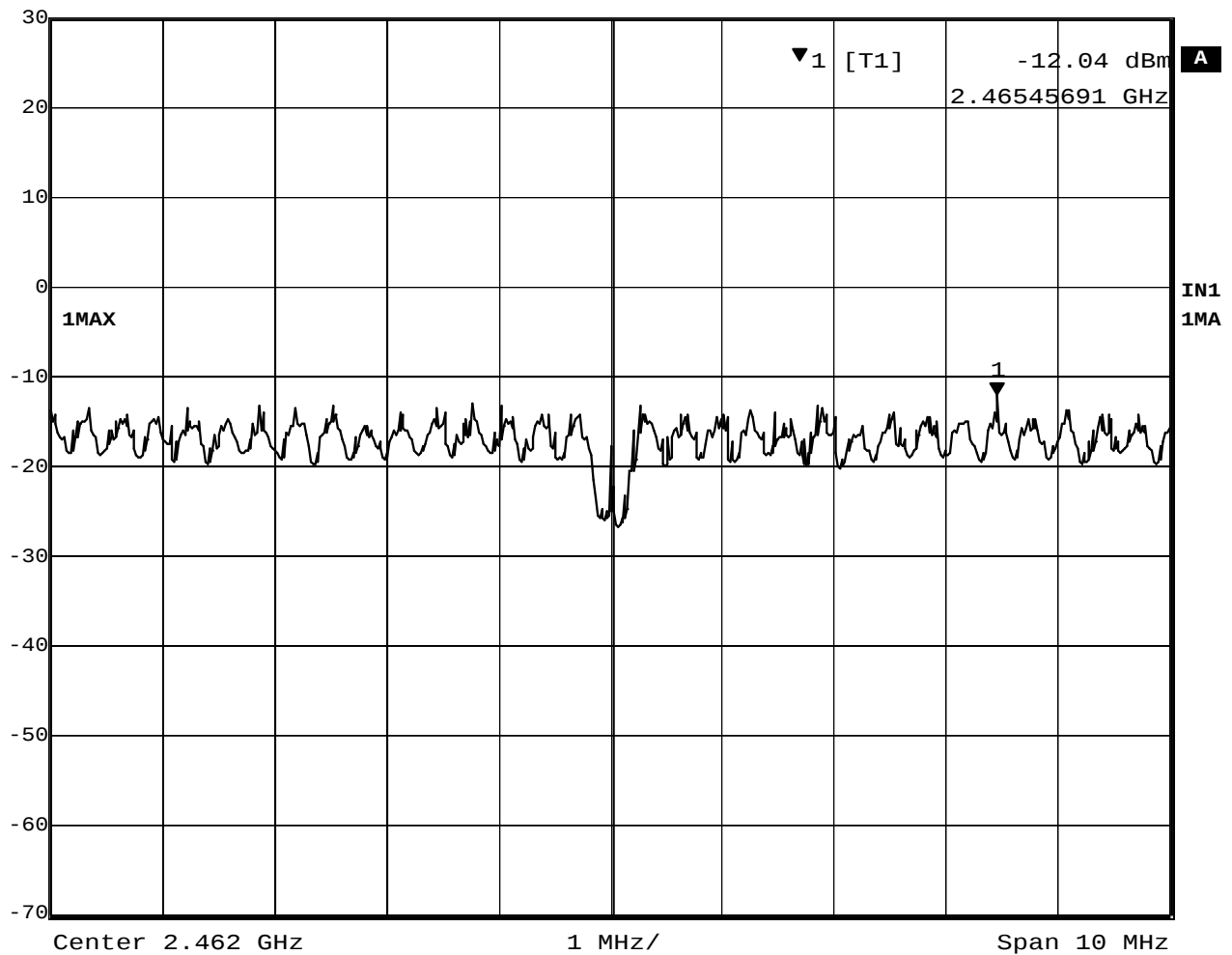


Date: 16.JUL.2003 20:01:21

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



Marker 1 [T1] RBW 3 kHz RF Att 40 dB  
Ref Lvl -12.04 dBm VBW 100 kHz  
30 dBm 2.46545691 GHz SWT 2.8 s Unit dBm

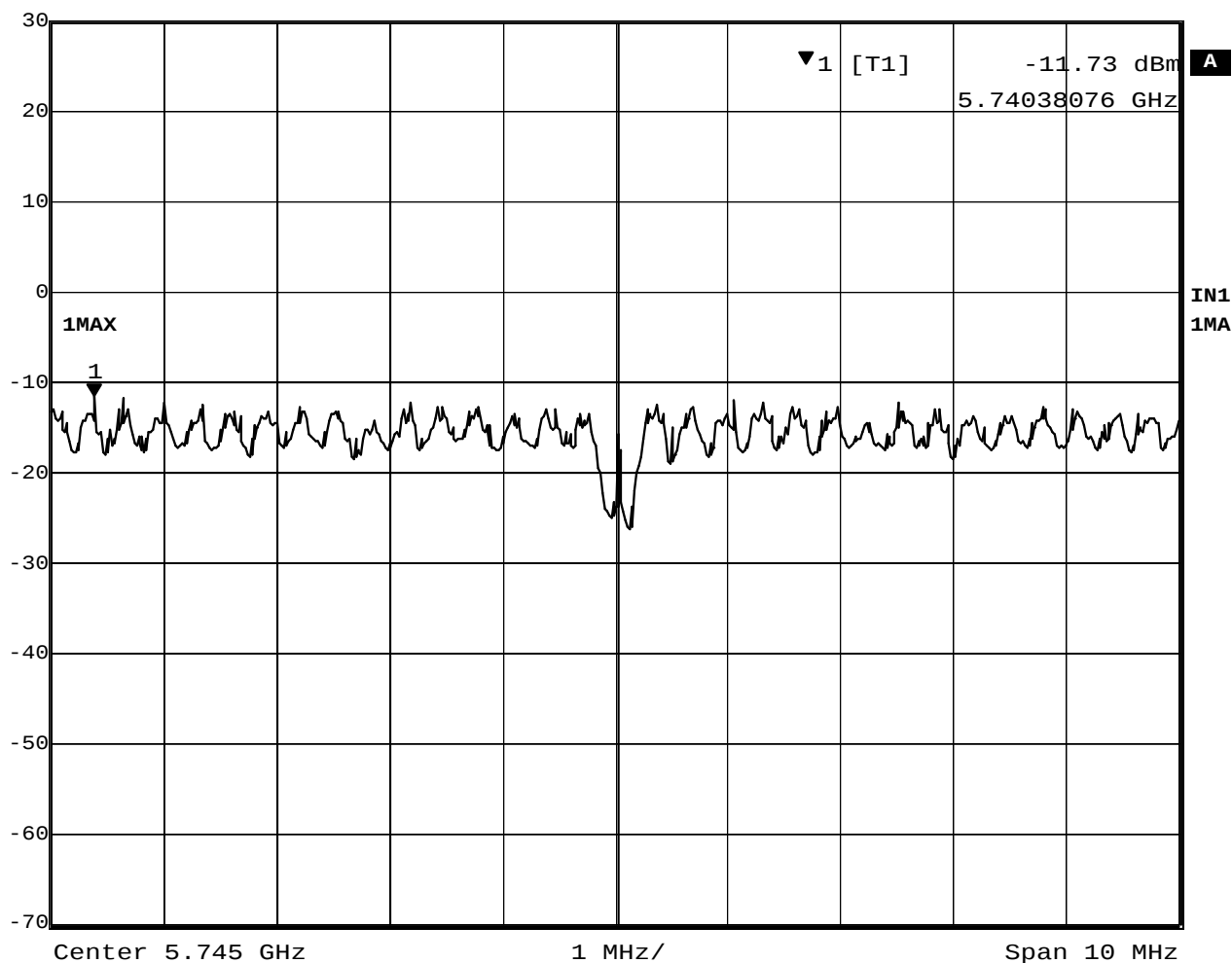


Date: 16.JUL.2003 20:03:56

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



Marker 1 [T1] RBW 3 kHz RF Att 40 dB  
Ref Lvl -11.73 dBm VBW 100 kHz  
30 dBm 5.74038076 GHz SWT 2.8 s Unit dBm

