



## Certification Test Report

CFR 47 FCC Part 15, Subpart C Section  
15.247 and Industry Canada RSS 210, Issue 6

Model: NXR-ZGW Gateway  
NXR-ZRP Repeater

FCC ID.: CWU-NXR-ZGW

Project Code: W6373  
(Report W6373-WIRELESS-2)  
Revision: 1

**Prepared for:** AMX  
3000 Research Dr.  
Richardson, TX  
75082 USA

**Author:** Tom Tidwell

**Issued:** 19 December, 2006

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# Report Summary NTS Plano

Accreditation Numbers: FCC: 101741  
IC: 46405-4319 File # IC-4319A-1  
Standards A2LA Laboratory Cert. No. 0214.19

Applicant: AMX  
3000 Research Dr.  
Richardson, TX  
75082 USA

Customer Representative: Tuan Tran

### EUT Description:

EUT Description	Manufacturer	Model	Revision	Serial Number
The equipment tested is part of a digital transmission system	AMX	NXR-ZGW NXR-ZRP	A	579101PBETA3660020

Model differences: The NXR-ZGW and NXR-ZRP are identical units except that the NXR-ZRP (repeater) unit does not have an active Ethernet interface. Although the NXR-ZRP is called a repeater unit, it is a fully functional transceiver and does not act as a booster or amplifier within the system. The NXR-ZGW model was fully tested to demonstrate compliance of both models.

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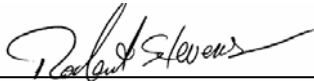


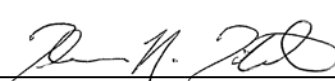
### Test Summary

Appendix	Test/Requirement Description	Deviations from:			Pass / Fail	Applicable Rule Parts
		Base Standard	Test Basis	NTS Procedure		
A	TX 6 dB Bandwidth	No	No	No	PASS	15.247
B	TX Peak Power Output	No	No	No	PASS	15.247
C	TX Peak Power Density	No	No	No	PASS	15.247
D	TX Conducted Spurious Emissions	No	No	No	PASS	15.247, 15.205
E	TX Conducted Spurious Emissions Band edge	No	No	No	PASS	15.247, 15.205
F	TX Radiated Spurious Emissions 30 MHz- 25 GHz	No	No	No	PASS	15.247, 15.205
G	AC Power line Conducted Emissions	No	No	No	PASS	15.207

Test Result: The product presented for testing complied with test requirements as shown above.

This is to certify that the preceding report is true and correct to the best of my knowledge.

  
 \_\_\_\_\_  
 Robert Stevens,  
 Quality Assurance Manager

  
 \_\_\_\_\_  
 Tom Tidwell,  
 Wireless Test Engineer

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**Register of revisions**

Revision	Reason for Revision	Revision Date
0	Original	19 Dec., 2006
1	Changed model number to NXR-ZRP from NXR-ZRD	19 Dec., 2006

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## 1.0 INTRODUCTION

### 1.1 PURPOSE

The purpose of this document is to describe the tests applied by NTS Plano to demonstrate compliance of the NXR-ZGW and NXR-ZRP to FCC Part 15 Subpart C section 15.247 for DTS transmitter.

## 2.0 EUT DESCRIPTION

### 2.1 CONFIGURATION

#### Description of EUT

	Name	Model	Revision	Serial Number
EUT	Gateway/Repeater	NXR-ZGW	A	579101PBETA3660020
RF Exposure Classification	Mobile (>20 cm. separation from user)			
Channels/Frequency Range	2405 – 2480 MHz			
Power	-2 dBm at antenna			
Antenna	1/2 λ with 90 degree swivel, nominal 3 dBi gain			
Functional Description	Both the gateway (NXR-ZGW) and the repeater (NXR-ZRP) are digital transmission system transceivers with a data rate of 250 kb/s. Modulation is O-QPSK with a symbol rate of 62.5 ksymb/s. The chip rate for spreading is 32 x the symbol rate (2 Mchip/s).			

#### 2.1.1 EUT POWER

Voltage	12 Vdc supplied from debug board
Number of Feeds	+V and Return

### 2.2 EUT CABLES

Quantity	Model/Type	Routing		Shielded / Unshielded	Description	Cable Length (m)
		From	To			
1	GlobTek	Power supply	EUT	Unshielded	Permanently attached to power supply	1.7

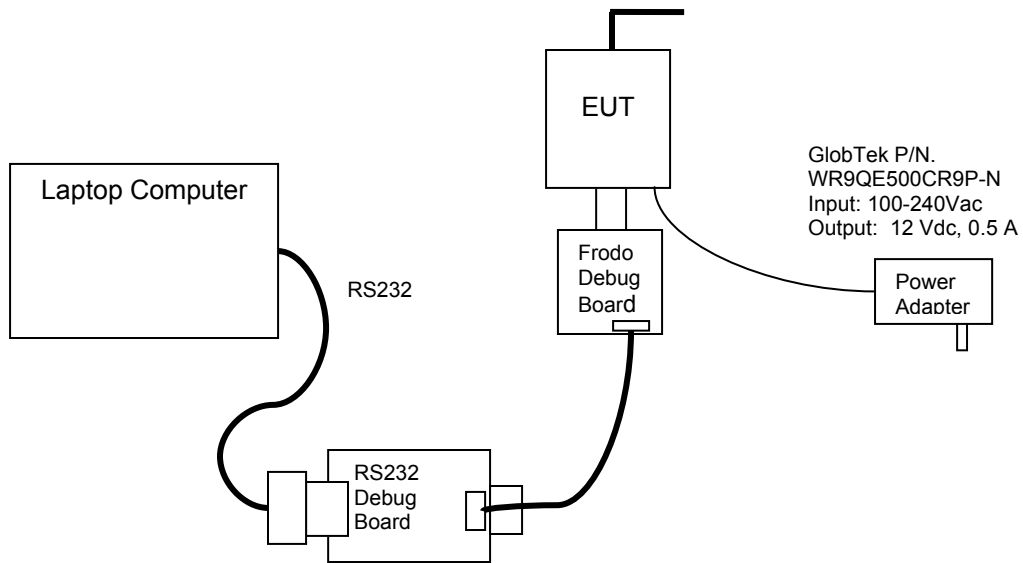
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**2.3 MODE OF OPERATION DURING TESTS**

The NXR-ZGW and NXR-ZRP was tested while in a continuous transmit mode. The EUT was tuned to a low, middle, and high channel for all tests. The EUT continuously transmitted a modulated packet with payload. While transmitting the EUT was setup to operate at the intended maximum power output available to the end user. For all test cases pre-scans were completed in all modes to determine worst case levels.

**3.0 SUPPORT EQUIPMENT**

**3.1 CONFIGURATION**



**3.2 TEST BED/PERIPHERAL CABLES**

NA

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## APPENDICES

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### APPENDIX A: 6 DB BANDWIDTH

#### A.1. Base Standard & Test Basis

<b>Base Standard</b>	FCC PART 15.247 (A)
<b>Test Basis</b>	RF conducted as per FCC Publication 558074
<b>Test Method</b>	RF conducted as per FCC Publication 558074

#### A.2. Specifications

15.247 2) Systems using digital modulation techniques may operate in the 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.

#### A.3. Measurement Uncertainty

<b>Expanded Uncertainty (K=2)</b>
1.2 dB / .01 ppm

#### A.4. Deviations

Deviation Number	Time & Date	Description and Justification of Deviation	Deviation Reference			Approval
			Base Standard	Test Basis	NTS Procedure	
none						

#### A.5. Test Procedure

RF conducted as per FCC Publication 558074

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**A.6. Test Results**

The EUT is in compliance with the limits as specified above

Channel	6 dB Bandwidth (MHz)
2405 MHz	1.62
2440 MHz	1.61
2480 MHz	1.57

**A.7. Operating Mode During Test**

The NXR-ZGW and NXR-ZRP was tested while in a continuous transmit mode. The EUT was tuned to a low, middle, and high channel. The EUT continuously transmitted a modulated packet with a payload. While transmitting the EUT was set to operate at maximum power.

**A.8. Sample Calculation**

NA

**A.9. Test Data**

See plots on following pages

**A.10. Tested By**

Name: Tom Tidwell  
Function: Manager of Wireless Services  
Date: 7 Dec., 2006

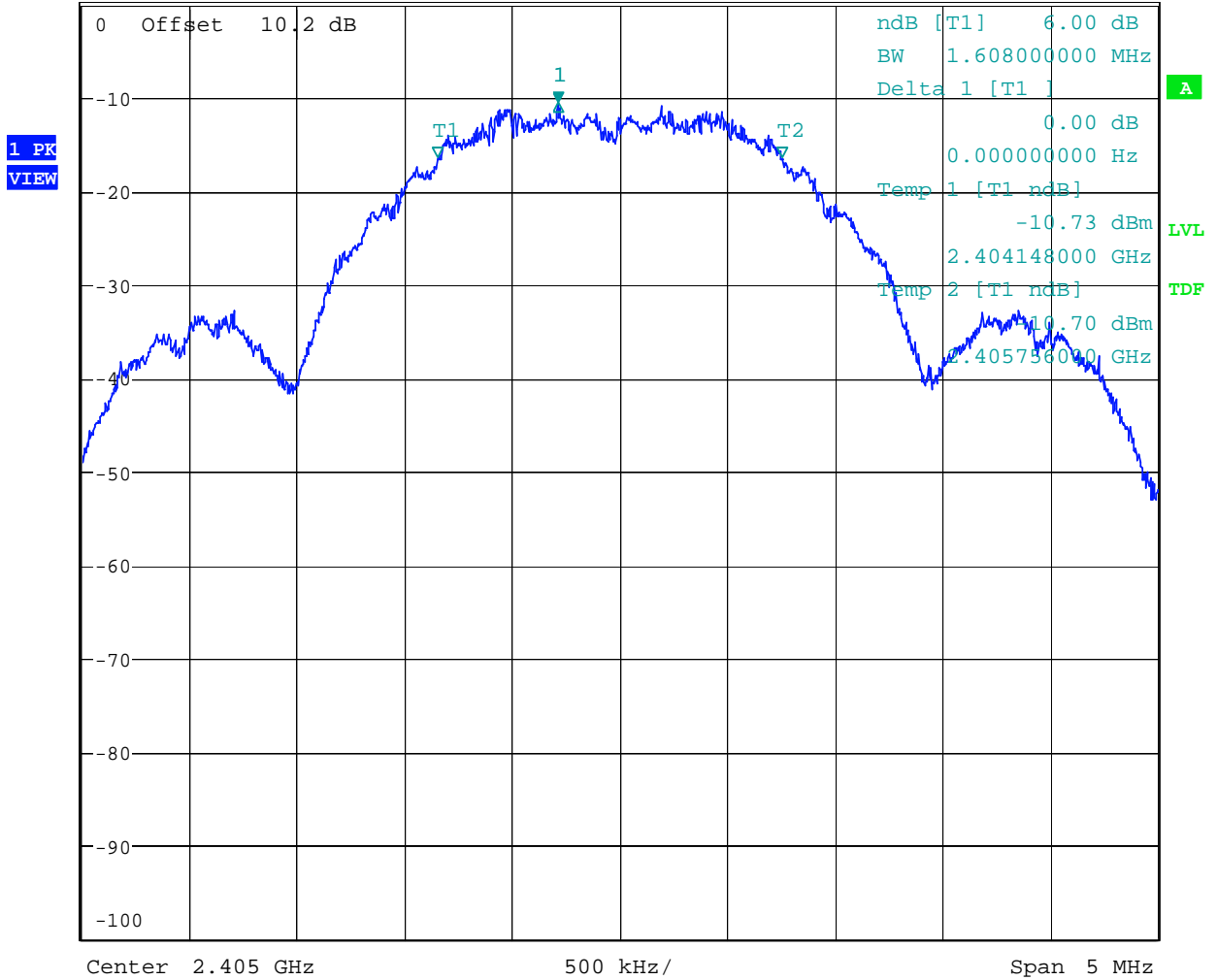
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Figure 1 6 dB Bandwidth Low Channel – 2405 MHz



