RADIO TEST REPORT

Test Report No. : 33BE0184-HO-04-A-R1

Applicant	:	**Panasonic Corporation of North America**
Type of Equipment	:	**Wireless Speaker System**
Model No.	:	**SC-NE1**
FCC ID	:	**ACJ-SC-NE1**
Test regulation	:	**FCC Part 15 Subpart C: 2012**
Test Result	:	**Complied**

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2. The results in this report apply only to the sample tested.
3. This sample tested is in compliance with the above regulation.
4. The test results in this report are traceable to the national or international standards.
5. This test report must not be used by the customer to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.
6. This report is a revised version of 33BE0184-HO-04-A. 33BE0184-HO-04-A is replaced with this report.

Date of test: October 16 to November 28, 2012

Representative test engineer:

Hironobu Ohnishi
Engineer of WiSE Japan,
UL Verification Service

Approved by:

Takahiro Hatakeda
Leader of WiSE Japan,
UL Verification Service

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

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SECTION 1: Customer information

Company Name	:	Panasonic Corporation *
Address	:	1006 Oaza Kadoma, Kadoma-shi, Osaka 571-8501 Japan
Telephone Number	:	+81-50-3487-3469
Facsimile Number	:	+81-6-6906-8800
Contact Person	:	Kazuo Taniguchi

*Panasonic Corporation is on behalf of the applicant: Panasonic Corporation of North America.

SECTION 2: Equipment under test (E.U.T.)

2.1 Identification of E.U.T.

Type of Equipment	:	Wireless Speaker System
Model No.	:	SC-NE1
Serial No.	:	Refer to Clause 4.2
Rating	:	AC 120V
Receipt Date of Sample	:	October 16, 2012
Country of Mass-production	:	Malaysia
Condition of EUT	:	Production prototype (Not for Sale: This sample is equivalent to mass-produced items.)
Modification of EUT	:	No Modification by the test lab

2.2 Product Description

Radio Specification

Radio Type	:	Transceiver
Frequency of Operation	:	2402-2480MHz
Modulation	:	FHSS
Power Supply (inner)	:	DC 3.3V
Antenna type	:	Internal Antenna
Antenna Gain	:	4.85dBi

SECTION 3: Test specification, procedures & results

3.1 Test Specification

Test Specification	:	FCC Part 15 Subpart C: 2012, final revised on August 13, 2012 and effective September 12, 2012
Title	:	FCC 47CFR Part15 Radio Frequency Device Subpart C Intentional Radiators Section 15.207 Conducted limits Section 15.247 Operation within the bands 902-928MHz, 2400-2483.5MHz, and 5725-5850MHz

*The EUT complies with FCC Part 15 Subpart B: 2012, final revised on August 13, 2012 and effective September 12, 2012.

3.2 Procedures and results

Item	Test Procedure	Specification	Worst Margin	Results	Remarks
Conducted Emission	**FCC:** ANSI C63.4:2003 7. AC powerline conducted emission measurements **IC:** RSS-Gen 7.2.4	**FCC:** Section 15.207 **IC:** RSS-Gen 7.2.4	**QP** 26.9dB, 0.15000MHz, N **AV** 25.9dB, 0.76775MHz, L	Complied	-
Carrier Frequency Separation	**FCC:** FCC Public Notice DA 00-705 **IC:** -	**FCC:** Section15.247(a)(1) **IC:** RSS-210 A8.1 (b)	See data.	Complied	Conducted
20dB Bandwidth	**FCC:** FCC Public Notice DA 00-705 **IC:** -	**FCC:** Section15.247(a)(1) **IC:** RSS-210 A8.1 (a)		Complied	Conducted
Number of Hopping Frequency	**FCC:** FCC Public Notice DA 00-705 **IC:** -	**FCC:** Section15.247(a)(1)(iii) **IC:** RSS-210 A8.1 (d)		Complied	Conducted
Dwell time	**FCC:** FCC Public Notice DA 00-705 **IC:** -	**FCC:** Section15.247(a)(1)(iii) **IC:** RSS-210 A8.1 (d)		Complied	Conducted
Maximum Peak Output Power	**FCC:** FCC Public Notice DA 00-705 **IC:** RSS-Gen 4.8	**FCC:** Section15.247(a)(b)(1) **IC:** RSS-210 A8.4 (2)		Complied	Conducted
Spurious Emission & Band Edge Compliance	**FCC:** FCC Public Notice DA 00-705 **IC:** RSS-Gen 4.9	**FCC:** Section15.247(d) **IC:** RSS-210 A8.5 RSS-Gen 6 and 7.2.3	6.0 dB 4804.00MHz, AV, Vertical	Complied	Conducted/ Radiated
Note: UL Japan, Inc.'s EMI Work Procedures No. 13-EM-W0420 and 13-EM-W0422.					

* In case any questions arise about test procedure, ANSI C63.4: 2003 is also referred.

FCC 15.31 (e)
This EUT provides stable voltage (DC3.3V) constantly to RF part regardless of input voltage. Therefore, this EUT complies with the requirement.

FCC Part 15.203 Antenna requirement
It is impossible for end users to replace the antenna, because the antenna is mounted inside of the EUT. Therefore, the equipment complies with the antenna requirement of Section 15.203.

3.3 Addition to standard

Item	Test Procedure	Specification	Worst margin	Results	Remarks
99% Occupied Bandwidth	**IC:** RSS-Gen 4.6.1	**IC:** RSS-Gen 4.6.1	N/A	-	Conducted

Other than above, no addition, exclusion nor deviation has been made from the standard.

3.4 Uncertainty

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	3.5dB
No.2	3.6dB
No.3	3.6dB
No.4	3.6dB

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	4.3dB	5.0dB	5.1dB	4.9dB	5.8dB	4.4dB	4.3dB
No.2	4.3dB	5.2dB	5.1dB	5.0dB	5.7dB	4.3dB	4.2dB
No.3	4.6dB	5.0dB	5.1dB	5.0dB	5.7dB	4.5dB	4.2dB
No.4	4.8dB	5.2dB	5.0dB	5.0dB	5.7dB	5.2dB	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

Conducted Emission test
The data listed in this test report has enough margin, more than the site margin.

Radiated emission test(3m)
The data listed in this test report has enough margin, more than the site margin.

3.5 Test Location

UL Japan, Inc. Head Office EMC Lab. *NVLAP Lab. code: 200572-0
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN
Telephone: +81 596 24 8116 Facsimile: +81 596 24 8124

	FCC Registration Number	IC Registration Number	Width x Depth x Height (m)	Size of reference ground plane (m) / horizontal conducting plane	Other rooms
No.1 semi-anechoic chamber	313583	2973C-1	19.2 x 11.2 x 7.7m	7.0 x 6.0m	No.1 Power source room
No.2 semi-anechoic chamber	655103	2973C-2	7.5 x 5.8 x 5.2m	4.0 x 4.0m	-
No.3 semi-anechoic chamber	148738	2973C-3	12.0 x 8.5 x 5.9m	6.8 x 5.75m	No.3 Preparation room
No.3 shielded room	-	-	4.0 x 6.0 x 2.7m	N/A	-
No.4 semi-anechoic chamber	134570	2973C-4	12.0 x 8.5 x 5.9m	6.8 x 5.75m	No.4 Preparation room
No.4 shielded room	-	-	4.0 x 6.0 x 2.7m	N/A	-
No.5 semi-anechoic chamber	-	-	6.0 x 6.0 x 3.9m	6.0 x 6.0m	-
No.6 shielded room	-	-	4.0 x 4.5 x 2.7m	4.75 x 5.4 m	-
No.6 measurement room	-	-	4.75 x 5.4 x 3.0m	4.75 x 4.15 m	-
No.7 shielded room	-	-	4.7 x 7.5 x 2.7m	4.7 x 7.5m	-
No.8 measurement room	-	-	3.1 x 5.0 x 2.7m	N/A	-
No.9 measurement room	-	-	8.0 x 4.5 x 2.8m	2.0 x 2.0m	-
No.10 measurement room	-	-	2.6 x 2.8 x 2.5m	2.4 x 2.4m	-
No.11 measurement room	-	-	3.1 x 3.4 x 3.0m	2.4 x 3.4m	-

* Size of vertical conducting plane (for Conducted Emission test) : 2.0 x 2.0m for No.1, No.2, No.3, and No.4 semi-anechoic chambers and No.3 and No.4 shielded rooms.

3.6 Data of EMI, Test instruments, and Test set up

Refer to APPENDIX.

SECTION 4: Operation of E.U.T. during testing

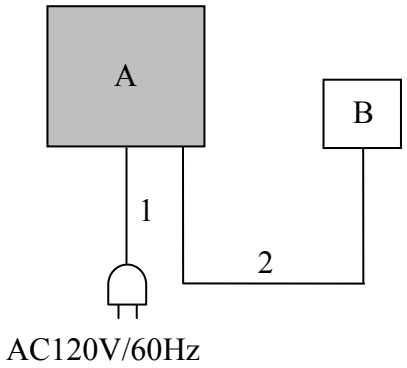
4.1 Operating Mode(s)

Bluetooth (BT): Transmitting (Tx), Payload: PRBS9
*Inquiry mode was not able to function on test tool.

Details of Operating Mode(s)

Test Item	Mode	Tested frequency
Conducted Emission, Spurious Emission (Conducted/Radiated)	Tx (Hopping off) DH5, 3DH5	2402MHz 2441MHz 2480MHz
Carrier Frequency Separation	Tx (Hopping on) DH5, 3DH5	2402MHz 2441MHz 2480MHz
20dB Bandwidth	Tx (Hopping off) DH5, 3DH5	2402MHz 2441MHz 2480MHz
Number of Hopping Frequency	Tx (Hopping on) DH5, 3DH5	-
Dwell time	Tx (Hopping on), -DH1, DH3, DH5 -3DH1, 3DH3, 3DH5	-
Maximum Peak Output Power	Tx (Hopping off) DH5, 3DH5	2402MHz 2441MHz 2480MHz
Band Edge Compliance (Conducted)	Tx DH5, 3DH5 -Hopping on -Hopping off	2402MHz 2480MHz
99% Occupied Bandwidth	Tx DH5, 3DH5 -Hopping on -Hopping off	2402MHz 2441MHz 2480MHz
*As a result of preliminary test, the formal test was performed with the above modes, which had the maximum payload length (except Dwell time test) *EUT has the power settings by the software as follows; - Power settings: CSR Blue Test 3 Version 2.2.0.0 - Software: Ext 255 Int 50 *This setting of software is the worst case. Any conditions under the normal use do not exceed the condition of setting. In addition, end users cannot change the settings of the output power of the product.		

4.2 Configuration and peripherals



* Cabling and setup(s) were taken into consideration and test data was taken under worse case conditions.

Description of EUT and Support equipment

No.	Item	Model number	Serial number	Manufacturer	Remark
A	Wireless Speaker System	SC-NE1	002	Panasonic	EUT
B	iPod nano	MC525J/A	-	Apple	-

List of cables used

No.	Name	Length (m)	Shield		Remark
			Cable	Connector	
1	AC Cable	1.6	Unshielded	Unshielded	-
2	Audio Cable	3.0	Shielded	Shielded	

SECTION 5: Conducted Emission

Test Procedure and conditions

EUT was placed on a urethane platform of nominal size, 0.5m by 1.0m, raised 0.8m above the conducting ground plane. The rear of tabletop was located 40cm to the vertical conducting plane. The rear of EUT, including peripherals aligned and flushed with rear of tabletop. All other surfaces of tabletop were at least 80cm from any other grounded conducting surface. EUT was located 80cm from a Line Impedance Stabilization Network (LISN)/ Artificial mains Network (AMN) and excess AC cable was bundled in center.

For the tests on EUT with other peripherals (as a whole system)
I/O cables that were connected to the peripherals were bundled in center. They were folded back and forth forming a bundle 30cm to 40cm long and were hanged at a 40cm height to the ground plane. All unused 50ohm connectors of the LISN(AMN) were resistivity terminated in 50ohm when not connected to the measuring equipment.

The AC Mains Terminal Continuous disturbance Voltage has been measured with the EUT in a Semi Anechoic Chamber . The EUT was connected to a LISN (AMN).
An overview sweep with peak detection has been performed.

The test results and limit are rounded off to one decimal place, so some differences might be observed.

Detector : QP and AV
Measurement range : 0.15-30MHz
Test data : APPENDIX
Test result : Pass

SECTION 6: Radiated Spurious Emission

Test Procedure
EUT was placed on a urethane platform of nominal size, 0.5m by 1.0m, raised 0.8m above the conducting ground plane.
The Radiated Electric Field Strength has been measured in a Semi Anechoic Chamber with a ground plane.
The height of the measuring antenna varied between 1 and 4m and EUT was rotated a full revolution in order to obtain the maximum value of the electric field strength.
The measurements were performed for both vertical and horizontal antenna polarization with the Test Receiver, or the Spectrum Analyzer.
The measurements were made with the following detector function of the test receiver and the Spectrum analyzer (in linear mode).
The test was made with the detector (RBW/VBW) in the following table.
When using Spectrum analyzer, the test was made with adjusting span to zero by using peak hold.

Test Antennas are used as below;

Frequency	30MHz to 300MHz	300MHz to 1GHz	Above 1GHz
Antenna Type	Biconical	Logperiodic	Horn

In any 100kHz bandwidth outside the restricted band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator confirmed 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power, based on a radiated measurement.

20dBc was applied to the frequency over the limit of FCC 15.209 / Table 5 of RSS-Gen 7.2.5 (IC) and outside the restricted band of FCC15.205 / Table 3 of RSS-Gen 7.2.2 (IC).

Frequency	Below 1GHz	Above 1GHz		20dBc
Instrument used	Test Receiver	Spectrum Analyzer		Spectrum Analyzer
Detector	QP	PK	AV	PK
IF Bandwidth	BW 120kHz(T/R)	RBW: 1MHz VBW: 3MHz	RBW: 1MHz VBW: 10Hz *1)	RBW: 100kHz VBW: 300kHz (S/A)
Test Distance	3m	3m (below 10GHz), 1m*2) (above 10GHz)		3m (below 10GHz), 1m*2) (above 10GHz)

*1) Although 00-705 accepts VBW=10Hz for AV measurements, it was confirmed that superfluous smoothing was not performed."
*2) Distance Factor: 20 x log (3.0m/1.0m) = 9.5dB

The test was made on EUT at the normal use position.

The test results and limit are rounded off to one decimal place, so some differences might be observed.

Measurement range : 30M-25GHz
Test data : APPENDIX
Test result : Pass

SECTION 7: Antenna Terminal Conducted Tests

Test Procedure

The tests were made with below setting connected to the antenna port.

Test	Span	RBW	VBW	Sweep time	Detector	Trace	Instrument used
20dB Bandwidth	3MHz	30kHz	100kHz	Auto	Peak	Max Hold	Spectrum Analyzer
99% Occupied Bandwidth	Enough width to display 20dB Bandwidth	1 to 3% of Span	Three times of RBW	Auto	Peak	Max Hold	Spectrum Analyzer
Maximum Peak Output Power	-	-	-	Auto	Peak	-	Power Meter (Sensor: 50MHz BW)
Carrier Frequency Separation	3MHz	30kHz	100kHz	Auto	Peak	Max Hold	Spectrum Analyzer
Number of Hopping Frequency	30MHz	300kHz	1MHz	Auto	Peak	Max Hold	Spectrum Analyzer
Dwell Time	Zero Span	100kHz, 1MHz	300kHz, 3MHz	As necessary capture the entire dwell time per hopping channel	Peak	Max Hold	Spectrum Analyzer
Conducted Spurious Emission *1)	9kHz to 150kHz	200Hz	620Hz	Auto	Peak	Max Hold	Spectrum Analyzer
	150kHz to 30MHz	9.1kHz	27kHz				
	30MHz to 25GHz (Less or equal to 5GHz)	100kHz	300kHz				
Conducted Spurious Emission Band Edge compliance	20MHz	100kHz	300kHz	Auto	Peak	Max Hold	Spectrum Analyzer

*1) In the frequency range below 30MHz, RBW was narrowed to separate the noise contents.
Then, wide-band noise near the limit was checked separately, however the noise was not detected as shown in the chart.(9kHz-150kHz:RBW=200Hz, 150kHz-30MHz:RBW=9.1kHz)

The test results and limit are rounded off to two decimals place, so some differences might be observed.

Test data : APPENDIX
Test result : Pass

APPENDIX 1: Data of EMI test

Conducted Emission

DATA OF CONDUCTED EMISSION TEST

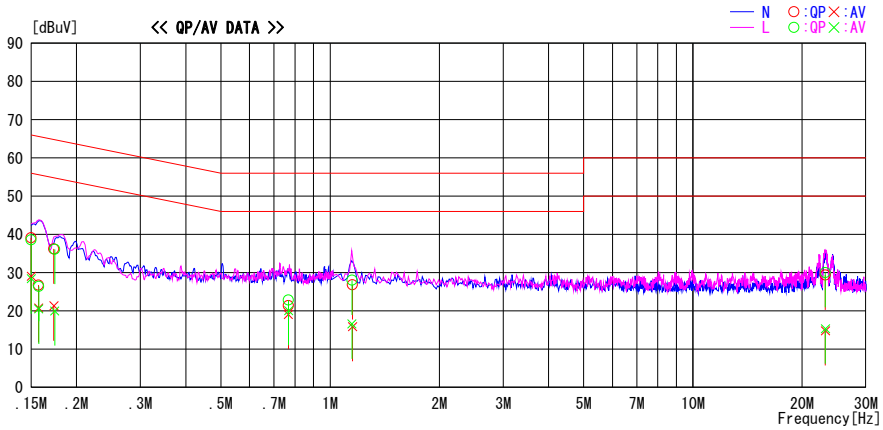
UL Japan, Inc. Head Office EMC Lab. No.4 Semi Anechoic Chamber
Date : 2012/11/27

Report No. : 33BE0184-HO-04

Temp./Humi. : 21deg. C / 35% RH
Engineer : Hironobu Ohnishi

Mode / Remarks : Tx DH5 2402MHz

LIMIT : FCC15.207 QP
FCC15.207 AV



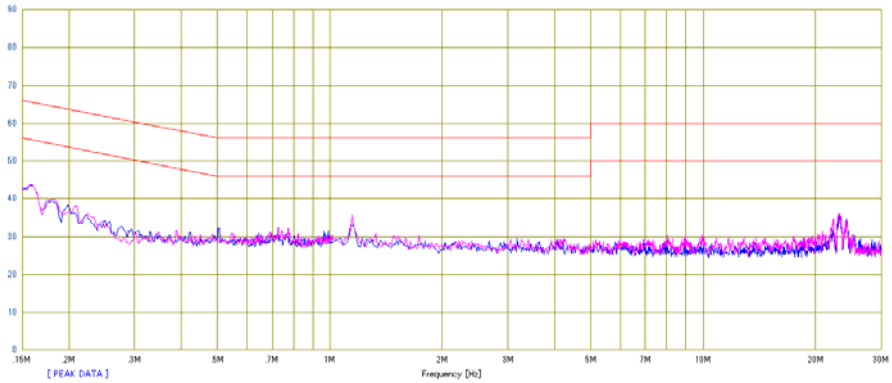
Frequency	Reading Level		Corr.	Results		Limit		Margin		Phase	Comment
	QP	AV	Factor	QP	AV	QP	AV	QP	AV		
[MHz]	[dBuV]	[dBuV]	[dB]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dB]	[dB]		
0.15000	25.8	15.8	13.3	39.1	29.1	66.0	56.0	26.9	26.9	N	
0.15721	13.4	7.5	13.3	26.7	20.8	65.6	55.6	38.9	34.8	N	
0.17324	22.9	8.0	13.3	36.2	21.3	64.8	54.8	28.6	33.5	N	
0.76721	8.0	5.7	13.4	21.4	19.1	56.0	46.0	34.6	26.9	N	
1.15218	13.4	2.5	13.4	26.8	15.9	56.0	46.0	29.2	30.1	N	
23.17753	14.6	0.0	14.8	29.4	14.8	60.0	50.0	30.6	35.2	N	
0.15000	25.3	15.1	13.3	38.6	28.4	66.0	56.0	27.4	27.6	L	
0.15725	13.1	7.2	13.3	26.4	20.5	65.6	55.6	39.2	35.1	L	
0.17410	22.8	6.7	13.3	36.1	20.0	64.8	54.8	28.7	34.8	L	
0.76775	9.4	6.7	13.4	22.8	20.1	56.0	46.0	33.2	25.9	L	
1.14869	14.6	3.2	13.4	28.0	16.6	56.0	46.0	28.0	29.4	L	
23.17841	15.2	0.5	14.8	30.0	15.3	60.0	50.0	30.0	34.7	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.

