Test Report

Test Report Number	EOTEL108
Applied Standard(s)	FCC Part15 Subpart C 15.205 115.209 15.247 / IC RSS-210 / ANSI C63.4 2009
Date of Issue	31th, March 2015
Testing Laboratory Address	Astronaut Noborito Laboratory 294 Noborito, Tama-ku Kawasaki-shi, Kanagawa, 214-0014 Japan
Test Date(s)	11th March, 2015
Product Name	Silmee Bar type Lite（S1150SL00） Silmee Bar type Medical（S1151SL00）
Model Number	S1150SL00 S1151SL00
Serial Number	-
Applicant (Client) Address	1-1, Shibaura 1-Chome, Minato-ku, Tokyo, 105-8001, Japan Toshiba Corporation Healthcare Company
Manufacturer Address	1975, 23-chome, Minami 5-jodori, Asahikawa, 078-8335, Japan Toshiba Hokuto Electronics Corporation.
FCC ID / IC	FCC ID : 2ADLXS1150SL00

Test Result

The test result for the electromagnetic compatibility tests as described in the section 1 to 2 and in this page was:

Pass

Tested by: Katsutoshi Hatanaka
Katsutoshi Hatanaka
Test Enginner

Approved by: Koji Imai
Koji Imai
Testing Group Leader

Checked box (☒) indicates that the listed condition, standard or equipment is applicable for this Report.
Blank box (☐) indicates that the listed condition, standard or equipment is not applicable for this Report.
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Test results of this report refer only to the EUT tested here.

Page

1. Summary

1.1 Terms and definitions

AV
Average

DoC
Declaration of Conformity

EUT
Equipment Under Test

PK
Peak

QP
Quasi-peak

1.2 Standard(s) and Result

Applied Standard(s)	Normative Reference(s)	Classification	Result	Note
FCC Part15 Subpart C	20dB Bandwidth	15.247(a)(1)	Pass	
	Carrier Frequency Separation	15.247(a)(1)	Pass	
	Number of Hopping Frequencies	15.247(a)(1)	Pass	
	Time of Occupancy(Dwell Time)	15.247(a)(1)	Pass	
	Maximum Peak Output Power	15.247(b)(1)(2)FHSS	Pass	
	Band Edge of Compliance of RF Conducted Emissions	15.247(d)	Pass	
	Conducted Spurious Emission Measurement	15.247(d)	Pass	
	Line Conducted Measurement	15.207	Pass	
	Radiated emissions	15.209 15.205	Pass	
	Maximum Permissible Exposure	1.1310 Safety code6, 2.2.1	N/A	

1.3 Test Methodology

All mesurements contained in this report were conducted with ANSI C63.4-2003,American National Standard for Methods of Mesurement of Radio-Niose Emissions from Low-Voltage Electrical and Electronic Equipment in the range of 9kHz to 40GHz.The public notice DA 00-705 for frequency hopping spread spectrum systems shall be performed also.

2. Equipment Under Test (EUT)

2.1 General Descriptions

・Measuring a number of vital signs simultaneously
ECG(Electro-Cardiography), Pulse, accelerations and skin temperature
・Signal processing of vital signs by internal micro processer
Heart rate detection / amount of body movement ,,,
・Sending data to network via Bluetooth ® in real time
・Storage data to internal FLASH memory in Silmee
・Water resistant, small, right-weight
・Analyzing autonomic nervous activity and sleep state using measured vital signs in smart-phone/ tablet

2.2 Detailed Descriptions

Product Name	Silmee Bar type Lite（S1150SL00） Silmee Bar type Medical（S1151SL00）
Model Number	S1150SL00 S1151SL00
Serial Number	-
Power Supply	3.7Vdc(Lithium-ion battery)
Dimension	64(W)x28(D)x9.6(H)mm
Operating Frequency	2402.000MHz – 2480.000MHz
Normal Placement	outdoor
Condition of the EUT	Prototype

2.3 WORST-CASE CONFIGURATION AND MODE

(a) EUT axes

The fundamental was measured in three different orientations X, Y and Z to find worst-case orientation, and it was found that Y orientation is worst-case; therefore final testing for radiated emissions was performed with EUT in X orientation with Cable.

2.4 Operation Mode(s) of the EUT for EMC during the Test(s)

Operation Mode Name	Description
BDR mode	Normal operationTx mode

2.5 Peripheral Devices

Mark	Description	Model Number	Serial Number	FCC ID Code or DoC status	Manufacturer
1	Personal Computer	S-10-3	QB02052841	DoC	lenovo

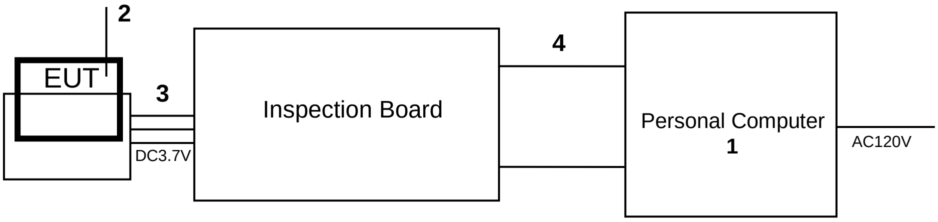
2.6 Interconnecting Cables

Mark	Description	Length (m)	Shielded		Tested Port(s) (Note:1)	
			Cable	Connector	Applicable	Interface
2	Antenna cable	0.05	Yes	Yes	No	RF cable
3	Power cable	0.10	No	Yes	No	DC power
4	USBcable	0.40	Yes	Yes	No	I/O signal

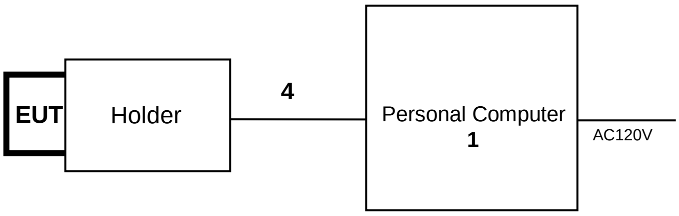
Remarks:

2.7 System Configuration

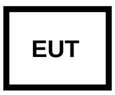
Unless otherwise specified in the following sections, the test configuration described here is applied for the tests. The configuration was choice by the applicant.



Conducted1(RF TEST)



Conducted2(15.207)



Radiated

2.8 Labeling Requirements

Per 15.19; Docket 95-19

The label shall be permanently affixed at a conspicuous location on the device; instruction manual or pamphlet supplied to the user and be readily visible to the purchaser at the time of purchase. However, when the device is so small wherein placement of the label with specified statement is not practical, only the trade name and FCC ID must be displayed on the device per Section 15.19(b)(2).
Please see attachment for FCC ID label and label location

2.9 Antenna Requirements

Excerpt from §15.203 of the FCC Rules/Regulations:
"An intentional radiator antenna shall be designed to ensure that no antenna other than that furnished by the responsible party can be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient t to comply with the provisions of this section."

The antennas of the Toshiba Corporation Healthcare Company are permanently attached.
There are no provisions for connection to an external antenna

Conclusion:

Toshiba Corporation Healthcare Company unit complies with the requirement of §15.203.

2.10 Frequency Hopping System Requirements

2.10.1 Standard Applicable

According to FCC Part 15.247(a)(1),The system shall hop to channel frequencies that are selected at the system hopping rate from a pseudo randomly ordered list of hopping frequencies.Each frequency must be used equally on the average by each transmitter.The system recievers shall have input bandwidth that match the hopping channel bandwidth of their corresponding transmitter and shall shift frequencies in synchronization with the transmitted signals.

(g) Frequency hopping spread spectrum systems are not required to employ all available hopping channels during each transmission. However, the system, consisting of both the transmitter and the receiver, must be designed to comply with all of the regulations in this section should the transmitter be presented with a continuous data (or information) stream. In addition, a system employing short transmission bursts must comply with the definition of a frequency hopping system and must distribute its transmissions over the minimum number of hopping channels specified in this section.

(h) The incorporation of intelligence within a frequency hopping spread spectrum system that permits the system to recognize other users within the spectrum band so that it individually and independently chooses and adapts its hopsets to avoid hopping on occupied channels is permitted. The coordination of frequency hopping systems in any other manner for the express purpose of avoiding the simultaneous occupancy of individual hopping frequencies by multiple transmitters is not permitted.

2.10.2 Frequency Hopping System

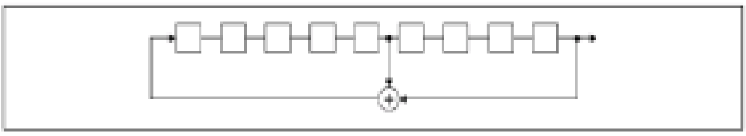
This transmitter device is frequency hopping device,and complies with FCC part 15.247 rule.

This device uses Bluetooth radio which operates in 2400-2483.5MHz band.Bluetooth uses a radio technology called frequency-hopping spread spectrum,which chops up the data being sent and transmits chunks of it on up to 79 bands(1MHz each;centred from 2402 to 2480MHz) in the range 2,400-2,483.5MHz.The transmitter switches hop frequencies 1,600 times per second to assure a high degree of data security.All Bluetooth devices participating in a given piconet are synchronized to the frequency-hopping channel for the piconet. The frequency hopping sequence is determined by the master's device address and the phase of the hopping sequence(the frequency to hop at a specific time) is determined by the master's internal clock.Therefore,all slaves in a piconet must know the master's device address and must synchronize their clocks with the master's clock.

2.10.3 Pseudorandom Frequency Hopping Sequence

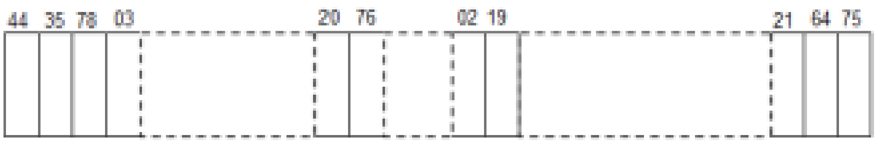
The channel is represented by a pseudo-random hopping sequence hopping through the 79 RF channels. The hopping sequence is unique for the piconet and is determined by the Bluetooth device address of phase in the hopping sequence is determined by the Bluetooth clock of the master.
The channel is divide into time slots where each slot corresponds to an RF hop frequency. Consecutive correspond to different RF hop frequencies. The normal hop is 1,600 hops/s.
The Pseudorandom sequence may be generated in a nine-stage shift register whose 5th and 9th stage added in a modulo-two addition stage. And the result is fed back to the input of the first stage. The sequence with the first ONE of 9 consecutive ONEs; i.e. the shift register is initialized with nine ones.

- Number of shift register stages : 9
- Length of Pseudo-random sequence : 29-1 = 511 bits
- Longest sequence of zeros : 8 (non-inverted signal)



Linear Feedback Shift Register for generation of the PRBS sequence

An example of Pseudorandom Frequency Hopping Sequence as follow:



2.10.4 Equal Hopping Frequency Use

All Bluetooth units participating in the piconet are time and hop-synchronized to the channel.
Example of a 79 hopping sequence in data mode:

40, 21, 44, 23, 42, 53, 46, 55, 48, 33, 53, 35, 50, 65, 54, 67, 56, 37, 60, 39, 58, 69, 62, 71, 64, 25, 68, 27, 66, 57, 70, 59, 72, 29,76, 31, 74, 61, 78, 63, 01, 41, 05, 43, 03, 73, 07, 75, 09, 45, 13, 47, 11, 77, 15, 00, 64, 49, 66, 53, 68, 02, 70, 06, 01, 51, 03, 55,05, 04

Each Frequency used equally on the average by each transmitter

3. Test Data

3.1 Test specification

Standard	FCC Part15 Subpart C 15.205 115.209 15.247 / IC RSS-210 / ANSI C63.4 2009
Frequency Range	2402.000 MHz to 2480.000MHz
Test Date	11th March, 2015
Test Location	Astronaut Noborito Laboratory 294 Noborito, Tama-ku Kawasaki-shi, Kanagawa, 214-0014 Japan
Test Engineer	Katsutoshi Hatanaka
Temperature	19.2℃
Humidity	47%RH RH
Pressure	1005 hPa
Power Supply	3.7Vdc(Lithium-ion battery)
Operation Mode Name	BDR Mode
Modulation Type	GFSK
Tested channel	Lower ch 2402.000MHz Middle ch 2441.000MHz Higher ch 2480.000MHz

Remark: *1 : Equivalent isotropic radiated power and Frequency Range only.