\*RBW 100 kHz      Marker 1 [T1 ]  
 VBW 300 kHz      -4.90 dBm  
 Ref 6 dBm      Att 5 dB      SWT 10 ms      2.404708000 GHz



Date: 15.DEC.2006 23:25:34

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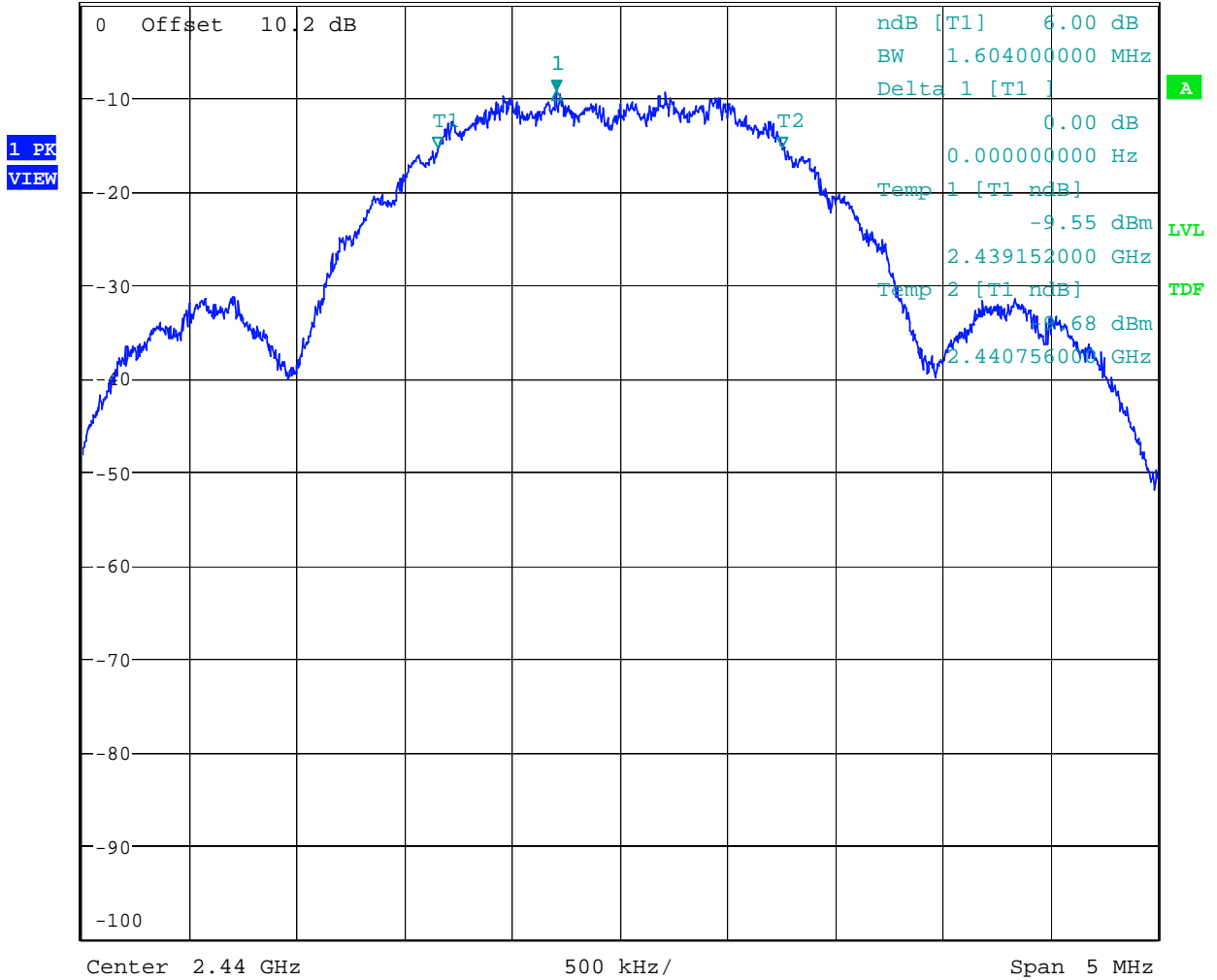
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Figure 2 6 dB Bandwidth Mid Channel – 2440 MHz



\*RBW 100 kHz      Marker 1 [T1 ]  
 VBW 300 kHz      -3.45 dBm  
 Ref 6 dBm      Att 5 dB      SWT 10 ms      2.439700000 GHz



Date: 15.DEC.2006 23:26:33

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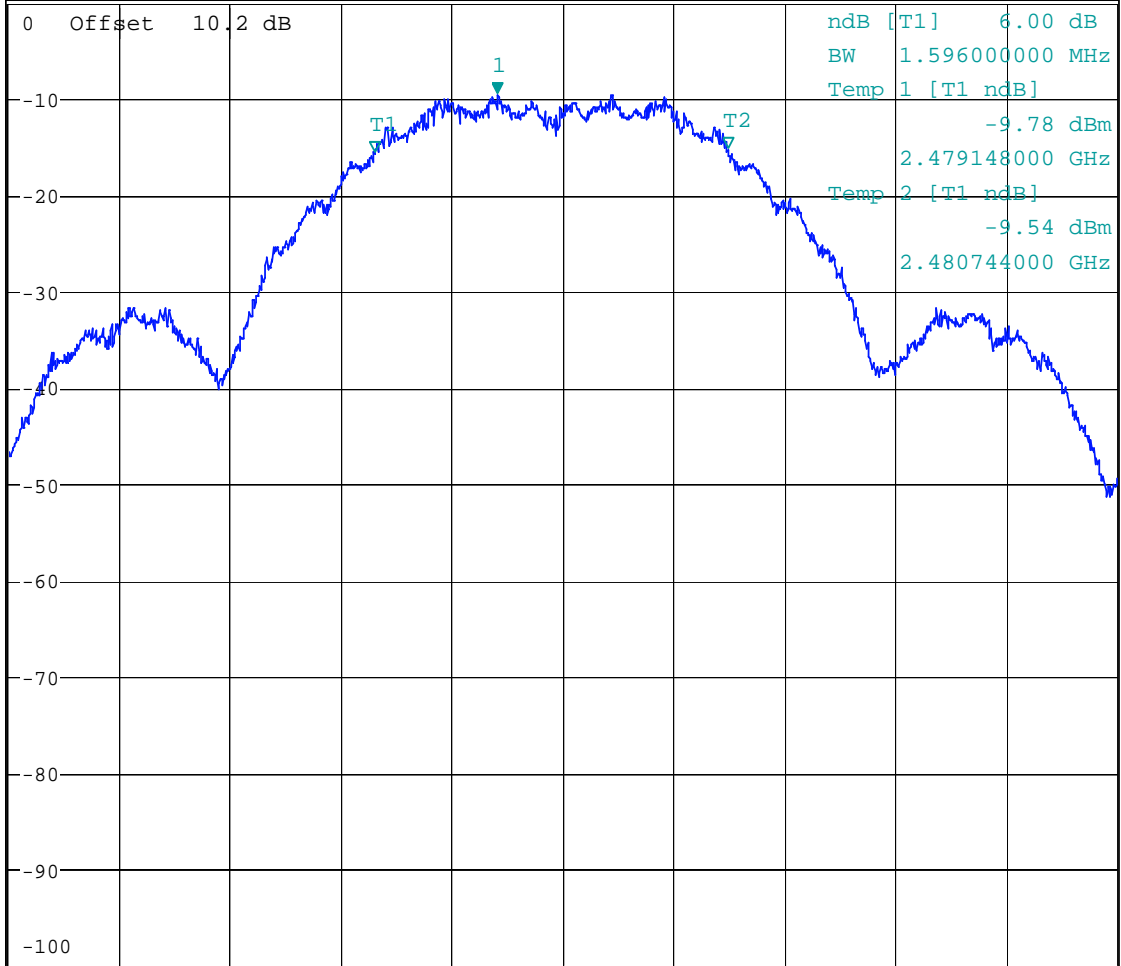
Figure 3 6 dB Bandwidth Upper Channel – 2480 MHz



MARKER 1  
 2.479704 GHz  
 Ref 6 dBm Att 5 dB

\*RBW 100 kHz Marker 1 [T1 ]  
 VBW 300 kHz -3.67 dBm  
 SWT 10 ms 2.479704000 GHz

1 PK VIEW



Center 2.48 GHz 500 kHz/ Span 5 MHz

Date: 15.DEC.2006 23:27:51

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## APPENDIX B: PEAK POWER OUTPUT

### B.1. Base Standard & Test Basis

<b>Base Standard</b>	FCC 15.247
<b>Test Basis</b>	FCC 15.247 RF conducted as per FCC Publication 558074
<b>Test Method</b>	RF conducted as per FCC Publication 558074

### B.2. Specifications

The maximum peak output power shall not exceed +30 dBm (1 watt) in the 2400 MHz- 2483.5 MHz band

### B.3. Measurement Uncertainty

Expanded Uncertainty (K=2)
0.06 dB

### B.4. Deviations

Deviation Number	Time & Date	Description and Justification of Deviation	Deviation Reference			Approval
			Base Standard	Test Basis	NTS Procedure	
none						

### B.5. Test Method

RF conducted as per FCC Publication 558074 using a peak power meter. The peak power meter uses a high number of samples to measure peak power over time.

### B.6. Test Results

Compliant – The maximum conducted peak power was +7.08 dBm (.005 w) eirp.

### B.7. Sample Calculation

Peak EIRP(dBm) = Measured max. conducted pk. power(dBm) + TX antenna directional gain(dBi)

$$\text{Peak EIRP (W)} = [10^{(\text{Peak EIRP(dBm)}/10)}] / 1000$$

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**B.8. Test Data Summary**

<b>EUT Transmit Frequency (MHz)</b>	<b>Measured Max. Conducted Peak Power (dBm)</b>	<b>Antenna Directional Gain (dBi)</b>	<b>EIRP (dBm)</b>
2405 MHz	4.06	3	7.06
2440 MHz	4.08	3	7.08
2480 MHz	4.03	3	7.03

Note: These measurements were made using a peak power meter. The plots that follow are for visual reference only.

