TEST REPORT

For

Microcomputer Board

In conformity with

FCC CFR 47 Part15 Subpart C / RSS-247 Issue 2

Model (HVIN/PMN)	**: RTK5523W8BC00001BJ**
FCC ID	**: 2AEMXRX23WSKB85**
ISED ID	**: 20194-RX23WSKB85**
Report No.	**: WE190925BB2-12**
Issue Date	**: July 10, 2020**

Prepared for

Renesas Electronics Corporation
3-2-24 Toyosu, Koto-ku, Tokyo 135-0061, Japan

Prepared by

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History

Report No.	Date	Revisions	Issued By
WE190925BB1-11	February 28, 2020	Initial Issue	K. Onishi
WE190925BB1-12	July 10, 2020	Added the information (FVIN (1.1), power setting (1.6.2), RF conducted test photo (3.3)).	K. Onishi

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1 General information

1.1 Product information from applicant

Test item	: Microcomputer Board
Manufacturer	: TESSERA TECHNOLOGY INC.
Address	: 6F, Oak Yokohama Bldg., 2-15-10 Kitasaiwai, Nishi-ku, Kanagawa-shi 220-0004, Japan
Model (HVIN/PMN)	: RTK5523W8BC00001BJ
FCC ID	: 2AEMXRX23WSKB85
ISED ID	: 20194-RX23WSKB85
Serial number	: 201906-033
Hardware version	: 0
Software version (FVIN)	: V. 1.00
Operating frequency	: 2402 - 2480 MHz
Modulation	: GFSK (Bluetooth Ver. 5.0 LE)
Antenna Gain	: +2.5 dBi (manufacturer declaration)
Receipt date of EUT	: November 18, 2019
Nominal power source voltages	: DC 5.0 V (USB)
Family model	: RTK5523W8AC00001BJ (Difference is with/without TSIP function. RF circuits are same.)

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1.2 Test(s) performed/ Summary of test result

Test specification(s)	: FCC CFR 47 Part 15 Subpart C (01 Oct. 2018) RSS-247 Issue 2, RSS-Gen Issue 5
Test method(s)	: ANSI C63.10: 2013
Test(s) started	: February 12, 2020
Test(s) completed	: February 18, 2020
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
K. Onishi
Wireless testing laboratory

Reviewer :
Y. Taki
Manager, Wireless testing laboratory

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Member of the SGS Group (Société Générale de Surveillance)

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

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Registered by Innovation, Science and Economic Development Canada (ISED):
The registered CAB identifier is JP0009.

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

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TESTING
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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):	± 3.3 dB
Radiated emission (9 kHz - 30 MHz):	± 5.0 dB
Radiated emission (30 MHz - 1000 MHz):	± 5.2 dB
Radiated emission (1 GHz - 6 GHz):	± 4.9 dB
Radiated emission (6 GHz - 18 GHz):	± 4.9 dB
Radiated emission (18 GHz - 26 GHz):	± 5.5 dB

1.5 Summary of test results

Requirement	Section in FCC	Section in RSS-247	Result	Section in this report
Occupied Bandwidth (99 %)	2.1049	6.7 (RSS-Gen)	Complied	2.1
6 dB Bandwidth	15.247 (a) (2)	5.2 (a)	Complied	2.2
Conducted Output Power	15.247 (b) (3)	5.4 (d)	Complied	2.3
Conducted Spurious Emission	15.247 (d)	5.5	Complied	2.4
Power Spectral Density	15.247 (e)	5.2 (b)	Complied	2.5
Transmitter Radiated Spurious Emissions	15.247(d), 15.205 (a)	8.9/8.10 (RSS-Gen)	Complied	2.6
AC power line conducted emissions	15.207	8.8 (RSS-Gen)	Complied	2.7
Radiated Emissions (Receiver)	-	7.3 (RSS-Gen)	Complied	2.8
AC power line conducted emissions (Receiver)	-	7.2 (RSS-Gen)	Complied	2.9

