



RADIO TEST REPORT

Test Report No. : 32IE0315-HO-01-B-R1

Applicant : Weifang Goertek Electronics Co., Ltd
Type of Equipment : Wireless Controller
Model No. : CECH-ZCM1U
FCC ID : SZGCECHZCMB
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 32IE0315-HO-01. 32IE0315-HO-01 is replaced with this report.

Date of test: May 15 to June 12, 2012

Representative test engineer:

T. Shimada

Takumi Shimada
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UL Verification Service

Approved by:

M. Nishiyama

Masanori Nishiyama
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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13-EM-F0429

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SECTION 1: Customer information

Company Name : Weifang Goertek Electronics Co., Ltd
Address : Dongfang North Road Hi-tech Industry Development District, Weifang
Shandong, China
Telephone Number : +86-532-88973250
Facsimile Number : +86-532-88997217
Contact Person : George Yang

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

2.1 Identification of E.U.T.

Type of Equipment : Wireless Controller
Model No. : CECH-ZCM1U
Serial No. : Refer to Clause 4.2
Receipt Date of Sample : May 8, 2012
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

Model No: CECH-ZCM1U (referred to as the EUT in this report) is the Wireless Controller.

General Specification

Clock frequency in the system	26MHz, 8MHz
Operating Temperature	5-35 deg. C
Power Supply	DC5V (USB Bus Power)
Battery Supply	DC3.6V
Size	200 x 46 mm
Weight	145 g

Radio Specification: Bluetooth (Ver. 2.0+EDR)

Equipment Type	Transceiver
Frequency of Operation	2402-2480MHz
Type of Modulation	FHSS (GFSK, $\pi/4$ DQPSK, 8DPSK)
Bandwidth & Channel spacing	1MHz & 1MHz
Method of frequency generation	Synthesizer
Power Supply (inner)	DC3.2V
Antenna Type	PIFA
Antenna Gain	-0.8dBi max

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SECTION 3: Test specification, procedures & results

3.1 Test Specification

Test Specification : FCC Part 15 Subpart C: 2012, final revised on July 23, 2012 and effective August 22, 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 revision on July 23, 2012 does not affect the test specification applied to the EUT.

*The EUT complies with FCC Part 15 Subpart B: 2011, final revised on May 17, 2012 and effective June 18, 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 18.9dB, 0.20121MHz, L AV 18.7dB, 4.49847MHz, L	Complied	-	
Carrier Frequency Separation	FCC: FCC Public Notice DA 00-705 ----- IC: -	FCC: Section 15.247(a)(1) ----- IC: RSS-210 A8.1 (b)	See data.	Complied	Conducted	
20dB Bandwidth	FCC: FCC Public Notice DA 00-705 ----- IC: -	FCC: Section 15.247(a)(1) ----- IC: RSS-210 A8.1 (a)		-	Conducted	
Number of Hopping Frequency	FCC: FCC Public Notice DA 00-705 ----- IC: -	FCC: Section 15.247(a)(1)(iii) ----- IC: RSS-210 A8.1 (d)		Complied	Conducted	
Dwell time	FCC: FCC Public Notice DA 00-705 ----- IC: -	FCC: Section 15.247(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: Section 15.247(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: Section 15.247(d) ----- IC: RSS-210 A8.5 RSS-Gen 6 and 7.2.3		10.1dB 7206.000MHz, AV, 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)

This EUT provides stable voltage(DC3.2V) 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	4.2dB	5.0dB	5.1dB	4.7dB	5.7dB	4.4dB	4.3dB
No.2	4.1dB	5.2dB	5.1dB	4.8dB	5.6dB	4.3dB	4.2dB
No.3	4.5dB	5.0dB	5.2dB	4.8dB	5.6dB	4.5dB	4.2dB
No.4	4.7dB	5.2dB	5.2dB	4.8dB	5.6dB	5.1dB	4.2dB

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

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

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

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.

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3.5 Test Location

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	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

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, 20dB Bandwidth,	Tx (Hopping on) 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, 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
<p>*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: BDR: Ext.=255, Int.=47 EDR: Ext.=255, Int.=49 Software: CSR BlueSuite BlueTest 3 Version 2.2.0.0 CSR BlueSuite BtCliCtrl Version 2.2.0.0 (Inquiry mode only) *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.</p>		

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4.2 Configuration and peripherals

This page has been submitted for a separate exhibit.

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

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SECTION 6: Radiated Spurious Emission

Test Procedure

EUT was placed on a urethane platform of nominal size, 1.0m by 1.5m, 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: $20 \times \log(3.0\text{m}/1.0\text{m}) = 9.5\text{dB}$

- 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-26.5GHz
Test data : APPENDIX
Test result : Pass

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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				

*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

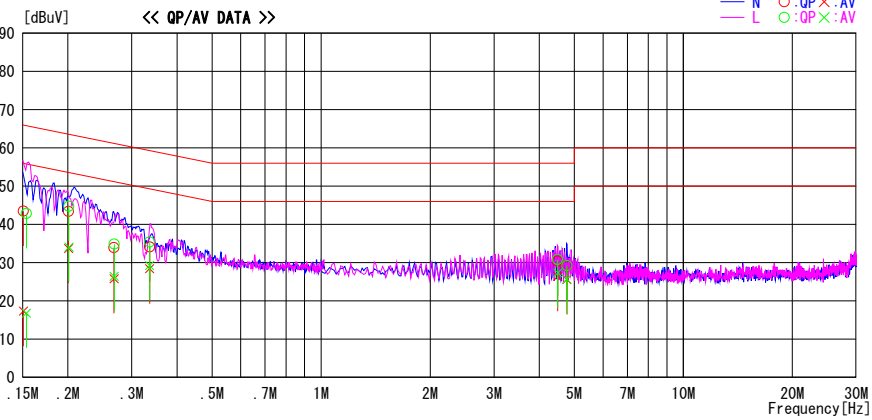
UL Japan, Inc. Head Office EMC Lab. No. 2 Semi Anechoic Chamber
 Date : 2012/05/25

Report No. : 32IE0315-HO-01

Temp./Humi. : 24deg. C / 55% RH
 Engineer : Keisuke Kawamura

Mode / Remarks : Tx BT DH5 2441MHz

LIMIT : FCC15. 207 QP
 FCC15. 207 AV

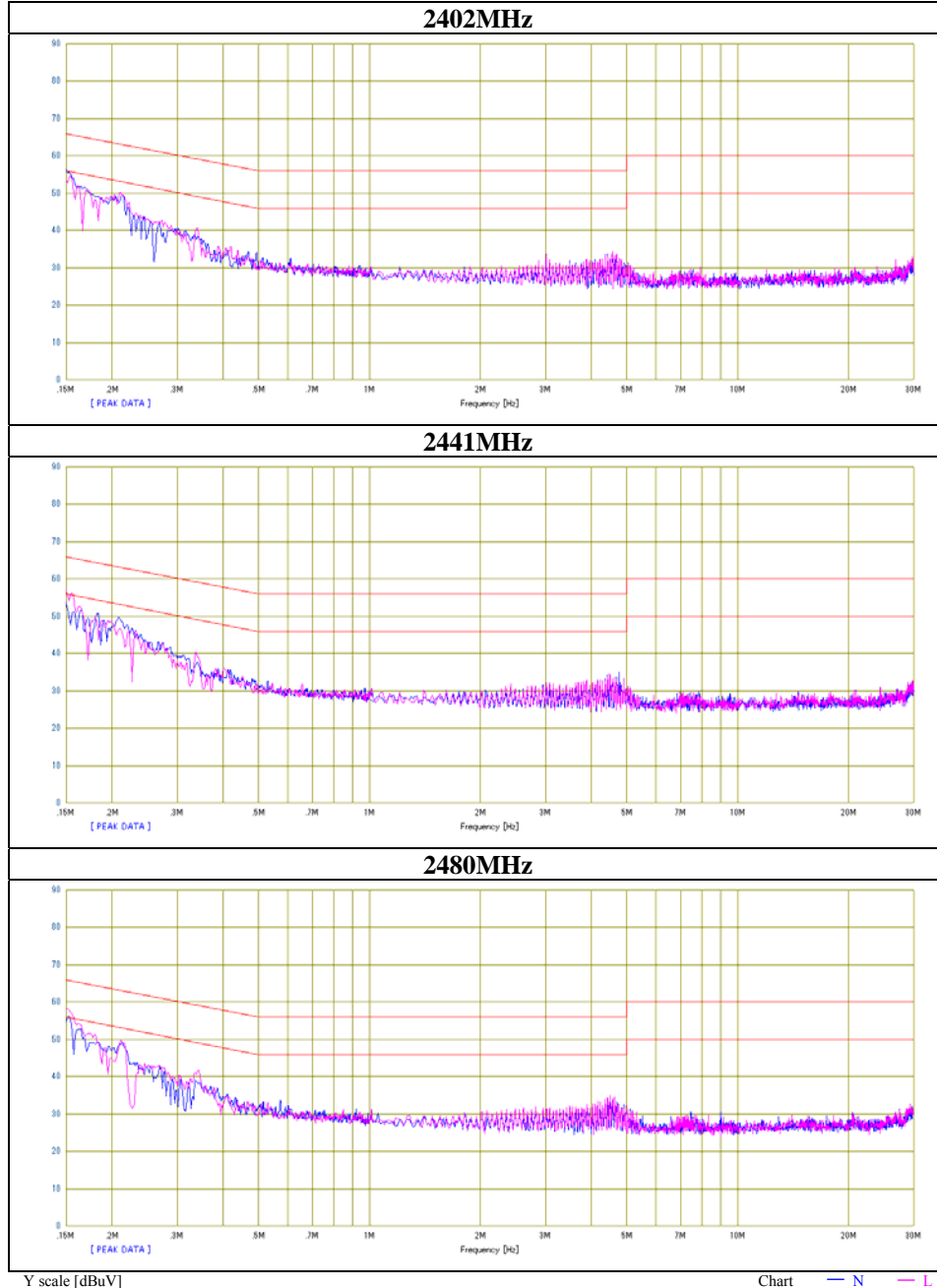


Frequency [MHz]	Reading Level		Corr. Factor [dB]	Results		Limit		Margin		Phase	Comment
	QP [dBuV]	AV [dBuV]		QP [dBuV]	AV [dBuV]	QP [dBuV]	AV [dBuV]	QP [dB]	AV [dB]		
0.15073	30.3	4.1	13.2	43.5	17.3	66.0	56.0	22.5	38.7	N	
0.20084	30.2	20.5	13.2	43.4	33.7	63.6	53.6	20.2	19.9	N	
0.26821	20.7	12.6	13.2	33.9	25.8	61.2	51.2	27.3	25.4	N	
0.33624	20.9	15.2	13.2	34.1	28.4	59.3	49.3	25.2	20.9	N	
4.50047	16.6	12.6	13.8	30.4	26.4	56.0	46.0	25.6	19.6	N	
4.76957	15.3	11.8	13.8	29.1	25.6	56.0	46.0	26.9	20.4	N	
0.15351	29.6	3.6	13.2	42.8	16.8	65.8	55.8	23.0	39.0	L	
0.20121	31.5	20.9	13.2	44.7	34.1	63.6	53.6	18.9	19.5	L	
0.26843	21.6	13.2	13.2	34.8	26.4	61.2	51.2	26.4	24.8	L	
0.33612	22.2	16.0	13.2	35.4	29.2	59.3	49.3	23.9	20.1	L	
4.49847	17.0	13.5	13.8	30.8	27.3	56.0	46.0	25.2	18.7	L	
4.76669	15.4	11.9	13.8	29.2	25.7	56.0	46.0	26.8	20.3	L	

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

Conducted Emission

Test place : Head Office EMC Lab. No.2 Semi Anechoic Chamber
Report No. : 32IE0315-HO-01
Date : 05/25/2012
Temperature/ Humidity : 24 deg. C / 55% RH
Engineer : Keisuke Kawamura
Mode : Tx DH5



Conducted Emission

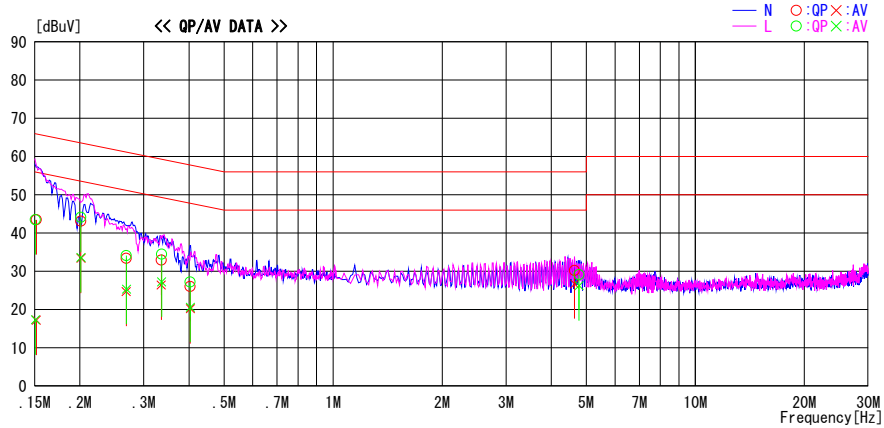
DATA OF CONDUCTED EMISSION TEST

UL Japan, Inc. Head Office EMC Lab. No. 2 Semi Anechoic Chamber
Date : 2012/05/25

Report No. : 32IE0315-H0-01
 Temp./Humi. : 24deg. C / 55% RH
 Engineer : Keisuke Kawamura

Mode / Remarks : Tx BT 3DH5 2441MHz

LIMIT : FCC15.207 QP
 FCC15.207 AV

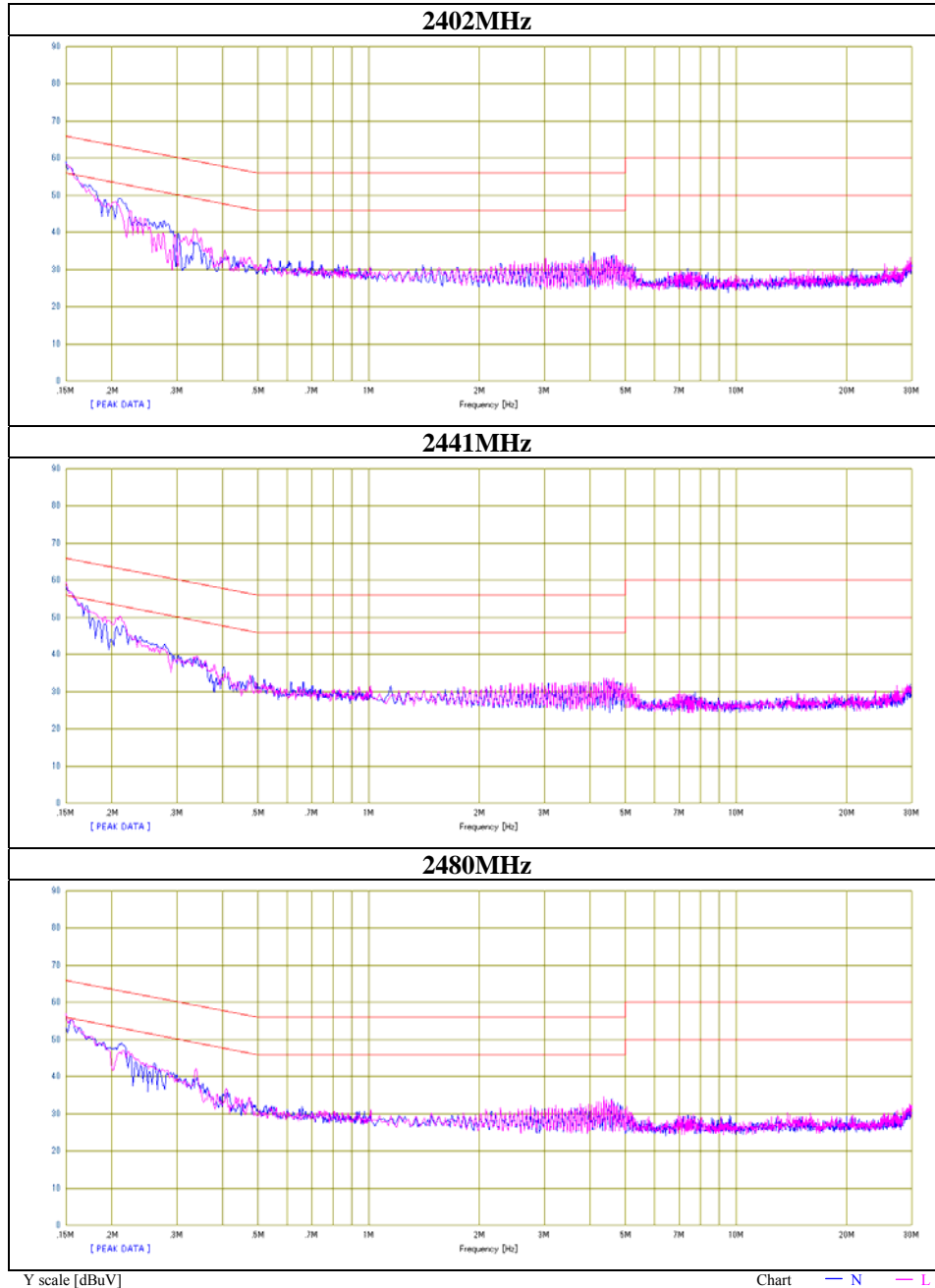


Frequency [MHz]	Reading Level		Corr. Factor [dB]	Results		Limit		Margin		Phase	Comment
	QP [dBuV]	AV [dBuV]		QP [dBuV]	AV [dBuV]	QP [dBuV]	AV [dBuV]	QP [dB]	AV [dB]		
0.15162	30.3	4.0	13.2	43.5	17.2	65.9	55.9	22.4	38.7	N	
0.20131	29.9	20.2	13.2	43.1	33.4	63.6	53.6	20.5	20.2	N	
0.26831	20.2	11.5	13.2	33.4	24.7	61.2	51.2	27.8	26.5	N	
0.33551	19.7	13.2	13.2	32.9	26.4	59.3	49.3	26.4	22.9	N	
0.40312	12.8	7.0	13.2	26.0	20.2	57.8	47.8	31.8	27.6	N	
4.63824	16.4	12.9	13.8	30.2	26.7	56.0	46.0	25.8	19.3	N	
0.15072	30.3	4.1	13.2	43.5	17.3	66.0	56.0	22.5	38.7	L	
0.20118	30.9	20.4	13.2	44.1	33.6	63.6	53.6	19.5	20.0	L	
0.26863	20.9	12.1	13.2	34.1	25.3	61.2	51.2	27.1	25.9	L	
0.33612	21.3	14.0	13.2	34.5	27.2	59.3	49.3	24.8	22.1	L	
0.40312	14.0	7.4	13.2	27.2	20.6	57.8	47.8	30.6	27.2	L	
4.77297	15.3	12.4	13.8	29.1	26.2	56.0	46.0	26.9	19.8	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.2 Semi Anechoic Chamber
Report No.	32IE0315-HO-01
Date	05/25/2012
Temperature/ Humidity	24 deg. C / 55% RH
Engineer	Keisuke Kawamura
Mode	Tx 3DH5



