



RADIO TEST REPORT

Test Report No. : 32DE0204-HO-01-B-R1

Applicant : DENSO CORPORATION
Type of Equipment : Navigation ECU
Model No. : DNNS078
FCC ID : HYQDNNS078
Test regulation : FCC Part 15 Subpart C: 2011
Test Result : Complied

1. This test report shall not be reproduced in full or partial, without the written approval of UL Japan, Inc.
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 32DE0204-HO-01-B. 32DE0204-HO-01-B is replaced with this report.

Date of test: November 29 to December 6, 2011

Representative test engineer:

K. Kawamura

Keisuke Kawamura
Engineer of WiSE Japan,
UL Verification Service

Approved by:

S. Watanabe

Shinya Watanabe
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>

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

13-EM-F0429

CONTENTS	PAGE
SECTION 1: Customer information.....	3
SECTION 2: Equipment under test (E.U.T.).....	3
SECTION 3: Test specification, procedures & results.....	4
SECTION 4: Operation of E.U.T. during testing.....	7
SECTION 5: Radiated Spurious Emission	9
SECTION 6: Antenna Terminal Conducted Tests.....	10
APPENDIX 1: Data of EMI test.....	11
Number of Hopping Frequency	14
Dwell time.....	16
Maximum Peak Output Power	19
Radiated Spurious Emission	20
Conducted Spurious Emission	35
Conducted Emission Band Edge compliance	48
99%Occupied Bandwidth	50
APPENDIX 2: Test instruments	52
APPENDIX 3: Photographs of test setup	53
Radiated Spurious Emission	53

SECTION 1: Customer information

Company Name	:	DENSO CORPORATION
Address	:	1-1 Showa-cho, Kariya-shi, Aichi-ken, 448-8661 Japan
Telephone Number	:	+81-566-20-3923
Facsimile Number	:	+81-566-25-4920
Contact Person	:	Hiromasa Obuta

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

2.1 Identification of E.U.T.

Type of Equipment	:	Navigation ECU
Model No.	:	DNNS078
Serial No.	:	Refer to Section 4, Clause 4.2
Rating	:	DC 12.0V
Receipt Date of Sample	:	November 24, 2011
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: DNNS078 (referred to as the EUT in this report) is the Navigation ECU.

Feature of EUT: EUT shall provide visual and verbal route guidance plan according to the desired destination selected by the user from information database. The system shall use GPS technology, dead reckoning and map matching to determine where the vehicle is located. EUT has Bluetooth communication with hands free phone.

Clock frequencies	:	GPS: 48MHz, FM Tuner: 41.6MHz, Bluetooth: 26MHz
Equipment type	:	Transceiver
Frequency of operation	:	2402-2480MHz
Bandwidth & Channel spacing	:	79MHz & 1MHz/CH
Modulation	:	FHSS GFSK, $\pi/4$ DQPSK, 8DPSK
Power Supply (inner)	:	DC 12.0V (DNNS078) DC 3.3V (Bluetooth IC)
Antenna type	:	CHIP antenna
Antenna connector type	:	HRS U.FL-R-SMT(10)
Antenna gain	:	-1.0dBi (max)

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: 2011, final revised on July 8, 2011 and effective August 8, 2011

Title : FCC 47CFR Part15 Radio Frequency Device Subpart C Intentional Radiators
Section 15.207 Conducted limits
Section 15.247 Operation within the bands 902-928MHz,
2400-2483.5MHz, and 5725-5850MHz

* The EUT complies with FCC Part 15 Subpart B: 2011, final revised on July 8, 2011 and effective August 8, 2011

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	N/A	N/A *1)	-
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	5.2dB 543.576MHz, QP, Horizontal 543.578MHz, QP, Horizontal	Complied	Conducted/ Radiated

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

*1) The test is not applicable since the EUT is not the device that is designed to be connected to the public utility (AC) power line.

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

FCC 15.31 (e)

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

FCC Part 15.203 Antenna requirement

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

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
Receiver Spurious Emission	IC: RSS-Gen 4.10	IC: RSS-Gen 6	5.6dB 471.101MHz, QP, Horizontal	Complied	Radiated

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)	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	5.6dB	5.9dB	4.4dB	4.3dB
No.2	4.1dB	5.2dB	5.1dB	5.7dB	5.8dB	4.3dB	4.2dB
No.3	4.5dB	5.0dB	5.2dB	5.7dB	5.8dB	4.5dB	4.2dB
No.4	4.7dB	5.2dB	5.2dB	5.7dB	5.8dB	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

Radiated emission test(3m)

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

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

3.5 Test Location

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

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

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

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

Refer to APPENDIX.

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

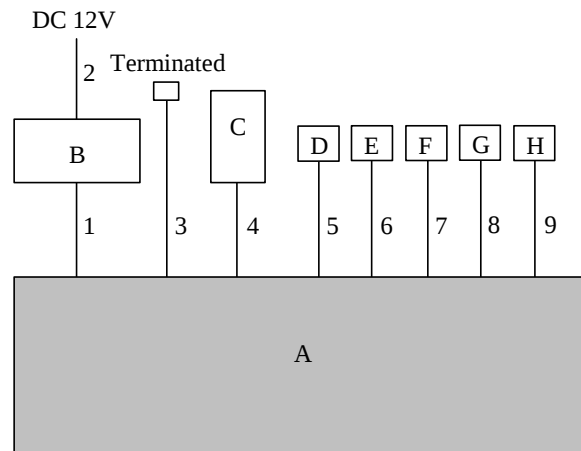
4.1 Operating Mode(s)

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

Details of Operating Mode(s)

Test Item	Mode	Tested frequency
Spurious Emission (Conducted/Radiated)	Tx (Hopping off) DH5, 3DH5	2402MHz 2441MHz 2480MHz
	Rx	2441MHz
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
*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: Not changeable Software: pTool Navigator 2009 *This setting of software is the worst case. Any conditions under the normal use do not exceed the condition of setting. In addition, end users cannot change the settings of the output power of the product.		

4.2 Configuration and peripherals



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

Description of EUT and Support equipment

No.	Item	Model number	Serial number	Manufacturer	Remarks
A	Navigation ECU	DNNS078	000062	DENSO CORPORATION	EUT
B	TEST BENCH	-	-	DENSO CORPORATION	-
C	FM Antenna	-	-	DENSO CORPORATION	-
D	i-pod	A1137	YM626H5QSZC	Apple	-
E	Microphone	-	-	DENSO CORPORATION	-
F	Camera	GP-KD2371RV	47B03109	DENSO CORPORATION	-
G	steering SW	-	-	DENSO CORPORATION	-
H	Dummy speaker	-	-	DENSO CORPORATION	-

List of cables used

No.	Name	Length (m)	Shield		Remarks
			Cable	Connector	
1	DC Cable	1.8	Unshielded	Unshielded	-
2	DC Cable	2.7	Unshielded	Unshielded	-
3	Signal Cable	0.1	Unshielded	Unshielded	-
4	Antenna Cable	2.4	Unshielded	Unshielded	-
5	Signal Cable	3.1	Unshielded	Unshielded	-
6	Signal Cable	4.4	Unshielded	Unshielded	-
7	Signal Cable	1.8	Unshielded	Unshielded	-
8	Signal Cable	1.8	Unshielded	Unshielded	-
9	Signal Cable	1.8	Unshielded	Unshielded	-

SECTION 5: 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	Below 30MHz	30MHz to 300MHz	300MHz to 1GHz	Above 1GHz
Antenna Type	Loop	Biconical	Logperiodic	Horn

Frequency	Below 1GHz	Above 1GHz	
Instrument used	Test Receiver	Spectrum Analyzer	
Detector	QP	PK	AV
IF Bandwidth	BW 120kHz(T/R)	RBW: 1MHz VBW: 3MHz	RBW: 1MHz VBW: 10Hz or RBW: 1MHz VBW: 270Hz *1)
Test Distance	3m	3m (below 10GHz), 1m*2) (above 10GHz), 0.5m*3) (above 26.5GHz)	

*1) Used for the band edge of the carrier and the harmonics that can be measured. The VBW is based on the inverse of the duty cycle (see Appendix). 270Hz was used for DH5 and 3DH5.

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

*3) Distance Factor: $20 \times \log (3.0\text{m}/0.5\text{m}) = 15.6\text{dB}$

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

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

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

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 6: 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	300kHz or 100kHz	Auto	Peak	Max Hold	Spectrum Analyzer
Number of Hopping Frequency	30MHz	300kHz	3MHz	Auto	Peak	Max Hold	Spectrum Analyzer
Dwell Time	Zero Span	100kHz, 1MHz	300kHz, 3MHz	As necessary capture the entire dwell time per hopping channel	Peak	Max Hold	Spectrum Analyzer
Conducted Spurious Emission *1)	9kHz to 150kHz	200Hz	620Hz	Auto	Peak	Max Hold	Spectrum Analyzer
	150kHz to 30MHz	9.1kHz	27kHz				
	30MHz to 25GHz (Less or equal to 5GHz)	100kHz	300kHz				
Conducted Spurious Emission Band Edge compliance	20MHz	300kHz	1MHz	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

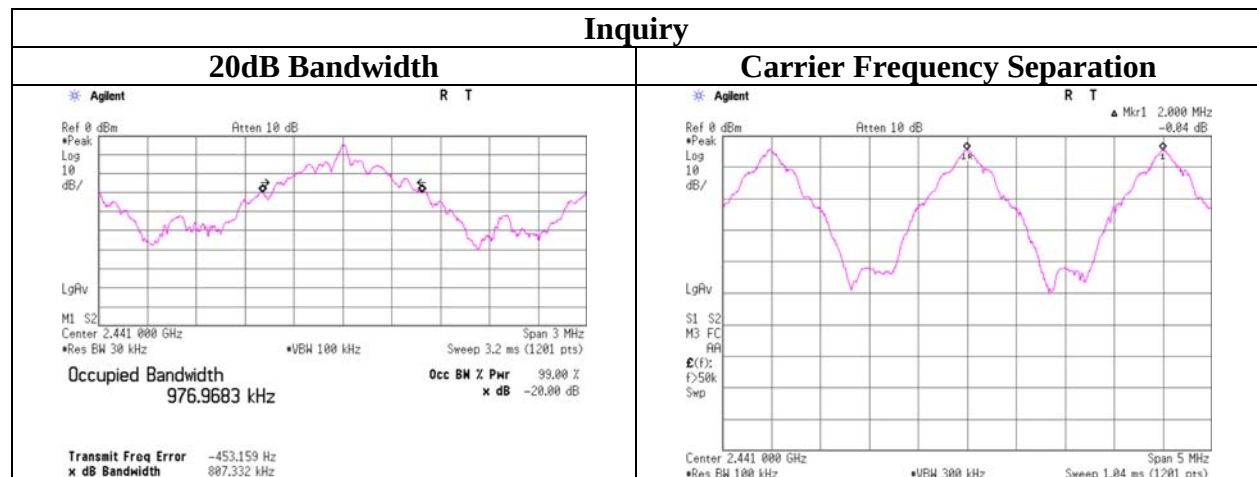
20dB Bandwidth and Carrier Frequency Separation

Test place	Head Office EMC Lab. No.7 Measurement Room
Report No.	32DE0204-HO-01
Date	11/29/2011
Temperature/ Humidity	23 deg. C / 32% RH
Engineer	Keisuke Kawamura
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	0.927	1.000	≥ 0.618
DH5	2480.0	0.927	1.000	≥ 0.618
3DH5	2402.0	1.277	1.000	≥ 0.851
3DH5	2441.0	1.278	1.000	≥ 0.852
3DH5	2480.0	1.297	1.000	≥ 0.865
Inquiry	2441.0	0.807	2.000	≥ 0.538

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

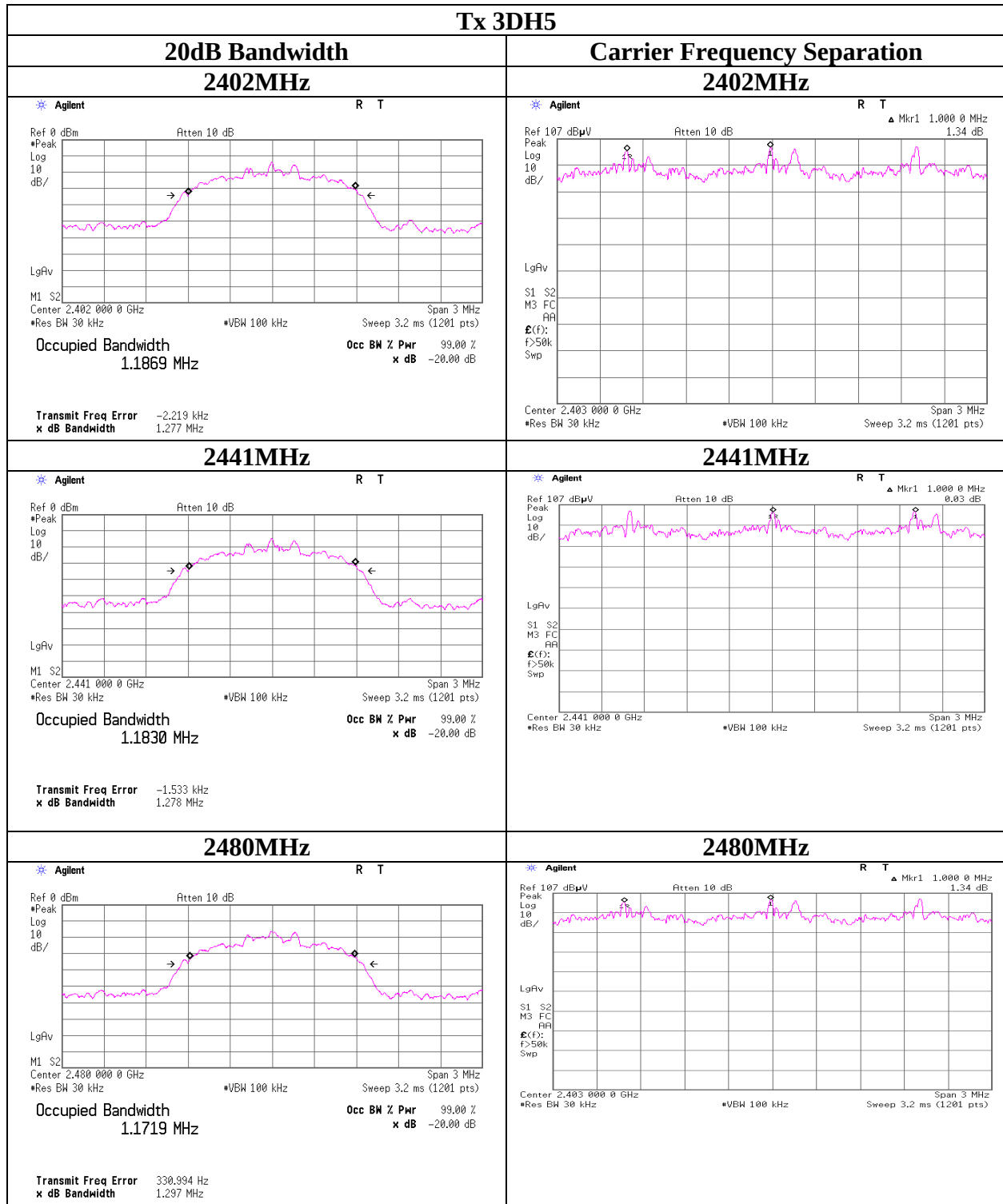
No limit applies to 20dB Bandwidth.



