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Report On

Application for Grant of Equipment Authorization of the
AnyDATA

ACT233L 4G Vehicle Tracker with Hotspot

FCC Part 15 Subpart C §15.247

IC RSS-Gen and RSS-210 Issue 8 December 2010

Report No. SC1304495B

May 2013



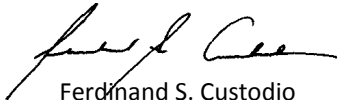
REPORT ON Radio Testing of the
AnyDATA
4G Vehicle Tracker with Hotspot

TEST REPORT NUMBER SC1304495B

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DATED

May 20, 2013



Revision History

SC1304495B AnyDATA ACT233L 4G Vehicle Tracker with Hotspot					
DATE	OLD REVISION	NEW REVISION	REASON	PAGES AFFECTED	APPROVED BY
05/20/13	Initial Release				Ferdinand Custodio

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SECTION 1

REPORT SUMMARY

Radio Testing of the
AnyDATA
4G Vehicle Tracker with Hotspot

1.1 INTRODUCTION

The information contained in this report is intended to show verification of the AnyDATA ACT233L 4G Vehicle Tracker with Hotspot to the requirements of the following:

- FCC Part 15 Subpart C §15.247
- IC RSS-Gen and RSS-210 Issue 8 December 2010.

Objective	To perform Radio Testing to determine the Equipment Under Test's (EUT's) compliance with the Test Specification, for the series of tests carried out.
Manufacturer	AnyDATA
Model Number(s)	ACT233L
FCC ID Number	P4M-ACT233
IC Number	4594B-ACT233
Serial Number(s)	20130418001833/20130418001828
Number of Samples Tested	2
Test Specification/Issue/Date	• FCC Part 15 Subpart C §15.247 (October 1, 2012). • RSS-210 - Licence-exempt Radio Apparatus (All Frequency Bands): Category I Equipment (Issue 8, December 2010). • RSS-Gen - General Requirements and Information for the Certification of Radio Apparatus (Issue 3, December 2010). • (DA 00-705 Released March 30, 2000) Filing and Measurement Guidelines for Frequency Hopping Spread Spectrum Systems.
Start of Test	May 03, 2013
Finish of Test	May 07, 2013
Name of Engineer(s)	Ferdinand Custodio
Related Document(s)	None. Supporting documents for EUT certification are separate exhibits.

1.2 BRIEF SUMMARY OF RESULTS

A brief summary of the tests carried out in accordance with FCC Part 15 Subpart C §15.247 with cross-reference to the corresponding IC RSS standard is shown below.

Section	§15.247 Spec Clause	RSS	Test Description	Result	Comments/ Base Standard
2.1	§15.207 (a)	RSS-Gen 7.2.4	Conducted Emissions	Not Applicable	
2.2	§15.247(a)(1)	RSS-210 A8.1(b)	Carrier Frequency Separation	Compliant	
2.3	§15.247(a)(1)(iii)	RSS-210 A8.1(d)	Number of Hopping Frequencies	Compliant	
2.4	§15.247(a)(1)(iii)	RSS-210 A8.1(d)	Time of Occupancy (Dwell Time)	Compliant	
2.5	§15.215(c)	RSS-210 A8.1(a)	20 dB Bandwidth	Compliant	
2.6	§15.247(b)(1)	RSS-210 A8.4(2)	Peak Output Power	Compliant	
2.7	§15.247(d)	RSS-210 A8.5	Band-edge Compliance of RF Conducted Emissions	Compliant	
2.8	§15.247(d)	RSS-210 A8.5	Spurious RF Conducted Emissions	Compliant	
2.9	§15.247(d)	RSS-210 2.2	Spurious Radiated Emissions	Compliant	
2.10	§15.247(d)	RSS-210 2.2	Radiated Band Edge Measurements And Immediate Restricted Bands	Compliant	
2.11		RSS-Gen 6.0	Receiver Spurious Emissions	Compliant	

1.3 PRODUCT INFORMATION

1.3.1 EUT General Description

The Equipment Under Test (EUT) was an AnyDATA ACT233L 4G Vehicle Tracker with Hotspot as shown in the photograph below. The EUT connects to a vehicle's OBD2 port; it enables remote functions and vehicle tracking through a Smartphone app.



1.3.2 EUT General Description

EUT Description	ACT233L 4G Vehicle Tracker with Hotspot
Model Number(s)	ACT233L
Rated Voltage	13.5 VDC Nominal voltage.
Mode Verified	Bluetooth v2.0 +EDR
Capability	800/1900 CDMA2000 1xRTT and 1xEV-DO Release 0 Revision A, Band 4 and 13 LTE, 802.11 b/g/n WLAN, BT and Part 15.231 Transmitter
Primary Unit (EUT)	☒ Production ☐ Pre-Production ☐ Engineering
Antenna Type	Integral custom ILA (Inverted L Antenna) type
Antenna Gain	2400MHz = -6.0dBi 2440MHz = -5.5dBi 2480MHz = -6.5dBi

1.3.3 Maximum Conducted Output Power

Modulation	Frequency Range (MHz)	Average Output Power (dBm)	Peak Output Power (dBm)	Peak Output Power (mW)
GFSK	2402-2480	7.37	8.90	7.76
$\pi/4$ -DQPSK	2402-2480	6.74	8.83	7.64
8DPSK	2402-2480	5.65	9.21	8.34

1.4 EUT TEST CONFIGURATION

1.4.1 Test Configuration Description

Test Configuration	Description
A	Conducted antenna port measurement
B	Radiated test setup. EUT transmitting through integral antenna.

Note: Antenna port is for service function only.

1.4.2 EUT Exercise Software

Before each test, the EUT is configured using BTCmd –Diag (Version 1.1) application provided by the client. The software allows configuration of modulation, channels and mode (hopping or non-hopping). Power setting is preconfigured within the test profiles.

1.4.3 Support Equipment and I/O cables

Manufacturer	Equipment/Cable	Description
Sony	Support Laptop	Model PCG-3131L SN27545537 3001106
Rongchun	USB cable	0.9m, high speed USB, Type A to Micro-B connector, style 2725, USB Revision 2.0

1.4.4 Worst Case Configuration

Worst-case configuration used in this test report as per peak output power measurements:

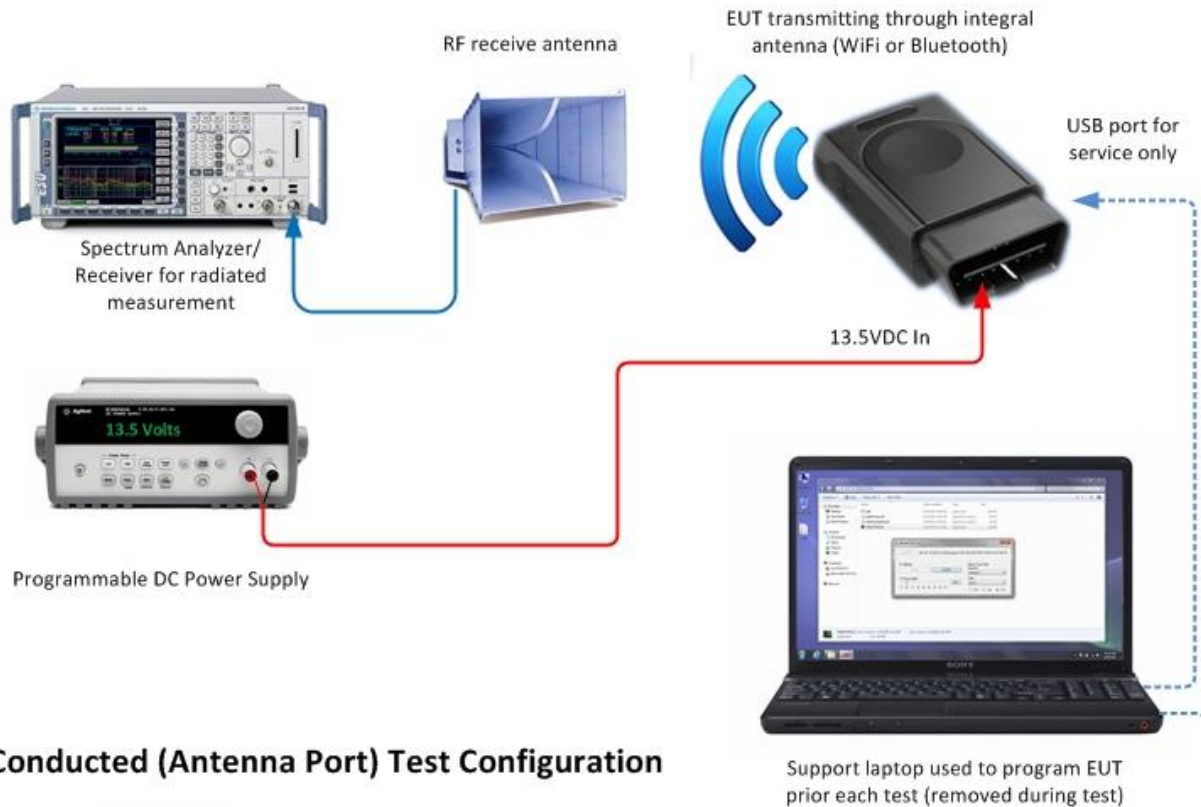
Modulation	Channel/Packet Type	Mode
8DPSK	38 (Mid Channel)	Non-hopping
8DPSK	38 (Mid Channel) DH5	Hopping

EUT is a mobile device. For radiated measurements X, Y and Z orientations were verified. Worst case position is "X".

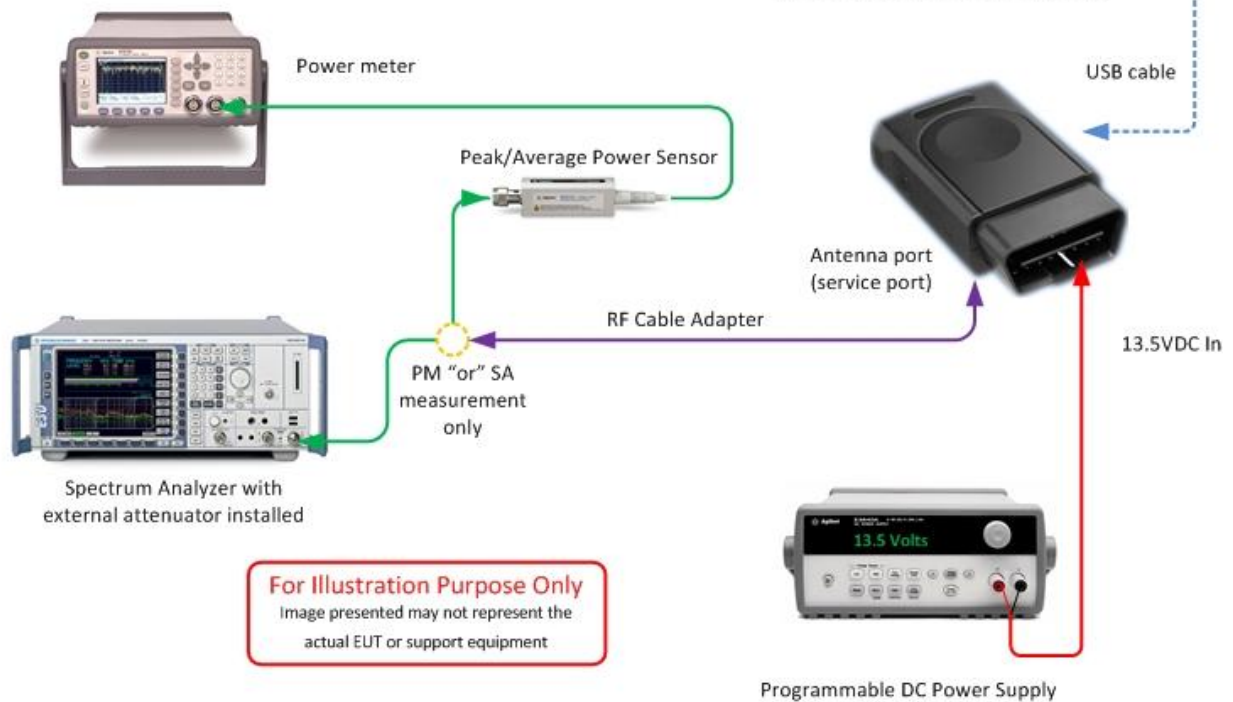


1.4.5 Simplified Test Configuration Diagram

Radiated Test Configuration



Conducted (Antenna Port) Test Configuration



1.5 DEVIATIONS FROM THE STANDARD

No deviations from the applicable test standards or test plan were made during testing.

1.6 MODIFICATION RECORD

Description of Modification	Modification Fitted By	Date Modification Fitted
Serial Number 20130418001833/20130418001828		
N/A		

The table above details modifications made to the EUT during the test programme. The modifications incorporated during each test (if relevant) are recorded on the appropriate test pages.

1.7 TEST METHODOLOGY

All measurements contained in this report were conducted with ANSI C63.4-2009, 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.

For conducted and radiated emissions the equipment under test (EUT) was configured to measure its highest possible emission level. This level was based on the maximized cable configuration from exploratory testing per ANSI C63.4-2009. The test modes were adapted according to the Operating Instructions provided by the manufacturer/client.

1.8 TEST FACILITY

1.8.1 FCC – Registration No.: US5296

TUV SUD America Inc. (San Diego), is an accredited test facility with the site description report on file and has met all the requirements specified in §2.498 of the FCC rules. The acceptance letter from the FCC is maintained in our files and the Registration is US5296.

1.8.2 Industry Canada (IC) Registration No.: 3067A

The 10m Semi-anechoic chamber of TUV SUD America Inc. (San Diego) has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No. 3067A.



SECTION 2

TEST DETAILS

Radio Testing of the
AnyDATA
4G Vehicle Tracker with Hotspot

2.1 CONDUCTED EMISSIONS

2.1.1 Specification Reference

Part 15 Subpart C §15.207(a)

2.1.2 Standard Applicable

An intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table, as measured using a 50 μ H/50 ohms line impedance stabilization network (LISN).

Frequency of emission (MHz)	Conducted limit (dB μ V)	
	Quasi-peak	Average
0.15–0.5	66 to 56*	56 to 46*
0.5–5	56	46
5–30	60	50

**Decreases with the logarithm of the frequency.*

2.1.3 Equipment Under Test and Modification State

Not applicable. EUT is for vehicle use only.



2.2 CARRIER FREQUENCY SEPARATION

2.2.1 Specification Reference

Part 15 Subpart C §15.247(a)(1)

2.2.2 Standard Applicable

(1) Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400–2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW. The system shall hop to channel frequencies that are selected at the system hopping rate from a pseudo randomly ordered list of hopping frequencies. Each frequency must be used equally on the average by each transmitter. The system receivers shall have input bandwidths that match the hopping channel bandwidths of their corresponding transmitters and shall shift frequencies in synchronization with the transmitted signals.

2.2.3 Equipment Under Test and Modification State

Serial No: 20130418001828 / Test Configuration A

2.2.4 Date of Test/Initial of test personnel who performed the test

May 07, 2013/FSC

2.2.5 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.2.6 Environmental Conditions

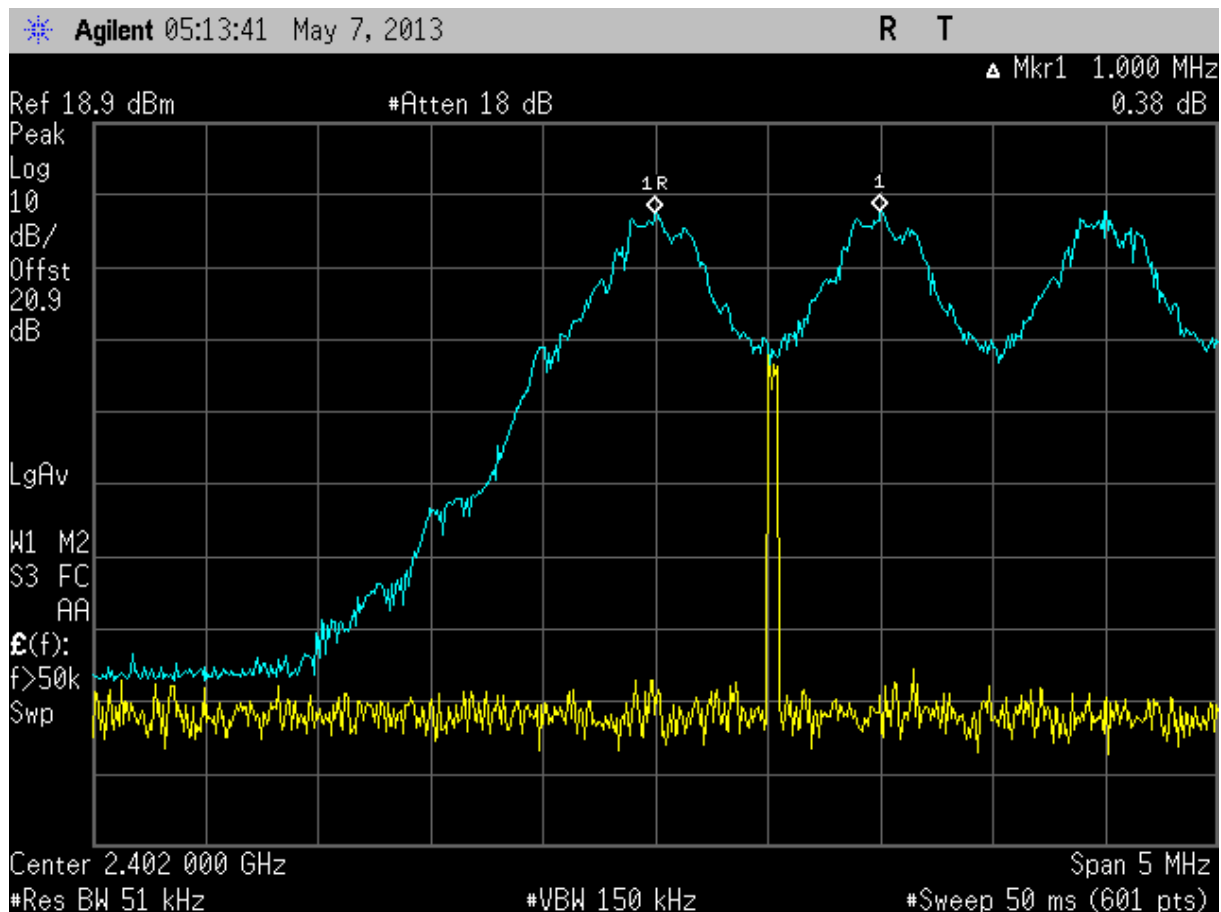
Ambient Temperature	24.0°C
Relative Humidity	47.1%
ATM Pressure	99.1 kPa

2.2.7 Additional Observations

- Hopping function enabled.
- Span is wide enough to capture the peaks of two adjacent channels.
- RBW is 1% of the span.
- VBW is 3x RBW
- Sweep is auto

- Detector is peak.
- Trace is max hold.
- An offset of 20.9dB was added to compensate for the external attenuator and cable used.
- Marker-delta function is used between the peaks of the adjacent channels.
- Limit used is >894 kHz (2/3 of worst case 20dB BW).

2.2.8 Test Results



Observed carrier frequency separation between Channel 0 and Channel 1 = 1.0 MHz (Complies. Greater than 894 kHz)

2.3 NUMBER OF HOPPING FREQUENCIES

2.3.1 Specification Reference

Part 15 Subpart C §15.247(a)(1)(iii)

2.3.2 Standard Applicable

(iii) Frequency hopping systems in the 2400–2483.5 MHz band shall use at least 15 channels. The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed. Frequency hopping systems may avoid or suppress transmissions on a particular hopping frequency provided that a minimum of 15 channels are used.

2.3.3 Equipment Under Test and Modification State

Serial No: 20130418001828 / Test Configuration A

2.3.4 Date of Test/Initial of test personnel who performed the test

May 07, 2013/FSC

2.3.5 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.3.6 Environmental Conditions

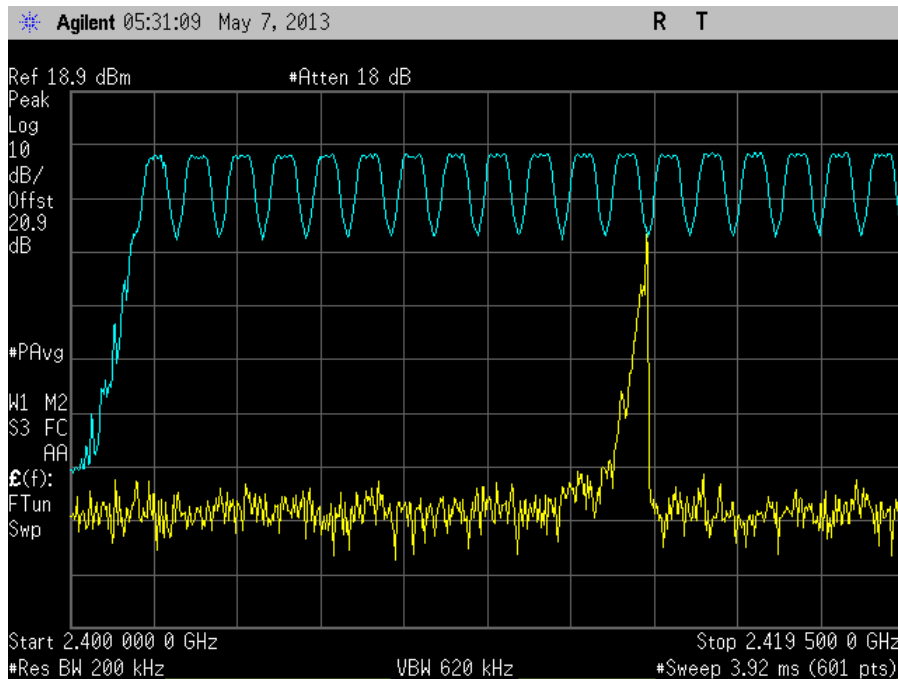
Ambient Temperature	24.0°C
Relative Humidity	47.1%
ATM Pressure	99.1 kPa

2.3.7 Additional Observations

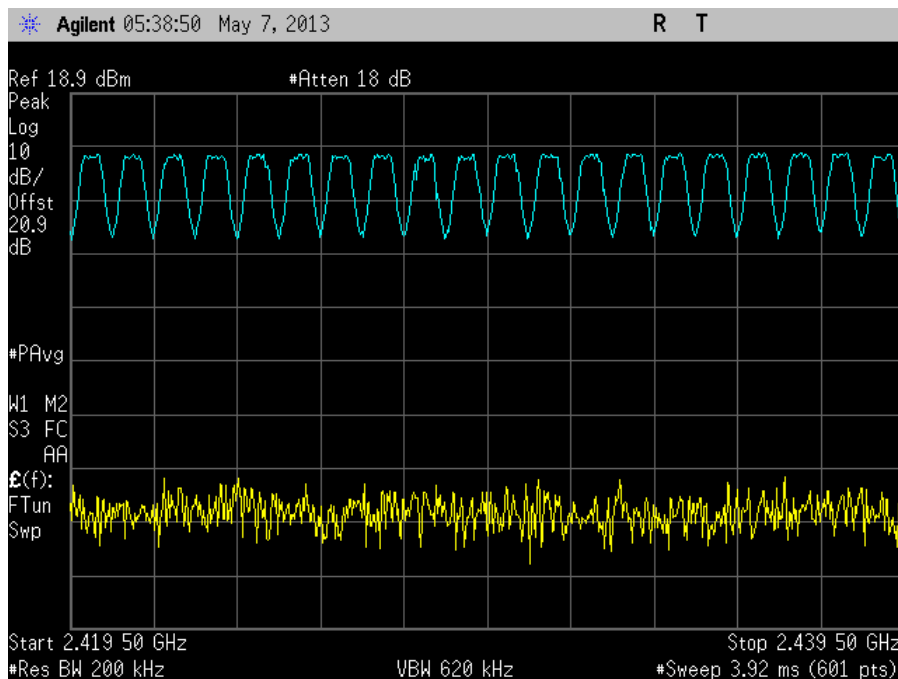
- Hopping function enabled.
- Span is wide enough to capture the channels of interests.
- The span was broken up to sections in order to clearly show all of the hopping frequencies.
- RBW is 1% of the span, VBW is 3x RBW
- Sweep is auto
- Detector is peak, trace is max hold.
- An offset of 20.9dB was added to compensate for the external attenuator and cable used.

