RADIO TEST REPORT

Test Report No. : 10191363H-A

Applicant	:	**BROTHER INDUSTRIES, LTD.**
Type of Equipment	:	**Bluetooth Module**
Model No.	:	**BRBT2G4RJ3**
FCC ID	:	**B3QBRBT2G4RJ3**
Test regulation	:	**FCC Part 15 Subpart C: 2013**
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.

Date of test: January 17 to March 16, 2014

Representative test engineer:
Takayuki Shimada
Engineer of WiSE Japan,
UL Verification Service

Approved by:
Masanori Nishiyama
Manager 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

REVISION HISTORY

Original Test Report No.: 10191363H-A

Revision	Test report No.	Date	Page revised	Contents
- (Original)	10191363H-A	March 19, 2014	-	-

CONTENTS PAGE

SECTION 1: Customer information....4
SECTION 2: Equipment under test (E.U.T.)....4
SECTION 3: Test specification, procedures & results....5
SECTION 4: Operation of E.U.T. during testing....9
SECTION 5: Conducted Emission....11
SECTION 6: Radiated Spurious Emission....12
SECTION 7: Antenna Terminal Conducted Tests....13
APPENDIX 1: Data of EMI test....14
Conducted Emission....14
20dB Bandwidth and Carrier Frequency Separation....18
Number of Hopping Frequency....21
Dwell time....23
Maximum Peak Output Power....26
Radiated Spurious Emission....28
Conducted Spurious Emission....42
Conducted Emission Band Edge compliance....54
99%Occupied Bandwidth....56
APPENDIX 2: Test instruments....59
APPENDIX 3: Photographs of test setup....61
Conducted Emission....61
Radiated Spurious Emission....62
Worst Case Position (Horizontal: Z-axis/ Vertical:Y-axis)....63

SECTION 1: Customer information

Company Name	:	BROTHER INDUSTRIES, LTD.
Trade Name	:	BROTHER
Address	:	15-1, Naeshiro-cho, Mizuho-ku, Nagoya-shi, 467-8561, Japan
Telephone Number	:	+81-52-824-2345
Facsimile Number	:	+81-52-824-1068
Contact Person	:	Toshikazu Koike

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

2.1 Identification of E.U.T.

Type of Equipment	:	Bluetooth Module
Model No.	:	BRBT2G4RJ3
Serial No.	:	Refer to Section 4, Clause 4.2
Rating	:	DC 1.8 V
Receipt Date of Sample	:	January 11, 2014
Country of Mass-production	:	China
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

General Specification

Clock frequency(ies) in the system	:	38.4MHz for oscillator, 32kHz for Sleep Clock

Radio Specification

[Bluetooth (Ver. 3.0 with EDR function)]

Radio Type	:	Transceiver
Frequency of Operation	:	2402-2480MHz
Modulation	:	FHSS
Power Supply (radio part input)	:	DC 1.8V
Antenna type	:	Chip Antenna
Antenna Gain	:	1.5dBi

SECTION 3: Test specification, procedures & results

3.1 Test Specification

Test Specification	:	FCC Part 15 Subpart C: 2013, final revised on September 30, 2013 and effective October 30, 2013
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

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** 32.2dB, 0.15033MHz, N **AV** 36.2dB, 0.49423MHz, 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	4.0dB 19528.000MHz, PK HoriMHz, PK, Hori.	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)

The RF Module has its own regulator.
The RF Module is constantly provided voltage (DC 1.8V) through the regulator 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 it is soldered on the circuit board. Therefore the equipment complies with the requirement of 15.203/212.

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

Test room (semi-anechoic chamber)	**Radiated emission (10m*)(±dB)**		
	9kHz -30MHz	30MHz -300MHz	300MHz -1GHz
No.1	4.0dB	5.1dB	4.7dB
No.2	-	-	-
No.3	-	-	-
No.4	-	-	-

*10m = Measurement distance

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	4.0dB	5.1dB	5.0dB	5.1dB	6.0dB	4.9dB	4.3dB
No.2	3.9dB	5.2dB	5.0dB	4.9dB	5.9dB	4.7dB	4.2dB
No.3	4.3dB	5.1dB	5.2dB	5.2dB	6.0dB	4.8dB	4.2dB
No.4	4.6dB	5.2dB	5.0dB	5.2dB	6.0dB	5.7dB	4.2dB

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

Power meter (±dB)	
Below 1GHz	Above 1GHz
0.7dB	1.5dB

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	
1.5dB	1.7dB	2.8dB	2.8dB	2.9dB	2.6dB

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

Radiated emission test
The data listed in this report meets the limits unless the uncertainty is taken into consideration.

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 8999 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	4.0 x 4.5 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 4.6 x 2.8m	2.4 x 2.4m	-
No.11 measurement room	-	-	6.2 x 4.7 x 3.0m	4.8 x 4.6m	-

* 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

Details of Operating Mode(s)

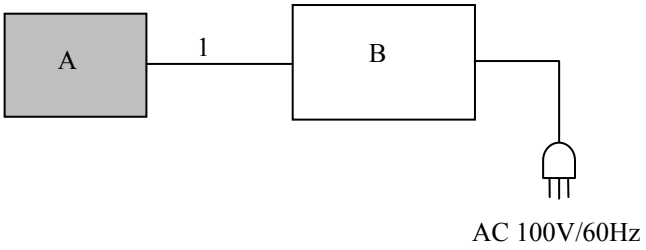
Test Item	Mode	Tested frequency
Conducted Emission, Spurious Emission (Conducted/Radiated)	Tx (Hopping off) DH5, 3DH5	2402MHz 2441MHz 2480MHz
Carrier Frequency Separation	Tx (Hopping on) DH5, 3DH5 Inquiry	2402MHz 2441MHz 2480MHz
20dB Bandwidth	Tx (Hopping off) DH5, 3DH5 Inquiry	2402MHz 2441MHz 2480MHz
Number of Hopping Frequency	Tx (Hopping on) DH5, 3DH5 Inquiry	-
Dwell time	Tx (Hopping on), -DH1, DH3, DH5 -3DH1, 3DH3, 3DH5 Inquiry	-
Maximum Peak Output Power	Tx (Hopping off) DH5, 2DH5, 3DH5 Inquiry	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
Spurious Emissions (Receiver) (Conducted/Radiated)	Rx	2402MHz 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)
*We removed 2DH mode (2 Mb/s EDR: pi/4DQPSK) except power measurement by using 3DH mode (3 Mb/s EDR:8DPSK) as a representative.

*EUT has the power settings by the software as follows;
Power settings: BDR: Index=15
EDR: Index=15
Software: HCI Tester

*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

No.	Item	Model number	Serial number	Manufacturer	Remarks
A	Bluetooth Module	BRBT2G4RJ3	130 Used for AT* 167 Used for other tests	BROTHER INDUSTRIES, LTD.	EUT
B	DC Power Supply	PMC35-2A	13441100	Kikusui	-

List of cables used

No.	Name	Length (m)	Shield		Remarks
			Cable	Connector	
1	DC Cable	1.8	Unshielded	Unshielded	-

*AT: Antenna Terminal Conducted test
RE: Radiated Spurious test
CE: Conducted Emission test

SECTION 5: Conducted Emission

Test Procedure and conditions

EUT was placed on a urethane platform of nominal size, 1.0m by 1.5m, 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 CISPR 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 1.0 m, 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	Below 30MHz	30MHz to 300MHz	300MHz to 1GHz	Above 1GHz
Antenna Type	Loop	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 carrier level and noise levels were confirmed at each position of X, Y and Z axes of EUT to see the position of maximum noise, and the test was made at the position that has the maximum noise.

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 *1)	Spectrum Analyzer
Maximum Peak Output Power	-	-	-	Auto	Peak Average *3)	-	Power Meter (Sensor: 50MHz BW)
Carrier Frequency Separation	5MHz 3MHz	100kHz 30kHz	300kHz 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 *2)	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	10MHz	100kHz	300kHz	Auto	Peak	Max Hold	Spectrum Analyzer

*1) The measurement was performed with Max Hold since the duty cycle was not 100%.
*2) 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)
*3) Reference data

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

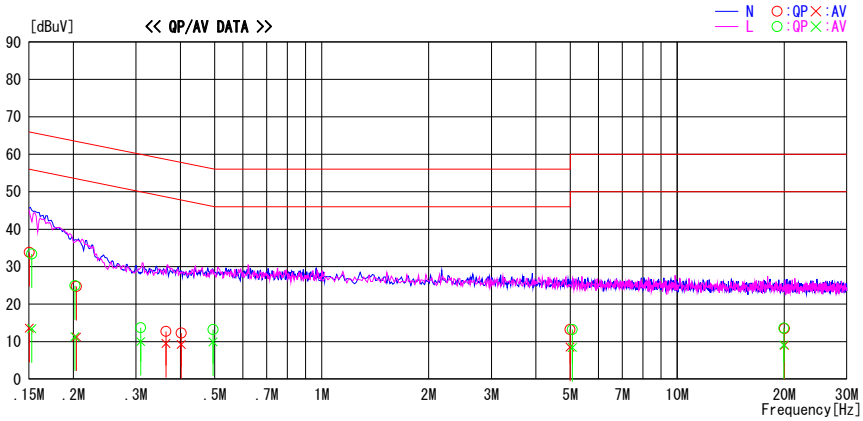
DATA OF CONDUCTED EMISSION TEST

UL Japan, Inc. Head Office EMC Lab. No.3 Semi Anechoic Chamber
Date : 2014/03/16

Report No. : 10191363H
Power : AC 120V / 60Hz
Temp./Humi. : 25deg. C / 30% RH
Engineer : Tomohisa Nakagawa

Mode / Remarks : BT BDR Tx 2480MHz

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]		
0.15033	20.6	0.4	13.2	33.8	13.6	66.0	56.0	32.2	42.4	N	
0.20401	11.4	-2.1	13.3	24.7	11.2	63.4	53.4	38.7	42.2	N	
0.36433	-0.6	-3.8	13.3	12.7	9.5	58.6	48.6	45.9	39.1	N	
0.40223	-1.0	-4.1	13.3	12.3	9.2	57.8	47.8	45.5	38.6	N	
4.99195	-0.5	-5.2	13.7	13.2	8.5	56.0	46.0	42.8	37.5	N	
20.02324	-1.2	-5.7	14.7	13.5	9.0	60.0	50.0	46.5	41.0	N	
0.15283	20.2	0.2	13.2	33.4	13.4	65.8	55.8	32.4	42.4	L	
0.20223	11.6	-2.0	13.3	24.9	11.3	63.5	53.5	38.6	42.2	L	
0.30938	0.4	-3.3	13.3	13.7	10.0	60.0	50.0	46.3	40.0	L	
0.49423	-0.1	-3.4	13.3	13.2	9.9	56.1	46.1	42.9	36.2	L	
5.06835	-0.5	-5.3	13.7	13.2	8.4	60.0	50.0	46.8	41.6	L	
19.93905	-1.1	-5.6	14.7	13.6	9.1	60.0	50.0	46.4	40.9	L	

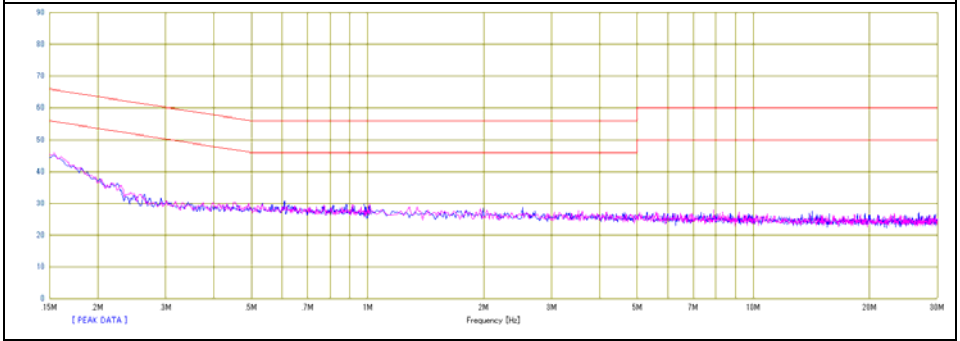
CHART:WITH FACTOR,Peak hold data. CALCULATION:RESULT=READING+C.F(LISN LOSS+ATT LOSS +CABLE LOSS)
Except for the above table : adequate margin data below the limits.

*The limit is rounded down to one decimal place.
*The test result is rounded off to one or two decimal places, so some differences might be observed.

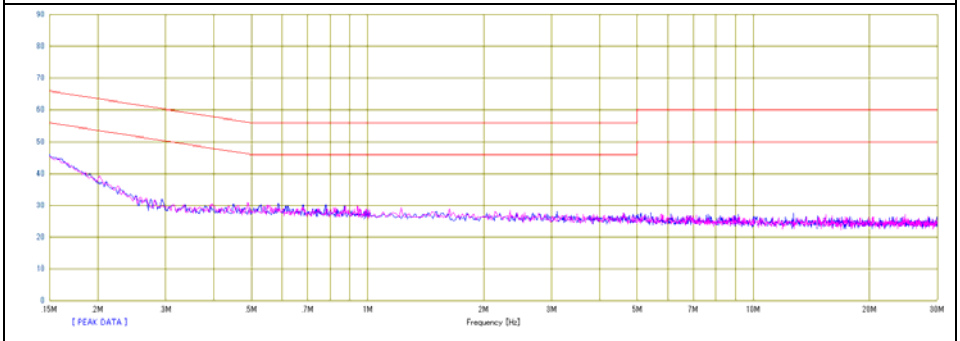
Conducted Emission

Test place	Head Office EMC Lab. No.3 Semi Anechoic Chamber
Report No.	10191363H
Date	03/16/2014
Temperature/ Humidity	24 deg.C/30 % RH
Engineer	Tomohisa Nakagawa
Mode	Tx DH5

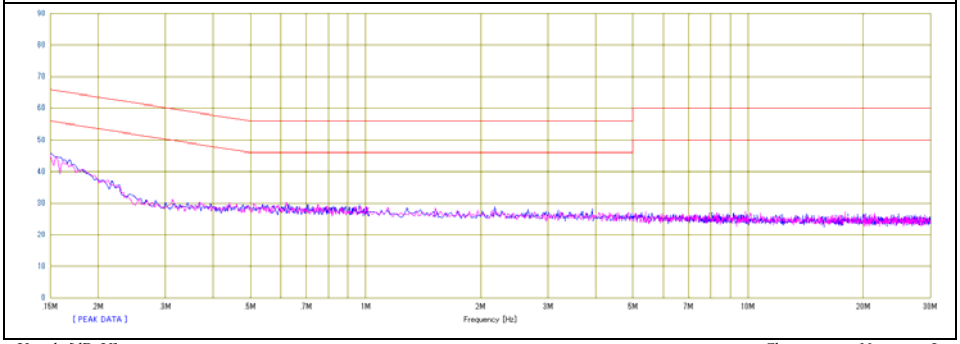
2402MHz



2441MHz



2480MHz



Y scale [dBuV]

Chart — N — L

Conducted Emission

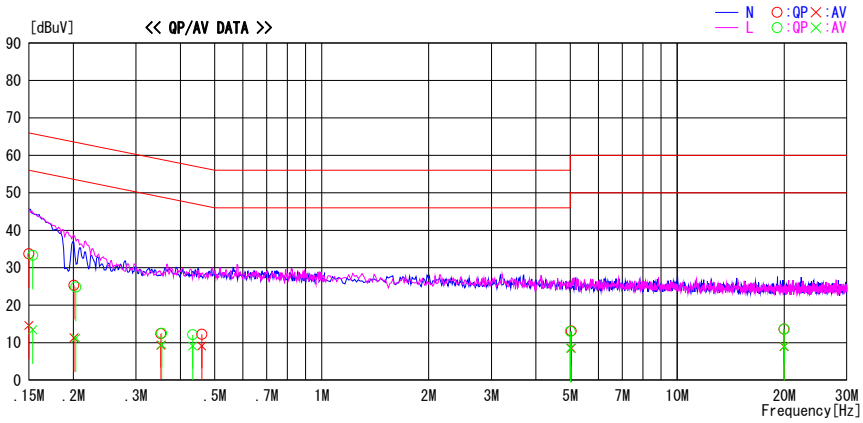
DATA OF CONDUCTED EMISSION TEST

UL Japan, Inc. Head Office EMC Lab. No.3 Semi Anechoic Chamber
Date : 2014/03/16

Report No. : 10191363H
Power : AC 120V / 60Hz
Temp./Humi. : 25deg. C / 30% RH
Engineer : Tomohisa Nakagawa

Mode / Remarks : BT EDR Tx 2441MHz

LIMIT : FCC15.207 QP
FCC15.207 AV



Frequency	Reading Level		Corr.	Results		Limit		Margin		Phase	Comment
	QP	AV	Factor	QP	AV	QP	AV	QP	AV		
[MHz]	[dBuV]	[dBuV]	[dB]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dB]	[dB]		
0.15000	20.5	1.4	13.2	33.7	14.6	66.0	56.0	32.3	41.4	N	
0.20093	12.0	-2.0	13.3	25.3	11.3	63.6	53.6	38.3	42.3	N	
0.35258	-0.9	-4.0	13.3	12.4	9.3	58.9	48.9	46.5	39.6	N	
0.45955	-1.1	-4.2	13.3	12.2	9.1	56.7	46.7	44.5	37.6	N	
5.03125	-0.6	-5.2	13.7	13.1	8.5	60.0	50.0	46.9	41.5	N	
19.96235	-1.1	-5.8	14.7	13.6	8.9	60.0	50.0	46.4	41.1	N	
0.15373	20.1	0.2	13.2	33.3	13.4	65.8	55.8	32.5	42.4	L	
0.20323	11.5	-2.1	13.3	24.8	11.2	63.5	53.5	38.7	42.3	L	
0.35450	-0.8	-3.9	13.3	12.5	9.4	58.9	48.9	46.4	39.5	L	
0.43316	-1.2	-4.2	13.3	12.1	9.1	57.2	47.2	45.1	38.1	L	
5.00629	-0.7	-5.2	13.7	13.0	8.5	60.0	50.0	47.0	41.5	L	
20.00925	-1.1	-5.7	14.7	13.6	9.0	60.0	50.0	46.4	41.0	L	

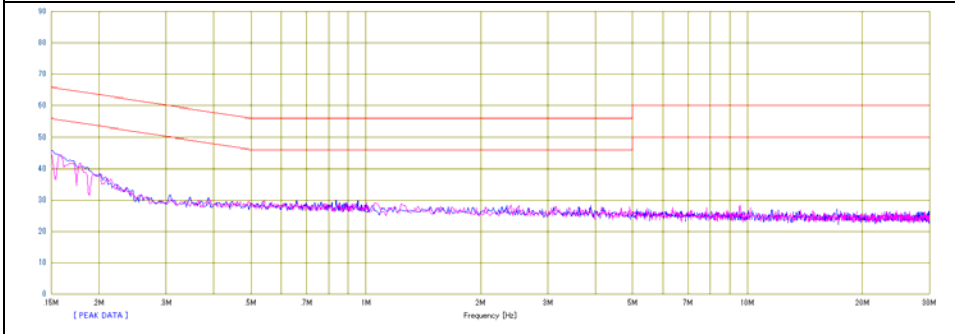
CHART:WITH FACTOR,Peak hold data. CALCULATION:RESULT=READING+C.F(LISN LOSS+ATT LOSS +CABLE LOSS)
Except for the above table : adequate margin data below the limits.

*The limit is rounded down to one decimal place.
*The test result is rounded off to one or two decimal places, so some differences might be observed.

