




RADIO TEST REPORT


Test Report No. : 32IE0154-HO-01-B-R1

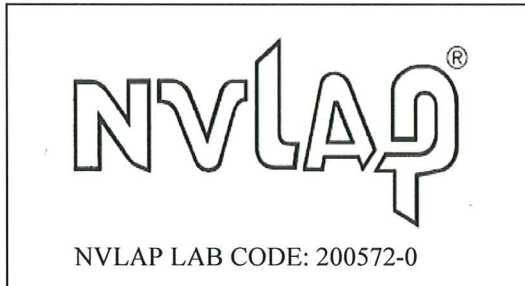
Applicant : silex technology, Inc.
Type of Equipment : SDIO Wireless Module
Model No. : SX-SDMAN
FCC ID : N6C-SDMAN
Test regulation : FCC Part 15 Subpart C: 2012
Test Result : Complied

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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.
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6. This report is a revised version of 32IE0154-HO-01-B. 32IE0154-HO-01-B is replaced with this report.

Date of test: May 30 to June 22, 2012

Representative test engineer: 
Yutaka Yoshida
Engineer of WiSE Japan,
UL Verification Service

Approved by: 
Takahiro Hatakeda
Leader of WiSE Japan,
UL Verification Service



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SECTION 1: Customer information

Company Name : silex technology, Inc.
Address : 2-3-1 Hikaridai, Seika-cho, Kyoto 619-0237, Japan
Telephone Number : +81-774-98-3878
Facsimile Number : +81-774-98-3758
Contact Person : Toshiro Kometani

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

2.1 Identification of E.U.T.

Type of Equipment : SDIO Wireless Module
Model No. : SX-SDMAN
Serial No. : Refer to Section 4, Clause 4.2
Rating : DC3.3V
Receipt Date of Sample : April 11, 2012
Country of Mass-production : Japan
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: SX-SDMAN (referred to as the EUT in this report) is the SDIO Wireless Module.

General Specification

Clock frequency(ies) in the system : 26MHz

Radio Specification

Radio Type : Transceiver
Method of Frequency Generation : Synthesizer
Power Supply (inner) : DC1.2V

Specification of Wireless LAN (IEEE802.11b/g/a/n-20/n-40)

Type of radio	IEEE802.11b	IEEE802.11g	IEEE802.11a	IEEE802.11n (20 M band)	IEEE802.11n (40 M band)
Frequency of operation	2412-2462MHz	2412-2462MHz	5180-5320MHz *1) 5745-5825MHz	2412 - 2462MHz 5180-5320MHz *1) 5745-5825MHz	5190 - 5310MHz *2) 5755 - 5795MHz
Type of modulation	DSSS (CCK, DQPSK, DBPSK)	OFDM-CCK (64QAM, 16QAM, QPSK, BPSK)	OFDM (64QAM, 16QAM, QPSK, BPSK)		
Channel spacing	5MHz		20MHz	<u>2.4GHz band</u> 5MHz <u>5GHz band</u> 20MHz	40MHz
Antenna type	Sleeve antenna: Sansei Embedded antenna: Ethertronics				
Antenna Gain	Sleeve antenna: 1.0dBi (2.4GHz including cableloss 0.5dB), 1.1dBi (5GHz including cableloss 1.0dB) Embedded antenna: 2.0dBi (2.4GHz including cableloss 0.5dB), 2.5dBi (5GHz including cableloss 1.0dB)				
Antenna Connector type	U.FL connector				

*1) 5180 - 5320MHz is applied for other test report.(Test Report No.: 32IE0154-HO-01-C)

*2) 5190 - 5310MHz is applied for other test report.(Test Report No.: 32IE0154-HO-01-C)

Specification of Bluetooth (Ver.4.0 + EDR)

Type of radio	Bluetooth
Frequency of Operation	2402-2480MHz
Type of Modulation	FHSS
Channel spacing	1MHz
Antenna type	Embedded antenna: Ethertronics
Antenna Gain	2.0dBi (2.4GHz including cableloss 0.5dB), 2.5dBi (5GHz including cableloss 1.0dB)
Antenna Connector Type	U.FL Alternative connector

Specification of Low Energy (Ver.4.0 + EDR/LE Dual mode)

Type of radio	Low Energy
Frequency of Operation	2402-2480MHz
Type of Modulation	DSSS
Channel spacing	2MHz
Antenna type	Embedded antenna: Ethertronics
Antenna Gain	2.0dBi (2.4GHz including cableloss 0.5dB), 2.5dBi (5GHz including cableloss 1.0dB)
Antenna Connector Type	U.FL Alternative connector

*This test report applies for Bluetooth (Ver.4.0 + EDR).

Wireless LAN and Bluetooth do not transmit simultaneously.

UL Japan, Inc.

Head Office EMC Lab.

4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

Telephone : +81 596 24 8116

Facsimile : +81 596 24 8124

SECTION 3: Test specification, procedures & results

3.1 Test Specification

Test Specification : FCC Part 15 Subpart C: 2012, final revised on May 17, 2012 and effective June 18, 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 May 17, 2012 does not affect the test specification applied to the EUT.

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 29.8dB, 0.15000MHz, N/L AV 36.9dB, 1.00000MHz, N	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)		-	Conducted	
Number of Hopping Frequency	FCC: FCC Public Notice DA 00-705 IC: -	FCC: Section15.247(a)(1)(iii) ----- IC: RSS-210 A8.1 (d)		Complied	Conducted	
Dwell time	FCC: FCC Public Notice DA 00-705 IC: -	FCC: Section15.247(a)(1)(iii) ----- IC: RSS-210 A8.1 (d)		Complied	Conducted	
Maximum Peak Output Power	FCC: FCC Public Notice DA 00-705 IC: RSS-Gen 4.8	FCC: Section15.247(a)(b)(1) ----- IC: RSS-210 A8.4 (2)		Complied	Conducted	
Spurious Emission & Band Edge Compliance	FCC: FCC Public Notice DA 00-705 IC: RSS-Gen 4.9	FCC: Section15.247(d) ----- IC: RSS-210 A8.5 RSS-Gen 6 and 7.2.3		6.3dB 3456.016MHz, AV, Vertical	Complied	Conducted/ Radiated

Note: UL Japan, Inc.'s EMI Work Procedures No. 13-EM-W0420 and 13-EM-W0422.

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

FCC 15.31 (e)

The RF Module has own regulator.

The RF Module is constantly provided voltage through own regulator regardless of input voltage (DC3.3V).

Therefore, this EUT complies with the requirement.

FCC Part 15.203/212 Antenna requirement

The EUT has a unique antenna connector.

Therefore the equipment complies with the requirement of 15.203/212.

UL Japan, Inc.

Head Office EMC Lab.

4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

Telephone : +81 596 24 8116

Facsimile : +81 596 24 8124

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 (10m*)(±dB)		
	9kHz -30MHz	30MHz -300MHz	300MHz -1GHz
No.1	4.1dB	5.0dB	4.8dB
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	4.2dB	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 and 10m)

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

UL Japan, Inc.

Head Office EMC Lab.

4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

Telephone : +81 596 24 8116

Facsimile : +81 596 24 8124

3.5 Test Location

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

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

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

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

Refer to APPENDIX.

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

4.1 Operating Mode(s)

Bluetooth (BT): Transmitting (Tx), Payload: PRBS9
Inquiry

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, 3DH5	2402MHz 2441MHz 2480MHz
Band Edge Compliance (Conducted)	Tx DH5, 3DH5 -Hopping on -Hopping off	2402MHz 2480MHz
99% Occupied Bandwidth	Tx DH5, 3DH5 -Hopping on -Hopping off Inquiry	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: Step = 11/11; Level = 12 dBm (Maximum) EDR: Step = 11/11; Level = 12 dBm (Maximum) Software: BtUART Version 2.0 (Atheros Communications, Inc.) *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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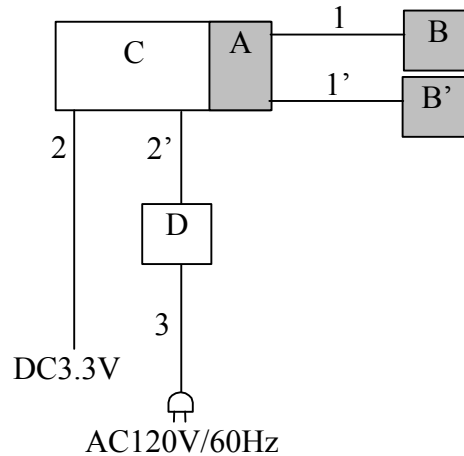
Head Office EMC Lab.

4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

Telephone : +81 596 24 8116

Facsimile : +81 596 24 8124

4.2 Configuration and peripherals



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

* Output to Antenna B' is not possible. This antenna was attached to EUT as a dummy load just for testing purpose.

Description of EUT

No.	Item	Model number	Serial number	Manufacturer	Remarks
A	SDIO Wireless Module	SX-SDMAN	003C7FF0F00A	silex technology, Inc.	EUT
B	Embedded Antenna	1000418	001	Ethertronics	EUT
B'	Embedded Antenna	1000418	002	Ethertronics	EUT
C	Jig Board	-	-	silex technology, Inc.	-
D	DC Power Supply	PMC35-2A	13090501	KIKUSUI ELECTRONICS CORP.	*1)

List of cables used

No.	Name	Length (m)	Shield		Remarks
			Cable	Connector	
1	Antenna Cable	0.1	Shielded	Shielded	-
1'	Antenna Cable	0.1	Shielded	Shielded	-
2	DC Cable	1.5	Unshielded	Unshielded	-
2'	DC Cable	1.5	Unshielded	Unshielded	*1)
3	AC Cable	1.8	Unshielded	Unshielded	*1)

*1) Used for Conducted Emission test only

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Head Office EMC Lab.

4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

Telephone : +81 596 24 8116

Facsimile : +81 596 24 8124

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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Head Office EMC Lab.

4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

Telephone : +81 596 24 8116

Facsimile : +81 596 24 8124

SECTION 6: Radiated Spurious Emission

Test Procedure

EUT was placed on a urethane platform of nominal size, 0.5m by 1.0m, raised 0.8m above the conducting ground plane.

The Radiated Electric Field Strength has been measured in a Semi Anechoic Chamber with a ground plane.

The height of the measuring antenna varied between 1 and 4m and EUT was rotated a full revolution in order to obtain the maximum value of the electric field strength.

The measurements were performed for both vertical and horizontal antenna polarization with the Test Receiver, or the Spectrum Analyzer.

The measurements were made with the following detector function of the test receiver and the Spectrum analyzer (in linear mode).

The test was made with the detector (RBW/VBW) in the following table.

When using Spectrum analyzer, the test was made with adjusting span to zero by using peak hold.

Test Antennas are used as below;

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

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

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

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

*1) Although 00-705 accepts VBW=10Hz for AV measurements, it was confirmed that superfluous smoothing was not performed.”

*2) Distance Factor: $20 \times \log(3.0\text{m}/1.0\text{m}) = 9.5\text{dB}$

- The carrier level and noise levels were confirmed at each position of X, Y and Z axes of Module, Antenna 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

UL Japan, Inc.

Head Office EMC Lab.

4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

Telephone : +81 596 24 8116

Facsimile : +81 596 24 8124

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 2MHz(Inquiry mode)	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	5MHz or 3MHz	100kHz or 30kHz	300kHz or 100kHz	Auto	Peak	Max Hold	Spectrum Analyzer
Number of Hopping Frequency	30MHz	300kHz	1MHz	Auto	Peak	Max Hold	Spectrum Analyzer
Dwell Time	Zero Span	100kHz, 1MHz	300kHz, 3MHz	As necessary capture the entire dwell time per hopping channel	Peak	Max Hold	Spectrum Analyzer
Conducted Spurious Emission *1)	9kHz to 150kHz	200Hz	620Hz	Auto	Peak	Max Hold	Spectrum Analyzer
	150kHz to 30MHz	9.1kHz	27kHz				
	30MHz to 25GHz (Less or equal to 5GHz)	100kHz	300kHz				
Conducted Spurious Emission Band Edge compliance	10MHz	100kHz	300kHz	Auto	Peak	Max Hold	Spectrum Analyzer

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

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

Test data : APPENDIX
Test result : Pass

APPENDIX 1: Data of EMI test

Conducted Emission

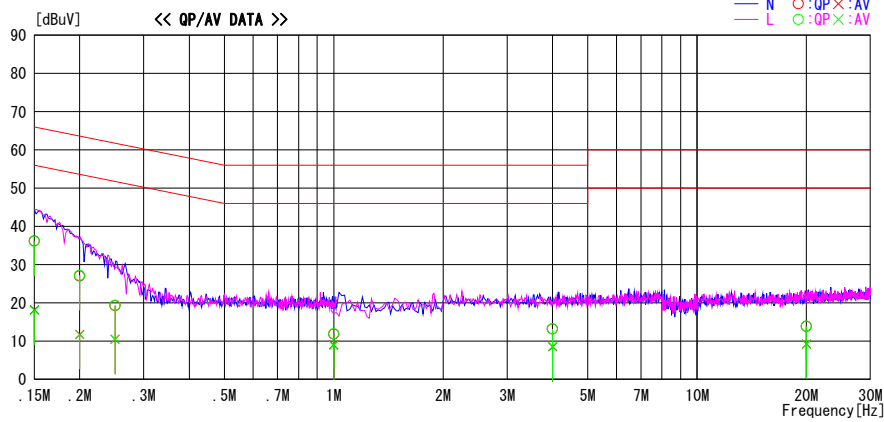
DATA OF CONDUCTED EMISSION TEST

UL Japan, Inc. Head Office EMC Lab. No. 4 Semi Anechoic Chamber
Date : 2012/06/22

Report No. : 32IE0154-H0-01
 Temp./Humi. : 23 deg. C / 58% RH
 Engineer : Takeshi Choda

Mode / Remarks : BT Tx BDR 2402MHz

LIMIT : FCC15.207 QP
 FCC15.207 AV

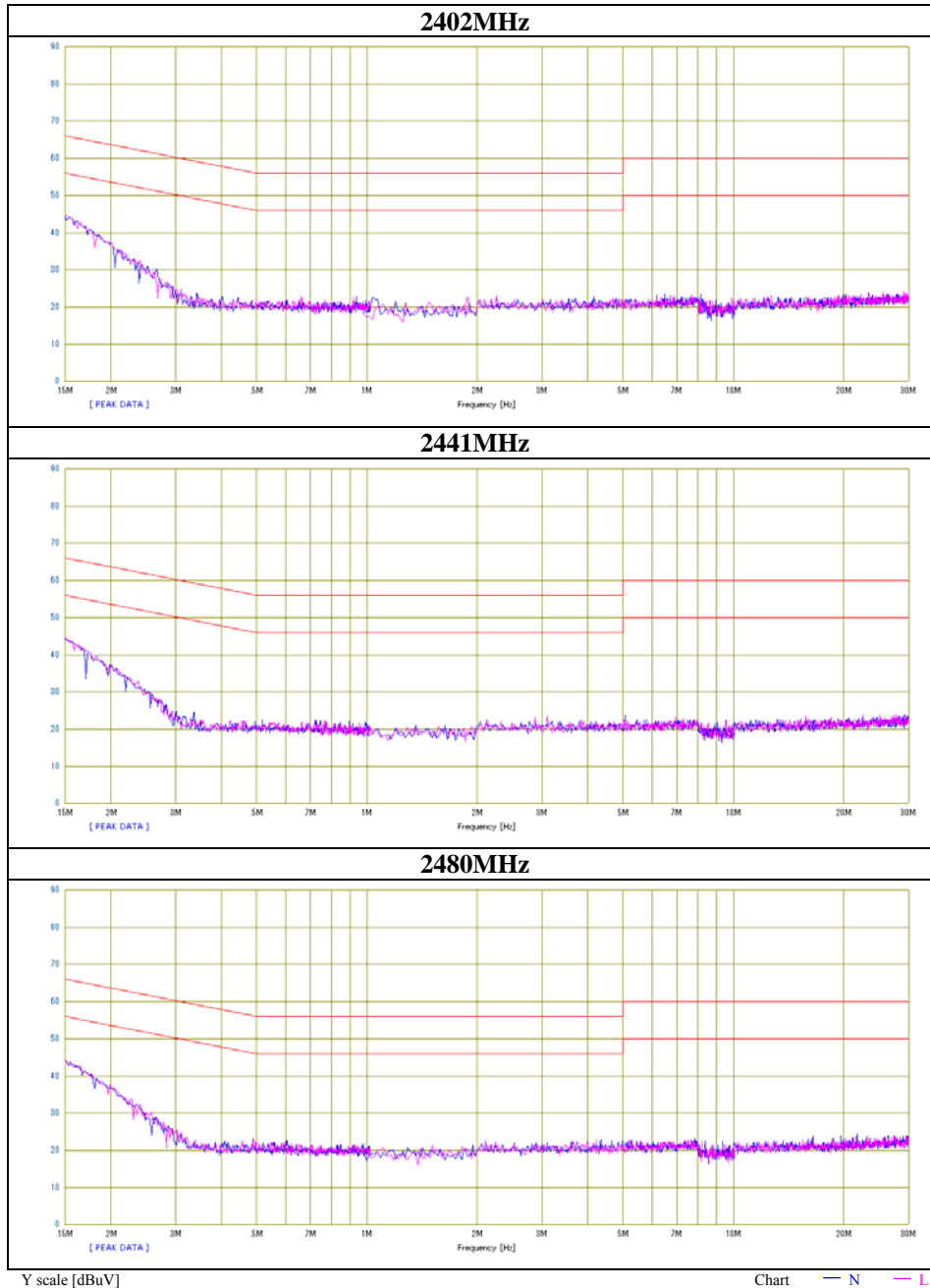


Frequency [MHz]	Reading Level		Corr. Factor	Results		Limit		Margin		Phase	Comment
	QP [dBuV]	AV [dBuV]		QP [dBuV]	AV [dBuV]	QP [dBuV]	AV [dBuV]	QP [dB]	AV [dB]		
0.15000	22.9	4.9	13.3	36.2	18.2	66.0	56.0	29.8	37.8	N	
0.20000	13.7	-1.5	13.3	27.0	11.8	63.6	53.6	36.6	41.8	N	
0.25000	6.0	-2.8	13.3	19.3	10.5	61.8	51.8	42.5	41.3	N	
1.00000	-1.6	-4.3	13.4	11.8	9.1	56.0	46.0	44.2	36.9	N	
4.00000	-0.4	-5.1	13.6	13.2	8.5	56.0	46.0	42.8	37.5	N	
20.00000	-1.0	-5.6	14.8	13.8	9.2	60.0	50.0	46.2	40.8	N	
0.15000	22.8	4.8	13.3	36.1	18.1	66.0	56.0	29.9	37.9	L	
0.20000	13.9	-1.6	13.3	27.2	11.7	63.6	53.6	36.4	41.9	L	
0.25000	6.1	-2.8	13.3	19.4	10.5	61.8	51.8	42.4	41.3	L	
1.00000	-1.5	-4.5	13.4	11.9	8.9	56.0	46.0	44.1	37.1	L	
4.00000	-0.4	-4.9	13.6	13.2	8.7	56.0	46.0	42.8	37.3	L	
20.00000	-0.9	-5.6	14.8	13.9	9.2	60.0	50.0	46.1	40.8	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.4 Semi Anechoic Chamber
Report No.	32IE0154-HO-01
Date	06/22/2012
Temperature/ Humidity	23 deg. C / 58% RH
Engineer	Takeshi Choda
Mode	Tx DH5