**B.9. Tested By**

Name: Tom Tidwell  
Function: Manager of Wireless Services  
Date: 15 December, 2006

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Figure 4 Peak Power Output - 2404 MHz

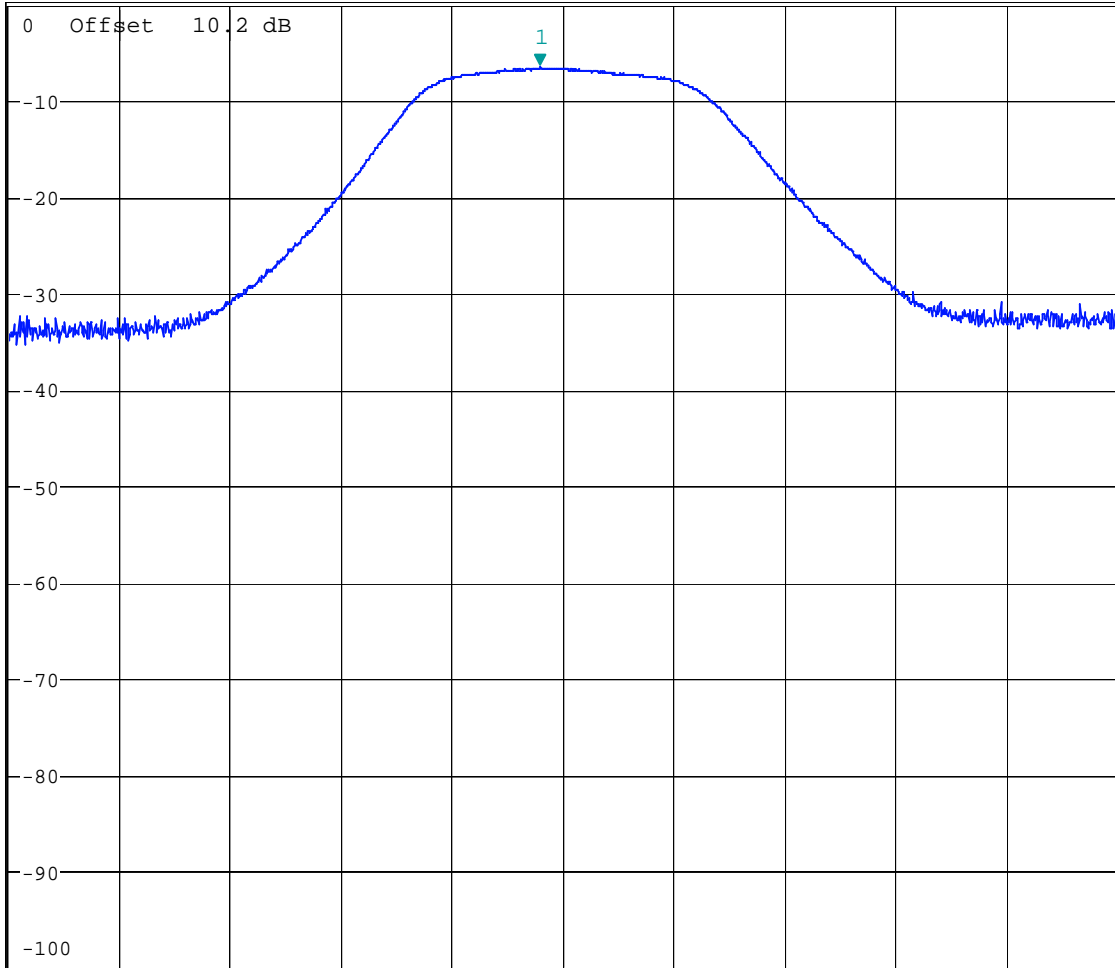


\*RBW 50 MHz      Marker 1 [T1 ]  
VBW 30 MHz      -0.71 dBm  
SWT 10 ms      2.400840000 GHz

Ref 6 dBm

Att 5 dB

1 PK  
VIEW



Center 2.405 GHz

20 MHz/

Span 200 MHz

Date: 15.DEC.2006 23:31:29

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Figure 5 Peak Power Output 2440 MHz



\* RBW 50 MHz      Marker 1 [T1 ]  
VBW 30 MHz      0.61 dBm  
SWT 10 ms      2.437440000 GHz

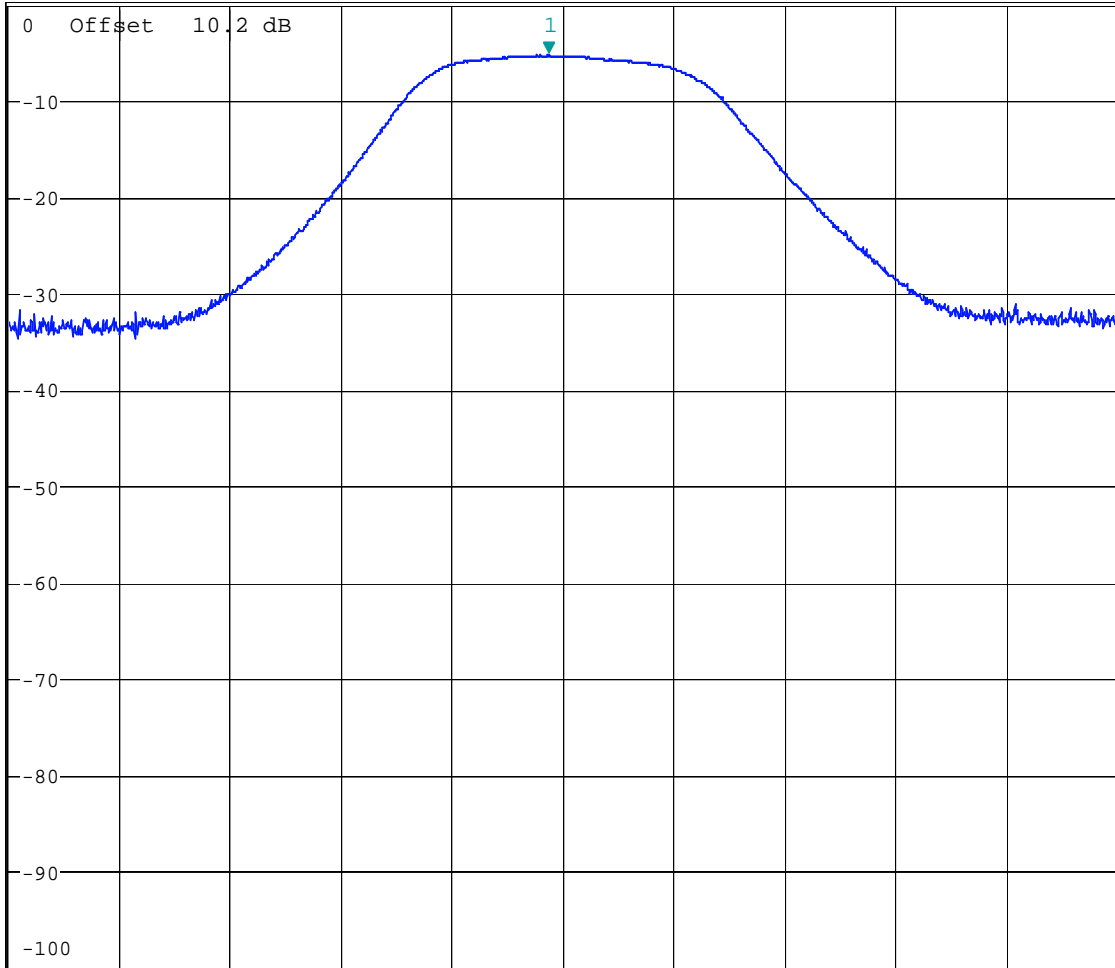
Ref 6 dBm

Att 5 dB

SWT 10 ms

2.437440000 GHz

1 PK  
VIEW



Center 2.44 GHz

20 MHz/

Span 200 MHz

Date: 15.DEC.2006 23:30:43

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Figure 6 Peak Power Output - 2480 MHz

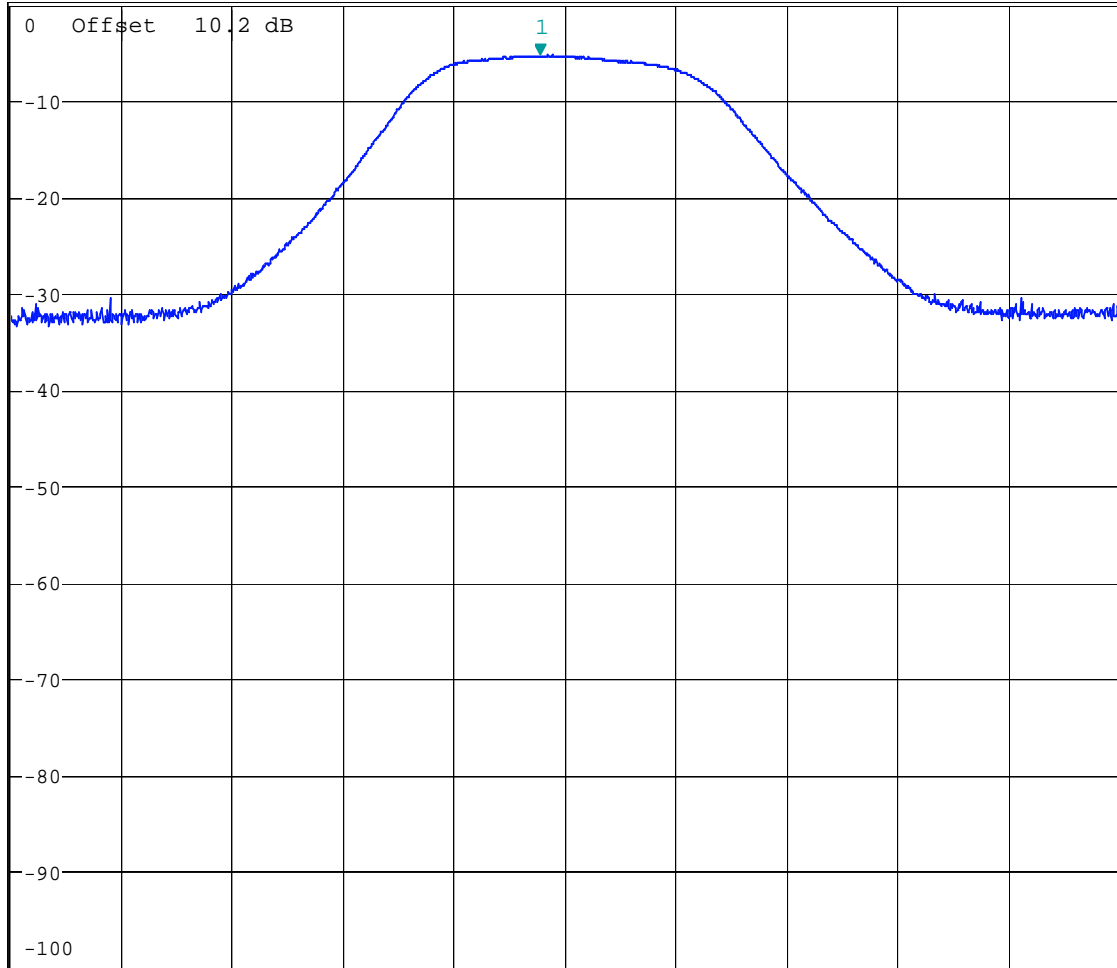


\* RBW 50 MHz      Marker 1 [T1 ]  
VBW 30 MHz      0.50 dBm  
SWT 10 ms      2.475360000 GHz

Ref 6 dBm

Att 5 dB

1 PK  
MAXH



Center 2.48 GHz

20 MHz/

Span 200 MHz

Date: 15.DEC.2006 23:29:22

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### APPENDIX C: PEAK POWER DENSITY

#### C.1. Base Standard & Test Basis

<b>Base Standard</b>	CFR Title 47 – Telecommunications, Chapter I - FCC Part 15.247 – Radio Frequency Devices - Subpart C– intentional Radiators
<b>Test Basis</b>	RF conducted as per FCC Publication 558074
<b>Test Method</b>	RF conducted as per FCC Publication 558074

#### C.2. Specifications

15.247 e) For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than +8 dBm in any 3 kHz band during any time interval of continuous transmission. This power spectral density shall be determined in accordance with the provisions of paragraph (b) of this section. The same method of determining the conducted output power shall be used to determine the power spectral density.

