Electromagnetic Compatibility Test Report

Tests Performed on a Trilithic

Cable Installer Meter with Wifi Transciever, Model 360DSP

Radiometrics Document RP-7340

ACCREDITED
TESTING CERT #1495.01

Product Detail: FCC ID: P4V360DSP IC: 7020A-360DSP Equipment type: 2.4 GHz DTS Transmitter
Test Standards: US CFR Title 47, Chapter I, FCC Part 15 Subpart C FCC Part 15 CFR Title 47: 2012 Industry Canada RSS-210, Issue 8: 2010 as required for Category I Equipment This report concerns: Original Grant for Certification FCC Part 15.247

Tests Performed For:	*Test Facility:*
Trilithic 9710 Park Davis Dr. Indianpolis, IN 46235	**Radiometrics Midwest Corporation** 12 East Devonwood Romeoville, IL 60446 (815) 293-0772

Test Date(s): (Month-Day-Year)
July 12 to 25, 2012

Document RP-7340 Revisions:

Rev.	Issue Date	Affected Sections	Revised By
0	August 9, 2012		
1	August 20, 2012	9, 10.2 & 10.5	Joseph Strzelecki

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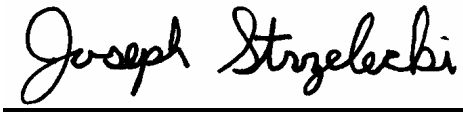
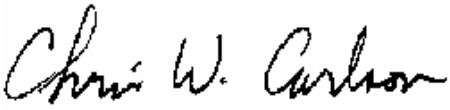
1 ADMINISTRATIVE DATA

Equipment Under Test: A Trilithic, Cable Installer Meter with Wifi Model: 360DSP Serial Number: 281195 This will be referred to as the EUT in this Report	
Date EUT Received at Radiometrics: (Month-Day-Year) July 12, 2012	*Test Date(s): (Month-Day-Year)* July 12 to 25, 2012
Test Report Written By: Joseph Strzelecki Senior EMC Engineer	*Test Witnessed By:* The tests were not witnessed by Trilithic Trilithic
Radiometrics' Personnel Responsible for Test:  Joseph Strzelecki Senior EMC Engineer NARTE EMC-000877-NE	*Test Report Approved By*  Chris W. Carlson Director of Engineering NARTE EMC-000921-NE

2 TEST SUMMARY AND RESULTS

The EUT (Equipment Under Test) is a Cable Installer Meter with Wifi, Model 360DSP, manufactured by Trilithic. The detailed test results are presented in a separate section. The following is a summary of the test results.

Spread Spectrum Transmitter Requirements

Environmental Phenomena	Frequency Range	FCC Section	RSS- Section	Test Result
RF AC Mains Conducted Emissions	0.15 - 30 MHz	15.207	GEN; 7.2.2	Pass
RF Radiated Emissions	30-25,000 MHz	15.209	GEN; 7.2.5	Pass
6 dB Bandwidth Test	2400 to 2483 MHz	15.247 a	210; A8.1 (4)	Pass
Peak Output Power	2400 to 2483 MHz	15.247 b	210; A8.1 (1)	Pass
Band-edge Compliance of RF Conducted Emissions	2400 to 2483 MHz	15.247 d	210; A8.4 (2)	Pass
Spurious Radiated Emissions	30 MHz to 25 GHz	15.247 d	210; A8.5	Pass
Power Spectral Density	2400 to 2483 MHz	15.247 e	210; A8.2 (1)	Pass

Note: The RSS-210 specification is not currently covered in Radiometrics' Scope of Accreditation. This is technically very similar to FCC, CFR 47 Part 15 which is on Radiometrics scope.

2.1 RF Exposure Compliance Requirements

Since the Average power output is 19.1 mW, the EUT meets the FCC requirement for RF exposure and is exempt from RSS-102. There are no power level adjustments and the antenna is permanently attached. The detailed calculations for RF Exposure are presented in a separate document.

3 EQUIPMENT UNDER TEST (EUT) DETAILS

3.1 EUT Description

The EUT is a Cable Installer Meter with Wifi, Model 360DSP, manufactured by Trilithic. The EUT was in good working condition during the tests, with no known defects.

3.1.1 FCC Section 15.203 & RSS-GEN Antenna Requirements

The Antenna is internal to the unit and the port cannot be accessed by the end user. Therefore it meets the 15.203 Requirements. The antenna is a Pulse part number W3525B100, 2.4GHz PCB Antenna.

3.2 Related Submittals

Trilithic is not submitting any other products simultaneously for equipment authorization related to the EUT.

4 TESTED SYSTEM DETAILS

4.1 Tested System Configuration

The system was configured for testing in a typical fashion. The EUT was placed on an 80-cm high, nonconductive test stand. The testing was performed in conditions as close as possible to installed conditions. Wiring was consistent with manufacturer's recommendations. Power was supplied at 115 VAC, 60 Hz single-phase to its external power supply.

The identification for all equipment, plus descriptions of all cables used in the tested system, are:

Tested System Configuration List

Item	Description	Type*	Manufacturer	Model Number	Serial Number
1	Cable Installer Meter with Wifi	E	Trilithic	360DSP	281195
2	Router	P	Dynex	DX-GB8PRT	10K22B16124

* Type: E = EUT, P = Peripheral, S = Support Equipment; H = Host Computer

List of System Cables

QTY	Length (m)	Cable Description	Shielded?
1	1.8	AC Cord to external power supply	No
1	1.5	AC Cord to external power supply	Yes
1	10	Ethernet cable	No
1	1.0	75 Ohm coaxial Cable	No

4.2 Special Accessories

No special accessories were used during the tests in order to achieve compliance.

4.3 Equipment Modifications

No modifications were made to the EUT at Radiometrics' test facility in order to comply with the standards listed in this report.

5 TEST SPECIFICATIONS AND RELATED DOCUMENTS

Document	Date	Title
FCC CFR Title 47	2012	Code of Federal Regulations Title 47, Chapter 1, Federal Communications Commission, Part 15 - Radio Frequency Devices
ANSI C63.4-2009	2009	Methods of Measurement of Radio Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz
IC RSS-210 Issue 8	2010	Low Power Licence-Exempt Radiocommunication Devices (All Frequency Bands) Category I Equipment
IC RSS-Gen Issue 3	2010	General Requirements and Information for the Certification of Radiocommunication Equipment (RSS-Gen)
FCC 558074	2005	Measurement of Digital Transmission Systems Operating under Section 15.247

The test procedures used are in accordance with the FCC 558074, Industry Canada RSS-GEN and ANSI document C63.4, "Methods of Measurement of Radio Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz". The specific procedures are described herein. Radiated testing was performed at an antenna to EUT distance of 3 meters. The antenna was raised and lowered from 1 to 4 meters.

6 RADIOMETRICS' TEST FACILITIES

The results of these tests were obtained at Radiometrics Midwest Corp. in Romeoville, Illinois, USA. Radiometrics is accredited by A2LA (American Association for Laboratory Accreditation) to conform to ISO/IEC 17025: 2005 "General Requirements for the Competence of Calibration and Testing Laboratories". Radiometrics' Lab Code is 121191 and Certification Number is 1495.01. Radiometrics' scope of accreditation includes all of the test methods listed herein. A copy of the accreditation can be accessed on our web site (www.radiomet.com). Radiometrics accreditation status can be verified at A2LA's web site (www.a2la2.org).

The following is a list of shielded enclosures located in Romeoville, Illinois used during the tests:

Chamber A: Is an anechoic chamber that measures 24' L X 12' W X 12' H. The walls and ceiling are fully lined with ferrite absorber tiles. The floor has a 10' x 10' section of ferrite absorber tiles located in the center. Panashield of Rowayton, Connecticut manufactured the chamber. The enclosure is NAMAS certified.

Chamber E: Is a custom made anechoic chamber that measures 52' L X 30' W X 18' H. The walls and ceiling are fully lined with RF absorber. Pro-shield of Collinsville, Oklahoma manufactured the chamber.

Test Station F: Is an area that measures 10' D X 12' W X 10' H. The floor and back wall are metal shielded. This area is used for conducted emissions measurements.

A separate ten-foot long, brass plated, steel ground rod attached via a 6 inch copper braid grounds each of the above chambers. Each enclosure is also equipped with low-pass power line filters.

The FCC has accepted these sites as test site number US1065. The FCC test site Registration Number is 732175. Details of the site characteristics are on file with the Industry Canada as site number IC3124A-1.

A complete list of the test equipment is provided herein. The calibration due dates are indicated on the equipment list. The equipment is calibrated in accordance to ANSI/NCSL Z540-1 with traceability to the National Institute of Standards and Technology (NIST).

7 DEVIATIONS AND EXCLUSIONS FROM THE TEST SPECIFICATIONS

There were no deviations or exclusions from the test specifications.

8 CERTIFICATION

Radiometrics Midwest Corporation certifies that the data contained herein was taken under conditions that meet or exceed the requirements of the test specification and the data contained herein was taken with calibrated test equipment. The results relate only to the EUT listed herein.

9 TEST EQUIPMENT TABLE

RMC ID	Manufacturer	Description	Model No.	Serial No.	Frequency Range	Cal Period	Cal Date
AMP-05	RMC/Celeritek	Pre-amplifier	MW110G	1001	1.0-12GHz	12 Mo.	01/24/12
AMP-20	Avantek	Pre-amplifier	SF8-0652	15221	8-18GHz	12 Mo	01/24/12
AMP-22	Anritsu	Pre-amplifier	MH648A	M23969	0.1-1200MHz	12 Mo.	01/24/12
AMP-29	HP / Agilent	Amplifier	11975A	2304A00158	2-8 GHz	12 Mo.	06/29/12
ANT-13	EMCO	Horn Antenna	3115	2502	1.0-18GHz	24 Mo.	11/18/10
ANT-44	Impossible Machine	Super Log Antenna	SL-20M2G	1002	20-2000MHz	24 Mo.	12/14/11
ANT-48	RMC	Std Gain Horn	HW2020	1001	18-26 GHz	12 Mo.	04/05/12
ANT-53	EMCO	Loop Antenna	6507	1453	1 kHz-30 MHz	24 Mo	10/26/11
CST-01	Wiltron	Crystal Detector	75N50	CST-01	1 MHz -18GHz	12 Mo.	08/06/12
HPF-01	Solar	High Pass Filter	7930-100	HPF-1	0.15-30MHz	24 Mo.	01/24/12
HPF-03	Mini-Circuits	High Pass Filter	VHP-39	HPF-03	3-10 GHz	24 Mo.	02/18/11
LSN-01	Electrometrics	50 uH LISN	FCC/VDE 50/2	1001	0.01-30MHz	24 Mo.	06/14/11
LSN-03	Farnell	50 uH LISN	1EXLSN30B	000314	0.01-30MHz	24 Mo.	06/14/11
MXR-02	HP / Agilent	Harmonic Mixer	11970K	2332A00489	18-26.5GHz	12 Mo.	06/19/12
REC-01	Hewlett Packard	Spectrum Analyzer	8566A	2106A02115, 2209A01349	30Hz-22GHz	24 Mo.	10/29/10
REC-03	Anritsu	Spectrum Analyzer	MS2601B	MT94589	0.01-2200MHz	12 Mo.	04/02/12
REC-07	Anritsu	Spectrum Analyzer	MS2601A	MT53067	0.01-2200MHz	12 Mo.	05/21/12
REC-08	Hewlett Packard	Spectrum Analyzer	8566B	2648A13481 2209A01436	30Hz-22GHz	24 Mo.	10/28/11
THM-02	Fluke	Temp/Humid Meter	971	93490471	N/A	12 Mo.	05/25/12

Note: All calibrated equipment is subject to periodic checks.

10 TEST SECTIONS

10.1 AC Conducted Emissions

The tests and limits are in accordance with FCC section 15.207 and RSS Gen section 7.2.2.

A computer-controlled analyzer was used to perform the conducted emissions measurements. The frequency range was divided into 500 subranges equally spaced on a logarithmic scale. The computer recorded the peak of each subrange. This data was then plotted on semi-log graph paper generated by the computer and plotter. Adjusting the positions of the cables and orientation of the test system then maximizes the highest emissions.

Mains Conducted emission measurements were performed using a 50 Ohm/50 uH Line Impedance Stabilization Network (LISN) as the pick-up device. Measurements were repeated on both leads within the power cord. If the EUT power cord exceeded 80 cm in length, the excess length of the power cord was made into a 30 to 40 cm bundle near the center of the cord. The LISN was placed on the floor at the base of the test platform and electrically bonded to the ground plane.

FCC Limits of Conducted Emissions at the AC Mains Ports

Frequency Range (MHz)	Class B Limits (dBuV)	
	Quasi-Peak	Average
0.150 - 0.50*	66 - 56	56 - 46
0.5 – 5.0	56	46
5.0 - 30	60	50
* The limit decreases linearly with the logarithm of the frequency in this range.		

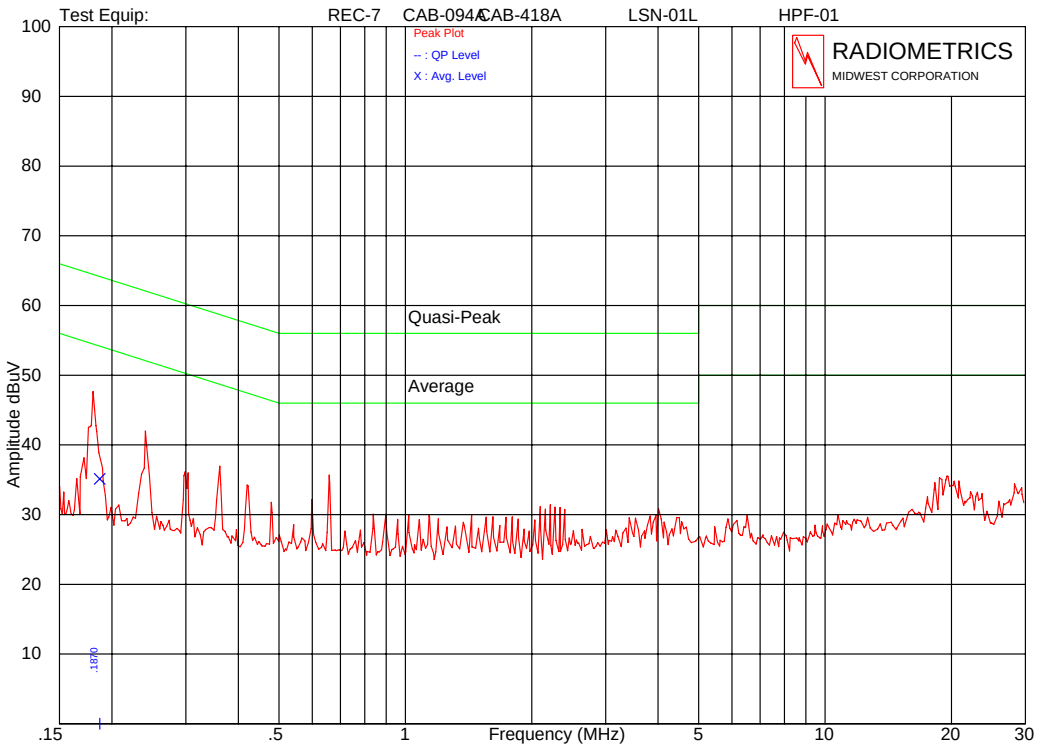
The initial step in collecting conducted data is a peak detector scan and the plotting of the measurement range. Significant peaks are then marked as shown on the following table, and these signals are then measured with the quasi-peak detector. The following represents the worst case emissions from the host computer (with the EUT connected) power cord, after testing all modes of operation.

Test Date : July 23, 2012
The Amplitude is the final corrected value with cable and LISN Loss.

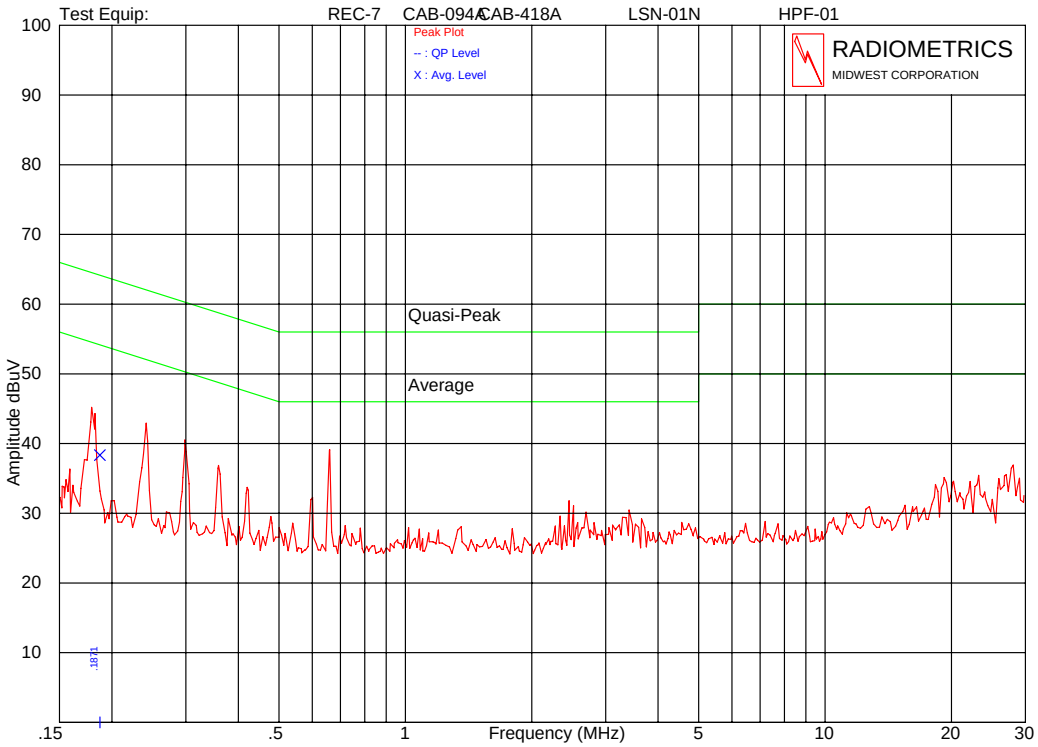
Lead Tested	Frequency MHz	QP Amplitude	QP Limit	Average Amplitude	Average Limit
AC Neutral	0.187	45.2 P	64.2	38.3	54.2
AC Hot	0.187	47.6 P	64.2	35.1	54.2

The above are the worst case results with three frequencies test for each EUT
* QP readings are quasi-peak with a 9 kHz bandwidth and no video filter.

