

# TEST RESULT SUMMARY

**FCC Part 15 Subpart C Section 15.247**

**Industry Canada RSS-210 Issue 7**

**Industry Canada RSS-Gen Issue 2**

MANUFACTURER'S NAME	Healthsense Incorporated
NAME OF EQUIPMENT	Modular Sensor Radio (MSR)
MODEL NUMBER(S) TESTED	100033-0001-AA
MANUFACTURER'S ADDRESS	1191 Northland Drive Suite 100 Mendota Heights MN 55120
TEST REPORT NUMBER	WC805442.1
TEST DATE(S)	09 – 31 July 2008

TÜV SÜD America Inc, as an independent testing laboratory, declares that the equipment tested as specified above conforms to the applicable requirements of FCC Part 15, Subpart C, Section 15.247 *"Operation within the bands 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz"* and Industry Canada's RSS-210 Issue 7 *"Low-power Licence-exempt Radiocommunication Devices (All Frequency Bands): Category I Equipment"* and RSS-Gen Issue 2 *"General Requirements and Information for the Certification of Radiocommunication Equipment"*


It is the manufacturer's responsibility to assure that additional production units of this model are manufactured with identical electrical and mechanical characteristics. Any modifications necessary for compliance made during testing on the above mentioned date(s) must be implemented in all production units for compliance to be maintained.

Date: 27 August 2008

Tested by:

Approved by:

Location: Taylors Falls MN  
USA

  
Greg S Jakubowski  
Senior EMC Technician

  
Joel T Schneider  
Senior EMC Engineer

Not Transferable

# EMC TEST REPORT

Test Report No. WC805442.1 Date of issue: 27 August 2008

Model / Serial No(s) Tested 100033-0001-AA / ---

Product Type Modular Sensor Radio (MSR)

Manufacturer Healthsense Incorporated

Address 1191 Northland Drive

Suite 100

Mendota Heights MN 55120

Test Result ☒ Positive ☐ Negative

Total pages including Appendices 115

*TÜV SÜD America Inc reports apply only to the specific samples tested under stated test conditions. It is the manufacturer's responsibility to assure that additional production units of this model are manufactured with identical electrical and mechanical components. TÜV SÜD America Inc shall have no liability for any deductions, inferences or generalizations drawn by the client or others from TÜV SÜD America Inc issued reports.*

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## REVISION RECORD

REVISION	TOTAL NUMBER OF PAGES	DATE	DESCRIPTION
	115	27 August 2008	Initial Release



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**EMC TEST REGULATIONS:**

**The tests were performed according to the following regulations:**

- FCC Part 15 Subpart C Section 15.247 Paragraphs (A)(2), (b)(3), (d), (e)
- Industry Canada RSS-210 Issue 7 Sections A8.2(a), A8.4(4), A8.5, A8.2(b)
- Industry Canada RSS-Gen Issue 2 Section 4.6.1



## ENVIRONMENTAL CONDITIONS IN THE LAB

	<u>Actual</u>
Temperature:	: 22-26°C
Atmospheric pressure	: 98kPa
Relative Humidity	: 57-63%

## POWER SUPPLY UTILIZED

Power supply system : 3VDC

## TEST EQUIPMENT

All measurement instrumentation is traceable to the National Institute of Standards and Technology and is calibrated according to internal procedure.

## SIGN EXPLANATIONS

- ☐ - not applicable
- ☒ - applicable



## 6 dB Bandwidth

FCC 15.247(a)(2), IC RSS-210 A8.2(a)

### Test summary

The requirements are: ☒ - MET ☐ - NOT MET

Testing was performed in accordance with the test procedure of FCC KDB Publication 558074

The minimum 6 dB bandwidth = 8.76 MHz

### Test location

☐ - Wild River Lab Large Test Site (Open Area Test Site)

☐ - Wild River Lab Small Test Site (Open Area Test Site)

☒ - Wild River Lab Tech Area, conducted measurement

### Test equipment

TUV ID	Model	Manufacturer	Description	Serial	Cal Due
WRLE03371	E4440A	Agilent	Spectrum Analyzer	MY43362222	19-Dec-08

### Test limit

500 kHz minimum

### Test data

See following pages

6 dB Bandwidth  
Channel 1, 1 MB rate

✱ Agilent 23:14:05 Jul 15, 2008

▲ Mkr2 10.08 MHz  
0.57 dB

Ref 15 dBm

Atten 30 dB

#Peak

Log

2

dB/

Offst

1.3

dB

DI

5.7

dBm

LgAv

V1 S2

Center 2.412 50 GHz

Span 20 MHz

#Res BW 100 kHz

VBW 300 kHz

Sweep 1.933 ms (1001 pts)

Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	2.411 52 GHz	11.70 dBm
2R	(1)	Freq	2.406 98 GHz	5.37 dBm
2Δ	(1)	Freq	10.08 MHz	0.57 dB



6 dB Bandwidth  
Channel 1, 2 MB rate

Agilent 23:20:03 Jul 15, 2008

▲ Mkr2 9.80 MHz  
0.60 dB

Ref 15 dBm

Atten 30 dB

#Peak

Log

2

dB/

Offst

1.3

dB

DI

5.7

dBm

LgAv

V1 S2

Center 2.412 50 GHz

#Res BW 100 kHz

VBW 300 kHz

Sweep 1.933 ms (1001 pts)

Span 20 MHz

Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	2.412 74 GHz	11.71 dBm
2R	(1)	Freq	2.407 18 GHz	5.84 dBm
2Δ	(1)	Freq	9.80 MHz	0.60 dB

6 dB Bandwidth  
Channel 1, 5 MB rate

Agilent 23:22:05 Jul 15, 2008

▲ Mkr2 8.76 MHz  
0.28 dB

Ref 15 dBm

Atten 30 dB

#Peak

Log

2

dB/

Offst

1.3

dB

DI

6.1

dBm

LgAv

V1 S2

Center 2.412 50 GHz

Span 20 MHz

#Res BW 100 kHz

VBW 300 kHz

Sweep 1.933 ms (1001 pts)

Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	2.412 38 GHz	12.06 dBm
2R	(1)	Freq	2.407 76 GHz	5.85 dBm
2Δ	(1)	Freq	8.76 MHz	0.28 dB

6 dB Bandwidth  
Channel 1, 11 MB rate

Agilent 23:23:58 Jul 15, 2008

▲ Mkr2 10.22 MHz  
-0.07 dB

Ref 15 dBm

Atten 30 dB

#Peak

Log

2

dB/

Offst

1.3

dB

DI

6.2

dBm

LgAv

V1 S2

Center 2.412 50 GHz

Span 20 MHz

#Res BW 100 kHz

VBW 300 kHz

Sweep 1.933 ms (1001 pts)

Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	2.412 38 GHz	12.25 dBm
2R	(1)	Freq	2.406 66 GHz	6.24 dBm
2Δ	(1)	Freq	10.22 MHz	-0.07 dB

6 dB Bandwidth  
Channel 6, 1 MB rate

Agilent 23:26:21 Jul 15, 2008

▲ Mkr2 10.08 MHz  
0.23 dB

Ref 15 dBm

Atten 30 dB

#Peak

Log

2

dB/

Offst

1.3

dB

DI

4.7

dBm

LgAv

V1 S2

Center 2.437 00 GHz

#Res BW 100 kHz

VBW 300 kHz

Sweep 1.933 ms (1001 pts)

Span 20 MHz

Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	2.436 00 GHz	11.27 dBm
2R	(1)	Freq	2.431 96 GHz	5.11 dBm
2Δ	(1)	Freq	10.08 MHz	0.23 dB

6 dB Bandwidth  
Channel 6, 2 MB rate

Agilent 23:28:01 Jul 15, 2008

▲ Mkr2 10.06 MHz  
0.90 dB

Ref 15 dBm

Atten 30 dB

#Peak

Log

2

dB/

Offst

1.3

dB

DI

4.7

dBm

LgAv

V1 S2

Center 2.437 00 GHz

Span 20 MHz

#Res BW 100 kHz

VBW 300 kHz

Sweep 1.933 ms (1001 pts)

Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	2.437 56 GHz	11.16 dBm
2R	(1)	Freq	2.431 98 GHz	4.45 dBm
2Δ	(1)	Freq	10.06 MHz	0.90 dB

6 dB Bandwidth  
Channel 6, 5 MB rate

Agilent 23:29:39 Jul 15, 2008

▲ Mkr2 9.38 MHz  
0.20 dB

Ref 15 dBm

Atten 30 dB

#Peak

Log

2

dB/

Offst

1.3

dB

DI

6.6

dBm

LgAv

V1 S2

Center 2.437 00 GHz

Span 20 MHz

#Res BW 100 kHz

VBW 300 kHz

Sweep 1.933 ms (1001 pts)

Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	2.437 28 GHz	12.59 dBm
2R	(1)	Freq	2.432 46 GHz	6.54 dBm
2Δ	(1)	Freq	9.38 MHz	0.20 dB

6 dB Bandwidth  
Channel 6, 11 MB rate

Agilent 23:33:00 Jul 15, 2008

▲ Mkr2 10.32 MHz  
-0.01 dB

Ref 15 dBm

Atten 30 dB

#Peak

Log

2

dB/

Offst

1.3

dB

DI

5.7

dBm

LgAv

V1 S2

Center 2.437 00 GHz

Span 20 MHz

#Res BW 100 kHz

VBW 300 kHz

Sweep 1.933 ms (1001 pts)

Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	2.437 48 GHz	11.73 dBm
2R	(1)	Freq	2.431 96 GHz	5.78 dBm
2Δ	(1)	Freq	10.32 MHz	-0.01 dB

6 dB Bandwidth  
Channel 11, 1 MB rate

Agilent 23:35:27 Jul 15, 2008

▲ Mkr2 10.10 MHz  
0.92 dB

Ref 15 dBm

Atten 30 dB

#Peak

Log

2

dB/

Offst

1.3

dB

DI

5.2

dBm

LgAv

V1 S2

Center 2.462 00 GHz

Span 20 MHz

#Res BW 100 kHz

VBW 300 kHz

Sweep 1.933 ms (1001 pts)

Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	2.461 52 GHz	11.21 dBm
2R	(1)	Freq	2.456 94 GHz	4.53 dBm
2Δ	(1)	Freq	10.10 MHz	0.92 dB



6 dB Bandwidth  
Channel 11, 2 MB rate

Agilent 23:36:52 Jul 15, 2008

▲ Mkr2 9.90 MHz  
0.17 dB

Ref 15 dBm

Atten 30 dB

#Peak

Log

2

dB/

Offst

1.3

dB

DI

5.2

dBm

LgAv

V1 S2

Center 2.462 00 GHz

Span 20 MHz

#Res BW 100 kHz

VBW 300 kHz

Sweep 1.933 ms (1001 pts)

Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	2.461 30 GHz	11.17 dBm
2R	(1)	Freq	2.457 10 GHz	5.47 dBm
2Δ	(1)	Freq	9.90 MHz	0.17 dB

6 dB Bandwidth  
Channel 11, 5 MB rate

Agilent 23:38:47 Jul 15, 2008

▲ Mkr2 10.28 MHz  
-0.04 dB

Ref 15 dBm

Atten 30 dB

#Peak

Log

2

dB/

Offst

1.3

dB

DI

5.6

dBm

LgAv

V1 S2

Center 2.462 00 GHz

Span 20 MHz

#Res BW 100 kHz

VBW 300 kHz

Sweep 1.933 ms (1001 pts)

Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	2.460 90 GHz	11.64 dBm
2R	(1)	Freq	2.456 90 GHz	6.09 dBm
2Δ	(1)	Freq	10.28 MHz	-0.04 dB

6 dB Bandwidth  
Channel 11, 11 MB rate

Agilent 23:40:57 Jul 15, 2008

▲ Mkr2 9.70 MHz  
-0.68 dB

Ref 15 dBm

Atten 30 dB

#Peak

Log

2

dB/

Offst

1.3

dB

DI

6.3

dBm

LgAv

V1 S2

Center 2.462 00 GHz

Span 20 MHz

#Res BW 100 kHz

VBW 300 kHz

Sweep 1.933 ms (1001 pts)

Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	2.463 70 GHz	12.31 dBm
2R	(1)	Freq	2.457 36 GHz	6.25 dBm
2Δ	(1)	Freq	9.70 MHz	-0.68 dB

## Maximum peak output power

FCC 15.247(b)(3), IC RSS-210 A8.4(4)

### Test summary

The requirements are: ■ - MET □ - NOT MET

Testing was performed in accordance with the test procedure of FCC KDB Publication 558074

Maximum peak output power measured with a power meter is 20.9 dBm or 123 mW

### Test location

□ - Wild River Lab Large Test Site (Open Area Test Site)

□ - Wild River Lab Small Test Site (Open Area Test Site)

■ - Wild River Lab Tech Area, conducted measurement

### Test equipment

TUV ID	Model	Manufacturer	Description	Serial	Cal Due
WRLE03371	E4440A	Agilent	Spectrum Analyzer	MY43362222	19-Dec-08
WRLE03334	8542C	Giga-tronics	Peak Power Meter	1831096	21-Mar-09
WRLE03335	80350A	Giga-tronics	Peak Power Sensor	1828549	21-Mar-09

### Test limit

1 watt

### Test data

See following pages

Peak output power

Channel 1, 1 MB rate

Agilent 11:10:38 Jul 24, 2008

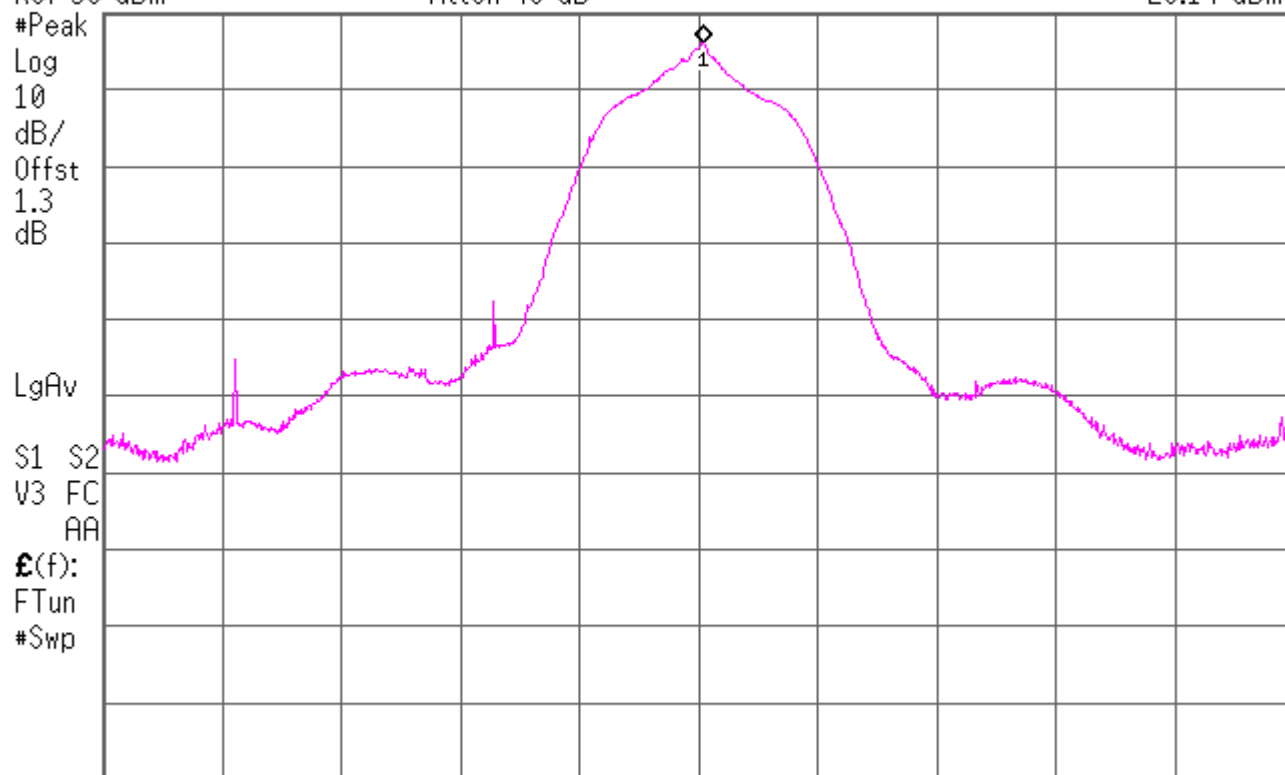
Level with peak power meter = 20.4 dBm

Mkr1 2.412 4 GHz

Ref 30 dBm

Atten 40 dB

26.14 dBm



Center 2.412 0 GHz

Span 100 MHz

#Res BW 8 MHz

#VBW 50 MHz

Sweep 1 ms (1001 pts)

Peak output power

Channel 1, 2 MB rate

Agilent 11:13:09 Jul 24, 2008

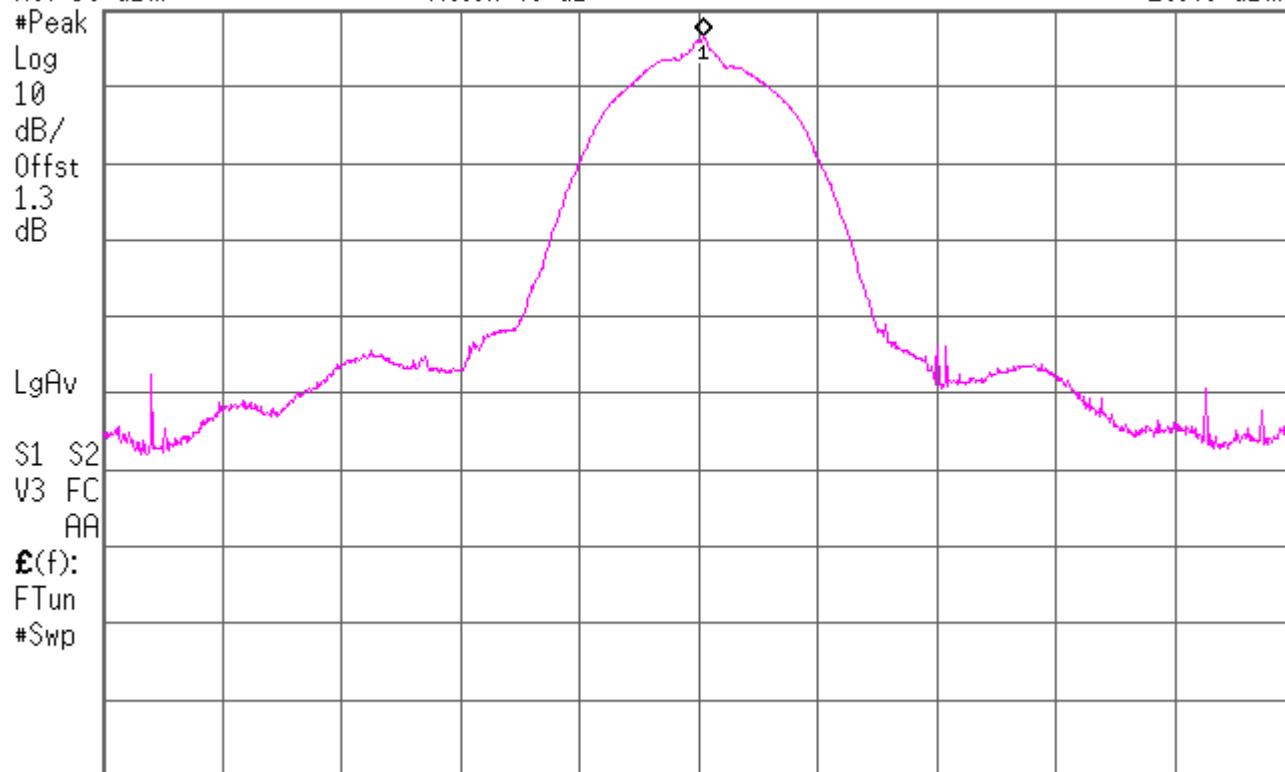
Level with peak power meter = 20.8 DBM

Ref 30 dBm

Atten 40 dB

Mkr1 2.412 4 GHz

26.48 dBm



Center 2.412 0 GHz

Span 100 MHz

#Res BW 8 MHz

#VBW 50 MHz

Sweep 1 ms (1001 pts)

Peak output power

Channel 1, 5 MB rate

Agilent 11:15:17 Jul 24, 2008

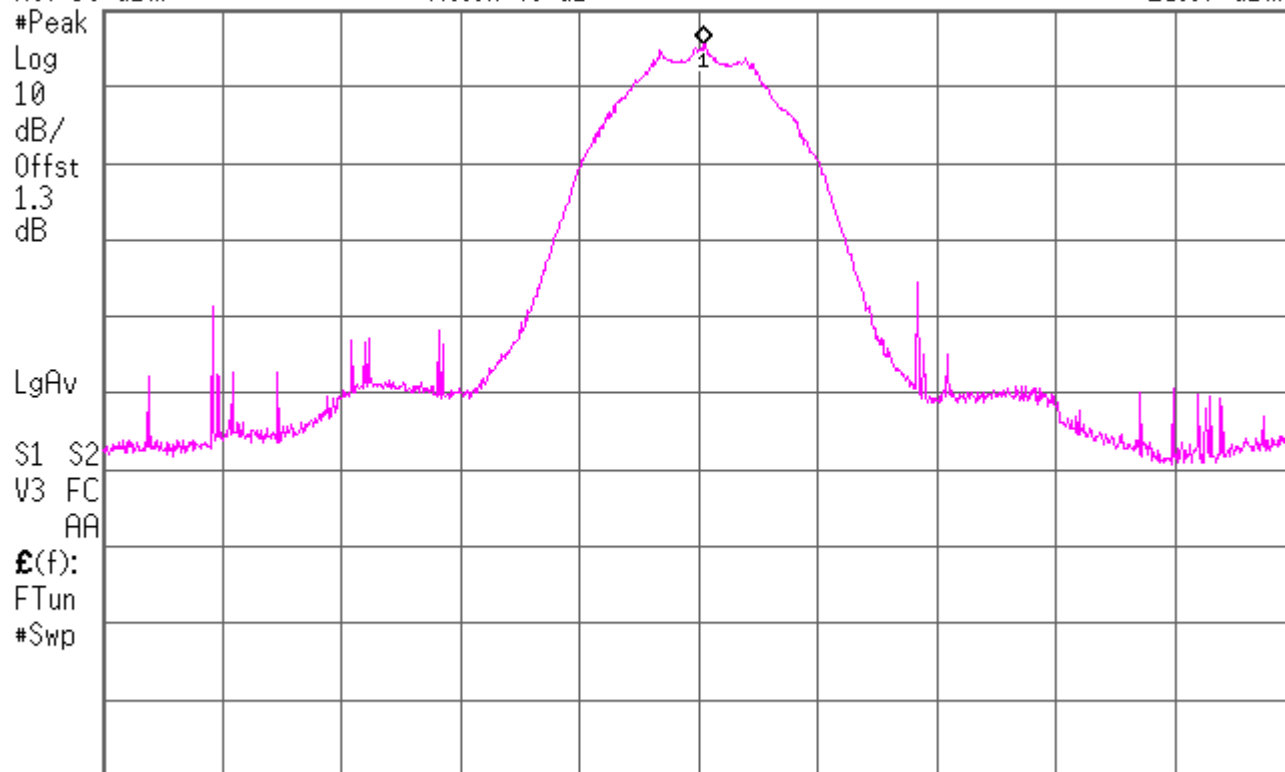
Level with peak power meter = 20.3 DBM

Ref 30 dBm

Atten 40 dB

Mkr1 2.412 4 GHz

25.67 dBm



Center 2.412 0 GHz

Span 100 MHz

#Res BW 8 MHz

#VBW 50 MHz

Sweep 1 ms (1001 pts)

Peak output power

Channel 1, 11 MB rate

Agilent 11:17:16 Jul 24, 2008

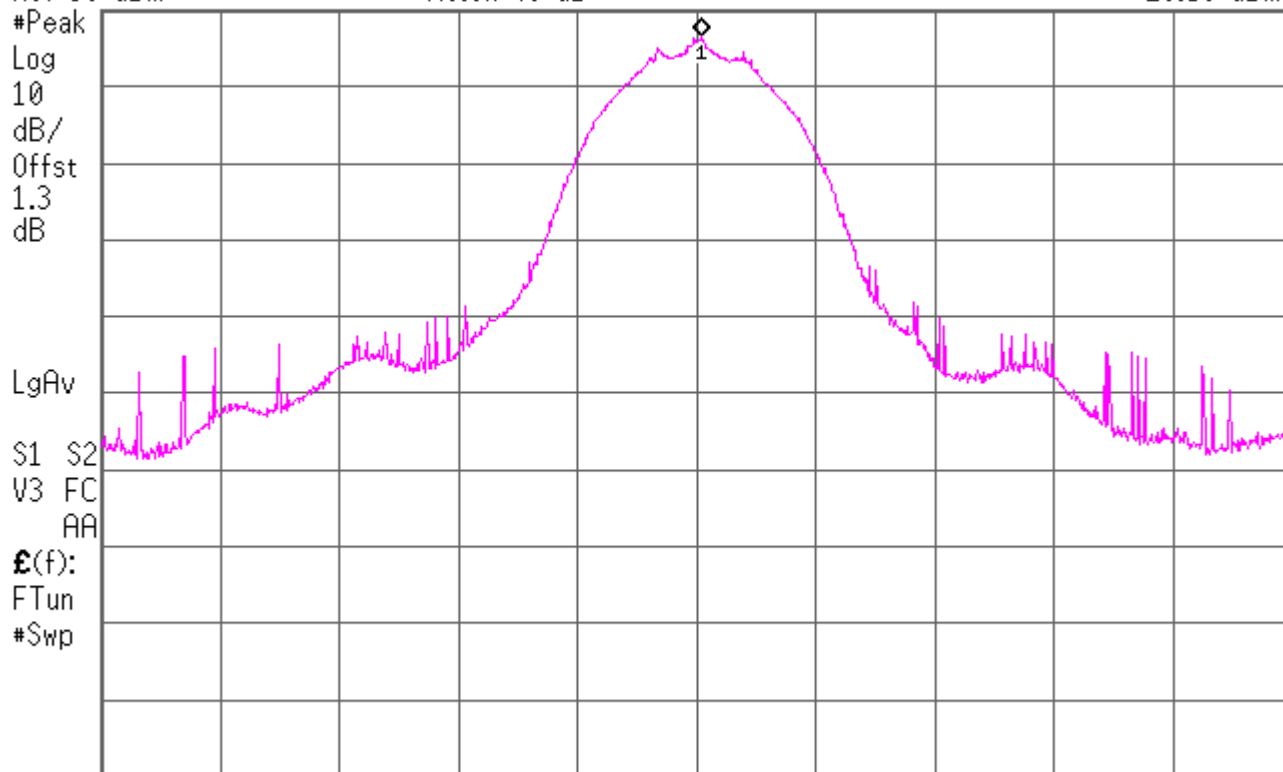
Level with peak power meter = 20.8 DBM

Ref 30 dBm

Atten 40 dB

Mkr1 2.412 4 GHz

26.59 dBm



Center 2.412 0 GHz

Span 100 MHz

#Res BW 8 MHz

#VBW 50 MHz

Sweep 1 ms (1001 pts)



Peak output power

Channel 6, 1 MB rate

Agilent 11:21:50 Jul 24, 2008

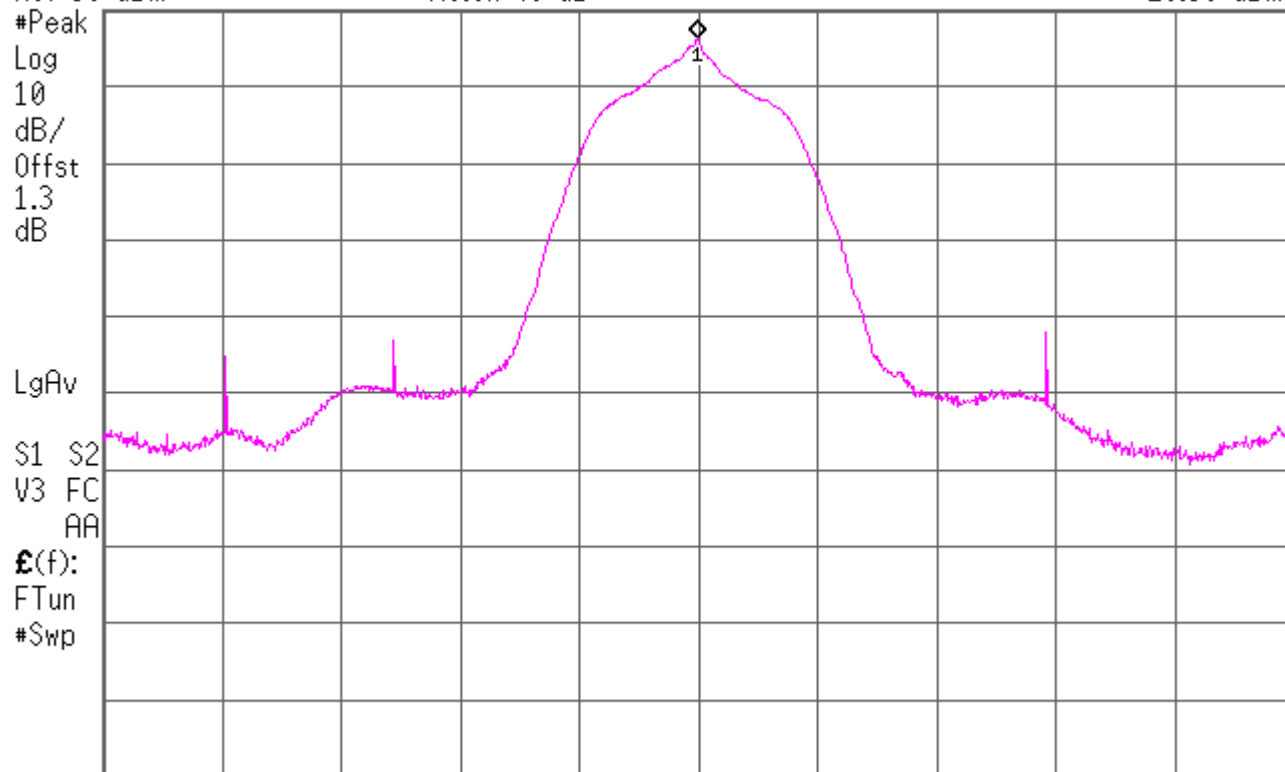
Level with peak power meter = 20.2 DBM

Ref 30 dBm

Atten 40 dB

Mkr1 2.437 5 GHz

26.30 dBm



Center 2.437 5 GHz

Span 100 MHz

#Res BW 8 MHz

#VBW 50 MHz

Sweep 1 ms (1001 pts)

Peak output power

Channel 6, 2 MB rate

Agilent 11:23:31 Jul 24, 2008

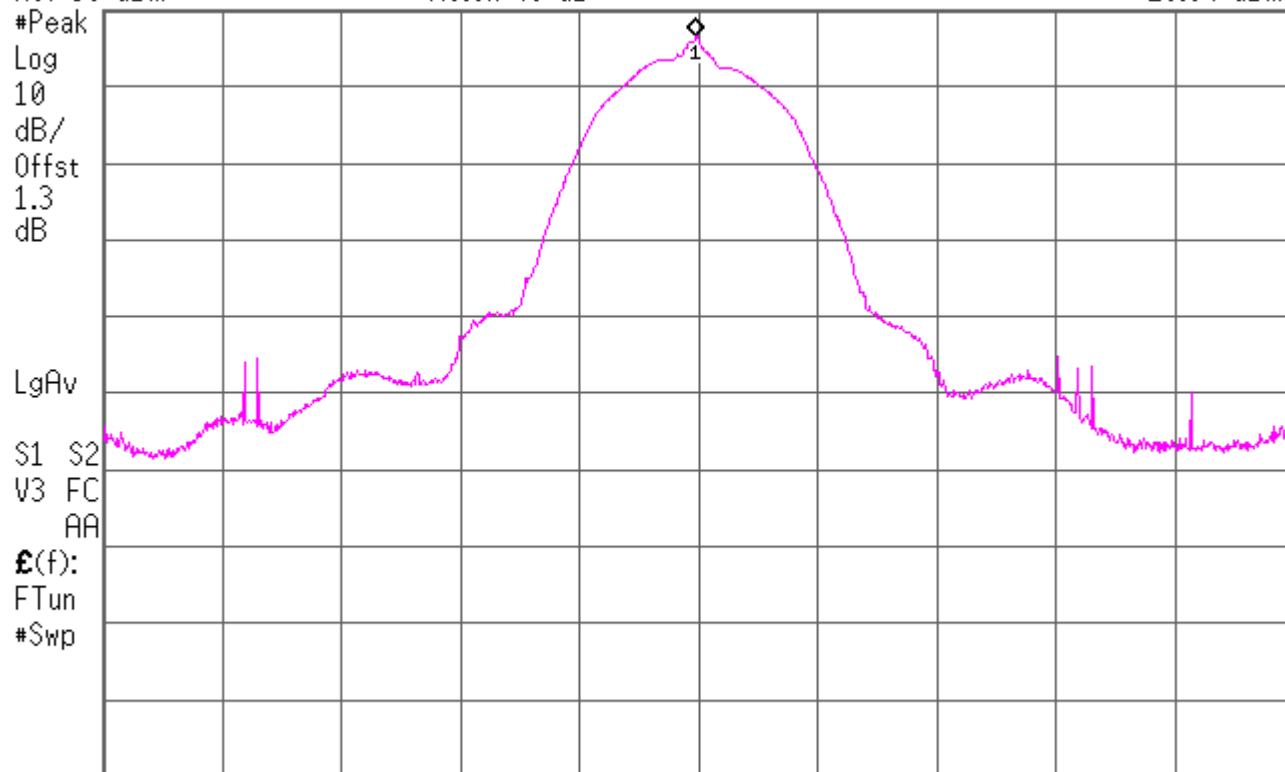
Level with peak power meter = 20.7 DBM

Ref 30 dBm

Atten 40 dB

Mkr1 2.437 3 GHz

26.64 dBm



Center 2.437 5 GHz

Span 100 MHz

#Res BW 8 MHz

#VBW 50 MHz

Sweep 1 ms (1001 pts)

