TEST REPORT

Report Number : A-001-13-C

Date of Issue: 20 May 2013

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 : Panasonic Corporation

Mailing Address : 1-15, Matsuo-cho, Kadoma-shi, Osaka, Japan

2. Identification of Tested Device

Type of Device : Transmitter
FCC ID : ACJ-SC-NT10
Device Name : Wireless Speaker System
Model Number : SC-NT10
Serial Number : PR001
Trade Name : Panasonic
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
Time of Occupancy (Dwell Time) Measurement (FHSS only)	☒ Pass	☐ Fail	☐ N/A
Number of Hopping Measurement (FHSS only)	☒ Pass	☐ Fail	☐ N/A
20dB Bandwidth Measurement (FHSS only)	☒ Pass	☐ Fail	☐ N/A
6dB Bandwidth Measurement (DSSS only)	☐ Pass	☐ Fail	☒ N/A (*1)
Peak Conducted Output Power Measurement	☒ Pass	☐ Fail	☐ N/A
Spurious Emissions Measurement	☒ Pass	☐ Fail	☐ N/A
Peak Power Spectral Density Measurement (DSSS only)	☐ Pass	☐ Fail	☒ N/A (*1)

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

ilac-MRA LAB JAB Testing RTL02810

Approved by Ikuya Minematsu / Group Manager

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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) American Association for Laboratory Accreditation (A2LA) : Accreditation Number: 2070.01
(2) Japan Accreditation Board for Conformity Assessment (JAB) : Accreditation Number: RTL02810
(3) 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)	+2.6 / -2.8 dB
Conducted Disturbance at Mains Port (9kHz-30MHz)	+2.9 / -3.3 dB
Conducted Disturbance at Telecommunication Ports ISN method (None-Shield type)	+2.6 / -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	+2.2 / -2.7dB
Conducted Disturbance at Telecommunication Ports 150Ω Load voltage method (using a 150Ω Load to the out side surface of the shield)	+1.9 / -2.3 dB
Conducted Disturbance at Telecommunication Ports None Invasive method (using a combination of current probe and capacitive voltage probe)	+2.7 / -3.7 dB
Conducted Disturbance at Lead Terminals and Additional Terminals	+1.8 / -2.2 dB
Disturbance Power (30MHz -300MHz)	+2.6 / -3.6 dB
Radiated Disturbance at Frequency Range from 9kHz up to 30MHz 60cm Loop Antenna method	+3.6 / -4.2 dB
Radiated Disturbance at Frequency Range from 9kHz up to 30MHz LLA method	+2.3 / -2.9 dB
Radiated Disturbance at Frequency Range from 30MHz up to 300MHz 3m method	+3.1 / -4.0 dB
Radiated Disturbance at Frequency Range from 300MHz up to 1GHz 3m method	+3.5 / -4.4 dB
Radiated Disturbance at Frequency Range from 30MHz up to 1GHz 10m method	+4.2 / -4.5 dB
Radiated Disturbance at Frequency Range from 1GHz up to 6GHz 3m method	+4.5 / -5.9 dB
Radiated Disturbance at Frequency Range from 6GHz up to 26.5GHz 3m method	+4.4 / -4.6 dB
Harmonics Currents Emissions	+4.6% / -4.6%
Voltage Change, Voltage Fluctuations and Flicker	+4.2% / -4.2%
Frequency Tolerance of Carrier Signal	+/- 1.0×10^{-7}

Expiration Date : 2013/9/30

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
- Built-in Bluetooth (Receiving Audio) : FCC: ACJ-SC-NT10

(2) Radio Specifications
- Modulation : FHSS
- Frequency band : 2402-2480MHz
- Power supply (Built-in Battery output) : 3.6V
- Antenna type : PCB Pattern Antenna
- Antenna gain : -1.45dBi

(3) Maximum Oscillators Frequency
- DSP Clock : 24.576MHz (Main PCB)

(4) Software Version : ISRT Ver.2.1.9.3270

(5) Firmware Version : NT10_3LG009

(6) Interface and Provide Terminal
- AUX in
- USB : Built-in Battery charging use

(7) Rated Power Supply : DC5V 0.6A
(PC : test for AC 120V 60Hz, EUT : DC 5V)

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 C63.4-2003

3.2. Date of Test

Receipt of Test Sample : 22 April 2013
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 : 13 May 2013
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

Test Item	Operating Mode	Frequency
AC Power Line Conducted Emission	Bluetooth Communication	-
Carrier Separation	DH5 / 3DH5	2402MHz
		2441MHz
		2480MHz
Time of Occupancy	DH1 / DH3 / DH5 3DH1 / 3DH3 / 3DH5	-
Number of Hopping	DH5 / 3DH5	-
20dB Bandwidth	DH5 / 3DH5	2402MHz
		2441MHz
		2480MHz
Peak Conducted Output Power	DH5 / 3DH5	2402MHz
		2441MHz
		2480MHz
Spurious Emissions (*1)	DH5 / 3DH5	2402MHz
		2441MHz
		2480MHz

[Note]

(1) The power setting used a set value (DH5:0×2b, 3DH5:0×24) of software.

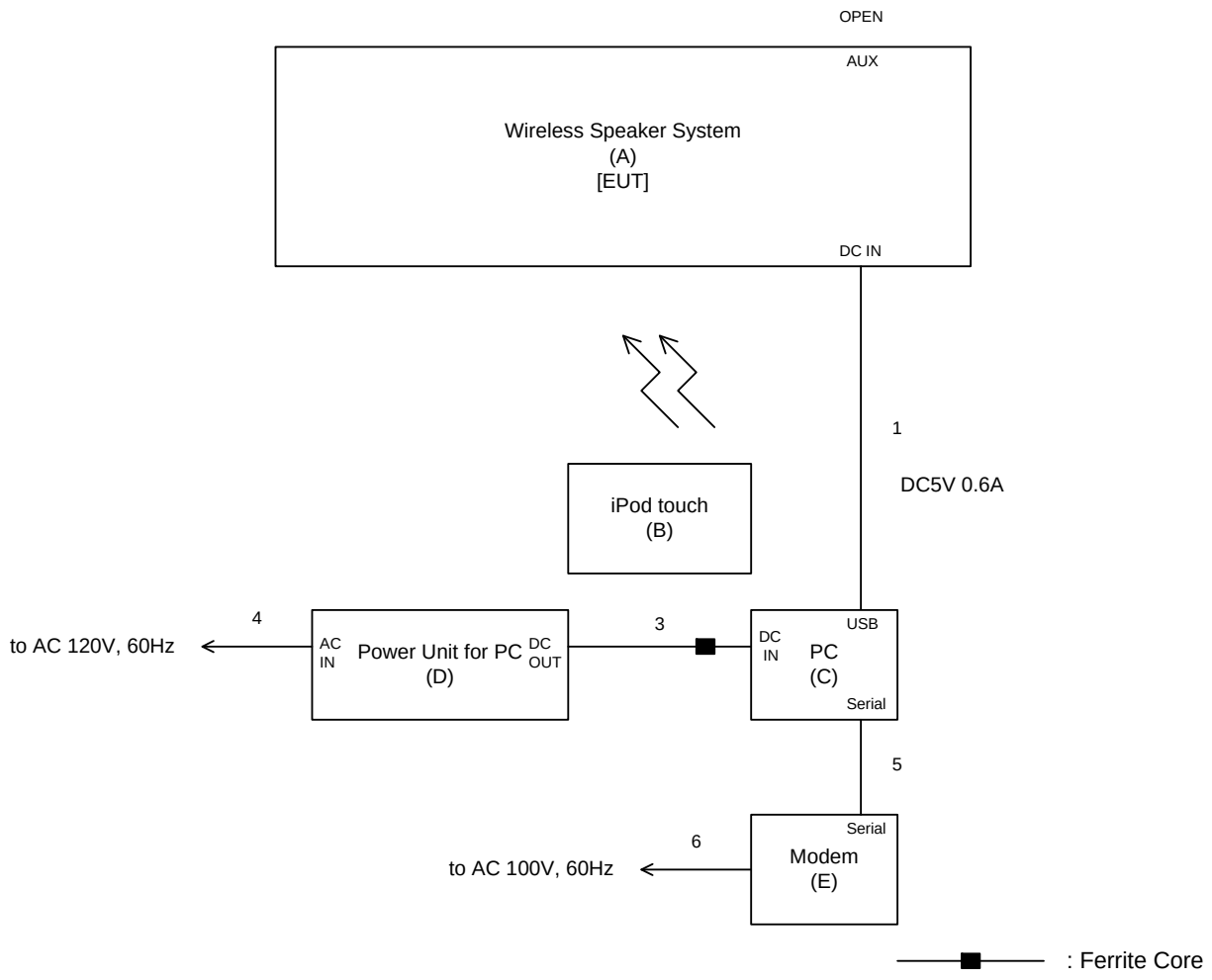
(2) AC Power Line Conducted Emission was measured in AC power cord on the PC.

(*1) 9kHz – 30MHz : Conducted measurement
30MHz – 25GHz : Radiated measurement

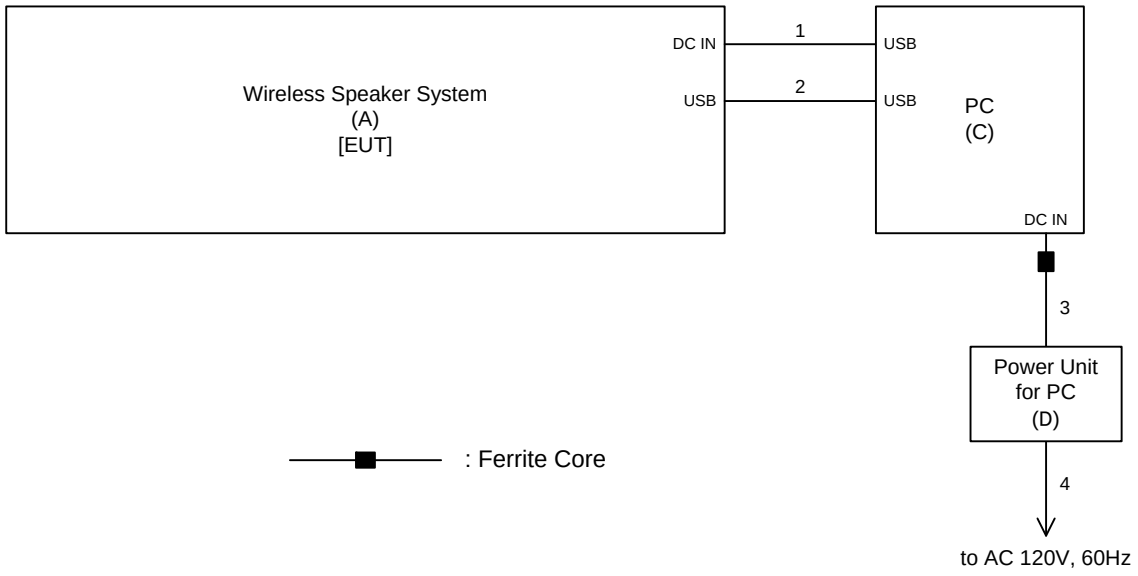
M130621: This page (Page 6 of 42) is amended for the original test report (Report No. A-001-13-C, dated 20 May 2013).

3.5. Block Diagram of TEST System

Conducted Emission



Spurious Emission



3.6. List of Test System

No.	Device Name	Model Number	Serial Number	Trade Name	Note
A	Wireless Speaker System	SC-NT10	PR001	Panasonic	EUT
B	iPod touch	A1421	CCQJF5UDF4JR	Apple	
C	PC	CF-30FW1AJS	8FKSA52812	Panasonic	
D	Power Unit for PC	CF-AA1652A M6	1652AM607Y00559J	Panasonic	
E	Modem	T1200-SD2	S87369400	OMNITEL	

[Note]
(1): Option of EUT

3.7. List of Cables

No.	Cable Name	Shielded (Y/N)	Length (m)	Note	
1	USB Cable (For EUT)	N	0.5	Attached cable of EUT	(2)
2	USB Cable	Y	1.0		
3	DC Power Cord	N	1.8	With one ferrite core (1-turn)	(1)
4	AC Power Cord	N	0.8		(4)
5	Serial Cable	Y	2.0		
6	AC Power Cord	N	1.9		(1),(3)

[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 C63.4-2003 section 7.
(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 Results

Measured Frequency (MHz)	LISN Factor (dB)	Meter Reading				Maximum RF Voltage		Limit		Margin for Limit	
		Q-Peak		Average							
		Va (dBμV)	Vb (dBμV)	Va (dBμV)	Vb (dBμV)	Q-Peak (dBμV)	Average (dBμV)	Q-Peak (dBμV)	Average (dBμV)	Q-Peak (dB)	Average (dB)
0.150	10.4	47.8	40.6	28.5	21.5	58.2	38.9	66.0	56.0	7.8	17.1
0.175	10.3	45.6	37.5	25.7	17.2	55.9	36.0	64.7	54.7	8.8	18.7
0.346	10.2	35.6	28.1	14.9	7.3	45.8	25.1	59.1	49.1	13.3	24.0
0.514	10.2	28.5	23.0	13.3	9.1	38.7	23.5	56.0	46.0	17.3	22.5
0.725	10.2	26.2	22.1	7.7	4.3	36.4	17.9	56.0	46.0	19.6	28.1
11.062	10.6	21.7	21.8	18.2	18.3	32.4	28.9	60.0	50.0	27.6	21.1

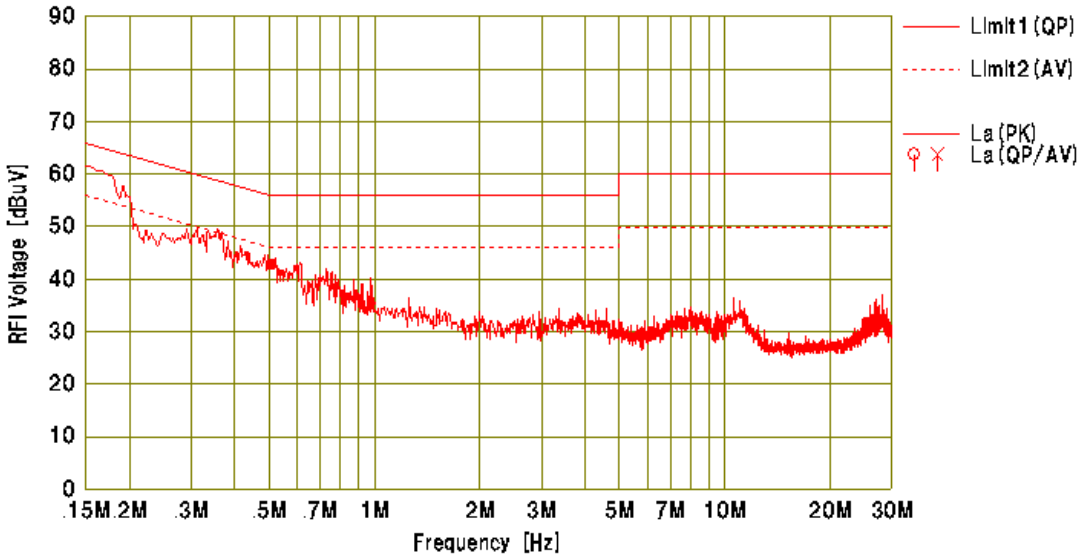
[Note]
LISN Factor includes the cable loss and attenuator loss.

