4.9 Restricted Band of Operation

4.9.1 Measurement procedure

[FCC 15.247(d), 15.205, 15.209]

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

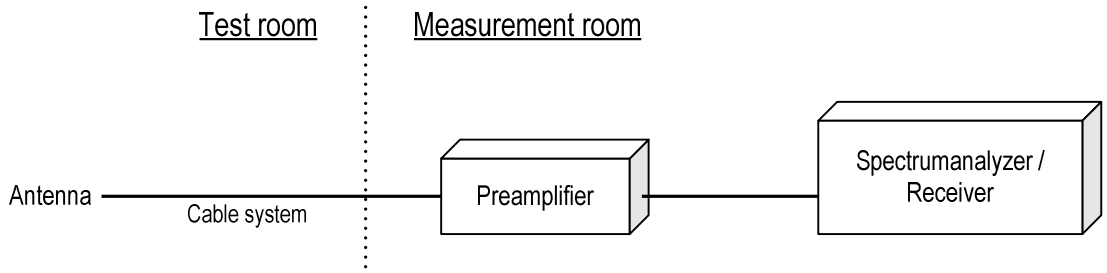
Average Measurement Setting [VBW]

Mode	Duty Cycle (%)	T_{on} (us)	T_{off} (us)	$1/T_{on}$ (kHz)	Determined VBW Setting
Bluetooth 4.1 EDR	76.93	2885	865	0.347	1kHz

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

4.9.2 Limit

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

4.9.3 Measurement result

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

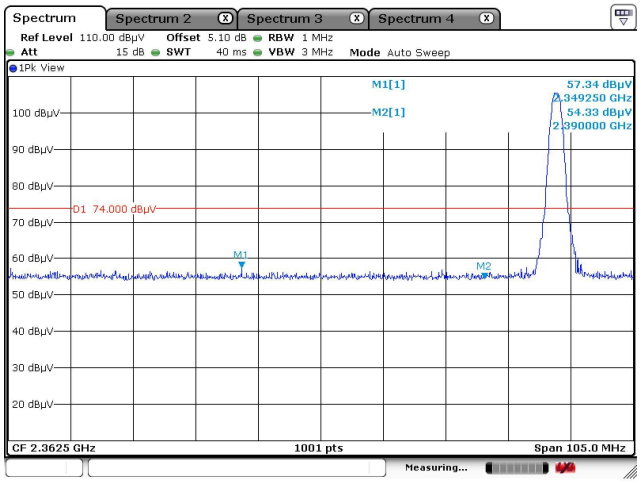
4.9.4 Test data

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

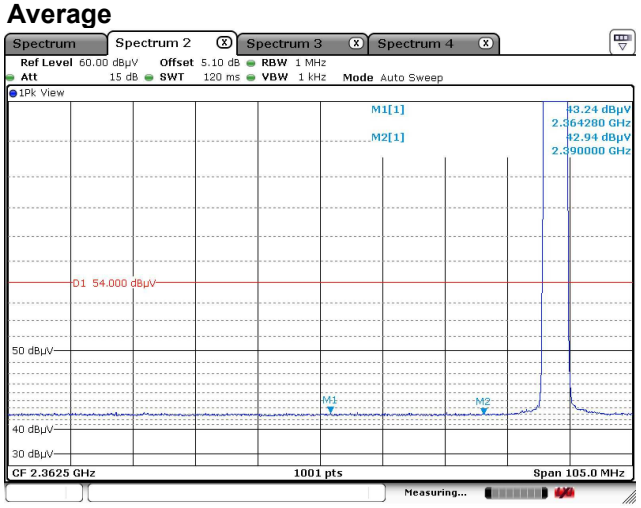
Test engineer : Chiaki Kanno

Japan

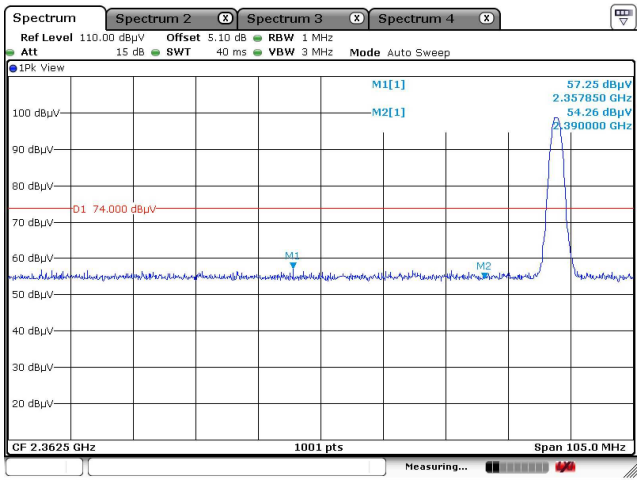
[With camera]
[DH5]
Channel: Low
Horizontal
Peak



