



# FCC Test Report

## FCC Part 15.247 for FHSS systems/ CANADA RSS-210

FOR:

JACK SERVICE POINT

MODEL #: SP640

WIDERAY CORPORATION  
25 KEARNY STREET—6<sup>TH</sup> FLOOR  
SAN FRANCISCO, CALIFORNIA 94108  
U.S.A

FCC ID: SONSP640TY  
IC ID: 5509A-SP640TY

TEST REPORT #: EMC\_1040\_2005\_BLUETOOTH  
DATE: SEPTEMBER 20, 2005



TTI-P-G 081/94-A0

Accredited according to ISO/IEC 17025



Bluetooth Qualification  
Test Facility  
(BQTF)



FCC listed # 101450

IC recognized # 3925

### **CETECOM Inc.**

411 Dixon Landing Road • Milpitas, CA 95035 • U.S.A.

Phone: + 1 (408) 586 6200 • Fax: + 1 (408) 586 6299 • E-mail: [info@cetecomusa.com](mailto:info@cetecomusa.com) • <http://www.cetecom.com>

CETECOM Inc. is a Delaware Corporation with Corporation number: 2113686  
Board of Directors: Dr. Harald Ansorge, Dr. Klaus Matkey, Hans Peter May

**TABLE OF CONTENTS**

<b>1</b>	<b>Assessment</b>	<b>4</b>
<b>2</b>	<b>Administrative Data</b>	<b>5</b>
2.1	Identification of the Testing Laboratory Issuing the EMC Test Report	5
2.2	Identification of the Client	5
2.3	Identification of the Manufacturer	5
<b>3</b>	<b>Equipment under Test (EUT)</b>	<b>6</b>
3.1	Identification of the Equipment under Test	6
<b>4</b>	<b>Subject Of Investigation</b>	<b>7</b>
<b>5</b>	<b>Measurements</b>	<b>8</b>
5.1	MAXIMUM PEAK OUTPUT POWER § 15.247 (RADIATED)	8
5.1.1	LIMIT SUB CLAUSE § 15.247 (b) (1) (2) (3) (4)	8
5.1.2	RESULTS:	8
5.2	MAXIMUM PEAK OUTPUT POWER § 15.247 (CONDUCTED)	12
5.2.1	LIMIT SUB CLAUSE § 15.247 (b) (1)	12
5.2.2	RESULTS:	12
5.3	20dB BANDWIDTH	16
5.3.1	LIMIT SUB CLAUSE § 15.247 (a) (1) (i) (ii) (iii)	16
5.3.2	RESULTS:	16
5.4	CARRIER FREQUENCY SEPARATION	20
5.4.1	LIMIT SUB CLAUSE § 15.247 (a) (1) (i) (ii) (iii)	20
5.4.2	RESULTS:	20
5.5	NUMBER OF HOPPING CHANNELS	22
5.5.1	LIMIT SUB CLAUSE § 15.247 (a) (1) (iii)	22
5.5.2	RESULTS:	22
5.6	TIME OF OCCUPANCY (DWELL TIME)	27
5.6.1	LIMIT SUB CLAUSE § 15.247 (a) (1) (i) (ii) (iii)	27
5.6.2	RESULTS:	27
5.7	CONDUCTED SPURIOUS EMISSIONS	31
5.7.1	LIMIT SUB CLAUSE § 15.247 (d)	31
5.7.2	RESULTS	32
5.8	RESTRICTED BAND EDGE COMPLIANCE RADIATED §15.247/15.205	38
5.8.1	LIMITS	38
5.8.2	RESULTS (2402MHz)	39
5.8.3	RESULTS (2480MHz)	41
5.9	TRANSMITTER SPURIOUS EMISSIONS RADIATED § 15.247/15.205/15.209	43
5.9.1	LIMITS	43
5.9.2	RESULTS	44
5.10	RECEIVER SPURIOUS RADIATION § 15.209/RSS210	53
5.10.1	LIMITS	53
5.10.2	RESULTS	54

Test Report #: EMC\_1040\_2005\_BLUETOOTH

Date of Report: 2005-09-20

Page 3 of 70



<b>5.11</b>	<b>CO-LOCATION</b>	<b>59</b>
5.11.1	RESULTS (PCS AND BLUETOOTH)	60
<b>5.12</b>	<b>AC POWER LINE CONDUCTED EMISSIONS § 15.107/207</b>	<b>66</b>
5.12.1	LIMITS	66
5.12.2	RESULTS	67
<b>5.13</b>	<b>TEST EQUIPMENT AND ANCILLARIES USED FOR TESTS</b>	<b>69</b>
<b>5.14</b>	<b>BLOCK DIAGRAMS</b>	<b>70</b>

## 1 Assessment

The following is in compliance with the applicable criteria specified in FCC rules Part 15.247 of the Code of Federal Regulations and in compliance with the applicable criteria specified in Industry Canada rules RSS210.

Company	Description	Model #
WIDERAY CORP.	JACK SERVICE POINT	SP640



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2005-09-20  
Neelesh Raj  
Project Leader



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2005-09-20  
Lothar Schmidt  
Test Lab Manager

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

## **2 Administrative Data**

### **2.1 Identification of the Testing Laboratory Issuing the EMC Test Report**

Company Name:	CETECOM Inc.
Department:	EMC
Address:	411 Dixon Landing Road Milpitas, CA 95035 U.S.A.
Telephone:	+1 (408) 586 6200
Fax:	+1 (408) 586 6299
Responsible Test Lab Manager:	Lothar Schmidt
Responsible Project Leader:	Neelesh Raj
Date of test:	2005-09-09 to 2005-09-20

### **2.2 Identification of the Client**

Applicant's Name:	<b>WIDERAY CORP</b>
Street Address:	<b>25 KEARNY STREET – 6<sup>TH</sup> FLOOR</b>
City/Zip Code	<b>SAN FRANCISCO, CALIFORNIA 94108</b>
Country	<b>U.S.A</b>
Contact Person:	<b>GERRY WEST</b>
Phone No.	<b>604.233.1105</b>
Fax:	<b>604.233.1108</b>
e-mail:	<a href="mailto:gerry@wideray.com"><b>gerry@wideray.com</b></a>

### **2.3 Identification of the Manufacturer**

Manufacturer's Name:	<b>WIDERAY</b>
Manufacturers Address:	<b>90-10451 SHELLBRIDGE WAY</b>
City/Zip Code	<b>RICHMOND BC V6X-2W8</b>
Country	<b>CANADA</b>

### 3 Equipment under Test (EUT)

#### 3.1 Identification of the Equipment under Test

Marketing Name:	<b>JACK SERVICE POINT</b>
Description:	<b>SERVICE POINT (ACCESS POINT)</b>
Model No:	<b>SP640</b>
FCC ID:	<b>SONSP640TY</b>
IC ID:	<b>5509A-SP640TY</b>
Frequency Range:	<b>2400-2483.5MHz</b>
Type(s) of Modulation:	<b>GFSK</b>
Number of Channels:	<b>79</b>
Antenna Type:	<b>INTERNAL PCB</b>
Output Power:	<b>0.32mW CONDUCTED @ 2402MHz</b>



#### **4 Subject Of Investigation**

All testing was performed on the SP640 referred to as EUT. The EUT carries Tayo Yuden Bluetooth module model# EYSF2CAUX.

During the testing process the EUT was connected to the CMU200 and was tested on a single channel/hopping using PRBS9 payload.

The objective of the measurements done by Cetecom Inc. was to measure the performance of the EUT as specified by requirements listed in FCC rules Part 15.247 of Title 47 of the Code of Federal Regulations and Industry Canada rules RSS210.

## 5 Measurements

### 5.1 MAXIMUM PEAK OUTPUT POWER § 15.247 (RADIATED)

#### 5.1.1 LIMIT SUB CLAUSE § 15.247 (b) (1) (2) (3) (4)

Frequency range	RF power output
2400-2483.5 MHz	36dBm EIRP

\*limit is based upon antenna gain of less than or equal to 6dBi.

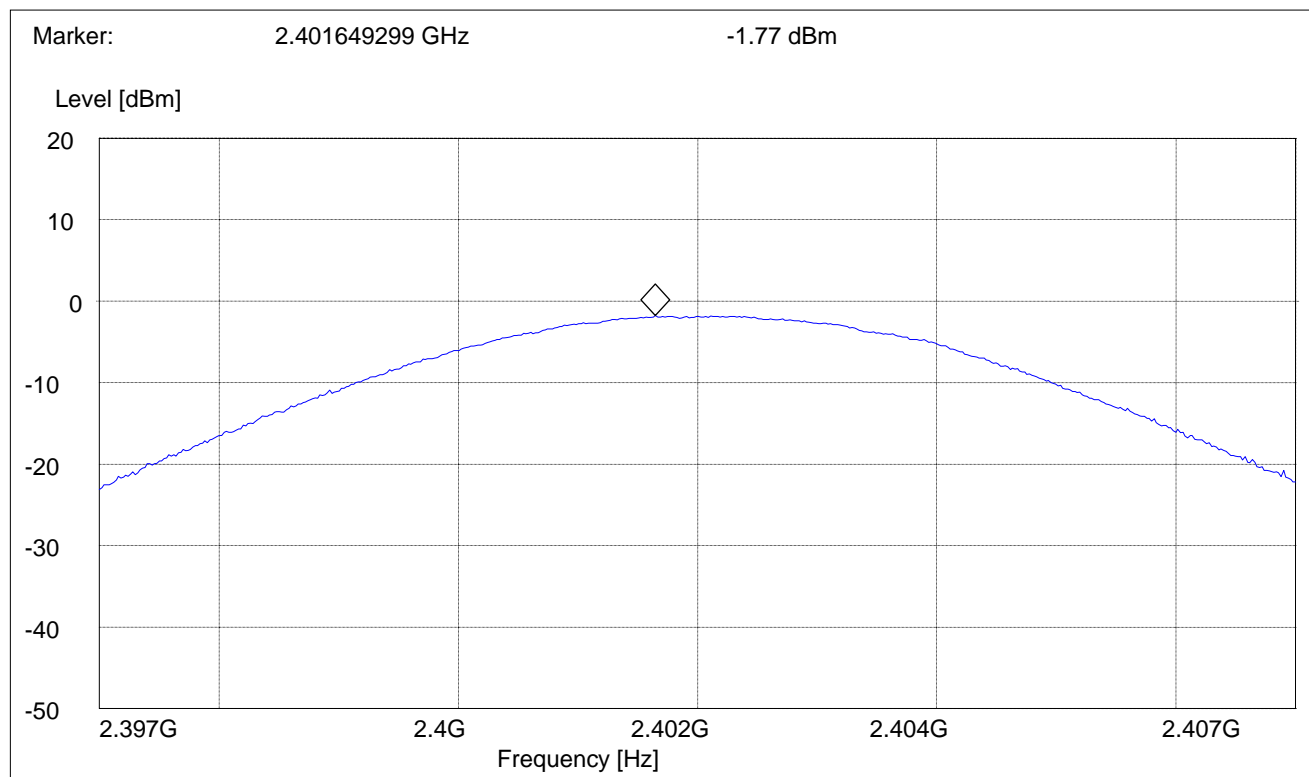
#### 5.1.2 RESULTS:

TEST CONDITIONS		MAXIMUM PEAK OUTPUT POWER (dBm)		
Frequency (MHz)		2402 MHz	2441 MHz	2480 MHz
T <sub>nom</sub> (23)°C	V <sub>nom</sub> VDC	-1.77	-3.42	-4.09
Measurement uncertainty		±0.5dBm		



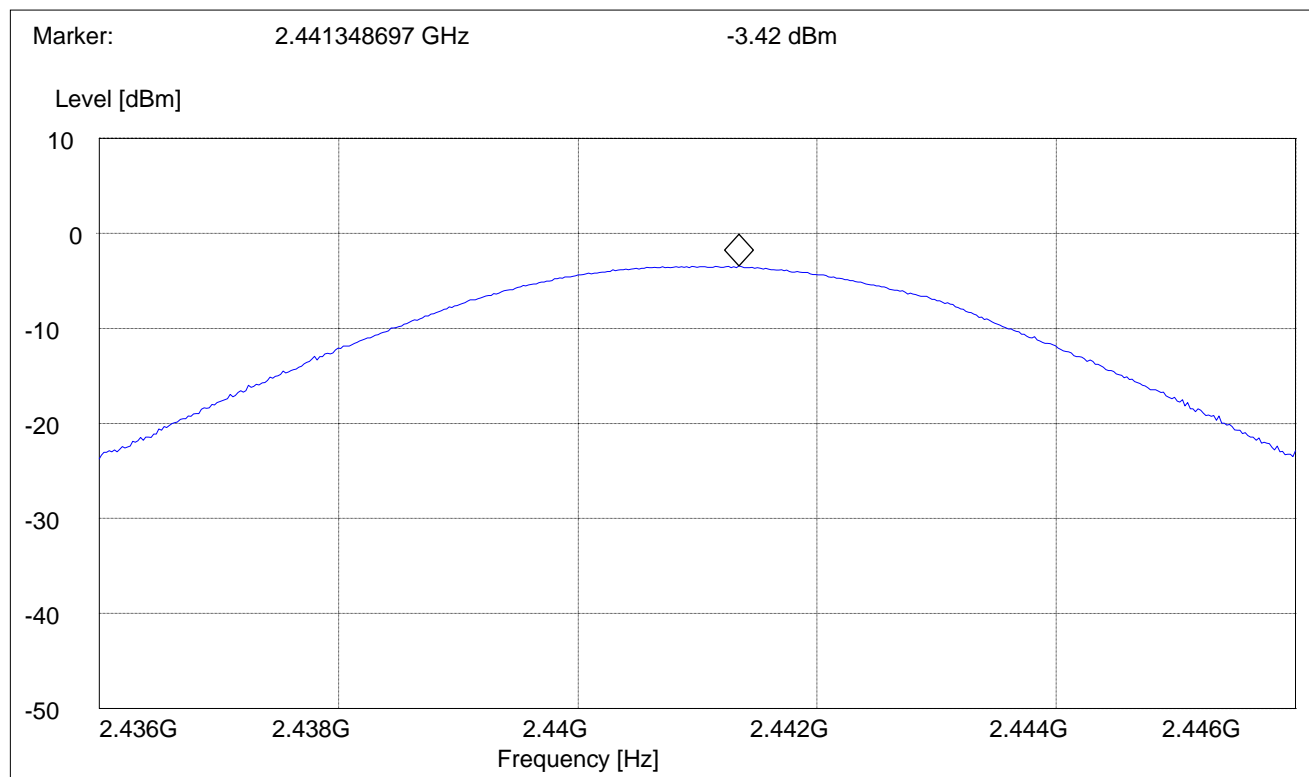
**EIRP (2402 MHz)**

Start Frequency	Stop Frequency	Detector	Meas. Time	IF BW
2397 MHz	2407 MHz	Max Peak	Coupled	3 MHz



**EIRP (2441 MHz)**

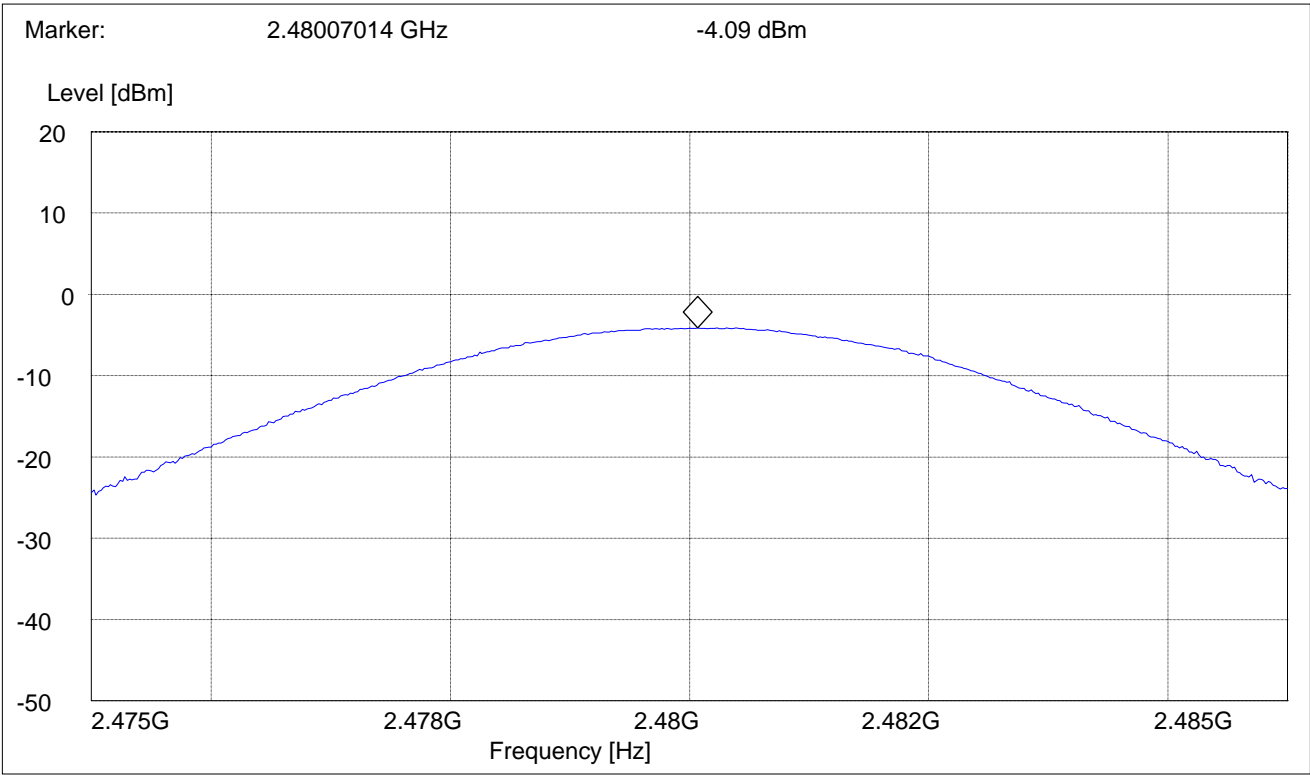
Start Frequency	Stop Frequency	Detector	Meas. Time	IF BW
2436 MHz	2446 MHz	Max Peak	Coupled	3 MHz





EIRP (2480 MHz)

Start Frequency	Stop Frequency	Detector	Meas. Time	IF BW
2475 MHz	2478 MHz	Max Peak	Coupled	3 MHz





## 5.2 MAXIMUM PEAK OUTPUT POWER § 15.247 (CONDUCTED)

### 5.2.1 LIMIT SUB CLAUSE § 15.247 (b) (1)

Frequency range	RF power output
2400-2483.5 MHz	30dBm

\*limit is based upon antenna gain of less than or equal to 6dBi.

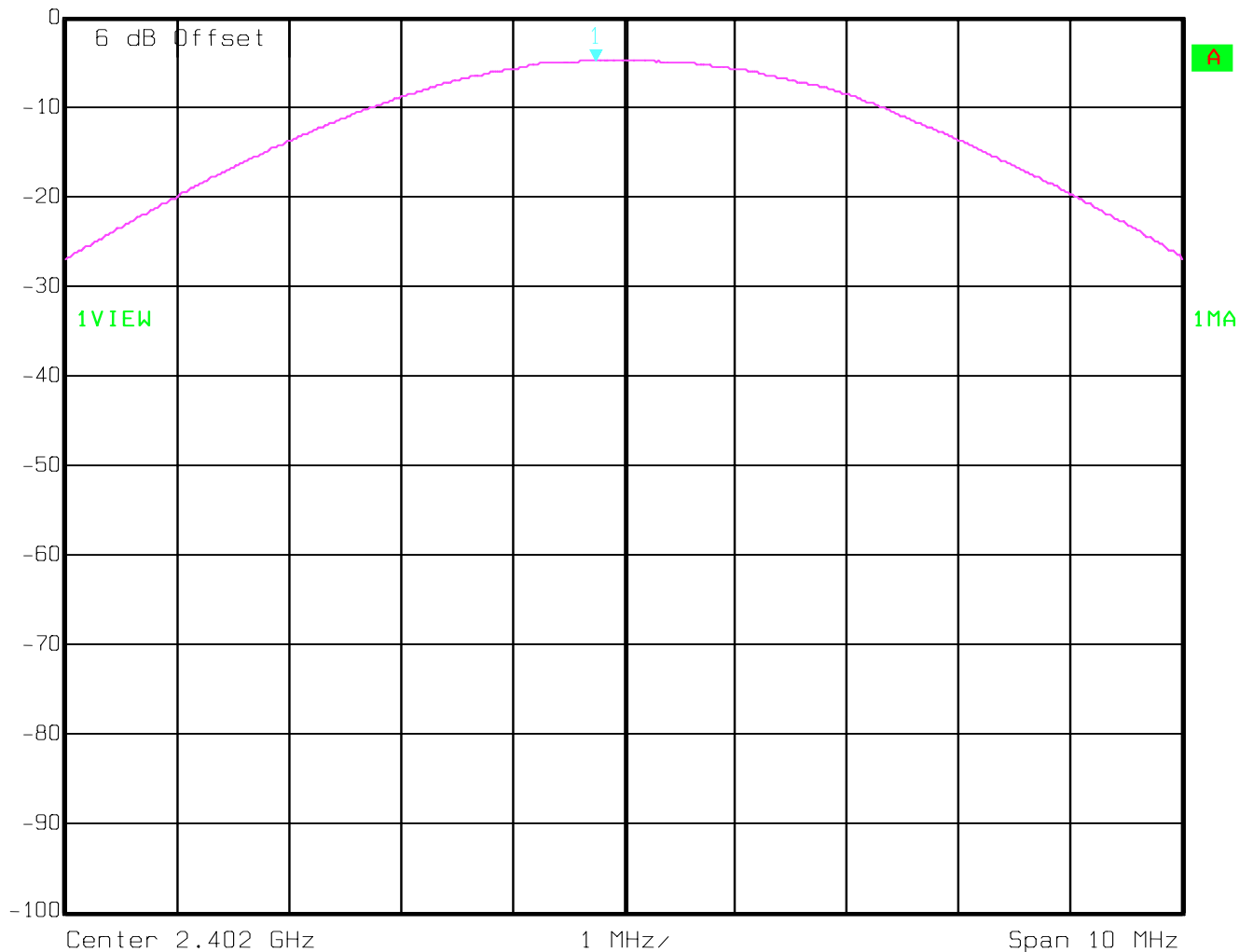
### 5.2.2 RESULTS:

TEST CONDITIONS		MAXIMUM PEAK OUTPUT POWER (dBm)		
Frequency (MHz)		2402 MHz	2441 MHz	2480 MHz
T <sub>nom</sub> (23)°C	V <sub>nom</sub> VDC	-4.9	-5.87	-5.37

