



TEST REPORT

Report Number : A-007-14-C

Date of Issue: 29 January 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 : INTELLIGENT SYSTEMS CO.,LTD.
Mailing Address : 10 Daimotsu-cho Kamitoba Minami-ku Kyoto-shi Kyoto-fu 601-8121 Japan

2. Identification of Tested Device

Type of Device : Transmitter
FCC ID : SRX-FULLW001
Device Name : SRX-ISJFULL
Model Number : SRX-ISJFULL
Serial Number : 2200035[7]
Trade Name : IS-SPR-DEBUGGER&CAPTURE
Type of Test : ☐ Production ☒ Pre-production ☐ Prototype

3. Test Items

AC Power Line Conducted Emission Measurement	☒ Pass	☐ Fail	☐ N/A
Carrier Separation Measurement (FHSS only)	☐ Pass	☐ Fail	☒ N/A (*1)
Time of Occupancy (Dwell Time) Measurement (FHSS only)	☐ Pass	☐ Fail	☒ N/A (*1)
Number of Hopping Measurement (FHSS only)	☐ Pass	☐ Fail	☒ N/A (*1)
20dB Bandwidth Measurement (FHSS only)	☐ Pass	☐ Fail	☒ N/A (*1)
6dB Bandwidth Measurement (DSSS only)	☐ Pass	☐ Fail	☒ N/A (*3)
Peak Conducted Output Power Measurement	☒ Pass	☐ Fail	☐ N/A
Spurious Emission (The Frequency Range of 9kHz to 30MHz)	☒ Pass	☐ Fail	☐ N/A
Spurious Emission (The Frequency Range of above 30MHz)	☒ Pass	☐ Fail	☐ N/A
Peak Power Spectral Density Measurement (DSSS only)	☐ Pass	☐ Fail	☒ N/A (*3)

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

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0. REVISION HISTORY

[illegible]

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	:	☐				

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]

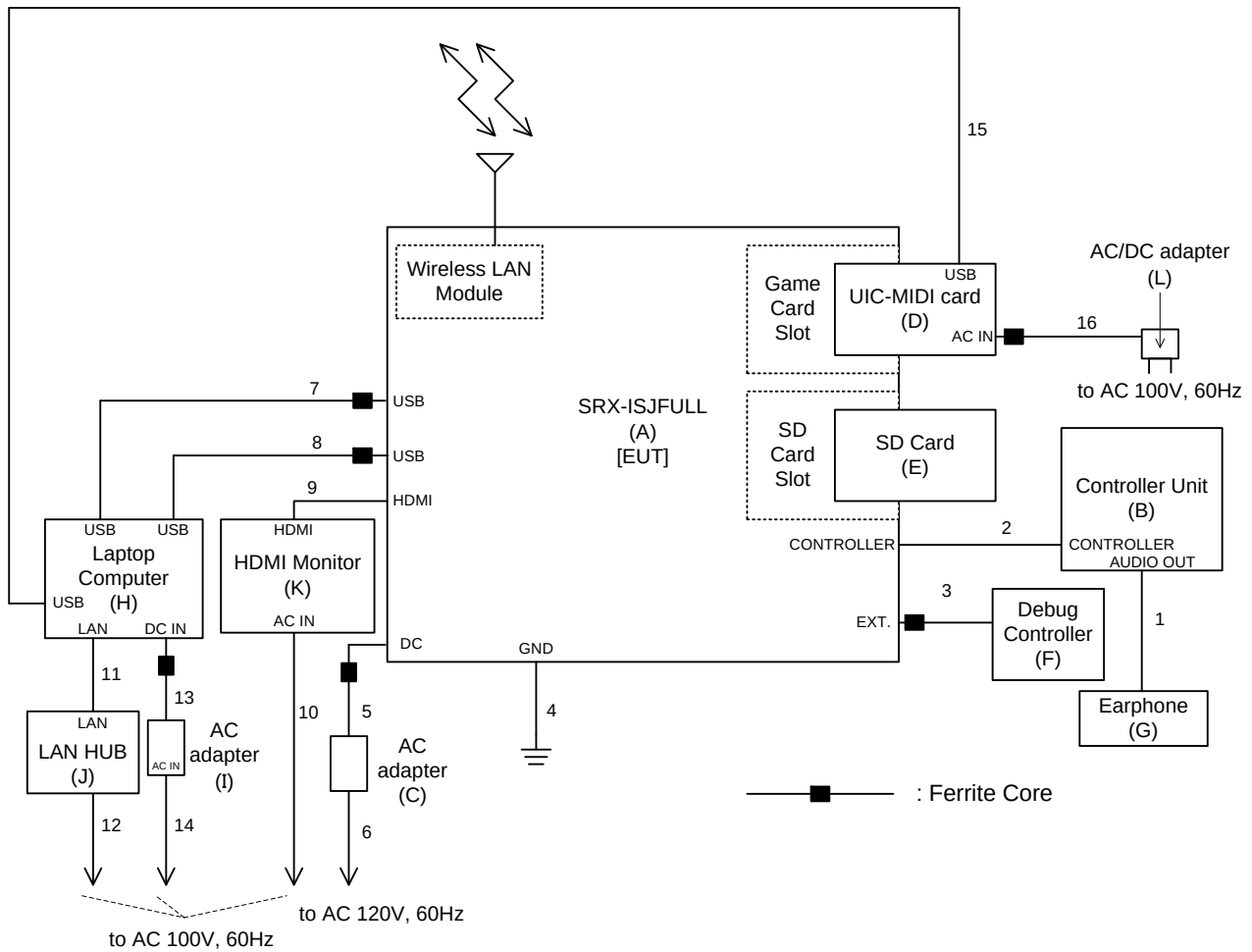
If the measured result is below the specification limit and a margin is less than the above measurement uncertainty, it is impossible to determine compliance at a level of confidence of 95%. However, the measured result indicates high probability that the tested device complies with the specification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

2. GENERAL INFORMATION

2.1. Product Description

(1) Radio Standard	: IEEE 802.11b IEEE 802.11g
(2) Frequency Range	
· IEEE 802.11b	: 2412 - 2472MHz
· IEEE 802.11g	: 2412 - 2462MHz
(3) Output Power	
· IEEE 802.11b	: 8.64dBm (Conducted)
· IEEE 802.11g	: 14.83dBm (Conducted)
(4) Antenna Gain	: 2.14dBi
(5) Antenna Type	: 1/2 lambda type
(6) Modulation Type	
· IEEE 802.11b (DSSS)	: DBPSK, DQPSK, CCK
· IEEE 802.11g (OFDM)	: BPSK, QPSK, 16QAM, 64QAM
(7) Modulation / Spreading	: DSSS and OFDM (coupled with modulation type above)
(8) Transmit Speed	
· IEEE 802.11b	: 11 / 5.5 / 2 / 1 Mbps
· IEEE 802.11g	: 54 / 48 / 36 / 24 / 18 / 12 / 9 / 6 Mbps
(9) Number of Channels	
· IEEE 802.11b	: 13
· IEEE 802.11g	: 11
(10) Temperature Range	: 10 - 40°C
(11) Dimension (approx.)	
IS-SPR-BOX : 66(W)×145(D) ×218(H) mm (except the protrusions)	
Controller for IS-SPR-BOX : 117(Vertical)×155(Horizontal) ×22(Thickness) mm (when closed)	
(12) Weight (approx.)	: < 30kg
(13) Environment	: Residential and commercial/industrial environment
(14) Highest Frequency Generated or Used	: 432MHz for the digital interface, 2472MHz for the radio
(15) Rated Voltage & Frequency	: AC 100-240V, 50/60Hz (Tested AC120V, 60Hz)

3.5. Block Diagram of TEST System



3.6. List of Test System

No.	Device Name	Model Number	Serial Number	Trade Name	Note
A	SRX-ISJFULL	SRX-ISJFULL	2200035[7]	IS-SPR-DEBUGGER&CAPTURE	EUT WLAN module : J27H023.01
B	Controller Unit	SRX-ISJFULL	2200035[7]	IS-SPR-DEBUGGER&CAPTURE	EUT
C	AC adapter	RVL-002(USA)	-	Nintendo Co., Ltd.	for No. A EUT
D	UIC-MIDI card	-	I0400427-USB	Kyoto Microcomputer	
E	SD Card	RVL-038	SS1KN051418	Nintendo Co., Ltd.	-
F	Debug controller	RVL-005(-05)	-	Nintendo Co., Ltd.	-
G	Earphone	-	-	-	-
H	Laptop Computer	CF-30FW1AJS	8FKSA52812	Panasonic	-
I	AC adapter	CF-AA1652A M6	1652AM607Y00559J	Panasonic	for No. H
J	LAN HUB	CG-SW05TXLV2	1082970060301497	corega	
K	HDMI Monitor	2709Wb	CN-0HW126-74261-953-080S	DELL	
L	AC/DC adapter	WAP-002(JPN)	-	Nintendo Co., Ltd.	for No. D

[Note]

(1): Option of EUT

3.7. List of Cables

No.	Cable Name	Shielded (Y/N)	Length (m)	Note
1	Earphone cable	N	1.1	(1)
2	Controller connection cable	Y	1.0	for EUT (2)
3	Debug Controller cable	Y	0.8	With ferrite core (2-turn x1) (1)
4	Earth cable	N	1.2	(2)
5	DC cable	N	0.9	for EUT With ferrite core (2-turn x1) (1),(2)
6	AC cable	N	2.1	RVL-002(USA) (1),(2) (4)
7	USB cable	Y	1.3	for EUT Debugger port With ferrite core (3-turn x1) (2)
8	USB cable	Y	1.3	for EUT Capture port With ferrite core (3-turn x1) (2)
9	HDMI cable	Y	1.5	for EUT HDMI port
10	AC cable	N	2.0	for HDMI Monitor (3)
11	LAN cable	N	1.0	
12	AC cable	N	1.5	For LAN HUB (4)
13	DC cable	N	1.8	for Laptop computer With ferrite core (1-turn x1) (1)
14	AC cable	N	0.8	for Laptop computer (4)
15	USB cable	Y	1.5	for UIC-MIDI card
16	DC cable	N	2.0	for UIC-MIDI card With ferrite core (2-turn x1) (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 C63.10-2013.
- (2) The EUT is activated as to simulate an actual operation.
- (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 function	: Peak mode

(*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

Measured Frequency (MHz)	LISN 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)						
0.173	10.4	40.1	39.6	38.2	37.6	50.5	48.6	64.8	54.8	14.3	6.2
0.231	10.3	37.8	37.7	36.7	36.2	48.1	47.0	62.4	52.4	14.3	5.4
0.288	10.2	31.7	31.5	29.2	28.9	41.9	39.4	60.6	50.6	18.7	11.2
0.578	10.2	35.4	34.8	34.6	33.8	45.6	44.8	56.0	46.0	10.4	1.2
0.636	10.2	36.2	35.5	35.2	34.5	46.4	45.4	56.0	46.0	9.6	0.6
4.637	10.3	33.8	33.6	32.9	32.5	44.1	43.2	56.0	46.0	11.9	2.8
4.995	10.3	35.6	35.7	34.2	33.5	46.0	44.5	56.0	46.0	10.0	1.5
7.423	10.4	40.1	39.7	38.9	38.4	50.5	49.3	60.0	50.0	9.5	0.7
7.490	10.4	40.0	39.8	38.8	38.5	50.4	49.2	60.0	50.0	9.6	0.8

[Note]

LISN Factor includes the cable loss and attenuator loss.

