Report on the RF Testing of:

KYOCERA Corporation
Mobile Phone, Model: JA53
FCC ID: JOYJA53

In accordance with FCC Part 15 Subpart C

TÜV SÜD Japan

Add value.
Inspire trust.

Prepared for: KYOCERA Corporation
Yokohama Office 2-1-1 Kagahara, Tsuzuki-ku
Yokohama-shi, Kanagawa, Japan
Phone: +81-45-943-6253 Fax: +81-45-943-6314

COMMERCIAL-IN-CONFIDENCE

Document Number: JPD-TR-19047-0

SIGNATURE			
Hiro Suzuki			
NAME	**JOB TITLE**	**RESPONSIBLE FOR**	**ISSUE DATE**
Hiroaki Suzuki	Deputy Manager of RF Group	Approved Signatory	14 FEB 2019

Signatures in this approval box have checked this document in line with the requirements of TÜV SÜD Japan Ltd. document control rules.

EXECUTIVE SUMMARY
A sample(s) of this product was tested and found to be compliant with FCC Part 15 Subpart C.

NVLAP® TESTING
NVLAP LAB CODE 200306-0

ilac-MRA

DISCLAIMER AND COPYRIGHT
The results in this report are applicable only to the equipment tested.
This report shall not be re-produced except in full without the written approval of TÜV SÜD Japan Ltd.

ACCREDIATION
This test report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, ILAC-MRA, or any agency of the federal government.

TÜV SÜD Japan Ltd.
Yonezawa Testing Center
5-4149-7 Hachimanpara,
Yonezawa-shi, Yamagata,
992-1128 Japan

Phone: +81 (0) 238 28 2881
Fax: +81 (0) 238 28 2888
www.tuv-sud.jp

Japan

Contents

1 Summary of Test 3

1.1 Modification history of the test report 3
1.2 Standards 3
1.3 Test methods 3
1.4 Deviation from standards 3
1.5 List of applied test(s) of the EUT 3
1.6 Test information 3
1.7 Test set up 3
1.8 Test period 3

2 Equipment Under Test 4

2.1 EUT information 4
2.2 Modification to the EUT 4
2.3 Variation of family model(s) 5
2.4 Operating channels and frequencies 5
2.5 Operating mode 5
2.6 Operating flow 6

3 Configuration of Equipment 7

3.1 Equipment used 7
3.2 Cable(s) used 7
3.3 System configuration 7

4 Test Result 8

4.1 6dB Bandwidth 8
4.2 Maximum Peak Output Power 10
4.3 Band Edge Compliance of RF Conducted Emissions 11
4.4 Spurious emissions - Conducted - 13
4.5 Spurious Emissions - Radiated - 17
4.6 Restricted Band of Operation 38
4.7 Transmitter Power Spectral Density 44
4.8 AC Power Line Conducted Emissions 46

5 Antenna requirement 50

6 Measurement Uncertainty 51

7 Laboratory Information 52

Appendix A. Test Equipment 53

Appendix B. Duty Cycle 54

Japan

1 Summary of Test

1.1 Modification history of the test report

Document Number	Modification History	Issue Date
JPD-TR-19047-0	First Issue	Refer to the cover page

1.2 Standards

CFR47 FCC Part 15 Subpart C

1.3 Test methods

ANSI C63.10-2013,
KDB 558074 D01 15.247 Meas Guidance v05

1.4 Deviation from standards

None

1.5 List of applied test(s) of the EUT

Test item section	Test item	Condition	Result	Remark
15.247(a)(2)	6dB Bandwidth	Conducted	PASS	-
15.247(b)(3)	Maximum Peak Output Power	Conducted	PASS	-
15.247(d)	Band Edge Compliance of RF Conducted Emissions	Conducted	PASS	-
15.247(d) 15.205 15.209	Spurious Emissions	Conducted Radiated	PASS	-
15.247(d) 15.205 15.209	Restricted Bands of Operation	Radiated	PASS	-
15.247(e)	Transmitter Power Spectral Density	Conducted	PASS	-
15.207	AC Power Line Conducted Emissions	Conducted	PASS	-

1.6 Test information

None

1.7 Test set up

Table-top

1.8 Test period

24-January-2019 - 06-February-2019

Japan

2 Equipment Under Test

2.1 EUT information

Applicant	KYOCERA Corporation
	Yokohama Office 2-1-1 Kagahara, Tsuzuki-ku Yokohama-shi, Kanagawa, Japan
	Phone: +81-45-943-6253 Fax: +81-45-943-6314
Equipment Under Test (EUT)	Mobile Phone
Model number	JA53
Serial number	N/A
Trade name	Kyocera
Number of sample(s)	1
EUT condition	Pre-Production
Power rating	Battery: DC 3.8 V
Size	(W) 51.3 × (D) 17.4 × (H) 112.3 mm
Environment	Indoor and Outdoor use
Terminal limitation	-20 ˚C to 60 ˚C
RF Specification	
Protocol	Bluetooth 4.1 + EDR
Frequency range	2402 MHz-2480 MHz
Number of RF Channels	40 Channels
Modulation method/Data rate	GFSK (1 Mbps)
Channel separation	2 MHz
Conducted power	0.589 mW
Antenna type	Internal antenna
Antenna gain	1.98 dBi

2.2 Modification to the EUT

The table below details modifications made to the EUT during the test project.

Modification State	Description of Modification	Modification fitted by	Date of Modification
Model: JA53, Serial Number: N/A			
0	As supplied by the applicant	Not Applicable	Not Applicable

Japan

2.3 Variation of family model(s)

2.3.1 List of family model(s)

JA53 has model with camera and without camera.

2.3.2 Reason for selection of EUT

Not applicable

2.4 Operating channels and frequencies

Channel	Frequency [MHz]	Channel	Frequency [MHz]
0	2402	20	2442
1	2404	21	2444
2	2406	22	2446
3	2408	23	2448
4	2410	24	2450
5	2412	25	2452
6	2414	26	2454
7	2416	27	2456
8	2418	28	2458
9	2420	29	2460
10	2422	30	2462
11	2424	31	2464
12	2426	32	2466
13	2428	33	2468
14	2430	34	2470
15	2432	35	2472
16	2434	36	2474
17	2436	37	2476
18	2438	38	2478
19	2440	39	2480

2.5 Operating mode

The EUT had been tested under operating condition.
There are three channels have been tested as following:

Tested Channel	Frequency [MHz]
Low	2402
Middle	2440
High	2480

The pre-test has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates.

Tested Channel	Modulation Type	Data Rate
Low, Middle, High	GFSK	1 Mbps

The field strength of spurious emissions was measured at each position of all three axis X, Y and Z to compare the level, and the maximum noise.
The worst emission was found in X-axis, Open and the worst case recorded.

Japan

2.6 Operating flow

[Tx mode]
i) Test program setup to the DM tool
ii) Select a Test mode
Operating frequency: Channel Low: 2402 MHz, Channel Middle: 2440 MHz, Channel High: 2480 MHz
iii) Start test mode

[Rx mode]
i) Test program setup to the DM tool
ii) Select a Test mode
Operating frequency: Channel Low: 2402 MHz, Channel Middle: 2440 MHz, Channel High: 2480 MHz
iii) Start test mode

Japan

3 Configuration of Equipment

Numbers assigned to equipment on the diagram in “3.2 System configuration” correspond to the list in “3.1 Equipment used”.

3.1 Equipment used

No.	Equipment	Company	Model No.	Serial No.	FCC ID/DoC	Comment
1	Mobile Phone	KYOCERA	JA53	N/A	JOYJA53	EUT
2	AC Adapter	au	N/A	N/A	N/A	*

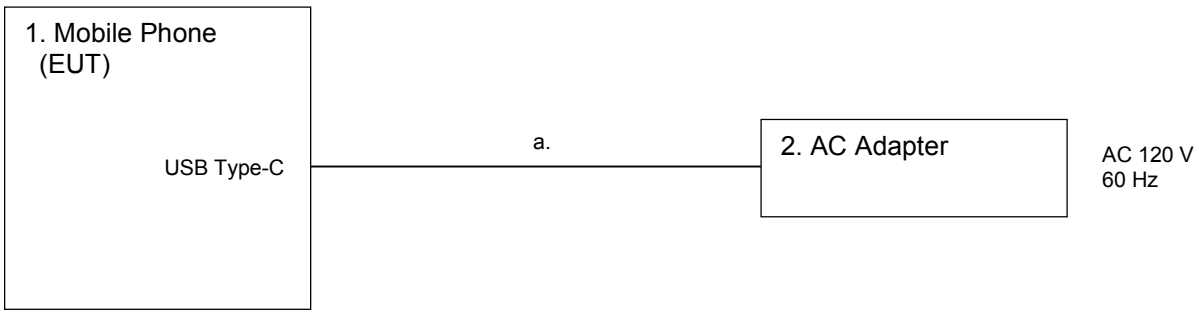
*:AC power line Conducted Emission Test.

3.2 Cable(s) used

No.	Equipment	Length[m]	Shield	Connector	Comment
a	USB cable (for AC Adapter)	1.0	Yes	Metal	*

*:AC power line Conducted Emission Test.

3.3 System configuration



Japan

4 Test Result

4.1 6dB Bandwidth

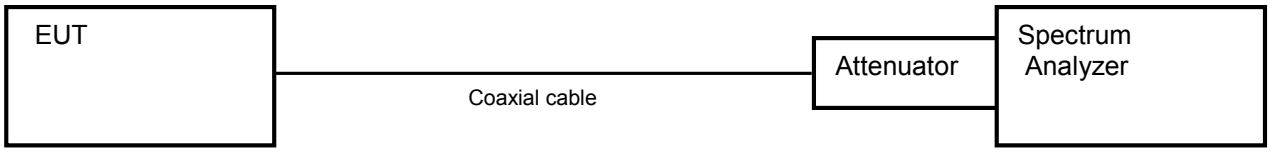
4.1.1 Measurement procedure

[FCC 15.247(a)(2), KDB558074 D01 v05]

The bandwidth at 6 dB down from the highest inband spectral density is measured with spectrum analyzer connected to the antenna terminal, while EUT is operating in transmission mode at the appropriate center frequency.

The spectrum analyzer is set to;
a) RBW = 100 kHz
b) VBW ≥ 3 x RBW
c) Sweep time = auto-couple
d) Detector = peak
e) Trace mode = max hold

- Test configuration



4.1.2 Limit

The minimum permissible 6dB bandwidth is 500kHz.

4.1.3 Measurement result

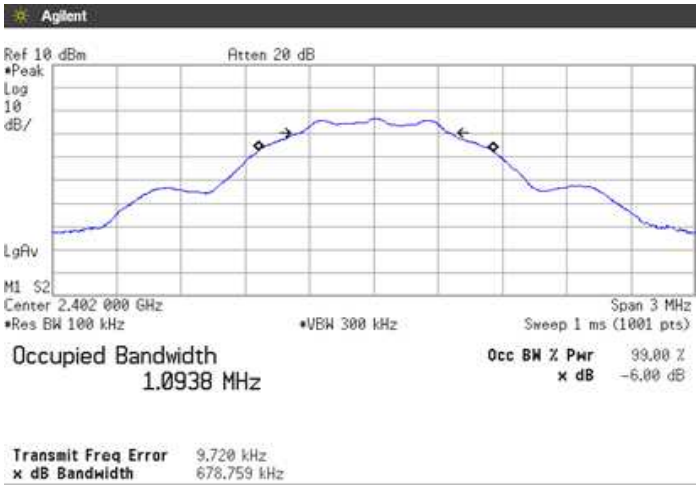
Date : 29-January-2019
Temperature : 21.5 [˚C]
Humidity : 30.0 [%]
Test place : Shielded room No.4

Test engineer : Taiki Watanabe

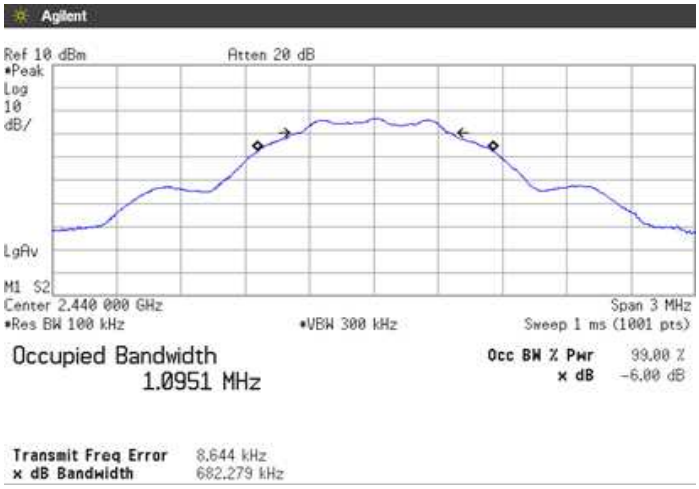
Channel	Frequency [MHz]	6 dB bandwidth [MHz]
Low	2402	0.679
Middle	2440	0.682
High	2480	0.677

4.1.4 Trace data

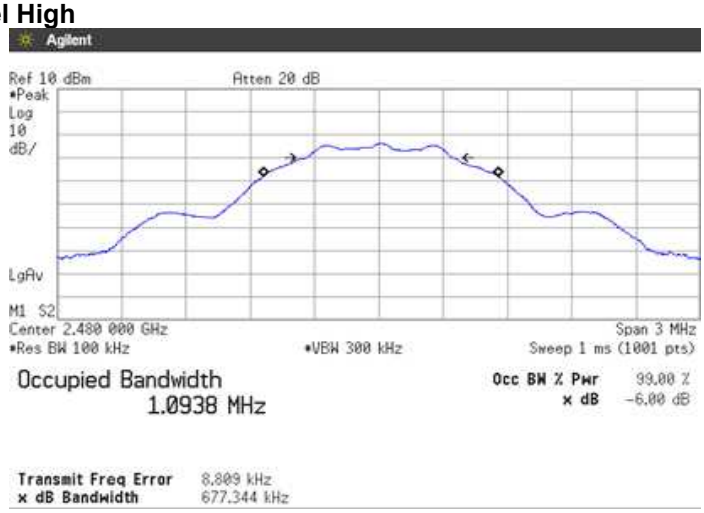
Channel Low



Channel Middle



Channel High



Japan

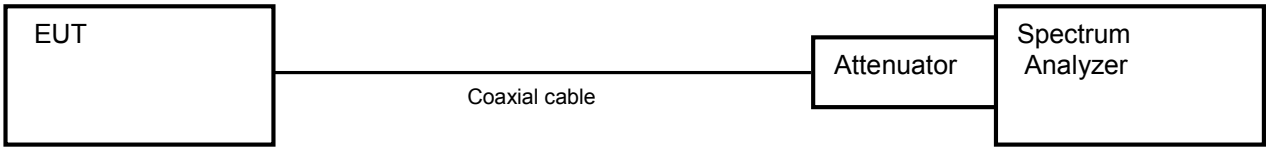
4.2 Maximum Peak Output Power

4.2.1 Measurement procedure

[FCC 15.247(b)(3), KDB558074 D01 v05]

The peak power is measured with a power sensor connected to the antenna terminal, while EUT is operating in transmission mode at the appropriate center frequency.

- Test configuration



4.2.2 Limit

1 W(1000 mW) or less

4.2.3 Measurement result

Date : 24-January-2019
Temperature : 24.5 [˚C]
Humidity : 35.6 [%]
Test place : Shielded room No.4

Test engineer : Taiki Watanabe

Battery Full

Channel	Center Frequency (MHz)	Reading (dBm)	Factor (dB)	Level (dBm)	Peak Output Power (mW)	Limit (mW)	Result
Low	2402	-12.83	10.48	-2.35	0.582	≦1000	PASS
Middle	2440	-12.83	10.48	-2.35	0.582	≦1000	PASS
High	2480	-12.78	10.48	-2.30	0.589	≦1000	PASS

Calculation;
Reading (dBm) + Factor (dB) = Level (dBm)
10logP = Level (dBm)
$P = 10^{(\text{Maximum Peak Output Power} / 10)}$ (mW)

4.3 Band Edge Compliance of RF Conducted Emissions

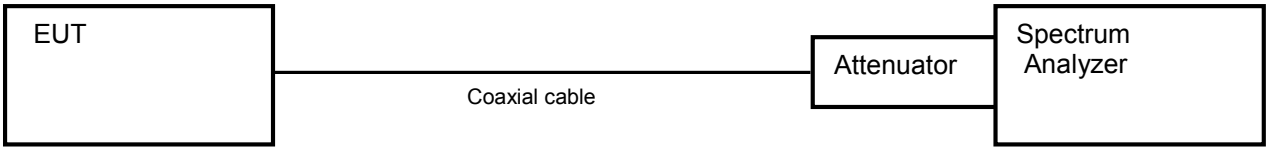
4.3.1 Measurement procedure

[FCC 15.247(d), KDB558074 D01 v05]

The Band Edge is measured with a spectrum analyzer connected to the antenna terminal, while EUT is operating in transmission mode at the appropriate center frequency.

The spectrum analyzer is set to;
a) Span = Arbitrary setting. (Setting suitable for measurement.)
b) RBW = 100 kHz
c) VBW ≥ 3 x RBW
d) Sweep time = auto-couple
e) Detector = peak
f) Trace mode = max hold

- Test configuration



4.3.2 Limit

In any 100kHz bandwidth outside the frequency band the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power.