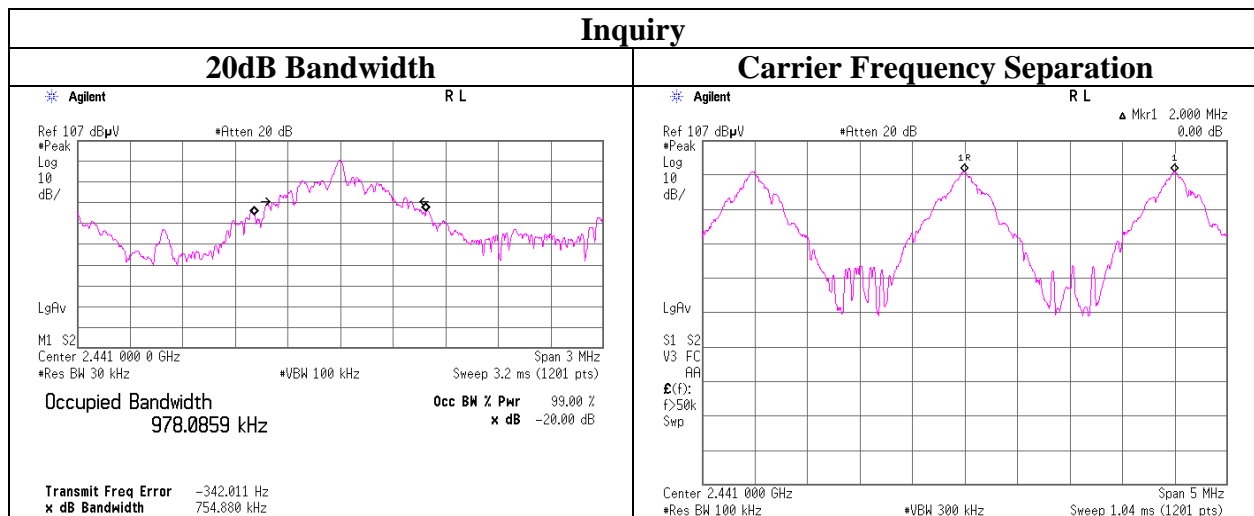
20dB Bandwidth and Carrier Frequency Separation

Test place	Head Office EMC Lab. No.6 Measurement Room	
Report No.	32IE0315-HO-01	
Date	05/15/2012	05/18/2012
Temperature/ Humidity	24 deg. C / 62% RH	23 deg. C / 41% RH
Engineer	Takumi Shimada	Takumi Shimada
Mode	Tx (Hopping on) DH5/3DH5/Inquiry	

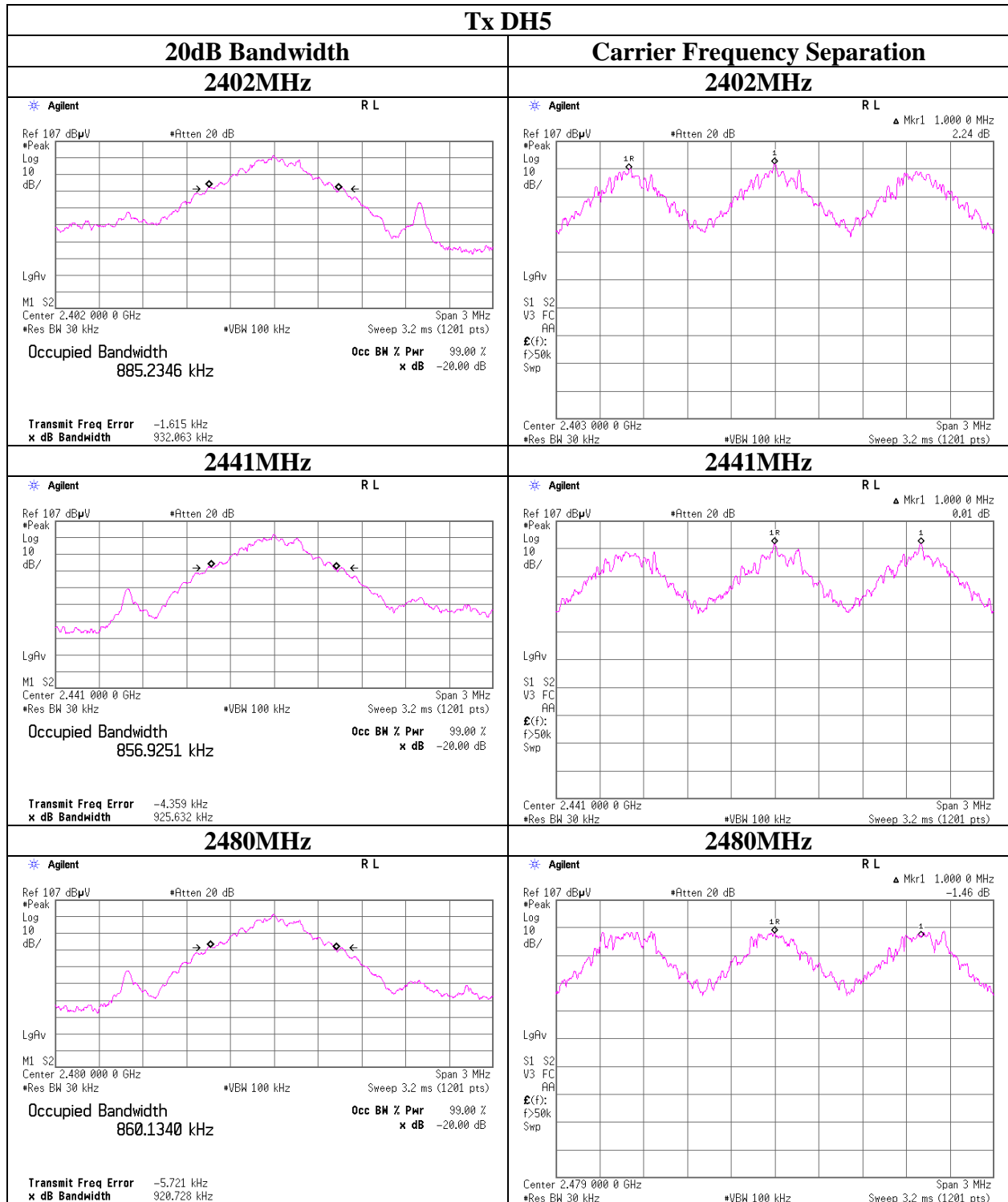
Mode	Freq. [MHz]	20dB Bandwidth [MHz]	Carrier Frequency Separation [MHz]	Limit for Carrier Frequency separation [MHz]
DH5	2402.0	0.932	1.000	>= 0.621
DH5	2441.0	0.926	1.000	>= 0.617
DH5	2480.0	0.921	1.000	>= 0.614
3DH5	2402.0	1.279	1.000	>= 0.853
3DH5	2441.0	1.260	1.000	>= 0.840
3DH5	2480.0	1.258	1.000	>= 0.839
Inquiry	2441.0	0.755	2.000	>= 0.503

Limit: Two-thirds of 20dB Bandwidth or 25kHz (whichever is greater).

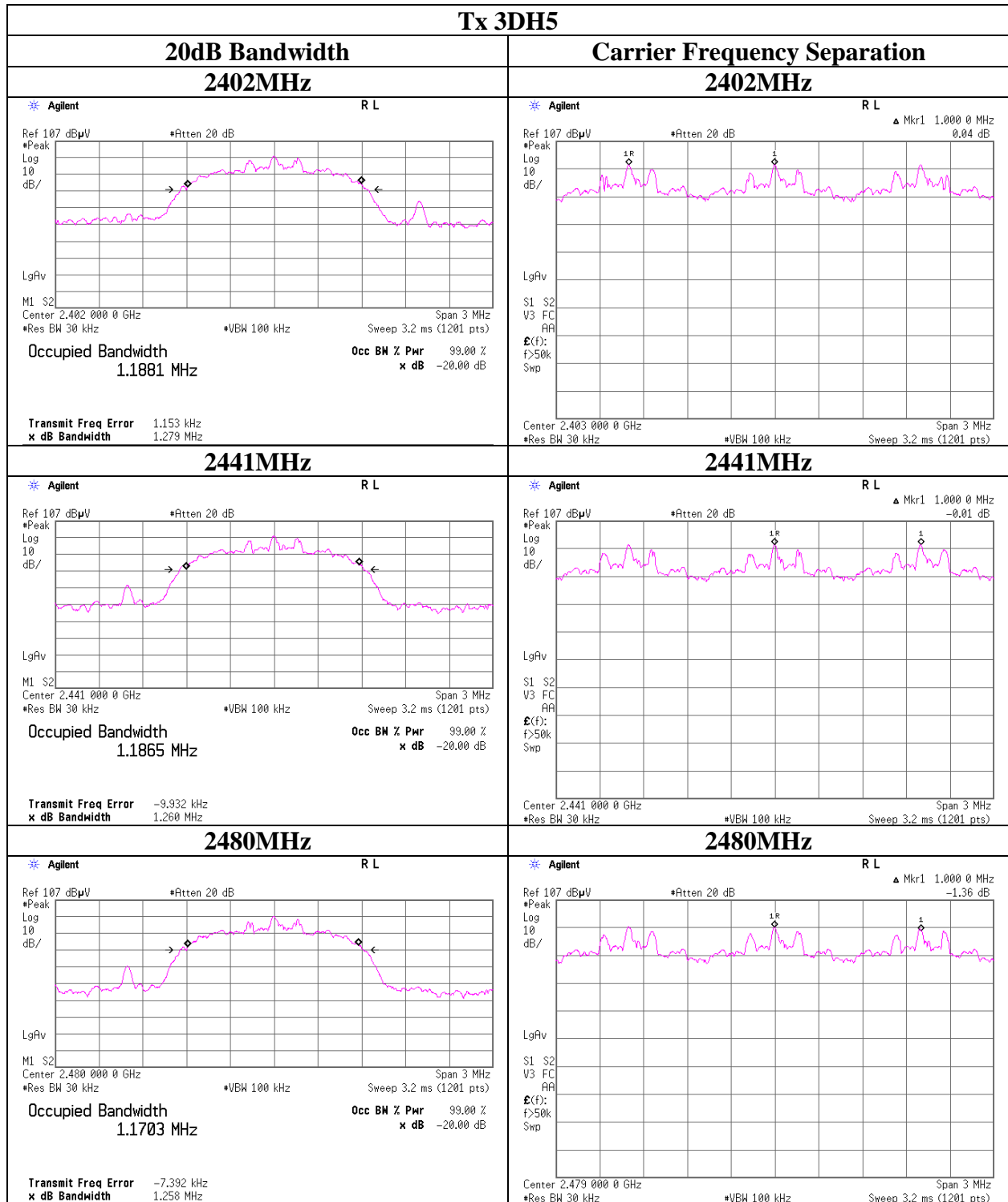
No limit applies to 20dB Bandwidth.