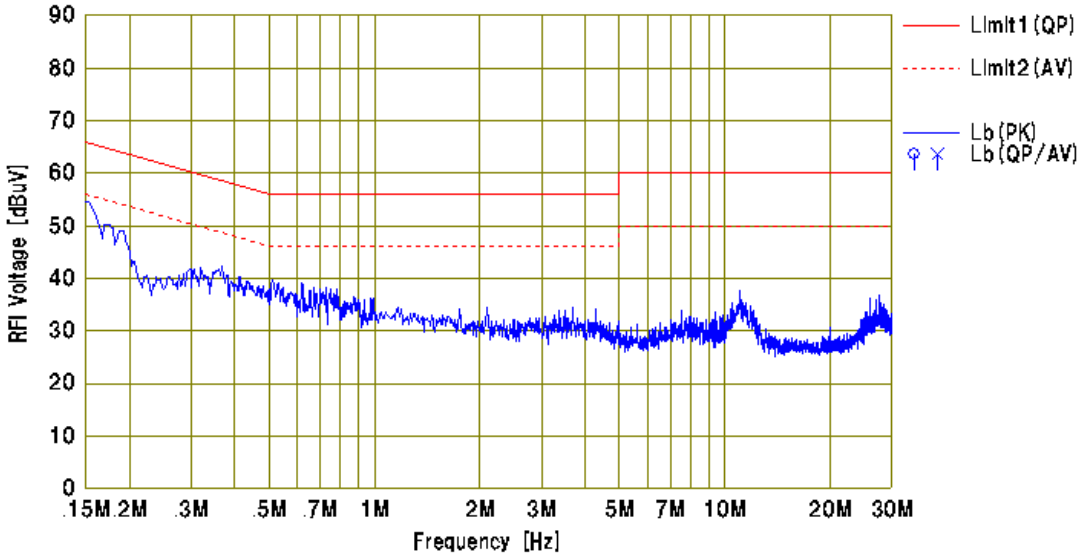
[Calculation method]
Maximum RF Voltage (dBμV)
= Meter Reading (at maximum level of Va or Vb) (dBμV) + LISN Factor (dB)

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
26 April 2013	22 °C	33 %

Test Results in Graph





5. CARRIER SEPARATION MEASUREMENT

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 : ≧3×RBW
Sweep : Auto
Trace Mode : Max Hold

5.2. Test Results

Operating mode	Frequency (MHz)	Channel separation (MHz)	Limit (*1) (MHz)
DH5	2402	1.000	≥0.630
	2441	1.000	≥0.616
	2480	1.000	≥0.631
3DH5	2402	1.000	≥0.841
	2441	1.000	≥0.842
	2480	1.000	≥0.841

[Note]
(1) (*1) mark : Two-thirds of 20dB Bandwidth.
(2) See next page figure.

[Test Condition]
EUT operation : Hopping transmission

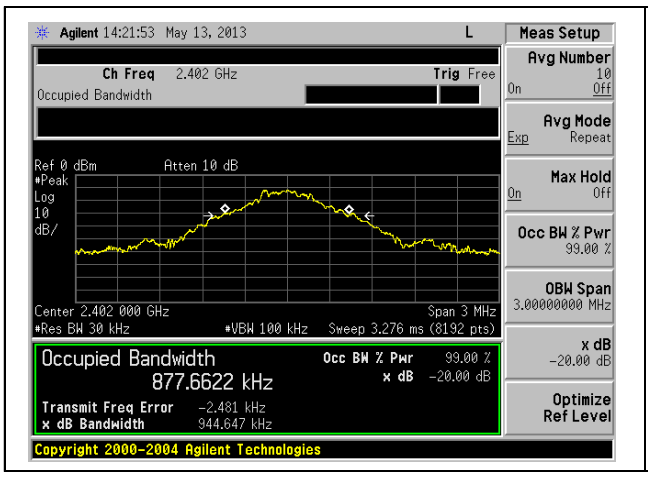
Tested Date	Environment	
	Temperature	Humidity
13 May 2013	20 °C	37 %

M130621: This page (Page 12 of 42) is amended for the original test report (Report No. A-001-13-C, dated 20 May 2013).