#### C.3. Measurement Uncertainty

<b>Expanded Uncertainty (K=2)</b>
+/-1.2 dB

#### C.4. Deviations

Deviation Number	Time & Date	Description and Justification of Deviation	Deviation Reference			Approval
			Base Standard	Test Basis	NTS Procedure	
none						

#### C.5. Test Method

RF conducted as per FCC Publication 558074

#### C.6. Test Results

Compliant. The maximum measured Peak Power Density was -14 dBm/3 kHz.

#### C.7. Deviations from Normal Operating Mode During Test

None.

#### C.8. Sample Calculation

None.

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**C.9. Test Data**

EUT Transmit Channel	Peak Power Density (dBm)
2405 MHz	-15.8
2440 MHz	-14.3
2480 MHz	-14.0

See plots following.

**C.10. Tested By**

Name: Tom Tidwell  
Function: Manager of Wireless Services  
Date: 15 December, 2006

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Figure 7 Power Density – 2405 MHz



\* RBW 3 kHz

Marker 1 [T1 ]

\* VBW 30 kHz

-15.84 dBm

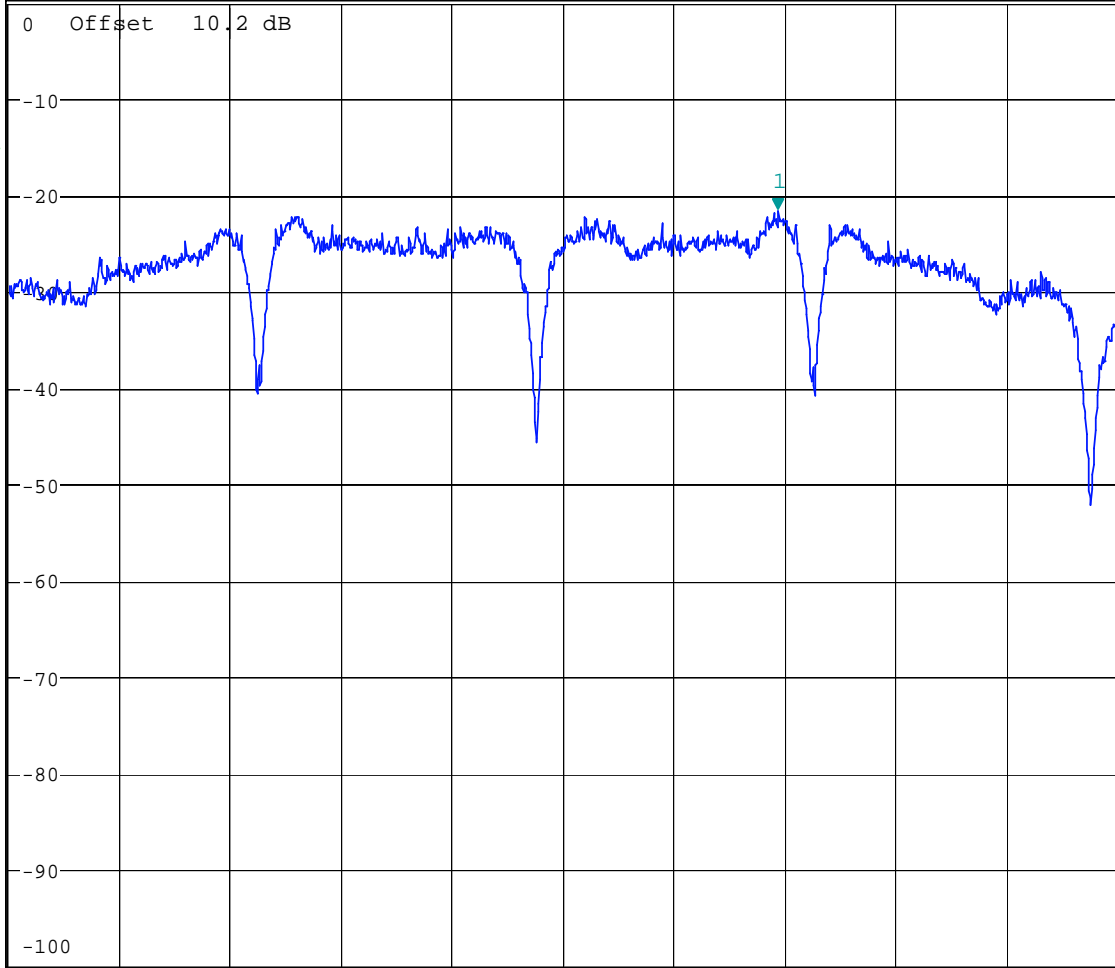
\* SWT 680 s

2.405388800 GHz

Ref 6 dBm

Att 5 dB

1 PK \*  
VIEW



Center 2.405 GHz

200 kHz/

Span 2 MHz

Date: 18.DEC.2006 15:23:10

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Figure 8 Power Density – 2440 MHz



\* RBW 3 kHz

Marker 1 [T1 ]

\* VBW 30 kHz

-14.29 dBm

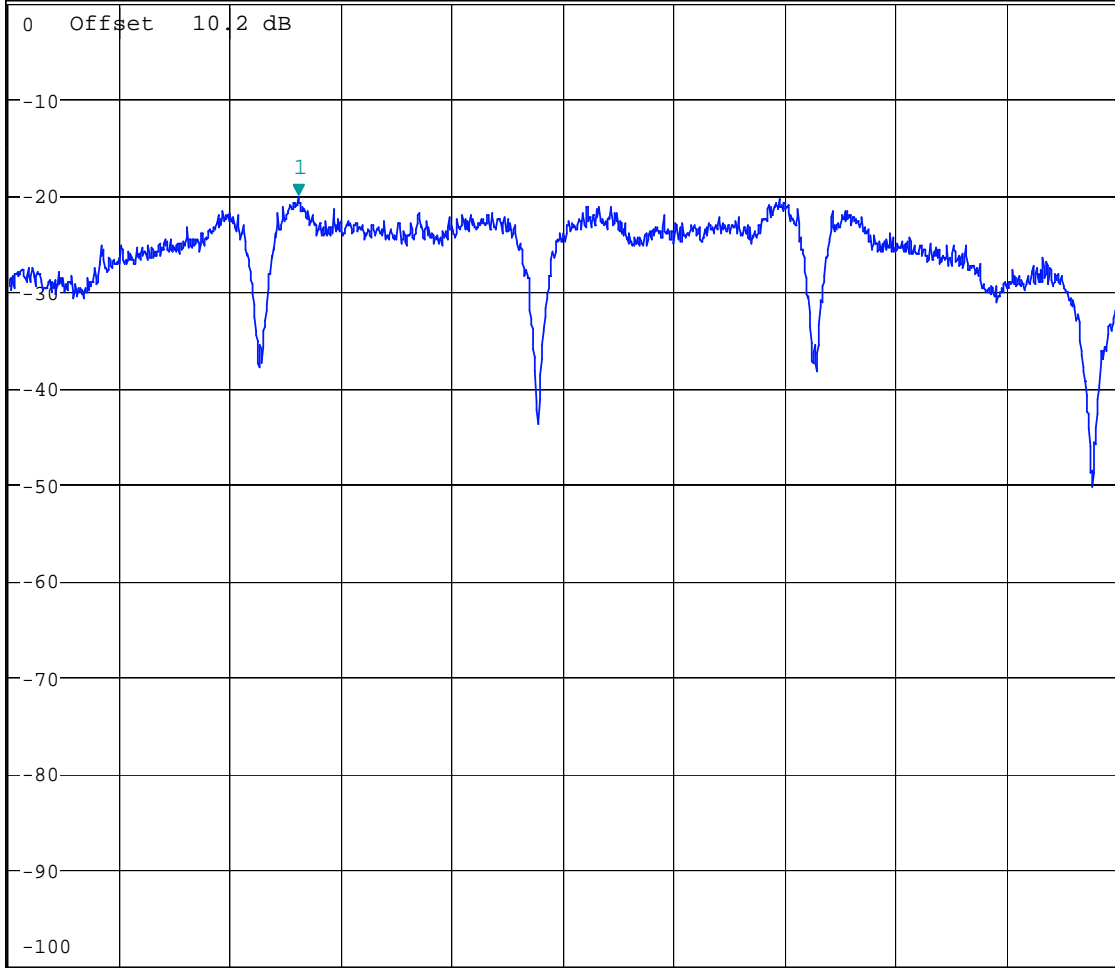
\* SWT 680 s

2.439521600 GHz

Ref 6 dBm

Att 5 dB

1 PK \*  
VIEW



Center 2.44 GHz

200 kHz/

Span 2 MHz

Date: 18.DEC.2006 15:39:35

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Figure 9 Power Density – 2480 MHz