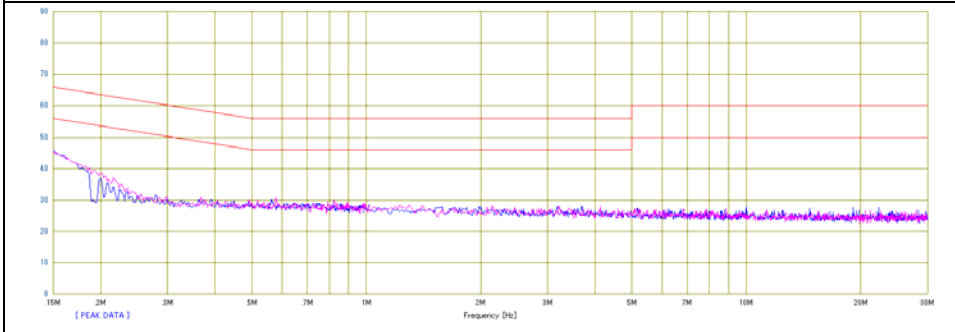
Conducted Emission

Test place	Head Office EMC Lab. No.3 Semi Anechoic Chamber
Report No.	10191363H
Date	03/16/2014
Temperature/ Humidity	24 deg.C/30 % RH
Engineer	Tomohisa Nakagawa
Mode	Tx 3DH5

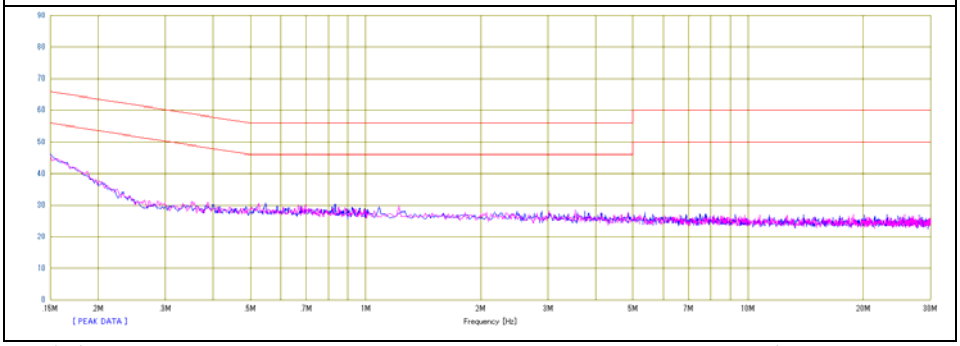
2402MHz



2441MHz



2480MHz



Y scale [dBuV]

Chart — N — L

20dB Bandwidth and Carrier Frequency Separation

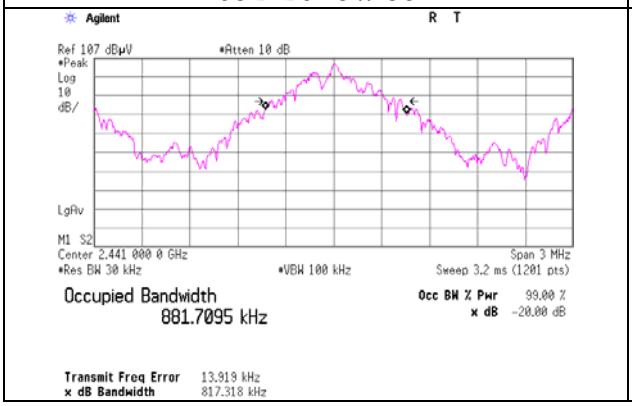
Test place	Head Office EMC Lab. No.11 Measurement Room	
Report No.	10191363H	
Date	01/17/2014	01/21/2014
Temperature/ Humidity	24 deg.C/ 30% RH	24 deg.C/ 30% RH
Engineer	Tsubasa Takayama	Tomohisa Nakagawa
Mode	Tx (Hopping on) DH5/3DH5/Inquiry	

Mode	Freq. [MHz]	20dB Bandwidth [MHz]	Carrier Frequency Separation [MHz]	Limit for Carrier Frequency separation [MHz]
DH5	2402.0	0.944	1.000	>= 0.629
DH5	2441.0	0.950	1.000	>= 0.633
DH5	2480.0	0.945	1.000	>= 0.630
3DH5	2402.0	1.311	1.000	>= 0.874
3DH5	2441.0	1.311	1.000	>= 0.874
3DH5	2480.0	1.309	1.000	>= 0.873
Inquiry	2441.0	0.817	2.000	>= 0.545

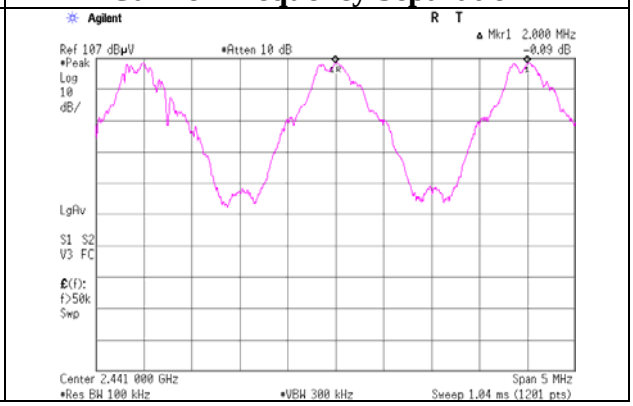
Limit: Two-thirds of 20dB Bandwidth or 25kHz (whichever is greater).
No limit applies to 20dB Bandwidth.

Inquiry

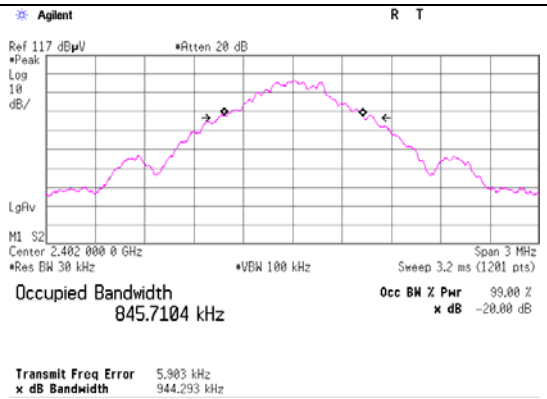
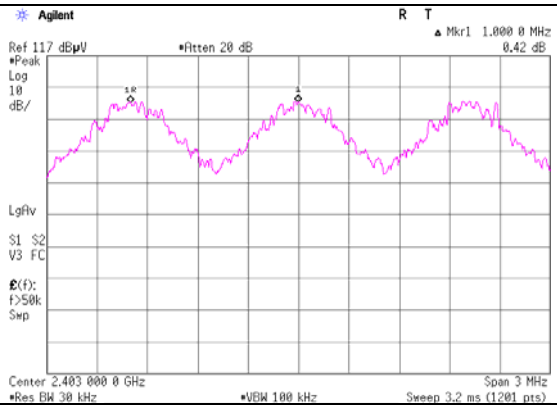
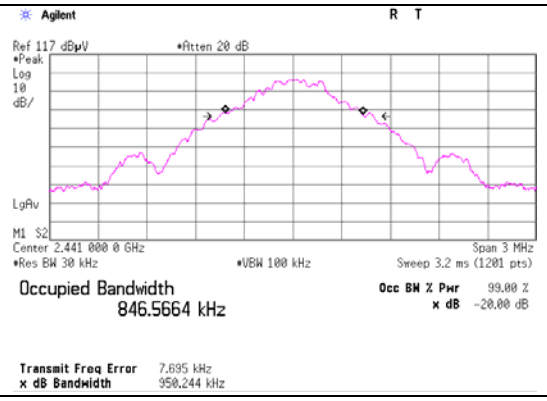
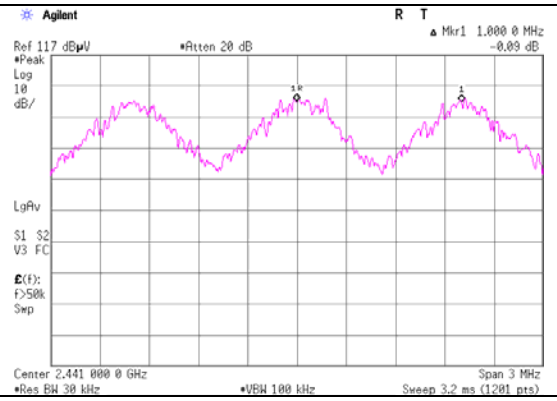
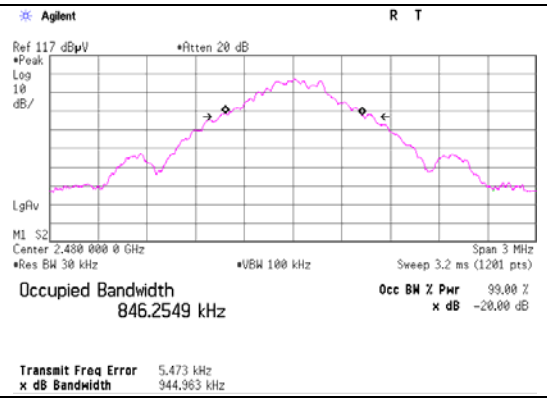
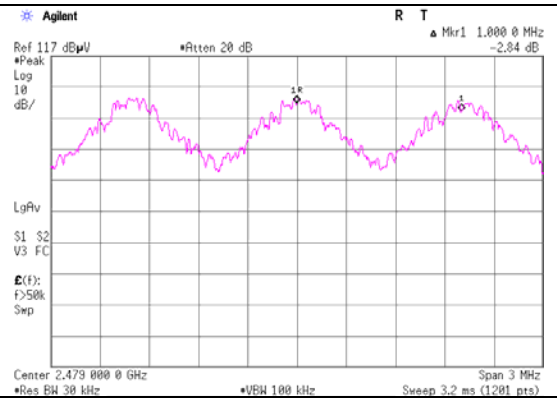
20dB Bandwidth



Carrier Frequency Separation



20dB Bandwidth and Carrier Frequency Separation

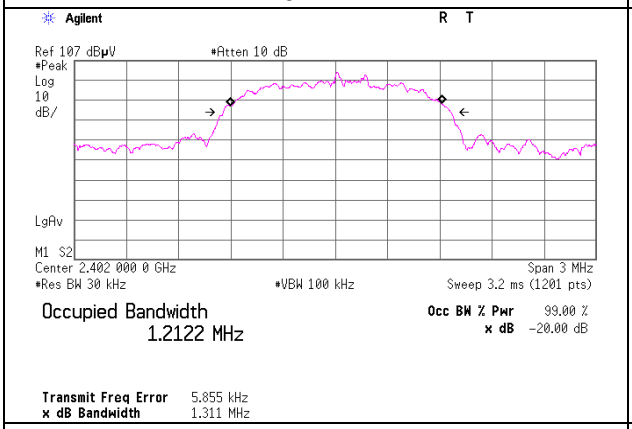
Tx DH5	
20dB Bandwidth	**Carrier Frequency Separation**
2402MHz	**2402MHz**
	
2441MHz	**2441MHz**
	
2480MHz	**2480MHz**
	

20dB Bandwidth and Carrier Frequency Separation

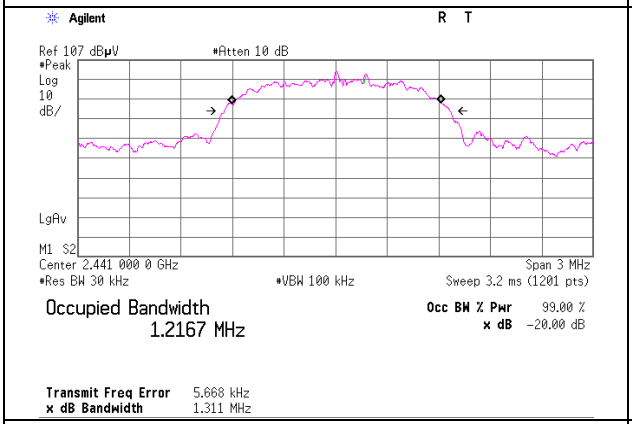
Tx 3DH5

20dB Bandwidth

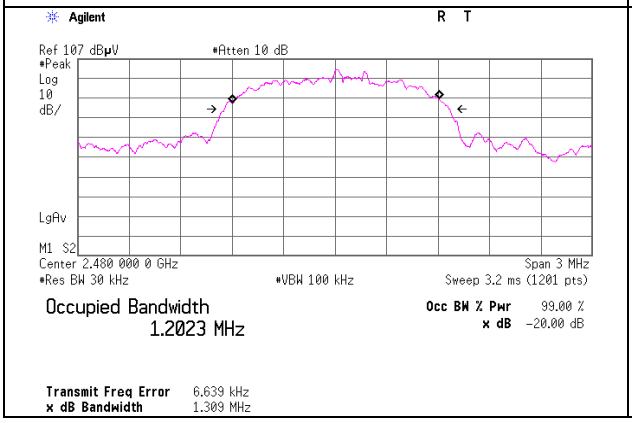
2402MHz



2441MHz

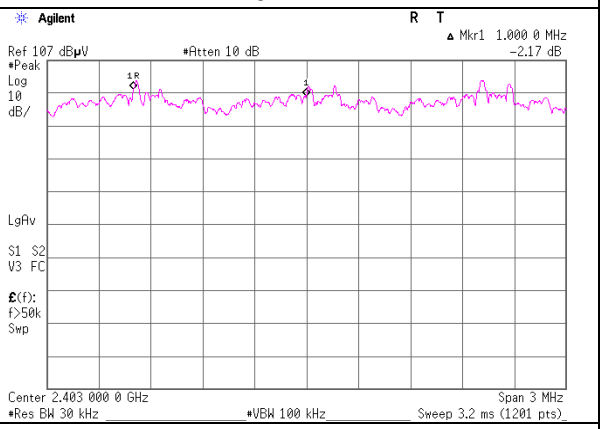


2480MHz

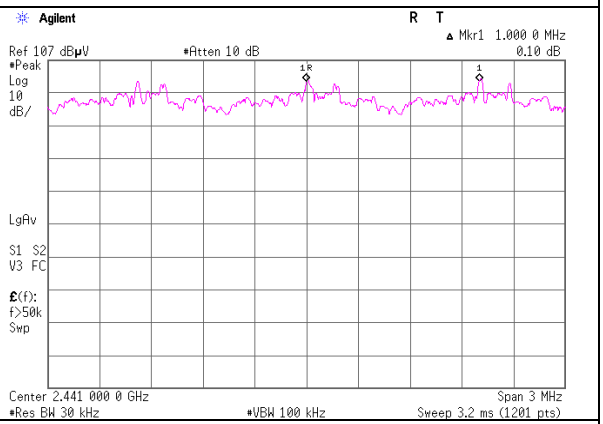


Carrier Frequency Separation

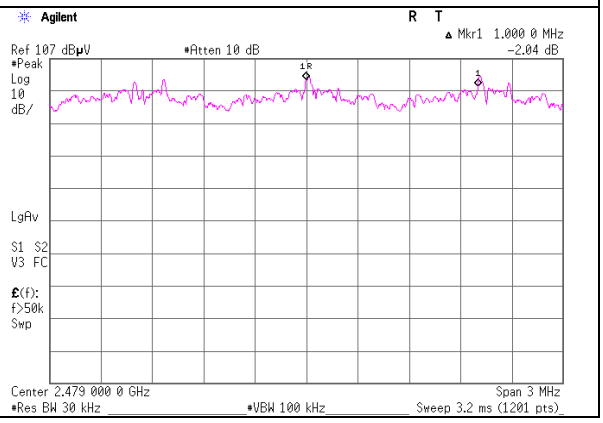
2402MHz



2441MHz



2480MHz



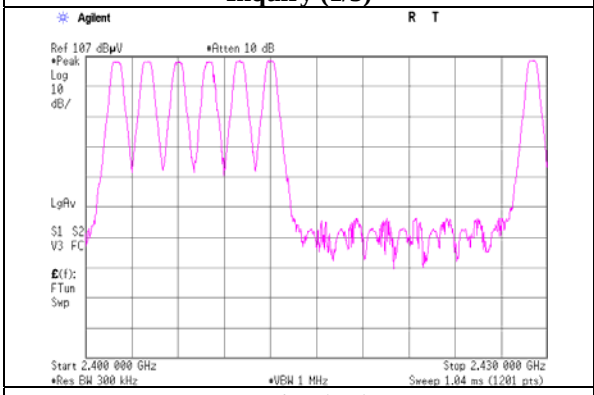
Number of Hopping Frequency

Test place	Head Office EMC Lab. No.11 Measurement Room	
Report No.	10191363H	
Date	01/17/2014	01/21/2014
Temperature/ Humidity	24 deg.C/ 30% RH	24 deg.C/ 30% RH
Engineer	Tsubasa Takayama	Tomohisa Nakagawa
Mode	Tx (Hopping on) DH5/3DH5/Inquiry	

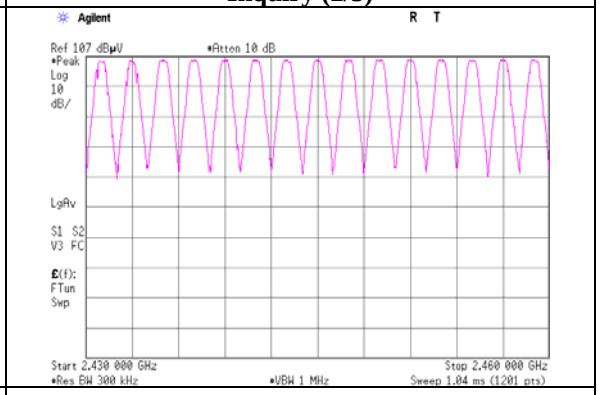
Mode	Number of channel [times]	Limit [times]
DH5	79	>= 15
3DH5	79	>= 15
Inquiry	32	>= 15

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.

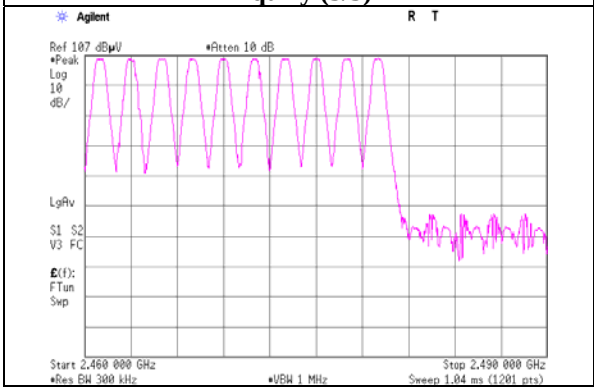
Inquiry (1/3)



Inquiry (2/3)



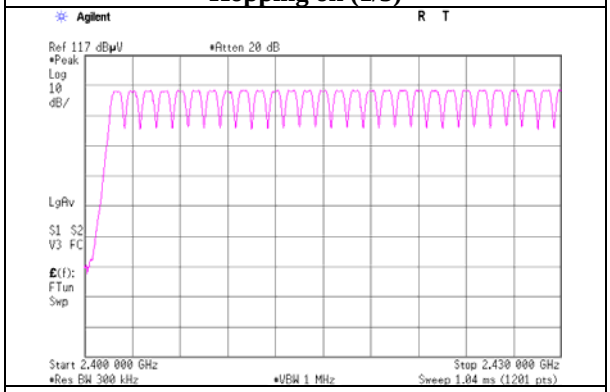
Inquiry (3/3)



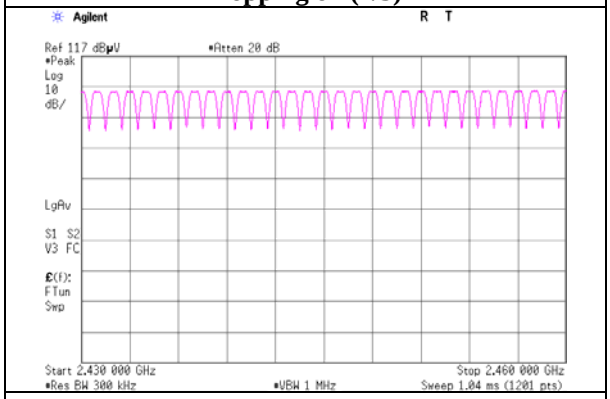
Number of Hopping Frequency

Tx DH5

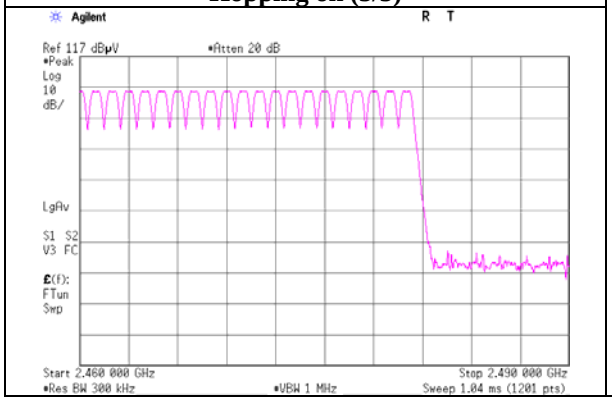
Hopping on (1/3)



Hopping on (2/3)

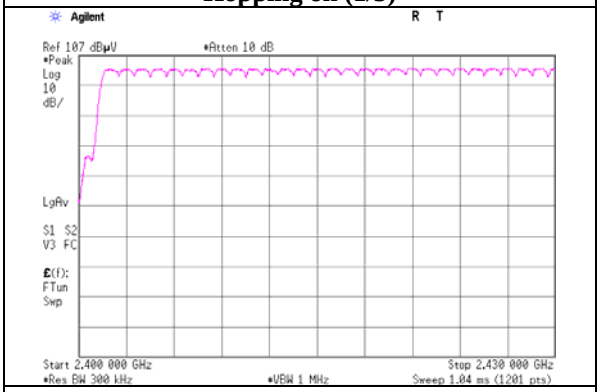


Hopping on (3/3)