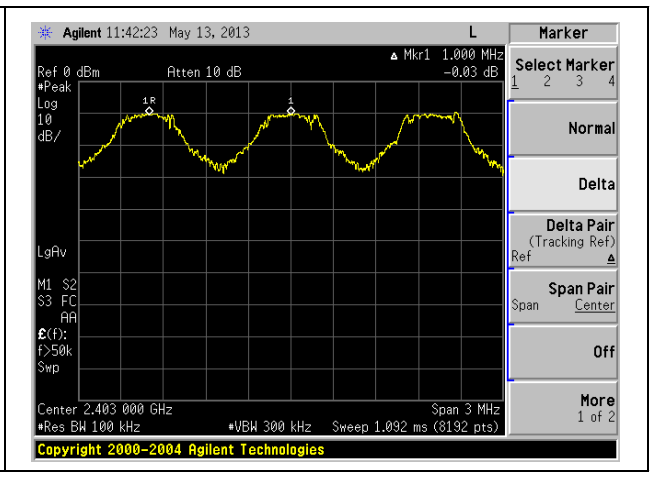
Spectrum Chart

DH5 2402MHz

20dB Bandwidth

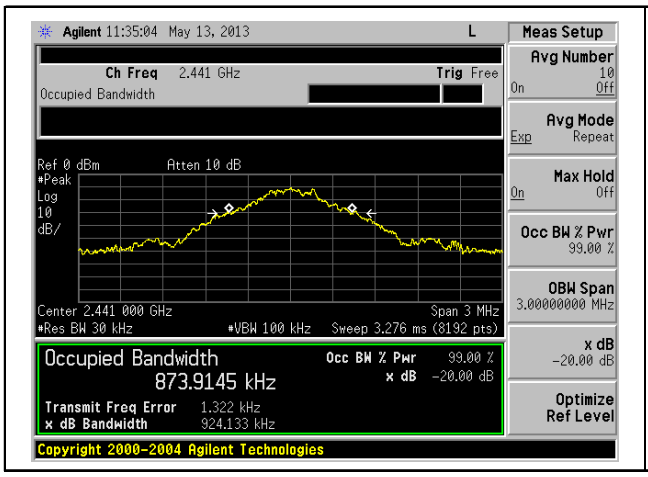


Carrier Frequency Separation

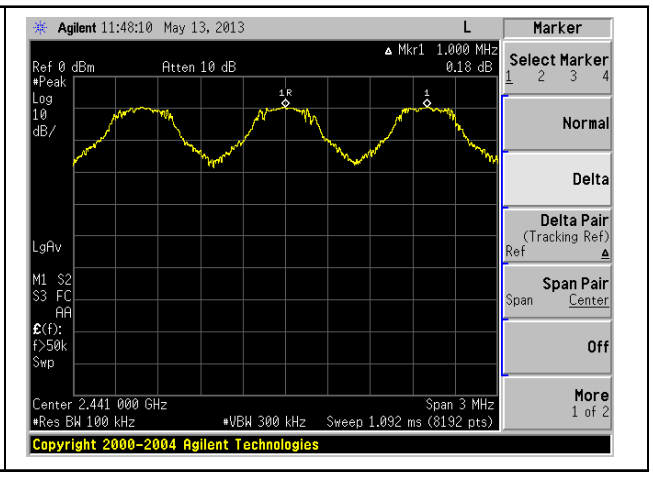


DH5 2441MHz

20dB Bandwidth

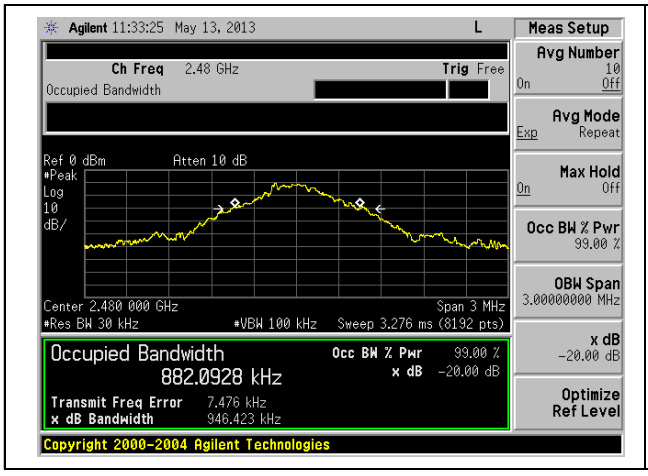


Carrier Frequency Separation

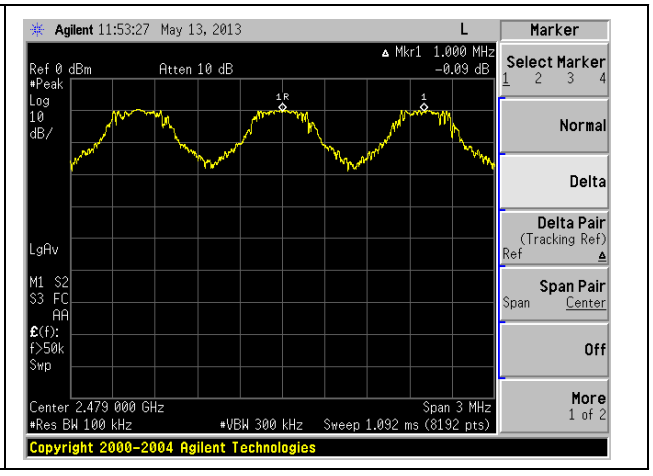


DH5 2480MHz

20dB Bandwidth

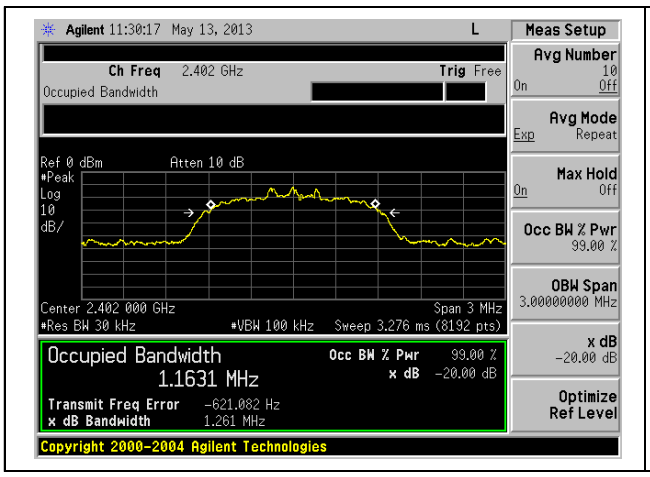


Carrier Frequency Separation

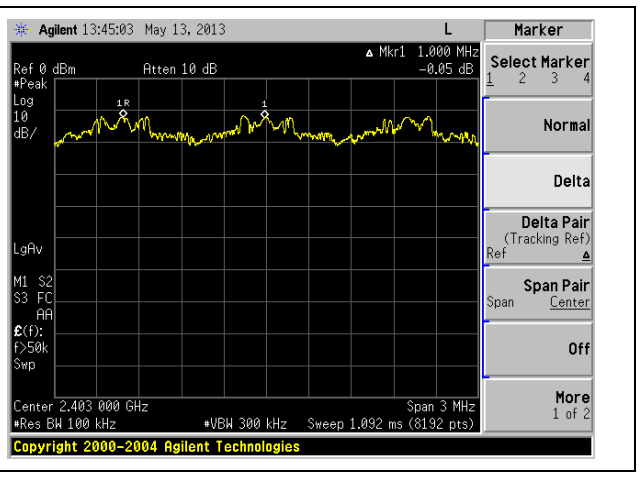


3DH5 2402MHz

20dB Bandwidth

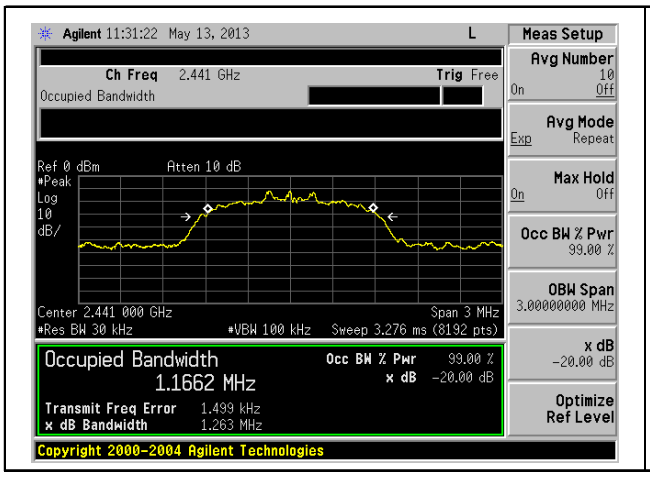


Carrier Frequency Separation

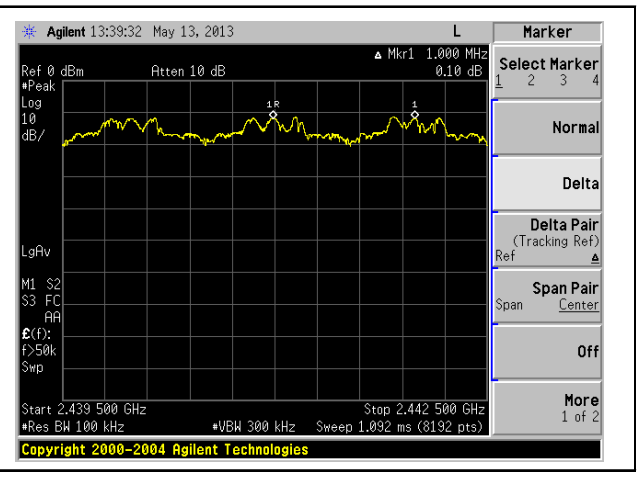


3DH5 2441MHz

20dB Bandwidth

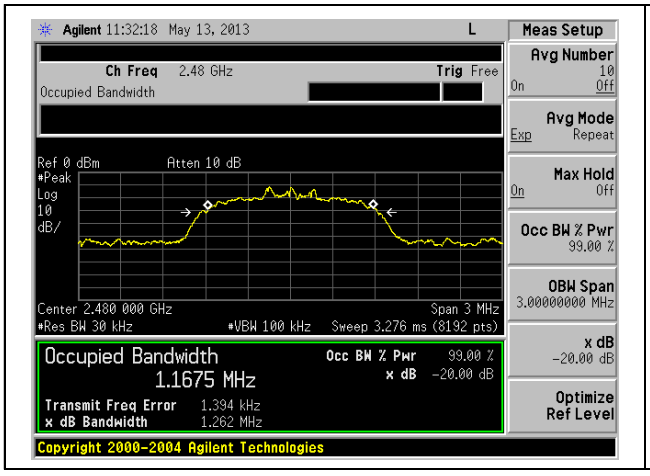


Carrier Frequency Separation

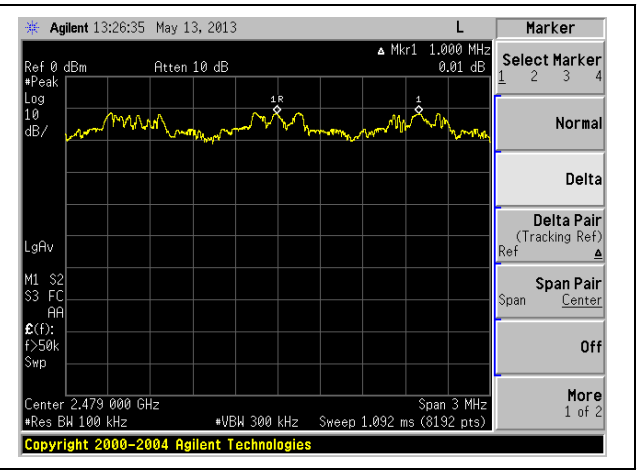


3DH5 2480MHz

20dB Bandwidth



Carrier Frequency Separation



6. TIME OF OCCUPANCY MEASUREMENT

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 36.1s, and the number of channel was measured.

[Note]
(*1) Spectrum Analyzer Set Up Conditions
Frequency Span : Zero span
Resolution bandwidth : 1MHz
Video bandwidth :≧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 : 3kHz
Video bandwidth :≧RBW
Sweep : 36.1s
Detector function : Peak

6.2. Test Results

Operating mode	Measurement Value (msec)	Number of Channel (times)	Result (msec)	Limit (msec)
DH1	0.407	256	104.22	<400
DH3	1.664	142	236.29	<400
DH5	2.913	102	297.13	<400
3DH1	0.419	252	105.46	<400
3DH3	1.670	146	243.82	<400
3DH5	2.921	94	274.57	<400

[Note]
See next page figure.

[Test Condition]
EUT operation : Hopping transmission

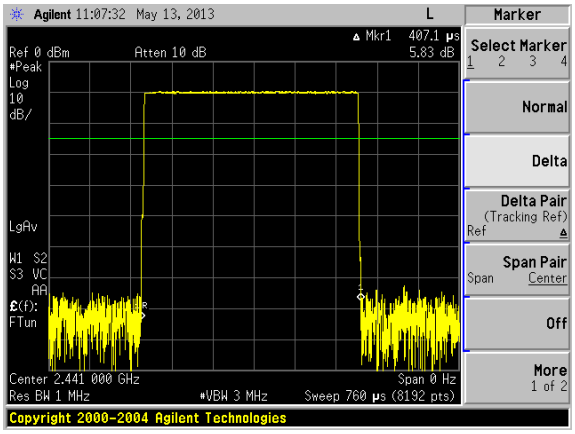
[Calculation method]
Result (msec) = Measurement Value (msec) ×Number of Channel (times)

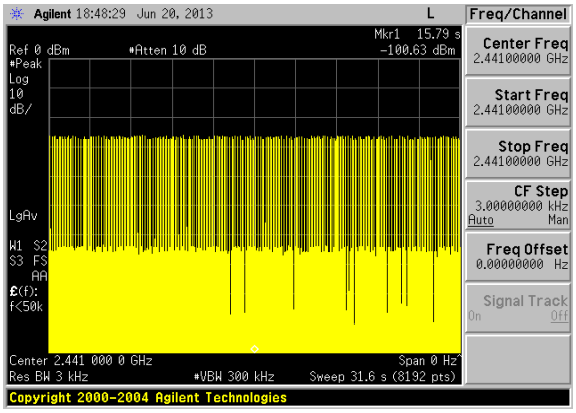
Tested Date	Environment	
	Temperature	Humidity
13 May 2013	20 °C	37 %

M130621: This page (Page 15 of 42) is amended for the original test report (Report No. A-001-13-C, dated 20 May 2013).

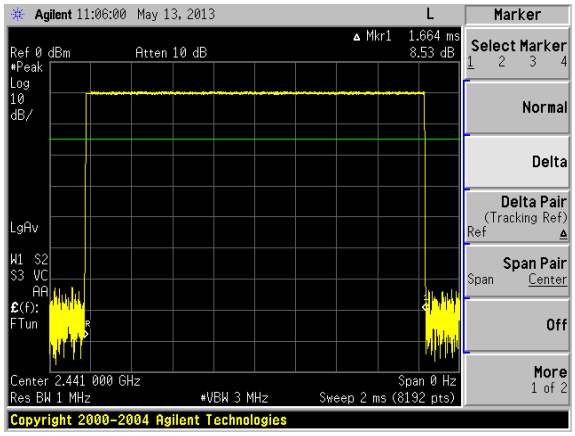
Spectrum Chart

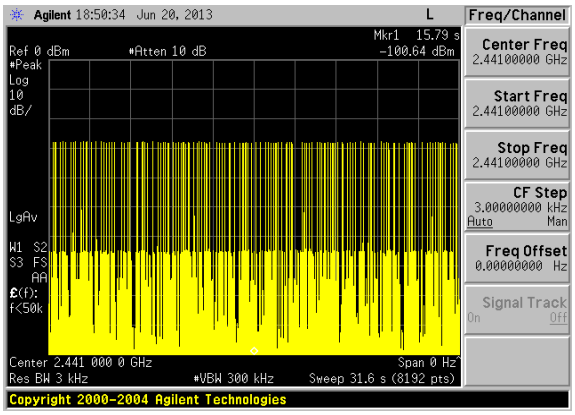
DH1



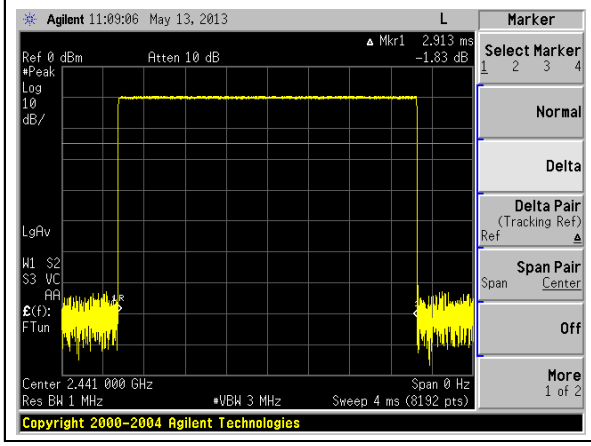


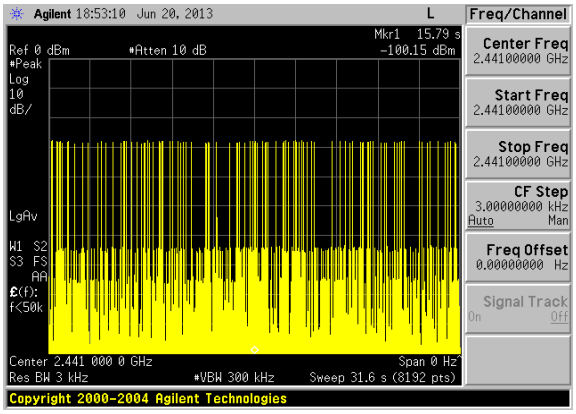
DH3





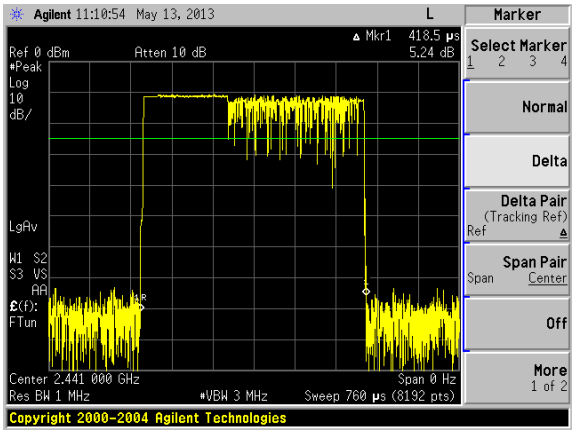
DH5

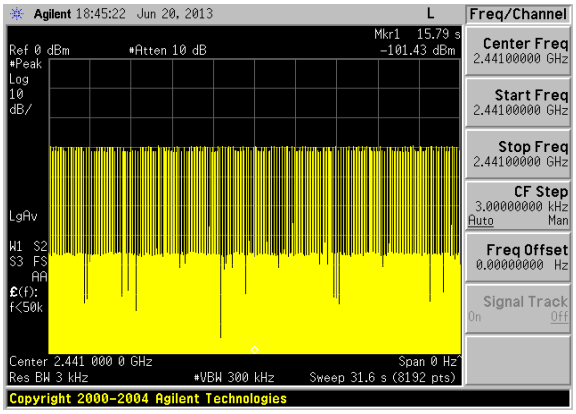




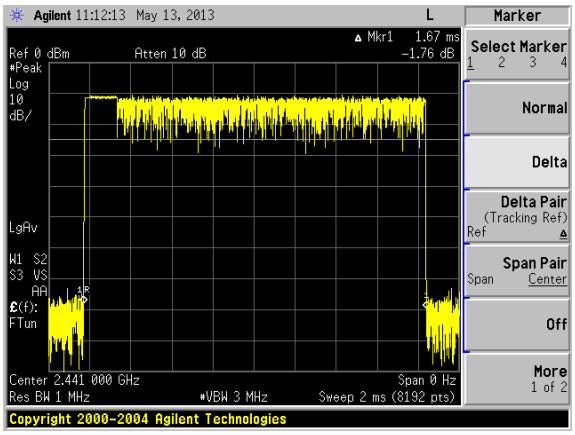
M130621: This page (Page 16 of 42) is amended for the original test report (Report No. A-001-13-C, dated 20 May 2013).

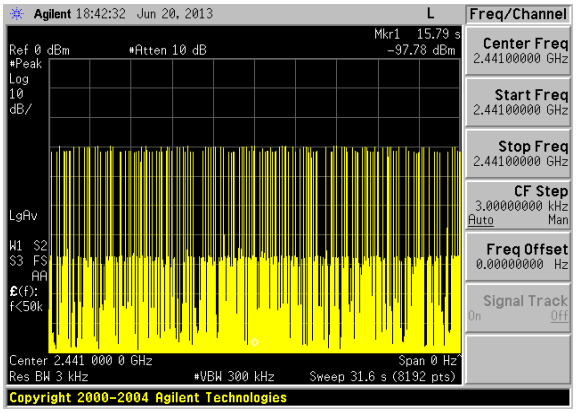
3DH1



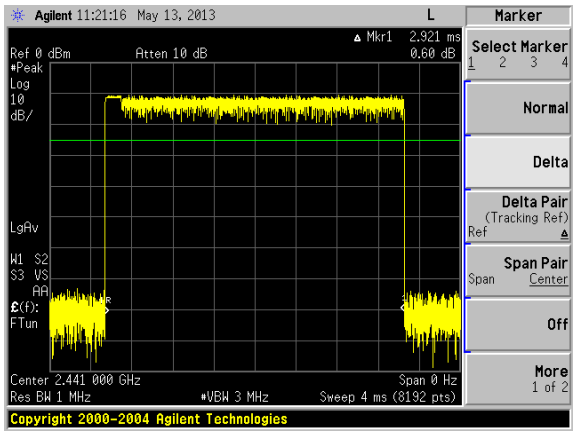


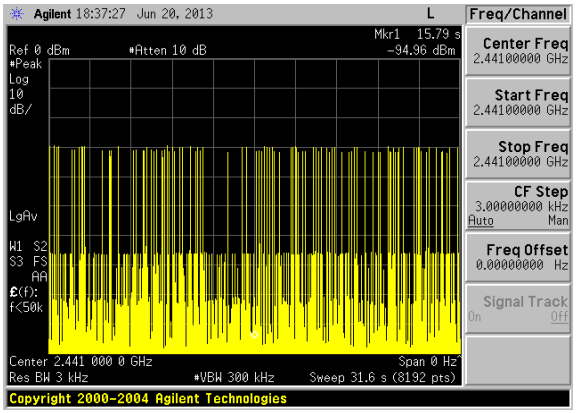
3DH3





3DH5





7. NUMBER OF HOPPING MEASUREMENT

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 :≧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

[Note]
(1) Test was not performed at AFH mode whose number of hopping channel is 20 channels because this Bluetooth radio is in compliance of Bluetooth Specification.
(2) See next page figure.

