

# EMC TEST REPORT

**Report No.:** TS09070098-EME  
**Model No.:** BiPAC 5200N RC, BiPAC 5200SN RC, BiPAC 5200N RD, BiPAC 5200SN RD, BiPAC 7300N RC, BiPAC 7300SN RC, BiPAC 7300N RD, BiPAC 7300SN RD, BEC 5200N RC, BEC 5200SN RC, BEC 5200N RD, BEC 5200SN RD, BEC 7300N RC, BEC 7300SN RC, BEC 7300N RD  
**Issued Date:** Aug. 04, 2009

**Applicant:** Billion Electric Co., Ltd.  
8F., No. 192, Sec. 2, Chung Hsing Road, Hsin Tien City, Taipei Hsien, Taiwan

**Test Method/ Standard:** 47 CFR FCC Part 15.247 & ANSI C63.4 2003

**Test By:** Intertek Testing Services Taiwan Ltd.  
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**The test report was reviewed by:**

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## 1. Summary of Test Data

Test/Requirement Description	Applicable Rule	Result
Minimum 6dB Bandwidth	15.247(a)(2)	Pass
Maximum Output Power	15.247(b)	Pass
Power Spectral Density	15.247(e)	Pass
RF Antenna Conducted Spurious	15.247(d)	Pass
Radiated Spurious Emission	15.247(d), 15.205, 15.209	Pass
Emission on the Band Edge	15.247(d)	Pass
AC Power Line Conducted Emission	15.207	Pass

## 2. General Information

### Identification of the EUT

Product:	802.11n draft ADSL2+ Firewall Router
Model No.:	BiPAC 5200N RC
FCC ID.:	QI3-5200N RC
Frequency Range:	2412 MHz to 2462 MHz for 802.11b/g/n HT20 2422 MHz to 2452 MHz for 802.11n HT40
Channel Number:	11 channels for 802.11b/g/n HT20 7 channels for 802.11n HT40
Rated Power:	DC 12 V from adapter Model No.: AD-121AN I/P: 120 Vac, 60Hz
Power Cord:	N/A
Data Cable:	1. RJ-45 UTP Cat.5 10 meter × 4 2. RJ-11 unshielded cable 10 meter × 1
Sample Received:	Jul. 23, 2009
Test Date(s):	Jul. 23, 2009 ~ Jul. 27, 2009
Note 1:	This report is for the exclusive use of Intertek's Client and is provided pursuant to the agreement between Intertek and its Client. Intertek's responsibility and liability are limited to the terms and conditions of the agreement. Intertek assumes no liability to any party, other than to the Client in accordance with the agreement, for any loss, expense or damage occasioned by the use of this report. Only the Client is authorized to permit copying or distribution of this report and then only in its entirety. Any use of the Intertek name or one of its marks for the sale or advertisement of the tested material, product or service must first be approved in writing by Intertek. The observations and test results in this report are relevant only to the sample tested. This report by itself does not imply that the material, product, or service is or has ever been under an Intertek certification program.
Note 2:	When determining the test conclusion, the Measurement Uncertainty of test has been considered.

## Description of EUT

The EUT is an 802.11n draft ADSL2+ Firewall Router, and was defined as radio and telecommunications terminal equipment.

The customer confirmed the models listed as below are series model to model BiPAC 5200N RC (EUT), the difference between main model and series model are listed as below.

Trade Name	Model list	Different			
		LAN port	Antenna	Flash (MB)	SDRAM (MB)
Billion	BiPAC 5200N RC	4 port	2 Antenna	2	8
	BiPAC 5200SN RC	1 port	2 Antenna	2	8
	BiPAC 5200N RD	4 port	2 Antenna	2	16
	BiPAC 5200SN RD	1 port	2 Antenna	2	16
	BiPAC 7300N RC	4 port	2 Antenna	4	16
	BiPAC 7300SN RC	1 port	2 Antenna	4	16
	BiPAC 7300N RD	4 port	2 Antenna	4	16
	BiPAC 7300SN RD	1 port	2 Antenna	4	16
BEC	BEC 5200N RC	4 port	2 Antenna	2	8
	BEC 5200SN RC	1 port	2 Antenna	2	8
	BEC 5200N RD	4 port	2 Antenna	2	16
	BEC 5200SN RD	1 port	2 Antenna	2	16
	BEC 7300N RC	4 port	2 Antenna	4	16
	BEC 7300SN RC	1 port	2 Antenna	4	16
	BEC 7300N RD	4 port	2 Antenna	4	16

For more detail features, please refer to User's manual as file name "Installation guide.pdf"

802.11b ch6		802.11n(20) ch6		802.11n(40) ch6	
Data rate (Mbps)	PK(dBm)	Data rate (Mbps)	PK(dBm)	Data rate (Mbps)	PK(dBm)
1	18.23	6.5	22.98	13	23.20
2	18.01	13	22.84	26	23.08
5.5	17.94	19.5	22.81	39	22.79
11	17.56	26	22.79	52	22.56
802.11g ch6		39	22.74	78	22.34
Data rate (Mbps)	PK(dBm)	52	22.68	104	21.89
6	23.86	58.5	22.56	117	21.84
9	23.44	65	22.46	130	21.81
12	23.04				
18	22.78				
24	22.56				
36	22.34				
48	22.08				
54	22.00				

### Antenna description

The antenna is affixed to the EUT using a unique connector, which allows for replacement of a broken antenna, but DOES NOT use a standard antenna jack or electrical connector.

Antenna Gain : 2 dBi max  
Antenna Type : Dipole antenna  
Connector Type : I-PAX

### 3. Maximum 6 dB Bandwidth

<b>Name of Test</b>	Maximum 6dB Bandwidth
<b>Base Standard</b>	FCC 15.247 (a)(2)

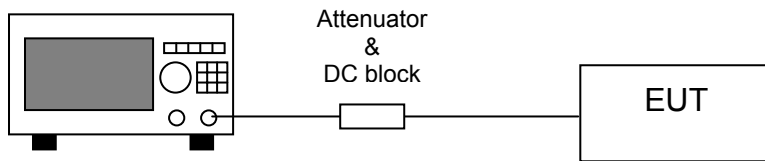
**Test Result:** Complies  
**Measurement Data:** See Table & plots below

**Method of Measurement:**

**Reference FCC document: KDB558074**

A portion of the transmitted signal is coupled to a Spectrum Analyzer with a resolution bandwidth of at least 1 % of the bandwidth of the transmitted signal. The resolution bandwidth is chosen so as not to reduce the peak level of the measured waveform. The appropriate bandwidth mask is applied to the output waveform to verify compliance.

**Test Diagram:**



Spectrum Analyzer

**Note:** The EUT was tested while in a continuous transmit mode and the worst case data rates are 1 Mbps data rate for 802.11b, 6Mbps data rate for 802.11g, 6.5 Mbps data rate for 802.11n HT20 and 13 Mbps data rate for 802.11n HT40. The EUT was tuned to a low, middle and high channel.

Table 1. Maximum 6dB Bandwidth

Single Tx

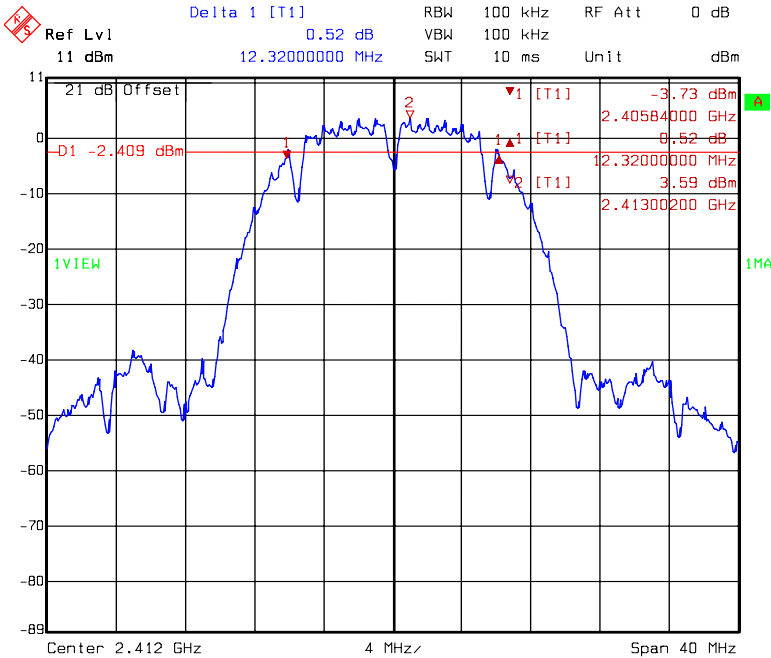
Mode	Channel	Frequency (MHz)	6dB Bandwidth (MHz)		Min. Limit (MHz)	Pass/Fail
			DAC0			
802.11b	1	2412	12.32		0.5	Pass
	6	2437	12.32		0.5	Pass
	11	2462	12.08		0.5	Pass
802.11g	1	2412	16.64		0.5	Pass
	6	2437	16.64		0.5	Pass
	11	2462	16.64		0.5	Pass

Dual Tx

Mode	Channel	Frequency (MHz)	6dB Bandwidth (MHz)		Min. Limit (MHz)	Pass/Fail
			DAC0	DAC1		
802.11 HT20	1	2412	17.76	17.84	0.5	Pass
	6	2437	17.84	17.84	0.5	Pass
	11	2462	17.84	17.84	0.5	Pass
802.11 HT40	3	2422	36.66	36.54	0.5	Pass
	6	2437	36.66	36.78	0.5	Pass
	9	2452	36.66	36.78	0.5	Pass

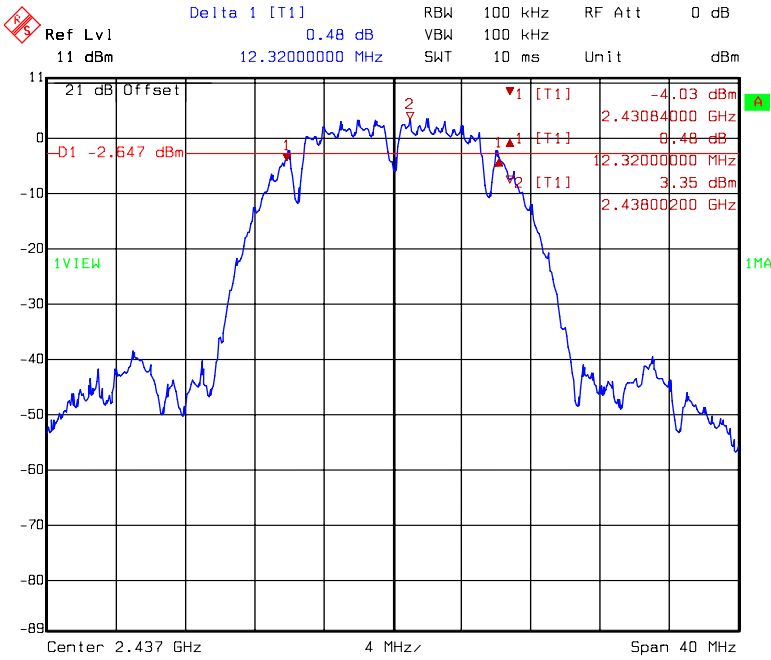


### DAC0: 6dB Bandwidth @ 802.11b mode channel 1



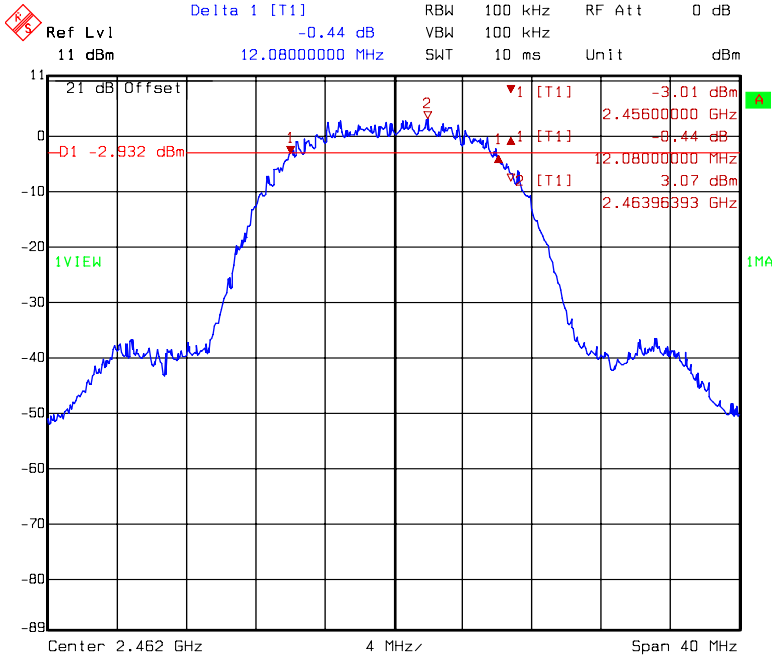
Title: 6dB Band-Width  
 Comment A: CH 1 at 802.11b mode DAC0  
 Date: 23.JUL.2009 09:54:09

### DAC0: 6dB Bandwidth @ 802.11b mode channel 6



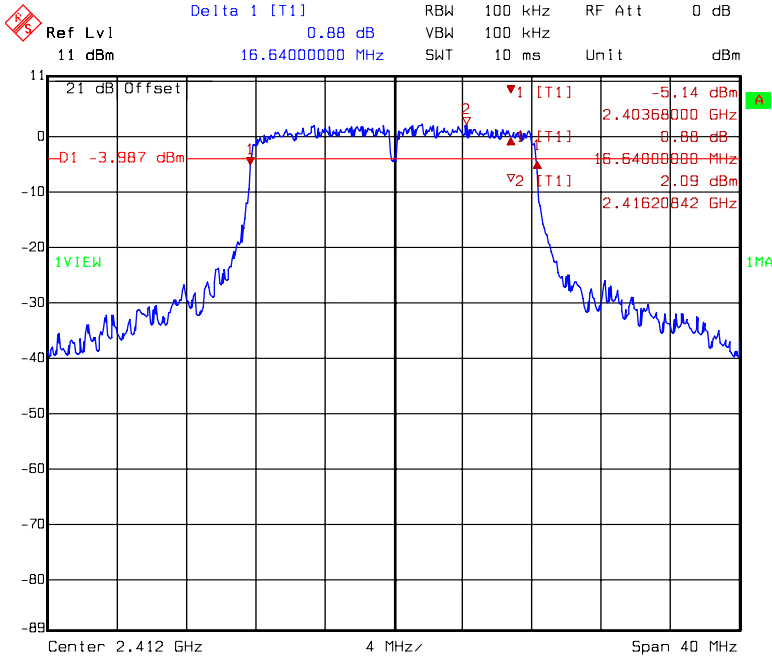
Title: 6dB Band-Width  
 Comment A: CH 6 at 802.11b mode DAC0  
 Date: 23.JUL.2009 09:59:20

### DAC0: 6dB Bandwidth @ 802.11b mode channel 11



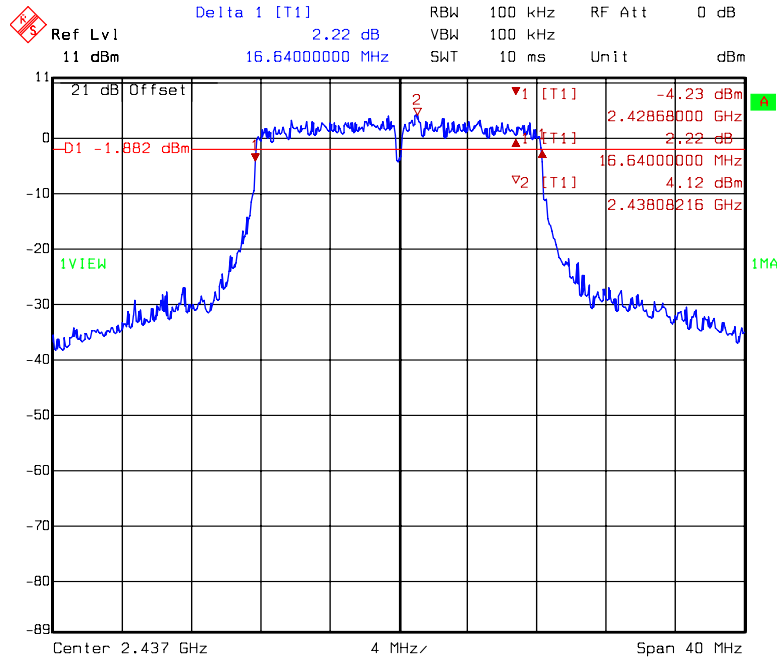
Title: 6dB Band-Width  
 Comment A: CH 11 at 802.11b mode DAC0  
 Date: 23.JUL.2009 10:02:20

### DAC0: 6dB Bandwidth @ 802.11g mode channel 1



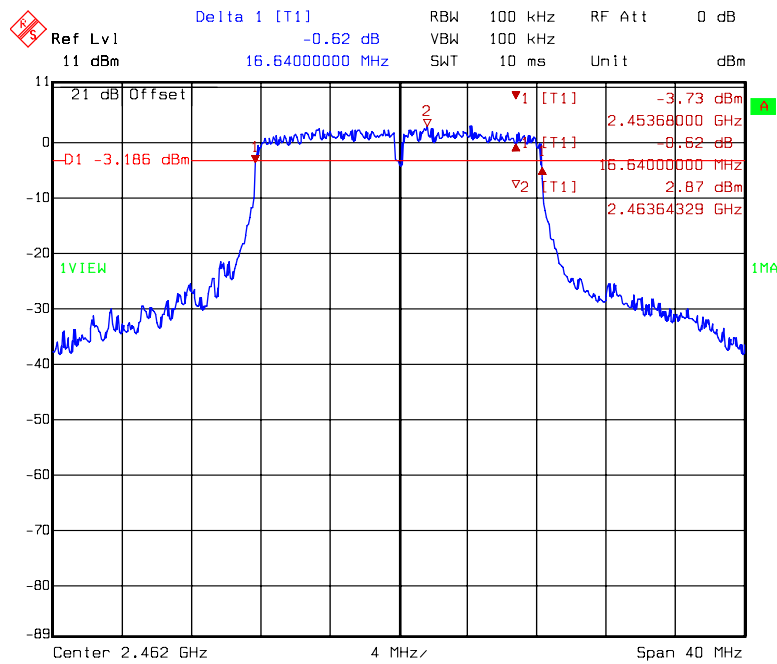
Title: 6dB Band-Width  
 Comment A: CH 1 at 802.11g mode DAC0  
 Date: 23.JUL.2009 10:06:17

## DAC0: 6dB Bandwidth @ 802.11g mode channel 6



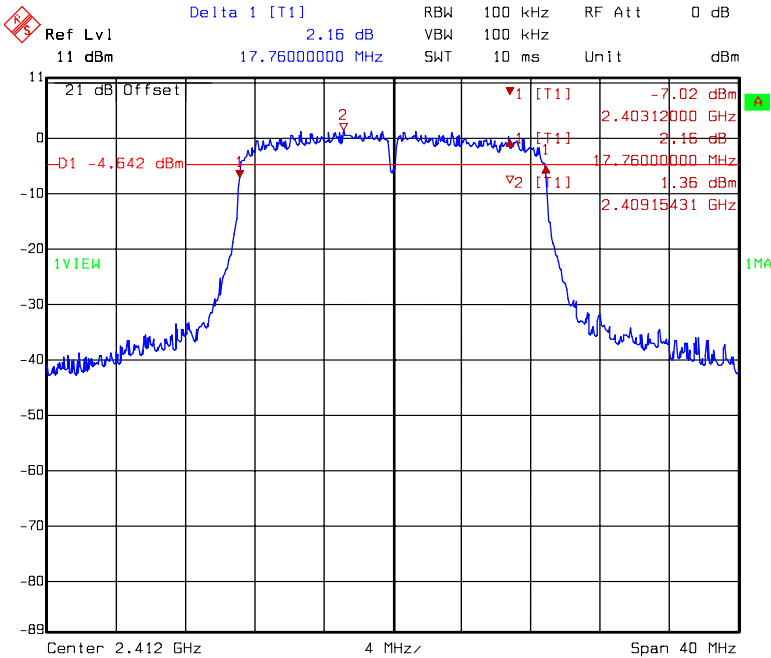
Title: 6dB Band-Width  
Comment A: CH 6 at 802.11g mode DAC0  
Date: 23.JUL.2009 10:09:38

## DAC0: 6dB Bandwidth @ 802.11g mode channel 11



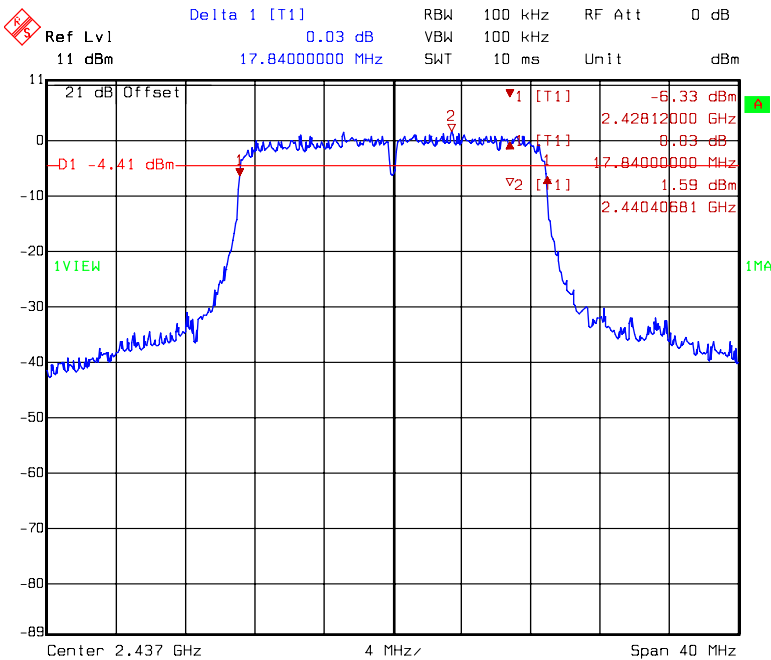
Title: 6dB Band-Width  
Comment A: CH 11 at 802.11g mode DAC0  
Date: 23.JUL.2009 10:13:24

### DAC0: 6dB Bandwidth @ 802.11n HT20 mode channel 1



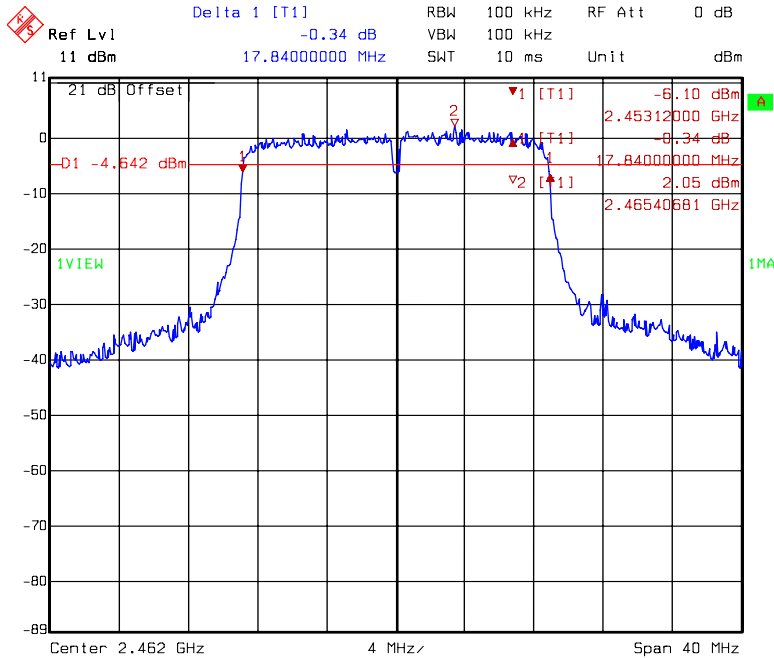
Title: 6dB Band-Width  
Comment A: CH 1 at 802.11n 20MHz mode DAC0  
Date: 23.JUL.2009 10:18:25

### DAC0: 6dB Bandwidth @ 802.11n HT20 mode channel 6



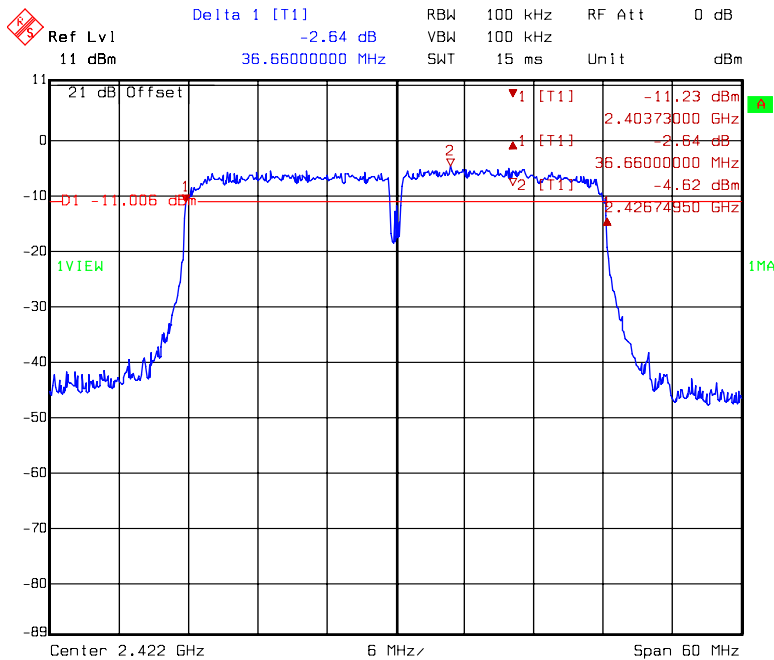
Title: 6dB Band-Width  
Comment A: CH 6 at 802.11n 20MHz mode DAC0  
Date: 23.JUL.2009 10:21:50

### DAC0: 6dB Bandwidth @ 802.11n HT20 mode channel 11



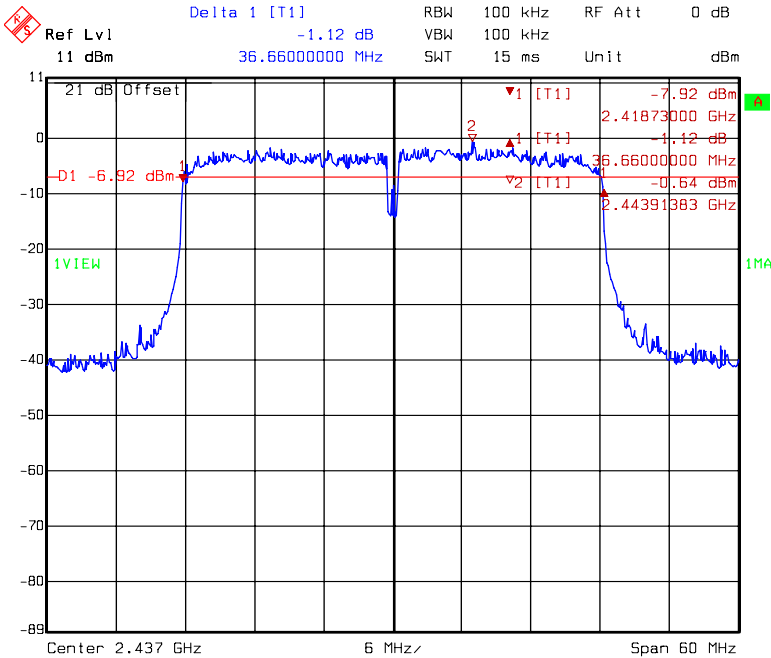
Title: 6dB Band-Width  
 Comment A: CH 11 at 802.11n 20MHz mode DAC0  
 Date: 23.JUL.2009 10:24:51

### DAC0: 6dB Bandwidth @ 802.11n HT40 mode channel 3



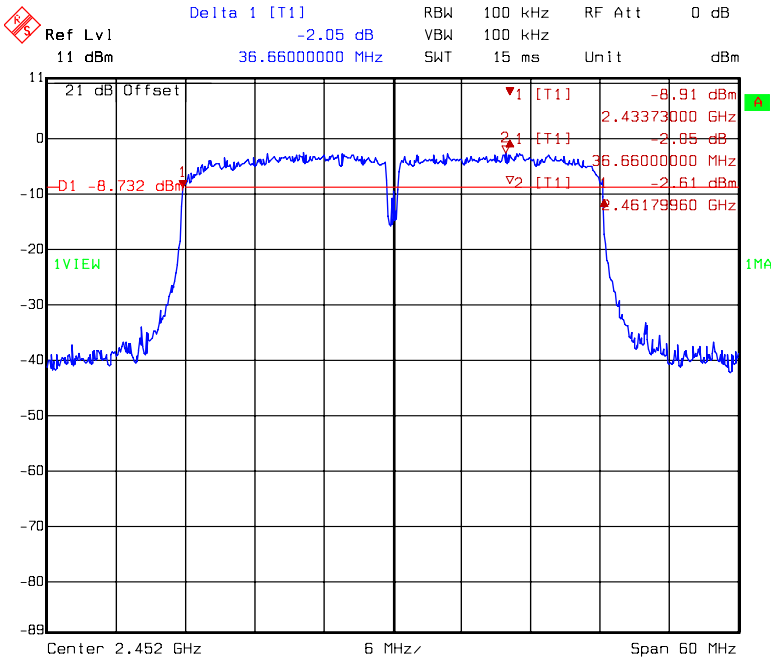
Title: 6dB Band-Width  
 Comment A: CH 3 at 802.11n 40MHz mode DAC0  
 Date: 23.JUL.2009 10:29:15

DAC0: 6dB Bandwidth @ 802.11n HT40 mode channel 6



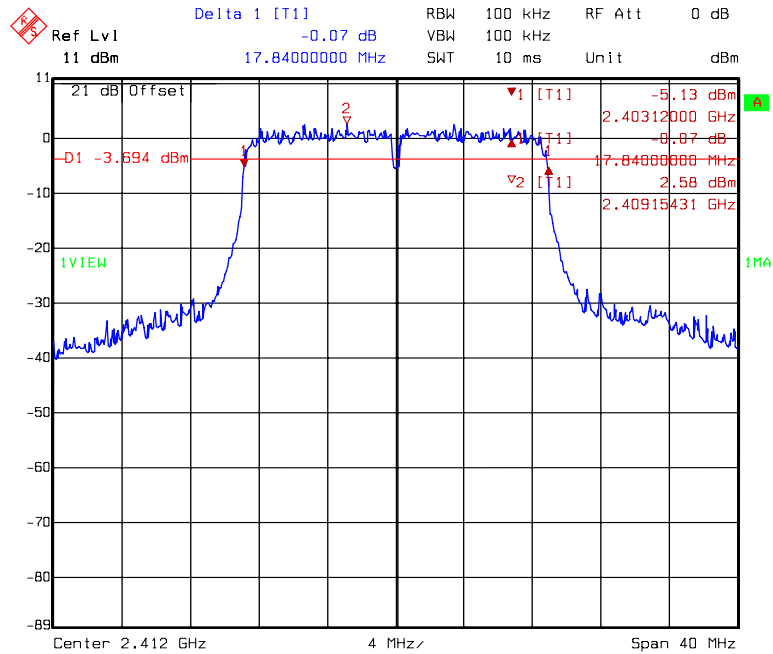
Title: 6dB Band-Width  
Comment A: CH 6 at 802.11n 40MHz mode DAC0  
Date: 23.JUL.2009 10:32:05

DAC0: 6dB Bandwidth @ 802.11n HT40 mode channel 9



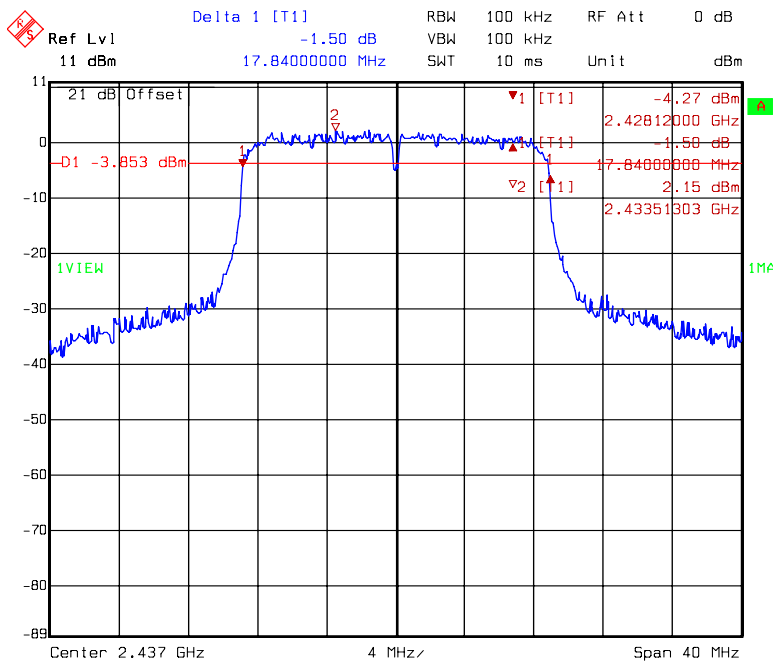
Title: 6dB Band-Width  
Comment A: CH 9 at 802.11n 40MHz mode DAC0  
Date: 23.JUL.2009 10:34:57