20dB Bandwidth and Carrier Frequency Separation



20dB Bandwidth and Carrier Frequency Separation

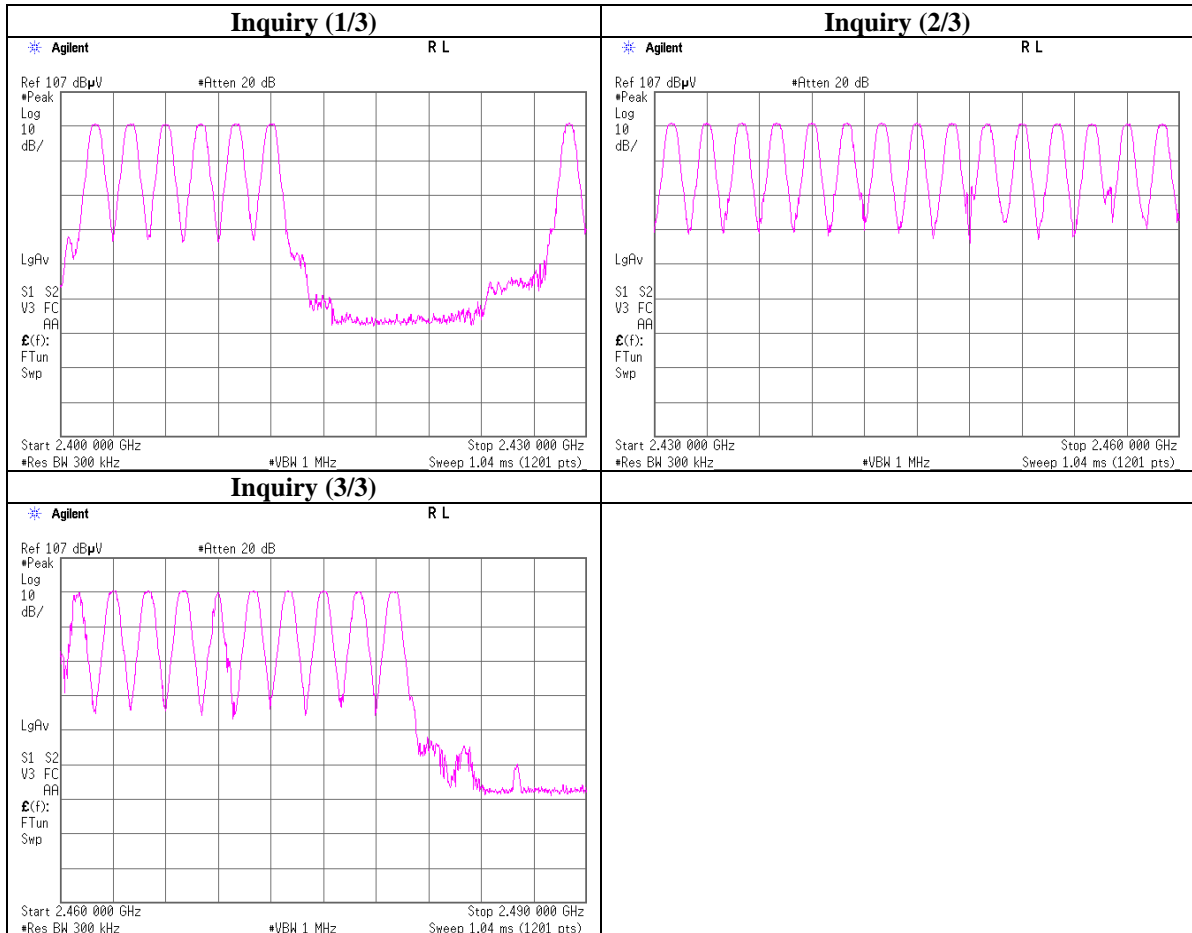


Number of Hopping Frequency

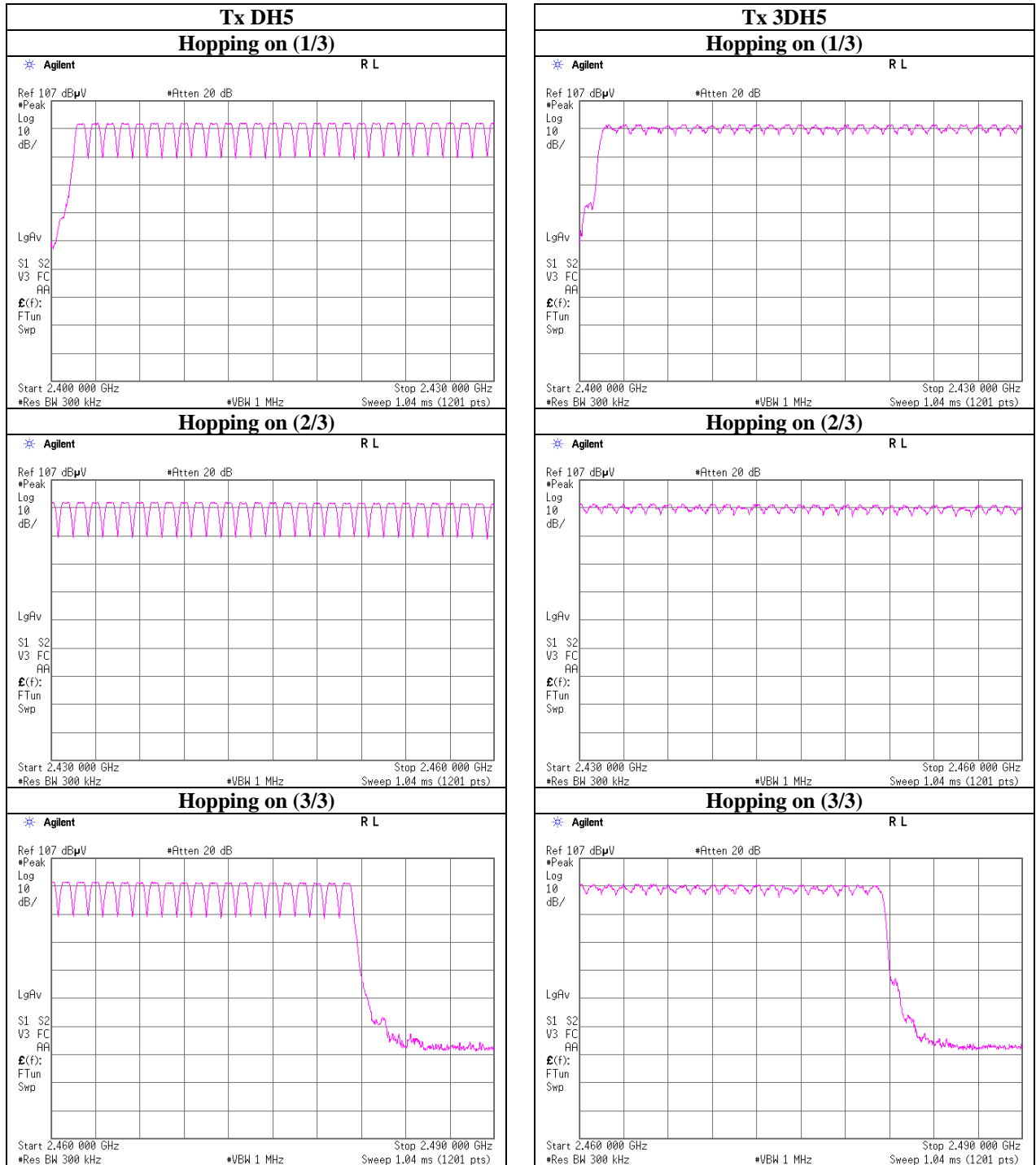
Test place	Head Office EMC Lab. No.6 Measurement Room
Report No.	32IE0315-HO-01
Date	05/18/2012
Temperature/ Humidity	23 deg. C / 41% RH
Engineer	Takumi Shimada
Mode	Tx (Hopping on) DH5/3DH5/Inquiry

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.



Number of Hopping Frequency



Dwell time

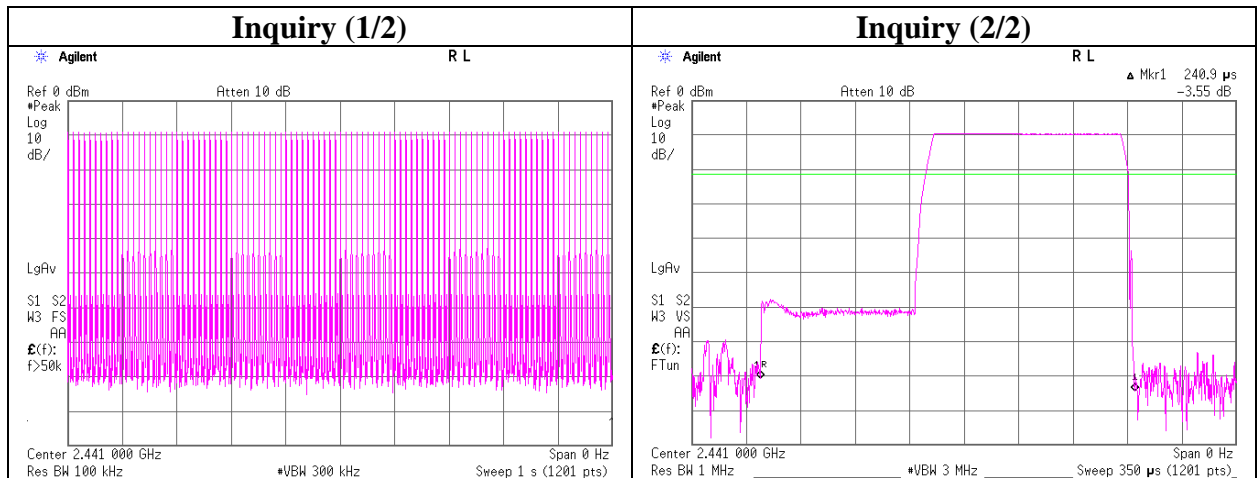
Test place	Head Office EMC Lab. No.6 Measurement Room
Report No.	32IE0315-HO-01
Date	05/18/2012
Temperature/ Humidity	23 deg. C / 41% RH
Engineer	Takumi Shimada
Mode	Tx (Hopping on) DH5/3DH5/Inquiry

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	51.0 times / 5 sec. x 31.6 sec. = 323 times	0.545	176	400
DH3	26.0 times / 5 sec. x 31.6 sec. = 165 times	1.801	297	400
DH5	17.0 times / 5 sec. x 31.6 sec. = 108 times	3.066	331	400
3DH1	51.0 times / 5 sec. x 31.6 sec. = 323 times	0.558	180	400
3DH3	26.0 times / 5 sec. x 31.6 sec. = 165 times	1.811	299	400
3DH5	17.0 times / 5 sec. x 31.6 sec. = 108 times	3.070	332	400
Inquiry	100.0 times / 1 sec. x 12.8 sec. = 1280 times	0.241	308	400

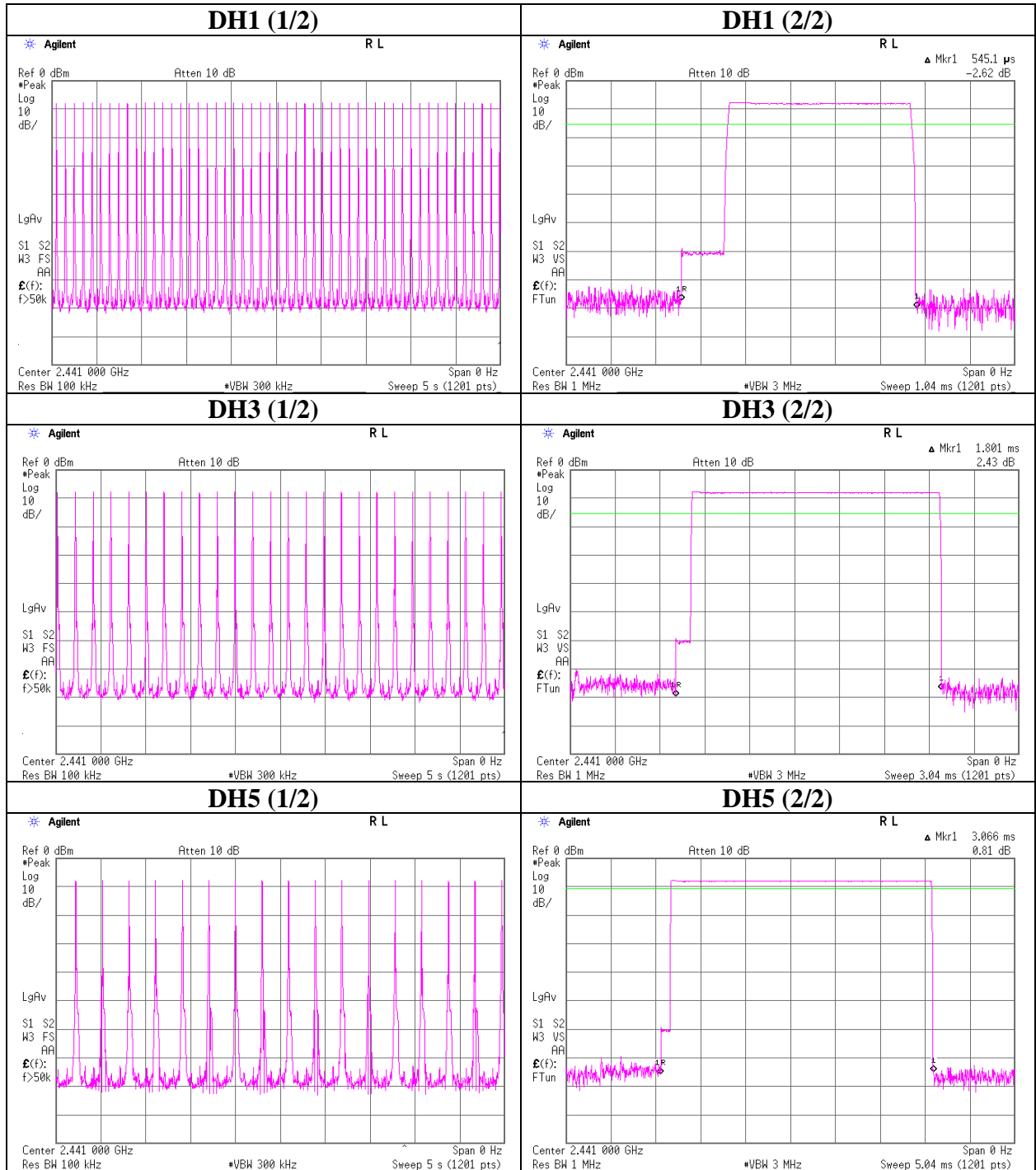
Sample Calculation

Result = Number of transmission x Length of transmission time

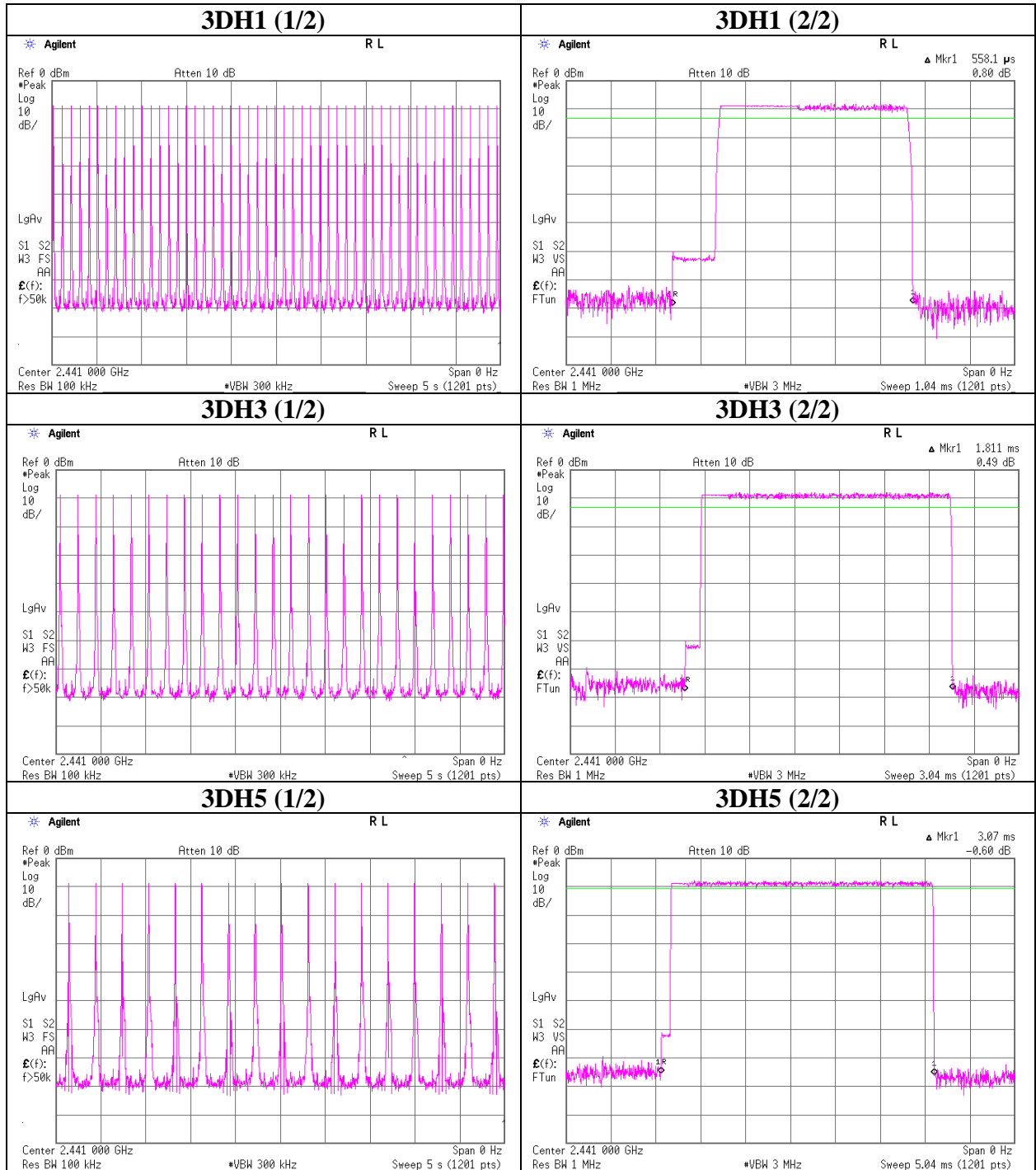
This device complies with the Bluetooth protocol for FHSS operation, employing a pseudo random channel selection and hopping rate to ensure that the occupancy time in $N \times 0.4s$, where N is the number of channels being used in the hopping sequence ($20 \leq N \leq 79$), is always less than 0.4s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



Dwell time



Dwell time



Maximum Peak Output Power

Test place : Head Office EMC Lab. No.4 Measurement Room
 Report No. : 32IE0315-HO-01
 Date : 05/15/2012
 Temperature/ Humidity : 24 deg. C / 62% RH
 Engineer : Takumi Shimada
 Mode : Tx (Hopping off) DH5/3DH5/Inquiry

Mode	Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. [dB]	Result		Limit		Margin [dB]
					[dBm]	[mW]	[dBm]	[mW]	
DH5	2402.0	-6.64	0.50	10.07	3.93	2.47	20.96	125	17.03
DH5	2441.0	-6.54	0.50	10.07	4.03	2.53	20.96	125	16.93
DH5	2480.0	-7.16	0.50	10.07	3.41	2.19	20.96	125	17.55
3DH5	2402.0	-6.44	0.50	10.07	4.13	2.59	20.96	125	16.83
3DH5	2441.0	-6.48	0.50	10.07	4.09	2.56	20.96	125	16.87
3DH5	2480.0	-7.24	0.50	10.07	3.33	2.15	20.96	125	17.63
Inquiry	2441.0	-7.88	0.50	10.07	2.69	1.86	20.96	125	18.27

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.