**(2402 MHz)**



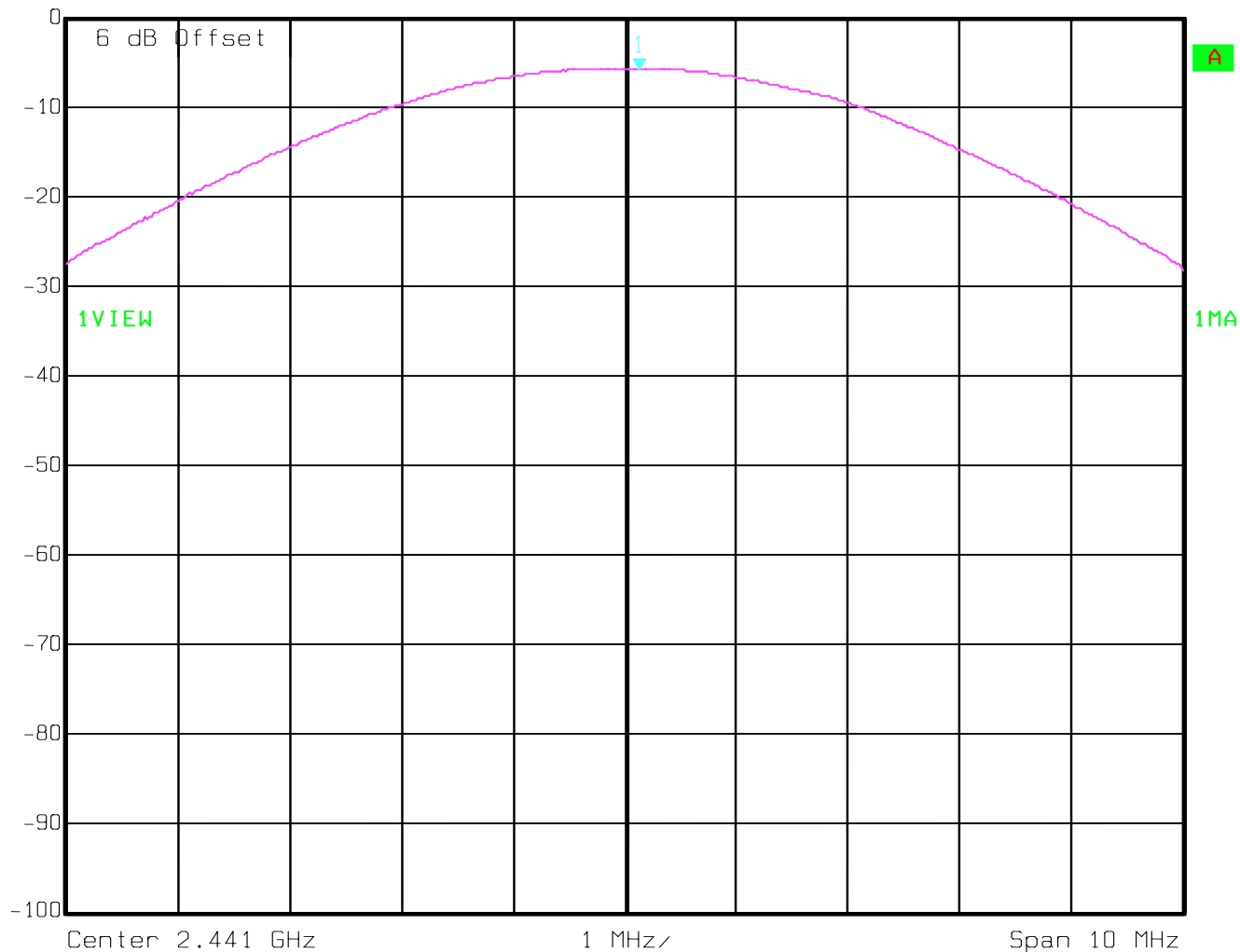
Ref Lvl 0 dBm  
 Marker 1 [T1] -4.90 dBm  
 2.40174950 GHz  
 RBW 3 MHz RF Att 20 dB  
 VBW 3 MHz  
 SWT 5 ms Unit dBm



Date: 15.SEP.2005 16:35:52

**(2441 MHz)**

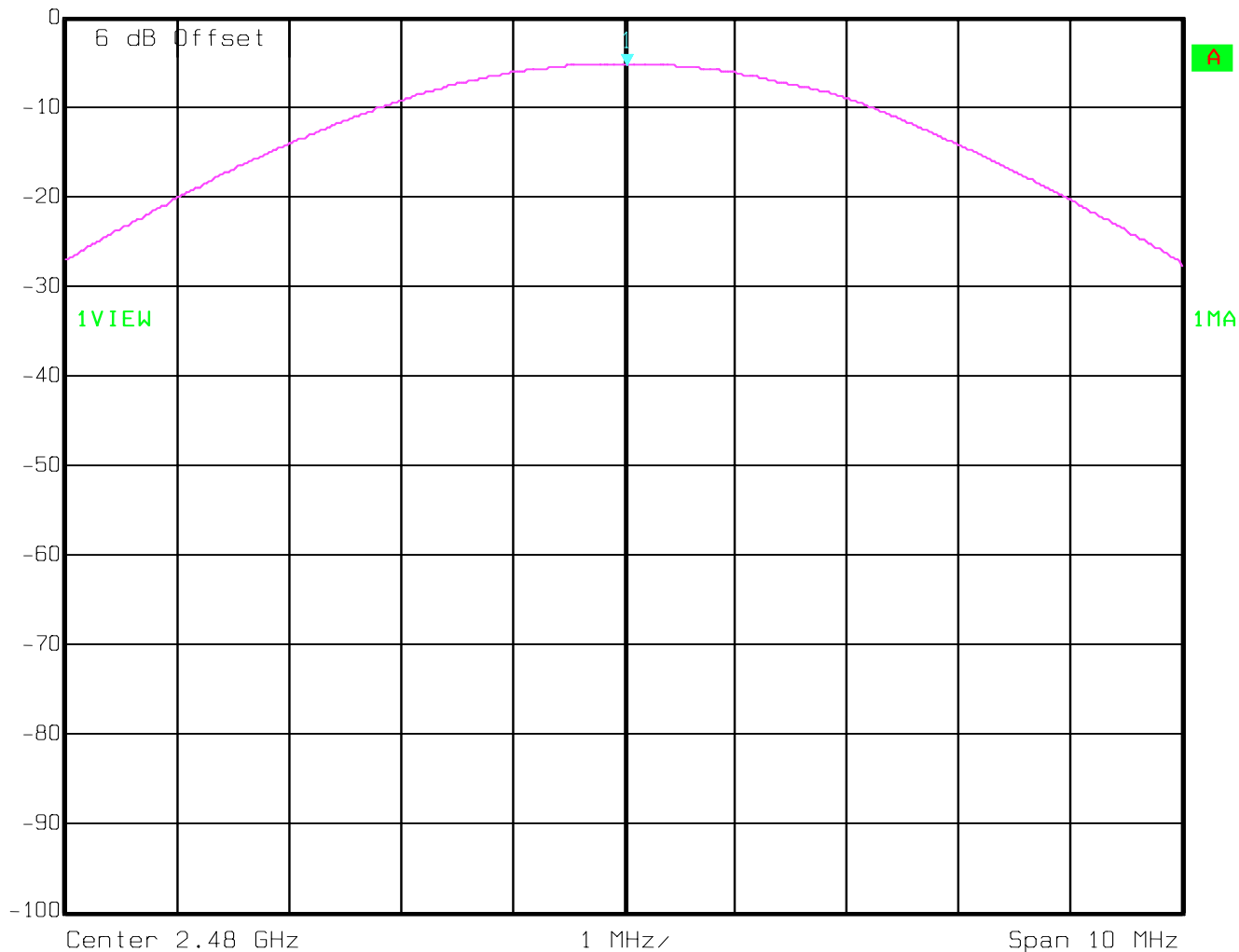

 Marker 1 [T1] RBW 3 MHz RF Att 20 dB  
 Ref Lvl -5.87 dBm VBW 3 MHz  
 0 dBm 2.44113026 GHz SWT 5 ms Unit dBm



Date: 15.SEP.2005 16:36:31

**(2480 MHz)**


 Marker 1 [T1] RBW 3 MHz RF Att 20 dB  
 Ref Lvl -5.37 dBm VBW 3 MHz  
 0 dBm 2.48003006 GHz SWT 5 ms Unit dBm



Date: 15.SEP.2005 16:38:16

### 5.3 20dB BANDWIDTH

#### 5.3.1 LIMIT SUB CLAUSE § 15.247 (a) (1) (i) (ii) (iii)

NUMBER OF CHANNELS	BANDWIDTH
79	<1MHz

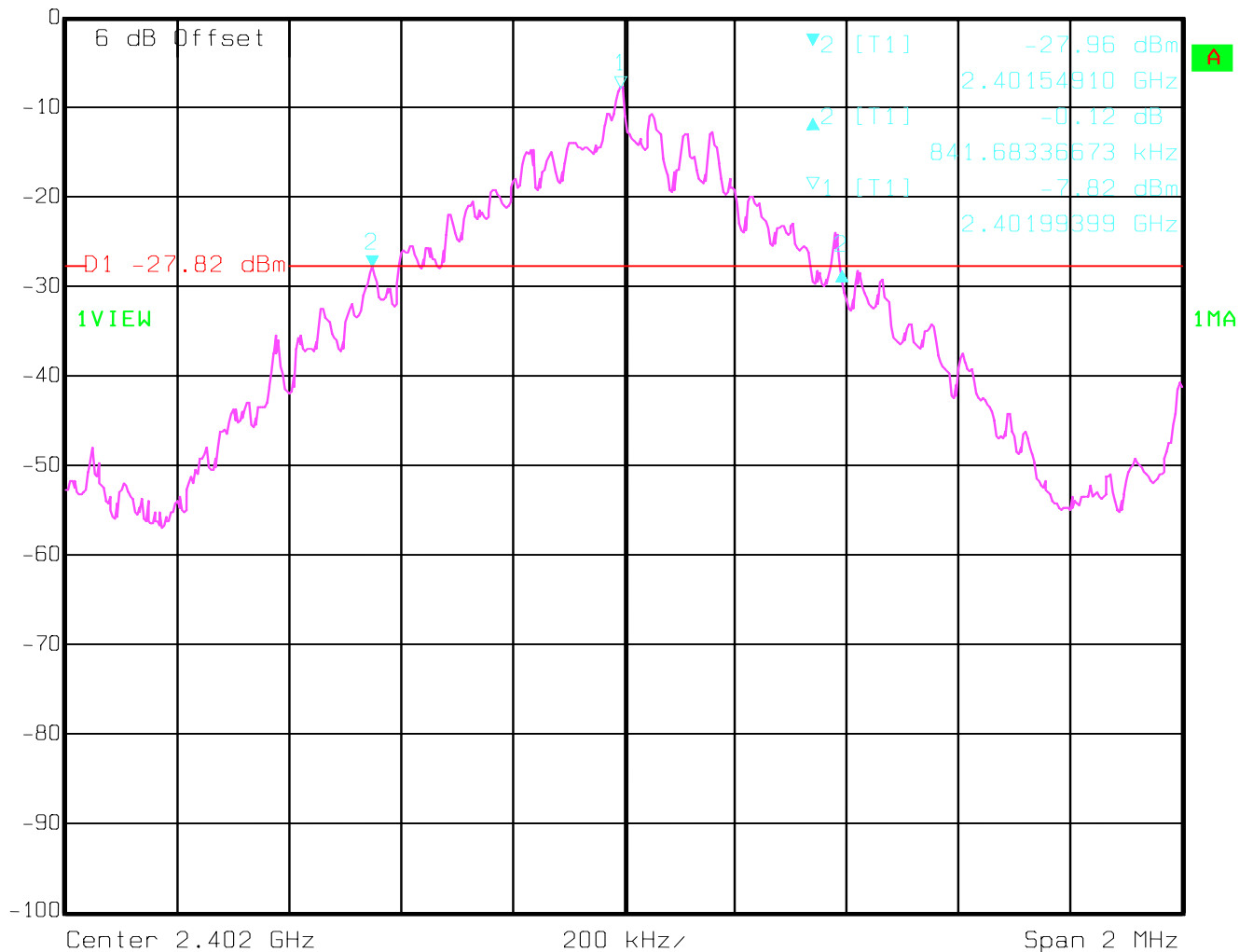
#### 5.3.2 RESULTS:

TEST CONDITIONS		BANDWIDTH (KHz)		
Frequency (MHz)		2402 MHz	2441 MHz	2480 MHz
T <sub>nom</sub> (23)°C	V <sub>nom</sub> VDC	841.68	793.58	821.64



**(2402 MHz)**

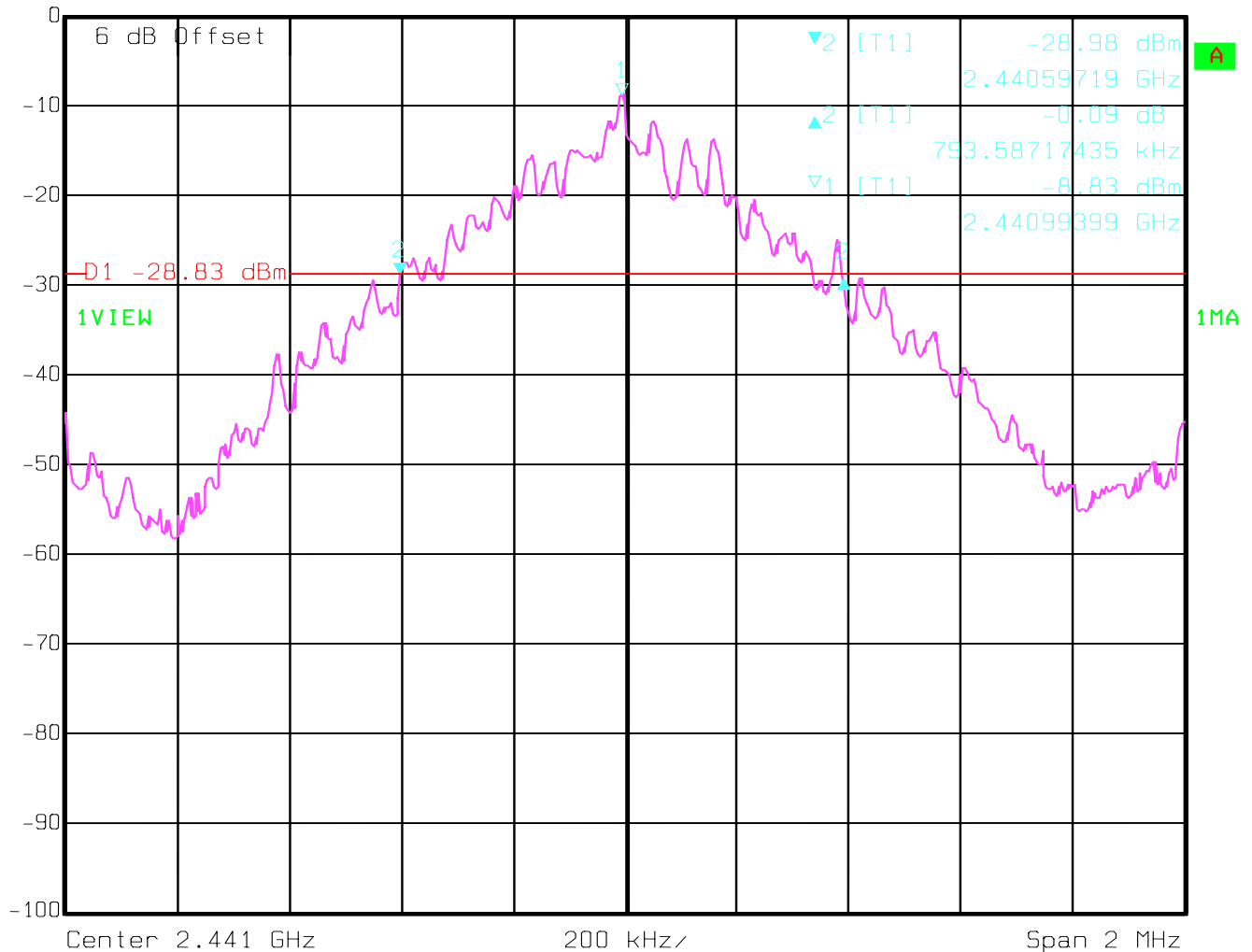
 **Delta 2 [T1]** RBW 10 kHz RF Att 20 dB  
 Ref Lvl -0.12 dB VBW 30 kHz  
 0 dBm 841.68336673 kHz SWT 50 ms Unit dBm



Date: 15.SEP.2005 16:42:01

**(2441 MHz)**

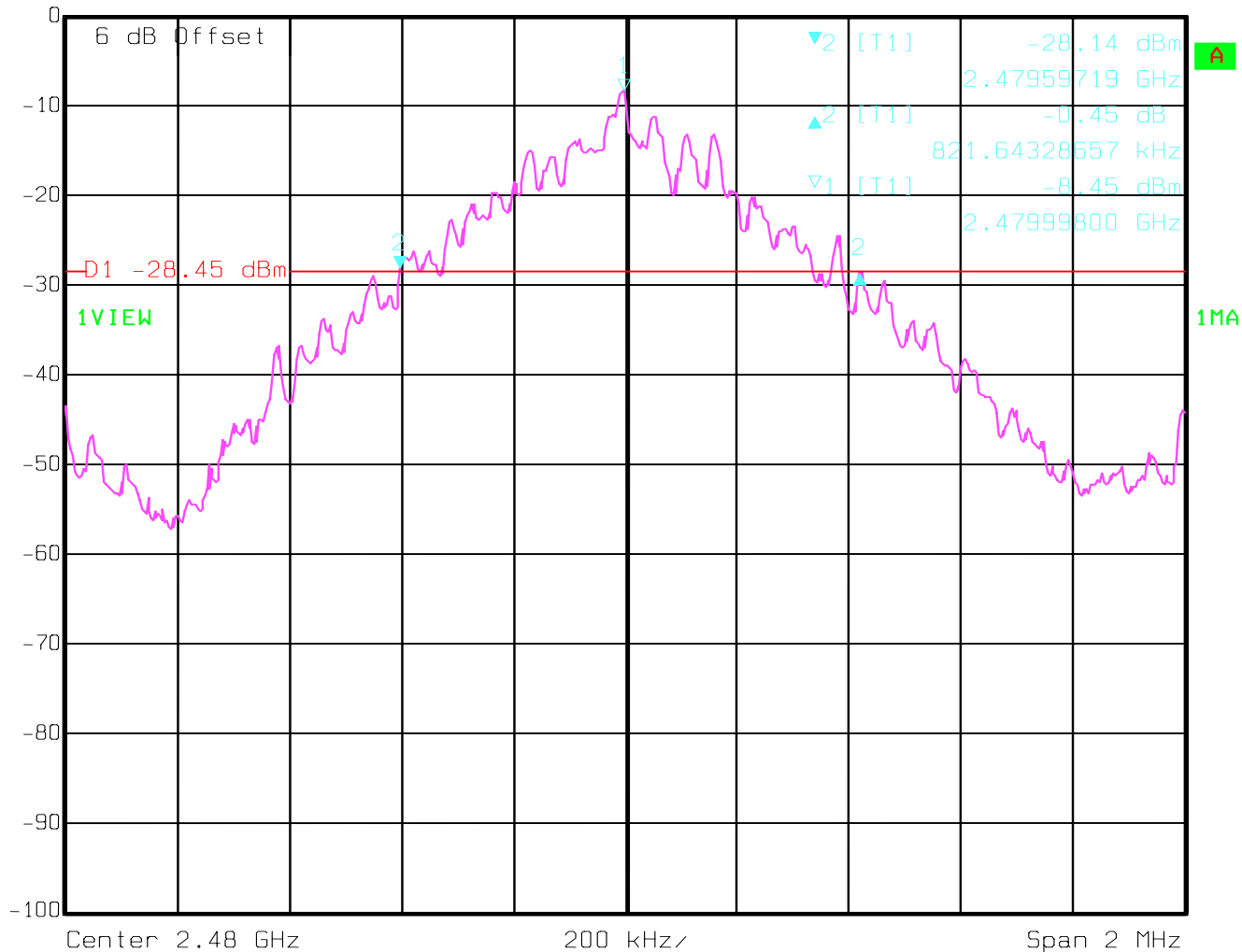
 Ref Lvl **Delta 2 [T1]** RBW 10 kHz RF Att 20 dB  
 0 dBm **-0.09 dB** VBW 30 kHz  
**793.58717435 kHz** SWT 50 ms Unit dBm



Date: 15.SEP.2005 16:43:37

**(2480 MHz)**

 **Delta 2 [T1]** RBW 10 kHz RF Att 20 dB  
 Ref Lvl -0.45 dB VBW 30 kHz  
 0 dBm 821.64328657 kHz SWT 50 ms Unit dBm



Date: 15.SEP.2005 16:45:15

#### 5.4 CARRIER FREQUENCY SEPARATION

##### 5.4.1 LIMIT SUB CLAUSE § 15.247 (a) (1) (i) (ii) (iii)

SEPARATION
> 25 KHz or > 20 dB BANDWIDTH

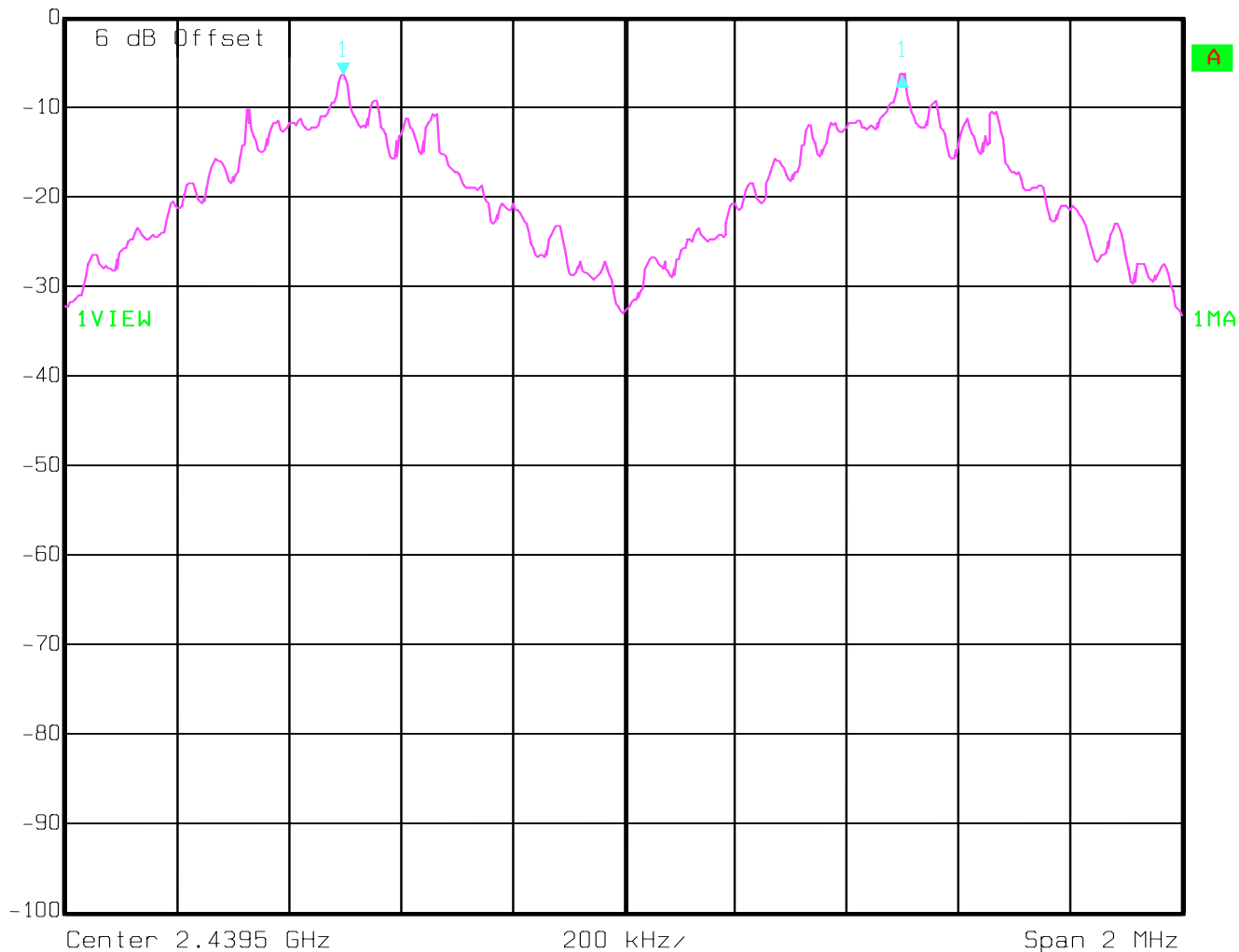
##### 5.4.2 RESULTS:

TEST CONDITIONS		SEPARATION (MHz)
T <sub>nom</sub> (23)°C	V <sub>nom</sub> VDC	1.002

(plot)



Delta 1 [T1] RBW 20 kHz RF Att 20 dB  
 Ref Lvl -0.02 dB VBW 50 kHz  
 0 dBm 1.00200401 MHz SWT 12.5 ms Unit dBm



