LS RESEARCH, LLC
WIRELESS PRODUCT DEVELOPMENT
ACCREDITED
Testing Cert. 1255.01
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TEST REPORT # 312057 UNIITX
LSR Job #: C-1562

Compliance Testing of:
Airborne Enterprise Server and Access Point

Test Date(s):
November 15th 2012 to March 30th 2013

Prepared For:
Attn: Paul Harrington
B&B Electronics
707 E Dayton Road PO Box 1040
Ottawa, IL 61350

This Test Report is issued under the Authority of:
Khairul Aidi Zainal, Senior EMC Engineer.

Signature: Date: 04/02/13

Test Report Reviewed by:	Project Engineer:
Thomas Smith, Manager EMC Test Services	Khairul Aidi Zainal, Senior EMC Engineer.
Signature: Date: 04/02/13	Signature: Date: 03/30/13

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EXHIBIT 1. INTRODUCTION

1.1 - Scope

References:	FCC Part 15, Subpart C, Section 15.407 RSS GEN issue 3 and RSS 210 issue 8 Annex 9 RSS 102 issue 4
Title:	FCC : Telecommunication – Code of Federal Regulations, CFR 47, Part 15. IC : Low-power License-exempt Radio-communication Devices (All Frequency Bands): Category I Equipment
Purpose of Test:	To gain FCC and IC Certification Authorization for Low-Power License-Exempt Transmitters.
Test Procedures:	OET KDB 789033 D01 General UNII Test Procedure
Environmental Classification:	Commercial, Industrial or Business Residential

1.2 – Normative References

Publication	Year	Title
FCC CFR Parts 0-15	2013	Code of Federal Regulations – Telecommunications
ANSI C63.4	2003	American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz.
RSS-210 Annex 9	2010	Low-power License-exempt Radio communication Devices (All Frequency Bands): Category I Equipment
RSS-GEN Issue 3	2010	General Requirements and Information for the Certification of Radio Apparatus
RSS 102	2010	Radio Frequency (RF) Exposure Compliance of Radiocommunication apparatus.
ANSI C63.10	2009	American National Standard for Testing Unlicensed Wireless Devices
FCC KDB 789033 D01 v01r02	2012	Guidelines for Compliance Testing of Unlicensed National Information Infrastructure (U-NII) Devices- Part 15 Subpart E.
Appendix B. FCC order, ET Docket No. 03-122 (FCC 06-96)	2006	Compliance measurement procedures for U-NII devices operating in the 5.25-5.35GHz and 5.47-5.725GHz bands incorporating dynamic Frequency Selection.

1.3 - LS Research, LLC Test Facility

LS Research, LLC is accredited by A2LA (American Association for Laboratory Accreditation) as conforming to ISO/IEC 17025, 2005 “General Requirements for the Competence of Calibration and Testing Laboratories”.

LS Research, LLC’s scope of accreditation includes all test methods listed herein, unless otherwise noted.

1.4 – Location of Testing

All testing was performed at the following location utilizing the facilities listed below, unless otherwise noted.

LS Research, LLC
W66 N220 Commerce Court
Cedarburg, Wisconsin, 53012 USA,

List of Facilities Located at LS Research, LLC:

Compact Chamber
Semi-Anechoic Chamber
Open Area Test Site (OATS)

1.5 – Test Equipment Utilized

A complete list of equipment utilized in testing is provided in Appendix A of this test report. Calibration dates are indicated in Appendix A. All test equipment is calibrated by a calibration laboratory accredited to the requirements of ISO/IEC 17025, and traceable to the SI standard.

EXHIBIT 2. PERFORMANCE ASSESSMENT

2.1 – Client Information

Manufacturer Name:	B&B Electronics
Address:	707 Dayton Road PO Box 1040, Ottawa, IL 61350
Contact Name:	Paul Harrington

2.2 - Equipment Under Test (EUT) Information

The following information has been supplied by the applicant.

Product Name:	Airborne Enterprise Server and Access Point
Model Number:	9768 & 9373 & WLNN-AN-CE551
Serial Number:	04-070,03-065,Unit2, Unit1: Radiated measurements 03-058,03-066,Unit1 : Conducted measurements

2.3 - Associated Antenna Description

The antennas associated with the EUT are:

MFG	P/N:	Peak Gain 2.4G (dBi)	Avg Gain 2.4G (dBi	Peak Gain 5G (dBi)	Avg Gain 5G (dBi)	Connector Type
Laird	CAF 94505	2.0		4.0		IPEX MHF (U.FL)
Taoglas	GW.71.5153	3.8	-0.7	5.5	0.0	RP-SMA
Taoglas	PC.11.07.0100A	3.0	-0.6	4.5	-0.5	Cable to IPEX MHF (U.FL)
Nearson	T131XX	2.0	N/A	2.0	N/A	RP-SMA
Taoglas	WS.01.B.305151	4.1	-1.6	4.7	-3.0	Cable to RP-SMA
Taoglas	FXP810.07.0100C	2.4	-1.2	5.1	-0.8	Cable to IPEX MHF (U.FL)
Taoglas	FXP.830.07.0100C	2.6	-3.0	5.0	-0.6	Cable to IPEX MHF (U.FL)

2.4 - EUT'S Technical Specifications

EUT Frequency Range (in MHz)	5180 to 5240 MHz 5260 to 5320 MHz 5500 to 5700 MHz
RF Power in Watts (Conducted measurement)	
Minimum:	802.11a = 0.0115 Watts 802.11n(HT20) = 0.0078 Watts
Maximum:	802.11 a = 0.0257 Watts 802.11 n(HT20) =0.0219 Watts 5180 to 5240 MHz = 0.0219 Watts 5260 to 5320 MHz = 0.0257 Watts 5500 to 5700 MHz = 0.0219 Watts
Max Conducted Output Power (in dBm)	5180 to 5240 MHz = 13.4 dBm 5260 to 5320 MHz = 14.1 dBm 5500 to 5700 MHz = 13.4 dBm
Field Strength at 3 meters (Maximum)	Not Applicable
Occupied Bandwidth	802.11 a = 23.0 MHz 802.11 n(HT20) = 21.8 MHz
Type of Modulation	OFDM
Transmitter Spurious (worst case) at 3 meters	56.96dBµV/m (Peak detector) at 11400MHz.
Stepped (Y/N)	Y
Step Value:	1 dBm
Frequency Tolerance %, Hz, ppm	Better than 1 PPM
Transceiver and microprocessor Model # (if applicable)	Transceiver: Atheros AR6203 Microprocessor: Atmel AT91SAM9G20
Antenna Information	
Detachable/non-detachable	detachable
Type	Screw mount antenna, PCB dipole, sleeve dipole.
Gain	Highest Peak gain = 5.5dBi
EUT will be operated under FCC Rule Part(s)	Title 47 part 15.407
EUT will be operated under RSS Rule Part(s)	RSS 210 A9
Modular Filing	☒ Yes ☐ No
Portable or Mobile?	Mobile

RF Technical Information:

Type of Evaluation (check one)		SAR Evaluation: Device Used in the Vicinity of the Human Head
		SAR Evaluation: Body-worn Device
	X	RF Evaluation

If RF Evaluation checked above, test engineer to complete the following:

Evaluated against exposure limits: ☒ General Public Use ☐ Controlled Use
Duty Cycle used in evaluation: 100 %
Standard used for evaluation: OET 65
Measurement Distance: 20 cm
RF Value: **0.181** ☐ ☐ V/m ☐ A/m ☒ W/m^2
☐ Measured ☐ Computed ☒ Calculated

2.5 - Product Description

The EUT is an 802.11 a/b/g/n WLAN module that can be used as a client, access point and bridge mode with an Ethernet or UART interface.

EXHIBIT 3. EUT OPERATING CONDITIONS & CONFIGURATIONS DURING TESTS

3.1 - Climate Test Conditions

Temperature:	70 -71° F
Humidity:	32-42%
Pressure:	728-741mmHg

3.2 - Applicability & Summary Of EMC Emission Test Results

3.2.1 Operation in the 5.15 – 5.25 GHz band

FCC Rule Part	RSS Rule Part	Test Description	Test Result
15.407 (a)(1)	210 A9.2 (1)	Power Limits	Pass
15.407 (a)(1)	210 A9.2 (1)	Peak Power Spectral Density	Pass
15.407 (a)(1)	210 A9.2 (1)	26dB Bandwidth	Pass
15.407 (a)(6)	N/A	Peak Excursion Ratio	Pass
15.407 (b)(1)	210 A9.2 (1)	Undesirable emissions Limit	Pass
15.407 (b)(6) & (7),	210 A9.2 (1) GEN	Spurious Emissions below 1GHz AC Mains emissions	Pass
15.407 (e)	210 A.9.2 (1)	Indoor Operation	Pass
15.407 (f)	102 (4)	RF Exposure requirements	Pass
15.407 (g)	N/A	Frequency Stability	Pass

3.2.2 Operation in the 5.25 – 5.35 GHz band

FCC Rule Part	RSS Rule Part	Test Description	Test Result
15.407 (a)(2)	210 A9.2 (2)	Power Limits	Pass
15.407 (a)(2)	210 A9.2 (2)	Peak Power Spectral Density	Pass
15.407 (a)(2)	210 A9.2 (2)	26dB Bandwidth	Pass
15.407 (a)(6)	N/A	Peak Excursion Ratio	Pass
15.407 (b)(2)	210 A9.2 (2)	Undesirable emissions Limit	Pass
15.407 (b)(6) & (7),	210 A9.2 (2) GEN	Spurious Emissions below 1GHz AC Mains emissions	Pass
15.407 (f)	102 (4)	RF Exposure requirements	Pass
15.407 (g)	N/A	Frequency Stability	Pass
15.407 (h)(1)	210 A9.2 (2)	Transmit Power Control (TPC)	N/A**
15.407 (h)(2)	210 A9.3 (a)	Dynamic Frequency Selection	N/A*
15.407 (h)(2)(ii)	210 A9.3 (b)(ii)	Channel Availability Check Time	N/A*
15.407 (h)(2)(iii)	210 A9.3 (b)(iii)	Channel Move Time	Pass
15.407 (h)(2)(iv)	210 A9.3 (b)(v)	Non-Occupancy period	Pass

* : The EUT is a client device

** : The EUT has an EIRP of less than 500mW.

Note: Channel 5260MHz complies with technical requirements of 5.15 to 5.25 GHz band.

3.2.3 Operation in the 5.47 – 5.725 GHz band

FCC Rule Part	RSS Rule Part	Test Description	Test Result
15.407 (a)(2)	210 A9.2 (3)	Power Limits	Pass
15.407 (a)(2)	210 A9.2 (3)	Peak Power Spectral Density	Pass
15.407 (a)(2)	210 A9.2 (3)	26dB Bandwidth	Pass
15.407 (a)(6)	N/A	Peak Excursion Ratio	Pass
15.407 (b)(3)	210 A9.2 (3)	Undesirable emissions Limit	Pass
15.407 (b)(6) & (7),	210 A9.2 (3) GEN	Spurious Emissions below 1GHz AC Mains emissions	Pass
15.407 (f)	1025 (4)	RF Exposure requirements	Pass
15.407 (g)	N/A	Frequency Stability	Pass
15.407 (h)(1)	A9.2 (3)	Transmit Power Control (TPC)	N/A**
15.407 (h)(2)	A9.3 (a)	Dynamic Frequency Selection	N/A*
15.407 (h)(2)(ii)	A9.3 (b)(ii)	Channel Availability Check Time	N/A*
15.407 (h)(2)(iii)	A9.3 (b)(iii)	Channel Move Time	Pass
15.407 (h)(2)(iv)	A9.3 (b)(v)	Non-Occupancy period	Pass

* : The EUT is a client device

** : The EUT has an EIRP of less than 500mW.

3.3 - Modifications Incorporated In The EUT For Compliance Purposes

☐ None ☒ Yes (explain below)

In order to use Channel 52 (5260MHz), the manufacturer set the channel to meet all applicable technical requirements for operation in the 5.15 to 5.25 GHz band, including indoor use. The indoor use requirement for channel 52 will be included in the owner's manual.

3.4 - Deviations & Exclusions From Test Specifications

☒ None ☐ Yes (explain below)

EXHIBIT 4. DECLARATION OF CONFORMITY

The EUT was found to MEET the requirements as described within the specification of FCC Title 47, CFR Part 15.407, and Industry Canada RSS-210, Issue 8 (2010), Annex 9.

Note: If some emissions are seen to be within 3 dB of their respective limits; as these levels are within the tolerances of the test equipment and site employed, there is a possibility that this unit, or a similar unit selected out of production may not meet the required limit specification if tested by another agency.

LS Research, LLC certifies that the data contained herein was taken under conditions that meet or exceed the requirements of the test specifications. The results in this Test Report apply only to the item(s) tested on the above-specified dates. Any modifications made to the EUT subsequent to the indicated test date(s) will invalidate the data herein, and void this certification.

EXHIBIT 5. General Procedures.

5.1 Radiated measurements

Radiated RF measurements were performed on the EUT in a 3 meter Semi-Anechoic, FCC listed Chamber. The frequency range from 30 MHz to 40000 MHz was scanned and investigated. The radiated RF emission levels were manually noted at the various fixed degree settings of azimuth on the turntable and antenna height. The EUT was placed on a non-conductive pedestal in the 3 meter Semi-Anechoic Chamber, with the antenna mast placed such that the antenna was 3 meters from the EUT. A Biconical Antenna was used to measure emissions from 30 MHz to 300 MHz, and a Log Periodic Antenna was used to measure emissions from 300 MHz to 1000 MHz. A Double-Ridged Waveguide Horn Antenna was used from 1 GHz to 18 GHz while a standard gain horn antenna was used in the 18 GHz to 40 GHz range. The maximum radiated RF emissions between 30MHz to 4 GHz were found by raising and lowering the sense antenna between 1 and 4 meters in height, using both horizontal and vertical antenna polarities. Measurements above 4 GHz are performed at 1 meter separation distance.

The EUT was positioned in 3 orthogonal orientations.

5.2 Calculation of Radiated emissions limits and reported data.

Reported data:

For both fundamental and spurious emissions measurement, the data reported includes all necessary correction factors. These correction factors are loaded onto the EMI receiver when measurements are performed.

Reported Measurement data = Raw receiver measurement (dBµV/m) + Antenna correction Factor + Cable factor (dB) + Miscellaneous factors when applicable (dB) – amplification factor when applicable (dB).

Generic example of reported data:

Reported Measurement data = 18.2 (raw receiver measurement) + 15.8 (antenna factor) + 1.45 (cable factor) = 35.45 (dBµV/m).

As specified in 15.247 (d) and RSS 210 A8.5, radiated emissions that fall within the restricted band described in 15.205(c) for FCC and section 2.2 of RSS 210 for IC, must comply with the general emissions limit.

The following table depicts the general radiated emission limits above 30 MHz. These limits are obtained from Title 47 CFR, Part 15.209, for radiated emissions measurements. These limits were applied to any signals found in the 15.205 restricted bands. The mentioned limits correspond to those limits listed in RSS GEN.

Frequency (MHz)	3 m Limit μV/m	3 m Limit (dBμV/m)	1 m Limit (dBμV/m)
30-88	100	40.0	-
88-216	150	43.5	-
216-960	200	46.0	-
960-24,000	500	54.0	63.5

Sample conversion of field strength (μV/m to dBμV/m):
dBμV/m = 20 log $_{10}$ (100)= 40 dBμV/m (from 30-88 MHz)

Conversion of field strength measurements to EIRP (KDB 412172).

E[dBμV/m] = EIRP[dBm] – 20 log(d[meters]) + 104.77

E is the field strength
d is the measurements distance

Example:

1. Field strength to EIRP:

   E = 105.2 [dBμV/m], d = 3 [meters]
   EIRP = 105.2 – 95.2 = 10 dBm

   E = 54 [dBμV/m]*, d = 3 [meters]
   EIRP = 54.0 – 95.2 = -41.2 dBm
   * Average limit for emissions above 1GHz

2. EIRP to field strength:

   EIRP = -30.0 dBm, d = 3 [meters]
   E = -30.0 + 95.2 = 65.2 [dBμV/m]

EXHIBIT 6. EUT Duty Cycle

Test Engineer: Khairul Aidi Zainal

All measurements are to be performed with the EUT transmitting at greater than or equal to 98% percent duty cycle. If greater than or equal to 98 percent duty cycle is not available, the actual duty cycle needs to be measured so that power and peak spectral density measurements can be corrected upwards.

6.1 Test Procedure.

Per KDB 789033 D01 section B (2) (b), a spectrum analyzer with zero span at the frequency of interest was used to measure the on and off times of the transmitted signal.

6.2 Data.

The data reported includes all necessary correction factors. These correction factors are loaded onto the EMI receiver when measurements are performed.

Reported Measurement data = Raw receiver measurement (dBm) + Cable factor (dB) + Miscellaneous factors when applicable (dB).

Generic example of reported data:

Reported Measurement data = 8.55 (raw receiver measurement in dBm) + 0.85 (cable factor in dB) = 9.4 (dBm).

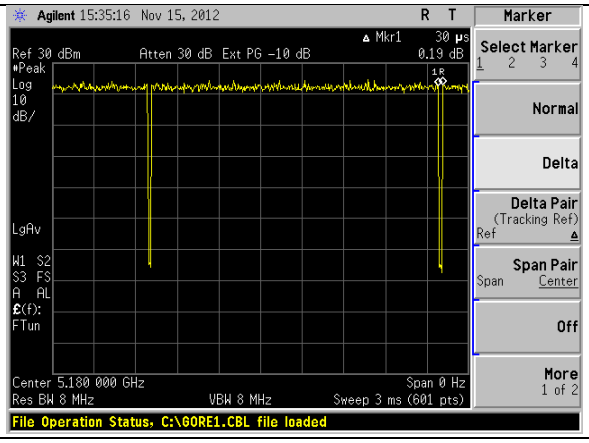
Duty Cycle correction = 10 log (1/x),
Where, x is the duty cycle.

Example:

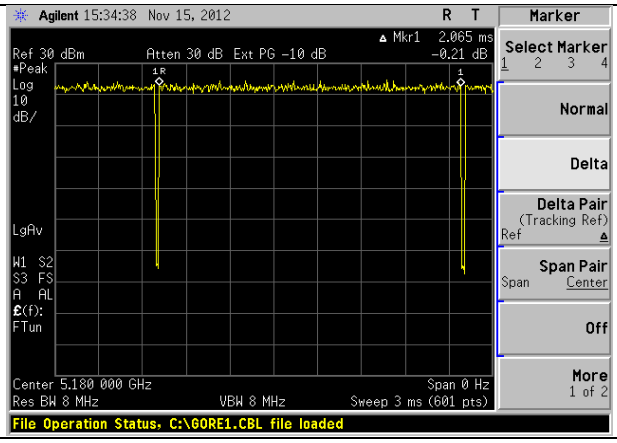
x = 0.97

Duty Cycle Correction = 10 log(1/0.97) = **0.12dB**

6.2.1 6MBPS.



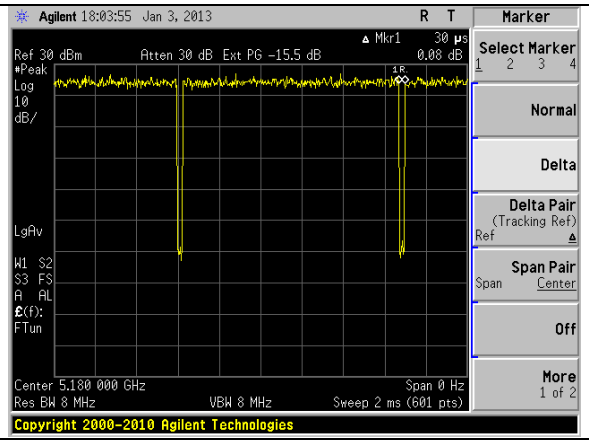
Off time



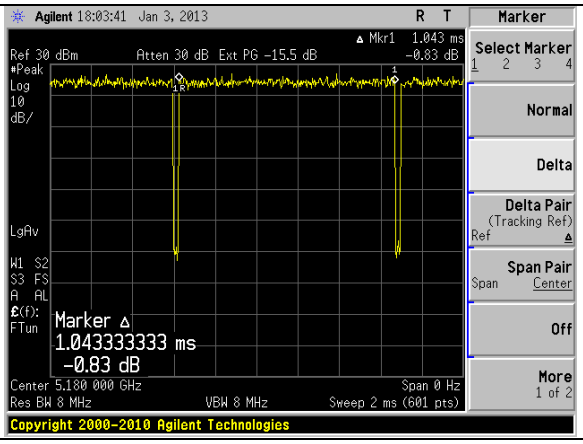
On time

Duty Cycle = (2.065ms/2.065ms+30µs) = 98.6%. No duty cycle correction.

6.2.2 12MBPS



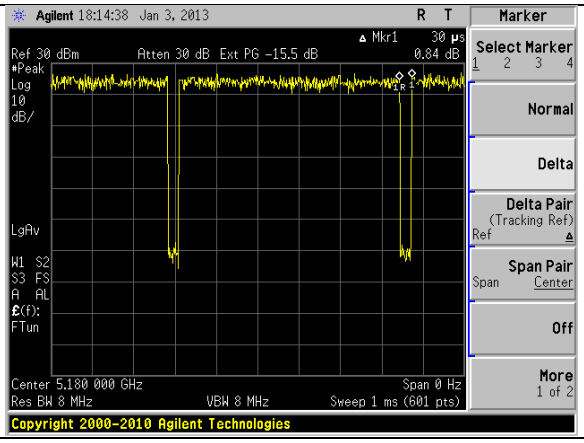
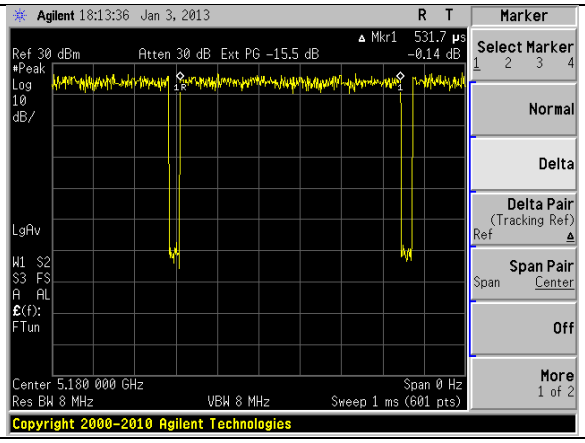
Off time



On time

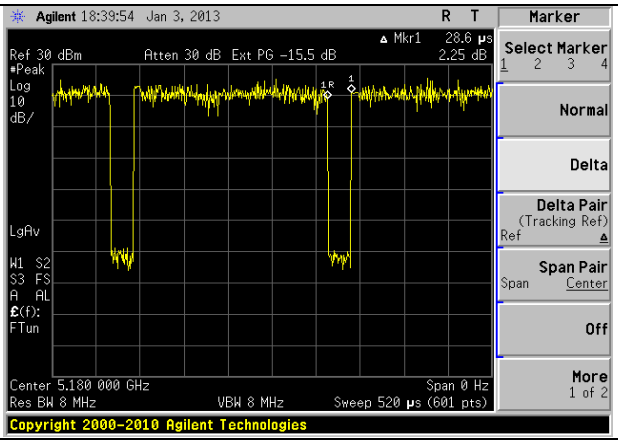
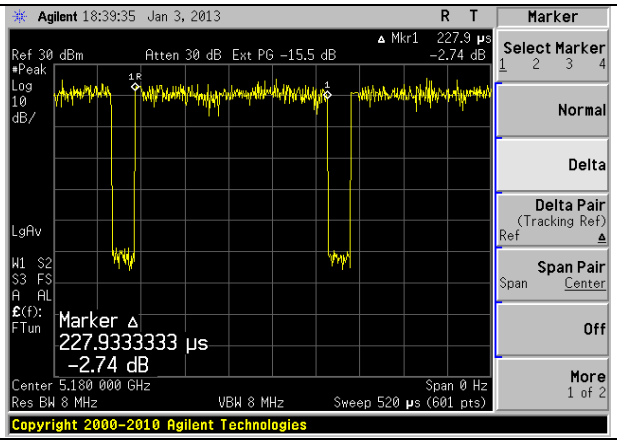
Duty Cycle = (1.043ms/1.043ms+30µs) = 97.2%. Duty cycle correction = 0.12dB.

6.2.3 24MBPS

	
Off time	On time

Duty Cycle = (531.7µs/531.7µs +30µs) = 94.7%. Duty cycle correction = 0.24dB.

6.2.4 MCS7

	
Off time	On time

Duty Cycle = (227.9µs/227.9µs +28.6µs) = 88.8%. Duty cycle correction = 0.51dB.

EXHIBIT 7. Emission Bandwidth (EBW)

Test Engineer: Khairul Aidi Zainal

The emission bandwidth is the 26dB bandwidth in MHz. This bandwidth is used to determine the maximum conducted output power measurement and the appropriate limit.

7.1 Test procedure.

KDB 789033 D01 section D.

7.2 Test Data.

The data reported includes all necessary correction factors. These correction factors are loaded onto the EMI receiver when measurements are performed.

Reported Measurement data = Raw receiver measurement (dBm) + Cable factor (dB) + Miscellaneous factors when applicable (dB).

7.2.1 Operation in the 5.15 – 5.25 GHz band

7.2.1.1 6MBPS

Data Rate	Channel	Frequency (MHz)	99% (MHz)	EBW 26dB (MHz)
6 Mbps	36	5180	16.5	21.3
	40	5200	16.5	21.6
	48	5240	16.5	21.5

7.2.1.2 12MBPS

Data Rate	Channel	Frequency (MHz)	99% (MHz)	EBW 26dB (MHz)
12 Mbps	36	5180	16.5	22.0
	40	5200	16.6	21.5
	48	5240	16.5	22.0

7.2.1.3 24MBPS

Data Rate	Channel	Frequency (MHz)	99% (MHz)	EBW 26dB (MHz)
24 Mbps	36	5180	16.5	23.0
	40	5200	16.5	23.0
	48	5240	16.5	22.0

7.2.1.4 MCS7

Data Rate	Channel	Frequency (MHz)	99% (MHz)	EBW 26dB (MHz)
65 Mbps (MCS7)	36	5180	17.6	21.8
	40	5200	17.6	21.5
	48	5240	17.6	21.4

7.2.2 Operation in the 5.25 – 5.35 GHz band

7.2.2.1 6MBPS

Data Rate	Channel	Frequency (MHz)	99% (MHz)	EBW 26dB (MHz)
6 Mbps	52	5260	16.5	21.3
	56	5280	16.5	21.0
	60	5300	16.5	20.8
	64	5320	16.5	21.0

7.2.2.2 12MBPS

Data Rate	Channel	Frequency (MHz)	99% (MHz)	EBW 26dB (MHz)
12 Mbps	52	5260	16.5	21.6
	56	5280	16.5	21.4
	60	5300	16.5	21.1
	64	5320	16.5	21.1

7.2.2.3 24MBPS

Data Rate	Channel	Frequency (MHz)	99% (MHz)	EBW 26dB (MHz)
24 Mbps	52	5260	16.5	21.8
	56	5280	16.5	21.3
	60	5300	16.4	20.8
	64	5320	16.5	21.2

7.2.2.4 MCS7

Data Rate	Channel	Frequency (MHz)	99% (MHz)	EBW 26dB (MHz)
65 Mbps (MCS7)	52	5260	17.6	21.5
	56	5280	17.6	21.6
	60	5300	17.6	21.0
	64	5320	17.6	21.5

7.2.3 Operation in the 5.47 – 5.725 GHz band

7.2.3.1 6MBPS

Data Rate	Channel	Frequency (MHz)	99% (MHz)	EBW 26dB (MHz)
6 Mbps	100	5500	16.5	20.9
	116	5580	16.5	21.0
	140	5700	16.6	21.6

7.2.3.2 12MBPS

Data Rate	Channel	Frequency (MHz)	99% (MHz)	EBW 26dB (MHz)
12 Mbps	100	5500	16.6	21.2
	116	5580	16.5	21.1
	140	5700	16.5	20.7

7.2.3.3 24MBPS

Data Rate	Channel	Frequency (MHz)	99% (MHz)	EBW 26dB (MHz)
24 Mbps	100	5500	16.4	20.2
	116	5580	16.4	20.2
	140	5700	16.4	20.1

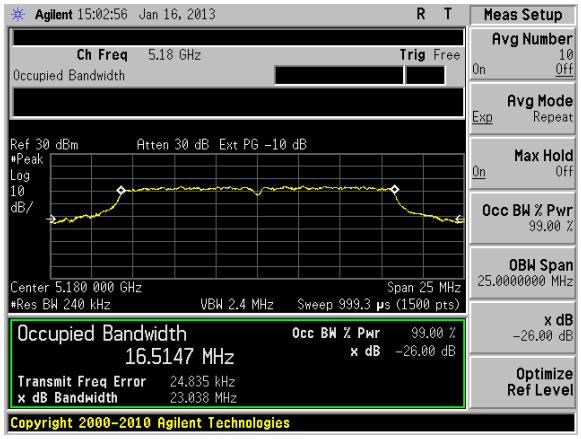
7.2.3.4 MCS7

Data Rate	Channel	Frequency (MHz)	99% (MHz)	EBW 26dB (MHz)
65 Mbps (MCS 7)	100	5500	17.6	21.1
	116	5580	17.6	20.9
	140	5700	17.6	21.4

7.3 Screen Captures

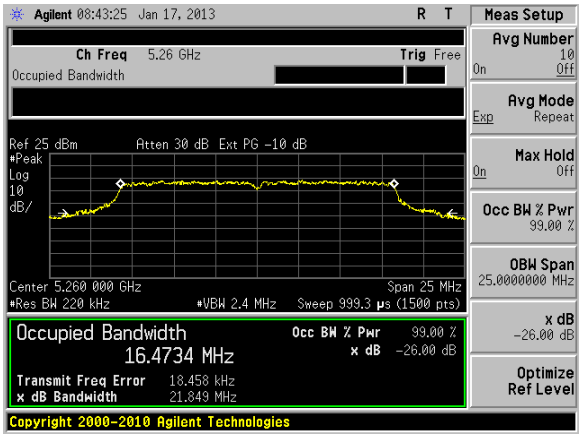
7.3.1 Operation in the 5.15 – 5.25 GHz band

Channel 36



7.3.2 Operation in the 5.25 – 5.35 GHz band

Channel 52



7.3.1 Operation in the 5.47 – 5.725 GHz band

Channel 140

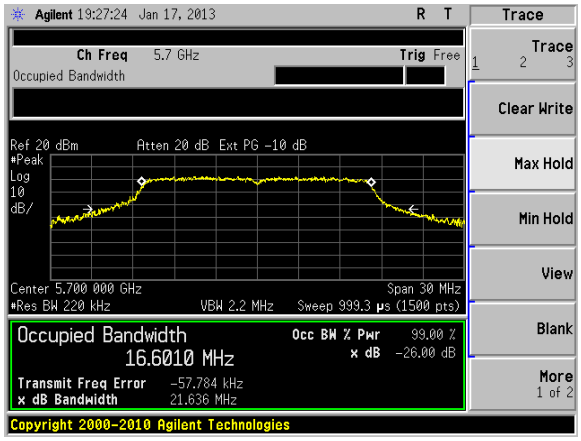


EXHIBIT 8 Maximum Conducted Output Power And Peak Power Spectral Density

Test Engineer: Khairul Aidi Zainal

8.1 Test Procedure

KDB 789033 D01 section C (Maximum Conducted Output Power) and E (Peak Power Spectral Density)

For maximum conducted output power, the test method SA-1(for rates with duty cycle greater than 98%) and method SA-2 (for rates with duty cycle greater than 98%).