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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	Model No.	Manufacture	Serial No.
A	Microcomputer Board	RTK5523W8BC00001BJ	TESSERA TECHNOLOGY INC.	201906-033
-	-	-	-	-

Support Equipment(s)

No.	Item	Model No.	Manufacture	Serial No.
B	PC	PC-VK17HBBCD	NEC	26012321A
C	AC adapter	ADP-65JH E	NEC	2208800DD

Connected cable(s)

No.	Item	From	To	Length [m]	Shield	Ferrite Core
1	USB cable	A	B	1.2	Yes	Yes
2	DC cable	B	C	1.8	No	Yes
3	AC cable	C	AC mains	1.8	No	Yes

1.6.2 Operating condition:

- Power setting: 4dBm output mode
- Tx (2402MHz): The EUT is in normal transmission mode at 2402MHz (2Mbps, 1Mbps)
- Tx (2442MHz): The EUT is in normal transmission mode at 2442MHz (2Mbps, 1Mbps)
- Tx (2480MHz): The EUT is in normal transmission mode at 2480MHz (2Mbps, 1Mbps)
- Rx (2402MHz): The EUT is in normal transmission mode at 2402MHz
- Rx (2442MHz): The EUT is in normal transmission mode at 2442MHz
- Rx (2480MHz): The EUT is in normal transmission mode at 2480MHz

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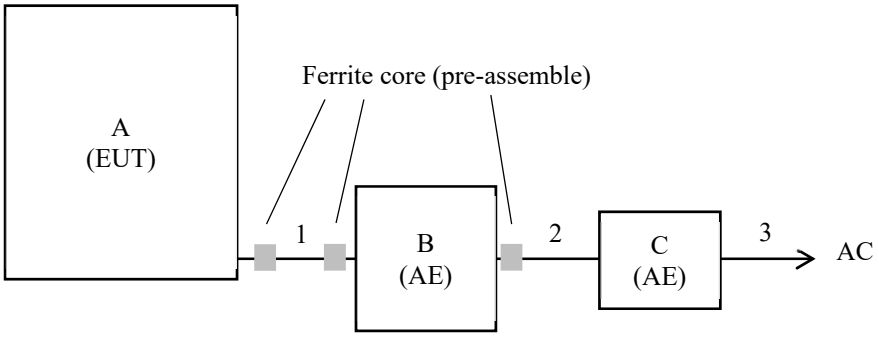
1.6.3 Setup diagram of tested system



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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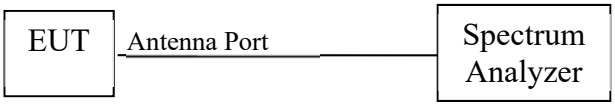
2 Test procedure and test data

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)

TR06	CL31	-	-	-	-

Test results

Transmission Frequency [MHz]	Occupied Bandwidth [MHz]	
	1Mbps	2Mbps
2402	1.378	2.027
2442	1.650	2.035
2480	1.842	2.051

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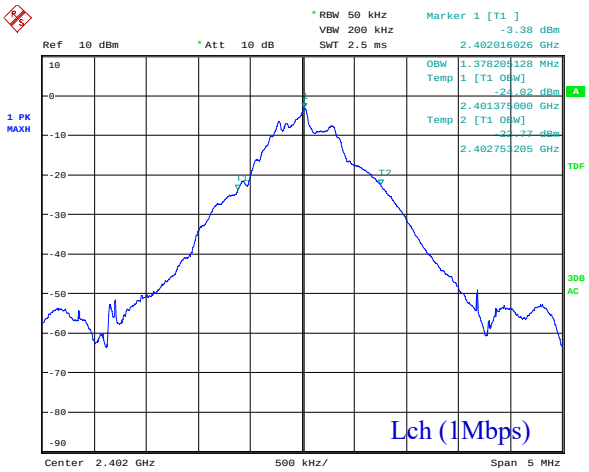