Peak output power

Channel 6, 5 MB rate

Agilent 11:25:13 Jul 24, 2008

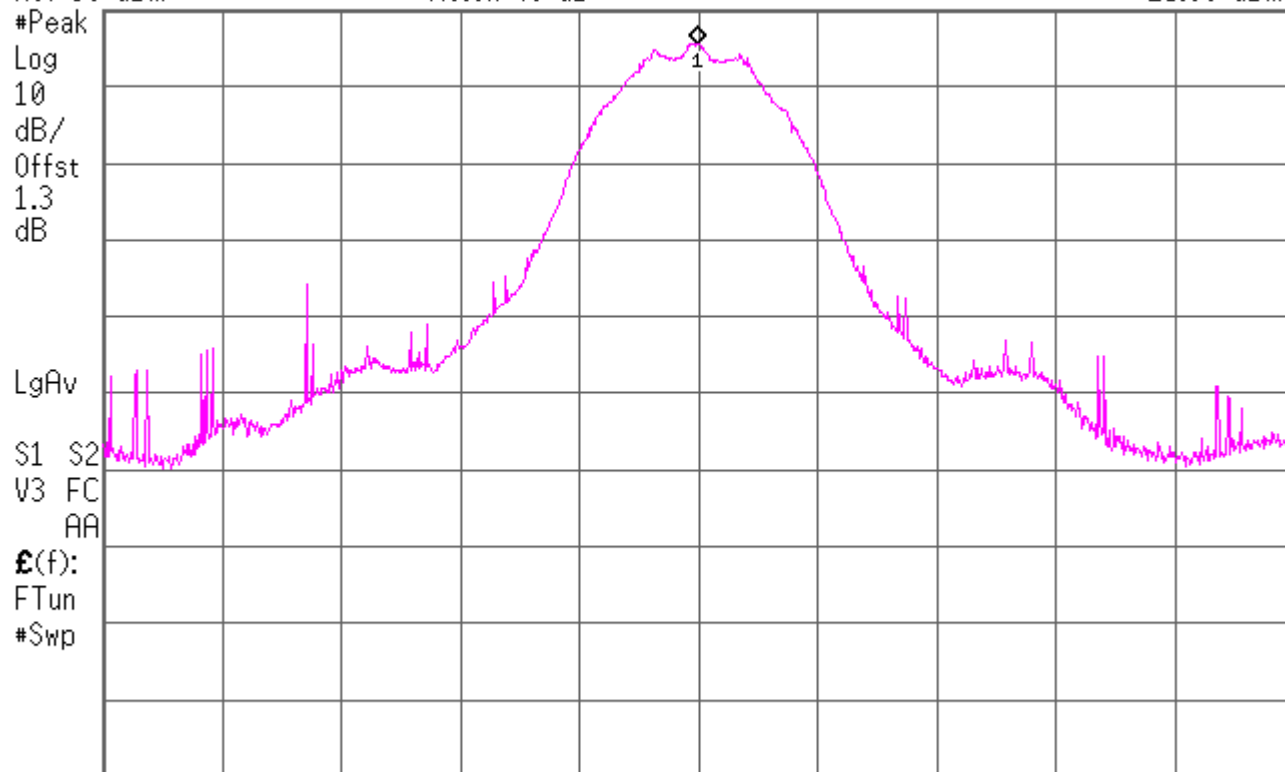
Level with peak power meter = 20.9 DBM

Mkr1 2.437 5 GHz

Ref 30 dBm

Atten 40 dB

25.68 dBm



Center 2.437 5 GHz

Span 100 MHz

#Res BW 8 MHz

#VBW 50 MHz

Sweep 1 ms (1001 pts)

Peak output power

Channel 6, 11 MB rate

Agilent 11:27:17 Jul 24, 2008

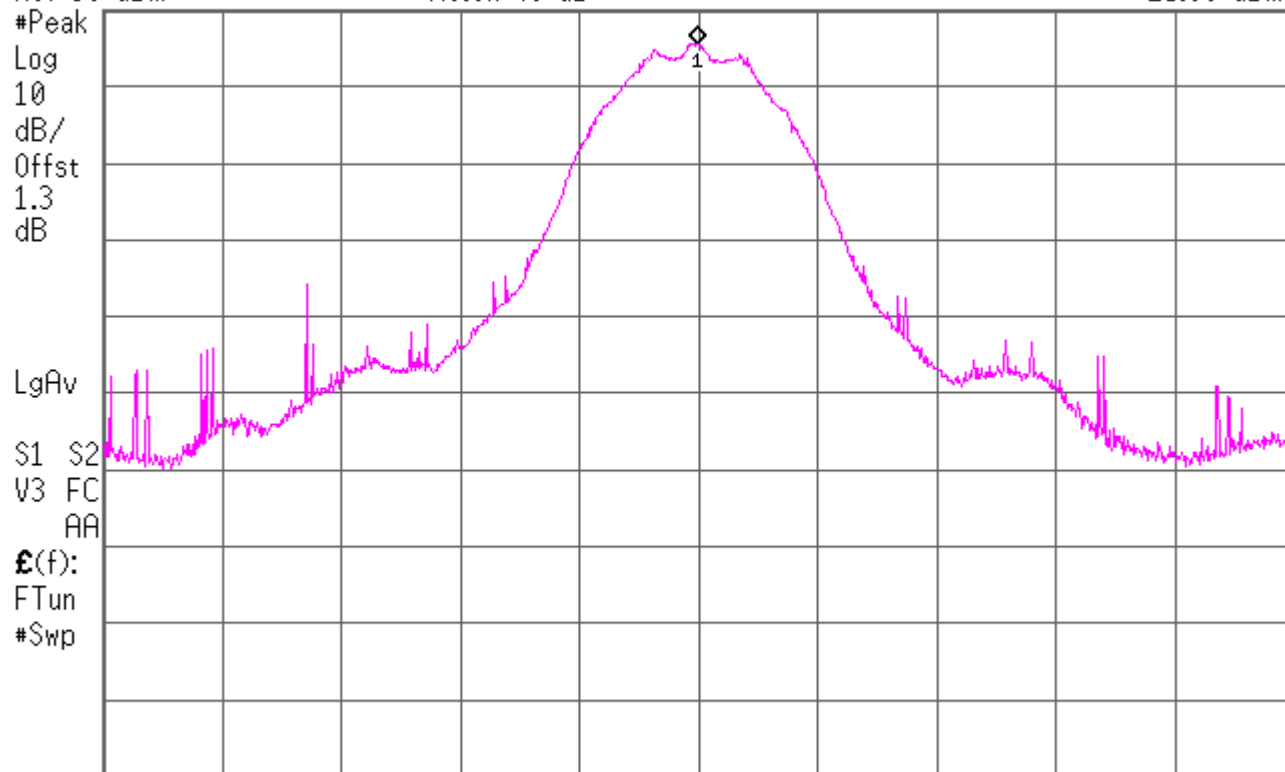
Level with peak power meter = 20.5 DBM

Ref 30 dBm

Atten 40 dB

Mkr1 2.437 5 GHz

25.68 dBm



Center 2.437 5 GHz

Span 100 MHz

#Res BW 8 MHz

#VBW 50 MHz

Sweep 1 ms (1001 pts)

Peak output power

Channel 11, 1 MB rate

Agilent 11:29:40 Jul 24, 2008

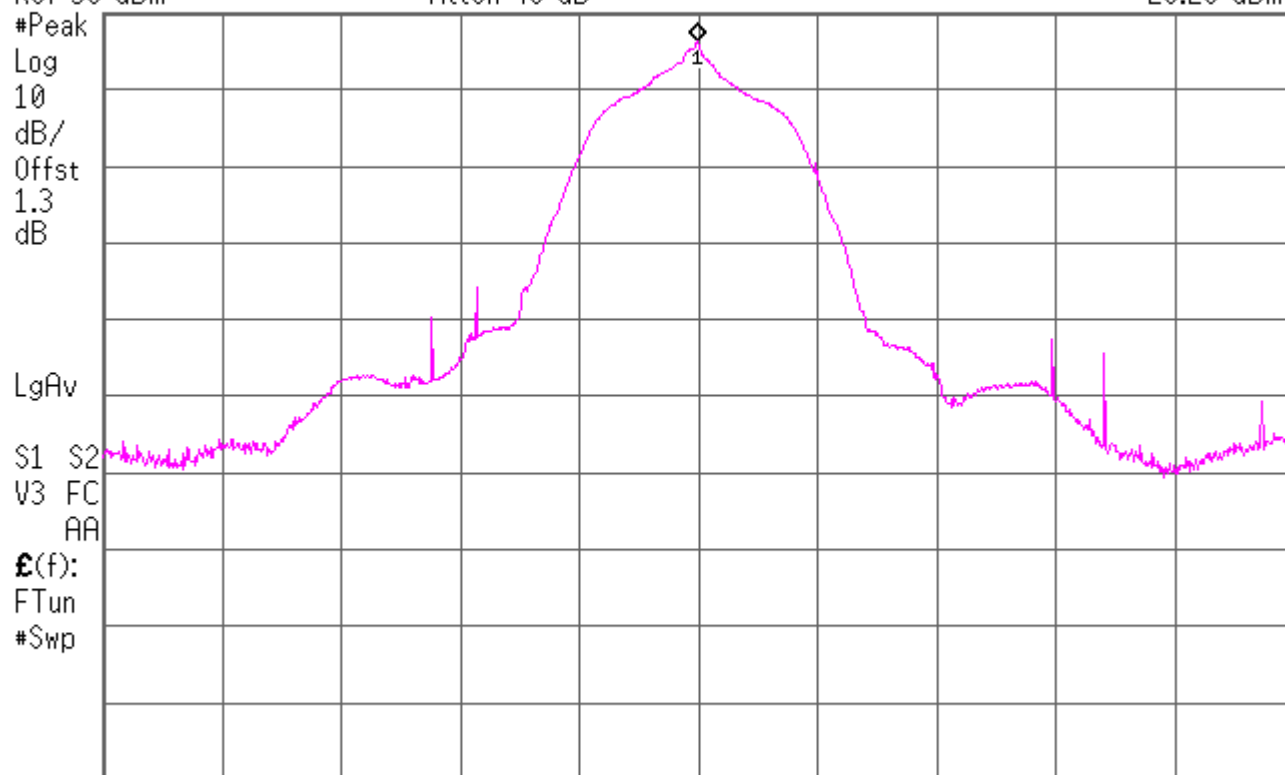
Level with peak power meter = 20.2 DBM

Ref 30 dBm

Atten 40 dB

Mkr1 2.462 4 GHz

26.28 dBm



Center 2.462 5 GHz

Span 100 MHz

#Res BW 8 MHz

#VBW 50 MHz

Sweep 1 ms (1001 pts)

Peak output power

Channel 11, 2 MB rate

Agilent 11:31:28 Jul 24, 2008

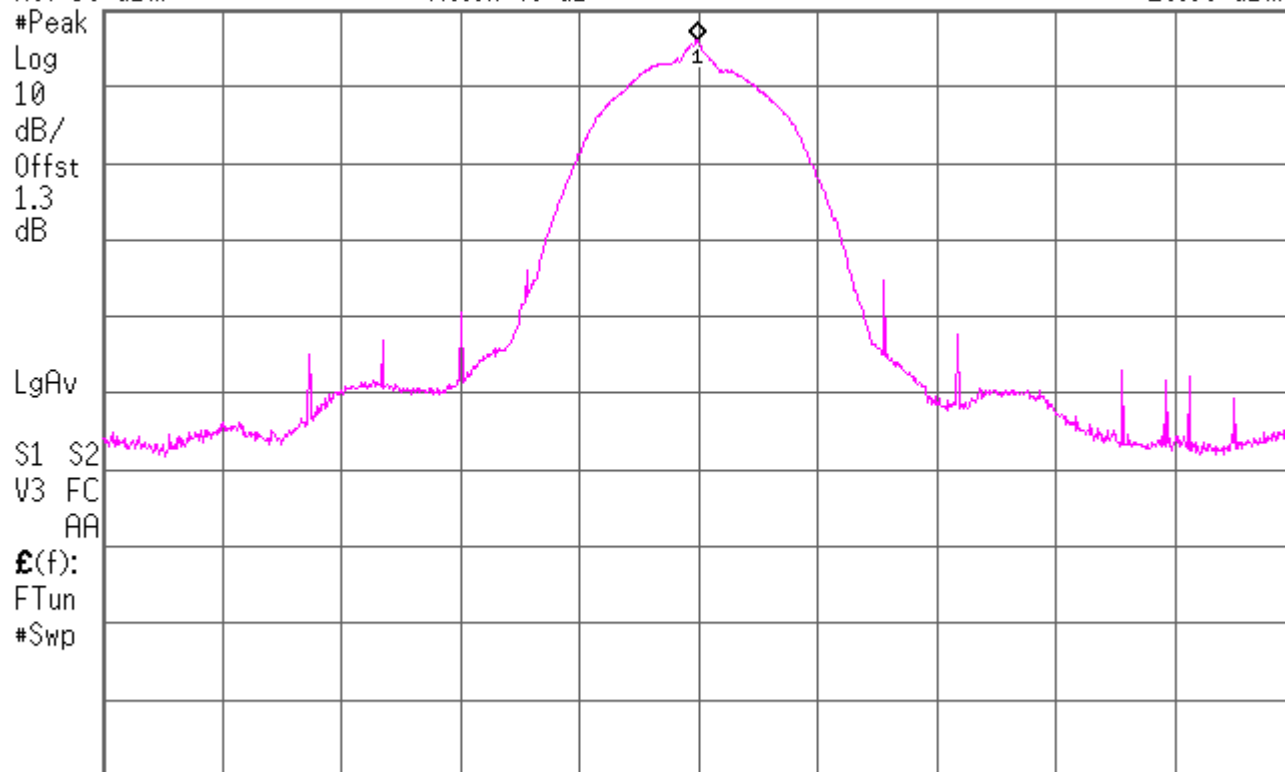
Level with peak power meter = 20.2 DBM

Ref 30 dBm

Atten 40 dB

Mkr1 2.462 4 GHz

26.08 dBm



Center 2.462 5 GHz

Span 100 MHz

#Res BW 8 MHz

#VBW 50 MHz

Sweep 1 ms (1001 pts)

Peak output power

Channel 11, 5 MB rate

Agilent 11:06:55 Jul 24, 2008

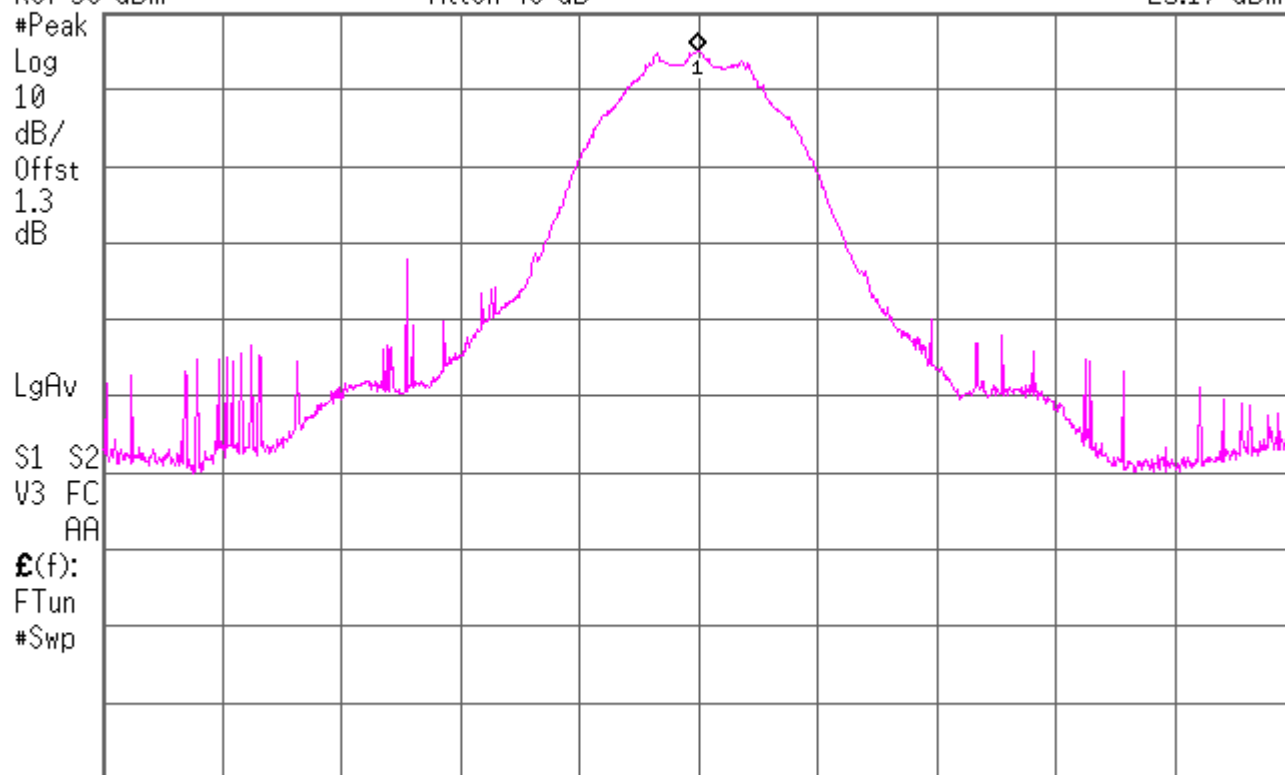
Level with peak power meter = 20.1 dbm

Ref 30 dBm

Atten 40 dB

Mkr1 2.462 3 GHz

25.17 dBm



Center 2.462 3 GHz

Span 100 MHz

#Res BW 8 MHz

#VBW 50 MHz

Sweep 1 ms (1001 pts)

Peak output power

Channel 11, 11 MB rate

Agilent 11:02:10 Jul 24, 2008

Level with peak power meter = 20.1 dbm

Mkr1 2.462 2 GHz

Ref 30 dBm

Atten 40 dB

26.27 dBm

#Peak

Log

10

dB/

Offst

1.3

dB

LgAv

S1 S2

V3 FC

AA

f(f):

FTun

#Swp

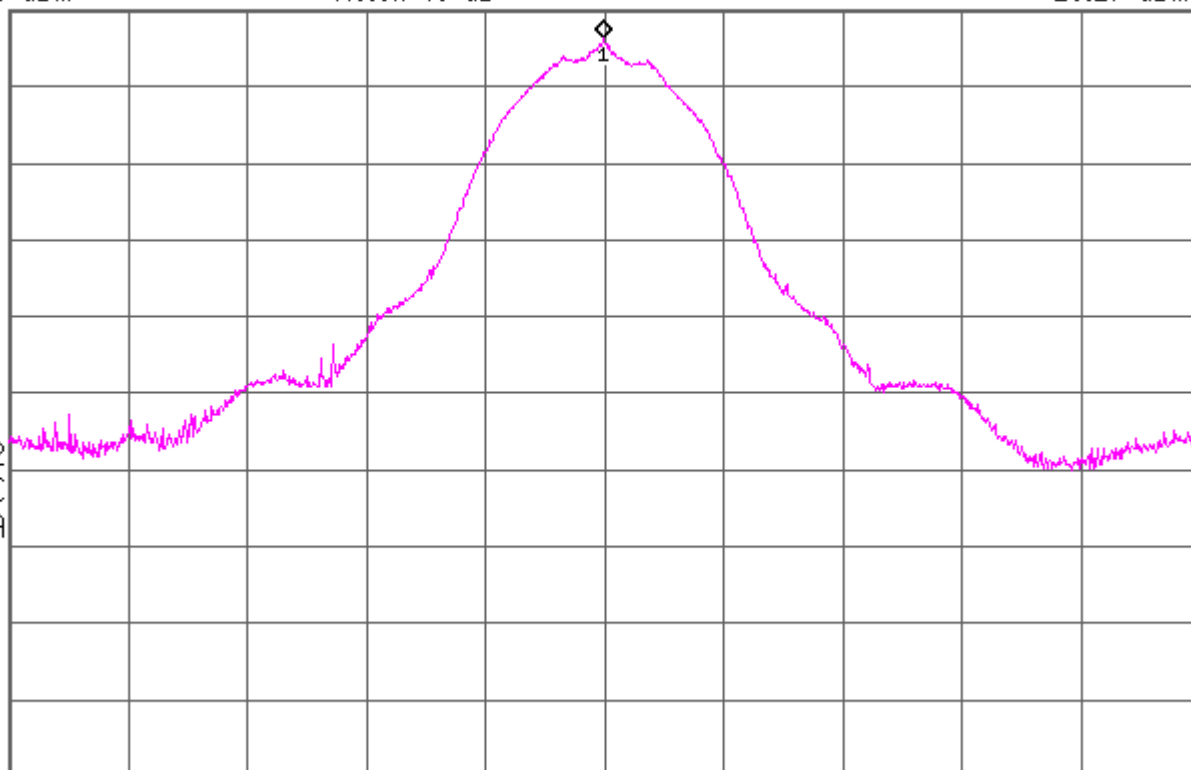
Center 2.462 3 GHz

Span 100 MHz

#Res BW 8 MHz

#VBW 50 MHz

Sweep 1 ms (1001 pts)





## Spurious emissions

FCC 15.247(d), IC RSS-210 A8.5

### Test summary

The requirements are: ■ - MET □ - NOT MET

Testing was performed in accordance with ANSI C63.4 2003, clause 8.3 and FCC KDB Publication 558074

Maximum conducted spurious emission is -28.9 dBm at 2.3867 GHz, -40.65 dBc

Maximum radiated spurious emission is 53.77 dBμV/m avg or 488 μV/m at 3 meters at 4.924 GHz

Minimum margin of compliance = 0.23 dB

Peak-average duty cycle correction = -12.0 dB

### Test location

■ - Wild River Lab Large Test Site (Open Area Test Site)

□ - Wild River Lab Small Test Site (Open Area Test Site)

■ - Wild River Lab Tech Area, conducted measurement

### Test equipment

TUV ID	Model	Manufacturer	Description	Serial	Cal Due
WRLE03371	E4440A	Agilent	Spectrum Analyzer	MY43362222	19-Dec-08
WRLE03978	SL26-3010	Phase One Microwave	Amplifier 18-26.5 GHz	0005	26-Mar-09
WRLE06717	3116	EMCO	Ridge Guide Ant 18-40 GHz	2005	10-Oct-08
WRLE02682	85650A	Hewlett-Packard	Quasi-Peak Adapter	2811A01127	04-Dec-08
WRLE08052	8566B	Hewlett-Packard	Spectrum Analyzer	2115A00853	27-Mar-09
WRLE08051	85662A	Hewlett-Packard	Analyzer Display	2112A02220	27-Mar-09
WRLE03847	ZHL-1042J	Mini-Circuits	Preamplifier 10 - 3000 MHz	0607	Code B
WRLE010527	SL18B4020	Phase One Microwave	Preamplifier 1 - 18 GHz	0001	Code B
WRLE03995	EM-6917B	Electro-Metrics	Biconicalog Periodic	151	23-Apr-09
WRLE02075	3115	EMCO	Ridge Guide Ant. 1-18 GHz	9001-3275	16-Jan-09
WRLE03997	EWT-14-0066	EWT	2.4 GHz Notch filter	E2	Code B
WRLE02003	F550B1	Acronetics	4 - 8 GHz Bandpass Filter	010	Code B
WRLE03933	F551B-1	Acronetics	8 - 12 GHz Bandpass Filter	010	Code B

Cal Code B = Calibration verification performed internally.

### Test limit - conducted

-20 dBc

### Test limit within restricted bands per 15.205 - radiated

Frequency (MHz)	Field strength (μV/meter)	Field strength (dBμV/meter)
30 - 88	100, QP	40.0
88 - 216	150, QP	43.5
216 - 960	200, QP	46.0
Above 960	500, QP	54.0
> 1000	500, AV	54.0
	5000, PK	74.0

### Test data

See following pages

# Conducted spurious emissions

Channel 1, 1 MB rate

Agilent 15:59:05 Jul 23, 2008

Mkr2 12.06 GHz  
-38.86 dBm




Start 30 MHz Stop 25.03 GHz  
#Res BW 100 kHz VBW 300 kHz Sweep 2.389 s (1001 pts)

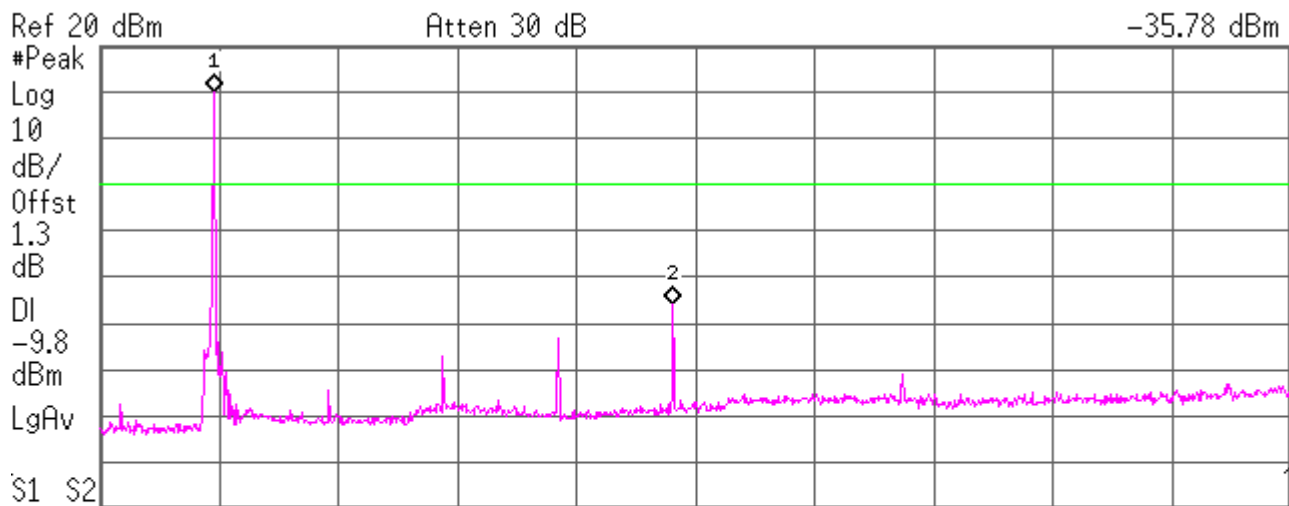
Marker	Trace	Type	X Axis	Amplitude
1	(3)	Freq	2.40 GHz	11.30 dBm
2	(3)	Freq	12.06 GHz	-38.86 dBm

# Conducted spurious emissions

Channel 1, 2 MB rate

 **Agilent** 09:37:09 Jul 24, 2008

Mkr2 12.06 GHz  
-35.78 dBm



Start 30 MHz

Stop 25.03 GHz

#Res BW 100 kHz

VBW 300 kHz

Sweep 2.389 s (1001 pts)

Marker	Trace	Type	X Axis	Amplitude
1	(3)	Freq	2.40 GHz	10.25 dBm
2	(3)	Freq	12.06 GHz	-35.78 dBm

# Conducted spurious emissions

Channel 1, 5 MB rate

Agilent 09:40:41 Jul 24, 2008

Mkr2 12.08 GHz

-44.62 dBm



Start 30 MHz

Stop 25.03 GHz

#Res BW 100 kHz


VBW 300 kHz

Sweep 2.389 s (1001 pts)

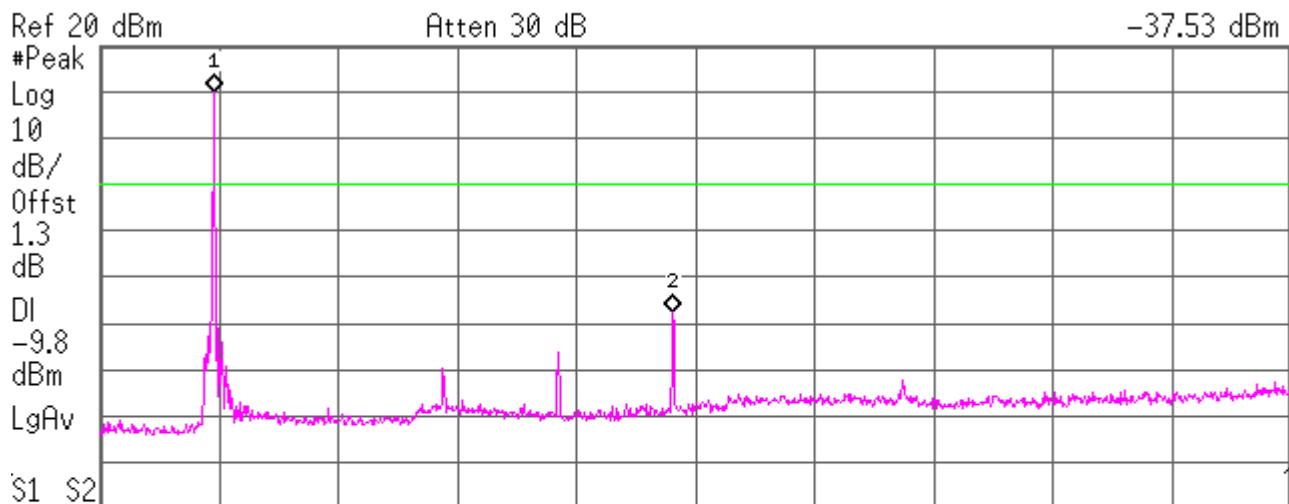
Marker	Trace	Type	X Axis	Amplitude
1	(3)	Freq	2.40 GHz	11.01 dBm
2	(3)	Freq	12.08 GHz	-44.62 dBm

# Conducted spurious emissions

Channel 1, 11 MB rate

 **Agilent** 09:43:41 Jul 24, 2008

Mkr2 12.06 GHz  
-37.53 dBm



Start 30 MHz Stop 25.03 GHz  
#Res BW 100 kHz VBW 300 kHz Sweep 2.389 s (1001 pts)

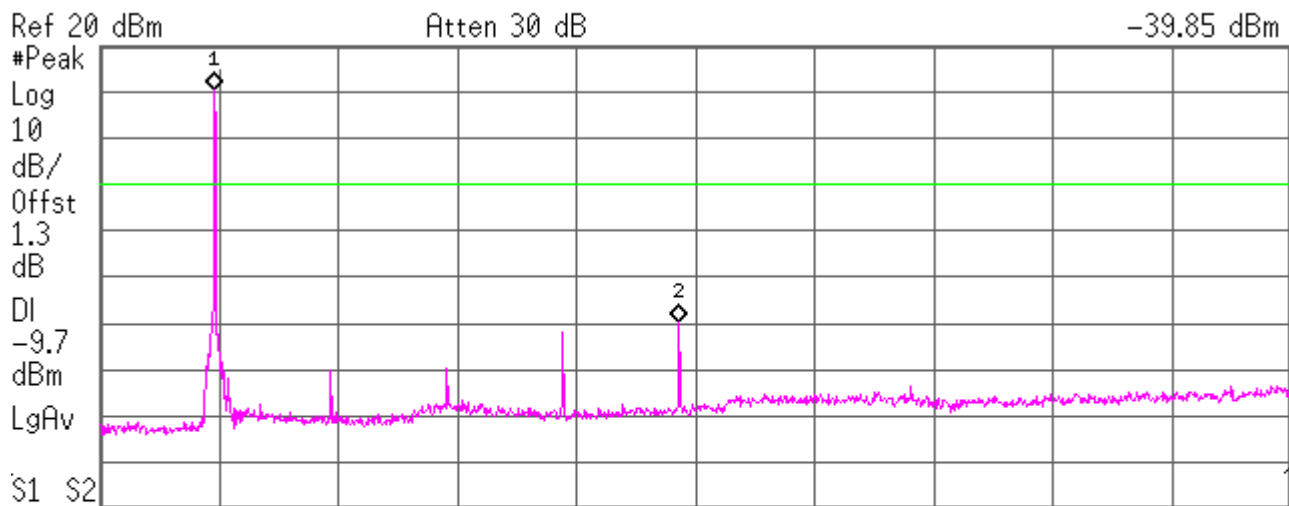
Marker	Trace	Type	X Axis	Amplitude
1	(3)	Freq	2.40 GHz	10.22 dBm
2	(3)	Freq	12.06 GHz	-37.53 dBm

