

EXHIBIT VI

Test Report - New Certification

FCC ID: AZ489FT7005

PowerPad Terminal

Under Part 15.247

Prepared On Behalf Of

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Exhibit VI

Bluetooth Test Report

Section 2.1033(b)6

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* Not applicable under the FHSS rules, applies to DTS modulation

BLUETOOTH APPROVALS

The following exhibit indicates the FCC Spread Spectrum requirements in Section 15.247(only) for devices meeting the Bluetooth Specifications for devices operating in the USA. The purpose of this exhibit is to help expedite the approval process for Bluetooth devices. This exhibit provides items that vary for each device and also provides a list of items that are common to Bluetooth devices that explains the remaining requirements. The list of common items can be submitted for each application for equipment authorization. This Bluetooth transmitter is a Frequency Hopping Spread Spectrum(FHSS) transmitter in the data mode and a Hybrid transmitter in the acquisition mode.

For each individual device, the following items, 1-6, will vary from one device to another and must be submitted.

- 1) The occupied bandwidth in Section 15.247(a)1ii .
- 2) Conducted output power specified in Section 15.247(b)1.
- 3) EIRP limit in Section 15.247(b)3.
- 4) RF safety requirement in Section 15.247(b)4
- 5) Spurious emission limits in Section 15.247(c).
- 6) Power spectral density in the **acquisition mode**.

For all devices, the following items, 1-12, are common to all Bluetooth devices and will not vary from one device to another. The list can be copied and pasted into the filing.

1 Output power and channel separation of a Bluetooth device in the different operating modes:

The different operating modes (data-mode, acquisition-mode) of a Bluetooth device don't influence the output power and the channel spacing. There is only one transmitter which is driven by identical input parameters concerning these two parameters.

Only a different hopping sequence will be used. For this reason the check of these RF parameters in one op-mode is sufficient.

2 Frequency range of a Bluetooth device:

Hereby we declare that the maximum frequency of this device is: **2402 – 2480 MHz**.

This is according the Bluetooth Core Specification V 1.0B (+ critical errata) for devices which will be operated in the USA. This was checked during the Bluetooth Qualification tests (Test Case: TRM/CA/04-E). Other frequency ranges (e.g. for Spain, France, Japan) which are allowed according the Core Specification are **not** supported by this device.

3 Co-ordination of the hopping sequence in data mode to avoid simultaneous occupancy by multiple transmitters:

Bluetooth units which want to communicate with other units must be organized in a structure called piconet. This piconet consist of max. 8 Bluetooth units. One unit is the master the other seven are the slaves. The master co-ordinates frequency occupation in this piconet for all units. As the master hop sequence is derived from it's BD address which is unique for every Bluetooth device, additional masters intending to establish new piconets will always use different hop sequences.

4 Example of a hopping sequence in data mode:

Example of a 79 hopping sequence in data mode:

40, 21, 44, 23, 42, 53, 46, 55, 48, 33, 52, 35, 50, 65, 54, 67,
56, 37, 60, 39, 58, 69, 62, 71, 64, 25, 68, 27, 66, 57, 70, 59,
72, 29, 76, 31, 74, 61, 78, 63, 01, 41, 05, 43, 03, 73, 07, 75,

09, 45, 13, 47, 11, 77, 15, 00, 64, 49, 66, 53, 68, 02, 70, 06,
01, 51, 03, 55, 05, 04

5 Equally average use of frequencies in data mode and behaviour for short transmissions:

The generation of the hopping sequence in connection mode depends essentially on two input values:

1. LAP/UAP of the master of the connection
2. Internal master clock

The LAP (lower address part) are the 24 LSB's of the 48 BD_ADDRESS. The BD_ADDRESS is an unambiguous number of every Bluetooth unit. The UAP (upper address part) are the 24 MSB's of the 48 BD_ADDRESS. The internal clock of a Bluetooth unit is derived from a free running clock which is never adjusted and is never turned off. For synchronisation with other units only offset are used. It has no relation to the time of the day. Its resolution is at least half the RX/TX slot length of 312.5 µs. The clock has a cycle of about one day (23h30). In most case it is implemented as 28 bit counter. For the deriving of the hopping sequence the entire LAP (24 bits), 4 LSB's (4 bits) (Input 1) and the 27 MSB's of the clock (Input 2) are used. With this input values different mathematical procedures (permutations, additions, XOR-operations) are performed to generate the sequence. This will be done at the beginning of every new transmission.

Regarding short transmissions the Bluetooth system has the following behaviour:

The first connection between the two devices is established, a hopping sequence was generated. For transmitting the wanted data the complete hopping sequence was not used. The connection ended. The second connection will be established. A new hopping sequence is generated. Due to the fact that the Bluetooth clock has a different value, because the period between the two transmission is longer (and it cannot be shorter) than the minimum resolution of the clock (312.5 µs). The hopping sequence will always differ from the first one.

6 Receiver input bandwidth and behaviour for repeated single or multiple packets:

The input bandwidth of the receiver is 1 MHz.

In every connection one Bluetooth device is the master and the other one is the slave.

The master determines the hopping sequence (see chapter 5). The slave follows this sequence. Both devices shift between RX and TX time slot according to the clock of the master. Additionally the type of connection (e.g. single or multislot packet) is set up at the beginning of the connection. The master adapts its hopping frequency and its TX/RX timing according to the packet type of the connection. Also the slave of the connection will use these settings. Repeating of a packet has no influence on the hopping sequence. The hopping sequence generated by the master of the connection will be followed in any case. That means, a repeated packet will not be send on the same frequency, it is send on the next frequency of the hopping sequence

7 Dwell time in data mode

The dwell time of 0.3797s within a 30 second period in data mode is independent from the packet type (packet length). The calculation for a 30 second period is as follows:

Dwell time = time slot length * hop rate / number of hopping channels * 30s

Example for a DH1 packet (with a maximum length of one time slot)

Dwell time = 625 µs * 1600 1/s / 79 * 30s = 0.3797s (in a 30s period)

For multislot packet the hopping is reduced according to the length of the packet.

Example for a DH5 packet (with a maximum length of five time slots)

Dwell time = 5 * 625 µs * 1600 * 1/5 * 1/s / 79 * 30s = 0.3797s (in a 30s period)

This is according the Bluetooth Core Specification V 1.0B (+ critical errata) for all Bluetooth devices. Therefore all Bluetooth devices **comply** with the FCC dwell time

requirement in data mode.

This was checked during the Bluetooth Qualification tests.

The Dwell time in hybrid mode is approximately 2.6 mS (in a 12.8s period)

8 Channel Separation in hybrid mode

The nominal channel spacing of the Bluetooth system is 1Mhz independent of the operating mode.

The maximum "initial carrier frequency tolerance" which is allowed for Bluetooth is $f_{center} = 75 \text{ kHz}$.

This was checked during the Bluetooth Qualification tests (Test Case: TRM/CA/07-E) for three frequencies (2402, 2441, 2480 MHz).

9 Derivation and examples for a hopping sequence in hybrid mode

For the generation of the inquiry and page hop sequences the same procedures as described for the data mode are used (see item 5), but this time with different input vectors:

****For the inquiry hop sequence, a predefined fixed address is always used. This results in the same 32 frequencies used by all devices doing an inquiry but every time with a different start frequency and phase in this sequence.**

****For the page hop sequence, the device address of the paged unit is used as input vector. This results in the use of a subset of 32 frequencies which is specific for that initial state of the connection establishment between the two units. A page to different devices would result in a different subset of 32 frequencies.**

So it is ensured that also in hybrid mode the frequency use equally averaged.

Example of a hopping sequence in inquiry mode:

48, 50, 09, 13, 52, 54, 41, 45, 56, 58, 11, 15, 60, 62, 43, 47, 00, 02, 64, 68, 04, 06, 17, 21, 08, 10, 66, 70, 12, 14, 19, 23

Example of a hopping sequence in paging mode:

08, 57, 68, 70, 51, 02, 42, 40, 04, 61, 44, 46, 63, 14, 50, 48, 16, 65, 52, 54, 67, 18, 58, 56, 20, 53, 60, 62, 55, 06, 66, 64

10 Receiver input bandwidth and synchronization in hybrid mode:

The receiver input bandwidth is the same as in the data mode (1 MHz). When two Bluetooth devices establish contact for the first time, one device sends an inquiry access code, the other device is scanning for this inquiry access code. If two devices have been connected previously and want to start a new transmission, a similar procedure takes place. The only difference is, instead of the inquiry access code, a special access code, derived from the BD_ADDRESS of the paged device will be, will be sent by the master of this connection. Due to the fact that both units have been connected before (in the inquiry procedure) the paging unit has timing and frequency information about the page scan of the paged unit. For this reason the time to establish the connection is reduced considerable.