[Calculation method]

Maximum RF Voltage (dBμV)

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

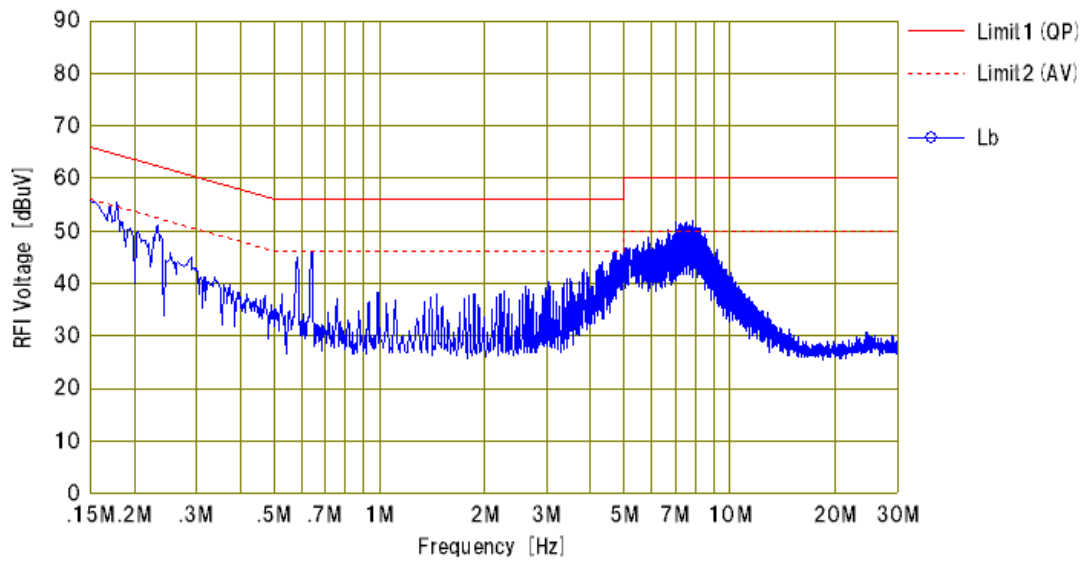
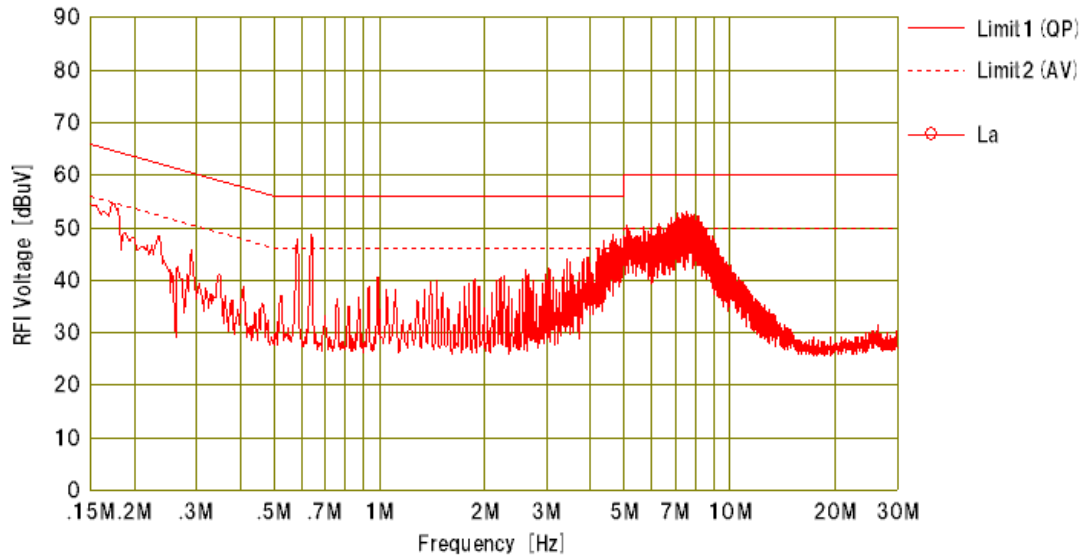
At the next page, the result of exploratory conducted emission measurement by using the spectrum analyzer is shown by the spectrum chart.

Tested Date	Environment	
	Temperature	Humidity
17 December 2014	28 °C	20 %



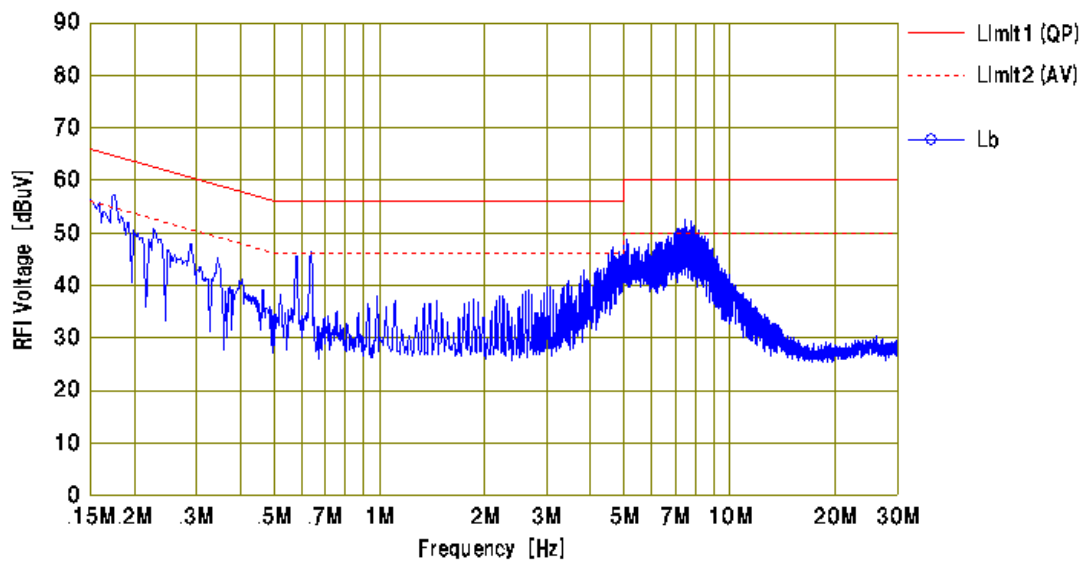
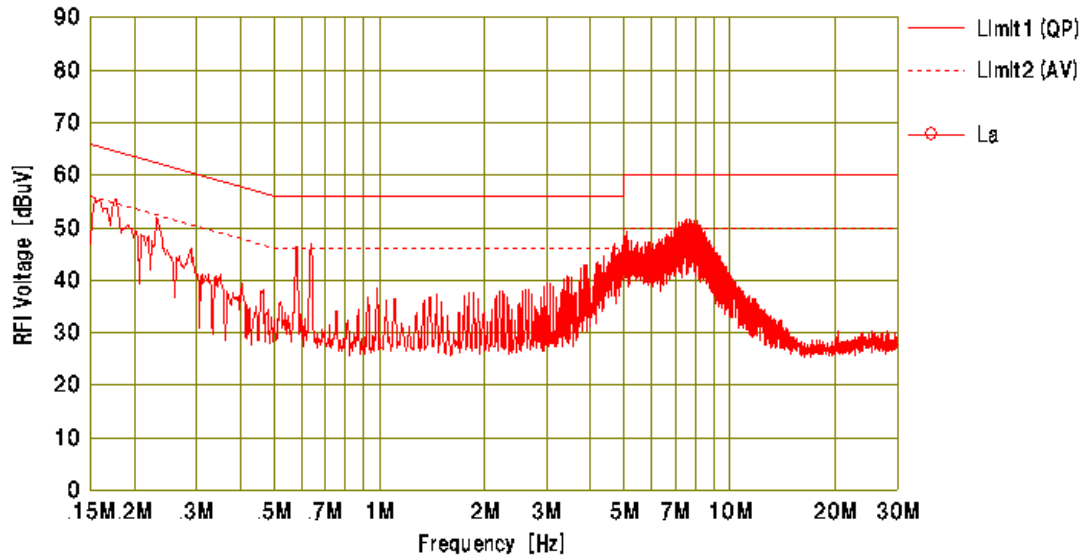
Test Results in Graph

802.11b 2412MHz

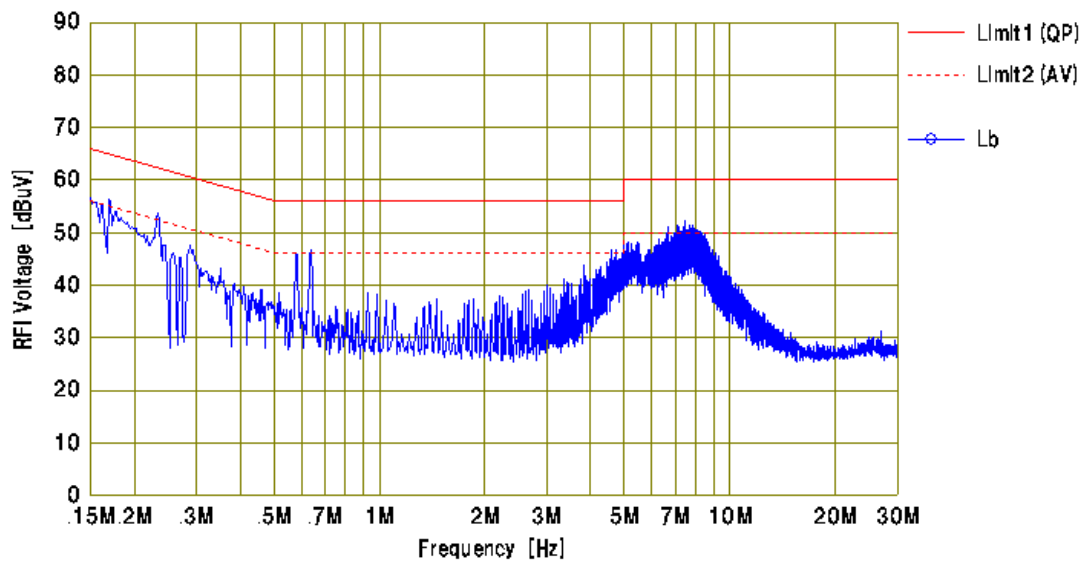
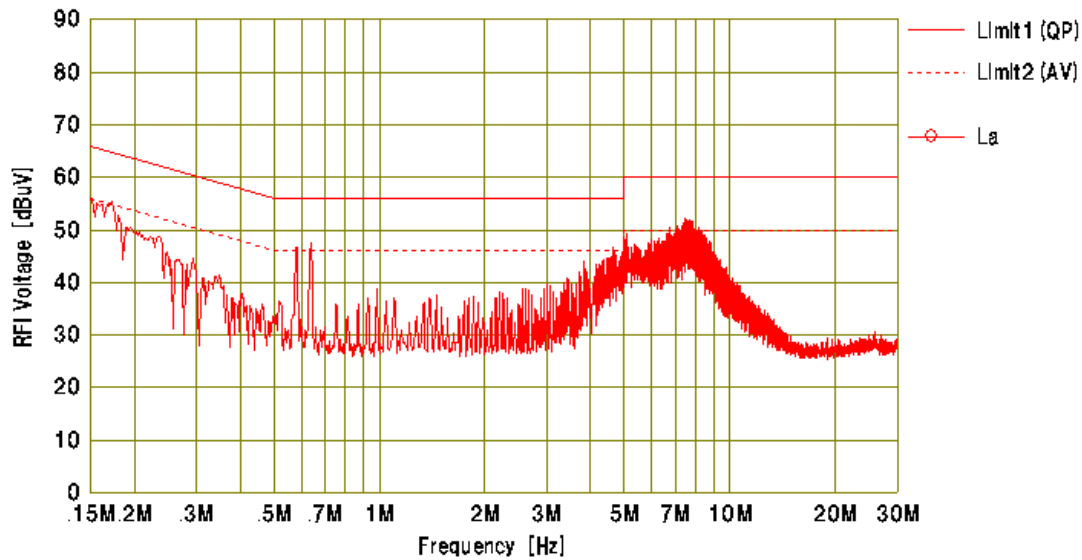