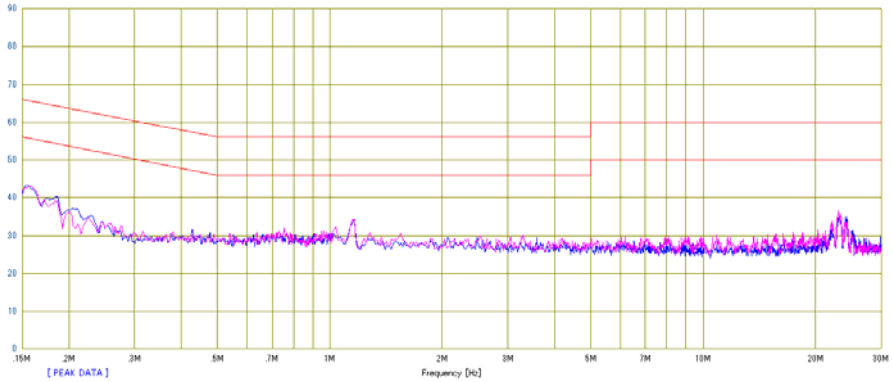
Conducted Emission

Test place	Head Office EMC Lab. No.4 Semi Anechoic Chamber
Report No.	33BE0184-HO-04
Date	11/27/2012
Temperature/ Humidity	21 deg. C / 35% RH
Engineer	Hironobu Ohnishi
Mode	Tx DH5

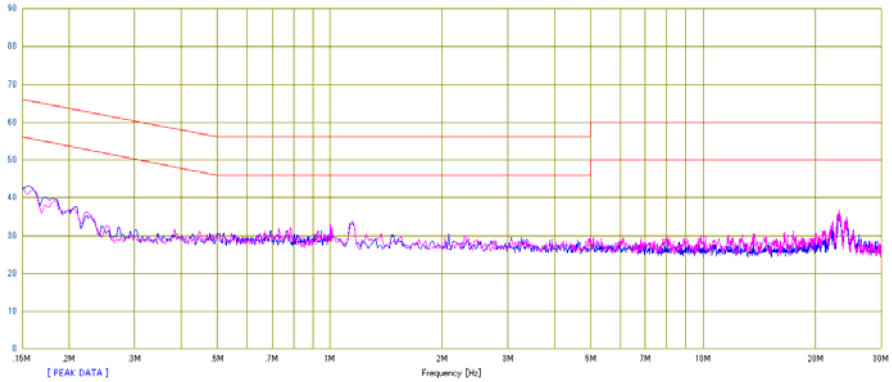
2402MHz



2441MHz



2480MHz



Y scale [dBuV] Chart — N — L

Conducted Emission

DATA OF CONDUCTED EMISSION TEST

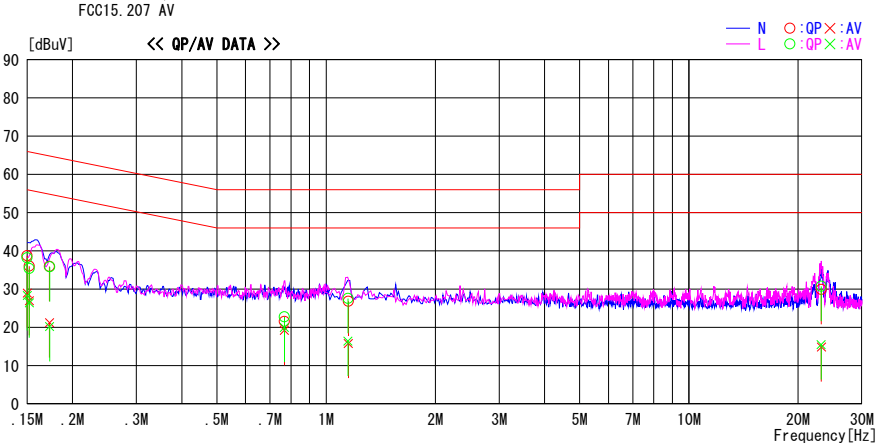
UL Japan, Inc. Head Office EMC Lab. No.4 Semi Anechoic Chamber
Date : 2012/11/27

Report No. : 33BE0184-HO-04

Temp./Humi. : 21deg. C / 35% RH
Engineer : Hironobu Ohnishi

Mode / Remarks : Tx 3DH5 2402MHz

LIMIT : FCC15.207 QP
FCC15.207 AV



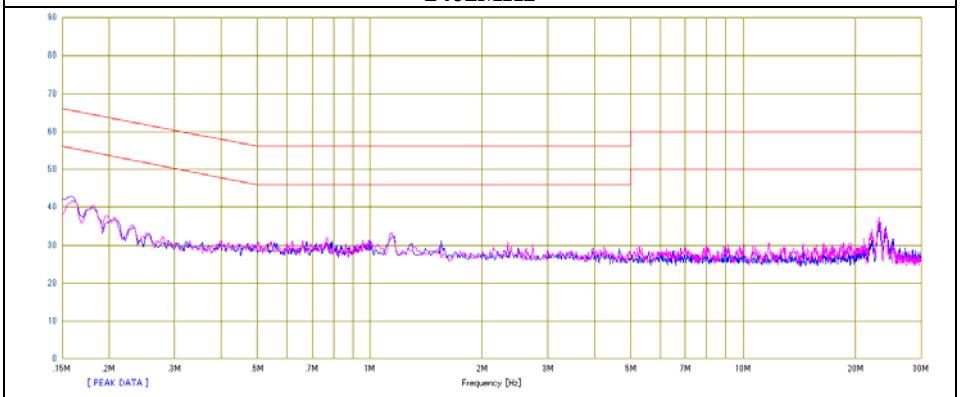
Frequency	Reading Level		Corr.	Results		Limit		Margin		Phase	Comment
	QP	AV	Factor	QP	AV	QP	AV	QP	AV		
[MHz]	[dBuV]	[dBuV]	[dB]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dB]	[dB]		
0.15000	25.4	15.7	13.3	38.7	29.0	66.0	56.0	27.3	27.0	N	
0.15208	22.7	13.7	13.3	36.0	27.0	65.9	55.9	29.9	28.9	N	
0.17285	22.6	7.9	13.3	35.9	21.2	64.8	54.8	28.9	33.6	N	
0.76754	8.2	5.8	13.4	21.6	19.2	56.0	46.0	34.4	26.8	N	
1.15126	13.4	2.4	13.4	26.8	15.8	56.0	46.0	29.2	30.2	N	
23.16800	15.1	0.1	14.8	29.9	14.9	60.0	50.0	30.1	35.1	N	
0.15000	24.9	15.0	13.3	38.2	28.3	66.0	56.0	27.8	27.7	L	
0.15210	22.1	13.1	13.3	35.4	26.4	65.9	55.9	30.5	29.5	L	
0.17298	22.5	6.9	13.3	35.8	20.2	64.8	54.8	29.0	34.6	L	
0.76725	9.3	6.6	13.4	22.7	20.0	56.0	46.0	33.3	26.0	L	
1.14865	14.2	3.0	13.4	27.6	16.4	56.0	46.0	28.4	29.6	L	
23.15000	15.9	0.7	14.8	30.7	15.5	60.0	50.0	29.3	34.5	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.

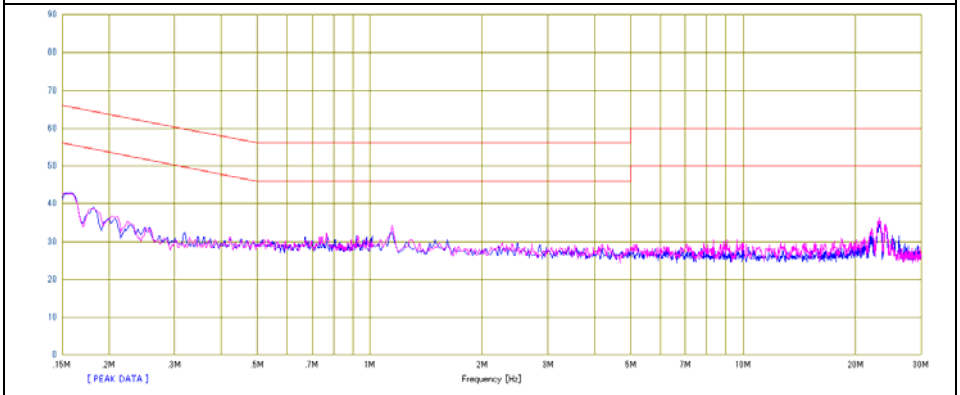
Conducted Emission

Test place	Head Office EMC Lab. No.4 Semi Anechoic Chamber
Report No.	33BE0184-HO-04
Date	11/27/2012
Temperature/ Humidity	21 deg. C / 35% RH
Engineer	Hironobu Ohnishi
Mode	Tx 3DH5

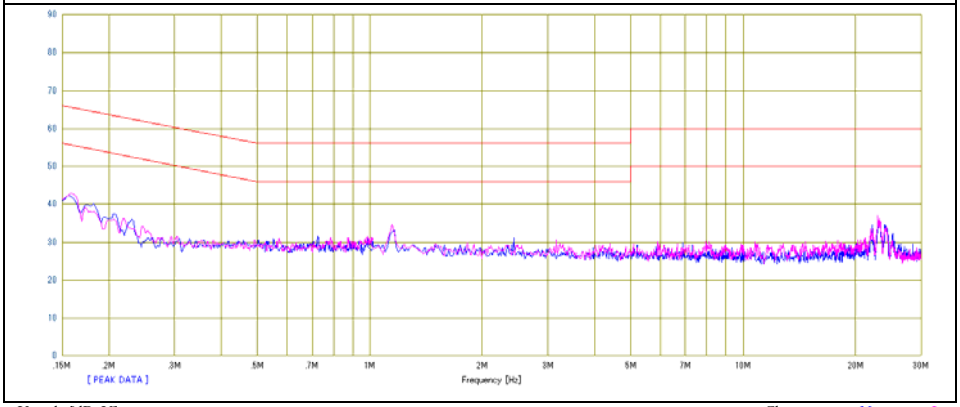
2402MHz



2441MHz



2480MHz



Y scale [dBuV] Chart — N — L

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20dB Bandwidth and Carrier Frequency Separation

Test place	Head Office EMC Lab. No.6 Shielded Room
Report No.	33BE0184-HO-04
Date	10/16/2012
Temperature/ Humidity	25 deg. C / 43% RH
Engineer	Tomohisa Nakagawa
Mode	Tx (Hopping on) DH5/3DH5

Mode	Freq. [MHz]	20dB Bandwidth [MHz]	Carrier Frequency Separation [MHz]	Limit for Carrier Frequency separation [MHz]
DH5	2402.0	0.931	1.000	>= 0.621
DH5	2441.0	0.925	1.000	>= 0.617
DH5	2480.0	0.933	1.000	>= 0.622
3DH5	2402.0	1.285	1.000	>= 0.857
3DH5	2441.0	1.301	1.000	>= 0.867
3DH5	2480.0	1.280	1.000	>= 0.853

Limit: Two-thirds of 20dB Bandwidth or 25kHz (whichever is greater).
No limit applies to 20dB Bandwidth.

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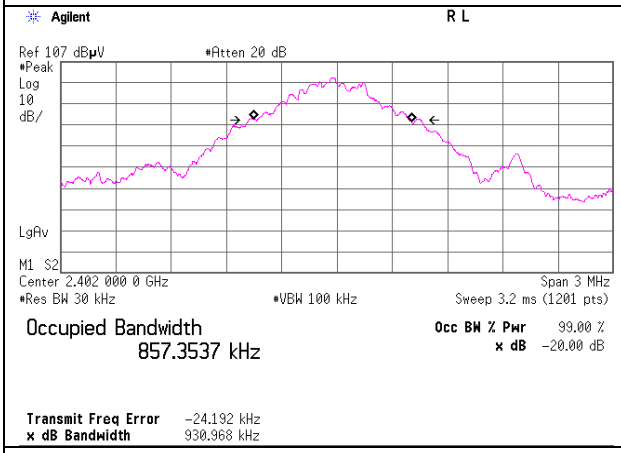
20dB Bandwidth and Carrier Frequency Separation