20dB Bandwidth and Carrier Frequency Separation

Tx DH5	
20dB Bandwidth	Carrier Frequency Separation
2402MHz Agilent R T Ref 0 dBm Peak Log 10 dB/ Atten 10 dB LgAv M1 S2 Center 2.402 000 GHz *Res BW 30 kHz Span 3 MHz Sweep 3.2 ms (1201 pts) Occupied Bandwidth 846.6223 kHz Occ BW % Pwr 99.00 % x dB -20.00 dB Transmit Freq Error -535.781 Hz x dB Bandwidth 931.817 kHz	2402MHz Agilent R T Ref 107 dBμV Peak Log 10 dB/ Atten 10 dB LgAv S1 S2 M3 FC AR Δ(f): f>50k Sep Center 2.403 000 GHz *Res BW 30 kHz Span 3 MHz Sweep 3.2 ms (1201 pts) Mkr1 1.000 0 MHz 2.21 dB
2441MHz Agilent R T Ref 0 dBm Peak Log 10 dB/ Atten 10 dB LgAv M1 S2 Center 2.441 000 GHz *Res BW 30 kHz Span 3 MHz Sweep 3.2 ms (1201 pts) Occupied Bandwidth 849.0701 kHz Occ BW % Pwr 99.00 % x dB -20.00 dB Transmit Freq Error -1.660 kHz x dB Bandwidth 927.450 kHz	2441MHz Agilent R T Ref 107 dBμV Peak Log 10 dB/ Atten 10 dB LgAv S1 S2 M3 FC AR Δ(f): f>50k Sep Center 2.441 000 GHz *Res BW 30 kHz Span 3 MHz Sweep 3.2 ms (1201 pts) Mkr1 1.000 0 MHz 2.40 dB
2480MHz Agilent R T Ref 0 dBm Peak Log 10 dB/ Atten 10 dB LgAv M1 S2 Center 2.480 000 GHz *Res BW 30 kHz Span 3 MHz Sweep 3.2 ms (1201 pts) Occupied Bandwidth 846.7748 kHz Occ BW % Pwr 99.00 % x dB -20.00 dB Transmit Freq Error -1.706 kHz x dB Bandwidth 926.733 kHz	2480MHz Agilent R T Ref 107 dBμV Peak Log 10 dB/ Atten 10 dB LgAv S1 S2 M3 FC AR Δ(f): f>50k Sep Center 2.479 000 GHz *Res BW 30 kHz Span 3 MHz Sweep 3.2 ms (1201 pts) Mkr1 1.000 0 MHz -1.17 dB

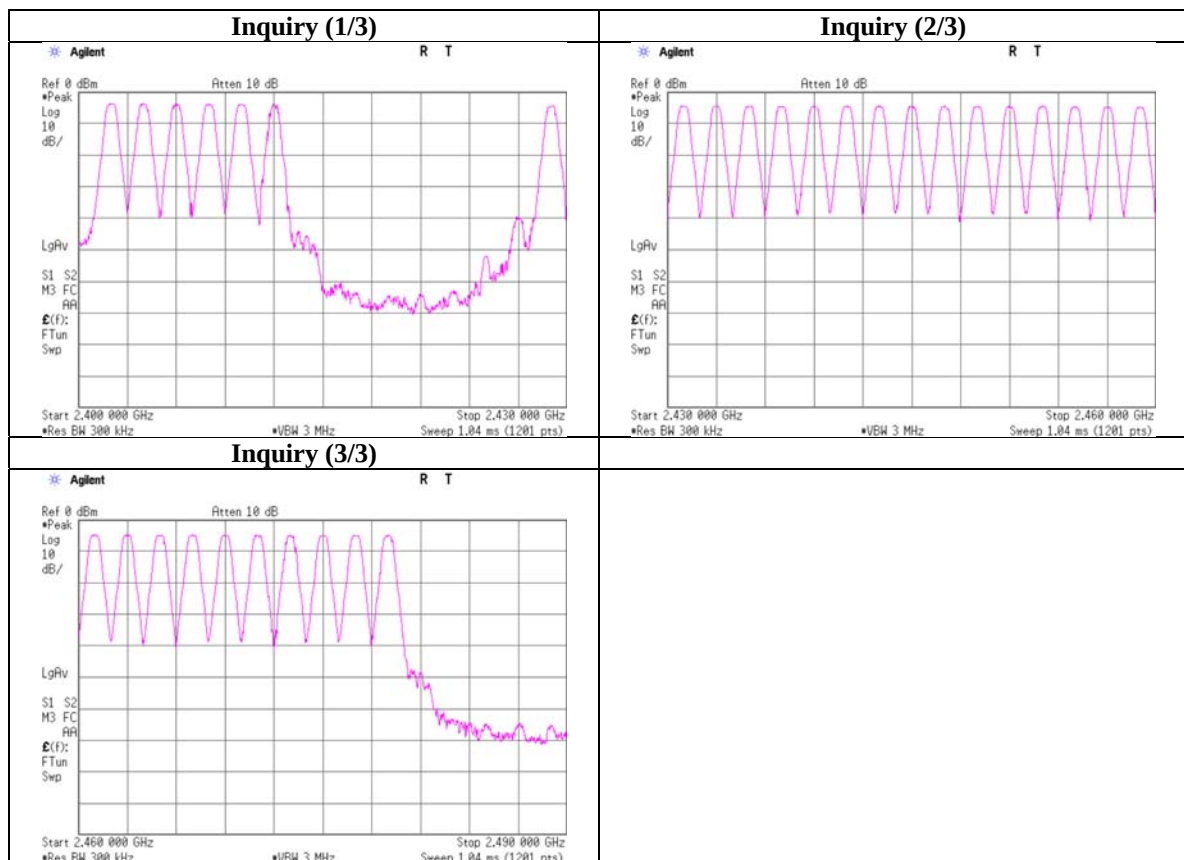
20dB Bandwidth and Carrier Frequency Separation



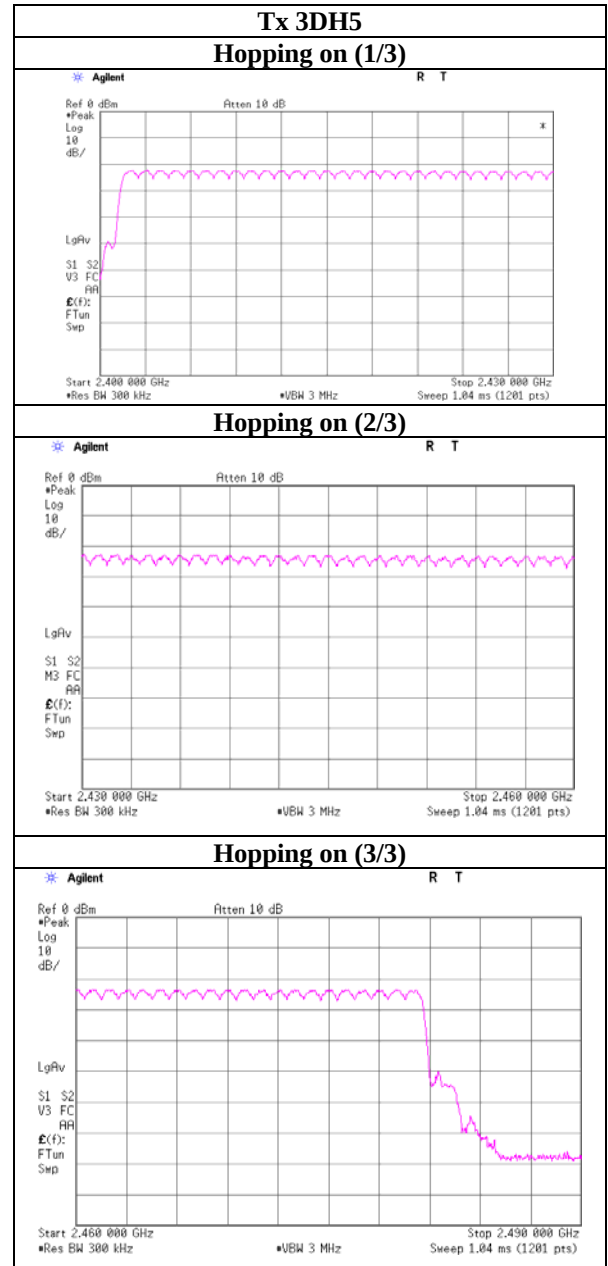
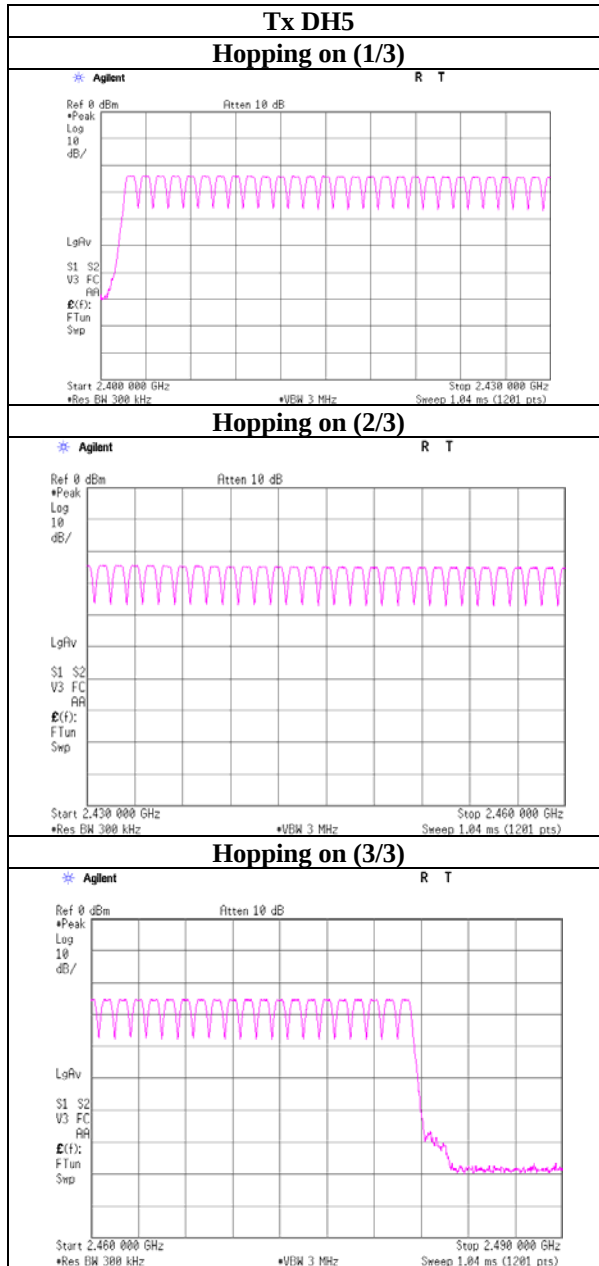
Number of Hopping Frequency

Test place	Head Office EMC Lab. No.7 Measurement Room
Report No.	32DE0204-HO-01
Date	11/29/2011
Temperature/ Humidity	23 deg. C / 32% RH
Engineer	Keisuke Kawamura
Mode	Tx (Hopping on) DH5/3DH5/Inquiry

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



Number of Hopping Frequency



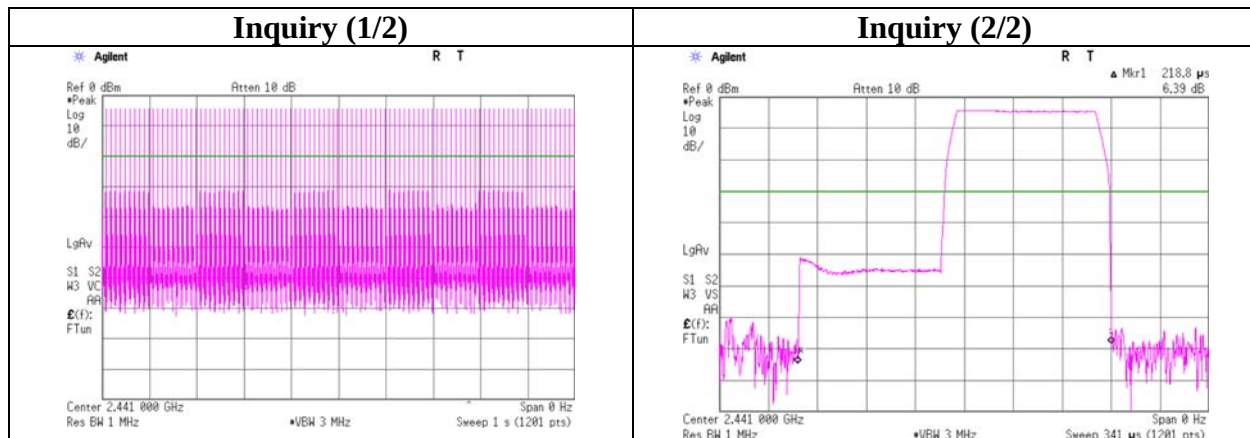
Dwell time

Test place Head Office EMC Lab. No.7 Measurement Room
Report No. 32DE0204-HO-01
Date 11/29/2011
Temperature/ Humidity 23 deg. C / 32% RH
Engineer Keisuke Kawamura
Mode Tx (Hopping on) DH5/3DH5/Inquiry

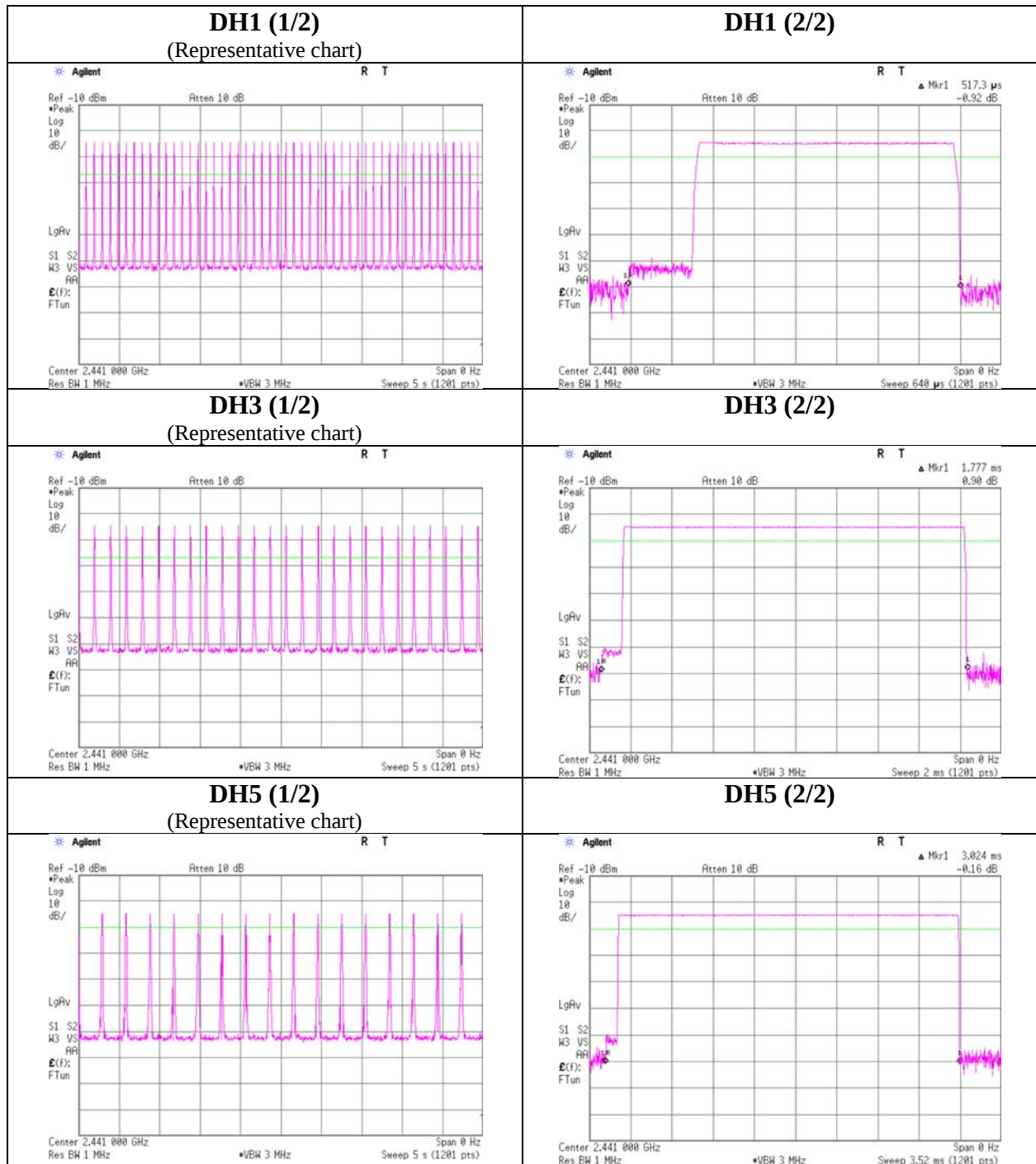
Mode	Number of transmission in a 31.6(79 Hopping x 0.4) / 12.8(32 Hopping x 0.4)second period				Length of transmission time [msec]	Result [msec]	Limit [msec]
DH1	50.0 times	/	5 sec.	x	31.6 sec. =	316 times	400
DH3	26.0 times	/	5 sec.	x	31.6 sec. =	165 times	400
DH5	17.0 times	/	5 sec.	x	31.6 sec. =	108 times	400
3DH1	50.0 times	/	5 sec.	x	31.6 sec. =	316 times	400
3DH3	26.0 times	/	5 sec.	x	31.6 sec. =	165 times	400
3DH5	17.0 times	/	5 sec.	x	31.6 sec. =	108 times	400
Inquiry	100.0 times	/	1 sec.	x	12.8 sec. =	1280 times	400