2.3.8 Test Results

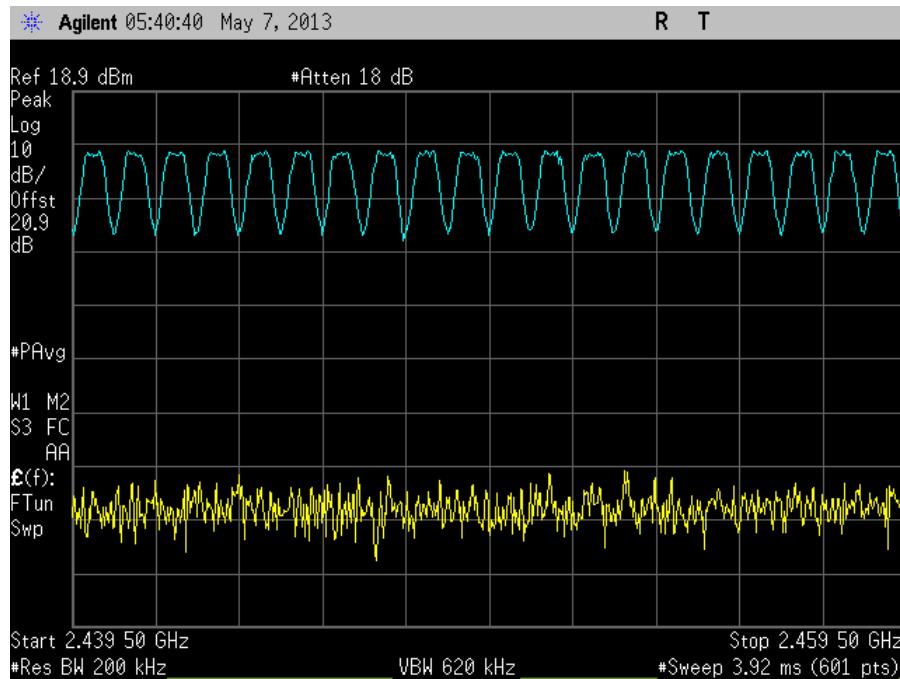
Observed Number of Hopping Frequencies is = **79 (Complies)**
 = Plot #1 + Plot #2 + Plot #3 + Plot #4 + Plot #5
 = 18 + 20 + 20 + 20 + 1



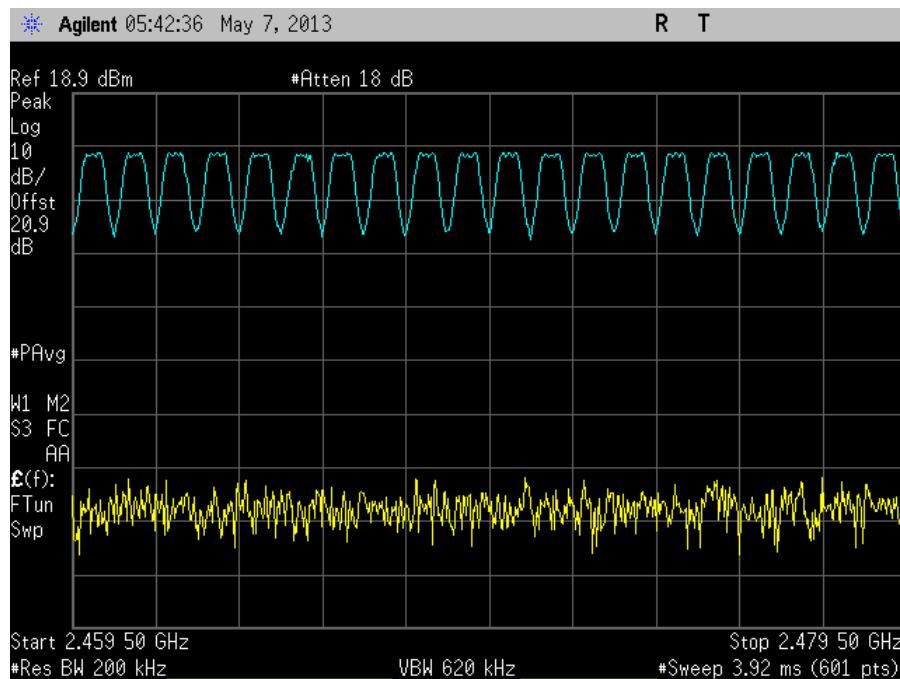
Plot #1



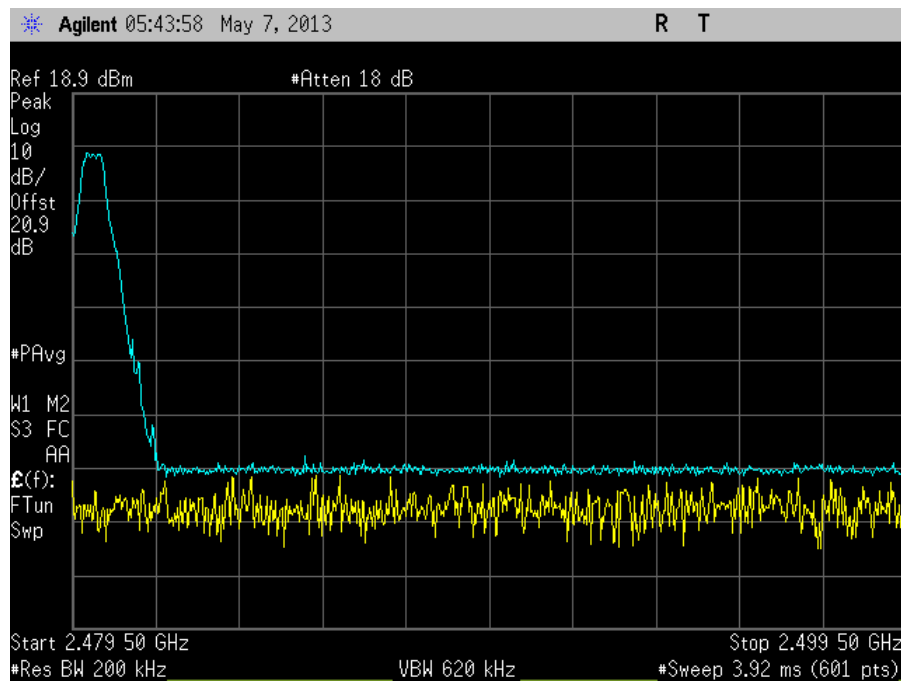
Plot #2



Plot #3



Plot #4



Plot #5

2.4 TIME OF OCCUPANCY (DWELL TIME)

2.4.1 Specification Reference

Part 15 Subpart C §15.247(a)(1)(iii)

2.4.2 Standard Applicable

(iii) Frequency hopping systems in the 2400–2483.5 MHz band shall use at least 15 channels. The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed. Frequency hopping systems may avoid or suppress transmissions on a particular hopping frequency provided that a minimum of 15 channels are used.

2.4.3 Equipment Under Test and Modification State

Serial No: 20130418001828 / Test Configuration A

2.4.4 Date of Test/Initial of test personnel who performed the test

May 07, 2013/FSC

2.4.5 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.4.6 Environmental Conditions

Ambient Temperature	24.0°C
Relative Humidity	47.1%
ATM Pressure	99.1 kPa

2.4.7 Additional Observations

- Hopping function enabled.
- Span = zero span, centered on a hopping channel.
- RBW is 1MHz.
- VBW is 3x RBW
- Detector is peak.
- A single pulse is first measured. This measurement is then used to compute the average time of occupancy in the required period (no. of channels x 0.4 second).

2.4.8 Test Results

Packet Types	Measured time of occupancy	Requirement
DH1	124.0 ms	<400 ms
DH3	261.2 ms	<400 ms
DH5	348.0 ms	<400 ms

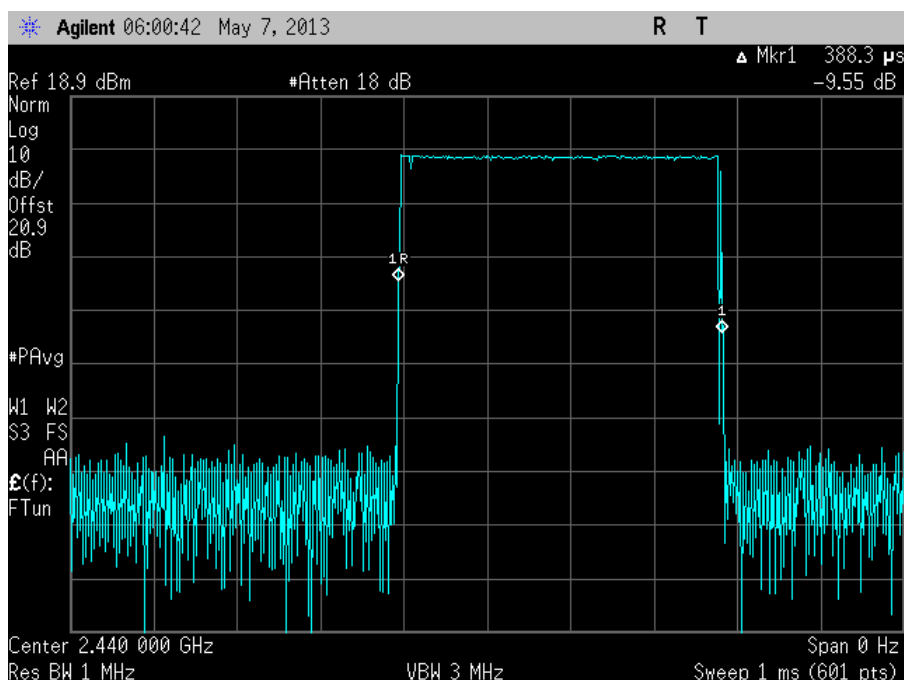
2.4.9 Sample Computation (DH5)

Width of single pulse = 2.9 ms
 Observed occurrence = 12 pulses/3.16 seconds
 Required period = 79 channels x 0.4 second
 = 31.6 seconds

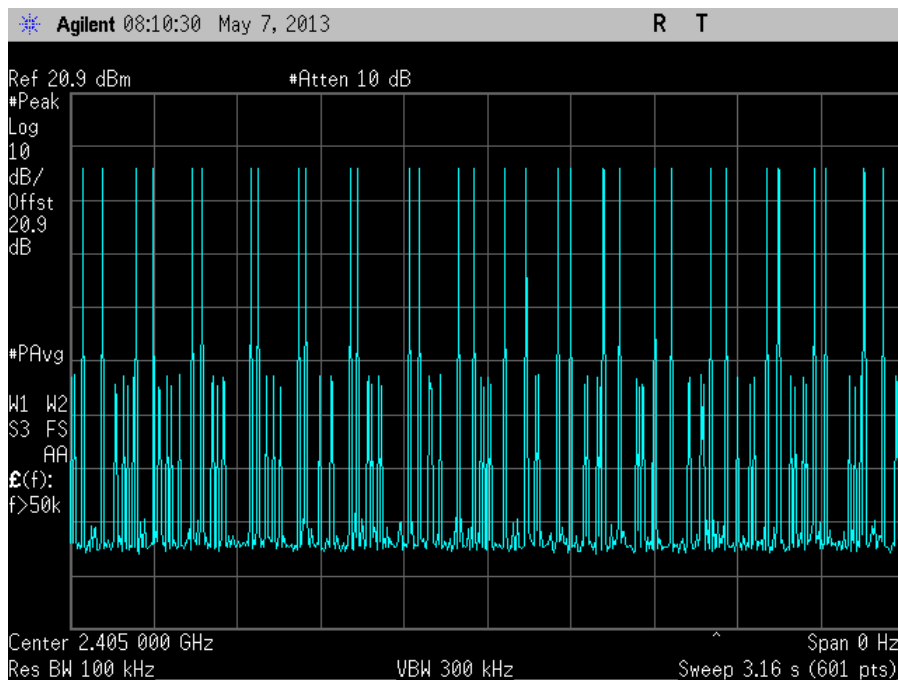
Average time of occupancy = Pulse width x #pulses in 3.16 seconds x 10
 = 0.0029 second x 12x 10
 = 0.348 second

Compliance = **Complies.** 0.348 second < 0.4 second

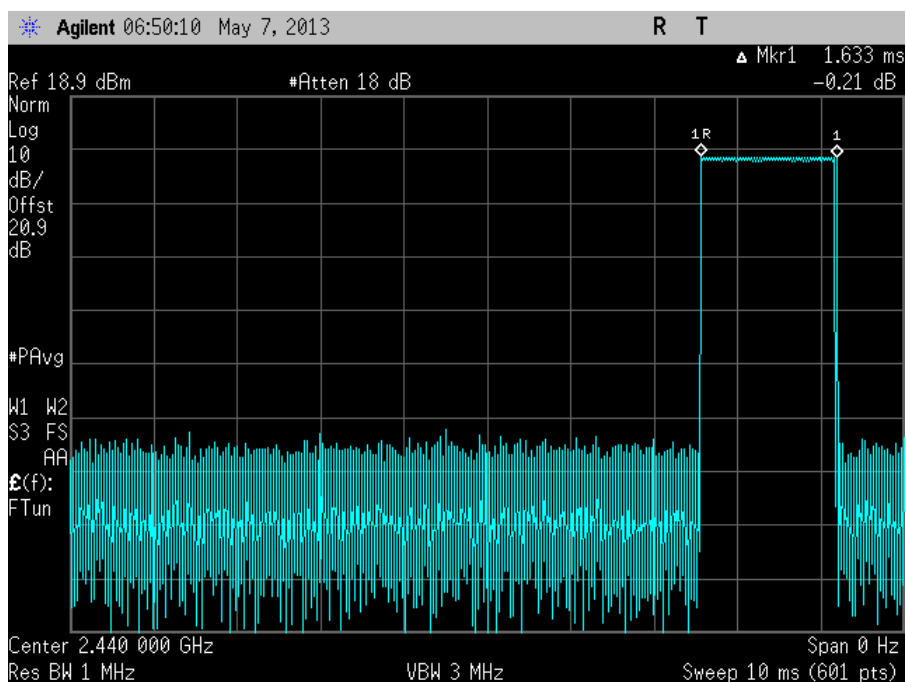
2.4.10 Test Results Plots



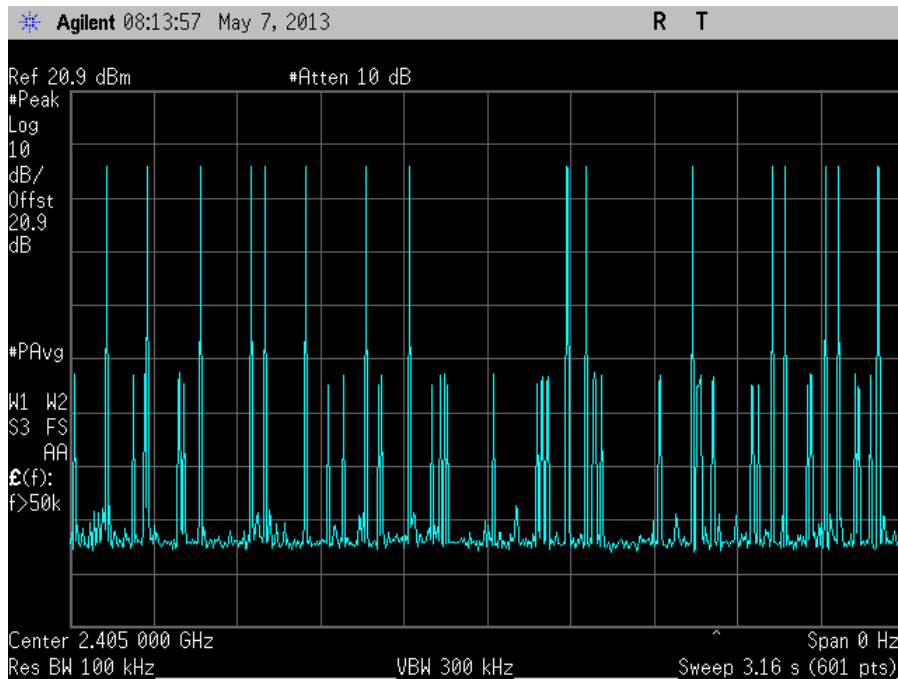
DH1 Width of single pulse (0.388ms)



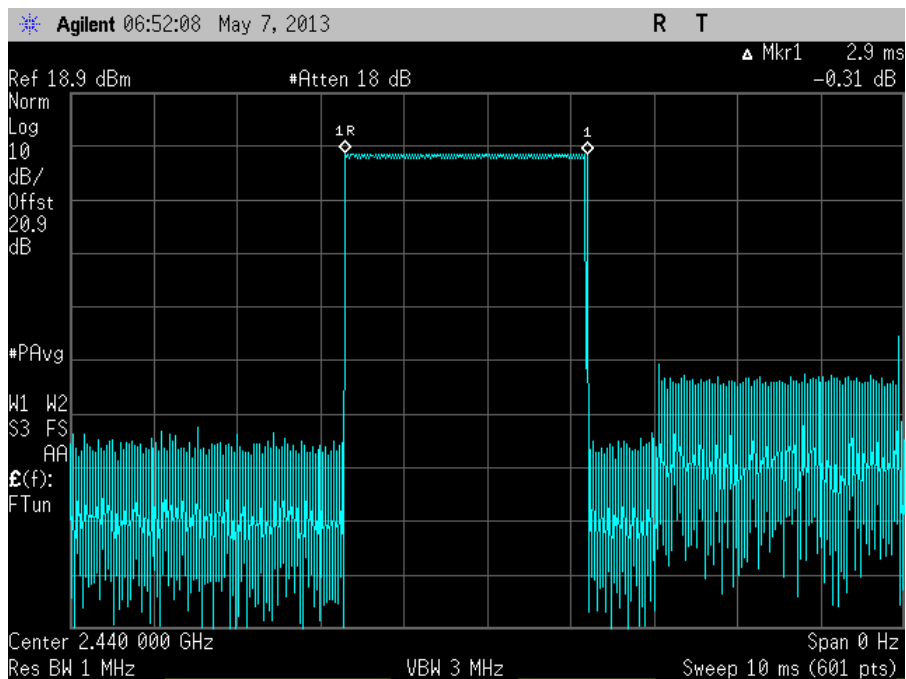
32 pulses/3.16 seconds (DH1)



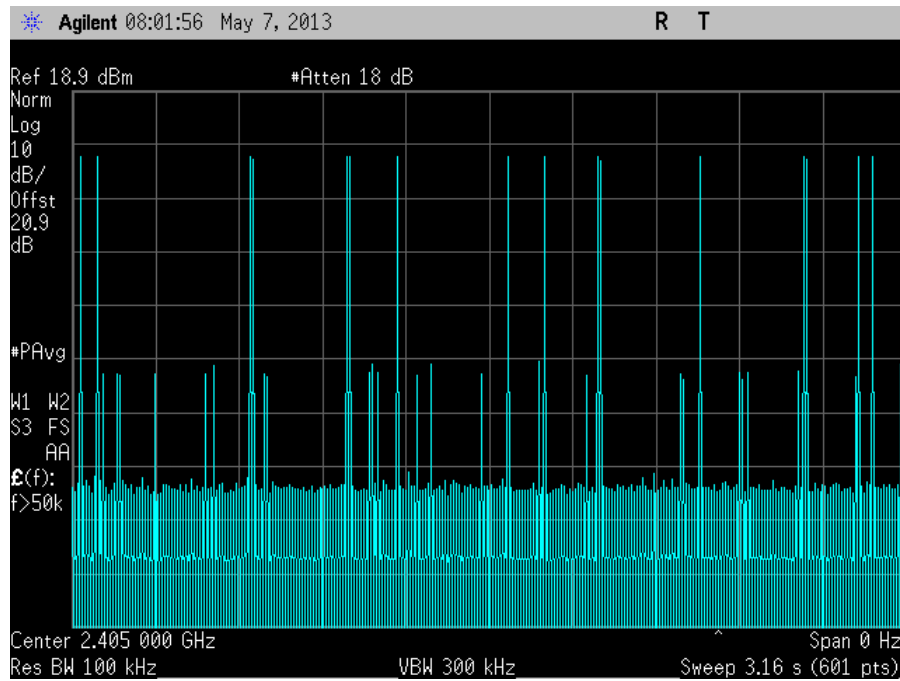
DH3 Width of single pulse (1.633ms)



16 pulses/3.16 seconds (DH3)



DH5 Width of single pulse (2.9ms)



12 pulses/3.16 seconds (DH5)



2.5 20 dB BANDWIDTH

2.5.1 Specification Reference

Part 15 Subpart C §15.215(c)

2.5.2 Standard Applicable

(c) Intentional radiators operating under the alternative provisions to the general emission limits, as contained in §§15.217 through 15.257 and in Subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated. The requirement to contain the designated bandwidth of the emission within the specified frequency band includes the effects from frequency sweeping, frequency hopping and other modulation techniques that may be employed as well as the frequency stability of the transmitter over expected variations in temperature and supply voltage. If a frequency stability is not specified in the regulations, it is recommended that the fundamental emission be kept within at least the central 80% of the permitted band in order to minimize the possibility of out-of-band operation.