Conducted Emission

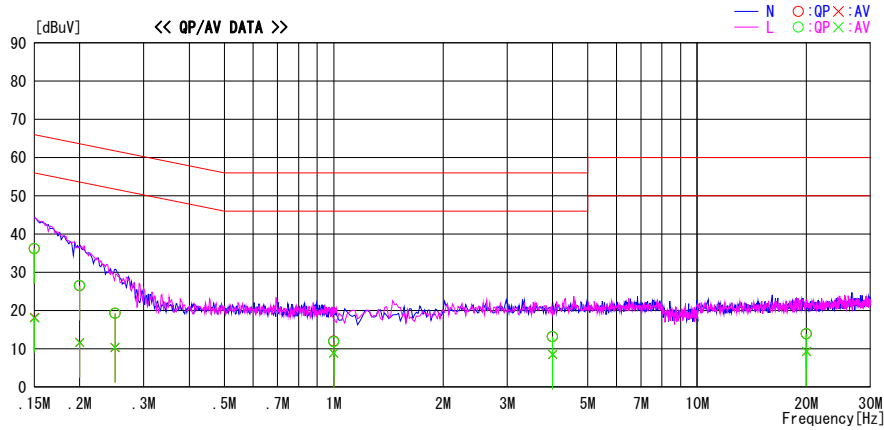
DATA OF CONDUCTED EMISSION TEST

UL Japan, Inc. Head Office EMC Lab. No.4 Semi Anechoic Chamber
 Date : 2012/06/22

Report No. : 32IE0154-HO-01
 Temp./Humi. : 23 deg. C / 58% RH
 Engineer : Takeshi Choda

Mode / Remarks : BT Tx EDR 2402MHz

LIMIT : FCC15.207 QP
 FCC15.207 AV

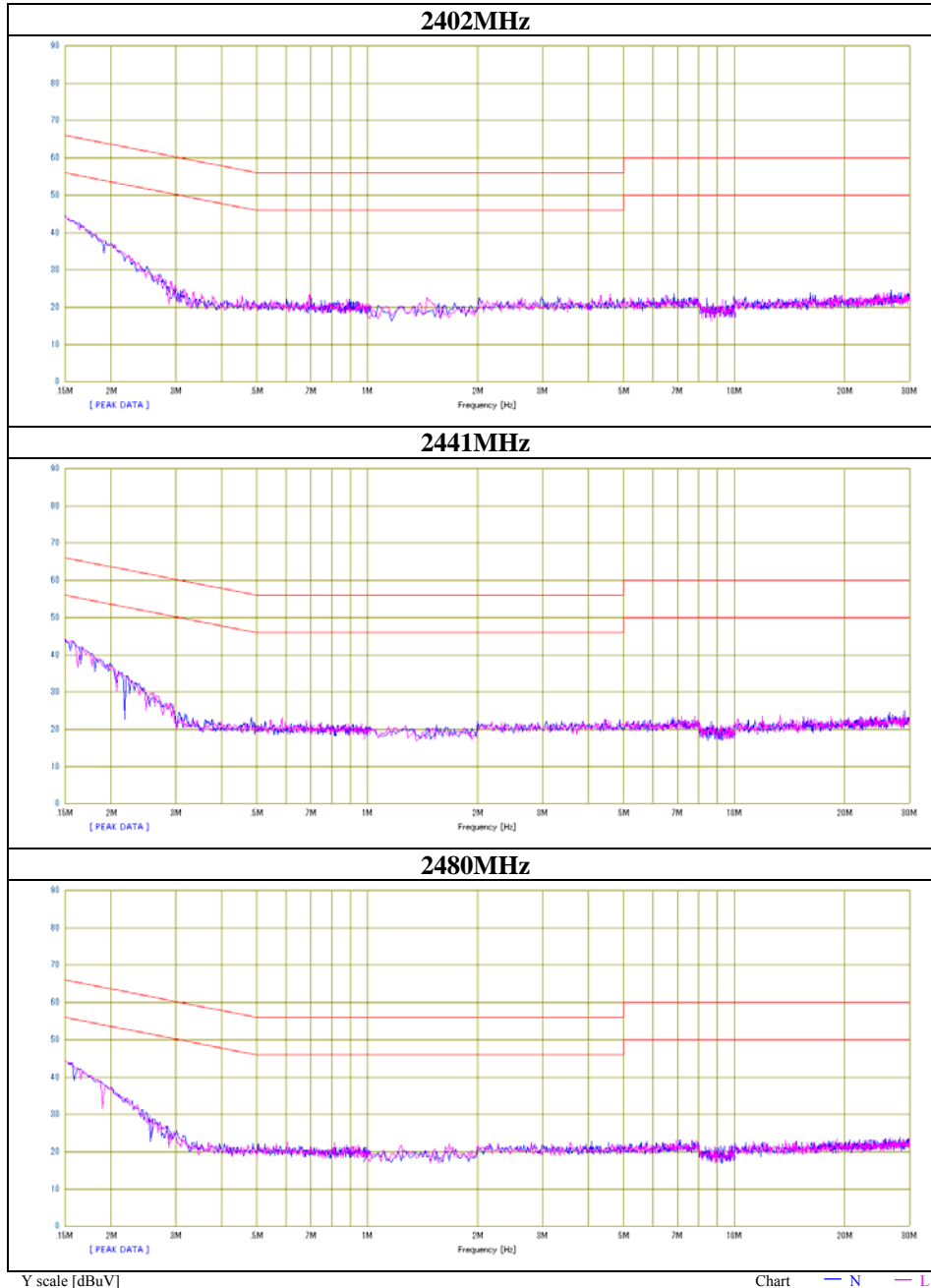


Frequency [MHz]	Reading Level		Corr. Factor	Results		Limit		Margin		Phase	Comment
	QP [dBuV]	AV [dBuV]		QP [dBuV]	AV [dBuV]	QP [dBuV]	AV [dBuV]	QP [dB]	AV [dB]		
0.15000	22.9	4.9	13.3	36.2	18.2	66.0	56.0	29.8	37.8	N	
0.20000	13.2	-1.6	13.3	26.5	11.7	63.6	53.6	37.1	41.9	N	
0.25000	6.0	-3.0	13.3	19.3	10.3	61.8	51.8	42.5	41.5	N	
1.00000	-1.4	-4.5	13.4	12.0	8.9	56.0	46.0	44.0	37.1	N	
4.00000	-0.4	-5.1	13.6	13.2	8.5	56.0	46.0	42.8	37.5	N	
20.00000	-0.9	-5.5	14.8	13.9	9.3	60.0	50.0	46.1	40.7	N	
0.15000	22.9	4.8	13.3	36.2	18.1	66.0	56.0	29.8	37.9	L	
0.20000	13.3	-1.7	13.3	26.6	11.6	63.6	53.6	37.0	42.0	L	
0.25000	6.0	-2.9	13.3	19.3	10.4	61.8	51.8	42.5	41.4	L	
1.00000	-1.6	-4.5	13.4	11.8	8.9	56.0	46.0	44.2	37.1	L	
4.00000	-0.4	-5.0	13.6	13.2	8.6	56.0	46.0	42.8	37.4	L	
20.00000	-0.9	-5.5	14.8	13.9	9.3	60.0	50.0	46.1	40.7	L	

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

Conducted Emission

Test place	Head Office EMC Lab. No.4 Semi Anechoic Chamber
Report No.	32IE0154-HO-01
Date	06/22/2012
Temperature/ Humidity	23 deg. C / 58% RH
Engineer	Takeshi Choda
Mode	Tx 3DH5

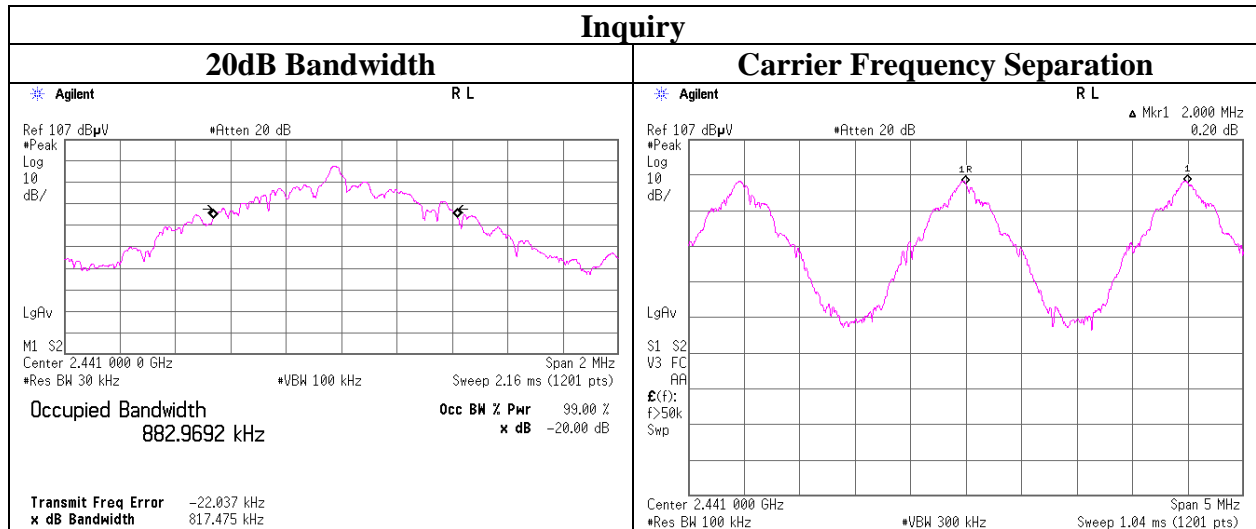


20dB Bandwidth and Carrier Frequency Separation

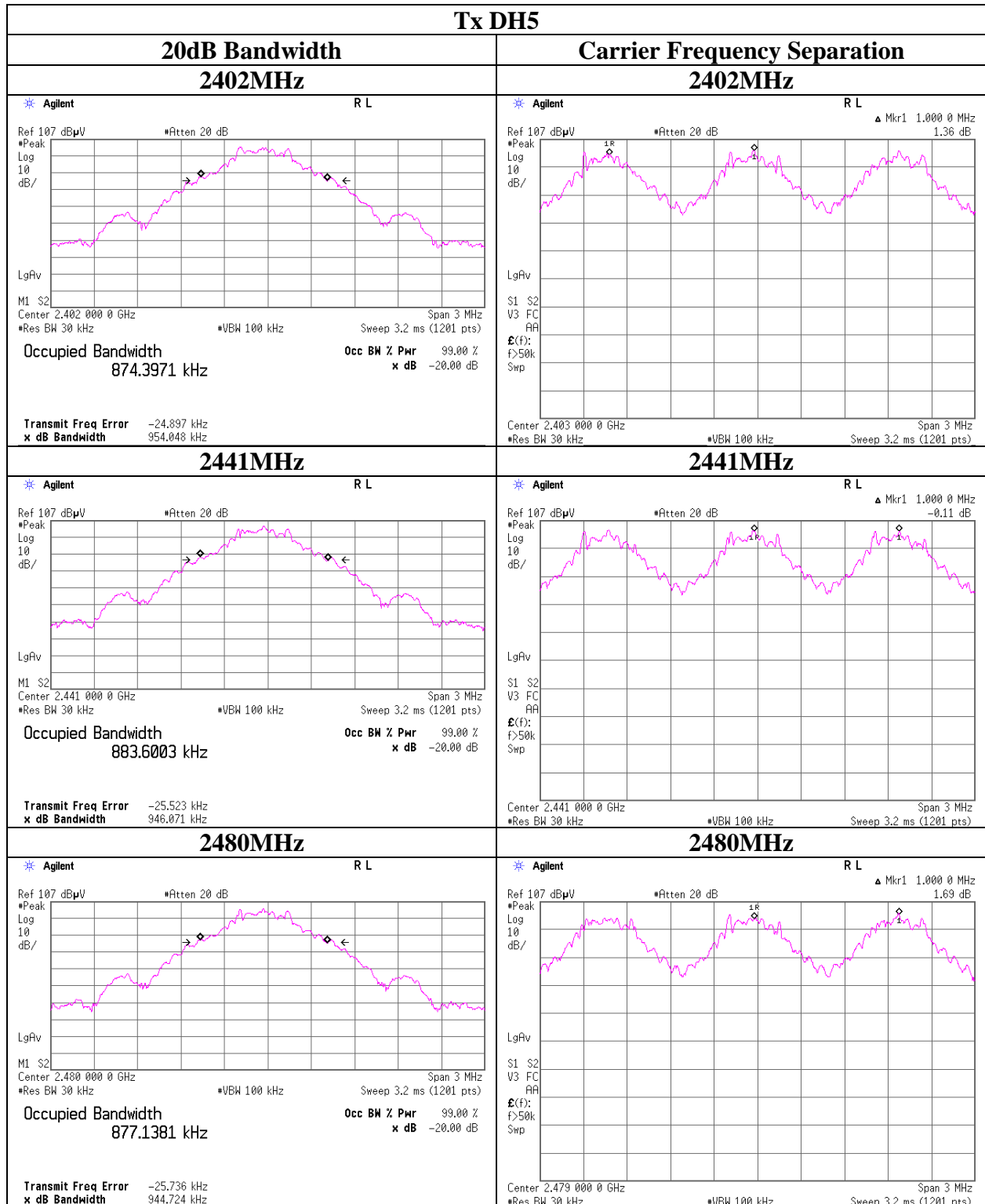
Test place	Head Office EMC Lab. No.4 Measurement Room	
Report No.	32IE0154-HO-01	
Date	05/30/2012	06/01/2012
Temperature/ Humidity	26 deg. C / 44% RH	24 deg. C / 49% RH
Engineer	Yutaka Yoshida	Yutaka Yoshida
Mode	Tx (Hopping on) DH5/3DH5/Inquiry	

Mode	Freq. [MHz]	20dB Bandwidth [MHz]	Carrier Frequency Separation [MHz]	Limit for Carrier Frequency separation [MHz]
DH5	2402.0	0.954	1.000	≧ 0.636
DH5	2441.0	0.946	1.000	≧ 0.631
DH5	2480.0	0.945	1.000	≧ 0.630
3DH5	2402.0	1.303	1.000	≧ 0.869
3DH5	2441.0	1.310	1.000	≧ 0.873
3DH5	2480.0	1.301	1.000	≧ 0.867
Inquiry	2441.0	0.817	2.000	≧ 0.545

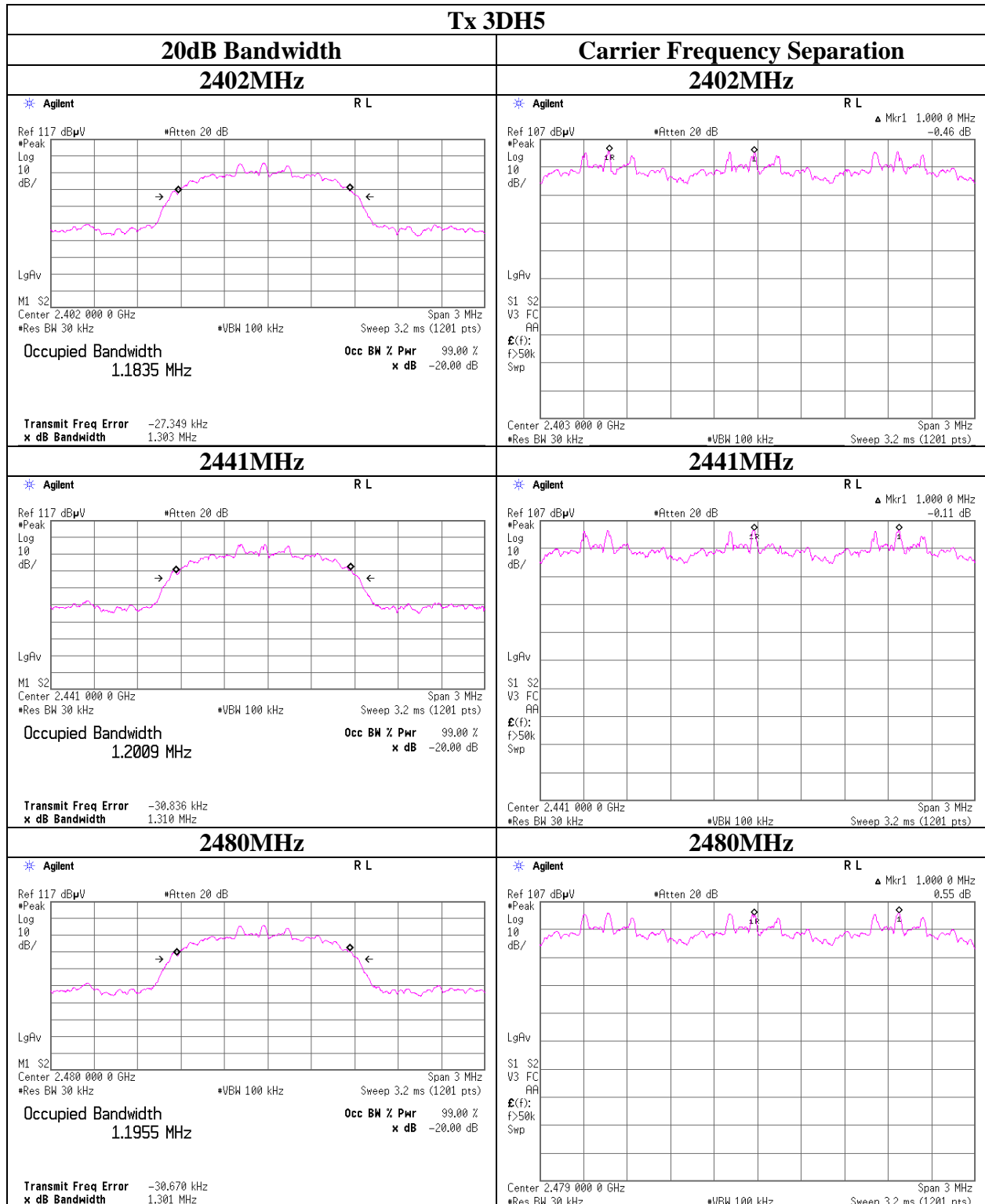
Limit: Two-thirds of 20dB Bandwidth or 25kHz (whichever is greater).
 No limit applies to 20dB Bandwidth.