Judgment: Passed by at least 6 dB

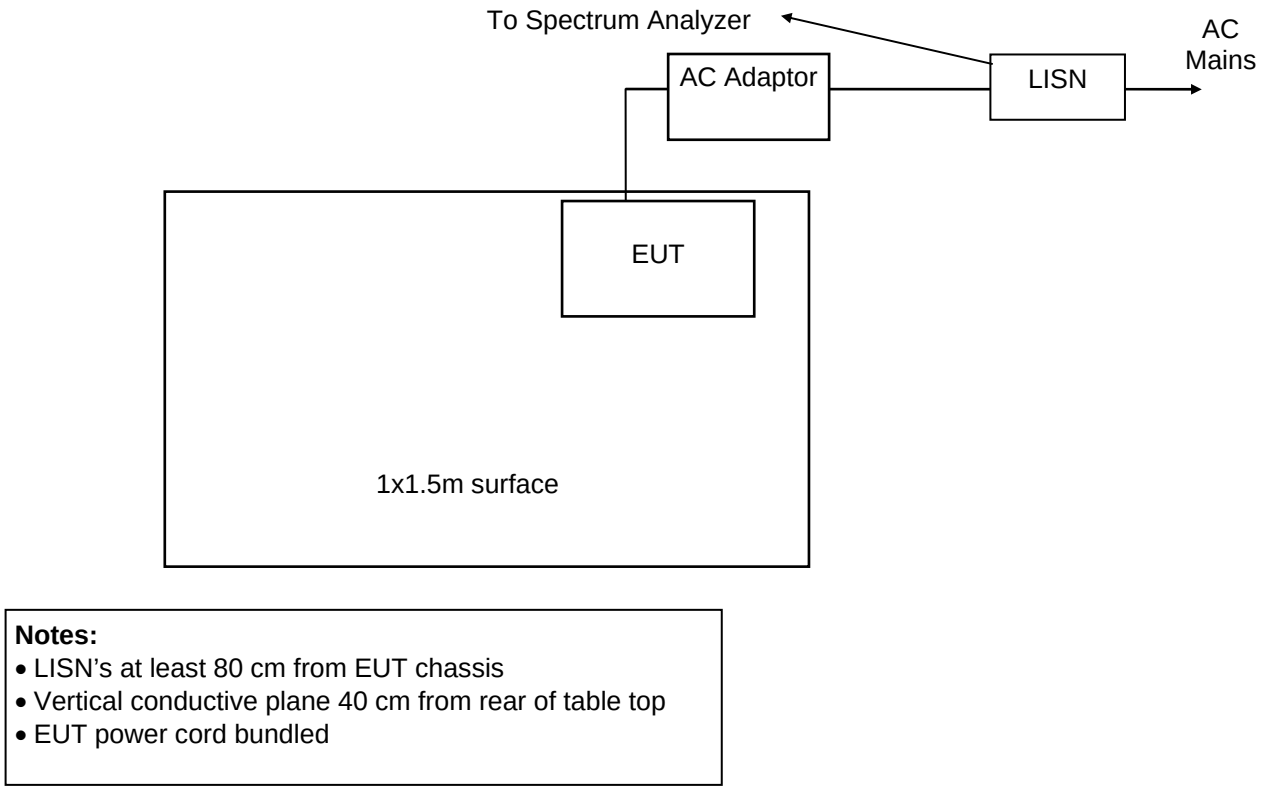


Company: Trilithic
Lead Tested: AC Hot 120 VAC
Notes: 120 VAC
Model: 360DSP
S/N : 281195
Date :07-23-2012
Time:08:07
Tested By: CED
FCC 15 & EN55022 Class B Conducted Emissions; Mains Port
RP-7340 | CE120L1



Company: Trilithic
Lead Tested: AC Neutral 120 VAC
Notes: 120 VAC
Model: 360DSP
S/N : 281195
Date :07-23-2012
Time:08:10
Tested By: CED
FCC 15 & EN55022 Class B Conducted Emissions; Mains Port
RP-7340 | CE120L2

Figure 1. Conducted Emissions Test Setup



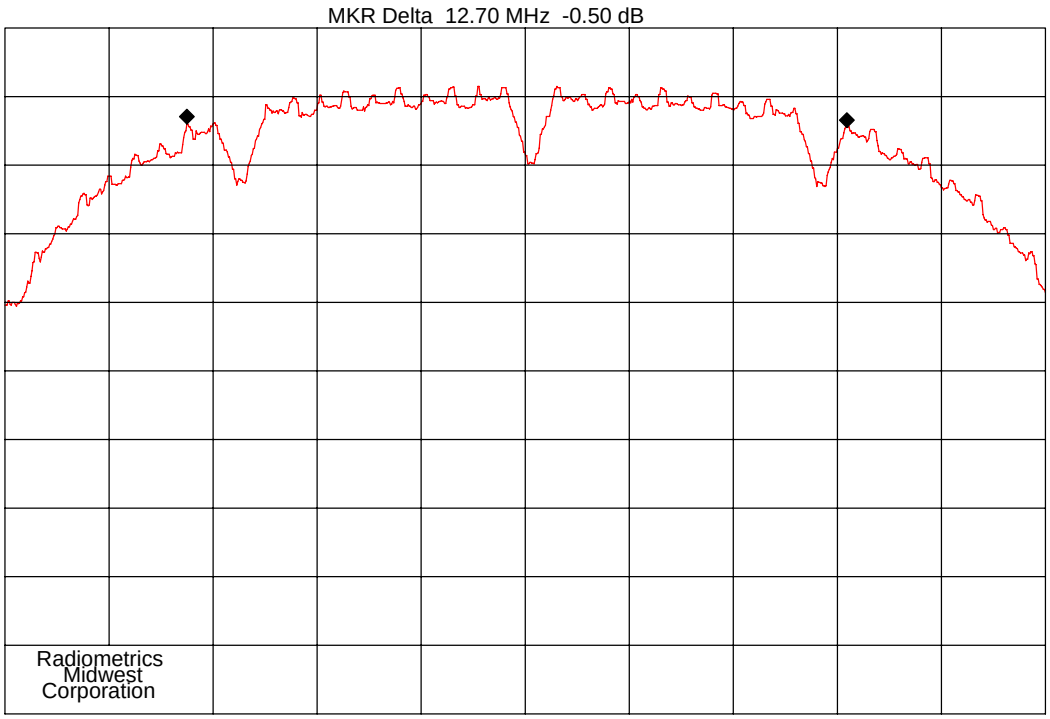
Notes:
- LISN's at least 80 cm from EUT chassis
- Vertical conductive plane 40 cm from rear of table top
- EUT power cord bundled

10.2 Occupied Bandwidth

The spectrum analyzer was set to the MAX HOLD mode to record the worst case of the modulation. The EUT was transmitting at its maximum data rate. The trace was allowed to stabilize.

The marker-to-peak function was set to the peak of the emission. Then the marker-delta function was used to measure 6 or 20 dB down one side of the emission. The marker-delta function was reset and then moved to the other side of the emission, until it is (as close as possible to) even with the reference marker level. The marker-delta reading at this point is the bandwidth of the emission.

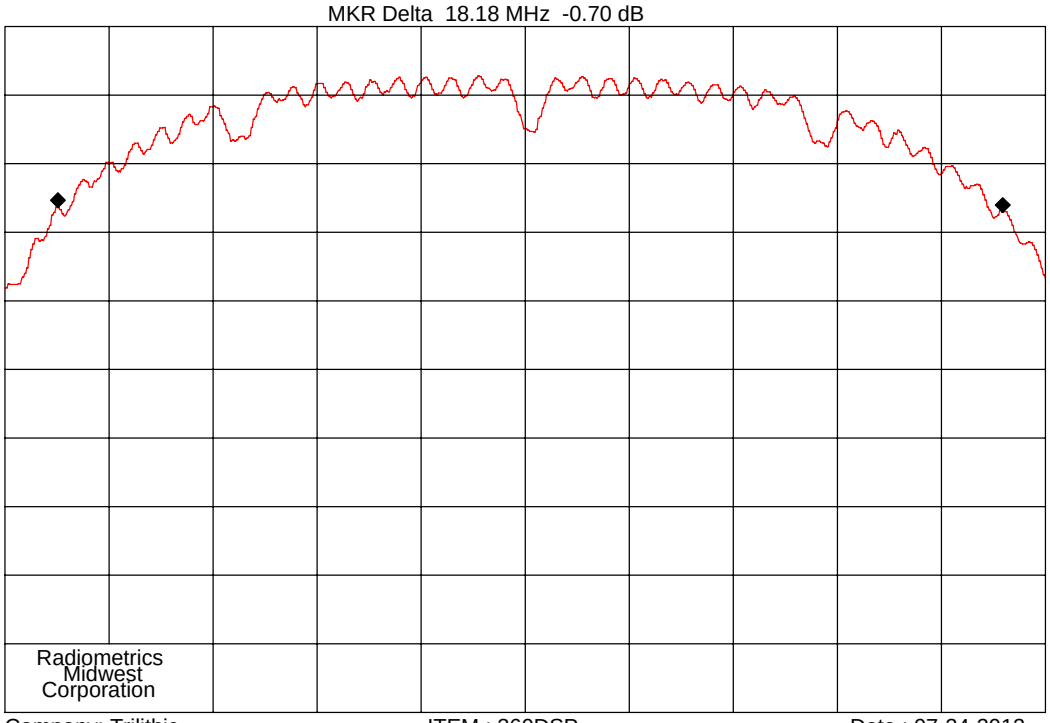
Channel	802.11b 6 dB EBW MHz	802.11b 99% 20 dB EBW MHz	802.11g 6 dB EBW MHz	802.11g 99% 20 dB EBW MHz
1	12.7	18.18	16.62	19.48
6	13.24	18.32	16.48	19.3
11	12.56	18.1	16.34	19.36



Company: Trilithic
CENTER 2.412 0 GHz
RES BW 100 kHz
10 dB/
Notes: Occupied Bandwidth, Channel 1; 802.11b

ITEM : 360DSP
REF 10.0 dBm
VBW 300 kHz
Time: 16:53

Date : 07-24-2012
SPAN 20.0 MHz
ATTEN 20 dB
SWP 20.0 msec
File: BW1b-6

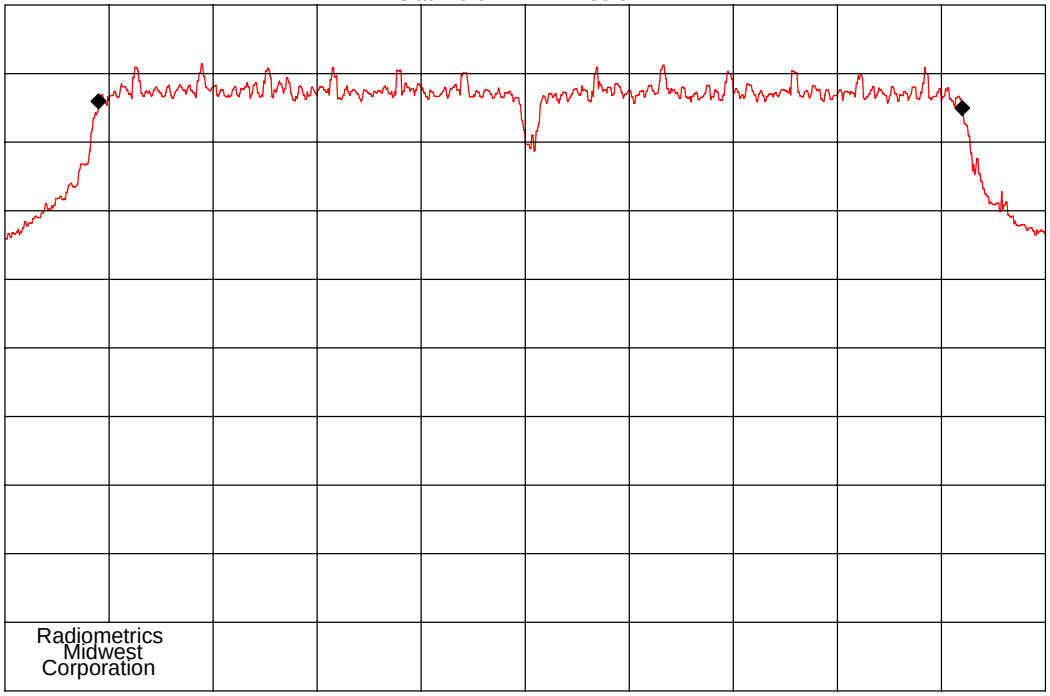


Company: Trilithic
CENTER 2.412 0 GHz
RES BW 300 kHz
10 dB/
Notes: Occupied Bandwidth, Channel 1; 802.11b

ITEM : 360DSP
REF 10.0 dBm
VBW 1 MHz
Time: 17:05

Date : 07-24-2012
SPAN 20.0 MHz
ATTEN 20 dB
SWP 20.0 msec
File: BW1b-20

MKR Delta 16.62 MHz -1.00 dB

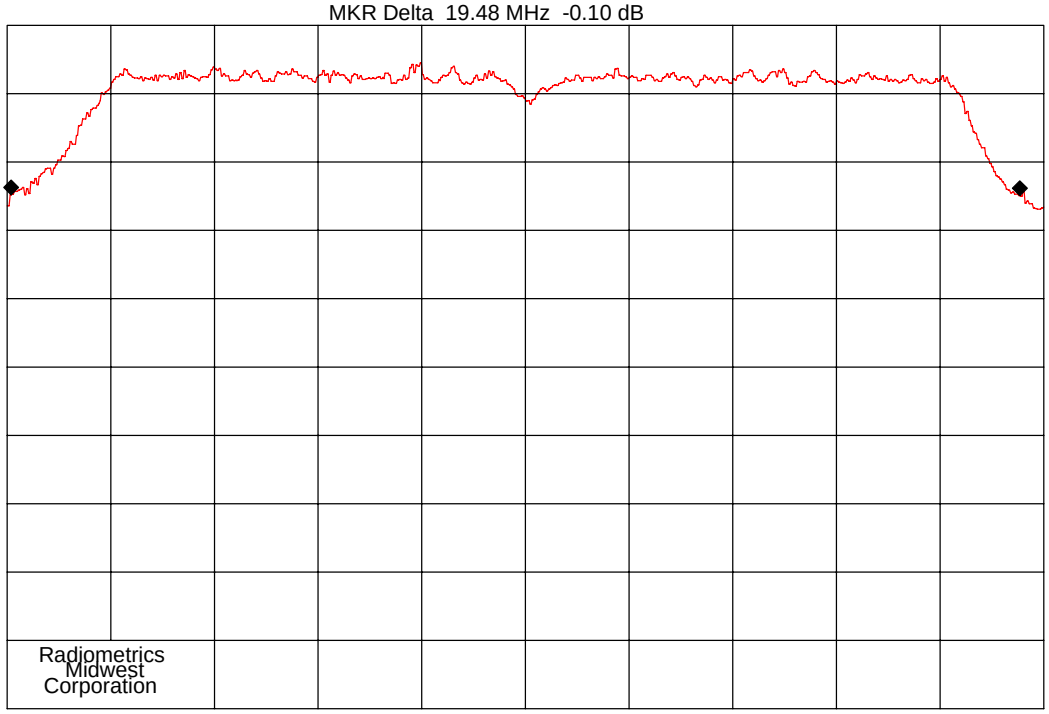


Company: Trilithic
CENTER 2.412 0 GHz
RES BW 100 kHz
10 dB/
Notes: Occ. Bandwidth 6 dB, Chan. 1; 802.11g