4.3.3 Measurement result

Date : 29-January-2019
Temperature : 21.5 [˚C]
Humidity : 30.0 [%]
Test place : Shielded room No.4

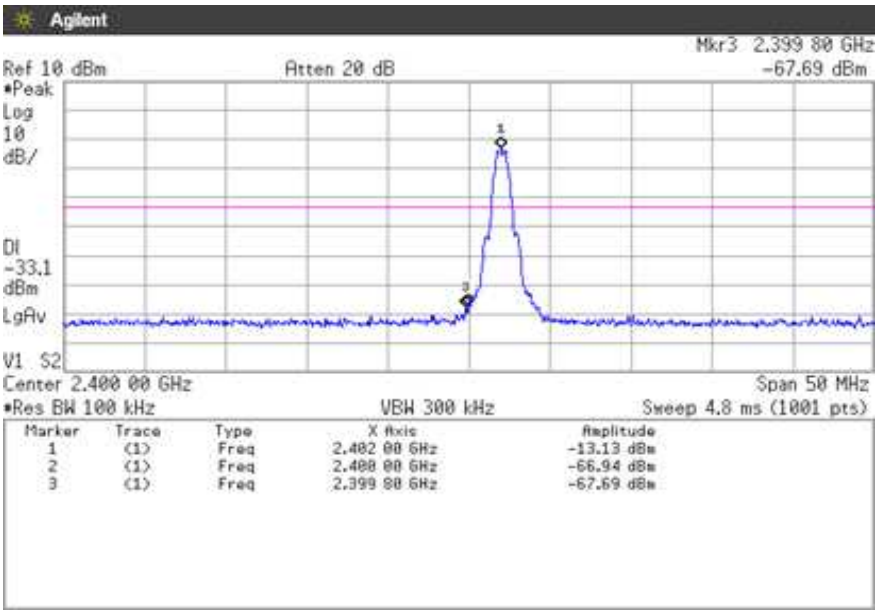
Test engineer : Taiki Watanabe

Channel	Frequency (MHz)	RF Power Level (dBm)	Band-edge Frequency (MHz)	Band-edge Level (dBm)	Difference Level (dBm)	Limit (dBm)	Result
Low	2402	-13.13	2399.80	-67.69	54.56	At least 20dB below from peak of RF	PASS
High	2480	-13.63	2494.80	-70.54	56.91	At least 20dB below from peak of RF	PASS

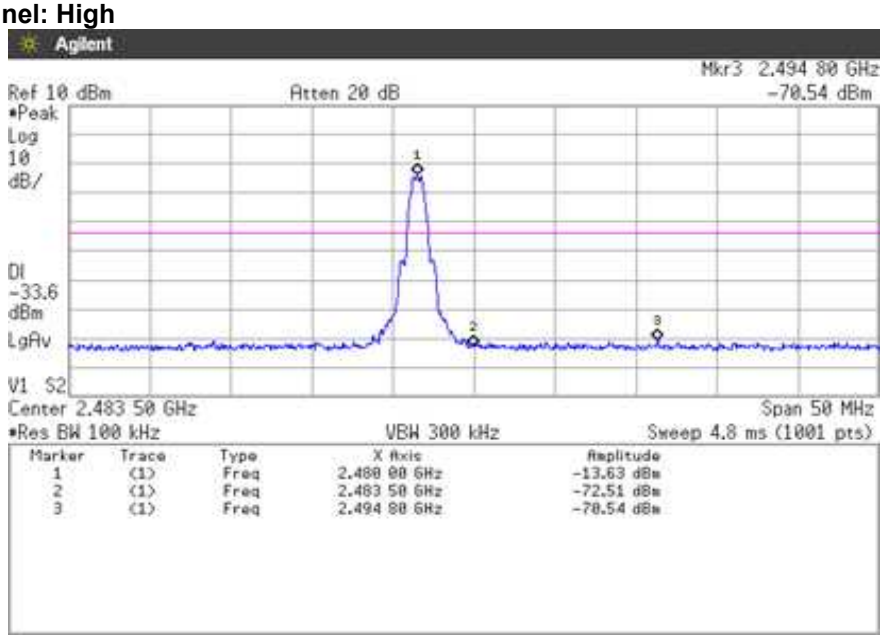
Japan

4.3.4 Trace data

Channel: Low



Channel: High



Japan

4.4 Spurious emissions - Conducted -

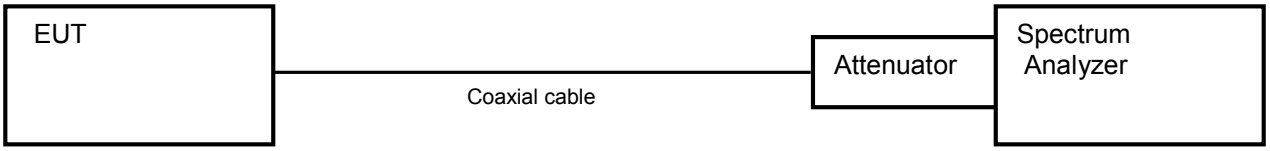
4.4.1 Measurement procedure

[FCC 15.247(d), KDB558074 D01 v05]

The spurious emissions (Conducted) are measured with a spectrum analyzer connected to the antenna terminal, while EUT is operating in transmission mode at the appropriate center frequency.

The spectrum analyzer is set to;
a) Span = wide enough to fully capture the emission being measured.
b) RBW = 100 kHz
c) VBW ≥ RBW
d) Sweep time = auto-couple
e) Detector = peak
f) Trace mode = max hold

- Test configuration



4.4.2 Limit

In any 100kHz bandwidth outside the frequency band the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power.

4.4.3 Measurement result

Date : 29-January-2019
Temperature : 21.5 [˚C]
Humidity : 30.0 [%]
Test place : Shielded room No.4

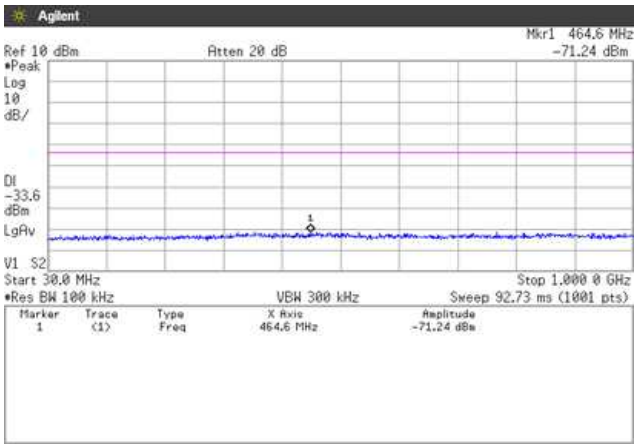
Test engineer : Taiki Watanabe

Channel	Frequency [MHz]	Limit [dB]	Results Chart	Result
Low	2402	At least 20dB below from peak of RF	See the trace Data	PASS
Middle	2440	At least 20dB below from peak of RF	See the trace Data	PASS
High	2480	At least 20dB below from peak of RF	See the trace Data	PASS