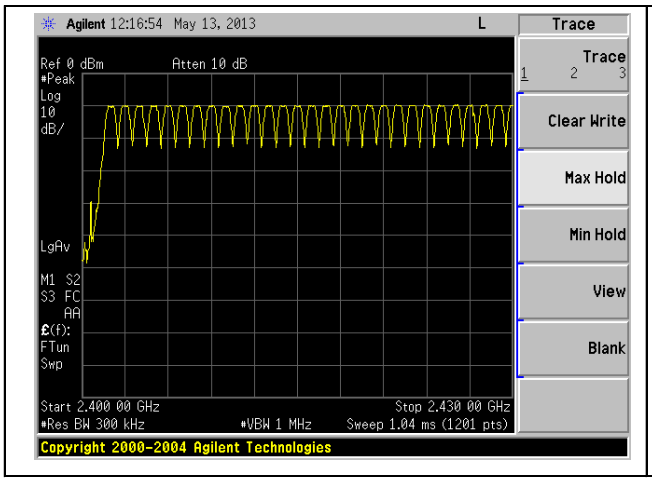
[Test Condition]
EUT operation : Hopping transmission

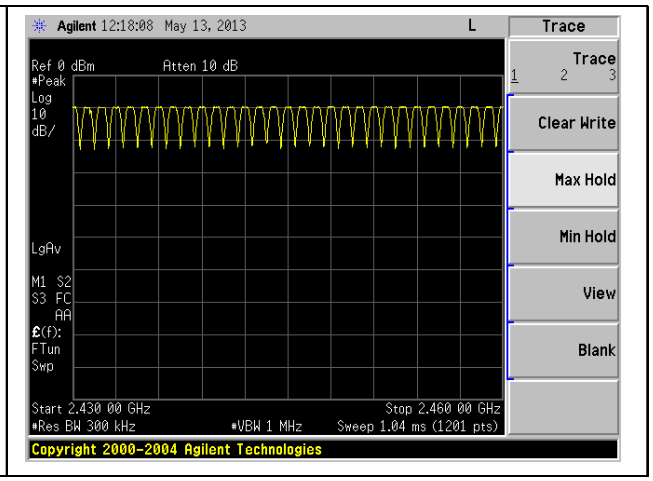
Tested Date	Environment	
	Temperature	Humidity
13 May 2013	20 °C	37 %

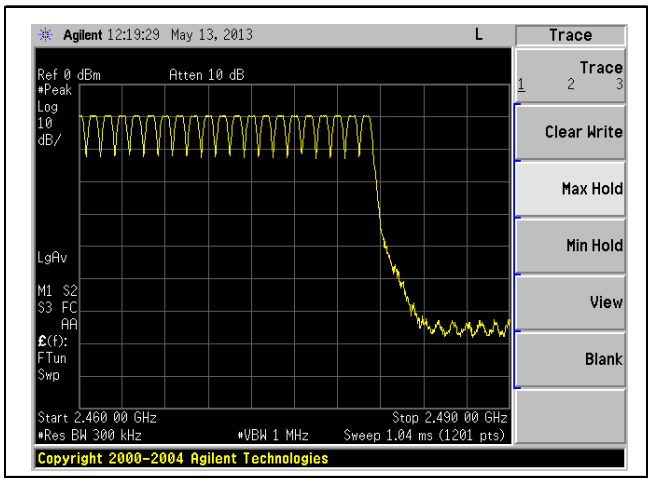
M130627: This page (Page 18 of 42) is amended for the original test report (Report No. A-001-13-C, dated 20 May 2013).

Spectrum Chart

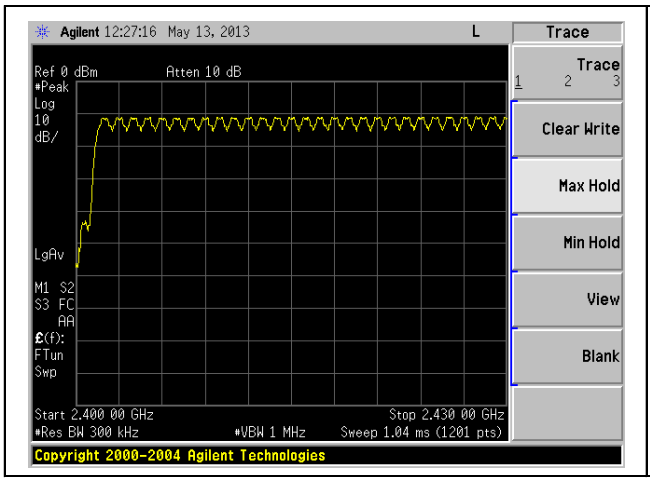
DH5

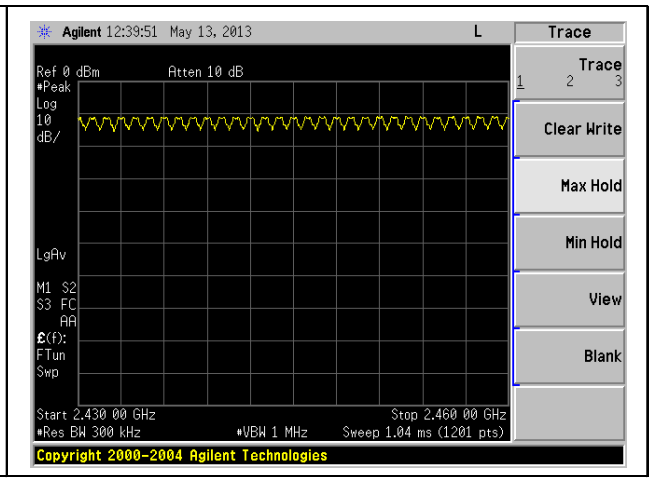






3DH5


Agilent 12:27:16 May 13, 2013
L
Trace
Ref 0 dBm
Atten 10 dB
#Peak
Log
10
dB/
LgAv
M1 S2
S3 FC
AA
£(f):
FTun
Swp
Start 2.400 00 GHz
Stop 2.430 00 GHz
#Res BW 300 kHz
#VBW 1 MHz
Sweep 1.04 ms (1201 pts)
Trace
1 2 3
Clear Write
Max Hold
Min Hold
View
Blank
Copyright 2000-2004 Agilent Technologies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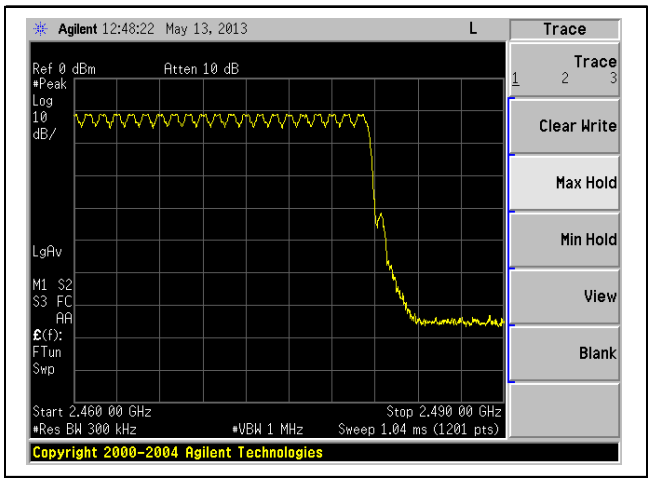
L
Trace
Ref 0 dBm
Atten 10 dB
#Peak
Log
10
dB/
LgAv
M1 S2
S3 FC
AA
£(f):
FTun
Swp
Start 2.430 00 GHz
Stop 2.460 00 GHz
#Res BW 300 kHz
#VBW 1 MHz
Sweep 1.04 ms (1201 pts)
Trace
1 2 3
Clear Write
Max Hold
Min Hold
View
Blank
Copyright 2000-2004 Agilent Technologies


Agilent 12:48:22 May 13, 2013
L
Trace
Ref 0 dBm
Atten 10 dB
#Peak
Log
10
dB/
LgAv
M1 S2
S3 FC
AA
£(f):
FTun
Swp
Start 2.460 00 GHz
Stop 2.490 00 GHz
#Res BW 300 kHz
#VBW 1 MHz
Sweep 1.04 ms (1201 pts)
Trace
1 2 3
Clear Write
Max Hold
Min Hold
View
Blank
Copyright 2000-2004 Agilent Technologies

8. 20dB BANDWIDTH MEASUREMENT

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 maximum emission condition, the transmitting data rate of EUT is set to maximum data rate.
(4) 20dB Bandwidth is measured using the function of spectrum analyzer.

[Note]
(*1) Spectrum Analyzer Set Up Conditions

Frequency Span	: 3MHz
Resolution bandwidth	: 30kHz
Video bandwidth	:≧RBW
Detector function	: Peak
x dB	: -20dB

8.2. Test Results

Operating mode	Frequency (MHz)	Emission Bandwidth (MHz)
DH5	2402	0.945
	2441	0.924
	2480	0.946
3DH5	2402	1.261
	2441	1.263
	2480	1.262

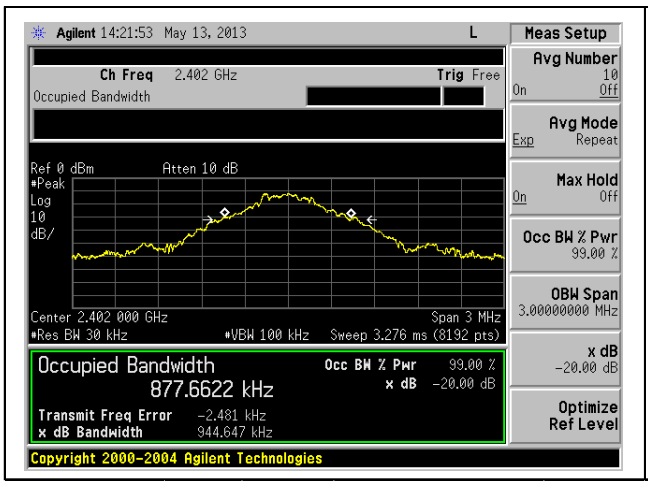
[Note]
See next page figure.

Tested Date	Environment	
	Temperature	Humidity
13 March 2013	20 °C	37 %

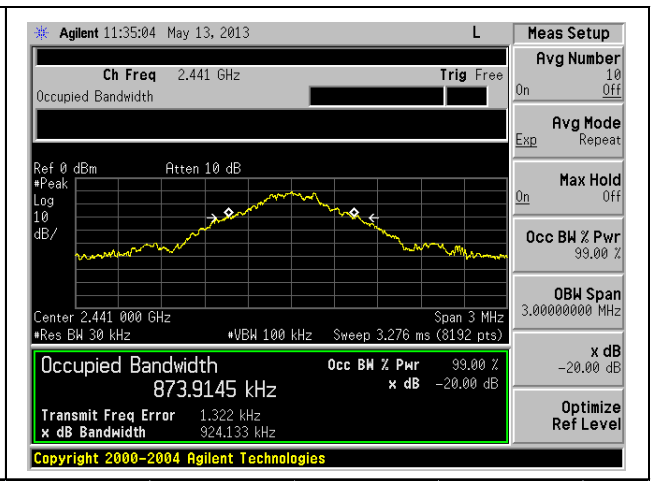
Spectrum Chart

DH5

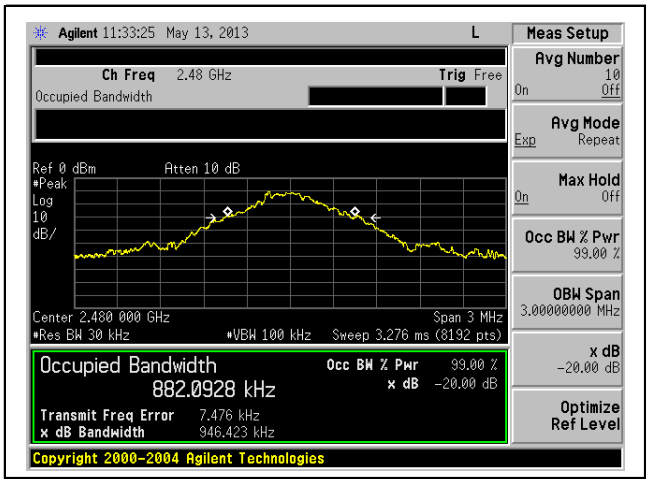
2402MHz



2441MHz

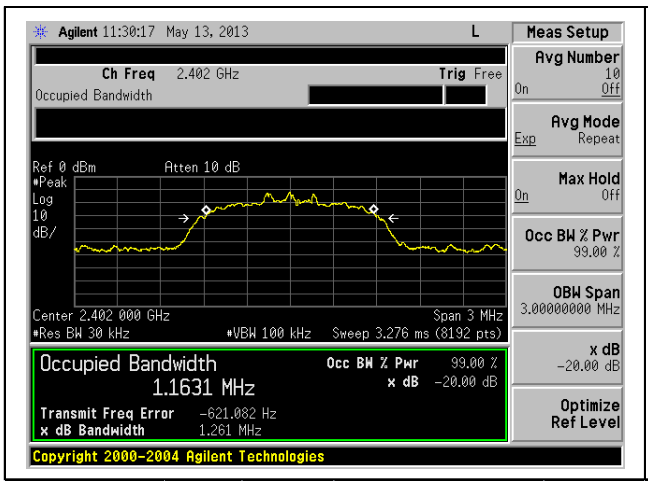


2480MHz

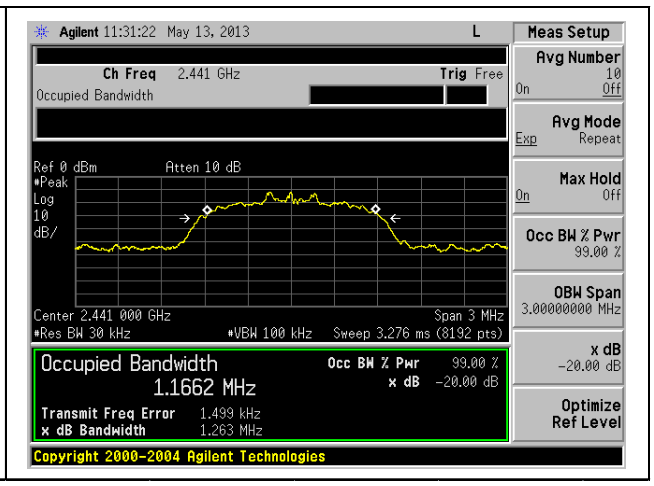


3DH5

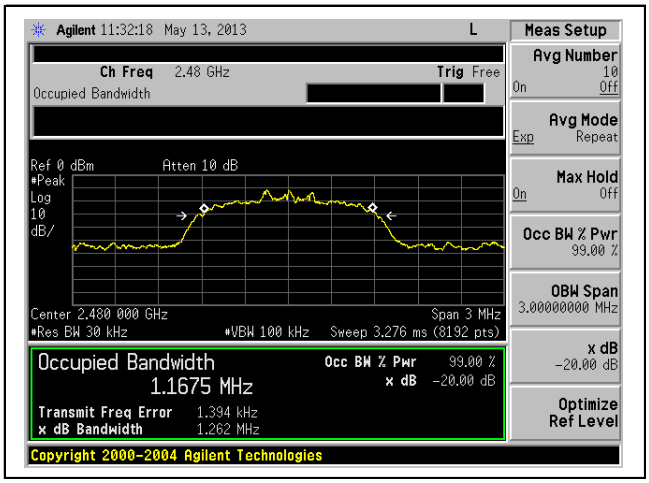
2402MHz



2441MHz



2480MHz



9. PEAK CONDUCTED OUTPUT POWER MEASUREMENT

9.1. 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) Measurement is started using the spectrum analyzer.