2.5.3 Equipment Under Test and Modification State

Serial No: 20130418001828 / Test Configuration A

2.5.4 Date of Test/Initial of test personnel who performed the test

May 06, 2013/FSC

2.5.5 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.5.6 Environmental Conditions

Ambient Temperature	23.6°C
Relative Humidity	52.2%
ATM Pressure	99.1 kPa

2.5.7 Additional Observations

- This is a conducted test.
- An offset of 20.9dB was added to compensate for the external attenuator and cable used.
- Span is approximately 2 to 3 times the expected 20dB bandwidth.
- RBW is $\geq 1\%$ of the expected 20dB bandwidth while VBW is $\geq$ RBW.
- Sweep is auto.
- Detector is peak.
- Max hold function activated.

- “x dB” function (20dB) under Occupied Bandwidth measurement of the spectrum analyzer was used for this test.

2.5.8 Test Results

Modulation	Channel	Frequency (MHz)	Measured 20dB Bandwidth (MHz)
GFSK	0	2402	0.884
	38	2440	0.922
	78	2480	0.924
$\pi/4$ -DQPSK	0	2402	1.341
	38	2440	1.318
	78	2480	1.318
8DPSK	0	2402	1.265
	38	2440	1.264
	78	2480	1.317

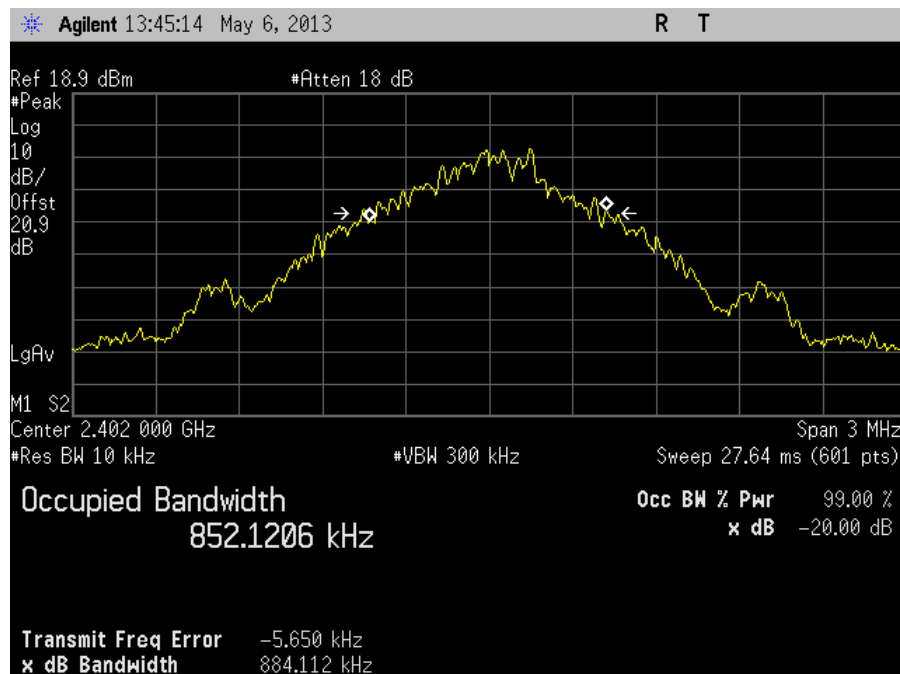
Worst case configuration (Low Channel $\pi/4$ -DQPSK)

2402 MHz – (20dB BW/2) = 2401.33 MHz (within the frequency band - **Compliant**)

Worst case configuration (High Channel $\pi/4$ -DQPSK)

2480 MHz + (20dB BW/2) = 2480.67 MHz (within the frequency band - **Compliant**)

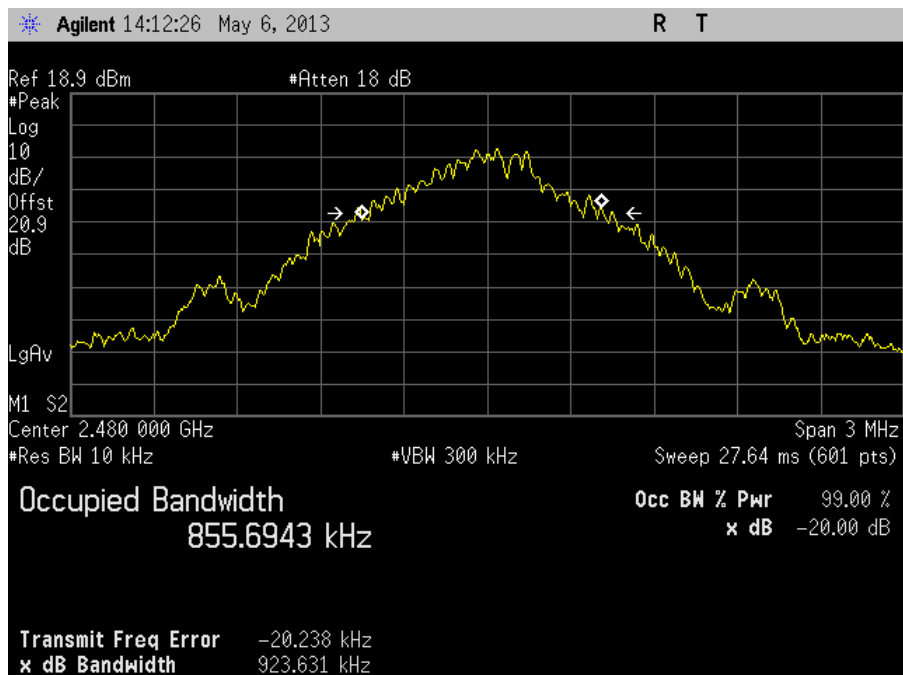
2.5.9 Test Results Plots



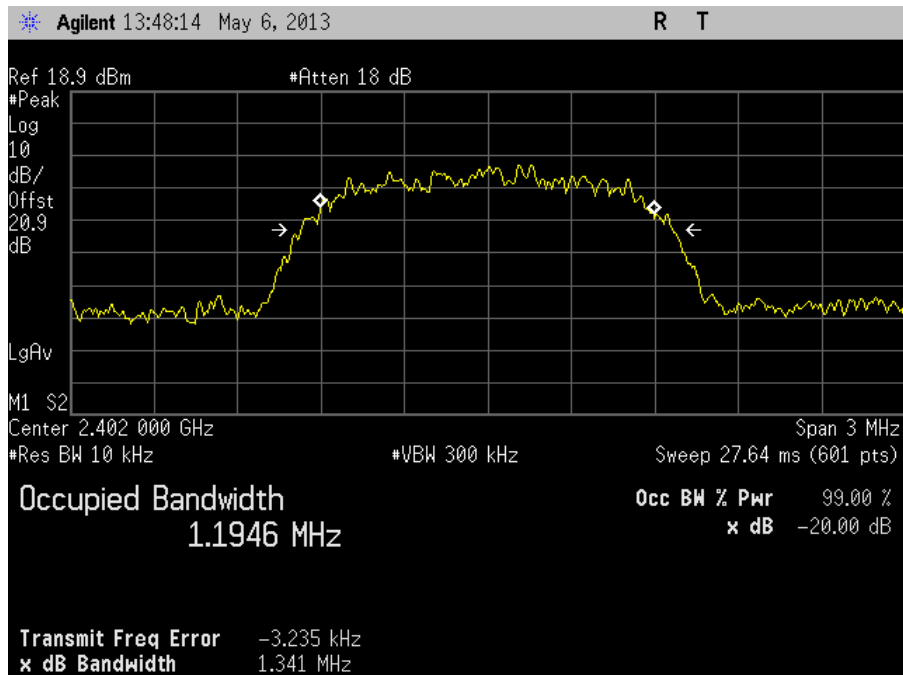
GFSK Low Channel



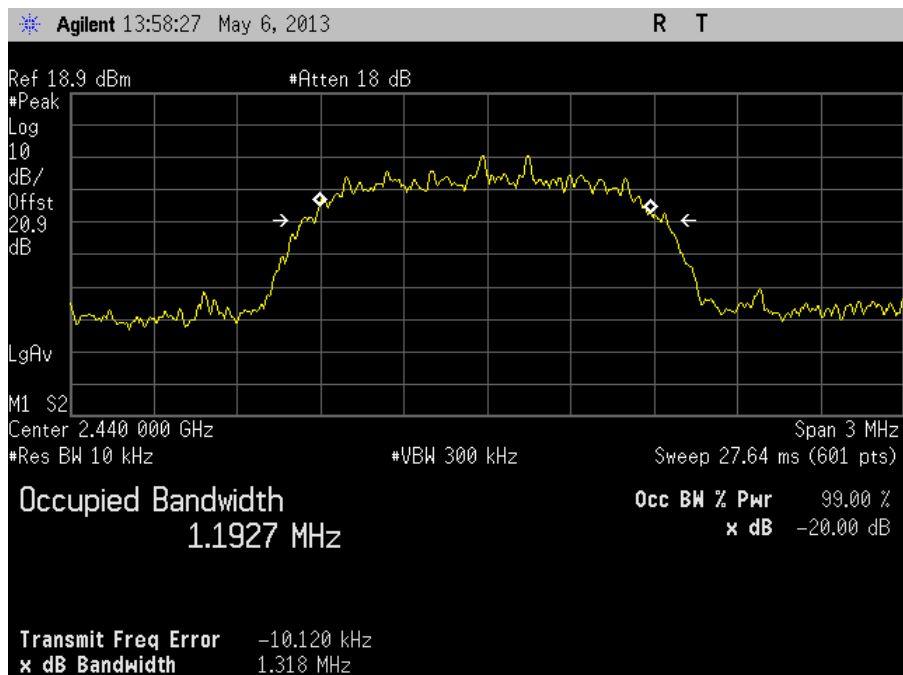
GFSK Mid Channel



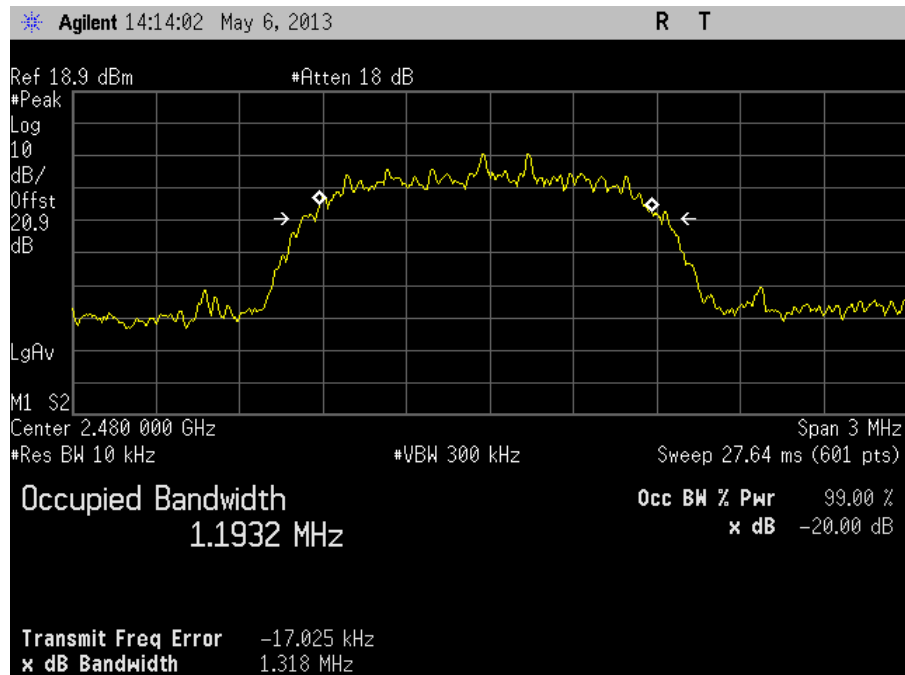
GFSK High Channel



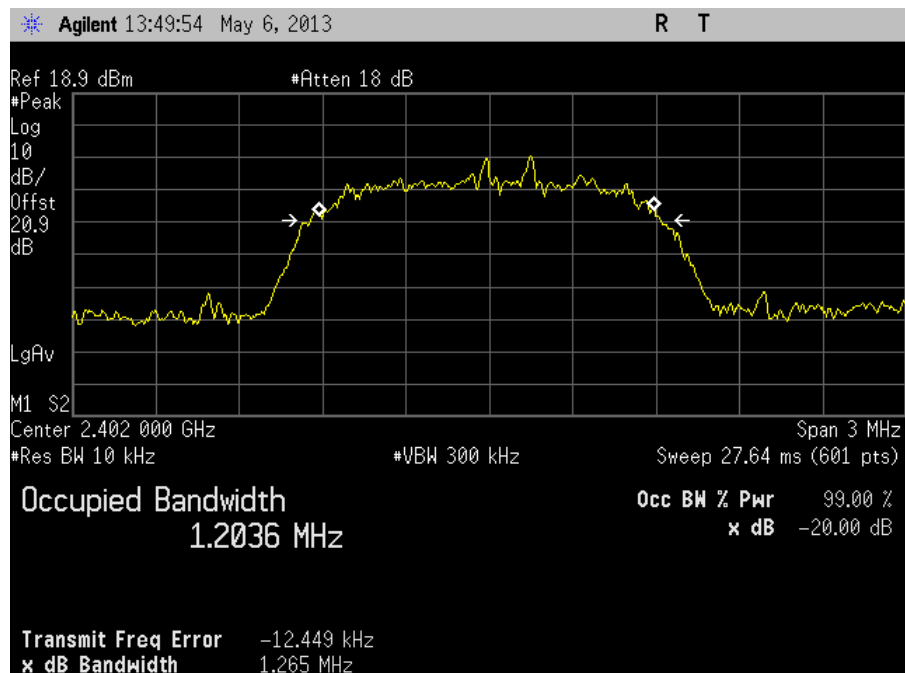
$\pi/4$ -DQPSK Low Channel



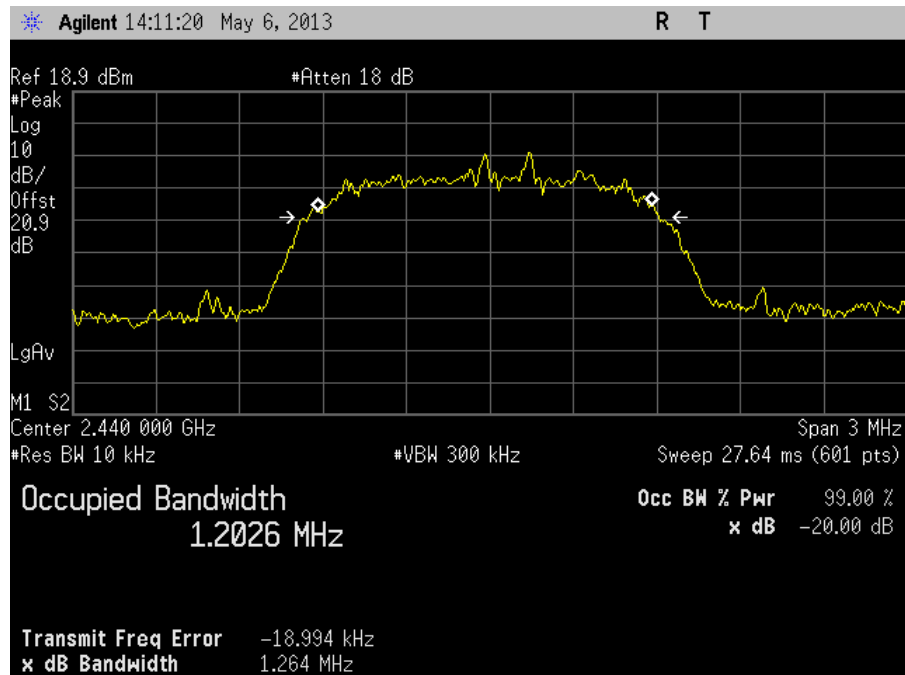
$\pi/4$ -DQPSK Mid Channel



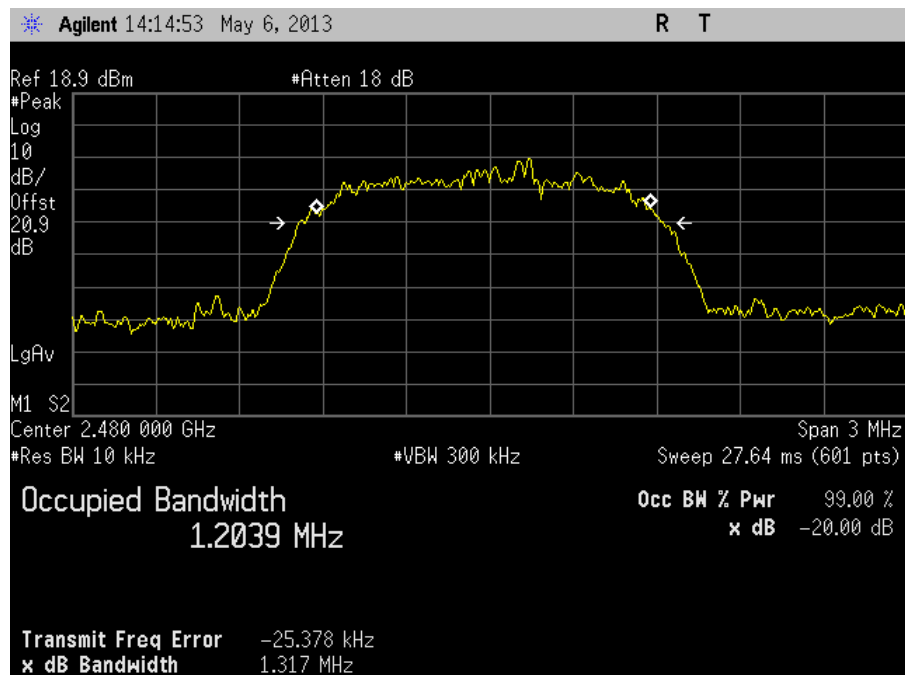
$\pi/4$ -DQPSK High Channel



8DPSK Low Channel



8DPSK Mid Channel



8DPSK High Channel

2.6 PEAK OUTPUT POWER

2.6.1 Specification Reference

Part 15 Subpart C §15.247(b)(1)

2.6.2 Standard Applicable

(1) For frequency hopping systems operating in the 2400–2483.5 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725–5850 MHz band: 1 watt. For all other frequency hopping systems in the 2400–2483.5 MHz band: 0.125 watts.

2.6.3 Equipment Under Test and Modification State

Serial No: 20130418001828 / Test Configuration A

2.6.4 Date of Test/Initial of test personnel who performed the test

May 06, 2013/FSC

2.6.5 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.6.6 Environmental Conditions

Ambient Temperature	23.6°C
Relative Humidity	52.2%
ATM Pressure	99.1 kPa

2.6.7 Additional Observations

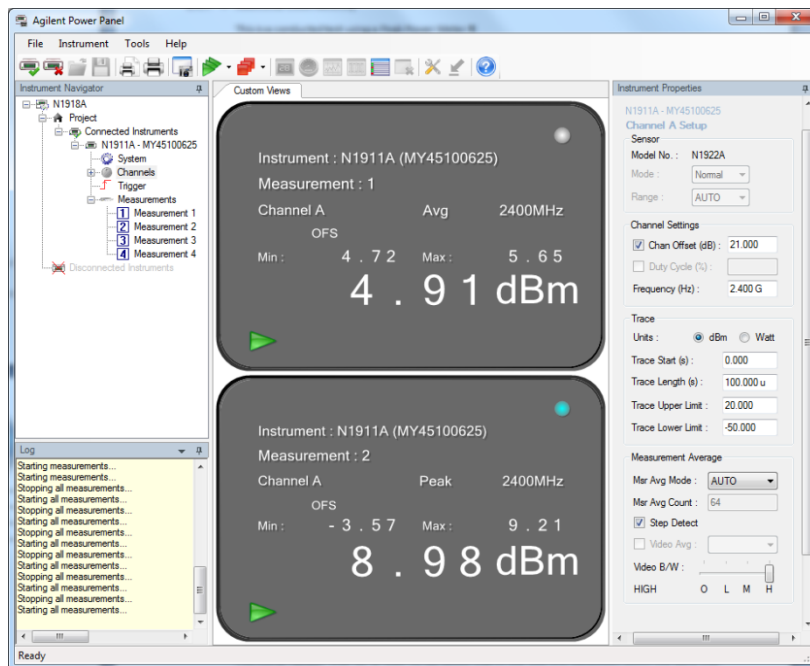
This is a conducted test using a Peak Power Meter.

