FCC CFR47 PART 15 SUBPART C

CERTIFICATION TEST REPORT

FOR

Bluetooth Module

MODEL NUMBER: BT12B

FCC ID: ACJ9TGBT12B

REPORT NUMBER: 32KE0147-HO-A-R1

ISSUE DATE: July 23, 2012

Prepared for
Panasonic Corporation of North America
One Panasonic Way, 4B-8
Secaucus, New Jersey, 07094, USA

Prepared by
UL Japan, Inc.
Head Office EMC Lab.
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NVLAP LAB CODE: 200572-0

This laboratory is accredited by the NVLAP LAB CODE 200572-0, U.S.A. The tests reported herein have been performed in accordance with its terms of accreditation.
*As for the range of Accreditation in NVLAP, you may refer to the WEB address, http://www.ul.com/japan/jpn/pages/services/emc/about/mark1/index.jsp#nvlap

Revision History

Rev.	Issue Date	Revisions	Revised By
--	07/17/12	Initial Issue	----------
1	07/23/12	Addition of Antenna Type (PIFA) in clause 5.3 *This report is a revised version of 32KE0147-HO-A, which is replaced with this report.	T. Hatakeda

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TABLE OF CONTENTS

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME:	Panasonic Corporation of North America One Panasonic Way, 4B-8 Secaucus, New Jersey, 07094, USA
EUT DESCRIPTION:	Bluetooth Module
MODEL:	BT12B
SERIAL NUMBER:	DVT1 (Conducted sample) DVT2 (Radiated sample)
DATE TESTED:	June 20 to 30, 2012

APPLICABLE STANDARDS	
STANDARD	**TEST RESULTS**
CFR 47 Part 15 Subpart C	Pass

UL Japan, Inc. tested the above equipment in accordance with the requirements set forth in the above standards. All indications of Pass/Fail in this report are opinions expressed by UL Japan, Inc based on interpretations and/or observations of test results. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

Note: The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. This document may not be altered or revised in any way unless done so by UL Japan, Inc. and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL Japan, Inc. will constitute fraud and shall nullify the document. No part of this report may be used to claim product certification, approval, or endorsement by any government agency.

Approved & Released For UL Japan, Inc. By:

Takahiro Hatakeda
Leader of WiSE Japan
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Tested By:

Yutaka Yoshida
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2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.10-2009, FCC CFR 47 Part 2, FCC CFR 47 Part 15.

3. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN.

UL Japan, Inc. is accredited by NVLAP, Laboratory Code 200572-0
The full scope of accreditation can be viewed at
http://www.ul.com/japan/jpn/pages/services/emc/about/mark1/index.jsp#nvlap

4. CALIBRATION AND UNCERTAINTY

4.1. MEASURING INSTRUMENT CALIBRATION

The measuring equipment utilized to perform the tests documented in this report has been calibrated in accordance with the manufacturer's recommendations, and is traceable to recognized national standards.

4.2. SAMPLE CALCULATION

Where relevant, the following sample calculation is provided:

Field Strength (dBuV/m) = Measured Voltage (dBuV) + Antenna Factor (dB/m) + Cable Loss (dB) – Preamp Gain (dB)
36.5 dBuV + 18.7 dB/m + 0.6 dB – 26.9 dB = 28.9 dBuV/m

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4.3. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

EMI
The following uncertainties have been calculated to provide a confidence level of 95% using a coverage factor k=2.

Test room (semi-anechoic chamber)	**Conducted emission (±dB)**
	150kHz-30MHz
No.1	3.1dB
No.2	3.3dB
No.3	3.7dB
No.4	3.2dB

Test room (semi-anechoic chamber)	**Radiated emission**						
	(3m*)(±dB)				**(1m*)(±dB)**		**(0.5m*)(±dB)**
	9kHz -30MHz	30MHz -300MHz	300MHz -1GHz	1GHz -10GHz	10GHz -18GHz	18GHz -26.5GHz	26.5GHz -40GHz
No.1	4.2dB	5.0dB	5.1dB	4.7dB	5.7dB	4.4dB	4.3dB
No.2	4.1dB	5.2dB	5.1dB	4.8dB	5.6dB	4.3dB	4.2dB
No.3	4.5dB	5.0dB	5.2dB	4.8dB	5.6dB	4.5dB	4.2dB
No.4	4.7dB	5.2dB	5.2dB	4.8dB	5.6dB	5.1dB	4.2dB

*3m/1m/0.5m = Measurement distance

Power meter (±dB)	
Below 1GHz	Above 1GHz
1.0dB	1.0dB

Antenna terminal conducted emission and Power density (±dB)			**Antenna terminal conducted emission (±dB)**		**Channel power (±dB)**
Below 1GHz	1GHz-3GHz	3GHz-18GHz	18GHz-26.5GHz	26.5GHz-40GHz	
1.0dB	1.1dB	2.7dB	3.2dB	3.3dB	1.5dB

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5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The EUT is a Bluetooth Module, Model BT12B.

The radio module is manufactured by Panasonic.

5.2. MAXIMUM OUTPUT POWER

The transmitter has a maximum peak conducted output power as follows:

Frequency Range (MHz)	Mode	Output Power (dBm)	Output Power (mW)
2402 - 2480	Basic GFSK	1.48	1.41
2402 - 2480	Enhanced 8PSK	2.81	1.91

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes a PIFA antenna with a maximum gain of -0.48dBi.

5.4. SOFTWARE AND FIRMWARE

The EUT driver software installed during testing was ALPS module with CSR BlueCore08 Bluetooth, v2.4.0.0.

The test utility software used during testing was CSR BlueTest3, v2.4 Release Build.

5.5. WORST-CASE CONFIGURATIONS AND MODE

The worst-case data rate for each mode is determined to be as follows, based on preliminary tests of the chipset utilized in this radio.

All final tests in the GFSK mode were made at 1 Mb/s.
All final tests in the 8PSK mode were made at 3 Mb/s.

The EUT was investigated in three different positions, X, Y, & Z and turned out the X (Horizontal), X (Vertical) were worst-position for Module and the X (Horizontal), Y (Vertical) for Antenna. This worst position will be set for all radiated emissions testing.

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5.6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

PERIPHERAL SUPPORT EQUIPMENT LIST				
Description	**Manufacturer**	**Model**	**Serial Number**	**FCC ID**
Laptop PC	Panasonic	CF-SX2J03YS	2SKSA00563	DoC
AC Adaptor	Panasonic	CF-AA6503A M4	6503AM412213669	N/A

I/O CABLES

Cable No.	Port	# of Identical Ports	Connector Type	Cable Type	Cable Length (m)	Remarks
1	I/O	1	I/O	Unshielded	0.1	
2	DC	1	USB	Unshielded	1.3	*1)
3	AC	1	DC	Unshielded	1.8	

*1) It was confirmed that tha a ferrite core did not affect the emission test result

TEST SETUP

The EUT is configured as shown in the setup diagram.

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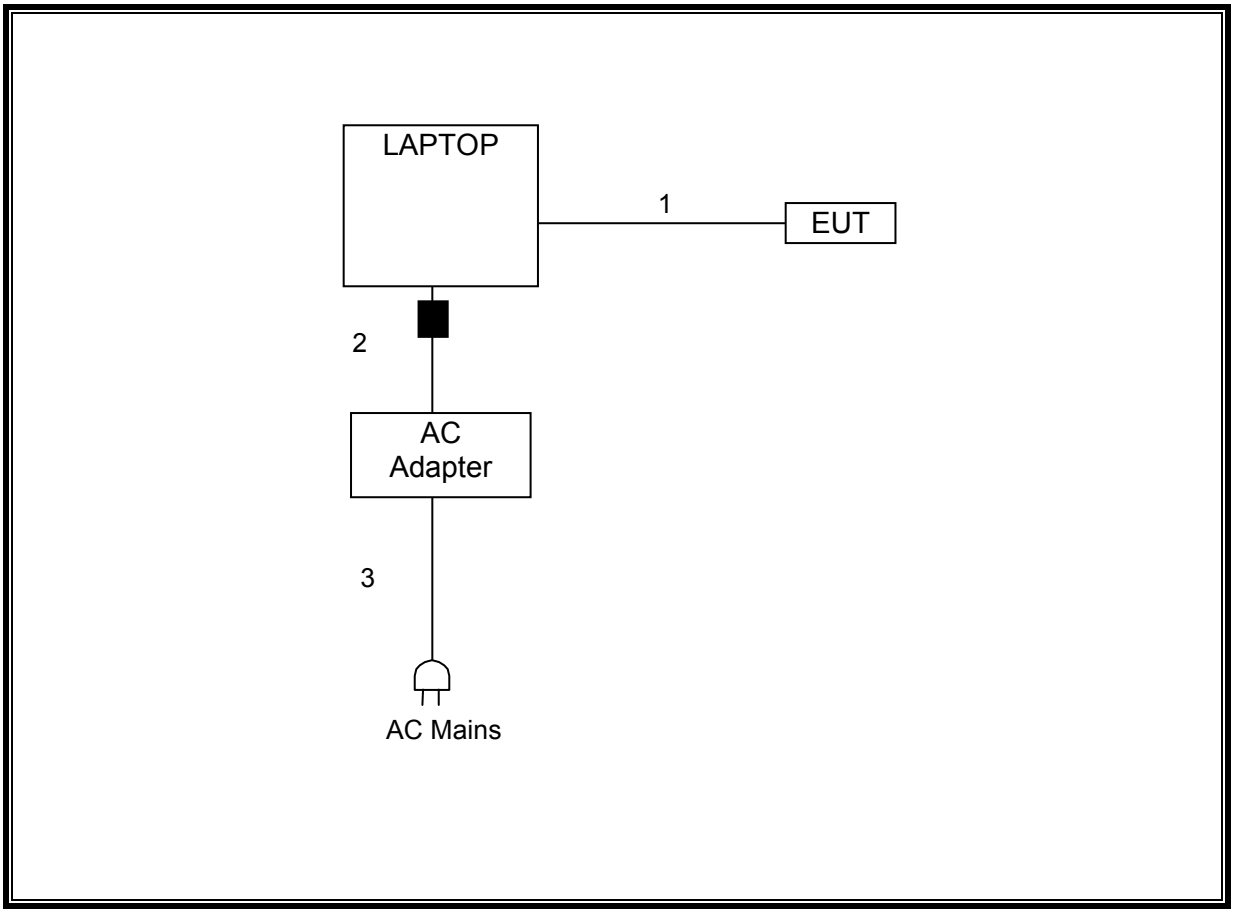
SETUP DIAGRAM



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TEST AND MEASUREMENT EQUIPMENT

The following test and measurement equipment was utilized for the tests documented in this report:

Control No.	Instrument	Manufacturer	Model No	Serial No	Test Item	Calibration Date * Interval(month)
MSA-03	Spectrum Analyzer	Agilent	E4448A	MY44020357	AT	2011/11/23 * 12
MPM-08	Power Meter	Anritsu	ML2495A	6K00003338	AT	2011/09/13 * 12
MPSE-11	Power sensor	Anritsu	MA2411B	011737	AT	2011/09/13 * 12
MCC-138	Microwave cable	HUBER+SUHNER	SUCOFLEX 102	37953/2	AT	2011/10/28 * 12
MCC-102	Microwave Cable	Hirose Electric	U.FL-2LP-066J1-A(200)	-	AT	2012/06/27 * 12
MAT-19	Attenuator(6dB)(above 1GHz)	HIROSE ELECTRIC CO.,LTD.	AT-106	-	AT	2012/01/12 * 12
MOS-14	Thermo-Hygrometer	Custom	CTH-201	-	AT	2012/02/06 * 12
MAEC-04	Semi Anechoic Chamber(NSA)	TDK	Semi Anechoic Chamber 3m	DA-10005	RE/CE	2012/02/29 * 12
MOS-15	Thermo-Hygrometer	Custom	CTH-180	-	RE/CE	2012/02/06 * 12
MJM-07	Measure	PROMART	SEN1955	-	RE/CE	-
COTS-MEMI	EMI measurement program	TSJ	TEPTO-DV	-	RE/CE	-
MSA-03	Spectrum Analyzer	Agilent	E4448A	MY44020357	RE	2011/11/23 * 12
MHA-21	Horn Antenna 1-18GHz	Schwarzbeck	BBHA9120D	9120D-557	RE	2011/08/11 * 12
MCC-141	Microwave Cable	Junkosha	MWX221	1203S212(1m) / 1204S062(5m)	RE	2012/04/23 * 12
MPA-12	MicroWave System Amplifier	Agilent	83017A	MY39500780	RE	2012/03/28 * 12
MHA-17	Horn Antenna 15-40GHz	Schwarzbeck	BBHA9170	BBHA9170307	RE	2012/06/27 * 12
MHF-06	High Pass Filter 3.5-24GHz	TOKIMEC	TF323DCA	601	RE	2012/05/30 * 12
MSA-05	Spectrum Analyzer	Advantest	R3273	160400285	RE/CE	2011/11/23 * 12
MTR-07	Test Receiver	Rohde & Schwarz	ESCI	100635	RE/CE	2012/04/05 * 12
MBA-05	Biconical Antenna	Schwarzbeck	BBA9106	1302	RE	2011/11/16 * 12
MLA-08	Logperiodic Antenna	Schwarzbeck	UKLP9140-A	N/A	RE	2011/11/16 * 12
MCC-50	Coaxial Cable	UL Japan	-	-	RE	2012/06/01 * 12
AT-38	Attenuator	Anritsu	MP721B	6200961025	RE	2011/12/08 * 12
MPA-14	Pre Amplifier	SONOMA INSTRUMENT	310	260833	RE	2012/03/05 * 12
MLS-06	LISN(AMN)	Schwarzbeck	NSLK8127	8127363	CE	2012/02/06 * 12
MTA-31	Terminator	TME	CT-01	-	CE	2012/01/11 * 12
MAT-67	Attenuator(13dB)	JFW Industries, Inc.	50FP-013H2 N	-	CE	2012/01/28 * 12
MCC-113	Coaxial cable	Fujikura/Suhner/TSJ	5D-2W(10m)/SFM141(5m)/421-010(1m)/sucoform 141-PE(1m)/RFM-E121(Switcher)	-/04178	CE	2011/07/04 * 12

The expiration date of the calibration is the end of the expired month.
As for some calibrations performed after the tested dates, those test equipment have been controlled by means of an unbroken chains of calibrations.
All equipment is calibrated with valid calibrations. Each measurement data is traceable to the national or international standards.

Test Item:
RE: Radiated emission, CE: Conducted emission, AT: Antenna Terminal Conducted test

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6. ANTENNA PORT TEST RESULTS

6.1. BASIC DATA RATE GFSK MODULATION

6.1.1. 20 dB AND 99% BANDWIDTH

LIMIT

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The RBW is set to ≥ 1% of the 20 dB bandwidth. The VBW is set to ≥ RBW. The sweep time is coupled.

RESULTS

Channel	Frequency (MHz)	20 dB Bandwidth (MHz)	99% Bandwidth (MHz)
Low	2402	0.962	0.875
Middle	2441	0.958	0.862
High	2480	1.003	0.866

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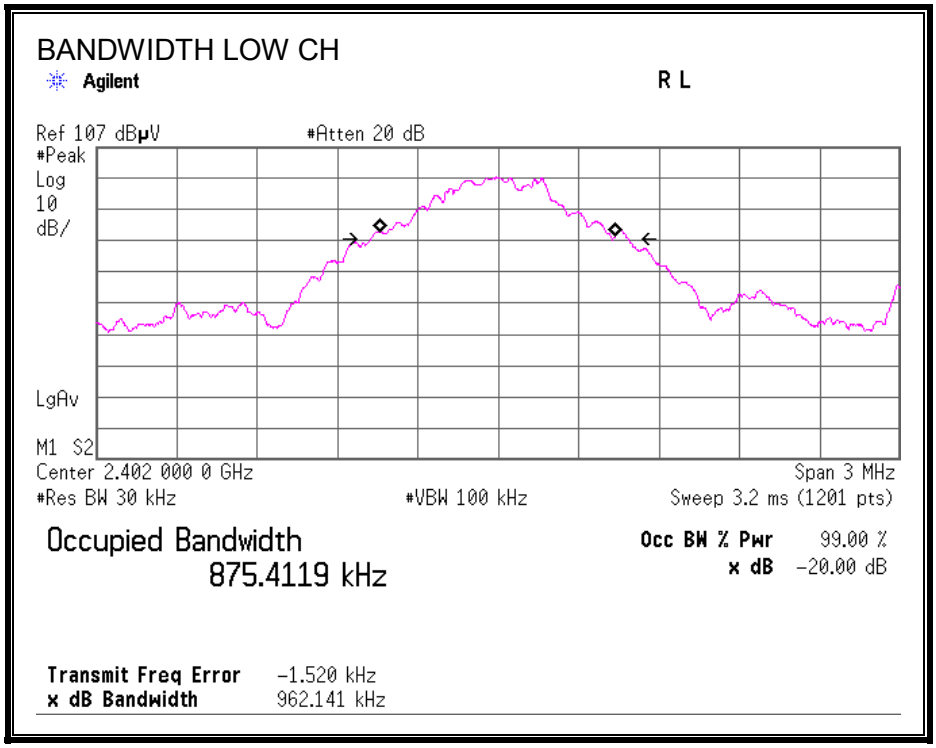
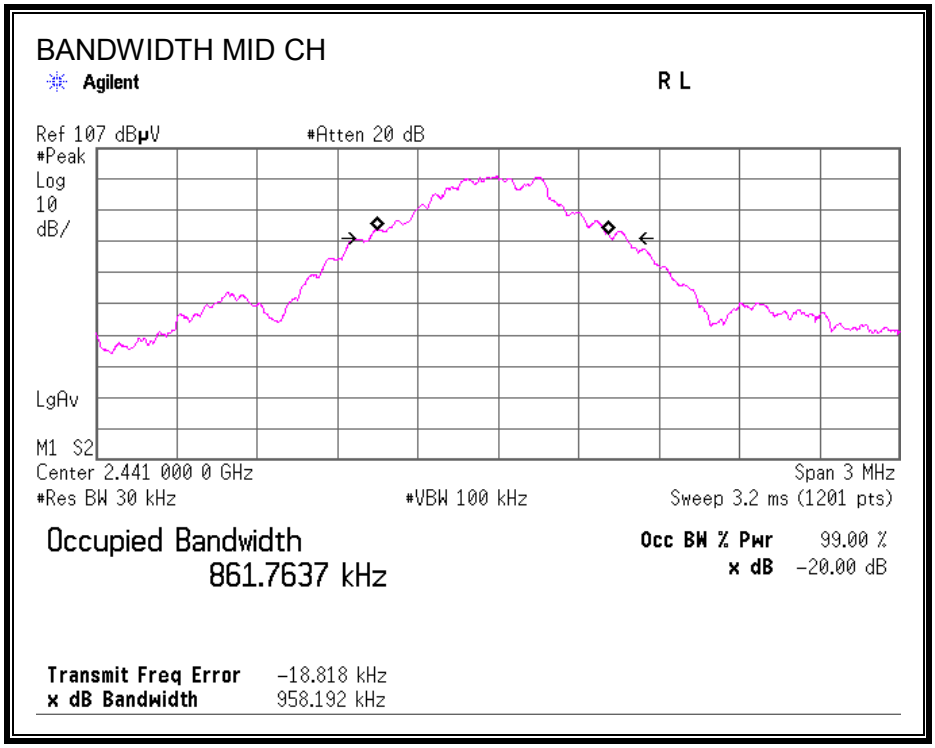
20 dB BANDWIDTH





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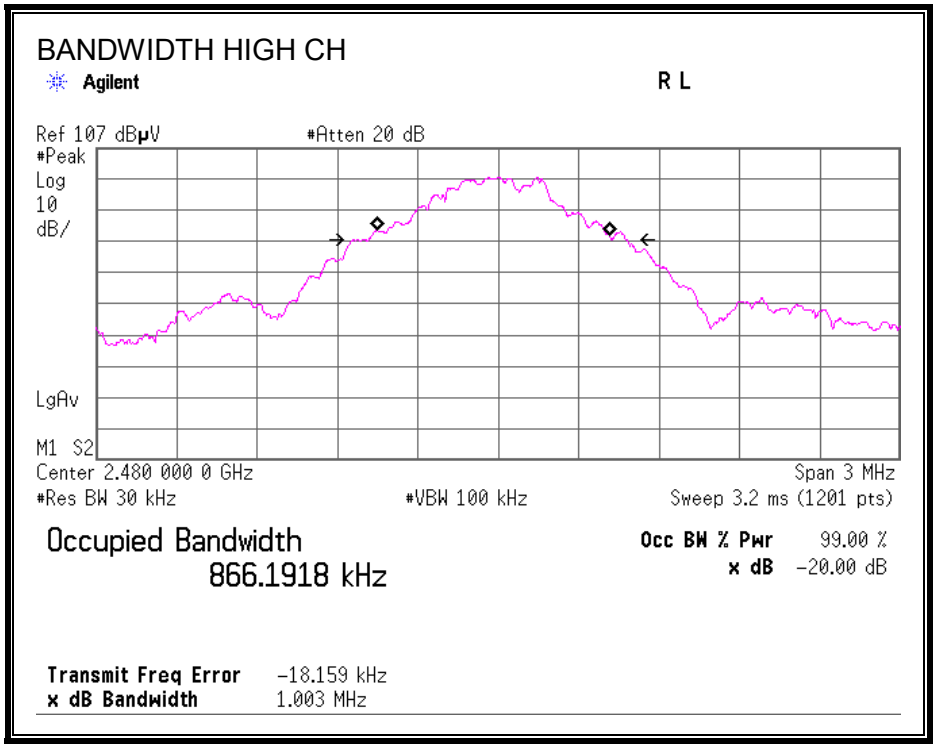

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6.1.2. HOPPING FREQUENCY SEPARATION

LIMIT

FCC §15.247 (a) (1)

IC RSS-210 A8.1 (b)

Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hoping 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.

TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The RBW is set to 30 kHz and the VBW is set to 100 kHz. The sweep time is coupled.