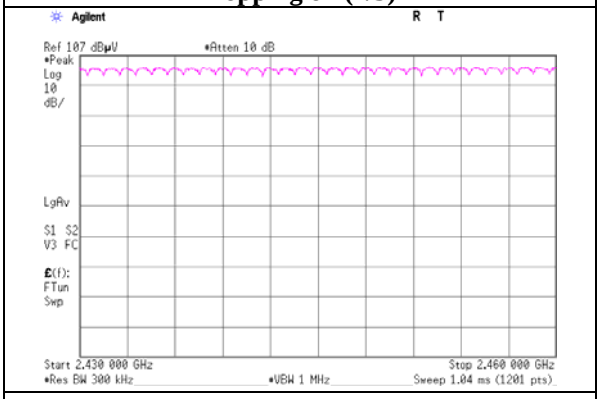


Tx 3DH5

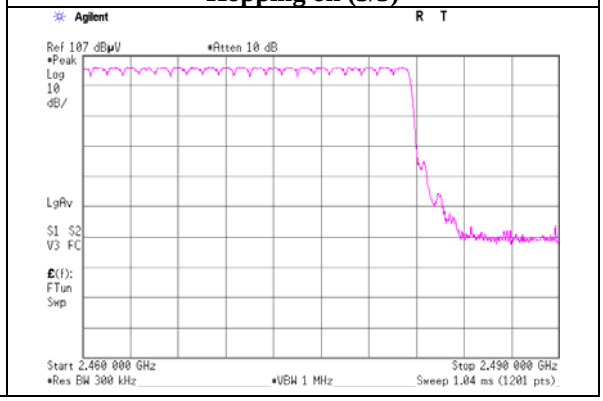
Hopping on (1/3)



Hopping on (2/3)



Hopping on (3/3)



Dwell time

Test place	Head Office EMC Lab. No.11 Measurement Room	
Report No.	10191363H	
Date	01/17/2014	01/21/2014
Temperature/ Humidity	24 deg.C/ 30% RH	24 deg.C/ 30% RH
Engineer	Tsubasa Takayama	Tomohisa Nakagawa
Mode	Tx (Hopping on) DH5/3DH5/Inquiry	

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	47.8 times / 5 sec. x 31.6 sec. = 303 times	0.424	128	400
DH3	25.8 times / 5 sec. x 31.6 sec. = 164 times	1.673	274	400
DH5	17.0 times / 5 sec. x 31.6 sec. = 108 times	2.937	317	400
3DH1	50.0 times / 5 sec. x 31.6 sec. = 316 times	0.428	135	400
3DH3	26.6 times / 5 sec. x 31.6 sec. = 169 times	1.680	284	400
3DH5	16.8 times / 5 sec. x 31.6 sec. = 107 times	2.941	315	400
Inquiry	100.0 times / 1 sec. x 12.8 sec. = 1280 times	0.123	157	400

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

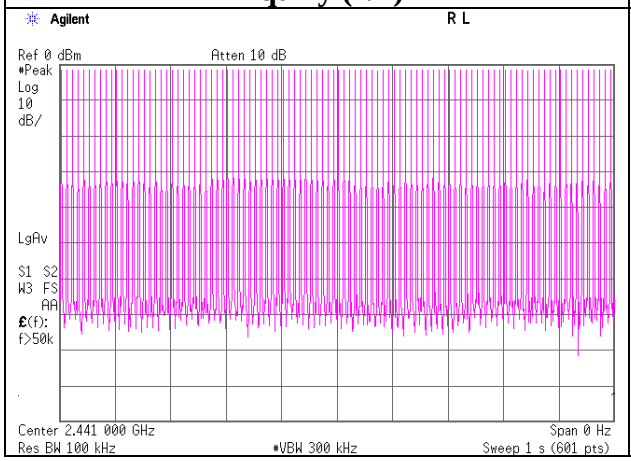
*Average data of 5 tests.(except Inquiry)

Mode	Sampling [times]					Average [times]
	1	2	3	4	5	
DH1	50	49	40	50	50	47.8
DH3	29	28	24	23	25	25.8
DH5	16	15	19	17	18	17
3DH1	52	50	50	48	50	50
3DH3	30	25	27	25	26	26.6
3DH5	20	15	15	15	19	16.8

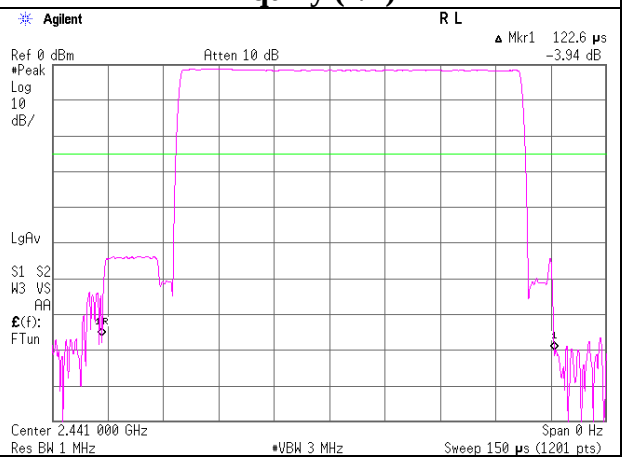
Sample Calculation
Average= Summation(Sampling 1 to 5) / 5

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

Inquiry (1/2)

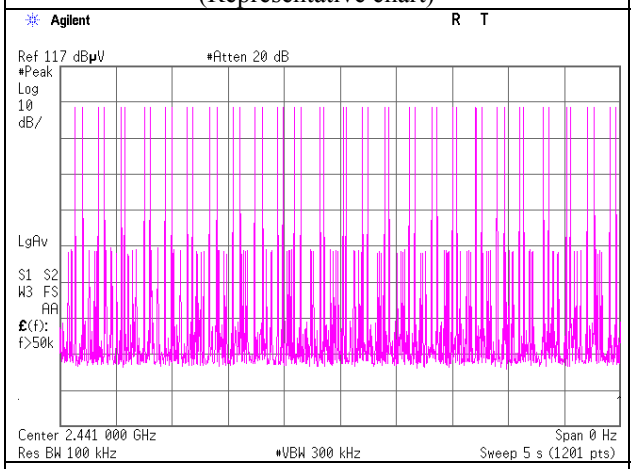


Inquiry (2/2)

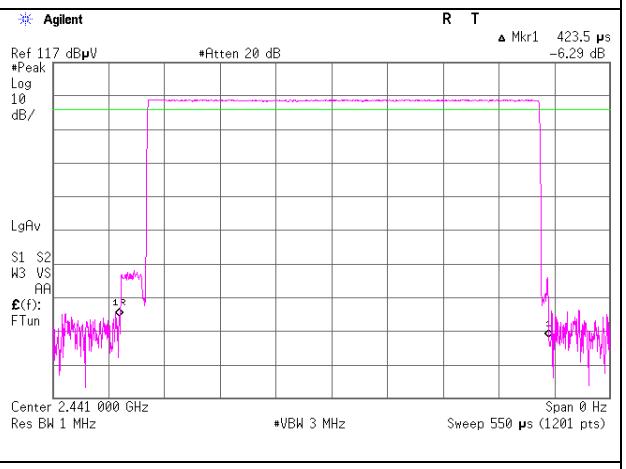


Dwell time

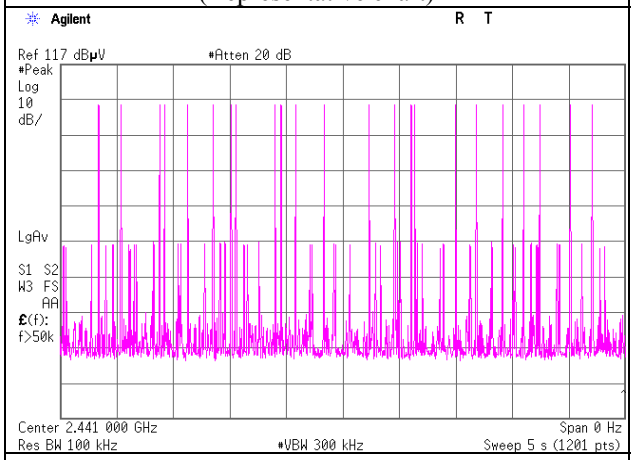
DH1 (1/2)
(Representative chart)



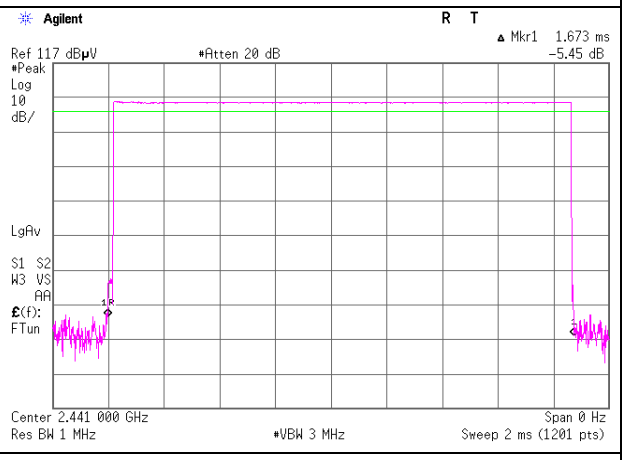
DH1 (2/2)



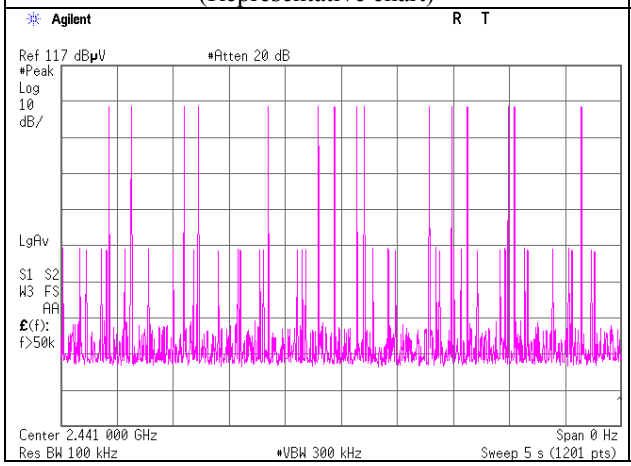
DH3 (1/2)
(Representative chart)



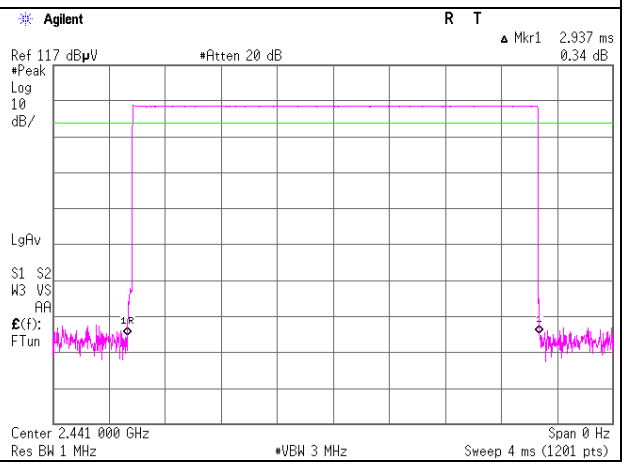
DH3 (2/2)



DH5 (1/2)
(Representative chart)

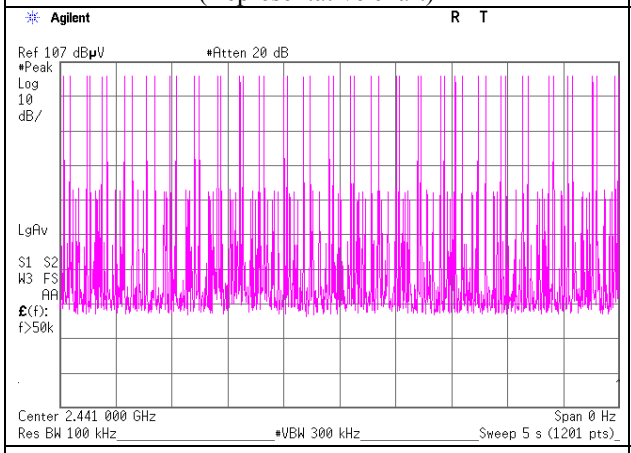


DH5 (2/2)

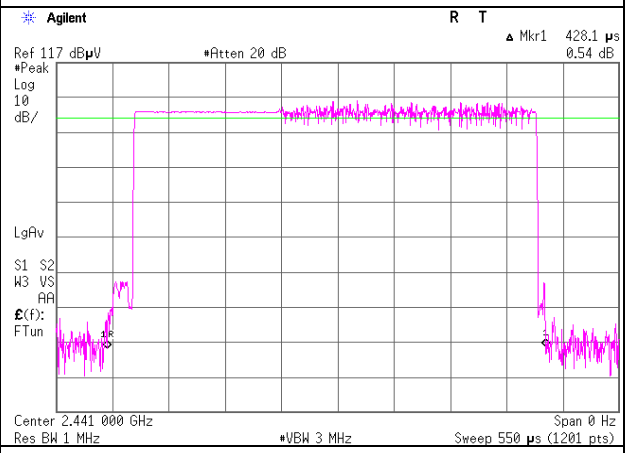


Dwell time

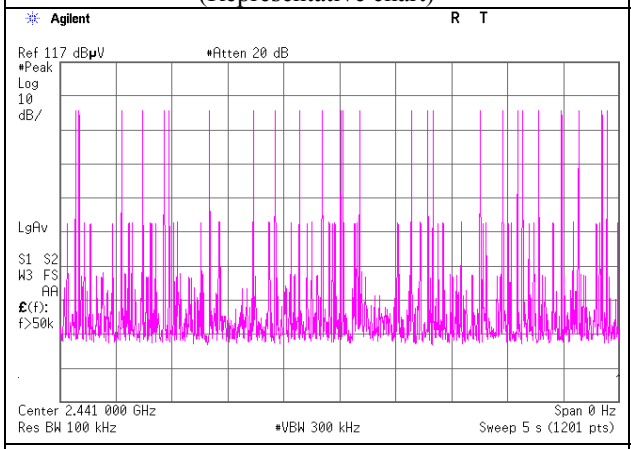
3DH1 (1/2)
(Representative chart)



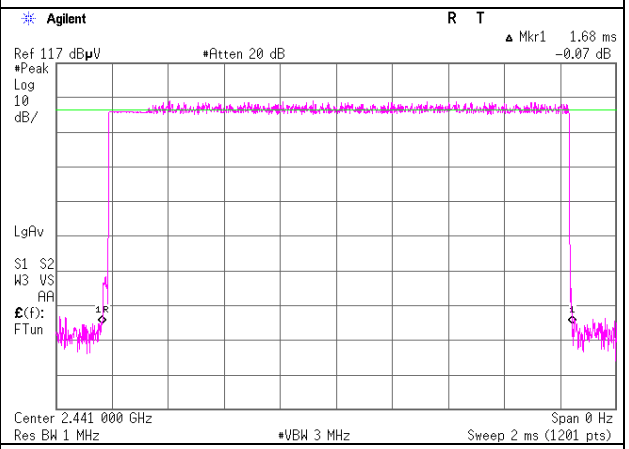
3DH1 (2/2)



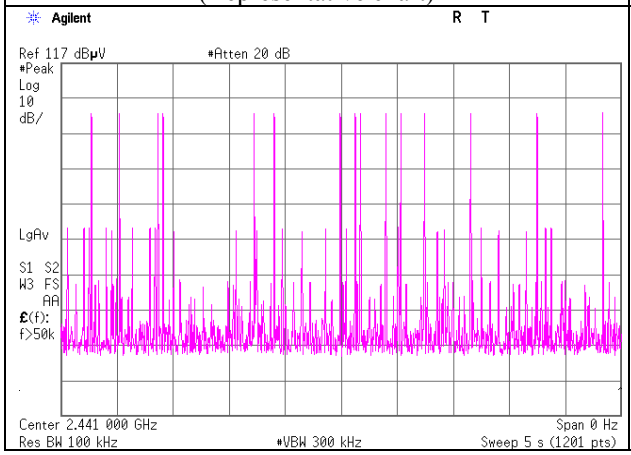
3DH3 (1/2)
(Representative chart)



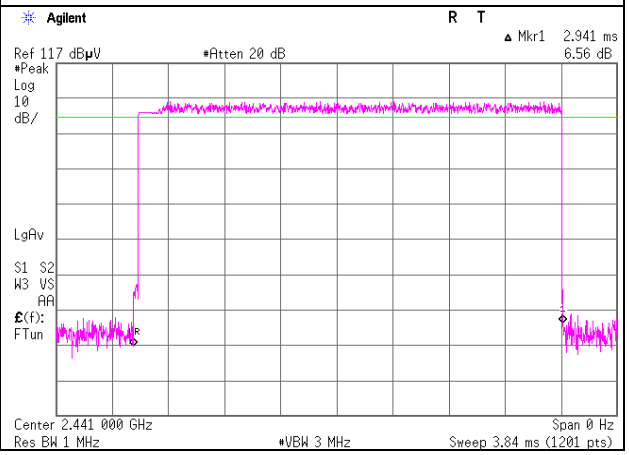
3DH3 (2/2)



3DH5 (1/2)
(Representative chart)



3DH5 (2/2)



Maximum Peak Output Power

Test place	Head Office EMC Lab. No.11 Measurement Room	
Report No.	10191363H	
Date	01/17/2014	01/21/2014
Temperature/ Humidity	24 deg.C/ 30% RH	24 deg.C/ 30% RH
Engineer	Tsubasa Takayama	Tomohisa Nakagawa
Mode	Tx (Hopping off) DH5/3DH5/Inquiry	

Mode	Freq.	Reading	Cable Loss	Atten.	Result		Limit		Margin
	[MHz]	[dBm]	[dB]	[dB]	[dBm]	[mW]	[dBm]	[mW]	[dB]
DH5	2402.0	-1.82	1.67	10.08	9.93	9.84	20.96	125	11.03
DH5	2441.0	-1.51	1.69	10.08	10.26	10.62	20.96	125	10.70
DH5	2480.0	-1.27	1.69	10.08	10.50	11.22	20.96	125	10.46
2DH5	2402.0	-1.59	1.67	10.08	10.16	10.38	20.96	125	10.80
2DH5	2441.0	-1.26	1.69	10.08	10.51	11.25	20.96	125	10.45
2DH5	2480.0	-1.07	1.69	10.08	10.70	11.75	20.96	125	10.26
3DH5	2402.0	-1.01	1.67	10.08	10.74	11.86	20.96	125	10.22
3DH5	2441.0	-0.65	1.69	10.08	11.12	12.94	20.96	125	9.84
3DH5	2480.0	-0.48	1.69	10.08	11.29	13.46	20.96	125	9.67
Inquiry	2441.0	-1.18	1.70	10.08	10.60	11.48	20.96	125	10.36

Sample Calculation:
Result = Reading + Cable Loss (including the cable(s) customer supplied)+ 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.