3.2 20dB Bandwidth

3.2.1 Test Result

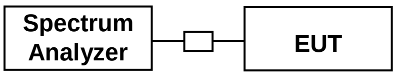
Mode	Cannel	Center Frequency (MHz)	20dB Bandwidth (kHz)	Limit (kHz)
BDR (DH5)	Lower	2402.000	1100.200	Not defined
	Middle	2441.000	1130.261	Not defined
	Higher	2480.000	1130.261	Not defined

Table1　20dB Bandwidth

Result：Pass

3.2.2 Test Detail

1.The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator.
The path loss was compensated to the results for each measurement.
2.Set to the maximum power setting and enable the EUT transmit continuously.
3.Enable the EUT hopping function.
4.Use the following spectrum analyzer setting for 20dB Bandwidth measurement.
Span:approximately 2 to 3 times the 20dB Bandwidth
Frequency:Centered on a hopping Channel
RBW:≧1% of the 20dB bandwidth　VBW:RBW≦VBW
Sweep:auto　Detector function:peak　Trace:max hold
5.Measure and record the results in the test report.



3.2.3 Test data

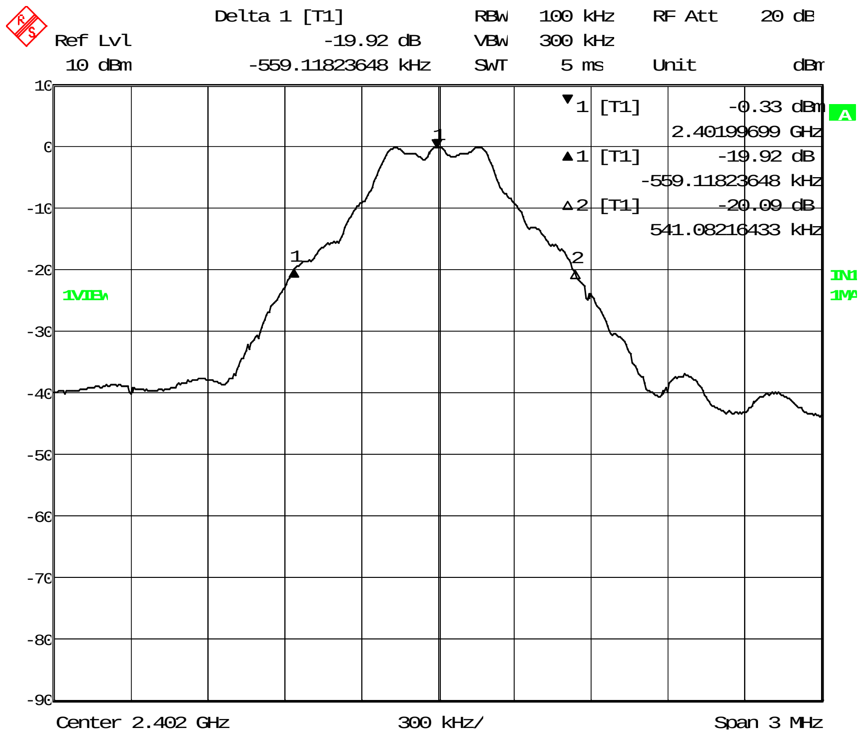


Figure 1　20dB Bandwidth(Lower ch_2402.000MHz)

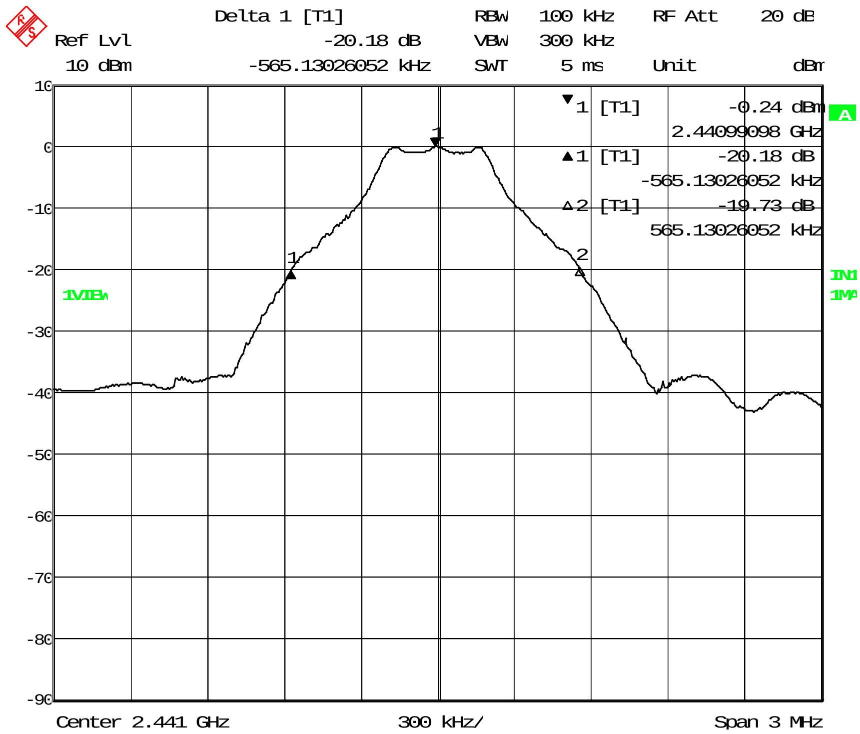


Figure 2　20dB Bandwidth(Middle ch_2441.000MHz)

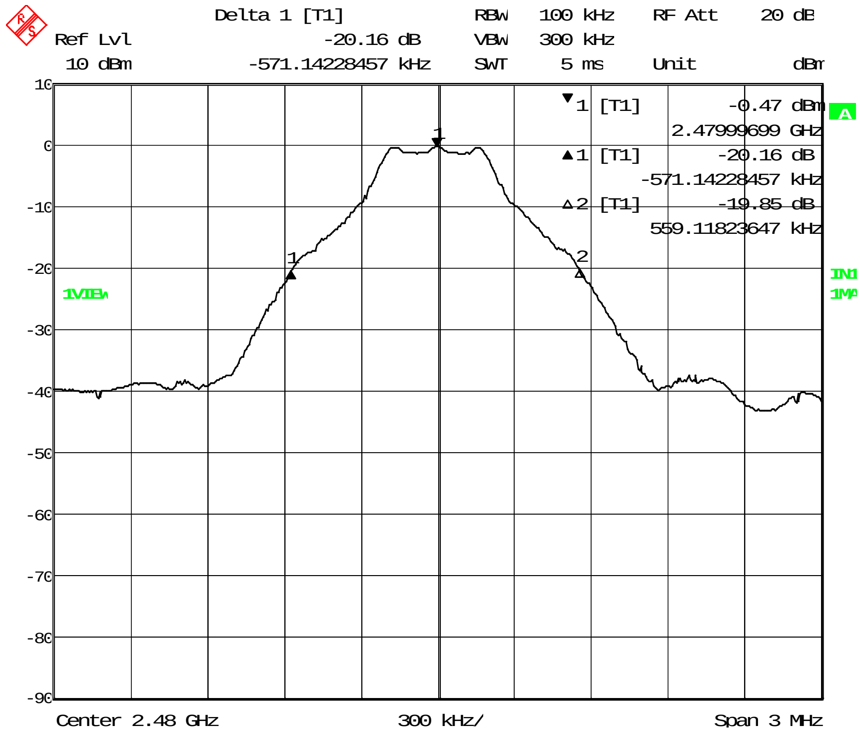


Figure 3 20dB Bandwidth(Higher ch_2480.000MHz)

3.3 Carrier Frequency Separation

3.3.1 Test Result

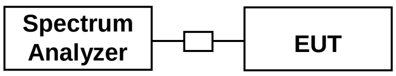
Mode	Channel	Result (kHz)	Limit 2/3 of 20dB Bandwidh (kHz)
BDR (DH5)	Lower	1010.020	673.347
	Middle	1010.020	673.347
	Higher	1016.032	677.355

Table2　Carrier Frequency Separation

Result：Pass

3.3.2 Test Detail

1.The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator.
The path loss was compensated to the results for each measurement.
2.Set to the maximum power setting and enable the EUT transmit continuously.
3.Enable the EUT hopping function.
4.Use the following spectrum analyzer setting
Span:wide enough to capture the peak of two adjacent channels
RBW:≧1% of the span　VBW:RBW≦VBW Sweep:auto
Detector function:peak　Trace:max hold
5.Measure and record the results in the test report.



3.3.2 Test Data

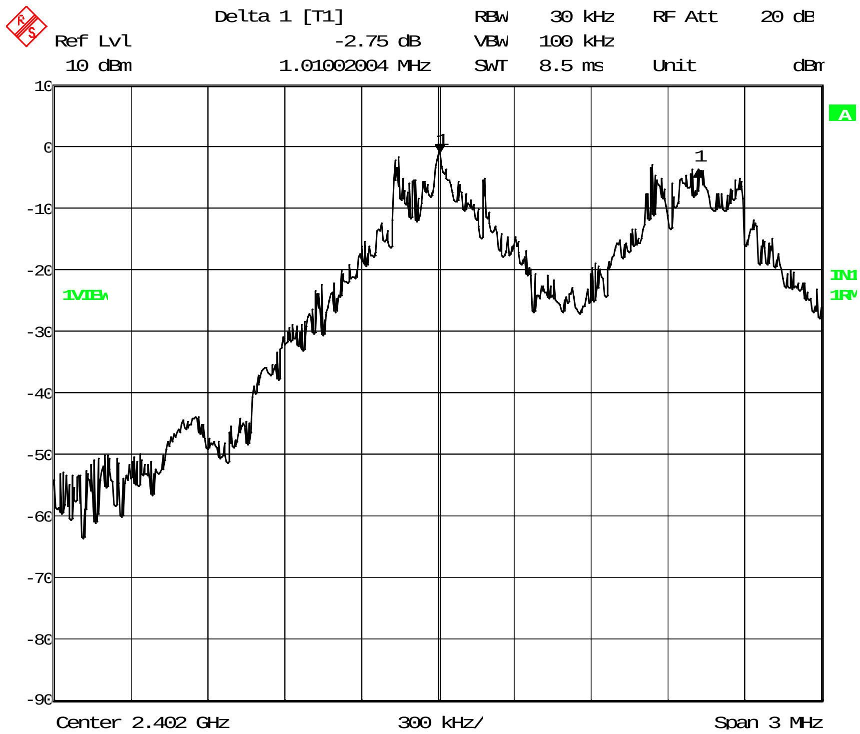


Figure 4 Carrier Frequency Separation (Lower)

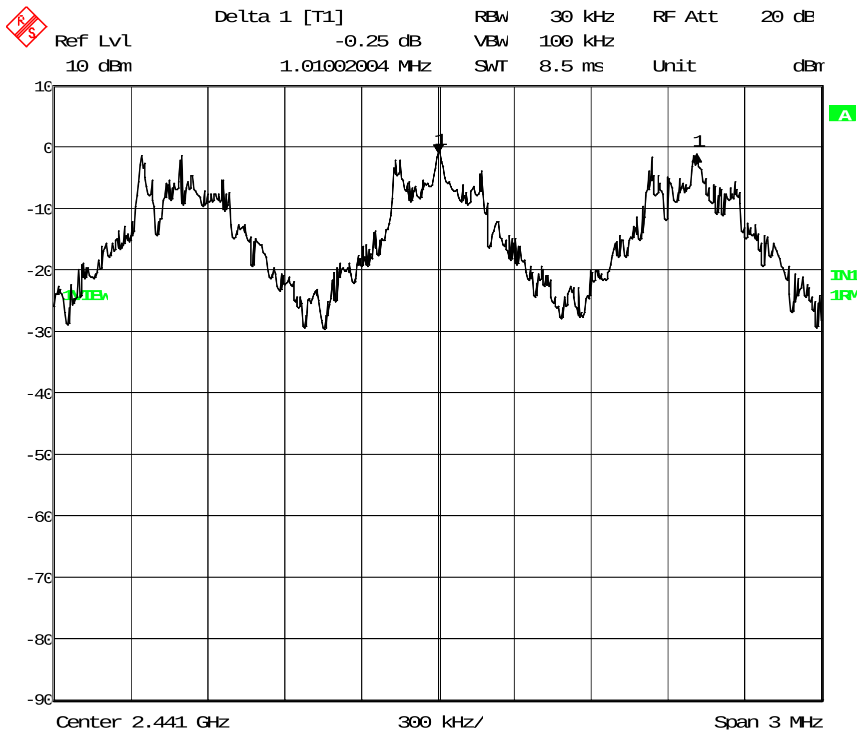


Figure 5 Carrier Frequency Separation (Middle)