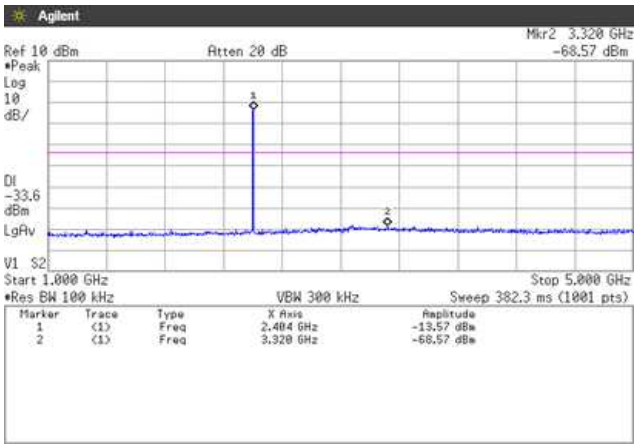
4.4.4 Trace data

Channel: Low

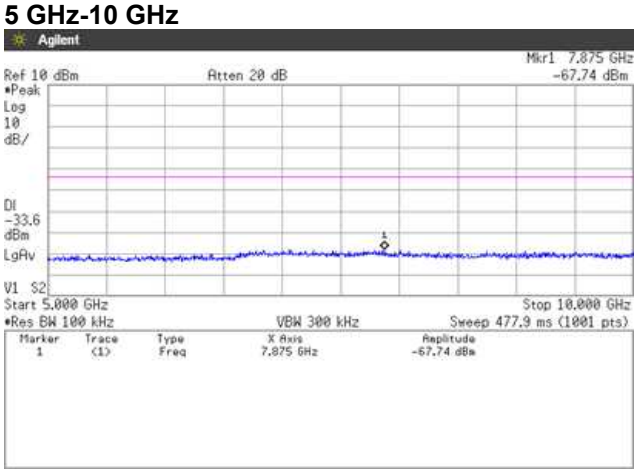
30 MHz-1 GHz



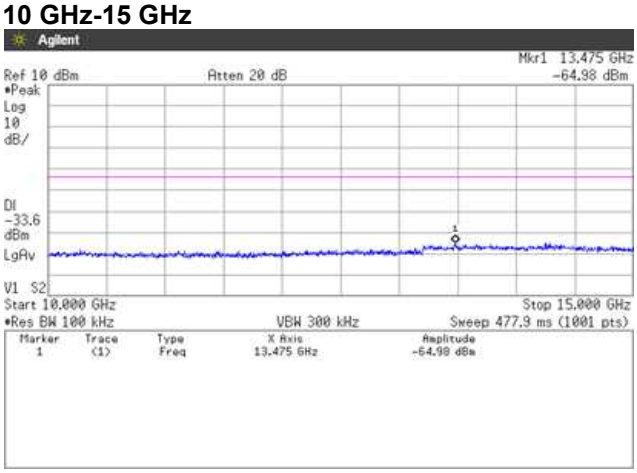
1 GHz-5 GHz



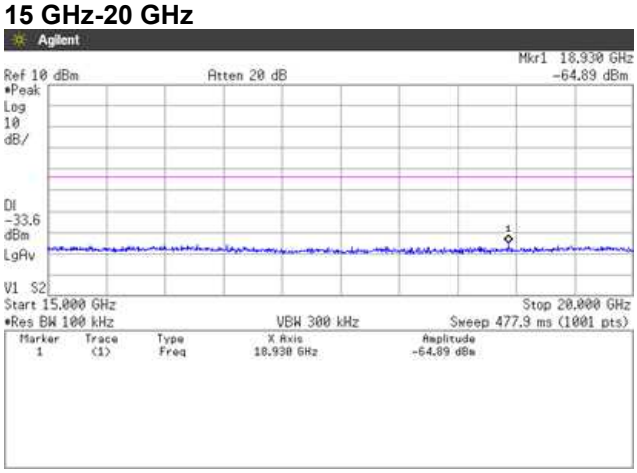
5 GHz-10 GHz



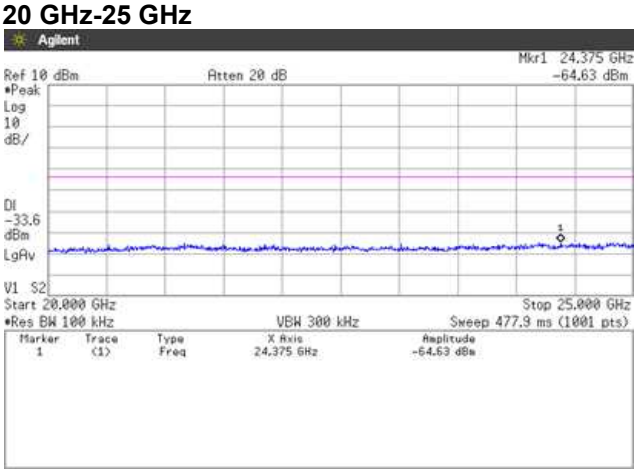
10 GHz-15 GHz



15 GHz-20 GHz

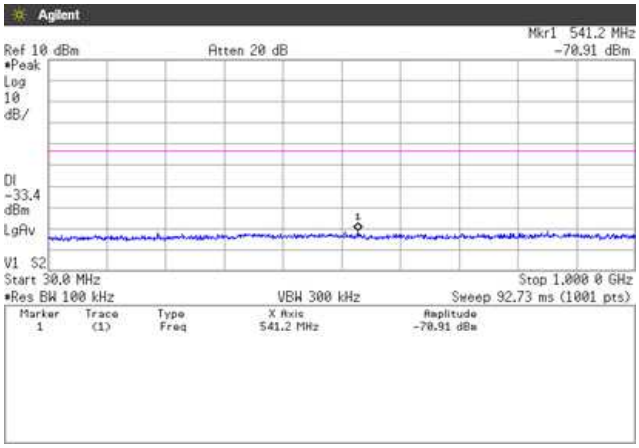


20 GHz-25 GHz

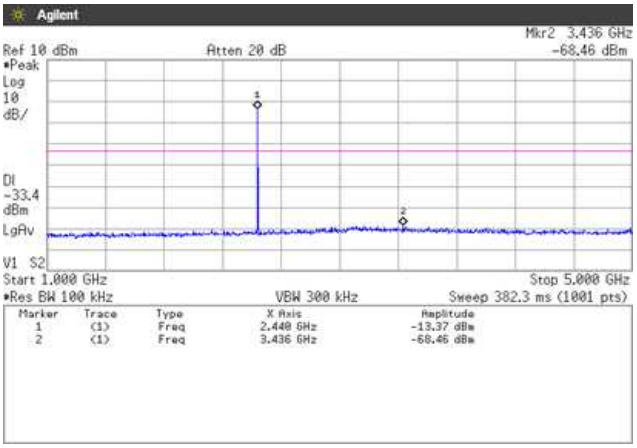


Channel: Middle

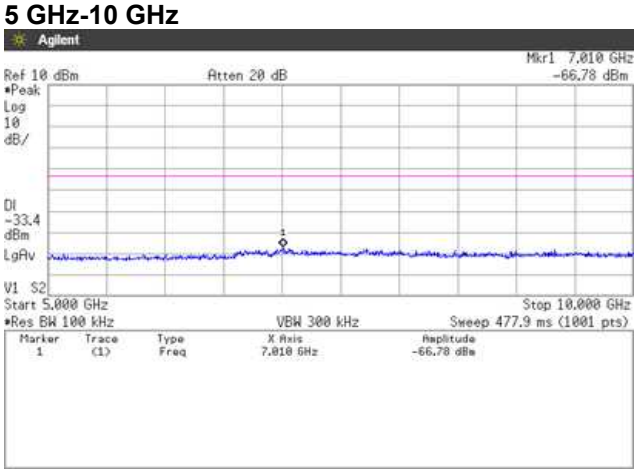
30 MHz-1 GHz



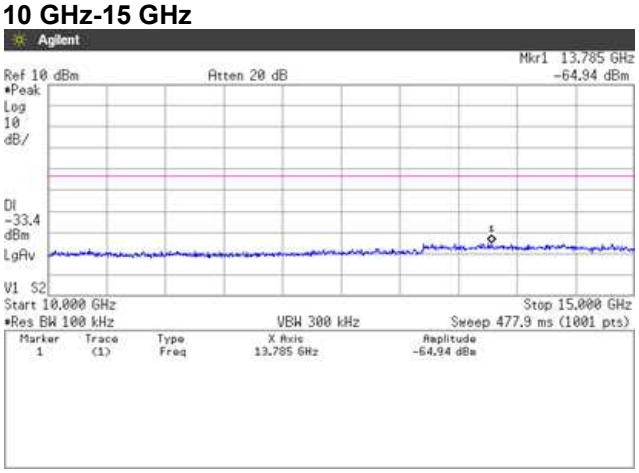
1 GHz-5 GHz



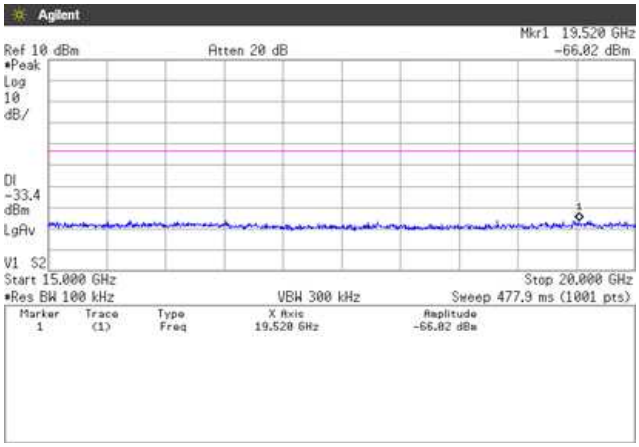
5 GHz-10 GHz



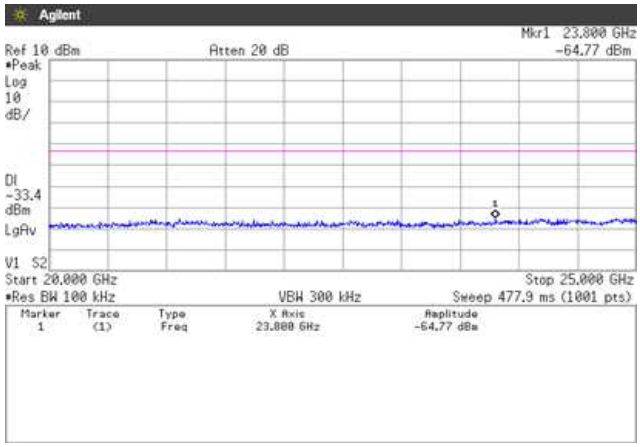
10 GHz-15 GHz



15 GHz-20 GHz

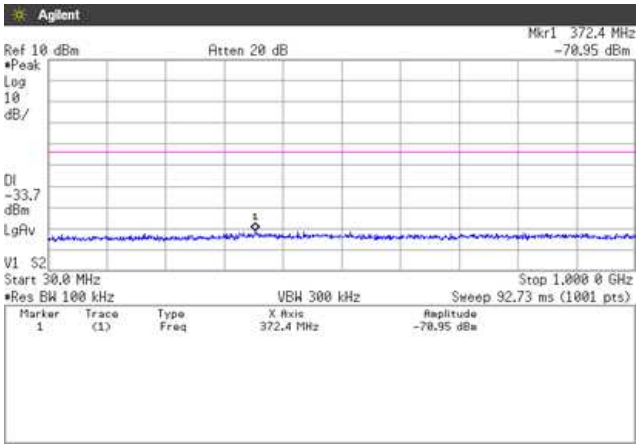


20 GHz-25 GHz

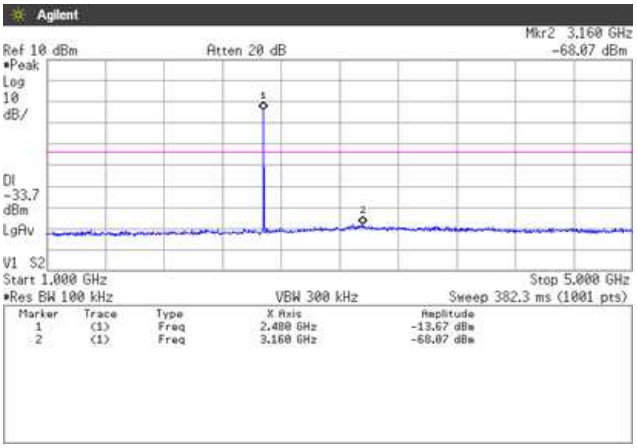


Channel: High

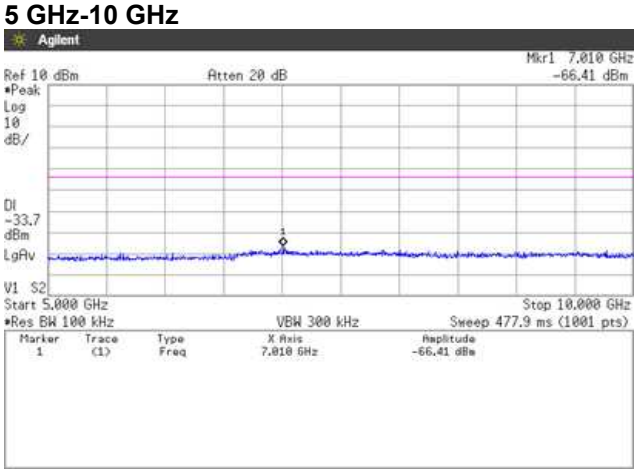
30 MHz-1 GHz



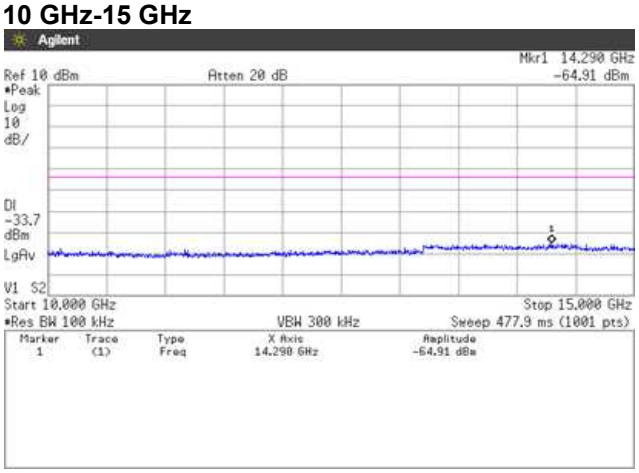
1 GHz-5 GHz



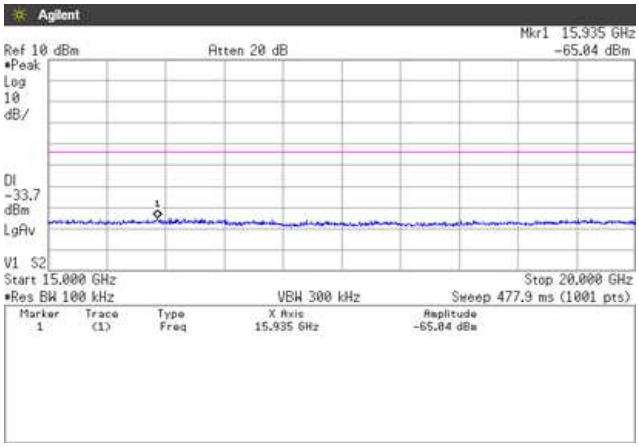
5 GHz-10 GHz



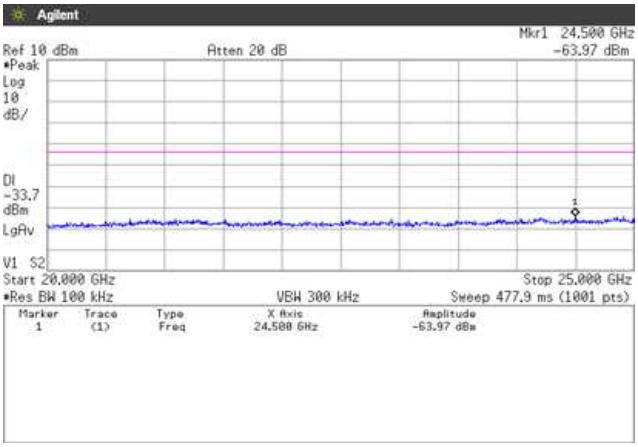
10 GHz-15 GHz



15 GHz-20 GHz



20 GHz-25 GHz



4.5 Spurious Emissions - Radiated -

4.5.1 Measurement procedure

[FCC 15.247(d), 15.205, 15.209, KDB558074 D01 v05]

Test was applied by following conditions.

Test method	:	ANSI C63.10
Frequency range	:	9kHz to 25GHz
Test place	:	3m Semi-anechoic chamber
EUT was placed on	:	Styrofoam table / (W)1.0m × (D)1.0m × (H)0.8m (below 1GHz) Styrofoam table / (W)0.6m × (D)0.6m ×(H)1.5m (above 1GHz)
Antenna distance	:	3m
Test receiver setting		Below 1GHz
- Detector	:	Average (9kHz-90kHz, 110kHz-490kHz), Quasi-peak
- Bandwidth	:	200Hz, 120kHz
Spectrum analyzer setting		Above 1GHz
- Peak	:	RBW=1MHz, VBW=3MHz, Span=0Hz, Sweep=auto
- Average	:	RBW=1MHz, VBW=3kHz, Span=0Hz, Sweep=auto Display mode=Linear

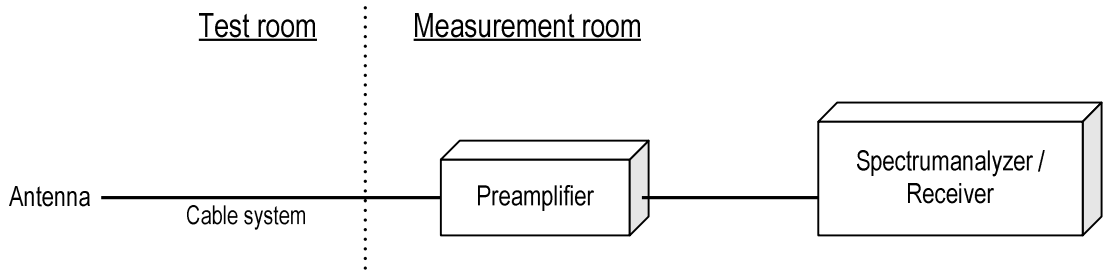
Average Measurement Setting [VBW]

Mode	Duty Cycle (%)	T_{on} (us)	T_{off} (us)	$1/T_{on}$ (kHz)	Determined VBW Setting
Bluetooth 4.1 LE	62.56	391	234	2.558	3kHz

Although these tests were performed other than open area test site,
adequate comparison measurements were confirmed against 30 m open are test site.
Therefore sufficient tests were made to demonstrate that the alternative site produces results that correlate with the ones of tests made in an open field based on KDB 937606.

Radiated emission measurements are performed at 3m distance with the broadband antenna (Loop antenna, Biconical antenna, Log periodic antenna, Double ridged guide antenna and Broad-band horn Antenna). The antenna is positioned both the horizontal and vertical planes of polarization and height is varied 1m to 4m and stopped at height producing the maximum emission. As for the Loop antenna, it is positioned with its plane vertical, and the center of the Loop antenna is 1m above the ground plane.
The EUT is Placed on a turntable, which is 0.8m/1.5m above ground plane. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level. The test results represent the worst case emission for each emission with manipulating the EUT, support equipment, interconnecting cables and varying the mode of operation. Sufficient time for the EUT, support equipment, and test equipment are allowed in order for them to warm up to their normal operating condition.

- Test configuration



Japan

4.5.2 Calculation method

[9kHz to 150kHz]
Emission level = Reading + (Ant factor + Cable system loss)
Margin = Limit – Emission level

[150kHz to 25GHz]
Emission level = Reading + (Ant factor + Cable system loss - Amp. Gain)
Margin = Limit – Emission level

Example:
Limit @ 4804.0MHz : 74.0dBuV/m (Peak Limit)
S.A Reading = 39.9dBuV Cable system loss = 8.3dB
Result = 39.9 + 8.3 = 48.2dBuV/m
Margin = 74.0 - 48.2 = 25.8dB

4.5.3 Limit

Frequency [MHz]	Field strength		Distance [m]
	[uV/m]	[dBuV/m]	
0.009-0.490	2400 / F [kHz]	20logE [uV/m]	300
0.490-1.705	24000 / F [kHz]	20logE [uV/m]	30
1.705-30	30	29.5	30
30-88	100	40.0	3
88-216	150	43.5	3
216-960	200	46.0	3
Above 960	500	54.0	3

Note:
1. The lower limit shall apply at the transition frequencies.
2. Emission level [dBuV/m] = 20log Emission [uV/m]
3. As shown in 15.35(b), for frequencies above 1000MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20dB under any condition modulation.

Japan

4.5.4 Test data

Date	:	01-February-2019			
Temperature	:	18.5 [˚C]			
Humidity	:	28.3 [%]	Test engineer	:	
Test place	:	3m Semi-anechoic chamber			Chiaki Kanno

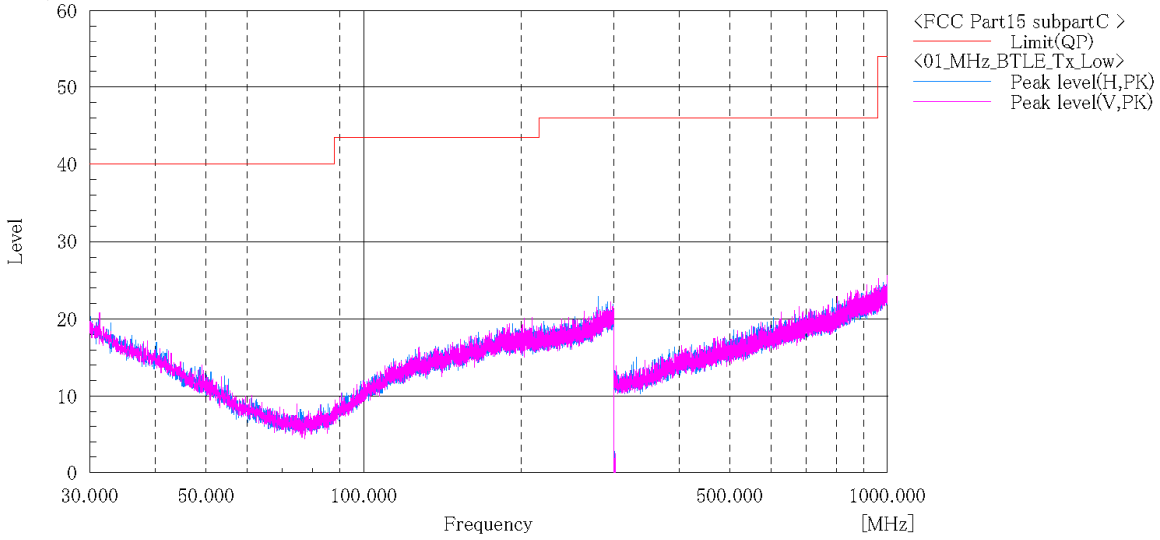
Date	:	02-February-2019			
Temperature	:	18.3 [˚C]			
Humidity	:	27.1 [%]	Test engineer	:	
Test place	:	3m Semi-anechoic chamber			Chiaki Kanno

[Transmission mode - With camera]
Channel: Low
BELOW 1 GHz

******* RADIATED EMISSION *******
[3m Semi-anechoic chamber]

TUV SUD Japan Ltd. <<DATA Sheet No.01>> 1 February,2019 06:00

Company name	: KYOCERA Corporation	Standard	: FCC Part.15 subpartC
EUT	: Mobile Phone	Operator	: C.Kanno
Model No.	: JA53	Temp,Hum	: 18.5[℃] 28.3[%]
Serial No.	: N/A	Note1	:
Test mode	: BT_LE_Tx_ch:Low	Note2	:



Final Result

No.	Frequency [MHz]	(P)	c.f [dB(1/m)]	Height [cm]	Angle [°]	Remark

Note:
1. Emission Level (Margin) = Limit - [Reading + Factor (Antenna + Cable – Amp)]
2. No emission were detected in frequency range 9kHz to 30MHz at the 3 meters distance.

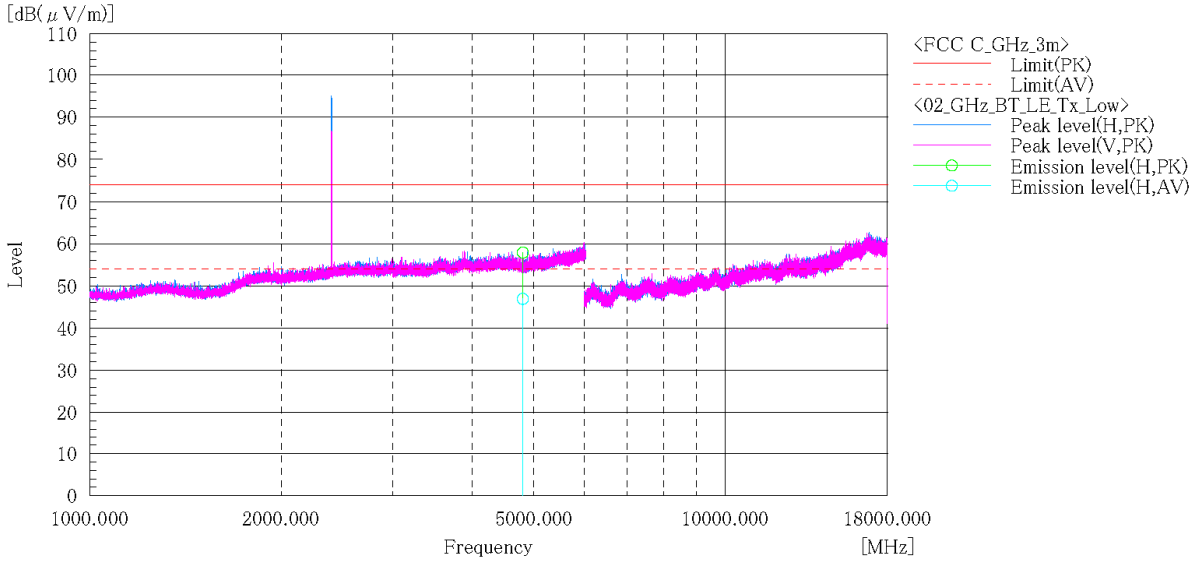
Japan

Channel: Low
ABOVE 1 GHz

******* RADIATED EMISSION *******
[3m Semi-anechoic chamber]

TUV SUD Japan Ltd. <<DATA Sheet No.02>> 1 February,2019 22:35

Company name	: KYOCERA Corporation	Standard	: FCC Part.15 subpart C
EUT	: Mobile Phone	Operator	: C.Kanno
Model No.	: JA53	Temp,Hum,Atm	: 18.5[℃] 28.3[%]
Serial No.	: N/A	Note1	:
Test mode	: BT_LE_Tx_ch:Low	Note2	:



Final Result

No.	Frequency	(P)	Reading PK	Reading AV	c.f	Result PK	Result AV	Limit PK	Limit AV	Margin PK	Margin AV	Height	Angle	Remark
	[MHz]		[dB(μV)]	[dB(μV)]	[dB(1/m)]	[dB(μV/m)]	[dB(μV/m)]	[dB(μV/m)]	[dB(μV/m)]	[dB]	[dB]	[cm]	[°]	
1	4804.000	H	49.0	38.0	8.9	57.9	46.9	74.0	54.0	16.1	7.1	100.0	253.0	

Note:
1. Emission Level (Margin) = Limit - [Reading + Factor (Antenna + Cable – Amp)]
2. No emission were detected in frequency range 18GHz to 25GHz at the 3 meters distance.

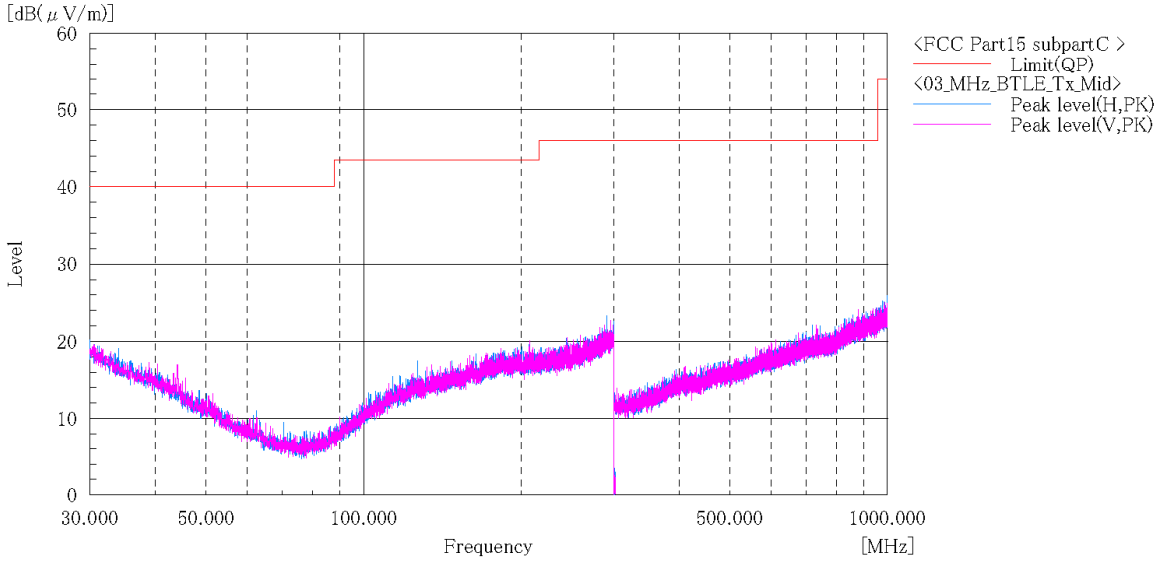
Japan

Channel: Middle
BELOW 1 GHz

******* RADIATED EMISSION *******
[3m Semi-anechoic chamber]

TUV SUD Japan Ltd. <<DATA Sheet No.03>> 1 February,2019 06:20

Company name	: KYOCERA Corporation	Standard	: FCC Part.15 subpartC
EUT	: Mobile Phone	Operator	: C.Kanno
Model No.	: JA53	Temp,Hum	: 18.5[℃] 28.3[%]
Serial No.	: N/A	Note1	:
Test mode	: BT_LE_Tx_ch:Mid	Note2	:



Final Result

No.	Frequency [MHz]	(P)	c.f [dB(1/m)]	Height [cm]	Angle [°]	Remark

Note:
1. Emission Level (Margin) = Limit - [Reading + Factor (Antenna + Cable – Amp)]
2. No emission were detected in frequency range 9kHz to 30MHz at the 3 meters distance.