Sample Calculation

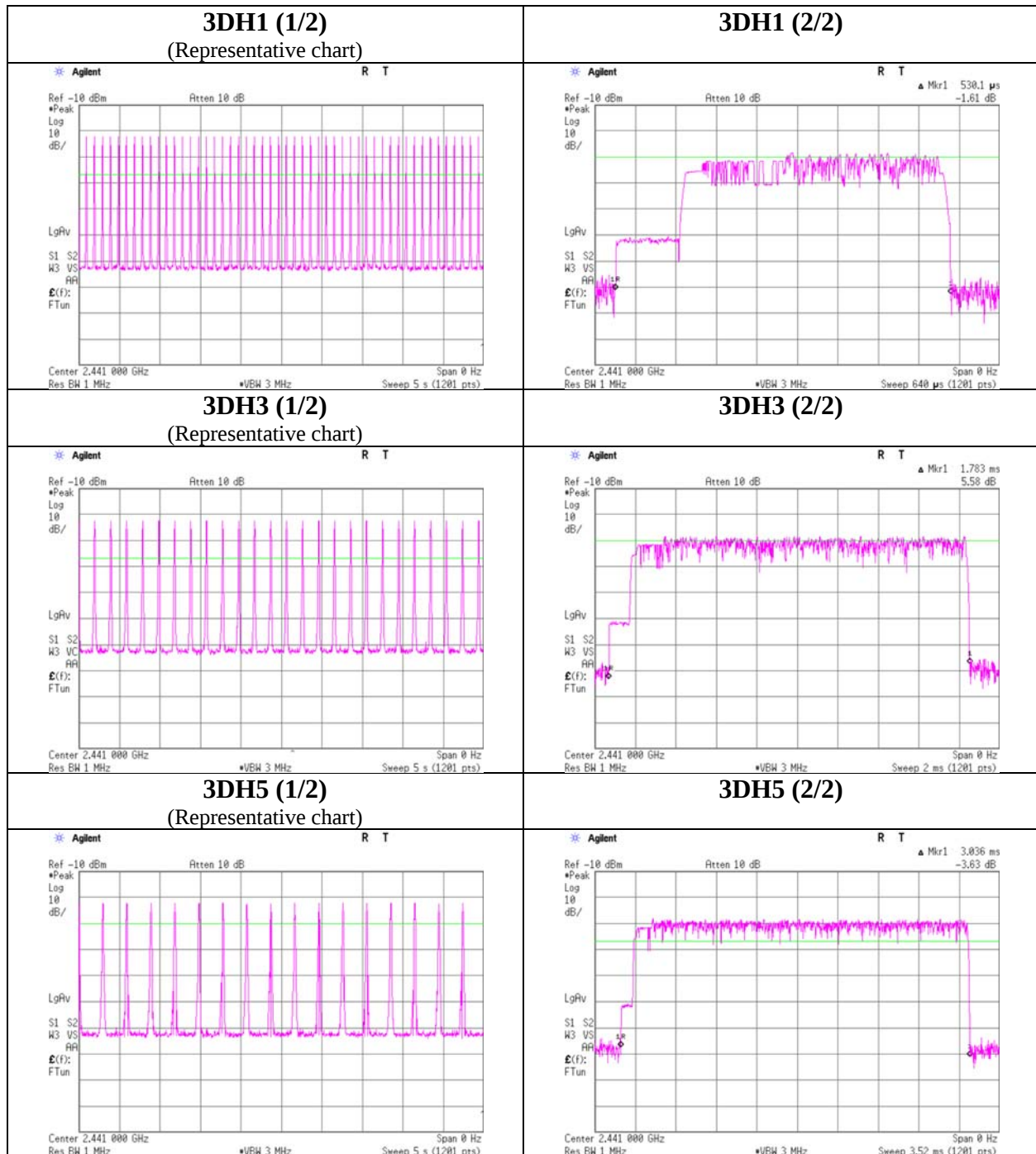
Result = Number of transmission x Length of transmittion time



Dwell time



Dwell time



Maximum Peak Output Power

Test place Head Office EMC Lab. No.7 Measurement Room
Report No. 32DE0204-HO
Date 11/29/2011
Temperature/ Humidity 23 deg. C / 43% RH
Engineer Keisuke Kawamura
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	-3.65	1.68	0.00	-1.97	0.64	20.97	125	22.94
DH5	2441.0	-4.43	1.68	0.00	-2.75	0.53	20.97	125	23.72
DH5	2480.0	-5.05	1.78	0.00	-3.27	0.47	20.97	125	24.24
3DH5	2402.0	-1.55	1.68	0.00	0.13	1.03	20.97	125	20.84
3DH5	2441.0	-2.07	1.68	0.00	-0.39	0.91	20.97	125	21.36
3DH5	2480.0	-2.28	1.78	0.00	-0.50	0.89	20.97	125	21.47
Inquiry	2441.0	-3.52	1.68	0.00	-1.84	0.65	20.97	125	22.81

Sample Calculation:

Result = Reading + Cable Loss (customer supplied)

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.

However, the limit level 125mW of AFH mode was used for the test.

Radiated Spurious Emission

Test place	Head Office EMC Lab. No.2 Semi Anechoic Chamber	
Report No.	32DE0204-HO-01	
Date	12/05/2011	12/06/2011
Temperature/ Humidity	20 deg. C / 37% RH	22 deg. C / 30% RH
Engineer	Keisuke Kawamura	Keisuke Kawamura
	Above 1GHz	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	96.008	QP	35.5	8.8	7.4	28.4	23.3	43.5	20.2	
Hori	362.380	QP	36.1	16.3	9.1	28.0	33.5	46.0	12.5	
Hori	471.098	QP	40.3	18.0	9.6	28.6	39.3	46.0	6.7	
Hori	543.578	QP	40.6	19.0	9.9	28.8	40.7	46.0	5.3	
Hori	779.050	QP	30.5	21.9	10.9	28.1	35.2	46.0	10.8	
Hori	1000.000	QP	32.0	23.4	11.6	27.5	39.5	53.9	14.4	
Hori	2390.000	PK	43.0	27.4	2.2	32.6	40.0	73.9	33.9	
Hori	2400.000	PK	55.6	27.4	2.2	32.6	52.6	73.9	21.3	
Hori	4804.000	PK	50.4	31.3	3.9	31.9	53.7	73.9	20.2	
Hori	7206.000	PK	43.5	35.5	4.5	32.4	51.1	73.9	22.8	NS
Hori	9608.000	PK	43.1	38.4	5.3	32.9	53.9	73.9	20.0	NS
Hori	24020.000	PK	45.3	40.5	-1.7	31.6	52.5	73.9	21.4	NS
Hori	2390.000	AV	31.0	27.4	2.2	32.6	28.0	53.9	25.9	
Hori	2400.000	AV	47.2	27.4	2.2	32.6	44.2	53.9	9.7	
Hori	4804.000	AV	46.4	31.3	3.9	31.9	49.7	-	-	See Dwell time fucter sheet
Hori	7206.000	AV	30.7	35.5	4.5	32.4	38.3	53.9	15.6	NS
Hori	9608.000	AV	31.5	38.4	5.3	32.9	42.3	53.9	11.6	NS
Hori	24020.000	AV	33.6	40.5	-1.7	31.6	40.8	53.9	13.2	NS
Vert	108.010	QP	37.8	10.9	7.5	28.4	27.8	43.5	15.7	
Vert	434.862	QP	35.6	17.7	9.5	28.5	34.3	46.0	11.7	
Vert	471.098	QP	38.4	18.0	9.6	28.6	37.4	46.0	8.6	
Vert	543.578	QP	37.3	19.0	9.9	28.8	37.4	46.0	8.6	
Vert	616.058	QP	34.6	19.9	10.2	28.7	36.0	46.0	10.0	
Vert	905.956	QP	29.5	22.2	11.3	27.9	35.1	46.0	10.9	
Vert	2390.000	PK	53.8	27.4	2.2	32.6	50.8	73.9	23.1	
Vert	2400.000	PK	58.4	27.4	2.2	32.6	55.4	73.9	18.5	
Vert	4804.000	PK	50.7	31.3	3.9	31.9	54.0	73.9	19.9	
Vert	7206.000	PK	42.6	35.5	4.5	32.4	50.2	73.9	23.7	NS
Vert	9608.000	PK	43.1	38.4	5.3	32.9	53.9	73.9	20.0	NS
Vert	24020.000	PK	45.2	40.5	-1.7	31.6	52.4	73.9	21.5	NS
Vert	2390.000	AV	31.5	27.4	2.2	32.6	28.5	53.9	25.4	
Vert	2400.000	AV	50.3	27.4	2.2	32.6	47.3	53.9	6.6	
Vert	4804.000	AV	46.8	31.3	3.9	31.9	50.1	-	-	See Dwell time fucter sheet
Vert	7206.000	AV	30.9	35.5	4.5	32.4	38.5	53.9	15.4	NS
Vert	9608.000	AV	32.2	38.4	5.3	32.9	43.0	53.9	10.9	NS
Vert	24020.000	AV	33.1	40.5	-1.7	31.6	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

*NS=No signal detected

*No Radiated Spurious Emission was detected at 1.603GHz and 3.203GHz where Conducted Sprious Emission was detected.

Radiated Spurious Emission

Test place Head Office EMC Lab. No.2 Semi Anechoic Chamber
Report No. 32DE0204-HO-01
Date 12/05/2011
Temperature/ Humidity 20 deg. C / 37% RH
Engineer Keisuke Kawamura
Above 1GHz
Mode Tx, DH5 2402MHz

Dwell time factor relaxation

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant Factor [dB/m]	Loss [dB]	Gain [dB]	Dwell Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	4804.000	AV	46.4	31.3	3.9	31.9	-23.7	26.0	53.9	27.9	
Vert	4804.000	AV	46.8	31.3	3.9	31.9	-23.7	26.4	53.9	27.5	

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

- Gain(Amplifier) + Dwell time factor (Refer to dwell time data sheet)

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

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

Radiated Spurious Emission

Test place Head Office EMC Lab. No.2 Semi Anechoic Chamber
Report No. 32DE0204-HO-01
Date 12/05/2011 12/06/2011
Temperature/ Humidity 20 deg. C / 37% RH 22 deg. C / 30% RH
Engineer Keisuke Kawamura Keisuke Kawamura
Above 1GHz 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	96.008	QP	35.5	8.8	7.4	28.4	23.3	43.5	20.2	
Hori	362.380	QP	36.1	16.3	9.1	28.0	33.5	46.0	12.5	
Hori	471.098	QP	40.7	18.0	9.6	28.6	39.7	46.0	6.3	
Hori	543.578	QP	40.6	19.0	9.9	28.8	40.7	46.0	5.3	
Hori	779.050	QP	30.5	21.9	10.9	28.1	35.2	46.0	10.8	
Hori	1000.000	QP	32.0	23.4	11.6	27.5	39.5	53.9	14.4	
Hori	4882.000	PK	50.8	31.5	3.8	31.9	54.2	73.9	19.7	
Hori	7323.000	PK	42.5	35.7	4.6	32.4	50.4	73.9	23.5	NS
Hori	9764.000	PK	43.8	38.5	5.3	32.9	54.7	73.9	19.2	NS
Hori	24410.000	PK	47.4	40.4	-1.7	31.4	54.7	73.9	19.2	NS
Hori	4882.000	AV	47.3	31.5	3.8	31.9	50.7	-	-	See Dwell time fucter sheet
Hori	7323.000	AV	30.6	35.7	4.6	32.4	38.5	53.9	15.5	NS
Hori	9764.000	AV	31.3	38.5	5.3	32.9	42.2	53.9	11.7	NS
Hori	24410.000	AV	35.2	40.4	-1.7	31.4	42.5	53.9	11.4	NS
Vert	108.010	QP	37.8	10.9	7.5	28.4	27.8	43.5	15.7	
Vert	434.862	QP	35.6	17.7	9.5	28.5	34.3	46.0	11.7	
Vert	471.098	QP	38.4	18.0	9.6	28.6	37.4	46.0	8.6	
Vert	543.578	QP	37.3	19.0	9.9	28.8	37.4	46.0	8.6	
Vert	616.058	QP	34.6	19.9	10.2	28.7	36.0	46.0	10.0	
Vert	905.956	QP	29.5	22.2	11.3	27.9	35.1	46.0	10.9	
Vert	4882.000	PK	50.3	31.5	3.8	31.9	53.7	73.9	20.2	
Vert	7323.000	PK	43.3	35.7	4.6	32.4	51.2	73.9	22.7	NS
Vert	9764.000	PK	43.7	38.5	5.3	32.9	54.6	73.9	19.3	NS
Vert	24410.000	PK	47.1	40.4	-1.7	31.4	54.4	73.9	19.5	NS
Vert	4882.000	AV	46.8	31.5	3.8	31.9	50.2	-	-	See Dwell time fucter sheet
Vert	7323.000	AV	30.5	35.7	4.6	32.4	38.4	53.9	15.5	NS
Vert	9764.000	AV	31.2	38.5	5.3	32.9	42.1	53.9	11.8	NS
Vert	24410.000	AV	35.1	40.4	-1.7	31.4	42.4	53.9	11.5	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

*NS=No signal detected

*No Radiated Spurious Emission was detected at 1.627GHz and 3.257GHz where Conducted Spurious Emission was detected.

Radiated Spurious Emission

Test place Head Office EMC Lab. No.2 Semi Anechoic Chamber
Report No. 32DE0204-HO-01
Date 12/05/2011
Temperature/ Humidity 20 deg. C / 37% RH
Engineer Keisuke Kawamura
Above 1GHz
Mode Tx, DH5 2441MHz

Dwell time factor relaxation

Polarity	Frequency	Detector	Reading	Ant Factor	Loss	Gain	Dwell Factor	Result	Limit	Margin	Remark
	[MHz]		[dBuV]	[dB/m]	[dB]	[dB]	[dB]	dBuV/m	dBuV/m	[dB]	
Hori	4882.000	AV	47.3	31.5	3.8	31.9	-23.7	27.0	53.9	26.9	
Vert	4882.000	AV	46.8	31.5	3.8	31.9	-23.7	26.5	53.9	27.4	

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

- Gain(Amplifier) + Dwell time factor (Refer to dwell time data sheet)

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

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

Radiated Spurious Emission

Test place	Head Office EMC Lab. No.2 Semi Anechoic Chamber	
Report No.	32DE0204-HO-01	
Date	12/05/2011	12/06/2011
Temperature/ Humidity	20 deg. C / 37% RH	22 deg. C / 30% RH
Engineer	Keisuke Kawamura	Keisuke Kawamura
	Above 1GHz	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	96.008	QP	35.5	8.8	7.4	28.4	23.3	43.5	20.2	
Hori	362.380	QP	36.1	16.3	9.1	28.0	33.5	46.0	12.5	
Hori	471.098	QP	40.7	18.0	9.6	28.6	39.7	46.0	5.3	
Hori	543.578	QP	40.6	19.0	9.9	28.8	40.7	46.0	-	
Hori	779.050	QP	30.5	21.9	10.9	28.1	35.2	46.0	10.8	
Hori	1000.000	QP	32.0	23.4	11.6	27.5	39.5	53.9	14.4	
Hori	2483.500	PK	52.5	27.6	2.3	32.6	49.8	73.9	24.1	
Hori	4960.000	PK	50.8	31.7	3.9	31.9	54.5	73.9	19.4	
Hori	7440.000	PK	42.4	35.8	4.6	32.4	50.4	73.9	23.5	NS
Hori	9920.000	PK	42.8	38.7	5.4	32.9	54.0	73.9	19.9	NS
Hori	24800.000	PK	47.4	40.3	-1.6	31.2	54.9	73.9	19.0	NS
Hori	2483.500	AV	41.3	27.6	2.3	32.6	38.6	53.9	15.3	
Hori	4960.000	AV	47.0	31.7	3.9	31.9	50.7	-	-	See Dwell time fucter sheet
Hori	7440.000	AV	30.5	35.8	4.6	32.4	38.5	53.9	15.4	NS
Hori	9920.000	AV	31.1	38.7	5.4	32.9	42.3	53.9	11.6	NS
Hori	24800.000	AV	35.2	40.3	-1.6	31.2	42.7	53.9	11.2	NS
Vert	108.010	QP	37.8	10.9	7.5	28.4	27.8	43.5	15.7	
Vert	434.862	QP	35.6	17.7	9.5	28.5	34.3	46.0	11.7	
Vert	471.098	QP	38.4	18.0	9.6	28.6	37.4	46.0	8.6	
Vert	543.578	QP	37.3	19.0	9.9	28.8	37.4	46.0	8.6	
Vert	616.058	QP	34.6	19.9	10.2	28.7	36.0	46.0	10.0	
Vert	905.956	QP	29.5	22.2	11.3	27.9	35.1	46.0	10.9	
Vert	2483.500	PK	52.5	27.6	2.3	32.6	49.8	73.9	24.1	
Vert	4960.000	PK	50.6	31.7	3.9	31.9	54.3	73.9	19.6	
Vert	7440.000	PK	42.1	35.8	4.6	32.4	50.1	73.9	23.8	NS
Vert	9920.000	PK	43.8	38.7	5.4	32.9	55.0	73.9	18.9	NS
Vert	24800.000	PK	47.0	40.3	-1.6	31.2	54.5	73.9	19.4	NS
Vert	2483.500	AV	40.9	27.6	2.3	32.6	38.2	53.9	15.7	
Vert	4960.000	AV	46.9	31.7	3.9	31.9	50.6	-	-	See Dwell time fucter sheet
Vert	7440.000	AV	30.5	35.8	4.6	32.4	38.5	53.9	15.4	NS
Vert	9920.000	AV	31.1	38.7	5.4	32.9	42.3	53.9	11.6	NS
Vert	24800.000	AV	35.1	40.3	-1.6	31.2	42.6	53.9	11.3	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

*NS=No signal detected

*No Radiated Spurious Emission was detected at 1.653GHz where Conducted Spurious Emission was detected.