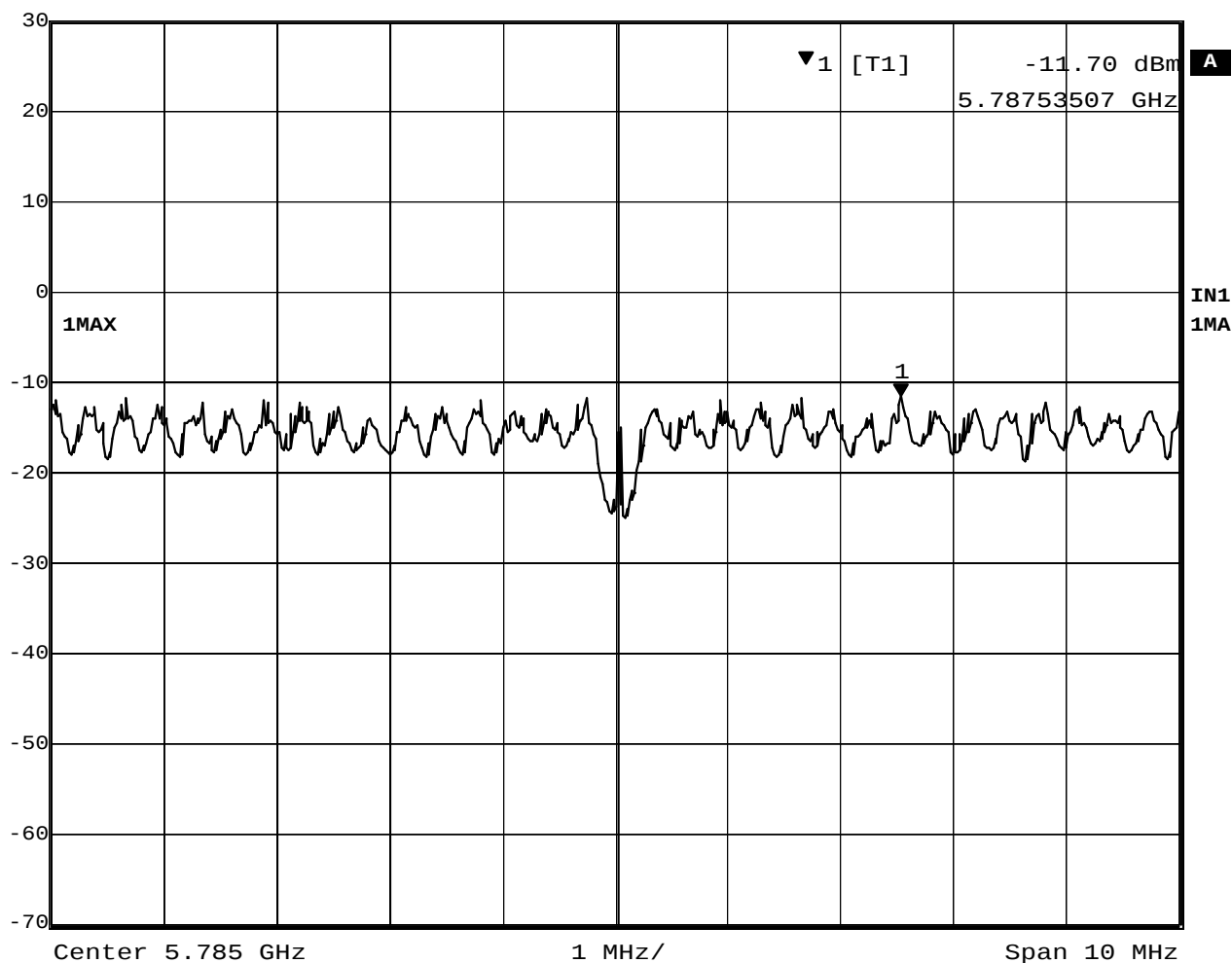


Date: 16.JUL.2003 20:07:45

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



Marker 1 [T1] RBW 3 kHz RF Att 40 dB  
Ref Lvl -11.70 dBm VBW 100 kHz  
30 dBm 5.78753507 GHz SWT 2.8 s Unit dBm

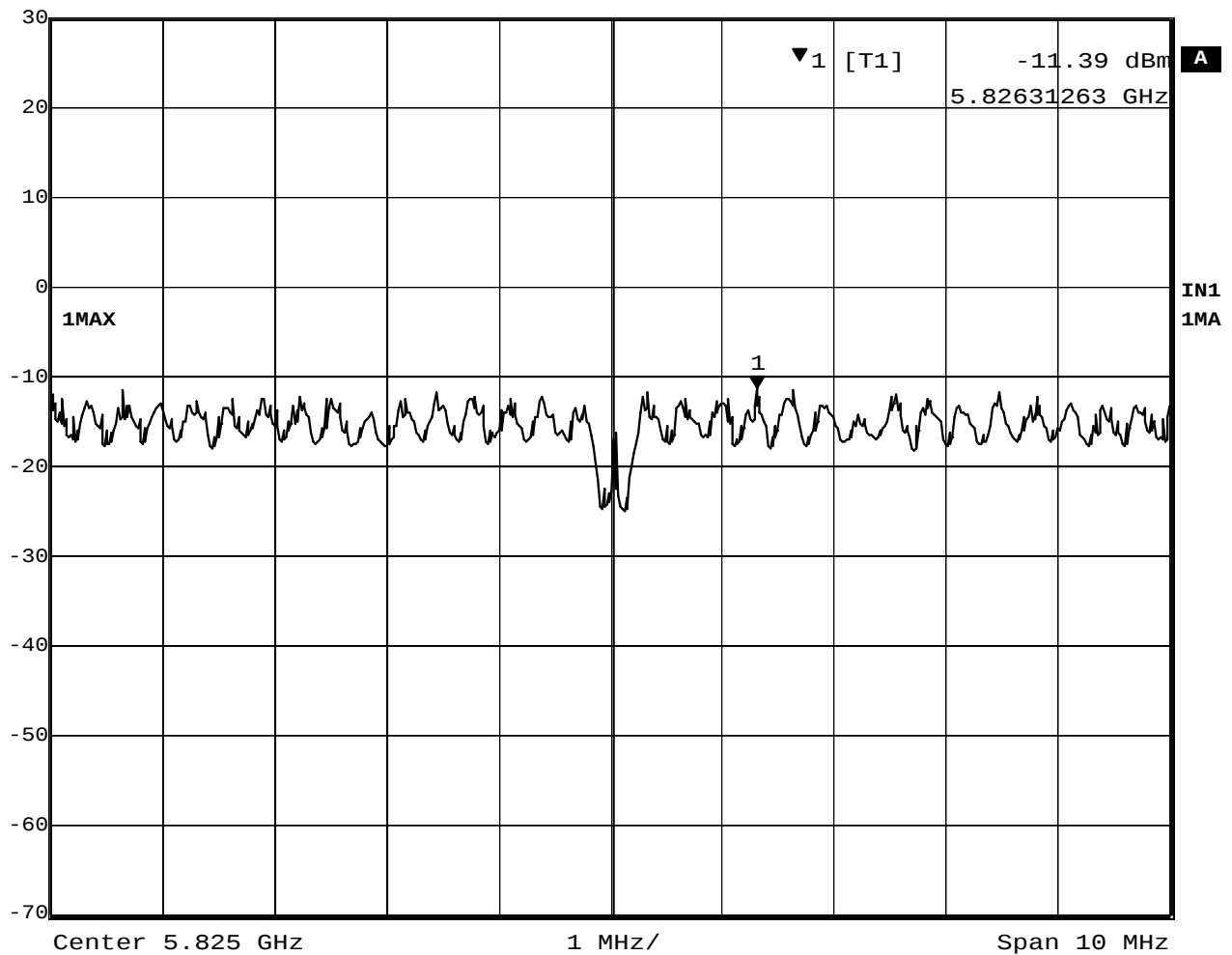


Date: 16.JUL.2003 20:09:39

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



Marker 1 [T1] RBW 3 kHz RF Att 40 dB  
Ref Lvl -11.39 dBm VBW 100 kHz  
30 dBm 5.82631263 GHz SWT 2.8 s Unit dBm



Date: 16.JUL.2003 20:11:11

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:<br>- Lisen-L <=> SW/Con.unit (SW100)<br>- Lisen-N <=> SW/Con.unit (SW101)<br>- SW/Con.unit <=> RCVR (Input)<br>- SW/Con.unit<=> Spe Ana.(Signal In) | Length:<br>4 m<br>4 m<br>1 m<br>1 m | - EMIC-L<br>- EMIC-N<br>- EMIC-R<br>- EMIC-S |