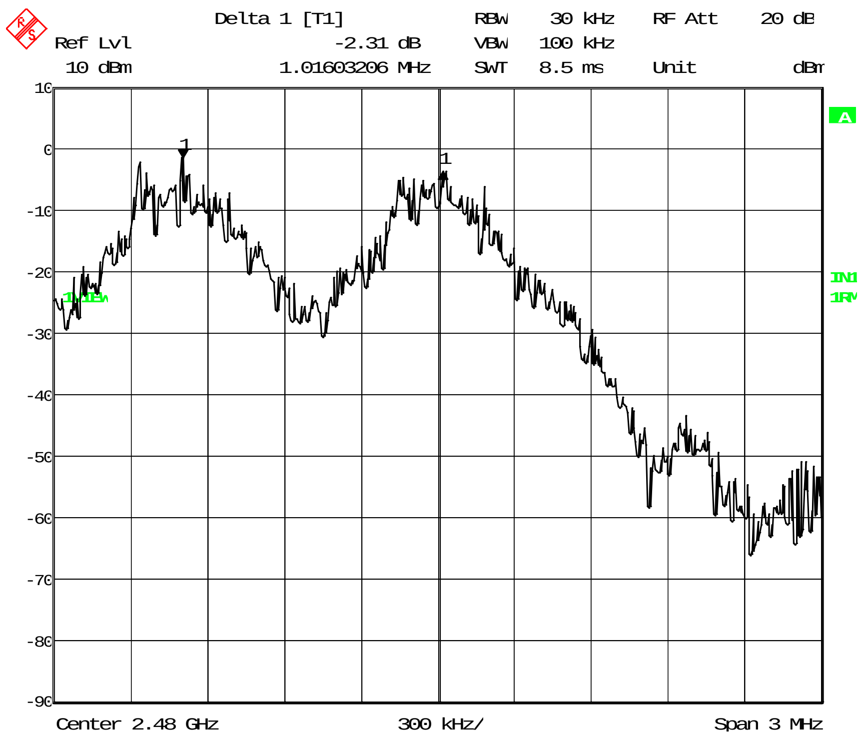


Figure 6 Carrier Frequency Separation (Higher)

3.4 Number of Hopping Frequencies

3.4.1 Test Result

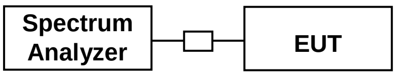
Mode	Result	Limit
BDR (DH5)	79	＞15

Table3 Number of Hopping channels

Result：Pass

3.4.2 Test Detail

1.The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator.
The path loss was compensated to the results for each measurement.
2.Set to the maximum power setting and enable the EUT transmit continuously.
3.Enable the EUT hopping function.
4.Use the following spectrum analyzer setting
Span:the frequency band of operation
RBW:≧1% of the span　VBW:RBW≦VBW　Sweep:auto
Detector function:peak　Trace:max hold
5.The number of hopping frequency used is defined as the number of total channel.
5.Measure and record the results in the test report.



3.4.3 Test Data

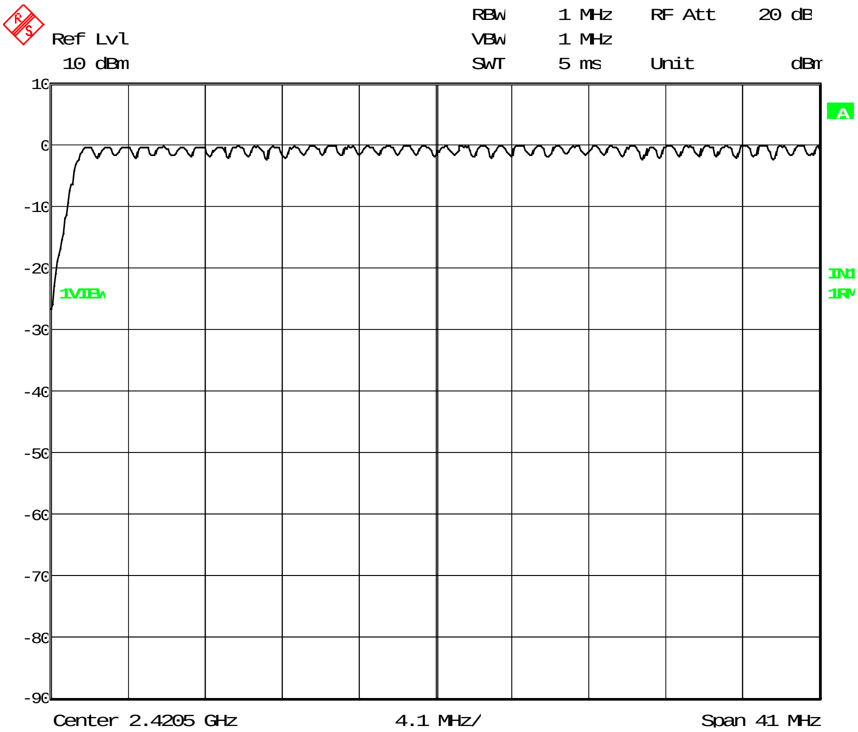


Figure 7 Number of Hopping Channel Plot channel 00-38

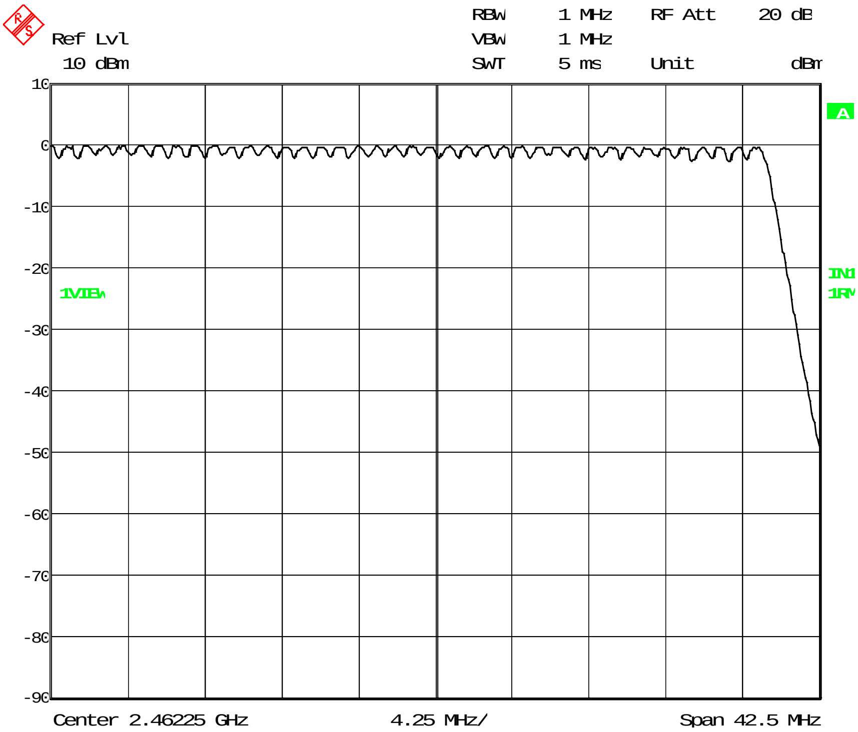


Figure 8 Number of Hopping Channel Plot channel 39-78

3.5 Time of Occupancy(Dwell Time)

3.5.1 Test Result

Mode	Hopping Channel Number	N	Package Transfer Time(msec)	Result Dwell Time (sec)	Limit (sec)
BDR (DH1)	79	2	0.436874	0.139800	<0.4
BDR (DH3)	79	4	1.693387	0.270942	<0.4
BDR (DH5)	79	6	2.931864	0.312732	<0.4

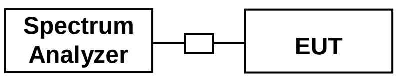
Table4　Time of Occupancy(Dwell Time)

Result：Pass

3.5.2 Test Detail

1.The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator.
The path loss was compensated to the results for each measurement.
2.Set to the maximum power setting and enable the EUT transmit continuously.
3.Enable the EUT hopping function.
4.Use the following spectrum analyzer setting
Span:Zero Span　Frequency:Centered on a hopping Channel
RBW:1MHz　VBW:1MHz
Sweep:as necessary to capture the entire dwell time per hopping channel
Detector function:peak　Trace:max hold
5.Measure and record the results in the test report.
6.Calclation formula