Radiated Spurious Emission

Test place Head Office EMC Lab. No.2 Semi Anechoic Chamber
Report No. 32IE0315-HO-01
Date 05/24/2012 05/25/2012 06/12/2012
Temperature/ Humidity 24 deg. C / 52% RH 24 deg. C / 55% RH 24 deg. C / 55% RH
Engineer Motoya Imura Keisuke Kawamura Takumi Shimada
(1-10GHz) (Above 10GHz) (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	32.194	QP	23.2	17.2	6.8	28.5	18.7	40.0	21.3	
Hori	60.103	QP	31.5	8.3	7.1	28.6	18.3	40.0	21.7	
Hori	84.094	QP	40.3	6.8	7.3	28.4	26.0	40.0	14.0	
Hori	149.320	QP	24.4	14.8	7.8	28.1	18.9	43.5	24.6	
Hori	209.215	QP	36.0	16.5	8.2	27.9	32.8	43.5	10.7	
Hori	330.775	QP	28.0	15.4	9.0	27.8	24.6	46.0	21.4	
Hori	2390.000	PK	46.9	27.4	2.2	34.8	41.7	73.9	32.2	
Hori	2400.000	PK	68.0	27.5	2.2	34.8	62.9	-	-	See 20dBc Data Sheet
Hori	4804.000	PK	43.5	31.2	3.9	34.0	44.6	73.9	29.3	
Hori	7206.000	PK	44.6	35.9	4.5	34.2	50.8	73.9	23.1	
Hori	9608.000	PK	43.3	38.8	5.3	34.7	52.7	73.9	21.2	NS
Hori	24020.000	PK	46.1	40.5	-1.7	31.7	53.2	73.9	20.7	NS
Hori	2390.000	AV	34.7	27.4	2.2	34.8	29.5	53.9	24.4	
Hori	2400.000	AV	59.0	27.5	2.2	34.8	53.9	-	-	See 20dBc Data Sheet
Hori	4804.000	AV	33.2	31.2	3.9	34.0	34.3	53.9	19.6	
Hori	7206.000	AV	33.8	35.9	4.5	34.2	40.0	53.9	13.9	
Hori	9608.000	AV	32.2	38.8	5.3	34.7	41.6	53.9	12.3	NS
Hori	24020.000	AV	34.1	40.5	-1.7	31.7	41.2	53.9	12.7	NS
Vert	33.432	QP	30.8	16.7	6.8	28.5	25.8	40.0	14.2	
Vert	60.095	QP	35.1	8.3	7.1	28.6	21.9	40.0	18.1	
Vert	84.083	QP	42.9	6.8	7.3	28.4	28.6	40.0	11.4	
Vert	148.031	QP	28.0	14.7	7.8	28.1	22.4	43.5	21.1	
Vert	209.239	QP	33.2	16.5	8.2	27.9	30.0	43.5	13.5	
Vert	663.869	QP	31.5	20.4	10.4	28.5	33.8	46.0	12.2	
Vert	2390.000	PK	45.3	27.4	2.2	34.8	40.1	73.9	33.8	
Vert	2400.000	PK	66.1	27.5	2.2	34.8	61.0	-	-	See 20dBc Data Sheet
Vert	4804.000	PK	43.8	31.2	3.9	34.0	44.9	73.9	29.0	
Vert	7206.000	PK	45.2	35.9	4.5	34.2	51.4	73.9	22.5	
Vert	9608.000	PK	43.3	38.8	5.3	34.7	52.7	73.9	21.2	NS
Vert	24020.000	PK	46.0	40.5	-1.7	31.7	53.1	73.9	20.8	NS
Vert	2390.000	AV	33.5	27.4	2.2	34.8	28.3	53.9	25.6	
Vert	2400.000	AV	55.4	27.5	2.2	34.8	50.3	-	-	See 20dBc Data Sheet
Vert	4804.000	AV	33.6	31.2	3.9	34.0	34.7	53.9	19.2	
Vert	7206.000	AV	35.9	35.9	4.5	34.2	42.1	53.9	11.8	
Vert	9608.000	AV	32.2	38.8	5.3	34.7	41.6	53.9	12.3	NS
Vert	24020.000	AV	34.1	40.5	-1.7	31.7	41.2	53.9	12.8	NS

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.2 Semi Anechoic Chamber
 Report No. : 32IE0315-HO-01
 Date : 05/24/2012
 Temperature/ Humidity : 24 deg. C / 52% RH
 Engineer : Motoya Imura
 (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	104.2	27.5	2.2	34.8	99.1	-	-	Carrier
Hori	2400.000	PK	61.2	27.5	2.2	34.8	56.1	79.1	23.0	
Vert	2402.000	PK	104.8	27.5	2.2	34.8	99.7	-	-	Carrier
Vert	2400.000	PK	66.1	27.5	2.2	34.8	61.0	79.7	18.7	

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

Radiated Spurious Emission

Test place	Head Office EMC Lab. No.2 Semi Anechoic Chamber		
Report No.	32IE0315-HO-01		
Date	05/24/2012	05/25/2012	06/12/2012
Temperature/ Humidity	24 deg. C / 52% RH	24 deg. C / 55% RH	24 deg. C / 55% RH
Engineer	Motoya Imura	Keisuke Kawamura	Takumi Shimada
	(1-10GHz)	(Above 10GHz)	(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	32.194	QP	23.2	17.2	6.8	28.5	18.7	40.0	21.3	
Hori	60.103	QP	31.5	8.3	7.1	28.6	18.3	40.0	21.7	
Hori	84.094	QP	40.3	6.8	7.3	28.4	26.0	40.0	14.0	
Hori	153.245	QP	27.3	15.0	7.9	28.1	22.1	43.5	21.4	
Hori	209.215	QP	36.0	16.5	8.2	27.9	32.8	43.5	10.7	
Hori	330.775	QP	28.0	15.4	9.0	27.8	24.6	46.0	21.4	
Hori	4882.000	PK	45.5	31.4	3.8	34.0	46.7	73.9	27.2	
Hori	7323.000	PK	44.2	36.0	4.6	34.2	50.6	73.9	23.3	
Hori	9764.000	PK	43.9	39.0	5.3	34.7	53.5	73.9	20.4	
Hori	24410.000	PK	47.5	40.5	-1.7	32.2	54.1	73.9	19.9	NS
Hori	4882.000	AV	35.2	31.4	3.8	34.0	36.4	53.9	17.5	
Hori	7323.000	AV	32.6	36.0	4.6	34.2	39.0	53.9	14.9	
Hori	9764.000	AV	32.2	39.0	5.3	34.7	41.8	53.9	12.1	
Hori	24410.000	AV	35.0	40.5	-1.7	32.2	41.6	53.9	12.3	NS
Vert	33.432	QP	26.7	16.7	6.8	28.5	21.7	40.0	18.3	
Vert	60.095	QP	35.1	8.3	7.1	28.6	21.9	40.0	18.1	
Vert	84.083	QP	42.9	6.8	7.3	28.4	28.6	40.0	11.4	
Vert	148.035	QP	29.3	14.7	7.8	28.1	23.7	43.5	19.8	
Vert	209.239	QP	33.2	16.5	8.2	27.9	30.0	43.5	13.5	
Vert	663.869	QP	31.5	20.4	10.4	28.5	33.8	46.0	12.2	
Vert	4882.000	PK	45.2	31.4	3.8	34.0	46.4	73.9	27.5	
Vert	7323.000	PK	44.3	36.0	4.6	34.2	50.7	73.9	23.2	
Vert	9764.000	PK	43.9	39.0	5.3	34.7	53.5	73.9	20.4	NS
Vert	24410.000	PK	47.7	40.5	-1.7	32.2	54.3	73.9	19.6	NS
Vert	4882.000	AV	33.6	31.4	3.8	34.0	34.8	53.9	19.1	
Vert	7323.000	AV	33.7	36.0	4.6	34.2	40.1	53.9	13.8	
Vert	9764.000	AV	32.2	39.0	5.3	34.7	41.8	53.9	12.1	NS
Vert	24410.000	AV	35.0	40.5	-1.7	32.2	41.6	53.9	12.3	NS

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.2 Semi Anechoic Chamber
Report No. 32IE0315-HO-01
Date 05/24/2012 05/25/2012 06/12/2012
Temperature/ Humidity 24 deg. C / 52% RH 24 deg. C / 55% RH 24 deg. C / 55% RH
Engineer Motoya Imura Keisuke Kawamura Takumi Shimada
(1-10GHz) (Above 10GHz) (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	32.199	QP	23.1	17.2	6.8	28.5	18.6	40.0	21.4	
Hori	60.035	QP	31.3	8.3	7.1	28.6	18.1	40.0	21.9	
Hori	84.093	QP	40.5	6.8	7.3	28.4	26.2	40.0	13.8	
Hori	153.185	QP	27.7	15.0	7.9	28.1	22.5	43.5	21.0	
Hori	209.235	QP	35.5	16.5	8.2	27.9	32.3	43.5	11.2	
Hori	330.761	QP	27.7	15.4	9.0	27.8	24.3	46.0	21.7	
Hori	2483.500	PK	55.2	27.5	2.3	34.8	50.2	73.9	23.7	
Hori	4960.000	PK	44.5	31.6	3.9	34.0	46.0	73.9	27.9	
Hori	7440.000	PK	42.4	36.2	4.6	34.3	48.9	73.9	25.0	NS
Hori	9920.000	PK	43.7	39.1	5.4	34.7	53.5	73.9	20.4	NS
Hori	24800.000	PK	45.4	40.6	-1.6	32.7	51.7	73.9	22.2	NS
Hori	2483.500	AV	42.4	27.5	2.3	34.8	37.4	53.9	16.5	
Hori	4960.000	AV	35.9	31.6	3.9	34.0	37.4	53.9	16.5	
Hori	7440.000	AV	31.4	36.2	4.6	34.3	37.9	53.9	16.0	NS
Hori	9920.000	AV	31.4	39.1	5.4	34.7	41.2	53.9	12.7	NS
Hori	24800.000	AV	33.0	40.6	-1.6	32.7	39.3	53.9	14.6	NS
Vert	33.234	QP	26.5	16.8	6.8	28.5	21.6	40.0	18.4	
Vert	60.125	QP	34.9	8.3	7.1	28.6	21.7	40.0	18.3	
Vert	84.097	QP	43.3	6.8	7.3	28.4	29.0	40.0	11.0	
Vert	148.021	QP	29.1	14.7	7.8	28.1	23.5	43.5	20.0	
Vert	209.231	QP	33.4	16.5	8.2	27.9	30.2	43.5	13.3	
Vert	663.863	QP	31.2	20.4	10.4	28.5	33.5	46.0	12.5	
Vert	2483.500	PK	53.1	27.5	2.3	34.8	48.1	73.9	25.8	
Vert	2483.500	PK	40.4	27.5	2.3	34.8	35.4	73.9	38.5	
Vert	4960.000	PK	45.8	31.6	3.9	34.0	47.3	73.9	26.6	
Vert	7440.000	PK	42.4	36.2	4.6	34.3	48.9	73.9	25.0	NS
Vert	9920.000	PK	43.7	39.1	5.4	34.7	53.5	73.9	20.4	NS
Vert	24800.000	PK	44.7	40.6	-1.6	32.7	51.0	73.9	22.9	NS
Vert	4960.000	AV	39.0	31.6	3.9	34.0	40.5	53.9	13.4	
Vert	7440.000	AV	31.4	36.2	4.6	34.3	37.9	53.9	16.0	NS
Vert	9920.000	AV	31.4	39.1	5.4	34.7	41.2	53.9	12.7	NS
Vert	24800.000	AV	33.0	40.6	-1.6	32.7	39.3	53.9	14.6	NS

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.2 Semi Anechoic Chamber
Report No. 32IE0315-HO-01
Date 05/24/2012 05/25/2012 06/12/2012
Temperature/ Humidity 24 deg. C / 52% RH 24 deg. C / 55% RH 24 deg. C / 55% RH
Engineer Motoya Imura Keisuke Kawamura Takumi Shimada
(1-10GHz) (Above 10GHz) (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	32.317	QP	22.9	17.1	6.8	28.5	18.3	40.0	21.7	
Hori	60.103	QP	31.4	8.3	7.1	28.6	18.2	40.0	21.8	
Hori	84.102	QP	40.4	6.8	7.3	28.4	26.1	40.0	13.9	
Hori	153.341	QP	26.8	15.0	7.9	28.1	21.6	43.5	21.9	
Hori	209.234	QP	34.9	16.5	8.2	27.9	31.7	43.5	11.8	
Hori	330.768	QP	27.3	15.4	9.0	27.8	23.9	46.0	22.1	
Hori	2390.000	PK	46.9	27.4	2.2	34.8	41.7	73.9	32.2	
Hori	2400.000	PK	75.0	27.5	2.2	34.8	69.9	-	-	See 20dBc Data Sheet
Hori	4804.000	PK	43.8	31.2	3.9	34.0	44.9	73.9	29.0	
Hori	7206.000	PK	47.0	35.9	4.5	34.2	53.2	73.9	20.7	
Hori	9608.000	PK	43.3	38.8	5.3	34.7	52.7	73.9	21.2	NS
Hori	24020.000	PK	46.1	40.5	-1.7	31.7	53.2	73.9	20.7	NS
Hori	2390.000	AV	35.3	27.4	2.2	34.8	30.1	53.9	23.8	
Hori	2400.000	AV	59.6	27.5	2.2	34.8	54.5	-	-	See 20dBc Data Sheet
Hori	4804.000	AV	33.6	31.2	3.9	34.0	34.7	53.9	19.2	
Hori	7206.000	AV	37.6	35.9	4.5	34.2	43.8	53.9	10.1	
Hori	9608.000	AV	32.2	38.8	5.3	34.7	41.6	53.9	12.3	NS
Hori	24020.000	AV	34.1	40.5	-1.7	31.7	41.2	53.9	12.7	NS
Vert	33.217	QP	26.7	16.8	6.8	28.5	21.8	40.0	18.2	
Vert	60.121	QP	35.2	8.3	7.1	28.6	22.0	40.0	18.0	
Vert	84.083	QP	42.9	6.8	7.3	28.4	28.6	40.0	11.4	
Vert	148.028	QP	27.9	14.7	7.8	28.1	22.3	43.5	21.2	
Vert	209.212	QP	33.1	16.5	8.2	27.9	29.9	43.5	13.6	
Vert	663.613	QP	30.7	20.4	10.4	28.5	33.0	46.0	13.0	
Vert	2390.000	PK	45.4	27.4	2.2	34.8	40.2	73.9	33.7	
Vert	2400.000	PK	72.6	27.5	2.2	34.8	67.5	-	-	See 20dBc Data Sheet
Vert	4804.000	PK	42.9	31.2	3.9	34.0	44.0	73.9	29.9	
Vert	7206.000	PK	46.3	35.9	4.5	34.2	52.5	73.9	21.4	
Vert	9608.000	PK	43.3	38.8	5.3	34.7	52.7	73.9	21.2	NS
Vert	24020.000	PK	46.0	40.5	-1.7	31.7	53.1	73.9	20.8	NS
Vert	2390.000	AV	33.5	27.4	2.2	34.8	28.3	53.9	25.6	
Vert	2400.000	AV	56.6	27.5	2.2	34.8	51.5	-	-	See 20dBc Data Sheet
Vert	4804.000	AV	32.9	31.2	3.9	34.0	34.0	53.9	19.9	
Vert	7206.000	AV	36.5	35.9	4.5	34.2	42.7	53.9	11.2	
Vert	9608.000	AV	32.2	38.8	5.3	34.7	41.6	53.9	12.3	NS
Vert	24020.000	AV	34.1	40.5	-1.7	31.7	41.2	53.9	12.8	NS

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.2 Semi Anechoic Chamber
Report No. : 32IE0315-HO-01
Date : 05/24/2012
Temperature/ Humidity : 24 deg. C / 52% RH
Engineer : Motoya Imura
(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	105.0	27.5	2.2	34.8	99.9	-	-	Carrier
Hori	2400.000	PK	60.2	27.5	2.2	34.8	55.1	79.9	24.8	
Vert	2402.000	PK	103.0	27.5	2.2	34.8	97.9	-	-	Carrier
Vert	2400.000	PK	58.8	27.5	2.2	34.8	53.7	77.9	24.2	

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

Radiated Spurious Emission

Test place Head Office EMC Lab. No.2 Semi Anechoic Chamber
Report No. 32IE0315-HO-01
Date 05/24/2012 05/25/2012 06/12/2012
Temperature/ Humidity 24 deg. C / 52% RH 24 deg. C / 55% RH 24 deg. C / 55% RH
Engineer Motoya Imura Keisuke Kawamura Takumi Shimada
(1-10GHz) (Above 10GHz) (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	32.450	QP	23.0	17.1	6.8	28.5	18.4	40.0	21.6	
Hori	60.094	QP	31.1	8.3	7.1	28.6	17.9	40.0	22.1	
Hori	84.089	QP	40.2	6.8	7.3	28.4	25.9	40.0	14.1	
Hori	153.342	QP	26.2	15.0	7.9	28.1	21.0	43.5	22.5	
Hori	209.215	QP	34.4	16.5	8.2	27.9	31.2	43.5	12.3	
Hori	330.772	QP	26.9	15.4	9.0	27.8	23.5	46.0	22.5	
Hori	4882.000	PK	43.8	31.4	3.8	34.0	45.0	73.9	28.9	
Hori	7323.000	PK	44.2	36.0	4.6	34.2	50.6	73.9	23.3	NS
Hori	9764.000	PK	43.9	39.0	5.3	34.7	53.5	73.9	20.4	NS
Hori	24410.000	PK	47.5	40.5	-1.7	32.2	54.1	73.9	19.9	NS
Hori	4882.000	AV	32.0	31.4	3.8	34.0	33.2	53.9	20.7	
Hori	7323.000	AV	31.3	36.0	4.6	34.2	37.7	53.9	16.2	NS
Hori	9764.000	AV	32.2	39.0	5.3	34.7	41.8	53.9	12.1	NS
Hori	24410.000	AV	35.0	40.5	-1.7	32.2	41.6	53.9	12.3	NS
Vert	33.173	QP	26.6	16.8	6.8	28.5	21.7	40.0	18.3	
Vert	60.097	QP	34.9	8.3	7.1	28.6	21.7	40.0	18.3	
Vert	84.081	QP	42.6	6.8	7.3	28.4	28.3	40.0	11.7	
Vert	148.115	QP	28.0	14.7	7.8	28.1	22.4	43.5	21.1	
Vert	209.233	QP	33.3	16.5	8.2	27.9	30.1	43.5	13.4	
Vert	663.848	QP	28.9	20.4	10.4	28.5	31.2	46.0	14.8	
Vert	4882.000	PK	44.0	31.4	3.8	34.0	45.2	73.9	28.7	
Vert	7323.000	PK	44.3	36.0	4.6	34.2	50.7	73.9	23.2	NS
Vert	9764.000	PK	43.9	39.0	5.3	34.7	53.5	73.9	20.4	NS
Vert	24410.000	PK	47.7	40.5	-1.7	32.2	54.3	73.9	19.6	NS
Vert	4882.000	AV	32.5	31.4	3.8	34.0	33.7	53.9	20.2	
Vert	7323.000	AV	31.3	36.0	4.6	34.2	37.7	53.9	16.2	NS
Vert	9764.000	AV	32.2	39.0	5.3	34.7	41.8	53.9	12.1	NS
Vert	24410.000	AV	35.0	40.5	-1.7	32.2	41.6	53.9	12.3	NS