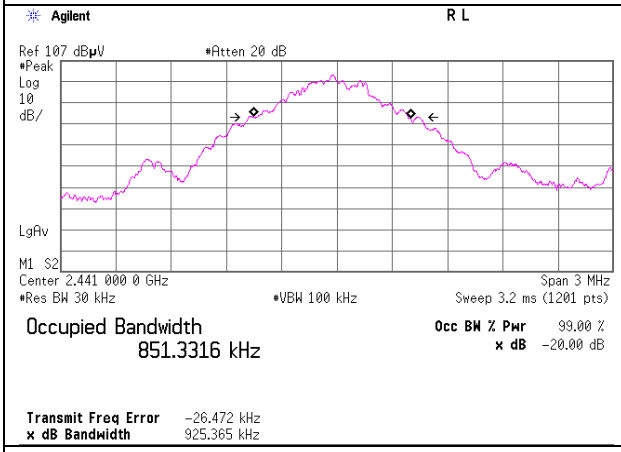
Tx DH5

20dB Bandwidth

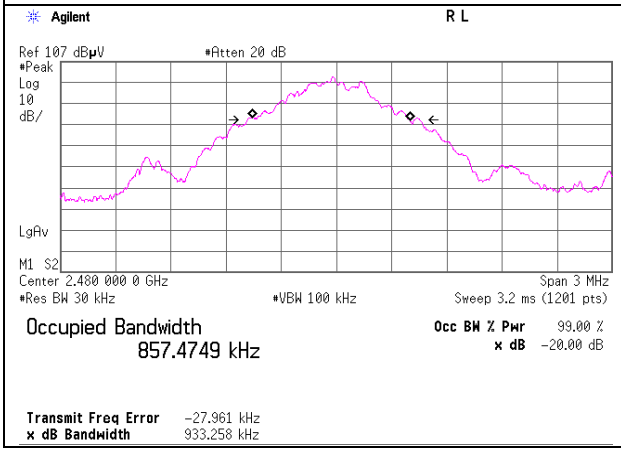
2402MHz



2441MHz

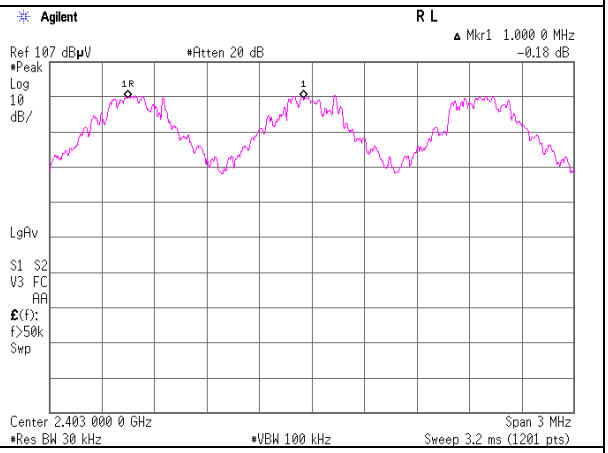


2480MHz

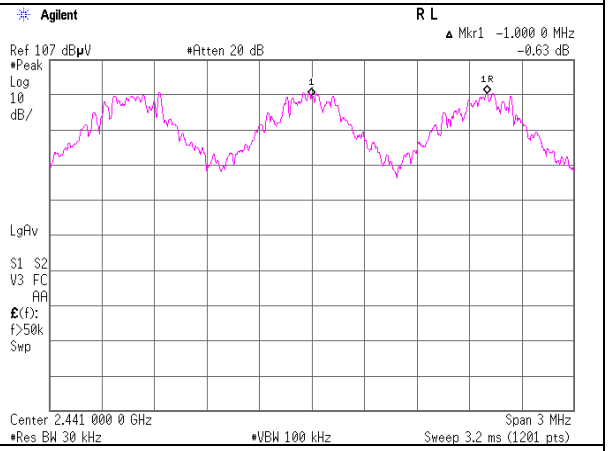


Carrier Frequency Separation

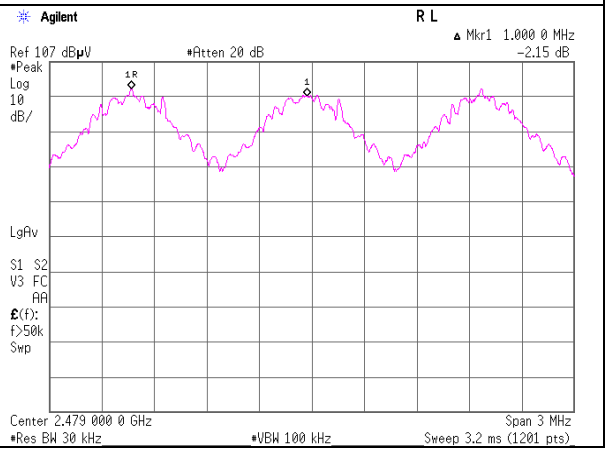
2402MHz



2441MHz



2480MHz

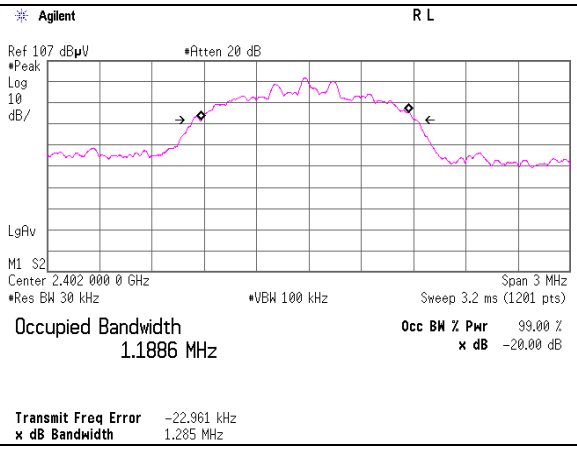


20dB Bandwidth and Carrier Frequency Separation

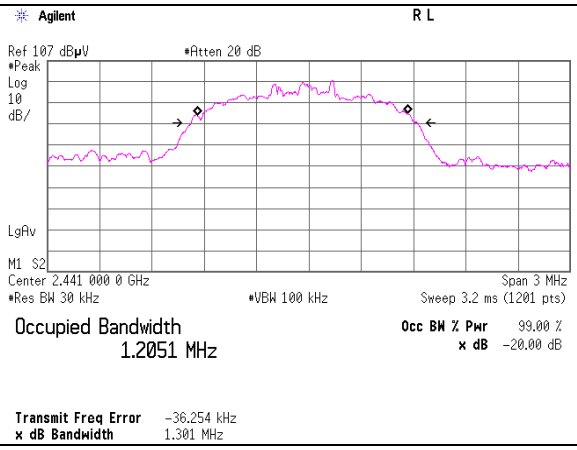
Tx 3DH5

20dB Bandwidth

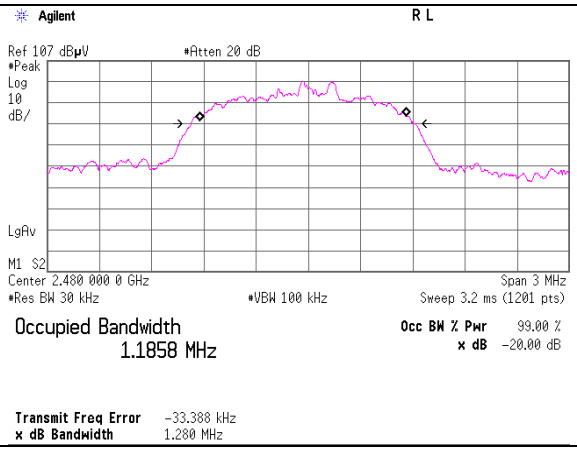
2402MHz



2441MHz

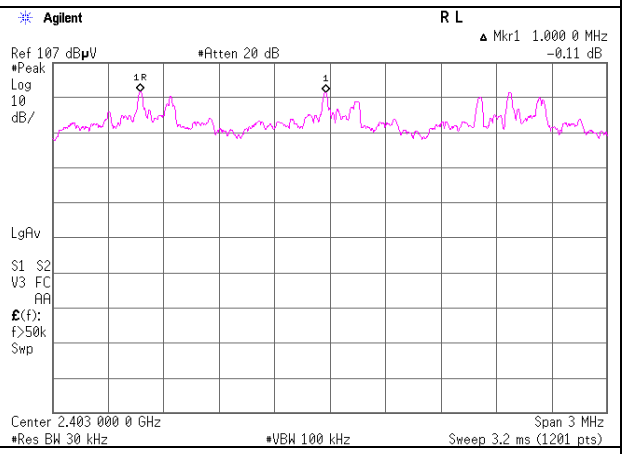


2480MHz

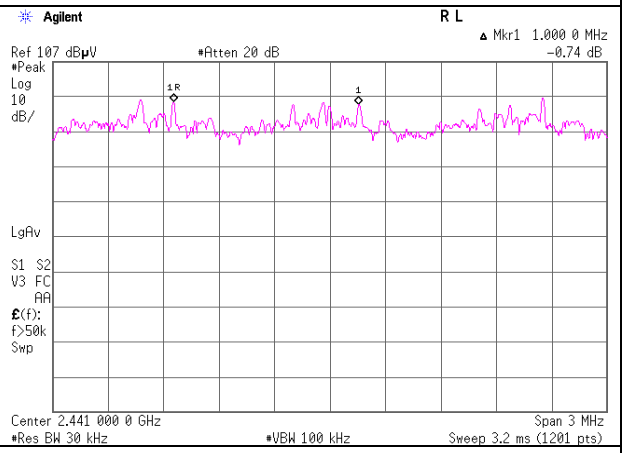


Carrier Frequency Separation

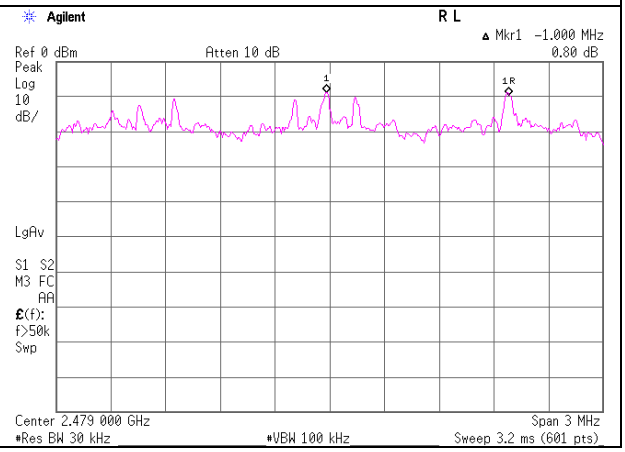
2402MHz



2441MHz



2480MHz



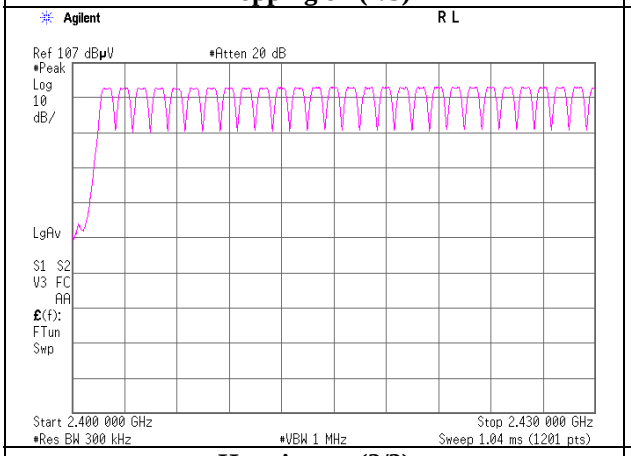
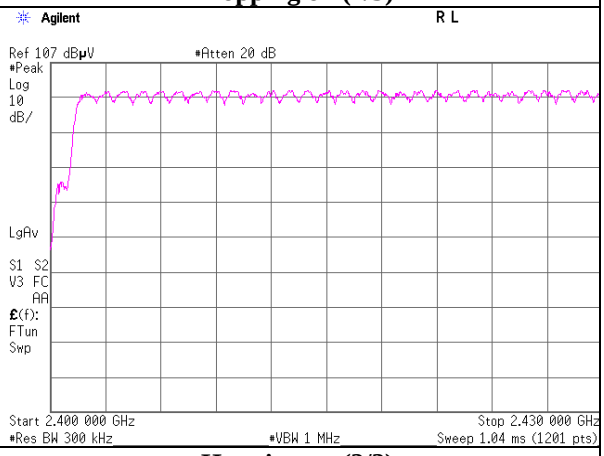
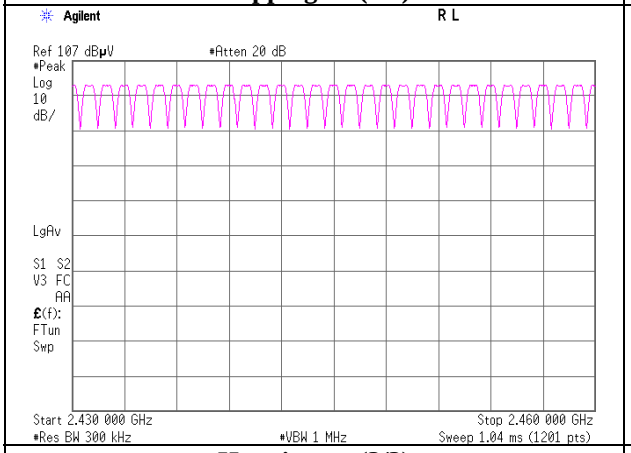
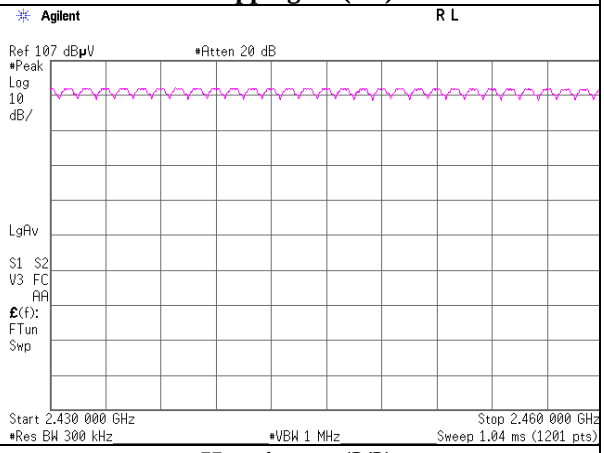
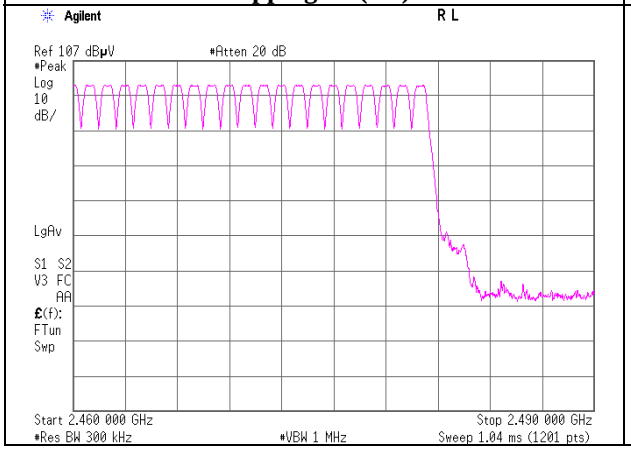
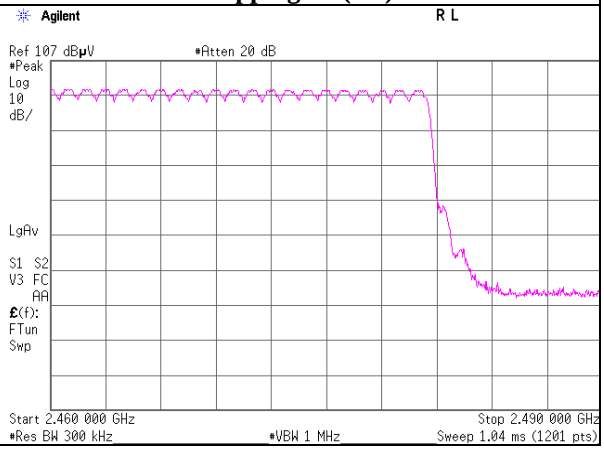
Number of Hopping Frequency

Test place	Head Office EMC Lab. No.6 Shielded Room
Report No.	33BE0184-HO-04
Date	10/16/2012
Temperature/ Humidity	25 deg. C / 43% RH
Engineer	Tomohisa Nakagawa
Mode	Tx (Hopping on) DH5/3DH5

Mode	Number of channel [times]	Limit [times]
DH5	79	>= 15
3DH5	79	>= 15

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.

Number of Hopping Frequency

Tx DH5	Tx 3DH5
Hopping on (1/3)	Hopping on (1/3)
	
Hopping on (2/3)	Hopping on (2/3)
	
Hopping on (3/3)	Hopping on (3/3)
	

Dwell time

Test place	Head Office EMC Lab. No.6 Shielded Room
Report No.	33BE0184-HO-04
Date	10/16/2012
Temperature/ Humidity	25 deg. C / 43% RH
Engineer	Tomohisa Nakagawa
Mode	Tx (Hopping on) DH5/3DH5

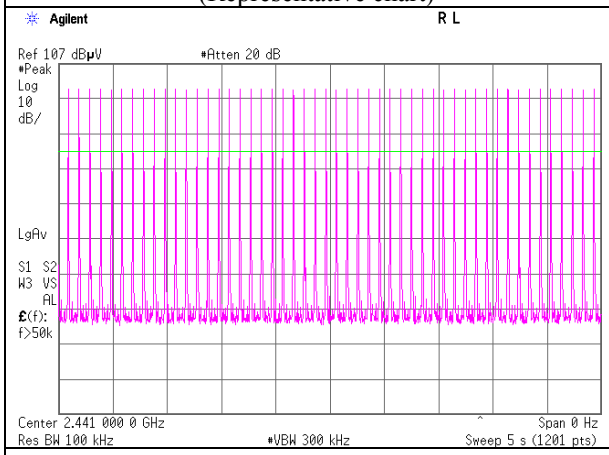
Mode	Number of transmission in a 31.6(79 Hopping x 0.4) / 12.8(32 Hopping x 0.4)second period					Length of transmission time [msec]	Result [msec]	Limit [msec]
DH1	50.0 times	/ 5 sec.	x	31.6 sec.	= 316 times	0.422	133	400
DH3	25.0 times	/ 5 sec.	x	31.6 sec.	= 158 times	1.682	266	400
DH5	16.0 times	/ 5 sec.	x	31.6 sec.	= 102 times	2.933	299	400
3DH1	50.0 times	/ 5 sec.	x	31.6 sec.	= 316 times	0.435	137	400
3DH3	25.0 times	/ 5 sec.	x	31.6 sec.	= 158 times	1.689	267	400
3DH5	16.0 times	/ 5 sec.	x	31.6 sec.	= 102 times	2.939	300	400

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

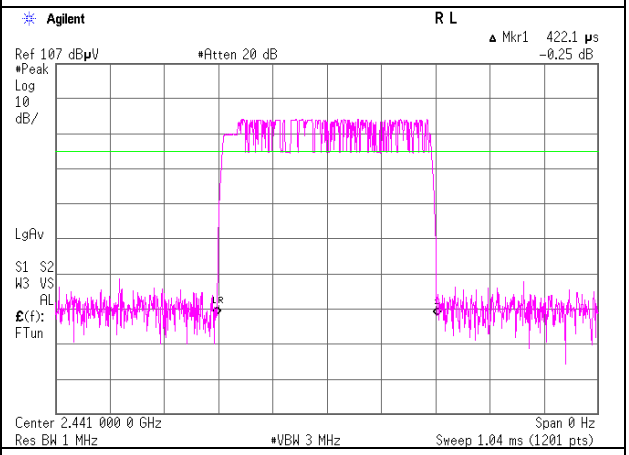
This device complies with the Bluetooth protocol for FHSS operation, employing a pseudo random channel selection and hopping rate to ensure that the occupancy time in N x 0.4s, where N is the number of channels being used in the hopping sequence ($20 \leq N \leq 79$), is always less than 0.4s regardless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

Dwell time

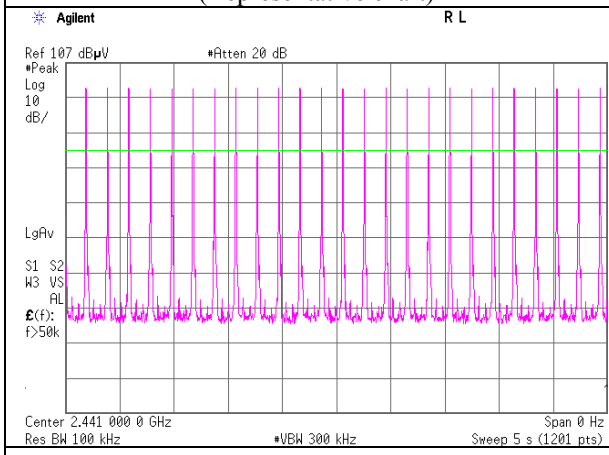
DH1 (1/2)
(Representative chart)



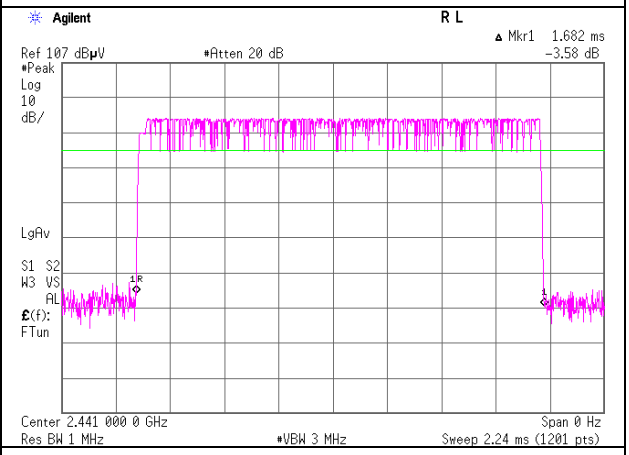
DH1 (2/2)



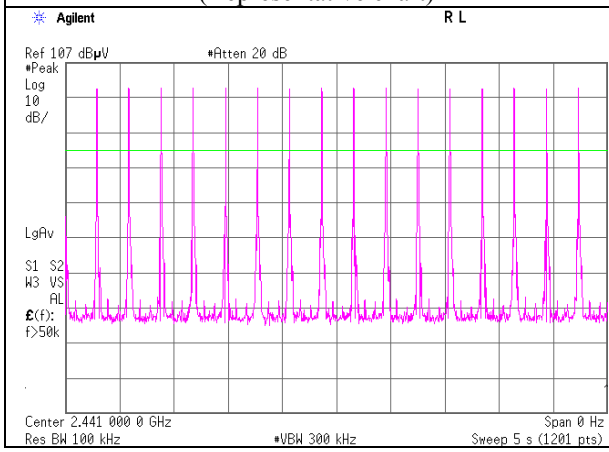
DH3 (1/2)
(Representative chart)



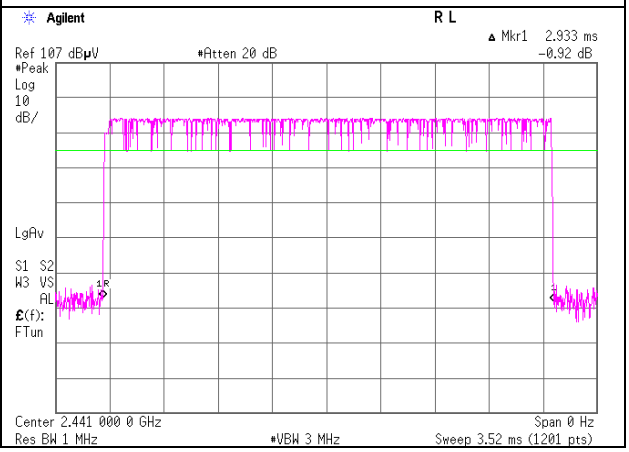
DH3 (2/2)



DH5 (1/2)
(Representative chart)

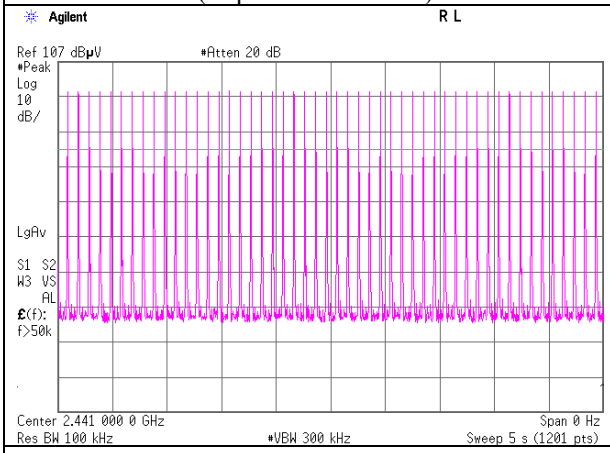


DH5 (2/2)