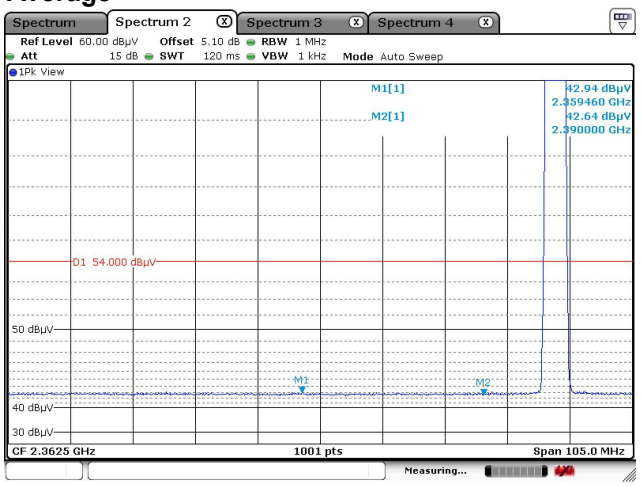
Average



Vertical
Peak

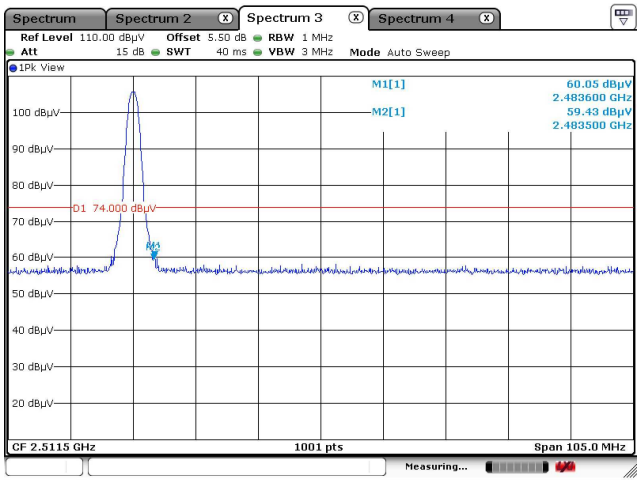


Average

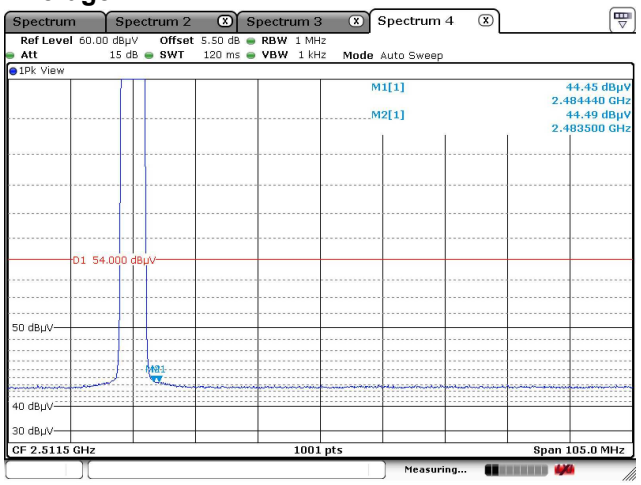


Japan

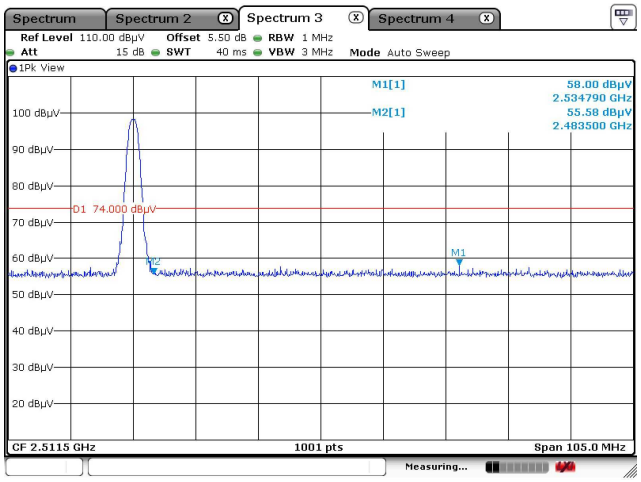
[DH5]
Channel: High
Horizontal
Peak



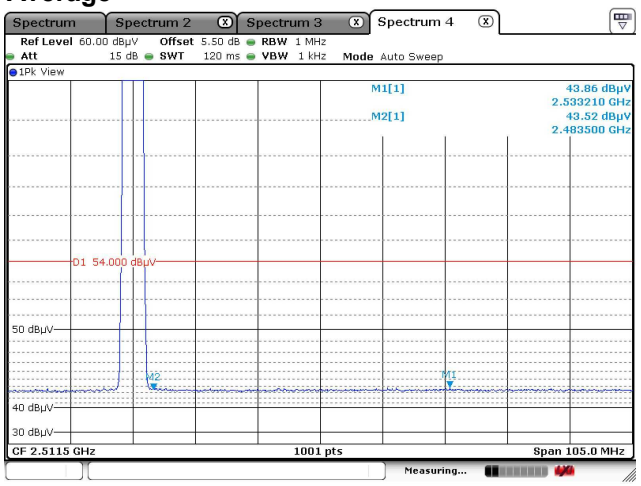
Average



Vertical
Peak

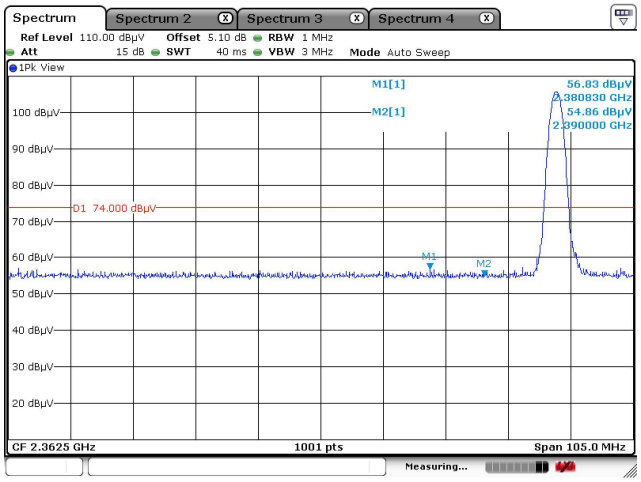


Average

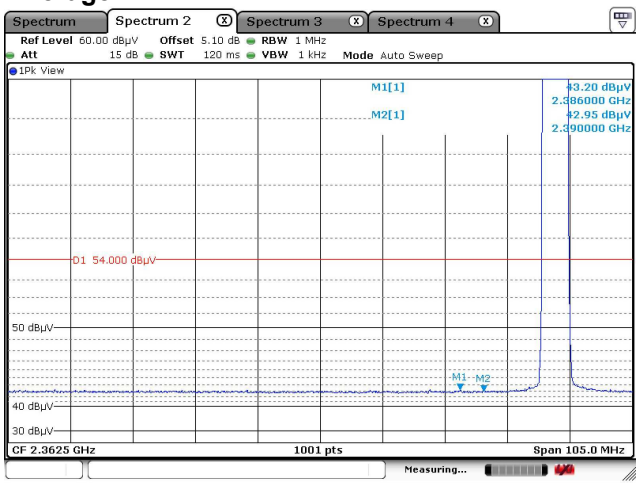