802.11b 2437MHz

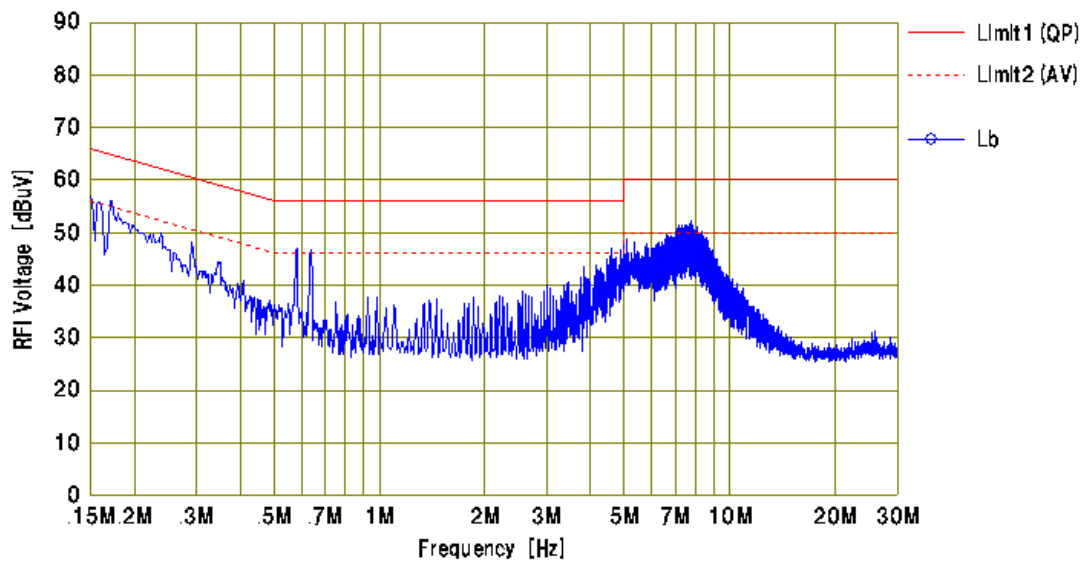
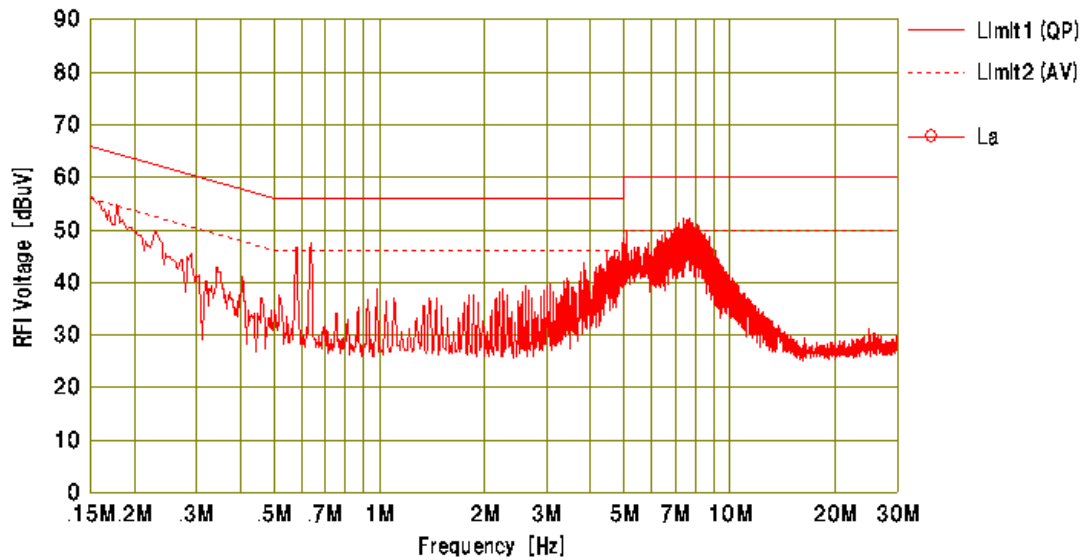


802.11b 2472MHz



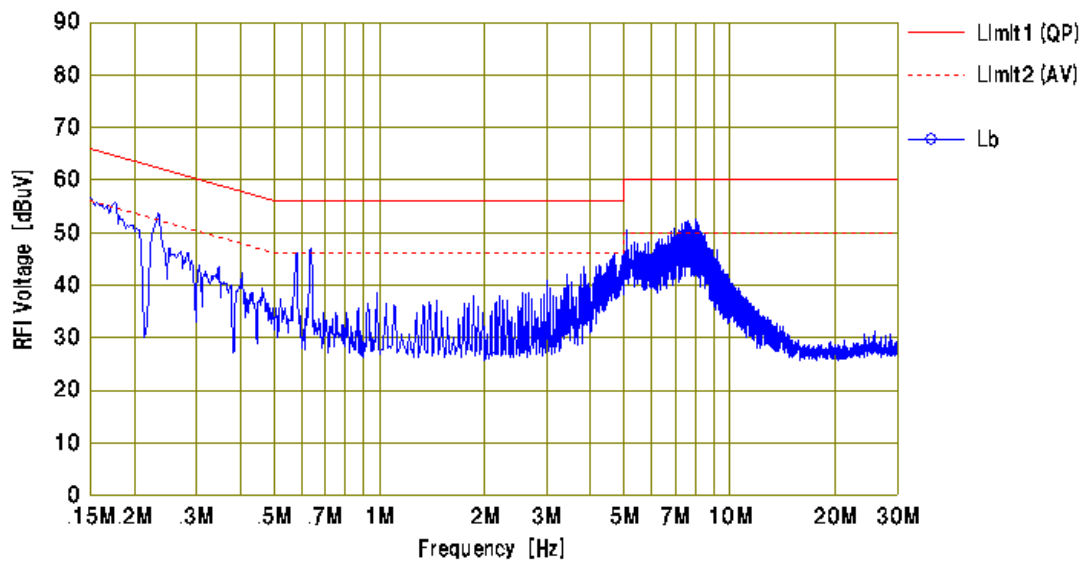
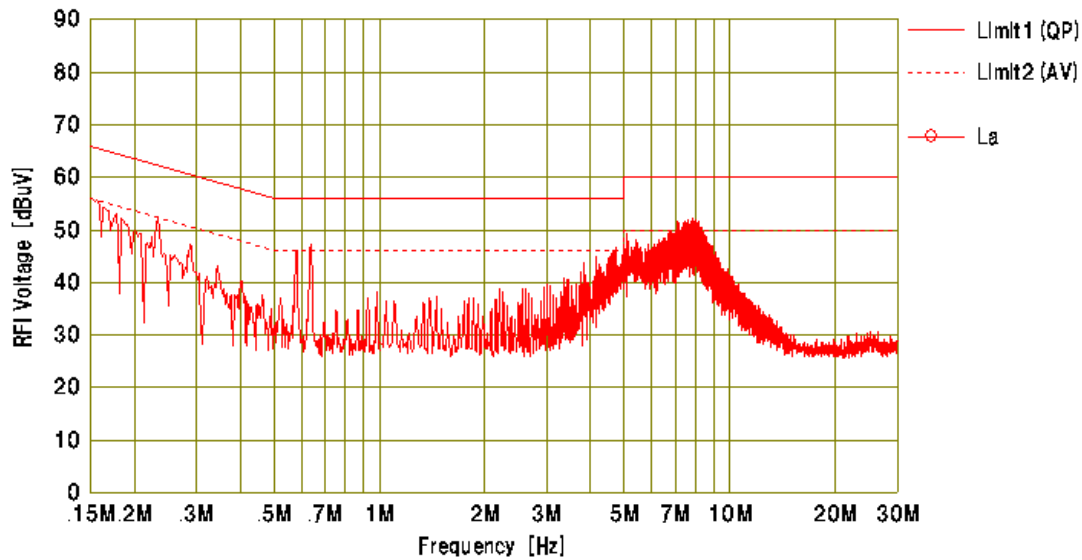