# Conducted spurious emissions

Channel 6, 1 MB rate

Agilent 09:48:24 Jul 24, 2008

Mkr2 12.18 GHz  
-39.85 dBm



Start 30 MHz Stop 25.03 GHz  
#Res BW 100 kHz VBW 300 kHz Sweep 2.389 s (1001 pts)

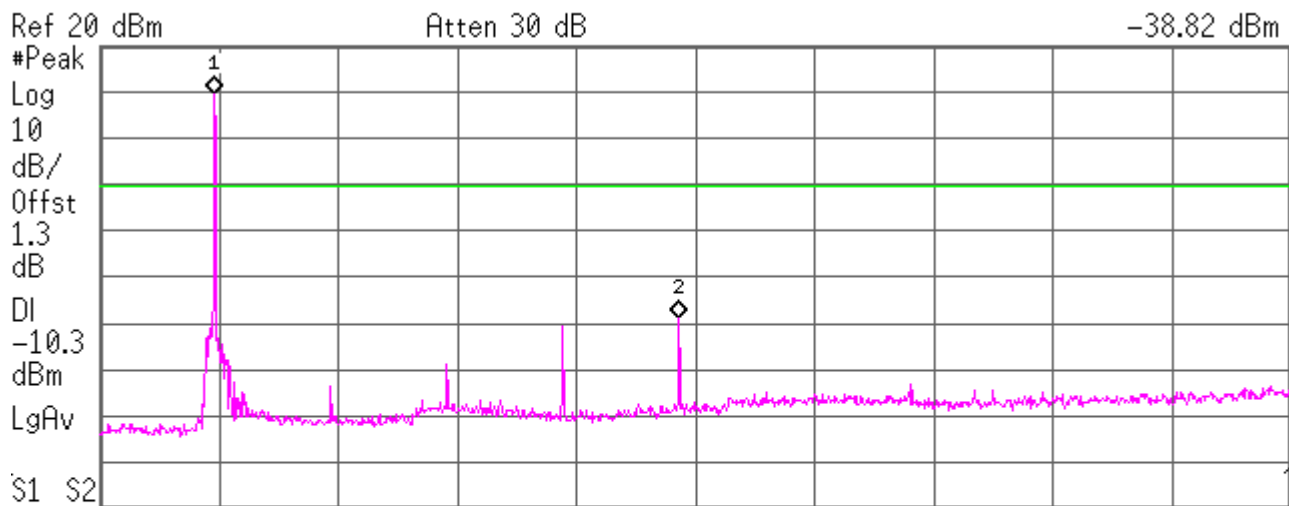
Marker	Trace	Type	X Axis	Amplitude
1	(3)	Freq	2.43 GHz	10.28 dBm
2	(3)	Freq	12.18 GHz	-39.85 dBm

# Conducted spurious emissions

Channel 6, 2 MB rate

Agilent 09:52:11 Jul 24, 2008

Mkr2 12.18 GHz  
-38.82 dBm



Start 30 MHz Stop 25.03 GHz  
#Res BW 100 kHz VBW 300 kHz Sweep 2.389 s (1001 pts)

Marker	Trace	Type	X Axis	Amplitude
1	(3)	Freq	2.43 GHz	9.66 dBm
2	(3)	Freq	12.18 GHz	-38.82 dBm

# Conducted spurious emissions

Channel 6, 5 MB rate

Agilent 09:55:27 Jul 24, 2008

Mkr2 12.18 GHz  
-43.28 dBm



Start 30 MHz Stop 25.03 GHz  
#Res BW 100 kHz VBW 300 kHz Sweep 2.389 s (1001 pts)

Marker	Trace	Type	X Axis	Amplitude
1	(3)	Freq	2.43 GHz	10.75 dBm
2	(3)	Freq	12.18 GHz	-43.28 dBm

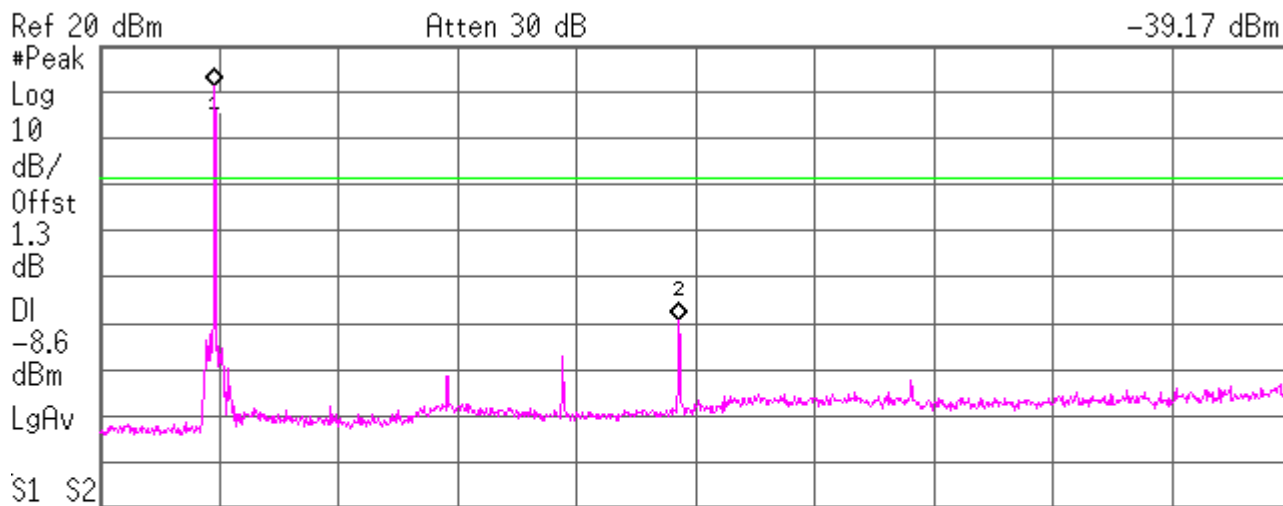


# Conducted spurious emissions

Channel 6, 11 MB rate

Agilent 09:58:28 Jul 24, 2008

Mkr2 12.18 GHz  
-39.17 dBm



Start 30 MHz Stop 25.03 GHz  
#Res BW 100 kHz VBW 300 kHz Sweep 2.389 s (1001 pts)

Marker	Trace	Type	X Axis	Amplitude
1	(3)	Freq	2.43 GHz	11.43 dBm
2	(3)	Freq	12.18 GHz	-39.17 dBm

# Conducted spurious emissions

Channel 11, 1 MB rate

Agilent 10:04:43 Jul 24, 2008

Mkr2 9.86 GHz  
-41.40 dBm



Start 30 MHz Stop 25.03 GHz  
#Res BW 100 kHz VBW 300 kHz Sweep 2.389 s (1001 pts)

Marker	Trace	Type	X Axis	Amplitude
1	(3)	Freq	2.46 GHz	10.10 dBm
2	(3)	Freq	9.86 GHz	-41.40 dBm

# Conducted spurious emissions

Channel 11, 2 MB rate

Agilent 10:11:07 Jul 24, 2008

Mkr2 9.86 GHz  
-42.13 dBm



Start 30 MHz Stop 25.03 GHz  
#Res BW 100 kHz VBW 300 kHz Sweep 2.389 s (1001 pts)

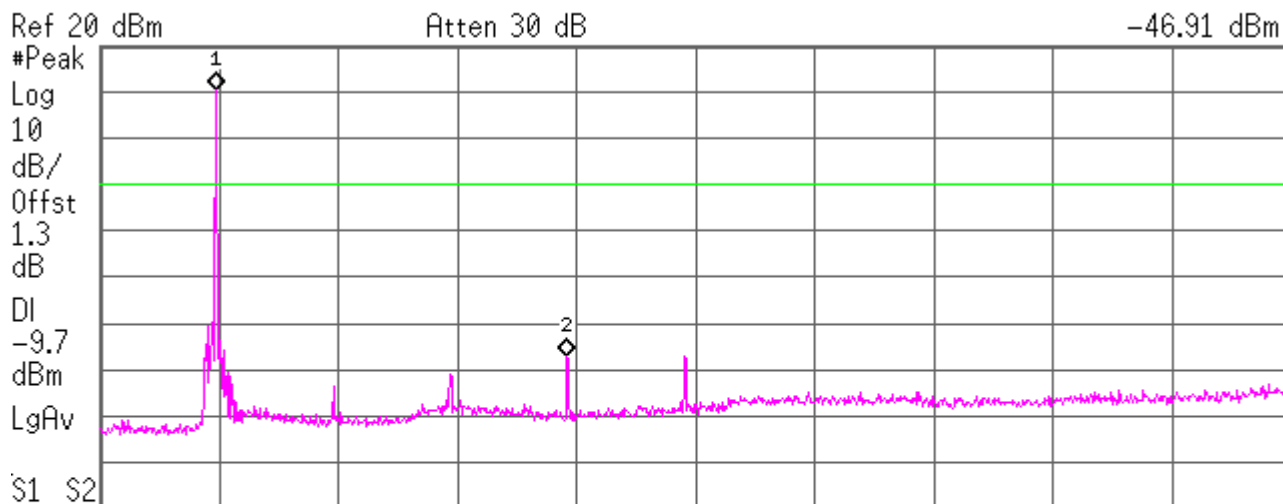
Marker	Trace	Type	X Axis	Amplitude
1	(3)	Freq	2.46 GHz	9.62 dBm
2	(3)	Freq	9.86 GHz	-42.13 dBm

# Conducted spurious emissions

Channel 11, 5 MB rate

Agilent 10:14:26 Jul 24, 2008

Mkr2 9.83 GHz  
-46.91 dBm



Start 30 MHz Stop 25.03 GHz  
#Res BW 100 kHz VBW 300 kHz Sweep 2.389 s (1001 pts)

Marker	Trace	Type	X Axis	Amplitude
1	(3)	Freq	2.46 GHz	10.34 dBm
2	(3)	Freq	9.83 GHz	-46.91 dBm

# Conducted spurious emissions

Channel 11, 11 MB rate

Agilent 10:17:14 Jul 24, 2008

Mkr2 12.30 GHz  
-42.20 dBm



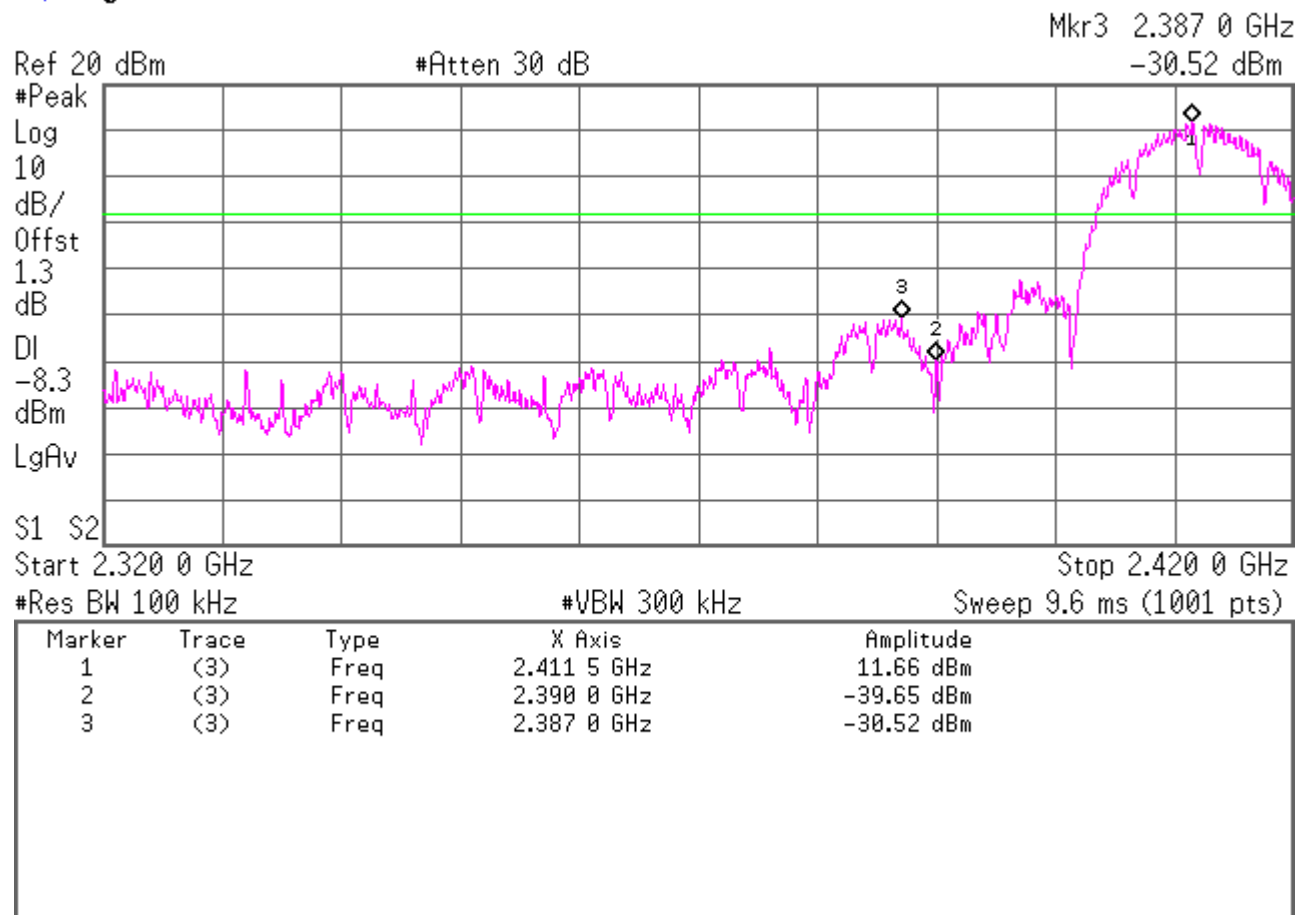
Start 30 MHz Stop 25.03 GHz  
#Res BW 100 kHz VBW 300 kHz Sweep 2.389 s (1001 pts)

Marker	Trace	Type	X Axis	Amplitude
1	(3)	Freq	2.46 GHz	9.66 dBm
2	(3)	Freq	12.30 GHz	-42.20 dBm

Conducted band edge

Channel 1, 1 MB rate

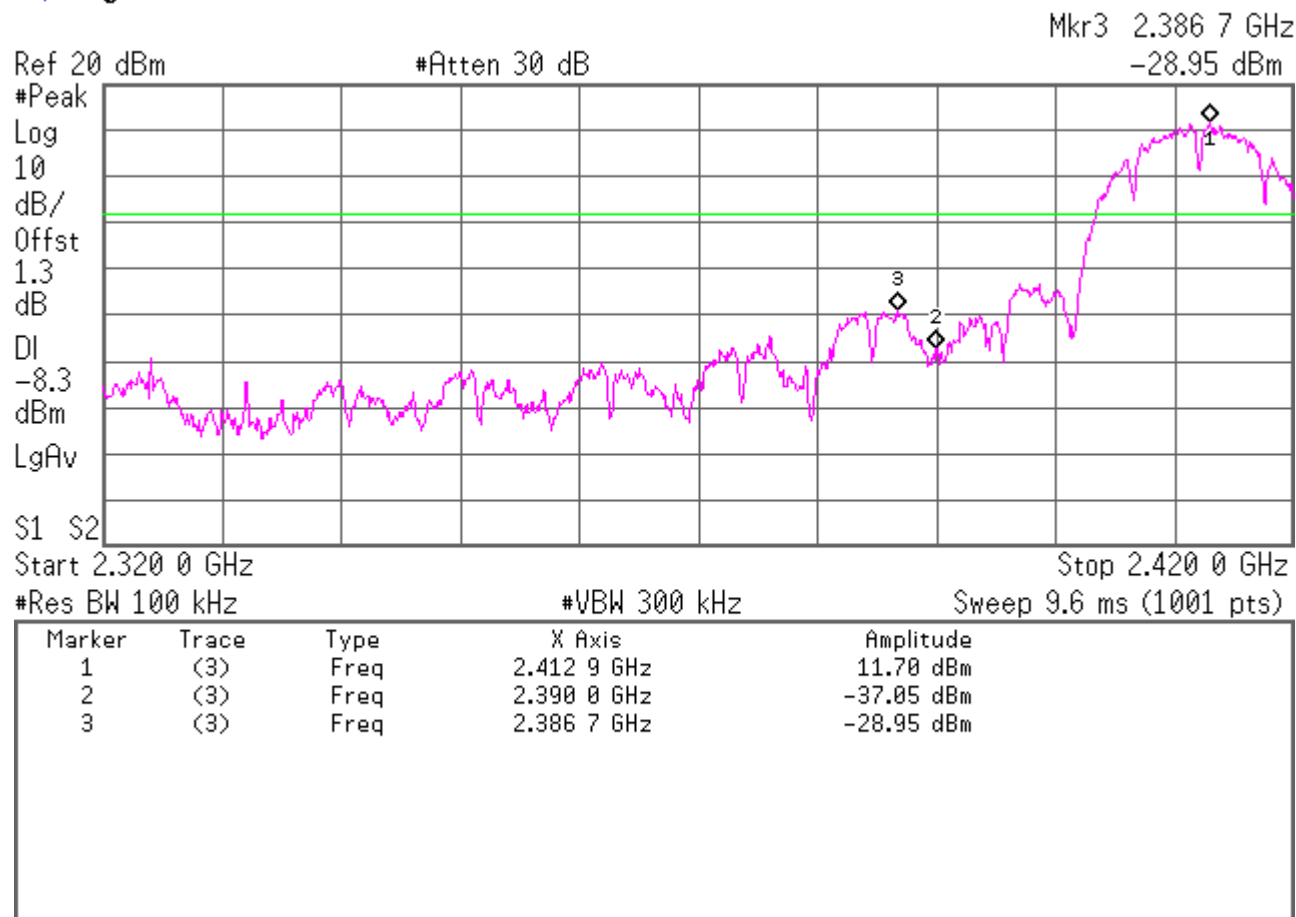
Agilent 13:01:44 Jul 24, 2008



Conducted band edge

Channel 1, 2 MB rate

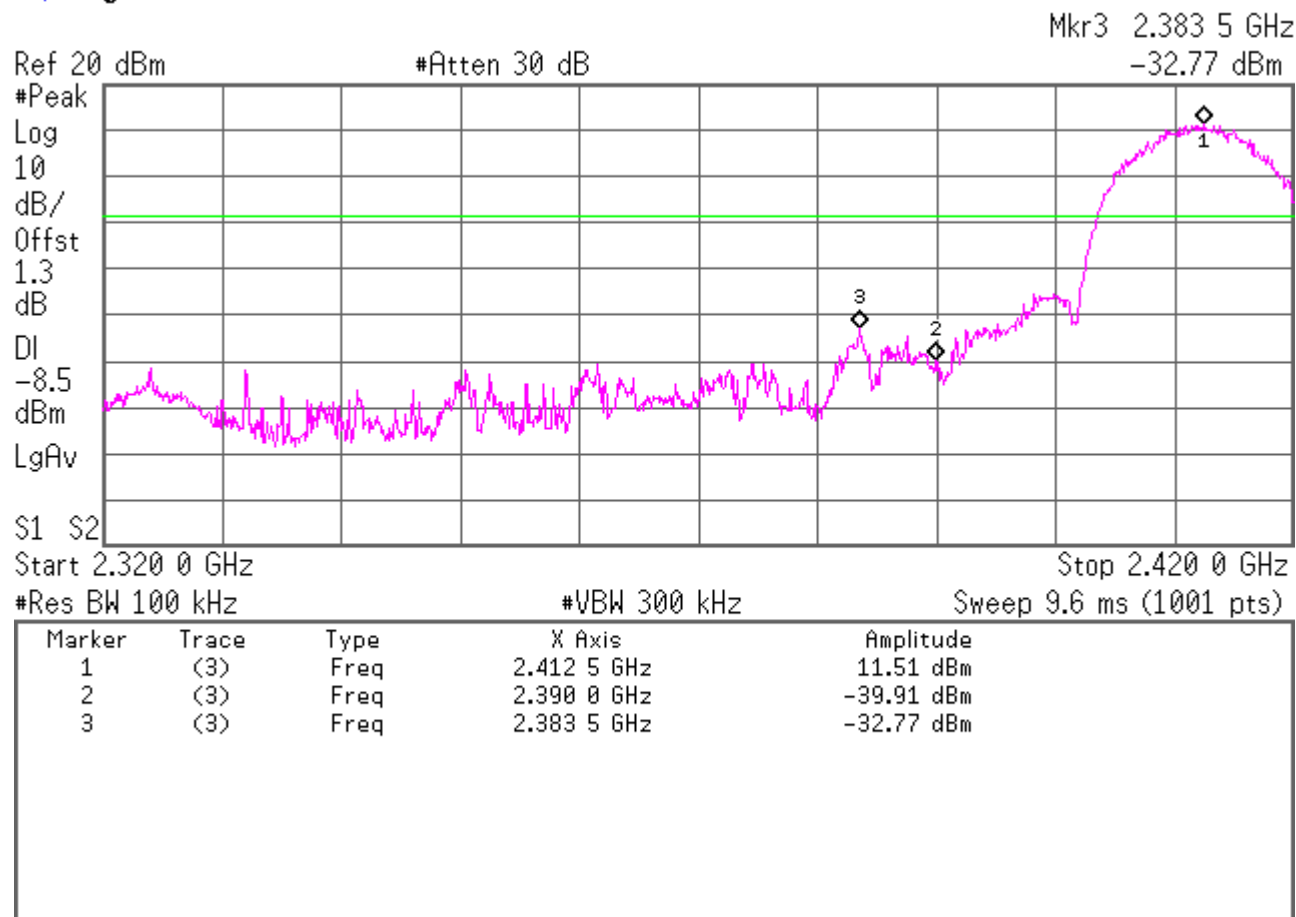
\* Agilent 13:05:21 Jul 24, 2008



Conducted band edge

Channel 1, 5 MB rate

Agilent 13:06:39 Jul 24, 2008

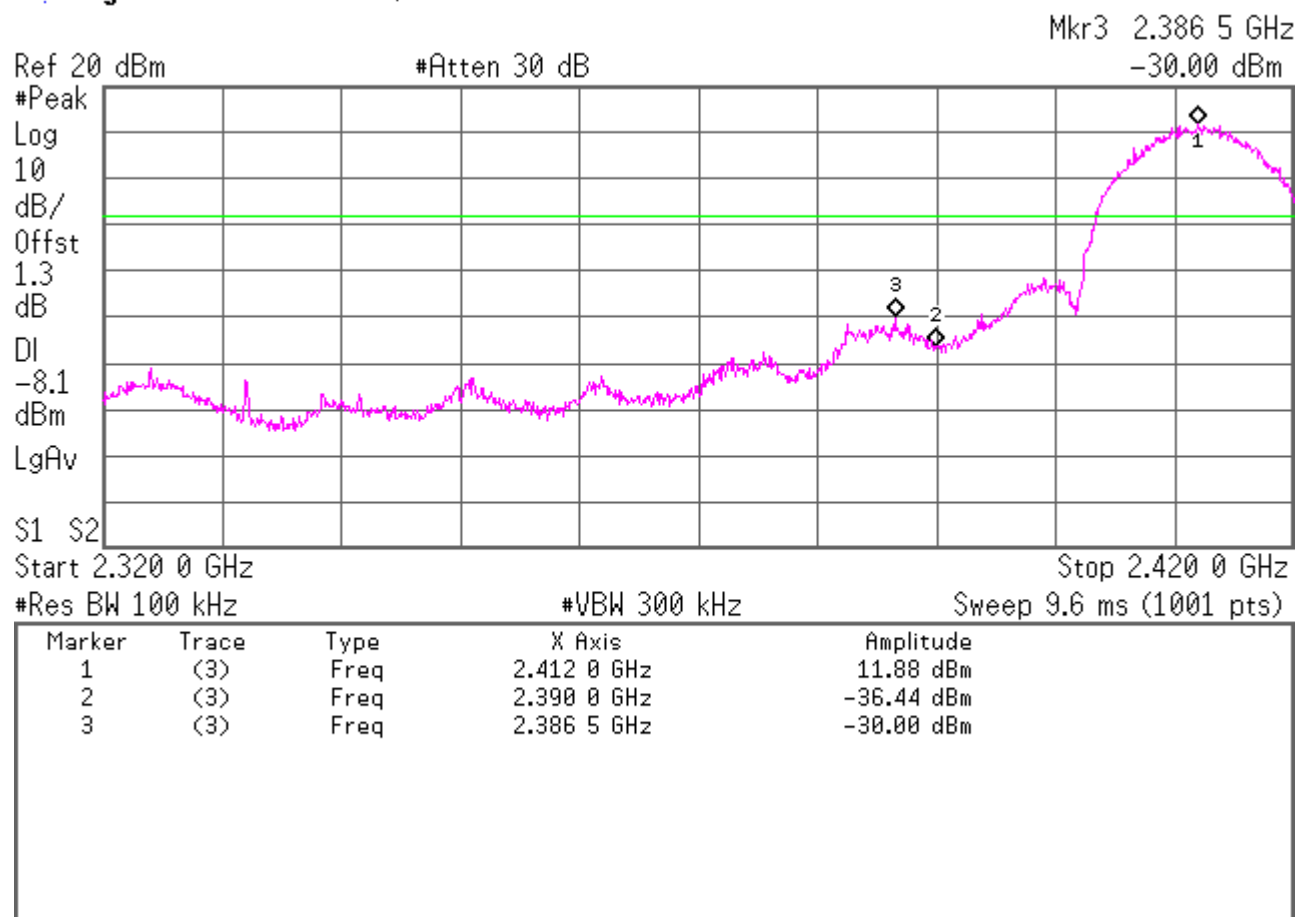




Conducted band edge

Channel 1, 11 MB rate

Agilent 13:08:02 Jul 24, 2008



Conducted band edge

Channel 11, 1 MB rate

Agilent 11:48:29 Jul 24, 2008

Mkr3 2.488 00 GHz  
-31.33 dBm

Ref 20 dBm

#Atten 30 dB

#Peak

Log

10

dB/

Offst

1.3

dB

DI

-9.7

dBm

LgAv

S1 S2

Start 2.450 00 GHz

Stop 2.500 00 GHz

#Res BW 100 kHz

#VBW 300 kHz

Sweep 4.8 ms (1001 pts)

Marker	Trace	Type	X Axis	Amplitude
1	(3)	Freq	2.461 00 GHz	10.48 dBm
2	(3)	Freq	2.483 50 GHz	-40.83 dBm
3	(3)	Freq	2.488 00 GHz	-31.33 dBm

Conducted band edge

Channel 11, 2 MB rate

Agilent 11:44:51 Jul 24, 2008

Mkr3 2.487 90 GHz  
-35.92 dBm

Ref 20 dBm

#Atten 30 dB

#Peak

Log

10

dB/

Offst

1.3

dB

DI

-9.7

dBm

LgAv

S1 S2

Start 2.450 00 GHz

Stop 2.500 00 GHz

#Res BW 100 kHz

#VBW 300 kHz

Sweep 4.8 ms (1001 pts)

Marker	Trace	Type	X Axis	Amplitude
1	(3)	Freq	2.461 20 GHz	10.26 dBm
2	(3)	Freq	2.483 50 GHz	-45.45 dBm
3	(3)	Freq	2.487 90 GHz	-35.92 dBm

Conducted band edge

Channel 11, 5 MB rate

Agilent 11:50:38 Jul 24, 2008

Mkr3 2.487 35 GHz  
-34.32 dBm

Ref 20 dBm

#Atten 30 dB

#Peak

Log

10

dB/

Offst

1.3

dB

DI

-8.6

dBm

LgAv

S1 S2

Start 2.450 00 GHz

Stop 2.500 00 GHz

#Res BW 100 kHz

#VBW 300 kHz

Sweep 4.8 ms (1001 pts)

Marker	Trace	Type	X Axis	Amplitude
1	(3)	Freq	2.462 30 GHz	11.40 dBm
2	(3)	Freq	2.483 50 GHz	-40.80 dBm
3	(3)	Freq	2.487 35 GHz	-34.32 dBm

Conducted band edge

Channel 11, 11 MB rate

Agilent 11:53:39 Jul 24, 2008

Mkr3 2.488 50 GHz  
-34.00 dBm

Ref 20 dBm

#Atten 30 dB

#Peak

Log

10

dB/

Offst

1.3

dB

DI

-8.3

dBm

LgAv

S1 S2

Start 2.450 00 GHz

Stop 2.500 00 GHz

#Res BW 100 kHz

#VBW 300 kHz

Sweep 4.8 ms (1001 pts)

Marker	Trace	Type	X Axis	Amplitude
1	(3)	Freq	2.461 45 GHz	11.69 dBm
2	(3)	Freq	2.483 50 GHz	-38.89 dBm
3	(3)	Freq	2.488 50 GHz	-34.00 dBm

# RADIATED EMISSIONS



Test Report #: WC805442 Run 2 Test Area: LTS

EUT Model #: 100033-0001-AA Date: 7/9/2008

EUT Serial #: 9 EUT Power: 3 VDC Temperature: 22.0 °C

Test Method: FCC 15.247 Modular Air Pressure: 98.0 kPa

Customer: Healthsense Inc. Rel. Humidity: 57.0 %

EUT Description: WiFi 802.11 Module

Notes: Determine highest fundamental field strength at 3 orthoganal positions

Data File Name: 5442.dat

Page: 1 of 1

## List of measurements for run #: 2

FREQ	LEVEL (dBuV)	CABLE / ANT / PREAMP / ATTEN (dB)	FINAL (dBuV / m)	POL / HGT / AZ (m)(DEG)	DELTA1	DELTA2
Ch 6, 11Mbps						
Measurements maximized						
Board vertical, antennas up						
2.437 GHz	76.85 Pk	6.17 / 28.63 / 0.0 / 0.0	111.65	V / 1.12 / 19	n/a	n/a
Board vertical, antennas left						
2.437 GHz	75.3 Pk	6.17 / 28.63 / 0.0 / 0.0	110.1	V / 1.00 / 0	n/a	n/a
Board horizontal, flat						
2.437 GHz	76.1 Pk	6.17 / 28.63 / 0.0 / 0.0	110.9	H / 1.25 / 92	n/a	n/a

Tested by: Greg Jakubowski

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# RADIATED EMISSIONS



Test Report #: WC805442 Run 4 Test Area: LTS

EUT Model #: 100033-0001-AA Date: 7/15/2008

EUT Serial #: (multiple) EUT Power: 3 VDC Temperature: 26.0 °C

Test Method: FCC 15.247 Air Pressure: 98.0 kPa

Customer: Healthsense Inc. Rel. Humidity: 63.0 %

EUT Description: WiFi 802.11 Module

Notes:

Data File Name: 5442.dat

Page: 1 of 22

## List of measurements for run #: 4

FREQ	LEVEL (dBuV)	CABLE / ANT / PREAMP / ATTEN (dB)	FINAL (dBuV / m)	POL / HGT / AZ (m)(DEG)	DELTA1 FCC 15.247 3m ave	DELTA2 FCC 15.247 3m peak
Begin scan 1 - 18 GHz in restricted bands						
No duty cycle correction applied						
Average measurements are peak detector with 1 MHz RBW, 10 Hz VBW						
maximized						
Ch 1, 11 Mbps						
4.824 GHz	70.55 Pk	9.54 / 32.81 / 43.57 / 0.59	69.92	V / 1.08 / 355	15.92*	-4.08
4.824 GHz	58.85 Av	9.54 / 32.81 / 43.57 / 0.59	58.22	V / 1.08 / 355	4.22	n/a
7.236 GHz	55.55 Pk	13.1 / 36.06 / 43.13 / 1.26	62.84	V / 1.00 / 58	8.84*	-11.16
7.236 GHz	46.54 Av	13.1 / 36.06 / 43.13 / 1.26	53.83	V / 1.00 / 58	-0.17	n/a
Ch 6, 11 Mbps						
4.874 GHz	71.25 Pk	9.62 / 32.92 / 43.61 / 0.62	70.8	V / 1.19 / 14	16.8*	-3.2
4.874 GHz	59.44 Av	9.62 / 32.92 / 43.61 / 0.62	58.99	V / 1.19 / 14	4.99	n/a
7.311 GHz	56.25 Pk	13.18 / 36.16 / 43.18 / 1.21	63.62	V / 1.00 / 21	9.62*	-10.38
7.311 GHz	47.61 Av	13.18 / 36.16 / 43.18 / 1.21	54.98	V / 1.00 / 21	0.98	n/a
Ch 11, 11 Mbps						
4.924 GHz	70.05 Pk	9.7 / 33.03 / 43.64 / 0.65	69.79	V / 1.34 / 14	15.79*	-4.21
4.924 GHz	58.08 Av	9.7 / 33.03 / 43.64 / 0.65	57.82	V / 1.34 / 14	3.82	n/a
7.386 GHz	55.3 Pk	13.27 / 36.25 / 43.17 / 1.24	62.9	V / 1.00 / 14	8.9*	-11.1
7.386 GHz	46.22 Av	13.27 / 36.25 / 43.17 / 1.24	53.82	V / 1.00 / 14	-0.18	n/a
Ch 6, 1 Mbps						
4.874 GHz	65.5 Pk	9.62 / 32.92 / 43.61 / 0.62	65.05	V / 1.20 / 14	11.05*	-8.95