11 Spread rate / data rate of the direct sequence signal

The Spread rate / Data rate in inquiry and paging mode can be defined via the access code. The access code is the only criterion for the system to check if there is a valid transmission or not. If you regard the presence of a valid access code as one bit of information, and compare it with the length of the access code of 68 bits, the Spread rate / Data rate will be 68/1.

12 Spurious emission in hybrid mode

The Dwell in hybrid mode is shorter than in data mode. For this reason the spurious emissions average level in data mode is worst case. The spurious emissions peak level is the same for both modes.

EXHIBIT 6A TEST: 20 dB BANDWIDTH

FCC ID: AZ489FT7005
 Applicant: Motorola, Inc.
 Model: F4420A

Minimum Standard Specified: FCC reply to TCB council 10/08/02, Frequency hoppers in the 2.4 GHz band are required to use a minimum of 15 non-overlapping channels. The hopping channel bandwidth can be wider than 1 MHz as long as the channels do not overlap and all emissions stay within the 2400- 2483.5 MHz band. For example a system that uses the minimum 15 channels can have hopping channel bandwidth that are up to 5 MHz wide.

Test Results: The measured 20 dB bandwidth complies with the non-overlapping channel requirements of the FCC interpretation referenced above.

Authorization Procedure: Part 2.1049

Method of Measurement:

1. The output power level had been preset during production.
2. The output of the EUT was connected directly via an adapter to the input of the HP8562A spectrum analyzer. The setting were RBW of 10 kHz & VBW of 30 kHz.
3. The measured channels cover the low, middle and high channels of the operational frequency range requested for this intentional radiator.
4. The EUT was *modulated but not hopping* channels during this test. The data rate is 1mbps per the Bluetooth standard. The data type would be periodic data.
5. Measurements done according to DA 00-705 Filing and Measurement Guide for FHSS Systems.

Measurement Results of Modulated Occupied Bandwidth			
Channel	Channel Frequency GHz	Measured Maximum 20 dB BW EUT modulated	Limit Non-overlapping channels, all emissions within band
Plot 1 Low	2.402	783 kHz	complies
Plot 2 Middle	2.441	783 kHz	complies
Plot 3 High	2.480	783 kHz	complies

Plots 1, 2 & 3 of the 20 dB Bandwidth, supporting the above data, are located in Appendix 1 at the end of this report.

EXHIBIT 6A TEST: CONDUCTED PEAK OUTPUT POWER

FCC ID: AZ489FT7005
 Applicant: Motorola, Inc.
 Model: F4420A

Minimum Standard Specified: Part 15.247(b)1 is 1 Watt Maximum

Test Results: The measured output power level of the sample shows compliance with the maximum permissible 1 Watt limit

Authorization Procedure: Part 2.1046

Rated Output Power: 0 dBm, 1 mW - **Class II Bluetooth**

Measured Output Power: -0.13 dBm or 0.970 mWatt conducted

Method of Measurement:

- 1.) The output power levels referenced above, had been preset during production.
- 2.) The output of the EUT was connected directly via an adapter to the input of the HP8562A spectrum analyzer.
- 3.) The measured channels cover the low, middle and high channels of the operational frequency range requested for this intentional radiator. The EUT was *modulated but not hopping* during this measurement. The data rate is 1mbps per the Bluetooth standard. The data type would be periodic data.
- 4.) Measurements done according to DA 00-705 Filing and Measurement Guide for FHSS Systems.

Channel	Frequency (GHz)	Measured Peak Output Power (mW)	Measured Peak Output Power (dBm)	Internal EUT Cable loss	Corrected Peak Output Power (dBm)	Corrected Peak Output Power (mW)
Low	2.402	0.891	-0.50	.2	-0.30	0.933
Middle	2.441	0.926	-0.33*	.2	-0.13	0.970
High	2.480	0.794	-1.00	.2	-0.8	0.831

Plots 5, 6 & 7 supporting the above data are located in Appendix 1 at the end of this report.

Equivalent Isotropic Radiated Power

$$\begin{aligned}
 & -0.13 \text{ dBm (max. conducted power)} \\
 & + 2.51 \text{ dBi (max. antenna gain)} \\
 & = \mathbf{2.38 \text{ dBm EIRP}}
 \end{aligned}$$

This Bluetooth Intentional Radiator complies with the maximum de-facto EIRP limit with the only antenna that can be used with this device.

EXHIBIT 6G TEST: CONDUCTED SPURIOUS EMISSIONS

FCC ID: AZ489FT7005
 Applicant: Motorola, Inc.
 Model: F4420A

Minimum Standard Specified: Part 15.247(c) In any 100 kHz bandwidth outside the 2.412 – 2.485 band RF power shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest power.

Test Results: Equipment complies with standard

Authorization Procedure: Part 2.1051

Frequency Range Observed: 0 to 25 GHz

Operating Frequencies: 2.402, 2.441, & 2.480 GHz (2.402 – 2.480 GHz band)

Measured Output Power: -0.13 dBm or 0.970 mWatt conducted

Method of Measurement:

- 1) The output power level had been preset during production.
- 2) The output of the EUT was connected directly via an adapter to the input of the HP8562A spectrum analyzer. The setting were 1 MHz for both RBW & VBW.
- 3) The measured channels cover the low, middle and high channels of the operational frequency range requested for this intentional radiator.
- 4) The EUT was *modulated but not hopping* channels during this test. The data rate is 1mbps per the Bluetooth standard. The data type would be periodic data.
- 5.) Measurements done according to DA 00-705 Filing and Measurement Guide for FHSS Systems.

Highest Conducted Spurious Emission Measured For Each Channel				
Channel	Frequency GHz	Emission level dBm	Limit in dBm 20 dB	dB below limit
Plot 9 - 2Fo, Low	4.804	-38.00	-20.0	18.0
Plot 9 - 2Fo, Middle	4.882	-41.50	-20.0	21.5
Plot 9 - 2Fo, High	4.960	-41.83	-20.0	21.83

Note: All three channels displayed max hold collectively on 2 plots to cover the wide frequency range.
 Plot 8, covering 10 – 2900 MHz, (1 MHz RBW & VBW) &
 Plot 9, covering 2.750 – 25 GHz (1 MHz RBW & VBW) are located in Appendix 1.

BAND-EDGE COMPLIANCE OF RF CONDUCTED EMISSIONS

Please refer to Plots 10 and 11 for the lower and upper band-edge measurements, located in Appendix 1.

Trace A - Band-edge channel modulated, hopping disabled
 Trace B - All channels modulated, hopping enabled (indication of spreading function evident)

EXHIBIT 6G TEST: FIELD STRENGTH OF SPURIOUS RADIATION EMISSIONS

FCC ID: AZ489FT7005
Applicant: Motorola, Inc.
Model: F4420A

Minimum Standard Specified: Part 15.247(c)