802.11g 2412MHz

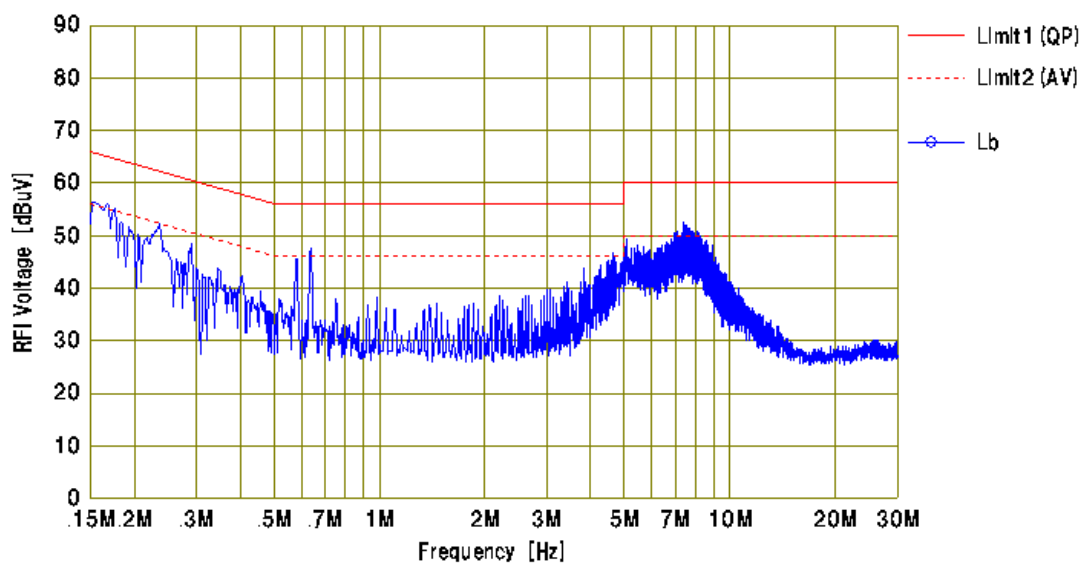
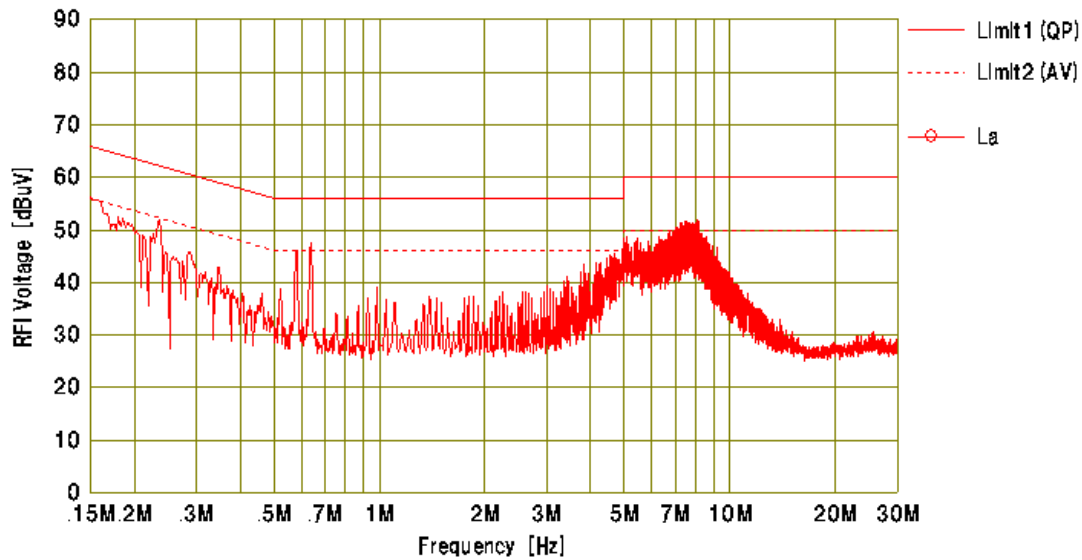




802.11g 2437MHz



802.11g 2462MHz



5. PEAK CONDUCTED OUTPUT POWER MEASUREMENT

5.1. 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 maximum emission condition, the transmitting data rate of EUT is set to maximum data rate.
- (4) Measurement is started using the peak power meter.

5.2. Test Results

[IEEE 802.11b]

Measured Frequency (MHz)	Correction Factor (dB)	Meter Reading (dBm)	Peak Output Power (dBm)	Limit (dBm)	Margin for Limit (dB)
2412	10.40	-1.76	8.64	30.00	21.40
2437	10.40	-2.06	8.34	30.00	21.70
2472	10.40	-7.54	2.86	30.00	27.10

[IEEE 802.11g]

Measured Frequency (MHz)	Correction Factor (dB)	Meter Reading (dBm)	Peak Output Power (dBm)	Limit (dBm)	Margin for Limit (dB)
2412	10.40	4.38	14.78	30.00	15.20
2437	10.40	4.43	14.83	30.00	15.20
2462	10.40	3.99	14.39	30.00	15.60

[Note]

Correction Factor includes the attenuator loss.

[Calculation method]

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

Tested Date	Environment	
	Temperature	Humidity
18 December 2014	21 °C	23 %

6. Spurious Emission (The Frequency Range of 9kHz to 30MHz)

6.1. Test Procedure

- (1) The EUT is placed in accordance with ANSI C63.10-2013.
- (2) The EUT is activated as to simulate an actual operation.
- (3) 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 radiated measurement are performed using the spectrum analyzer (*1) and the loop antenna.
- (4) The emissions recorded are measured at the specified distance using the loop antenna and the test receiver (*2).
- (5) If the emission level is low and not detected at the specified distance, compliance test is performed at a closer distance and judged from calculating field strength at specified distance by using the measured data at a closer distance.

[Note]

- (*1) Spectrum Analyzer Set Up Conditions
- | | |
|----------------------|----------------------------------|
| Frequency range | : 9kHz – 150kHz / 150kHz – 30MHz |
| Resolution bandwidth | : 300Hz / 10kHz |
| Detector function | : Peak mode |
- (*2) Test Receiver Set Up Conditions
- | | |
|-------------------|--------------------------|
| Detector function | : Quasi – Peak |
| IF bandwidth | : 200Hz (9kHz – 150kHz) |
| | : 10kHz (150kHz – 30MHz) |



6.2. Test Results

1) Field Strength at 300m

Measured Frequency (MHz)	Antenna Factor (dB)	Meter Reading (dBμV/m)	Maximum Field Strength at 3m (dBμV/m)	Conversion Factor 3m to 300m (dB)	Maximum Field Strength at 300m (dBμV/m)	Limit at 300m (dBμV/m)	Margin for Limit (dB)
0.04322	20.8	38.7	59.5	-80.0	-20.5	34.8	55.3
0.05786	20.6	36.8	57.4	-80.0	-22.6	32.3	54.9
0.08644	20.5	26.4	46.9	-80.0	-33.1	28.8	61.9
0.11570	20.5	32.9	53.4	-80.0	-26.6	26.3	52.9
0.17402	20.5	28.1	48.6	-80.0	-31.4	22.7	54.1
0.29024	20.5	28.0	48.5	-80.0	-31.5	18.3	49.8
0.46300	20.5	20.1	40.6	-80.0	-39.4	14.2	53.6

2) Field Strength at 30m

Measured Frequency (MHz)	Antenna Factor (dB)	Meter Reading (dBμV/m)	Maximum Field Strength at 3m (dBμV/m)	Conversion Factor 3m to 30m (dB)	Maximum Field Strength at 30m (dBμV/m)	Limit at 30m (dBμV/m)	Margin for Limit (dB)
0.51973	20.5	19.0	39.5	-40.0	-0.5	33.2	33.7
27.34000	22.9	8.3	31.2	-40.0	-8.8	29.5	38.3

[Note]

- (1) Antenna Factor includes the cable loss.
- (2) Measurement Distance : 3m
- (3) Conversion Factor : FCC Part 15 Subpart A Section 15.31(f) (2) is applied.

[Calculation method]

Maximum Field Strength (dBμV/m) = Meter Reading (dBμV/m) + Antenna Factor (dB) + Conversion Factor (dB)

Tested Date	Environment	
	Temperature	Humidity
12 December 2014	22°C	36 %

7. Spurious Emission (The Frequency Range of above 30MHz)

7.1. Test Procedure

- (1) The EUT is placed in accordance with ANSI C63.10-2013.
- (2) The EUT is activated as to simulate an actual operation.
- (3) 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 radiated measurement are performed using the spectrum analyzer (*1) and the broad band antenna.
- (4) The spectrums are scanned from 30MHz to 1GHz, and collect the highest emissions on the spectrum analyzer relative to the limits in the whole range.
In the frequency above 1GHz, it is performed using the spectrum analyzer (*2) and the horn antenna.
- (5) The highest emissions are measured at the specified distance using the test receiver (*3) 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 (*4) and the horn antenna (*5).

[Note]

(*1) Spectrum Analyzer Set Up Conditions

Frequency range : 30MHz – 1GHz
Resolution bandwidth : 100kHz
Detector function : Peak mode

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

Frequency range : 1GHz – Upper frequency of measurement range
Resolution bandwidth : 1MHz

(*3) Test Receiver Set Up Conditions

Detector function : Quasi – Peak
IF bandwidth : 120kHz

(*4) Spectrum Analyzer Set Up Conditions

Center Frequency : Measurement Frequency
Resolution bandwidth : 1MHz
Video bandwidth : 3MHz
Detector function : Peak mode
RMS mode (Average measurement)

Spectrum Analyzer Set Up Conditions at Bandedge measurement

Resolution bandwidth : 100kHz
Video bandwidth : 300kHz
Detector function : Peak mode

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

Frequency [GHz]	Cover Area [m]	
	Distance : 3 m	Distance : 1 m
1 - 6	1.89	-
5.8 - 12.4	0.63	0.21
12.4 - 26.5	0.47	0.16

7.2. 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



7.3. Test Results

802.11b 2412MHz

Measured Frequency (MHz)	Antenna 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)				
Peak measurement							
2390.00	6.1	45.4	47.6	-	53.7	74.0	20.3
4824.00	4.0	<45.0	<45.0	-	<49.0	74.0	>25.0
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	9.5	<41.5	74.0	>32.5
24120.00	12.7	<45.0	<45.0	9.5	<48.2	74.0	>25.8

Measured Frequency	Antenna Factor	Meter Reading		Distance Factor from 1 m to 3 m	Duty Cycle Factor	Maximum Field Strength	Limit	Margin for Limit
		Horizontal Polarization	Vertical Polarization					
(MHz)	(dB/m)	(dBμV)	(dBμV)	(dB)	(dB)	(dBμV/m)	(dBμV/m)	(dB)
Average measurement								
2390.00	6.1	35.2	36.5	-	-	42.6	54.0	11.4
4824.00	4.0	<35.0	<35.0	-	0.0	<39.0	54.0	>15.0
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	9.5	0.0	<31.5	54.0	>22.5
24120.00	12.7	<35.0	<35.0	9.5	0.0	<38.2	54.0	>15.8

[20dBc Data Sheet]

Measured Frequency (MHz)	Antenna 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	6.1	88.1	-	94.2	-	-
2400.00	6.1	47.8	-	53.9	74.2	20.3
2397.81	6.1	52.4	-	58.5	74.2	15.7
*1) 2412.00	6.1	-	89.8	95.9	-	-
2400.00	6.1	-	49.1	55.2	75.9	20.7
2396.98	6.1	-	54.9	61.0	75.9	14.9



802.11b 2437MHz

Measured Frequency (MHz)	Antenna Factor (dB/m)	Meter Reading		Distance Factor from 1 m to 3 m (dB)	Maximum Field Strength (dBμV/m)	Limit (dBμV/m)	Margin for Limit (dB)
		Horizontal Polarization (dBμV)	Vertical Polarization (dBμV)				
Peak measurement							
4874.00	4.2	<45.0	<45.0	-	<49.2	74.0	>24.8
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	9.5	<41.8	74.0	>32.2
24370.00	12.7	<45.0	<45.0	9.5	<48.2	74.0	>25.8