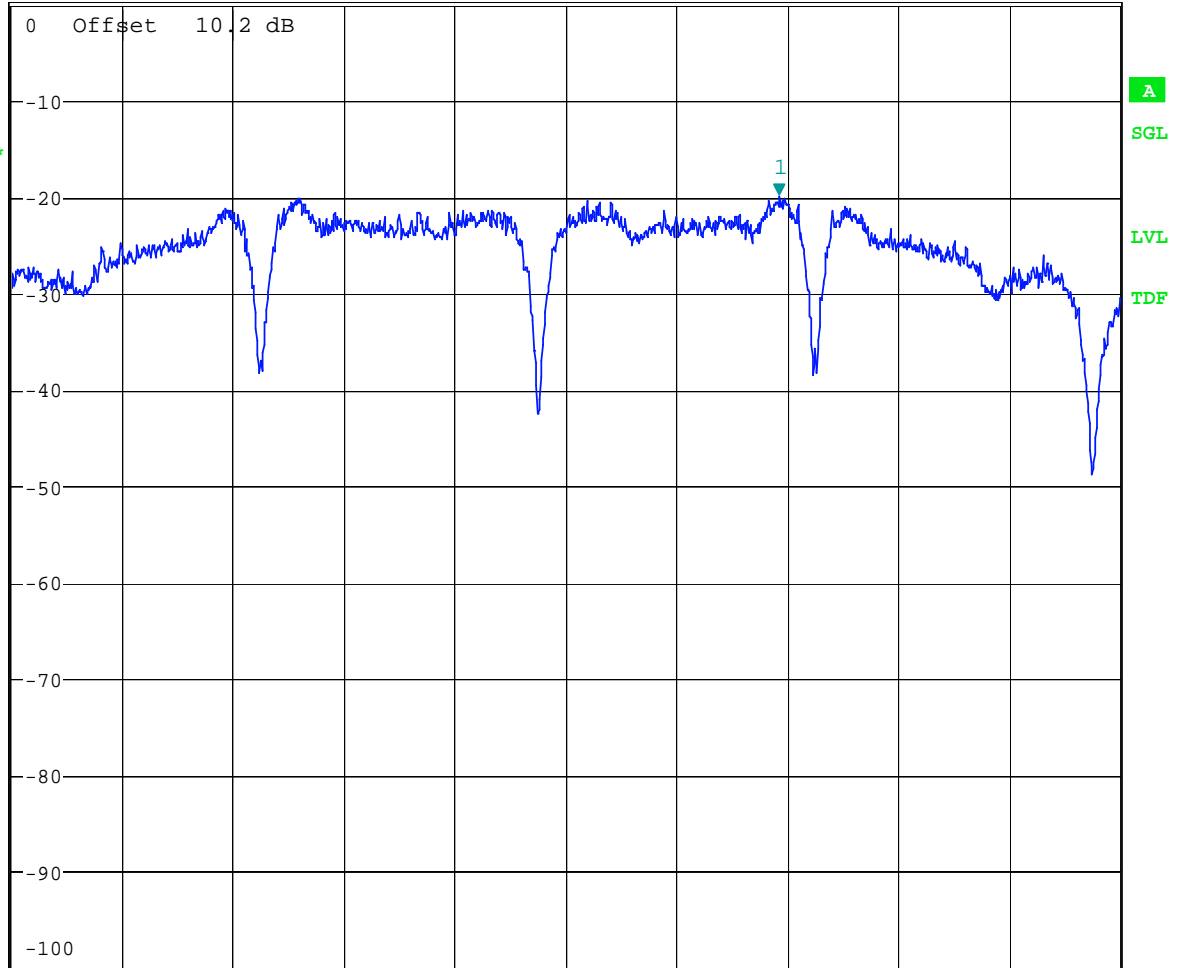


\* RBW 3 kHz      Marker 1 [T1 ]  
\* VBW 30 kHz      -14.03 dBm  
\* SWT 680 s      2.480385600 GHz

Ref 6 dBm

Att 5 dB

1 PK\*  
VIEW



Center 2.48 GHz

200 kHz/

Span 2 MHz

Date: 18.DEC.2006 15:55:13

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### APPENDIX D: 15.247 CONDUCTED SPURIOUS EMISSIONS

#### D.1. Base Standard & Test Basis

<b>Base Standard</b>	CFR Title 47 – Telecommunications, Chapter I – FCC Part 15.247 – Radio Frequency Devices - Subpart C– intentional Radiators
<b>Test Basis</b>	RF conducted as per FCC Publication 558074
<b>Test Method</b>	RF conducted as per FCC Publication 558074

#### D.2. Specifications

(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 §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

#### D.3. Measurement Uncertainty

<b>Expanded Uncertainty (K=2)</b>
+/- 1.2 dB

#### D.4. Deviations

Deviation Number	Time & Date	Description and Justification of Deviation	Deviation Reference			Approval
			Base Standard	Test Basis	NTS Procedure	
none						

#### D.5. Test Results

Compliant. All peak emissions were more than 20 dB below the in-band power.

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**D.6. Test Data**

See following pages.

**D.7. Tested By**

Name: Tom Tidwell

Function: Manager of Wireless Services

Date: 15 December, 2006

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Figure 10 Conducted Spurious Emissions – Low Channel (2405 MHz)

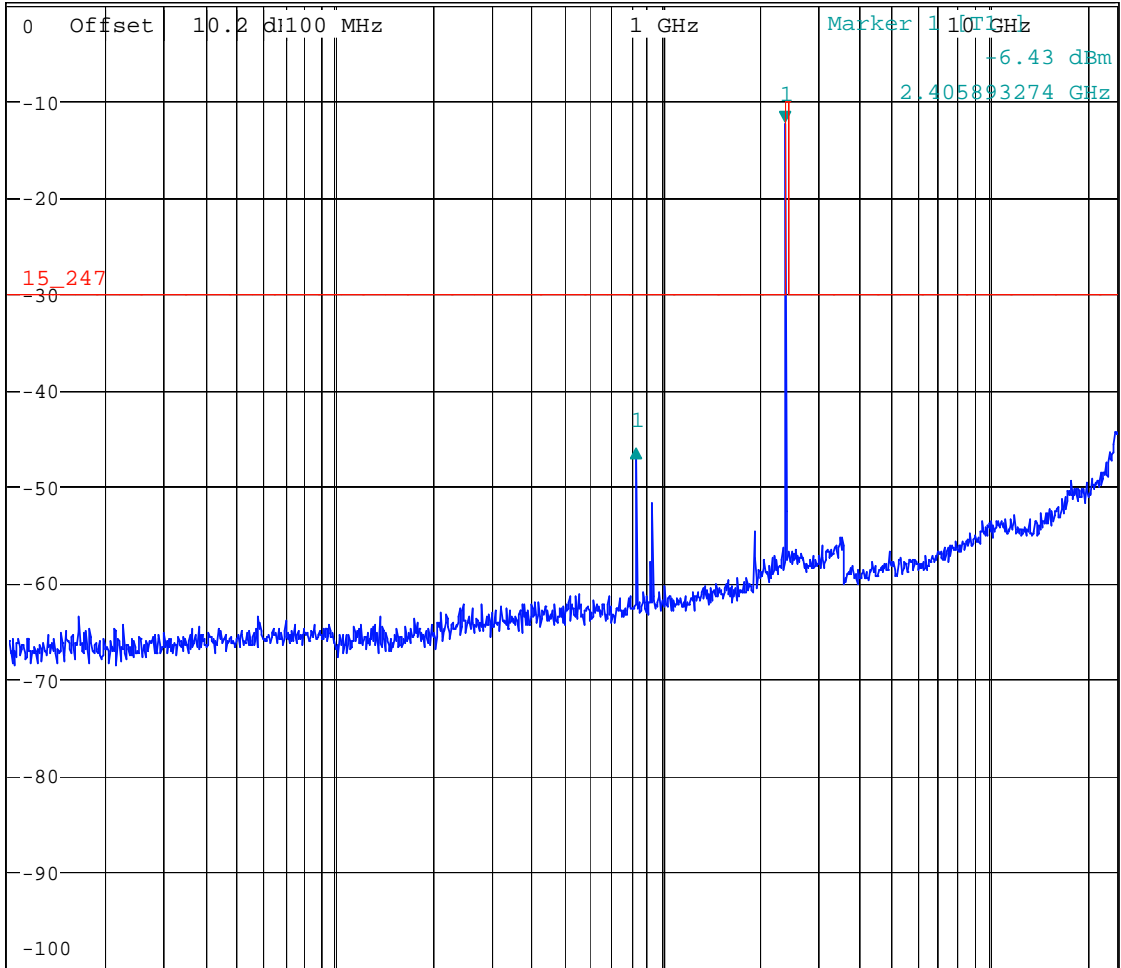


\*RBW 100 kHz      Delta 1 [T1 ]  
 VBW 300 kHz      -33.97 dB  
 SWT 2.5 s      -1.566701232 GHz

Ref 6 dBm

Att 5 dB

1 PK  
MAXH



Start 10 MHz

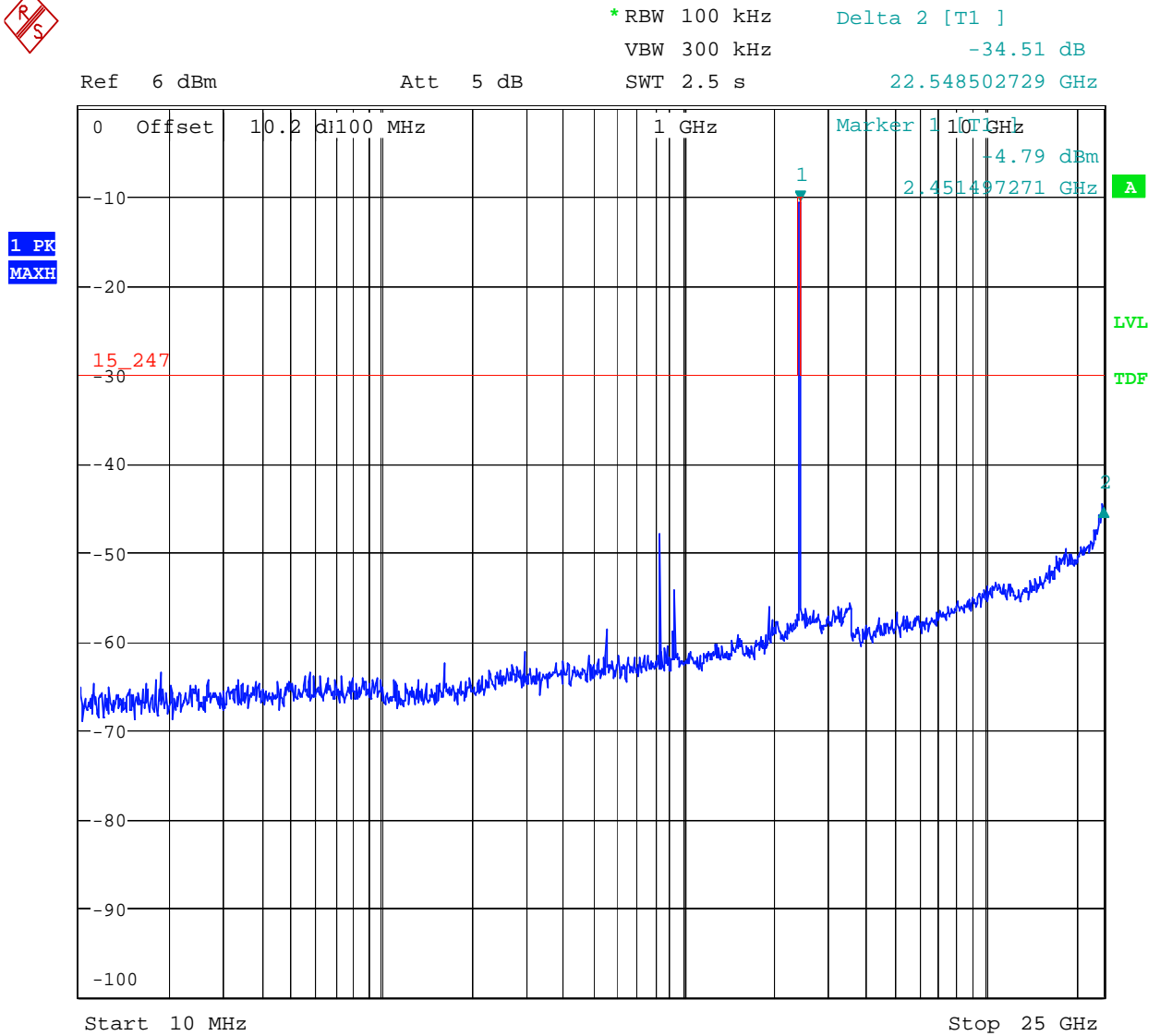
Stop 25 GHz

Date: 15.DEC.2006 23:23:07

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Figure 11 Conducted Spurious Emissions – Mid Channel (2440 MHz)