Japan

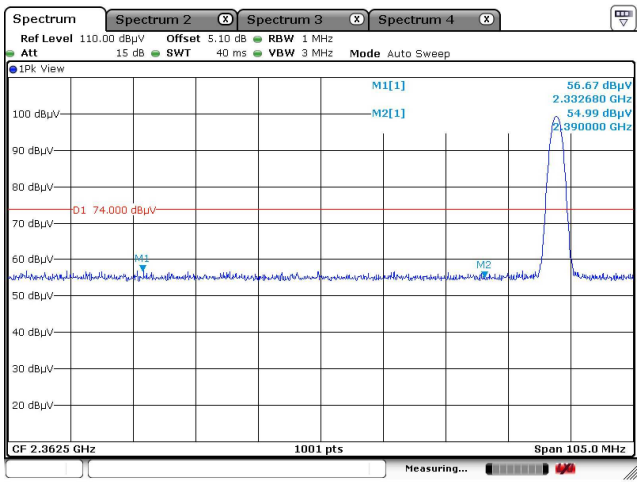
[3-DH5]
Channel: Low
Horizontal
Peak



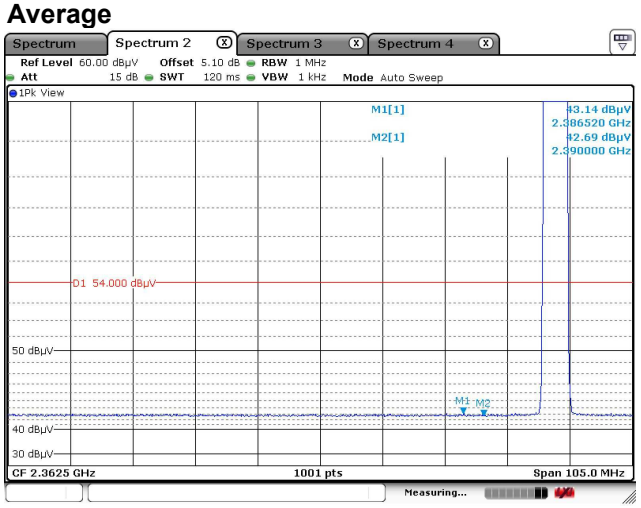
Average



Vertical
Peak

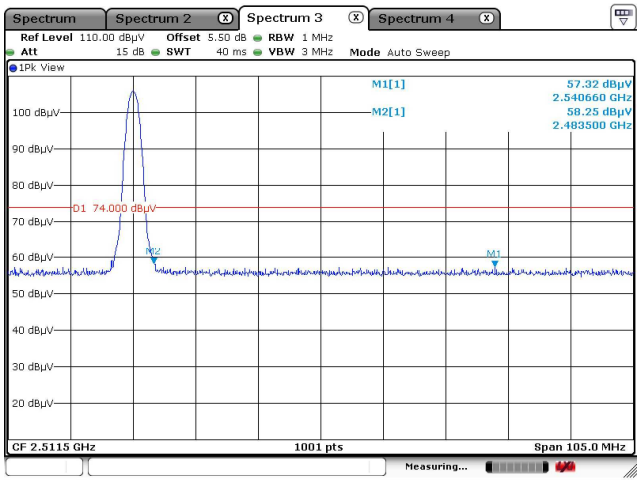


Average

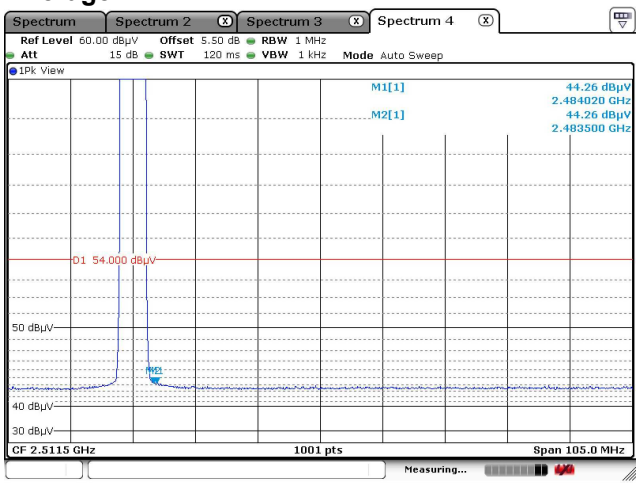


Japan

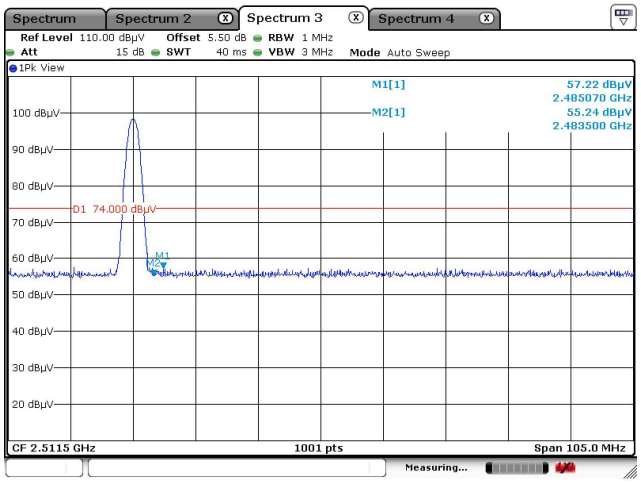
[3-DH5]
Channel: High
Horizontal
Peak



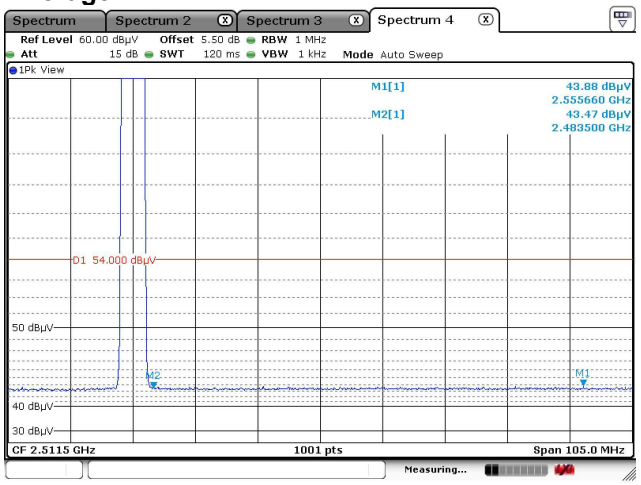