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.2 Semi Anechoic Chamber
Report No. : 32IE0315-HO-01
Date : 05/24/2012 05/25/2012 06/12/2012
Temperature/ Humidity : 24 deg. C / 52% RH 24 deg. C / 55% RH 24 deg. C / 55% RH
Engineer : Motoya Imura Keisuke Kawamura Takumi Shimada
(1-10GHz) (Above 10GHz) (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	32.210	QP	22.7	17.2	6.8	28.5	18.2	40.0	21.8	
Hori	60.088	QP	31.2	8.3	7.1	28.6	18.0	40.0	22.0	
Hori	84.093	QP	40.1	6.8	7.3	28.4	25.8	40.0	14.2	
Hori	153.316	QP	26.5	15.0	7.9	28.1	21.3	43.5	22.2	
Hori	209.223	QP	34.1	16.5	8.2	27.9	30.9	43.5	12.6	
Hori	330.768	QP	27.4	15.4	9.0	27.8	24.0	46.0	22.0	
Hori	2483.500	PK	52.0	27.5	2.3	34.8	47.0	73.9	26.9	
Hori	4960.000	PK	44.5	31.6	3.9	34.0	46.0	73.9	27.9	
Hori	7440.000	PK	42.4	36.2	4.6	34.3	48.9	73.9	25.0	NS
Hori	9920.000	PK	43.7	39.1	5.4	34.7	53.5	73.9	20.4	NS
Hori	24800.000	PK	45.4	40.6	-1.6	32.7	51.7	73.9	22.2	NS
Hori	2483.500	AV	41.8	27.5	2.3	34.8	36.8	53.9	17.1	
Hori	4960.000	AV	32.0	31.6	3.9	34.0	33.5	53.9	20.4	
Hori	7440.000	AV	31.4	36.2	4.6	34.3	37.9	53.9	16.0	NS
Hori	9920.000	AV	31.4	39.1	5.4	34.7	41.2	53.9	12.7	NS
Hori	24800.000	AV	33.0	40.6	-1.6	32.7	39.3	53.9	14.6	NS
Vert	33.138	QP	26.8	16.8	6.8	28.5	21.9	40.0	18.1	
Vert	60.091	QP	34.9	8.3	7.1	28.6	21.7	40.0	18.3	
Vert	84.087	QP	42.3	6.8	7.3	28.4	28.0	40.0	12.0	
Vert	148.210	QP	28.0	14.7	7.8	28.1	22.4	43.5	21.1	
Vert	209.270	QP	32.9	16.5	8.2	27.9	29.7	43.5	13.8	
Vert	663.852	QP	28.6	20.4	10.4	28.5	30.9	46.0	15.1	
Vert	2483.500	PK	53.1	27.5	2.3	34.8	48.1	73.9	25.8	
Vert	4960.000	PK	45.4	31.6	3.9	34.0	46.9	73.9	27.0	
Vert	7440.000	PK	42.4	36.2	4.6	34.3	48.9	73.9	25.0	NS
Vert	9920.000	PK	43.7	39.1	5.4	34.7	53.5	73.9	20.4	NS
Vert	24800.000	PK	44.7	40.6	-1.6	32.7	51.0	73.9	22.9	NS
Vert	2483.500	AV	40.2	27.5	2.3	34.8	35.2	73.9	38.7	
Vert	4960.000	AV	32.9	31.6	3.9	34.0	34.4	53.9	19.5	
Vert	7440.000	AV	31.4	36.2	4.6	34.3	37.9	53.9	16.0	NS
Vert	9920.000	AV	31.4	39.1	5.4	34.7	41.2	53.9	12.7	NS
Vert	24800.000	AV	33.0	40.6	-1.6	32.7	39.3	53.9	14.6	NS

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

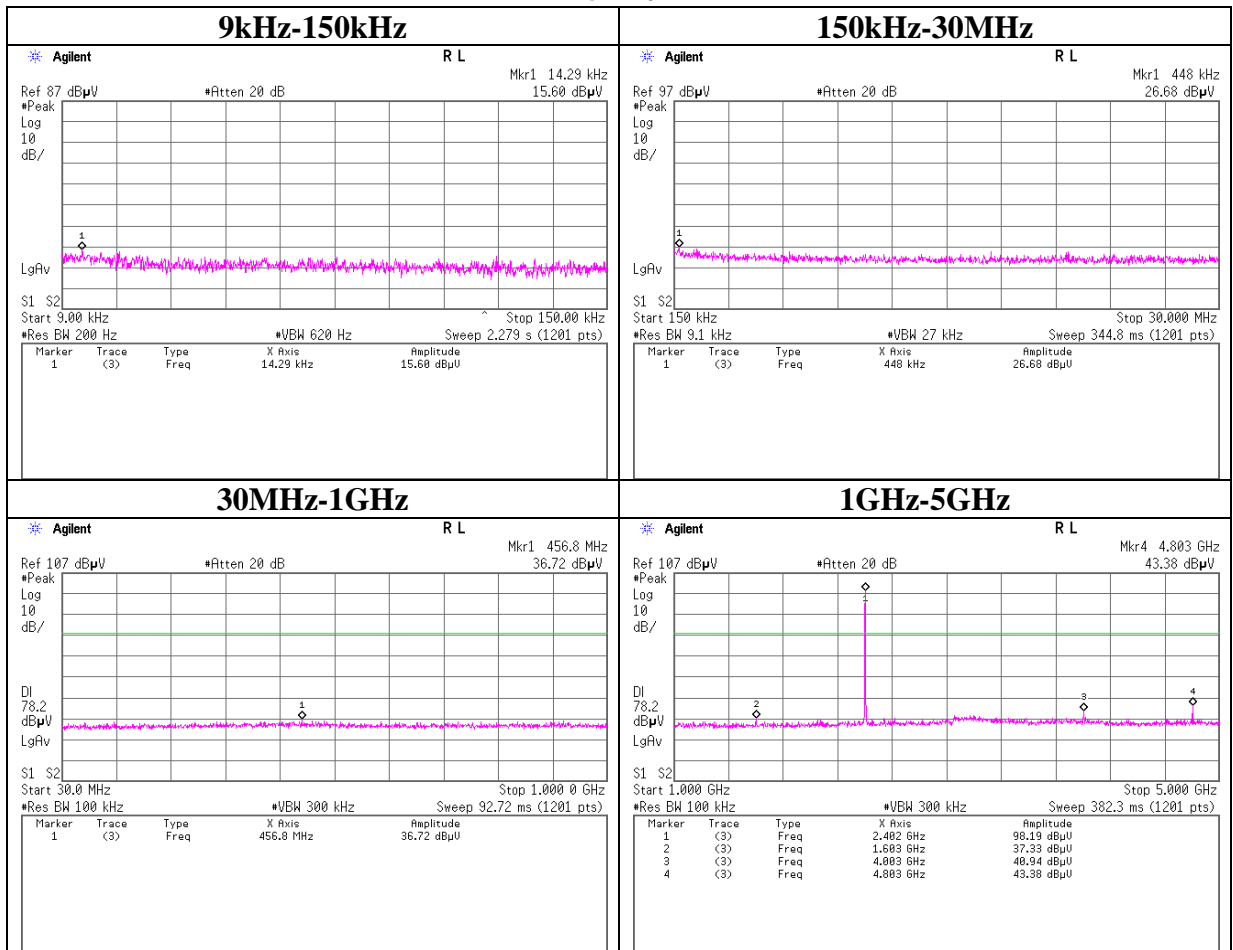
*Other frequency noises omitted in this report were not seen or had enough margin (more than 20dB).

