

TEST REPORT

For

Receiver

In conformity with

FCC CFR 47 Part15 Subpart C

Model : RC-R02

FCC ID : AORMETROLRCR001

Report No. : ERY1807Z25R1

Issue Date : July 25, 2018

Prepared for

Metrol Co., Ltd.

1-100 Takamatsu-cho, Tachikawa City, Tokyo 190-0011 Japan

Prepared by

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Table of contents

1	General information.....	3
1.1	Product description	3
1.2	Test(s) performed/ Summary of test result	3
1.3	Test facility	4
1.4	Measurement uncertainty.....	5
1.5	Summary of test results.....	5
1.6	Setup of equipment under test (EUT)	6
1.6.1	Test configuration of EUT	6
1.6.2	Operating condition:	6
1.6.3	Setup diagram of tested system.....	7
1.7	Equipment modifications.....	7
1.8	Deviation from the standard	7
2	Test procedure and test data	8
2.1	Occupied Bandwidth (99%).....	8
2.2	6dB Bandwidth	10
2.3	Peak Output Power	12
2.4	Conducted Spurious Emissions.....	14
2.5	Power Spectral density.....	19
2.6	Radiated emissions	21
2.7	AC power line conducted emissions.....	37
3	Test setup photographs	39
3.1	Radiated emissions	39
3.2	AC power line conducted emissions.....	40
4	List of utilized test equipment / calibration	41

History

Report No.	Date	Revisions	Issued By
ERY1805Z11R2	May 11, 2018	Initial Issue	K. Onishi
ERY1806Z25R1	June 25, 2018	Correction of test setup photo (Clause 3.1)	K. Onishi
ERY1807Z18R1	July 18, 2018	Correction of antenna gain (Clause 1.1)	K. Onishi
ERY1807Z25R1	July 25, 2018	Correction of H/W, S/W version (Clause 1.1)	K. Onishi

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1 General information

1.1 Product description

Test item : Receiver
Manufacturer : Metrol Co., Ltd.
Address : 1-100 Takamatsu-cho, Tachikawa City, Tokyo 190-0011 Japan
Model : RC-R02
FCC ID : AORMETROLRCR001
Serial number : R1 (RF conducted), R3/R4/R10/R11 (RF radiated)
Hardware version : RCR001
Software version : RCR001
Operating frequency : 2404 - 2476 MHz
Modulation : GFSK
Antenna Gain : +2.08 dBi
Receipt date of EUT : March 5, 2018
Nominal power source voltages : DC 24 V

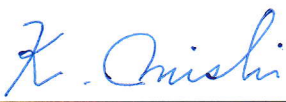
1.2 Test(s) performed/ Summary of test result

Test specification(s) : FCC CFR 47 Part 15 Subpart C (01 Oct. 2017)
Test method(s) : ANSI C63.10: 2013
Test(s) started : March 7, 2018
Test(s) completed : May 8, 2018

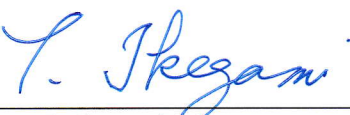
Summary of test result : Complied

Note: The above judgment is only based on the measurement data and it does not include the measurement uncertainty. Accordingly, the statement below is applied to the test result.
The EUT complies with the limit required in the standard in case that the margin is not less than the measurement uncertainty in the Laboratory.
Compliance of the EUT is more probable than non-compliance is case that the margin is less than the measurement uncertainty in the Laboratory.

Test engineer

: 
K. Onishi
Wireless testing laboratory

Reviewer

: 
T. Ikegami
Manager
Wireless testing laboratory

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JP 013124

1.3 Test facility

[Yokohama Laboratory]

Address: 472, Nippa-cho, Kohoku-ku, Yokohama, 223-0057, Japan
TEL: +81-45-534-0645
FAX: +81-45-592-7506

Accredited by National Voluntary Laboratory Accreditation Program (NVLAP) for the emission tests stated in the scope of the certificate under Certificate Number 200780-0

Registered by Innovation, Science and Economic Development Canada (ISED):

The registered facility number is as follows;

Test site (Semi-Anechoic chamber 3m): 6974A-1

Registered by Voluntary Control Council for Interference by Information Technology Equipment (VCCI)

Each registered facility number is as follows;

Test site A-0045

[Kitayamata laboratory]

Address: 3-5-23, Kitayamata, Tsuzuki-ku, Yokohama, 224-0021, Japan
TEL: +81-45-550-3520
FAX: +81-45-592-7506

Accredited by National Voluntary Laboratory Accreditation Program (NVLAP) for the emission tests stated in the scope of the certificate under Certificate Number 200780-0

Registered by Innovation, Science and Economic Development Canada (ISED):

The registered facility number is as follows;

Test site (Semi-Anechoic chamber 3m): 21105-1

Registered by Voluntary Control Council for Interference by Information Technology Equipment (VCCI)

Each registered facility number is as follows;

Test site A-0212

This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.



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1.4 Measurement uncertainty

The treatment of uncertainty is based on the general matters on the definition of uncertainty in “Guide to the expression of uncertainty in measurement (GUM)” published by ISO. The Lab’s uncertainty is determined by referring ETSI TR 100 028-1 V1.4.1 (2001-12).

The uncertainty of the measurement result in the level of confidence of approximately 95% (k=2) is as follows;

Conducted emission (150 kHz - 30 MHz):	± 3.4 dB
Radiated emission (9 kHz - 30 MHz):	± 5.1 dB
Radiated emission (30 MHz - 1000 MHz):	± 5.3 dB
Radiated emission (1 GHz - 6 GHz):	± 5.2 dB
Radiated emission (6 GHz - 18 GHz):	± 5.2 dB
Radiated emission (18 GHz - 26 GHz):	± 5.7 dB

1.5 Summary of test results

Requirement	Section in FCC	Result	Section in this report
Occupied Bandwidth (99 %)	2.1049	Complied	2.1
6 dB Bandwidth	15.247 (a) (2)	Complied	2.2
Conducted Output Power	15.247 (b) (3)	Complied	2.3
Conducted Spurious Emission	15.247 (d)	Complied	2.4
Power Spectral Density	15.247 (e)	Complied	2.5
Radiated Emissions	15.247(d), 15.205 (a)	Complied	2.6
AC power line conducted emissions	15.207	Complied	2.7

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1.6 Setup of equipment under test (EUT)

1.6.1 Test configuration of EUT

Equipment(s) under test

No.	Item	Manufacture	Model No.	Serial No.
A1	Receiver (for conducted)	Metrol Co., Ltd.	RC-R02	R1
A2	Receiver (for radiated)	Metrol Co., Ltd.	RC-R02	R3/R11 (*)
A3	Receiver (for radiated)	Metrol Co., Ltd.	RC-R02	R4/R10 (*)

Note: The difference between R3/R11 and R4/R10 is the direction of antenna.

Support Equipment(s)

No.	Item	Manufacture	Model No.	Serial No.
B	AC adapter	GO FORWARD ENTERPRISE CORP.	GF12-US2405	-
-	-	-	-	-

Connected cable(s)

No.	Item	Identification (Manu. etc.)	Cable Shielded	Ferrite Core	Length [m]
1-1	Data cable	-	No	No	4.3
1-2	Data cable	-	No	No	0.6
2	DC cable	GO FORWARD ENTERPRISE CORP.	No	No	1.6

1.6.2 Operating condition:

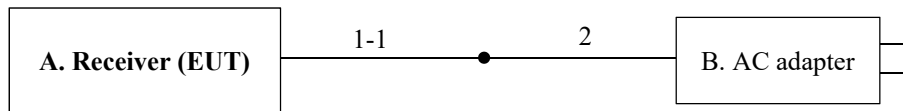
- Tx (2404MHz): The EUT is in normal transmission mode at 2404MHz
- Tx (2440MHz): The EUT is in normal transmission mode at 2440MHz
- Tx (2476MHz): The EUT is in normal transmission mode at 2476MHz

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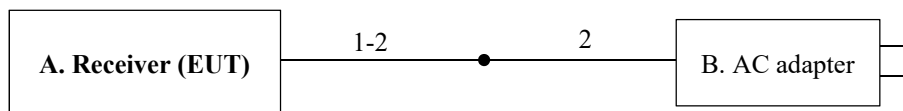
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1.6.3 Setup diagram of tested system

[Configuration 1]



[Configuration 2]



1.7 Equipment modifications

No modifications have been made to the equipment in order to achieve compliance with the applicable standards described in clause 1.2.

1.8 Deviation from the standard

No deviations from the standards described in clause 1.2.

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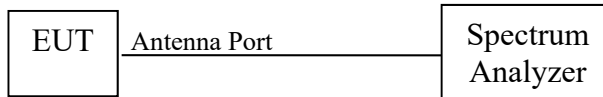
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2 Test procedure and test data

2.1 Occupied Bandwidth (99%)

Test setup

Test setup is the following drawing. The antenna port of EUT was connected to the spectrum analyzer.



Test procedure

Spectrum analyzer is set as below according to ANSI C63.10 clause 6.9

- RBW: 1 to 5 % of OBW
- VBW > 3 x RBW
- Span: OBW x 1.5 to 5
- Trace: Max hold

Limitation

There are no limitations.

The measurement value is used for the emission designator.

