



TEST REPORT

Report Number : A-001-15-C

Date of Issue: 23 July 2015

FCC Rules and Regulations Part 15 Subpart C Intentional Radiators.

This test report is to certify that the device was tested according to the requirements of the above.
The results of this report should not be construed to imply compliance of devices other than the sample tested.
Without the laboratory approval by the documents, this report should not be copied in part.

1. Applicant

Company Name : TAIYO YUDEN CO.,LTD.
Mailing Address : 8-1, Sakae-cho, Takasaki-shi, Gunma, 370-8522, Japan

2. Identification of Tested Device

Type of Device : Transmitter
FCC ID : RYYWYSAAVDXB-E
Device Name : Wireless Module
Model Number : WYSAAVDXB-E
Serial Number : 01
Trade Name : EPSON
Type of Test : ☐ Production ☐ Pre-production ☒ Prototype

3. Test Items

AC Power Line Conducted Emission	☒ Pass	☐ Fail	☐ N/A
20dB Bandwidth and Carrier Frequency Separation (FHSS only)	☒ Pass	☐ Fail	☐ N/A
Time of Occupancy (Dwell Time) (FHSS only)	☒ Pass	☐ Fail	☐ N/A
Number of Hopping Frequency (FHSS only)	☒ Pass	☐ Fail	☐ N/A
6dB Bandwidth (DTS only)	☒ Pass	☐ Fail	☐ N/A
Peak Conducted Output Power	☒ Pass	☐ Fail	☐ N/A
Power Spectral Density (DTS only)	☒ Pass	☐ Fail	☐ N/A
Spurious Emission	☒ Pass	☐ Fail	☐ N/A

Refer the below reason(s) with respect to the decision and justification not to test.

(*1) EUT Specifications (*2) Request of Applicant (*3) According to Test Plan

KEC Electronic Industry Development Center Testing Division
3-2-2, Hikari-dai, Seika-cho, Soraku-gun, Kyoto 619-0237 Japan

Test Engineer(s)

Naoki Norimoto

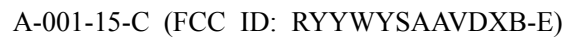


Approved by

Ikuya Minematsu / Group Manager

Table of Contents

0. REVISION HISTORY	3
1. LABORATORY INFORMATION.....	4
1.1. Laboratory Accreditation.....	4
1.2. Test Facility	4
1.3. Measurement Uncertainty.....	4
2. GENERAL INFORMATION	5
2.1. Product Description	5
3. TESTED SYSTEM.....	6
3.1. Reference Rule and Specification.....	6
3.2. Date of Test.....	6
3.3. Deviation of Standard	6
3.4. Test Mode	7
3.5. Block Diagram of TEST System	8
3.6. List of Test System	8
3.7. List of Cables.....	8
4. AC POWER LINE CONDUCTED EMISSION MEASUREMENT	9
4.1. Test Procedure	9
4.2. Test Software List	9
4.3. Test Results.....	10
5. 20dB BANDWIDTH and CARRIER FREQUENCY SEPARATION (FHSS only)	29
5.1. Test Procedure	29
5.2. Test Results.....	29
6. TIME OF OCCUPANCY (Dwell Time) (FHSS only).....	32
6.1. Test Procedure	32
6.2. Test Results.....	32
7. NUMBER OF HOPPING FREQUENCY (FHSS only).....	35
7.1. Test Procedure	35
7.2. Test Results.....	35
8. 6dB BANDWIDTH MEASUREMENT (DTS only)	39
8.1. Test Procedure	39
8.2. Test Results.....	39
9. PEAK CONDUCTED OUTPUT POWER.....	43
9.1. Test Procedure	43
9.2. Test Results.....	43
10. POWER SPECTRAL DENSITY (DTS only).....	45
10.1. Test Procedure	45
10.2. Test Results.....	46
11. SPURIOUS EMISSION	49
11.1. Test Procedure	49
11.2. Test Software List	50
11.3. Test Results.....	51
12. TEST EQUIPMENT	75
APPENDIX A (DECLARATION OF COMPLIANCE TO MAXIMUM PERMISSIBLE EXPOSURE LIMITS FOR HUMANS)	77



1. LABORATORY INFORMATION

1.1. Laboratory Accreditation

The KEC has been accredited by the following organizations based on their criteria for testing laboratory (ISO/IEC 17025).

- | | |
|---|----------------------------------|
| (1) Japan Accreditation Board for Conformity Assessment (JAB) | : Accreditation Number: RTL02810 |
| (2) Voluntary EMC Laboratory Accreditation Center Inc. (VLAC) | : Accreditation Number: VLAC-005 |

1.2. Test Facility

All tests described in this report were performed by:

Name: KEC Electronic Industry Development Center
Testing Division

Address: 3-2-2, Hikari-dai, Seika-cho, Soraku-gun, Kyoto 619-0237 Japan

Anechoic Chamber	:	☐ No.1	☐ No.2	☐ No.3	☐ No.6	☐ No.7
		☐ No.8	☐ No.9	☐ No.10	☒ No.11	☐ No.12
Shielded Room	:	☐ No.1	☐ No.7	☐ No.8	☒ No.9	☐ No.10
Harmonic Current Meas. Room	:	☐				

This test facility has been filed with the FCC under the criteria of ANSI C63.4-2009.

Registered Test Site Number : 174872

1.3. Measurement Uncertainty

The result of a measurement is only an approximation or estimate of the value of a specific quantity.

And thus the measurand is complete only when a statement of uncertainty is given.

KEC quotes Measurement Uncertainty (U) as follows.

Conducted Disturbance at Mains Port (150kHz-30MHz)	+3.1 / -3.7 dB
Conducted Disturbance at Mains Port (9kHz-30MHz)	+3.4 / -4.3 dB
Conducted Disturbance at Telecommunication Ports ISN method (None-Shield type)	+2.5 / -2.9 dB
Conducted Disturbance at Telecommunication Ports ISN method (Shield type)	+2.4 / -2.6 dB
Conducted Disturbance at Telecommunication Ports Current Probe method	+2.3 / -2.8 dB
Conducted Disturbance at Telecommunication Ports 150Ω Load voltage method	+1.9 / -2.5 dB
Conducted Disturbance at Telecommunication Ports None Invasive method	+2.8 / -3.8 dB
Conducted Disturbance at Lead Terminals and Additional Terminals	+1.7 / -2.4 dB
Disturbance Power (30MHz -300MHz)	+3.3 / -3.4 dB
Radiated Disturbance at Frequency Range from 9kHz up to 30MHz 60cm Loop Antenna method	+3.7 / -4.4 dB
Radiated Disturbance at Frequency Range from 9kHz up to 30MHz LLA method	+2.2 / -2.8 dB
Radiated Disturbance at Frequency Range from 30MHz up to 300MHz 3m method	+3.4 / -3.3 dB
Radiated Disturbance at Frequency Range from 300MHz up to 1GHz 3m method	+3.4 / -3.6 dB
Radiated Disturbance at Frequency Range from 30MHz up to 300MHz 10m method	+3.2 / -3.9 dB
Radiated Disturbance at Frequency Range from 300MHz up to 1GHz 10m method	+3.6 / -4.5 dB
Radiated Disturbance at Frequency Range from 30MHz up to 1GHz 10m method (Hybrid Antenna used measurement)	+4.1 / -4.4 dB
Radiated Disturbance at Frequency Range from 1GHz up to 6GHz 3m method	+4.7 / -6.2 dB
Radiated Disturbance at Frequency Range from 6GHz up to 26.5GHz 3m method	+4.5 / -5.0 dB
Peak Conducted Output Power Measurement	+1.0 / -1.0 dB
Harmonics Currents Emissions	+/- 6.5 %
Voltage Change, Voltage Fluctuations and Flicker	+/- 2.3 %

Expiration Date : 2015/9/30

The above values are calculated as Expanded Uncertainty (k=2 [95%]).

[Note]

If the measured result is below the specification limit and a margin is less than the above measurement uncertainty, it is impossible to determine compliance at a level of confidence of 95%. However, the measured result indicates high probability that the tested device complies with the specification limit.

2. GENERAL INFORMATION

2.1. Product Description

(1) Technical Specifications

- Wireless LAN + Bluetooth : IEEE802.11a/b/g/n + Bluetooth3.0
- Transmit speed : 11/5.5/2/1 Mbps(11b),
54/48/36/24/18/12/9/6Mbps(11a/g),
72.2 ~ 6.5 Mbps (11n20), 150 ~ 13.5 Mbps (11n40)
- Type of Modulation : DSSS(11b), OFDM(11a/g/n)
FHSS(Bluetooth)
- Frequency of Operation : 2412-2462MHz(11b/g/n)
5180-5825MHz(11a/n)
2402-2480MHz(Bluetooth)
- Bandwidth : 20MHz(11a/b/g/n20)
40MHz(11n40)
79MHz(Bluetooth)
- Channel Number : 1 to 11ch (11b/g/n),
36 to 64ch, 100 to 140ch, 149 to 165ch(11a/n),
0 to 78ch (Bluetooth)
- Antenna Type : Monopole Antenna
- Antenna Gain : 2.1dBi(2.4GHz), 2.4dBi(5GHz)
- Tx Output Power : 12dBm (Typ.) (11a/b/g/n), 0dBm (Typ.) (Bluetooth)
- Operating temperature range : -30 to 85 deg.C.

(2) Maximum Oscillators Frequency

- Crystal oscillator : 38.4MHz

(3) Software Version

- LABTOOL (Exclude Adaptivity, DFS) : 1.0.7.38
- Iperf (Adaptivity, DFS) : 2.0.5

(4) Firmware Version

- : 1.0.7.40 (Exclude Adaptivity, DFS)
- : 14.66.35.p46 (Adaptivity, DFS)

(5) Interface and Provide Terminal

- SD_DATA 0~3 : SDIO data
- SD_CLK : SDIO Clock
- SD_CMD : SDIO Command
- VIO : Digital I/O Power Supply
- VDD3.3 : Power Supply
- PDn : Power Down
- PCM_CLK : PCM Clock
- PCM_SYNC : PCM Sync
- PCM_DOUT : PCM Data Output
- PCM_DIN : PCM Data Input
- GND : GND

(6) Rated Power Supply

- : DC 3.0 to 3.6V (Test for DC 3.3V)



3. TESTED SYSTEM

3.1. Reference Rule and Specification

(1) Reference Rule and Regulation	: FCC Rule Part 15 Subpart C, Section 15.247 Operation within the bands 902-928MHz, 2400-2483.5MHz, 5725-5850MHz ☒ Section 15.205 ☒ Section 15.207 ☒ Section 15.209 ☒ Section 15.247 (a)(1) ☒ Section 15.247 (a)(2) ☒ Section 15.247 (b)(1) ☒ Section 15.247 (b)(3) ☒ Section 15.247 (d) ☒ Section 15.247 (e)
(2) Test Procedure	: ANSI C63.4-2009 FCC Public Notice DA 00-705 KDB Publication No.558074 D01 DTS Meas Guidance V03r02

3.2. Date of Test

Receipt of Test Sample : 14 April 2015
Condition of Test Sample : ☒ Damage is not found on the set.
☐ Damage is found on the set. (Details are described in this report)

Test Completed on : 4 May 2015
Condition of Test Sample : ☒ Damage is not found on the set.
☐ Damage is found on the set. (Details are described in this report)

3.3. Deviation of Standard

☒ without deviation, ☐ with deviation (details are found inside of this report)

3.4. Test Mode

•Wireless LAN

Test Item	Operating Mode	Test Frequency	Parameter Setting of Power
AC Power Line Conducted Emission	802.11b/g/n-20	2412MHz / 2437MHz / 2462MHz	12
	802.11n-40	2422MHz / 2437MHz / 2452MHz	
6dB Bandwidth	802.11b/g/n-20	2412MHz / 2437MHz / 2462MHz	12
	802.11n-40	2422MHz / 2437MHz / 2452MHz	
Peak Conducted Output Power	802.11b/g/n-20	2412MHz / 2437MHz / 2462MHz	12
	802.11n-40	2422MHz / 2437MHz / 2452MHz	
Power Spectral Density	802.11b/g/n-20	2412MHz / 2437MHz / 2462MHz	12
	802.11n-40	2422MHz / 2437MHz / 2452MHz	
Spurious Emissions / Restricted Band Edges (Radiated / Conducted) (*1)	802.11b/g/n-20	2412MHz / 2437MHz / 2462MHz	12
	802.11n-40	2422MHz / 2437MHz / 2452MHz	

Worst Data Rate		
Operating Mode	Data Rate / MCS	Worst Data Rate
802.11b	1-11 Mbps	2 Mbps
802.11g	6-54 Mbps	18 Mbps
802.11n-20	MCS 0-7	MCS 1
802.11n-40	MCS 0-7	MCS 1

•Bluetooth

Test Item	Operating Mode	Test Frequency	Parameter Setting of Power
AC Power Line Conducted Emission	DH5 / 3DH5	2402MHz / 2441MHz / 2480MHz	2
20dB Bandwidth and Carrier Frequency Separation	DH5 / 3DH5	2402MHz / 2441MHz / 2480MHz / Hopping	2
Time of Occupancy (Dwell Time)	DH1 / DH3 / DH5 3DH1 / 3DH3 / 3DH5	Hopping	2
Number of Hopping Frequency	DH5 / 3DH5 / AFH	Hopping	2
Peak Conducted Output Power	DH5 / 2DH5 / 3DH5	2402MHz / 2441MHz / 2480MHz	2
Spurious Emissions / Restricted Band Edges (Radiated / Conducted) (*1)	DH5 / 3DH5	2402MHz / 2441MHz / 2480MHz	2

[Note]

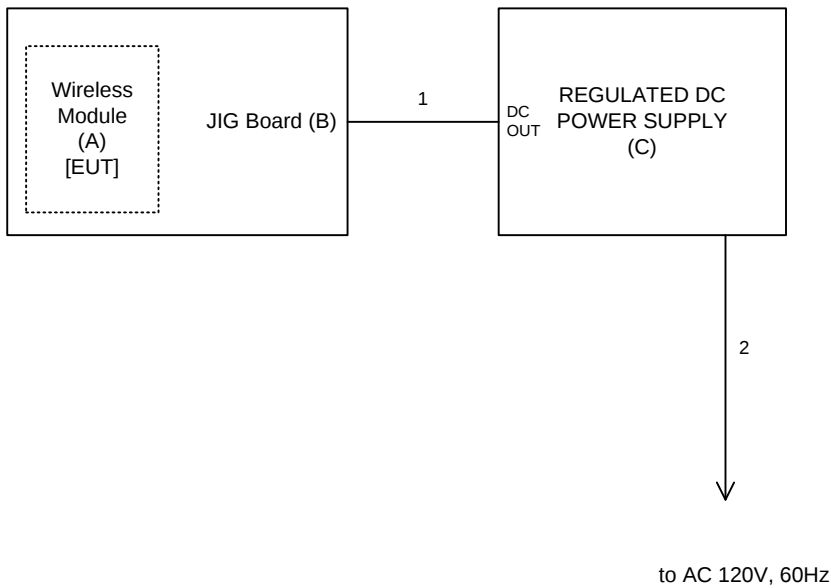
- (1) The test program was prepared by the applicant.
- (2) Parameter Setting of Power was Maximum Power Setting, and it was determined by the applicant.
- (3) The spurious emissions data of the each modes were checked in three orthogonal axes, and the data of the producing the maximum emissions were reported at each frequency.
- (4) Worst Data Rate/MCS was determined by the check of RF output power.
- (5) AC Power Line Conducted Emission were checked in each modes and test frequencies, and the final measurement was performed in the following.

Wireless LAN : 11b 2412MHz

Bluetooth : DH5 2402MHz

(*1) Above 30MHz : Radiated measurement, Below 30MHz : Conducted measurement

3.5. Block Diagram of TEST System



3.6. List of Test System

No.	Device Name	Model Number	Serial Number	Trade Name	Note
A	Wireless Module	WYSAAVDXB-E	01	EPSON	EUT
B	JIG Board	-	-	-	
C	REGULATED DC POWER SUPPLY	PAB18-3A	46023104	KIKUSUI	

[Note]

(1): Option of EUT

3.7. List of Cables

No.	Cable Name	Shielded (Y/N)	Length (m)	Note
1	DC Power Cord	N	1.8	
2	AC Power Cord	N	1.0	(1), (4)

[Note]

(1) : Undetachable cable type

(2) : Accessories cable of EUT

(3) : 3-wires type, earth plug is grounded

(4) : 2-wires type

4. AC POWER LINE CONDUCTED EMISSION MEASUREMENT

4.1. Test Procedure

- (1) The EUT is placed in accordance with ANSI C63.4.
- (2) The EUT is activated as to simulate a worst data rate.
- (3) Connect the EUT's AC power cord to one Line Impedance Stabilization Network (LISN).
- (4) Any other power cord of other equipment is connected to a LISN different from the LISN used for the EUT.
- (5) Connect the spectrum analyzer (*1) to the measuring port of the LISN for the EUT, using a calibrated coaxial cable.
- (6) To find out the maximum emission of the configuration of the EUT System, the operation mode and the position of the cables are changed, then preliminary conducted measurement are performed.
- (7) The spectrums are scanned from 150kHz to 30MHz and collect the six highest emissions minimum on the spectrum analyzer relative to the limits in the whole range.
- (8) The test receiver (*2) is connected to the LISN for the EUT, and the six highest emissions minimum recorded above are measured.

[Note]

(*1) Spectrum Analyzer Set Up Conditions

Frequency range	: 150kHz – 30MHz
Resolution bandwidth	: 10kHz
Video bandwidth	: 1MHz
Detector	: Peak

(*2) Test Receiver Set Up Conditions

Detector function	: Quasi – Peak / Average (if necessary)
IF bandwidth	: 10kHz

4.2. Test Software List

KEC No.	Software Name	Version	Manufacture
TF-088	TEPTO Conducted emission automatic measurement	2.3.0320	TSJ
TF-110	Junction sheet	1.6H	KEC

4.3. Test Results

Wireless LAN

11b 2412MHz

Measured Frequency (MHz)	Correction Factor (dB)	Meter Reading				Maximum RF Voltage		Limit		Margin for Limit	
		Q-Peak		Average		Q-Peak (dBμV)	Average (dBμV)	Q-Peak (dBμV)	Average (dBμV)	Q-Peak (dB)	Average (dB)
		Va (dBμV)	Vb (dBμV)	Va (dBμV)	Vb (dBμV)						
0.150	10.4	<0.0	<0.0	<0.0	<0.0	<10.4	<10.4	66.0	56.0	>55.6	>45.6
0.203	10.3	18.0	17.2	14.3	13.9	28.3	24.6	63.5	53.5	35.2	28.9
0.340	10.2	4.8	3.2	1.6	0.1	15.0	11.8	59.2	49.2	44.2	37.4
5.000	10.4	<0.0	<0.0	<0.0	<0.0	<10.4	<10.4	56.0	46.0	>45.6	>35.6
20.000	11.0	<0.0	<0.0	<0.0	<0.0	<11.0	<11.0	60.0	50.0	>49.0	>39.0
30.000	11.4	<0.0	<0.0	<0.0	<0.0	<11.4	<11.4	60.0	50.0	>48.6	>38.6

Bluetooth

DH5 2402MHz

Measured Frequency (MHz)	Correction Factor (dB)	Meter Reading				Maximum RF Voltage		Limit		Margin for Limit	
		Q-Peak		Average		Q-Peak (dBμV)	Average (dBμV)	Q-Peak (dBμV)	Average (dBμV)	Q-Peak (dB)	Average (dB)
		Va (dBμV)	Vb (dBμV)	Va (dBμV)	Vb (dBμV)						
0.150	10.4	<0.0	<0.0	<0.0	<0.0	<10.4	<10.4	66.0	56.0	>55.6	>45.6
0.204	10.3	18.1	17.3	14.3	13.8	28.4	24.6	63.4	53.4	35.0	28.8
0.340	10.2	4.0	3.8	0.6	0.5	14.2	10.8	59.2	49.2	45.0	38.4
5.000	10.4	<0.0	<0.0	<0.0	<0.0	<10.4	<10.4	56.0	46.0	>45.6	>35.6
20.000	11.0	<0.0	<0.0	<0.0	<0.0	<11.0	<11.0	60.0	50.0	>49.0	>39.0
30.000	11.4	<0.0	<0.0	<0.0	<0.0	<11.4	<11.4	60.0	50.0	>48.6	>38.6

[Note]

Correction Factor includes the LISN Factor, cable loss and attenuator loss.

[Calculation method]

Maximum RF Voltage (dBμV)

= Meter Reading (at maximum level of Va or Vb) (dBμV) + Correction Factor (dB)

At the next page, the result of exploratory conducted emission measurement by using the spectrum analyzer is shown by the spectrum chart.

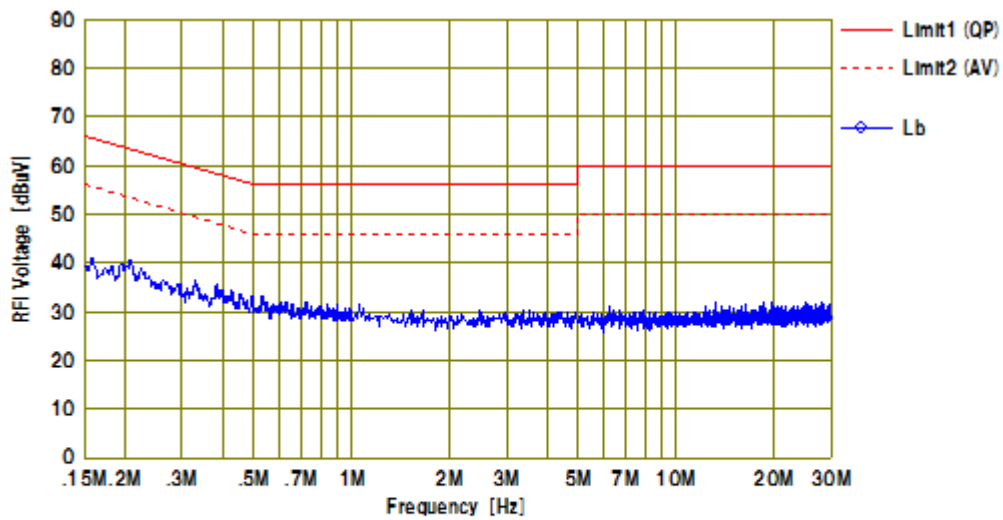
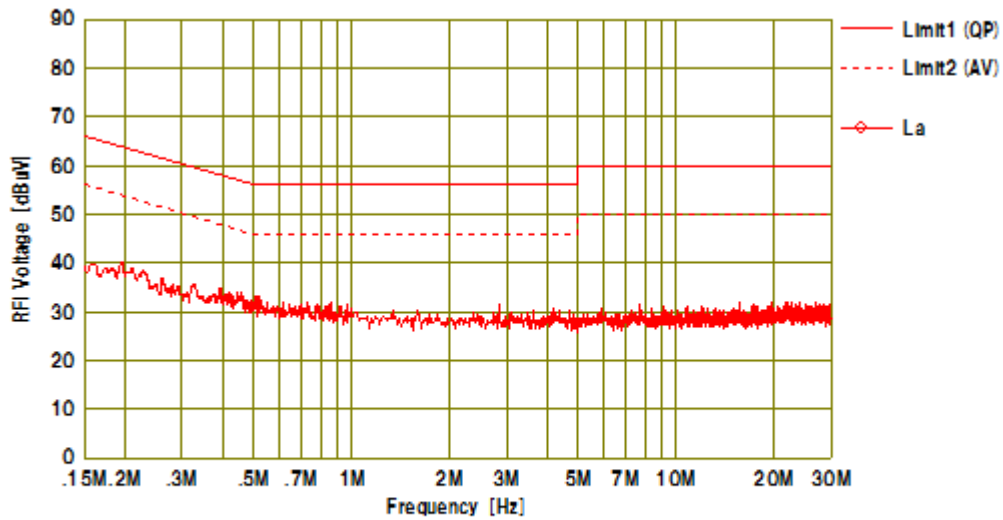
Tested Date	Environment	
	Temperature	Humidity
4 May 2015	24 °C	40 %



