FCC CFR47 PART 15 SUBPART C
INDUSTRY CANADA RSS-210 ISSUE 8

CERTIFICATION TEST REPORT

FOR

BT-CRADLE ASSY(LB)BK

MODEL NUMBER: LO(BTCP)

FCC ID: UI3LOBTCP
IC: 140L-LOBTCP

REPORT NUMBER: 32AE0133-HO-R1

ISSUE DATE: October 4, 2011

Prepared for
NEC Corporation of America
6365 NORTH STATE HIGHWAY 161
IRVING, TEXAS 75039, 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
-	09/27/11	Initial Issue	T. Hatakeda
1	10/04/11	1. Correct the output power limit description in Section 7.5 on page 21 2. Correct limit value in tables and add the explanation about AFH mode on page 22 3. Delete description on dwell time factor from the formulas below the tables on page 53 *This report is a revised version of 32AE0133-HO, which is replaced with this report.	T. Hatakeda

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: NEC Corporation of America
6365 NORTH STATE HIGHWAY 161
IRVING, TEXAS 75039, USA

EUT DESCRIPTION: BT-CRADLE ASSY(LB)BK

MODEL: LO(BTCP)

SERIAL NUMBER: No. 7 (Radiated and Conducted tests),
No. 10 (Antenna Terminal Conducted test)

DATE TESTED: SEPTEMBER 13 and 14, 2011

APPLICABLE STANDARDS	
STANDARD	**TEST RESULTS**
CFR 47 Part 15 Subpart C	Pass
INDUSTRY CANADA RSS-210 Issue 8 Annex 8	Pass
INDUSTRY CANADA RSS-GEN Issue 3	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:

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2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.10-2003, FCC CFR 47 Part 2, FCC CFR 47 Part 15, RSS-GEN Issue 3, and RSS-210 Issue 8.

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	3.5dB	5.1dB	5.2dB	4.8dB	5.1dB	4.4dB	4.3dB
No.2	4.0dB	5.1dB	5.2dB	4.8dB	5.0dB	4.3dB	4.2dB
No.3	4.2dB	4.7dB	5.2dB	4.8dB	5.0dB	4.5dB	4.2dB
No.4	4.0dB	5.0dB	5.1dB	4.8dB	5.0dB	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 Cradle.

The radio module is manufactured by SMK Corporation, model: BT505A.

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	2.73	1.87
2402 - 2480	Enhanced 8PSK	2.33	1.71

* Refer to Section 7.5.

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes chip multilayer antenna, with a maximum gain of 0.7 dBi.

5.4. SOFTWARE AND FIRMWARE

The test utility software used during testing: RF Test Tool for Bluetooth Device ver.1.2.4

5.5. WORST-CASE CONFIGURATION AND MODE

The fundamental and spurious was measured in three different orientations X, Y and Z to find worst-case orientation, and final testing for radiated emissions was performed with EUT in following orientation.

	Horizontal	Vertical
Carrier	Y without Hand set	Y without Hand set
Spurious (above 1GHz)	Y without Hand set	Y without Hand set
Spurious (below 1GHz)	Y without Hand set	Y without Hand set

The worst-case channel is determined as the channel with the highest output power, radiated emissions below 1 GHz and power line conducted emissions were performed with the EUT set to the channel with highest output power.

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5.6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

PERIPHERAL SUPPORT EQUIPMENT LIST			
Description	**Manufacturer**	**Model**	**Serial Number**
Hand Set	NEC Infrontia	-	01
Jig	SMK	-	01

I/O CABLES

I/O CABLE LIST						
Cable No.	**Port**	**# of Identic Ports**	**Connector Type**	**Cable Type**	**Cable Length**	**Remarks**
1	DC	1	DC	Un-Shielded	0.1m	N/A
2	DC	1	DC	Un-Shielded	1.5m	N/A

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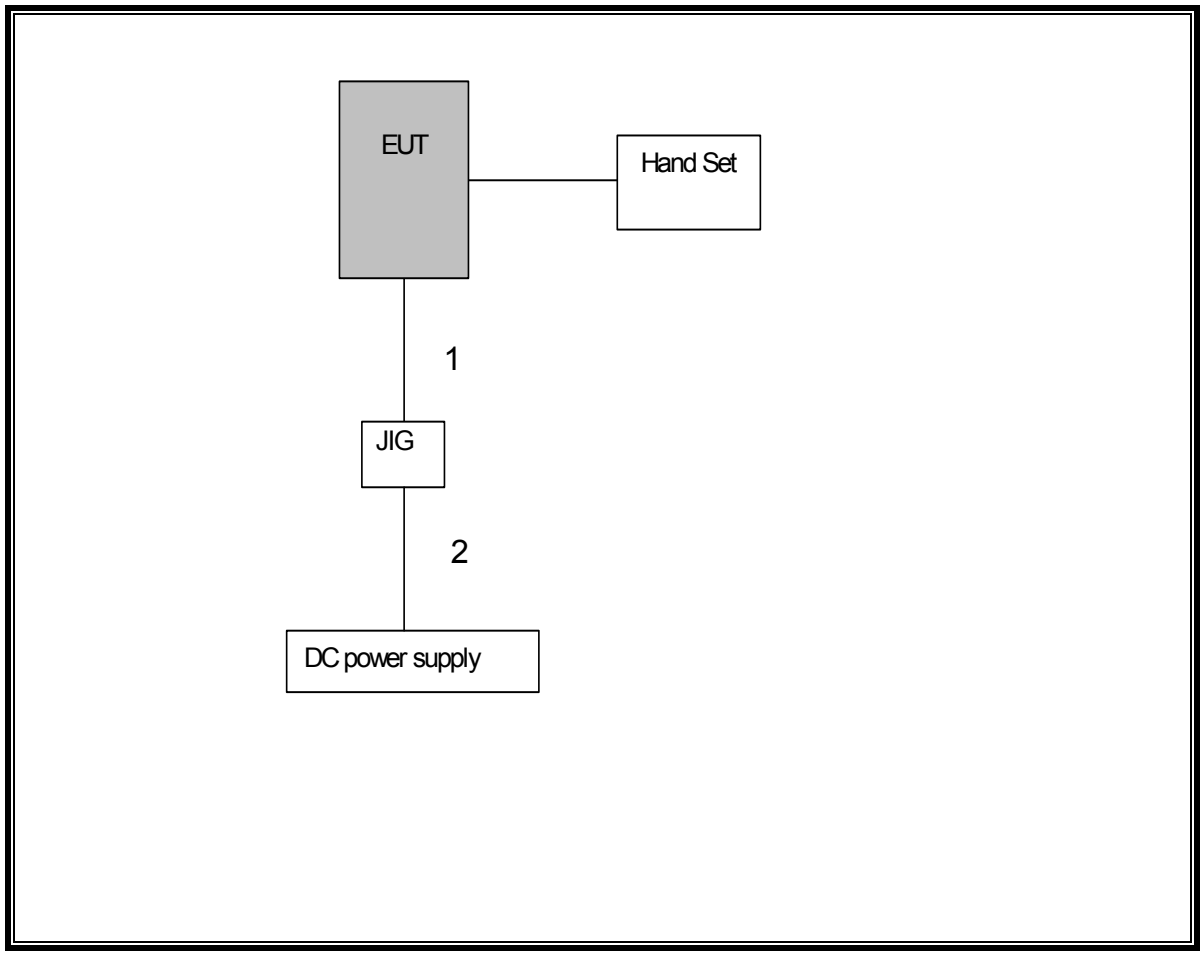
SETUP DIAGRAM



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6. 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)
MAEC-03	Semi Anechoic Chamber(NSA)	TDK	Semi Anechoic Chamber 3m	DA-10005	RE/CE	2011/02/22 * 12
MOS-13	Thermo-Hygrometer	Custom	CTH-180	-	RE/CE	2011/02/23 * 12
MJM-06	Measure	PROMART	SEN1955	-	RE/CE	
COTS-MEMI	EMI measurement program	TSJ	TEPTO-DV	-	RE/CE	-
MSA-04	Spectrum Analyzer	Agilent	E4448A	US44300523	RE/AT/CE	2011/04/08 * 12
MTR-08	Test Receiver	Rohde & Schwarz	ESCI	100767	RE/CE	2011/08/11 * 12
MBA-03	Biconical Antenna	Schwarzbeck	BBA9106	1915	RE	2010/10/11 * 12
MLA-03	Logperiodic Antenna	Schwarzbeck	USLP9143	174	RE	2010/10/11 * 12
MCC-51	Coaxial cable	UL Japan	-	-	RE	2011/07/15 * 12
MAT-09	Attenuator(6dB)	Weinschel Corp	2	BK7973	RE	2010/11/05 * 12
MPA-13	Pre Amplifier	SONOMA INSTRUMENT	310	260834	RE	2011/03/04 * 12
MHA-20	Horn Antenna 1-18GHz	Schwarzbeck	BBHA9120D	258	RE	2011/05/23 * 12
MCC-133	Microwave Cable	HUBER+SUHNER	SUCOFLEX104	336164/4(1m) / 340640(5m)	RE	2011/09/07 * 12
MPA-11	MicroWave System Amplifier	Agilent	83017A	MY39500779	RE	2011/03/10 * 12
MHA-16	Horn Antenna 15-40GHz	Schwarzbeck	BBHA9170	BBHA9170306	RE	2011/05/23 * 12
MCC-35	Microwave Cable	Hirose Electric	U.FL-2LP-066-A-(200)	-	AT	2010/09/29 * 12
MAT-20	Attenuator(10dB)(above1GHz)	HIROSE ELECTRIC CO.,LTD.	AT-110	-	AT	2011/01/06 * 12
MLS-06	LISN(AMN)	Schwarzbeck	NSLK8127	8127363	CE(EUT or AE)	2011/02/20 * 12
MCC-112	Coaxial cable	Fujikura/Suhner/TSJ	5D-2W(10m)/SFM141(3m)/sucoform141-PE(1m)/421-010(1.5m)/RFM-E321(Switcher)	-/00640	CE	2011/07/15 * 12
MAT-66	Attenuator(13dB)	JFW Industries, Inc.	50FP-013H2 N	-	CE	2011/02/22 * 12
MSA-10	Spectrum Analyzer	Agilent	E4448A	MY46180655	AT	2011/02/15 * 12
MPM-09	Power Meter	Anritsu	ML2495A	6K00003348	AT	2010/09/10 * 12
MPSE-12	Power sensor	Anritsu	MA2411B	011598	AT	2010/09/10 * 12
MOS-14	Thermo-Hygrometer	Custom	CTH-201	-	AT	2011/02/23 * 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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7. ANTENNA PORT TEST RESULTS

7.1. 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

DH5

Channel	Frequency (MHz)	20 dB Bandwidth (kHz)	99% Bandwidth (kHz)
Low	2402	963.325	869.2936
Middle	2441	955.007	863.9284
High	2480	930.661	855.3156

3DH5

Channel	Frequency (MHz)	20dB Bandwidth (MHz)	99% Bandwidth (MHz)
Low	2402	1.279	1.1667
Middle	2441	1.257	1.1624
High	2480	1.257	1.1594

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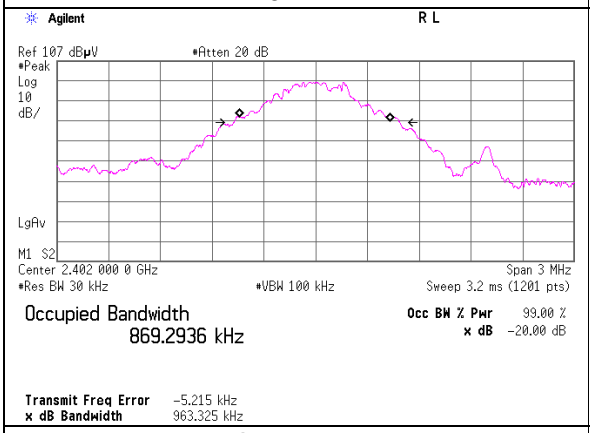
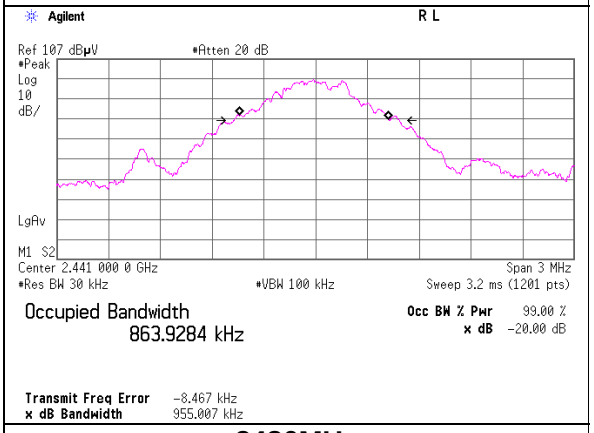
20 dB AND 99% BANDWIDTH

DH5

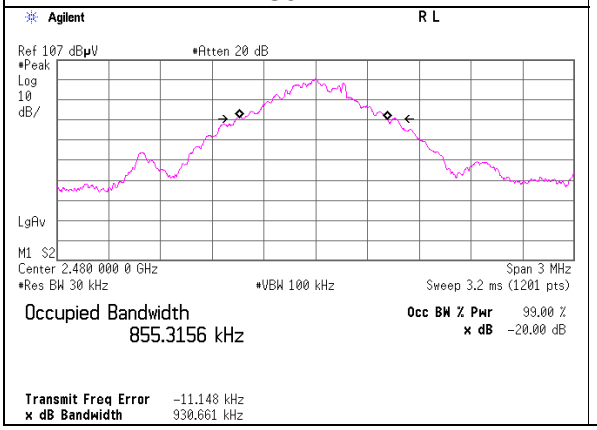
2402MHz



2441MHz

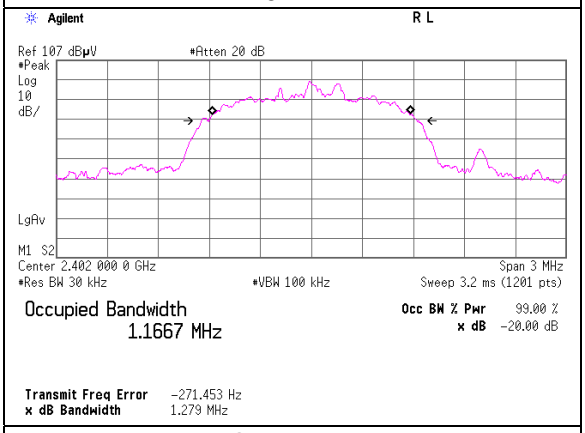


2480MHz

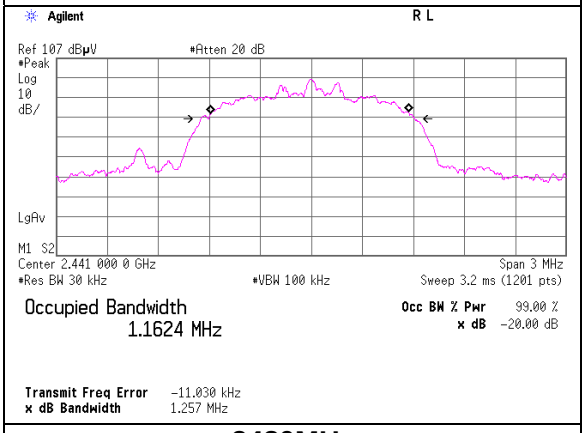


3DH5

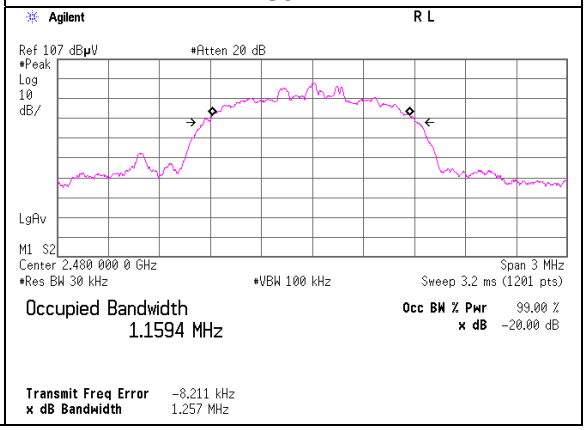
2402MHz



2441MHz



2480MHz



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7.2. 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.

DH5:The RBW is set to 100 kHz and the VBW is set to 300 kHz.
3DH5:The RBW is set to 30 kHz and the VBW is set to 100 kHz.

The sweep time is coupled.

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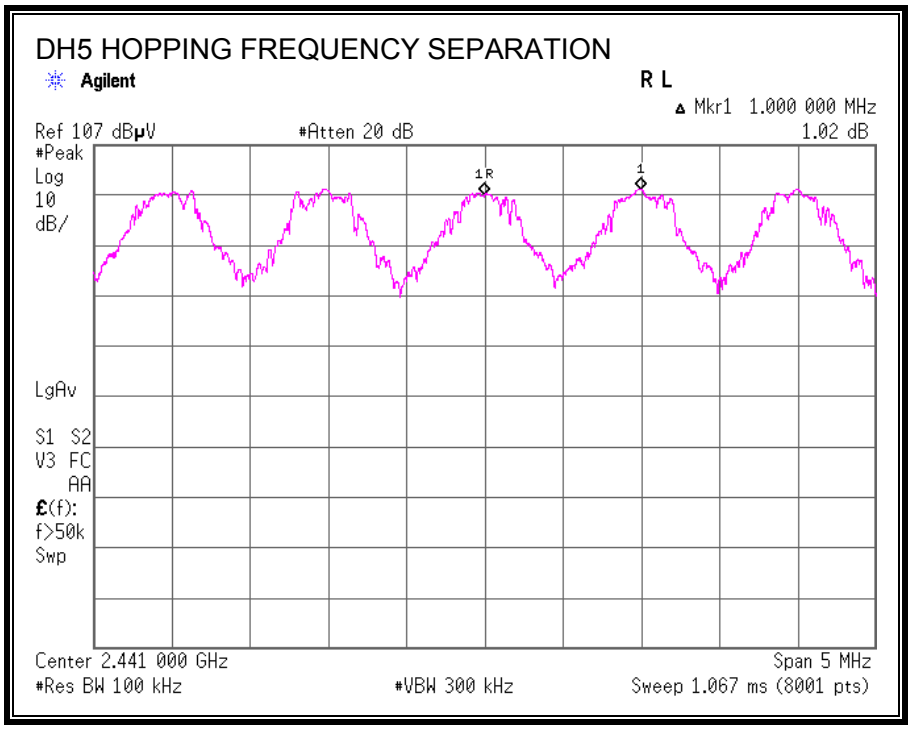
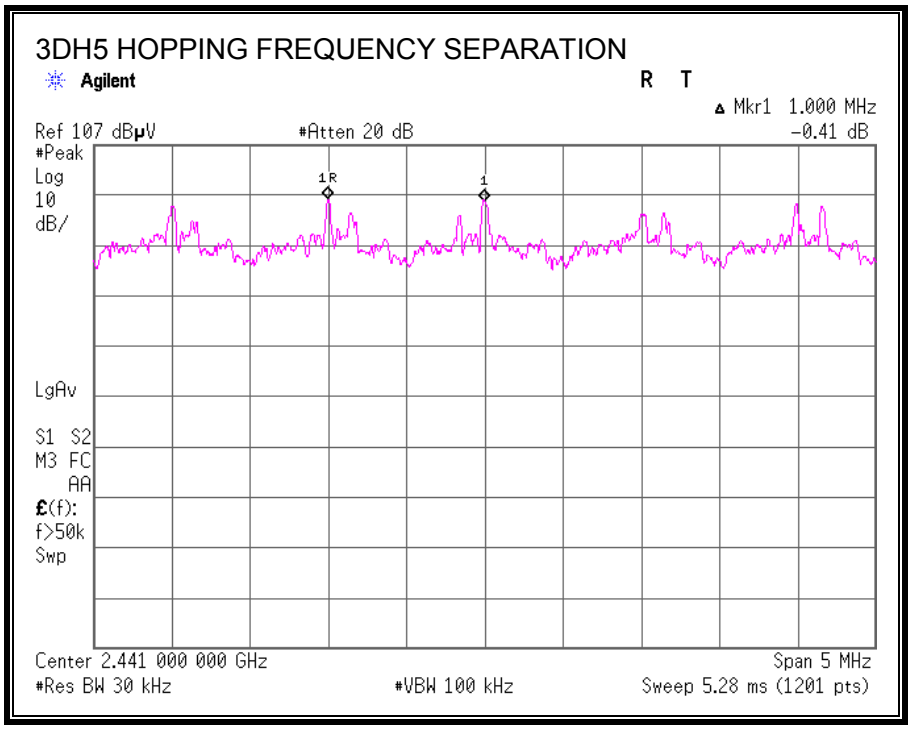
RESULTS

HOPPING FREQUENCY SEPARATION





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7.3. 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.