20dB Bandwidth and Carrier Frequency Separation



20dB Bandwidth and Carrier Frequency Separation

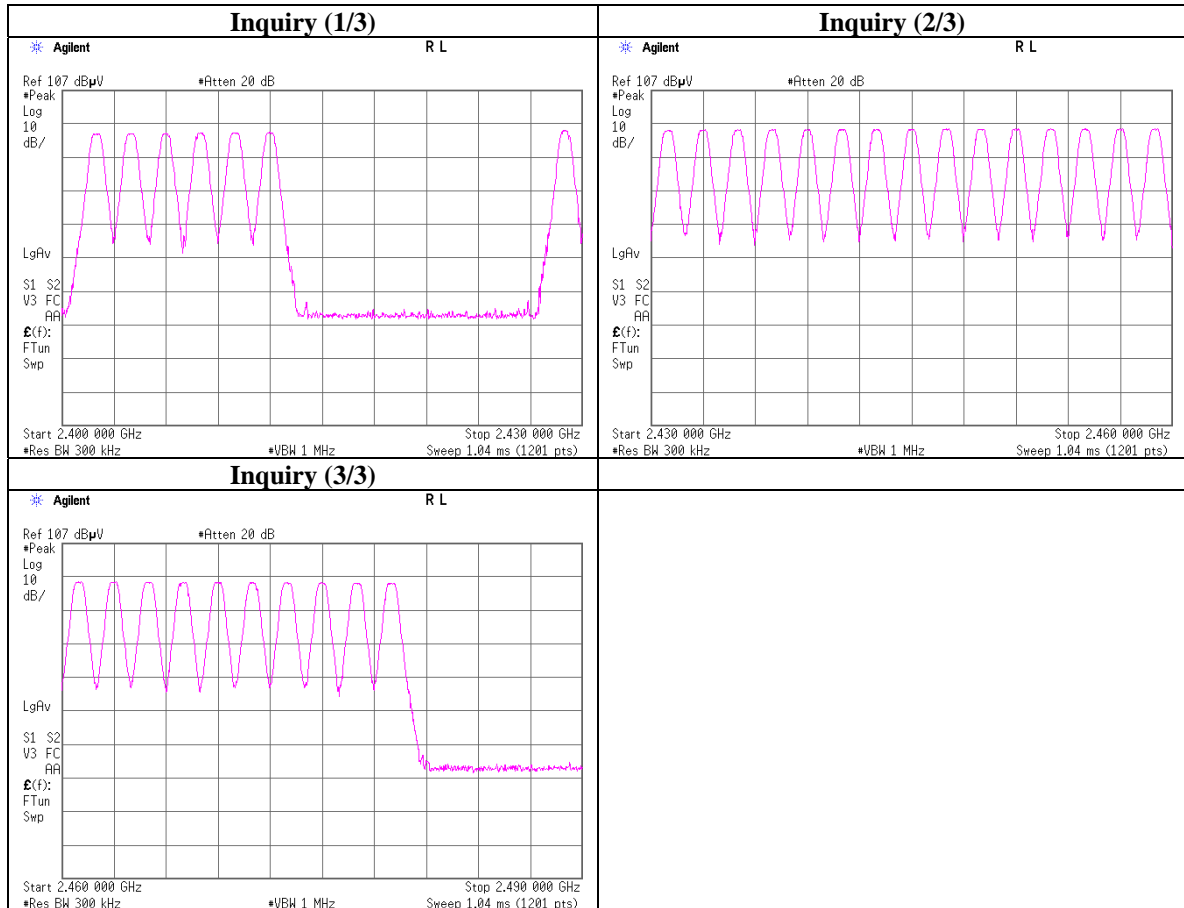


Number of Hopping Frequency

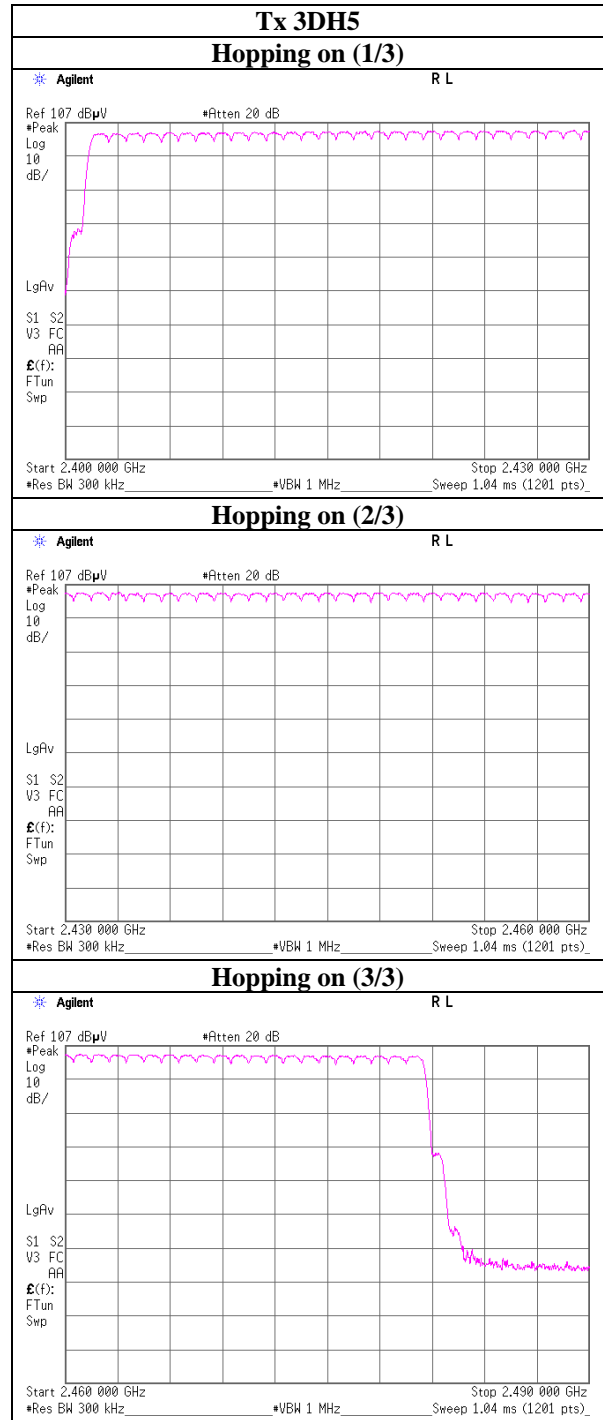
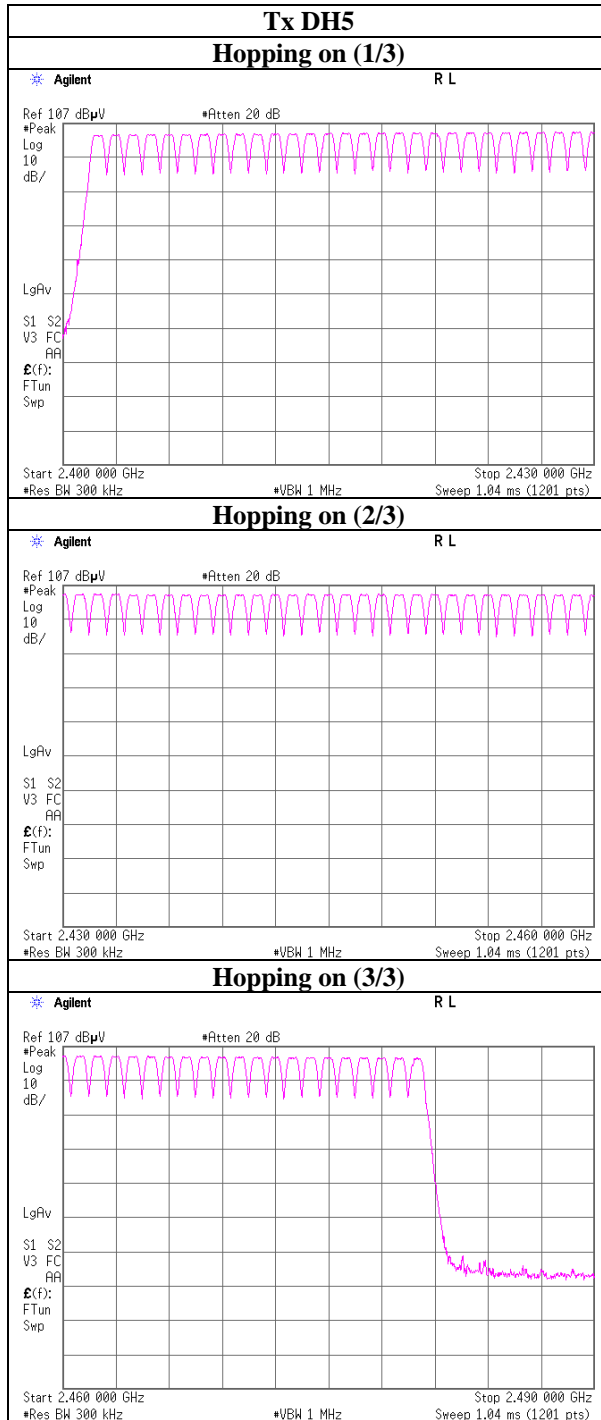
Test place	Head Office EMC Lab. No.4 Measurement Room	
Report No.	32IE0154-HO-01	
Date	05/30/2012	06/01/2012
Temperature/ Humidity	26 deg. C / 44% RH	24 deg. C / 49% RH
Engineer	Yutaka Yoshida	Yutaka Yoshida
Mode	Tx (Hopping on) DH5/3DH5/Inquiry	

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.4 Measurement Room	
Report No.	32IE0154-HO-01	
Date	05/30/2012	06/01/2012
Temperature/ Humidity	26 deg. C / 44% RH	24 deg. C / 49% RH
Engineer	Yutaka Yoshida	Yutaka Yoshida
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	50.8 times / 5 sec. x 31.6 sec. = 322 times	0.402	129	400
DH3	25.2 times / 5 sec. x 31.6 sec. = 160 times	1.661	266	400
DH5	15.0 times / 5 sec. x 31.6 sec. = 95 times	2.910	276	400
3DH1	50.2 times / 5 sec. x 31.6 sec. = 318 times	0.410	130	400
3DH3	27.2 times / 5 sec. x 31.6 sec. = 172 times	1.663	286	400
3DH5	18.4 times / 5 sec. x 31.6 sec. = 117 times	2.919	342	400
Inquiry	100.0 times / 1 sec. x 12.8 sec. = 1280 times	0.103	132	400

Sample Calculation

Result = Number of transmission x Length of transmission time

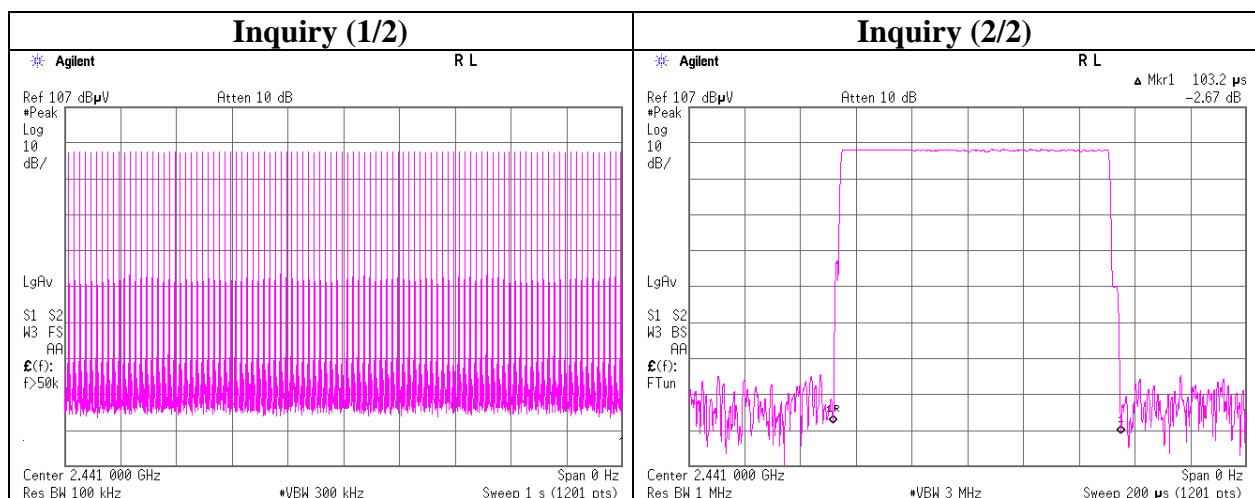
*Average data of 5 tests.(except Inquiry)

Mode	Sampling [times]					Average [times]
	1	2	3	4	5	
DH1	51	51	50	52	50	50.8
DH3	29	26	28	22	21	25.2
DH5	13	20	13	16	13	15
3DH1	50	50	50	50	51	50.2
3DH3	29	32	20	28	27	27.2
3DH5	18	18	16	18	22	18.4