## DAC1: 6dB Bandwidth @ 802.11n HT20 mode channel 1



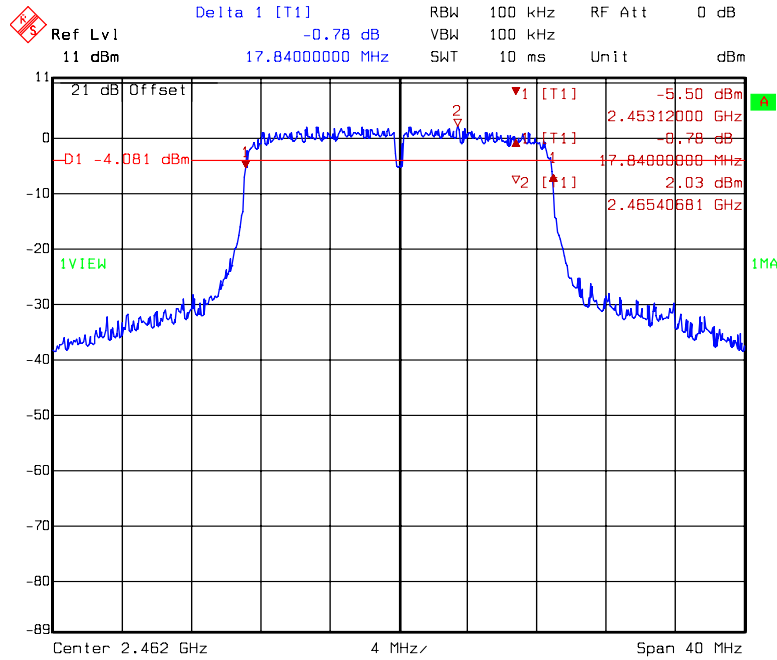
Title: 6dB Band-Width  
Comment A: CH 1 at 802.11n 20MHz mode DAC1  
Date: 23.JUL.2009 10:54:13

## DAC1: 6dB Bandwidth @ 802.11n HT20 mode channel 6



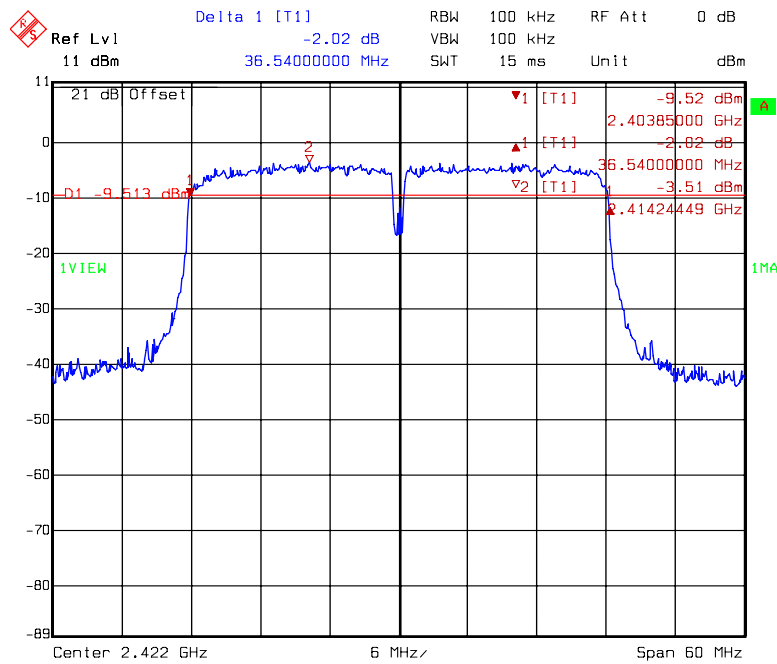
Title: 6dB Band-Width  
Comment A: CH 6 at 802.11n 20MHz mode DAC1  
Date: 23.JUL.2009 10:57:30

## DAC1: 6dB Bandwidth @ 802.11n HT20 mode channel 11



Title: 6dB Band-Width  
 Comment A: CH 11 at 802.11n 20MHz mode DAC1  
 Date: 23.JUL.2009 11:02:44

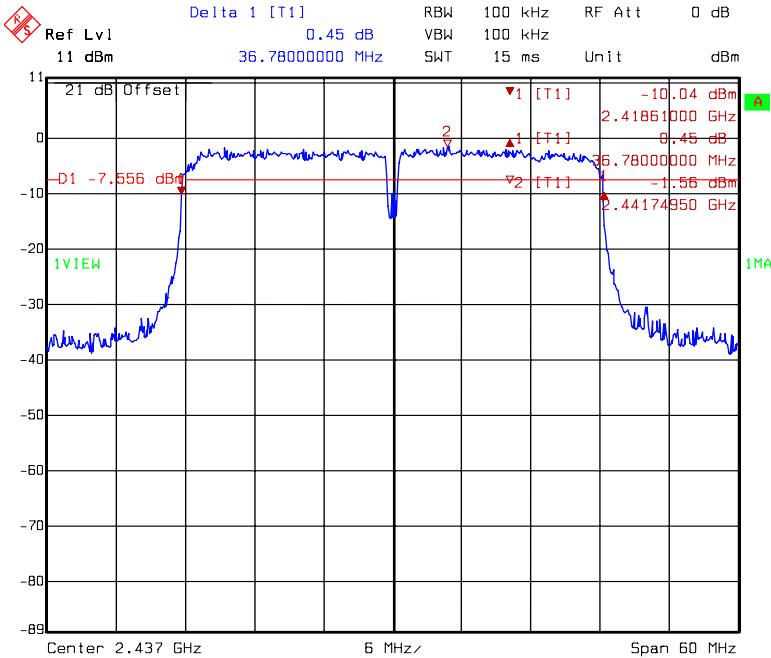
## DAC1: 6dB Bandwidth @ 802.11n HT40 mode channel 3



Title: 6dB Band-Width  
 Comment A: CH 3 at 802.11n 40MHz mode DAC1  
 Date: 23.JUL.2009 10:43:01

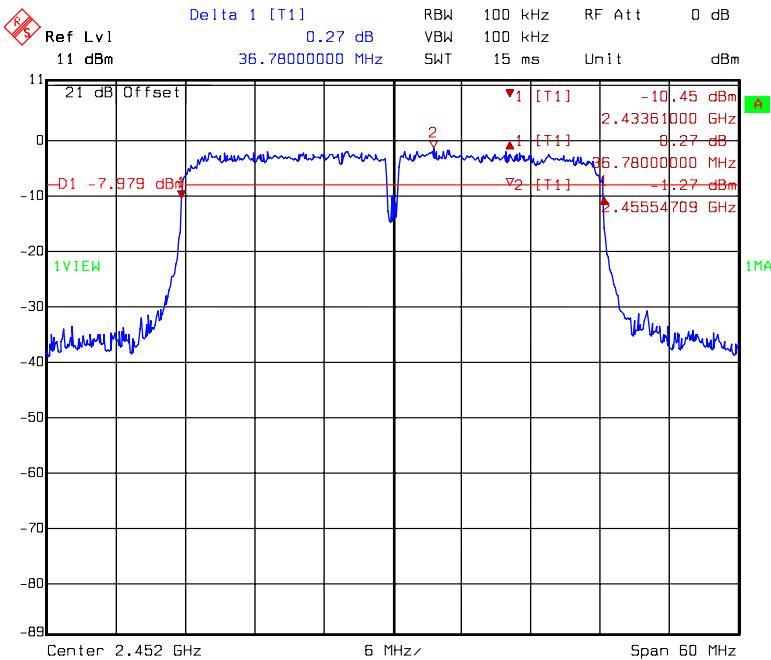


### DAC1: 6dB Bandwidth @ 802.11n HT40 mode channel 6



Title: 6dB Band-Width  
Comment A: CH 6 at 802.11n 40MHz mode DAC1  
Date: 23.JUL.2009 10:47:40

### DAC1: 6dB Bandwidth @ 802.11n HT40 mode channel 9



Title: 6dB Band-Width  
Comment A: CH 9 at 802.11n 40MHz mode DAC1  
Date: 23.JUL.2009 10:50:46

#### 4. 99% Occupied Bandwidth

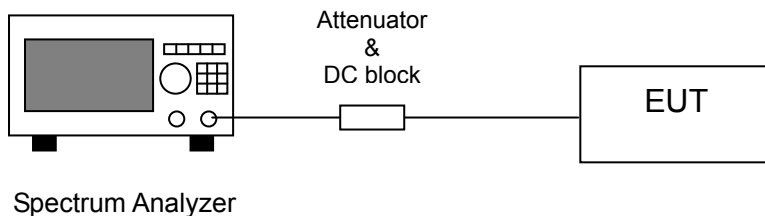
<b>Name of Test</b>	99% Occupied Bandwidth
<b>Base Standard</b>	None; for reporting purposes only

**Test Result:** Complies  
**Measurement Data:** See Table & plots below

**Method of Measurement:**  
**Reference FCC document: KDB558074**

A portion of the transmitted signal is coupled to a Spectrum Analyzer with a resolution bandwidth of at least 1 % of the bandwidth of the transmitted signal. The resolution bandwidth is chosen so as not to reduce the peak level of the measured waveform. The appropriate bandwidth mask is applied to the output waveform to verify compliance.

#### Test Diagram:



**Note:** The EUT was tested while in a continuous transmit mode and the worst case data rates are 1 Mbps for 802.11b, 6 Mbps for 802.11g and 6.5Mbps for 802.11n HT20, 13.5Mbps for 802.11n HT40. The EUT was tuned to a low, middle and high channel.

Table 2. 99% Occupied Bandwidth

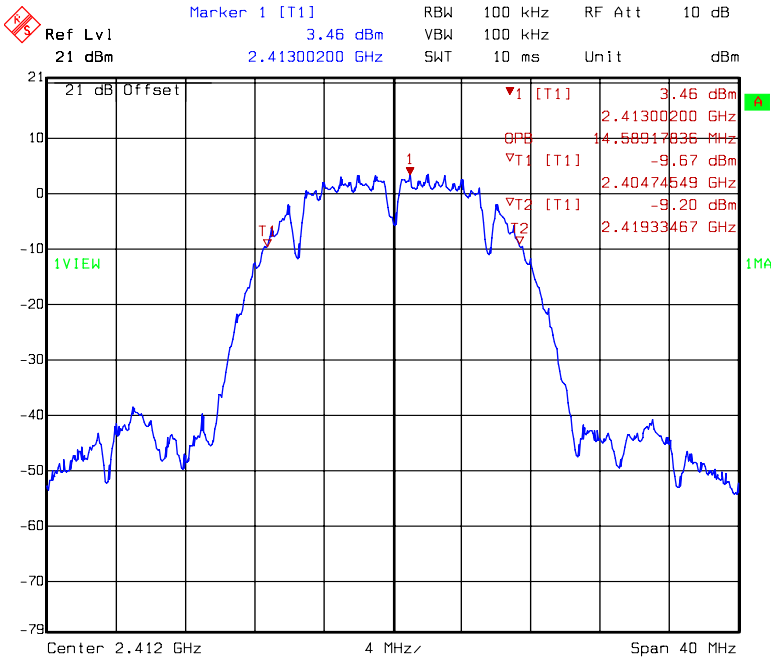
Single Tx

Mode	Channel	Frequency (MHz)	Occupied Bandwidth (MHz)
			DAC0
802.11b	1	2412	14.59
	6	2437	14.59
	11	2462	14.99
802.11g	1	2412	16.43
	6	2437	16.43
	11	2462	16.43

Dual Tx

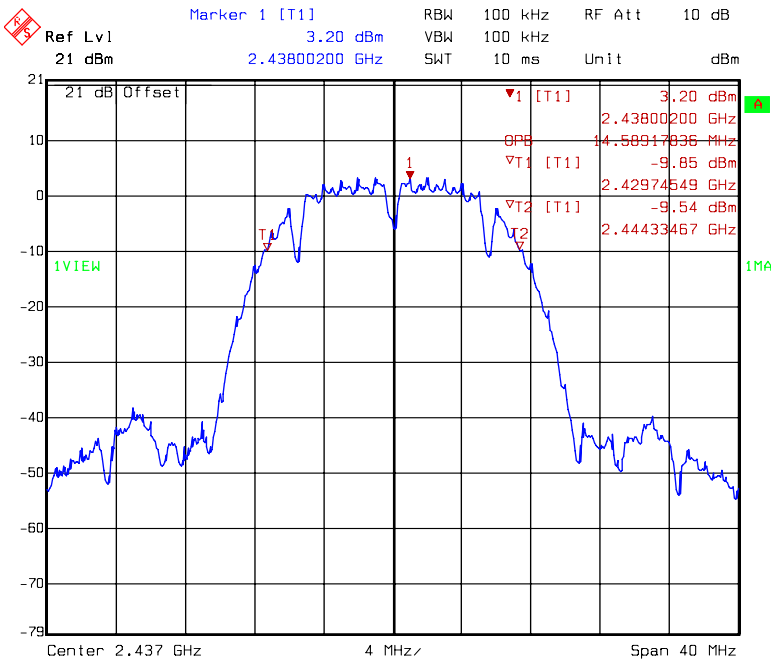
Mode	Channel	Frequency (MHz)	Occupied Bandwidth (MHz)	
			DAC0	DAC1
802.11n HT20	1	2412	17.47	17.55
	6	2437	17.47	17.55
	11	2462	17.55	17.55
802.11n HT40	3	2422	35.95	35.83
	6	2437	35.95	35.95
	9	2452	35.83	35.95

### DAC0: 99% Occupied Bandwidth @ 802.11b mode channel 1



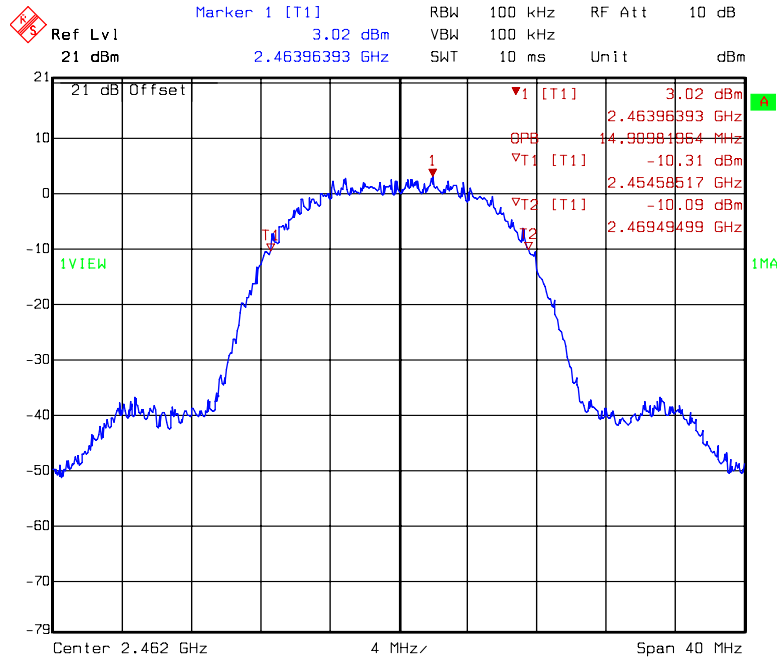
Title: Occupied Band-Width  
Comment A: CH 1 at 802.11b mode DAC0  
Date: 23.JUL.2009 09:55:57

### DAC0: 99% Occupied Bandwidth @ 802.11b mode channel 6



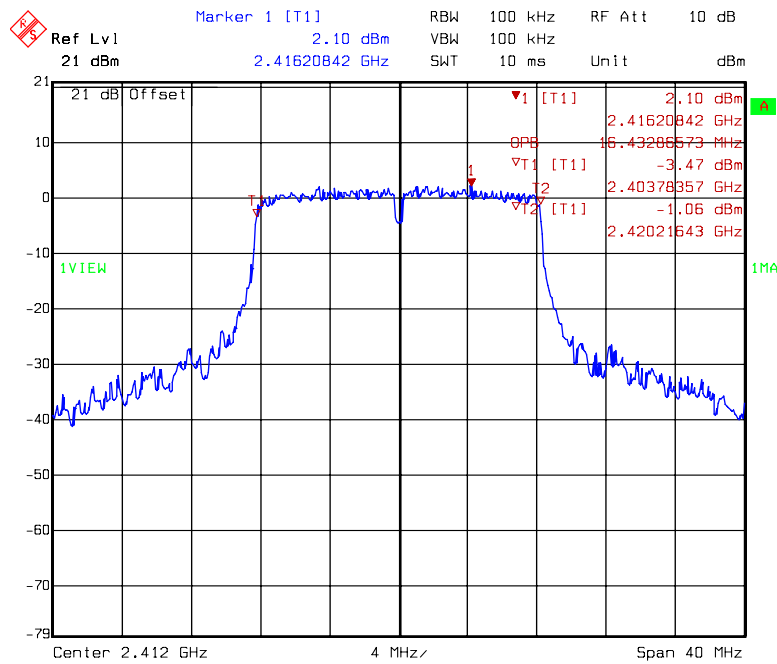
Title: Occupied Band-Width  
Comment A: CH 6 at 802.11b mode DAC0  
Date: 23.JUL.2009 10:01:07

## DAC0: 99% Occupied Bandwidth @ 802.11b mode channel 11



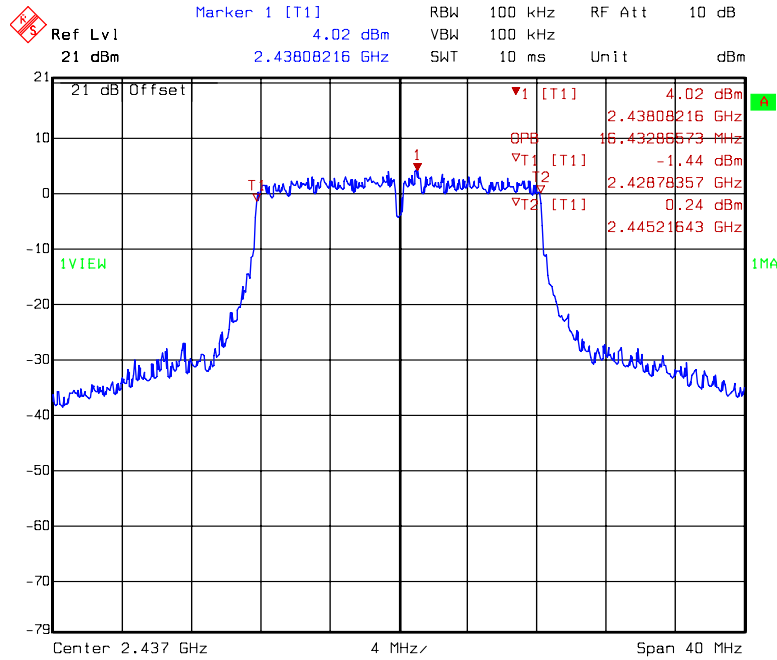
Title: Occupied Band-Width  
Comment A: CH 11 at 802.11b mode DAC0  
Date: 23.JUL.2009 10:04:08

## DAC0: 99% Occupied Bandwidth @ 802.11g mode channel 1

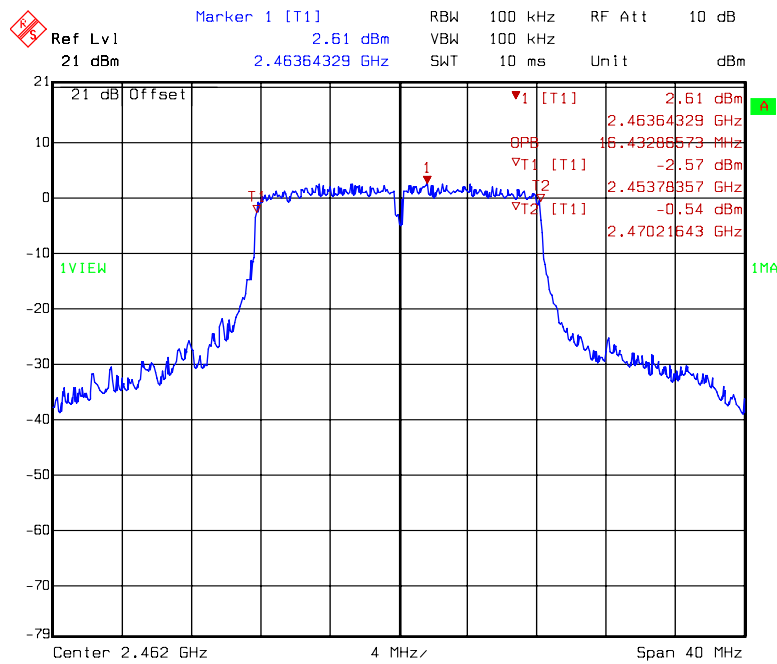


Title: Occupied Band-Width  
Comment A: CH 1 at 802.11g mode DAC0  
Date: 23.JUL.2009 10:08:04

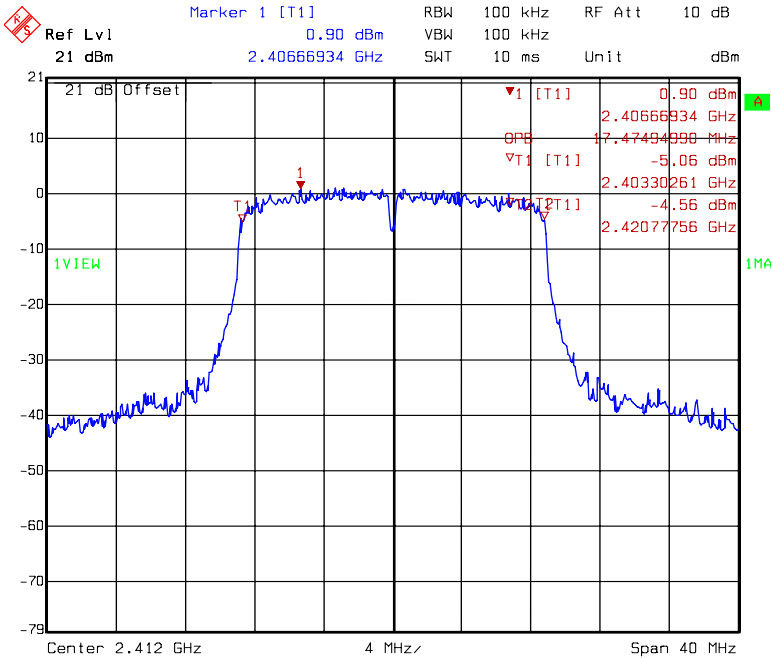
## DAC0: 99% Occupied Bandwidth @ 802.11g mode channel 6



## DAC0: 99% Occupied Bandwidth @ 802.11g mode channel 11

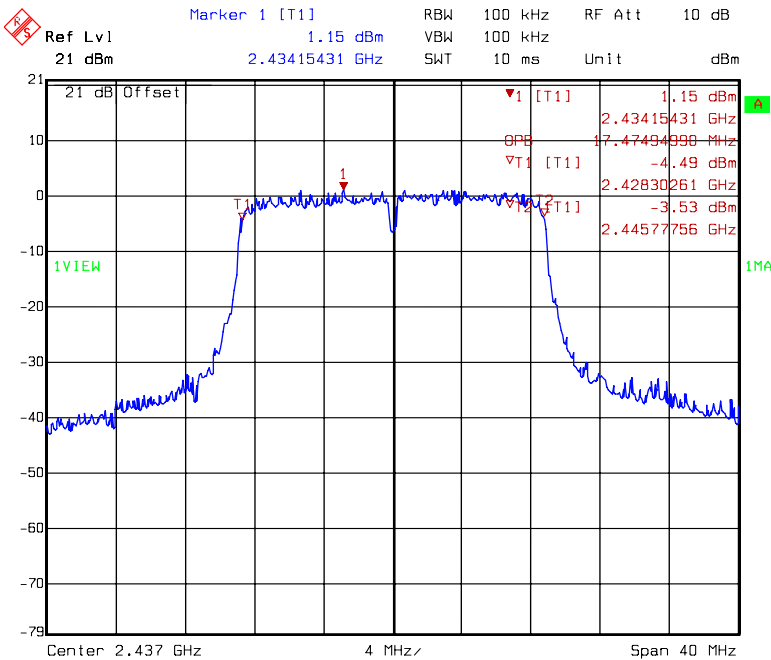


### DAC0: 99% Occupied Bandwidth @ 802.11n HT20 mode channel 1



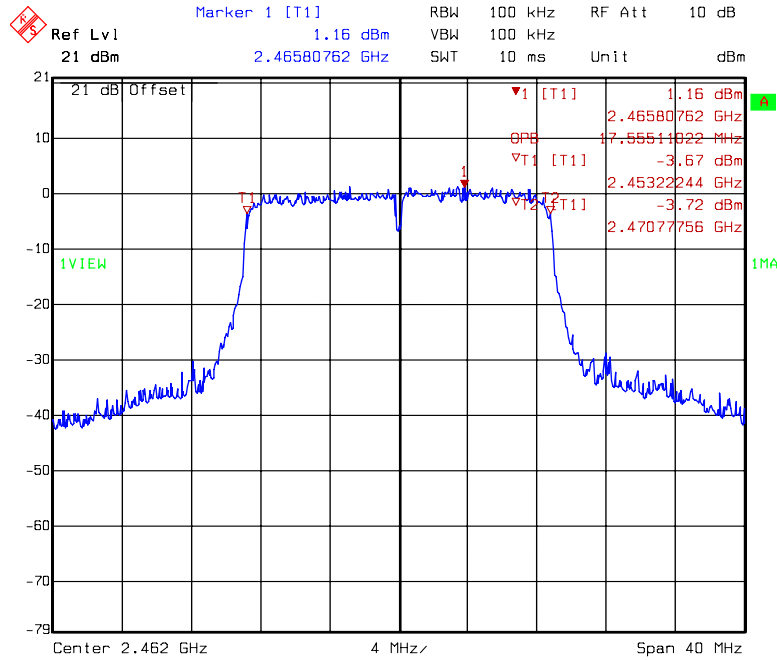
Title: Occupied Band-Width  
 Comment A: CH 1 at 802.11n 20MHz mode DAC0  
 Date: 23.JUL.2009 10:20:12

### DAC0: 99% Occupied Bandwidth @ 802.11n HT20 mode channel 6



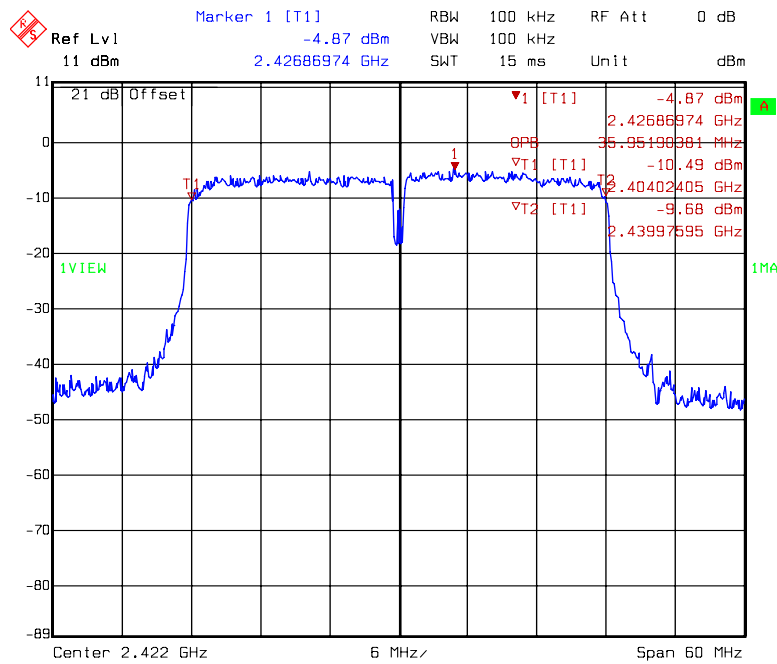
Title: Occupied Band-Width  
 Comment A: CH 6 at 802.11n 20MHz mode DAC0  
 Date: 23.JUL.2009 10:23:38

## DAC0: 99% Occupied Bandwidth @ 802.11n HT20 mode channel 11



Title: Occupied Band-Width  
Comment A: CH 11 at 802.11n 20MHz mode DAC0  
Date: 23.JUL.2009 10:26:38

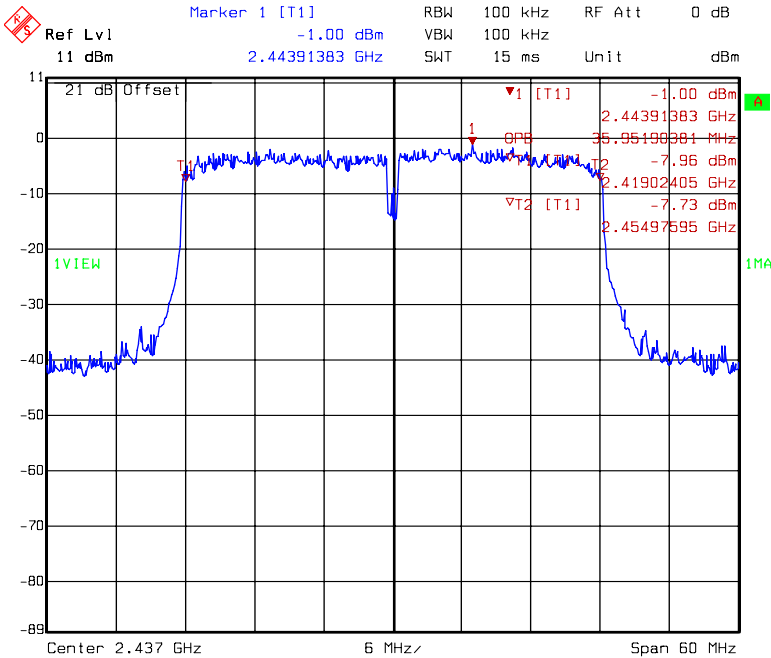
## DAC0: 99% Occupied Bandwidth @ 802.11n HT40 mode channel 3



Title: Occupied Band-Width  
Comment A: CH 3 at 802.11n 40MHz mode DAC0  
Date: 23.JUL.2009 10:30:57

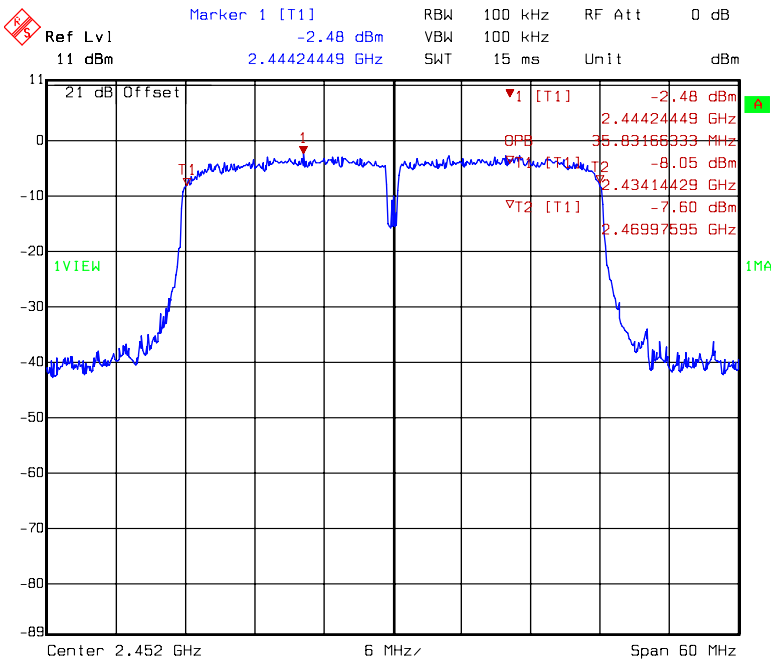


### DAC0: 99% Occupied Bandwidth @ 802.11n HT40 mode channel 6



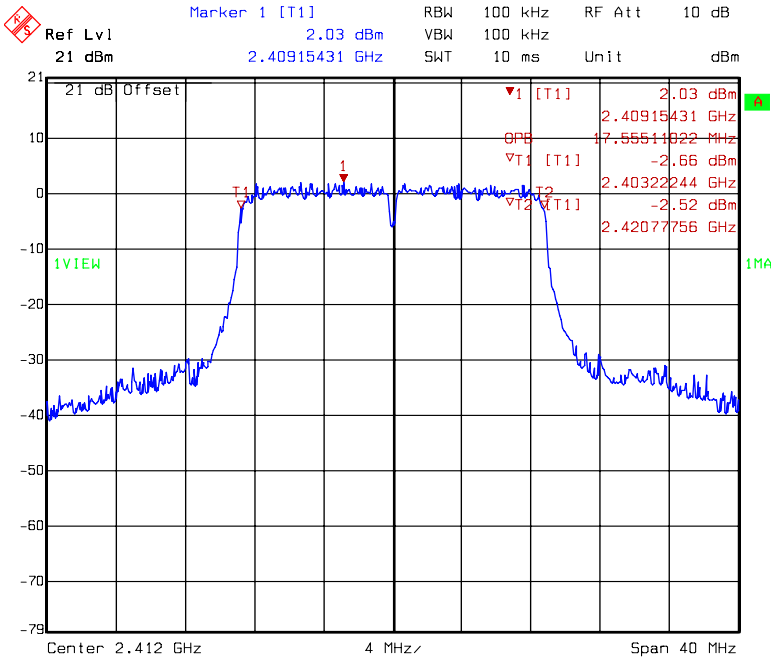
Title: Occupied Band-Width  
 Comment A: CH 6 at 802.11n 40MHz mode DAC0  
 Date: 23.JUL.2009 10:33:46