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

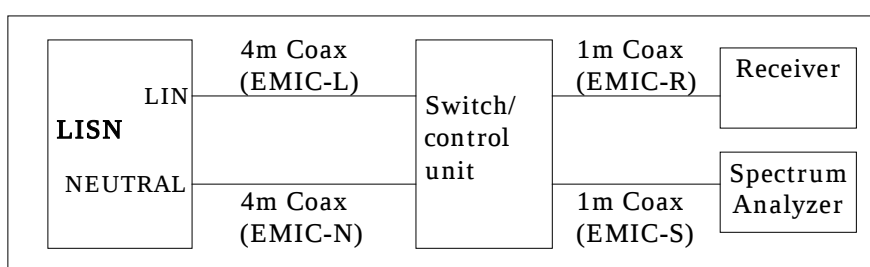


Figure 6. Cables for Conducted Emission Test

## 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:

$$CORR = 0.6 + 0.1 + 0.1 + 0.2 = 1.0 \text{ (dB)}$$

$$PV = 50.0 + 1.0 = 51.0 \text{ (dBμV)}$$

## 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 (dB $\mu$ V) | CISPR22 AV Limit (dB $\mu$ V) | Phase   |
|-----------------|-------------------------------|-------------------|--------------------------------|-------------------------------|-------------------|--------------------------------|-------------------------------|-------------------------------|---------|
|                 | Measured Reading (dB $\mu$ V) | Corr. Factor (dB) | Powerline Voltage (dB $\mu$ V) | Measured Reading (dB $\mu$ V) | Corr. Factor (dB) | Powerline Voltage (dB $\mu$ V) |                               |                               |         |
| 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 (dB $\mu$ V) | CISPR22 AV Limit (dB $\mu$ V) | Phase   |
|-----------------|-------------------------------|-------------------|--------------------------------|-------------------------------|-------------------|--------------------------------|-------------------------------|-------------------------------|---------|
|                 | Measured Reading (dB $\mu$ V) | Corr. Factor (dB) | Powerline Voltage (dB $\mu$ V) | Measured Reading (dB $\mu$ V) | Corr. Factor (dB) | Powerline Voltage (dB $\mu$ V) |                               |                               |         |
| 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 (dB $\mu$ V) | CISPR22 AV Limit (dB $\mu$ V) | Phase   |
|-----------------|-------------------------------|-------------------|--------------------------------|-------------------------------|-------------------|--------------------------------|-------------------------------|-------------------------------|---------|
|                 | Measured Reading (dB $\mu$ V) | Corr. Factor (dB) | Powerline Voltage (dB $\mu$ V) | Measured Reading (dB $\mu$ V) | Corr. Factor (dB) | Powerline Voltage (dB $\mu$ V) |                               |                               |         |
| 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 (dB $\mu$ V) | CISPR22 AV Limit (dB $\mu$ V) | Phase   |
|-----------------|-------------------------------|-------------------|--------------------------------|-------------------------------|-------------------|--------------------------------|-------------------------------|-------------------------------|---------|
|                 | Measured Reading (dB $\mu$ V) | Corr. Factor (dB) | Powerline Voltage (dB $\mu$ V) | Measured Reading (dB $\mu$ V) | Corr. Factor (dB) | Powerline Voltage (dB $\mu$ V) |                               |                               |         |
| 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 (dB $\mu$ V) | CISPR22 AV Limit (dB $\mu$ V) | Phase   |
|-----------------|-------------------------------|-------------------|--------------------------------|-------------------------------|-------------------|--------------------------------|-------------------------------|-------------------------------|---------|
|                 | Measured Reading (dB $\mu$ V) | Corr. Factor (dB) | Powerline Voltage (dB $\mu$ V) | Measured Reading (dB $\mu$ V) | Corr. Factor (dB) | Powerline Voltage (dB $\mu$ V) |                               |                               |         |
| 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 (dB $\mu$ V) | CISPR22 AV Limit (dB $\mu$ V) | Phase   |
|-----------------|-------------------------------|-------------------|--------------------------------|-------------------------------|-------------------|--------------------------------|-------------------------------|-------------------------------|---------|
|                 | Measured Reading (dB $\mu$ V) | Corr. Factor (dB) | Powerline Voltage (dB $\mu$ V) | Measured Reading (dB $\mu$ V) | Corr. Factor (dB) | Powerline Voltage (dB $\mu$ V) |                               |                               |         |
| 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 (dB $\mu$ V) | CISPR22 AV Limit (dB $\mu$ V) | Phase   |
|-----------------|-------------------------------|-------------------|--------------------------------|-------------------------------|-------------------|--------------------------------|-------------------------------|-------------------------------|---------|
|                 | Measured Reading (dB $\mu$ V) | Corr. Factor (dB) | Powerline Voltage (dB $\mu$ V) | Measured Reading (dB $\mu$ V) | Corr. Factor (dB) | Powerline Voltage (dB $\mu$ V) |                               |                               |         |
| 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 (dB $\mu$ V) | CISPR22 AV Limit (dB $\mu$ V) | Phase   |
|-----------------|-------------------------------|-------------------|--------------------------------|-------------------------------|-------------------|--------------------------------|-------------------------------|-------------------------------|---------|
|                 | Measured Reading (dB $\mu$ V) | Corr. Factor (dB) | Powerline Voltage (dB $\mu$ V) | Measured Reading (dB $\mu$ V) | Corr. Factor (dB) | Powerline Voltage (dB $\mu$ V) |                               |                               |         |
| 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 (dB $\mu$ V) | CISPR22 AV Limit (dB $\mu$ V) | Phase   |
|-----------------|-------------------------------|-------------------|--------------------------------|-------------------------------|-------------------|--------------------------------|-------------------------------|-------------------------------|---------|
|                 | Measured Reading (dB $\mu$ V) | Corr. Factor (dB) | Powerline Voltage (dB $\mu$ V) | Measured Reading (dB $\mu$ V) | Corr. Factor (dB) | Powerline Voltage (dB $\mu$ V) |                               |                               |         |
| 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 (dB $\mu$ V) | CISPR22 AV Limit (dB $\mu$ V) | Phase   |
|-----------------|-------------------------------|-------------------|--------------------------------|-------------------------------|-------------------|--------------------------------|-------------------------------|-------------------------------|---------|
|                 | Measured Reading (dB $\mu$ V) | Corr. Factor (dB) | Powerline Voltage (dB $\mu$ V) | Measured Reading (dB $\mu$ V) | Corr. Factor (dB) | Powerline Voltage (dB $\mu$ V) |                               |                               |         |
| 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 (dB $\mu$ V) | CISPR22 AV Limit (dB $\mu$ V) | Phase   |
|-----------------|-------------------------------|-------------------|--------------------------------|-------------------------------|-------------------|--------------------------------|-------------------------------|-------------------------------|---------|
|                 | Measured Reading (dB $\mu$ V) | Corr. Factor (dB) | Powerline Voltage (dB $\mu$ V) | Measured Reading (dB $\mu$ V) | Corr. Factor (dB) | Powerline Voltage (dB $\mu$ V) |                               |                               |         |
| 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<br>(MHz) | QP                                  |                         |                                      | AV                                  |                         |                                      | CISPR22<br>QP Limit<br>(dB $\mu$ V) | CISPR22<br>AV Limit<br>(dB $\mu$ V) | Phase   |
|--------------------|-------------------------------------|-------------------------|--------------------------------------|-------------------------------------|-------------------------|--------------------------------------|-------------------------------------|-------------------------------------|---------|
|                    | Measured<br>Reading<br>(dB $\mu$ V) | Corr.<br>Factor<br>(dB) | Powerline<br>Voltage<br>(dB $\mu$ V) | Measured<br>Reading<br>(dB $\mu$ V) | Corr.<br>Factor<br>(dB) | Powerline<br>Voltage<br>(dB $\mu$ V) |                                     |                                     |         |
| 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                                       | HP 8447D     | 2805A02919    |
| - for 200-1000MHz                                     | HP 8447D     | 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:                                        | Length:      |               |
| - Bi-coni Ant <=> 10m Cable                           | 9 m          | - EM103L01    |
| - 10m Cable <=> Shield Panel                          | 10 m         | - EM103L02    |
| - Shield Panel <=> RF Amp                             | 7 m          | - EM103L03    |
| - RF Amp <=> Power Splitter                           | 0.5m         | - EM103L04    |
| - Log-peri Ant <=> 10m Cable                          | 9 m          | - EM103H01    |
| - 10m Cable <=> Shield Panel                          | 10 m         | - EM103H02    |
| - Shield Panel <=> RF Amp                             | 7 m          | - EM103H03    |
| - RF Amp <=> Power Splitter                           | 0.5m         | - EM103H04    |
| Coax cables:                                          |              |               |
| - Power Splitter <=> SW/Con.unit (SW110)              | 1 m          | - EM103L05    |
| - Power Splitter <=> SW/Con.unit (SW300)              | 1 m          | - EM103L06    |
| - Power Splitter <=> SW/Con.unit (SW100)              | 1 m          | - EM103H05    |
| - Power Splitter <=> SW/Con.unit (SW301)              | 1 m          | - EM103H06    |
| - SW/Con.unit <=> Receiver (Input)                    | 2 m          | - EM1RCV      |
| - SW/Con.unit <=> Spe Ana.(Signal In) for 30- 200MHz  | 2 m          | - EM1SPL      |
| - SW/Con.unit <=> Spe Ana.(Signal In) for 200-1000MHz | 2 m          | - EM1SPH      |

## Notes:

- HP: Hewlett Packard, R&amp;S: Rohde &amp; Schwarz

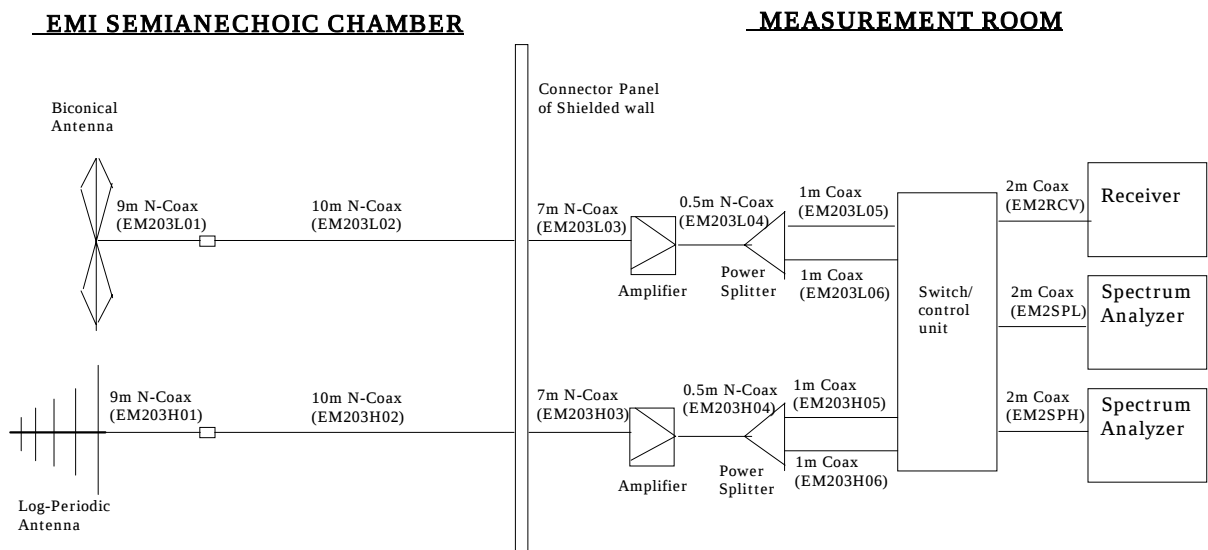


Figure 7 Cables for Radiated Emission Test

## 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 51.5dB $\mu$ V; 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:

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

Conversion between dB $\mu$ V/m (or dB $\mu$ V) and  $\mu$ V/m (or  $\mu$ V) are done as:

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

$$40\text{dB}\mu\text{V/m} = 100\mu\text{V/m}$$

$$48\text{dB}\mu\text{V/m} = 250\mu\text{V/m}$$

## 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 (dB $\mu$ V) | Antenna Factor (dB/m) | Corr. Factor (dB) | Field Strength (dB $\mu$ V/m) | Limit (dB $\mu$ V/m) | Field Strength ( $\mu$ V/m) | Limit ( $\mu$ V/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 (dB $\mu$ V) | Antenna Factor (dB/m) | Corr. Factor (dB) | Field Strength (dB $\mu$ V/m) | Limit (dB $\mu$ V/m) | Field Strength ( $\mu$ V/m) | Limit ( $\mu$ V/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 (dB $\mu$ V) | Antenna Factor (dB/m) | Corr. Factor (dB) | Field Strength (dB $\mu$ V/m) | Limit (dB $\mu$ V/m) | Field Strength ( $\mu$ V/m) | Limit ( $\mu$ V/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 (dB $\mu$ V) | Antenna Factor (dB/m) | Corr. Factor (dB) | Field Strength (dB $\mu$ V/m) | Limit (dB $\mu$ V/m) | Field Strength ( $\mu$ V/m) | Limit ( $\mu$ V/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 (dB $\mu$ V) | Antenna Factor (dB/m) | Corr. Factor (dB) | Field Strength (dB $\mu$ V/m) | Limit (dB $\mu$ V/m) | Field Strength ( $\mu$ V/m) | Limit ( $\mu$ V/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 (dB $\mu$ V) | Antenna Factor (dB/m) | Corr. Factor (dB) | Field Strength (dB $\mu$ V/m) | Limit (dB $\mu$ V/m) | Field Strength ( $\mu$ V/m) | Limit ( $\mu$ V/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 (dB $\mu$ V) | Antenna Factor (dB/m) | Corr. Factor (dB) | Field Strength (dB $\mu$ V/m) | Limit (dB $\mu$ V/m) | Field Strength ( $\mu$ V/m) | Limit ( $\mu$ V/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 (dB $\mu$ V) | Antenna Factor (dB/m) | Corr. Factor (dB) | Field Strength (dB $\mu$ V/m) | Limit (dB $\mu$ V/m) | Field Strength ( $\mu$ V/m) | Limit ( $\mu$ V/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 (dB $\mu$ V) | Antenna Factor (dB/m) | Corr. Factor (dB) | Field Strength (dB $\mu$ V/m) | Limit (dB $\mu$ V/m) | Field Strength ( $\mu$ V/m) | Limit ( $\mu$ V/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 (dB $\mu$ V) | Antenna Factor (dB/m) | Corr. Factor (dB) | Field Strength (dB $\mu$ V/m) | Limit (dB $\mu$ V/m) | Field Strength ( $\mu$ V/m) | Limit ( $\mu$ V/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 (dB $\mu$ V) | Antenna Factor (dB/m) | Corr. Factor (dB) | Field Strength (dB $\mu$ V/m) | Limit (dB $\mu$ V/m) | Field Strength ( $\mu$ V/m) | Limit ( $\mu$ V/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<br>(MHz) | Polarity<br>(H/V) | Measured<br>(dB $\mu$ V) | Antenna Factor<br>(dB/m) | Corr. Factor<br>(dB) | Field Strength<br>(dB $\mu$ V/m) | Limit<br>(dB $\mu$ V/m) | Field Strength<br>( $\mu$ V/m) | Limit<br>( $\mu$ V/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:<br>- Horn Ant <=> RF Amp. (1-18GHz)<br>- RF Amp. <=> Spectrum Analyzer (1-12.4GHz)<br>- RF Amp. <=> Spectrum Analyzer (12.4-18GHz)<br>- Horn Ant <=> RF Amp. (18-40GHz)<br>- RF Amp. <=> Spectrum Analyzer (18-40GHz) | Length:<br>6 m<br>16 m<br>3m<br>3m<br>1m | - EM206SCO<br>- GEM0101<br>- SF102-20166<br>- SF102-20167<br>- SF102-21105 |

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

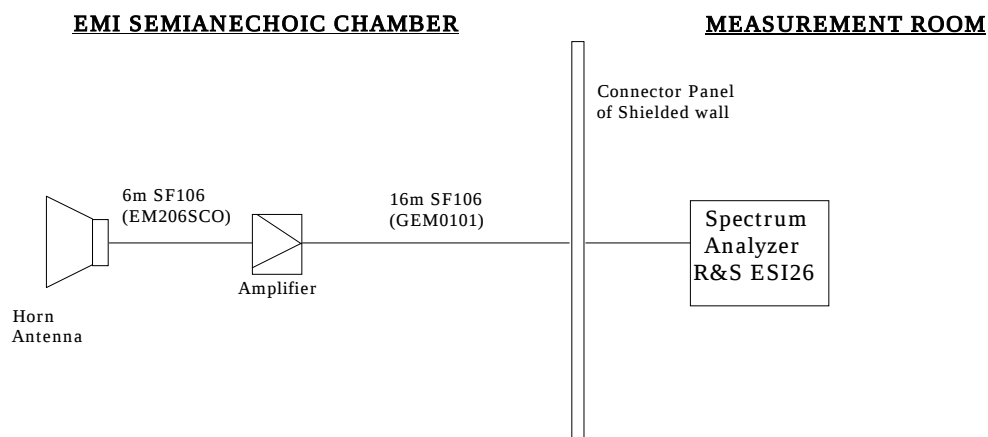


Figure 8-1. Cables for Radiated Emission Test (1 – 12.4 GHz)

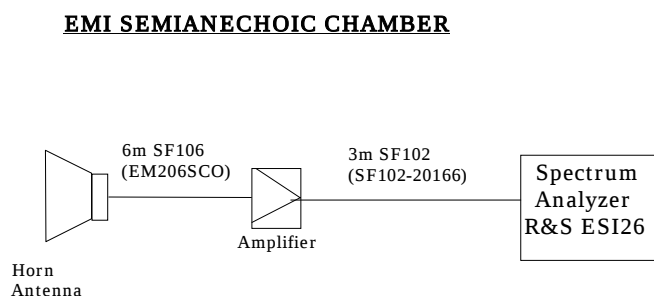


Figure 8-2. Cables for Radiated Emission Test (12.4 - 18GHz)

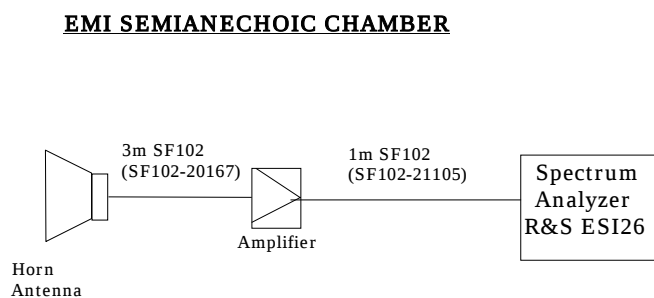


Figure 8-3. Cables for Radiated Emission Test (18 - 26.5GHz)

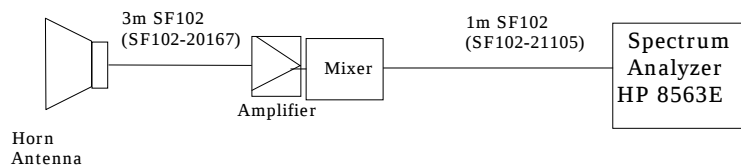
**EMI SEMIANECHOIC CHAMBER**

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 dB $\mu$ V; 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:

$$FS = 51.5 + 8.5 + 1.3 - 26 - 0.0 = 35.6 \text{ dB}\mu\text{V/m}$$

Conversions between dB $\mu$ V/m (or dB $\mu$ V) and  $\mu$ V/m (or  $\mu$ V) are done as :