RESULTS

79 Channels observed.

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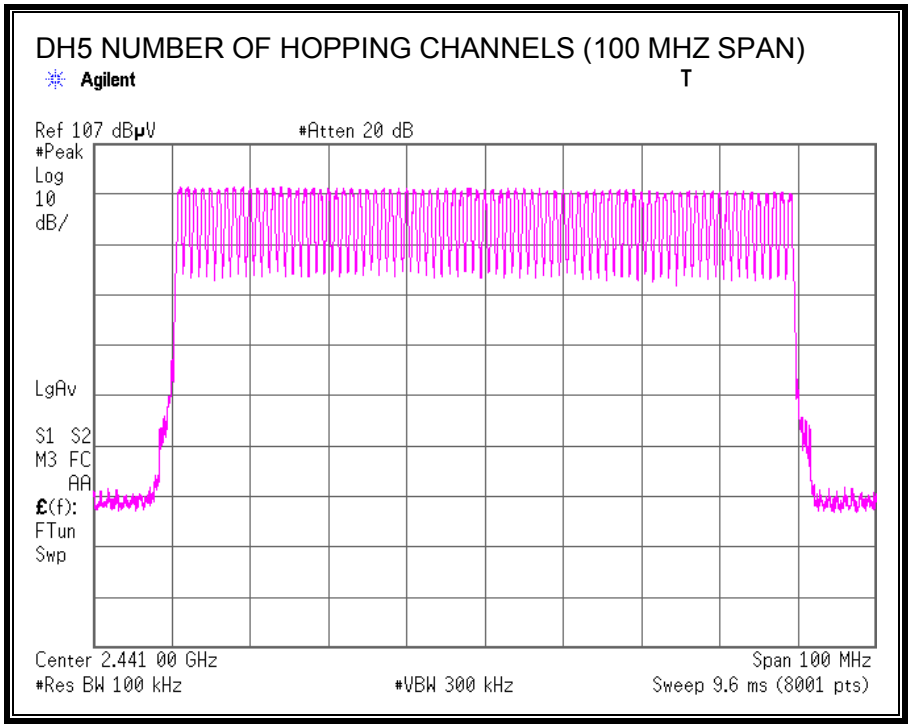
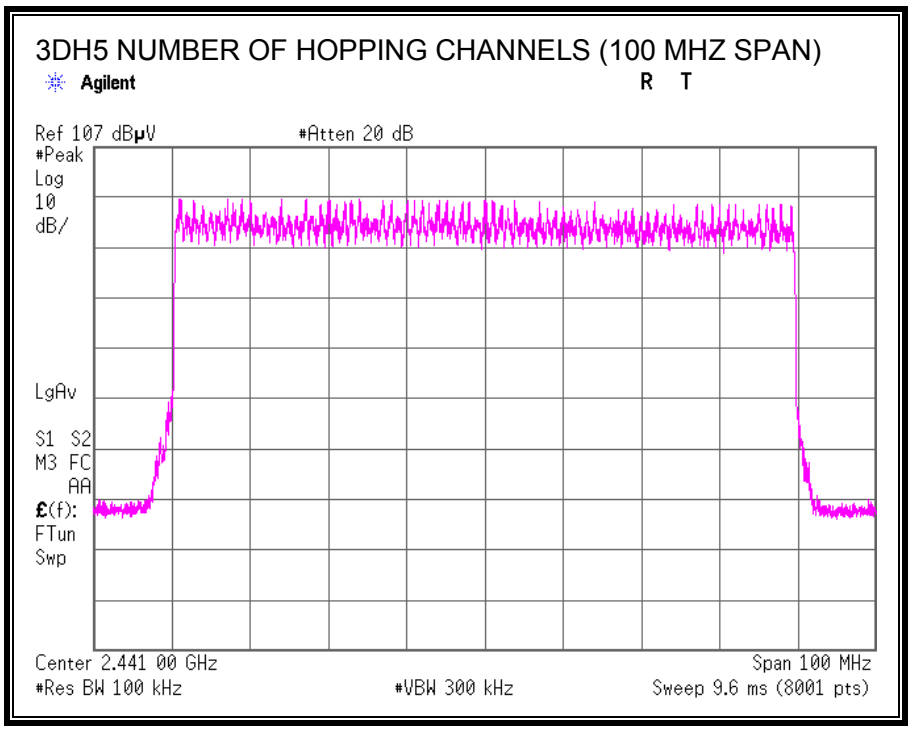
NUMBER OF HOPPING CHANNELS





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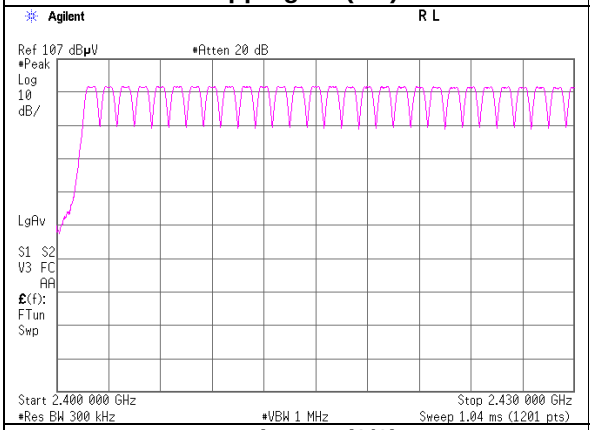
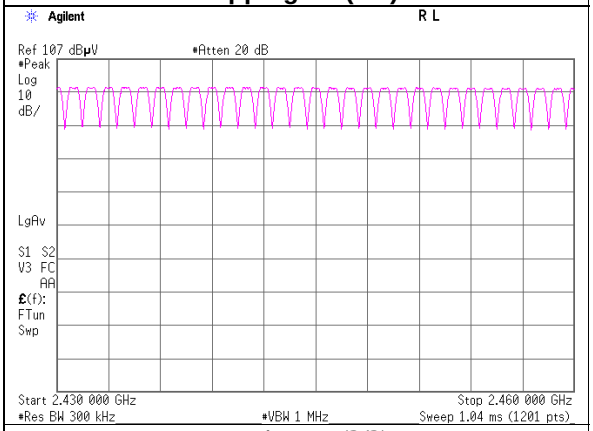
DH5

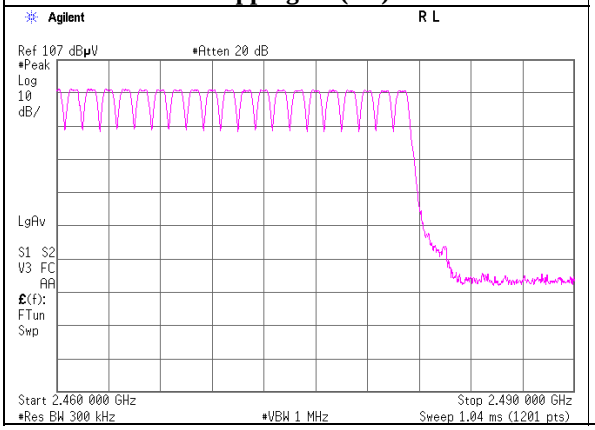
Hopping on (1/3)



Hopping on (2/3)

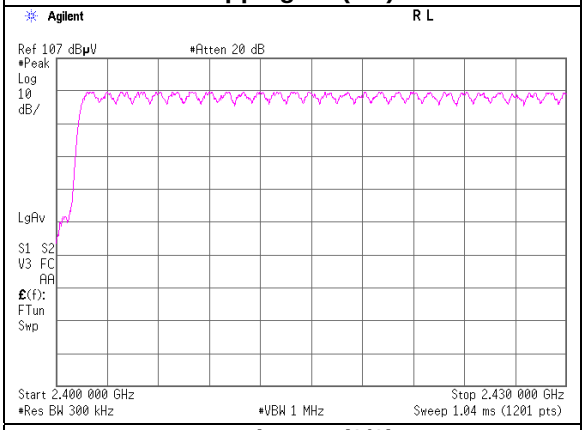


Hopping on (3/3)

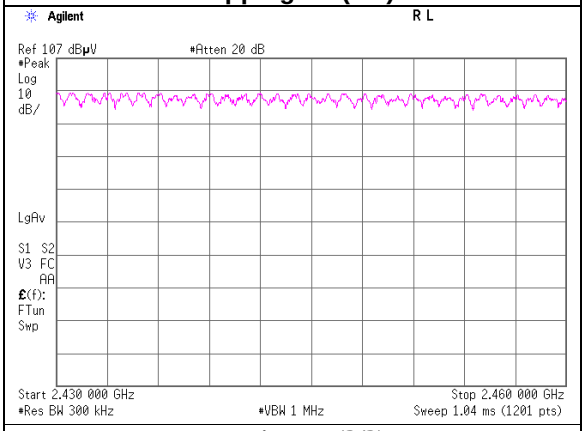


3DH5

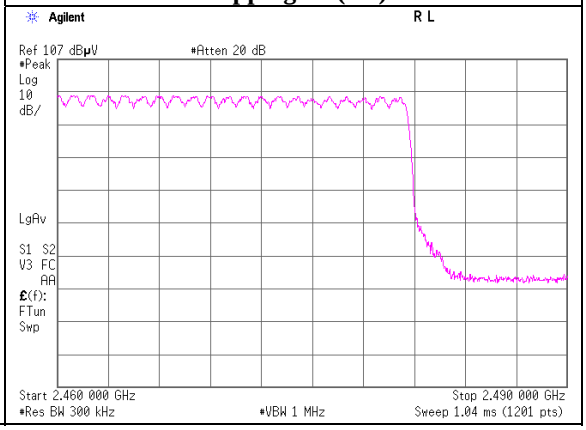
Hopping on (1/3)



Hopping on (2/3)



Hopping on (3/3)



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7.4. 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 3.16 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 10 * (# of pulses in 3.16 s) * pulse width.

RESULTS

DH Packet	Pulse Width (msec)	Number of Pulses in 3.16 seconds	Average Time of (sec)	Limit (sec)	Margin (sec)
DH1	0.399	11	0.044	0.4	0.356
DH3	1.655	11	0.182	0.4	0.218
DH5	2.902	11	0.319	0.4	0.081

DH Packet	Pulse Width (msec)	Number of Pulses in 3.16 seconds	Average Time of (sec)	Limit (sec)	Margin (sec)
3DH1	0.412	11	0.045	0.4	0.355
3DH3	1.663	11	0.183	0.4	0.217
3DH5	2.911	11	0.320	0.4	0.080

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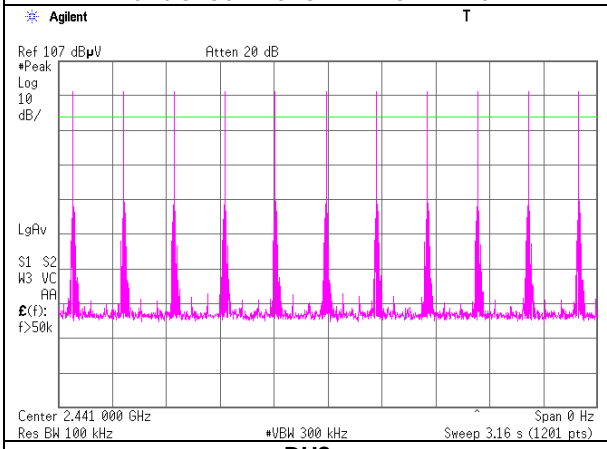
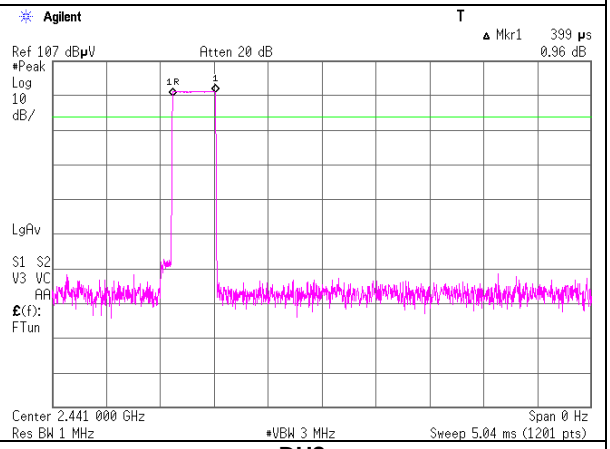
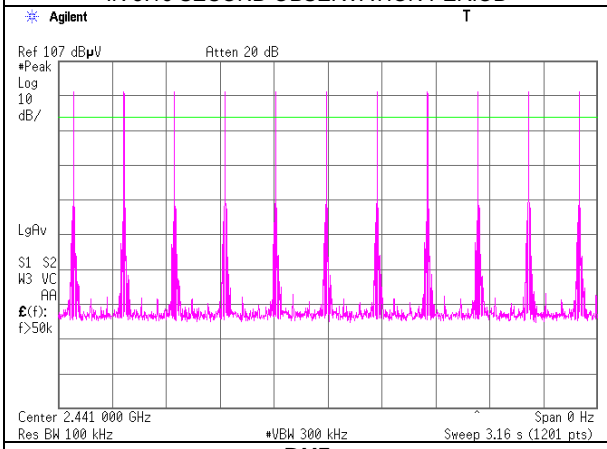
DH1
NUMBER OF PULSES
IN 3.16 SECOND OBSERVATION PERIOD



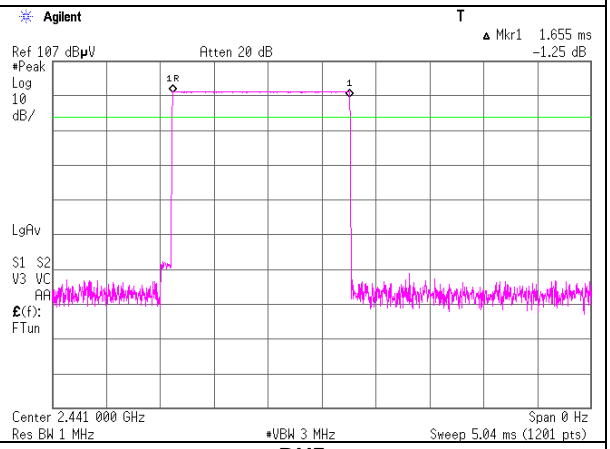
DH1
PULSE WIDTH



DH3
NUMBER OF PULSES
IN 3.16 SECOND OBSERVATION PERIOD



DH3
PULSE WIDTH



DH5
NUMBER OF PULSES
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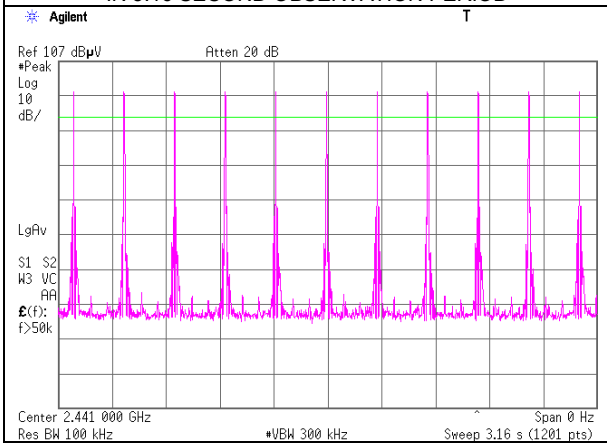
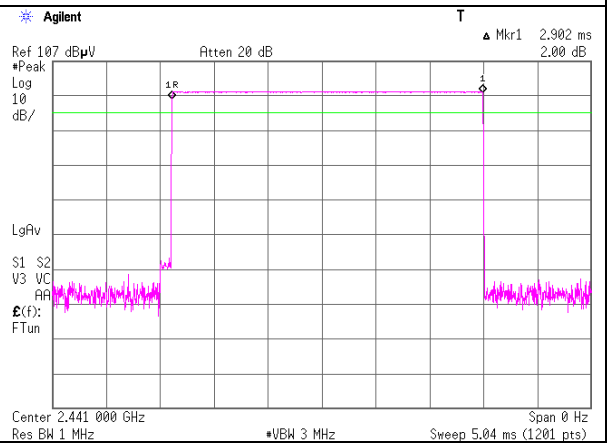