Measured Frequency (MHz)	Antenna 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	<35.0	<35.0	-	0.0	<39.2	54.0	>14.8
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	9.5	0.0	<31.8	54.0	>22.2
24370.00	12.7	<35.0	<35.0	9.5	0.0	<38.2	54.0	>15.8

802.11b 2472MHz

Measured Frequency (MHz)	Antenna Factor (dB/m)	Meter Reading		Distance Factor from 1 m to 3 m (dB)	Maximum Field Strength (dBμV/m)	Limit (dBμV/m)	Margin for Limit (dB)
		Horizontal Polarization (dBμV)	Vertical Polarization (dBμV)				
Peak measurement							
2483.50	6.0	48.8	50.8	-	56.8	74.0	17.2
4944.00	4.2	<45.0	<45.0	-	<49.2	74.0	>24.8
7416.00	-1.3	<45.0	<45.0	-	<43.7	74.0	>30.3
9888.00	2.2	<45.0	<45.0	-	<47.2	74.0	>26.8
12360.00	6.4	<45.0	<45.0	9.5	<41.9	74.0	>32.1
24720.00	12.5	<45.0	<45.0	9.5	<48.0	74.0	>26.0

Measured Frequency	Antenna Factor	Meter Reading		Distance Factor from 1 m to 3 m	Duty Cycle Factor	Maximum Field Strength	Limit	Margin for Limit
		Horizontal Polarization	Vertical Polarization					
(MHz)	(dB/m)	(dBμV)	(dBμV)	(dB)	(dB)	(dBμV/m)	(dBμV/m)	(dB)
Average measurement								
2483.50	6.0	40.5	41.9	-	-	47.9	54.0	6.1
4944.00	4.2	<35.0	<35.0	-	0.0	<39.2	54.0	>14.8
7416.00	-1.3	<35.0	<35.0	-	0.0	<33.7	54.0	>20.3
9888.00	2.2	<35.0	<35.0	-	0.0	<37.2	54.0	>16.8
12360.00	6.4	<35.0	<35.0	9.5	0.0	<31.9	54.0	>22.1
24720.00	12.5	<35.0	<35.0	9.5	0.0	<38.0	54.0	>16.0



802.11g 2412MHz

Measured Frequency (MHz)	Antenna Factor (dB/m)	Meter Reading		Distance Factor from 1 m to 3 m (dB)	Maximum Field Strength (dBμV/m)	Limit (dBμV/m)	Margin for Limit (dB)
		Horizontal Polarization (dBμV)	Vertical Polarization (dBμV)				
Peak measurement							
2390.00	6.1	56.8	57.3	-	63.4	74.0	10.6
4824.00	4.0	<45.0	<45.0	-	<49.0	74.0	>25.0
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	9.5	<41.5	74.0	>32.5
24120.00	12.7	<45.0	<45.0	9.5	<48.2	74.0	>25.8

Measured Frequency (MHz)	Antenna 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	6.1	41.6	42.2	-	-	48.3	54.0	5.7
4824.00	4.0	<35.0	<35.0	-	0.0	<39.0	54.0	>15.0
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	9.5	0.0	<31.5	54.0	>22.5
24120.00	12.7	<35.0	<35.0	9.5	0.0	<38.2	54.0	>15.8

[20dBc Data Sheet]

Measured Frequency (MHz)	Antenna 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	6.1	86.7	-	92.8	-	-
2400.00	6.1	57.9	-	64.0	72.8	8.8
*1) 2412.00	6.1	-	88.4	94.5	-	-
2400.00	6.1	-	58.0	64.1	74.5	10.4



802.11g 2437MHz

Measured Frequency (MHz)	Antenna 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)				
Peak measurement							
4874.00	4.2	<45.0	<45.0	-	<49.2	74.0	>24.8
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	9.5	<41.8	74.0	>32.2
24370.00	12.7	<45.0	<45.0	9.5	<48.2	74.0	>25.8

Measured Frequency (MHz)	Antenna 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	<35.0	<35.0	-	0.0	<39.2	54.0	>14.8
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	9.5	0.0	<31.8	54.0	>22.2
24370.00	12.7	<35.0	<35.0	9.5	0.0	<38.2	54.0	>15.8

802.11g 2462MHz

Measured Frequency (MHz)	Antenna Factor (dB/m)	Meter Reading		Distance Factor from 1 m to 3m (dB)	Maximum Field Strength (dBμV/m)	Limit (dBμV/m)	Margin for Limit (dB)
		Horizontal Polarization (dBμV)	Vertical Polarization (dBμV)				
Peak measurement							
2483.50	6.0	54.6	55.7	-	61.7	74.0	12.3
4924.00	4.3	<45.0	<45.0	-	<49.3	74.0	>24.7
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	9.5	<42.1	74.0	>31.9
24620.00	12.6	<45.0	<45.0	9.5	<48.1	74.0	>25.9

Measured Frequency	Antenna Factor	Meter Reading		Distance Factor from 1 m to 3 m	Duty Cycle Factor	Maximum Field Strength	Limit	Margin for Limit
		Horizontal Polarization	Vertical Polarization					
(MHz)	(dB/m)	(dBμV)	(dBμV)	(dB)	(dB)	(dBμV/m)	(dBμV/m)	(dB)
Average measurement								
2483.50	6.0	40.2	41.3	-	-	47.3	54.0	6.7
4924.00	4.3	<35.0	<35.0	-	0.0	<39.3	54.0	>14.7
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	9.5	0.0	<32.0	54.0	>22.0
24620.00	12.6	<35.0	<35.0	9.5	0.0	<38.1	54.0	>15.9

[Remark]

*1) : Carrier

[Note]

- (1) ☐ Antenna Factor includes the cable loss, attenuator loss and pre-amplifier gain.
☒ Antenna 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 10GHz> 1m
- (5) Bore-sight method setting: horn antenna orientation was center of EUT
- (6) Frequency range 30MHz - 1000MHz were the noise from the IT devices, and it conforms to the FCC Part 15 Subpart B - Unintentional Radiators class A limit. (Test Report No. A-020-14-A)
See next page, the radio device power on and off spectrum chart.

[Calculation method]

Maximum Field Strength (dBμV/m)

= Meter Reading (at maximum level of Horizontal or Vertical) (dBμV) + Antenna Factor (dB/m) – Distance factor (*) + Duty Cycle factor (dB) (**)

(*) Applied for Radiated Emission Measurement (above 10GHz) only.

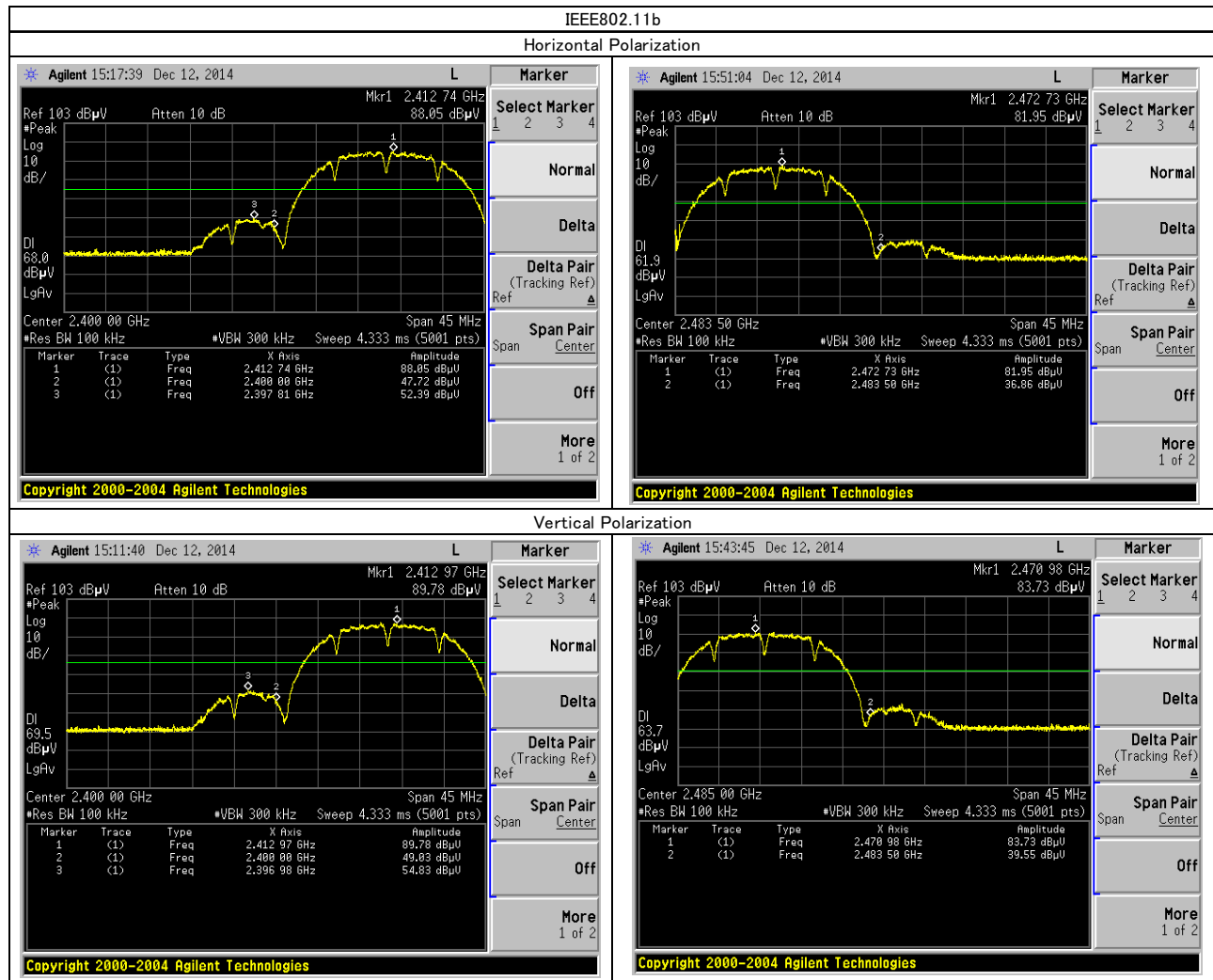
Distance factor : $20 \times \log_{10} (3\text{m}/1\text{m}) = 9.5\text{dB}$