Test Results: Equipment complies with standard

Authorization Procedure: Part 2.1053

Test Equipment Set Up: See Block Diagram in Exhibit 7

Frequency Range Observed: 0 to 22 GHz

RADIATED HARMONIC AND SPURIOUS EMISSIONS & RESTRICTED BANDS										
Frequency GHz	SA Rdg. dBuV	Ant. Vert. or Horz.	Peak or Average Reading	Antenna Factor dB	Cable & filter loss dB	Amp Gain	Corrected Reading dBuV/m	Corrected Reading uV/m	Peak Limit dBuV	Avg Limit dBuV
Fo - 2.402										
4.804	48.67	V	Peak	32.83	3.95	23.2	62.25	1295.68	74	---
4.804	40.50	H	Peak	32.83	3.95	23.2	54.08	505.82	74	---
4.804	27.33	V	Average	32.83	3.95	23.2	40.91	111.04	---	54
4.804	28.00	H	Average	32.83	3.95	23.2	41.58	119.94	---	54
Fo - 2.441										
4.882	42.50	V	Peak	33.33	3.95	23.2	56.58	674.52	74	---
4.882	40.33	H	Peak	33.33	3.95	23.2	54.41	525.41	74	---
4.882	25.83	V	Average	33.33	3.95	23.2	39.91	98.96	---	54
4.882	26.50	H	Average	33.33	3.95	23.2	40.58	106.90	---	54
Fo - 2.480										
4.960	40.83	V	Peak	33.33	3.95	23.2	54.91	556.54	74	---
4.960	43.17	H	Peak	33.33	3.95	23.2	57.25	728.61	74	---
4.960	25.30	V	Average	33.33	3.95	23.2	39.38	93.11	---	54
4.960	25.83	H	Average	33.33	3.95	23.2	39.91	98.96	---	54
Emissions on all three channels 3Fo – 10 Fo at or below noise floor										
Channel	Frequency in GHz		Harmonics Observed				Limit 74 dBuV/m Peak & 54 dBuV/m Average			
Low Ch.	2.402									
3Fo – 10Fo	7.206 – 24.020		None -at or < noise floor @3m				All emissions < 54 dBuV/m or 500 uV/m			
Mid Ch.	2.441									
3Fo – 10Fo	7.323 – 24.820		None -at or < noise floor @3m				All emissions < 54 dBuV/m or 500 uV/m			
High Ch.	2.480									
3Fo - 10Fo	7.440 – 24.480		None -at or < noise floor @3m				All emissions < 54 dBuV/m or 500 uV/m			

EXHIBIT 6G TEST: FIELD STRENGTH OF SPURIOUS RADIATION AT UPPER BAND EDGE

FCC ID: AZ489FT7005
 Applicant: Motorola, Inc.
 Model: F4420A

Minimum Standard Specified: Part 15.247(c)

Test Results: Equipment complies with standard

Authorization Procedure: Part 2.1053

Test Equipment Set Up: See Block Diagram in Exhibit 7

Frequency Range Observed: 2.480 – 2.5GHz

Note: No emissions were observed in the restricted band 2.835 – 2.5 GHz so a band-edge measurement was made.

RADIATED EMISSIONS MEASUREMENT AT UPPER BAND EDGE										
Frequency GHz	SA Rdg. dBuV	Ant. Vert. or Horz.	Peak or Average Reading	Antenna Factor dB	Cable & filter loss dB	Amp Gain	Corrected Reading dBuV/m	Corrected Reading uV/m	Peak Limit dBuV	Avg Limit dBuV
2.4835	34.83	V	Peak	28.37	3.35	22.3	44.25	163.11	74	---
2.4835	34.17	H	Peak	28.37	3.35	22.3	43.59	151.18	74	---
2.4835	22.83	V	Average	28.37	3.35	22.3	32.35	40.97	---	54
2.4835	22.83	H	Average	28.37	3.35	22.3	32.25	40.97	---	54

Radiated Test Notes

- 1.) All spurious and harmonics in the *restricted bands* listed in Part 15.205 are below the Part 15.209 limit.
- 2.) No peak emissions above 1 GHz are more than 20 dB above the average limit.
- 3.) Peak measurements made with 1 MHz RBW & VBW, Average made with 1MHz RBW & 10 Hz VBW.
- 4.) During preliminary measurements the EUT was measured in 3 mutually orthogonal planes. The highest level for Fo was found with the EUT standing Upright. So this position was used during final measurements at 3 meters.
- 5.) The EUT was powered with a fresh battery prior to beginning the testing.
- 6.) The EUT was *modulated but not hopping* channels during this test. The data rate is 1mbps per the Bluetooth standard. The data type would be periodic data.
- 7.) Measurements done according to DA 00-705 Filing and Measurement Guide for FHSS Systems
- 8.) A HP preamplifier and a high pass filter was used during the measurements of the harmonics to reduce the fundamental signal and avoid overloading the front end of the analyzer.

Appendix 1

Plots 1 to 11 are located on the following pages.