8.2 Limits

8.2.1 Operation in the band 5.15 to 5.25 GHz

Maximum conducted output power = Lesser of 50mW or 4dBm + 10 log EBW

Peak Power Spectral Density = 4 dBm/MHz

8.2.2 Operation in the band 5.25 to 5.35 GHz

Maximum conducted output power = Lesser of 250mW or 11dBm + 10 log EBW

Peak Power Spectral Density = 11 dBm/MHz

8.2.3 Operation in the band 5.47 to 5.725 GHz

Maximum conducted output power = Lesser of 250mW or 11dBm + 10 log EBW

Peak Power Spectral Density = 11 dBm/MHz

8.2.4 Operation in the band 5.725 to 5.825 GHz

Maximum conducted output power = Lesser of 1W or 4dBm + 17 log EBW

Peak Power Spectral Density = 17 dBm/MHz

8.3 Test Data

The data reported includes all necessary correction factors. These correction factors are loaded onto the EMI receiver when measurements are performed.

Reported Measurement data = Raw receiver measurement (dBm) + Cable factor (dB) + Miscellaneous factors when applicable (dB).

Generic example of reported data:

Reported Measurement data = 8.55 (raw receiver measurement in dBm) + 0.85 (cable factor in dB) = 9.4 (dBm).

8.3.1 Operation in the band 5.15 to 5.25 GHz

8.3.1.1 6MBPS

Data Rate	Channel	Frequency (MHz)	Power *SA1 (dBm)	Power Limit (dBm)	Power Margin (dB)	*PPSD (dBm)	PKPSD Limit (dBm)	PKPSD Margin (dB)
6 Mbps	36	5180	12.2	17.0	4.8	1.1	4.0	2.9
	40	5200	12.5	17.0	4.5	0.0	4.0	4.0
	48	5240	12.8	17.0	4.2	0.4	4.0	3.6

Note:

1. Maximum conducted output power method SA-1

8.3.1.2 12MBPS

Data Rate	Channel	Frequency (MHz)	Power *SA2 (dBm)	Corrected Power (dBm)	Power Limit (dBm)	Power Margin (dB)	*PPSD (dBm)	Corrected PPSD (dBm)	PKPSD Limit (dBm)	PKPSD Margin (dB)
12 Mbps	36	5180	12.4	12.5	17	4.5	1.6	1.8	4	2.2
	40	5200	12.5	12.6	17	4.4	0.1	0.2	4	3.8
	48	5240	12.8	12.9	17	4.1	-0.2	-0.1	4	4.1

Note:

1. 0.12 dB of duty cycle correction was added to measurements
2. Maximum conducted output power method SA-2

Sample calculation:

Power (Chan 36) = 12.36dBm + 0.12dB (duty cycle correction) = 12.5dBm
PPSD (Chan 36) = 1.64dBm + 0.12dB (duty cycle correction) = 1.8dBm

8.3.1.3 24 MBPS

Data Rate	Channel	Frequency (MHz)	Power *SA2 (dBm)	Corrected Power (dBm)	Power Limit (dBm)	Power Margin (dB)	*PPSD (dBm)	Corrected PPSD (dBm)	PKPSD Limit (dBm)	PKPSD Margin (dB)
24 Mbps	36	5180	12.4	12.7	17	4.4	2.4	2.6	4.0	1.4
	40	5200	12.5	12.8	17	4.2	0.5	0.7	4.0	3.3
	48	5240	12.9	13.1	17	3.9	0.5	0.7	4.0	3.3

Note:

1. 0.24 dB of duty cycle correction was added to measurements
2. Maximum conducted output power method SA-2

8.3.1.4 MCS7

Data Rate	Channel	Frequency (MHz)	Power SA-2 (dBm)	Corrected Power (dBm)	Power Limit (dBm)	Power Margin (dB)	*PPSD (dBm)	Corrected PPSD (dBm)	PKPSD Limit (dBm)	PKPSD Margin (dB)
65 Mbps (MCS7)	36	5180	10.7	11.2	17	5.8	-0.1	0.4	4.0	3.6
	40	5200	10.9	11.4	17	5.6	-2.3	-1.8	4.0	5.8
	48	5240	12.9	13.4	17	3.6	0.3	0.8	4.0	3.2

Note:

1. 0.51 dB of duty cycle correction was added to measurements
2. Maximum conducted output power method SA-2

Sample calculation:

Power (Chan 40) = 10.93dBm + 0.51dB (duty cycle correction) = 11.4dBm
PPSD (Chan 40) = -2.31dBm + 0.51dB (duty cycle correction) = -1.8dBm

8.3.2 Operation in the band 5.25 to 5.35 GHz

Note: Channel 52 is compared to the requirements of the 5.15 to 5.25 GHz band.

8.3.2.1 6MBPS

Data Rate	Channel	Frequency (MHz)	Power *SA1 (dBm)	Power Limit (dBm)	Power Margin (dB)	*PPSD (dBm)	PKPSD Limit (dBm)	PKPSD Margin (dB)
6 Mbps	52	5260	12.7	17.0	4.4	2.3	4.0	1.7
	56	5280	11.4	24.0	12.6	0.6	11.0	10.4
	60	5300	11.2	24.0	12.8	0.5	11.0	10.5
	64	5320	10.6	24.0	13.4	0.2	11.0	10.8

Note:

1. Maximum conducted output power method SA-1

8.3.2.2 12MBPS

Data Rate	Channel	Frequency (MHz)	Power *SA2 (dBm)	Corrected Power (dBm)	Power Limit (dBm)	Power Margin (dB)	*PPSD (dBm)	Corrected PPSD (dBm)	PKPSD Limit (dBm)	PKPSD Margin (dB)
12 Mbps	52	5260	12.7	12.8	17.0	4.4	1.9	2.0	4.0	2.0
	56	5280	11.7	11.8	24.0	12.3	1.0	1.1	11.0	9.9
	60	5300	11.2	11.3	24.0	12.8	0.6	0.7	11.0	10.3
	64	5320	10.5	10.6	24.0	13.5	-0.1	0.0	11.0	11.0

Note:

1. 0.12 dB of duty cycle correction was added to measurements
2. Maximum conducted output power method SA-2

8.3.2.3 24 MBPS

Data Rate	Channel	Frequency (MHz)	Power *SA2 (dBm)	Corrected Power (dBm)	Power Limit (dBm)	Power Margin (dB)	*PPSD (dBm)	Corrected PPSD (dBm)	PKPSD Limit (dBm)	PKPSD Margin (dB)
24 Mbps	52	5260	13.9	14.1	17.0	2.9	2.2	2.4	4.0	1.6
	56	5280	12.2	12.4	24.0	11.6	1.5	1.7	11.0	9.3
	60	5300	10.8	11.0	24.0	13.0	0.1	0.4	11.0	10.6
	64	5320	10.5	10.7	24.0	13.3	-0.5	-0.3	11.0	11.3

Note:

1. 0.24 dB of duty cycle correction was added to measurements
2. Maximum conducted output power method SA-2

Sample calculation:

Power (Chan 60) = 10.75dBm + 0.24dB (duty cycle correction) = 11.0dBm
PPSD (Chan 60) = 0.13dBm + 0.24dB (duty cycle correction) = 0.4dBm

8.3.2.4 MCS7

Data Rate	Channel	Frequency (MHz)	Power *SA2 (dBm)	Corrected Power (dBm)	Power Limit (dBm)	Power Margin (dB)	*PPSD (dBm)	Corrected PPSD (dBm)	PKPSD Limit (dBm)	PKPSD Margin (dB)
65 Mbps (MCS7)	52	5260	12.8	13.3	17.0	3.7	1.7	2.2	4.0	1.8
	56	5280	11.4	11.9	24.0	12.1	0.8	1.3	11.0	9.7
	60	5300	10.0	10.5	24.0	13.5	-0.7	-0.1	11.0	11.1
	64	5320	8.4	8.9	24.0	15.1	-3.1	-2.6	11.0	13.6

Note:

1. 0.51 dB of duty cycle correction was added to measurements
2. Maximum conducted output power method SA-2

8.3.3 Operation in the band 5.47 to 5.725 GHz

8.3.3.1 6MBPS

Data Rate	Channel	Frequency (MHz)	Power *SA1 (dBm)	Power Limit (dBm)	Power Margin (dB)	*PPSD (dBm)	PKPSD Limit (dBm)	PKPSD Margin (dB)
6 Mbps	100	5500	11.9	24.0	12.1	0.9	11.0	10.1
	116	5580	13.4	24.0	10.6	2.4	11.0	8.6
	140	5700	12.4	24.0	11.6	0.9	11.0	10.1

Note:

1. Maximum conducted output power method SA-1

8.3.3.2 12MBPS

Data Rate	Channel	Frequency (MHz)	Power *SA2 (dBm)	Corrected Power (dBm)	Power Limit (dBm)	Power Margin (dB)	*PPSD (dBm)	Corrected PPSD (dBm)	PKPSD Limit (dBm)	PKPSD Margin (dB)
12 Mbps	100	5500	11.9	12.0	24.0	12.1	1.0	1.1	11.0	9.9
	116	5580	13.3	13.4	24.0	10.7	2.4	2.5	11.0	8.5
	140	5700	12.2	12.3	24.0	11.8	2.0	2.1	11.0	8.9

Note:

1. 0.12 dB of duty cycle correction was added to measurements
2. Maximum conducted output power method SA-2

8.3.3.3 24 MBPS

Data Rate	Channel	Frequency (MHz)	Power *SA2 (dBm)	Corrected Power (dBm)	Power Limit (dBm)	Power Margin (dB)	*PPSD (dBm)	Corrected PPSD (dBm)	PKPSD Limit (dBm)	PKPSD Margin (dB)
24 Mbps	100	5500	11.2	11.4	24.0	12.8	0.1	0.4	11.0	10.6
	116	5580	12.7	12.9	24.0	11.3	2.0	2.3	11.0	8.7
	140	5700	12.1	12.3	24.0	11.9	2.0	2.3	11.0	8.7

Note:
1. 0.24 dB of duty cycle correction was added to measurements
2. Maximum conducted output power method SA-2

8.3.3.4 MCS7

Data Rate	Channel	Frequency (MHz)	Power *SA2 (dBm)	Corrected Power (dBm)	Power Limit (dBm)	Power Margin (dB)	*PPSD (dBm)	Corrected PPSD (dBm)	PKPSD Limit (dBm)	PKPSD Margin (dB)
65 Mbps (MCS 7)	100	5500	10.5	11.0	24.0	13.0	-0.4	0.1	11.0	10.9
	116	5580	11.6	12.1	24.0	11.9	0.9	1.4	11.0	9.6
	140	5700	10.9	11.4	24.0	12.6	0.2	0.7	11.0	10.3

Note:
1. 0.51 dB of duty cycle correction was added to measurements
2. Maximum conducted output power method SA-2

Sample calculation:

Power (Chan 116) = 11.60dBm + 0.51dB (duty cycle correction) = 12.1dBm
PPSD (Chan 116) = 0.88dBm + 0.51dB (duty cycle correction) = 1.4dBm