RESULTS

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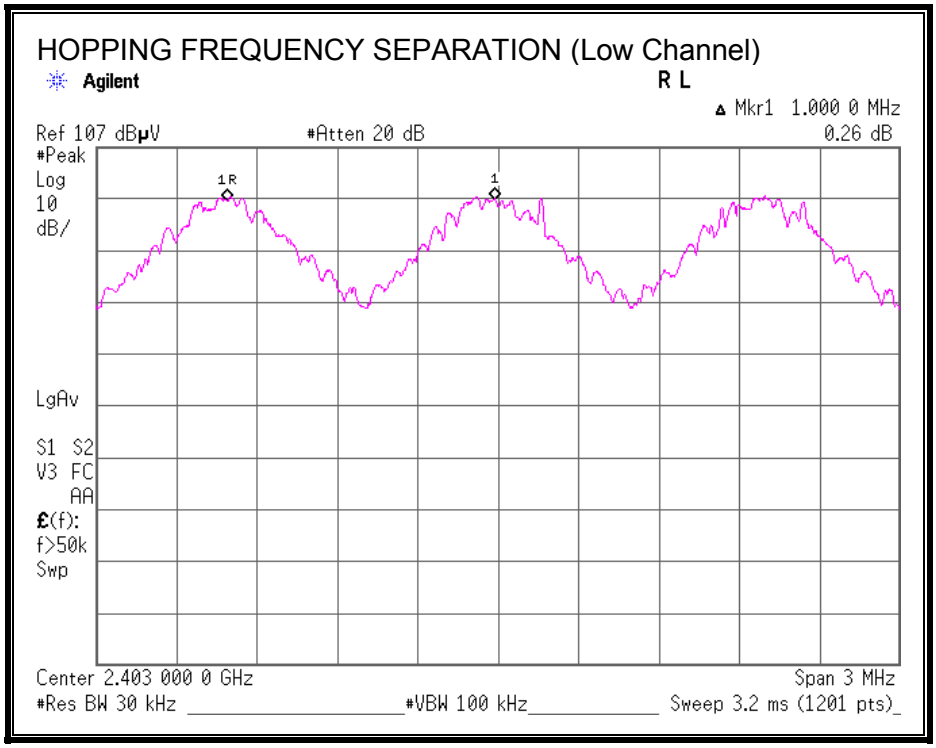
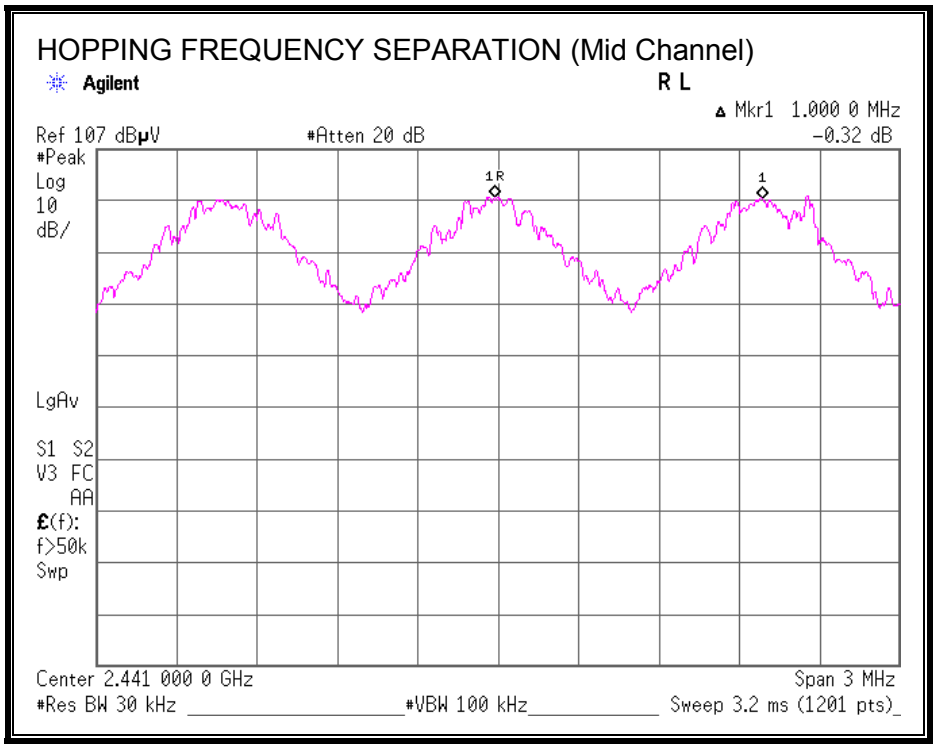
HOPPING FREQUENCY SEPARATION





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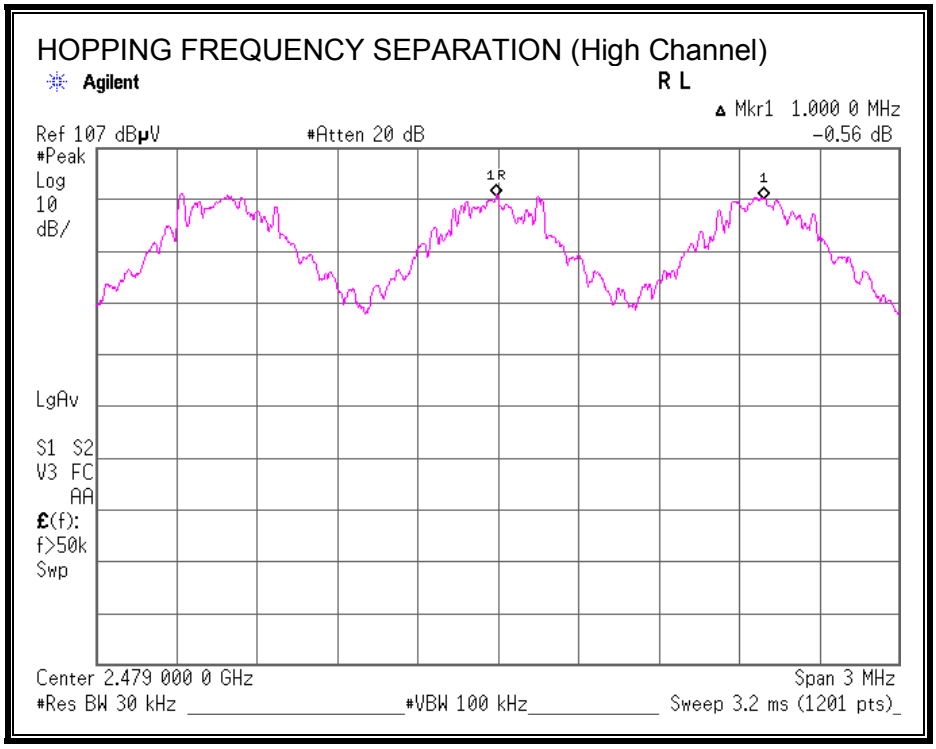
HOPPING FREQUENCY SEPARATION (High Channel)



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6.1.3. NUMBER OF HOPPING CHANNELS

LIMIT

FCC §15.247 (a) (1) (iii)

IC RSS-210 A8.1 (d)

Frequency hopping systems in the 2400 – 2483.5 MHz band shall use at least 15 non-overlapping channels.

TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The span is set to cover the entire authorized band, in either a single sweep or in multiple contiguous sweeps. The RBW is set to a maximum of 1 % of the span. The analyzer is set to Max Hold.

Test was not performed at AFH mode whose number of hopping channel is 20 channels because this Bluetooth radio is in compliance of Bluetooth Specification.

RESULTS

79 Channels observed.

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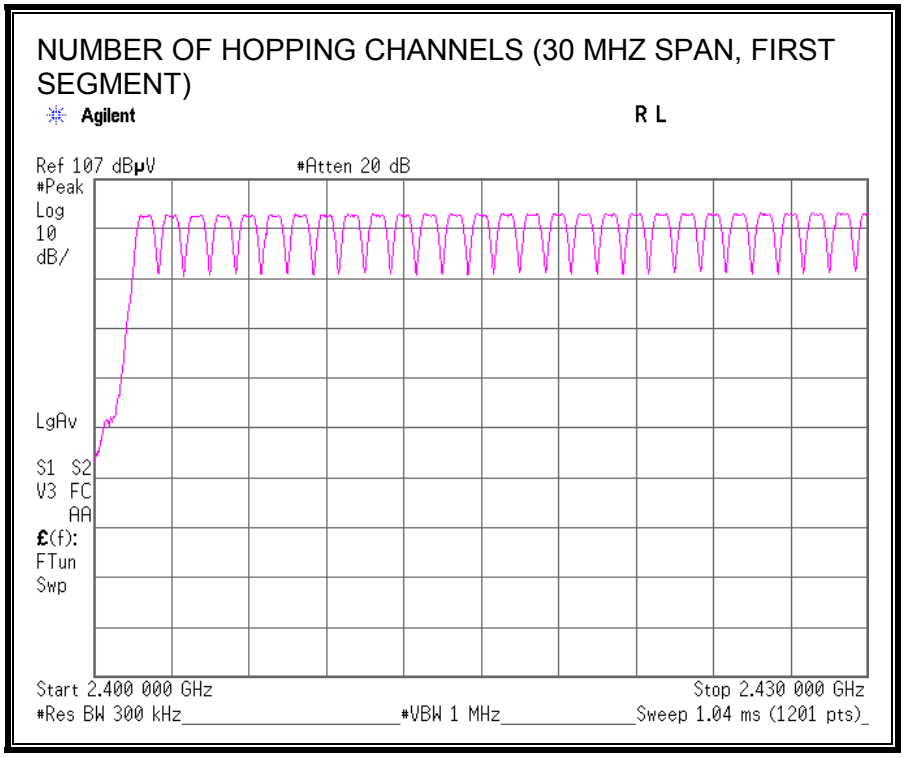
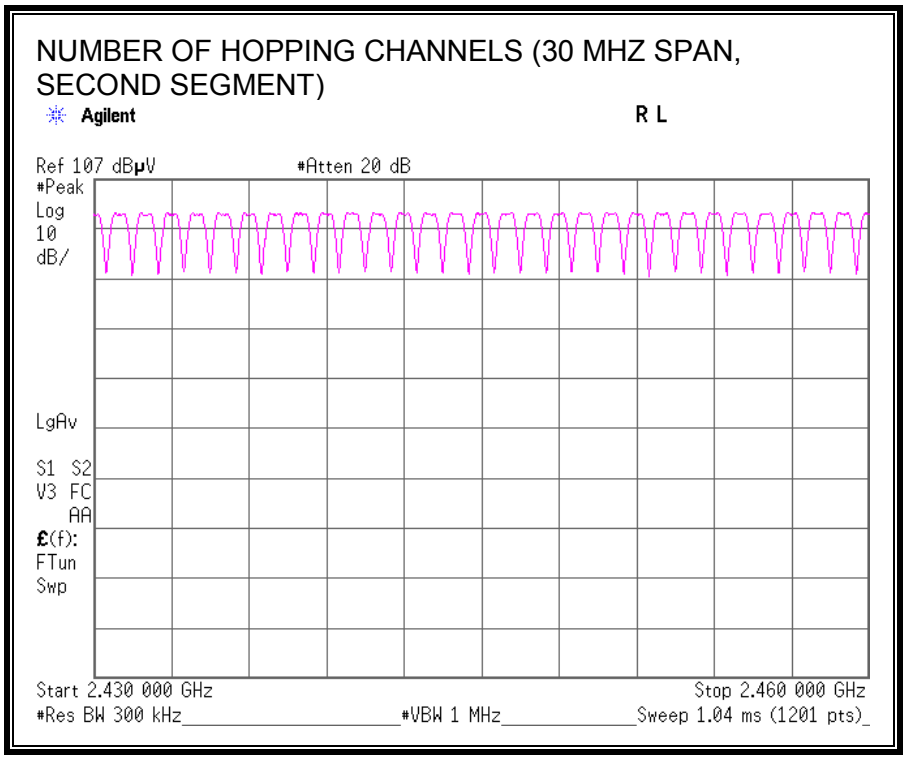
NUMBER OF HOPPING CHANNELS





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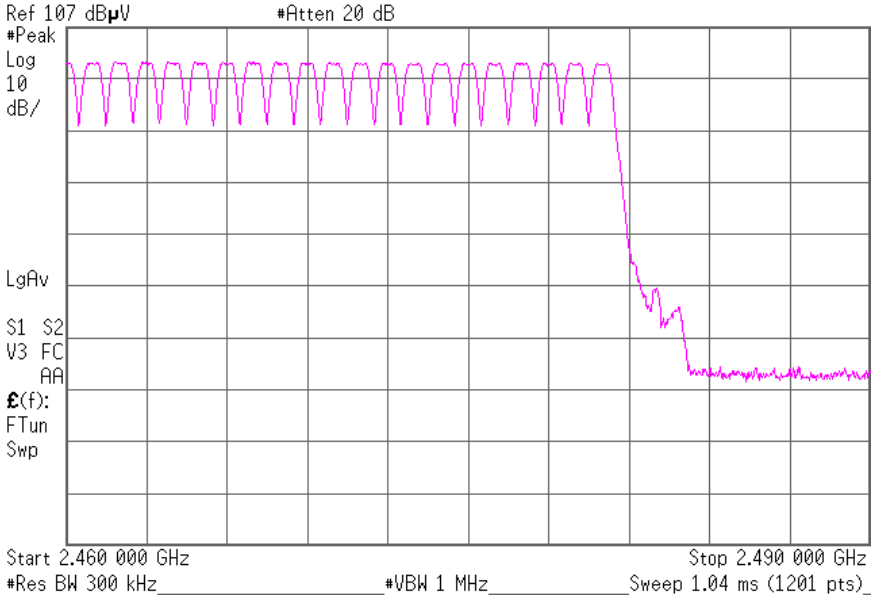
NUMBER OF HOPPING CHANNELS (30 MHZ SPAN, THIRD SEGMENT)



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6.1.4. AVERAGE TIME OF OCCUPANCY

LIMIT

FCC §15.247 (a) (1) (iii)

IC RSS-210 A8.1 (d)

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.

TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The span is set to 0 Hz, centered on a single, selected hopping channel. The width of a single pulse is measured in a fast scan. The number of pulses is measured in a 5 second scan, to enable resolution of each occurrence.

The average time of occupancy in the specified 31.6 second period (79 channels * 0.4 s) is equal to 31.6 * (# of pulses in 5 s / 5 s) * pulse width.

This device complies with the Bluetooth protocol for FHSS operation, employing a pseudo random channel selection and hopping rate to ensure that the occupancy time in N x 0.4s, where N is the number of channels being used in the hopping sequence (20 ≤ N ≤ 79), is always less than 0.4s regardless of packet size. This is confirmed in the test report for N=79.

RESULTS

Mode	Number of transmission in a 31.6(79 Hopping x 0.4) / 12.8(32 Hopping x 0.4)second period					Length of transmission time [msec]	Result [msec]	Limit [msec]
DH1	50.0 times	/ 5 sec.	x 31.6 sec.	=	316 times	0.403	127	400
DH3	26.0 times	/ 5 sec.	x 31.6 sec.	=	165 times	1.666	275	400
DH5	16.6 times	/ 5 sec.	x 31.6 sec.	=	105 times	2.913	306	400

Sample Calculation
Result = Number of transmission x Length of transmition time

*Average data of 5 tests.(except Inquiry)

Mode	Sampling [times]					Average [times]
	1	2	3	4	5	
DH1	50	50	50	50	50	50.0
DH3	26	26	27	26	25	26.0
DH5	16	17	17	16	17	16.6

Sample Calculation
Average= Summation(Sampling 1 to 5) / 5

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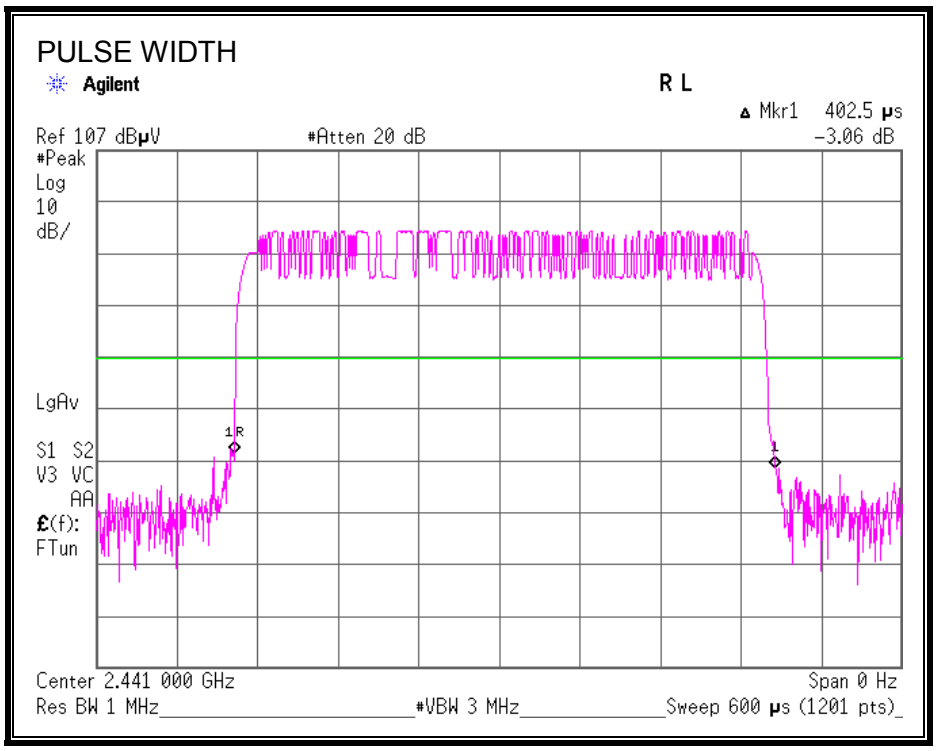
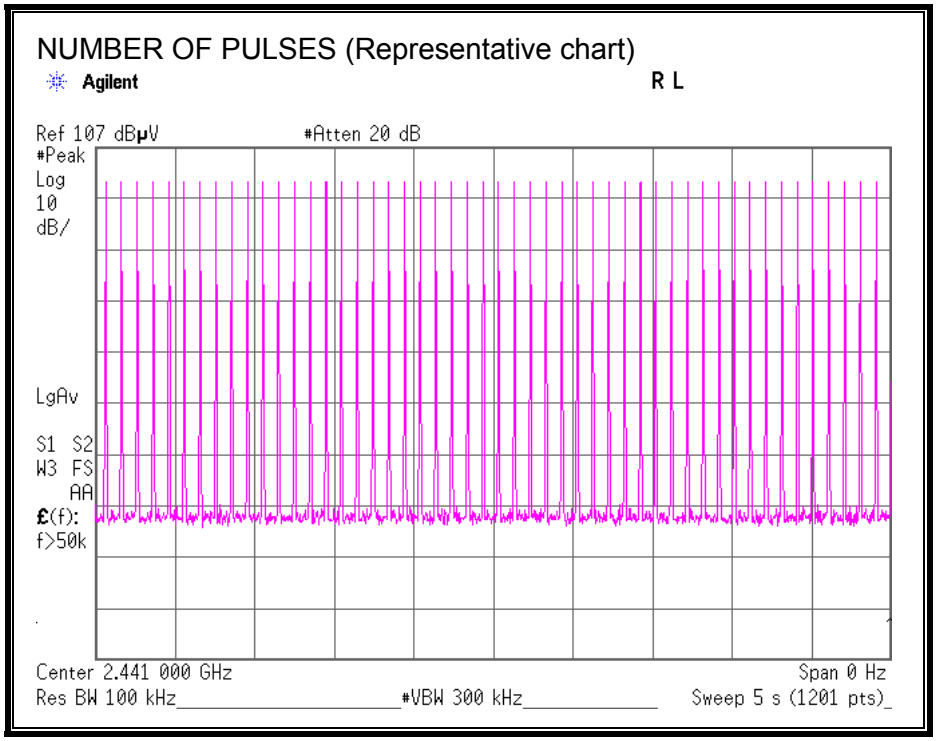
DH1

PULSE WIDTH



NUMBER OF PULSES IN 5 SECOND OBSERVATION PERIOD



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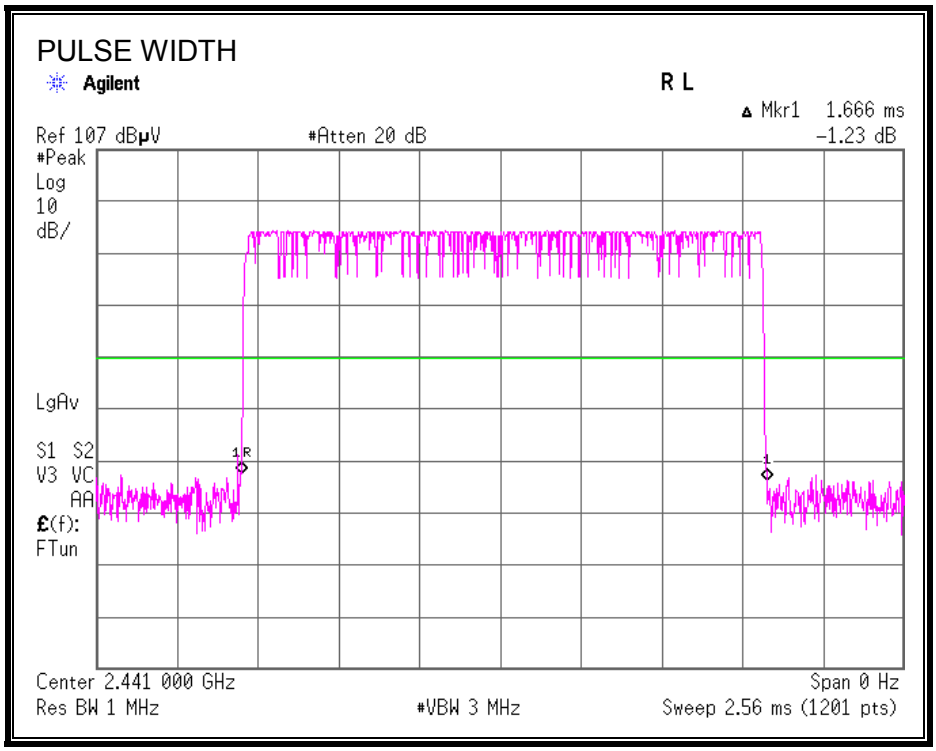
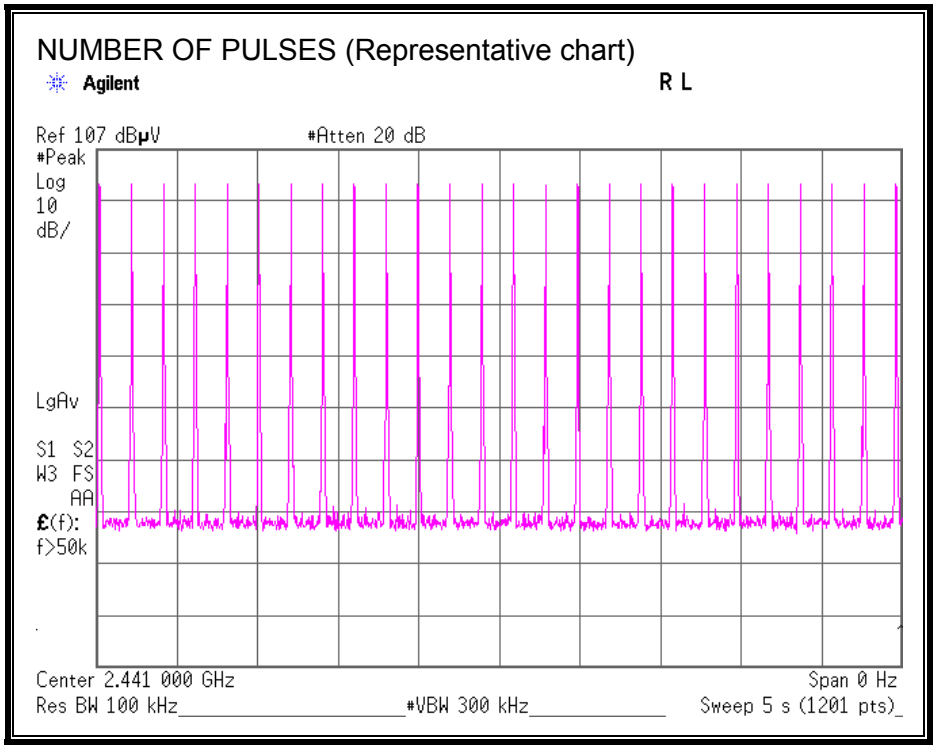
DH3