Test equipment used (refer to List of utilized test equipment)

SA06	CL31	-	-	-	-
------	------	---	---	---	---

Test results

Test sample: R1

Configuration: 1

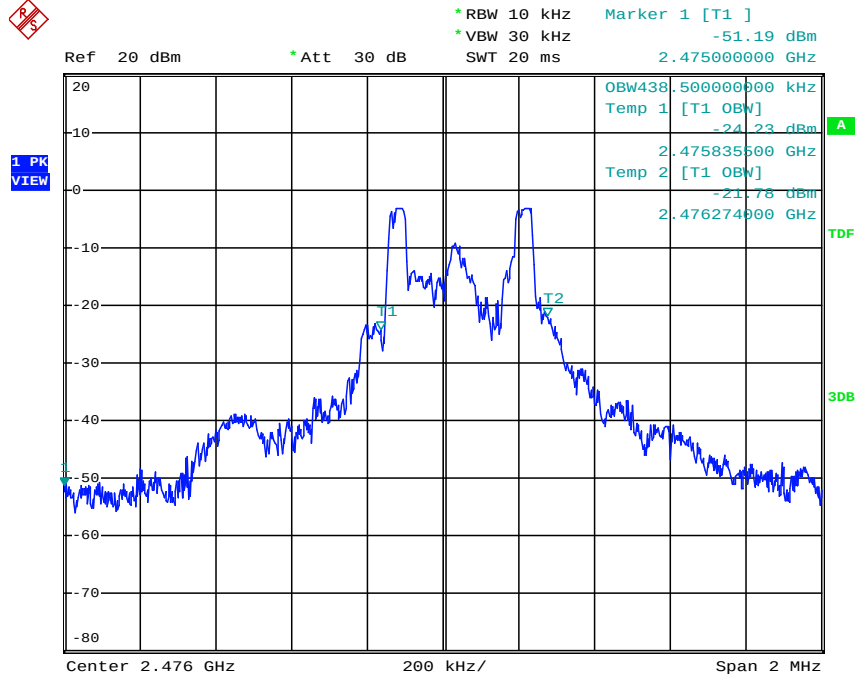
Transmission Frequency [MHz]	Occupied Bandwidth [kHz]
2404	428.0
2440	432.0
2476	438.5

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[Chart]

Tx (2476 MHz)



Tested Date: March 15, 2018
Humidity: 49 %

Temperature: 21 degC
Atmos. Press: 1017 hPa

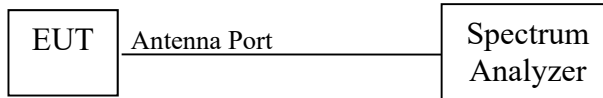
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2.2 6dB Bandwidth

Test setup

Test setup is the following drawing. The antenna port of EUT was connected to the spectrum analyzer.



Test procedure

Spectrum analyzer is set as below according to ANSI C63.10 clause 11.8

- RBW: 100 kHz
- VBW: 300 kHz
- Detector: Peak
- Trace: Max hold

Applicable rule and limitation

15.247 (a) (2) Systems using digital modulation techniques may operate in the 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.

Test equipment used (refer to List of utilized test equipment)

SA06	CL31	-	-	-	-
------	------	---	---	---	---

Test results - Complied with requirement

Test Data

Test sample: R1
Configuration: 1

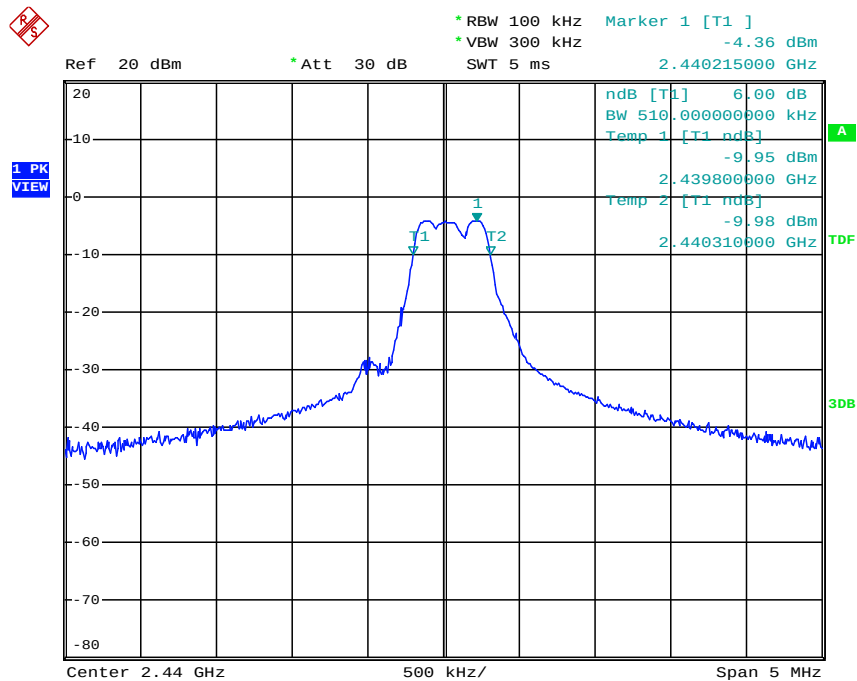
Transmission Frequency [MHz]	6 dB Bandwidth [kHz]
2404	510
2440	510
2476	520

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[Chart]

Tx (2440 MHz)



Tested Date: March 15, 2018
Humidity: 49 %

Temperature: 21 degC
Atmos. Press: 1017 hPa

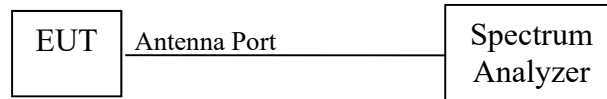
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2.3 Peak Output Power

Test setup

Test setup is the following drawing. The antenna port of EUT was connected to the spectrum analyzer.



Test procedure

Spectrum analyzer is set as below according to ANSI C63.10 clause 11.9

- RBW > 6dB BW
- Span > 3 x RBW
- Trace: Max hold
- VBW > 3 x RBW
- Detector: Peak

Applicable rule and limitation

15.247(b) (3); For systems using digital modulation in the 902–928 MHz, 2400–2483.5MHz, and 5725–5850 MHz bands: 1 Watt (30 dBm).

Test equipment used (refer to List of utilized test equipment)

SA06	CL31	-	-	-	-
------	------	---	---	---	---

Test results - Complied with requirement

Test Data

Test sample: R1
Configuration: 1

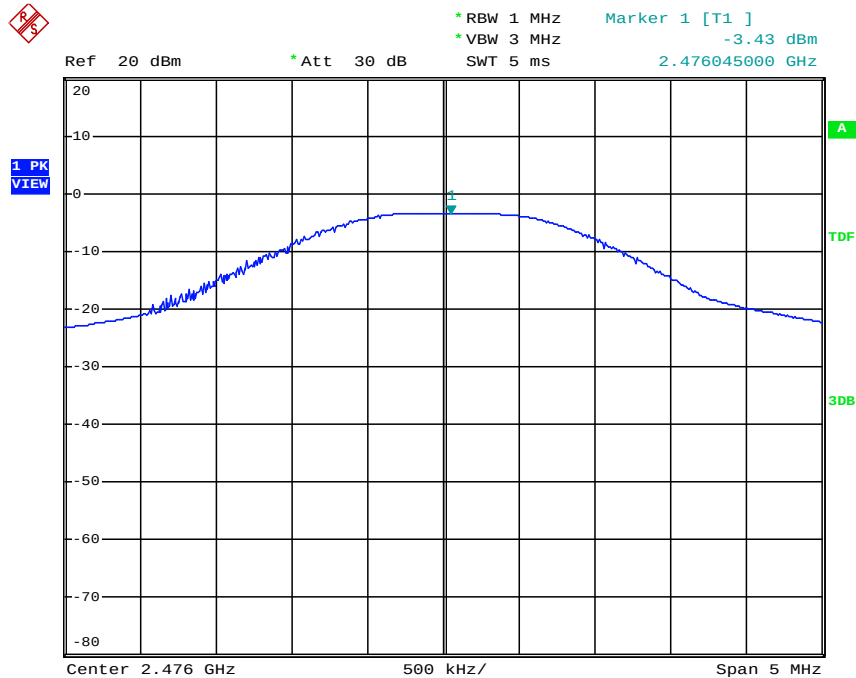
Transmission Frequency [MHz]	Output Power [dBm]
2404	-4.68
2440	-4.17
2476	-3.43

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[Chart]

Tx (2476 MHz)



Tested Date: March 15, 2018
Humidity: 49 %

Temperature: 21 degC
Atmos. Press: 1017 hPa

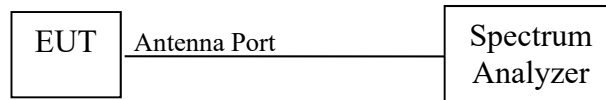
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2.4 Conducted Spurious Emissions

Test setup

Test setup is the following drawing. The antenna port of EUT was connected to the spectrum analyzer.



Test procedure

Spectrum analyzer is set as below according to ANSI C63.10 clause 7.8.8

- RBW: 100 kHz
- VBW: 300 kHz
- Detector: Peak
- Trace: Max hold

Limitation

15.247(d); In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits.

Test equipment used (refer to List of utilized test equipment)

SA06	CL31	-	-	-	-
------	------	---	---	---	---

Test results - Complied with requirement

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Test Data

Test sample: R1
Configuration: 1

Operating mode: Tx (2404 MHz)

Frequency [GHz]	Spurious level [dBm]	Carrier level [dBm]	20dB below [dBm]
1.202	-46.30	-4.80	-24.80
4.808	-40.86	-4.80	-24.80
9.615	-42.63	-4.80	-24.80

Operating mode: Tx (2440 MHz)

Frequency [GHz]	Spurious level [dBm]	Carrier level [dBm]	20dB below [dBm]
1.220	-45.42	-4.27	-24.27
4.880	-41.87	-4.27	-24.27
9.759	-40.87	-4.27	-24.27

Operating mode: Tx (2476 MHz)