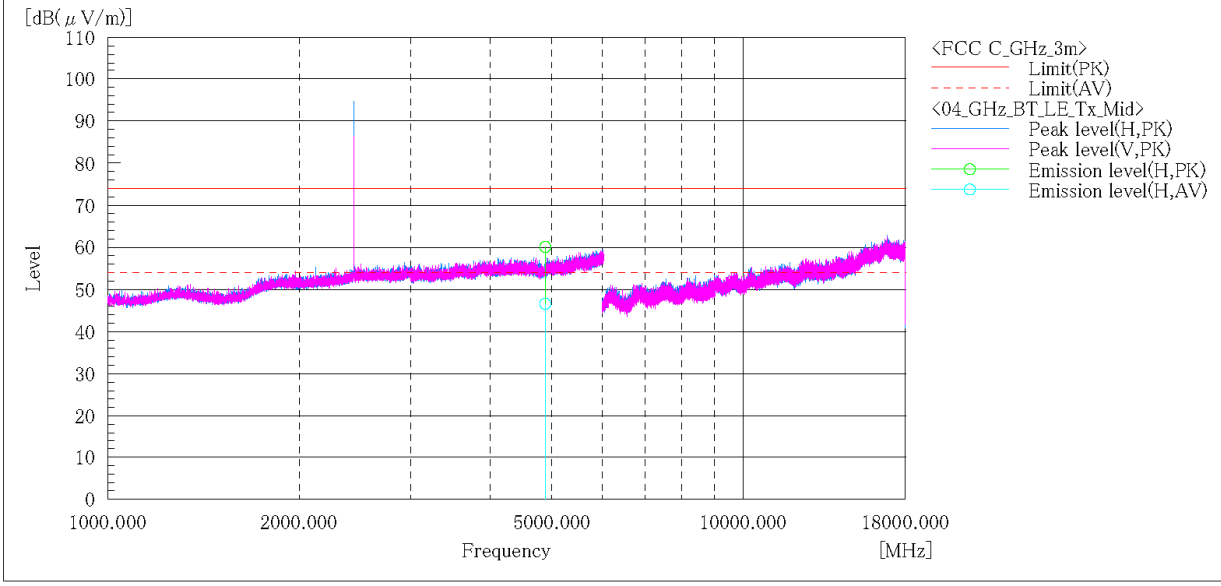
Japan

Channel: Middle
ABOVE 1 GHz

******* RADIATED EMISSION *******
[3m Semi-anechoic chamber]

TUV SUD Japan Ltd. <<DATA Sheet No.04>> 1 February,2019 23:05

Company name	: KYOCERA Corporation	Standard	: FCC Part.15 subpart C
EUT	: Mobile Phone	Operator	: C.Kanno
Model No.	: JA53	Temp,Hum,Atm	: 18.5[℃] 28.3[%]
Serial No.	: N/A	Note1	:
Test mode	: BT_LE_Tx_ch:Mid	Note2	:



Final Result

No.	Frequency	(P)	Reading PK	Reading AV	c.f	Result PK	Result AV	Limit PK	Limit AV	Margin PK	Margin AV	Height	Angle	Remark
	[MHz]		[dB(μV)]	[dB(μV)]	[dB(1/m)]	[dB(μV/m)]	[dB(μV/m)]	[dB(μV/m)]	[dB(μV/m)]	[dB]	[dB]	[cm]	[°]	
1	4880.000	H	50.9	37.4	9.2	60.1	46.6	74.0	54.0	13.9	7.4	100.0	0.0	

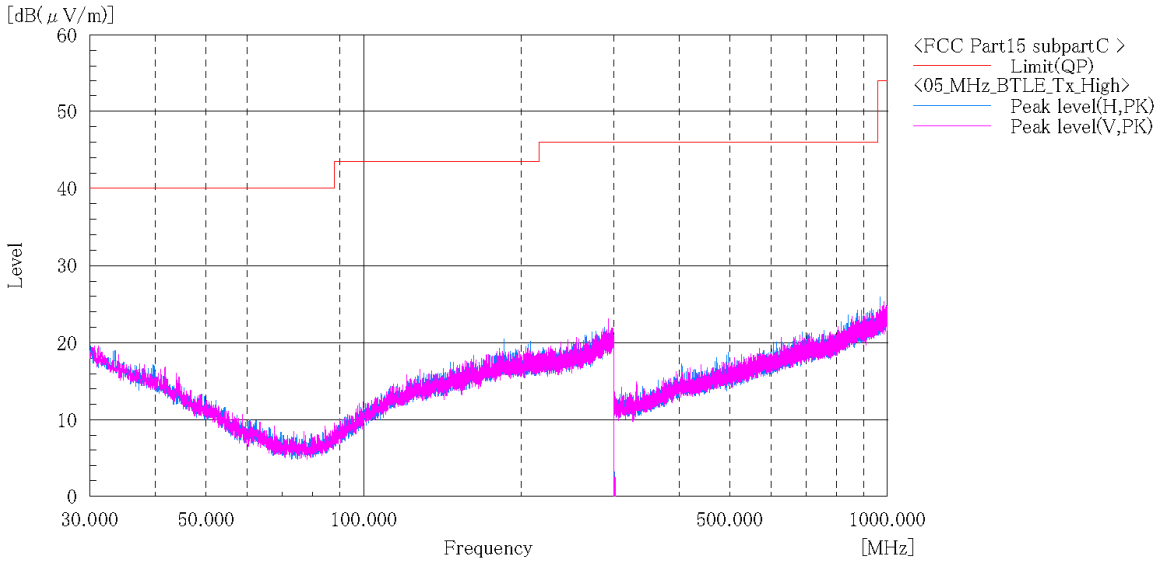
Note:
1. Emission Level (Margin) = Limit - [Reading + Factor (Antenna + Cable – Amp)]
2. No emission were detected in frequency range 18GHz to 25GHz at the 3 meters distance.

Channel: High
BELOW 1 GHz

******* RADIATED EMISSION *******
[3m Semi-anechoic chamber]

TUV SUD Japan Ltd. <<DATA Sheet No.05>> 1 February,2019 06:40

Company name	: KYOCERA Corporation	Standard	: FCC Part.15 subpartC
EUT	: Mobile Phone	Operator	: C.Kanno
Model No.	: JA53	Temp,Hum	: 18.5[℃] 28.3[%]
Serial No.	: N/A	Note1	:
Test mode	: BT_LE_Tx_ch:High	Note2	:



Final Result

No.	Frequency [MHz]	(P)	c.f [dB(1/m)]	Height [cm]	Angle [°]	Remark

Note:
1. Emission Level (Margin) = Limit - [Reading + Factor (Antenna + Cable – Amp)]
2. No emission were detected in frequency range 9kHz to 30MHz at the 3 meters distance.

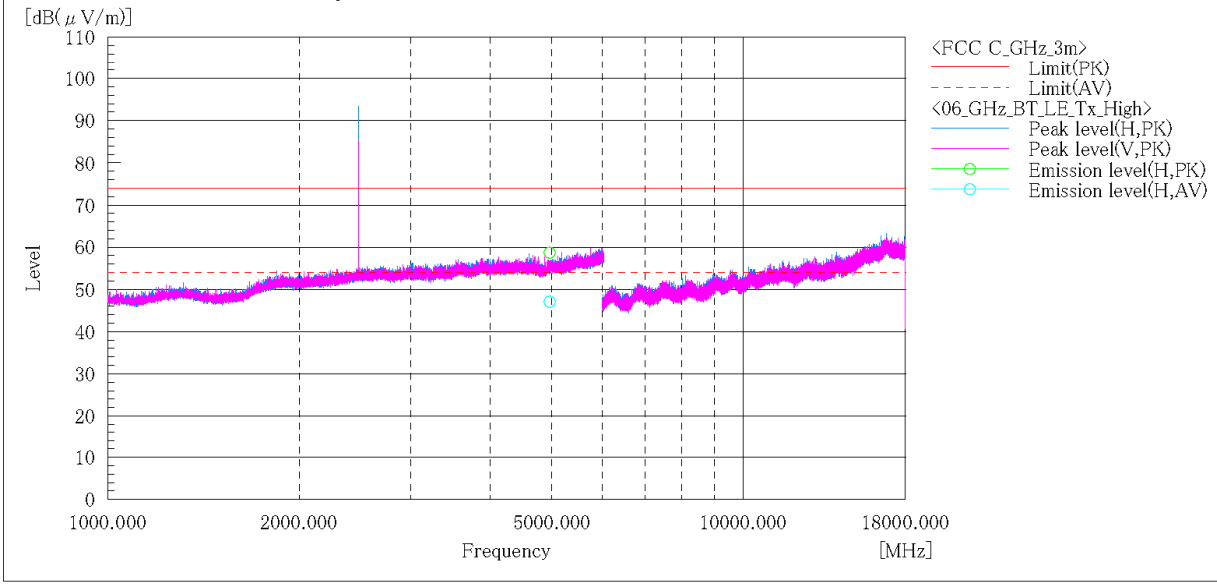
Japan

Channel: High
ABOVE 1 GHz

******* RADIATED EMISSION *******
[3m Semi-anechoic chamber]

TUV SUD Japan Ltd. <<DATA Sheet No.06>> 1 February,2019 23:40

Company name	: KYOCERA Corporation	Standard	: FCC Part.15 subpart C
EUT	: Mobile Phone	Operator	: C.Kanno
Model No.	: JA53	Temp,Hum,Atm	: 18.5[℃] 28.3[%]
Serial No.	: N/A	Note1	:
Test mode	: BT_LE_Tx_ch:High	Note2	:



Final Result

No.	Frequency	(P)	Reading PK	Reading AV	c.f	Result PK	Result AV	Limit PK	Limit AV	Margin PK	Margin AV	Height	Angle	Remark
	[MHz]		[dB(μV)]	[dB(μV)]	[dB(1/m)]	[dB(μV/m)]	[dB(μV/m)]	[dB(μV/m)]	[dB(μV/m)]	[dB]	[dB]	[cm]	[°]	
1	4960.000	H	48.9	37.3	9.8	58.7	47.1	74.0	54.0	15.3	6.9	168.0	161.0	

Note:
1. Emission Level (Margin) = Limit - [Reading + Factor (Antenna + Cable – Amp)]
2. No emission were detected in frequency range 18GHz to 25GHz at the 3 meters distance.

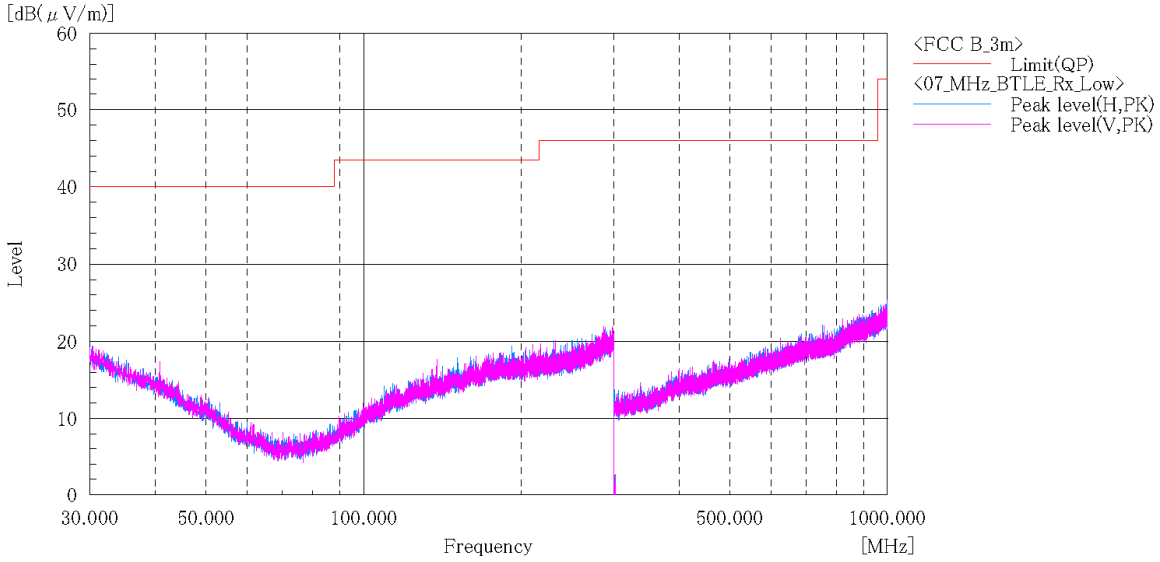
Japan

[Receive mode - With camera]
Channel: Low
BELOW 1 GHz

******* RADIATED EMISSION *******
[3m Semi-anechoic chamber]

TUV SUD Japan Ltd. <<DATA Sheet No.07>> 1 February,2019 07:00

Company name	: KYOCERA Corporation	Standard	: FCC Part.15 subpart C
EUT	: Mobile Phone	Operator	: C.Kanno
Model No.	: JA53	Temp,Hum	: 18.5[℃] 28.3[%]
Serial No.	: N/A	Note1	:
Test mode	: BT_LE_Rx_ch:Low	Note2	:



Final Result

No.	Frequency [MHz]	(P)	c.f [dB(1/m)]	Height [cm]	Angle [°]	Remark

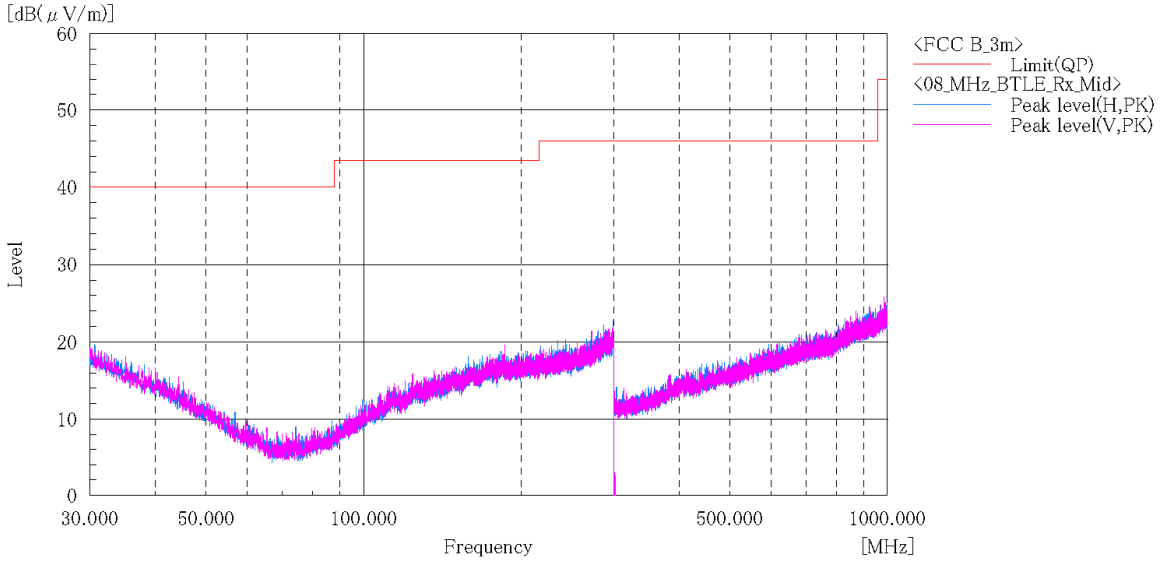
Note:
1. Emission Level (Margin) = Limit - [Reading + Factor (Antenna + Cable – Amp)]
2. No emission were detected in frequency range 9kHz to 30MHz and 1GHz to 25GHz at the 3 meters distance.

Channel: Middle
BELOW 1 GHz

******* RADIATED EMISSION *******
[3m Semi-anechoic chamber]

TUV SUD Japan Ltd. <<DATA Sheet No.08>> 1 February,2019 07:20

Company name	: KYOCERA Corporation	Standard	: FCC Part.15 subpart C
EUT	: Mobile Phone	Operator	: C.Kanno
Model No.	: JA53	Temp,Hum	: 18.5[℃] 28.3[%]
Serial No.	: N/A	Note1	:
Test mode	: BT_LE_Rx_ch:Mid	Note2	:



Final Result

No.	Frequency [MHz]	(P)	c.f [dB(1/m)]	Height [cm]	Angle [°]	Remark

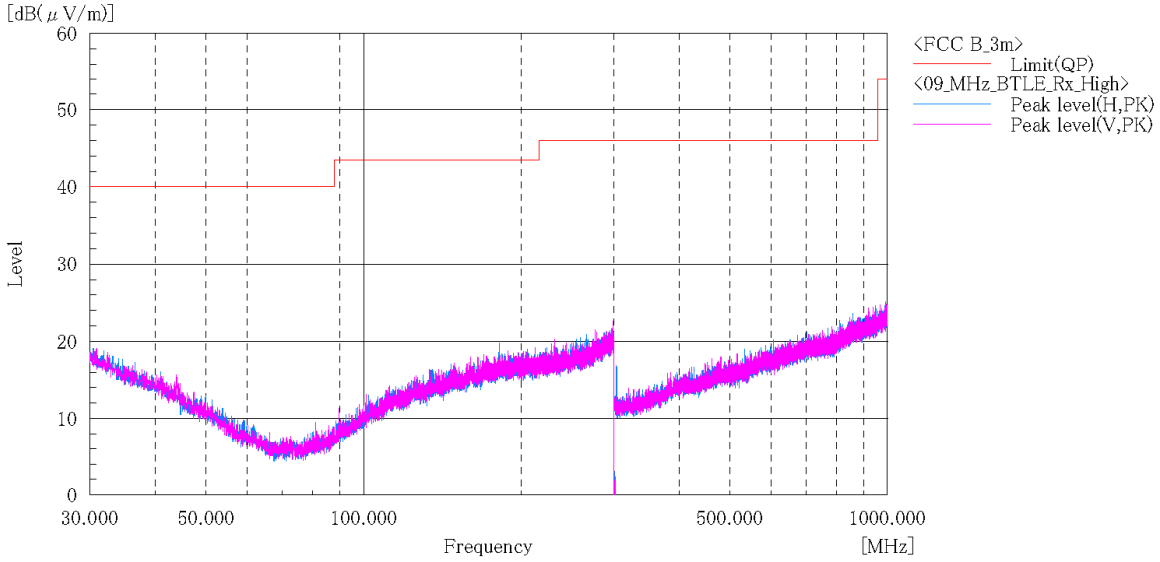
Note:
1. Emission Level (Margin) = Limit - [Reading + Factor (Antenna + Cable – Amp)]
2. No emission were detected in frequency range 9kHz to 30MHz and 1GHz to 25GHz at the 3 meters distance.

Channel: High
BELOW 1 GHz

******* RADIATED EMISSION *******
[3m Semi-anechoic chamber]

TUV SUD Japan Ltd. <<DATA Sheet No.09>> 1 February,2019 07:40

Company name	: KYOCERA Corporation	Standard	: FCC Part.15 subpart C
EUT	: Mobile Phone	Operator	: C.Kanno
Model No.	: JA53	Temp,Hum	: 18.5[℃] 28.3[%]
Serial No.	: N/A	Note1	:
Test mode	: BT_LE_Rx_ch:High	Note2	:



Final Result

No.	Frequency [MHz]	(P)	c.f [dB(1/m)]	Height [cm]	Angle [°]	Remark

Note:
1. Emission Level (Margin) = Limit - [Reading + Factor (Antenna + Cable – Amp)]
2. No emission were detected in frequency range 9kHz to 30MHz and 1GHz to 25GHz at the 3 meters distance.