Tested by: Greg Jakubowski

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Reviewed by: Joel T Schneider

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# RADIATED EMISSIONS



Test Report #: WC805442 Run 4 Test Area: LTS

EUT Model #: 100033-0001-AA Date: 7/15/2008

EUT Serial #: (multiple) EUT Power: 3 VDC Temperature: 26.0 °C

Test Method: FCC 15.247 Air Pressure: 98.0 kPa

Customer: Healthsense Inc. Rel. Humidity: 63.0 %

EUT Description: WiFi 802.11 Module

Notes:

Data File Name: 5442.dat

Page: 2 of 22

## List of measurements for run #: 4

FREQ	LEVEL (dBuV)	CABLE / ANT / PREAMP / ATTEN (dB)	FINAL (dBuV / m)	POL / HGT / AZ (m)(DEG)	DELTA1 FCC 15.247 3m ave	DELTA2 FCC 15.247 3m peak
4.874 GHz	64.8 Av	9.62 / 32.92 / 43.61 / 0.62	64.35	V / 1.20 / 14	10.35	n/a
7.31 GHz	53.3 Pk	13.18 / 36.16 / 43.17 / 1.21	60.67	V / 1.20 / 14	6.67*	-13.33
7.31 GHz	49.27 Av	13.18 / 36.16 / 43.17 / 1.21	56.64	V / 1.20 / 14	2.64	n/a
Ch 6, 2 Mbps						
4.874 GHz	68.25 Pk	9.62 / 32.92 / 43.61 / 0.0	67.18	V / 1.20 / 16	13.18*	-6.82
4.874 GHz	65.99 Av	9.62 / 32.92 / 43.61 / 0.62	65.54	V / 1.20 / 16	11.54	n/a
7.312 GHz	52.9 Pk	13.18 / 36.16 / 43.18 / 1.21	60.28	V / 1.00 / 61	6.28*	-13.72
7.312 GHz	48.14 Av	13.18 / 36.16 / 43.18 / 1.21	55.52	V / 1.00 / 61	1.52	n/a
Ch 6, 5 Mbps						
4.868 GHz	67.5 Pk	9.61 / 32.91 / 43.61 / 0.62	67.03	V / 1.17 / 16	13.03*	-6.97
4.869 GHz	64.71 Av	9.61 / 32.91 / 43.61 / 0.62	64.24	V / 1.17 / 16	10.24	n/a
7.303 GHz	54.8 Pk	13.17 / 36.15 / 43.17 / 1.2	62.15	V / 1.00 / 20	8.15*	-11.85
7.303 GHz	48.34 Av	13.17 / 36.15 / 43.17 / 1.2	55.69	V / 1.00 / 20	1.69	n/a
ch 6, 2 Mbps = worst case 2nd harmonic						
Ch 1, 2 Mbps						
4.824 GHz	67.0 Pk	9.54 / 32.81 / 43.57 / 0.59	66.37	V / 1.04 / 0	12.37*	-7.63
4.824 GHz	64.54 Av	9.54 / 32.81 / 43.57 / 0.59	63.91	V / 1.04 / 0	9.91	n/a
7.237 GHz	54.3 Pk	13.1 / 36.06 / 43.13 / 1.26	61.59	V / 1.00 / 22	7.59*	-12.41
7.237 GHz	51.15 Av	13.1 / 36.06 / 43.13 / 1.26	58.44	V / 1.00 / 22	4.44	n/a
Ch 11, 2 Mbps						
4.924 GHz	68.55 Pk	9.7 / 33.03 / 43.64 / 0.65	68.29	V / 1.03 / 15	14.29*	-5.71
4.924 GHz	66.03 Av	9.7 / 33.03 / 43.64 / 0.65	65.77	V / 1.03 / 15	11.77	n/a

Tested by: Greg Jakubowski

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Reviewed by: Joel T Schneider

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# RADIATED EMISSIONS



Test Report #: WC805442 Run 4 Test Area: LTS  
EUT Model #: 100033-0001-AA Date: 7/15/2008  
EUT Serial #: (multiple) EUT Power: 3 VDC Temperature: 26.0 °C  
Test Method: FCC 15.247 Air Pressure: 98.0 kPa  
Customer: Healthsense Inc. Rel. Humidity: 63.0 %  
EUT Description: WiFi 802.11 Module

Notes: \_\_\_\_\_

Data File Name: 5442.dat

Page: 3 of 22

## List of measurements for run #: 4

FREQ	LEVEL (dBuV)	CABLE / ANT / PREAMP / ATTEN (dB)	FINAL (dBuV / m)	POL / HGT / AZ (m)(DEG)	DELTA1 FCC 15.247 3m ave	DELTA2 FCC 15.247 3m peak
7.384 GHz	52.15 Pk	13.27 / 36.25 / 43.17 / 1.24	59.74	V / 1.00 / 14	5.74*	-14.26
7.384 GHz	46.81 Av	13.27 / 36.25 / 43.17 / 1.24	54.4	V / 1.00 / 14	0.4	n/a
End scan 1 - 18 GHz in restricted bands						
Begin scan 18-25 GHz						
EUT rotated 360 degrees, measurement antenna 1-4 meters high, vertical & horizontal						
No emissions detected, 0.3 meter distance, low mid & high channels, 1 Mbps, 2 Mbps, 5 Mbps, & 11 Mbps						
End scan 1 - 25 GHz						

Tested by: Greg Jakubowski

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Reviewed by: Joel T Schneider

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# RADIATED EMISSIONS



Test Report #: WC805442 Run 4 Test Area: LTS

EUT Model #: 100033-0001-AA Date: 7/15/2008

EUT Serial #: (multiple) EUT Power: 3 VDC Temperature: 26.0 °C

Test Method: FCC 15.247 Air Pressure: 98.0 kPa

Customer: Healthsense Inc. Rel. Humidity: 63.0 %

EUT Description: WiFi 802.11 Module

Notes: \_\_\_\_\_

Data File Name: 5442.dat

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## Measurement summary for limit1: FCC B >1GHz 3m Average Corrected, subtracting 12 dB duty cycle correction

FREQ	LEVEL (dBuV)	CABLE / ANT / PREAMP / ATTEN / CORRECTION (dB)	FINAL (dBuV / m)	POL / HGT / AZ (m)(DEG)	DELTA1 FCC 15.247 3m ave
4.924 GHz	66.03 Av	9.7 / 33.03 / 43.64 / 0.65 / 12.0	53.77	V / 1.03 / 15	-0.23
4.874 GHz	65.99 Av	9.62 / 32.92 / 43.61 / 0.62 / 12.0	53.54	V / 1.20 / 16	-0.46
4.869 GHz	64.71 Av	9.61 / 32.91 / 43.61 / 0.62 / 12.0	52.24	V / 1.17 / 16	-1.76
4.824 GHz	64.54 Av	9.54 / 32.81 / 43.57 / 0.59 / 12.0	51.91	V / 1.04 / 0	-2.09
7.237 GHz	51.15 Av	13.1 / 36.06 / 43.13 / 1.26 / 12.0	46.44	V / 1.00 / 22	-7.56
7.31 GHz	49.27 Av	13.18 / 36.16 / 43.17 / 1.21 / 12.0	44.64	V / 1.20 / 14	-9.36
7.303 GHz	48.34 Av	13.17 / 36.15 / 43.17 / 1.2 / 12.0	43.69	V / 1.00 / 20	-10.31
7.312 GHz	48.14 Av	13.18 / 36.16 / 43.18 / 1.21 / 12.0	43.52	V / 1.00 / 61	-10.48
7.311 GHz	47.61 Av	13.18 / 36.16 / 43.18 / 1.21 / 12.0	42.98	V / 1.00 / 21	-11.02
7.384 GHz	46.81 Av	13.27 / 36.25 / 43.17 / 1.24 / 12.0	42.4	V / 1.00 / 14	-11.6
7.236 GHz	46.54 Av	13.1 / 36.06 / 43.13 / 1.26 / 12.0	41.83	V / 1.00 / 58	-12.17
7.386 GHz	46.22 Av	13.27 / 36.25 / 43.17 / 1.24 / 12.0	41.82	V / 1.00 / 14	-12.18

Tested by: Greg Jakubowski

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Reviewed by: Joel T Schneider

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# RADIATED EMISSIONS



Test Report #: WC805442 Run 4 Test Area: LTS

EUT Model #: 100033-0001-AA Date: 7/15/2008

EUT Serial #: (multiple) EUT Power: 3 VDC Temperature: 26.0 °C

Test Method: FCC 15.247 Air Pressure: 98.0 kPa

Customer: Healthsense Inc. Rel. Humidity: 63.0 %

EUT Description: WiFi 802.11 Module

Notes: \_\_\_\_\_

Data File Name: 5442.dat

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## Measurement summary for limit2: FCC B >1G 3 M peak (Pk)

FREQ	LEVEL (dBuV)	CABLE / ANT / PREAMP / ATTEN (dB)	FINAL (dBuV / m)	POL / HGT / AZ (m)(DEG)	DELTA2 FCC 15.247 3m peak
4.874 GHz	71.25 Pk	9.62 / 32.92 / 43.61 / 0.62	70.8	V / 1.19 / 14	-3.2
4.824 GHz	70.55 Pk	9.54 / 32.81 / 43.57 / 0.59	69.92	V / 1.08 / 355	-4.08
4.924 GHz	70.05 Pk	9.7 / 33.03 / 43.64 / 0.65	69.79	V / 1.34 / 14	-4.21
4.868 GHz	67.5 Pk	9.61 / 32.91 / 43.61 / 0.62	67.03	V / 1.17 / 16	-6.97
7.311 GHz	56.25 Pk	13.18 / 36.16 / 43.18 / 1.21	63.62	V / 1.00 / 21	-10.38
7.386 GHz	55.3 Pk	13.27 / 36.25 / 43.17 / 1.24	62.9	V / 1.00 / 14	-11.1
7.236 GHz	55.55 Pk	13.1 / 36.06 / 43.13 / 1.26	62.84	V / 1.00 / 58	-11.16
7.303 GHz	54.8 Pk	13.17 / 36.15 / 43.17 / 1.2	62.15	V / 1.00 / 20	-11.85
7.237 GHz	54.3 Pk	13.1 / 36.06 / 43.13 / 1.26	61.59	V / 1.00 / 22	-12.41
7.31 GHz	53.3 Pk	13.18 / 36.16 / 43.17 / 1.21	60.67	V / 1.20 / 14	-13.33
7.312 GHz	52.9 Pk	13.18 / 36.16 / 43.18 / 1.21	60.28	V / 1.00 / 61	-13.72
7.384 GHz	52.15 Pk	13.27 / 36.25 / 43.17 / 1.24	59.74	V / 1.00 / 14	-14.26

Tested by: Greg Jakubowski

Printed

Signature

Reviewed by: Joel T Schneider

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Signature

# RADIATED EMISSIONS



Test Report #: WC805442 Run 4 Test Area: LTS  
EUT Model #: 100033-0001-AA Date: 7/15/2008  
EUT Serial #: (multiple) EUT Power: 3 VDC Temperature: 26.0 °C  
Test Method: FCC 15.247 Air Pressure: 98.0 kPa  
Customer: Healthsense Inc. Rel. Humidity: 63.0 %  
EUT Description: WiFi 802.11 Module

Notes:

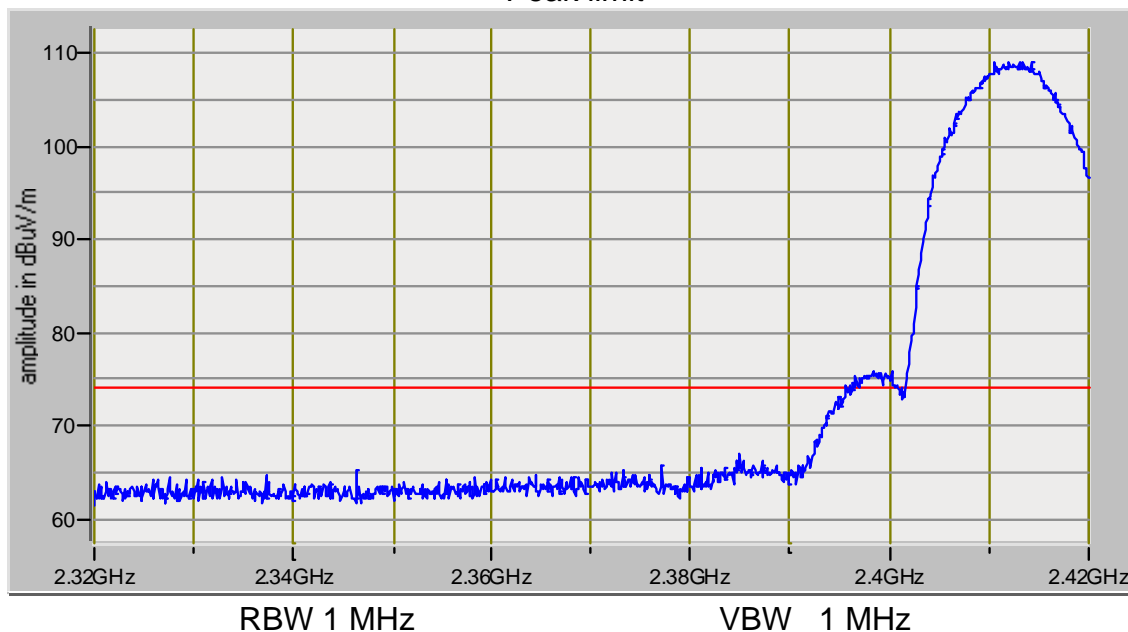
Data File Name: 5442.dat

Page: 6 of 22

Bandedge plots  
Signal maximized, trace max hold

Ch 1, 11 Mbps

Peak limit



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# RADIATED EMISSIONS



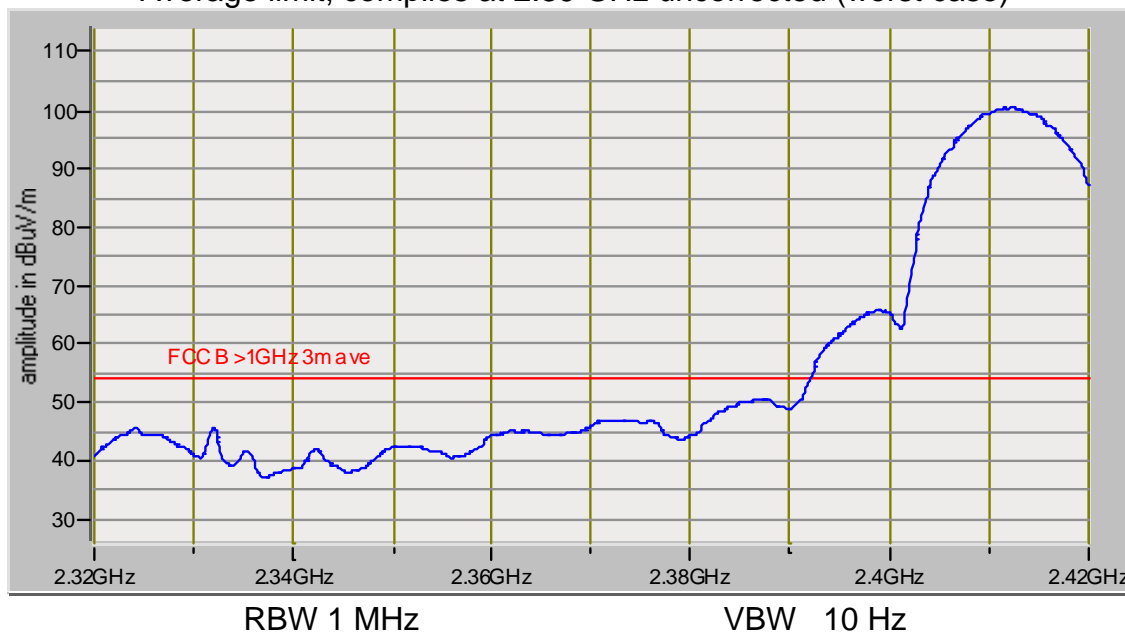
Test Report #: WC805442 Run 4 Test Area: LTS  
EUT Model #: 100033-0001-AA Date: 7/15/2008  
EUT Serial #: (multiple) EUT Power: 3 VDC Temperature: 26.0 °C  
Test Method: FCC 15.247 Air Pressure: 98.0 kPa  
Customer: Healthsense Inc. Rel. Humidity: 63.0 %  
EUT Description: WiFi 802.11 Module

Notes:

Data File Name: 5442.dat

Page: 7 of 22

Average limit, complies at 2.39 GHz uncorrected (worst case)



Tested by: Greg Jakubowski

Printed

Signature

Reviewed by: Joel T Schneider

Printed

Signature

# RADIATED EMISSIONS



Test Report #: WC805442 Run 4 Test Area: LTS  
EUT Model #: 100033-0001-AA Date: 7/15/2008  
EUT Serial #: (multiple) EUT Power: 3 VDC Temperature: 26.0 °C  
Test Method: FCC 15.247 Air Pressure: 98.0 kPa  
Customer: Healthsense Inc. Rel. Humidity: 63.0 %  
EUT Description: WiFi 802.11 Module

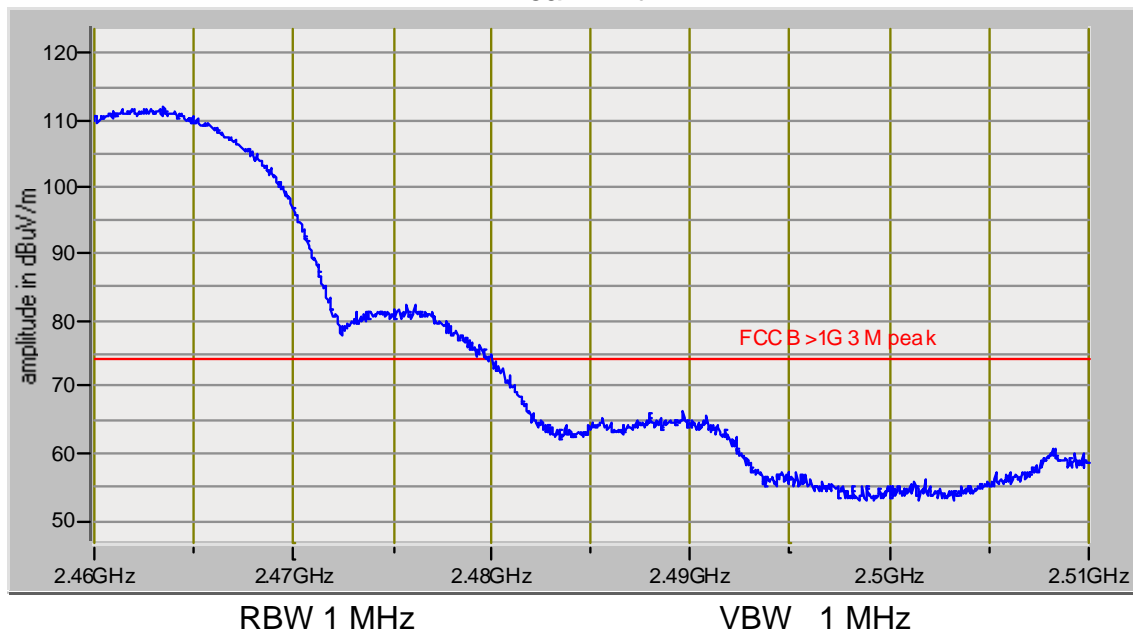
Notes:

Data File Name: 5442.dat

Page: 8 of 22

Ch 11, 11 Mbps

Peak limit



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Reviewed by: Joel T Schneider

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Signature

# RADIATED EMISSIONS



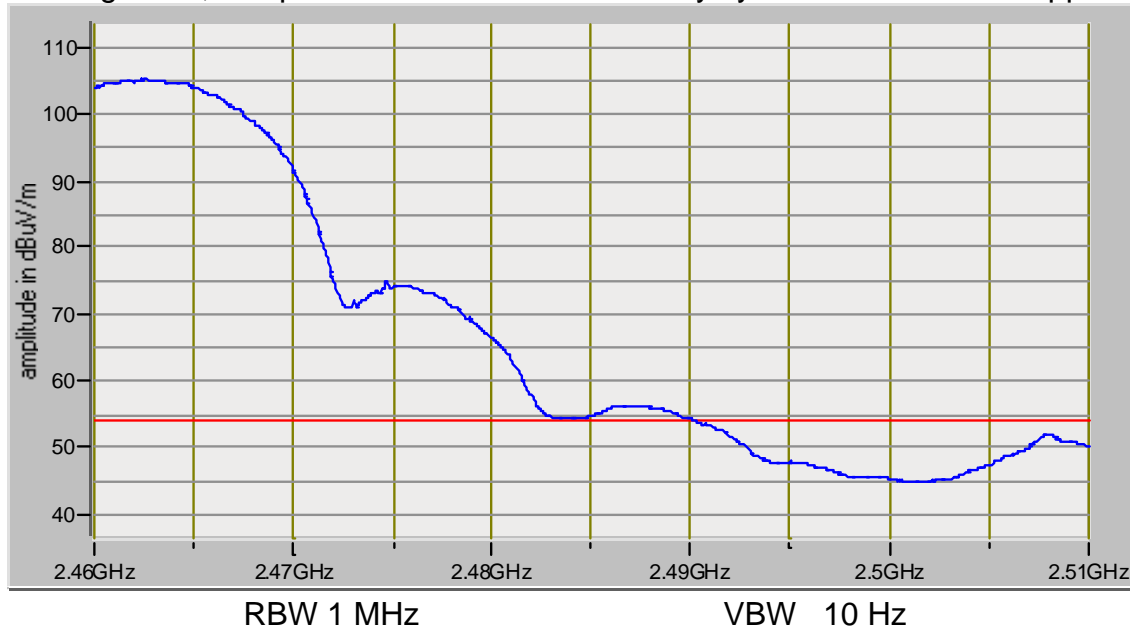
Test Report #: WC805442 Run 4 Test Area: LTS  
EUT Model #: 100033-0001-AA Date: 7/15/2008  
EUT Serial #: (multiple) EUT Power: 3 VDC Temperature: 26.0 °C  
Test Method: FCC 15.247 Air Pressure: 98.0 kPa  
Customer: Healthsense Inc. Rel. Humidity: 63.0 %  
EUT Description: WiFi 802.11 Module

Notes: \_\_\_\_\_

Data File Name: 5442.dat

Page: 9 of 22

Average limit, complies at 2.4835 if -12.0 dB duty cycle correction were applied



Tested by: Greg Jakubowski

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Signature

Reviewed by: Joel T Schneider

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Signature

# RADIATED EMISSIONS



Test Report #: WC805442 Run 4 Test Area: LTS  
EUT Model #: 100033-0001-AA Date: 7/15/2008  
EUT Serial #: (multiple) EUT Power: 3 VDC Temperature: 26.0 °C  
Test Method: FCC 15.247 Air Pressure: 98.0 kPa  
Customer: Healthsense Inc. Rel. Humidity: 63.0 %  
EUT Description: WiFi 802.11 Module

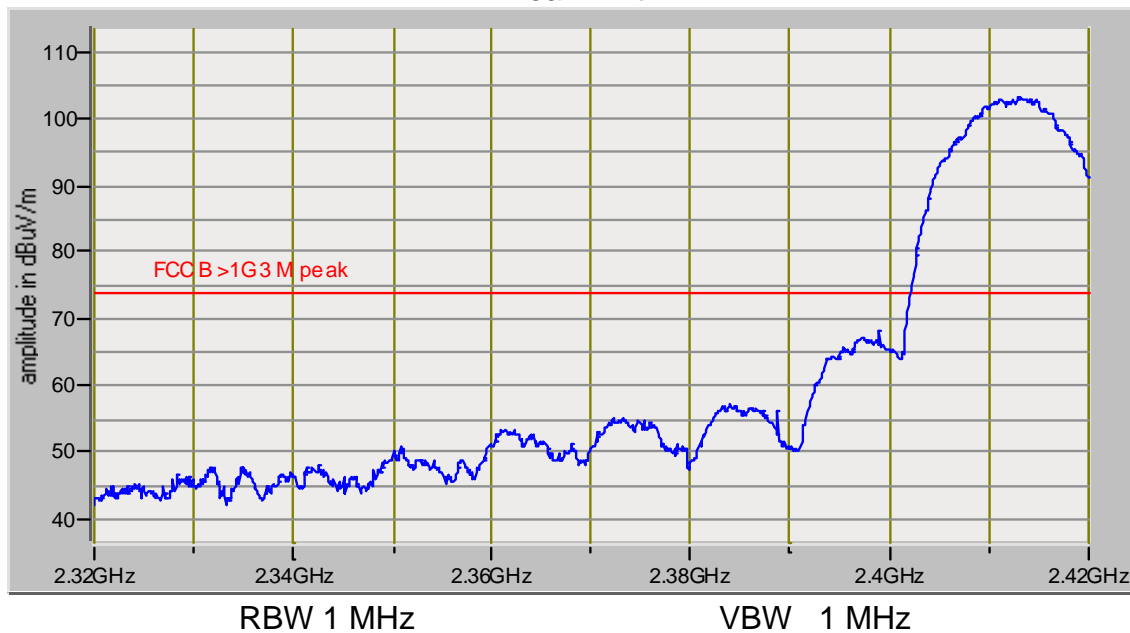
Notes:

Data File Name: 5442.dat

Page: 10 of 22

Ch 1, 1 Mbps

Peak limit



Tested by: Greg Jakubowski

Printed

Signature

Reviewed by: Joel T Schneider

Printed

Signature



# RADIATED EMISSIONS



Test Report #: WC805442 Run 4 Test Area: LTS  
EUT Model #: 100033-0001-AA Date: 7/15/2008  
EUT Serial #: (multiple) EUT Power: 3 VDC Temperature: 26.0 °C  
Test Method: FCC 15.247 Air Pressure: 98.0 kPa  
Customer: Healthsense Inc. Rel. Humidity: 63.0 %  
EUT Description: WiFi 802.11 Module

Notes:

Data File Name: 5442.dat

Page: 11 of 22

Average limit, complies at 2.39 GHz uncorrected (worst case)



Tested by: Greg Jakubowski

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Signature

Reviewed by: Joel T Schneider

Printed

Signature

# RADIATED EMISSIONS



Test Report #: WC805442 Run 4 Test Area: LTS  
EUT Model #: 100033-0001-AA Date: 7/15/2008  
EUT Serial #: (multiple) EUT Power: 3 VDC Temperature: 26.0 °C  
Test Method: FCC 15.247 Air Pressure: 98.0 kPa  
Customer: Healthsense Inc. Rel. Humidity: 63.0 %  
EUT Description: WiFi 802.11 Module

Notes: \_\_\_\_\_

Data File Name: 5442.dat

Page: 12 of 22

Ch 11, 1 Mbps

Peak limit



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Signature

# RADIATED EMISSIONS



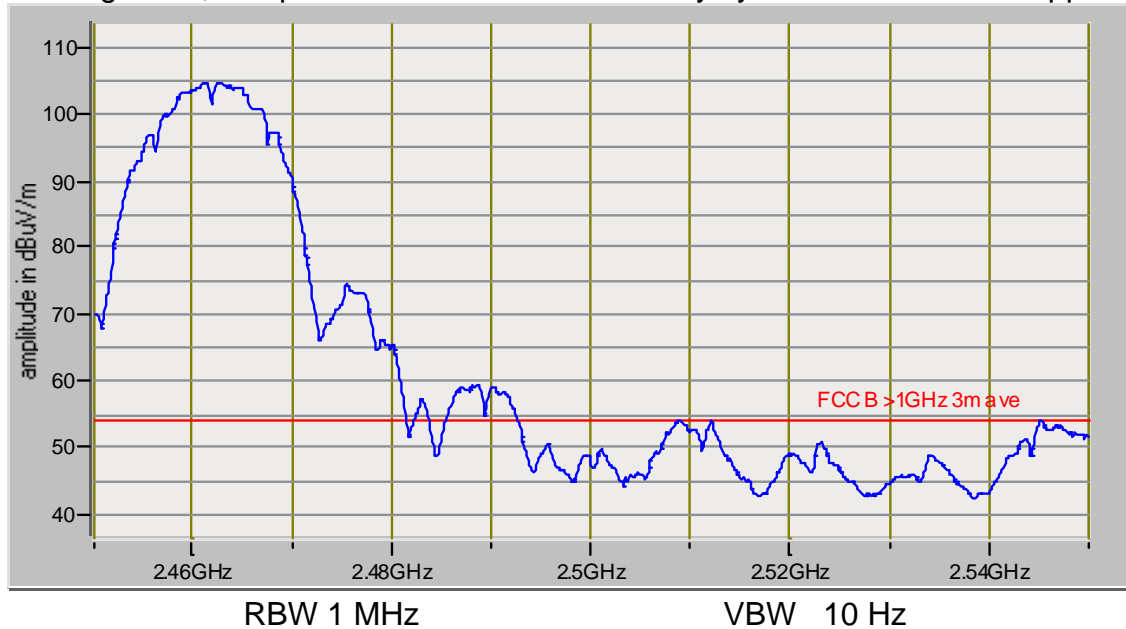
Test Report #: WC805442 Run 4 Test Area: LTS  
EUT Model #: 100033-0001-AA Date: 7/15/2008  
EUT Serial #: (multiple) EUT Power: 3 VDC Temperature: 26.0 °C  
Test Method: FCC 15.247 Air Pressure: 98.0 kPa  
Customer: Healthsense Inc. Rel. Humidity: 63.0 %  
EUT Description: WiFi 802.11 Module

Notes:

Data File Name: 5442.dat

Page: 13 of 22

Average limit, complies at 2.4835 if -12.0 dB duty cycle correction were applied



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Reviewed by: Joel T Schneider

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Signature

# RADIATED EMISSIONS



Test Report #: WC805442 Run 4 Test Area: LTS

EUT Model #: 100033-0001-AA Date: 7/15/2008

EUT Serial #: (multiple) EUT Power: 3 VDC Temperature: 26.0 °C

Test Method: FCC 15.247 Air Pressure: 98.0 kPa

Customer: Healthsense Inc. Rel. Humidity: 63.0 %

EUT Description: WiFi 802.11 Module

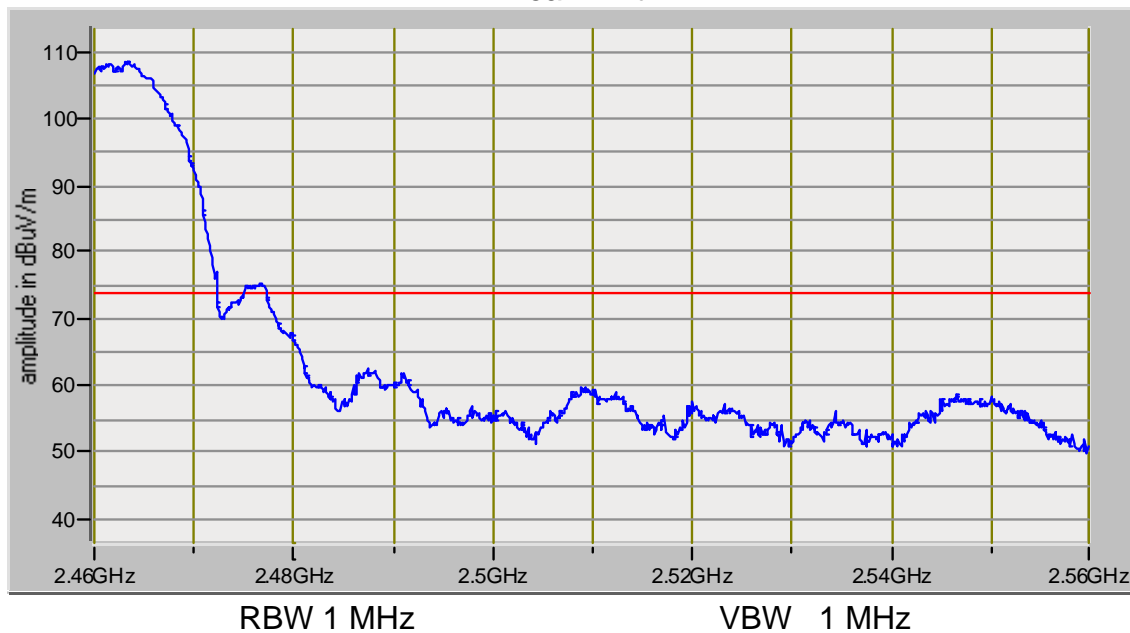
Notes:

Data File Name: 5442.dat

Page: 14 of 22

Ch 11, 2 Mbps

Peak limit



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*Greg Jakubowski*

Signature

Reviewed by: Joel T Schneider

Printed

*Joel T. Schneider*

Signature

# RADIATED EMISSIONS



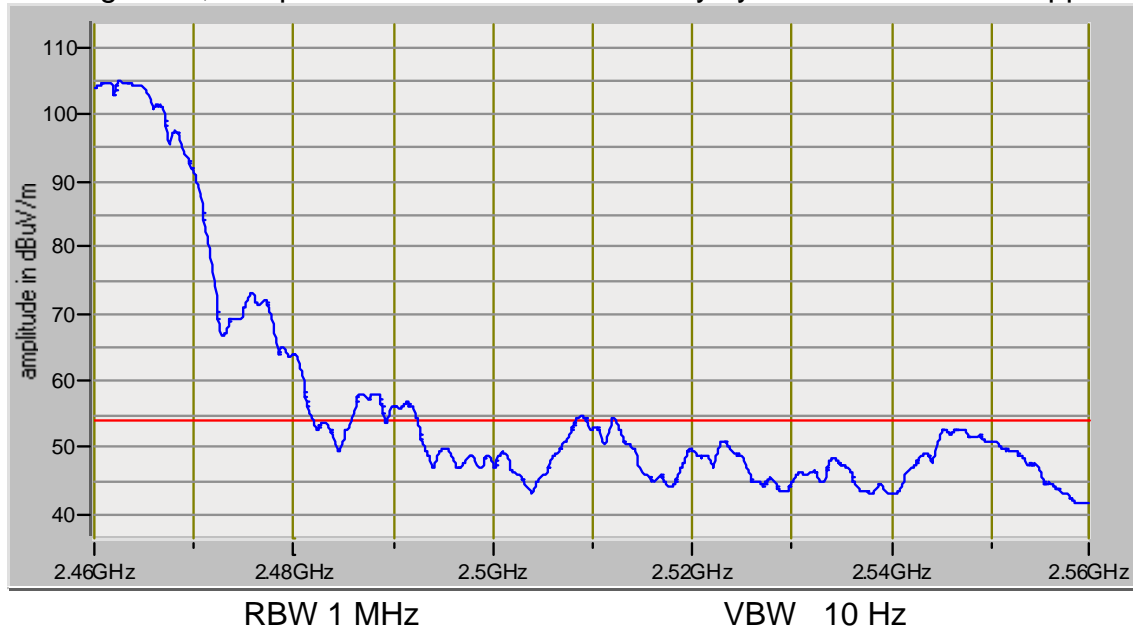
Test Report #: WC805442 Run 4 Test Area: LTS  
EUT Model #: 100033-0001-AA Date: 7/15/2008  
EUT Serial #: (multiple) EUT Power: 3 VDC Temperature: 26.0 °C  
Test Method: FCC 15.247 Air Pressure: 98.0 kPa  
Customer: Healthsense Inc. Rel. Humidity: 63.0 %  
EUT Description: WiFi 802.11 Module

Notes:

Data File Name: 5442.dat

Page: 15 of 22

Average limit, complies at 2.4835 if -12.0 dB duty cycle correction were applied



Tested by: Greg Jakubowski

Printed

Signature

Reviewed by: Joel T Schneider

Printed

Signature

# RADIATED EMISSIONS



Test Report #: WC805442 Run 4 Test Area: LTS  
EUT Model #: 100033-0001-AA Date: 7/15/2008  
EUT Serial #: (multiple) EUT Power: 3 VDC Temperature: 26.0 °C  
Test Method: FCC 15.247 Air Pressure: 98.0 kPa  
Customer: Healthsense Inc. Rel. Humidity: 63.0 %  
EUT Description: WiFi 802.11 Module

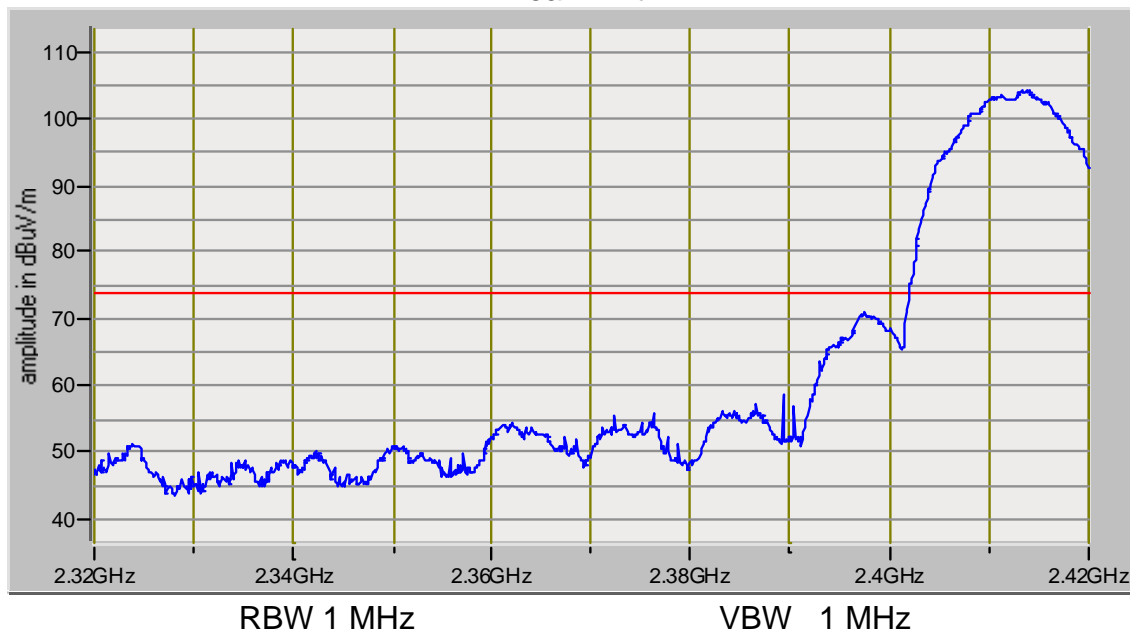
Notes: \_\_\_\_\_

Data File Name: 5442.dat

Page: 16 of 22

Ch 1, 2 Mbps

Peak limit



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Signature

Reviewed by: Joel T Schneider

Printed

Signature

# RADIATED EMISSIONS



Test Report #: WC805442 Run 4 Test Area: LTS  
EUT Model #: 100033-0001-AA Date: 7/15/2008  
EUT Serial #: (multiple) EUT Power: 3 VDC Temperature: 26.0 °C  
Test Method: FCC 15.247 Air Pressure: 98.0 kPa  
Customer: Healthsense Inc. Rel. Humidity: 63.0 %  
EUT Description: WiFi 802.11 Module

Notes: \_\_\_\_\_

Data File Name: 5442.dat

Page: 17 of 22

Average limit, complies at 2.39 GHz uncorrected (worst case)



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Reviewed by: Joel T Schneider

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Signature

# RADIATED EMISSIONS



Test Report #: WC805442 Run 4 Test Area: LTS  
EUT Model #: 100033-0001-AA Date: 7/15/2008  
EUT Serial #: (multiple) EUT Power: 3 VDC Temperature: 26.0 °C  
Test Method: FCC 15.247 Air Pressure: 98.0 kPa  
Customer: Healthsense Inc. Rel. Humidity: 63.0 %  
EUT Description: WiFi 802.11 Module

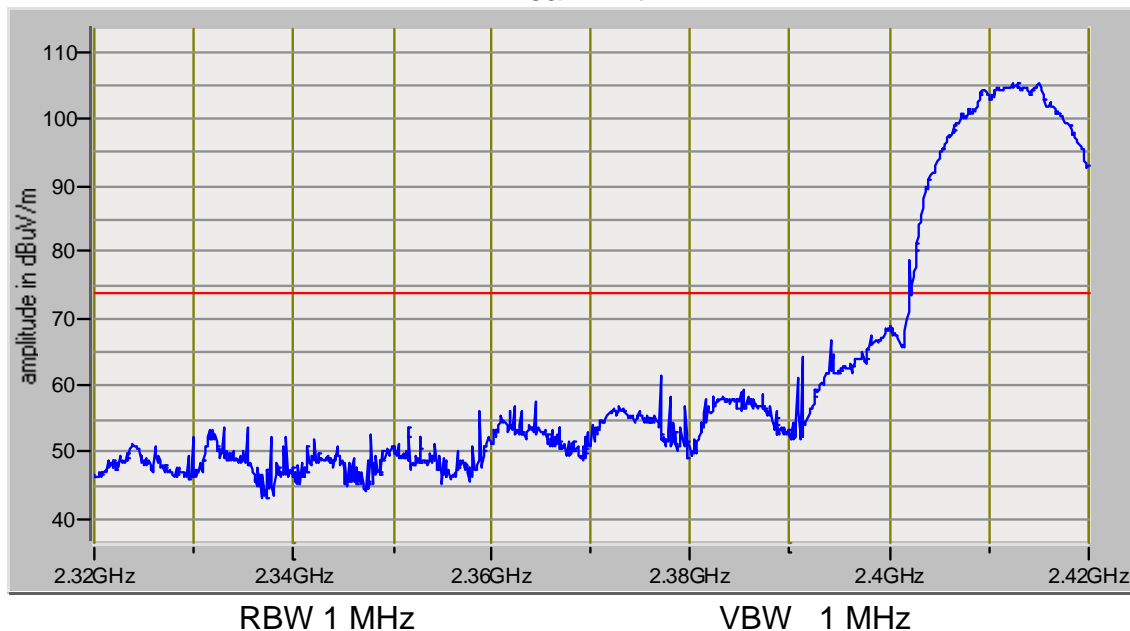
Notes: \_\_\_\_\_

Data File Name: 5442.dat

Page: 18 of 22

Ch 1, 5 Mbps

Peak limit



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Reviewed by: Joel T Schneider

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Signature



# RADIATED EMISSIONS



Test Report #: WC805442 Run 4 Test Area: LTS  
EUT Model #: 100033-0001-AA Date: 7/15/2008  
EUT Serial #: (multiple) EUT Power: 3 VDC Temperature: 26.0 °C  
Test Method: FCC 15.247 Air Pressure: 98.0 kPa  
Customer: Healthsense Inc. Rel. Humidity: 63.0 %  
EUT Description: WiFi 802.11 Module

Notes:

Data File Name: 5442.dat

Page: 19 of 22

Average limit, complies at 2.39 GHz uncorrected (worst case)



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Printed

Signature

Reviewed by: Joel T Schneider

Printed

Signature

# RADIATED EMISSIONS



Test Report #: WC805442 Run 4 Test Area: LTS  
EUT Model #: 100033-0001-AA Date: 7/15/2008  
EUT Serial #: (multiple) EUT Power: 3 VDC Temperature: 26.0 °C  
Test Method: FCC 15.247 Air Pressure: 98.0 kPa  
Customer: Healthsense Inc. Rel. Humidity: 63.0 %  
EUT Description: WiFi 802.11 Module

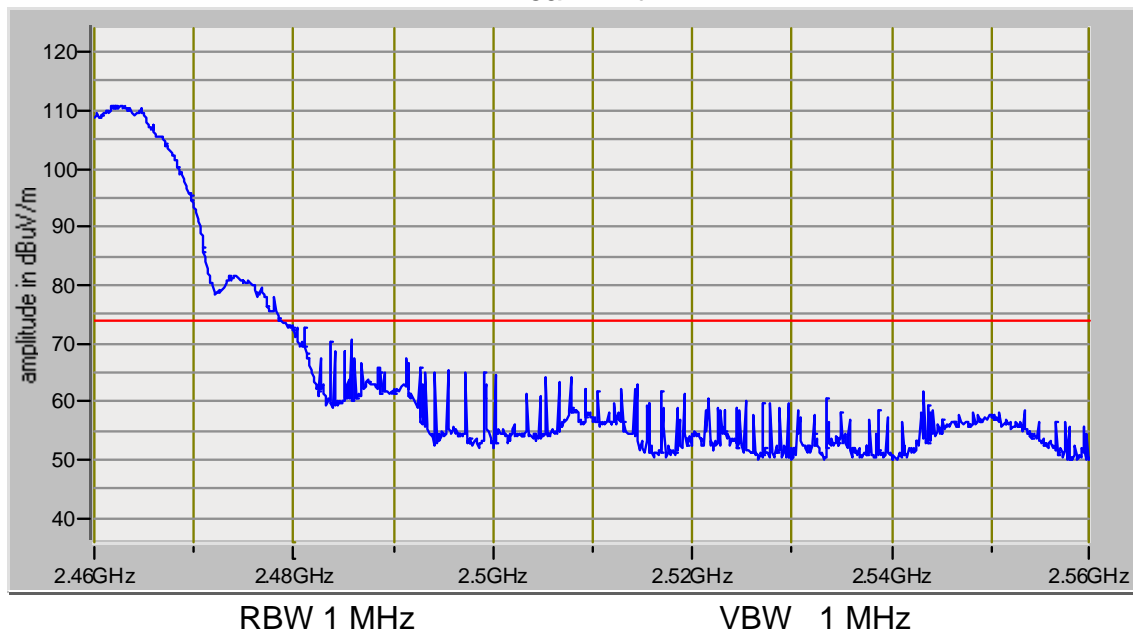
Notes: \_\_\_\_\_

Data File Name: 5442.dat

Page: 20 of 22

Ch 11, 5 Mbps

Peak limit



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Reviewed by: Joel T Schneider

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Signature

# RADIATED EMISSIONS



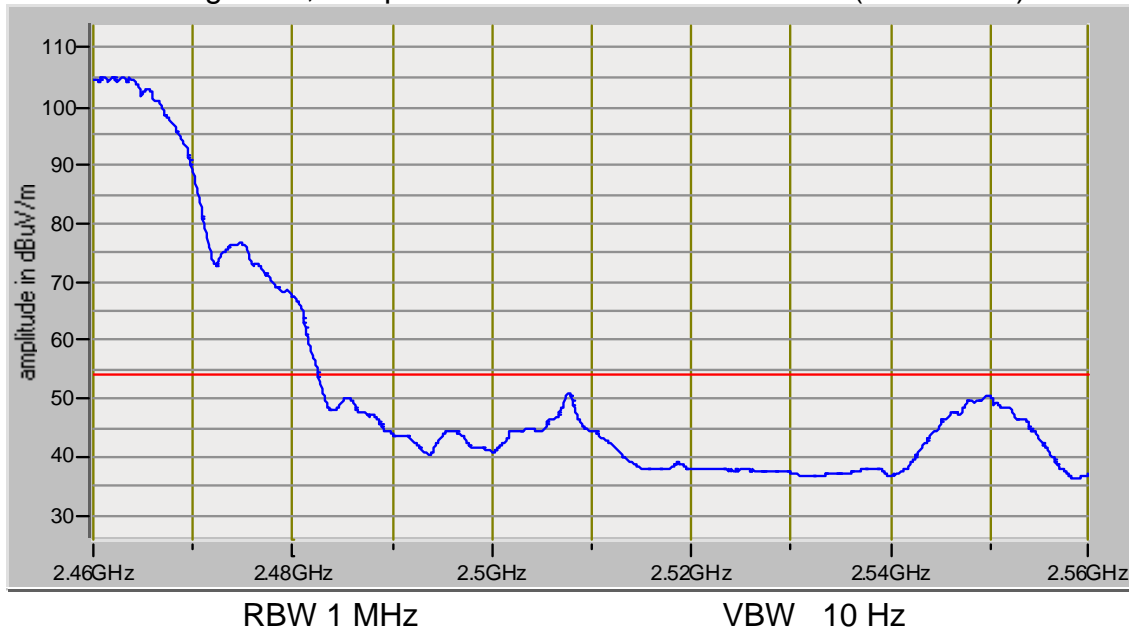
Test Report #: WC805442 Run 4 Test Area: LTS  
EUT Model #: 100033-0001-AA Date: 7/15/2008  
EUT Serial #: (multiple) EUT Power: 3 VDC Temperature: 26.0 °C  
Test Method: FCC 15.247 Air Pressure: 98.0 kPa  
Customer: Healthsense Inc. Rel. Humidity: 63.0 %  
EUT Description: WiFi 802.11 Module

Notes: \_\_\_\_\_

Data File Name: 5442.dat

Page: 21 of 22

Average limit, complies at 2.4835 GHz uncorrected (worst case)



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Reviewed by: Joel T Schneider

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Signature

# RADIATED EMISSIONS



Test Report #: WC805442 Run 4 Test Area: LTS

EUT Model #: 100033-0001-AA Date: 7/15/2008

EUT Serial #: (multiple) EUT Power: 3 VDC Temperature: 26.0 °C

Test Method: FCC 15.247 Air Pressure: 98.0 kPa

Customer: Healthsense Inc. Rel. Humidity: 63.0 %

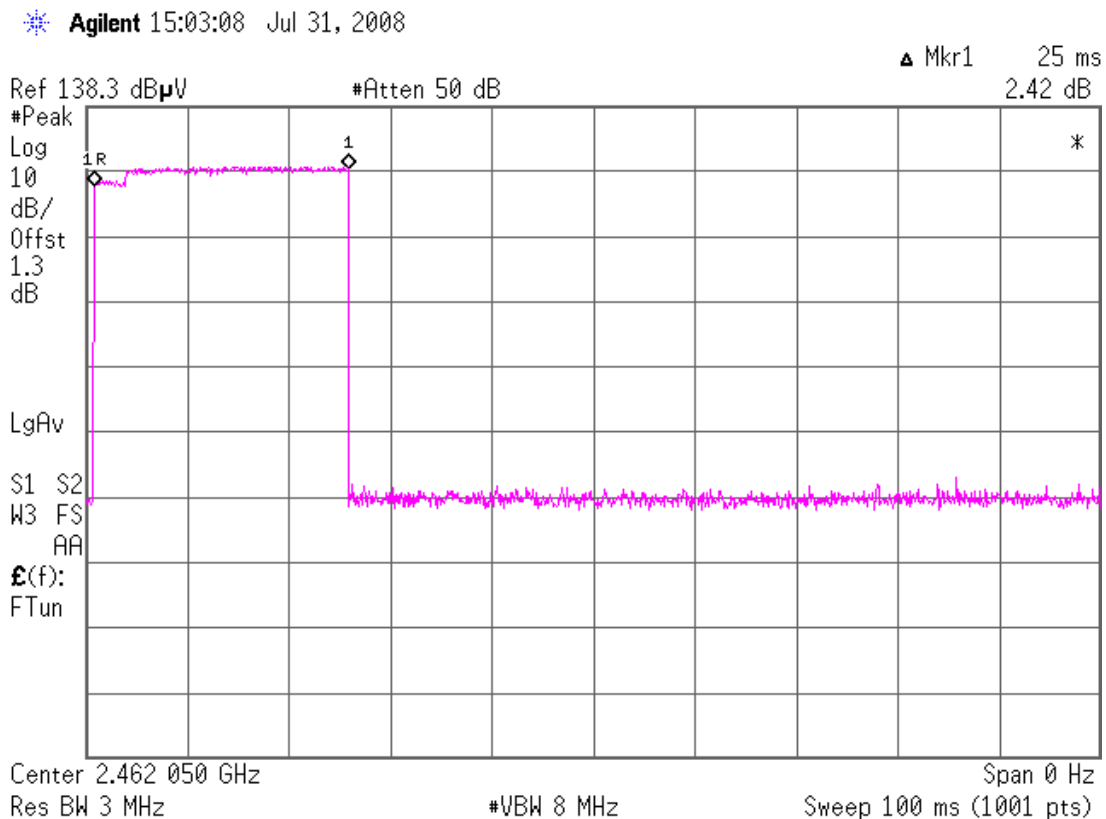
EUT Description: WiFi 802.11 Module

Notes:

Data File Name: 5442.dat

Page: 22 of 22

## Duty cycle



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Signature

Reviewed by: Joel T Schneider

*Joel T. Schneider*

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# RADIATED EMISSIONS



Test Report #: WC805442 Run 5 Test Area: LTS  
EUT Model #: 100033-0001-AA Date: 7/15/2008  
EUT Serial #: (multiple) EUT Power: 3 VDC Temperature: 26.0 °C  
Test Method: FCC 15.247 Air Pressure: 98.0 kPa  
Customer: Healthsense Inc. Rel. Humidity: 63.0 %  
EUT Description: WiFi 802.11 Module

Notes: \_\_\_\_\_

Data File Name: 5442.dat

Page: 1 of 3

## List of measurements for run #: 5

FREQ	LEVEL (dBuV)	CABLE / ANT / PREAMP / ATTEN (dB)	FINAL (dBuV / m)	POL / HGT / AZ (m)(DEG)	DELTA1 FCC 15.209 <1GHz 3m	DELTA2
Begin scan 30 - 1000 MHz in restricted bands						
Ch 1, 2 Mbps rate						
115.032 MHz	43.5 Qp	1.17 / 9.4 / 29.7 / 0.0	24.37	V / 1.00 / 0	-19.13	n/a
maximized						
115.032 MHz	46.27 Qp	1.17 / 9.4 / 29.7 / 0.0	27.14	V / 1.00 / 165	-16.36	n/a
ch 11, 2 Mbps rate						
No other emissions detected						
ch 6, 2 Mbps						
No other emissions detected						
End scan 30 - 1000 MHz in restricted bands						

Tested by: Greg Jakubowski

Printed

Signature

Reviewed by: Joel T Schneider

Printed

Signature

# RADIATED EMISSIONS



Test Report #: WC805442 Run 5 Test Area: LTS  
EUT Model #: 100033-0001-AA Date: 7/15/2008  
EUT Serial #: (multiple) EUT Power: 3 VDC Temperature: 26.0 °C  
Test Method: FCC 15.247 Air Pressure: 98.0 kPa  
Customer: Healthsense Inc. Rel. Humidity: 63.0 %  
EUT Description: WiFi 802.11 Module

Notes: \_\_\_\_\_

Data File Name: 5442.dat

Page: 2 of 3

## Measurement summary for limit1: FCC-B <1GHz 3m (Qp)

FREQ	LEVEL (dBuV)	CABLE / ANT / PREAMP / ATTEN (dB)	FINAL (dBuV / m)	POL / HGT / AZ (m)(DEG)	DELTA1 FCC 15.209 <1GHz 3m
115.032 MHz	46.27 Qp	1.17 / 9.4 / 29.7 / 0.0	27.14	V / 1.00 / 165	-16.36

Tested by: Greg Jakubowski

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Reviewed by: Joel T Schneider

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Signature

# RADIATED EMISSIONS



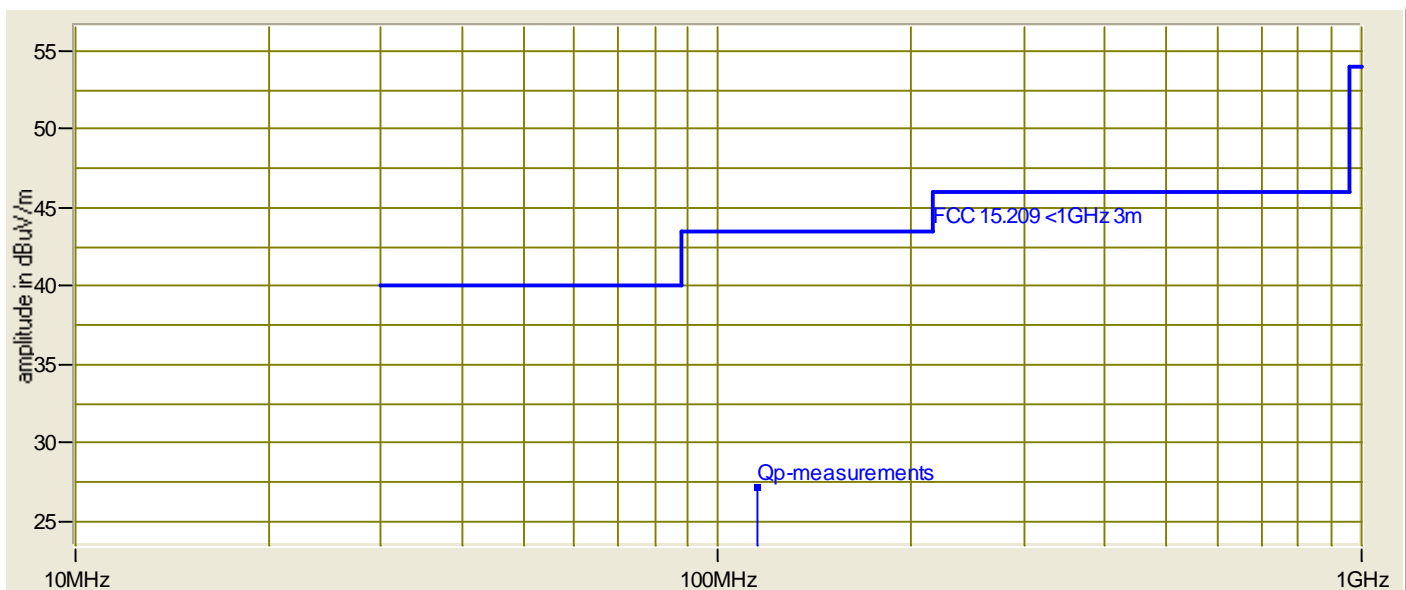
Test Report #: WC805442 Run 5 Test Area: LTS  
EUT Model #: 100033-0001-AA Date: 7/15/2008  
EUT Serial #: (multiple) EUT Power: 3 VDC Temperature: 26.0 °C  
Test Method: FCC 15.247 Air Pressure: 98.0 kPa  
Customer: Healthsense Inc. Rel. Humidity: 63.0 %  
EUT Description: WiFi 802.11 Module

Notes: \_\_\_\_\_

Data File Name: 5442.dat

Page: 3 of 3

## Graph:



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## Power spectral density

### FCC 15.247(e), IC RSS-210 A8.2(b)

#### Test summary

The requirements are: ☒ - MET ☐ - NOT MET

Test was performed in accordance with the test procedure of FCC KDB Publication 558074

Maximum power spectral density is  $-1.25$  dBm / 3 kHz

#### Test location

☐ - Wild River Lab Large Test Site (Open Area Test Site)

☐ - Wild River Lab Small Test Site (Open Area Test Site)

☒ - Wild River Lab Tech Area, conducted measurement

#### Test equipment

TUV ID	Model	Manufacturer	Description	Serial	Cal Due
WRLE03371	E4440A	Agilent	Spectrum Analyzer	MY43362222	19-Dec-08

#### Test limit

No greater than 8 dBm in any 3 kHz band

#### Test data

See following pages.



# Power spectral density

Channel 1, 1 MB rate

Agilent 09:02:31 Jul 31, 2008

Mkr1 2.411 328 GHz  
-1.55 dBm

Ref 8 dBm

#Atten 30 dB

#Peak

Log

10

dB/

Offst

1.3

dB

LgAv

V1 S2

S3 FC

AA

$\mathcal{E}(f)$ :

$f > 50k$

#Swp

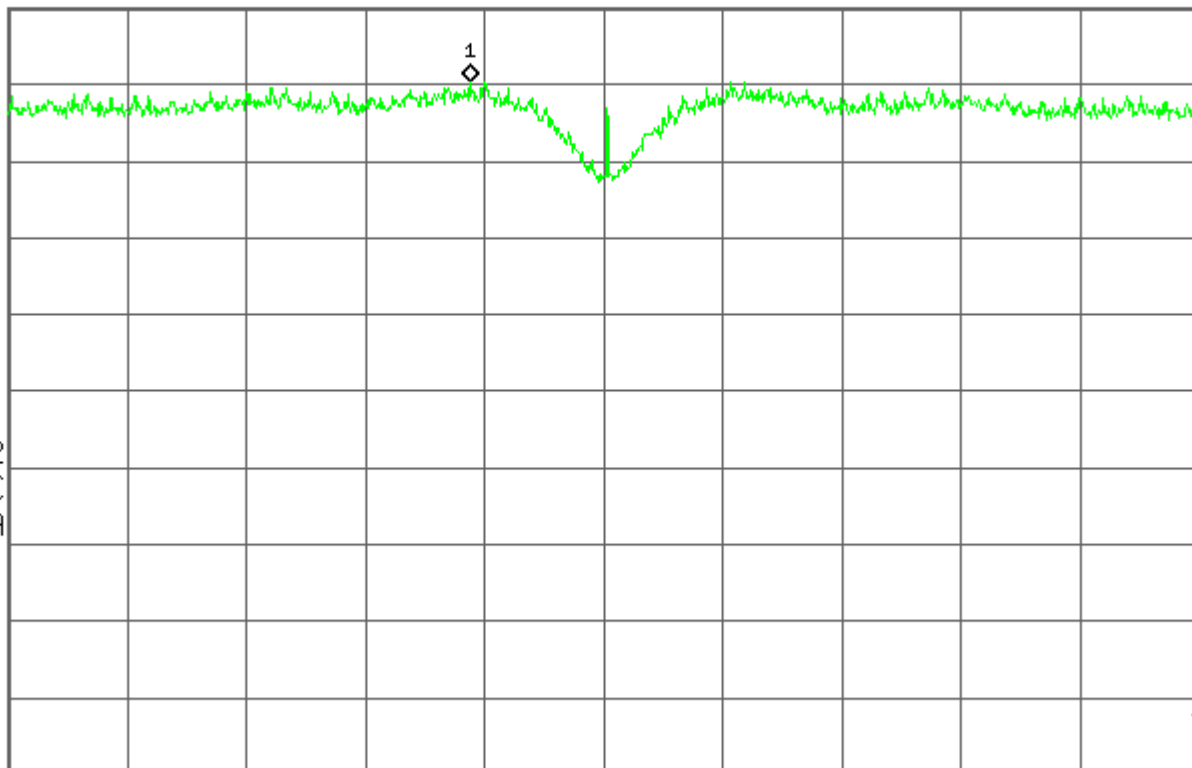
Center 2.412 000 GHz

Span 6 MHz

#Res BW 3 kHz

#VBW 10 kHz

#Sweep 2 ks (1001 pts)



# Power spectral density

Channel 1, 2 MB rate

Agilent 09:38:12 Jul 31, 2008

Mkr1 2.411 316 GHz  
-1.53 dBm

Ref 8 dBm

#Atten 30 dB

#Peak

Log

10

dB/

Offst

1.3

dB

LgAv

S1 S2

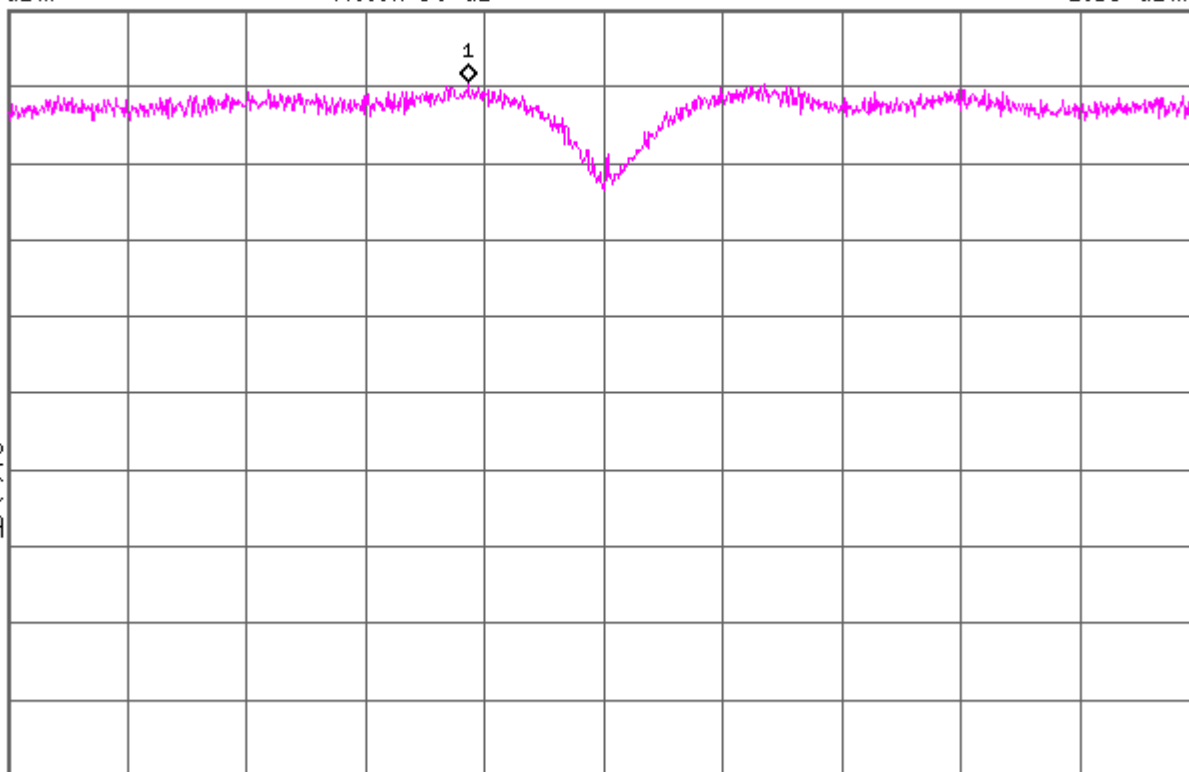
V3 FC

AA

$\mathcal{E}(f)$ :