Average



Vertical
Peak

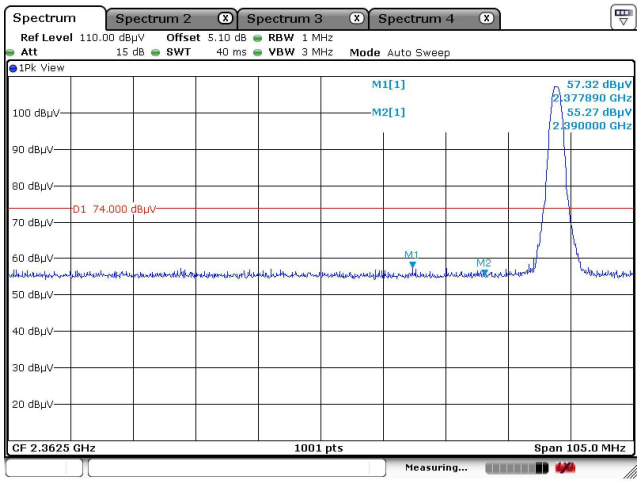


Average

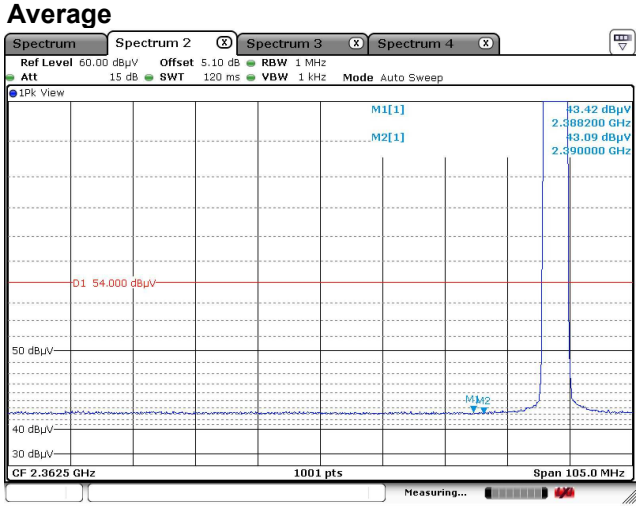


Japan

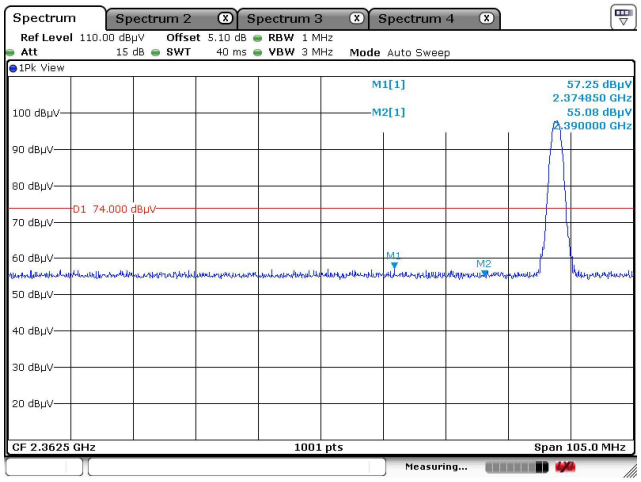
[Without camera]
[DH5]
Channel: Low
Horizontal
Peak



Average



Vertical
Peak



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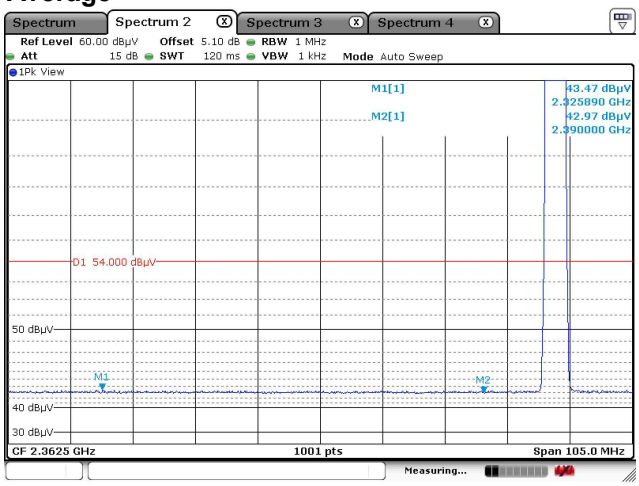
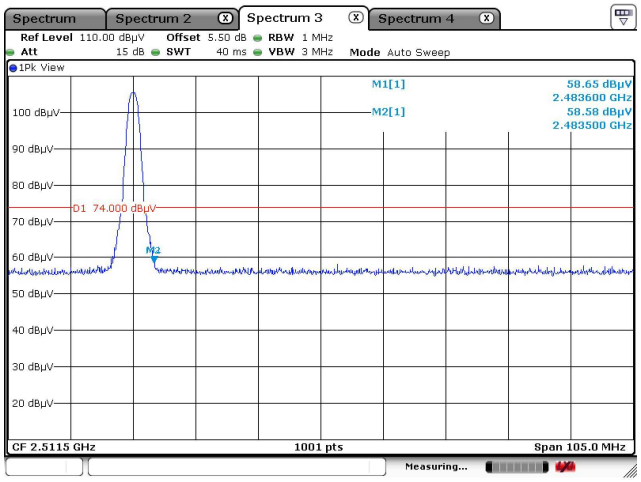