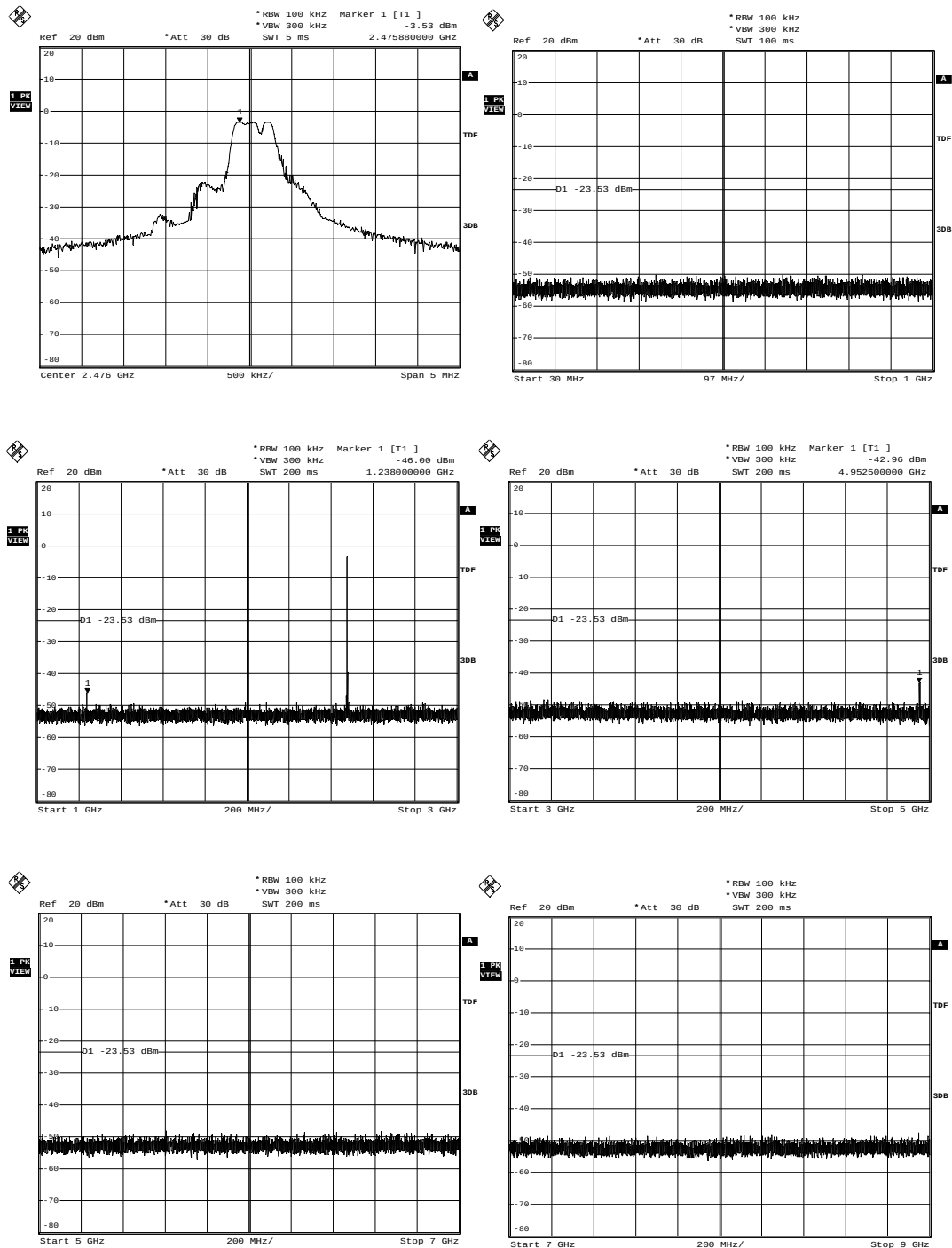
Frequency [GHz]	Spurious level [dBm]	Carrier level [dBm]	20dB below [dBm]
1.238	-46.00	-3.53	-23.53
4.952	-42.96	-3.53	-23.53
9.904	-39.41	-3.53	-23.53

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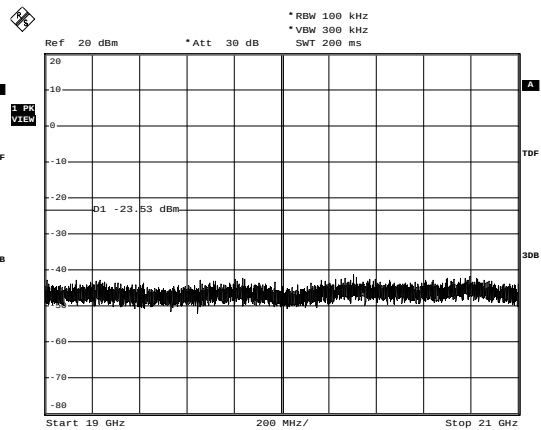
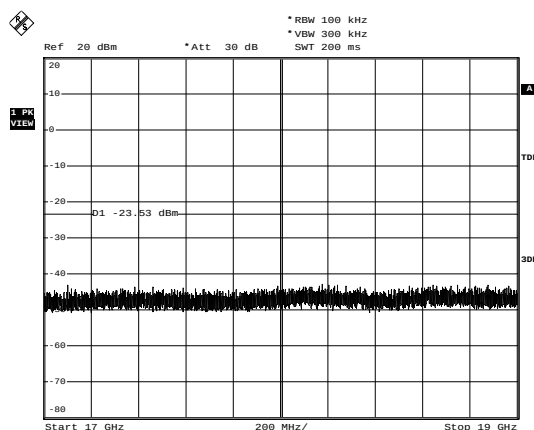
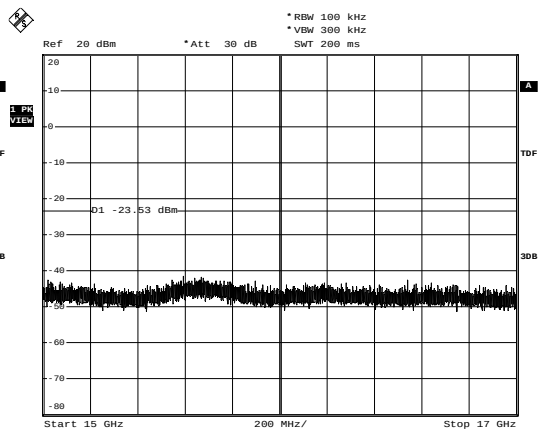
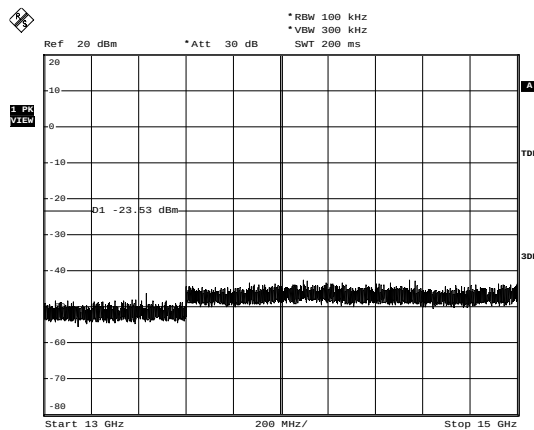
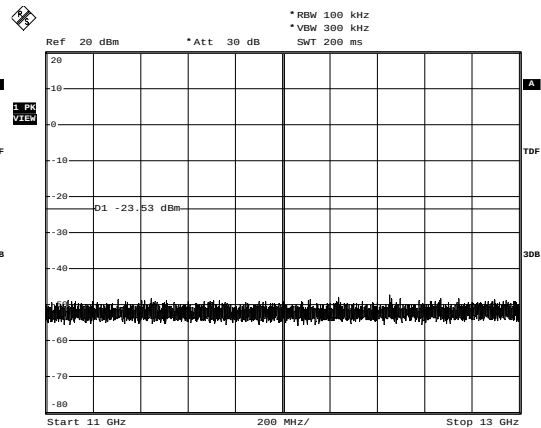
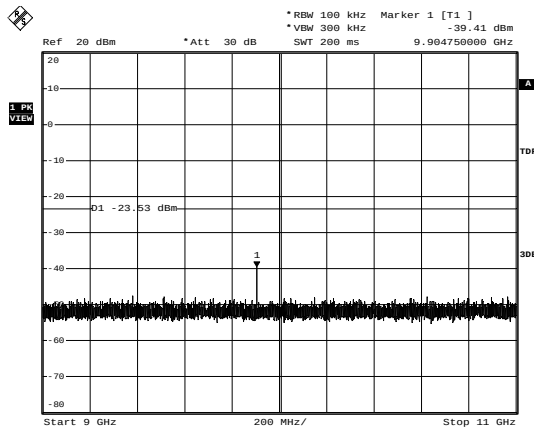
[Chart]

Tx (2476 MHz)



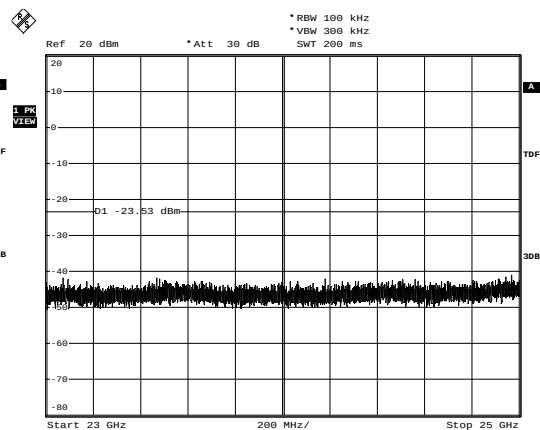
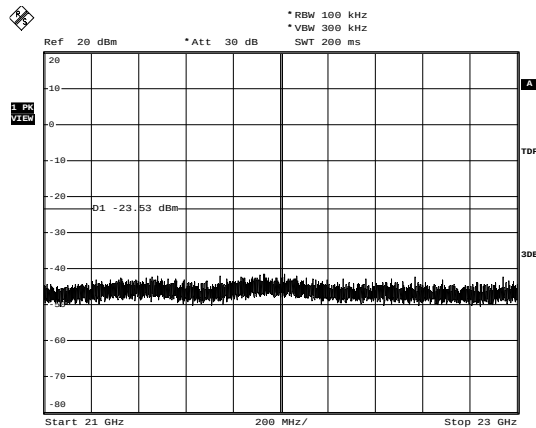
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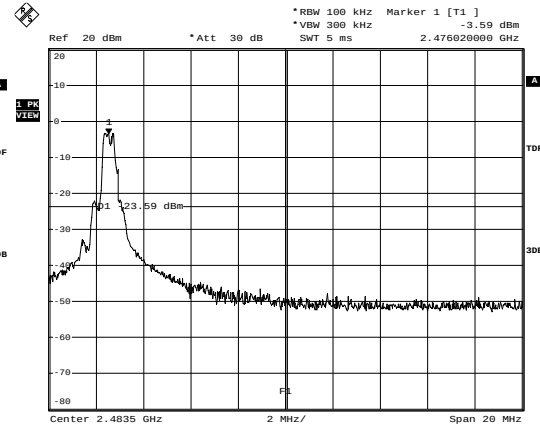
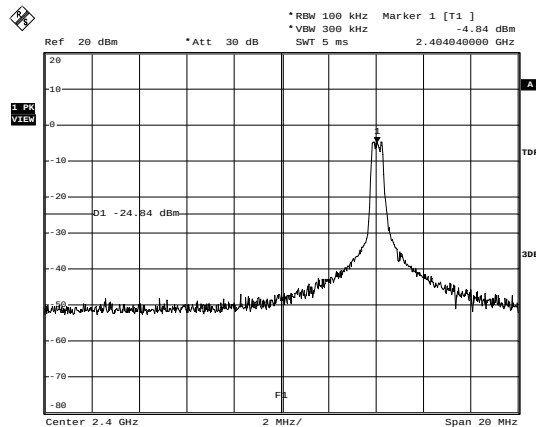


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[Bandedge]



Tested Date: March 15, 2018
Humidity: 49 %

Temperature: 21 degC
Atmos. Press: 1017 hPa

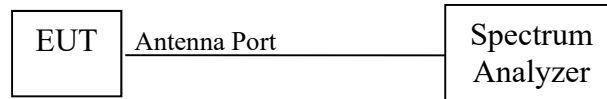
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2.5 Power Spectral density

Test setup

Test setup is the following drawing. The antenna port of EUT was connected to the spectrum analyzer.