Plots 1 to 4, 20 dB Bandwidth

Plots 5 to 7, Conducted Output Power

Plots 8 to 9, Spurious RF Conducted Emissions

Plot 10, Lower Band-edge Compliance of RF Conducted Emissions

Plot 11, Upper Band-edge Compliance of RF Conducted Emissions

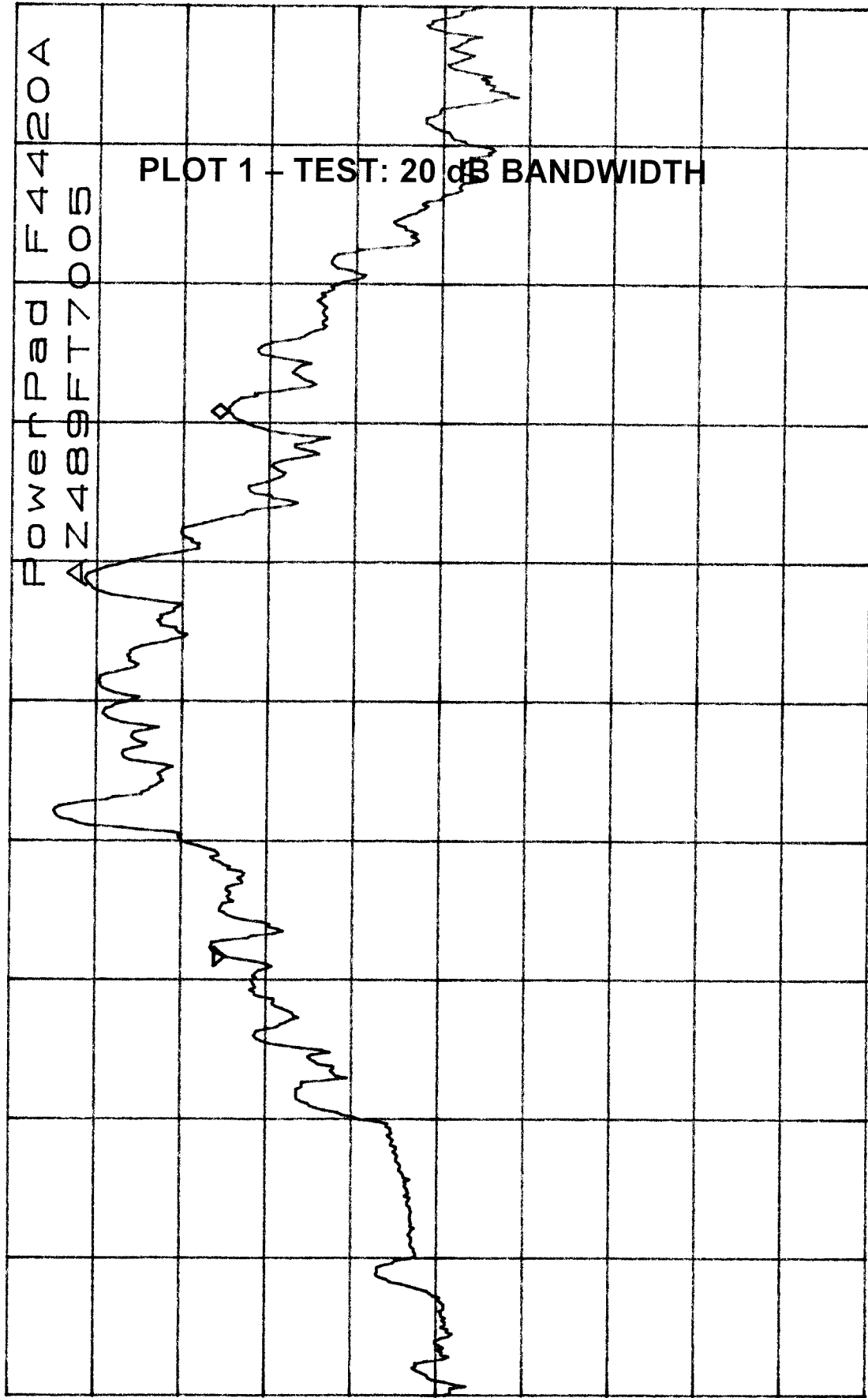
*ATTEN 10dB

RL 0dBm

ΔMKR 0dB

10dB/

783kHz



D

CENTER 2.402000GHZ

SPAN 2.000MHZ

*RBW 10KHZ

*VBW 30KHZ

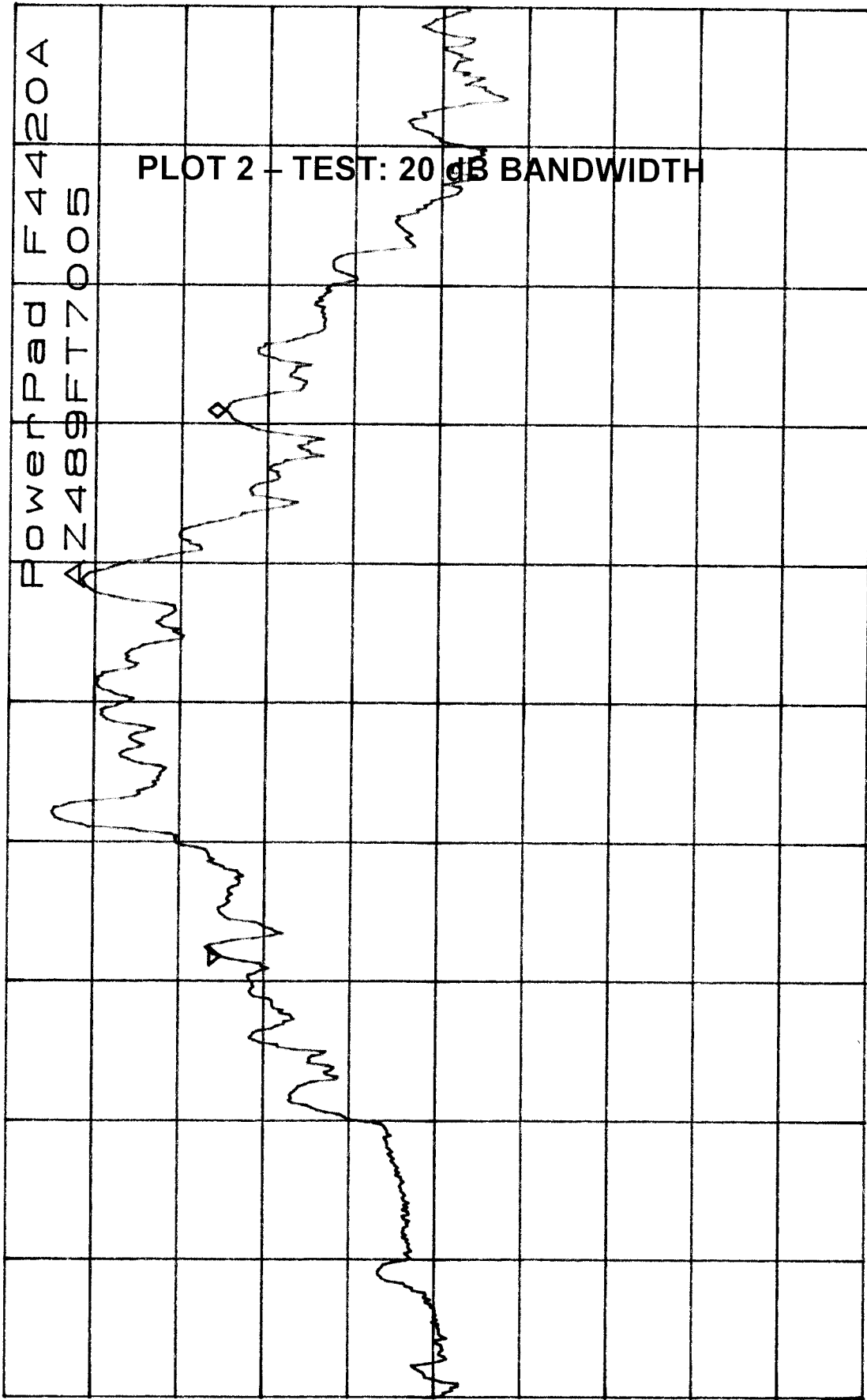