Dwell Time=1600/(79×N)×Package Transfer Time×（0.4×79）
DH1 N=2　　DH3 N=4　　DH5 N=6



3.5.3 Test Data

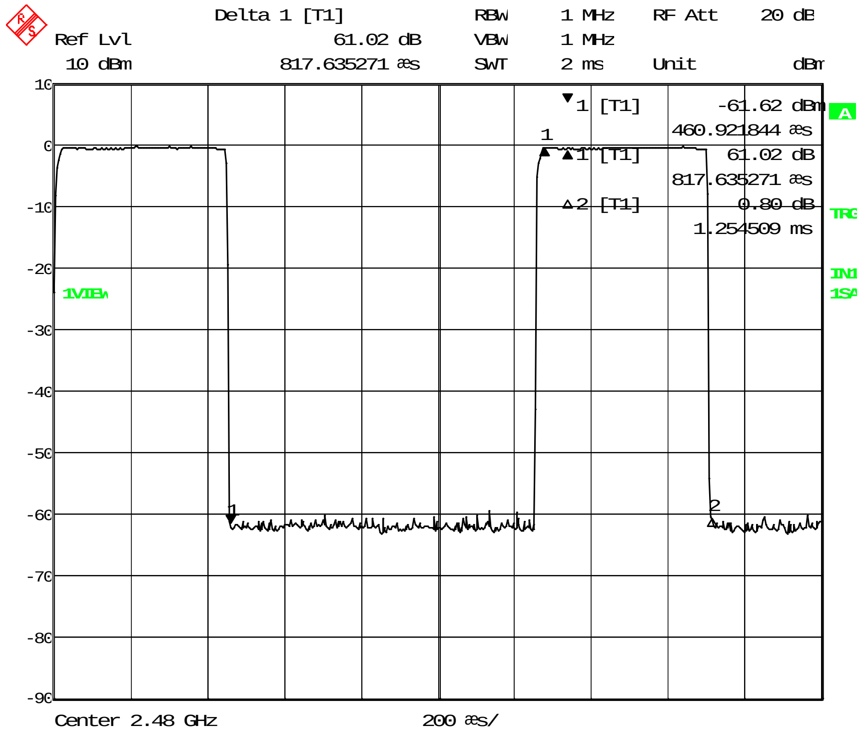


Figure 9 Package Transfer Time Plot_DH1

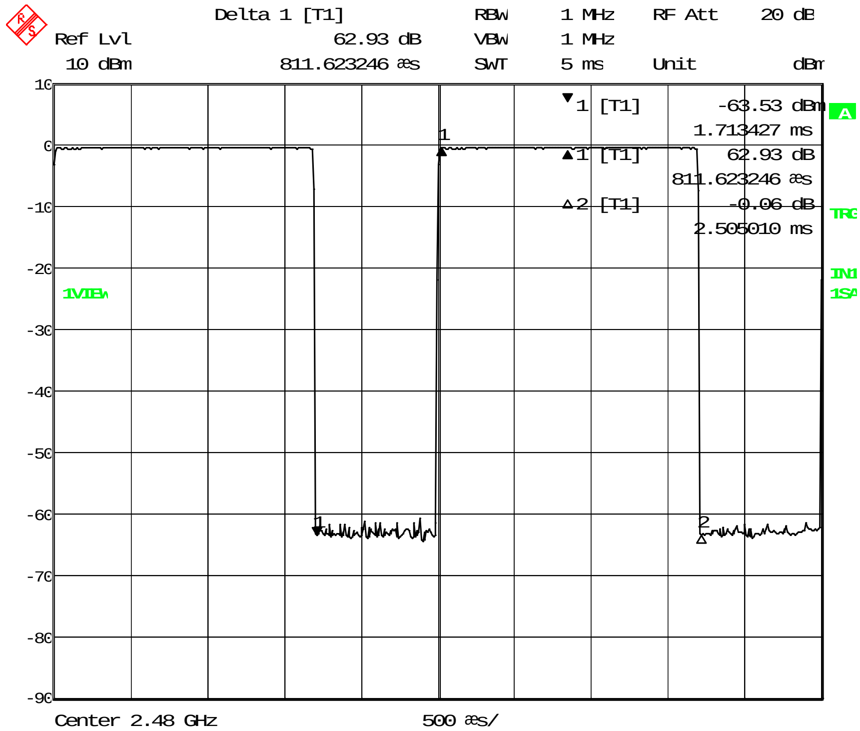


Figure 10 Package Transfer Time Plot_DH3

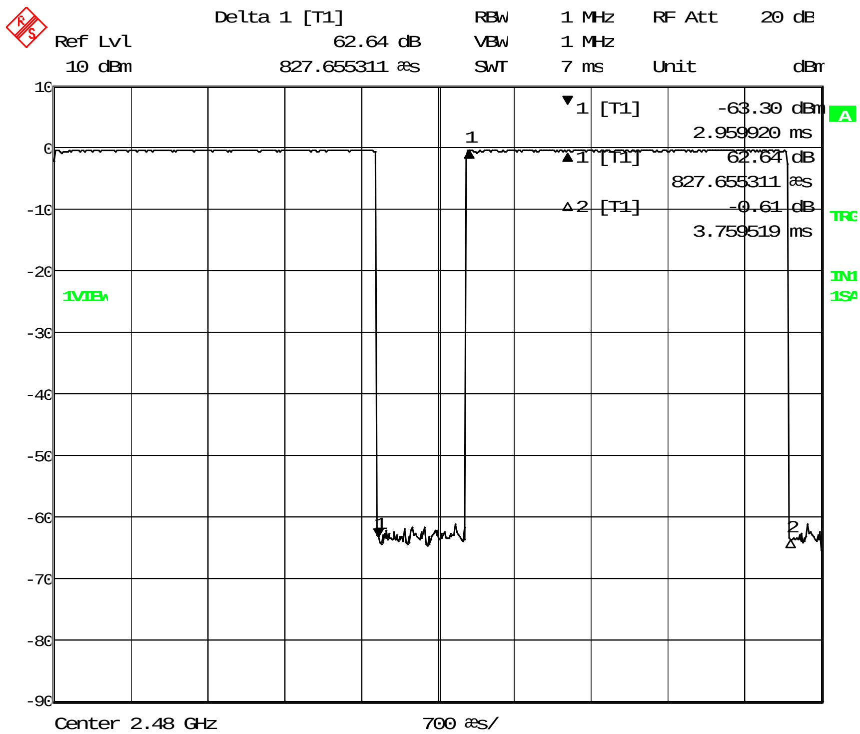


Figure 11 Package Transfer Time Plot_DH5

3.6 Maximum Peak Output Power

3.6.1 Test Result

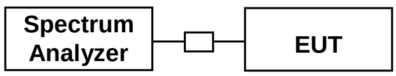
Mode	Channel	Frequency (MHz)	S/A Reading (dBm)	Factor (dB)	Result (dBm)	Limit (dBm)	Margin (dB)
BDR (DH5)	Lower	2402.000	−0.40	1.00	0.60	30.0	29.40
	Middle	2441.000	−0.16	1.00	0.84	30.0	29.16
	Higher	2480.000	−0.49	1.00	0.51	30.0	29.49

Table5　Maximum Peak Output Power

Result：Pass

3.6.2　Test Detail

1.The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator.
The path loss was compensated to the results for each measurement.
2.Set to the maximum power setting and enable the EUT transmit continuously.
3.Enable the EUT hopping function.
4.Measure the conducted output power with cable loss and record the result in the test report.
5.Measure and record the results in the test report.



3.6.3 Test data

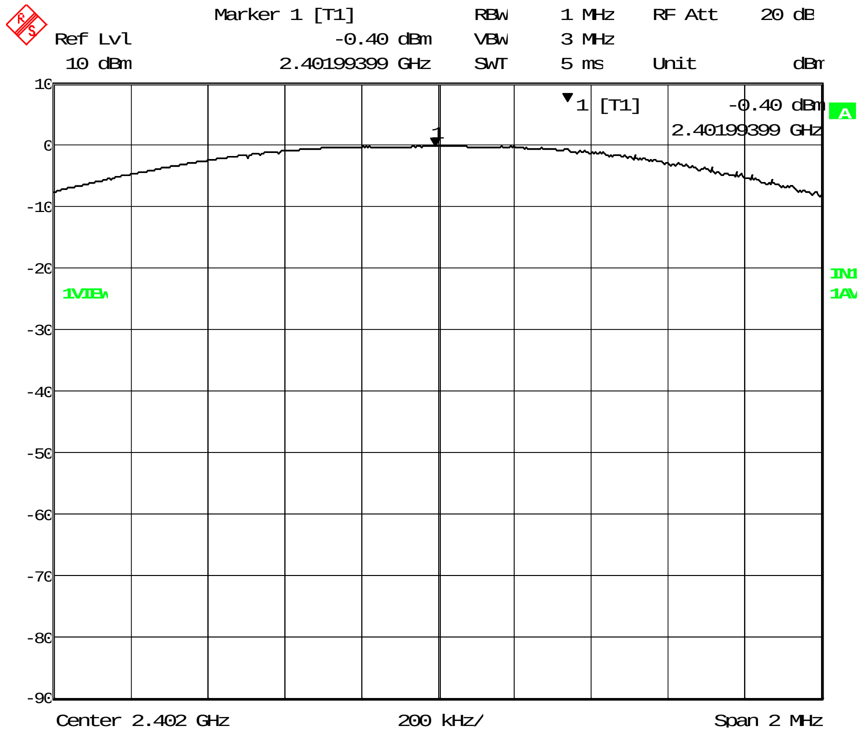


Figure 12 Maximum Peak Output Power(Lower ch_2402.000MHz)

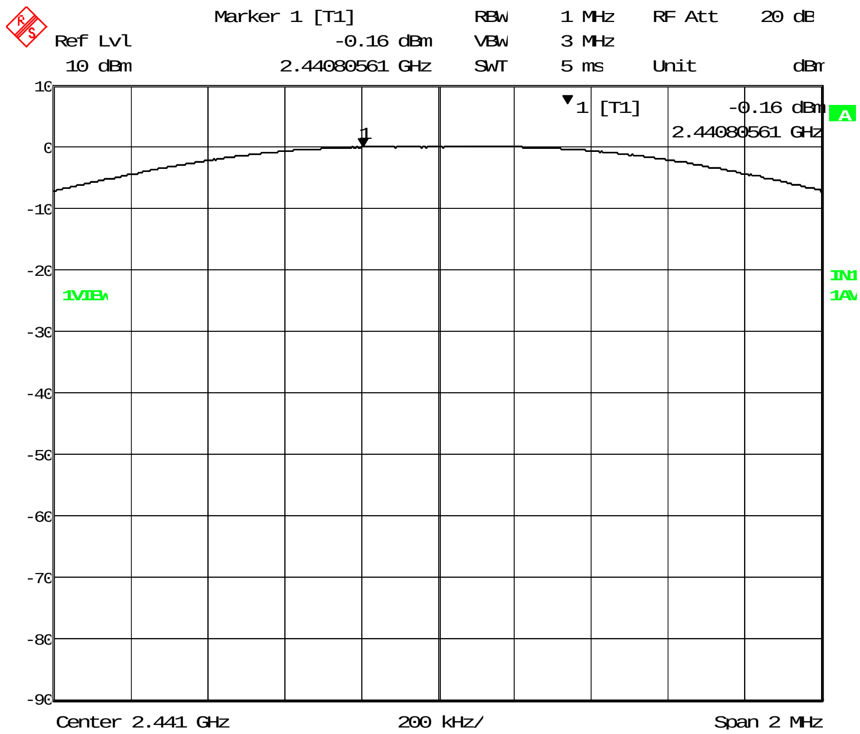


Figure 13 Maximum Peak Output Power(Middle ch_2441.000MHz)

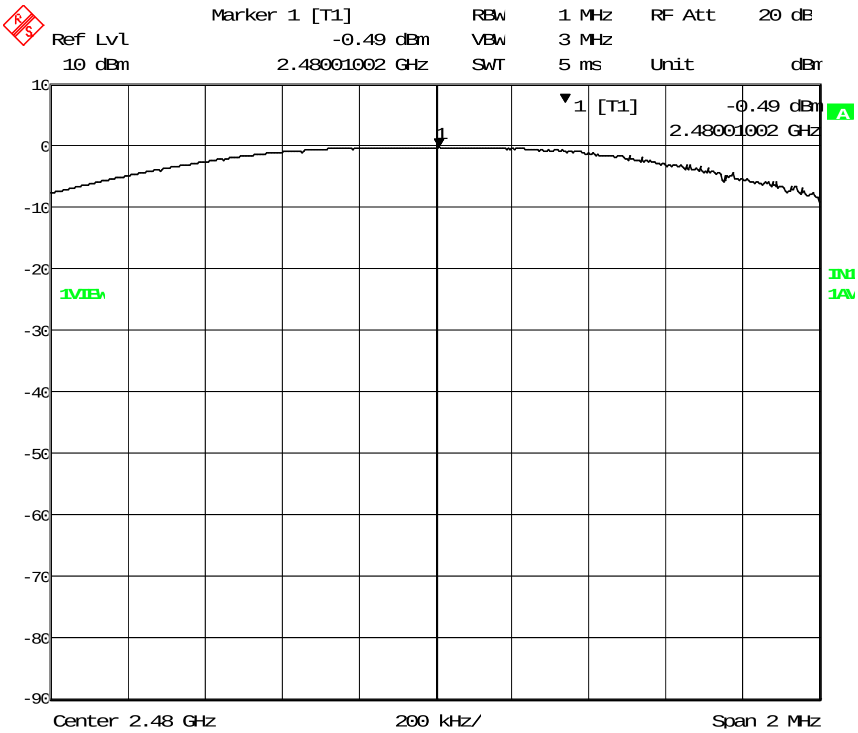


Figure 14 Maximum Peak Output Power(Higher ch_2480.000MHz)

3.7 Band Edge of Compliance of RF Conducted Emissions

3.7.1 Test Result

Mode	Edge	Deference (dB)	Limit (dB)	Margin (dB)
BDR (DH5)	Lower	40.37	＞20	20.37
	Higher	47.17	＞20	27.17
Hopping (DH5)	Lower	41.96	＞20	21.96
	Higher	60.82	＞20	19.21

Table6　Band Edge of Compliance of RF Conducted Emissions

Result：Pass

3.7.2 Test Detail

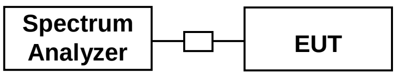
1.Set to the maximum power setting and enable the EUT transmit continuously.

2.Set RBW=300kHz(≧1%　Span=30MHz)　VBW＝300kHz(≧RBW)

Bandefge emissions must be at least 20dB down from the highest emission level within the authorize Band as measure with a 300kHz RBW.The attenuation shall be 30dB instead of 20dB when RMS conducted output power procedure is used.

4.Enable hopping function of the EUT and then repeat step 2. And 3.

5.Measure and record the results in the test report.