*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

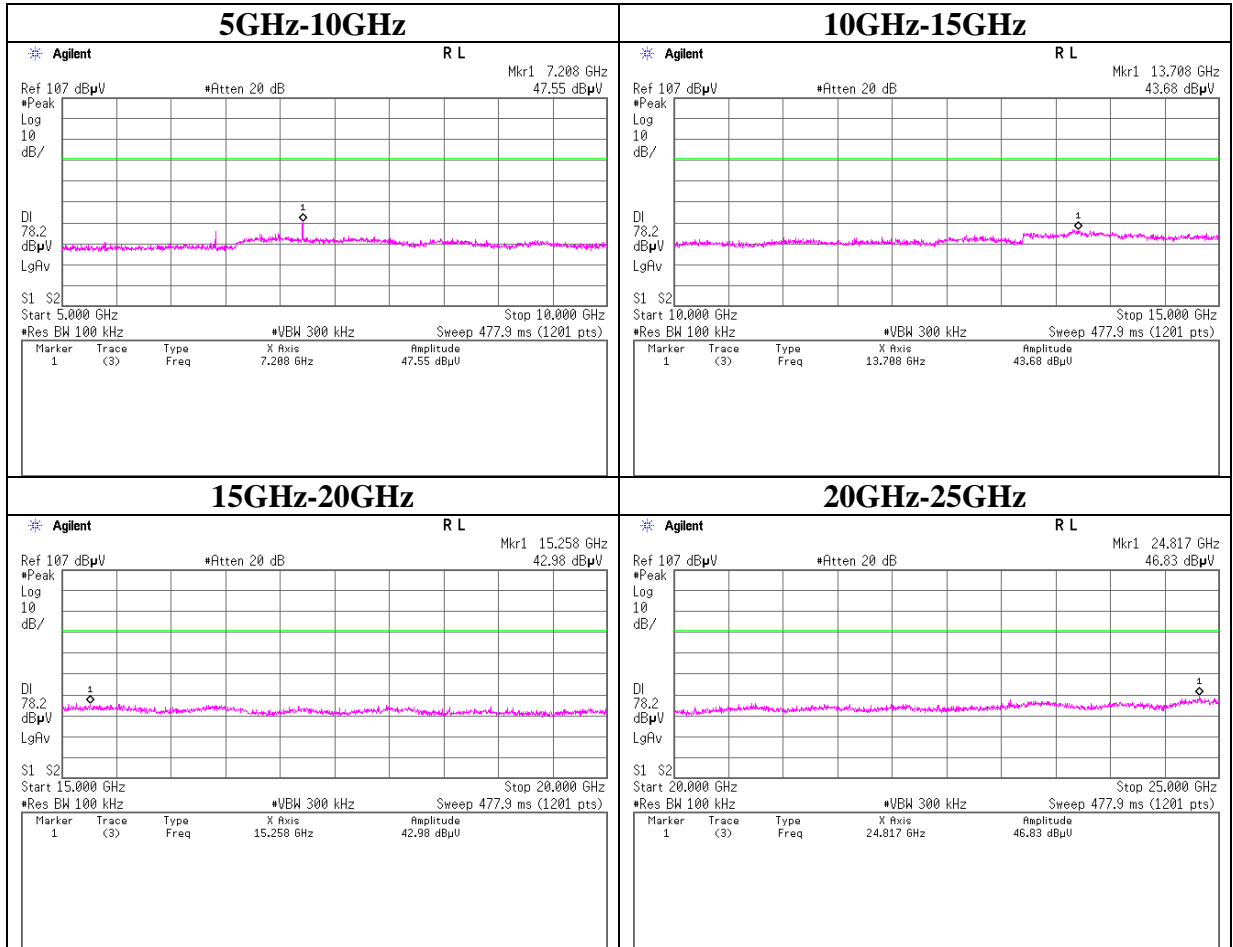
Conducted Spurious Emission

Tx DH5 2402MHz



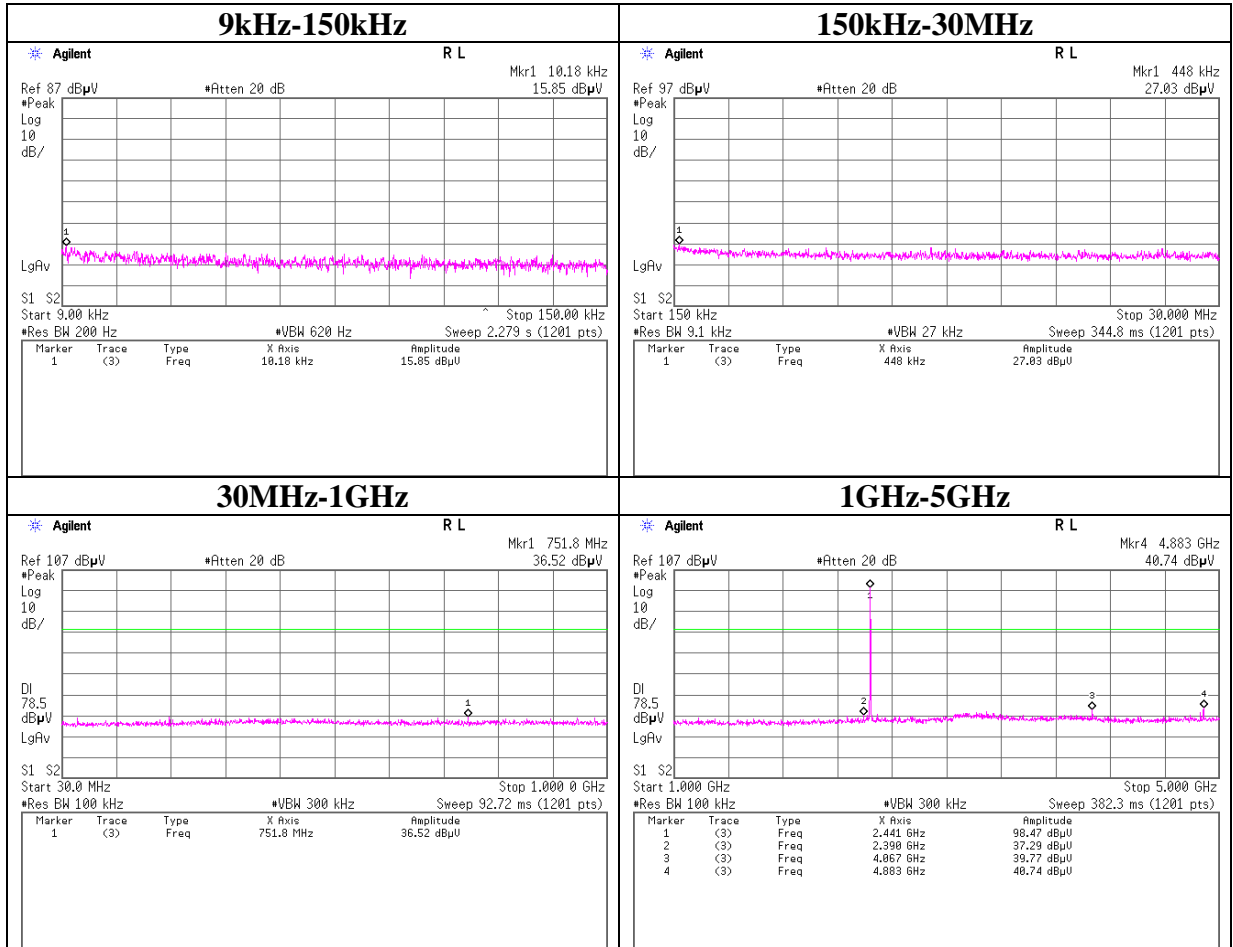
Conducted Spurious Emission

Tx DH5 2402MHz



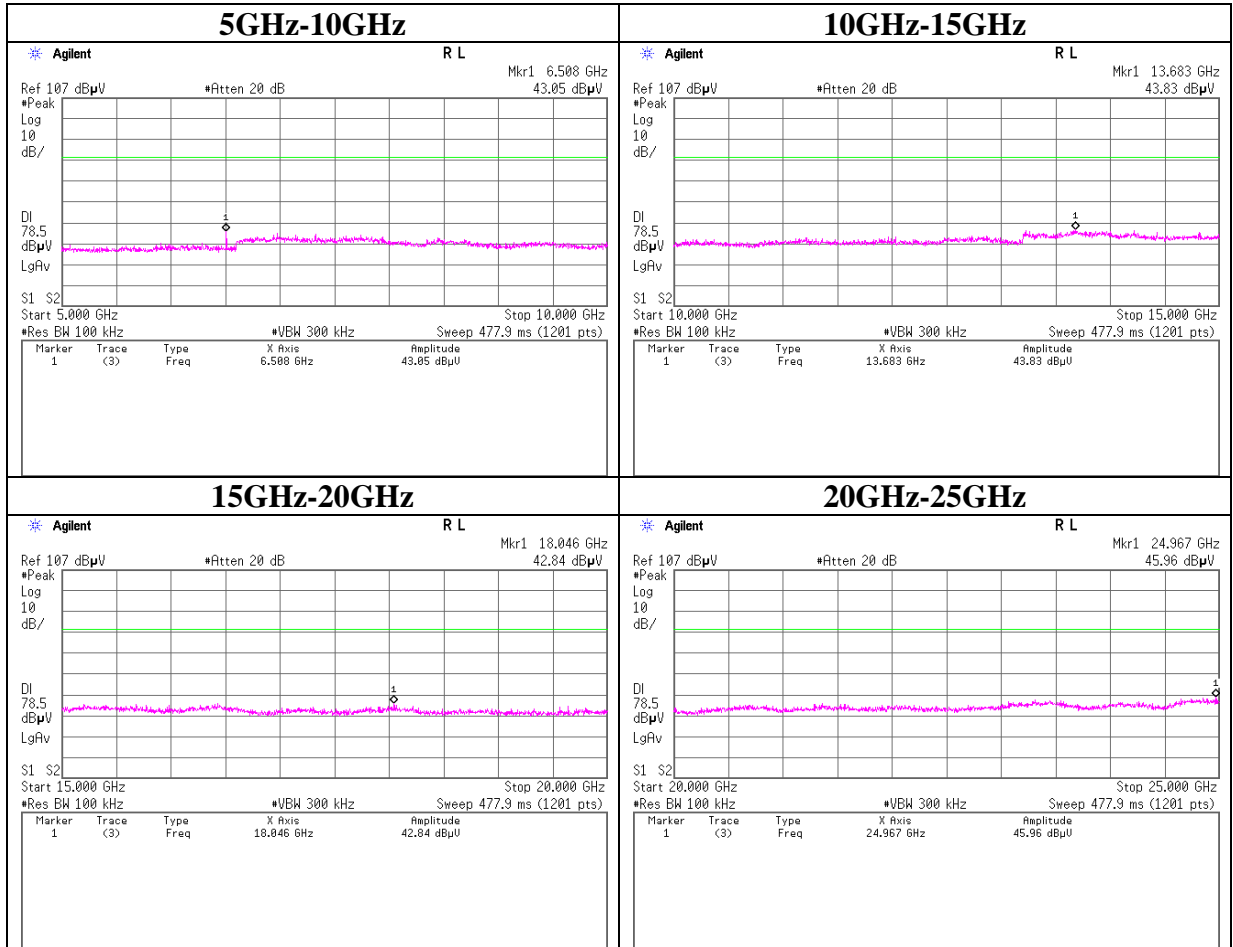
Conducted Spurious Emission

Tx DH5 2441MHz



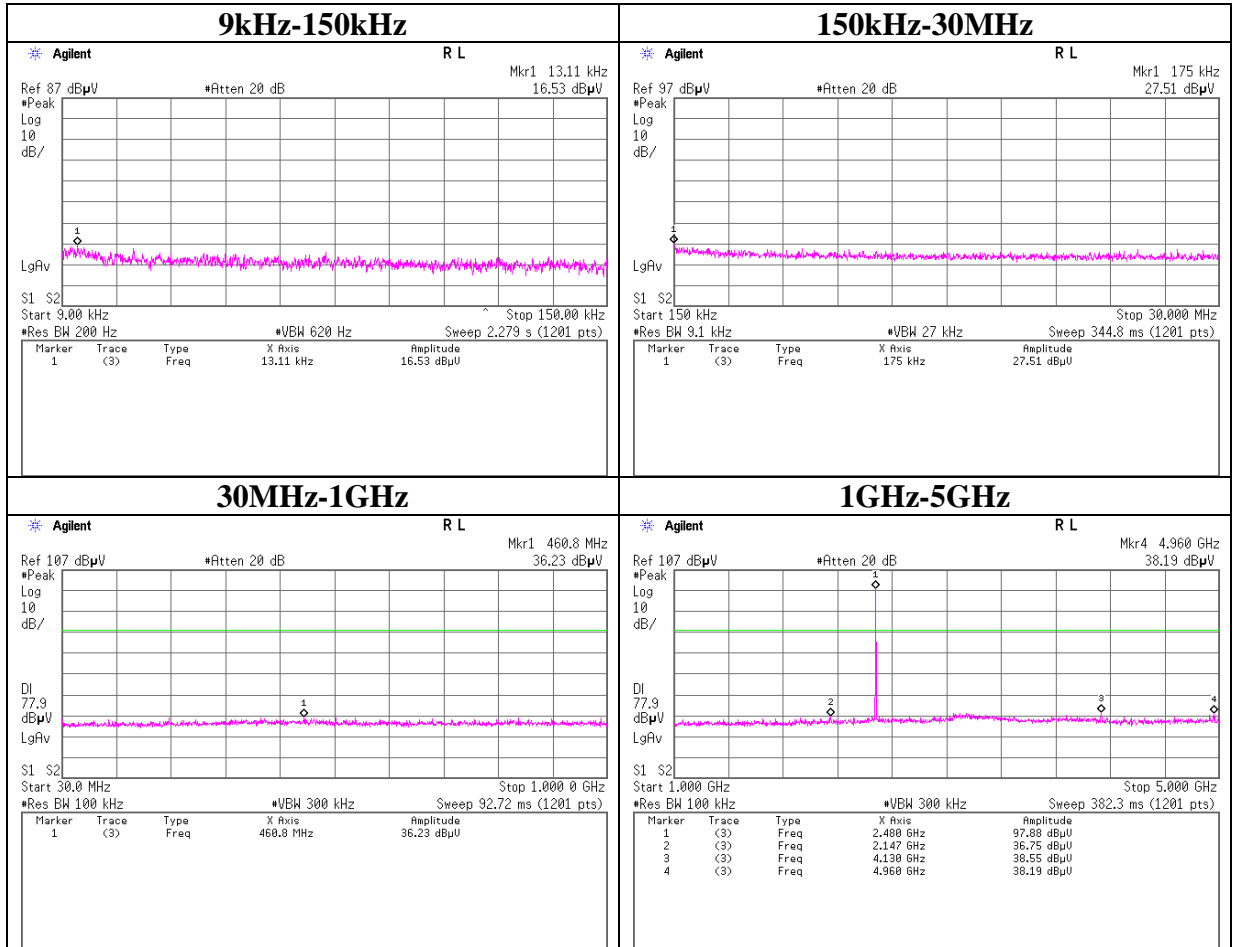
Conducted Spurious Emission

Tx DH5 2441MHz



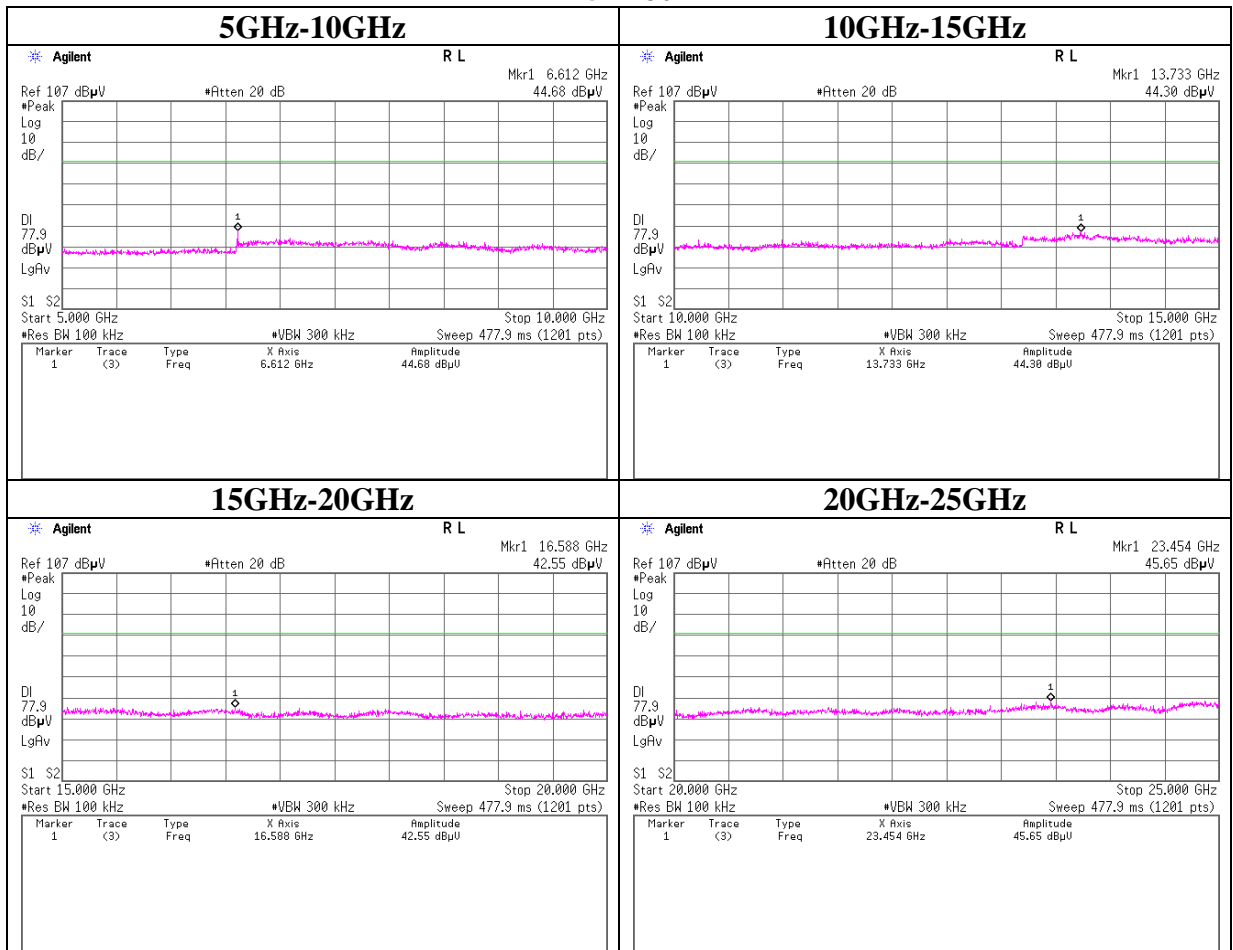
Conducted Spurious Emission

Tx DH5 2480MHz



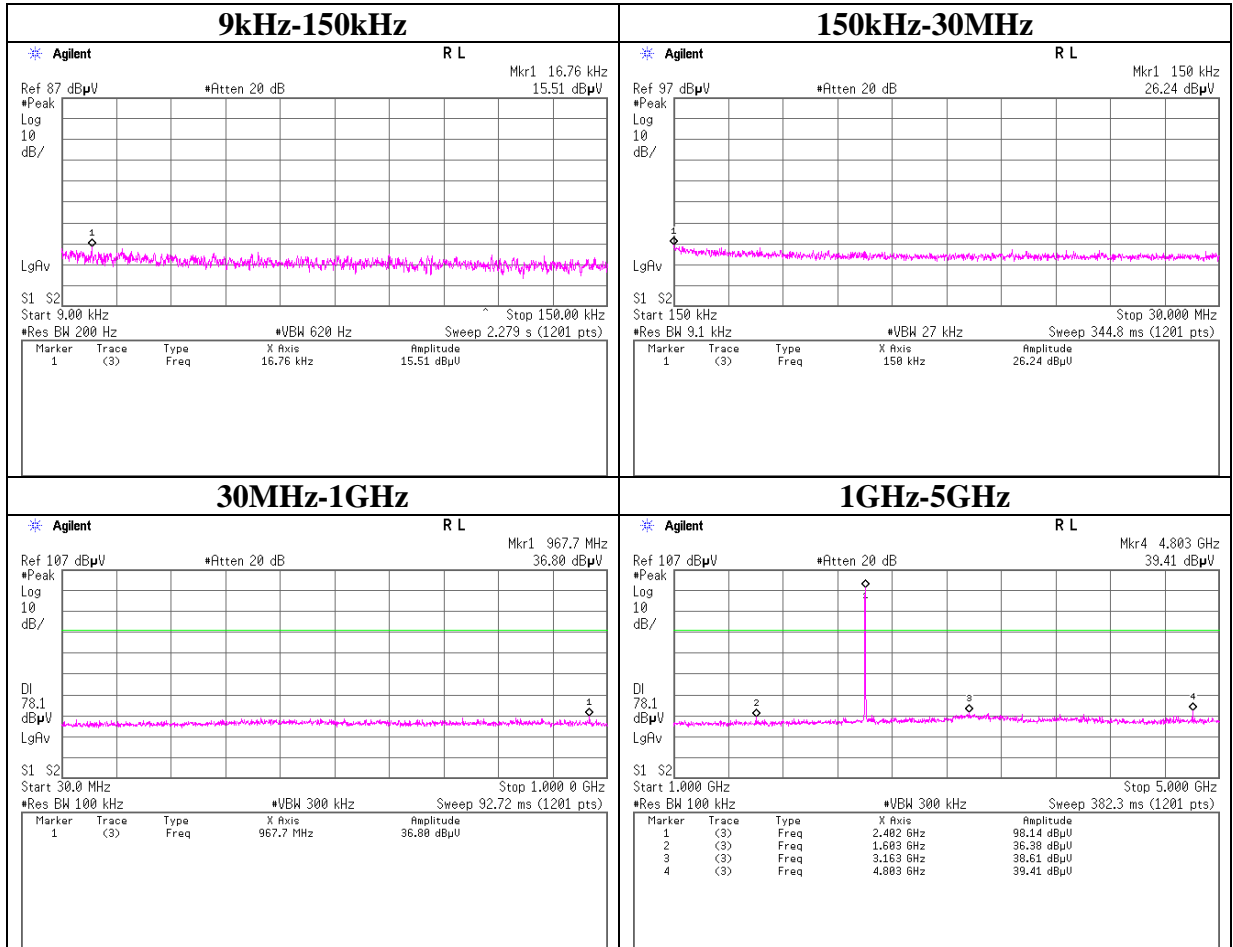
Conducted Spurious Emission

Tx DH5 2480MHz



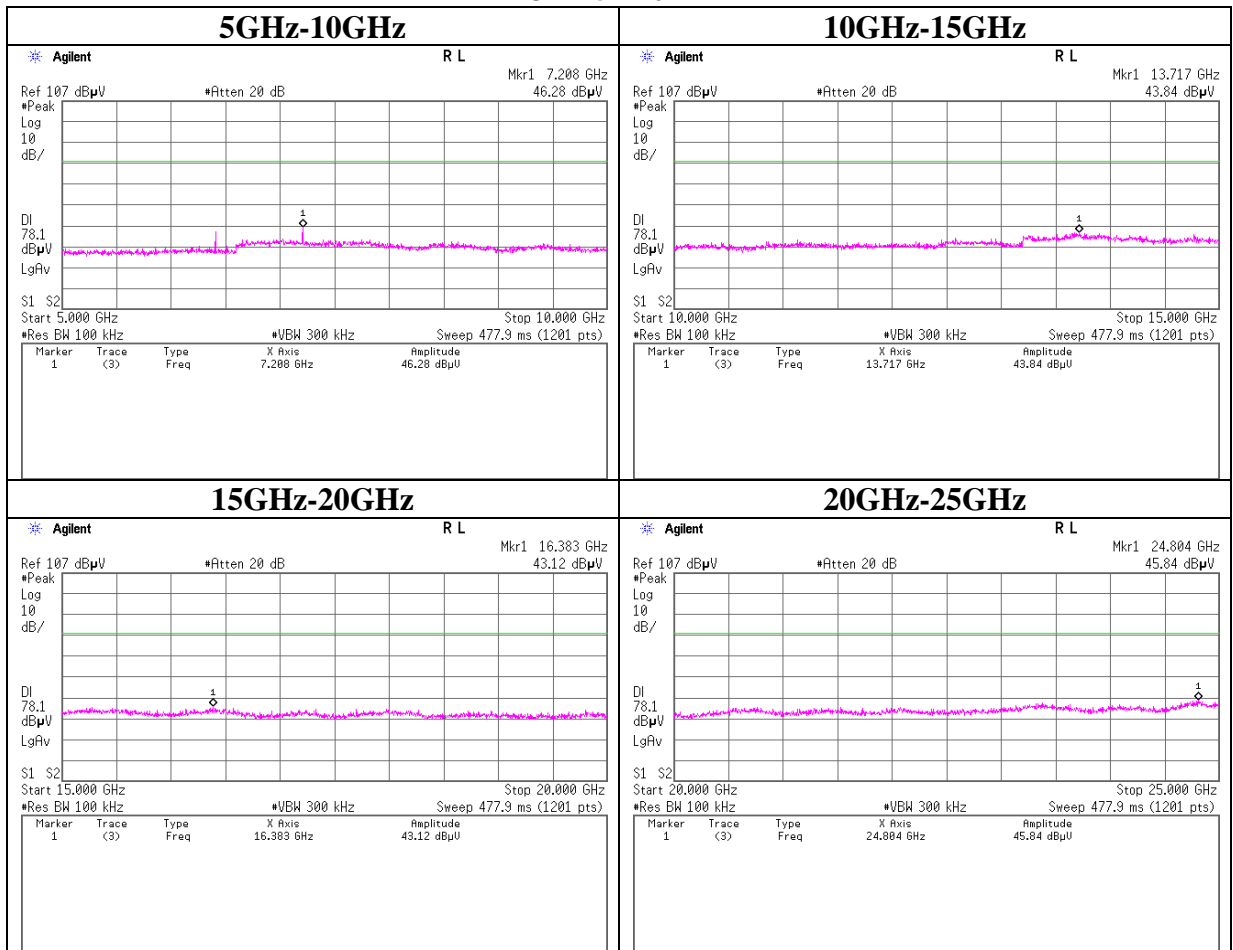
Conducted Spurious Emission

Tx 3DH5 2402MHz



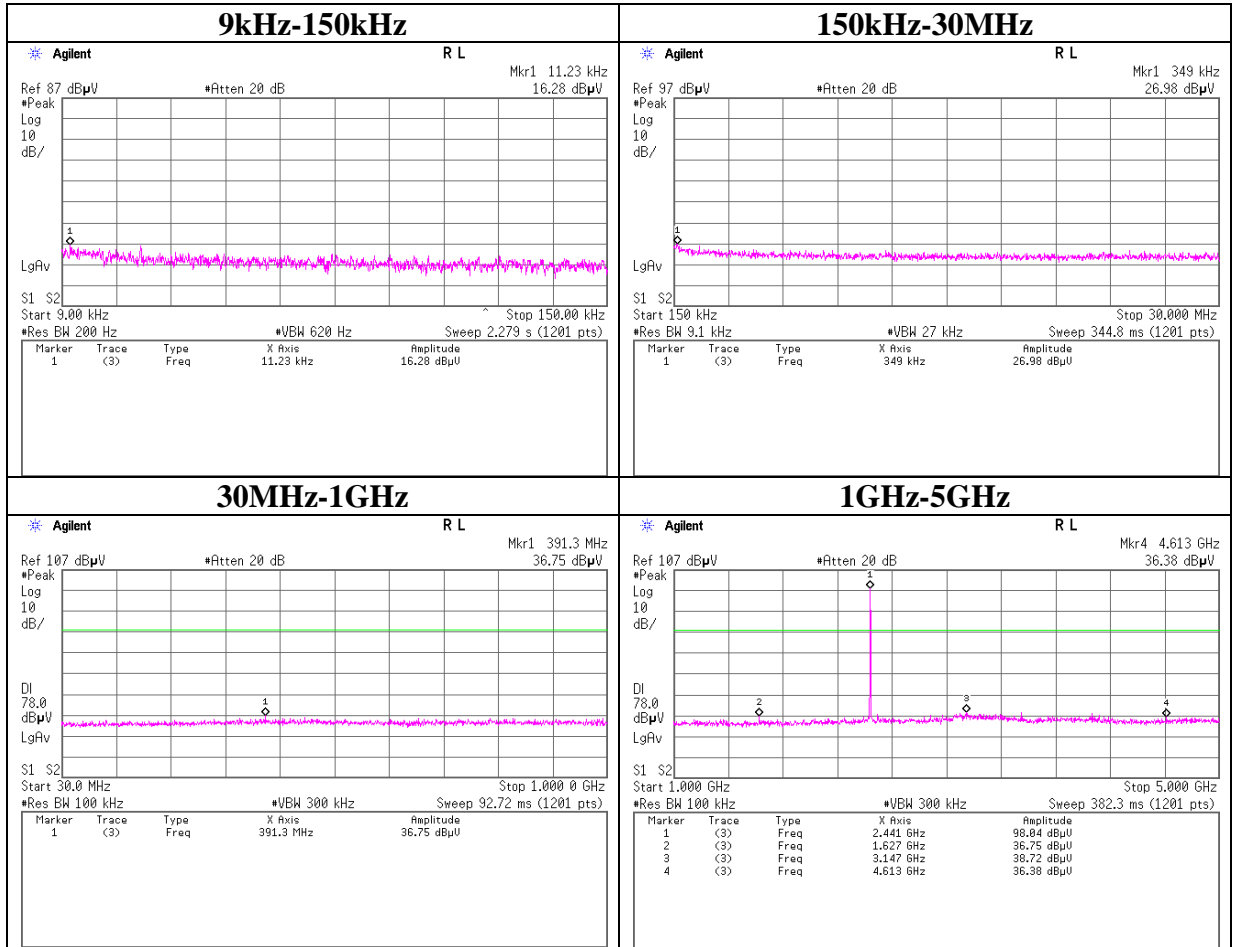
Conducted Spurious Emission

Tx 3DH5 2402MHz



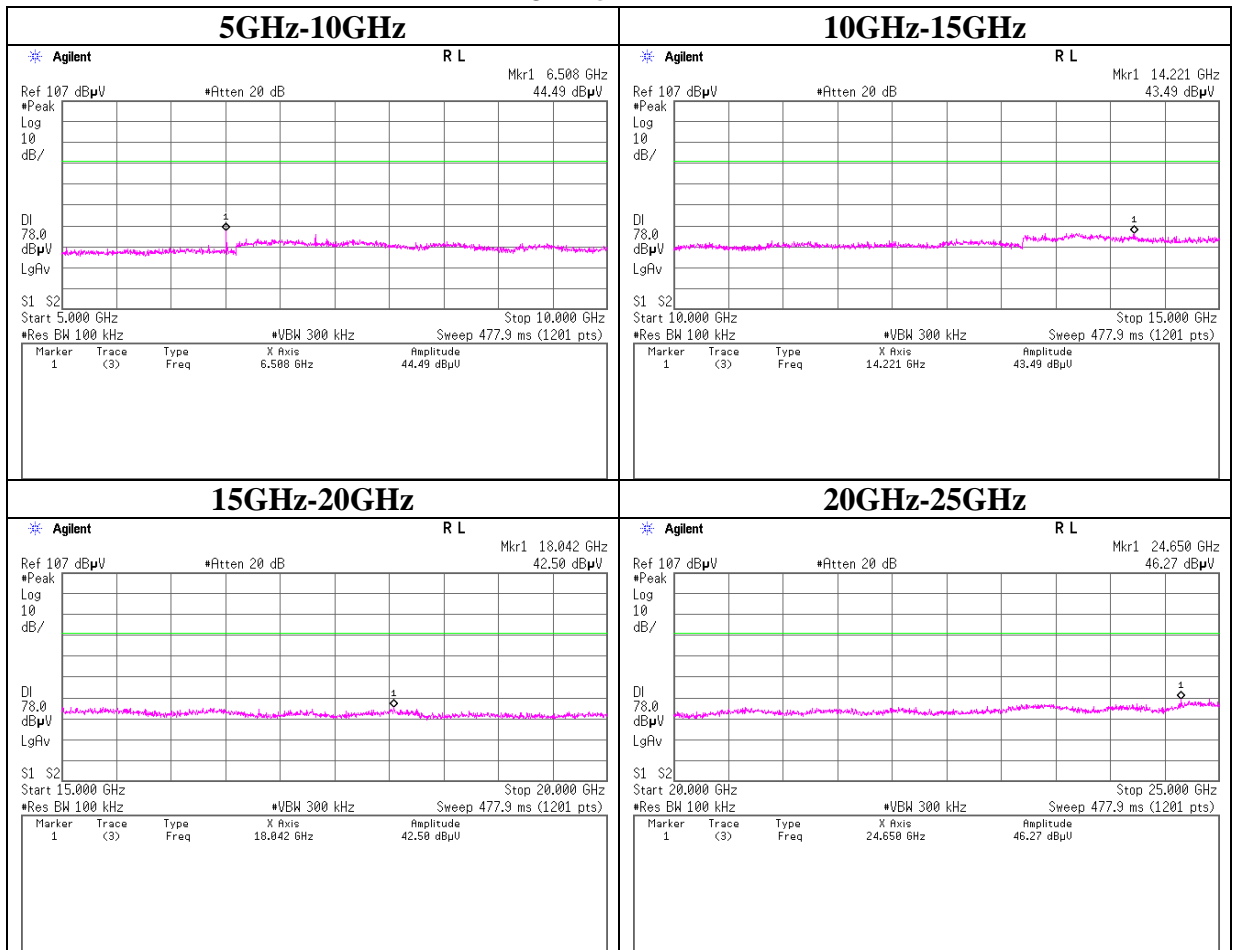
Conducted Spurious Emission

Tx 3DH5 2441MHz



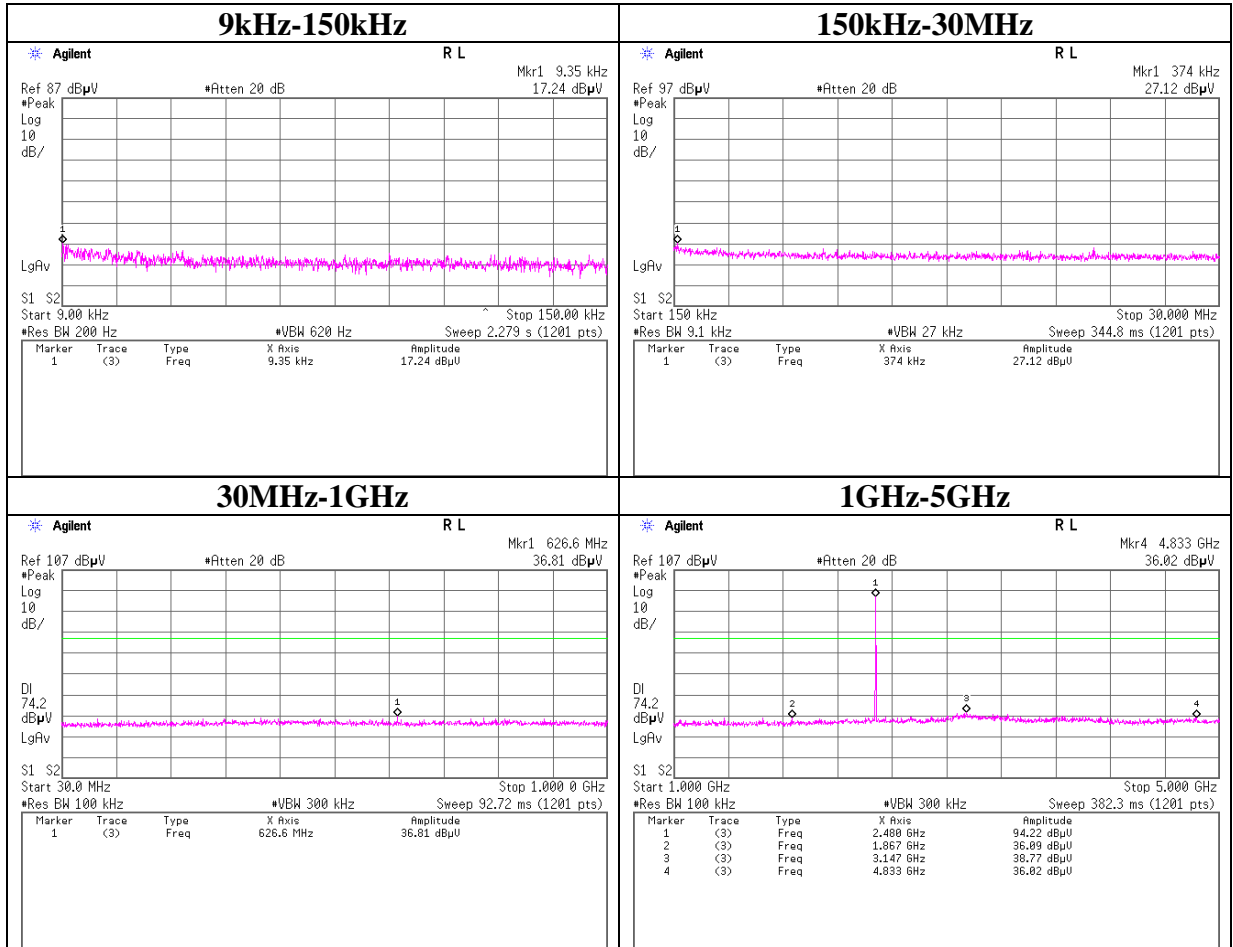
Conducted Spurious Emission

Tx 3DH5 2441MHz



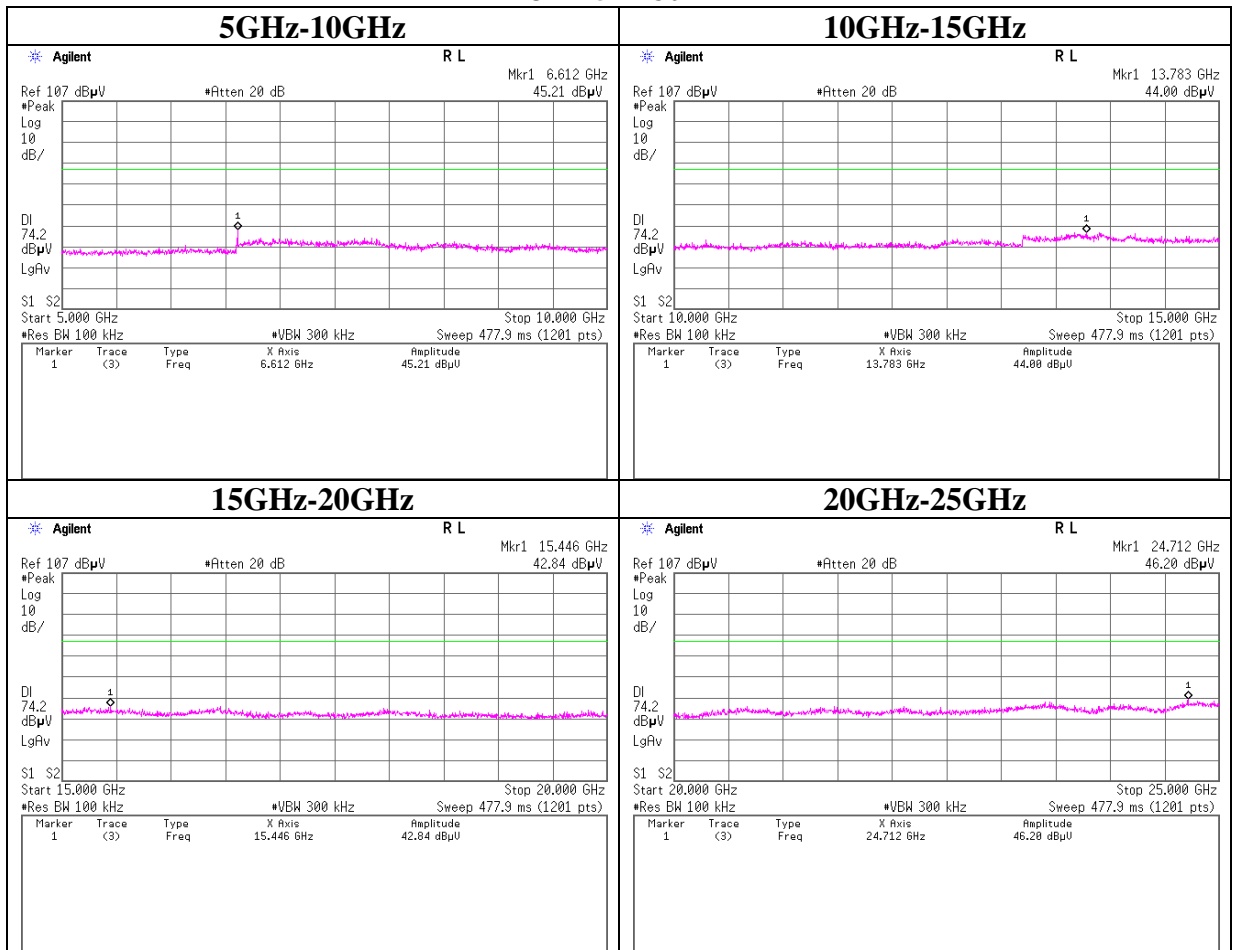
Conducted Spurious Emission

Tx 3DH5 2480MHz



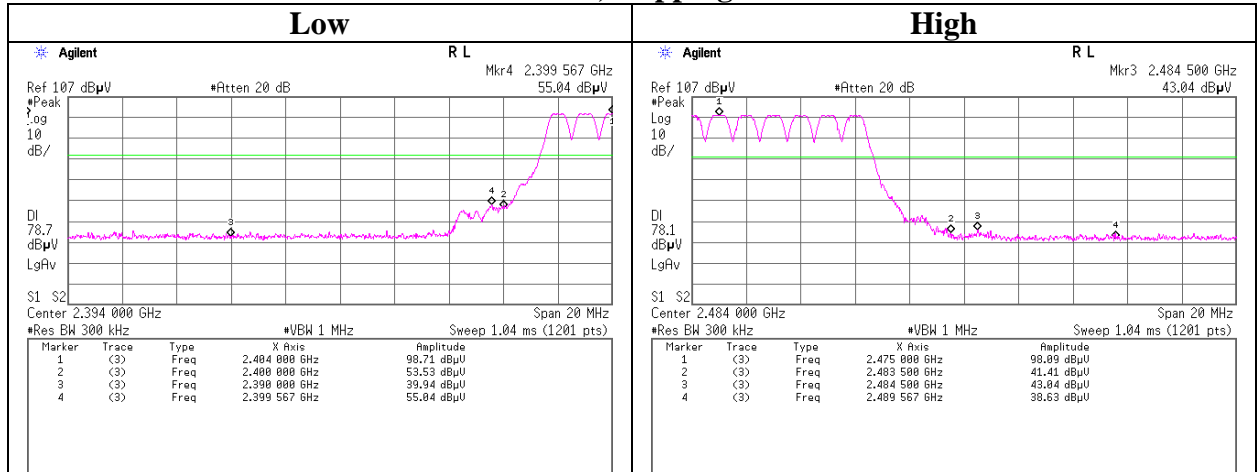
Conducted Spurious Emission

Tx 3DH5 2480MHz

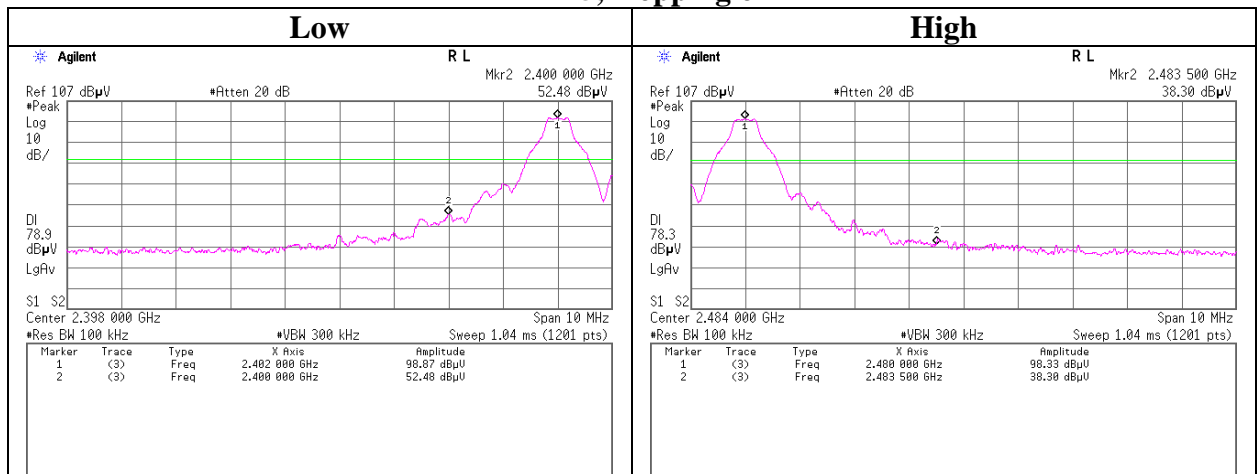


Conducted Emission Band Edge compliance

Tx DH5, Hopping on