$f > 50k$

#Swp



Center 2.412 000 GHz

Span 6 MHz

#Res BW 3 kHz

#VBW 10 kHz

#Sweep 2 ks (1001 pts)

# Power spectral density

Channel 1, 5 MB rate

Agilent 10:13:11 Jul 31, 2008

Mkr1 2.413 344 GHz

-2.29 dBm

Ref 8 dBm

#Atten 30 dB

#Peak

Log

10

dB/

Offst

1.3

dB

LgAv

S1 S2

V3 FC

AA

$\mathcal{E}(f)$ :

$f > 50k$

#Swp

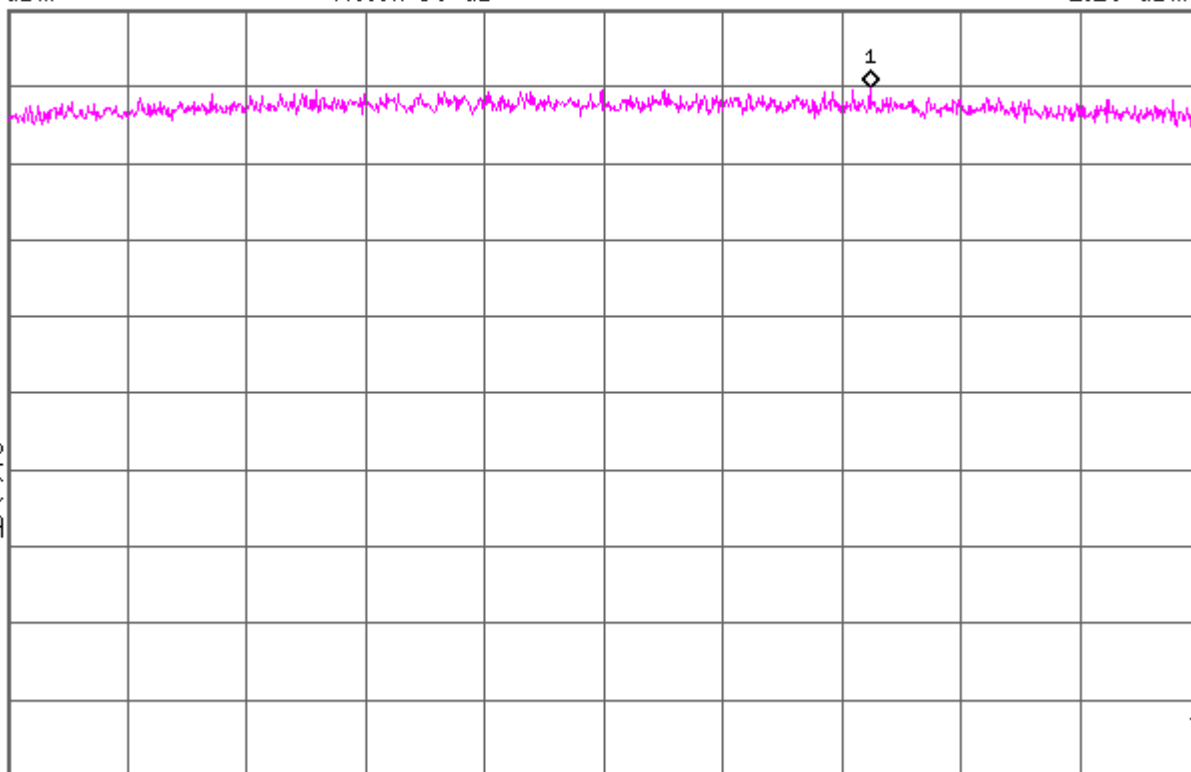
Center 2.412 000 GHz

Span 6 MHz

#Res BW 3 kHz

#VBW 10 kHz

#Sweep 2 ks (1001 pts)



Power spectral density

Channel 1, 11 MB rate

Agilent 10:49:53 Jul 31, 2008

Mkr1 2.410 962 GHz  
-1.25 dBm

Ref 8 dBm

#Atten 30 dB

#Peak

Log

10

dB/

Offst

1.3

dB

LgAv

S1 S2

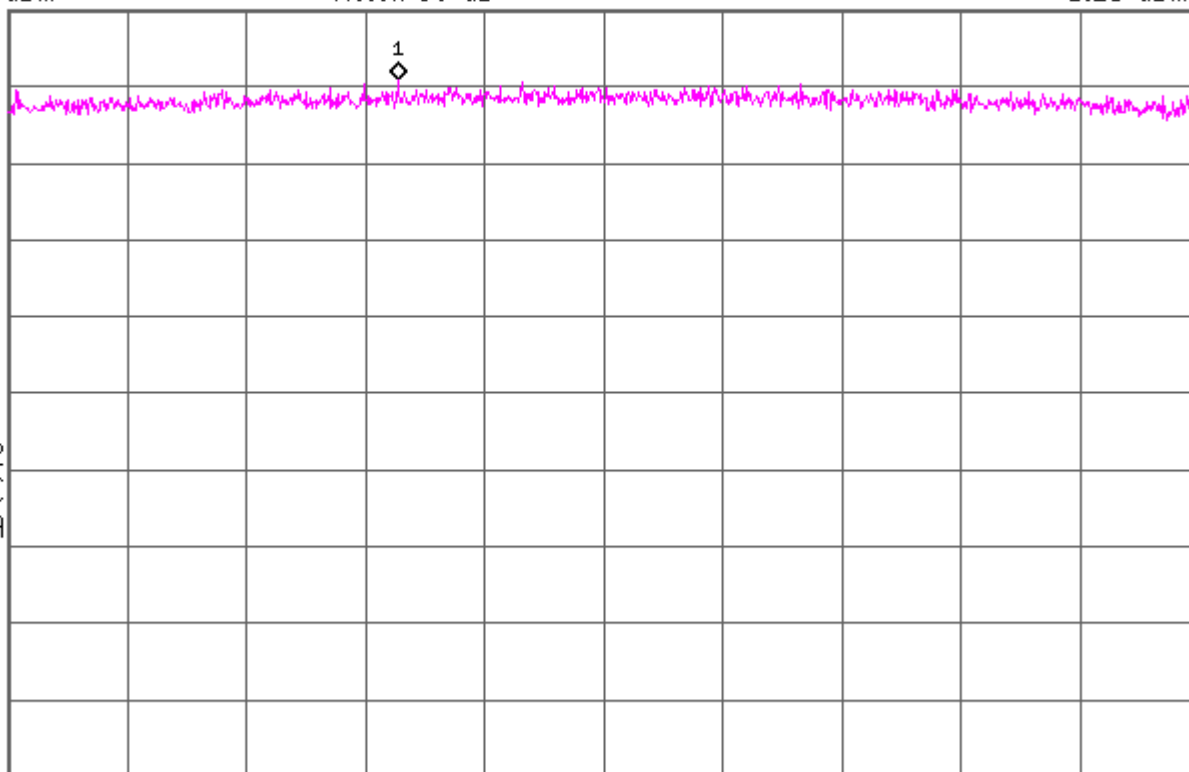
V3 FC

AA

$\mathcal{E}(f)$ :

$f > 50k$

#Swp



Center 2.412 000 GHz

Span 6 MHz

#Res BW 3 kHz

#VBW 10 kHz

#Sweep 2 ks (1001 pts)

# Power spectral density

Channel 6, 1 MB rate

Agilent 14:03:15 Jul 24, 2008

Mkr1 2.436 304 GHz  
-1.87 dBm

Ref 8 dBm

#Atten 30 dB

#Peak

Log

10

dB/

Offst

1.3

dB

LgAv

S1 S2

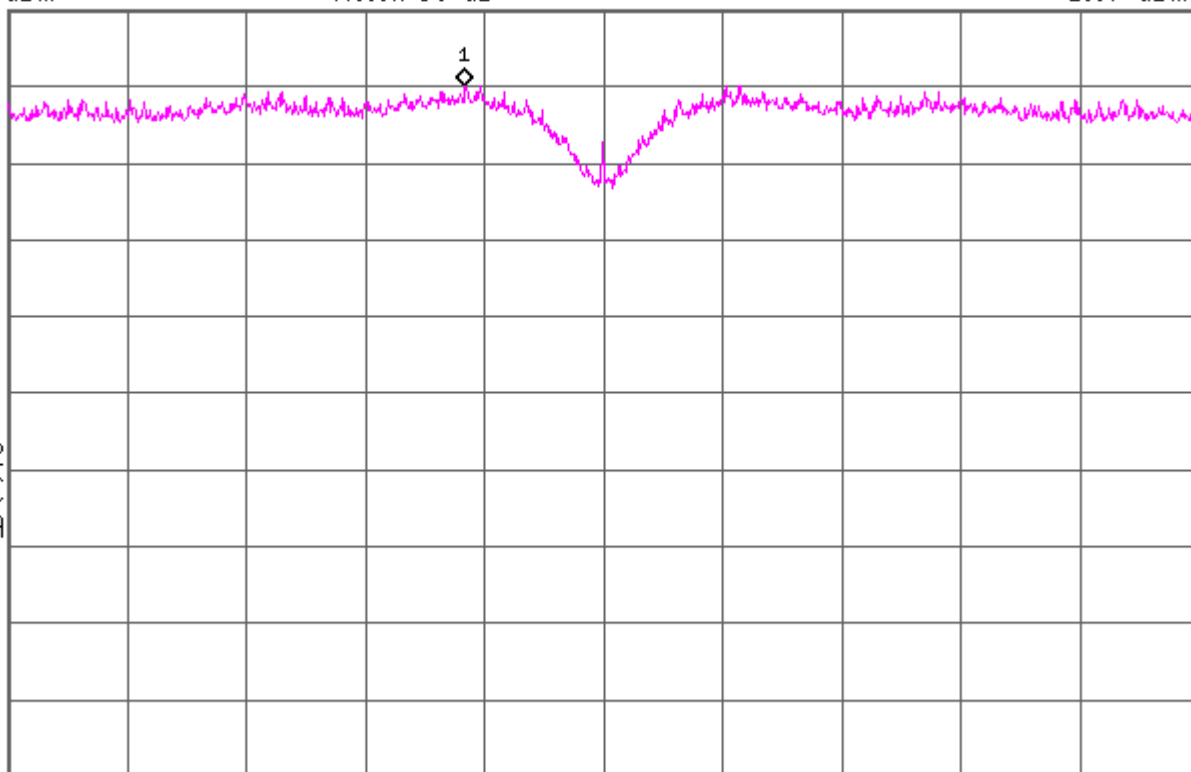
V3 FC

AA

$\mathcal{E}(f)$ :

$f > 50k$

#Swp



Center 2.437 000 GHz

Span 6 MHz

#Res BW 3 kHz

#VBW 10 kHz

#Sweep 2 ks (1001 pts)

Power spectral density

Channel 6, 2 MB rate

Agilent 14:37:47 Jul 24, 2008

Mkr1 2.437 792 GHz  
-1.54 dBm

Ref 8 dBm

#Atten 30 dB

#Peak

Log

10

dB/

Offst

1.3

dB

LgAv

S1 S2

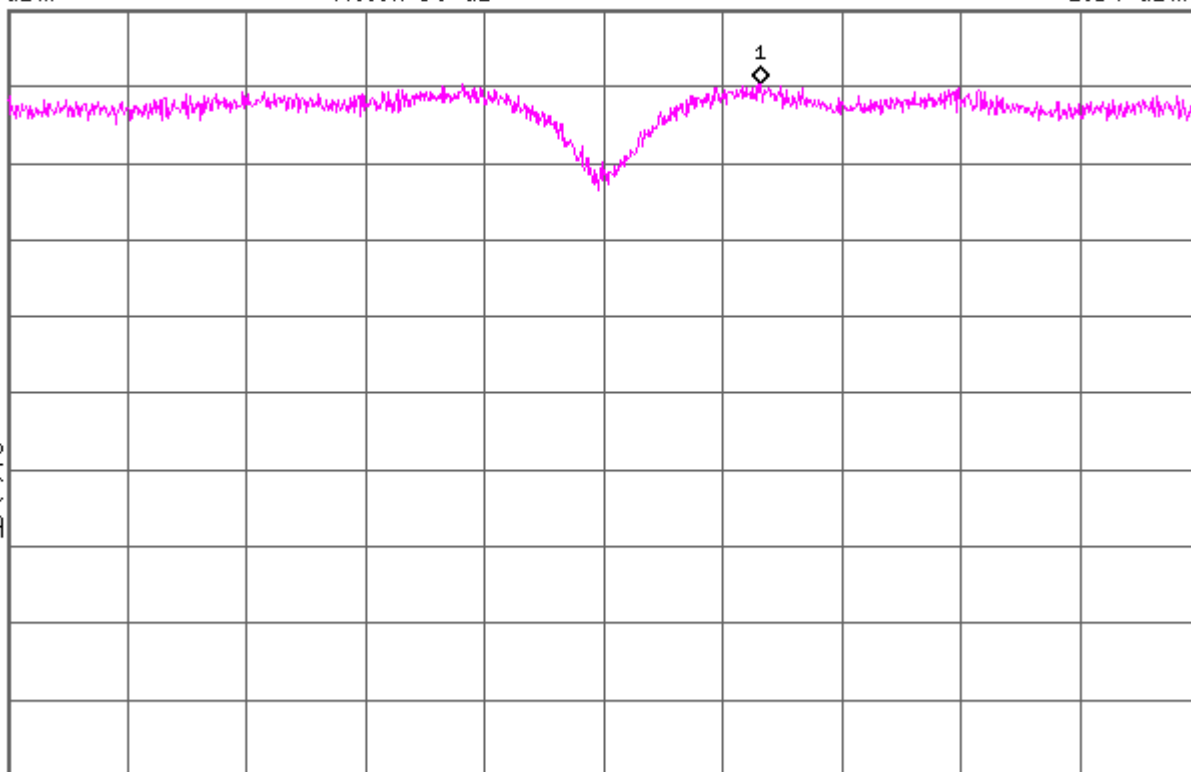
V3 FC

AA

$\mathcal{E}(f)$ :

$f > 50k$

#Swp



Center 2.437 000 GHz

Span 6 MHz

#Res BW 3 kHz

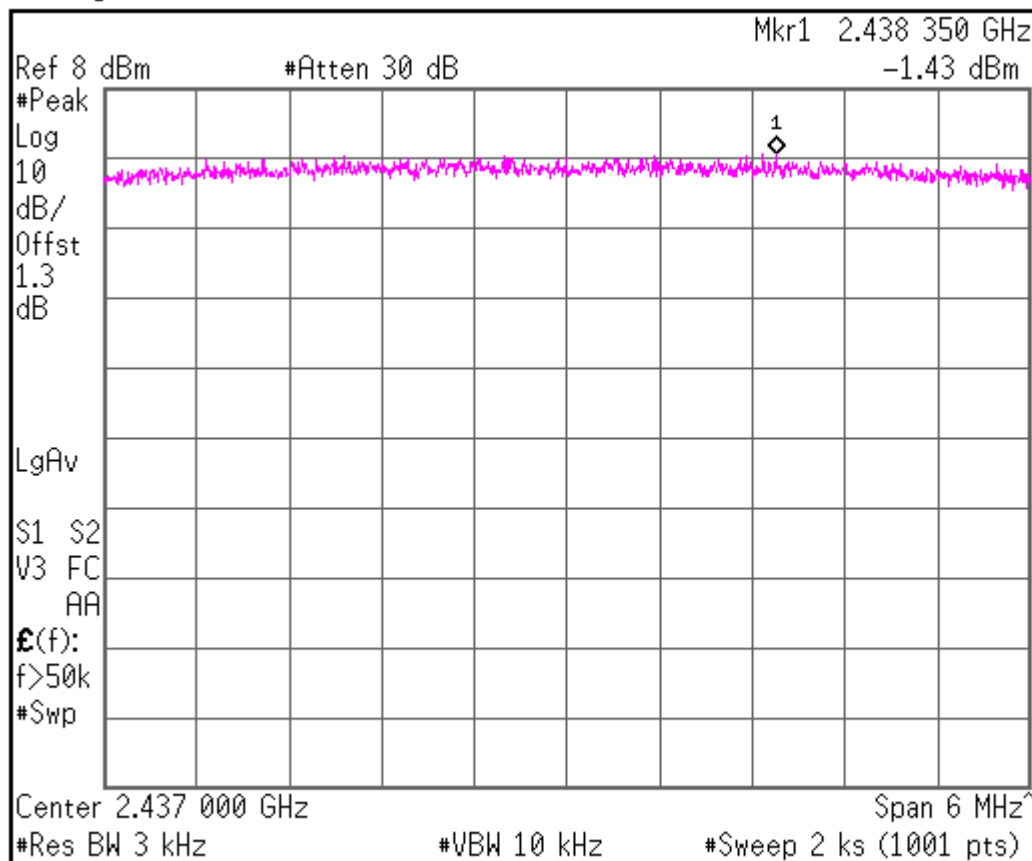
#VBW 10 kHz

#Sweep 2 ks (1001 pts)

Power spectral density

Channel 6, 5 MB rate

Agilent 15:12:59 Jul 24, 2008



Title
Change Title
Clear Title

File Operation Status, A:\SCREN033.GIF file saved

Power spectral density

Channel 6, 11 MB rate

Agilent 15:47:49 Jul 24, 2008

Mkr1 2.436 994 GHz  
-11.90 dBm

Ref 8 dBm

#Atten 30 dB

#Peak

Log

10

dB/

Offst

1.3

dB

LgAv

S1 S2

V3 FC

AA

$\mathcal{E}(f)$ :

f>50k

#Swp

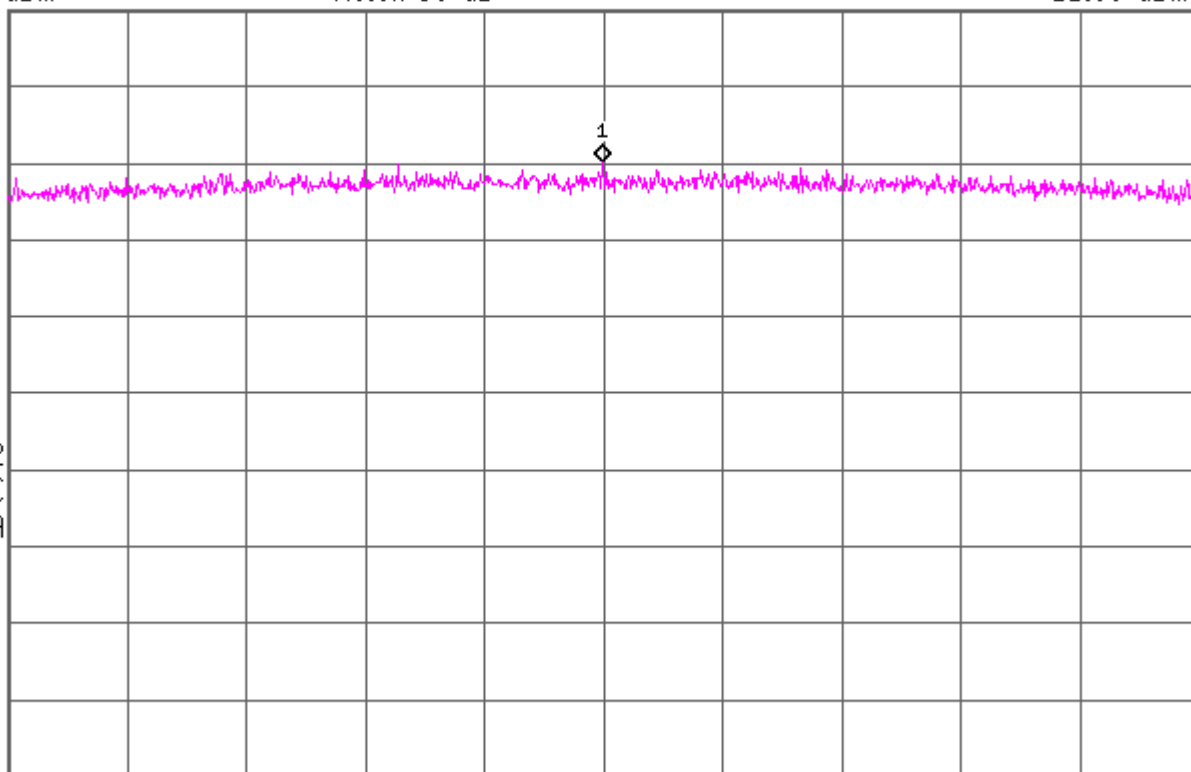
Center 2.437 000 GHz

#Res BW 3 kHz

#VBW 10 kHz

Span 6 MHz

#Sweep 2 ks (1001 pts)





Power spectral density

Channel 11, 1 MB rate

Agilent 11:26:27 Jul 31, 2008

Mkr1 2.462 690 GHz  
-1.82 dBm

Ref 8 dBm

#Atten 30 dB

#Peak

Log

10

dB/

Offst

1.3

dB

LgAv

S1 S2

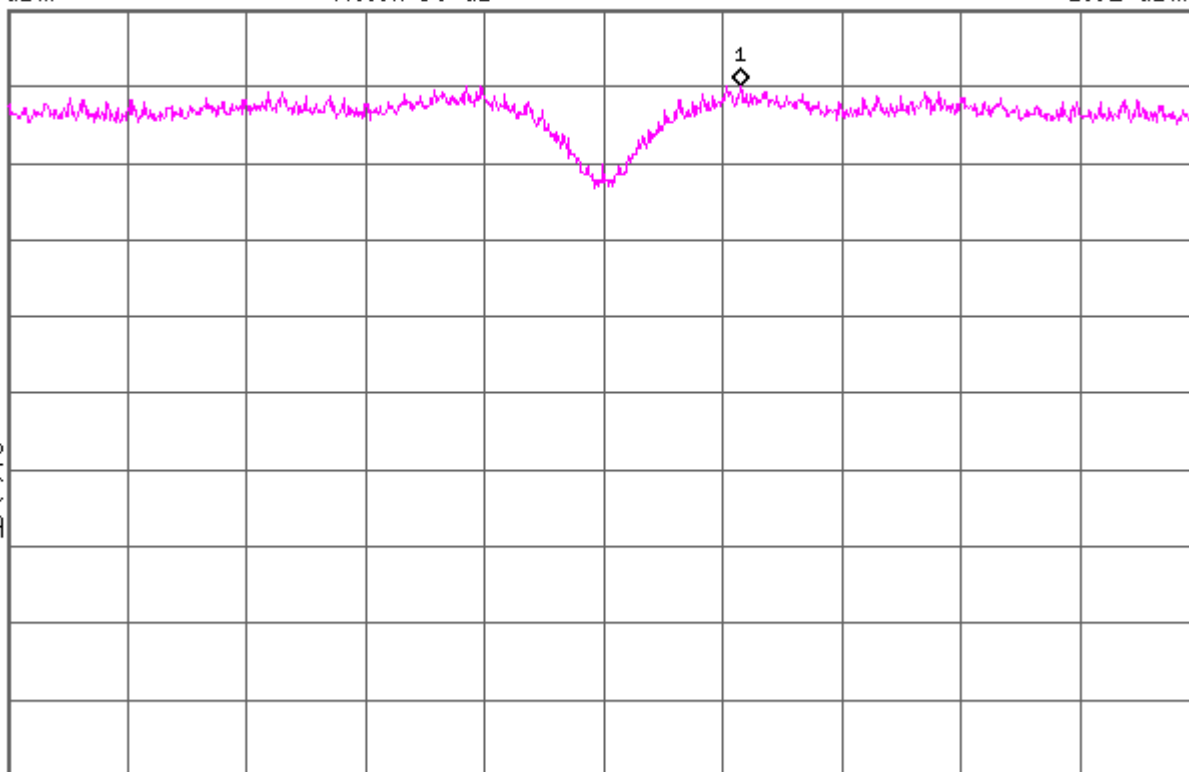
V3 FC

AA

$\mathcal{E}(f)$ :

$f > 50k$

#Swp



Center 2.462 000 GHz

Span 6 MHz

#Res BW 3 kHz

#VBW 10 kHz

#Sweep 2 ks (1001 pts)

Power spectral density

Channel 11, 2 MB rate

Agilent 12:02:30 Jul 31, 2008

Mkr1 2.462 786 GHz  
-1.96 dBm

Ref 8 dBm

#Atten 30 dB

#Peak

Log

10

dB/

Offst

1.3

dB

LgAv

S1 S2

V3 FC

AA

$\mathcal{E}(f)$ :

f>50k

#Swp

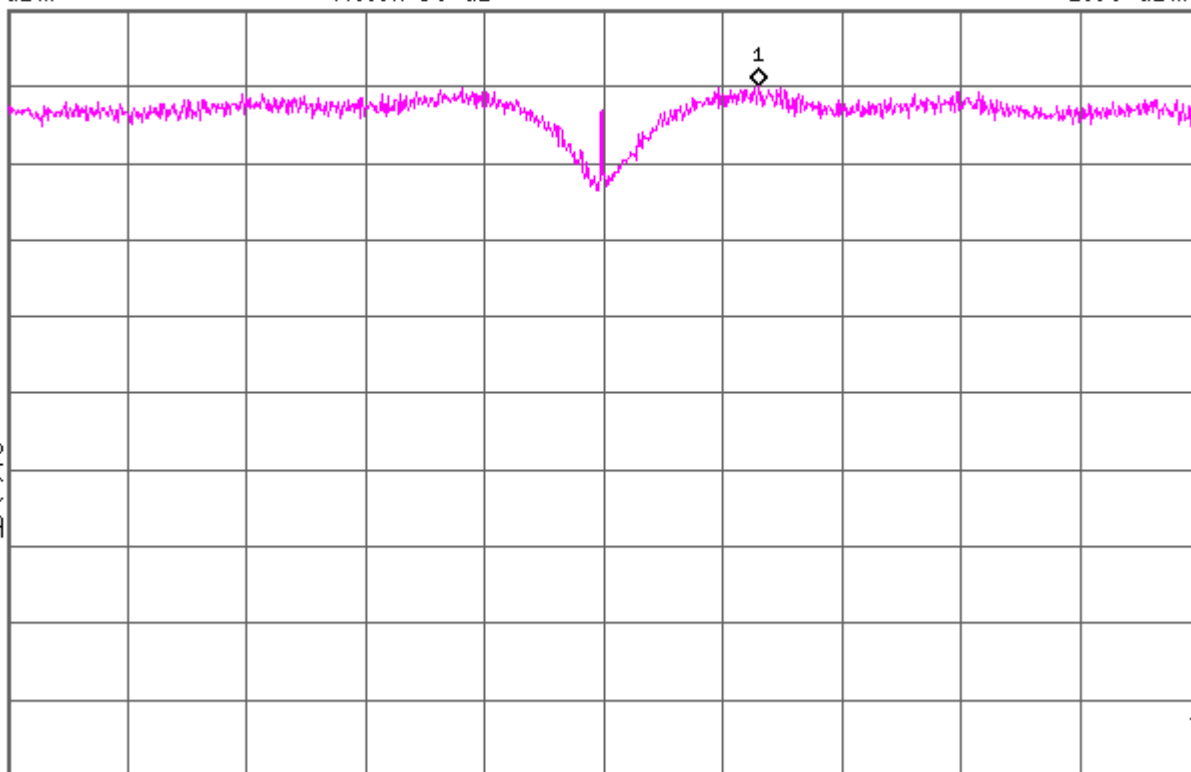
Center 2.462 000 GHz

Span 6 MHz

#Res BW 3 kHz

#VBW 10 kHz

#Sweep 2 ks (1001 pts)



Power spectral density

Channel 11, 5 MB rate

Agilent 12:37:37 Jul 31, 2008

Mkr1 2.461 202 GHz  
-1.75 dBm

Ref 8 dBm

#Atten 30 dB

#Peak

Log

10

dB/

Offst

1.3

dB

LgAv

S1 S2

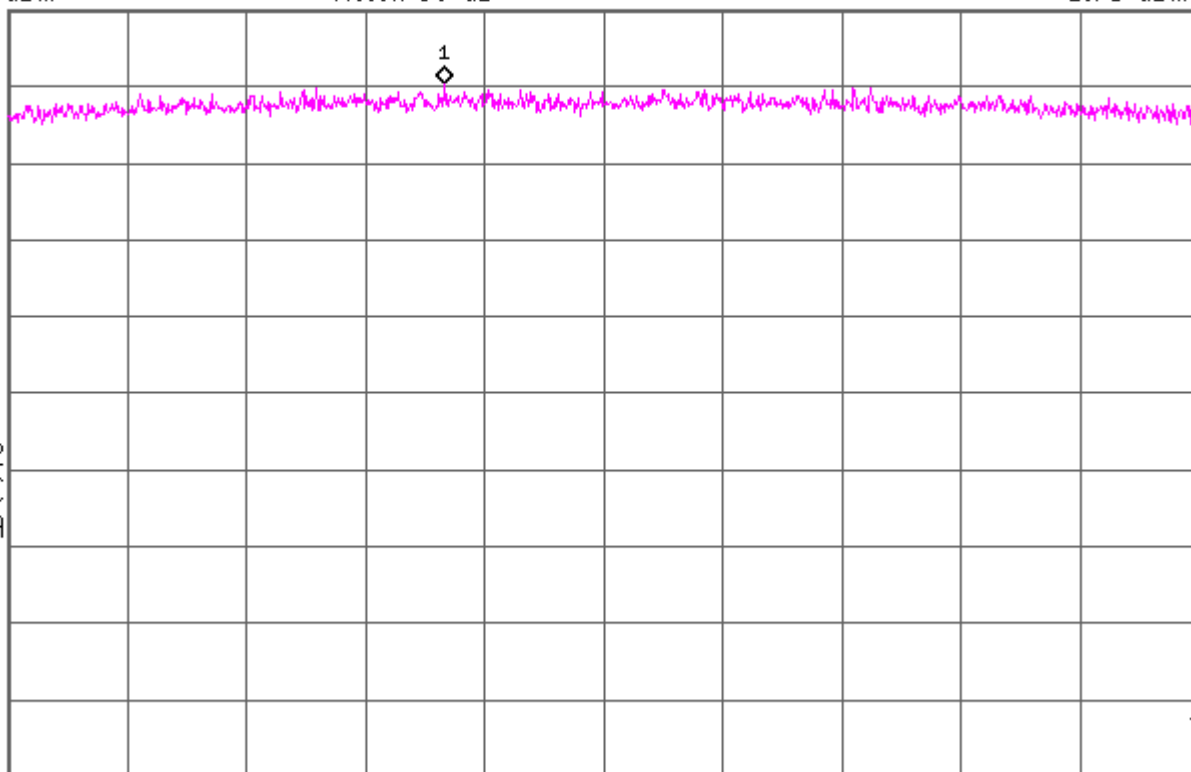
V3 FC

AA

$\mathcal{E}(f)$ :

$f > 50k$

#Swp



Center 2.462 000 GHz

Span 6 MHz

#Res BW 3 kHz

#VBW 10 kHz

#Sweep 2 ks (1001 pts)

Power spectral density

Channel 11, 11 MB rate

Agilent 13:13:37 Jul 31, 2008

Mkr1 2.460 956 GHz  
-1.93 dBm

Ref 8 dBm

#Atten 30 dB

#Peak

Log

10

dB/

Offst

1.3

dB

LgAv

S1 S2

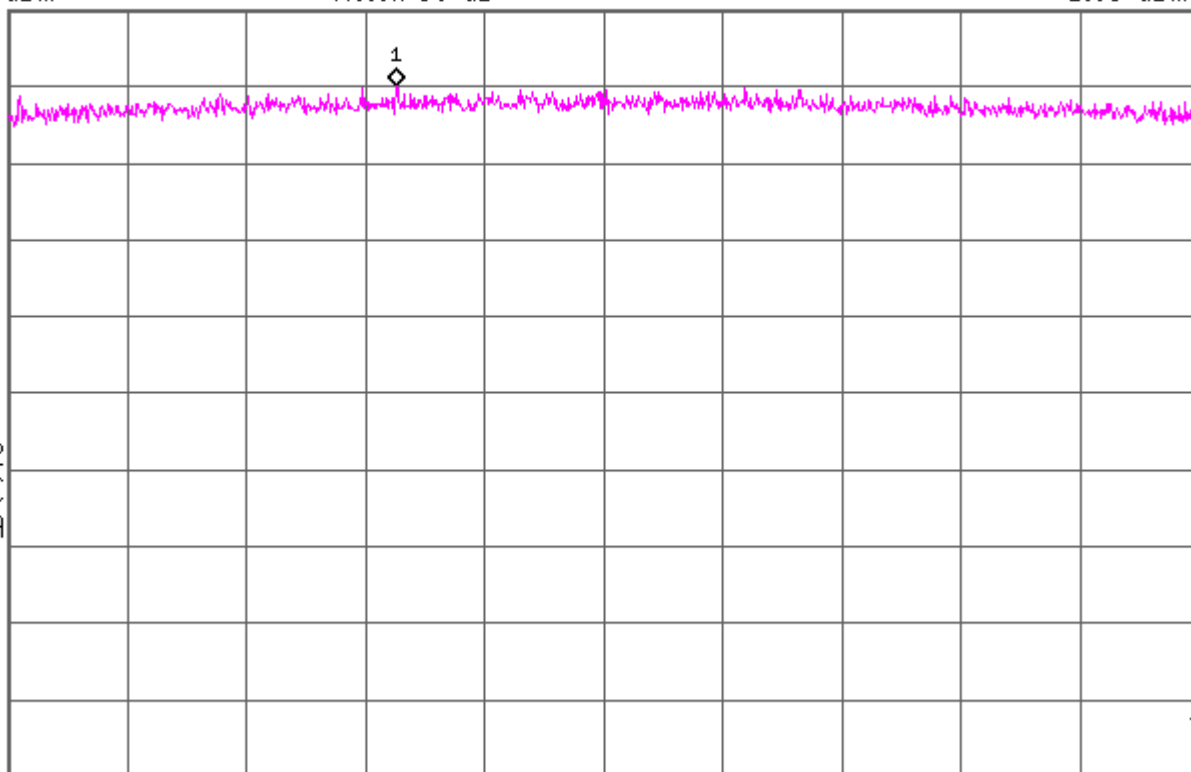
V3 FC

AA

$\mathcal{E}(f)$ :

$f > 50k$

#Swp



Center 2.462 000 GHz

Span 6 MHz

#Res BW 3 kHz

#VBW 10 kHz

#Sweep 2 ks (1001 pts)

## 99% Bandwidth IC RSS-GEN 4.6

### Test summary

The requirements are: ☒ - MET ☐ - NOT MET

Test was performed in accordance with the article "The Measurement of Occupied Bandwidth" by Industry Canada's certification bureau

99% Occupied bandwidth range is from 9.98 MHz to 10.30 MHz.