2.6.8 Test Results

Modulation	Channel	Frequency (MHz)	Measured Average Output Power (dBm)	Measured Peak Output Power (dBm)	Measured Peak Output Power (mW)	Limit (mW)
GFSK	0	2402	6.70	8.32	6.792	125.0
	38	2440	7.34	8.90	7.762	125.0
	78	2480	7.37	8.89	7.745	125.0
$\pi/4$ -DQPSK	0	2402	5.05	8.26	6.700	125.0
	38	2440	6.74	8.72	7.450	125.0
	78	2480	5.36	8.83	7.640	125.0

8DPSK	0	2402	5.20	8.49	6.840	125.0
	38	2440	5.65	9.21	8.035	125.0
	78	2480	5.36	9.01	7.870	125.0

2.6.9 Sample Test Display



8DPSK mid channel (Channel 38 2440 MHz)

2.7 BAND-EDGE COMPLIANCE OF RF CONDUCTED EMISSIONS

2.7.1 Specification Reference

Part 15 Subpart C §15.247(d)

2.7.2 Standard Applicable

(d) In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

2.7.3 Equipment Under Test and Modification State

Serial No: 20130418001828 / Test Configuration A

2.7.4 Date of Test/Initial of test personnel who performed the test

May 07, 2013/FSC

2.7.5 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.7.6 Environmental Conditions

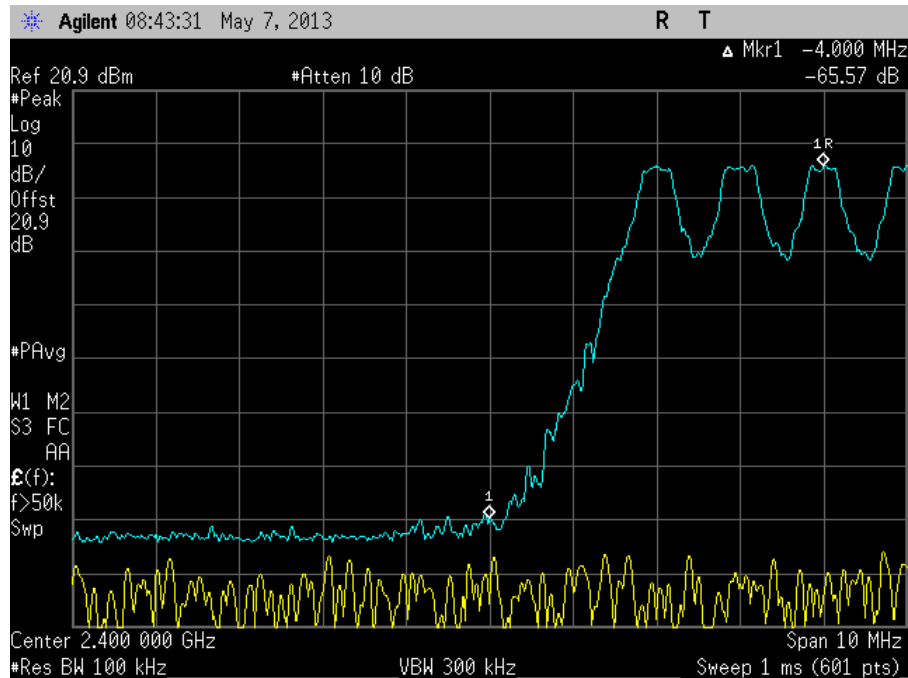
Ambient Temperature	24.0°C
Relative Humidity	47.1%
ATM Pressure	99.1 kPa

2.7.7 Additional Observations

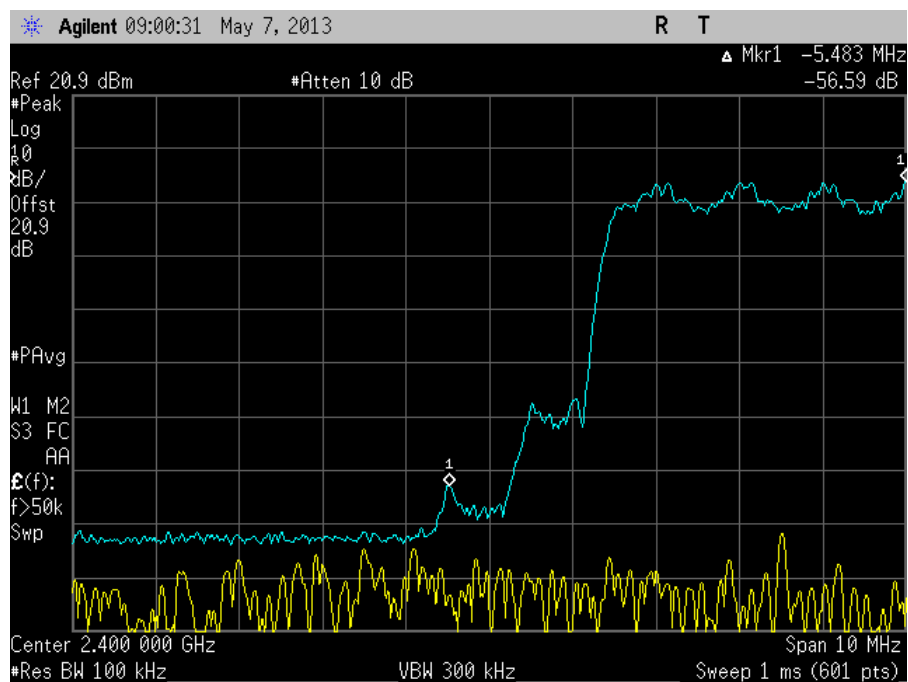
- This is a conducted test.
- An offset of 20.9dB was added to compensate for the external attenuator and cable used.
- Span is wide enough to capture the peak level of the emission operating on the channel closest to the bandedge.
- RBW is $\geq 1\%$ of the span, VBW is $\geq$ RBW.
- Sweep is auto, detector is peak, trace is max hold.
- Trace allowed to stabilize. Marker-delta function used to verify compliance.

- Limit is 20dBc.
- Both Hopping and Non-Hopping mode verified.

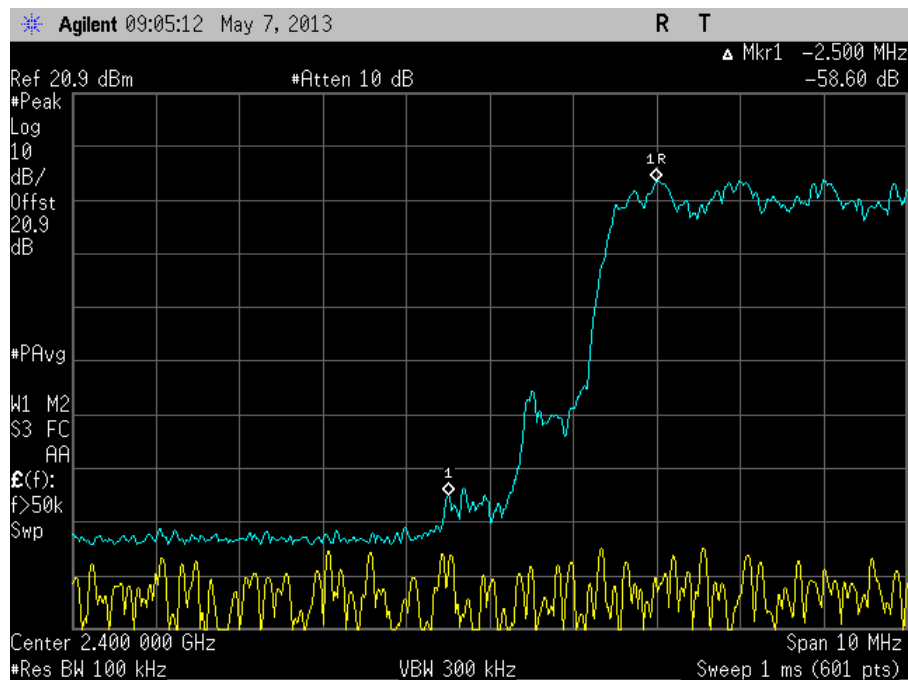
2.7.8 Test Results



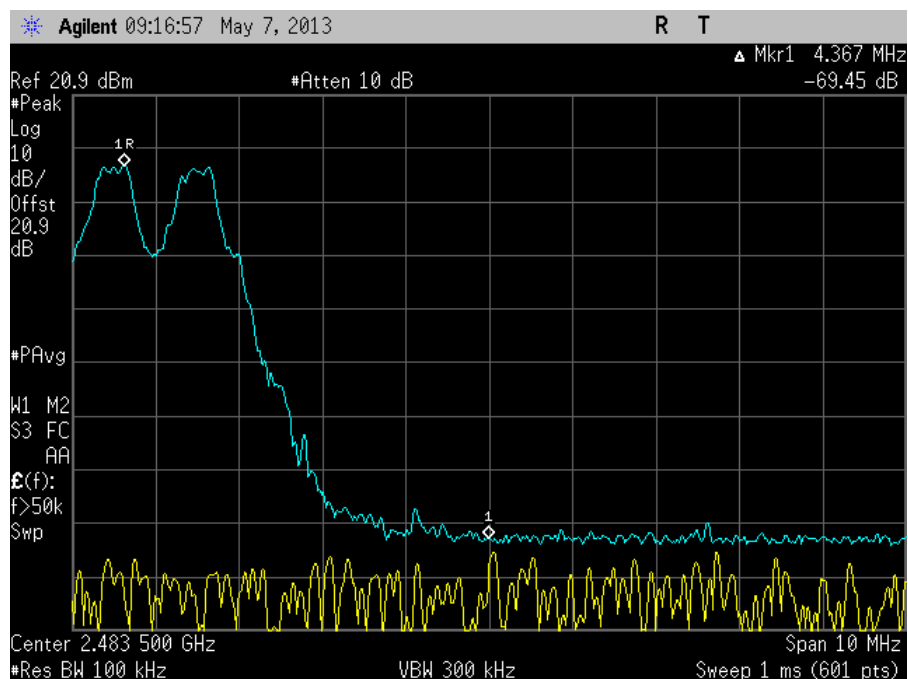
Hopping lower bandedge (GFSK)



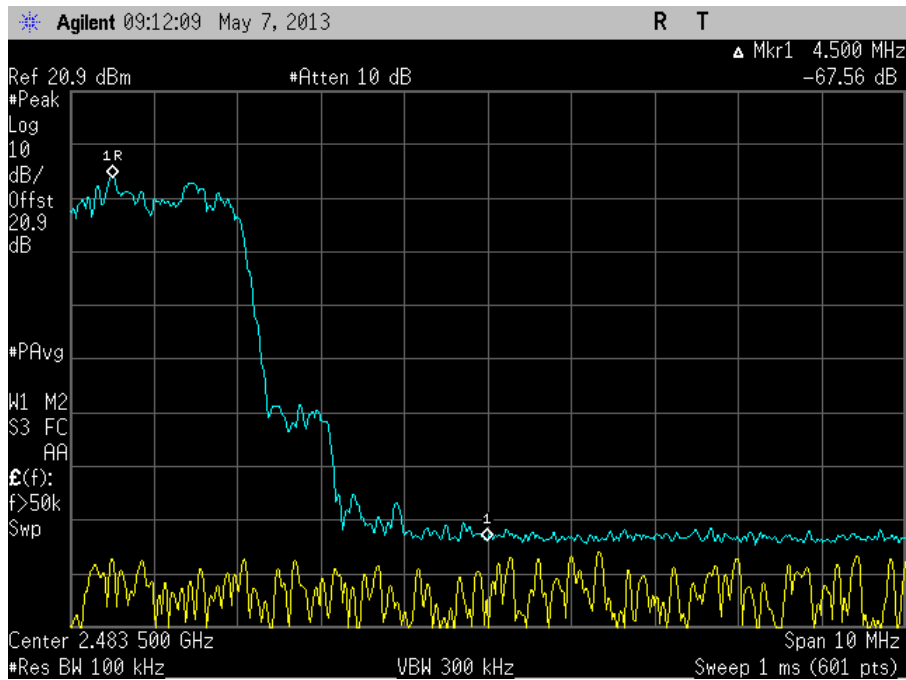
Hopping lower bandedge ($\pi/4$ -DQPSK)



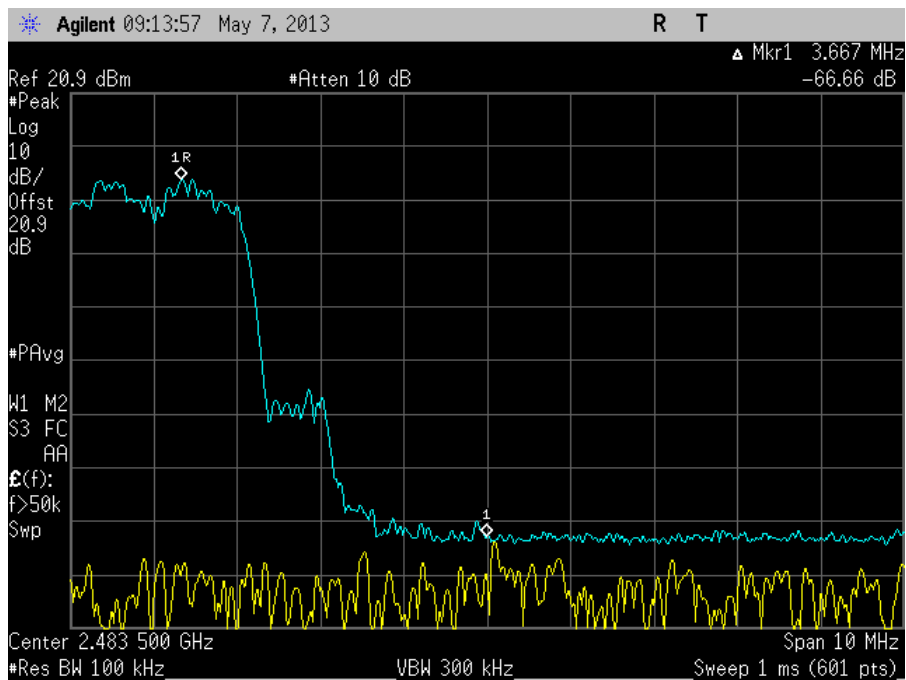
Hopping lower bandedge (8DPSK)



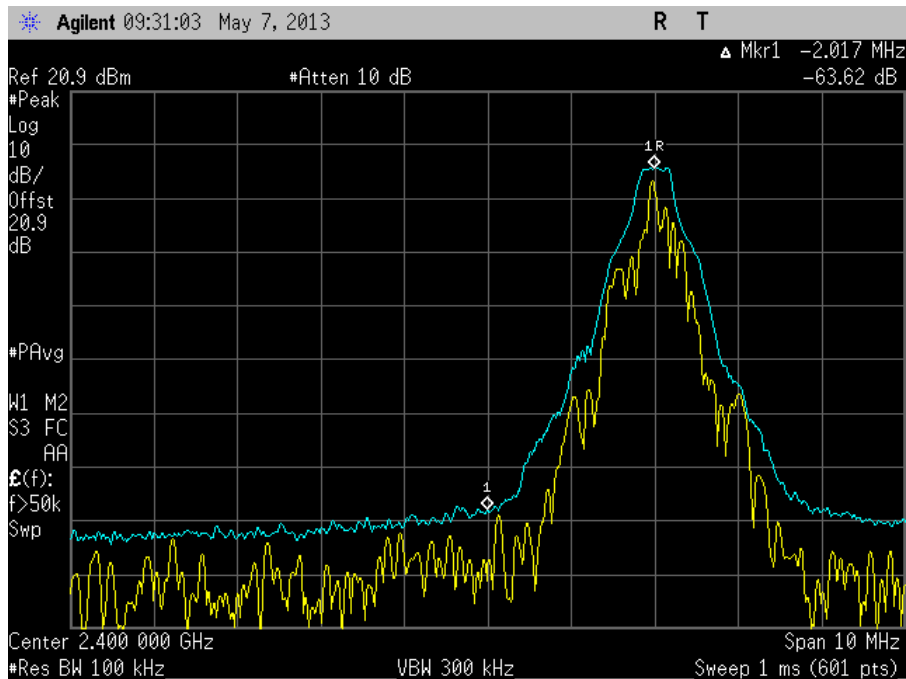
Hopping upper bandedge (GFSK)



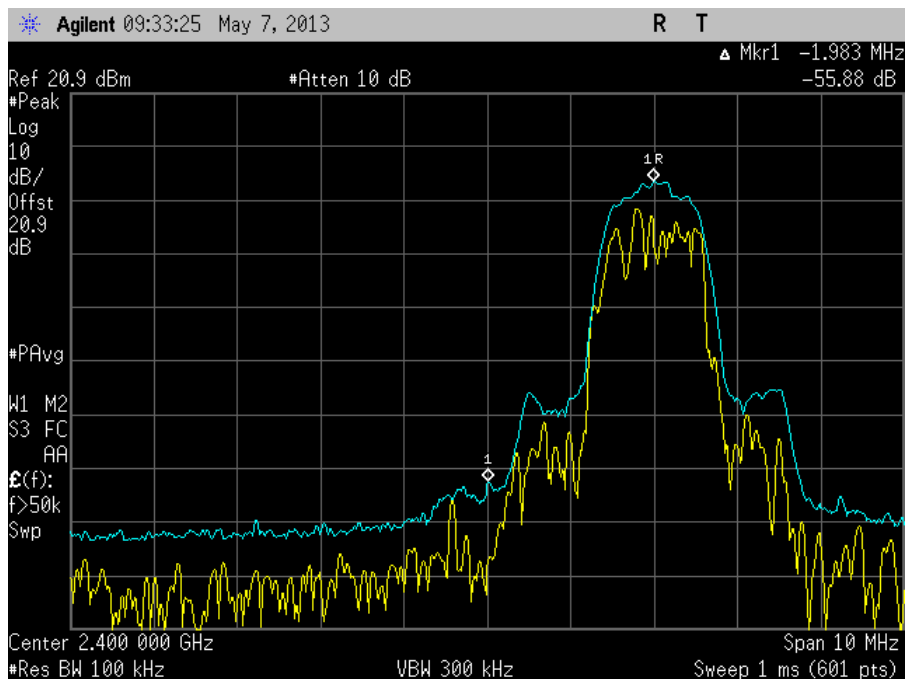
Hopping upper bandedge ($\pi/4$ -DQPSK)



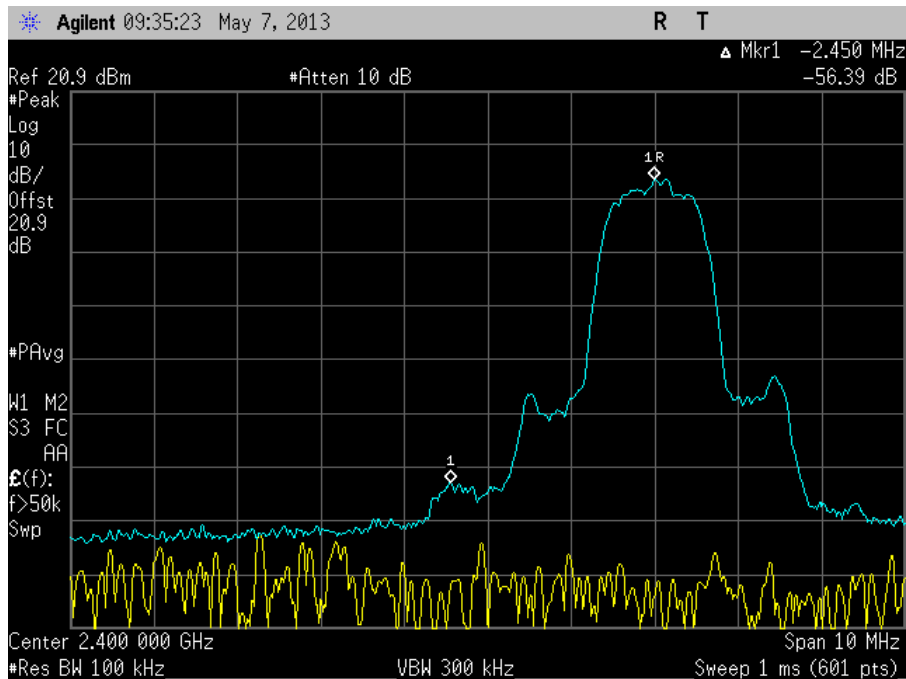
Hopping upper bandedge (8DPSK)



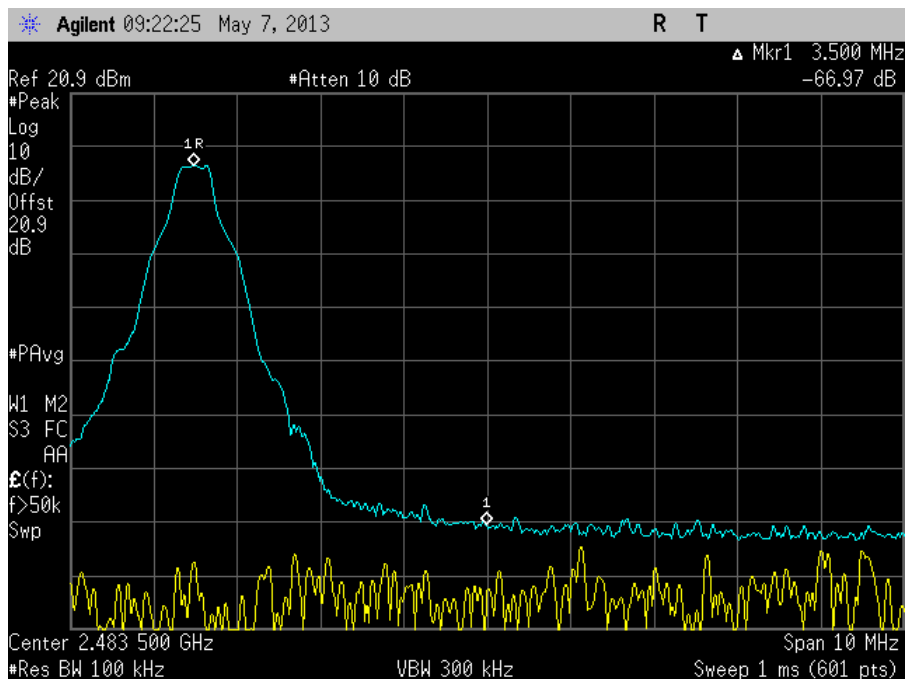
Non-hopping lower bandedge (GFSK)