Radiated Spurious Emission

Test place Head Office EMC Lab. No.2 Semi Anechoic Chamber
Report No. 32DE0204-HO-01
Date 12/05/2011
Temperature/ Humidity 20 deg. C / 37% RH
Engineer Keisuke Kawamura
Above 1GHz
Mode Tx, DH5 2480MHz

Dwell time factor relaxation

Polarity	Frequency	Detector	Reading	Ant Factor	Loss	Gain	Dwell Factor	Result	Limit	Margin	Remark
	[MHz]		[dBuV]	[dB/m]	[dB]	[dB]	[dB]	[dBuV/m]	[dBuV/m]	[dB]	
Hori	4960.000	AV	47.0	31.7	3.9	31.9	-23.7	27.0	53.9	26.9	
Vert	4960.000	AV	46.9	31.7	3.9	31.9	-23.7	26.9	53.9	27.0	

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

- Gain(Amplifier) + Dwell time factor (Refer to dwell time data sheet)

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

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

Radiated Spurious Emission

Test place Head Office EMC Lab. No.2 Semi Anechoic Chamber
Report No. 32DE0204-HO-01
Date 12/05/2011 12/06/2011
Temperature/ Humidity 20 deg. C / 37% RH 22 deg. C / 30% RH
Engineer Keisuke Kawamura Keisuke Kawamura
Above 1GHz 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	96.150	QP	34.9	8.8	7.4	28.4	22.7	43.5	20.8	
Hori	362.378	QP	36.0	16.3	9.1	28.0	33.4	46.0	12.6	
Hori	471.100	QP	40.7	18.0	9.6	28.6	39.7	46.0	6.3	
Hori	543.576	QP	40.7	19.0	9.9	28.8	40.8	46.0	5.2	
Hori	779.042	QP	31.7	21.9	10.9	28.1	36.4	46.0	9.6	
Hori	1000.000	QP	30.3	23.4	11.6	27.5	37.8	53.9	16.1	
Hori	2390.000	PK	44.1	27.4	2.2	32.6	41.1	73.9	32.8	
Hori	2400.000	PK	63.5	27.4	2.2	32.6	60.5	73.9	13.4	
Hori	4804.000	PK	50.9	31.3	3.9	31.9	54.2	73.9	19.7	
Hori	7206.000	PK	42.7	35.5	4.5	32.4	50.3	73.9	23.6	NS
Hori	9608.000	PK	44.6	38.4	5.3	32.9	55.4	73.9	18.5	NS
Hori	24020.000	PK	45.3	40.5	-1.7	31.6	52.5	73.9	21.4	NS
Hori	2390.000	AV	31.0	27.4	2.2	32.6	28.0	53.9	25.9	
Hori	2400.000	AV	50.5	27.4	2.2	32.6	47.5	-	-	See Dwell time fucter sheet
Hori	4804.000	AV	43.0	31.3	3.9	31.9	46.3	-	-	See Dwell time fucter sheet
Hori	7206.000	AV	30.9	35.5	4.5	32.4	38.5	53.9	15.5	NS
Hori	9608.000	AV	31.4	38.4	5.3	32.9	42.2	53.9	11.7	NS
Hori	24020.000	AV	33.6	40.5	-1.7	31.6	40.8	53.9	13.2	NS
Vert	108.012	QP	37.7	10.9	7.5	28.4	27.7	43.5	15.8	
Vert	434.862	QP	35.7	17.7	9.5	28.5	34.4	46.0	11.6	
Vert	471.100	QP	38.8	18.0	9.6	28.6	37.8	46.0	8.2	
Vert	543.576	QP	37.2	19.0	9.9	28.8	37.3	46.0	8.7	
Vert	616.054	QP	34.4	19.9	10.2	28.7	35.8	46.0	10.2	
Vert	905.958	QP	29.4	22.2	11.3	27.9	35.0	46.0	11.0	
Vert	2390.000	PK	43.7	27.4	2.2	32.6	40.7	73.9	33.3	
Vert	2400.000	PK	66.7	27.4	2.2	32.6	63.7	73.9	10.2	
Vert	4804.000	PK	53.3	31.3	3.9	31.9	56.6	73.9	17.3	
Vert	7206.000	PK	42.2	35.5	4.5	32.4	49.8	73.9	24.1	NS
Vert	9608.000	PK	43.7	38.4	5.3	32.9	54.5	73.9	19.5	NS
Vert	24020.000	PK	45.2	40.5	-1.7	31.6	52.4	73.9	21.5	NS
Vert	2390.000	AV	31.7	27.4	2.2	32.6	28.7	53.9	25.2	
Vert	2400.000	AV	53.7	27.4	2.2	32.6	50.7	-	-	See Dwell time fucter sheet
Vert	4804.000	AV	45.8	31.3	3.9	31.9	49.1	-	-	See Dwell time fucter sheet
Vert	7206.000	AV	31.2	35.5	4.5	32.4	38.8	53.9	15.1	NS
Vert	9608.000	AV	31.4	38.4	5.3	32.9	42.2	53.9	11.7	NS
Vert	24020.000	AV	33.1	40.5	-1.7	31.6	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

*NS=No signal detected

*No Radiated Spurious Emission was detected at 1.603GHz and 3.203GHz where Conducted Spurious Emission was detected.

Radiated Spurious Emission

Test place : Head Office EMC Lab. No.2 Semi Anechoic Chamber
Report No. : 32DE0204-HO-01
Date : 12/05/2011
Temperature/ Humidity : 20 deg. C / 37% RH
Engineer : Keisuke Kawamura
Above 1GHz
Mode : Tx, 3DH5 2402MHz

Dwell time factor relaxation

Polarity	Frequency	Detector	Reading	Ant Factor	Loss	Gain	Dwell Factor	Result	Limit	Margin	Remark
	[MHz]		[dBuV]	[dB/m]	[dB]	[dB]	[dB]	[dBuV/m]	[dBuV/m]	[dB]	
Hori	2400.000	AV	50.5	27.4	2.2	32.6	-22.9	24.6	53.9	29.3	
Hori	4804.000	AV	43.0	31.3	3.9	31.9	-22.9	23.4	53.9	30.5	
Vert	2400.000	AV	53.7	27.4	2.2	32.6	-22.9	27.8	53.9	26.1	
Vert	4804.000	AV	45.8	31.3	3.9	31.9	-22.9	26.2	53.9	27.7	

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

- Gain(Amplifier) + Dwell time factor (Refer to dwell time data sheet)

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

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

Radiated Spurious Emission

Test place Head Office EMC Lab. No.2 Semi Anechoic Chamber
Report No. 32DE0204-HO-01
Date 12/05/2011 12/06/2011
Temperature/ Humidity 20 deg. C / 37% RH 22 deg. C / 30% RH
Engineer Keisuke Kawamura Keisuke Kawamura
Above 1GHz 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	96.008	QP	35.5	8.8	7.4	28.4	23.3	43.5	20.2	
Hori	362.380	QP	36.1	16.3	9.1	28.0	33.5	46.0	12.5	
Hori	471.098	QP	40.6	18.0	9.6	28.6	39.6	46.0	6.4	
Hori	543.578	QP	40.7	19.0	9.9	28.8	40.8	46.0	5.2	
Hori	779.050	QP	30.5	21.9	10.9	28.1	35.2	46.0	10.8	
Hori	1000.000	QP	32.0	23.4	11.6	27.5	39.5	53.9	14.4	
Hori	4882.000	PK	53.1	31.5	3.8	31.9	56.5	73.9	17.4	
Hori	7323.000	PK	42.5	35.7	4.6	32.4	50.4	73.9	23.5	NS
Hori	9764.000	PK	43.8	38.5	5.3	32.9	54.7	73.9	19.2	NS
Hori	24410.000	PK	47.4	40.4	-1.7	31.4	54.7	73.9	19.2	NS
Hori	4882.000	AV	46.0	31.5	3.8	31.9	49.4	-	-	See Dwell time fucter sheet
Hori	7323.000	AV	30.6	35.7	4.6	32.4	38.5	53.9	15.5	NS
Hori	9764.000	AV	31.3	38.5	5.3	32.9	42.2	53.9	11.7	NS
Hori	24410.000	AV	35.2	40.4	-1.7	31.4	42.5	53.9	11.4	NS
Vert	108.010	QP	37.8	10.9	7.5	28.4	27.8	43.5	15.7	
Vert	434.862	QP	35.6	17.7	9.5	28.5	34.3	46.0	11.7	
Vert	471.098	QP	38.4	18.0	9.6	28.6	37.4	46.0	8.6	
Vert	543.578	QP	37.3	19.0	9.9	28.8	37.4	46.0	8.6	
Vert	616.058	QP	34.6	19.9	10.2	28.7	36.0	46.0	10.0	
Vert	905.956	QP	29.5	22.2	11.3	27.9	35.1	46.0	10.9	
Vert	4882.000	PK	53.0	31.5	3.8	31.9	56.4	73.9	17.5	
Vert	7323.000	PK	43.3	35.7	4.6	32.4	51.2	73.9	22.7	NS
Vert	9764.000	PK	43.7	38.5	5.3	32.9	54.6	73.9	19.3	NS
Vert	24410.000	PK	47.1	40.4	-1.7	31.4	54.4	73.9	19.5	NS
Vert	4882.000	AV	45.2	31.5	3.8	31.9	48.6	-	-	See Dwell time fucter sheet
Vert	7323.000	AV	30.5	35.7	4.6	32.4	38.4	53.9	15.5	NS
Vert	9764.000	AV	31.2	38.5	5.3	32.9	42.1	53.9	11.8	NS
Vert	24410.000	AV	35.1	40.4	-1.7	31.4	42.4	53.9	11.5	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

*NS=No signal detected

*No Radiated Spurious Emission was detected at 1.627GHz and 3.257GHz where Conducted Spurious Emission was detected.

Radiated Spurious Emission

Test place Head Office EMC Lab. No.2 Semi Anechoic Chamber
Report No. 32DE0204-HO-01
Date 12/05/2011
Temperature/ Humidity 20 deg. C / 37% RH
Engineer Keisuke Kawamura
Above 1GHz
Mode Tx, 3DH5 2441MHz

Dwell time factor relaxation

Polarity	Frequency	Detector	Reading	Ant Factor	Loss	Gain	Dwell Factor	Result	Limit	Margin	Remark
	[MHz]		[dBuV]	[dB/m]	[dB]	[dB]	[dB]	dBuV/m	dBuV/m	[dB]	
Hori	4882.000	AV	46.0	31.5	3.8	31.9	-22.9	26.5	53.9	27.4	
Vert	4882.000	AV	45.2	31.5	3.8	31.9	-22.9	25.7	53.9	28.2	

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

- Gain(Amplifier) + Dwell time factor (Refer to dwell time data sheet)

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

Distance factor: 10GHz-26.5GHz $20\log(3.0\text{m}/1.0\text{m})= 9.5\text{dB}$

26.5GHz-40GHz $20\log(3.0\text{m}/0.5\text{m})=15.6\text{dB}$

Radiated Spurious Emission

Test place	Head Office EMC Lab. No.2 Semi Anechoic Chamber	
Report No.	32DE0204-HO-01	
Date	12/05/2011	12/06/2011
Temperature/ Humidity	20 deg. C / 37% RH	22 deg. C / 30% RH
Engineer	Keisuke Kawamura	Keisuke Kawamura
	Above 1GHz	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	96.008	QP	35.5	8.8	7.4	28.4	23.3	43.5	20.2	
Hori	362.380	QP	36.1	16.3	9.1	28.0	33.5	46.0	12.5	
Hori	471.098	QP	40.7	18.0	9.6	28.6	39.7	46.0	6.3	
Hori	543.578	QP	40.7	19.0	9.9	28.8	40.8	46.0	5.2	
Hori	779.050	QP	30.5	21.9	10.9	28.1	35.2	46.0	10.8	
Hori	1000.000	QP	32.0	23.4	11.6	27.5	39.5	53.9	14.4	
Hori	2483.500	PK	59.4	27.6	2.3	32.6	56.7	73.9	17.2	
Hori	4960.000	PK	52.7	31.7	3.9	31.9	56.4	73.9	17.5	
Hori	7440.000	PK	42.4	35.8	4.6	32.4	50.4	73.9	23.5	NS
Hori	9920.000	PK	42.8	38.7	5.4	32.9	54.0	73.9	19.9	NS
Hori	24800.000	PK	47.4	40.3	-1.6	31.2	54.9	73.9	19.0	NS
Hori	2483.500	AV	48.4	27.6	2.3	32.6	45.7	53.9	8.2	
Hori	4960.000	AV	45.7	31.7	3.9	31.9	49.4	-	-	See Dwell time fucter sheet
Hori	7440.000	AV	30.5	35.8	4.6	32.4	38.5	53.9	15.4	NS
Hori	9920.000	AV	31.1	38.7	5.4	32.9	42.3	53.9	11.6	NS
Hori	24800.000	AV	35.2	40.3	-1.6	31.2	42.7	53.9	11.2	NS
Vert	108.010	QP	37.8	10.9	7.5	28.4	27.8	43.5	15.7	
Vert	434.862	QP	35.6	17.7	9.5	28.5	34.3	46.0	11.7	
Vert	471.098	QP	38.4	18.0	9.6	28.6	37.4	46.0	8.6	
Vert	543.578	QP	37.3	19.0	9.9	28.8	37.4	46.0	8.6	
Vert	616.058	QP	34.6	19.9	10.2	28.7	36.0	46.0	10.0	
Vert	905.956	QP	29.5	22.2	11.3	27.9	35.1	46.0	10.9	
Vert	2483.500	PK	59.8	27.6	2.3	32.6	57.1	73.9	16.8	
Vert	4960.000	PK	51.8	31.7	3.9	31.9	55.5	73.9	18.4	
Vert	7440.000	PK	42.1	35.8	4.6	32.4	50.1	73.9	23.8	NS
Vert	9920.000	PK	43.8	38.7	5.4	32.9	55.0	73.9	18.9	NS
Vert	24800.000	PK	47.0	40.3	-1.6	31.2	54.5	73.9	19.4	NS
Vert	2483.500	AV	48.8	27.6	2.3	32.6	46.1	53.9	7.8	
Vert	4960.000	AV	44.6	31.7	3.9	31.9	48.3	-	-	See Dwell time fucter sheet
Vert	7440.000	AV	30.5	35.8	4.6	32.4	38.5	53.9	15.4	NS
Vert	9920.000	AV	31.1	38.7	5.4	32.9	42.3	53.9	11.6	NS
Vert	24800.000	AV	35.1	40.3	-1.6	31.2	42.6	53.9	11.3	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

*NS=No signal detected

*No Radiated Spurious Emission was detected at 1.653GHz where Conducted Spurious Emission was detected.

Radiated Spurious Emission

Test place : Head Office EMC Lab. No.2 Semi Anechoic Chamber
Report No. : 32DE0204-HO-01
Date : 12/05/2011
Temperature/ Humidity : 20 deg. C / 37% RH
Engineer : Keisuke Kawamura
Above 1GHz
Mode : Tx, 3DH5 2480MHz

Dwell time factor relaxation

Polarity	Frequency	Detector	Reading	Ant Factor	Loss	Gain	Dwell Factor	Result	Limit	Margin	Remark
	[MHz]		[dBuV]	[dB/m]	[dB]	[dB]	[dB]	[dBuV/m]	[dBuV/m]	[dB]	
Hori	4960.000	AV	45.7	31.7	3.9	31.9	-22.9	26.5	53.9	27.4	
Vert	4960.000	AV	44.6	31.7	3.9	31.9	-22.9	25.4	53.9	28.5	

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

- Gain(Amplifier) + Dwell time factor (Refer to dwell time data sheet)

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

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

Radiated Spurious Emission

Test place	Head Office EMC Lab. No.2 Semi Anechoic Chamber	
Report No.	32DE0204-OH-01	
Date	12/05/2011	12/06/2011
Temperature/ Humidity	20 deg. C / 37% RH	22 deg. C / 30% RH
Engineer	Keisuke Kawamura	Keisuke Kawamura
	Above 1GHz	Below 1GHz
Mode	Rx, 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	96.003	QP	33.9	8.8	7.4	28.4	21.7	43.5	21.8	
Hori	362.386	QP	36.5	16.3	9.1	28.0	33.9	46.0	12.1	
Hori	471.101	QP	41.4	18.0	9.6	28.6	40.4	46.0	5.6	
Hori	543.577	QP	36.9	19.0	9.9	28.8	37.0	46.0	9.0	
Hori	779.045	QP	33.0	21.9	10.9	28.1	37.7	46.0	8.3	
Hori	1000.000	QP	32.1	23.4	11.6	27.5	39.6	53.9	14.3	
Hori	2441.000	PK	42.1	27.5	2.3	32.6	39.3	73.9	34.6	NS
Hori	3145.617	PK	52.0	28.6	2.6	32.2	51.0	73.9	22.9	
Hori	2441.000	AV	30.0	27.5	2.3	32.6	27.2	53.9	26.7	NS
Hori	3145.617	AV	48.8	28.6	2.6	32.2	47.8	53.9	6.1	
Vert	108.005	QP	38.1	10.9	7.5	28.4	28.1	43.5	15.4	
Vert	434.862	QP	36.0	17.7	9.5	28.5	34.7	46.0	11.3	
Vert	471.101	QP	39.3	18.0	9.6	28.6	38.3	46.0	7.7	
Vert	543.577	QP	37.0	19.0	9.9	28.8	37.1	46.0	8.9	
Vert	616.053	QP	36.0	19.9	10.2	28.7	37.4	46.0	8.6	
Vert	905.958	QP	31.5	22.2	11.3	27.9	37.1	46.0	8.9	
Vert	2441.000	PK	43.4	27.5	2.3	32.6	40.6	73.9	33.3	NS
Vert	3145.617	PK	48.3	28.6	2.6	32.2	47.3	73.9	26.6	
Vert	2441.000	AV	30.0	27.5	2.3	32.6	27.2	53.9	26.7	NS
Vert	3145.617	AV	43.8	28.6	2.6	32.2	42.8	53.9	11.1	

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

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

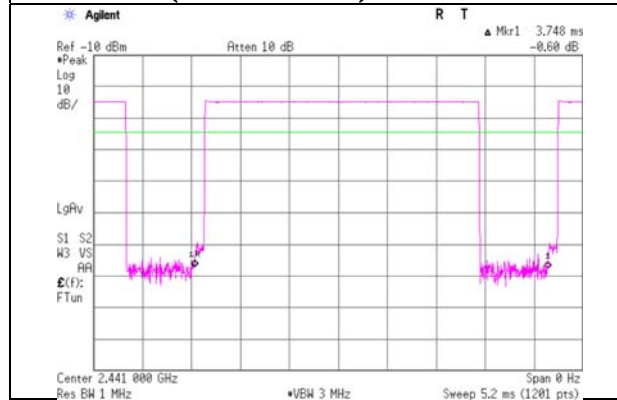
*The 10th harmonic was not seen so the result was its base noise level.