PULSE WIDTH



NUMBER OF PULSES IN 5 SECOND OBSERVATION PERIOD



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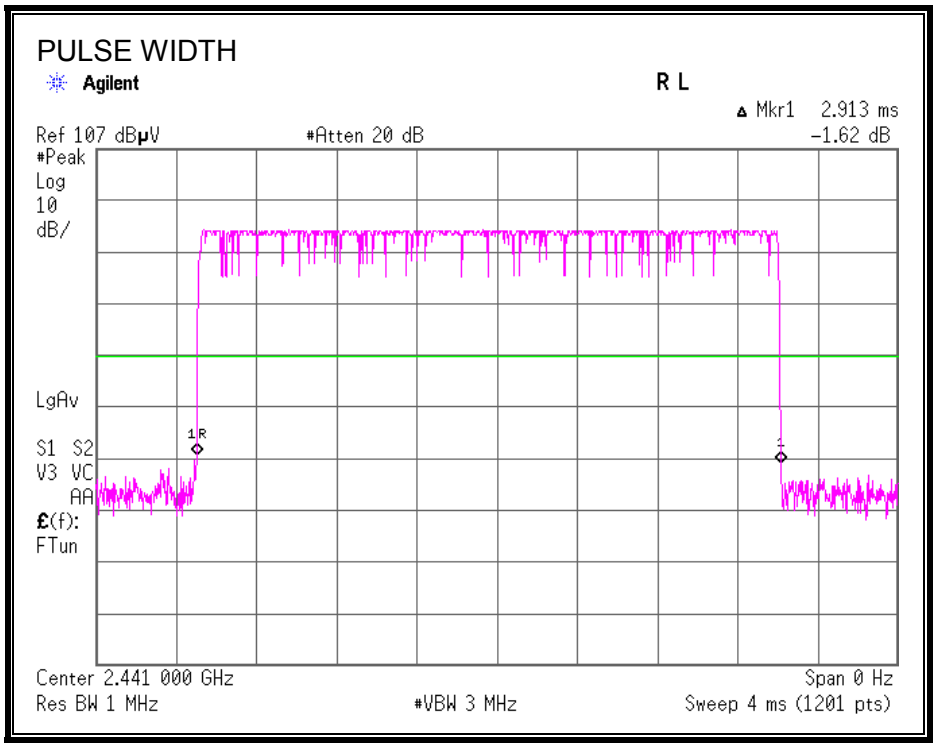
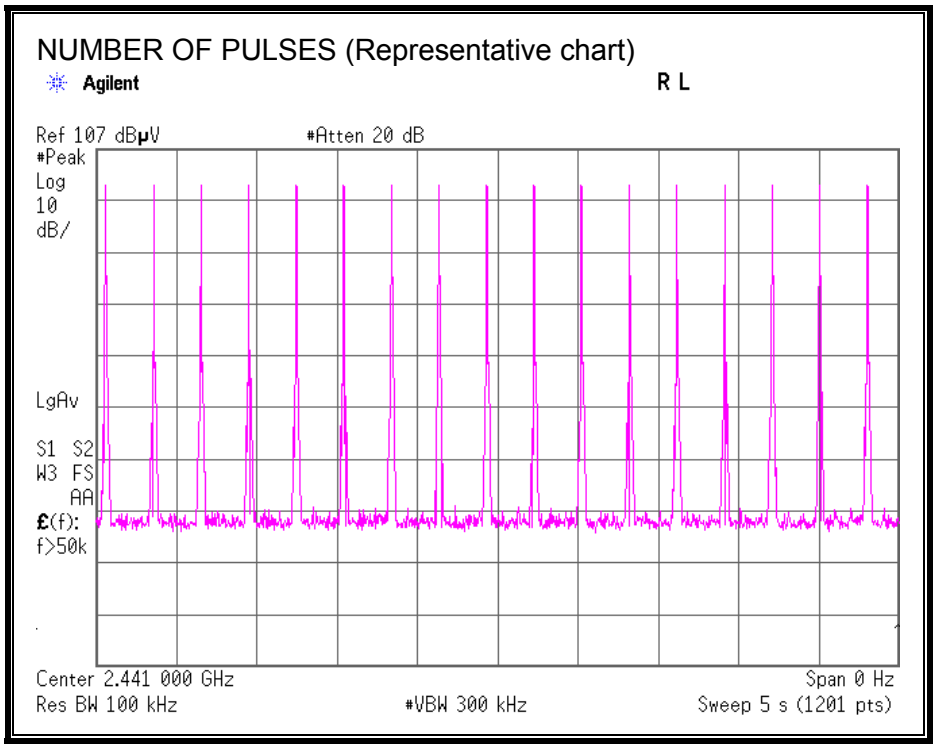
DH5

PULSE WIDTH



NUMBER OF PULSES IN 5 SECOND OBSERVATION PERIOD



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6.1.5. MAXIMUM PEAK OUTPUT POWER

LIMIT

§15.247 (b) (1)

RSS-210 Issue 7 Clause A8.4

The maximum antenna gain is less than 6 dBi, therefore the limit is 30 dBm.
Test was not performed at AFH mode, because the decrease of number of channel (min: 20ch) at AFH mode does not influence on the output power and bandwidth of the EUT.
However, the limit level 125mW of AFH mode was used for the test.

TEST PROCEDURE

The transmitter output is connected to a power meter.

RESULTS

Mode	Freq.	Reading Power Meter(PK)	Cable Loss	Atten.	Result		Limit		Margin
	[MHz]	[dBm]	[dB]	[dB]	[dBm]	[mW]	[dBm]	[mW]	[dB]
DH5	2402.0	-7.19	2.13	6.11	1.05	1.27	20.96	125	19.91
DH5	2441.0	-6.78	2.15	6.11	1.48	1.41	20.96	125	19.48
DH5	2480.0	-6.99	2.16	6.11	1.28	1.34	20.96	125	19.68

Sample Calculation:
Result = Reading + Cable Loss + Attenuator

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6.1.6. AVERAGE POWER

LIMIT

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

RESULTS

Mode	Freq.	Reading Power Meter(AV)	Cable Loss	Atten.	Result	
	[MHz]	[dBm]	[dB]	[dB]	[dBm]	[mW]
DH5	2402.0	-8.67	2.13	6.11	-0.43	0.91
DH5	2441.0	-8.25	2.15	6.11	0.01	1.00
DH5	2480.0	-8.45	2.16	6.11	-0.18	0.96

Sample Calculation:
Result = Reading + Cable Loss + Attenuator

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6.1.7. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.247 (d)

IC RSS-210 A8.5

Limit = -20 dBc

TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

The spectrum from 9 kHz to 25 GHz is investigated with the transmitter set to the lowest, middle, and highest channels.

The bandedges at 2.4 and 2.4835 GHz are investigated with the transmitter set to the normal hopping mode.

RESULTS

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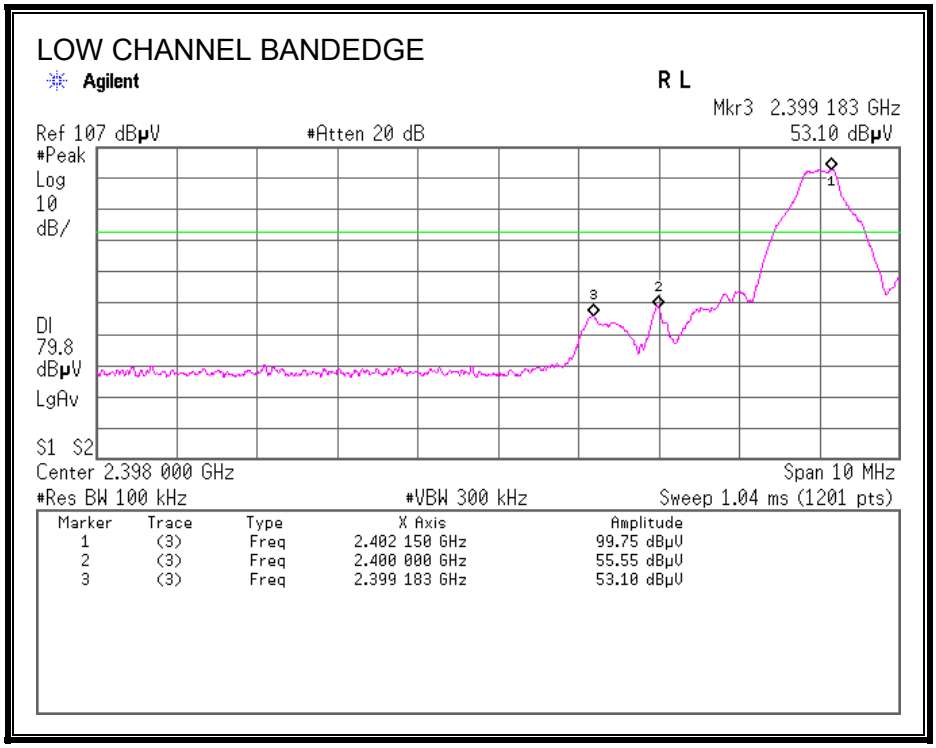
SPURIOUS EMISSIONS, LOW CHANNEL



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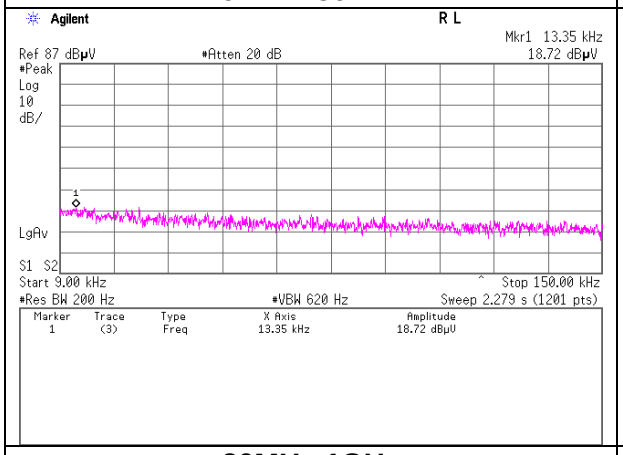
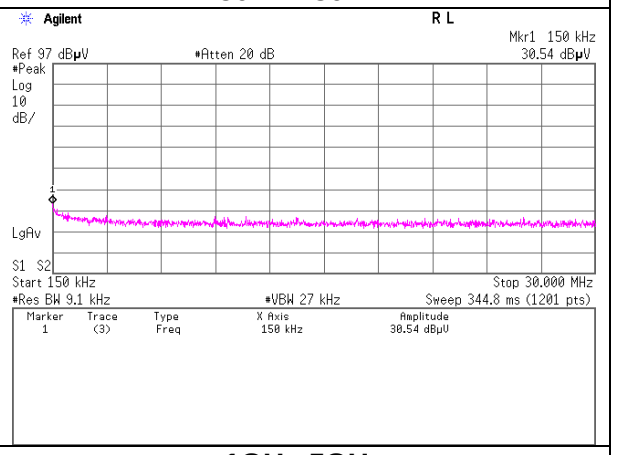
Tx DH5 2402MHz

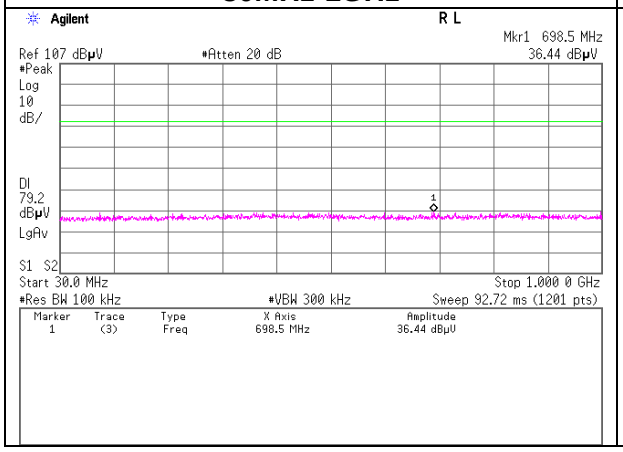
9kHz-150kHz



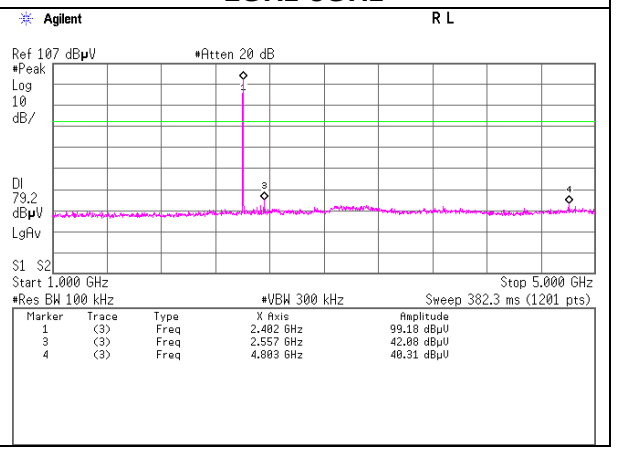
150kHz-30MHz



30MHz-1GHz



1GHz-5GHz



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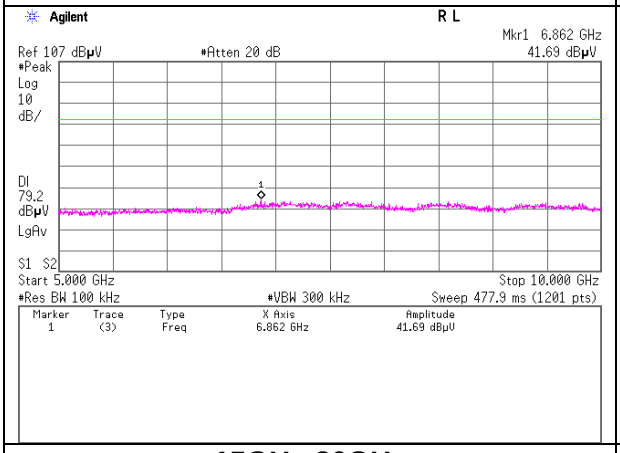
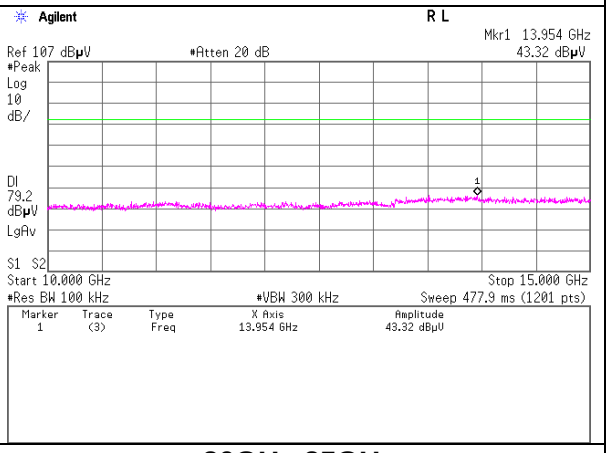
Tx DH5 2402MHz

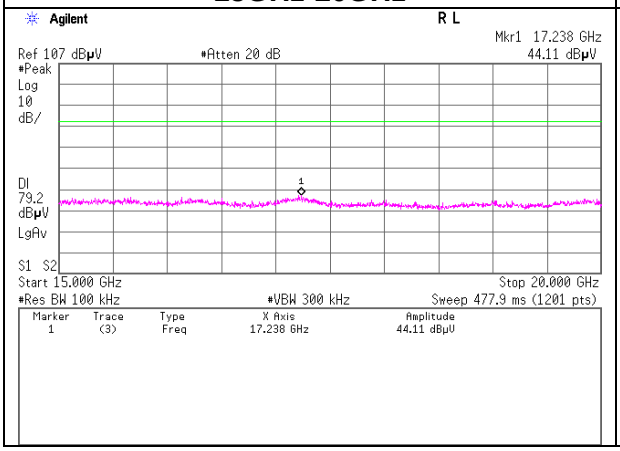
5GHz-10GHz



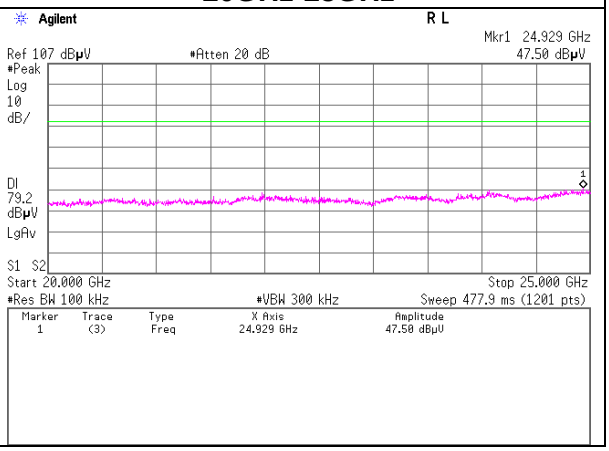
10GHz-15GHz



15GHz-20GHz



20GHz-25GHz



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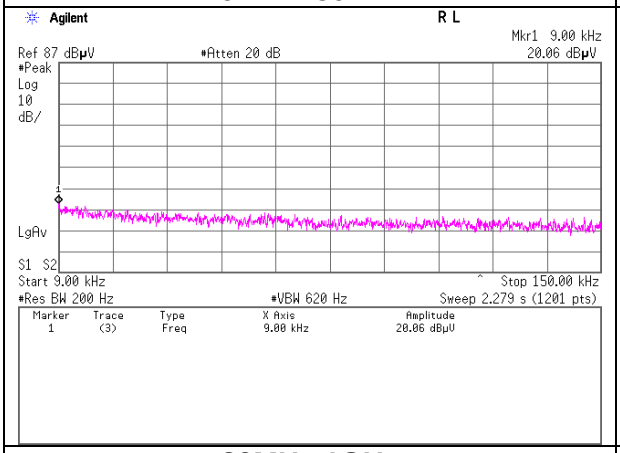
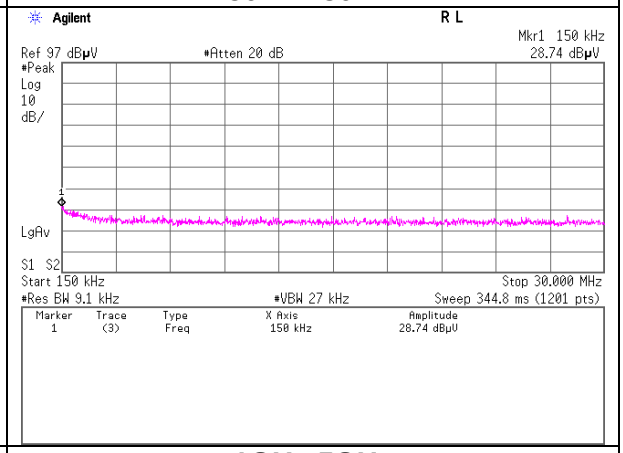
SPURIOUS EMISSIONS, MID CHANNEL

Tx DH5 2441MHz

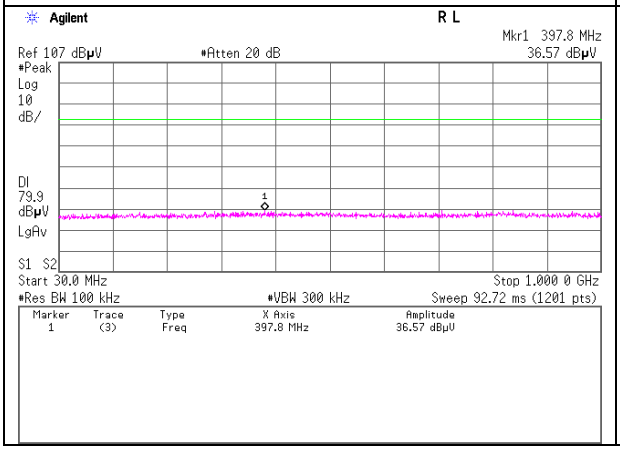
9kHz-150kHz



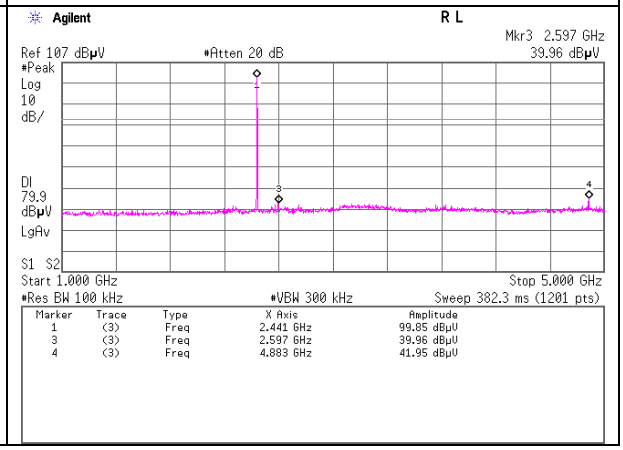
150kHz-30MHz



30MHz-1GHz



1GHz-5GHz



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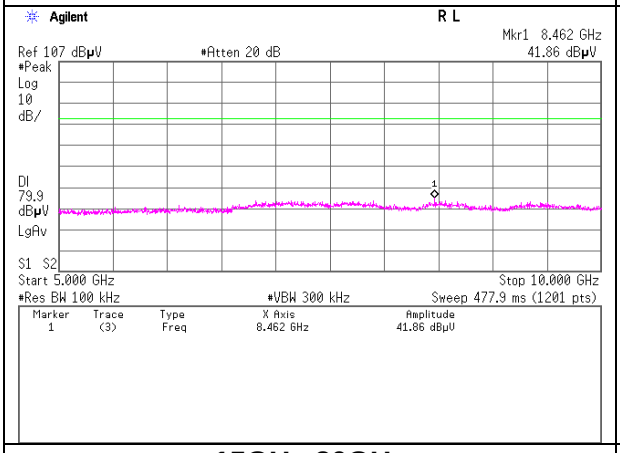
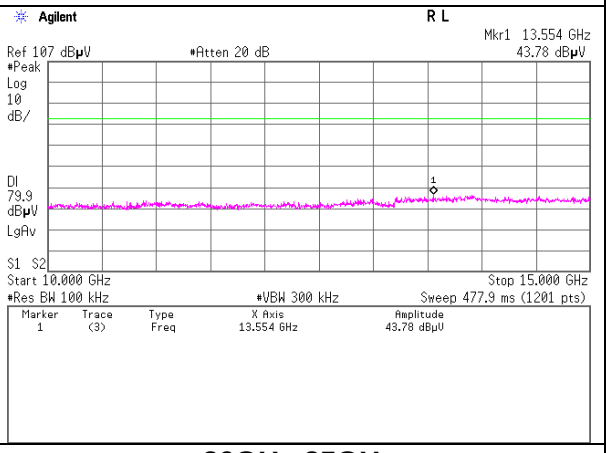
Tx DH5 2441MHz

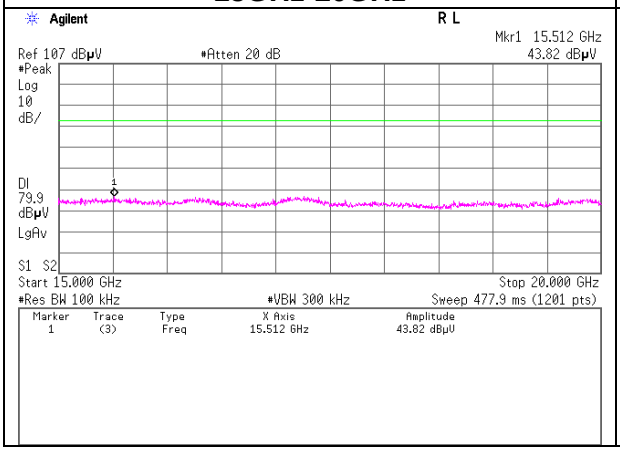
5GHz-10GHz



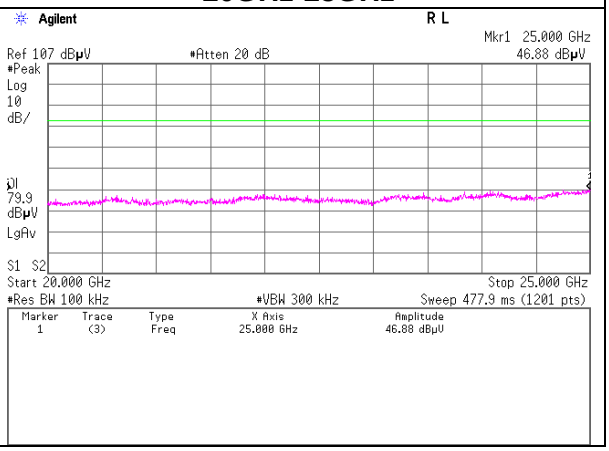
10GHz-15GHz



15GHz-20GHz



20GHz-25GHz



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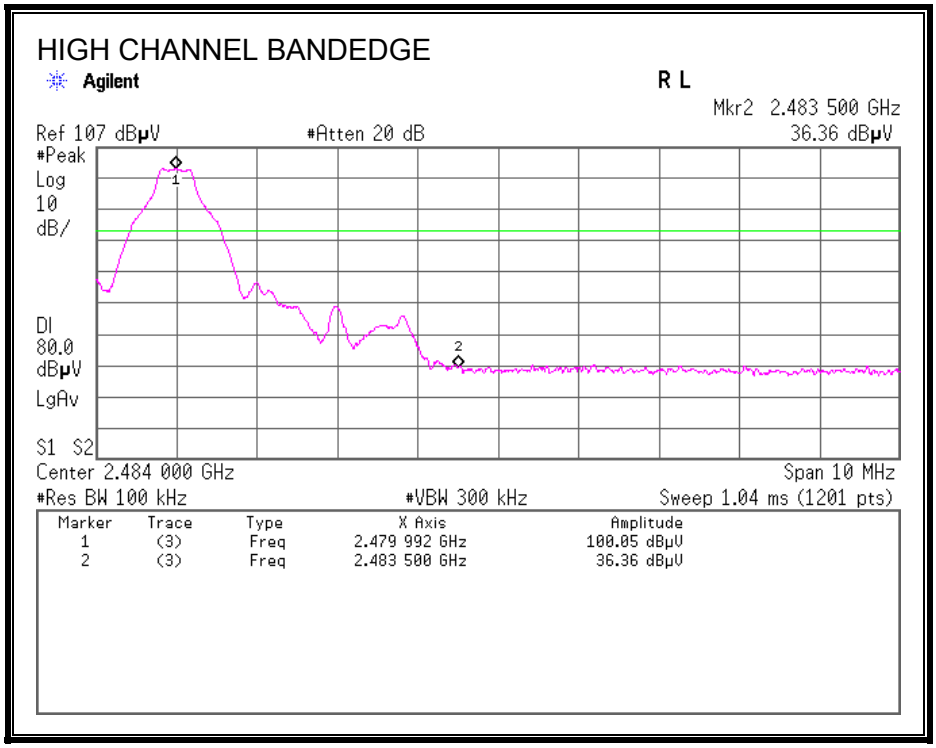
SPURIOUS EMISSIONS, HIGH CHANNEL