Average Output Power
(Reference data for SAR testing)

Test place	Head Office EMC Lab. No.11 Measurement Room
Report No.	10191363H
Date	01/17/2014
Temperature/ Humidity	24 deg.C/ 30% RH
Engineer	Tsubasa Takayama
Mode	Tx (Hopping off) DH5/2DH5/3DH5

Mode	Freq.	Reading	Cable Loss	Atten.	Result		Limit		Margin
	[MHz]	[dBm]	[dB]	[dB]	[dBm]	[mW]	[dBm]	[mW]	[dB]
DH5	2402.0	-3.02	1.67	10.08	8.73	7.46	20.97	125	12.24
DH5	2441.0	-2.71	1.69	10.08	9.06	8.05	20.97	125	11.91
DH5	2480.0	-2.47	1.69	10.08	9.30	8.51	20.97	125	11.67
2DH5	2402.0	-5.86	1.67	10.08	5.89	3.88	20.97	125	15.08
2DH5	2441.0	-5.54	1.69	10.08	6.23	4.20	20.97	125	14.74
2DH5	2480.0	-5.22	1.69	10.08	6.55	4.52	20.97	125	14.42
3DH5	2402.0	-5.82	1.67	10.08	5.93	3.92	20.97	125	15.04
3DH5	2441.0	-5.48	1.69	10.08	6.29	4.26	20.97	125	14.68
3DH5	2480.0	-5.13	1.69	10.08	6.64	4.61	20.97	125	14.33

Sample Calculation:
Result = Reading + Cable Loss + Attenuator

Radiated Spurious Emission

Test place	Head Office EMC Lab. No.2 Semi Anechoic Chamber	
Report No.	10191363H	
Date	03/12/2014	03/16/2014
Temperature/ Humidity	22 deg.C/ 35% RH	22 deg.C/ 28% RH
Engineer	Takumi Shimada (1-10GHz)	Takayuki Shimada (except for 1-10GHz)
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	80.000	QP	35.7	6.4	7.3	28.6	20.8	40.0	19.2	
Hori	800.674	QP	27.3	21.8	10.8	28.2	31.7	46.0	14.3	
Hori	2390.000	PK	46.0	27.0	2.4	34.7	40.7	73.9	33.2	
Hori	4804.000	PK	62.4	31.8	4.4	33.9	64.7	73.9	9.2	
Hori	7206.000	PK	46.0	35.7	5.2	33.8	53.1	73.9	20.8	
Hori	9608.000	PK	45.2	38.0	6.0	34.4	54.8	73.9	19.1	
Hori	12010.000	PK	57.0	39.5	-1.6	33.7	61.2	73.9	12.7	
Hori	19216.000	PK	59.9	40.2	-1.9	32.2	66.0	73.9	7.9	
Hori	2390.000	AV	33.5	27.0	2.4	34.7	28.2	53.9	25.7	
Vert	40.000	QP	32.9	14.6	6.8	28.6	25.7	40.0	14.3	
Vert	50.042	QP	31.0	10.8	7.0	28.5	20.3	40.0	19.7	
Vert	80.000	QP	45.6	6.4	7.3	28.6	30.7	40.0	9.3	
Vert	800.674	QP	24.6	21.8	10.8	28.2	29.0	46.0	17.0	
Vert	2390.000	PK	44.0	27.0	2.4	34.7	38.7	73.9	35.2	
Vert	4804.000	PK	61.5	31.8	4.4	33.9	63.8	73.9	10.1	
Vert	7206.000	PK	47.3	35.7	5.2	33.8	54.4	73.9	19.5	
Vert	9608.000	PK	44.8	38.0	6.0	34.4	54.4	73.9	19.5	
Vert	12010.000	PK	59.7	39.5	-1.6	33.7	63.9	73.9	10.0	
Vert	19216.000	PK	58.6	40.2	-1.9	32.2	64.7	73.9	9.2	
Vert	2390.000	AV	33.4	27.0	2.4	34.7	28.1	53.9	25.8	

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

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

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

Radiated Spurious Emission

Test place	Head Office EMC Lab. No.2 Semi Anechoic Chamber	
Report No.	10191363H	
Date	03/12/2014	03/16/2014
Temperature/ Humidity	22 deg.C/ 35% RH	22 deg.C/ 28% RH
Engineer	Takumi Shimada (1-10GHz)	Takayuki Shimada (except for 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	102.9	27.0	2.4	34.7	97.6	-	-	Carrier
Hori	2400.000	PK	44.3	27.0	2.4	34.7	39.0	77.6	38.6	
Hori	14412.000	PK	55.9	40.7	-0.6	32.5	63.5	77.6	14.1	
Hori	16814.000	PK	43.0	39.9	0.9	32.7	51.1	77.6	26.5	
Hori	21618.000	PK	49.9	39.9	-1.4	32.4	56.0	77.6	21.6	
Hori	24020.000	PK	47.6	39.9	-1.0	31.9	54.6	77.6	23.0	
Vert	2402.000	PK	103.0	27.0	2.4	34.7	97.7	-	-	Carrier
Vert	2400.000	PK	42.7	27.0	2.4	34.7	37.4	77.7	40.3	
Vert	14412.000	PK	56.3	40.7	-0.6	32.5	63.9	77.7	13.8	
Vert	16814.000	PK	41.6	39.9	0.9	32.7	49.7	77.7	28.0	
Vert	21618.000	PK	49.0	39.9	-1.4	32.4	55.1	77.7	22.6	
Vert	24020.000	PK	50.5	39.9	-1.0	31.9	57.5	77.7	20.2	

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	60.3	31.8	4.4	33.9	-23.7	38.9	53.9	15.0	
Hori	7206.000	AV	37.7	35.7	5.2	33.8	-23.7	21.1	53.9	32.8	
Hori	9608.000	AV	33.6	38.0	6.0	34.4	-23.7	19.5	53.9	34.4	
Hori	12010.000	AV	46.2	39.5	-1.6	33.7	-23.7	26.7	53.9	27.2	
Hori	19216.000	AV	44.8	40.2	-1.9	32.2	-23.7	27.2	53.9	26.7	
Vert	4804.000	AV	59.0	31.8	4.4	33.9	-23.7	37.6	53.9	16.3	
Vert	7206.000	AV	37.2	35.7	5.2	33.8	-23.7	20.6	53.9	33.3	
Vert	9608.000	AV	33.7	38.0	6.0	34.4	-23.7	19.6	53.9	34.3	
Vert	12010.000	AV	49.7	39.5	-1.6	33.7	-23.7	30.2	53.9	23.7	
Vert	19216.000	AV	44.1	40.2	-1.9	32.2	-23.7	26.5	53.9	27.4	

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.2 Semi Anechoic Chamber	
Report No.	10191363H	
Date	03/12/2014	03/16/2014
Temperature/ Humidity	22 deg.C/ 35% RH	22 deg.C/ 28% RH
Engineer	Takumi Shimada (1-10GHz)	Takayuki Shimada (except for 1-10GHz)
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	80.000	QP	35.5	6.4	7.3	28.6	20.6	40.0	19.4	
Hori	813.674	QP	27.5	21.8	10.8	28.1	32.0	46.0	14.0	
Hori	4882.000	PK	61.6	32.0	4.4	33.9	64.1	73.9	9.8	
Hori	7323.000	PK	46.3	35.8	5.3	33.8	53.6	73.9	20.3	
Hori	9764.000	PK	45.0	38.3	6.1	34.5	54.9	73.9	19.0	
Hori	12205.000	PK	53.9	39.5	-1.6	33.5	58.3	73.9	15.6	
Hori	19528.000	PK	63.8	40.4	-1.8	32.5	69.9	73.9	4.0	
Vert	40.000	QP	32.6	14.6	6.8	28.6	25.4	40.0	14.6	
Vert	50.042	QP	31.2	10.8	7.0	28.5	20.5	40.0	19.5	
Vert	80.000	QP	45.7	6.4	7.3	28.6	30.8	40.0	9.2	
Vert	813.674	QP	24.3	21.8	10.8	28.1	28.8	46.0	17.2	
Vert	4882.000	PK	65.6	32.0	4.4	33.9	68.1	73.9	5.8	
Vert	7323.000	PK	46.0	35.8	5.3	33.8	53.3	73.9	20.6	
Vert	9764.000	PK	45.2	38.3	6.1	34.5	55.1	73.9	18.8	
Vert	12205.000	PK	56.5	39.5	-1.6	33.5	60.9	73.9	13.0	
Vert	19528.000	PK	62.4	40.4	-1.8	32.5	68.5	73.9	5.4	

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

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

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

Radiated Spurious Emission

Test place	Head Office EMC Lab. No.2 Semi Anechoic Chamber	
Report No.	10191363H	
Date	03/12/2014	03/16/2014
Temperature/ Humidity	22 deg.C/ 35% RH	22 deg.C/ 28% RH
Engineer	Takumi Shimada (1-10GHz)	Takayuki Shimada (except for 1-10GHz)
Mode	Tx, DH5 2441MHz	

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	2441.000	PK	105.1	26.9	2.5	34.7	99.8	-	-	Carrier
Hori	14646.000	PK	51.6	41.0	-0.3	32.6	59.7	79.8	20.1	
Hori	17087.000	PK	49.1	41.0	1.0	32.5	58.6	79.8	21.2	
Hori	21969.000	PK	40.9	39.8	-1.4	31.9	47.4	79.8	32.4	
Hori	24410.000	PK	49.9	39.9	-0.9	32.5	56.4	79.8	23.4	
Vert	2441.000	PK	105.9	26.9	2.5	34.7	100.6	-	-	Carrier
Vert	14646.000	PK	53.0	41.0	-0.3	32.6	61.1	80.6	19.5	
Vert	17087.000	PK	47.1	41.0	1.0	32.5	56.6	80.6	24.0	
Vert	21969.000	PK	42.1	39.8	-1.4	31.9	48.6	80.6	32.0	
Vert	24410.000	PK	51.3	39.9	-0.9	32.5	57.8	80.6	22.8	

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	4882.000	AV	59.0	32.0	4.4	33.9	-23.7	37.8	53.9	16.1	
Hori	7323.000	AV	36.8	35.8	5.3	33.8	-23.7	20.4	53.9	33.5	
Hori	9764.000	AV	33.8	38.3	6.1	34.5	-23.7	20.0	53.9	33.9	
Hori	12205.000	AV	42.7	39.5	-1.6	33.5	-23.7	23.4	53.9	30.5	
Hori	19528.000	AV	49.3	40.4	-1.8	32.5	-23.7	31.7	53.9	22.2	
Vert	4882.000	AV	63.3	32.0	4.4	33.9	-23.7	42.1	53.9	11.8	
Vert	7323.000	AV	38.4	35.8	5.3	33.8	-23.7	22.0	53.9	31.9	
Vert	9764.000	AV	34.7	38.3	6.1	34.5	-23.7	20.9	53.9	33.0	
Vert	12205.000	AV	46.2	39.5	-1.6	33.5	-23.7	26.9	53.9	27.0	
Vert	19528.000	AV	47.9	40.4	-1.8	32.5	-23.7	30.3	53.9	23.6	

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.2 Semi Anechoic Chamber	
Report No.	10191363H	
Date	03/12/2014	03/16/2014
Temperature/ Humidity	22 deg.C/ 35% RH	22 deg.C/ 28% RH
Engineer	Takumi Shimada (1-10GHz)	Takayuki Shimada (except for 1-10GHz)
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	80.000	QP	35.5	6.4	7.3	28.6	20.6	40.0	19.4	
Hori	826.681	QP	27.4	21.9	10.9	28.1	32.1	46.0	13.9	
Hori	2483.500	PK	50.9	26.9	2.5	34.7	45.6	73.9	28.3	
Hori	4960.000	PK	60.1	32.2	4.4	34.0	62.7	73.9	11.2	
Hori	7440.000	PK	46.8	35.8	5.3	33.9	54.0	73.9	19.9	
Hori	9920.000	PK	45.8	38.7	6.1	34.5	56.1	73.9	17.8	
Hori	12400.000	PK	47.3	39.4	-1.4	33.4	51.9	73.9	22.0	
Hori	19840.000	PK	63.6	40.7	-1.7	32.8	69.8	73.9	4.1	
Hori	22320.000	PK	45.6	39.8	-1.3	31.8	52.3	73.9	21.6	
Hori	2483.500	AV	38.7	26.9	2.5	34.7	33.4	53.9	20.5	
Vert	40.000	QP	32.3	14.6	6.8	28.6	25.1	40.0	14.9	
Vert	50.042	QP	31.4	10.8	7.0	28.5	20.7	40.0	19.3	
Vert	80.000	QP	45.4	6.4	7.3	28.6	30.5	40.0	9.5	
Vert	826.681	QP	24.4	21.9	10.9	28.1	29.1	46.0	16.9	
Vert	2483.500	PK	50.0	26.9	2.5	34.7	44.7	73.9	29.2	
Vert	4960.000	PK	62.7	32.2	4.4	34.0	65.3	73.9	8.6	
Vert	7440.000	PK	48.8	35.8	5.3	33.9	56.0	73.9	17.9	
Vert	9920.000	PK	45.0	38.7	6.1	34.5	55.3	73.9	18.7	
Vert	12400.000	PK	49.7	39.4	-1.4	33.4	54.3	73.9	19.6	
Vert	19840.000	PK	62.6	40.7	-1.7	32.8	68.8	73.9	5.1	
Vert	22320.000	PK	47.3	39.8	-1.3	31.8	54.0	73.9	19.9	
Vert	2483.500	AV	37.9	26.9	2.5	34.7	32.6	53.9	21.3	

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

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

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

Radiated Spurious Emission

Test place	Head Office EMC Lab. No.2 Semi Anechoic Chamber	
Report No.	10191363H	
Date	03/12/2014	03/16/2014
Temperature/ Humidity	22 deg.C/ 35% RH	22 deg.C/ 28% RH
Engineer	Takumi Shimada (1-10GHz)	Takayuki Shimada (except for 1-10GHz)
Mode	Tx, DH5 2480MHz	

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	2480.000	PK	106.3	26.9	2.5	34.7	101.0	-	-	Carrier
Hori	14880.000	PK	49.8	41.3	-0.2	32.8	58.1	81.0	22.9	
Hori	17360.000	PK	42.2	43.4	1.1	32.4	54.3	81.0	26.7	
Hori	24800.000	PK	47.3	40.0	-0.8	33.0	53.5	81.0	27.5	
Vert	2480.000	PK	106.3	26.9	2.5	34.7	101.0	-	-	Carrier
Vert	14880.000	PK	50.0	41.3	-0.2	32.8	58.3	81.0	22.7	
Vert	17360.000	PK	41.7	43.4	1.1	32.4	53.8	81.0	27.2	
Vert	24800.000	PK	50.5	40.0	-0.8	33.0	56.7	81.0	24.3	

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	4960.000	AV	58.2	32.2	4.4	34.0	-23.7	37.1	53.9	16.8	
Hori	7440.000	AV	37.2	35.8	5.3	33.9	-23.7	20.7	53.9	33.2	
Hori	9920.000	AV	33.5	38.7	6.1	34.5	-23.7	20.1	53.9	33.8	
Hori	12400.000	AV	35.5	39.4	-1.4	33.4	-23.7	16.4	53.9	37.5	
Hori	19840.000	AV	48.7	40.7	-1.7	32.8	-23.7	31.2	53.9	22.7	
Hori	22320.000	AV	33.1	39.8	-1.3	31.8	-23.7	16.1	53.9	37.8	
Vert	4960.000	AV	60.9	32.2	4.4	34.0	-23.7	39.8	53.9	14.1	
Vert	7440.000	AV	41.5	35.8	5.3	33.9	-23.7	25.0	53.9	28.9	
Vert	9920.000	AV	35.1	38.7	6.1	34.5	-23.7	21.7	53.9	32.2	
Vert	12400.000	AV	37.9	39.4	-1.4	33.4	-23.7	18.8	53.9	35.1	
Vert	19840.000	AV	47.9	40.7	-1.7	32.8	-23.7	30.4	53.9	23.5	
Vert	22320.000	AV	33.4	39.8	-1.3	31.8	-23.7	16.4	53.9	37.5	

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.2 Semi Anechoic Chamber
Report No. 10191363H
Date 03/16/2014
Temperature/ Humidity 22 deg.C/ 28% RH
Engineer Takayuki Shimada
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	80.000	QP	35.4	6.4	7.3	28.6	20.5	40.0	19.5	
Hori	800.674	QP	27.3	21.8	10.8	28.2	31.7	46.0	14.3	
Hori	2390.000	PK	60.7	27.0	3.0	34.7	56.0	73.9	17.9	
Hori	4804.000	PK	59.2	31.8	5.4	33.9	62.5	73.9	11.4	
Hori	7206.000	PK	50.4	35.7	6.5	33.8	58.8	73.9	15.1	
Hori	9608.000	PK	44.8	38.0	7.2	34.4	55.6	73.9	18.3	
Hori	12010.000	PK	55.7	39.5	-1.6	33.7	59.9	73.9	14.0	
Hori	19216.000	PK	59.6	40.2	-1.9	32.2	65.7	73.9	8.2	
Hori	2390.000	AV	38.3	27.0	3.0	34.7	33.6	53.9	20.3	
Vert	40.000	QP	32.7	14.6	6.8	28.6	25.5	40.0	14.5	
Vert	50.041	QP	31.6	10.8	7.0	28.5	20.9	40.0	19.1	
Vert	80.000	QP	45.6	6.4	7.3	28.6	30.7	40.0	9.3	
Vert	800.674	QP	24.5	21.8	10.8	28.2	28.9	46.0	17.1	
Vert	2390.000	PK	55.9	27.0	3.0	34.7	51.2	73.9	22.7	
Vert	4804.000	PK	63.0	31.8	5.4	33.9	66.3	73.9	7.6	
Vert	7206.000	PK	51.8	35.7	6.5	33.8	60.2	73.9	13.7	
Vert	9608.000	PK	43.8	38.0	7.2	34.4	54.6	73.9	19.3	
Vert	12010.000	PK	58.6	39.5	-1.6	33.7	62.8	73.9	11.1	
Vert	19216.000	PK	58.5	40.2	-1.9	32.2	64.6	73.9	9.3	
Vert	2390.000	AV	35.0	27.0	3.0	34.7	30.3	53.9	23.6	

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 10GHz)) - Gain(Amplifier)
*Other frequency noises omitted in this report were not seen or had enough margin (more than 20dB).
Distance factor: 10GHz-26.5GHz 20log(3.0m/1.0m)= 9.5dB
26.5GHz-40GHz 20log(3.0m/0.5m)=15.6dB

Radiated Spurious Emission

Test place Head Office EMC Lab. No.2 Semi Anechoic Chamber
Report No. 10191363H
Date 03/16/2014
Temperature/ Humidity 22 deg.C/ 28% RH
Engineer Takayuki Shimada
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	105.3	27.0	3.0	34.7	100.6	-	-	Carrier
Hori	2400.000	PK	66.1	27.0	3.0	34.7	61.4	80.6	19.2	
Hori	14412.000	PK	52.9	40.7	-0.6	32.5	60.5	80.6	20.1	
Hori	16814.000	PK	44.1	39.9	0.9	32.7	52.2	80.6	28.4	
Hori	21618.000	PK	43.7	39.9	-1.4	32.4	49.8	80.6	30.8	
Hori	24020.000	PK	47.3	39.9	-1.0	31.9	54.3	80.6	26.3	
Vert	2402.000	PK	103.0	27.0	3.0	34.7	98.3	-	-	Carrier
Vert	2400.000	PK	60.8	27.0	3.0	34.7	56.1	78.3	22.2	
Vert	14412.000	PK	54.1	40.7	-0.6	32.5	61.7	78.3	16.6	
Vert	16814.000	PK	43.3	39.9	0.9	32.7	51.4	78.3	26.9	
Vert	21618.000	PK	40.4	39.9	-1.4	32.4	46.5	78.3	31.8	
Vert	24020.000	PK	49.7	39.9	-1.0	31.9	56.7	78.3	21.6	

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	51.2	31.8	5.4	33.9	-23.7	30.8	53.9	23.1	
Hori	7206.000	AV	41.4	35.7	6.5	33.8	-23.7	26.1	53.9	27.8	
Hori	9608.000	AV	32.1	38.0	7.2	34.4	-23.7	19.2	53.9	34.7	
Hori	12010.000	AV	43.1	39.5	-1.6	33.7	-23.7	23.6	53.9	30.3	
Hori	19216.000	AV	47.6	40.2	-1.9	32.2	-23.7	30.0	53.9	23.9	
Vert	4804.000	AV	55.3	31.8	5.4	33.9	-23.7	34.9	53.9	19.0	
Vert	7206.000	AV	42.0	35.7	6.5	33.8	-23.7	26.7	53.9	27.2	
Vert	9608.000	AV	32.1	38.0	7.2	34.4	-23.7	19.2	53.9	34.7	
Vert	12010.000	AV	46.4	39.5	-1.6	33.7	-23.7	26.9	53.9	27.0	
Vert	19216.000	AV	46.8	40.2	-1.9	32.2	-23.7	29.2	53.9	24.7	

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.2 Semi Anechoic Chamber
Report No. 10191363H
Date 03/16/2014
Temperature/ Humidity 22 deg.C/ 28% RH
Engineer Takayuki Shimada
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	80.000	QP	35.5	6.4	7.3	28.6	20.6	40.0	19.4	
Hori	813.675	QP	26.8	21.8	10.8	28.1	31.3	46.0	14.7	
Hori	4882.000	PK	61.4	32.0	5.4	33.9	64.9	73.9	9.0	
Hori	7323.000	PK	48.5	35.8	6.6	33.8	57.1	73.9	16.8	
Hori	9764.000	PK	43.5	38.3	7.3	34.5	54.6	73.9	19.3	
Hori	12205.000	PK	52.5	39.5	-1.6	33.5	56.9	73.9	17.0	
Hori	19528.000	PK	62.3	40.4	-1.8	32.5	68.4	73.9	5.5	
Vert	40.000	QP	32.2	14.6	6.8	28.6	25.0	40.0	15.0	
Vert	50.042	QP	31.5	10.8	7.0	28.5	20.8	40.0	19.2	
Vert	80.000	QP	45.9	6.4	7.3	28.6	31.0	40.0	9.0	
Vert	813.675	QP	24.5	21.8	10.8	28.1	29.0	46.0	17.0	
Vert	4882.000	PK	63.6	32.0	5.4	33.9	67.1	73.9	6.8	
Vert	7323.000	PK	48.6	35.8	6.6	33.8	57.2	73.9	16.7	
Vert	9764.000	PK	43.2	38.3	7.3	34.5	54.3	73.9	19.6	
Vert	12205.000	PK	54.9	39.5	-1.6	33.5	59.3	73.9	14.6	
Vert	19528.000	PK	62.1	40.4	-1.8	32.5	68.2	73.9	5.7	