DH5
PULSE WIDTH



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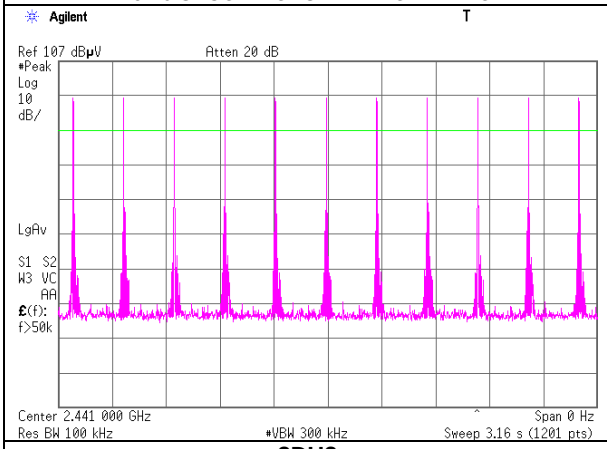
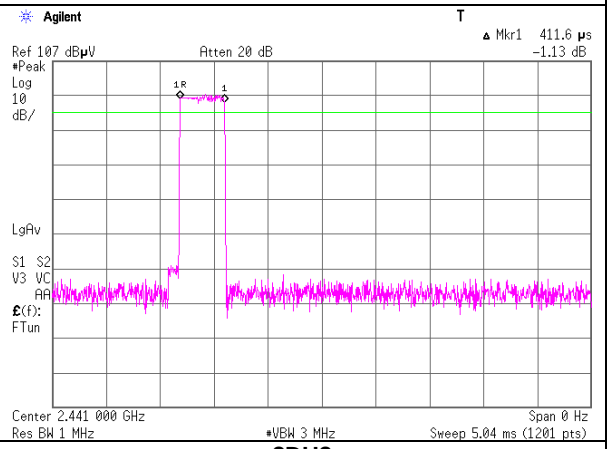
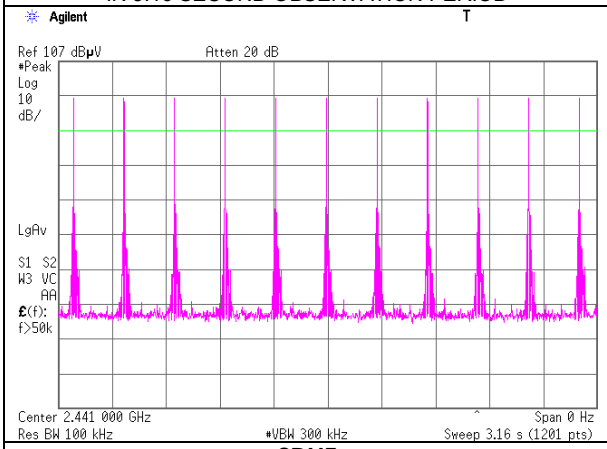
3DH1
NUMBER OF PULSES
IN 3.16 SECOND OBSERVATION PERIOD



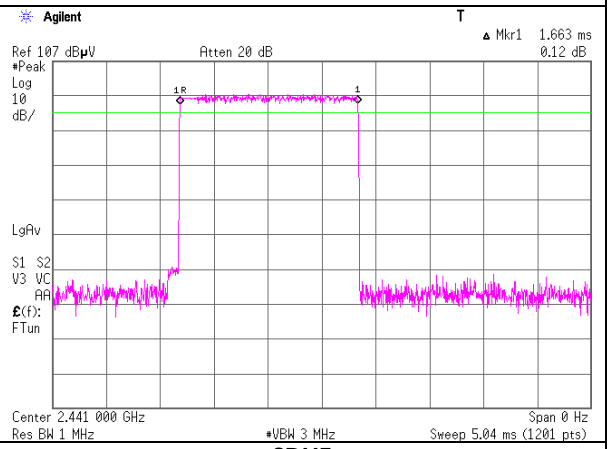
3DH1
PULSE WIDTH



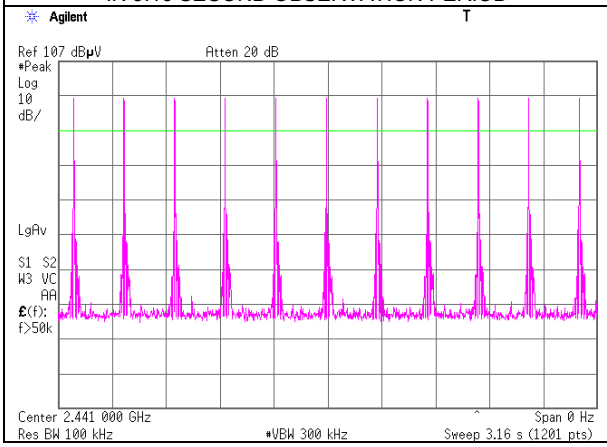
3DH3
NUMBER OF PULSES
IN 3.16 SECOND OBSERVATION PERIOD



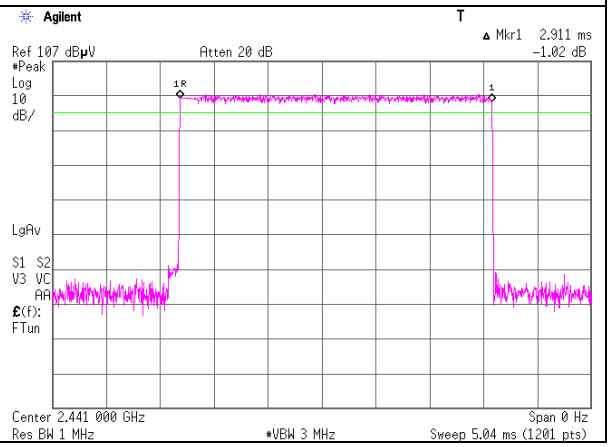
3DH3
PULSE WIDTH



3DH5
NUMBER OF PULSES
IN 3.16 SECOND OBSERVATION PERIOD



3DH5
PULSE WIDTH



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7.5. OUTPUT POWER

LIMIT

§15.247 (b) (1)

RSS-210 Issue 7 Clause A8.4

As the EUT had AFH mode and frequency separation could not meet the requirement of over 20dB BW without 2/3 relaxation, 125mW power limit was applied to it.

TEST PROCEDURE

The transmitter output is connected to a power meter and a spectrum analyzer. The analyzer bandwidth is set to a value greater than the 20 dB bandwidth of the EUT.

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RESULTS

(Spectrum analyzer measurement)

Mode	Channel	Frequency (MHz)	Output Power (dBm)	Limit (dBm)	Margin (dB)
DH5	Low	2402	2.44	20.97	-18.53
DH5	Middle	2441	2.13	20.97	-18.84
DH5	High	2480	1.49	20.97	-19.48
3DH5	Low	2402	2.07	20.97	-18.90
3DH5	Middle	2441	1.64	20.97	-19.33
3DH5	High	2480	0.88	20.97	-20.09

(Power meter measurement)

Mode	Channel	Frequency (MHz)	Output Power Reading (dBm)	factor (cable ,ATT) (dB)	Output Power Result (dBm)	Limit (dBm)	Margin (dB)
DH5	Low	2402	-8.19	10.92	2.73	20.97	-18.24
DH5	Middle	2441	-8.58	10.92	2.34	20.97	-18.63
DH5	High	2480	-9.24	10.93	1.69	20.97	-19.28
3DH5	Low	2402	-8.59	10.92	2.33	20.97	-18.64
3DH5	Middle	2441	-9.10	10.92	1.82	20.97	-19.15
3DH5	High	2480	-9.84	10.93	1.09	20.97	-19.88

Sample calculation: Output Power Reading [dBm] + factor [dB]

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.

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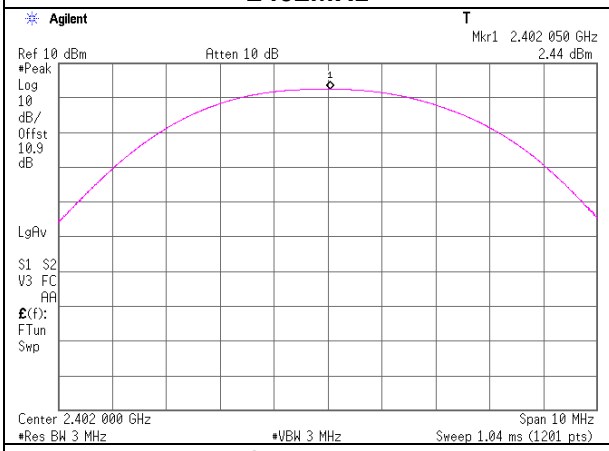
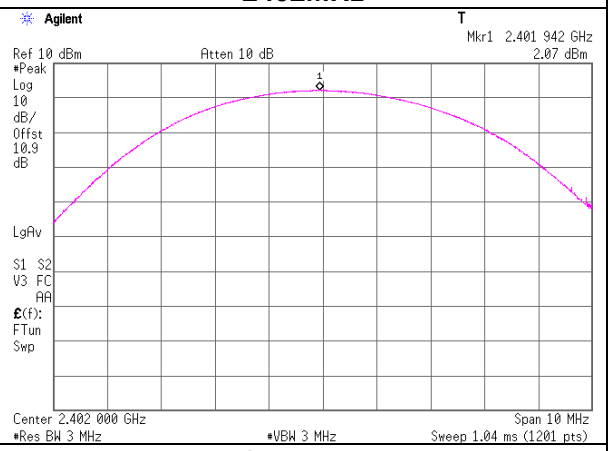
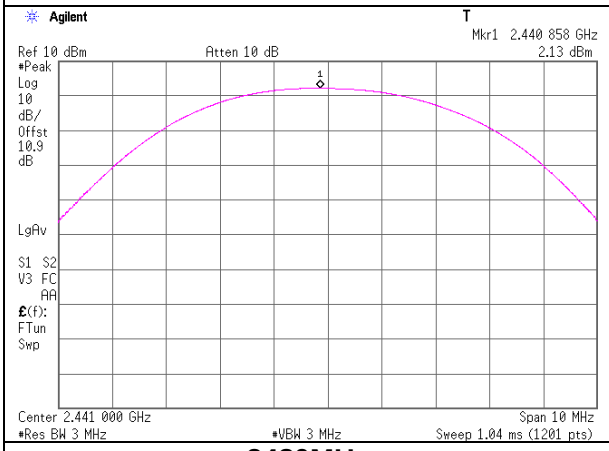
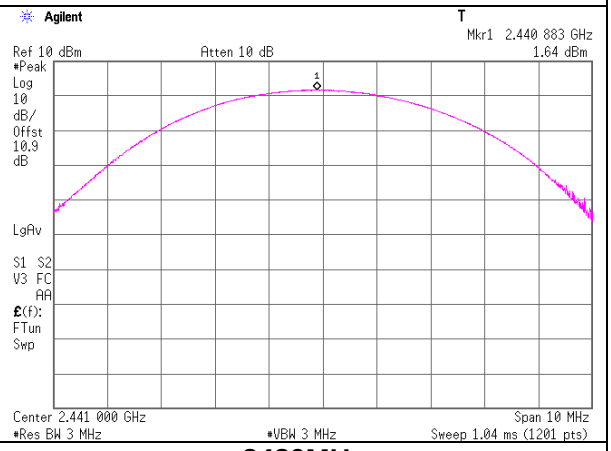
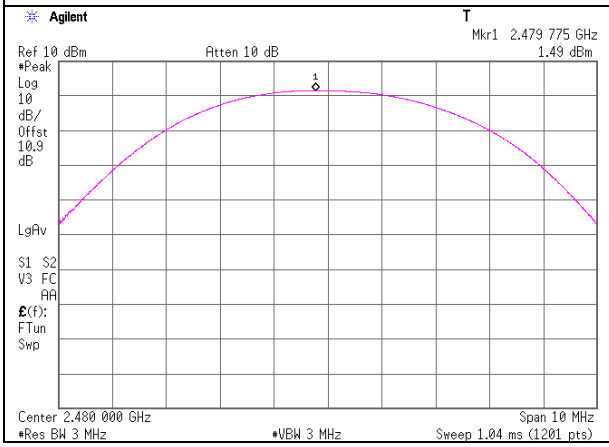
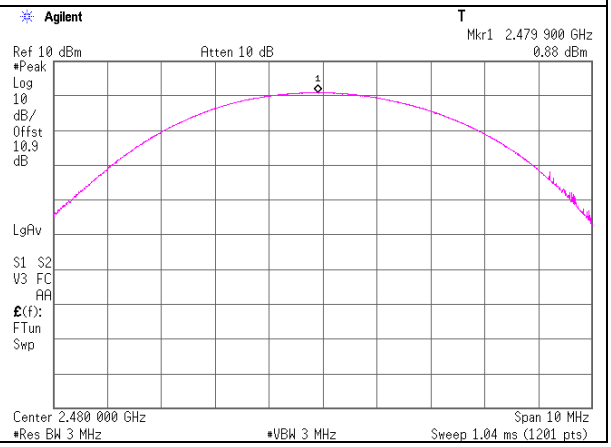
OUTPUT POWER

DH5	3DH5
2402MHz	**2402MHz**
	
2441MHz	**2441MHz**
	
2480MHz	**2480MHz**
	

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7.6. AVERAGE POWER

LIMIT

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

RESULTS

The cable assembly insertion loss of 10.92/10.93 dB(Low and Mid/High Channel) (including 10.07 dB pad and 0.85/0.86 dB(Low and Mid/High Channel) cable) was entered as an offset in the power meter to allow for direct reading of power.

Mode	Channel	Frequency (MHz)	Average Power (dBm)
DH5	Low	2402	1.44
DH5	Middle	2441	1.05
DH5	High	2480	0.35
3DH5	Low	2402	-1.39
3DH5	Middle	2441	-1.89
3DH5	High	2480	-2.69

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7.7. 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 30 MHz to 26 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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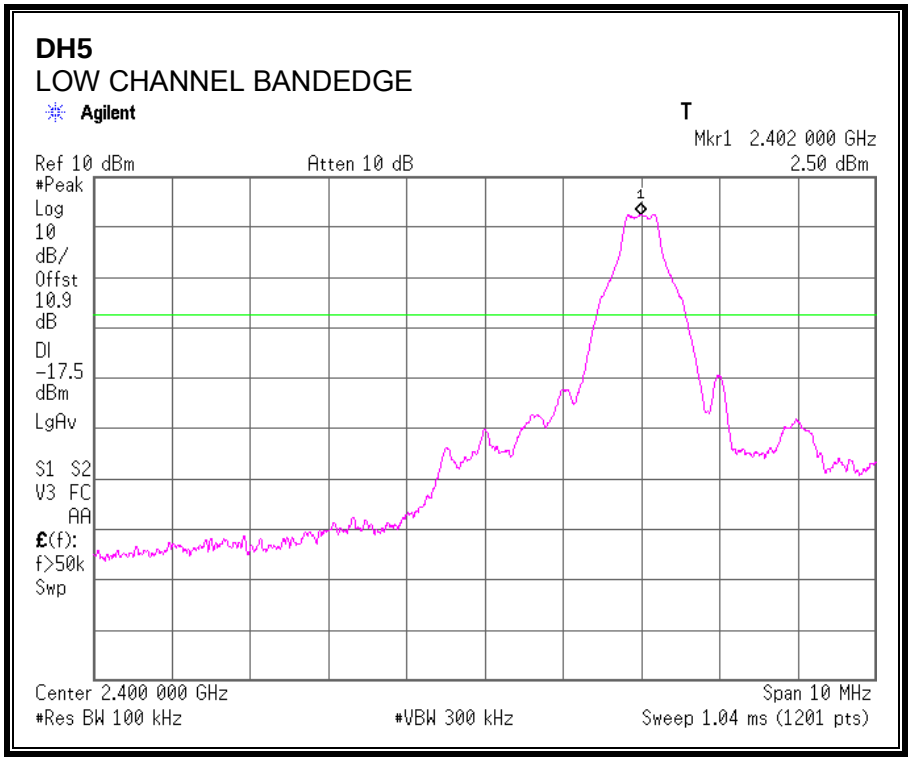
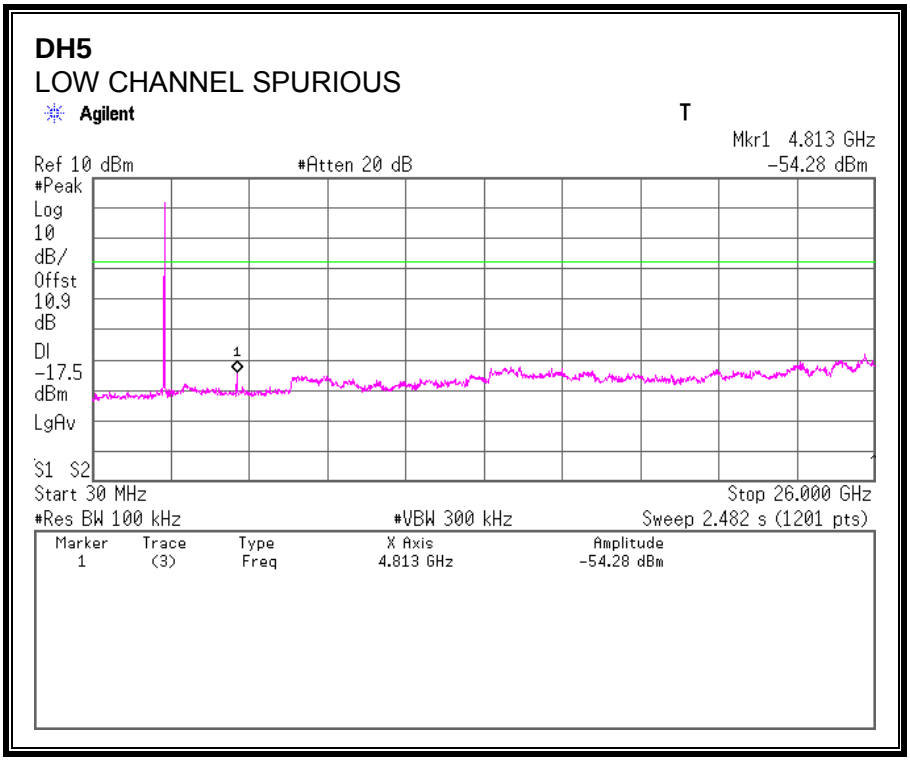
SPURIOUS EMISSIONS, LOW CHANNEL