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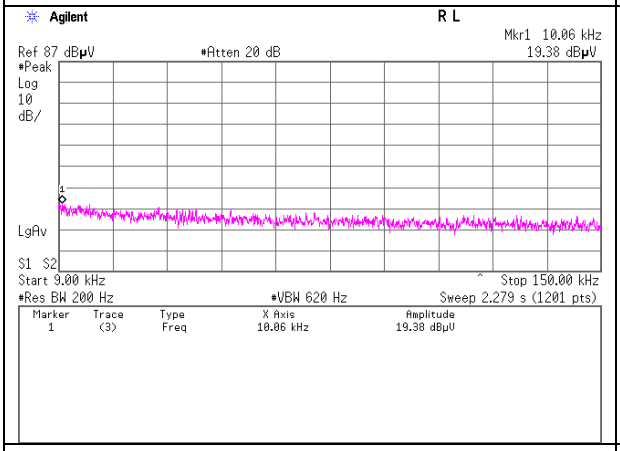
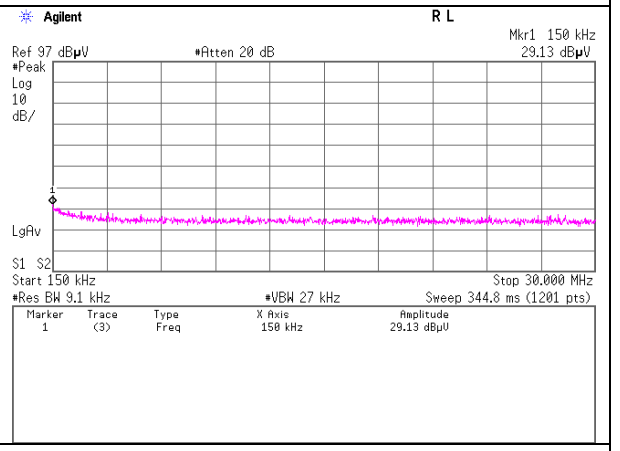
Tx DH5 2480MHz

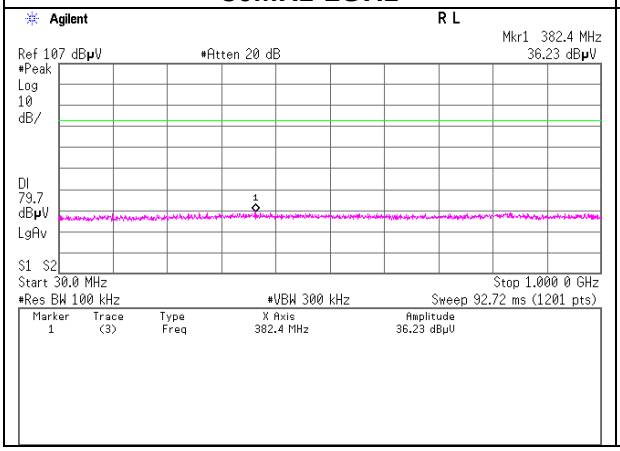
9kHz-150kHz



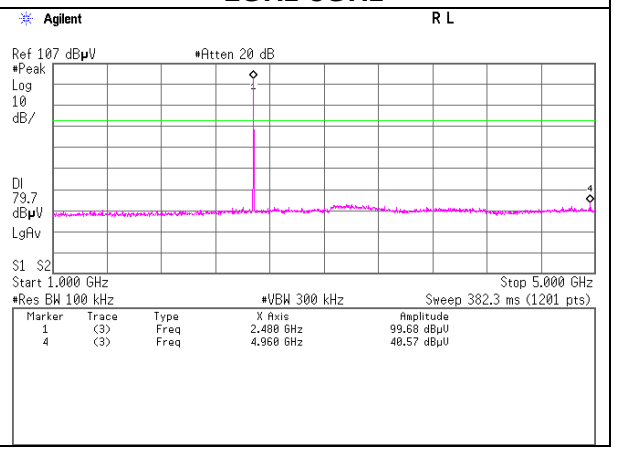
150kHz-30MHz



30MHz-1GHz



1GHz-5GHz



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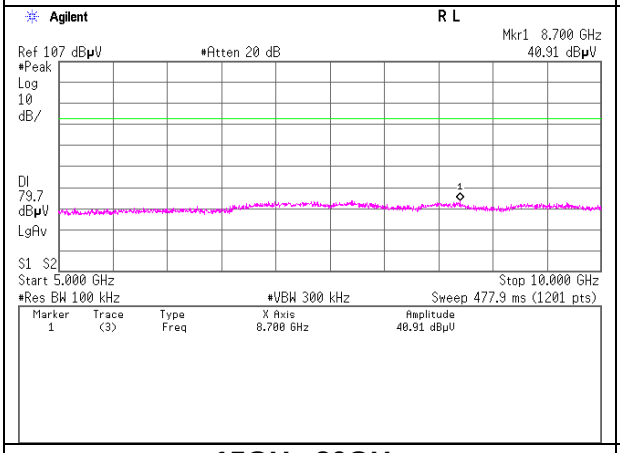
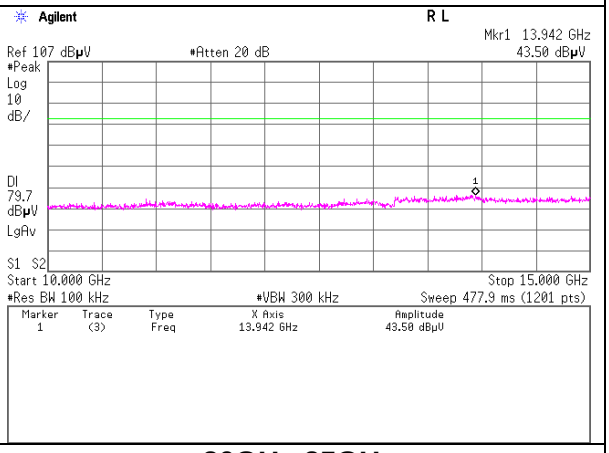
Tx DH5 2480MHz

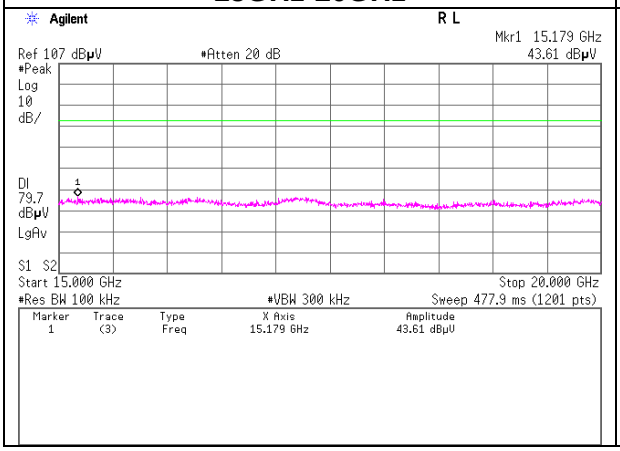
5GHz-10GHz



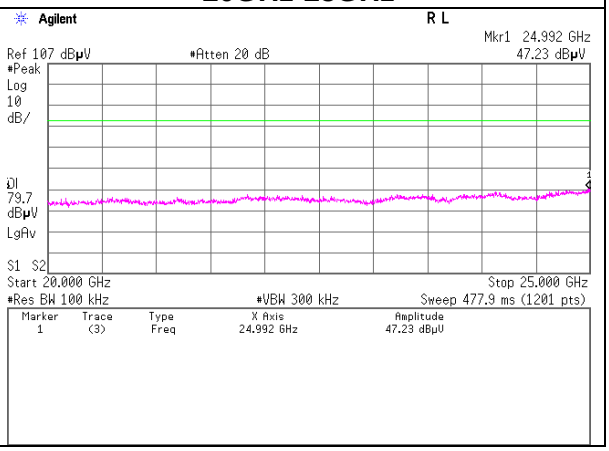
10GHz-15GHz



15GHz-20GHz



20GHz-25GHz



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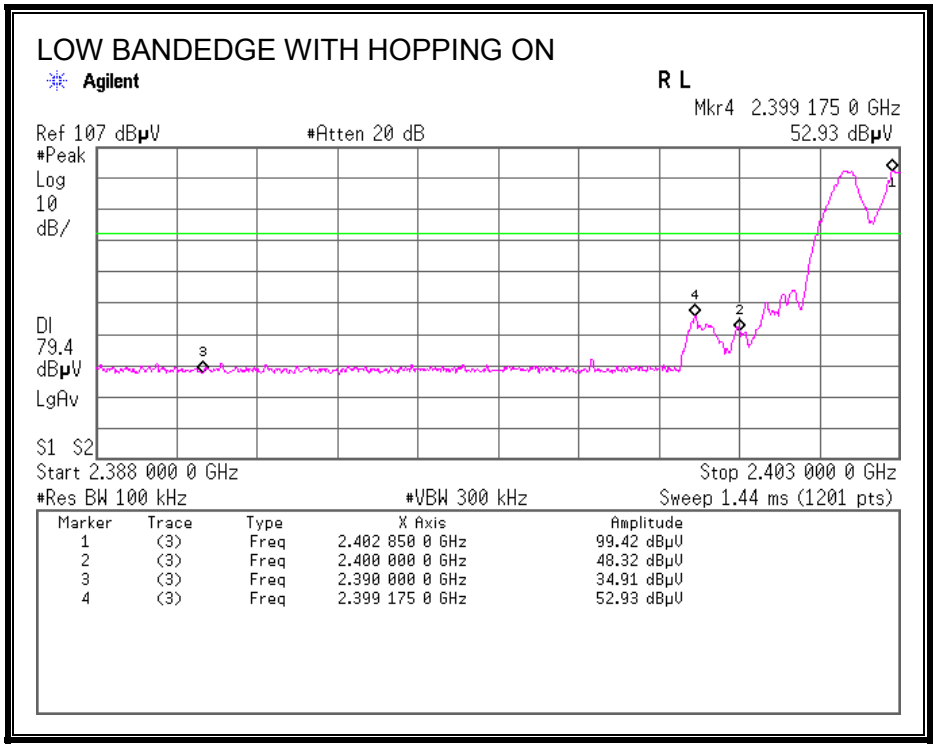
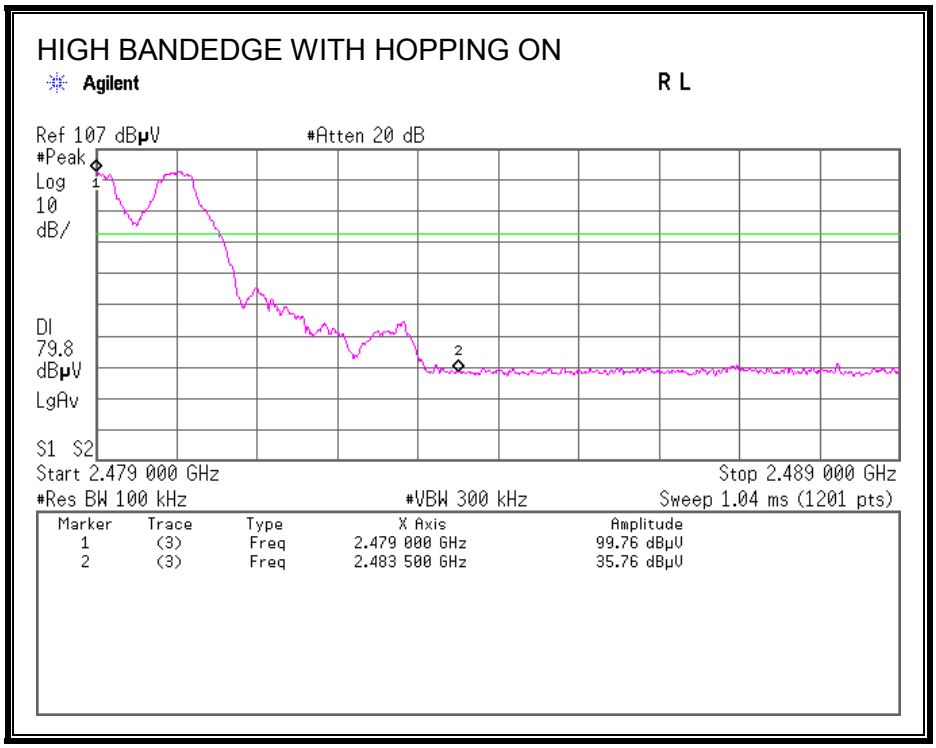
SPURIOUS BANDEDGE EMISSIONS WITH HOPPING ON





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6.2. ENHANCED DATA RATE 8PSK MODULATION

6.2.1. 20 dB AND 99% BANDWIDTH

LIMIT

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The RBW is set to ≥ 1% of the 20 dB bandwidth. The VBW is set to ≥ RBW. The sweep time is coupled.

RESULTS

Channel	Frequency (MHz)	20 dB Bandwidth (MHz)	99% Bandwidth (MHz)
Low	2402	1.296	1.164
Middle	2441	1.288	1.171
High	2480	1.290	1.179

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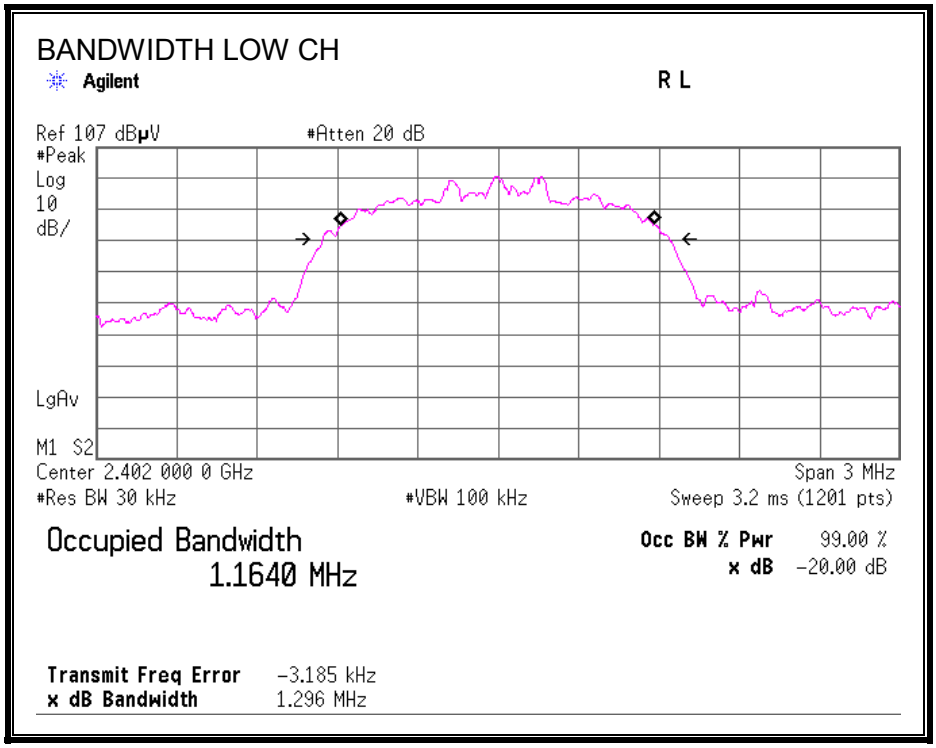
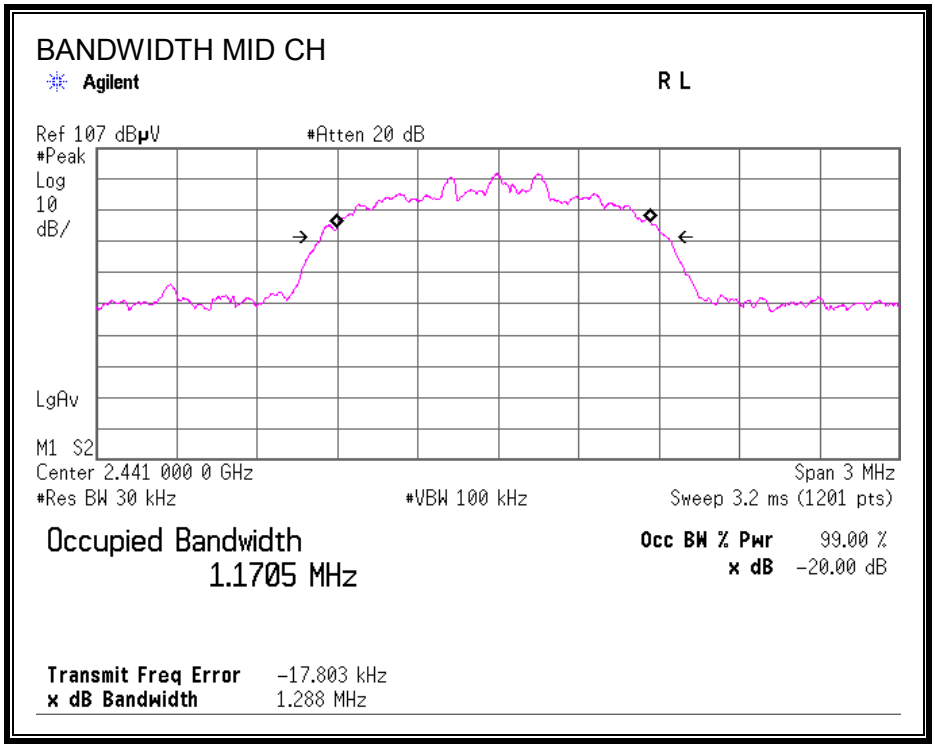
20 dB BANDWIDTH





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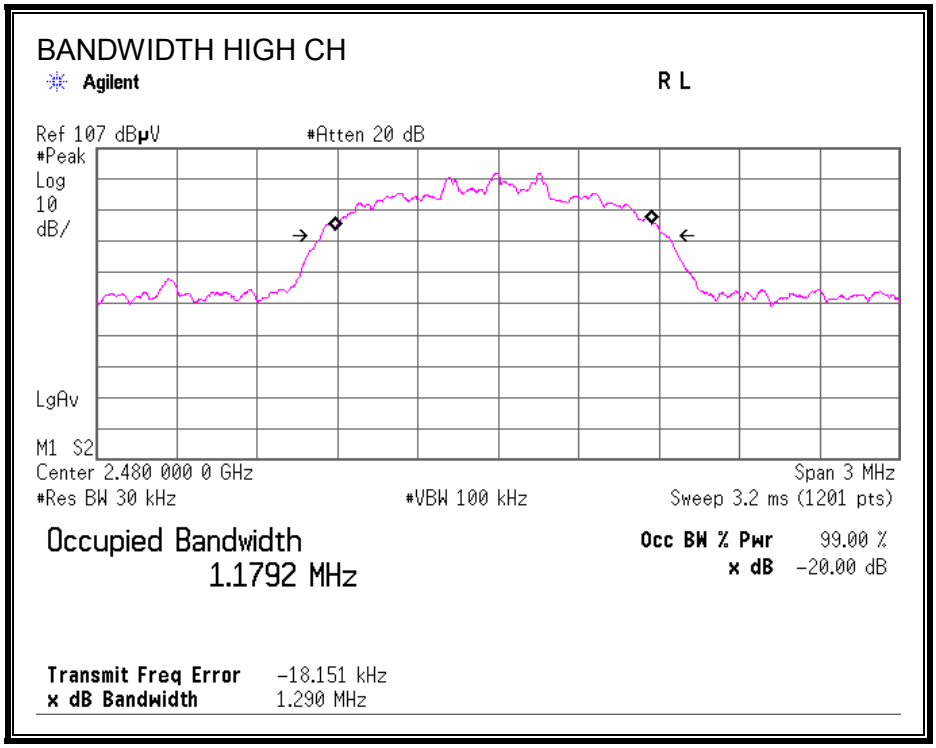

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6.2.2. HOPPING FREQUENCY SEPARATION

LIMIT

FCC §15.247 (a) (1)

IC RSS-210 A8.1 (b)

Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hoping 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.

TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The RBW is set to 30 kHz and the VBW is set to 100 kHz. The sweep time is coupled.