Test Results in Graph

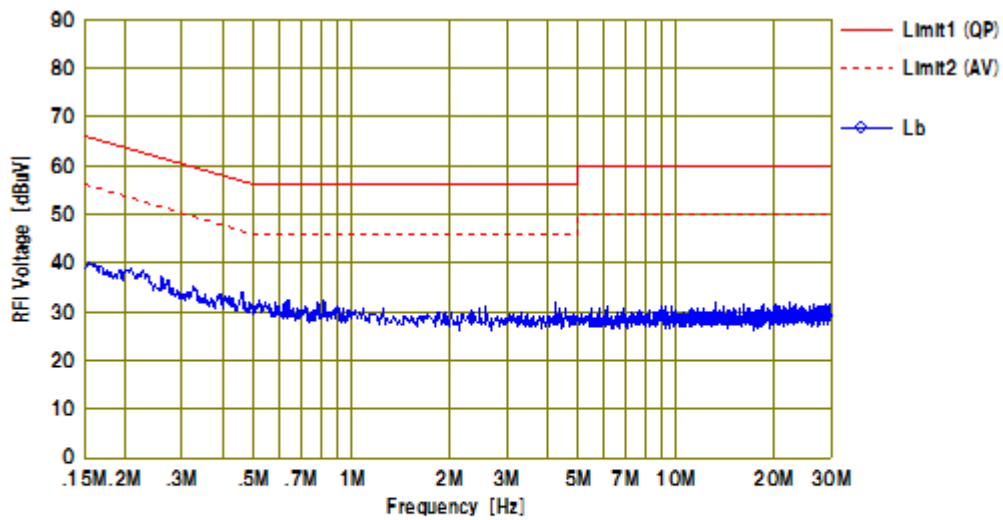
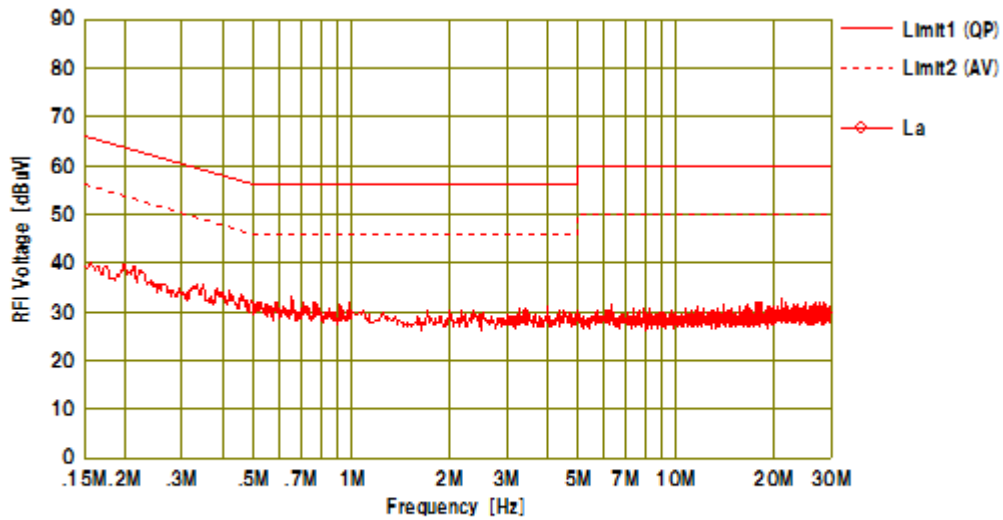
Wireless LAN

11b 2412MHz



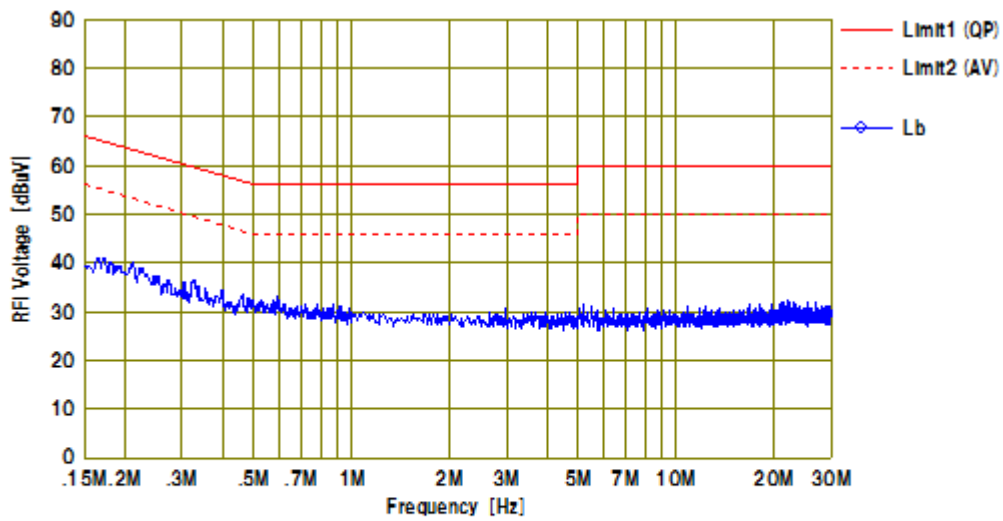
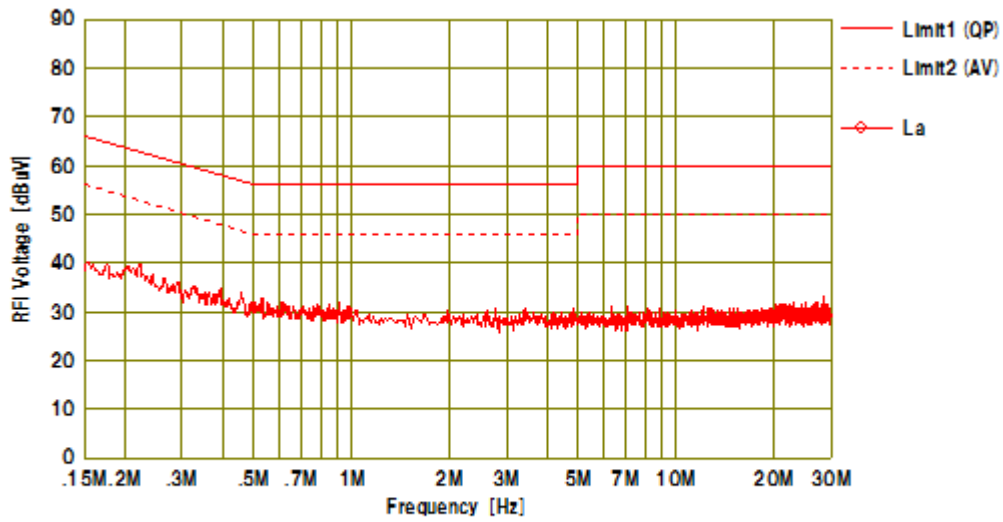


11b 2437MHz



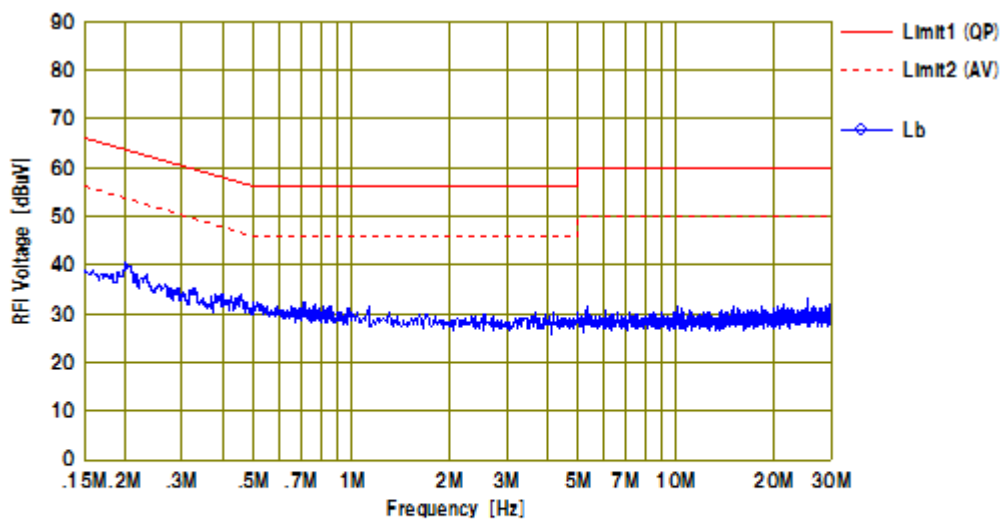
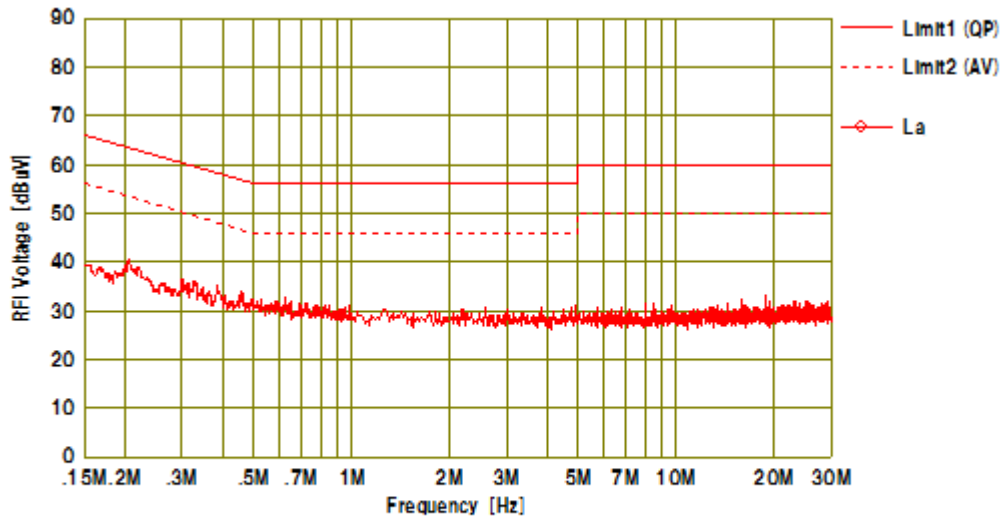


11b 2462MHz



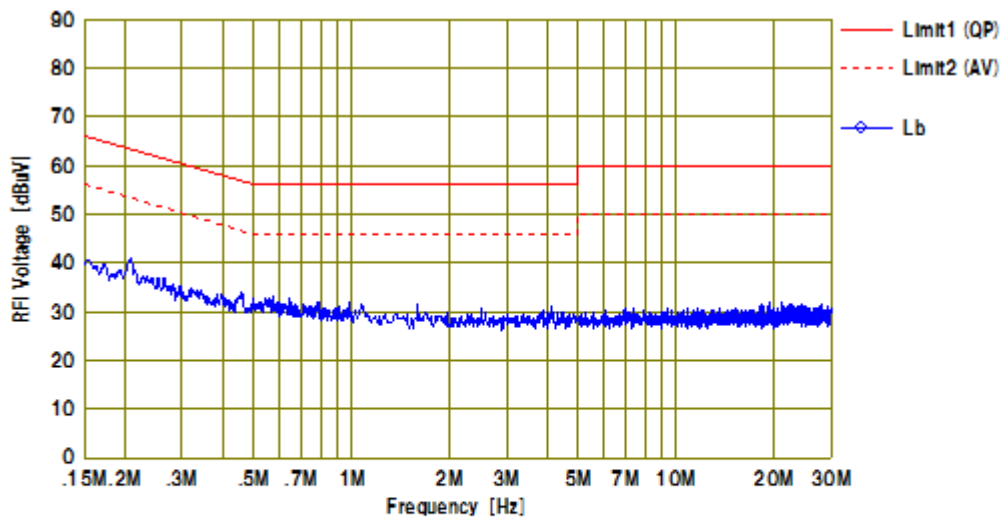
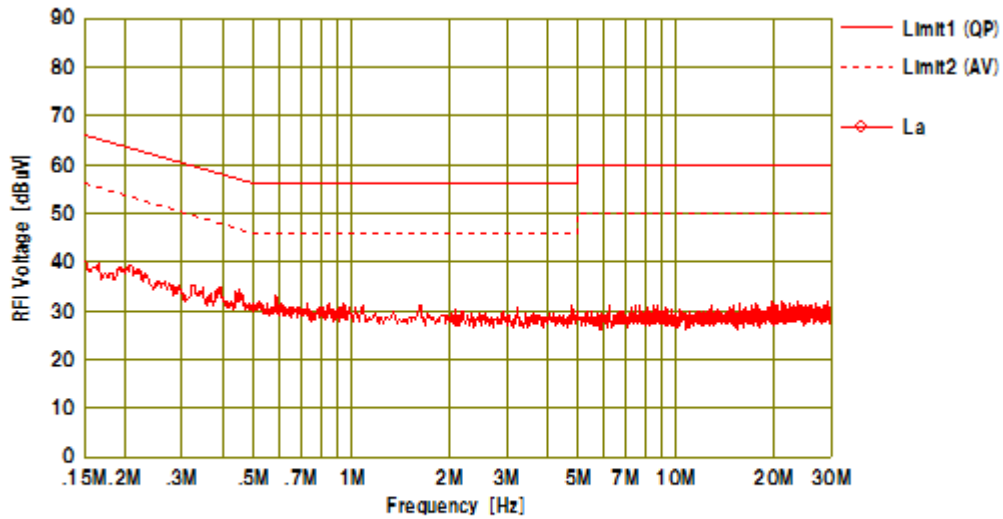


11g 2412MHz



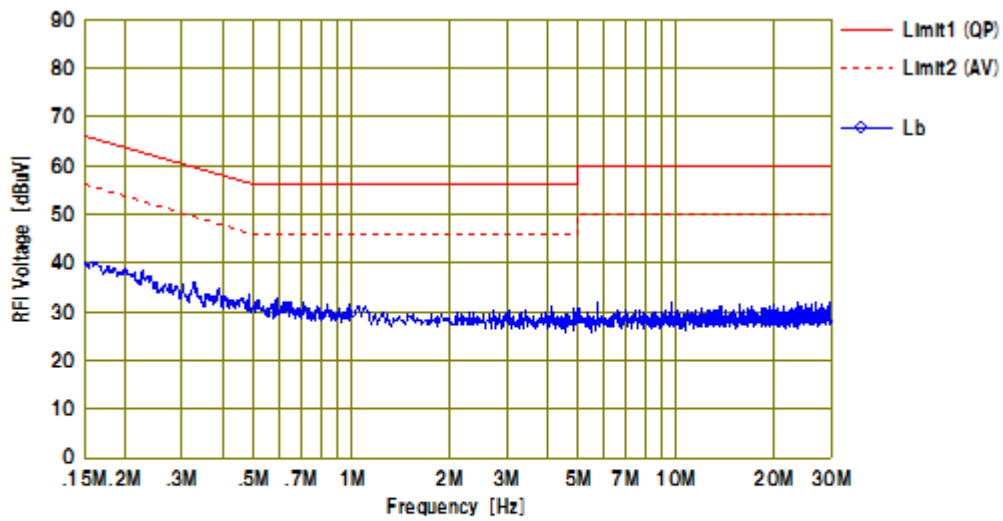
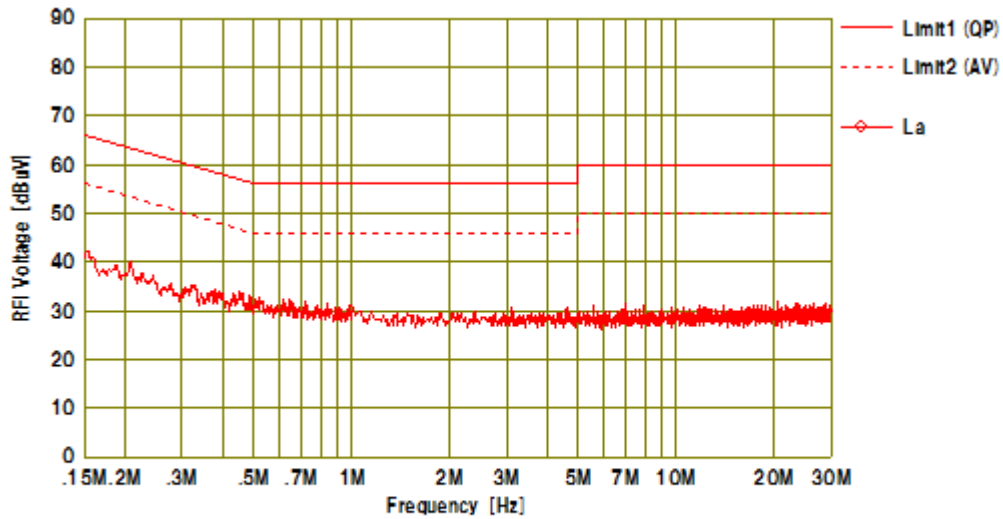


11g 2437MHz



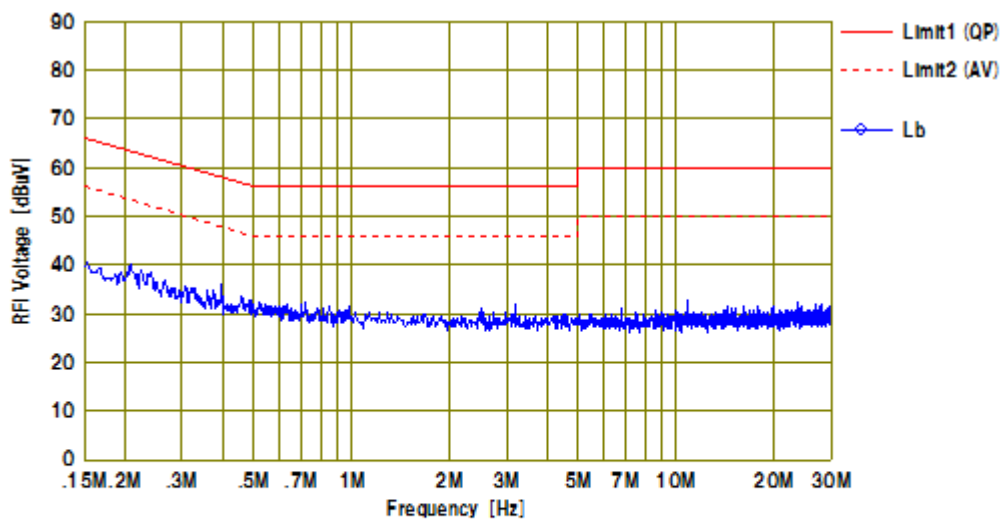
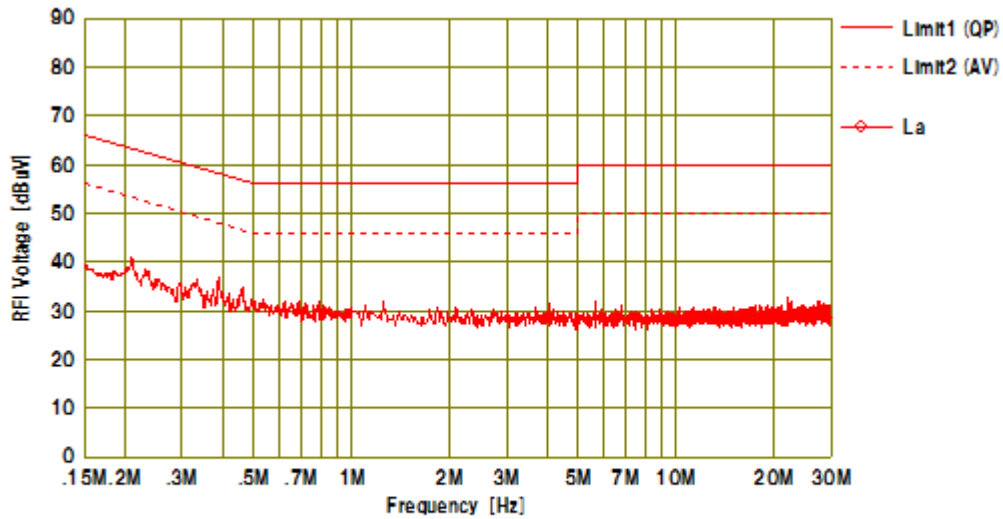


11g 2462MHz



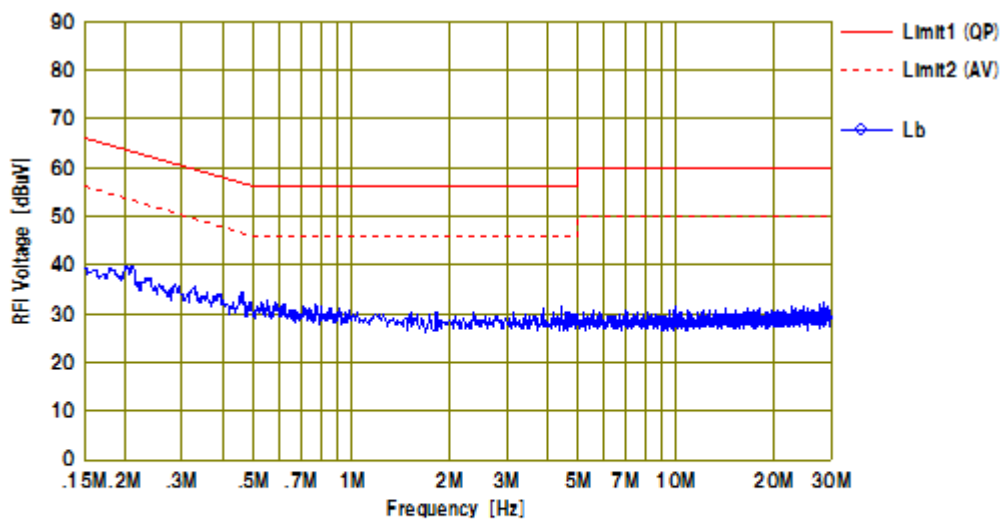
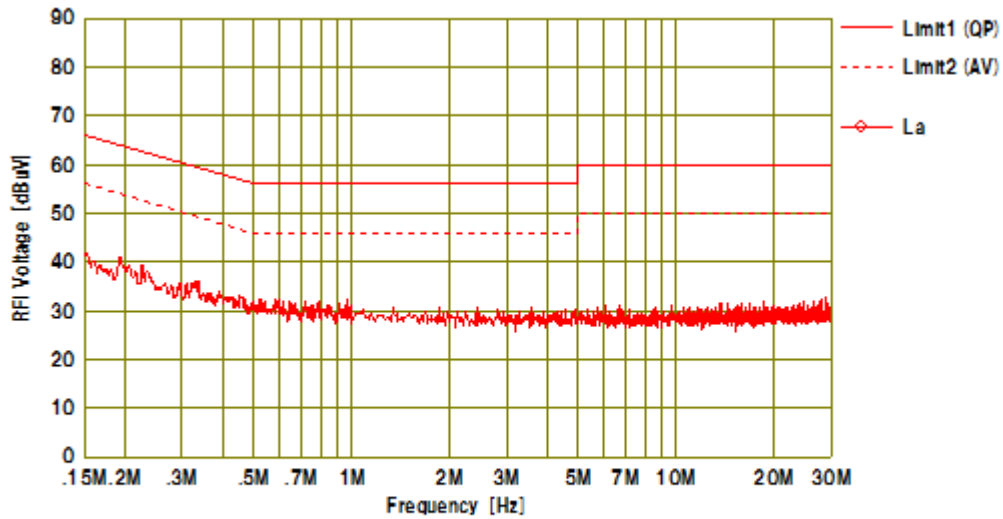


11n-20 2412MHz



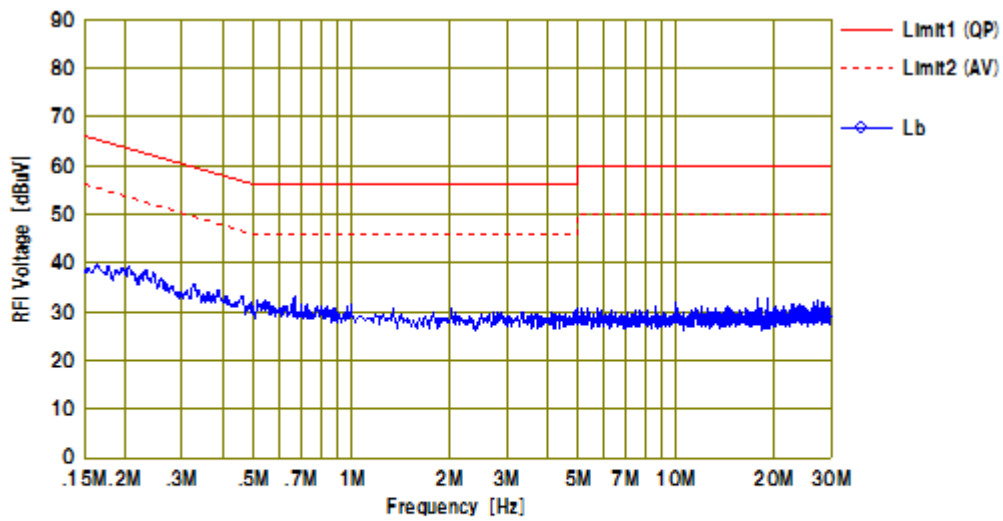
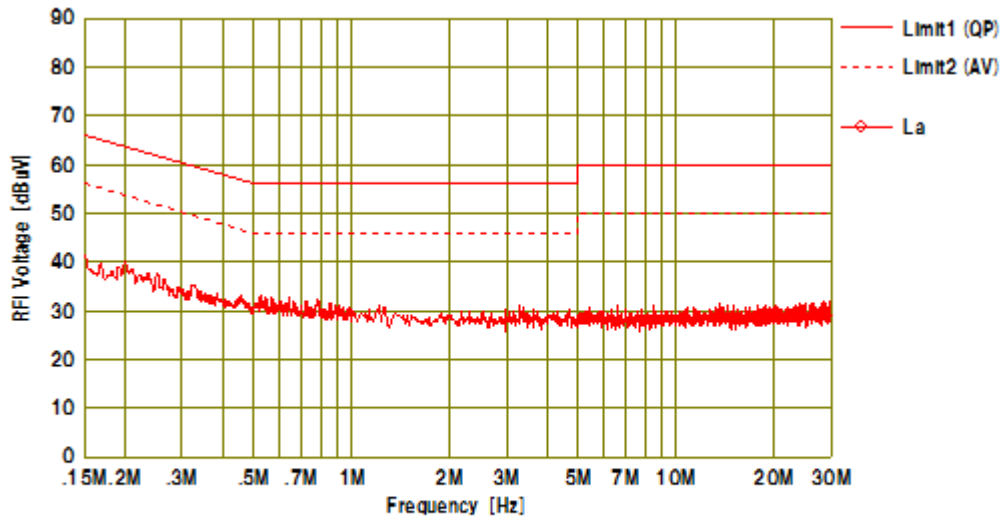