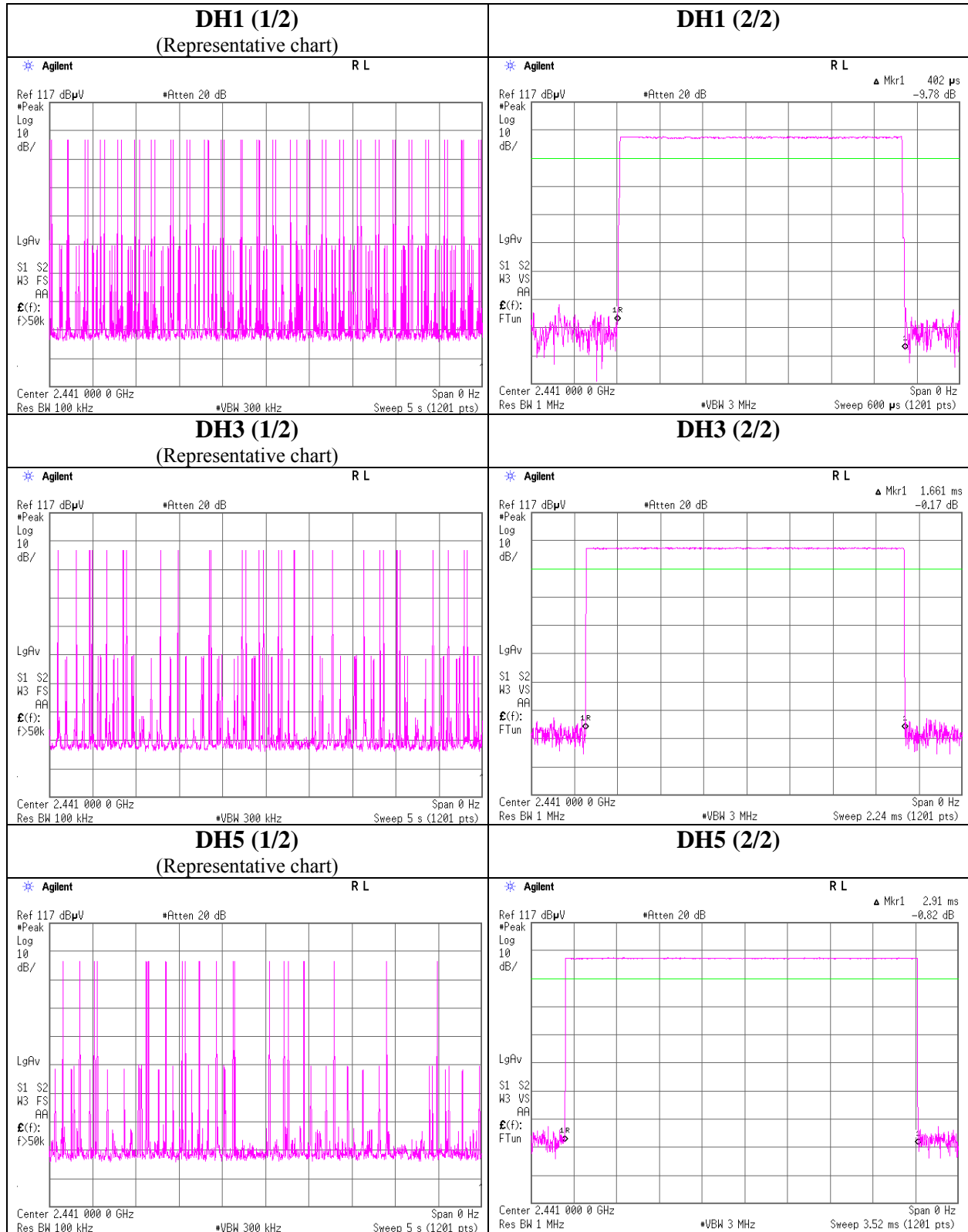
Sample Calculation

Average= Summation(Sampling 1 to 5) / 5

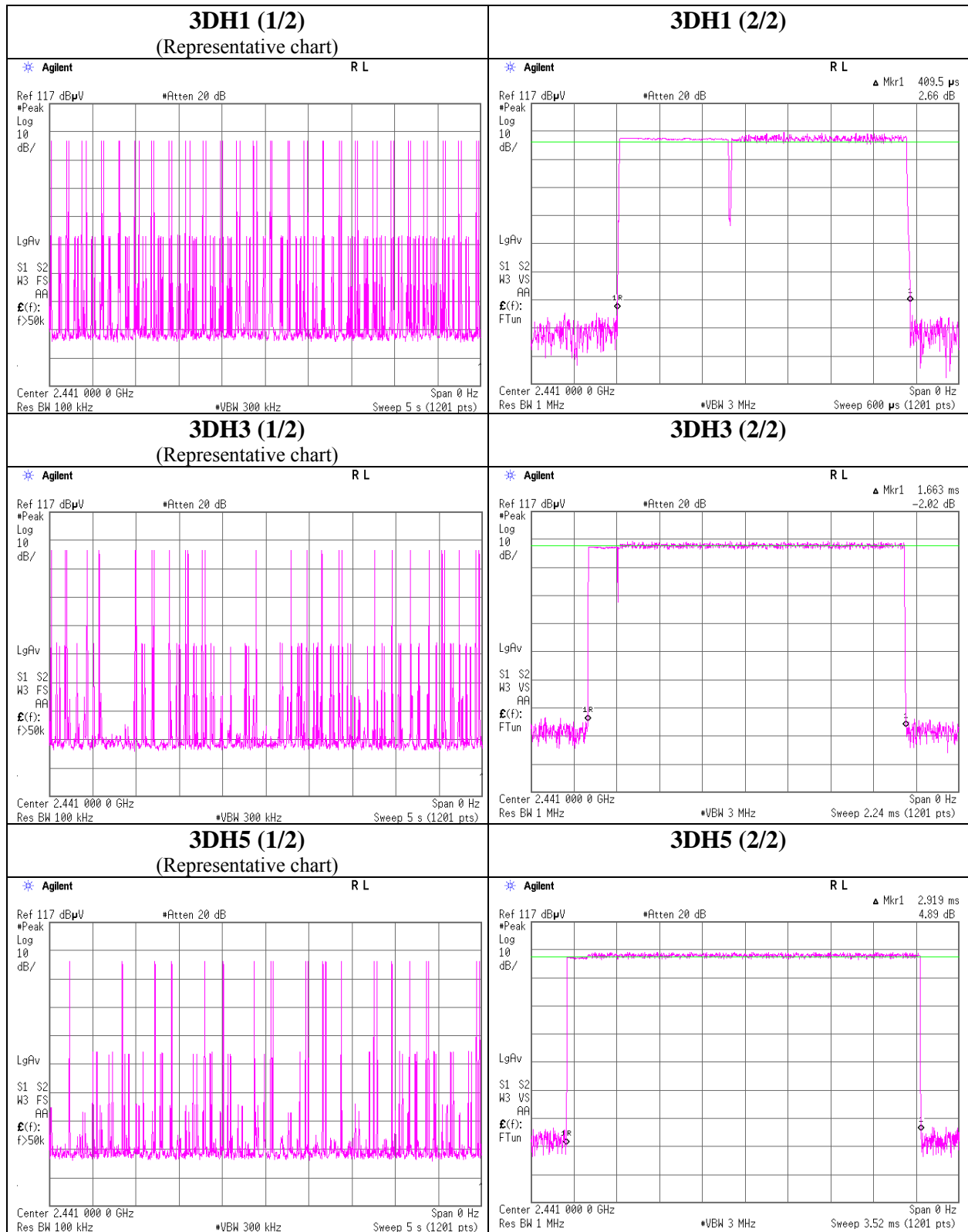
This device complies with the Bluetooth protocol for FHSS operation, employing a pseudo random channel selection and hopping rate to ensure that the occupancy time in $N \times 0.4s$, where N is the number of channels being used in the hopping sequence ($20 \leq N \leq 79$), is always less than $0.4s$ 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. : 32IE0154-HO-01
 Date : 05/30/2012
 Temperature/ Humidity : 26 deg. C / 44% RH
 Engineer : Yutaka Yoshida
 Mode : Tx (Hopping off) DH5/3DH5

Mode	Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. [dB]	Result		Limit		Margin [dB]
					[dBm]	[mW]	[dBm]	[mW]	
DH5	2402.0	-3.38	2.03	9.96	8.61	7.26	20.96	125	12.35
DH5	2441.0	-2.70	2.05	9.96	9.31	8.53	20.96	125	11.65
DH5	2480.0	-3.37	2.06	9.96	8.65	7.33	20.96	125	12.31
3DH5	2402.0	-0.81	2.03	9.96	11.18	13.12	20.96	125	9.78
3DH5	2441.0	-0.57	2.05	9.96	11.44	13.93	20.96	125	9.52
3DH5	2480.0	-1.19	2.06	9.96	10.83	12.11	20.96	125	10.13

Sample Calculation:

Result = Reading + Cable Loss + Attenuator

Test was not performed at AFH mode, because the decrease of number of channel (min: 20ch) at AFH mode does not influence on the output power and bandwidth of the EUT.

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

UL Japan, Inc.

Head Office EMC Lab.

4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

Telephone : +81 596 24 8116

Facsimile : +81 596 24 8124

Radiated Spurious Emission

Test place Head Office EMC Lab. No.2 and 3 Semi Anechoic Chamber
Report No. 32IE0154-HO-01
Date 06/14/2012 06/21/2012
Temperature/ Humidity 23deg. C / 57% RH 24deg. C / 64% RH
Engineer Takeshi Choda Takeshi Choda
(1-10GHz) Below 1GHz and above 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	900.000	QP	21.7	22.2	11.3	27.9	27.3	46.0	18.7	NS	
Hori	2390.000	PK	43.9	28.1	2.4	32.3	42.1	73.9	31.8	See 20dBc Data Sheet	
Hori	2400.000	PK	56.6	28.1	2.4	32.3	-	73.9	-		
Hori	3456.017	PK	47.9	28.9	5.3	31.8	50.3	73.9	23.6		
Hori	4804.000	PK	40.8	31.2	5.1	31.5	45.6	73.9	28.3		
Hori	7206.000	PK	42.0	35.6	5.9	32.5	51.0	73.9	22.9		NS
Hori	9608.000	PK	42.2	38.3	7.1	32.9	54.7	73.9	19.2		NS
Hori	24020.000	PK	44.7	40.5	-1.7	31.7	51.8	73.9	22.1		NS
Hori	2390.000	AV	31.4	28.1	2.4	32.3	29.6	53.9	24.3		See 20dBc Data Sheet
Hori	2400.000	AV	41.1	28.1	2.4	32.3	-	53.9	-		
Hori	3456.017	AV	44.2	28.9	5.3	31.8	46.6	53.9	7.3		
Hori	4804.000	AV	29.0	31.2	5.1	31.5	33.8	53.9	20.1		
Hori	7206.000	AV	30.3	35.6	5.9	32.5	39.3	53.9	14.6	NS	
Hori	9608.000	AV	30.2	38.3	7.1	32.9	42.7	53.9	11.2	NS	
Hori	24020.000	AV	33.2	40.5	-1.7	31.7	40.3	53.9	13.6	NS	
Vert	900.000	QP	21.7	22.2	11.3	27.9	27.3	46.0	18.7	NS	
Vert	2390.000	PK	43.8	28.1	2.4	32.3	42.0	73.9	31.9	See 20dBc Data Sheet	
Vert	2400.000	PK	55.5	28.1	2.4	32.3	-	73.9	-		
Vert	3456.017	PK	48.3	28.9	5.3	31.8	50.7	73.9	23.2		
Vert	4804.000	PK	40.9	31.2	5.1	31.5	45.7	73.9	28.2		
Vert	7206.000	PK	42.1	35.6	5.9	32.5	51.1	73.9	22.8		NS
Vert	9608.000	PK	42.3	38.3	7.1	32.9	54.8	73.9	19.1		NS
Vert	24020.000	PK	44.5	40.5	-1.7	31.7	51.6	73.9	22.3		NS
Vert	2390.000	AV	31.4	28.1	2.4	32.3	29.6	53.9	24.3		See 20dBc Data Sheet
Vert	2400.000	AV	40.0	28.1	2.4	32.3	-	53.9	-		
Vert	3456.017	AV	44.1	28.9	5.3	31.8	46.5	53.9	7.4		
Vert	4804.000	AV	29.1	31.2	5.1	31.5	33.9	53.9	20.0		
Vert	7206.000	AV	30.3	35.6	5.9	32.5	39.3	53.9	14.6	NS	
Vert	9608.000	AV	30.3	38.3	7.1	32.9	42.8	53.9	11.1	NS	
Vert	24020.000	AV	33.2	40.5	-1.7	31.7	40.3	53.9	13.6	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 and 3 Semi Anechoic Chamber
 Report No. 32IE0154-HO-01
 Date 06/14/2012 06/21/2012
 Temperature/ Humidity 23deg. C / 57% RH 24deg. C / 64% RH
 Engineer Takeshi Choda Takeshi Choda
 Mode (1-10GHz) Below 1GHz and above 10GHz
 Tx, DH5 2402MHz

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	28.1	2.4	32.3	101.1	-	-	Carrier
Hori	2400.000	PK	45.5	28.1	2.4	32.3	43.7	81.1	37.4	
Vert	2402.000	PK	101.7	28.1	2.4	32.3	99.9	-	-	Carrier
Vert	2400.000	PK	43.2	28.1	2.4	32.3	41.4	79.9	38.5	

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 and 3 Semi Anechoic Chamber	
Report No.	32IE0154-HO-01	
Date	06/14/2012	06/21/2012
Temperature/ Humidity	23deg. C / 57% RH	24deg. C / 64% RH
Engineer	Takeshi Choda	Takeshi Choda
	(1-10GHz)	Below 1GHz and above 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	900.000	QP	21.7	22.2	11.3	27.9	27.3	46.0	18.7	NS
Hori	3456.016	PK	47.6	28.9	5.3	31.8	50.0	73.9	23.9	
Hori	4882.000	PK	40.9	31.4	5.2	31.5	46.0	73.9	27.9	
Hori	7323.000	PK	42.1	35.7	5.9	32.5	51.2	73.9	22.7	NS
Hori	9764.000	PK	42.3	38.5	7.4	32.9	55.3	73.9	18.6	NS
Hori	24410.000	PK	44.2	40.5	-1.7	32.2	50.8	73.9	23.1	NS
Hori	3456.016	AV	44.3	28.9	5.3	31.8	46.7	53.9	7.2	
Hori	4882.000	AV	29.0	31.4	5.2	31.5	34.1	53.9	19.8	
Hori	7323.000	AV	30.2	35.7	5.9	32.5	39.3	53.9	14.6	NS
Hori	9764.000	AV	30.2	38.5	7.4	32.9	43.2	53.9	10.7	NS
Hori	24410.000	AV	32.7	40.5	-1.7	32.2	39.3	53.9	14.6	NS
Vert	900.000	QP	21.7	22.2	11.3	27.9	27.3	46.0	18.7	NS
Vert	3456.016	PK	48.3	28.9	5.3	31.8	50.7	73.9	23.2	
Vert	4882.000	PK	41.1	31.4	5.2	31.5	46.2	73.9	27.7	
Vert	7323.000	PK	42.0	35.7	5.9	32.5	51.1	73.9	22.8	NS
Vert	9764.000	PK	42.2	38.5	7.4	32.9	55.2	73.9	18.7	NS
Vert	24410.000	PK	43.9	40.5	-1.7	32.2	50.5	73.9	23.4	NS
Vert	3456.016	AV	44.9	28.9	5.3	31.8	47.3	53.9	6.6	
Vert	4882.000	AV	29.1	31.4	5.2	31.5	34.2	53.9	19.7	
Vert	7323.000	AV	30.2	35.7	5.9	32.5	39.3	53.9	14.6	NS
Vert	9764.000	AV	30.2	38.5	7.4	32.9	43.2	53.9	10.7	NS
Vert	24410.000	AV	32.7	40.5	-1.7	32.2	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 and 3 Semi Anechoic Chamber
Report No. 32IE0154-HO-01
Date 06/14/2012 06/21/2012
Temperature/ Humidity 23deg. C / 57% RH 24deg. C / 64% RH
Engineer Takeshi Choda Takeshi Choda
(1-10GHz) Below 1GHz and above 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	900.000	QP	21.7	22.2	11.3	27.9	27.3	46.0	18.7	NS
Hori	2483.500	PK	49.4	28.5	2.4	32.2	48.1	73.9	25.8	
Hori	3456.016	PK	48.4	28.9	5.3	31.8	50.8	73.9	23.1	
Hori	4960.000	PK	41.9	31.6	5.2	31.5	47.2	73.9	26.7	
Hori	7440.000	PK	42.5	35.8	6.0	32.6	51.7	73.9	22.2	NS
Hori	9920.000	PK	42.6	38.6	7.5	33.0	55.7	73.9	18.2	NS
Hori	24800.000	PK	46.4	40.6	-1.6	32.7	52.7	73.9	21.2	NS
Hori	2483.500	AV	35.2	28.5	2.4	32.2	33.9	53.9	20.0	
Hori	3456.016	AV	44.2	28.9	5.3	31.8	46.6	53.9	7.3	
Hori	4960.000	AV	29.1	31.6	5.2	31.5	34.4	53.9	19.5	
Hori	7440.000	AV	30.4	35.8	6.0	32.6	39.6	53.9	14.3	NS
Hori	9920.000	AV	30.4	38.6	7.5	33.0	43.5	53.9	10.4	NS
Hori	24800.000	AV	34.2	40.6	-1.6	32.7	40.5	53.9	13.4	NS
Vert	900.000	QP	21.7	22.2	11.3	27.9	27.3	46.0	18.7	NS
Vert	2483.500	PK	47.4	28.5	2.4	32.2	46.1	73.9	27.8	
Vert	3456.016	PK	49.9	28.9	5.3	31.8	52.3	73.9	21.6	
Vert	4960.000	PK	41.7	31.6	5.2	31.5	47.0	73.9	26.9	
Vert	7440.000	PK	42.4	35.8	6.0	32.6	51.6	73.9	22.3	NS
Vert	9920.000	PK	42.7	38.6	7.5	33.0	55.8	73.9	18.1	NS
Vert	24800.000	PK	46.5	40.6	-1.6	32.7	52.8	73.9	21.1	NS
Vert	2483.500	AV	34.0	28.5	2.4	32.2	32.7	53.9	21.2	
Vert	3456.016	AV	45.2	28.9	5.3	31.8	47.6	53.9	6.3	
Vert	4960.000	AV	29.0	31.6	5.2	31.5	34.3	53.9	19.6	
Vert	7440.000	AV	30.4	35.8	6.0	32.6	39.6	53.9	14.3	NS
Vert	9920.000	AV	30.3	38.6	7.5	33.0	43.4	53.9	10.5	NS
Vert	24800.000	AV	34.2	40.6	-1.6	32.7	40.5	53.9	13.4	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 and 3 Semi Anechoic Chamber
Report No. 32IE0154-HO-01
Date 06/14/2012 06/21/2012
Temperature/ Humidity 23deg. C / 57% RH 24deg. C / 64% RH
Engineer Takeshi Choda Takeshi Choda
(1-10GHz) Below 1GHz and above 10GHz
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	900.000	QP	21.7	22.2	11.3	27.9	27.3	46.0	18.7	NS
Hori	2390.000	PK	44.1	28.1	2.4	32.3	42.3	73.9	31.6	
Hori	2400.000	PK	66.4	28.1	2.4	32.3	-	73.9	-	See 20dBc Data Sheet
Hori	3456.017	PK	48.8	28.9	5.3	31.8	51.2	73.9	22.7	
Hori	4804.000	PK	41.1	31.2	5.1	31.5	45.9	73.9	28.0	
Hori	7206.000	PK	42.7	35.6	5.9	32.5	51.7	73.9	22.2	NS
Hori	9608.000	PK	41.8	38.3	7.1	32.9	54.3	73.9	19.6	NS
Hori	24020.000	PK	44.6	40.5	-1.7	31.7	51.7	73.9	22.2	NS
Hori	2390.000	AV	31.7	28.1	2.4	32.3	29.9	53.9	24.0	
Hori	2400.000	AV	51.7	28.1	2.4	32.3	-	53.9	-	See 20dBc Data Sheet
Hori	3456.017	AV	44.0	28.9	5.3	31.8	46.4	53.9	7.5	
Hori	4804.000	AV	29.0	31.2	5.1	31.5	33.8	53.9	20.1	
Hori	7206.000	AV	30.3	35.6	5.9	32.5	39.3	53.9	14.6	NS
Hori	9608.000	AV	30.2	38.3	7.1	32.9	42.7	53.9	11.2	NS
Hori	24020.000	AV	33.2	40.5	-1.7	31.7	40.3	53.9	13.6	NS
Vert	900.000	QP	21.7	22.2	11.3	27.9	27.3	46.0	18.7	NS
Vert	2390.000	PK	44.0	28.1	2.4	32.3	42.2	73.9	31.7	
Vert	2400.000	PK	65.2	28.1	2.4	32.3	-	73.9	-	See 20dBc Data Sheet
Vert	3456.017	PK	48.6	28.9	5.3	31.8	51.0	73.9	22.9	
Vert	4804.000	PK	41.2	31.2	5.1	31.5	46.0	73.9	27.9	
Vert	7206.000	PK	42.3	35.6	5.9	32.5	51.3	73.9	22.6	NS
Vert	9608.000	PK	42.7	38.3	7.1	32.9	55.2	73.9	18.7	NS
Vert	24020.000	PK	44.8	40.5	-1.7	31.7	51.9	73.9	22.0	NS
Vert	2390.000	AV	31.1	28.1	2.4	32.3	29.3	53.9	24.6	
Vert	2400.000	AV	50.7	28.1	2.4	32.3	-	53.9	-	See 20dBc Data Sheet
Vert	3456.017	AV	44.2	28.9	5.3	31.8	46.6	53.9	7.3	
Vert	4804.000	AV	29.0	31.2	5.1	31.5	33.8	53.9	20.1	
Vert	7206.000	AV	30.2	35.6	5.9	32.5	39.2	53.9	14.7	NS
Vert	9608.000	AV	30.3	38.3	7.1	32.9	42.8	53.9	11.1	NS
Vert	24020.000	AV	33.2	40.5	-1.7	31.7	40.3	53.9	13.6	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 and 3 Semi Anechoic Chamber
Report No. 32IE0154-HO-01
Date 06/14/2012 06/21/2012
Temperature/ Humidity 23deg. C / 57% RH 24deg. C / 64% RH
Engineer Takeshi Choda Takeshi Choda
 (1-10GHz) Below 1GHz and above 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	103.1	28.1	2.4	32.3	101.3	-	-	Carrier
Hori	2400.000	PK	44.7	28.1	2.4	32.3	42.9	81.3	38.4	
Vert	2402.000	PK	101.9	28.1	2.4	32.3	100.1	-	-	Carrier
Vert	2400.000	PK	44.8	28.1	2.4	32.3	43.0	80.1	37.1	