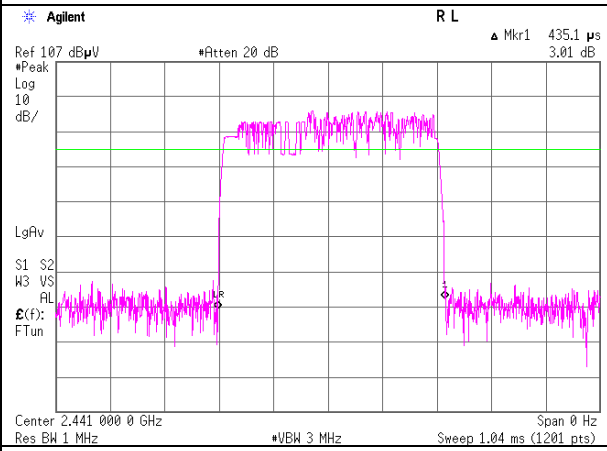


Dwell time

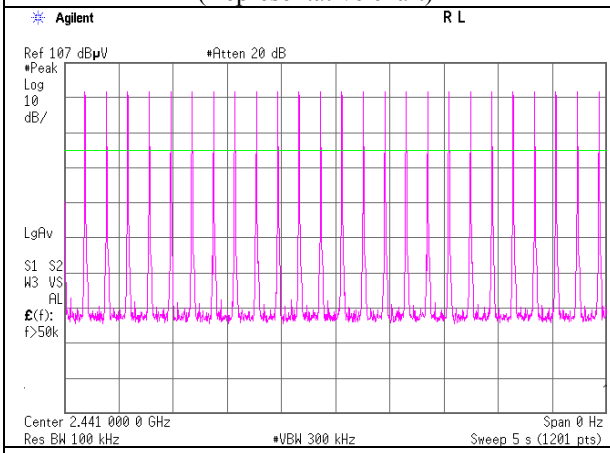
3DH1 (1/2)
(Representative chart)



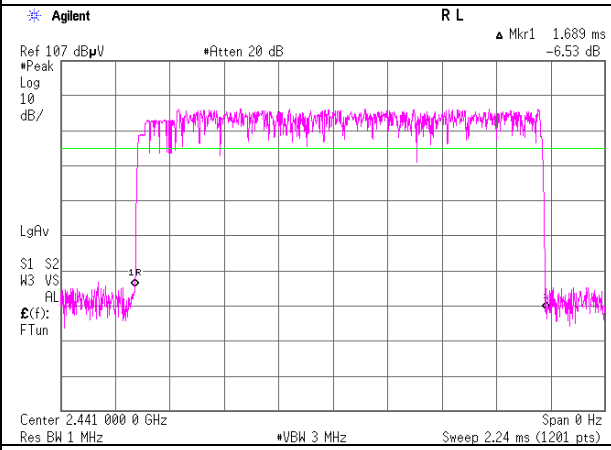
3DH1 (2/2)



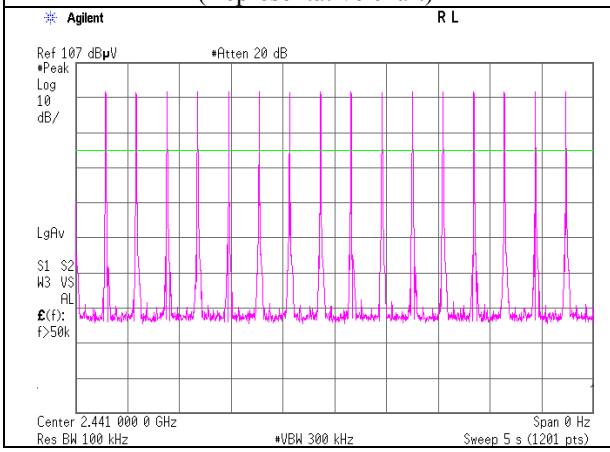
3DH3 (1/2)
(Representative chart)



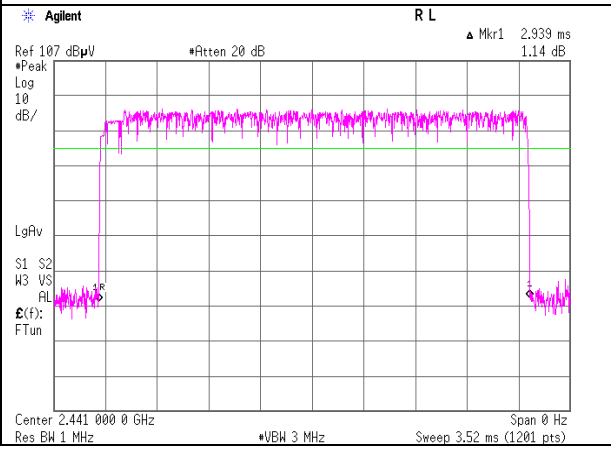
3DH3 (2/2)



3DH5 (1/2)
(Representative chart)



3DH5 (2/2)



Maximum Peak Output Power

Test place	Head Office EMC Lab. No.6 Shielded Room
Report No.	33BE0184-HO-04
Date	10/16/2012
Temperature/ Humidity	25 deg. C / 43% RH
Engineer	Tomohisa Nakagawa
Mode	Tx (Hopping off) DH5/3DH5

Mode	Freq.	Reading	Cable Loss	Atten.	Result		Limit		Margin
	[MHz]	[dBm]	[dB]	[dB]	[dBm]	[mW]	[dBm]	[mW]	[dB]
DH5	2402.0	-8.21	0.77	10.03	2.59	1.82	20.96	125	18.37
DH5	2441.0	-8.04	0.77	10.03	2.76	1.89	20.96	125	18.20
DH5	2480.0	-8.21	0.78	10.03	2.60	1.82	20.96	125	18.36
3DH5	2402.0	-10.28	0.77	10.03	0.52	1.13	20.96	125	20.44
3DH5	2441.0	-10.15	0.77	10.03	0.65	1.16	20.96	125	20.31
3DH5	2480.0	-10.19	0.78	10.03	0.62	1.15	20.96	125	20.34

Sample Calculation:
Result = Reading + Cable Loss + Attenuator

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.
As this device 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.

Radiated Spurious Emission

Test place	Head Office EMC Lab. No.4 Semi Anechoic Chamber		
Report No.	33BE0184-HO-04		
Date	11/26/2012	11/26/2012	11/28/2012
Temperature/ Humidity	21 deg. C / 35% RH	21 deg. C / 35% RH	22 deg. C / 41% RH
Engineer	Tomohisa Nakagawa (1-10GHz)	Hironobu Ohnishi (Above 10GHz)	Tomotaka Sasagawa (Below 1GHz)
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	40.822	QP	24.5	14.5	7.3	32.0	14.3	40.0	25.7	
Hori	73.828	QP	33.8	6.6	7.7	32.1	16.0	40.0	24.0	
Hori	110.621	QP	38.0	11.7	8.2	32.0	25.9	43.5	17.6	
Hori	135.511	QP	33.3	14.2	8.5	32.0	24.0	43.5	19.5	
Hori	159.860	QP	31.6	15.4	8.6	32.0	23.6	43.5	19.9	
Hori	295.670	QP	30.7	19.9	9.6	32.0	28.2	46.0	17.8	
Hori	2390.000	PK	47.5	27.5	2.4	32.3	45.1	73.9	28.8	
Hori	4804.000	PK	52.4	31.3	4.9	31.5	57.1	73.9	16.8	
Hori	7206.000	PK	43.5	35.8	5.9	32.5	52.7	73.9	21.2	
Hori	9608.000	PK	42.1	38.3	6.8	32.9	54.3	73.9	19.6	
Hori	2390.000	AV	30.4	27.5	2.4	32.3	28.0	53.9	25.9	
Hori	7206.000	AV	30.5	35.8	5.9	32.5	39.7	53.9	14.2	
Hori	9608.000	AV	31.7	38.3	6.8	32.9	43.9	53.9	10.0	
Vert	39.198	QP	39.6	15.1	7.2	32.0	29.9	40.0	10.1	
Vert	73.828	QP	47.4	6.6	7.7	32.1	29.6	40.0	10.4	
Vert	110.080	QP	34.5	11.6	8.2	32.0	22.3	43.5	21.2	
Vert	135.511	QP	37.2	14.2	8.5	32.0	27.9	43.5	15.6	
Vert	159.860	QP	34.5	15.4	8.6	32.0	26.5	43.5	17.0	
Vert	295.670	QP	32.4	19.9	9.6	32.0	29.9	46.0	16.1	
Vert	2390.000	PK	42.5	27.5	2.4	32.3	40.1	73.9	33.8	
Vert	4804.000	PK	55.3	31.3	4.9	31.5	60.0	73.9	13.9	
Vert	7206.000	PK	42.1	35.8	5.9	32.5	51.3	73.9	22.6	
Vert	9608.000	PK	41.7	38.3	6.8	32.9	53.9	73.9	20.0	
Vert	2390.000	AV	31.5	27.5	2.4	32.3	29.1	53.9	24.8	
Vert	7206.000	AV	31.7	35.8	5.9	32.5	40.9	53.9	13.0	
Vert	9608.000	AV	31.2	38.3	6.8	32.9	43.4	53.9	10.5	

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

Radiated Spurious Emission

Test place	Head Office EMC Lab. No.4 Semi Anechoic Chamber
Report No.	33BE0184-HO-04
Date	11/26/2012
Temperature/ Humidity	21 deg. C / 35% RH
Engineer	Tomohisa Nakagawa (1-10GHz)
Mode	Tx, DH5 2402MHz

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	96.5	27.5	2.4	32.3	94.1	-	-	Carrier
Hori	2400.000	PK	57.3	27.5	2.4	32.3	54.9	74.1	19.2	
Hori	2399.500	PK	54.4	27.5	2.4	32.3	52.0	74.1	22.1	
Vert	2402.000	PK	102.3	27.5	2.4	32.3	99.9	-	-	Carrier
Vert	2400.000	PK	62.6	27.5	2.4	32.3	60.2	79.9	19.7	
Vert	2399.500	PK	59.3	27.5	2.4	32.3	56.9	79.9	23.0	

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

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	47.1	31.3	4.9	31.5	-24.6	27.2	53.9	26.7	
Vert	4804.000	AV	51.4	31.3	4.9	31.5	-24.6	31.5	53.9	22.4	

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
26.5GHz-40GHz 20log(3.0m/0.5m)=15.6dB

Radiated Spurious Emission

Test place	Head Office EMC Lab. No.4 Semi Anechoic Chamber		
Report No.	33BE0184-HO-04		
Date	11/26/2012	11/26/2012	11/28/2012
Temperature/ Humidity	21 deg. C / 35% RH	21 deg. C / 35% RH	22 deg. C / 41% RH
Engineer	Tomohisa Nakagawa (1-10GHz)	Hironobu Ohnishi (Above 10GHz)	Tomotaka Sasagawa (Below 1GHz)
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	40.521	QP	24.3	14.6	7.3	32.0	14.2	40.0	25.8	
Hori	73.841	QP	33.9	6.6	7.8	32.1	16.2	40.0	23.8	
Hori	110.421	QP	38.0	11.7	8.2	32.0	25.9	43.5	17.6	
Hori	135.653	QP	33.5	14.3	8.5	32.0	24.3	43.5	19.2	
Hori	159.410	QP	31.7	15.4	8.6	32.0	23.7	43.5	19.8	
Hori	295.621	QP	30.9	19.9	9.6	32.0	28.4	46.0	17.6	
Hori	4882.000	PK	50.4	31.5	5.0	31.5	55.4	73.9	18.6	
Hori	7323.000	PK	42.3	35.8	5.9	32.5	51.5	73.9	22.4	
Hori	9764.000	PK	42.5	38.4	7.1	32.9	55.1	73.9	18.8	
Hori	7323.000	AV	30.2	35.8	5.9	32.5	39.4	53.9	14.5	
Hori	9764.000	AV	30.0	38.4	7.1	32.9	42.6	53.9	11.3	
Vert	38.932	QP	38.0	15.2	7.2	32.0	28.4	40.0	11.6	
Vert	73.521	QP	47.3	6.6	7.7	32.1	29.5	40.0	10.5	
Vert	110.842	QP	34.5	11.7	8.2	32.0	22.4	43.5	21.1	
Vert	135.445	QP	37.5	14.2	8.5	32.0	28.2	43.5	15.3	
Vert	159.421	QP	34.9	15.4	8.6	32.0	26.9	43.5	16.6	
Vert	296.324	QP	32.9	20.0	9.6	32.0	30.5	46.0	15.5	
Vert	4882.000	PK	54.6	31.5	5.0	31.5	59.6	73.9	14.3	
Vert	7323.000	PK	41.4	35.8	5.9	32.5	50.6	73.9	23.3	
Vert	9764.000	PK	42.5	38.4	7.1	32.9	55.1	73.9	18.8	
Vert	7323.000	AV	30.2	35.8	5.9	32.5	39.4	53.9	14.5	
Vert	9764.000	AV	30.1	38.4	7.1	32.9	42.7	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).

*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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Radiated Spurious Emission

Test place	Head Office EMC Lab. No.4 Semi Anechoic Chamber
Report No.	33BE0184-HO-04
Date	11/26/2012
Temperature/ Humidity	21 deg. C / 35% RH
Engineer	Tomohisa Nakagawa (1-10GHz)
Mode	Tx, DH5 2441MHz

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	44.4	31.5	5.0	31.5	-24.6	24.8	53.9	29.1	
Vert	4882.000	AV	49.7	31.5	5.0	31.5	-24.6	30.1	53.9	23.8	

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
26.5GHz-40GHz 20log(3.0m/0.5m)=15.6dB

Radiated Spurious Emission

Test place	Head Office EMC Lab. No.4 Semi Anechoic Chamber		
Report No.	33BE0184-HO-04		
Date	11/26/2012	11/26/2012	11/28/2012
Temperature/ Humidity	21 deg. C / 35% RH	21 deg. C / 35% RH	22 deg. C / 41% RH
Engineer	Tomohisa Nakagawa (1-10GHz)	Hironobu Ohnishi (Above 10GHz)	Tomotaka Sasagawa (Below 1GHz)
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	40.521	QP	24.9	14.6	7.3	32.0	14.8	40.0	25.2	
Hori	73.521	QP	34.1	6.6	7.7	32.1	16.3	40.0	23.7	
Hori	110.421	QP	38.2	11.7	8.2	32.0	26.1	43.5	17.4	
Hori	135.242	QP	33.9	14.2	8.5	32.0	24.6	43.5	18.9	
Hori	159.582	QP	32.1	15.4	8.6	32.0	24.1	43.5	19.4	
Hori	295.412	QP	31.2	19.9	9.6	32.0	28.7	46.0	17.3	
Hori	2483.500	PK	47.6	27.5	2.4	32.2	45.3	73.9	28.6	
Hori	4960.000	PK	47.5	31.8	5.0	31.5	52.8	73.9	21.1	
Hori	7440.000	PK	42.6	35.9	6.0	32.6	51.9	73.9	22.0	
Hori	9920.000	PK	42.4	38.6	7.1	33.0	55.1	73.9	18.8	
Hori	2483.500	AV	37.5	27.5	2.4	32.2	35.2	53.9	18.7	
Hori	7440.000	AV	31.3	35.9	6.0	32.6	40.6	53.9	13.3	
Hori	9920.000	AV	30.4	38.6	7.1	33.0	43.1	53.9	10.8	
Vert	40.040	QP	40.0	14.8	7.3	32.0	30.1	40.0	9.9	
Vert	73.542	QP	47.8	6.6	7.7	32.1	30.0	40.0	10.0	
Vert	110.452	QP	34.9	11.7	8.2	32.0	22.8	43.5	20.7	
Vert	135.421	QP	37.4	14.2	8.5	32.0	28.1	43.5	15.4	
Vert	159.782	QP	34.6	15.4	8.6	32.0	26.6	43.5	16.9	
Vert	295.252	QP	32.5	19.9	9.6	32.0	30.0	46.0	16.0	
Vert	2483.500	PK	51.0	27.5	2.4	32.2	48.7	73.9	25.2	
Vert	4960.000	PK	49.8	31.8	5.0	31.5	55.1	73.9	18.8	
Vert	7440.000	PK	43.5	35.9	6.0	32.6	52.8	73.9	21.1	
Vert	9920.000	PK	42.0	38.6	7.1	33.0	54.7	73.9	19.2	
Vert	2483.500	AV	38.6	27.5	2.4	32.2	36.3	53.9	17.6	
Vert	7440.000	AV	31.8	35.9	6.0	32.6	41.1	53.9	12.8	
Vert	9920.000	AV	30.3	38.6	7.1	33.0	43.0	53.9	10.9	

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).