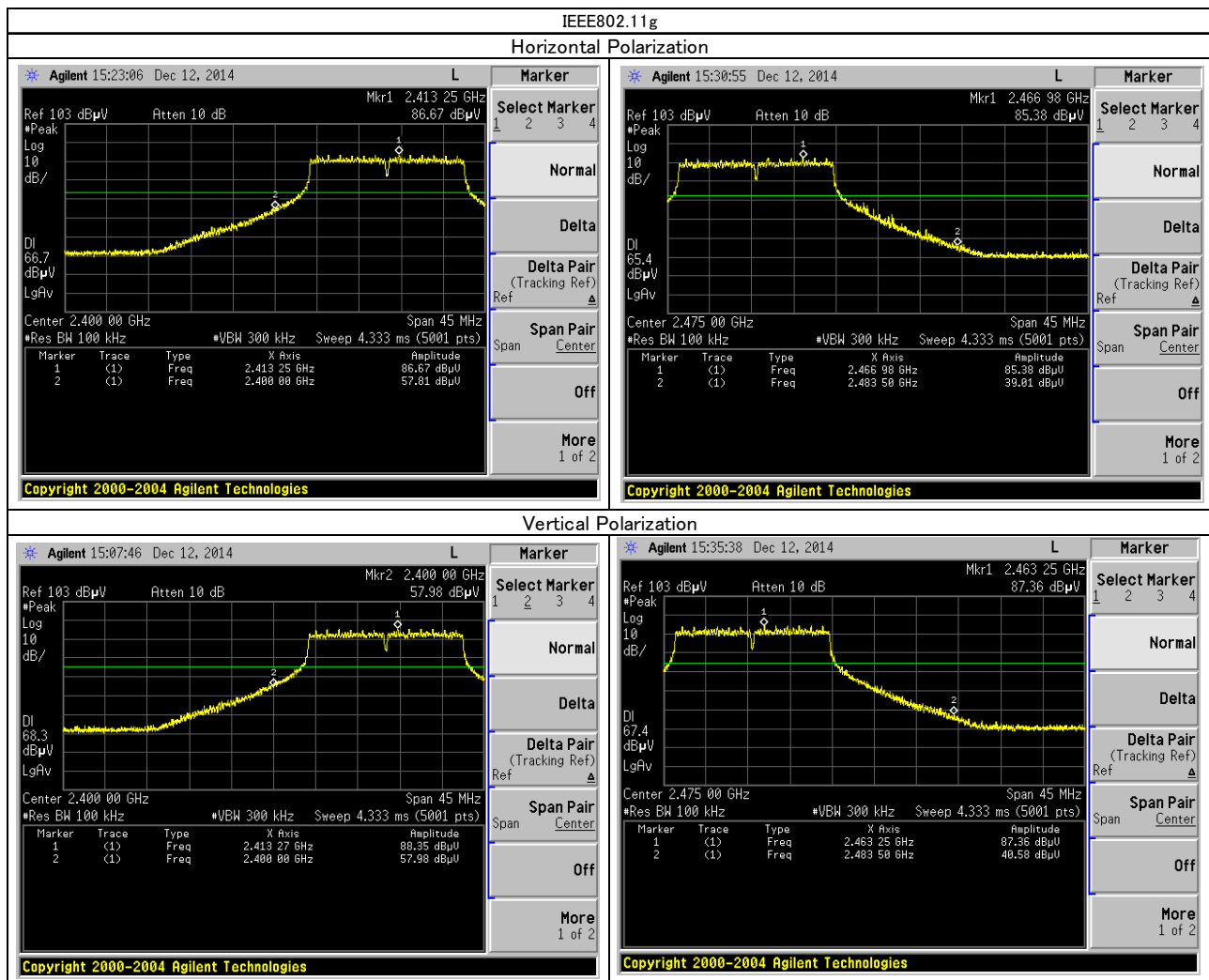
(**) See page 28.

Tested Date	Environment	
	Temperature	Humidity
12 December 2014	22°C	36 %



20dBc Bandedge Measurement

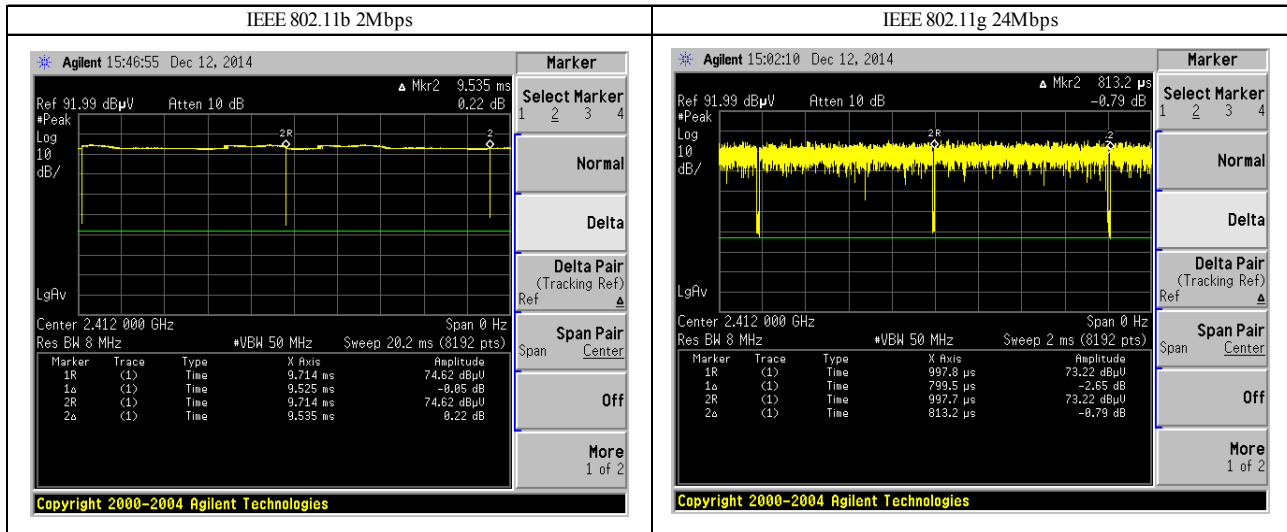




Tested Date	Environment	
	Temperature	Humidity
12 December 2014	22°C	36 %



Duty Cycle



	11b	11g
Tx on	9.525	997.7
Tx on + Tx off	9.535	997.8
Duty Cycle	0.9990	0.9999
Duty Cycle Factor (dB)	0.0046	0.0004

[Calculation method]

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

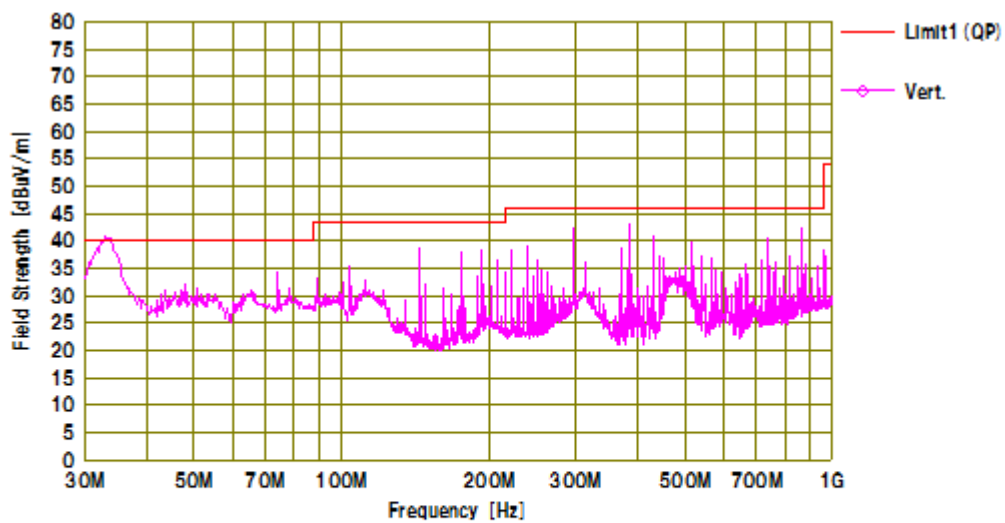
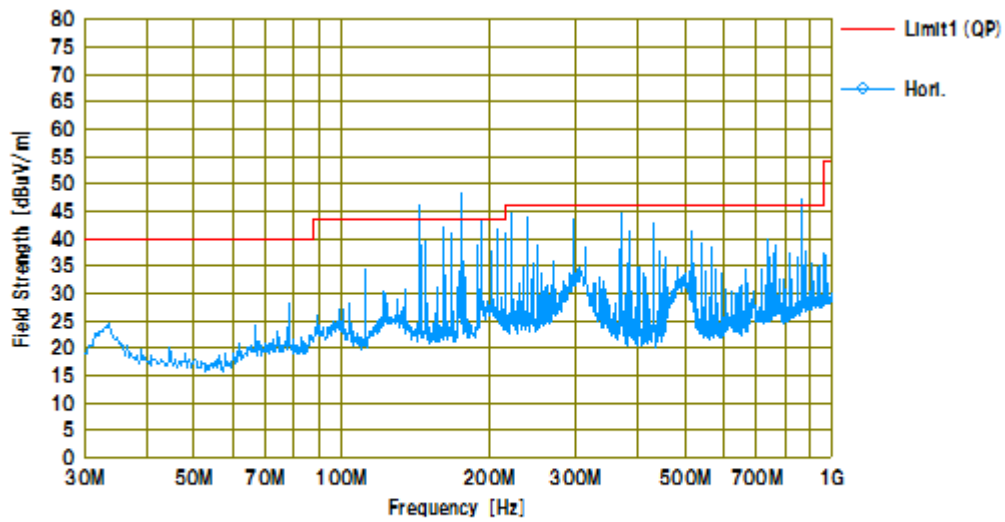
Duty Cycle Factor (dB) = 10Log (1/Duty Cycle)

Tested Date	Environment	
	Temperature	Humidity
12 December 2014	22°C	36 %

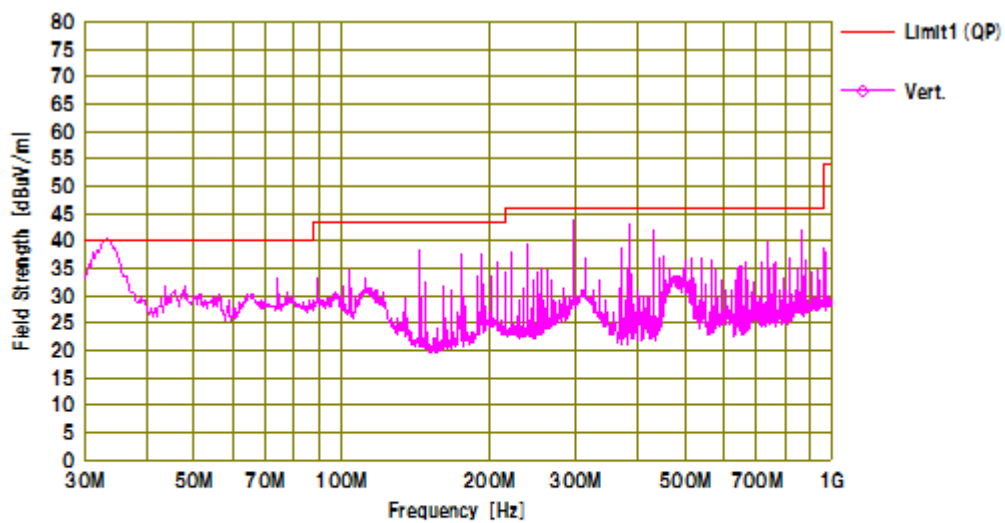
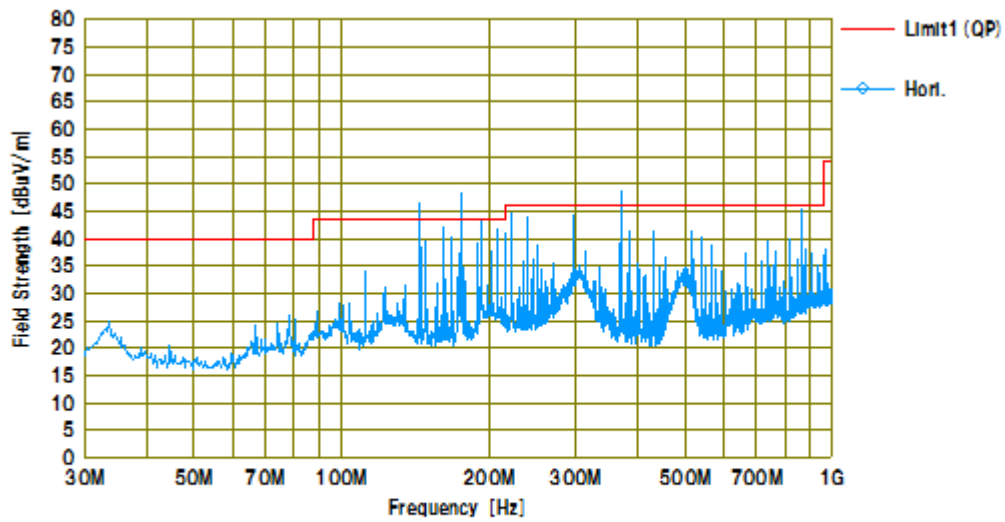
Test Results in Graph