11n-20 2437MHz



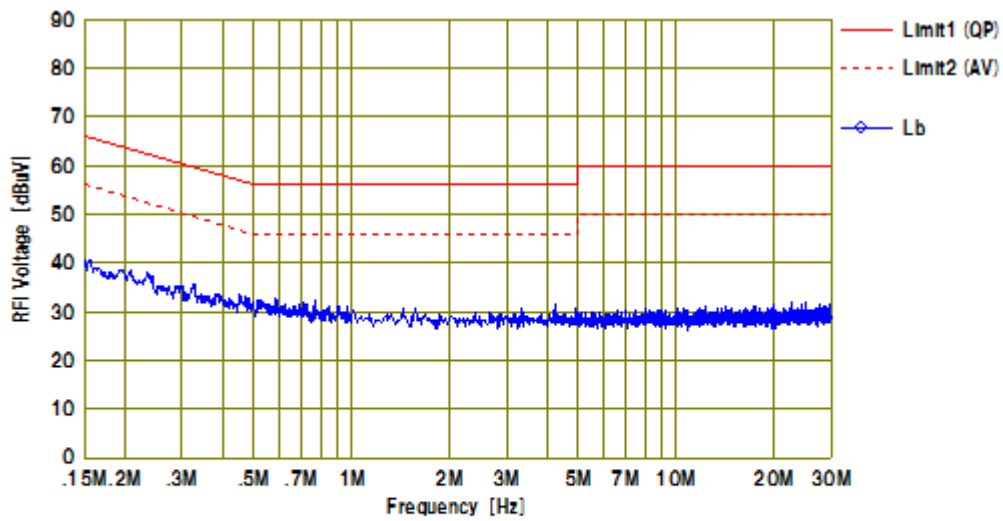
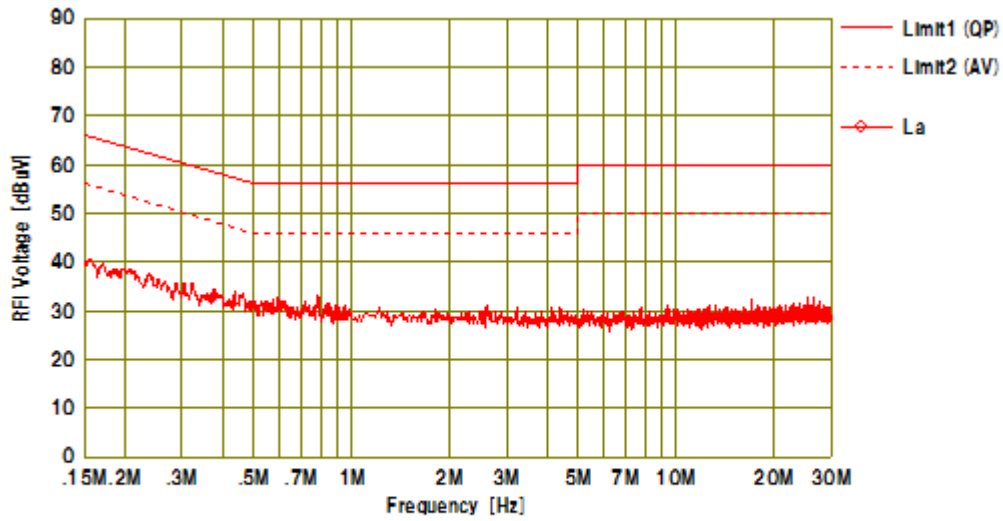


11n-20 2462MHz



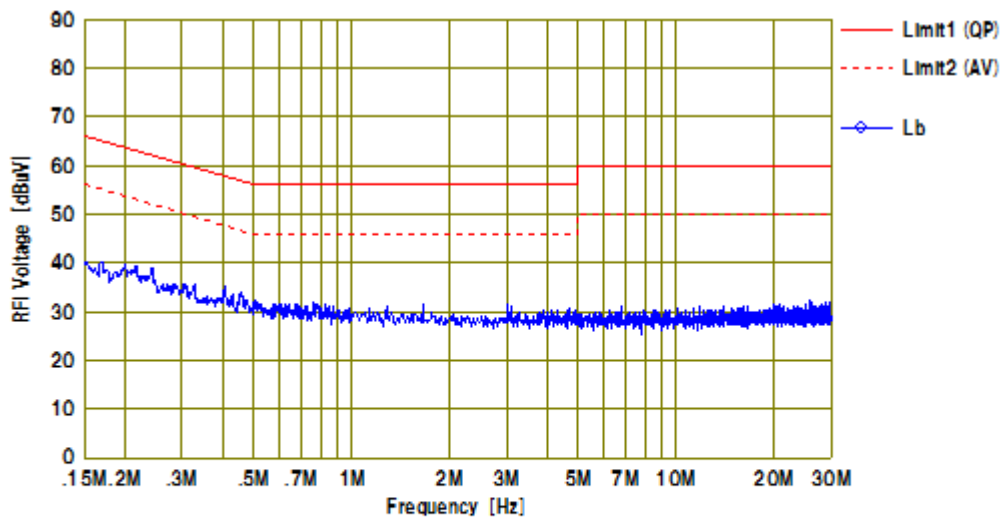
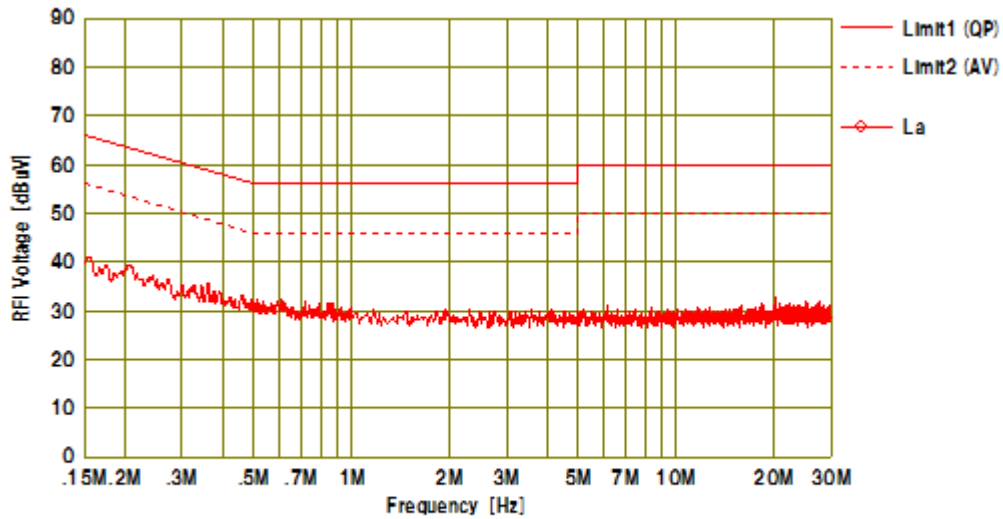


11n-40 2422MHz



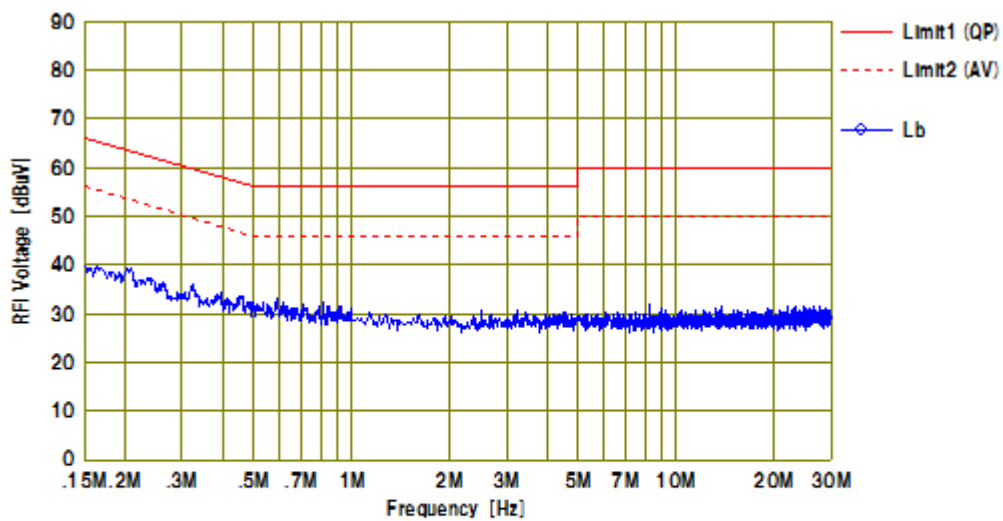
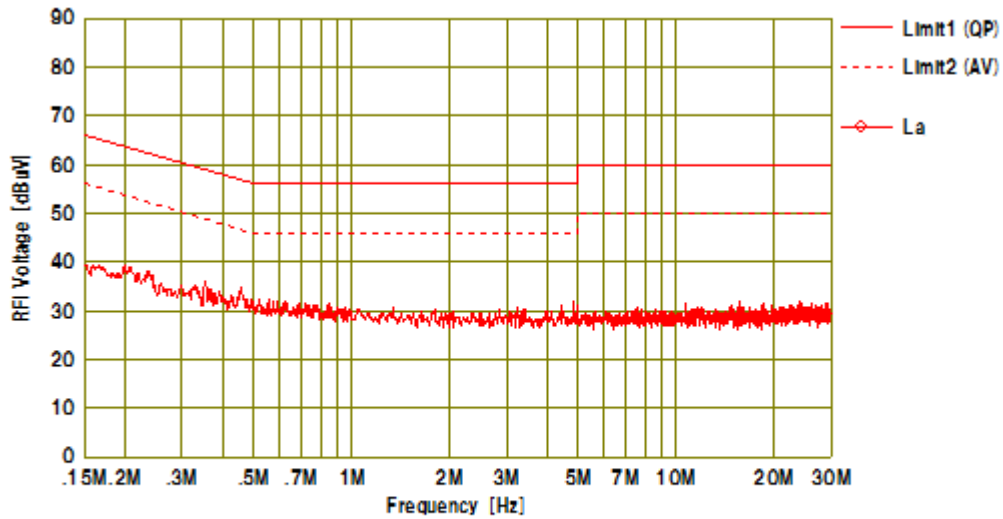


11n-40 2437MHz





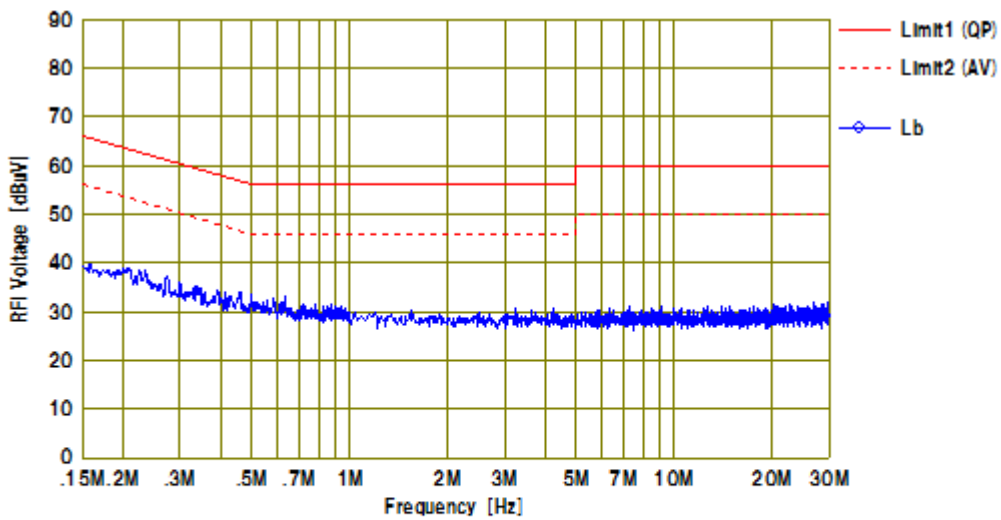
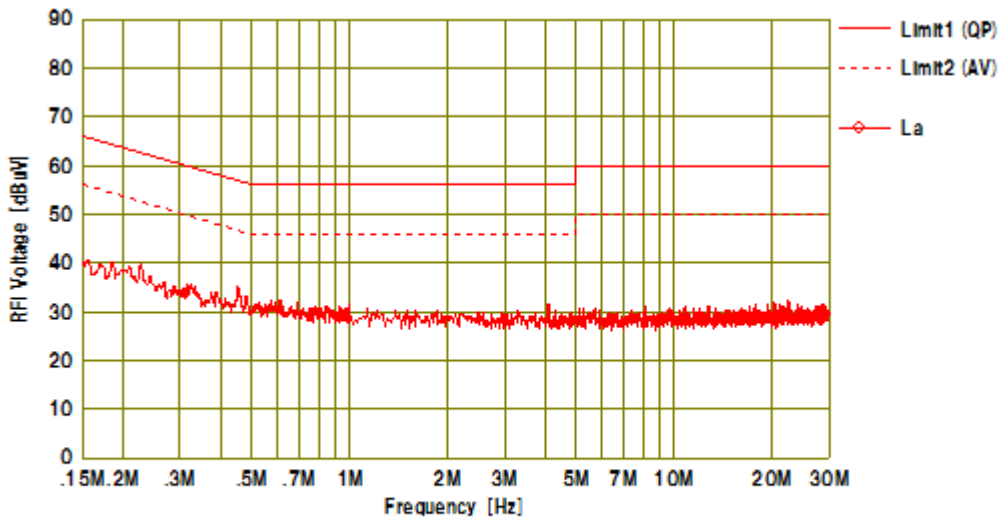
11n-40 2452MHz





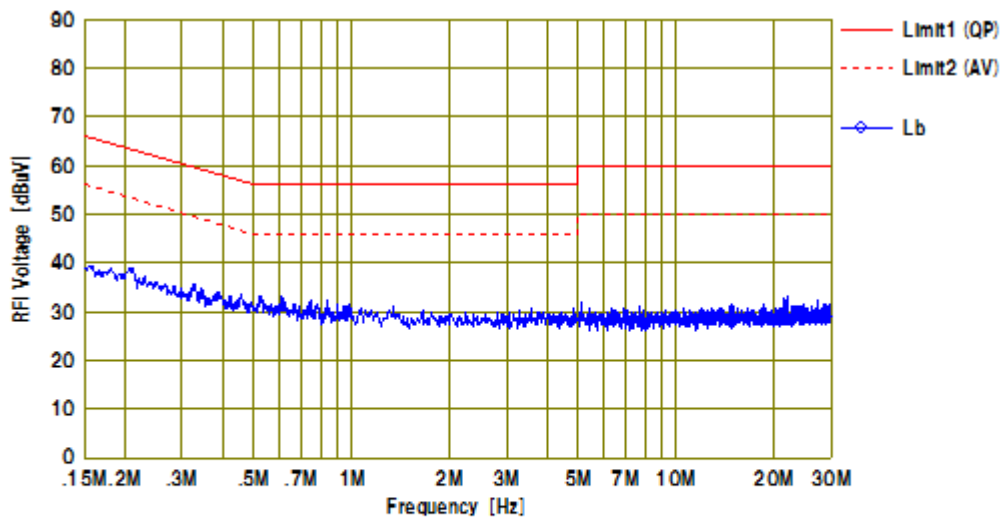
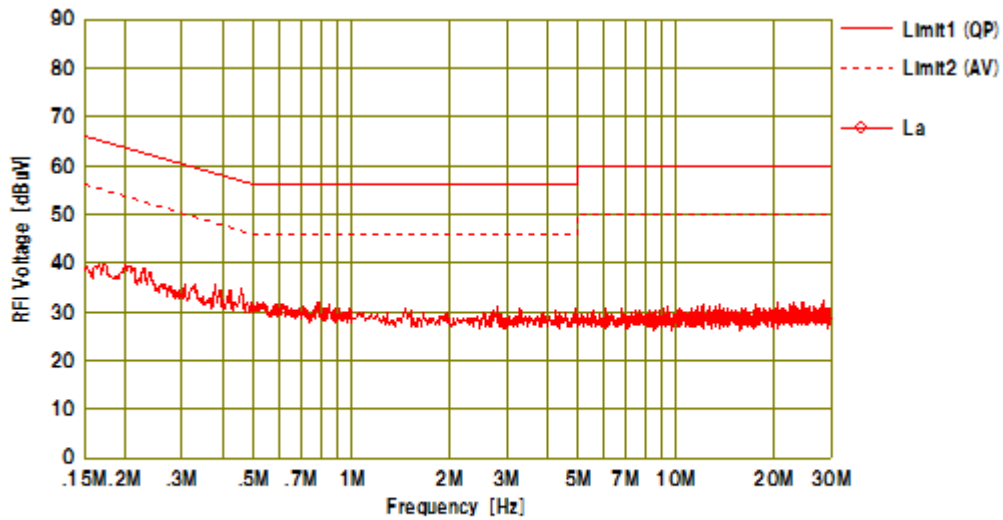
Bluetooth

DH5 2402MHz



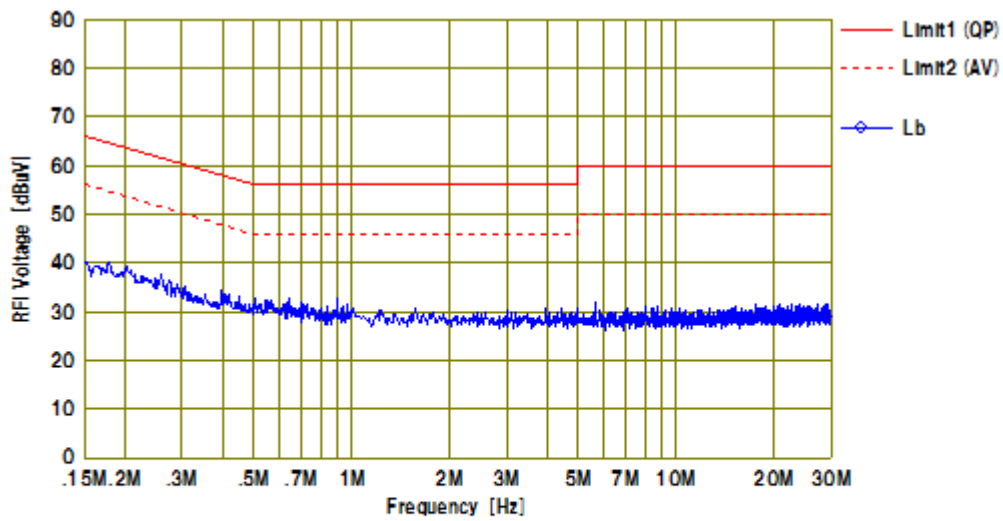
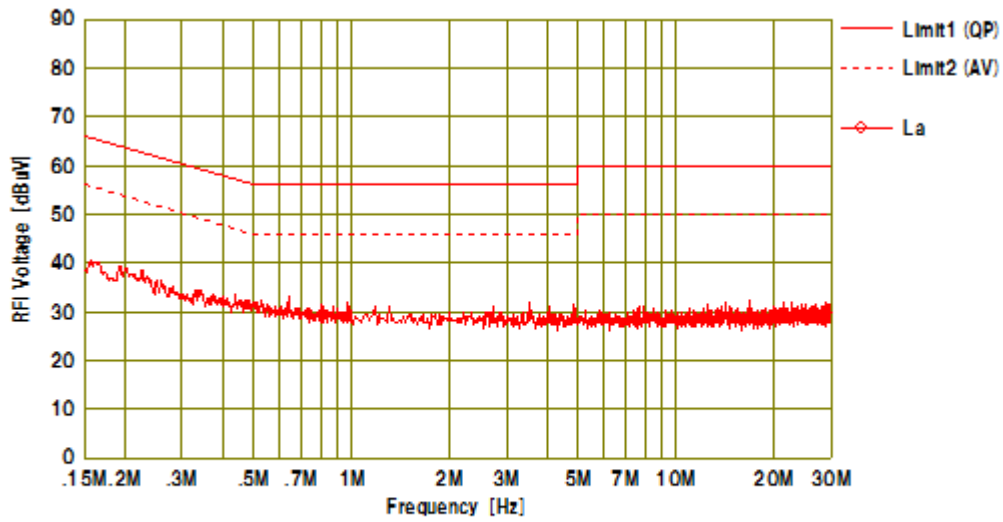


DH5 2441MHz



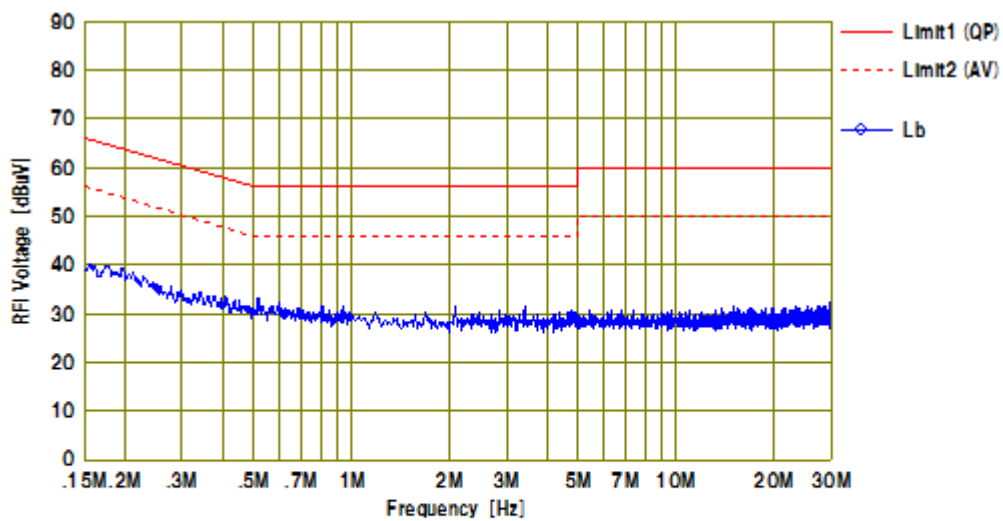
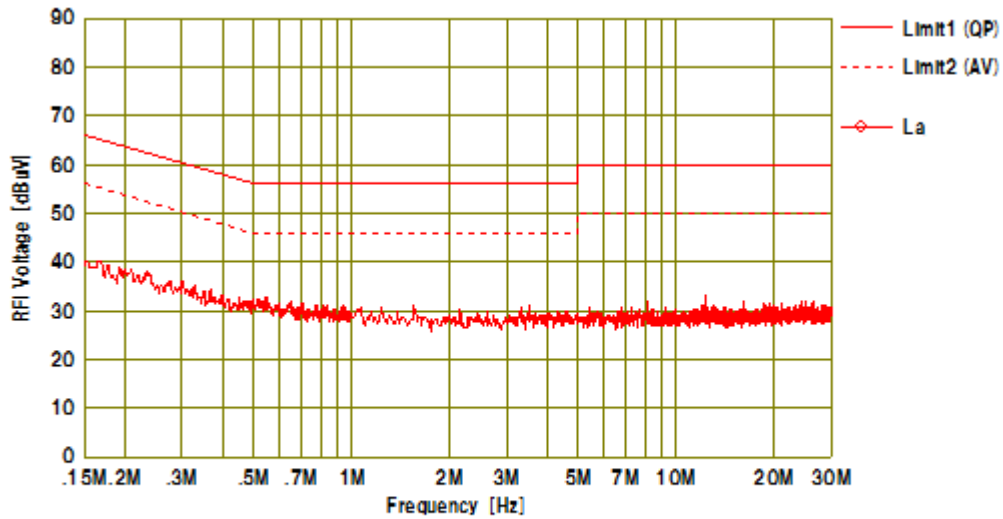