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 10GHz)) - Gain(Amplifier)
*Other frequency noises omitted in this report were not seen or had enough margin (more than 20dB).
Distance factor: 10GHz-26.5GHz 20log(3.0m/1.0m)= 9.5dB
26.5GHz-40GHz 20log(3.0m/0.5m)=15.6dB

Radiated Spurious Emission

Test place Head Office EMC Lab. No.2 Semi Anechoic Chamber
Report No. 10191363H
Date 03/16/2014
Temperature/ Humidity 22 deg.C/ 28% RH
Engineer Takayuki Shimada
Mode Tx, 3DH5 2441MHz

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	2441.000	PK	110.5	26.9	3.1	34.7	105.8	-	-	Carrier
Hori	14646.000	PK	50.7	41.0	-0.3	32.6	58.8	85.8	27.0	
Hori	17087.000	PK	48.6	41.0	1.0	32.5	58.1	85.8	27.7	
Hori	21969.000	PK	38.0	39.8	-1.4	31.9	44.5	85.8	41.3	
Hori	24410.000	PK	43.6	39.9	-0.9	32.5	50.1	85.8	35.7	
Vert	2441.000	PK	102.6	26.9	3.1	34.7	97.9	-	-	Carrier
Vert	14646.000	PK	50.0	41.0	-0.3	32.6	58.1	77.9	19.8	
Vert	17087.000	PK	44.6	41.0	1.0	32.5	54.1	77.9	23.8	
Vert	21969.000	PK	39.8	39.8	-1.4	31.9	46.3	77.9	31.6	
Vert	24410.000	PK	47.3	39.9	-0.9	32.5	53.8	77.9	24.1	

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	4882.000	AV	52.5	32.0	5.4	33.9	-23.7	32.3	53.9	21.6	
Hori	7323.000	AV	37.8	35.8	6.6	33.8	-23.7	22.7	53.9	31.2	
Hori	9764.000	AV	32.1	38.3	7.3	34.5	-23.7	19.5	53.9	34.4	
Hori	12205.000	AV	39.7	39.5	-1.6	33.5	-23.7	20.4	53.9	33.5	
Hori	19528.000	AV	50.7	40.4	-1.8	32.5	-23.7	33.1	53.9	20.8	
Vert	4882.000	AV	55.4	32.0	5.4	33.9	-23.7	35.2	53.9	18.7	
Vert	7323.000	AV	38.9	35.8	6.6	33.8	-23.7	23.8	53.9	30.1	
Vert	9764.000	AV	31.9	38.3	7.3	34.5	-23.7	19.3	53.9	34.6	
Vert	12205.000	AV	41.8	39.5	-1.6	33.5	-23.7	22.5	53.9	31.4	
Vert	19528.000	AV	50.3	40.4	-1.8	32.5	-23.7	32.7	53.9	21.2	

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.2 Semi Anechoic Chamber
Report No.	10191363H
Date	03/16/2014
Temperature/ Humidity	22 deg.C/ 28% RH
Engineer	Takayuki Shimada
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	80.000	QP	35.5	6.4	7.3	28.6	20.6	40.0	19.4	
Hori	826.680	QP	27.3	21.9	10.9	28.1	32.0	46.0	14.0	
Hori	2483.500	PK	66.6	26.9	3.1	34.7	61.9	73.9	12.0	
Hori	4960.000	PK	60.4	32.2	5.4	34.0	64.0	73.9	9.9	
Hori	7440.000	PK	51.0	35.8	6.6	33.9	59.5	73.9	14.4	
Hori	9920.000	PK	44.2	38.7	7.3	34.5	55.7	73.9	18.2	
Hori	12400.000	PK	50.9	39.4	-1.4	33.4	55.5	73.9	18.4	
Hori	19840.000	PK	61.9	40.7	-1.7	32.8	68.1	73.9	5.8	
Hori	22320.000	PK	45.2	39.8	-1.3	31.8	51.9	73.9	22.0	
Hori	2483.500	AV	50.7	26.9	3.1	34.7	46.0	53.9	7.9	
Vert	40.000	QP	32.4	14.6	6.8	28.6	25.2	40.0	14.8	
Vert	50.042	QP	32.0	10.8	7.0	28.5	21.3	40.0	18.7	
Vert	80.000	QP	46.0	6.4	7.3	28.6	31.1	40.0	8.9	
Vert	826.680	QP	24.7	21.9	10.9	28.1	29.4	46.0	16.6	
Vert	2483.500	PK	59.2	26.9	3.1	34.7	54.5	73.9	19.4	
Vert	4960.000	PK	62.5	32.2	5.4	34.0	66.1	73.9	7.8	
Vert	7440.000	PK	51.4	35.8	6.6	33.9	59.9	73.9	14.0	
Vert	9920.000	PK	43.8	38.7	7.3	34.5	55.3	73.9	18.6	
Vert	12400.000	PK	53.7	39.4	-1.4	33.4	58.3	73.9	15.6	
Vert	19840.000	PK	61.9	40.7	-1.7	32.8	68.1	73.9	5.8	
Vert	22320.000	PK	46.4	39.8	-1.3	31.8	53.1	73.9	20.8	
Vert	2483.500	AV	44.1	26.9	3.1	34.7	39.4	53.9	14.5	

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).

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.2 Semi Anechoic Chamber
Report No. 10191363H
Date 03/16/2014
Temperature/ Humidity 22 deg.C/ 28% RH
Engineer Takayuki Shimada
Mode Tx, 3DH5 2480MHz

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	2480.000	PK	111.4	26.9	3.1	34.7	106.7	-	-	Carrier
Hori	14880.000	PK	52.0	41.3	-0.2	32.8	60.3	86.7	26.4	
Hori	17360.000	PK	47.2	43.4	1.1	32.4	59.3	86.7	27.4	
Hori	24800.000	PK	45.9	40.0	-0.8	33.0	52.1	86.7	34.6	
Vert	2480.000	PK	104.2	26.9	3.1	34.7	99.5	-	-	Carrier
Vert	14880.000	PK	52.9	41.3	-0.2	32.8	61.2	79.5	18.3	
Vert	17360.000	PK	44.6	43.4	1.1	32.4	56.7	79.5	22.8	
Vert	24800.000	PK	47.9	40.0	-0.8	33.0	54.1	79.5	25.4	

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	4960.000	AV	51.1	32.2	5.4	34.0	-23.7	31.0	53.9	22.9	
Hori	7440.000	AV	41.5	35.8	6.6	33.9	-23.7	26.3	53.9	27.6	
Hori	9920.000	AV	32.4	38.7	7.3	34.5	-23.7	20.2	53.9	33.7	
Hori	12400.000	AV	39.7	39.4	-1.4	33.4	-23.7	20.6	53.9	33.3	
Hori	19840.000	AV	50.8	40.7	-1.7	32.8	-23.7	33.3	53.9	20.6	
Hori	22320.000	AV	32.3	39.8	-1.3	31.8	-23.7	15.3	53.9	38.6	
Vert	4960.000	AV	53.6	32.2	5.4	34.0	-23.7	33.5	53.9	20.4	
Vert	7440.000	AV	41.9	35.8	6.6	33.9	-23.7	26.7	53.9	27.2	
Vert	9920.000	AV	32.4	38.7	7.3	34.5	-23.7	20.2	53.9	33.7	
Vert	12400.000	AV	42.7	39.4	-1.4	33.4	-23.7	23.6	53.9	30.3	
Vert	19840.000	AV	50.4	40.7	-1.7	32.8	-23.7	32.9	53.9	21.0	
Vert	22320.000	AV	33.6	39.8	-1.3	31.8	-23.7	16.6	53.9	37.3	

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

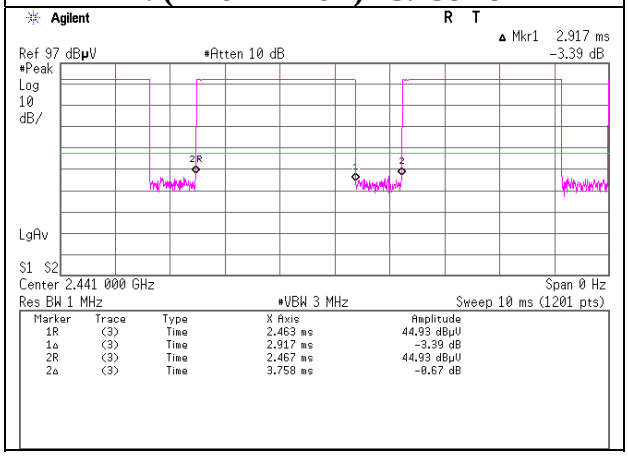
*Other frequency noises omitted in this report were not seen or had enough margin (more than 20dB).

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

VBW (AV) Calculation

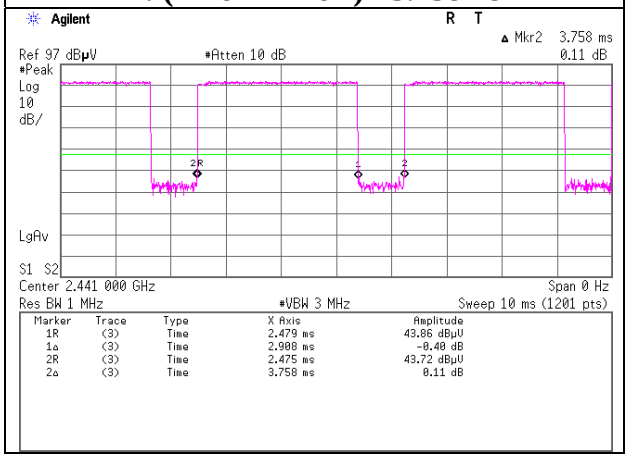
DH5

VBW: 10Hz
x: (Tx on+Tx off) =3.758ms



3DH5

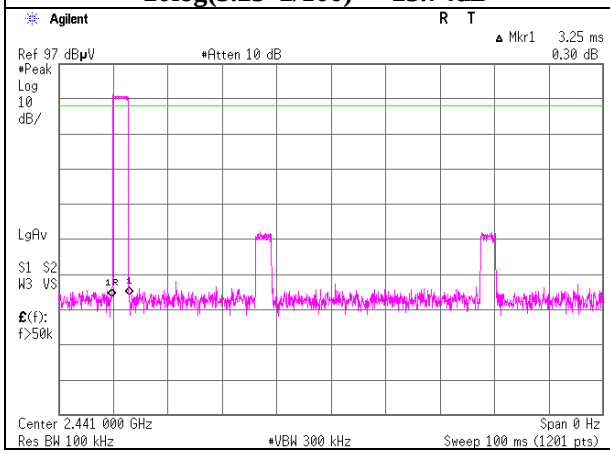
VBW: 10Hz
x: (Tx on+Tx off) =3.758ms

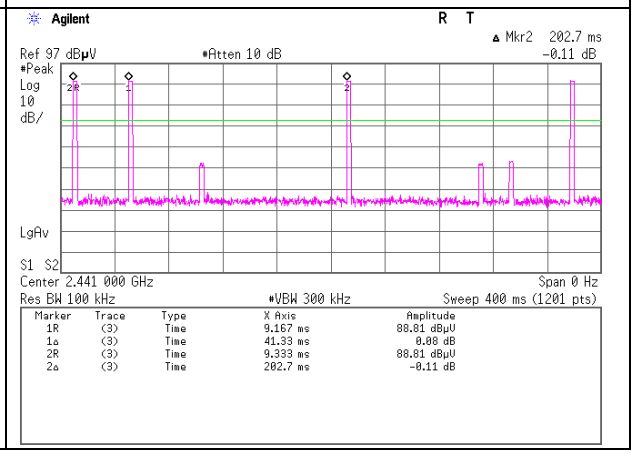


Dwell time factor

DH5

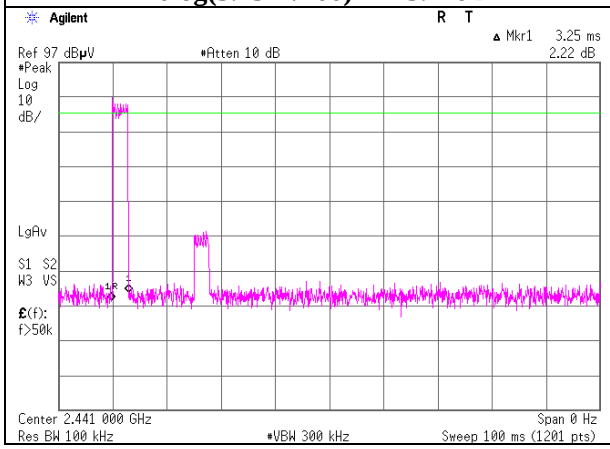
Worst 100ms	1cycle time
Dwell time factor = 20log(3.25*2/100) = -23.74dB	41.33ms

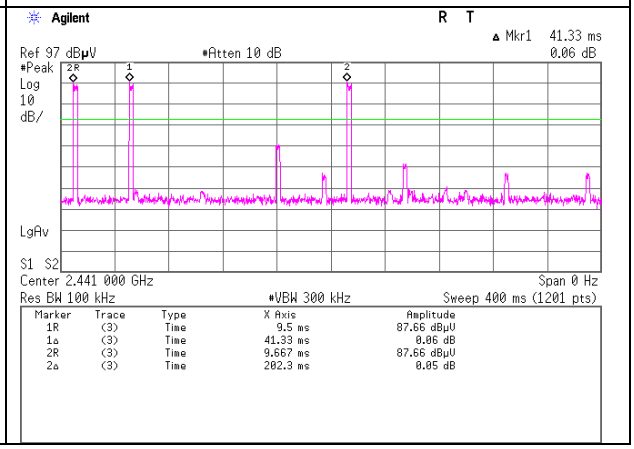




3DH5

Worst 100ms	1cycle time
Dwell time factor = 20log(3.25*2/100) = -23.74dB	41.33ms



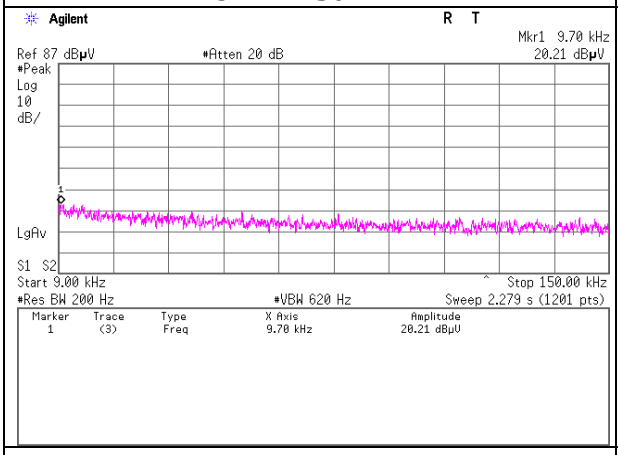


Conducted Spurious Emission

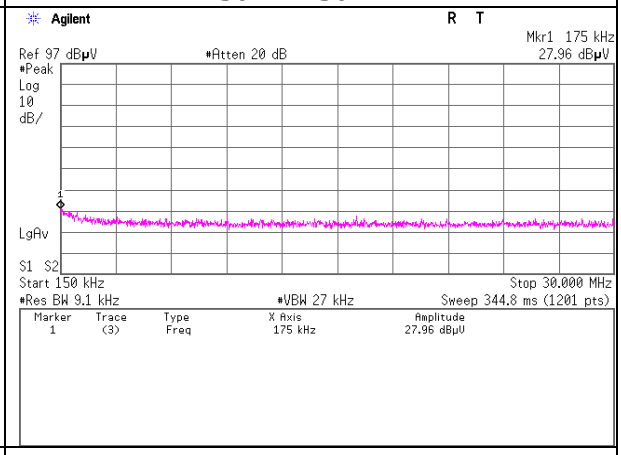
Test place	Head Office EMC Lab. No.11 Measurement Room
Report No.	10191363H
Date	01/17/2014
Temperature/ Humidity	24 deg.C/ 30% RH
Engineer	Tsubasa Takayama
Mode	Tx (Hopping off) DH5