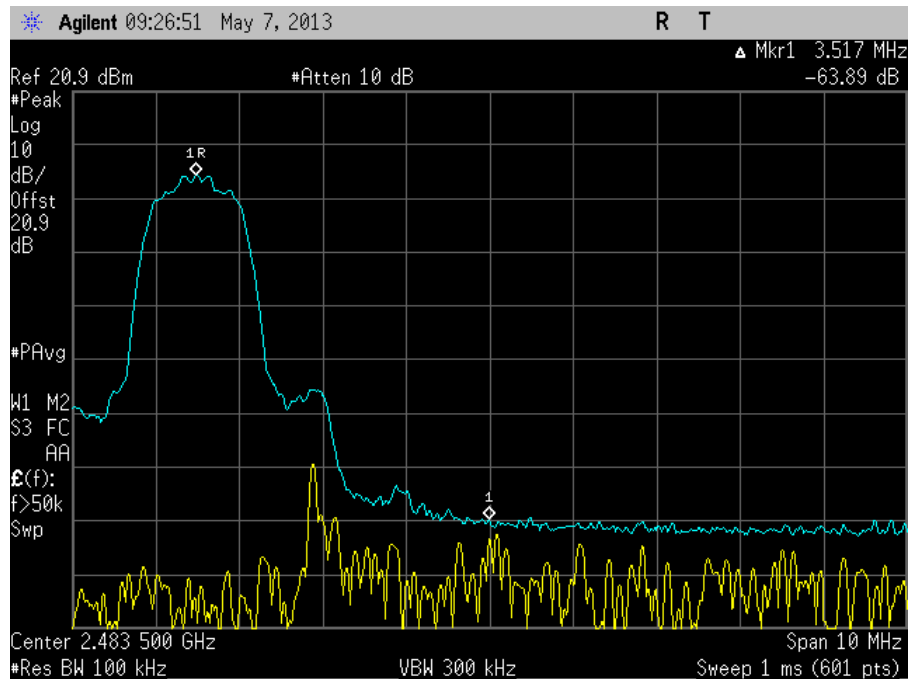
Non-hopping lower bandedge ($\pi/4$ -DQPSK)



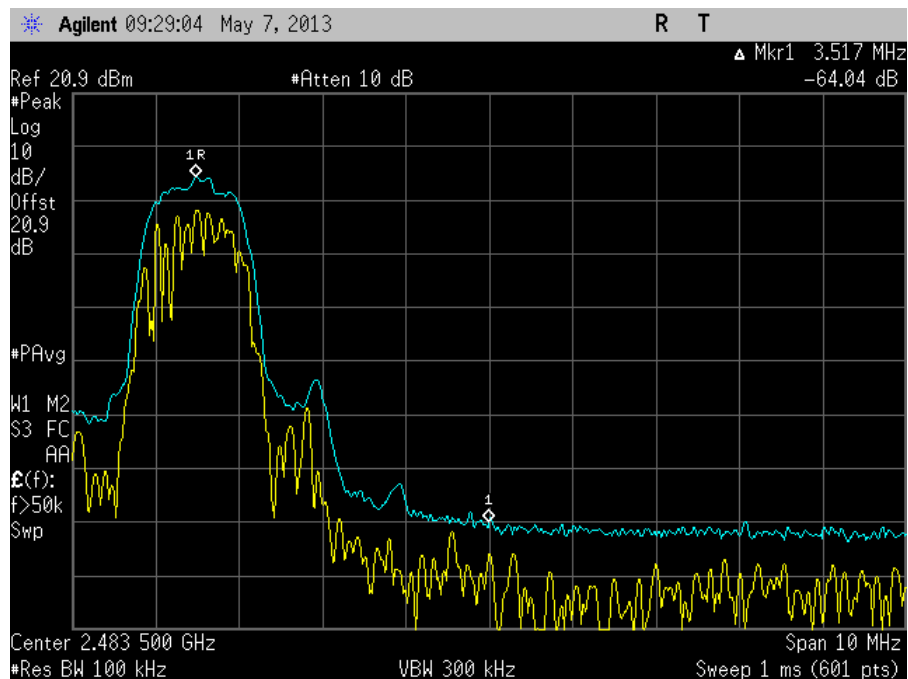
Non-hopping lower bandedge (8DPSK)



Non-hopping upper bandedge (GFSK)



Non-hopping upper bandedge ($\pi/4$ -DQPSK)



Non-hopping upper bandedge (8DPSK)

2.8 SPURIOUS RF CONDUCTED EMISSIONS

2.8.1 Specification Reference

Part 15 Subpart C §15.247(d)

2.8.2 Standard Applicable

(d) In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

2.8.3 Equipment Under Test and Modification State

Serial No: 20130418001828 / Test Configuration A

2.8.4 Date of Test/Initial of test personnel who performed the test

May 07, 2013/FSC

2.8.5 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.8.6 Environmental Conditions

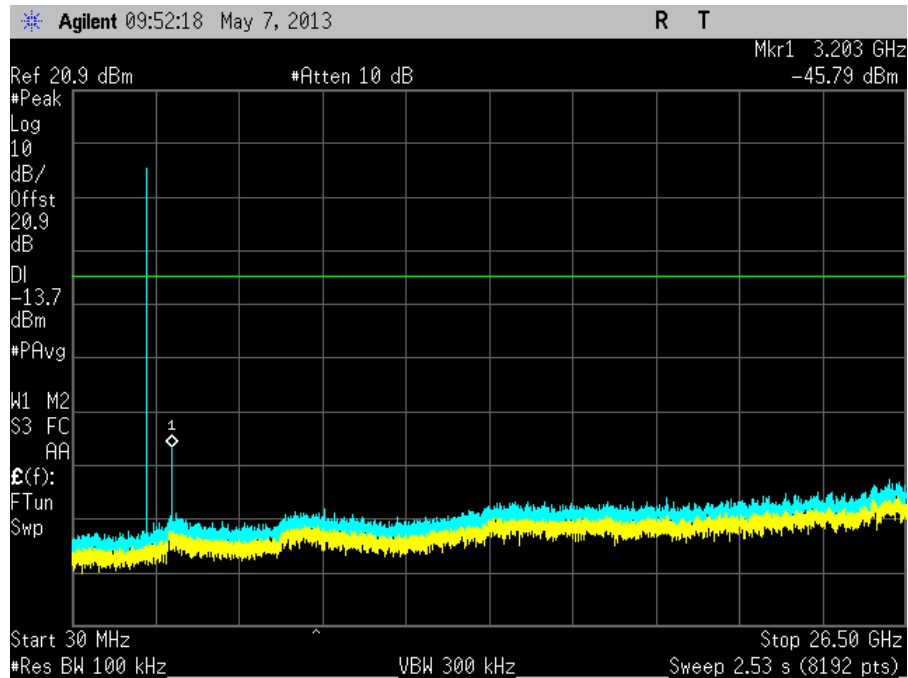
Ambient Temperature	24.0°C
Relative Humidity	47.1%
ATM Pressure	99.1 kPa

2.8.7 Additional Observations

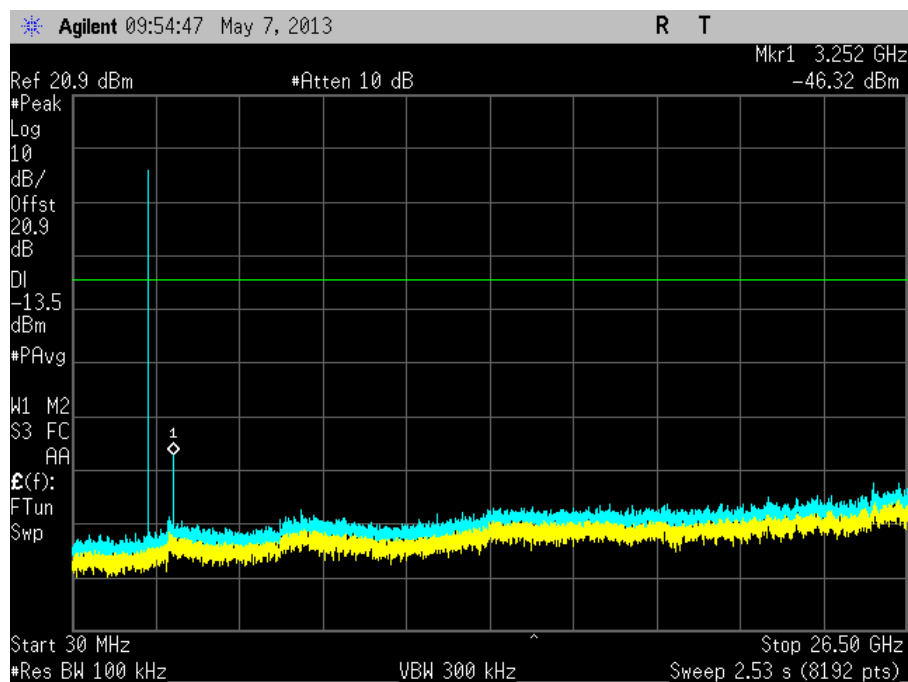
- This is a conducted test.
- An offset of 20.9dB was added to compensate for the external attenuator and cable used.
- Span is from 30MHz up to 26GHz (to cover 10th harmonic of the High Channel).
- Sweep point setting of the spectrum analyzer is set to maximum (8192).
- RBW is 100 kHz, VBW is ≥ RBW.
- Sweep is auto, detector is peak.
- Trace is max hold.

- Trace allowed to stabilize. Maximum spurious emission compared to limit.
- Limit is 20dBc.

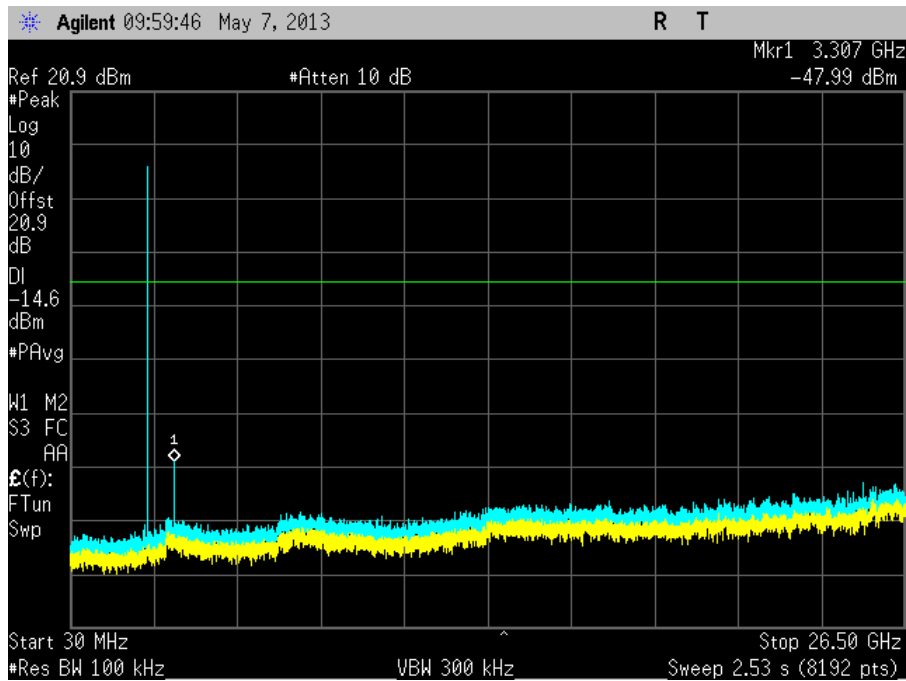
2.8.8 Test Results Plots



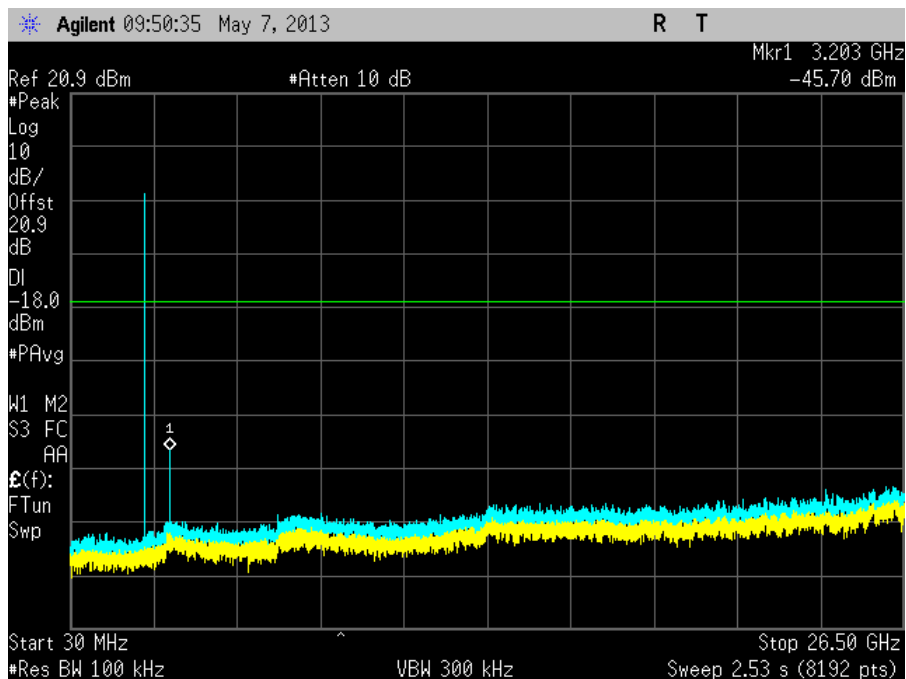
Low Channel (GFSK)



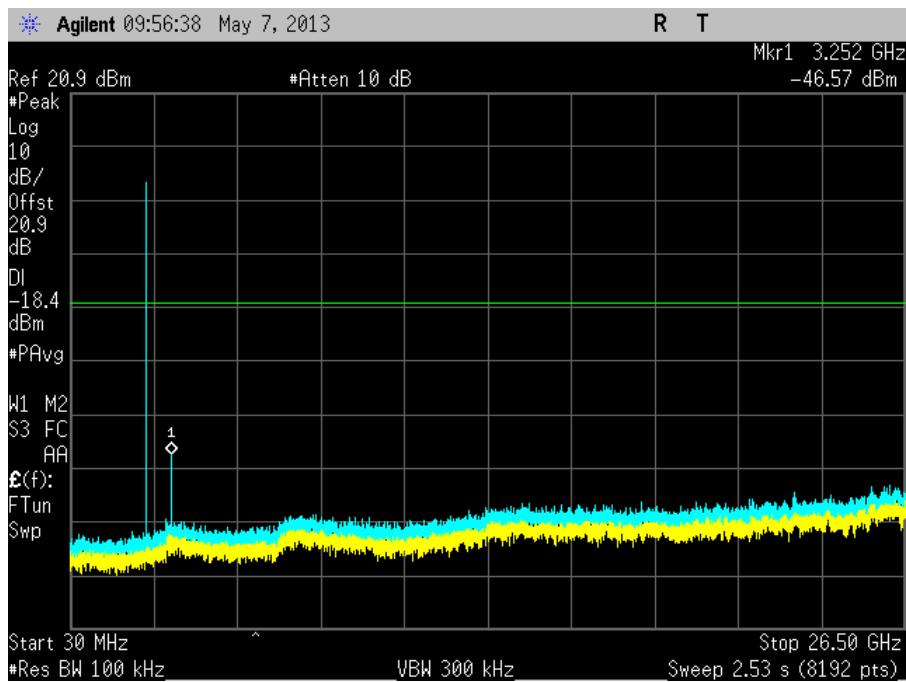
Mid Channel (GFSK)



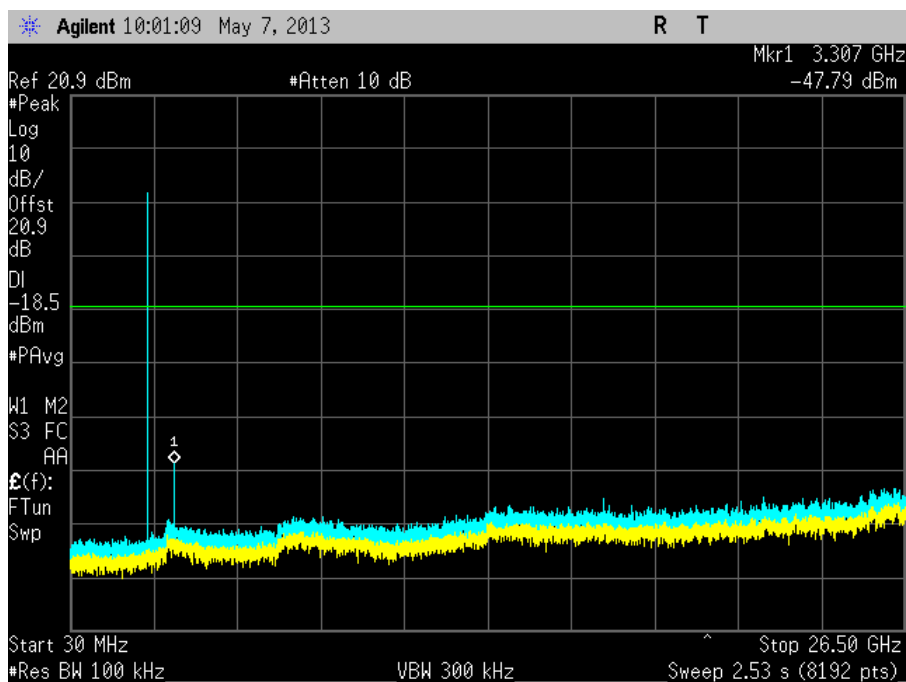
High Channel (GFSK)



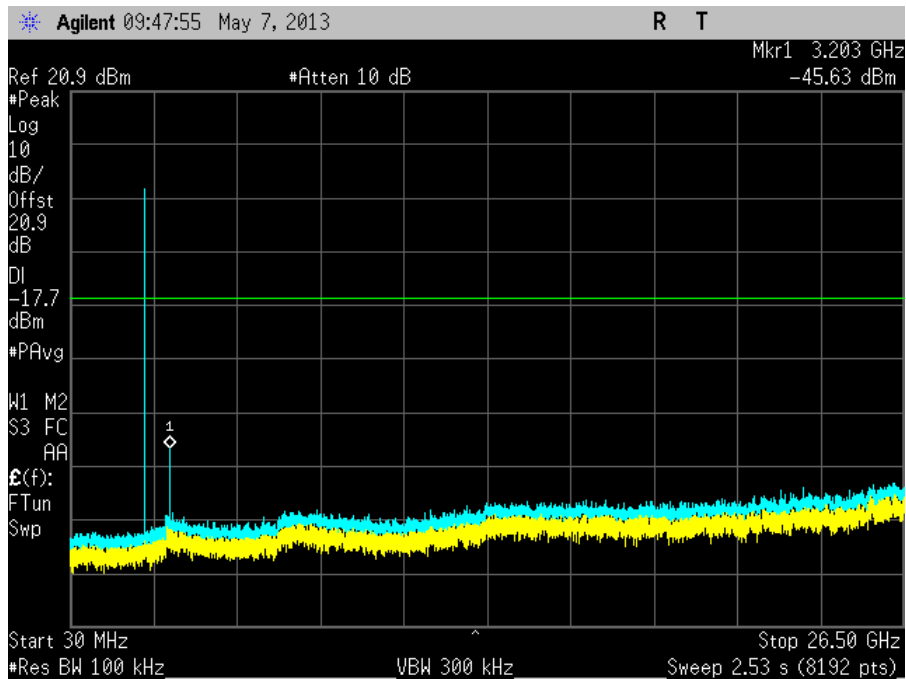
Low Channel ($\pi/4$ -DQPSK)



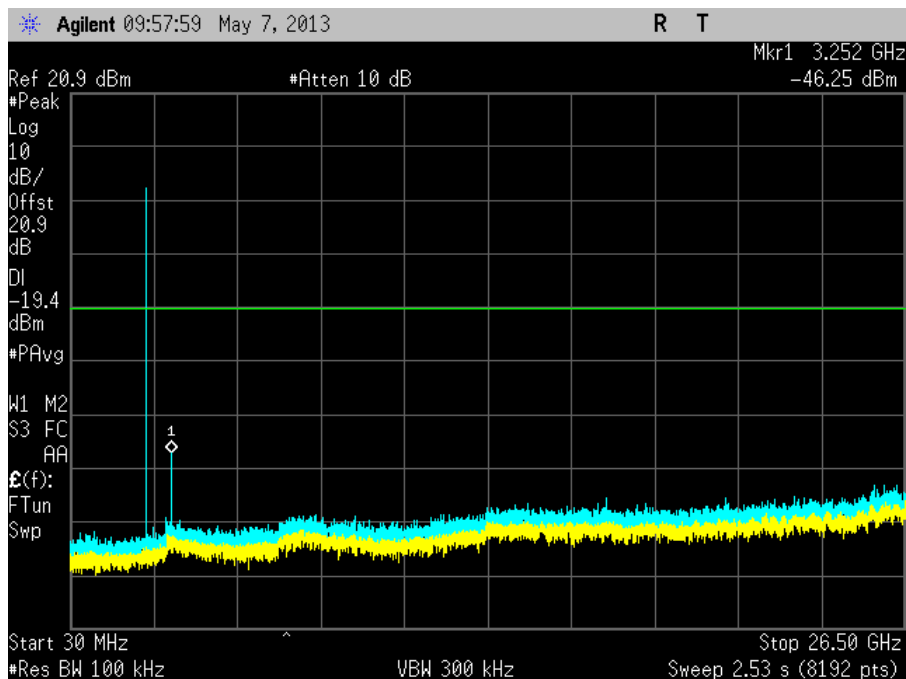
Mid Channel ($\pi/4$ -DQPSK)



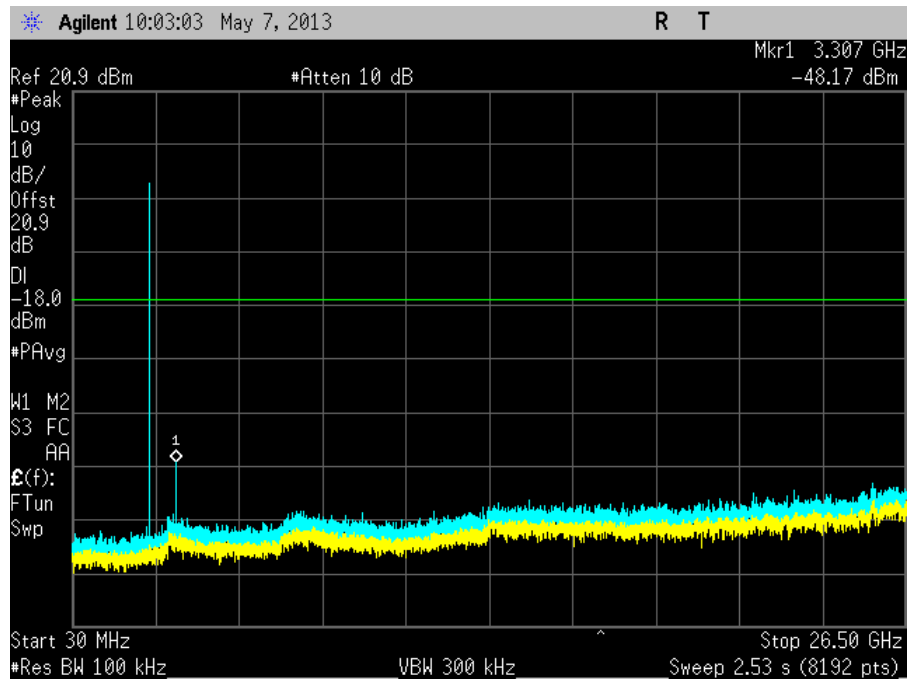
High Channel ($\pi/4$ -DQPSK)



Low Channel (8DPSK)



Mid Channel (8DPSK)



High Channel (8DPSK)

2.9 SPURIOUS RADIATED EMISSIONS

2.9.1 Specification Reference

Part 15 Subpart C §15.247(d)

2.9.2 Standard Applicable

(d) In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

2.9.3 Equipment Under Test and Modification State

Serial No: 20130418001833 / Test Configuration B

2.9.4 Date of Test/Initial of test personnel who performed the test

May 03 and 06, 2013/FSC

2.9.5 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.9.6 Environmental Conditions

Ambient Temperature	25.4-25.8°C
Relative Humidity	43.5-44.5%
ATM Pressure	98.7-99.0 kPa

2.9.7 Additional Observations

- This is a radiated test. The spectrum was searched from 30MHz to the 10th harmonic (25GHz).
- There are no emissions found that do not comply to the restricted bands defined in FCC Part 15 Subpart C, 15.205 or Part 15.247(d).
- Only the considered worst case configuration (mid channel 8DPSK) presented for radiated emissions when not hopping. There are no significant differences in radiated emissions between the three modulation types.