3.7.3 Test data

3.7.3.1 Conducted Band Edges

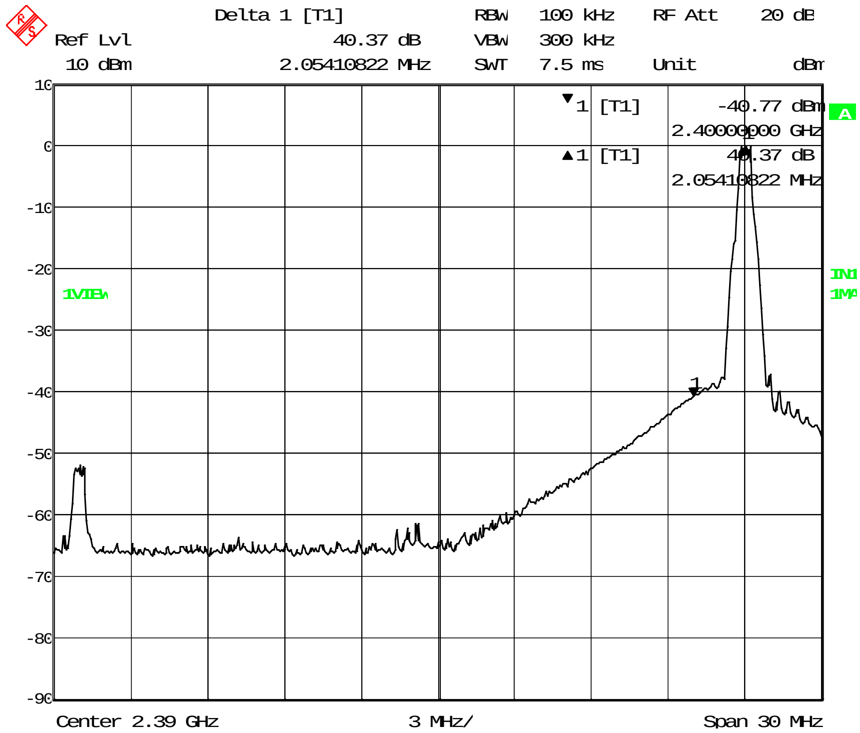


Figure 15 Low Band Edge Plot on Channel 00_2402.000MHz

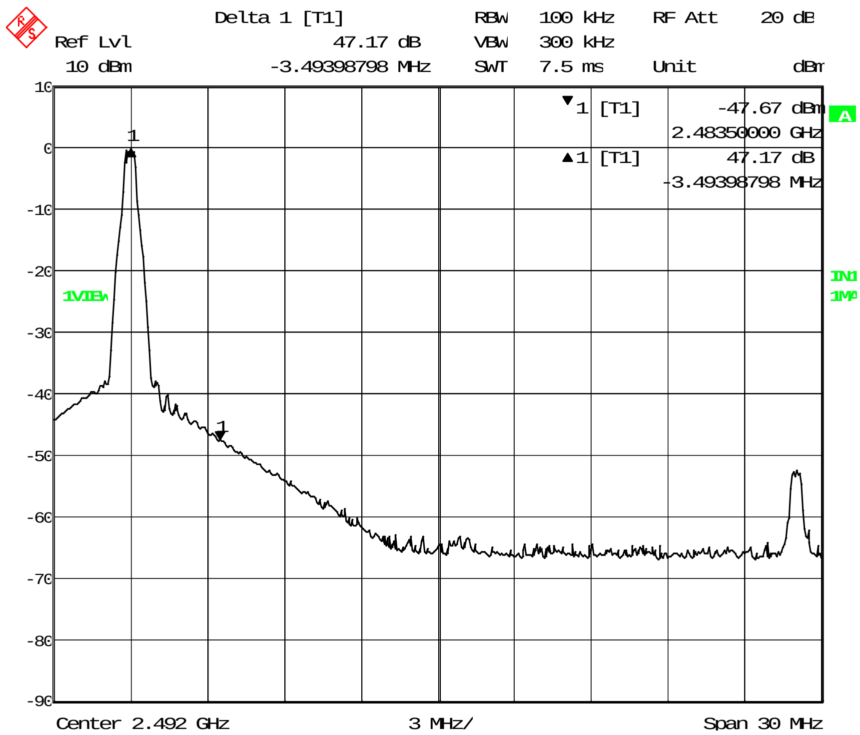


Figure 16 High Band Edge Plot on Channel 00_2480.000MHz

3.7.3.2 Conducted Hopping Mode Band Edges

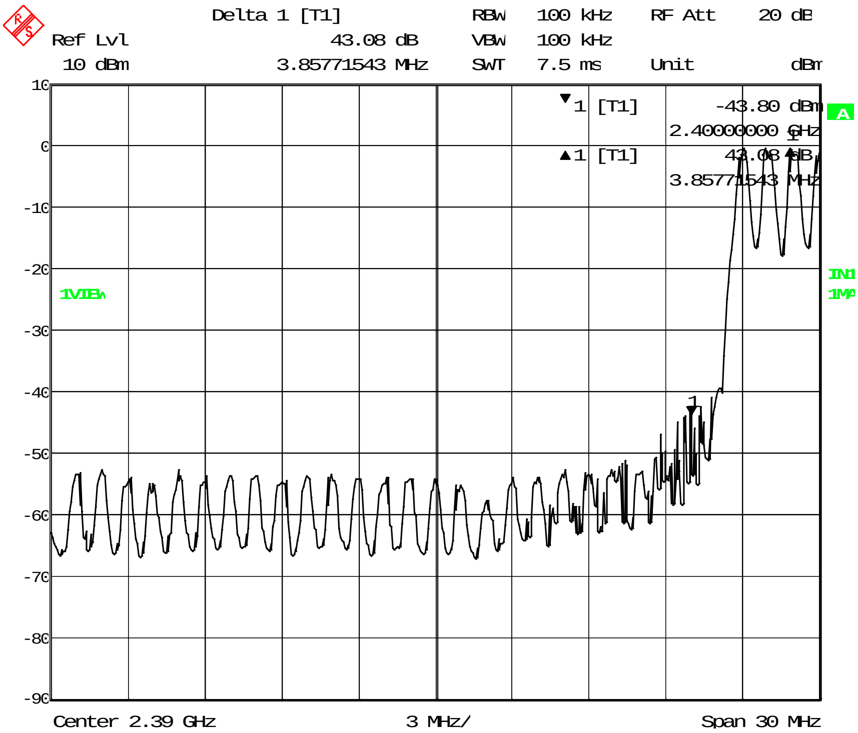


Figure 17 Hopping Band Edge Plot on 2402.000MHz

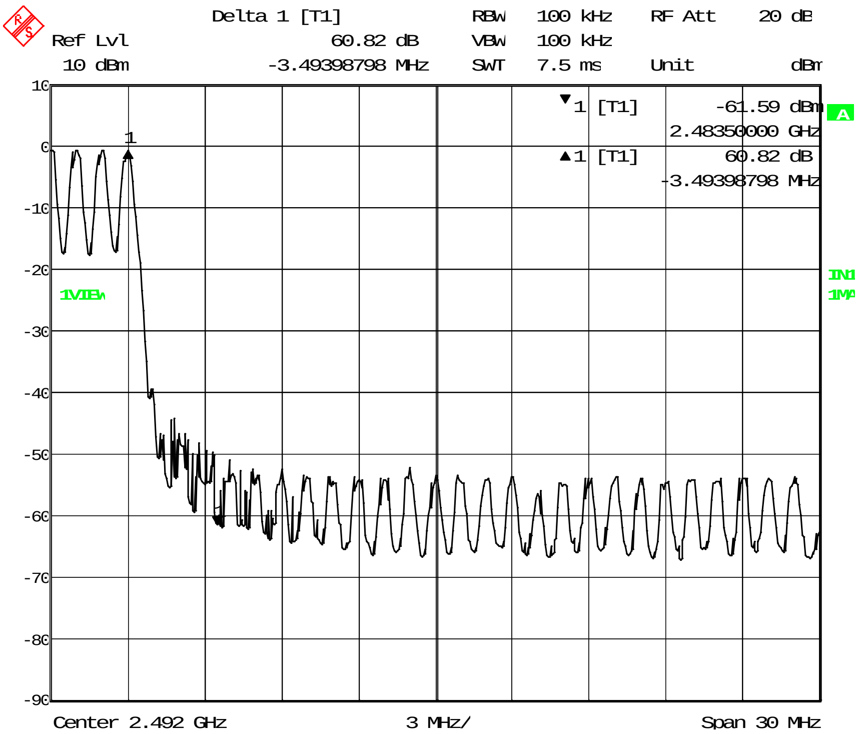


Figure 18 Hopping Band Edge Plot on 2480.000MHz

3.8 Conducted Spurious Emission Measurement

3.8.1 Test Result

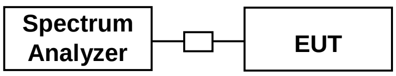
Mode	Measure Frequency (MHz)	Channel	Deference (dB)	Limit (dB)	Margin (dB)
BDR (DH5)	30MHz-3GHz	Lower	64.65	>20	44.65
		Middle	63.63	>20	43.63
		Higher	55.43	>20	35.43
	3GHz-25GHz	Lower	59.61	>20	39.61
		Middle	60.08	>20	40.08
		Higher	59.04	>20	39.04

Table7　Conducted Spurious Emission Measurement

Result : Pass

3.8.2 Test Detail

1.The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator.
The path loss was compensated to the results for each measurement.
2.Set to the maximum power setting and enable the EUT transmit continuously.
3.Enable the EUT hopping function.
4.Use the following spectrum analyzer setting
RBW:100kHz　VBW:300kHz scan up through 10th harmonic.
All harmonics/spurs must be at least 20dB down from the highest emission level within the authorized band as measured with a 100kHz RBW.
5.Measure and record the results in the test report.