SWP 50ms

*ATTEN 10dB

RL 0dBm

ΔMKR -.17dB

10dB/ 783kHz



CENTER 2.441000GHZ

SPAN 2.000MHZ

*RBW 10KHZ

*VBW 30KHZ

SWP 50ms

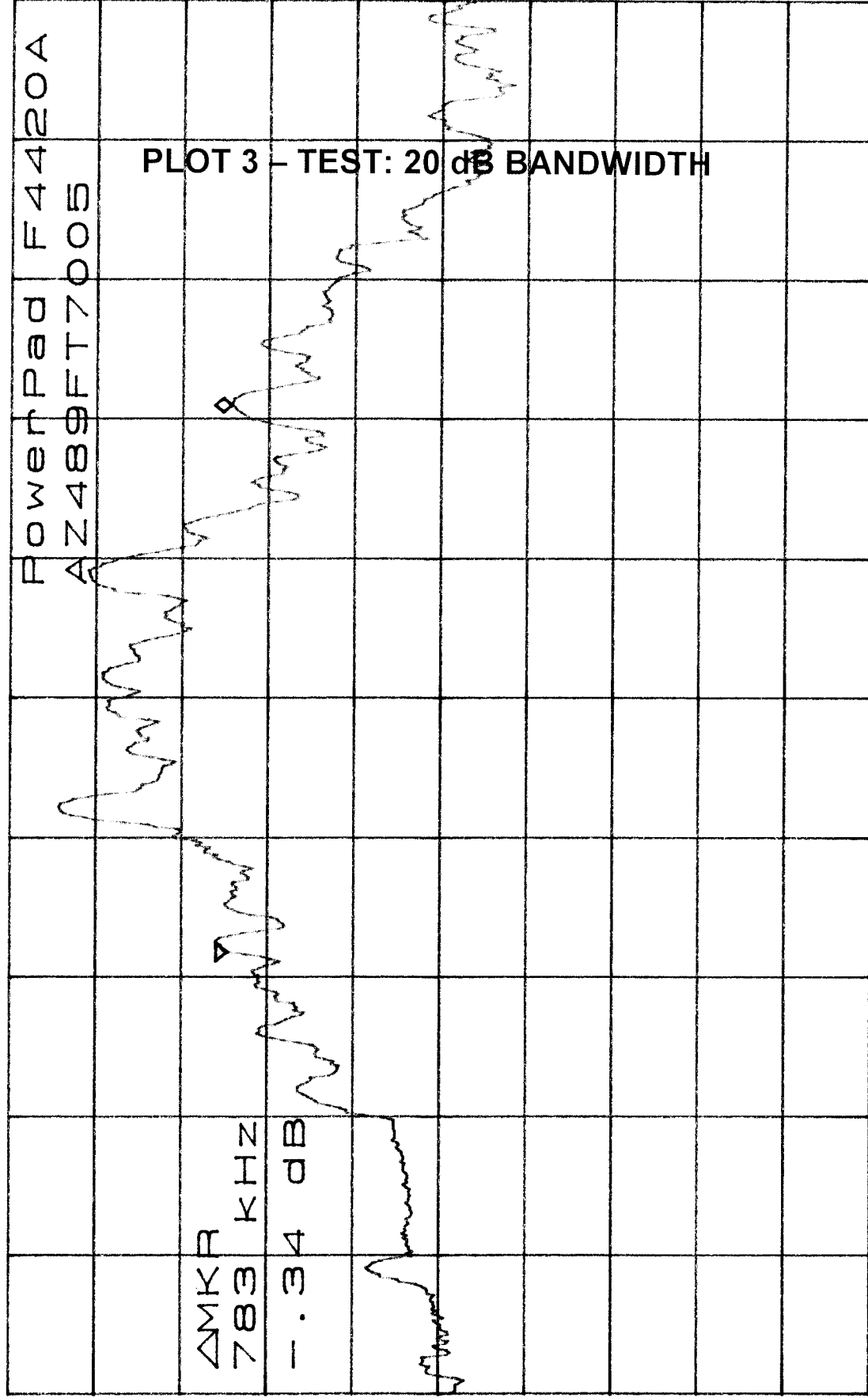
*ATTEN 10dB

ΔMKR - .34dB

RL 0dBm

10dB/

783kHz



D

CENTER 2.480000GHZ

SPAN 2.000MHZ

*RBW 10KHZ

*VBW 30KHZ

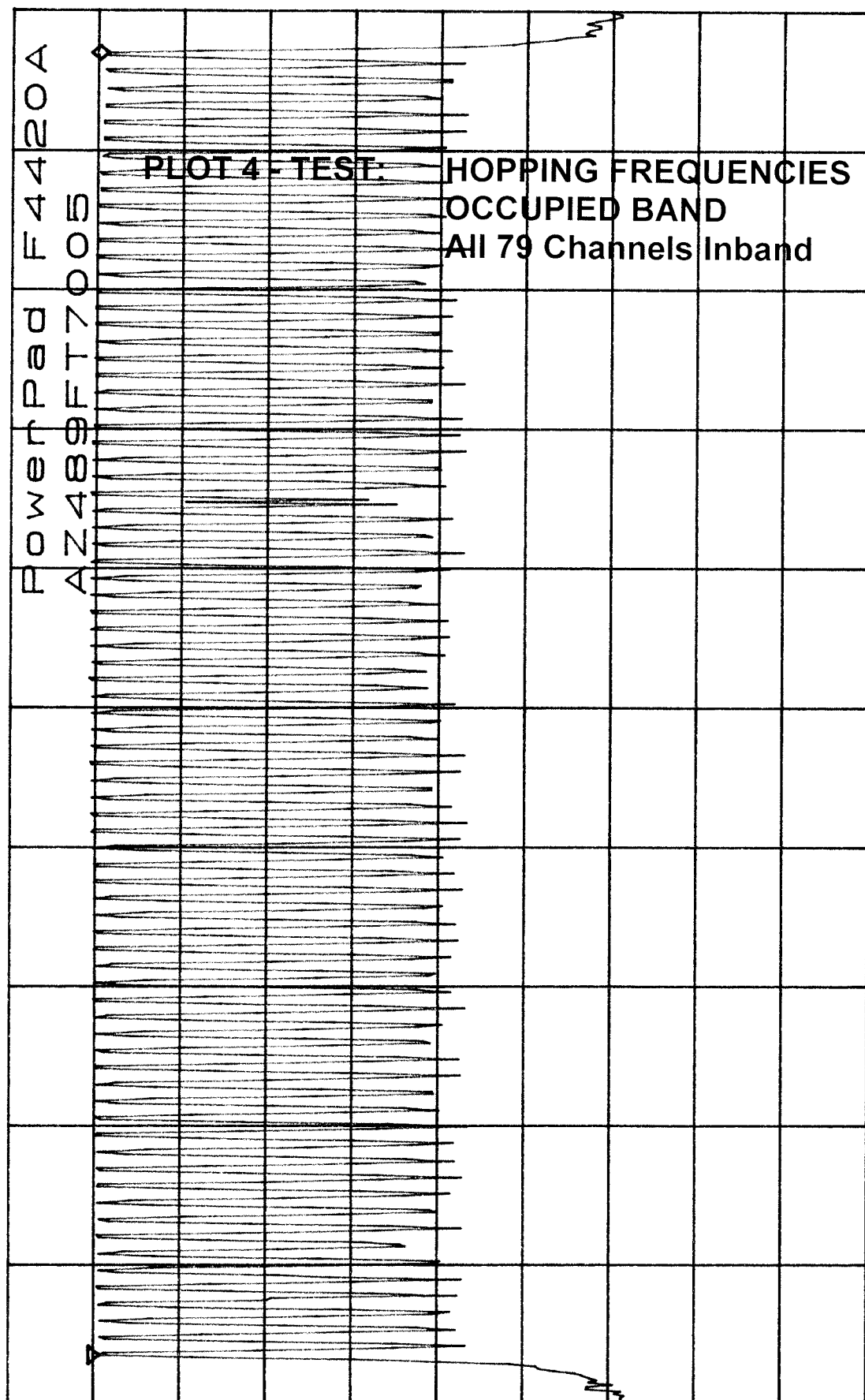
SWP 50ms

*****ZNN*****

RL 10.00B3E

BOOK 1 RYAN

10dB/77.61MHZ