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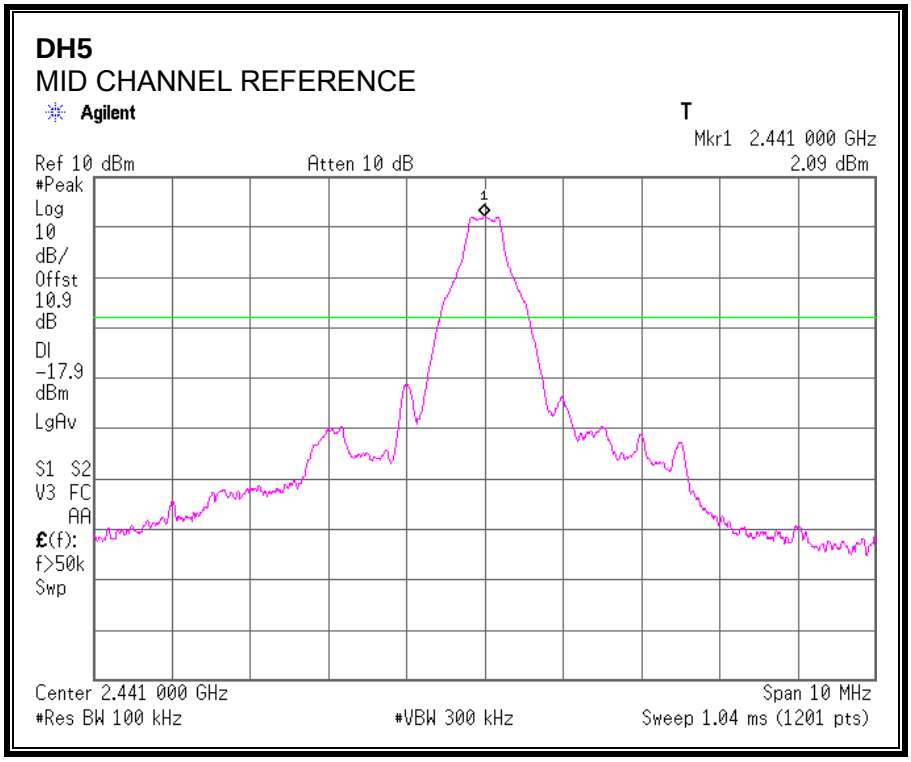
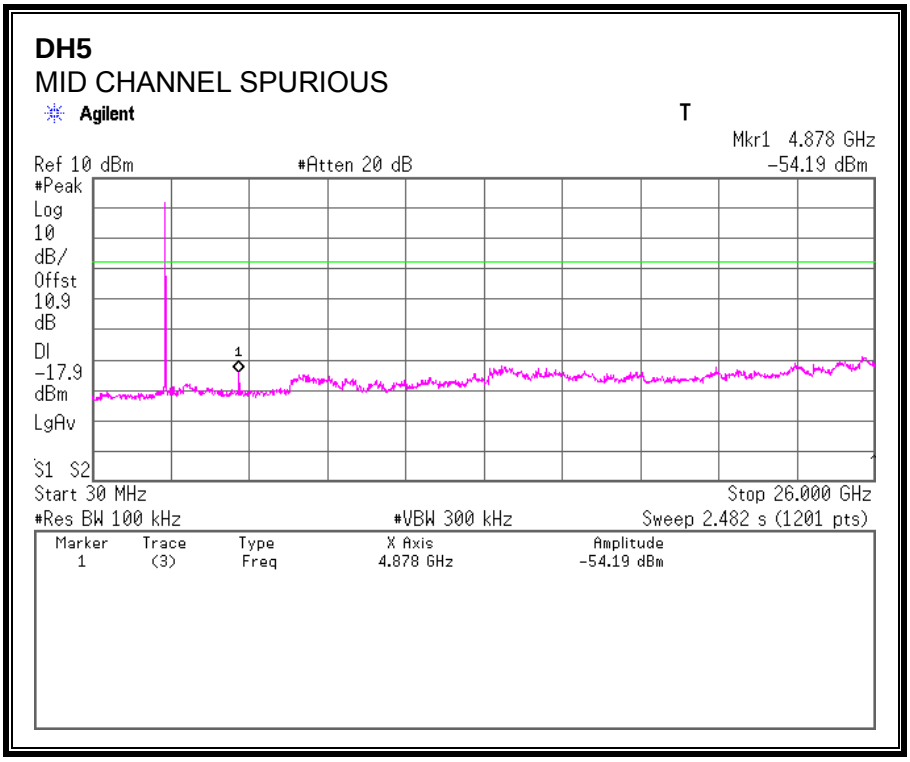
SPURIOUS EMISSIONS, MID CHANNEL





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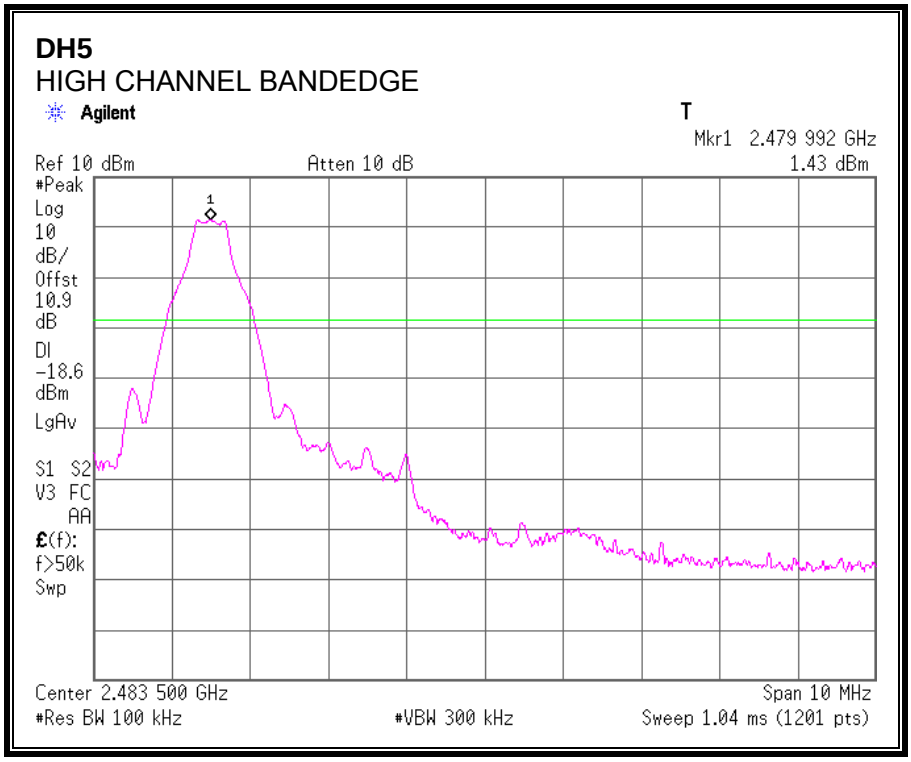
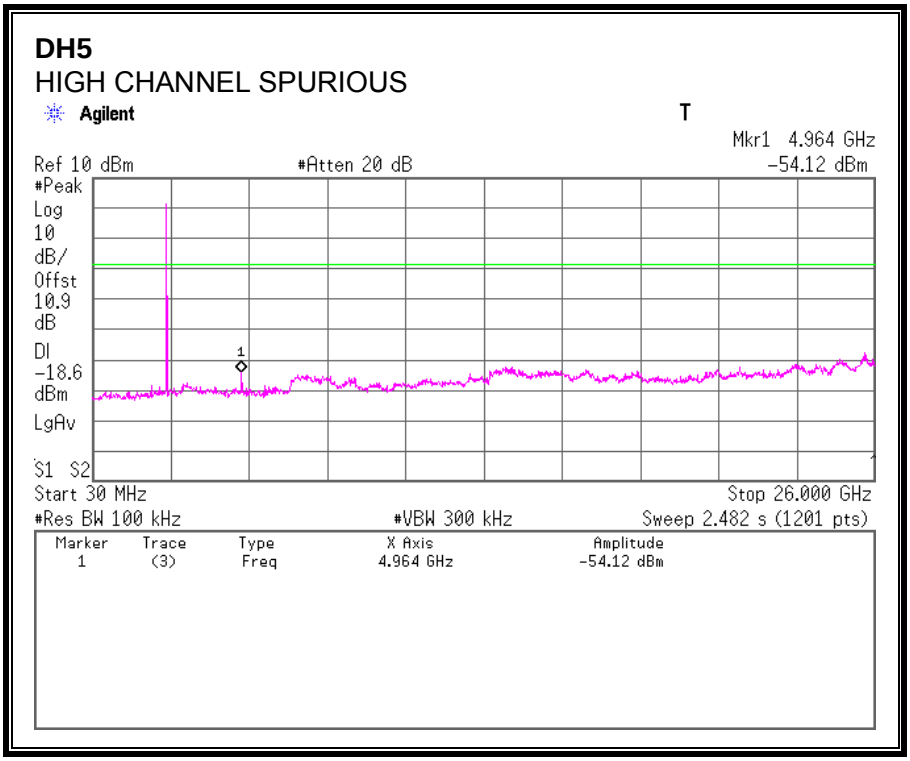
SPURIOUS EMISSIONS, HIGH CHANNEL

DH5
HIGH CHANNEL BANDEDGE



DH5
HIGH CHANNEL SPURIOUS



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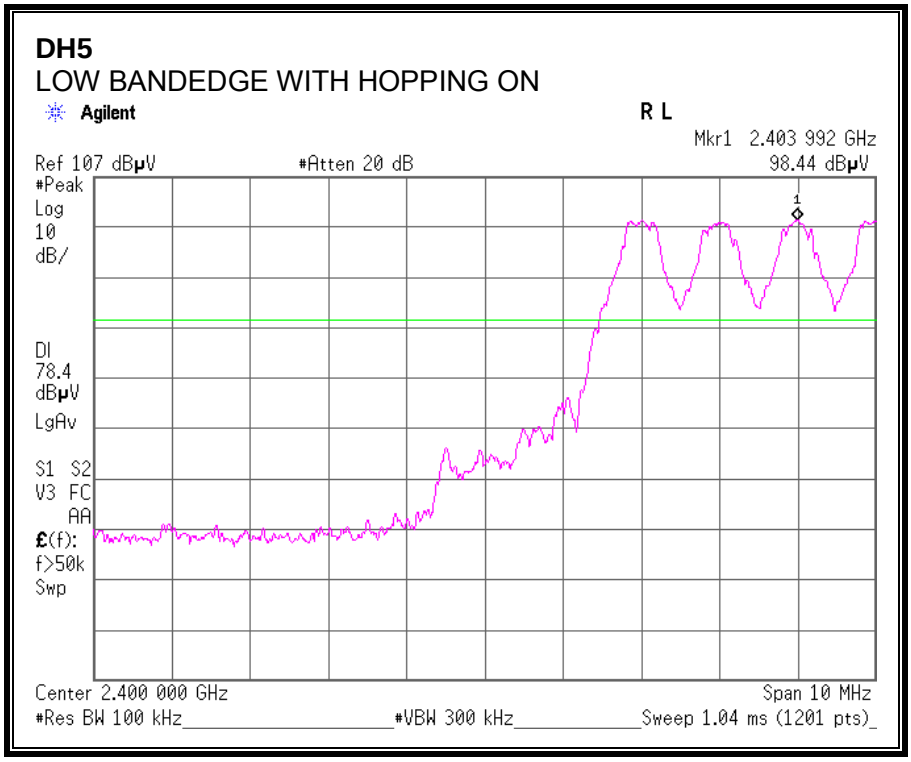
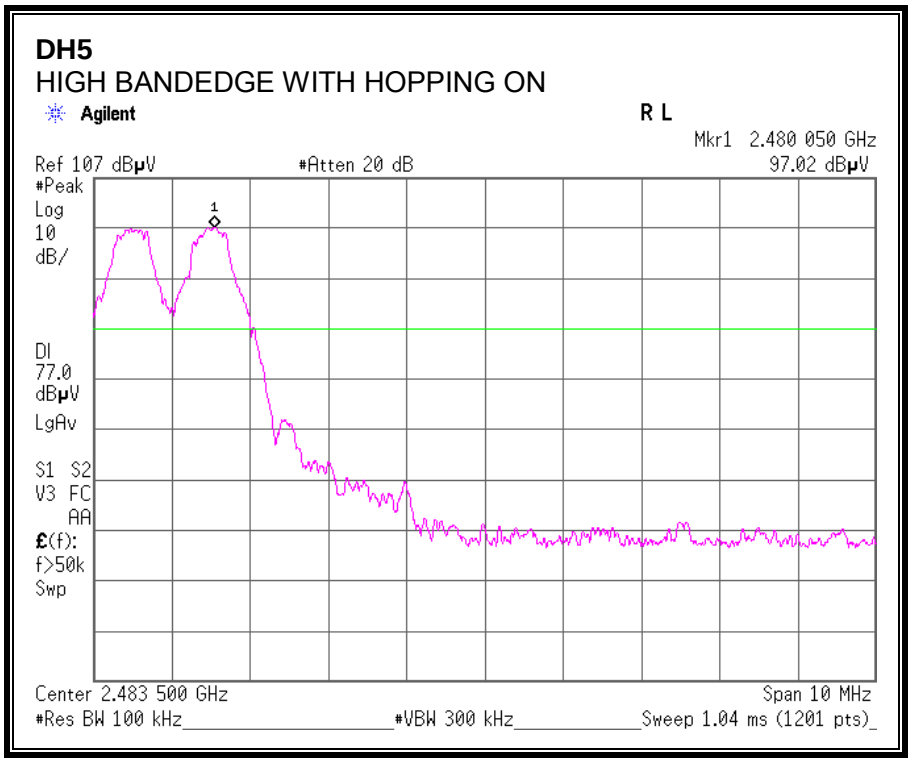
SPURIOUS BANDEDGE EMISSIONS WITH HOPPING ON

DH5
LOW BANDEDGE WITH HOPPING ON



DH5
HIGH BANDEDGE WITH HOPPING ON



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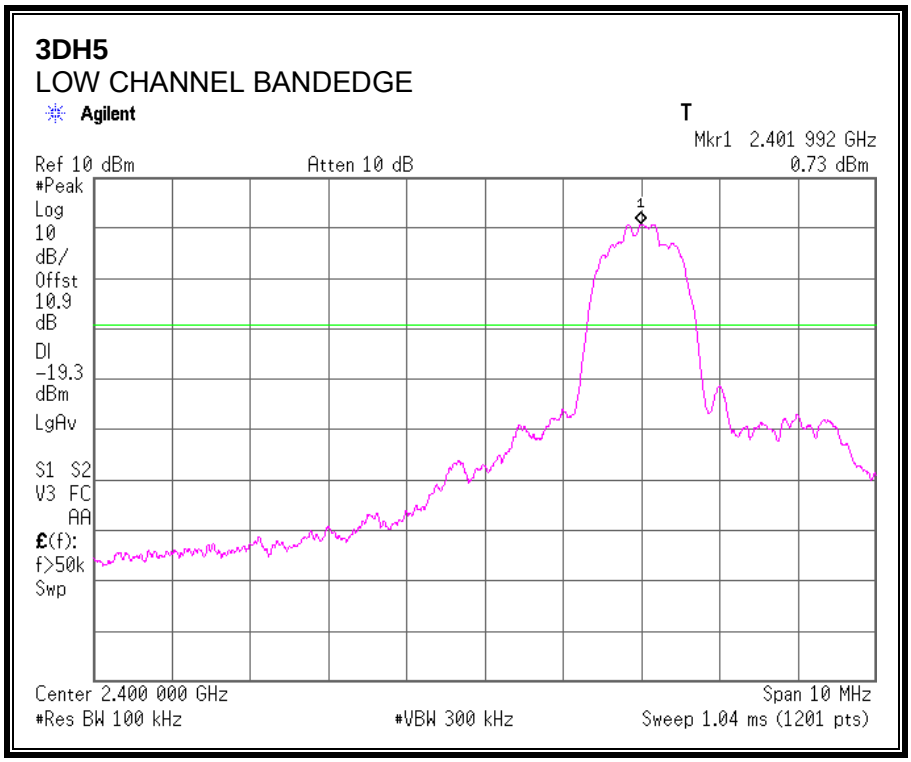
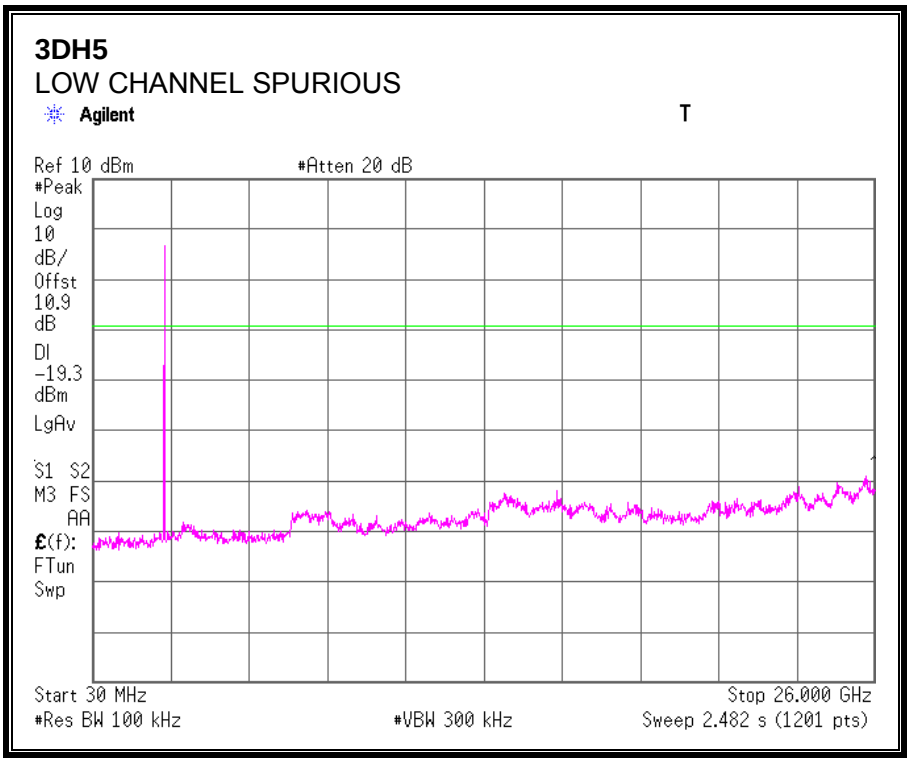
SPURIOUS EMISSIONS, LOW CHANNEL