Date: 15.DEC.2006 23:21:29

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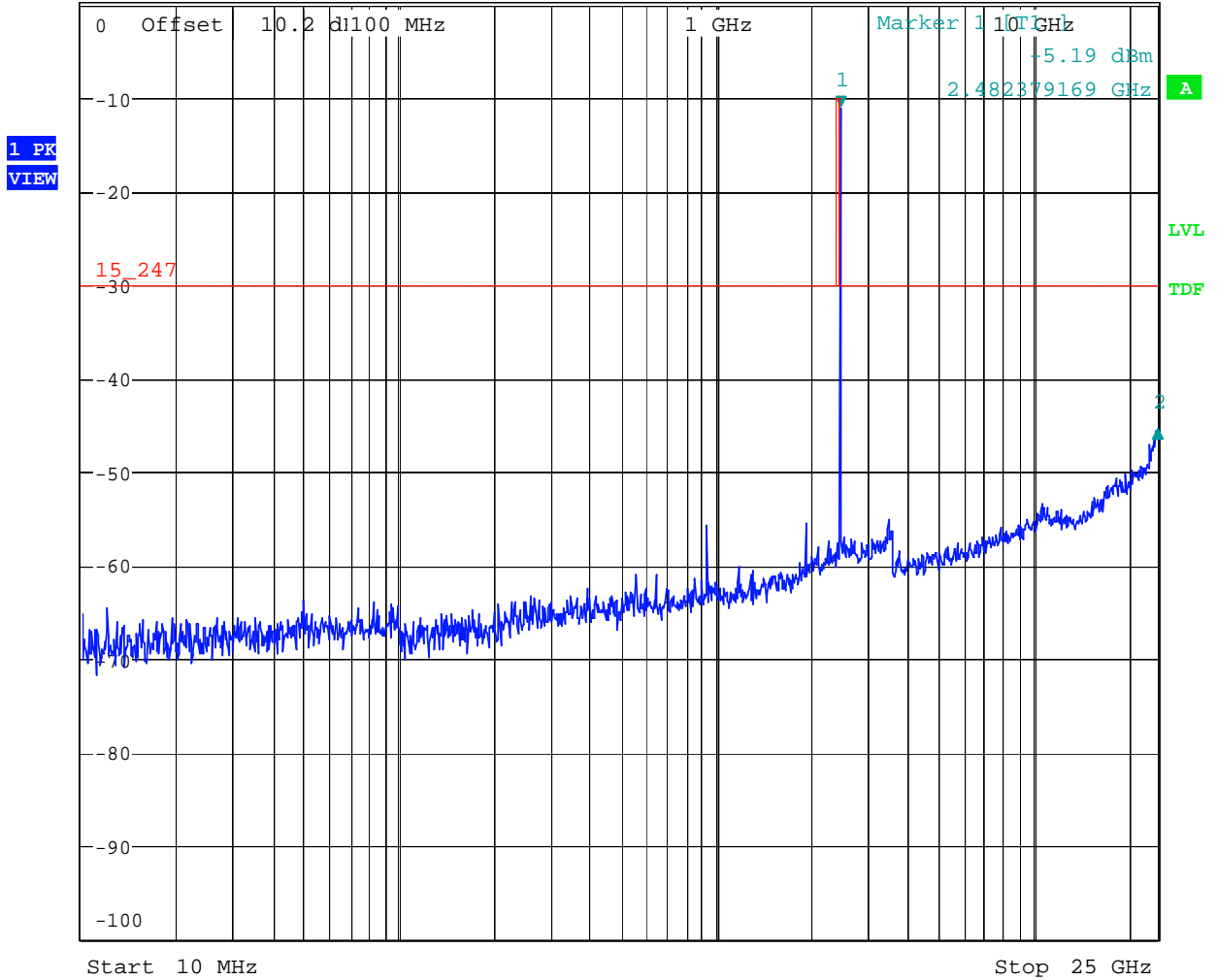
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Figure 12 Conducted Spurious Emissions – High Channel (2480 MHz)



\*RBW 100 kHz      Delta 2 [T1 ]  
 VBW 300 kHz      -34.59 dB  
 Ref 6 dBm      Att 5 dB      SWT 2.5 s      22.517620831 GHz



Date: 15.DEC.2006 23:19:59

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## APPENDIX E: CONDUCTED SPURIOUS EMISSIONS BAND EDGE MEASUREMENTS

### E.1. Base Standard & Test Basis

<b>Base Standard</b>	CFR Title 47 – Telecommunications, Chapter I – FCC Part 15.247 – Radio Frequency Devices - Subpart C– intentional Radiators.
<b>Test Basis</b>	RF conducted as per FCC Publication 558074
<b>Test Method</b>	RF conducted as per FCC Publication 558074

### E.2. Limits

(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 §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

### E.3. Measurement Uncertainty

<b>Expanded Uncertainty (K=2)</b>
-----------------------------------

+/- 1.2 dB, .01 ppm
---------------------

### E.4. Test Results

Compliant. All out of band spurious emissions are more than 20 dB below the in band power of the fundamental.

### E.5. Deviations from Normal Operating Mode During Test

None.

### E.6. Sample Calculation

NA.

### E.7. Test Data

See plots on following pages.

### E.8. Tested By

Name: Tom Tidwell  
Function: Manager of Wireless Services  
Date: 15 December, 2006

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Figure 13 2400 MHz Band edge Measurement – TX set to 2404 MHz

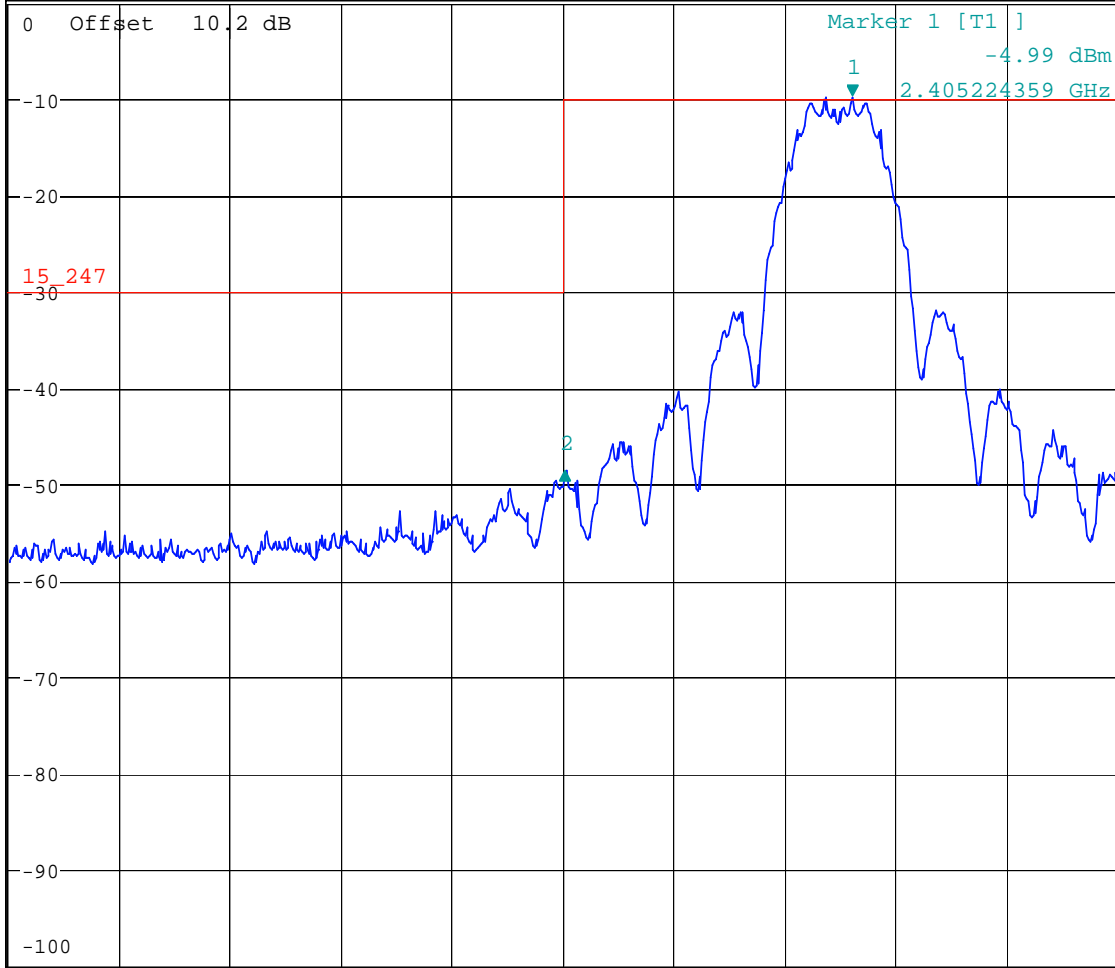


\*RBW 100 kHz      Delta 2 [T1 ]  
 VBW 300 kHz      -38.79 dB  
 \*SWT 15 ms      -5.192307692 MHz