START 2.40000E12

NIYOT
RBBW
J*

W
B
V
*

NIYOM

DOTS

2.48300 IN

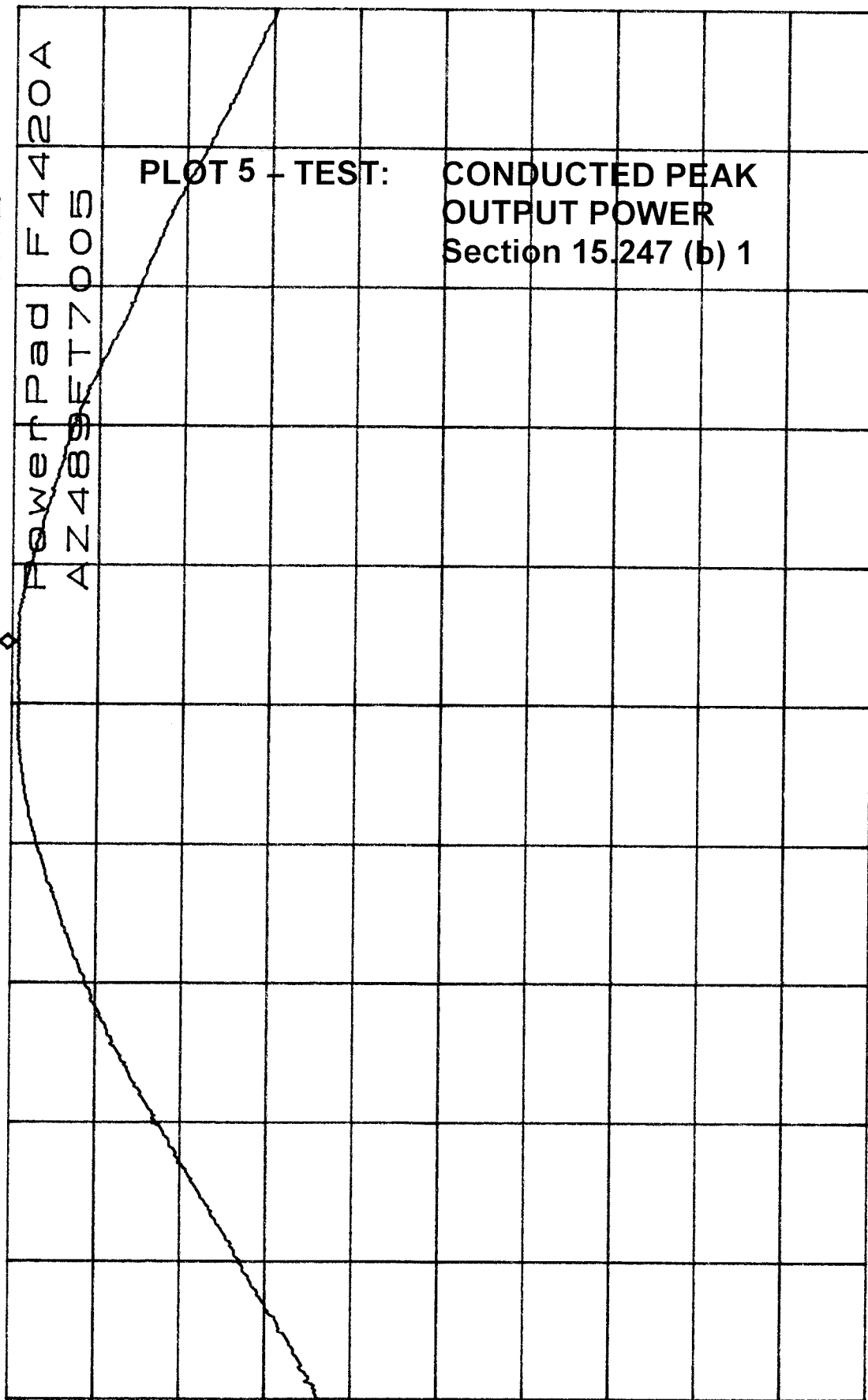
SECRET

*ATTEN 10dB

RL 0dBm

MKR -.500dBm

10dB/ 2.402225GHz



D

CENTER 2.402000GHz

SPAN 5.000MHz

*RBW 1.0MHz

*VBW 3.0MHz

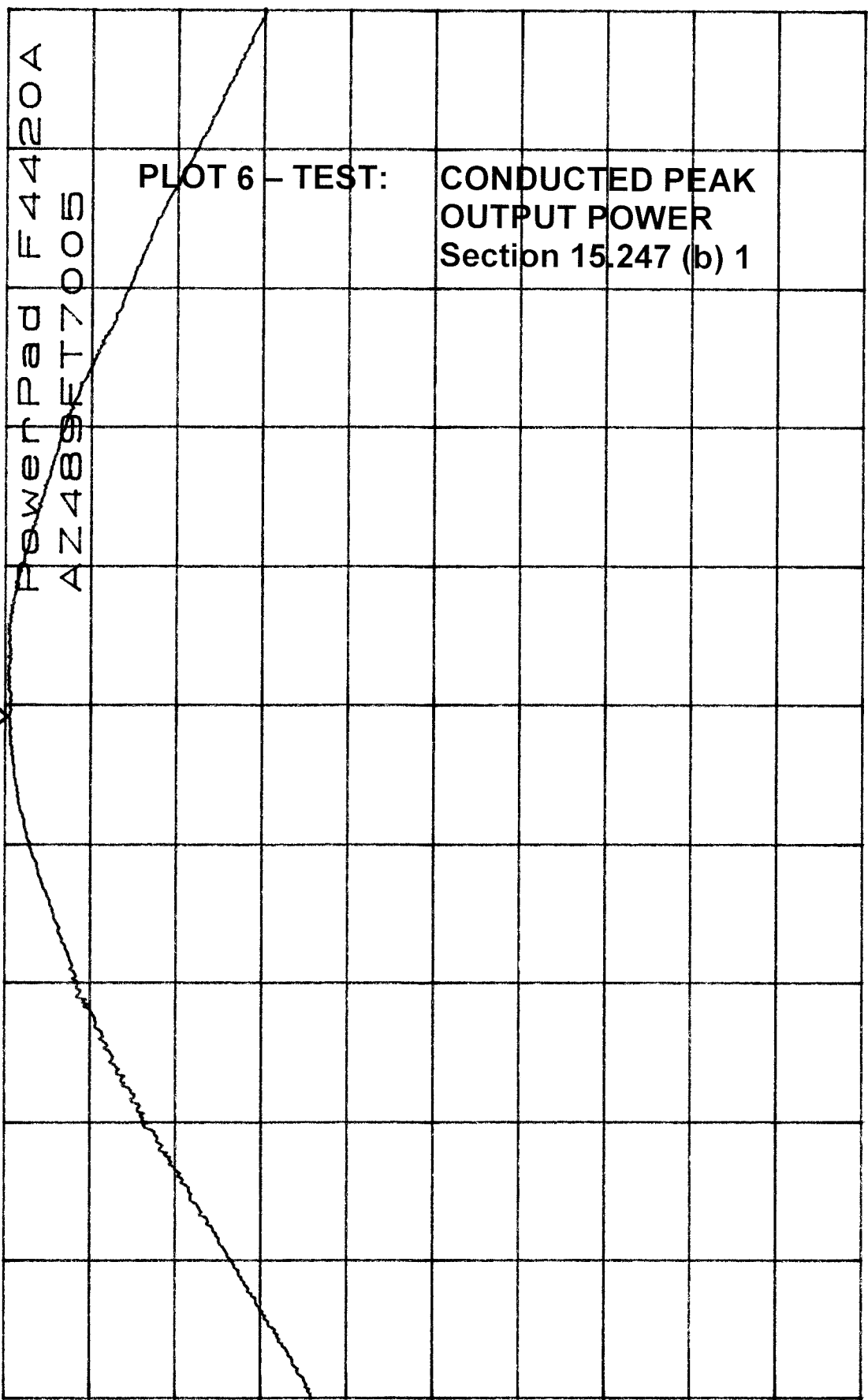
SWP 50ms

*ATTEN 10dB

RL 0dBm

MKR - .33dBm

2.440958GHZ



CENTER 2.441000GHZ

SPAN 5.000MHZ

*RBW 1.0MHZ

*VBW 3.0MHZ