Test procedure

Spectrum analyzer is set as below according to ANSI C63.10 clause 11.10

- RBW: 3 kHz
- Span > 1.5 x 6dB BW
- Trace: Max hold
- VBW: 10 kHz
- Detector: Peak

Limitation

15.247(e); For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

Test equipment used (refer to List of utilized test equipment)

SA06	CL31	-	-	-	-
------	------	---	---	---	---

Test results - Complied with requirement

Test Data

Test sample: R1
Configuration: 1

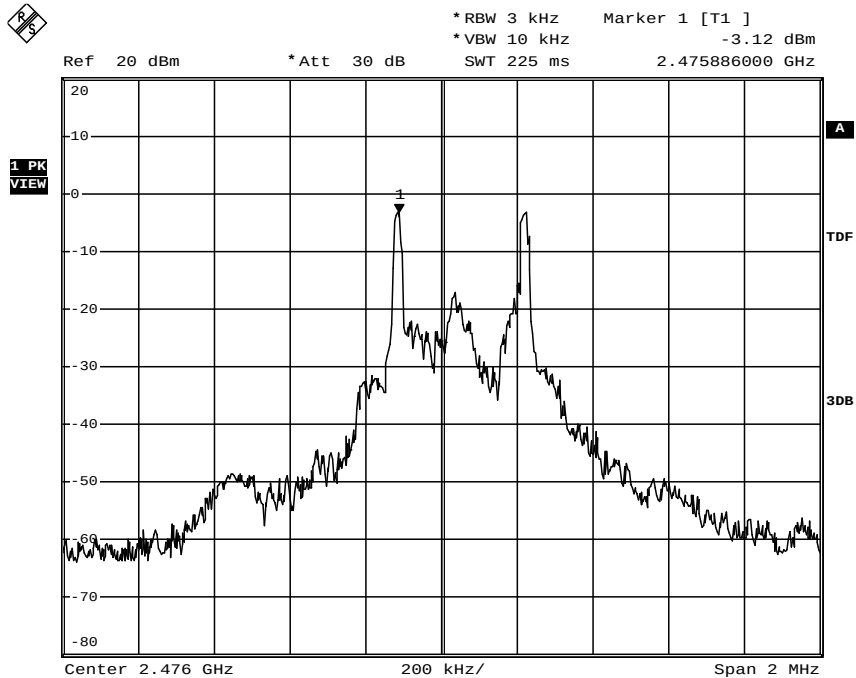
Transmission Frequency [MHz]	Spectral Density [dBm]
2404	-4.31
2440	-3.91
2476	-3.12

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[Chart]

Tx (2476 MHz)



Tested Date: March 15, 2018
Humidity: 49 %

Temperature: 21 degC
Atmos. Press: 1017 hPa

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2.6 Radiated emissions (for restricted frequency band)

Test setup

Test setup was implemented according to the method of ANSI C63.10 clause 6.

Test procedure

Measurement procedures were implemented according to the method of ANSI C63.10 clauses 6.
The test receiver is set as below

- [9 - 150 kHz]
RBW: 200 Hz, Detector: QP
- [150 kHz - 30 MHz]
RBW: 9 kHz, Detector: QP
- [30 - 1000 MHz]
RBW: 120 kHz, Detector: QP
- [above 1000 MHz]
RBW: 1 MHz, Detector: Ave/PK

Applicable rule and limitation

FCC 15.205 restricted bands of operation

Except as shown in paragraph 15.205 (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
0.490 - 0.510	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.025 - 8.5
4.17725 - 4.17775	37.5 - 38.25	1435 - 1626.5	9.0 - 9.2
4.20725 - 4.20775	73 - 74.6	1645.5 - 1646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1660 - 1710	10.6 - 12.7
6.26775 - 6.26825	108 - 121.94	1718.8 - 1722.2	13.25 - 13.4
6.31175 - 6.31225	123 - 138	2200 - 2300	14.47 - 14.5
8.291 - 8.294	149.9 - 150.05	2310 - 2390	15.35 - 16.2
8.362 - 8.366	156.52475 - 156.52525	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.7 - 156.9	2690 - 2900	22.01 - 23.12
8.41425 - 8.41475	162.0125 - 167.17	3260 - 3267	23.6 - 24.0
12.29 - 12.293	167.72 - 173.2	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	240 - 285	3345.8 - 3358	36.43 - 36.5
12.57675 - 12.57725	322 - 335.4	3600 - 4400	38.6 -

The field strength of emissions appearing within these frequency bands shall not exceed the limits shown in FCC 15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in FCC 15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000 MHz, compliance with the emission limits in Section 15.209 shall be demonstrated based on the average value of the measured emissions.

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FCC 15.209; Field strength limits

Frequency [MHz]	Field Strength [μ V/m]	Measurement Distance [m]	Field Strength [dB μ V/m]
30 – 88	100	3	40.0
88 – 216	150	3	43.5
216 – 960	200	3	46.0
Above 960	500	3	53.9

In the emission table above, the tighter limit applies at the band edges.

The emission limits shown in the above table are based on measurements employing a quasi-peak detector.

Test results - Complied with requirement

Test equipment used (refer to List of utilized test equipment)

AC01	CL11	TR06	PR21	BA07	CL30	CL38	PR12
DH06	CH01	SH01	LP06	AT33	HPF4	-	-

Test software used

EMI1 Ver. 5.7

Calculation method

The Correction Factor and Result are calculated as followings.

Correction Factor [dB/m] = Ant. Factor [dB/m] + Loss [dB] – Gain [dB]

Result [dB μ V/m] = Reading [dB μ V] + Correction Factor [dB/m]

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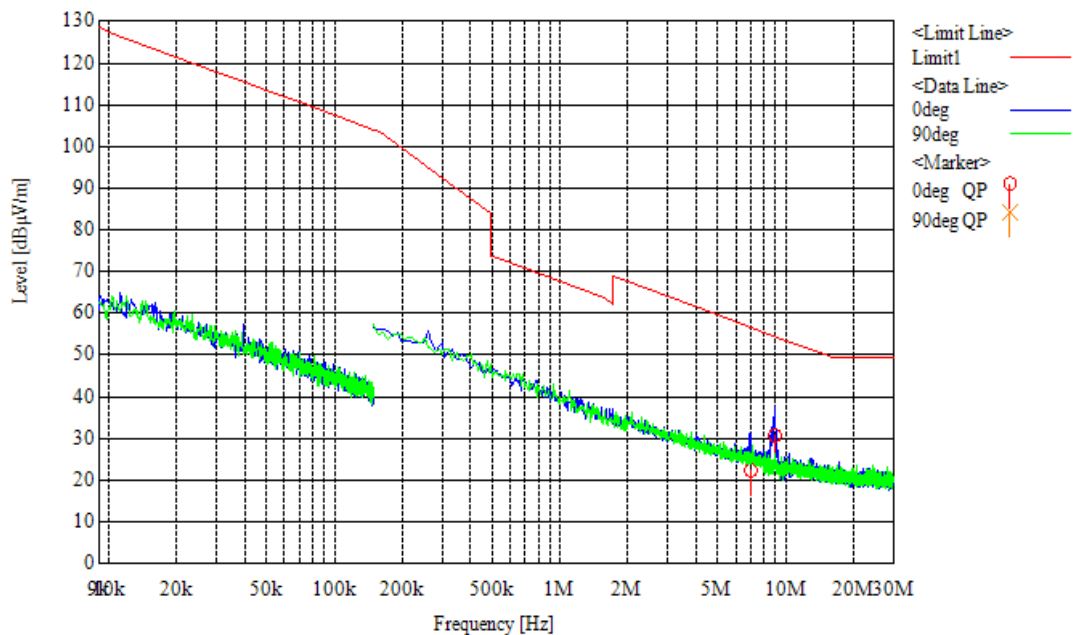
Test Data (9 kHz - 30MHz)

Test sample: R11
Configuration: 1
Operating mode: 2404MHz, Y-plane (Worst)
Test site: Yokohama Laboratory
Measurement distance: 3 m

[Emission level]

No.	Frequency [MHz]	Reading [dBμV]	Factor [dB/m]	Loss [dB]	Gain [dB]	Result [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Ant.
1	6.96406	11.1	10.8	0.5	0.0	22.4	56.6	34.2	0deg
2	8.94598	19.4	10.6	0.6	0.0	30.6	54.5	23.9	0deg

[Chart]



Tested Date: May 8, 2018
Humidity: 56 %

Temperature: 22 degC
Atmos. Press: 1014 hPa

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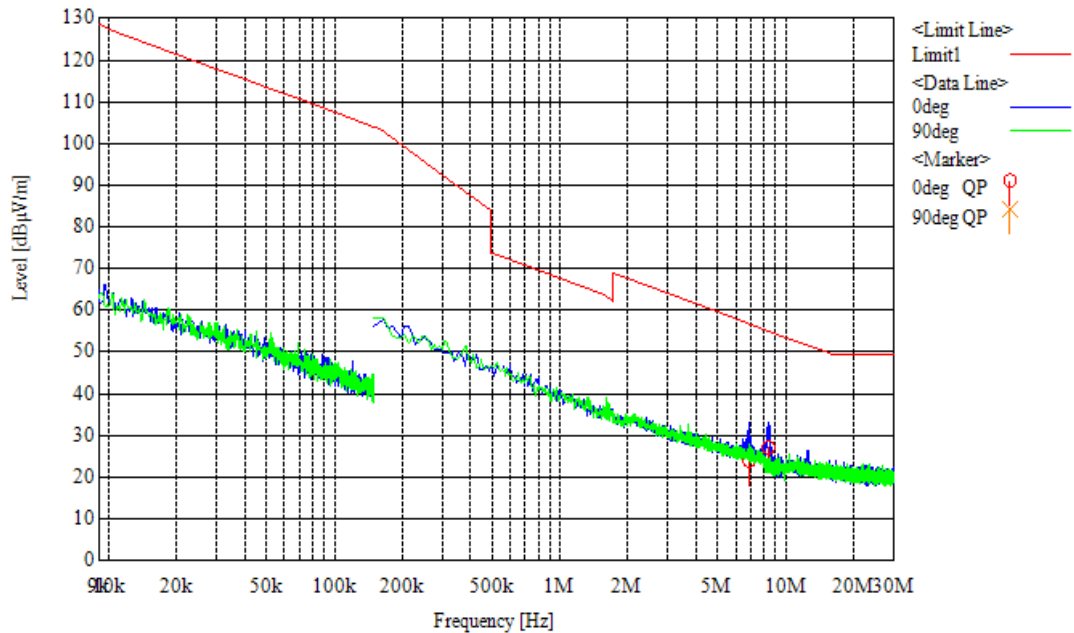
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Test sample: R10
Configuration: 1
Operating mode: 2404MHz, Z-plane (Worst)
Test site: Yokohama Laboratory
Measurement distance: 3 m