*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

Radiated Spurious Emission

Test place	Head Office EMC Lab. No.4 Semi Anechoic Chamber
Report No.	33BE0184-HO-04
Date	11/26/2012
Temperature/ Humidity	21 deg. C / 35% RH
Engineer	Tomohisa Nakagawa
	(1-10GHz)
Mode	Tx, DH5 2480MHz

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	4960.000	AV	40.2	31.8	5.0	31.5	-24.6	20.9	53.9	33.0	
Vert	4960.000	AV	44.3	31.8	5.0	31.5	-24.6	25.0	53.9	28.9	

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
26.5GHz-40GHz 20log(3.0m/0.5m)=15.6dB

Radiated Spurious Emission

Test place	Head Office EMC Lab. No.4 Semi Anechoic Chamber		
Report No.	33BE0184-HO-04		
Date	11/26/2012	11/26/2012	11/28/2012
Temperature/ Humidity	21 deg. C / 35% RH	21 deg. C / 35% RH	22 deg. C / 41% RH
Engineer	Tomohisa Nakagawa (1-10GHz)	Hironobu Ohnishi (Above 10GHz)	Tomotaka Sasagawa (Below 1GHz)
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	40.562	QP	25.2	14.6	7.3	32.0	15.1	40.0	24.9	
Hori	135.653	QP	33.9	14.3	8.5	32.0	24.7	43.5	18.8	
Hori	159.423	QP	32.1	15.4	8.6	32.0	24.1	43.5	19.4	
Hori	295.613	QP	31.2	19.9	9.6	32.0	28.7	46.0	17.3	
Hori	2390.000	PK	43.6	27.5	2.4	32.3	41.2	73.9	32.7	
Hori	2399.500	PK	52.6	27.5	2.4	32.3	50.2	73.9	23.7	
Hori	2400.000	PK	54.6	27.5	2.4	32.3	52.2	73.9	21.7	
Hori	4804.000	PK	46.8	31.3	4.9	31.5	51.5	73.9	22.4	
Hori	7206.000	PK	42.5	35.8	5.9	32.5	51.7	73.9	22.2	
Hori	9608.000	PK	39.9	38.3	6.8	32.9	52.1	73.9	21.8	
Hori	2390.000	AV	30.6	27.5	2.4	32.3	28.2	53.9	25.7	
Hori	4804.000	AV	37.6	31.3	4.9	31.5	42.3	53.9	11.7	
Hori	7206.000	AV	30.5	35.8	5.9	32.5	39.7	53.9	14.2	
Hori	9608.000	AV	30.1	38.3	6.8	32.9	42.3	53.9	11.6	
Vert	40.320	QP	40.4	14.7	7.3	32.0	30.4	40.0	9.6	
Vert	73.542	QP	47.8	6.6	7.7	32.1	30.0	40.0	10.0	
Vert	110.521	QP	34.9	11.7	8.2	32.0	22.8	43.5	20.7	
Vert	135.242	QP	37.6	14.2	8.5	32.0	28.3	43.5	15.2	
Vert	159.421	QP	34.9	15.4	8.6	32.0	26.9	43.5	16.6	
Vert	295.634	QP	32.8	19.9	9.6	32.0	30.3	46.0	15.7	
Vert	2390.000	PK	43.3	27.5	2.4	32.3	40.9	73.9	33.0	
Vert	2399.500	PK	56.5	27.5	2.4	32.3	54.1	73.9	19.8	
Vert	2400.000	PK	58.7	27.5	2.4	32.3	56.3	73.9	17.6	
Vert	4804.000	PK	51.0	31.3	4.9	31.5	55.7	73.9	18.2	
Vert	7206.000	PK	41.8	35.8	5.9	32.5	51.0	73.9	22.9	
Vert	9608.000	PK	40.8	38.3	6.8	32.9	53.0	73.9	20.9	
Vert	2390.000	AV	31.6	27.5	2.4	32.3	29.2	53.9	24.7	
Vert	4804.000	AV	43.2	31.3	4.9	31.5	47.9	53.9	6.0	
Vert	7206.000	AV	30.5	35.8	5.9	32.5	39.7	53.9	14.2	
Vert	9608.000	AV	30.6	38.3	6.8	32.9	42.8	53.9	11.1	

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

Radiated Spurious Emission

Test place	Head Office EMC Lab. No.4 Semi Anechoic Chamber
Report No.	33BE0184-HO-04
Date	11/26/2012
Temperature/ Humidity	21 deg. C / 35% RH
Engineer	Tomohisa Nakagawa
	(1-10GHz)
Mode	Tx, 3DH5 2402MHz

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	96.6	27.5	2.4	32.3	94.2	-	-	Carrier
Hori	2399.500	PK	52.6	27.5	2.4	32.3	50.2	74.2	24.0	
Hori	2400.000	PK	54.6	27.5	2.4	32.3	52.2	74.2	22.0	
Vert	2402.000	PK	101.1	27.5	2.4	32.3	98.7	-	-	Carrier
Vert	2399.500	PK	56.5	27.5	2.4	32.3	54.1	78.7	24.6	
Vert	2400.000	PK	58.7	27.5	2.4	32.3	56.3	78.7	22.4	

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

Radiated Spurious Emission

Test place	Head Office EMC Lab. No.4 Semi Anechoic Chamber	
Report No.	33BE0184-HO-04	
Date	11/26/2012	11/28/2012
Temperature/ Humidity	21 deg. C / 35% RH	22 deg. C / 41% RH
Engineer	Hironobu Ohnishi (Above 1GHz)	Tomotaka Sasagawa (Below 1GHz)
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	40.632	QP	24.9	14.6	7.3	32.0	14.8	40.0	25.2	
Hori	73.521	QP	34.2	6.6	7.7	32.1	16.4	40.0	23.6	
Hori	110.532	QP	39.2	11.7	8.2	32.0	27.1	43.5	16.4	
Hori	135.412	QP	35.1	14.2	8.5	32.0	25.8	43.5	17.7	
Hori	159.875	QP	32.1	15.4	8.6	32.0	24.1	43.5	19.4	
Hori	295.231	QP	31.2	19.9	9.6	32.0	28.7	46.0	17.3	
Hori	1626.657	PK	46.5	26.0	2.0	33.2	41.3	73.9	32.6	
Hori	4882.000	PK	46.8	31.5	5.0	31.5	51.8	73.9	22.1	
Hori	7323.000	PK	43.2	35.8	5.9	32.5	52.4	73.9	21.5	
Hori	9764.000	PK	42.8	38.4	7.1	32.9	55.4	73.9	18.5	
Hori	1626.657	AV	41.4	26.0	2.0	33.2	36.2	53.9	17.7	
Hori	4882.000	AV	37.0	31.5	5.0	31.5	42.0	53.9	11.9	
Hori	7323.000	AV	30.2	35.8	5.9	32.5	39.4	53.9	14.5	
Hori	9764.000	AV	30.1	38.4	7.1	32.9	42.7	53.9	11.2	
Vert	39.874	QP	38.9	14.9	7.2	32.0	29.0	40.0	11.0	
Vert	73.421	QP	47.8	6.6	7.7	32.1	30.0	40.0	10.0	
Vert	110.452	QP	34.8	11.7	8.2	32.0	22.7	43.5	20.8	
Vert	135.421	QP	37.8	14.2	8.5	32.0	28.5	43.5	15.0	
Vert	159.742	QP	34.4	15.4	8.6	32.0	26.4	43.5	17.1	
Vert	295.610	QP	32.8	19.9	9.6	32.0	30.3	46.0	15.7	
Vert	1626.657	PK	50.4	26.0	2.0	33.2	45.2	73.9	28.7	
Vert	4882.000	PK	51.8	31.5	5.0	31.5	56.8	73.9	17.1	
Vert	7323.000	PK	43.4	35.8	5.9	32.5	52.6	73.9	21.3	
Vert	9764.000	PK	43.6	38.4	7.1	32.9	56.2	73.9	17.7	
Vert	1626.657	AV	46.5	26.0	2.0	33.2	41.3	53.9	12.6	
Vert	4882.000	AV	42.5	31.5	5.0	31.5	47.5	53.9	6.4	
Vert	7323.000	AV	30.2	35.8	5.9	32.5	39.4	53.9	14.5	
Vert	9764.000	AV	30.2	38.4	7.1	32.9	42.8	53.9	11.1	

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

Radiated Spurious Emission

Test place	Head Office EMC Lab. No.4 Semi Anechoic Chamber	
Report No.	33BE0184-HO-04	
Date	11/26/2012	11/28/2012
Temperature/ Humidity	21 deg. C / 35% RH	22 deg. C / 41% RH
Engineer	Hironobu Ohnishi (Above 1GHz)	Tomotaka Sasagawa (Below 1GHz)
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	40.521	QP	24.9	14.6	7.3	32.0	14.8	40.0	25.2	
Hori	73.521	QP	34.2	6.6	7.7	32.1	16.4	40.0	23.6	
Hori	110.523	QP	37.9	11.7	8.2	32.0	25.8	43.5	17.7	
Hori	135.424	QP	34.5	14.2	8.5	32.0	25.2	43.5	18.3	
Hori	159.887	QP	32.1	15.4	8.6	32.0	24.1	43.5	19.4	
Hori	295.214	QP	31.2	19.9	9.6	32.0	28.7	46.0	17.3	
Hori	1652.656	PK	48.0	26.1	2.0	33.1	43.0	73.9	30.9	
Hori	2483.500	PK	54.4	27.5	2.4	32.2	52.1	73.9	21.8	
Hori	4960.000	PK	45.5	31.8	5.0	31.5	50.8	73.9	23.1	
Hori	7440.000	PK	44.2	35.9	6.0	32.6	53.5	73.9	20.4	
Hori	9920.000	PK	43.4	38.6	7.1	33.0	56.1	73.9	17.8	
Hori	1652.656	AV	42.1	26.1	2.0	33.1	37.1	53.9	16.8	
Hori	2483.500	AV	38.8	27.5	2.4	32.2	36.5	53.9	17.4	
Hori	4960.000	AV	33.9	31.8	5.0	31.5	39.2	53.9	14.7	
Hori	7440.000	AV	31.1	35.9	6.0	32.6	40.4	53.9	13.5	
Hori	9920.000	AV	30.4	38.6	7.1	33.0	43.1	53.9	10.8	
Vert	39.874	QP	40.2	14.9	7.2	32.0	30.3	40.0	9.7	
Vert	73.421	QP	47.8	6.6	7.7	32.1	30.0	40.0	10.0	
Vert	110.421	QP	34.2	11.7	8.2	32.0	22.1	43.5	21.4	
Vert	135.252	QP	37.5	14.2	8.5	32.0	28.2	43.5	15.3	
Vert	159.775	QP	34.6	15.4	8.6	32.0	26.6	43.5	16.9	
Vert	295.635	QP	32.8	19.9	9.6	32.0	30.3	46.0	15.7	
Vert	1652.656	PK	49.9	26.1	2.0	33.1	44.9	73.9	29.0	
Vert	2483.500	PK	58.4	27.5	2.4	32.2	56.1	73.9	17.8	
Vert	4960.000	PK	49.4	31.8	5.0	31.5	54.7	73.9	19.2	
Vert	7440.000	PK	44.2	35.9	6.0	32.6	53.5	73.9	20.4	
Vert	9920.000	PK	43.9	38.6	7.1	33.0	56.6	73.9	17.3	
Vert	1652.656	AV	46.6	26.1	2.0	33.1	41.6	53.9	12.3	
Vert	2483.500	AV	42.7	27.5	2.4	32.2	40.4	53.9	13.5	
Vert	4960.000	AV	39.8	31.8	5.0	31.5	45.1	53.9	8.8	
Vert	7440.000	AV	31.2	35.9	6.0	32.6	40.5	53.9	13.4	
Vert	9920.000	AV	30.3	38.6	7.1	33.0	43.0	53.9	10.9	

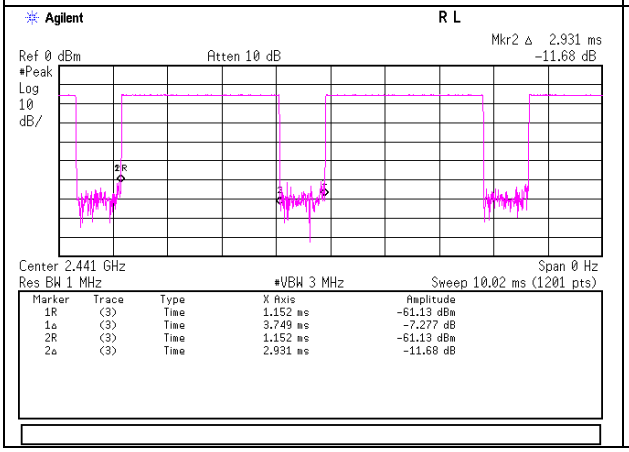
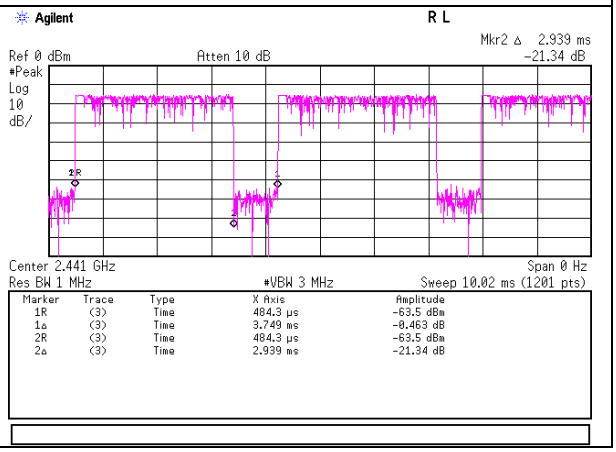
Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 10GHz)) - Gain(Amplifier)

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

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

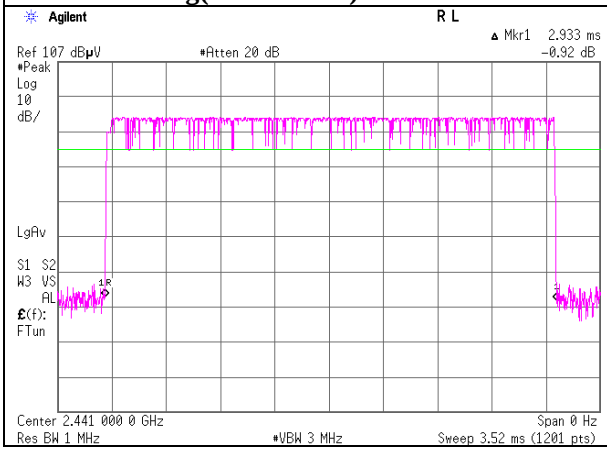
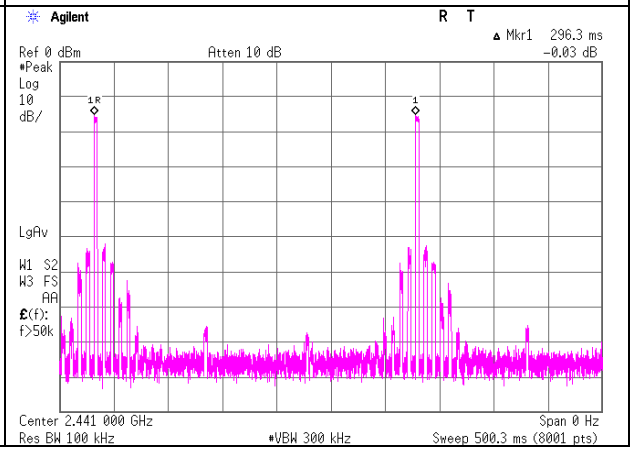
Distance factor: 10GHz-26.5GHz 20log(3.0m/1.0m)= 9.5dB
26.5GHz-40GHz 20log(3.0m/0.5m)=15.6dB

Burst rate confirmation

DH5	3DH5
Duty cycle = 78.2% Tx on = 2.931ms Tx on+Tx off =3.749ms	Duty cycle = 78.4% Tx on = 2.939ms Tx on+Tx off =3.749ms
	

Dwell time factor

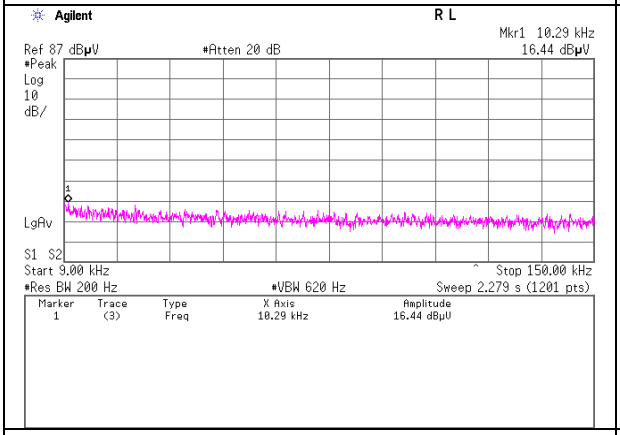
DH5

Worst 100ms	1cycle time
Dwell time factor = 20log(2.933*2/100) = -24.63dB	296.3ms
	

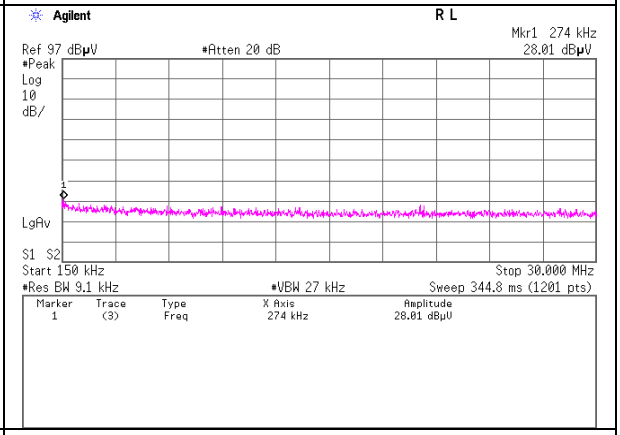
Conducted Spurious Emission

Tx DH5 2402MHz

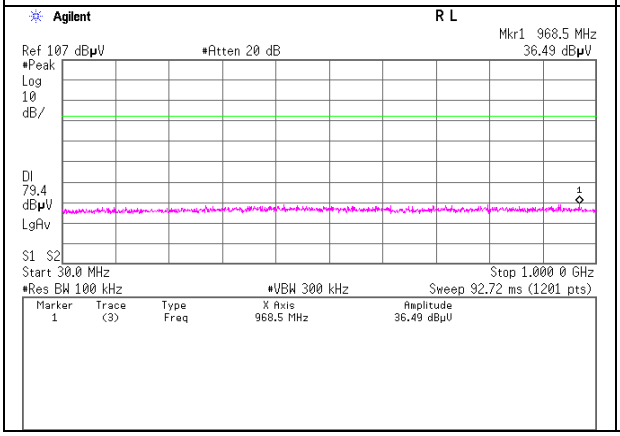
9kHz-150kHz



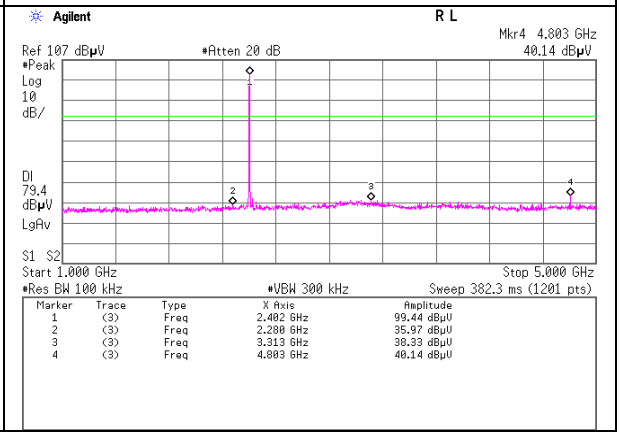
150kHz-30MHz



30MHz-1GHz



1GHz-5GHz



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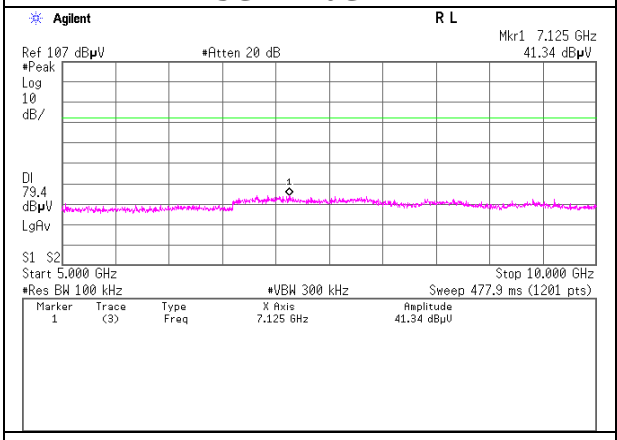
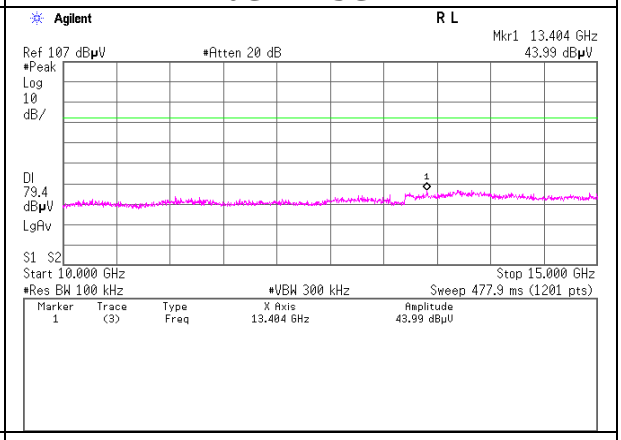
Conducted Spurious Emission