ITEM : 360DSP
REF 10.0 dBm
VBW 300 kHz
Time: 17:11

Date : 07-24-2012
SPAN 20.0 MHz
ATTEN 20 dB
SWP 20.0 msec
File: BW1g-6

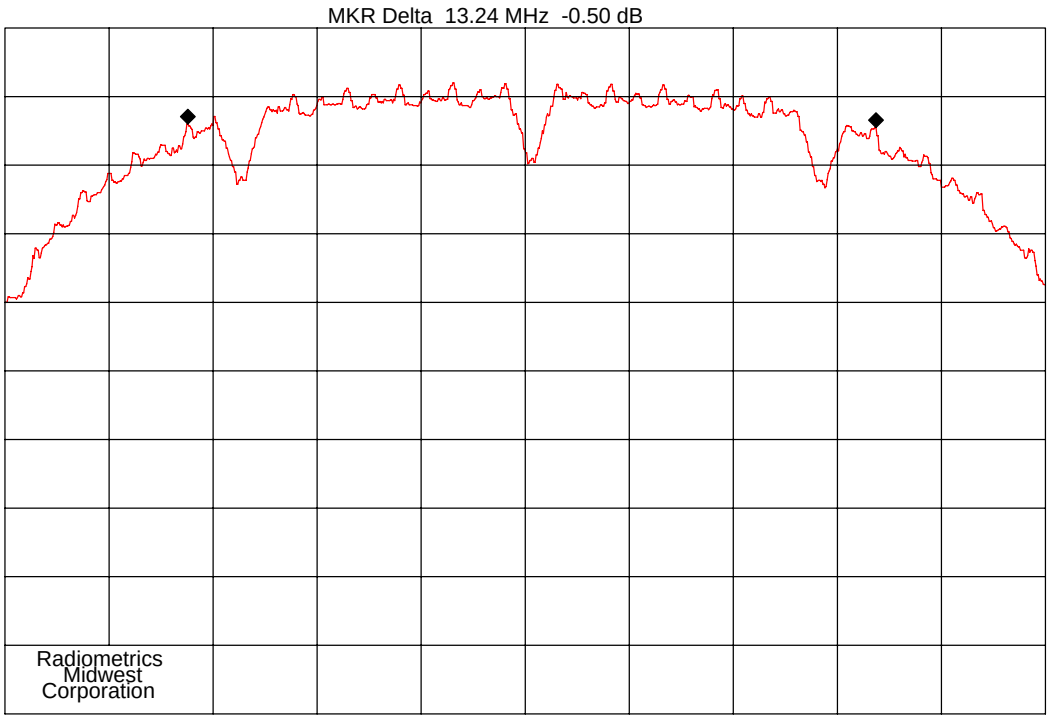
MKR Delta 19.48 MHz -0.10 dB



Company: Trilithic
CENTER 2.412 0 GHz
RES BW 300 kHz
10 dB/
Notes: Occ. Bandwidth 20 dB, Chan. 1; 802.11g

ITEM : 360DSP
REF 10.0 dBm
VBW 1 MHz
Time: 17:12

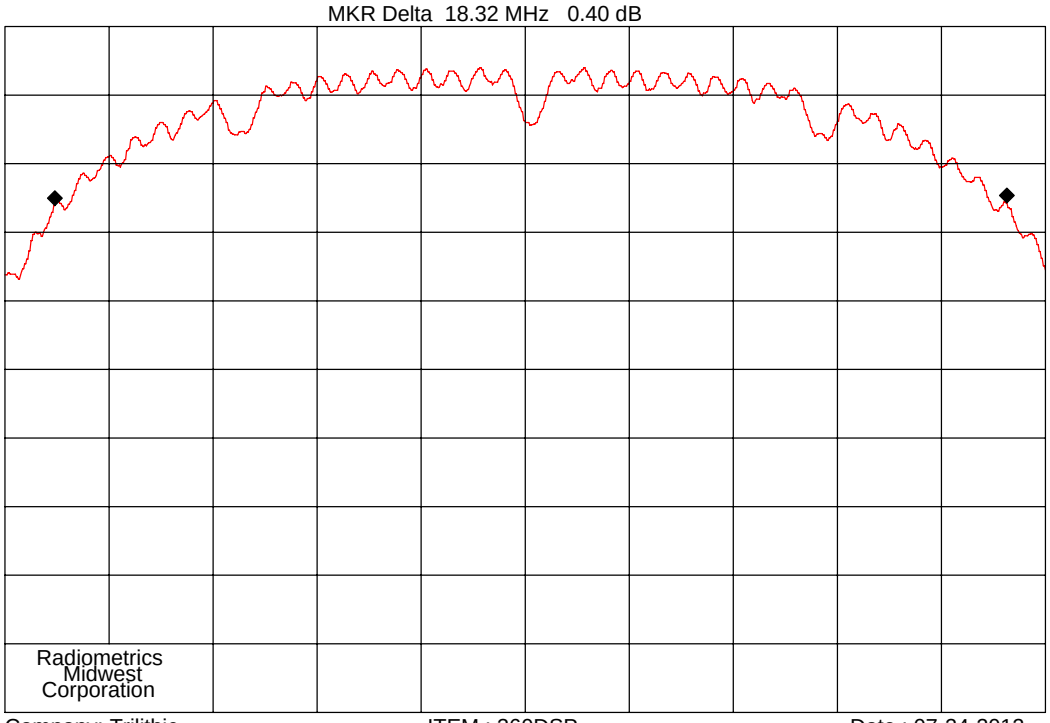
Date : 07-24-2012
SPAN 20.0 MHz
ATTEN 20 dB
SWP 20.0 msec
File: BW1g-20



Company: Trilithic
CENTER 2.437 0 GHz
RES BW 100 kHz
10 dB/
Notes: Occ. Bandwidth 6 dB, Chan. 6; 802.11b

ITEM : 360DSP
REF 10.0 dBm
VBW 300 kHz
Time: 17:25

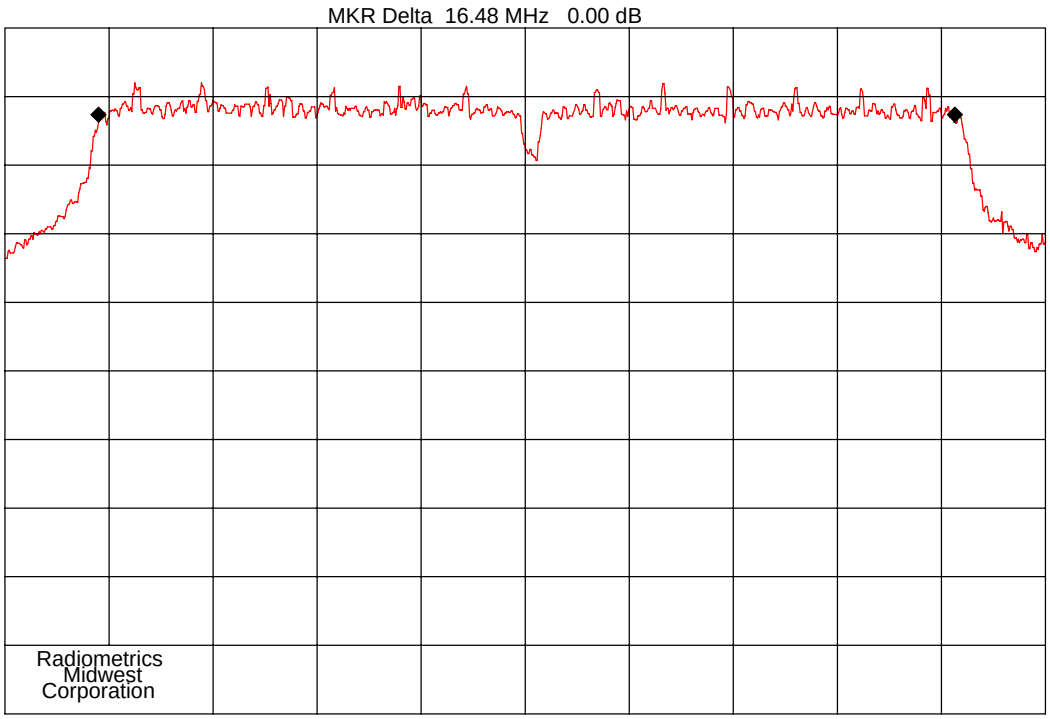
Date : 07-24-2012
SPAN 20.0 MHz
ATTEN 20 dB
SWP 20.0 msec
File: BW6b-6



Company: Trilithic
CENTER 2.437 0 GHz
RES BW 300 kHz
10 dB/
Notes: Occ. Bandwidth 20 dB, Chan. 6; 802.11b

ITEM : 360DSP
REF 10.0 dBm
VBW 1 MHz
Time: 17:27

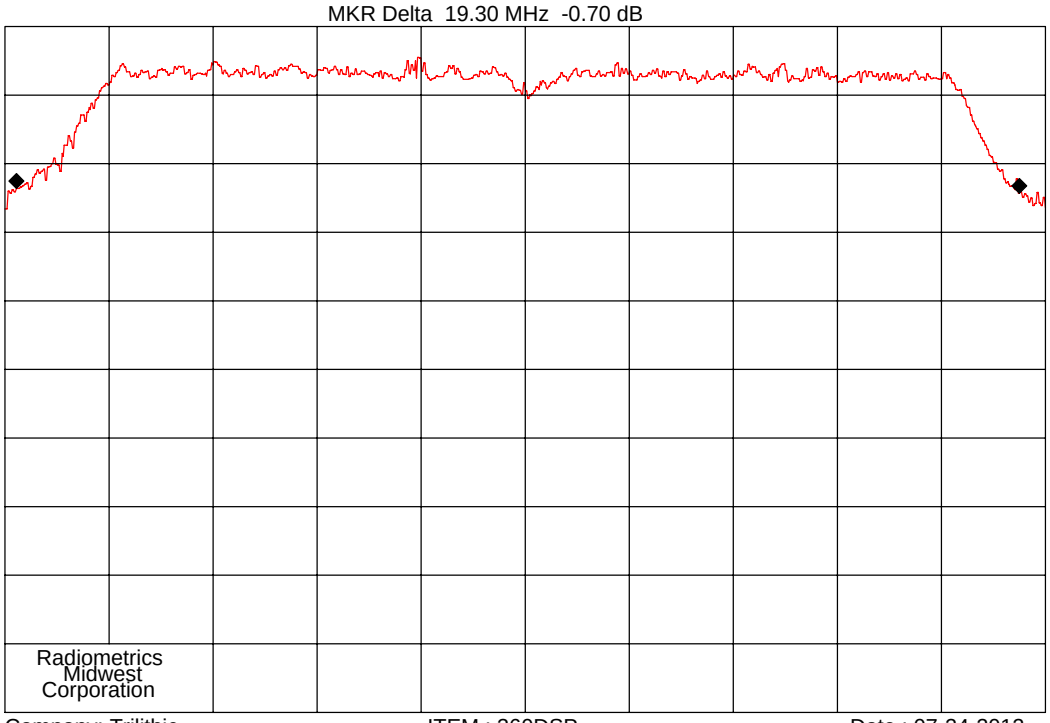
Date : 07-24-2012
SPAN 20.0 MHz
ATTEN 20 dB
SWP 20.0 msec
File: BW6b-20



Company: Trilithic
CENTER 2.437 0 GHz
RES BW 100 kHz
10 dB/
Notes: Occ. Bandwidth 6 dB, Chan. 6; 802.11g

ITEM : 360DSP
REF 10.0 dBm
VBW 300 kHz
Time: 17:16

Date : 07-24-2012
SPAN 20.0 MHz
ATTEN 20 dB
SWP 20.0 msec
File: BW6g-6

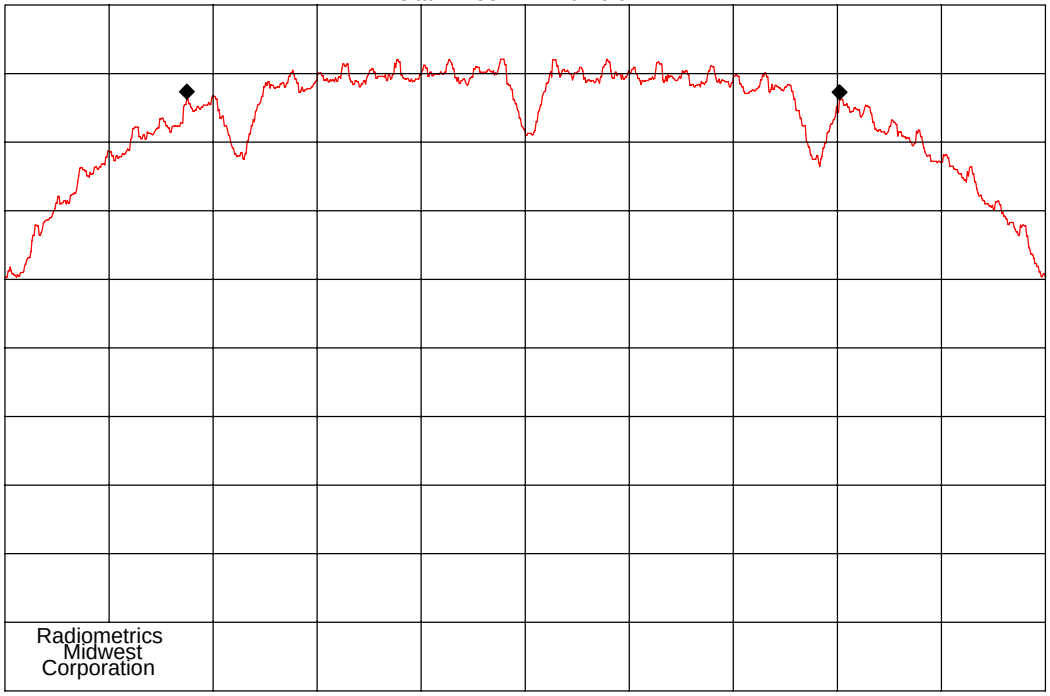


Company: Trilithic
CENTER 2.437 0 GHz
RES BW 300 kHz
10 dB/
Notes: Occ. Bandwidth 20 dB, Chan. 6; 802.11g

ITEM : 360DSP
REF 10.0 dBm
VBW 1 MHz
Time: 17:20

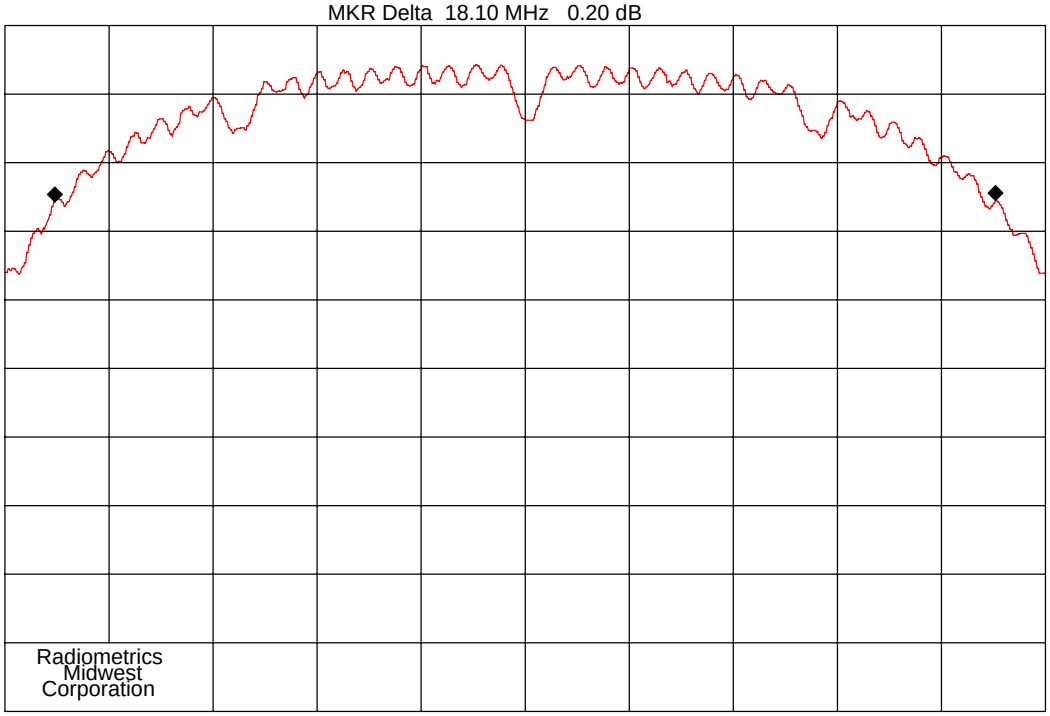
Date : 07-24-2012
SPAN 20.0 MHz
ATTEN 20 dB
SWP 20.0 msec
File: BW6g-20