DH5 2480MHz



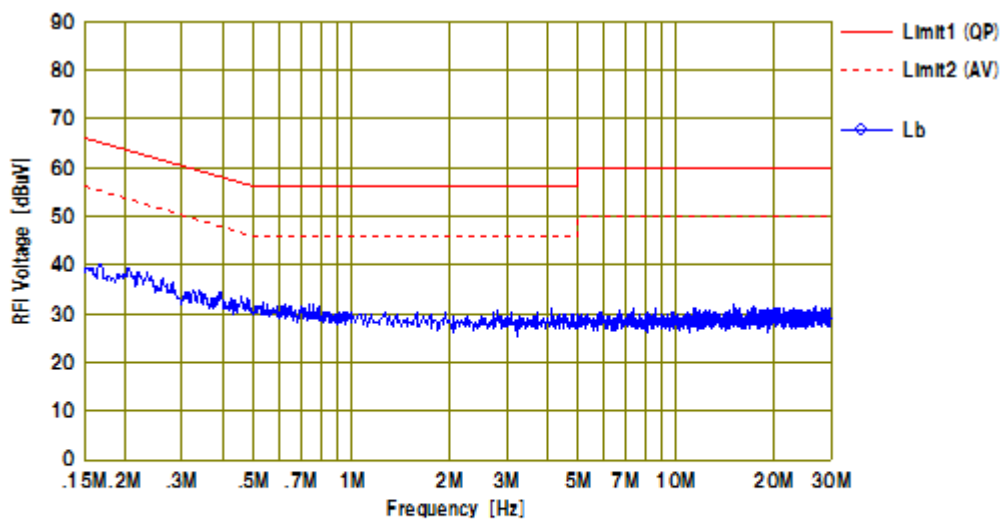
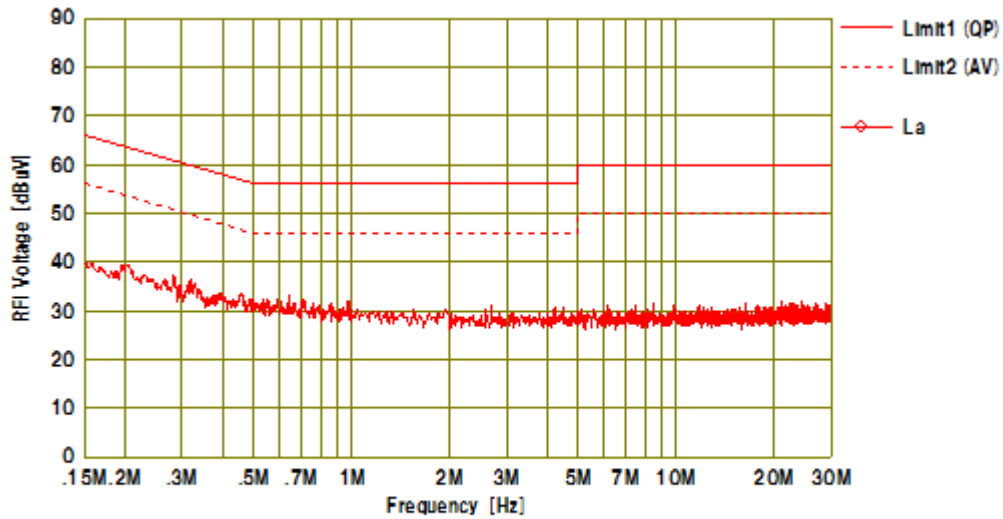


3DH5 2402MHz



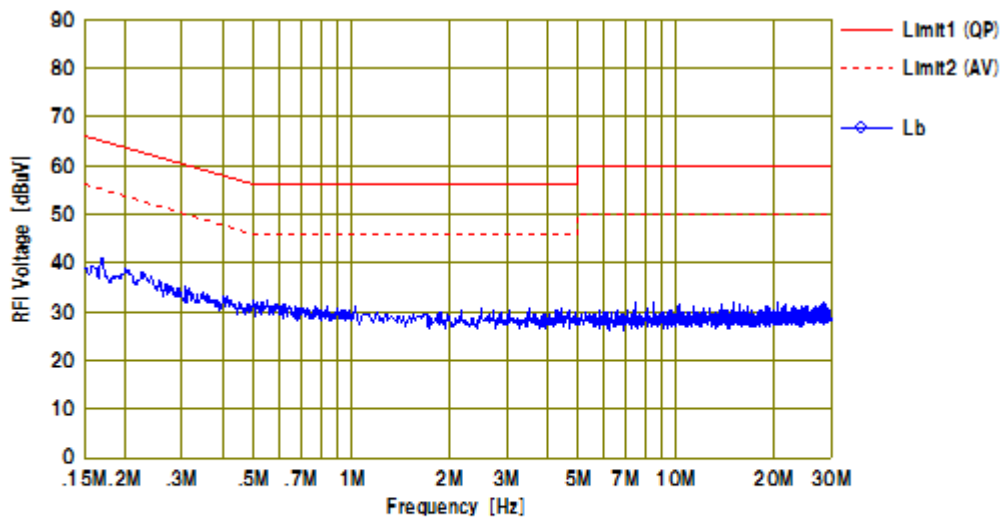
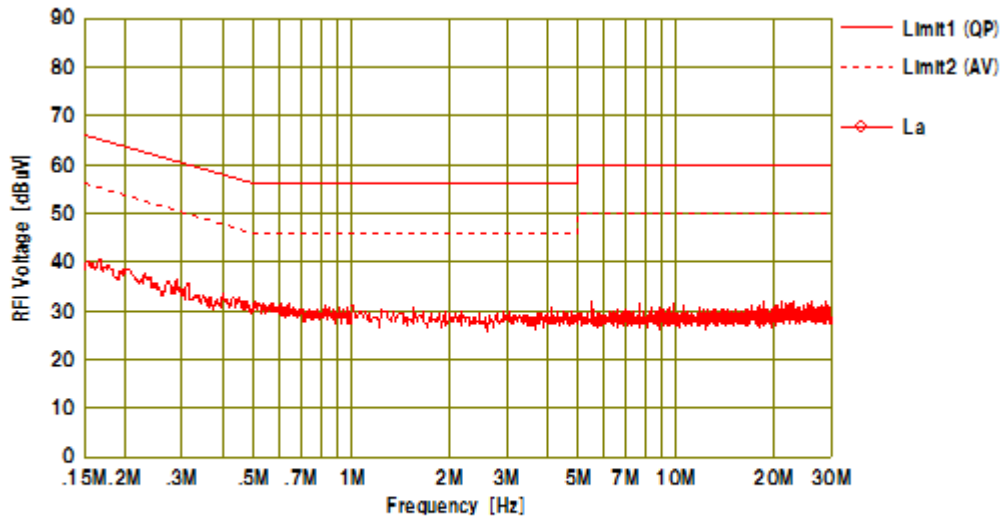


3DH5 2441MHz





3DH5 2480MHz



5. 20dB BANDWIDTH and CARRIER FREQUENCY SEPARATION (FHSS only)

5.1. Test Procedure

- (1) Connect the EUT RF output port to spectrum analyzer via calibrated coaxial cable and suitable attenuator (if necessary).
- (2) Activates the EUT System and execute the software prepared for test, if necessary.
- (3) To find out the maximum emission condition, the transmitting data rate of EUT is set to maximum data rate.
- (4) The Spectrums are scanned and allow the trace stabilized.
- (5) The separation between the peaks of the peaks of adjacent channel were measured by using delta-maker function of the spectrum analyzer (*1).

[Note]

(*1) Spectrum Analyzer Set Up Conditions

Resolution bandwidth : 100 kHz

Video bandwidth : $\geq 3 \times \text{RBW}$

Sweep : Auto

Trace Mode : Max Hold

5.2. Test Results

Operating mode	Frequency (MHz)	20dB Bandwidth (MHz)	Channel Separation (MHz)	Limit (*1) (MHz)
DH5	2402	1.047	1.056	≥ 0.698
	2441	1.032	1.113	≥ 0.688
	2480	1.030	1.011	≥ 0.687
3DH5	2402	1.315	1.017	≥ 0.877
	2441	1.319	1.083	≥ 0.879
	2480	1.318	1.002	≥ 0.879

[Note]

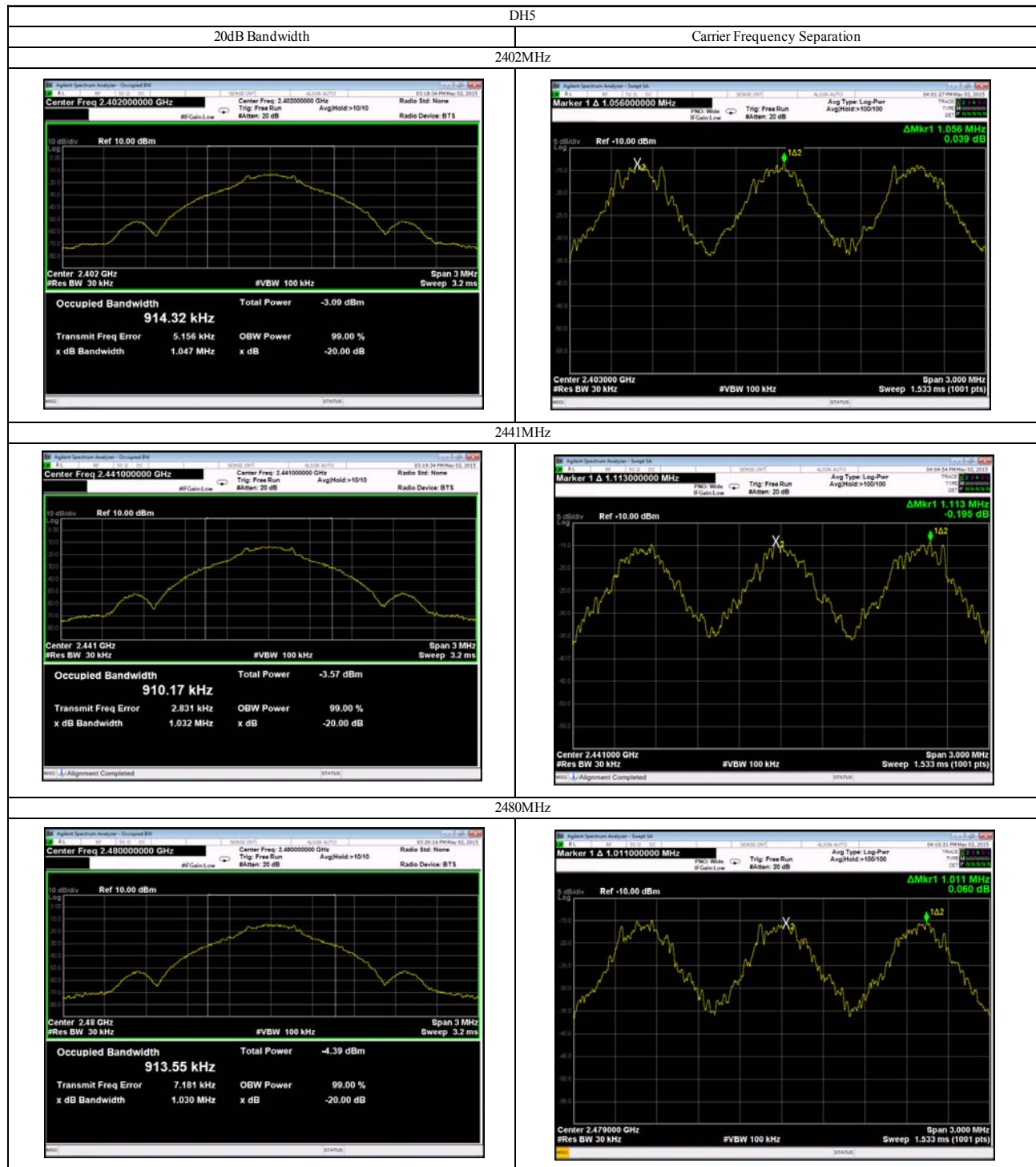
(1) (*1) mark : Two-thirds of 20dB Bandwidth.

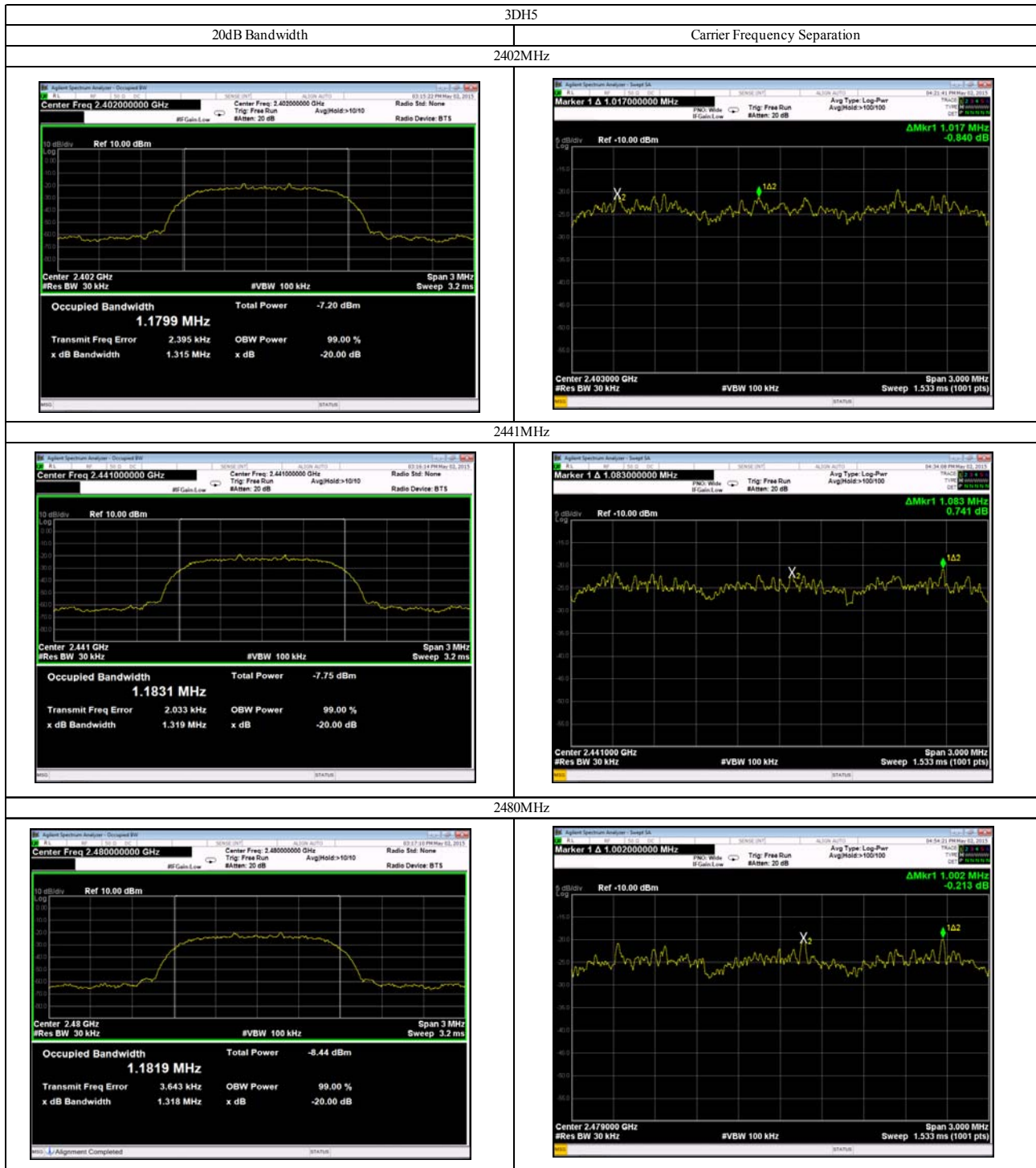
(2) See next page figure.

Tested Date	Environment	
	Temperature	Humidity
2 May 2015	23 °C	30 %



Spectrum Chart





6. TIME OF OCCUPANCY (Dwell Time) (FHSS only)

6.1. Test Procedure

- (1) Connect the EUT RF output port to spectrum analyzer via calibrated coaxial cable and suitable attenuator (if necessary).
- (2) Activates the EUT System and execute the software prepared for test, if necessary.
- (3) To find out the maximum emission condition, the transmitting data rate of EUT is set to maximum data rate.
- (4) The span of spectrum analyzer (*1) was set to zero span. The occupied time at center on a hopping frequency was observed and recorded as "Ton".
- (5) Sweep time of spectrum analyzer (*2) was set to 5s, and the number of transmission was measured.

[Note]

(*1) Spectrum Analyzer Set Up Conditions

Frequency Span : Zero span
Resolution bandwidth : 1MHz
Video bandwidth : $\geq$ RBW
Sweep : as necessary to capture the entire dwell time per hopping channel
Detector function : Peak

(*2) Spectrum Analyzer Set Up Conditions

Frequency Span : Zero span
Resolution bandwidth : 100kHz
Video bandwidth : $\geq$ RBW
Sweep : 5s
Detector function : Peak

6.2. Test Results

Operating mode	Dwell Time per hop (msec)	Number of transmission in 31.6 (79hop x 0.4) sec	Result (msec)	Limit (msec)
DH1	0.381	50 / 5.0 sec x 31.6 sec = 316 times	121	<400
DH3	1.636	29 / 5.0 sec x 31.6 sec = 184 times	302	<400
DH5	2.885	20 / 5.0 sec x 31.6 sec = 127 times	367	<400
3DH1	0.385	51 / 5.0 sec x 31.6 sec = 323 times	125	<400
3DH3	1.636	28 / 5.0 sec x 31.6 sec = 177 times	290	<400
3DH5	2.886	19 / 5.0 sec x 31.6 sec = 121 times	350	<400

[Note]

See next page figure.

[Test Condition]

EUT operation : Hopping transmission

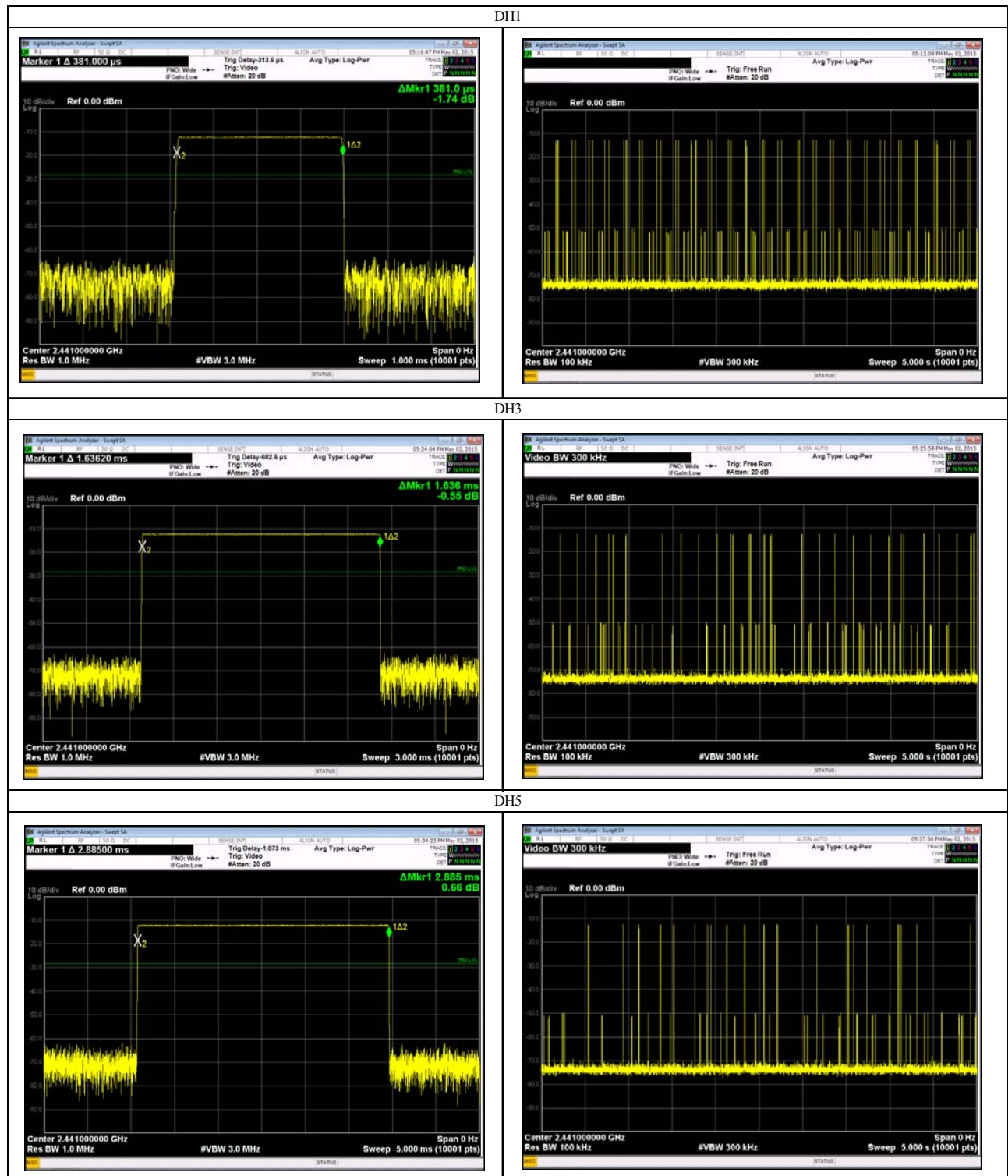
[Calculation method]

Result (msec) = Dwell time per hop (msec) × Number of transmission in 31.6 sec (times)

Tested Date	Environment	
	Temperature	Humidity
2 May 2015	23 °C	30 %

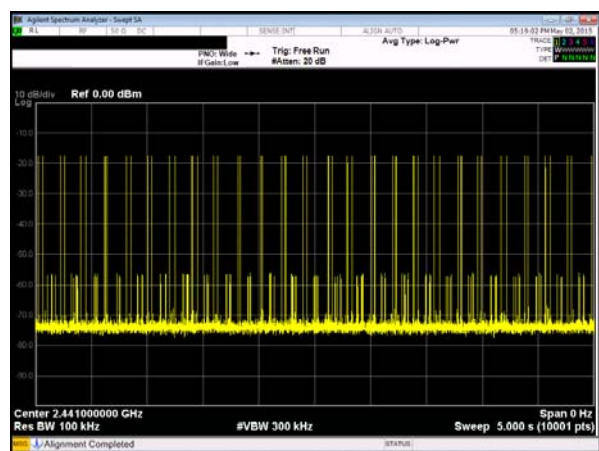
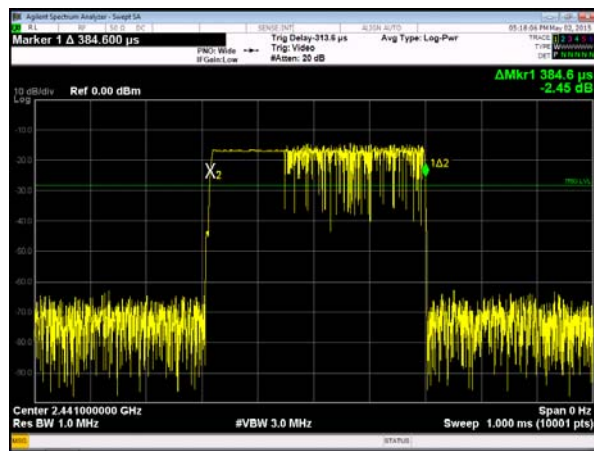


Spectrum Chart

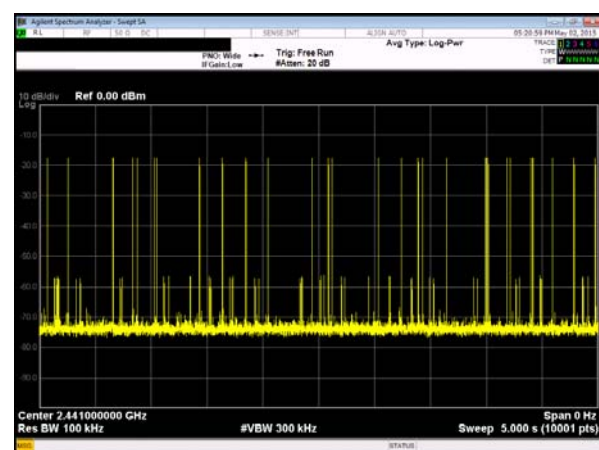
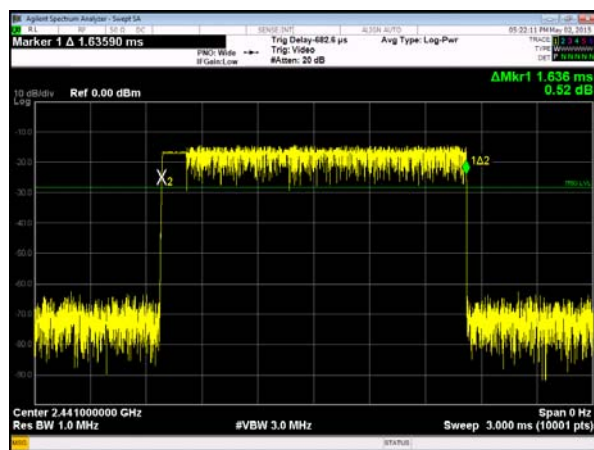




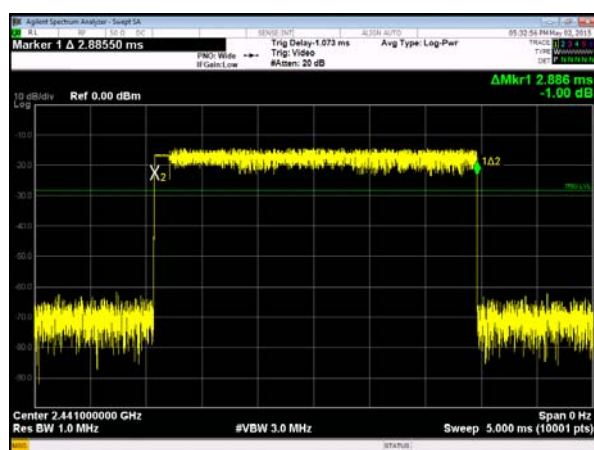
3DH1



3DH3



3DH5



7. NUMBER OF HOPPING FREQUENCY (FHSS only)

7.1. Test Procedure

- (1) Connect the EUT RF output port to spectrum analyzer (*1) via calibrated coaxial cable and suitable attenuator (if necessary).
- (2) Activates the EUT System and execute the software prepared for test, if necessary.
- (3) To find out the maximum emission condition, the transmitting data rate of EUT is set to maximum data rate.
- (4) The occupied number of hopping was recorded.