RESULTS

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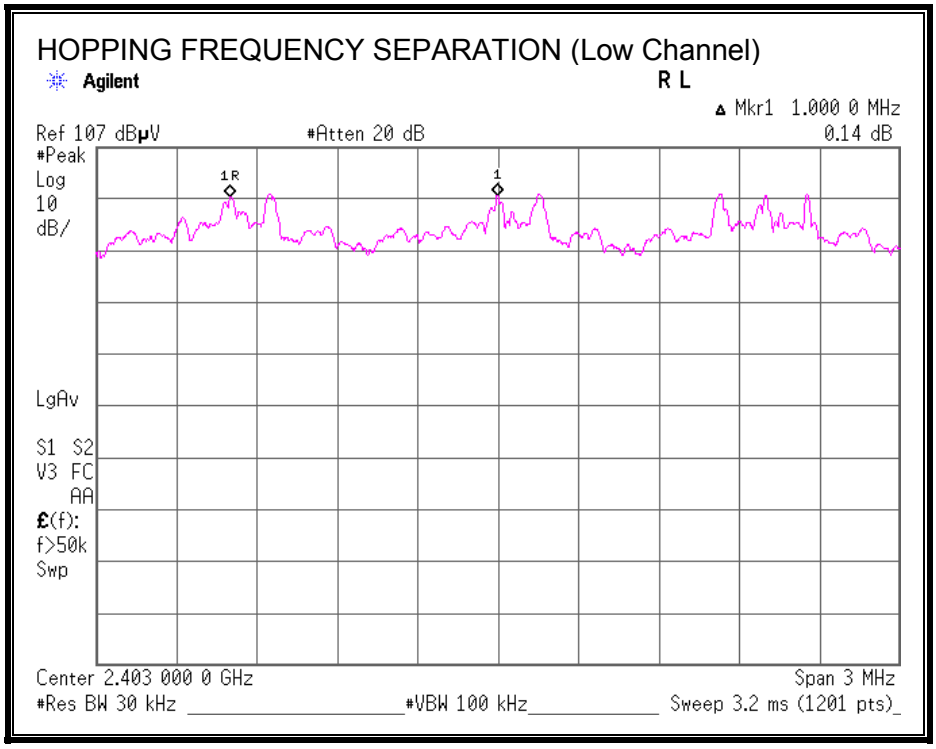
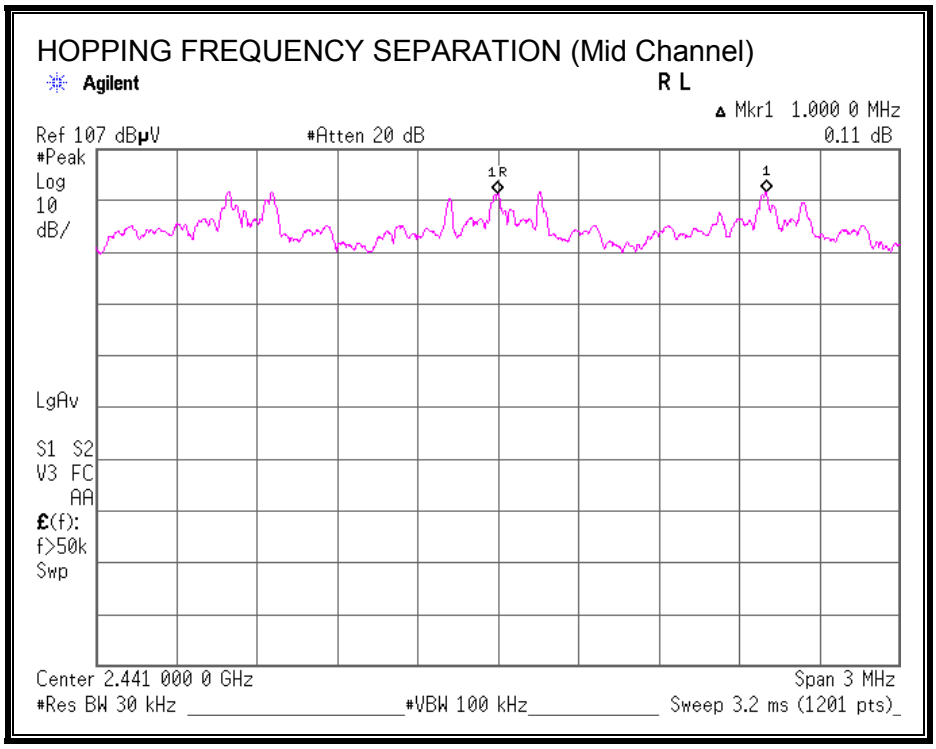
HOPPING FREQUENCY SEPARATION





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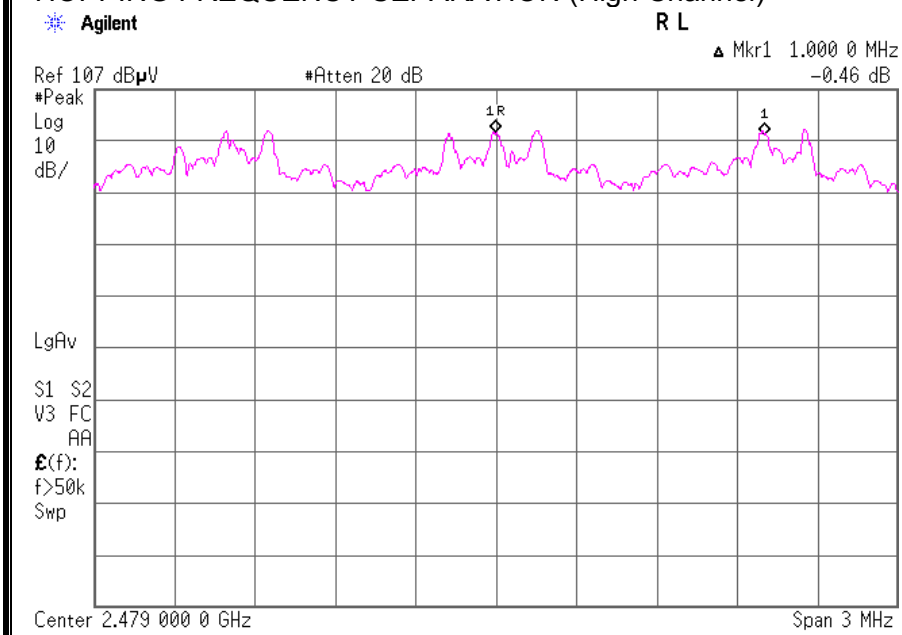
HOPPING FREQUENCY SEPARATION (High Channel)



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6.2.3. NUMBER OF HOPPING CHANNELS

LIMIT

FCC §15.247 (a) (1) (iii)

IC RSS-210 A8.1 (d)

Frequency hopping systems in the 2400 – 2483.5 MHz band shall use at least 15 non-overlapping channels.

TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The span is set to cover the entire authorized band, in either a single sweep or in multiple contiguous sweeps. The RBW is set to a maximum of 1 % of the span. The analyzer is set to Max Hold.

Test was not performed at AFH mode whose number of hopping channel is 20 channels because this Bluetooth radio is in compliance of Bluetooth Specification.

RESULTS

79 Channels observed.

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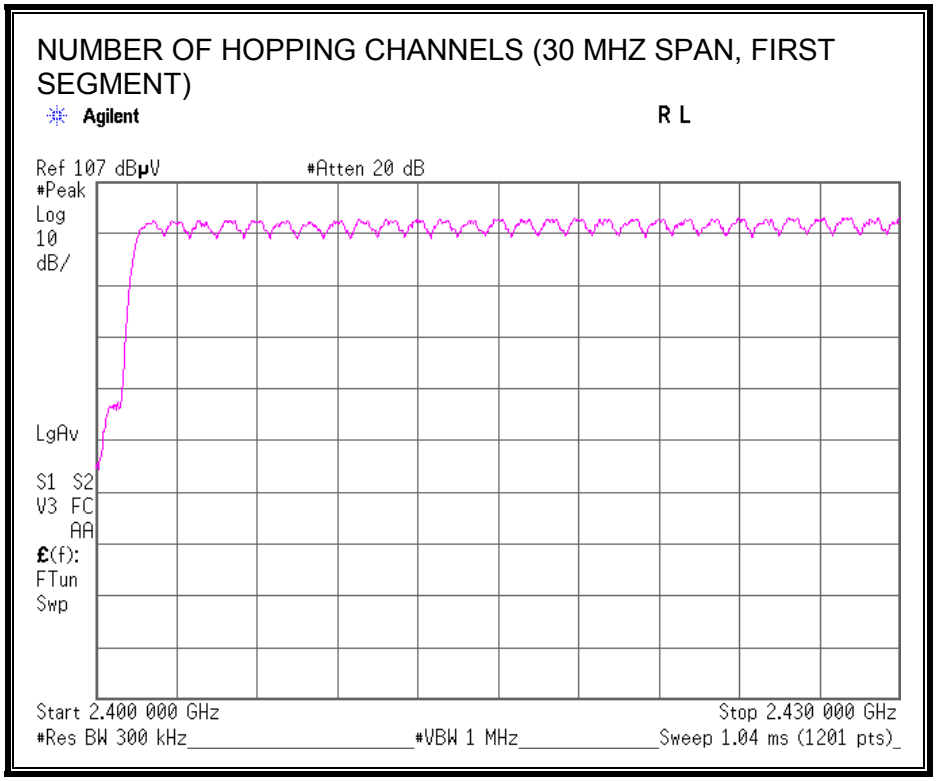
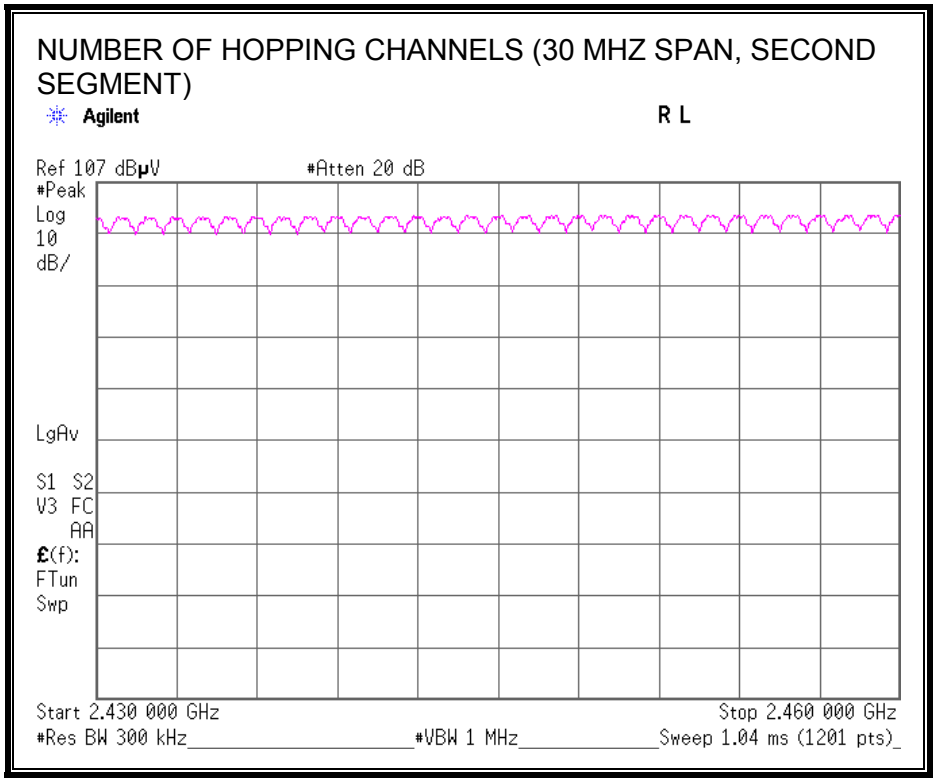
NUMBER OF HOPPING CHANNELS





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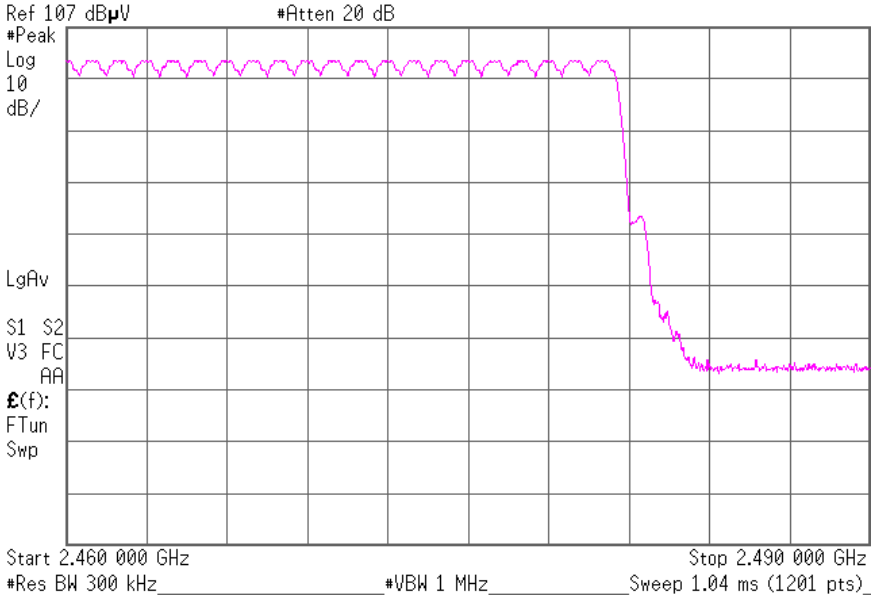
NUMBER OF HOPPING CHANNELS (30 MHZ SPAN, THIRD SEGMENT)



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6.2.4. AVERAGE TIME OF OCCUPANCY

LIMIT

FCC §15.247 (a) (1) (iii)

IC RSS-210 A8.1 (d)

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.

TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The span is set to 0 Hz, centered on a single, selected hopping channel. The width of a single pulse is measured in a fast scan. The number of pulses is measured in a 5 second scan, to enable resolution of each occurrence.

The average time of occupancy in the specified 31.6 second period (79 channels * 0.4 s) is equal to 31.6 * (# of pulses in 5 s / 5 s) * pulse width.

This device complies with the Bluetooth protocol for FHSS operation, employing a pseudo random channel selection and hopping rate to ensure that the occupancy time in N x 0.4s, where N is the number of channels being used in the hopping sequence (20 ≤ N ≤ 79), is always less than 0.4s regardless of packet size. This is confirmed in the test report for N=79.

RESULTS

Mode	Number of transmission in a 31.6(79 Hopping x 0.4) / 12.8(32 Hopping x 0.4)second period	Length of transmission time [msec]	Result [msec]	Limit [msec]
3DH1	50.2 times / 5 sec. x 31.6 sec. = 318 times	0.435	138	400
3DH3	25.4 times / 5 sec. x 31.6 sec. = 161 times	1.694	273	400
3DH5	16.8 times / 5 sec. x 31.6 sec. = 107 times	2.947	315	400

Sample Calculation
Result = Number of transmission x Length of transmition time

*Average data of 5 tests.(except Inquiry)

Mode	Sampling [times]					Average [times]
	1	2	3	4	5	
3DH1	51	50	50	50	50	50.2
3DH3	25	26	25	25	26	25.4
3DH5	17	16	17	17	17	16.8

Sample Calculation
Average= Summation(Sampling 1 to 5) / 5

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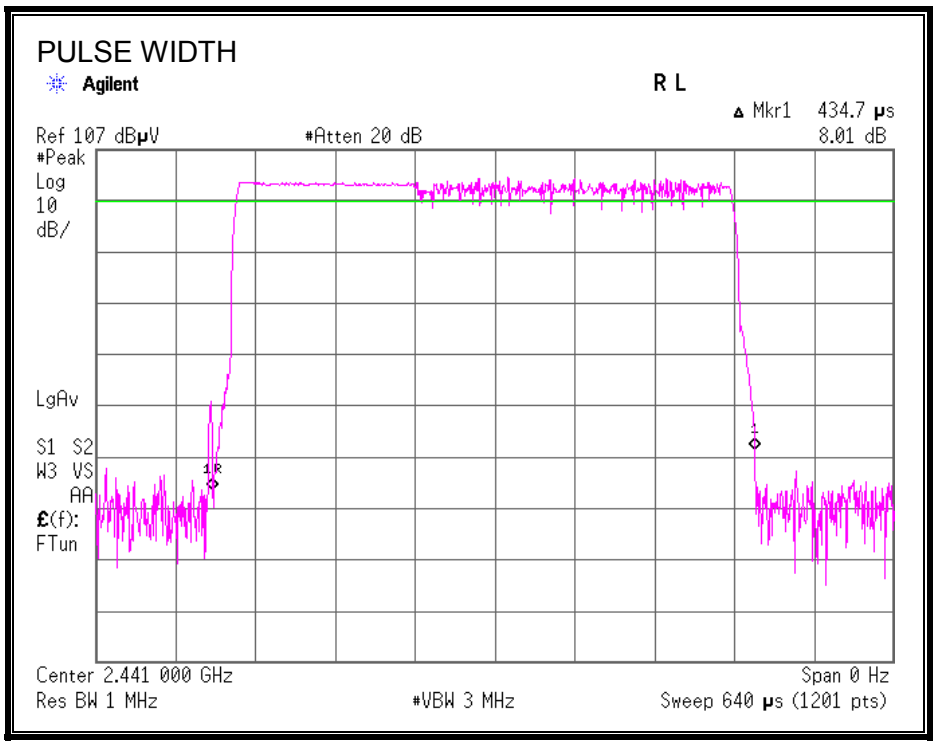
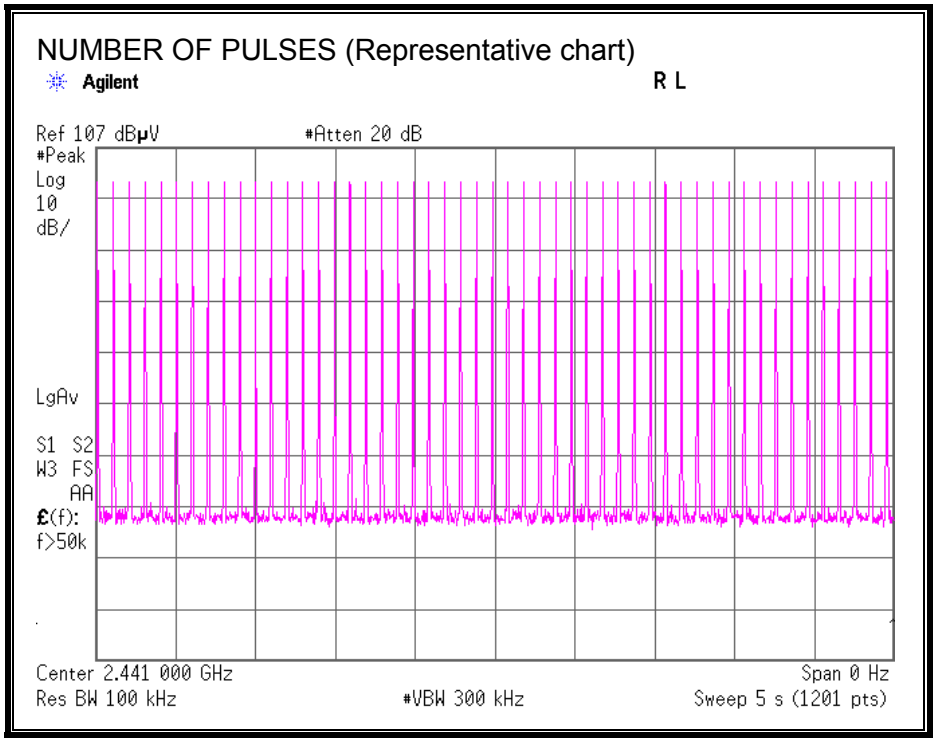
3DH1

PULSE WIDTH



NUMBER OF PULSES IN 5 SECOND OBSERVATION PERIOD



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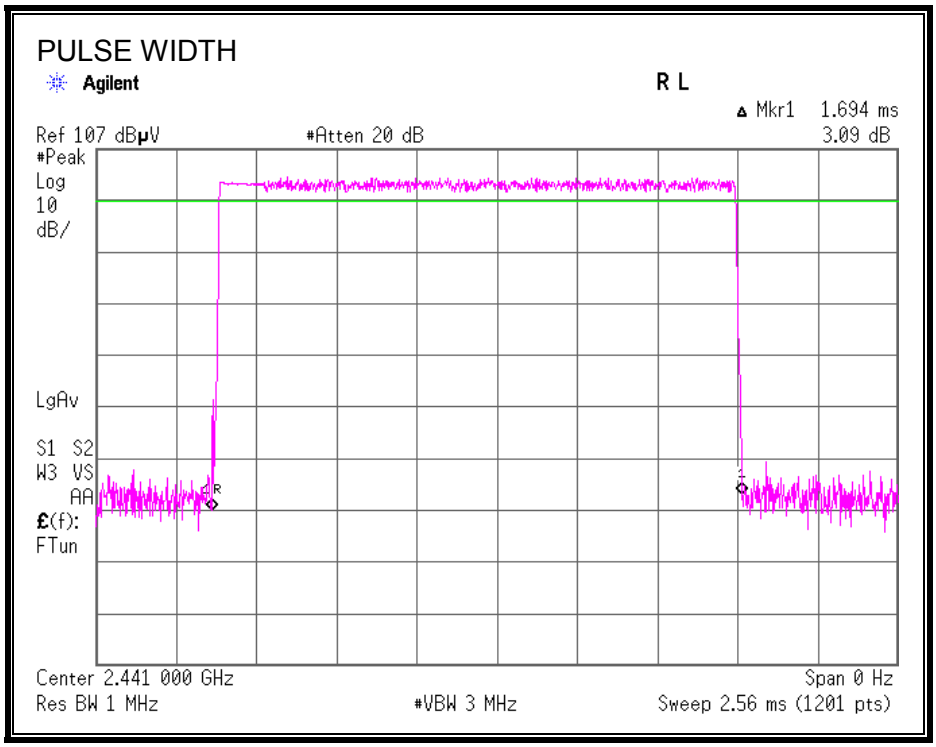
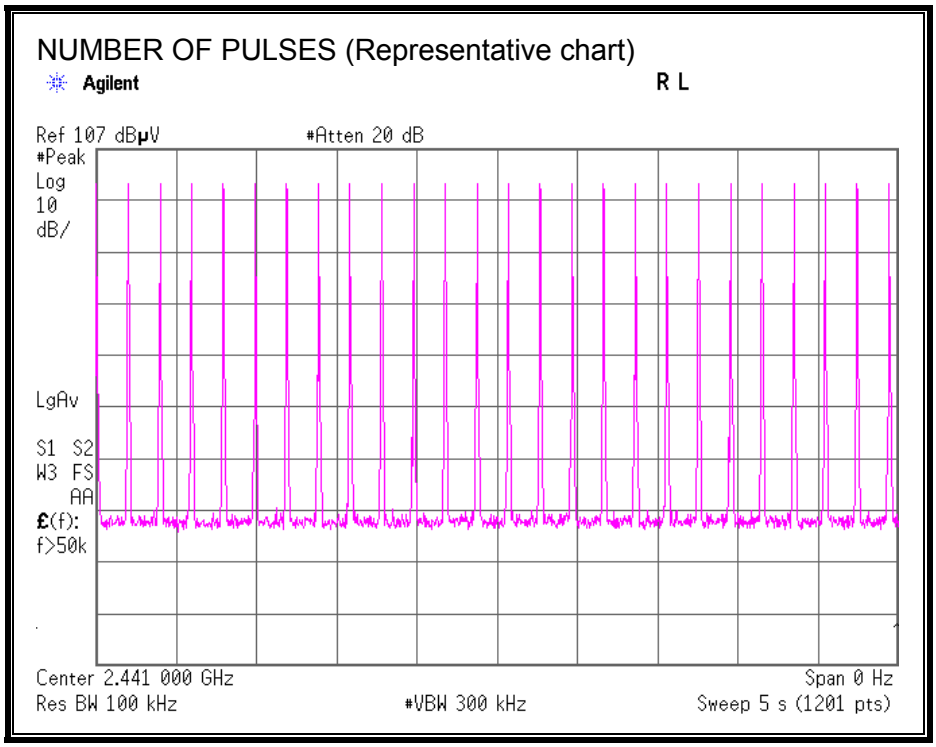
3DH3

PULSE WIDTH



NUMBER OF PULSES IN 5 SECOND OBSERVATION PERIOD



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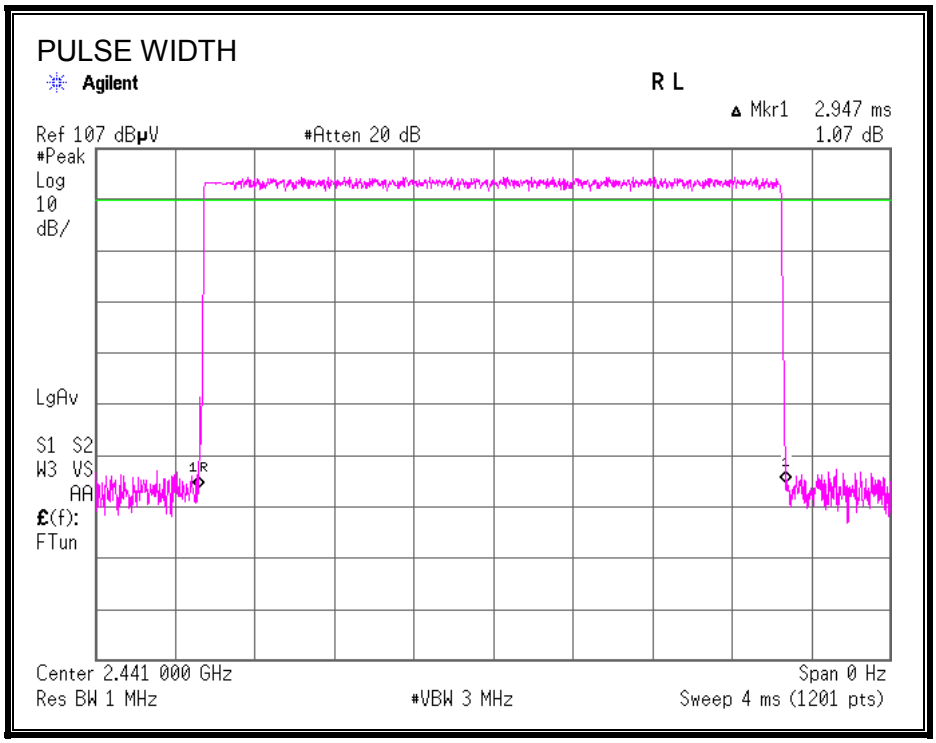
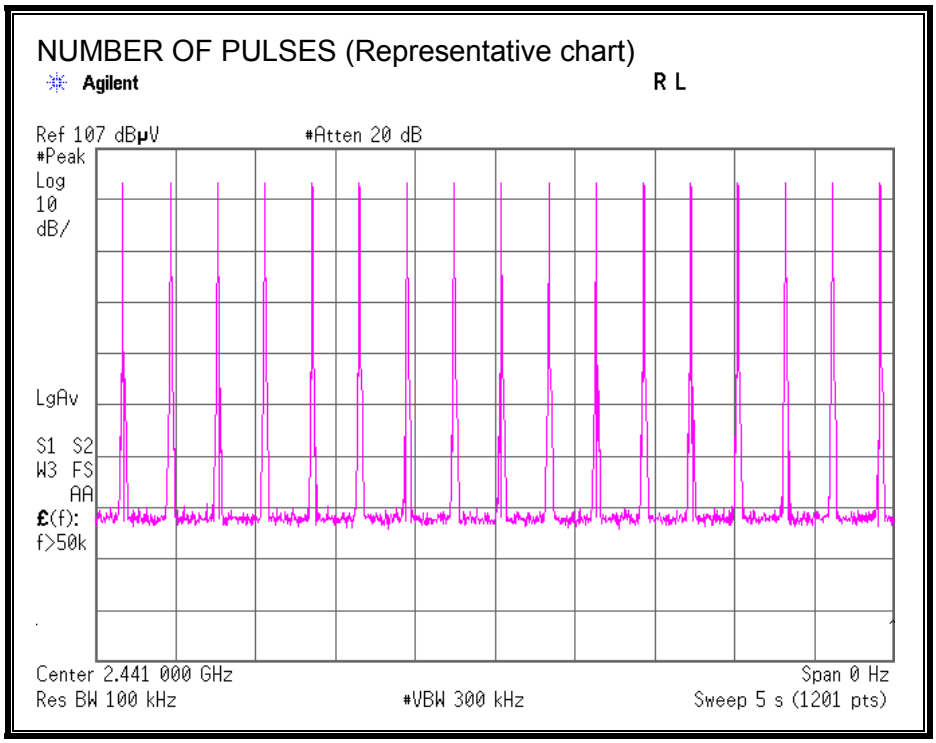
3DH5

PULSE WIDTH



NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD



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6.2.5. MAXIMUM PEAK OUTPUT POWER

LIMIT

§15.247 (b) (1)

RSS-210 Issue 7 Clause A8.4

The maximum antenna gain is less than 6 dBi, therefore the limit is 30 dBm.