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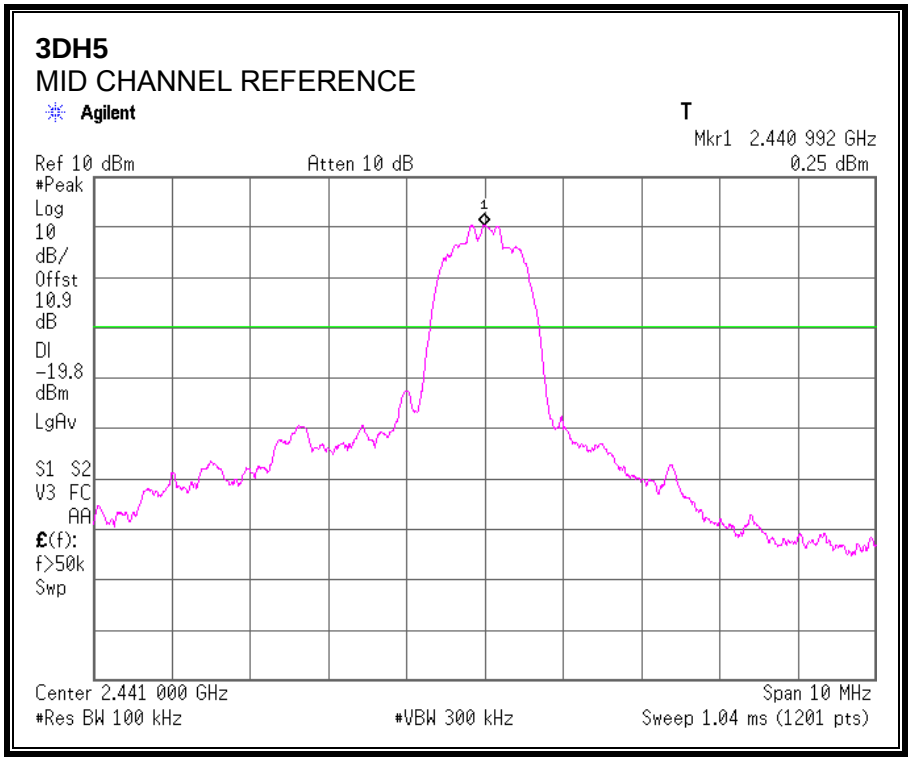
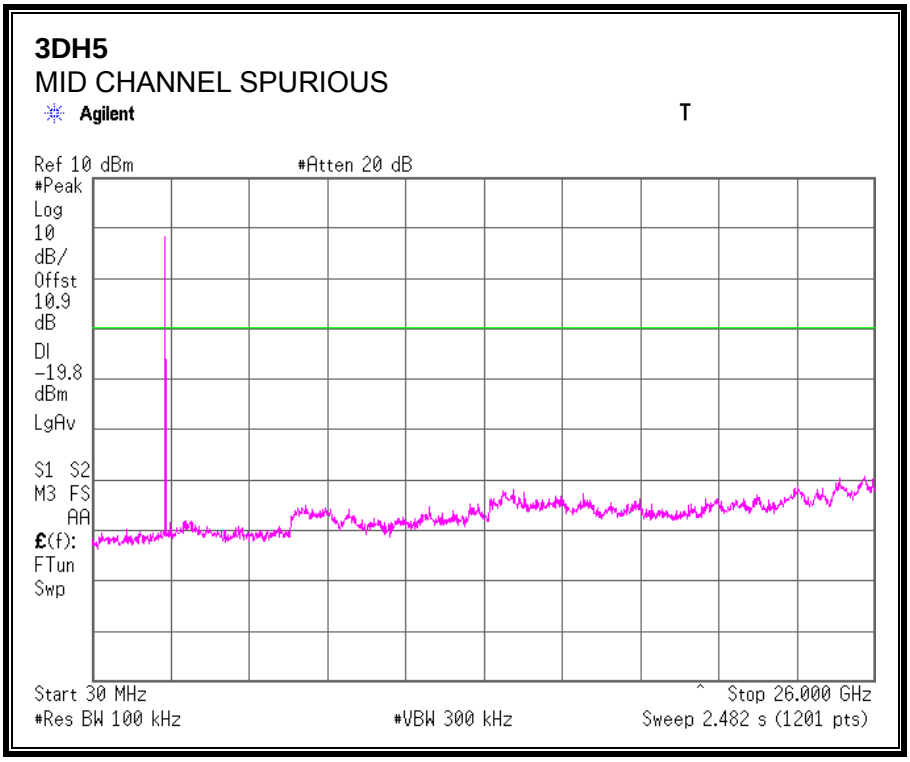
SPURIOUS EMISSIONS, MID CHANNEL





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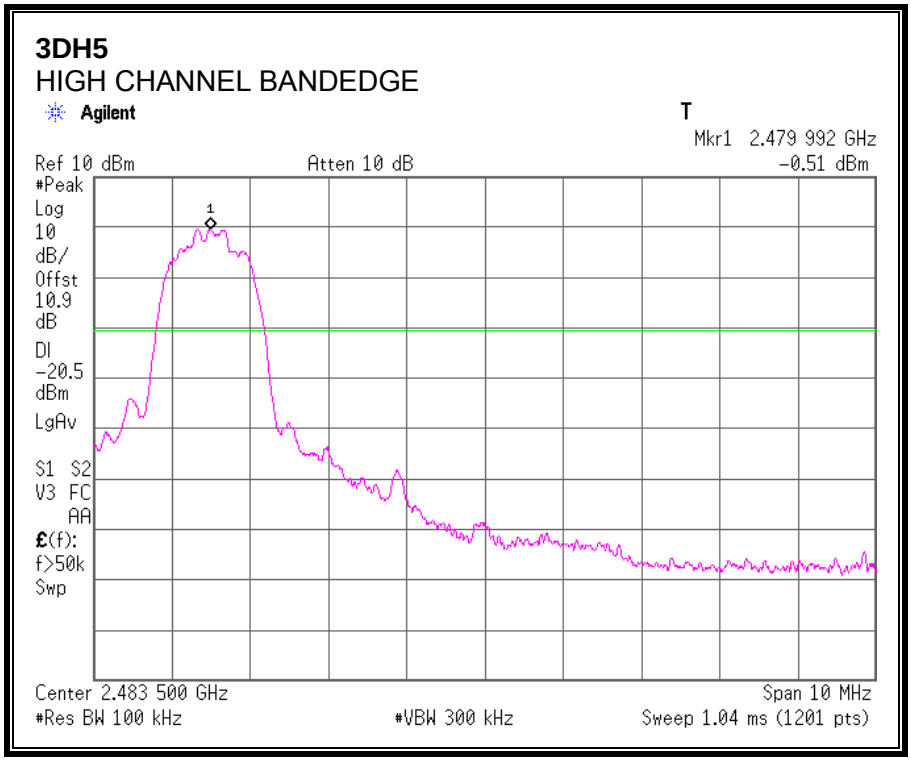
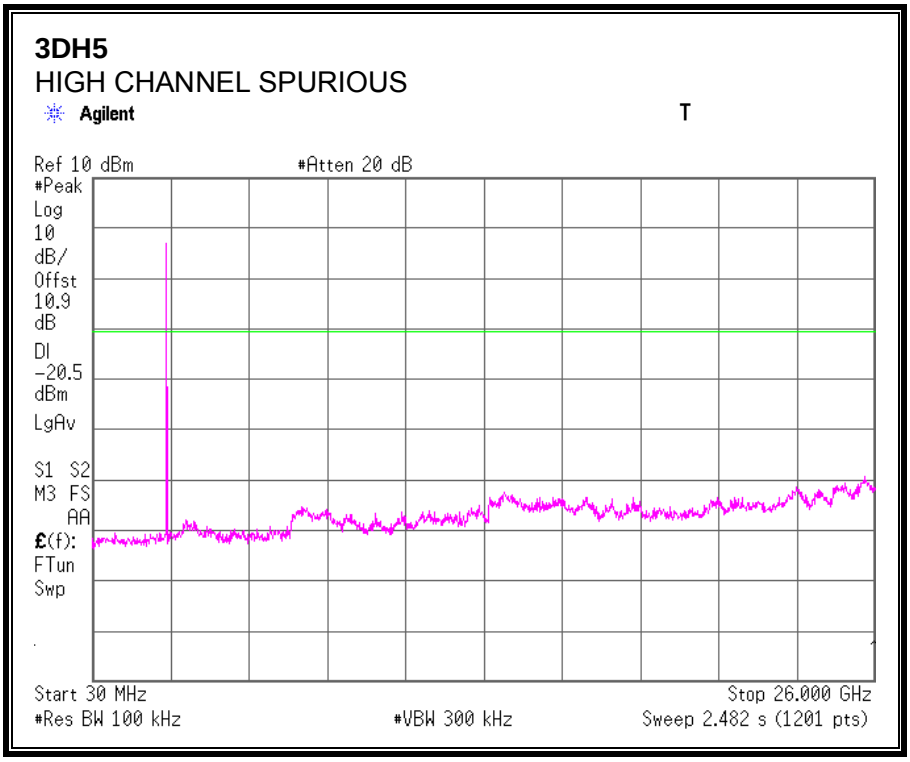
SPURIOUS EMISSIONS, HIGH CHANNEL





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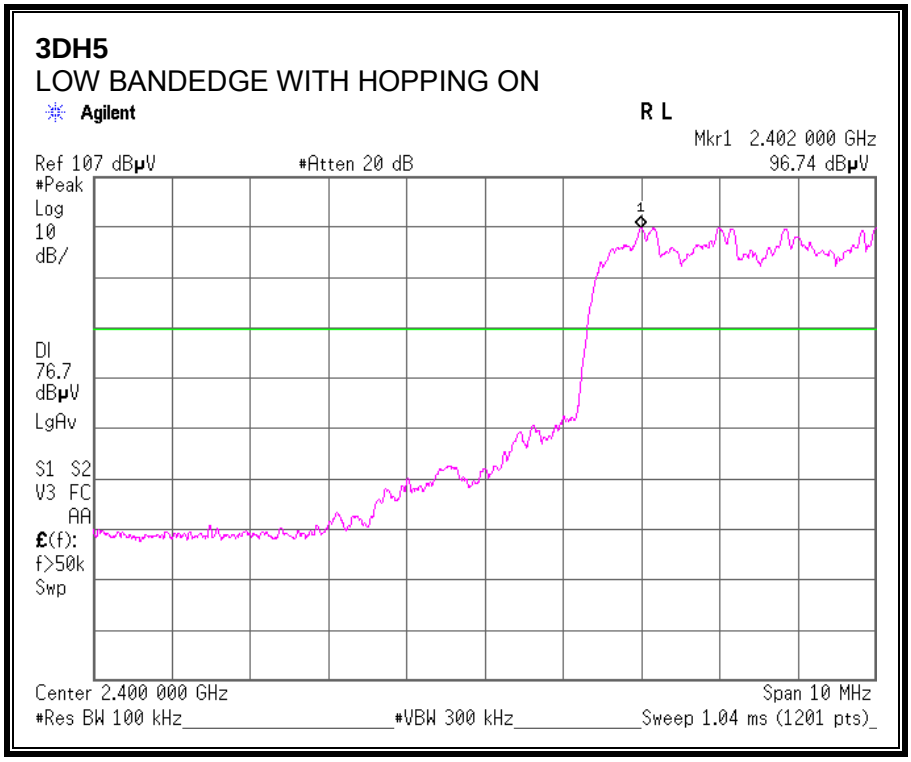
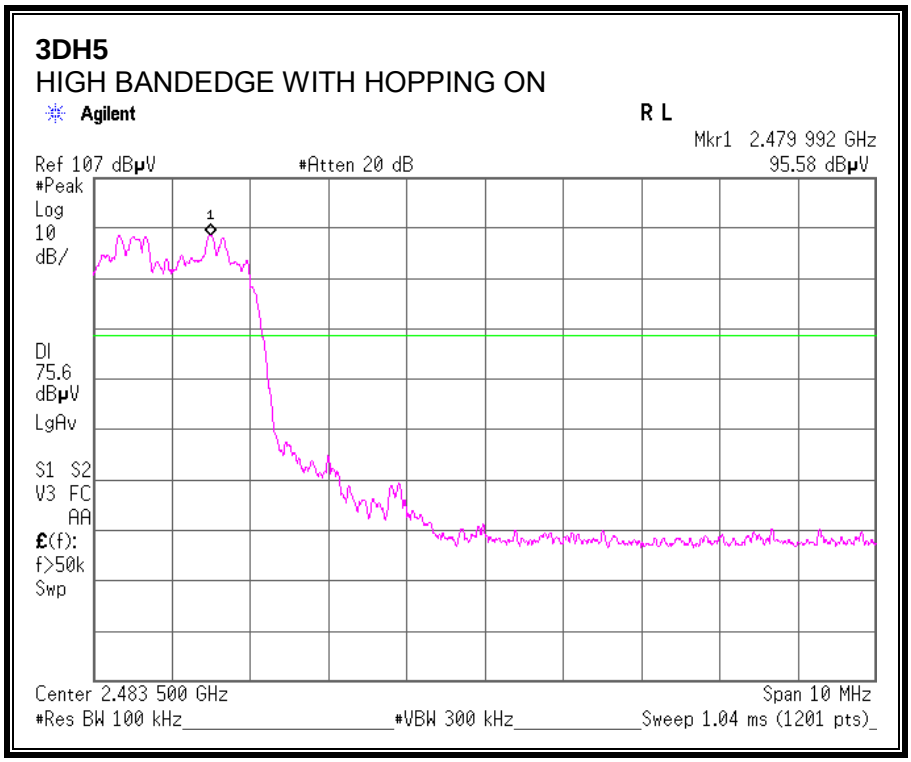
SPURIOUS BANDEDGE EMISSIONS WITH HOPPING ON

3DH5
LOW BANDEDGE WITH HOPPING ON



3DH5
HIGH BANDEDGE WITH HOPPING ON



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8. RADIATED TEST RESULTS

8.1 LIMITS AND PROCEDURE

LIMITS

FCC §15.205 and §15.209

IC RSS-210 Clause 2.5 (Transmitter)

IC RSS-GEN Clause 6 (Receiver)

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 1 MHz for peak measurements and 10 Hz for average measurements. Used for the band edge of the carrier and the harmonics that can be measured. The VBW is based on the inverse of the duty cycle. 270Hz was used for DH5 and 3DH5

The spectrum from 30 MHz to 26 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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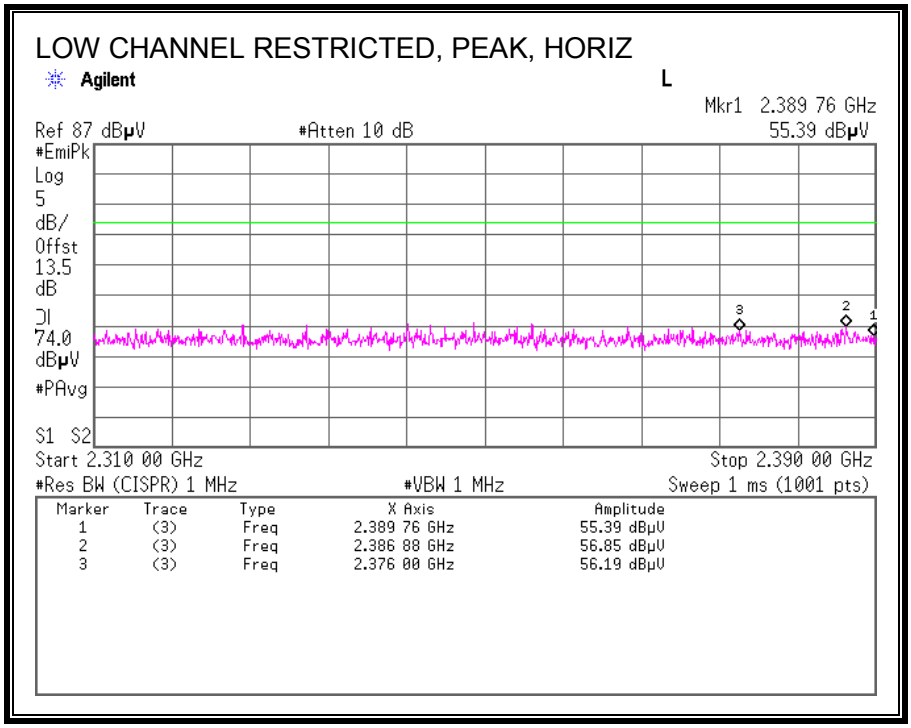
8.2 TRANSMITTER ABOVE 1 GHz

8.2.1 BASIC DATA RATE GFSK MODULATION

RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



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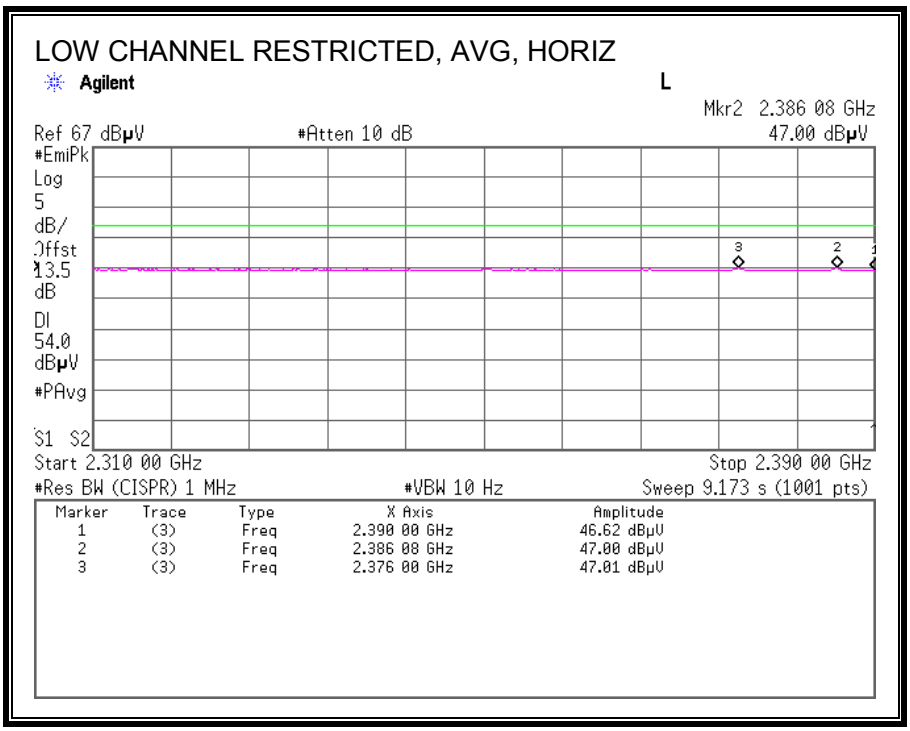

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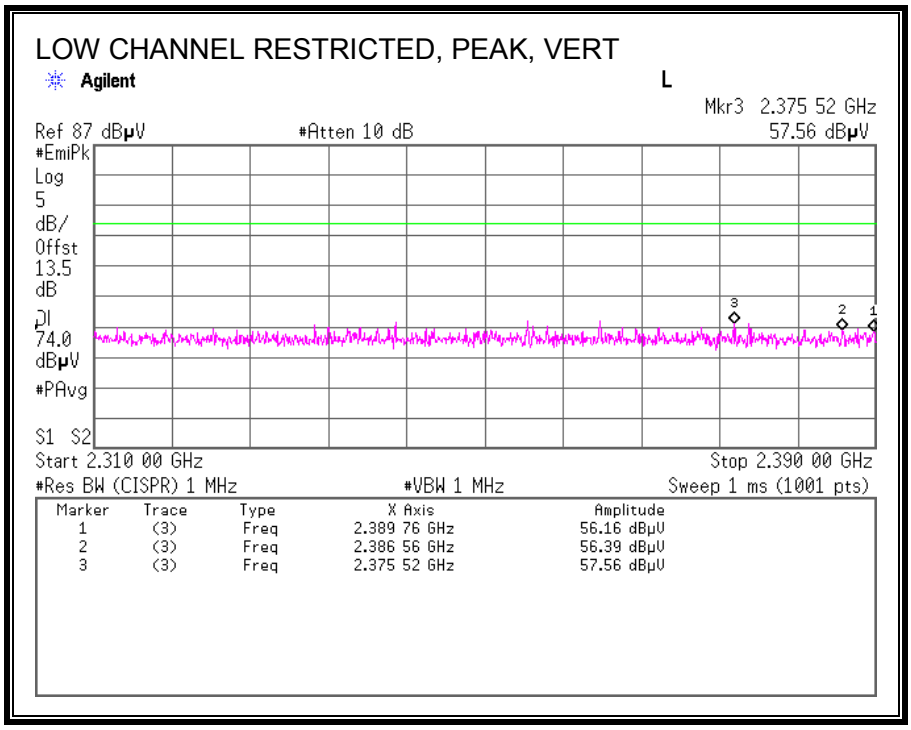
RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