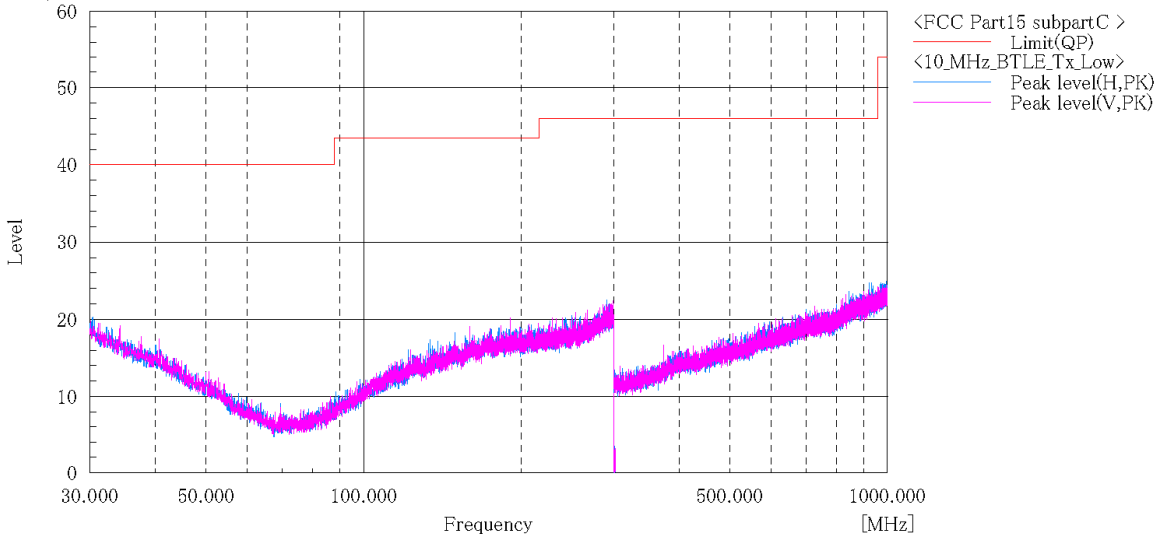
Japan

[Transmit mode - Without camera]
Channel: Low
BELOW 1 GHz

******* RADIATED EMISSION *******
[3m Semi-anechoic chamber]

TUV SUD Japan Ltd. <<DATA Sheet No.10>> 2 February,2019 03:45

Company name	: KYOCERA Corporation	Standard	: FCC Part.15 subpartC
EUT	: Mobile Phone	Operator	: C.Kanno
Model No.	: JA53	Temp,Hum	: 18.3[℃] 27.1[%]
Serial No.	: N/A	Note1	:
Test mode	: BT_LE_Tx_ch:Low	Note2	:



Final Result

No.	Frequency [MHz]	(P)	c.f [dB(1/m)]	Height [cm]	Angle [°]	Remark

Note:
1. Emission Level (Margin) = Limit - [Reading + Factor (Antenna + Cable – Amp)]
2. No emission were detected in frequency range 9kHz to 30MHz at the 3 meters distance.

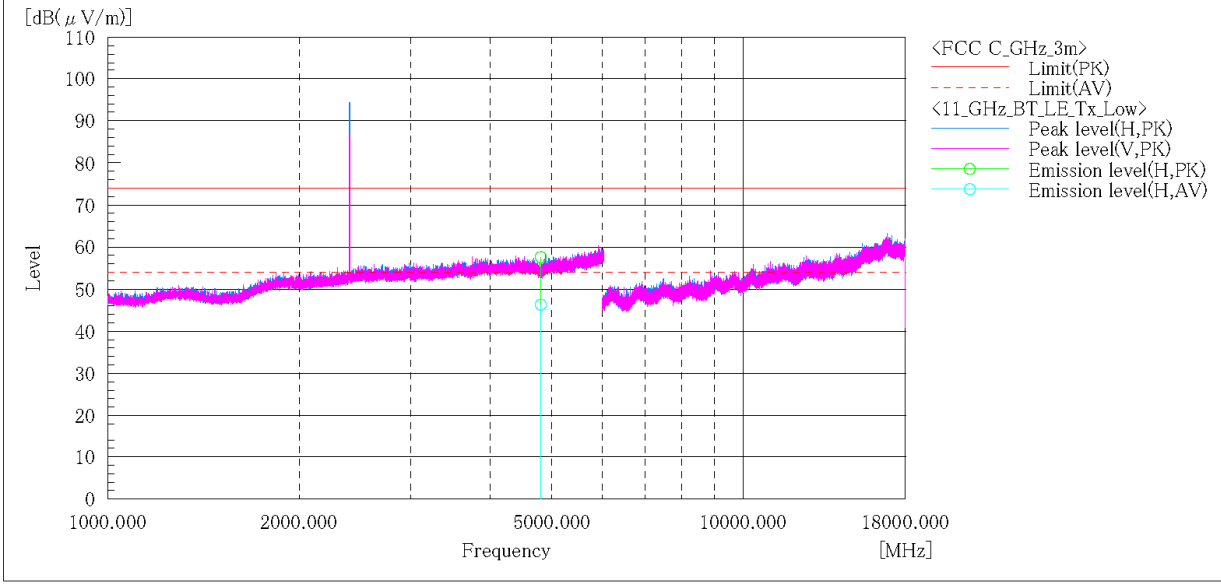
Japan

Channel: Low
ABOVE 1 GHz

******* RADIATED EMISSION *******
[3m Semi-anechoic chamber]

TUV SUD Japan Ltd. <<DATA Sheet No.11>> 2 February,2019 01:00

Company name	: KYOCERA Corporation	Standard	: FCC Part.15 subpart C
EUT	: Mobile Phone	Operator	: C.Kanno
Model No.	: JA53	Temp,Hum,Atm	: 18.3[℃] 27.1[%]
Serial No.	: N/A	Note1	:
Test mode	: BT_LE_Tx_ch:Low	Note2	:



Final Result

No.	Frequency	(P)	Reading PK	Reading AV	c.f	Result PK	Result AV	Limit PK	Limit AV	Margin PK	Margin AV	Height	Angle	Remark
	[MHz]		[dB(μV)]	[dB(μV)]	[dB(1/m)]	[dB(μV/m)]	[dB(μV/m)]	[dB(μV/m)]	[dB(μV/m)]	[dB]	[dB]	[cm]	[°]	
1	4804.000	H	48.7	37.4	8.9	57.6	46.3	74.0	54.0	16.4	7.7	156.0	168.0	

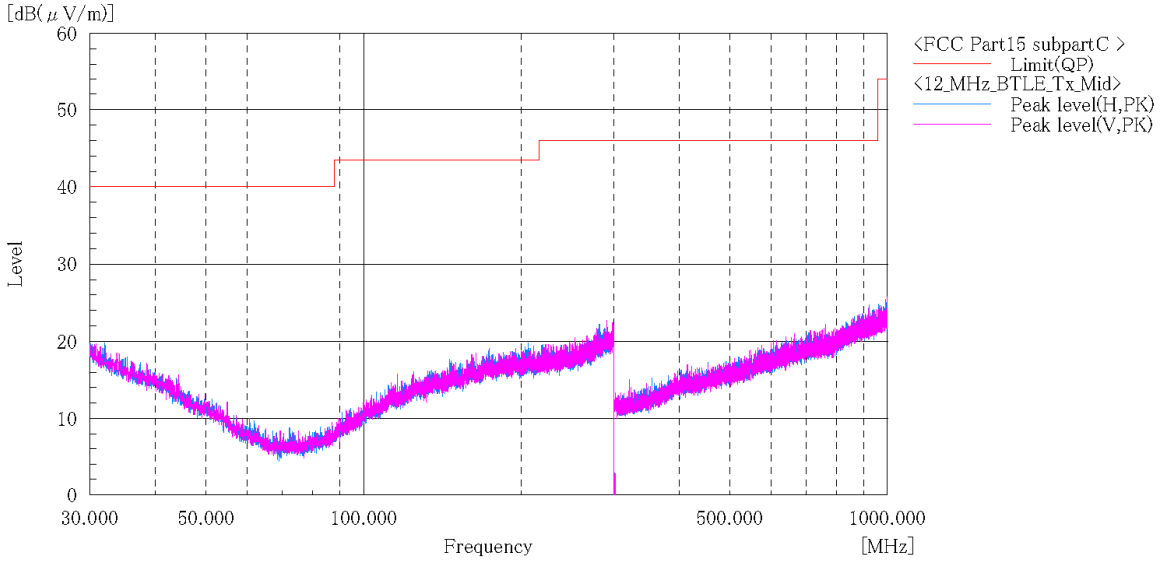
Note:
1. Emission Level (Margin) = Limit - [Reading + Factor (Antenna + Cable – Amp)]
2. No emission were detected in frequency range 18GHz to 25GHz at the 3 meters distance.

Channel: Middle
BELOW 1 GHz

******* RADIATED EMISSION *******
[3m Semi-anechoic chamber]

TUV SUD Japan Ltd. <<DATA Sheet No.12>> 2 February,2019 04:00

Company name	: KYOCERA Corporation	Standard	: FCC Part.15 subpartC
EUT	: Mobile Phone	Operator	: C.Kanno
Model No.	: JA53	Temp,Hum	: 18.3[℃] 27.1[%]
Serial No.	: N/A	Note1	:
Test mode	: BT_LE_Tx_ch:Mid	Note2	:



Final Result

No.	Frequency [MHz]	(P)	c.f [dB(1/m)]	Height [cm]	Angle [°]	Remark

Note:
1. Emission Level (Margin) = Limit - [Reading + Factor (Antenna + Cable – Amp)]
2. No emission were detected in frequency range 9kHz to 30MHz at the 3 meters distance.

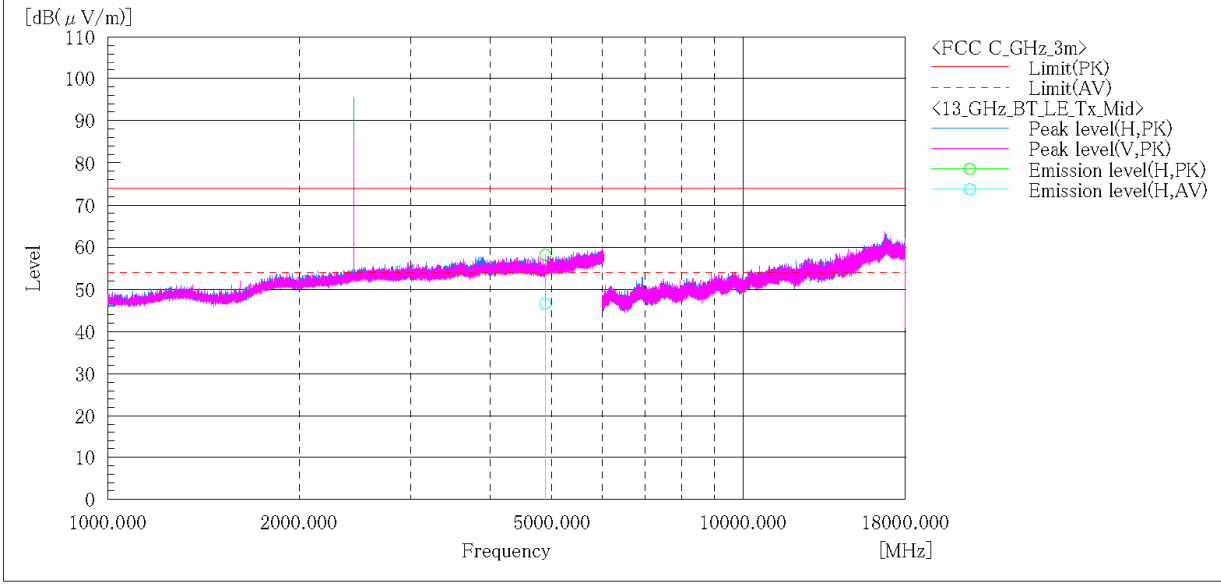
Japan

Channel: Middle
ABOVE 1 GHz

******* RADIATED EMISSION *******
[3m Semi-anechoic chamber]

TUV SUD Japan Ltd. <<DATA Sheet No.13>> 2 February,2019 01:30

Company name	: KYOCERA Corporation	Standard	: FCC Part.15 subpart C
EUT	: Mobile Phone	Operator	: C.Kanno
Model No.	: JA53	Temp,Hum,Atm	: 18.3[℃] 27.1[%]
Serial No.	: N/A	Note1	:
Test mode	: BT_LE_Tx_ch:Mid	Note2	:



Final Result

No.	Frequency	(P)	Reading PK	Reading AV	c.f	Result PK	Result AV	Limit PK	Limit AV	Margin PK	Margin AV	Height	Angle	Remark
	[MHz]		[dB(μV)]	[dB(μV)]	[dB(1/m)]	[dB(μV/m)]	[dB(μV/m)]	[dB(μV/m)]	[dB(μV/m)]	[dB]	[dB]	[cm]	[°]	
1	4880.000	H	49.0	37.4	9.2	58.2	46.6	74.0	54.0	15.8	7.4	154.0	163.0	

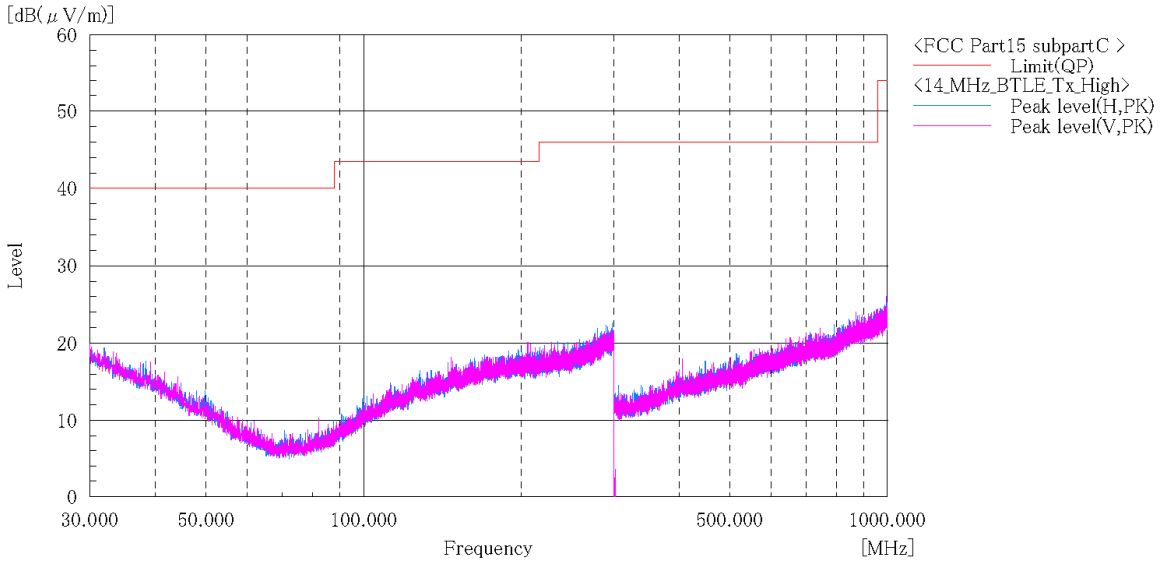
Note:
1. Emission Level (Margin) = Limit - [Reading + Factor (Antenna + Cable – Amp)]
2. No emission were detected in frequency range 18GHz to 25GHz at the 3 meters distance.

Channel: High
BELOW 1 GHz

******* RADIATED EMISSION *******
[3m Semi-anechoic chamber]

TUV SUD Japan Ltd. <<DATA Sheet No.14>> 2 February,2019 04:20

Company name	: KYOCERA Corporation	Standard	: FCC Part.15 subpartC
EUT	: Mobile Phone	Operator	: C.Kanno
Model No.	: JA53	Temp,Hum	: 18.3[℃] 27.1[%]
Serial No.	: N/A	Note1	:
Test mode	: BT_LE_Tx_ch:High	Note2	:



Final Result

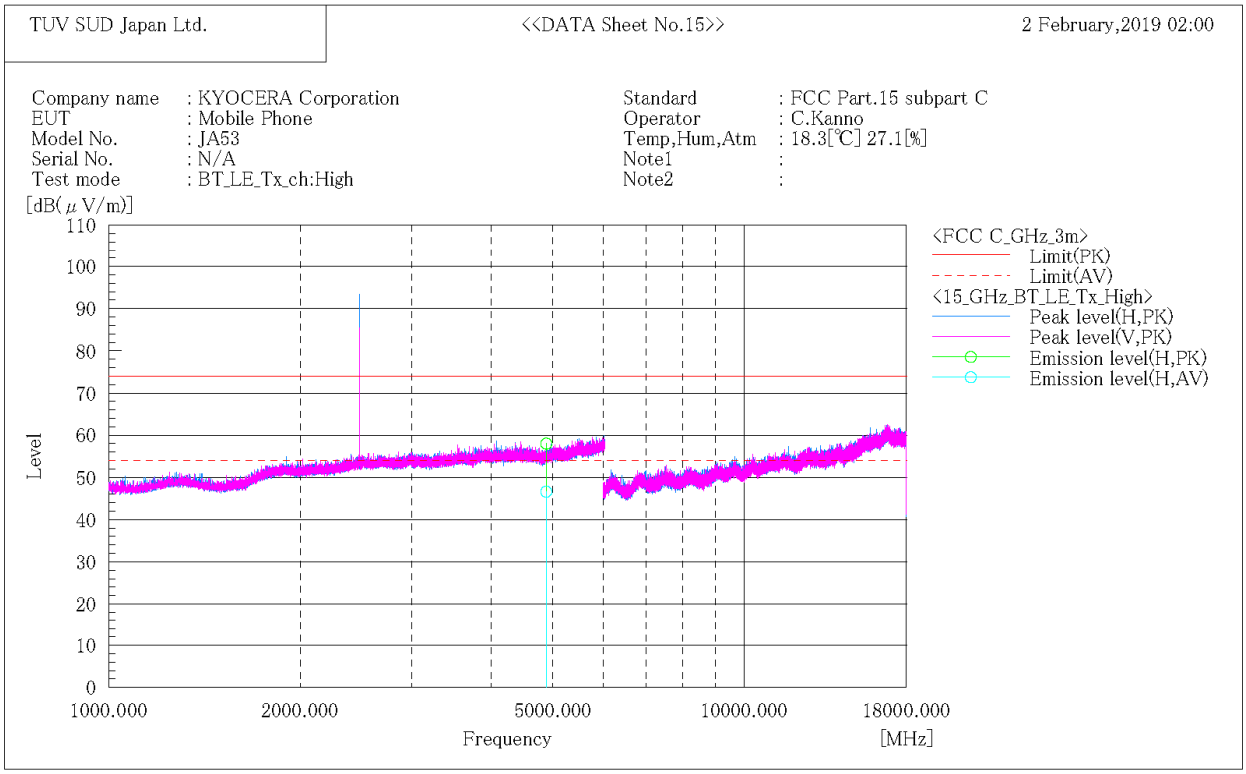
No.	Frequency [MHz]	(P)	c.f [dB(1/m)]	Height [cm]	Angle [°]	Remark

Note:
1. Emission Level (Margin) = Limit - [Reading + Factor (Antenna + Cable – Amp)]
2. No emission were detected in frequency range 9kHz to 30MHz at the 3 meters distance.