[Note]
(*1) Spectrum Analyzer Set Up Conditions
Frequency Span : approximately 5times the 20dB bandwidth
Resolution bandwidth :＞the 20dB bandwidth of the emission (*)
Video bandwidth :≧RBW
Detector function : Peak
(*) 20dB bandwidth≦1MHz : RBW 1MHz
20dB bandwidth＞1MHz : RBW ＞20dB bandwidth

9.2. Test Results

DH5

Measured Frequency (MHz)	Correction Factor (dB)	Meter Reading (dBm)	Peak Output Power (dBm)	Limit (dBm)	Margin for Limit (dB)
2402	11.40	-9.85	1.55	20.96	19.40
2441	11.40	-9.57	1.83	20.96	19.10
2480	11.40	-9.57	1.83	20.96	19.10

3DH5

Measured Frequency (MHz)	Correction Factor (dB)	Meter Reading (dBm)	Peak Output Power (dBm)	Limit (dBm)	Margin for Limit (dB)
2402	11.40	-9.91	1.49	20.96	19.50
2441	11.40	-9.68	1.72	20.96	19.20
2480	11.40	-9.65	1.75	20.96	19.20

[Note]
(1) Correction Factor includes the loss of attenuator and coaxial cables.
(2) See next page figure.

[Calculation method]
Peak Output Power (dBm) = Meter Reading (dBm) + Correction Factor (dB)

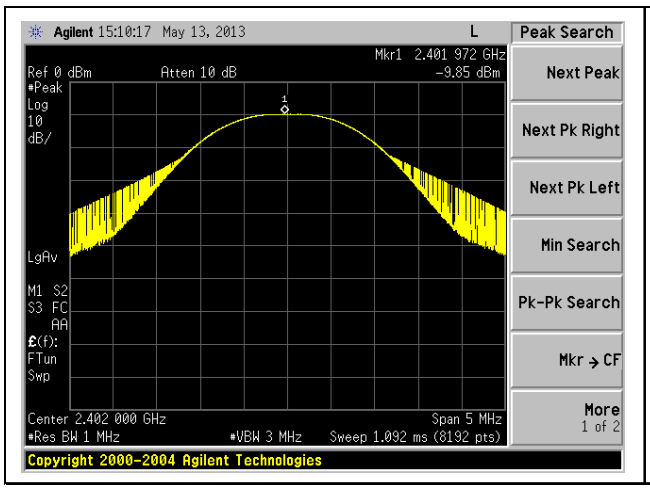
Tested Date	Environment	
	Temperature	Humidity
13 March 2013	20 °C	37 %

M130627: This page (Page 24 of 42) is amended for the original test report (Report No. A-001-13-C, dated 20 May 2013).

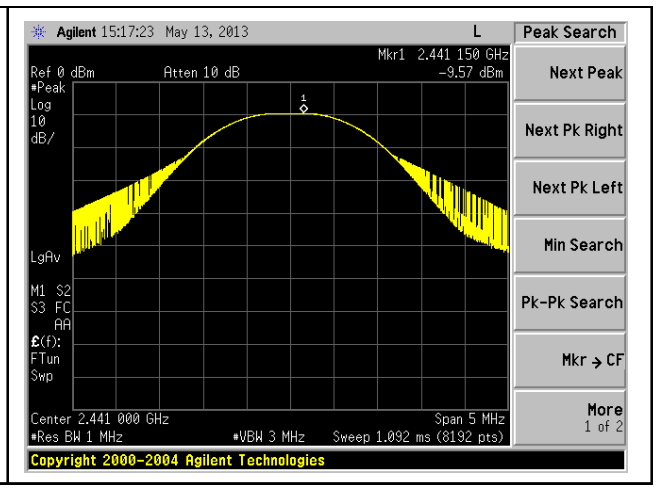
Spectrum Chart

DH5

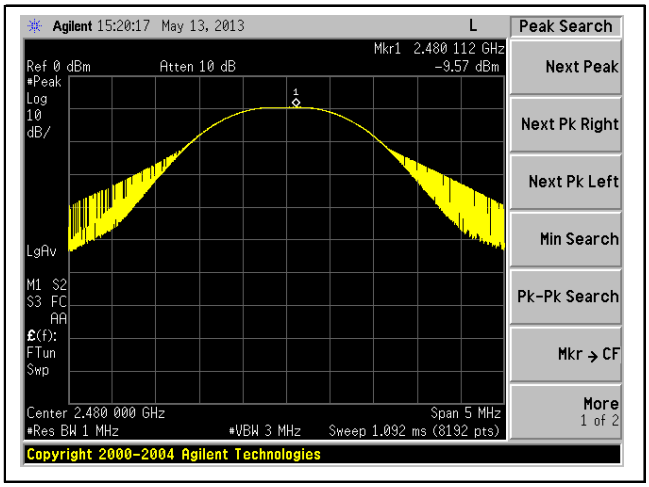
2402MHz



2441MHz

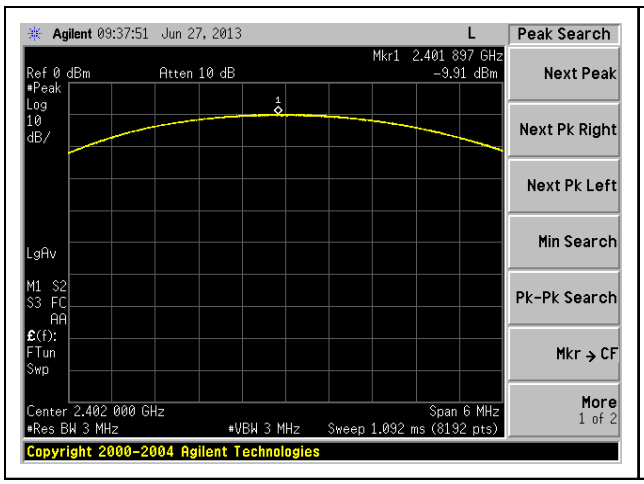


2480MHz

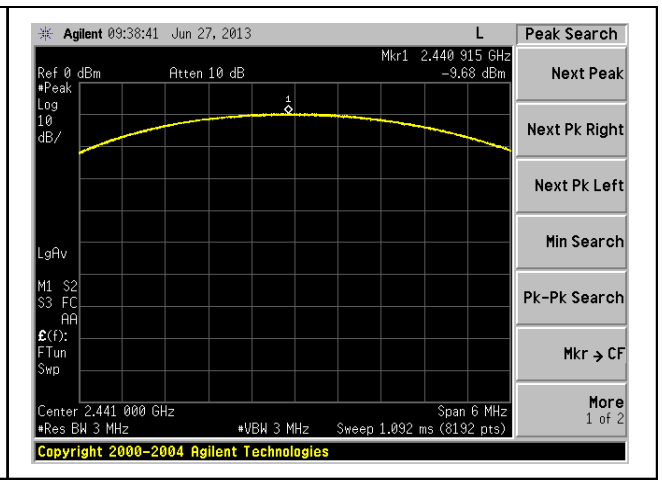


3DH5

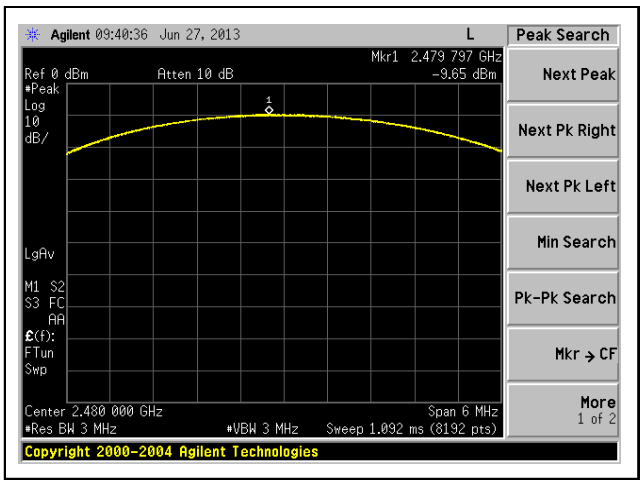
2402MHz



2441MHz



2480MHz



10. SPURIOUS EMISSIONS MEASUREMENT

10.1. Test Procedure

Radiated measurement

(1) Configure the EUT System in accordance with ANSI C63.4-2003 section 8.
See also the block diagram and the photographs of EUT System configuration in this report.

(2) If the EUT system is connected to a public power network, all power cords for the EUT System are connected the receptacle on the turntable.

(3) Warm up the EUT System.

(4) Activate the EUT System and run the prepared software for the test, if necessary.

(5) To find out the emissions of the EUT System, preliminary radiated measurement are performed at a closer distance than that specified for final radiated measurement using the spectrum analyzer (*1) and the broad band antenna.
In the frequency above 1GHz, it is performed using the spectrum analyzer (*2) (*3) and the horn antenna.

(6) To find out an EUT System condition, which produces the maximum emission, the configuration of EUT System, the position of the cables, and the operation mode, are changed under normal usage of the EUT.

(7) The spectrums are scanned from 30MHz to the upper frequency of measurement range, and collect the six highest emissions minimum on the spectrum analyzer relative to the limits in the whole range.

(8) In final compliance test, the six highest emissions minimum, recorded above, are measured at the specified distance using the broad band antenna or the tuned dipole antenna and the test receiver (*4).
In the frequency above 1GHz, the measurements are performed by the horn antenna and
☐ the test receiver (*5).
☒ the spectrum analyzer (*2) with pre-amplifier.

Conducted measurement

(1) Configure the EUT System in accordance with ANSI C63.4-2003 section 8.
See also the block diagram and the photographs of EUT System configuration in this report.

(2) Warm up the EUT System.

(3) Activate the EUT System and run the prepared software for the test, if necessary.

(4) To find out the emissions of the EUT System, conducted measurement are performed at connect the EUT RF output port to spectrum analyzer (*6) via calibrated coaxial cable and suitable attenuator.

[Note]

(*1) Spectrum Analyzer Set Up Conditions
Frequency range : 30 – 1000MHz
Resolution bandwidth : 100kHz
Detector function : Peak mode

(*2) Spectrum Analyzer Set Up Conditions
Frequency range : 1GHz – Upper frequency of measurement range
Resolution bandwidth : 1MHz
Video bandwidth : 1MHz
Attenuator : 10dB
Detector function : Peak mode

(*3) Spectrum Analyzer Set Up Conditions
Frequency range : Restricted Band Edge
Resolution bandwidth : 100kHz
Video bandwidth : 300kHz
Attenuator : 10dB
Detector function : Peak mode

(*4) Test Receiver Set Up Conditions
Detector function : Quasi – Peak or Peak
IF bandwidth : 120kHz

(*5) Test Receiver Set Up Conditions
Detector function : Average
IF bandwidth : 1MHz

(*6) Spectrum Analyzer Set Up Conditions
Frequency range : 9 – 150kHz / 150kHz – 30MHz
Resolution bandwidth : 300Hz / 10kHz
Video bandwidth : 100kHz
Attenuator : 10dB
Detector function : Peak mode

M130621: This page (Page 27 of 42) is amended for the original test report (Report No. A-001-13-C, dated 20 May 2013).

10.2. Test Results

DH5 <2402MHz>

Measured Frequency (MHz)	Antenna Factor (dB/m)	Meter Reading Horizontal Polarization (dBµV)	Meter Reading Vertical Polarization (dBµV)	Distance Factor from 1m to 3m (dB)	Maximum Field Strength (dBµV/m)	Limit (dBµV/m)	Margin for Limit (dB)
30.00	16.8	<0.0	15.1	-	31.9	40.0	8.1
33.78	16.6	0.2	18.0	-	34.6	40.0	5.4
105.15	14.1	13.0	6.6	-	27.1	43.5	16.4
195.44	19.0	19.0	10.1	-	38.0	43.5	5.5
282.62	23.5	12.4	6.8	-	35.9	46.0	10.1
331.77	20.2	18.3	12.7	-	38.5	46.0	7.5
651.45	25.4	6.3	8.8	-	34.2	46.0	11.8
Peak measurement							
2390.00	5.2	40.8	40.8	-	46.0	74.0	28.0
4804.00	1.6	<45.0	<45.0	-	<46.6	74.0	>27.4
7206.00	1.1	<45.0	<45.0	-	<46.1	74.0	>27.9
9608.00	4.1	<45.0	<45.0	-	<49.1	74.0	>24.9
12010.00	-1.5	<45.0	<45.0	9.5	<34.0	74.0	>40.0
24020.00	6.0	<45.0	<45.0	9.5	<41.5	74.0	>32.5
Average measurement							
2390.00	5.2	33.0	33.0	-	38.2	54.0	15.8
4804.00	1.6	<35.0	<35.0	-	<36.6	54.0	>17.4
7206.00	1.1	<35.0	<35.0	-	<36.1	54.0	>17.9
9608.00	4.1	<35.0	<35.0	-	<39.1	54.0	>14.9
12010.00	-1.5	<35.0	<35.0	9.5	<24.0	54.0	>30.0
24020.00	6.0	<35.0	<35.0	9.5	<31.5	54.0	>22.5

[20dBc Data Sheet]

Measured Frequency (MHz)	Antenna Factor (dB/m)	Meter Reading Horizontal Polarization (dBµV)	Meter Reading Vertical Polarization (dBµV)	Maximum Field Strength (dBµV/m)	Limit (dBµV/m)	Margin for Limit (dB)
Peak measurement						
*1) 2402.00	5.3	64.0	-	69.3	-	-
2400.00	5.3	33.5	-	38.8	49.3	10.5
*1) 2402.00	5.3	-	63.1	68.4	-	-
2400.00	5.3	-	32.5	37.8	48.4	10.6