Tx DH5 2402MHz

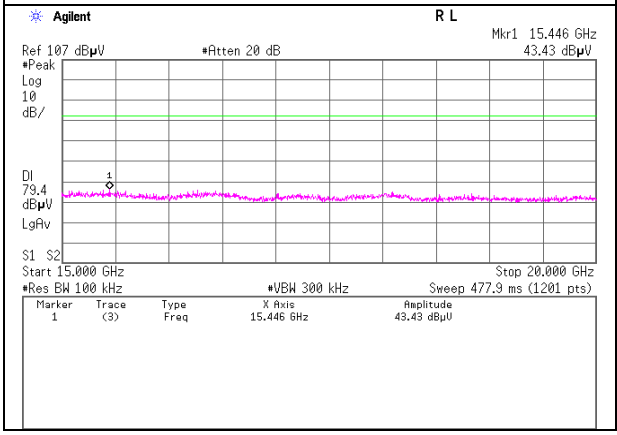
5GHz-10GHz



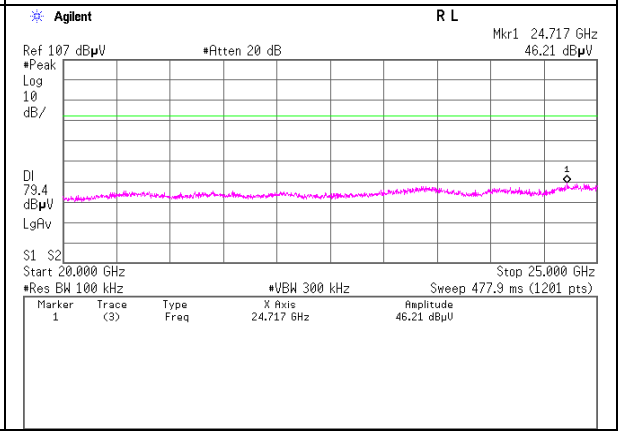
10GHz-15GHz



15GHz-20GHz



20GHz-25GHz



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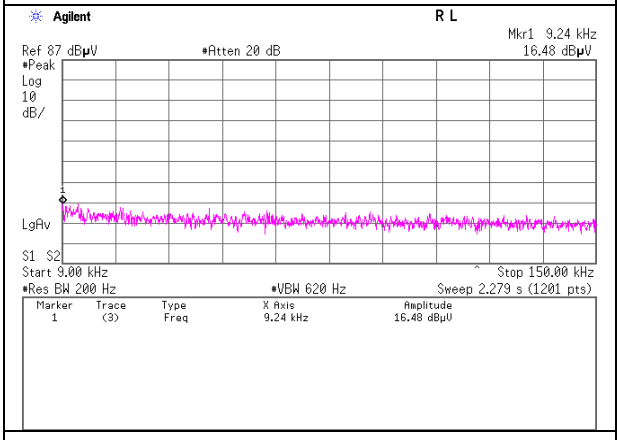
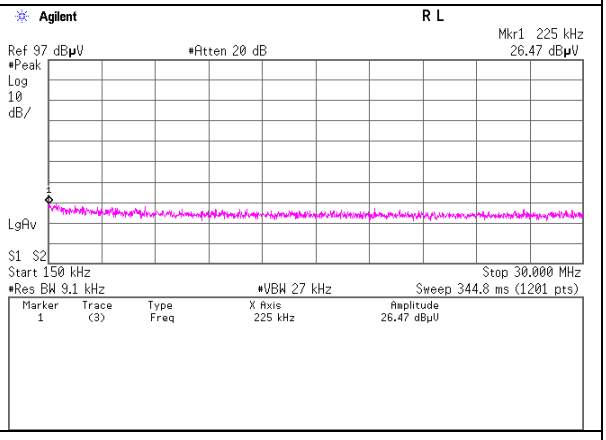
Conducted Spurious Emission

Tx DH5 2441MHz

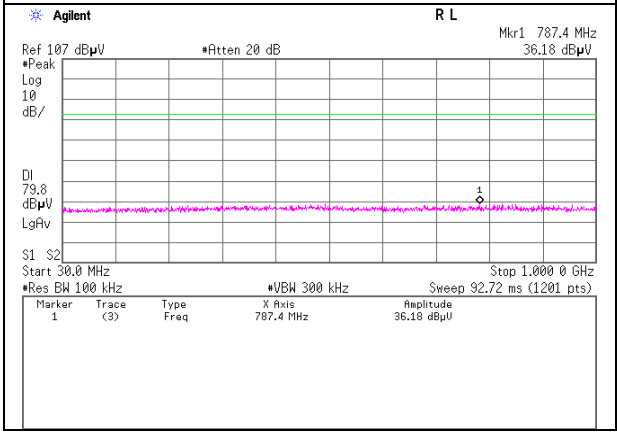
9kHz-150kHz



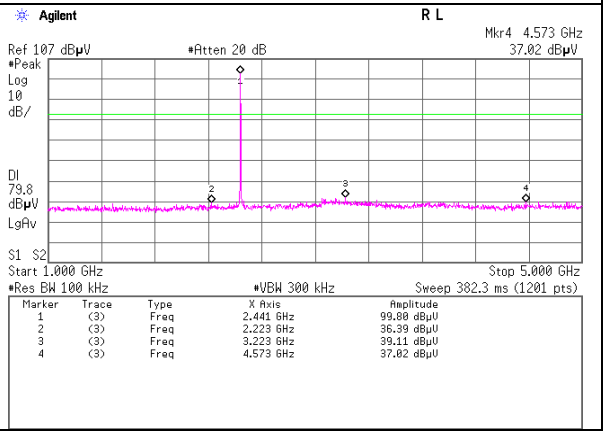
150kHz-30MHz



30MHz-1GHz



1GHz-5GHz



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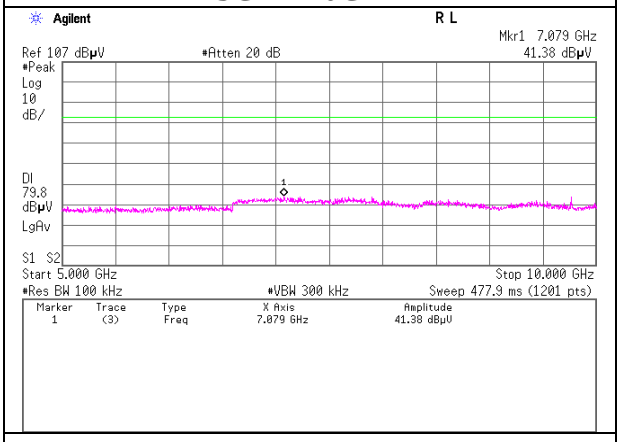
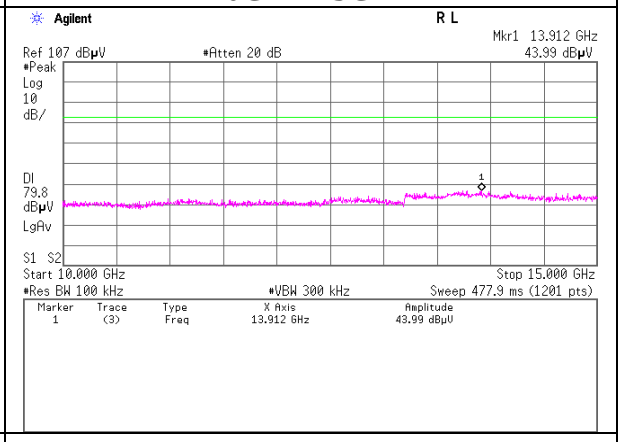
Conducted Spurious Emission