[Note]

(*1) Spectrum Analyzer Set Up Conditions

Resolution bandwidth : 300kHz
Video bandwidth : $\geq$ RBW
Trace : Max Hold
Detector function : Peak

7.2. Test Results

Operating mode	Number of channel (times)	Limit (times)
DH5	79	≥ 15
3DH5	79	≥ 15
AFH	20	≥ 15

[Note]

See next page figure.

[Test Condition]

EUT operation : Hopping transmission

Tested Date	Environment	
	Temperature	Humidity
2 May 2015	23 °C	30 %

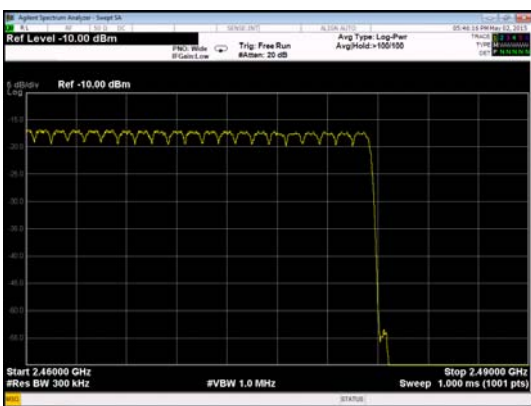
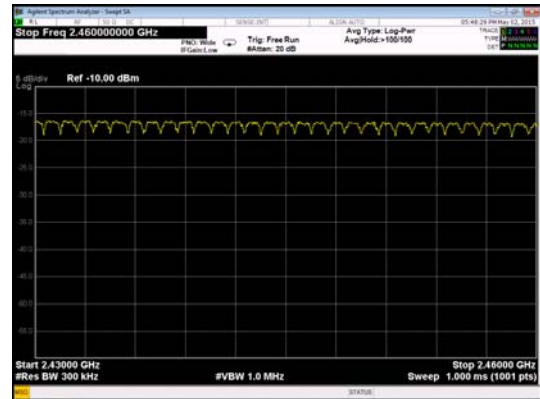
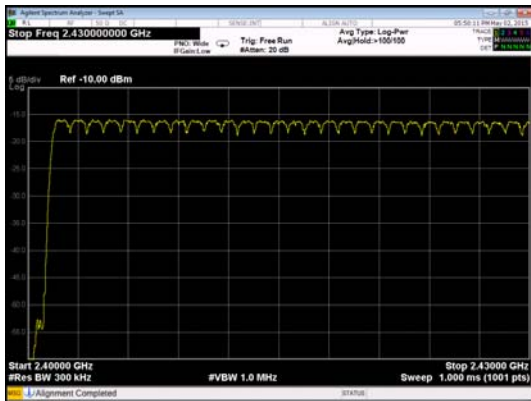


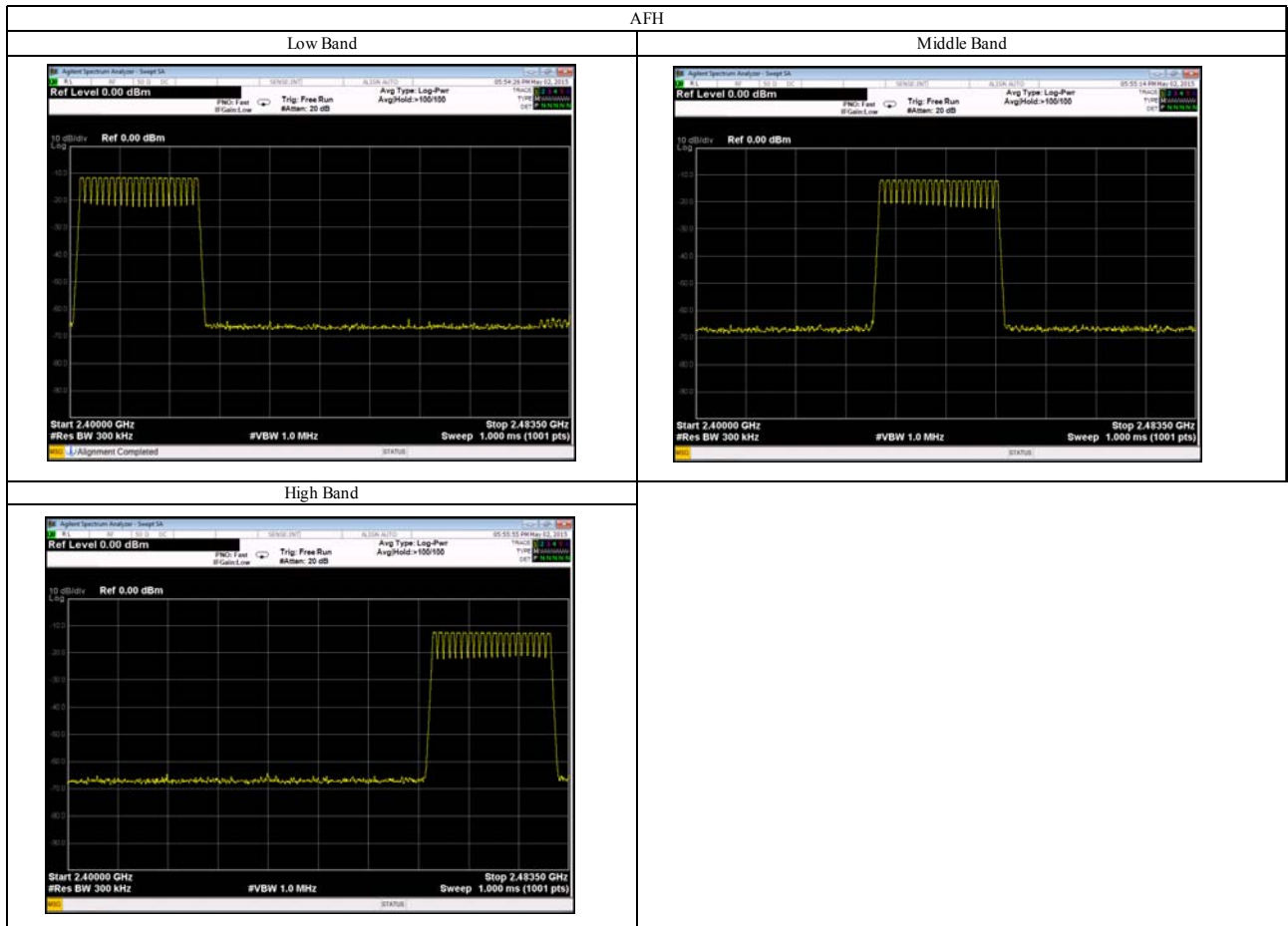
Spectrum Chart





3DH5





8. 6dB BANDWIDTH MEASUREMENT (DTS only)

8.1. Test Procedure

- (1) Connect the EUT RF output port to spectrum analyzer (*1) via calibrated coaxial cable and suitable attenuator (if necessary).
- (2) Activates the EUT System and execute the software prepared for test, if necessary.
- (3) To find out the worst condition, the transmitting data rate of EUT is changed.
- (4) 6dB Bandwidth is measured using the function of spectrum analyzer.

[Note]

(*1) Spectrum Analyzer Set Up Conditions

Resolution bandwidth : 100kHz
Video bandwidth : $\geq 3 \times \text{RBW}$
Detector function : Peak
x dB : -6dB

8.2. Test Results

11b

Measured Frequency (MHz)	6dB Bandwidth (MHz)	Limit (MHz)
2412	9.97	≥ 0.50
2437	9.97	≥ 0.50
2462	9.96	≥ 0.50

11g

Measured Frequency (MHz)	6dB Bandwidth (MHz)	Limit (MHz)
2412	16.59	≥ 0.50
2437	16.59	≥ 0.50
2462	16.59	≥ 0.50

11n-20

Measured Frequency (MHz)	6dB Bandwidth (MHz)	Limit (MHz)
2412	17.84	≥ 0.50
2437	17.85	≥ 0.50
2462	17.85	≥ 0.50

11n-40

Measured Frequency (MHz)	6dB Bandwidth (MHz)	Limit (MHz)
2422	36.57	≥ 0.50
2437	36.58	≥ 0.50
2452	36.58	≥ 0.50



[Note]
See next page figure.

Tested Date	Environment	
	Temperature	Humidity
2 May 2015	23 °C	30 %



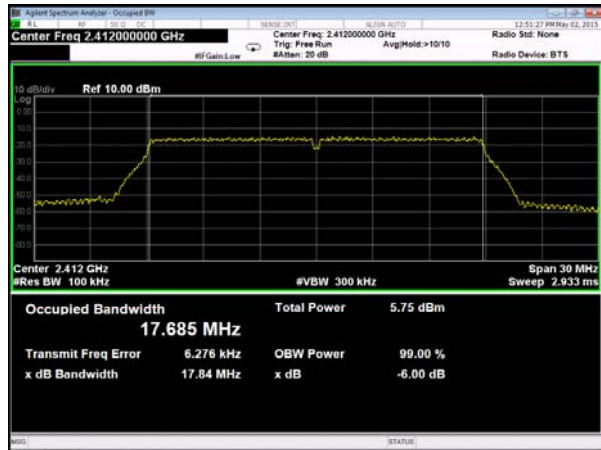
Spectrum Chart





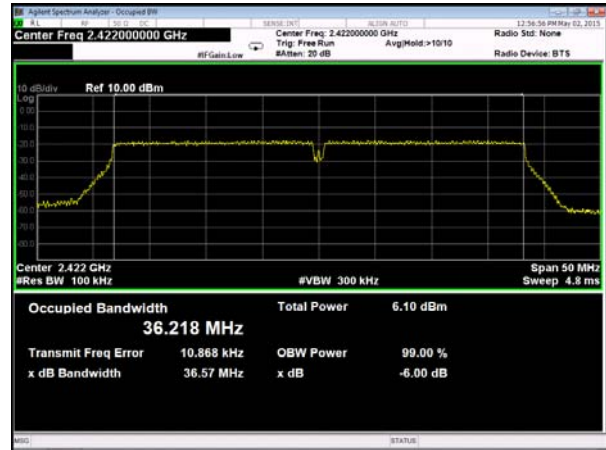
11n-20

2412MHz



11n-40

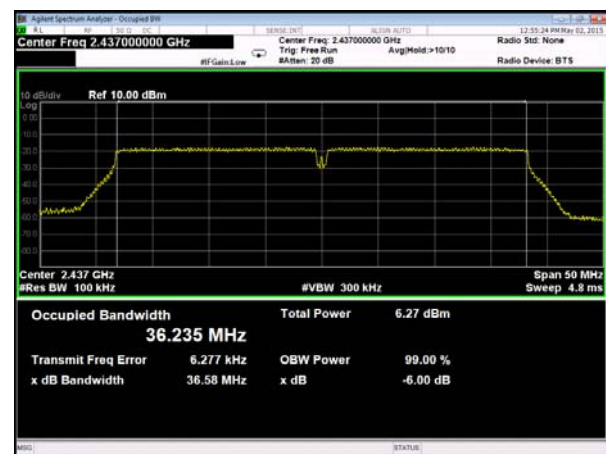
2422MHz



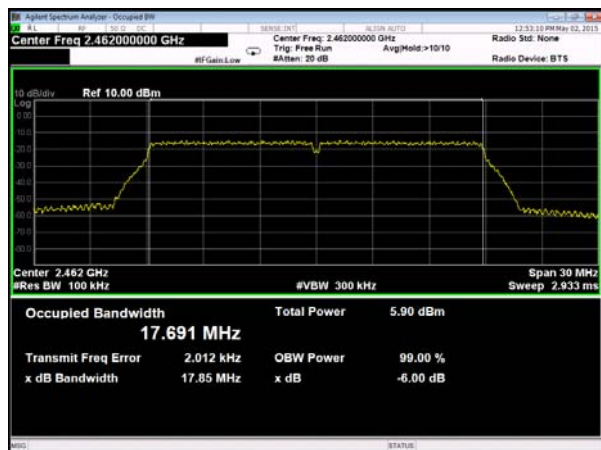
2437MHz



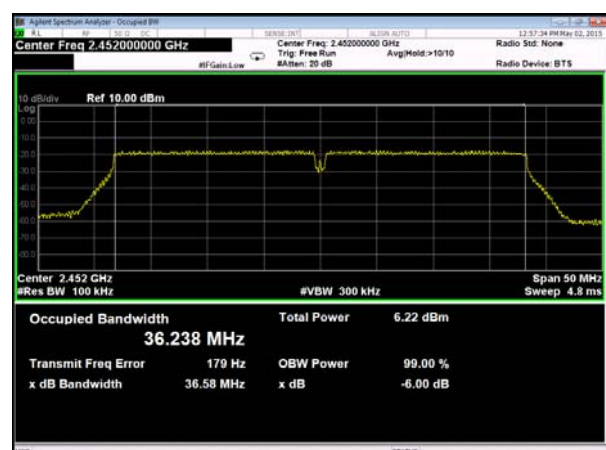
2437MHz



2462MHz



2452MHz



9. PEAK CONDUCTED OUTPUT POWER

9.1. Test Procedure

- (1) Connect the EUT RF output port to peak power meter via calibrated coaxial cable and suitable attenuator (if necessary).
- (2) Activates the EUT System and execute the software prepared for test, if necessary.
- (3) To find out the worst condition, the transmitting data rate of EUT is changed.
- (4) Measurement is started using the peak power meter.

9.2. Test Results

Wireless LAN

11b

Measured Frequency (MHz)	Correction Factor (dB)	Meter Reading (dBm)	Peak Output Power (dBm)	Limit (dBm)	Margin for Limit (dB)
2412	10.40	3.25	13.65	30.00	16.35
2437	10.40	3.37	13.77	30.00	16.23
2462	10.40	3.22	13.62	30.00	16.38

11g

Measured Frequency (MHz)	Correction Factor (dB)	Meter Reading (dBm)	Peak Output Power (dBm)	Limit (dBm)	Margin for Limit (dB)
2412	10.40	10.65	21.05	30.00	8.95
2437	10.40	11.06	21.46	30.00	8.54
2462	10.40	10.84	21.24	30.00	8.76

11n-20

Measured Frequency (MHz)	Correction Factor (dB)	Meter Reading (dBm)	Peak Output Power (dBm)	Limit (dBm)	Margin for Limit (dB)
2412	10.40	10.54	20.94	30.00	9.06
2437	10.40	10.67	21.07	30.00	8.93
2462	10.40	10.50	20.90	30.00	9.10

11n-40

Measured Frequency (MHz)	Correction Factor (dB)	Meter Reading (dBm)	Peak Output Power (dBm)	Limit (dBm)	Margin for Limit (dB)
2422	10.40	11.68	22.08	30.00	7.92
2437	10.40	11.54	21.94	30.00	8.06
2452	10.40	11.65	22.05	30.00	7.95



Bluetooth

DH5

Measured Frequency (MHz)	Correction Factor (dB)	Meter Reading (dBm)	Peak Output Power (dBm)	Limit (dBm)	Margin for Limit (dB)
2402	10.40	-10.67	-0.27	20.96	21.23
2441	10.40	-11.21	-0.81	20.96	21.77
2480	10.40	-11.89	-1.49	20.96	22.45

2DH5

Measured Frequency (MHz)	Correction Factor (dB)	Meter Reading (dBm)	Peak Output Power (dBm)	Limit (dBm)	Margin for Limit (dB)
2402	10.40	-12.67	-2.27	20.96	23.23
2441	10.40	-13.27	-2.87	20.96	23.83
2480	10.40	-13.81	-3.41	20.96	24.37

3DH5

Measured Frequency (MHz)	Correction Factor (dB)	Meter Reading (dBm)	Peak Output Power (dBm)	Limit (dBm)	Margin for Limit (dB)
2402	10.40	-12.14	-1.74	20.96	22.70
2441	10.40	-12.72	-2.32	20.96	23.28
2480	10.40	-13.27	-2.87	20.96	23.83

[Note]

Correction Factor includes the cable loss and attenuator loss.

[Calculation method]

Peak Output Power (dBm) = Meter Reading (dBm) + Correction Factor (dB)

Tested Date	Environment	
	Temperature	Humidity
2 May 2015	23 °C	30 %

10. POWER SPECTRAL DENSITY (DTS only)

10.1. Test Procedure

- (1) Connect the EUT RF output port to spectrum analyzer (*1) via calibrated coaxial cable and suitable attenuator (if necessary).
- (2) Activates the EUT System and execute the software prepared for test, if necessary.
- (3) To find out the worst condition, the transmitting data rate of EUT is changed.
- (4) Record the spectral density perform peak search using the spectrum analyzer.

[Note]

(*1) Spectrum Analyzer Set Up Conditions

Center Frequency	: Carrier frequency
Frequency Span	: 1.5 times the emission bandwidth
Resolution bandwidth	: 3kHz
Video bandwidth	: $\geq 3 \times \text{RBW}$
Detector function	: Peak

10.2. Test Results

11b

Measured Frequency (MHz)	Correction Factor (dB)	Meter Reading (dBm)	Power Spectral Density (dBm)	Limit (dBm)	Margin for Limit (dB)
2412	11.00	-22.77	-11.77	8.00	19.77
2437	11.00	-22.60	-11.60	8.00	19.60
2462	11.00	-22.51	-11.51	8.00	19.51

11g

Measured Frequency (MHz)	Correction Factor (dB)	Meter Reading (dBm)	Power Spectral Density (dBm)	Limit (dBm)	Margin for Limit (dB)
2412	11.00	-26.87	-15.87	8.00	23.87
2437	11.00	-26.65	-15.65	8.00	23.65
2462	11.00	-26.69	-15.69	8.00	23.69

11n-20

Measured Frequency (MHz)	Correction Factor (dB)	Meter Reading (dBm)	Power Spectral Density (dBm)	Limit (dBm)	Margin for Limit (dB)
2412	11.00	-25.23	-14.23	8.00	22.23
2437	11.00	-25.50	-14.50	8.00	22.50
2462	11.00	-25.62	-14.62	8.00	22.62

11n-40

Measured Frequency (MHz)	Correction Factor (dB)	Meter Reading (dBm)	Power Spectral Density (dBm)	Limit (dBm)	Margin for Limit (dB)
2422	11.00	-25.92	-14.92	8.00	22.92
2437	11.00	-27.27	-16.27	8.00	24.27
2452	11.00	-26.13	-15.13	8.00	23.13

[Note]

- (1) Correction Factor includes the cable loss and attenuator loss.
- (2) See next page figure.

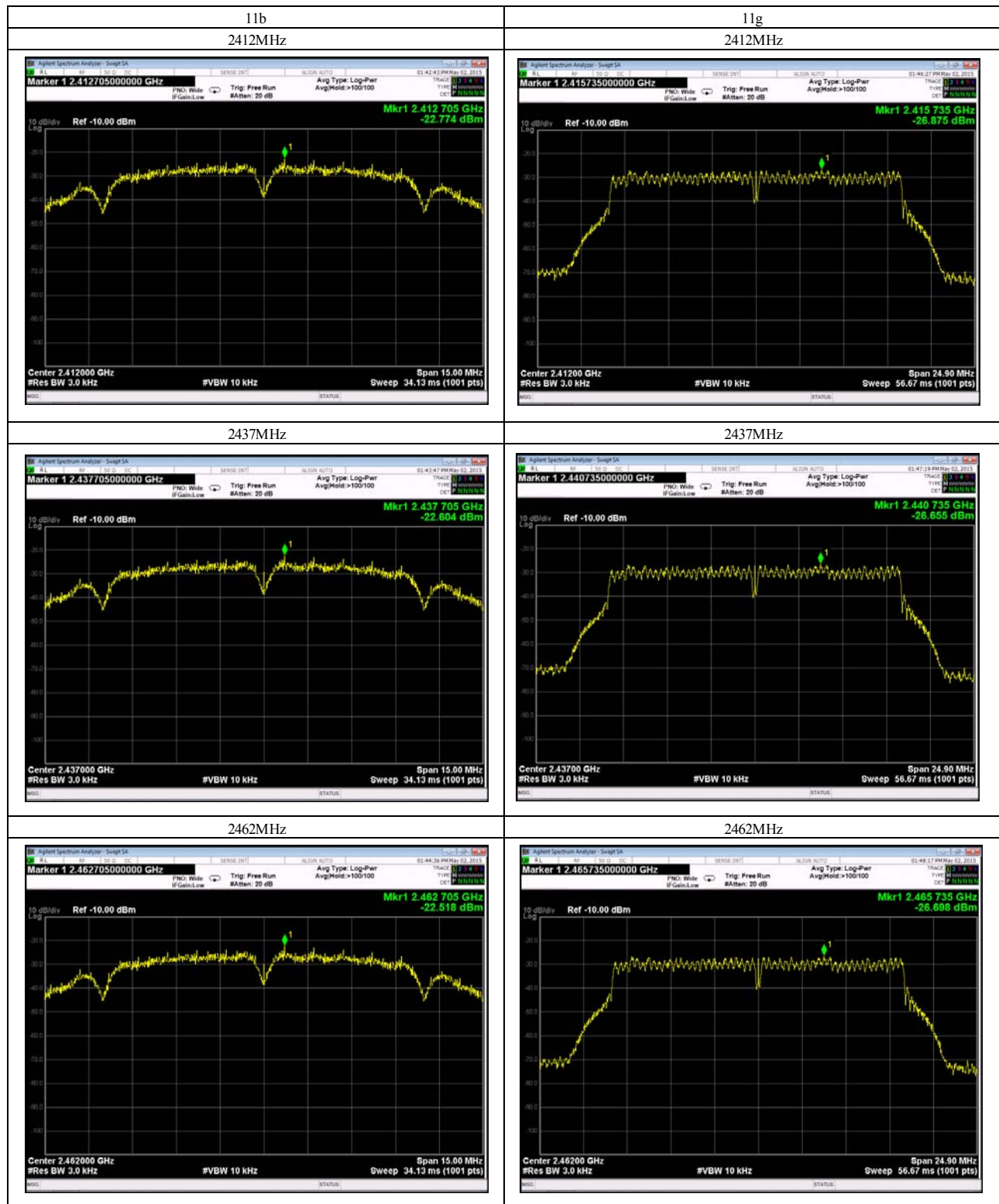
[Calculation method of Limit line]

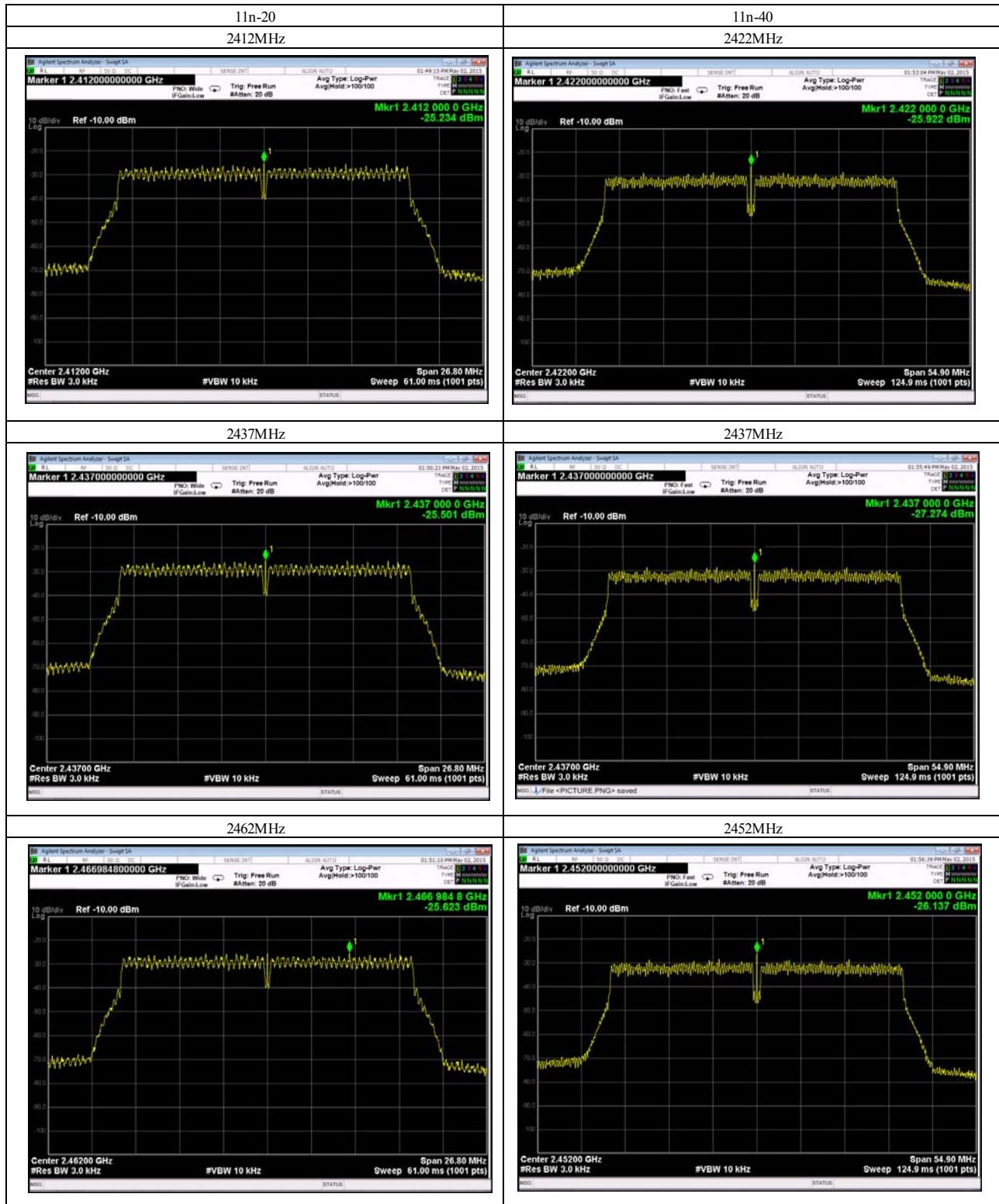
$$\text{Spectral Density (dBm)} = \text{Meter Reading (dBm)} + \text{Correction Factor (dB)}$$

Tested Date	Environment	
	Temperature	Humidity
2 May 2015	23 °C	30 %



Spectrum Chart





11. SPURIOUS EMISSION

11.1. Test Procedure

Radiated measurement

- (1) The EUT is placed in accordance with ANSI C63.4.
- (2) The EUT is activated as to simulate an worst datarate.
- (3) To find out the maximum emission of the configuration of the EUT System, the position of the cables are changed, then preliminary radiated measurement are performed using the spectrum analyzer ,the broad band antenna and the horn antenna.
- (4) The spectrums are scanned from 30MHz to 1GHz, and collect the highest emissions on the spectrum analyzer (*1) relative to the limits in the whole range.
In the frequency above 1GHz, it is performed using the spectrum analyzer (*1) and the horn antenna.
- (5) The highest emissions are measured at the specified distance using the test receiver (*2) and the broad band antenna or the tuned dipole. In the frequency above 1GHz, the measurements are performed by Bore-sight method using the spectrum analyzer (*3) and the horn antenna (*4).