### DAC0: 99% Occupied Bandwidth @ 802.11n HT40 mode channel 9



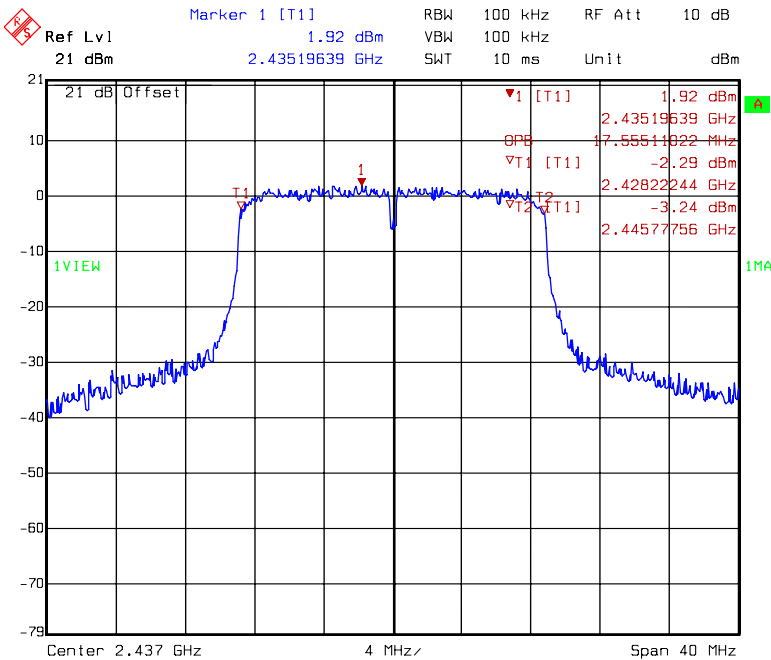
Title: Occupied Band-Width  
 Comment A: CH 9 at 802.11n 40MHz mode DAC0  
 Date: 23.JUL.2009 10:36:38

### DAC1: 99% Occupied Bandwidth @ 802.11n HT20 mode channel 1



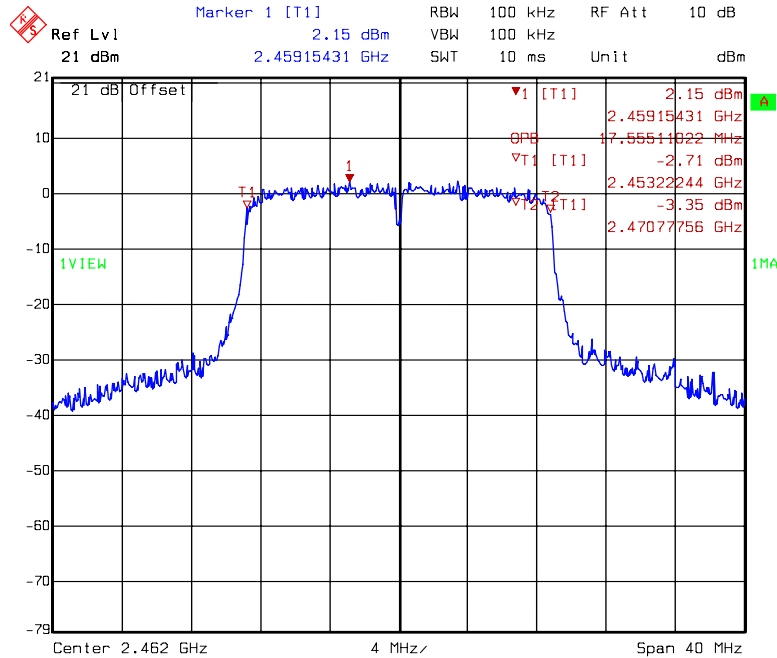
Title: Occupied Band-Width  
Comment A: CH 1 at 802.11n 20MHz mode DAC1  
Date: 23.JUL.2009 10:56:01

### DAC1: 99% Occupied Bandwidth @ 802.11n HT20 mode channel 6



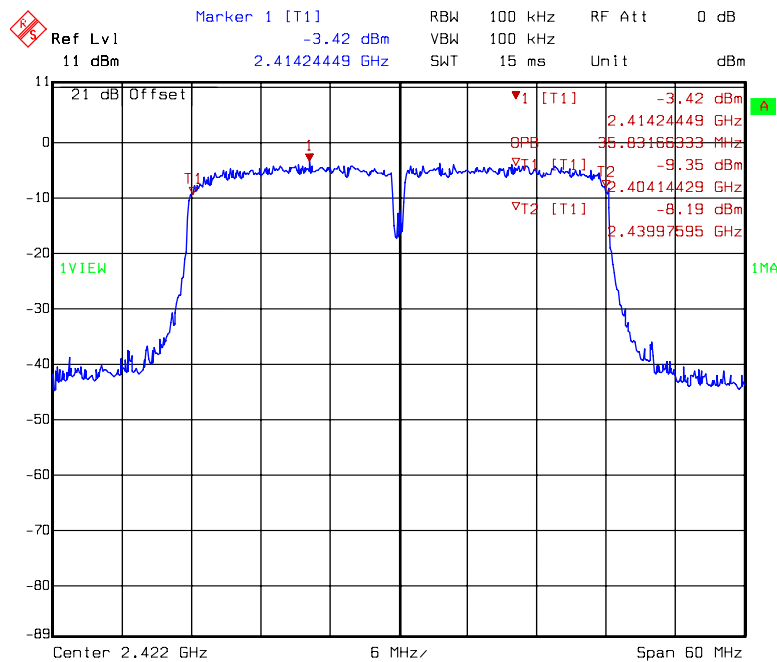
Title: Occupied Band-Width  
Comment A: CH 6 at 802.11n 20MHz mode DAC1  
Date: 23.JUL.2009 10:59:18

## DAC1: 99% Occupied Bandwidth @ 802.11n HT20 mode channel 11



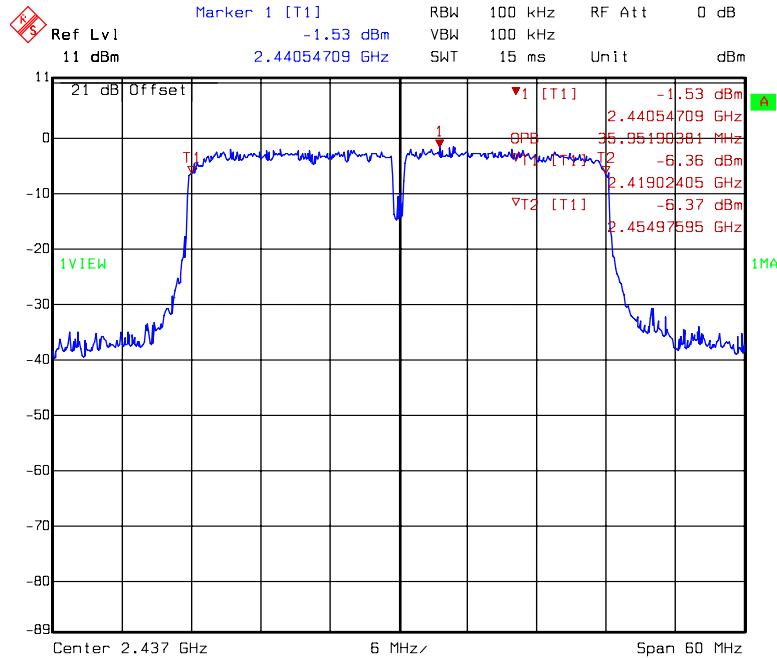
Title: Occupied Band-Width  
Comment A: CH 11 at 802.11n 20MHz mode DAC1  
Date: 23.JUL.2009 11:04:32

## DAC1: 99% Occupied Bandwidth @ 802.11n HT40 mode channel 3



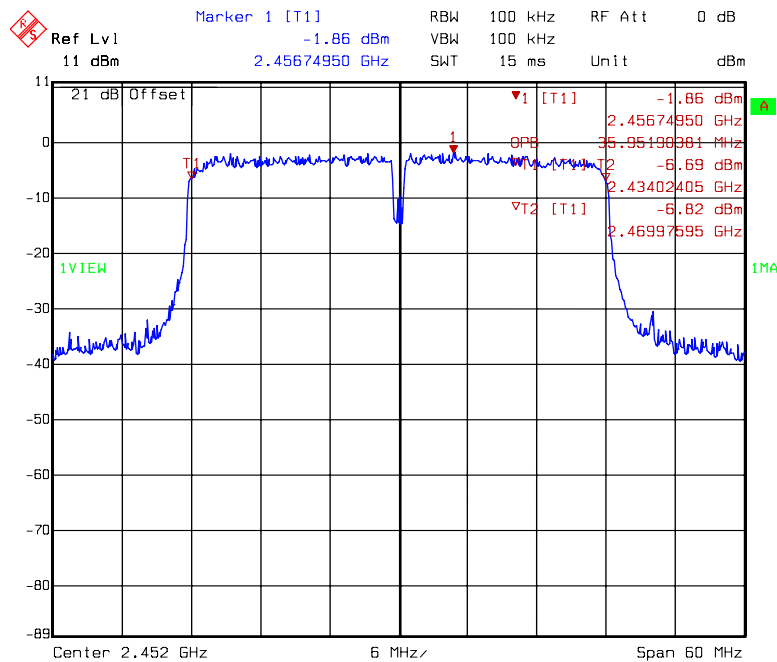
Title: Occupied Band-Width  
Comment A: CH 3 at 802.11n 40MHz mode DAC1  
Date: 23.JUL.2009 10:44:42

## DAC1: 99% Occupied Bandwidth @ 802.11n HT40 mode channel 6



Title: Occupied Band-Width  
 Comment A: CH 6 at 802.11n 40MHz mode DAC1  
 Date: 23.JUL.2009 10:49:21

## DAC1: 99% Occupied Bandwidth @ 802.11n HT40 mode channel 9



Title: Occupied Band-Width  
 Comment A: CH 9 at 802.11n 40MHz mode DAC1  
 Date: 23.JUL.2009 10:52:27

## 5. Maximum Output Power

<b>Name of Test</b>	Maximum output power
<b>Base Standard</b>	FCC 15.247(b)

**Measurement Uncertainty:** ±2dB (k=2)  
**Test Result:** Complies  
**Measurement Data:** See Table below

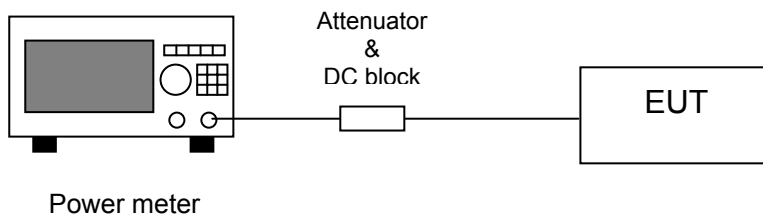
### Method of Measurement:

#### Reference FCC document: KDB558074

The power output was measured on the EUT using a 50 ohm SMA Cable connected to peak power meter via power sensor for below 20MHz bandwidth. For 40MHz bandwidth (HT40 mode), the spectrum analyzer was used.

Power output was measured with the maximum rated input level.

### Test Diagram:



**Note:** The EUT was tested while in a continuous transmit mode and the worst case data rates are 1 Mbps data rate for 802.11b mode, 6 Mbps data rate for 802.11g mode, 6.5 Mbps data rate for 802.11n HT20 mode and 13 Mbps data rate for 802.11n HT40 mode. The EUT was tuned to a low, middle and high channel.

Table 3. Maximum output power

Single Tx

Mode	Channel	Frequency (MHz)	Data Rate (Mbps)	Output Power (dBm)		Limit (dBm)
				DAC0	PK	
802.11b	1	2412	1	18.19		30
	6	2437		18.23		30
	11	2462		18.37		30
802.11g	1	2412	6	23.97		30
	6	2437		23.86		30
	11	2462		23.79		30

Dual Tx

Mode	Channel	Frequency (MHz)	Data Rate (Mbps)	Output Power (dBm)		Total Power (PK)		Limit (dBm)
				DAC0	DAC1	dBm	mW	
				PK	PK			
802.11n HT20	1	2412	6.5	23.42	23.25	26.35	431.13	30
	6	2437		22.98	23.42	26.22	418.40	30
	11	2462		23.65	23.3	26.49	445.54	30
802.11n HT40	3	2422	13.5	22.97	22.83	25.91	390.02	30
	6	2437		23.2	22.89	26.06	403.47	30
	9	2452		23.04	22.83	25.95	393.24	30

## 6. Power Spectral Density

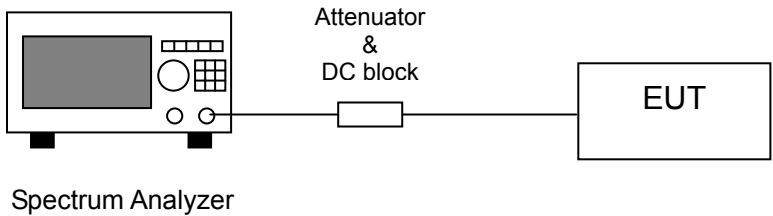
<b>Name of Test</b>	Power Spectral Density
<b>Base Standard</b>	FCC 15.247(e)

**Test Result:** Complies  
**Measurement Data:** See Table & plots below

**Method of Measurement:**  
**Reference FCC document: KDB558074**

A portion of the transmitted signal is coupled to a Spectrum Analyzer with a resolution bandwidth of at least 1 % of the bandwidth of the transmitted signal. The resolution bandwidth is chosen so as not to reduce the peak level of the measured waveform. The appropriate bandwidth mask is applied to the output waveform to verify compliance.

### Test Diagram:



**Note:** The EUT was tested while in a continuous transmit mode and the worst case data rates are 1 Mbps data rate for 802.11b mode, 6 Mbps data rate for 802.11g mode, 6.5 Mbps data rate for 802.11n HT20 mode and 13 Mbps data rate for 802.11n HT40 mode. The EUT was tuned to a low, middle and high channel.

Table 4. Power Spectral Density

Single Tx

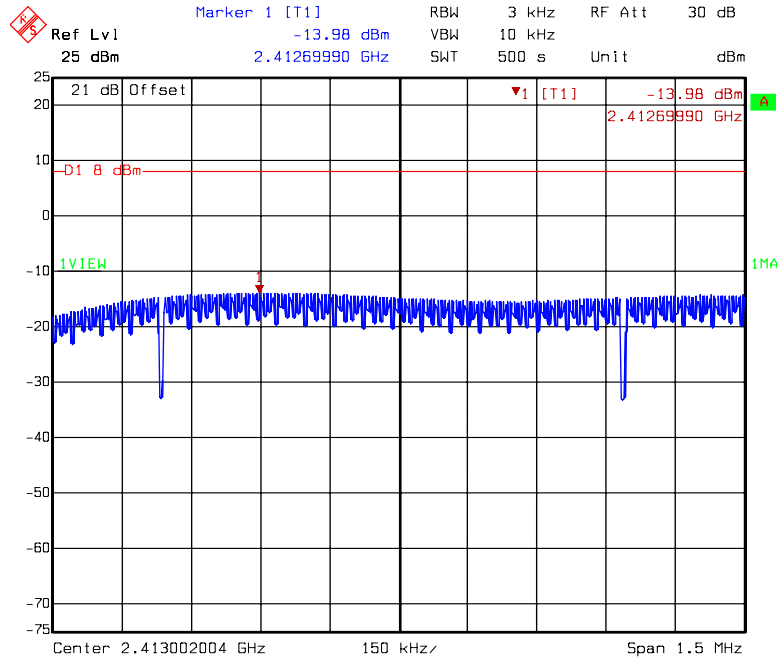
Mode	Channel	Frequency (MHz)	PSD (dBm)	Limit (dBm)
			DAC0	
802.11b	1	2412	-13.98	8
	6	2437	-14.27	8
	11	2462	-9.65	8
802.11g	1	2412	-12.82	8
	6	2437	-10.04	8
	11	2462	-11.24	8

Dual Tx

Mode	Channel	Frequency (MHz)	PSD (dBm)		Total PSD (dBm)	Total PSD (mW)	Limit (dBm)
			DAC0	DAC1			
802.11n HT20	1	2412	-12.62	-11.74	-9.15	0.12	8
	6	2437	-12.23	-10.49	-8.26	0.15	8
	11	2462	-12.14	-11.12	-8.59	0.14	8
802.11n HT40	3	2422	-18.31	-17.53	-14.89	0.03	8
	6	2437	-13.65	-15.48	-11.46	0.07	8
	9	2452	-15.71	-14.57	-12.09	0.06	8

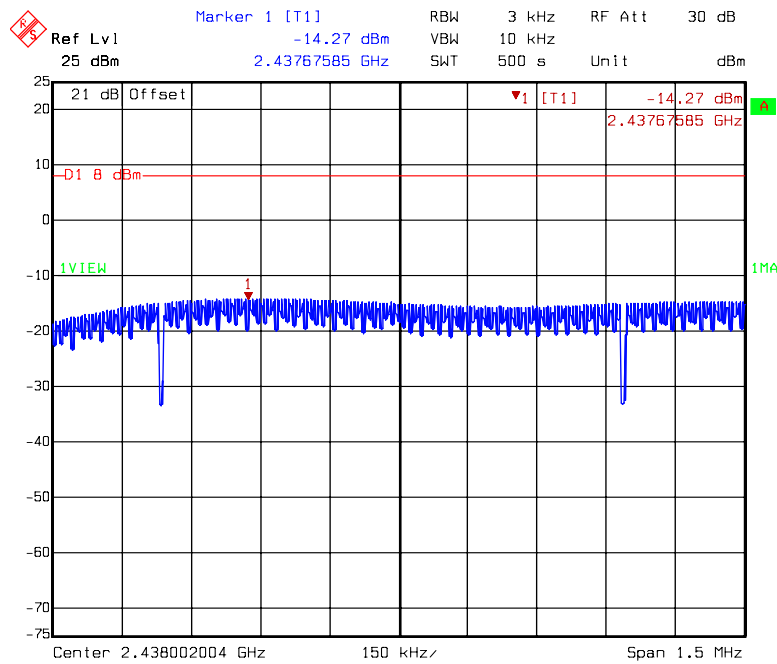


## DAC0: Power Spectral Density @ 802.11b mode channel 1



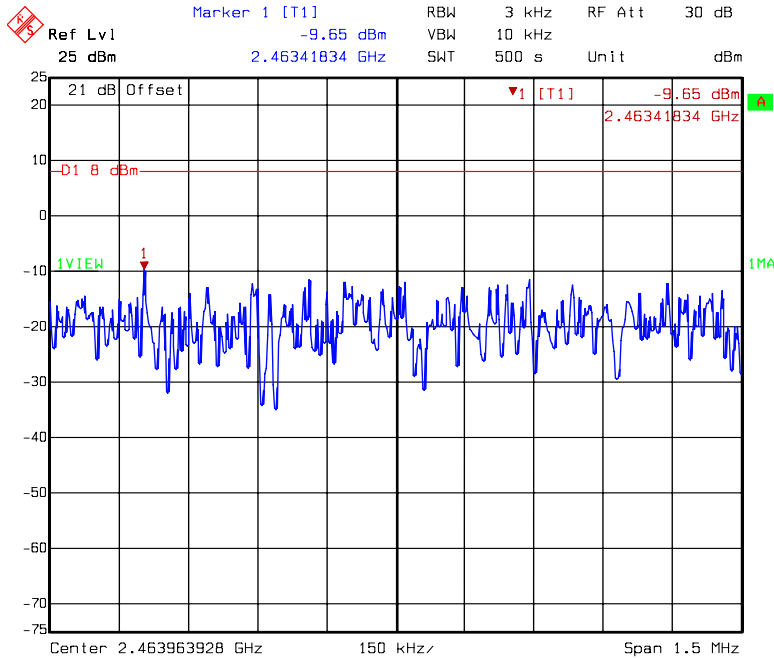
Title: Power density  
Comment A: CH 1 at 802.11b mode DAC0  
Date: 23.JUL.2009 09:54:24

## DAC0: Power Spectral Density @ 802.11b mode channel 6



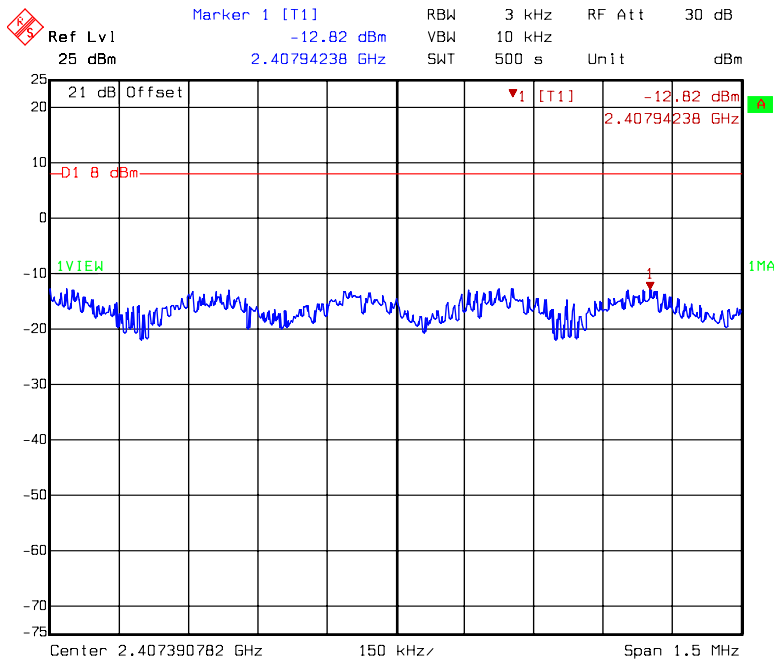
Title: Power density  
Comment A: CH 6 at 802.11b mode DAC0  
Date: 23.JUL.2009 09:59:35

**DAC0: Power Spectral Density @ 802.11b mode channel 11**



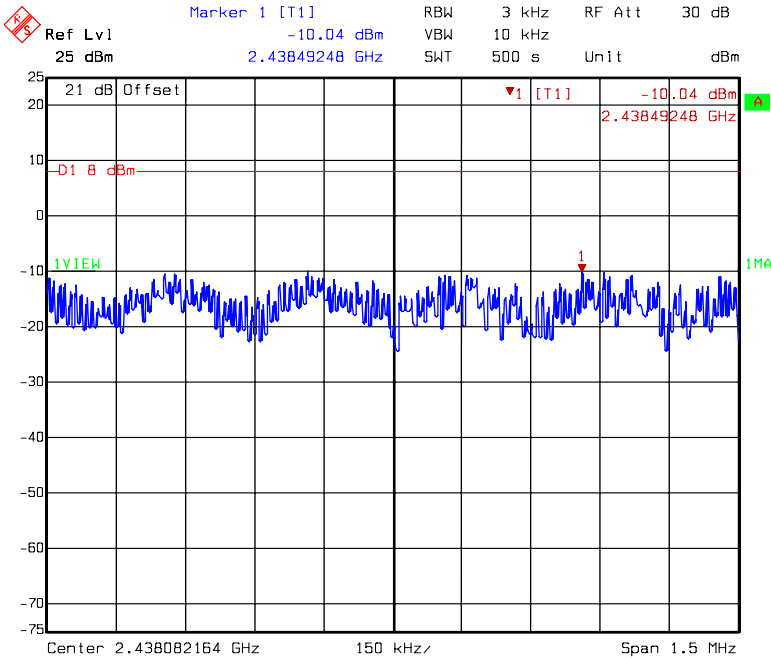
Title: Power density  
 Comment A: CH 11 at 802.11b mode DAC0  
 Date: 23.JUL.2009 10:02:35

**DAC0: Power Spectral Density @ 802.11g mode channel 1**



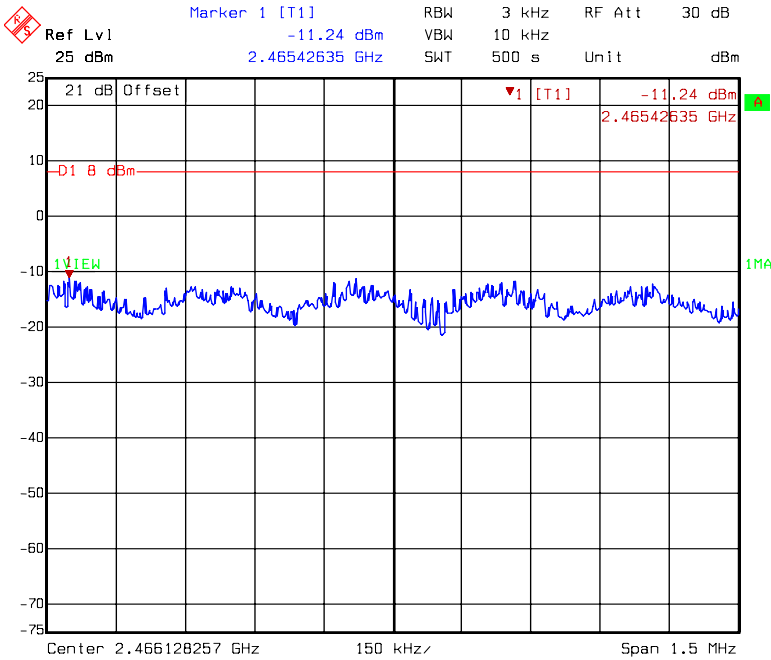
Title: Power density  
 Comment A: CH 1 at 802.11g mode DAC0  
 Date: 23.JUL.2009 10:06:32

**DAC0: Power Spectral Density @ 802.11g mode channel 6**



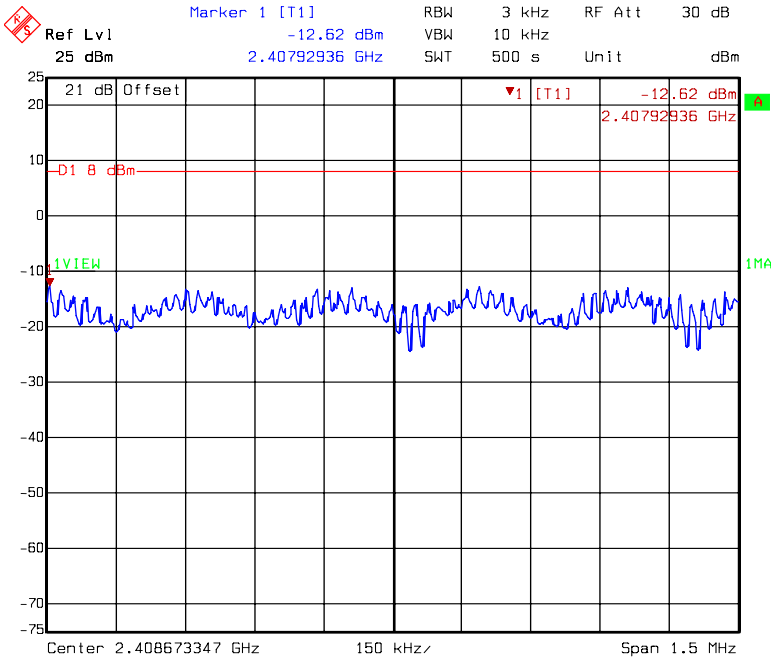
Title: Power density  
 Comment A: CH 6 at 802.11g mode DAC0  
 Date: 23.JUL.2009 10:09:53

**DAC0: Power Spectral Density @ 802.11g mode channel 11**



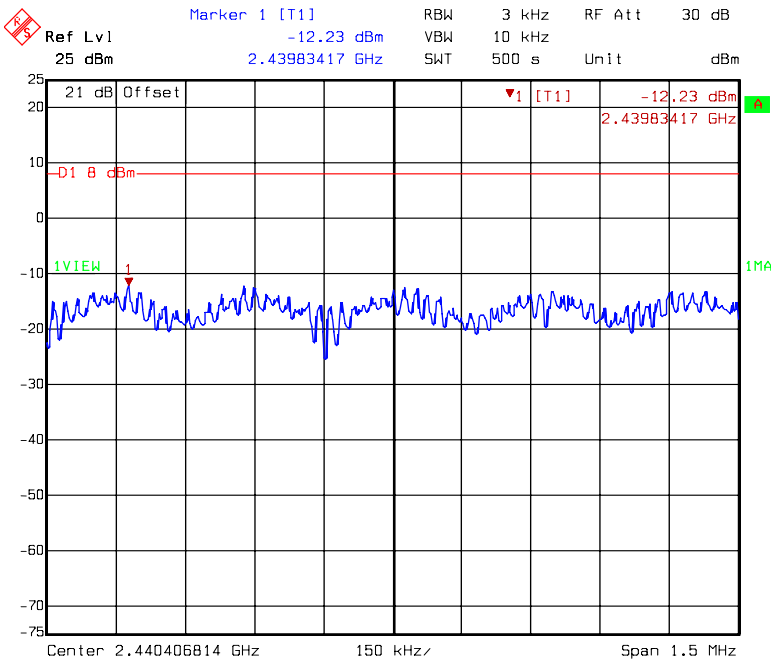
Title: Power density  
 Comment A: CH 11 at 802.11g mode DAC0  
 Date: 23.JUL.2009 10:13:40

**DAC0: Power Spectral Density @ 802.11n HT20 mode channel 1**



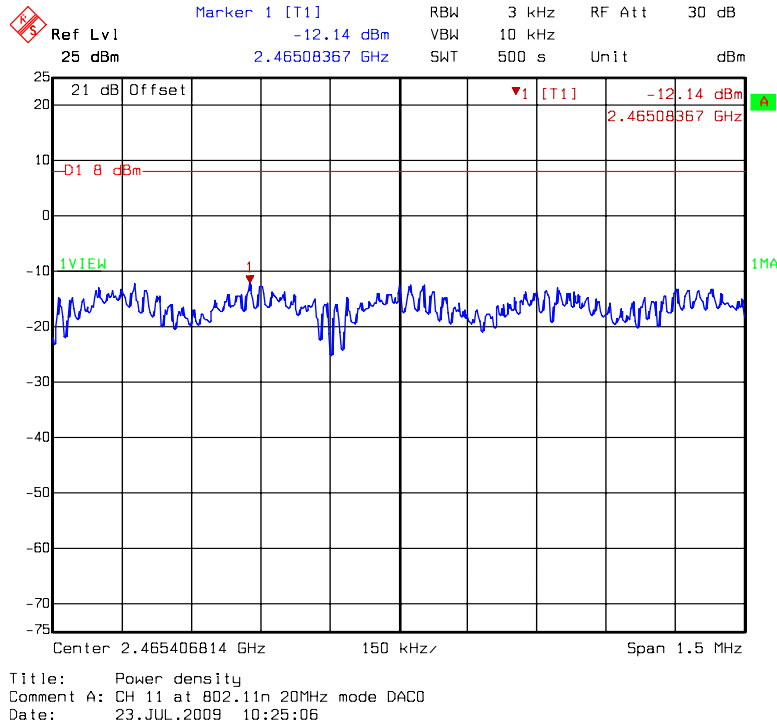
Title: Power density  
 Comment A: CH 1 at 802.11n 20MHz mode DAC0  
 Date: 23.JUL.2009 10:18:40

**DAC0: Power Spectral Density @ 802.11n HT20 mode channel 6**

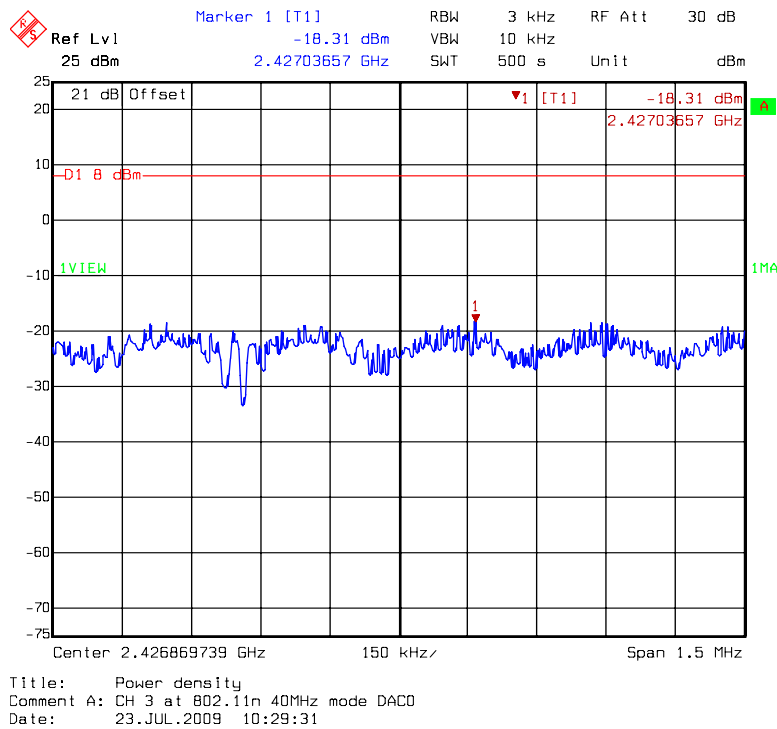


Title: Power density  
 Comment A: CH 6 at 802.11n 20MHz mode DAC0  
 Date: 23.JUL.2009 10:22:06

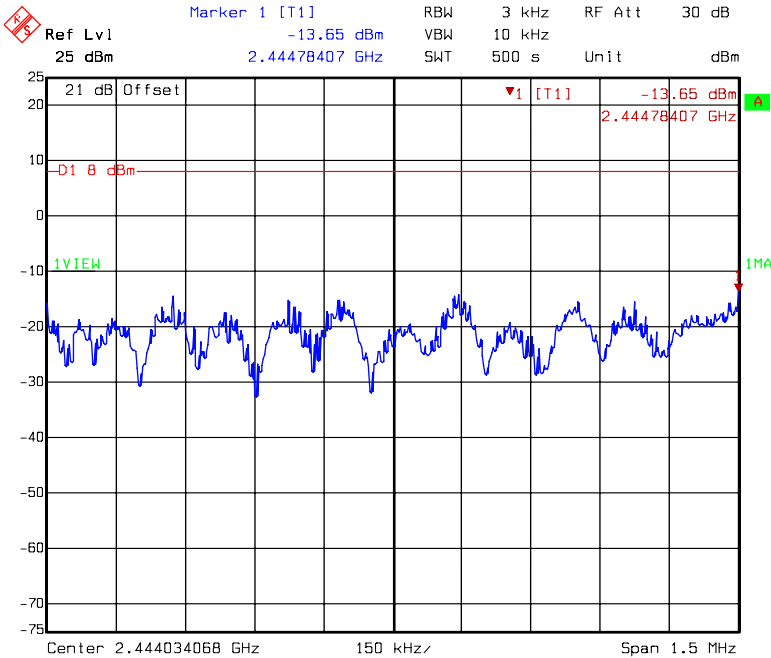
### DAC0: Power Spectral Density @ 802.11n HT20 mode channel 11