Ref 5 dBm

Att 5 dB

1 PK  
MAXH



Center 2.4 GHz

2 MHz/

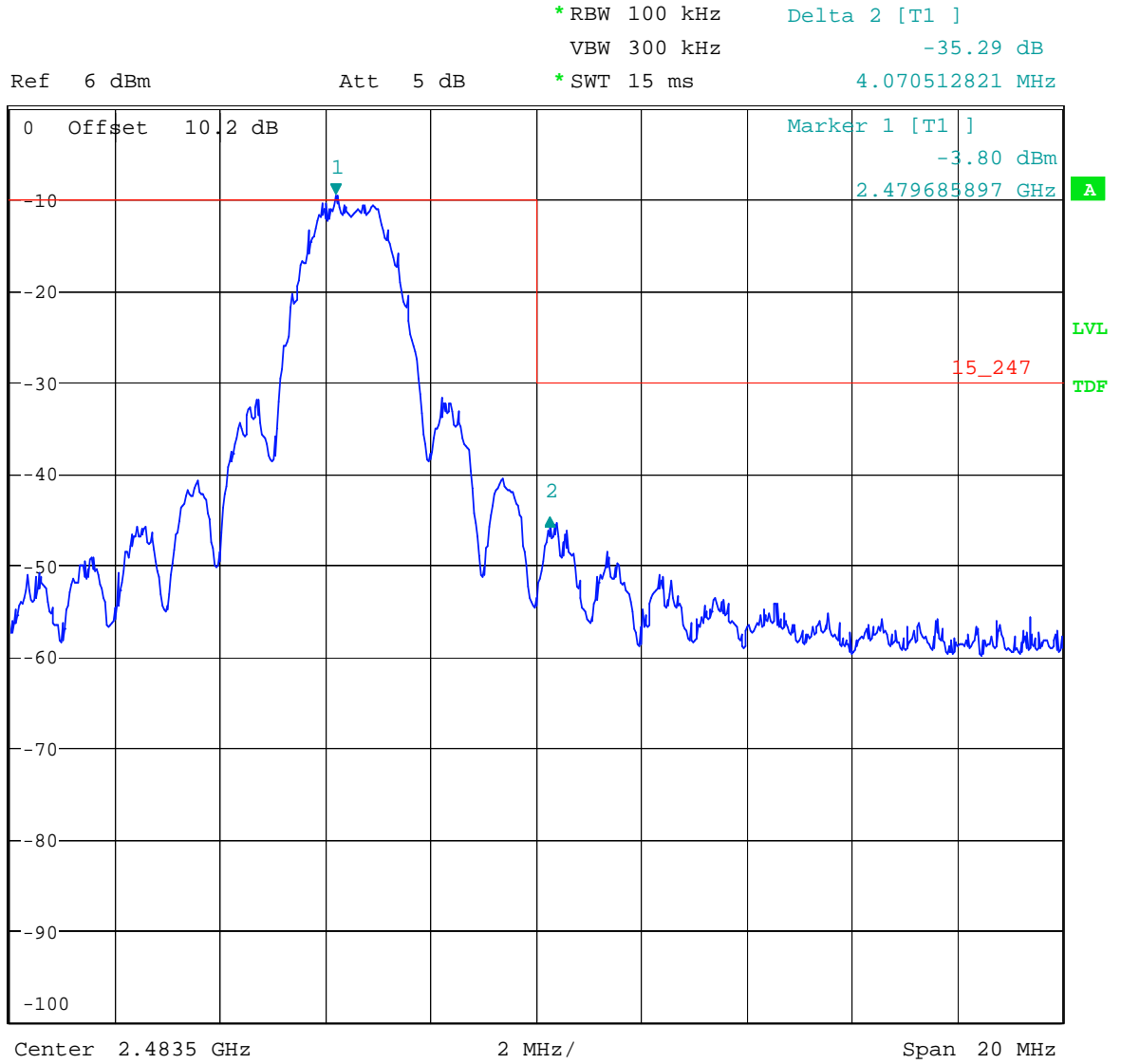
Span 20 MHz

Date: 15.DEC.2006 23:16:27

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Figure 14 2483.5 MHz Band edge Measurement – TX set to 2479 MHz



Date: 15.DEC.2006 23:18:22

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APPENDIX F: RADIATED EMISSIONS IN RESTRICTED BANDS 30 MHz – 25 GHz (TX AND RX)

F.1. Base Standard & Test Basis

Table with 2 columns: Base Standard, Test Basis, Test Method. Base Standard: CFR Title 47 – Telecommunications, Chapter I - FCC Part 15.209 – Radio Frequency Devices. Test Basis: ANSI C63.4-2003 Methods of Measurement of Radio Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz. Test Method: ANSI C63.4-2003 and FCC Publication 558074.

Specifications

Table with 4 columns: MHz, MHz, MHz, GHz. Lists frequency ranges for various bands.

\1\ Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz. \2\ Above 38.6

(b) Except as provided in paragraphs (d) and (e) of this section, the field strength of emissions appearing within these frequency bands shall not exceed the limits shown in §15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in §15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000 MHz, compliance with the emission limits in §15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in §15.35 apply to these measurements.

The test results contained in this report refer exclusively to the product(s) presented for testing. The test results do not cover models or products not referred herein. This test report should not be published or duplicated in whole or part without permission from the testing body and the customer.



**F.2. Measurement Uncertainty**

<b>Radiated Emissions 30 MHz – 25 GHz</b> (dB)	<b>Expanded Uncertainty (K=2)</b>  +/-3.26
---	--

**F.3. Deviations**

Deviation Number	Time & Date	Description and Justification of Deviation	Deviation Reference			Approval
			Base Standard	Test Basis	NTS Procedure	
none						

**F.4. Duty Cycle Calculation**

Duty cycle was not considered.

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**F.5. Test Results**

The EUT is in compliance with FCC CFR47 Part 15.205/15209 Radiated emission limits. The worst case emission was 48.6 dB $\mu$ V/m @ 3 meters @ 2483.5 MHz, a pass margin of 5.4 dB.

**F.6. Observations**

None

**F.7. Deviations from Normal Operating Mode During Test**

None.

**F.8. Sample Calculation**

Emission Level = Measured Level + Correction Factors.

Margin = Limit – Emission Level. A positive margin indicates a passing result.

**F.9. Test Data & Photographs**

Plots were not provided in order to reduce file size.

**F.10. Tested By**

Name: Tom Tidwell

Function: Manager of Wireless Services

Date: 7 Dec., 2006

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Note: The frequency spectrum was searched up to 25 GHz on each channel

	Project No: W6373 Model: NXR-ZGW Gateway Comments: Transmit full power at 2480 MHz, Continuously streaming data Date: 8 December, 2006
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Distance: 3 m	Standard: CFR 47, 15.247	RBW: (unless < 1 GHz = 120 kHz noted) GHz = 1 MHz	> 1 VBW: (unless Peak = 1 MHz noted) Avg. = 10 Hz
---------------	--------------------------	--	--

Antenna	Polarization	Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss + LNA (dB)	Duty Cycle Correction (dB)	Total Correction (dB/m)	Detector (Pk/Avg)	Measured (dBuV)	Corrected (dBuV/m)	Limit (dBuV/m)	Margin (dB)
	(V/H)										
E1149P	V	2483.5	27.4	0.6	0.0	28.0	Pk	36.3	64.3	74.0	9.7
E1149P	V	2483.5	27.4	0.6	0.0	28.0	Avg	20.6	48.6	54.0	5.4
E1149P	H	2483.5	27.4	0.6	0.0	28.0	Pk	34.2	62.2	74.0	11.8
E1149P	H	2483.5	27.4	0.6	0.0	28.0	Avg	15.3	43.3	54.0	10.7
E1149P	V	4960.0	32.3	-26.5	0.0	5.8	Pk	53.3	59.1	74.0	14.9
E1149P	V	4960.0	32.3	-26.5	0.0	5.8	Avg	41.4	47.2	54.0	6.8
E1149P	H	4960.0	32.3	-26.5	0.0	5.8	Pk	51.8	57.6	74.0	16.4
E1149P	H	4960.0	32.3	-26.5	0.0	5.8	Avg	40.6	46.4	54.0	7.6
E1149P	V	7440.0	35.2	-25.1	0.0	10.1	Pk	41.0	51.1	74.0	22.9
E1149P	V	7440.0	35.2	-25.1	0.0	10.1	Avg	30.0	40.1	54.0	13.9
E1149P	H	7440.0	35.2	-25.1	0.0	10.1	Pk	42.2	52.3	74.0	21.7
E1149P	H	7440.0	35.2	-25.1	0.0	10.1	Avg	31.4	41.5	54.0	12.5
E1068P	V	24400.0	46.0	-11.6	0.0	34.4	Pk	22.5	56.9	74.0	17.1
E1068P	V	24400.0	46.0	-11.6	0.0	34.4	Avg	5.1	39.5	54.0	14.5
E1068P	H	24400.0	46.0	-11.6	0.0	34.4	Pk	23.7	58.1	74.0	15.9
E1068P	H	24400.0	46.0	-11.6	0.0	34.4	Avg	4.1	38.5	54.0	15.5

Notes: (1) A positive margin indicates a passing result  
(2) For 15.247 emissions Peak detector indicates 1 MHz RBW/ 1 MHz VBW and Average indicates 1 MHz RBW / 10 Hz VBW  
(3) The device was maximized around three orthogonal axis.

The spectrum was searched from 30 MHz to 25 GHz. All emissions within 20 dB of the specification limit are reported.

The test results contained in this report refer exclusively to the product(s) presented for testing. The test results do not cover models or products not referred herein. This test report should not be published or duplicated in whole or part without permission from the testing body and the customer.



Project No:	W6373
Model:	NXR-ZGW Gateway
Comments:	Transmit full power at 2405 MHz, Continuously streaming data
Date:	8 December, 2006

<b>Distance:</b> 3 m	<b>Standard:</b> CFR 47, 15.247	<b>RBW:</b> (unless < 1 GHz = 120 kHz noted) GHz = 1 MHz	<b>VBW:</b> (unless Peak = 1 MHz noted) Avg. = 10 Hz
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Antenna	Polarization	Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss + LNA (dB)	Duty Cycle Correction (dB)	Total Correction (dB/m)	Detector (Pk/Avg)	Measured (dBuV)	Corrected (dBuV/m)	Limit (dBuV/m)	Margin (dB)
	(V/H)										
E1149P	V	4810.0	32.3	-26.8	0.0	5.5	Pk	54.1	59.6	74.0	14.4
E1149P	V	4810.0	32.3	-26.8	0.0	5.5	Avg	42.3	47.8	54.0	6.2
E1149P	H	4810.0	32.3	-26.8	0.0	5.5	Pk	51.6	57.1	74.0	16.9
E1149P	H	4810.0	32.3	-26.8	0.0	5.5	Avg	40.9	46.4	54.0	7.6
E1149P	V	7215.0	35.2	-25.2	0.0	10.0	Pk	42.3	52.3	74.0	21.7
E1149P	V	7215.0	35.2	-25.2	0.0	10.0	Avg	31.2	41.2	54.0	12.8
E1149P	H	9620.0	37.8	-23.1	0.0	14.7	Pk	47.0	61.7	74.0	12.3
E1149P	H	9620.0	37.8	-23.1	0.0	14.7	Avg	29.1	43.8	54.0	10.2
E1149P	V	12025.0	39.2	-20.0	0.0	19.2	Pk	49.0	68.2	74.0	5.8
E1149P	V	12025.0	39.2	-20.0	0.0	19.2	Avg	28.7	47.9	54.0	6.1
E1149P	H	12025.0	39.2	-20.0	0.0	19.2	Pk	42.6	61.8	74.0	12.2
E1149P	H	12025.0	39.2	-20.0	0.0	19.2	Avg	21.7	40.9	54.0	13.1
E1068P	V	24050.0	46.0	-11.6	0.0	34.4	Pk	22.1	56.5	74.0	17.5
E1068P	V	24050.0	46.0	-11.6	0.0	34.4	Avg	4.1	38.5	54.0	15.5
E1068P	H	24050.0	46.0	-11.6	0.0	34.4	Pk	22.2	56.6	74.0	17.4
E1068P	H	24050.0	46.0	-11.6	0.0	34.4	Avg	4.0	38.4	54.0	15.6

Notes: (1) A positive margin indicates a passing result  
(2) For 15.247 emissions Peak detector indicates 1 MHz RBW/ 1 MHz VBW and Average indicates 1 MHz RBW / 10 Hz VBW  
(3) The device was maximized around three orthogonal axis.