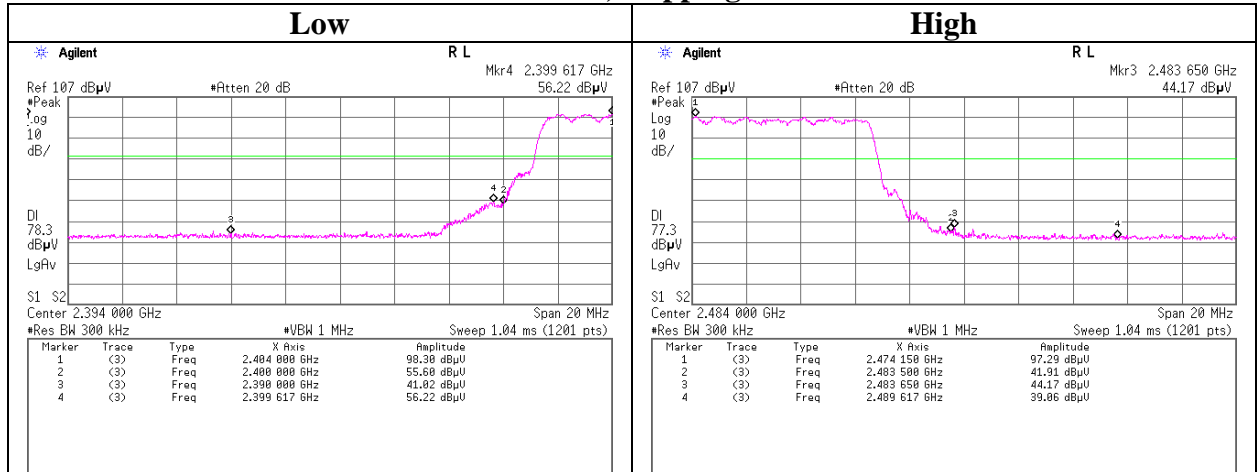


Tx DH5, Hopping off

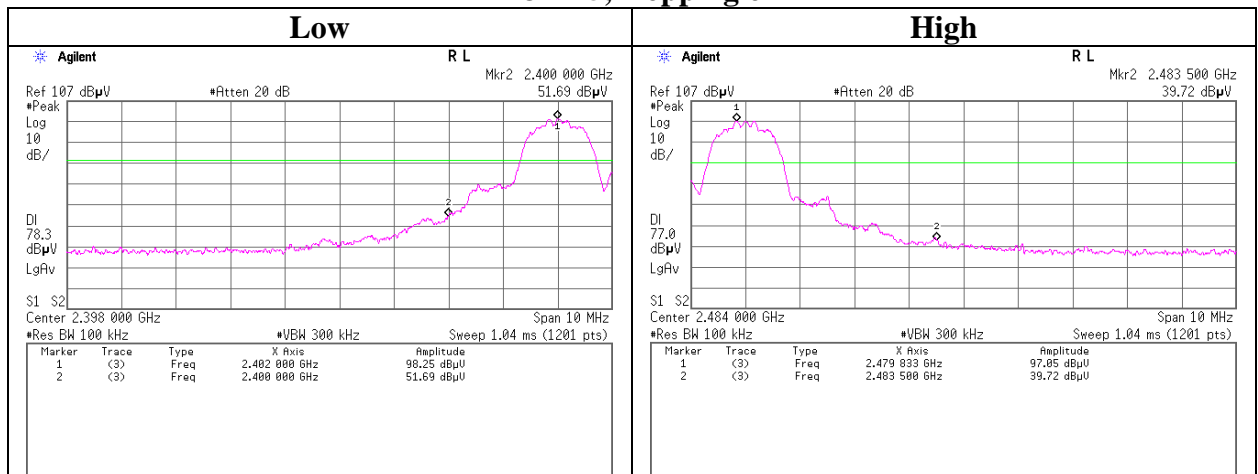


Conducted Emission Band Edge compliance

Tx 3DH5, Hopping on



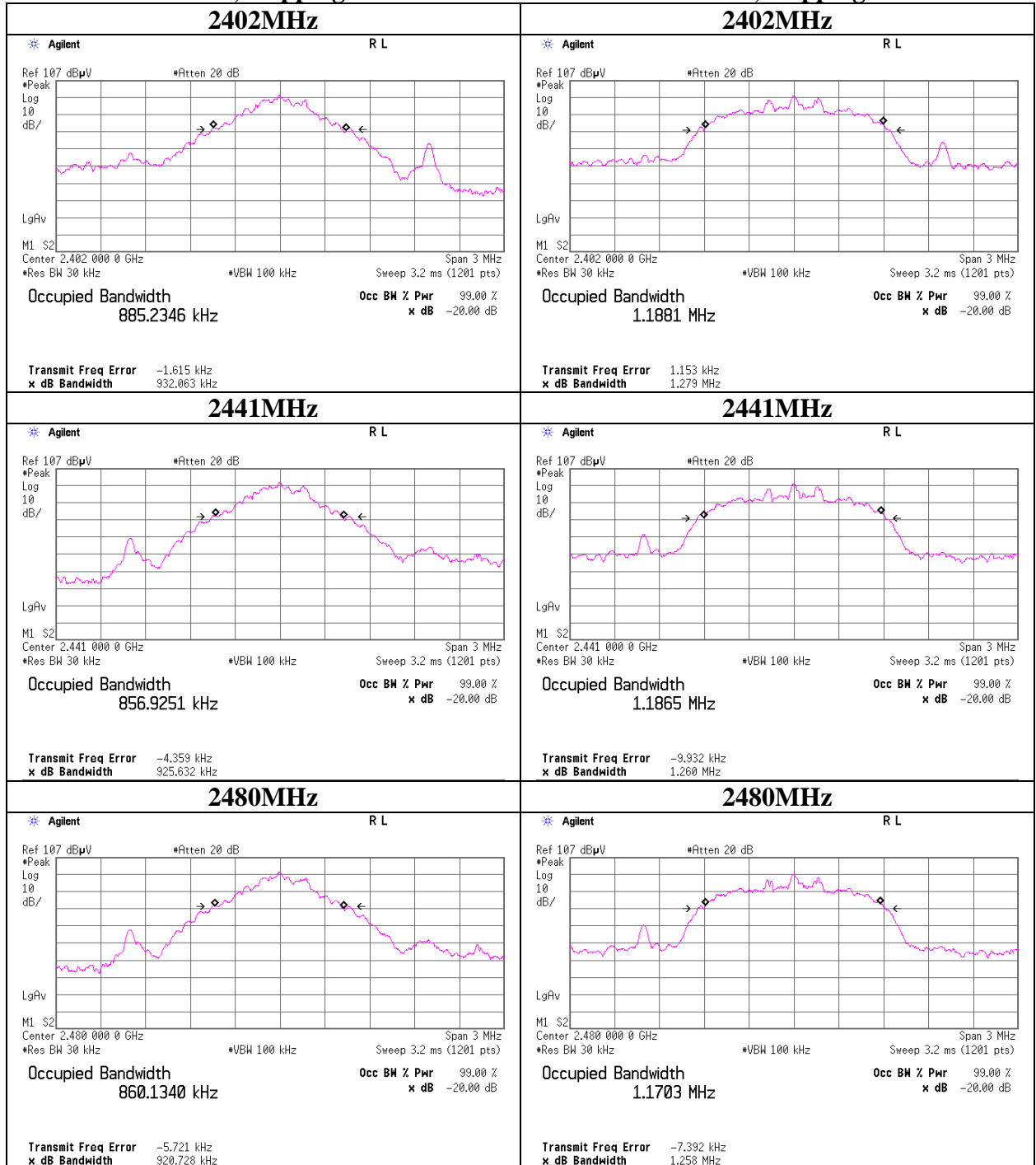
Tx 3DH5, Hopping off



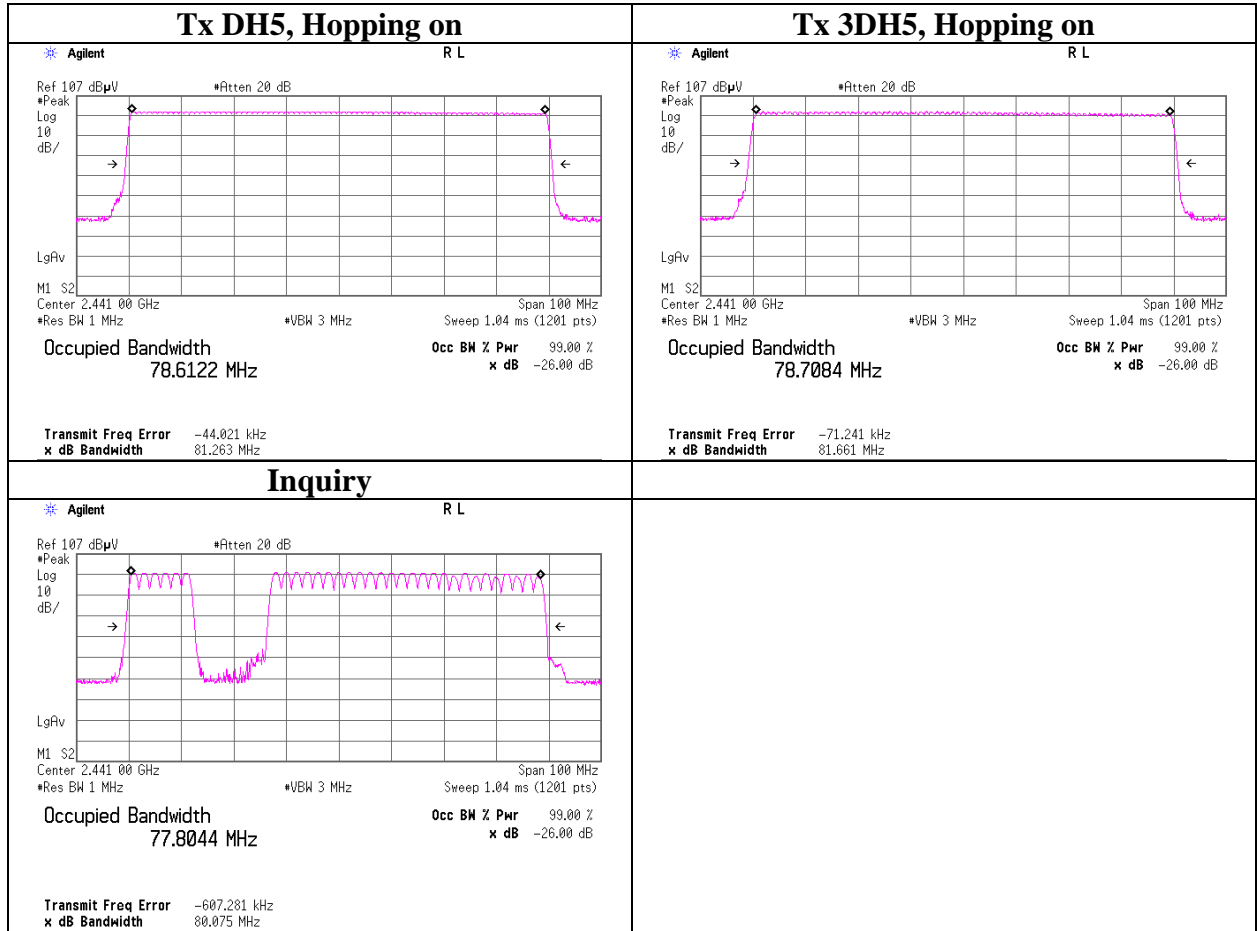
99% Occupied Bandwidth

Tx DH5, Hopping off

Tx 3DH5, Hopping off



99% Occupied Bandwidth



APPENDIX 2: Test instruments

EMI test equipment

Control No.	Instrument	Manufacturer	Model No	Serial No	Test Item	Calibration Date * Interval(month)
MPM-08	Power Meter	Anritsu	ML2495A	6K00003338	AT	2011/09/13 * 12
MPSE-11	Power sensor	Anritsu	MA2411B	011737	AT	2011/09/13 * 12
MSA-10	Spectrum Analyzer	Agilent	E4448A	MY46180655	AT	2012/02/03 * 12
MCC-138	Microwave cable	HUBER+SUHNER	SUCOFLEX 102	37953/2	AT	2011/10/28 * 12
MAT-23	Attenuator(10dB) 1-18GHz	Orient Microwave	BX10-0476-00	-	AT	2012/03/27 * 12
MCC-66	Microwave Cable 1G-40GHz	Suhner	SUCOFLEX102	28636/2	RE	2012/04/25 * 12
MAT-22	Attenuator(10dB) 1-18GHz	Orient Microwave	BX10-0476-00	-	RE	2012/03/27 * 12
MOS-14	Thermo-Hygrometer	Custom	CTH-201	-	RE	2012/02/06 * 12
MAEC-02	Semi Anechoic Chamber(NSA)	TDK	Semi Anechoic Chamber 3m	DA-06902	RE/CE	2011/06/21 * 12
MOS-22	Thermo-Hygrometer	Custom	CTH-201	0003	RE/CE	2012/02/06 * 12