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

$$40 \text{ dB}\mu\text{V/m} = 100 \mu\text{V/m}$$

$$48 \text{ dB}\mu\text{V/m} = 250 \mu\text{V/m}$$

## 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 (dB $\mu$ V) ( <i>peak</i> ) | Measured (dB $\mu$ V) ( <i>average</i> ) | Antenna Factor (dB/m) | Corr. Factor (dB) | Falloff Factor (dB) | Field Strength (dB $\mu$ V/m) ( <i>peak</i> ) | FCC Limit (dB $\mu$ V/m) ( <i>peak</i> ) | Field Strength (dB $\mu$ V/m) ( <i>average</i> ) | FCC Limit (dB $\mu$ V/m) ( <i>average</i> ) |
|----------------------|----------------|---------------------------------------|------------------------------------------|-----------------------|-------------------|---------------------|-----------------------------------------------|------------------------------------------|--------------------------------------------------|---------------------------------------------|
| Inband<br>2.462      | H              | 109.6                                 | 101.4                                    | 28.4                  | -29.6             | 0.0                 | 108.4                                         | OB*                                      | 100.2                                            | OB*                                         |
| Adjacent RB<br>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 (dB $\mu$ V) ( <i>peak</i> ) | Measured (dB $\mu$ V) ( <i>average</i> ) | Antenna Factor (dB/m) | Corr. Factor (dB) | Falloff Factor (dB) | Field Strength (dB $\mu$ V/m) ( <i>peak</i> ) | FCC Limit (dB $\mu$ V/m) ( <i>peak</i> ) | Field Strength (dB $\mu$ V/m) ( <i>average</i> ) | FCC Limit (dB $\mu$ V/m) ( <i>average</i> ) |
|-----------------|----------------|---------------------------------------|------------------------------------------|-----------------------|-------------------|---------------------|-----------------------------------------------|------------------------------------------|--------------------------------------------------|---------------------------------------------|
| 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 (dB $\mu$ V) ( <i>peak</i> ) | Measured (dB $\mu$ V) ( <i>average</i> ) | Antenna Factor (dB/m) | Corr. Factor (dB) | Falloff Factor (dB) | Field Strength (dB $\mu$ V/m) ( <i>peak</i> ) | FCC Limit (dB $\mu$ V/m) ( <i>peak</i> ) | Field Strength (dB $\mu$ V/m) ( <i>average</i> ) | FCC Limit (dB $\mu$ V/m) ( <i>average</i> ) |
|----------------------|----------------|---------------------------------------|------------------------------------------|-----------------------|-------------------|---------------------|-----------------------------------------------|------------------------------------------|--------------------------------------------------|---------------------------------------------|
| Inband<br>2.417      | H              | 107.2                                 | 95.8                                     | 28.3                  | -29.6             | 0.0                 | 105.9                                         | OB*                                      | 94.5                                             | OB*                                         |
| Adjacent RB<br>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 (dB $\mu$ V) ( <i>peak</i> ) | Measured (dB $\mu$ V) ( <i>average</i> ) | Antenna Factor (dB/m) | Corr. Factor (dB) | Falloff Factor (dB) | Field Strength (dB $\mu$ V/m) ( <i>peak</i> ) | FCC Limit (dB $\mu$ V/m) ( <i>peak</i> ) | Field Strength (dB $\mu$ V/m) ( <i>average</i> ) | FCC Limit (dB $\mu$ V/m) ( <i>average</i> ) |
|----------------------|----------------|---------------------------------------|------------------------------------------|-----------------------|-------------------|---------------------|-----------------------------------------------|------------------------------------------|--------------------------------------------------|---------------------------------------------|
| Inband<br>2.442      | H              | 110.7                                 | 98.7                                     | 28.4                  | -29.6             | 0.0                 | 109.5                                         | OB*                                      | 97.5                                             | OB*                                         |
| Adjacent RB<br>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 (dB $\mu$ V) ( <i>peak</i> ) | Measured (dB $\mu$ V) ( <i>average</i> ) | Antenna Factor (dB/m) | Corr. Factor (dB) | Falloff Factor (dB) | Field Strength (dB $\mu$ V/m) ( <i>peak</i> ) | FCC Limit (dB $\mu$ V/m) ( <i>peak</i> ) | Field Strength (dB $\mu$ V/m) ( <i>average</i> ) | FCC Limit (dB $\mu$ V/m) ( <i>average</i> ) |
|----------------------|----------------|---------------------------------------|------------------------------------------|-----------------------|-------------------|---------------------|-----------------------------------------------|------------------------------------------|--------------------------------------------------|---------------------------------------------|
| Inband<br>2.469      | H              | 107.8                                 | 95.8                                     | 28.4                  | -29.6             | 0.0                 | 106.6                                         | OB*                                      | 94.6                                             | OB*                                         |
| Adjacent RB<br>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 (dB $\mu$ V) ( <i>peak</i> ) | Measured (dB $\mu$ V) ( <i>average</i> ) | Antenna Factor (dB/m) | Corr. Factor (dB) | Falloff Factor (dB) | Field Strength (dB $\mu$ V/m) ( <i>peak</i> ) | FCC Limit (dB $\mu$ V/m) ( <i>peak</i> ) | Field Strength (dB $\mu$ V/m) ( <i>average</i> ) | FCC Limit (dB $\mu$ V/m) ( <i>average</i> ) |
|-----------------|----------------|---------------------------------------|------------------------------------------|-----------------------|-------------------|---------------------|-----------------------------------------------|------------------------------------------|--------------------------------------------------|---------------------------------------------|
| 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<br>(GHz) | Polarity<br>(H/V) | Measured<br>(dB $\mu$ V)<br>(peak) | Measured<br>(dB $\mu$ V)<br>(average) | Antenna<br>Factor<br>(dB/m) | Corr.<br>Factor<br>(dB) | Falloff<br>Factor<br>(dB) | Field<br>Strength<br>(dB $\mu$ V/m)<br>(peak) | FCC Limit<br>(dB $\mu$ V/m)<br>(peak) | Field<br>Strength<br>(dB $\mu$ V/m)<br>(average) | FCC Limit<br>(dB $\mu$ V/m)<br>(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<br>(GHz) | Polarity<br>(H/V) | Measured<br>(dB $\mu$ V)<br>(peak) | Measured<br>(dB $\mu$ V)<br>(average) | Antenna<br>Factor<br>(dB/m) | Corr.<br>Factor<br>(dB) | Falloff<br>Factor<br>(dB) | Field<br>Strength<br>(dB $\mu$ V/m)<br>(peak) | FCC Limit<br>(dB $\mu$ V/m)<br>(peak) | Field<br>Strength<br>(dB $\mu$ V/m)<br>(average) | FCC Limit<br>(dB $\mu$ V/m)<br>(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                                     |

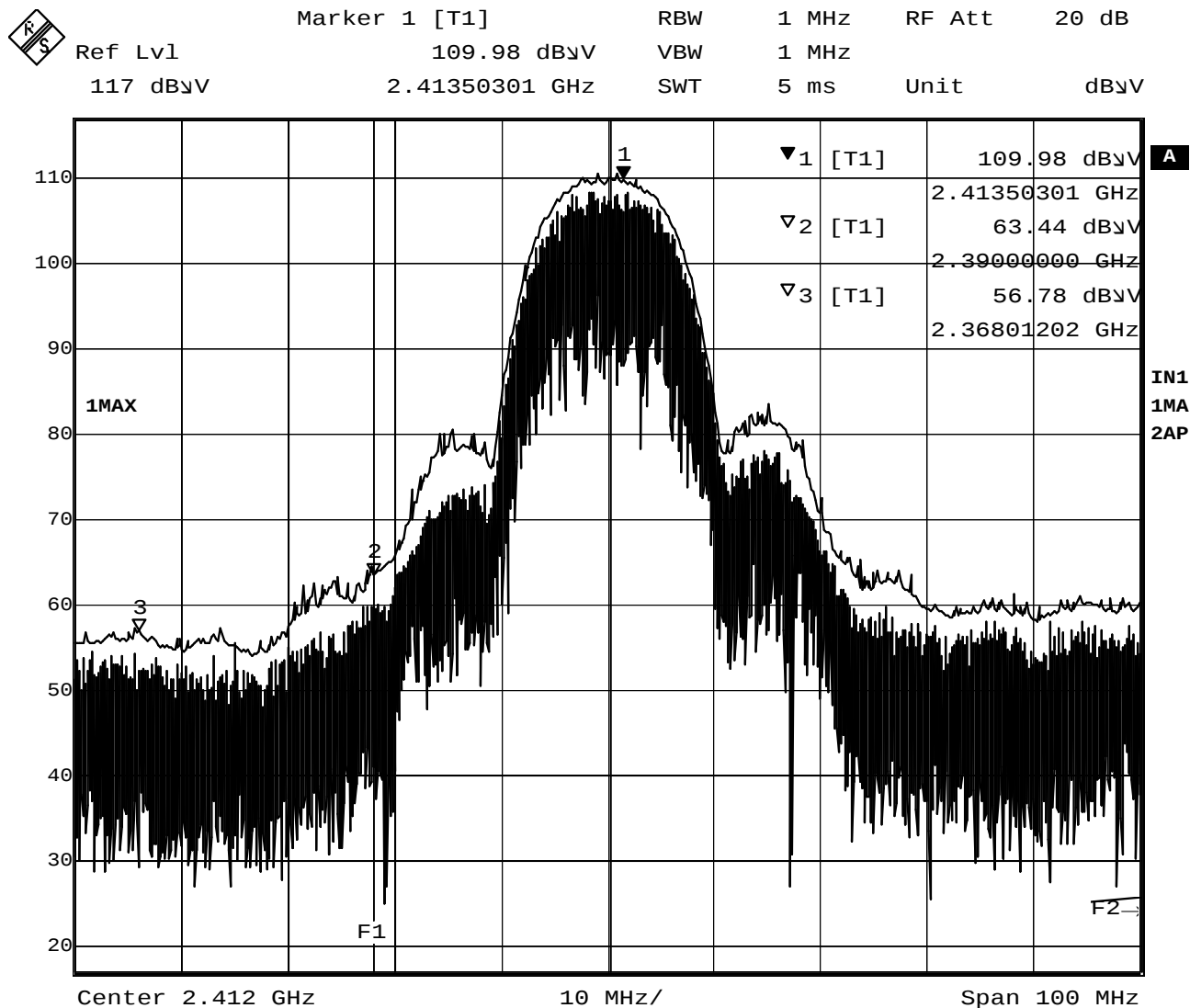
Table 8-2-11 EUT: Ch.165 (5825MHz) **TX** mode 24Mbps

| Frequency<br>(GHz) | Polarity<br>(H/V) | Measured<br>(dB $\mu$ V)<br>(peak) | Measured<br>(dB $\mu$ V)<br>(average) | Antenna<br>Factor<br>(dB/m) | Corr.<br>Factor<br>(dB) | Falloff<br>Factor<br>(dB) | Field<br>Strength<br>(dB $\mu$ V/m)<br>(peak) | FCC Limit<br>(dB $\mu$ V/m)<br>(peak) | Field<br>Strength<br>(dB $\mu$ V/m)<br>(average) | FCC Limit<br>(dB $\mu$ V/m)<br>(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<br>(GHz) | Polarity<br>(H/V) | Measured<br>(dB $\mu$ V)<br><i>(peak)</i> | Measured<br>(dB $\mu$ V)<br><i>(average)</i> | Antenna<br>Factor<br>(dB/m) | Corr.<br>Factor<br>(dB) | Falloff<br>Factor<br>(dB) | Field<br>Strength<br>(dB $\mu$ V/m)<br><i>(peak)</i> | FCC Limit<br>(dB $\mu$ V/m)<br><i>(peak)</i> | Field<br>Strength<br>(dB $\mu$ V/m)<br><i>(average)</i> | FCC Limit<br>(dB $\mu$ V/m)<br><i>(average)</i> |
|--------------------|-------------------|-------------------------------------------|----------------------------------------------|-----------------------------|-------------------------|---------------------------|------------------------------------------------------|----------------------------------------------|---------------------------------------------------------|-------------------------------------------------|
| 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