MKR Delta 12.56 MHz -0.10 dB



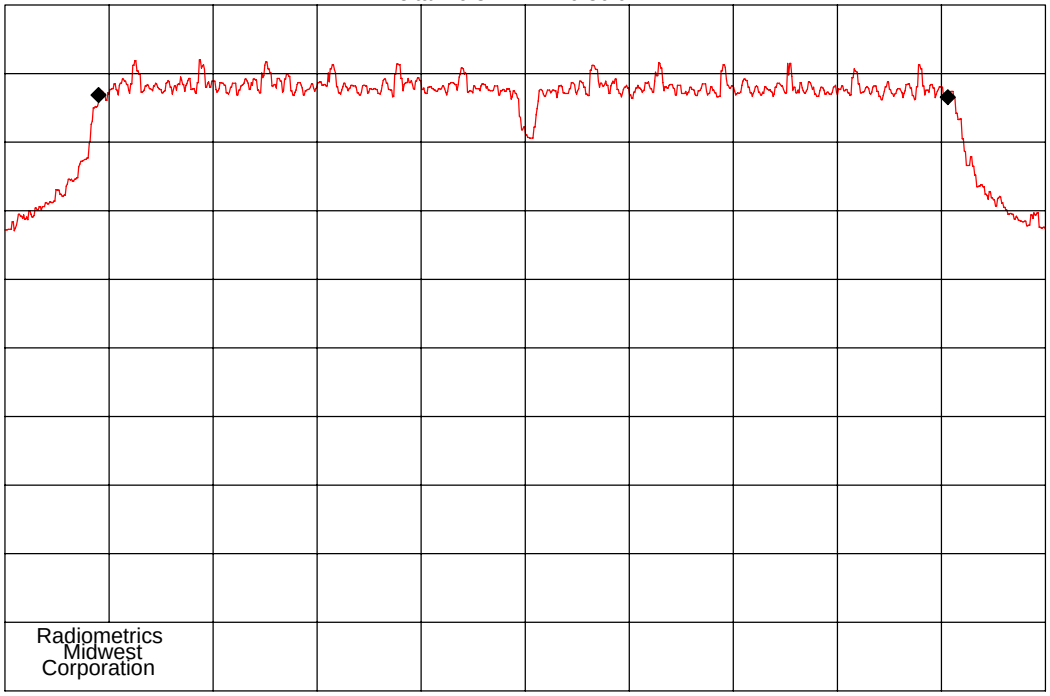
Company: Trilithic
CENTER 2.462 0 GHz
RES BW 100 kHz
10 dB/
ITEM : 360DSP
REF 10.0 dBm
VBW 300 kHz
Time: 17:31
Date : 07-24-2012
SPAN 20.0 MHz
ATTEN 20 dB
SWP 20.0 msec
File: BW11b6
Notes: Occ. Bandwidth 6 dB, Chan. 11; 802.11b

MKR Delta 18.10 MHz 0.20 dB



Company: Trilithic
CENTER 2.462 0 GHz
RES BW 300 kHz
10 dB/
ITEM : 360DSP
REF 10.0 dBm
VBW 1 MHz
Time: 17:32
Date : 07-24-2012
SPAN 20.0 MHz
ATTEN 20 dB
SWP 20.0 msec
File: BW11b20
Notes: Occ. Bandwidth 20 dB, Chan. 11; 802.1b

MKR Delta 16.34 MHz -0.30 dB

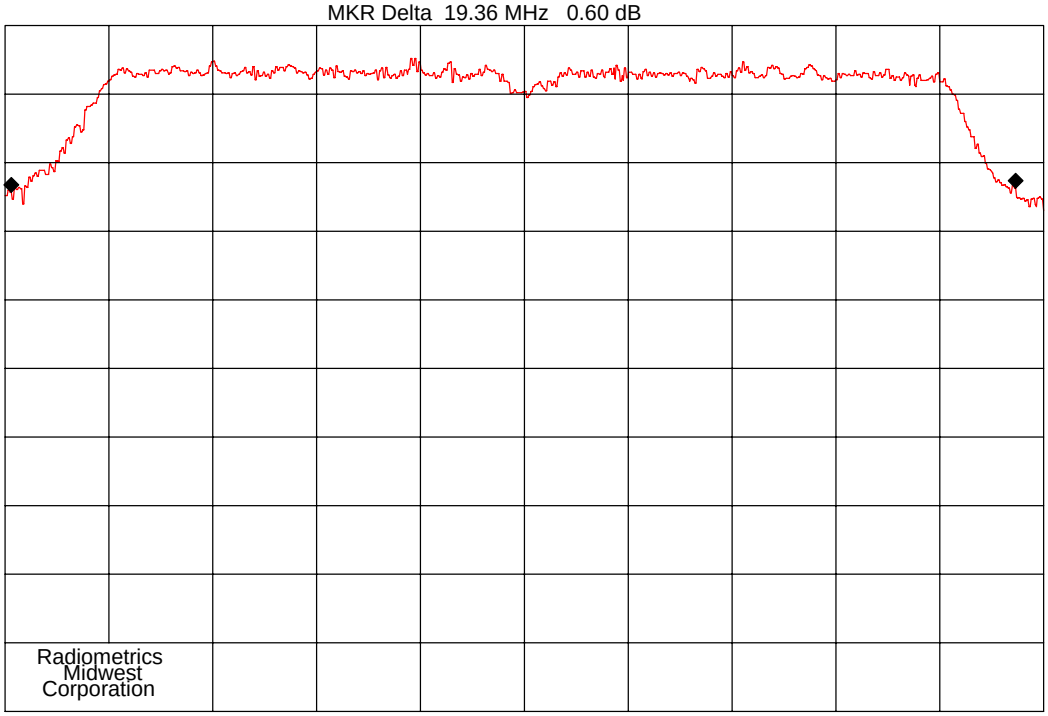


Company: Trilithic
CENTER 2.462 0 GHz
RES BW 100 kHz
10 dB/
Notes: Occ. Bandwidth 6 dB, Chan. 11; 802.11g

ITEM : 360DSP
REF 10.0 dBm
VBW 300 kHz
Time: 17:37

Date : 07-24-2012
SPAN 20.0 MHz
ATTEN 20 dB
SWP 20.0 msec
File: BW11g6

MKR Delta 19.36 MHz 0.60 dB



Company: Trilithic
CENTER 2.462 0 GHz
RES BW 300 kHz
10 dB/
Notes: Occ. Bandwidth 20 dB, Chan. 11; 802.11g

ITEM : 360DSP
REF 10.0 dBm
VBW 1 MHz
Time: 17:38

Date : 07-24-2012
SPAN 20.0 MHz
ATTEN 20 dB
SWP 20.0 msec
File: BW11g20

10.3 Peak Output Power

The EUT antenna port was connected to the Spectrum analyzer via a low loss coaxial cable.

The power output option 2; Method #3 from FCC rules 558074 was used for this test. The spectrum analyzer was set to the following settings:

Span = 20 MHz; RBW = 1 MHz; VBW = 3 MHz
Sweep = auto; Detector function = peak; Trace = max hold

The trace was allowed to stabilize. The marker-to-peak function was used to measure the peak of the emission. The indicated level is the peak output power. The BW correction factor is 10*Log(BW). Note 30 dBm = 1 watt. Since the gain of the antenna is always less than 6 dB, the limit is not reduced.

Mode	Freq. (MHz)	Reading (dBm)	BW Corr Factor (dB)	Cable Loss (dB)	Total Power (dBm)		Limit (dBm)
					dBm	Watts	
802.11b	2412	7.1	11.0	0.1	18.2	0.067	30
802.11b	2437	8.0	11.2	0.1	19.3	0.085	30
802.11b	2462	8.0	11.0	0.1	19.1	0.081	30
802.11g	2412	8.5	12.2	0.1	20.8	0.120	30
802.11g	2437	10.2	12.2	0.1	22.5	0.177	30
802.11g	2462	10.2	12.1	0.1	22.4	0.175	30

Overall Test result: Pass by 7.5 dB

10.4 Power Spectral Density

PSD option 1 was used for this test. No external attenuator was used. The spectrum analyzer was set to the following settings:

Span = 3 MHz; RBW = 3 kHz; VBW = 10 kHz; Sweep = 1000 Seconds; Detector function = Peak

Mode	Frequency (MHz)	Reading dBm	Cable Loss (dB)	3 kHz Spectral Density (dBm)	Limit (dBm)
802.11b	2412	-13.5	0.1	-13.4	8.0
802.11b	2437	-12.1	0.1	-12.0	8.0
802.11b	2462	-12.6	0.1	-12.5	8.0
802.11g	2412	-12.7	0.1	-12.6	8.0
802.11g	2437	-12.2	0.1	-12.1	8.0
802.11g	2462	-12.2	0.1	-12.1	8.0

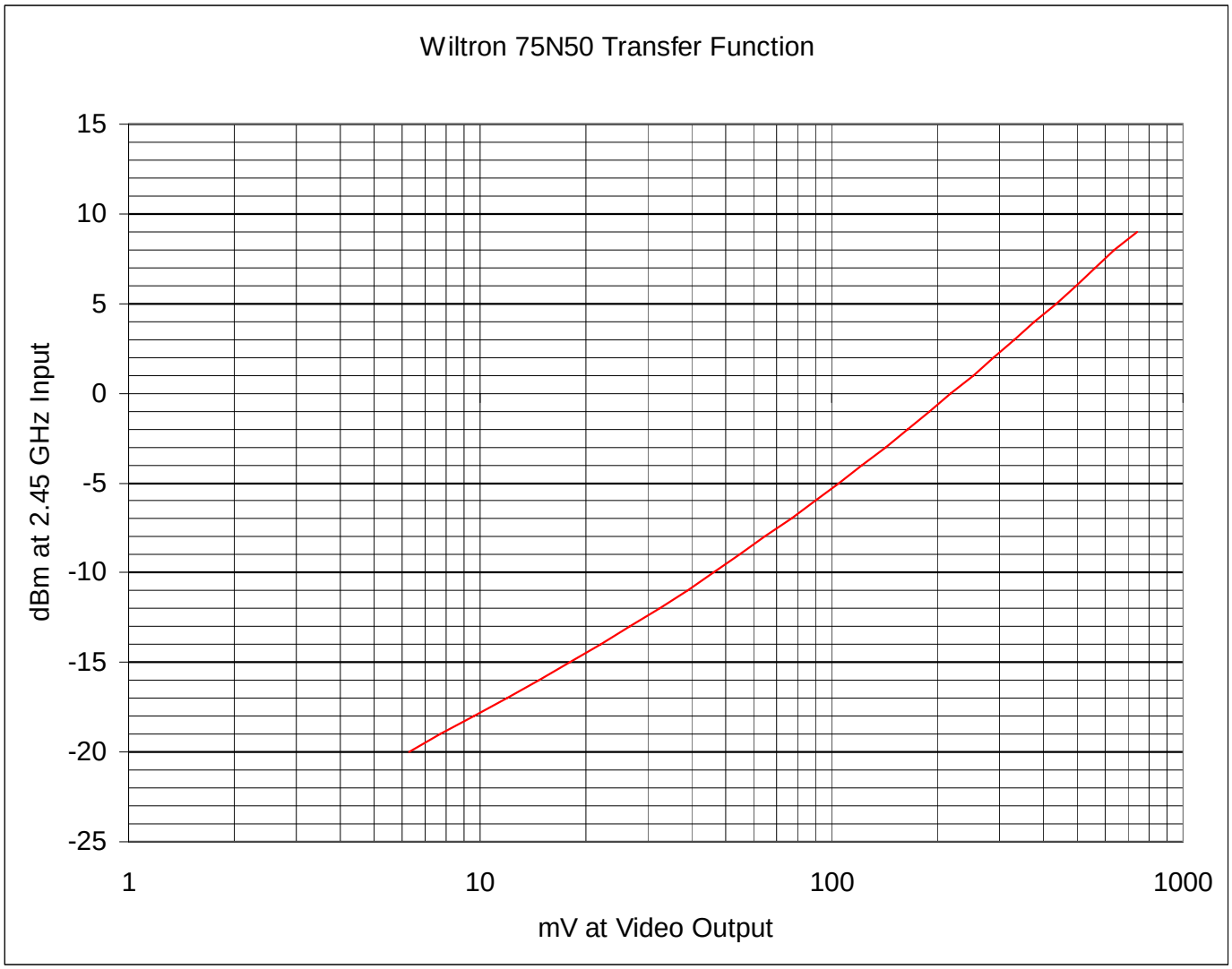
10.5 Average power

These measurements were made with an 18 GHz crystal RF detector. FCC part 15 and RSS-210 do not have limits on average power. The purpose of this is for RF Exposure Compliance requirements. The average voltage level from the crystal detector. This is a direct reading from the Antenna port on the EUT.

		EUT reading 200 samples	Equivalent		Average	
	Freq.	Ave Mode	Reading	Attenuator	Power	
Mode	MHz	(mV)	dBm	dB	dBm	mW
802.11b	2412	267	1.4	10	11.4	13.8
802.11b	2437	278	1.7	10	11.7	14.8
802.11b	2462	269	1.5	10	11.5	14.1
802.11g	2412	314	2.6	10	12.6	18.2
802.11g	2437	321	2.8	10	12.8	19.1
802.11g	2462	315	2.6	10	12.6	18.2

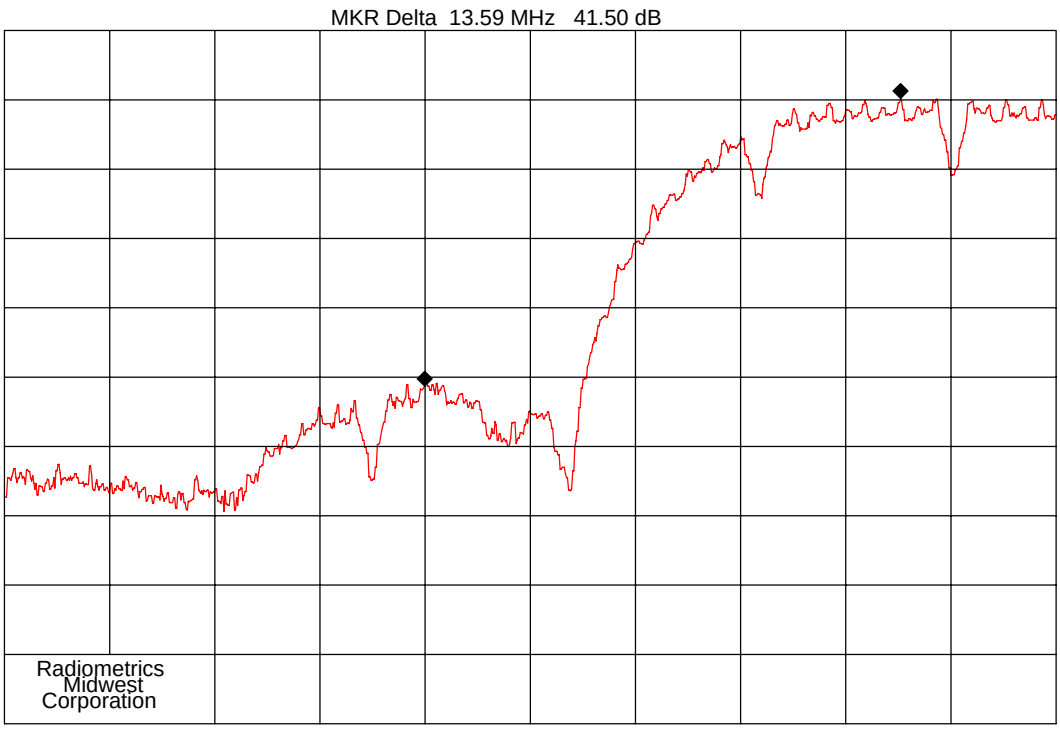
Since the average power output is 19.1 mW, The EUT meets the FCC requirement for RF exposure.

The crystal detector and attenuator was calibrated at 2450 MHz in terms of mV output versus power input using a calibrated oscilloscope and a calibrated RF generator. The third column is from the same oscilloscope connected to the detector while connected to the EUT. It is converted to dBm by using the calibration transfer function as seen below.



10.6 Band-edge Compliance of RF Conducted Emissions

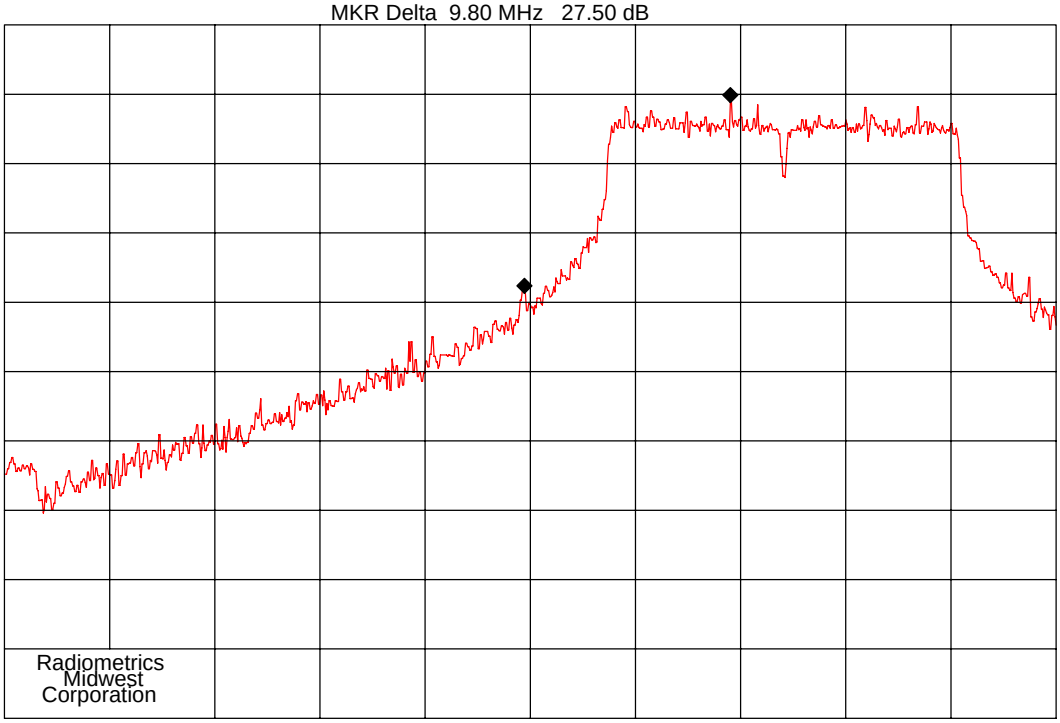
The spectrum analyzer was set to the MAX HOLD mode to record the worst case of the modulation at the band-edge, with the EUT set to the lowest frequency. The trace was allowed to stabilize.