Japan

[DH5]
Channel: High
Horizontal
Peak



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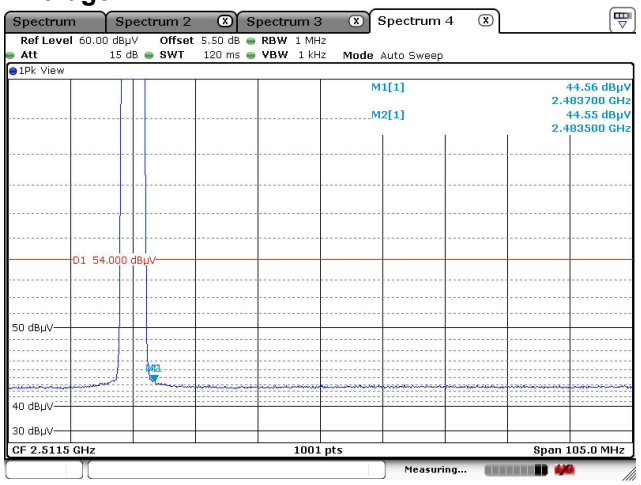
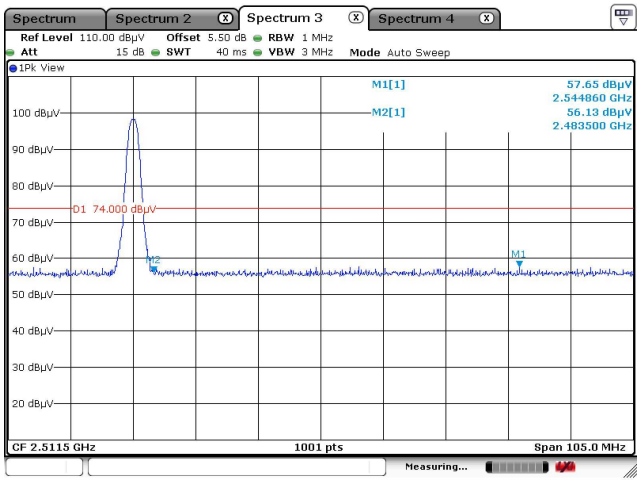


Vertical
Peak



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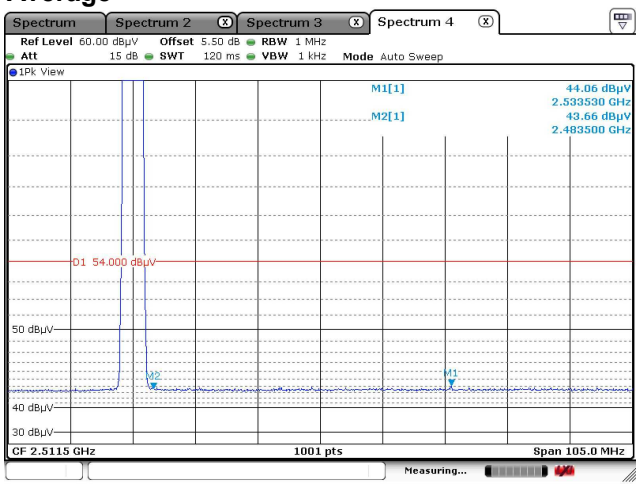
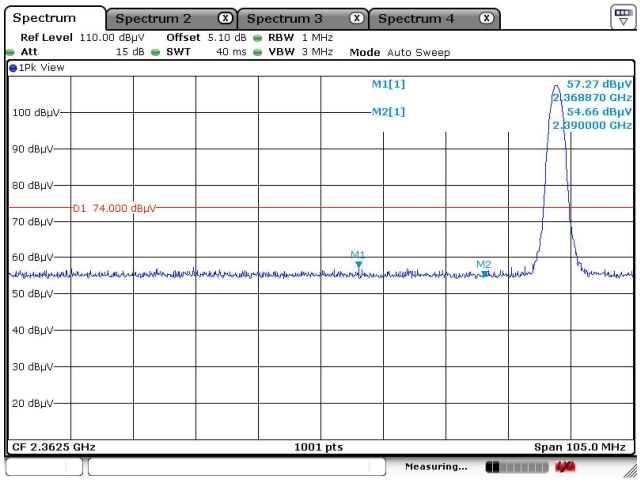
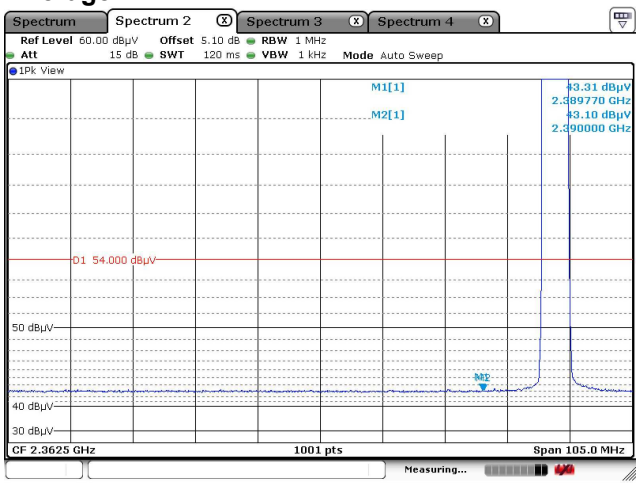