Date: 15.SEP.2005 16:51:09

## 5.5 NUMBER OF HOPPING CHANNELS

### 5.5.1 LIMIT SUB CLAUSE § 15.247 (a) (1) (iii)

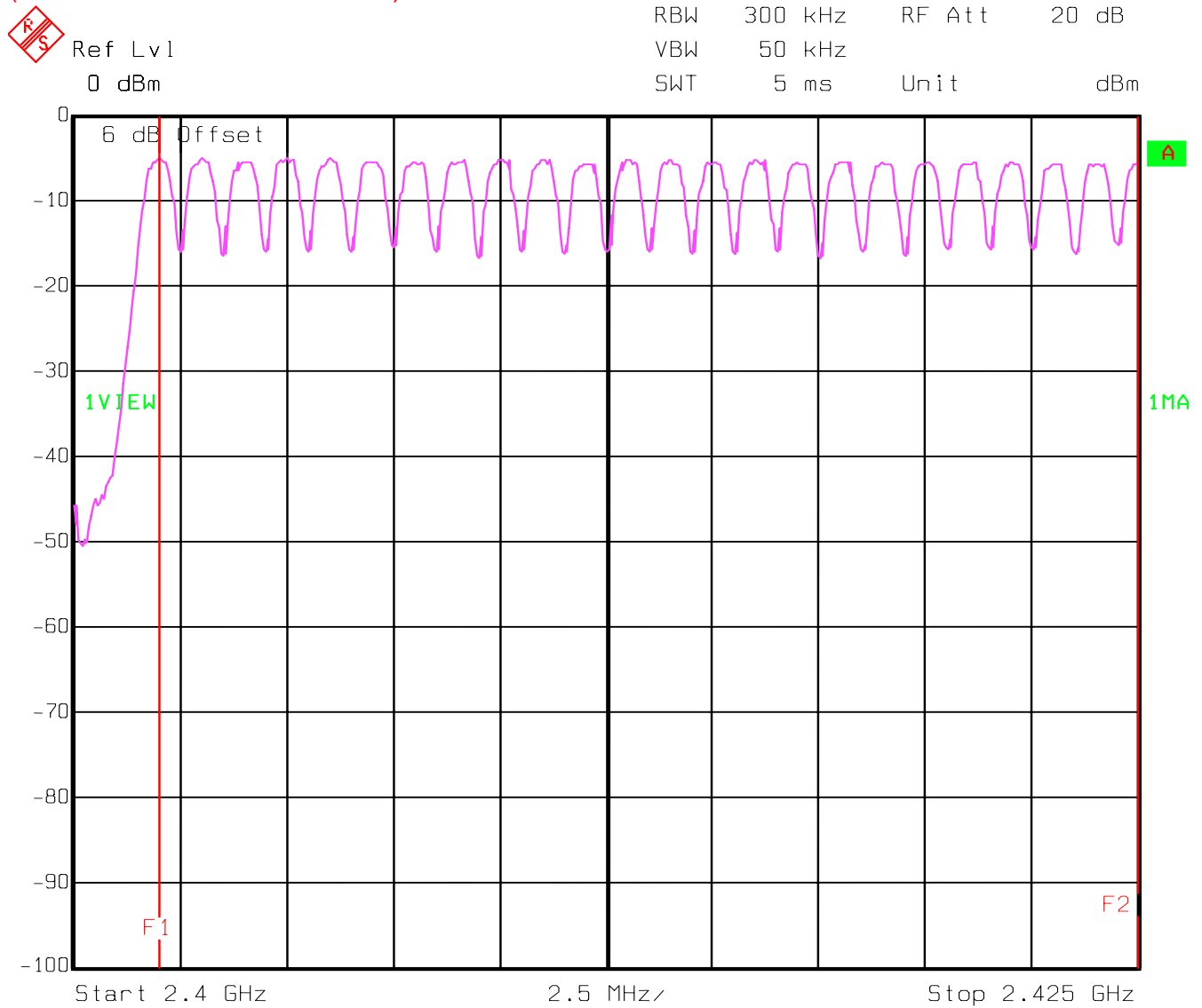
NUMBER OF CHANNELS
<b>&gt; 15</b>

### 5.5.2 RESULTS:

TEST CONDITIONS		NUMBER OF CHANNELS
<b>T<sub>nom</sub>(23)°C</b>	<b>V<sub>nom</sub> VDC</b>	<b>79</b>

**(PLOT 1)**

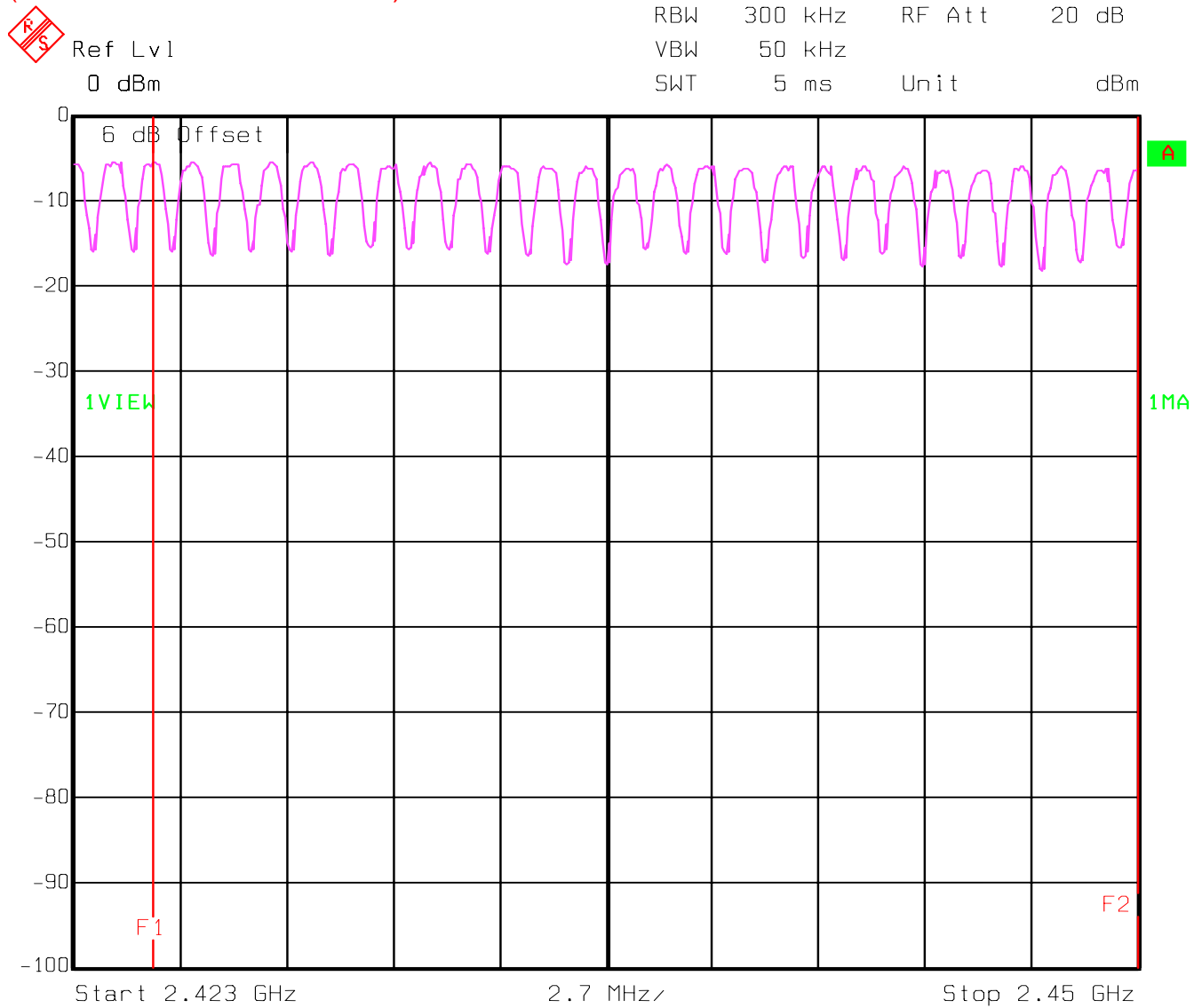
(F1-F2=2402MHz to 2425MHz)



Date: 15.SEP.2005 16:53:58

**(PLOT 2)**

(F1-F2=2425MHz to 2450MHz)

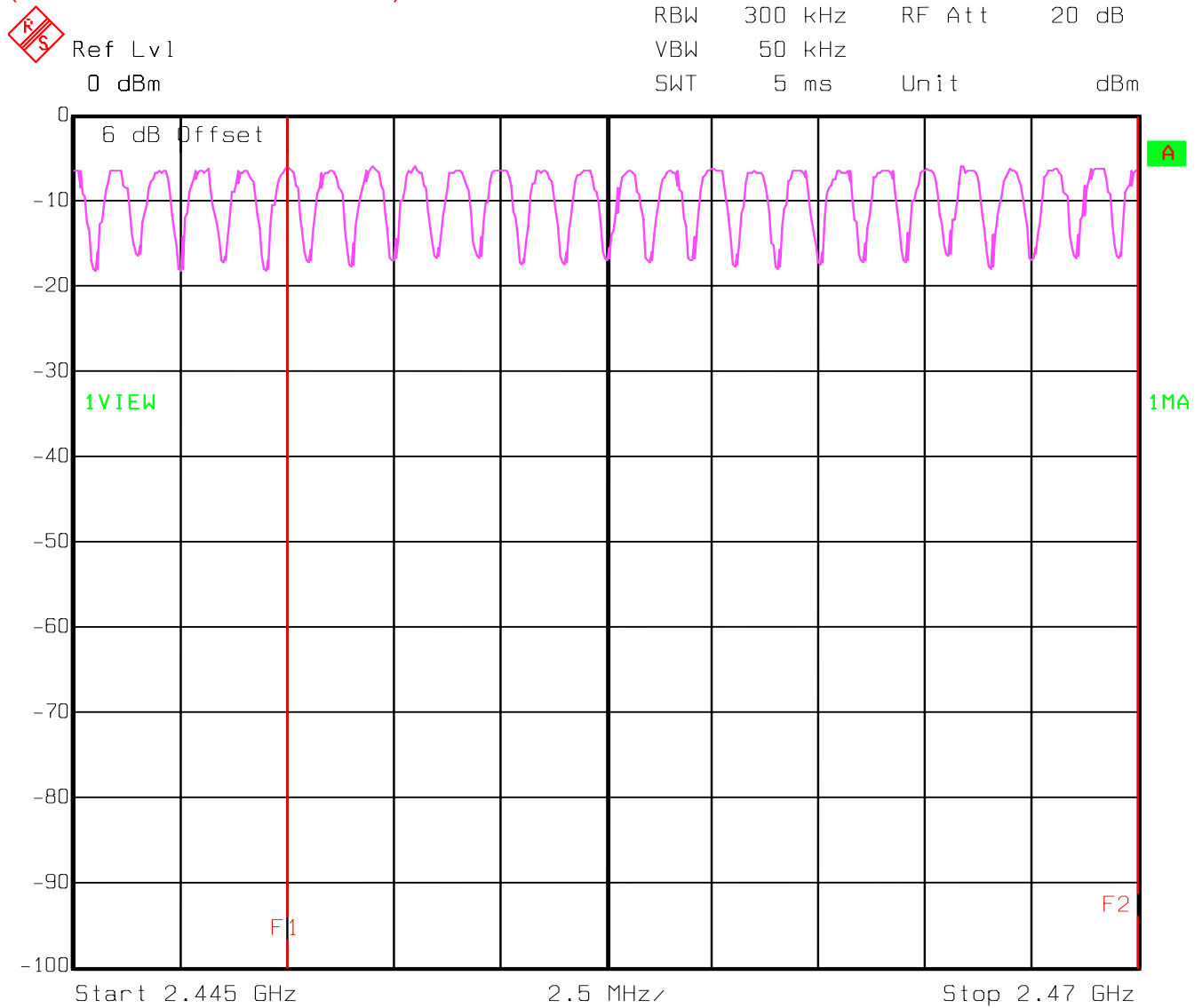


Date: 15.SEP.2005 16:55:50



**(PLOT 3)**

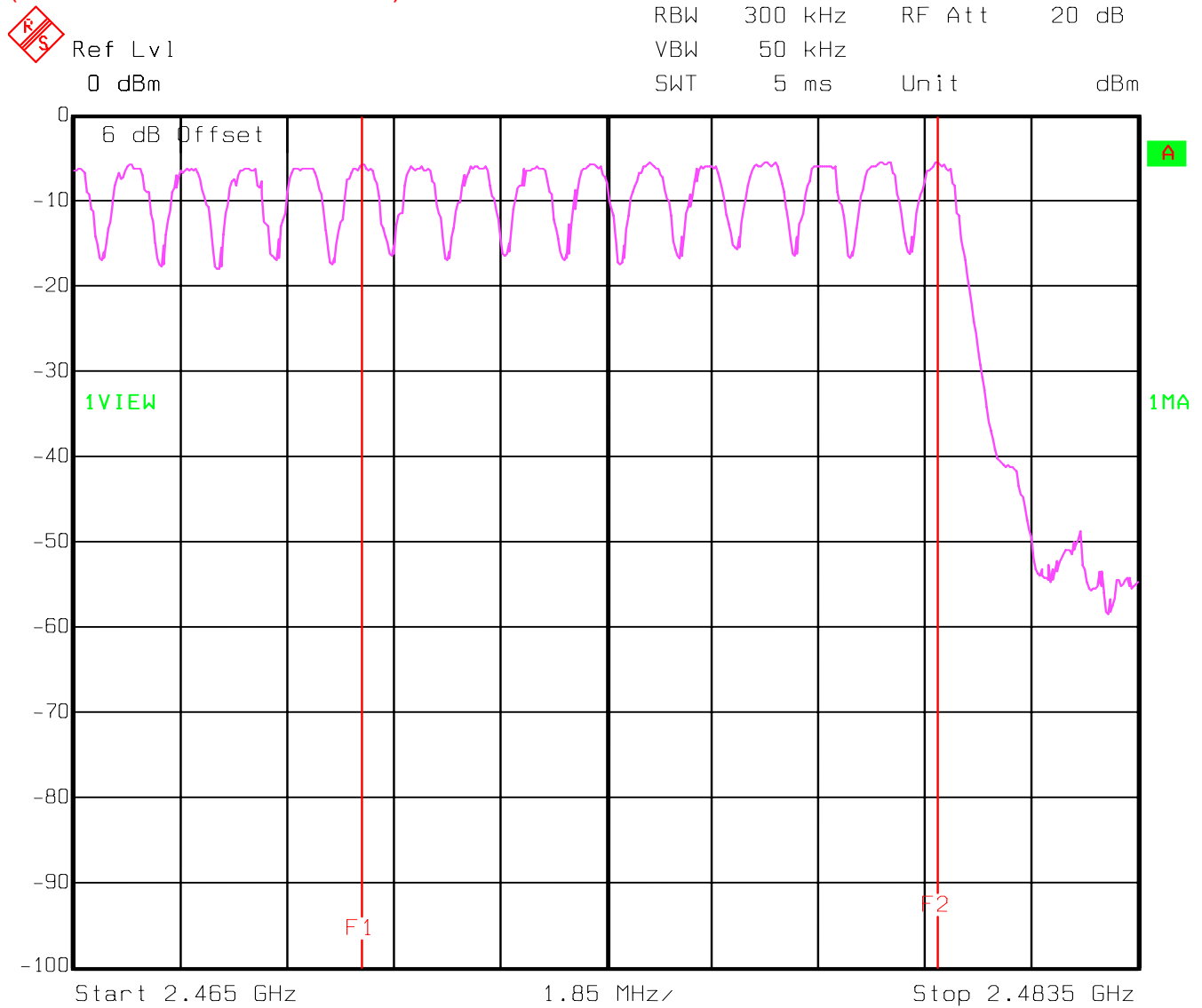
(F1-F2=2450MHz to 2470MHz)



Date: 15.SEP.2005 16:58:00

**(PLOT 4)**

(F1-F2=2470MHz to 2480MHz)



Date: 15.SEP.2005 17:05:17

## 5.6 TIME OF OCCUPANCY (DWELL TIME)

### 5.6.1 LIMIT SUB CLAUSE § 15.247 (a) (1) (i) (ii) (iii)

FREQUENCY RANGE	AVERAGE TIME OF OCCUPANCY PER 31.6 SECONDS (LIMIT)
2400-2483.5	0.4 SECONDS

### 5.6.2 RESULTS:

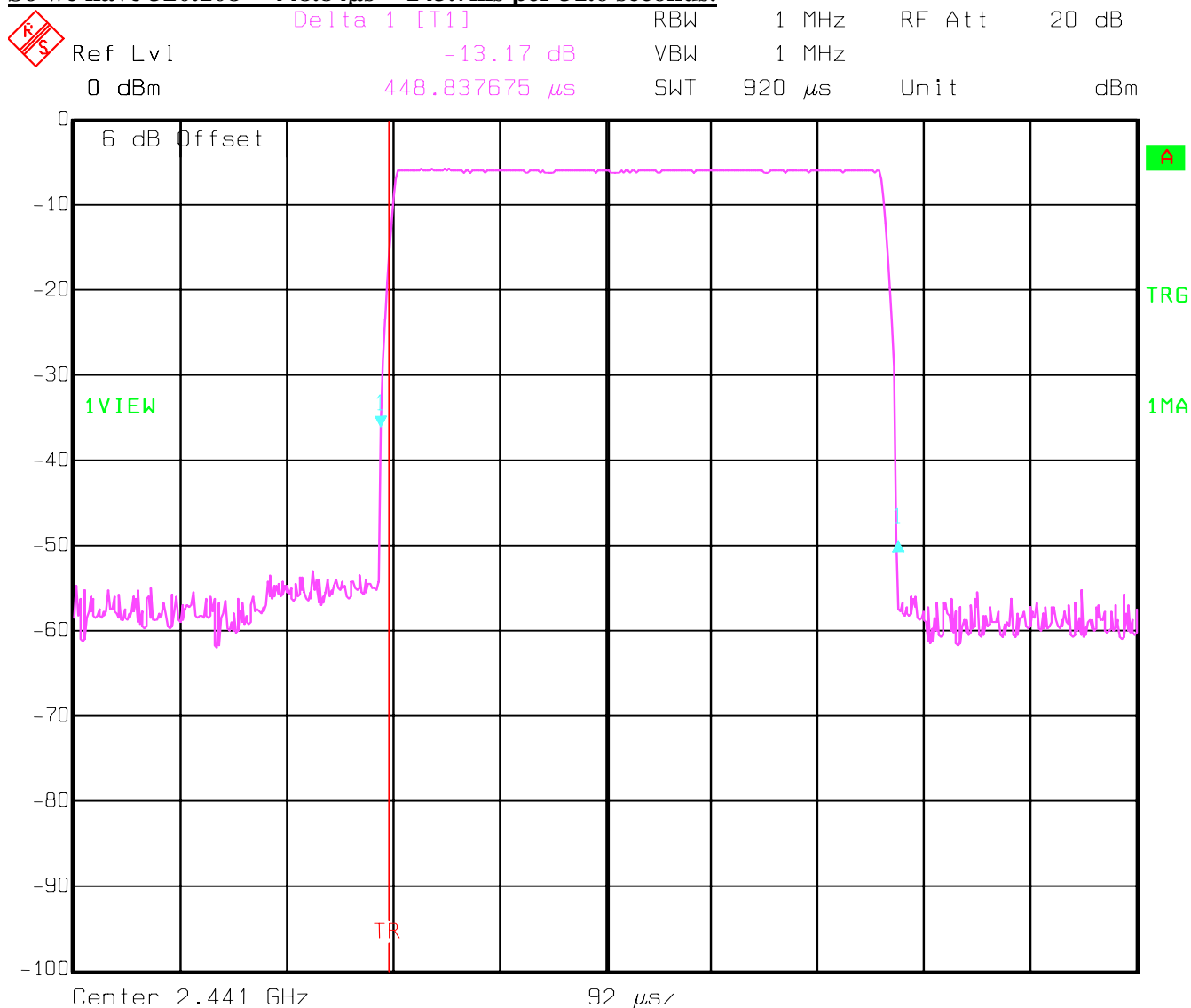
TEST CONDITIONS		TIME OF OCCUPANCY IN 31.6 SECONDS		
PACKET TYPE		DH1	DH3	DH5
$T_{nom}(23)^{\circ}C$	$V_{nom}$ VDC	0.1437 Seconds	0.27477 Seconds	0.31396 Seconds

**(DH1)**

The system makes worst case 1600 hops per second or 1 time slot has a length of 625 $\mu$ s with 79 channels. A DH1 Packet need 1 time slot for transmitting and 1 time slot for receiving. Then the system makes worst case 800 hops per second with 79 channels. So you have each channel 10.13 times per second and so for 31.6 seconds you have 320.108 times of appearance.

Each Tx-time per appearance is 448.84 $\mu$ s.

So we have  $320.108 * 448.84\mu s = 143.7ms$  per 31.6 seconds.



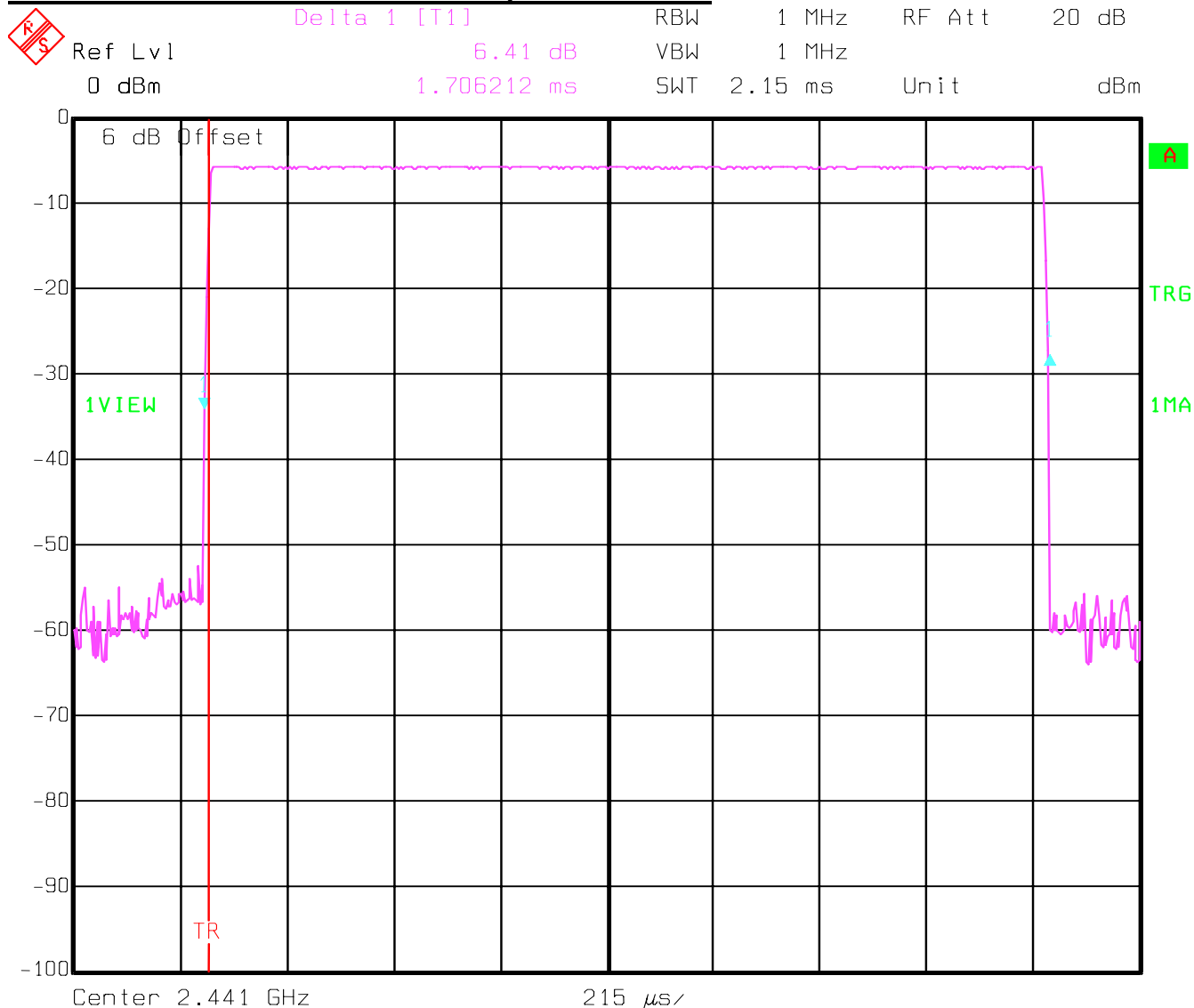
Date: 15.SEP.2005 17:12:42

**(DH3)**

A DH3 Packets need 3 time slots for transmit and 1 for receiving, then the system makes worst case 400 hops per second with 79 channels. So you have each channel 5.1 times per second and so for 31.6 seconds you have 161.16 times of appearance.