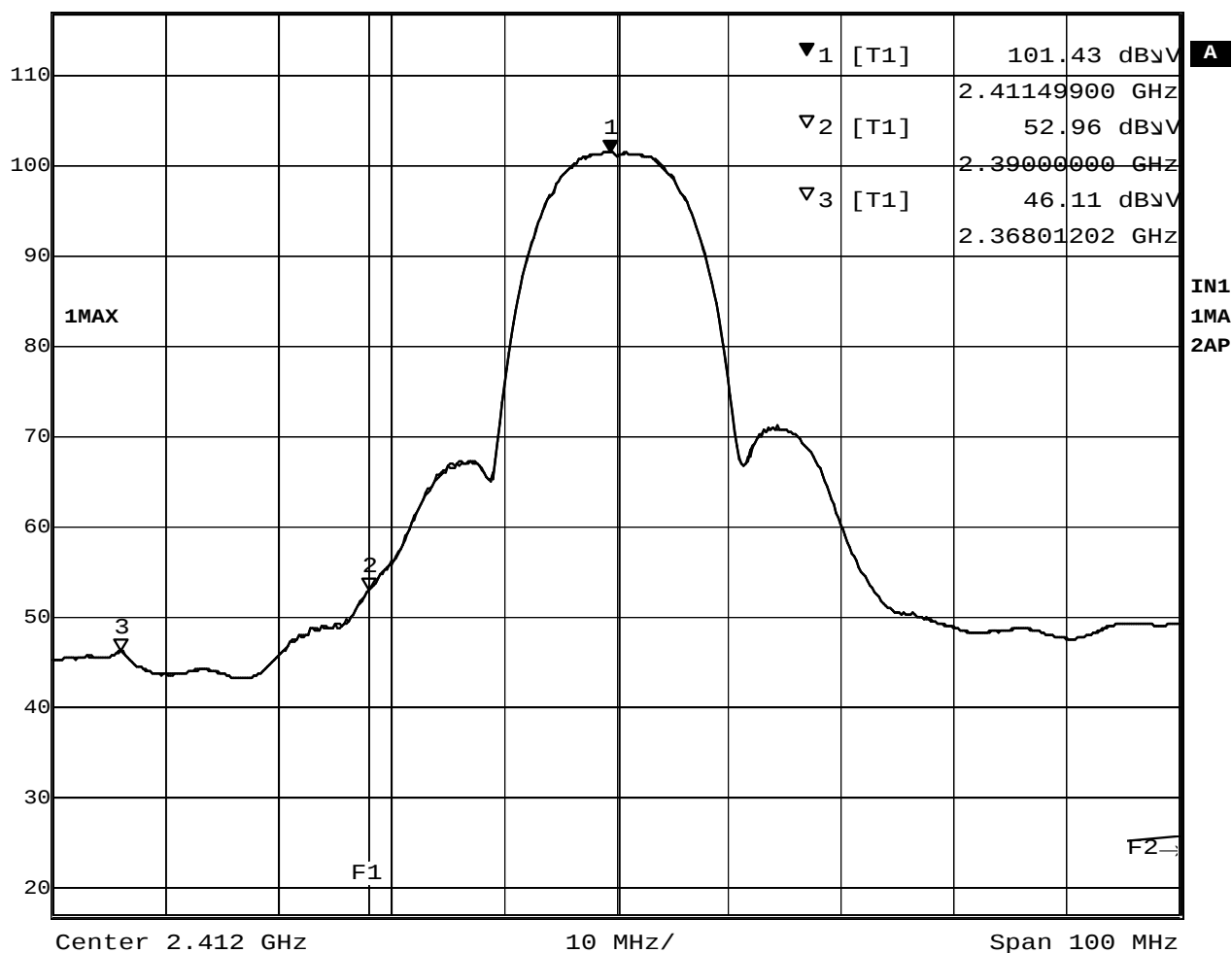


Date: 17.JUL.2003 20:35:23

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



Marker 1 [T1] RBW 1 MHz RF Att 20 dB  
Ref Lvl 101.43 dBμV VBW 10 Hz  
117 dBμV 2.41149900 GHz SWT 25 s Unit dBμV

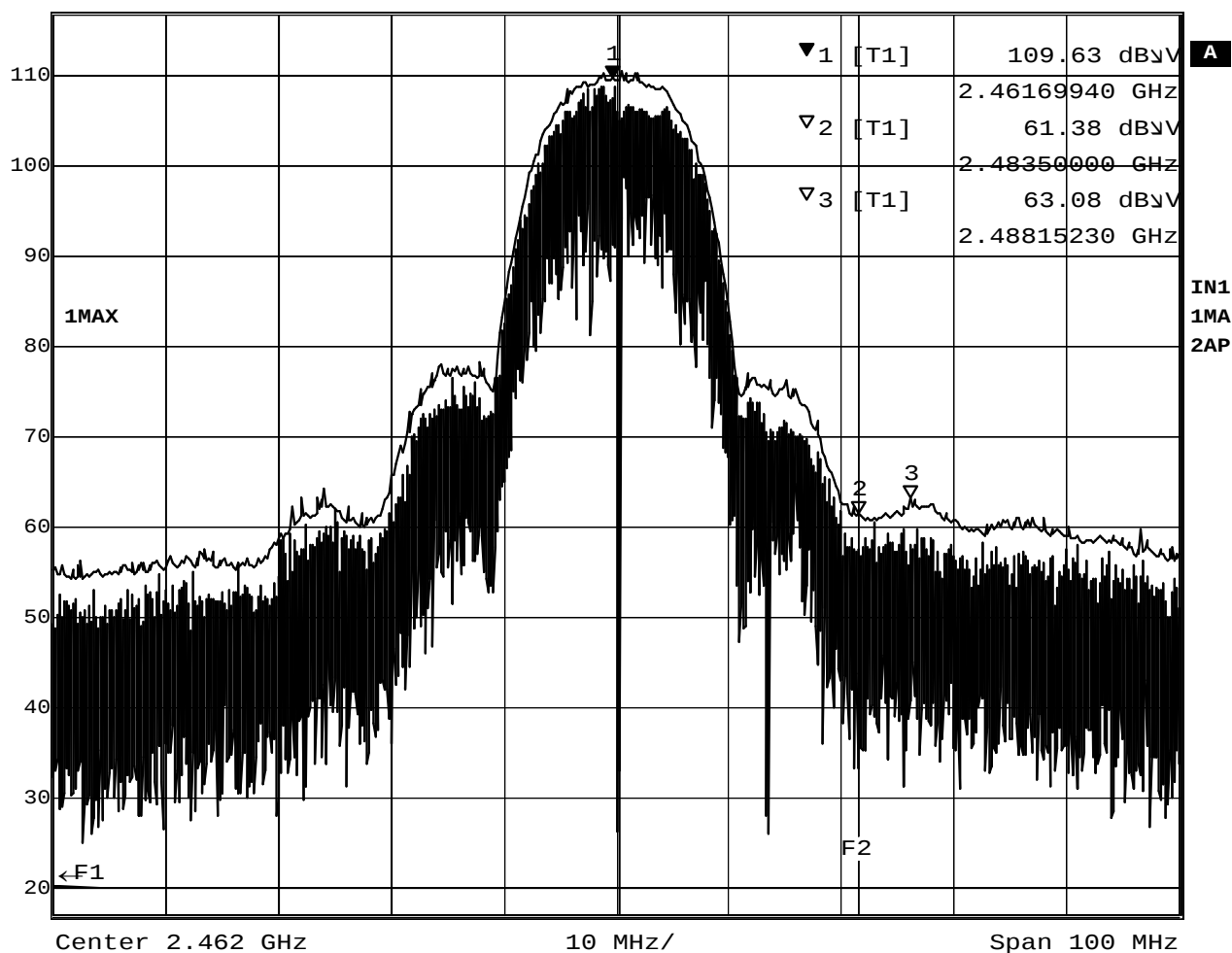


Date: 17.JUL.2003 20:34:35

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



Marker 1 [T1] RBW 1 MHz RF Att 20 dB  
Ref Lvl 109.63 dBμV VBW 1 MHz  
117 dBμV 2.46169940 GHz SWT 5 ms Unit dBμV