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.

TEST PROCEDURE

The transmitter output is connected to a power meter.

RESULTS

Mode	Freq.	Reading Power Meter(PK)	Cable Loss	Atten.	Result		Limit		Margin
	[MHz]	[dBm]	[dB]	[dB]	[dBm]	[mW]	[dBm]	[mW]	[dB]
3DH5	2402.0	-6.11	2.13	6.11	2.13	1.63	20.96	125	18.83
3DH5	2441.0	-5.47	2.15	6.11	2.79	1.90	20.96	125	18.17
3DH5	2480.0	-5.46	2.16	6.11	2.81	1.91	20.96	125	18.15

Sample Calculation:
Result = Reading + Cable Loss + Attenuator

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6.2.6. AVERAGE POWER

LIMIT

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

RESULTS

Mode	Freq.	Reading Power Meter(AV)	Cable Loss	Atten.	Result	
	[MHz]	[dBm]	[dB]	[dB]	[dBm]	[mW]
3DH5	2402.0	-9.97	2.13	6.11	-1.73	0.67
3DH5	2441.0	-9.11	2.15	6.11	-0.85	0.82
3DH5	2480.0	-8.84	2.16	6.11	-0.57	0.88

Sample Calculation:
Result = Reading + Cable Loss + Attenuator

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6.2.7. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.247 (d)

IC RSS-210 A8.5

Limit = -20 dBc

TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

The spectrum from 9 kHz to 25 GHz is investigated with the transmitter set to the lowest, middle, and highest channels.

The bandedges at 2.4 and 2.4835 GHz are investigated with the transmitter set to the normal hopping mode.

RESULTS

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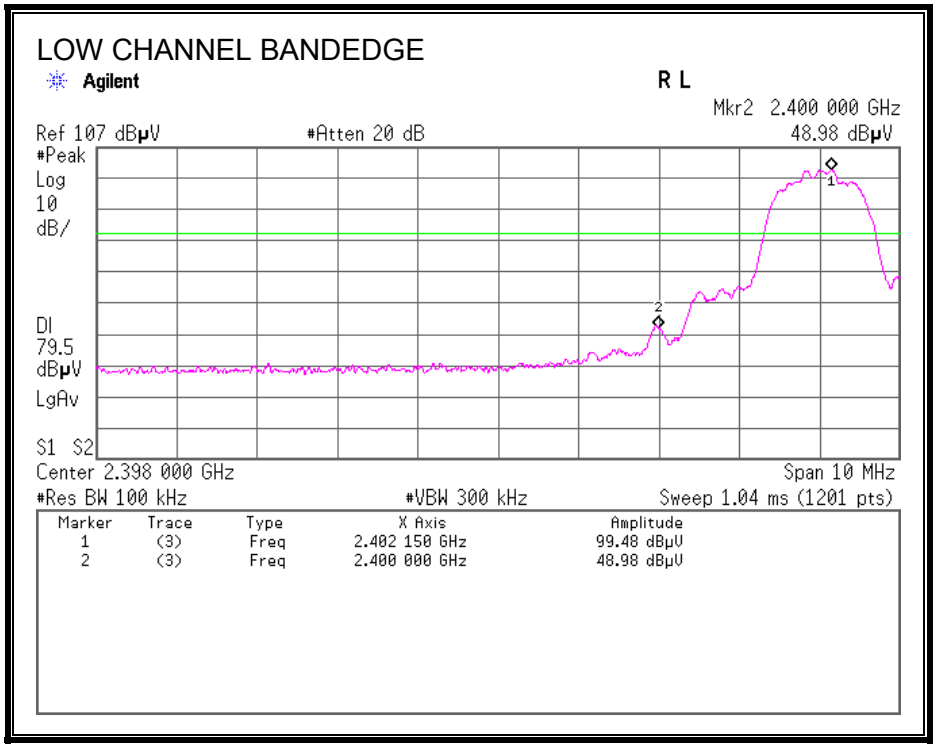
SPURIOUS EMISSIONS, LOW CHANNEL



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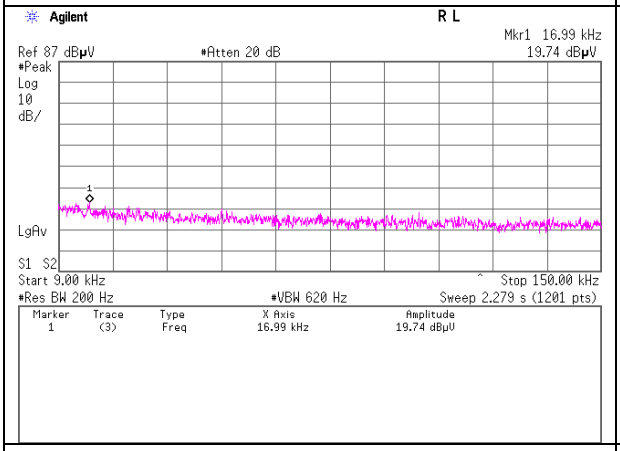
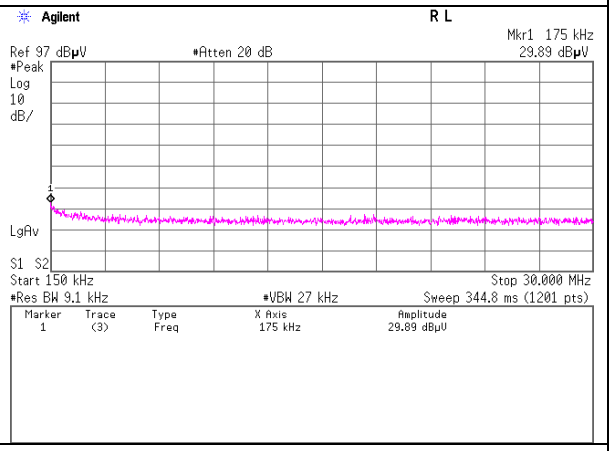
Tx 3DH5 2402MHz

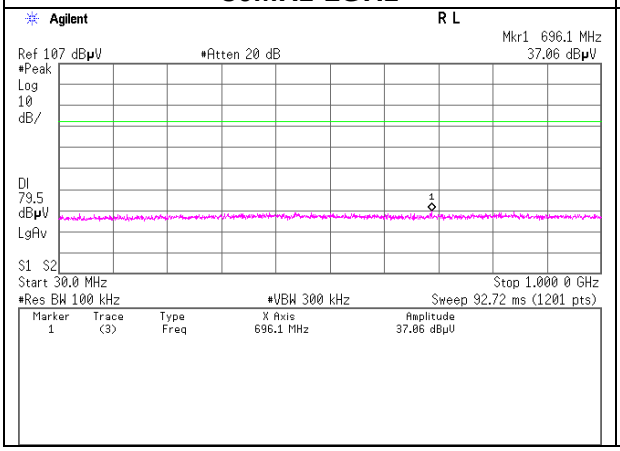
9kHz-150kHz



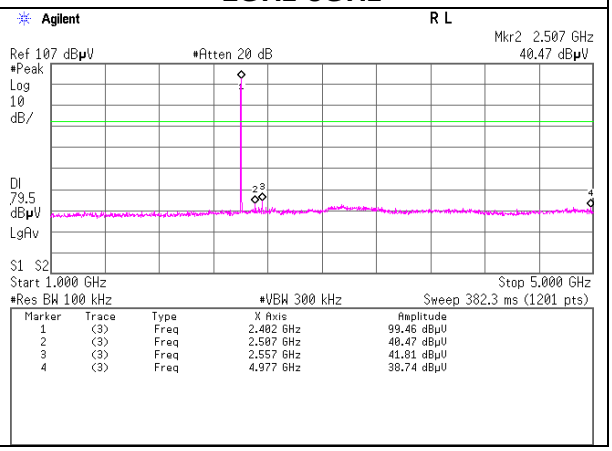
150kHz-30MHz



30MHz-1GHz



1GHz-5GHz



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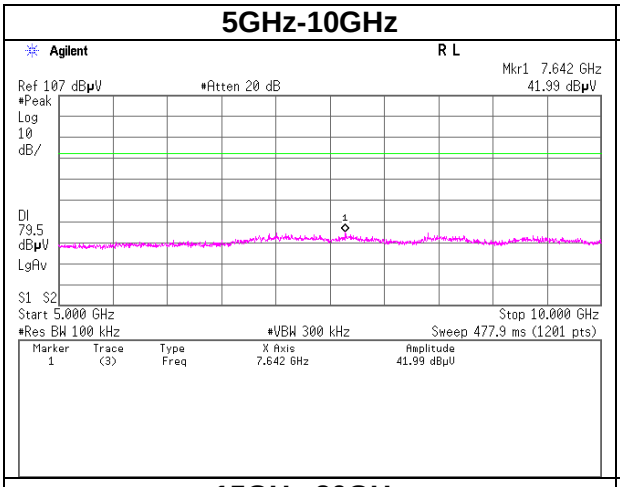
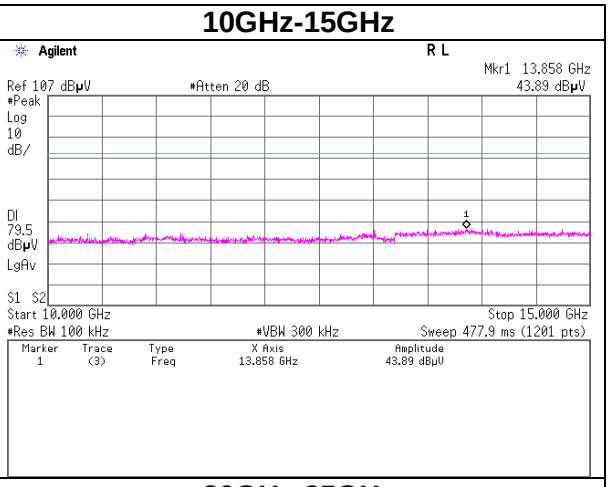
Tx 3DH5 2402MHz

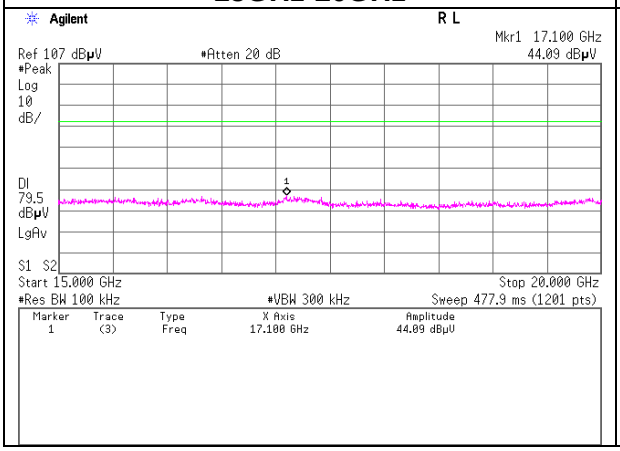
5GHz-10GHz



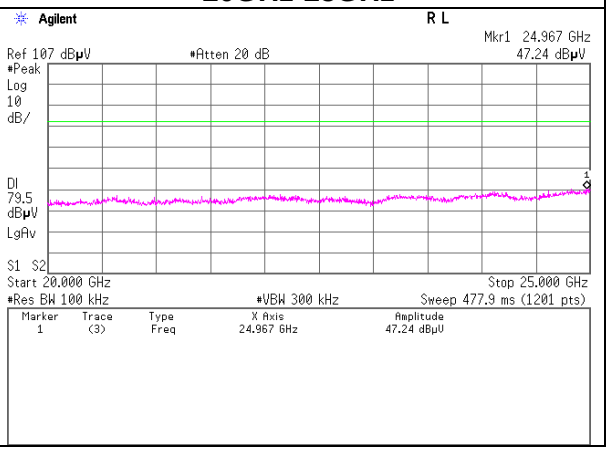
10GHz-15GHz



15GHz-20GHz



20GHz-25GHz



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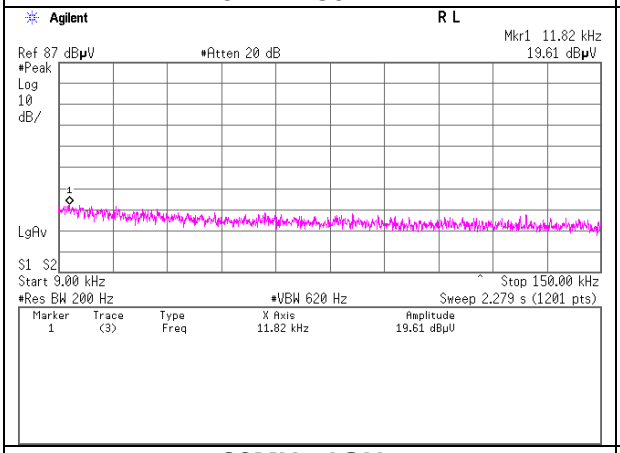
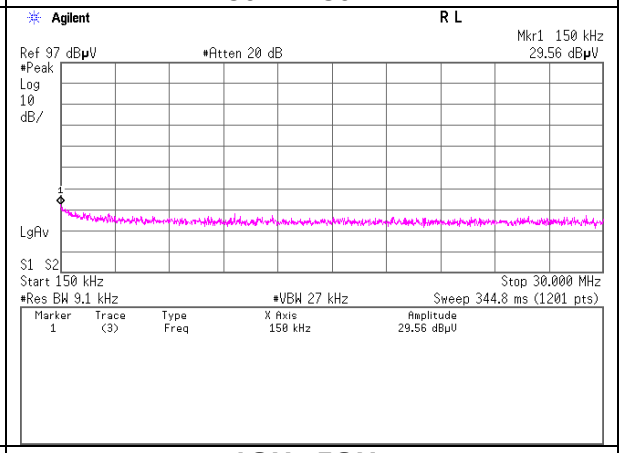
SPURIOUS EMISSIONS, MID CHANNEL

Tx 3DH5 2441MHz

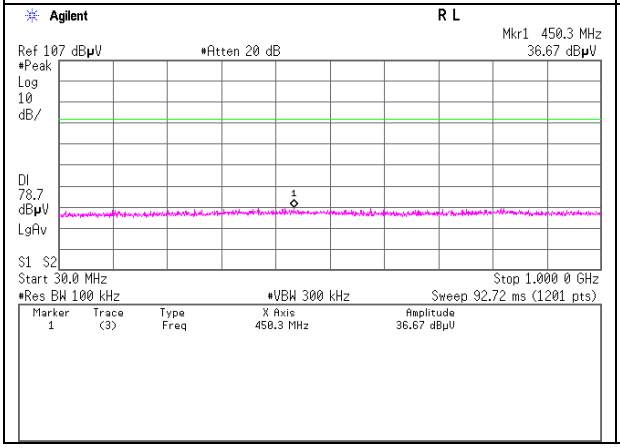
9kHz-150kHz



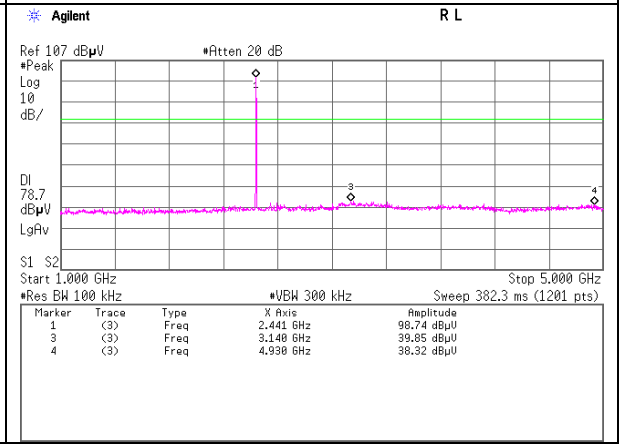
150kHz-30MHz



30MHz-1GHz



1GHz-5GHz



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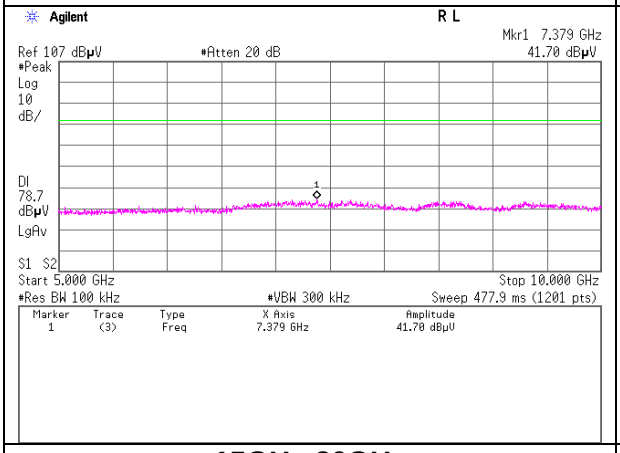
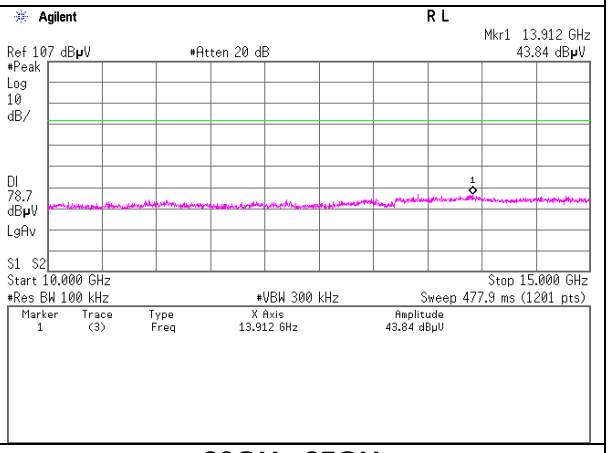
Tx 3DH5 2441MHz

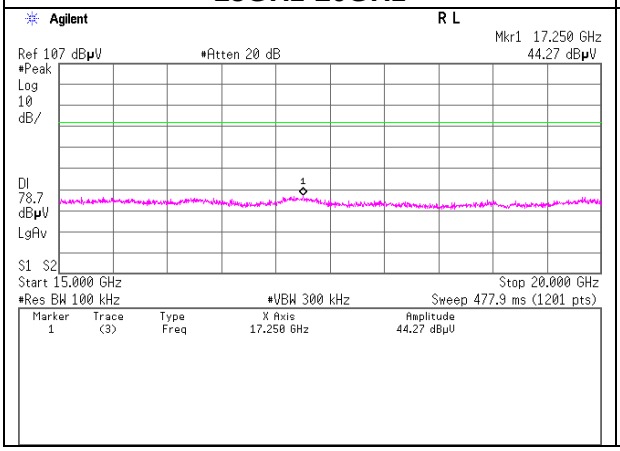
5GHz-10GHz



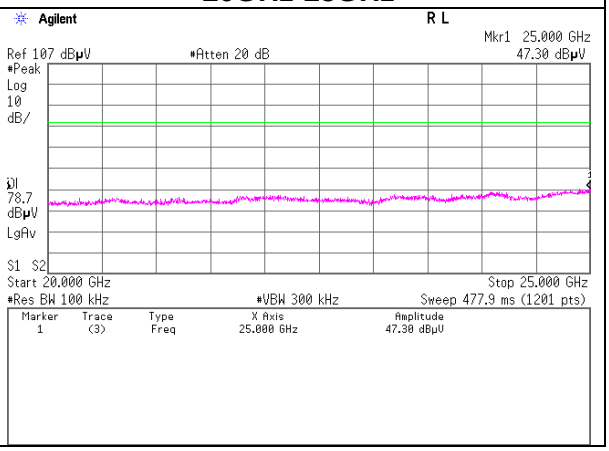
10GHz-15GHz



15GHz-20GHz



20GHz-25GHz



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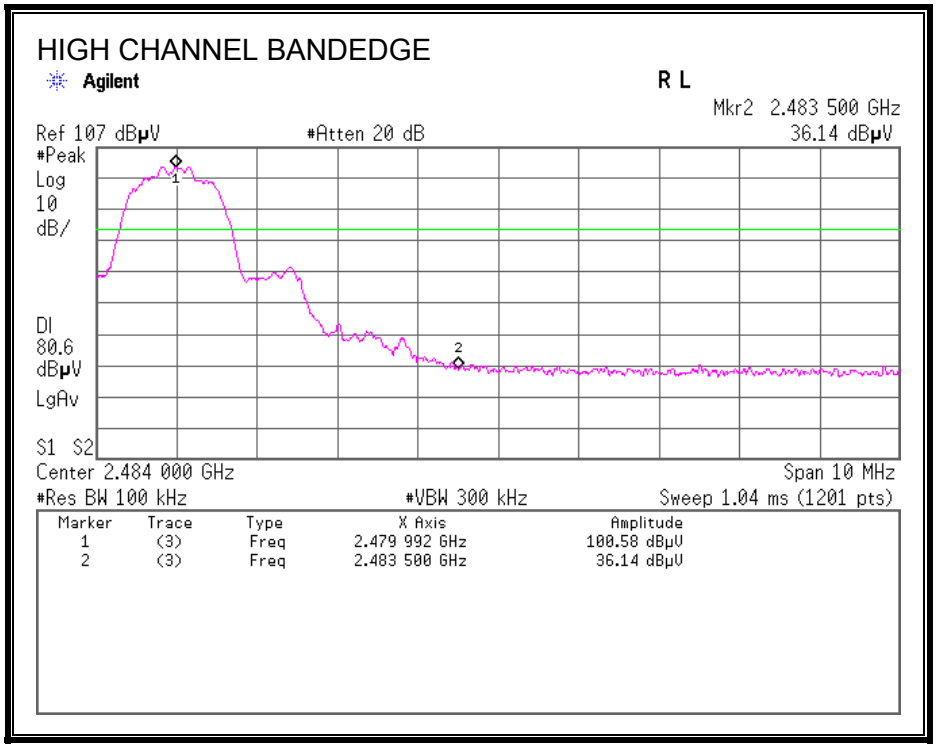
SPURIOUS EMISSIONS, HIGH CHANNEL