8.3.4 Operation in the band 5.725 to 5.825 GHz

8.3.4.1 6MBPS
Not Applicable

8.3.4.2 12MBPS
Not Applicable

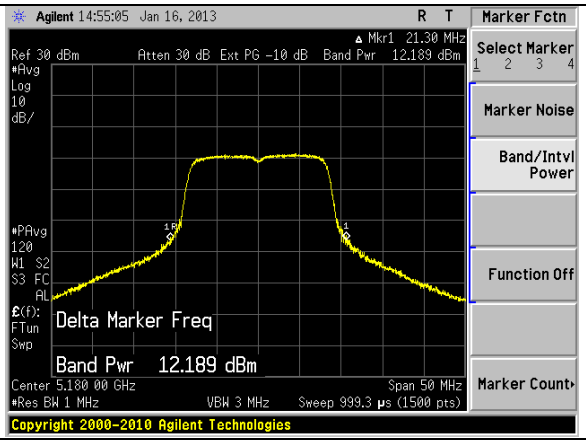
8.3.4.3 24 MBPS
Not Applicable

8.3.4.4 MCS7
Not Applicable

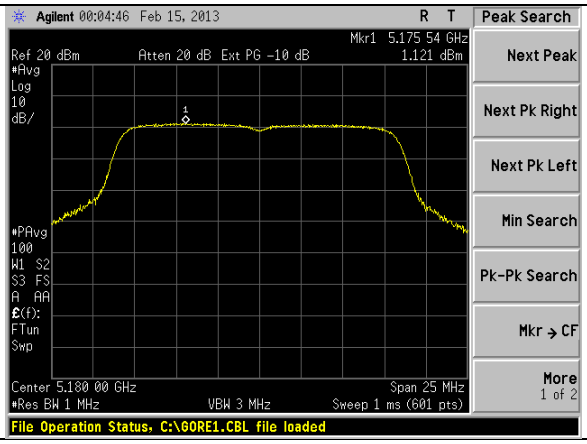
8.4 Screen Captures

8.4.1 Operation in the band 5.15 to 5.25 GHz

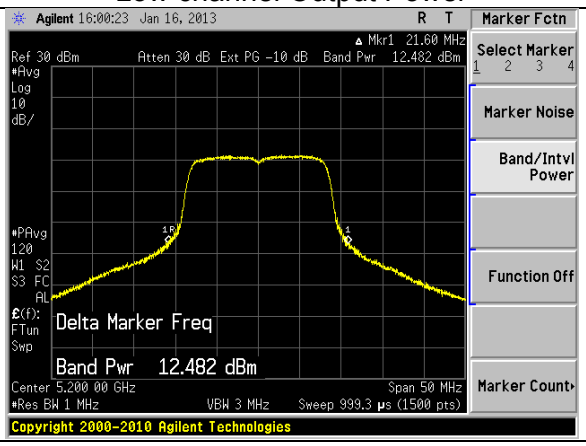
8.4.1.1 6MBPS



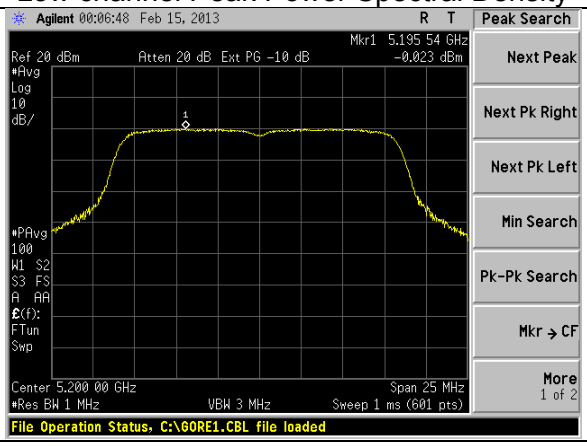
Low channel Output Power



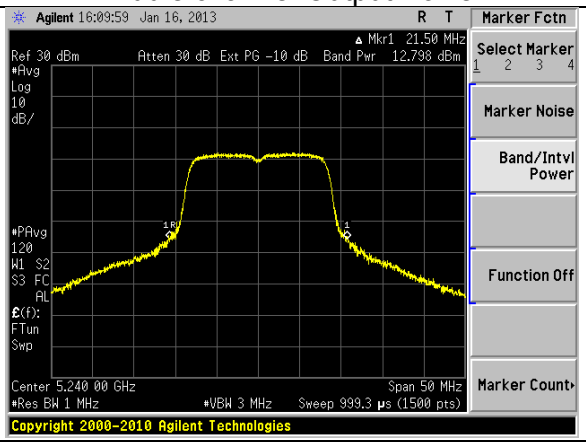
Low channel Peak Power Spectral Density



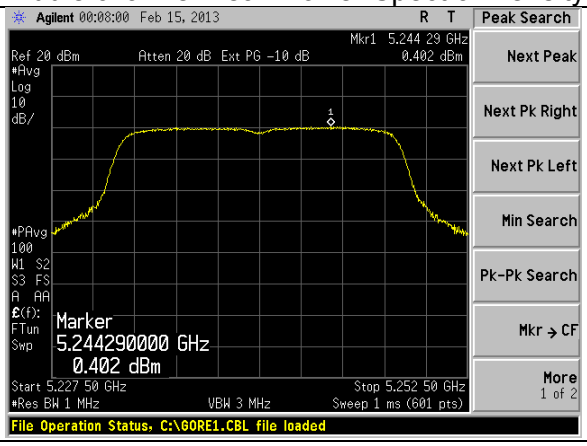
Middle channel Output Power



Middle channel Peak Power Spectral Density

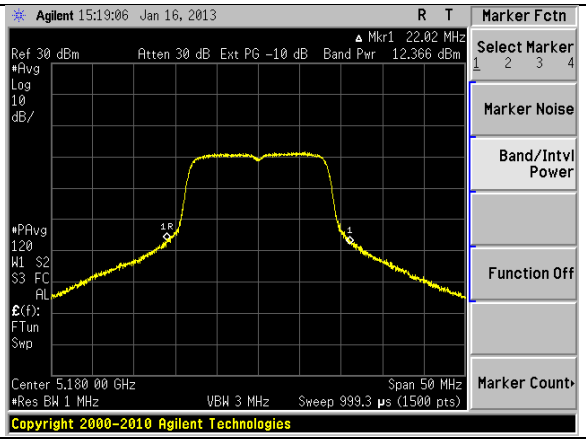


High channel Output Power

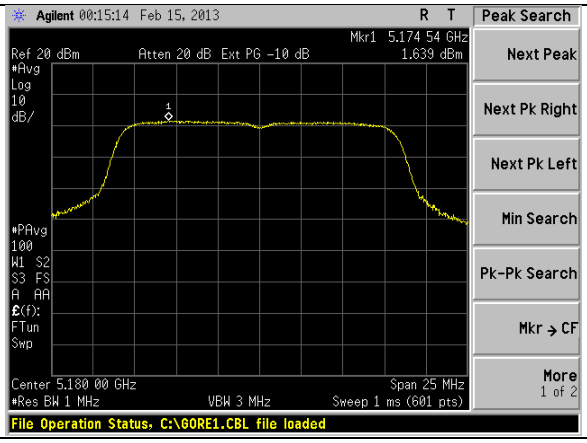


High channel Peak Power Spectral Density

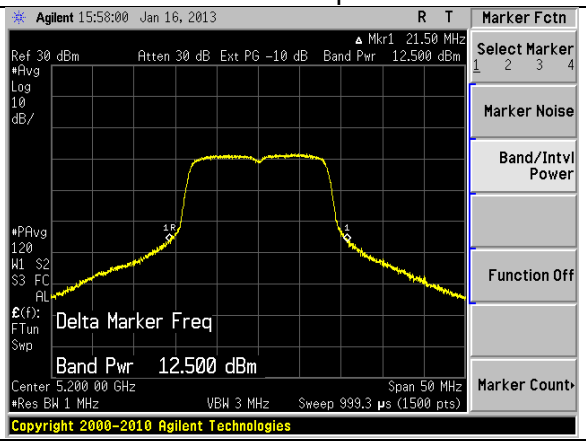
8.4.1.2 12MBPS



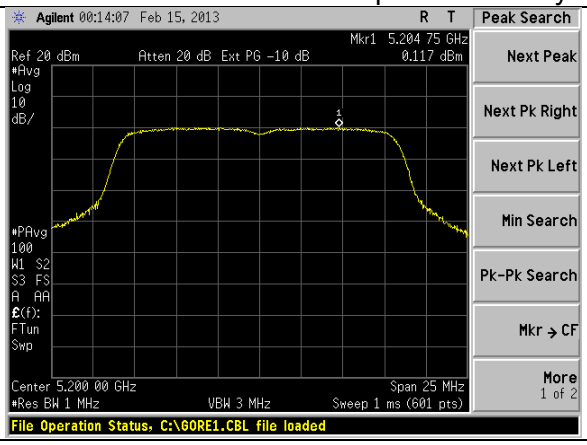
Low channel Output Power



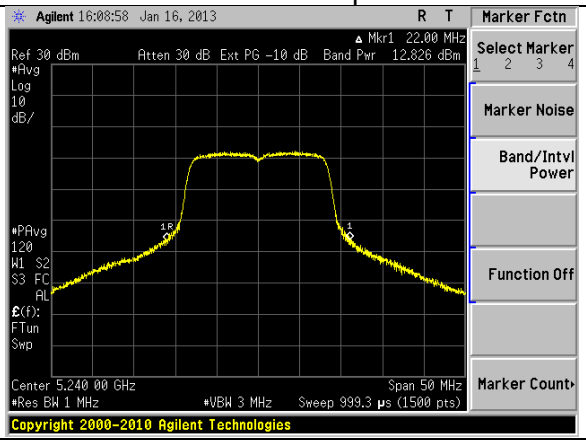
Low channel Peak Power Spectral Density



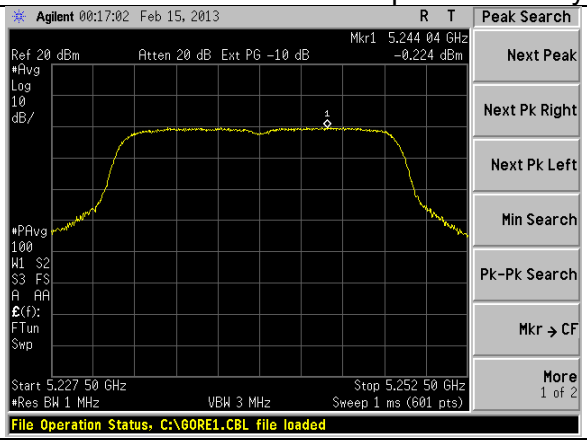
Middle channel Output Power



Middle channel Peak Power Spectral Density

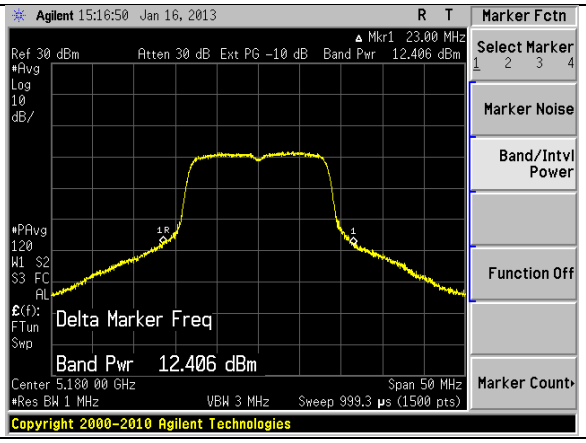


High channel Output Power

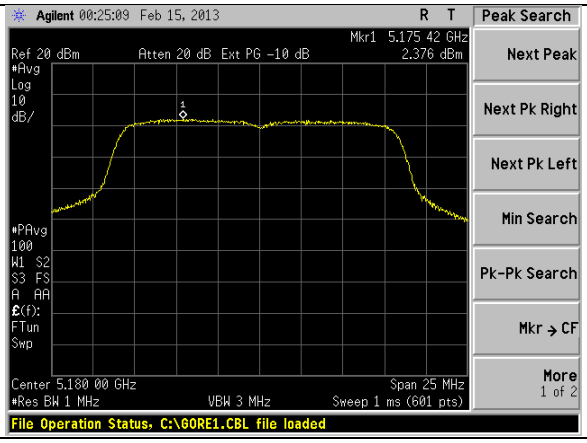


High channel Peak Power Spectral Density

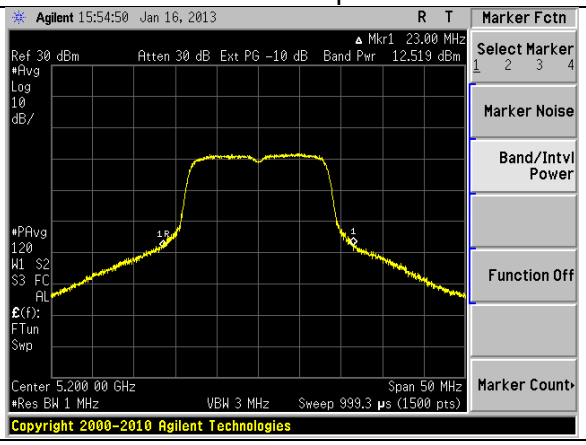
8.4.1.3 24MBPS



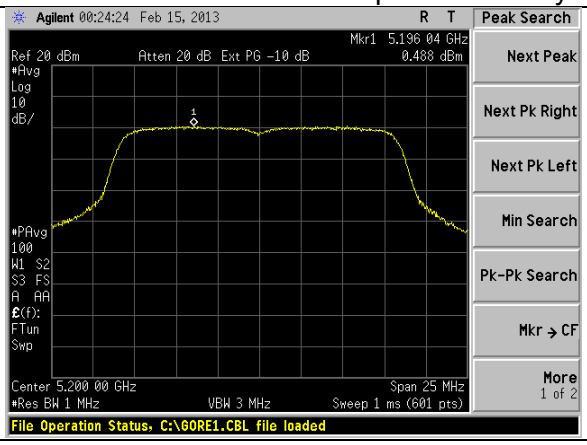
Low channel Output Power



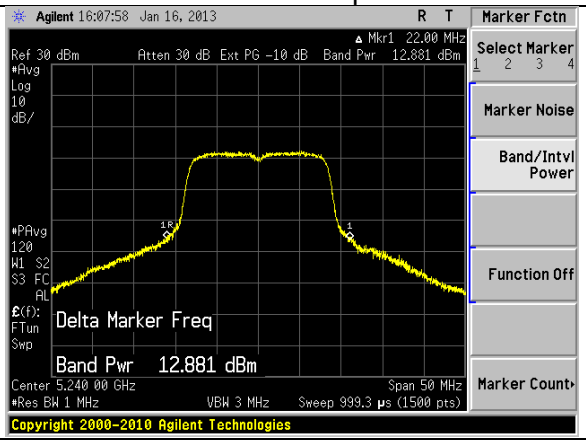
Low channel Peak Power Spectral Density



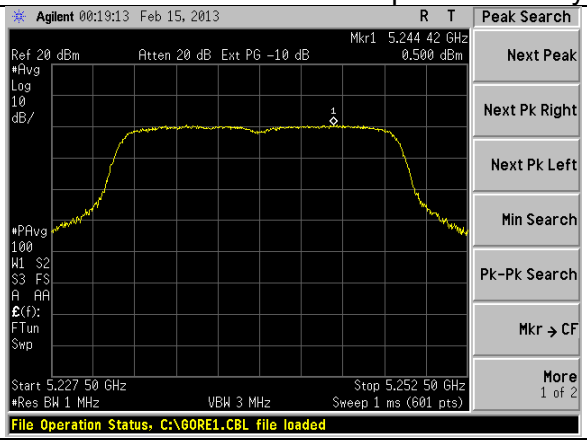
Middle channel Output Power



Middle channel Peak Power Spectral Density

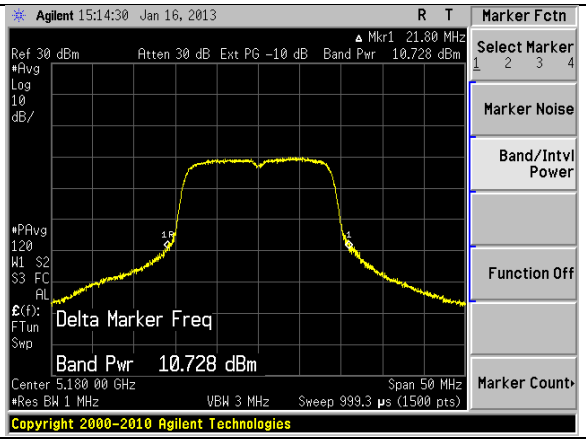


High channel Output Power

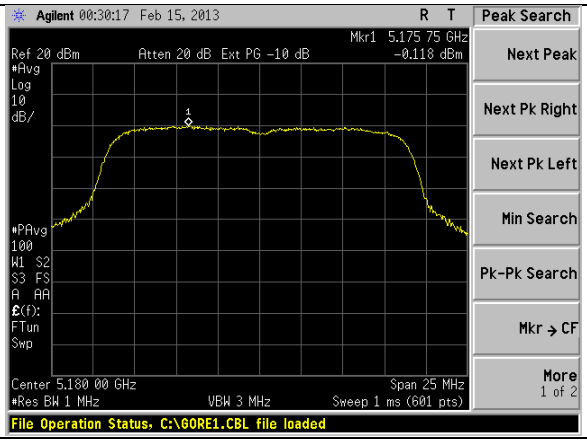


High channel Peak Power Spectral Density

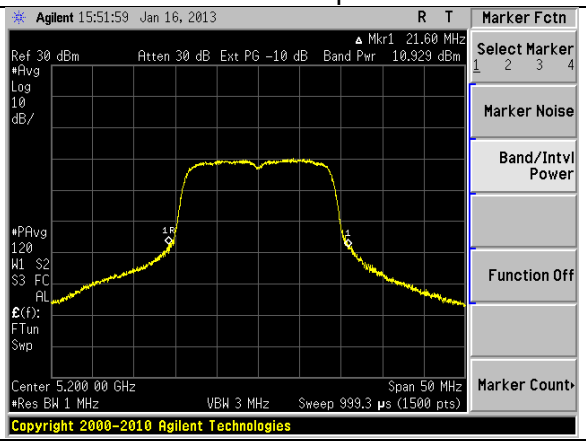
8.4.1.3 MCS7



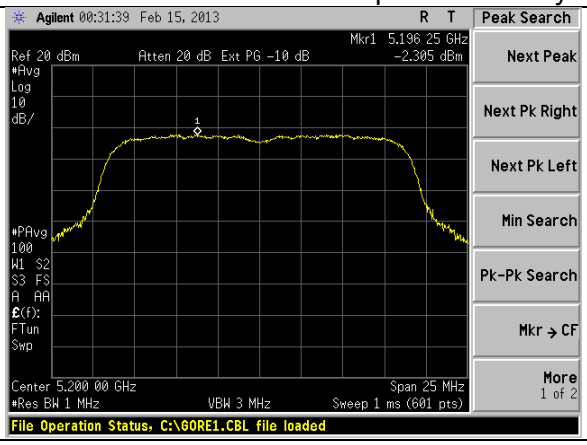
Low channel Output Power



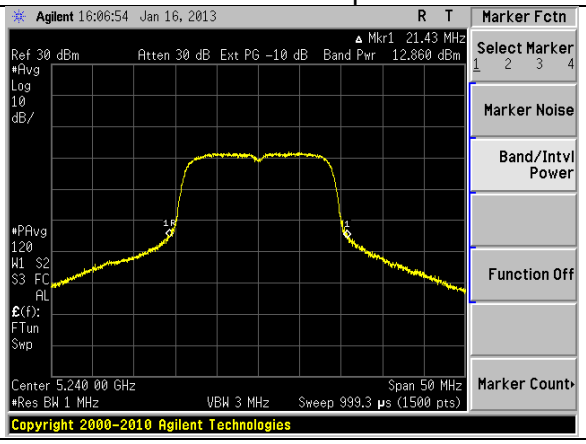
Low channel Peak Power Spectral Density



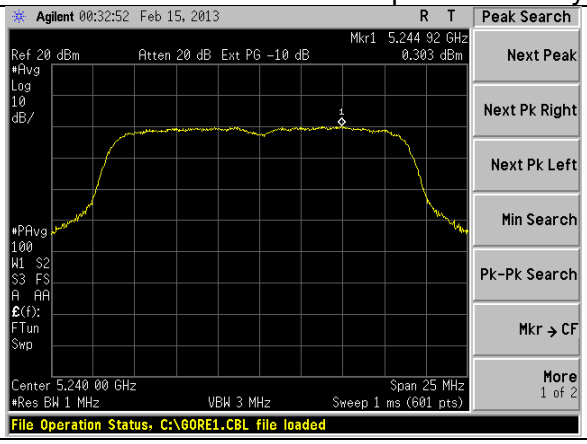
Middle channel Output Power



Middle channel Peak Power Spectral Density



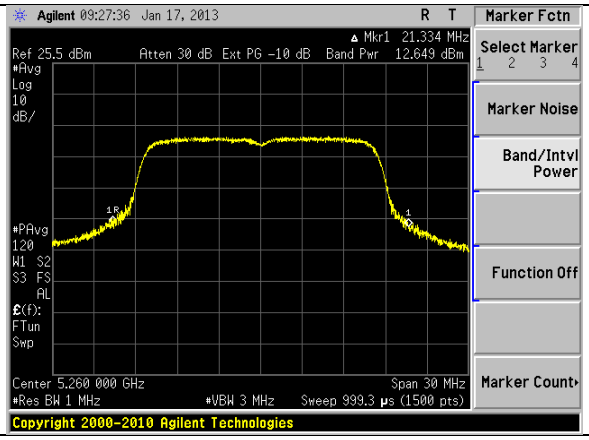
High channel Output Power



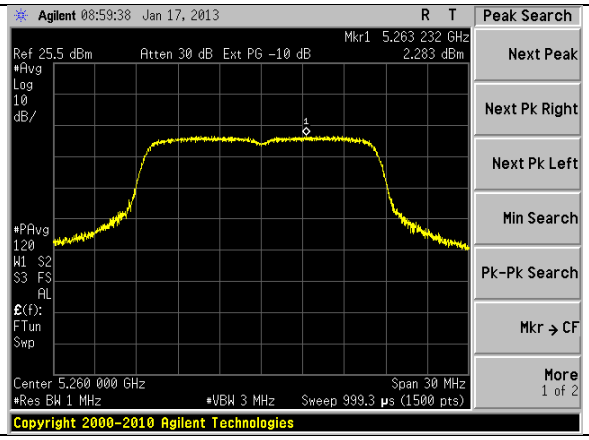
High channel Peak Power Spectral Density

8.4.2 Operation in the band 5.25 to 5.35 GHz

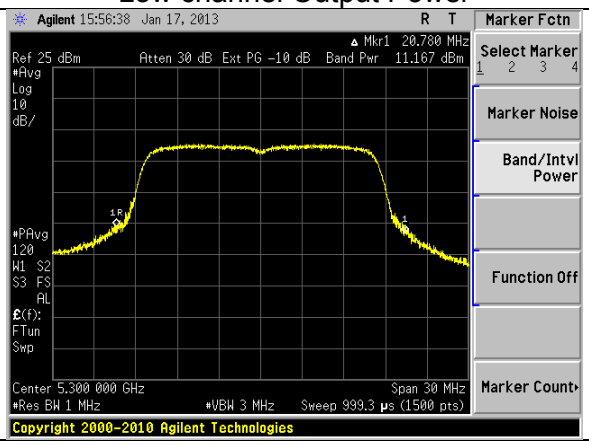
8.4.2.1 6MBPS



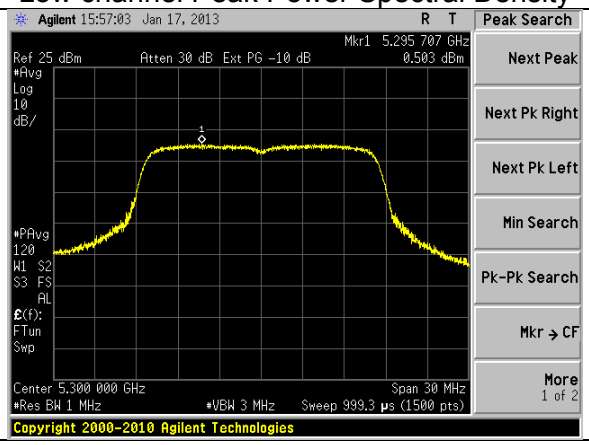
Low channel Output Power



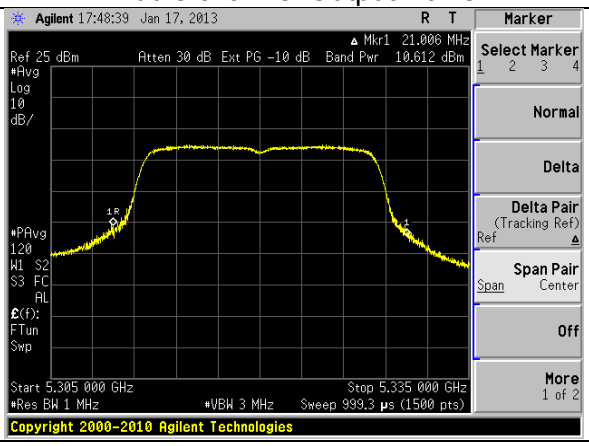
Low channel Peak Power Spectral Density



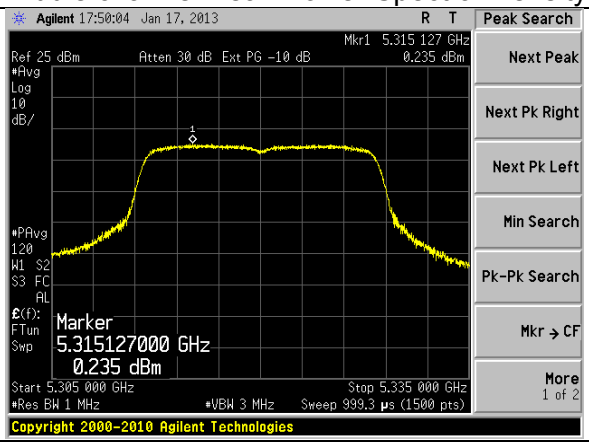
Middle channel Output Power



Middle channel Peak Power Spectral Density

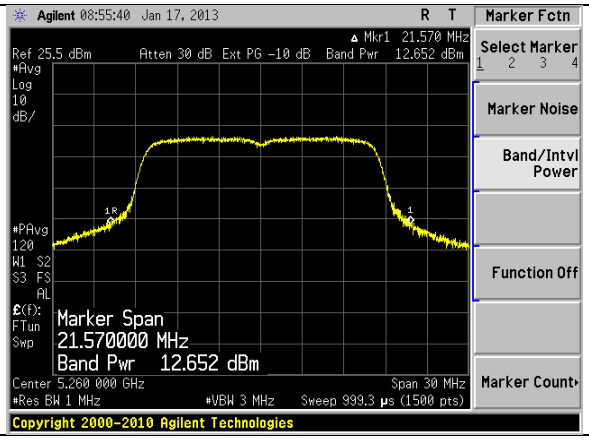


High channel Output Power

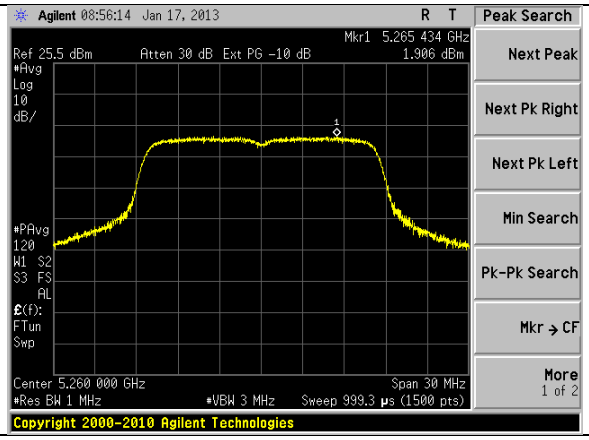


High channel Peak Power Spectral Density

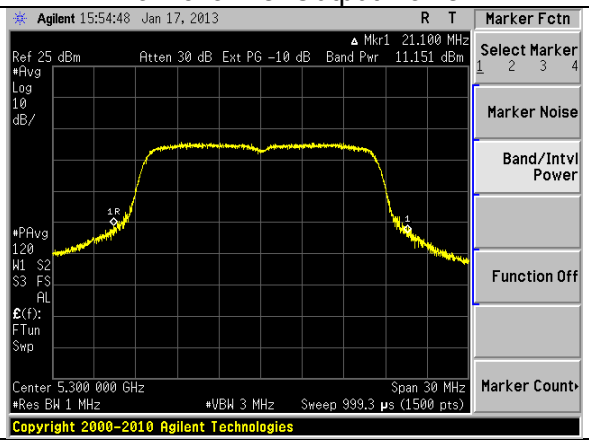
8.4.2.2 12MBPS



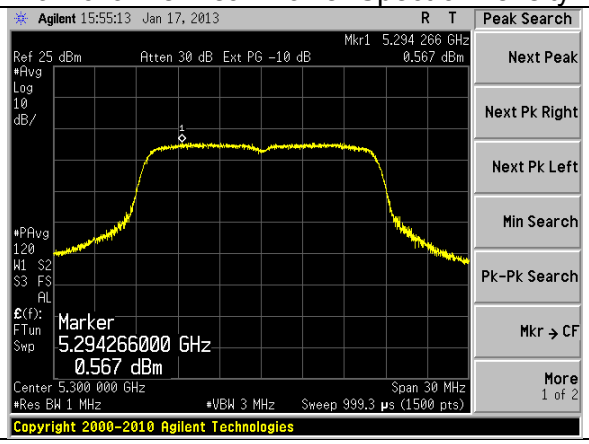
Low channel Output Power



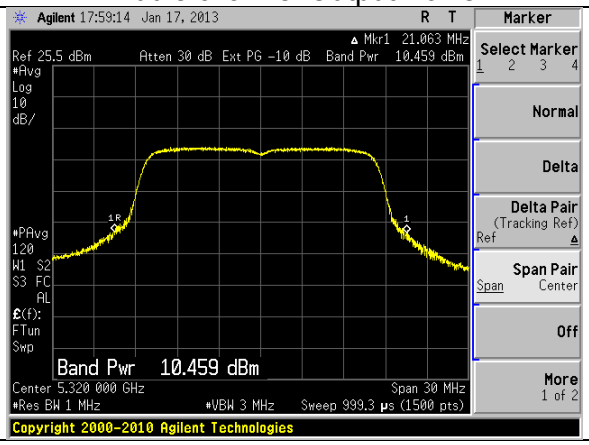
Low channel Peak Power Spectral Density



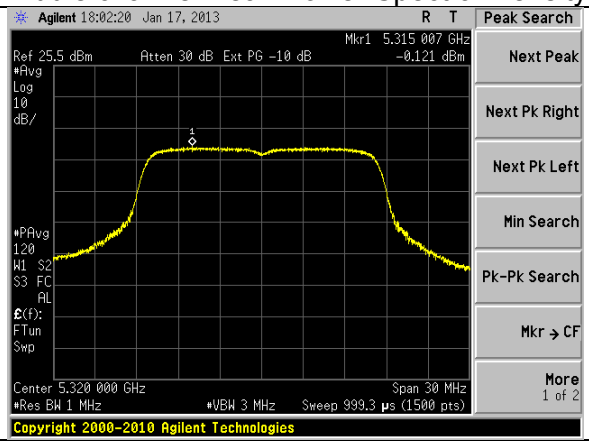
Middle channel Output Power



Middle channel Peak Power Spectral Density

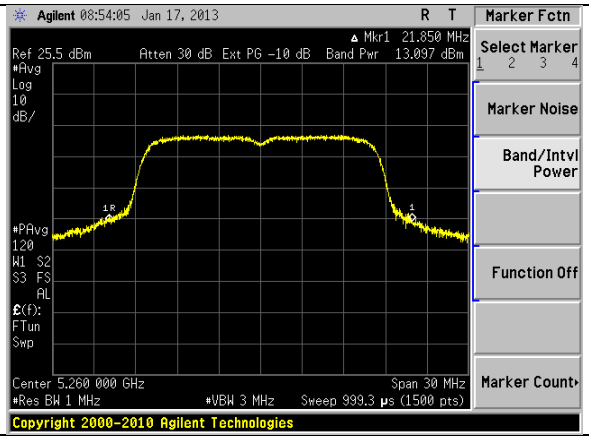


High channel Output Power

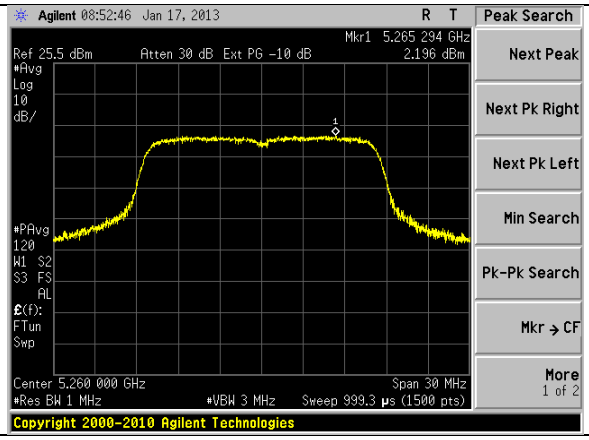


High channel Peak Power Spectral Density

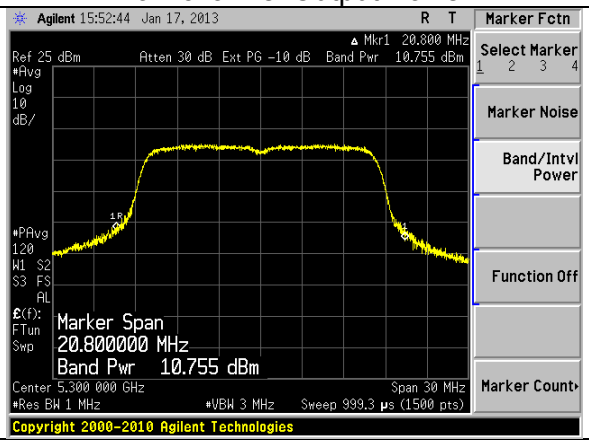
8.4.2.3 24MBPS



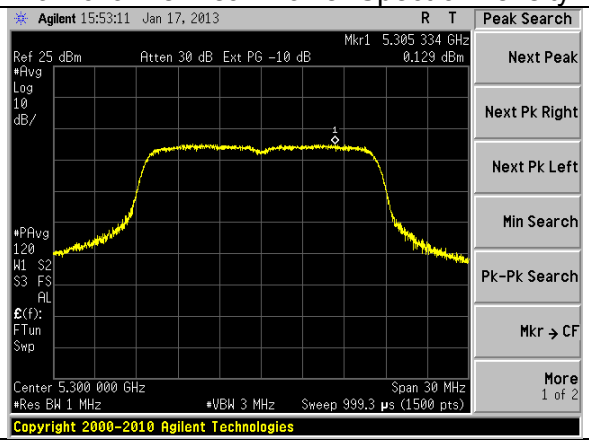
Low channel Output Power



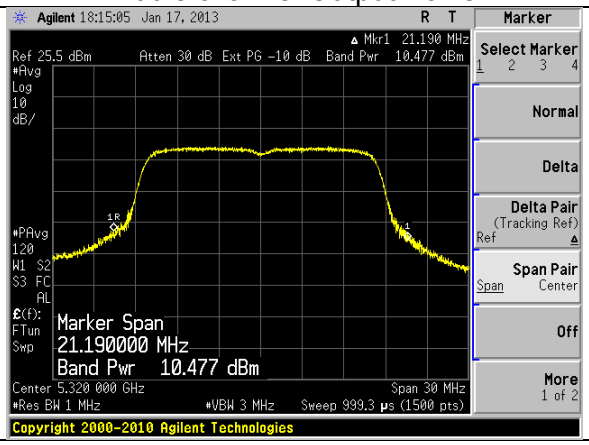
Low channel Peak Power Spectral Density



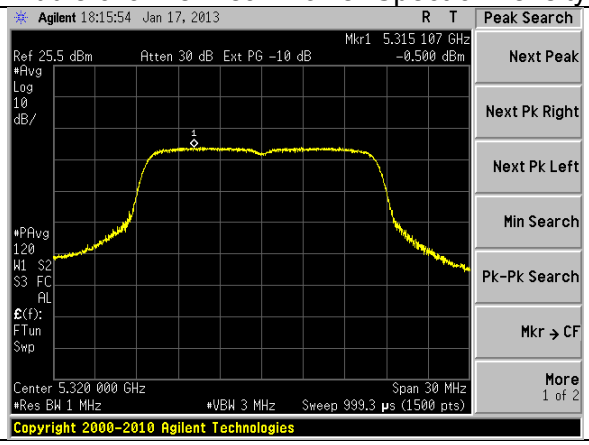
Middle channel Output Power



Middle channel Peak Power Spectral Density

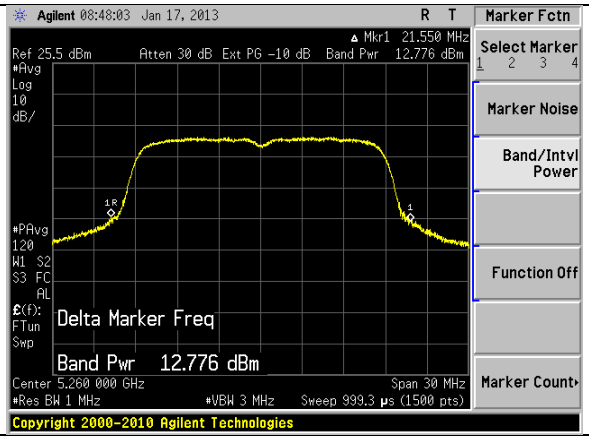


High channel Output Power

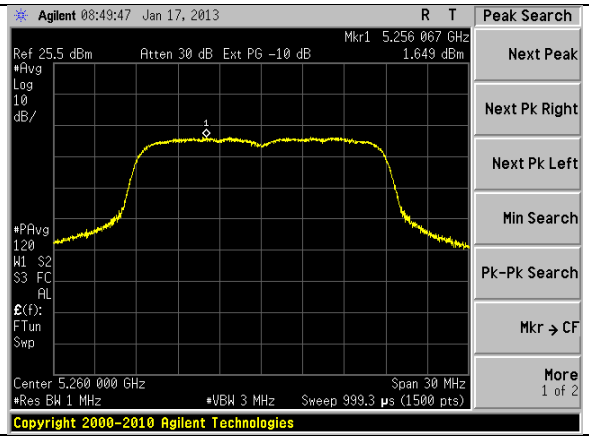


High channel Peak Power Spectral Density

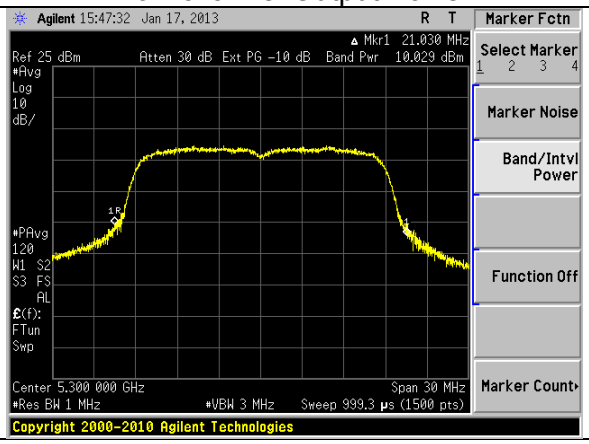
8.4.2.4 MCS7



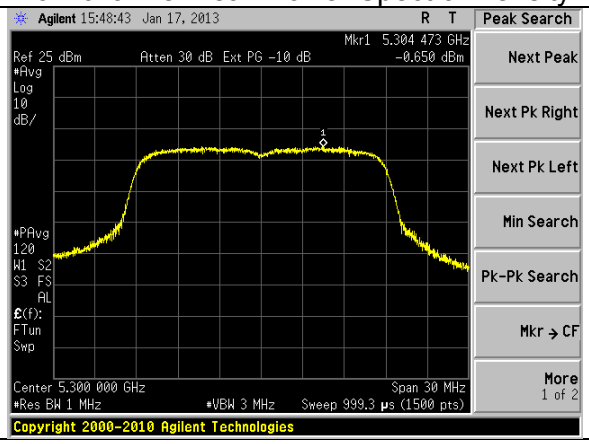
Low channel Output Power



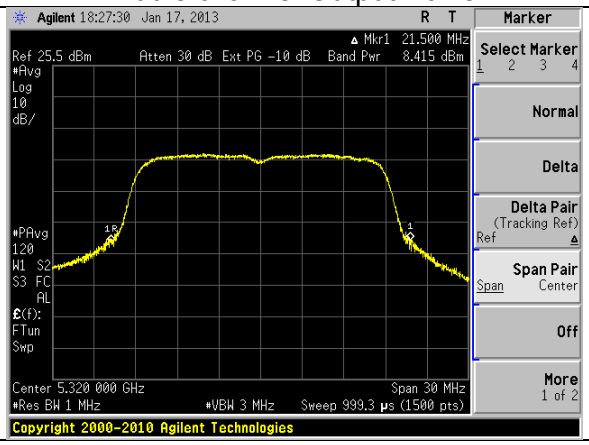
Low channel Peak Power Spectral Density



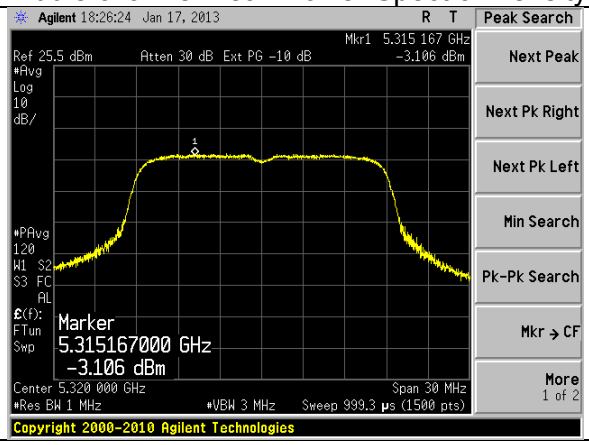
Middle channel Output Power



Middle channel Peak Power Spectral Density



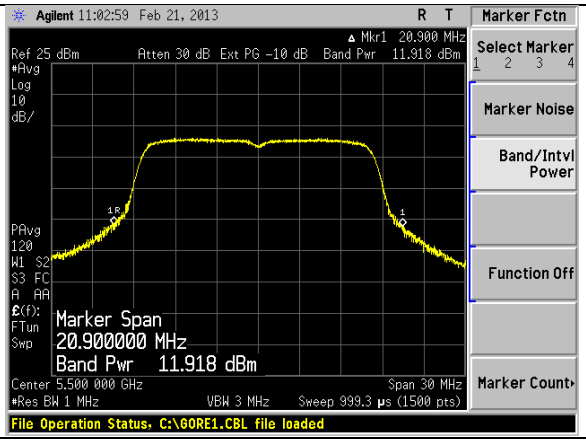
High channel Output Power



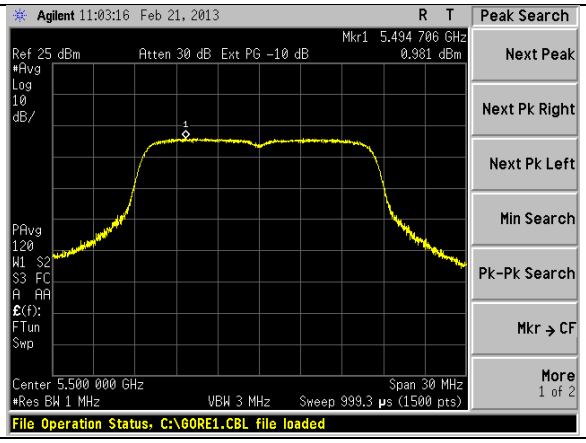
High channel Peak Power Spectral Density