Japan

Channel: High
ABOVE 1 GHz

******* RADIATED EMISSION *******
[3m Semi-anechoic chamber]



Final Result

No.	Frequency	(P)	Reading PK	Reading AV	c.f	Result PK	Result AV	Limit PK	Limit AV	Margin PK	Margin AV	Height	Angle	Remark
	[MHz]		[dB(μV)]	[dB(μV)]	[dB(1/m)]	[dB(μV/m)]	[dB(μV/m)]	[dB(μV/m)]	[dB(μV/m)]	[dB]	[dB]	[cm]	[°]	
1	4880.000	H	48.8	37.4	9.2	58.0	46.6	74.0	54.0	16.0	7.4	192.0	163.0	

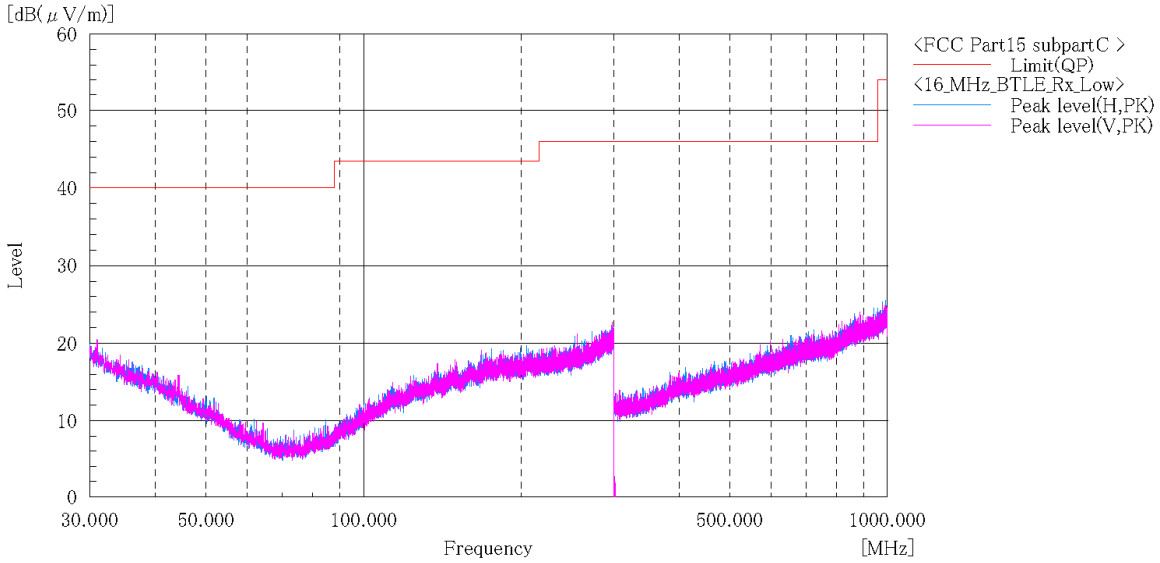
Note:
1. Emission Level (Margin) = Limit - [Reading + Factor (Antenna + Cable – Amp)]
2. No emission were detected in frequency range 18GHz to 25GHz at the 3 meters distance.

[Receive mode - Without camera]
Channel: Low
BELOW 1 GHz

******* RADIATED EMISSION *******
[3m Semi-anechoic chamber]

TUV SUD Japan Ltd. <<DATA Sheet No.16>> 2 February,2019 04:40

Company name	: KYOCERA Corporation	Standard	: FCC Part.15 subpartC
EUT	: Mobile Phone	Operator	: C.Kanno
Model No.	: JA53	Temp,Hum	: 18.3[℃] 27.1[%]
Serial No.	: N/A	Note1	:
Test mode	: BT_LE_Rx_ch:Low	Note2	:



Final Result

No.	Frequency [MHz]	(P)	c.f [dB(1/m)]	Height [cm]	Angle [°]	Remark

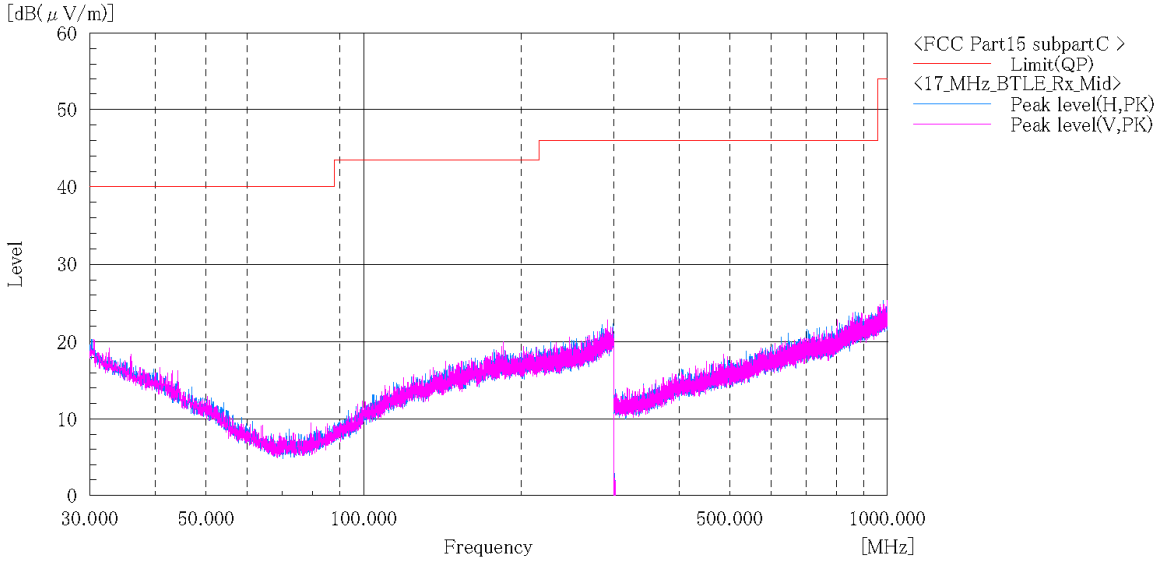
Note:
1. Emission Level (Margin) = Limit - [Reading + Factor (Antenna + Cable – Amp)]
2. No emission were detected in frequency range 9kHz to 30MHz and 1GHz to 25GHz at the 3 meters distance.

Channel: Middle
BELOW 1 GHz

******* RADIATED EMISSION *******
[3m Semi-anechoic chamber]

TUV SUD Japan Ltd. <<DATA Sheet No.17>> 2 February,2019 05:00

Company name	: KYOCERA Corporation	Standard	: FCC Part.15 subpartC
EUT	: Mobile Phone	Operator	: C.Kanno
Model No.	: JA53	Temp,Hum	: 18.3[℃] 27.1[%]
Serial No.	: N/A	Note1	:
Test mode	: BT_LE_Rx_ch:Mid	Note2	:



Final Result

No.	Frequency [MHz]	(P)	c.f [dB(1/m)]	Height [cm]	Angle [°]	Remark

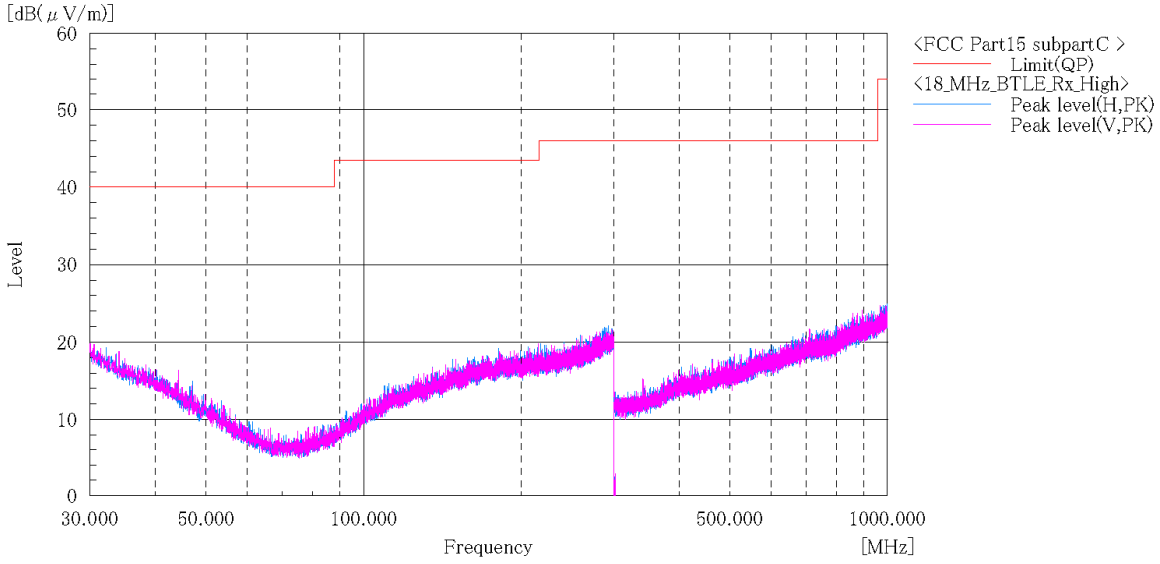
Note:
1. Emission Level (Margin) = Limit - [Reading + Factor (Antenna + Cable – Amp)]
2. No emission were detected in frequency range 9kHz to 30MHz and 1GHz to 25GHz at the 3 meters distance.

Channel: High
BELOW 1 GHz

******* RADIATED EMISSION *******
[3m Semi-anechoic chamber]

TUV SUD Japan Ltd. <<DATA Sheet No.18>> 2 February,2019 05:20

Company name	: KYOCERA Corporation	Standard	: FCC Part.15 subpartC
EUT	: Mobile Phone	Operator	: C.Kanno
Model No.	: JA53	Temp,Hum	: 18.3[℃] 27.1[%]
Serial No.	: N/A	Note1	:
Test mode	: BT_LE_Rx_ch:High	Note2	:



Final Result

No.	Frequency [MHz]	(P)	c.f [dB(1/m)]	Height [cm]	Angle [°]	Remark

Note:
1. Emission Level (Margin) = Limit - [Reading + Factor (Antenna + Cable – Amp)]
2. No emission were detected in frequency range 9kHz to 30MHz and 1GHz to 25GHz at the 3 meters distance.

4.6 Restricted Band of Operation

4.6.1 Measurement procedure

[FCC 15.247(d), 15.205, 15.209, KDB558074 D01 v05]

Test was applied by following conditions.

Test method	:	ANSI C63.10
Test place	:	3m Semi-anechoic chamber
EUT was placed on	:	Styrofoam table / (W)1.0m × (D)1.0m × (H)0.8m (below 1GHz) Styrofoam table / (W)0.6m × (D)0.6m ×(H)1.5m (above 1GHz)
Antenna distance	:	3m
Spectrum analyzer setting		
- Peak	:	RBW=1MHz, VBW=3MHz, Span=Arbitrary setting, Sweep=auto
- Average	:	RBW=1MHz, VBW=3kHz, Span=Arbitrary setting, Sweep=auto Display mode=Linear

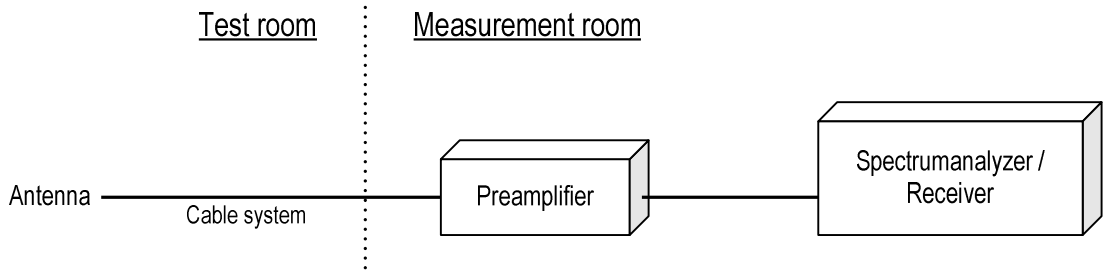
Average Measurement Setting [VBW]

Mode	Duty Cycle (%)	T_{on} (us)	T_{off} (us)	$1/T_{on}$ (kHz)	Determined VBW Setting
Bluetooth 4.1 LE	62.56	391	234	2.558	3kHz

Although these tests were performed other than open area test site,
adequate comparison measurements were confirmed against 30 m open are test site.
Therefore sufficient tests were made to demonstrate that the alternative site produces results that correlate with the ones of tests made in an open field based on KDB 937606.

Radiated emission measurements are performed at 3m distance with the broadband antenna (Loop antenna, Biconical antenna, Log periodic antenna, Double ridged guide antenna and Broad-band horn Antenna). The antenna is positioned both the horizontal and vertical planes of polarization and height is varied 1m to 4m and stopped at height producing the maximum emission. As for the Loop antenna, it is positioned with its plane vertical, and the center of the Loop antenna is 1m above the ground plane.
The EUT is Placed on a turntable, which is 0.8m/1.5m above ground plane. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level. The test results represent the worst case emission for each emission with manipulating the EUT, support equipment, interconnecting cables and varying the mode of operation. Sufficient time for the EUT, support equipment, and test equipment are allowed in order for them to warm up to their normal operating condition.

- Test configuration



Japan

4.6.2 Limit

Emission at the boundary of the restricted band provided by 15.205 shall be lower than 15.209 limit.

4.6.3 Measurement result

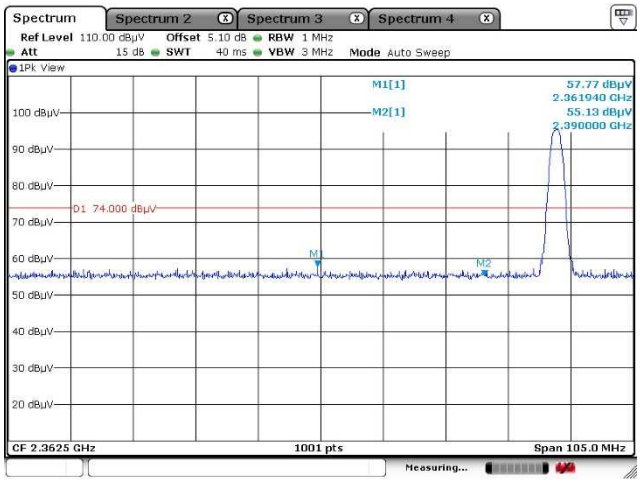
Channel	Frequency [MHz]	Results Chart	Result
Low	2402	See the Trace Data	Pass
High	2480	See the Trace Data	Pass

4.6.4 Test data

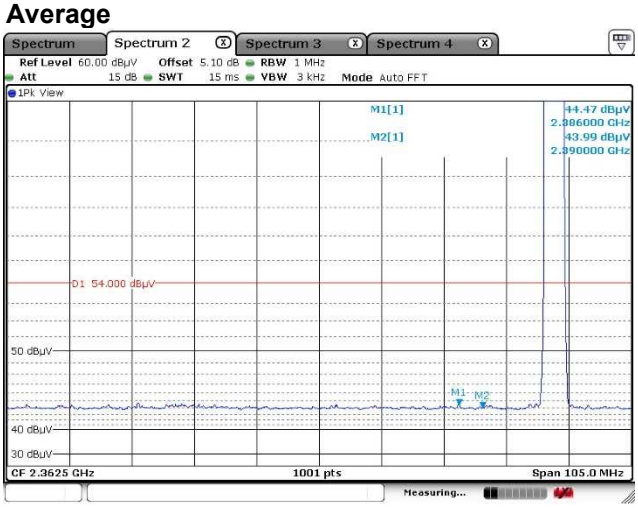
Date : 04-February-2019
Temperature : 19.3 [˚C]
Humidity : 32.1 [%]
Test place : 3m Semi-anechoic chamber

Test engineer : Chiaki Kanno

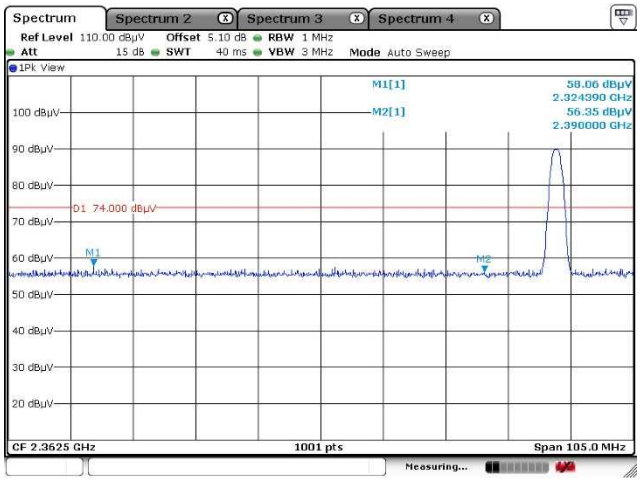
[With camera]
Channel: Low
Horizontal
Peak