3.8.3 Test data

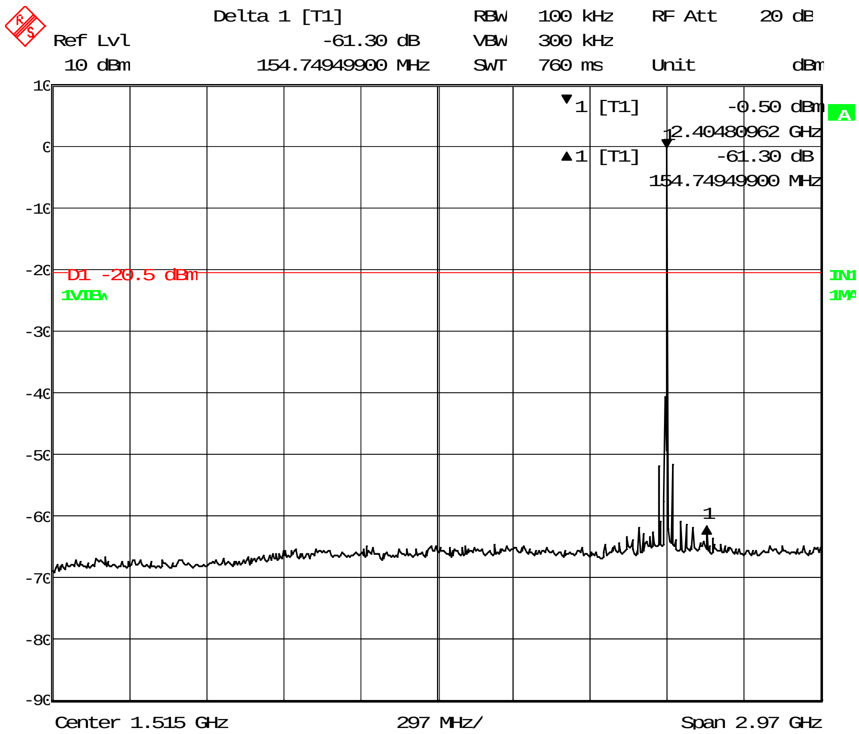


Figure 19 Conducted Spurious emission Plot between 30MHz－3GHz_Lower Ch

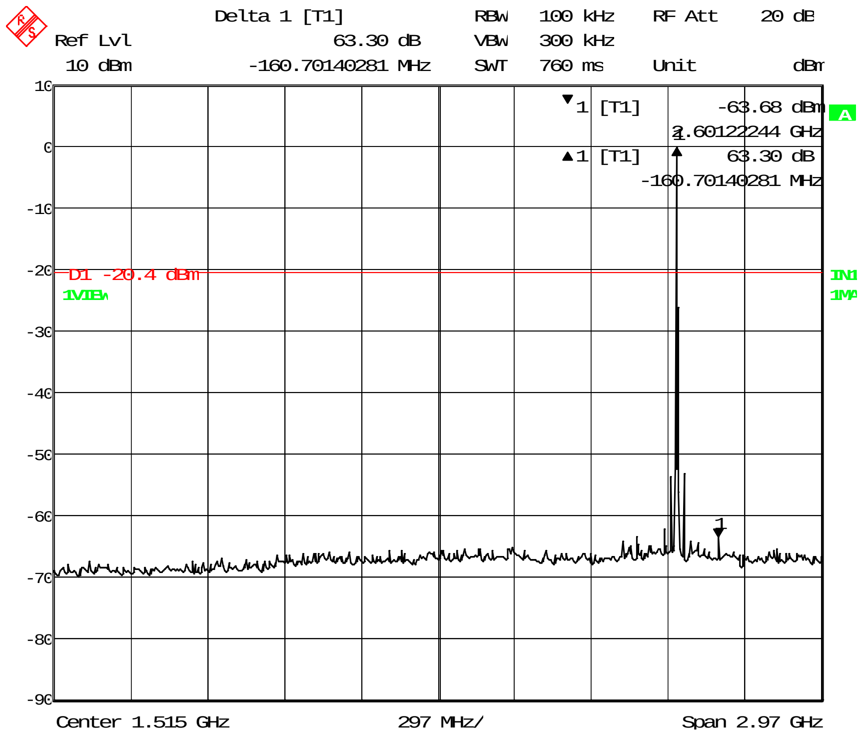


Figure 20 Conducted Spurious emission Plot between 30MHz－3GHz_Middle Ch

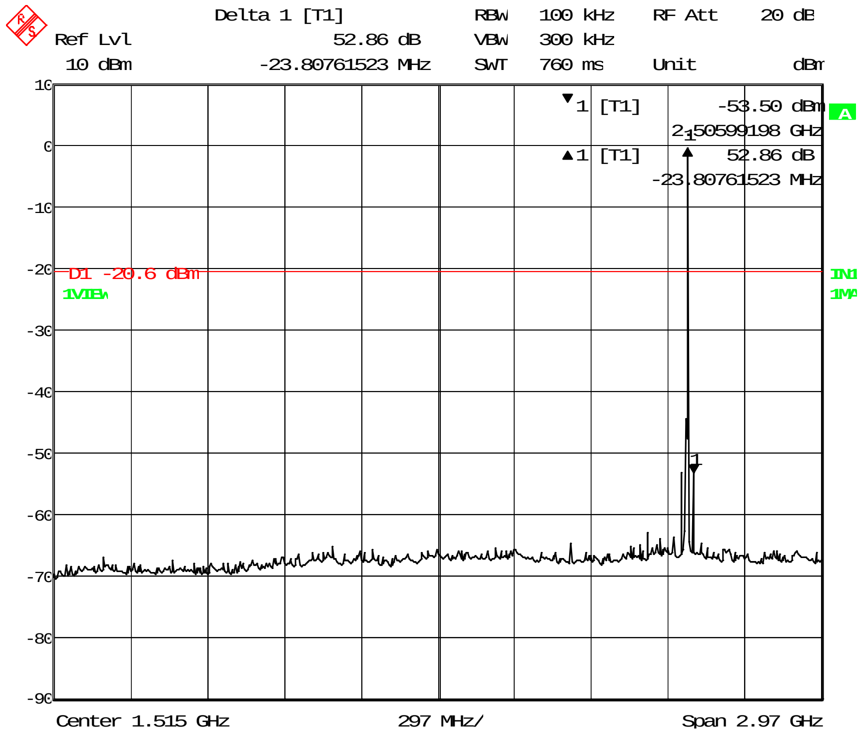


Figure 21 Conducted Spurious emission Plot between 30MHz－3GHz_Higher Ch

3.9 Line Conducted Measurement

3.9.1 Test Result

Frequency [MHz]	Line [A/B]	Factor [dB]	Level[dBμV]		Result[dBμV]		Limit[dBμV]		Margin[dB]	
			QP	AV	QP	AV	QP	AV	QP	AV
0.1537	A	39.4	23.3	9.9	49.3	33.2	65.8	55.8	16.5	22.6
0.1834	A	32.8	17.4	10.1	42.9	27.5	64.3	54.3	21.4	26.8
0.1964	A	28.9	12.6	9.9	38.8	22.5	63.8	53.8	25.0	31.3
0.5055	A	33.1	31.9	10.2	43.3	42.1	56.0	46.0	12.7	3.9
0.5071	A	33.0	31.6	10.2	43.2	41.8	56.0	46.0	12.8	4.2
16.8260	A	35.0	28.4	10.3	45.3	38.7	60.0	50.0	14.7	11.3
0.1545	B	38.4	24.4	9.9	48.3	34.3	65.8	55.8	17.5	21.5
0.2012	B	31.4	20.5	9.9	41.3	30.4	63.6	53.6	22.3	23.2
0.5055	B	32.4	31.2	10.2	42.6	41.4	56.0	46.0	13.4	4.6
16.7502	B	35.3	28.7	10.4	45.7	39.1	60.0	50.0	14.3	10.9

Table8　Line Conducted Measurement

Result：Pass

3.9.2 Test Detail

Onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table, as measured using a 50 μH/50 ohms line impedance stabilization network (LISN).

LINE A：Line

LINE B：Neutral

3.9.3 Test data

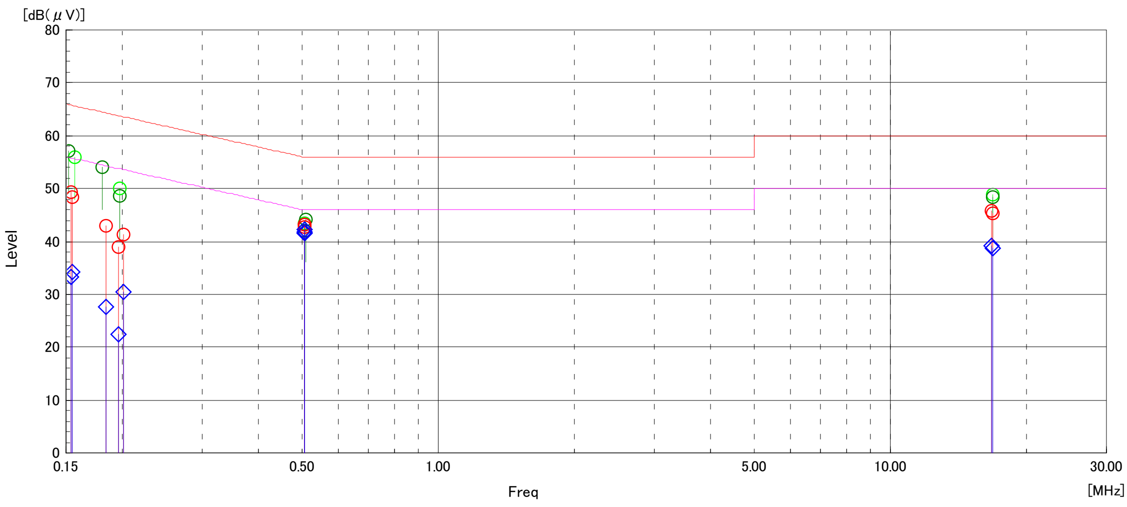


Figure 22 Line Conducted Measurement

3.10 Radiated emission

3.10.1 Test Result

3.10.1.1 9kHz to 1000MHz

Mode	Measurement Frequency (MHz)	Reading (dBμV)	Correction factor (dB/m)	Noise level (dBμV/m)	Ant height (m)	Ant Pol (H/V)	Turn table angle (digree)	Limit (dBμV/m)	Margin (dB)
Hopping	0.611	32.2	-4.2	28	139	V	283	31.9	3.9
	30.000	13.9	-8.7	5.2	106	V	216	40.0	34.8
	44.114	-2.3	19.7	17.4	399	V	25	40.0	22.6
	155.069	-2.5	23.7	21.2	397	V	25	43.5	22.3
	261.012	-3.2	26.6	23.4	103	H	308	46.0	22.6
	797.428	-1.4	31.6	30.2	100	V	300	46.0	15.8
	976.889	-1.2	33.5	32.3	224	H	10	54.0	21.7

Table9 Radiated Emission (9kHz-1000MHz)

Result：Pass

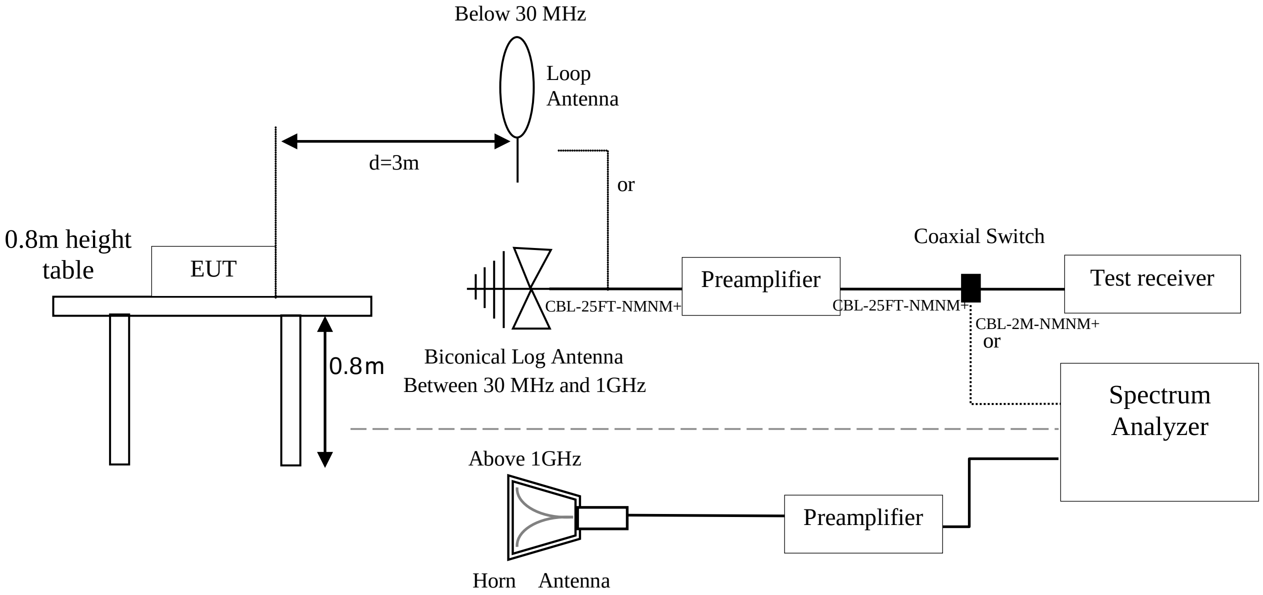
3.10.1.2 1GHz to 25GHz

Mode	Measurement Frequency (MHz)	Reading (dBμV)	Correction factor (dB/m)	Noise level (dBμV/m)	Ant height (m)	Ant Pol (H/V)	Turn table angle (digree)	Limit (dBμV/m)	Margin (dB)
Hopping	4856.967	42.5	-10.0	32.5	103	V	286	54	21.5
	10262.34	42.5	-0.5	42.0	182	H	195	54	12.0
	14780.86	42.3	7.8	50.1	118	V	66	54	3.9
	16125.36	41.5	9.2	50.7	214	H	6	54	3.3

Table 10 Radiated Emission (1GHz-25GHz)

Result：Pass

3.10.2 Test Detail



1. The EUT is placed on a non-conducting table 80 cm above the ground plane. The antenna to EUT distance is 3 meters. The EUT is configured in accordance with ANSI C63.4:2003. The EUT is set to transmit in a continuous mode.
2. For measurements below 1 GHz the resolution bandwidth is set to 100 kHz for peak detection measurements or 120 kHz for quasi-peak detection measurements. Peak detection is used unless otherwise noted as quasi-peak.
3. For measurements above 1 GHz the resolution bandwidth is set to 1 MHz, then the video bandwidth is set to 1 MHz for peak measurements and 10 Hz for average measurements.
4. The spectrum from 30 MHz to 25 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in the 2.4 GHz band.
5. The frequency range of interest is monitored at a fixed antenna height and EUT azimuth. The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the emission. Measurements are made with the antenna polarized in both the vertical and the horizontal positions.