Conducted measurement

- (1) Connect the EUT RF output port to the spectrum analyzer (*5) via calibrated coaxial cable and suitable attenuator (if necessary).
- (2) The EUT is activated as to simulate an worst data rate.

[Note]

(*1) Spectrum Analyzer Set Up Conditions (Pre-measurement)

- Frequency range : 30MHz – 1GHz / 1GHz – Upper frequency of measurement range
- Resolution bandwidth : 100kHz / 1MHz
- Detector function : Peak

(*2) Test Receiver Set Up Conditions

- Detector function : Quasi – Peak
- IF bandwidth : 120kHz

(*3) Peak measurement Set Up Conditions

- Resolution bandwidth : 1MHz
- Video bandwidth : 3 x RBW
- Detector function : Peak

Average measurement Set Up Conditions

- Resolution bandwidth : 1MHz
- Video bandwidth : 3 x RBW (DTS) / 10Hz (FHSS)
- Detector function : RMS (DTS) / Peak (FHSS)
- Trace : Trace Average 100 times (DTS)
- Y axis : Linear (FHSS)

Non-Restricted Band measurement Set Up Conditions

- Resolution bandwidth : 100kHz
- Video bandwidth : 3 x RBW
- Detector function : Peak

(*4) Cover Area of Horn Antenna (3dB Beamwidth)

Frequency [GHz]	Cover Area [m] at distance 3m	Cover Area [m] at distance 1m
1.0-6.0	1.89	-
5.8-12.4	0.63	0.21
12.4-40.0	0.47	0.16

(*5) Spectrum Analyzer Set Up Conditions

- Frequency range : 9kHz – 150kHz / 150kHz – 30MHz
- Resolution bandwidth : 300Hz / 10kHz
- Video bandwidth : 3 x RBW
- Detector function : Peak



11.2. Test Software List

KEC No.	Software Name	Version	Manufacture
TF-059	TEPTO Radiated emission automatic measurement	2.3.0321	TSJ
TF-110	Junction sheet	1.6H	KEC



11.3. Test Results

Wireless LAN

11b 2412MHz

Measured Frequency (MHz)	Correction Factor (dB/m)	Meter Reading		Distance Factor from 1m to 3m (dB)	Maximum Field Strength (dBμV/m)	Limit (dBμV/m)	Margin for Limit (dB)
		Horizontal Polarization (dBμV)	Vertical Polarization (dBμV)				
720.00	23.8	6.2	6.5	-	30.3	46.0	15.7
880.00	26.1	5.1	4.7	-	31.2	46.0	14.8
960.00	27.2	3.1	3.1	-	30.3	46.0	15.7
Peak measurement							
2390.00	3.9	44.6	44.8	-	48.7	74.0	25.3
4824.00	4.0	53.0	52.8	-	57.0	74.0	17.0
7236.00	-1.6	<45.0	<45.0	-	<43.4	74.0	>30.6
9648.00	1.9	<45.0	<45.0	-	<46.9	74.0	>27.1
12060.00	6.0	<45.0	<45.0	-	<51.0	74.0	>23.0
24120.00	12.7	<45.0	<45.0	9.5	<48.2	74.0	>25.8

Measured Frequency (MHz)	Correction Factor (dB/m)	Meter Reading		Distance Factor from 1 m to 3 m (dB)	Duty Cycle Factor (dB)	Maximum Field Strength (dBμV/m)	Limit (dBμV/m)	Margin for Limit (dB)
		Horizontal Polarization (dBμV)	Vertical Polarization (dBμV)					
Average measurement								
2390.00	3.9	33.6	33.5	-	-	37.5	54.0	16.5
4824.00	4.0	48.3	48.6	-	0.0	52.6	54.0	1.4
7236.00	-1.6	<35.0	<35.0	-	0.0	<33.4	54.0	>20.6
9648.00	1.9	<35.0	<35.0	-	0.0	<36.9	54.0	>17.1
12060.00	6.0	<35.0	<35.0	-	0.0	<41.0	54.0	>13.0
24120.00	12.7	<35.0	<35.0	9.5	0.0	<38.2	54.0	>15.8

[20dBc Data Sheet]

Measured Frequency (MHz)	Correction Factor (dB/m)	Meter Reading		Maximum Field Strength (dBμV/m)	Limit (dBμV/m)	Margin for Limit (dB)
		Horizontal Polarization (dBμV)	Vertical Polarization (dBμV)			
Peak measurement						
*1) 2412.00	3.9	91.8	-	95.7	-	-
2400.00	3.9	39.6	-	43.5	75.7	32.2
2396.95	3.9	43.0	-	46.9	75.7	28.8
*1) 2412.00	3.9	-	88.1	92.0	-	-
2400.00	3.9	-	36.3	40.2	72.0	31.8
2396.95	3.9	-	44.8	48.7	72.0	23.3



11b 2437MHz

Measured Frequency (MHz)	Correction Factor (dB/m)	Meter Reading		Distance Factor from 1 m to 3 m (dB)	Maximum Field Strength (dB μ V/m)	Limit (dB μ V/m)	Margin for Limit (dB)
		Horizontal Polarization (dB μ V)	Vertical Polarization (dB μ V)				
720.00	23.8	6.2	6.5	-	30.3	46.0	15.7
880.00	26.1	5.1	4.7	-	31.2	46.0	14.8
960.00	27.2	3.1	3.1	-	30.3	46.0	15.7
Peak measurement							
4874.00	4.2	52.6	50.2	-	56.8	74.0	17.2
7311.00	-1.4	<45.0	<45.0	-	<43.6	74.0	>30.4
9748.00	2.0	<45.0	<45.0	-	<47.0	74.0	>27.0
12185.00	6.3	<45.0	<45.0	-	<51.3	74.0	>22.7
24370.00	12.7	<45.0	<45.0	9.5	<48.2	74.0	>25.8

Measured Frequency (MHz)	Correction Factor (dB/m)	Meter Reading		Distance Factor from 1m to 3m (dB)	Duty Cycle Factor (dB)	Maximum Field Strength (dBμV/m)	Limit (dBμV/m)	Margin for Limit (dB)
		Horizontal Polarization (dBμV)	Vertical Polarization (dBμV)					
Average measurement								
4874.00	4.2	48.1	45.3	-	0.0	52.3	54.0	1.7
7311.00	-1.4	<35.0	<35.0	-	0.0	<33.6	54.0	>20.4
9748.00	2.0	<35.0	<35.0	-	0.0	<37.0	54.0	>17.0
12185.00	6.3	<35.0	<35.0	-	0.0	<41.3	54.0	>12.7
24370.00	12.7	<35.0	<35.0	9.5	0.0	<38.2	54.0	>15.8



11b 2462MHz

Measured Frequency (MHz)	Correction Factor (dB/m)	Meter Reading		Distance Factor from 1m to 3m (dB)	Maximum Field Strength (dBμV/m)	Limit (dBμV/m)	Margin for Limit (dB)
		Horizontal Polarization (dBμV)	Vertical Polarization (dBμV)				
720.00	23.8	6.2	6.5	-	30.3	46.0	15.7
880.00	26.1	5.1	4.7	-	31.2	46.0	14.8
960.00	27.2	3.1	3.1	-	30.3	46.0	15.7
Peak measurement							
2483.50	3.8	46.2	45.8	-	50.0	74.0	24.0
4924.00	4.3	52.2	51.0	-	56.5	74.0	17.5
7386.00	-1.4	<45.0	<45.0	-	<43.6	74.0	>30.4
9848.00	2.1	<45.0	<45.0	-	<47.1	74.0	>26.9
12310.00	6.6	<45.0	<45.0	-	<51.6	74.0	>22.4
24620.00	12.6	<45.0	<45.0	9.5	<48.1	74.0	>25.9

Measured Frequency (MHz)	Correction Factor (dB/m)	Meter Reading		Distance Factor from 1 m to 3 m (dB)	Duty Cycle Factor (dB)	Maximum Field Strength (dBμV/m)	Limit (dBμV/m)	Margin for Limit (dB)
		Horizontal Polarization (dBμV)	Vertical Polarization (dBμV)					
Average measurement								
2483.50	3.8	33.4	33.2	-	-	37.2	54.0	16.8
4924.00	4.3	47.9	46.1	-	0.0	52.2	54.0	1.8
7386.00	-1.4	<35.0	<35.0	-	0.0	<33.6	54.0	>20.4
9848.00	2.1	<35.0	<35.0	-	0.0	<37.1	54.0	>16.9
12310.00	6.6	<35.0	<35.0	-	0.0	<41.6	54.0	>12.4
24620.00	12.6	<35.0	<35.0	9.5	0.0	<38.1	54.0	>15.9

[20dBc Data Sheet]

Measured Frequency (MHz)	Correction Factor (dB/m)	Meter Reading		Maximum Field Strength (dBμV/m)	Limit (dBμV/m)	Margin for Limit (dB)
		Horizontal Polarization (dBμV)	Vertical Polarization (dBμV)			
Peak measurement						
*1) 2462.00	3.9	90.7	-	94.6	-	-
2483.50	3.9	33.8	-	37.7	74.6	36.9
*1) 2462.00	3.9	-	87.9	91.8	-	-
2483.50	3.9	-	33.4	37.3	71.8	34.5



11g 2412MHz

Measured Frequency (MHz)	Correction Factor (dB/m)	Meter Reading		Distance Factor from 1m to 3m (dB)	Maximum Field Strength (dBμV/m)	Limit (dBμV/m)	Margin for Limit (dB)
		Horizontal Polarization (dBμV)	Vertical Polarization (dBμV)				
720.00	23.8	6.3	6.3	-	30.1	46.0	15.9
880.00	26.1	5.4	4.5	-	31.5	46.0	14.5
960.00	27.2	4.8	4.3	-	32.0	46.0	14.0
Peak measurement							
2390.00	3.9	55.8	51.1	-	59.7	74.0	14.3
4824.00	4.0	51.8	50.6	-	55.8	74.0	18.2
7236.00	-1.6	<45.0	<45.0	-	<43.4	74.0	>30.6
9648.00	1.9	<45.0	<45.0	-	<46.9	74.0	>27.1
12060.00	6.0	<45.0	<45.0	-	<51.0	74.0	>23.0
24120.00	12.7	<45.0	<45.0	9.5	<48.2	74.0	>25.8

Measured Frequency (MHz)	Correction Factor (dB/m)	Meter Reading		Distance Factor from 1m to 3m (dB)	Duty Cycle Factor (dB)	Maximum Field Strength (dBμV/m)	Limit (dBμV/m)	Margin for Limit (dB)
		Horizontal Polarization (dBμV)	Vertical Polarization (dBμV)					
Average measurement								
2390.00	3.9	38.9	35.5	-	-	42.8	54.0	11.2
4824.00	4.0	40.9	39.6	-	0.0	44.9	54.0	9.1
7236.00	-1.6	<35.0	<35.0	-	0.0	<33.4	54.0	>20.6
9648.00	1.9	<35.0	<35.0	-	0.0	<36.9	54.0	>17.1
12060.00	6.0	<35.0	<35.0	-	0.0	<41.0	54.0	>13.0
24120.00	12.7	<35.0	<35.0	9.5	0.0	<38.2	54.0	>15.8

[20dBc Data Sheet]

Measured Frequency (MHz)	Correction Factor (dB/m)	Meter Reading		Maximum Field Strength (dBμV/m)	Limit (dBμV/m)	Margin for Limit (dB)
		Horizontal Polarization (dBμV)	Vertical Polarization (dBμV)			
Peak measurement						
*1) 2412.00	3.9	88.4	-	92.3	-	-
2400.00	3.9	50.8	-	54.7	72.3	17.6
*1) 2412.00	3.9	-	84.6	88.5	-	-
2400.00	3.9	-	48.5	52.4	68.5	16.1



11g 2437MHz

Measured Frequency (MHz)	Correction Factor (dB/m)	Meter Reading		Distance Factor from 1 m to 3 m (dB)	Maximum Field Strength (dB μ V/m)	Limit (dB μ V/m)	Margin for Limit (dB)
		Horizontal Polarization (dB μ V)	Vertical Polarization (dB μ V)				
720.00	23.8	6.3	6.3	-	30.1	46.0	15.9
880.00	26.1	5.4	4.5	-	31.5	46.0	14.5
960.00	27.2	4.8	4.3	-	32.0	46.0	14.0
Peak measurement							
4874.00	4.2	47.4	48.3	-	52.5	74.0	21.5
7311.00	-1.4	<45.0	<45.0	-	<43.6	74.0	>30.4
9748.00	2.0	<45.0	<45.0	-	<47.0	74.0	>27.0
12185.00	6.3	<45.0	<45.0	-	<51.3	74.0	>22.7
24370.00	12.7	<45.0	<45.0	9.5	<48.2	74.0	>25.8

Measured Frequency (MHz)	Correction Factor (dB/m)	Meter Reading		Distance Factor from 1 m to 3 m (dB)	Duty Cycle Factor (dB)	Maximum Field Strength (dBμV/m)	Limit (dBμV/m)	Margin for Limit (dB)
		Horizontal Polarization (dBμV)	Vertical Polarization (dBμV)					
Average measurement								
4874.00	4.2	36.0	37.5	-	0.0	41.7	54.0	12.3
7311.00	-1.4	<35.0	<35.0	-	0.0	<33.6	54.0	>20.4
9748.00	2.0	<35.0	<35.0	-	0.0	<37.0	54.0	>17.0
12185.00	6.3	<35.0	<35.0	-	0.0	<41.3	54.0	>12.7
24370.00	12.7	<35.0	<35.0	9.5	0.0	<38.2	54.0	>15.8



11g 2462MHz

Measured Frequency (MHz)	Correction Factor (dB/m)	Meter Reading		Distance Factor from 1m to 3m (dB)	Maximum Field Strength (dBμV/m)	Limit (dBμV/m)	Margin for Limit (dB)
		Horizontal Polarization (dBμV)	Vertical Polarization (dBμV)				
720.00	23.8	6.3	6.3	-	30.1	46.0	15.9
880.00	26.1	5.4	4.5	-	31.5	46.0	14.5
960.00	27.2	4.8	4.3	-	32.0	46.0	14.0
Peak measurement							
2483.50	3.8	48.9	49.3	-	53.1	74.0	20.9
4924.00	4.3	46.7	49.1	-	53.4	74.0	20.6
7386.00	-1.4	<45.0	<45.0	-	<43.6	74.0	>30.4
9848.00	2.1	<45.0	<45.0	-	<47.1	74.0	>26.9
12310.00	6.6	<45.0	<45.0	-	<51.6	74.0	>22.4
24620.00	12.6	<45.0	<45.0	9.5	<48.1	74.0	>25.9

Measured Frequency (MHz)	Correction Factor (dB/m)	Meter Reading		Distance Factor from 1 m to 3 m (dB)	Duty Cycle Factor (dB)	Maximum Field Strength (dBμV/m)	Limit (dBμV/m)	Margin for Limit (dB)
		Horizontal Polarization (dBμV)	Vertical Polarization (dBμV)					
Average measurement								
2483.50	3.8	36.8	36.2	-	-	40.6	54.0	13.4
4924.00	4.3	37.0	39.5	-	0.0	43.8	54.0	10.2
7386.00	-1.4	<35.0	<35.0	-	0.0	<33.6	54.0	>20.4
9848.00	2.1	<35.0	<35.0	-	0.0	<37.1	54.0	>16.9
12310.00	6.6	<35.0	<35.0	-	0.0	<41.6	54.0	>12.4
24620.00	12.6	<35.0	<35.0	9.5	0.0	<38.1	54.0	>15.9

[20dBc Data Sheet]

Measured Frequency (MHz)	Correction Factor (dB/m)	Meter Reading		Maximum Field Strength (dBμV/m)	Limit (dBμV/m)	Margin for Limit (dB)
		Horizontal Polarization (dBμV)	Vertical Polarization (dBμV)			
Peak measurement						
*1) 2462.00	3.9	88.2	-	92.1	-	-
2483.50	3.9	35.6	-	39.5	72.1	32.6
*1) 2462.00	3.9	-	84.8	88.7	-	-
2483.50	3.9	-	35.0	38.9	68.7	29.8



11n-20 2412MHz

Measured Frequency (MHz)	Correction Factor (dB/m)	Meter Reading		Distance Factor from 1m to 3m (dB)	Maximum Field Strength (dBμV/m)	Limit (dBμV/m)	Margin for Limit (dB)
		Horizontal Polarization (dBμV)	Vertical Polarization (dBμV)				
720.00	23.8	6.2	6.4	-	30.2	46.0	15.8
880.00	26.1	5.6	5.3	-	31.7	46.0	14.3
960.00	27.2	4.9	4.5	-	32.1	46.0	13.9
Peak measurement							
2390.00	3.9	55.9	52.2	-	59.8	74.0	14.2
4824.00	4.0	48.0	49.9	-	53.9	74.0	20.1
7236.00	-1.6	<45.0	<45.0	-	<43.4	74.0	>30.6
9648.00	1.9	<45.0	<45.0	-	<46.9	74.0	>27.1
12060.00	6.0	<45.0	<45.0	-	<51.0	74.0	>23.0
24120.00	12.7	<45.0	<45.0	9.5	<48.2	74.0	>25.8

Measured Frequency (MHz)	Correction Factor (dB/m)	Meter Reading		Distance Factor from 1 m to 3 m (dB)	Duty Cycle Factor (dB)	Maximum Field Strength (dBμV/m)	Limit (dBμV/m)	Margin for Limit (dB)
		Horizontal Polarization (dBμV)	Vertical Polarization (dBμV)					
Average measurement								
2390.00	3.9	37.9	35.9	-	-	41.8	54.0	12.2
4824.00	4.0	37.4	38.4	-	0.0	42.4	54.0	11.6
7236.00	-1.6	<35.0	<35.0	-	0.0	<33.4	54.0	>20.6
9648.00	1.9	<35.0	<35.0	-	0.0	<36.9	54.0	>17.1
12060.00	6.0	<35.0	<35.0	-	0.0	<41.0	54.0	>13.0
24120.00	12.7	<35.0	<35.0	9.5	0.0	<38.2	54.0	>15.8

[20dBc Data Sheet]

Measured Frequency (MHz)	Correction Factor (dB/m)	Meter Reading		Maximum Field Strength (dBµV/m)	Limit (dBµV/m)	Margin for Limit (dB)
		Horizontal Polarization (dBµV)	Vertical Polarization (dBµV)			
Peak measurement						
*1) 2412.00	3.9	86.9	-	90.8	-	-
2400.00	3.9	46.9	-	50.8	70.8	20.0
*1) 2412.00	3.9	-	82.8	86.7	-	-
2400.00	3.9	-	41.4	45.3	66.7	21.4



11n-20 2437MHz

Measured Frequency (MHz)	Correction Factor (dB/m)	Meter Reading		Distance Factor from 1 m to 3 m (dB)	Maximum Field Strength (dB μ V/m)	Limit (dB μ V/m)	Margin for Limit (dB)
		Horizontal Polarization (dB μ V)	Vertical Polarization (dB μ V)				
720.00	23.8	6.2	6.4	-	30.2	46.0	15.8
880.00	26.1	5.6	5.3	-	31.7	46.0	14.3
960.00	27.2	4.9	4.5	-	32.1	46.0	13.9
Peak measurement							
4874.00	4.2	45.3	48.1	-	52.3	74.0	21.7
7311.00	-1.4	<45.0	<45.0	-	<43.6	74.0	>30.4
9748.00	2.0	<45.0	<45.0	-	<47.0	74.0	>27.0
12185.00	6.3	<45.0	<45.0	-	<51.3	74.0	>22.7
24370.00	12.7	<45.0	<45.0	9.5	<48.2	74.0	>25.8

Measured Frequency (MHz)	Correction Factor (dB/m)	Meter Reading		Distance Factor from 1 m to 3 m (dB)	Duty Cycle Factor (dB)	Maximum Field Strength (dBμV/m)	Limit (dBμV/m)	Margin for Limit (dB)
		Horizontal Polarization (dBμV)	Vertical Polarization (dBμV)					
Average measurement								
4874.00	4.2	35.4	36.5	-	0.0	40.7	54.0	13.3
7311.00	-1.4	<35.0	<35.0	-	0.0	<33.6	54.0	>20.4
9748.00	2.0	<35.0	<35.0	-	0.0	<37.0	54.0	>17.0
12185.00	6.3	<35.0	<35.0	-	0.0	<41.3	54.0	>12.7
24370.00	12.7	<35.0	<35.0	9.5	0.0	<38.2	54.0	>15.8



11n-20 2462MHz

Measured Frequency (MHz)	Correction Factor (dB/m)	Meter Reading		Distance Factor from 1m to 3m (dB)	Maximum Field Strength (dBμV/m)	Limit (dBμV/m)	Margin for Limit (dB)
		Horizontal Polarization (dBμV)	Vertical Polarization (dBμV)				
720.00	23.8	6.2	6.4	-	30.2	46.0	15.8
880.00	26.1	5.6	5.3	-	31.7	46.0	14.3
960.00	27.2	4.9	4.5	-	32.1	46.0	13.9
Peak measurement							
2483.50	3.8	48.1	46.2	-	51.9	74.0	22.1
4924.00	4.3	47.5	50.0	-	54.3	74.0	19.7
7386.00	-1.4	<45.0	<45.0	-	<43.6	74.0	>30.4
9848.00	2.1	<45.0	<45.0	-	<47.1	74.0	>26.9
12310.00	6.6	<45.0	<45.0	-	<51.6	74.0	>22.4
24620.00	12.6	<45.0	<45.0	9.5	<48.1	74.0	>25.9