Company: Trilithic
CENTER 2.400 0 GHz
RES BW 100 kHz
10 dB/
Notes: Lower Band edge at 2400 MHz, Chan. 1; 802.11b

ITEM : 360DSP
REF 10.0 dBm
VBW 300 kHz
Time: 08:00

Date : 07-25-2012
SPAN 30.0 MHz
ATTEN 20 dB
SWP 20.0 msec
File: BE1b-1

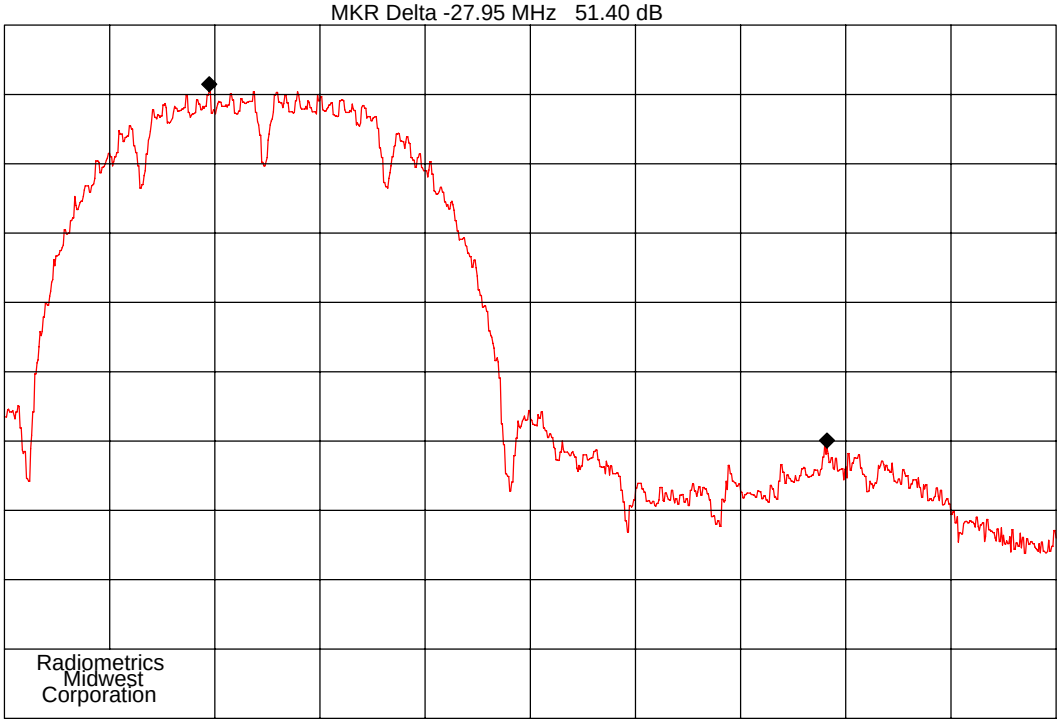


Company: Trilithic
CENTER 2.400 0 GHz
RES BW 100 kHz
10 dB/
Notes: Lower Band edge at 2400 MHz, Chan. 1; 802.11g

ITEM : 360DSP
REF 10.0 dBm
VBW 300 kHz
Time: 08:27

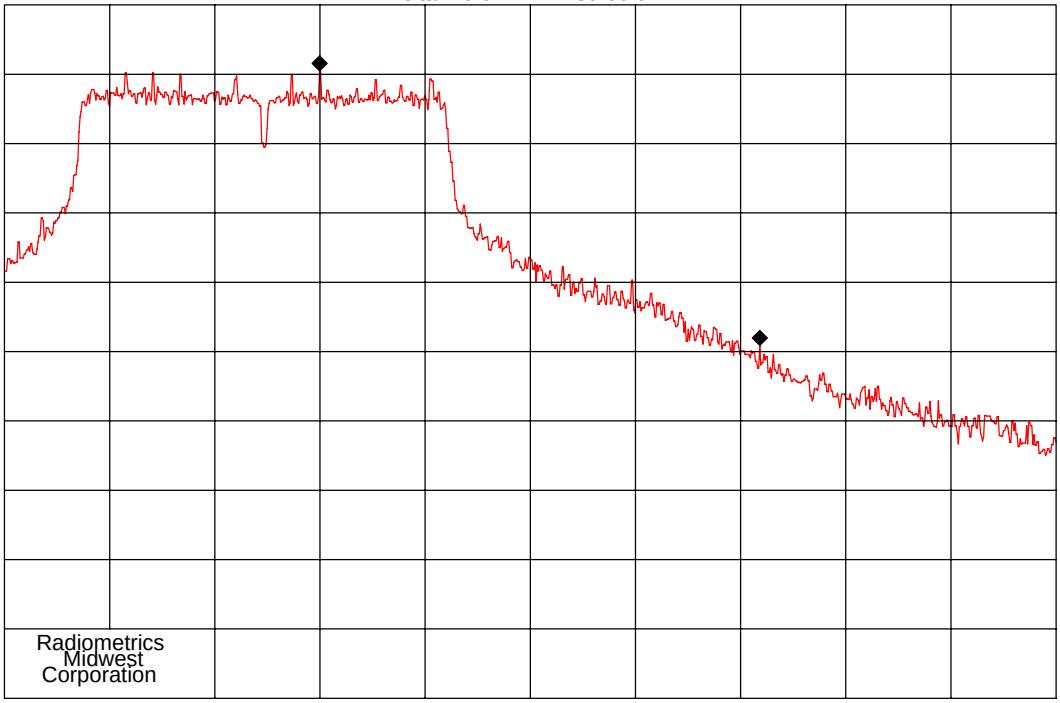
Date : 07-25-2012
SPAN 50.0 MHz
ATTEN 20 dB
SWP 20.0 msec
File: BE1g-1

MKR Delta -27.95 MHz 51.40 dB



Company: Trilithic
CENTER 2.474 0 GHz
RES BW 100 kHz
10 dB/
ITEM : 360DSP
REF 10.0 dBm
VBW 300 kHz
Time: 08:39
Date : 07-25-2012
SPAN 47.5 MHz
ATTEN 20 dB
SWP 20.0 msec
File: BE11b
Notes: Upper Band edge at 2483.5 MHz, Chan. 11; 802.11b

MKR Delta -19.92 MHz 39.60 dB



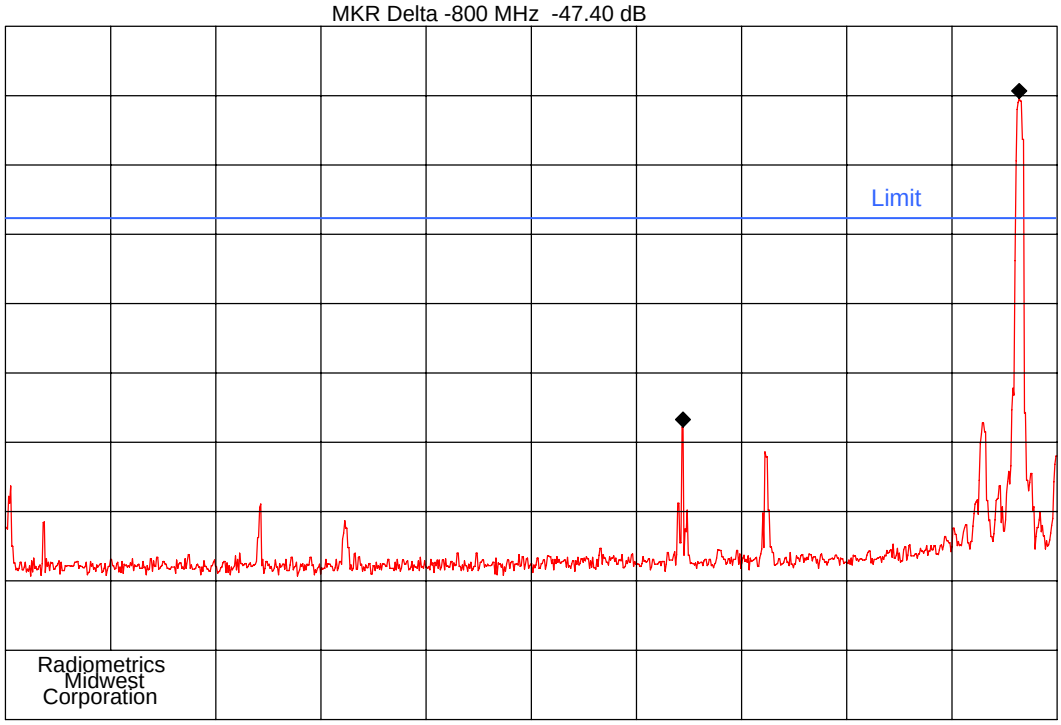
Company: Trilithic
CENTER 2.474 0 GHz
RES BW 100 kHz
10 dB/
ITEM : 360DSP
REF 10.0 dBm
VBW 300 kHz
Time: 08:34
Date : 07-25-2012
SPAN 47.5 MHz
ATTEN 20 dB
SWP 20.0 msec
File: BE11g
Notes: Upper Band edge at 2483.5 MHz, Chan. 11; 802.11g

Channel	Band Edge Delta Readings in dB		
	802.11b	802.11g	Limit
2412 Lower Band edge	41.5	27.5	20
2462 Upper Band edge	51.4	39.6	20

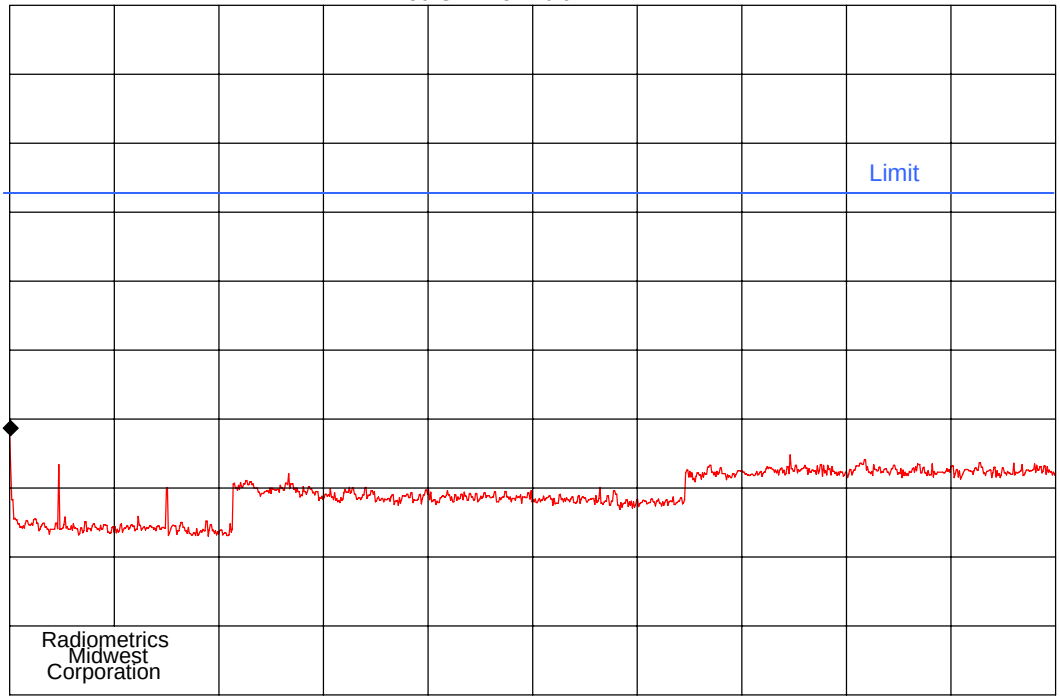
Judgement: Pass by 7.5 dB

10.7 Spurious RF Conducted Emissions

The spectrum analyzer was set to the MAX HOLD mode to record all spurious emissions from the lowest frequency generated in the EUT up through the 10th harmonic. The trace was allowed to stabilize. The first two plots were made while stepping through three frequencies (Low middle and high). Each frequency was on for 30 seconds.



MKR 2.50 GHz -52.40 dBm

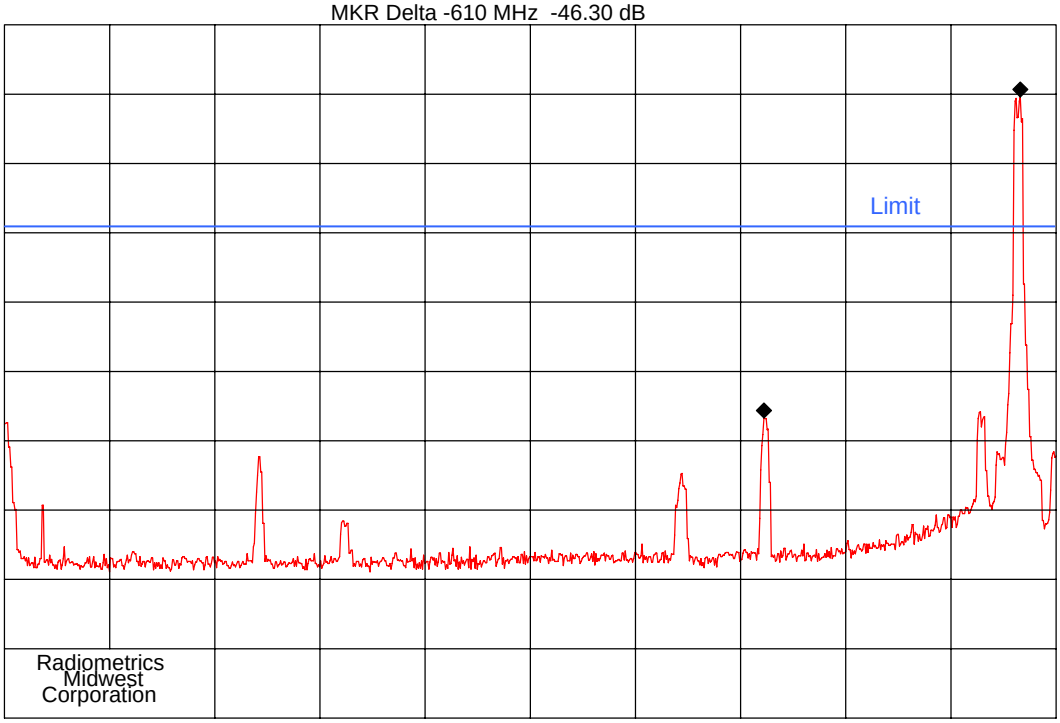


Company: Trilithic
START 2.5 GHz
RES BW 100 kHz
10 dB/
Notes: Ant Cond Emissions, Ch. 01; 802.11b

ITEM : 360DSP
REF 10.0 dBm
VBW 300 kHz
Time: 09:20

Date : 07-25-2012
STOP 18.0 GHz
ATTEN 20 dB
SWP 4.65 sec
File: AC01b-2

MKR Delta -610 MHz -46.30 dB

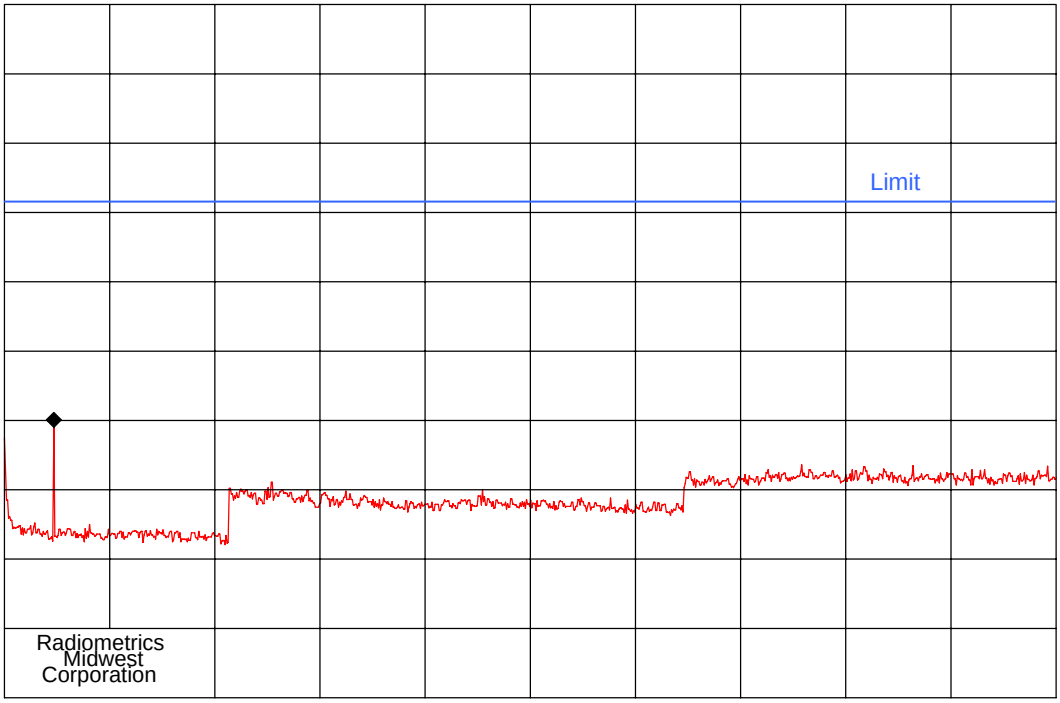


Company: Trilithic
START 1 MHz
RES BW 100 kHz
10 dB/
Notes: Ant Cond Emissions, Ch. 01; 802.11g