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 and 3 Semi Anechoic Chamber
Report No. 32IE0154-HO-01
Date 06/14/2012 06/21/2012
Temperature/ Humidity 23deg. C / 57% RH 24deg. C / 64% RH
Engineer Takeshi Choda Takeshi Choda
(1-10GHz) Below 1GHz and above 10GHz
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	900.000	QP	21.7	22.2	11.3	27.9	27.3	46.0	18.7	NS
Hori	2483.500	PK	49.1	28.5	2.4	32.2	47.8	73.9	26.1	
Hori	3456.016	PK	48.4	28.9	5.3	31.8	50.8	73.9	23.1	
Hori	4960.000	PK	40.7	31.6	5.2	31.5	46.0	73.9	27.9	
Hori	7440.000	PK	42.1	35.8	6.0	32.6	51.3	73.9	22.6	NS
Hori	9920.000	PK	42.3	38.6	7.5	33.0	55.4	73.9	18.5	NS
Hori	24800.000	PK	46.7	40.6	-1.6	32.7	53.0	73.9	20.9	NS
Hori	2483.500	AV	35.1	28.5	2.4	32.2	33.8	53.9	20.1	
Hori	3456.016	AV	44.0	28.9	5.3	31.8	46.4	53.9	7.5	
Hori	4960.000	AV	29.0	31.6	5.2	31.5	34.3	53.9	19.6	
Hori	7440.000	AV	30.3	35.8	6.0	32.6	39.5	53.9	14.4	NS
Hori	9920.000	AV	30.3	38.6	7.5	33.0	43.4	53.9	10.5	NS
Hori	24800.000	AV	34.2	40.6	-1.6	32.7	40.5	53.9	13.4	NS
Vert	900.000	QP	21.7	22.2	11.3	27.9	27.3	46.0	18.7	NS
Vert	2483.500	PK	48.2	28.5	2.4	32.2	46.9	73.9	27.0	
Vert	3456.016	PK	50.2	28.9	5.3	31.8	52.6	73.9	21.3	
Vert	4960.000	PK	41.5	31.6	5.2	31.5	46.8	73.9	27.1	
Vert	7440.000	PK	42.4	35.8	6.0	32.6	51.6	73.9	22.3	NS
Vert	9920.000	PK	42.7	38.6	7.5	33.0	55.8	73.9	18.1	NS
Vert	24800.000	PK	46.0	40.6	-1.6	32.7	52.3	73.9	21.6	NS
Vert	2483.500	AV	32.5	28.5	2.4	32.2	31.2	53.9	22.7	
Vert	3456.016	AV	44.4	28.9	5.3	31.8	46.8	53.9	7.1	
Vert	4960.000	AV	29.1	31.6	5.2	31.5	34.4	53.9	19.5	
Vert	7440.000	AV	30.4	35.8	6.0	32.6	39.6	53.9	14.3	NS
Vert	9920.000	AV	30.4	38.6	7.5	33.0	43.5	53.9	10.4	NS
Vert	24800.000	AV	34.2	40.6	-1.6	32.7	40.5	53.9	13.4	NS

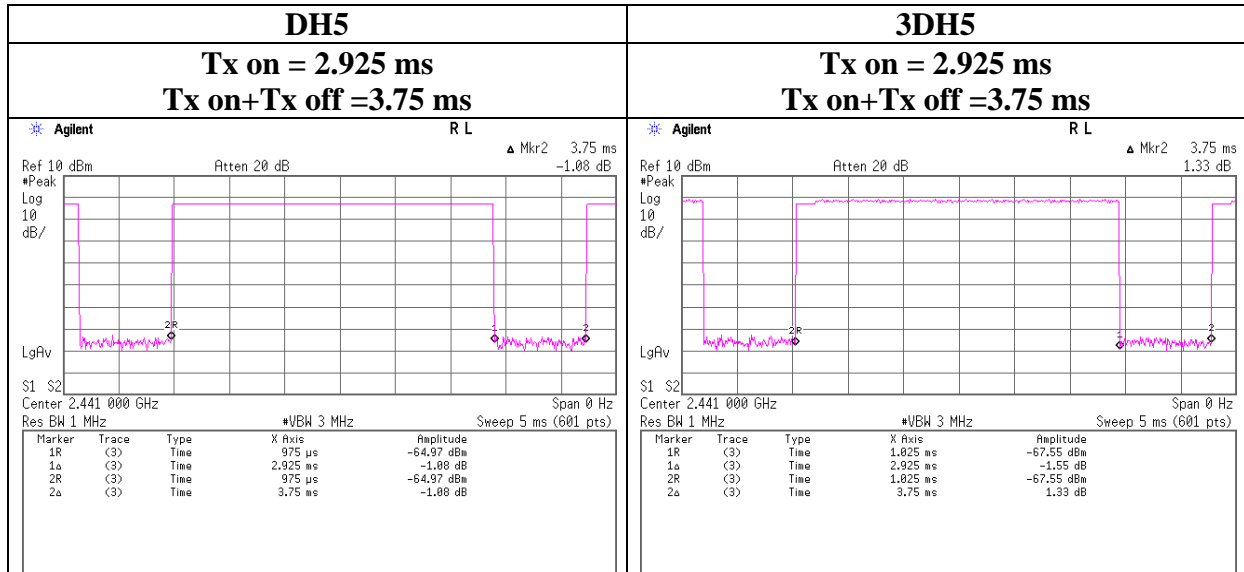
Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 10GHz)) - Gain(Amplifier)