Transmission of RF : ON

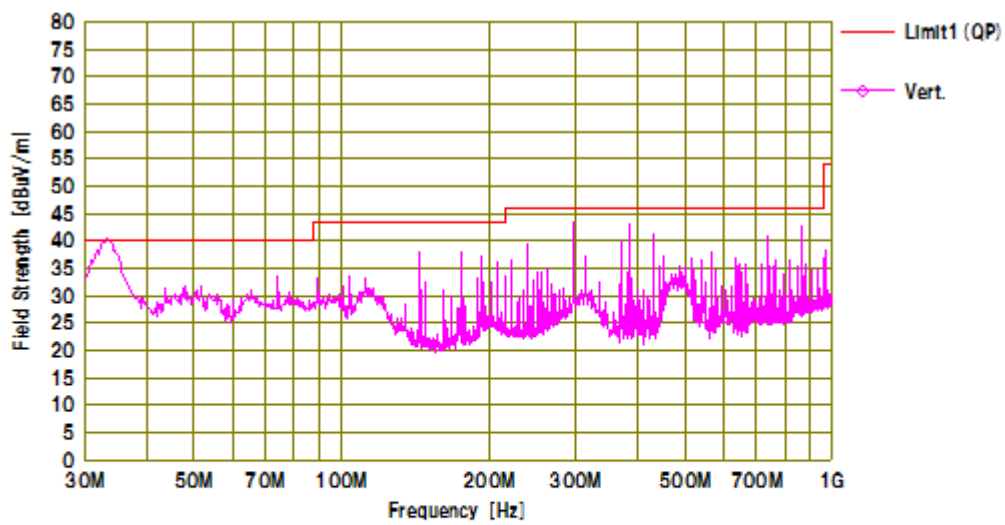
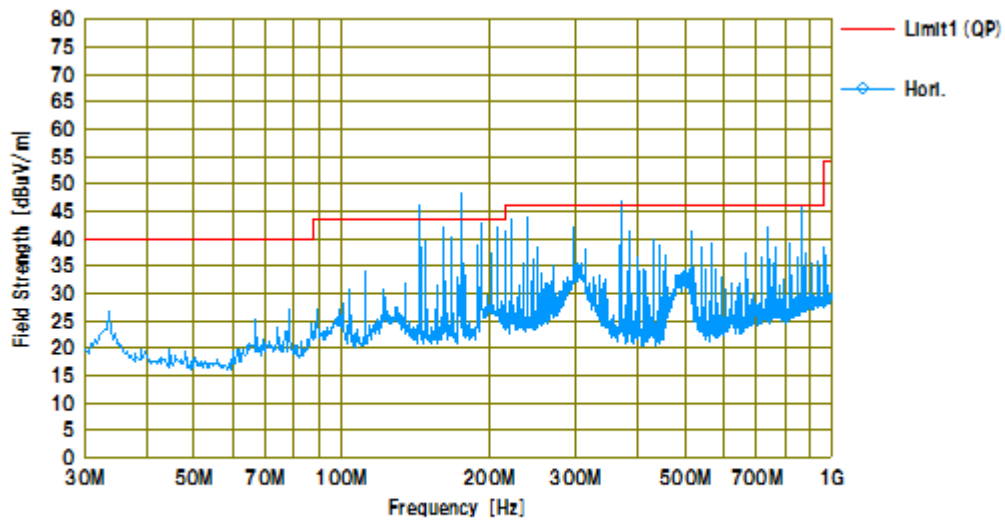
802.11b 2412MHz



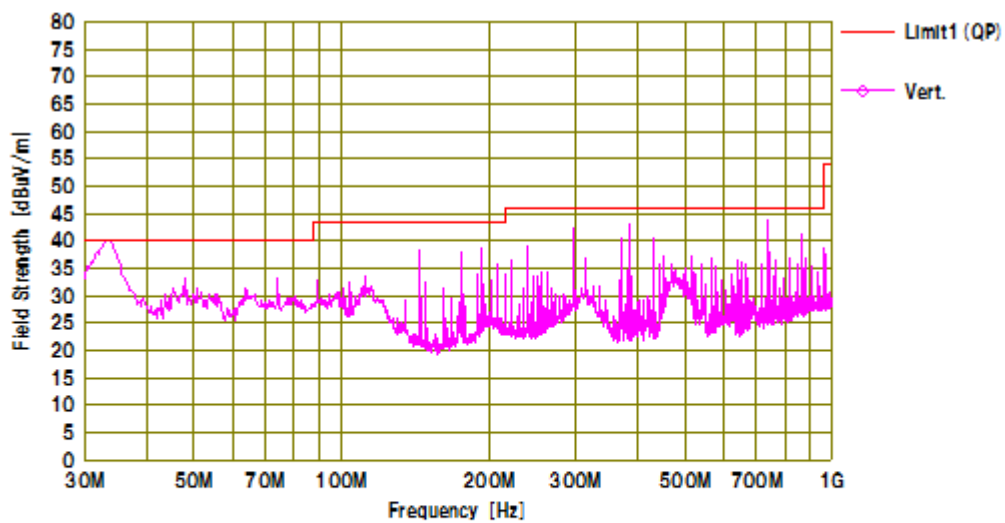
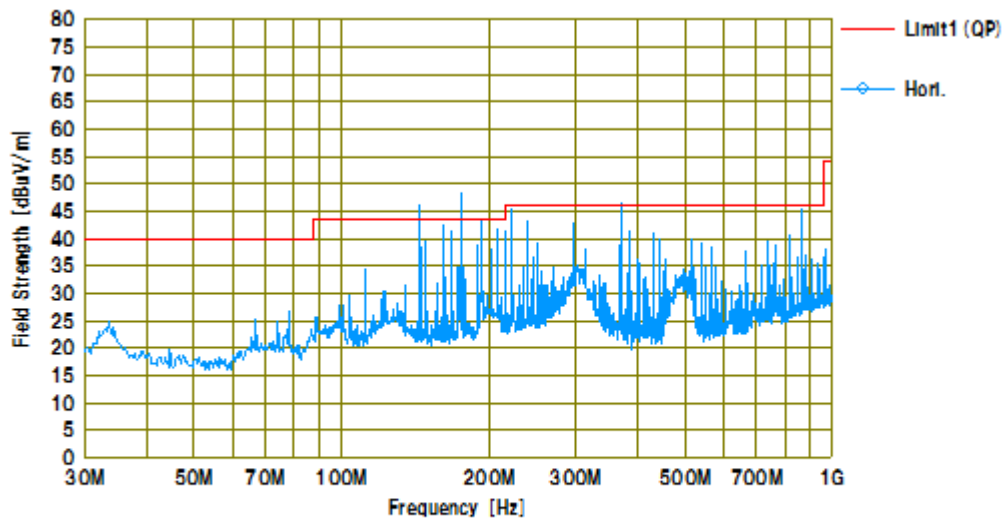
802.11b 2437MHz



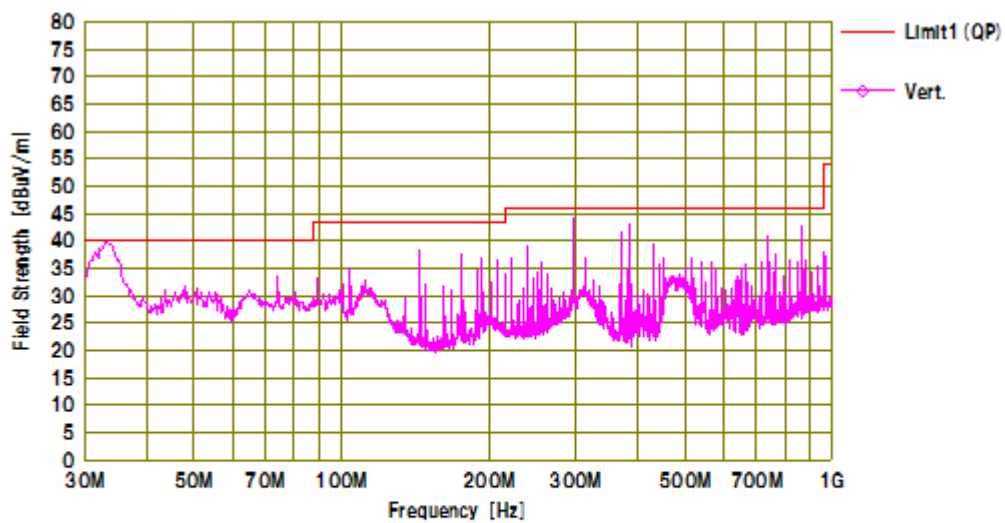
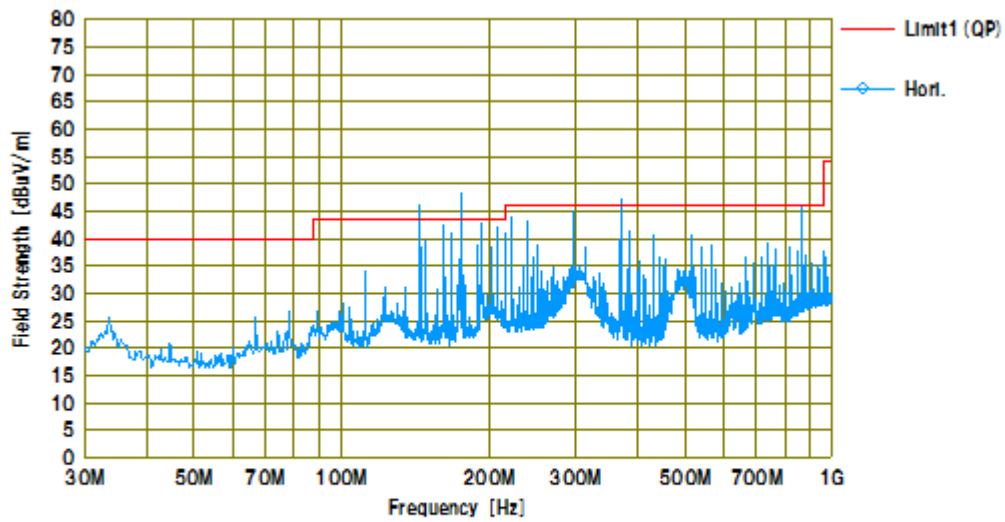
802.11b 2472MHz