8.4.3 Operation in the band 5.47 to 5.725 GHz

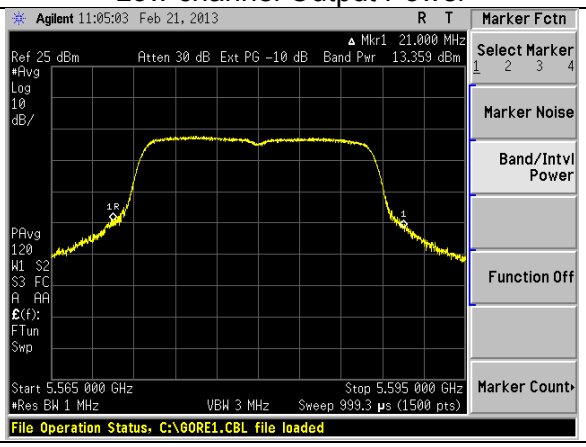
8.4.3.1 6MBPS



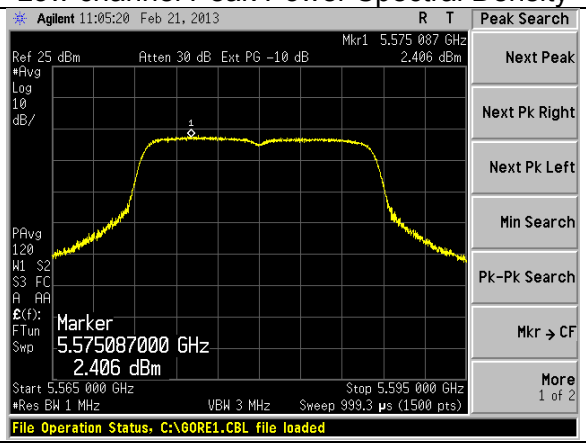
Low channel Output Power



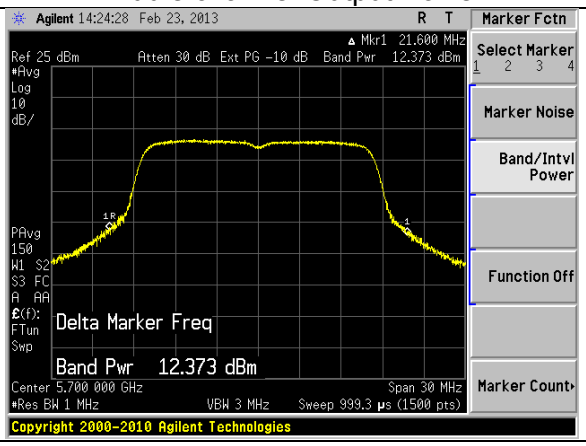
Low channel Peak Power Spectral Density



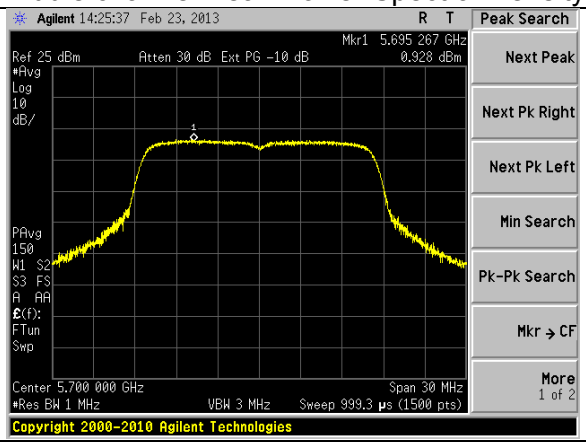
Middle channel Output Power



Middle channel Peak Power Spectral Density

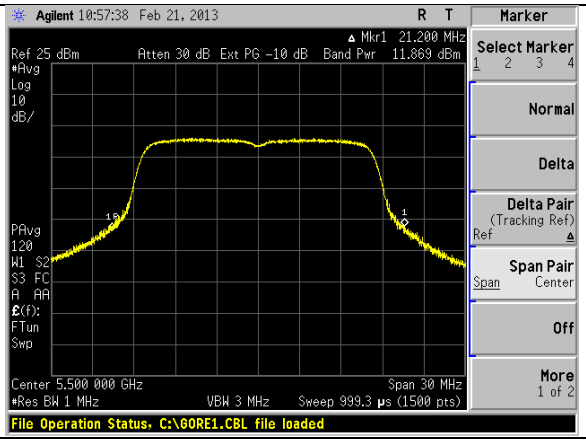


High channel Output Power

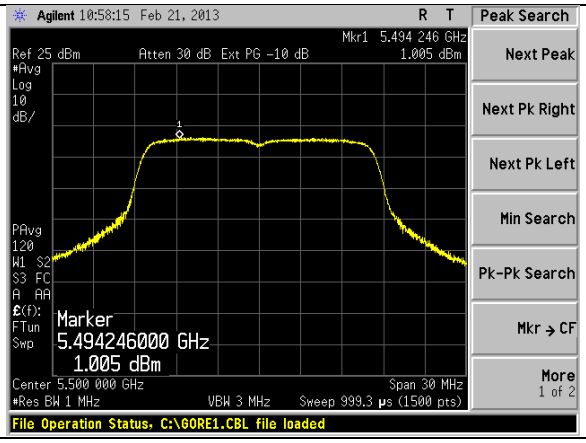


High channel Peak Power Spectral Density

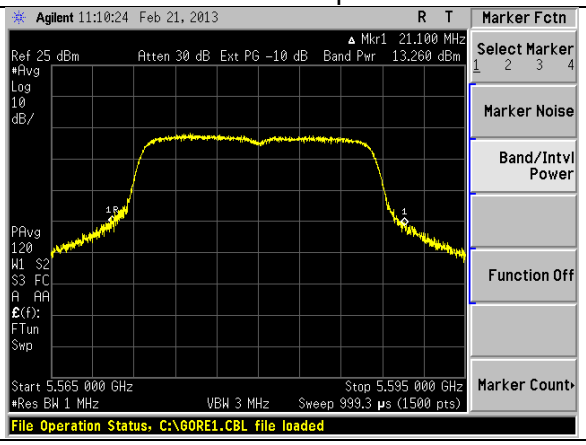
8.4.3.2 12MBPS



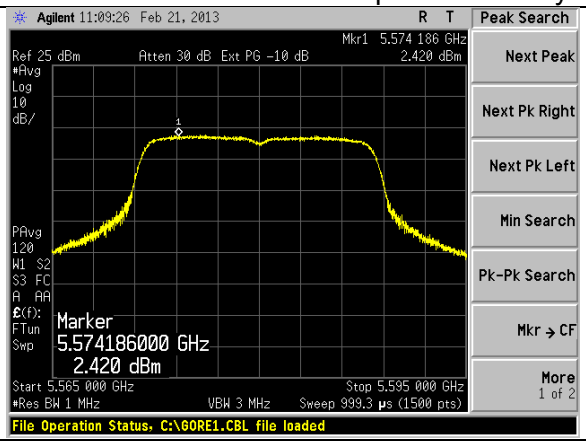
Low channel Output Power



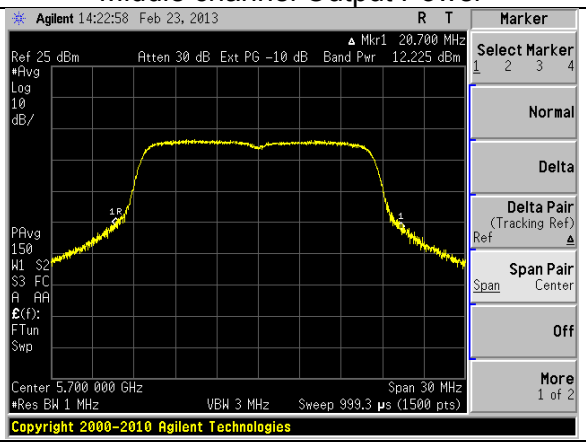
Low channel Peak Power Spectral Density



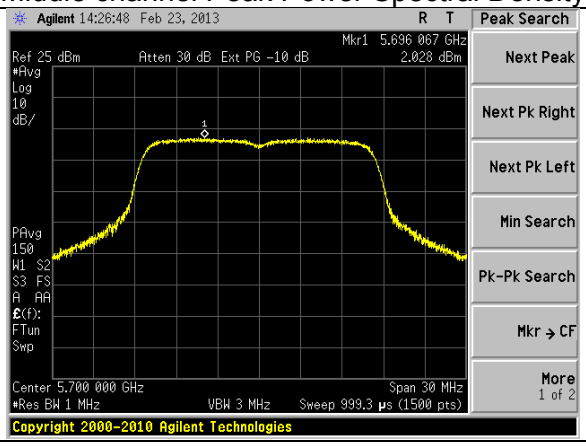
Middle channel Output Power



Middle channel Peak Power Spectral Density

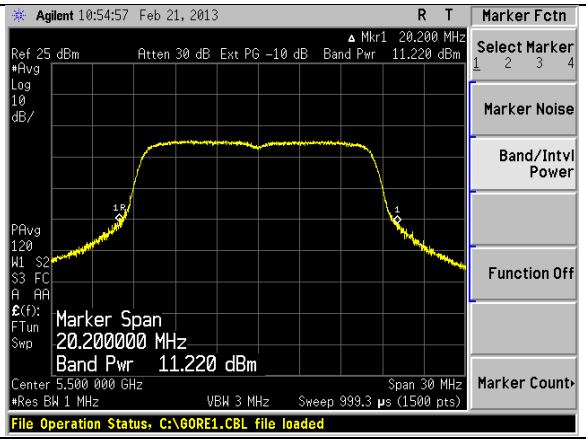


High channel Output Power

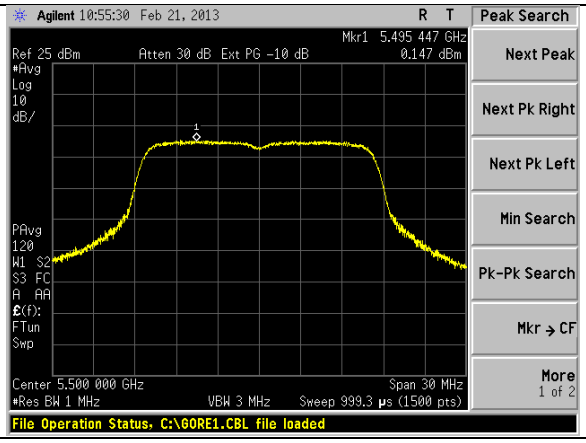


High channel Peak Power Spectral Density

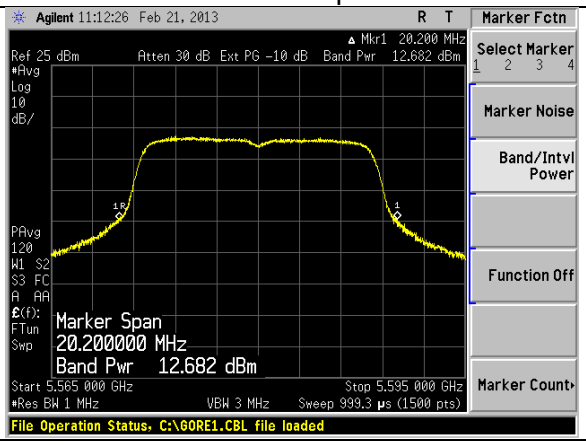
8.4.3.3 24MBPS



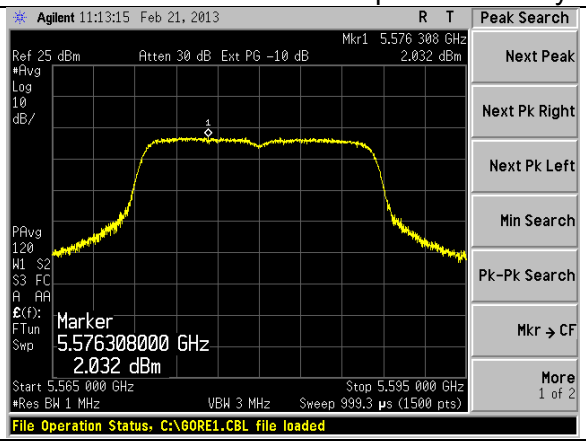
Low channel Output Power



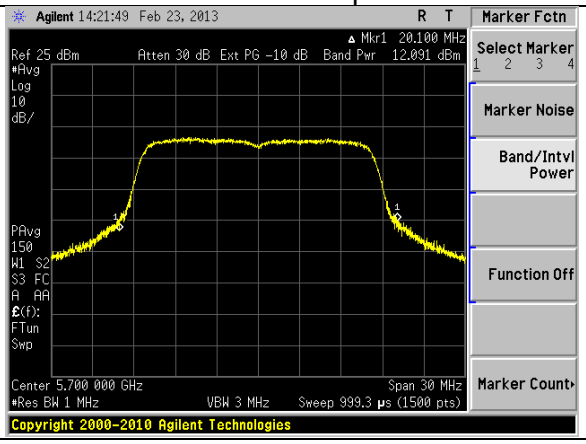
Low channel Peak Power Spectral Density



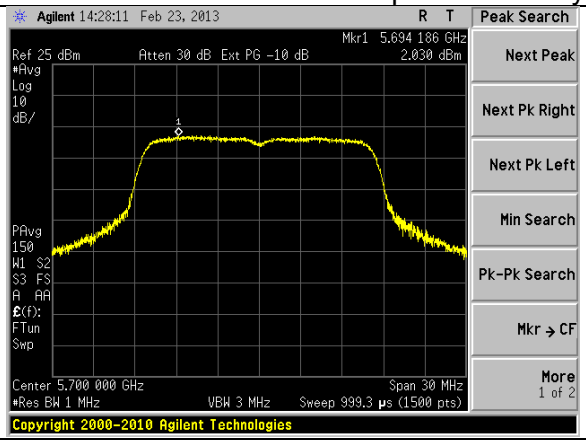
Middle channel Output Power



Middle channel Peak Power Spectral Density

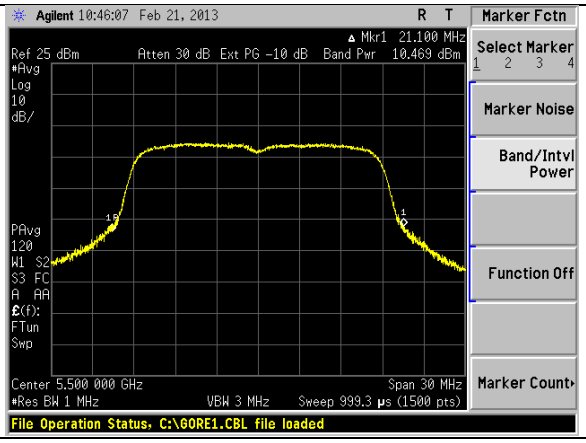


High channel Output Power

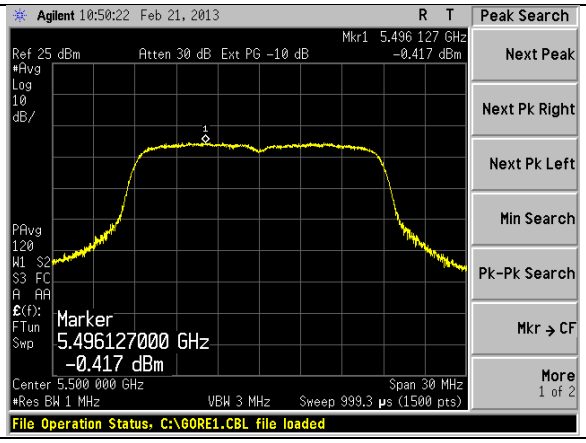


High channel Peak Power Spectral Density

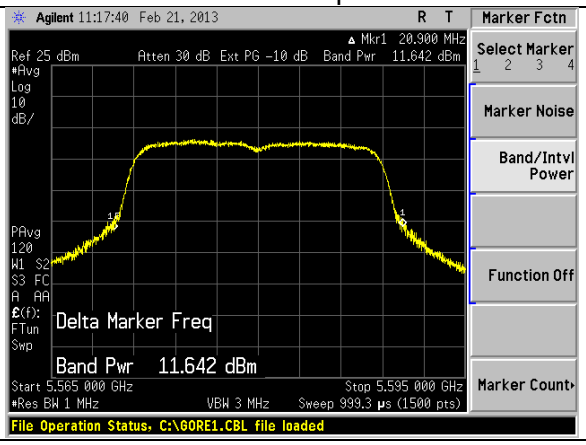
8.4.3.4 MCS7



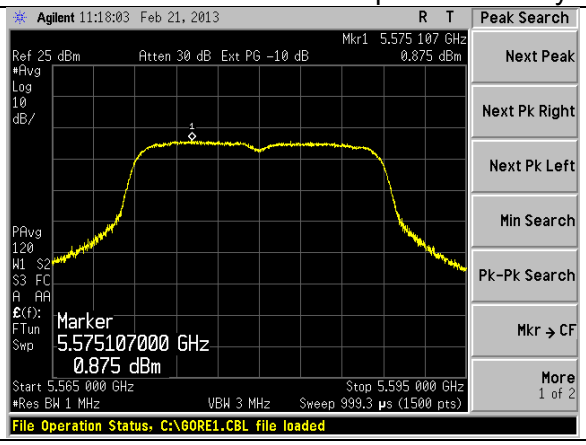
Low channel Output Power



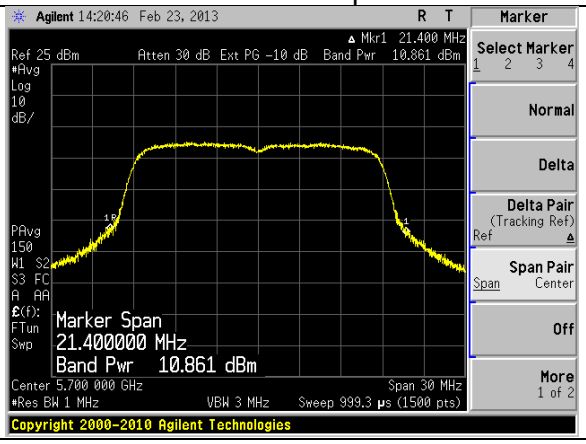
Low channel Peak Power Spectral Density



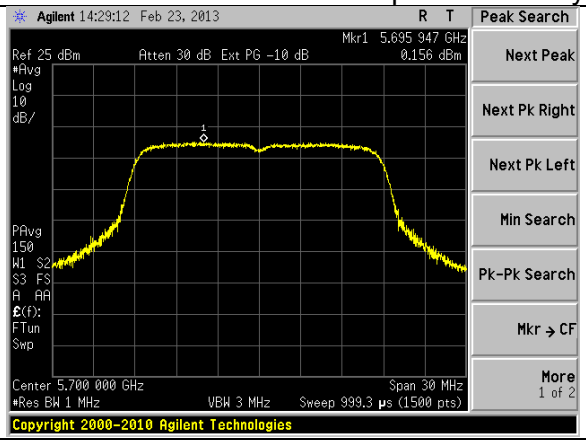
Middle channel Output Power



Middle channel Peak Power Spectral Density



High channel Output Power



High channel Peak Power Spectral Density

EXHIBIT 9. Peak Excursion Ratio

Test Engineer: Khairul Aidi Zainal

9.1 Test Procedure

KDB 789033 D01 section F. Per measurement method, testing on separate modulation mode on a single channel is sufficient to demonstrate compliance with the peak Excursion requirements.

9.2 Limit

The ratio of the peak excursion of the modulation envelope to the maximum conducted output power shall not exceed 13dB across any 1 MHz bandwidth or the emission bandwidth, whichever is less.

9.3 Test Data

The data reported includes all necessary correction factors. These correction factors are loaded onto the EMI receiver when measurements are performed.

Reported Measurement data = Raw receiver measurement (dBm) + Cable factor (dB) + Miscellaneous factors when applicable (dB).

Generic example of reported data:

Reported Measurement data = 8.55 (raw receiver measurement in dBm) + 0.85 (cable factor in dB) = 9.4 (dBm).

Sample calculation for PPSD value:

PPSD (dBm) = SA reading + cable correction factor + duty cycle correction factor
PPSD (Chan 40:5200MHz) = -3.71dBm + 1.39dB + 0.51dB (duty cycle correction) = -1.8dBm

9.3.1. Operation in the 5.15 – 5.25 GHz band

Data Rate (MBPS)	Channel	Frequency (MHz)	PPSD (dBm)	Maximum Peak Hold (dBm)	Peak Excursion (dB)	Peak Excursion Limit (dB)	Peak Excursion Margin (dB)
6	40	5200	0	8.0	8.0	13.0	5.0
12	40	5200	0.2	10.1	9.9	13.0	3.1
24	40	5200	0.7	10.0	9.3	13.0	3.7
65	40	5200	-1.8	7.3	9.1	13.0	3.4

9.3.2 Operation in the 5.25 – 5.35 GHz band

Data Rate (MBPS)	Channel	Frequency (MHz)	PPSD (dBm)	Maximum Peak Hold (dBm)	Peak Excursion (dB)	Peak Excursion Limit (dB)	Peak Excursion Margin (dB)
6	60	5300	0.5	5.4	4.9	13.0	8.1
12	60	5300	0.7	6.3	5.6	13.0	7.4
24	60	5300	0.4	7.7	7.3	13.0	5.7
65	60	5300	-0.1	4.9	5.0	13.0	8.1

9.3.3 Operation in the 5.47 – 5.725 GHz band

Data Rate (MBPS)	Channel	Frequency (MHz)	PPSD (dBm)	Maximum Peak Hold (dBm)	Peak Excursion (dB)	Peak Excursion Limit (dB)	Peak Excursion Margin (dB)
6	116	5580	2.4	10.3	7.9	13.0	5.1
12	116	5580	2.5	11.6	9.1	13.0	3.9
24	116	5580	2.3	10.9	8.6	13.0	4.4
65	116	5580	1.4	9.5	8.1	13.0	4.9

Sample calculation for peak excursion:

Peak Excursion (Channel 40/6MBPS) = 8.03 dBm (Maximum Peak Hold) – -0.02dBm(PPSD) = 8.0dBm

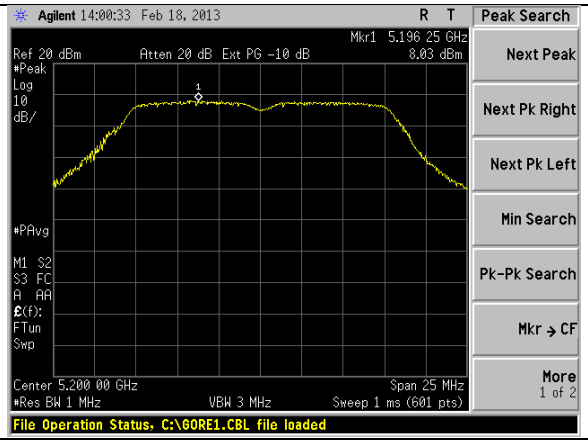
Sample calculation for PPSD value:

PPSD (dBm) = SA reading + cable correction factor + duty cycle correction factor
PPSD (Chan 40:5200MHz) = -3.71dBm + 1.39dB + 0.51dB (duty cycle correction) = -1.8dBm

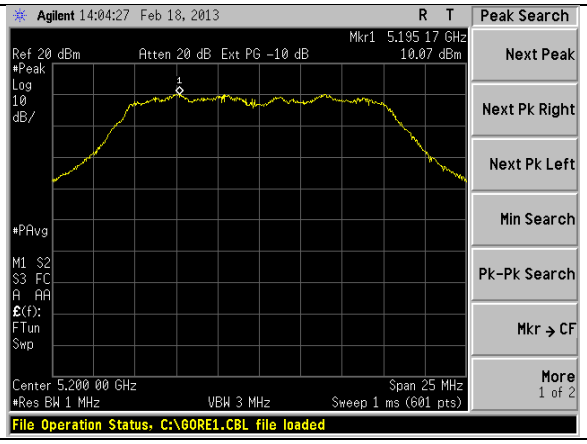
9.4 Screen Captures

The screen captures are of the 'Peak Max Hold' plot. The Peak PSD (corrected for Duty cycle) value is then subtracted from this peak value to get Peak Excursion.