Tx DH5 2402MHz

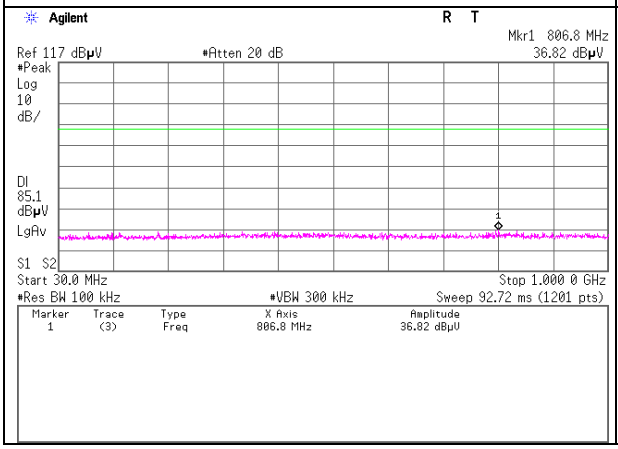
9kHz-150kHz



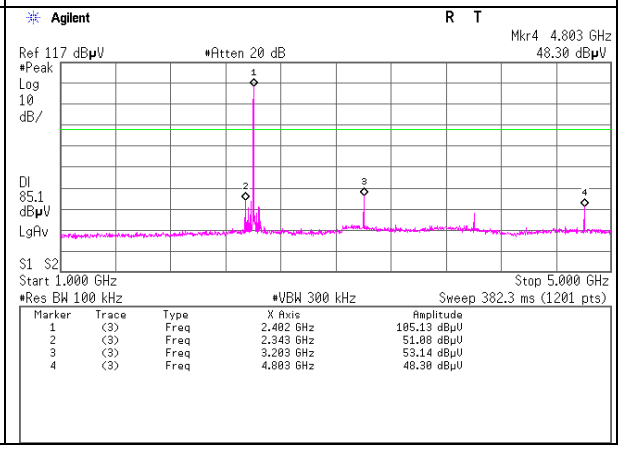
150kHz-30MHz



30MHz-1GHz



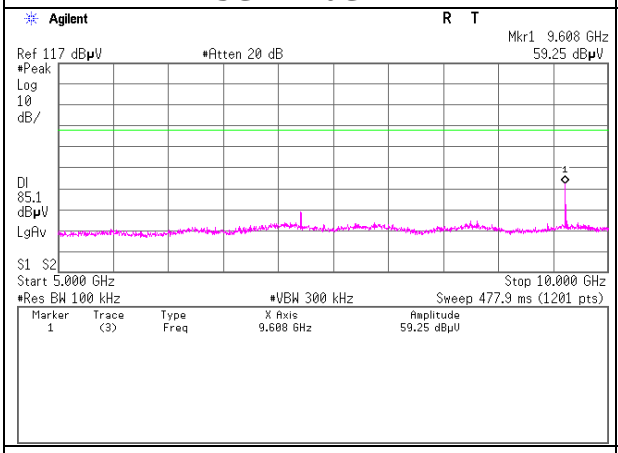
1GHz-5GHz



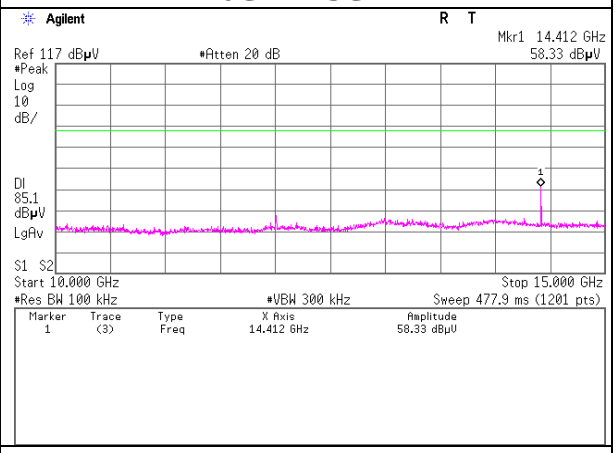
Conducted Spurious Emission

Tx DH5 2402MHz

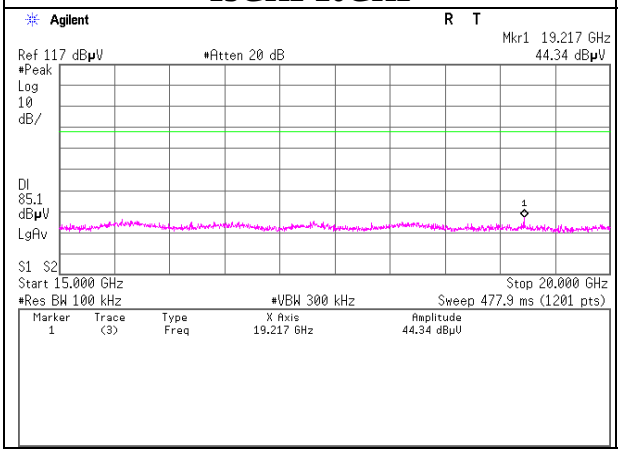
5GHz-10GHz



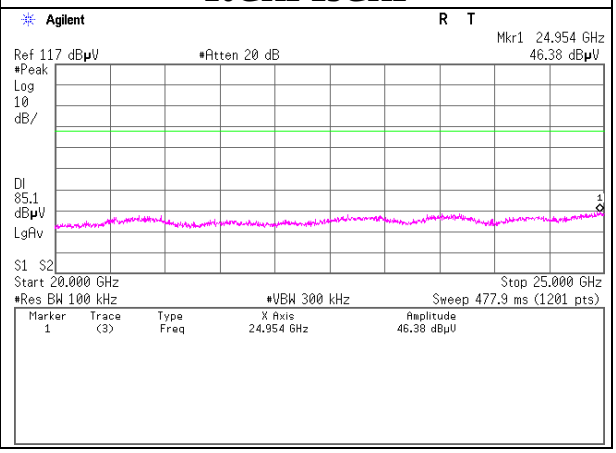
10GHz-15GHz



15GHz-20GHz



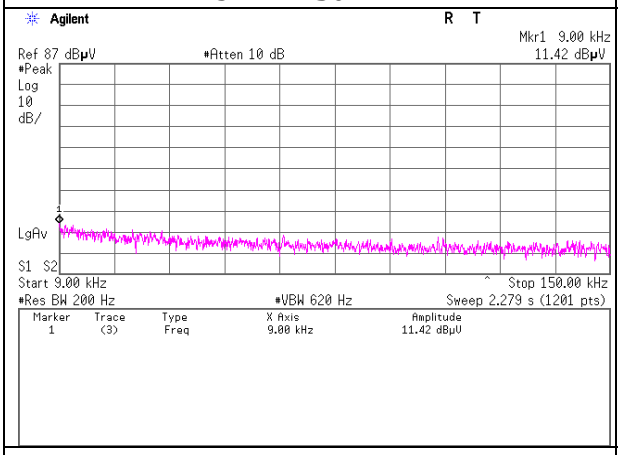
20GHz-25GHz



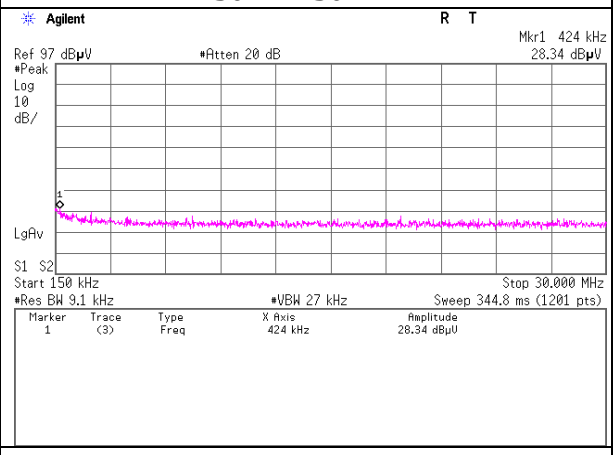
Conducted Spurious Emission

Tx DH5 2441MHz

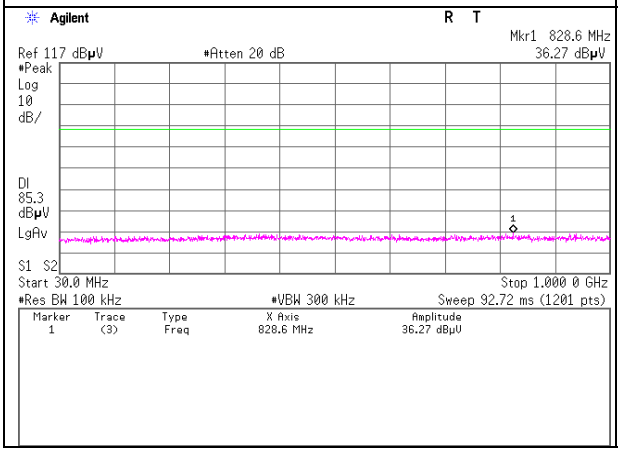
9kHz-150kHz



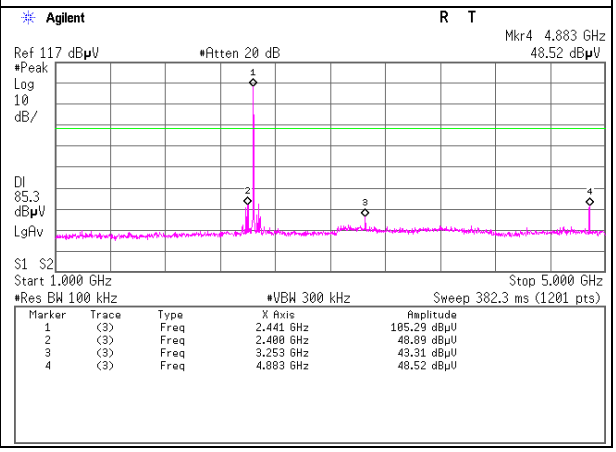
150kHz-30MHz



30MHz-1GHz



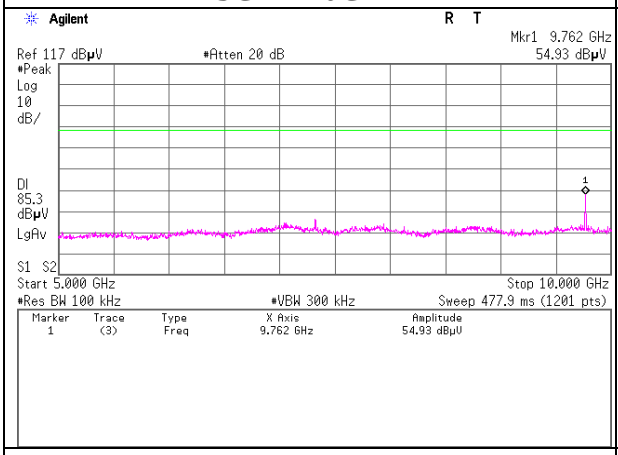
1GHz-5GHz



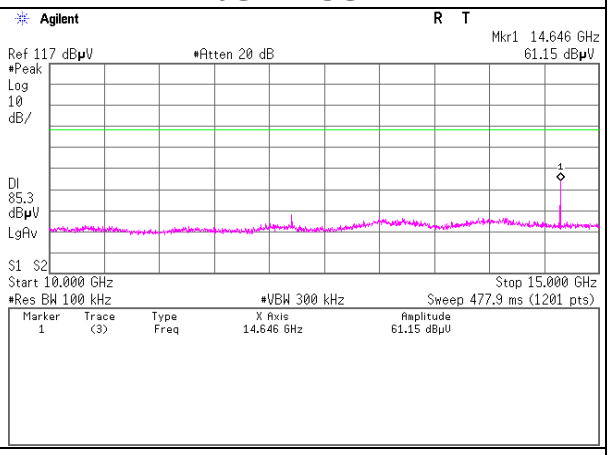
Conducted Spurious Emission

Tx DH5 2441MHz

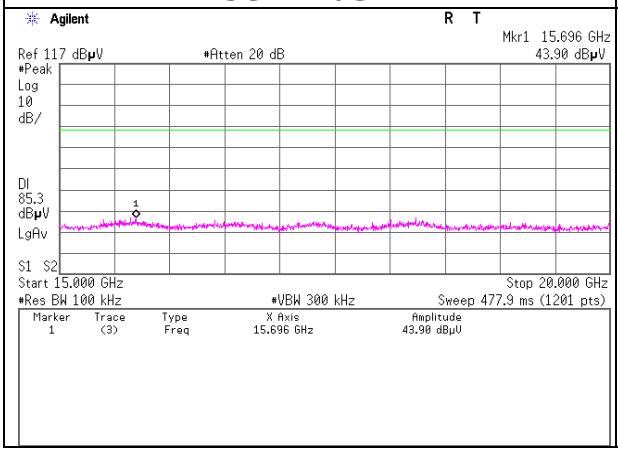
5GHz-10GHz



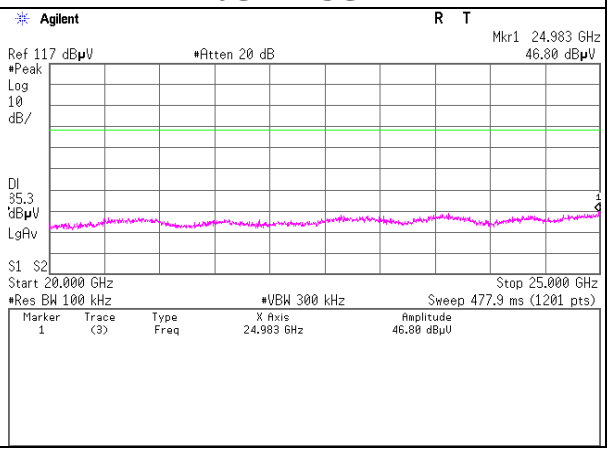
10GHz-15GHz



15GHz-20GHz



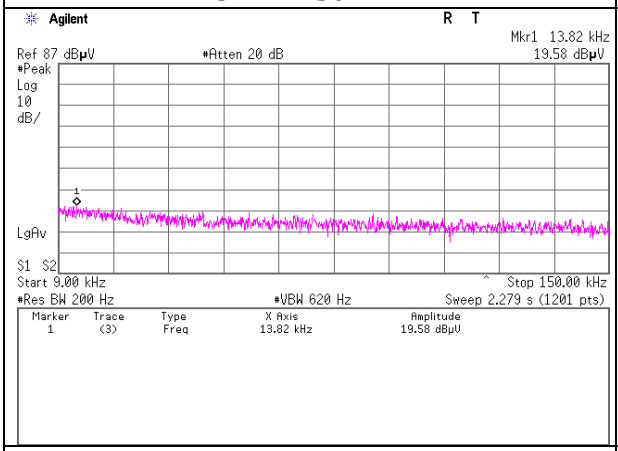
20GHz-25GHz



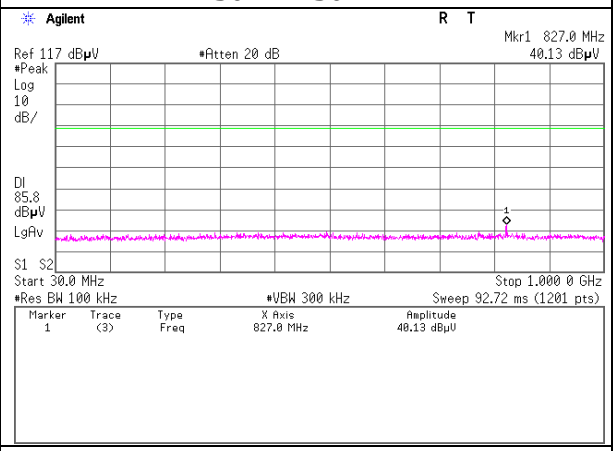
Conducted Spurious Emission

Tx DH5 2480MHz

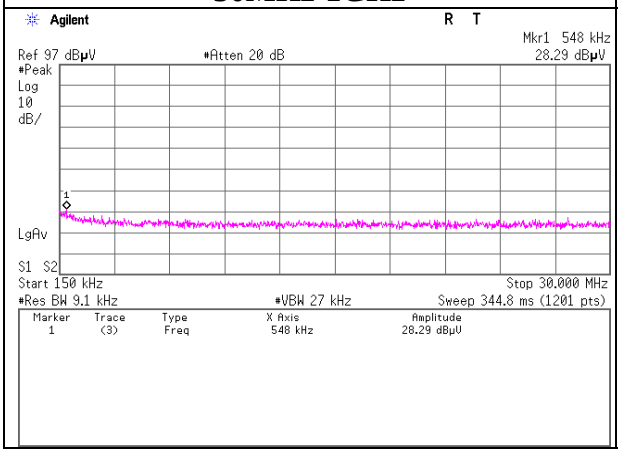
9kHz-150kHz



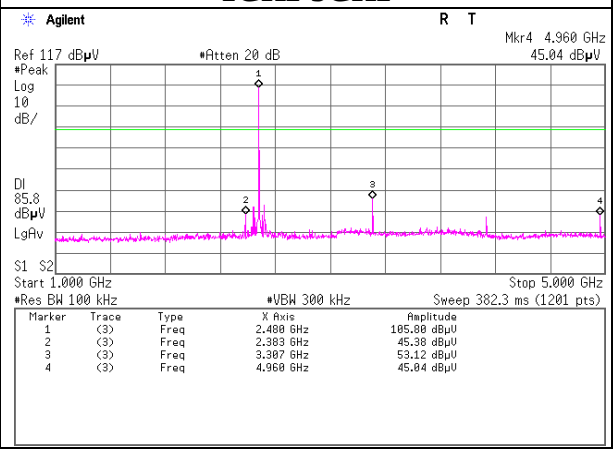
150kHz-30MHz



30MHz-1GHz



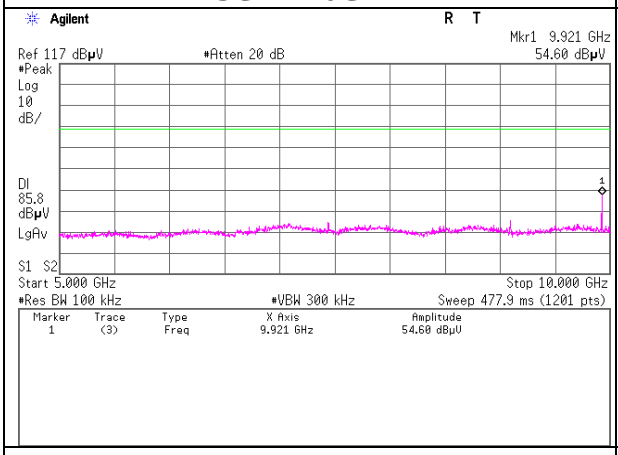
1GHz-5GHz



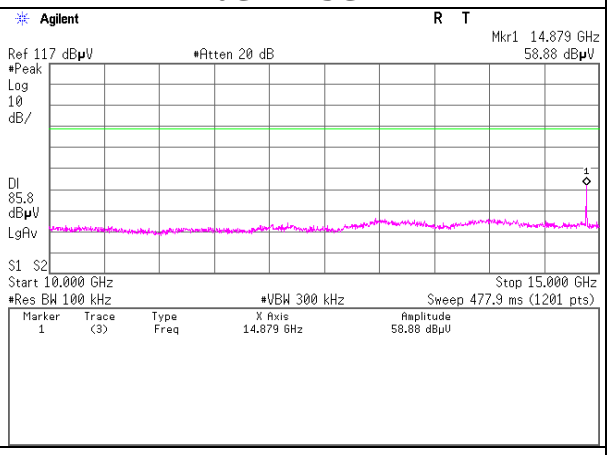
Conducted Spurious Emission

Tx DH5 2480MHz

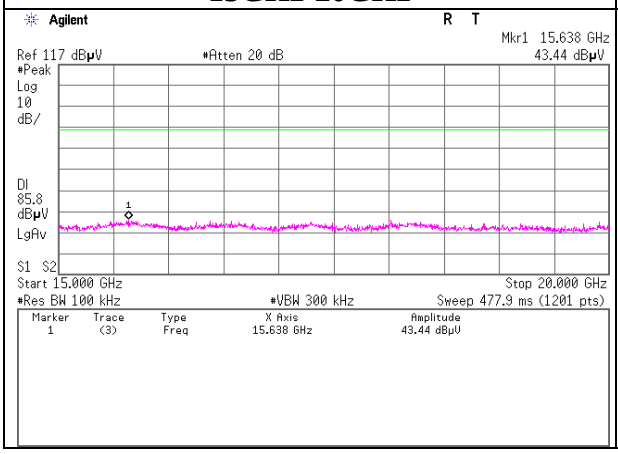
5GHz-10GHz



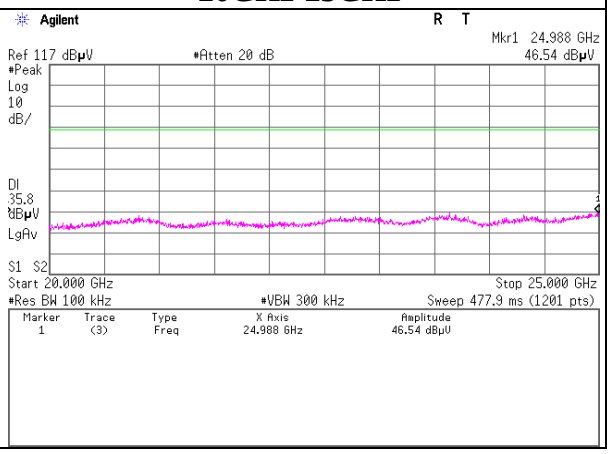
10GHz-15GHz



15GHz-20GHz



20GHz-25GHz

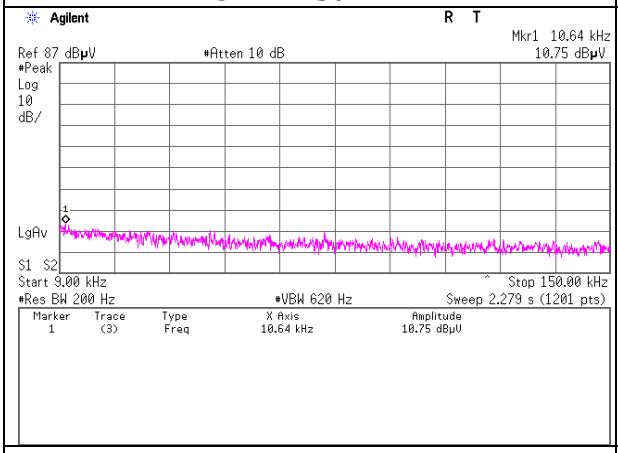


Conducted Spurious Emission

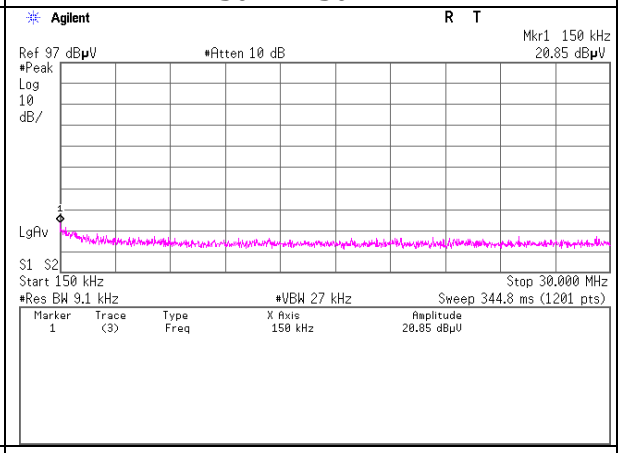
Test place	Head Office EMC Lab. No.11 Measurement Room
Report No.	10191363H
Date	01/17/2014
Temperature/ Humidity	24 deg.C/ 30% RH
Engineer	Tsubasa Takayama
Mode	Tx (Hopping off) 3DH5