Each Tx-time per appearance is 1.706ms.

So we have  $161.16 * 1.706\text{ms} = 274.77\text{ms}$  per 31.6 seconds.



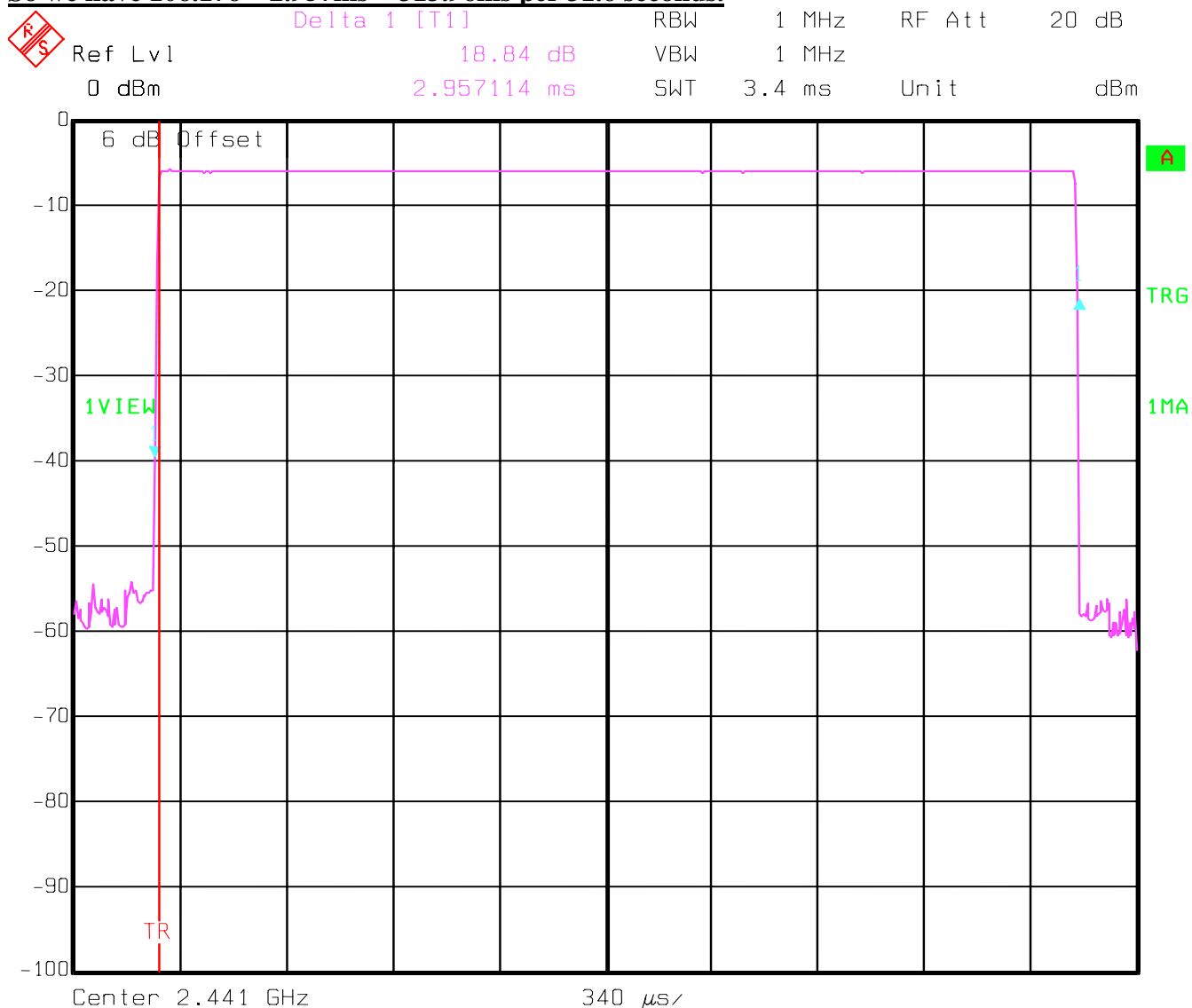
Date: 15.SEP.2005 17:11:47

**(DH5)**

At DH5 Packets you need 5 time slots for transmit and 1 for receiving, then the system makes worst case 266.7 hops per second with 79 channels. So you have each channel 3.36 times per second and so for 30 seconds you have 106.176 times of appearance.

Each Tx-time per appearance is 2.957ms.

So we have  $106.176 * 2.957\text{ms} = 313.96\text{ms}$  per 31.6 seconds.



Date: 15.SEP.2005 17:09:39



## **5.7 CONDUCTED SPURIOUS EMISSIONS**

### **5.7.1 LIMIT SUB CLAUSE § 15.247 (d)**

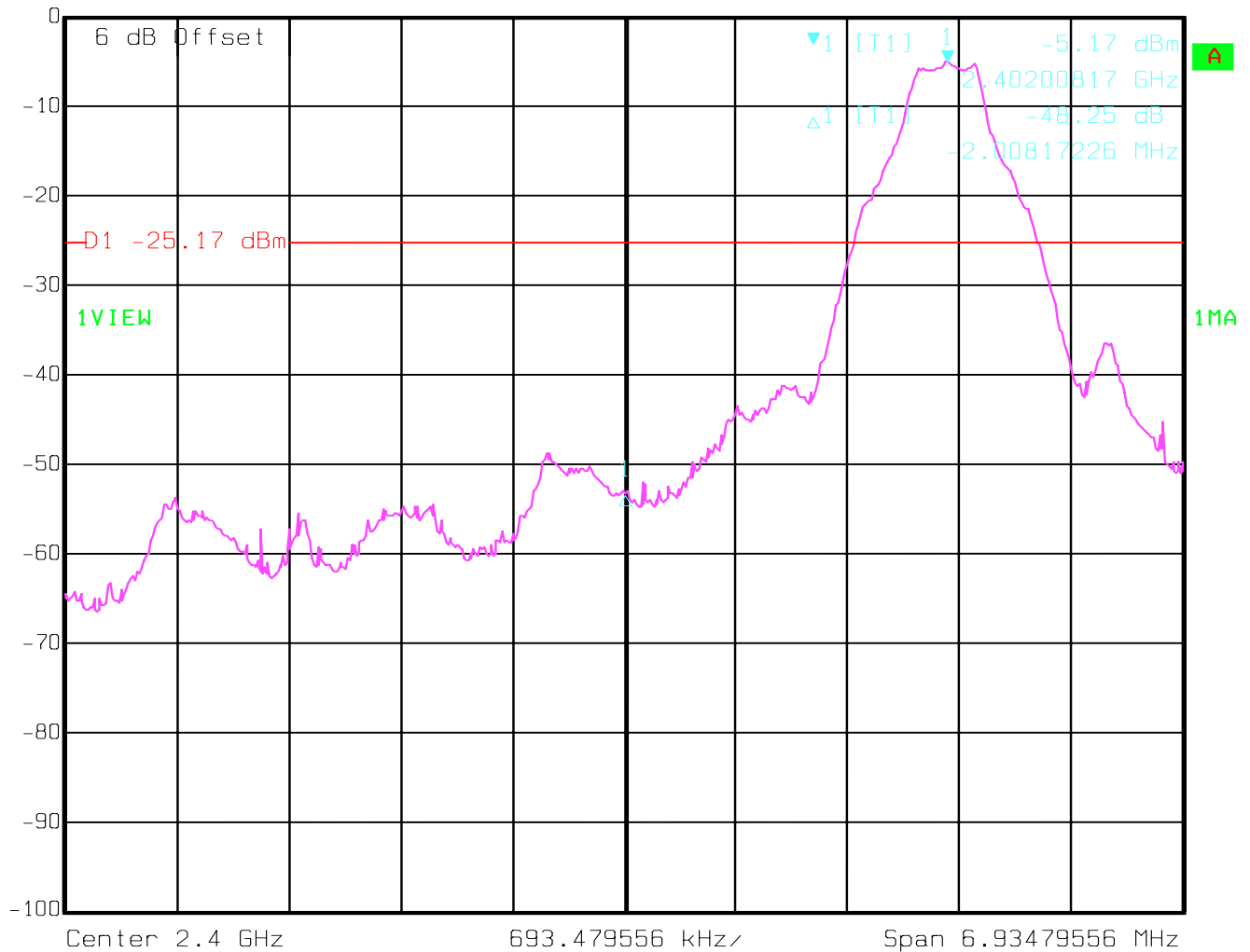
**In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)).**

## 5.7.2 RESULTS

### CONDUCTED BANDEGDE COMPLIANCE 2402 MHz



Ref Lvl 0 dBm  
 Marker 1 [T1] -5.17 dBm  
 2.40200817 GHz  
 RBW 100 kHz RF Att 10 dB  
 VBW 300 kHz  
 SWT 5 ms Unit dBm

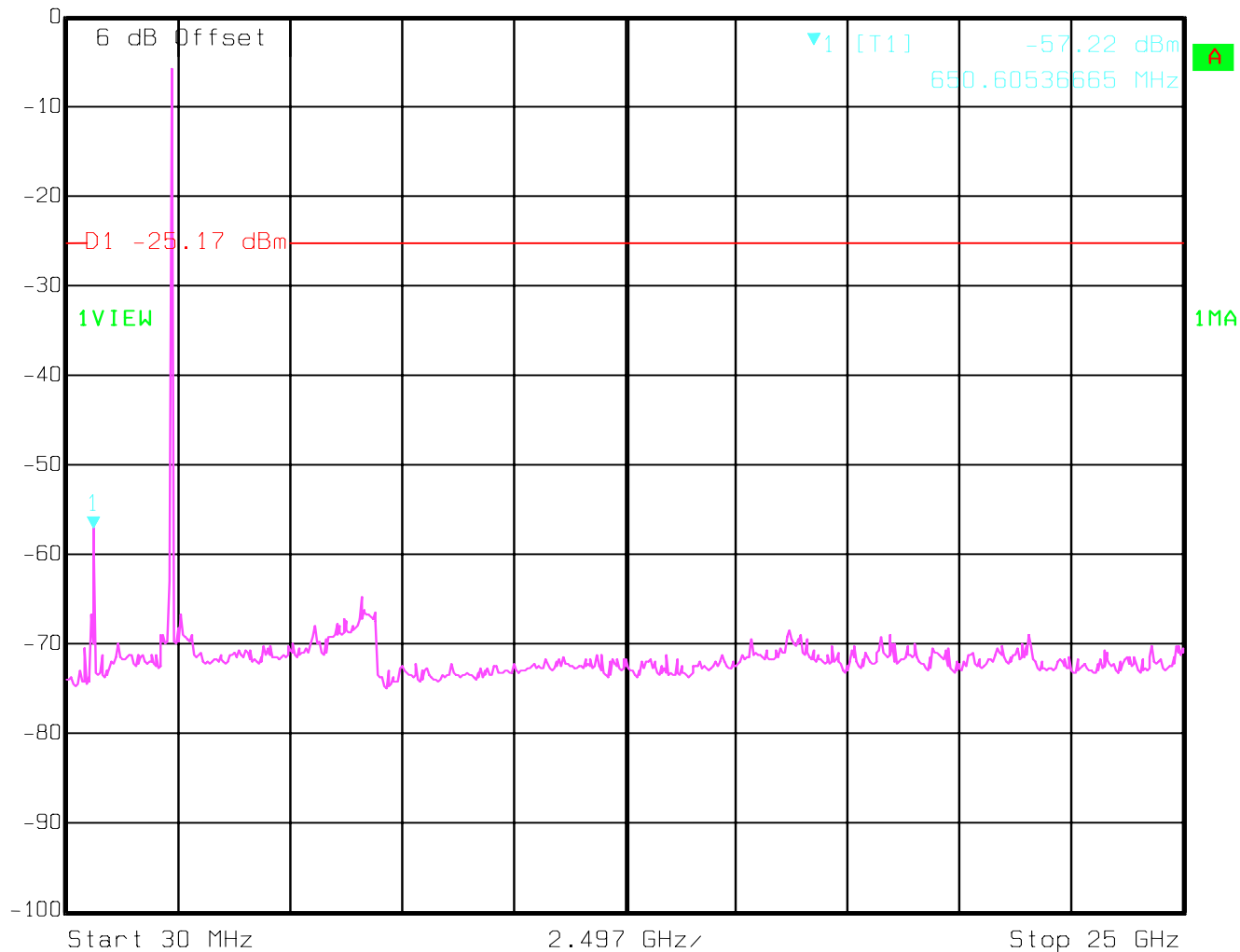


Date: 15.SEP.2005 17:18:10



CONDUCTED SPURIOUS 2402 MHz

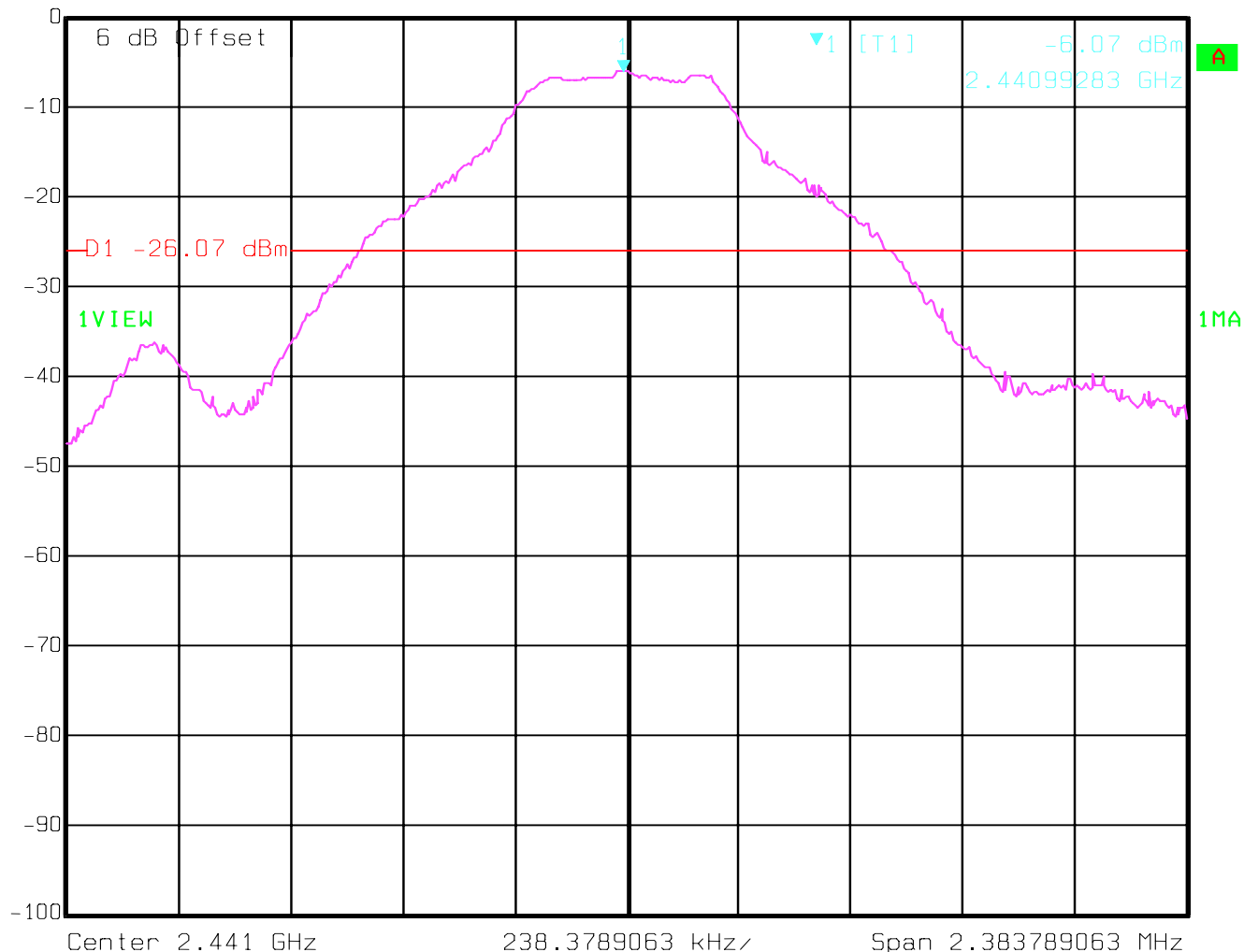
 Ref Lvl 0 dBm Marker 1 [T1] -57.22 dBm RBW 100 kHz RF Att 10 dB  
650.6053665 MHz VBW 300 kHz Unit dBm  
SWT 6.4 s



Date: 15.SEP.2005 17:19:20

REFERENCE 2441 MHz

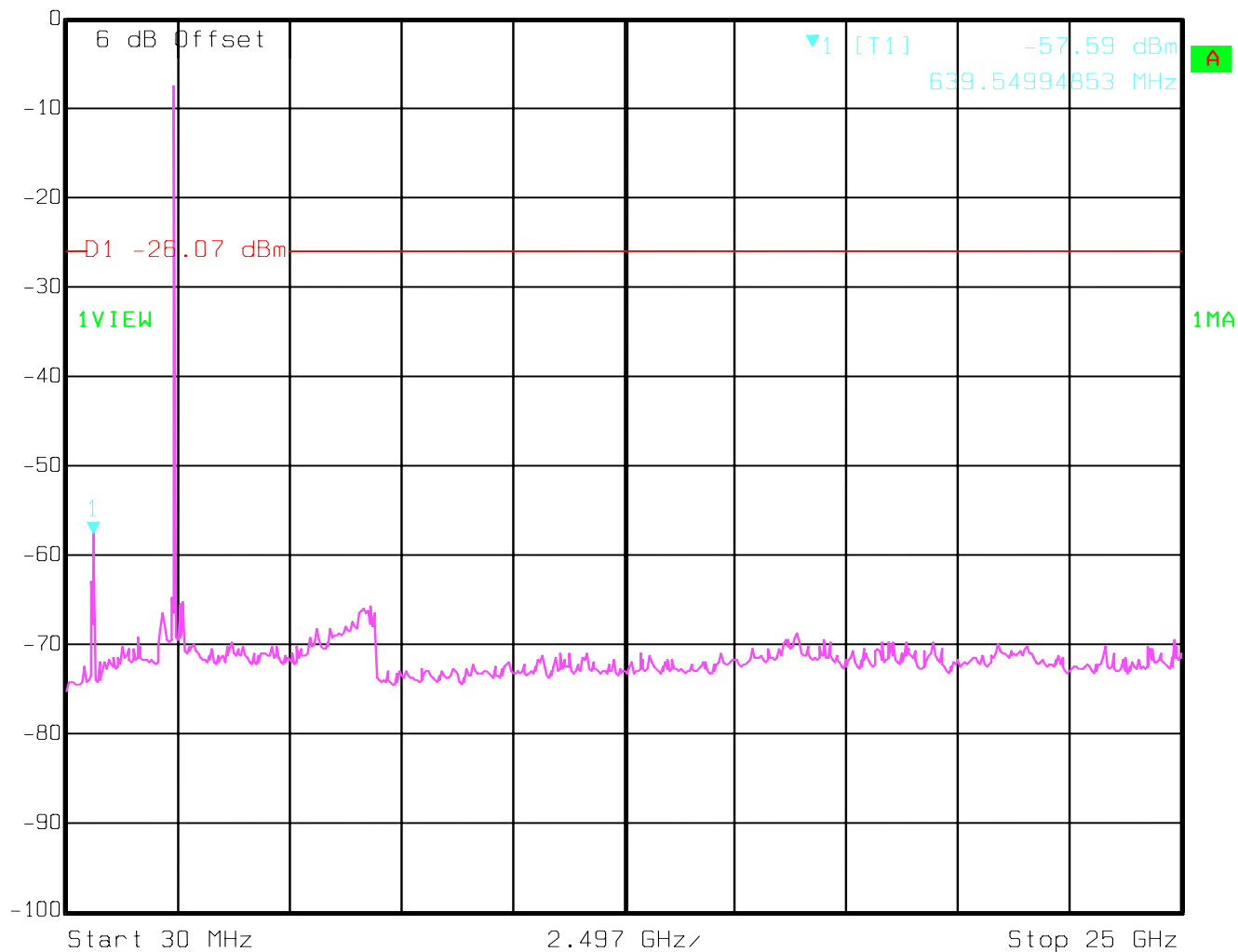

 Ref Lvl 0 dBm  
 Marker 1 [T1] -6.07 dBm  
 2.44099283 GHz  
 RBW 100 kHz  
 VBW 300 kHz  
 SWT 5 ms  
 RF Att 10 dB  
 Unit dBm



Date: 15.SEP.2005 17:20:14

CONDUCTED SPURIOUS 2441 MHz


 Marker 1 [T1] RBW 100 kHz RF Att 10 dB  
 Ref Lvl -57.59 dBm VBW 300 kHz  
 0 dBm 639.54994853 MHz SWT 6.4 s Unit dBm