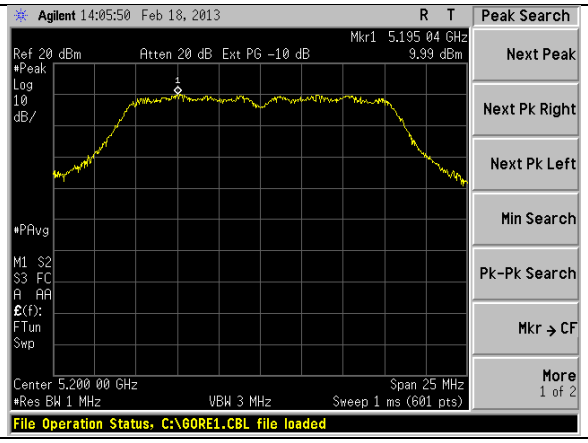
9.4.1 Operation in the 5.15 – 5.25 GHz band



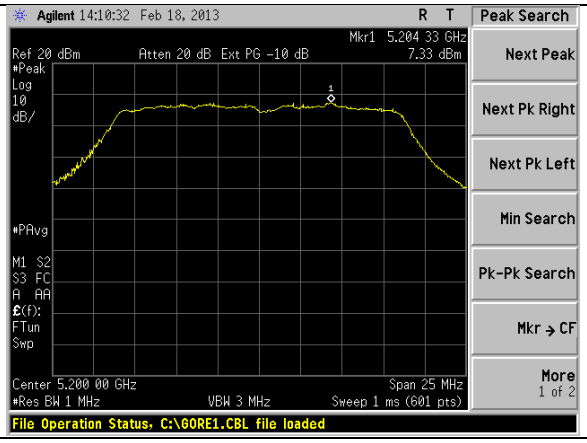
6 MBPS



12MBPS

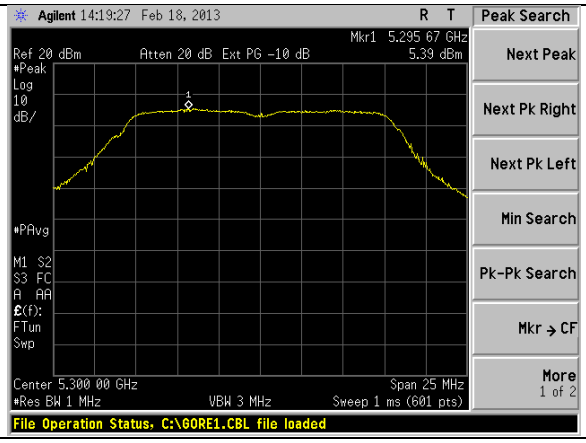


24MBPS

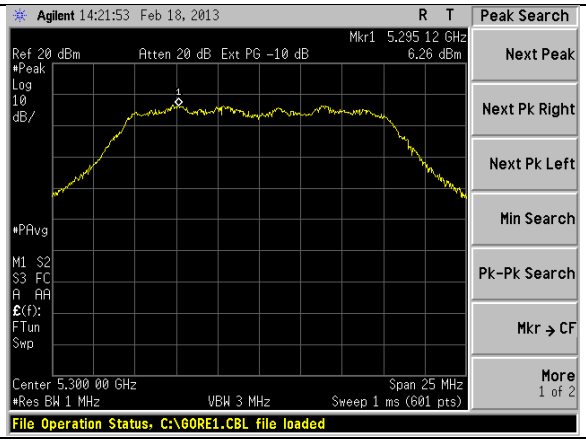


MCS7

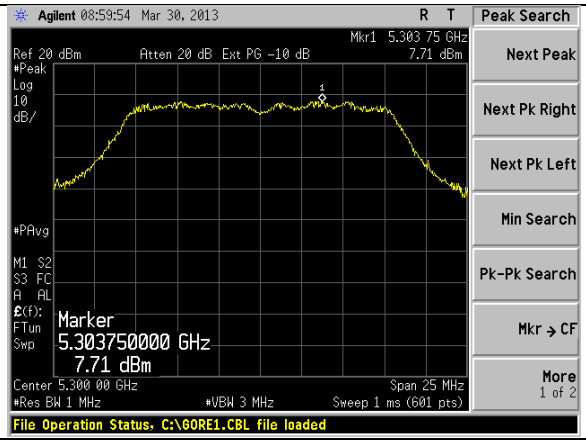
9.4.2 Operation in the 5.25 – 5.35 GHz band



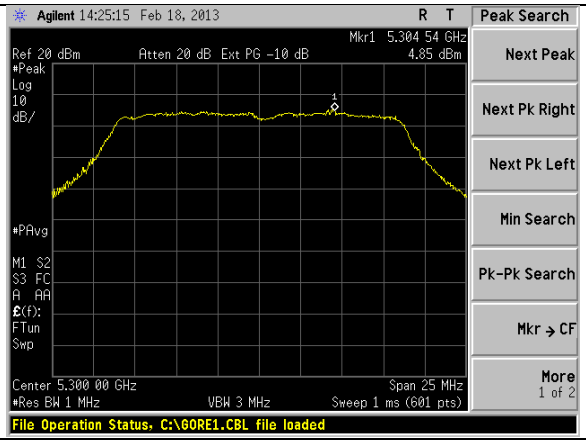
6 MBPS



12MBPS

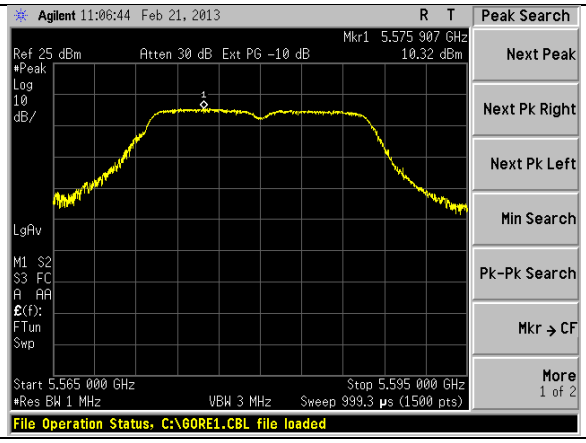


24MBPS

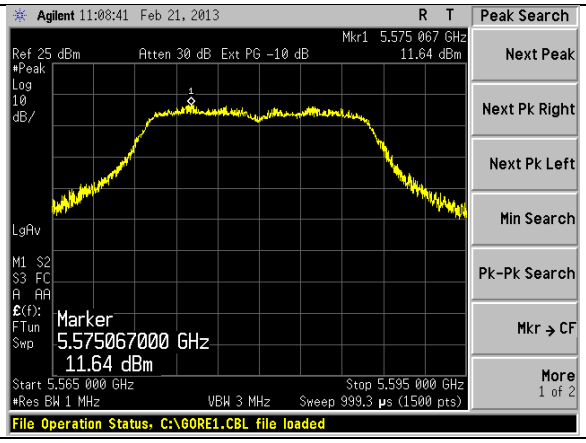


MCS7

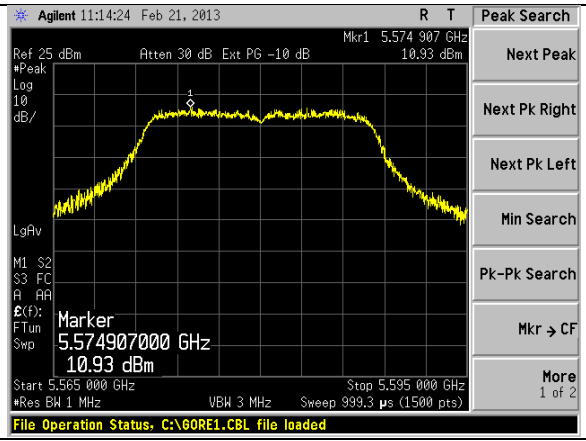
9.4.3 Operation in the 5.47 – 5.725 GHz band



6 MBPS



12MBPS



24MBPS

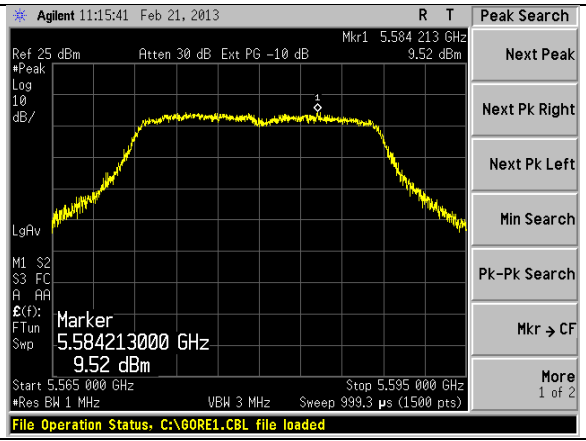


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EXHIBIT 10 Spurious Emissions

Test Engineers: Khairul Aidi Zainal, Peter Feilen

10.1 Test Procedure

1. KDB 789033 D01 section G.
2. ANSI C63.4-2003

The unwanted emissions measurements both in the restricted and non-restricted bands were performed via antenna-port conducted measurements in conjunction with cabinet emissions test. In the cabinet emissions tests, the EUT antenna was replaced with a termination matching the nominal impedance of the antenna.

When performing measurements, gain was added to the spectrum analyzer via the external pre-amp gain function of the spectrum analyzer to account for out of band antenna gain, in-band antenna gain, ground bounce effects, etc.

For measurements between 30 MHz to 1000 MHz, gain of 4.7dB was added to the spectrum analyzer reading via the external Pre Amp gain function of the spectrum analyzer to account for ground bounce.

Sample calculations of reported data are presented in the respective section.

10.2 Limits

10.2.1 Operation in the 5150 to 5250 MHz band

All emissions outside of the 5150 to 5350 MHz band shall not exceed an EIRP of -27dBm.

Emissions in the restricted band shall comply with the general emissions limit:

For below 1000 MHz, the limits are:

30 to 88 MHz
Quasi Peak Limit at 3m
EIRP (dBm) = E (dBμV/m) – 95.2 = 40.0 -95.2 = -55.2 dBm

88 to 216 MHz
Quasi Peak Limit at 3m
EIRP (dBm) = E (dBμV/m) – 95.2 = 43.0 -95.2 = -52.2 dBm

216 to 960 MHz
Quasi Peak Limit at 3m
EIRP (dBm) = E (dBμV/m) – 95.2 = 46.0 -95.2 = -49.2 dBm

For above 960 MHz, the limits are:

Peak Limit = 74dBμV/m at 3m
EIRP (dBm) = E (dBμV/m) – 95.2 = 74 -95.2 = -21.2 dBm

Average Limit = 54dBμV/m at 3m
EIRP (dBm) = E (dBμV/m) – 95.2 = 54 -95.2 = -41.2 dBm

10.2.2 Operation in the 5250 to 5350 MHz band

All emissions outside of the 5150 to 5350 MHz band shall not exceed an EIRP of -27dBm.
Devices operating in the 5250 to 5350 MHz band that generate emissions in the 5150 to 5250 MHz band must meet all applicable technical requirements for operation in the 5150 to 5250 MHz band (including indoor use) or alternatively meet an out of band emission EIRP limit of -27dBm/MHz in the 5150 to 5250 MHz band.

Emissions in the restricted band shall comply with the general emissions limit:

For below 1000 MHz, the limits are:

30 to 88 MHz
Quasi Peak Limit at 3m
EIRP (dBm) = E (dBµV/m) – 95.2 = 40.0 -95.2 = -55.2 dBm

88 to 216 MHz
Quasi Peak Limit at 3m
EIRP (dBm) = E (dBµV/m) – 95.2 = 43.0 -95.2 = -52.2 dBm

216 to 960 MHz
Quasi Peak Limit at 3m
EIRP (dBm) = E (dBµV/m) – 95.2 = 46.0 -95.2 = -49.2 dBm

For above 960 MHz, the limits are:

Peak Limit = 74dBµV/m at 3m
EIRP (dBm) = E (dBµV/m) – 95.2 = 74 -95.2 = -21.2 dBm

Average Limit = 54dBµV/m at 3m
EIRP (dBm) = E (dBµV/m) – 95.2 = 54 -95.2 = -41.2 dBm

10.2.3 Operation in the 5470 to 5725 MHz band

All emissions outside of the 5150 to 5350 MHz band shall not exceed an EIRP of -27dBm

Emissions in the restricted band shall comply with the general emissions limit:

For below 1000 MHz, the limits are:

30 to 88 MHz
Quasi Peak Limit at 3m
EIRP (dBm) = E (dBµV/m) – 95.2 = 40.0 -95.2 = -55.2 dBm

88 to 216 MHz
Quasi Peak Limit at 3m
EIRP (dBm) = E (dBµV/m) – 95.2 = 43.0 -95.2 = -52.2 dBm

216 to 960 MHz
Quasi Peak Limit at 3m
EIRP (dBm) = E (dBµV/m) – 95.2 = 46.0 -95.2 = -49.2 dBm

For above 960 MHz, the limits are:

Peak Limit = 74dBµV/m at 3m
EIRP (dBm) = E (dBµV/m) – 95.2 = 74 -95.2 = -21.2 dBm

Average Limit = 54dBµV/m at 3m
EIRP (dBm) = E (dBµV/m) – 95.2 = 54 -95.2 = -41.2 dBm

10.2.4 Operation in the 5725 MHz to 5825 MHz band

All emissions within the frequency range from the band edge to 10 MHz above or below the band edge shall not exceed an EIRP of -17dBm/MHz.

For frequencies 10 MH or greater above or below the band edge, emissions shall not exceed an EIRP of -27dBm/MHz.

Emissions in the restricted band shall comply with the general emissions limit:

For below 1000 MHz, the limits are:

30 to 88 MHz
Quasi Peak Limit at 3m
EIRP (dBm) = E (dBμV/m) – 95.2 = 40.0 -95.2 = -55.2 dBm

88 to 216 MHz
Quasi Peak Limit at 3m
EIRP (dBm) = E (dBμV/m) – 95.2 = 43.0 -95.2 = -52.2 dBm

216 to 960 MHz
Quasi Peak Limit at 3m
EIRP (dBm) = E (dBμV/m) – 95.2 = 46.0 -95.2 = -49.2 dBm

For above 960 MHz, the limits are:

Peak Limit = 74dBμV/m at 3m
EIRP (dBm) = E (dBμV/m) – 95.2 = 74 -95.2 = -21.2 dBm

Average Limit = 54dBμV/m at 3m
EIRP (dBm) = E (dBμV/m) – 95.2 = 54 -95.2 = -41.2 dBm

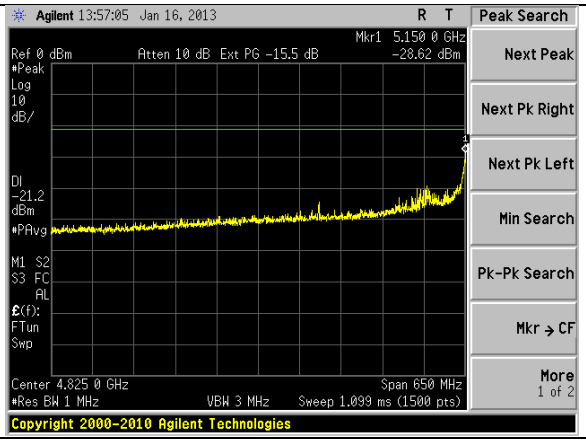
10.3 Test Data

10.3.1 Antenna port conducted measurements.

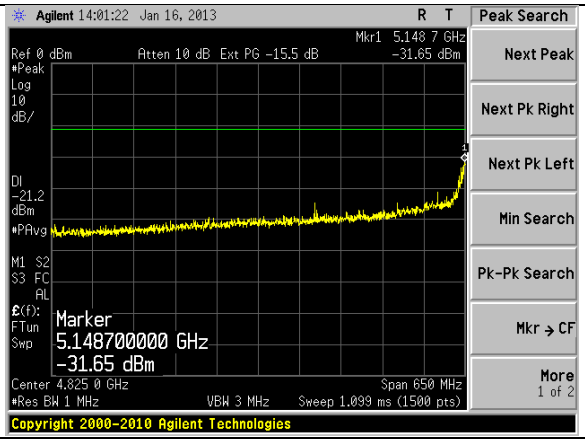
10.3.1.1 Operation in the 5150 to 5250 MHz band

10.3.1.1.1 Lower Band edge (Restricted Band)

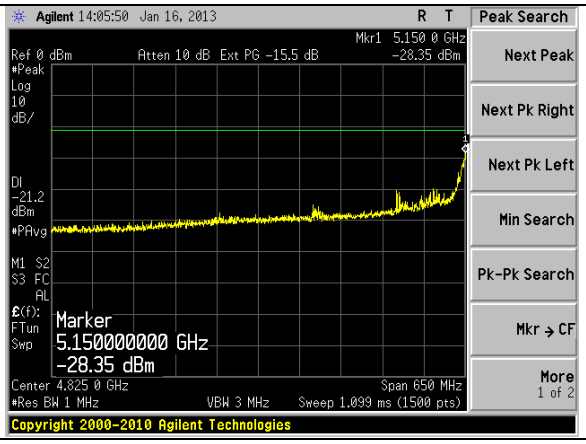
Peak



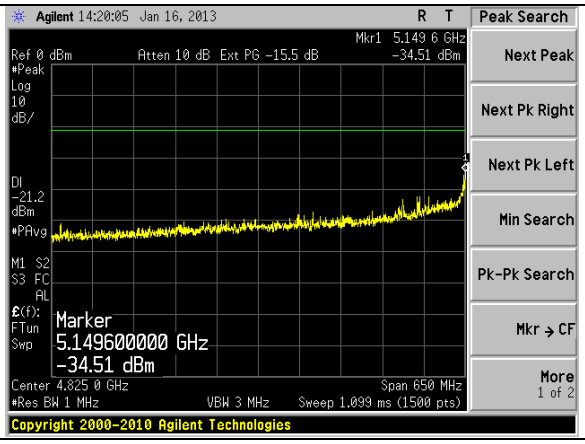
6MBPS



12MBPS



24MBPS



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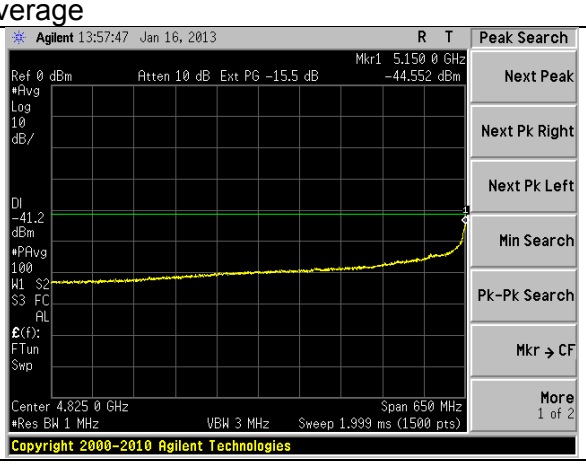
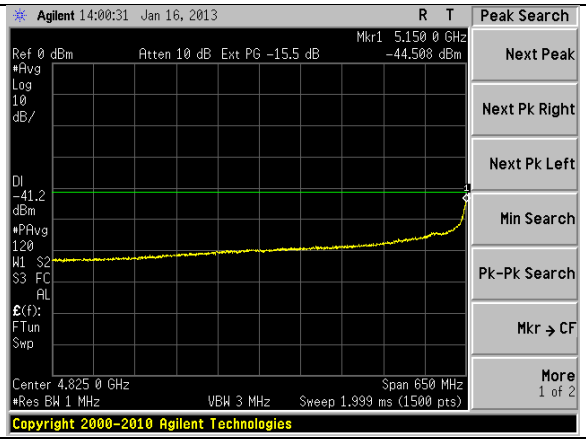
Note: Per section G(3)(b)(iii) of KDB 789033, antenna gain was accounted for in the plots above by adding an external PG to the spectrum analyzer. The plot shows Ext PG of -15.5 which accounts for a 10dB attenuator and a 5.5 peak antenna gain.

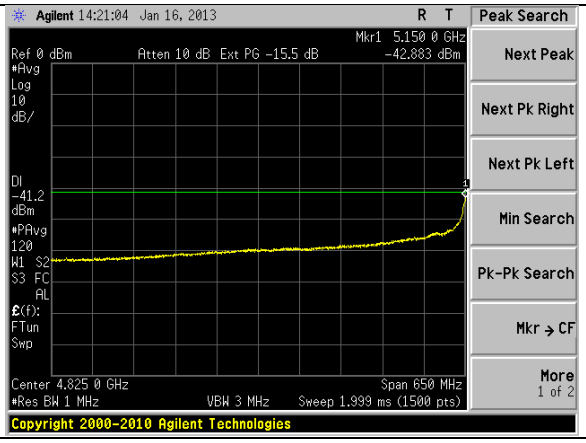
Average



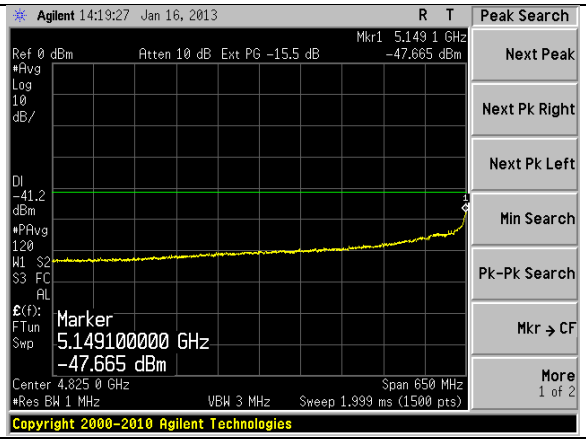
6MBPS



12MBPS



24MBPS

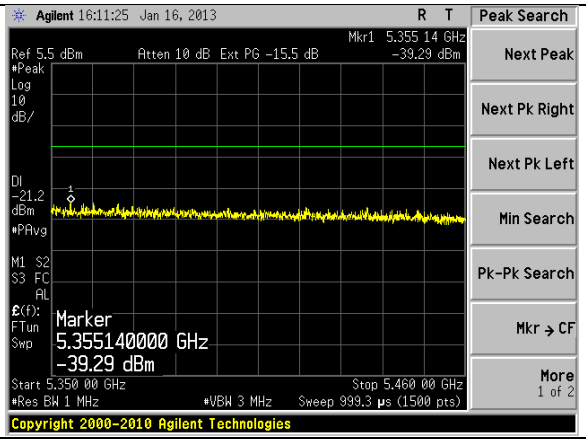


MCS7

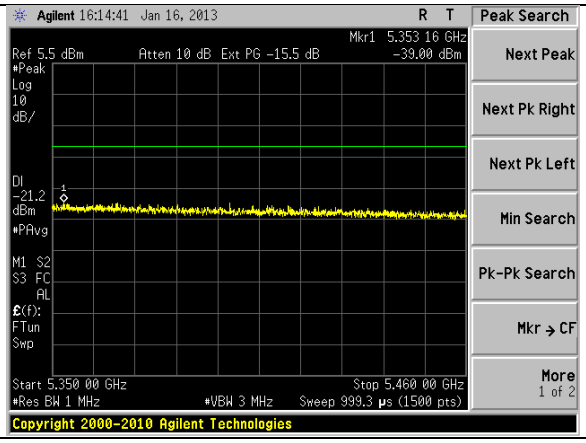
Note: Per section G(3)(b)(iii) of KDB 789033, antenna gain was accounted for in the plots above by adding an external PG to the spectrum analyzer. The plot shows Ext PG of -15.5 which accounts for a 10dB attenuator and a 5.5 peak antenna gain.

10.3.1.1.2 Upper Band edge (Restricted Band)

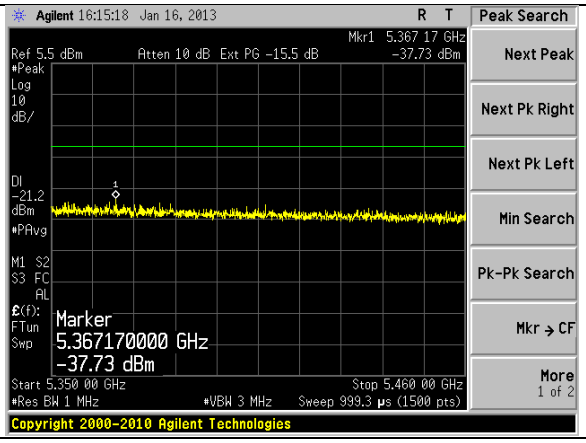
Peak



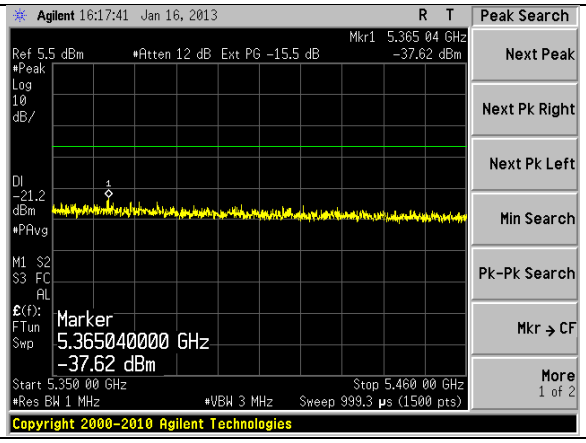
6MBPS



12MBPS



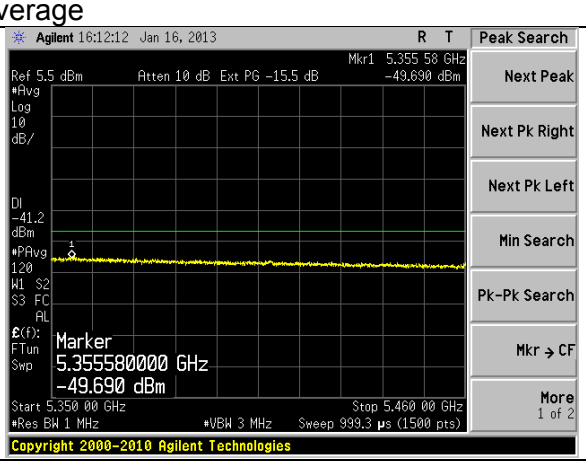
24MBPS



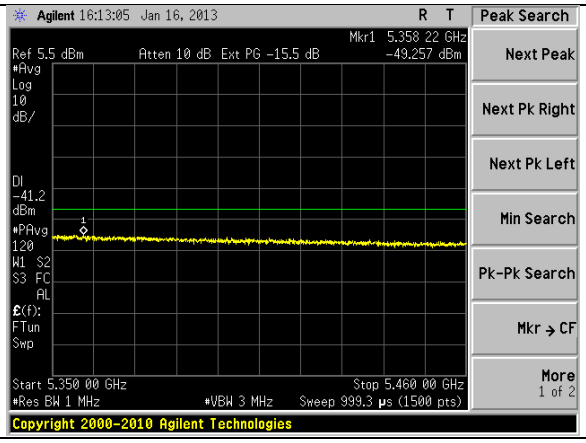
MCS7

Note: Per section G(3)(b)(iii) of KDB 789033, antenna gain was accounted for in the plots above by adding an external PG to the spectrum analyzer. The plot shows Ext PG of -15.5 which accounts for a 10dB attenuator and a 5.5 peak antenna gain.

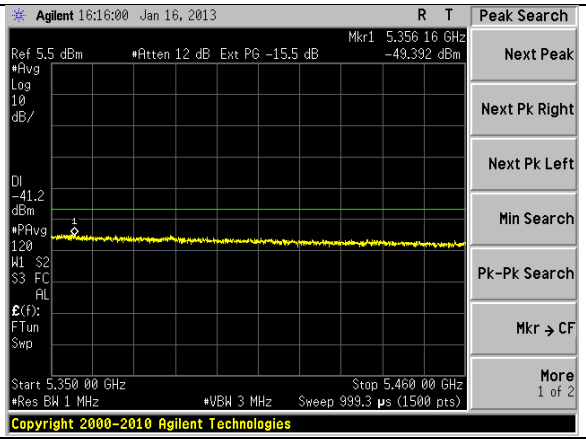
Average



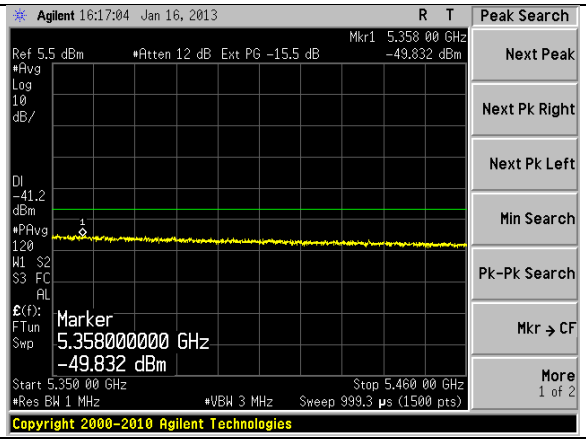
6MBPS



12MBPS



24MBPS



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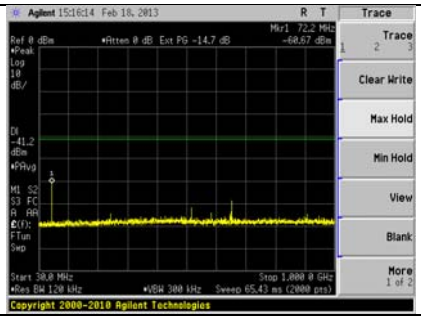
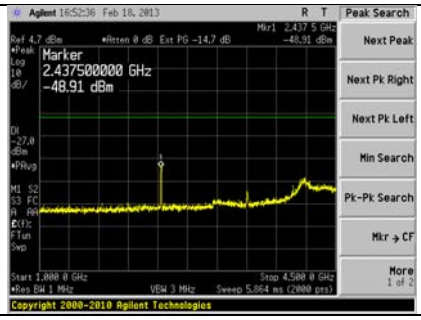
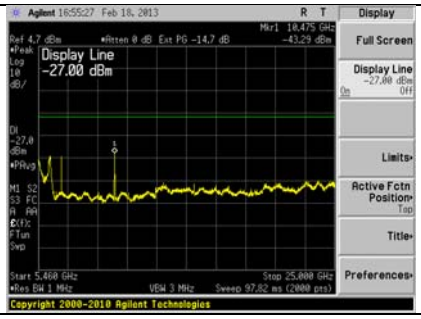
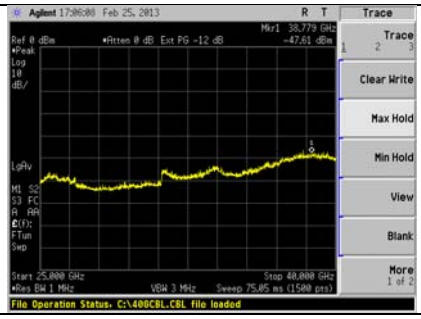
Note: Per section G(3)(b)(iii) of KDB 789033, antenna gain was accounted for in the plots above by adding an external PG to the spectrum analyzer. The plot shows Ext PG of -15.5 which accounts for a 10dB attenuator and a 5.5 peak antenna gain.

10.3.1.1.3 Unwanted Emissions other than band-edges.

The plots shown below are those of 6MBPS which is representative of the other data rates.

	
30 to 1000 MHz	1000 to 4500 MHz
	
5460 to 25000 MHz	25000 to 40000 MHz

Note: The band edges are shown in the preceding section. The display lines shown in the plots above were not used as reference for compliance.