ITEM : 360DSP
REF 10.0 dBm
VBW 300 kHz
Time: 09:12

Date : 07-25-2012
STOP 2.50 GHz
ATTEN 20 dB
SWP 750 msec
File: AC01g-1

MKR 3.21 GHz -51.00 dBm

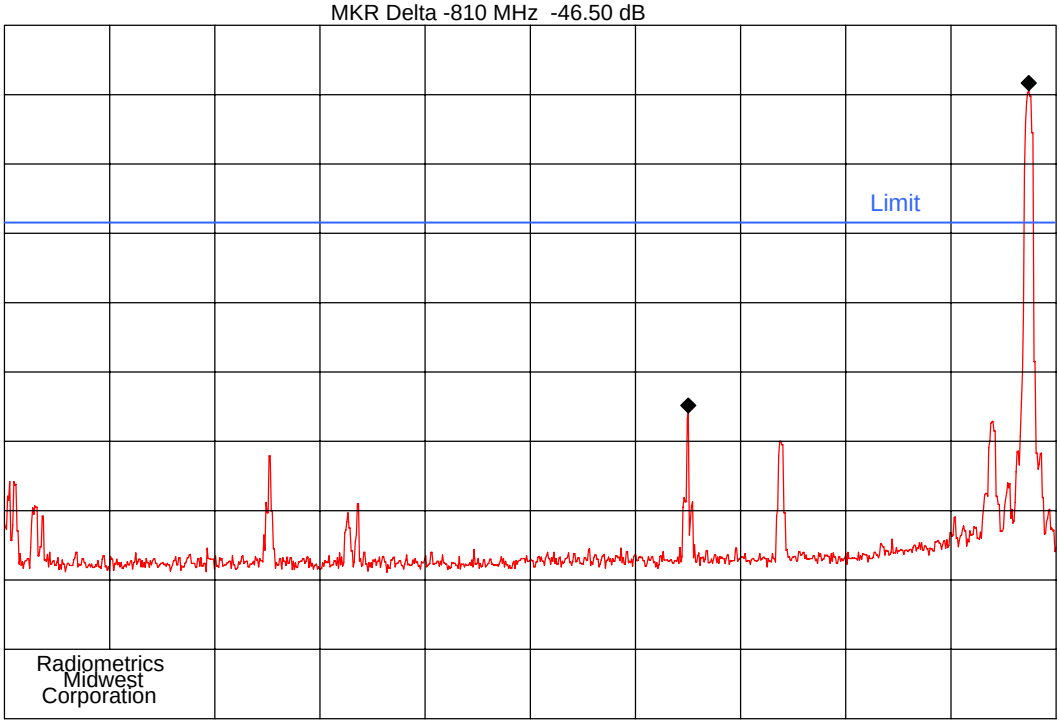


Company: Trilithic
START 2.5 GHz
RES BW 100 kHz
10 dB/
Notes: Ant Cond Emissions, Ch. 01; 802.11g

ITEM : 360DSP
REF 10.0 dBm
VBW 300 kHz
Time: 09:13

Date : 07-25-2012
STOP 18.0 GHz
ATTEN 20 dB
SWP 4.65 sec
File: AC01g-2

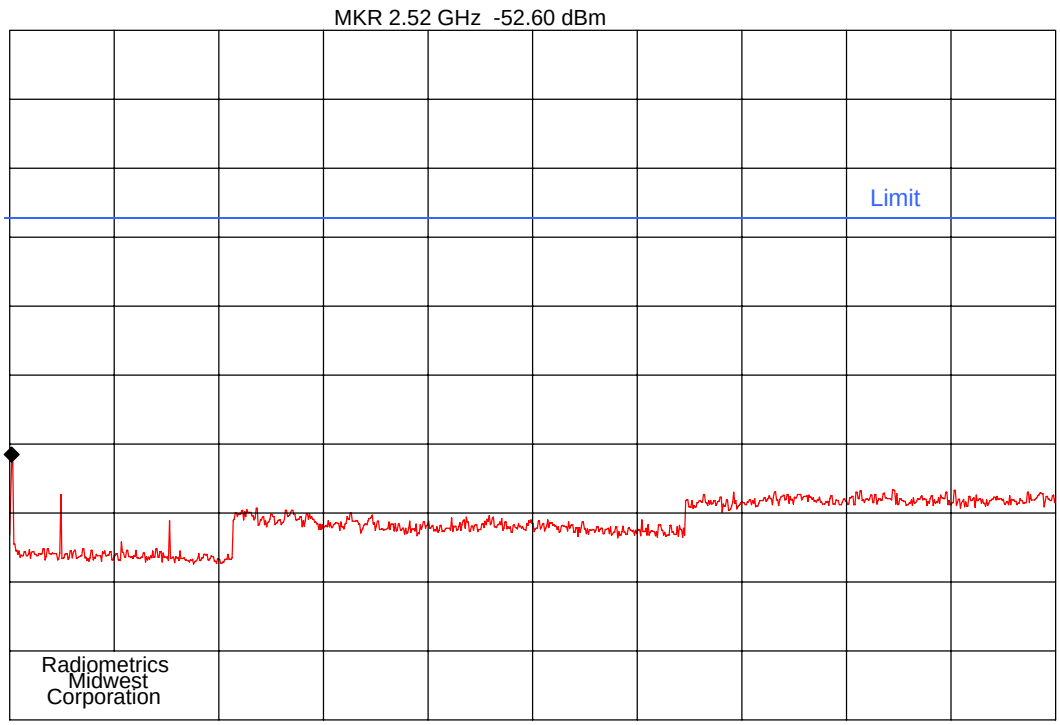
MKR Delta -810 MHz -46.50 dB



Company: Trilithic
START 1 MHz
RES BW 100 kHz
10 dB/
Notes: Ant Cond Emissions, Ch. 06; 802.11b

ITEM : 360DSP
REF 10.0 dBm
VBW 300 kHz
Time: 09:22

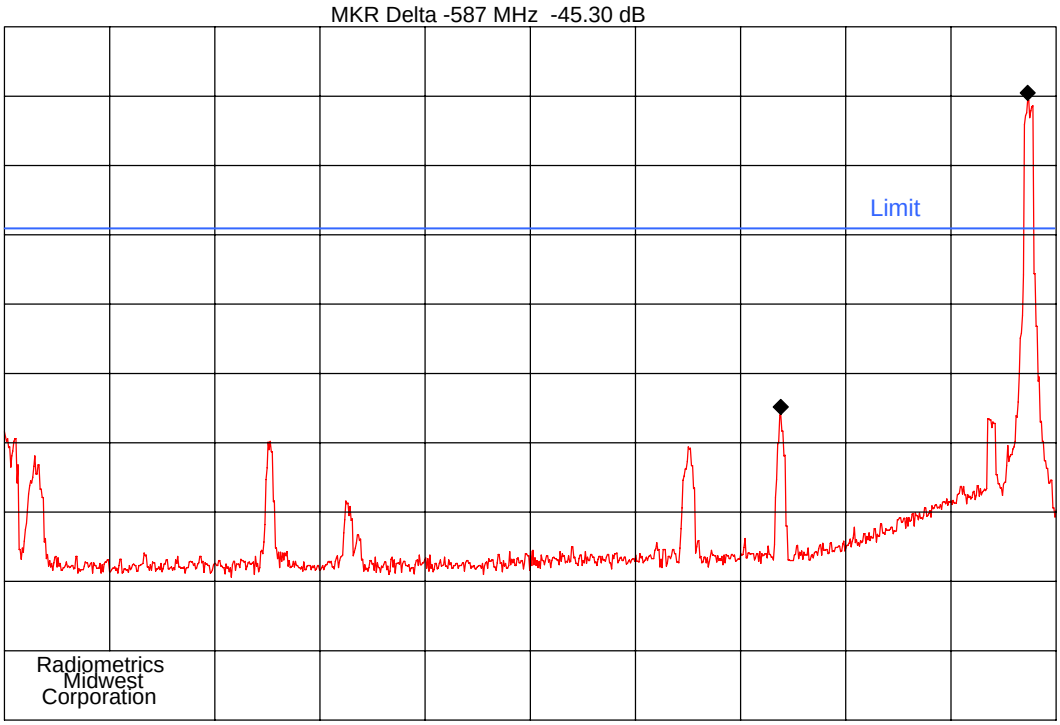
Date : 07-25-2012
STOP 2.50 GHz
ATTEN 20 dB
SWP 750 msec
File: AC06b-1



Company: Trilithic
START 2.5 GHz
RES BW 100 kHz
10 dB/
Notes: Ant Cond Emissions, Ch. 06; 802.11b

ITEM : 360DSP
REF 10.0 dBm
VBW 300 kHz
Time: 09:24

Date : 07-25-2012
STOP 18.0 GHz
ATTEN 20 dB
SWP 4.65 sec
File: AC06b-2

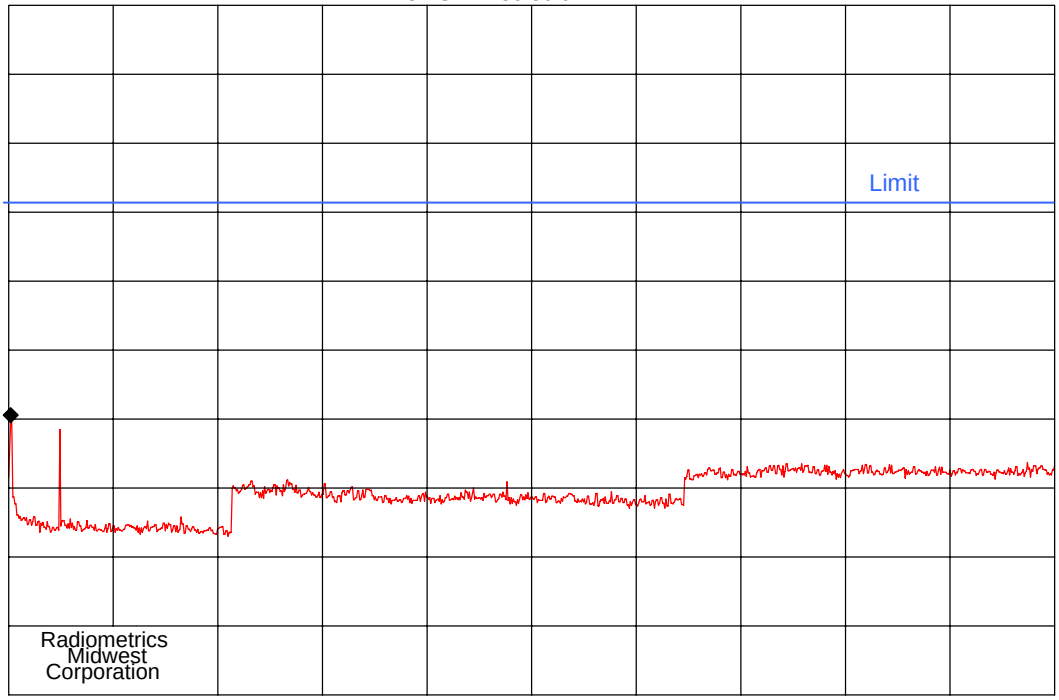


Company: Trilithic
START 1 MHz
RES BW 100 kHz
10 dB/
Notes: Ant Cond Emissions, Ch. 06; 802.11g

ITEM : 360DSP
REF 10.0 dBm
VBW 300 kHz
Time: 09:08

Date : 07-25-2012
STOP 2.50 GHz
ATTEN 20 dB
SWP 750 msec
File: AC06g-1

MKR 2.52 GHz -50.50 dBm

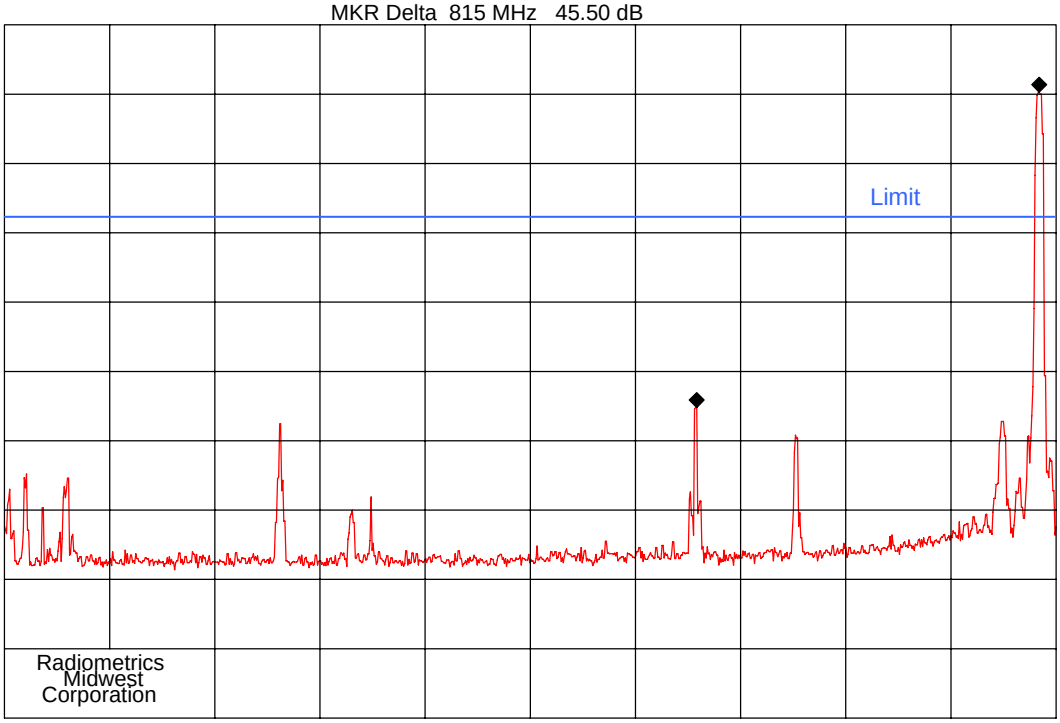


Company: Trilithic
START 2.5 GHz
RES BW 100 kHz
10 dB/
Notes: Ant Cond Emissions, Ch. 6; 802.11g

ITEM : 360DSP
REF 10.0 dBm
VBW 300 kHz
Time: 09:07

Date : 07-25-2012
STOP 18.0 GHz
ATTEN 20 dB
SWP 4.65 sec
File: AC06g-2

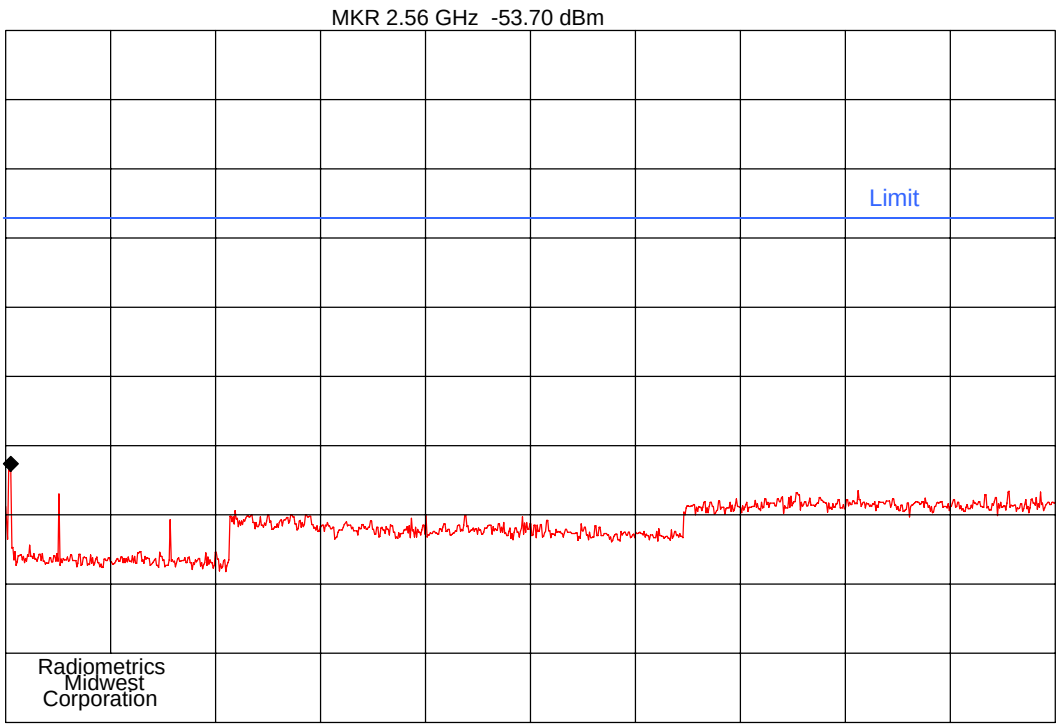
MKR Delta 815 MHz 45.50 dB



Company: Trilithic
START 1 MHz
RES BW 100 kHz
10 dB/
Notes: Ant Cond Emissions, Ch. 11; 802.11b