Japan

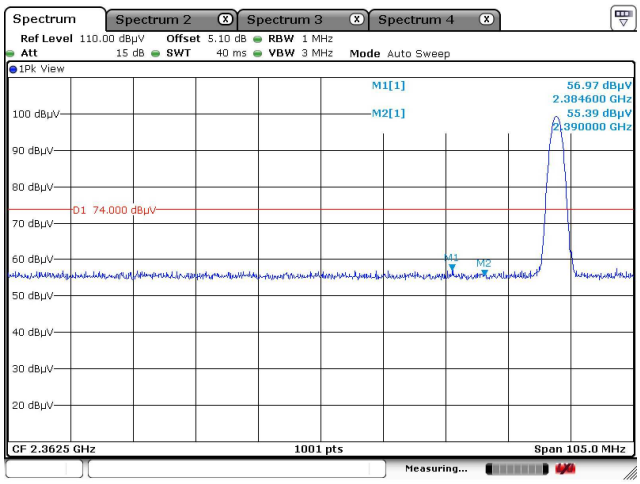
[3-DH5]
Channel: Low
Horizontal
Peak



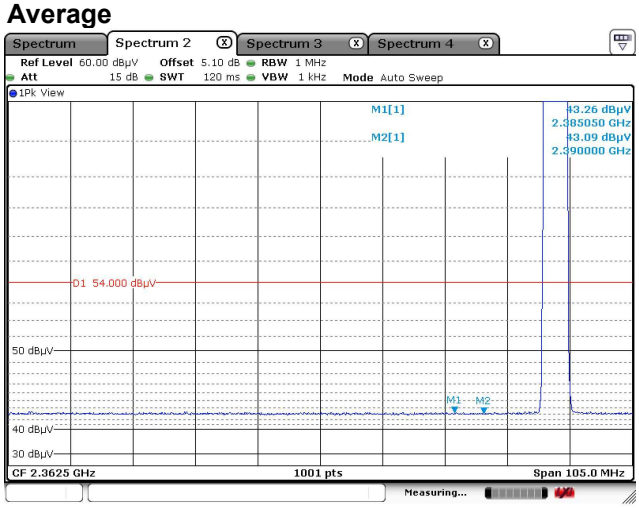
Average



Vertical
Peak

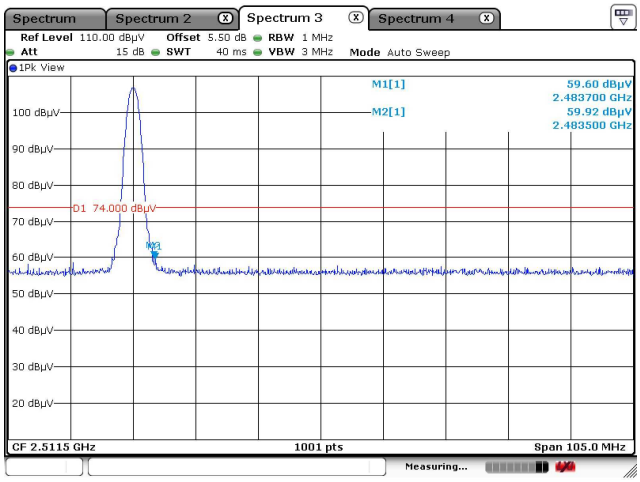


Average

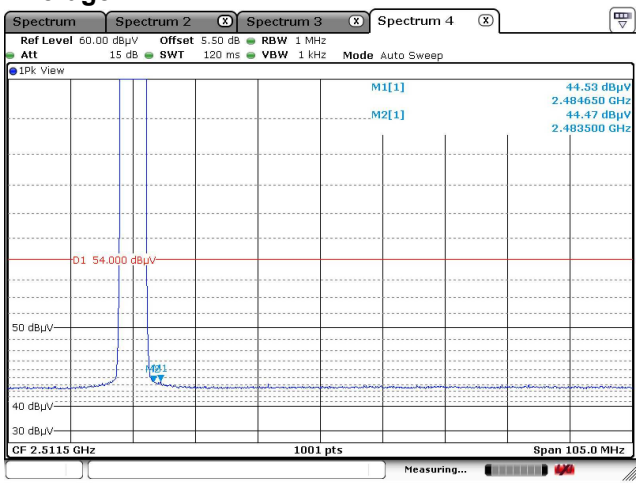


Japan

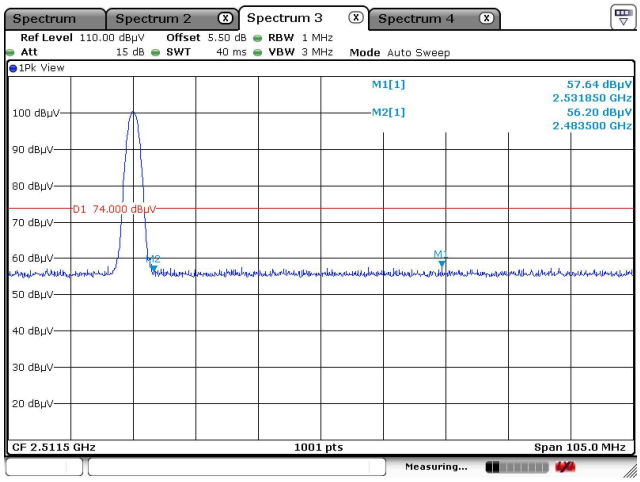
[3-DH5]
Channel: High
Horizontal
Peak



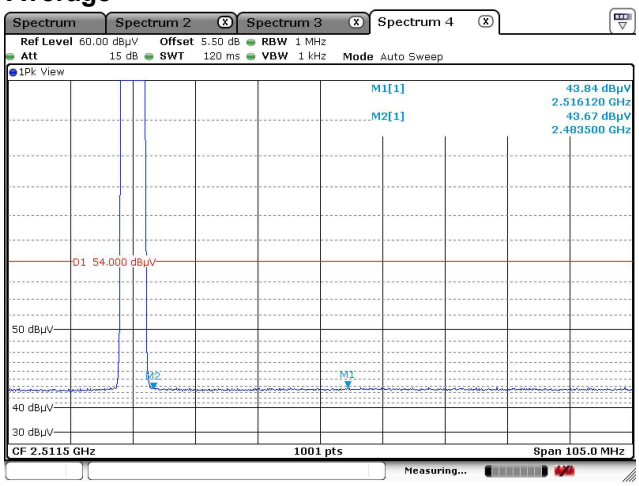
Average



Vertical
Peak



Average



Japan

4.10 AC Power Line Conducted Emissions

4.10.1 Measurement procedure

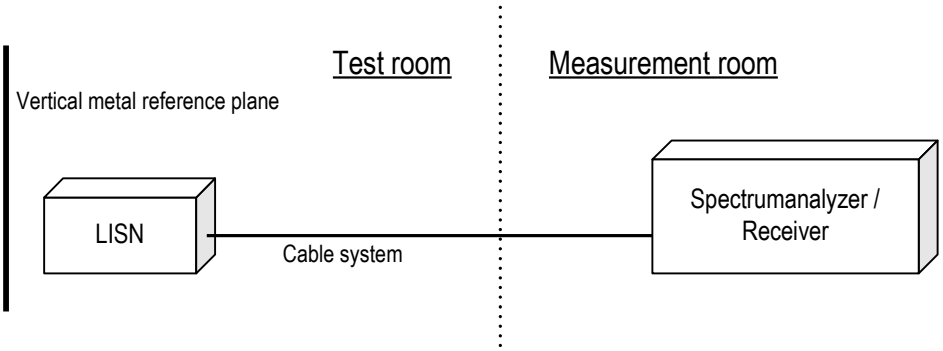
[FCC 15.207]

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



Japan

4.10.2 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

4.10.3 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

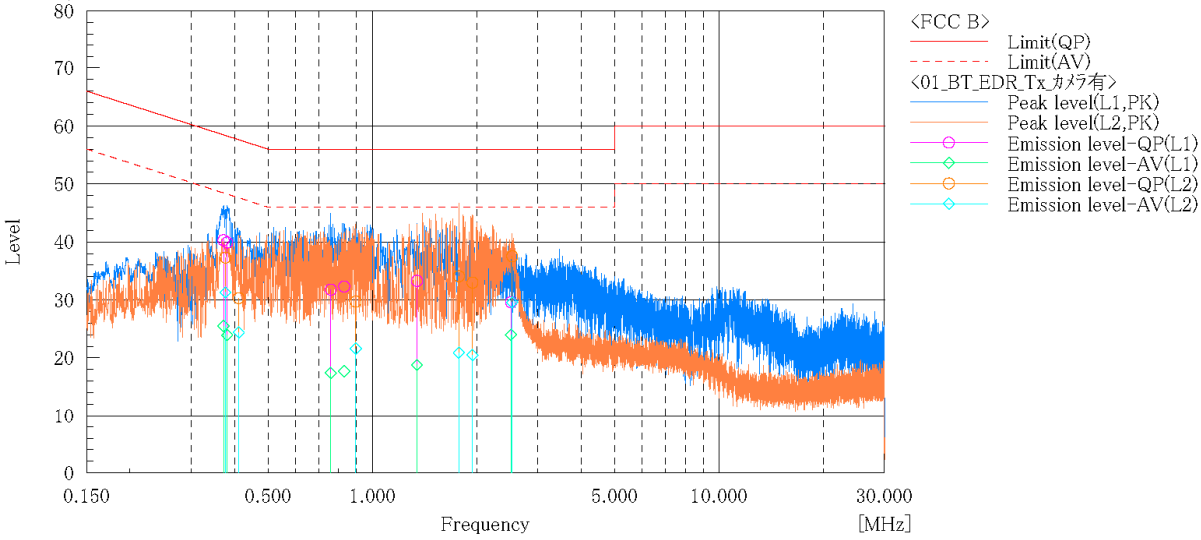
4.10.4 Test data

[With camera]

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