Tx DH5 2441MHz

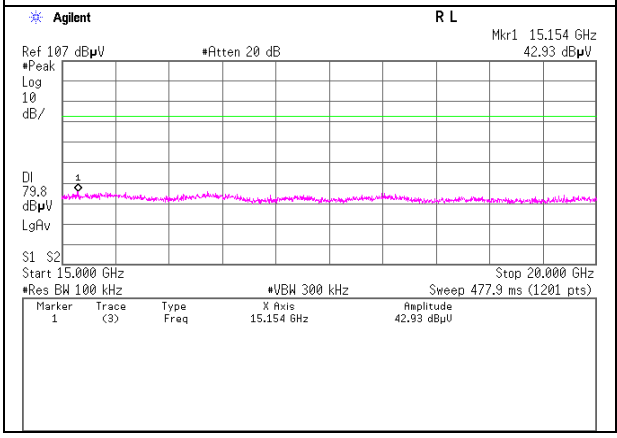
5GHz-10GHz



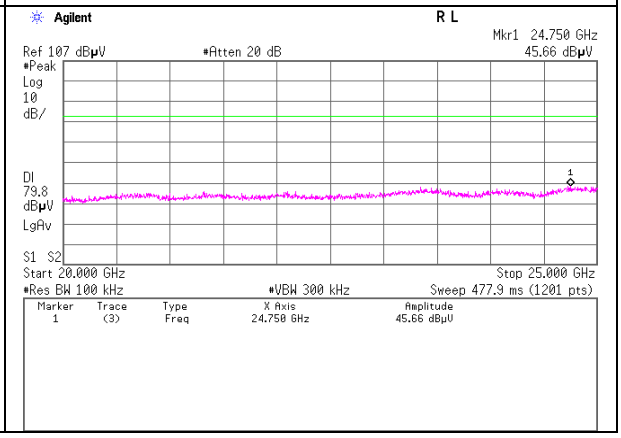
10GHz-15GHz



15GHz-20GHz



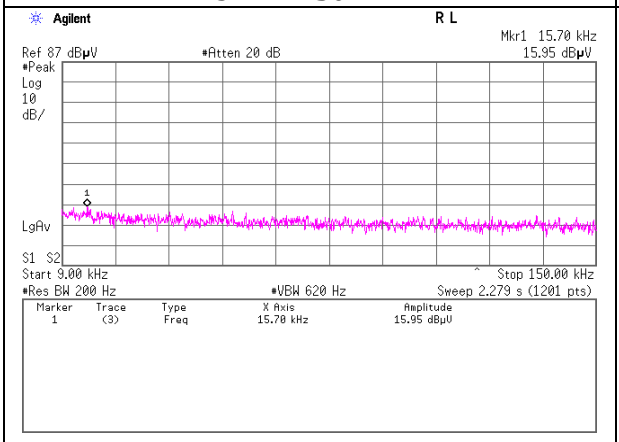
20GHz-25GHz



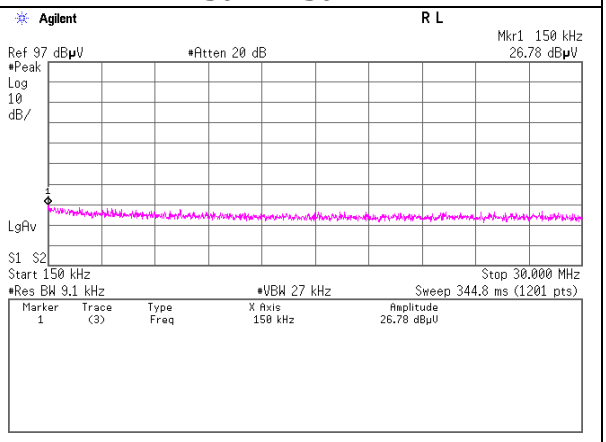
Conducted Spurious Emission

Tx DH5 2480MHz

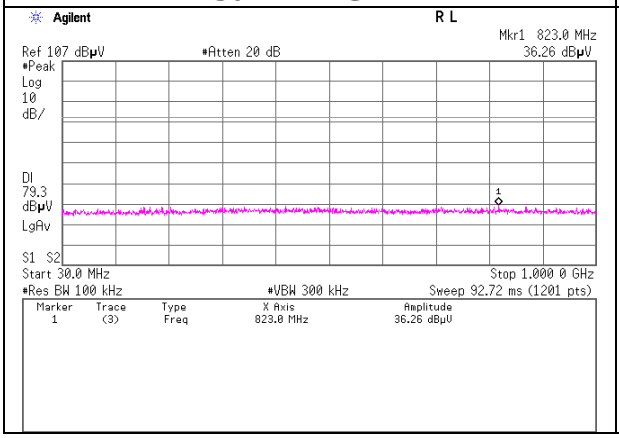
9kHz-150kHz



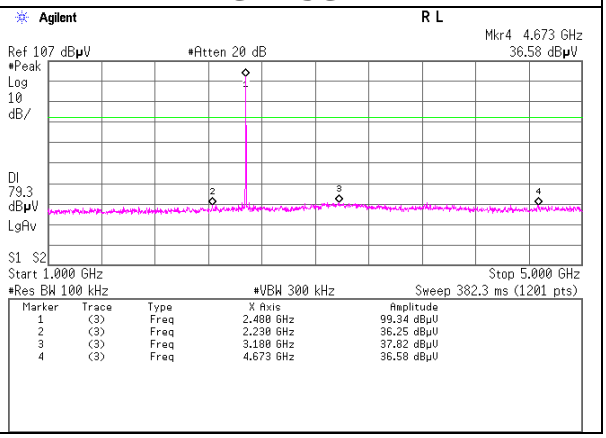
150kHz-30MHz



30MHz-1GHz



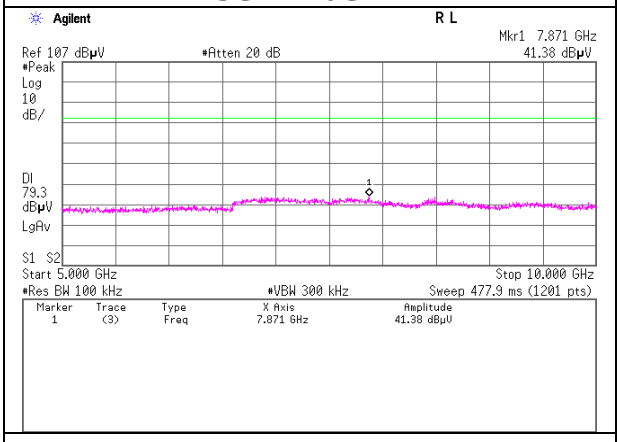
1GHz-5GHz



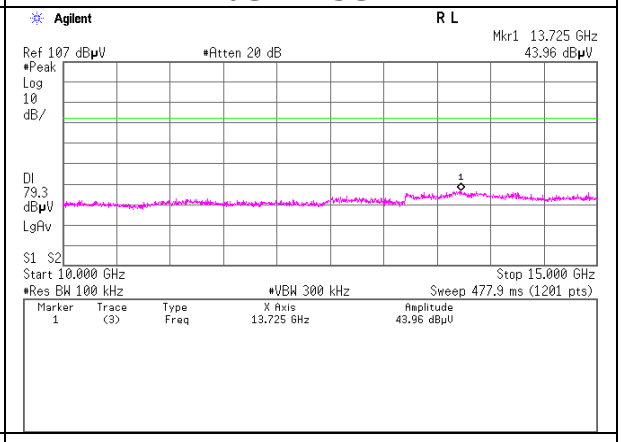
Conducted Spurious Emission

Tx DH5 2480MHz

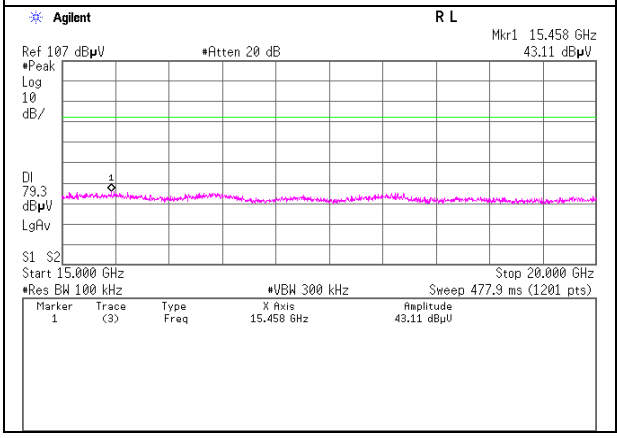
5GHz-10GHz



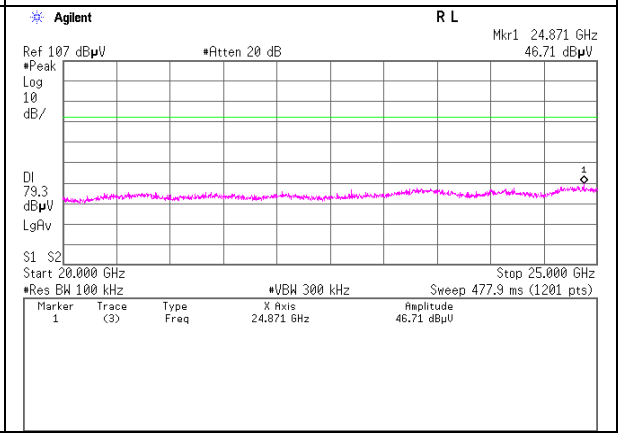
10GHz-15GHz



15GHz-20GHz



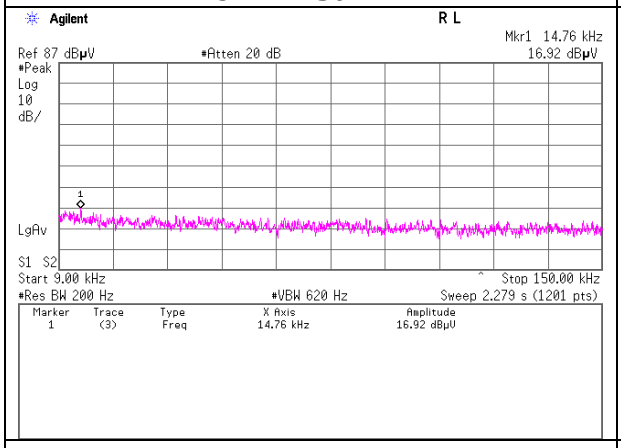
20GHz-25GHz



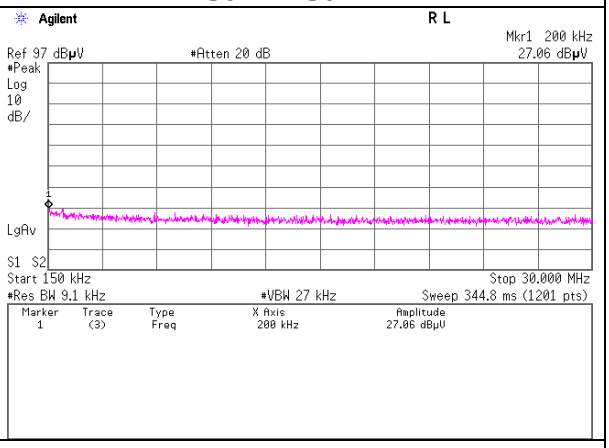
Conducted Spurious Emission

Tx 3DH5 2402MHz

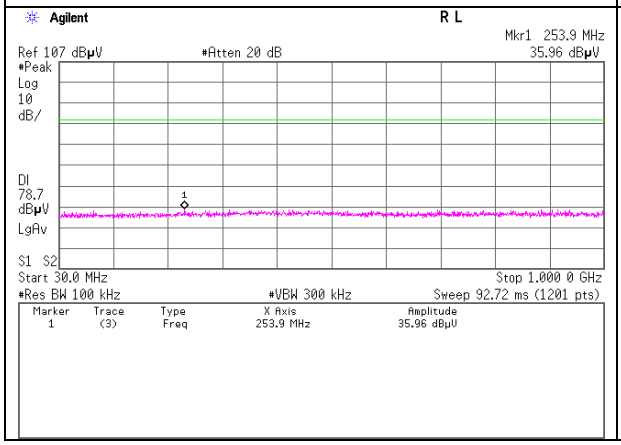
9kHz-150kHz



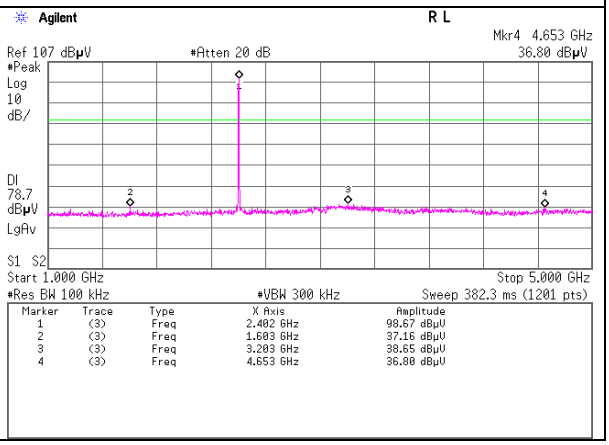
150kHz-30MHz



30MHz-1GHz



1GHz-5GHz



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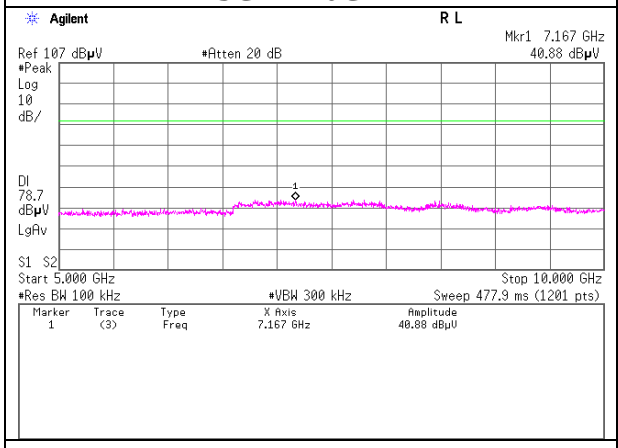
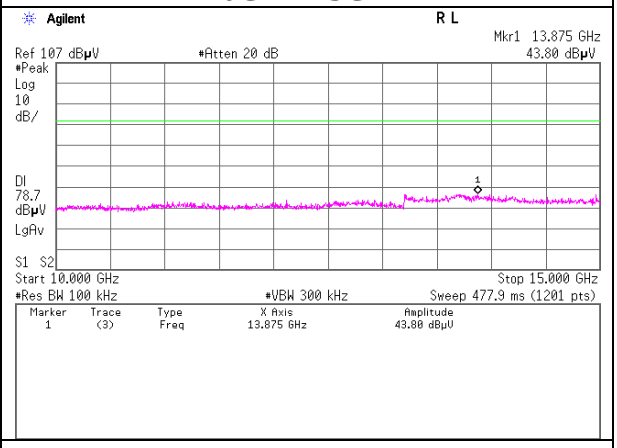
Conducted Spurious Emission

Tx 3DH5 2402MHz

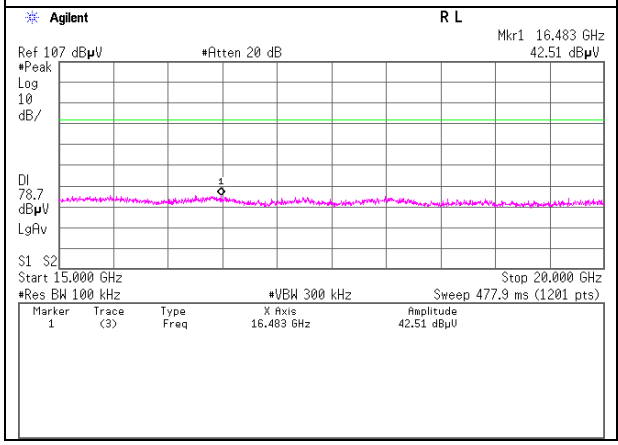
5GHz-10GHz



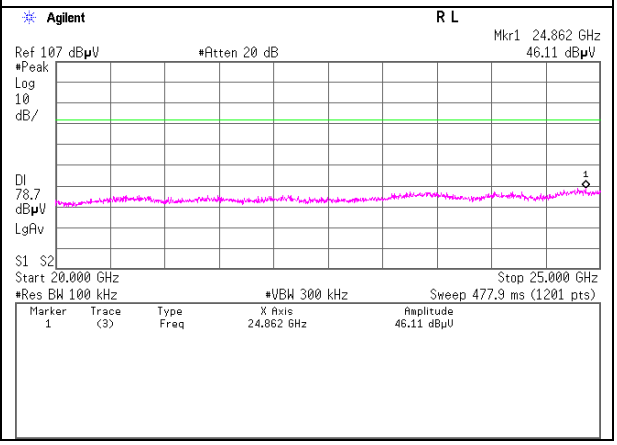
10GHz-15GHz



15GHz-20GHz



20GHz-25GHz



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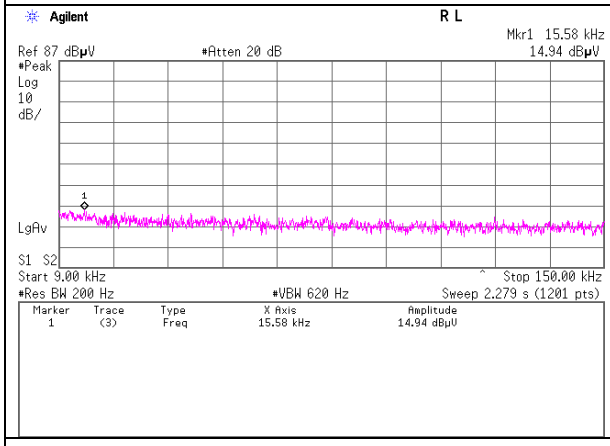
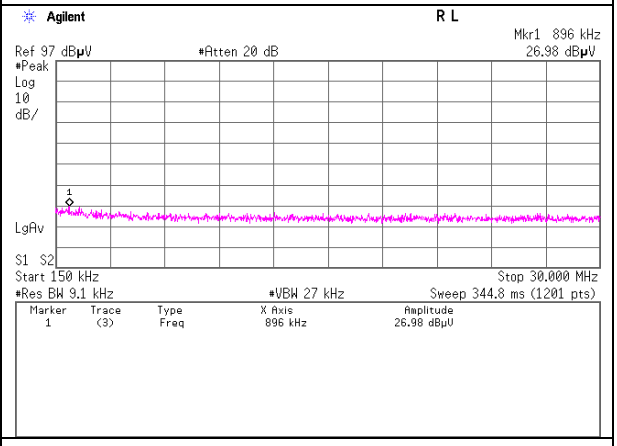
Conducted Spurious Emission

Tx 3DH5 2441MHz

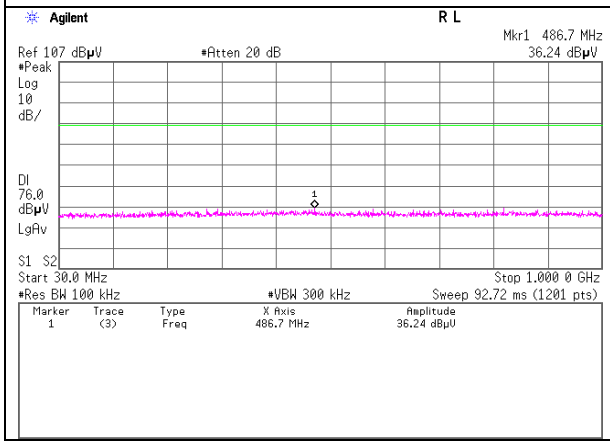
9kHz-150kHz



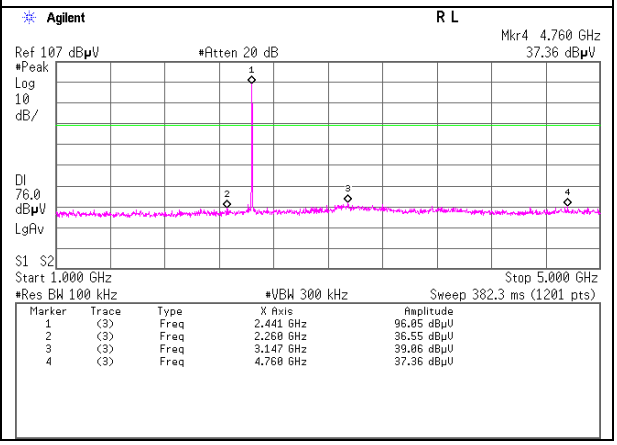
150kHz-30MHz



30MHz-1GHz



1GHz-5GHz



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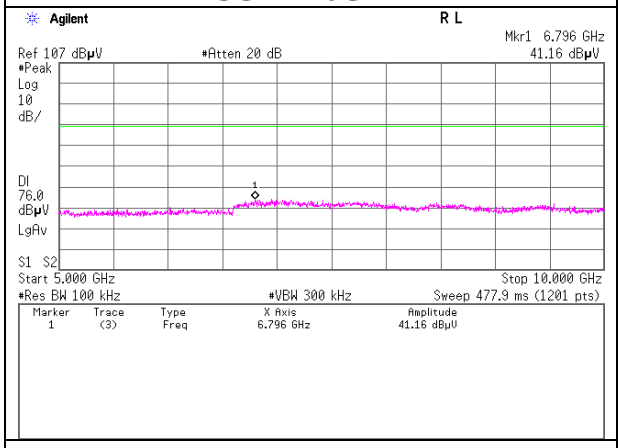
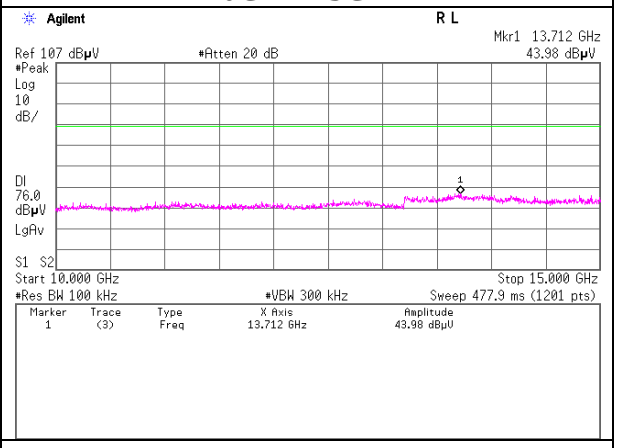
Conducted Spurious Emission

Tx 3DH5 2441MHz

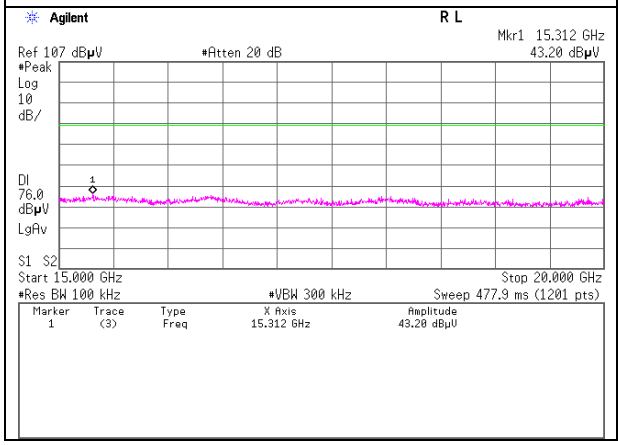
5GHz-10GHz



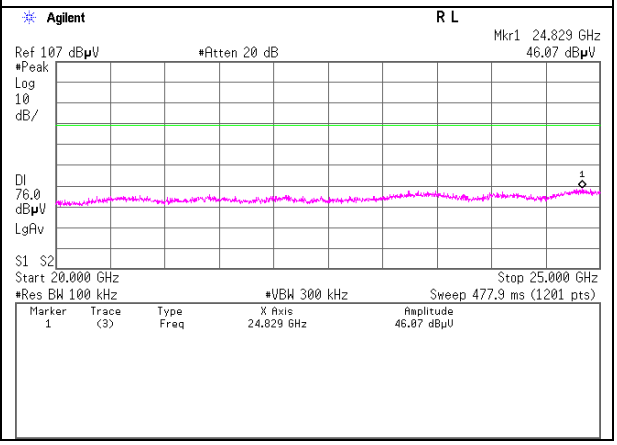
10GHz-15GHz



15GHz-20GHz



20GHz-25GHz



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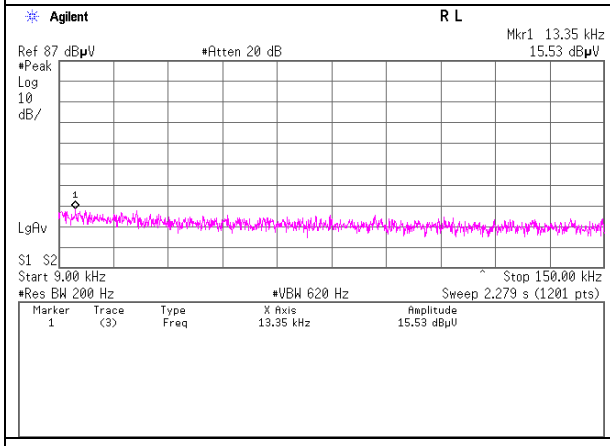
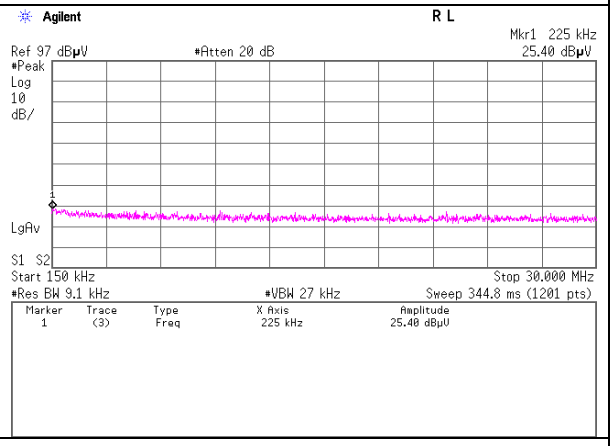
Conducted Spurious Emission

Tx 3DH5 2480MHz

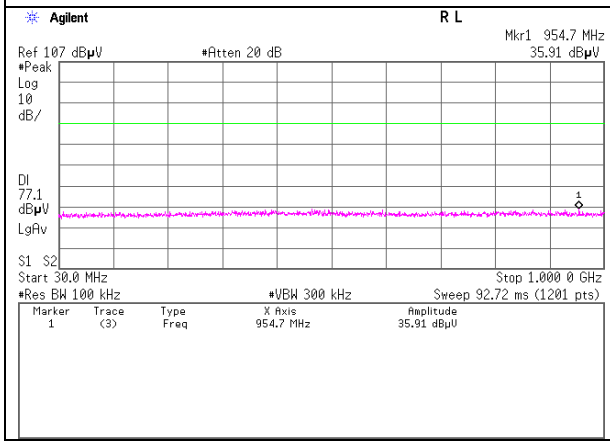
9kHz-150kHz



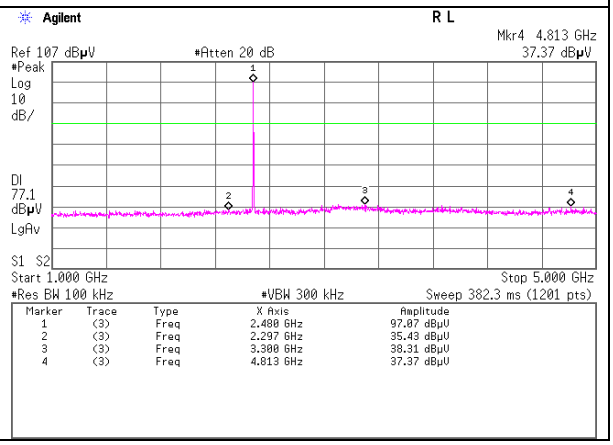
150kHz-30MHz



30MHz-1GHz



1GHz-5GHz



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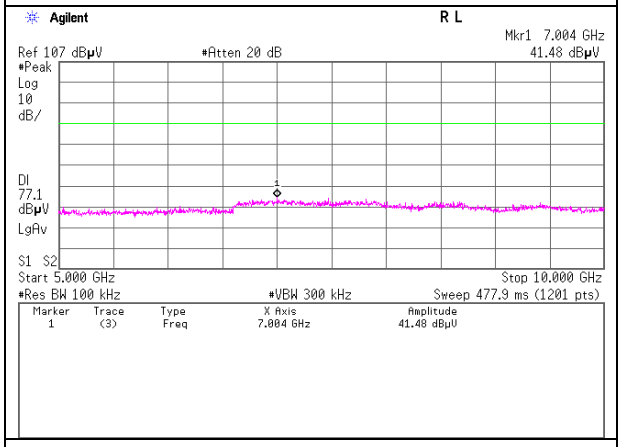
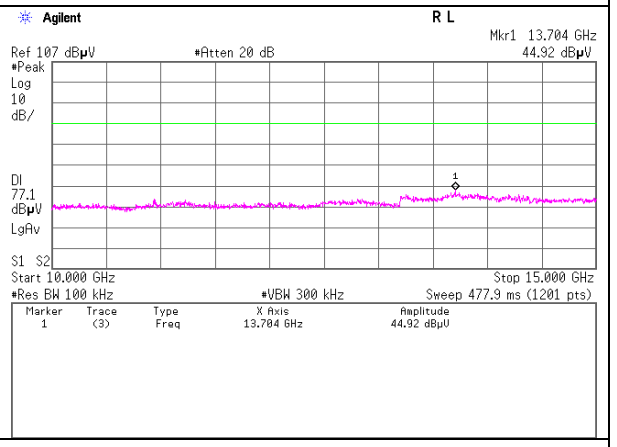
Conducted Spurious Emission