ITEM : 360DSP
REF 10.0 dBm
VBW 300 kHz
Time: 08:48

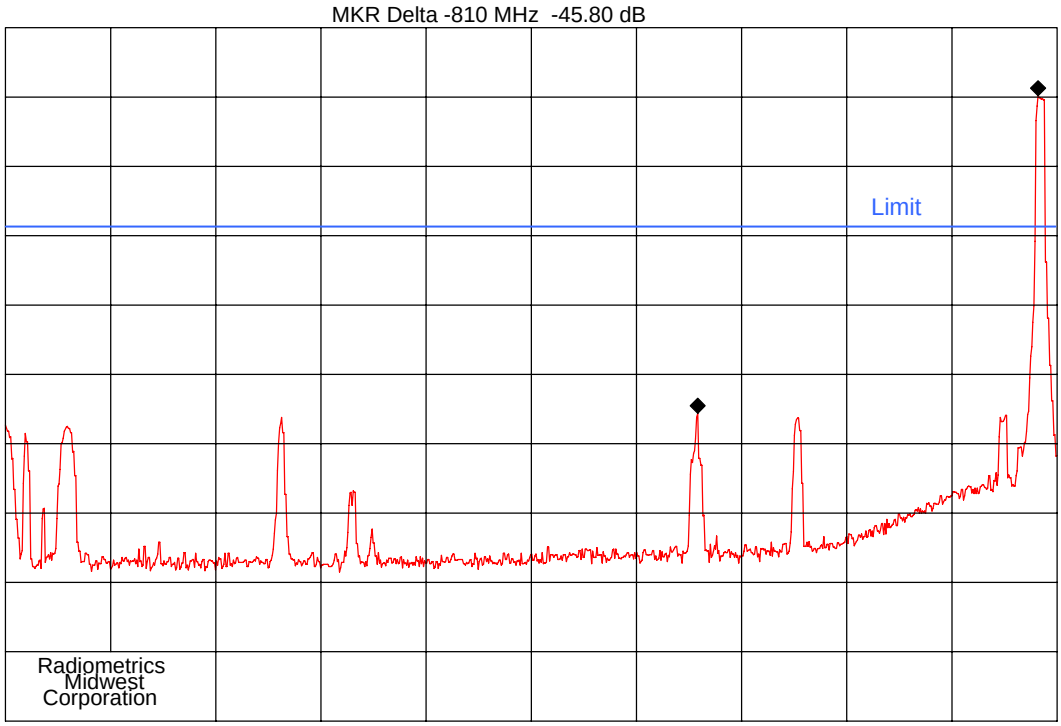
Date : 07-25-2012
STOP 2.50 GHz
ATTEN 20 dB
SWP 749 msec
File: AC11b-1



Company: Trilithic
START 2.5 GHz
RES BW 100 kHz
10 dB/
Notes: Ant Cond Emissions, Ch. 11; 802.11b

ITEM : 360DSP
REF 10.0 dBm
VBW 300 kHz
Time: 08:50

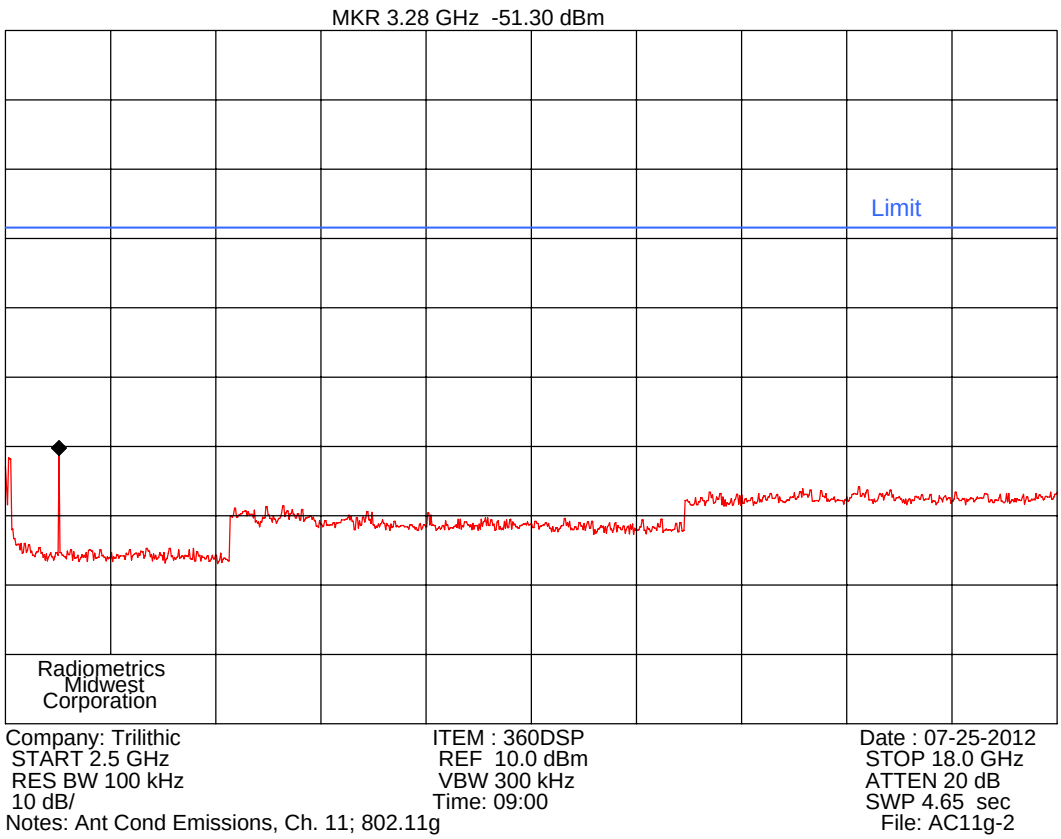
Date : 07-25-2012
STOP 18.0 GHz
ATTEN 20 dB
SWP 4.65 sec
File: AC11b-2



Company: Trilithic
START 1 MHz
RES BW 100 kHz
10 dB/
Notes: Ant Cond Emissions, Ch. 11; 802.11g

ITEM : 360DSP
REF 10.0 dBm
VBW 300 kHz
Time: 08:52

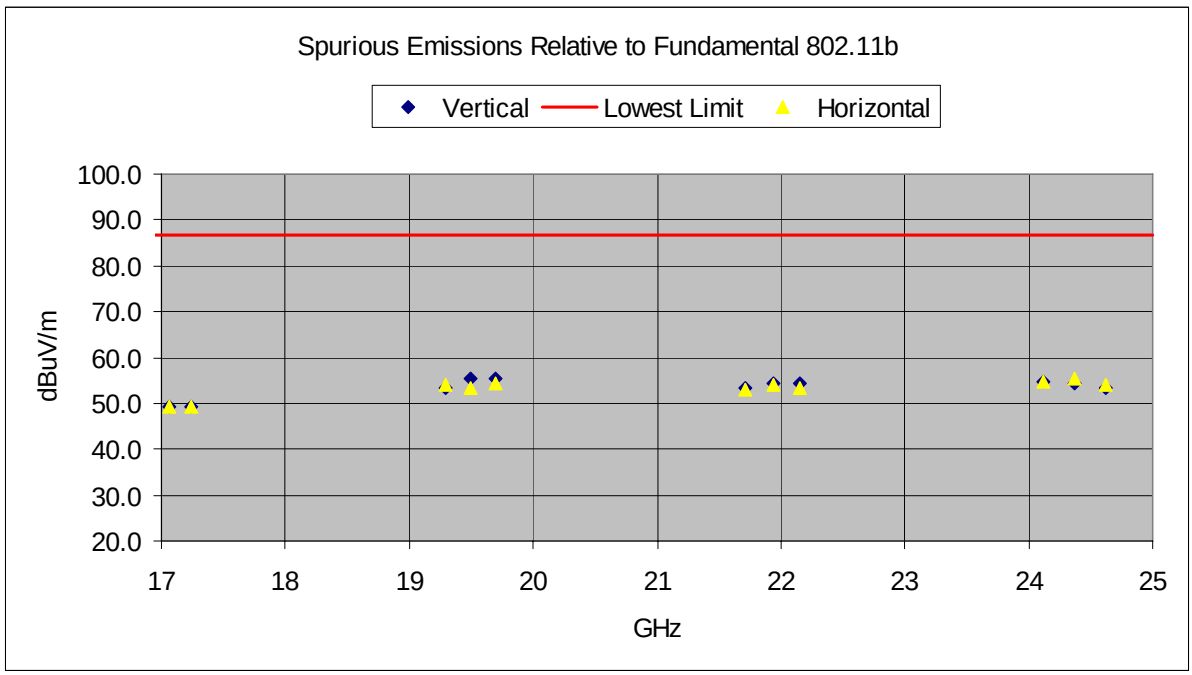
Date : 07-25-2012
STOP 2.50 GHz
ATTEN 20 dB
SWP 750 msec
File: AC11g-1

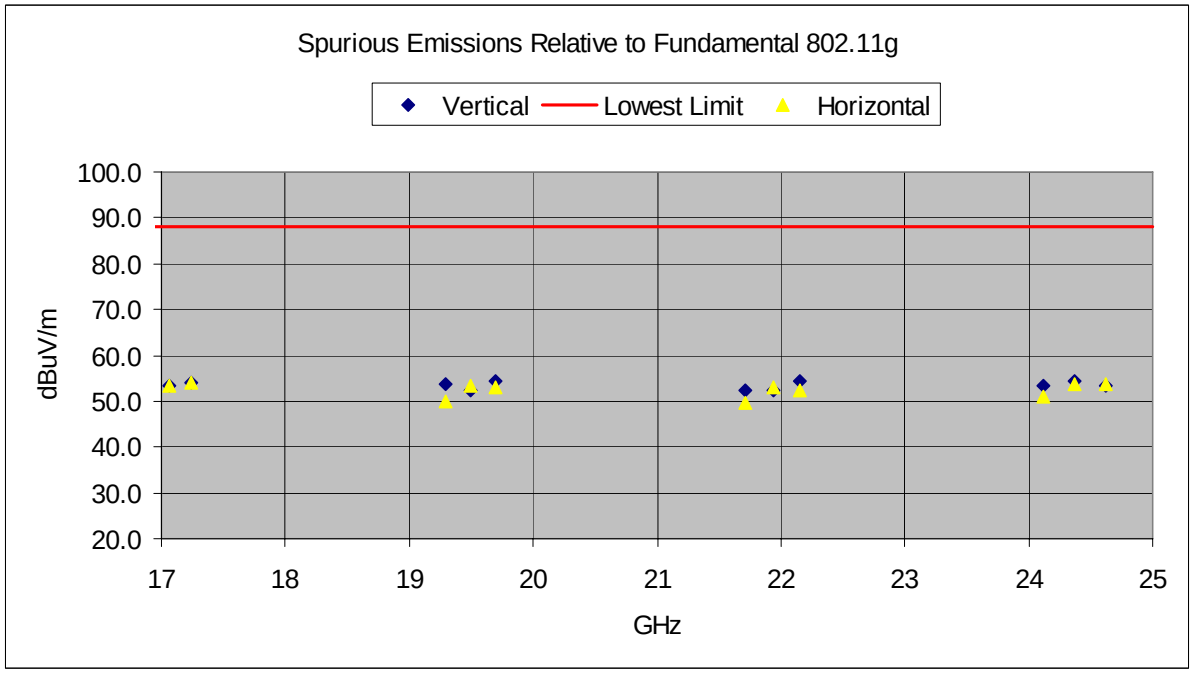


10.7.1 Radiated Method (18 - 25 GHz)

Due to limitations on the cable and connectors, conducted emissions could not be performed on the EUT above 18 GHz. Therefore, radiated tests were performed to show compliance with this requirement from 18 to 25 GHz.

The EUT was tested in continous mode and peak readings were made from 2.5 GHz up through the 10th harmonic. The limit is 20 dB lower than the peak of the lowest fundamental. The data is shown graphically.





Judgement: Pass by at least 20 dB

10.8 Spurious Radiated Emissions (Restricted Band)

Radiated emission measurements were performed with linearly polarized broadband antennas. The results obtained with these antennas can be correlated with results obtained with a tuned dipole antenna. The radiated emission measurements were performed with a spectrum analyzer. The bandwidth used from 150 kHz to 30 MHz is 9 or 10 kHz and the bandwidth from 30 MHz to 1000 MHz is 100 or 120 kHz. Above 1 GHz, a 1 MHz bandwidth is used. A 10 dB linearity check is performed prior to start of testing in order to determine if an overload condition exists.

From 30 to 1000 MHz, an Anritsu spectrum analyzer was used. For tests from 1 to 25 GHz, an HP 8566 spectrum analyzer was used. For tests from 1 to 10 GHz, a high pass filter was used to reduce the fundamental emission. A harmonic mixer was used from 18 to 25 GHz. Figure 4 herein lists the details of the test equipment used during radiated emissions tests. In addition, a high pass filter was used to reduce the fundamental emission.

The was device was rotated through three orthogonal axis as per 13.1.4.1 of ANSI C63.4 during the radiated tests.

Final radiated emissions measurements were performed inside of an anechoic chamber at a test distance of 3 meters. The anechoic chamber is designated as Chamber E. This Chamber meets the Site Attenuation requirements of ANSI C63.4 and CISPR 16-1. Chamber E is located at 12 East Devonwood Ave. Romeoville, Illinois EMI test lab.

The entire frequency range from 30 to 25,000 MHz was slowly scanned with particular attention paid to those frequency ranges which appeared high. Measurements were performed using two antenna polarizations, (vertical and horizontal). The worst case emissions were recorded. All measurements may be performed using either the peak, average or quasi-peak detector functions. If the peak detector data exceeds or is marginally close to the limits, the measurements are repeated using a quasi-peak detector or average function as required by the specification for final determination of compliance.

The detected emission levels were maximized by rotating the EUT, adjusting the positions of all cables, and by scanning the measurement antenna from 1 to 4 meters above the ground.

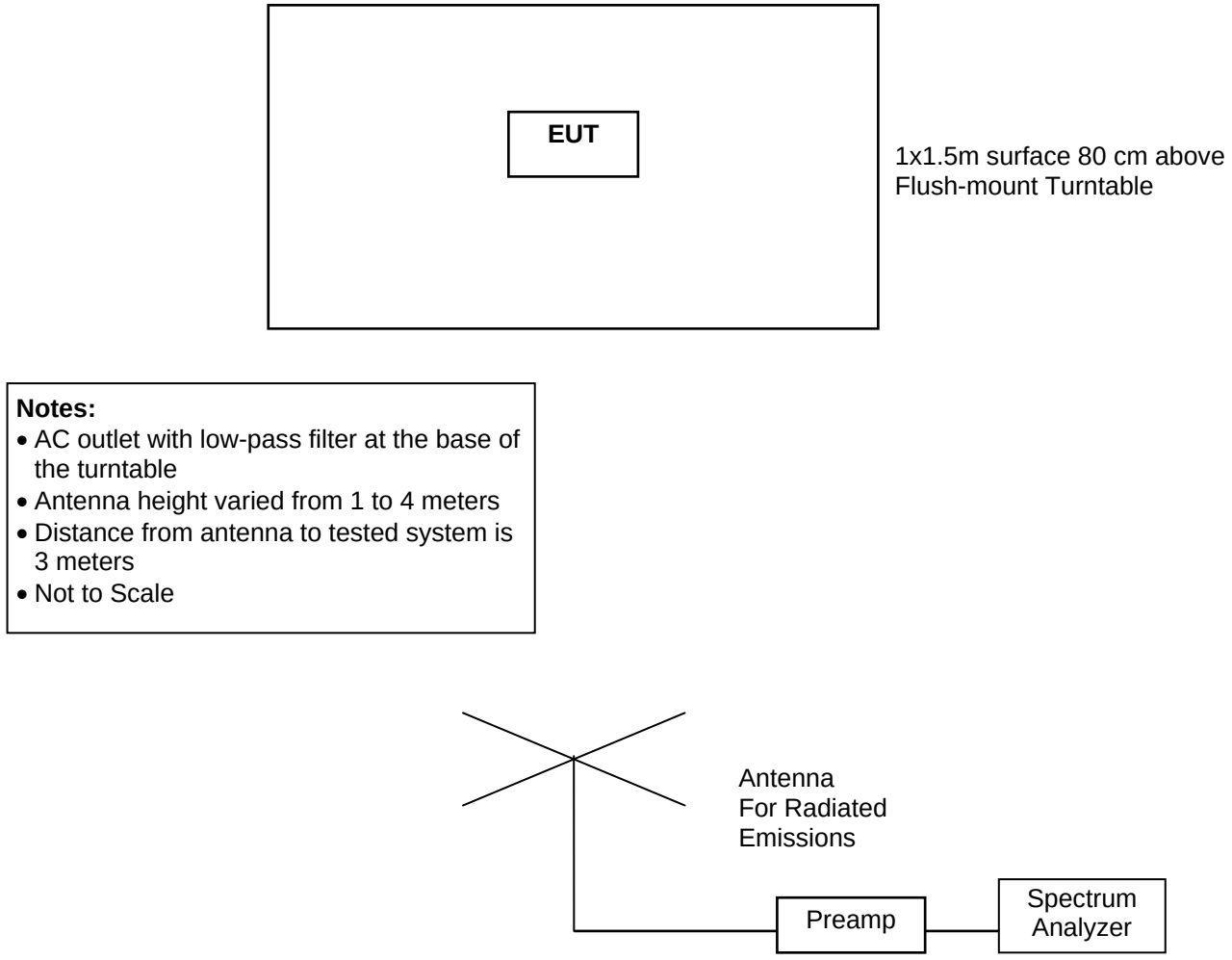
10.8.1 Radiated Emissions Field Strength Sample Calculation

The field strength is calculated by adding the Antenna Factor and Cable Loss, and by subtracting the Amplifier Gain from the measured reading. The basic equation is as follows:

FS = RA + AF + CF - AG

Where: FS = Field Strength
RA = Receiver Amplitude
AF = Antenna Factor
CF = Cable Attenuation Factor
AG = Amplifier Gain
HPF = High pass Filter Loss

Figure 2. Drawing of Radiated Emissions Setup



10.8.2 Radiated Emissions Test Results

The following spectrum analyzer settings were used.
Span = wide enough to fully capture the emission being measured
RBW = 1 MHz for f ≥ 1 GHz, 100 kHz for f < 1 GHz
VBW ≥ RBW; Sweep = auto; Detector function = peak; Trace = max hold
A Video Bandwidth of 10 Hz was used for Average measurements above 1 GHz.