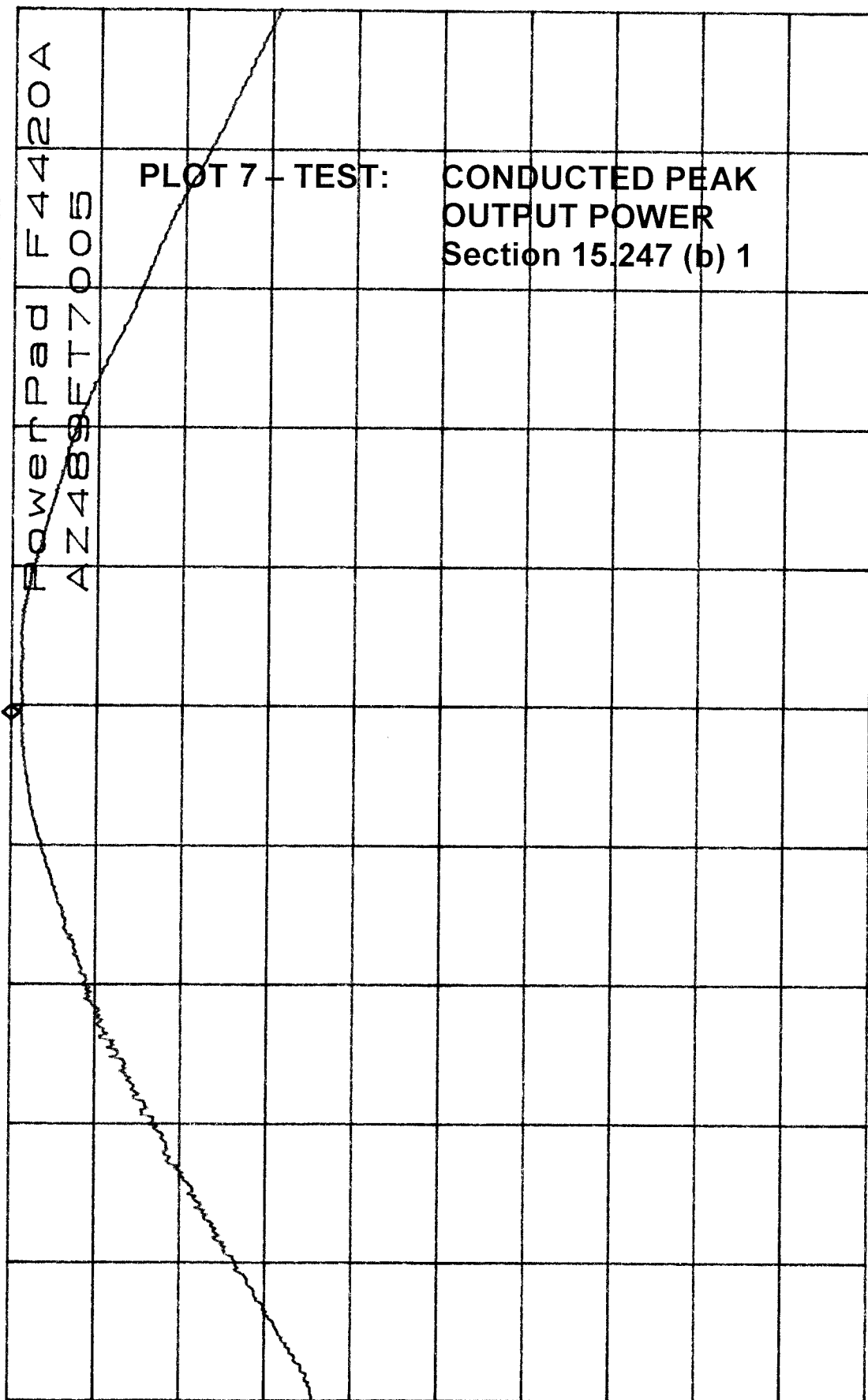
SWP 50ms

*ATTEN 10dB

RL 0dBm

MKR -1.00dBm

10dB/ 2.479975GHz



CENTER 2.480000GHz

SPAN 5.000MHz

*RBW 1.0MHz

*VBW 3.0MHz

SWP 50ms

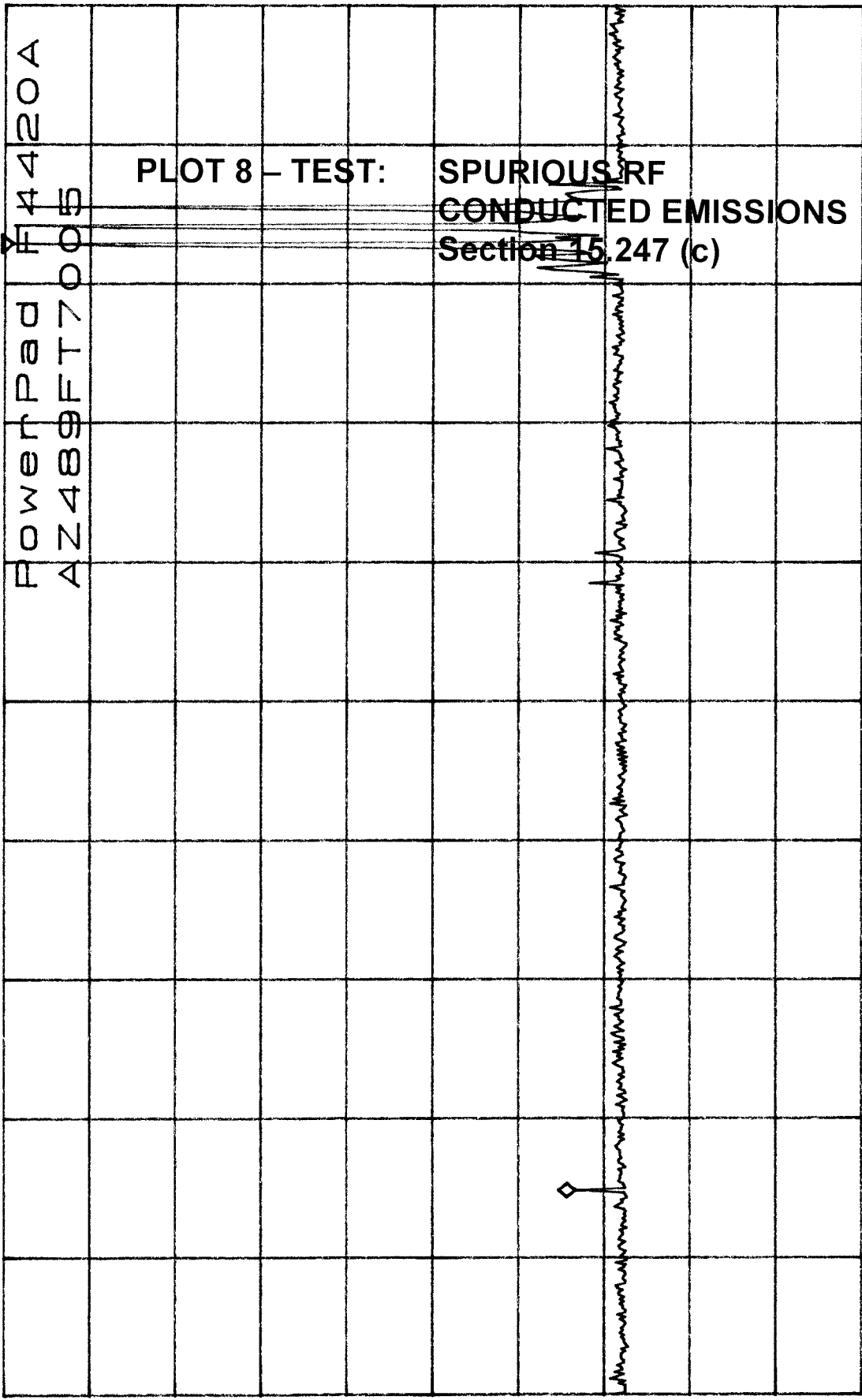
*ATTEN 10dB

ΔMKR -65.67dB

RL 0dBm

10dB/

-1.965GHz



START 10MHZ

STOP 2.900GHZ

*RBW 100KHZ

*VBW 300KHZ

SWP 800ms

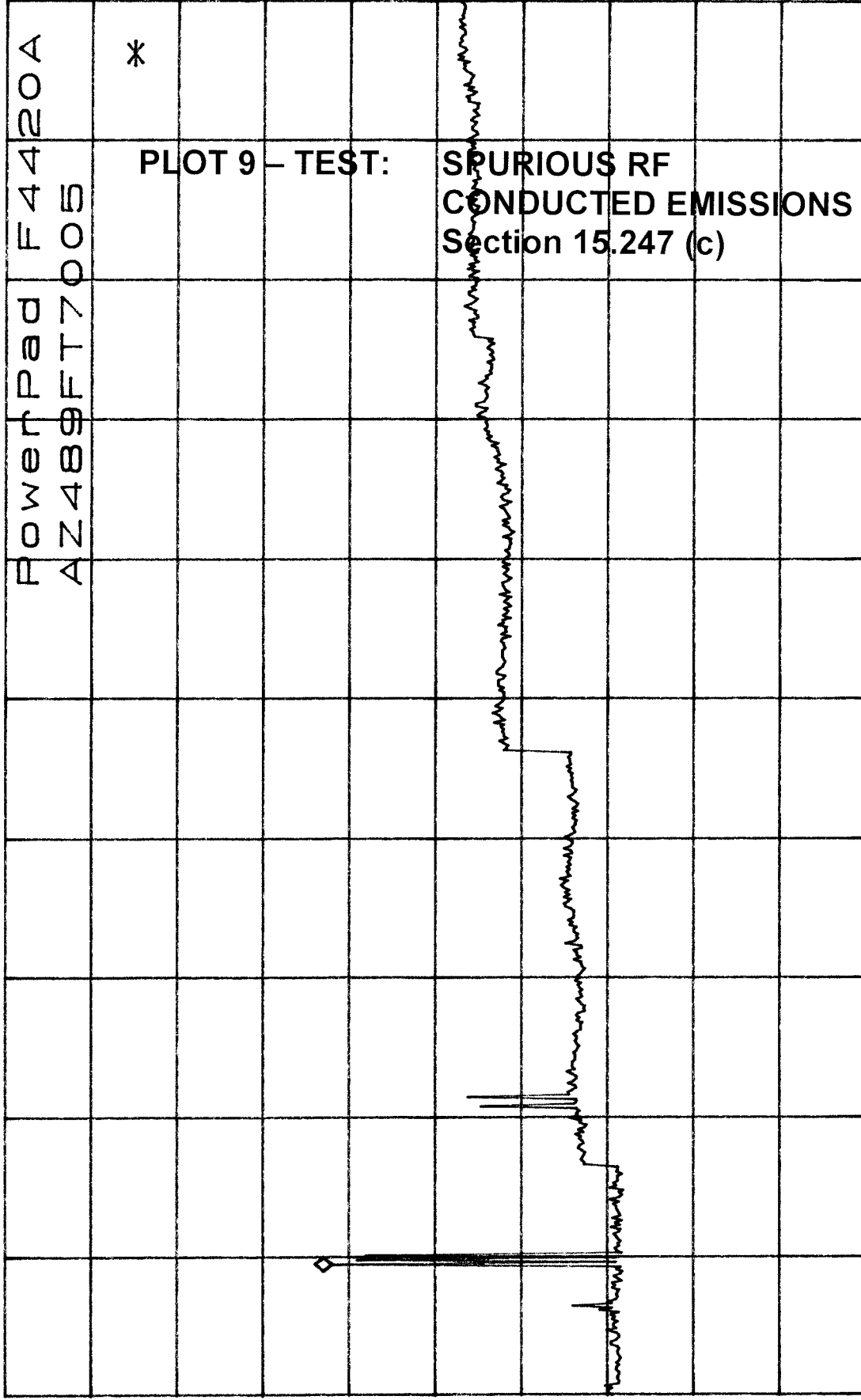
*ATTEN 10dB

MKR -38.00dBm

RL 0dBm

10dB/