- Measurement was done using EMC32 automated software. Reported level is the actual level with all the correction factors factored in. Correction Factor column is for informational purposes only. See Section 2.9.8 for sample computation.

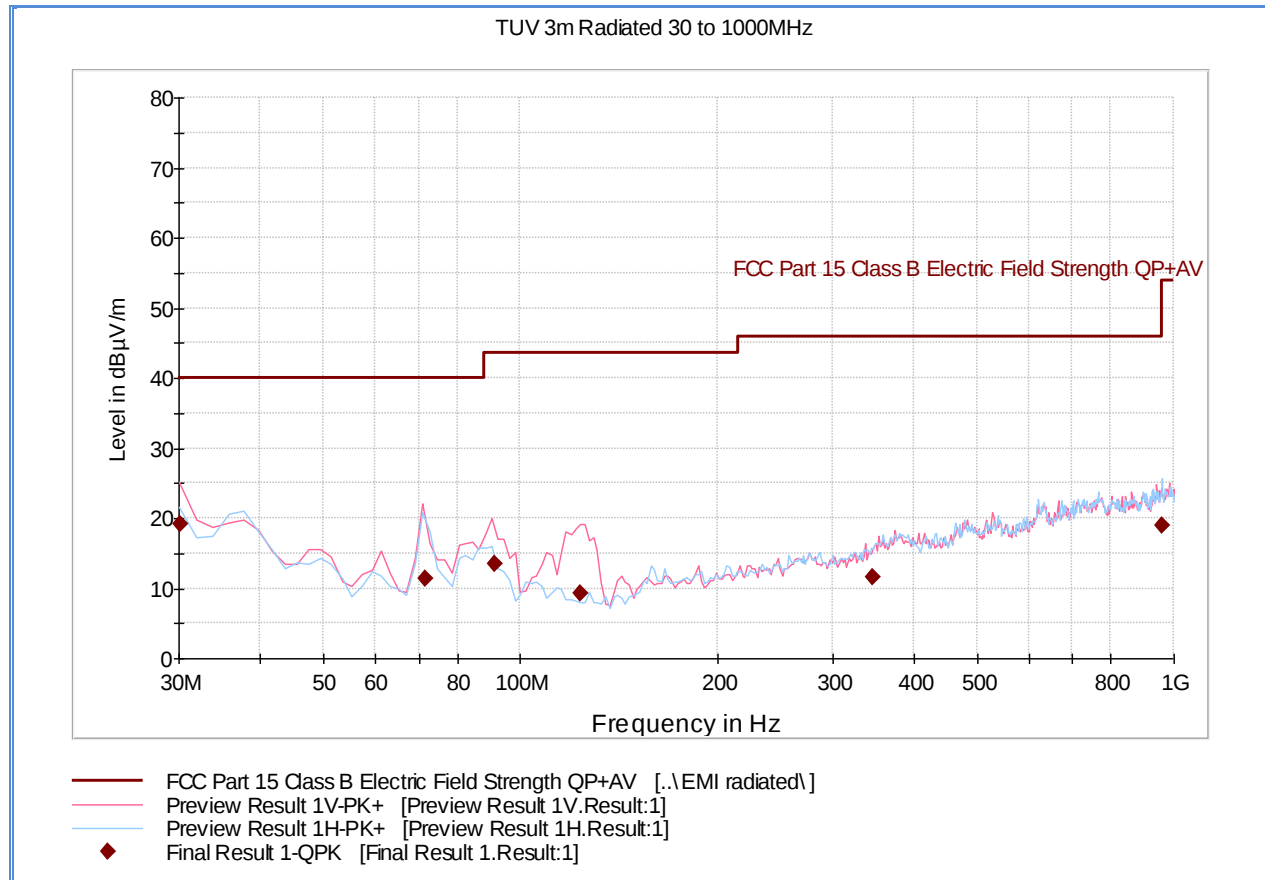
2.9.8 Sample Computation (Radiated Emission)

Measuring equipment raw measurement (db μ V) @ 30 MHz			24.4
Correction Factor (dB)	Asset# 1066 (cable)	0.3	-12.6
	Asset# 1172 (cable)	0.3	
	Asset# 1016 (preamplifier)	-30.7	
	Asset# 1175(cable)	0.3	
	Asset# 1002 (antenna)	17.2	
Reported QuasiPeak Final Measurement (db μ V/m) @ 30MHz			11.8

2.9.9 Test Results

See attached plots.

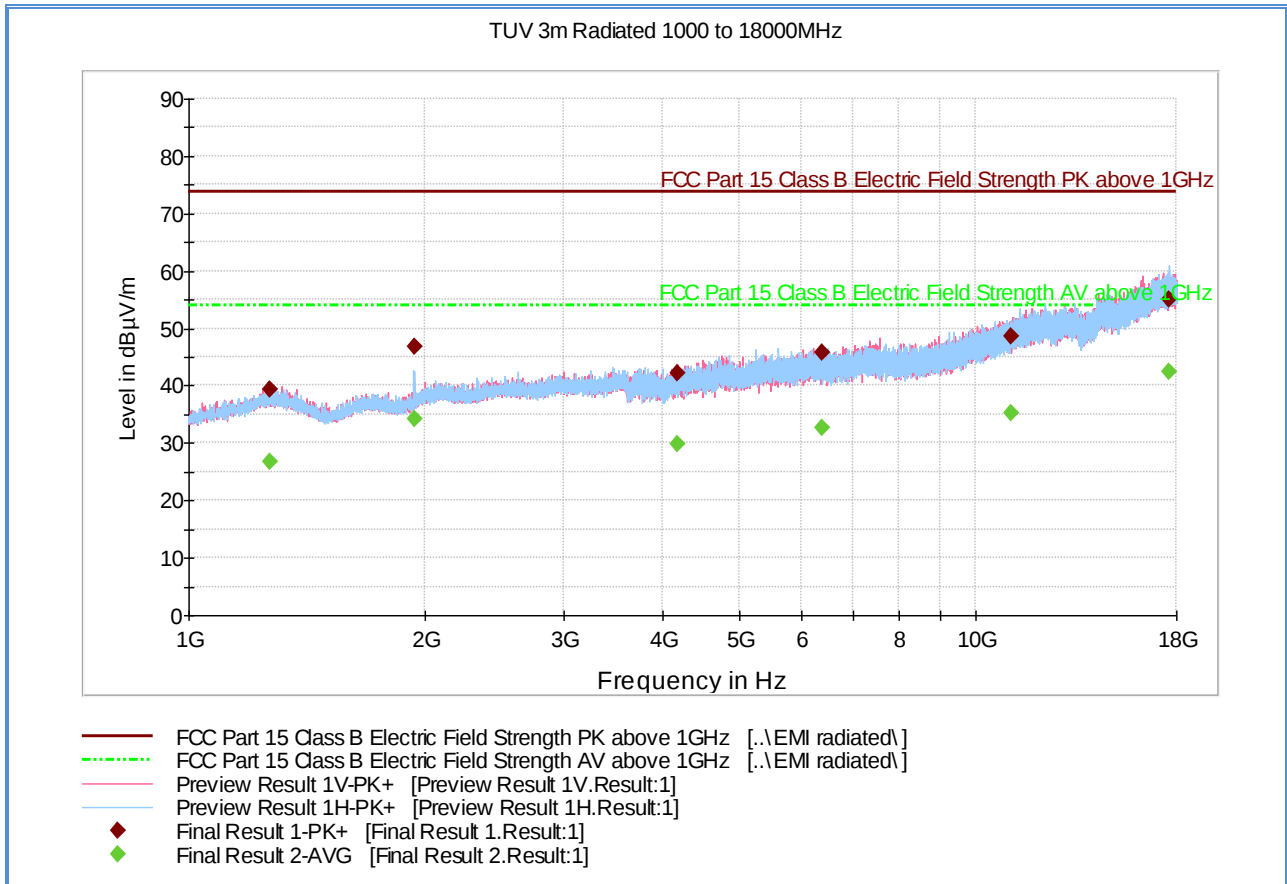
2.9.10 Test Results Below 1GHz (Receive Mode)



Quasi Peak Data

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
30.200000	19.2	1000.0	120.000	350.0	V	221.0	-11.8	20.8	40.0
71.381643	11.4	1000.0	120.000	100.0	V	332.0	-21.7	28.6	40.0
91.540521	13.6	1000.0	120.000	110.0	V	244.0	-20.3	29.9	43.5
123.586613	9.3	1000.0	120.000	105.0	V	156.0	-20.3	34.2	43.5
346.077595	11.6	1000.0	120.000	309.0	V	173.0	-10.2	34.4	46.0
960.258357	18.9	1000.0	120.000	200.0	H	129.0	0.8	35.0	53.9

2.9.11 Test Results Above 1GHz (Receive Mode)



Peak Data

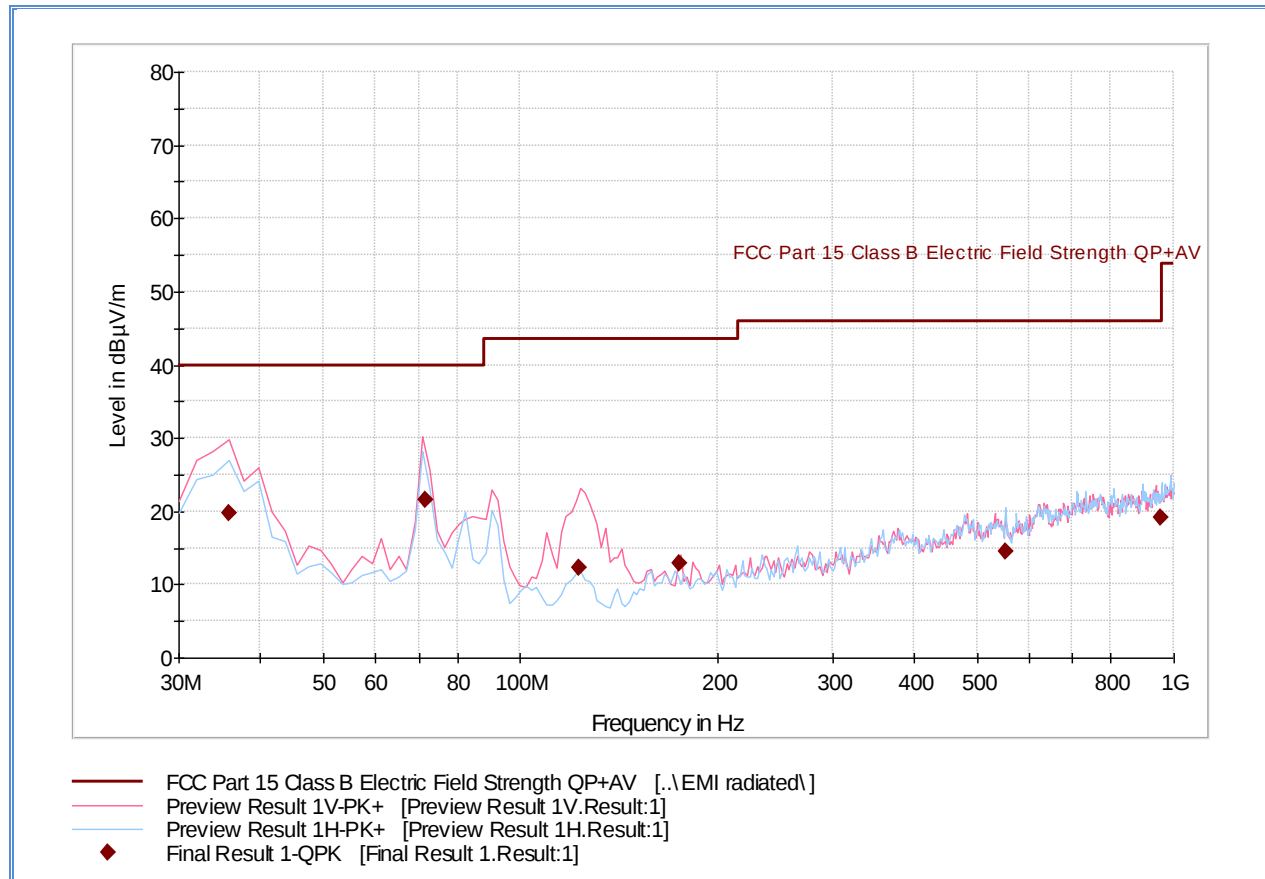
Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1270.886667	39.3	1000.0	1000.000	400.4	V	15.0	-4.8	34.6	73.9
1932.746667	46.7	1000.0	1000.000	99.8	H	43.0	-2.0	27.2	73.9
4177.726667	42.3	1000.0	1000.000	307.2	V	15.0	3.7	31.6	73.9
6369.073333	45.8	1000.0	1000.000	209.5	H	302.0	8.4	28.1	73.9
11114.333333	48.5	1000.0	1000.000	400.4	H	331.0	14.6	25.4	73.9
17648.44000	55.0	1000.0	1000.000	296.3	H	10.0	22.1	18.9	73.9

Average Data

Frequency (MHz)	Average (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1270.886667	26.9	1000.0	1000.000	400.4	V	15.0	-4.8	27.0	53.9
1932.746667	34.3	1000.0	1000.000	99.8	H	43.0	-2.0	19.6	53.9
4177.726667	29.8	1000.0	1000.000	307.2	V	15.0	3.7	24.1	53.9
6369.073333	32.5	1000.0	1000.000	209.5	H	302.0	8.4	21.4	53.9
11114.333333	35.2	1000.0	1000.000	400.4	H	331.0	14.6	18.7	53.9
17648.44000	42.3	1000.0	1000.000	296.3	H	10.0	22.1	11.6	53.9

Test Notes: No significant emissions observed.

2.9.12 Test Results Below 1GHz (Hopping worst case configuration)

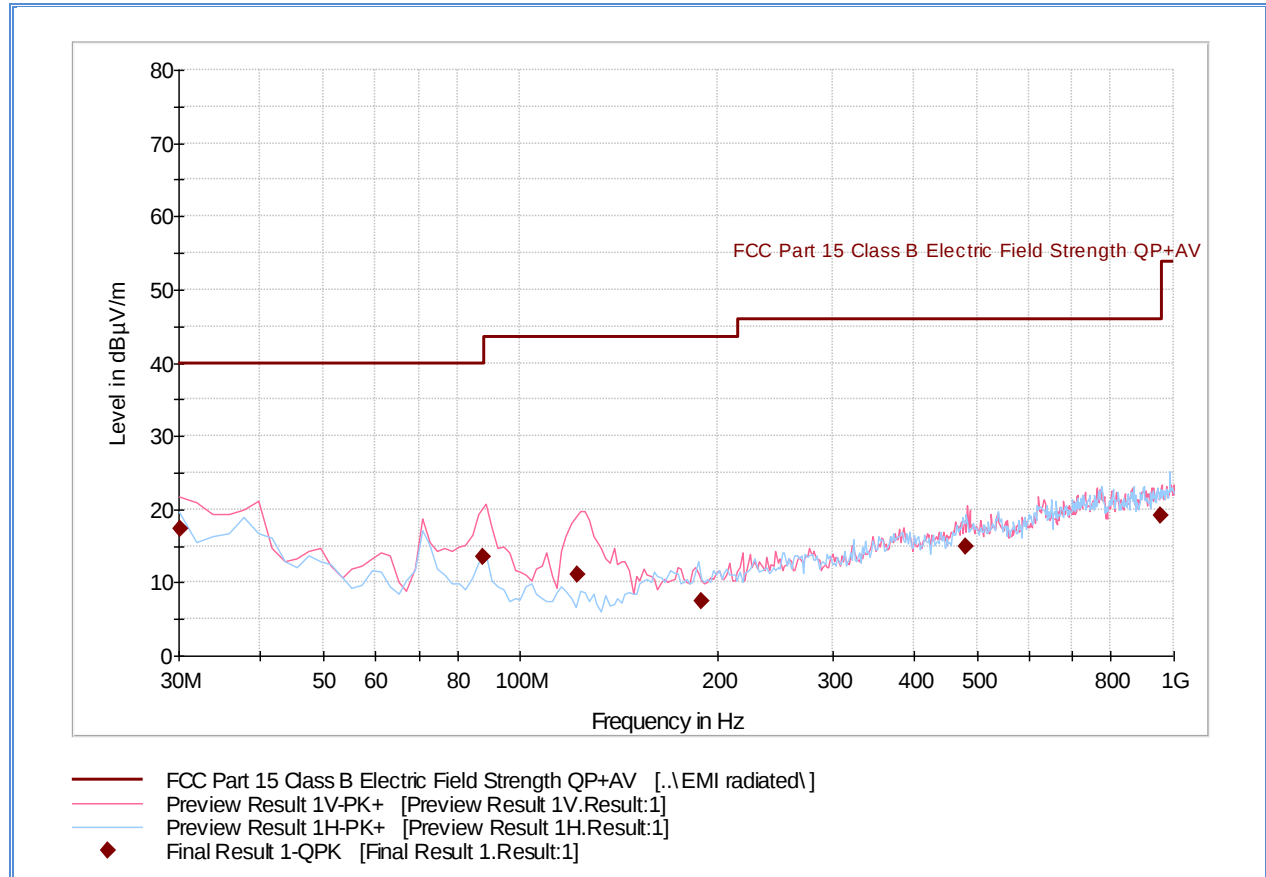


Quasi Peak Data

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
35.831663	19.8	1000.0	120.000	100.0	V	156.0	-14.9	20.2	40.0
71.621643	21.6	1000.0	120.000	100.0	V	66.0	-21.7	18.4	40.0
122.706613	12.3	1000.0	120.000	106.0	V	2.0	-20.3	31.2	43.5
175.231583	12.8	1000.0	120.000	100.0	V	290.0	-17.0	30.7	43.5
551.865812	14.4	1000.0	120.000	400.0	H	22.0	-5.8	31.6	46.0
954.514469	19.1	1000.0	120.000	349.0	H	332.0	0.5	26.9	46.0

Test Notes:

2.9.13 Test Results Below 1GHz (Non-hopping worst case configuration)

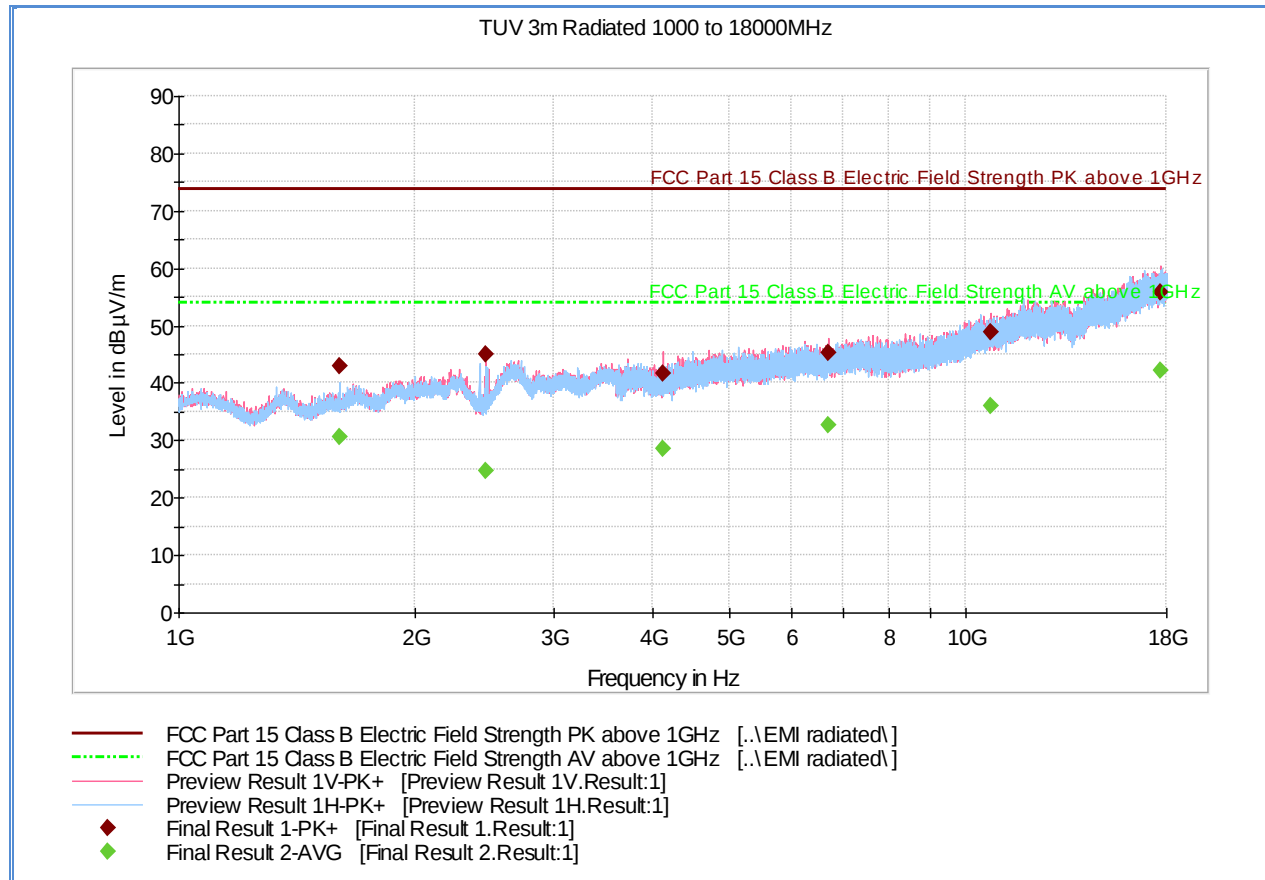


Quasi Peak Data

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
30.160000	17.3	1000.0	120.000	160.0	V	312.0	-11.8	22.7	40.0
87.772745	13.6	1000.0	120.000	109.0	V	68.0	-20.7	26.4	40.0
122.106613	11.1	1000.0	120.000	110.0	V	112.0	-20.3	32.4	43.5
189.174910	7.4	1000.0	120.000	181.0	H	49.0	-15.9	36.1	43.5
480.725852	14.8	1000.0	120.000	308.0	V	178.0	-6.0	31.2	46.0
955.914469	19.1	1000.0	120.000	100.0	V	330.0	0.6	26.9	46.0