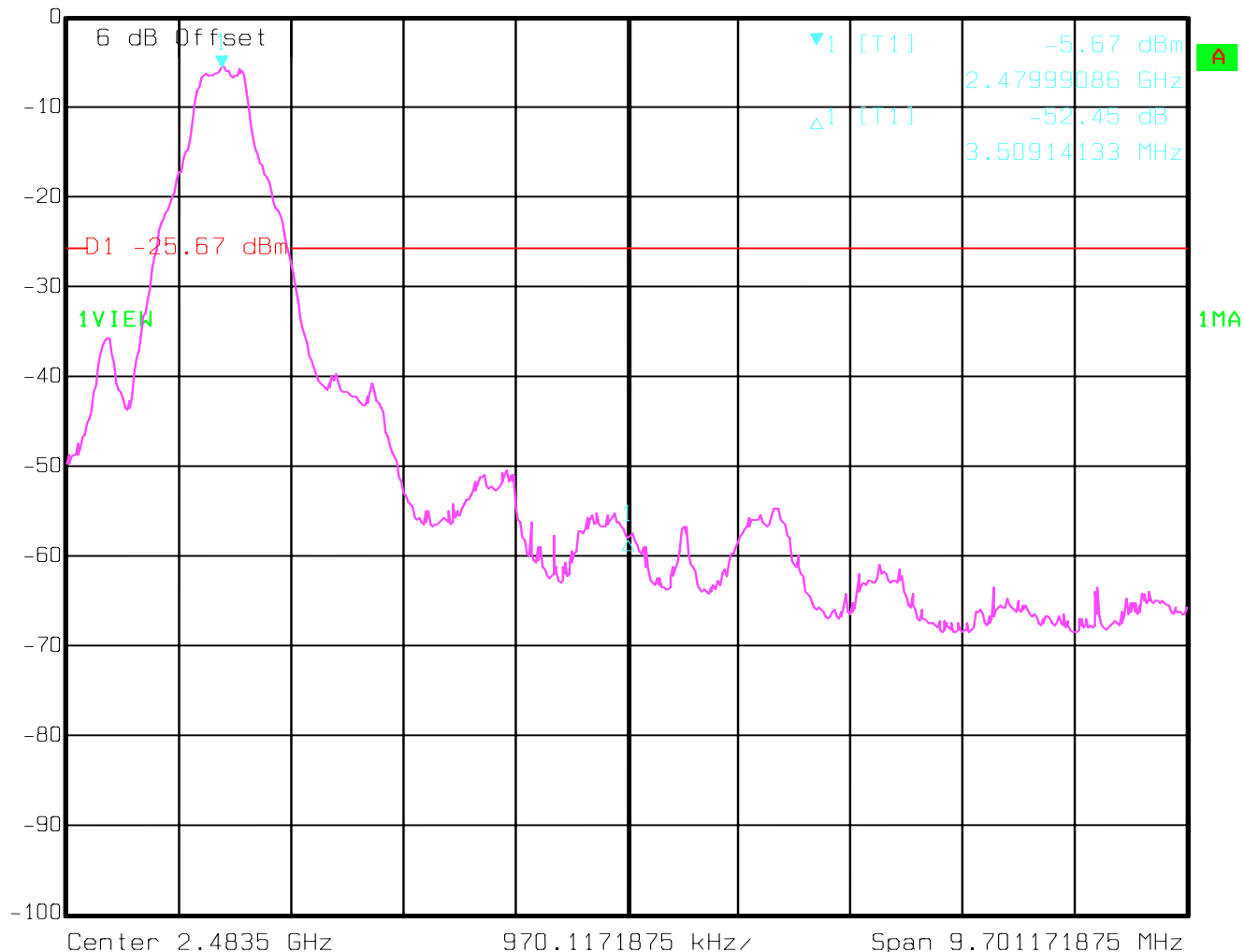


Date: 15.SEP.2005 17:21:53



**CONDUCTED BANDEGDE COMPLIANCE 2480 MHz**

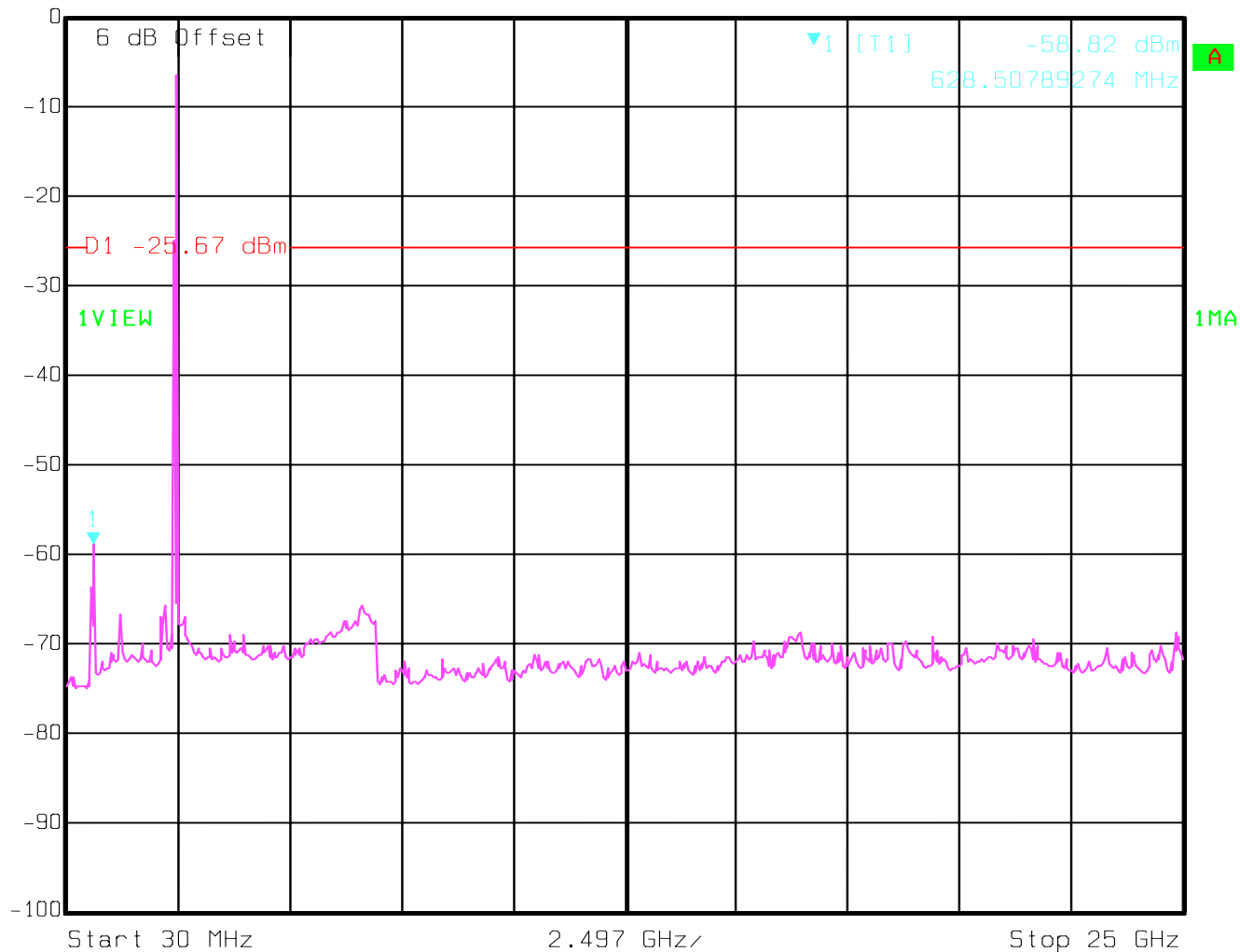

 Ref Lvl 0 dBm  
 Marker 1 [T1] -5.67 dBm  
 2.47999086 GHz  
 RBW 100 kHz  
 VBW 300 kHz  
 SWT 5 ms  
 RF Att 10 dB  
 Unit dBm



Date: 15.SEP.2005 17:23:43

CONDUCTED SPURIOUS 2480 MHz


 Marker 1 [T1] RBW 100 kHz RF Att 10 dB  
 Ref Lvl -58.82 dBm VBW 300 kHz  
 0 dBm 628.50789274 MHz SWT 6.4 s Unit dBm



Date: 15.SEP.2005 17:24:48

## 5.8 RESTRICTED BAND EDGE COMPLIANCE RADIATED §15.247/15.205

### 5.8.1 LIMITS

(a) Except as shown in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
<sup>1</sup> 0.495 - 0.505	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.025 - 8.5
4.17725 - 4.17775	37.5 - 38.25	1435 - 1626.5	9.0 - 9.2
4.20725 - 4.20775	73 - 74.6	1645.5 - 1646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1660 - 1710	10.6 - 12.7
6.26775 - 6.26825	108 - 121.94	1718.8 - 1722.2	13.25 - 13.4
6.31175 - 6.31225	123 - 138	2200 - 2300	14.47 - 14.5
8.291 - 8.294	149.9 - 150.05	2310 - 2390	15.35 - 16.2
8.362 - 8.366	156.52475 - 156.52525	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.7 - 156.9	2690 - 2900	22.01 - 23.12
8.41425 - 8.41475	162.0125 - 167.17	3260 - 3267	23.6 - 24.0
12.29 - 12.293	167.72 - 173.2	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	240 - 285	3345.8 - 3358	36.43 - 36.5
12.57675 - 12.57725	322 - 335.4	3600 - 4400	( <sup>2</sup> )
13.36 - 13.41			

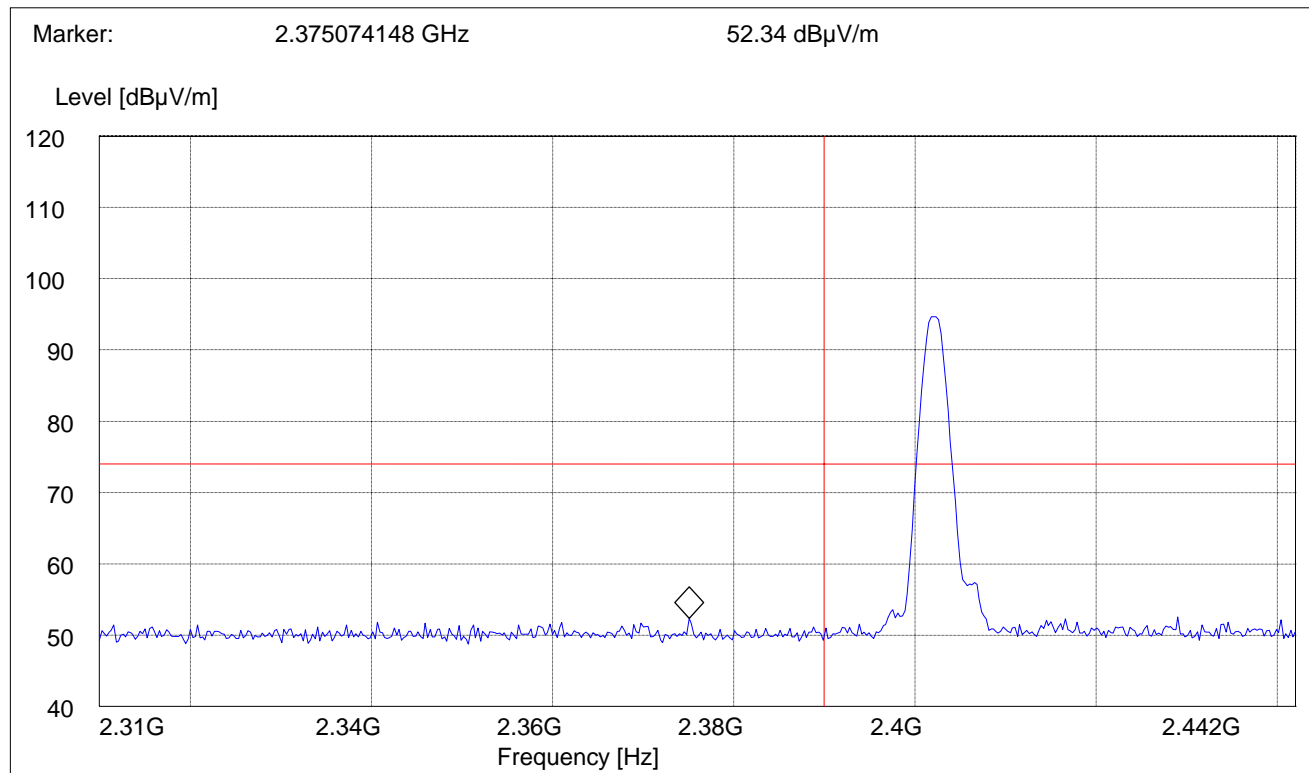
\*PEAK LIMIT= 74dBuV

\*AVG. LIMIT= 54dBuV

## 5.8.2 RESULTS (2402MHz)

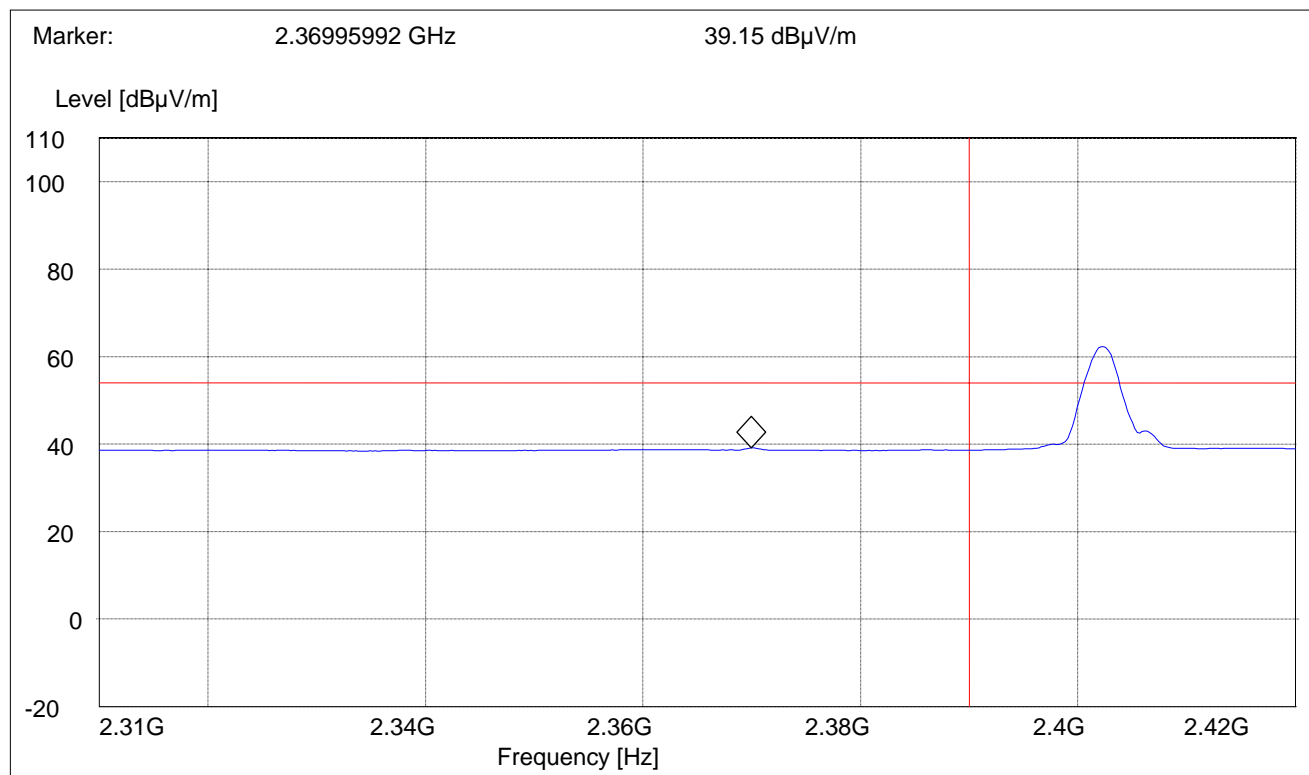
### PEAK

Start Frequency	Stop Frequency	Detector	Meas. Time	RBW	VBW
2310 MHz	2442 MHz	Max Peak	Coupled	1 MHz	1 MHz



**AVG**

Start Frequency	Stop Frequency	Detector	Meas. Time	RBW	VBW
2310 MHz	2420 MHz	Max Peak	Coupled	1 MHz	10 Hz

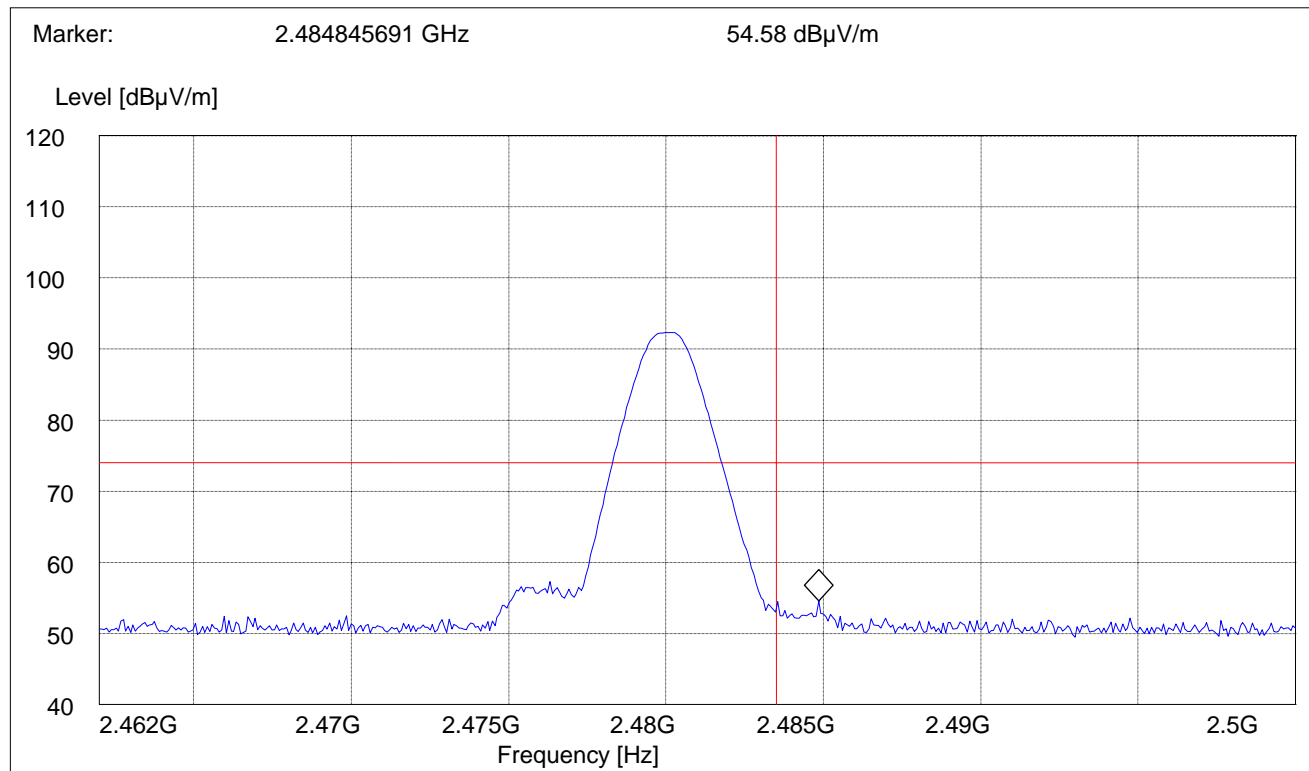




### 5.8.3 RESULTS (2480MHz)

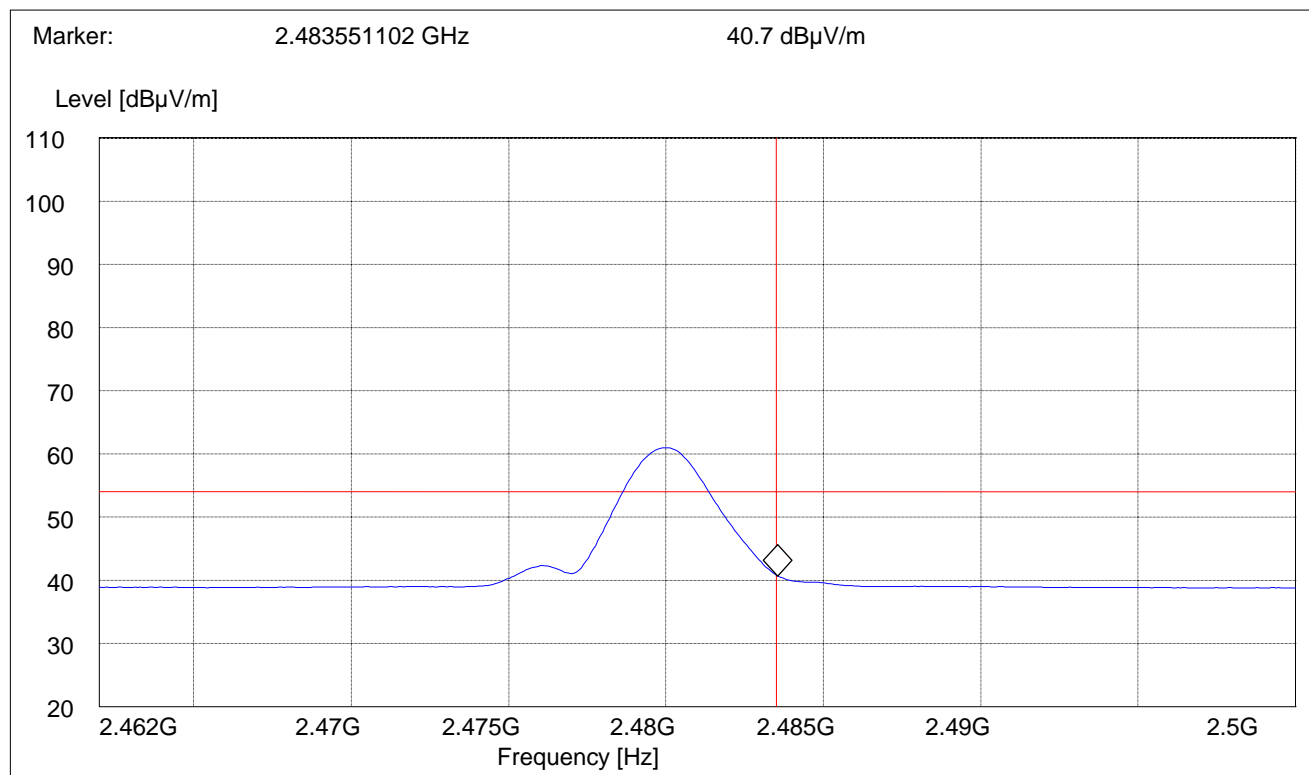
#### PEAK

Start Frequency	Stop Frequency	Detector	Meas. Time	RBW	VBW
2462 MHz	2500 MHz	Max Peak	Coupled	1 MHz	1 MHz



**AVG**

Start Frequency	Stop Frequency	Detector	Meas. Time	RBW	VBW
2462 MHz	2500 MHz	Max Peak	Coupled	1 MHz	10 Hz



## 5.9 TRANSMITTER SPURIOUS EMISSIONS RADIATED § 15.247/15.205/15.209

### 5.9.1 LIMITS

(a) Except as shown in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
<sup>1</sup> 0.495 - 0.505	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.025 - 8.5
4.17725 - 4.17775	37.5 - 38.25	1435 - 1626.5	9.0 - 9.2
4.20725 - 4.20775	73 - 74.6	1645.5 - 1646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1660 - 1710	10.6 - 12.7
6.26775 - 6.26825	108 - 121.94	1718.8 - 1722.2	13.25 - 13.4
6.31175 - 6.31225	123 - 138	2200 - 2300	14.47 - 14.5
8.291 - 8.294	149.9 - 150.05	2310 - 2390	15.35 - 16.2
8.362 - 8.366	156.52475 - 156.52525	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.7 - 156.9	2690 - 2900	22.01 - 23.12
8.41425 - 8.41475	162.0125 - 167.17	3260 - 3267	23.6 - 24.0
12.29 - 12.293	167.72 - 173.2	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	240 - 285	3345.8 - 3358	36.43 - 36.5
12.57675 - 12.57725	322 - 335.4	3600 - 4400	( <sup>2</sup> )
13.36 - 13.41			

**\*PEAK LIMIT= 74dBuV**

**\*AVG. LIMIT= 54dBuV**

#### NOTE:

1. The radiated emissions were done with different settings, using the relevant pre-amplifiers for the relevant frequency ranges. This is the reason that the graphs show different noise levels. In the range between 3 and 25 GHz very short cable connections to the antenna was used to minimize the noise level.