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

*NS=No signal detected

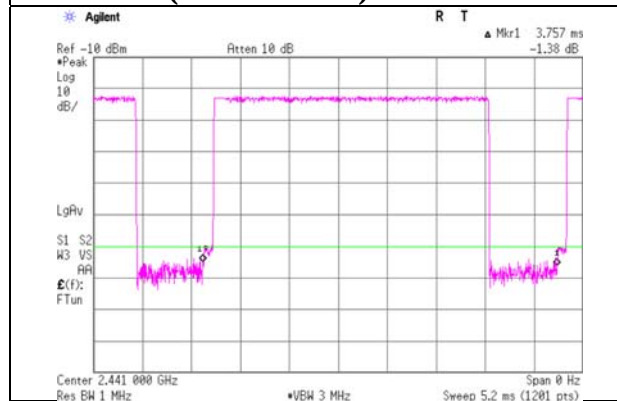
VBW (AV) Calculation
DH5

VBW: $1/x = 266\text{Hz} < 270\text{Hz}$
x: (Tx on+Tx off) = 3.748ms



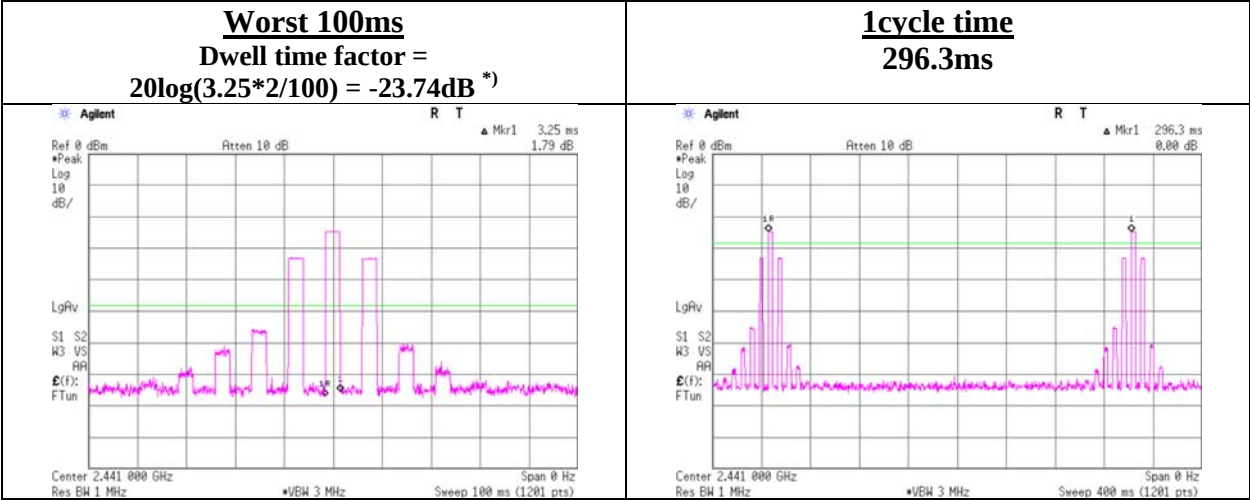
3DH5

VBW: $1/x = 266\text{Hz} < 270\text{Hz}$
x: (Tx on+Tx off) = 3.757ms

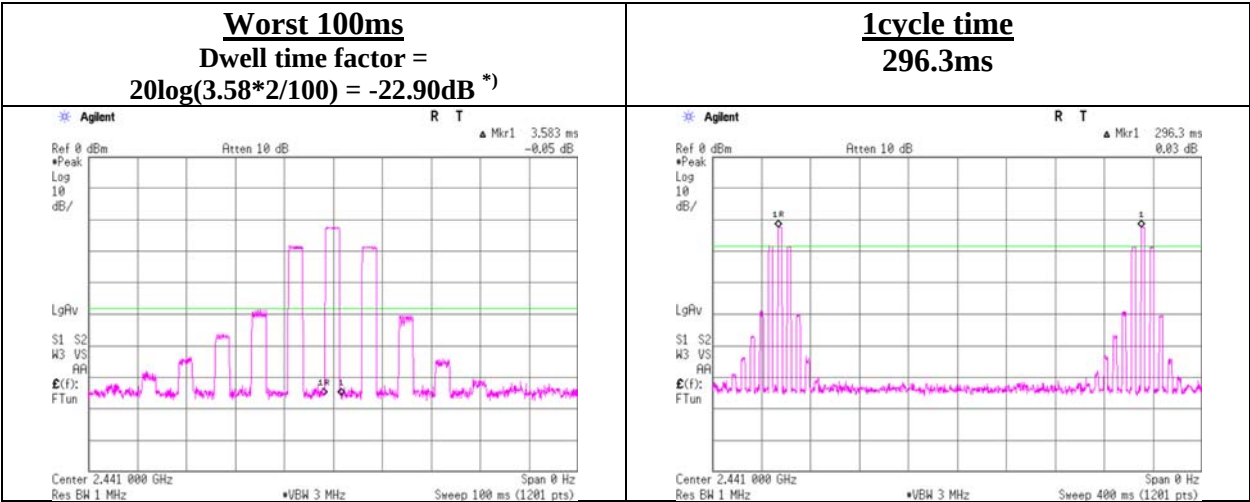


Dwell time factor

DH5



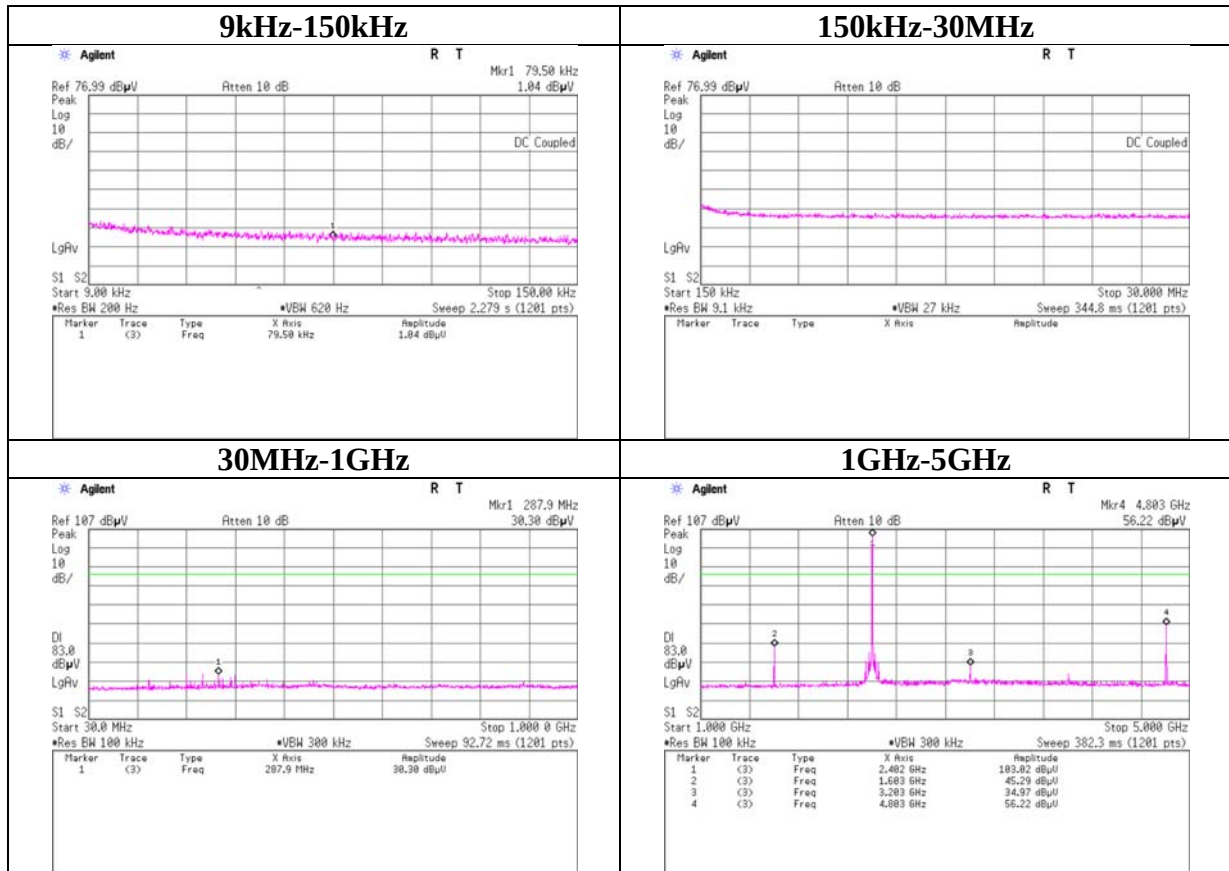
3DH5



* Dwell time factor was calculated as the worst case where two hops dwells at one channel in 100ms.
Theoretical value of dwell time is 0.625ms*5slot*2=6.25ms, which is almost identical to the measured value.