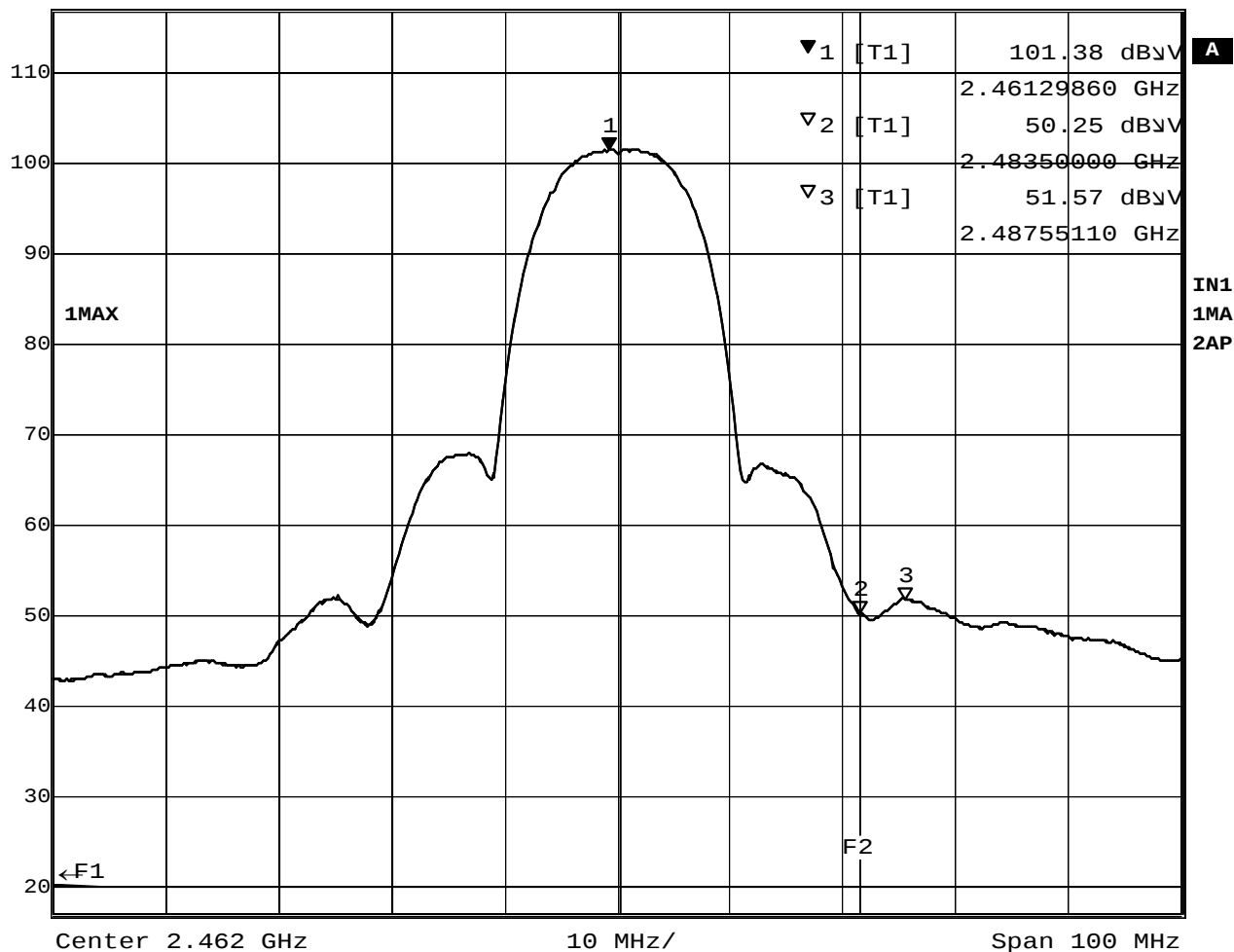


Date: 17.JUL.2003 20:56:30

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



Marker 1 [T1] RBW 1 MHz RF Att 20 dB  
Ref Lvl 101.38 dBμV VBW 10 Hz  
117 dBμV 2.46129860 GHz SWT 25 s Unit dBμV

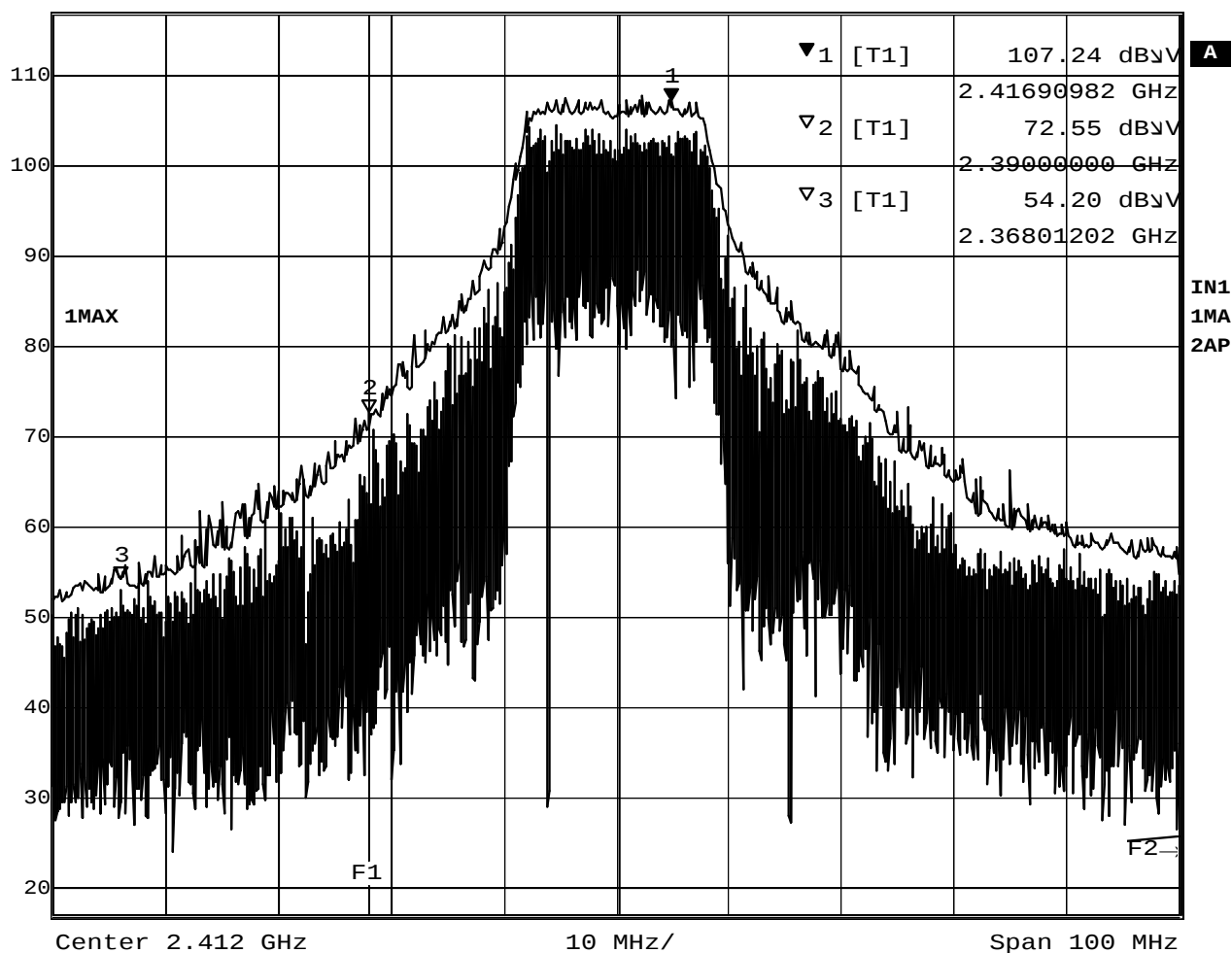


Date: 17.JUL.2003 20:51:14

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



Marker 1 [T1] RBW 1 MHz RF Att 20 dB  
Ref Lvl 107.24 dBμV VBW 1 MHz  
117 dBμV 2.41690982 GHz SWT 5 ms Unit dBμV