*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

Tested Burst Timing



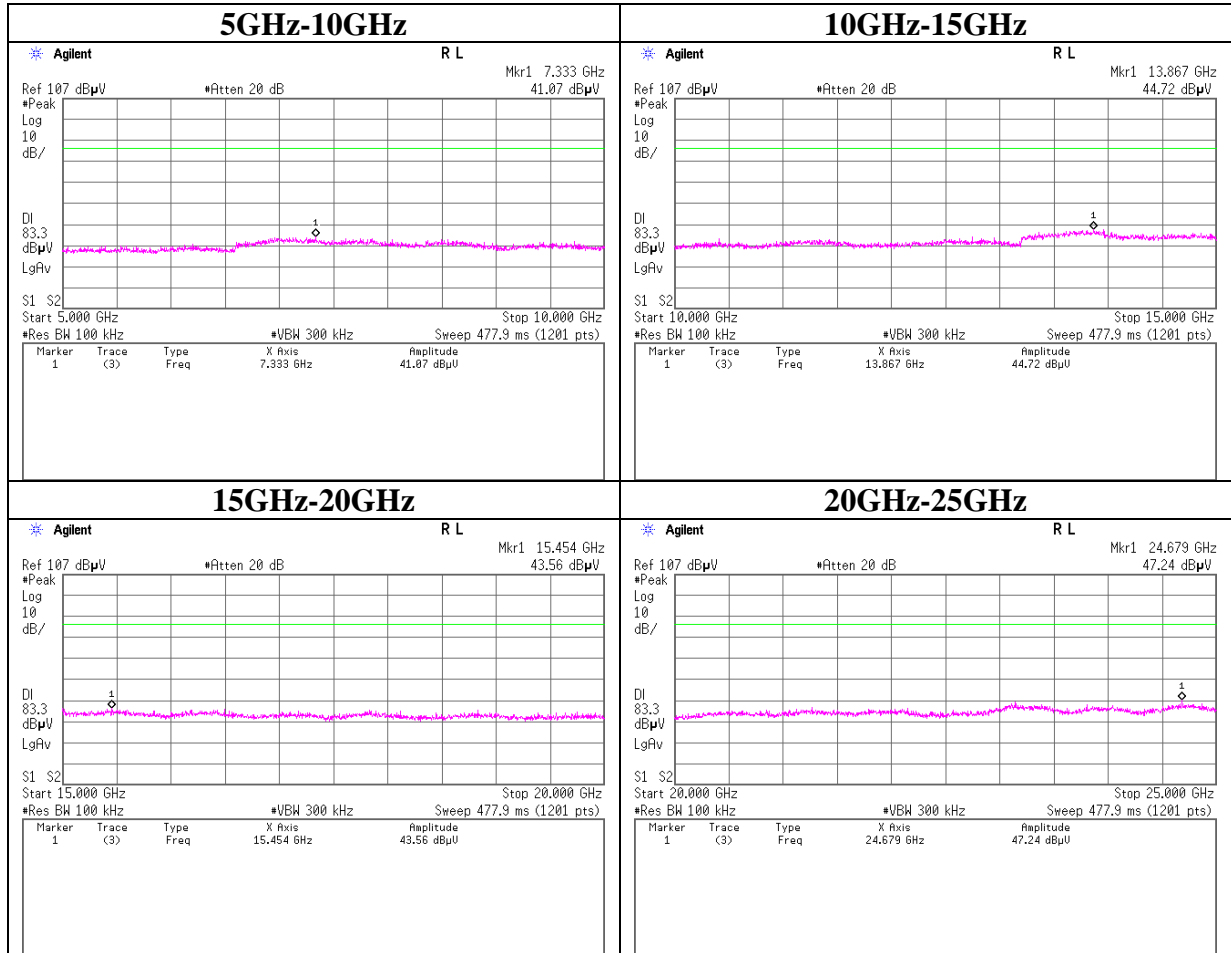
Conducted Spurious Emission

Tx DH5 2402MHz



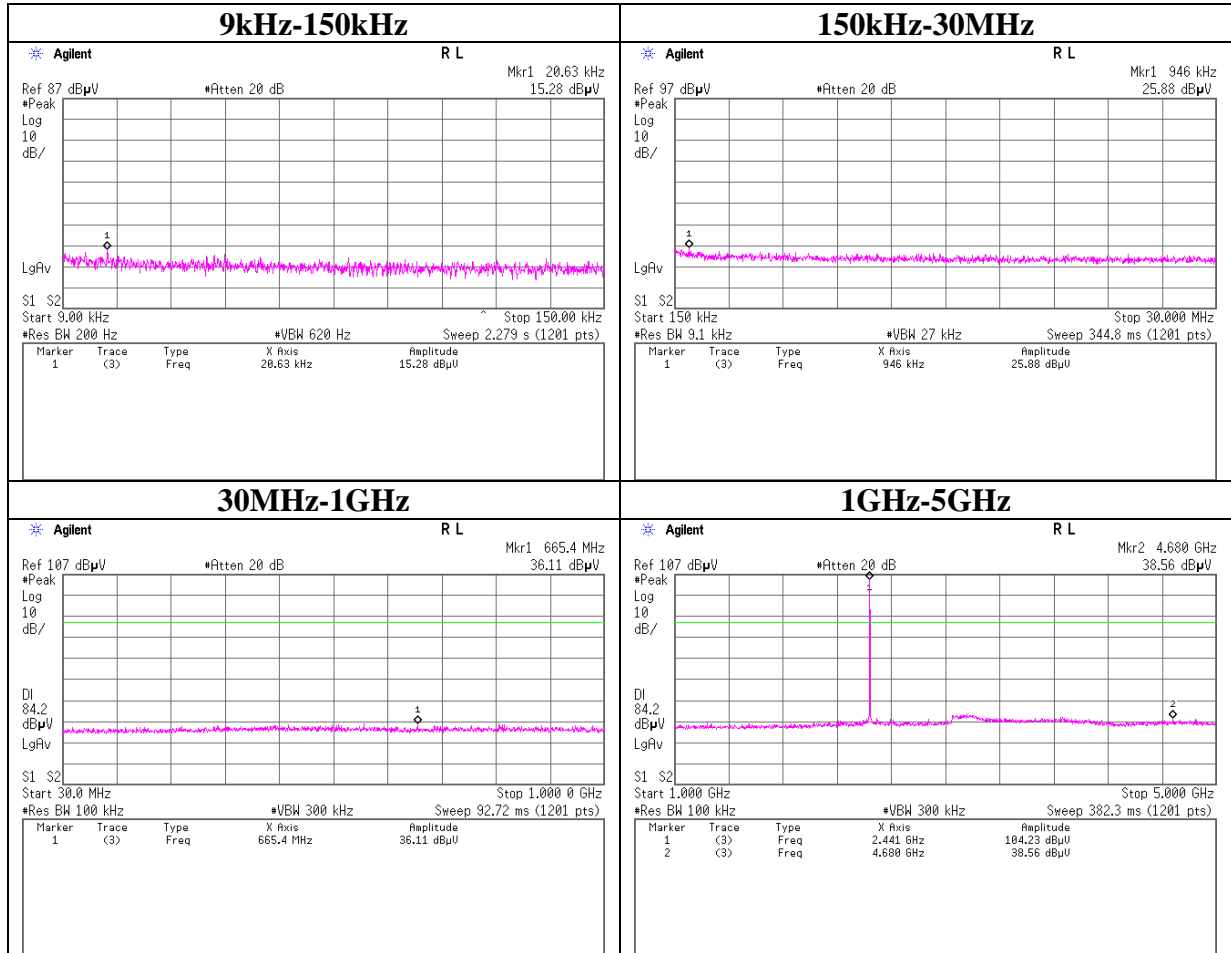
Conducted Spurious Emission

Tx DH5 2402MHz



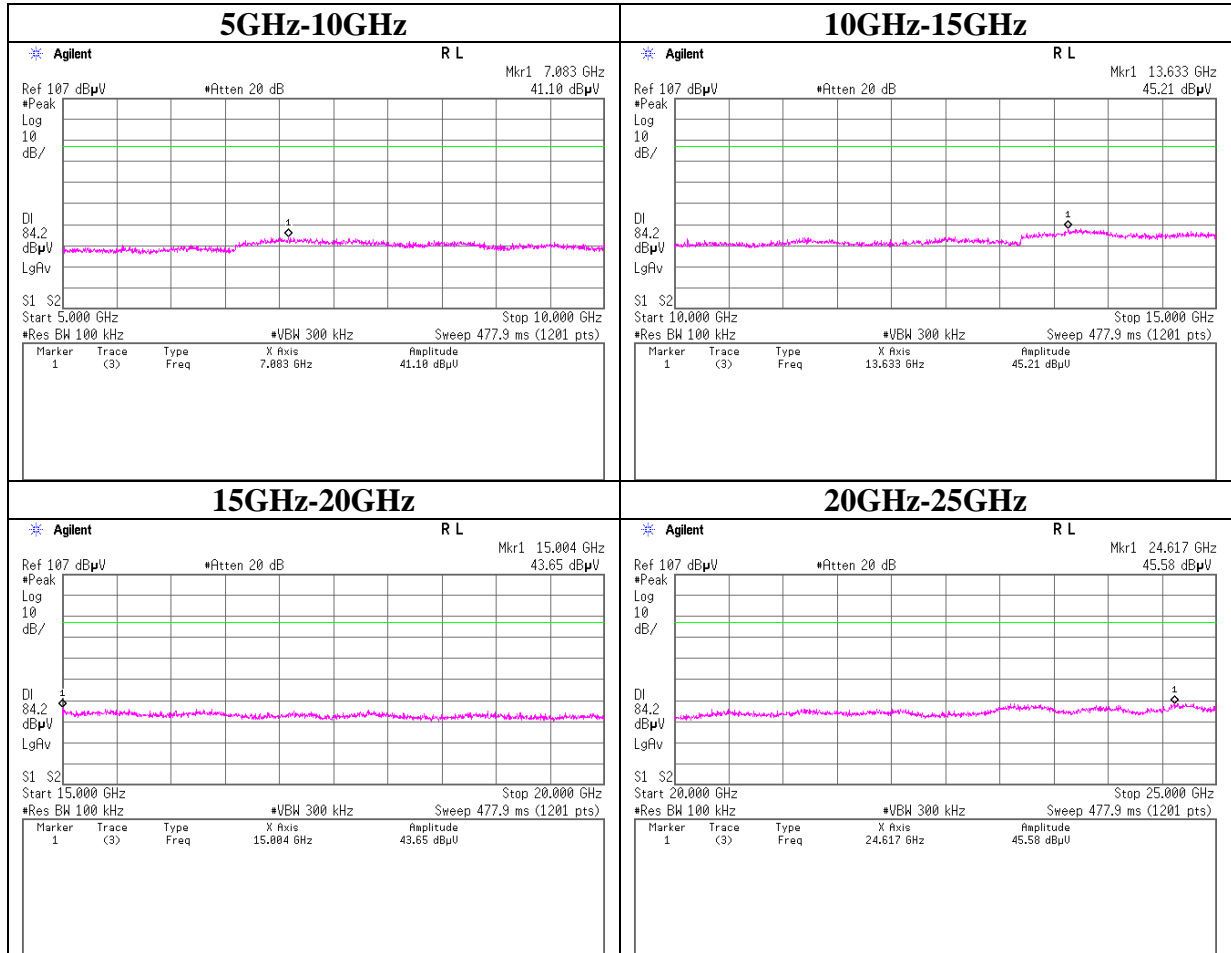
Conducted Spurious Emission

Tx DH5 2441MHz



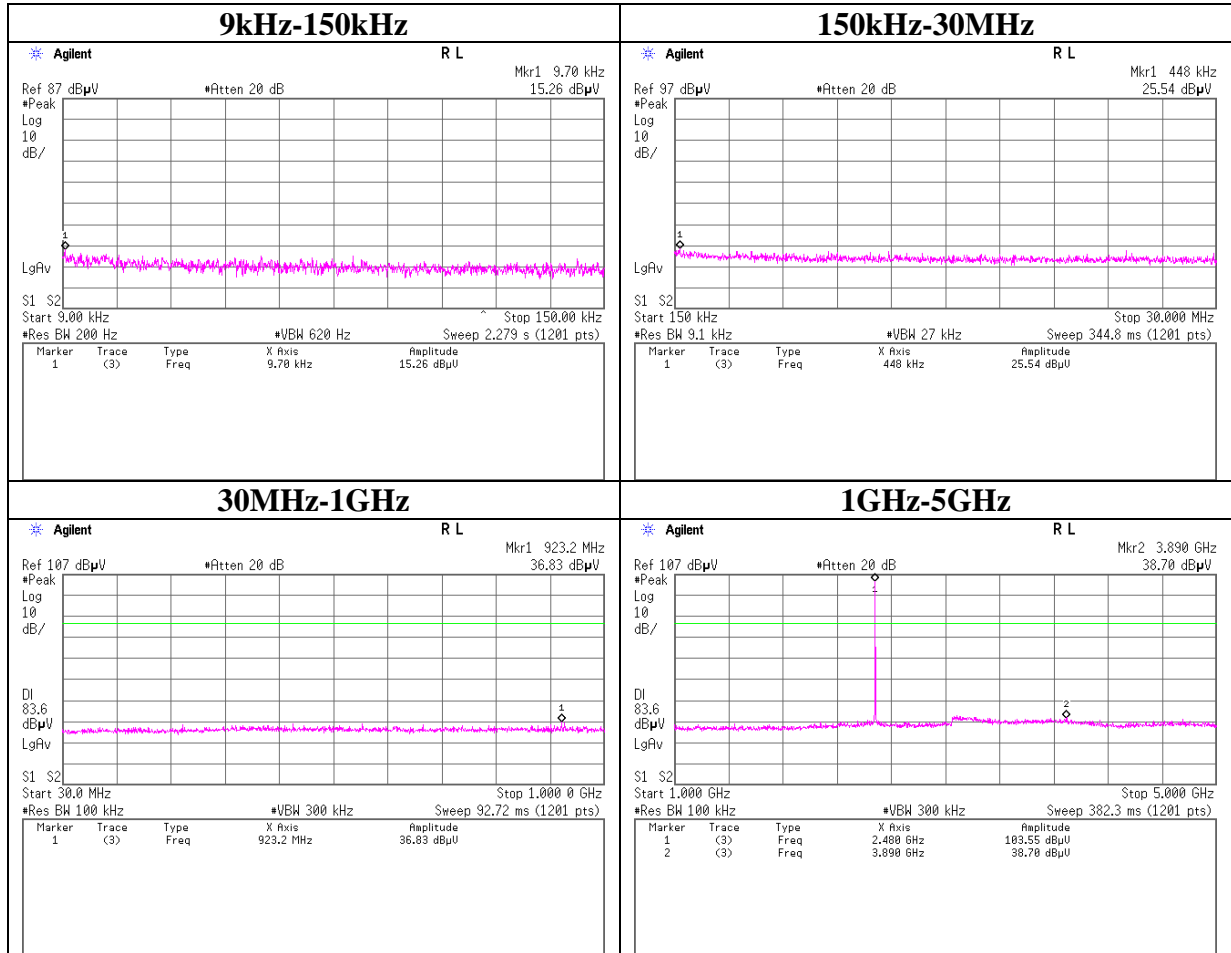
Conducted Spurious Emission

Tx DH5 2441MHz



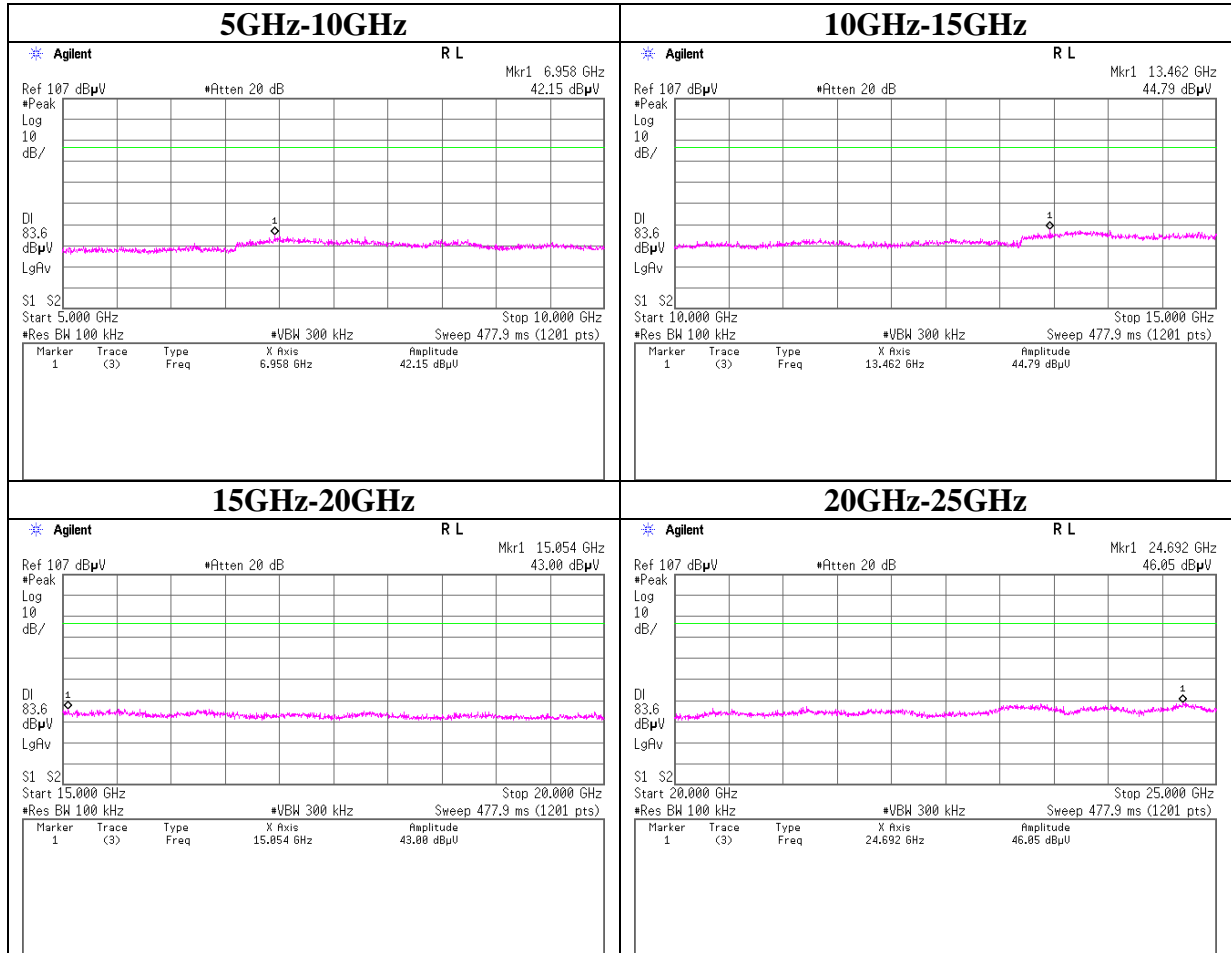
Conducted Spurious Emission

Tx DH5 2480MHz



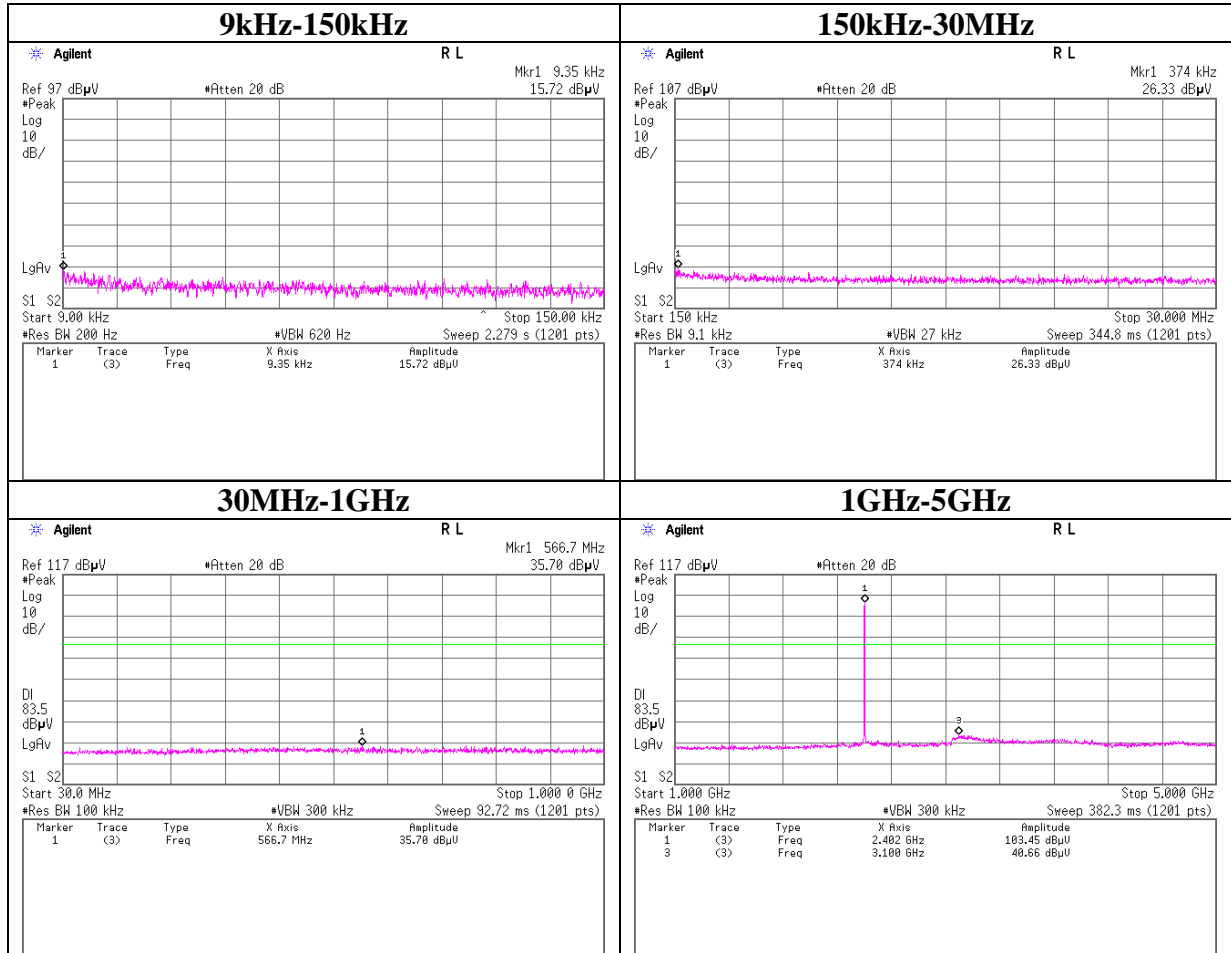
Conducted Spurious Emission

Tx DH5 2480MHz



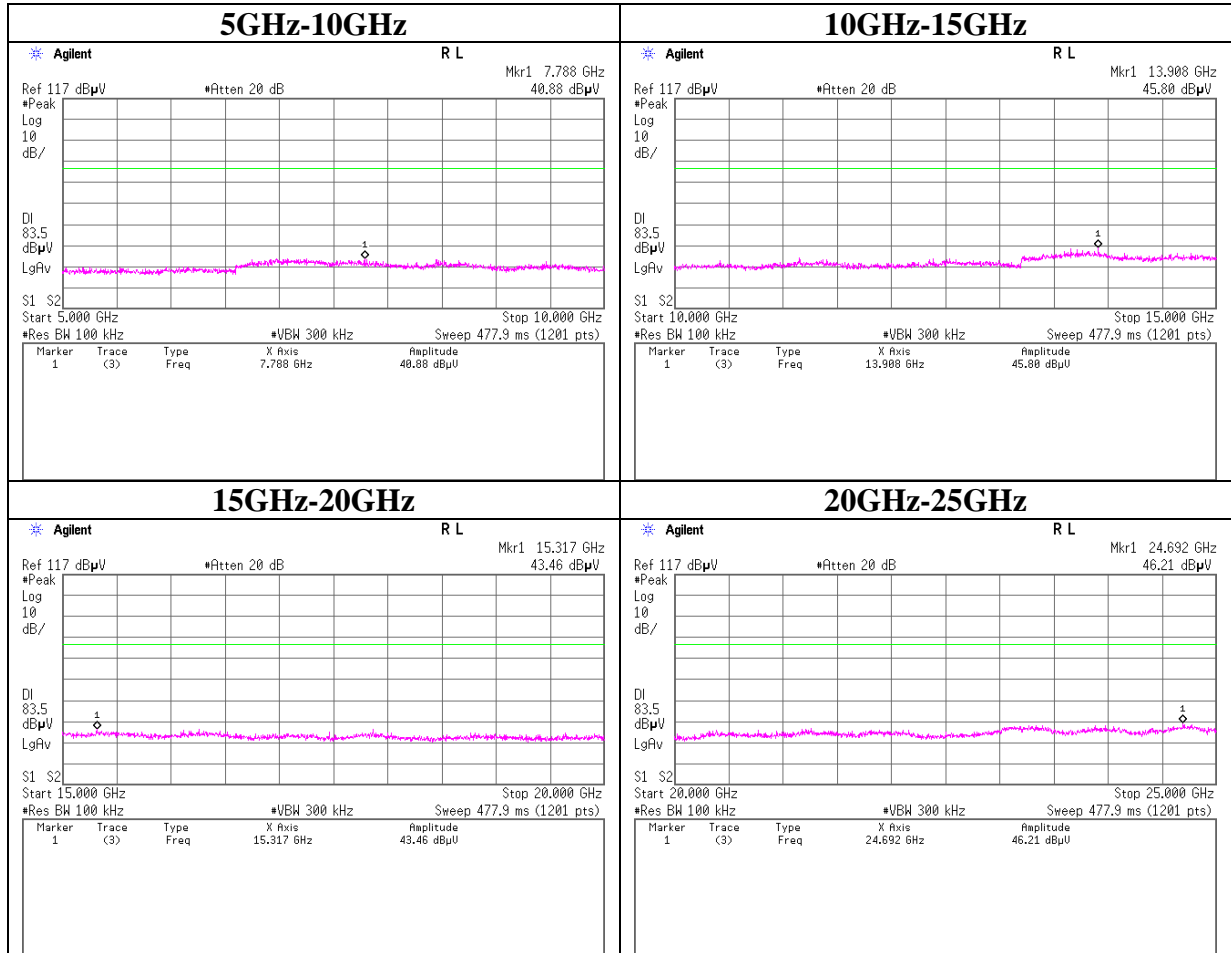
Conducted Spurious Emission

Tx 3DH5 2402MHz



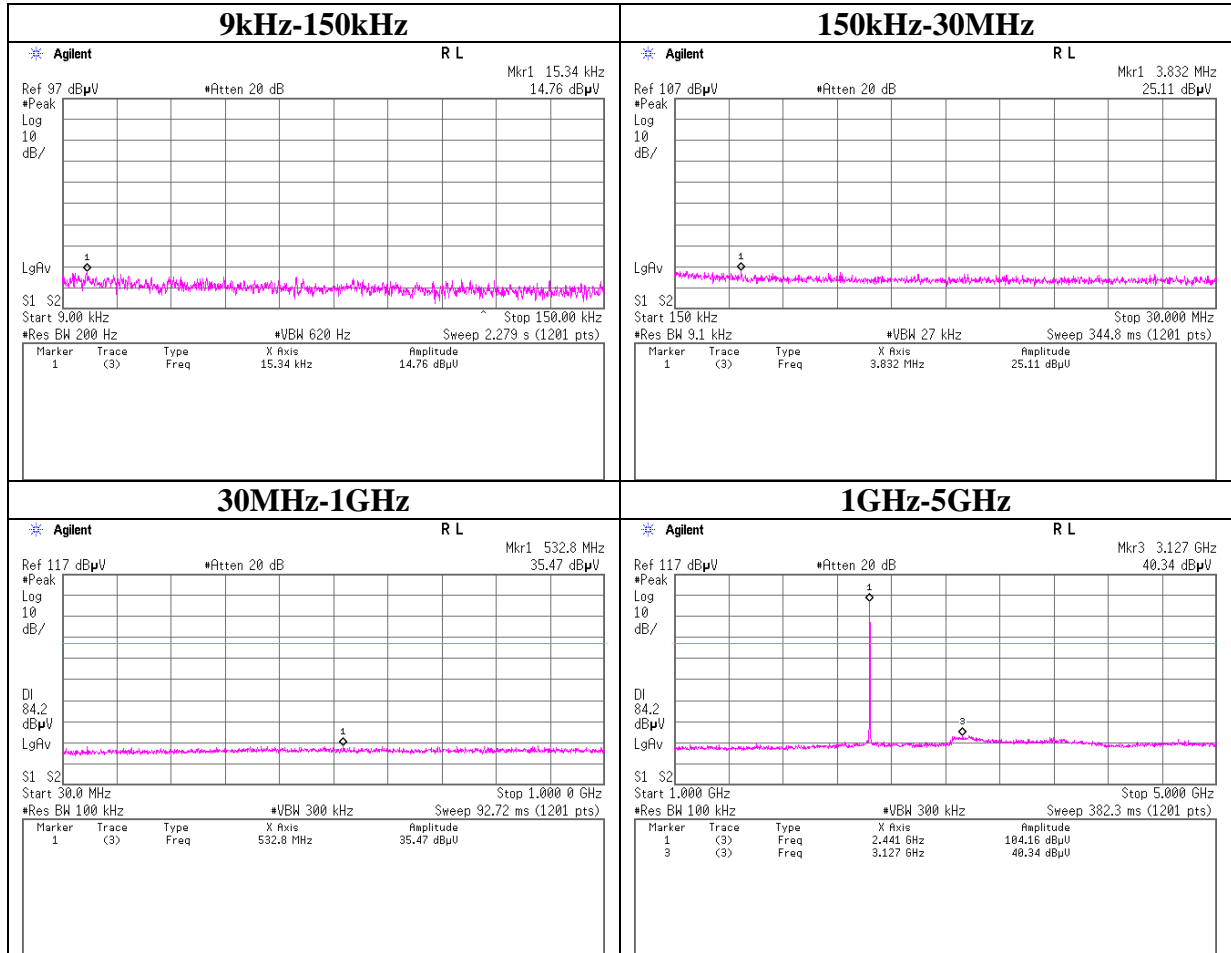
Conducted Spurious Emission

Tx 3DH5 2402MHz



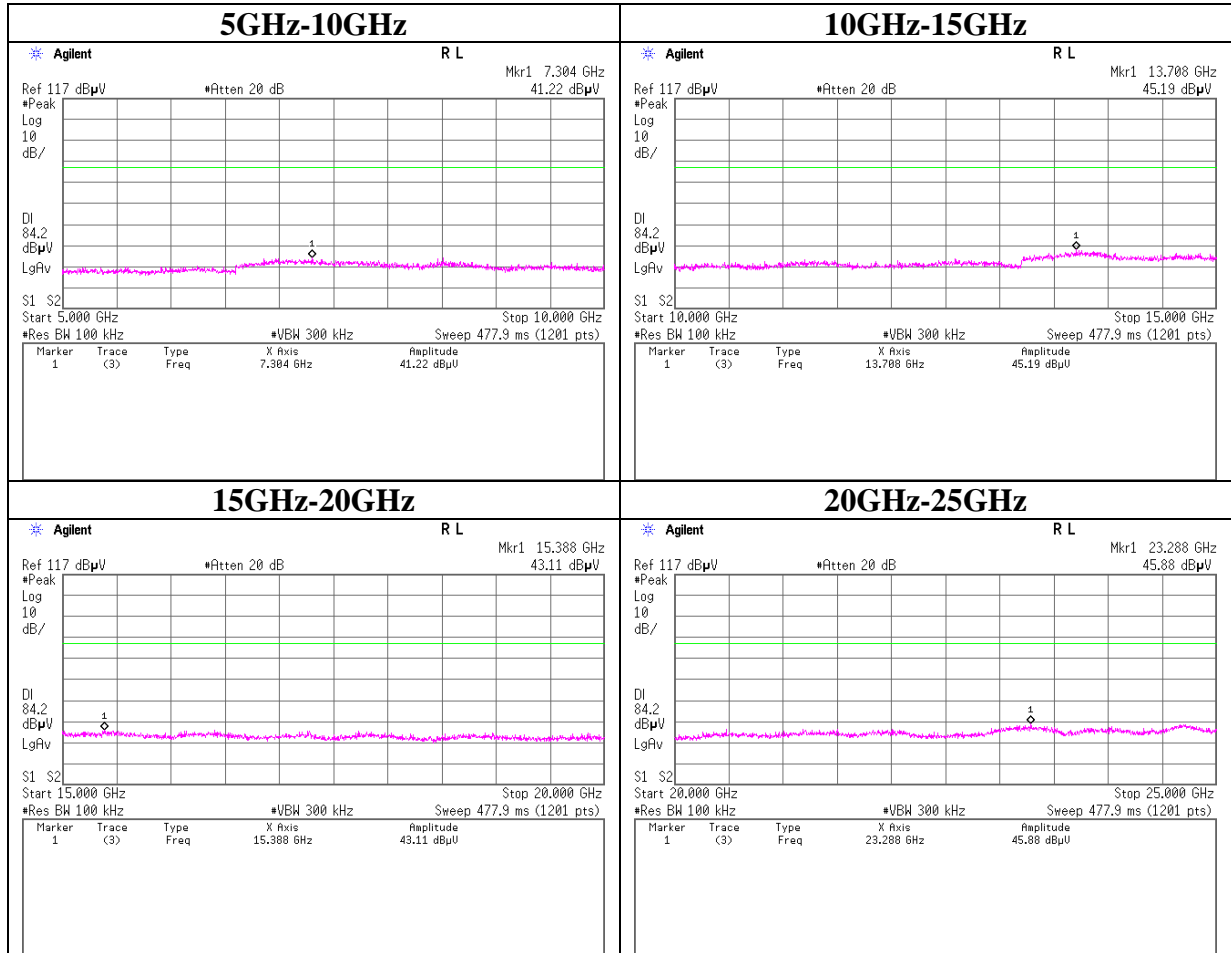
Conducted Spurious Emission

Tx 3DH5 2441MHz



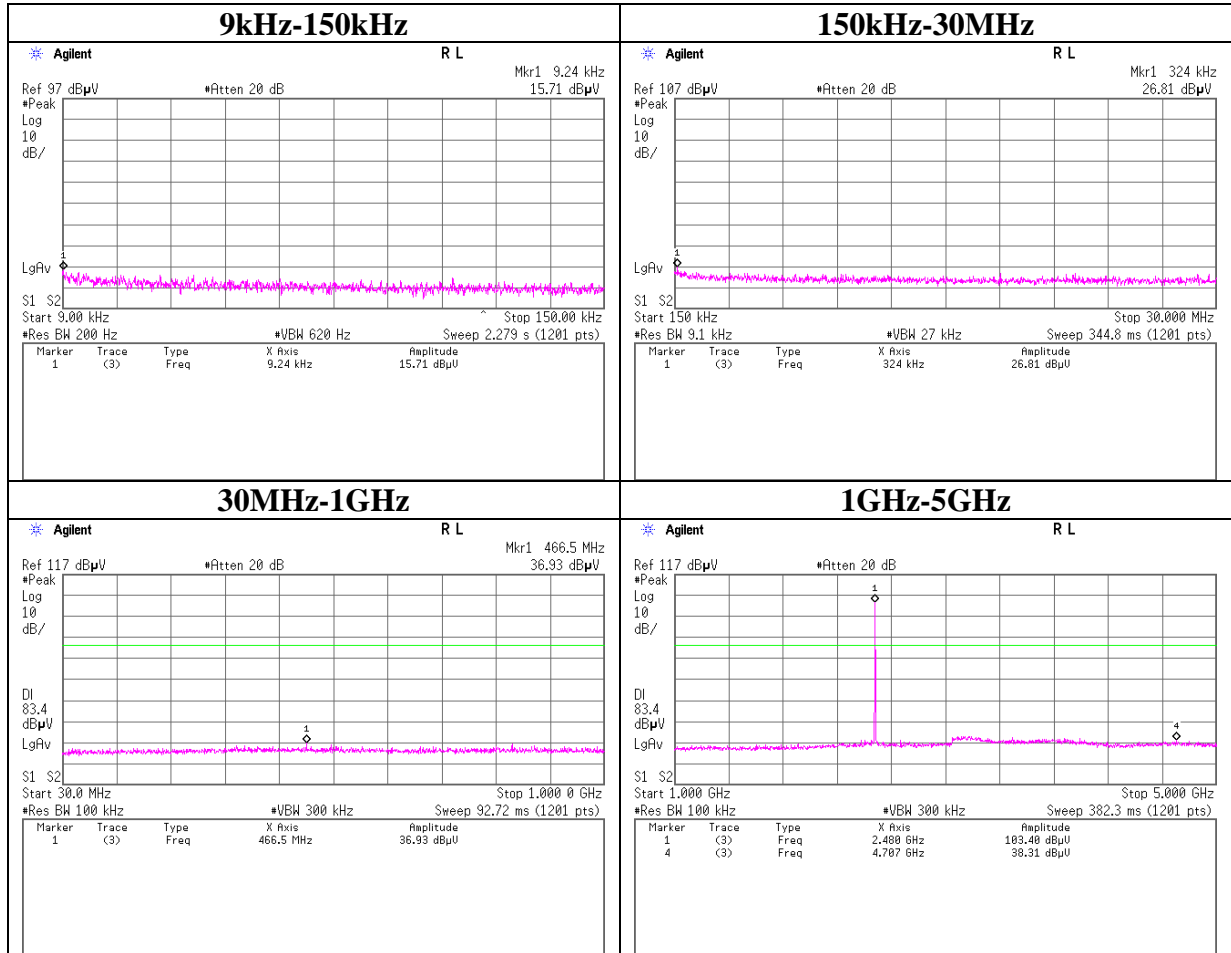
Conducted Spurious Emission

Tx 3DH5 2441MHz



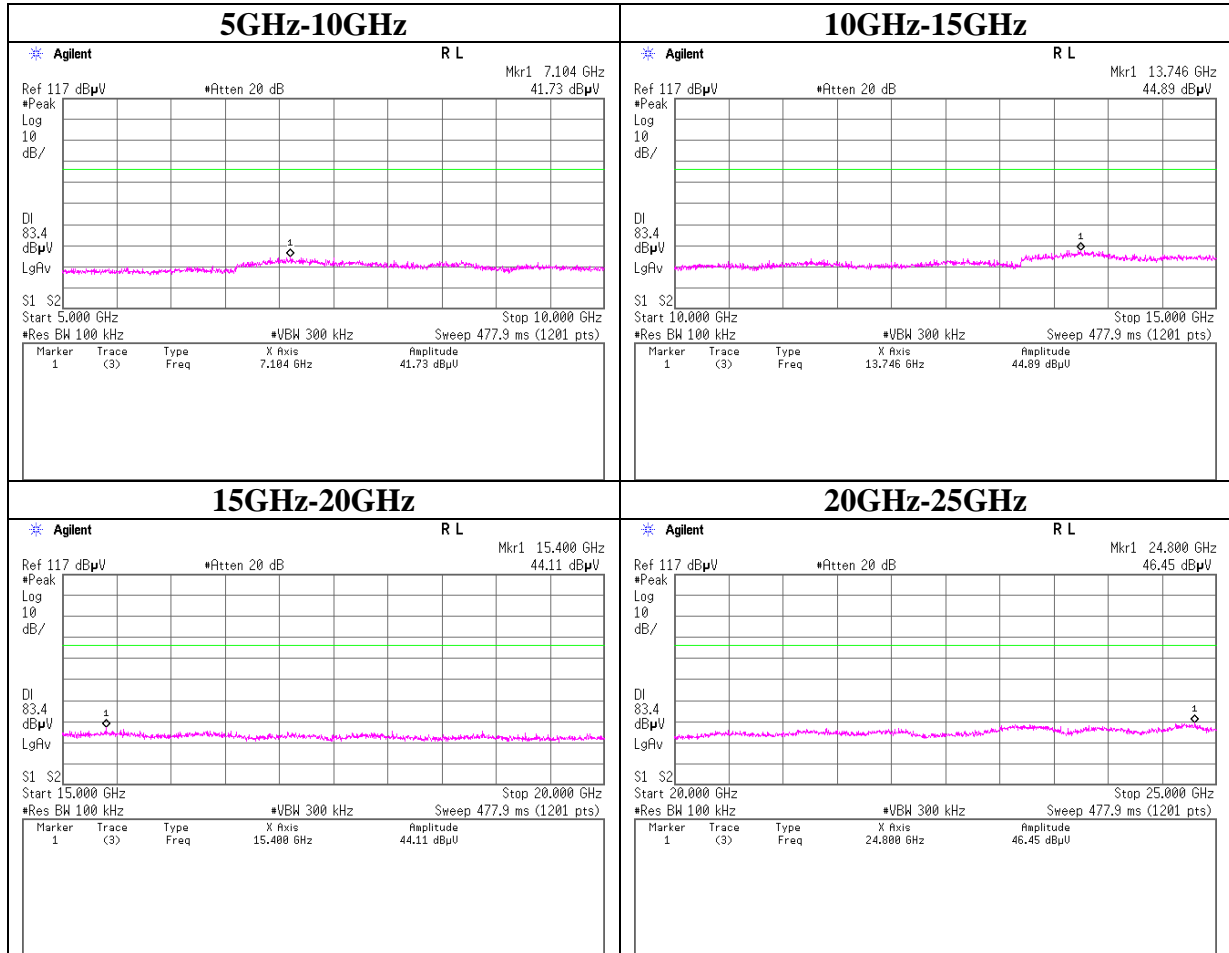
Conducted Spurious Emission

Tx 3DH5 2480MHz



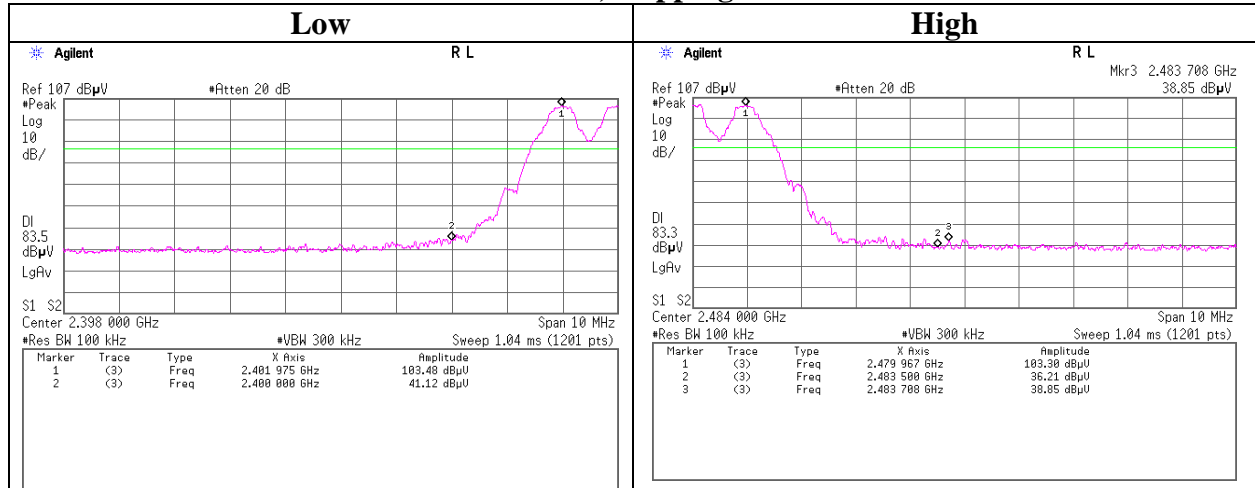
Conducted Spurious Emission

Tx 3DH5 2480MHz

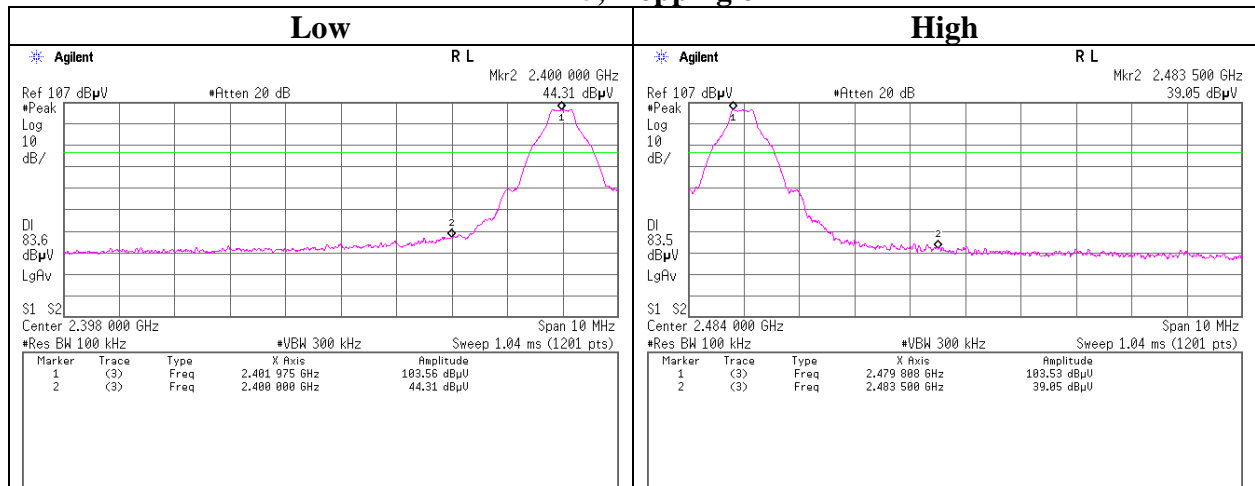


Conducted Emission Band Edge compliance

Tx DH5, Hopping on

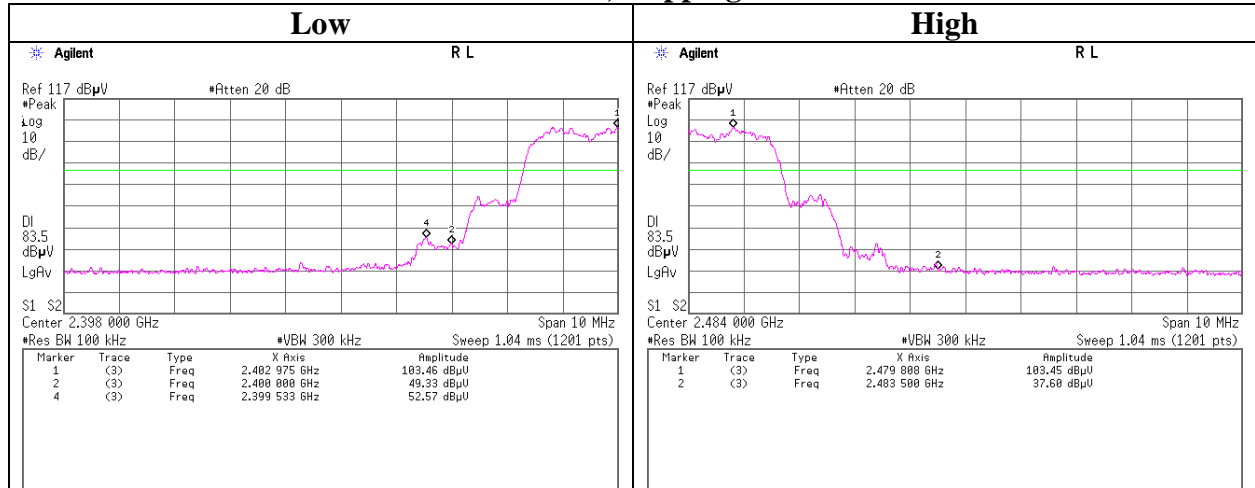


Tx DH5, Hopping off

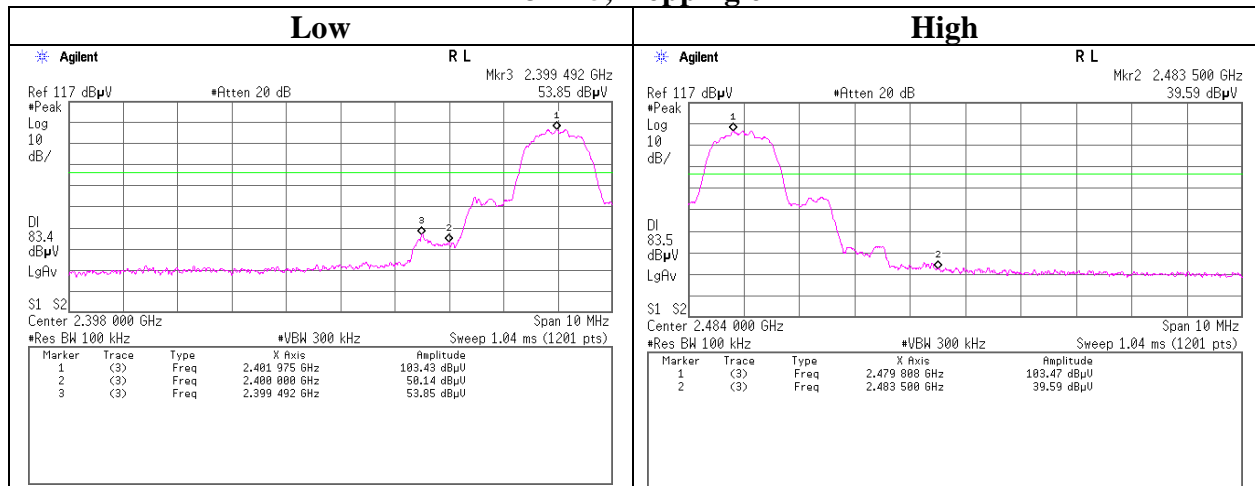


Conducted Emission Band Edge compliance

Tx 3DH5, Hopping on



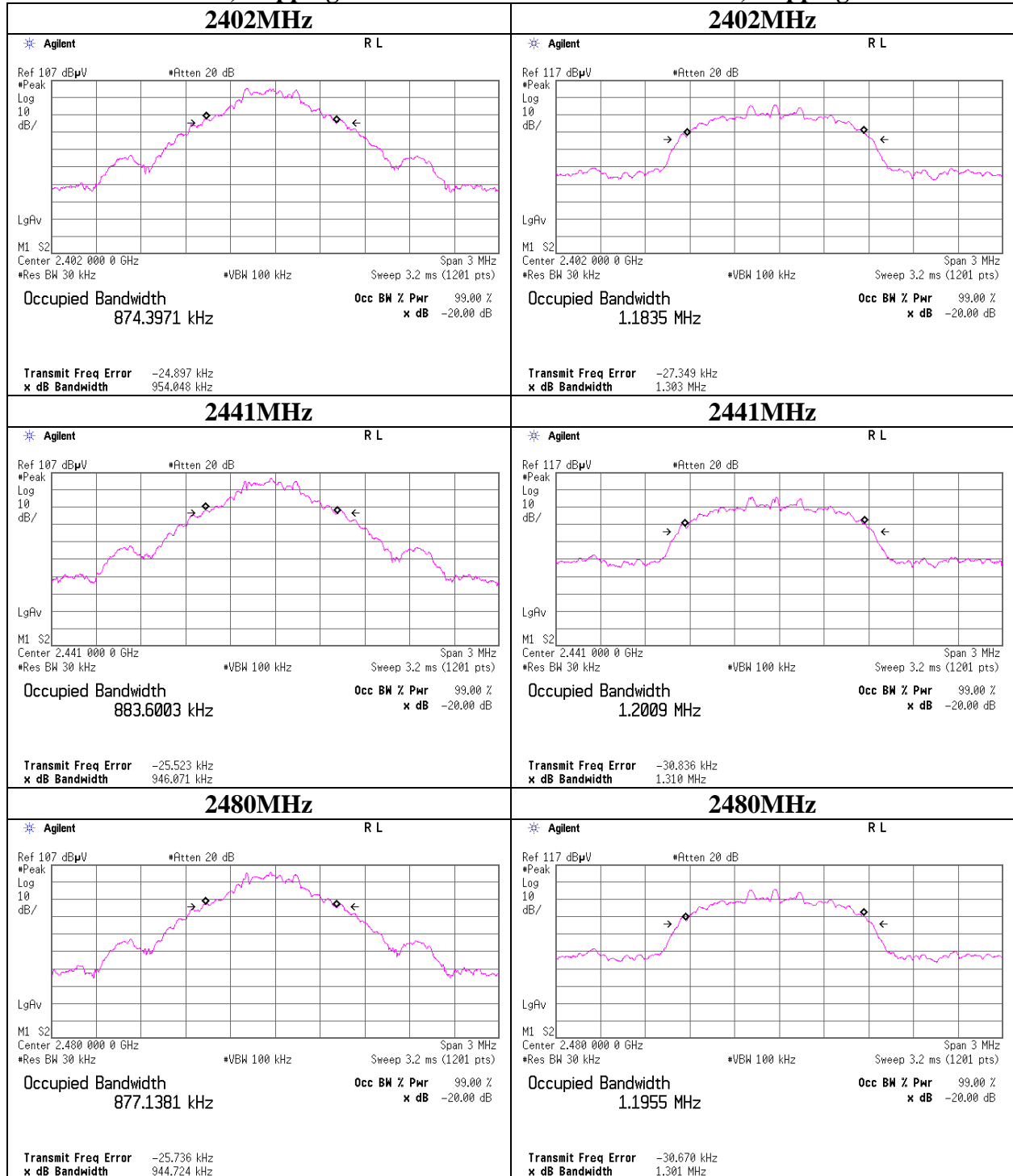
Tx 3DH5, Hopping off



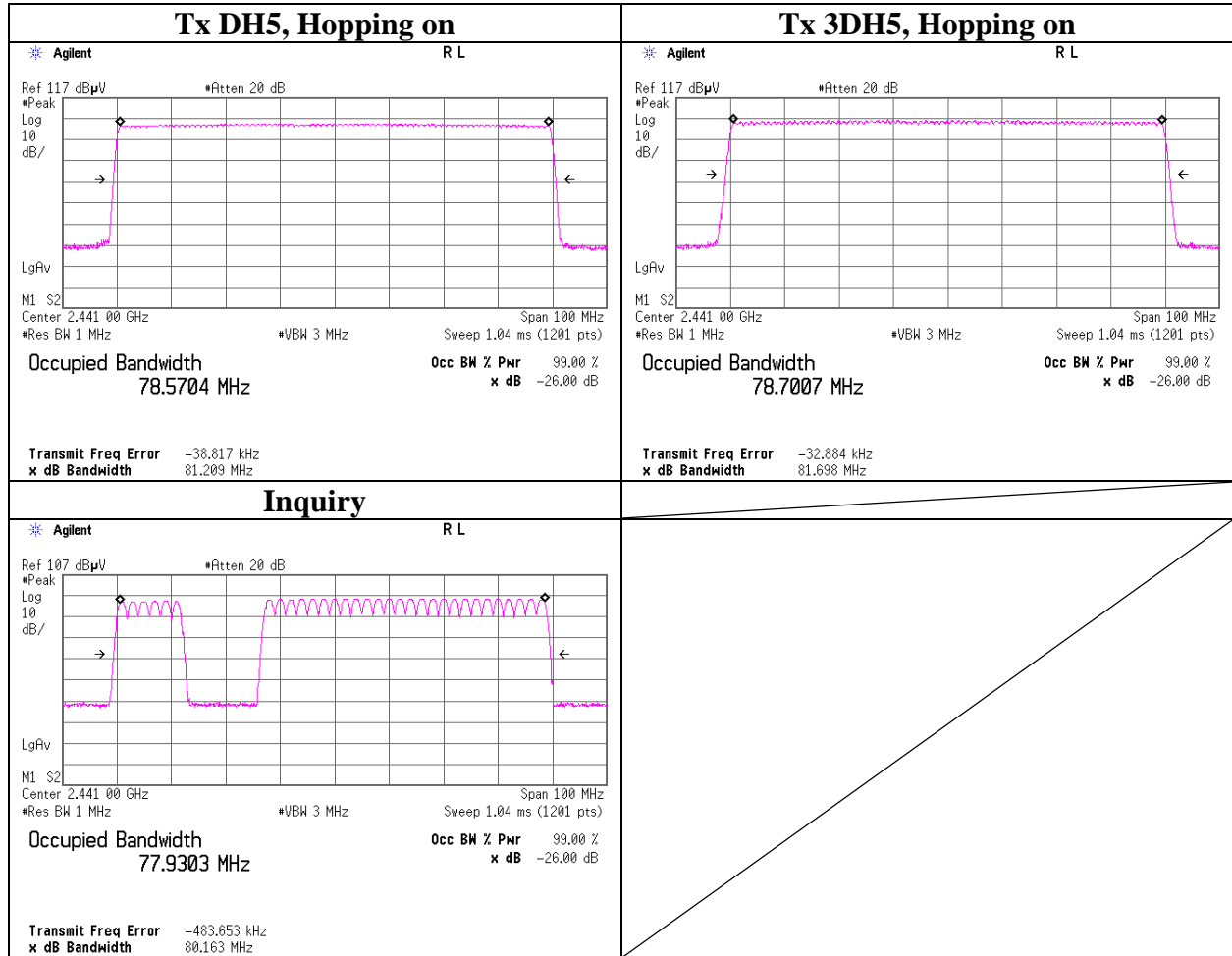
99% Occupied Bandwidth

Tx DH5, Hopping off

Tx 3DH5, Hopping off



99% Occupied Bandwidth



APPENDIX 2: Test instruments

EMI test equipment (1/2)

Control No.	Instrument	Manufacturer	Model No	Serial No	Test Item	Calibration Date * Interval(month)