[Emission level]

No.	Frequency [MHz]	Reading [dBμV]	Factor [dB/m]	Loss [dB]	Gain [dB]	Result [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Ant.
1	6.85549	12.6	10.8	0.5	0.0	23.9	56.8	32.9	0deg
2	8.41795	16.0	10.6	0.6	0.0	27.2	55.0	27.8	0deg

[Chart]



Tested Date: May 8, 2018
Humidity: 56 %

Temperature: 22 degC
Atmos. Press: 1014 hPa

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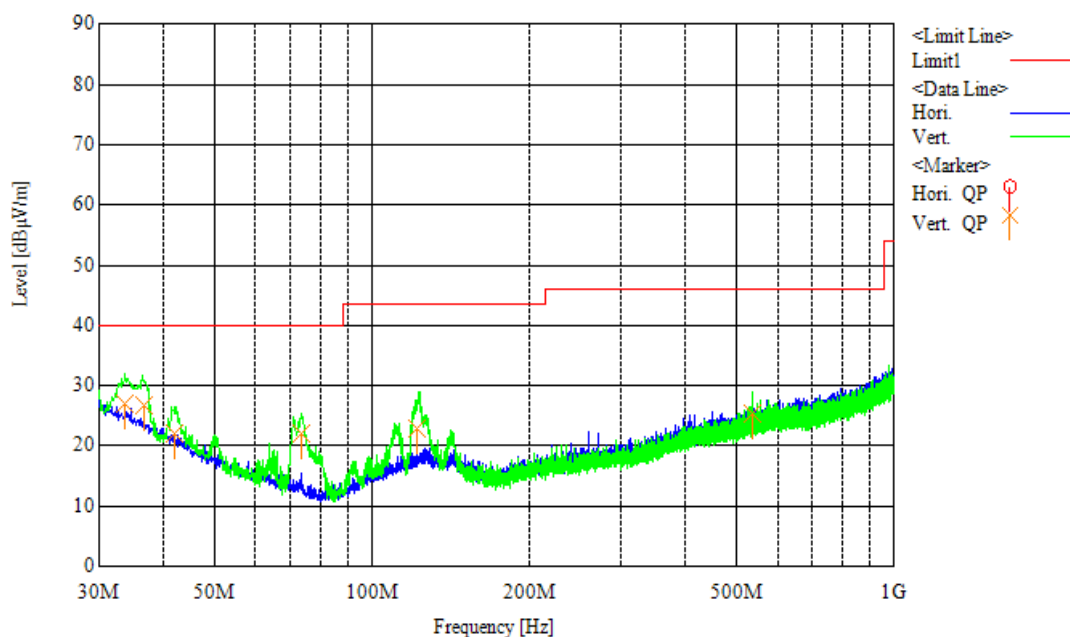
Test Data (30 - 1000MHz)

Test sample: R11
Configuration: 1
Operating mode: 2404MHz, Y-plane (Worst)
Test site: Yokohama Laboratory
Measurement distance: 3 m

[Emission level]

No.	Frequency [MHz]	Reading [dBμV]	Factor [dB/m]	Loss [dB]	Gain [dB]	Result [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Ant.
1	33.791	29.9	20.6	6.9	30.4	27.0	40.0	13.0	Vert.
2	36.641	31.0	19.2	6.9	30.4	26.7	40.0	13.3	Vert.
3	41.838	28.7	16.7	7.0	30.4	22.0	40.0	18.0	Vert.
4	73.302	36.9	8.1	7.4	30.3	22.1	40.0	17.9	Vert.
5	122.428	32.7	12.5	7.9	30.2	22.9	43.5	20.6	Vert.
6	537.885	26.9	17.7	10.9	30.1	25.4	46.0	20.6	Vert.

[Chart]



Tested Date: May 8, 2018
Humidity: 56 %

Temperature: 22 degC
Atmos. Press: 1014 hPa

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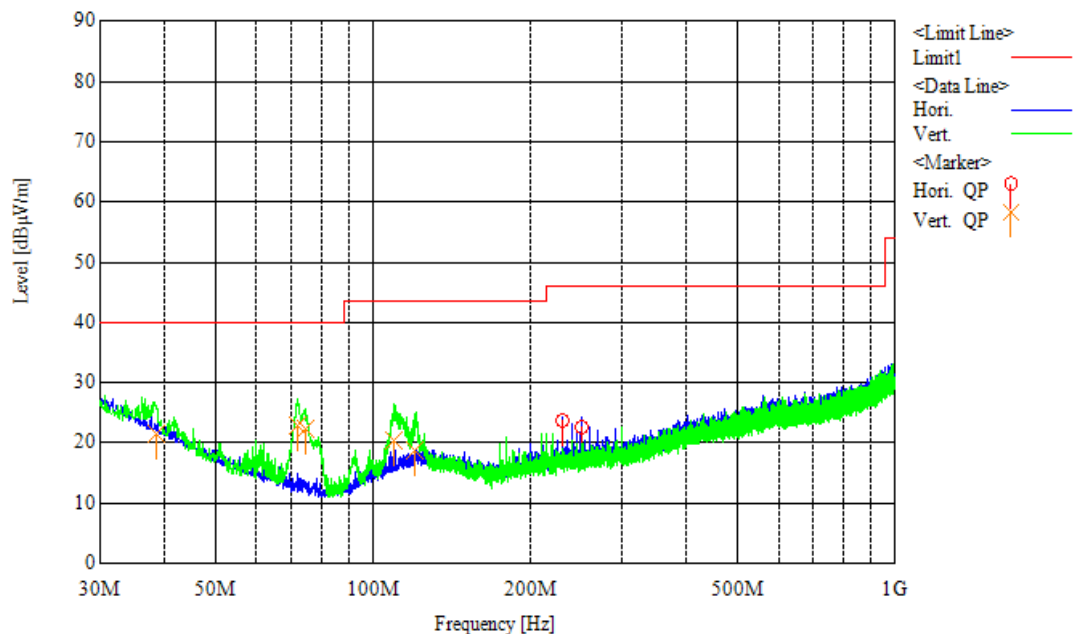
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Test sample: R10
Configuration: 1
Operating mode: 2404MHz, Z-plane (Worst)
Test site: Yokohama Laboratory
Measurement distance: 3 m

[Emission level]

No.	Frequency [MHz]	Reading [dBμV]	Factor [dB/m]	Loss [dB]	Gain [dB]	Result [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Ant.
1	230.962	33.0	12.1	8.9	30.2	23.8	46.0	22.2	Hori.
2	251.044	31.4	12.5	9.0	30.2	22.7	46.0	23.3	Hori.
3	38.520	26.8	18.3	6.9	30.4	21.6	40.0	18.4	Vert.
4	72.000	37.4	8.3	7.4	30.3	22.8	40.0	17.2	Vert.
5	74.270	37.1	8.0	7.4	30.3	22.2	40.0	17.8	Vert.
6	109.776	31.3	11.5	7.8	30.2	20.4	43.5	23.1	Vert.
7	120.883	28.6	12.5	7.9	30.2	18.8	43.5	24.7	Vert.

[Chart]



Tested Date: May 8, 2018
Humidity: 56 %

Temperature: 22 degC
Atmos. Press: 1014 hPa

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Test Data (above 1000MHz)

Test sample: R3
Configuration: 1
Operating mode: 2404MHz
Test site: Yokohama Laboratory
Measurement distance: 3 m

[Emission level] X-plane

No.	Frequency [MHz]	Reading PK [dBμV]	Reading Ave [dBμV]	C.Factor [dB]	Result PK [dBμV/m]	Result Ave [dBμV/m]	Limit PK [dBμV/m]	Limit Ave [dBμV/m]	Margin PK [dB]	Margin Ave [dB]	Ant.
1	4808.000	49.0	46.2	2.7	51.7	48.9	73.9	53.9	22.2	5.0	Hori.
2	4808.000	47.8	43.9	2.7	50.5	46.6	73.9	53.9	23.4	7.3	Vert.
3	12020.000	43.3	38.6	4.5	47.8	43.1	73.9	53.9	26.1	10.8	Hori.

[Emission level] Y-plane

No.	Frequency [MHz]	Reading PK [dBμV]	Reading Ave [dBμV]	C.Factor [dB]	Result PK [dBμV/m]	Result Ave [dBμV/m]	Limit PK [dBμV/m]	Limit Ave [dBμV/m]	Margin PK [dB]	Margin Ave [dB]	Ant.
1	4808.000	49.4	46.8	2.7	52.1	49.5	73.9	53.9	21.8	4.4	Hori.
2	4808.000	51.8	49.8	2.7	54.5	52.5	73.9	53.9	19.4	1.4	Vert.
3	12020.000	42.9	38.2	4.5	47.4	42.7	73.9	53.9	26.5	11.2	Hori.
4	12020.000	44.5	40.4	4.5	49.0	44.9	73.9	53.9	24.9	9.0	Vert.

[Emission level] Z-plane

No.	Frequency [MHz]	Reading PK [dBμV]	Reading Ave [dBμV]	C.Factor [dB]	Result PK [dBμV/m]	Result Ave [dBμV/m]	Limit PK [dBμV/m]	Limit Ave [dBμV/m]	Margin PK [dB]	Margin Ave [dB]	Ant.
1	4808.000	51.0	49.1	2.7	53.7	51.8	73.9	53.9	20.2	2.1	Hori.
2	4808.000	49.9	46.9	2.7	52.6	49.6	73.9	53.9	21.3	4.3	Vert.
3	12020.000	44.0	38.3	4.5	48.5	42.8	73.9	53.9	25.4	11.1	Hori.
4	12020.000	43.9	38.9	4.5	48.4	43.4	73.9	53.9	25.5	10.5	Vert.