Manufacturer	Trilithic	Specification	FCC Part 15 Subpart C & RSS-210
Model	360DSP	Test Date	July 13, 2012
Serial Number	281195	Test Distance	3 Meters
Abbreviations	Pol = Antenna Polarization; V = Vertical; H = Horizontal; BC = Biconical (ANT-3); LP = Log-Periodic (ANT-6); HN = Horn (ANT-13) P = peak; Q = QP		
Notes	Corr. Factors = Cable Loss – Preamp Gain – Duty Cycle Factor + HP Filter Loss		

Emissions below 1 GHz

Freq. MHz	Meter Reading dBuV	Dect. Type	Antenna Factor dB	Antenna Pol/ ID#	Corr. Factors dB	Field Strength dBuV/m EUT	Field Strength dBuV/m Limit	Margin Under Limit dB
44.4	34.6	P	15.2	H/44	-27.8	22.0	40.0	18.0
58.4	46.6	P	11.3	H/44	-27.6	30.3	40.0	9.7
77.8	49.5	Q	6.9	H/44	-27.3	29.1	40.0	10.9
219.2	56.9	P	11.4	H/44	-25.9	42.5	46.0	3.5
225.6	55.0	P	11.7	H/44	-25.9	40.9	46.0	5.1
272.0	51.1	P	13.0	H/44	-25.6	38.6	46.0	7.4
337.6	41.6	P	14.2	H/44	-25.1	30.7	46.0	15.3
376.8	41.0	P	15.4	H/44	-25.0	31.4	46.0	14.6
486.5	42.9	P	17.5	H/44	-24.3	36.1	46.0	9.9
544.0	42.5	P	18.9	H/44	-23.9	37.5	46.0	8.5
619.9	27.2	Q	19.4	H/44	-23.3	23.2	46.0	22.8
620.5	26.2	Q	19.4	H/44	-23.3	22.2	46.0	23.8
752.0	42.1	P	20.4	H/44	-22.5	40.0	46.0	6.0
752.6	21.9	Q	20.5	H/44	-22.4	19.9	46.0	26.1
780.2	25.1	Q	20.6	H/44	-22.1	23.6	46.0	22.4
846.0	33.9	P	21.5	H/44	-21.5	33.9	46.0	12.1
902.5	31.0	Q	21.9	H/44	-20.9	32.0	46.0	14.0
930.6	23.8	Q	22.2	H/44	-20.6	25.4	46.0	20.6
30.7	42.5	Q	16.4	V/44	-27.9	31.0	40.0	9.0
58.2	24.4	Q	11.4	V/44	-27.6	8.2	40.0	31.8
228.4	52.5	P	11.6	V/44	-25.9	38.3	46.0	7.7
277.6	41.9	P	13.1	V/44	-25.5	29.5	46.0	16.5
337.6	39.4	P	14.2	V/44	-25.1	28.5	46.0	17.5
366.7	43.0	P	14.5	V/44	-25.1	32.3	46.0	13.7
440.6	40.3	P	17.5	V/44	-24.6	33.2	46.0	12.8
539.0	39.6	P	18.6	V/44	-24.0	34.2	46.0	11.8
622.0	34.2	P	19.6	V/44	-23.3	30.5	46.0	15.5
643.0	36.6	P	20.0	V/44	-23.2	33.5	46.0	12.5
737.0	30.6	P	20.2	V/44	-22.7	28.1	46.0	17.9
856.0	28.9	P	21.2	V/44	-21.4	28.6	46.0	17.4
960.0	26.8	P	21.9	V/44	-20.3	28.4	46.0	17.6

Judgement: Pass by 3.5 dB

802.11b Radiated emissions

		Spectrum Analyzer Readings									EUT	Peak	Ave	Peak	Ave	Margin
hrm	Tx	Peak			Ave	Peak			Ave	Corr	Emission	Tot. FS		Limit		Under
		Vertical Polarization				Horizontal Polarization					Freq					
#	Freq	X	Y	Z	Max	X	Y	Z	Max	Fact.	MHz	dBuV/m		dBuV/m		Limit
1	2412	98.3	93.5	105.5	101.5	95.9	99.5	94.1	97.0	2.1	2412	107.6	103.6	125	115	11.4
BE	2412	46.1	41.3	53.3	49.3	43.7	47.3	41.9	44.8	2.1	2390	55.4	51.4	74	54	2.6
2	2412	35.5	36.2	36.0	33.1	35.9	39.8	33.5	36.7	10.5	4824	50.3	47.2	74	54	6.8
3	2412	36.0	36.0	36.0	32.9	36.0	36.0	36.0	32.9	11.3	7236	47.3	44.2	74	54	9.8
4	2412	37.0	37.0	37.0	33.9	37.0	37.0	37.0	33.9	6.8	9648	43.8	40.7	74	54	13.3
1	2437	96.8	94.1	104.6	101.5	95.9	105.1	99.9	102.0	2.2	2437	107.3	104.2	125	115	10.8
2	2437	39.1	37.6	40.0	36.9	35.6	40.7	36.3	37.6	10.6	4874	51.3	48.2	74	54	5.8
3	2437	36.0	36.0	36.0	32.9	36.0	36.0	36.0	32.9	11.1	7311	47.1	44.0	74	54	10.0
4	2437	37.0	37.0	37.0	33.9	37.0	37.0	36.0	33.9	6.8	9748	43.8	40.7	74	54	13.3
1	2462	93.9	96.5	104.5	101.4	95.8	103.1	97.5	100.0	2.3	2462	106.8	103.7	125	115	11.3
BE	2462	38.9	41.5	49.5	46.4	40.8	48.1	42.5	45.0	2.3	2483.5	51.8	48.7	74	54	5.3
2	2462	38.7	39.7	41.9	38.8	39.0	41.8	38.7	38.7	10.0	4924	51.9	48.8	74	54	5.2
3	2462	36.0	36.0	36.0	32.9	36.0	36.0	36.0	32.9	11.5	7386	47.5	44.4	74	54	9.6
4	2462	37.0	37.0	37.0	33.9	37.0	37.0	37.0	33.9	6.8	9848	43.8	40.7	74	54	13.3
Column numbers (see below for explanations)																
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17

Judgment: Passed by 2.6 dB
No other emissions were detected from 10 to 25 GHz.

Column #1. hrm = Harmonic; BE = Band Edge emissions
Column #2. Frequency of Transmitter.
Column #3. Uncorrected readings from the spectrum analyzer with First Axis Rotation.
Column #4. Uncorrected readings from the spectrum analyzer with Second Axis Rotation.
Column #5. Uncorrected readings from the spectrum analyzer with Third Axis Rotation.
Column #6. Average Reading based on peak reading reduced by the Duty cycle correction
Column #7. Uncorrected readings from the spectrum analyzer with First Axis Rotation.
Column #8. Uncorrected readings from the spectrum analyzer with Second Axis Rotation.
Column #9. Uncorrected readings from the spectrum analyzer with Third Axis Rotation.
Column #10. Average Reading based on peak reading reduced by the Duty cylce correction
Column #11. Corr. Factors = Cable Loss – Preamp Gain + Antenna Factor
Column #12. Frequency of Tested Emission
Column #13. Highest peak field strength at listed frequency.
Column #14. Highest Average field strength at listed frequency.
Column #15. Peak Limit.
Column #16. Average Limit.
Column #17. The margin (last column) is the worst case margin under the peak or average limits for that row.

802.11g Radiated emissions

		Spectrum Analyzer Readings									EUT	Peak	Ave	Peak	Ave	Margin
hrm	Tx	Peak			Ave	Peak			Ave	Corr	Emission	Tot. FS		Limit		Under
#	Freq	Vertical Polarization				Horizontal Polarization				Fact.	Freq MHz	dBuV/m		dBuV/m		Limit
		X	Y	Z	Max	X	Y	Z	Max							
1	2412	96.4	101.2	106.4	94.9	98.3	103.6	99.6	93.2	2.1	2412	108.5	97.0	125	115	16.5
BE	2412	63.5	65.8	70.2	50.4	63.2	68.9	64.5	49.6	2.1	2390	72.3	52.5	74	54	1.5
2	2412	36.6	39.7	42.8	36.8	35.9	43.1	36.8	37.1	10.5	4824	53.6	47.6	74	54	6.4
3	2412	36.0	36.0	36.0	30.0	36.0	36.0	36.0	30.0	11.3	7236	47.3	41.3	74	54	12.7
4	2412	37.0	37.0	37.0	31.0	37.0	37.0	37.0	6.8	12.3	9648	49.3	43.3	74	54	10.7
1	2437	99.8	101.2	106.9	100.9	99.3	105.6	102.8	93.5	2.2	2437	109.1	103.1	125	115	11.9
2	2437	37.8	38.9	41.2	35.2	35.9	42.0	39.0	36.0	10.6	4874	52.6	46.6	74	54	7.4
3	2437	36.0	36.0	36.0	30.0	37.0	39.7	37.0	33.7	11.1	7311	50.8	44.8	74	54	9.2
4	2437	37.0	37.0	37.0	31.0	37.0	37.0	37.0	6.8	12.4	9748	49.4	43.4	74	54	10.6
1	2462	99.5	101.7	105.9	93.9	99.4	105.6	101.6	95.0	2.3	2462	108.2	97.3	125	115	16.8
BE	2462	63.8	65.3	69.5	49.5	65.2	70.0	66.1	50.3	2.3	2483.5	72.3	52.6	74	54	1.4
2	2462	36.8	38.9	41.3	35.3	36.4	40.7	37.9	34.7	10.0	4924	51.3	45.3	74	54	8.7
3	2462	36.0	36.0	36.0	30.0	36.0	36.0	36.0	30.0	11.5	7386	47.5	41.5	74	54	12.5
4	2462	37.0	37.0	37.0	31.0	37.0	37.0	37.0	6.8	12.5	9848	49.5	43.5	74	54	10.5
Column numbers (see below for explanations)																
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17

Judgment: Passed by 1.4 dB
No other emissions were detected from 10 to 25 GHz.

Column #1. hrm = Harmonic; BE = Band Edge emissions
Column #2. Frequency of Transmitter.
Column #3. Uncorrected readings from the spectrum analyzer with First Axis Rotation.
Column #4. Uncorrected readings from the spectrum analyzer with Second Axis Rotation.
Column #5. Uncorrected readings from the spectrum analyzer with Third Axis Rotation.
Column #6. Average Reading based on peak reading reduced by the Duty cycle correction
Column #7. Uncorrected readings from the spectrum analyzer with First Axis Rotation.
Column #8. Uncorrected readings from the spectrum analyzer with Second Axis Rotation.
Column #9. Uncorrected readings from the spectrum analyzer with Third Axis Rotation.
Column #10. Average Reading based on peak reading reduced by the Duty cycle correction
Column #11. Corr. Factors = Cable Loss – Preamp Gain + Antenna Factor
Column #12. Frequency of Tested Emission
Column #13. Highest peak field strength at listed frequency.
Column #14. Highest Average field strength at listed frequency.
Column #15. Peak Limit.
Column #16. Average Limit.
Column #17. The margin (last column) is the worst case margin under the peak or average limits for that row.

10.9 Unintentional Emissions (Receive Mode)

Manufacturer	Trilithic	Specification	FCC Part 15.247 & RSS-210
Model	360DSP	Test Date	7/13/2012
Serial Number	281195	Test Distance	3 Meters
Abbreviations	Pol = Antenna Polarization; V = Vertical; H = Horizontal; P = peak; Q = QP		
Notes	Corr. Factors = Cable Loss – Preamp Gain		
Configuration	Receive mode		

Freq. MHz	Meter Reading dBuV	Dect. Type	Antenna Factor dB	Antenna Pol/ ID#	Corr. Factors dB	Field Strength dBuV/m EUT	Field Strength dBuV/m Limit	Margin Under Limit dB
44.4	34.6	P	15.2	H/44	-27.8	22.0	40.0	18.0
58.4	46.6	P	11.3	H/44	-27.6	30.3	40.0	9.7
90.8	33.7	P	8.1	H/44	-27.1	14.7	43.5	28.8
116.8	38.7	P	13.7	H/44	-26.7	25.7	43.5	17.8
181.6	50.6	P	9.1	H/44	-26.2	33.5	43.5	10.0
199.6	48.0	P	9.8	H/44	-26.0	31.8	43.5	11.7
222.0	42.0	P	11.5	H/44	-25.8	27.6	46.0	18.4
225.1	44.8	Q	11.7	H/44	-25.9	30.7	46.0	15.3
250.2	50.1	P	12.7	H/44	-25.7	37.1	46.0	8.9
300.6	37.9	P	12.9	H/44	-25.4	25.4	46.0	20.6
335.3	41.8	P	13.9	H/44	-25.2	30.6	46.0	15.4
376.8	46.3	P	15.4	H/44	-25.0	36.7	46.0	9.3
444.5	38.6	P	17.1	H/44	-24.5	31.1	46.0	14.9
469.2	38.6	P	17.3	H/44	-24.3	31.6	46.0	14.4
491.0	43.4	P	17.2	H/44	-24.3	36.3	46.0	9.7
521.0	42.4	P	17.9	H/44	-24.2	36.1	46.0	9.9
619.0	27.7	Q	19.4	H/44	-23.4	23.8	46.0	22.2
846.0	33.9	P	21.5	H/44	-21.5	33.9	46.0	12.1
902.9	21.0	Q	21.9	H/44	-20.9	22.0	46.0	24.0
948.8	21.6	Q	22.3	H/44	-20.5	23.4	46.0	22.6
30.7	42.5	Q	16.4	V/44	-27.9	31.0	40.0	9.0
31.2	46.9	P	16.4	V/44	-27.9	35.4	40.0	4.6
58.2	24.4	Q	11.4	V/44	-27.6	8.2	40.0	31.8
148.9	25.6	Q	9.8	V/44	-26.5	8.9	43.5	34.6
199.2	43.6	P	9.8	V/44	-26.0	27.3	43.5	16.2
224.0	40.7	P	11.6	V/44	-25.8	26.5	46.0	19.5
250.2	50.7	P	12.7	V/44	-25.7	37.7	46.0	8.3
275.4	37.2	P	13.1	V/44	-25.5	24.8	46.0	21.2
300.6	37.9	P	12.9	V/44	-25.4	25.3	46.0	20.7
375.1	36.6	P	15.3	V/44	-25.0	26.9	46.0	19.1
424.9	35.8	P	16.4	V/44	-24.8	27.5	46.0	18.5
474.8	32.3	P	17.5	V/44	-24.3	25.5	46.0	20.5
525.0	32.0	P	18.0	V/44	-24.2	25.9	46.0	20.1
602.0	33.8	P	19.2	V/44	-23.5	29.5	46.0	16.5
622.0	34.2	P	19.6	V/44	-23.3	30.5	46.0	15.5
675.0	31.4	P	20.0	V/44	-23.2	28.2	46.0	17.8
737.0	29.6	P	20.2	V/44	-22.7	27.1	46.0	18.9
826.0	27.3	P	21.1	V/44	-21.6	26.8	46.0	19.2
875.0	27.5	P	21.3	V/44	-21.3	27.6	46.0	18.4
960.0	26.8	P	21.9	V/44	-20.3	28.4	46.0	17.6

Judgement: Pass by 4.6 dB