			5180	MHz	Harmonics			
Frequency (MHz)	Peak (dBm)	Peak (dBµV/m)	Average (dBm)	Average (dBµV/m)	Peak limit (dBm)	Average limit (dB/m)	Peak margin (dB)	Average margin (dB)
10360	-40.6	54.6	N/A	N/A	-27.0	N/A	13.6	N/A
15540	-53.4	41.8	-66.5	28.7	-21.2	-41.2	32.2	25.3

			5200	MHz	Harmonics			
Frequency (MHz)	Peak (dBm)	Peak (dBµV/m)	Average (dBm)	Average (dBµV/m)	Peak limit (dBm)	Average limit (dB/m)	Peak margin (dB)	Average margin (dB)
10400	-45.9	49.3	N/A	N/A	-27.0	N/A	18.9	N/A
15600	-50.9	44.4	-63.1	32.1	-21.2	-41.2	29.6	21.9

			5240	MHz	Harmonics			
Frequency (MHz)	Peak (dBm)	Peak (dBµV/m)	Average (dBm)	Average (dBµV/m)	Peak limit (dBm)	Average limit (dB/m)	Peak margin (dB)	Average margin (dB)
10480	-43.3	51.9	N/A	N/A	-27.0	N/A	-16.3	N/A
15720	-50.3	44.9	-61.2	34.0	-21.2	-41.2	29.1	20.0

Sample calculation:

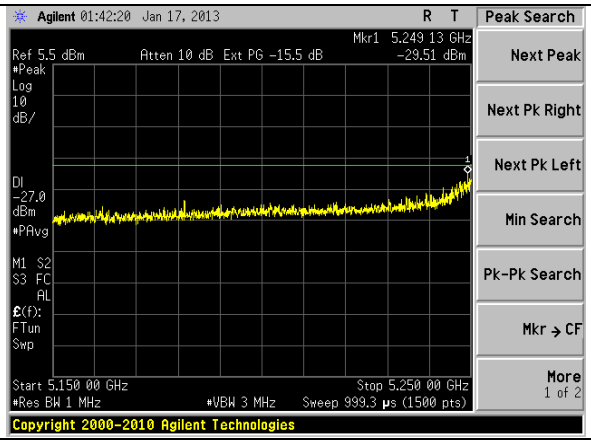
Emission at 10480 MHz

Peak EIRP (dBm) = SA reading + cable correction factor + antenna gain (in band or out of band)
Note: factors and readings are rounded upwards to one decimal point. The antenna gain used in the calculation is per KDB 789033 section G(3)(b)(iii).

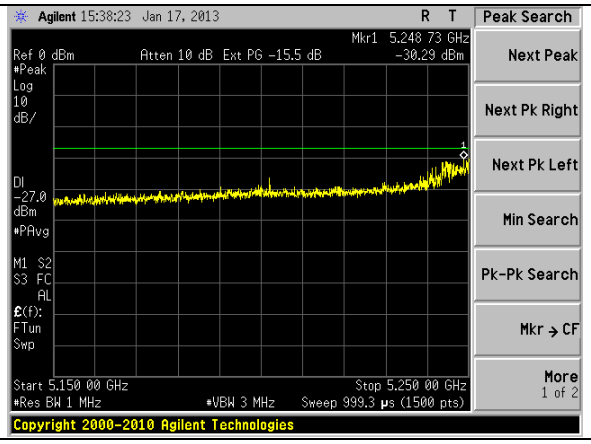
-43.3 (dBm) = -46.7dBm + 1.4dB + 2.0 dBi

10.3.1.2 Operation in the 5250 to 5350 MHz band

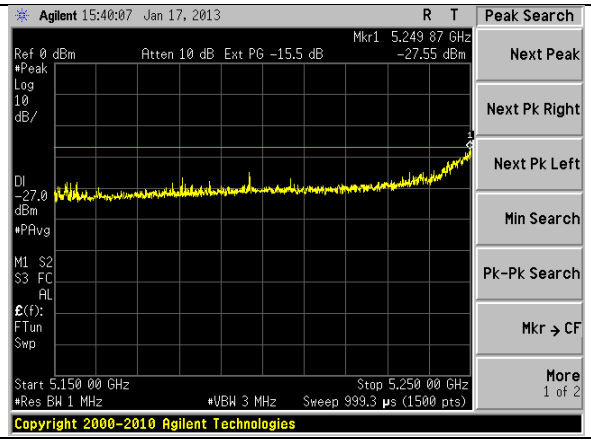
10.3.1.2.1 Lower Band-edge



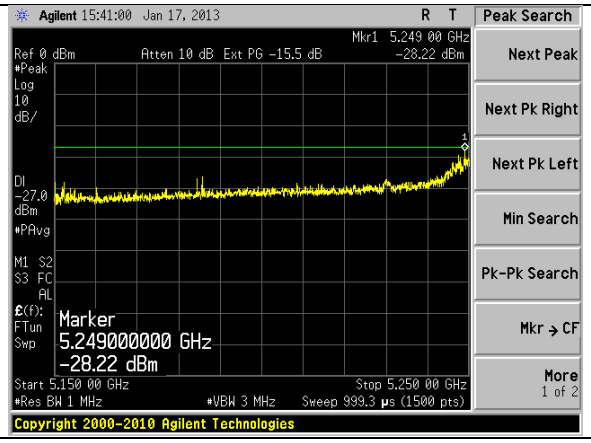
6MBPS



12MBPS



24MBPS



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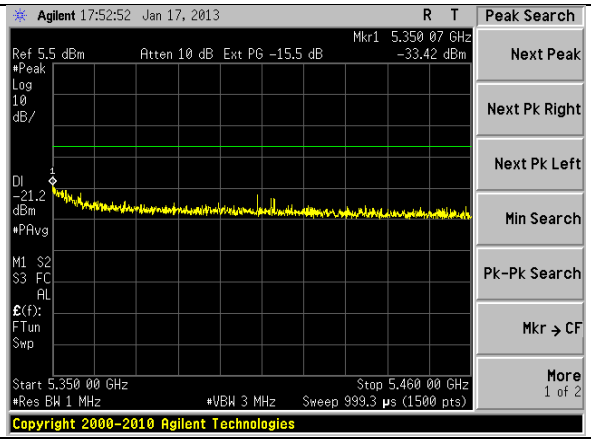
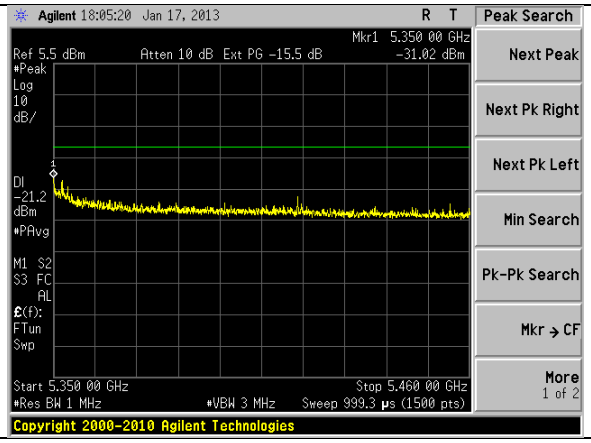
10.3.1.2.2 Upper Band edge screen captures

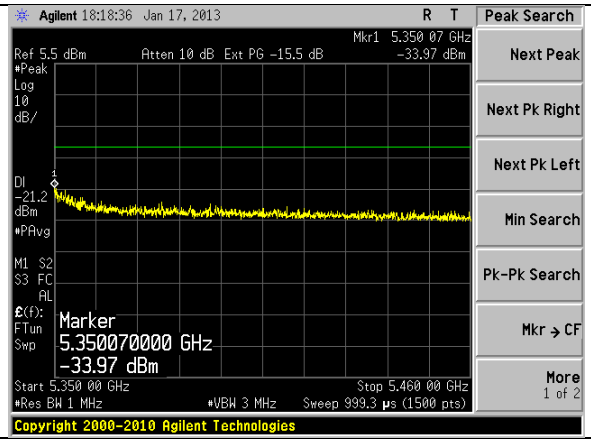
Peak



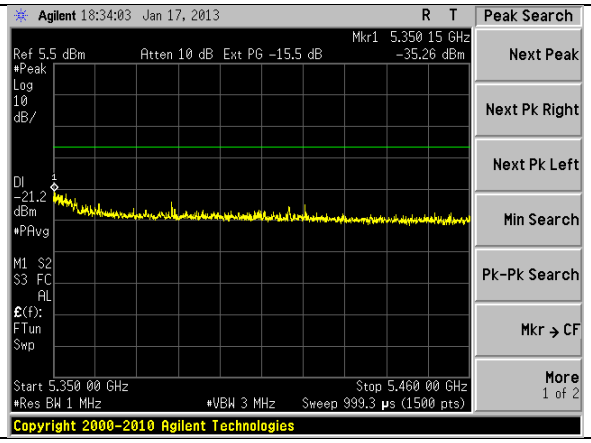
6MBPS



12MBPS



24MBPS



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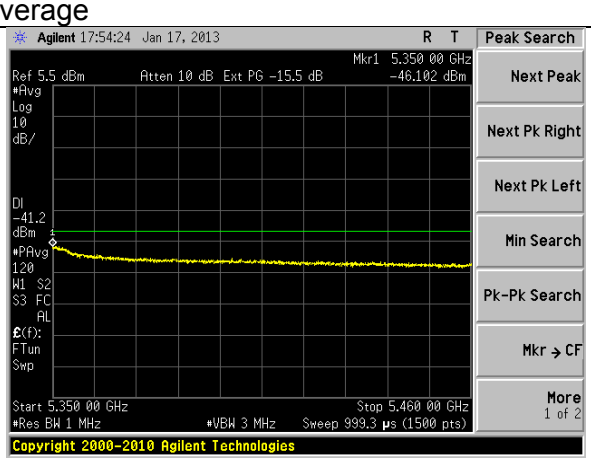
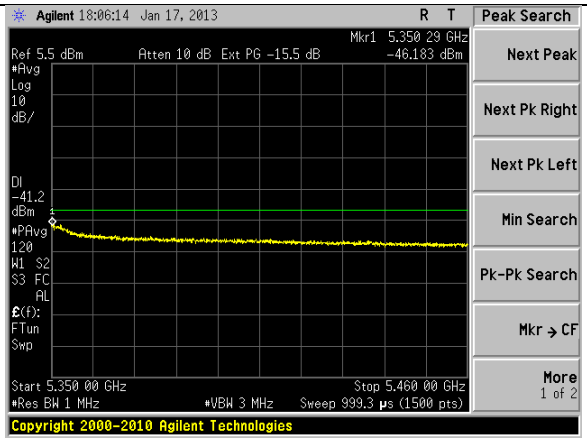
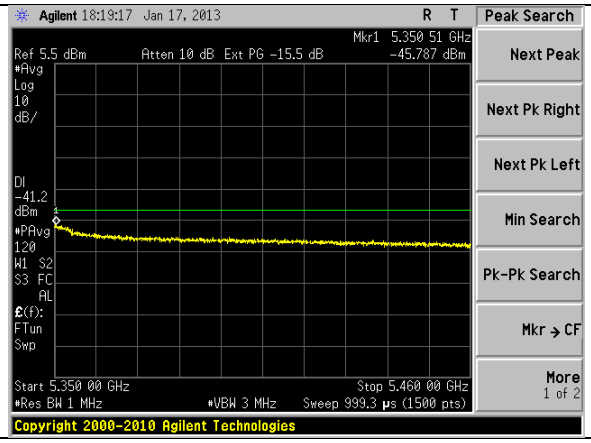
Average



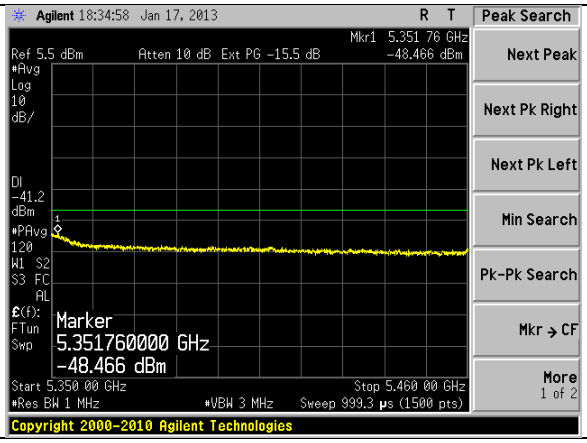
6MBPS



12MBPS



24MBPS



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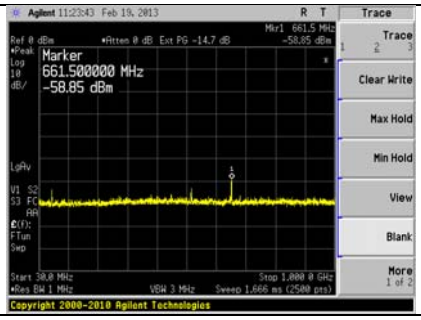
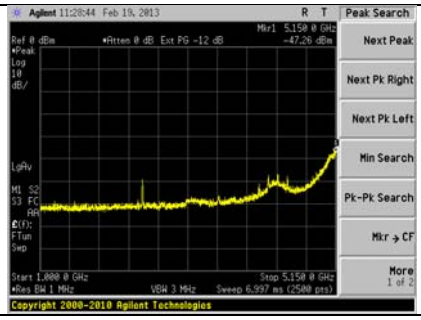
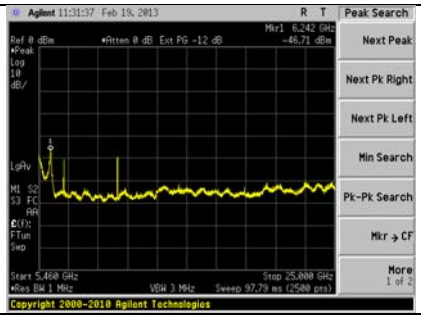
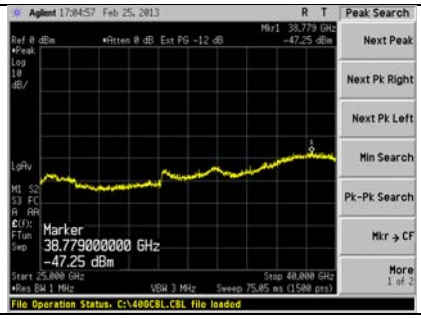
10.3.1.2.3 Unwanted Emissions

The plots shown below are those of 6MBPS which is representative of the other data rates.

	
30 to 1000 MHz	1000 to 5150 MHz
	
5460 to 25000 MHz	25000 to 40000 MHz

Note: The band edges are shown in the preceding section.

			5260 MHz Harmonics					
Frequency (MHz)	Peak (dBm)	Peak (dBµV/m)	Average (dBm)	Average (dBµV/m)	Peak limit (dBm)	Average limit (dB/m)	Peak margin (dB)	Average margin (dB)
10520	-39.9	55.3	N/A	N/A	-27.0	N/A	12.9	N/A
15780	-52.0	43.3	-66.1	29.1	-21.2	-41.2	30.8	24.9

			5300 MHz Harmonics					
Frequency (MHz)	Peak (dBm)	Peak (dBµV/m)	Average (dBm)	Average (dBµV/m)	Peak limit (dBm)	Average limit (dB/m)	Peak margin (dB)	Average margin (dB)
10600	-45.5	49.7	-55.1	40.1	-21.2	-41.2	24.3	13.9
15900	-51.9	43.3	-63.1	32.1	-21.2	-41.2	30.7	21.9

			5320 MHz Harmonics					
Frequency (MHz)	Peak (dBm)	Peak (dBµV/m)	Average (dBm)	Average (dBµV/m)	Peak limit (dBm)	Average limit (dB/m)	Peak margin (dB)	Average margin (dB)
10640	-45.1	50.2	-53.7	41.5	-21.2	-41.2	23.9	12.5
15960	-54.1	41.1	-66.3	28.9	-21.2	-41.2	32.9	25.1

Sample calculation:

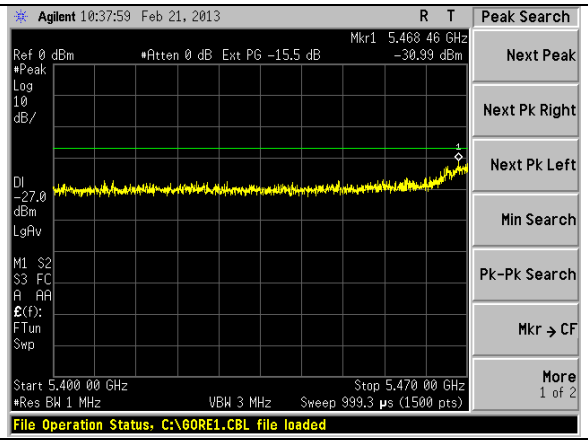
Emission at 10520 MHz

Peak EIRP (dBm) = SA reading + cable correction factor + antenna gain (in band or out of band)
Note: factors and readings are rounded upwards to one decimal point. The antenna gain used in the calculation is per KDB 789033 section G(3)(b)(iii).

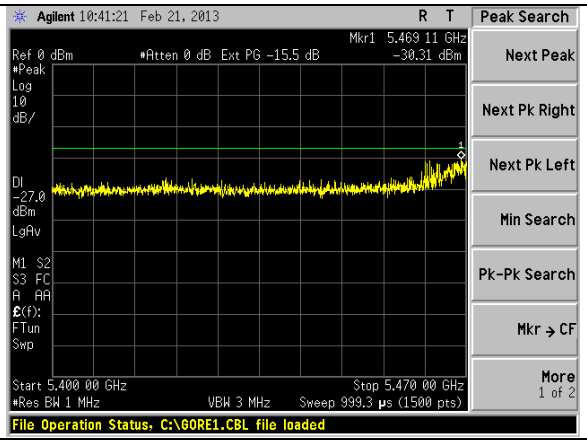
-39.9 (dBm) = -43.3 dBm + 1.4dB + 2.0 dBi

10.3.1.3 Operation in the 5470 to 5725 MHz band

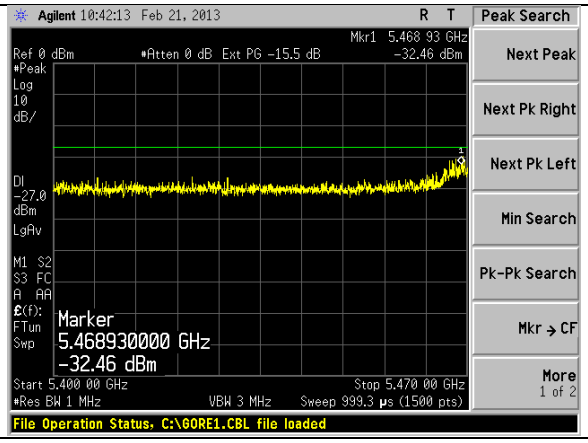
10.3.1.3.1 Lower Band-edge



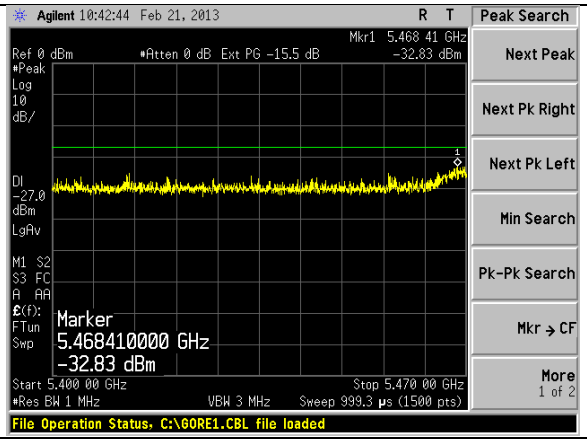
6MBPS



12MBPS

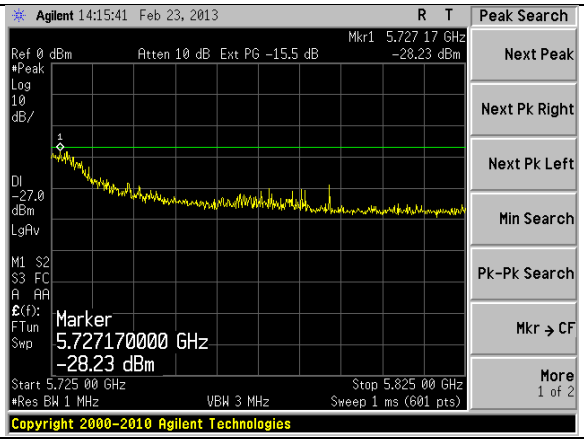


24MBPS

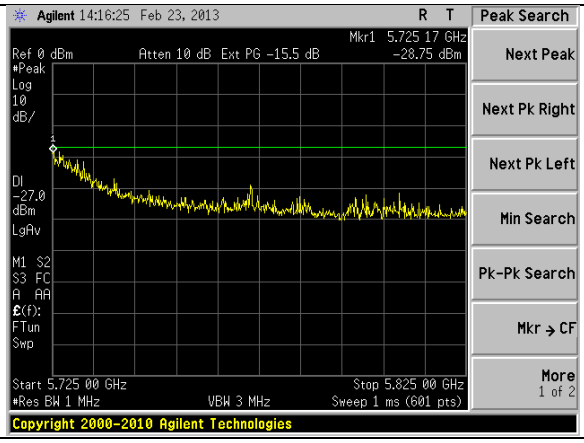


MCS7

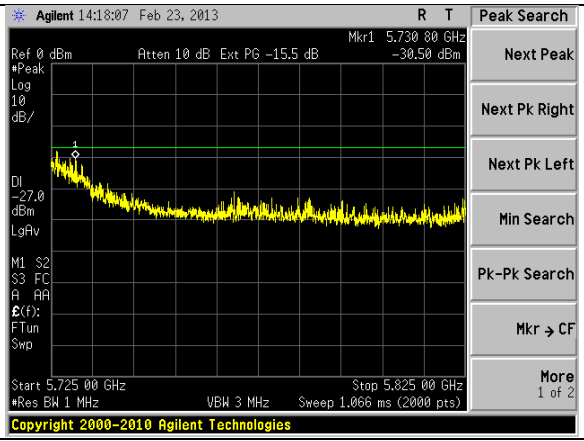
10.3.1.3.2 Upper Band edge screen captures



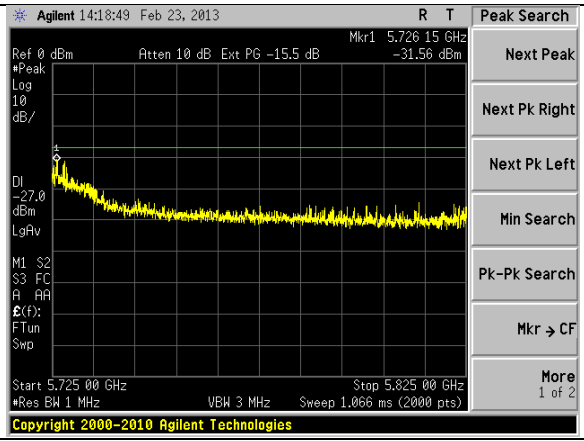
6MBPS



12MBPS



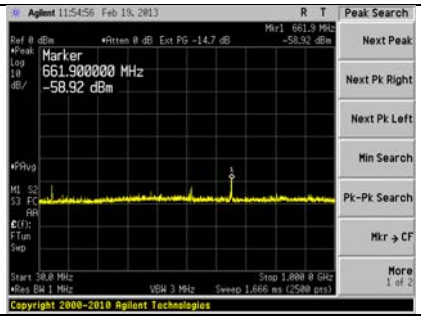
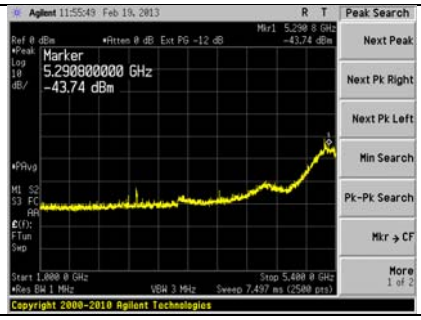
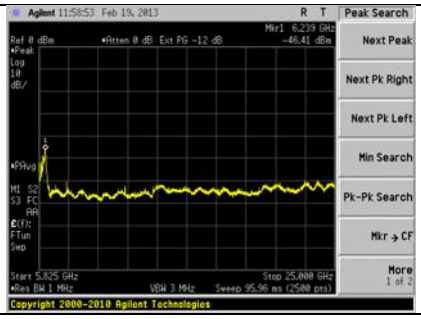
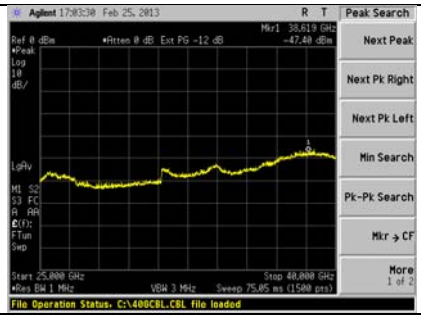
24MBPS



MCS7

10.3.1.3.4 Unwanted Emissions

The plots shown below are those of 6MBPS which is representative of the other data rates.

	
30 to 1000 MHz	1000 to 5400 MHz
	
5825 to 25000 MHz	25000 to 44000 MHz

Note: The band edges are shown in the preceding section.

			5500	MHz	Harmonics			
Frequency (MHz)	Peak (dBm)	Peak (dBµV/m)	Average (dBm)	Average (dBµV/m)	Peak limit (dBm)	Average limit (dB/m)	Peak margin (dB)	Average margin (dB)
11000	-49.8	45.4	-59.4	35.8	-21.2	-41.2	28.6	18.2
16500	-59.7	35.5	N/A	N/A	-27.0	N/A	32.7	N/A

			5580	MHz	Harmonics			
Frequency (MHz)	Peak (dBm)	Peak (dBµV/m)	Average (dBm)	Average (dBµV/m)	Peak limit (dBm)	Average limit (dB/m)	Peak margin (dB)	Average margin (dB)
11160	-49.9	45.4	-61.1	34.1	-21.2	-41.2	28.6	19.9
16740	-54.3	N/A	N/A	N/A	-27.0	N/A	27.3	N/A

			5700	MHz	Harmonics			
Frequency (MHz)	Peak (dBm)	Peak (dBµV/m)	Average (dBm)	Average (dBµV/m)	Peak limit (dBm)	Average limit (dB/m)	Peak margin (dB)	Average margin (dB)
11400	-57.3	37.9	-66.6	28.6	-21.2	-41.2	36.1	25.4

Sample calculation:

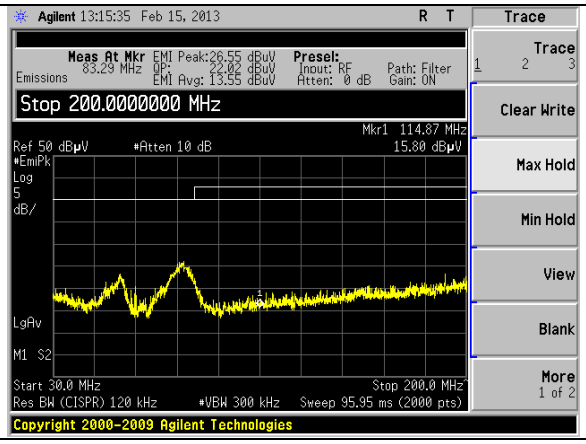
Emission at 16500 MHz

Peak EIRP (dBm) = SA reading + cable correction factor + antenna gain (in band or out of band)
Note: factors and readings are rounded upwards to one decimal point. The antenna gain used in the calculation is per KDB 789033 section G(3)(b)(iii).

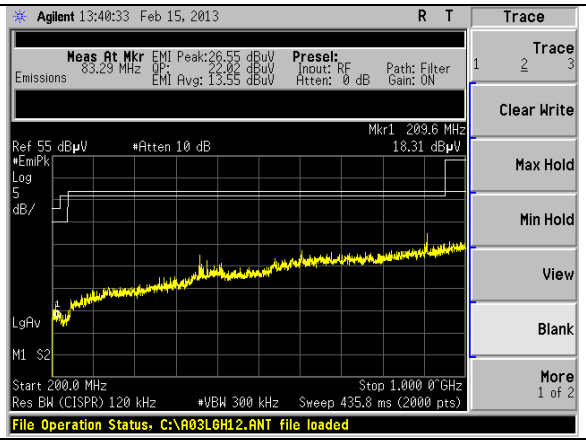
-59.7 (dBm) = -63.6 dBm + 1.9dB + 2.0 dBi

10.3.2 Cabinet radiation measurements.

10.3.2.1 Emissions below 1000 MHz



30 to 300 MHz



300 to 1000 MHz

Frequency (MHz)	Antenna	EUT	Height (m)	Azimuth (°)	Peak (dBµV/m)	Q. Peak (dBµV/m)	Average (dBµV/m)	Peak limit (dBµV/m)	Q.P. limit (dBµV/m)	Q.P. Margin (dB)	Notes
155.27	H	V	1.00	0	19.7	13.4	7.4	N/A	43.0	29.6	1.0
57.66	V	V	1.08	221	23.4	19.1	13.3	N/A	40.0	20.9	1.0
83.29	V	V	1.27	223	26.6	22.0	13.6	N/A	40.0	18.0	1.0
490.90	V	V	1.00	0	28.3	22.3	15.7	N/A	46.0	23.7	1.0
913.20	H	V	1.00	0	33.9	27.4	20.8	N/A	46.0	18.6	1.0

Note:
1. The emissions seen were not a function of the EUT.
2. H: Horizontal; V: Vertical
3. Refer to Exhibit 5.2 on explanation of how data is reported.