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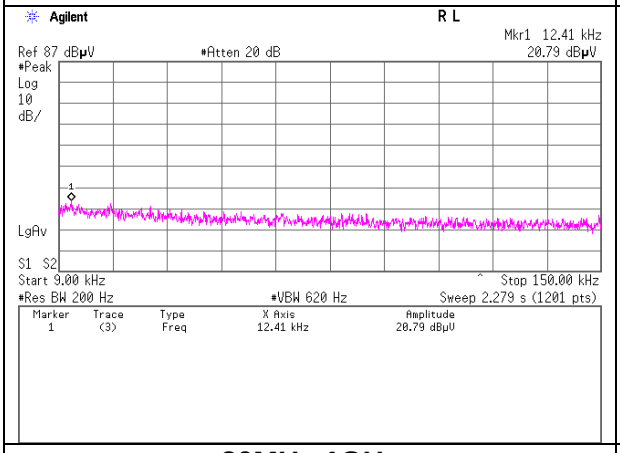
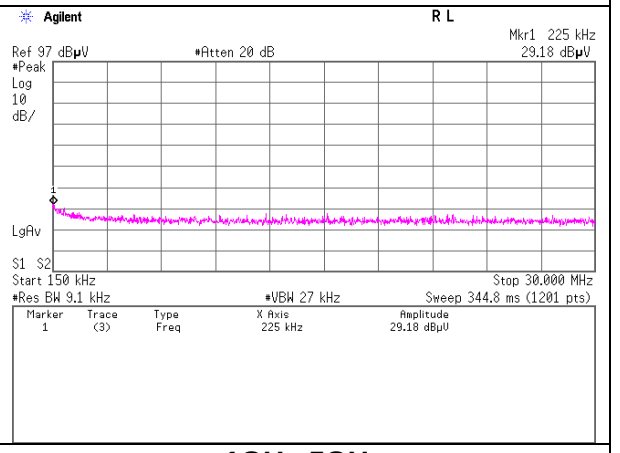
Tx 3DH5 2480MHz

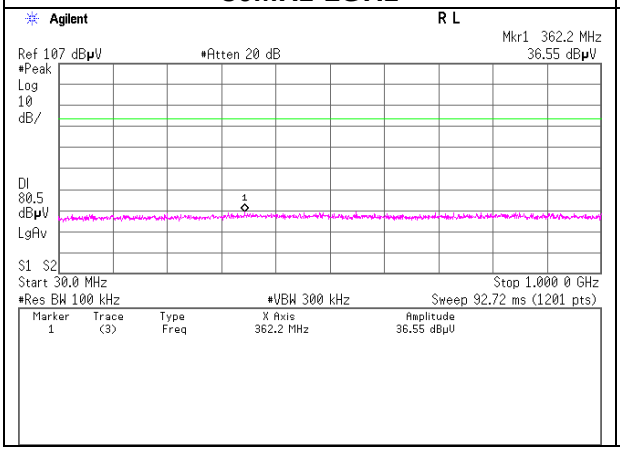
9kHz-150kHz



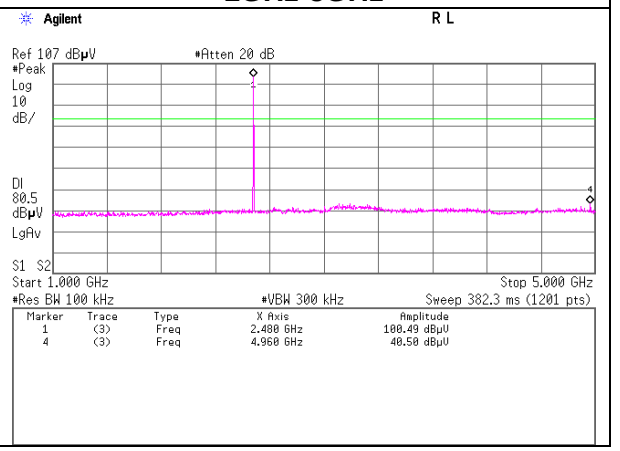
150kHz-30MHz



30MHz-1GHz



1GHz-5GHz



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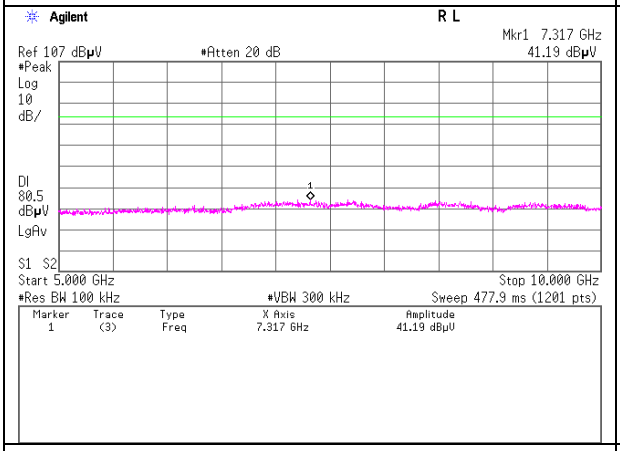
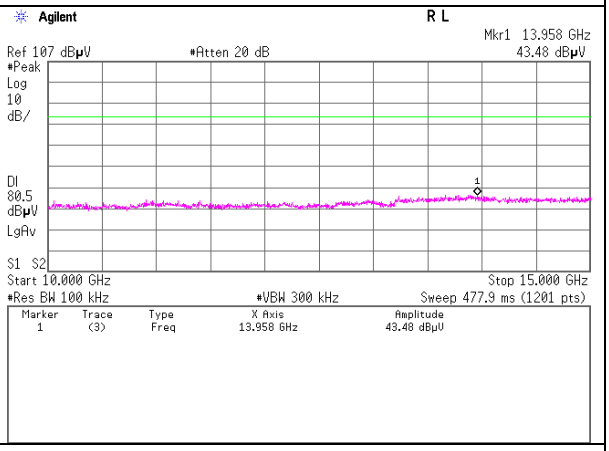
Tx 3DH5 2480MHz

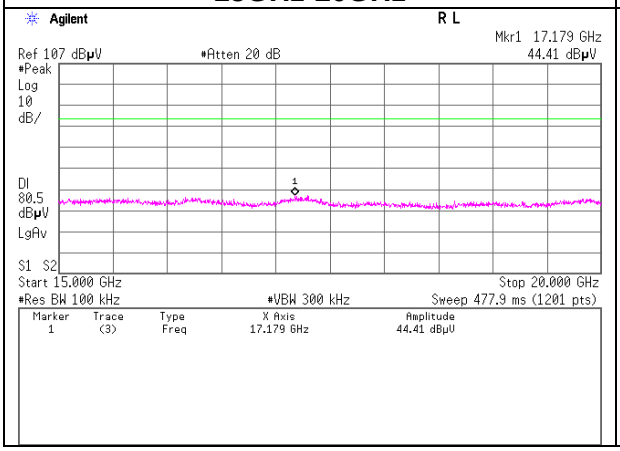
5GHz-10GHz



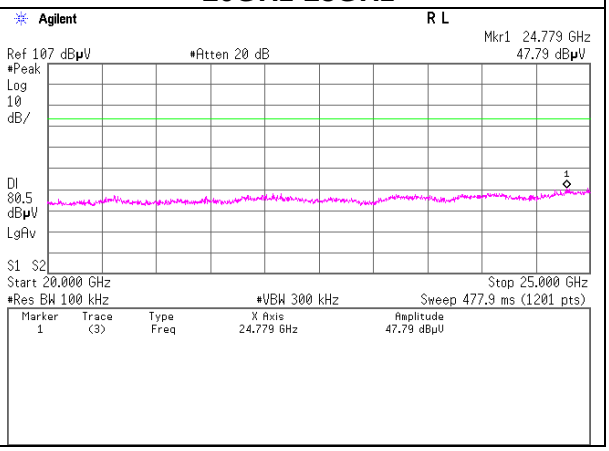
10GHz-15GHz



15GHz-20GHz



20GHz-25GHz



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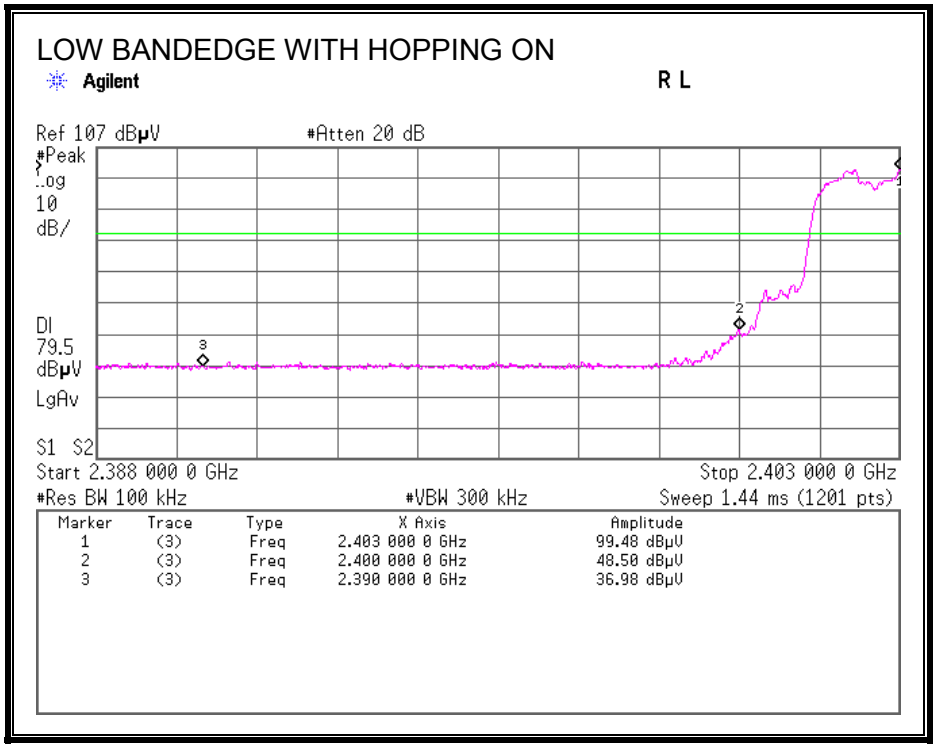
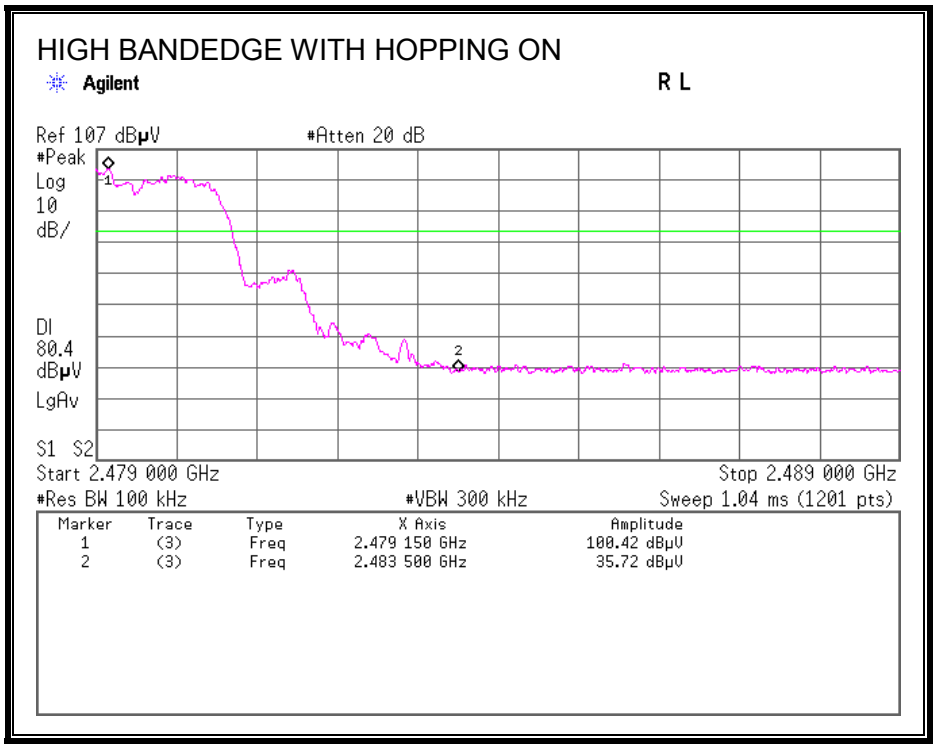
SPURIOUS BANDEDGE EMISSIONS WITH HOPPING ON





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7. RADIATED TEST RESULTS

7.1. LIMITS AND PROCEDURE

LIMITS

FCC §15.205 and §15.209

IC RSS-210 Clause 2.5 (Transmitter)

Frequency Range (MHz)	Field Strength Limit (uV/m) at 3 m	Field Strength Limit (dBuV/m) at 3 m
30 - 88	100	40
88 - 216	150	43.5
216 - 960	200	46
Above 960	500	54

TEST PROCEDURE

The EUT is placed on a non-conducting table 80 cm above the ground plane. The antenna to EUT distance is 3 meters. The EUT is configured in accordance with ANSI C63.4. The EUT is set to transmit in a continuous mode.

For measurements below 1 GHz the resolution bandwidth is set to 100 kHz for peak detection measurements or 120 kHz for quasi-peak detection measurements. Peak detection is used unless otherwise noted as quasi-peak.

For measurements above 1 GHz the resolution bandwidth is set to 1 MHz, then the video bandwidth is set to 3 MHz for peak measurements and 10 Hz for average measurements.

The spectrum from 30 MHz to 26.5 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in the 2.4 GHz band.

The frequency range of interest is monitored at a fixed antenna height and EUT azimuth. The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the emission. Measurements are made with the antenna polarized in both the vertical and the horizontal positions.

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Radiated Spurious Emission

Test place	Head Office EMC Lab. No.4 Semi Anechoic Chamber	
Report No.	32KE0147-HO	
Date	06/22/2012	06/30/2012
Temperature/ Humidity	24 deg.C/ 53% RH	24 deg.C/ 63% RH
Engineer	Satofumi Matsuyama (Above 1GHz)	Motoya Imura (30-1000MHz)
Mode	Tx, DH5 2402MHz	

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	30.541	QP	23.9	18.6	7.1	32.0	17.6	40.0	22.4	
Hori	99.630	QP	44.0	10.1	8.1	32.1	30.1	43.5	13.4	
Hori	150.690	QP	33.6	15.0	8.5	32.0	25.1	43.5	18.4	
Hori	168.032	QP	39.4	15.7	8.7	32.0	31.8	43.5	11.7	
Hori	400.000	QP	39.1	17.6	10.3	32.0	35.0	46.0	11.0	
Hori	451.680	QP	36.6	18.3	10.6	31.9	33.6	46.0	12.4	
Hori	2390.000	PK	42.3	28.1	2.4	32.3	40.5	73.9	33.4	
Hori	4804.000	PK	45.8	31.2	4.3	31.5	49.8	73.9	24.1	
Hori	2390.000	AV	29.9	28.1	2.4	32.3	28.1	53.9	25.8	
Hori	4804.000	AV	38.1	31.2	4.3	31.5	42.1	53.9	11.8	
Vert	31.623	QP	32.2	18.1	7.1	32.0	25.3	40.0	14.7	
Vert	99.636	QP	40.6	10.1	8.1	32.1	26.8	43.5	16.7	
Vert	150.661	QP	30.0	15.0	8.5	32.0	21.6	43.5	21.9	
Vert	168.517	QP	31.9	15.7	8.7	32.0	24.4	43.5	19.1	
Vert	400.000	QP	32.9	17.6	10.3	32.0	28.8	46.0	17.2	
Vert	451.940	QP	34.2	18.3	10.6	31.9	31.2	46.0	14.8	
Vert	2390.000	PK	42.1	28.1	2.4	32.3	40.3	73.9	33.6	
Vert	4804.000	PK	45.2	31.2	4.3	31.5	49.2	73.9	24.7	
Vert	2390.000	AV	29.9	28.1	2.4	32.3	28.1	53.9	25.8	
Vert	4804.000	AV	36.9	31.2	4.3	31.5	40.9	53.9	13.0	

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 10GHz)) - Gain(Amplifier)

*Other frequency noises omitted in this report were not seen or had enough margin (more than 20dB).

Distance factor: 10GHz-26.5GHz 20log(3.0m/1.0m)= 9.5dB

20dBc Data Sheet

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant Factor [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	2402.000	PK	99.9	28.1	2.4	32.3	98.1	-	-	Carrier
Hori	2400.000	PK	56.0	28.1	2.4	32.3	54.2	78.1	23.9	
Vert	2402.000	PK	98.1	28.1	2.4	32.3	96.3	-	-	Carrier
Vert	2400.000	PK	54.4	28.1	2.4	32.3	52.6	76.3	23.7	

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 10GHz)) - Gain(Amplifier)

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Radiated Spurious Emission

Test place	Head Office EMC Lab. No.4 Semi Anechoic Chamber	
Report No.	32KE0147-HO	
Date	06/22/2012	06/30/2012
Temperature/ Humidity	24 deg.C/ 53% RH	24 deg.C/ 63% RH
Engineer	Satofumi Matsuyama	Motoya Imura
	(Above 1GHz)	(30-1000MHz)
Mode	Tx, DH5 2441MHz	

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	30.521	QP	23.9	18.6	7.1	32.0	17.6	40.0	22.4	
Hori	99.636	QP	44.1	10.1	8.1	32.1	30.2	43.5	13.3	
Hori	150.687	QP	33.5	15.0	8.5	32.0	25.0	43.5	18.5	
Hori	168.432	QP	39.6	15.7	8.7	32.0	32.0	43.5	11.5	
Hori	400.000	QP	39.2	17.6	10.3	32.0	35.1	46.0	10.9	
Hori	451.743	QP	36.6	18.3	10.6	31.9	33.6	46.0	12.4	
Hori	4882.000	PK	47.6	31.4	4.3	31.5	51.8	73.9	22.1	
Hori	4882.000	AV	41.2	31.4	4.3	31.5	45.4	53.9	8.5	
Vert	31.611	QP	32.8	18.1	7.1	32.0	25.9	40.0	14.1	
Vert	99.636	QP	40.6	10.1	8.1	32.1	26.8	43.5	16.7	
Vert	150.625	QP	30.0	15.0	8.5	32.0	21.6	43.5	21.9	
Vert	168.514	QP	31.9	15.7	8.7	32.0	24.4	43.5	19.1	
Vert	400.000	QP	33.1	17.6	10.3	32.0	29.0	46.0	17.0	
Vert	451.727	QP	34.3	18.3	10.6	31.9	31.3	46.0	14.7	
Vert	4882.000	PK	46.2	31.4	4.3	31.5	50.4	73.9	23.5	
Vert	4882.000	AV	38.4	31.4	4.3	31.5	42.6	53.9	11.3	

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 10GHz)) - Gain(Amplifier)

*Other frequency noises omitted in this report were not seen or had enough margin (more than 20dB).

Distance factor: 10GHz-26.5GHz 20log(3.0m/1.0m)= 9.5dB

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Radiated Spurious Emission

Test place	Head Office EMC Lab. No.4 Semi Anechoic Chamber	
Report No.	32KE0147-HO	
Date	06/22/2012	06/30/2012
Temperature/ Humidity	24 deg.C/ 53% RH	24 deg.C/ 63% RH
Engineer	Satofumi Matsuyama	Motoya Imura
	(Above 1GHz)	(30-1000MHz)
Mode	Tx, DH5 2480MHz	

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	30.544	QP	24.2	18.6	7.1	32.0	17.9	40.0	22.1	
Hori	99.632	QP	44.0	10.1	8.1	32.1	30.1	43.5	13.4	
Hori	150.621	QP	33.7	15.0	8.5	32.0	25.2	43.5	18.3	
Hori	168.234	QP	39.4	15.7	8.7	32.0	31.8	43.5	11.7	
Hori	400.000	QP	39.1	17.6	10.3	32.0	35.0	46.0	11.0	
Hori	451.722	QP	36.6	18.3	10.6	31.9	33.6	46.0	12.4	
Hori	2483.500	PK	47.0	28.5	2.4	32.2	45.7	73.9	28.2	
Hori	4960.000	PK	47.6	31.6	4.3	31.5	52.0	73.9	21.9	
Hori	2483.500	AV	34.8	28.5	2.4	32.2	33.5	53.9	20.4	
Hori	4960.000	AV	40.4	31.6	4.3	31.5	44.8	53.9	9.1	
Vert	31.623	QP	32.1	18.1	7.1	32.0	25.2	40.0	14.8	
Vert	99.638	QP	41.0	10.1	8.1	32.1	27.2	43.5	16.3	
Vert	150.662	QP	30.1	15.0	8.5	32.0	21.7	43.5	21.8	
Vert	168.531	QP	32.0	15.7	8.7	32.0	24.5	43.5	19.0	
Vert	400.000	QP	33.1	17.6	10.3	32.0	29.0	46.0	17.0	
Vert	451.722	QP	34.3	18.3	10.6	31.9	31.3	46.0	14.7	
Vert	2483.500	PK	46.2	28.5	2.4	32.2	44.9	73.9	29.0	
Vert	4960.000	PK	46.2	31.6	4.3	31.5	50.6	73.9	23.3	
Vert	2483.500	AV	32.9	28.5	2.4	32.2	31.6	53.9	22.3	
Vert	4960.000	AV	38.5	31.6	4.3	31.5	42.9	53.9	11.0	

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 10GHz)) - Gain(Amplifier)

*Other frequency noises omitted in this report were not seen or had enough margin (more than 20dB).

Distance factor: 10GHz-26.5GHz 20log(3.0m/1.0m)= 9.5dB

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Radiated Spurious Emission

Test place	Head Office EMC Lab. No.4 Semi Anechoic Chamber	
Report No.	32KE0147-HO	
Date	06/22/2012	06/30/2012
Temperature/ Humidity	24 deg.C/ 53% RH	24 deg.C/ 63% RH
Engineer	Satofumi Matsuyama	Motoya Imura
	(Above 1GHz)	(30-1000MHz)
Mode	Tx, 3DH5 2402MHz	

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	30.120	QP	24.0	18.8	7.1	32.0	17.9	40.0	22.1	
Hori	99.633	QP	44.0	10.1	8.1	32.1	30.1	43.5	13.4	
Hori	150.690	QP	33.6	15.0	8.5	32.0	25.1	43.5	18.4	
Hori	168.430	QP	39.6	15.7	8.7	32.0	32.0	43.5	11.5	
Hori	400.000	QP	38.8	17.6	10.3	32.0	34.7	46.0	11.3	
Hori	451.712	QP	36.4	18.3	10.6	31.9	33.4	46.0	12.6	
Hori	2390.000	PK	43.1	28.1	2.4	32.3	41.3	73.9	32.6	
Hori	4804.000	PK	43.9	31.2	4.3	31.5	47.9	73.9	26.0	
Hori	2390.000	AV	29.9	28.1	2.4	32.3	28.1	53.9	25.8	
Hori	4804.000	AV	32.6	31.2	4.3	31.5	36.6	53.9	17.3	
Vert	31.666	QP	32.2	18.1	7.1	32.0	25.3	40.0	14.7	
Vert	99.636	QP	40.5	10.1	8.1	32.1	26.7	43.5	16.8	
Vert	150.662	QP	30.1	15.0	8.5	32.0	21.7	43.5	21.8	
Vert	168.522	QP	31.9	15.7	8.7	32.0	24.4	43.5	19.1	
Vert	400.000	QP	33.1	17.6	10.3	32.0	29.0	46.0	17.0	
Vert	451.771	QP	34.2	18.3	10.6	31.9	31.2	46.0	14.8	
Vert	2390.000	PK	42.2	28.1	2.4	32.3	40.4	73.9	33.5	
Vert	4804.000	PK	43.3	31.2	4.3	31.5	47.3	73.9	26.6	
Vert	2390.000	AV	29.9	28.1	2.4	32.3	28.1	53.9	25.8	
Vert	4804.000	AV	32.2	31.2	4.3	31.5	36.2	53.9	17.7	

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 10GHz)) - Gain(Amplifier)

*Other frequency noises omitted in this report were not seen or had enough margin (more than 20dB).