MSA-10	Spectrum Analyzer	Agilent	E4448A	MY46180655	AT/RE	2012/02/03 * 12
MCC-67	Microwave Cable 1G-40GHz	Suhner	SUCOFLEX102	28635/2	AT	2012/04/25 * 12
MCC-102	Microwave Cable	Hirose Electric	U.FL-2LP-066J1-A(200)	-	AT	2011/06/24 * 12
MAT-24	Attenuator(10dB)(above 1GHz)	Agilent	8493C	71389	AT	2011/06/23 * 12
MPM-08	Power Meter	Anritsu	ML2495A	6K00003338	AT	2011/09/13 * 12
MPSE-11	Power sensor	Anritsu	MA2411B	011737	AT	2011/09/13 * 12
MOS-21	Thermo-Hygrometer	Custom	CTH-201	0002	AT	2011/12/09 * 12
MAEC-03	Semi Anechoic Chamber(NSA)	TDK	Semi Anechoic Chamber 3m	DA-10005	RE	2012/02/24 * 12
MOS-13	Thermo-Hygrometer	Custom	CTH-180	-	RE	2012/02/06 * 12
MJM-06	Measure	PROMART	SEN1955	-	RE	-
MHA-20	Horn Antenna 1-18GHz	Schwarzbeck	BBHA9120D	258	RE	2012/05/25 * 12
MCC-133	Microwave Cable	HUBER+SUHNER	SUCOFLEX104	336164/4(1m) / 340640(5m)	RE	2011/09/07 * 12
MPA-11	MicroWave System Amplifier	Agilent	83017A	MY39500779	RE	2012/03/29 * 12
MHF-19	High Pass Filter 3.5-18.0GHz	TOKIMEC	TF323DCA	602	RE	2011/09/07 * 12
MCC-76	Microwave Cable 1G-26.5GHz	Suhner	SUCOFLEX104	278967/4	RE	2011/12/08 * 12
MAEC-02	Semi Anechoic Chamber(NSA)	TDK	Semi Anechoic Chamber 3m	DA-06902	RE	2011/06/21 * 12
MOS-22	Thermo-Hygrometer	Custom	CTH-201	0003	RE	2012/02/06 * 12
MJM-14	Measure	KOMELON	KMC-36	-	RE	-
MRENT-95	Spectrum Analyzer	Agilent	E4440A	MY46185823	RE	2012/06/19 * 12
MTR-03	Test Receiver	Rohde & Schwarz	ESCI	100300	RE	2012/04/03 * 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
MAT-07	Attenuator(6dB)	Weinschel Corp	2	BK7970	RE	2011/11/02 * 12
MPA-09	Pre Amplifier	Agilent	8447D	2944A10845	RE	2011/09/26 * 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
MHA-02	Horn Antenna 18-26.5GHz	EMCO	3160-09	1265	RE	2012/02/22 * 12