10.3.2.2 Emissions above 1000 MHz

For the following data, measurements were performed at a separation distance of **1 meter**. The field strength was then converted to EIRP per KDB 789033:

$$EIRP\ [dBm] = E[dBuV/m] + 20\log(d[meters]) - 104.77$$
$$= E[dBuV/m] + 20\log(1) - 104.77 = E[dBuV/m] - 104.77$$

EIRP is the equivalent isotropically radiated power in Watts
E is the field strength
D is the measurement distance

Once converted to EIRP, the measurements are compared to the limits (dBm).

Examples:

Above 960MHz Restricted band **limit** (at 3m) conversion to EIRP:

EIRP = 54[dBuV/m]+9.54-104.77= **-41.27dBm**

10.3.2.2.1 Operation in the 5150 to 5250 MHz band

10.3.2.2.1.1 Significant emissions data table

Channel 36

Frequency (MHz)	Height (m)	Azimuth (degree)	Peak Reading (dBµV/m)	Peak Reading (dBm)	Avg Reading (dBµV/m)	Avg Reading (dBm)	Peak Limit (dBm)	Avg Limit (dBm)	Peak Margin (dB)	Avg Margin (dB)	Antenna Polarity	EUT orientation
10360	1.05	26.8	63.1	-41.7	N/A	N/A	-27.0	N/A	14.7	N/A	Vertical	Vertical

Channel 40

Frequency (MHz)	Height (m)	Azimuth (degree)	Peak Reading (dBµV/m)	Peak Reading (dBm)	Avg Reading (dBµV/m)	Avg Reading (dBm)	Peak Limit (dBm)	Avg Limit (dBµV/m)	Peak Margin (dB)	Avg Margin (dB)	Antenna Polarity	EUT orientation
10400	1.10	17	66.1	-38.7	N/A	N/A	-27.0	N/A	11.7	N/A	Vertical	Vertical

Channel 48

Frequency (MHz)	Height (m)	Azimuth (degree)	Peak Reading (dBµV/m)	Peak Reading (dBm)	Avg Reading (dBµV/m)	Peak Reading (dBm)	Peak Limit (dBm)	Avg Limit (dBm)	Peak Margin (dB)	Average Margin (dB)	Antenna Polarity	EUT orientation
10480	1.00	9	63.7	-41.1	N/A	N/A	-27.0	N/A	14.1	N/A	Vertical	Vertical

Generic example of how Field strength measurement is calculated:

E[dBuV/m] = 18.2 (raw receiver measurement) + 15.8 (antenna factor) + 1.45 (cable factor)
= 35.45 (dBµV/m).

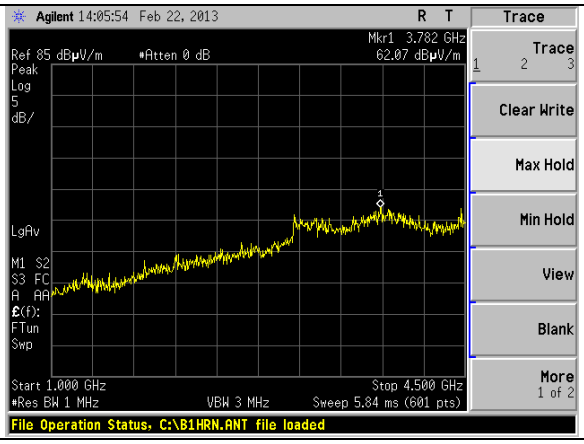
Sample measurement (conversion of field strength to EIRP):

Measurement at 10360MHz,

EIRP [dBm] = E[dBuV/m] +20 log(1)-104.77
= 63.1– 104.77
= -41.7dBm

10.3.2.2.1.2 Emissions between 1000 to 8000 MHz

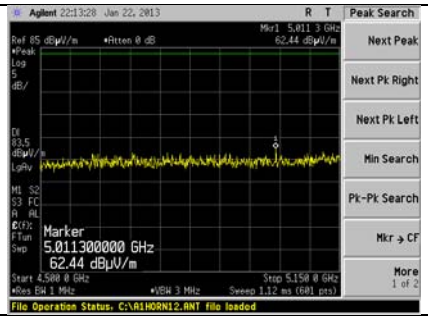
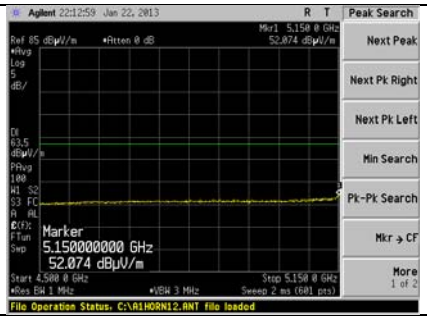
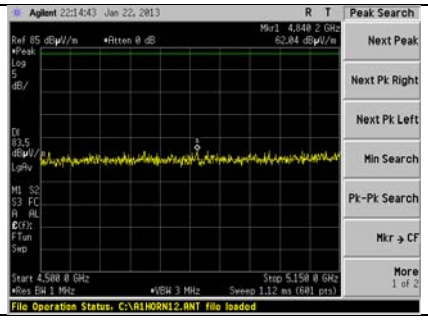
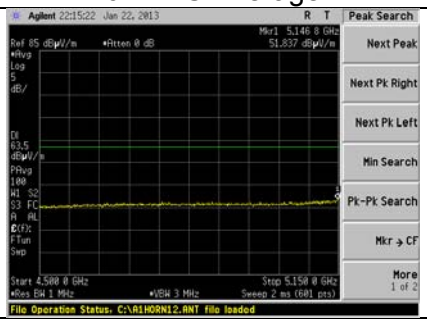
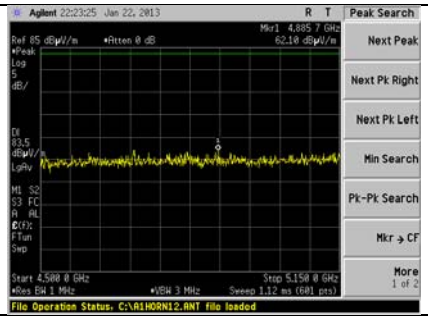
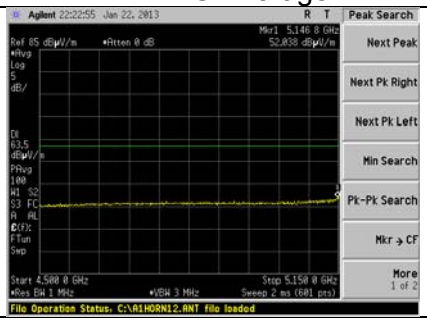
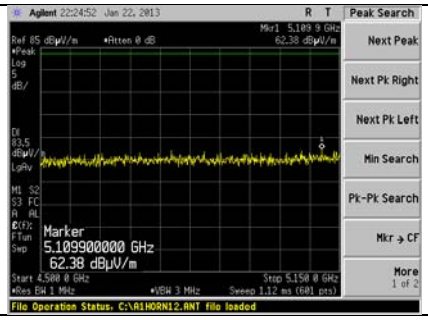
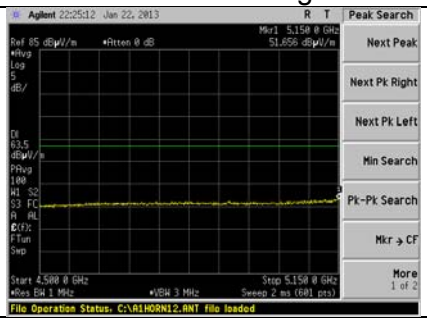
1000 to 4500 MHz



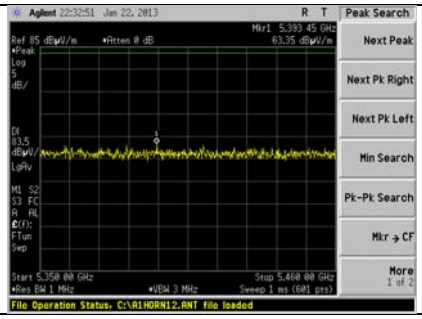
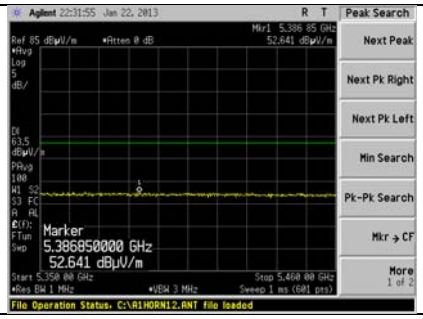
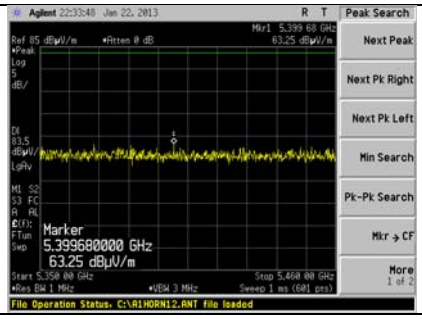
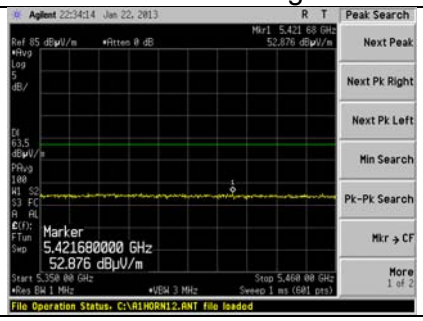
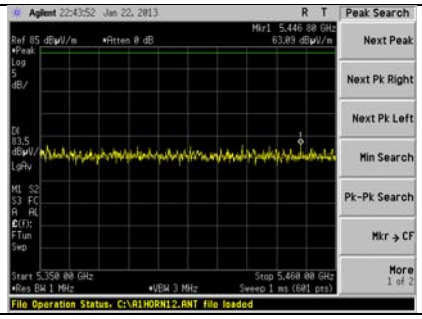
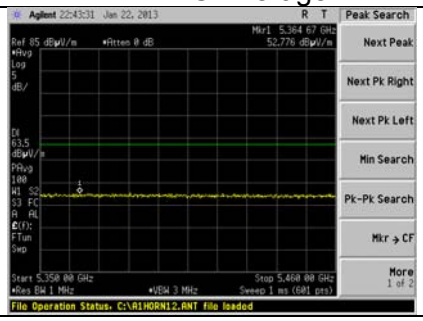
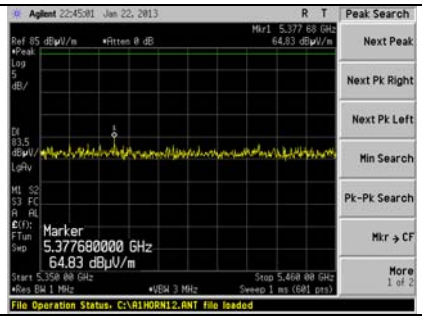
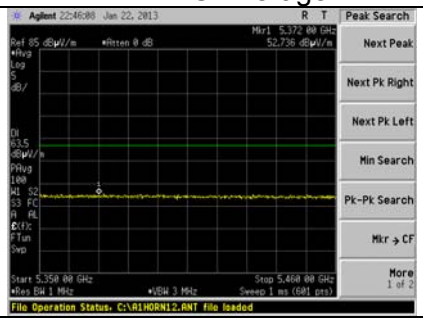
Peak Scan

Reduced Bandwidth

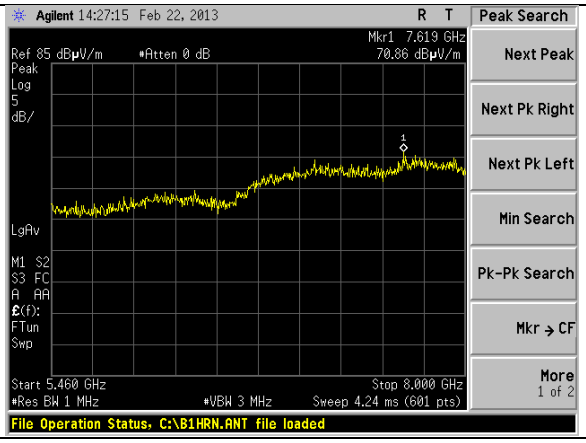
4500 to 5150 MHz

	
6MBPS Peak	6MBPS Average
	
12MBPS Peak	12MBPS Average
	
24MBPS Peak	24MBPS Average
	
MCS7 Peak	MCS7 Average

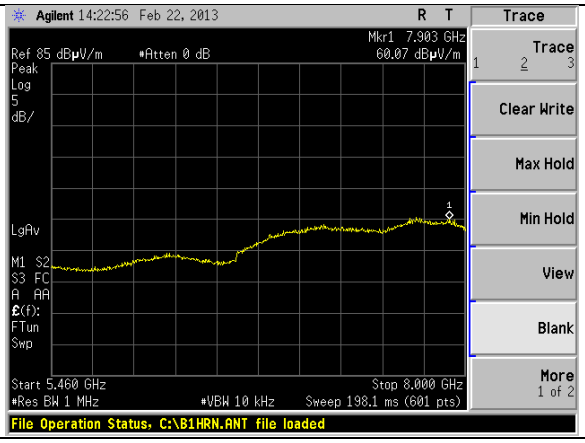
5350 to 5460 MHz

	
6MBPS Peak	6MBPS Average
	
12MBPS Peak	12MBPS Average
	
24MBPS Peak	24MBPS Average
	
MCS7 Peak	MCS7 Average

5460 to 8000 MHz



Peak Scan



Reduced Bandwidth

10.3.2.2.2 Operation in the 5250 to 5350 MHz band

10.3.2.2.2.1 Significant emissions data table

Channel 52

Frequency (MHz)	Height (m)	Azimuth (degree)	Peak Reading (dBµV/m)	Peak Reading (dBm)	Avg Reading (dBµV/m)	Avg Reading (dBm)	Peak Limit (dBm)	Avg Limit (dBm)	Peak Margin (dB)	Avg Margin (dB)	Antenna Polarity	EUT orientation
10520	1.00	351	61.5	-43.2	N/A	N/A	-27.0	N/A	16.2	N/A	Horizontal	Side
15780	1.00	55	49.8	-55.0	42.4	-62.4	-21.2	-41.2	33.8	21.2	Vertical	Vertical

Channel 56

Frequency (MHz)	Height (m)	Azimuth (degree)	Peak Reading (dBµV/m)	Peak Reading (dBm)	Avg Reading (dBµV/m)	Avg Reading (dBm)	Peak Limit (dBm)	Avg Limit (dBm)	Peak Margin (dB)	Avg Margin (dB)	Antenna Polarity	EUT orientation
10560	1.00	307	61.2	-43.6	N/A	N/A	-27.0	N/A	16.6	N/A	Horizontal	Vertical

Channel 60

Frequency (MHz)	Height (m)	Azimuth (degree)	Peak Reading (dBµV/m)	Peak Reading (dBm)	Avg Reading (dBµV/m)	Avg Reading (dBm)	Peak Limit (dBm)	Avg Limit (dBm)	Peak Margin (dB)	Avg Margin (dB)	Antenna Polarity	EUT orientation
10600	1	47	64.8	-40.0	54.4	-50.3	-21.2	-41.2	18.8	9.1	Horizontal	Side

Channel 64

Frequency (MHz)	Height (m)	Azimuth (degree)	Peak Reading (dBµV/m)	Peak Reading (dBm)	Avg Reading (dBµV/m)	Avg Reading (dBm)	Peak Limit (dBm)	Avg Limit (dBm)	Peak Margin (dB)	Avg Margin (dB)	Antenna Polarity	EUT orientation
10640	1	27	65.7	-39.1	55.7	-49.1	-21.2	-41.2	17.9	7.9	Vertical	Vertical

Generic example of how Field strength measurement is calculated:

E[dBuV/m] = 18.2 (raw receiver measurement) + 15.8 (antenna factor) + 1.45 (cable factor)
= 35.45 (dBµV/m).

Sample measurement (conversion of field strength to EIRP):

Measurement at 15780MHz,

Peak measurement:
EIRP [dBm] = E[dBuV/m] +20 log(1)-104.77
= 49.8– 104.77
= -55.0dBm

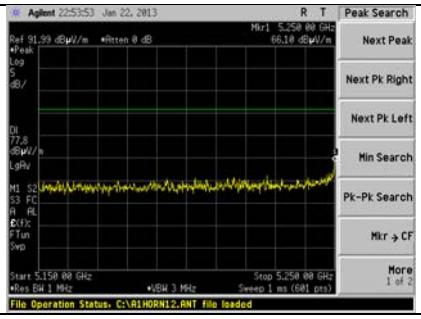
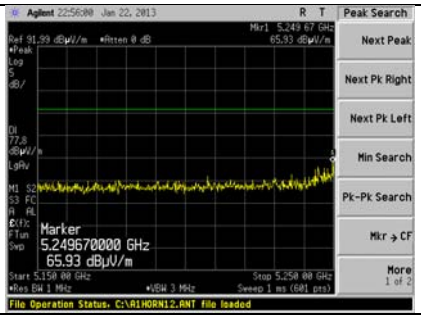
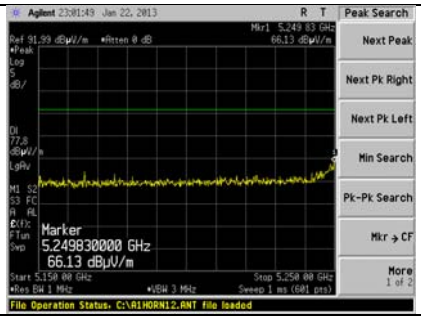
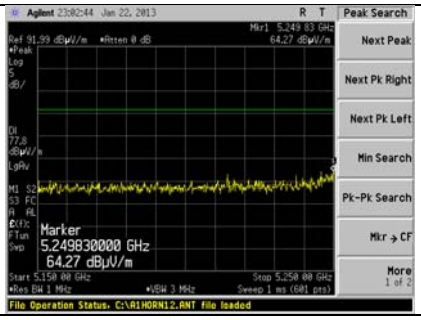
Average measurement:
EIRP [dBm] = E[dBuV/m] +20 log(1)-104.77
= 42.4– 104.77
= -62.4dBm

10.3.2.2.2.2 Emissions between 1000 to 8000 MHz

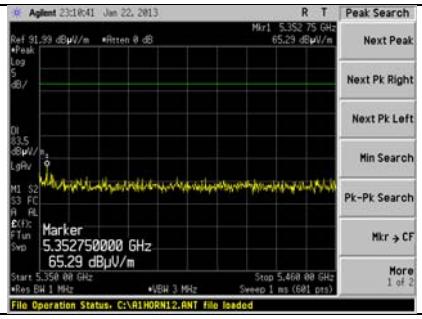
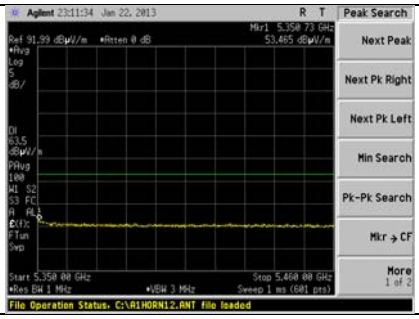
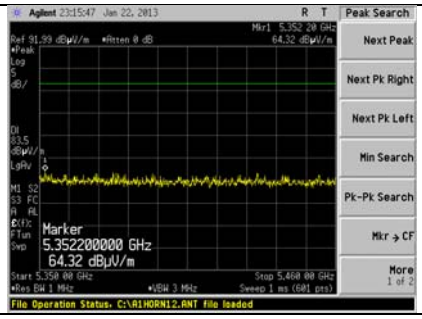
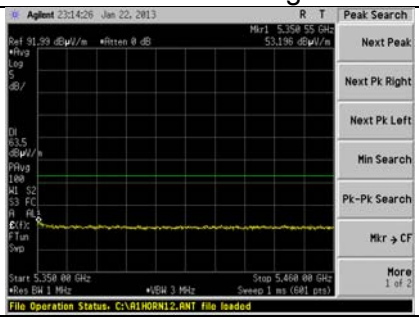
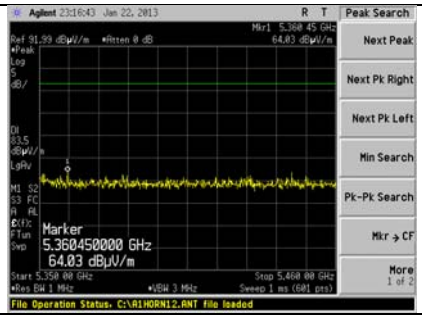
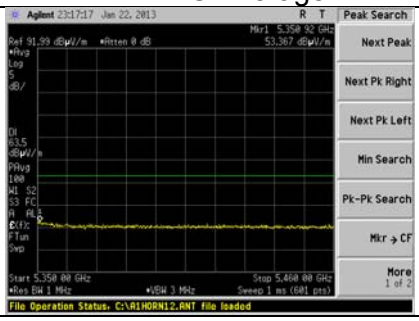
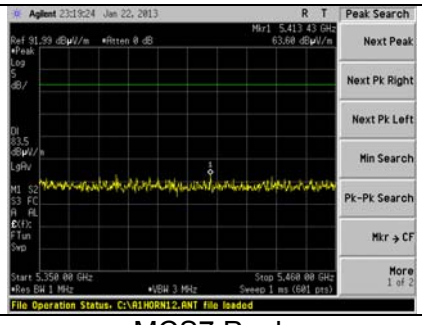
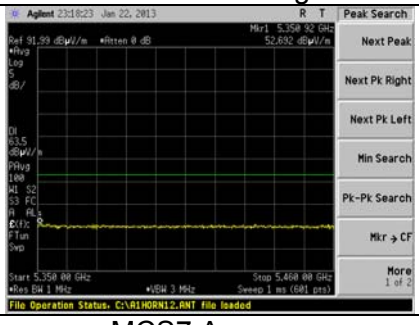
1000MHz to 5150 MHz

	
Peak	Reduced Bandwidth

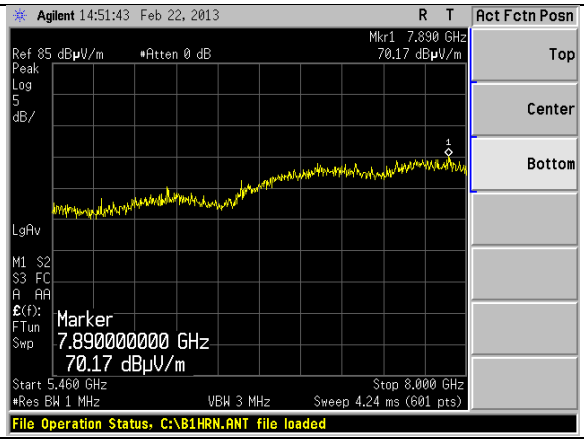
5150 MHz to 5250 MHz

	
6MBPS	12MBPS
	
24MBPS	MCS7

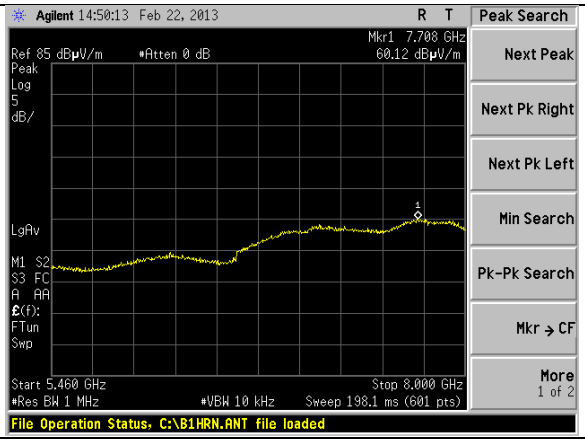
5350 to 5460 MHz

	
6MBPS Peak	6MBPS Average
	
12MBPS Peak	12MBPS Average
	
24MBPS Peak	24MBPS Average
	
MCS7 Peak	MCS7 Average

5460MHz to 8000MHz



Peak



Reduced Bandwidth

10.3.2.2.3 Operation in the 5470MHz to 5725MHz band

10.3.2.2.3.1 Significant emissions data table

Channel 100

Frequency (MHz)	Height (m)	Azimuth (degree)	Peak Reading (dBµV/m)	Peak Reading (dBm)	Avg Reading (dBµV/m)	Avg Reading (dBm)	Peak Limit (dBm)	Avg Limit (dBm)	Peak Margin (dB)	Avg Margin (dB)	Antenna Polarity	EUT orientation
11160	1	26	65.1	-39.7	58.4	-46.4	-21.2	-41.2	18.5	5.2	Horizontal	Side

Channel 116

Frequency (MHz)	Height (m)	Azimuth (degree)	Peak Reading (dBµV/m)	Peak Reading (dBm)	Avg Reading (dBµV/m)	Avg Reading (dBm)	Peak Limit (dBm)	Avg Limit (dBm)	Peak Margin (dB)	Avg Margin (dB)	Antenna Polarity	EUT orientation
11120	1	36	66.3	-38.5	55.3	-49.4	-21.2	-41.2	17.3	8.2	Vertical	Vertical

Channel 140

Frequency (MHz)	Height (m)	Azimuth (degree)	Peak Reading (dBµV/m)	Peak Reading (dBm)	Avg Reading (dBµV/m)	Avg Reading (dBm)	Peak Limit (dBm)	Avg Limit (dBm)	Peak Margin (dB)	Avg Margin (dB)	Antenna Polarity	EUT orientation
11400	1.33	34	66.5	-38.3	56.5	-48.3	-21.2	-41.2	17.1	7.1	Vertical	Flat

Generic example of how Field strength measurement is calculated:

E[dBuV/m] = 18.2 (raw receiver measurement) + 15.8 (antenna factor) + 1.45 (cable factor)
= 35.45 (dBµV/m).