2. All measurements are done in peak mode using an average limit , unless specified with the plots.

#### **Results for the radiated measurements below 30MHz according § 15.33**

Frequency	Measured values	Remarks
9KHz – 30MHz	No emissions found, caused by the EUT	This is valid for all the tested channels

## 5.9.2 RESULTS

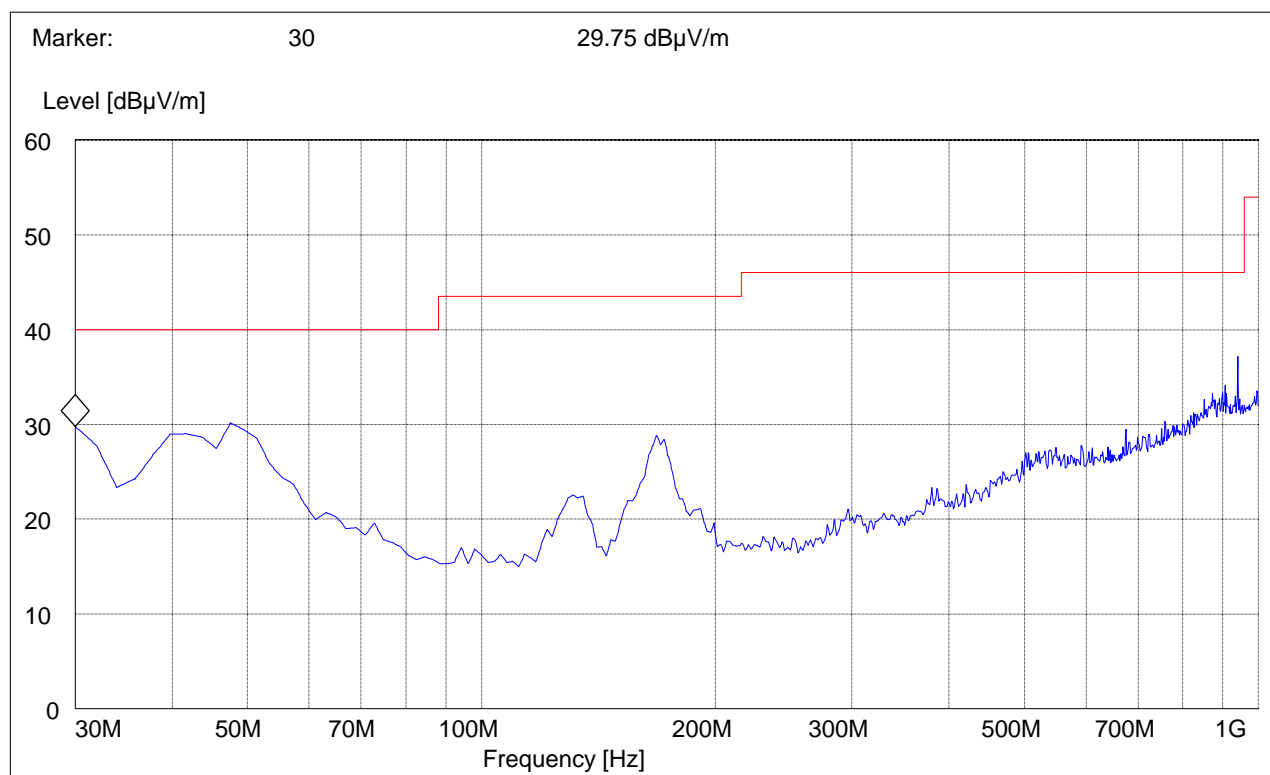
**30MHz – 1GHz**

**Antenna: vertical**

Start Frequency	Stop Frequency	Detector	Meas. Time	RBW	VBW
30MHz	1GHz	Max Peak	Coupled	100 KHz	100 KHz

**Note: This plot is valid for low, mid, high channels (worst-case plot)**

**Note: Peak reading vs. Quasi-peak limit**

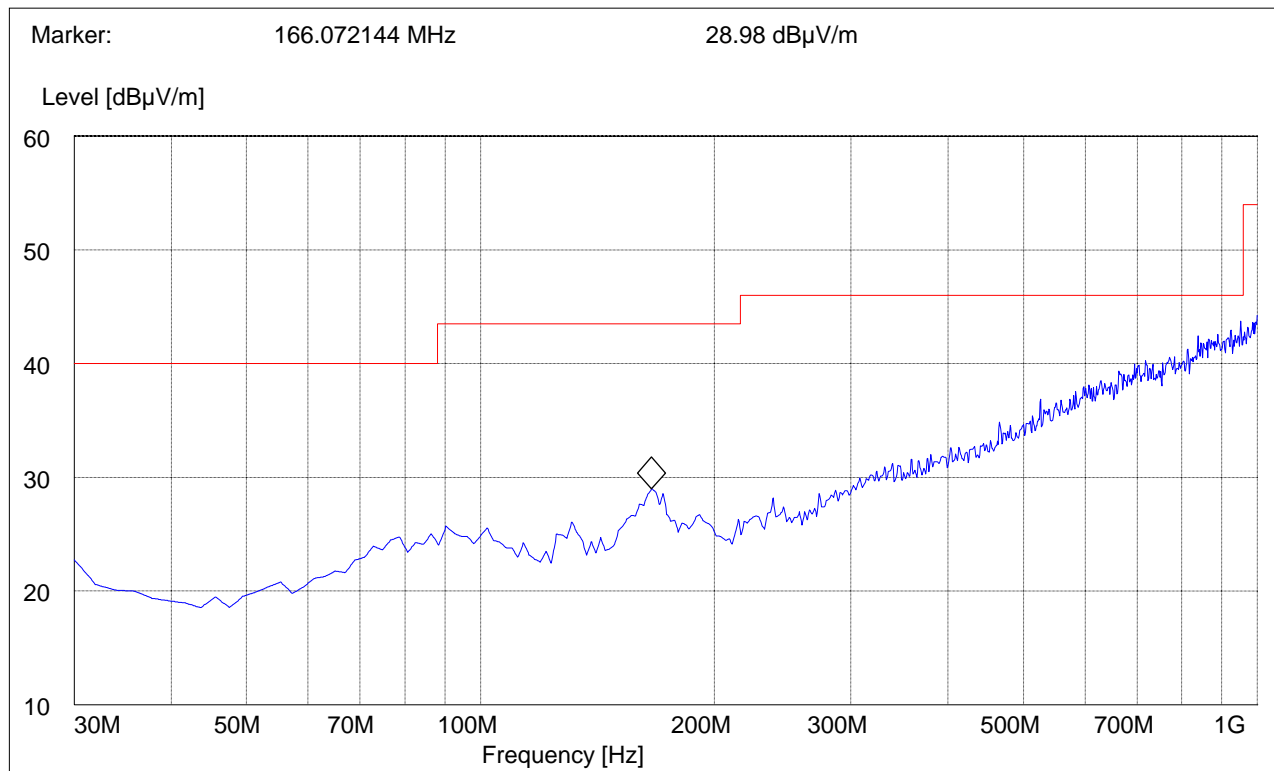


**30MHz – 1GHz**  
**Antenna: horizontal**

Start Frequency	Stop Frequency	Detector	Meas. Time	RBW	VBW
30MHz	1GHz	Max Peak	Coupled	100 KHz	100 KHz

**Note: This plot is valid for low, mid, high channels (worst-case plot)**

**Note: Peak reading vs. Quasi-peak limit**

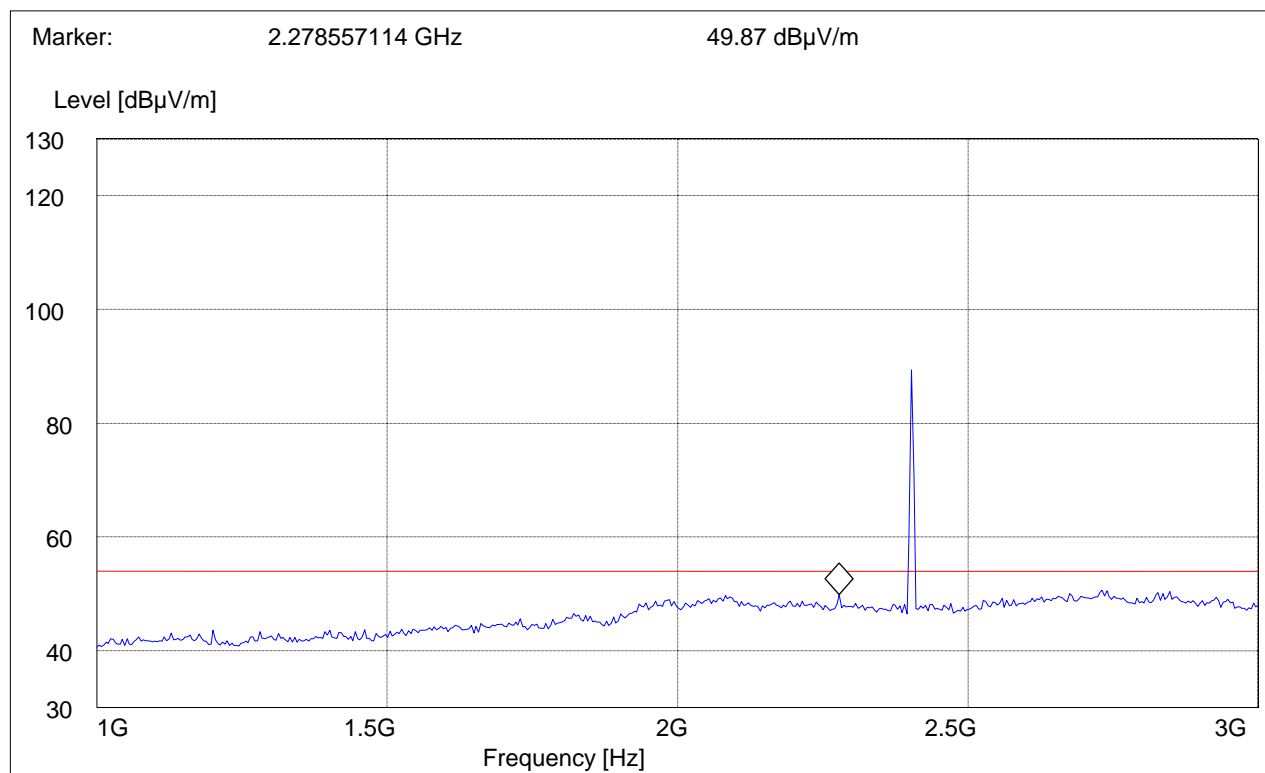


**1-3GHz (2402MHz)**

Start Frequency	Stop Frequency	Detector	Meas. Time	RBW	VBW
1GHz	3GHz	Max Peak	Coupled	1 MHz	1 MHz

**Note: The peaks above the limit line is the carrier freq.**

**Note: Peak Reading vs. Average limit**

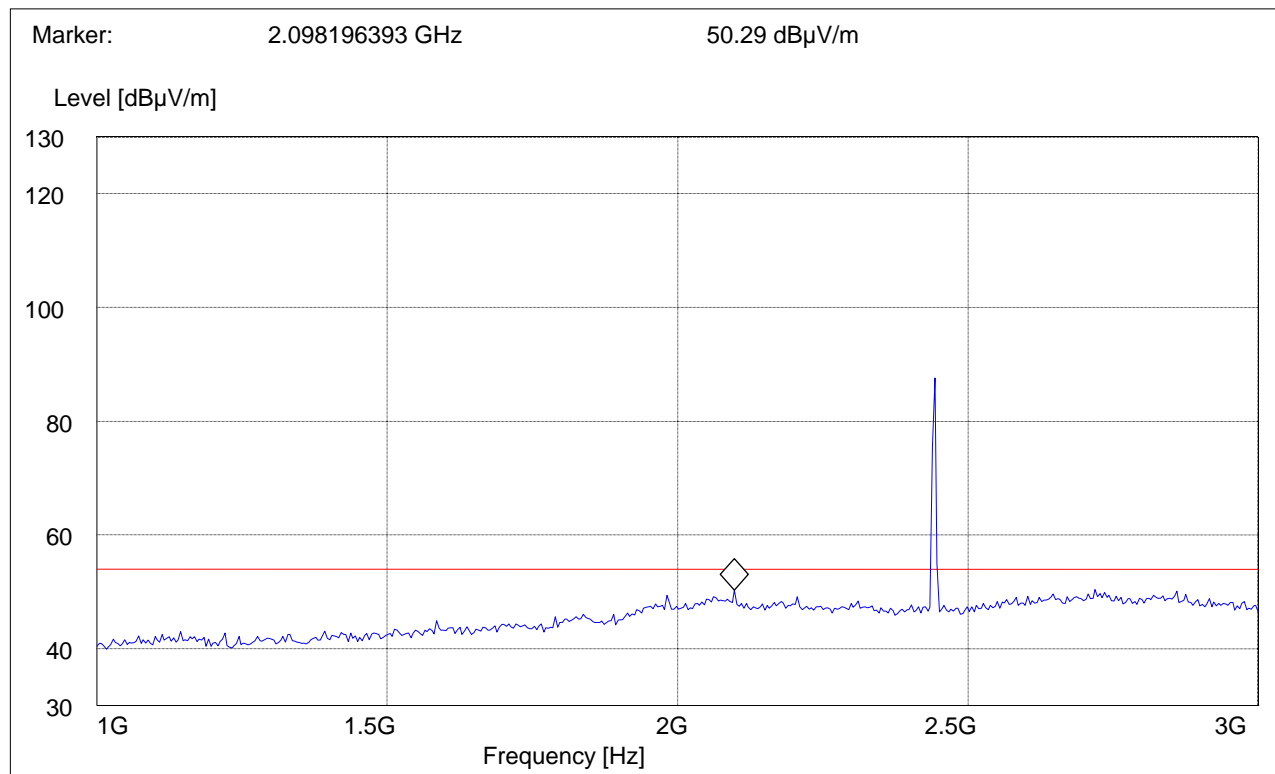


**1-3GHz (2441MHz)**

Start Frequency	Stop Frequency	Detector	Meas. Time	RBW	VBW
1GHz	3GHz	Max Peak	Coupled	1 MHz	1 MHz

**Note: The peaks above the limit line is the carrier freq.**

**Note: Peak Reading vs. Average limit**

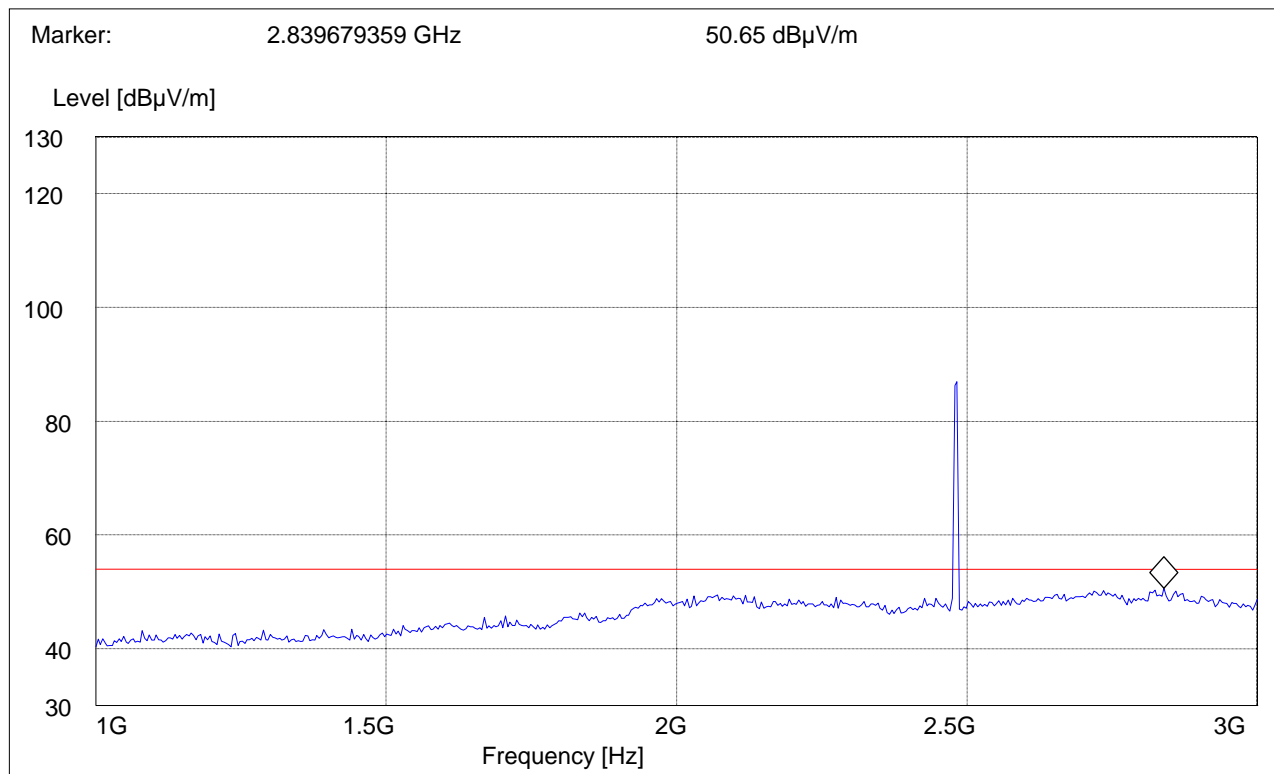


**1-3GHz (2480MHz)**

Start Frequency	Stop Frequency	Detector	Meas. Time	RBW	VBW
1GHz	3GHz	Max Peak	Coupled	1 MHz	1 MHz

**Note: The peaks above the limit line is the carrier freq.**

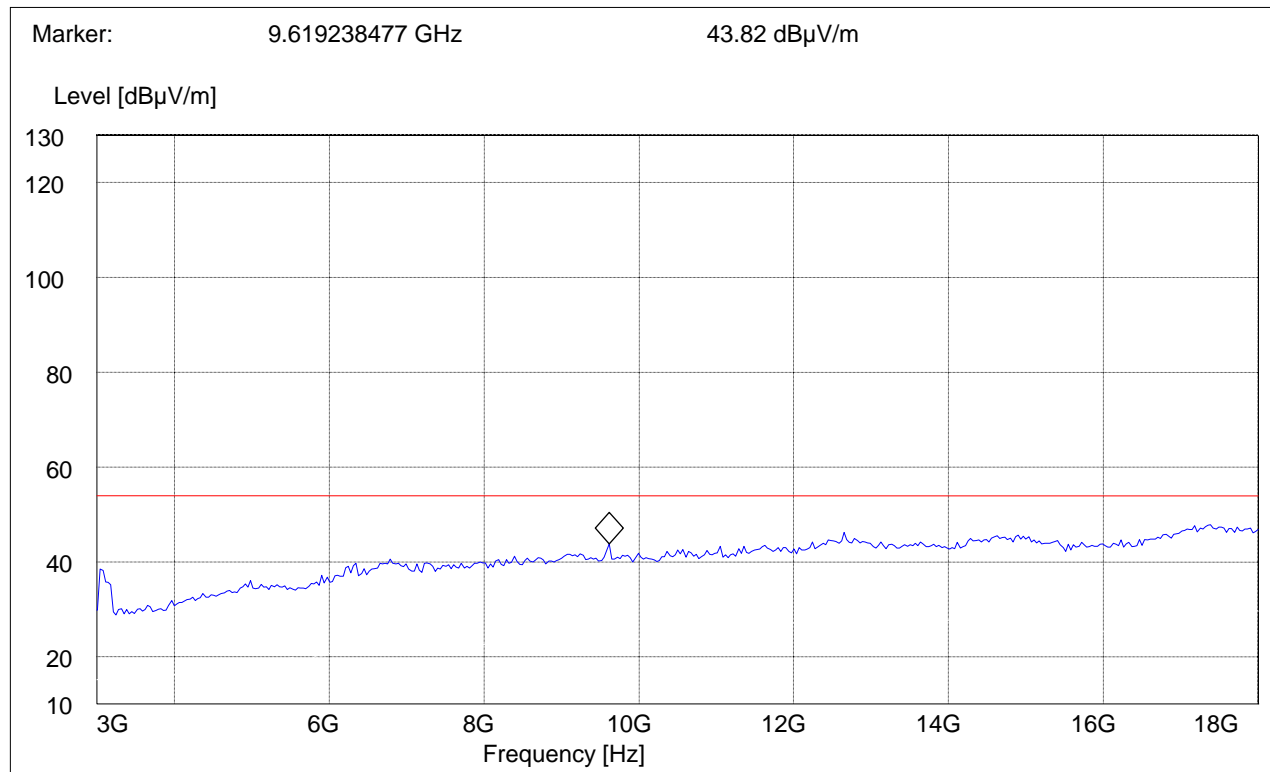
**Note: Peak Reading vs. Average limit**





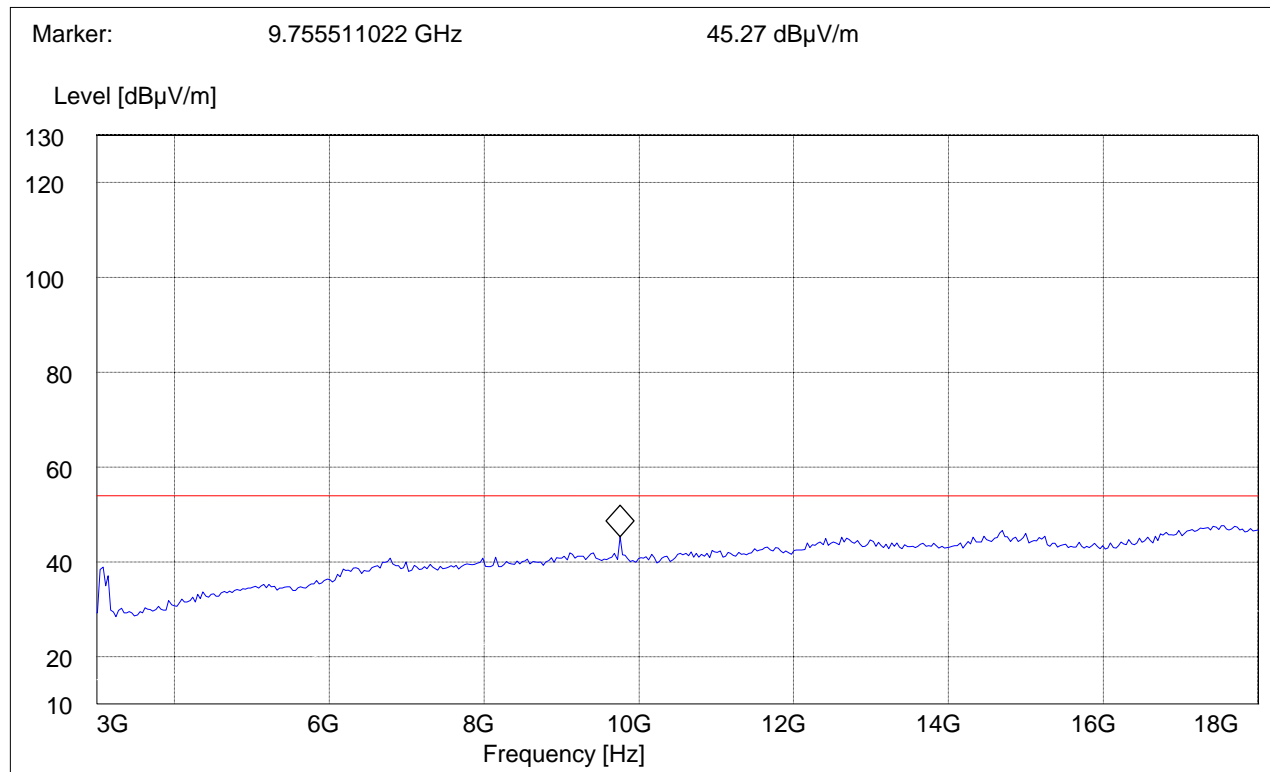
**3-18GHz (2402MHz)**

Start Frequency	Stop Frequency	Detector	Meas. Time	RBW	VBW
3GHz	18GHz	Max Peak	Coupled	1 MHz	1 MHz

**Note: Peak Reading vs. Average limit**

**3-18GHz (2441MHz)**

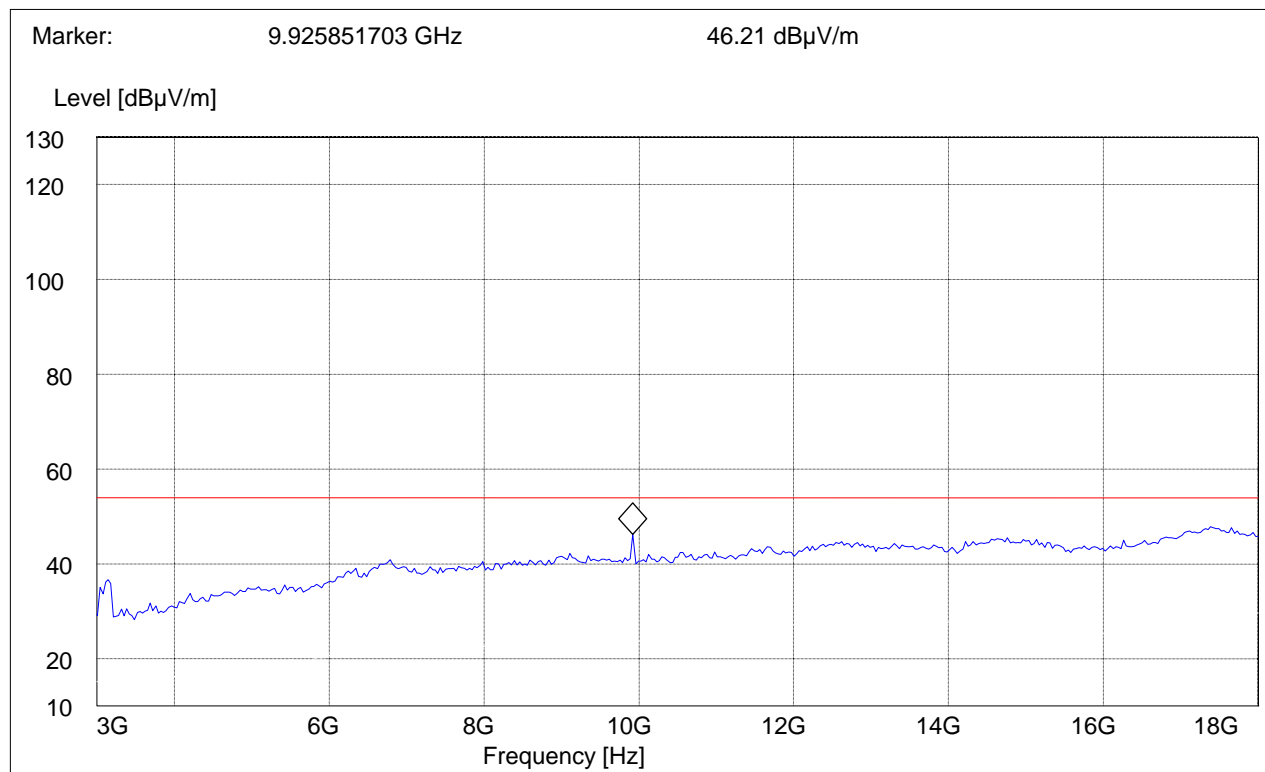
Start Frequency	Stop Frequency	Detector	Meas. Time	RBW	VBW
3GHz	18GHz	Max Peak	Coupled	1 MHz	1 MHz