### DAC0: Power Spectral Density @ 802.11n HT40 mode channel 3

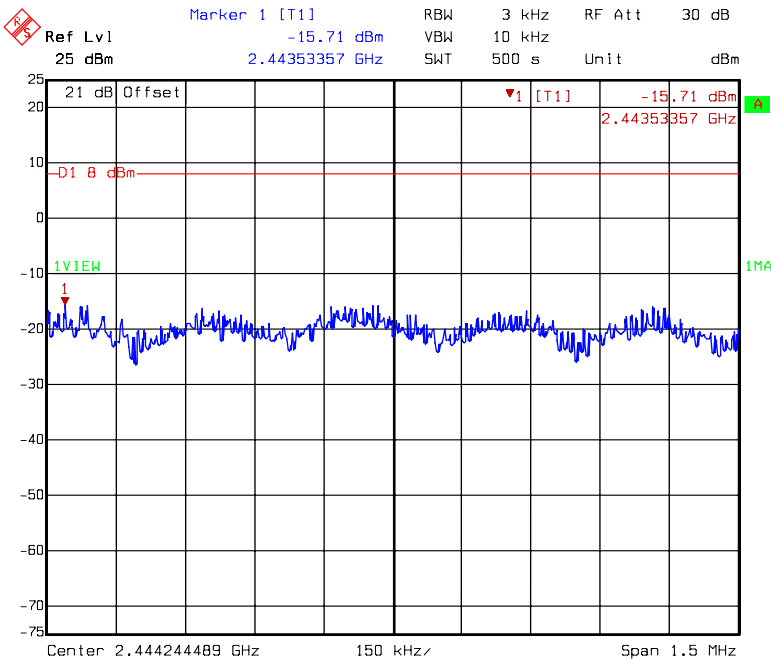


**DAC0: Power Spectral Density @ 802.11n HT40 mode channel 6**



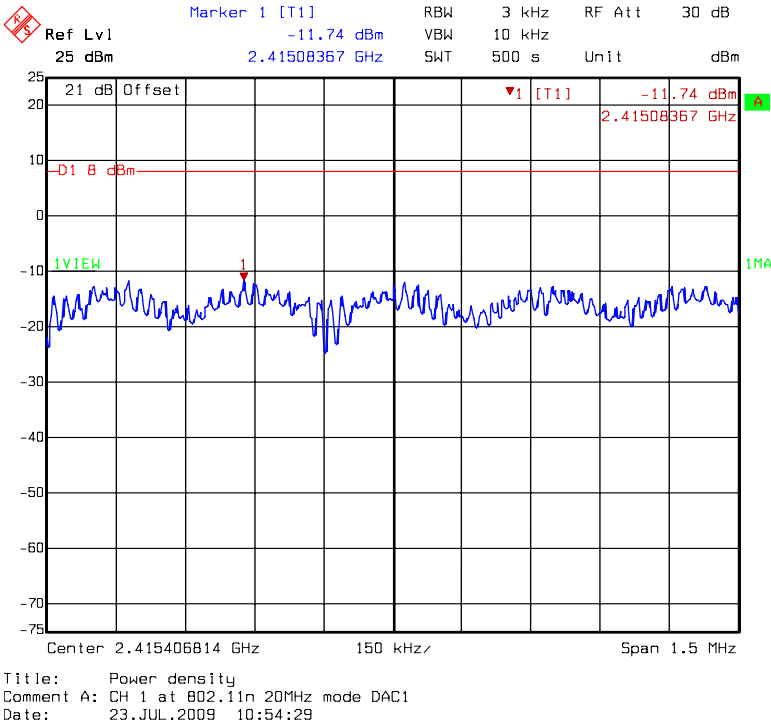
Title: Power density  
 Comment A: CH 6 at 802.11n 40MHz mode DAC0  
 Date: 23.JUL.2009 10:32:20

**DAC0: Power Spectral Density @ 802.11n HT40 mode channel 9**

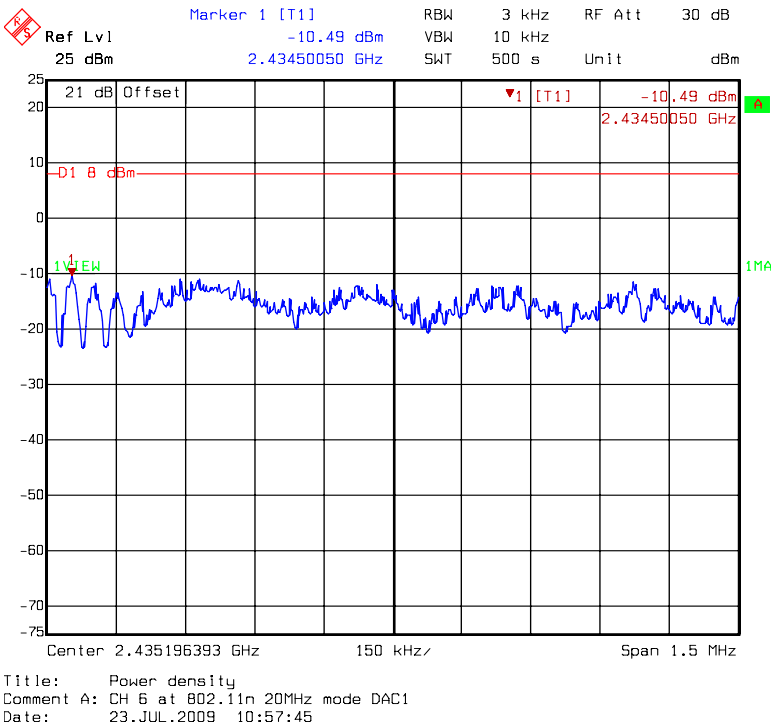


Title: Power density  
 Comment A: CH 9 at 802.11n 40MHz mode DAC0  
 Date: 23.JUL.2009 10:35:12

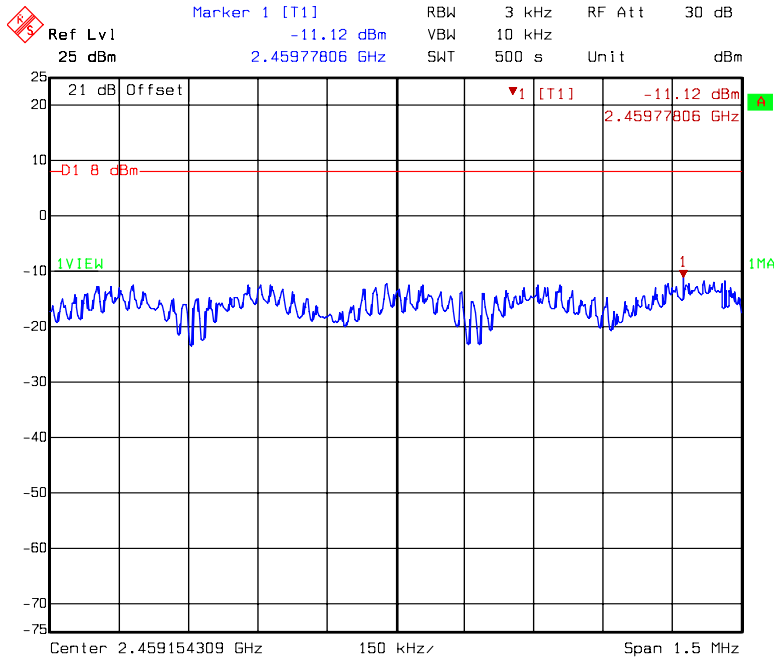
### DAC1: Power Spectral Density @ 802.11n HT20 mode channel 1



### DAC1: Power Spectral Density @ 802.11n HT20 mode channel 6

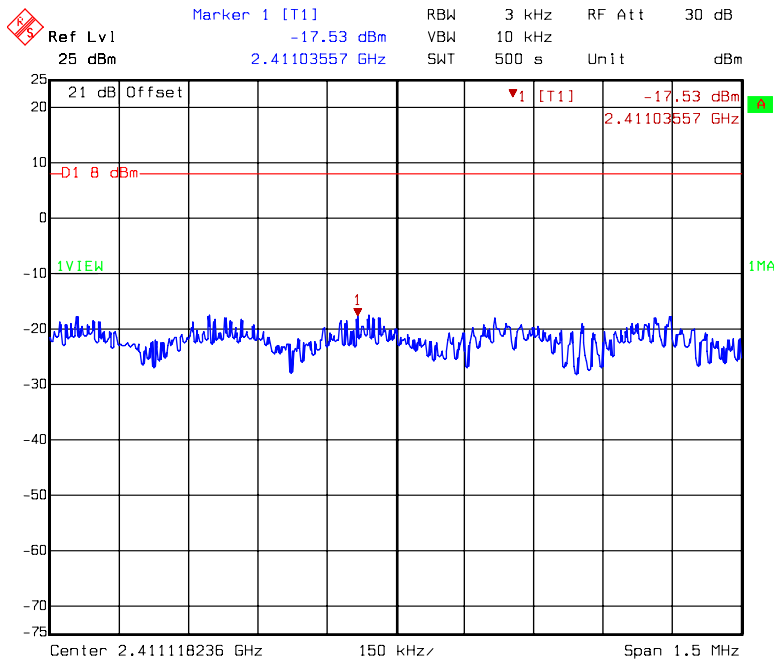


**DAC1: Power Spectral Density @ 802.11n HT20 mode channel 11**



Title: Power density  
Comment A: CH 11 at 802.11n 20MHz mode DAC1  
Date: 23.JUL.2009 11:02:59

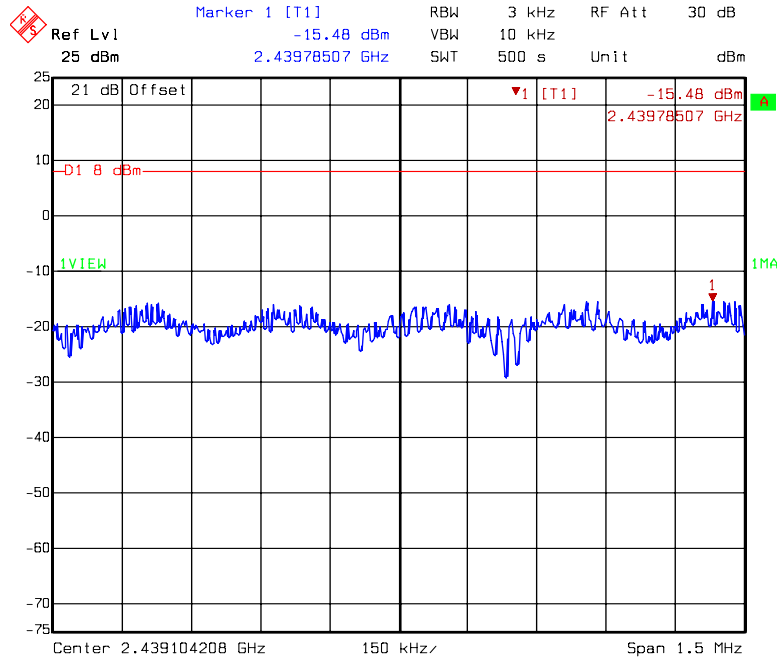
**DAC1: Power Spectral Density @ 802.11n HT40 mode channel 3**



Title: Power density  
Comment A: CH 3 at 802.11n 40MHz mode DAC1  
Date: 23.JUL.2009 10:43:16

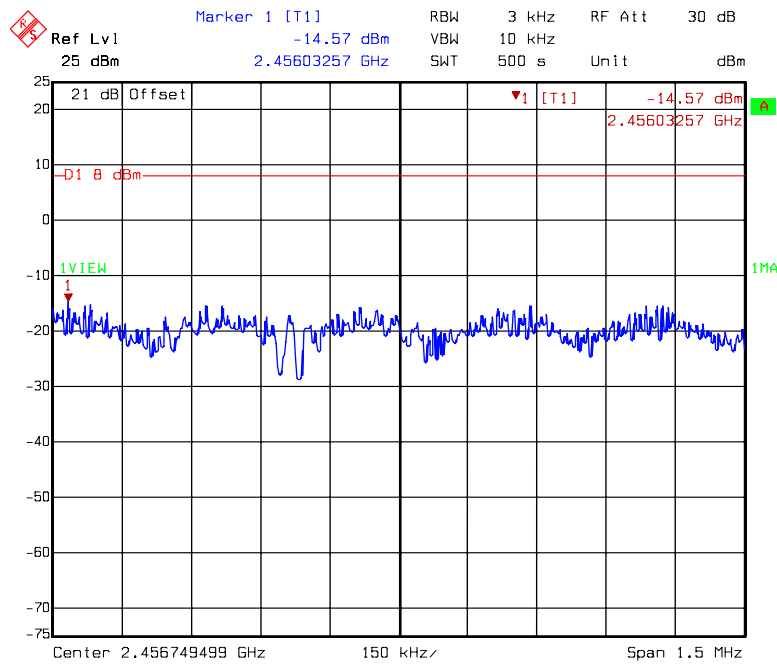


### DAC1: Power Spectral Density @ 802.11n HT40 mode channel 6



Title: Power density  
Comment A: CH 6 at 802.11n 40MHz mode DAC1  
Date: 23.JUL.2009 10:47:55

### DAC1: Power Spectral Density @ 802.11n HT40 mode channel 9



Title: Power density  
Comment A: CH 9 at 802.11n 40MHz mode DAC1  
Date: 23.JUL.2009 10:51:02

## 7. RF Antenna conducted Spurious

<b>Name of Test</b>	RF Antenna Conducted Spurious
<b>Base Standard</b>	FCC 15.247(d)

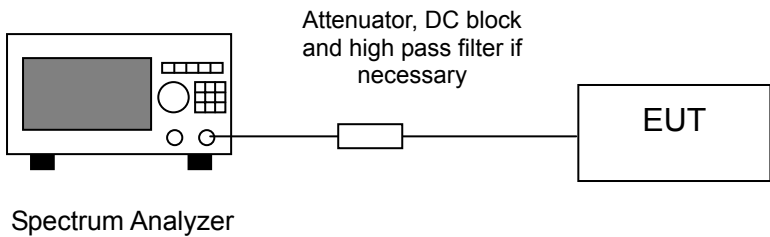
**Test Result:** Complies  
**Measurement Data:** See plots below

### Method of Measurement:

#### Reference FCC document: KDB558074

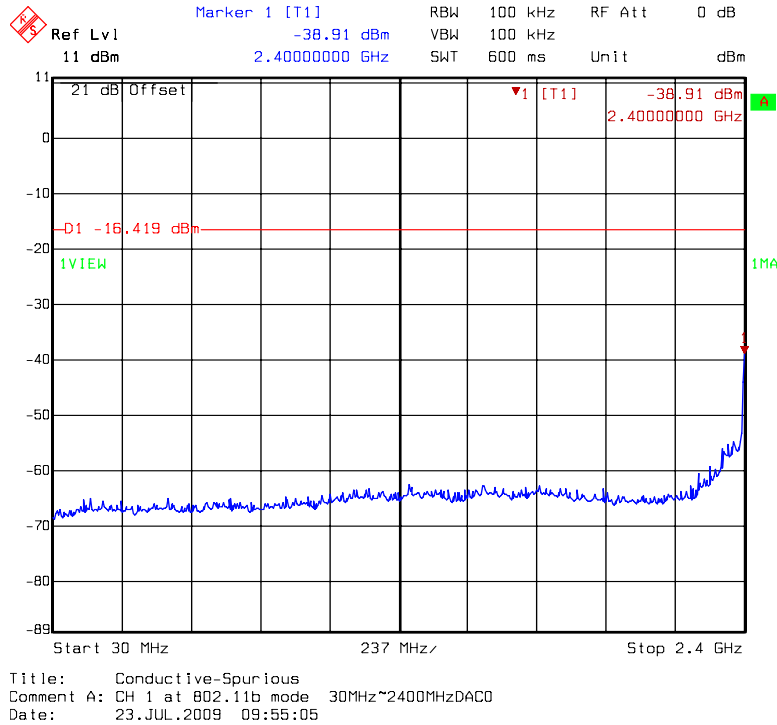
The measurements were performed from 30 MHz to 25 GHz RF antenna conducted per FCC 15.247 (d) was measured from the EUT antenna port using a 50 ohm spectrum analyzer with the resolution bandwidth set at 100 kHz, and the video bandwidth set at 100 kHz. Harmonics and spurious noise must be at least 20 dB down from the highest emission level within the authorized band as measured with a 100 kHz RBW. The table below is the results from the highest emission for each channel within the authorized band. This table was used to determine the spurious limits for each channel.

### Test Diagram:

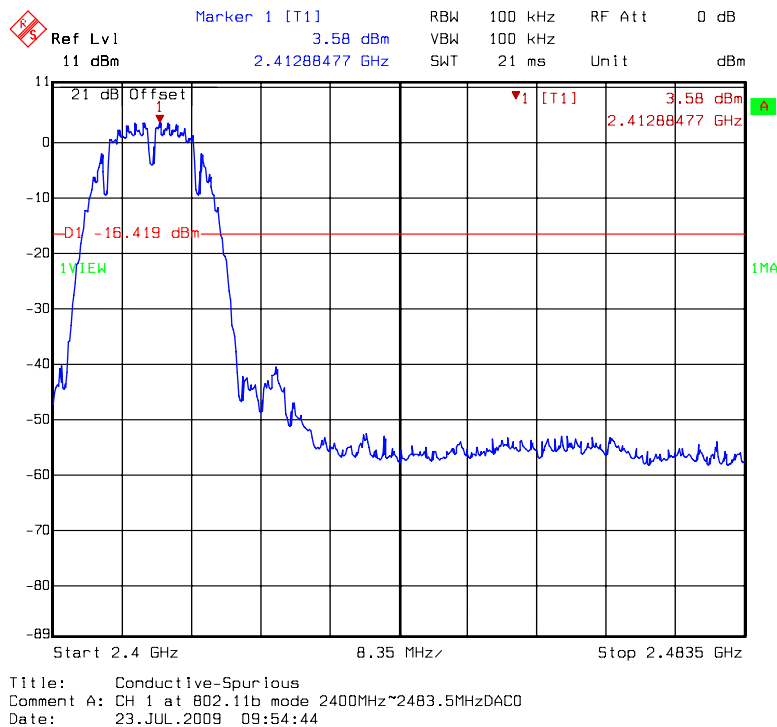


- Note:**
- (1) The EUT was tested while in a continuous transmit mode and the worst case data rates are 1 Mbps data rate for 802.11b mode, 6 Mbps data rate for 802.11g mode, 6.5 Mbps data rate for 802.11n HT20 mode and 13 Mbps data rate for 802.11n HT40 mode. The EUT was tuned to a low, middle and high channel.
  - (2) The EUT operating at 2.4 GHz ISM band. Frequency Range scanned from 30 MHz to 25 GHz.

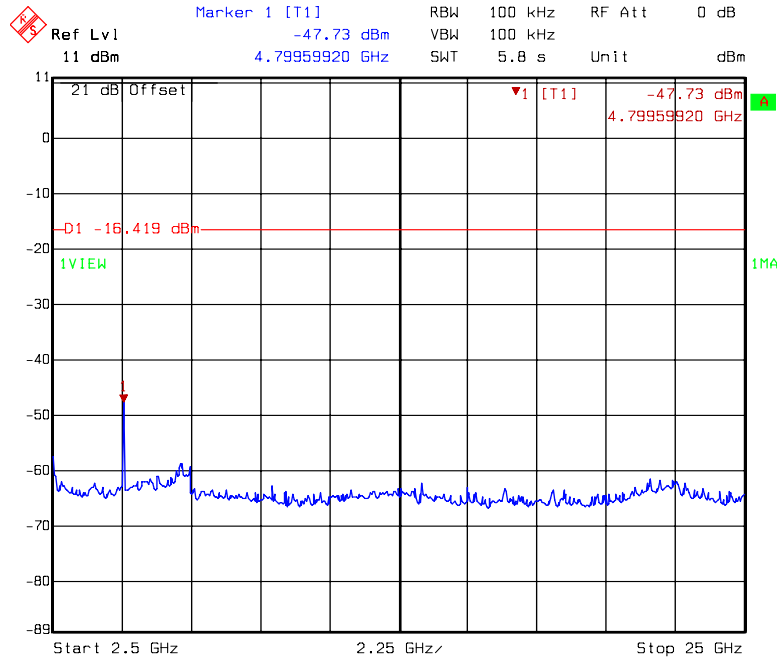
## DAC0: conducted spurious @ 802.11b mode channel 1 (1 of 3)



## DAC0: conducted spurious @ 802.11b mode channel 1 (2 of 3)



## DAC0: conducted spurious @ 802.11b mode channel 1 (3 of 3)



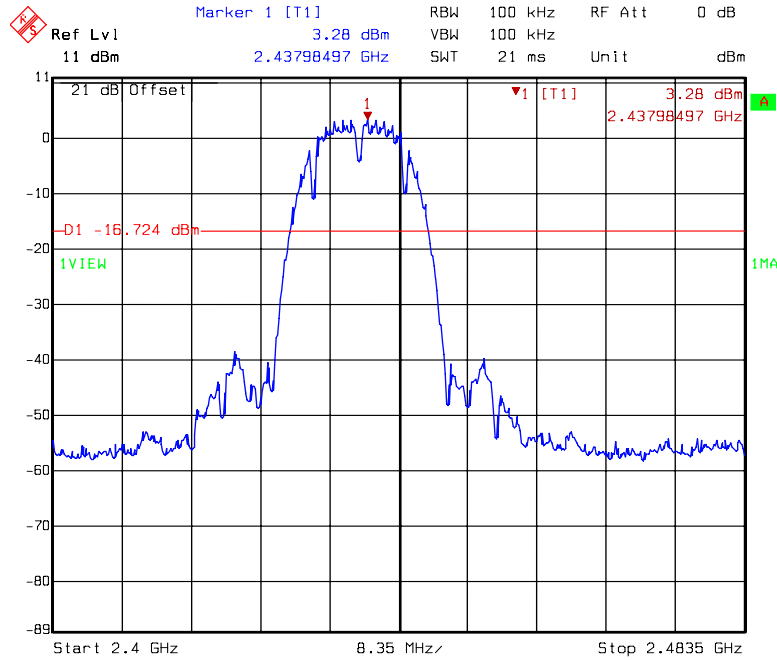
Title: Conductive-Spurious  
Comment A: CH 1 at 802.11b mode 2483.5MHz~25GHzDAC0  
Date: 23.JUL.2009 09:55:32

## DAC0: conducted spurious @ 802.11b mode channel 6 (1 of 3)



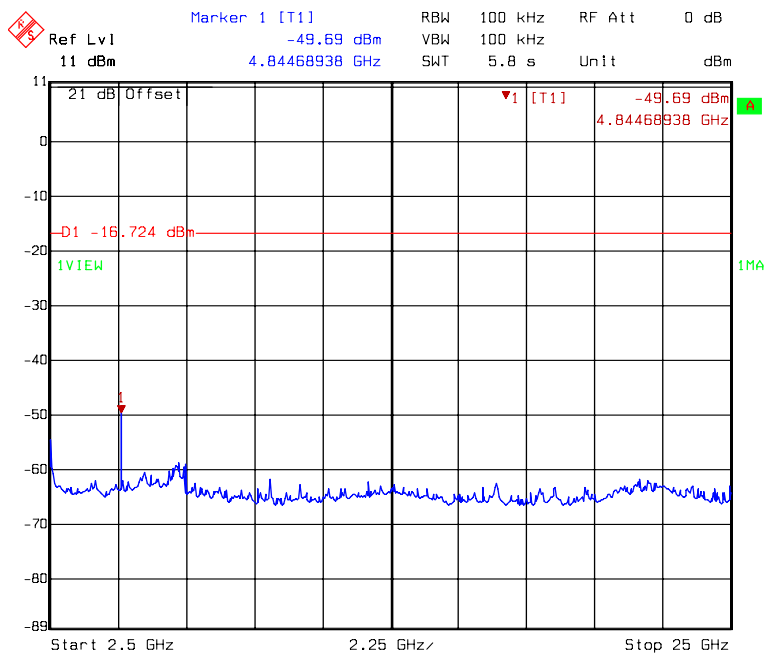
Title: Conductive-Spurious  
Comment A: CH 6 at 802.11b mode 30MHz~2400MHzDAC0  
Date: 23.JUL.2009 10:00:15

**DAC0: conducted spurious @ 802.11b mode channel 6 (2 of 3)**



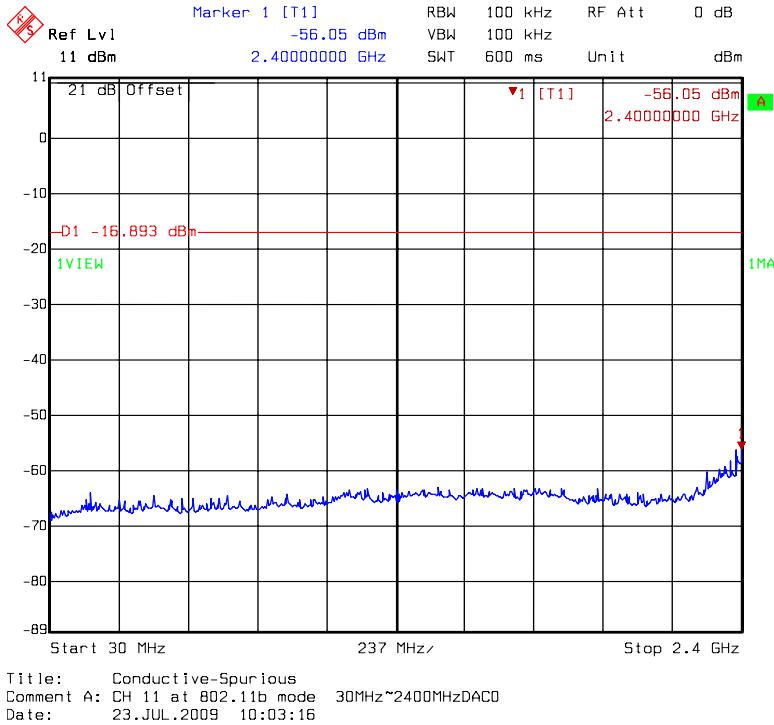
Title: Conductive-Spurious  
Comment A: CH 6 at 802.11b mode 2400MHz~2483.5MHzDAC0  
Date: 23.JUL.2009 09:59:55

**DAC0: conducted spurious @ 802.11b mode channel 6 (3 of 3)**

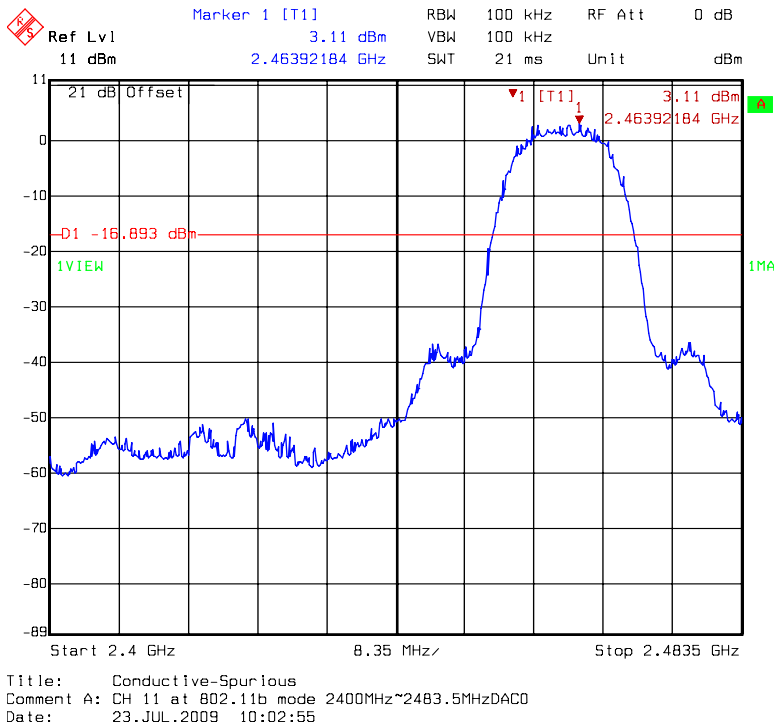


Title: Conductive-Spurious  
Comment A: CH 6 at 802.11b mode 2483.5MHz~25GHzDAC0  
Date: 23.JUL.2009 10:00:42

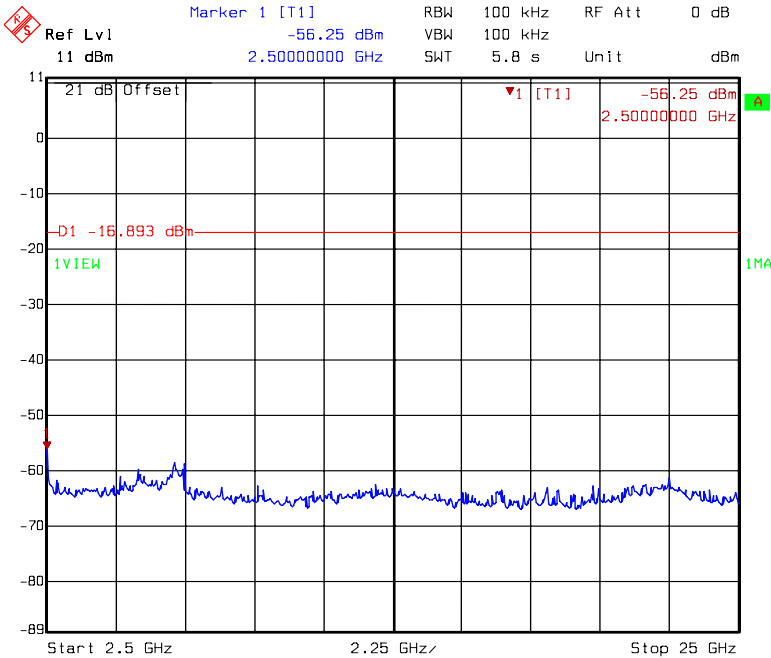
**DAC0: conducted spurious @ 802.11b mode channel 11 (1 of 3)**



**DAC0: conducted spurious @ 802.11b mode channel 11 (2 of 3)**

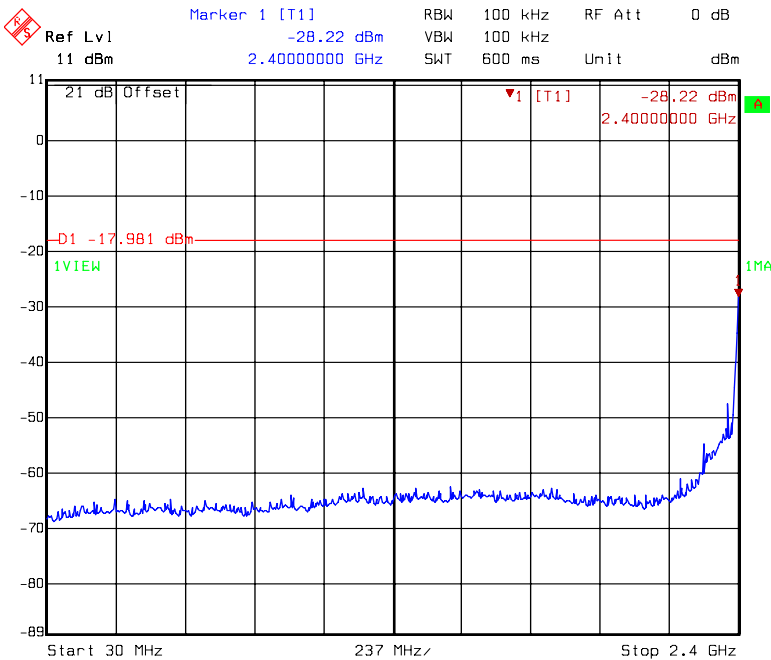


**DAC0: conducted spurious @ 802.11b mode channel 11 (3 of 3)**



Title: Conductive-Spurious  
 Comment A: CH 11 at 802.11b mode 2483.5MHz~25GHzDAC0  
 Date: 23.JUL.2009 10:03:43

**DAC0: conducted spurious @ 802.11g mode channel 1 (1 of 3)**



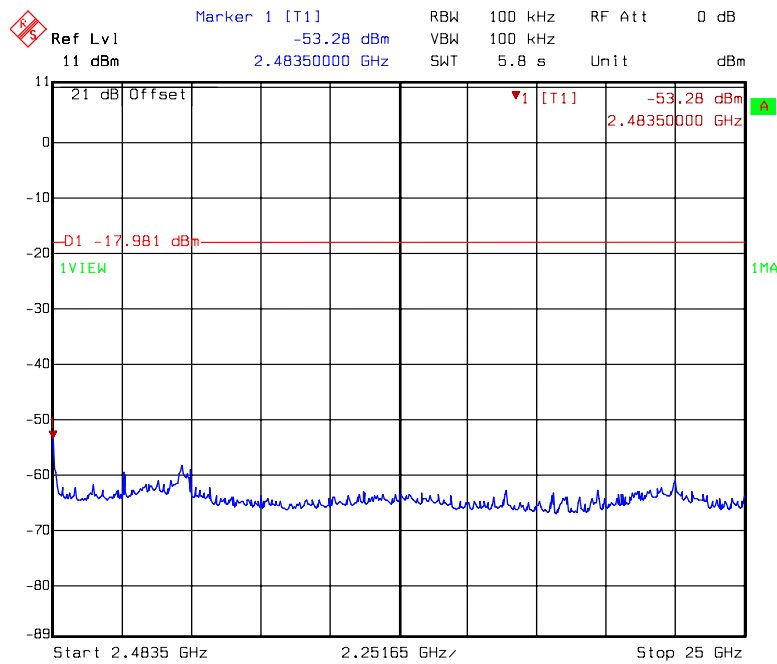
Title: Conductive-Spurious  
 Comment A: CH 1 at 802.11g mode 30MHz~2400MHzDAC0  
 Date: 23.JUL.2009 10:07:12