### Test location

☐ - Wild River Lab Large Test Site (Open Area Test Site)

☐ - Wild River Lab Small Test Site (Open Area Test Site)

☒ - Wild River Lab Tech Area, conducted measurement

### Test equipment

TUV ID	Model	Manufacturer	Description	Serial	Cal Due
WRLE03371	E4440A	Agilent	Spectrum Analyzer	MY43362222	19-Dec-08

### Test limit

Not applicable

### Test data

See following pages

99% Occupied bandwidth

Channel 6, 1 MB rate, 1 of 2

Agilent 13:24:56 Jul 31, 2008

Mkr1 2.437 30 GHz  
132.75 dB $\mu$ V

Ref 138.3 dB $\mu$ V

#Atten 40 dB

#Peak

Log

10

dB/

Offst

1.3

dB

LgAv

S1 S2

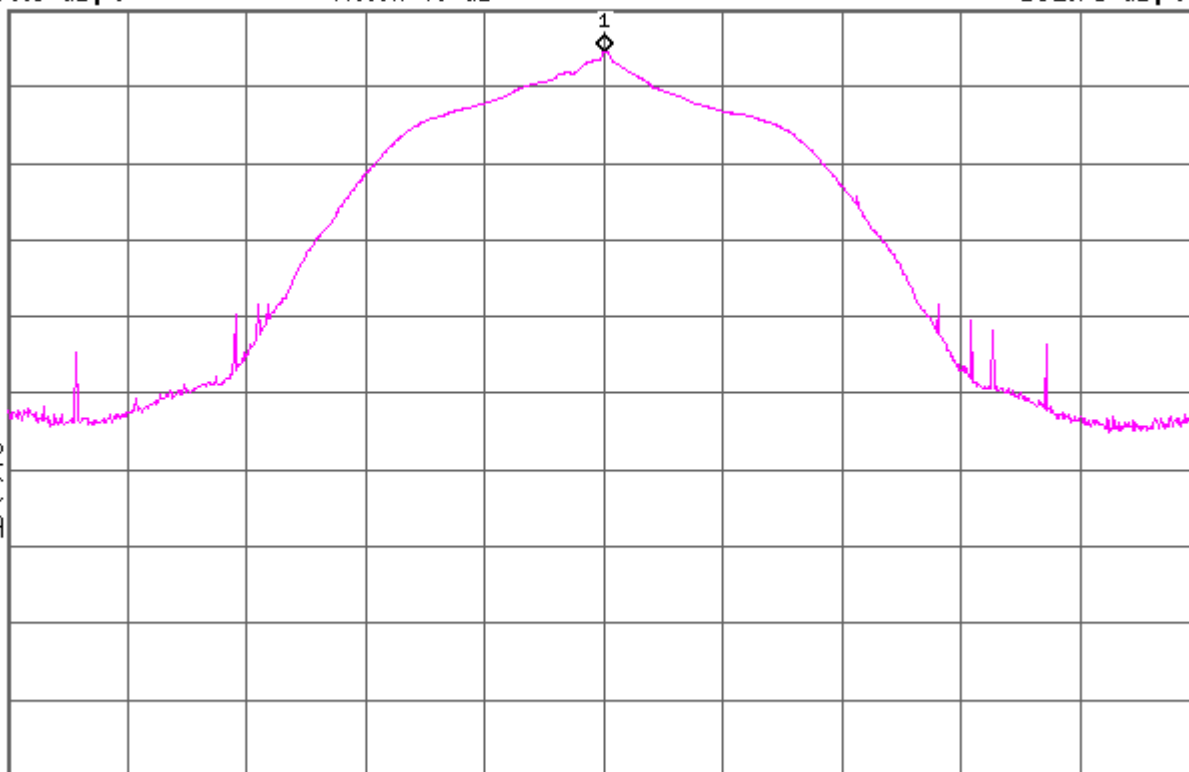
V3 FC

AA

$\mathcal{E}(f)$ :

FTun

#Swp



Center 2.437 25 GHz

#Res BW 8 MHz

#VBW 50 MHz

Span 50 MHz

Sweep 1 ms (1001 pts)

99% Occupied bandwidth

Channel 6, 1 MB rate, 2 of 2

Agilent 13:33:56 Jul 31, 2008

Ref lvl = pk when RBW > EBW

Ref 132.7 dB $\mu$ V

#Atten 40 dB

▲ Mkr1 10.00 MHz

-0.28 dB

#Peak

Log

10

dB/

Offst

1.3

dB

DI

112.7

dB $\mu$ V

LgAv

S1 S2

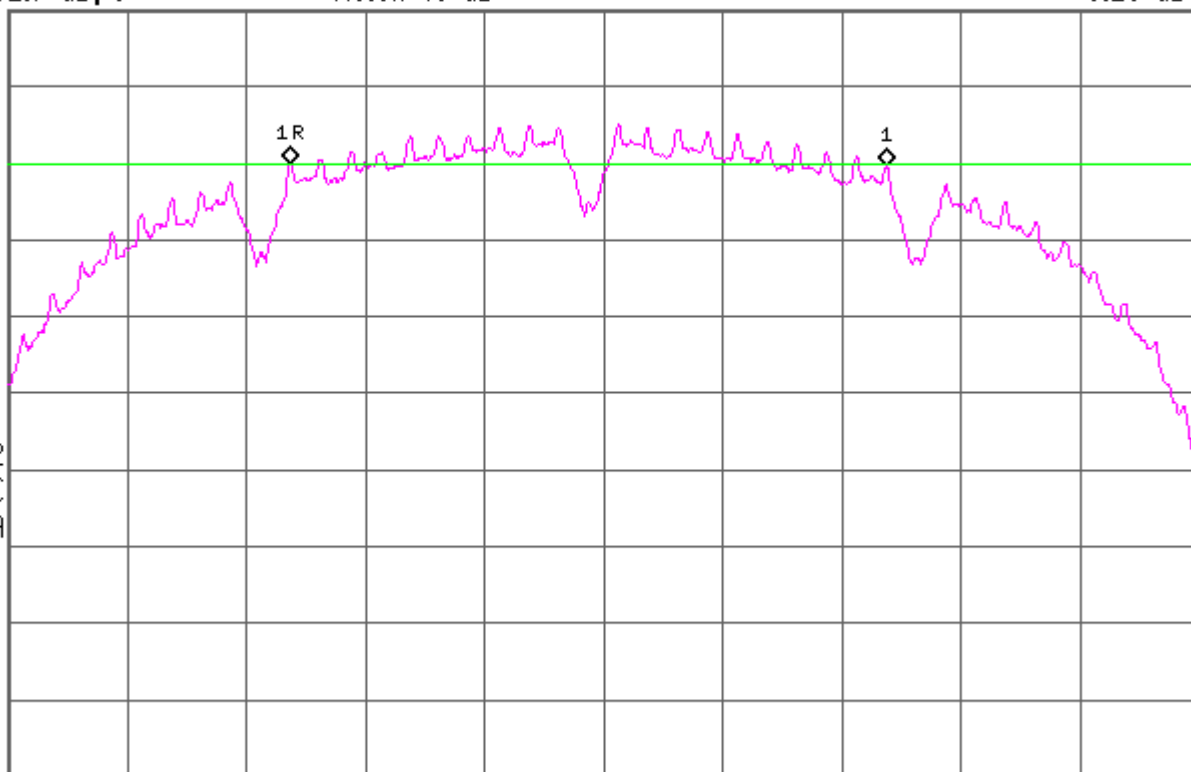
V3 FC

AA

$\mathcal{E}(f)$ :

FTun

#Swp



Center 2.437 25 GHz

Span 20 MHz

#Res BW 100 kHz

VBW 300 kHz

Sweep 1.933 ms (1001 pts)

99% Occupied bandwidth

Channel 6, 2 MB rate, 1 of 2

Agilent 13:43:28 Jul 31, 2008

Mkr1 2.437 40 GHz  
133.26 dB $\mu$ V

Ref 138.3 dB $\mu$ V

#Atten 40 dB

#Peak

Log

10

dB/

Offst

1.3

dB

LgAv

S1 S2

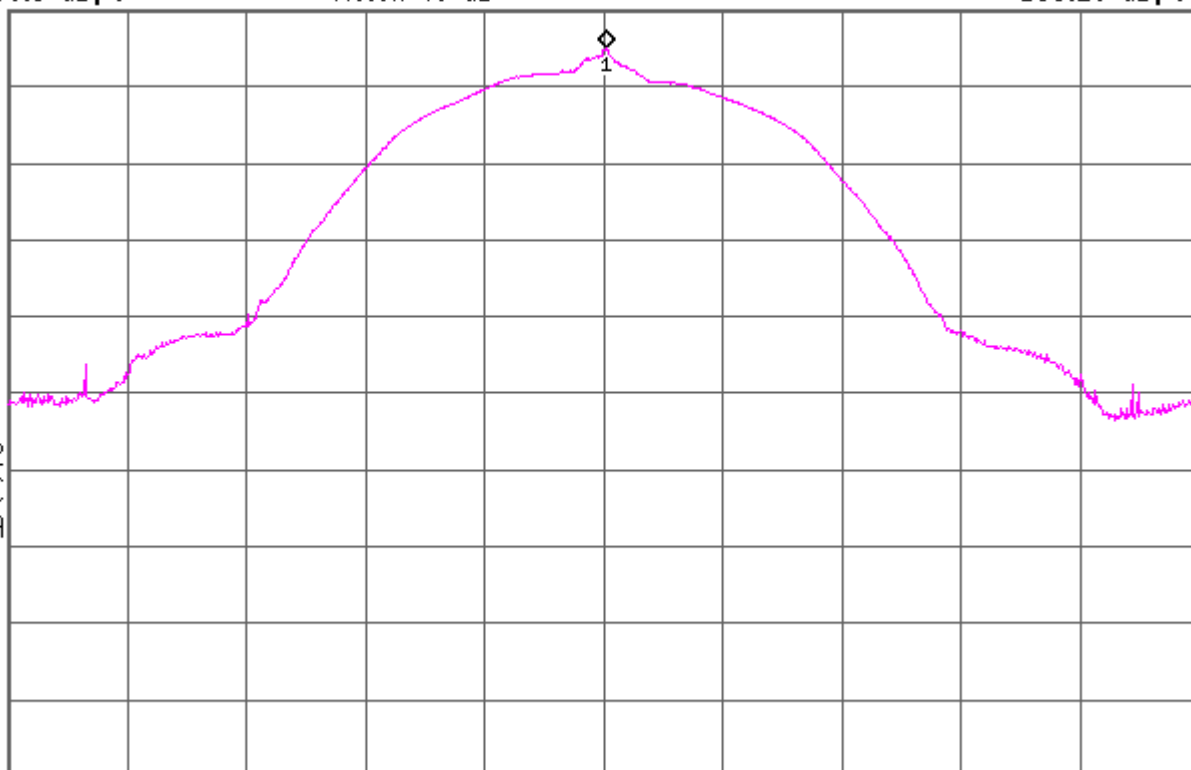
V3 FC

AA

$\mathcal{E}(f)$ :

FTun

#Swp



Center 2.437 25 GHz

#Res BW 8 MHz

#VBW 50 MHz

Span 50 MHz

Sweep 1 ms (1001 pts)



99% Occupied bandwidth

Channel 6, 2 MB rate, 2 of 2

Agilent 13:58:33 Jul 31, 2008

Ref lvl = pk when RBW > EBW

Ref 133.3 dB $\mu$ V

#Atten 40 dB

▲ Mkr1 9.98 MHz

0.28 dB

#Peak

Log

10

dB/

Offst

1.3

dB

DI

113.3

dB $\mu$ V

LgAv

S1 S2

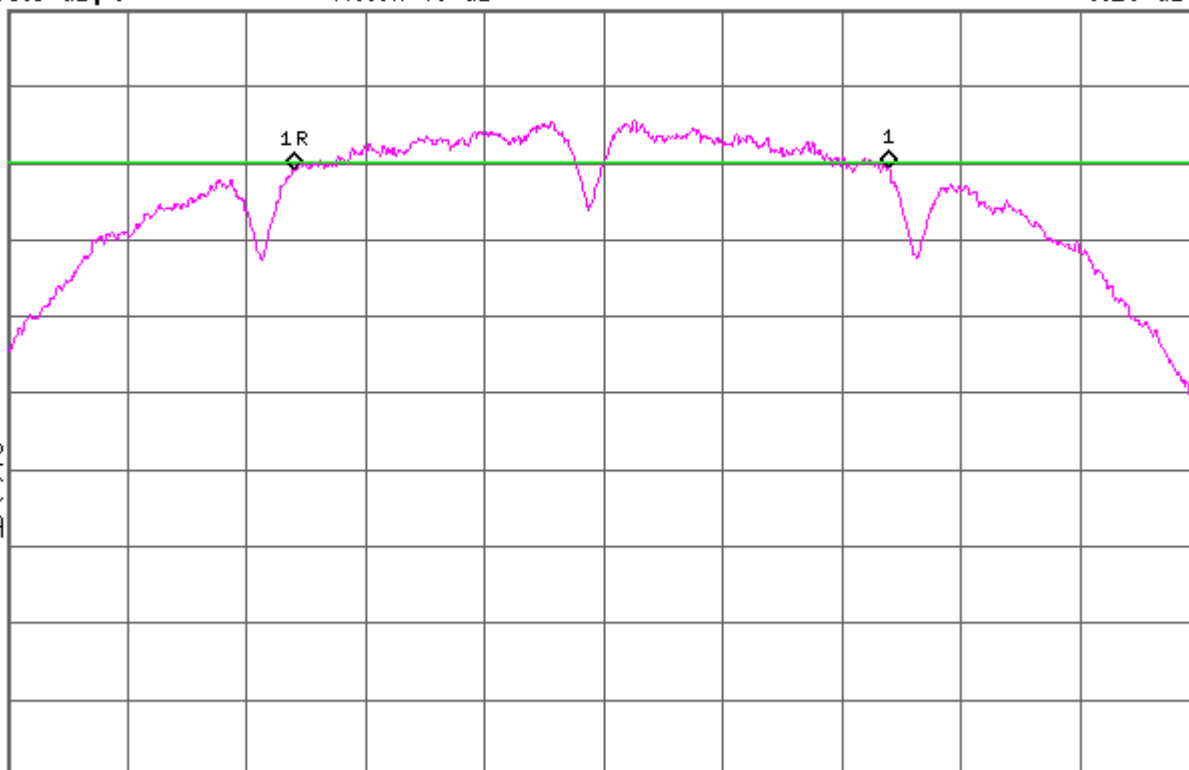
V3 FC

AA

$\mathcal{E}(f)$ :

FTun

#Swp



Center 2.437 25 GHz

Span 20 MHz

#Res BW 100 kHz

VBW 300 kHz

Sweep 1.933 ms (1001 pts)

99% Occupied bandwidth

Channel 6, 5 MB rate, 1 of 2

Agilent 13:45:51 Jul 31, 2008

Mkr1 2.437 40 GHz  
133.18 dB $\mu$ V

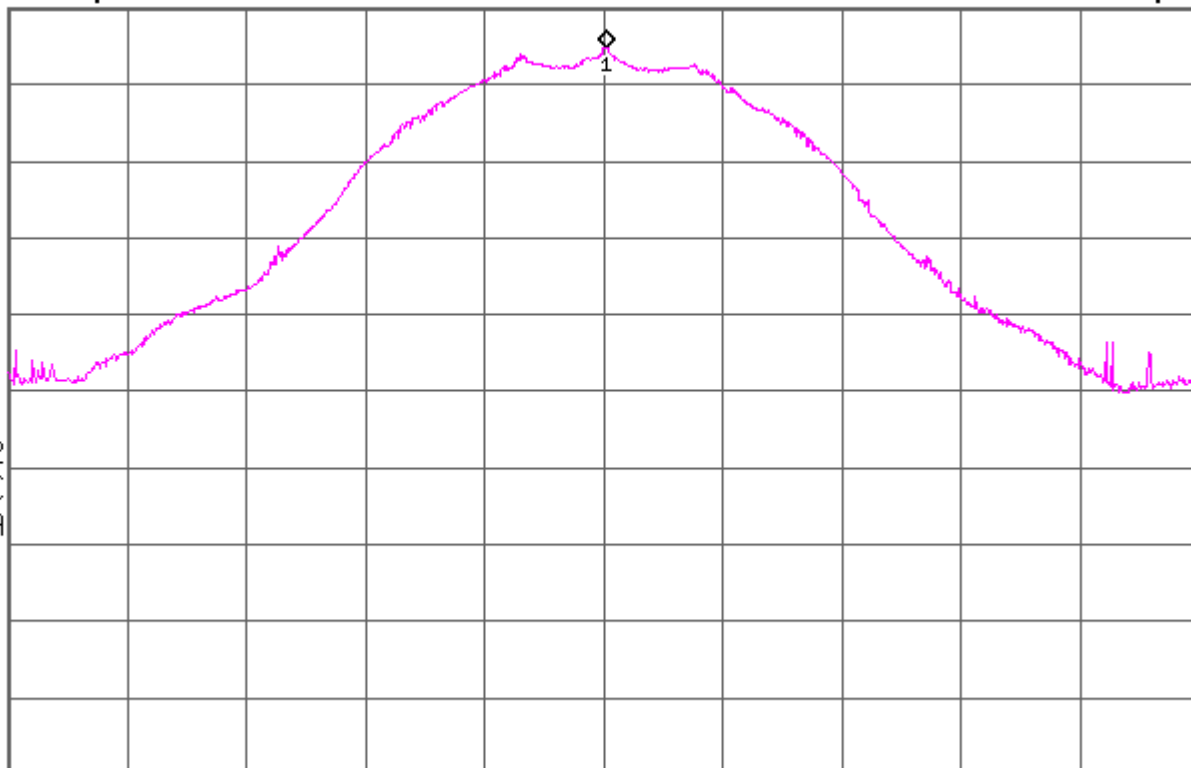
Ref 138.3 dB $\mu$ V

#Atten 40 dB

#Peak  
Log  
10  
dB/  
Offst  
1.3  
dB

LgAv

S1 S2  
V3 FC  
AA  
E(f):  
FTun  
#Swp



Center 2.437 25 GHz

#Res BW 8 MHz

#VBW 50 MHz

Span 50 MHz

Sweep 1 ms (1001 pts)

99% Occupied bandwidth

Channel 6, 5 MB rate, 2 of 2

Agilent 13:55:32 Jul 31, 2008

Ref lvl = pk when RBW > EBW

▲ Mkr1 10.18 MHz

Ref 133.2 dB $\mu$ V

#Atten 40 dB

0.36 dB

#Peak

Log

10

dB/

Offst

1.3

dB

DI

113.2

dB $\mu$ V

LgAv

S1 S2

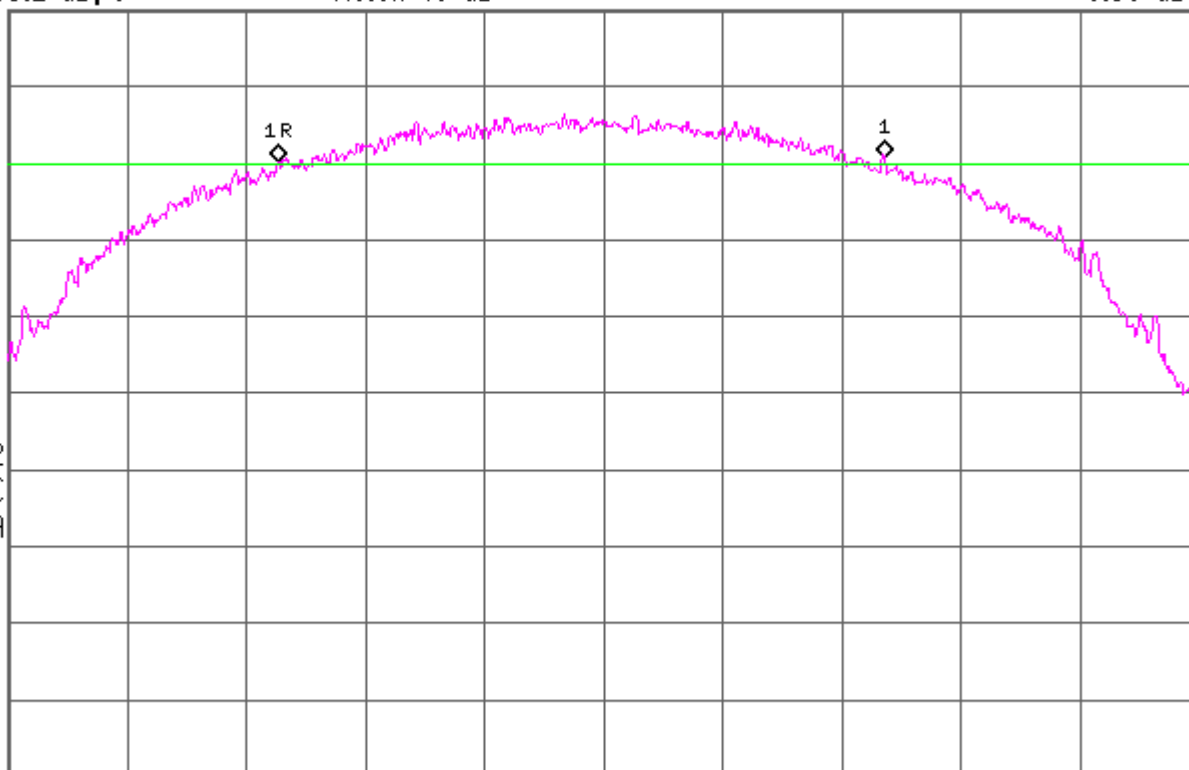
V3 FC

AA

$\mathcal{E}(f)$ :

FTun

#Swp



Center 2.437 25 GHz

Span 20 MHz

#Res BW 100 kHz

VBW 300 kHz

Sweep 1.933 ms (1001 pts)

99% Occupied bandwidth

Channel 6, 11 MB rate, 1 of 2

Agilent 13:46:41 Jul 31, 2008

Mkr1 2.437 25 GHz  
132.84 dB $\mu$ V

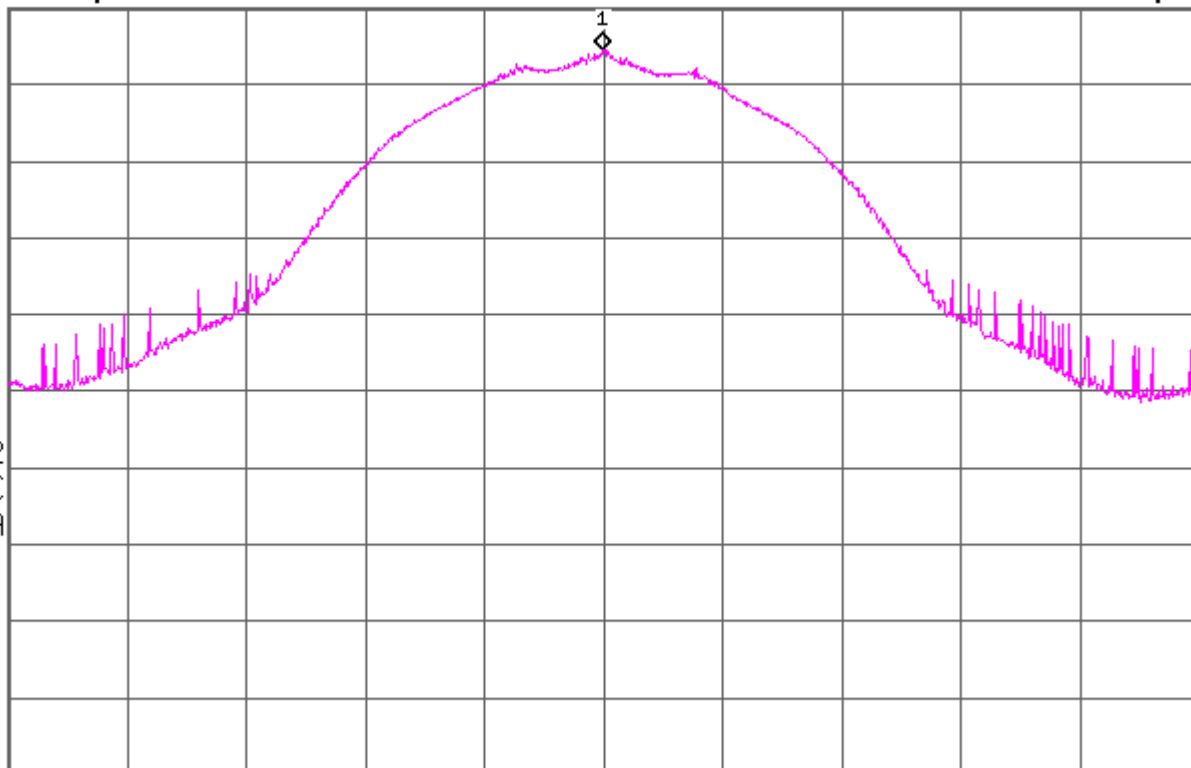
Ref 138.3 dB $\mu$ V

#Atten 40 dB

#Peak  
Log  
10  
dB/  
Offst  
1.3  
dB

LgAv

S1 S2  
V3 FC  
AA  
E(f):  
FTun  
#Swp



Center 2.437 25 GHz

#Res BW 8 MHz

#VBW 50 MHz

Span 50 MHz

Sweep 1 ms (1001 pts)

99% Occupied bandwidth

Channel 6, 11 MB rate, 2 of 2

Agilent 13:52:15 Jul 31, 2008

Ref lvl = pk when RBW > EBW

Ref 132.8 dB $\mu$ V

#Atten 40 dB

▲ Mkr1 10.30 MHz

0.22 dB

#Peak

Log

10

dB/

Offst

1.3

dB

DI

112.8

dB $\mu$ V

LgAv

S1 S2

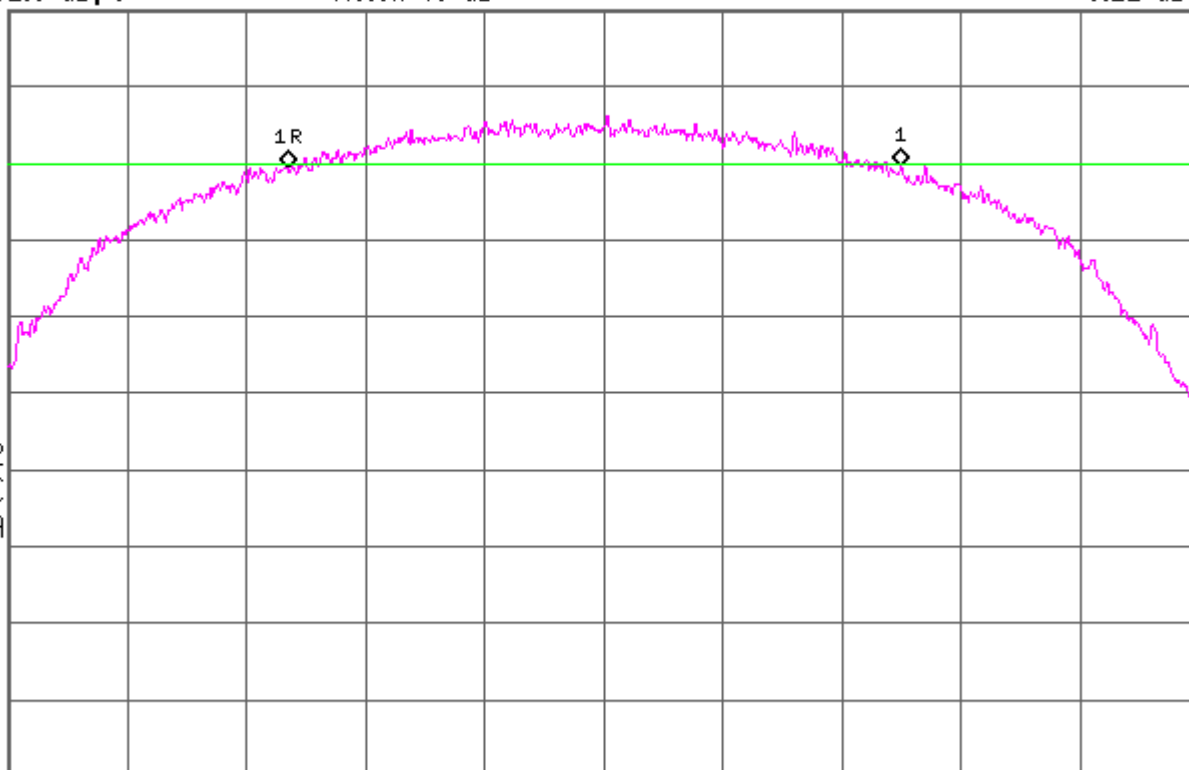
V3 FC

AA

$\mathcal{E}(f)$ :