3.10.3 Test data

3.10.3.1 9kHz to 1000MHz

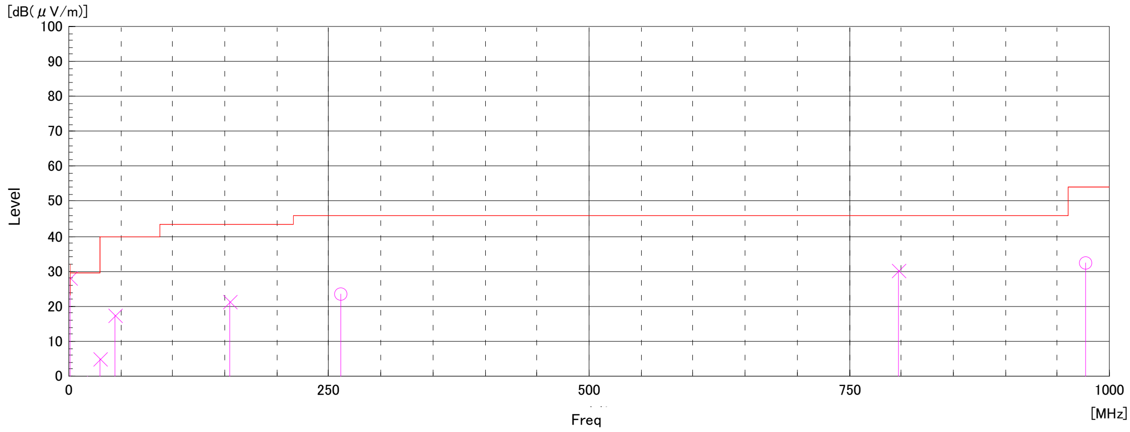


Figure 23 Radiated Emission (9kHz-1000MHz)

3.10.3.2 1GHz to 25GHz

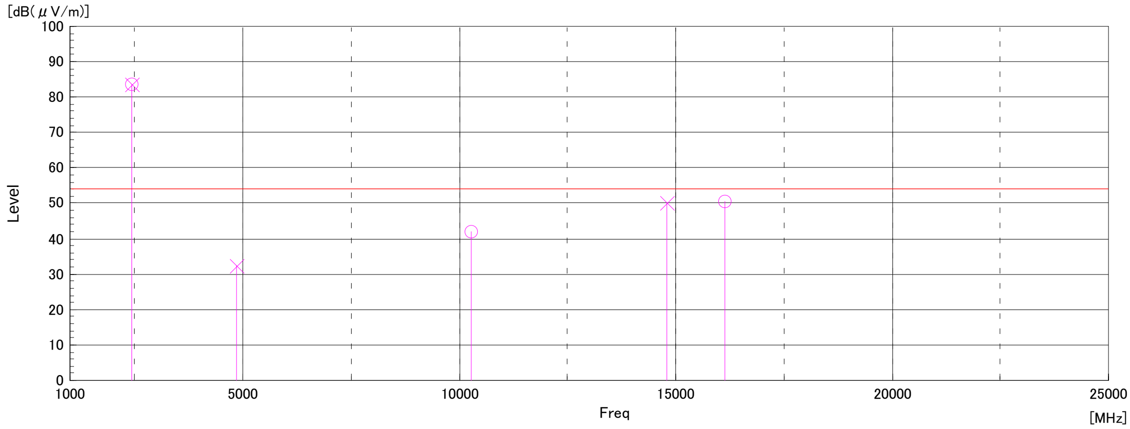


Figure 24 Radiated Emission (1-25GHz)

3.10.4 Remarks

1. All measurements were performed using a loop antenna. The antenna was positioned in three orthogonal positions
(X front, Y side, Z top) and the position with the highest emission level was recorded.
2. The EUT was positioned in three orthogonal planes to determine the orientation resulting in the worst case emissions.
3. Measurements were performed at 3m and the data was extrapolated to the specified measurement distance of 10m. to 300m.
4. All measurements were recorded using a spectrum analyzer employing a quasi-peak detector.
5. Field Strength Level $_{[dB\mu V/m]}$= Analyzer Level $_{[dB\mu V]}$ + AFCL $_{[dB/m]}$.
6. AFCL $_{[dB/m]}$ = Antenna Factor $_{[dBm]}$ + Cable Loss $_{[dB]}$
Margin $_{[dB]}$= Field Strength Level $_{[dB\mu V/m]}$ - Limit $_{[dB\mu V/m]}$

3.11 RF Exposure Requirements

Approximate SAR Test Exclusion Power Thresholds at Selected Frequencies and Test Separation Distances are illustrated in the following Table.

The 1-g and 10-g SAR test exclusion thresholds for 100 MHz to 6 GHz at test separation distances ≤ 50 mm are determined by:
[(max. power of channel, including tune-up tolerance, mW)/(min. test separation distance, mm)] · [√f(GHz)] ≤ 3.0 for 1-g SAR and ≤ 7.5 for 10-g extremity SAR,where

- f(GHz) is the RF channel transmit frequency in GHz
- Power and distance are rounded to the nearest mW and mm before calculation
- The result is rounded to one decimal place for comparison

The test exclusions are applicable only when the minimum test separation distance is ≤ 50 mm and for transmission frequencies between 100 MHz and 6 GHz. When the minimum test separation distance is < 5 mm, a distance of 5 mm is applied to determine SAR test exclusion.

3.11.1 Calculation

Mode:BDR(DH5)

Test Frequency (MHz)	Cnducted Power (dBm)	Turn-up Power of Tolerance (dB)	Maximum Power of Turn up Tolerance (mW)	Minimum Test separation Distance (mm)	Calculation Value	Threshold Value
2402.000	0.60	±1.0	1.445	5	0.447	3.0
2441.000	0.84	±1.0	1.528	5	0.477	3.0
2480.000	0.51	±1.0	1.416	5	0.446	3.0

3.11.2.Result

Therefore,EUT is not required the SAR Evaluation.

4.Test setup Photographs

4.1 Radiated

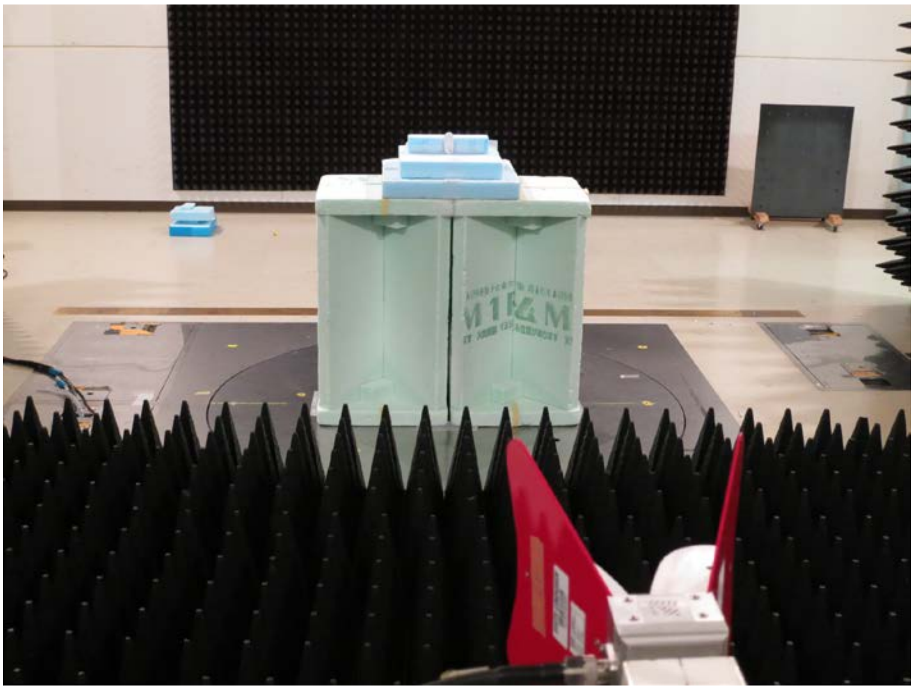


Photo1　Test setup for radiated (abobe 1GHz)

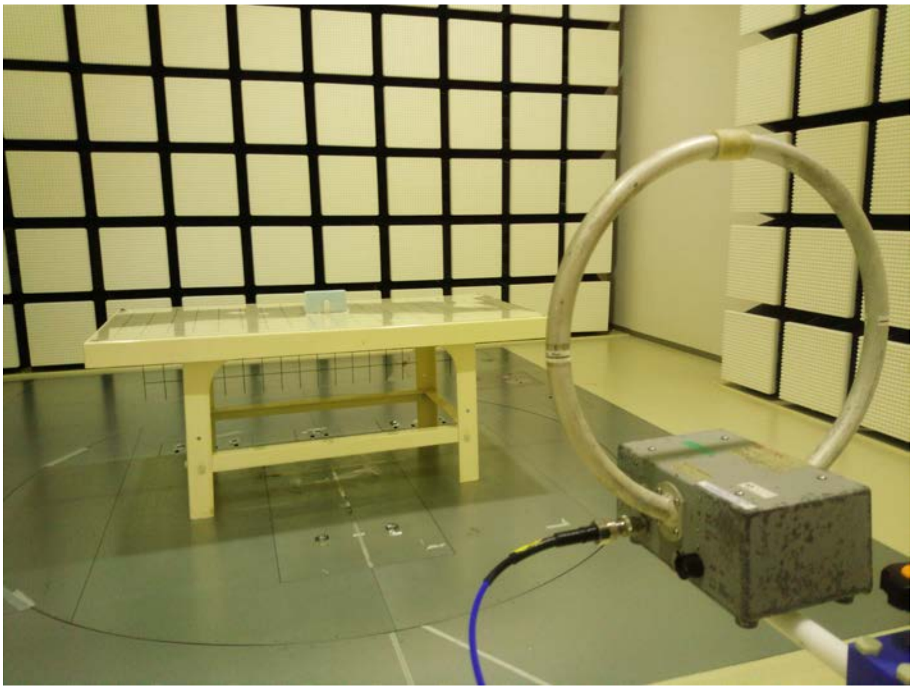


Photo2　Test setup for radiated (9kHz-30MHz)

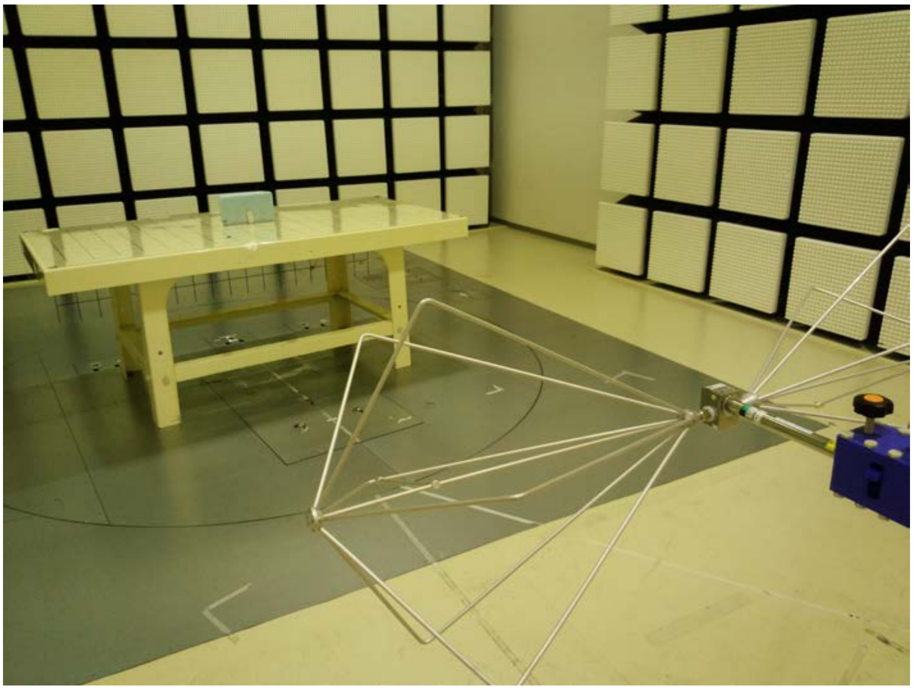


Photo3　Test setup for radiated (30-300MHz)