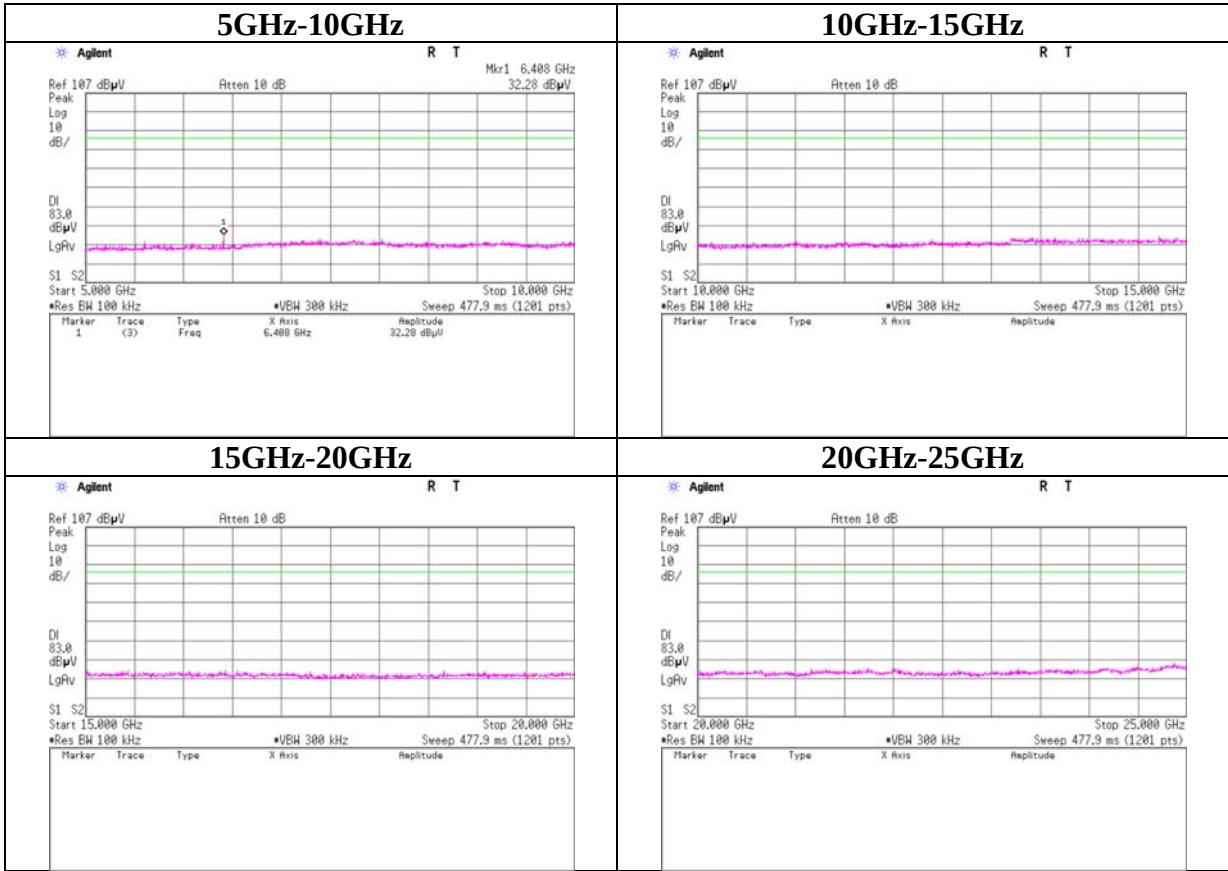
Conducted Spurious Emission

Tx DH5 2402MHz



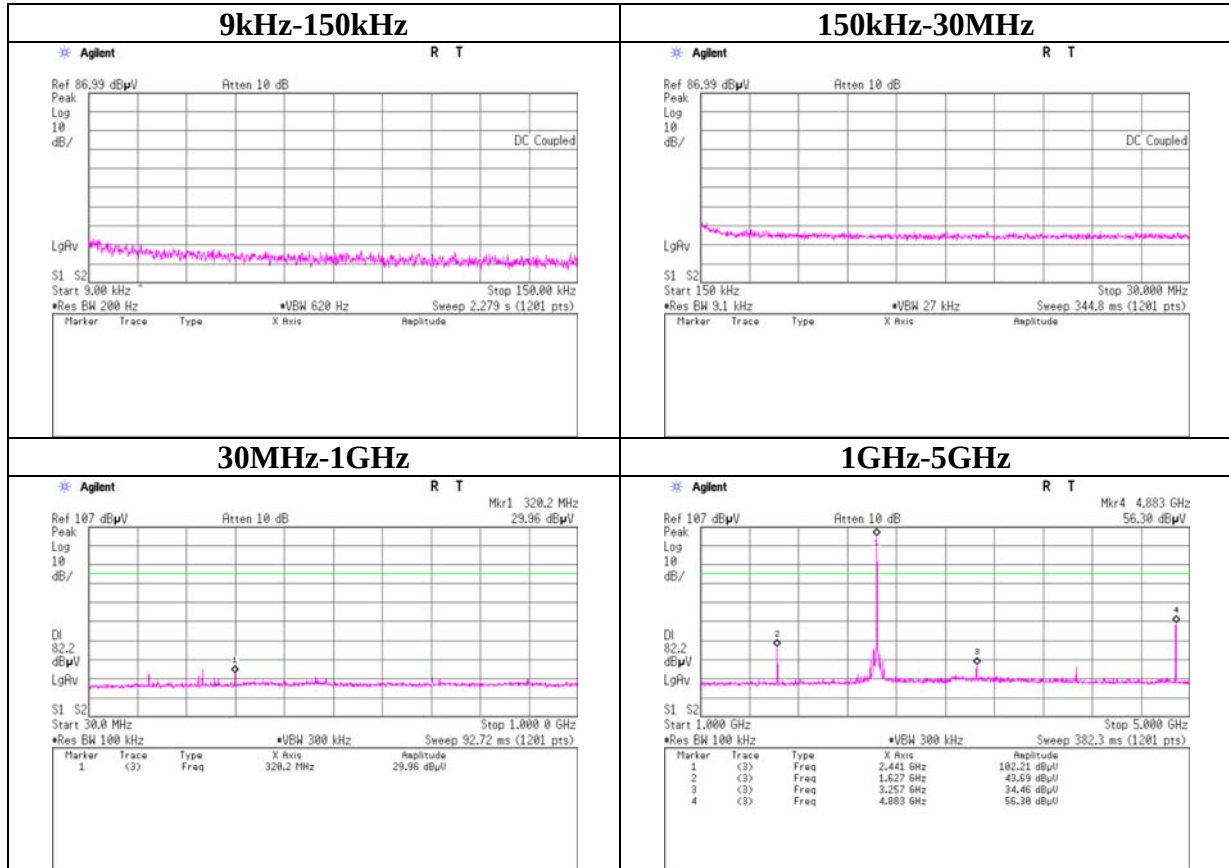
Conducted Spurious Emission

Tx DH5 2402MHz



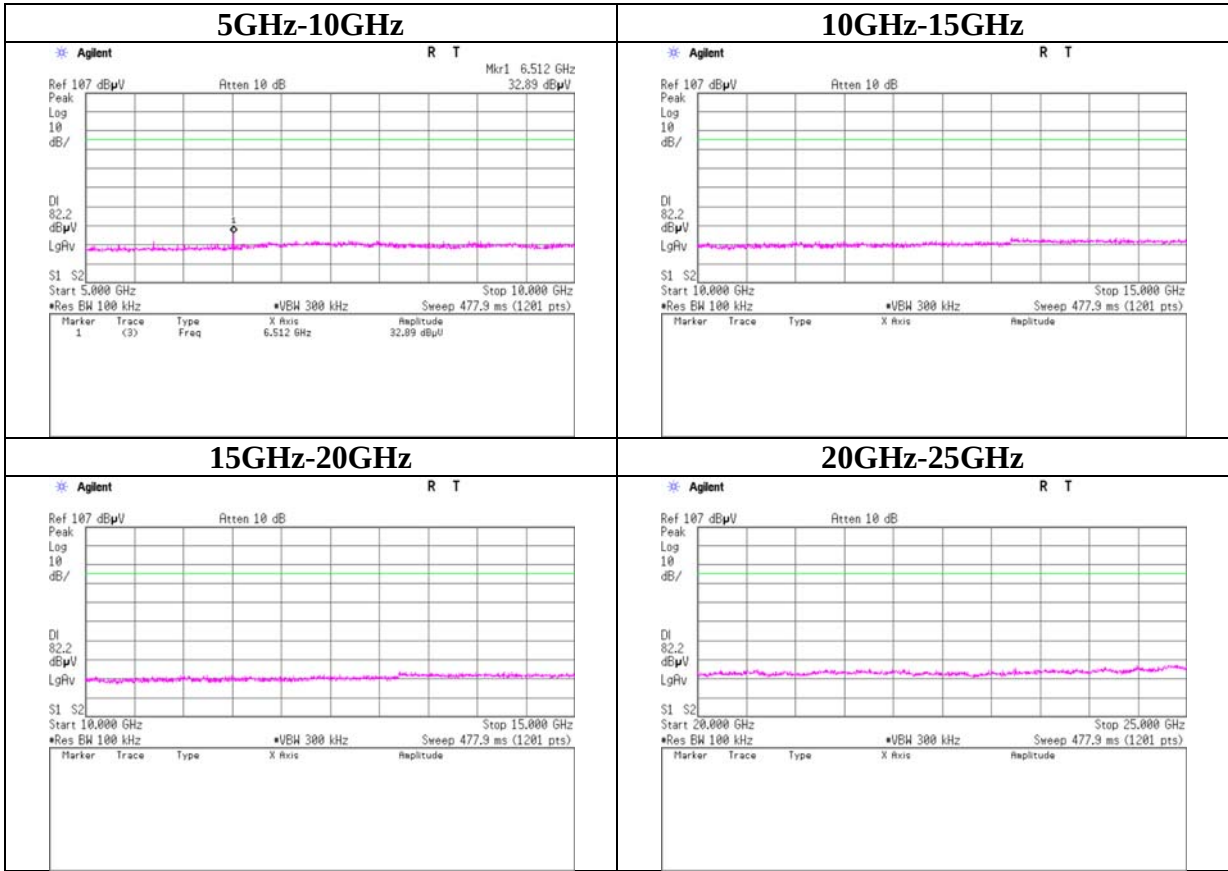
Conducted Spurious Emission

Tx DH5 2441MHz



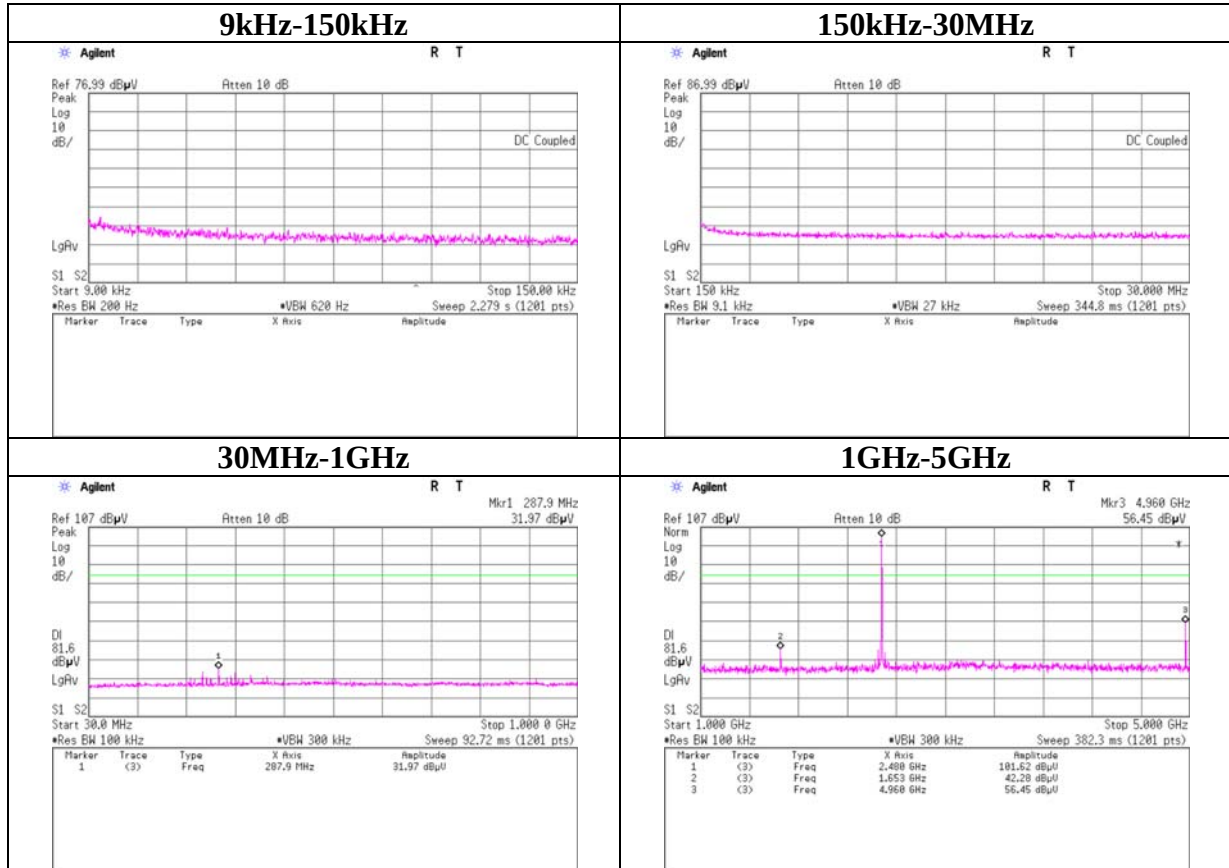
Conducted Spurious Emission

Tx DH5 2441MHz



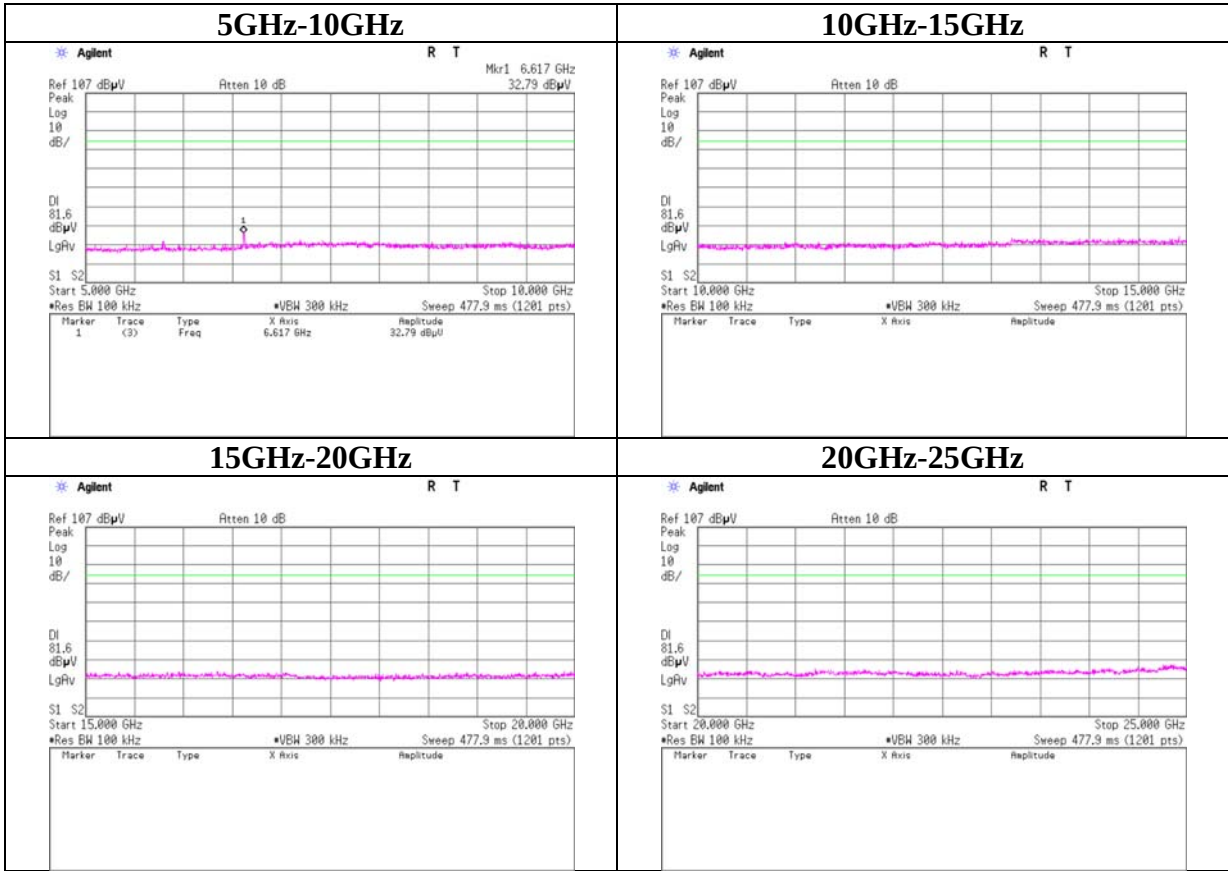
Conducted Spurious Emission

Tx DH5 2480MHz



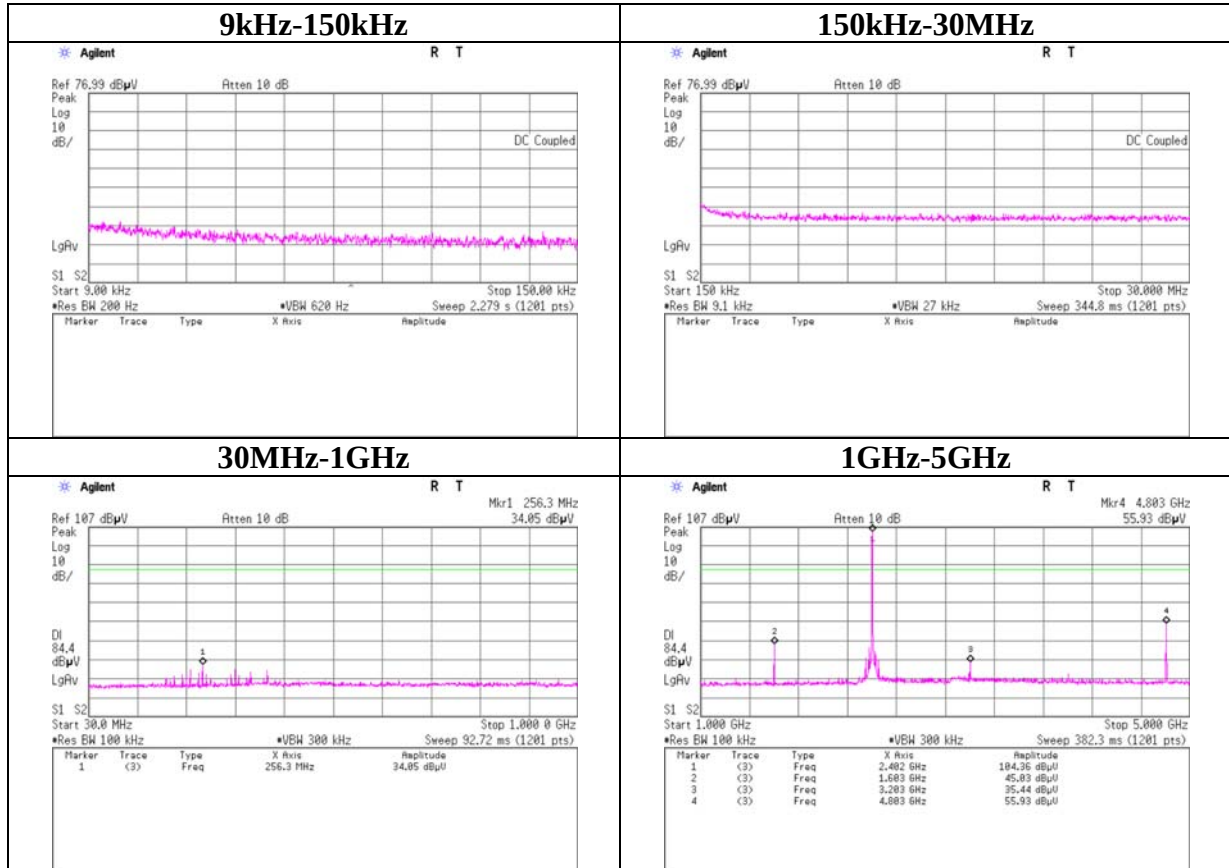
Conducted Spurious Emission

Tx DH5 2480MHz



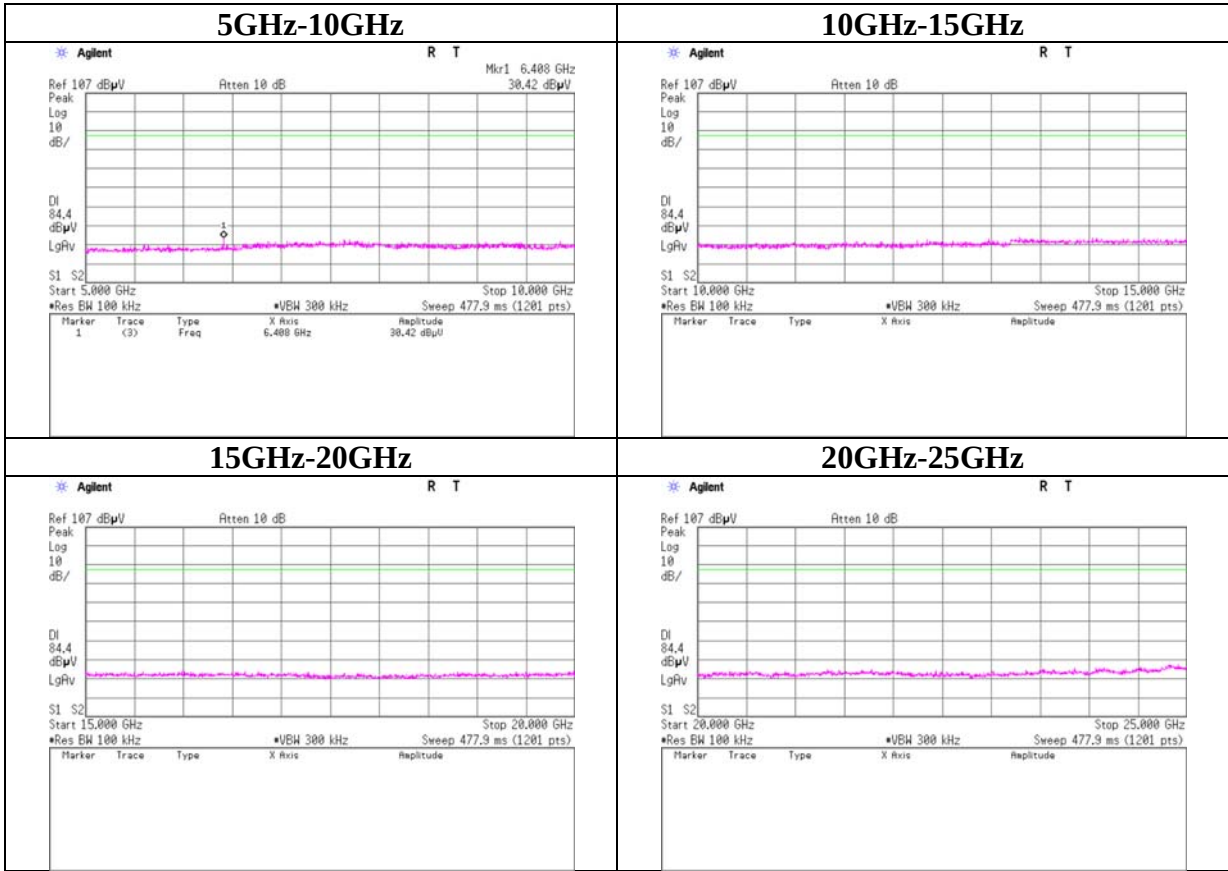
Conducted Spurious Emission

Tx 3DH5 2402MHz



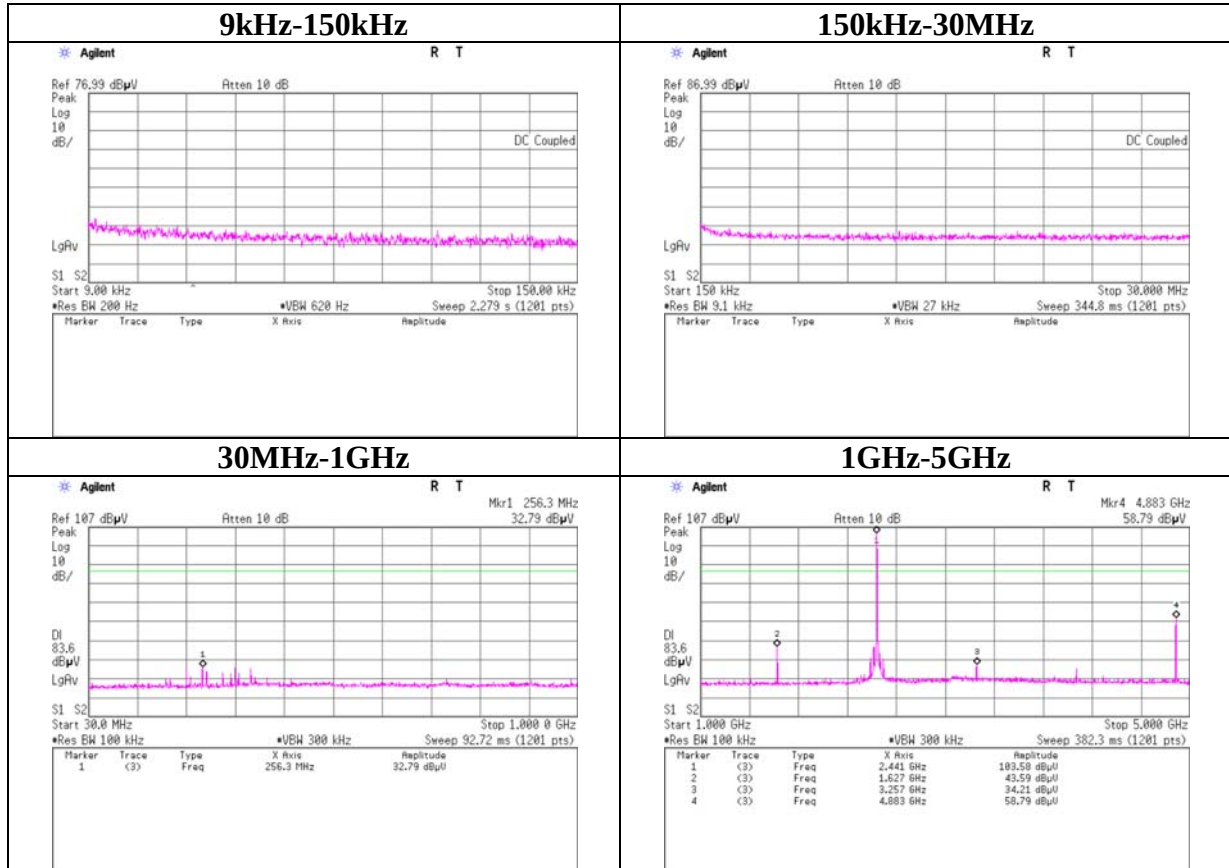
Conducted Spurious Emission

Tx 3DH5 2402MHz



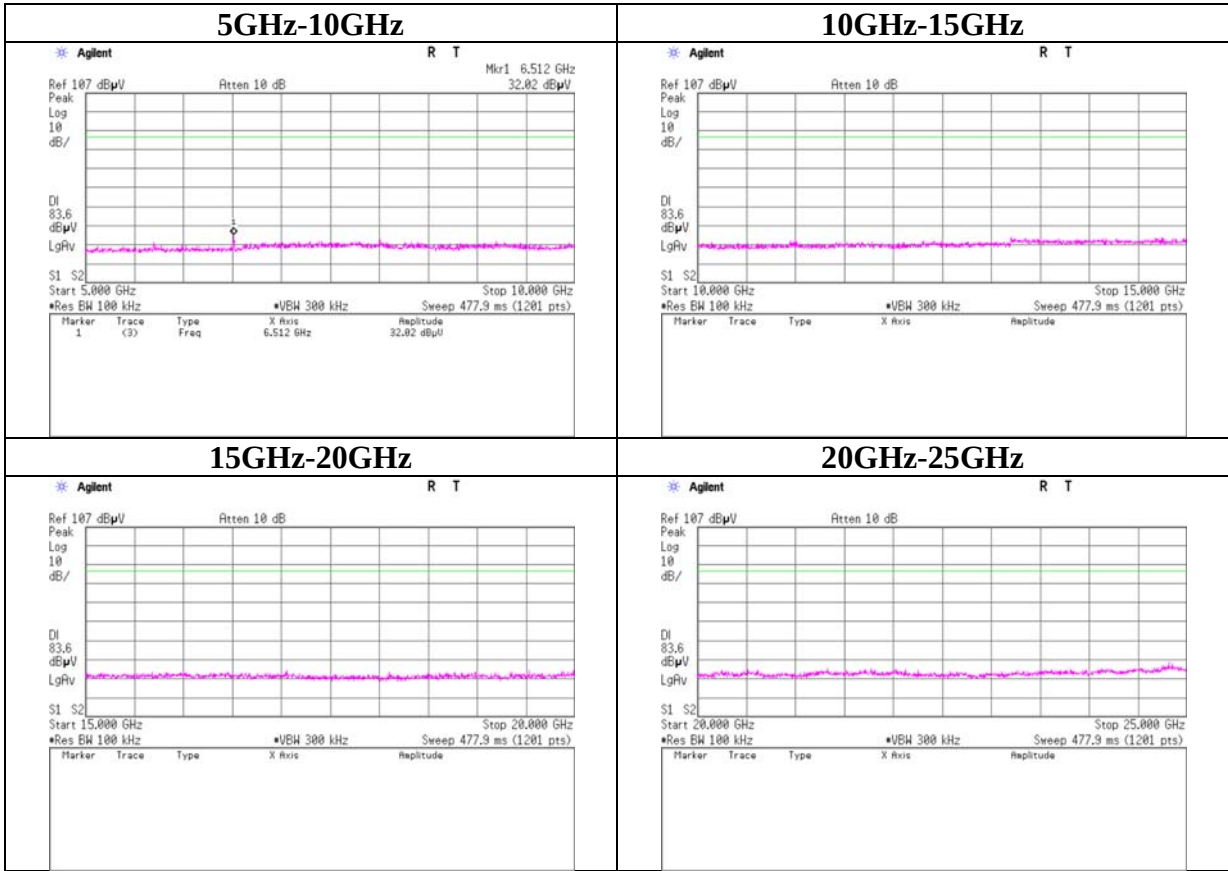
Conducted Spurious Emission

Tx 3DH5 2441MHz



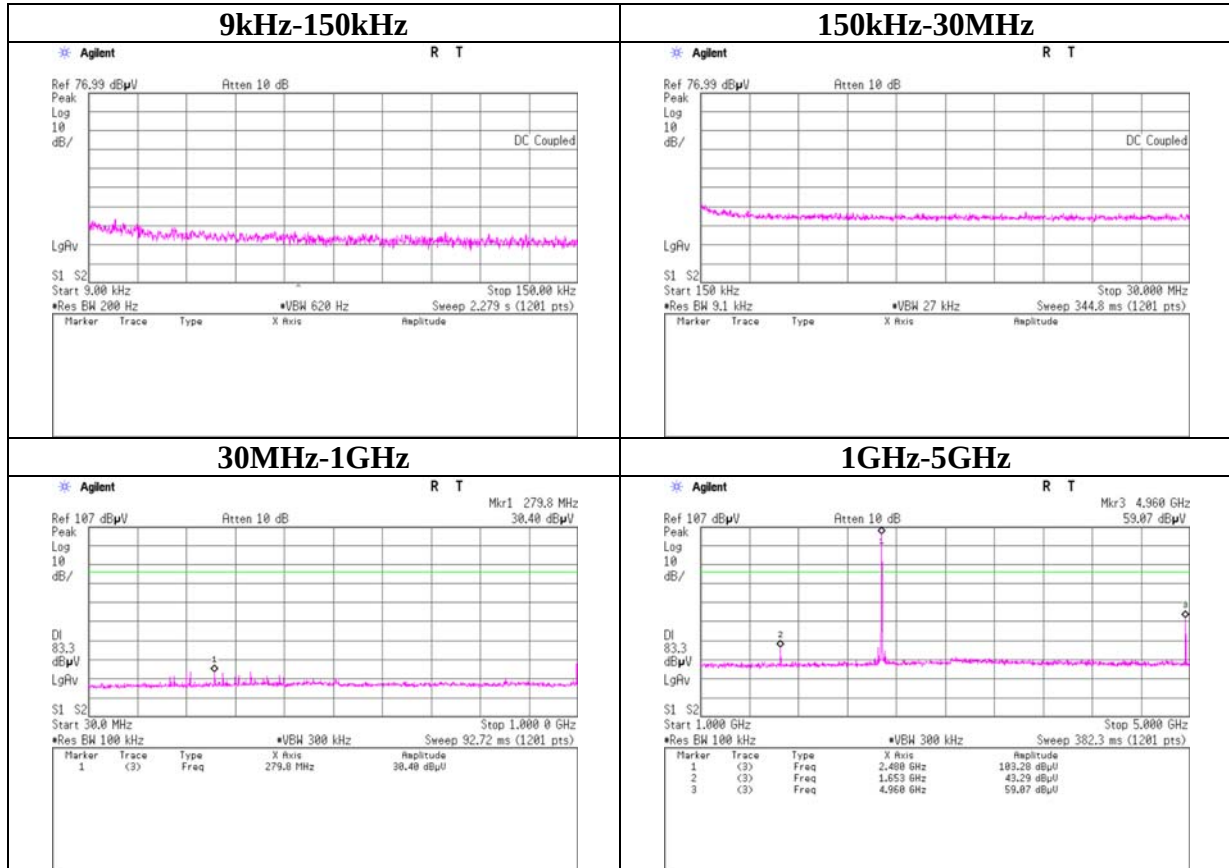
Conducted Spurious Emission

Tx 3DH5 2441MHz



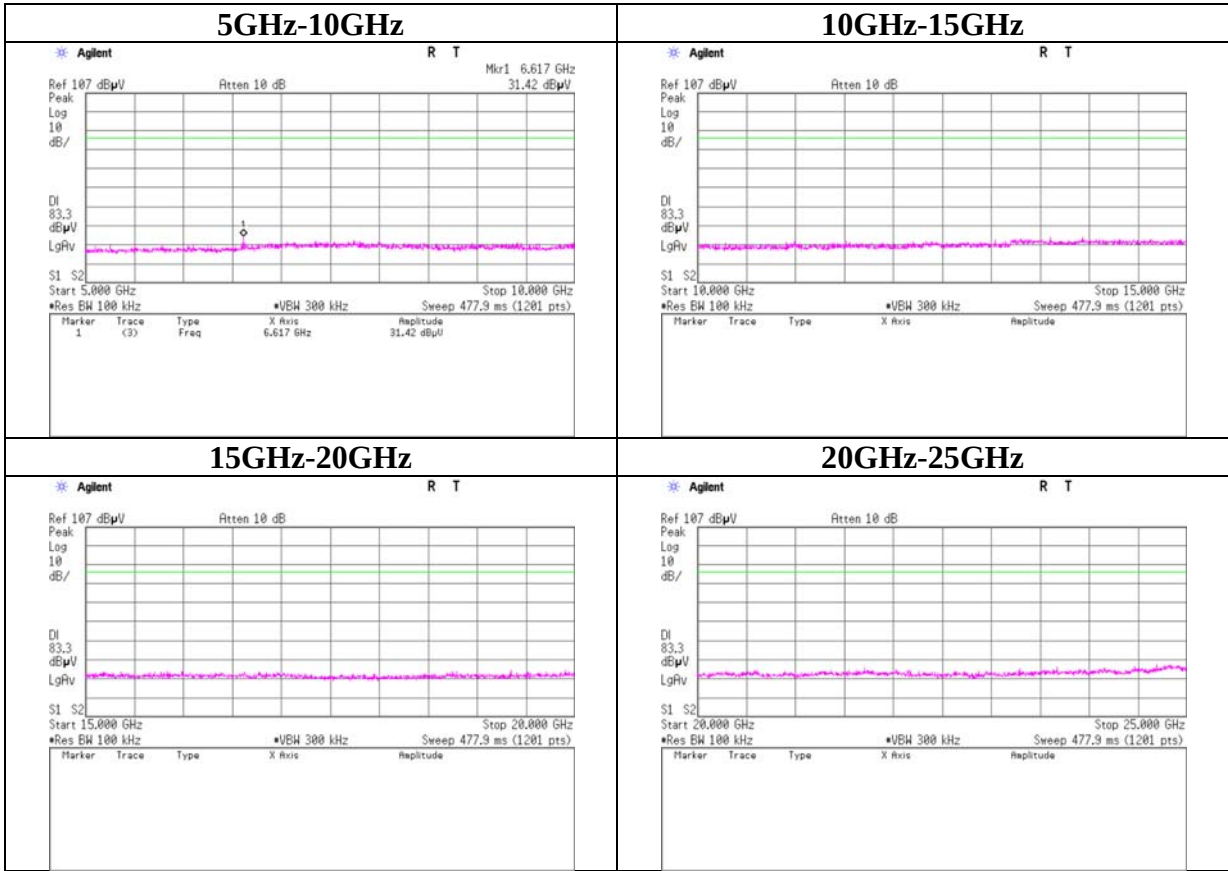
Conducted Spurious Emission

Tx 3DH5 2480MHz



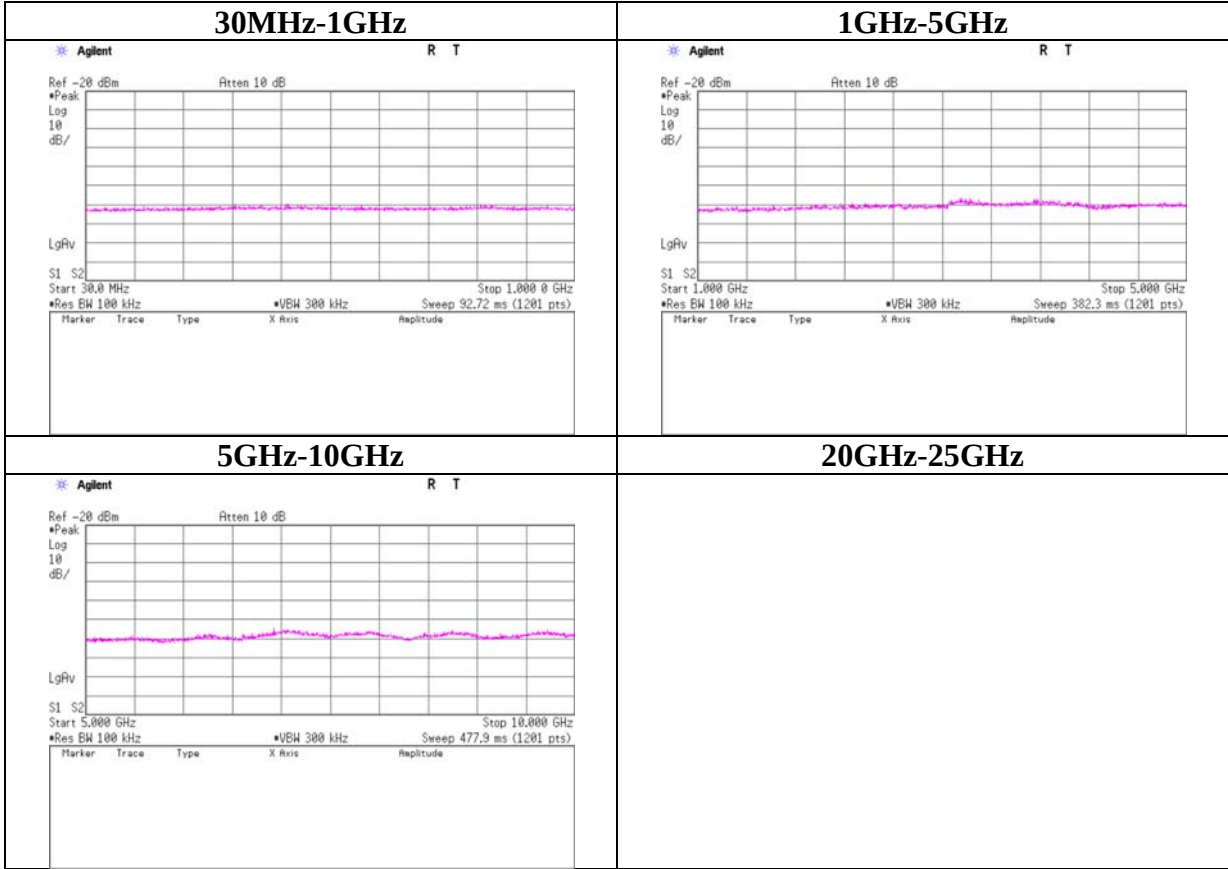
Conducted Spurious Emission

Tx 3DH5 2480MHz



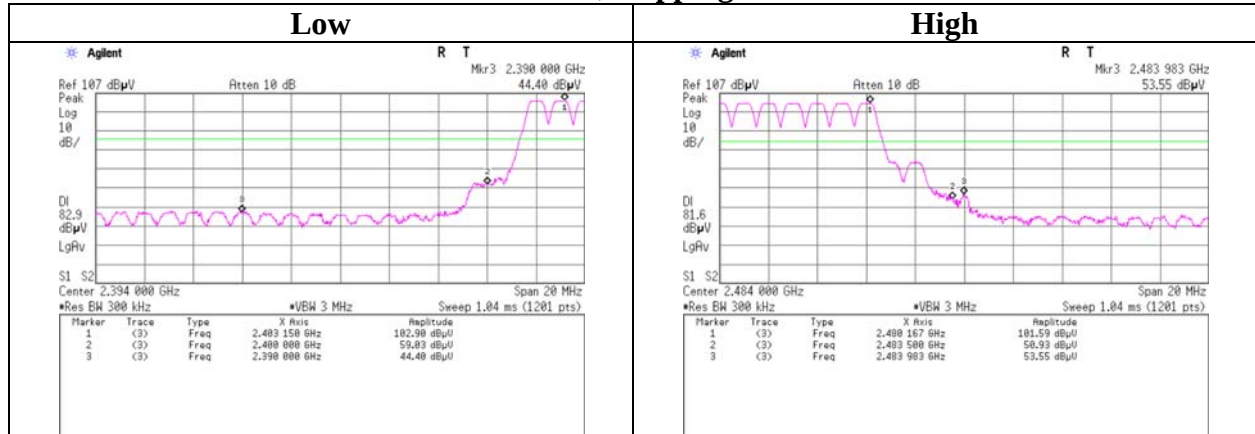