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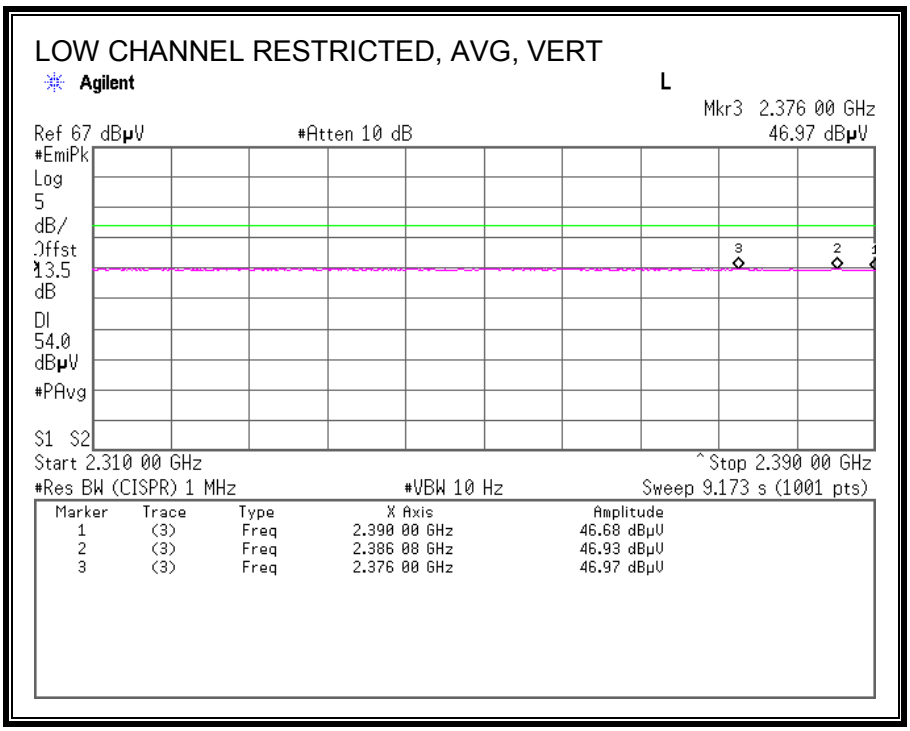

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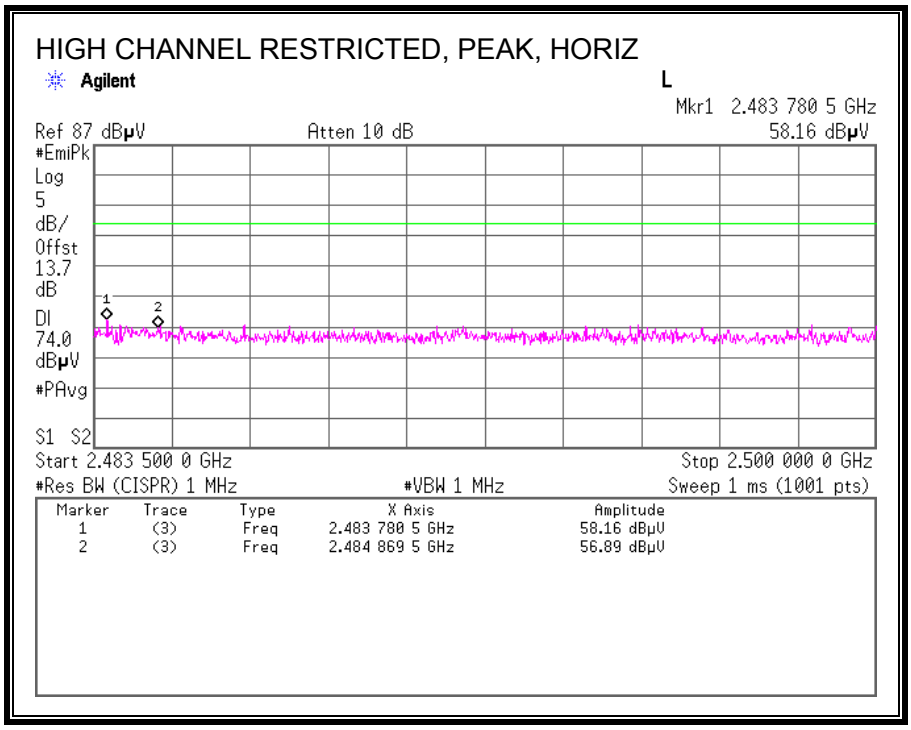
RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)



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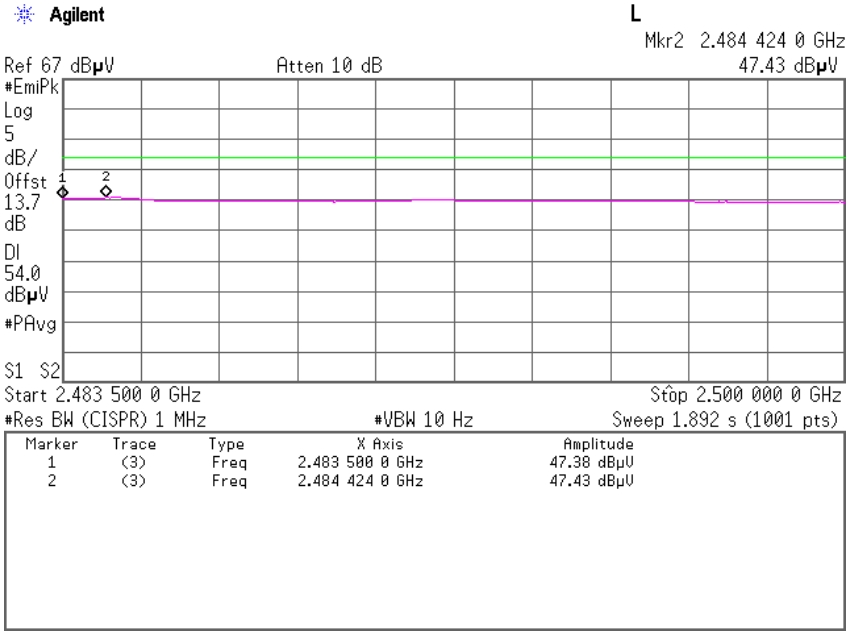
HIGH CHANNEL RESTRICTED, AVG, HORIZ



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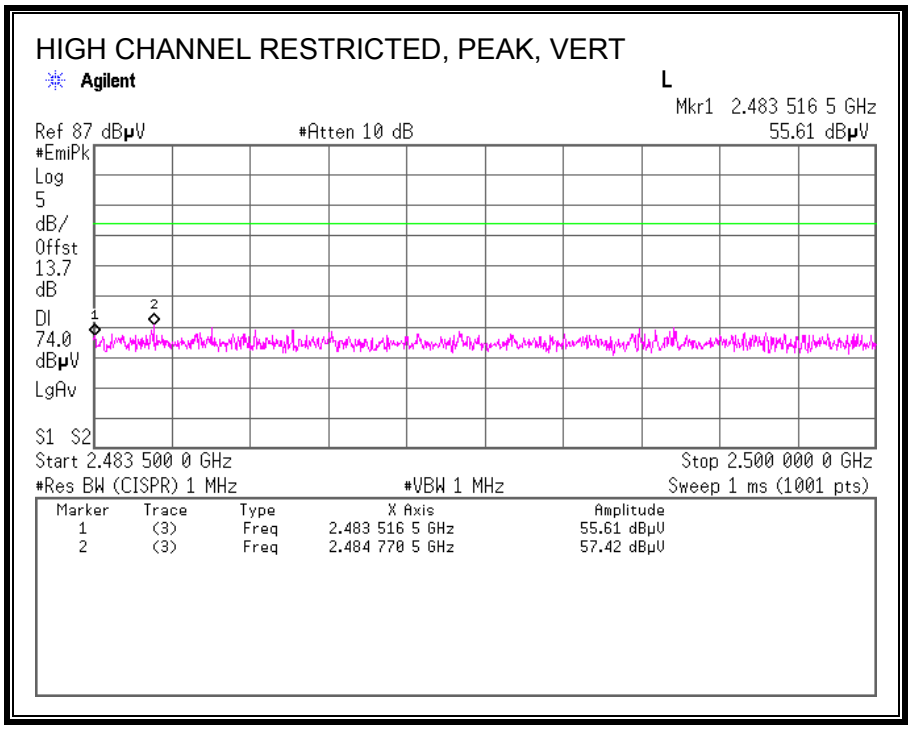
RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)



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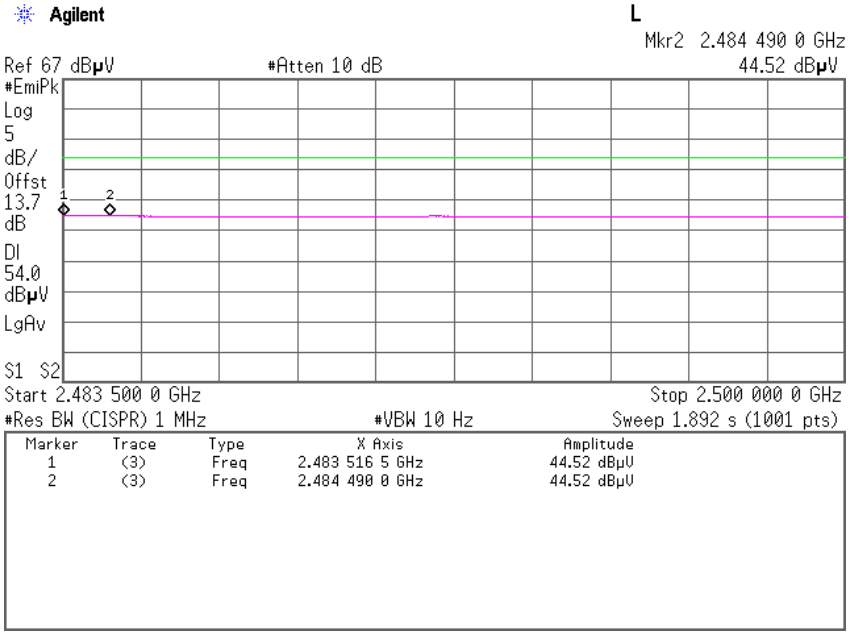
HIGH CHANNEL RESTRICTED, AVG, VERT



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HARMONICS AND SPURIOUS EMISSIONS

Test place	Head Office EMC Lab. No.3 Semi Anechoic Chamber
Report No.	32AE0133-HO
Date	09/13/2011
Temperature/ Humidity	23 deg.C/ 56% RH
Engineer	Tomohisa Nakagawa
Mode	Tx, DH5

LOW CH (2402MHz)

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg.]	Remark
Hori	1601.670	PK	52.5	25.6	1.8	33.7	46.2	73.9	27.7	100	142	
Hori	2390.000	PK	43.0	26.4	2.2	32.6	39.0	73.9	34.9	111	140	
Hori	2400.000	PK	43.5	26.4	2.2	32.6	39.5	73.9	34.4	111	140	
Hori	4804.000	PK	52.3	30.4	4.3	31.9	55.1	73.9	18.8	100	341	
Hori	1601.670	AV	46.9	25.6	1.8	33.7	40.6	53.9	13.3	100	142	
Hori	2390.000	AV	30.2	26.4	2.2	32.6	26.2	53.9	27.7	111	140	
Hori	2400.000	AV	31.2	26.4	2.2	32.6	27.2	53.9	26.7	111	140	
Vert	1601.670	PK	56.4	25.6	1.8	33.7	50.1	73.9	23.8	108	348	
Vert	2390.000	PK	43.6	26.4	2.2	32.6	39.6	73.9	34.4	100	184	
Vert	2400.000	PK	44.4	26.4	2.2	32.6	40.4	73.9	33.5	100	184	
Vert	4804.000	PK	48.1	30.4	4.3	31.9	50.9	73.9	23.0	153	49	
Vert	1601.670	AV	54.5	25.6	1.8	33.7	48.2	53.9	5.7	108	348	
Vert	2390.000	AV	31.8	26.4	2.2	32.6	27.8	53.9	26.1	100	184	
Vert	2400.000	AV	31.9	26.4	2.2	32.6	27.9	53.9	26.0	100	184	

Dwell time factor relaxation

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant Factor [dB/m]	Loss [dB]	Gain [dB]	Dwell Factor [dB]	Result [dBuV/m]	Limit dBuV/m	Margin [dB]	Remark
Hori	4804.000	AV	51.3	30.4	4.3	31.9	-23.7	30.4	53.9	23.5	
Vert	4804.000	AV	47.0	30.4	4.3	31.9	-23.7	26.1	53.9	27.8	

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 10GHz))
- Gain(Amprifier) + Dwell time factor (Refer to dwell time data sheet)

*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

MID CH (2441MHz)

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg.]	Remark
Hori	1627.004	PK	53.9	25.7	1.8	33.7	47.7	73.9	26.2	100	319	
Hori	4882.000	PK	57.8	30.5	4.3	31.9	60.7	73.9	13.2	100	321	
Hori	1627.004	AV	48.8	25.7	1.8	33.7	42.6	53.9	11.3	100	319	
Vert	1627.004	PK	59.4	25.7	1.8	33.7	53.2	73.9	20.7	100	148	
Vert	4882.000	PK	54.4	30.5	4.3	31.9	57.3	73.9	16.6	139	51	
Vert	1627.004	AV	55.5	25.7	1.8	33.7	49.3	53.9	4.6	100	148	

Dwell time factor relaxation

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant Factor [dB/m]	Loss [dB]	Gain [dB]	Dwell Factor [dB]	Result [dBuV/m]	Limit dBuV/m	Margin [dB]	Remark
Hori	4882.000	AV	53.3	30.5	4.3	31.9	-23.7	32.5	53.9	21.4	
Vert	4882.000	AV	49.7	30.5	4.3	31.9	-23.7	28.9	53.9	25.0	

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 10GHz))
- Gain(Amprifier) + Dwell time factor (Refer to dwell time data sheet)

*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

*For the band edge of the carrier and the harmonics that emission was found, the test was performed with VBW of the average detector set at 270Hz. For other average detectors, VBW was set at 10Hz.

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HARMONICS AND SPURIOUS EMISSIONS

Test place	Head Office EMC Lab. No.3 Semi Anechoic Chamber
Report No.	32AE0133-HO
Date	09/13/2011
Temperature/ Humidity	23 deg.C/ 56% RH
Engineer	Tomohisa Nakagawa
Mode	Tx, DH5

HI CH (2480MHz)

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg.]	Remark
Hori	1652.337	PK	50.1	25.7	1.8	33.6	44.0	73.9	29.9	100	12	
Hori	2483.500	PK	42.5	26.5	2.2	32.6	38.6	73.9	35.3	136	136	
Hori	4960.000	PK	53.2	30.6	4.3	31.9	56.2	73.9	17.7	113	321	
Hori	1652.337	AV	46.5	25.7	1.8	33.6	40.4	53.9	13.5	100	12	
Hori	2483.500	AV	30.1	26.5	2.2	32.6	26.2	53.9	27.7	136	136	
Hori	4960.000	AV	49.2	30.6	4.3	31.9	52.2	53.9	1.7	113	321	
Vert	1652.337	PK	53.2	25.7	1.8	33.6	47.1	73.9	26.8	100	74	
Vert	2483.500	PK	42.5	26.5	2.2	32.6	38.6	73.9	35.3	100	217	
Vert	4960.000	PK	52.6	30.6	4.3	31.9	55.6	73.9	18.3	100	71	
Vert	1652.337	AV	48.5	25.7	1.8	33.6	42.4	53.9	11.5	100	74	
Vert	2483.500	AV	30.0	26.5	2.2	32.6	26.1	53.9	27.8	100	217	
Vert	4960.000	AV	48.2	30.6	4.3	31.9	51.2	53.9	2.7	100	71	

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).

*The 10th harmonic was not seen so the result was its base noise level.

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

*For the band edge of the carrier and the harmonics that emission was found, the test was performed with VBW of the average detector set at 270Hz. For other average detectors, VBW was set at 10Hz.