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Test sample: R4
Configuration: 1
Operating mode: 2404MHz
Test site: Yokohama Laboratory
Measurement distance: 3 m

[Emission level] X-plane

No.	Frequency [MHz]	Reading PK [dBμV]	Reading Ave [dBμV]	C.Factor [dB]	Result PK [dBμV/m]	Result Ave [dBμV/m]	Limit PK [dBμV/m]	Limit Ave [dBμV/m]	Margin PK [dB]	Margin Ave [dB]	Ant.
1	4808.000	49.8	46.8	2.7	52.5	49.5	73.9	53.9	21.4	4.4	Hori.
2	4808.000	52.0	50.2	2.7	54.7	52.9	73.9	53.9	19.2	1.0	Vert.
3	12020.000	42.8	37.1	4.5	47.3	41.6	73.9	53.9	26.6	12.3	Vert.

[Emission level] Y-plane

No.	Frequency [MHz]	Reading PK [dBμV]	Reading Ave [dBμV]	C.Factor [dB]	Result PK [dBμV/m]	Result Ave [dBμV/m]	Limit PK [dBμV/m]	Limit Ave [dBμV/m]	Margin PK [dB]	Margin Ave [dB]	Ant.
1	4808.000	51.7	49.5	2.7	54.4	52.2	73.9	53.9	19.5	1.7	Hori.
2	4808.000	49.6	47.3	2.7	52.3	50.0	73.9	53.9	21.6	3.9	Vert.
3	12020.000	42.5	35.6	4.5	47.0	40.1	73.9	53.9	26.9	13.8	Hori.
4	12020.000	43.7	38.0	4.5	48.2	42.5	73.9	53.9	25.7	11.4	Vert.

[Emission level] Z-plane

No.	Frequency [MHz]	Reading PK [dBμV]	Reading Ave [dBμV]	C.Factor [dB]	Result PK [dBμV/m]	Result Ave [dBμV/m]	Limit PK [dBμV/m]	Limit Ave [dBμV/m]	Margin PK [dB]	Margin Ave [dB]	Ant.
1	4808.000	52.7	50.9	2.7	55.4	53.6	73.9	53.9	18.5	0.3	Hori.
2	4808.000	48.5	45.7	2.7	51.2	48.4	73.9	53.9	22.7	5.5	Vert.
3	12020.000	43.0	38.1	4.5	47.5	42.6	73.9	53.9	26.4	11.3	Hori.

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Test sample: R3
Configuration: 1
Operating mode: 2440MHz
Test site: Yokohama Laboratory
Measurement distance: 3 m

[Emission level] X-plane

No.	Frequency [MHz]	Reading PK [dBμV]	Reading Ave [dBμV]	C.Factor [dB]	Result PK [dBμV/m]	Result Ave [dBμV/m]	Limit PK [dBμV/m]	Limit Ave [dBμV/m]	Margin PK [dB]	Margin Ave [dB]	Ant.
1	4880.000	47.7	44.4	2.9	50.6	47.3	73.9	53.9	23.3	6.6	Hori.
2	4880.000	47.1	43.2	2.9	50.0	46.1	73.9	53.9	23.9	7.8	Vert.

[Emission level] Y-plane

No.	Frequency [MHz]	Reading PK [dBμV]	Reading Ave [dBμV]	C.Factor [dB]	Result PK [dBμV/m]	Result Ave [dBμV/m]	Limit PK [dBμV/m]	Limit Ave [dBμV/m]	Margin PK [dB]	Margin Ave [dB]	Ant.
1	4880.000	50.5	48.2	2.9	53.4	51.1	73.9	53.9	20.5	2.8	Hori.
2	4880.000	51.3	48.5	2.9	54.2	51.4	73.9	53.9	19.7	2.5	Vert.
3	12200.000	42.4	35.8	4.9	47.3	40.7	73.9	53.9	26.6	13.2	Hori.
4	12200.000	43.1	38.2	4.9	48.0	43.1	73.9	53.9	25.9	10.8	Vert.

[Emission level] Z-plane

No.	Frequency [MHz]	Reading PK [dBμV]	Reading Ave [dBμV]	C.Factor [dB]	Result PK [dBμV/m]	Result Ave [dBμV/m]	Limit PK [dBμV/m]	Limit Ave [dBμV/m]	Margin PK [dB]	Margin Ave [dB]	Ant.
1	4880.000	49.9	47.7	2.9	52.8	50.6	73.9	53.9	21.1	3.3	Hori.
2	4880.000	50.2	48.0	2.9	53.1	50.9	73.9	53.9	20.8	3.0	Vert.
3	12200.000	42.5	36.4	4.9	47.4	41.3	73.9	53.9	26.5	12.6	Hori.

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Test sample: R4
Configuration: 1
Operating mode: 2440MHz
Test site: Yokohama Laboratory
Measurement distance: 3 m

[Emission level] X-plane

No.	Frequency [MHz]	Reading PK [dBμV]	Reading Ave [dBμV]	C.Factor [dB]	Result PK [dBμV/m]	Result Ave [dBμV/m]	Limit PK [dBμV/m]	Limit Ave [dBμV/m]	Margin PK [dB]	Margin Ave [dB]	Ant.
1	4880.000	47.2	43.7	2.9	50.1	46.6	73.9	53.9	23.8	7.3	Hori.
2	4880.000	49.2	46.7	2.9	52.1	49.6	73.9	53.9	21.8	4.3	Vert.
3	12200.000	41.4	34.7	4.9	46.3	39.6	73.9	53.9	27.6	14.3	Vert.

[Emission level] Y-plane

No.	Frequency [MHz]	Reading PK [dBμV]	Reading Ave [dBμV]	C.Factor [dB]	Result PK [dBμV/m]	Result Ave [dBμV/m]	Limit PK [dBμV/m]	Limit Ave [dBμV/m]	Margin PK [dB]	Margin Ave [dB]	Ant.
1	4880.000	50.3	48.0	2.9	53.2	50.9	73.9	53.9	20.7	3.0	Hori.
2	4880.000	48.3	45.5	2.9	51.2	48.4	73.9	53.9	22.7	5.5	Vert.
3	12200.000	42.6	37.2	4.9	47.5	42.1	73.9	53.9	26.4	11.8	Vert.

[Emission level] Z-plane

No.	Frequency [MHz]	Reading PK [dBμV]	Reading Ave [dBμV]	C.Factor [dB]	Result PK [dBμV/m]	Result Ave [dBμV/m]	Limit PK [dBμV/m]	Limit Ave [dBμV/m]	Margin PK [dB]	Margin Ave [dB]	Ant.
1	4880.000	50.0	47.8	2.9	52.9	50.7	73.9	53.9	21.0	3.2	Hori.
2	4880.000	50.0	47.7	2.9	52.9	50.6	73.9	53.9	21.0	3.3	Vert.
3	12200.000	42.4	36.4	4.9	47.3	41.3	73.9	53.9	26.6	12.6	Hori.

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Test sample: R3
Configuration: 1
Operating mode: 2476MHz
Test site: Yokohama Laboratory
Measurement distance: 3 m

[Emission level] X-plane

No.	Frequency [MHz]	Reading PK [dBμV]	Reading Ave [dBμV]	C.Factor [dB]	Result PK [dBμV/m]	Result Ave [dBμV/m]	Limit PK [dBμV/m]	Limit Ave [dBμV/m]	Margin PK [dB]	Margin Ave [dB]	Ant.
1	4952.000	47.5	44.2	3.4	50.9	47.6	73.9	53.9	23.0	6.3	Hori.
2	4952.000	46.7	42.1	3.4	50.1	45.5	73.9	53.9	23.8	8.4	Vert.
3	12380.000	41.8	34.5	5.0	46.8	39.5	73.9	53.9	27.1	14.4	Hori.

[Emission level] Y-plane

No.	Frequency [MHz]	Reading PK [dBμV]	Reading Ave [dBμV]	C.Factor [dB]	Result PK [dBμV/m]	Result Ave [dBμV/m]	Limit PK [dBμV/m]	Limit Ave [dBμV/m]	Margin PK [dB]	Margin Ave [dB]	Ant.
1	4952.000	49.9	47.3	3.4	53.3	50.7	73.9	53.9	20.6	3.2	Hori.
2	4952.000	49.5	46.7	3.4	52.9	50.1	73.9	53.9	21.0	3.8	Vert.
3	12380.000	42.3	37.0	5.0	47.3	42.0	73.9	53.9	26.6	11.9	Vert.

[Emission level] Z-plane

No.	Frequency [MHz]	Reading PK [dBμV]	Reading Ave [dBμV]	C.Factor [dB]	Result PK [dBμV/m]	Result Ave [dBμV/m]	Limit PK [dBμV/m]	Limit Ave [dBμV/m]	Margin PK [dB]	Margin Ave [dB]	Ant.
1	4952.000	49.9	47.5	3.4	53.3	50.9	73.9	53.9	20.6	3.0	Hori.
2	7428.000	42.9	36.7	7.3	50.2	44.0	73.9	53.9	23.7	9.9	Hori.
3	4952.000	49.6	46.8	3.4	53.0	50.2	73.9	53.9	20.9	3.7	Vert.
4	12380.000	42.0	35.7	5.0	47.0	40.7	73.9	53.9	26.9	13.2	Vert.

Tested Date: March 7, 2018
Humidity: 36 %

Temperature: 16 degC
Atmos. Press: 1034 hPa

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Test sample: R4
Configuration: 1
Operating mode: 2476MHz
Test site: Yokohama Laboratory
Measurement distance: 3 m

[Emission level] X-plane

No.	Frequency [MHz]	Reading PK [dBμV]	Reading Ave [dBμV]	C.Factor [dB]	Result PK [dBμV/m]	Result Ave [dBμV/m]	Limit PK [dBμV/m]	Limit Ave [dBμV/m]	Margin PK [dB]	Margin Ave [dB]	Ant.
1	4952.000	44.5	40.1	3.4	47.9	43.5	73.9	53.9	26.0	10.4	Hori.
2	4952.000	48.5	45.8	3.4	51.9	49.2	73.9	53.9	22.0	4.7	Vert.

[Emission level] Y-plane

No.	Frequency [MHz]	Reading PK [dBμV]	Reading Ave [dBμV]	C.Factor [dB]	Result PK [dBμV/m]	Result Ave [dBμV/m]	Limit PK [dBμV/m]	Limit Ave [dBμV/m]	Margin PK [dB]	Margin Ave [dB]	Ant.
1	4952.000	49.4	46.9	3.4	52.8	50.3	73.9	53.9	21.1	3.6	Hori.
2	4952.000	47.2	44.0	3.4	50.6	47.4	73.9	53.9	23.3	6.5	Vert.
3	12380.000	42.6	35.7	5.0	47.6	40.7	73.9	53.9	26.3	13.2	Vert.