DH5 <2441MHz>

Measured Frequency (MHz)	Antenna Factor (dB/m)	Meter Reading Horizontal Polarization (dBμV)	Meter Reading Vertical Polarization (dBμV)	Distance Factor from 1m to 3m (dB)	Maximum Field Strength (dBμV/m)	Limit (dBμV/m)	Margin for Limit (dB)
30.00	16.8	<0.0	15.1	-	31.9	40.0	8.1
33.78	16.6	0.2	18.0	-	34.6	40.0	5.4
105.15	14.1	13.0	6.6	-	27.1	43.5	16.4
195.44	19.0	19.0	10.1	-	38.0	43.5	5.5
282.62	23.5	12.4	6.8	-	35.9	46.0	10.1
331.77	20.2	18.3	12.7	-	38.5	46.0	7.5
651.45	25.4	6.3	8.8	-	34.2	46.0	11.8
Peak measurement							
4882.00	2.5	<45.0	<45.0	-	<47.5	74.0	>26.5
7323.00	1.9	<45.0	<45.0	-	<46.9	74.0	>27.1
9764.00	5.6	<45.0	<45.0	-	<50.6	74.0	>23.4
12205.00	0.2	<45.0	<45.0	9.5	<35.7	74.0	>38.3
24410.00	5.8	<45.0	<45.0	9.5	<41.3	74.0	>32.7
Average measurement							
4882.00	2.5	<35.0	<35.0	-	<37.5	54.0	>16.5
7323.00	1.9	<35.0	<35.0	-	<36.9	54.0	>17.1
9764.00	5.6	<35.0	<35.0	-	<40.6	54.0	>13.4
12205.00	0.2	<35.0	<35.0	9.5	<25.7	54.0	>28.3
24410.00	5.8	<35.0	<35.0	9.5	<31.3	54.0	>22.7

DH5 <2480MHz>

Measured Frequency (MHz)	Antenna Factor (dB/m)	Meter Reading Horizontal Polarization (dBμV)	Meter Reading Vertical Polarization (dBμV)	Distance Factor from 1m to 3m (dB)	Maximum Field Strength (dBμV/m)	Limit (dBμV/m)	Margin for Limit (dB)
30.00	16.8	<0.0	15.1	-	31.9	40.0	8.1
33.78	16.6	0.2	18.0	-	34.6	40.0	5.4
105.15	14.1	13.0	6.6	-	27.1	43.5	16.4
195.44	19.0	19.0	10.1	-	38.0	43.5	5.5
282.62	23.5	12.4	6.8	-	35.9	46.0	10.1
331.77	20.2	18.3	12.7	-	38.5	46.0	7.5
651.45	25.4	6.3	8.8	-	34.2	46.0	11.8
Peak measurement							
2483.50	5.5	40.9	40.9	-	46.4	74.0	27.6
4960.00	1.7	<45.0	<45.0	-	<46.7	74.0	>27.3
7440.00	1.3	<45.0	<45.0	-	<46.3	74.0	>27.7
9920.00	4.4	<45.0	<45.0	-	<49.4	74.0	>24.6
12400.00	-1.9	<45.0	<45.0	9.5	<33.6	74.0	>40.4
24800.00	5.7	<45.0	<45.0	9.5	<41.2	74.0	>32.8
Average measurement							
2483.50	5.5	31.4	31.4	-	36.9	54.0	17.1
4960.00	1.7	<35.0	<35.0	-	<36.7	54.0	>17.3
7440.00	1.3	<35.0	<35.0	-	<36.3	54.0	>17.7
9920.00	4.4	<35.0	<35.0	-	<39.4	54.0	>14.6
12400.00	-1.9	<35.0	<35.0	9.5	<23.6	54.0	>30.4
24800.00	5.7	<35.0	<35.0	9.5	<31.2	54.0	>22.8

M130621: This page (Page 29 of 42) is amended for the original test report (Report No. A-001-13-C, dated 20 May 2013).

3DH5 <2402MHz>

Measured Frequency (MHz)	Antenna Factor (dB/m)	Meter Reading Horizontal Polarization (dBµV)	Meter Reading Vertical Polarization (dBµV)	Distance Factor from 1m to 3m (dB)	Maximum Field Strength (dBµV/m)	Limit (dBµV/m)	Margin for Limit (dB)
30.00	16.8	<0.0	15.1	-	31.9	40.0	8.1
33.78	16.6	0.2	18.0	-	34.6	40.0	5.4
105.15	14.1	13.0	6.6	-	27.1	43.5	16.4
195.44	19.0	19.0	10.1	-	38.0	43.5	5.5
282.62	23.5	12.4	6.8	-	35.9	46.0	10.1
331.77	20.2	18.3	12.7	-	38.5	46.0	7.5
651.45	25.4	6.3	8.8	-	34.2	46.0	11.8
Peak measurement							
2390.00	5.2	41.2	41.3	-	46.5	74.0	27.5
4804.00	1.6	<45.0	<45.0	-	<46.6	74.0	>27.4
7206.00	1.1	<45.0	<45.0	-	<46.1	74.0	>27.9
9608.00	4.1	<45.0	<45.0	-	<49.1	74.0	>24.9
12010.00	-1.5	<45.0	<45.0	9.5	<34.0	74.0	>40.0
24020.00	6.0	<45.0	<45.0	9.5	<41.5	74.0	>32.5
Average measurement							
2390.00	5.2	33.0	33.0	-	38.2	54.0	15.8
4804.00	1.6	<35.0	<35.0	-	<36.6	54.0	>17.4
7206.00	1.1	<35.0	<35.0	-	<36.1	54.0	>17.9
9608.00	4.1	<35.0	<35.0	-	<39.1	54.0	>14.9
12010.00	-1.5	<35.0	<35.0	9.5	<24.0	54.0	>30.0
24020.00	6.0	<35.0	<35.0	9.5	<31.5	54.0	>22.5

[20dBc Data Sheet]

Measured Frequency (MHz)	Antenna Factor (dB/m)	Meter Reading Horizontal Polarization (dBµV)	Meter Reading Vertical Polarization (dBµV)	Maximum Field Strength (dBµV/m)	Limit (dBµV/m)	Margin for Limit (dB)
Peak measurement						
*1) 2402.00	5.3	62.2	-	67.5	-	-
2400.00	5.3	32.2	-	37.5	47.5	10.0
*1) 2402.00	5.3	-	61.6	66.9	-	-
2400.00	5.3	-	33.5	38.8	46.9	8.1

3DH5 <2441MHz>

Measured Frequency (MHz)	Antenna Factor (dB/m)	Meter Reading Horizontal Polarization (dBμV)	Meter Reading Vertical Polarization (dBμV)	Distance Factor from 1m to 3m (dB)	Maximum Field Strength (dBμV/m)	Limit (dBμV/m)	Margin for Limit (dB)
30.00	16.8	<0.0	15.1	-	31.9	40.0	8.1
33.78	16.6	0.2	18.0	-	34.6	40.0	5.4
105.15	14.1	13.0	6.6	-	27.1	43.5	16.4
195.44	19.0	19.0	10.1	-	38.0	43.5	5.5
282.62	23.5	12.4	6.8	-	35.9	46.0	10.1
331.77	20.2	18.3	12.7	-	38.5	46.0	7.5
651.45	25.4	6.3	8.8	-	34.2	46.0	11.8
Peak measurement							
4882.00	2.5	<45.0	<45.0	-	<47.5	74.0	>26.5
7323.00	1.9	<45.0	<45.0	-	<46.9	74.0	>27.1
9764.00	5.6	<45.0	<45.0	-	<50.6	74.0	>23.4
12205.00	0.2	<45.0	<45.0	9.5	<35.7	74.0	>38.3
24410.00	5.8	<45.0	<45.0	9.5	<41.3	74.0	>32.7
Average measurement							
4882.00	2.5	<35.0	<35.0	-	<37.5	54.0	>16.5
7323.00	1.9	<35.0	<35.0	-	<36.9	54.0	>17.1
9764.00	5.6	<35.0	<35.0	-	<40.6	54.0	>13.4
12205.00	0.2	<35.0	<35.0	9.5	<25.7	54.0	>28.3
24410.00	5.8	<35.0	<35.0	9.5	<31.3	54.0	>22.7

3DH5 <2480MHz>

Measured Frequency (MHz)	Antenna Factor (dB/m)	Meter Reading Horizontal Polarization (dBμV)	Meter Reading Vertical Polarization (dBμV)	Distance Factor from 1m to 3m (dB)	Maximum Field Strength (dBμV/m)	Limit (dBμV/m)	Margin for Limit (dB)
30.00	16.8	<0.0	15.1	-	31.9	40.0	8.1
33.78	16.6	0.2	18.0	-	34.6	40.0	5.4
105.15	14.1	13.0	6.6	-	27.1	43.5	16.4
195.44	19.0	19.0	10.1	-	38.0	43.5	5.5
282.62	23.5	12.4	6.8	-	35.9	46.0	10.1
331.77	20.2	18.3	12.7	-	38.5	46.0	7.5
651.45	25.4	6.3	8.8	-	34.2	46.0	11.8
Peak measurement							
2483.50	5.5	41.0	41.0	-	46.5	74.0	27.5
4960.00	1.7	<45.0	<45.0	-	<46.7	74.0	>27.3
7440.00	1.3	<45.0	<45.0	-	<46.3	74.0	>27.7
9920.00	4.4	<45.0	<45.0	-	<49.4	74.0	>24.6
12400.00	-1.9	<45.0	<45.0	9.5	<33.6	74.0	>40.4
24800.00	5.7	<45.0	<45.0	9.5	<41.2	74.0	>32.8
Average measurement							
2483.50	5.5	31.4	31.4	-	36.9	54.0	17.1
4960.00	1.7	<35.0	<35.0	-	<36.7	54.0	>17.3
7440.00	1.3	<35.0	<35.0	-	<36.3	54.0	>17.7
9920.00	4.4	<35.0	<35.0	-	<39.4	54.0	>14.6
12400.00	-1.9	<35.0	<35.0	9.5	<23.6	54.0	>30.4
24800.00	5.7	<35.0	<35.0	9.5	<31.2	54.0	>22.8

M130621: This page (Page 31 of 42) is amended for the original test report (Report No. A-001-13-C, dated 20 May 2013).

[Remark]
*1) Carrier

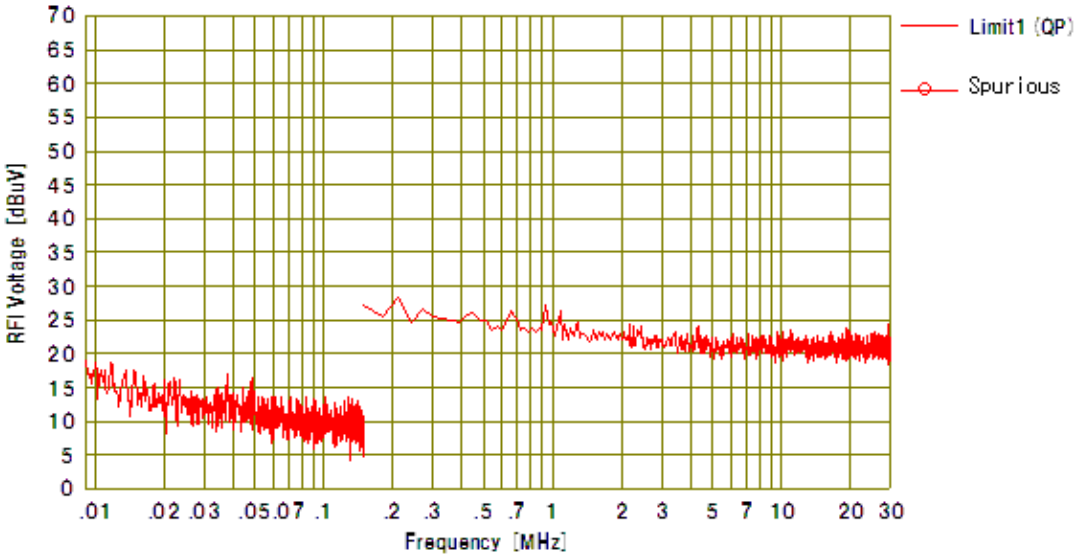
[Note]
(1) Antenna Factor includes the cable loss, attenuator loss and pre-amplifier gain.
Above 1000MHz, the antenna factor includes the cable loss, pre-amplifier gain and attenuator loss (if necessary).
(2) * mark in Measured Frequency : Measured with the tuned dipole antenna.
no mark in Measured Frequency : Measured with the broadband antenna.
(3) Upper Frequency : ☒Transmitter Frequency (TX): TX < 10GHz
☒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
<above 10GHz> 1m

[Calculation method]
Maximum Field Strength (dBμV/m)
= Meter Reading (at maximum level of Horizontal or Vertical) (dBμV) + Antenna Factor (dB/m) - Distance Factor (dB) (*)
(*) Applied for Radiated Emission Measurement (above 10GHz) only.
Distance Factor : 20 × log10 (3m/1m) = 9.5dB

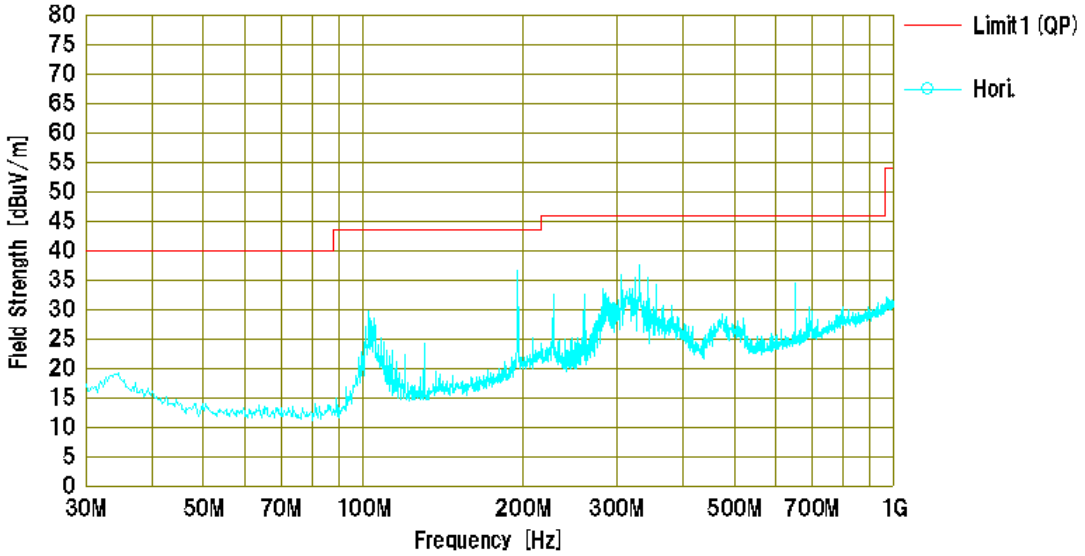
At the next page, the result of exploratory radiated emission measurement (below 10GHz) by using the spectrum analyzer is shown by the spectrum chart.
Above 10GHz, checked by manual measurement.