MCC-132	Microwave Cable	HUBER+SUHNER	SUCOFLEX104	336161/4(1m) / 340639(5m)	RE	2011/09/06 * 12
MCC-77	Microwave Cable 1G-26.5GHz	Suhner	SUCOFLEX104	278942/4	RE	2011/12/08 * 12
MHF-18	High Pass Filter 3.5-18.0GHz	TOKIMEC	TF323DCA	7002	RE	2011/09/08 * 12
MAEC-04	Semi Anechoic Chamber(NSA)	TDK	Semi Anechoic Chamber 3m	DA-10005	RE/CE	2012/02/29 * 12
MOS-15	Thermo-Hygrometer	Custom	CTH-180	-	RE/CE	2012/02/06 * 12
MJM-07	Measure	PROMART	SEN1955	-	RE/CE	-
COTS-MEMI	EMI measurement program	TSJ	TEPTO-DV	-	RE/CE	-
MSA-03	Spectrum Analyzer	Agilent	E4448A	MY44020357	RE	2011/11/23 * 12
MHA-21	Horn Antenna 1-18GHz	Schwarzbeck	BBHA9120D	9120D-557	RE	2011/08/11 * 12
MCC-56	Microwave Cable	Suhner	SUCOFLEX104	270875/4(1m) / 284655(5m)	RE	

UL Japan, Inc.

Head Office EMC Lab.

4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

Telephone : +81 596 24 8116

Facsimile : +81 596 24 8124

EMI test equipment (2/2)

Control No.	Instrument	Manufacturer	Model No	Serial No	Test Item	Calibration Date * Interval(month)
MPA-12	MicroWave System Amplifier	Agilent	83017A	MY39500780	RE	2012/03/28 * 12
MCC-79	Microwave Cable 1G-26.5GHz	Suhner	SUCOFLEX104	278923/4	RE	2011/12/08 * 12
MHF-20	High Pass Filter 3.5-18.0GHz	TOKIMEC	TF323DCC	607	RE	2011/09/08 * 12
MSA-05	Spectrum Analyzer	Advantest	R3273	160400285	CE	2011/11/23 * 12
MTR-07	Test Receiver	Rohde & Schwarz	ESCI	100635	CE	2012/04/05 * 12
MLS-06	LISN(AMN)	Schwarzbeck	NSLK8127	8127363	CE	2012/02/06 * 12
MTA-31	Terminator	TME	CT-01	-	CE	2012/01/11 * 12
MAT-67	Attenuator(13dB)	JFW Industries, Inc.	50FP-013H2 N	-	CE	2012/01/28 * 12
MCC-113	Coaxial cable	Fujikura/Suhner/TSJ	5D-2W(10m)/SFM141(5m)/421-010(1m)/sucoform141-PE(1m)/RFM-E121(Switcher)	-/04178	CE	2011/07/04 * 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