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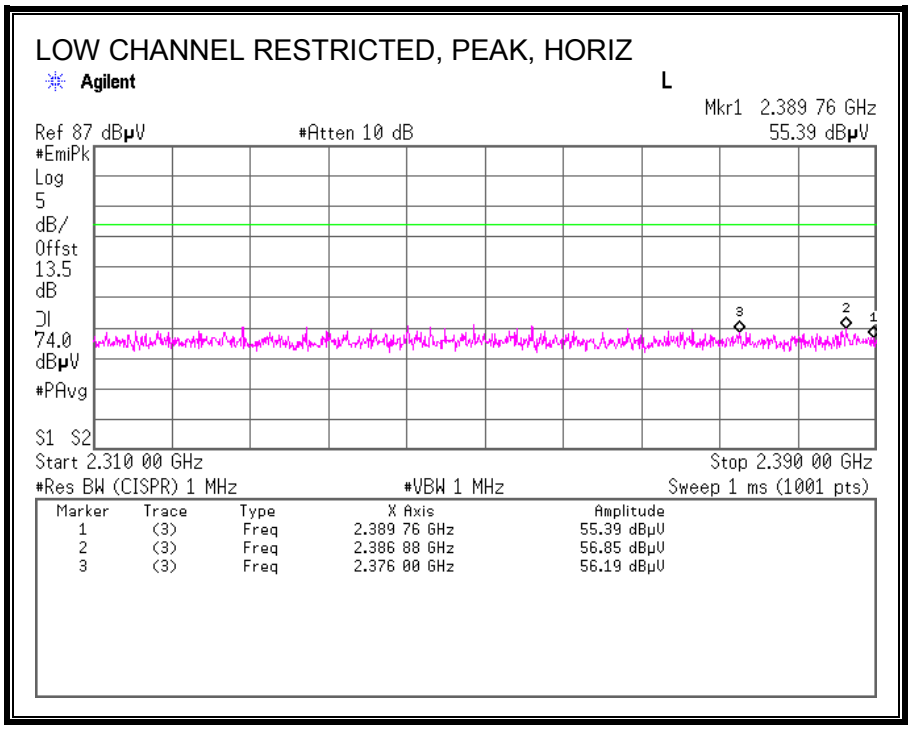
8.2.2 ENHANCED DATA RATE 8PSK MODULATION

RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



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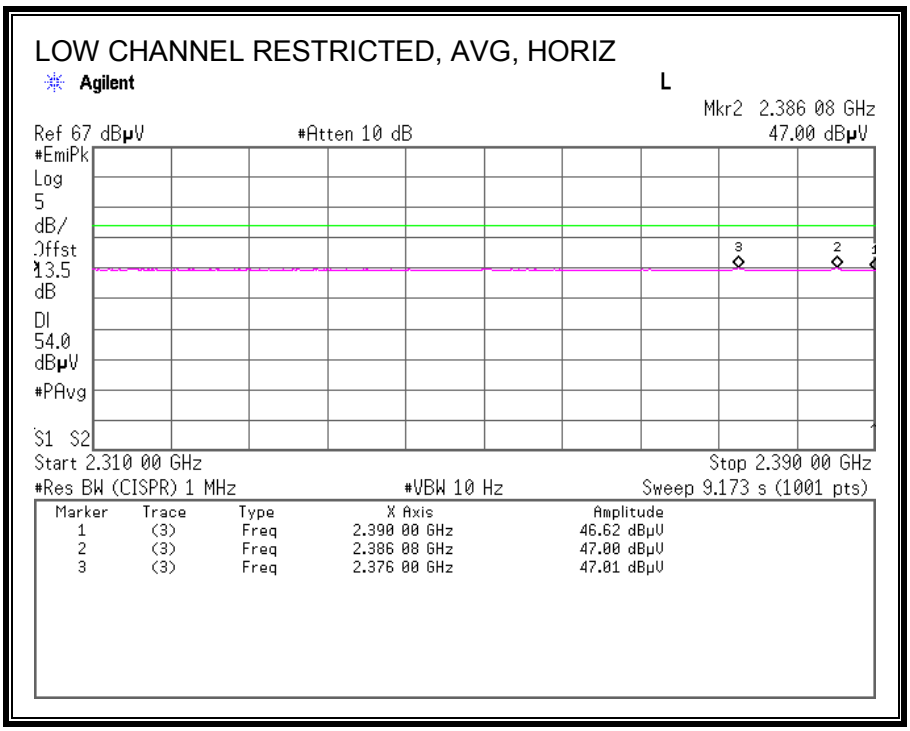

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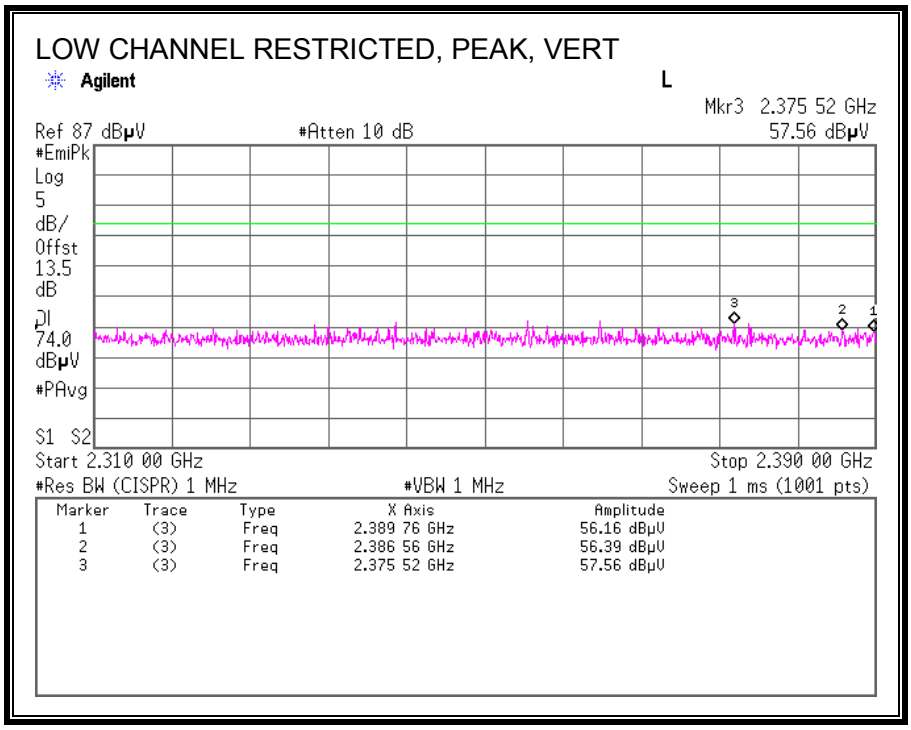
RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



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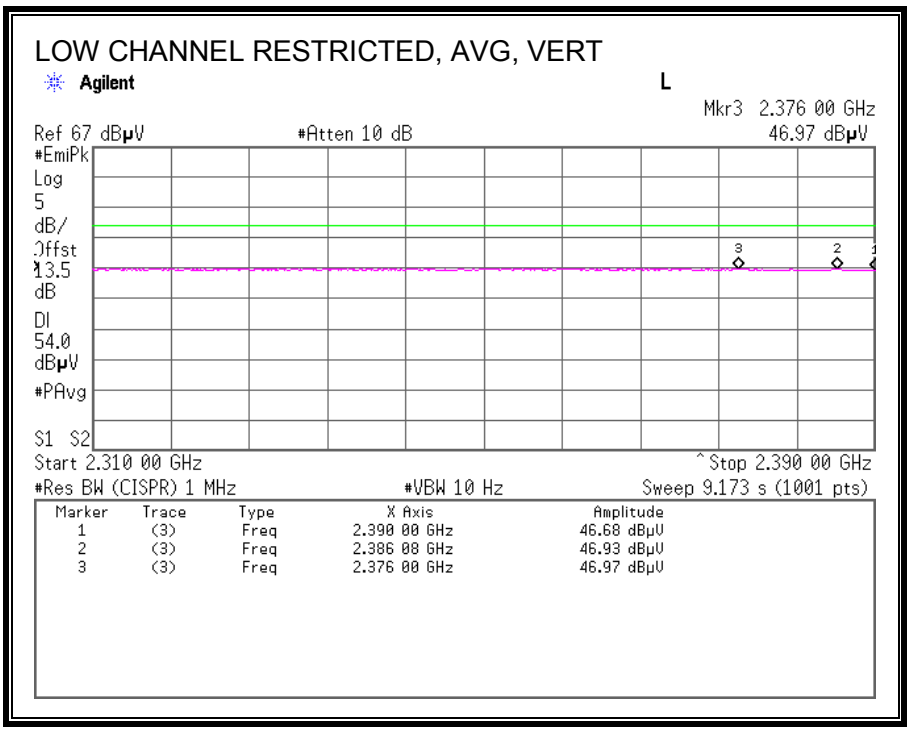

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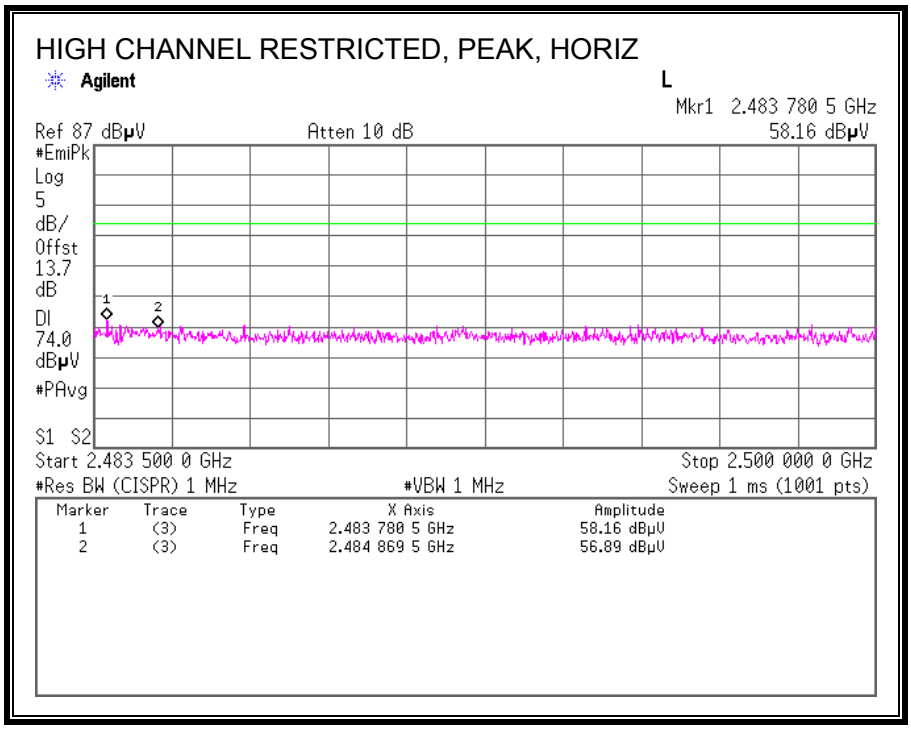
RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)



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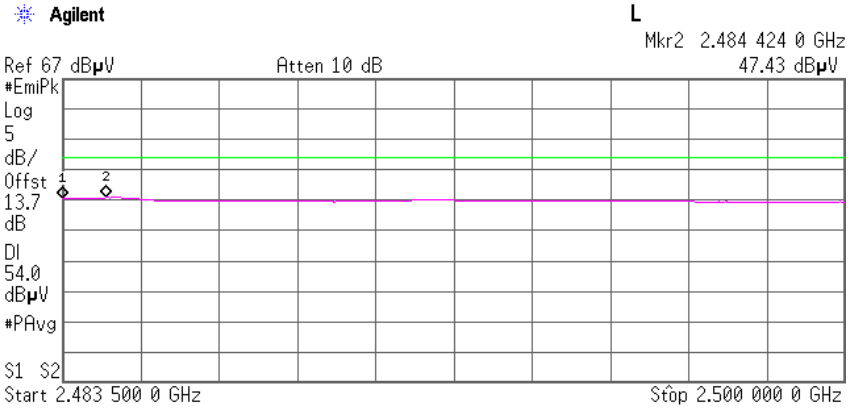
HIGH CHANNEL RESTRICTED, AVG, HORIZ



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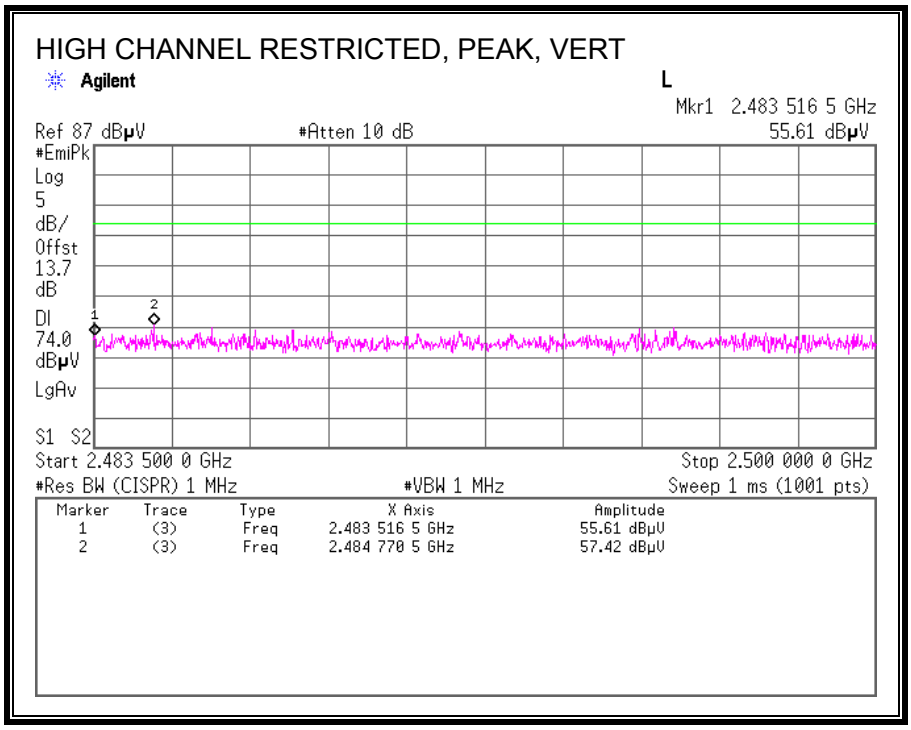
RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)



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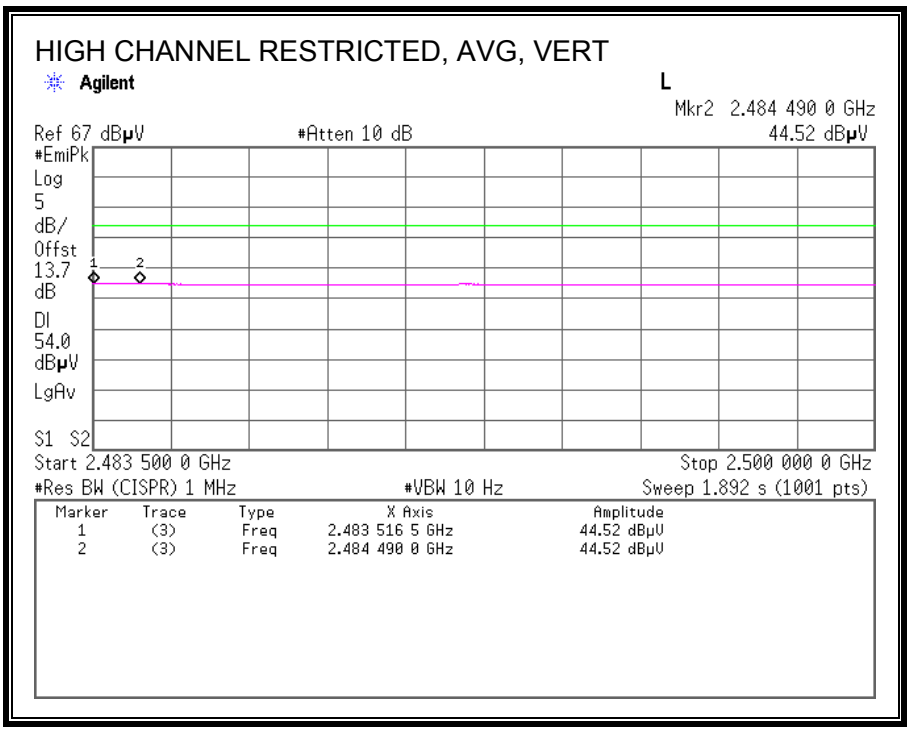

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HARMONICS AND SPURIOUS EMISSIONS

Test place	Head Office EMC Lab. No.3 Semi Anechoic Chamber
Report No.	32AE0133-HO
Date	09/14/2011
Temperature/ Humidity	24 deg.C/ 61% RH
Engineer	Takayuki Shimada
Mode	Tx, 3DH5

LOW CH (2402MHz)

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg.]	Remark
Hori	1601.980	PK	55.5	25.6	1.8	33.7	49.2	73.9	24.7	128	130	
Hori	2390.000	PK	42.5	26.4	2.2	32.6	38.5	73.9	35.4	153	195	
Hori	2400.000	PK	42.6	26.4	2.2	32.6	38.6	73.9	35.3	153	195	
Hori	4804.000	PK	50.7	30.4	4.7	31.9	53.9	73.9	20.0	129	345	
Hori	1601.980	AV	53.3	25.6	1.8	33.7	47.0	53.9	6.9	128	130	
Hori	2390.000	AV	30.4	26.4	2.2	32.6	26.4	53.9	27.5	153	195	
Hori	2400.000	AV	30.7	26.4	2.2	32.6	26.7	53.9	27.2	153	195	
Hori	4804.000	AV	37.8	30.4	4.7	31.9	41.0	53.9	12.9	129	345	
Vert	1601.980	PK	58.5	25.6	1.8	33.7	52.2	73.9	21.7	103	106	
Vert	2390.000	PK	42.8	26.4	2.2	32.6	38.8	73.9	35.1	100	192	
Vert	2400.000	PK	43.9	26.4	2.2	32.6	39.9	73.9	34.0	100	192	
Vert	4804.000	PK	46.1	30.4	4.7	31.9	49.3	73.9	24.6	153	40	
Vert	1601.980	AV	56.6	25.6	1.8	33.7	50.3	53.9	3.6	103	106	
Vert	2390.000	AV	30.4	26.4	2.2	32.6	26.4	53.9	27.5	100	192	
Vert	2400.000	AV	31.1	26.4	2.2	32.6	27.1	53.9	26.8	100	192	
Vert	4804.000	AV	35.7	30.4	4.7	31.9	38.9	53.9	15.0	153	40	

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

*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

MID CH (2441MHz)

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg.]	Remark
Hori	1626.664	PK	54.7	25.7	1.8	33.7	48.5	73.9	25.4	130	126	
Hori	4882.000	PK	53.6	30.5	4.7	31.9	56.9	73.9	17.0	141	351	
Hori	1626.664	AV	52.6	25.7	1.8	33.7	46.4	53.9	7.5	130	126	
Hori	4882.000	AV	40.7	30.5	4.7	31.9	44.0	53.9	9.9	141	351	
Vert	1626.664	PK	58.0	25.7	1.8	33.7	51.8	73.9	22.1	103	90	
Vert	4882.000	PK	46.1	30.5	4.7	31.9	49.4	73.9	24.5	153	40	
Vert	1626.664	AV	55.8	25.7	1.8	33.7	49.6	53.9	4.3	103	90	
Vert	4882.000	AV	35.7	30.5	4.7	31.9	39.0	53.9	14.9	153	40	

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

*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

*For the band edge of the carrier and the harmonics that emission was found, the test was performed with VBW of the average detector set at 270Hz. For other average detectors, VBW was set at 10Hz.

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HARMONICS AND SPURIOUS EMISSIONS

Test place	Head Office EMC Lab. No.3 Semi Anechoic Chamber
Report No.	32AE0133-HO
Date	09/14/2011
Temperature/ Humidity	24 deg.C/ 61% RH
Engineer	Takayuki Shimada
Mode	Tx, 3DH5

HI CH (2480MHz)

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg.]	Remark
Hori	1652.660	PK	55.8	25.7	1.8	33.6	49.7	73.9	24.2	125	131	
Hori	2483.500	PK	42.6	26.5	2.2	32.6	38.7	73.9	35.2	109	155	
Hori	4960.000	PK	52.6	30.6	4.7	31.9	56.0	73.9	17.9	139	358	
Hori	1652.660	AV	53.7	25.7	1.8	33.6	47.6	53.9	6.3	125	131	
Hori	2483.500	AV	30.3	26.5	2.2	32.6	26.4	53.9	27.5	109	155	
Hori	4960.000	AV	38.9	30.6	4.7	31.9	42.3	53.9	11.6	139	358	
Vert	1652.660	PK	61.0	25.7	1.8	33.6	54.9	73.9	19.0	101	98	
Vert	2483.500	PK	42.6	26.5	2.2	32.6	38.7	73.9	35.2	100	191	
Vert	4960.000	PK	47.8	30.6	4.7	31.9	51.2	73.9	22.7	165	78	
Vert	1652.660	AV	57.0	25.7	1.8	33.6	50.9	53.9	3.0	101	98	
Vert	2483.500	AV	30.3	26.5	2.2	32.6	26.4	53.9	27.5	100	191	
Vert	4960.000	AV	34.3	30.6	4.7	31.9	37.7	53.9	16.2	165	78	

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).