TUV SUD Japan Ltd. | <<Data Sheet No.01>> | 6 February,2019 02:30

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_EDR_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	30.0	15.2	10.3	40.3	25.5	58.5	48.5	18.2	23.0
2	0.381	29.6	13.6	10.3	39.9	23.9	58.3	48.3	18.4	24.4
3	0.759	21.5	7.1	10.3	31.8	17.4	56.0	46.0	24.2	28.6
4	0.829	22.0	7.4	10.3	32.3	17.7	56.0	46.0	23.7	28.3
5	1.345	23.0	8.5	10.3	33.3	18.8	56.0	46.0	22.7	27.2
6	2.511	19.2	13.6	10.4	29.6	24.0	56.0	46.0	26.4	22.0

--- 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	0.377	27.0	21.0	10.3	37.3	31.3	58.3	48.3	21.0	17.0
2	0.412	20.0	14.1	10.3	30.3	24.4	57.6	47.6	27.3	23.2
3	0.895	19.4	11.3	10.3	29.7	21.6	56.0	46.0	26.3	24.4
4	1.777	23.7	10.5	10.4	34.1	20.9	56.0	46.0	21.9	25.1
5	1.945	22.6	10.1	10.4	33.0	20.5	56.0	46.0	23.0	25.5
6	2.532	27.1	19.2	10.4	37.5	29.6	56.0	46.0	18.5	16.4