Tx 3DH5 2402MHz

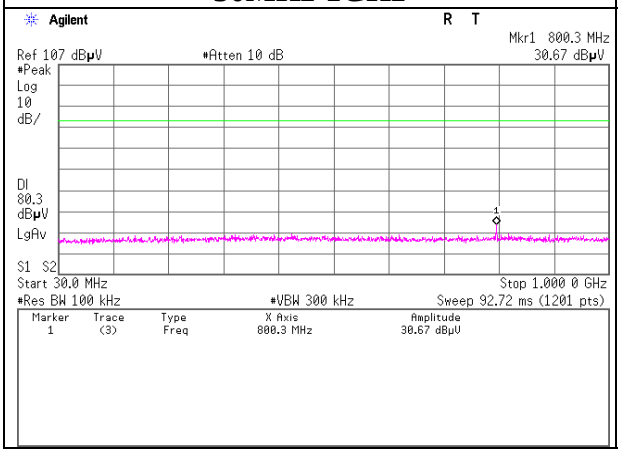
9kHz-150kHz



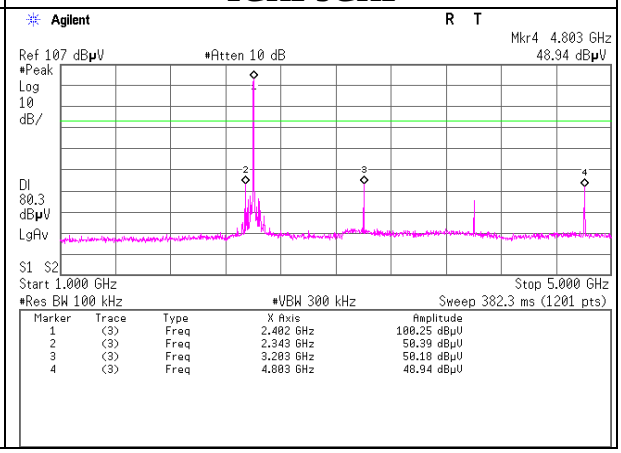
150kHz-30MHz



30MHz-1GHz



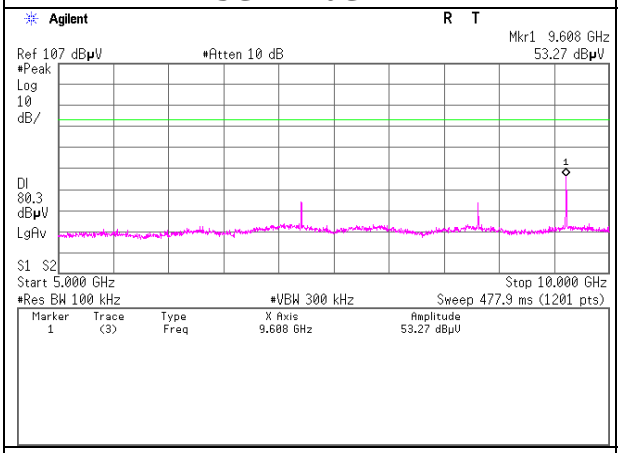
1GHz-5GHz



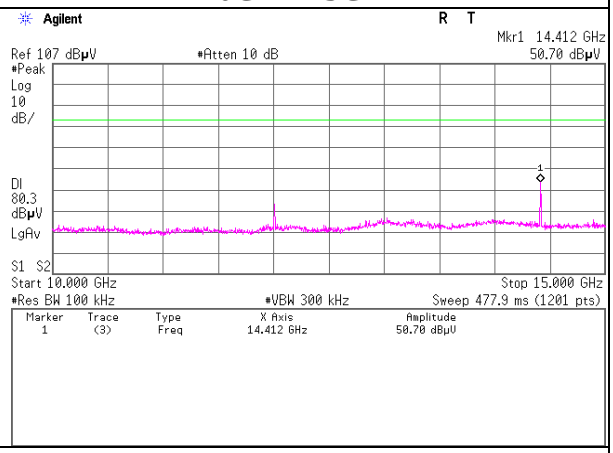
Conducted Spurious Emission

Tx 3DH5 2402MHz

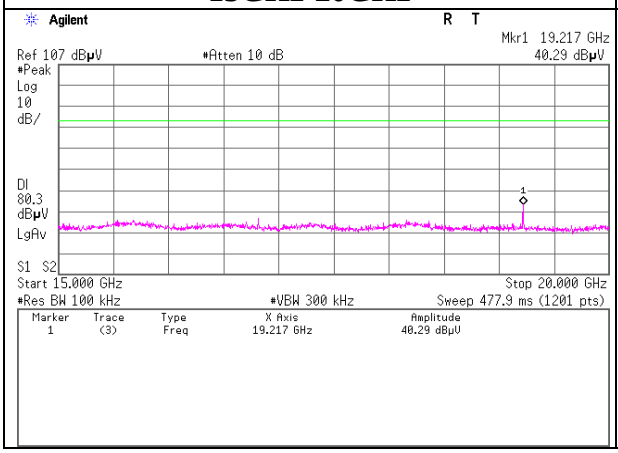
5GHz-10GHz



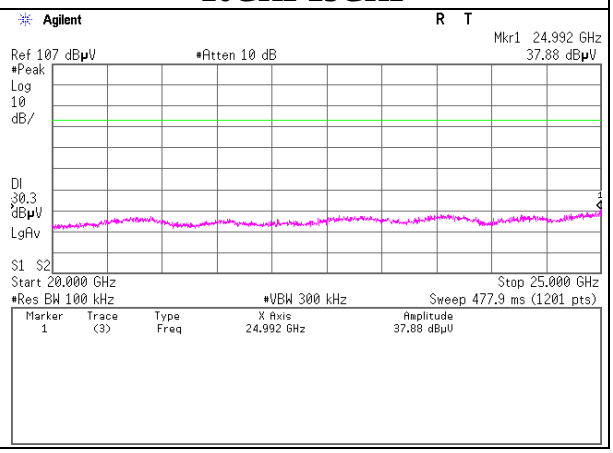
10GHz-15GHz



15GHz-20GHz



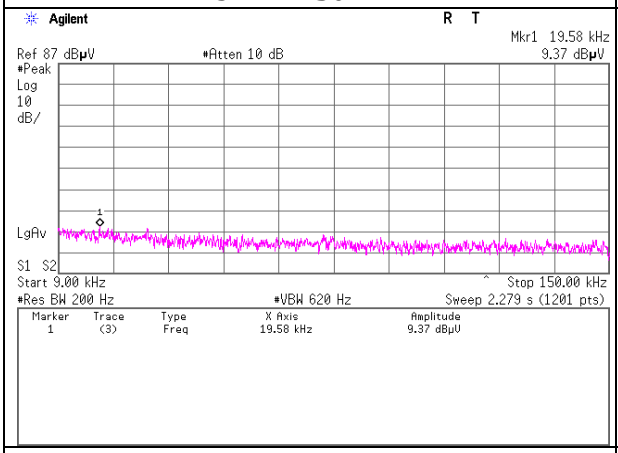
20GHz-25GHz



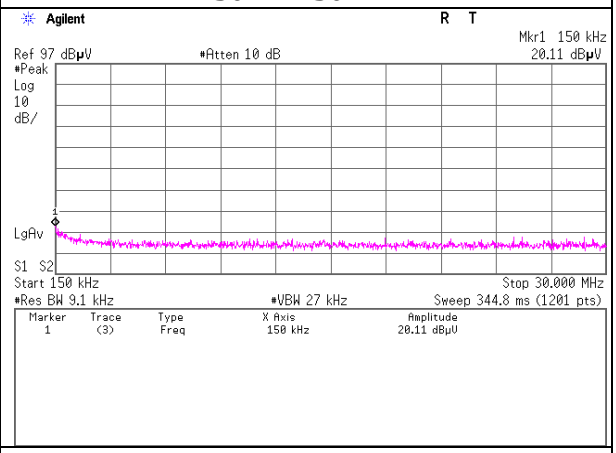
Conducted Spurious Emission

Tx 3DH5 2441MHz

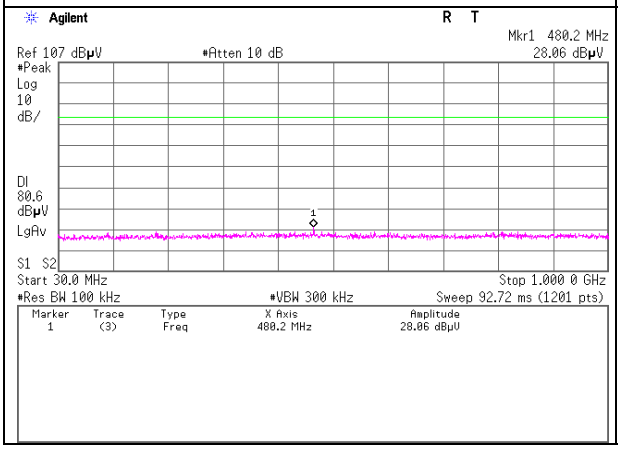
9kHz-150kHz



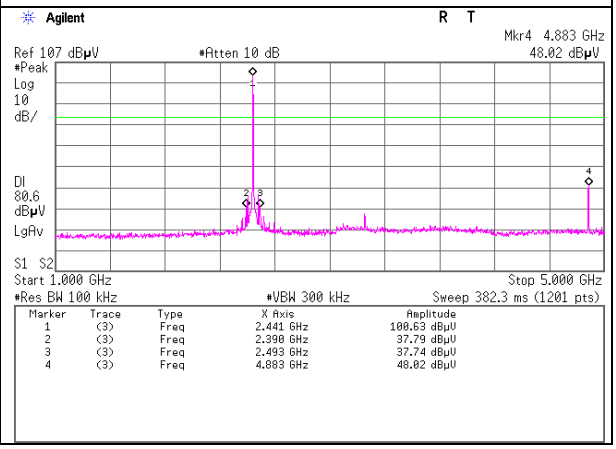
150kHz-30MHz



30MHz-1GHz



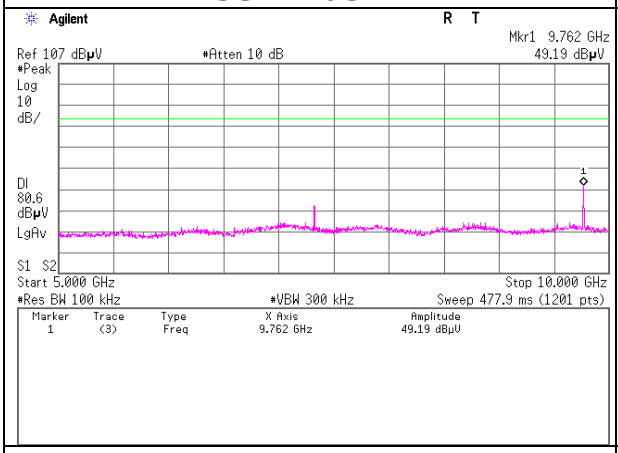
1GHz-5GHz



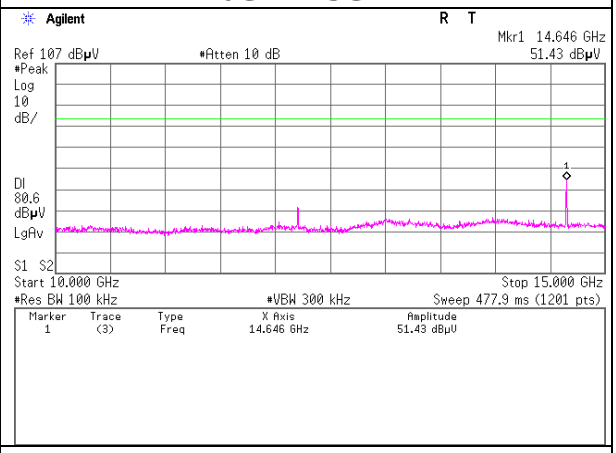
Conducted Spurious Emission

Tx 3DH5 2441MHz

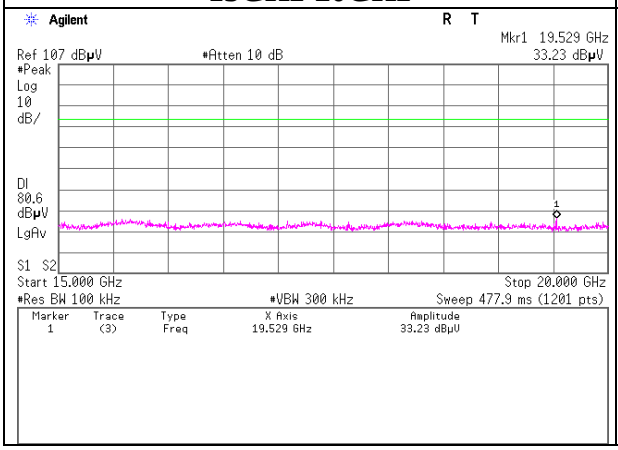
5GHz-10GHz



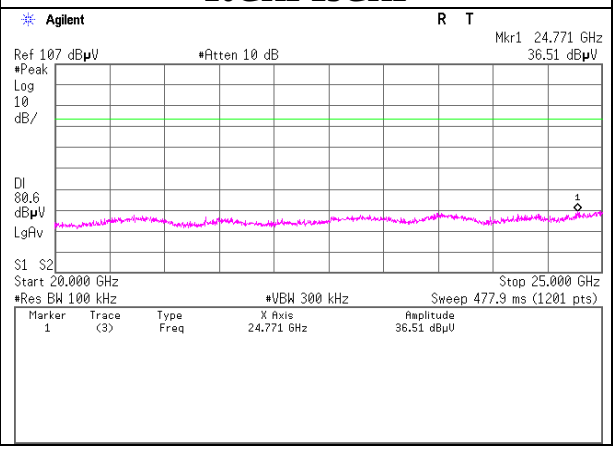
10GHz-15GHz



15GHz-20GHz



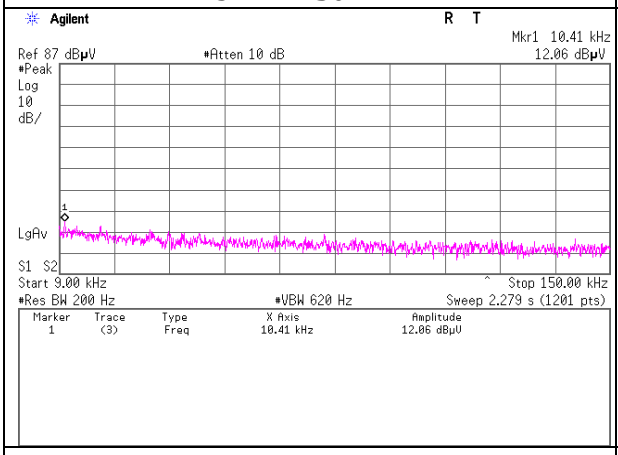
20GHz-25GHz



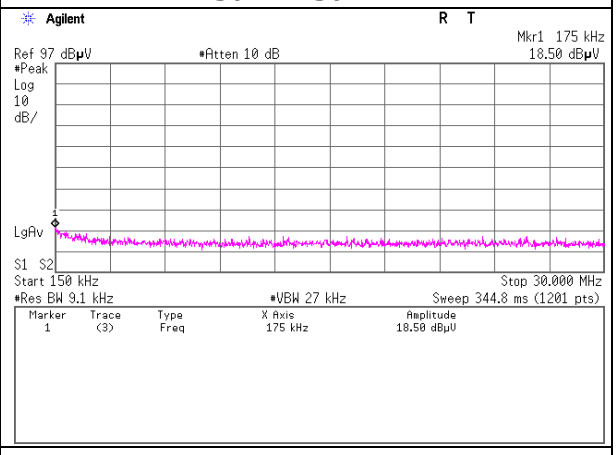
Conducted Spurious Emission

Tx 3DH5 2480MHz

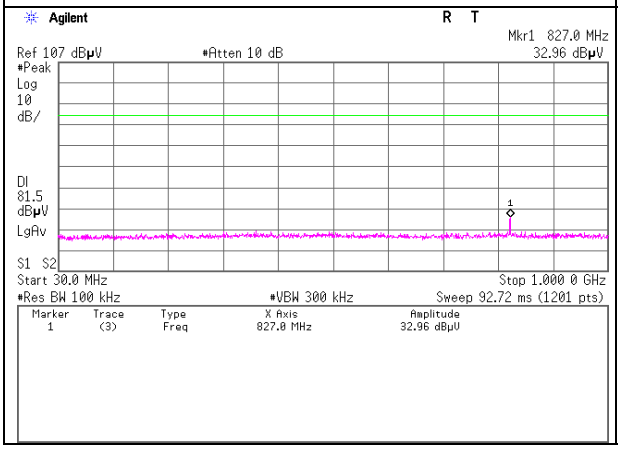
9kHz-150kHz



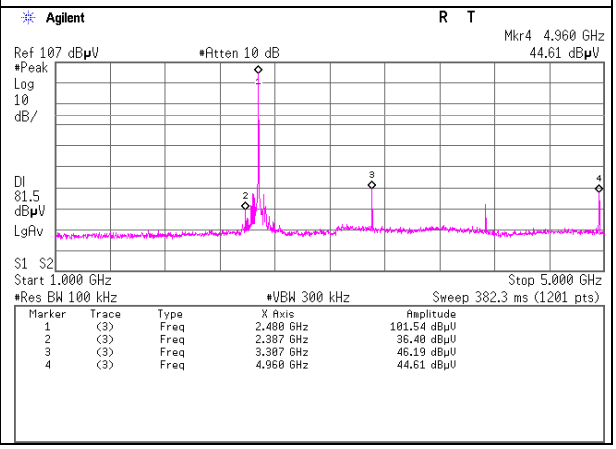
150kHz-30MHz



30MHz-1GHz



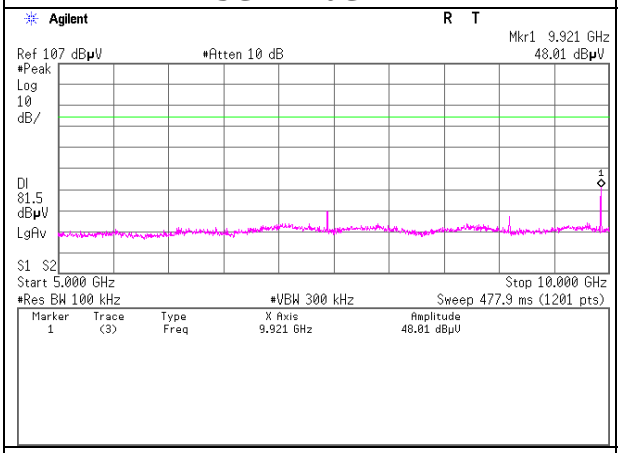
1GHz-5GHz



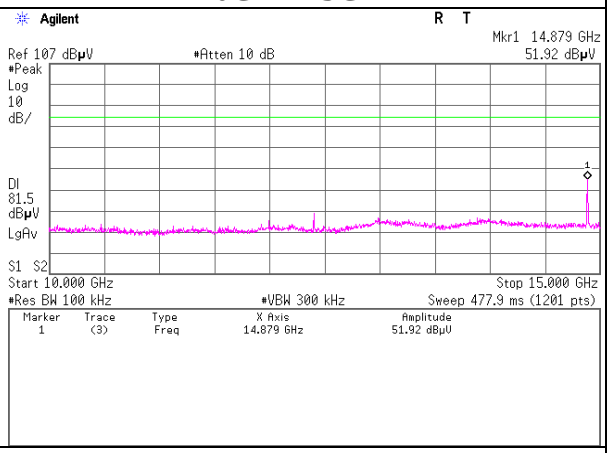
Conducted Spurious Emission

Tx 3DH5 2480MHz

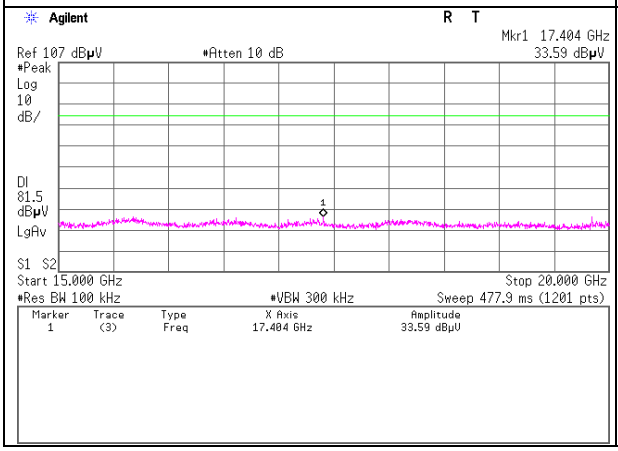
5GHz-10GHz



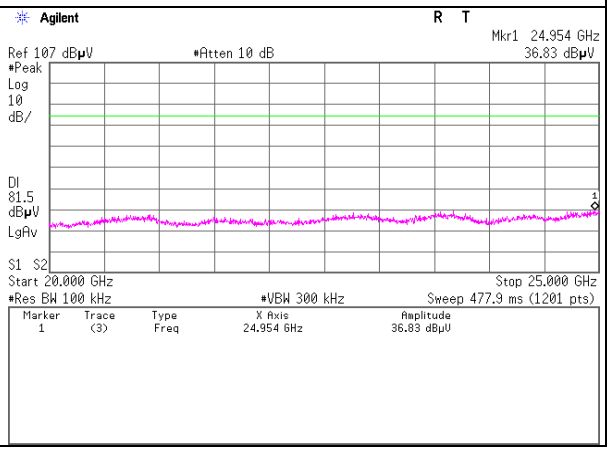
10GHz-15GHz



15GHz-20GHz



20GHz-25GHz

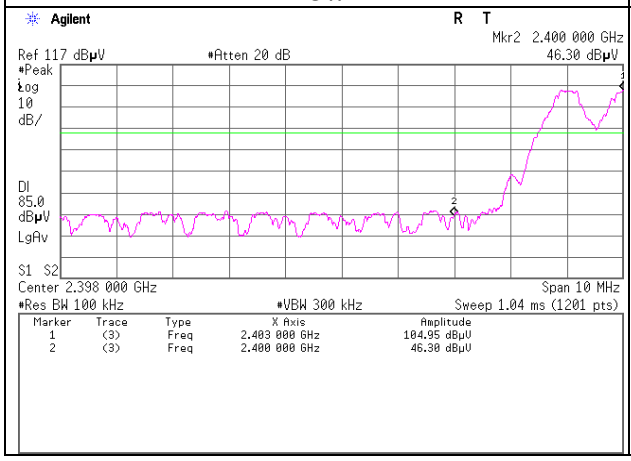


Conducted Emission Band Edge compliance

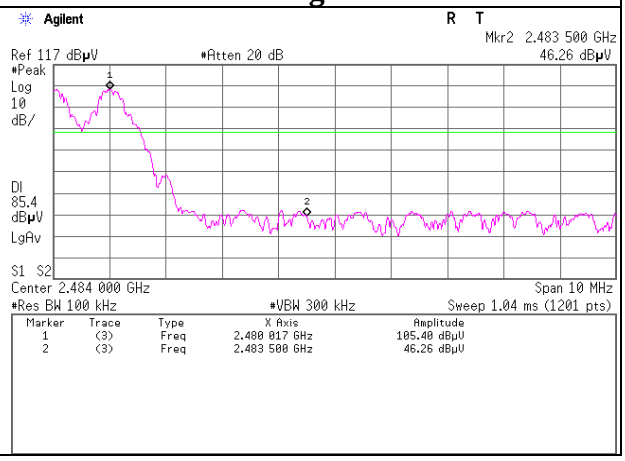
Test place	Head Office EMC Lab. No.11 Measurement Room
Report No.	10191363H
Date	01/17/2014
Temperature/ Humidity	24 deg.C/ 30% RH
Engineer	Tsubasa Takayama
Mode	Tx (Hopping on/off) DH5