### DAC0: conducted spurious @ 802.11g mode channel 1 (2 of 3)



Title: Conductive-Spurious  
Comment A: CH 1 at 802.11g mode 2400MHz~2483.5MHzDAC0  
Date: 23.JUL.2009 10:06:51

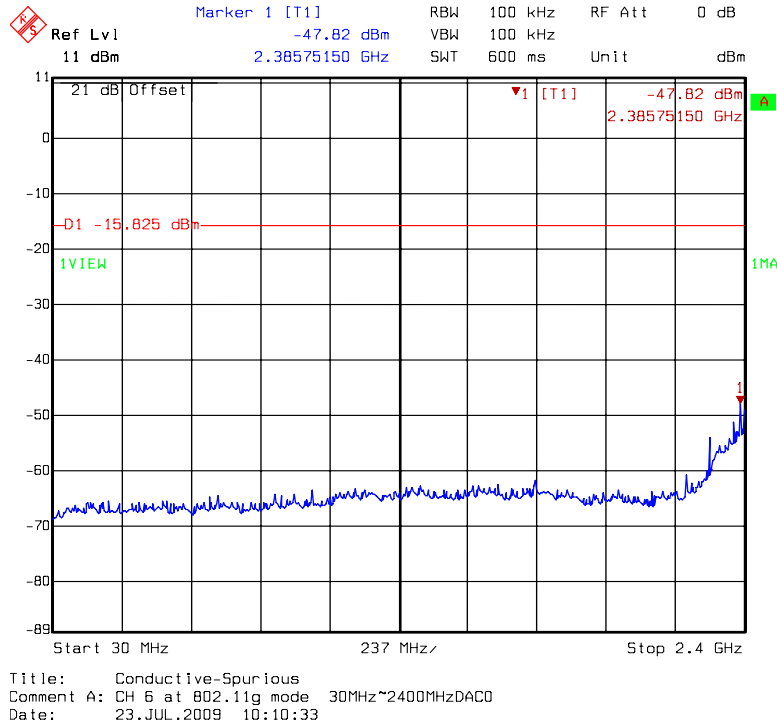
### DAC0: conducted spurious @ 802.11g mode channel 1 (3 of 3)



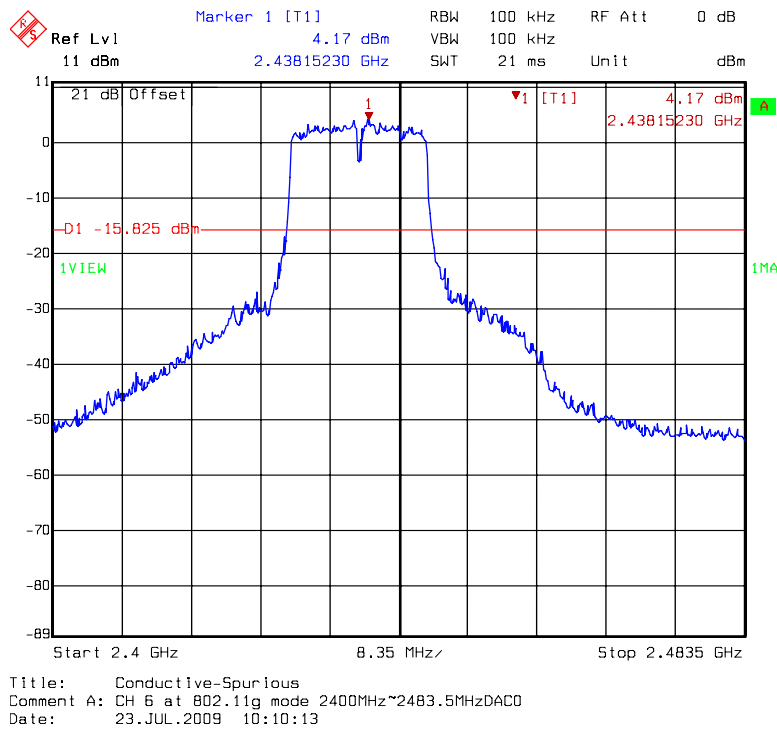
Title: Conductive-Spurious  
Comment A: CH 1 at 802.11g mode 2483.5MHz~25000MHzDAC0  
Date: 23.JUL.2009 10:07:39



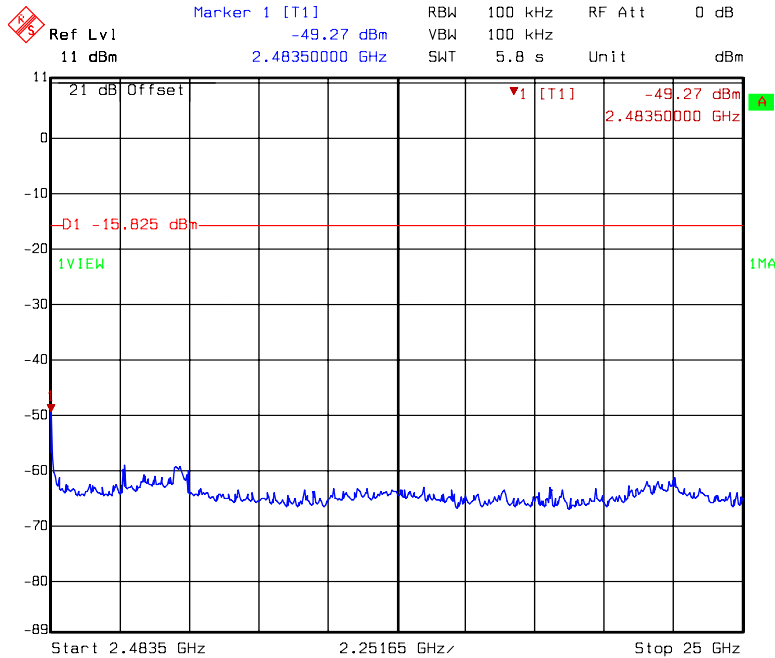
## DAC0: conducted spurious @ 802.11g mode channel 6 (1 of 3)



## DAC0: conducted spurious @ 802.11g mode channel 6 (2 of 3)

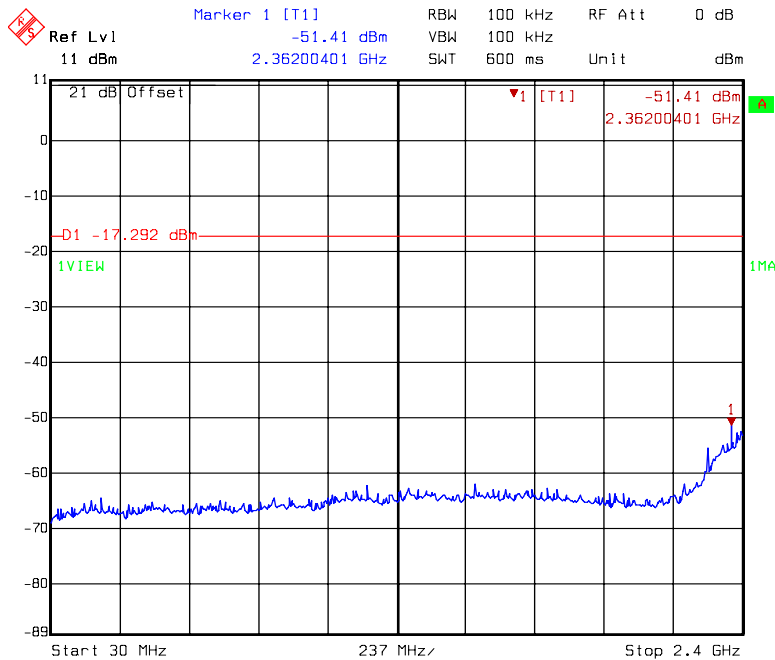


### DAC0: conducted spurious @ 802.11g mode channel 6 (3 of 3)



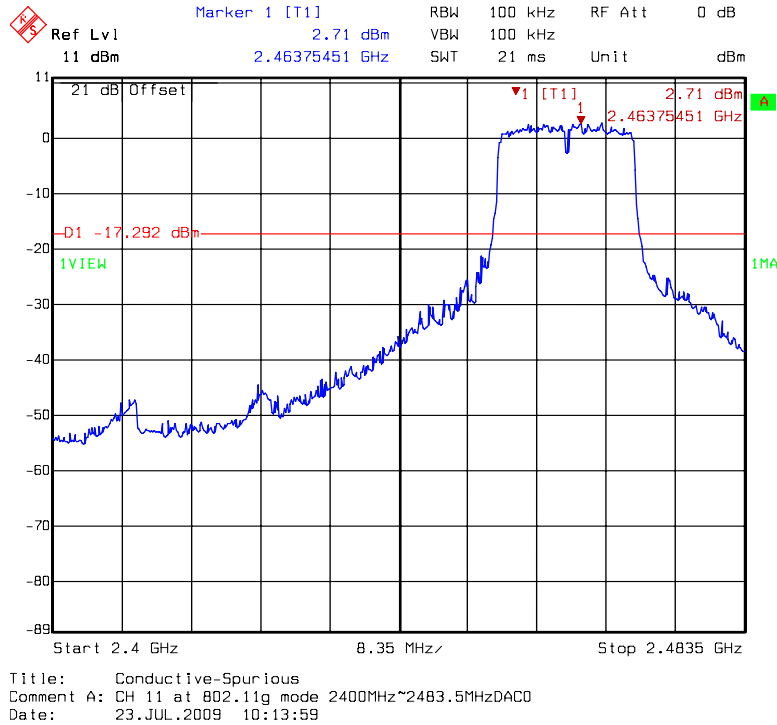
Title: Conductive-Spurious  
Comment A: CH 6 at 802.11g mode 2483.5MHz~25000MHzDAC0  
Date: 23.JUL.2009 10:11:00

### DAC0: conducted spurious @ 802.11g mode channel 11 (1 of 3)

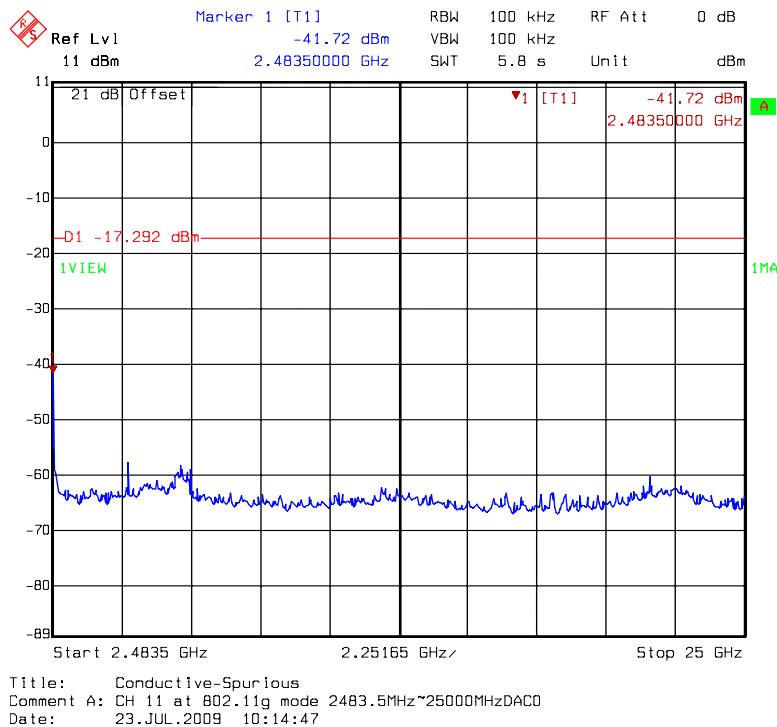


Title: Conductive-Spurious  
Comment A: CH 11 at 802.11g mode 30MHz~2400MHzDAC0  
Date: 23.JUL.2009 10:14:20

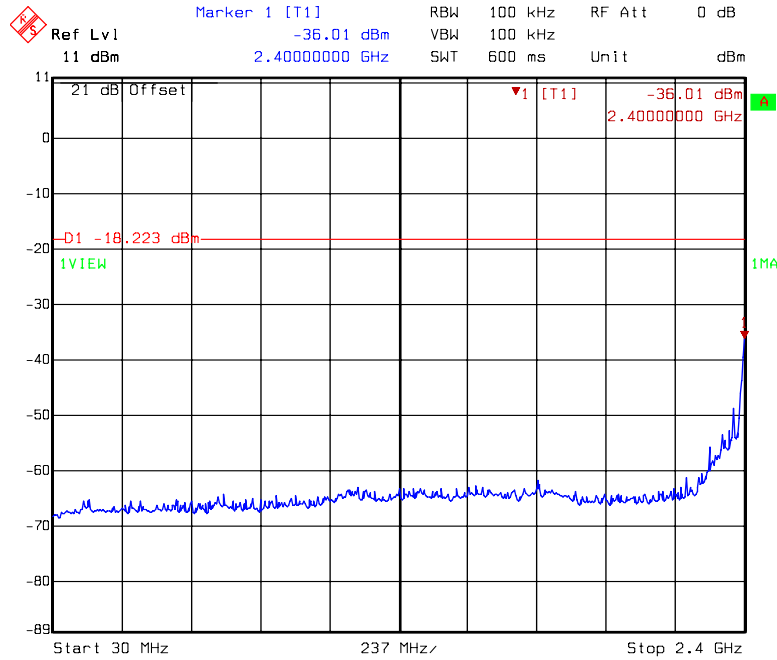
## DAC0: conducted spurious @ 802.11g mode channel 11 (2 of 3)



## DAC0: conducted spurious @ 802.11g mode channel 11 (3 of 3)

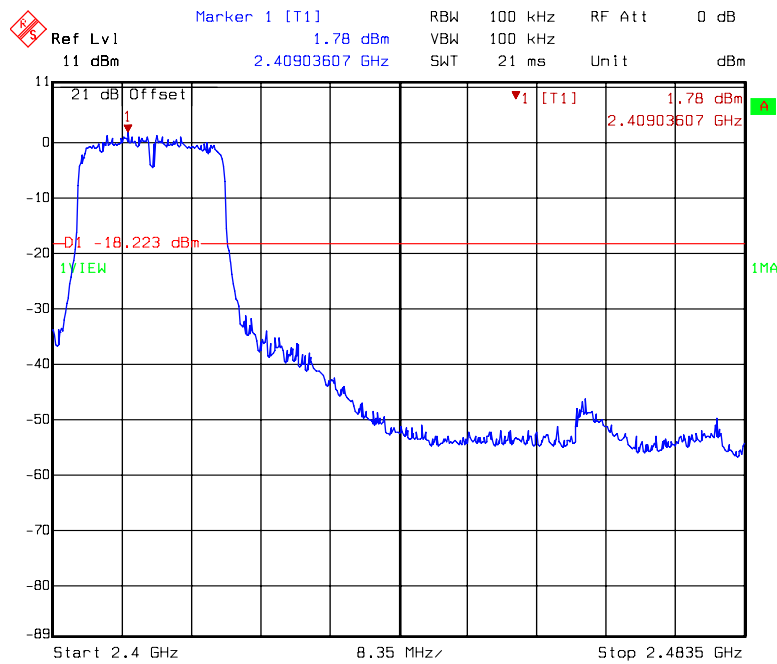


## DAC0: conducted spurious @ 802.11n HT20 mode channel 1 (1 of 3)



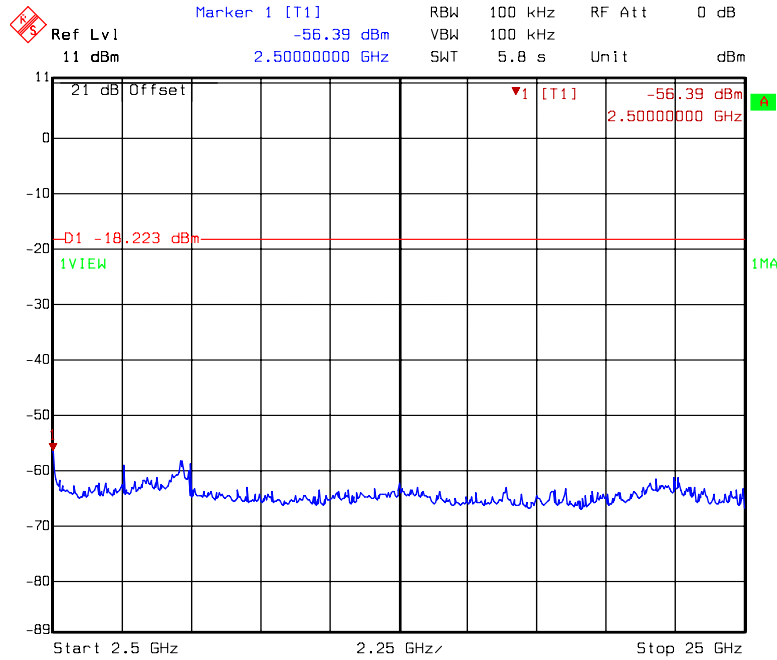
Title: Conductive-Spurious  
Comment A: CH 1 at 802.11n 20MHz mode DAC0  
Date: 23.JUL.2009 10:19:21

## DAC0: conducted spurious @ 802.11n HT20 mode channel 1 (2 of 3)



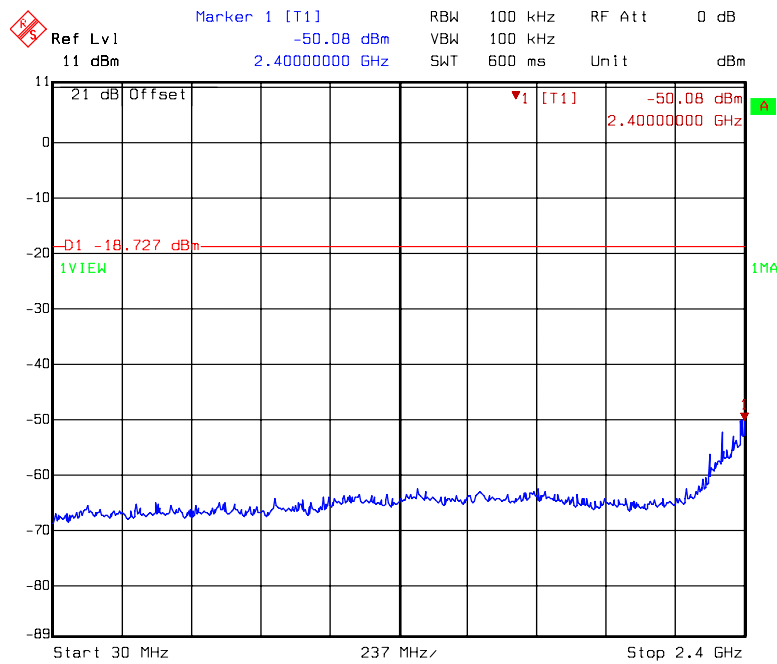
Title: Conductive-Spurious  
Comment A: CH 1 at 802.11n 20MHz mode DAC0  
Date: 23.JUL.2009 10:19:00

**DAC0: conducted spurious @ 802.11n HT20 mode channel 1 (3 of 3)**



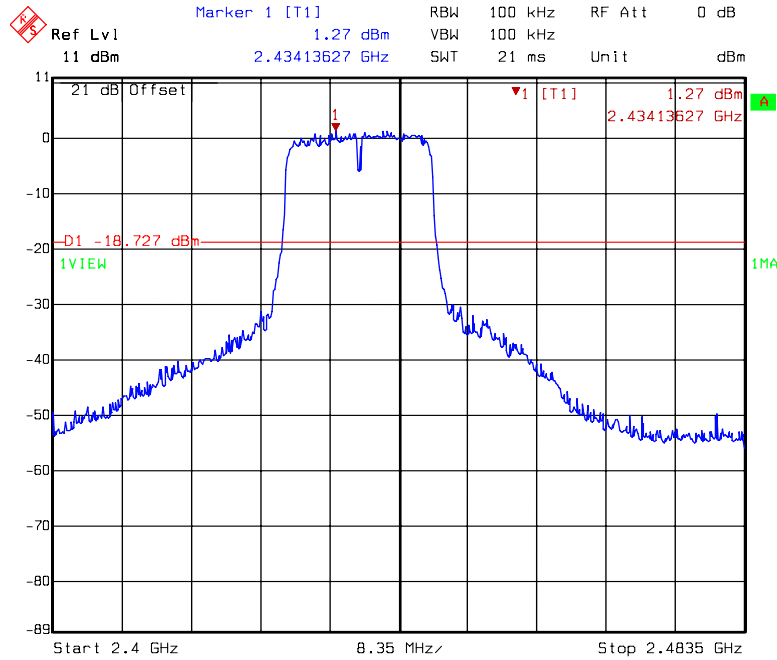
Title: Conductive-Spurious  
 Comment A: CH 1 at 802.11n 20MHz mode DAC0  
 Date: 23.JUL.2009 10:19:47

**DAC0: conducted spurious @ 802.11n HT20 mode channel 6 (1 of 3)**



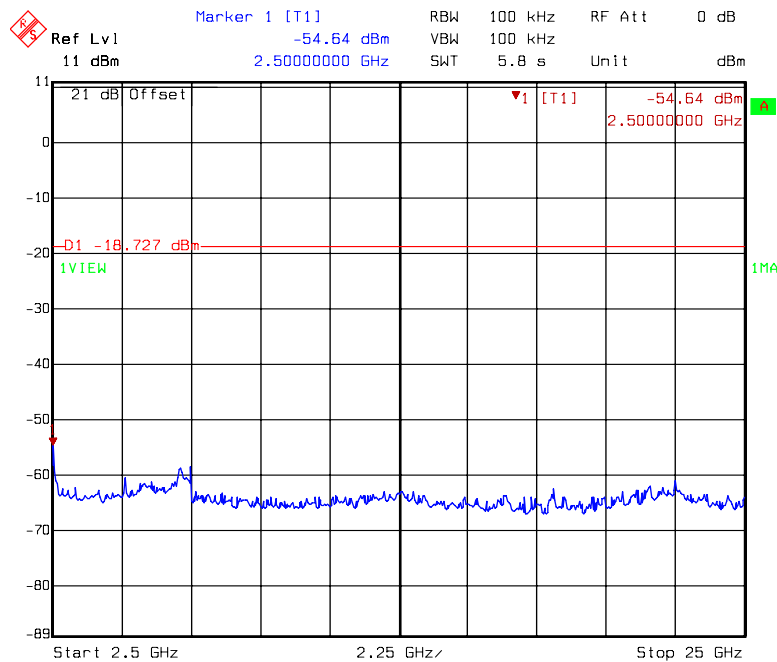
Title: Conductive-Spurious  
 Comment A: CH 6 at 802.11n 20MHz mode DAC0  
 Date: 23.JUL.2009 10:22:46

## DAC0: conducted spurious @ 802.11n HT20 mode channel 6 (2 of 3)



Title: Conductive-Spurious  
Comment A: CH 6 at 802.11n 20MHz mode DAC0  
Date: 23.JUL.2009 10:22:25

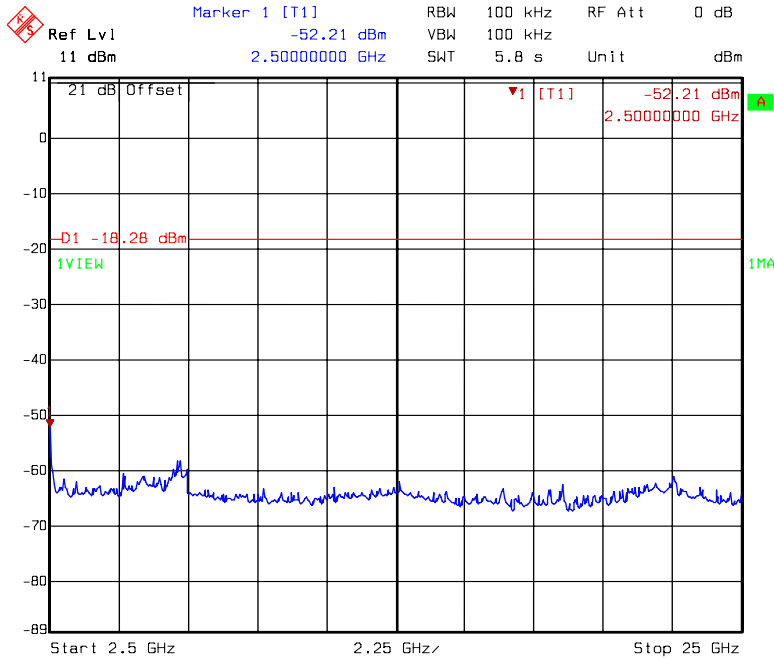
## DAC0: conducted spurious @ 802.11n HT20 mode channel 6 (3 of 3)



Title: Conductive-Spurious  
Comment A: CH 6 at 802.11n 20MHz mode DAC0  
Date: 23.JUL.2009 10:23:13

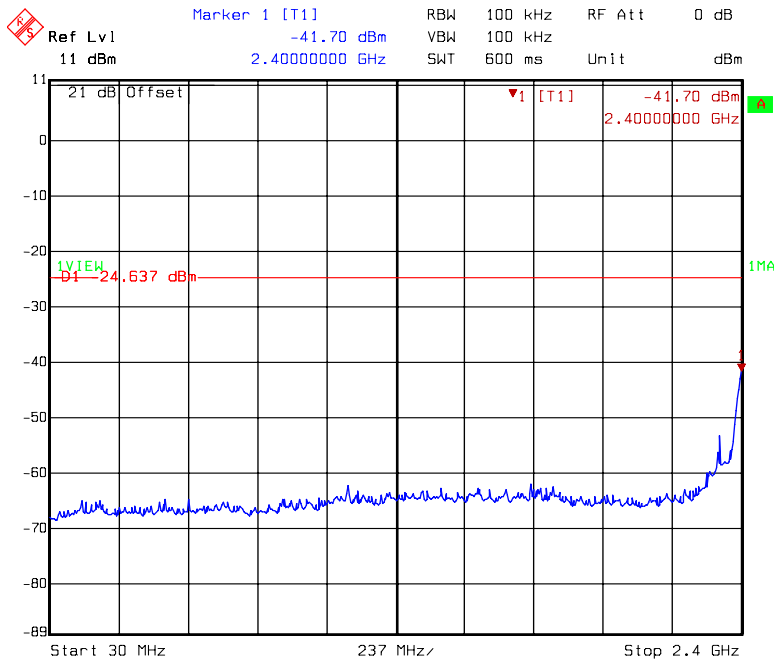


**DAC0: conducted spurious @ 802.11n HT20 mode channel 11 (3 of 3)**



Title: Conductive-Spurious  
 Comment A: CH 11 at 802.11n 20MHz mode DAC0  
 Date: 23.JUL.2009 10:26:13

**DAC0: conducted spurious @ 802.11n HT40 mode channel 3 (1 of 3)**



Title: Conductive-Spurious  
 Comment A: CH 3 at 802.11n 40MHz mode DAC0  
 Date: 23.JUL.2009 10:30:11

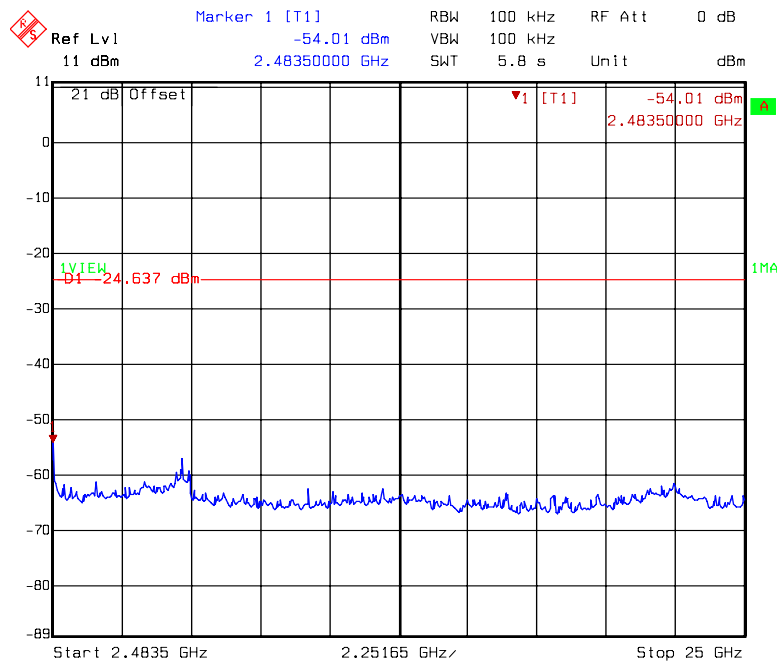


## DAC0: conducted spurious @ 802.11n HT40 mode channel 3 (2 of 3)



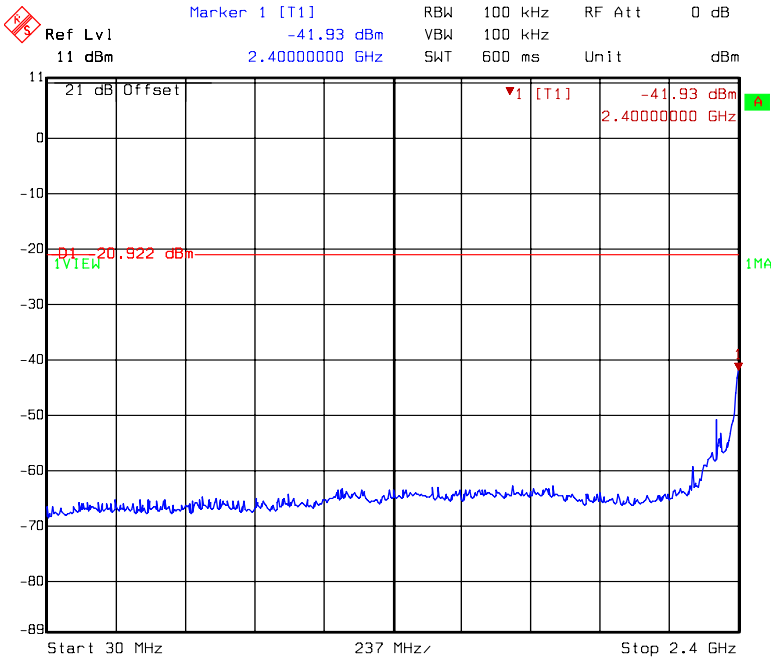
Title: Conductive-Spurious  
Comment A: CH 3 at 802.11n 40MHz mode DAC0  
Date: 23.JUL.2009 10:29:50

## DAC0: conducted spurious @ 802.11n HT40 mode channel 3 (3 of 3)



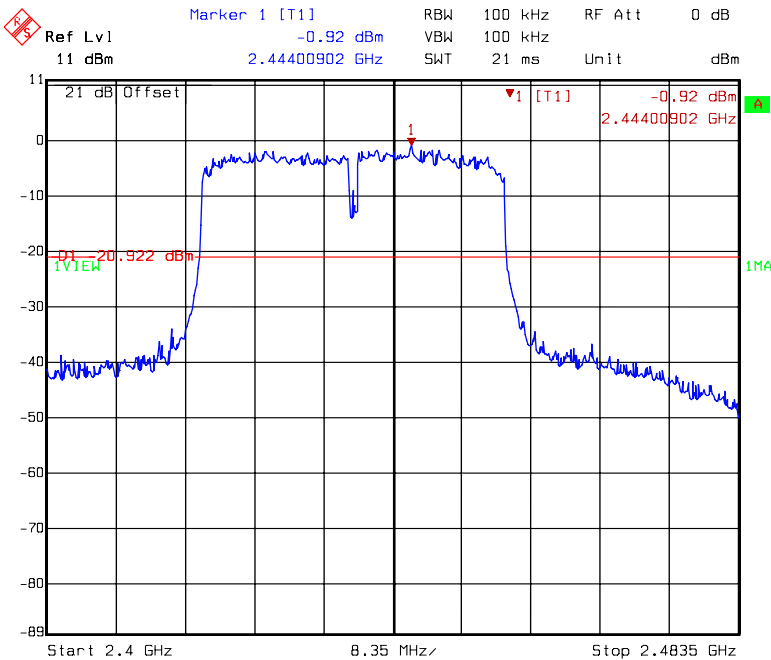
Title: Conductive-Spurious  
Comment A: CH 3 at 802.11n 40MHz mode DAC0  
Date: 23.JUL.2009 10:30:38