FTun

#Swp



Center 2.437 25 GHz

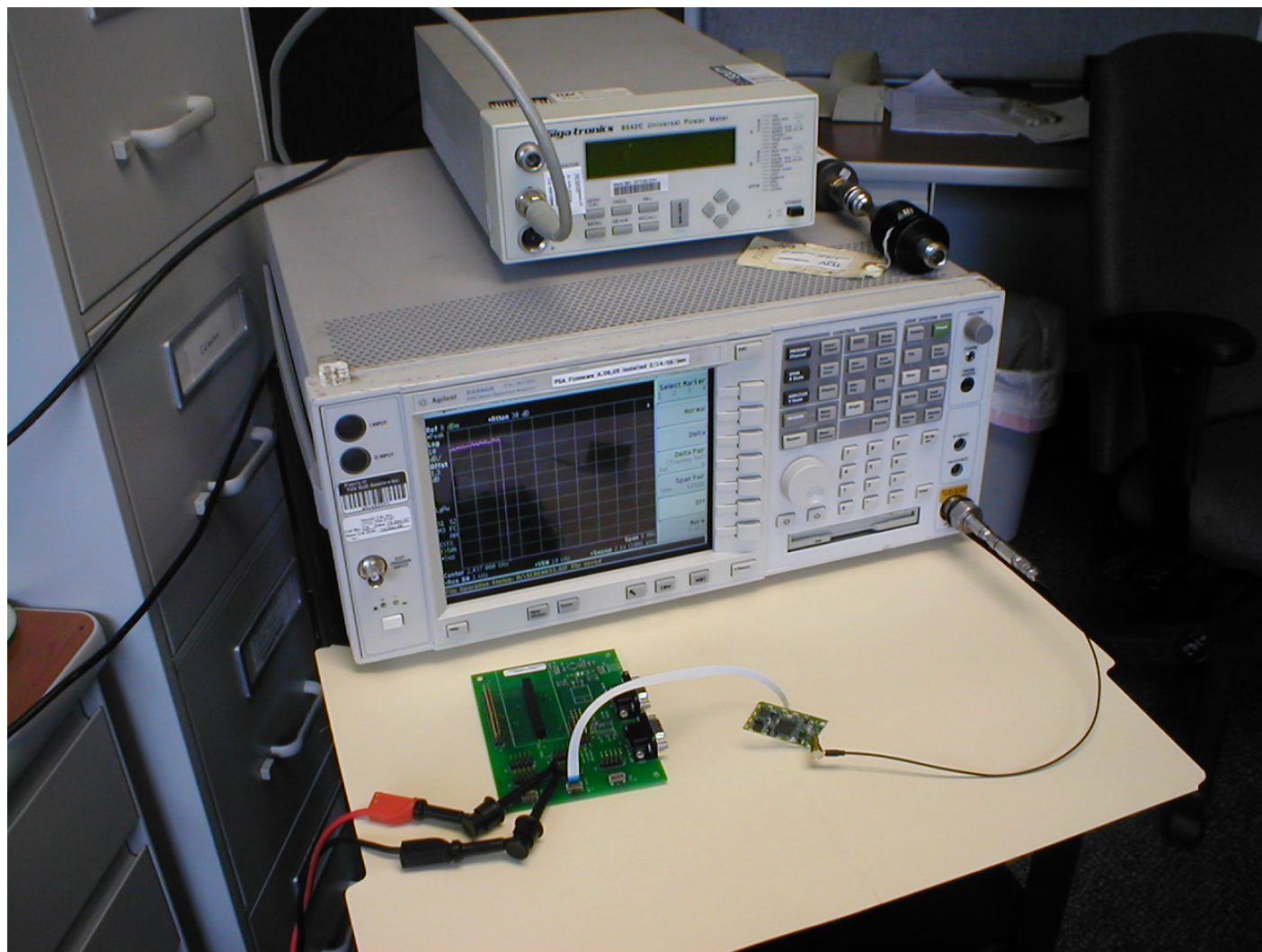
Span 20 MHz

#Res BW 100 kHz

VBW 300 kHz

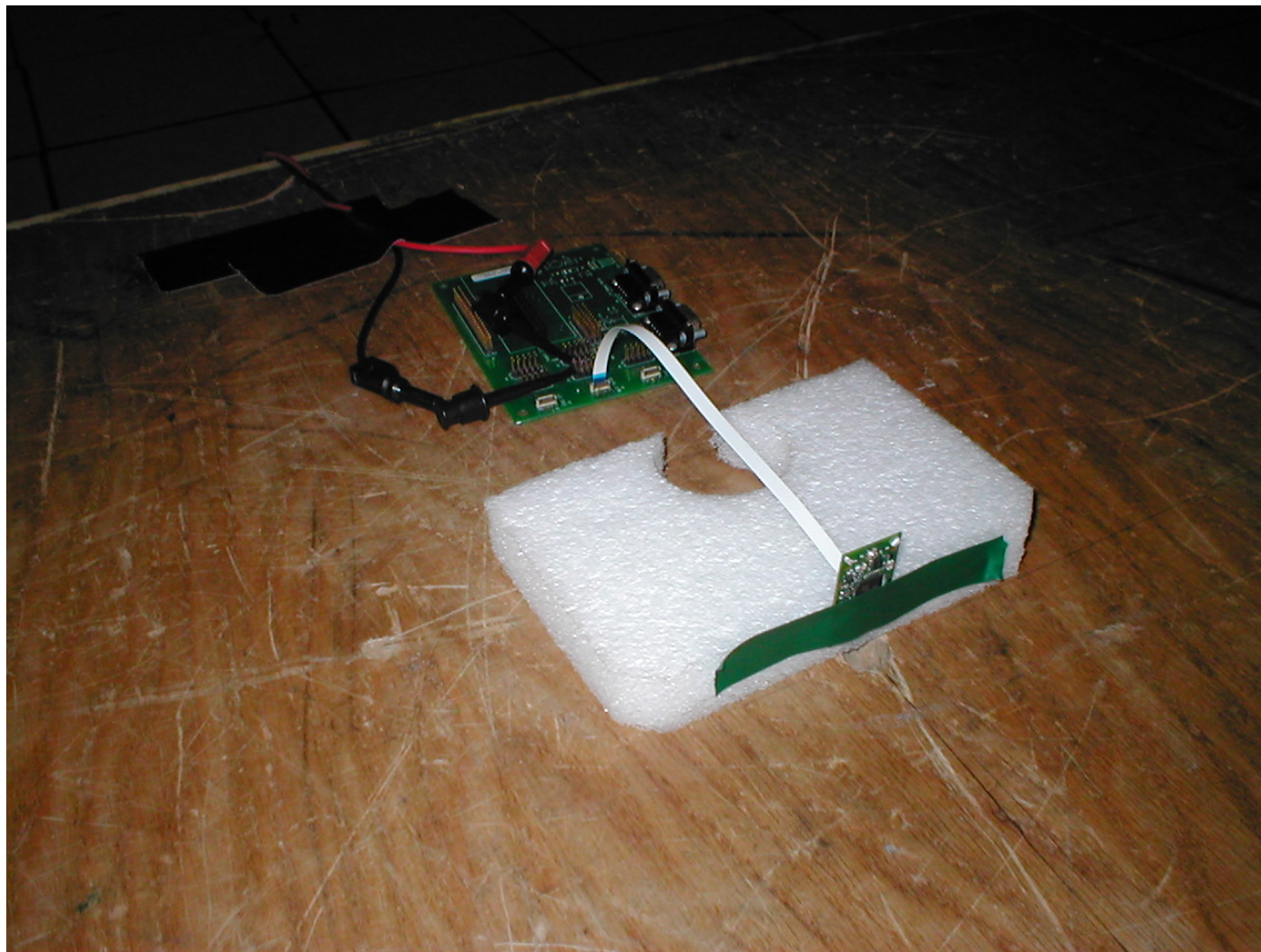
Sweep 1.933 ms (1001 pts)

**Test-setup photo(s):**  
**Conducted measurements**

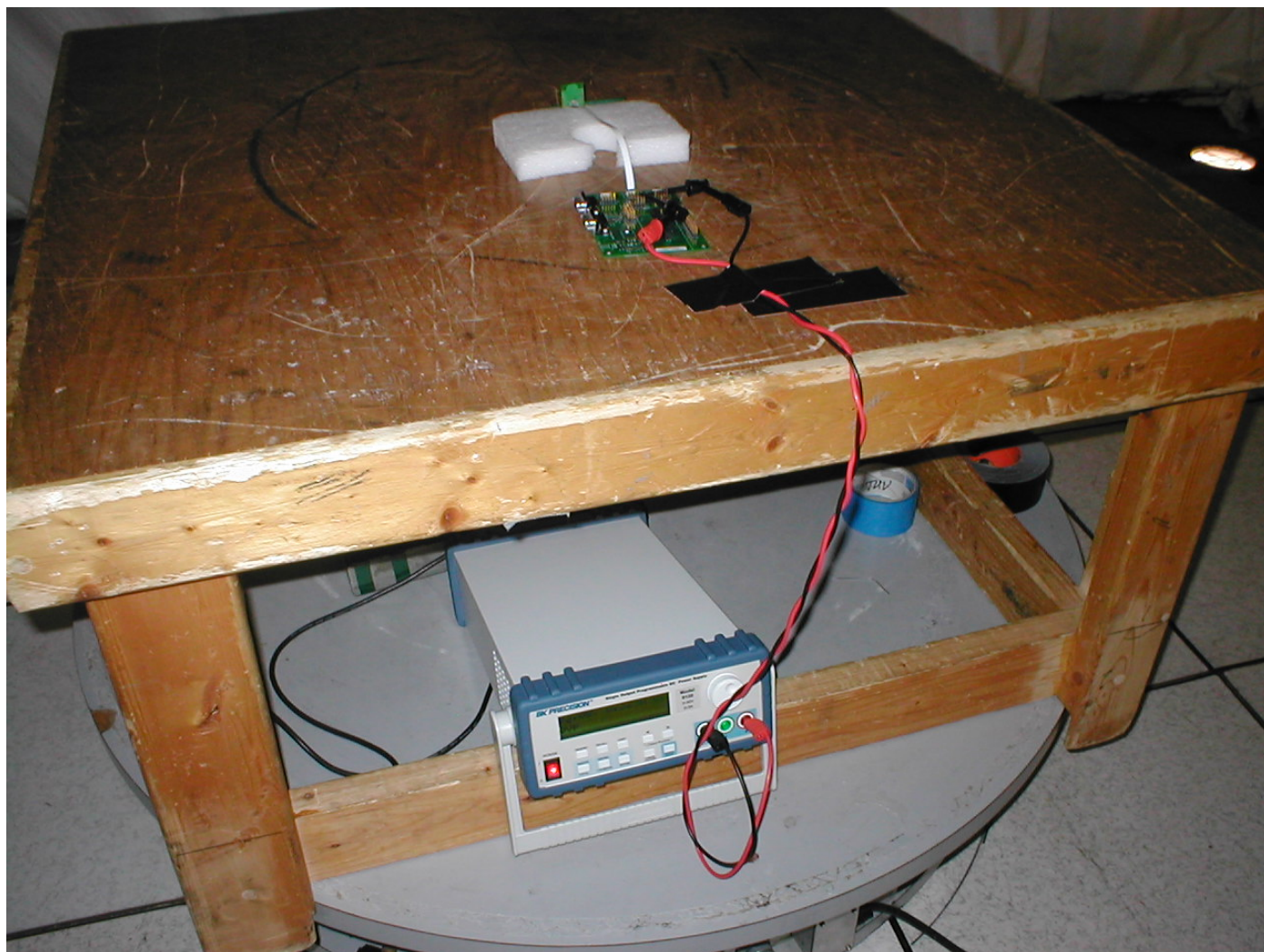




**Test-setup photo(s):**  
**Radiated measurements**



**Test-setup photo(s):**  
**Radiated measurements**





# Equipment Under Test (EUT) Test Operation Mode:

The device under test was operated under the following conditions during emissions testing:

- ☐ - Standby
- ☐ - Test program (H - Pattern)
- ☐ - Test program (color bar)
- ☐ - Test program (customer specific)
- ☐ - Practice operation
- ☐ - Normal Operating Mode
- ☒ - See Software and/or Operating Modes in Appendix A

## Configuration of the device under test:

- ☒ - See Constructional Data Form and Block Diagram in Appendix A
- ☐ - See Product Information Form in Appendix B

The following peripheral devices and interface cables were connected during the measurement:

- |   |                |
|---|----------------|
| <input checked="" type="checkbox"/> - 6" ribbon cable for DCV         | Type : _____   |
| <input checked="" type="checkbox"/> - Support board for DCV to ribbon | Type : _____   |
| <input checked="" type="checkbox"/> - DC power supply                 | Type : _____   |
| <input type="checkbox"/> - _____                                      | Type : _____   |
| <input type="checkbox"/> - _____                                      | Type : _____   |
| <input type="checkbox"/> - _____                                      | Type : _____   |
| <input type="checkbox"/> - _____                                      | Type : _____   |
| <input type="checkbox"/> - _____                                      | Type : _____   |
| <input type="checkbox"/> - unshielded power cable                     |                |
| <input type="checkbox"/> - unshielded cables                          |                |
| <input type="checkbox"/> - shielded cables                            | MPS.No.: _____ |
| <input type="checkbox"/> - customer specific cables                   |                |
| <input type="checkbox"/> - _____                                      |                |
| <input type="checkbox"/> - _____                                      |                |

## GENERAL REMARKS:

None

### Modifications required to pass:

- ☒ None
- ☐ As indicated on the data sheet(s)

### Test Specification Deviations: Additions to or Exclusions from:

- ☒ None
- ☐ As indicated in the Test Plan
- ☐

## SUMMARY:

The requirements according to the technical regulations are

- ☒ - met and the equipment under test does fulfill the general approval requirements.
- ☐ - **not** met and the equipment under test does **not** fulfill the general approval requirements.

EUT Received Date: 09 July 2008  
Condition of EUT: Normal  
Testing Start Date: 09 July 2008  
Testing End Date: 31 July 2008

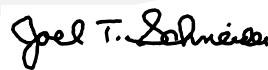
## TÜV SÜD AMERICA INC

Tested by:



Greg S Jakubowski  
Senior EMC Technician

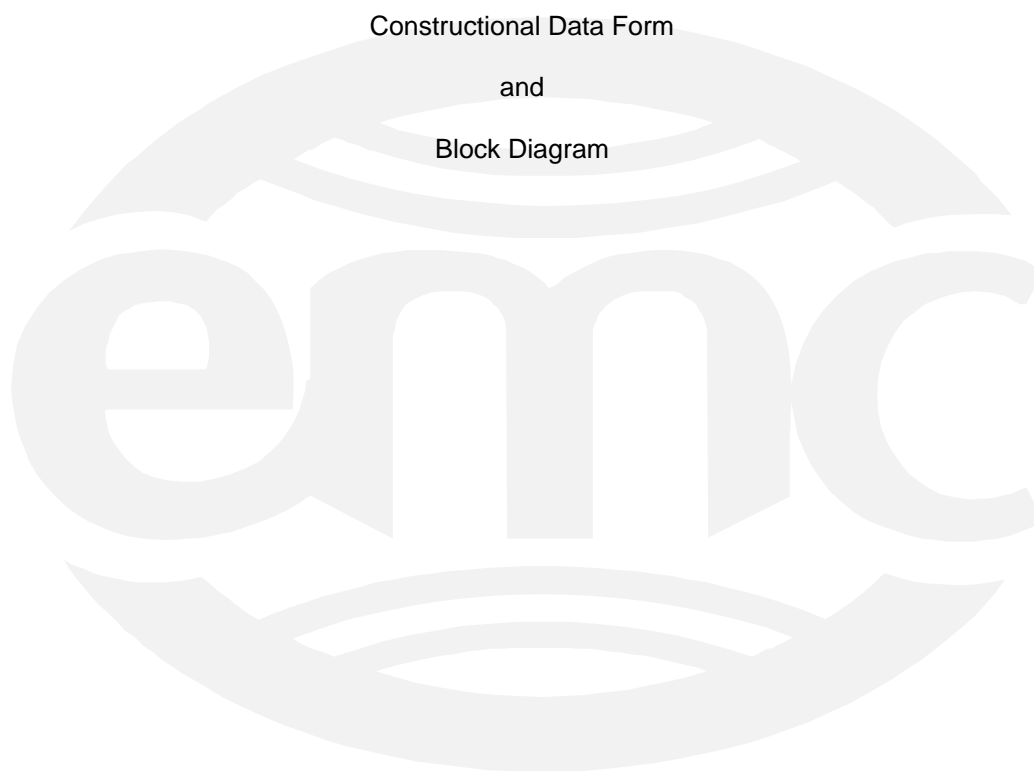
Approved by:



Joel T Schneider  
Senior EMC Engineer

## Appendix A

Constructional Data Form  
and  
Block Diagram





## EMC Test Plan and Constructional Data Form

PLEASE COMPLETE THIS DOCUMENT IN FULL, ENTERING N/A IF THE FIELD IS NOT APPLICABLE. IF TESTING RESULTS IN MODIFICATIONS TO THE EQUIPMENT, PLEASE SUBMIT A REVISED TP/CDF INDICATING THOSE MODIFICATIONS.

**NOTE: This information will be input into your test report as shown below. Press the F1 key at any time to get HELP for the current field selected.**

Company: Healthsense Inc.  
 Address: 1191 Northland Dr.  
Suite 100  
Mendota Heights, MN 55120  
 Contact: John Novotny Position: Principal Hardware Engineer  
 Phone: 952-400-7325 Fax: 952-400-0329  
 E-mail Address: john.novotny@healthsense.com

### General Equipment Description -- NOTE: This information will be input into your test report as shown below.

EUT Description WiFi 802.11 Module  
 EUT Name Modular Sensor Radio (MSR)  
 Model No.: 100033-0001-AA Serial No.: Multiple  
 Product Options: N/A  
 Configurations to be tested: Continuous transmit and normal operation

### Equipment Modification (If applicable, indicate modifications since EUT was last tested. If modifications are made during this testing, submit revised TP/CDF after testing is complete.)

Modifications since last test: N/A  
 Modifications made during test: N/A

### Test Objective(s): Please indicate the tests to be performed, entering the applicable standard(s) where noted.

- |   |  |
|---|--|
| <input type="checkbox"/> EMC Directive 2004/108/EC (EMC)  | <input checked="" type="checkbox"/> FCC: Class <input type="checkbox"/> A <input checked="" type="checkbox"/> B Part <u>15</u> |
| Std: _____  | <input type="checkbox"/> VCCI: Class <input type="checkbox"/> A <input type="checkbox"/> B                                     |
| <input type="checkbox"/> Machinery Directive 89/392/EEC (EMC)   | <input type="checkbox"/> BSMI: Class <input type="checkbox"/> A <input type="checkbox"/> B (Separate Report)                   |
| Std: _____  | <input checked="" type="checkbox"/> Canada: Class <input type="checkbox"/> A <input checked="" type="checkbox"/> B ue          |
| <input type="checkbox"/> Medical Device Directive 93/42/EEC (EMC)   | <input type="checkbox"/> Australia: Class <input type="checkbox"/> A <input type="checkbox"/> B                                |
| Std: _____  | <input checked="" type="checkbox"/> Other: <u>Subpart C and RSS 10 Canada</u>  |
| <input type="checkbox"/> Vehicle Directive: <input type="checkbox"/> 2001/3/EC (EMC) <input type="checkbox"/> 2004/104/EC (EMC) |  |
| <input type="checkbox"/> Other Vehicle Std: _____   |  |
| <input type="checkbox"/> FDA Reviewers Guidance for Premarket Notification Submissions (EMC)                                    |  |

### Third Party Certification, if applicable (\*Signature on Page 6 Required)

- |   |   |
|---|---|
| <input type="checkbox"/> Attestation of Conformity (AoC)*                             | <input type="checkbox"/> EMC Certification (used with Octagon Mark)*                                  |
| <input type="checkbox"/> Certificate of Conformity (CoC)*                             | <input type="checkbox"/> Compliance Document*   |
| Protection Class (N/A for vehicles)   | <input type="checkbox"/> Class I <input type="checkbox"/> Class II <input type="checkbox"/> Class III |
| (Press F1 when field is selected to show additional information on Protection Class.) |   |
| <input type="checkbox"/> FCC / TCB Certification                                      | <input type="checkbox"/> Industry Canada / FCB Certification  |
| <input type="checkbox"/> E-Mark Certification   | <input type="checkbox"/> Taiwan Certification   |



## EMC Test Plan and Constructional Data Form

### Attendance

Test will be: ☒ Attended by the customer ☐ Unattended by the customer

### Failure - Complete this section if testing will not be attended by the customer.

If a failure occurs, TÜV SÜD America should:

- ☐ Call contact listed above, if not available then stop testing. (After hrs phone): \_\_\_\_\_
- ☐ Continue testing to complete test series.
- ☐ Continue testing to define corrective action.
- ☐ Stop testing.

### EUT Specifications and Requirements

Length: 1.625 in Width: 0.0625 in Height: 0.875 in Weight: 0.2 oz

### Power Requirements

*Regulations require testing to be performed at typical power ratings in the countries of intended use. (i.e., European power is typically 230 VAC 50 Hz or 400 VAC 50 Hz, single and three phase, respectively)*

Voltage: 3 volts (If battery powered, make sure battery life is sufficient to complete testing.)

# of Phases: DC

Current (Amps/phase(max)): 500 mA Current (Amps/phase(nominal)): 50 uA

Other N/A

### Other Special Requirements

N/A

### Typical Installation and/or Operating Environment

(ie. Hospital, Small Business, Industrial/Factory, etc.)

Independent Senior Care, Assisted Senior Care, Hospital, Group Homes, Small and Large Businesses, Industrial

### EUT Power Cable

☐ Permanent OR ☐ Removable Length (in meters): \_\_\_\_\_

☐ Shielded OR ☐ Unshielded

☒ Not Applicable

## EMC Test Plan and Constructional Data Form

EUT Interface Ports and Cables													
Type	Analog	Digital	During Test		Qty	Shielding		Termination	Connector Type	Port Termination	Length tested (in meters)	Removable	Permanent
			Active	Passive		Yes	No						
<b>EXAMPLE:</b>													
RS232	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	2	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Foil over braid	Coaxial	Metallized 9-pin D-Sub	Characteristic Impedance	6	<input checked="" type="checkbox"/> <input type="checkbox"/>
N/A	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>						<input type="checkbox"/> <input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>						<input type="checkbox"/> <input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>						<input type="checkbox"/> <input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>						<input type="checkbox"/> <input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>						<input type="checkbox"/> <input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>						<input type="checkbox"/> <input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>						<input type="checkbox"/> <input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>						<input type="checkbox"/> <input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>						<input type="checkbox"/> <input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>						<input type="checkbox"/> <input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>						<input type="checkbox"/> <input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>						<input type="checkbox"/> <input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>						<input type="checkbox"/> <input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>						<input type="checkbox"/> <input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>						<input type="checkbox"/> <input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>						<input type="checkbox"/> <input type="checkbox"/>



## EMC Test Plan and Constructional Data Form

### EUT Software.

Revision Level: 0.4.0

Description: Healthsense call pendant 0.4.0 software revision, using G2 SDK version 2.4.1

### Equipment Under Test (EUT) Operating Modes to be Tested -- list the operating modes to be used during test.

It is recommended the equipment be tested while operating in a typical operation mode. FCC testing of personal computers and/or peripherals requires that a simple program generate a complete line of upper case H's. Provide a general description of all software, firmware, and PLD algorithms used in the equipment. List all code modules as described above, with the revision level used during testing. Consult with your TÜV Product Service Representative if additional assistance is required.

1. Continuous Transmit - EUT will continuously transmit a pseudo random bit stream. Individual modules are programmed for channels 1,6 and 11, and for transmission rates of 1,2,5 and 11 megabits/sec.
2. Normal Operation - EUT will perform a heartbeat every 5 seconds, which is a short communication with a WiFi access point. Normally this occurs every 15 minutes, but a parameter has been changed for this test to speed it up to once every 5 seconds.
- 3.

### Equipment Under Test (EUT) System Components -- List and describe all components which are part of the EUT. For FCC & Taiwan testing a minimum configuration is required. (ie. Mouse, Printer, Monitor, External Disk Drive, Motherboard, etc)

Description	Model #	Serial #	FCC ID #
MSR, WiFi	100033-0001-AA	Multiple	N/A



## EMC Test Plan and Constructional Data Form

**Support Equipment** -- List and describe all support equipment which is not part of the EUT. (i.e. peripherals, simulators, etc)  
This information is required for FCC & Taiwan testing.

<i>Description</i>	<i>Model #</i>	<i>Serial #</i>	<i>FCC ID #</i>
Apple Access Point			
Power Supply			
Programming board			

### Oscillator Frequencies

<i>Manufacturer</i>	<i>Frequency</i>	<i>Derived Frequency</i>	<i>Component # / Location</i>	<i>Description of Use</i>
Fox	32.768 KHz	N/A	Y2	Serial buad generator
ILSI	44.000 MHz	2.4 GHz (WiFi)	Y1	WiFi base clock

### Power Supply

<i>Manufacturer</i>	<i>Model #</i>	<i>Serial #</i>	<i>Type</i>
			<input type="checkbox"/> Switched-mode: (Frequency) _____ <input type="checkbox"/> Linear <input type="checkbox"/> Other: _____
			<input type="checkbox"/> Switched-mode: (Frequency) _____ <input type="checkbox"/> Linear <input type="checkbox"/> Other: _____

### Power Line Filters

<i>Manufacturer</i>	<i>Model #</i>	<i>Location in EUT</i>





## EMC Test Plan and Constructional Data Form

### Critical EMI Components (Capacitors, ferrites, etc.)

Description	Manufacturer	Part # or Value	Qty	Component # / Location
Power amp	Avago	MGA-412P8	1	U4
Antenna	Johanson	2450AT18A100	2	ANT1 & ANT2
Bandpass filter	Johanson	2450BP18C100 C	2	F1 & F2
Capacitor	Panasonic	8.2pF	1	C8

### EMC Critical Detail -- Describe other EMC Design details used to reduce high frequency noise.

Transmitter module has critical tuning of filter capacitor to maximize transmit power.

PLEASE ENTER NAMES BELOW (INSERT ELECTRONIC SIGNATURE IF POSSIBLE)

### Authorization (Signature Required if a Third Party Certification is checked on pg 1)

Customer authorization to perform tests  
according to this test plan.

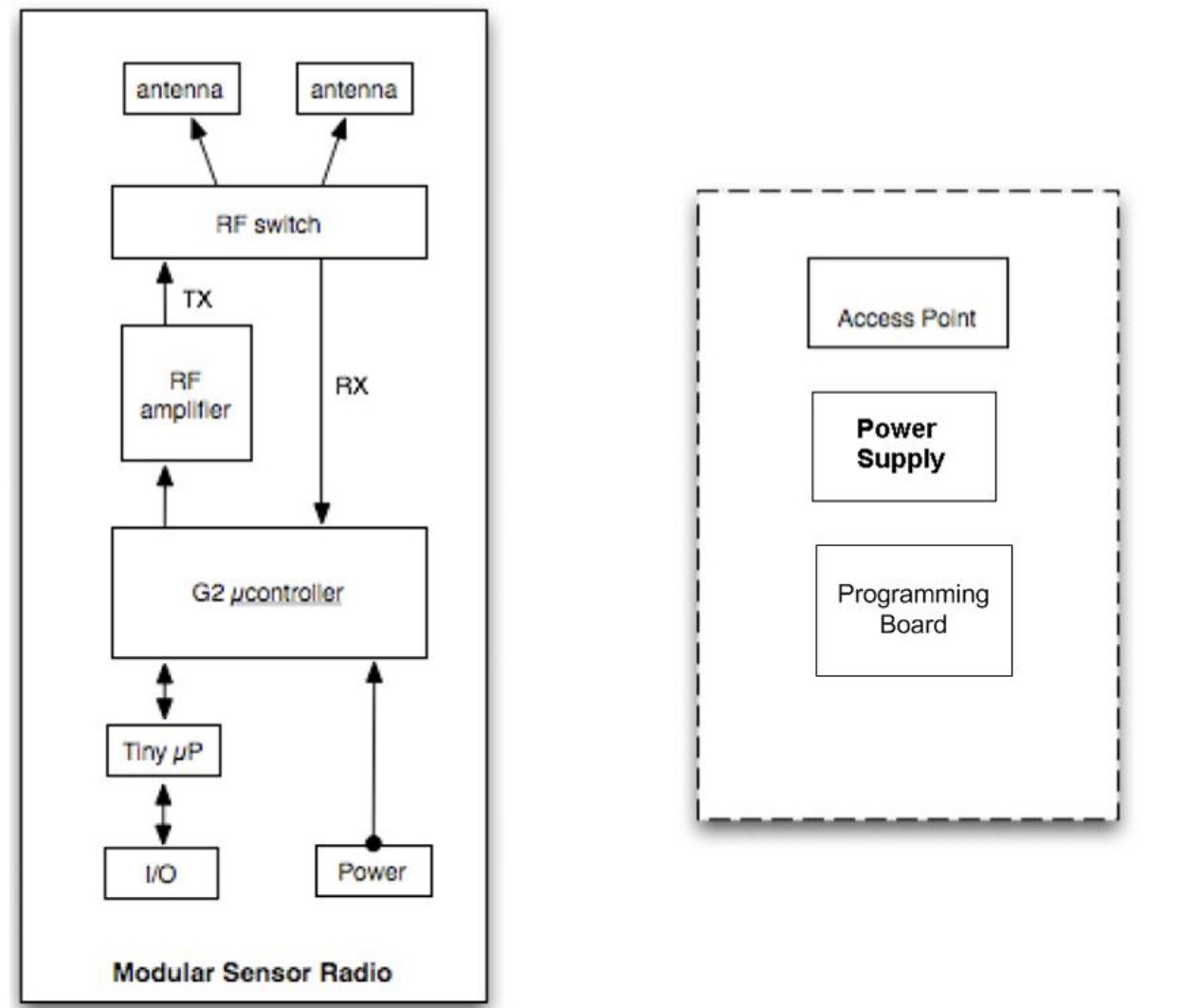
Date

Test Plan/CDF Prepared By (please print)

Date

## EMC Block Diagram Form

**System Configuration Block Diagram** -- Provide a line drawing identifying the EUT, simulators, support equipment, I/O cables, power cables, and any other pertinent components to be used during testing. Use a dashed line to separate the equipment in the testing field versus equipment outside testing field.



### Authorization Signatures

\_\_\_\_\_  
Customer authorization to perform tests  
according to this test plan.

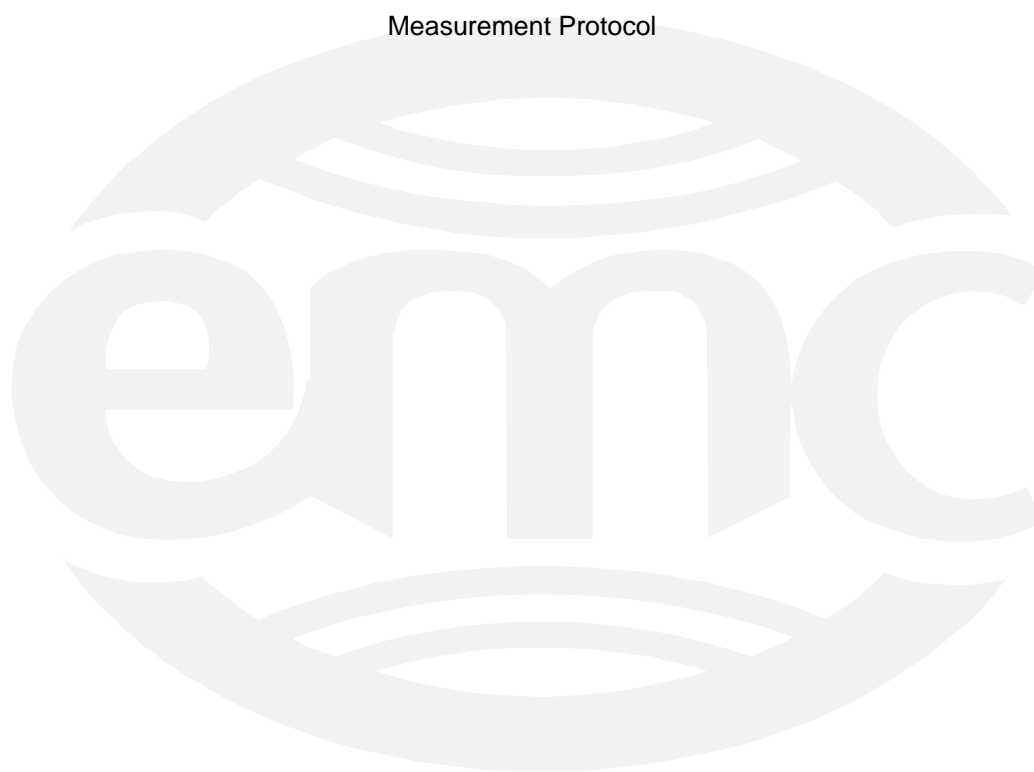
\_\_\_\_\_  
Date

\_\_\_\_\_  
Test Plan/CDF Prepared By (please print)

\_\_\_\_\_  
Date

## Appendix B

### Measurement Protocol



# MEASUREMENT PROTOCOL

## GENERAL INFORMATION

### Test Methodology

Emissions testing is performed according to the procedures in ANSI C63.4-2003.

### Measurement Uncertainty

The test system for conducted emissions is defined as the LISN, tuned receiver or spectrum analyzer, and coaxial cable. The test system has a measurement uncertainty of  $\pm 1.8$  dB. The test system for radiated emissions is defined as the antenna, the pre-amplifier, the spectrum analyzer and the coaxial cable. The test system has a measurement uncertainty of  $\pm 4.8$  dB. The equipment comprising the test systems is calibrated on an annual basis.

### Justification

The Equipment Under Test (EUT) is configured in a typical user arrangement in accordance with the manufacturer's instructions. A cable is connected to each available port and either terminated with a peripheral into its characteristic impedance or left unterminated. When appropriate, the cables are manually manipulated with respect to each other to obtain maximum emissions from the unit.

### Conducted Emissions

The final level, in dB $\mu$ V, equals the EMI receiver level plus the cable loss and LISN factor.

### Radiated Emissions

The spectrum analyzer uses a quasi-peak detector for frequencies up to and including 1 GHz. For measurements above 1 GHz, peak and average detectors are used. The bandwidth used are equal to or greater than 100 Hz from 9 kHz to 150 kHz, 9 kHz from 150 kHz to 30 MHz, 100 kHz from 30 MHz to 1000 MHz, and 1 MHz from 1 GHz to 40 GHz. Video bandwidth are at least three times greater than the IF bandwidth

The final level, in dB $\mu$ V/m, equals the reading from the spectrum analyzer (Level dB $\mu$ V), adding the antenna correction factor and cable loss factor (Factor dB) to it, and subtracting the preamp gain (and duty cycle correction factor, if applicable). This result then has the limit subtracted from it to provide the Delta, which gives the tabular data as shown in the data sheets in Attachment A. Intentional radiators are rotated through 3 orthogonal axes to determine the test position yielding the maximum emission levels.

Example:

FREQ (MHz)	LEVEL (dB $\mu$ V)	CABLE/ANT/PREAMP (dB) (dB/m) (dB)	FINAL (dB $\mu$ V/m)	POL/HGT/AZ (m) (deg)	DELTA1
60.80	42.5Qp +	1.2 + 10.9 - 25.5 =	29.1	V 1.0 0.0	-10.9

### Test Equipment

All measurement instrumentation is traceable to the National Institute of Standards and Technology and is calibrated according to internal procedure.