Measured Frequency (MHz)	Correction Factor (dB/m)	Meter Reading		Distance Factor from 1m to 3m (dB)	Duty Cycle Factor (dB)	Maximum Field Strength (dBμV/m)	Limit (dBμV/m)	Margin for Limit (dB)
		Horizontal Polarization (dBμV)	Vertical Polarization (dBμV)					
Average measurement								
2483.50	3.8	35.2	34.9	-	-	39.0	54.0	15.0
4924.00	4.3	36.5	39.0	-	0.0	43.3	54.0	10.7
7386.00	-1.4	<35.0	<35.0	-	0.0	<33.6	54.0	>20.4
9848.00	2.1	<35.0	<35.0	-	0.0	<37.1	54.0	>16.9
12310.00	6.6	<35.0	<35.0	-	0.0	<41.6	54.0	>12.4
24620.00	12.6	<35.0	<35.0	9.5	0.0	<38.1	54.0	>15.9

[20dBc Data Sheet]

Measured Frequency (MHz)	Correction Factor (dB/m)	Meter Reading		Maximum Field Strength (dBμV/m)	Limit (dBμV/m)	Margin for Limit (dB)
		Horizontal Polarization (dBμV)	Vertical Polarization (dBμV)			
Peak measurement						
*1) 2462.00	3.9	86.4	-	90.3	-	-
2483.50	3.9	35.2	-	39.1	70.3	31.2
*1) 2462.00	3.9	-	82.7	86.6	-	-
2483.50	3.9	-	34.5	38.4	66.6	28.2



11n-40 2422MHz

Measured Frequency (MHz)	Correction Factor (dB/m)	Meter Reading		Distance Factor from 1m to 3m (dB)	Maximum Field Strength (dBμV/m)	Limit (dBμV/m)	Margin for Limit (dB)
		Horizontal Polarization (dBμV)	Vertical Polarization (dBμV)				
720.00	23.8	9.0	8.0	-	32.8	46.0	13.2
880.00	26.1	3.0	3.1	-	29.2	46.0	16.8
960.00	27.2	5.8	4.8	-	33.0	46.0	13.0
Peak measurement							
2390.00	3.9	52.0	50.6	-	55.9	74.0	18.1
4844.00	4.0	47.4	47.1	-	51.4	74.0	22.6
7266.00	-1.5	<45.0	<45.0	-	<43.5	74.0	>30.5
9688.00	1.9	<45.0	<45.0	-	<46.9	74.0	>27.1
12110.00	6.1	<45.0	<45.0	-	<51.1	74.0	>22.9
24220.00	12.6	<45.0	<45.0	9.5	<48.1	74.0	>25.9

Measured Frequency (MHz)	Correction Factor (dB/m)	Meter Reading		Distance Factor from 1 m to 3 m (dB)	Duty Cycle Factor (dB)	Maximum Field Strength (dBμV/m)	Limit (dBμV/m)	Margin for Limit (dB)
		Horizontal Polarization (dBμV)	Vertical Polarization (dBμV)					
Average measurement								
2390.00	3.9	38.7	39.1	-	-	43.0	54.0	11.0
4844.00	4.0	36.7	35.7	-	0.0	40.7	54.0	13.3
7266.00	-1.5	<35.0	<35.0	-	0.0	<33.5	54.0	>20.5
9688.00	1.9	<35.0	<35.0	-	0.0	<36.9	54.0	>17.1
12110.00	6.1	<35.0	<35.0	-	0.0	<41.1	54.0	>12.9
24220.00	12.6	<35.0	<35.0	9.5	0.0	<38.1	54.0	>15.9

[20dBc Data Sheet]

Measured Frequency (MHz)	Correction Factor (dB/m)	Meter Reading		Maximum Field Strength (dBμV/m)	Limit (dBμV/m)	Margin for Limit (dB)
		Horizontal Polarization (dBμV)	Vertical Polarization (dBμV)			
Peak measurement						
*1) 2422.00	4.0	82.7	-	86.7	-	-
2400.00	3.9	41.7	-	45.6	66.7	21.1
*1) 2422.00	4.0	-	80.2	84.2	-	-
2400.00	3.9	-	41.9	45.8	64.2	18.4



11n-40 2437MHz

Measured Frequency (MHz)	Correction Factor (dB/m)	Meter Reading		Distance Factor from 1 m to 3 m (dB)	Maximum Field Strength (dB μ V/m)	Limit (dB μ V/m)	Margin for Limit (dB)
		Horizontal Polarization (dB μ V)	Vertical Polarization (dB μ V)				
720.00	23.8	9.0	8.0	-	32.8	46.0	13.2
880.00	26.1	3.0	3.1	-	29.2	46.0	16.8
960.00	27.2	5.8	4.8	-	33.0	46.0	13.0
Peak measurement							
4874.00	4.2	47.4	46.0	-	51.6	74.0	22.4
7311.00	-1.4	<45.0	<45.0	-	<43.6	74.0	>30.4
9748.00	2.0	<45.0	<45.0	-	<47.0	74.0	>27.0
12185.00	6.3	<45.0	<45.0	-	<51.3	74.0	>22.7
24370.00	12.7	<45.0	<45.0	9.5	<48.2	74.0	>25.8

Measured Frequency (MHz)	Correction Factor (dB/m)	Meter Reading		Distance Factor from 1 m to 3 m (dB)	Duty Cycle Factor (dB)	Maximum Field Strength (dBμV/m)	Limit (dBμV/m)	Margin for Limit (dB)
		Horizontal Polarization (dBμV)	Vertical Polarization (dBμV)					
Average measurement								
4874.00	4.2	36.6	35.1	-	0.0	40.8	54.0	13.2
7311.00	-1.4	<35.0	<35.0	-	0.0	<33.6	54.0	>20.4
9748.00	2.0	<35.0	<35.0	-	0.0	<37.0	54.0	>17.0
12185.00	6.3	<35.0	<35.0	-	0.0	<41.3	54.0	>12.7
24370.00	12.7	<35.0	<35.0	9.5	0.0	<38.2	54.0	>15.8



11n-40 2452MHz

Measured Frequency (MHz)	Correction Factor (dB/m)	Meter Reading		Distance Factor from 1m to 3m (dB)	Maximum Field Strength (dBμV/m)	Limit (dBμV/m)	Margin for Limit (dB)
		Horizontal Polarization (dBμV)	Vertical Polarization (dBμV)				
720.00	23.8	9.0	8.0	-	32.8	46.0	13.2
880.00	26.1	3.0	3.1	-	29.2	46.0	16.8
960.00	27.2	5.8	4.8	-	33.0	46.0	13.0
Peak measurement							
2483.50	3.8	51.3	51.1	-	55.1	74.0	18.9
4904.00	4.4	45.3	45.3	-	49.7	74.0	24.3
7356.00	-1.4	<45.0	<45.0	-	<43.6	74.0	>30.4
9808.00	2.1	<45.0	<45.0	-	<47.1	74.0	>26.9
12260.00	6.4	<45.0	<45.0	-	<51.4	74.0	>22.6
24520.00	12.6	<45.0	<45.0	9.5	<48.1	74.0	>25.9

Measured Frequency (MHz)	Correction Factor (dB/m)	Meter Reading		Distance Factor from 1m to 3m (dB)	Duty Cycle Factor (dB)	Maximum Field Strength (dBμV/m)	Limit (dBμV/m)	Margin for Limit (dB)
		Horizontal Polarization (dBμV)	Vertical Polarization (dBμV)					
Average measurement								
2483.50	3.8	39.1	37.7	-	-	42.9	54.0	11.1
4904.00	4.4	35.3	34.3	-	0.0	39.7	54.0	14.3
7356.00	-1.4	<35.0	<35.0	-	0.0	<33.6	54.0	>20.4
9808.00	2.1	<35.0	<35.0	-	0.0	<37.1	54.0	>16.9
12260.00	6.4	<35.0	<35.0	-	0.0	<41.4	54.0	>12.6
24520.00	12.6	<35.0	<35.0	9.5	0.0	<38.1	54.0	>15.9

[20dBc Data Sheet]

Measured Frequency (MHz)	Correction Factor (dB/m)	Meter Reading		Maximum Field Strength (dBμV/m)	Limit (dBμV/m)	Margin for Limit (dB)
		Horizontal Polarization (dBμV)	Vertical Polarization (dBμV)			
Peak measurement						
*1) 2452.00	4.0	81.6	-	85.6	-	-
2483.50	3.9	39.7	-	43.6	65.6	22.0
*1) 2452.00	4.0	-	81.0	85.0	-	-
2483.50	3.9	-	38.1	42.0	65.0	23.0



Bluetooth

DH5 2402MHz

Measured Frequency (MHz)	Correction Factor (dB/m)	Meter Reading		Distance Factor from 1m to 3m (dB)	Maximum Field Strength (dBμV/m)	Limit (dBμV/m)	Margin for Limit (dB)
		Horizontal Polarization (dBμV)	Vertical Polarization (dBμV)				
720.00	23.8	9.8	8.7	-	33.6	46.0	12.4
800.00	24.2	9.5	6.5	-	33.7	46.0	12.3
880.00	26.1	4.1	3.4	-	30.2	46.0	15.8
960.00	27.2	3.8	2.6	-	31.0	46.0	15.0
Peak measurement							
2390.00	3.9	45.3	44.9	-	49.2	74.0	24.8
4804.00	4.0	<45.0	<45.0	-	<49.0	74.0	>25.0
7206.00	-1.7	49.1	48.3	-	47.4	74.0	26.6
9608.00	1.9	49.5	47.3	-	51.4	74.0	22.6
12010.00	5.8	48.9	47.8	-	54.7	74.0	19.3
14412.00	5.1	45.2	45.5	9.5	41.1	74.0	32.9
16814.00	7.1	46.7	46.9	9.5	44.5	74.0	29.5
19216.00	9.5	47.2	45.1	9.5	47.2	74.0	26.8
21618.00	10.3	44.5	46.3	9.5	47.1	74.0	26.9
24020.00	11.5	48.1	46.8	9.5	50.1	74.0	23.9
Average measurement							
2390.00	3.9	33.6	33.6	-	37.5	54.0	16.5
4804.00	4.0	<35.0	<35.0	-	<39.0	54.0	>15.0
7206.00	-1.7	41.7	40.3	-	40.0	54.0	14.0
9608.00	1.9	41.3	37.8	-	43.2	54.0	10.8
12010.00	5.8	38.6	37.6	-	44.4	54.0	9.6
14412.00	5.1	34.1	33.8	9.5	29.7	54.0	24.3
16814.00	7.1	35.0	35.3	9.5	32.9	54.0	21.1
19216.00	9.5	36.8	35.5	9.5	36.8	54.0	17.2
21618.00	10.3	34.4	34.6	9.5	35.4	54.0	18.6
24020.00	11.5	37.0	35.8	9.5	39.0	54.0	15.0

[20dBc Data Sheet]

Measured Frequency (MHz)	Correction Factor (dB/m)	Meter Reading		Maximum Field Strength (dBμV/m)	Limit (dBμV/m)	Margin for Limit (dB)
		Horizontal Polarization (dBμV)	Vertical Polarization (dBμV)			
Peak measurement						
*1) 2402.00	3.9	88.0	-	91.9	-	-
2400.00	3.9	32.8	-	36.7	71.9	35.2
*1) 2402.00	3.9	-	85.1	89.0	-	-
2400.00	3.9	-	33.6	37.5	69.0	31.5



DH5 2441MHz

Measured Frequency (MHz)	Correction Factor (dB/m)	Meter Reading		Distance Factor from 1m to 3m (dB)	Maximum Field Strength (dBμV/m)	Limit (dBμV/m)	Margin for Limit (dB)
		Horizontal Polarization (dBμV)	Vertical Polarization (dBμV)				
720.00	23.8	6.2	6.5	-	30.3	46.0	15.7
880.00	26.1	5.1	4.7	-	31.2	46.0	14.8
960.00	27.2	3.1	3.1	-	30.3	46.0	15.7
Peak measurement							
4882.00	4.3	<45.0	<45.0	-	<49.3	74.0	>24.7
7323.00	-1.4	49.4	49.2	-	48.0	74.0	26.0
9764.00	2.0	48.0	47.9	-	50.0	74.0	24.0
12205.00	6.3	50.0	49.3	-	56.3	74.0	17.7
14646.00	5.1	45.1	43.6	9.5	40.7	74.0	33.3
17087.00	7.4	47.9	45.2	9.5	45.8	74.0	28.2
19528.00	9.6	45.5	46.4	9.5	46.5	74.0	27.5
21969.00	10.4	44.2	44.1	9.5	45.1	74.0	28.9
24410.00	11.6	48.1	48.9	9.5	51.0	74.0	23.0
Average measurement							
4882.00	4.3	<35.0	<35.0	-	<39.3	54.0	>14.7
7323.00	-1.4	42.5	42.1	-	41.1	54.0	12.9
9764.00	2.0	38.3	37.6	-	40.3	54.0	13.7
12205.00	6.3	39.9	39.9	-	46.2	54.0	7.8
14646.00	5.1	34.1	32.4	9.5	29.7	54.0	24.3
17087.00	7.4	35.5	33.9	9.5	33.4	54.0	20.6
19528.00	9.6	36.0	36.4	9.5	36.5	54.0	17.5
21969.00	10.4	34.0	34.4	9.5	35.3	54.0	18.7
24410.00	11.6	37.4	37.5	9.5	39.6	54.0	14.4



DH5 2480MHz

Measured Frequency (MHz)	Correction Factor (dB/m)	Meter Reading		Distance Factor from 1m to 3m (dB)	Maximum Field Strength (dBμV/m)	Limit (dBμV/m)	Margin for Limit (dB)
		Horizontal Polarization (dBμV)	Vertical Polarization (dBμV)				
720.00	23.8	9.8	8.7	-	33.6	46.0	12.4
800.00	24.2	9.5	6.5	-	33.7	46.0	12.3
880.00	26.1	4.1	3.4	-	30.2	46.0	15.8
960.00	27.2	3.8	2.6	-	31.0	46.0	15.0
Peak measurement							
2483.50	3.8	46.0	45.5	-	49.8	74.0	24.2
4960.00	4.1	<45.0	<45.0	-	<49.1	74.0	>24.9
7440.00	-1.3	49.9	50.2	-	48.9	74.0	25.1
9920.00	2.3	46.3	46.2	-	48.6	74.0	25.4
12400.00	5.5	51.5	49.6	-	57.0	74.0	17.0
14880.00	5.2	48.2	46.9	9.5	43.9	74.0	30.1
17360.00	7.8	47.4	45.4	9.5	45.7	74.0	28.3
19840.00	9.7	44.3	47.1	9.5	47.3	74.0	26.7
22320.00	10.5	45.3	44.8	9.5	46.3	74.0	27.7
24800.00	11.5	48.9	48.2	9.5	50.9	74.0	23.1
Average measurement							
2483.50	3.8	33.5	33.3	-	37.3	54.0	16.7
4960.00	4.1	<35.0	<35.0	-	<39.1	54.0	>14.9
7440.00	-1.3	43.3	43.6	-	42.3	54.0	11.7
9920.00	2.3	36.2	35.5	-	38.5	54.0	15.5
12400.00	5.5	42.0	40.8	-	47.5	54.0	6.5
14880.00	5.2	35.6	35.4	9.5	31.3	54.0	22.7
17360.00	7.8	35.8	33.9	9.5	34.1	54.0	19.9
19840.00	9.7	35.6	38.1	9.5	38.3	54.0	15.7
22320.00	10.5	36.2	35.5	9.5	37.2	54.0	16.8
24800.00	11.5	37.3	36.4	9.5	39.3	54.0	14.7

[20dBc Data Sheet]

Measured Frequency (MHz)	Correction Factor (dB/m)	Meter Reading		Maximum Field Strength (dBμV/m)	Limit (dBμV/m)	Margin for Limit (dB)
		Horizontal Polarization (dBμV)	Vertical Polarization (dBμV)			
Peak measurement						
* 1) 2480.00	3.9	89.6	-	93.5	-	-
2483.50	3.9	33.5	-	37.4	73.5	36.1
* 1) 2480.00	3.9	-	86.8	90.7	-	-
2483.50	3.9	-	33.8	37.7	70.7	33.0



3DH5 2402MHz

Measured Frequency (MHz)	Correction Factor (dB/m)	Meter Reading		Distance Factor from 1m to 3m (dB)	Maximum Field Strength (dBμV/m)	Limit (dBμV/m)	Margin for Limit (dB)
		Horizontal Polarization (dBμV)	Vertical Polarization (dBμV)				
720.00	23.8	9.5	7.9	-	33.3	46.0	12.7
800.00	24.2	9.1	5.5	-	33.3	46.0	12.7
880.00	26.1	5.4	4.9	-	31.5	46.0	14.5
960.00	27.2	3.3	2.7	-	30.5	46.0	15.5
Peak measurement							
2390.00	3.9	46.0	45.7	-	49.9	74.0	24.1
4804.00	4.0	<45.0	<45.0	-	<49.0	74.0	>25.0
7206.00	-1.7	46.6	46.4	-	44.9	74.0	29.1
9608.00	1.9	51.8	48.8	-	53.7	74.0	20.3
12010.00	5.8	48.8	47.7	-	54.6	74.0	19.4
14412.00	5.1	49.1	46.1	9.5	44.7	74.0	29.3
16814.00	7.1	46.2	46.5	9.5	44.1	74.0	29.9
19216.00	9.5	44.4	44.5	9.5	44.5	74.0	29.5
21618.00	10.3	43.6	43.8	9.5	44.6	74.0	29.4
24020.00	11.5	46.6	46.3	9.5	48.6	74.0	25.4
Average measurement							
2390.00	3.9	33.6	33.5	-	37.5	54.0	16.5
4804.00	4.0	<35.0	<35.0	-	<39.0	54.0	>15.0
7206.00	-1.7	37.8	36.6	-	36.1	54.0	17.9
9608.00	1.9	43.9	38.3	-	45.8	54.0	8.2
12010.00	5.8	37.4	36.6	-	43.2	54.0	10.8
14412.00	5.1	37.5	35.4	9.5	33.1	54.0	20.9
16814.00	7.1	34.3	34.3	9.5	31.9	54.0	22.1
19216.00	9.5	33.6	33.5	9.5	33.6	54.0	20.4
21618.00	10.3	33.5	33.6	9.5	34.4	54.0	19.6
24020.00	11.5	34.8	34.6	9.5	36.8	54.0	17.2

[20dBc Data Sheet]

Measured Frequency (MHz)	Correction Factor (dB/m)	Meter Reading		Maximum Field Strength (dBμV/m)	Limit (dBμV/m)	Margin for Limit (dB)
		Horizontal Polarization (dBμV)	Vertical Polarization (dBμV)			
Peak measurement						
*1) 2402.00	3.9	84.9	-	88.8	-	-
2400.00	3.9	36.5	-	40.4	68.8	28.4
*1) 2402.00	3.9	-	81.4	85.3	-	-
2400.00	3.9	-	34.1	38.0	65.3	27.3



3DH5 2441MHz

Measured Frequency (MHz)	Correction Factor (dB/m)	Meter Reading		Distance Factor from 1m to 3m (dB)	Maximum Field Strength (dBμV/m)	Limit (dBμV/m)	Margin for Limit (dB)
		Horizontal Polarization (dBμV)	Vertical Polarization (dBμV)				
720.00	23.8	9.5	7.9	-	33.3	46.0	12.7
800.00	24.2	9.1	5.5	-	33.3	46.0	12.7
880.00	26.1	5.4	4.9	-	31.5	46.0	14.5
960.00	27.2	3.3	2.7	-	30.5	46.0	15.5
Peak measurement							
4882.00	4.3	<45.0	<45.0	-	<49.3	74.0	>24.7
7323.00	-1.4	49.0	47.7	-	47.6	74.0	26.4
9764.00	2.0	49.2	45.7	-	51.2	74.0	22.8
12205.00	6.3	48.6	47.6	-	54.9	74.0	19.1
14646.00	5.1	47.8	45.8	9.5	43.4	74.0	30.6
17087.00	7.4	47.0	45.6	9.5	44.9	74.0	29.1
19528.00	9.6	45.7	44.7	9.5	45.8	74.0	28.2
21969.00	10.4	41.6	41.4	9.5	42.5	74.0	31.5
24410.00	11.6	47.1	46.9	9.5	49.2	74.0	24.8
Average measurement							
4882.00	4.3	<35.0	<35.0	-	<39.3	54.0	>14.7
7323.00	-1.4	39.0	38.2	-	37.6	54.0	16.4
9764.00	2.0	40.1	35.4	-	42.1	54.0	11.9
12205.00	6.3	38.0	36.8	-	44.3	54.0	9.7
14646.00	5.1	35.8	34.9	9.5	31.4	54.0	22.6
17087.00	7.4	34.0	33.8	9.5	31.9	54.0	22.1
19528.00	9.6	35.0	34.0	9.5	35.1	54.0	18.9
21969.00	10.4	33.0	33.1	9.5	34.0	54.0	20.0
24410.00	11.6	36.2	35.8	9.5	38.3	54.0	15.7



3DH5 2480MHz

Measured Frequency (MHz)	Correction Factor (dB/m)	Meter Reading		Distance Factor from 1m to 3m (dB)	Maximum Field Strength (dBμV/m)	Limit (dBμV/m)	Margin for Limit (dB)
		Horizontal Polarization (dBμV)	Vertical Polarization (dBμV)				
720.00	23.8	9.5	7.9	-	33.3	46.0	12.7
800.00	24.2	9.1	5.5	-	33.3	46.0	12.7
880.00	26.1	5.4	4.9	-	31.5	46.0	14.5
960.00	27.2	3.3	2.7	-	30.5	46.0	15.5
Peak measurement							
2483.50	3.8	45.6	47.0	-	50.8	74.0	23.2
4960.00	4.1	<45.0	<45.0	-	<49.1	74.0	>24.9
7440.00	-1.3	48.8	47.6	-	47.5	74.0	26.5
9920.00	2.3	46.9	46.4	-	49.2	74.0	24.8
12400.00	5.5	49.0	48.6	-	54.5	74.0	19.5
14880.00	5.2	50.2	46.5	9.5	45.9	74.0	28.1
17360.00	7.8	46.8	44.0	9.5	45.1	74.0	28.9
19840.00	9.7	46.5	44.3	9.5	46.7	74.0	27.3
22320.00	10.5	45.1	45.2	9.5	46.2	74.0	27.8
24800.00	11.5	46.5	46.0	9.5	48.5	74.0	25.5
Average measurement							
2483.50	3.8	33.7	33.9	-	37.7	54.0	16.3
4960.00	4.1	<35.0	<35.0	-	<39.1	54.0	>14.9
7440.00	-1.3	39.9	38.4	-	38.6	54.0	15.4
9920.00	2.3	36.9	35.8	-	39.2	54.0	14.8
12400.00	5.5	39.2	38.2	-	44.7	54.0	9.3
14880.00	5.2	37.6	34.5	9.5	33.3	54.0	20.7
17360.00	7.8	34.2	33.2	9.5	32.5	54.0	21.5
19840.00	9.7	35.6	33.1	9.5	35.8	54.0	18.2
22320.00	10.5	33.8	33.8	9.5	34.8	54.0	19.2
24800.00	11.5	35.9	35.6	9.5	37.9	54.0	16.1

[20dBc Data Sheet]