### DAC0: conducted spurious @ 802.11n HT40 mode channel 6 (1 of 3)



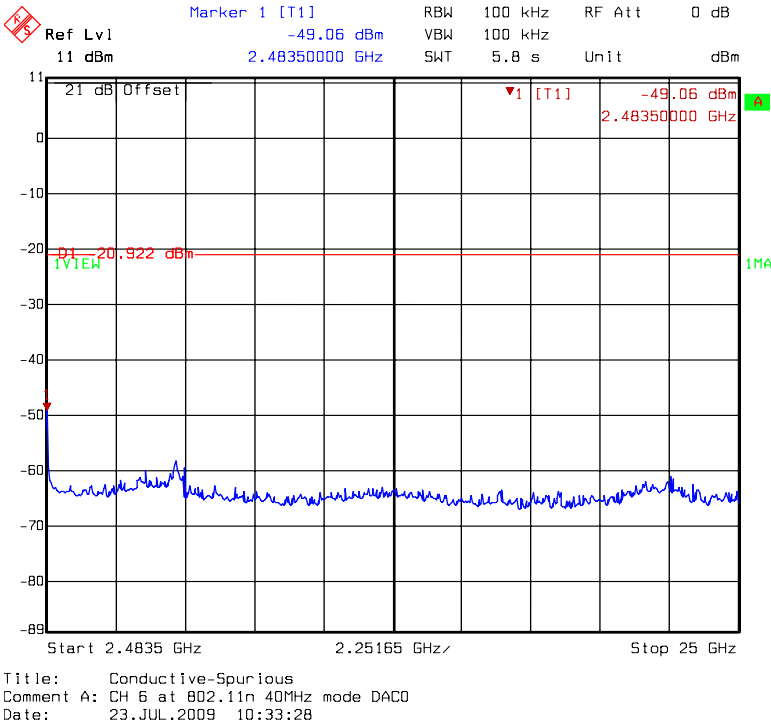
Title: Conductive-Spurious  
Comment A: CH 6 at 802.11n 40MHz mode DAC0  
Date: 23.JUL.2009 10:33:01

### DAC0: conducted spurious @ 802.11n HT40 mode channel 6 (2 of 3)

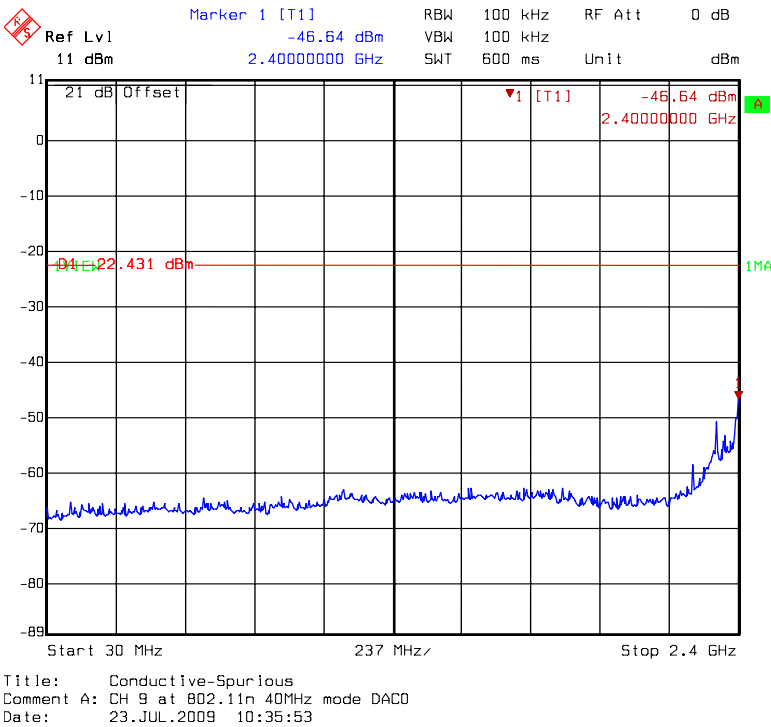


Title: Conductive-Spurious  
Comment A: CH 6 at 802.11n 40MHz mode DAC0  
Date: 23.JUL.2009 10:32:40

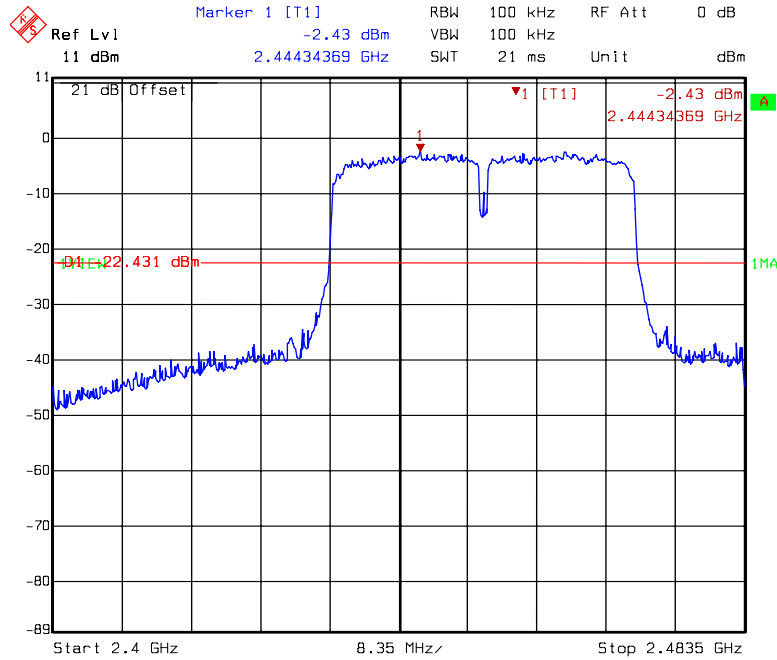
**DAC0: conducted spurious @ 802.11n HT40 mode channel 6 (3 of 3)**



**DAC0: conducted spurious @ 802.11n HT40 mode channel 9 (1 of 3)**

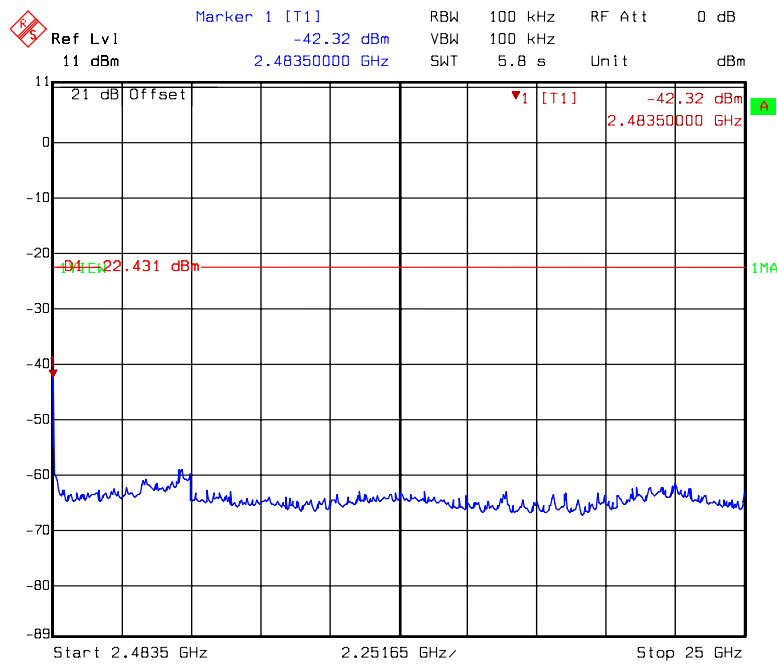


## DAC0: conducted spurious @ 802.11n HT40 mode channel 9 (2 of 3)



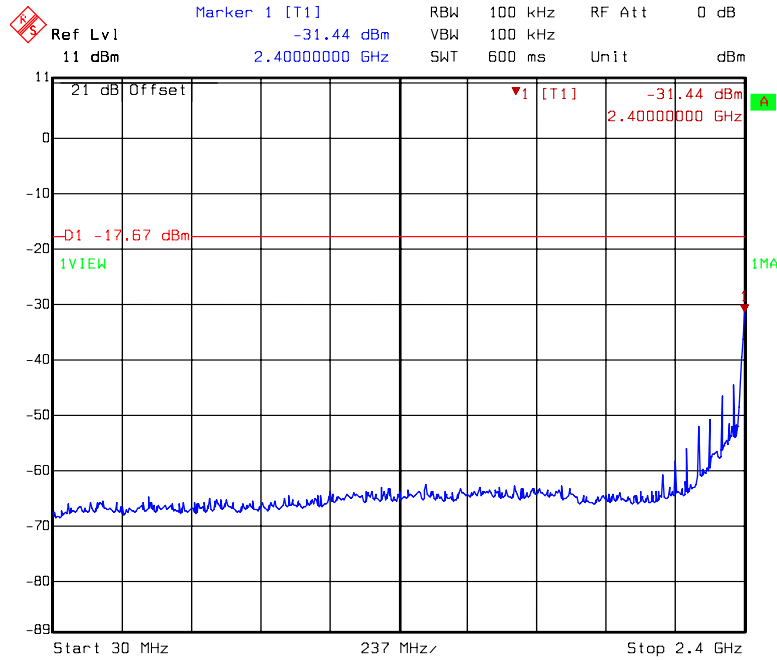
Title: Conductive-Spurious  
Comment A: CH 9 at 802.11n 40MHz mode DAC0  
Date: 23.JUL.2009 10:35:32

## DAC0: conducted spurious @ 802.11n HT40 mode channel 9 (3 of 3)



Title: Conductive-Spurious  
Comment A: CH 9 at 802.11n 40MHz mode DAC0  
Date: 23.JUL.2009 10:36:20

## DAC1: conducted spurious @ 802.11n HT20 mode channel 1 (1 of 3)



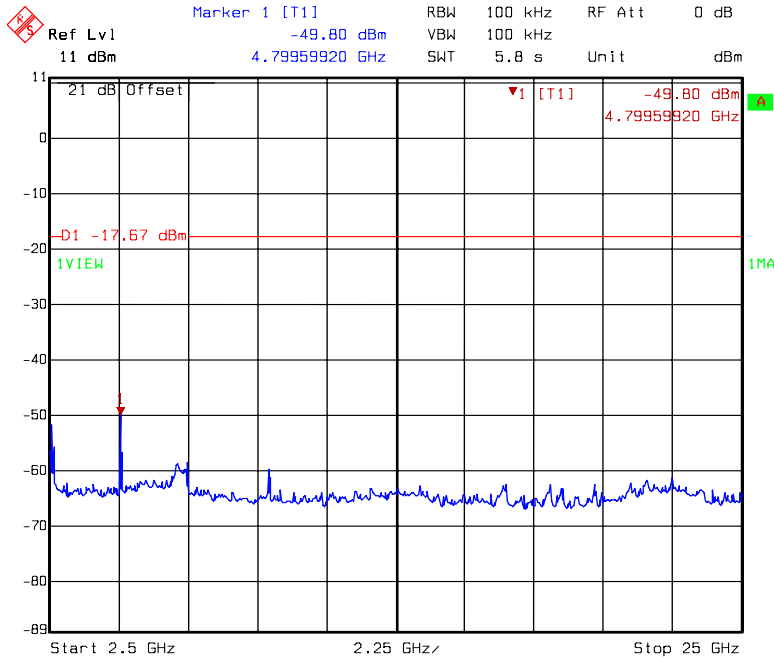
Title: Conductive-Spurious  
Comment A: CH 1 at 802.11n 20MHz mode DAC1  
Date: 23.JUL.2009 10:55:10

## DAC1: conducted spurious @ 802.11n HT20 mode channel 1 (2 of 3)



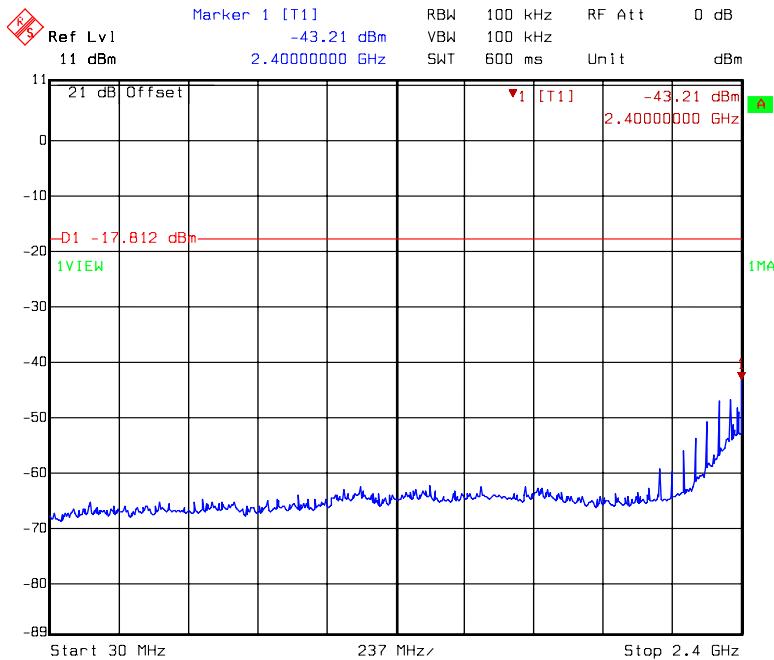
Title: Conductive-Spurious  
Comment A: CH 1 at 802.11n 20MHz mode DAC1  
Date: 23.JUL.2009 10:54:49

**DAC1: conducted spurious @ 802.11n HT20 mode channel 1 (3 of 3)**



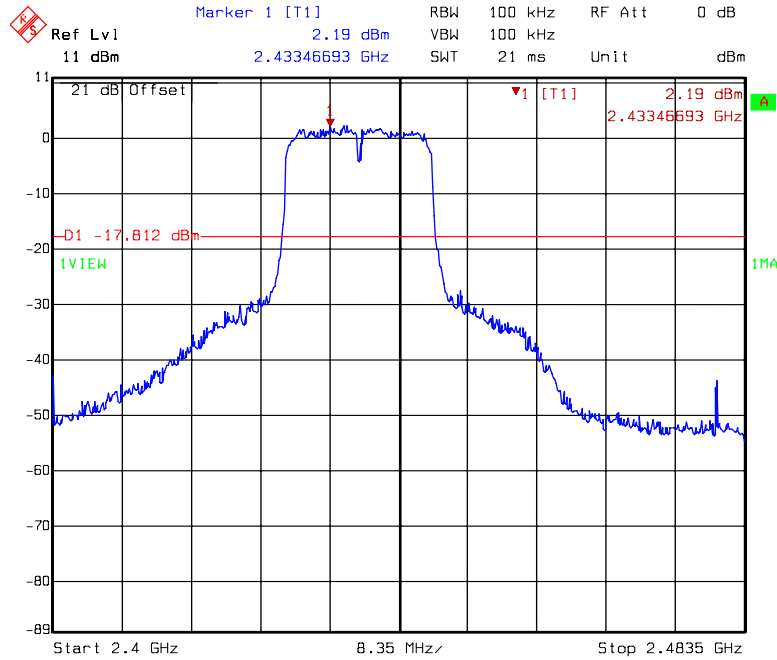
Title: Conductive-Spurious  
Comment A: CH 1 at 802.11n 20MHz mode DAC1  
Date: 23.JUL.2009 10:55:36

**DAC1: conducted spurious @ 802.11n HT20 mode channel 6 (1 of 3)**



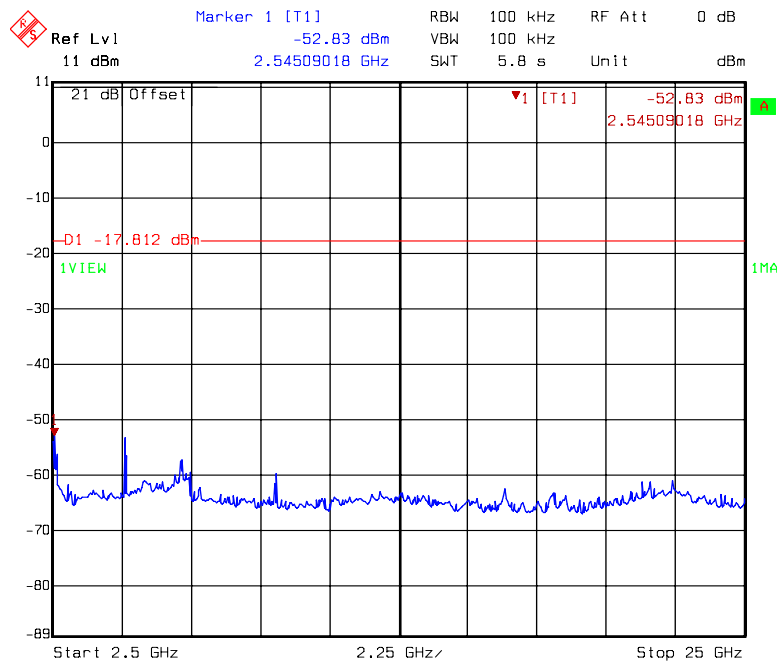
Title: Conductive-Spurious  
Comment A: CH 6 at 802.11n 20MHz mode DAC1  
Date: 23.JUL.2009 10:58:26

## DAC1: conducted spurious @ 802.11n HT20 mode channel 6 (2 of 3)



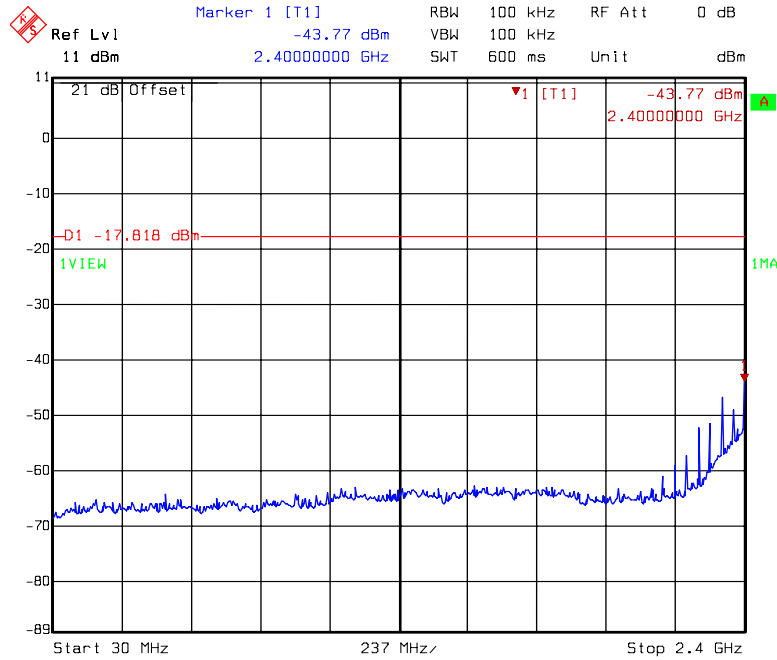
Title: Conductive-Spurious  
Comment A: CH 6 at 802.11n 20MHz mode DAC1  
Date: 23.JUL.2009 10:58:05

## DAC1: conducted spurious @ 802.11n HT20 mode channel 6 (3 of 3)



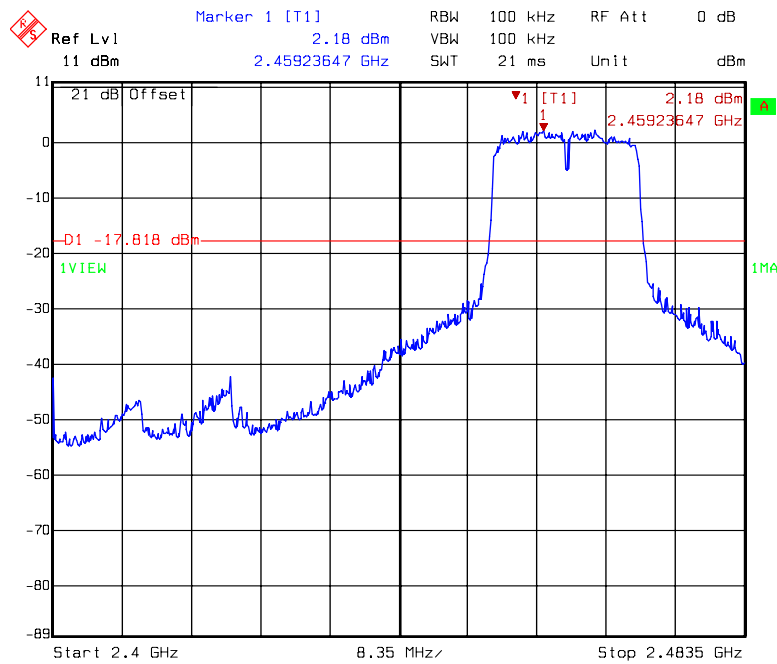
Title: Conductive-Spurious  
Comment A: CH 6 at 802.11n 20MHz mode DAC1  
Date: 23.JUL.2009 10:58:53

## DAC1: conducted spurious @ 802.11n HT20 mode channel 11 (1 of 3)



Title: Conductive-Spurious  
 Comment A: CH 11 at 802.11n 20MHz mode DAC1  
 Date: 23.JUL.2009 11:03:40

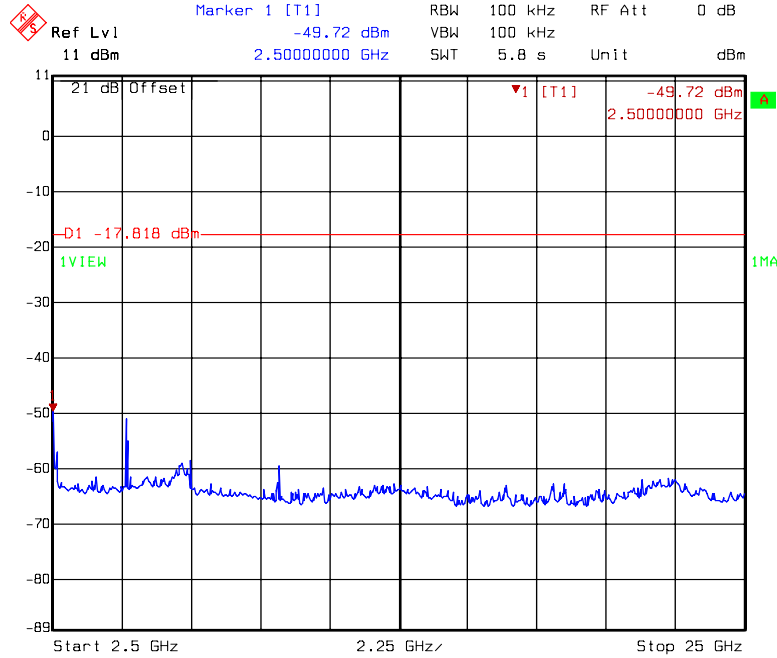
## DAC1: conducted spurious @ 802.11n HT20 mode channel 11 (2 of 3)



Title: Conductive-Spurious  
 Comment A: CH 11 at 802.11n 20MHz mode DAC1  
 Date: 23.JUL.2009 11:03:19

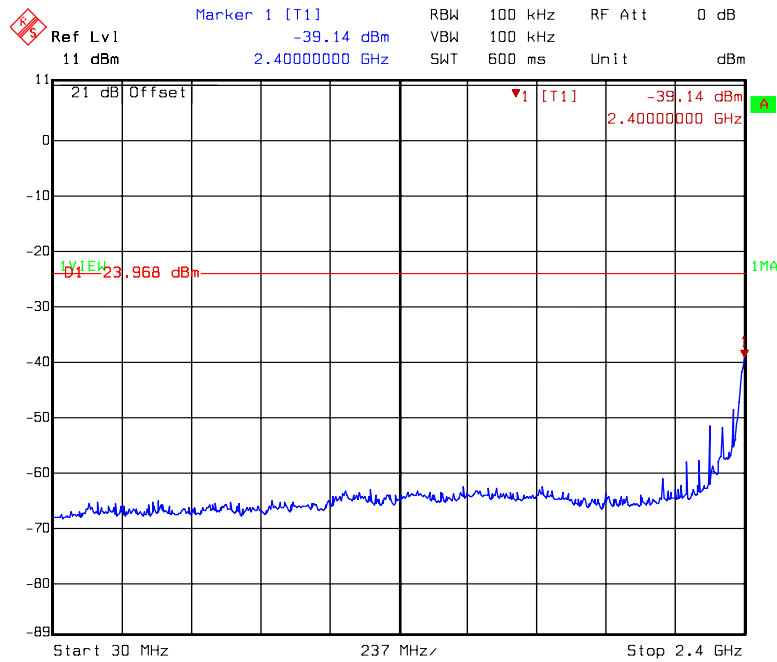


**DAC1: conducted spurious @ 802.11n HT20 mode channel 11 (3 of 3)**



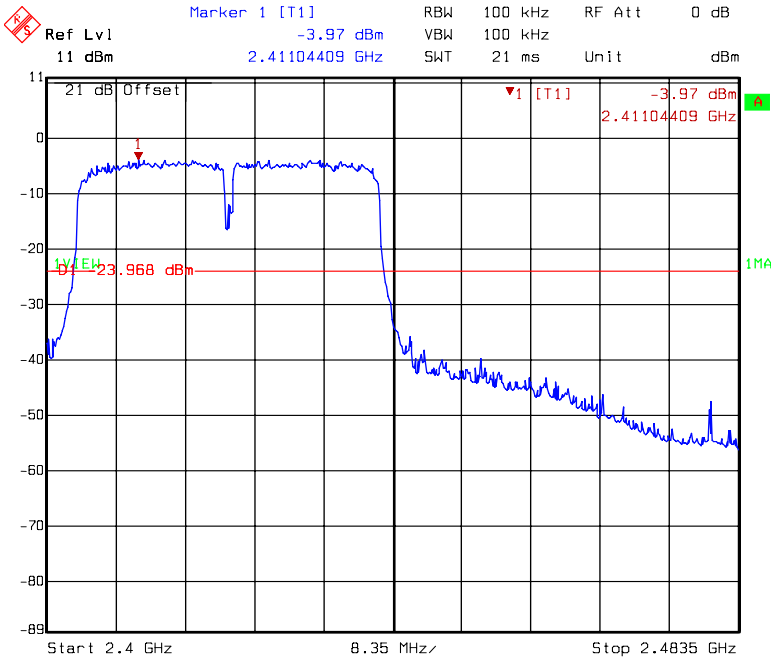
Title: Conductive-Spurious  
Comment A: CH 11 at 802.11n 20MHz mode DAC1  
Date: 23.JUL.2009 11:04:07

**DAC1: conducted spurious @ 802.11n HT40 mode channel 3 (1 of 3)**



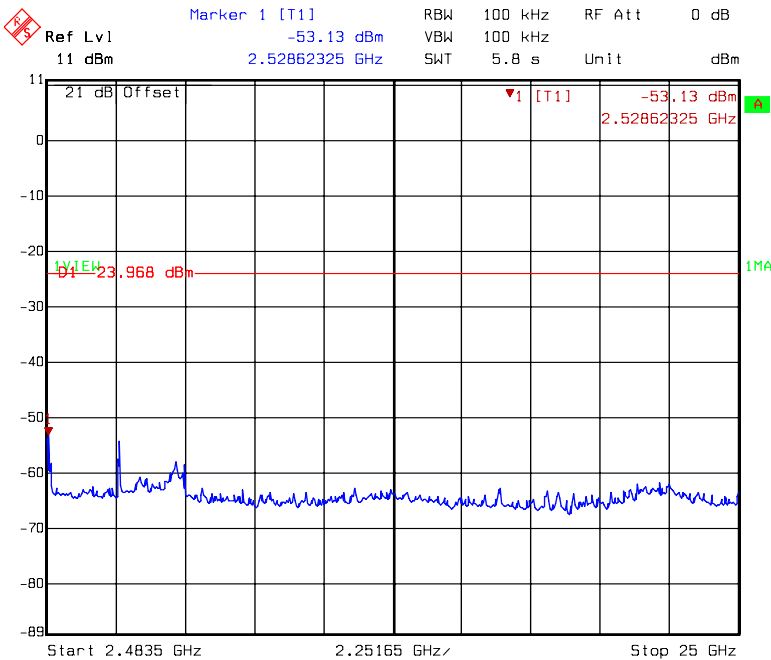
Title: Conductive-Spurious  
Comment A: CH 3 at 802.11n 40MHz mode DAC1  
Date: 23.JUL.2009 10:43:57

**DAC1: conducted spurious @ 802.11n HT40 mode channel 3 (2 of 3)**



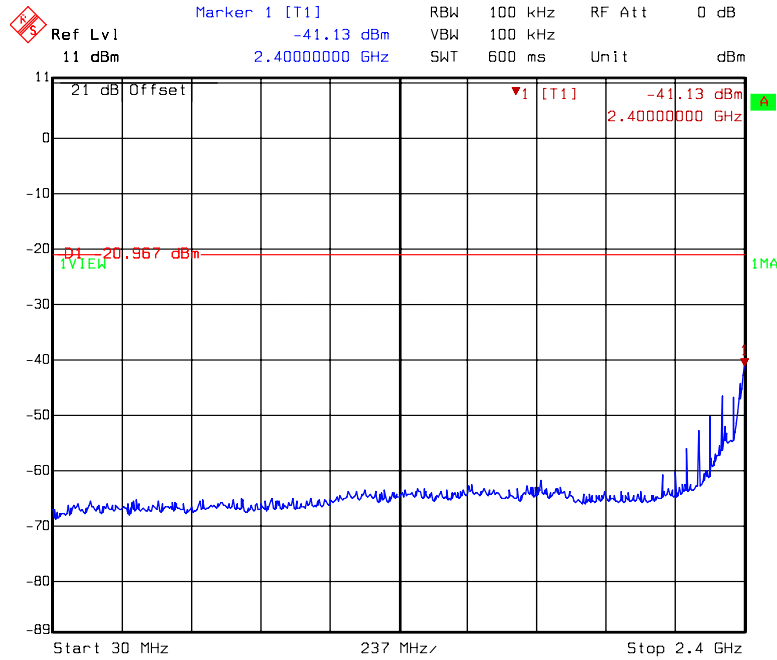
Title: Conductive-Spurious  
 Comment A: CH 3 at 802.11n 40MHz mode DAC1  
 Date: 23.JUL.2009 10:43:36

**DAC1: conducted spurious @ 802.11n HT40 mode channel 3 (3 of 3)**



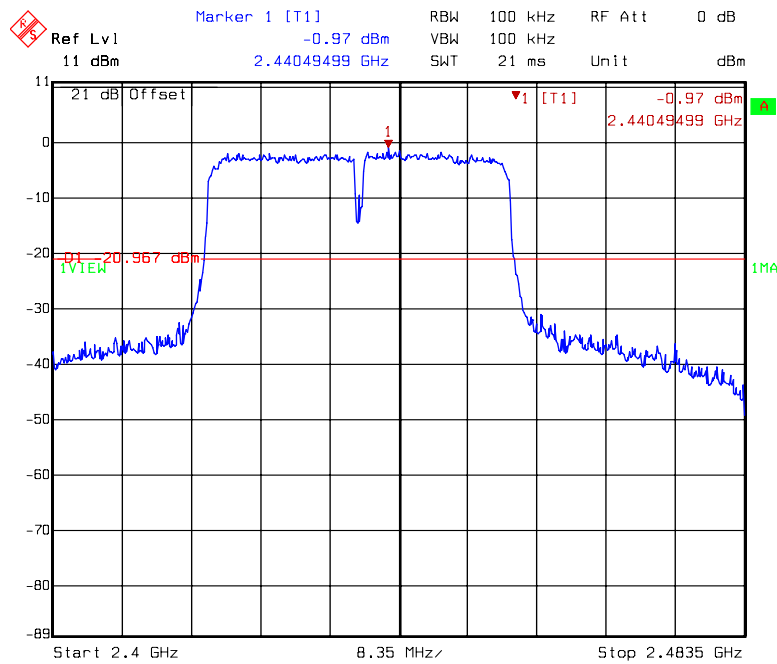
Title: Conductive-Spurious  
 Comment A: CH 3 at 802.11n 40MHz mode DAC1  
 Date: 23.JUL.2009 10:44:23

## DAC1: conducted spurious @ 802.11n HT40 mode channel 6 (1 of 3)



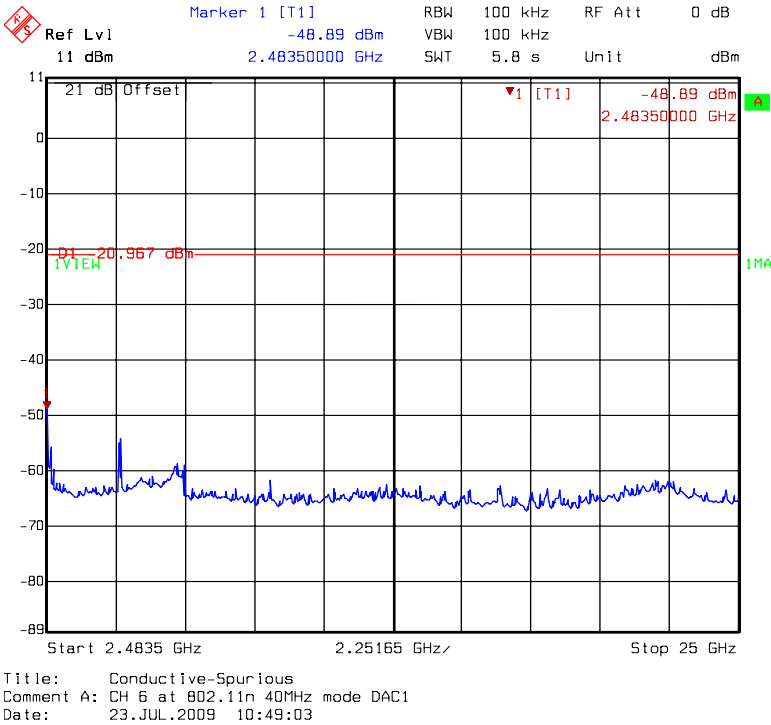
Title: Conductive-Spurious  
Comment A: CH 6 at 802.11n 40MHz mode DAC1  
Date: 23.JUL.2009 10:48:36