[Emission level] Z-plane

No.	Frequency [MHz]	Reading PK [dBμV]	Reading Ave [dBμV]	C.Factor [dB]	Result PK [dBμV/m]	Result Ave [dBμV/m]	Limit PK [dBμV/m]	Limit Ave [dBμV/m]	Margin PK [dB]	Margin Ave [dB]	Ant.
1	4952.000	47.5	44.0	3.4	50.9	47.4	73.9	53.9	23.0	6.5	Hori.
2	4952.000	49.0	46.1	3.4	52.4	49.5	73.9	53.9	21.5	4.4	Vert.
3	12380.000	42.0	36.2	5.0	47.0	41.2	73.9	53.9	26.9	12.7	Hori.

Tested Date: March 7, 2018
Humidity: 36 %

Temperature: 16 degC
Atmos. Press: 1034 hPa

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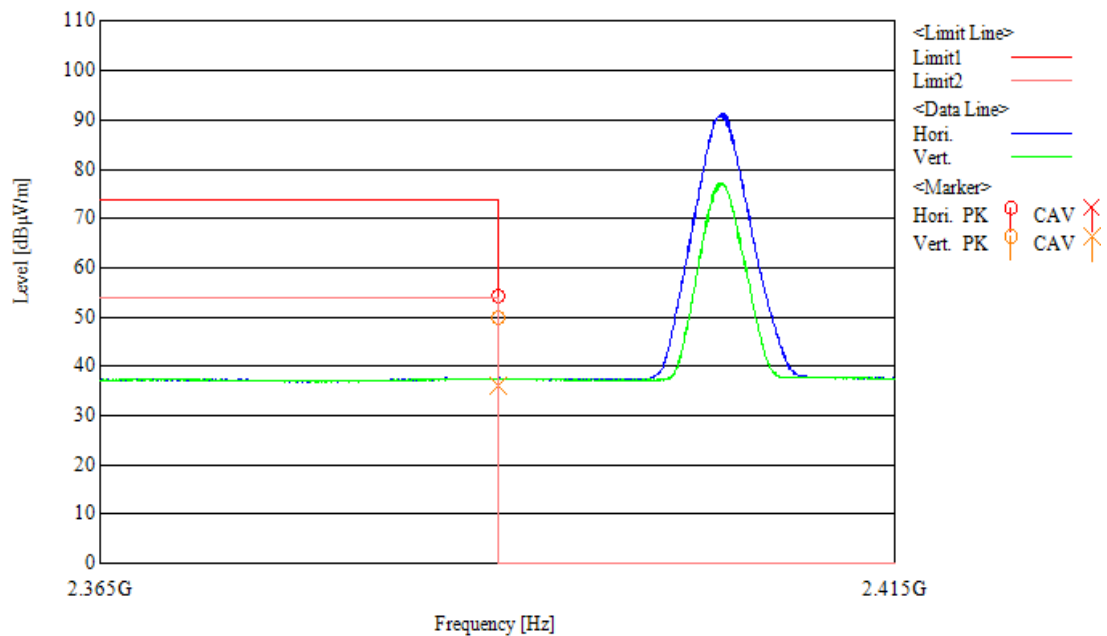
Restricted bandedge measurement

Test sample: R3
Configuration: 1
Operating mode: 2404MHz
Test site: Yokohama Laboratory
Measurement distance: 3 m

[Emission level] Z-plane (Worst)

No.	Frequency [MHz]	Reading PK [dBμV]	Reading Ave [dBμV]	C.Factor [dB]	Result PK [dBμV/m]	Result Ave [dBμV/m]	Limit PK [dBμV/m]	Limit Ave [dBμV/m]	Margin PK [dB]	Margin Ave [dB]	Ant.
1	2390.000	49.3	31.2	5.0	54.3	36.2	73.9	53.9	19.6	17.7	Hori.
2	2390.000	44.8	31.2	5.0	49.8	36.2	73.9	53.9	24.1	17.7	Vert.

[Chart]



Tested Date: March 7, 2018
Humidity: 36 %

Temperature: 16 degC
Atmos. Press: 1034 hPa

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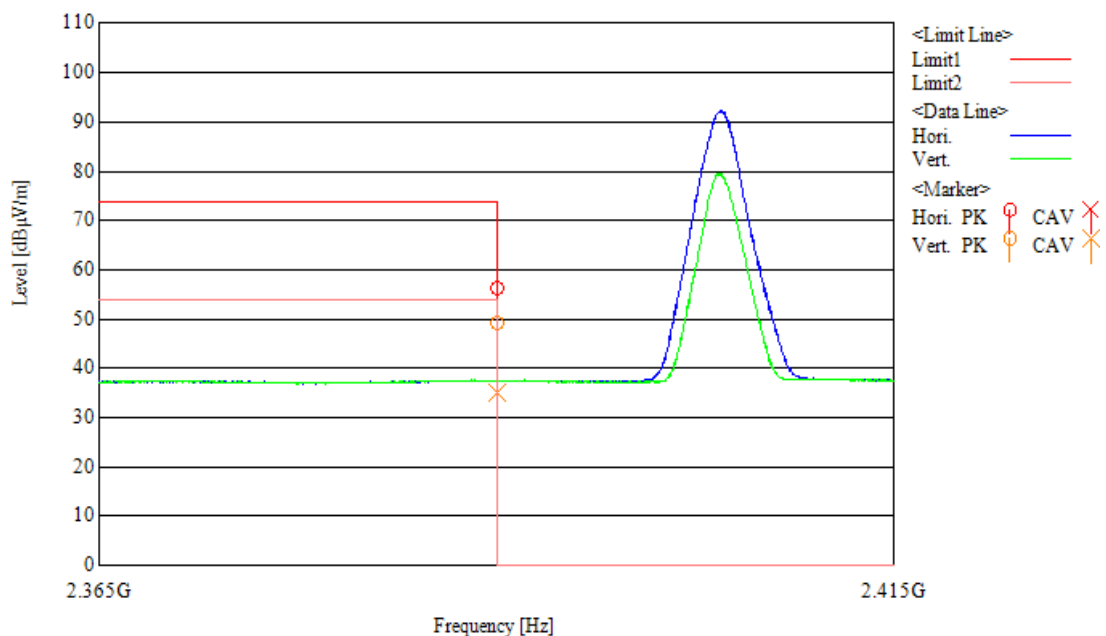
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Test sample: R4
Configuration: 1
Operating mode: 2404MHz
Test site: Yokohama Laboratory
Measurement distance: 3 m

[Emission level] Z-plane (Worst)

No.	Frequency [MHz]	Reading PK [dBμV]	Reading Ave [dBμV]	C.Factor [dB]	Result PK [dBμV/m]	Result Ave [dBμV/m]	Limit PK [dBμV/m]	Limit Ave [dBμV/m]	Margin PK [dB]	Margin Ave [dB]	Ant.
1	2390.000	51.4	30.2	5.0	56.4	35.2	73.9	53.9	17.5	18.7	Hori.
2	2390.000	44.2	30.2	5.0	49.2	35.2	73.9	53.9	24.7	18.7	Vert.

[Chart]



Tested Date: March 7, 2018
Humidity: 36 %

Temperature: 16 degC
Atmos. Press: 1034 hPa

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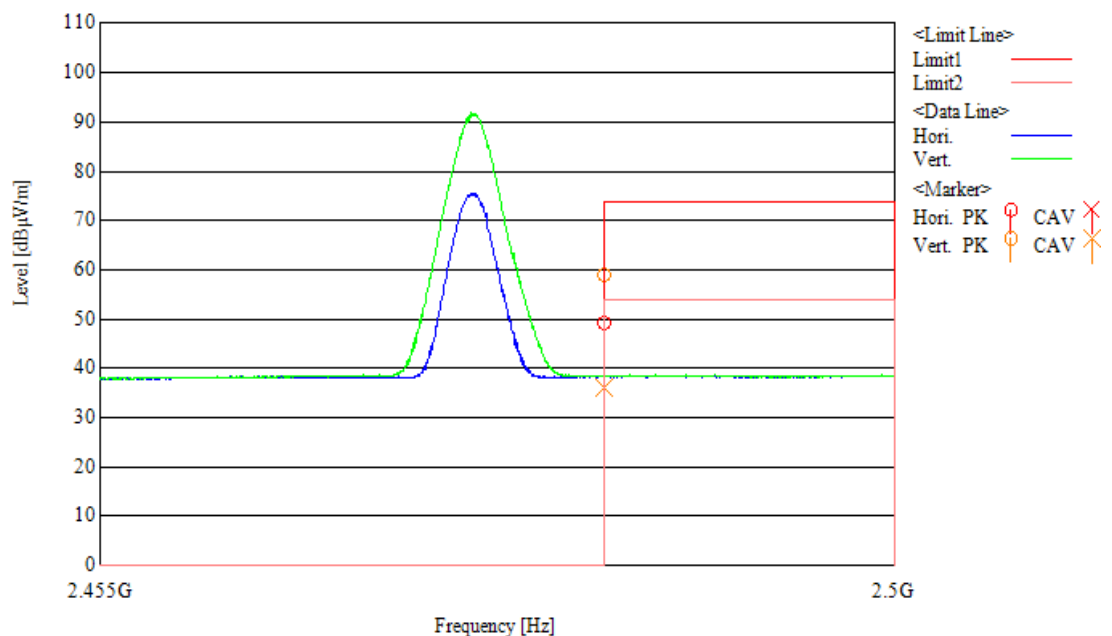
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Test sample: R3
Configuration: 1
Operating mode: 2476MHz
Test site: Yokohama Laboratory
Measurement distance: 3 m

[Emission level] Y-plane (Worst)

No.	Frequency [MHz]	Reading PK [dBμV]	Reading Ave [dBμV]	C.Factor [dB]	Result PK [dBμV/m]	Result Ave [dBμV/m]	Limit PK [dBμV/m]	Limit Ave [dBμV/m]	Margin PK [dB]	Margin Ave [dB]	Ant.
1	2483.500	43.3	30.1	6.0	49.3	36.1	73.9	53.9	24.6	17.8	Hori.
2	2483.500	53.1	30.2	6.0	59.1	36.2	73.9	53.9	14.8	17.7	Vert.