Distance factor: 10GHz-26.5GHz 20log(3.0m/1.0m)= 9.5dB

20dBc Data Sheet

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant Factor [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	2402.000	PK	98.6	28.1	2.4	32.3	96.8	-	-	Carrier
Hori	2400.000	PK	48.9	28.1	2.4	32.3	47.1	76.8	29.7	
Vert	2402.000	PK	97.1	28.1	2.4	32.3	95.3	-	-	Carrier
Vert	2400.000	PK	47.4	28.1	2.4	32.3	45.6	75.3	29.7	

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 10GHz)) - Gain(Amprifier)

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Radiated Spurious Emission

Test place	Head Office EMC Lab. No.4 Semi Anechoic Chamber	
Report No.	32KE0147-HO	
Date	06/22/2012	06/30/2012
Temperature/ Humidity	24 deg.C/ 53% RH	24 deg.C/ 63% RH
Engineer	Satofumi Matsuyama	Motoya Imura
	(Above 1GHz)	(30-1000MHz)
Mode	Tx, 3DH5 2441MHz	

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	31.545	QP	24.8	18.1	7.1	32.0	18.0	40.0	22.0	
Hori	99.641	QP	44.1	10.1	8.1	32.1	30.2	43.5	13.3	
Hori	150.676	QP	33.8	15.0	8.5	32.0	25.3	43.5	18.2	
Hori	168.032	QP	39.4	15.7	8.7	32.0	31.8	43.5	11.7	
Hori	400.000	QP	39.1	17.6	10.3	32.0	35.0	46.0	11.0	
Hori	451.468	QP	36.5	18.3	10.6	31.9	33.5	46.0	12.5	
Hori	4882.000	PK	46.7	31.4	4.3	31.5	50.9	73.9	23.0	
Hori	4882.000	AV	37.3	31.4	4.3	31.5	41.5	53.9	12.4	
Vert	32.643	QP	32.2	17.6	7.1	32.0	24.8	40.0	15.2	
Vert	99.636	QP	40.6	10.1	8.1	32.1	26.8	43.5	16.7	
Vert	150.678	QP	30.0	15.0	8.5	32.0	21.6	43.5	21.9	
Vert	168.521	QP	32.0	15.7	8.7	32.0	24.5	43.5	19.0	
Vert	400.000	QP	33.1	17.6	10.3	32.0	29.0	46.0	17.0	
Vert	451.468	QP	34.6	18.3	10.6	31.9	31.6	46.0	14.4	
Vert	4882.000	PK	45.2	31.4	4.3	31.5	49.4	73.9	24.5	
Vert	4882.000	AV	34.8	31.4	4.3	31.5	39.0	53.9	14.9	

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 10GHz)) - Gain(Amplifier)

*Other frequency noises omitted in this report were not seen or had enough margin (more than 20dB).

Distance factor: 10GHz-26.5GHz 20log(3.0m/1.0m)= 9.5dB

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Radiated Spurious Emission

Test place	Head Office EMC Lab. No.4 Semi Anechoic Chamber	
Report No.	32KE0147-HO	
Date	06/22/2012	06/30/2012
Temperature/ Humidity	24 deg.C/ 53% RH	24 deg.C/ 63% RH
Engineer	Satofumi Matsuyama	Motoya Imura
	(Above 1GHz)	(30-1000MHz)
Mode	Tx, 3DH5 2480MHz	

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	30.540	QP	24.0	18.6	7.1	32.0	17.7	40.0	22.3	
Hori	99.872	QP	44.1	10.2	8.1	32.1	30.3	43.5	13.2	
Hori	150.632	QP	33.5	15.0	8.5	32.0	25.0	43.5	18.5	
Hori	168.410	QP	39.5	15.7	8.7	32.0	31.9	43.5	11.6	
Hori	400.000	QP	39.1	17.6	10.3	32.0	35.0	46.0	11.0	
Hori	451.743	QP	36.6	18.3	10.6	31.9	33.6	46.0	12.4	
Hori	2483.500	PK	47.7	28.5	2.4	32.2	46.4	73.9	27.5	
Hori	4960.000	PK	46.6	31.6	4.3	31.5	51.0	73.9	22.9	
Hori	2483.500	AV	33.4	28.5	2.4	32.2	32.1	53.9	21.8	
Hori	4960.000	AV	37.1	31.6	4.3	31.5	41.5	53.9	12.4	
Vert	30.928	QP	32.7	18.4	7.1	32.0	26.1	40.0	13.9	
Vert	99.878	QP	40.7	10.2	8.1	32.1	27.0	43.5	16.5	
Vert	150.621	QP	30.1	15.0	8.5	32.0	21.7	43.5	21.8	
Vert	168.520	QP	32.0	15.7	8.7	32.0	24.5	43.5	19.0	
Vert	400.000	QP	33.1	17.6	10.3	32.0	29.0	46.0	17.0	
Vert	451.743	QP	34.2	18.3	10.6	31.9	31.2	46.0	14.8	
Vert	2483.500	PK	45.9	28.5	2.4	32.2	44.6	73.9	29.3	
Vert	4960.000	PK	45.2	31.6	4.3	31.5	49.6	73.9	24.3	
Vert	2483.500	AV	32.0	28.5	2.4	32.2	30.7	53.9	23.2	
Vert	4960.000	AV	35.3	31.6	4.3	31.5	39.7	53.9	14.2	

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 10GHz)) - Gain(Amplifier)

*Other frequency noises omitted in this report were not seen or had enough margin (more than 20dB).

Distance factor: 10GHz-26.5GHz 20log(3.0m/1.0m)= 9.5dB

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8. AC POWER LINE CONDUCTED EMISSIONS

LIMITS

FCC §15.207 (a)

RSS-Gen 7.2.2

Frequency of Emission (MHz)	Conducted Limit (dBuV)	
	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.

TEST PROCEDURE

The EUT is placed on a non-conducting table 40 cm from the vertical ground plane and 80 cm above the horizontal ground plane. The EUT is configured in accordance with ANSI C63.4.

The receiver is set to a resolution bandwidth of 9 kHz. Peak detection is used unless otherwise noted as quasi-peak or average.

Line conducted data is recorded for both NEUTRAL and HOT lines.

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RESULTS

Conducted Emission

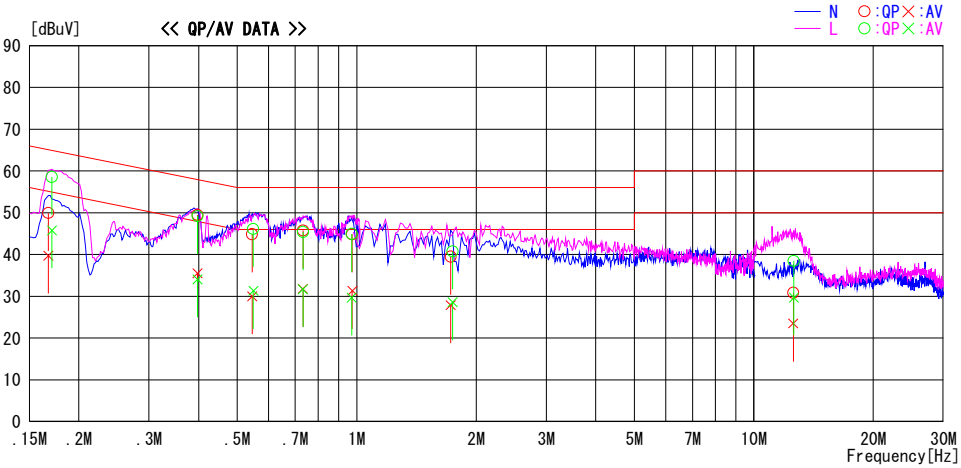
DATA OF CONDUCTED EMISSION TEST

UL Japan, Inc. Head Office EMC Lab. No.4 Semi Anechoic Chamber
Date : 2012/06/30

Report No. : 32KE0147-HO
Power : AC 120V / 60Hz
Temp./Humi. : 24deg. C / 63% RH
Engineer : Motoya Imura

Mode / Remarks : Tx BDR 2441MHz

LIMIT : FCC15.207 QP
FCC15.207 AV



Frequency	Reading Level		Corr.	Results		Limit		Margin		Phase	Comment
	QP	AV	Factor	QP	AV	QP	AV	QP	AV		
[MHz]	[dBuV]	[dBuV]	[dB]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dB]	[dB]		
0.16744	36.6	26.4	13.3	49.9	39.7	65.1	55.1	15.2	15.4	N	
0.39758	36.2	22.2	13.3	49.5	35.5	57.9	47.9	8.4	12.4	N	
0.54577	31.5	16.7	13.3	44.8	30.0	56.0	46.0	11.2	16.0	N	
0.73233	32.4	18.5	13.3	45.7	31.8	56.0	46.0	10.3	14.2	N	
0.97467	31.5	18.0	13.3	44.8	31.3	56.0	46.0	11.2	14.7	N	
1.72523	26.1	14.5	13.4	39.5	27.9	56.0	46.0	16.5	18.1	N	
12.56171	16.5	9.2	14.3	30.8	23.5	60.0	50.0	29.2	26.5	N	
0.17092	45.3	32.5	13.3	58.6	45.8	64.9	54.9	6.3	9.1	L	
0.39758	35.9	20.8	13.3	49.2	34.1	57.9	47.9	8.7	13.8	L	
0.54926	32.8	18.0	13.3	46.1	31.3	56.0	46.0	9.9	14.7	L	
0.73233	32.1	18.4	13.3	45.4	31.7	56.0	46.0	10.6	14.3	L	
0.97119	31.6	16.4	13.3	44.9	29.7	56.0	46.0	11.1	16.3	L	
1.74341	27.3	15.2	13.4	40.7	28.6	56.0	46.0	15.3	17.4	L	
12.60189	24.2	15.4	14.3	38.5	29.7	60.0	50.0	21.5	20.3	L	

CHART:WITH FACTOR,Peak hold data. CALCULATION:RESULT=READING+C.F(LISN LOSS+ATT LOSS +CABLE LOSS)
Except for the above table : adequate margin data below the limits.

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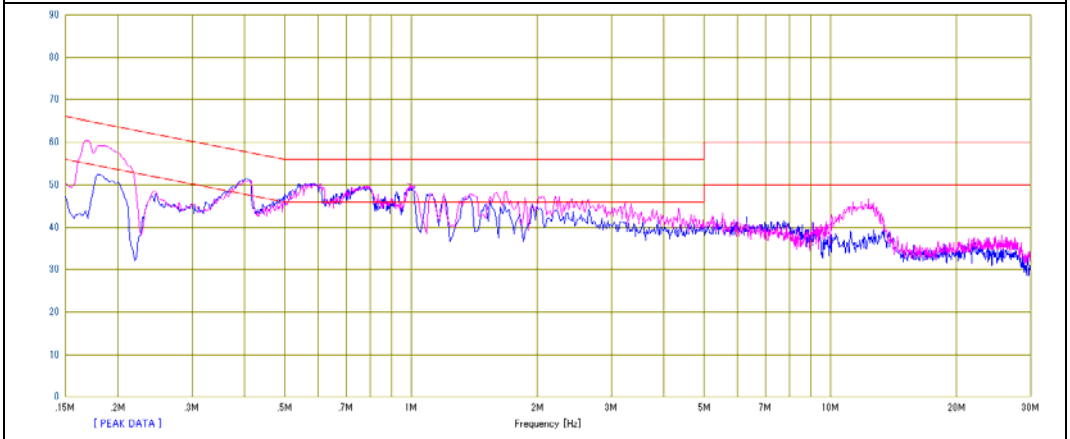
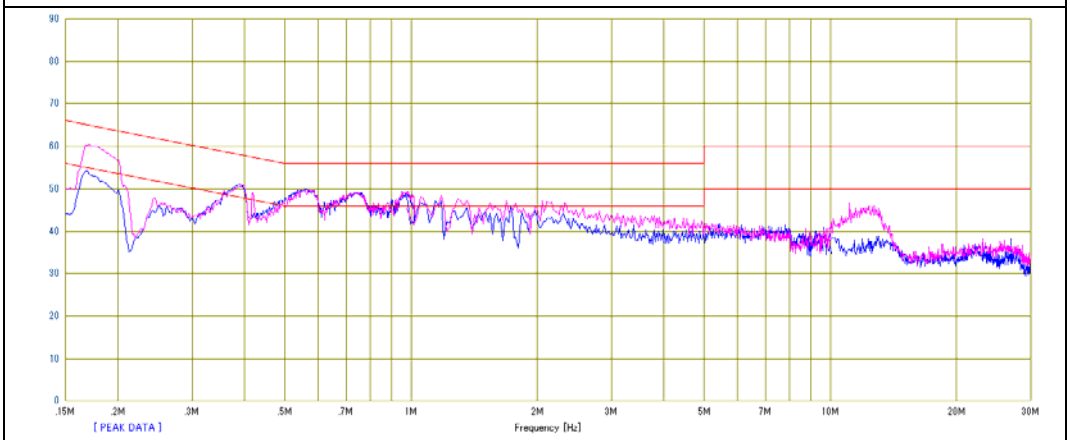
Conducted Emission

Test place	Head Office EMC Lab. No.4 Semi Anechoic Chamber
Date	06/20/2012
Temperature/ Humidity	24 deg.C/ 60% RH
Engineer	Motoya Imura
Mode	Tx DH5

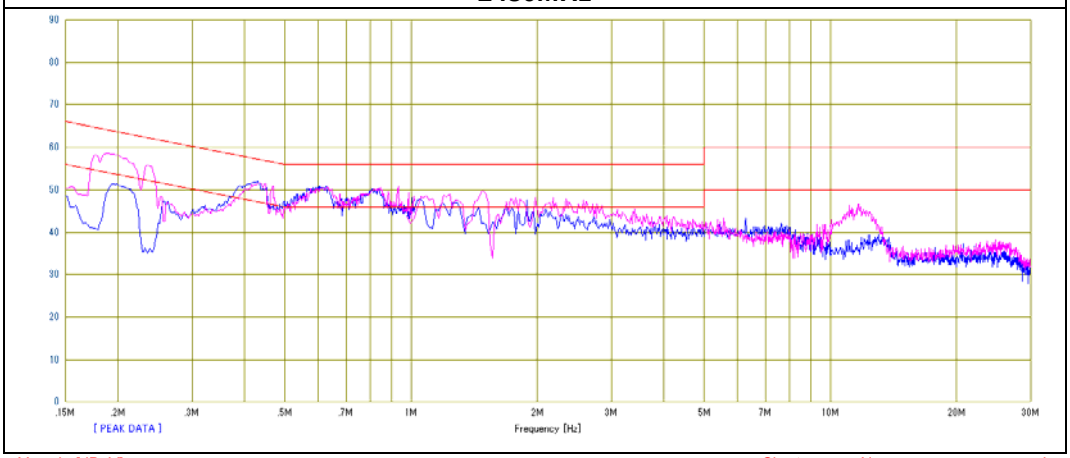
2402MHz



2441MHz



2480MHz



Y scale [dBuV] Chart — N — L

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Conducted Emission

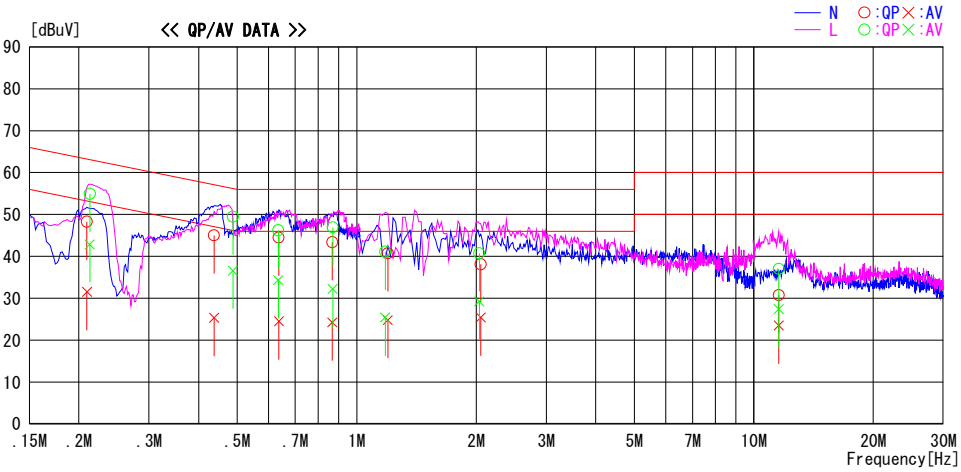
DATA OF CONDUCTED EMISSION TEST

UL Japan, Inc. Head Office EMC Lab. No.4 Semi Anechoic Chamber
Date : 2012/06/30

Report No. : 32KE0147-HO
Power : AC 120V / 60Hz
Temp./Humi. : 24deg. C / 63% RH
Engineer : Motoya Imura

Mode / Remarks : Tx EDR 2441MHz

LIMIT : FCC15.207 QP
FCC15.207 AV



Frequency	Reading Level		Corr.	Results		Limit		Margin		Phase	Comment
	QP	AV	Factor	QP	AV	QP	AV	QP	AV		
[MHz]	[dBuV]	[dBuV]	[dB]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dB]	[dB]		
0.20928	35.0	18.2	13.3	48.3	31.5	63.2	53.2	14.9	21.7	N	
0.43768	31.7	12.0	13.3	45.0	25.3	57.1	47.1	12.1	21.8	N	
0.63643	31.2	11.2	13.3	44.5	24.5	56.0	46.0	11.5	21.5	N	
0.86832	30.1	10.9	13.3	43.4	24.2	56.0	46.0	12.6	21.8	N	
1.19812	27.3	11.4	13.4	40.7	24.8	56.0	46.0	15.3	21.2	N	
2.05240	24.7	12.0	13.4	38.1	25.4	56.0	46.0	17.9	20.6	N	
11.55721	16.4	9.2	14.3	30.7	23.5	60.0	50.0	29.3	26.5	N	
0.21277	41.6	29.6	13.3	54.9	42.9	63.1	53.1	8.2	10.2	L	
0.48800	36.2	23.3	13.3	49.5	36.6	56.2	46.2	6.7	9.6	L	
0.63469	32.9	21.0	13.3	46.2	34.3	56.0	46.0	9.8	11.7	L	
0.87006	33.6	18.9	13.3	46.9	32.2	56.0	46.0	9.1	13.8	L	
1.17994	27.7	12.0	13.4	41.1	25.4	56.0	46.0	14.9	20.6	L	
2.03423	27.3	15.8	13.4	40.7	29.2	56.0	46.0	15.3	16.8	L	
11.55721	22.7	13.1	14.3	37.0	27.4	60.0	50.0	23.0	22.6	L	

CHART:WITH FACTOR,Peak hold data. CALCULATION:RESULT=READING+C.F(LISN LOSS+ATT LOSS +CABLE LOSS)
Except for the above table : adequate margin data below the limits.

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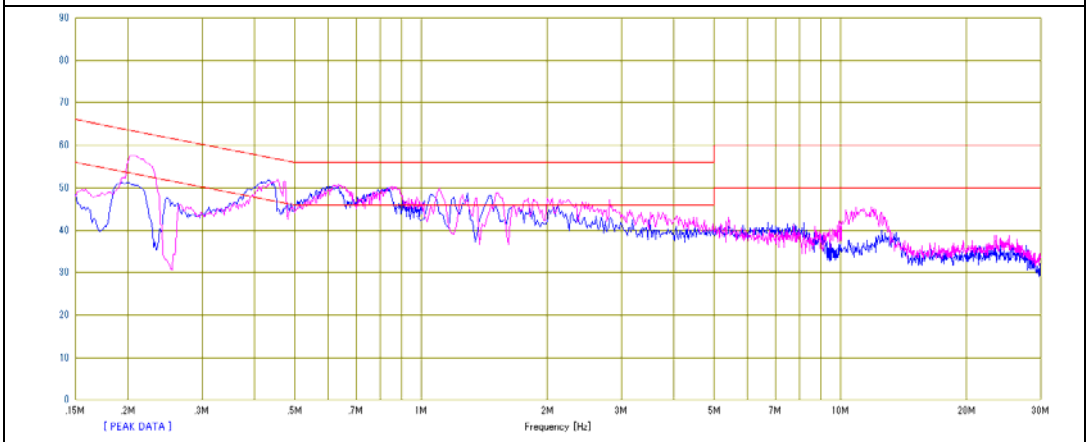
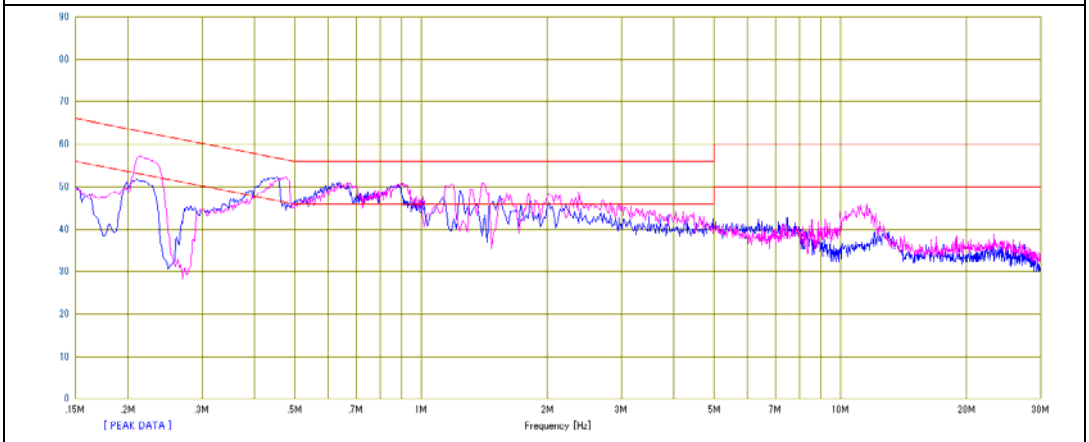
Conducted Emission

Test place	Head Office EMC Lab. No.4 Semi Anechoic Chamber
Date	06/20/2012
Temperature/ Humidity	24 deg.C/ 60% RH
Engineer	Motoya Imura
Mode	Tx 3DH5

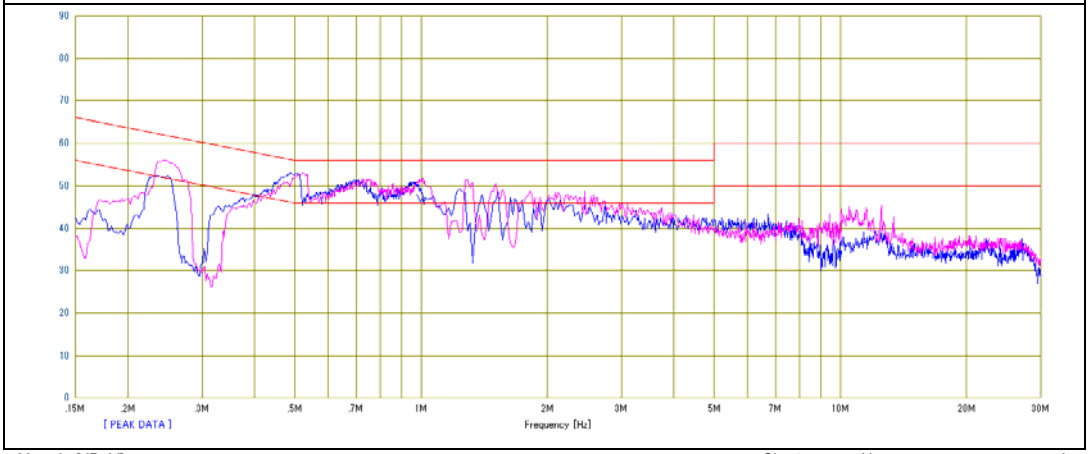
2402MHz



2441MHz



2480MHz



Y scale [dBuV] Chart — N — L

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