## DAC1: conducted spurious @ 802.11n HT40 mode channel 6 (2 of 3)

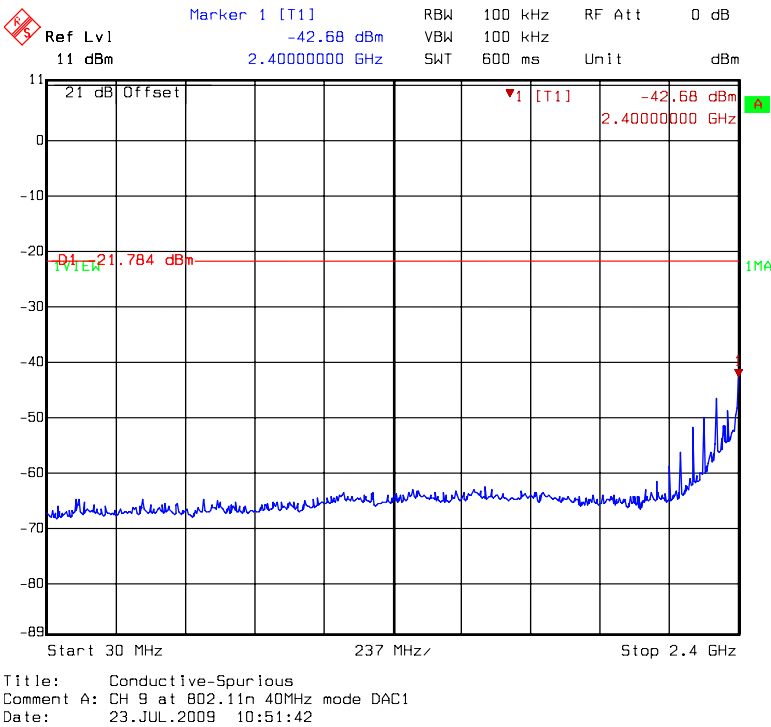


Title: Conductive-Spurious  
Comment A: CH 6 at 802.11n 40MHz mode DAC1  
Date: 23.JUL.2009 10:48:15

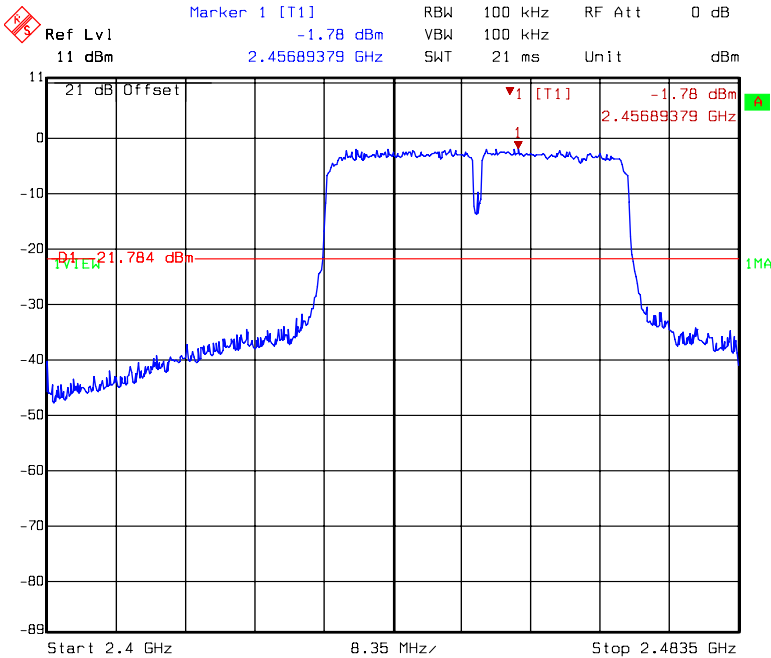
**DAC1: conducted spurious @ 802.11n HT40 mode channel 6 (3 of 3)**



**DAC1: conducted spurious @ 802.11n HT40 mode channel 9 (1 of 3)**

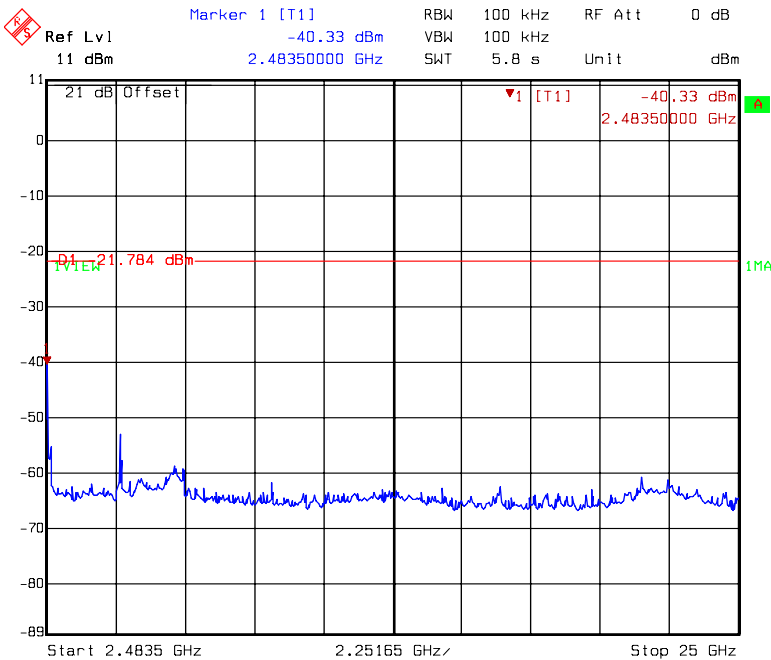


**DAC1: conducted spurious @ 802.11n HT40 mode channel 9 (2 of 3)**



Title: Conductive-Spurious  
 Comment A: CH 9 at 802.11n 40MHz mode DAC1  
 Date: 23.JUL.2009 10:51:21

**DAC1: conducted spurious @ 802.11n HT40 mode channel 9 (3 of 3)**



Title: Conductive-Spurious  
 Comment A: CH 9 at 802.11n 40MHz mode DAC1  
 Date: 23.JUL.2009 10:52:09

## 8. Radiated Spurious Emission

<b>Name of Test</b>	Radiated Spurious Emission
<b>Base Standard</b>	FCC 15.247(d), 15.209, 15.205

**Test Result:** Complies  
**Measurement Data:** See Tables below

### Method of Measurement:

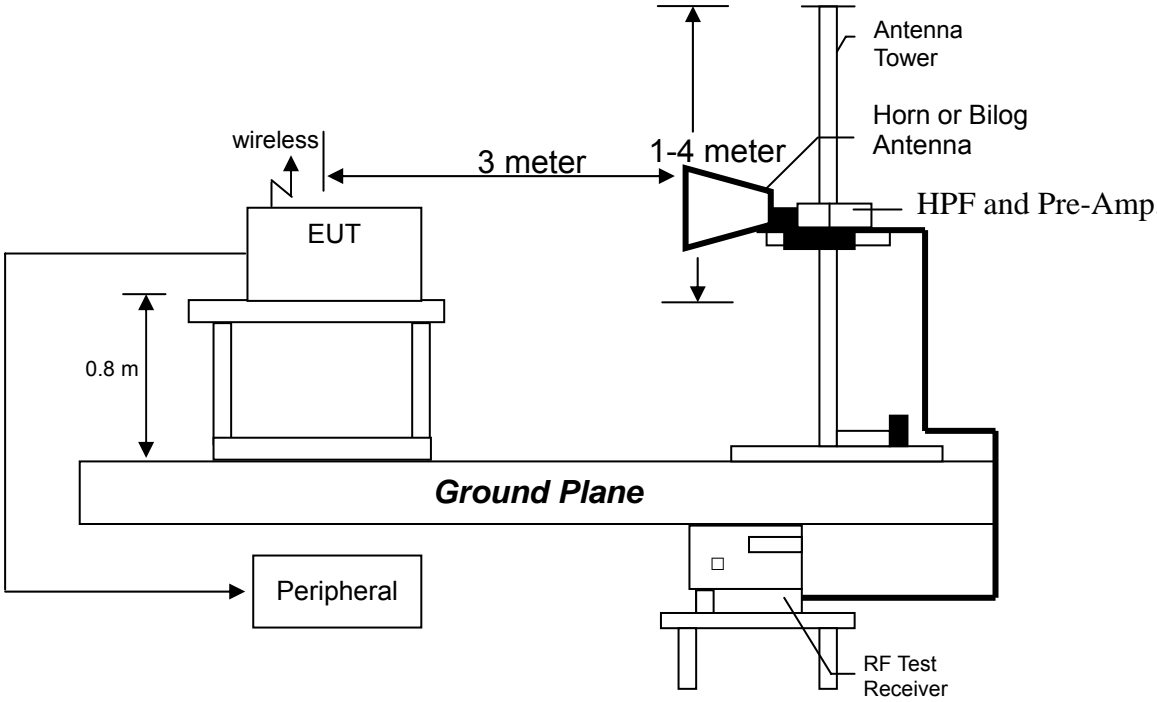
#### Reference FCC document: KDB558074, ANSI C63.4

The frequency range from 30 MHz to 1000 MHz using Bilog Antenna.  
The frequency range over 1 GHz using Horn Antenna.

Radiated emissions were investigated cover the frequency range from 30 MHz to 1000 MHz using a receiver RBW of 120 kHz record QP reading, and the frequency over 1 GHz using a spectrum analyzer RBW of 1 MHz and 10 Hz VBW record Average reading. (15.209 paragraph), the Peak reading (1 MHz RBW/VBW) recorded also on the report. The EUT for testing is arranged on a wooden turntable. If some peripherals apply to the EUT, the peripherals will be connected to EUT and the whole system. During the test, all cables were arranged to produce worst-case emissions. The signal is maximized through rotation. The height of antenna and polarization is changing constantly for exploring for maximum signal level. The height of antenna can be up to 4 meters and down to 1 meter. The measurement for radiated emission will be done at the distance of three meters unless the signal level is too low to measure at that distance. In the case of the reading under noise floor, a pre-amplifier is used and/or the test is conducted at a closer distance. And then all readings are extrapolated back to the equivalent 3 meters reading using inverse scaling with distance.

The EUT configuration please refer to the "Spurious set-up photo.pdf".

**Test Diagram:**



**Emission Limit:**

The spurious Emission shall test through the 10th harmonic. 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).

Frequency (MHz)	Limits (dBµV/m@ 3 meter)
30-88	40
88-216	43.5
216-960	46
Above 960	54

**Remark:**

1. In the above table, the tighter limit applies at the band edges.
2. Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system

**Note:** (1) The EUT was tested while in a continuous transmit mode and the worst case data rates are 1 Mbps data rate for 802.11b mode, 6 Mbps data rate for 802.11g mode, 6.5 Mbps data rate for 802.11n HT20 mode and 13 Mbps data rate for 802.11n HT40 mode. The EUT was tuned to a low, middle and high channel.

(1) The EUT operating at 2.4 GHz ISM band. Frequency Range scanned from 30 MHz to 25 GHz.

**Measurement results: frequencies equal to or less than 1 GHz**

The test was performed on EUT under 802.11b/g/n continuously triple transmitting mode. Channel 1, 6, 11 were verified. The worst case occurred at 802.11b Tx channel 1.

EUT : BiPAC 5200N RC  
 Worst Case : 802.11b Tx at channel 1

Antenna Polariz. (V/H)	Freq. (MHz)	Receiver Detector	Corr. Factor (dB/m)	Reading (dBuV)	Corrected Level (dBuV/m)	Limit @ 3 m (dBuV/m)	Margin (dB)
V	249.22	QP	12.22	32.55	44.76	46.0	-1.24
V	384.05	QP	16.40	21.29	37.69	46.0	-8.31
V	499.48	QP	18.43	18.99	37.41	46.0	-8.59
V	511.12	QP	18.56	19.28	37.83	46.0	-8.17
V	639.16	QP	21.53	22.96	44.49	46.0	-1.51
V	895.24	QP	24.35	15.03	39.37	46.0	-6.63
H	249.22	QP	12.36	31.66	44.02	46.0	-1.98
H	384.05	QP	16.74	26.07	42.81	46.0	-3.19
H	639.16	QP	21.55	23.35	44.89	46.0	-1.11
H	767.20	QP	23.02	12.55	35.57	46.0	-10.43
H	874.87	QP	24.12	16.08	40.19	46.0	-5.81
H	895.24	QP	24.62	16.30	40.91	46.0	-5.09

**Remark:**

1. Corr. Factor = Antenna Factor + Cable Loss
2. Corrected Level = Reading + Corr. Factor



**Measurement results: frequency above 1GHz**

EUT : BiPAC 5200N RC  
 Test Condition : 802.11b Tx at channel 1

Frequency (MHz)	Spectrum Analyzer Detector	Antenna Polariz. (H/V)	Preamp. Gain (dB)	Correction Factor (dB/m)	Reading (dBuV)	Corrected Level (dBuV/m)	Limit @ 3 m (dBuV/m)	Margin (dB)
4824.00	PK	V	35.1	38.54	51.57	55.01	74	-18.99
4824.00	AV	V	35.1	38.54	49.83	53.27	54	-0.73
7236.00	PK	V	33.0	44.60	35.49	47.09	54	-6.91
9648.00	PK	V	32.7	49.30	36.11	52.71	54	-1.29
4824.00	PK	H	35.1	38.54	42.28	45.72	54	-8.28

Remark:

1. Correction Factor = Antenna Factor + Cable Loss
2. Corrected Level = Reading + Correction Factor – Preamp. Gain
3. The frequency measured ranges from 1GHz to 25GHz. The data value listed above which is higher than the system noise floor.

EUT : BiPAC 5200N RC  
 Test Condition : 802.11b Tx at channel 6

Frequency (MHz)	Spectrum Analyzer Detector	Antenna Polariz. (H/V)	Preamp. Gain (dB)	Correction Factor (dB/m)	Reading (dBuV)	Corrected Level (dBuV/m)	Limit @ 3 m (dBuV/m)	Margin (dB)
4874.00	PK	V	35.1	38.54	51.45	54.89	74	-19.11
4874.00	AV	V	35.1	38.54	49.88	53.32	54	-0.68
9748.00	PK	V	32.7	49.30	39.96	56.56	74	-17.44
9748.00	AV	V	32.7	49.30	36.10	52.70	54	-1.30
4874.00	PK	H	35.1	38.54	42.73	46.17	54	-7.83

Remark:

1. Correction Factor = Antenna Factor + Cable Loss
2. Corrected Level = Reading + Correction Factor – Preamp. Gain
3. The frequency measured ranges from 1GHz to 25GHz. The data value listed above which is higher than the system noise floor.

EUT : BiPAC 5200N RC  
Test Condition : 802.11b Tx at channel 11

Frequency (MHz)	Spectrum Analyzer Detector	Antenna Polariz. (H/V)	Preamp. Gain (dB)	Correction Factor (dB/m)	Reading (dBuV)	Corrected Level (dBuV/m)	Limit @ 3 m (dBuV/m)	Margin (dB)
4924.00	PK	V	35.1	38.54	50.67	54.11	74	-19.89
4924.00	AV	V	35.1	38.54	48.71	52.15	54	-1.85
9848.00	PK	V	32.7	49.30	39.87	56.47	74	-17.53
9848.00	AV	V	32.7	49.30	36.61	53.21	54	-0.79
4924.00	PK	H	35.1	38.54	41.86	45.30	54	-8.70

Remark:

1. Correction Factor = Antenna Factor + Cable Loss
2. Corrected Level = Reading + Correction Factor – Preamp. Gain
3. The frequency measured ranges from 1GHz to 25GHz. The data value listed above which is higher than the system noise floor.

EUT : BiPAC 5200N RC  
Test Condition : 802.11g Tx at channel 1

Frequency (MHz)	Spectrum Analyzer Detector	Antenna Polariz. (H/V)	Preamp. Gain (dB)	Correction Factor (dB/m)	Reading (dBuV)	Corrected Level (dBuV/m)	Limit @ 3 m (dBuV/m)	Margin (dB)
4824.00	PK	V	35.1	38.54	44.5	47.94	54	-6.06
9648.00	PK	V	32.7	49.3	43.48	60.08	74	-13.92
9648.00	AV	V	32.7	49.3	26.68	43.28	54	-10.72
4824.00	PK	H	35.1	38.54	38.74	42.18	54	-11.82
9648.00	PK	H	32.7	49.3	33.38	49.98	54	-4.02

Remark:

1. Correction Factor = Antenna Factor + Cable Loss
2. Corrected Level = Reading + Correction Factor – Preamp. Gain
3. The frequency measured ranges from 1GHz to 25GHz. The data value listed above which is higher than the system noise floor.

EUT : BiPAC 5200N RC  
Test Condition : 802.11g Tx at channel 6

Frequency (MHz)	Spectrum Analyzer Detector	Antenna Polariz. (H/V)	Preamp. Gain (dB)	Correction Factor (dB/m)	Reading (dBuV)	Corrected Level (dBuV/m)	Limit @ 3 m (dBuV/m)	Margin (dB)
4874.00	PK	V	35.1	38.54	45.82	49.26	54	-4.74
9748.00	PK	V	32.7	49.3	44.65	61.25	74	-12.75
9748.00	AV	V	32.7	49.3	27.54	44.14	54	-9.86
4874.00	PK	H	35.1	38.54	39.42	42.86	54	-11.14
9748.00	PK	H	32.7	49.3	33.34	49.94	54	-4.06

Remark:

1. Correction Factor = Antenna Factor + Cable Loss
2. Corrected Level = Reading + Correction Factor – Preamp. Gain
3. The frequency measured ranges from 1GHz to 25GHz. The data value listed above which is higher than the system noise floor.

EUT : BiPAC 5200N RC  
Test Condition : 802.11g Tx at channel 11

Frequency (MHz)	Spectrum Analyzer Detector	Antenna Polariz. (H/V)	Preamp. Gain (dB)	Correction Factor (dB/m)	Reading (dBuV)	Corrected Level (dBuV/m)	Limit @ 3 m (dBuV/m)	Margin (dB)
4924.00	PK	V	35.1	38.54	44.74	48.18	54	-5.82
9848.00	PK	V	32.7	49.3	45.49	62.09	74	-11.91
9848.00	AV	V	32.7	49.3	28.21	44.81	54	-9.19
4924.00	PK	H	35.1	38.54	39.95	43.39	54	-10.61
9848.00	PK	H	32.7	49.3	32.93	49.53	54	-4.47

Remark:

1. Correction Factor = Antenna Factor + Cable Loss
2. Corrected Level = Reading + Correction Factor – Preamp. Gain
3. The frequency measured ranges from 1GHz to 25GHz. The data value listed above which is higher than the system noise floor.

EUT : BiPAC 5200N RC  
Test Condition : 802.11n HT20 Tx at channel 1

Frequency (MHz)	Spectrum Analyzer Detector	Antenna Polariz. (H/V)	Preamp. Gain (dB)	Correction Factor (dB/m)	Reading (dBuV)	Corrected Level (dBuV/m)	Limit @ 3 m (dBuV/m)	Margin (dB)
4824.00	PK	V	35.1	38.54	48.17	51.61	54	-2.39
9648.00	PK	V	32.7	49.30	43.63	60.23	74	-13.77
9648.00	AV	V	32.7	49.30	26.52	43.12	54	-10.88
4824.00	PK	H	35.1	38.54	40.14	43.58	54	-10.42
7236.00	PK	H	33.0	44.60	35.23	46.83	54	-7.17

Remark:

1. Correction Factor = Antenna Factor + Cable Loss
2. Corrected Level = Reading + Correction Factor – Preamp. Gain
3. The frequency measured ranges from 1GHz to 25GHz. The data value listed above which is higher than the system noise floor.

EUT : BiPAC 5200N RC  
Test Condition : 802.11n HT20 Tx at channel 6

Frequency (MHz)	Spectrum Analyzer Detector	Antenna Polariz. (H/V)	Preamp. Gain (dB)	Correction Factor (dB/m)	Reading (dBuV)	Corrected Level (dBuV/m)	Limit @ 3 m (dBuV/m)	Margin (dB)
4874.00	PK	V	35.1	38.54	46.75	50.19	54	-3.81
7311.00	PK	V	33.0	44.60	38.17	49.77	54	-4.23
9748.00	PK	V	32.7	49.30	44.52	61.12	74	-12.88
9748.00	AV	V	32.7	49.30	27.64	44.24	54	-9.76
12185.00	PK	V	31.6	50.87	32.41	51.68	54	-2.32
4874.00	PK	H	35.1	38.54	43.11	46.55	54	-7.45
7311.00	PK	H	33.0	44.60	35.08	46.68	54	-7.32

Remark:

1. Correction Factor = Antenna Factor + Cable Loss
2. Corrected Level = Reading + Correction Factor – Preamp. Gain
3. The frequency measured ranges from 1GHz to 25GHz. The data value listed above which is higher than the system noise floor.

EUT : BiPAC 5200N RC  
Test Condition : 802.11n HT20 Tx at channel 11

Frequency (MHz)	Spectrum Analyzer Detector	Antenna Polariz. (H/V)	Preamp. Gain (dB)	Correction Factor (dB/m)	Reading (dBuV)	Corrected Level (dBuV/m)	Limit @ 3 m (dBuV/m)	Margin (dB)
4924.00	PK	V	35.1	38.54	46.50	49.94	54	-4.06
7386.00	PK	V	33.0	44.6	38.89	50.49	54	-3.51
9848.00	PK	V	32.7	49.3	45.73	62.33	74	-11.67
9848.00	AV	V	32.7	49.3	29.07	45.67	54	-8.33
12310.00	PK	V	31.6	50.87	32.22	51.49	54	-2.51
4924.00	PK	H	35.1	38.54	39.35	42.79	54	-11.21

Remark:

1. Correction Factor = Antenna Factor + Cable Loss
2. Corrected Level = Reading + Correction Factor – Preamp. Gain
3. The frequency measured ranges from 1GHz to 25GHz. The data value listed above which is higher than the system noise floor.

EUT : BiPAC 5200N RC  
Test Condition : 802.11n HT40 Tx at channel 3

Frequency (MHz)	Spectrum Analyzer Detector	Antenna Polariz. (H/V)	Preamp. Gain (dB)	Correction Factor (dB/m)	Reading (dBuV)	Corrected Level (dBuV/m)	Limit @ 3 m (dBuV/m)	Margin (dB)
4844.00	PK	V	35.1	38.54	45.87	49.31	54	-4.69
9688.00	PK	V	32.7	49.30	33.41	50.01	54	-3.99
4844.00	PK	H	35.1	38.54	38.65	42.09	54	-11.91

Remark:

1. Correction Factor = Antenna Factor + Cable Loss
2. Corrected Level = Reading + Correction Factor – Preamp. Gain
3. The frequency measured ranges from 1GHz to 25GHz. The data value listed above which is higher than the system noise floor.

EUT : BiPAC 5200N RC  
 Test Condition : 802.11n HT40 Tx at channel 6

Frequency (MHz)	Spectrum Analyzer Detector	Antenna Polariz. (H/V)	Preamp. Gain (dB)	Correction Factor (dB/m)	Reading (dBuV)	Corrected Level (dBuV/m)	Limit @ 3 m (dBuV/m)	Margin (dB)
4874.00	PK	V	35.1	38.54	47.01	50.45	54	-3.55
9748.00	PK	V	32.7	49.3	34.86	51.46	54	-2.54
4844.00	PK	H	35.1	38.54	39.68	43.12	54	-10.88

Remark:

1. Correction Factor = Antenna Factor + Cable Loss
2. Corrected Level = Reading + Correction Factor – Preamp. Gain
3. The frequency measured ranges from 1GHz to 25GHz. The data value listed above which is higher than the system noise floor.

EUT : BiPAC 5200N RC  
 Test Condition : 802.11n HT40 Tx at channel 9

Frequency (MHz)	Spectrum Analyzer Detector	Antenna Polariz. (H/V)	Preamp. Gain (dB)	Correction Factor (dB/m)	Reading (dBuV)	Corrected Level (dBuV/m)	Limit @ 3 m (dBuV/m)	Margin (dB)
4904.00	PK	V	35.1	38.54	47.02	50.46	54	-3.54
9808.00	PK	V	32.7	49.30	33.91	50.51	54	-3.49
4844.00	PK	H	35.1	38.54	37.84	41.28	54	-12.72

Remark:

1. Correction Factor = Antenna Factor + Cable Loss
2. Corrected Level = Reading + Correction Factor – Preamp. Gain
3. The frequency measured ranges from 1GHz to 25GHz. The data value listed above which is higher than the system noise floor.

## 9. Emission on Band Edge

<b>Name of Test</b>	Emission Band Edge
<b>Base Standard</b>	FCC 15.247(d)

**Test Result:** Complies  
**Measurement Data:** See Tables & plots below

### Method of Measurement:

#### Reference FCC document: KDB558074, ANSI C63.4

The frequency range from 30 MHz to 1000 MHz using Bilog Antenna.  
The frequency range over 1 GHz using Horn Antenna.

Radiated emissions were investigated cover the frequency range from 30 MHz to 1000 MHz using a receiver RBW of 120 kHz record QP reading, and the frequency over 1 GHz using a spectrum analyzer RBW of 1 MHz and 10 Hz VBW record Average reading. (15.209 paragraph), the Peak reading (1 MHz RBW/VBW) recorded also on the report.

**Note:** The EUT was tested while in a continuous transmit mode and the worst case data rates are 1 Mbps data rate for 802.11b mode, 6 Mbps data rate for 802.11g mode, 6.5 Mbps data rate for 802.11n HT20 mode and 13 Mbps data rate for 802.11n HT40 mode. The EUT was tuned to a low, middle and high channel.

**Test Mode: 802.11b operating mode**

Channel	Measurement Freq.Band (MHz)	Detector	The Max. Field Strength in Restrict Band (dBuV/m)	Limit @ 3 m (dBuV/m)	Margin (dB)
1 (lowest)	2310-2390	PK	59.92	74	-14.08
		AV	49.56	54	-4.44
11 (highest)	2483.5-2500	PK	58.88	74	-15.12
		AV	48.27	54	-5.73

**Test Mode: 802.11g operating mode**

Channel	Measurement Freq.Band (MHz)	Detector	The Max. Field Strength in Restrict Band (dBuV/m)	Limit @ 3 m (dBuV/m)	Margin (dB)
1 (lowest)	2310-2390	PK	61.92	74	-12.08
		AV	48.76	54	-5.24
11 (highest)	2483.5-2500	PK	63.07	74	-10.93
		AV	48.42	54	-5.58



**Test Mode: 802.11n HT20 operating mode**

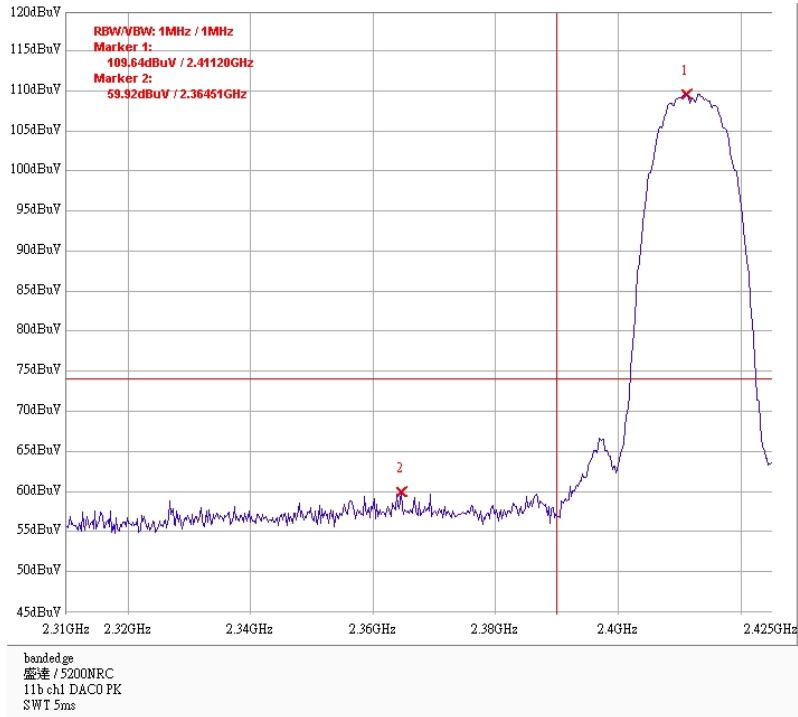
Channel	Measurement Freq.Band (MHz)	Detector	The Max. Field Strength in Restrict Band (dBuV/m)	Limit @ 3 m (dBuV/m)	Margin (dB)
1 (lowest)	2310-2390	PK	67.49	74	-6.51
		AV	51.77	54	-2.23
11 (highest)	2483.5-2500	PK	63.26	74	-10.74
		AV	48.86	54	-5.14

**Test Mode: 802.11n HT40 operating mode**

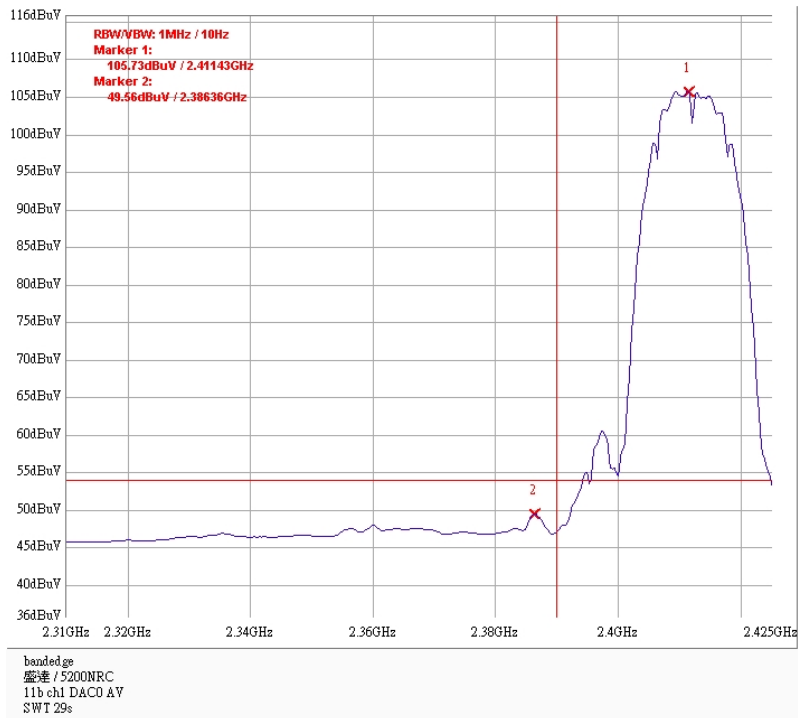
Channel	Measurement Freq.Band (MHz)	Detector	The Max. Field Strength in Restrict Band (dBuV/m)	Limit @ 3 m (dBuV/m)	Margin (dB)
3 (lowest)	2310-2390	PK	66.76	74	-7.24
		AV	52.79	54	-1.21
9 (highest)	2483.5-2500	PK	70.03	74	-3.97
		AV	53.09	54	-0.91

Please see the plot below.