Conducted Spurious Emission

Rx 2441MHz

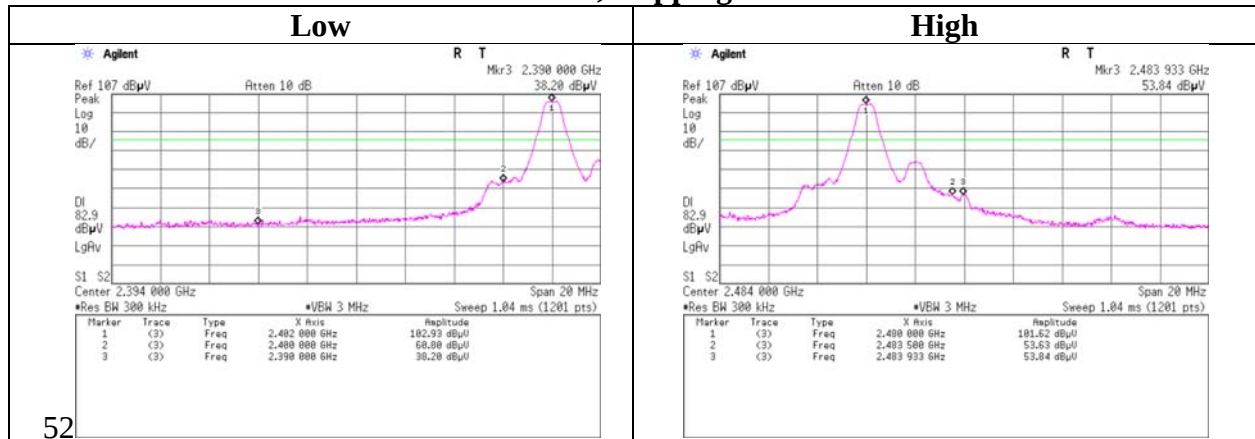


Conducted Emission Band Edge compliance

Tx DH5, Hopping on

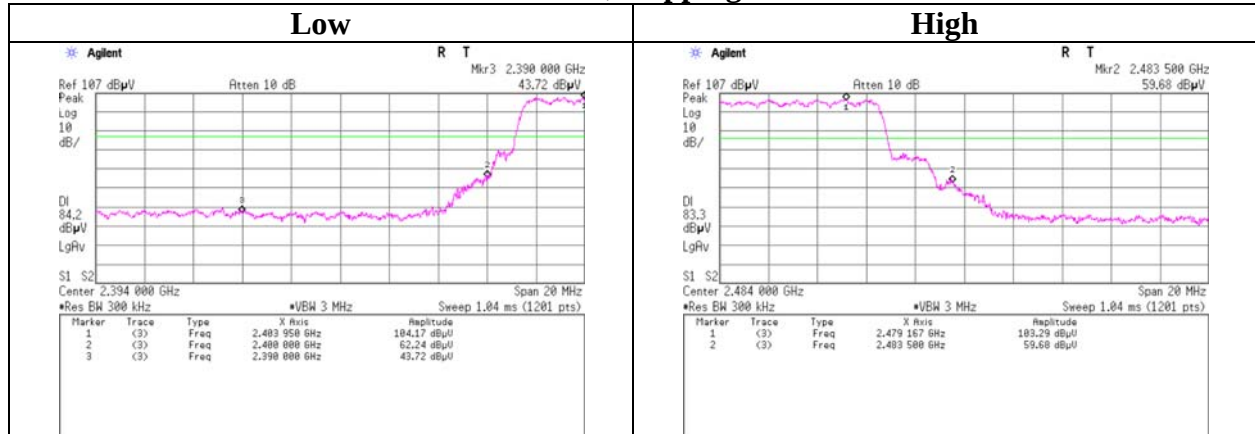


Tx DH5, Hopping off

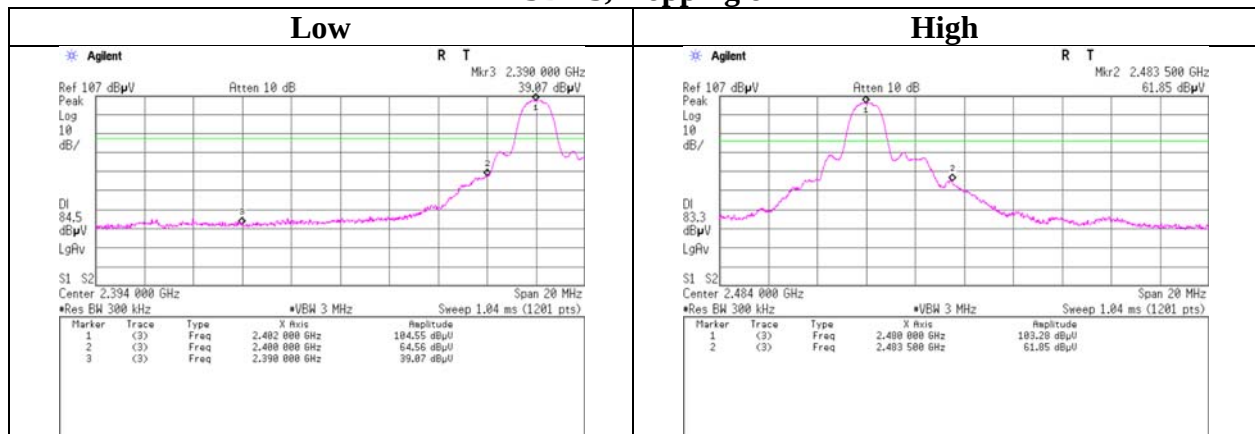


Conducted Emission Band Edge compliance

Tx 3DH5, Hopping on



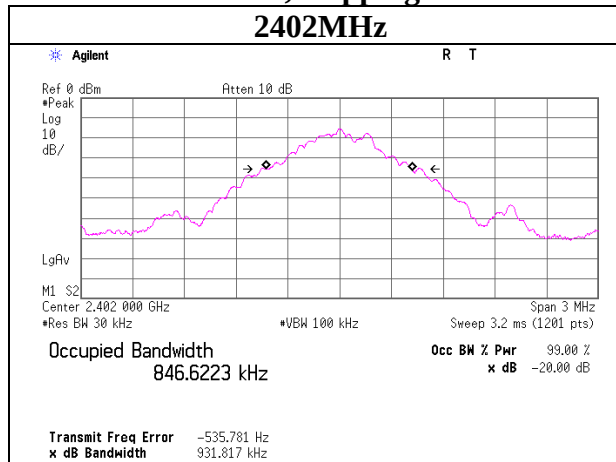
Tx 3DH5, Hopping off



99% Occupied Bandwidth

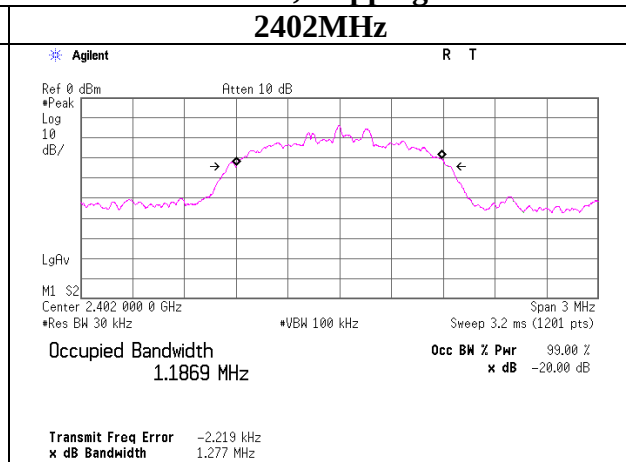
Tx DH5, Hopping off

2402MHz

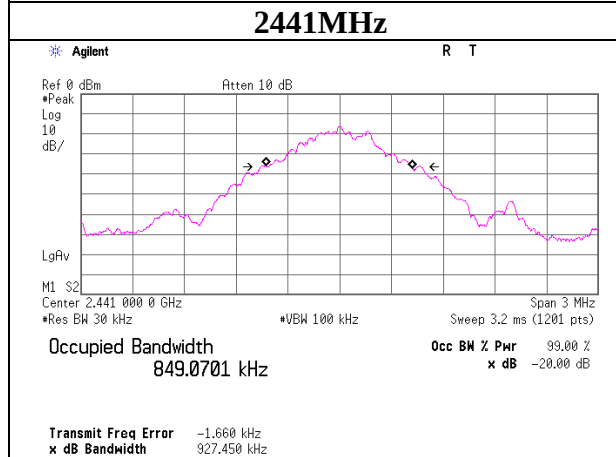


Tx 3DH5, Hopping off

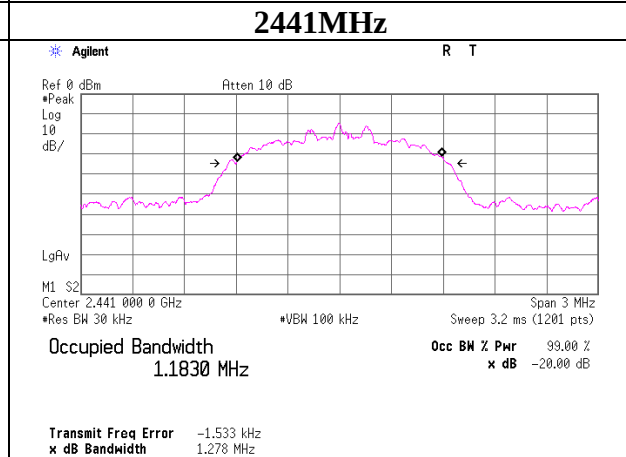
2402MHz



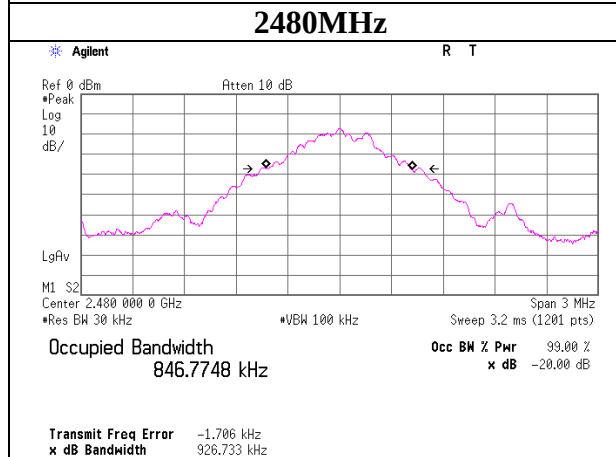
2441MHz



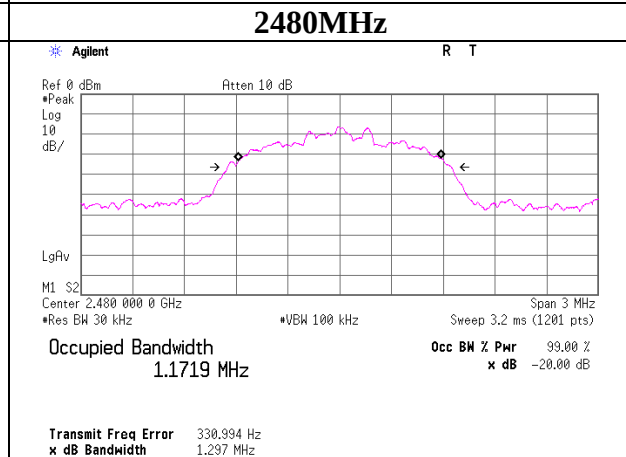
2441MHz



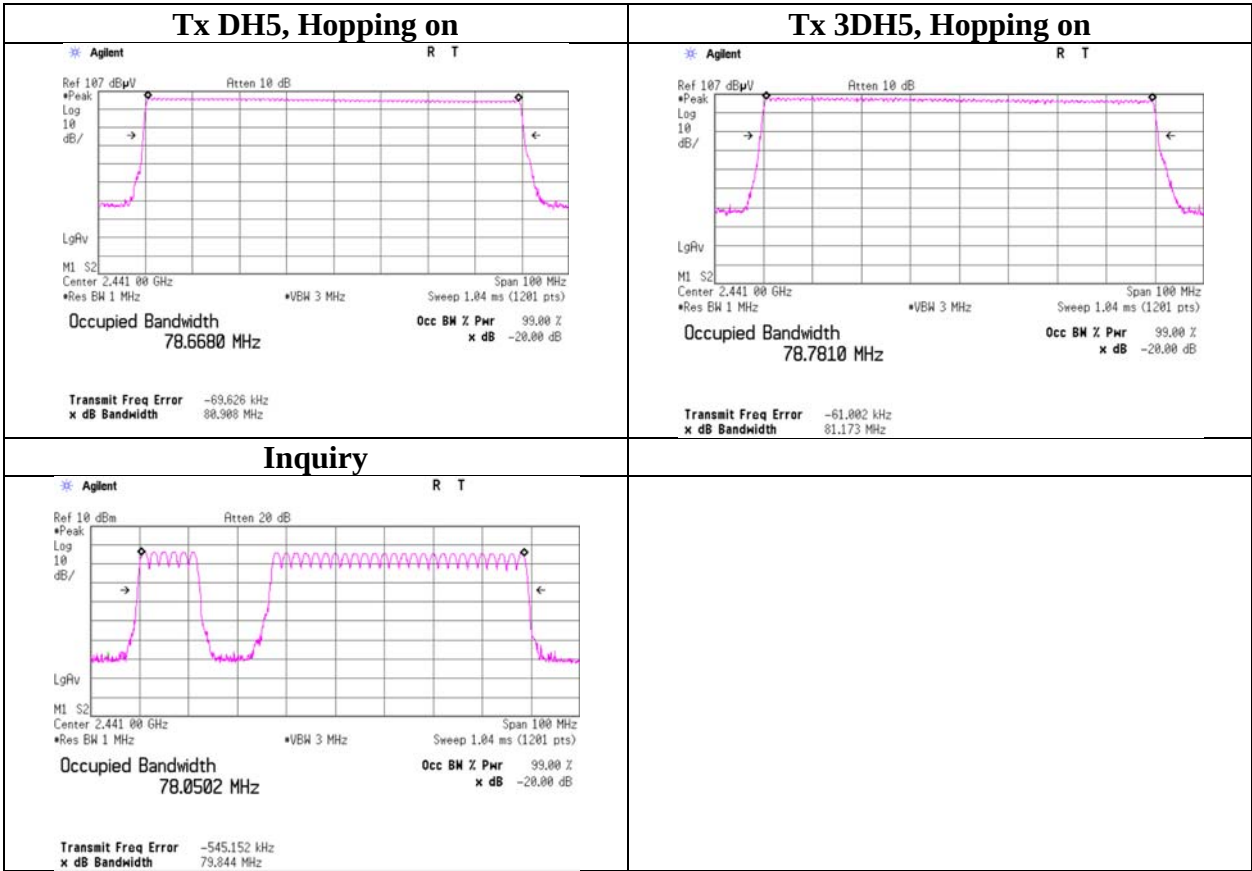
2480MHz



2480MHz



99% Occupied Bandwidth



APPENDIX 2: Test instruments

EMI test equipment

Control No.	Instrument	Manufacturer	Model No	Serial No	Test Item	Calibration Date * Interval(month)
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	2011/02/23 * 12
MJM-14	Measure	KOMELON	KMC-36	-	RE	-
COTS-MEMI	EMI measurement program	TSJ	TEPTO-DV	-	RE	-
MSA-04	Spectrum Analyzer	Agilent	E4448A	US44300523	RE/AT	2011/04/08 * 12
MHA-06	Horn Antenna 1-18GHz	Schwarzbeck	BBHA9120D	254	RE	2011/01/16 * 12
MPA-11	MicroWave System Amplifier	Agilent	83017A	MY39500779	RE	2011/03/10 * 12
MHA-02	Horn Antenna 18-26.5GHz	EMCO	3160-09	1265	RE	2011/01/16 * 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-03	Test Receiver	Rohde & Schwarz	ESCI	100300	RE	2011/04/15 * 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	2011/02/18 * 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
MOS-04	Digital Humidity Indicator	N.T	NT-1800	MOS04	AT	2011/02/23 * 12
MPM-09	Power Meter	Anritsu	ML2495A	6K00003348	AT	2011/09/12 * 12
MPSE-12	Power sensor	Anritsu	MA2411B	011598	AT	2011/09/12 * 12

The expiration date of the calibration is the end of the expired month.

All equipment is calibrated with valid calibrations. Each measurement data is traceable to the national or international standards.

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

Test Item:

RE: Radiated Emission

AT: Antenna Terminal Conducted test

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