Tx 3DH5 2480MHz

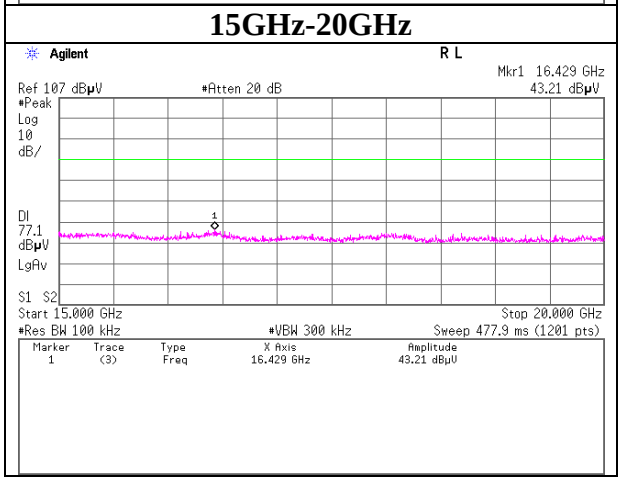
5GHz-10GHz



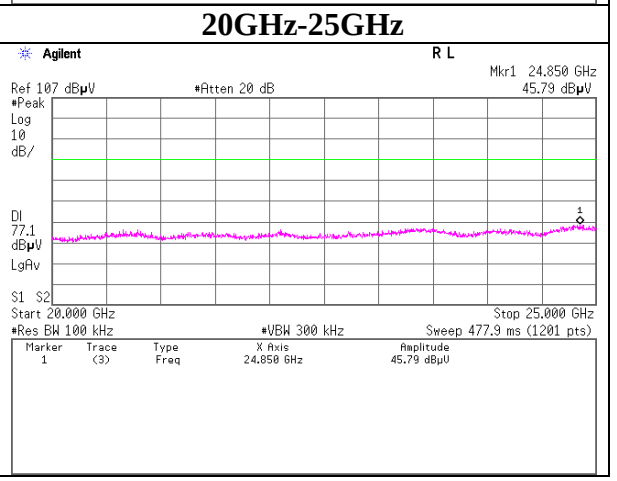
10GHz-15GHz



15GHz-20GHz



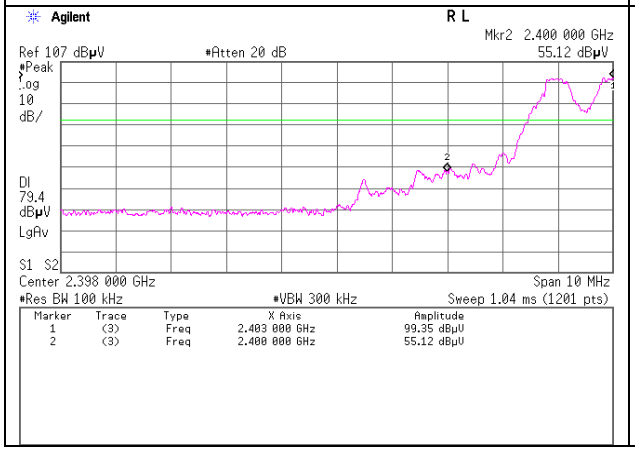
20GHz-25GHz



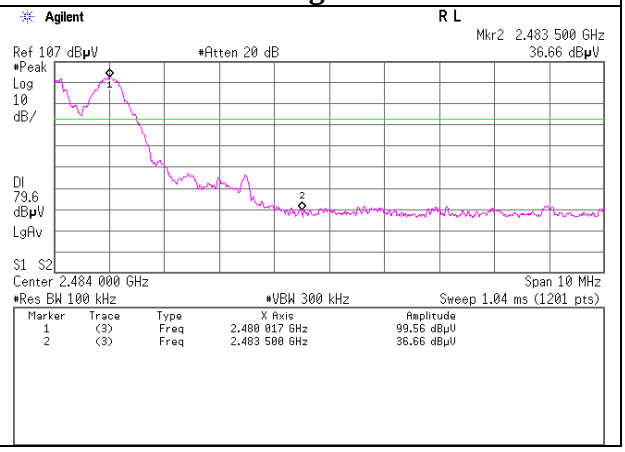
Conducted Emission Band Edge compliance

Tx DH5, Hopping on

Low

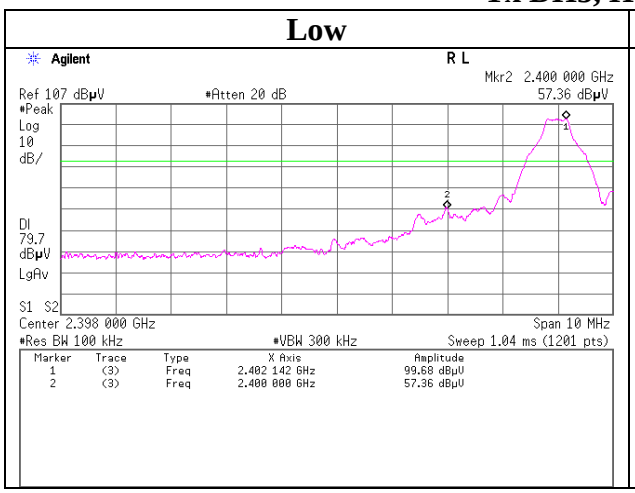


High



Tx DH5, Hopping off

Low



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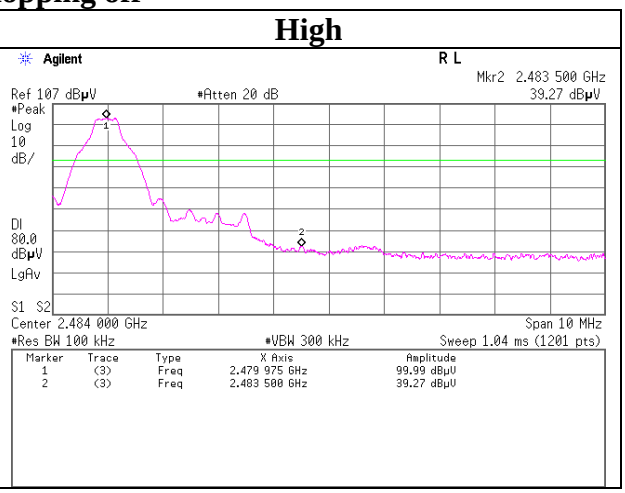

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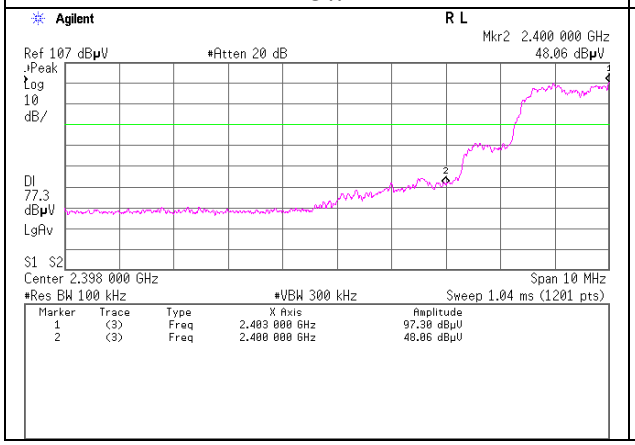
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN
Telephone : +81 596 24 8116
Facsimile : +81 596 24 8124

Conducted Emission Band Edge compliance

Tx 3DH5, Hopping on

Low



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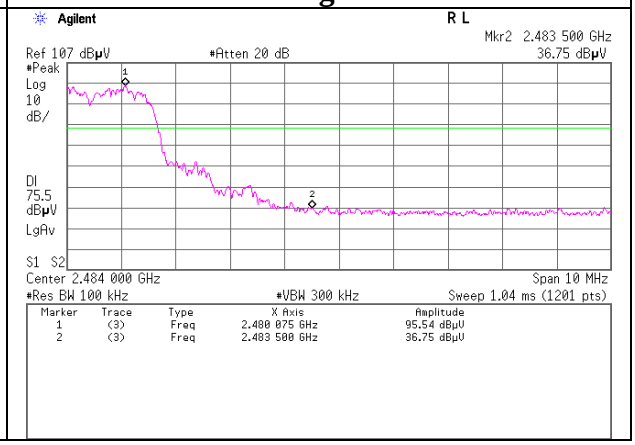
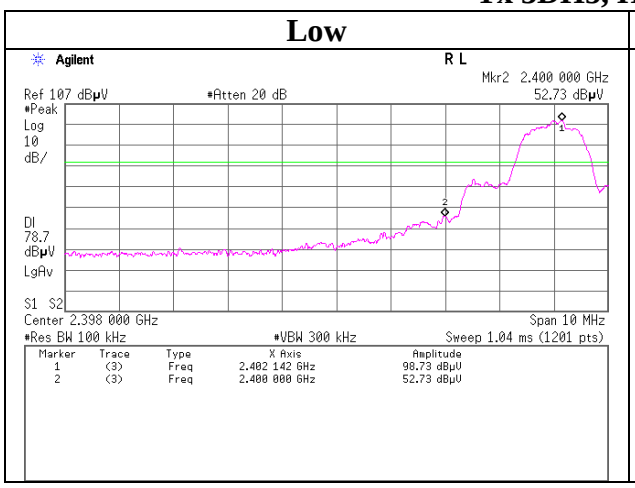


Tx 3DH5, Hopping off

Low



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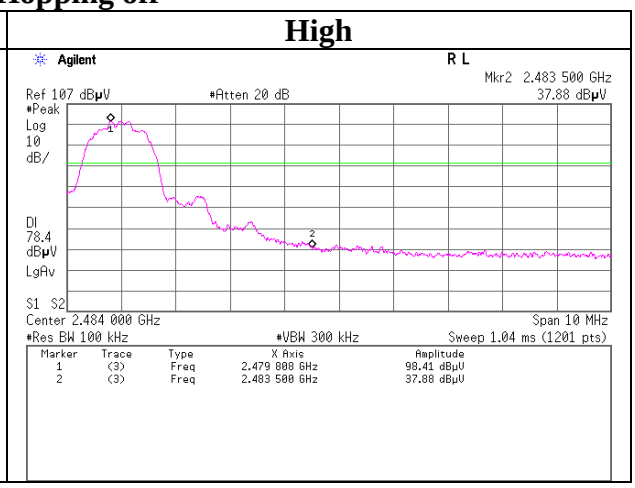
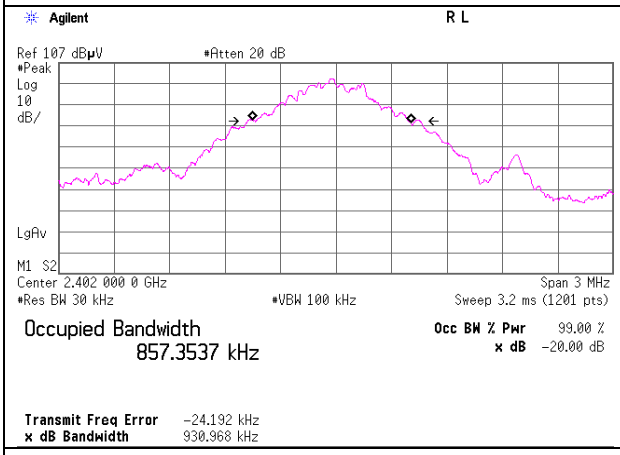


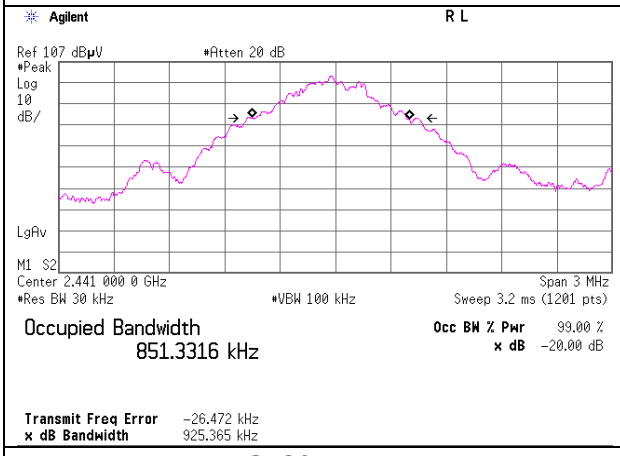
99%Occupied Bandwidth

Tx DH5, Hopping off

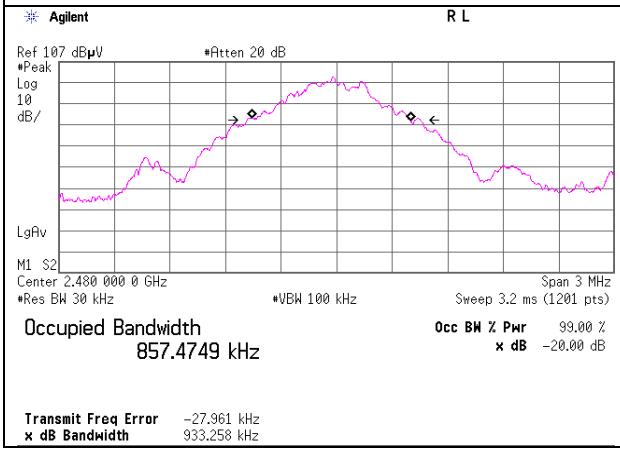
2402MHz



2441MHz

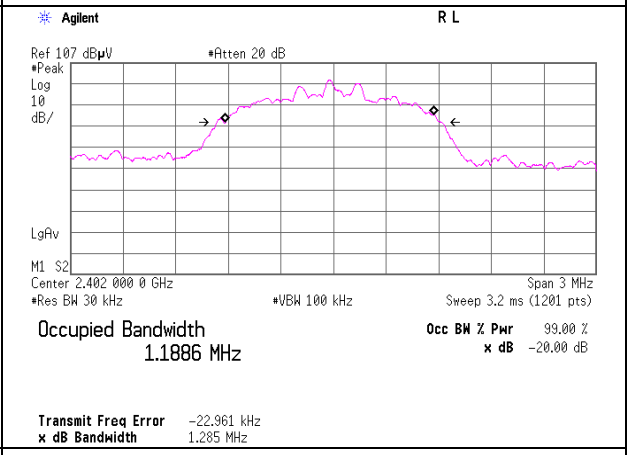


2480MHz

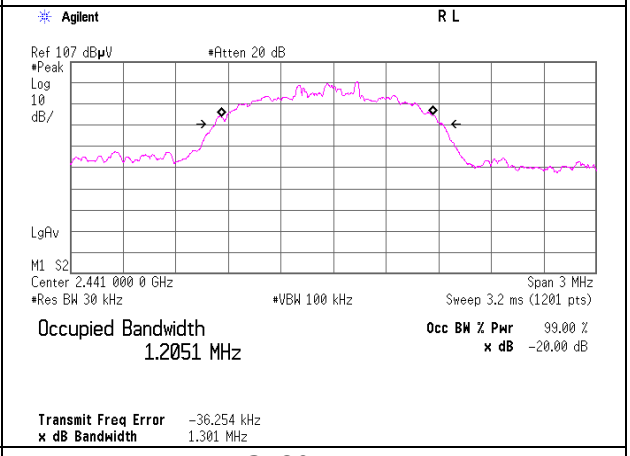


Tx 3DH5, Hopping off

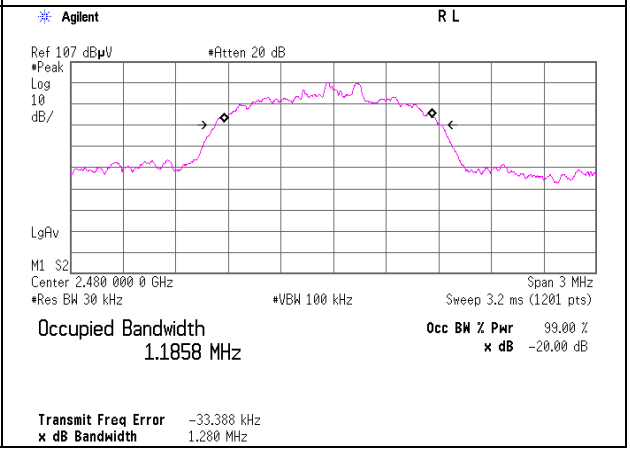
2402MHz



2441MHz

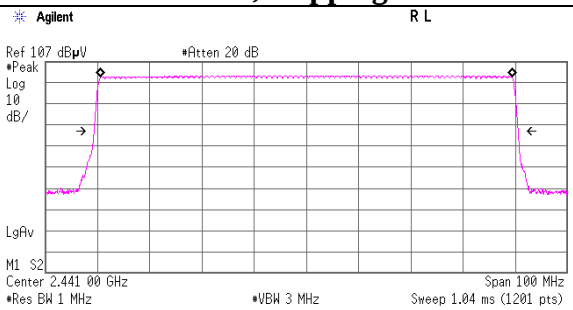


2480MHz

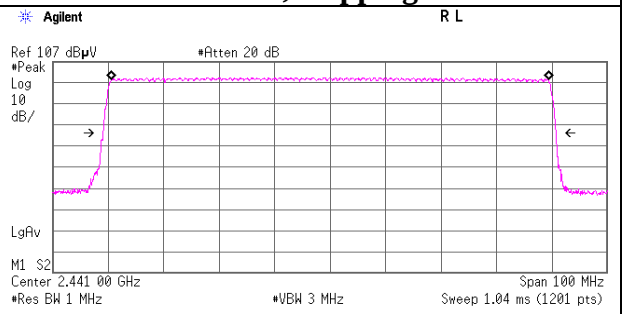


99% Occupied Bandwidth

Tx DH5, Hopping on



Tx 3DH5, Hopping on



APPENDIX 2: Test instruments

EMI test equipment

Control No.	Instrument	Manufacturer	Model No	Serial No	Test Item	Calibration Date * Interval(month)
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-10	Spectrum Analyzer	Agilent	E4448A	MY46180655	RE/CE/AT	2012/02/03 * 12
MHA-21	Horn Antenna 1-18GHz	Schwarzbeck	BBHA9120D	9120D-557	RE	2012/08/17 * 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
MCC-79	Microwave Cable 1G-26.5GHz	Suhner	SUCOFLEX104	278923/4	RE	2011/12/08 * 12
MHF-20	High Pass Filter 3.5-18.0GHz	TOKIMEC	TF323DCC	607	RE	2012/09/12 * 12
MHA-17	Horn Antenna 15-40GHz	Schwarzbeck	BBHA9170	BBHA9170307	RE	2012/06/27 * 12
MTR-07	Test Receiver	Rohde & Schwarz	ESCI	100635	CE	2012/04/05 * 12
MLS-07	LISN(AMN)	Schwarzbeck	NSLK8127	8127364	CE	2012/02/09 * 12
MAT-67	Attenuator	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)/ sucoform141-PE(1m)/ RFM-E121(Switcher)	-/04178	CE	2012/07/12 * 12
MOS-04	Digital Humidity Indicator	N.T	NT-1800	MOS04	AT	2012/02/06 * 12
MPSE-18	Power sensor	Anritsu	MA2411B	0738174	AT	2011/11/07 * 12
MPM-13	Power Meter	Anritsu	ML2495A	0824014	AT	2011/11/07 * 12
MCC-103	Microwave Cable	Hirose Electric	U.FL-2LP-066J1-A(200)	-	AT	2012/06/27 * 12
MAT-25	Attenuator(10dB) (above1GHz)	Agilent	8493C	71642	AT	2012/06/27 * 12
MTR-07	Test Receiver	Rohde & Schwarz	ESCI	100635	RE	2012/04/05 * 12
MBA-05	Biconical Antenna	Schwarzbeck	BBA9106	1302	RE	2012/11/18 * 12
MLA-08	Logperiodic Antenna	Schwarzbeck	UKLP9140-A	N/A	RE	2012/11/18 * 12
MCC-50	Coaxial Cable	UL Japan	-	-	RE	2012/06/01 * 12
MAT-68	Attenuator	Anritsu	MP721B	6200961025	RE	2012/11/21 * 12
MPA-14	Pre Amplifier	SONOMA INSTRUMENT	310	260833	RE	2012/03/05 * 12

The expiration date of the calibration is the end of the expired month.
All equipment is calibrated with valid calibrations. Each measurement data is traceable to the national or international standards.

As for some calibrations performed after the tested dates, those test equipment have been controlled by means of an unbroken chains of calibrations.

Test Item: CE: Conducted Emission
RE: Radiated Emission
AT: Antenna Terminal Conducted test