Test Notes:

2.9.14 Test Results Above 1GHz (Hopping worst case configuration)



Peak Data

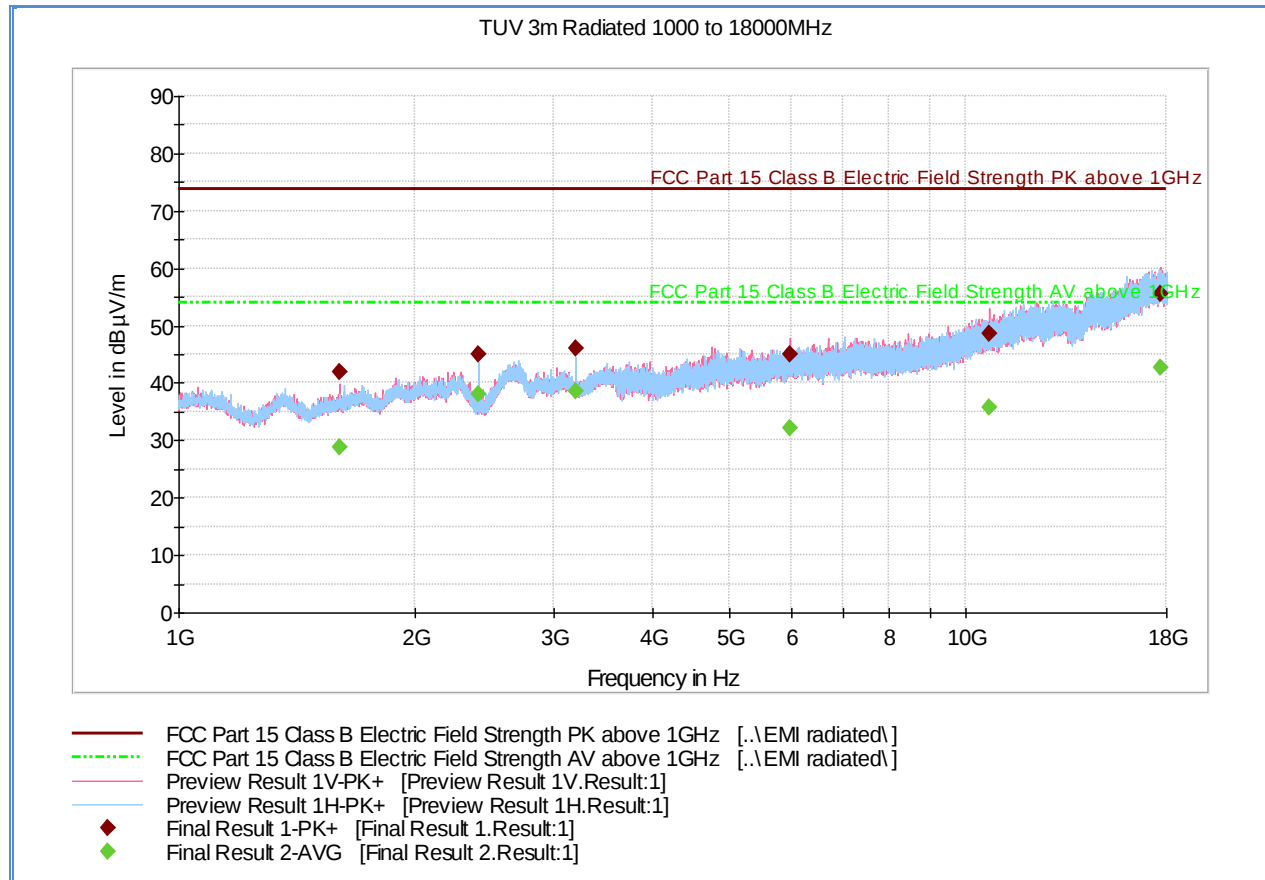
Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1600.200000	42.9	1000.0	1000.000	224.5	H	332.0	-4.3	31.0	73.9
2456.026667	44.9	1000.0	1000.000	101.8	V	56.0	-0.2	29.0	73.9
4128.866667	41.5	1000.0	1000.000	156.7	V	116.0	3.7	32.4	73.9
6703.553333	45.2	1000.0	1000.000	201.6	V	154.0	8.5	28.7	73.9
10774.366667	48.8	1000.0	1000.000	375.1	V	245.0	13.8	25.1	73.9
17713.893333	55.7	1000.0	1000.000	202.5	V	109.0	22.1	18.2	73.9

Average Data

Frequency (MHz)	Average (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1600.200000	30.5	1000.0	1000.000	224.5	H	332.0	-4.3	23.4	53.9
2456.026667	24.6	1000.0	1000.000	101.8	V	56.0	-0.2	29.3	53.9
4128.866667	28.6	1000.0	1000.000	156.7	V	116.0	3.7	25.3	53.9
6703.553333	32.7	1000.0	1000.000	201.6	V	154.0	8.5	21.2	53.9
10774.366667	36.0	1000.0	1000.000	375.1	V	245.0	13.8	17.9	53.9
17713.893333	42.2	1000.0	1000.000	202.5	V	109.0	22.1	11.7	53.9

Test Notes: Measurement was performed with a 2.4GHz notch filter. No significant emissions observed above 3GHz. Measurements above 3GHz are noise floor figures.

2.9.15 Test Results Above 1GHz (Non-hopping worst case configuration low channel)



Peak Data

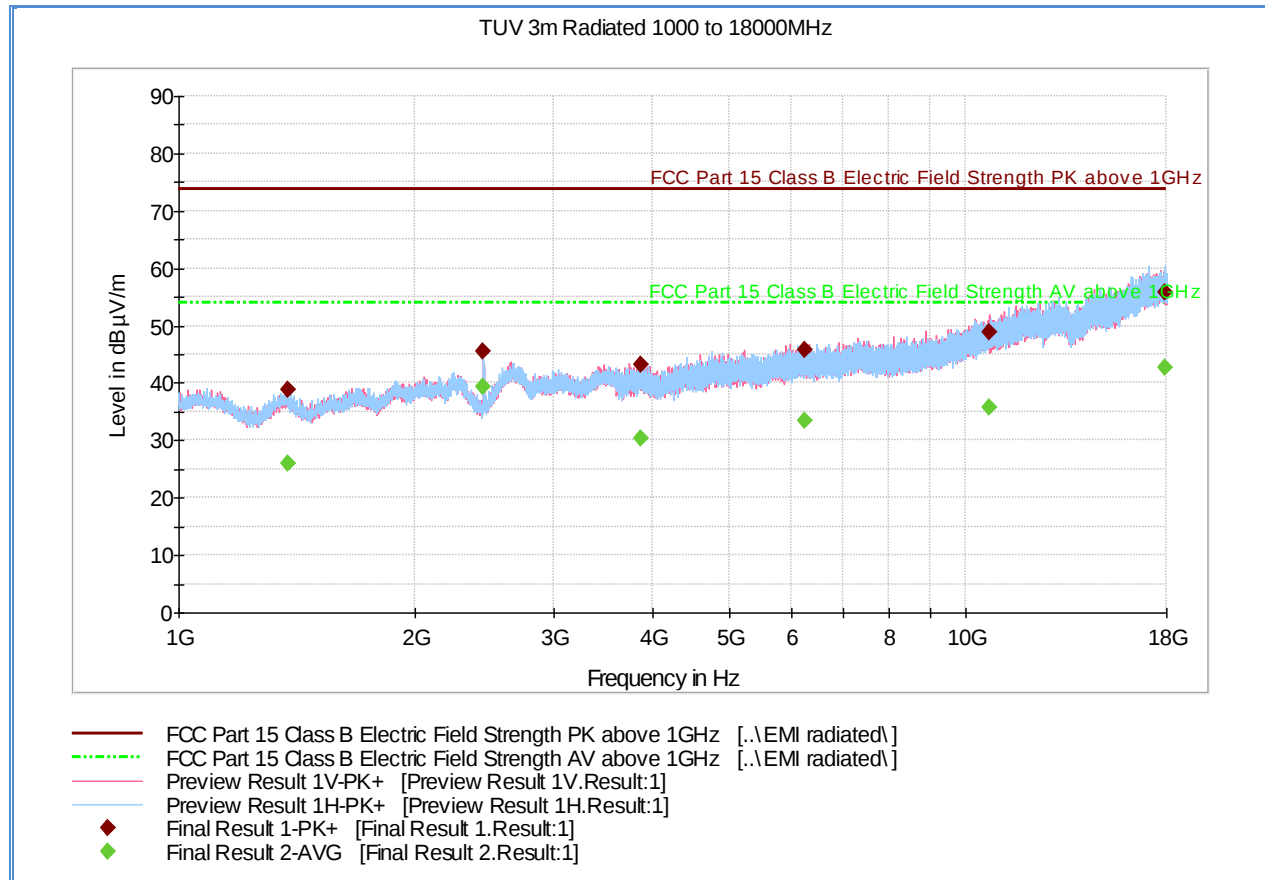
Frequency (MHz)	MaxPeak (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
1599.833333	41.8	1000.0	1000.000	208.5	V	33.0	-4.3	32.1	73.9
2402.153333	45.0	1000.0	1000.000	101.8	H	358.0	-0.4	28.9	73.9
3202.653333	45.9	1000.0	1000.000	102.8	H	265.0	1.4	28.0	73.9
5975.433333	44.9	1000.0	1000.000	275.3	V	9.0	7.7	29.0	73.9
10708.473333	48.6	1000.0	1000.000	400.3	V	9.0	13.8	25.3	73.9
17659.246667	55.5	1000.0	1000.000	190.6	V	96.0	22.1	18.5	73.9

Average Data

Frequency (MHz)	Average (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
1599.833333	28.9	1000.0	1000.000	208.5	V	33.0	-4.3	25.0	53.9
2402.153333	38.2	1000.0	1000.000	101.8	H	358.0	-0.4	15.7	53.9
3202.653333	38.6	1000.0	1000.000	102.8	H	265.0	1.4	15.3	53.9
5975.433333	32.2	1000.0	1000.000	275.3	V	9.0	7.7	21.7	53.9
10708.473333	35.7	1000.0	1000.000	400.3	V	9.0	13.8	18.2	53.9
17659.246667	42.7	1000.0	1000.000	190.6	V	96.0	22.1	11.2	53.9

Test Notes: Measurement was performed with a 2.4GHz notch filter. No significant emissions observed above 4GHz. Measurements above 4GHz are noise floor figures.

2.9.16 Test Results Above 1GHz (Non-hopping worst case configuration mid channel)



Peak Data

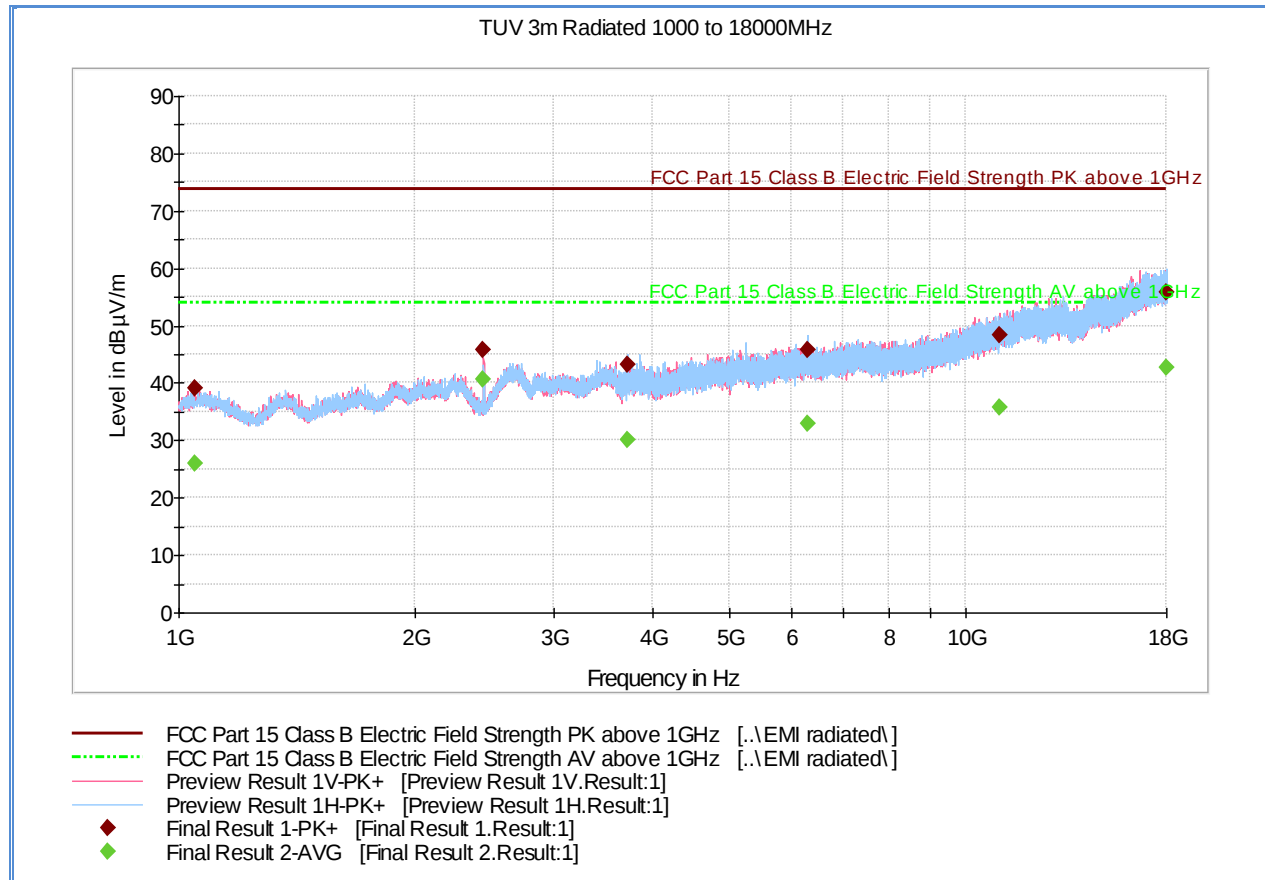
Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1374.506667	38.8	1000.0	1000.000	354.1	H	177.0	-4.9	35.1	73.9
2440.160000	45.6	1000.0	1000.000	102.8	H	29.0	-0.3	28.3	73.9
3868.900000	43.3	1000.0	1000.000	400.3	V	130.0	3.2	30.6	73.9
6256.666667	45.7	1000.0	1000.000	103.8	H	155.0	8.5	28.2	73.9
10709.006667	48.9	1000.0	1000.000	310.2	V	146.0	13.8	25.0	73.9
17913.966667	55.9	1000.0	1000.000	201.5	H	345.0	22.4	18.0	73.9

Average Data

Frequency (MHz)	Average (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1374.506667	26.1	1000.0	1000.000	354.1	H	177.0	-4.9	27.8	53.9
2440.160000	39.4	1000.0	1000.000	102.8	H	29.0	-0.3	14.5	53.9
3868.900000	30.4	1000.0	1000.000	400.3	V	130.0	3.2	23.5	53.9
6256.666667	33.3	1000.0	1000.000	103.8	H	155.0	8.5	20.6	53.9
10709.006667	35.7	1000.0	1000.000	310.2	V	146.0	13.8	18.2	53.9
17913.966667	42.8	1000.0	1000.000	201.5	H	345.0	22.4	11.1	53.9

Test Notes: Measurement was performed with a 2.4GHz notch filter. No significant emissions observed above 3GHz. Measurements above 3GHz are noise floor figures.

2.9.17 Test Results Above 1GHz (Non-hopping worst case configuration high channel)



Peak Data

Frequency (MHz)	MaxPeak (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
1046.526667	39.1	1000.0	1000.000	157.7	V	179.0	-6.0	34.8	73.9
2440.000000	45.9	1000.0	1000.000	142.7	V	101.0	-0.3	28.0	73.9
3725.560000	43.2	1000.0	1000.000	400.3	H	312.0	3.0	30.7	73.9
6288.713333	45.7	1000.0	1000.000	396.1	H	305.0	8.4	28.2	73.9
11052.773333	48.3	1000.0	1000.000	377.1	V	265.0	14.6	25.6	73.9
17987.346667	55.8	1000.0	1000.000	298.3	H	174.0	22.7	18.1	73.9

Average Data

Frequency (MHz)	Average (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
1046.526667	26.1	1000.0	1000.000	157.7	V	179.0	-6.0	27.8	53.9
2440.000000	40.5	1000.0	1000.000	142.7	V	101.0	-0.3	13.4	53.9
3725.560000	30.1	1000.0	1000.000	400.3	H	312.0	3.0	23.8	53.9
6288.713333	33.0	1000.0	1000.000	396.1	H	305.0	8.4	20.9	53.9
11052.773333	35.7	1000.0	1000.000	377.1	V	265.0	14.6	18.2	53.9
17987.346667	42.7	1000.0	1000.000	298.3	H	174.0	22.7	11.2	53.9

Test Notes: Measurement was performed with a 2.4GHz notch filter. No significant emissions observed above 3GHz. Measurements above 3GHz are noise floor figures.

2.10 RADIATED BAND EDGE MEASUREMENTS AND IMMEDIATE RESTRICTED BANDS

2.10.1 Specification Reference

Part 15 Subpart C §15.247(d)

2.10.2 Standard Applicable

(d) In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

2.10.3 Equipment Under Test and Modification State

Serial No: 20130418001833 / Test Configuration B

2.10.4 Date of Test/Initial of test personnel who performed the test

May 03 and 06, 2013/FSC

2.10.5 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.10.6 Environmental Conditions

Ambient Temperature	25.4-25.8°C
Relative Humidity	43.5-44.5%
ATM Pressure	98.7-99.0 kPa

2.10.7 Additional Observations

- This is a radiated test. The spectrum was searched from 2310MHz to 2390MHz for lower immediate restricted band and 2483.5MHz to 2500MHz for the upper immediate restricted band.
- Radiated band edge using 100 kHz RBW was also performed @ 2400 MHz band edge.
- There are no emissions found that do not comply with the restricted bands defined in FCC Part 15 Subpart C, 15.205.



- No significant differences observed when the EUT is in hopping or non-hopping mode. Non-hopping mode presented.
- Measurement was done using EMC32 automated software. Reported level is the actual level with all the correction factors factored in. Correction Factor column is for informational purposes only. See Section 2.8.8 for sample computation.

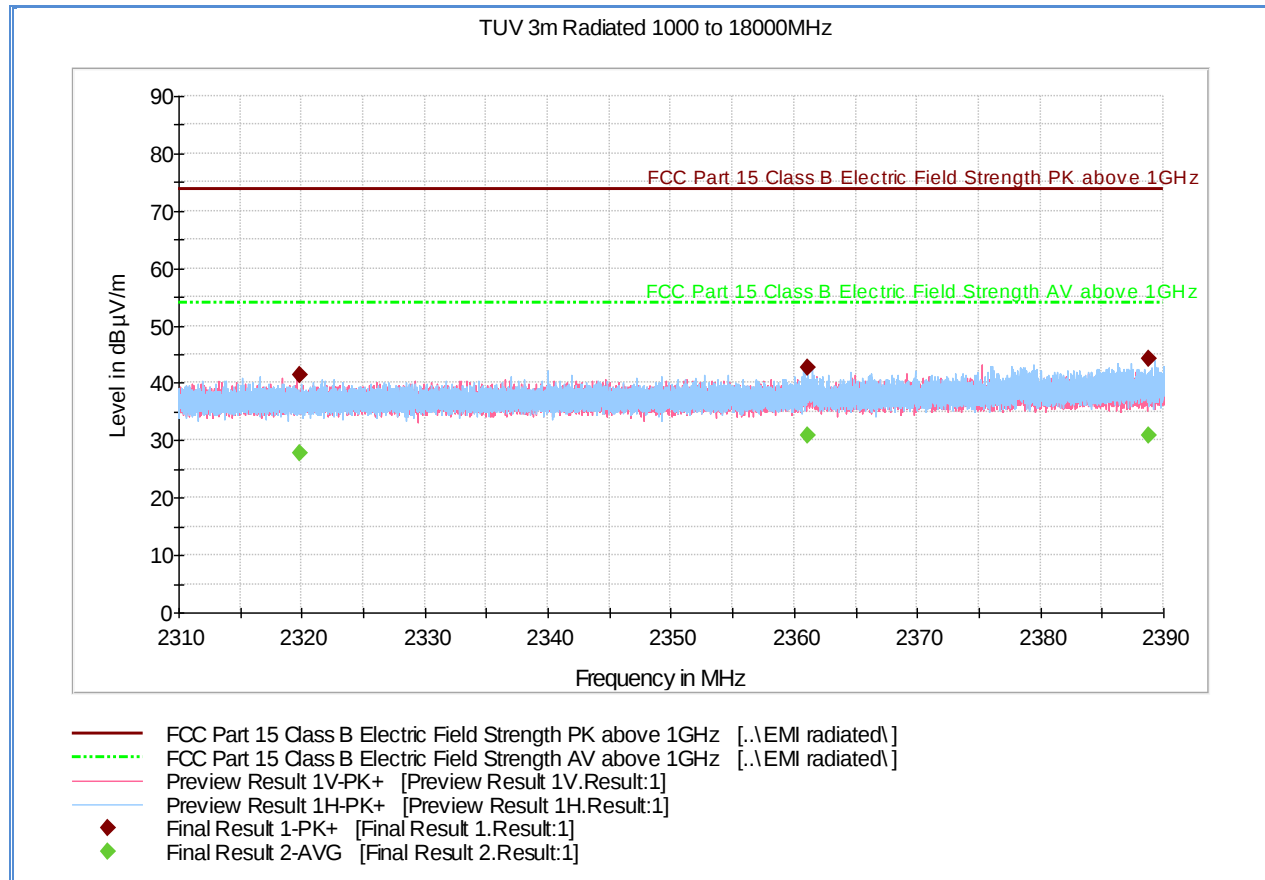
2.10.8 Sample Computation (Radiated Emission)

Measuring equipment raw measurement (db μ V) @ 2400 MHz			53.9
Correction Factor (dB)	Asset# 1153 (cable)	3.4	-0.4
	Asset# 8628(preamplifier)	-36.5	
	Asset#7575 (antenna)	32.7	
Reported Max Peak Final Measurement (db μ V/m) @ 2400 MHz			53.5

2.10.9 Test Results

See attached plots.