4.86GHz



START 2.75GHz

STOP 25.00GHz

*RBW 100kHz

*VBW 300kHz

SWP 6.0sec

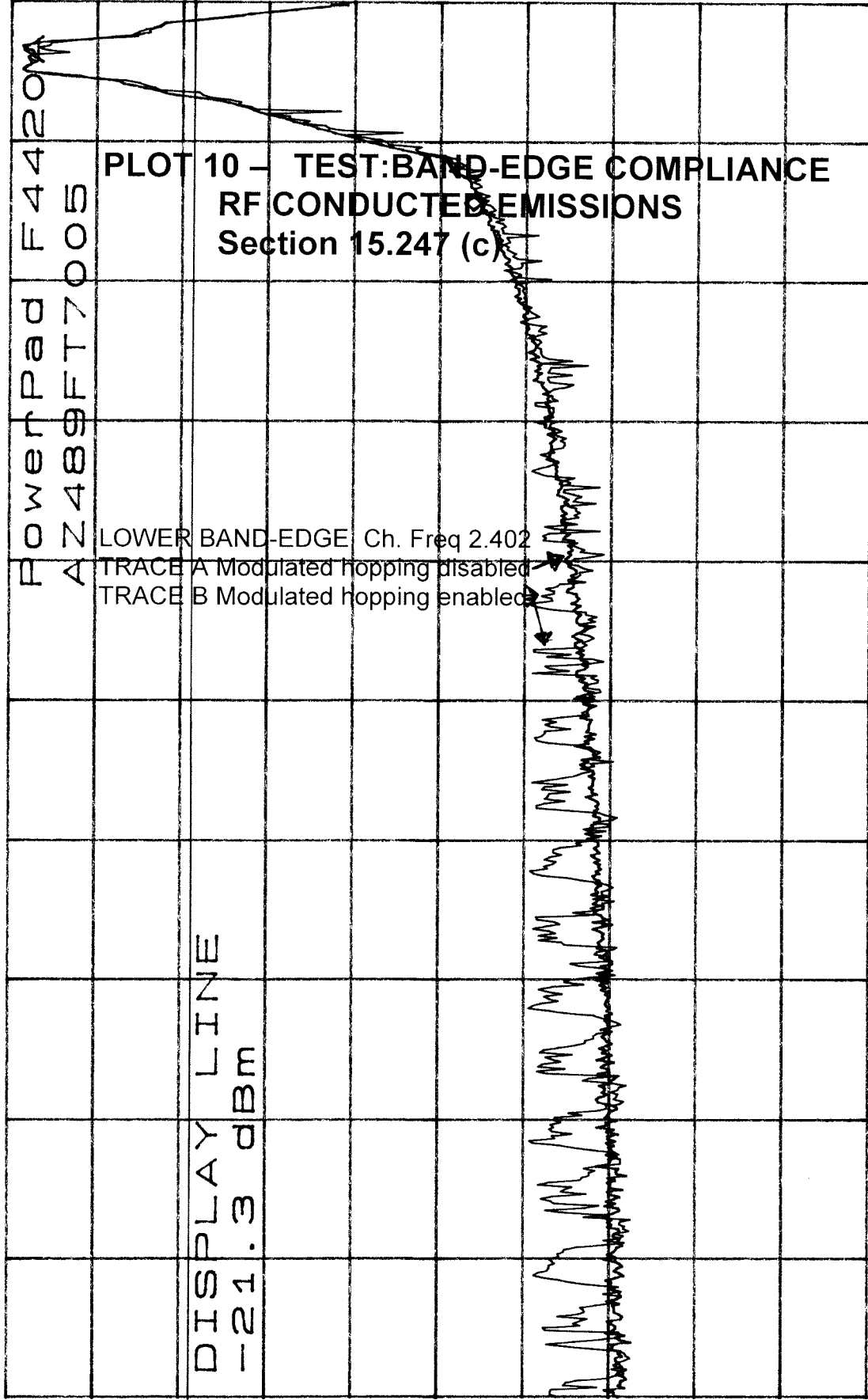
*ATTEN 10dB

MYR -54.83dBm

RL 0dBm

10dB/

2.399999GHZ



START 2.38200GHZ

STOP 2.40300GHZ

*RBW 100KHZ

*VBW 300KHZ

SWP 50ms

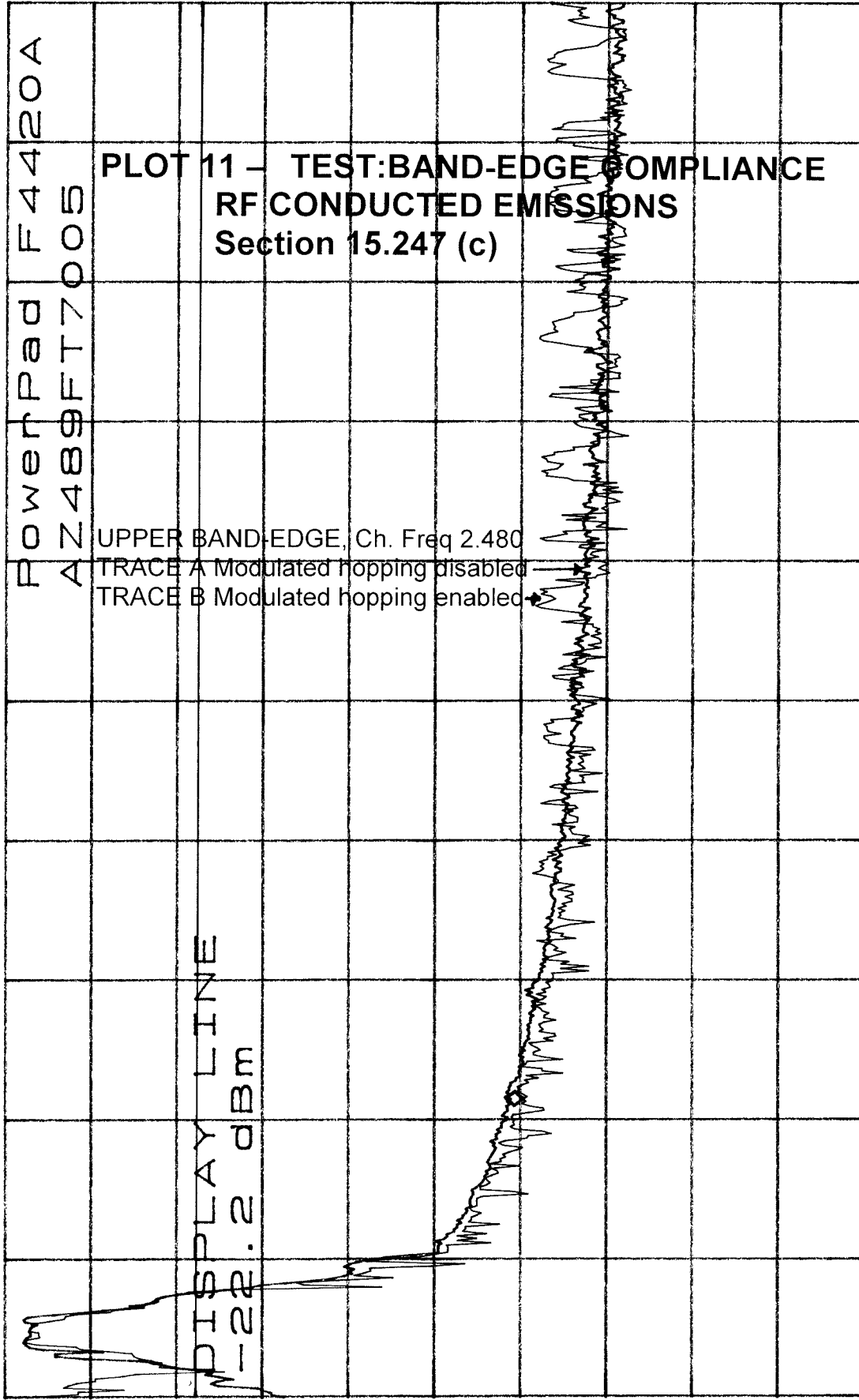
*ATTEN 10dB

MYR -60.33dBm

RL 0dBm

10dB/

2.48352GHZ



START 2.47900GHZ STOP 2.50000GHZ

*RBW 100KHZ

*VBW 300KHZ

SWP 50ms