[Chart]



Tested Date: March 7, 2018
Humidity: 36 %

Temperature: 16 degC
Atmos. Press: 1034 hPa

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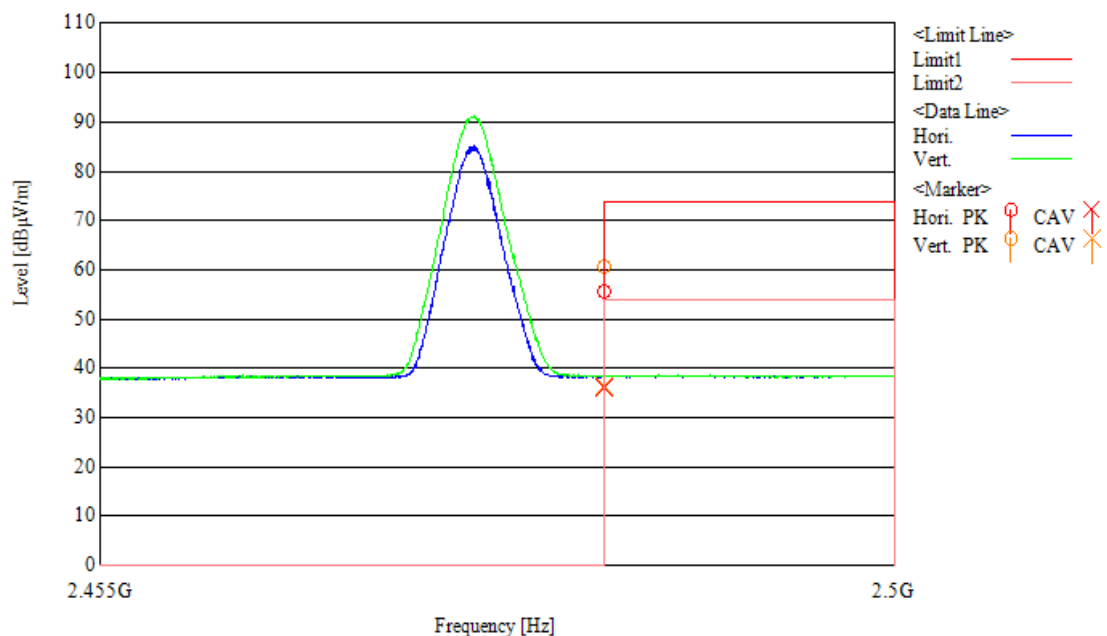
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Test sample: R4
Configuration: 1
Operating mode: 2476MHz
Test site: Yokohama Laboratory
Measurement distance: 3 m

[Emission level] X-plane (Worst)

No.	Frequency [MHz]	Reading PK [dBμV]	Reading Ave [dBμV]	C.Factor [dB]	Result PK [dBμV/m]	Result Ave [dBμV/m]	Limit PK [dBμV/m]	Limit Ave [dBμV/m]	Margin PK [dB]	Margin Ave [dB]	Ant.
1	2483.500	49.5	30.1	6.0	55.5	36.1	73.9	53.9	18.4	17.8	Hori.
2	2483.500	54.8	30.3	6.0	60.8	36.3	73.9	53.9	13.1	17.6	Vert.

[Chart]



Tested Date: March 7, 2018
Humidity: 36 %

Temperature: 16 degC
Atmos. Press: 1034 hPa

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2.7 AC power line conducted emissions

Test setup

Test setup was implemented according to the method of ANSI C63.10 clause 6.2.

Test procedure

Measurement procedures were implemented according to the method of ANSI C63.10 clause 6.2.

Applicable rule and limitation

FCC 15.207; AC power line conducted emissions limits

Frequency of Emission [MHz]	Conducted emissions Limit [dBμV]	
	Quasi-peak	Average
0.15 - 0.5	66 to 56 *	56 to 46 *
0.5 - 5	56	46
5 - 30	60	50

* Decreases with the logarithm of the frequency. The lower limit applies at the band edges.

Test equipment used (refer to List of utilized test equipment)

TR06	CL18	LN05
------	------	------

Test software used

EMI Ver. 5.8

Calculation method

The Correction Factor and Result are calculated as followings.

$$\begin{aligned}\text{Correction Factor [dB]} &= \text{ISN Factor [dB]} + \text{Loss [dB]} \\ \text{Result [dB}\mu\text{V]} &= \text{Reading [dB}\mu\text{V]} + \text{Correction Factor [dB]}\end{aligned}$$

Test results - Complied with requirement

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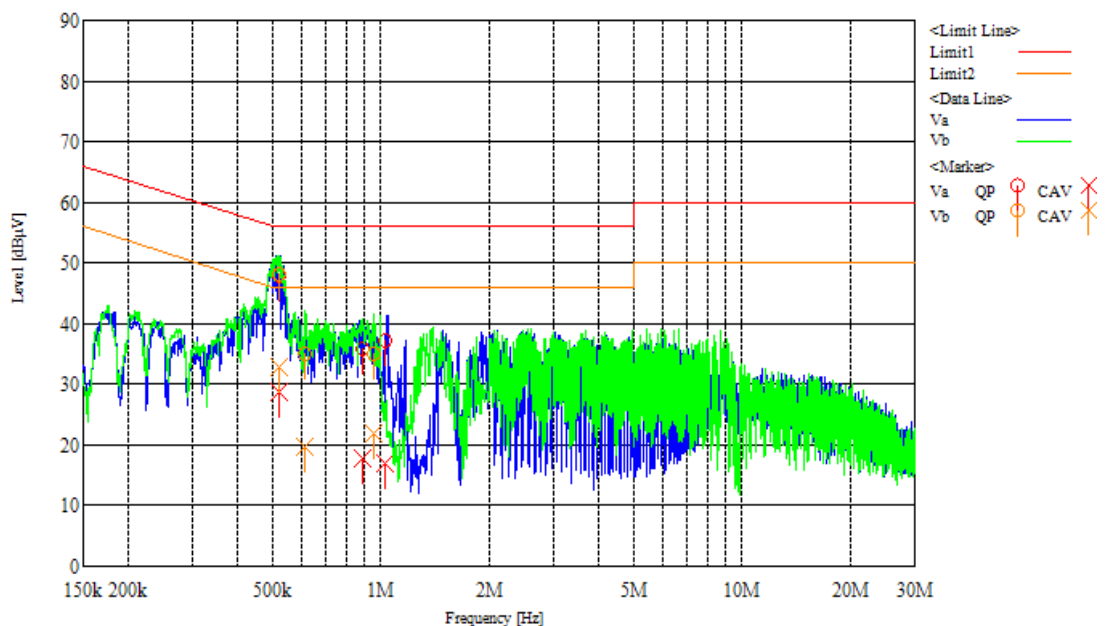
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Test Data

Test sample: R11
Configuration: 2
Operating mode: Continuous transmission
Test site: Yokohama Laboratory

No.	Frequency [MHz]	Reading		C.F. [dB]	Result		Limit		Margin		PHASE
		QP [dBuV]	AV [dBuV]		QP [dBuV]	AV [dBuV]	QP [dBuV]	AV [dBuV]	QP [dB]	AV [dB]	
1	0.52069	38.0	18.7	10.0	48.0	28.7	56.0	46.0	8.0	17.3	Va
2	0.88943	26.0	7.8	10.0	36.0	17.8	56.0	46.0	20.0	28.2	Va
3	1.02624	27.2	6.9	10.0	37.2	16.9	56.0	46.0	18.8	29.1	Va
4	0.52103	38.0	22.8	10.1	48.1	32.9	56.0	46.0	7.9	13.1	Vb
5	0.61212	25.0	9.7	10.1	35.1	19.8	56.0	46.0	20.9	26.2	Vb
6	0.95855	25.0	11.8	10.1	35.1	21.9	56.0	46.0	20.9	24.1	Vb

[Chart]



Tested Date: April 26, 2018
Humidity: 50 %

Temperature: 21 degC
Atmos. Press: 1009 hPa

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4 List of utilized test equipment / calibration

RFT ID No.	Kind of Equipment and Precision	Manufacturer	Model No.	Serial Number	Calibration Date	Calibrated until
AC01(EM)	Anechoic Chamber (1st test room)	JSE	203397C	-	2018/04/14	2019/04/30
AC01(EG)	Anechoic Chamber (1st test room)	JSE	203397C	-	2018/03/21	2019/03/31
AT33	Attenuator 10dB 26GHz	INMET	26A-10	-	2017/07/31	2018/07/31
BA07	Biological Antenna	TESEQ	CBL6143A	26670	2017/12/05	2018/12/31
CH01	Conical Horn Antenna (12-18GHz)	ETS-Lindgren	3163-05	00126641	2017/03/29	2019/03/31
CL11	RF Cable for RE	RFT	-	-	2018/03/26	2019/03/31
CL18	RF Cable for CE	RFT	-	-	2018/03/27	2019/03/31
CL30	RF Cable 5 m	SUHNER	SUCOFLEX104PE	MY3599	2018/01/29	2019/01/31
CL31	RF Cable 1 m	Junkosha	MWX221	1303S118	2018/01/29	2019/01/31
CL38	RF Cable 2 m	Junkosha	MWX221	1603S626	2018/01/29	2019/01/31
DH06	DRG Horn Antenna	A.H. Systems	SAS-571	1339	2016/06/01	2018/06/30
HPF4	High Pass Filter (3000MHz)	Tokyo KEIKI	TF23LCCZGA	9001	2017/11/08	2018/11/30
LN05	LISN	Kyoritsu	KNW-407F	8-1773-2	2017/05/25	2018/05/31
LP06	Loop Antenna	ETS-Lindgren	6502	00164299	2017/05/25	2018/05/31
PR12	Pre. Amplifier (1-26G)	Agilent Technologies	8449B	3008A02513	2018/01/29	2019/01/31
PR21	Pre. Amplifier	Anritsu	MH648A	6200467119	2017/12/04	2018/12/31
SA06	Spectrum Analyzer (F/W: 4.50 SP4)	Rohde & Schwarz	FSP40	100071	2017/12/05	2018/12/31
SH01	Standard Horn Antenna (18-26G)	A.H. Systems	SAS-572	208	2016/07/05	2018/07/31
TR06	Test Receiver (F/W : 4.73 SP4)	Rohde & Schwarz	ESU26	100002	2017/10/17	2018/10/31

The measuring equipment, which was utilized in performing the tests documented herein, has been calibrated in accordance with the manufacturer's recommendations for utilizing calibration equipment, which is traceable to recognized national standards.

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