Project No:	W6373
Model:	NXR-ZGW
Comments:	Transmit full power at 2440 MHz, Continuously streaming data
Date:	8 December, 2006

<b>Distance:</b> 3 m	<b>Standard:</b> CFR 47, 15.247	<b>RBW:</b> (unless < 1 GHz = 120 kHz noted) GHz = 1 MHz	<b>VBW:</b> (unless Peak = 1 MHz noted) Avg. = 10 Hz
----------------------	---------------------------------	--	--

Antenna	Polarization	Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss + LNA (dB)	Duty Cycle Correction (dB)	Total Correction (dB/m)	Detector (Pk/Avg)	Measured (dBuV)	Corrected (dBuV/m)	Limit (dBuV/m)	Margin (dB)
	(V/H)										
E1149P	V	4880.0	32.3	-26.6	0.0	5.7	Pk	51.7	57.4	74.0	16.6
E1149P	V	4880.0	32.3	-26.6	0.0	5.7	Avg	38.4	44.1	54.0	9.9
E1149P	H	4880.0	32.3	-26.6	0.0	5.7	Pk	52.2	57.9	74.0	16.1
E1149P	H	4880.0	32.3	-26.6	0.0	5.7	Avg	41.1	46.8	54.0	7.2
E1149P	V	7320.0	35.2	-25.2	0.0	10.0	Pk	46.5	56.5	74.0	17.5
E1149P	V	7320.0	35.2	-25.2	0.0	10.0	Avg	29.9	39.9	54.0	14.1
E1149P	H	7320.0	35.2	-25.2	0.0	10.0	Pk	46.6	56.6	74.0	17.4
E1149P	H	7320.0	35.2	-25.2	0.0	10.0	Avg	28.8	38.8	54.0	15.2
E1149P	V	12200.0	39.2	-19.7	0.0	19.5	Pk	40.3	59.8	74.0	14.2
E1149P	V	12200.0	39.2	-19.7	0.0	19.5	Avg	22.5	42.0	54.0	12.0
E1149P	H	12200.0	39.2	-19.7	0.0	19.5	Pk	40.0	59.5	74.0	14.5
E1149P	H	12200.0	39.2	-19.7	0.0	19.5	Avg	22.0	41.5	54.0	12.5
E1068P	V	24400.0	46.0	-11.6	0.0	34.4	Pk	23.4	57.8	74.0	16.2
E1068P	V	24400.0	46.0	-11.6	0.0	34.4	Avg	5.5	39.9	54.0	14.1
E1068P	H	24400.0	46.0	-11.6	0.0	34.4	Pk	21.4	55.8	74.0	18.2
E1068P	H	24400.0	46.0	-11.6	0.0	34.4	Avg	4.7	39.1	54.0	14.9

Notes: (1) A positive margin indicates a passing result  
(2) For 15.247 emissions Peak detector indicates 1 MHz RBW/ 1 MHz VBW and Average indicates 1 MHz RBW / 10 Hz VBW  
(3) The device was maximized around three orthogonal axis.

**The spectrum was searched from 30 MHz to 25 GHz. All emissions within 20 dB of the specification limit are reported.**

The test results contained in this report refer exclusively to the product(s) presented for testing. The test results do not cover models or products not referred herein. This test report should not be published or duplicated in whole or part without permission from the testing body and the customer.

**F.11. Test Setup Photo**



Orientation #1 (Worst-case orientation)



Orientation #2



Orientation #3

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**APPENDIX G: POWERLINE CONDUCTED EMISSIONS****G.1. Base Standard & Test Basis**

<b>Base Standard</b>	CFR Title 47 – Telecommunications, Chapter I - FCC Part 15.207 – Radio Frequency Devices - Subpart C – Unintentional Radiators
<b>Test Method</b>	ANSI C63.4-2003 Methods of Measurement of Radio Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz

**G.2. Specifications**

Frequency	<input type="checkbox"/>	Class A		<input checked="" type="checkbox"/>	Class B	
	Limit	Quasi-Peak	Average	Quasi-Peak	Average	
MHz		$\text{dB}\mu\text{V}$	$\text{dB}\mu\text{V}$	$\text{dB}\mu\text{V}$	$\text{dB}\mu\text{V}$	
0.150 – 0.500		79.00	66.00	66 to 56 <sup>1</sup>	56 to 46 <sup>1</sup>	
0.500 – 5.00		73.00	60.00	56	46	
5.00 – 30.00		73.00	60.00	60	50	

Note 1: decrease with the logarithm of the frequency.

**G.3. Measurement Uncertainty**

Conducted Current Emissions 150 kHz – 30 MHz	Measurement Uncertainty	Expanded Uncertainty (K=2)
(dB)	+/- 3 dB	+/- 3 dB

**G.4. Deviations**

Deviation Number	Time & Date	Description and Justification of Deviation	Deviation Reference			Approval
			Base Standard	Test Basis	NTS Procedure	
none						

**G.5. Special Considerations**

Testing was performed with an “commercial off-the-shelf” power supply to demonstrate compliance.

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**G.6. Test Results**

Compliant. The worst case emission level was 38.5 dB $\mu$ V at 364 kHz with a 9.5 dB margin of compliance.

**G.7. Deviations from Normal Operating Mode During Test**

None.

**G.8. Sample Calculation**

Correction Factor = LISN Correction Factor + Cable Loss  
Corrected Value = Measurement + Correction Factor  
Margin = Limit – Corrected Emission Level

**G.9. Test Data & Photographs**

The test data and photographs collected during this test appear following this page.

**G.10. Tested By**

This testing was conducted in accordance with the ISO 17025:2005 scope of accreditation, table 1; Quality Manual.

Name: Bobby Mummon  
Function: EMI Technician  
Date: 12/5/06

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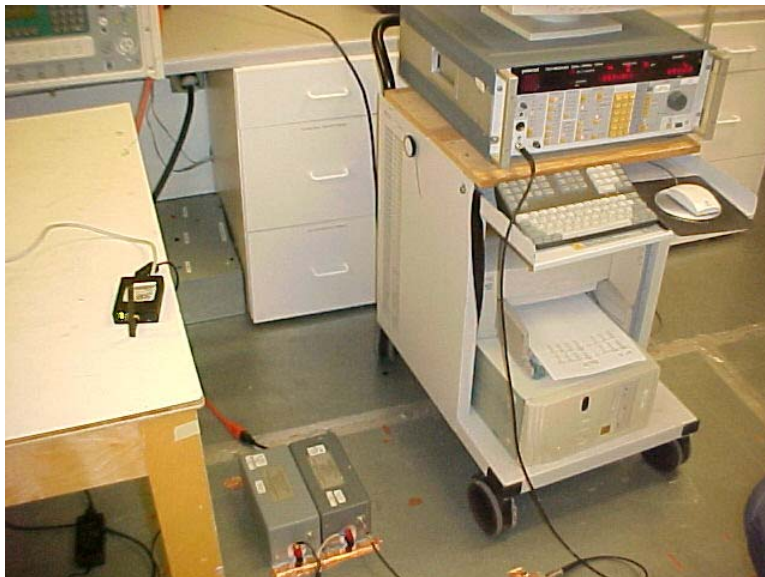
Date of measurement: 12/05/06.

Test Personnel: Bobby Mummon

EN55022	Class B			High			
Frequency	QP Limits	AVG Limits	Factor	Quasi Raw	AVG Raw	QP Margin	AVG Margin
0.191	64	54	1	43.2	42	-19.8	-11
0.28	61	51	1	40.8	32	-19.2	-18
0.363	58	48	1	41	37.3	-16	-9.7
11.96	60	50	1	36.4	31.2	-22.6	-17.8
13.36	60	50	1	37	31.4	-22	-17.6
25.7	60	50	1	37.5	31	-21.5	-18

EN55022	Class B			Return			
Frequency	QP Limits	AVG Limits	Factor	Quasi Raw	AVG Raw	QP Margin	AVG Margin
0.185	64	54	1	44.6	36	-18.4	-17
0.28	61	51	1	40.6	31.8	-19.4	-18.2
0.364	58	48	1	41	37.5	-16	-9.5
8.72	60	50	1	36.4	31.5	-22.6	-17.5
14.34	60	50	1	35.1	28	-23.9	-21
24.05	60	50	1	35.3	28.9	-23.7	-20.1

The test results derived from this testing demonstrates that the Netlinx Zigbee System (NXR-ZGW Gateway, NXR-ZRD Repeater and NXR-ZMO Module) conforms to EN 55022 Class B for Conducted Emissions.



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**APPENDIX H: TEST EQUIPMENT LIST****H.1. Radiated Emissions 30 MHz – 1 GHz Measurement Equipment**

Description	Manufacturer	Type/Model	Asset #	Cal Due
Bilog Antenna	ETS	3142C	E1289P	8/21/07
RF Cable	Gore	FJN	EMI8	9/1/07
Spectrum Analyzer	HP	8566B	E1007P	8/29/07
Quasi-Peak Adapter	HP		E1007P	8/29/07
Low Noise Amplifier	Miteq	AM-1431	E1279P	12/4/07
Multi Device Controller (Turntable and Mast)	ETS	2090	00058930	-

**H.2. Radiated Emissions 1 GHz – 25 GHz Measurement Equipment**

Description	Manufacturer	Type/Model	Asset #	Cal Due
Horn Antenna 1 GHz – 18 GHz	EMCO	3115	E1149P	8/24/07
Horn Antenna 18 GHz – 26.5 GHz	EMCO	3116	E1068P	8/24/07
High pass filter	K&L	11SH10- 2000	W1024P	-
Low Noise Amplifier	HP	8449B	E1010P	5/4/07
Spectrum Analyzer	HP	8566B	E1007P	8/29/07

**H.3. Antenna Conducted Emissions Measurement Equipment**

Description	Manufacturer	Type/Model	Asset #	Cal Due
Coaxial attenuator	Inmet	36AH-20	W1019P	9/29/07
Coaxial Cable	MegaPhase	TM26	W1010P	9/29/07
Spectrum Analyzer 20 Hz -26.5 GHz	Rohde & Schwarz	FSQ26	W1020P	10/16/07
Peak Power Meter	Boonton	4532	W1001P	9/1/07
Peak Power Sensor	Boonton	57340	W1002P	9/1/07

**H.4. Powerline Conducted Emissions Measurement Equipment**

Description	Manufacturer	Type/Model	Asset #	Cal Due
LISN	Solar	8028-50-TS-24-BNC	E1226 P	01/16/07
LISN	Solar	8028-50-TS-24-BNC	E1227 P	01/16/07
HP Spectrum Analyzer	HP	8566B	E1168 P	01/11/07
Quasi Peak Detector	HP	85650A	E1182 P	01/11/07

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