*The 10th harmonic was not seen so the result was its base noise level.

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

*For the band edge of the carrier and the harmonics that emission was found, the test was performed with VBW of the average detector set at 270Hz. For other average detectors, VBW was set at 10Hz.

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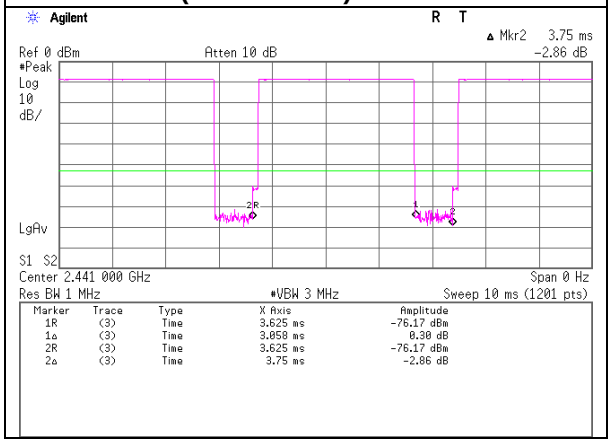
VBW (AV) Calculation

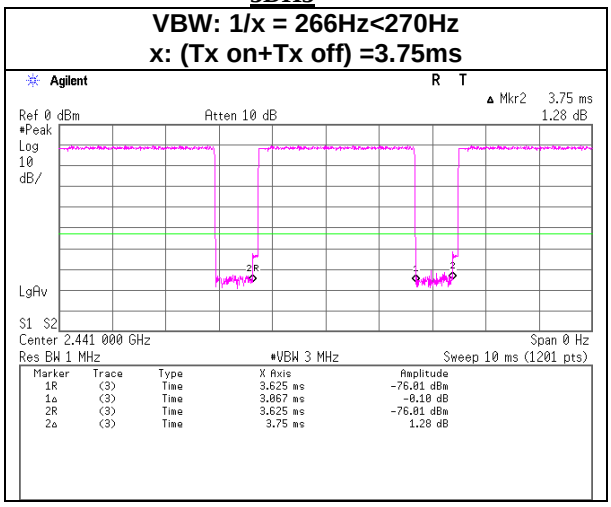
DH5

VBW: 1/x = 266Hz<270Hz
x: (Tx on+Tx off) =3.75ms



3DH5

VBW: 1/x = 266Hz<270Hz
x: (Tx on+Tx off) =3.75ms



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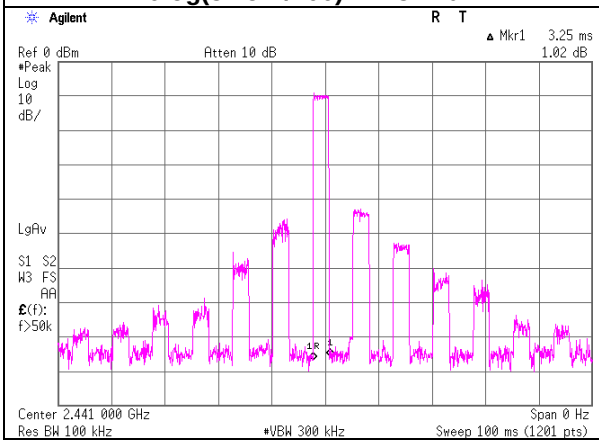
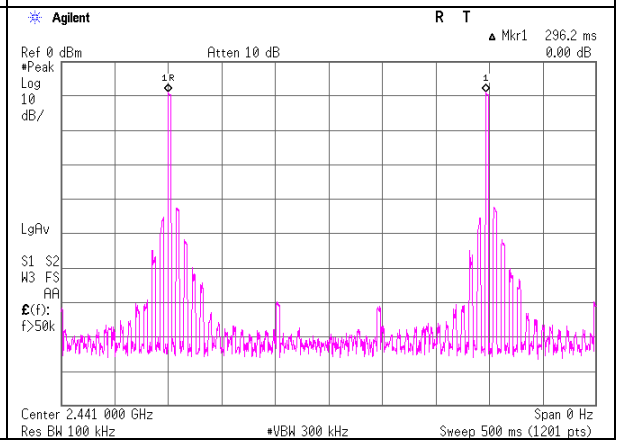
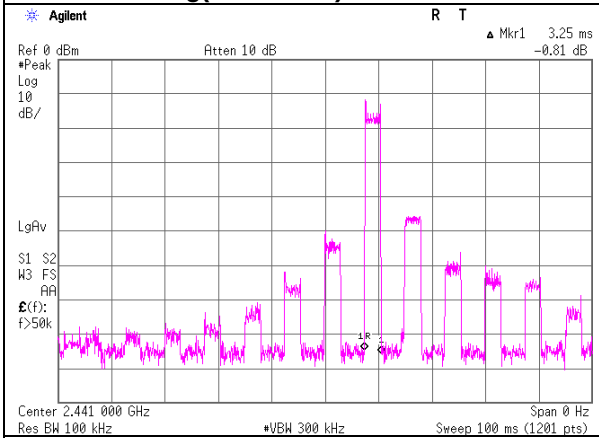
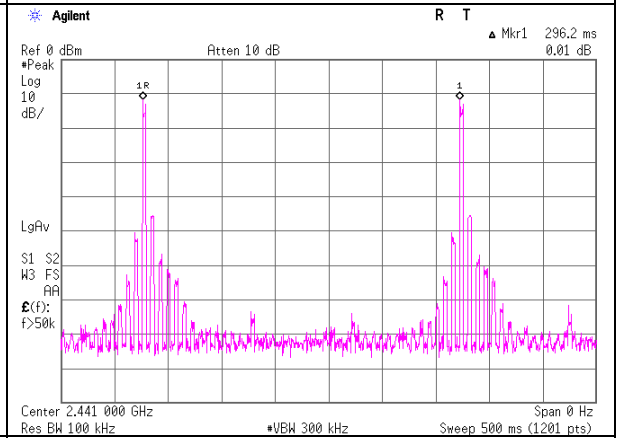
Dwell time factor

DH5

Worst 100ms **Dwell time factor =** **20log(3.25*2/100) = -23.74dB**	**1cycle time** **296.2ms**
	

3DH5

Worst 100ms **Dwell time factor =** **20log(3.25*2/100) = -23.74dB**	**1cycle time** **296.2ms**
	

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8.3 RECEIVER ABOVE 1 GHz

Test place	Head Office EMC Lab. No.3 Semi Anechoic Chamber
Report No.	32AE0133-HO
Date	09/14/2011
Temperature/ Humidity	23 deg.C/ 64% RH
Engineer	Tomohisa Nakagawa
Mode	Rx

HI CH (2480MHz)

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg.]	Remark
Hori	1627.004	PK	57.1	25.7	1.8	33.7	50.9	73.9	23.0	100	152	
Hori	2441.000	PK	45.3	26.4	2.2	32.6	41.3	73.9	32.6	100	0	
Hori	1627.004	AV	55.1	25.7	1.8	33.7	48.9	53.9	5.0	100	152	
Hori	2441.000	AV	35.8	26.4	2.2	32.6	31.8	53.9	22.1	100	0	
Vert	1627.004	PK	57.4	25.7	1.8	33.7	51.2	73.9	22.7	105	19	
Vert	2441.000	PK	43.6	26.4	2.2	32.6	39.6	73.9	34.3	100	317	
Vert	1627.004	AV	56.0	25.7	1.8	33.7	49.8	53.9	4.1	105	19	
Vert	2441.000	AV	33.8	26.4	2.2	32.6	29.8	53.9	24.1	100	317	

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).

*The 10th harmonic was not seen so the result was its base noise level.

Distance factor: 10GHz-26.5GHz 20log(3.0m/1.0m)= 9.5dB
26.5GHz-40GHz 20log(3.0m/0.5m)=15.6dB

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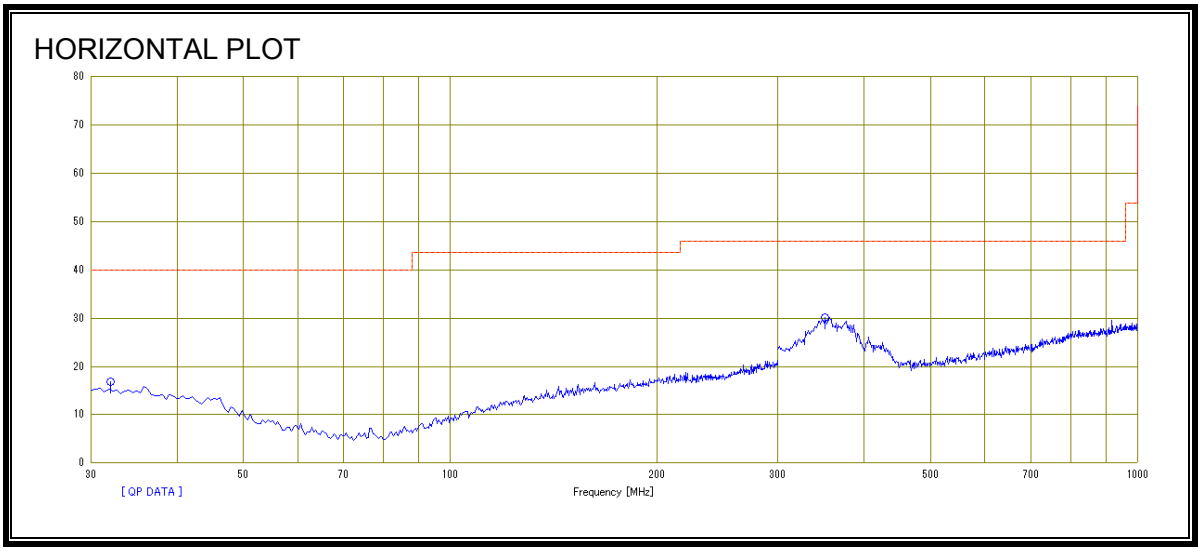
8.4 WORST-CASE BELOW 1 GHz

SPURIOUS EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION, HORIZONTAL)



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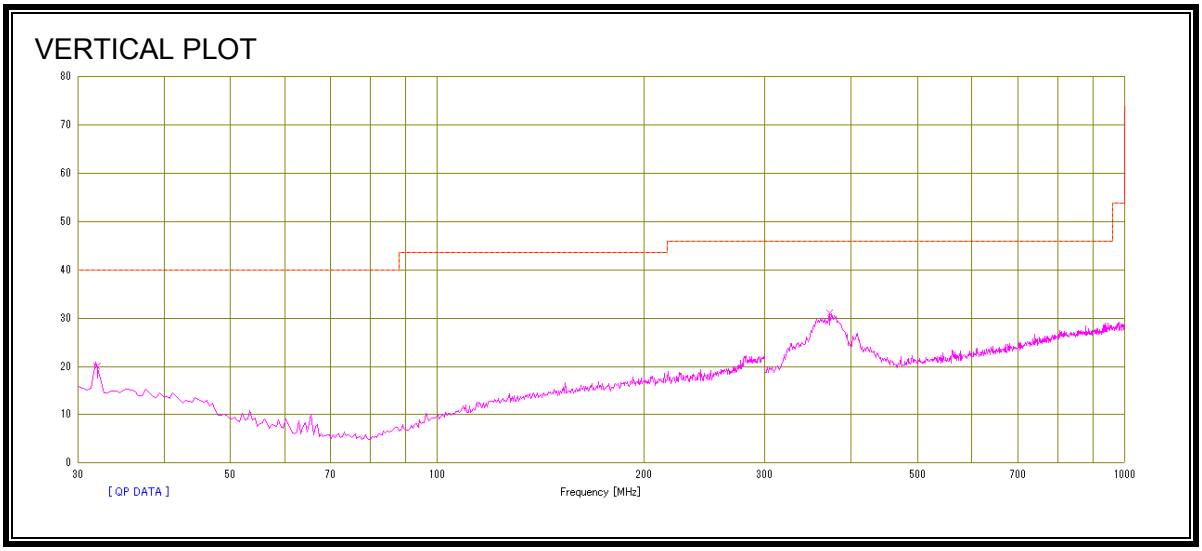
SPURIOUS EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION, VERTICAL)



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SPURIOUS EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION, VERTICAL)

Test place	Head Office EMC Lab. No.3 Semi Anechoic Chamber
Report No.	32AE0133-HO
Date	09/14/2011
Temperature/ Humidity	24 deg.C/ 61% RH
Engineer	Takayuki Shimada
Mode	Tx

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg.]	Remark
Hori	31.999	QP	25.1	16.8	7.1	32.2	16.8	40.0	23.2	166	238	
Hori	351.407	QP	35.5	16.4	10.3	32.0	30.2	46.0	15.8	100	300	
Vert	31.999	QP	28.3	16.8	7.1	32.2	20.0	40.0	20.0	100	294	
Vert	372.400	QP	35.6	16.9	10.5	32.0	31.0	46.0	15.0	100	76	

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).

*The 10th harmonic was not seen so the result was its base noise level.

Distance factor: 10GHz-26.5GHz 20log(3.0m/1.0m)= 9.5dB
26.5GHz-40GHz 20log(3.0m/0.5m)=15.6dB

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9 AC POWER LINE CONDUCTED EMISSIONS

LIMITS

FCC §15.207 (a)

RSS-Gen 7.2.4

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

ANSI C63.4

RESULTS

6 WORST EMISSIONS

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]		
0.15000	20.0	2.6	13.3	33.3	15.9	66.0	56.0	-32.7	-40.1	N	
0.20056	11.1	-1.8	13.2	24.3	11.4	63.6	53.6	-39.3	-42.2	N	
0.29645	-0.1	-3.5	13.3	13.2	9.8	60.3	50.3	-47.1	-40.5	N	
0.52834	-1.4	-3.5	13.4	12.0	9.9	56.0	46.0	-44.0	-36.1	N	
2.03423	-2.4	-4.7	13.6	11.2	8.9	56.0	46.0	-44.8	-37.1	N	
18.82983	-1.0	-5.3	16.3	15.3	11.0	60.0	50.0	-44.7	-39.0	N	
0.15000	20.0	2.8	13.3	33.3	16.1	66.0	56.0	-32.7	-39.9	L	
0.19882	11.3	-1.8	13.2	24.5	11.4	63.7	53.7	-39.2	-42.3	L	
0.29297	0.0	-3.5	13.3	13.3	9.8	60.4	50.4	-47.1	-40.6	L	
0.52659	-1.3	-1.7	13.4	12.1	11.7	56.0	46.0	-43.9	-34.3	L	
2.07058	-0.2	-4.8	13.6	13.4	8.8	56.0	46.0	-42.6	-37.2	L	
18.91019	-1.2	-5.4	16.3	15.1	10.9	60.0	50.0	-44.9	-39.1	L	

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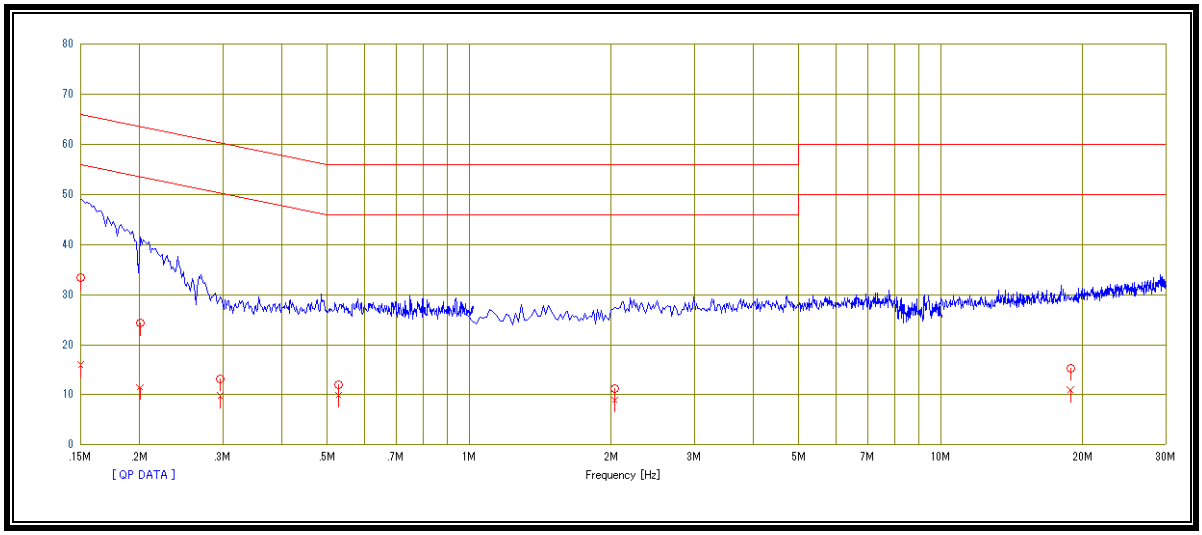
LINE 1 RESULTS



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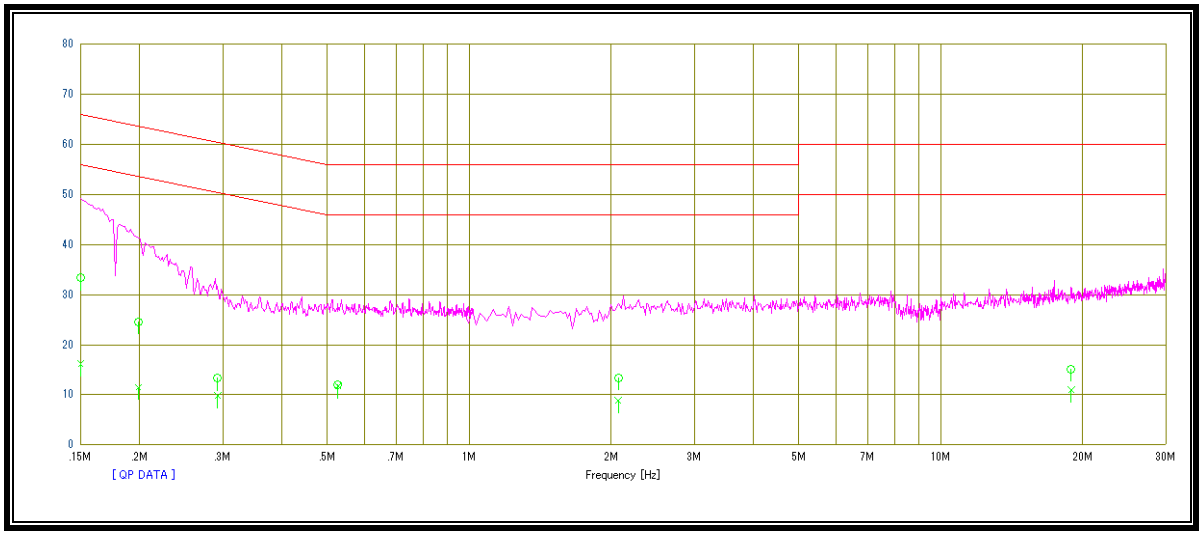
LINE 2 RESULTS



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