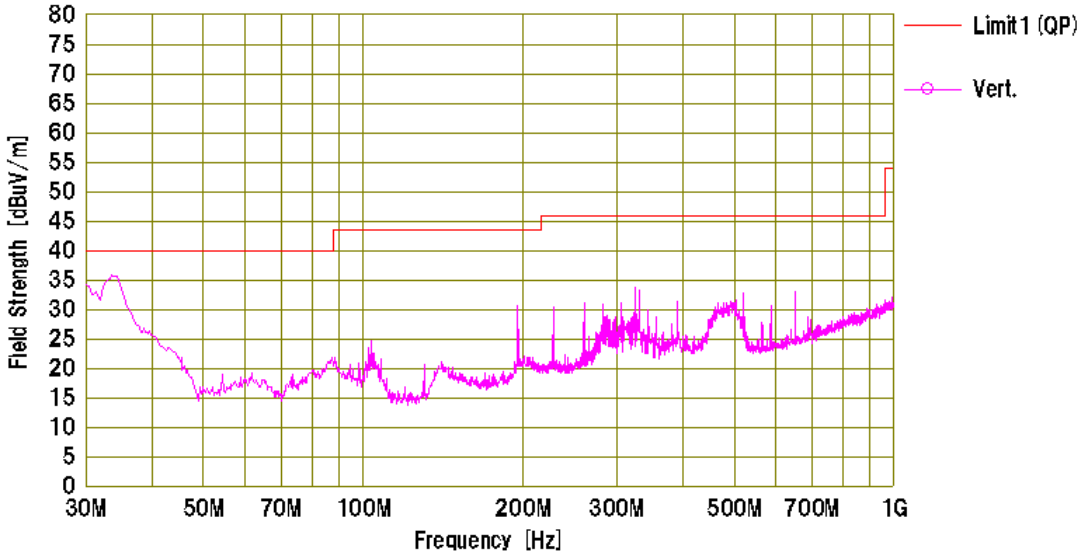
Tested Date	Environment	
	Temperature	Humidity
7 May 2013	20 °C	33 %

Test Results in Graph

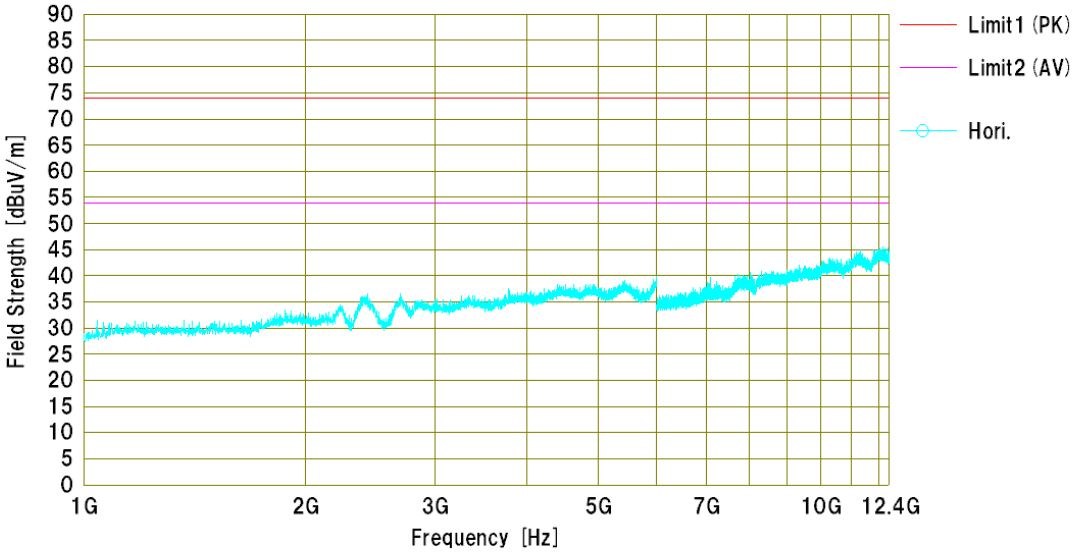


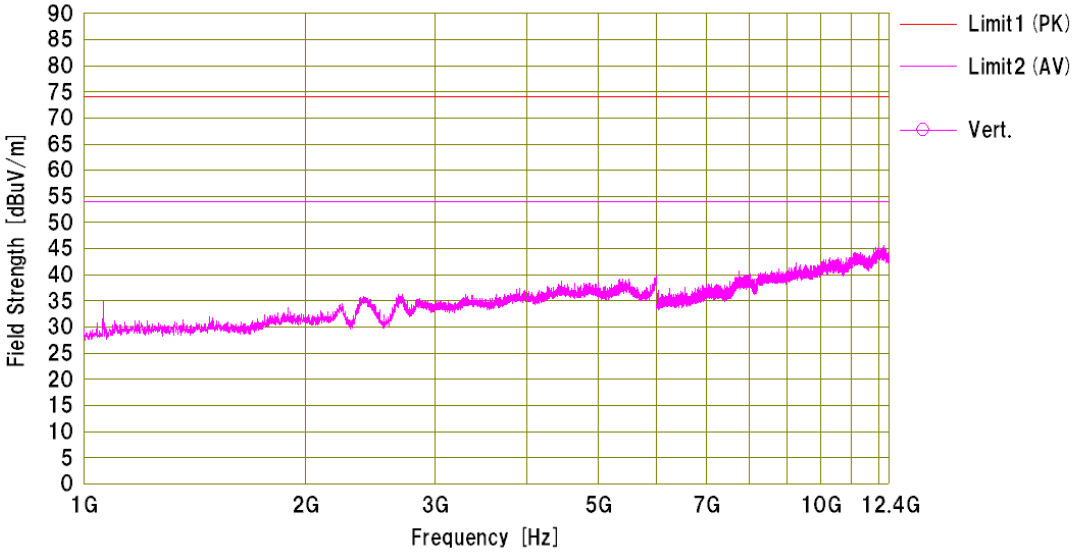
M130621: This page (Page 33 of 42) is amended for the original test report (Report No. A-001-13-C, dated 20 May 2013).


Limit 1 (QP)
Hori.
Field Strength [dBuV/m]
80
75
70
65
60
55
50
45
40
35
30
25
20
15
10
5
0
30M
50M
70M
100M
200M
300M
500M
700M
1G
Frequency [Hz]

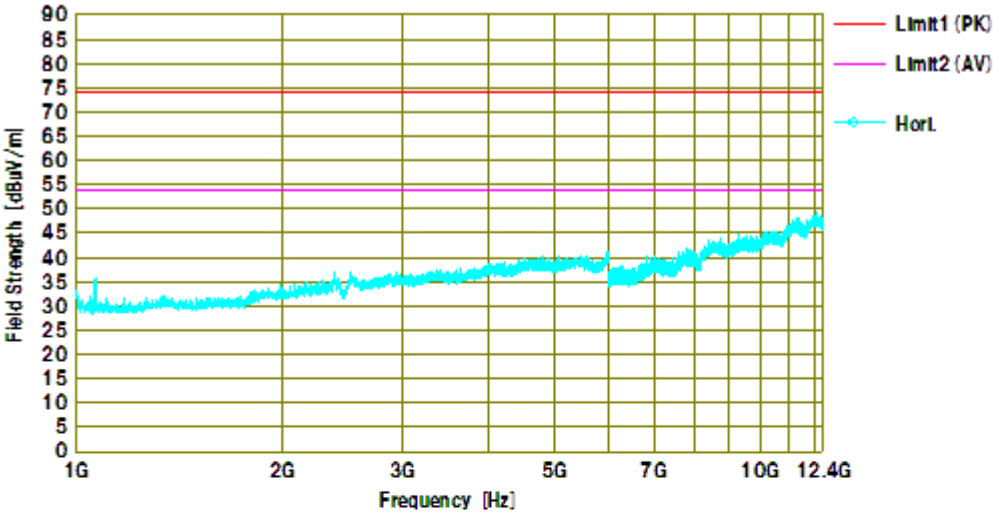

Limit 1 (QP)
Vert.
Field Strength [dBuV/m]
80
75
70
65
60
55
50
45
40
35
30
25
20
15
10
5
0
30M
50M
70M
100M
200M
300M
500M
700M
1G
Frequency [Hz]

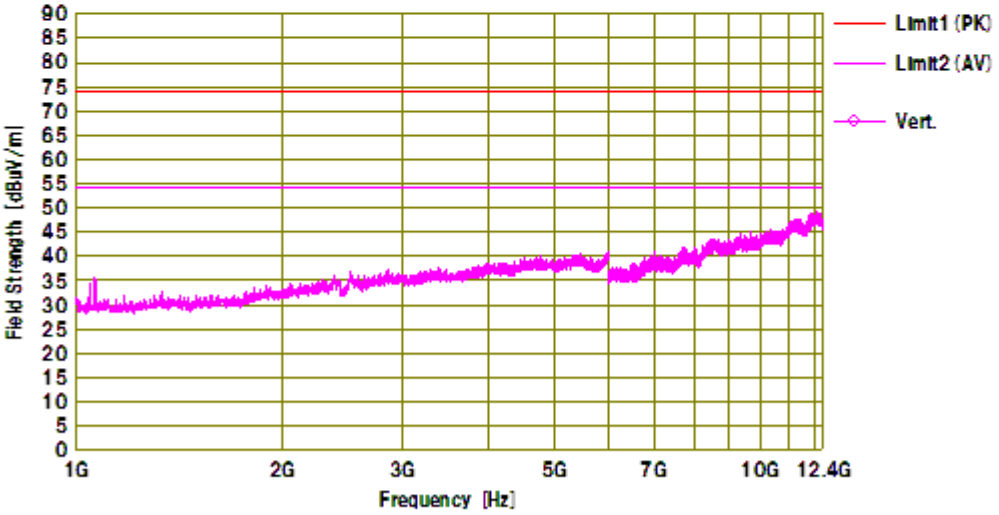
DH5 <2402MHz>


Limit1 (PK)
Limit2 (AV)
Hori.
Field Strength [dBuV/m]
Frequency [Hz]
1G
2G
3G
5G
7G
10G
12.4G


Limit1 (PK)
Limit2 (AV)
Vert.
Field Strength [dBuV/m]
Frequency [Hz]
1G
2G
3G
5G
7G
10G
12.4G

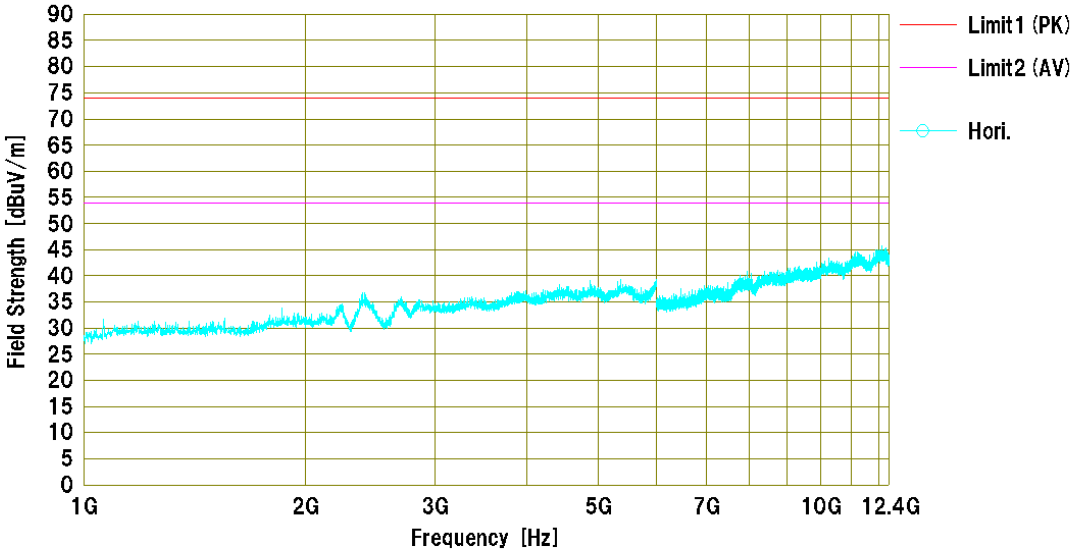
DH5 <2441MHz>

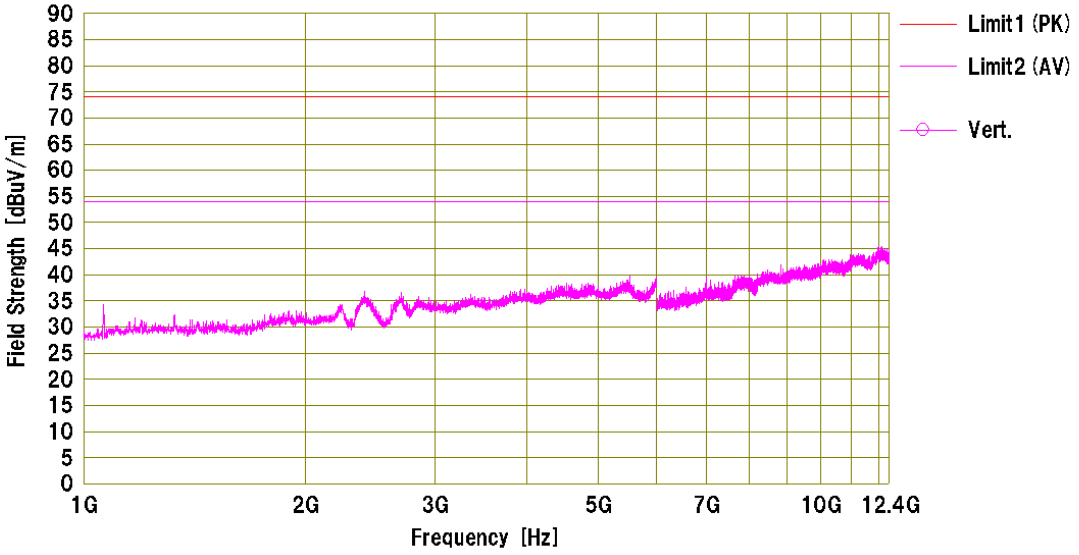




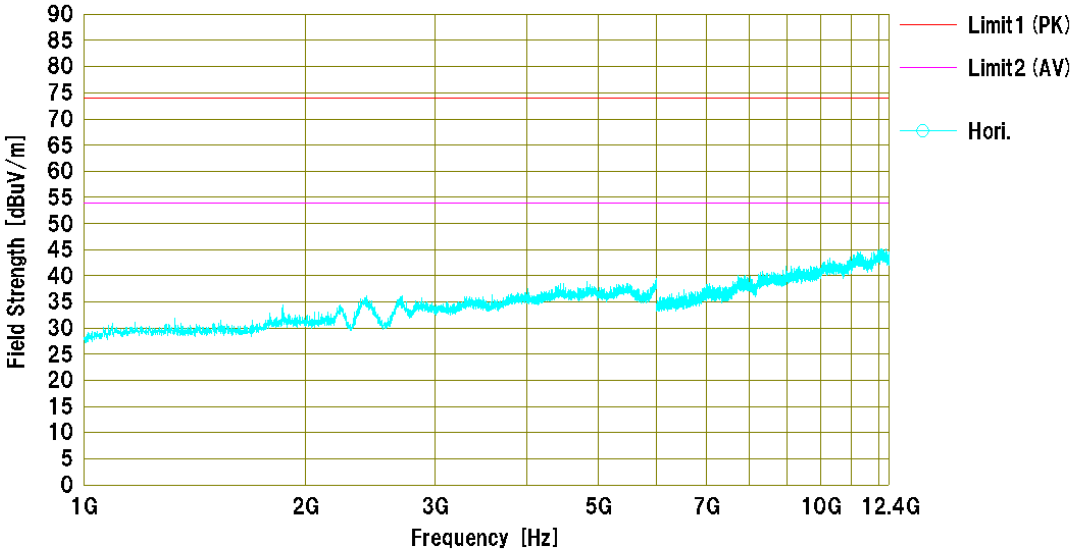
M130621: This page (Page 36 of 42) is amended for the original test report (Report No. A-001-13-C, dated 20 May 2013).