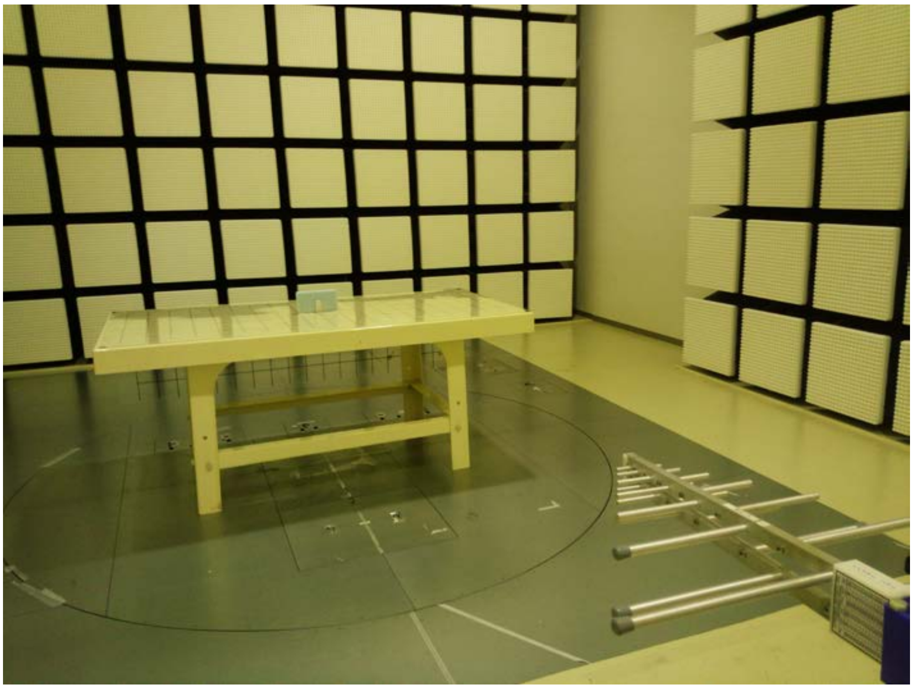


Photo4　Test setup for radiated (300-1000MHz)

4.2 Conducted

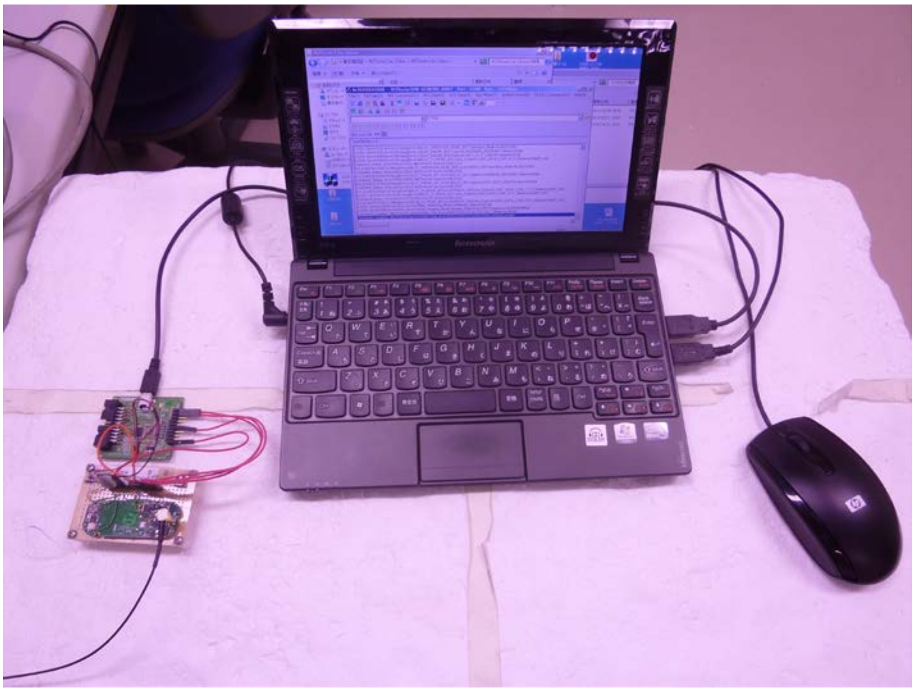


Photo5 Test setup for conducted(RF Test)

Photo6 Test setup for conducted(AC Line)

5.Test facility

5.1Test Instruments

5.1.1Conducted Emissions

Product Name	Manufacturer	Model Number	Serial Number	Calibration Date	Due Date
EMI Test Receiver	Rohde & Schwarz	ESIB40	100263	2014/10/16	2015/10/31
LISN	Rohde & Schwarz	ENV216	100466	2014/07/22	2015/07/31

5.1.2 Radiated Electric-Field Emissions

Product Name	Manufacturer	Model Number	Serial Number	Calibration Date	Due Date
EMI Test Receiver	Rohde & Schwarz	ESIB40	100263	2014/10/16	2015/10/31
Pre amplifier	SONOMA INSTRUMENT	310N	2805A03194	2014/07/29	2015/07/31
Pre amplifier	Hewlett Packard	8449B	3008A2309	2014/01/22	2015/01/31
Cable	Mini-Circuits	CBL-25FT-NMNM+	83148	2013/12/20	2014/12/31
Cable	Mini-Circuits	CBL-25FT-NMNM+	83145	2013/12/20	2014/12/31
Cable	Mini-Circuits	CBL-2M-NMNM+	71548	2013/12/20	2014/12/31
Cable	Mini-Circuits	CBL-1M-NMNM+	104547/4	2013/12/20	2014/12/31
Loop Antenna	EMCO	6507	9108-1268	2014/10/07	2015/10/31
Biconical Antenna	Schwarzbeck	VHA9103B	91032542	2014/08/21	2015/08/31
Logperidic antenna	Schwarzbeck	UHALP9108A	0779	2014/08/21	2015/08/31
Horn Antenna	ETS-LINDGREN	3117	00146463	2014/05/26	2015/05/31

5.2 Test equipment

Dimension	Material	Measurement
1.5m(W) X 0.8m(H) X 1.0m(D)	Polystyrene	Radiated Emissions
0.8m(W) X 0.8m(H) X 0.4m(D)	Polystyrene	Radiated Emissions
0.4m(W) X 0.7m(H) X 0.4m(D)	Polystyrene	Conducted Emissions

Annex A (Miscellaneous Information)

A.1 Test Locations

Unless otherwise described in this report, the tests were carried out at the following locations:

Astronouts Noborito Laboratory
294 NoboritoTama-ku Kawasaki-shi, Kanagawa, Japan
TEL: +81-44-819-8601
FAX: +81-44-819-8603

Annex B (Description of Test Method**)**

Unless otherwise described in this report, tests are carried out using the methods which are described in the applied standards and summarized in this section.

Specifically for 47 CFR 15 Subpart B, section 6 of ANSI C63.4-2003 is to be used for EUT arrangements and operations, and section 8 of the standard is to be used for radiated emissions measurement procedures.

B.1 Conducted Emissions (AC Main and Other Terminals)

Table-top EUT is placed on a wooden table so that one side (rear or bottom) of the EUT is separated 0.4 m from the reference plane (metallic wall or ground plane), and floor-standing EUT is placed on the ground plane.
Mains to the EUT is supplied through a LISN, and mains to non-EUT components, if any, are supplied through yet another LISN(s).
If LISN is not applicable, mains would be supplied directly and a voltage probe would be used instead for the measurement.
For each current-carrying conductors or terminals to be measured, a spectrum analyzer is used to pre-scan the emissions.
For each of the significant emissions detected, the maximum signal level is read using a measuring receiver having CISPR 16 quasi-peak (QP) and average (AV) detector function and 9 kHz nominal bandwidth.
Then, appropriate correction factor —consists of transducer (LISN or voltage probe) factor and transmission loss (due to the attenuator, filter and/or transient suppressor, if any, and the cable) in the system— is applied to the receiver reading to calculate the corresponding emission level.
For example, if reading on the receiver is 33.0 dBμV, the transducer factor is 0.5 dB, and transmission loss (attenuation) in the coaxial cable and the attenuator is 10.5 dB, the emission level is calculated as:
33.0 dBμV + 0.5 dB + 10.5 dB = 44.0 dBμV.
Finally, the calculated emission level is compared with the upper limit specified in the standard.
Actual measurement will be carried out according to the appropriate edition of CISPR 16-2-1, CISPR 22, and ANSI C63.4 and/or other standards whichever applicable.
Specifically for 47 CFR 15 Subpart B, section 6 of ANSI C63.4-2003 is to be used for EUT arrangements and operations, and section 8 of the standard is to be used for radiated emissions measurement procedures.

B.2 Radiated Electric-Field Emissions (30 MHz to 1000MHz)

EUT is placed on a turn-table in a test site, on a table (styrene form) 0.8 m height or on the floor unless otherwise specified in the standard.
Receiving antenna ---usually biconical, log-periodic or biconical/log-periodic hybrid---is positioned at the specified distance from the EUT.
For each polarization (horizontal and vertical), a spectrum analyzer is used to pre-scan the emissions while rotating the turn-table.
For each of the significant electromagnetic field detected, the test personnel discriminates EUT's emissions from the ambient noises.
For each of the significant emissions, maximum level of the emission is searched while rotating the turn-table and varying the antenna height between 1 m and 4 m, and the maximum signal level is read using a measuring receiver having CISPR 16 quasi-peak (QP) detector function and 120 kHz nominal bandwidth.
Then, appropriate correction factor —consists of antenna factor, amplifier gain and transmission loss (due to the attenuator and the cable loss) in the system— is applied to the receiver reading to calculate the corresponding field strength.
For example, if reading on the receiver is 33.0 dBμV, the antenna factor is 9.4 dB (1/m), the amplifier gain is 25.6 dB, and transmission loss (attenuation) in the coaxial cable and the attenuator is 6.5 dB, the field strength is calculated as: 33.0 dBμV + 9.4 dB (1/m) - 25.6 dB + 6.5 dB = 23.3 dBμV/m.
Finally, the calculated field strength is compared with the upper limit specified in the standard.
Actual measurement will be carried out according to the appropriate edition of CISPR 16-2-3, CISPR 22, and ANSI C63.4 and/or other standards whichever applicable.
Specifically for 47 CFR 15 Subpart B, section 6 of ANSI C63.4-2003 is to be used for EUT arrangements and operations, and section 8 of the standard is to be used for radiated emissions measurement procedures.

B.3 Radiated Electric-Field Emissions above 1000MHz

EUT is placed on a turn-table in a test site, on a table (styrene foam) 0.8 m height or on the floor unless otherwise specified in the standard.
Receiving antenna ---usually double ridge waveguide horn or standard horn--- is positioned at the specified distance from the EUT.
For each polarization (horizontal and vertical), a spectrum analyzer is used to pre-scan the emissions while rotating the turn-table.
For each of the significant electromagnetic field detected, the test personnel discriminates EUT's emissions from the ambient noises.
For each of the significant emissions, maximum level of the emission is searched while rotating the turn-table and varying the antenna height if it is required, and the maximum signal level is read using a spectrum analyzer or a measuring receiver having peak detector function and 1 MHz nominal bandwidth, unless otherwise specified in the standard. To obtain average readings with spectrum analyzers, video averaging (usually with VBW = 10 Hz) may be used.
As specified in the applicable standard, the antenna height would be (1) varied between 1 m and 4 m, or (2) varied so that the whole height of the EUT is covered by the main lobe of the receiving antenna, or (3) fixed to the approximate radiation center of the EUT.
Then, appropriate correction factor ---consists of antenna factor, amplifier gain and transmission loss (due to the attenuator and the cable loss) in the system--- is applied to the spectrum analyzer/receiver reading to calculate the corresponding field strength, and the result is compared with the upper limit specified in the standard.
Actual measurement will be carried out according to the appropriate edition of CISPR 16-2-3, CISPR 22, ANSI C63.4 and/or other standards whichever applicable.
Specifically for 47 CFR 15 Subpart B, section 6 of ANSI C63.4-2003 is to be used for EUT arrangements and operations, and section 8 of the standard is to be used for radiated emissions measurement procedures.

B.4 Radiated Magnetic-Field Emissions

EUT is placed on a turn-table in a test site, on a (styrene foam) table 0.8 m height or on the floor unless otherwise specified in the standard.
Receiving antenna ---loop antenna (active or passive) --- is positioned at the specified distance from the EUT.
A spectrum analyzer is used to pre-scan the emissions while rotating the turn-table.
For each of the significant electromagnetic field detected, the test personnel discriminates EUT's emissions from the ambient noises.
For each of the significant emissions, maximum level of the emission is searched while rotating the turn-table and rotating the receiving antenna about its center, and the maximum signal level is read using a measuring receiver having CISPR 16 quasi-peak (QP) detector function and 120 kHz nominal bandwidth.
Then, appropriate correction factor ---consists of antenna factor, and transmission loss (cable loss) in the system--- is applied to the receiver reading to calculate the corresponding field strength, and the result is compared with the upper limit specified in the standard.
In general, it is assumed that magnetic field strength can be converted to electric field strength by applying the free space impedance of approximately 377 ohms, and vice versa.
Actual measurement will be carried out according to the appropriate edition of CISPR 16-2-3, ANSI C63.4 and/or other standards whichever applicable.