2.10.10 Test Results 2310MHz to 2390MHz (Non-hopping low channel)



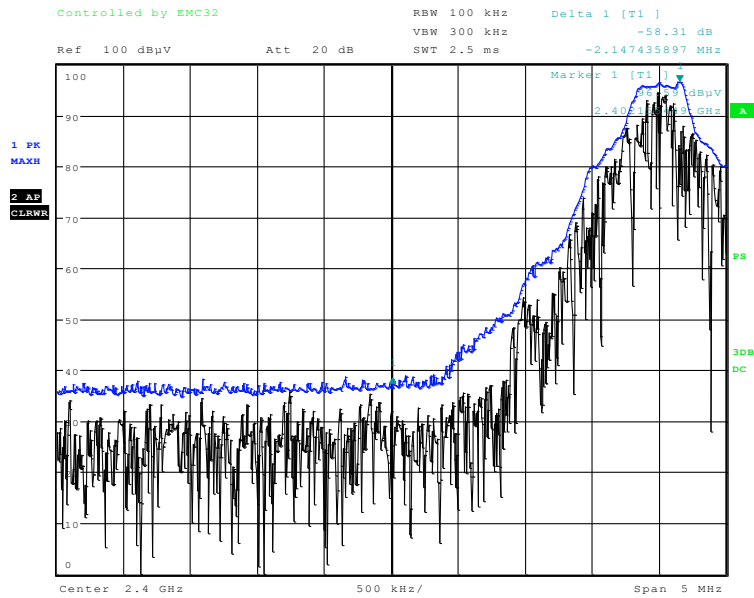
Peak Data

Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
2319.886667	41.3	1000.0	1000.000	266.4	V	175.0	-0.8	32.6	73.9
2361.145333	42.6	1000.0	1000.000	225.5	H	35.0	-0.6	31.3	73.9
2388.798667	44.4	1000.0	1000.000	128.8	H	0.0	-0.5	29.5	73.9

Average Data

Frequency (MHz)	Average (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
2319.886667	27.8	1000.0	1000.000	266.4	V	175.0	-0.8	26.1	53.9
2361.145333	30.7	1000.0	1000.000	225.5	H	35.0	-0.6	23.2	53.9
2388.798667	30.9	1000.0	1000.000	128.8	H	0.0	-0.5	23.0	53.9

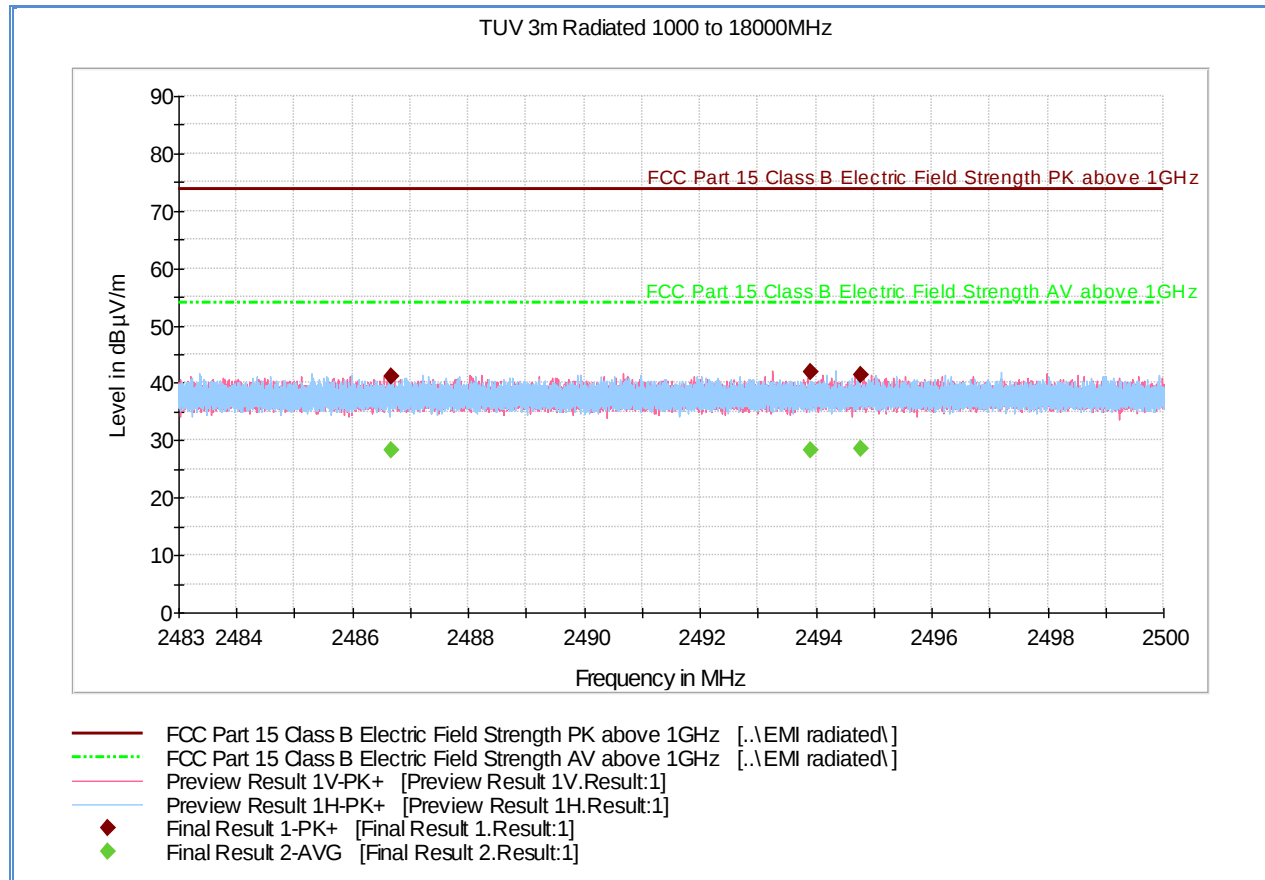
2.10.11 Test Results Lower Band Edge (Radiated - Low Channel using 100 kHz RBW)



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Test Notes: Carrier frequency (Low Channel) was maximized for this test. Correction factor of -0.4dB is from the cable, antenna and preamp used. Limit for this test is -20dBc. The highest measured emission close to the lower band edge is -58.31. EUT complies.

2.10.12 Test Results 2483.5MHz to 2500MHz (Non-hopping high channel)



Peak Data

Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
2486.663567	41.3	1000.0	1000.000	254.4	V	123.0	-0.2	32.6	73.9
2493.918367	41.8	1000.0	1000.000	400.2	V	47.0	-0.1	32.1	73.9
2494.762967	41.3	1000.0	1000.000	400.2	H	199.0	-0.1	32.6	73.9

Average Data

Frequency (MHz)	Average (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
2486.663567	28.4	1000.0	1000.000	254.4	V	123.0	-0.2	25.5	53.9
2493.918367	28.4	1000.0	1000.000	400.2	V	47.0	-0.1	25.5	53.9
2494.762967	28.4	1000.0	1000.000	400.2	H	199.0	-0.1	25.5	53.9

2.11 RECEIVER SPURIOUS EMISSIONS

2.11.1 Specification Reference

RSS-Gen 6.0

2.11.2 Standard Applicable

Receivers shall comply with the limits of spurious emissions set out in this section, measured over the frequency range determined in accordance with Section 4.10 of RSS-Gen.

Table 2: Radiated Limits of Receiver Spurious Emissions

Frequency (MHz)	Field Strength (microvolts/m at 3 metres)*
30-88	100
88-216	150
216-960	200
Above 960	500

*Measurements for compliance with limits in the above table may be performed at distances other than 3 metres, in accordance with Section 7.2.7 of RSS-Gen.

2.11.3 Equipment Under Test and Modification State

Serial No: 20130418001833 / Test Configuration B

2.11.4 Date of Test/Initial of test personnel who performed the test

May 03 and 06, 2013/FSC

2.11.5 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.11.6 Environmental Conditions

Ambient Temperature	25.4-25.8°C
Relative Humidity	43.5-44.5%
ATM Pressure	98.7-99.0 kPa

2.11.7 Additional Observations

- This is a radiated test. The spectrum was searched from 30MHz to the 3rd harmonic (up to 10th performed).
- Result identical to Section 2.9.10 and 2.9.11 of this test report.
- EUT in RX (Receive) mode configuration.



SECTION 3

TEST EQUIPMENT USED



3.1 TEST EQUIPMENT USED

List of absolute measuring and other principal items of test equipment.

ID Number (SDGE/SDRB)	Test Equipment	Type	Serial Number	Manufacturer	Cal Date	Cal Due Date
Conducted Port Setup						
7569	Series Power Meter	N1911A P-	MY45100625	Agilent	04/15/13	04/15/14
5217 (loaner from Techmaster)	50MHz-18GHz Wideband Power Sensor	N1921A	MY45240180	Agilent	10/18/12	02/18/14
6814	PSA Series Spectrum Analyzer	E4440A	MY42510441	Agilent	11/07/12	11/07/13
	20dB Attenuator	34-20-34	BP4180	MCE/Weinschel	Verified by 6814 and 1003	
8686	20dB Attenuator	0846	BW-N20W5+	MCL	Verified by 6814 and 1003	
Radiated Test Setup						
1033	Bilog Antenna	3142C	00044556	EMCO	05/23/12	05/23/13
7575	Double-ridged waveguide horn antenna	3117	00155511	EMCO	03/25/13	03/25/14
8628	Pre-amplifier	QLJ 01182835-JO	8986002	QuinStar Technologies Inc.	09/21/12	09/21/13
1153	High-frequency cable	SucoFlex 100 SX	N/A	Suhner	09/21/12	09/21/13
1040	EMI Test Receiver	ESIB40	100292	Rhode & Schwarz	08/10/12	08/10/13
1049	EMI Test Receiver	ESU	100133	Rhode & Schwarz	06/13/12	06/13/13
1016	Pre-amplifier	PAM-0202	187	PAM	09/24/12	09/24/13
Miscellaneous						
	Test Software	EMC32	V8.53	Rhode & Schwarz	N/A	
1003	Signal Generator	SMR-40	1104.0002.40	Rhode & Schwarz	11/12/12	11/12/13
6452	Multimeter	3478A	2911A52177	Hewlett Packard	07/16/12	07/16/13
7560	Barometer/Temperature /Humidity Transmitter	iBTHX-W	1240476	Omega	11/19/12	11/19/13
7539	DC Power Supply	6434B	1140A01866	Hewlett Packard	Verified by 6452	

3.2 MEASUREMENT UNCERTAINTY

For a 95% confidence level, the measurement uncertainties for defined systems are:

3.2.1 Radiated Emission Measurements (Below 1GHz)

Contribution		Probability Distribution Type	Probability Distribution x_i	Standard Uncertainty $u(x_i)$	$[u(x_i)]^2$
1	Receiver/Spectrum Analyzer	Rectangular	0.45	0.26	0.07
2	Cables	Rectangular	0.50	0.29	0.08
3	Preamp	Rectangular	0.50	0.29	0.08
4	Antenna	Rectangular	0.75	0.43	0.19
5	Site	Rectangular	3.89	2.25	5.04
6	EUT Setup	Rectangular	1.00	0.58	0.33
Combined Uncertainty (u_c):					2.41
Coverage Factor (k):					2
Expanded Uncertainty:					4.82

3.2.2 Radiated Emission Measurements (Above 1GHz)

Contribution		Probability Distribution Type	Probability Distribution x_i	Standard Uncertainty $u(x_i)$	$[u(x_i)]^2$
1	Receiver/Spectrum Analyzer	Rectangular	0.57	0.33	0.11
2	Cables	Rectangular	0.70	0.40	0.16
3	Preamp	Rectangular	0.50	0.29	0.08
4	Antenna	Rectangular	0.37	0.21	0.05
5	Site	Rectangular	3.89	2.25	5.04
6	EUT Setup	Rectangular	1.00	0.58	0.33
Combined Uncertainty (u_c):					2.40
Coverage Factor (k):					2
Expanded Uncertainty:					4.81

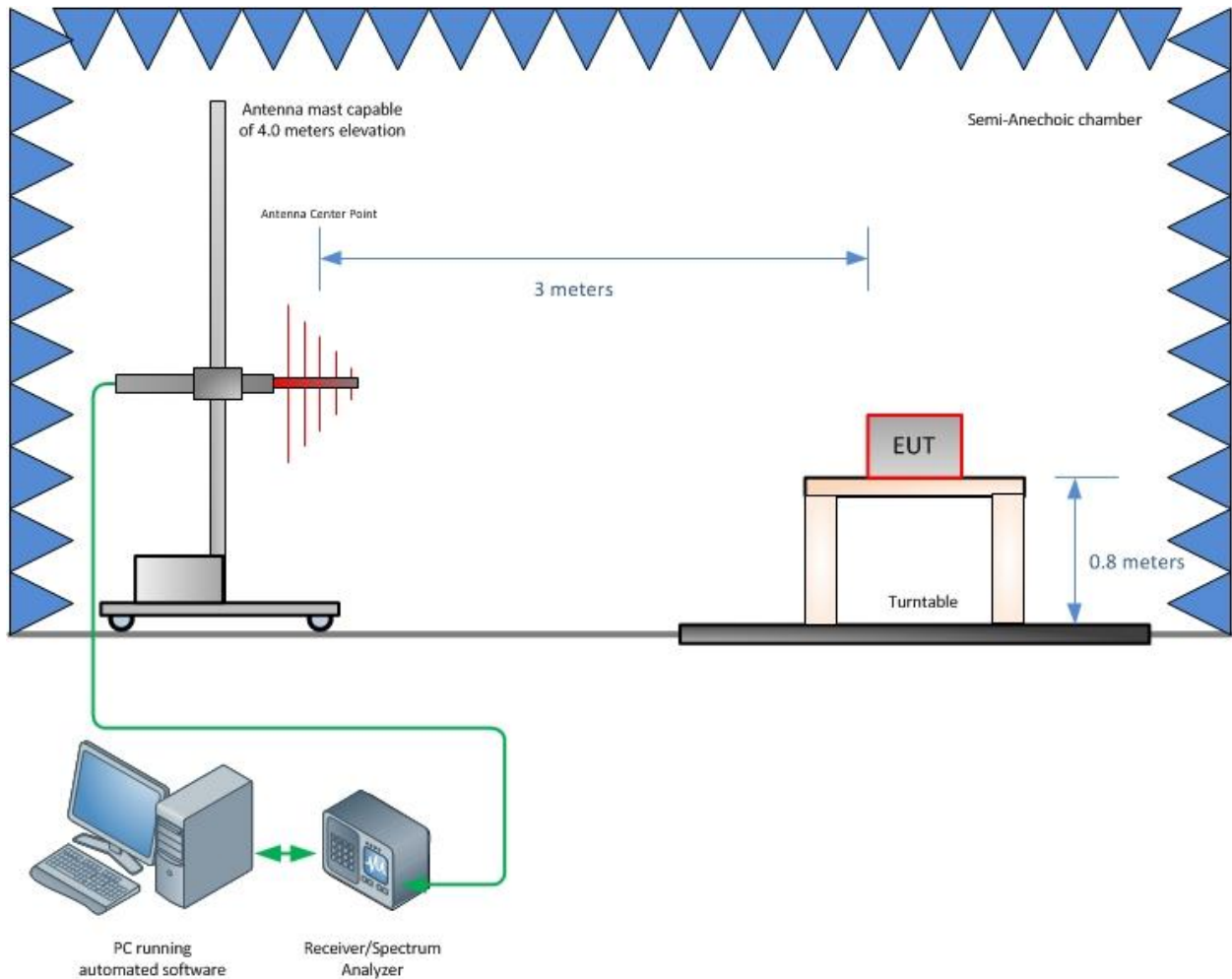
3.2.3 Conducted Antenna Port Measurement

Contribution		Probability Distribution Type	Probability Distribution x_i	Standard Uncertainty $u(x_i)$	$[u(x_i)]^2$
1	Receiver/Spectrum Analyzer	Rectangular	0.57	0.33	0.11
2	Cables	Rectangular	0.50	0.29	0.08
3	EUT Setup	Rectangular	1.00	0.58	0.33
Combined Uncertainty (u_c):					0.72
Coverage Factor (k):					2
Expanded Uncertainty:					1.45

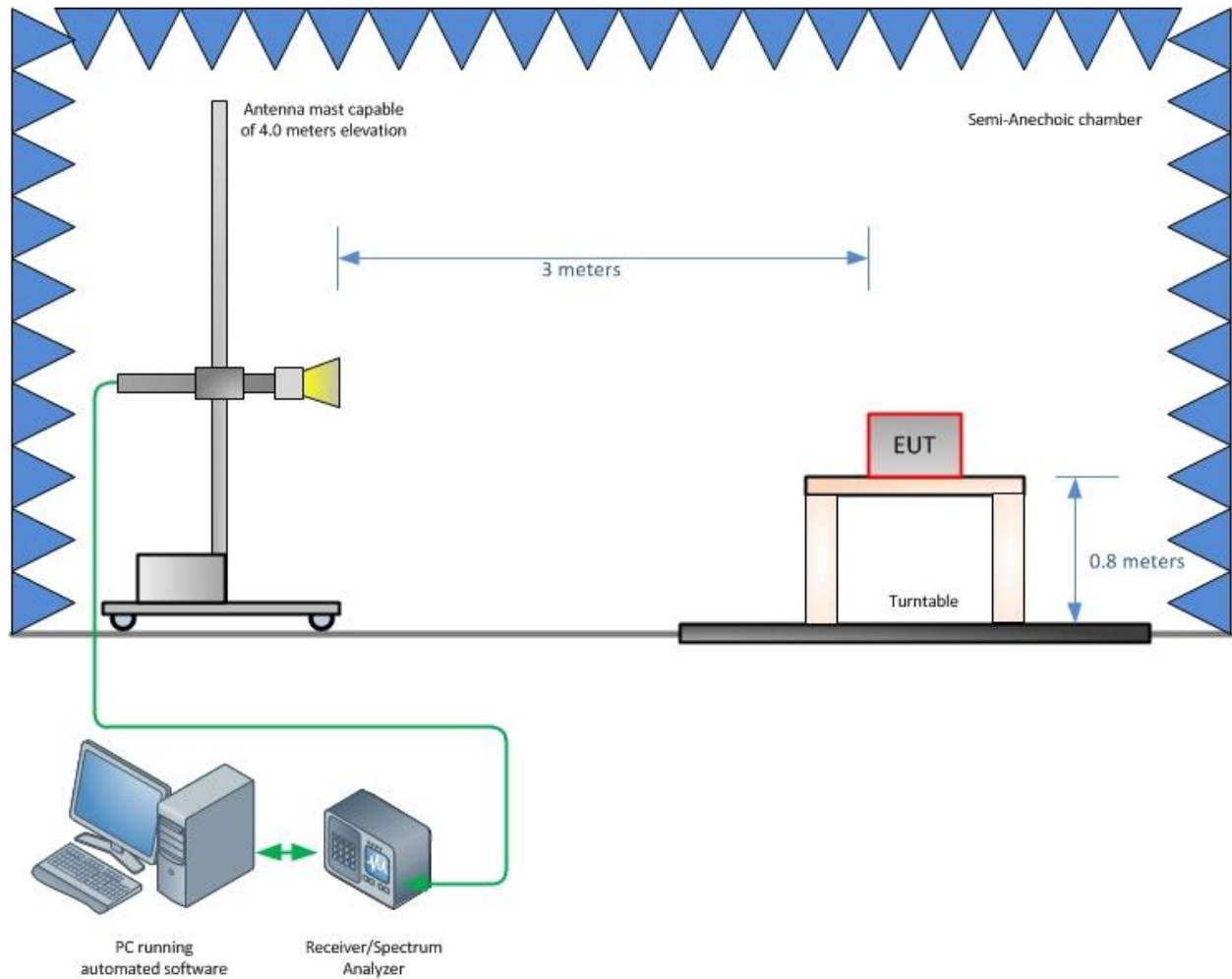
SECTION 4

DIAGRAM OF TEST SETUP

4.1 TEST SETUP DIAGRAM



Radiated Emission Test Setup (Below 1GHz)



Radiated Emission Test Setup (Above 1GHz)



SECTION 5

ACCREDITATION, DISCLAIMERS AND COPYRIGHT

5.1 ACCREDITATION, DISCLAIMERS AND COPYRIGHT

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