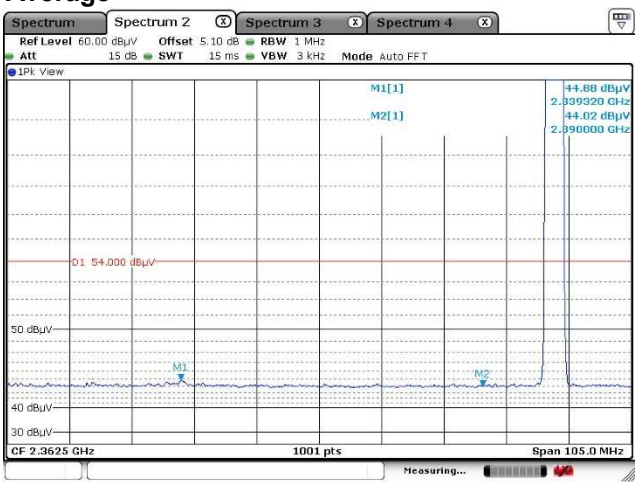
Average



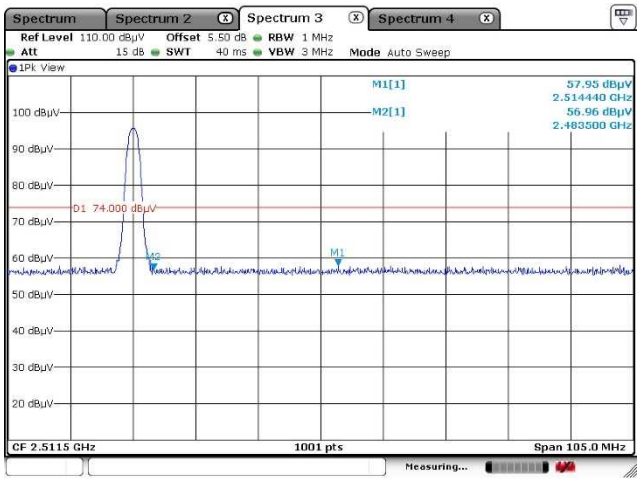
Vertical
Peak



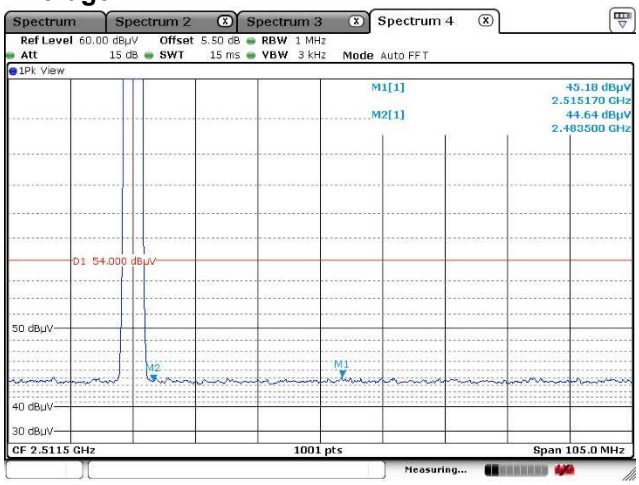
Average



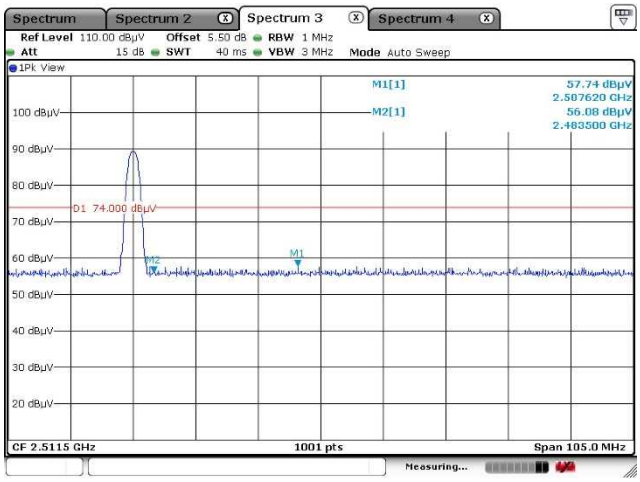
Channel: High
Horizontal
Peak



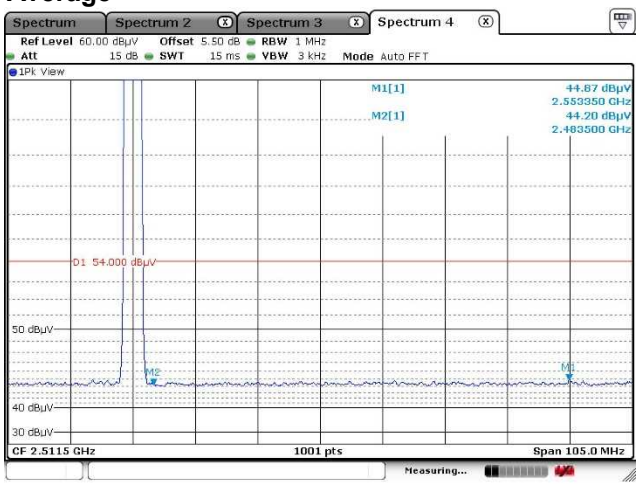
Average



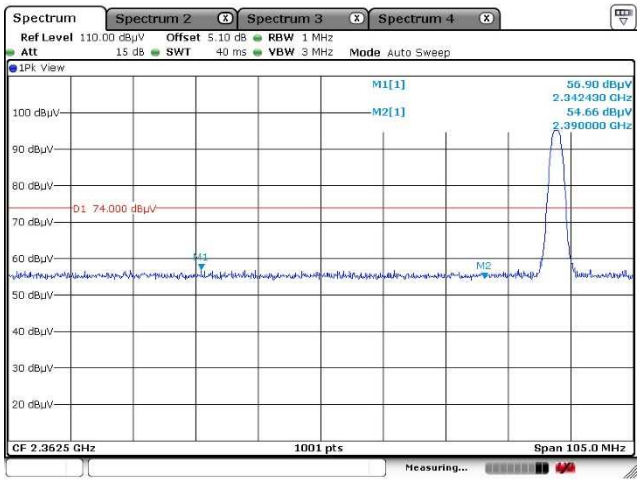
Vertical
Peak



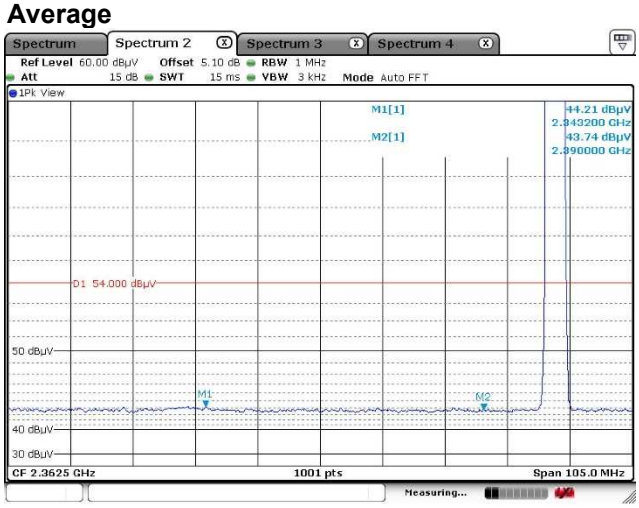
Average



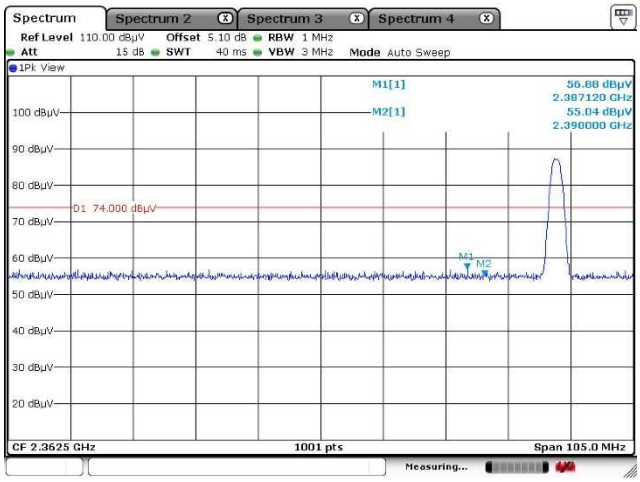
[Without camera]
Channel: Low
Horizontal
Peak



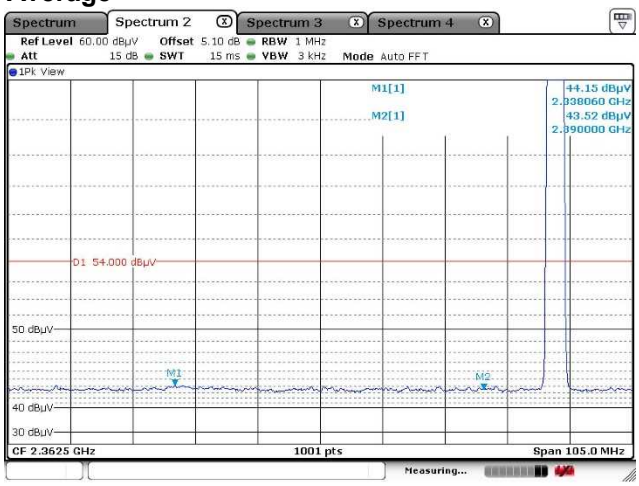
Average



Vertical
Peak

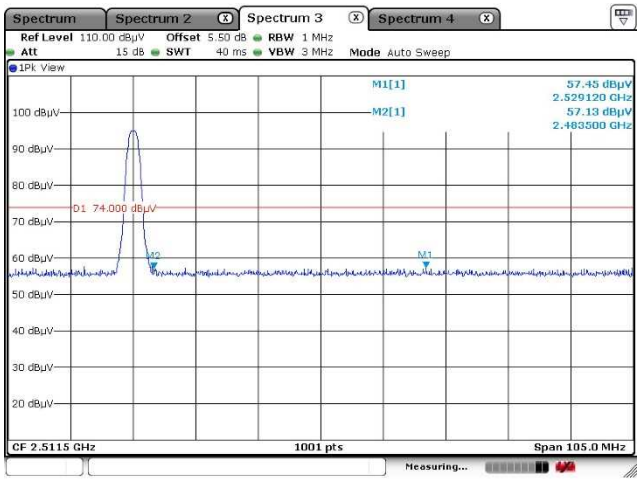


Average

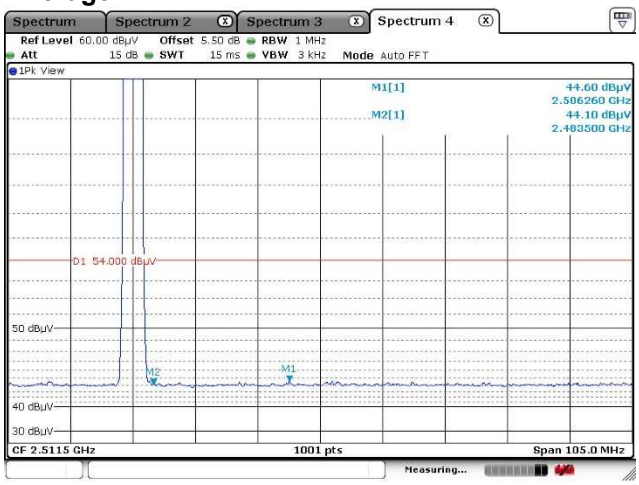


Japan

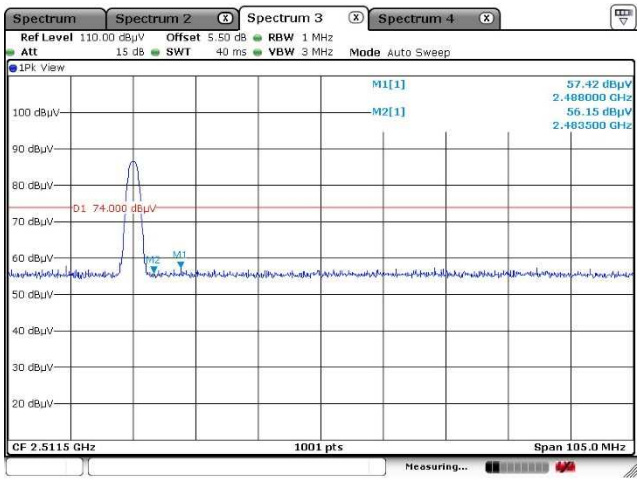
Channel: High
Horizontal
Peak



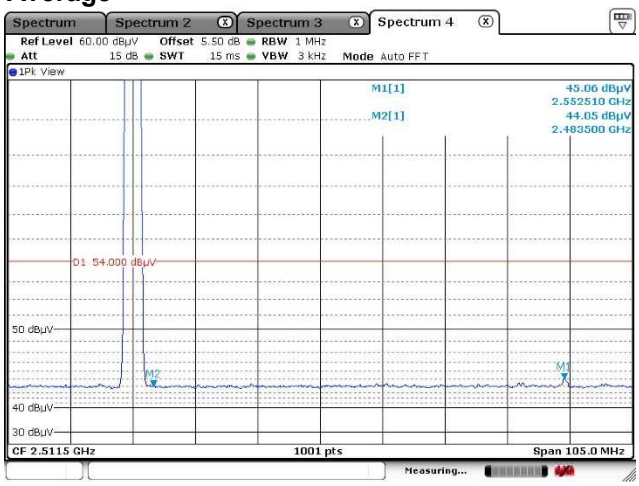
Average



Vertical
Peak



Average



Japan

4.7 Transmitter Power Spectral Density

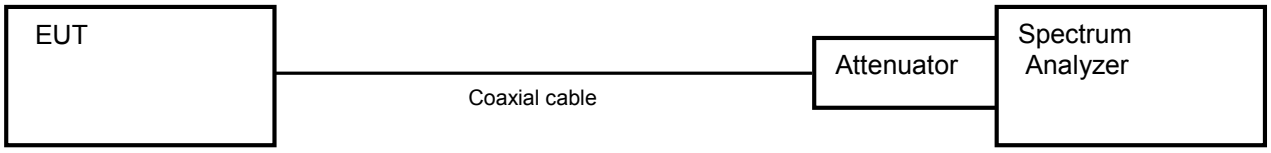
4.7.1 Measurement procedure

[FCC 15.247(e), KDB558074 D01 v05]

The peak power is measured with a spectrum analyzer connected to the antenna terminal, while EUT is operating in transmission mode at the appropriate center frequency.

The spectrum analyzer is set to;
a) Span = 1.5 times the 6 dB bandwidth.
b) RBW = 3kHz - 100kHz.
c) VBW ≥ 3 x RBW.
d) Sweep time = auto-couple.
e) Detector = peak.
f) Trace mode = max hold.

- Test configuration



4.7.2 Limit

The peak power spectral density shall not be greater than 8dBm in any 3kHz band.

4.7.3 Measurement result

Date : 29-January-2019
Temperature : 21.5 [˚C]
Humidity : 30.0 [%]
Test place : Shielded room No.4

Test engineer : Taiki Watanabe

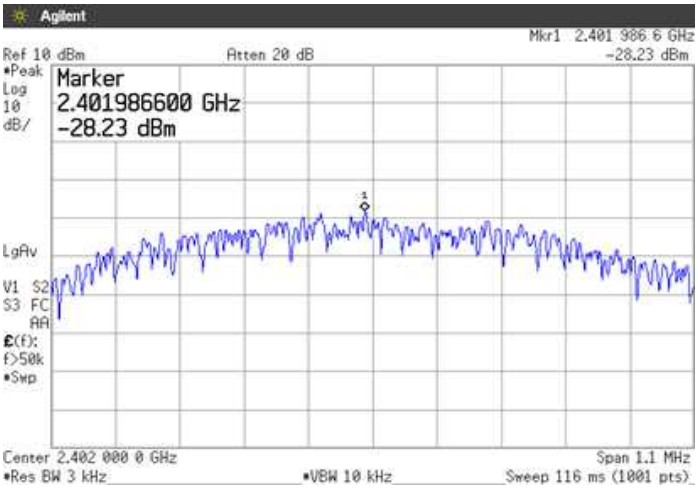
Channel	Center Frequency (MHz)	Reading (dBm)	Factor (dB)	Level (dBm)	Limit (dBm)	Margin (dBm)	Result
Low	2402	-28.23	10.48	-17.75	8.00	25.75	PASS
Middle	2440	-28.19	10.48	-17.71	8.00	25.71	PASS
High	2480	-28.75	10.48	-18.27	8.00	26.27	PASS

Calculation;
Transmitter Power Spectral Density Level (Margin) = Limit – (Reading + Factor)

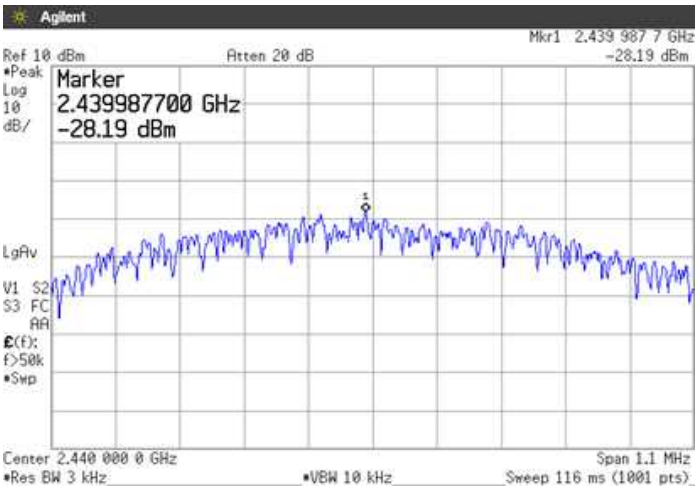
Japan

4.7.4 Trace data

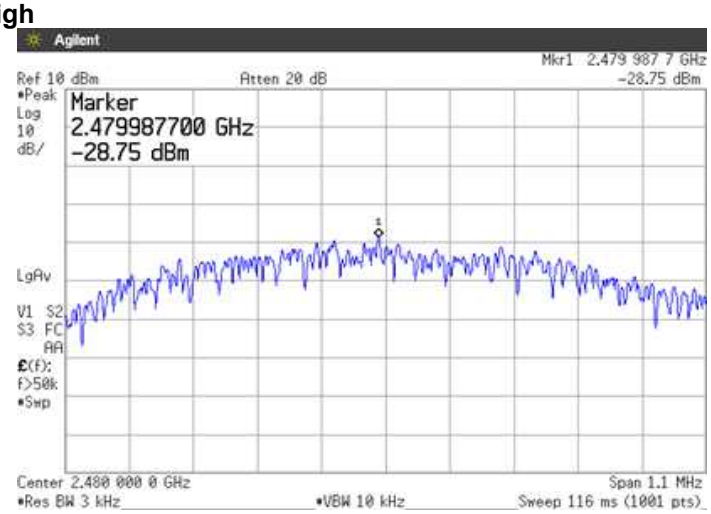
Channel Low



Channel Middle



Channel High



Japan

4.8 AC Power Line Conducted Emissions

4.8.1 Measurement procedure

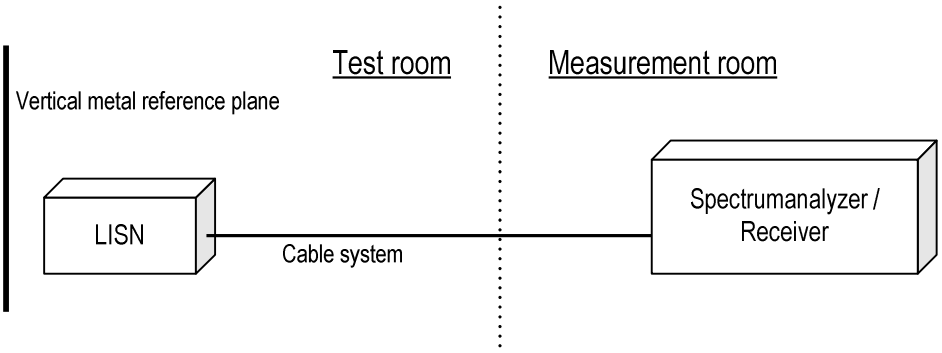
[FCC 15.207]

Test was applied by following conditions.

Test method	:	ANSI C63.10
Frequency range	:	0.15 MHz to 30 MHz
Test place	:	3 m Semi-anechoic chamber
EUT was placed on	:	FRP table / (W)2.0 m × (D)1.0 m × (H)0.8 m
Vertical Metal Reference Plane	:	(W)2.0 m × (H)2.0 m 0.4 m away from EUT
Test receiver setting		
- Detector	:	Quasi-peak, Average
- Bandwidth	:	9 kHz

EUT and peripherals are connected to 50Ω/50μH Line Impedance Stabilization Network (LISN) which are connected to reference ground plane, and are placed 80cm away from EUT. Excess of AC power cable is bundled in center.
LISN for peripheral is terminated in 50Ω.
EUT operating mode is selected to emit the maximum noise. Overall frequency range is investigated with spectrum analyzer using peak detector. Maximum emission configuration is determined by manipulating the EUT, peripherals, interconnecting cables. Then, emission measurements are performed with test receiver in above setting to each current-carrying conductor of the mains port. Sufficient time for EUT, peripherals and test equipment is provided in order for them to warm up to their normal operating condition. If the average limit is met when using a quasi-peak detector receiver, the EUT shall be deemed to meet both limits.

- Test configuration



4.8.2 Calculation method

Emission level = Reading + (LISN. Factor + Cable system loss)
Margin = Limit – Emission level

Example:
Limit @ 6.770 MHz : 60.0 dBµV(Quasi-peak)
: 50.0 dBµV(Average)
(Quasi peak) Reading = 41.2 dBµV c.f = 10.3 dB
Emission level = 41.2 + 10.3 = 51.5 dBµV
Margin = 60.0 – 51.5 = 8.5 dB
(Average) Reading = 35.0 dBµV c.f = 10.3 dB
Emission level = 35.0 + 10.3 = 45.3 dBµV
Margin = 50.0 – 45.3 = 4.7 dB

4.8.3 Limit

Frequency [MHz]	Limit	
	QP [dBuV]	AV [dBuV]
0.15-0.5	66-56*	56-46*
0.5-5	56	46
5-30	60	50

*: The limit decreases linearly with the logarithm of the frequency in the range 0.15MHz to 0.5MHz.