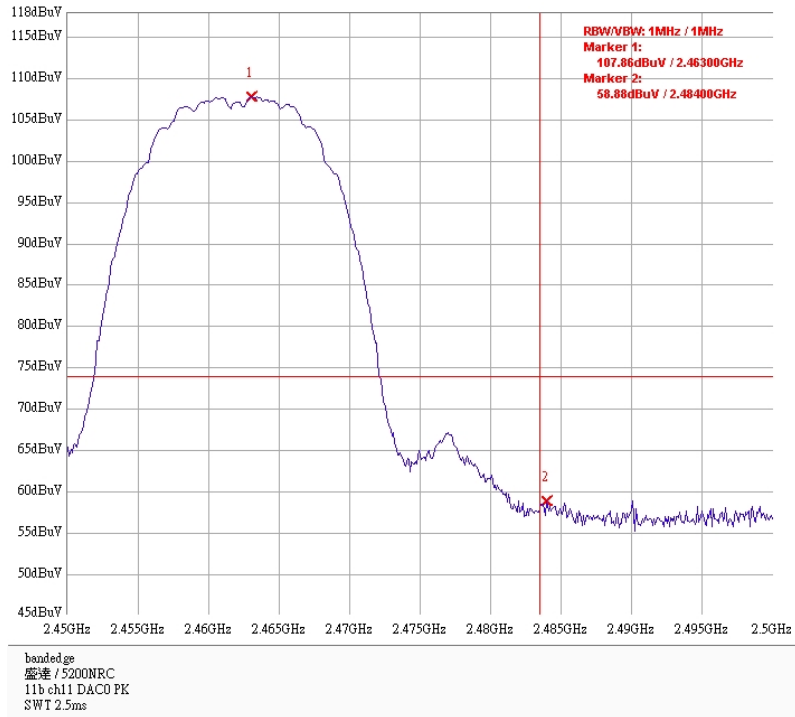
Band edge @ 802.11b mode channel 1 PK



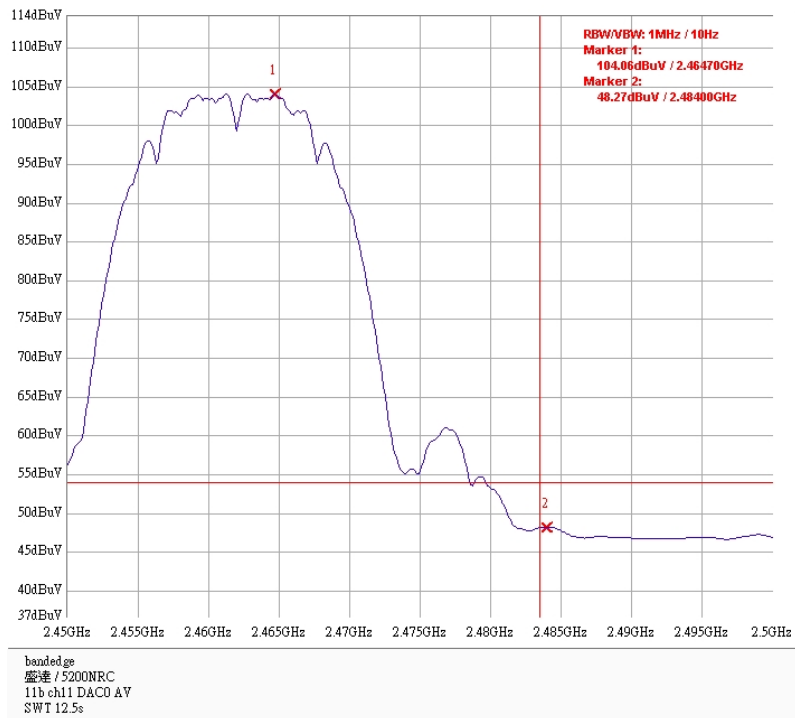
Band edge @ 802.11b mode channel 1 AV



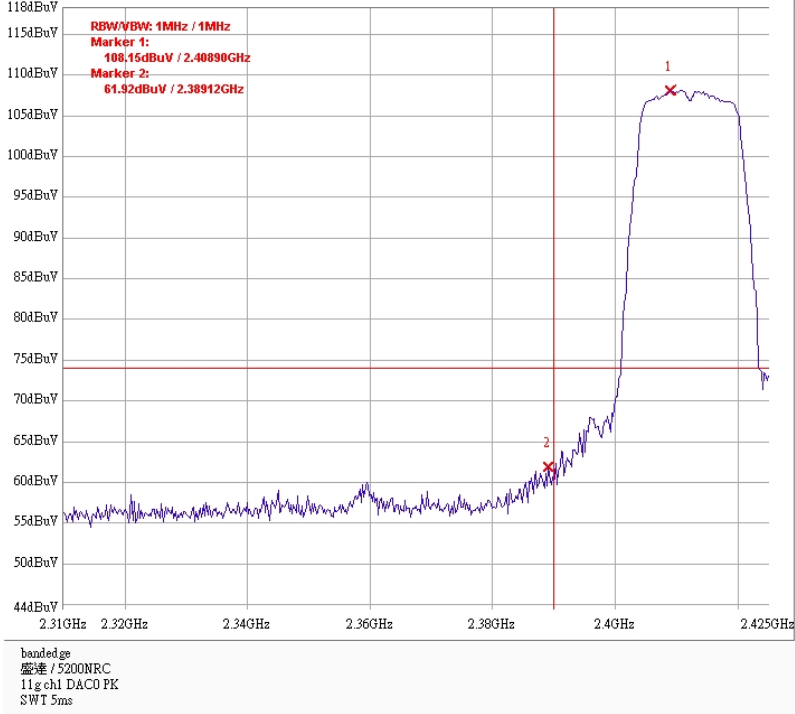
**Band edge @ 802.11b mode channel 11 PK**



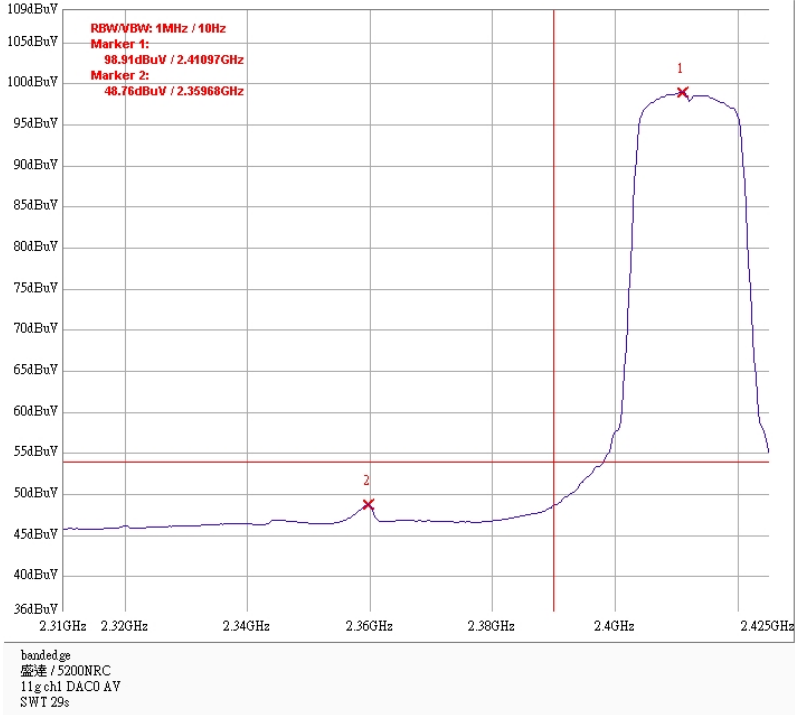
**Band edge @ 802.11b mode channel 11 AV**



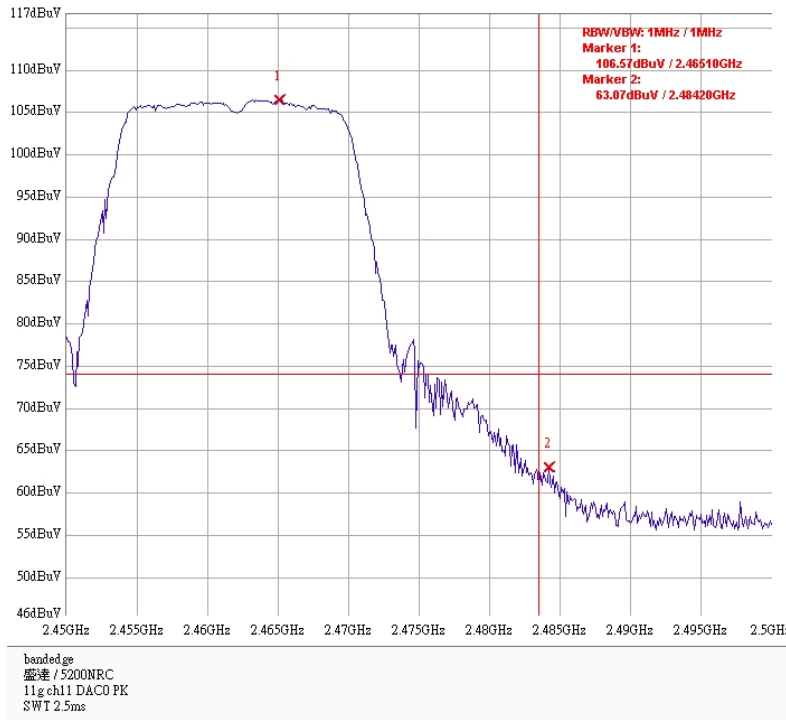
Band edge @ 802.11g mode channel 1 PK



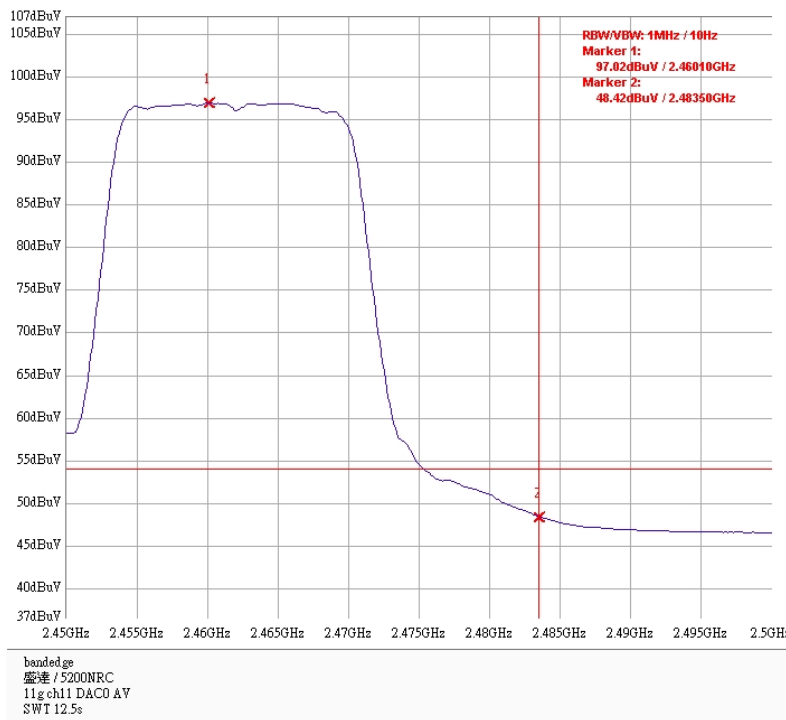
Band edge @ 802.11g mode channel 1 AV



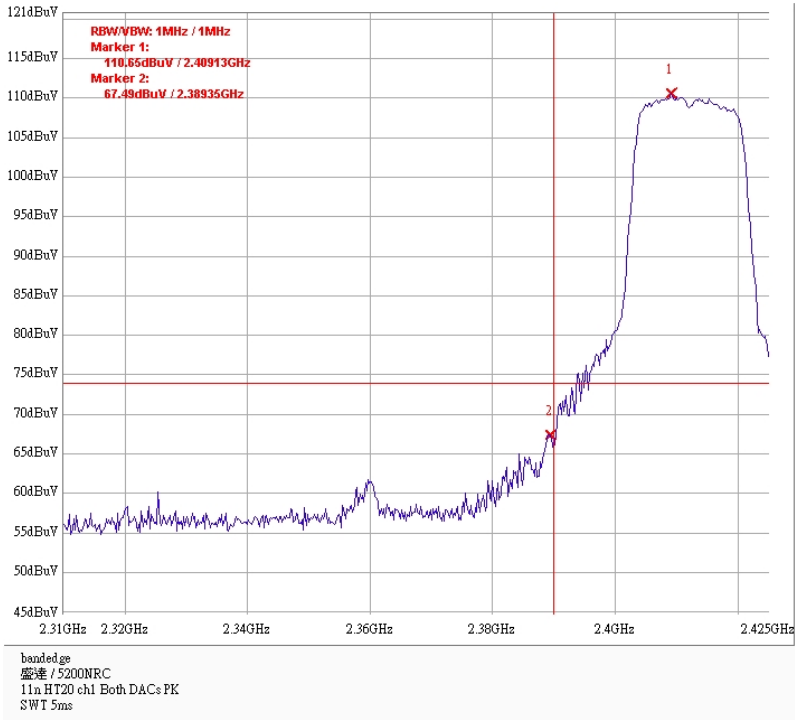
**Band edge @ 802.11g mode channel 11 PK**



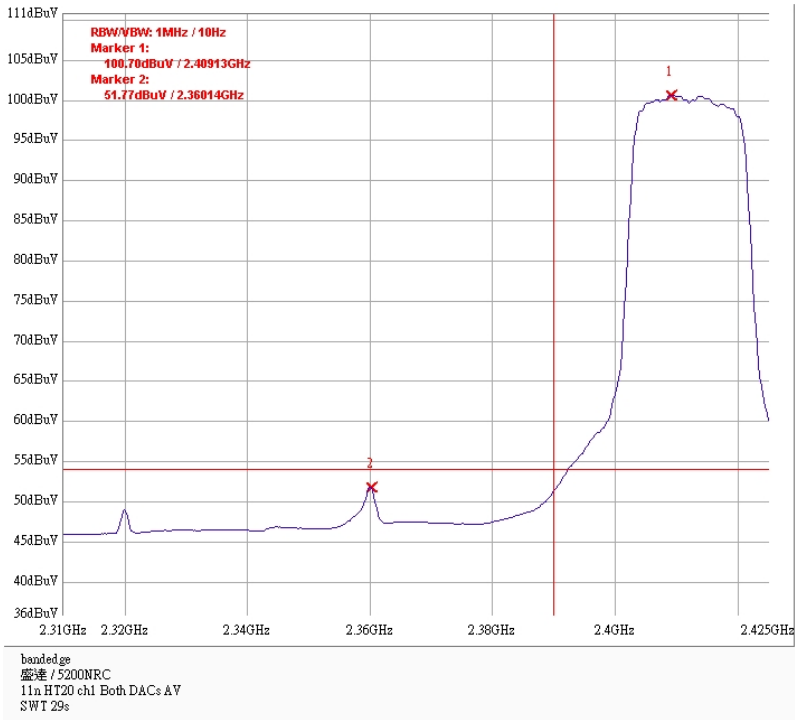
**Band edge @ 802.11g mode channel 11 AV**



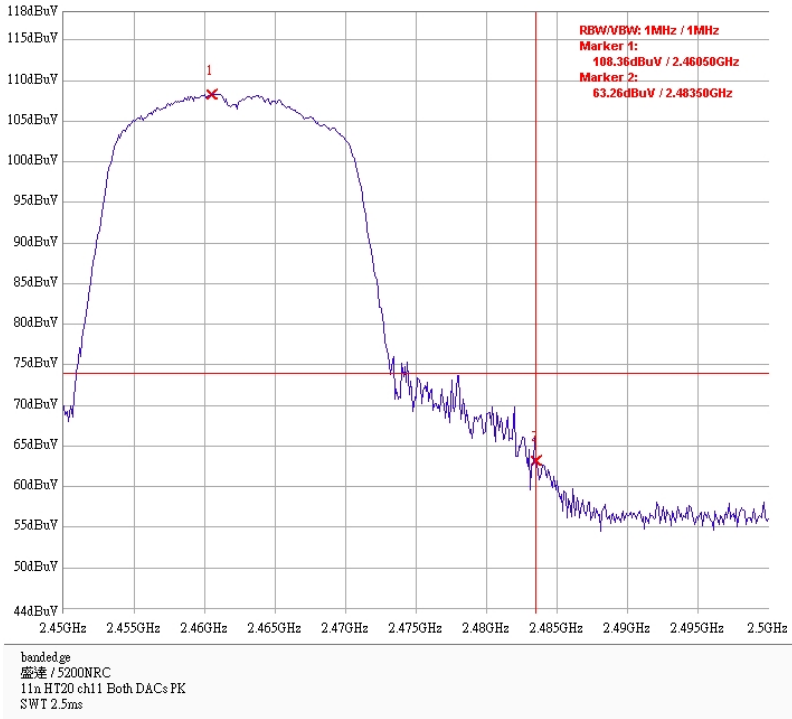
Band edge @802.11n HT20 mode channel 1 PK



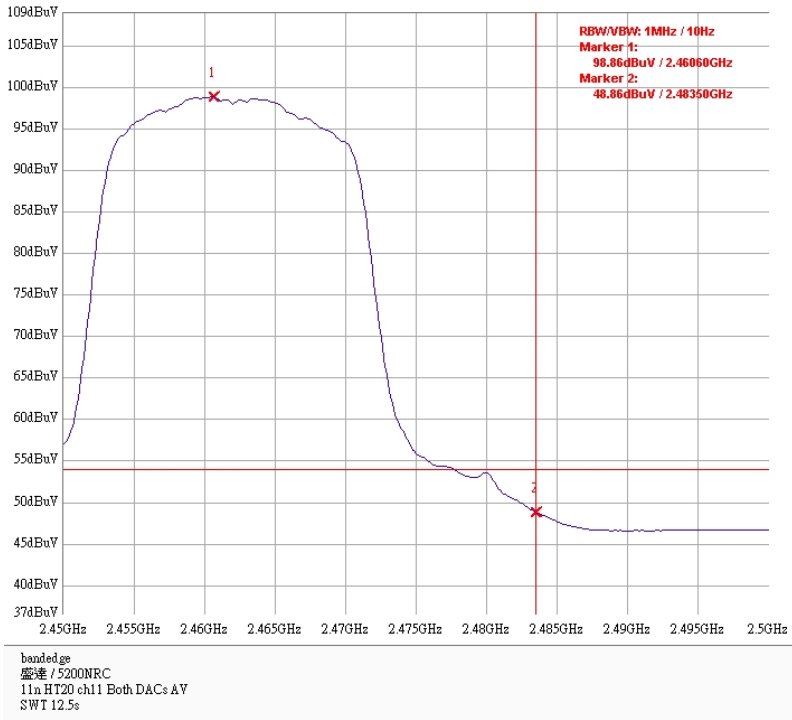
Band edge @802.11n HT20 mode channel 1 AV



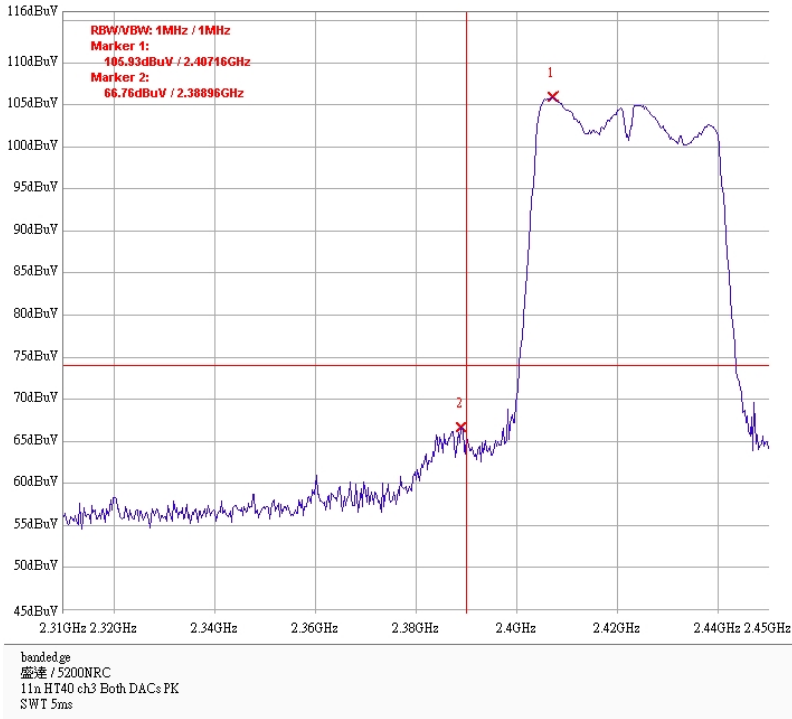
**Band edge @802.11n HT20 mode channel 11 PK**



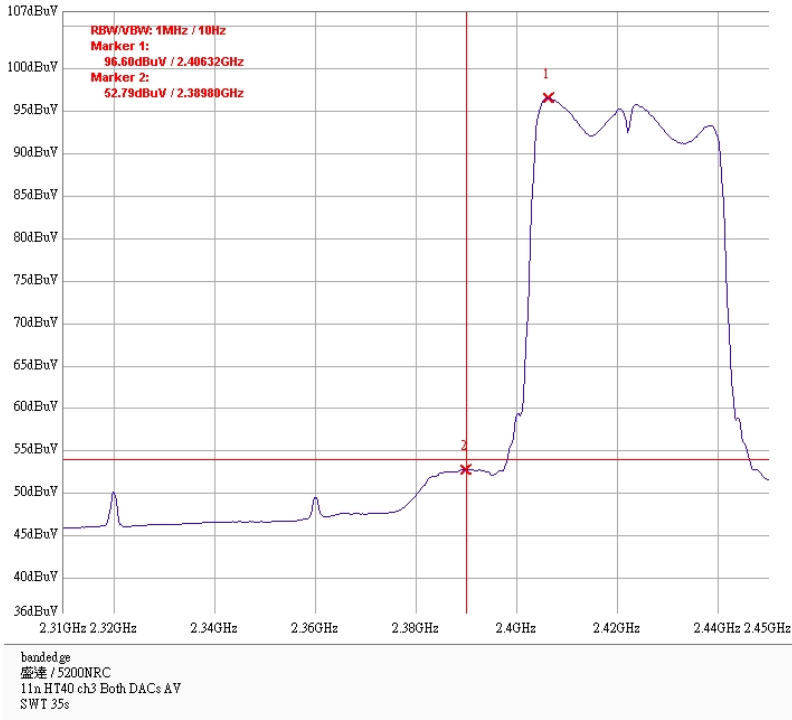
**Band edge @802.11n HT20 mode channel 11 AV**



**Band edge @802.11n HT40 mode channel 3 PK**

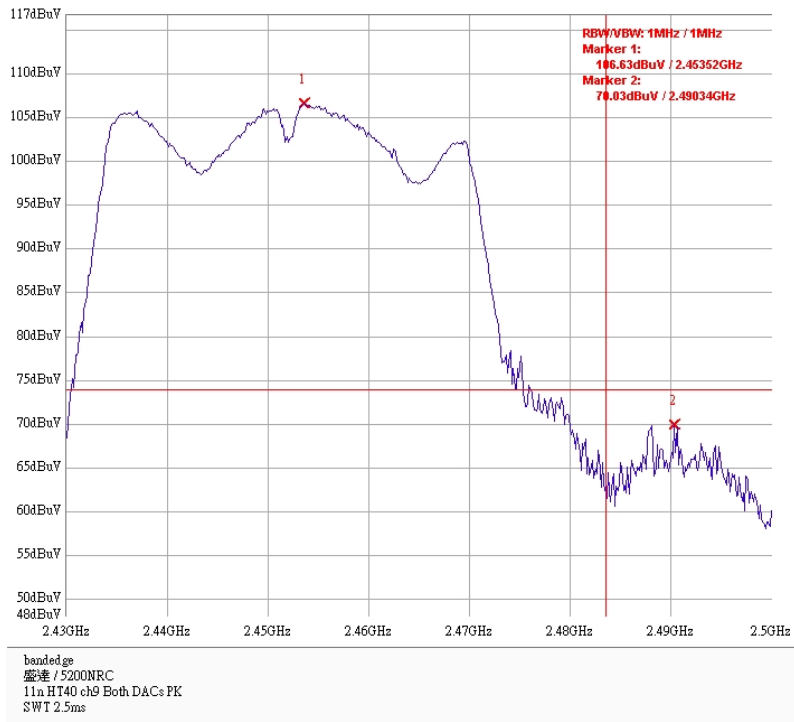


**Band edge @802.11n HT40 mode channel 3 AV**

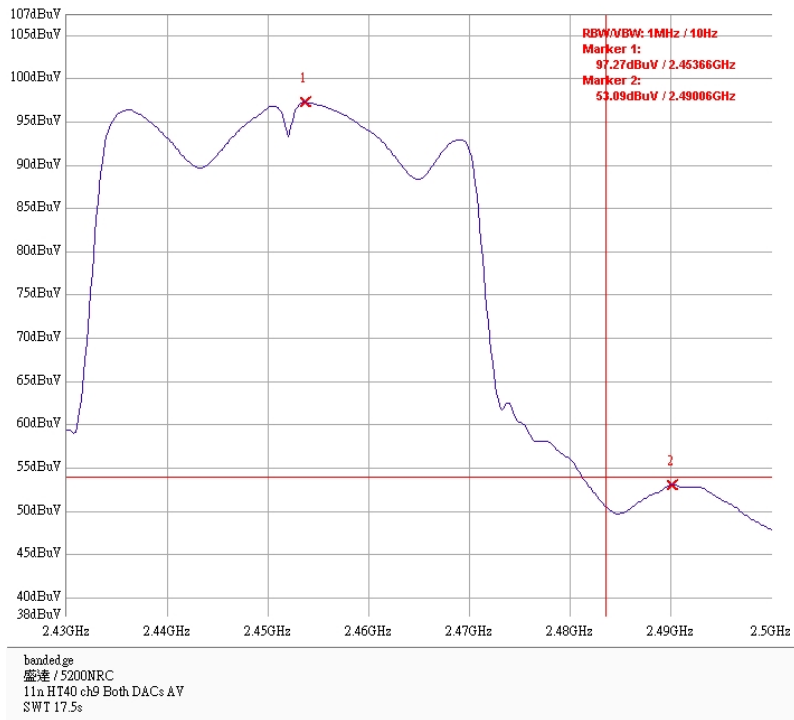




**Band edge @802.11n HT40 mode channel 9 PK**



**Band edge @802.11n HT40 mode channel 9 AV**



**10. AC power line conducted emission**

<b>Name of Test</b>	AC power line conducted emission
<b>Base Standard</b>	FCC 15.207

**Test Result:** Complies  
**Measurement Data:** See Tables & plots below  
**Method of Measurement:**  
**Reference FCC document: KDB558074, ANSI C63.4**

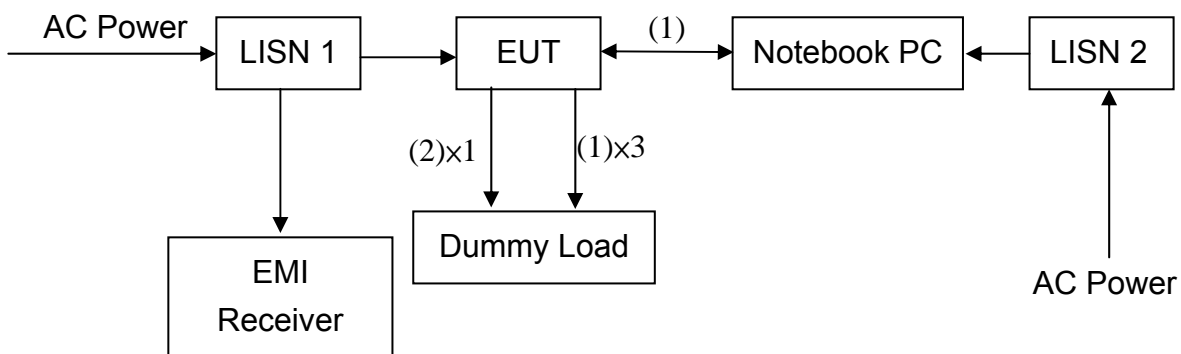
The EUT are connected to the main power through a line impedance stabilization network (LISN). This provides a 50 ohm/50 uH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN that provides a 50 ohm/ 50 uH coupling impedance with 50 ohm termination.

Both sides (Line and Neutral) of AC line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.4/2003 on conducted measurement.

The bandwidth of the field strength meter (R & S Test Receiver ESCS 30) is set at 9kHz.

The EUT configuration please refer to the “Conducted set-up photo.pdf”.

**Test Diagram:**



- (1) RJ-45 UTP Cat.5 10 meter
- (2) RJ-11 unshielded cable 10 meter

**Emission Limit:**

Freq. (MHz)	Conducted Limit (dBuV)	
	Q.P.	Ave.
0.15~0.50	66 – 56*	56 – 46*
0.50~5.00	56	46
5.00~30.0	60	50

\*Decreases with the logarithm of the frequency.

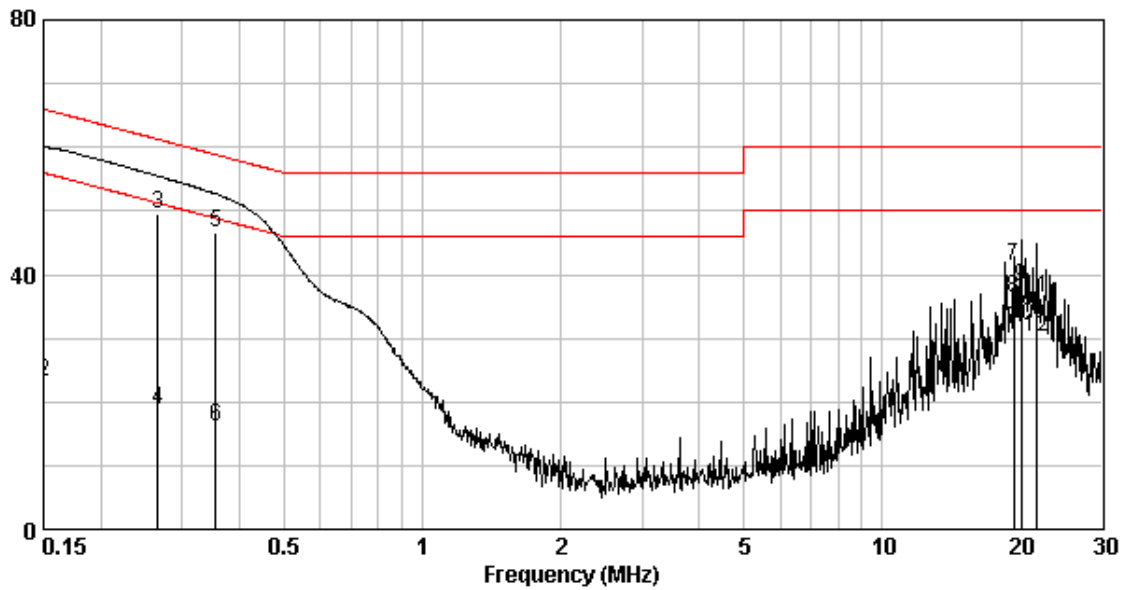
**Note:** The EUT was tested while in normal communication mode.

Phase : Line  
EUT : BiPAC 5200N RC  
Test Condition : Normal operating mode

Frequency (MHz)	Corr. Factor (dB)	Level Qp (dBuV)	Limit Qp (dBuV)	Level Av (dBuV)	Limit Av (dBuV)	Margin (dB)	
						Qp	Av
0.15	0.81	53.82	66.00	23.06	56.00	-12.18	-32.94
0.27	0.52	49.38	61.26	18.85	51.26	-11.88	-32.41
0.36	0.23	46.53	58.84	15.98	48.84	-12.31	-32.86
19.32	0.91	41.34	60.00	36.38	50.00	-18.66	-13.62
20.03	0.92	38.05	60.00	31.85	50.00	-21.95	-18.15
21.69	0.99	36.46	60.00	30.11	50.00	-23.54	-19.89

**Remark:**

1. Correction Factor (dB) = LISN Factor (dB) + Cable Loss (dB)
2. Margin (dB) = Level (dBuV) – Limit (dBuV)

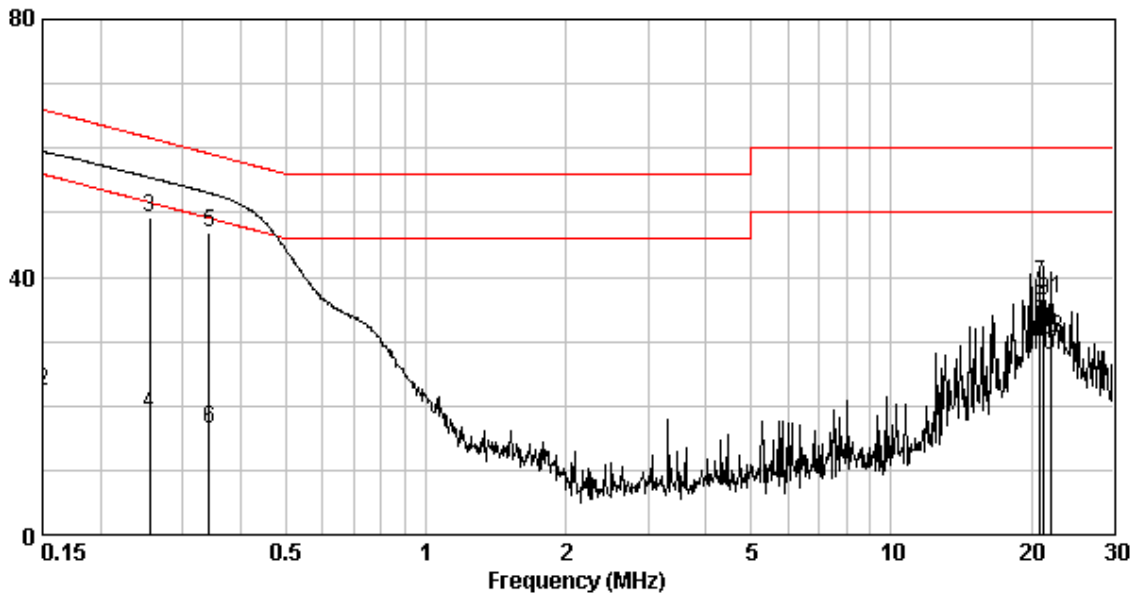


Phase : Neutral  
EUT : BiPAC 5200N RC  
Test Condition : Normal operating mode

Frequency (MHz)	Corr. Factor (dB)	Level Qp (dBuV)	Limit Qp (dBuV)	Level Av (dBuV)	Limit Av (dBuV)	Margin (dB)	
						Qp	Av
0.15	0.11	53.12	66.00	22.41	56.00	-12.88	-33.59
0.26	0.11	49.31	61.59	18.62	51.59	-12.28	-32.97
0.34	0.11	46.88	59.17	16.39	49.17	-12.29	-32.78
20.84	0.54	39.02	60.00	35.06	50.00	-20.98	-14.94
21.26	0.55	36.34	60.00	27.78	50.00	-23.66	-22.22
21.95	0.56	36.73	60.00	30.43	50.00	-23.27	-19.57

**Remark:**

1. Correction Factor (dB)= LISN Factor (dB) + Cable Loss (dB)
2. Margin (dB) = Level (dBuV) – Limit (dBuV)



## Appendix A: Test Equipment List

Equipment	Brand	Model No.
EMI Test Receiver	Rohde & Schwarz	ESCS 30
Spectrum Analyzer	Rohde & Schwarz	FSP 30
Spectrum Analyzer	Rohde & Schwarz	FSEK 30
Signal Generator	Rohde & Schwarz	SMR27
Horn Antenna	SCHWARZBECK	BBHA 9120 D
Horn Antenna	SCHWARZBECK	BBHA 9170
Bilog Antenna	SCHWARZBECK	VULB 9168
Pre-Amplifier	MITEQ	919981
Pre-Amplifier	MITEQ	828825
Controller	HDGmbH	CM 100
Antenna Tower	HDGmbH	MA 2400
LISN	Rohde & Schwarz	ESH3-Z5
Wideband Peak Power Meter/ Sensor	Anritsu	ML2495A/ MA2411B
Temperature Humidity Test Chamber	Juror	TR-4010

- Note: 1. The above equipments are within the valid calibration period.  
 2. The test antennas (receiving antenna) are calibration per 3 years.  
 3. The video bandwidth of the power meter and sensor can be up to 65 MHz.

### Measurement Uncertainty:

Measurement uncertainty was calculated in accordance with NAMAS NIS 81.

Parameter	Uncertainty
Radiated Emission	±4.98 dB
Conducted Emission	±2.6 dB

This uncertainty represents an expanded uncertainty expressed at approximately the 95 % confidence level using a coverage factor of k=2.