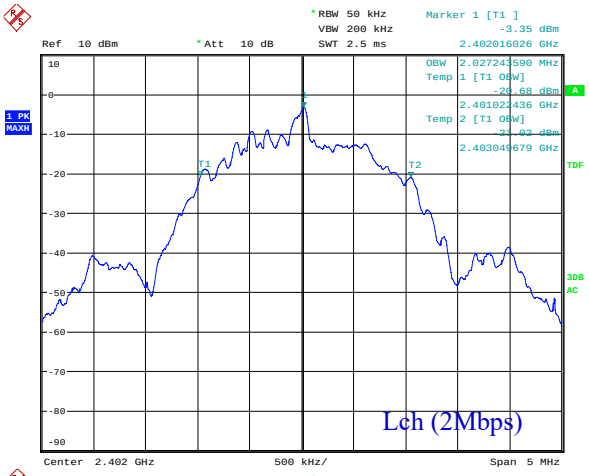

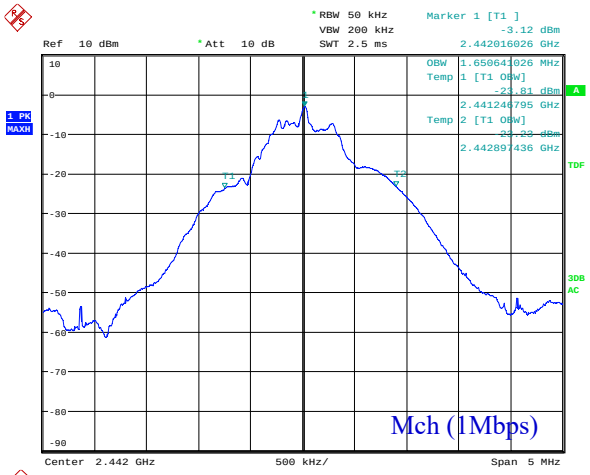

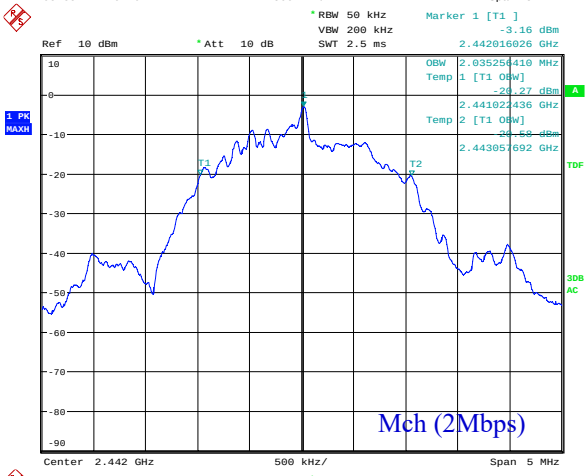

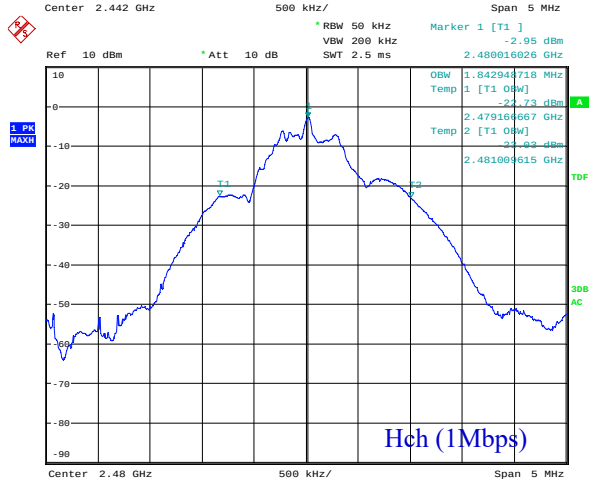

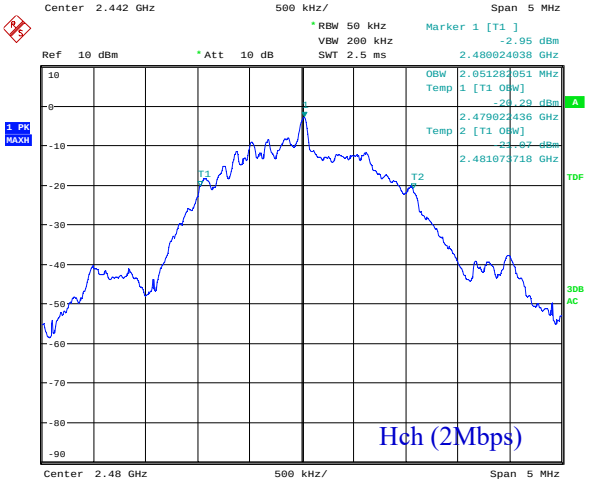

Tested Date:	February 18, 2020	Temperature:	20 degC
Humidity:	56 %	Atmos. Press:	1013 hPa

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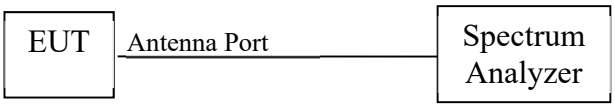
2.2 6dB Bandwidth