MJM-14	Measure	KOMELON	KMC-36	-	RE/CE	-
COTS-MEMI	EMI measurement program	TSJ	TEPTO-DV	-	RE/CE	-
MSA-04	Spectrum Analyzer	Agilent	E4448A	US44300523	RE/CE	2012/04/06 * 12
MHA-06	Horn Antenna 1-18GHz	Schwarzbeck	BBHA9120D	254	RE	2012/02/22 * 12
MPA-10	Pre Amplifier	Agilent	8449B	3008A02142	RE	2012/01/25 * 12
MCC-132	Microwave Cable	HUBER+SUHNER	SUCOFLEX104	336161/4(1m) / 340639(5m)	RE	2011/09/06 * 12
MHF-06	High Pass Filter 3.5-24GHz	TOKIMEC	TF323DCA	601	RE	2011/05/16 * 12
MTR-07	Test Receiver	Rohde & Schwarz	ESCI	100635	RE/CE	2012/04/05 * 12
MBA-02	Biconical Antenna	Schwarzbeck	BBA9106	VHA91032008	RE	2011/10/23 * 12
MLA-02	Logperiodic Antenna	Schwarzbeck	USLP9143	201	RE	2011/10/23 * 12
MCC-12	Coaxial Cable	Fujikura/Agilent	-	-	RE	2012/02/16 * 12
AT-38	Attenuator	Anritsu	MP721B	6200961025	RE	2011/12/08 * 12
MPA-09	Pre Amplifier	Agilent	8447D	2944A10845	RE	2011/09/26 * 12
MHA-02	Horn Antenna 18-26.5GHz	EMCO	3160-09	1265	RE	2012/02/22 * 12
MLS-07	LISN(AMN)	Schwarzbeck	NSLK8127	8127364	CE	2012/02/09 * 12
MCC-13	Coaxial Cable	Fujikura	3D-2W(12m)/5D-2W(5m)/5D-2W(0.8m)/5D-2W(1m)	-	CE	2012/02/16 * 12
MAT-65	Attenuator(13dB)	JFW Industries, Inc.	50FP-013H2 N	-	CE	2012/01/28 * 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**