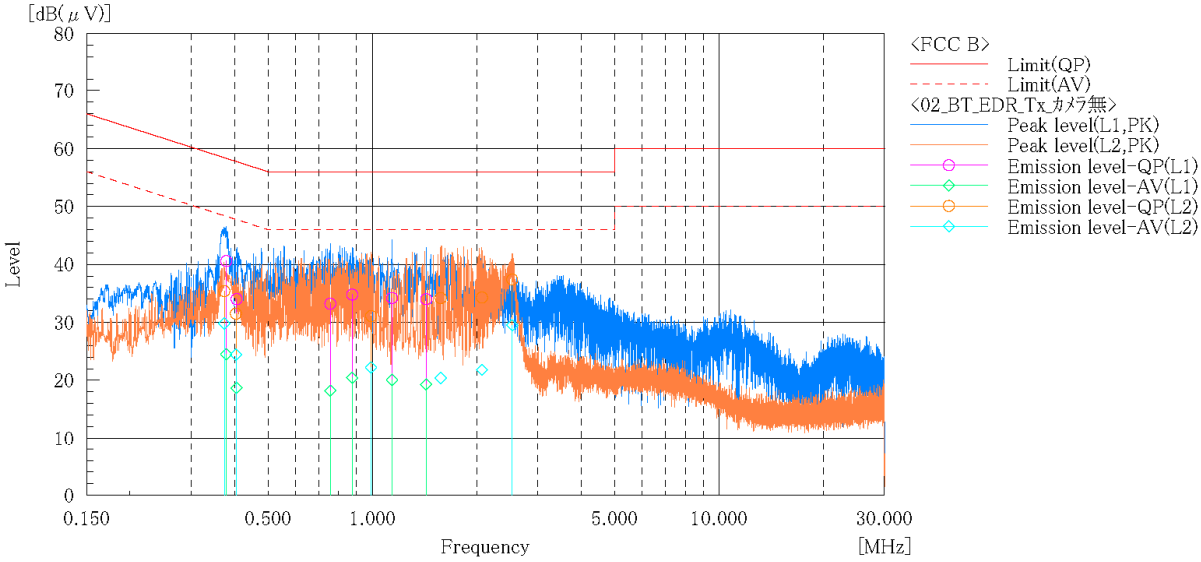
Japan

[Without camera]

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

TUV SUD Japan Ltd. | <<Data Sheet No.02>> | 6 February,2019 03:00

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_EDR_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	0.379	30.3	14.2	10.3	40.6	24.5	58.3	48.3	17.7	23.8
2	0.406	23.7	8.4	10.3	34.0	18.7	57.7	47.7	23.7	29.0
3	0.756	22.9	7.9	10.3	33.2	18.2	56.0	46.0	22.8	27.8
4	0.875	24.5	10.1	10.3	34.8	20.4	56.0	46.0	21.2	25.6
5	1.140	23.9	9.8	10.3	34.2	20.1	56.0	46.0	21.8	25.9
6	1.430	23.7	9.0	10.3	34.0	19.3	56.0	46.0	22.0	26.7

--- 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	25.1	19.5	10.3	35.4	29.8	58.4	48.4	23.0	18.6
2	0.404	21.2	14.1	10.3	31.5	24.4	57.8	47.8	26.3	23.4
3	0.992	20.8	11.9	10.3	31.1	22.2	56.0	46.0	24.9	23.8
4	1.575	23.9	10.1	10.3	34.2	20.4	56.0	46.0	21.8	25.6
5	2.070	23.9	11.4	10.4	34.3	21.8	56.0	46.0	21.7	24.2
6	2.532	27.0	19.1	10.4	37.4	29.5	56.0	46.0	18.6	16.5

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

Japan

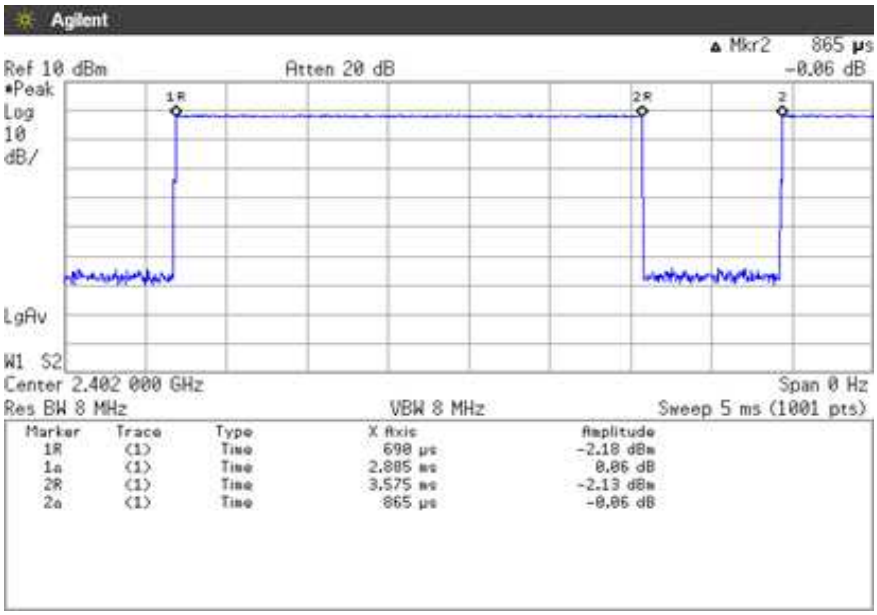
Conducted emission at mains port

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) = 2885[µs] / (2885[µs] + 865[µs]) = 76.93[%]