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) / RSS-247 5.2 (a): 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)

TR06	CL31	-	-	-	-

Test results - *Complied with requirement*

Test Data

Transmission Frequency [MHz]	6 dB Bandwidth [kHz]		Limit [kHz]
	1Mbps	2Mbps	
2402	688.0	1178.6	500
2442	696.0	1193.9	500
2480	688.0	1201.9	500

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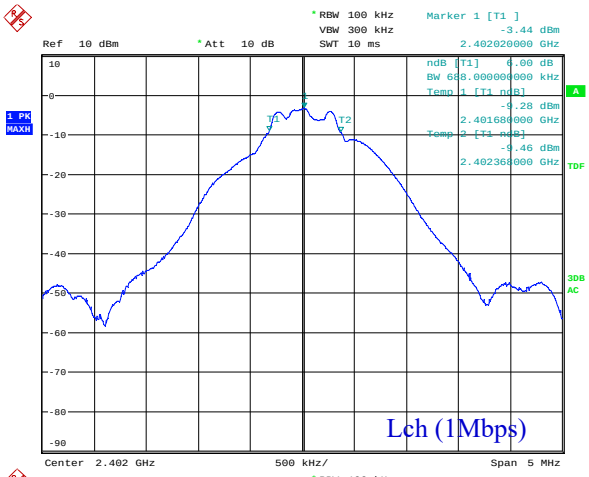