Japan

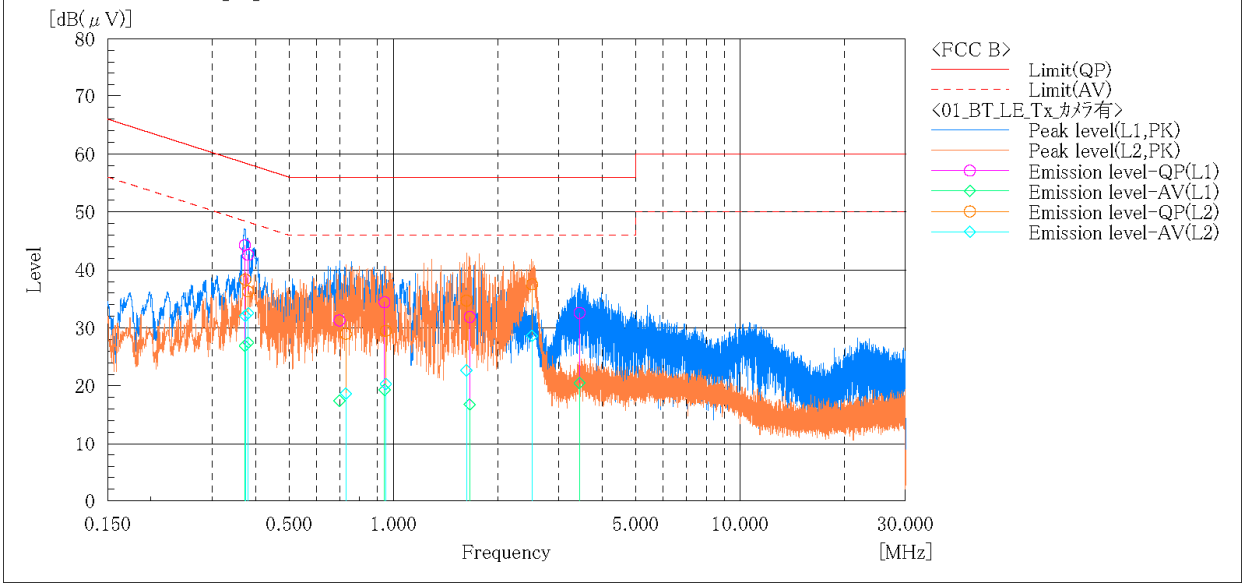
4.8.4 Test data

[With camera]

***** CONDUCTED EMISSION at MAINS PORT *****
[3m Semi-anechoic chamber]

TUV SUD Japan Ltd. | <<Data Sheet No.01>> | 6 February,2019 01:07

Company Name	: KYOCERA Corporation	Standard	: FCC Part.15 Class B
EUT	: Mobile Phone	Operator	: C.Kanno
Model No.	: JA53	Temp,Hum,Atm	: 21.0[℃] 28.1[%]
Serial No.	: N/A	Note1	: With camera
Test mode	: BT_LE_Tx	Note2	:



Final Result

--- L1 Phase ---

No.	Frequency [MHz]	Reading QP [dBμV]	Reading AV [dBμV]	c.f [dB]	Result QP [dBμV]	Result AV [dBμV]	Limit QP [dBμV]	Limit AV [dBμV]	Margin QP [dB]	Margin AV [dB]
1	0.373	34.0	16.6	10.3	44.3	26.9	58.4	48.4	14.1	21.5
2	0.381	32.3	17.2	10.3	42.6	27.5	58.3	48.3	15.7	20.8
3	0.699	21.0	7.1	10.3	31.3	17.4	56.0	46.0	24.7	28.6
4	0.943	24.1	9.0	10.3	34.4	19.3	56.0	46.0	21.6	26.7
5	1.661	21.5	6.4	10.4	31.9	16.8	56.0	46.0	24.1	29.2
6	3.443	22.1	10.0	10.5	32.6	20.5	56.0	46.0	23.4	25.5

--- L2 Phase ---

No.	Frequency [MHz]	Reading QP [dBμV]	Reading AV [dBμV]	c.f [dB]	Result QP [dBμV]	Result AV [dBμV]	Limit QP [dBμV]	Limit AV [dBμV]	Margin QP [dB]	Margin AV [dB]
1	0.374	28.0	21.8	10.3	38.3	32.1	58.4	48.4	20.1	16.3
2	0.381	26.0	22.2	10.3	36.3	32.5	58.3	48.3	22.0	15.8
3	0.729	18.7	8.4	10.3	29.0	18.7	56.0	46.0	27.0	27.3
4	0.951	19.2	10.0	10.3	29.5	20.3	56.0	46.0	26.5	25.7
5	1.625	24.3	12.3	10.4	34.7	22.7	56.0	46.0	21.3	23.3
6	2.511	27.1	18.2	10.4	37.5	28.6	56.0	46.0	18.5	17.4

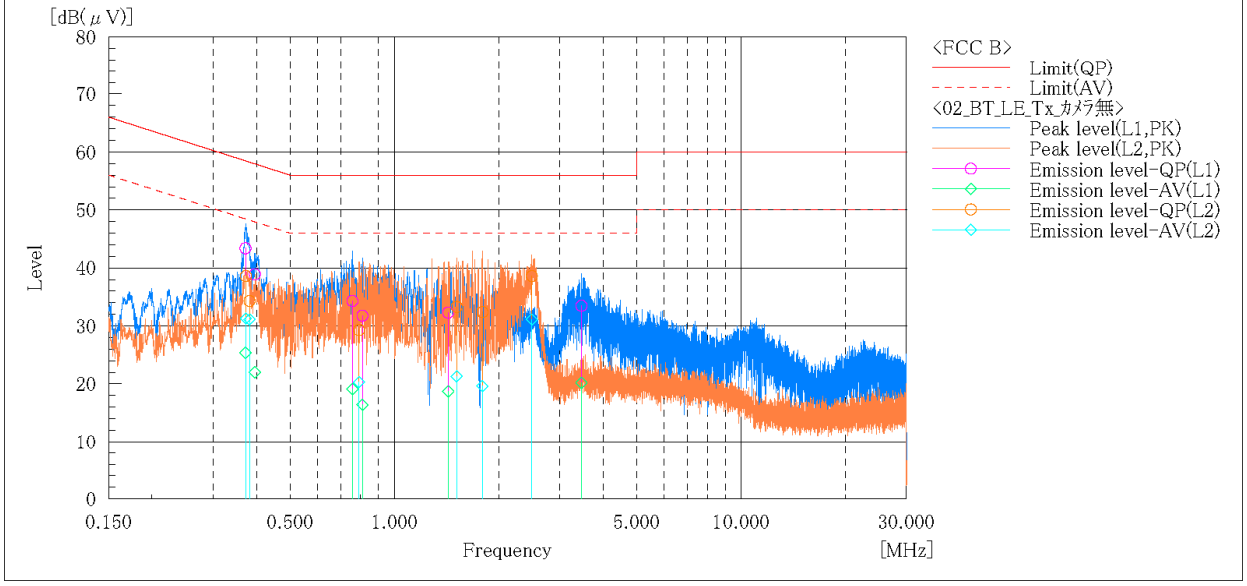
Japan

[Without camera]

***** CONDUCTED EMISSION at MAINS PORT *****
[3m Semi-anechoic chamber]

TUV SUD Japan Ltd. | <<Data Sheet No.02>> | 6 February,2019 01:50

Company Name	: KYOCERA Corporation	Standard	: FCC Part.15 Class B
EUT	: Mobile Phone	Operator	: C.Kanno
Model No.	: JA53	Temp,Hum,Atm	: 21.0[℃] 28.1[%]
Serial No.	: N/A	Note1	: Without camera
Test mode	: BT_LE_Tx	Note2	:



Final Result

--- L1 Phase ---

No.	Frequency [MHz]	Reading QP [dBμV]	Reading AV [dBμV]	c.f [dB]	Result QP [dBμV]	Result AV [dBμV]	Limit QP [dBμV]	Limit AV [dBμV]	Margin QP [dB]	Margin AV [dB]
1	0.372	33.1	15.1	10.3	43.4	25.4	58.5	48.5	15.1	23.1
2	0.396	28.6	11.7	10.3	38.9	22.0	57.9	47.9	19.0	25.9
3	0.757	24.0	8.8	10.3	34.3	19.1	56.0	46.0	21.7	26.9
4	0.809	21.5	6.1	10.3	31.8	16.4	56.0	46.0	24.2	29.6
5	1.429	22.0	8.4	10.3	32.3	18.7	56.0	46.0	23.7	27.3
6	3.463	23.0	9.7	10.5	33.5	20.2	56.0	46.0	22.5	25.8

--- L2 Phase ---

No.	Frequency [MHz]	Reading QP [dBμV]	Reading AV [dBμV]	c.f [dB]	Result QP [dBμV]	Result AV [dBμV]	Limit QP [dBμV]	Limit AV [dBμV]	Margin QP [dB]	Margin AV [dB]
1	0.373	28.3	21.0	10.3	38.6	31.3	58.4	48.4	19.8	17.1
2	0.382	24.0	20.8	10.3	34.3	31.1	58.2	48.2	23.9	17.1
3	0.791	19.0	10.0	10.3	29.3	20.3	56.0	46.0	26.7	25.7
4	1.513	23.0	11.0	10.3	33.3	21.3	56.0	46.0	22.7	24.7
5	1.795	22.0	9.2	10.4	32.4	19.6	56.0	46.0	23.6	26.4
6	2.493	28.2	20.7	10.4	38.6	31.1	56.0	46.0	17.4	14.9

Japan

5 Antenna requirement

According to FCC section 15.203, an intentional radiator shall be designed to ensure that no antenna other than furnished by the responsible party shall be used with the device.
The antenna is a special antenna mounted inside of the EUT. Therefore, the EUT complies with the antenna requirement of FCC section 15.203.

Japan

6 Measurement Uncertainty

Expanded uncertainties stated are calculated with a coverage Factor k=2.
Please note that these results are not taken into account when measurement uncertainty considerations contained in ETSI TR 100 028-0011 determining compliance or non-compliance with test result.

Test item	Measurement uncertainty
Conducted emission, AMN (9 kHz – 150 kHz)	±3.8 dB
Conducted emission, AMN (150 kHz – 30 MHz)	±3.3 dB
Radiated emission (9 kHz – 30 MHz)	±3.0 dB
Radiated emission (30 MHz – 1000 MHz)	±4.7 dB
Radiated emission (1 GHz – 6 GHz)	±4.9 dB
Radiated emission (6 GHz – 18 GHz)	±5.2 dB
Radiated emission (18 GHz – 40 GHz)	±5.8 dB

Japan

7 Laboratory Information

Testing was performed and the report was issued at:

TÜV SÜD Japan Ltd. Yonezawa Testing Center

Address: 5-4149-7 Hachimanpara, Yonezawa-shi, Yamagata, 992-1128 Japan
Phone: +81-238-28-2881
Fax: +81-238-28-2888

Accreditation and Registration
NVLAP
LAB CODE: 200306-0

VLAC
Accreditation No.: VLAC-013

BSMI
Laboratory Code: SL2-IN-E-6018, SL2-A1-E-6018

Innovation, Science and Economic Development Canada

Site number	Facility	Expiration date
4224A-4	3 m Semi-anechoic chamber	27-November-2020
4224A-5	10 m Semi-anechoic chamber No. 1	27-November-2020
4224A-6	10 m Semi-anechoic chamber No. 2	14-December-2019

VCCI Council

Registration number	Expiration date
A-0166	03-July-2019

Appendix A. Test Equipment

Antenna port conducted test

Equipment	Company	Model No.	Serial No.	Cal. Due	Cal. Date
Spectrum analyzer	Agilent Technologies	E4440A	US44302655	31-Jul-2019	02-Jul-2018
Attenuator	Weinschel	56-10	J4180	31-Jul-2019	12-Jul-2018
Power meter	ROHDE&SCHWARZ	NRP2	103269	31-Aug-2019	01-Aug-2018
Power sensor	ROHDE&SCHWARZ	NRP-Z81	102467	31-Aug-2019	01-Aug-2018

Radiated emission

Equipment	Company	Model No.	Serial No.	Cal. Due	Cal. Date
EMI Receiver	ROHDE&SCHWARZ	ESCI	100765	30-Sep-2019	20-Sep-2018
Spectrum analyzer	ROHDE&SCHWARZ	FSV40	101731	31-Dec-2019	07-Dec-2018
Spectrum analyzer	Agilent Technologies	E4440A	US40420937	31-Oct-2019	12-Oct-2018
Preamplifier	SONOMA	310	372170	30-Sep-2019	20-Sep-2018
Loop antenna	ROHDE&SCHWARZ	HFH2-Z2	100515	28-Feb-2019	20-Feb-2018
Attenuator	TDC	TAT-43B-06	N/A(S209)	31-Jul-2019	11-Jul-2018
Biconical antenna	Schwarzbeck	VHA9103/BBA9106	VHA91032155	31-Aug-2019	06-Aug-2018
Log periodic antenna	Schwarzbeck	UHALP9108A	0560	31-Aug-2019	06-Aug-2018
Attenuator	TAMAGAWA.ELEC	CFA-01/6dB	N/A(S465)	31-May-2019	16-May-2018
Attenuator	TAMAGAWA.ELEC	CFA-10/3dB	N/A(S503)	31-Jul-2019	11-Jul-2018
Preamplifier	TSJ	MLA-100M18-B02-40	1929118	31-Jan-2019	18-Jan-2018
				31-Jan-2020	17-Jan-2019
Attenuator	AEROFLEX	26A-10	081217-08	31-Jan-2019	18-Jan-2018
				31-Jan-2020	17-Jan-2019
Double ridged guide antenna	ETS LINDGREN	3117	00052315	31-Mar-2019	14-Mar-2018
Attenuator	Agilent Technologies	8491B	MY39268633	31-Mar-2019	14-Mar-2018
Double ridged guide antenna	A.H.Systems Inc.	SAS-574	469	31-Aug-2019	24-Aug-2018
Preamplifier	TSJ	MLA-1840-B03-35	1240332	31-Aug-2019	24-Aug-2018
Notch filter	Micro-Tronics	BRM50702	045	31-May-2019	16-May-2018
Microwave cable	HUBER+SUHNER	SUCOFLEX104/9m	MY30037/4	31-Jan-2019	18-Jan-2018
				31-Jan-2020	16-Jan-2019
		SUCOFLEX104/1m	my24610/4	31-Jan-2019	18-Jan-2018
				31-Jan-2020	16-Jan-2019
		SUCOFLEX104/8m	SN MY30031/4	31-Jan-2019	18-Jan-2018
				31-Jan-2020	16-Jan-2019
		SUCOFLEX104	MY32976/4	31-Jan-2019	18-Jan-2018
				31-Jan-2020	16-Jan-2019
		SUCOFLEX104/1.5m	MY19309/4	31-Jan-2019	19-Jan-2018
				31-Jan-2020	16-Jan-2019
		SUCOFLEX104/7m	41625/6	31-Jan-2019	19-Jan-2018
				31-Jan-2020	16-Jan-2019
PC	DELL	DIMENSION E521	75465BX	N/A	N/A
Software	TOYO Corporation	EP5/RE-AJ	0611193/V5.6.0	N/A	N/A
Absorber	RIKEN	PFP30	N/A	N/A	N/A
3m Semi an-echoic Chamber	TOKIN	N/A	N/A(9002-NSA)	31-May-2019	21-May-2018
3m Semi an-echoic Chamber	TOKIN	N/A	N/A(9002-SVSWR)	31-May-2019	22-May-2018

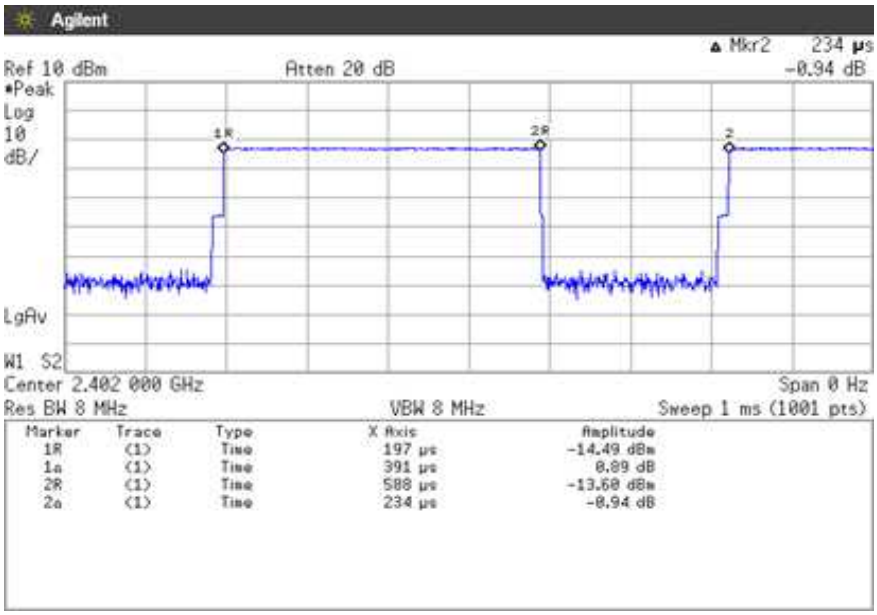
Conducted emission at mains port

Equipment	Company	Model No.	Serial No.	Cal. Due	Cal. Date
EMI Receiver	ROHDE&SCHWARZ	ESCI	100765	30-Sep-2019	20-Sep-2018
Attenuator	HUBER+SUHNER	6810.01.A	N/A (S411)	31-Jan-2020	17-Jan-2019
Line impedance stabilization network	Kyoritsu Electrical Works, Ltd.	KNW-407F	8-2003-1	28-Feb-2019	28-Feb-2018
Coaxial cable	FUJIKURA	5D-2W/4m	N/A (S350)	31-Jan-2020	16-Jan-2019
Coaxial cable	FUJIKURA	5D-2W/1m	N/A (S193)	31-Jan-2020	16-Jan-2019
Coaxial cable	HUBER+SUHNER	RG214/U/10m	N/A (S194)	31-Jan-2020	16-Jan-2019
PC	DELL	DIMENSION	75465BX	N/A	N/A
Software	TOYO Corporation	EP5/CE-AJ	0611193/V5.4.11	N/A	N/A

*: The calibrations of the above equipment are traceable to NIST or equivalent standards of the reference organizations.

Appendix B. Duty Cycle

[Plot & Calculation]



Duty Cycle = Ton / (Ton + Toff) = 391[µs] / (391[µs] + 234[µs]) = 62.56[%]