**Note: Peak Reading vs. Average limit**

**3-18GHz (2480MHz)**

Start Frequency	Stop Frequency	Detector	Meas. Time	RBW	VBW
3GHz	18GHz	Max Peak	Coupled	1 MHz	1 MHz

**Note: Peak Reading vs. Average limit**

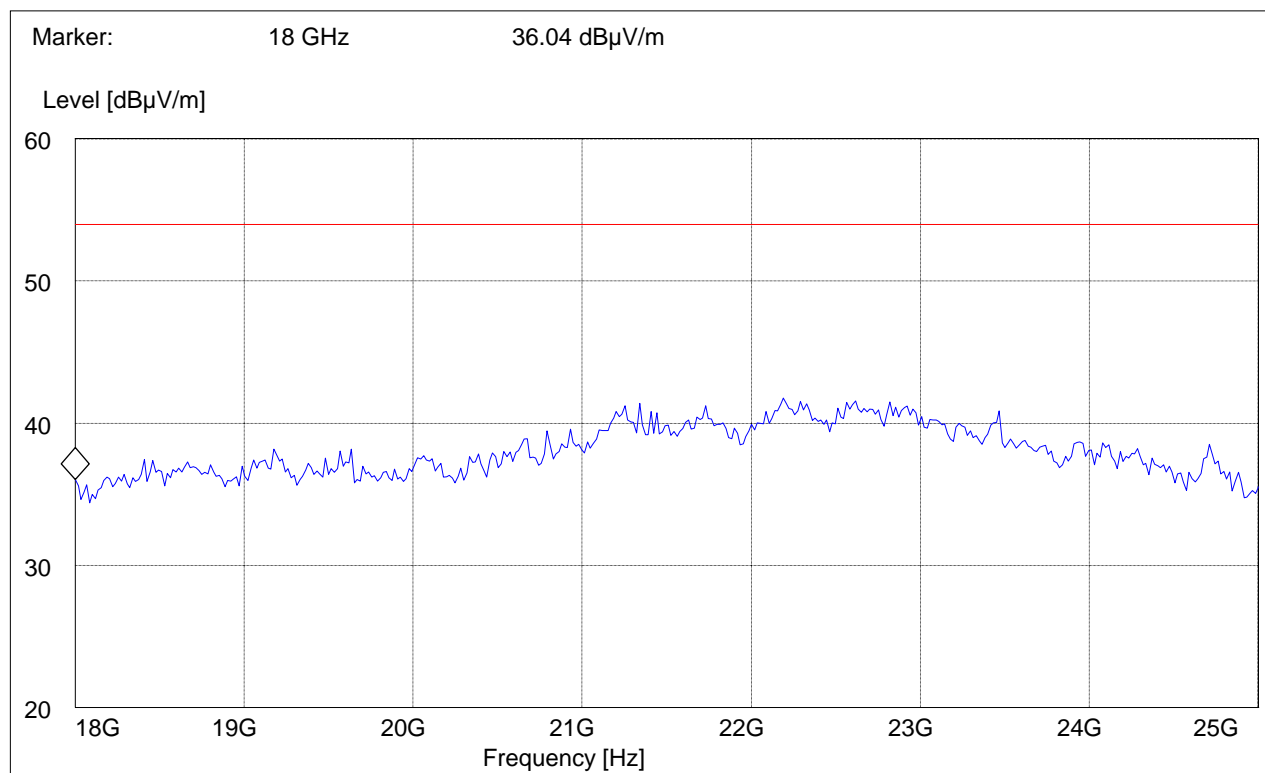


**18-25GHz**

Start Frequency	Stop Frequency	Detector	Meas. Time	RBW	VBW
18GHz	25GHz	Max Peak	Coupled	1 MHz	1 MHz

**Note: This plot is valid for low, mid, high channels (worst-case plot)**

**Note: Peak Reading vs. Average limit**



## 5.10 RECEIVER SPURIOUS RADIATION § 15.209/RSS210

### 5.10.1 LIMITS

Frequency (MHz)	Field strength ( $\mu\text{V/m}$ )	Measurement distance (m)
0.009 - 0.490	2400/F (kHz)	300
0.490 - 1.705	24000/F (kHz)	30
1.705 - 30.0	30	30
30 - 88	100	3
88 - 216	150	3
216 - 960	200	3
above 960	500	3

#### **NOTE:**

1. The radiated emissions were done with different settings, using the relevant pre-amplifiers for the relevant frequency ranges. This is the reason that the graphs show different noise levels. In the range between 3 and 25 GHz very short cable connections to the antenna was used to minimize the noise level.
2. All measurements are done in peak mode using a quasi-peak or average limit , unless specified with the plots.

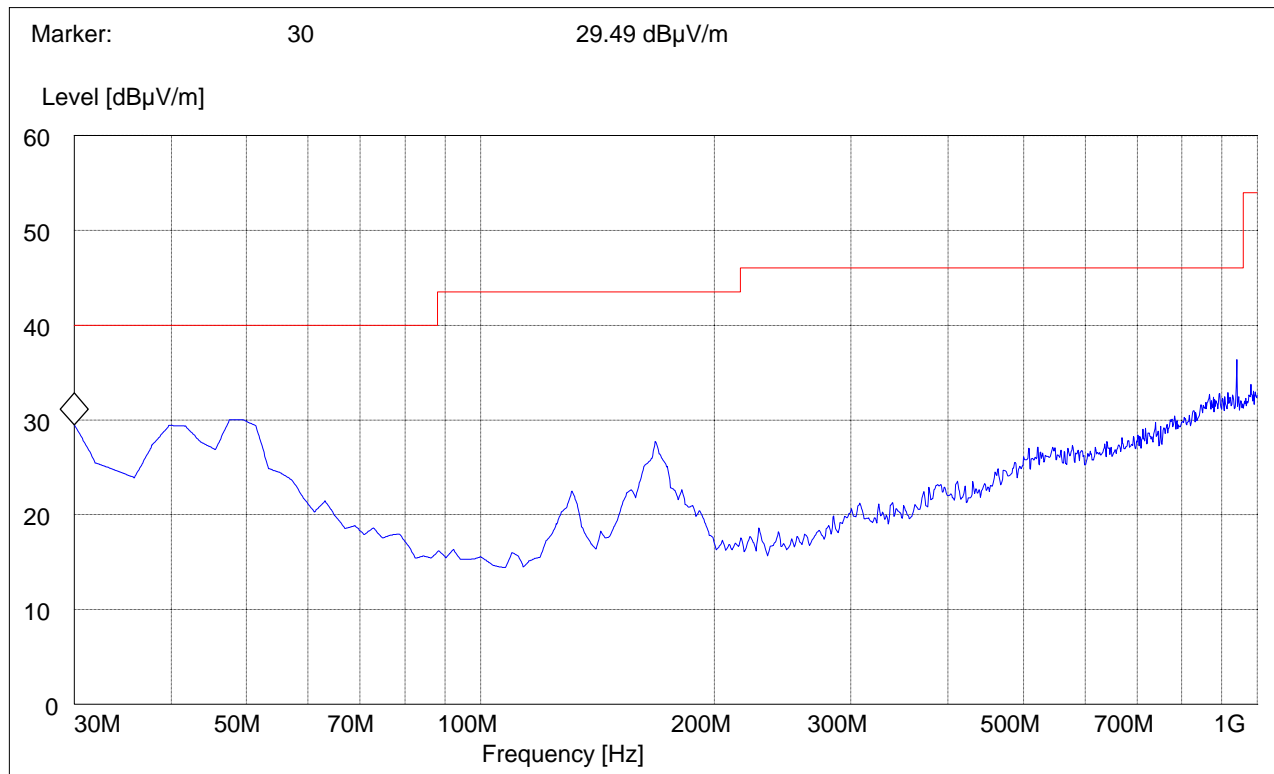
## 5.10.2 RESULTS

**30MHz – 1GHz**

**Antenna: vertical**

Start Frequency	Stop Frequency	Detector	Meas. Time	RBW	VBW
30MHz	1GHz	Max Peak	Coupled	100 KHz	100 KHz

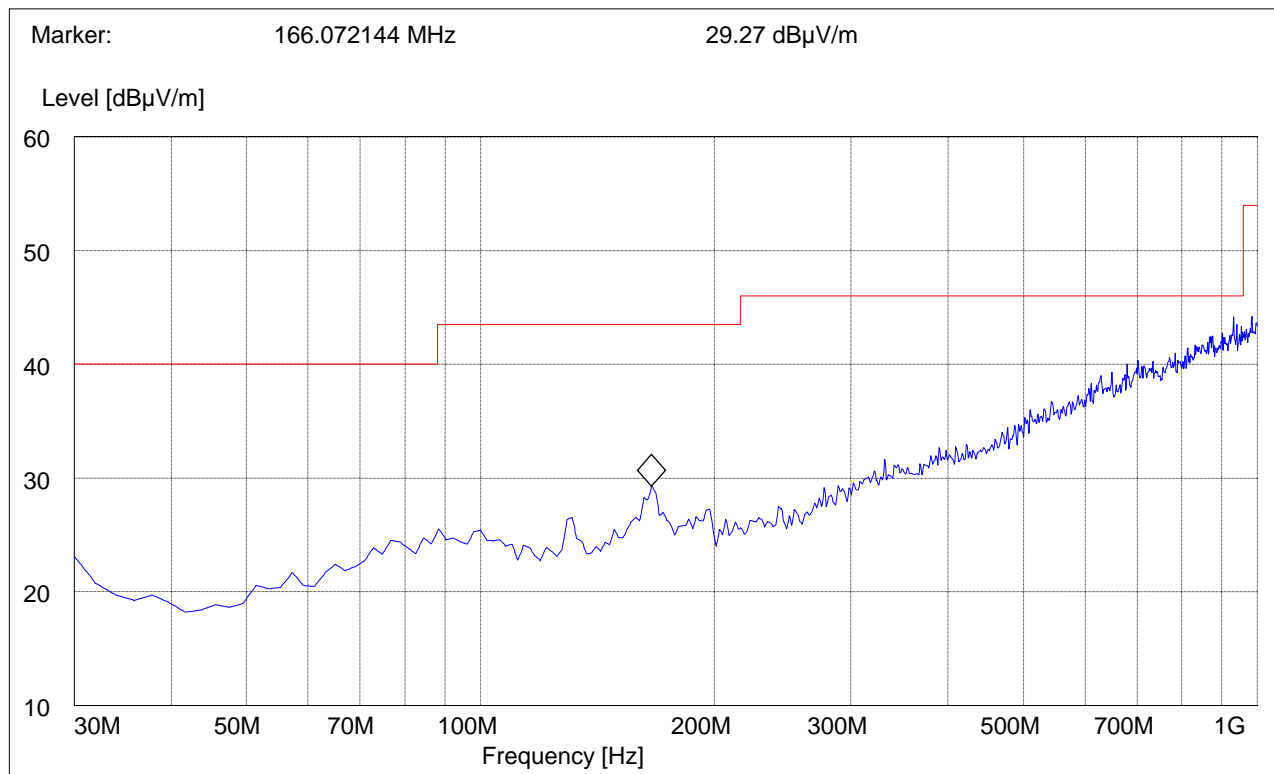
**Note: Peak Reading vs. Quasi-peak limit**



**30MHz – 1GHz**  
**Antenna: horizontal**

Start Frequency	Stop Frequency	Detector	Meas. Time	RBW	VBW
30MHz	1GHz	Max Peak	Coupled	100 KHz	100 KHz

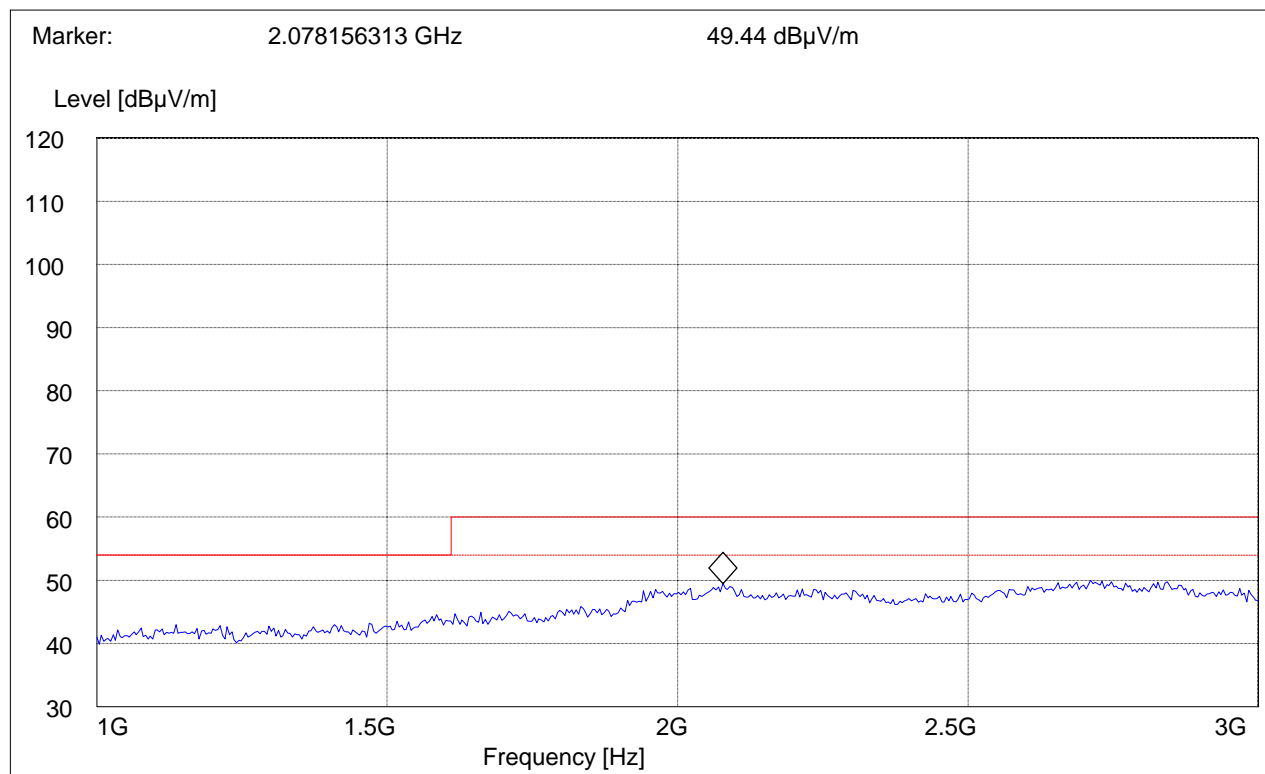
**Note: Peak Reading vs. Quasi-peak limit**



### 1-3GHz

Start Frequency	Stop Frequency	Detector	Meas. Time	RBW	VBW
1GHz	3GHz	Max Peak	Coupled	1 MHz	1 MHz

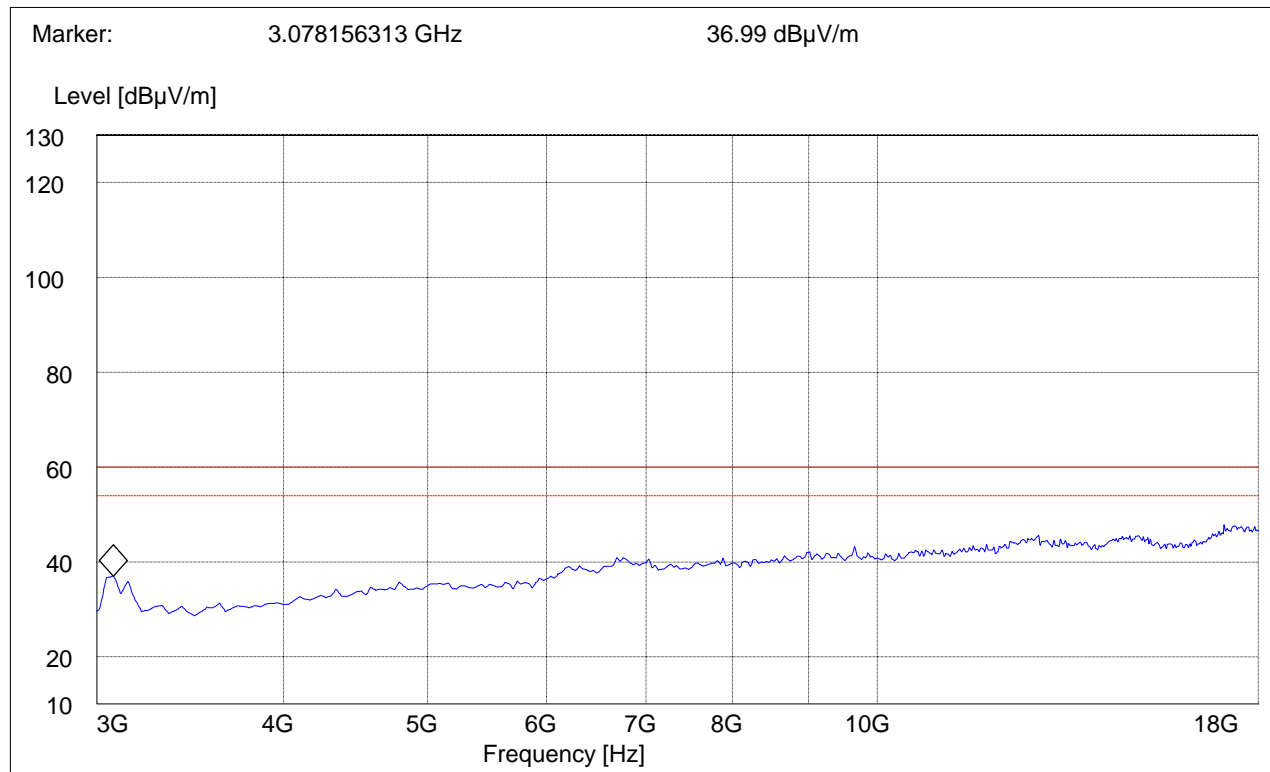
#### Note: Peak Reading vs. Average limit





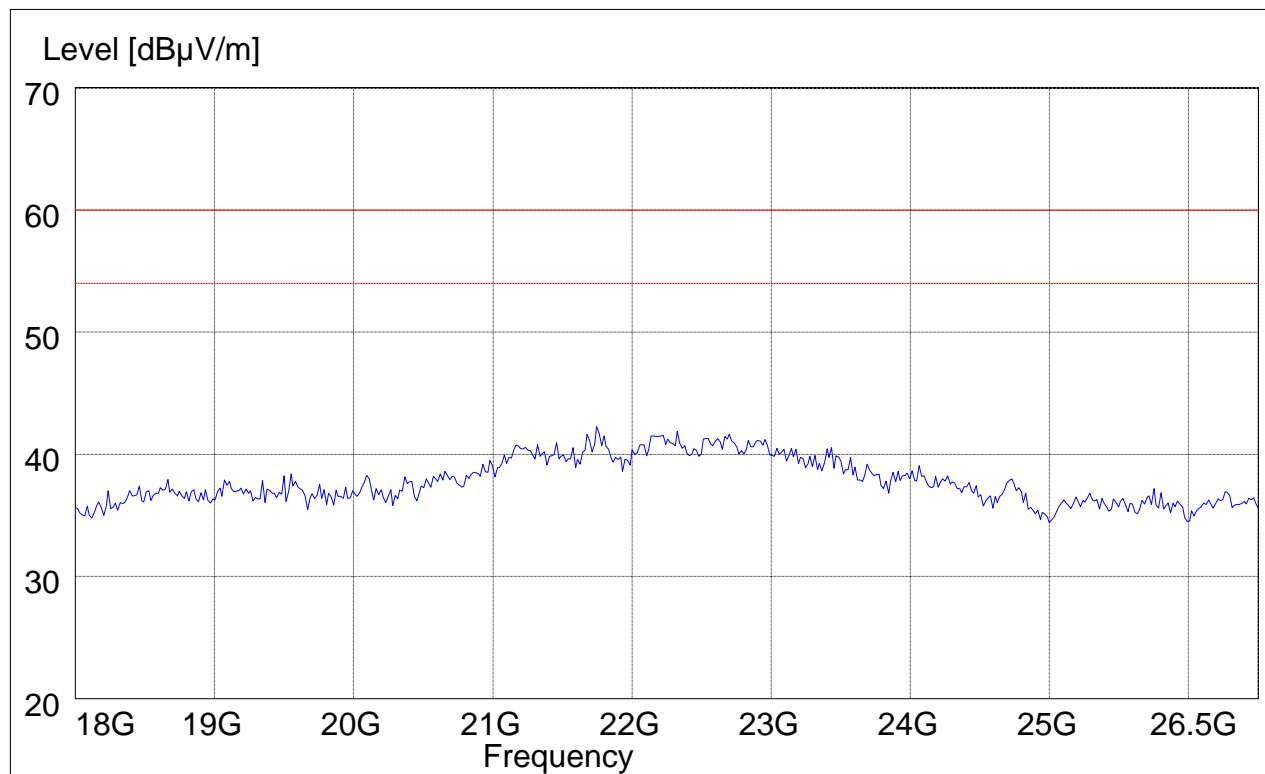
**3-18GHz**

Start Frequency	Stop Frequency	Detector	Meas. Time	RBW	VBW
3GHz	18GHz	Max Peak	Coupled	1 MHz	1 MHz

**Note: Peak Reading vs. Average limit**

**18-25GHz**

Start Frequency	Stop Frequency	Detector	Meas. Time	RBW	VBW
18GHz	25GHz	Max Peak	Coupled	1 MHz	1 MHz

**Note: Peak Reading vs. Average limit**



## **5.11 CO-LOCATION**

All Co-location testing was also performed with the EUT transmitting in the PCS band (1880MHz) and the EUT transmitting in Bluetooth mode(2402MHz).

These channels were deemed worst case due to there EIRP readings. All testing was performed using FCC 15.247 procedures/limits.