Tx DH5, Hopping on

Low

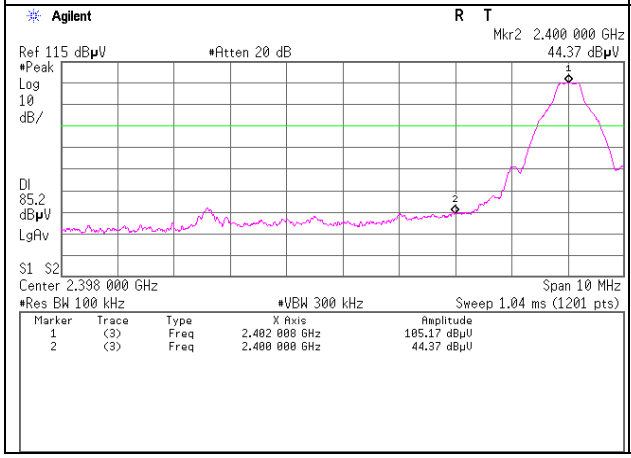


High

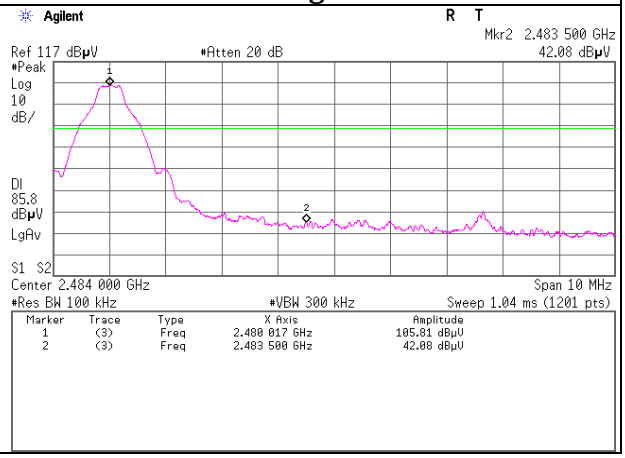


Tx DH5, Hopping off

Low



High

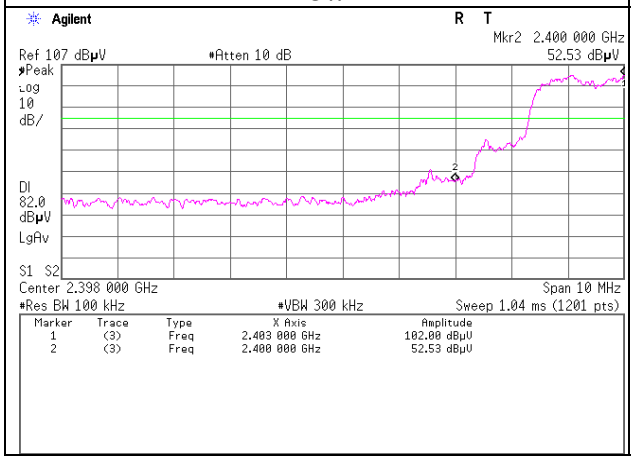


Conducted Emission Band Edge compliance

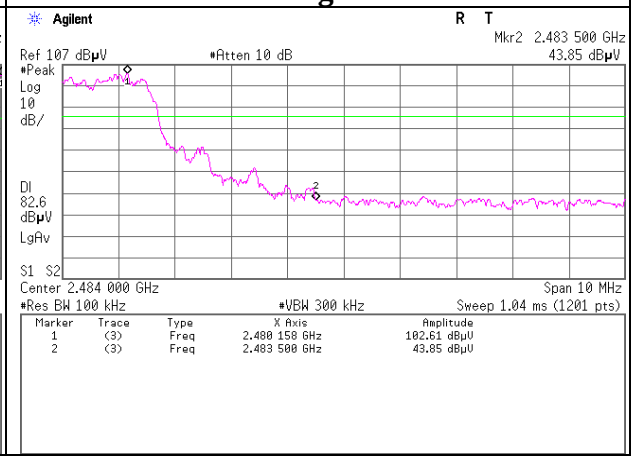
Test place	Head Office EMC Lab. No.11 Measurement Room
Report No.	10191363H
Date	01/17/2014
Temperature/ Humidity	24 deg.C/ 30% RH
Engineer	Tsubasa Takayama
Mode	Tx (Hopping on/off) 3DH5

Tx 3DH5, Hopping on

Low

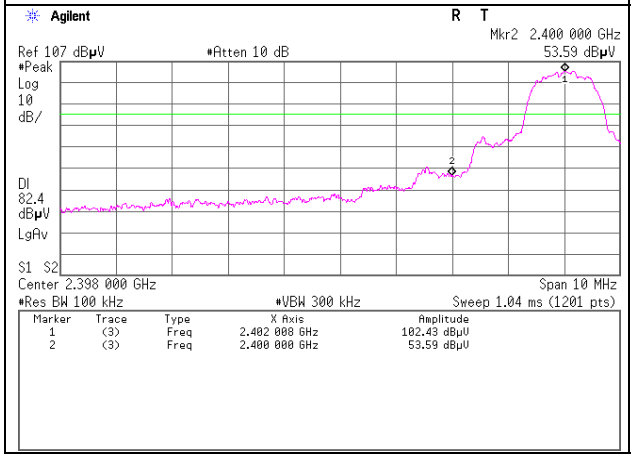


High

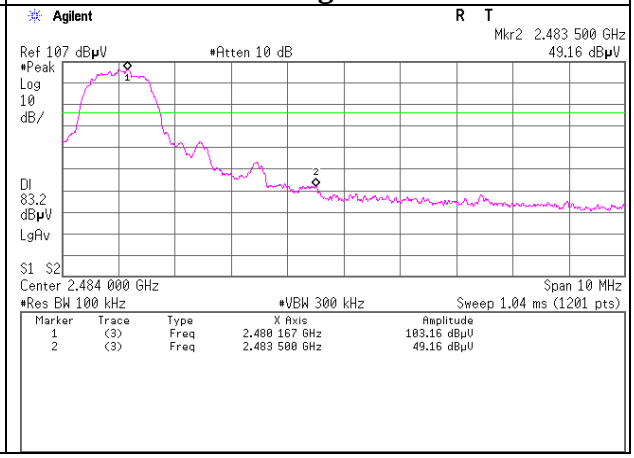


Tx 3DH5, Hopping off

Low



High

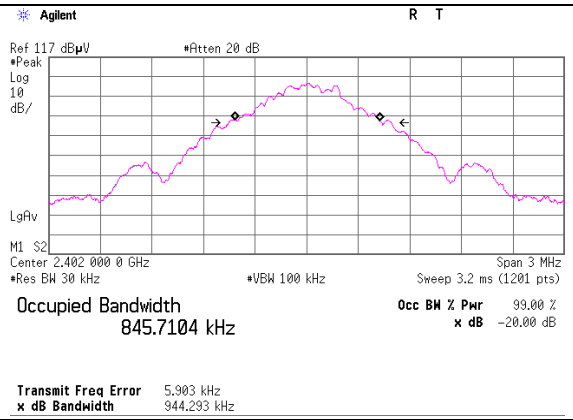


99%Occupied Bandwidth

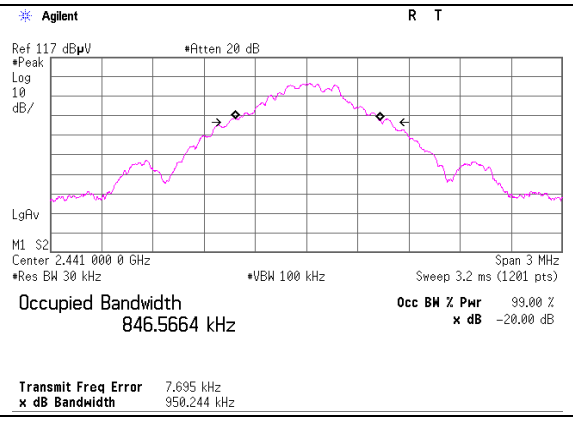
Test place	Head Office EMC Lab. No.11 Measurement Room
Report No.	10191363H
Date	01/17/2014
Temperature/ Humidity	24 deg.C/ 30% RH
Engineer	Tsubasa Takayama
Mode	Tx (Hopping on/off) DH5 / 3DH5

Tx DH5, Hopping off

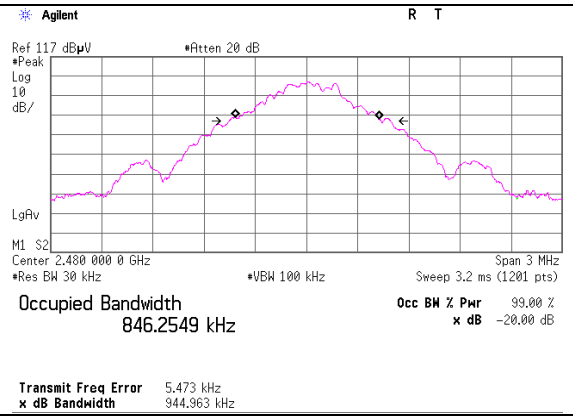
2402MHz



2441MHz

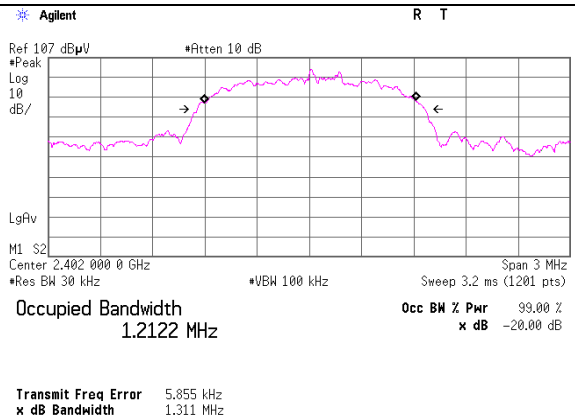


2480MHz

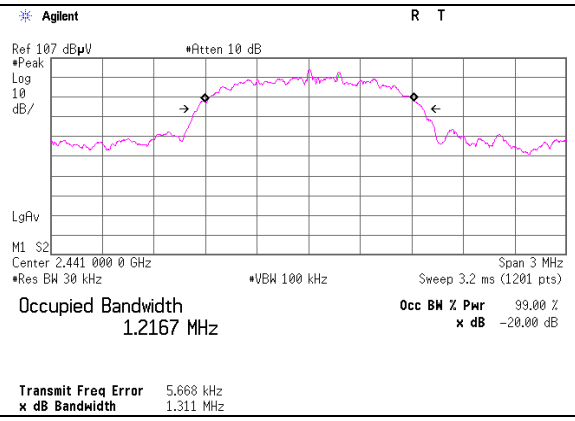


Tx 3DH5, Hopping off

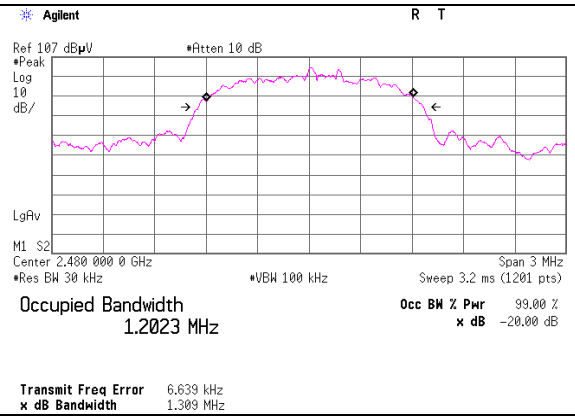
2402MHz



2441MHz



2480MHz

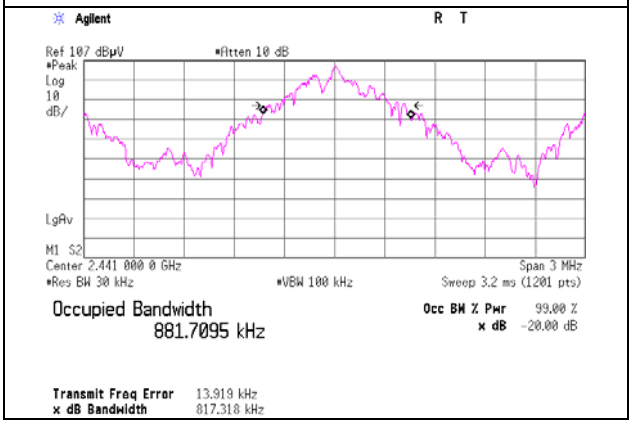


99%Occupied Bandwidth

Test place	Head Office EMC Lab. No.11 Measurement Room
Report No.	10191363H
Date	01/21/2014
Temperature/ Humidity	24 deg.C/ 30% RH
Engineer	Tomohisa Nakagawa
Mode	Tx Inquiry

Inquiry

2441MHz



99% Occupied Bandwidth

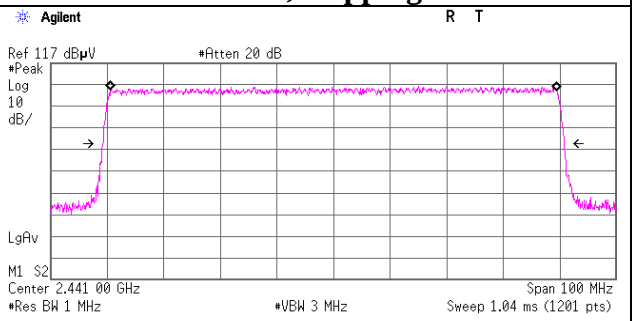
Tx DH5, Hopping on

Occupied Bandwidth
78.6394 MHz

Occ BW % Pwr 99.00 %
x dB -26.00 dB

Transmit Freq Error 21.600 kHz
x dB Bandwidth 81.193 MHz

Tx 3DH5, Hopping on

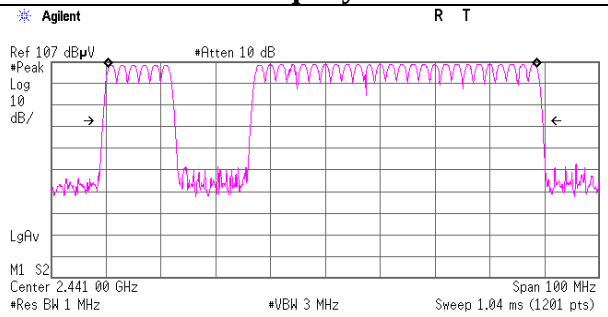


Occupied Bandwidth
78.6936 MHz

Occ BW % Pwr 99.00 %
x dB -26.00 dB

Transmit Freq Error 26.677 kHz
x dB Bandwidth 81.517 MHz

Inquiry



Occupied Bandwidth
78.0166 MHz

Occ BW % Pwr 99.00 %
x dB -26.00 dB

Transmit Freq Error -466.825 kHz
x dB Bandwidth 80.180 MHz

APPENDIX 2: Test instruments

EMI test equipment

Control No.	Instrument	Manufacturer	Model No	Serial No	Test Item	Calibration Date * Interval(month)
MSA-04	Spectrum Analyzer	Agilent	E4448A	US44300523	AT/RE	2013/11/25 * 12
MPM-12	Power Meter	Anritsu	ML2495A	0825002	AT	2013/06/12 * 12
MPSE-17	Power sensor	Anritsu	MA2411B	0738285	AT	2013/06/12 * 12
MAT-23	Attenuator(10dB) 1-18GHz	Orient Microwave	BX10-0476-00	-	AT	2013/03/21 * 12
MCC-67	Microwave Cable 1G-40GHz	Suhner	SUCOFLEX102	28635/2	AT	2013/04/16 * 12
MOS-19	Thermo-Hygrometer	Custom	CTH-201	0001	AT	2013/12/17 * 12
MCC-64	Coaxial Cable	UL Japan	-	-	AT	2013/03/22 * 12
MCC-66	Microwave Cable 1G-40GHz	Suhner	SUCOFLEX102	28636/2	AT	2013/04/17 * 12
MAEC-02	Semi Anechoic Chamber(NSA)	TDK	Semi Anechoic Chamber 3m	DA-06902	RE	2013/06/30 * 12
MOS-22	Thermo-Hygrometer	Custom	CTH-201	0003	RE	2013/02/26 * 12
MJM-14	Measure	KOMELON	KMC-36	-	RE	-
COTS-MEMI	EMI measurement program	TSJ	TEPTO-DV	-	RE/CE	-
MHA-06	Horn Antenna 1-18GHz	Schwarzbeck	BBHA9120D	254	RE	2013/02/15 * 12
MPA-10	Pre Amplifier	Agilent	8449B	3008A02142	RE	2014/01/21 * 12
MHA-02	Horn Antenna 18-26.5GHz	EMCO	3160-09	1265	RE	2013/02/15 * 12
MHF-06	High Pass Filter 3.5-24GHz	TOKIMEC	TF323DCA	601	RE	2013/05/30 * 12
MHA-06	Horn Antenna 1-18GHz	Schwarzbeck	BBHA9120D	254	RE	2014/02/21 * 12
MCC-166	Microwave Cable	Junkosha	MWX221	1303S120(1m) / 1311S167(5m)	RE	2013/11/27 * 12
MPA-10	Pre Amplifier	Agilent	8449B	3008A02142	RE	2014/01/21 * 12
MAEC-03	Semi Anechoic Chamber(NSA)	TDK	Semi Anechoic Chamber 3m	DA-10005	CE	2014/02/27 * 12
MOS-13	Thermo-Hygrometer	Custom	CTH-180	1301	CE	2014/02/20 * 12
MJM-16	Measure	KOMELON	KMC-36	-	CE	-
MSA-10	Spectrum Analyzer	Agilent	E4448A	MY46180655	CE	2014/02/20 * 12
MTR-08	Test Receiver	Rohde & Schwarz	ESCI	100767	CE	2013/08/20 * 12
MLS-07	LISN(AMN)	Schwarzbeck	NSLK8127	8127364	CE	2014/01/27 * 12
MTA-31	Terminator	TME	CT-01	-	CE	2014/01/20 * 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	2013/07/23 * 12
MAT-66	Attenuator(13dB)	JFW Industries, Inc.	50FP-013H2 N	-	CE	2014/01/29 * 12
MSA-13	Spectrum Analyzer	Agilent	E4440A	MY46185823	RE	2013/06/14 * 12
MHF-26	High Pass Filter 3.5-18.0GHz	UL Japan	HPF SELECTOR	002	RE	2013/09/01 * 12
MHA-02	Horn Antenna 18-26.5GHz	EMCO	3160-09	1265	RE	2014/02/21 * 12
MTR-03	Test Receiver	Rohde & Schwarz	ESCI	100300	RE	2013/06/11 * 12
MBA-02	Biconical Antenna	Schwarzbeck	BBA9106	VHA91032008	RE	2013/10/13 * 12
MLA-02	Logperiodic Antenna	Schwarzbeck	USLP9143	201	RE	2013/10/13 * 12
MCC-12	Coaxial Cable	Fujikura/Agilent	-	-	RE	2014/02/20 * 12
MAT-07	Attenuator(6dB)	Weinschel Corp	2	BK7970	RE	2013/11/26 * 12
MPA-09	Pre Amplifier	Agilent	8447D	2944A10845	RE	2013/09/12 * 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