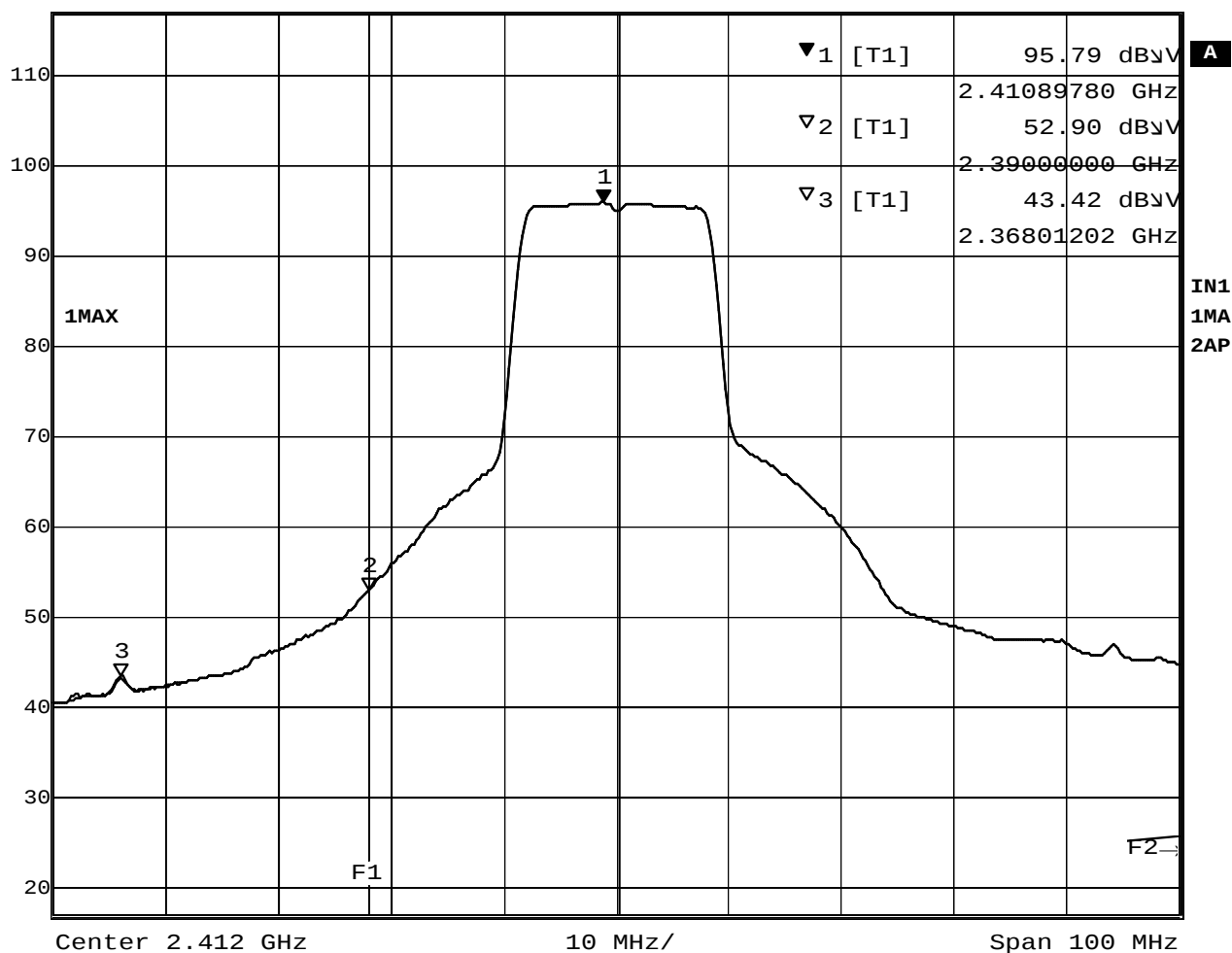


Date: 17.JUL.2003 20:43:44

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



Marker 1 [T1] RBW 1 MHz RF Att 20 dB  
Ref Lvl 95.79 dBμV VBW 10 Hz  
117 dBμV 2.41089780 GHz SWT 25 s Unit dBμV

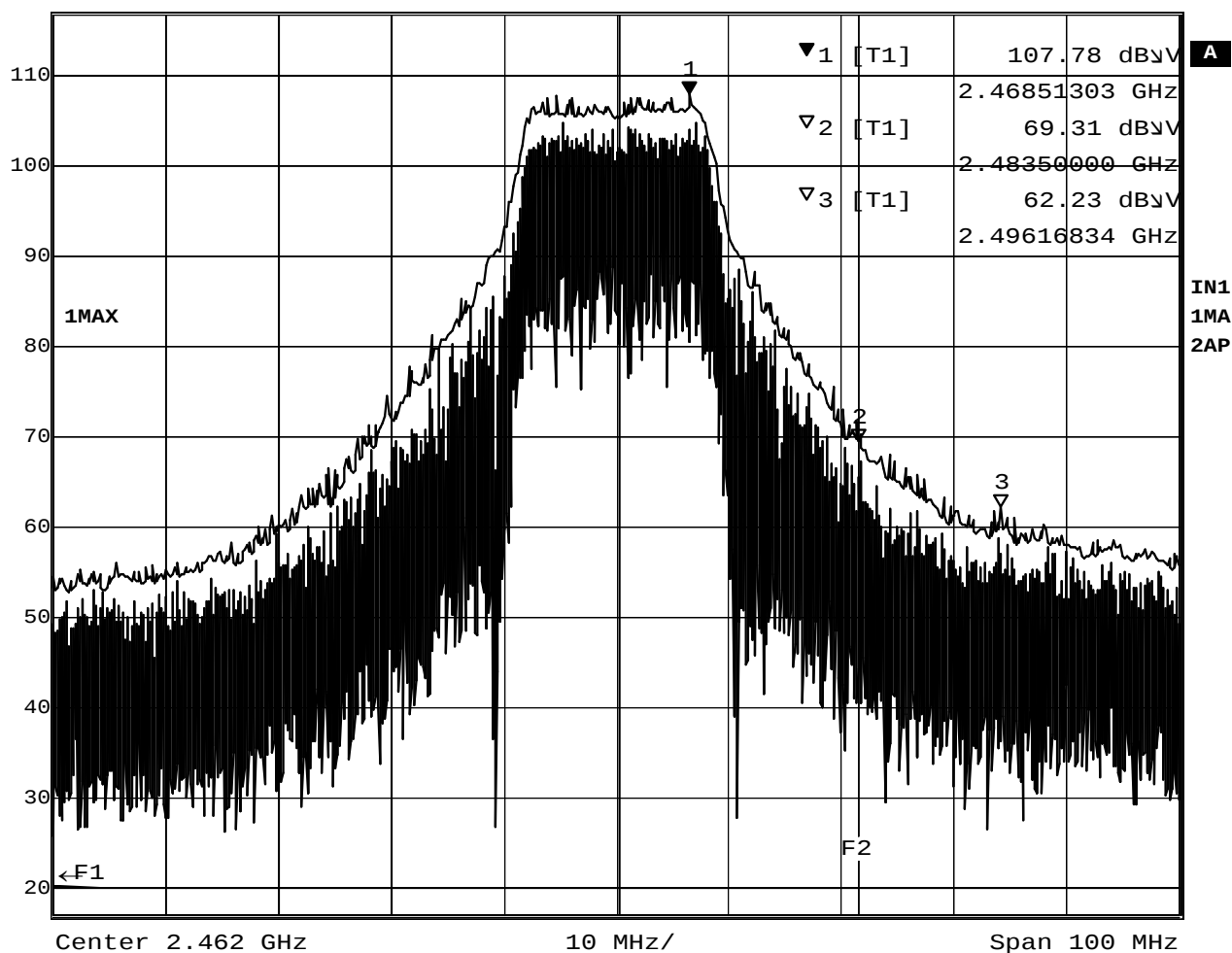


Date: 17.JUL.2003 20:43:02

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



Marker 1 [T1] RBW 1 MHz RF Att 20 dB  
Ref Lvl 107.78 dBμV VBW 1 MHz  
117 dBμV 2.46851303 GHz SWT 5 ms Unit dBμV

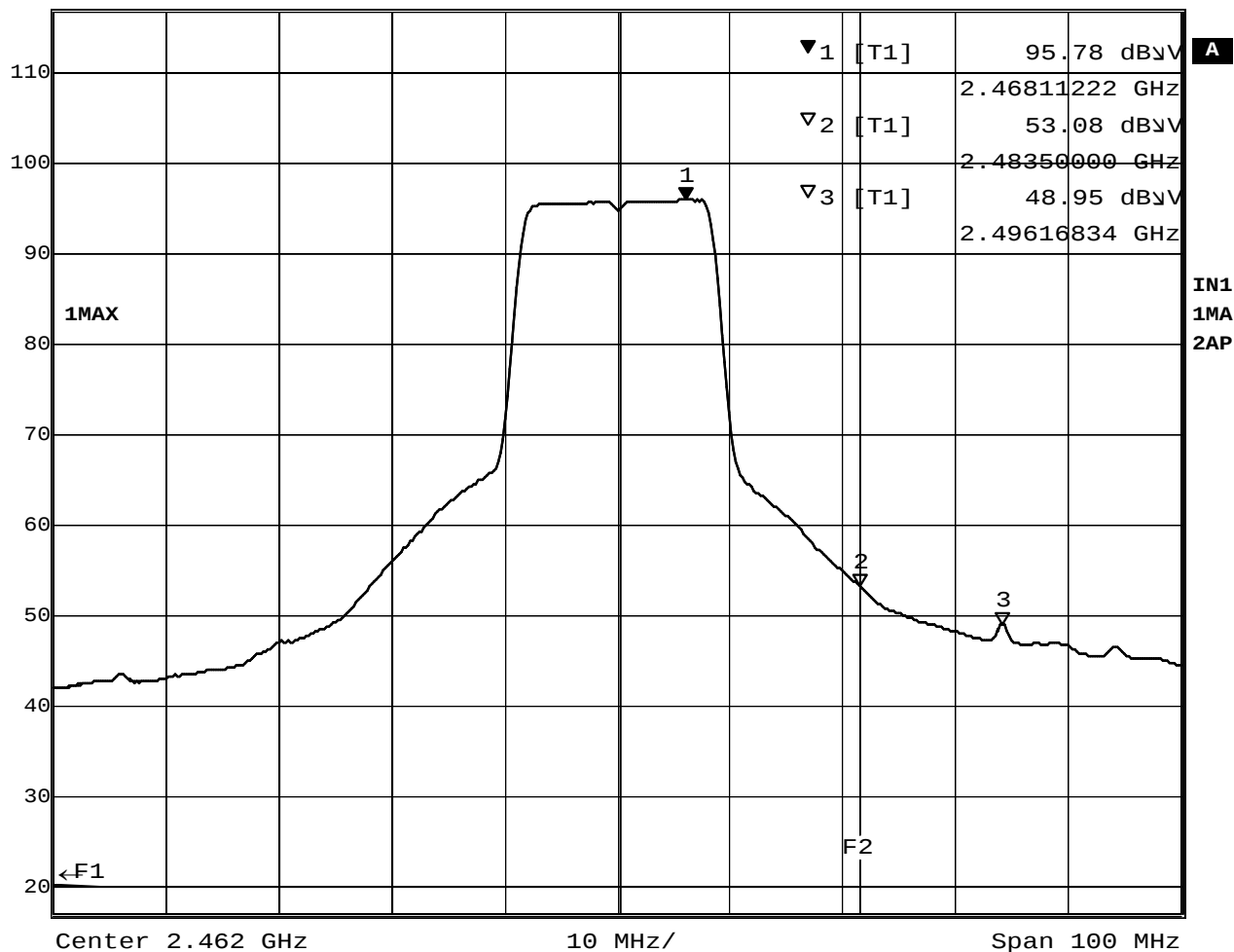


Date: 17.JUL.2003 20:49:17

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



Marker 1 [T1] RBW 1 MHz RF Att 20 dB  
Ref Lvl 95.78 dBμV VBW 10 Hz  
117 dBμV 2.46811222 GHz SWT 25 s Unit dBμV



Date: 17.JUL.2003 20:48:45

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