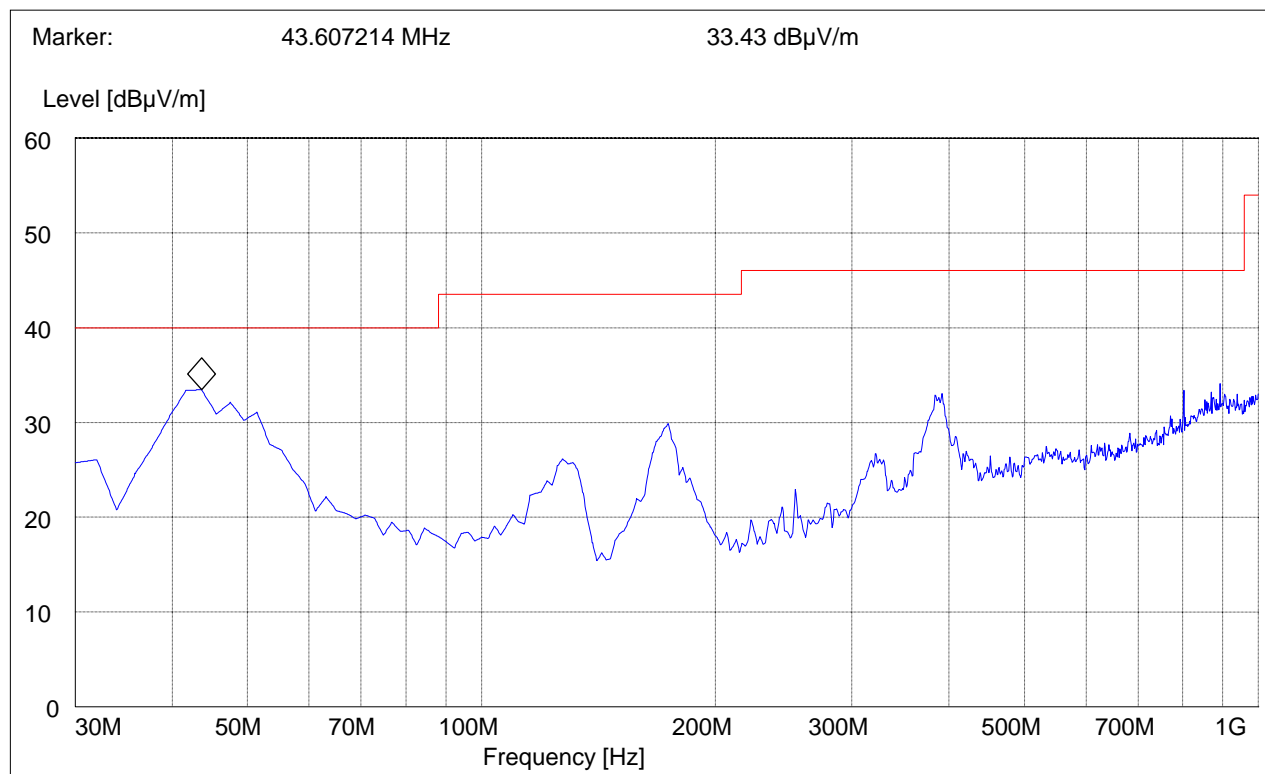
### 5.11.1 RESULTS (PCS AND BLUETOOTH)

**30MHz – 1GHz**

**Antenna: vertical**

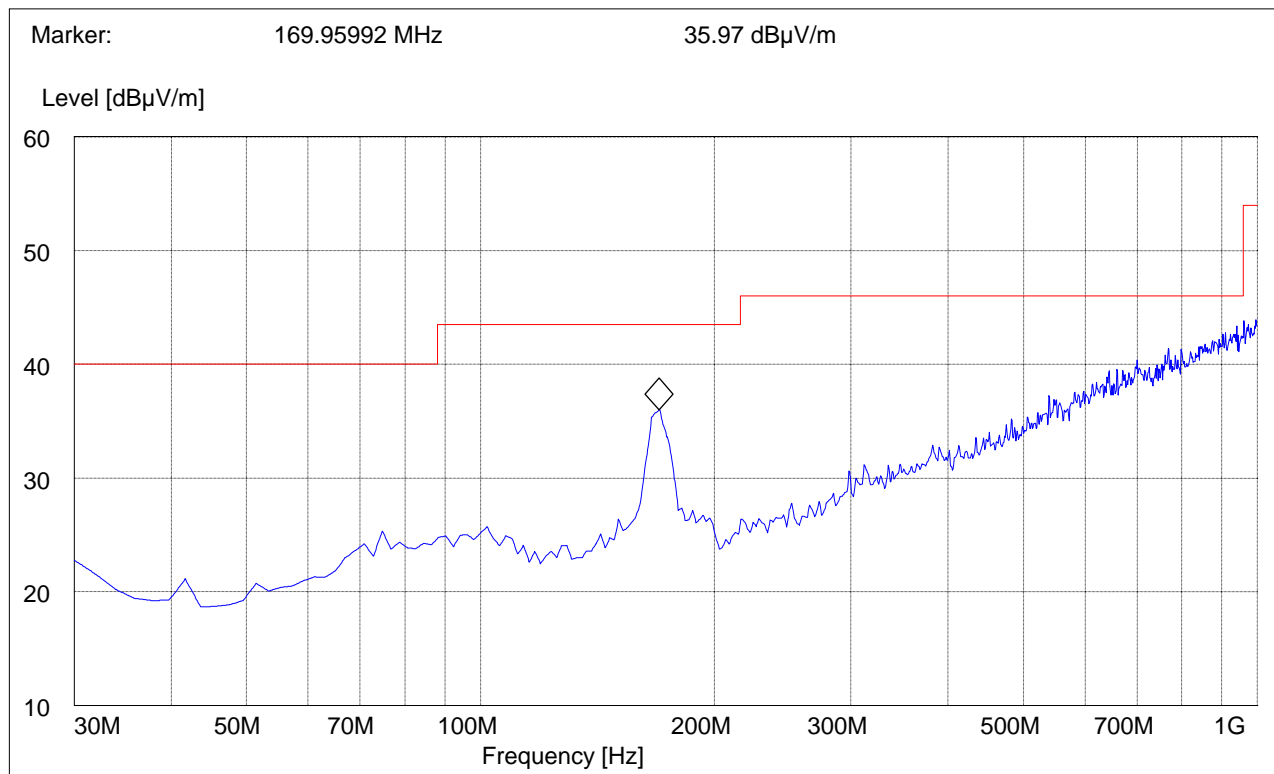
Start Frequency	Stop Frequency	Detector	Meas. Time	RBW	VBW
30MHz	1GHz	Max Peak	Coupled	100 KHz	100 KHz

**Note: Peak Reading vs. Quasi-Peak limit**



**30MHz – 1GHz****Antenna: horizontal**

Start Frequency	Stop Frequency	Detector	Meas. Time	RBW	VBW
30MHz	1GHz	Max Peak	Coupled	100 KHz	100 KHz

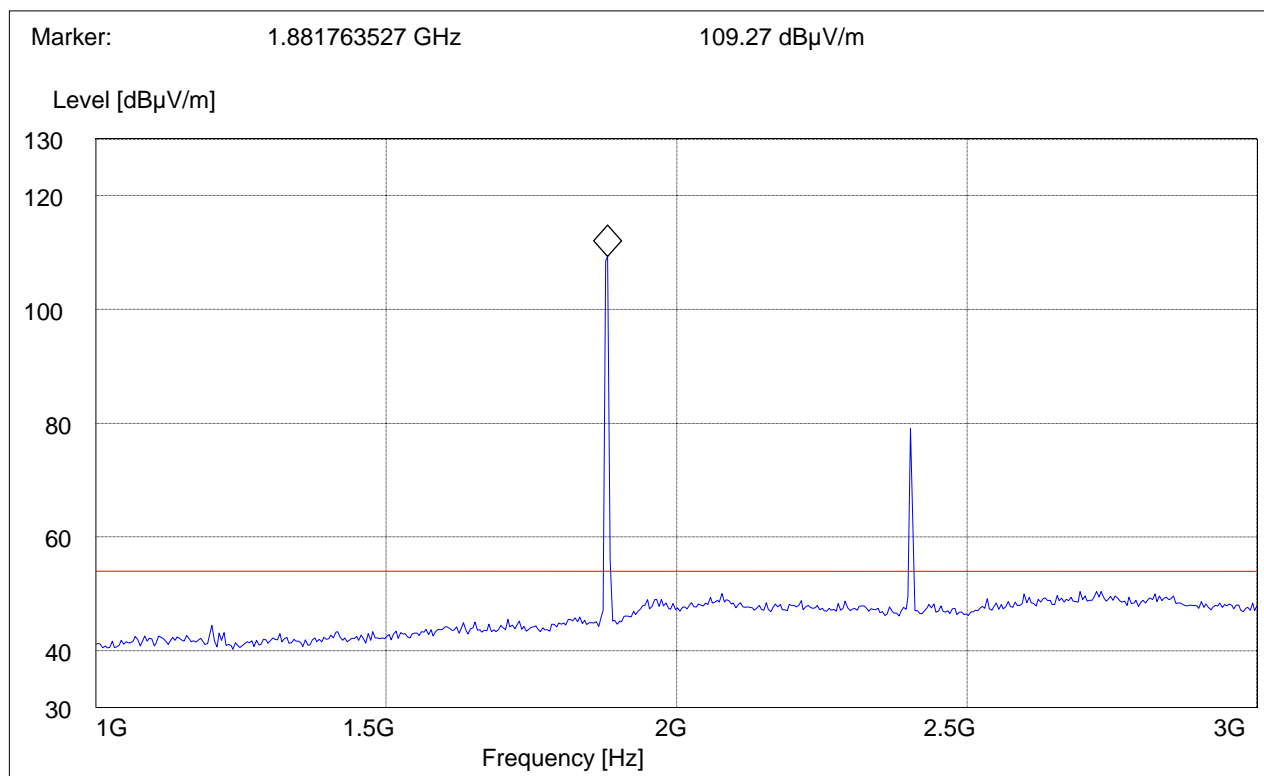
**Note: Peak Reading vs. Quasi-Peak limit**

**1-3GHz**

Start Frequency	Stop Frequency	Detector	Meas. Time	RBW	VBW
1GHz	3GHz	Max Peak	Coupled	1 MHz	1 MHz

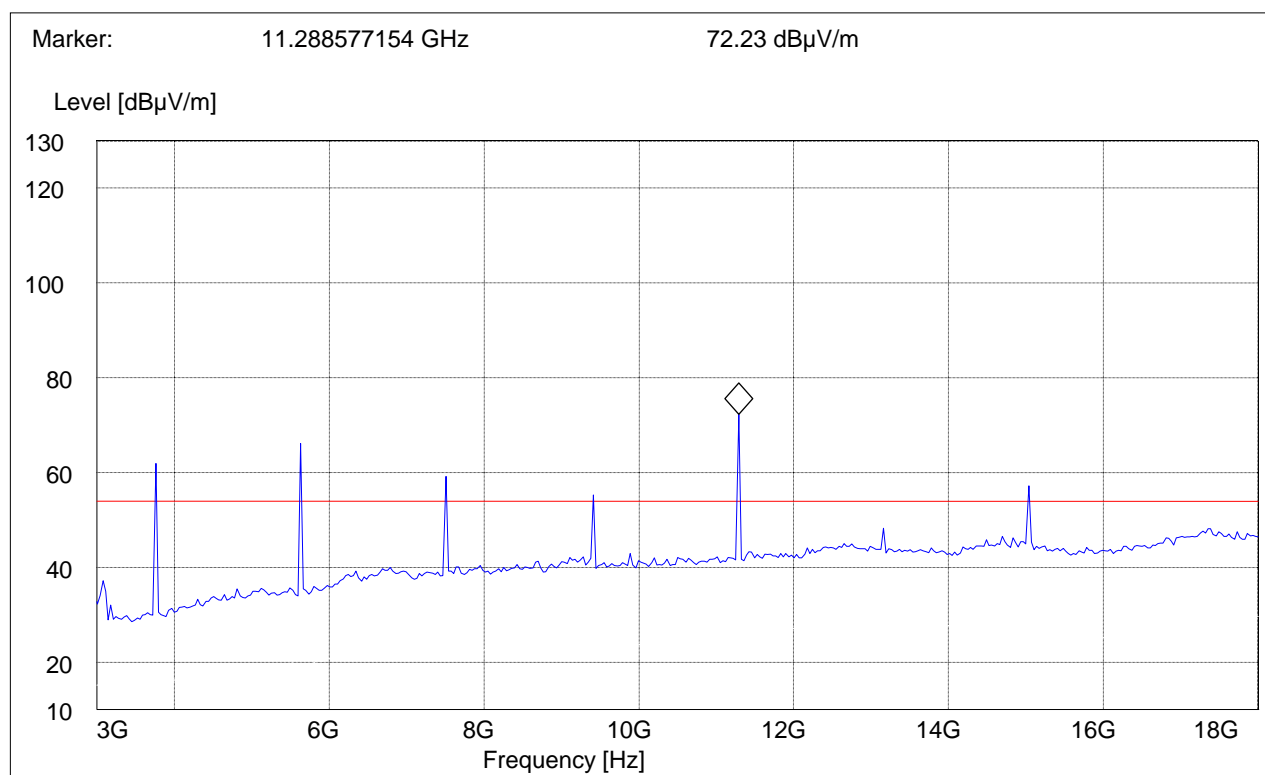
**Note: The peaks above the limit line is the carrier freq of the Bluetooth and PCS transmitter.**

**Note: Peak Reading vs. Average limit**



**3-18GHz**

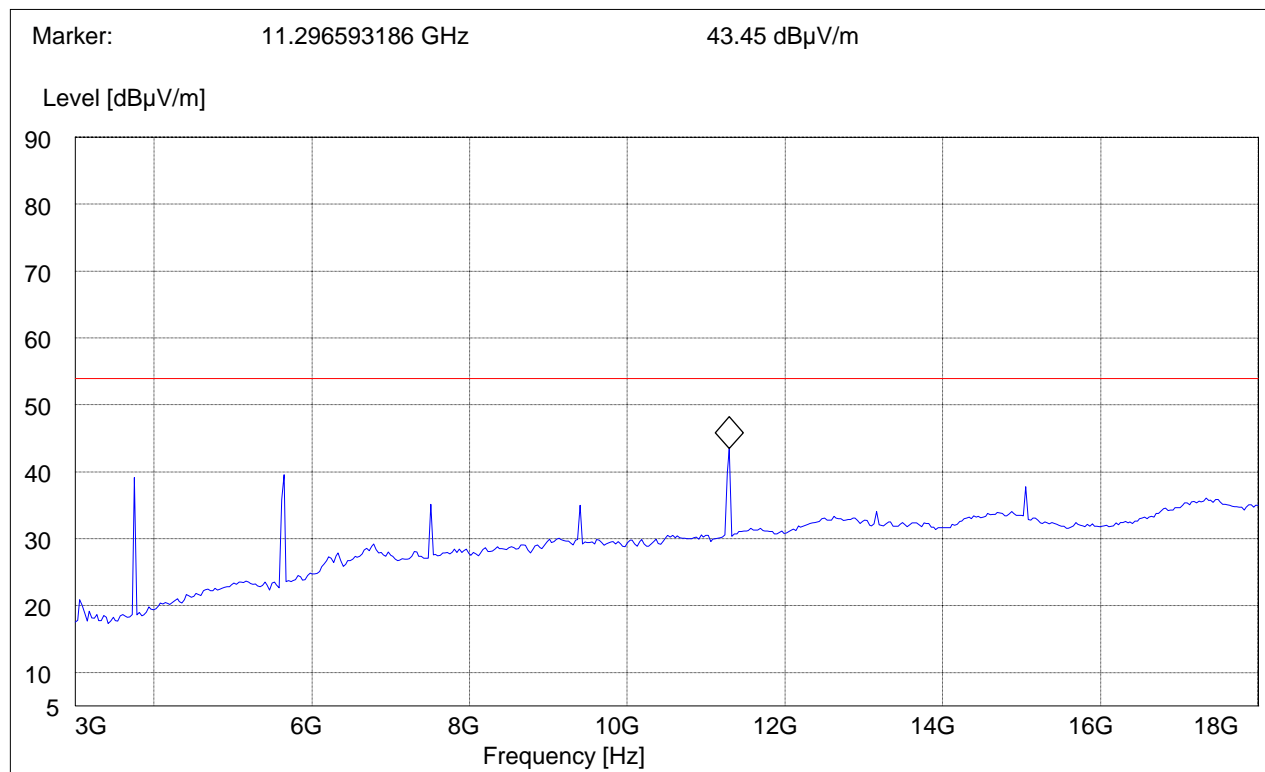
Start Frequency	Stop Frequency	Detector	Meas. Time	RBW	VBW
3GHz	18GHz	Max Peak	Coupled	1 MHz	1 MHz

**Note: Peak Reading vs. Average limit****(SEE NEXT PAGE FOR AVERAGE READING VS. AVERAGE LIMIT)**

### 3-18GHz

Start Frequency	Stop Frequency	Detector	Meas. Time	RBW	VBW
3GHz	18GHz	Max Peak	Coupled	1 MHz	10 Hz

**Note: Average Reading vs. Average limit**

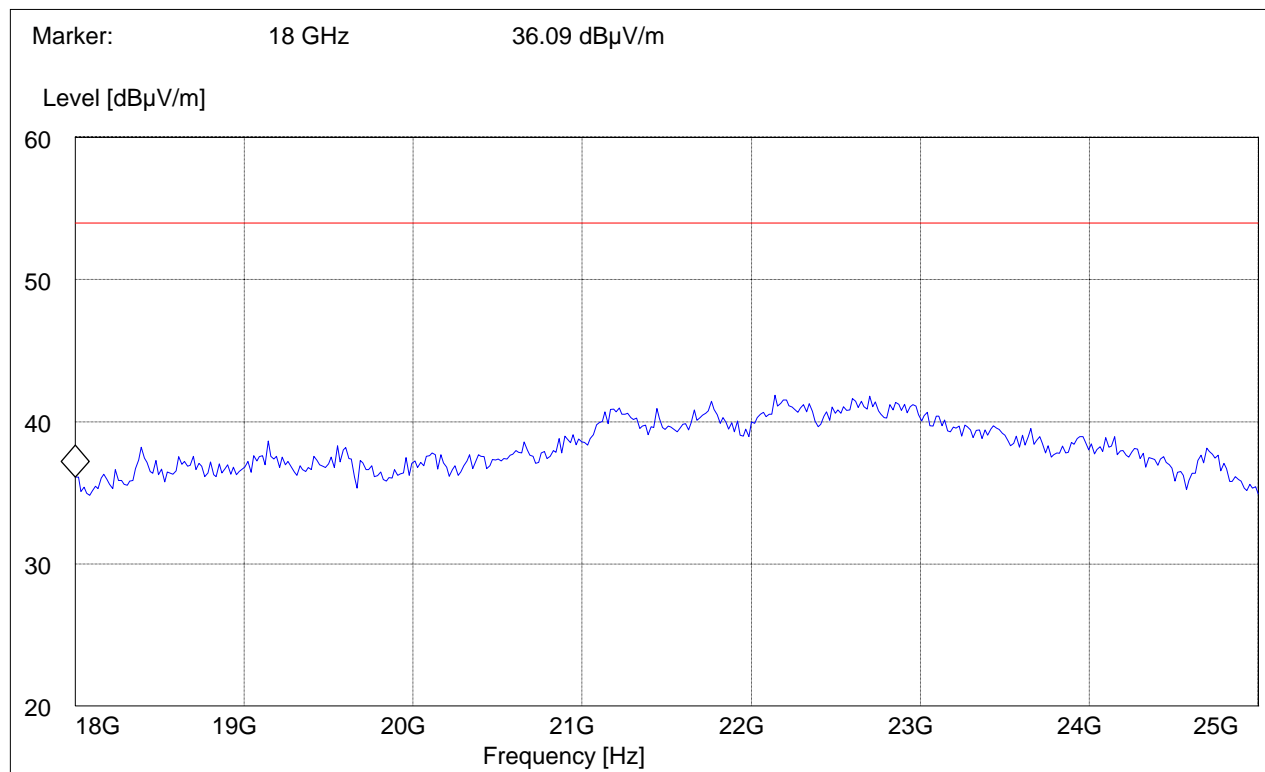




**18-25GHz**

Start Frequency	Stop Frequency	Detector	Meas. Time	RBW	VBW
18GHz	25GHz	Max Peak	Coupled	1 MHz	1 MHz

**Note: Peak Reading vs. Average limit**



## **5.12 AC POWER LINE CONDUCTED EMISSIONS § 15.107/207**

### **5.12.1 LIMITS**

**Technical specification: 15.107 / 15.207 (Revised as of August 20, 2002)**

#### **Limit**

Frequency of Emission (MHz)	Conducted Limit (dB $\mu$ V)	
	Quasi-Peak	Average
0.15 – 0.5	66 to 56*	56 to 46*
0.5 – 5	56	46
5 – 30	60	50
* Decreases with logarithm of the frequency		

**ANALYZER SETTINGS: RBW = 10KHz VBW = 10KHz**

**\*ALL MEASUREMENTS WERE DONE IN CO-LOCATION MODE WITH DUAL TRANSMITTERS**

## 5.12.2 RESULTS

Measured with AC/DC power adapter by GLOBTEK, INC. P/N: WR91E1500L.CP-D

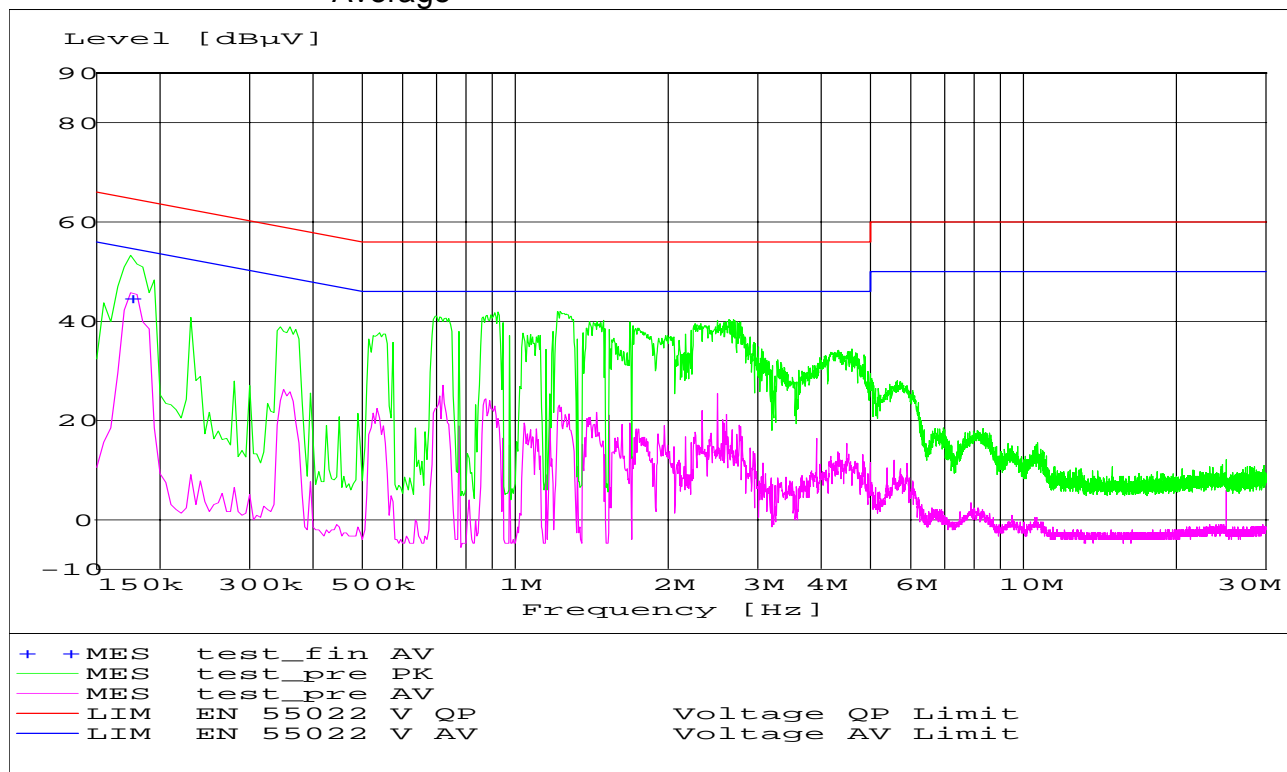
LISN

411 Dixon Landing Road, CA 95035

EUT / Description: SP640 / Bluetooth & PCS 1900 device  
Manufacturer: Wideray  
Test mode: TX@2402MHz bluetooth, PCS 1900 traffic channel-661  
Test Engineer: neelesh  
Phase: L & N  
Comment: 110 volt  
GLOBTEK power adapter  
Start of Test: 9/14/2005 / 12:11:20PM

SCAN TABLE: "EN 55022 Voltage"

Short Description:		EN 55022 Voltage				
Start	Stop	Step	Detector	Meas.	IF	
Transducer						
Frequency	Frequency	Width		Time	Bandw.	
150.0 kHz	30.0 MHz	5.0 kHz	MaxPeak	10.0 ms	9 kHz	None
Average						





MEASUREMENT RESULT: "test\_fin AV"

9/14/2005 12:14PM

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Line	PE
0.175000	44.70	0.0	55	10.0	L1	GND

**5.13 TEST EQUIPMENT AND ANCILLARIES USED FOR TESTS**

<b>No</b>	<b>Instrument/Ancillary</b>	<b>Type</b>	<b>Manufacturer</b>	<b>Serial No.</b>
<b>01</b>	Spectrum Analyzer	ESIB 40	Rohde & Schwarz	100107
<b>02</b>	Spectrum Analyzer	FSEM 30	Rohde & Schwarz	826880/010
<b>03</b>	Biconilog Antenna	3141	EMCO	0005-1186
<b>04</b>	Horn Antenna (700M-18GHz)	SAS-200/571	AH Systems	325
<b>05</b>	Horn Antenna (18-26.5GHz)	3160-09	EMCO	1240
<b>06</b>	2-3GHz Band reject filter	BRM50701	Microtronics	6
<b>07</b>	Power-Meter	NRVD	Rohde & Schwarz	0857.8008.02
<b>08</b>	Pre-Amplifier	TS-ANA	Rohde & Schwarz	--
<b>09</b>	Pre-Amplifier	JS4-00102600	Miteq	00616

## 5.14 BLOCK DIAGRAMS

### Radiated Testing