Sample measurement (conversion of field strength to EIRP):

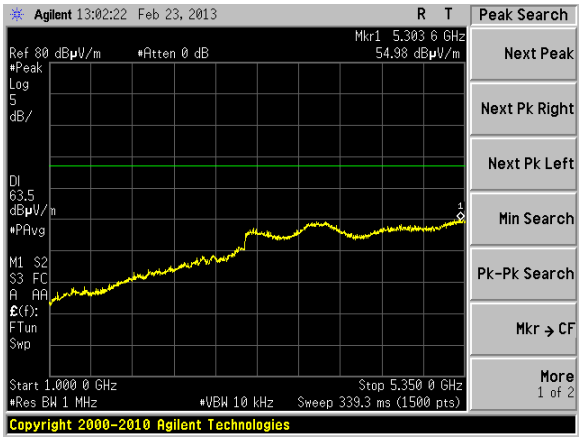
Measurement at 11400MHz,

Peak measurement:
EIRP [dBm] = E[dBuV/m] +20 log(1)-104.77
= 66.5– 104.77
= -38.3dBm

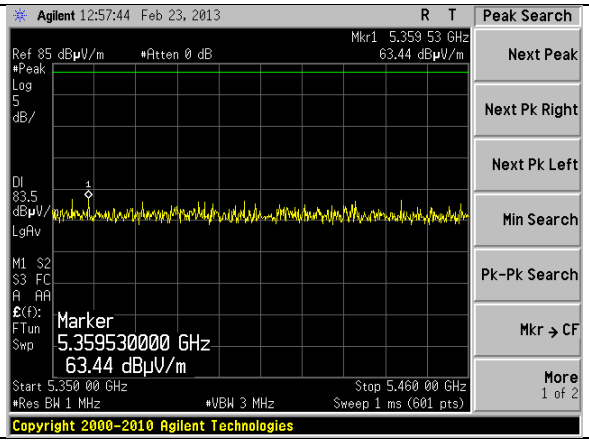
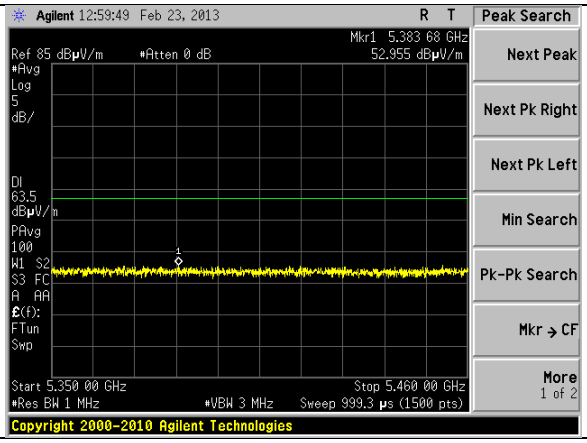
Average measurement:
EIRP [dBm] = E[dBuV/m] +20 log(1)-104.77
= 56.5– 104.77
= -48.3dBm

10.3.2.2.3.2 Emissions between 1000 to 8000 MHz

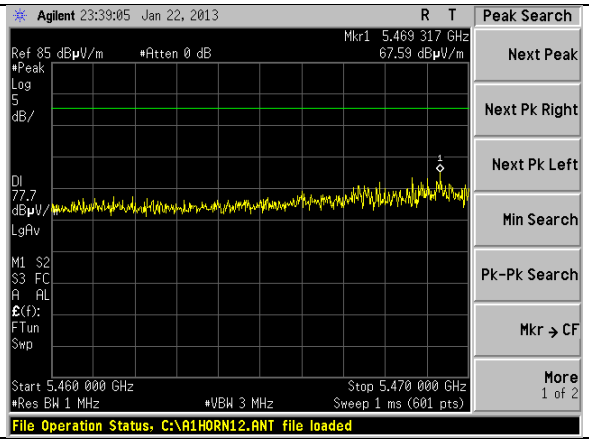
1000MHz to 5350MHz



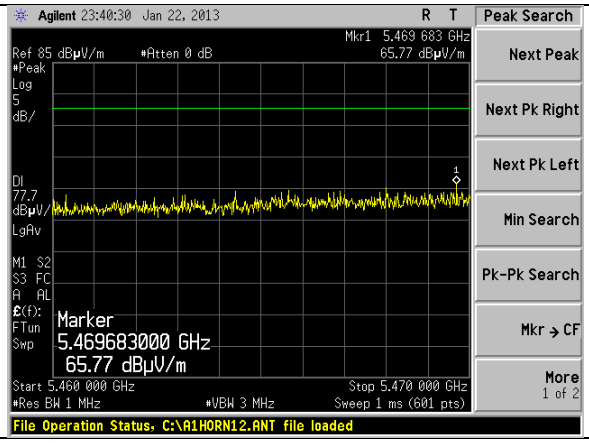
5350MHz to 5460MHz

	
Peak	Average

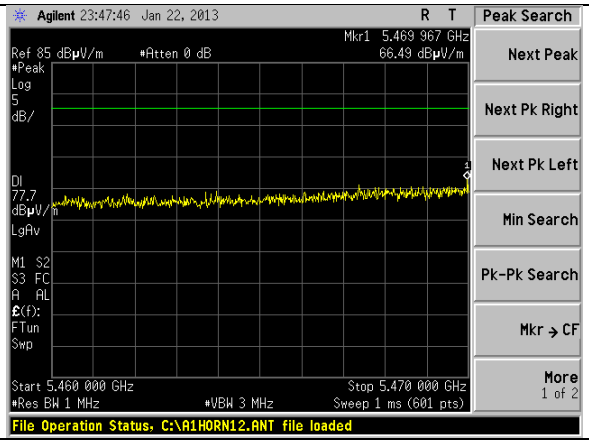
5460MHz to 5470MHz



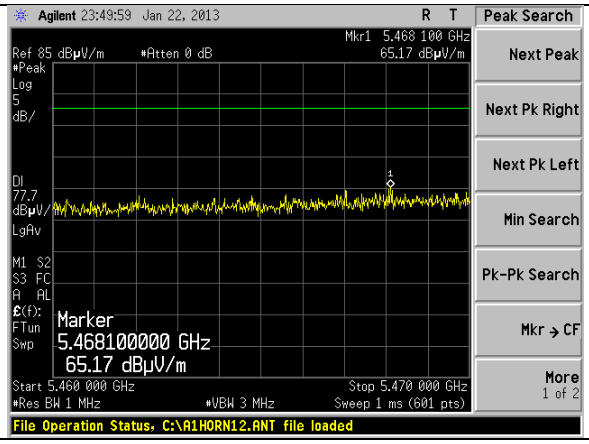
6MBPS



12MBPS

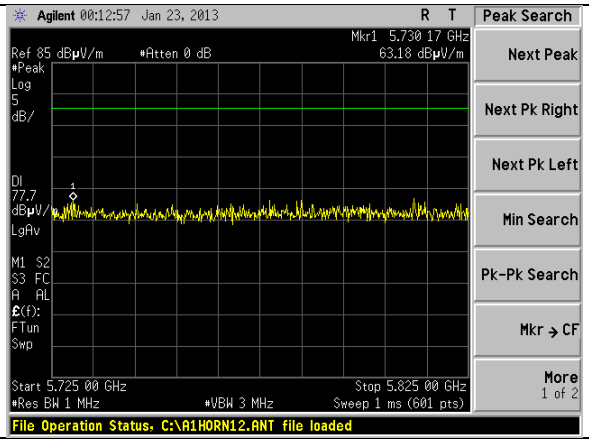


24MBPS

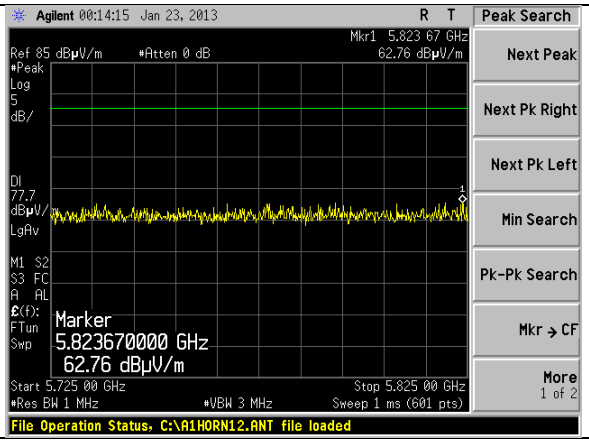


MCS7

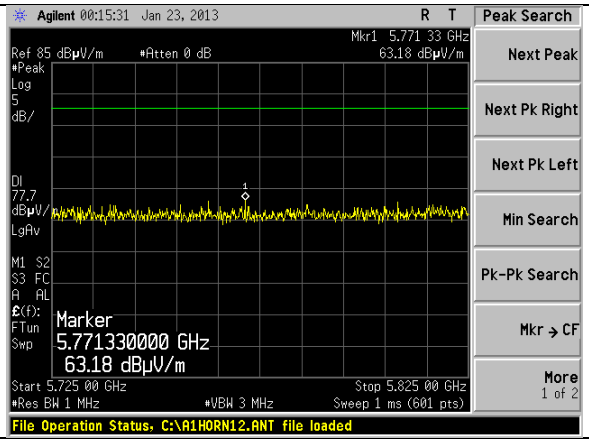
5725MHz to 5825MHz



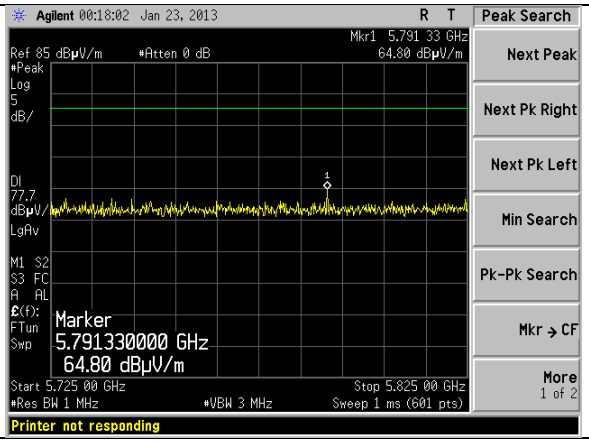
6MBPS



12MBPS

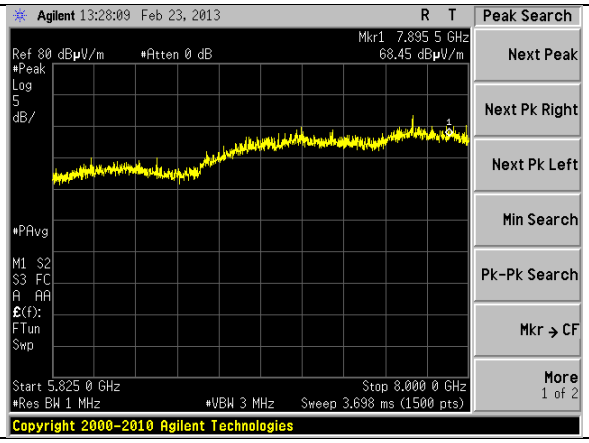


24MBPS

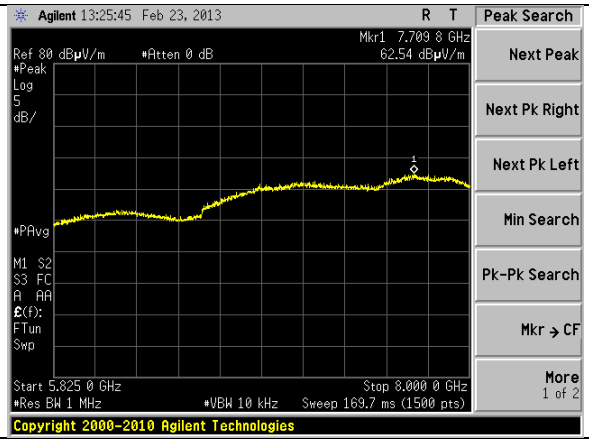


MCS7

5825MHz to 8000MHz



Peak

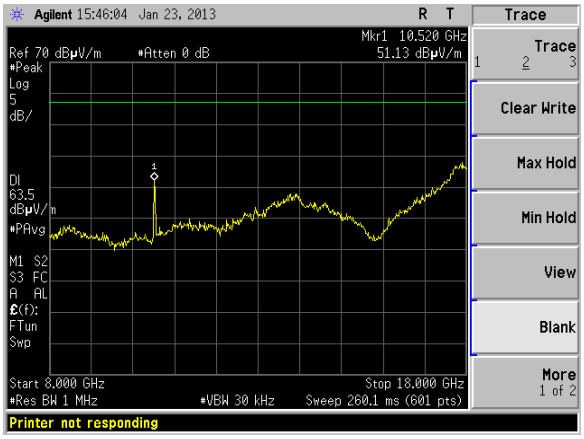


Reduced Bandwidth

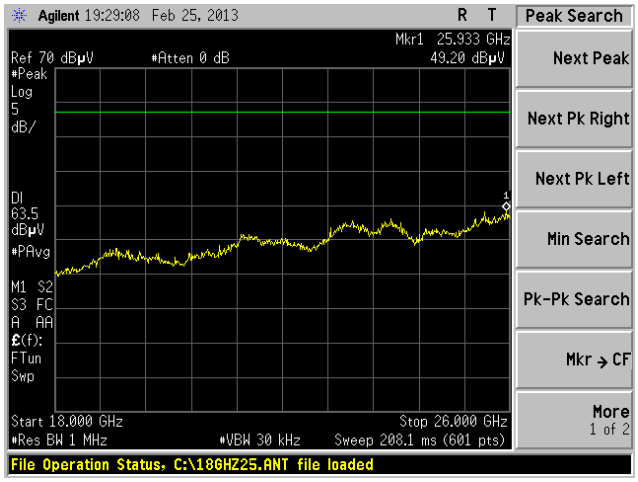
10.3.2.2.4 Emissions between 8000MHz to 40000MHz

The plots shown below are those of 6MBPS which is representative of the other data rates.

800MHz to 18000MHz



18000MHz to 26000MHz



26000MHz to 40000MHz

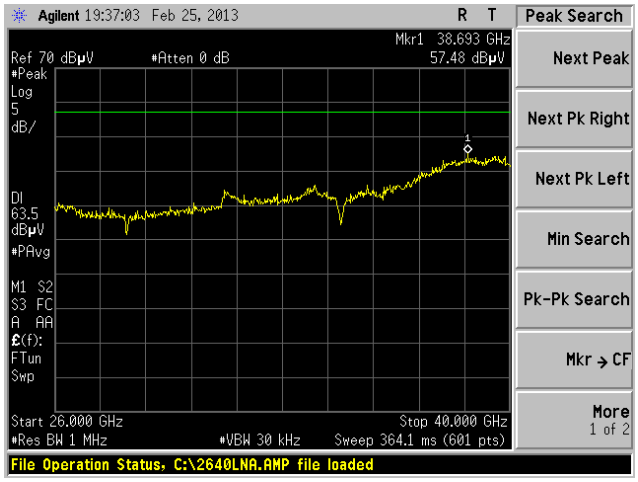


EXHIBIT 11 Frequency Stability

Test Engineer: Peter Feilen

11.1 Test Procedure

For this test, the EUT was placed inside an environmental chamber. Antenna port conducted measurements were performed at the operating temperature ranges specified by the manufacturer owner's manual. In addition, the supply voltage was varied per the operating ranges specified in the owner's manual.

11.2 Limit

Manufacturer of U-NII devices are responsible for insuring frequency stability such that an emission is maintained within the band of operation under all conditions of normal operation as specified in the user's manual.

11.3 Test Data

The data collected shows that the frequency stability of the EUT is better than 1PPM and hence will result in the EUT will remain within the bands of operation.

			Supply Voltage (V)					
			3.13	3.30	3.46	LIMIT		
Temp	Channel	Nominal Frequency (MHz)	Measured Frequency (Hz)	Measured Frequency (Hz)	Measured Frequency (Hz)	Lower Frequency (Hz)	Upper Frequency (Hz)	Result (Pass/ Fail)
-40°C	36	5180.0	5180005000	5180005000	5180005000	5179896400	5180103600	Pass
	64	5320.0	5320005000	5320005000	5320005000	5319893600	5320106400	Pass
	112	5560.0	5560008000	5560008000	5560005000	5559888800	5560111200	Pass
23°C	36	5180.0	5179995000	5179995000	5179995000	5179896400	5180103600	Pass
	64	5320.0	5319995000	5319995000	5319995000	5319893600	5320106400	Pass
	112	5560.0	5560045000	5560042000	5560045000	5559888800	5560111200	Pass
+85°C	36	5180.0	5179998000	5180002000	5179998000	5179896400	5180103600	Pass
	64	5320.0	5319975000	5319975000	5319975000	5319893600	5320106400	Pass
	112	5560.0	5559998000	5559998000	5559998000	5559888800	5560111200	Pass

EXHIBIT 12 Conducted Emissions Test, AC Power Line

Test Engineer: Khairul Aidi Zainal

12.1 Test Setup

The test area and setup are in accordance with ANSI C63.4 and with Title 47 CFR, FCC Part 15, Industry Canada RSS-210 and RSS GEN. The EUT was placed on a non-conductive wooden table, with a height of 80 cm above the reference ground plane. The Generic DC power supply was then plugged into a 50Ω (ohm), 50/250 μH Line Impedance Stabilization Network (LISN). The AC power supply of 120V was provided via an appropriate broadband EMI Filter, and then to the LISN line input. Final readings were then taken and recorded. After the EUT was setup and connected to the LISN, the RF Sampling Port of the LISN was connected to a 10 dB Attenuator-Limiter, and then to EMI receiver System. The EMCO LISN used has the ability to terminate the unused port with a 50Ω (ohm) load when switched to either L1 (line) or L2 (neutral).

12.2 Test Procedure

The EUT was investigated in continuous modulated transmit mode and continuous receive mode for this portion of the testing. The appropriate frequency range and bandwidths were selected on the EMI Receiver, and measurements were made. The bandwidth used for these measurements is 9 kHz, as specified in CISPR 16-1, Section 1, Table 1, for Quasi-Peak and Average detectors in the frequency range of 150 kHz to 30 MHz. Final readings were then taken and recorded.

An off-the-shelf DC power supply was used during the test to supply the EUT with the appropriate DC voltage.

12.3 Limits of Conducted Emissions at the AC Mains Ports

Frequency Range (MHz)	**Class B Limits (dBμV)**		**Measuring Bandwidth**
	Quasi-Peak	Average	
0.150 -0.50 *	66-56	56-46	RBW = 9 kHz VBW ≥ 9 kHz for QP VBW = 1 Hz for Average
0.5 – 5.0	56	46	
5.0 – 30	60	50	
* The limit decreases linearly with the logarithm of the frequency in this range.			

12.4 Test Data

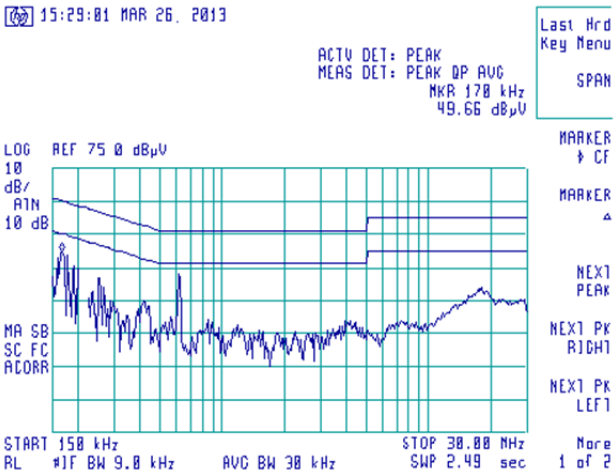
Manufacturer:	B&B Electronics					
Date(s) of Test:	03/26/13					
Project Engineer:	Khairul Aidi Zainal					
Test Engineer:	Khairul Aidi Zainal					
Voltage:	120 VAC					
Operation Mode:	Continuous transmit, modulated					
Environmental Conditions in the Lab:	Temperature: 71˚F Relative Humidity: 40%					
Test Location:	X	AC Mains Test area				Chamber
EUT Placed On:	X	40cm from Vertical Ground Plane				10cm Spacers
	X	80cm above Ground Plane				Other:
Measurements:		Pre-Compliance		Preliminary	X	Final
Detectors Used:		Peak	X	Quasi-Peak	X	Average

		Quasi-Peak			Average		
Frequency (MHz)	Line	Q-Peak Reading (dBµV)	Q-Peak Limit (dBµV)	Quasi-Peak Margin (dB)	Average Reading (dBµV)	Average Limit (dBµV)	Average Margin (dB)
0.168	L1	48.5	65.0	16.5	34.7	55.0	20.3
0.227	L1	36.5	62.6	26.1	18.5	52.6	34.1
0.620	L1	41.2	56.0	14.8	37.6	46.0	8.4
18.320	L1	34.8	60.0	25.2	29.3	50.0	20.7
0.171	L2	48.7	64.9	16.2	32.8	54.9	22.1
0.208	L2	40.1	63.3	23.2	20.1	53.3	33.2
0.620	L2	35.1	56.0	20.9	31.3	46.0	14.7
18.060	L2	34.7	60.0	25.3	29.0	50.0	21.0

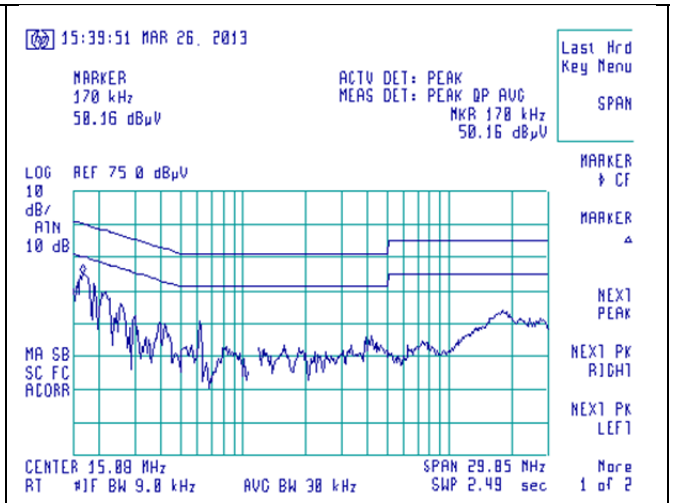
Notes:

1) The emissions listed are characteristic of the power supply used. Changing transmit channels did not change the emissions.

These screen captures represent Peak Emissions. For conducted emission measurements, both a Quasi-Peak detector function and an Average detector function are utilized. The emissions must meet both the Quasi-peak limit and the Average limit as described in 47 CFR 15.207 and RSS GEN 7.2.4.

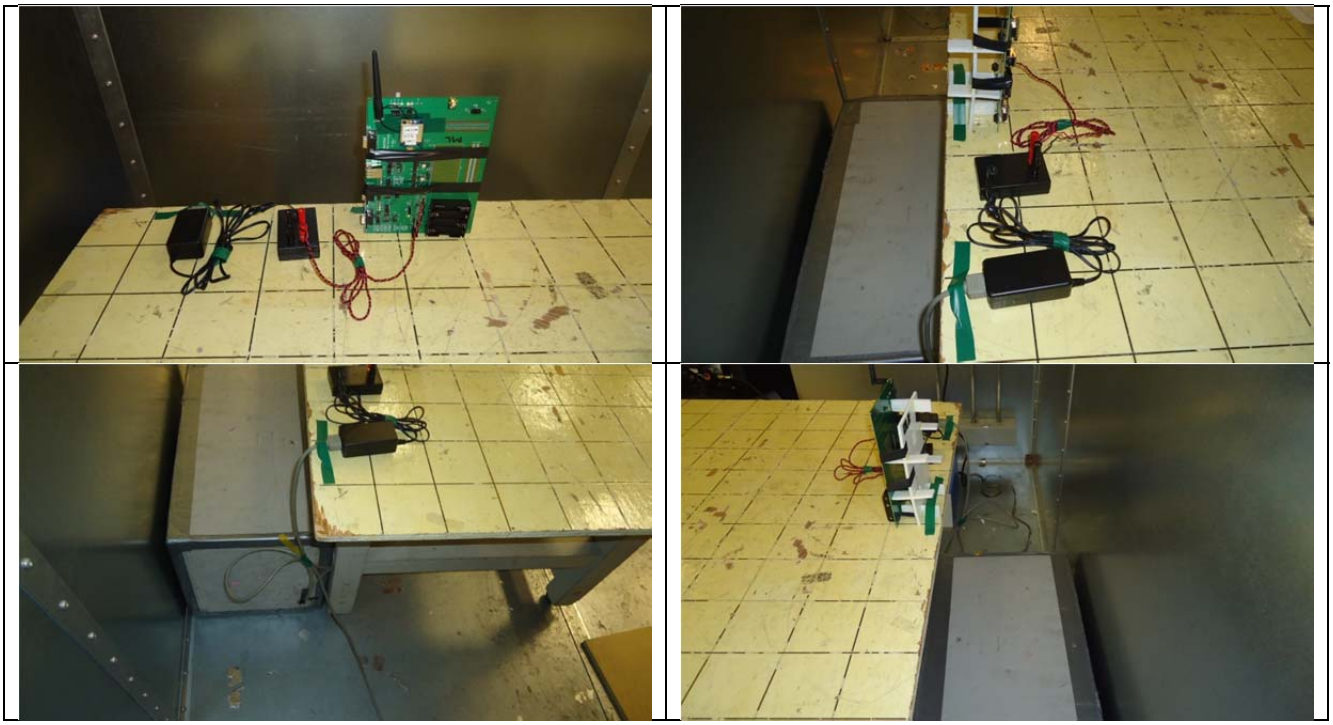


Line 1



Line 2

6.5 Test Setup Photo(s)



APPENDIX A – Test Equipment List

LS RESEARCH LLC
Wireless Product Development
Equipment Calibration

Date: 8-Jan-2013 Type Test: Radiated Emissions Job #: C-1562

Prepared By: Aidi Customer: B&B Electronics Quote #: 312057

No.	Asset #	Description	Manufacturer	Model #	Serial #	Cal Date	Cal Due Date	Equipment Status
1	EE 960160	0.8-21GHz LNA	Mini-Circuits	ZVA-213X-S+	977711030	9/17/2012	1/10/2013	Active Calibration
2	AA 960007	Double Ridge Horn Antenna	EMCO	3115	9311-4138	5/16/2012	1/10/2013	Active Calibration
3	AA 960144	Phaseflex	Gore	EKD01D010720	5800373	6/1/2011	6/1/2013	Active Calibration
4	AA 960154	2.4GHz High Pass Filter	KWM	HPF-L-14186	7272-02	6/28/2012	6/28/2013	Active Calibration
5	AA 960161	Highpass Filter	K&L Microwave	11SH10-8000	2	12/13/2012	12/13/2013	Active Calibration
6	EE 960157	3Hz-13.2GHz Spectrum Analyzer	Agilent	E4445A	MY 48250225	6/29/2012	6/29/2013	Active Calibration
7	EE 960158	RF Preselecter	Agilent	N9039A	MY 46520110	6/29/2012	6/29/2013	Active Calibration
8	EE 960156	100kHz-1GHz Analog Signal Generator	Agilent	N5181A	MY 49060062	6/30/2012	6/30/2013	Active Calibration
9	AA 960004	Log Periodic Antenna	EMCO	93146	9512-4276	9/17/2012	9/17/2013	Active Calibration
10	AA 960005	Biconical Antenna	EMCO	93110B	9601-2280	6/26/2012	6/26/2013	Active Calibration
11	EE 960073	Spectrum Analyzer	Agilent	E4446A	US45300564	5/9/2012	5/9/2013	Active Calibration

Project Engineer: Aidi Zainal Quality Assurance: Thomas T. Smith

LS RESEARCH LLC
Wireless Product Development
Equipment Calibration

Date: 17-Oct-2012 Type Test: Conducted measurements Job #: C-1562

Prepared By: Aidi Zainal Customer: B&B Electronics Quote #: 312057

No.	Asset #	Description	Manufacturer	Model #	Serial #	Cal Date	Cal Due Date	Equipment Status
1	EE 960073	Spectrum Analyzer	Agilent	E4446A	US45300564	5/9/2012	5/9/2013	Active Calibration
2	AA 960143	Phaseflex	Gore	EKD01D010480	5546519	6/1/2011	6/1/2013	Active Calibration
3	AA 960144	Phaseflex	Gore	EKD01D010720	5800373	6/1/2011	6/1/2013	Active Calibration

Project Engineer: Aidi Zainal Quality Assurance: Thomas T. Smith

LS RESEARCH LLC
Wireless Product Development
Equipment Calibration

Date: 17-Oct-2012 Type Test: AC mains Job #: C-1562

Prepared By: Aidi Zainal Customer: B&B Electronics Quote #: 312057

No.	Asset #	Description	Manufacturer	Model #	Serial #	Cal Date	Cal Due Date	Equipment Status
1	EE 960013	EMI Receiver	HP	8546A System	3617A00320;3448A	2/11/2013	2/11/2014	Active Calibration
2	EE 960014	EMI Receiver-filter section	HP	85460A	3448A00296	2/11/2013	2/11/2014	Active Calibration
3	AA 960031	Transient Limiter	HP	11947A	3107A01708	9/2/2012	9/2/2013	Active Calibration
4	EE 960084	LISN	Com-Power	LI-215A	191920	2/20/2013	2/20/2014	Active Calibration

Project Engineer: Aidi Zainal Quality Assurance: Thomas T. Smith

APPENDIX B – Test Standards: CURRENT PUBLICATION DATES RADIO

STANDARD #	DATE	Am. 1	Am. 2
ANSI C63.4	2003		
ANSI C63.10	2009		
FCC 47 CFR, Parts 0-15, 18, 90, 95	2013		
RSS GEN	2010		
RSS 210	2010		
RSS 102	2010		

APPENDIX C - Uncertainty Statement

Table of Expanded Uncertainty Values, (K=2) for Specified Measurements

Measurement Type	*Particular Configuration*	*Uncertainty Values*
Radiated Emissions	*3 – Meter chamber, Biconical Antenna*	*4.82 dB*
Radiated Emissions	*3-Meter Chamber, Log Periodic Antenna*	*4.88 dB*
Radiated Emissions	*3-Meter Chamber, Horn Antenna*	*4.85 dB*
Radiated Emissions	*10-Meter OATS, Biconical Antenna*	*4.32 dB*
Radiated Emissions	*10-Meter OATS, Log Periodic Antenna*	*3.63 dB*
Absolute Conducted Emissions	*Agilent PSA/ESA Series*	*1.38 dB*
AC Line Conducted Emissions	*Shielded Room/EMCO LISN*	*3.20 dB*
Radiated Immunity	*3 Volts/Meter in 3-Meter Chamber*	*2.05 Volts/Meter*
Conducted Immunity	*3 Volts level*	*2.33 V*
EFT Burst, Surge, VDI	*230 VAC*	*54.4 V*
ESD Immunity	*Discharge at 15kV*	*3200 V*
Temperature/Humidity	*Thermo-hygrometer*	*0.64° / 2.88 %RH*