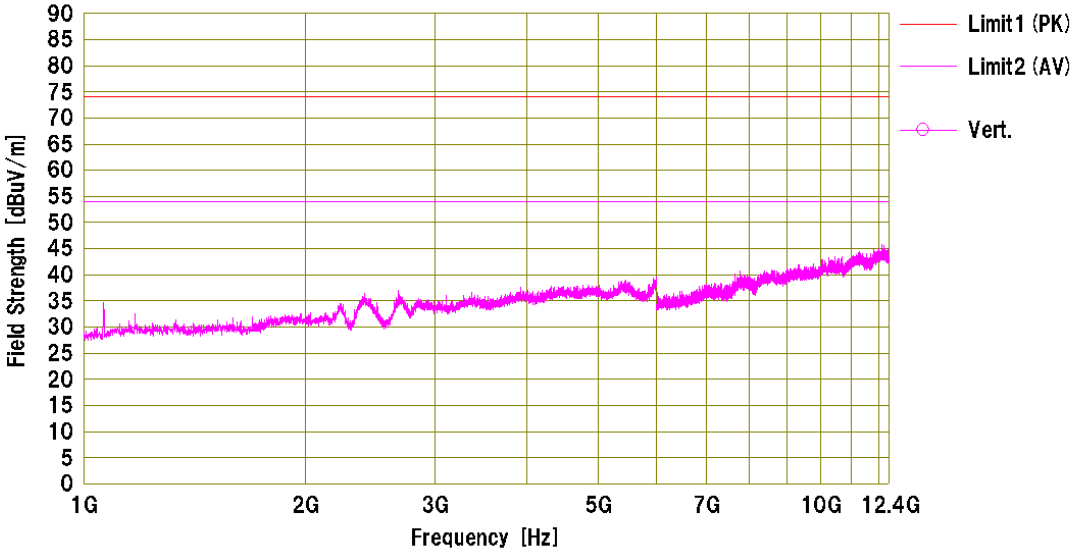
DH5 <2480MHz>


Limit1 (PK)
Limit2 (AV)
Hori.
Field Strength [dBuV/m]
Frequency [Hz]
1G
2G
3G
5G
7G
10G
12.4G

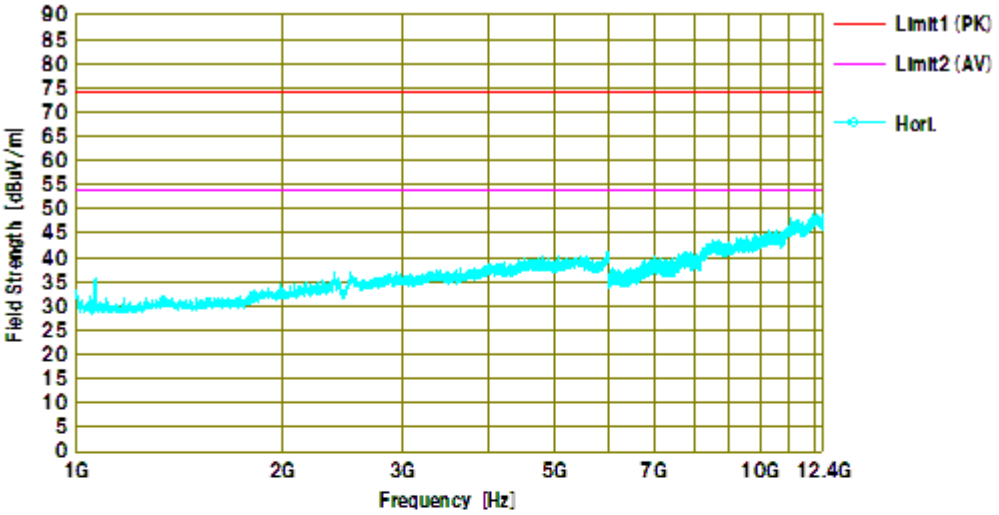

Limit1 (PK)
Limit2 (AV)
Vert.
Field Strength [dBuV/m]
Frequency [Hz]
1G
2G
3G
5G
7G
10G
12.4G

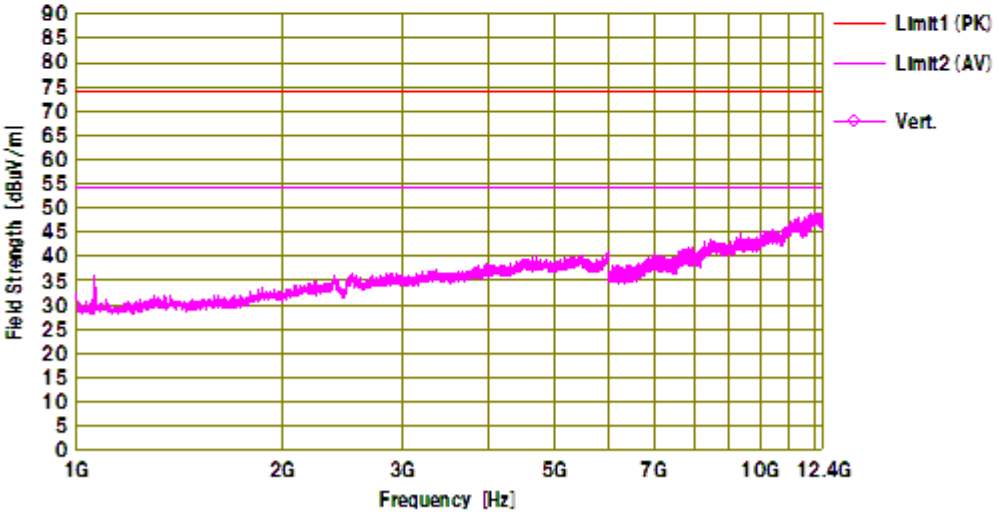
3DH5 <2402MHz>





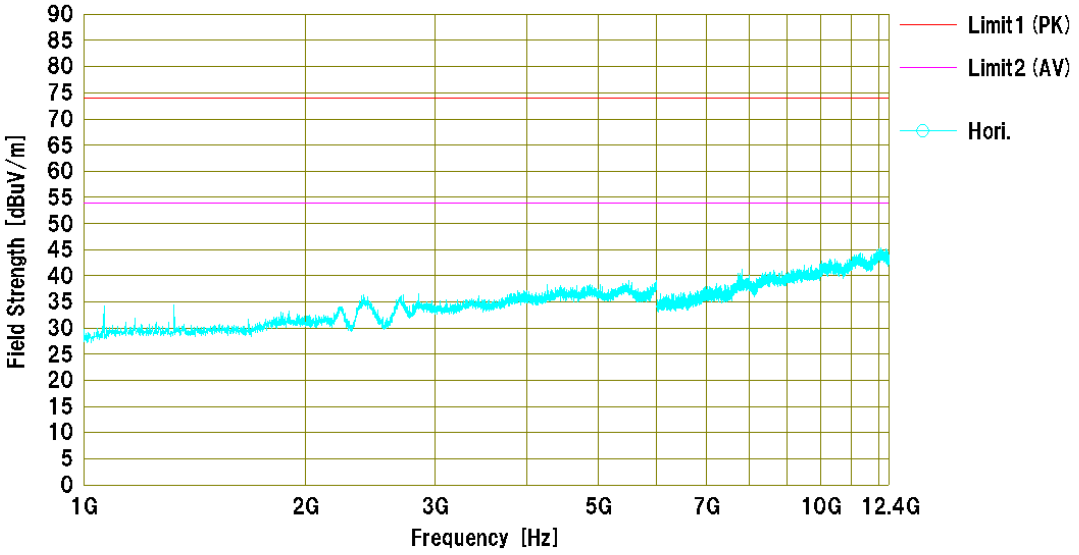
3DH5 <2441MHz>

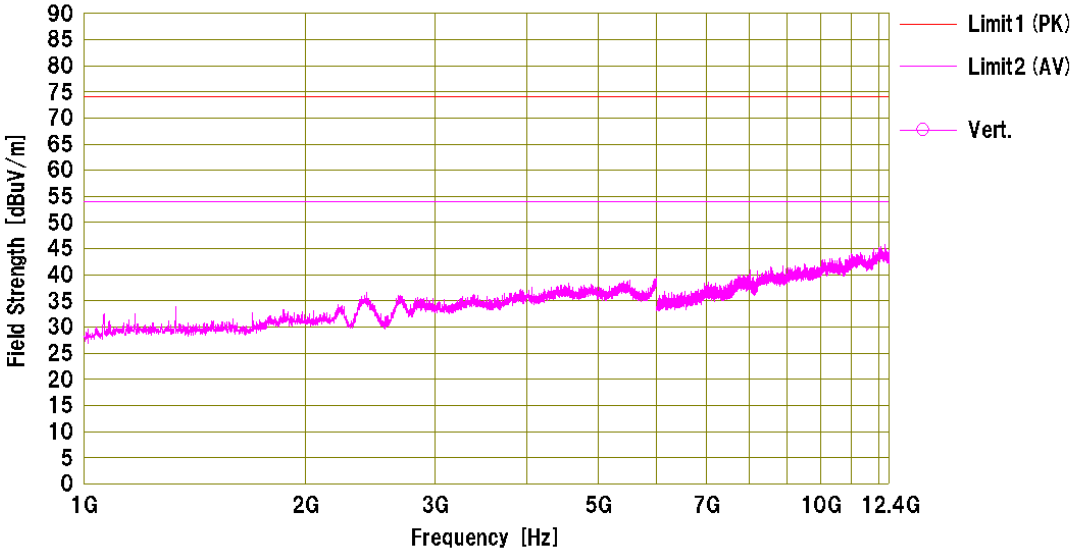




M130621: This page (Page 39 of 42) is amended for the original test report (Report No. A-001-13-C, dated 20 May 2013).

3DH5 <2480MHz>





11. TEST EQUIPMENT

· AC Power Line Conducted Emission Measurement

KEC No.	Equipment	Manufacturer	Model No.	Last Cal.	Next Cal.
AT-144	Low Power Attenuator	HUBER+SUHNER	6810.01.A	2012/09	2013/09
FL-107	LISN	KYORITSU	KNW-407	2012/09	2013/09
FL-110	LISN	KYORITSU	KNW-242	2012/09	2013/09
FL-110-1	50Ω Terminator	STACK	T1302	2012/09	2013/09
FS-083	Test Receiver	ROHDE & SCHWARZ	ESHS10	2012/12	2013/12
FS-103	Test Receiver	Schwarzbeck	FCKL1528	2013/01	2014/01
MM-252	RF Relay Matrix	TSJ	RFM-E121	2012/09	2013/09
SA-049	Spectrum Analyzer	Agilent	E4403B	2012/11	2013/11

· Carrier Separation Measurement (FHSS only)
· Time of Occupancy (Dwell Time) Measurement (FHSS only)
· Number of Hopping Measurement (FHSS only)
· 20dB Bandwidth Measurement (FHSS only)
· Peak Conducted Output Power Measurement

KEC No.	Equipment	Manufacturer	Model No.	Last Cal.	Next Cal.
AT-148	Fixed Attenuator	Anritsu	41KC-10	2013/03	2014/03
SA-052	Spectrum Analyzer	Agilent	E4446A	2012/10	2013/10

· Spurious Emissions Measurement

KEC No.	Equipment	Manufacturer	Model No.	Last Cal.	Next Cal.
AM-053	Pre-Amplifier	HP	8449B	2013/04	2014/04
AM-098	Pre-Amplifier	SONOMA	SONOMA 310N	2013/03	2014/03
AN-104	Std. Gain Horn Antenna	Scientific-Atlanta	12-5.8	2013/05	2015/04
AN-107	Std. Gain Horn Antenna	Scientific-Atlanta	12A-18	2011/07	2013/07
AN-145	Std. Gain Horn Antenna	Scientific-Atlanta	12-12	2013/05	2015/04
AN-210	Std. Gain Horn Antenna	Scientific-Atlanta	12-8.2	2013/05	2015/04
AN-220	LPDA Antenna	Schwarzbeck	UHALP 9108A	2013/04	2014/04
AN-296	Biconical Antenna	Schwarzbeck	VHBB9124	2013/04	2014/04
AN-298	DRG Horn Antenna	BBHA9120LF(A)	Schwarzbeck	2013/05	2014/04
AT-100	3dB Attenuator	JFW	50HF-003	2013/03	2014/03
AT-101	3dB Attenuator	JFW	50HF-003	2013/03	2014/03
FL-174	Band Eliminate Filter	MICRO-TRONICS	BRM12294	2013/03	2014/03
FS-099	Test Receiver	ROHDE & SCHWARZ	ESS	2012/12	2013/12
MM-302	RF Selector	TOYO	NS4900	2013/04	2014/04
SA-052	Spectrum Analyzer	Agilent	E4446A	2012/10	2013/10
SA-058	Spectrum Analyzer	Agilent	N9010A	2013/04	2014/04

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 SC-NT10 with 2400-2483.5MHz FHSS 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 0.04mW/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 = 1.83dBm (see 23 page)
G = 1.45dBi
D = 0.2

Therefore :

$$S(W/m^2) = \frac{10^{\frac{1.83}{10}} \times 10^{-3} \times 10^{\frac{1.45}{10}}}{4 \times 3.14 \times 0.2 \times 0.2} = 0.0042337$$

S≒0.04 (mW/cm^2)

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