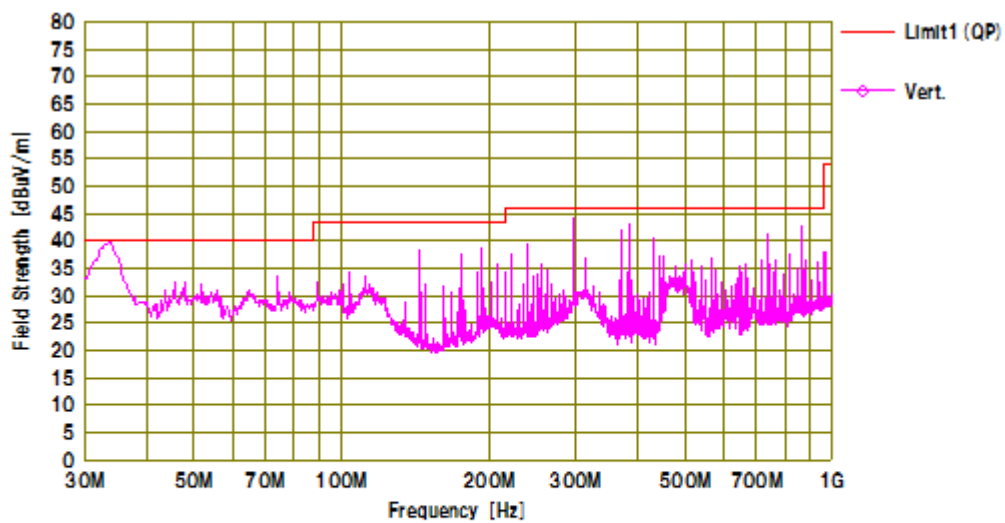
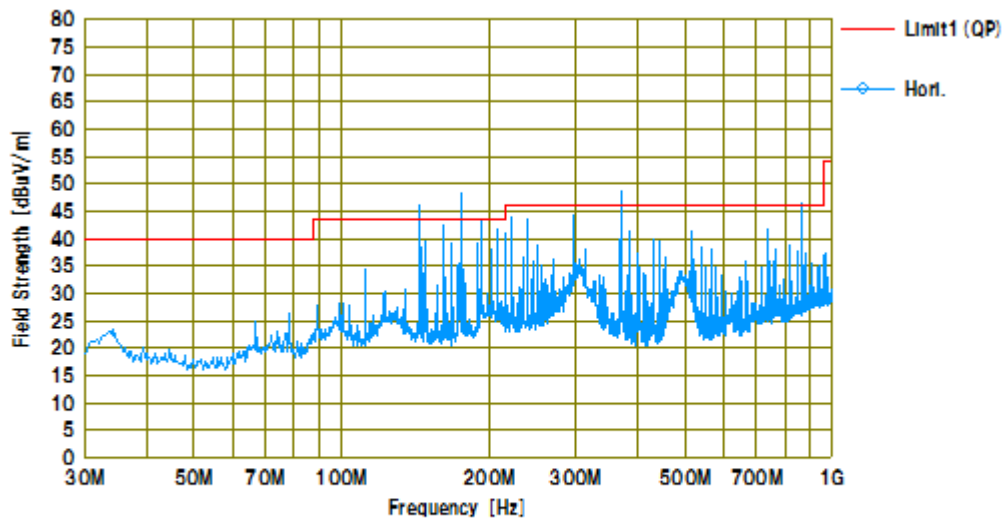
802.11g 2412MHz



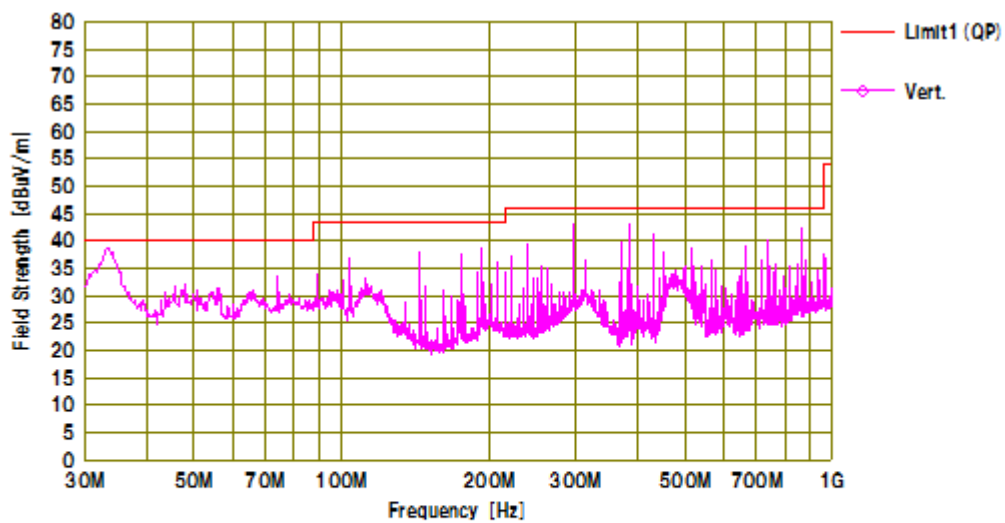
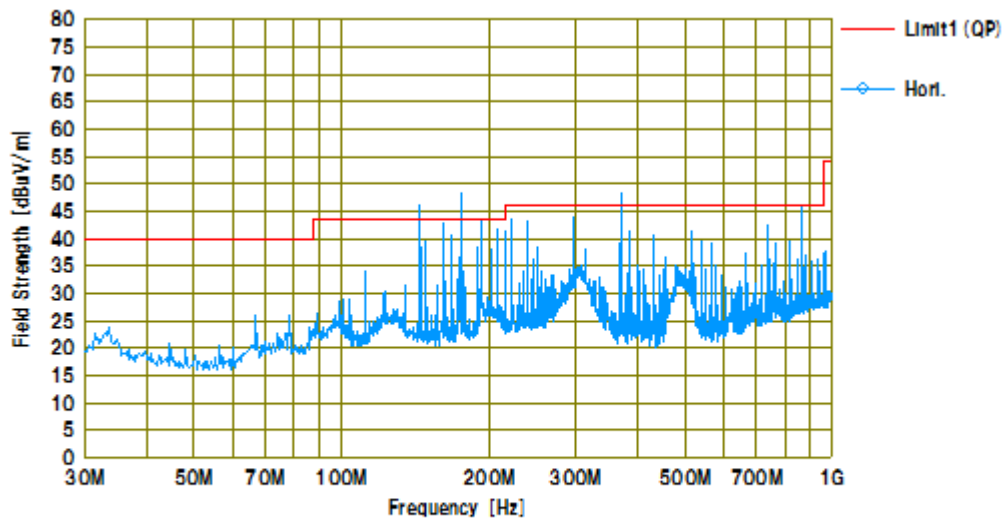
802.11g 2437MHz



802.11g 2462MHz



Transmission of RF : OFF





8. 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
FL-110	LISN	KYORITSU	KNW-242	2014/09	2015/09
FL-110-1	50Ω Terminator	STACK	T1302	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

• Peak Conducted Output Power Measurement

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

• Spurious Emission (below 30MHz)

KEC No.	Equipment	Manufacturer	Model No.	Last Cal.	Next Cal.
AM-098	Pre-Amplifier	SONOMA	SONOMA 310N	2014/03	2015/04
AN-054	Loop Antenna	ROHDE & SCHWARZ	HFH2-Z2	2014/04	2016/04
FS-099	Test Receiver	ROHDE & SCHWARZ	ESS	2014/12	2015/11
MM-302	RF Selector	TOYO	NS4900	2014/04	2015/04
SA-058	Spectrum Analyzer	Agilent	N9010A	2014/06	2015/04

• Spurious Emission (30MHz-1000MHz)

KEC No.	Equipment	Manufacturer	Model No.	Last Cal.	Next Cal.
AM-098	Pre-Amplifier	SONOMA	SONOMA 310N	2014/03	2015/04
AN-220	LPDA Antenna	Schwarzbeck	UHALP 9108A	2014/04	2015/04
AN-296	Biconical Antenna	Schwarzbeck	VHBB9124	2014/04	2015/04
AT-158	Fixed Attenuator	Anritsu	MP721B	2014/03	2015/04
FS-099	Test Receiver	ROHDE & SCHWARZ	ESS	2014/12	2015/11
MM-302	RF Selector	TOYO	NS4900	2014/04	2015/04
SA-058	Spectrum Analyzer	Agilent	N9010A	2014/06	2015/04



• Spurious Emission (above 1GHz)

KEC No.	Equipment	Manufacturer	Model No.	Last Cal.	Next Cal.
AM-053	Pre-Amplifier	HP	8449B	2014/05	2015/05
AN-044	Double Ridged Guide Antenna	Electro-Metrics	RGA-180	2013/05	2015/04
AN-104	Std. Gain Horn Antenna	Scientific	12-5.8	2013/05	2015/04
AN-107	Std. Gain Horn Antenna	Scientific	12A-18	2013/12	2015/12
AN-145	Std. Gain Horn Antenna	Scientific	12-12	2013/05	2015/04
AN-210	Std. Gain Horn Antenna	Scientific	12-8.2	2013/05	2015/04
FL-222	Band-stop Filter	TOYO	8BRM2442/T300	2014/04	2015/04
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 SRX-ISJFULL with 2400-2483.5MHz DTS 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 $0.01\text{mW}/\text{cm}^2$.

Calculation formula :

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

S : power density (W/m^2)

P : peak output power (W)

G : antenna gain (isotropic)

D : measurement distance (m)

Where :

P = 14.83dBm (see 17 page)

G = 2.14dBi

D = 0.2m

Therefore :

$$S(\text{W} / \text{m}^2) = \frac{10^{\frac{14.83}{10}} \times 10^{-3} \times 10^{\frac{2.14}{10}}}{4 \times \pi \times 0.2 \times 0.2} = 0.0990$$

$$S \doteq 0.01 (\text{mW}/\text{cm}^2)$$

This would be less than $1\text{mW}/\text{cm}^2$ when the separation distance between the user and the device's radiating element is less than 20cm.