Peak Data Sheet

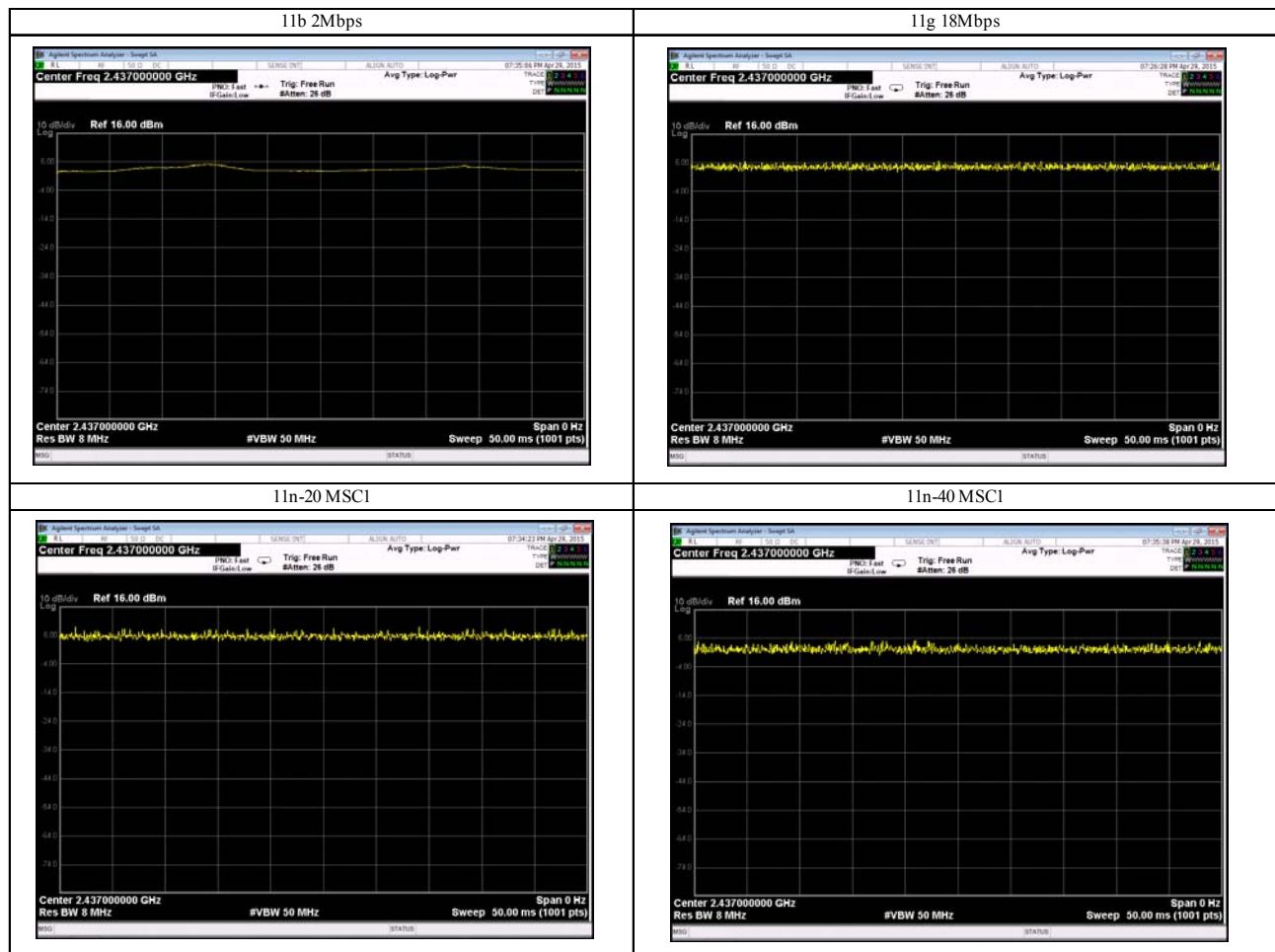
Measured Frequency (MHz)	Correction Factor (dB/m)	Meter Reading		Maximum Field Strength (dBμV/m)	Limit (dBμV/m)	Margin for Limit (dB)
		Horizontal Polarization (dBμV)	Vertical Polarization (dBμV)			
Peak measurement						
* 1) 2480.00	3.9	85.4	-	89.3	-	-
2483.50	3.9	34.4	-	38.3	69.3	31.0
* 1) 2480.00	3.9	-	82.5	86.4	-	-
2483.50	3.9	-	33.7	37.6	66.4	28.8

[Remark] *1) : Carrier
[Note] (1) ☐ Correction Factor includes the antenna factor, cable loss, attenuator loss and pre-amplifier gain. ☒ Correction Factor includes the cable loss and attenuator loss. Above 1000MHz, the antenna factor includes the cable loss, pre-amplifier gain and attenuator loss (if necessary). (2) * mark in Measured Frequency : Measured with the tuned dipole antenna. no mark in Measured Frequency : Measured with the broadband antenna. (3) Upper Frequency : ☒ Transmitter Frequency (TX): TX < 10GHz ☐ 1GHz ☒ 10th harmonic of the highest frequency / ☐ Up to 40GHz ☐ Transmitter Frequency (TX): 10GHz ≤ TX < 30GHz ☐ 10th harmonic of the highest frequency / ☐ Up to 100GHz ☐ Transmitter Frequency (TX): 30GHz ≤ TX ☐ 10th harmonic of the highest frequency / ☐ Up to 200GHz The emissions were checked to the upper frequency, and the lower emissions than the listed emissions in the above tables were omitted. (4) Measurement Distance : <below 1GHz> ☒ 3m ☐ 10m <above 1GHz> ☒ 3m ☐ 10m <above 12.4GHz> 1m (5) Bore-sight method setting: horn antenna orientation was center of Turn Table
[Calculation method] Maximum Field Strength (dBμV/m) = Meter Reading (at maximum level of Horizontal or Vertical) (dBμV) + Correction Factor (dB/m) – Distance factor (*) + Duty Cycle factor (dB) (**) (*) Applied for Radiated Emission Measurement (above 12.4GHz) only. Distance factor : $20 \times \log_{10} (3\text{m}/1\text{m}) = 9.5\text{dB}$ (**) See page 70.

Tested Date	Environment	
	Temperature	Humidity
29 April 2015	21°C	35 %



Duty Cycle



	11b	11g	11n-20	11n-40
Tx on	-	-	-	-
Tx on + Tx off	-	-	-	-
Duty Cycle	1.00	1.00	1.00	1.00
Duty Cycle Factor (dB)	0.00	0.00	0.00	0.00

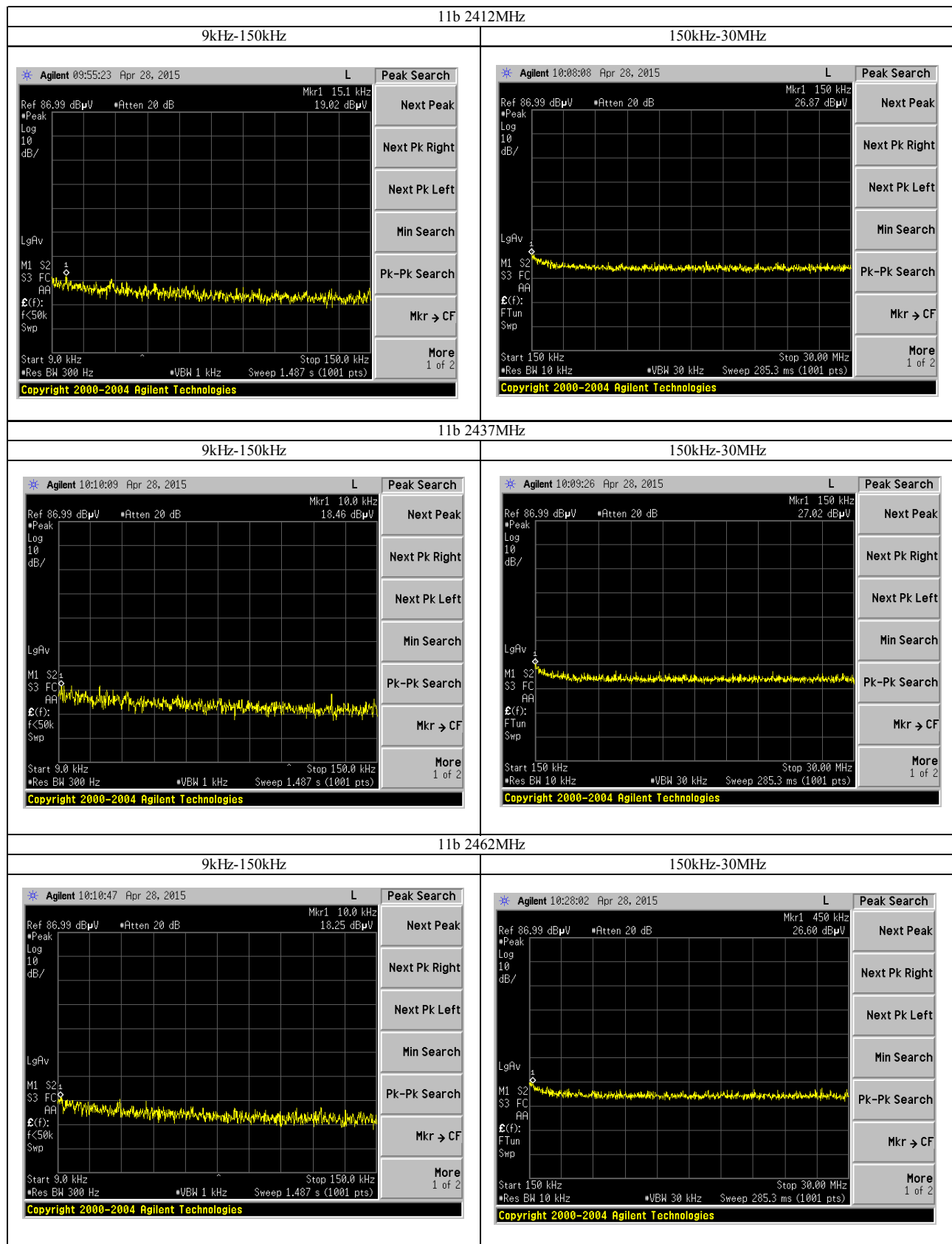
[Calculation method]

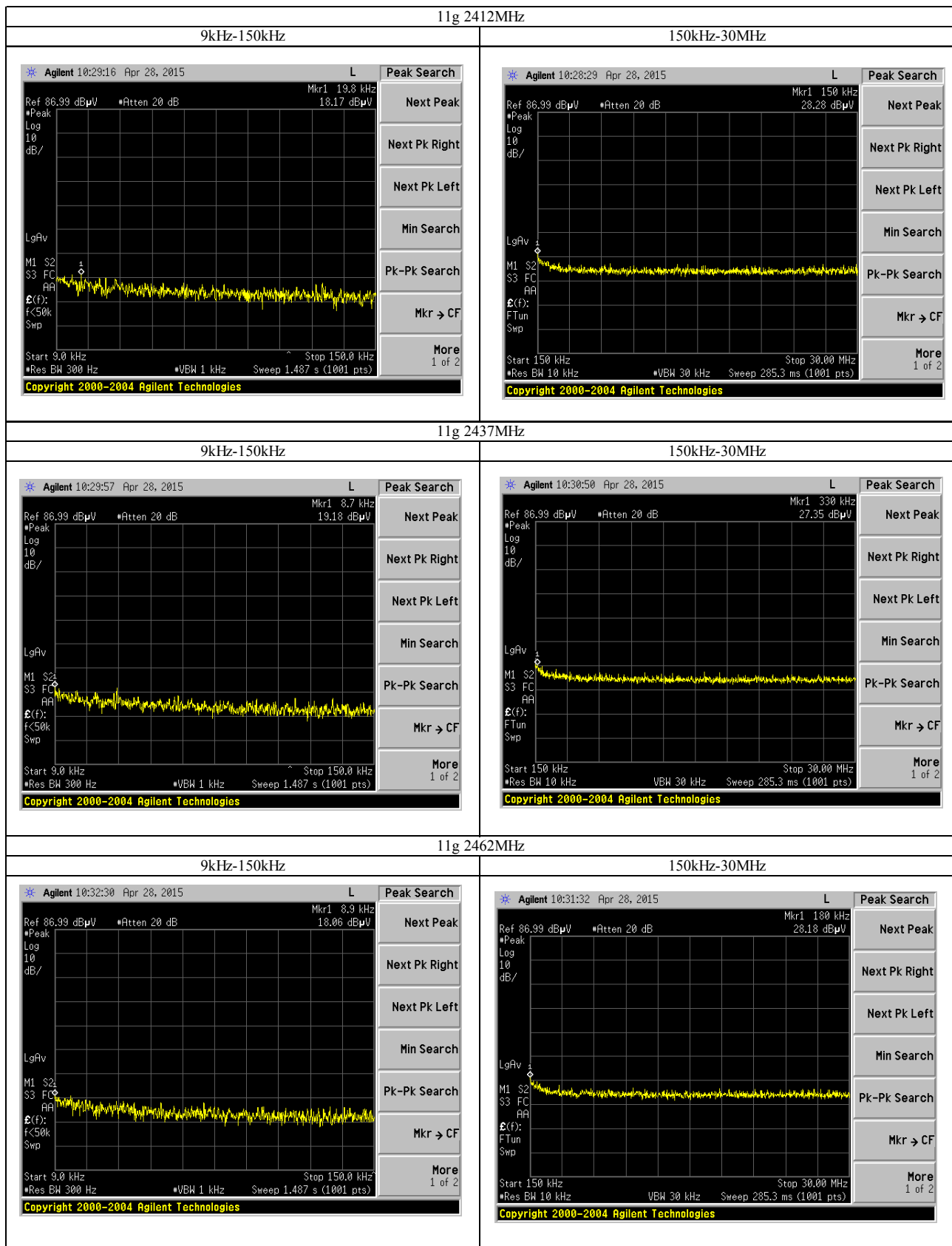
Duty Cycle = (Tx on) / (Tx on + Tx off)

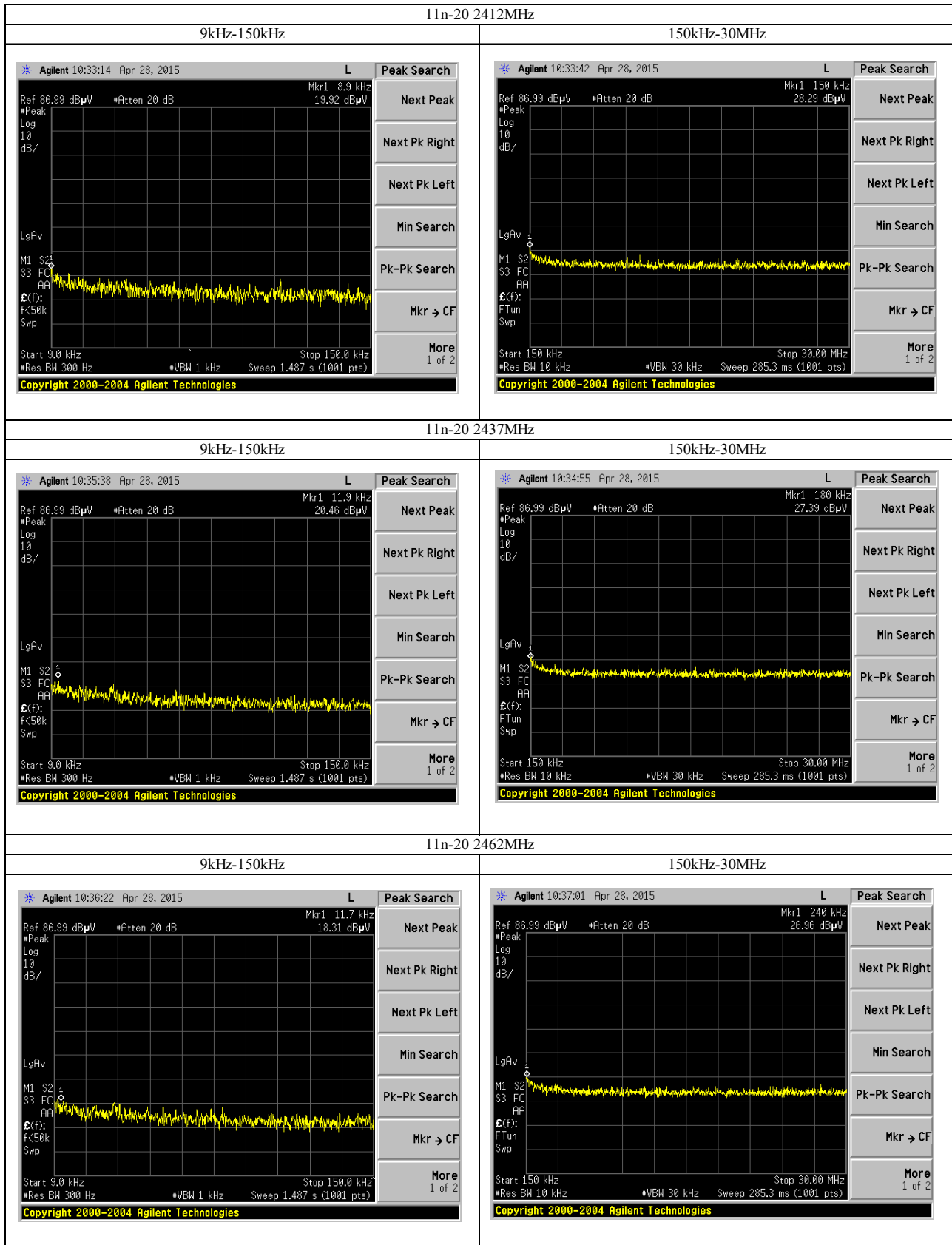
Duty Cycle Factor (dB) = 10Log (1/Duty Cycle)

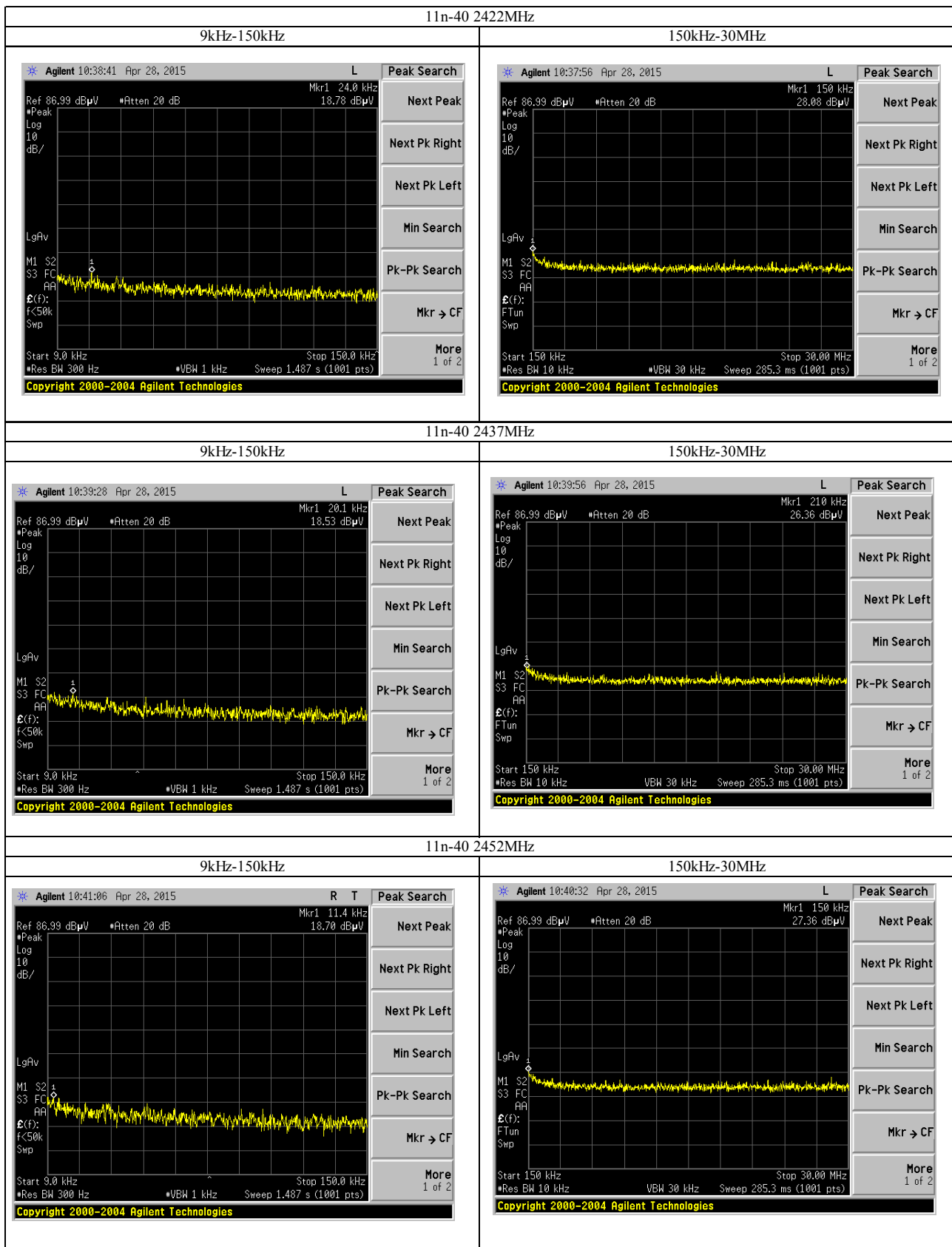


Conducted measurement









Tested Date	Environment	
	Temperature	Humidity
28 April 2015	20°C	31 %



12. TEST EQUIPMENT

• Conducted Emission

KEC No.	Equipment	Manufacturer	Model No.	Last Cal.	Next Cal.
AT-144	Low Power Attenuator	HUBER+SUHNER	6810.01.A	2014/09	2015/09
FL-107	LISN	KYORITSU	KNW-407	2014/09	2015/09
FS-083	Test Receiver	ROHDE & SCHWARZ	ESHS10	2014/12	2015/12
FS-103	Test Receiver	Schwarzbeck	FCKL1528	2014/12	2015/12
MM-252	RF Relay Matrix	TSJ	RFM-E121	2014/09	2015/09
SA-049	Spectrum Analyzer	Agilent	E4403B	2014/11	2015/11

- 20dB Bandwidth Measurement and Carrier Separation Measurement (FHSS only)
- Time of Occupancy (Dwell Time) (FHSS only)
- Number of Hopping Measurement (FHSS only)
- 6dB Bandwidth (DTS only)
- Power Spectral Density(DTS only)

KEC No.	Equipment	Manufacturer	Model No.	Last Cal.	Next Cal.
AT-148	Fixed Attenuator	Anritsu	41KC-10	2014/04	2015/05
SA-065	Signal Analyzer	Agilent	N9030A	2014/11	2015/11

• Peak Conducted Output Power

KEC No.	Equipment	Manufacturer	Model No.	Last Cal.	Next Cal.
AT-148	Fixed Attenuator	Anritsu	41KC-10	2014/04	2015/05
VV-061	Power Meter	Agilent	N1912A	2014/05	2015/06
VV-061-1	Wideband Power Sensor	Agilent	N1921A	2014/05	2015/06

• Spurious Emission (Radiated)

KEC No.	Equipment	Manufacturer	Model No.	Last Cal.	Next Cal.
AM-053	Pre-Amplifier	HP	8449B	2015/04	2016/04
AM-098	Pre-Amplifier	SONOMA	SONOMA 310N	2015/04	2016/04
AN-104	Std. Gain Horn Antenna	Scientific-Atlanta	12-5.8	2015/04	2017/04
AN-107	Std. Gain Horn Antenna	Scientific-Atlanta	12A-18	2013/12	2015/12
AN-145	Std. Gain Horn Antenna	Scientific-Atlanta	12-12	2015/04	2017/04
AN-210	Std. Gain Horn Antenna	Scientific-Atlanta	12-8.2	2015/04	2017/04
AN-220	LPDA Antenna	Schwarzbeck	UHALP 9108A	2015/04	2016/04
AN-296	Biconical Antenna	Schwarzbeck	VHBB9124	2015/04	2016/04
AN-298	DRG Horn Antenna	Schwarzbeck	BBHA9120LF(A)	2015/04	2016/04
AT-148	Fixed Attenuator	Anritsu	41KC-10	2014/04	2015/05
AT-158	Fixed Attenuator	Anritsu	MP721B	2015/04	2016/04
FL-222	Band-stop Filter	TOYO	8BRM2442/T300	2015/04	2016/04
FS-099	Test Receiver	ROHDE & SCHWARZ	ESS	2014/12	2015/11
MM-302	RF Selector	TOYO	NS4900	2015/04	2016/04
SA-052	Spectrum Analyzer	Agilent	E4446A	2014/10	2015/10
SA-058	Spectrum Analyzer	Agilent	N9010A	2015/04	2016/04



• Spurious Emission (Conducted)

KEC No.	Equipment	Manufacturer	Model No.	Last Cal.	Next Cal.
AT-148	Fixed Attenuator	Anritsu	41KC-10	2014/04	2015/05
SA-052	Spectrum Analyzer	Agilent	E4446A	2014/10	2015/10

Note : (*1) We check the performance, before using this device.

The overall program of calibration and verification of equipment is designed and operated so as to ensure that measurements made by KEC are traceable to national standards of measurement or equivalent abroad.



APPENDIX A (DECLARATION OF COMPLIANCE TO MAXIMUM PERMISSIBLE EXPOSURE LIMITS FOR HUMANS)

The Model WYSAAVDXB-E with 2400-2483.5MHz transmitter complies with Maximum permissible exposure limits for humans as called out in §1.1310. It is exempt from Maximum Permissible Exposure based on its operating frequency, and power density 0.01mW/cm².

Calculation formula :

$$S = PG / 4\pi D^2$$

S : power density (W/m²)

P : peak output power (W)

G : antenna gain (isotropic)

D : measurement distance (m)

Where :

P = 22.08dBm at 2422 MHz, 11n-40 (see 43 page)

G = 2.1dBi

D = 0.2m

Therefore :

$$S(W / m^2) = \frac{10^{\frac{22.08}{10}} \times 10^{-3} \times 10^{\frac{2.1}{10}}}{4 \times \pi \times 0.2 \times 0.2} = 0.5209$$

$$S \doteq 0.052 (mW/cm^2)$$

This would be less than 1mW/cm² when the separation distance between the user and the device's radiating element is less than 20cm.