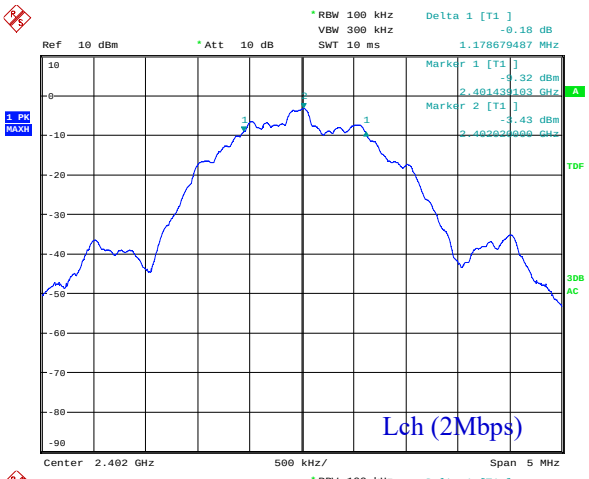

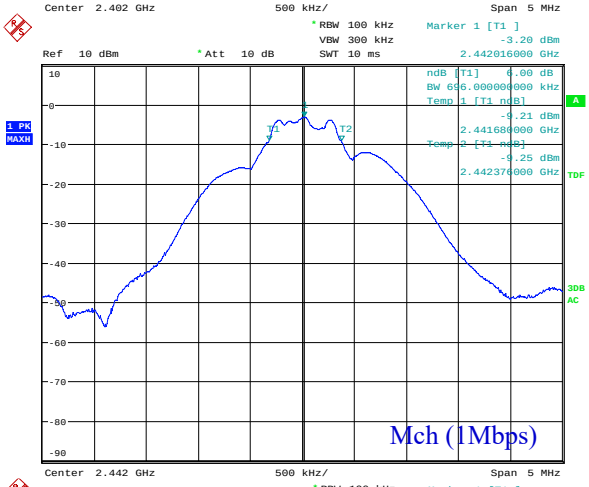

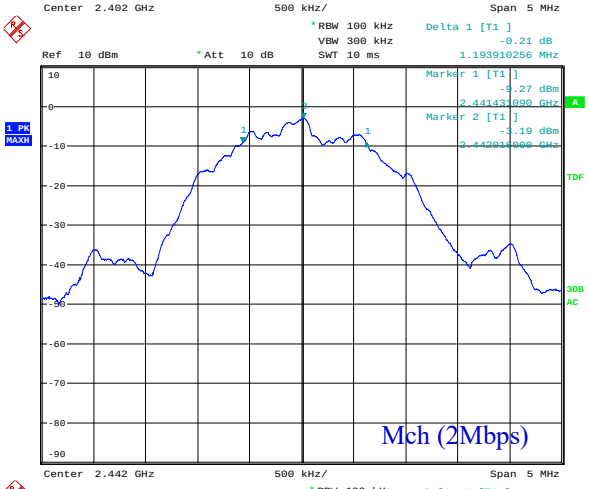

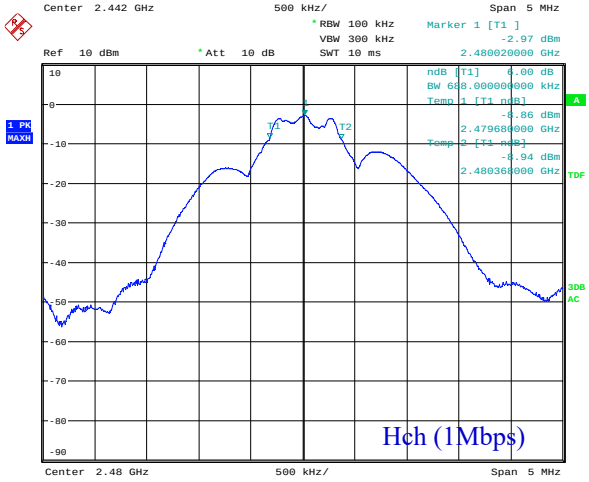

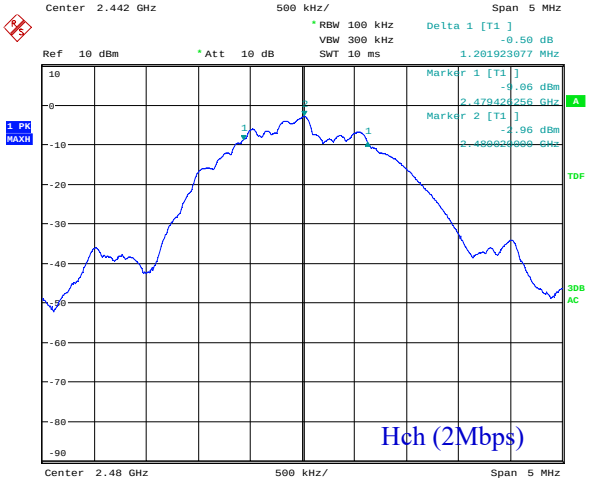

Tested Date:	February 18, 2020	Temperature:	20 degC
Humidity:	56 %	Atmos. Press:	1013 hPa

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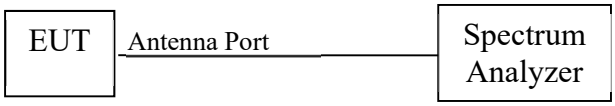
2.3 Peak Output Power

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

Applicable rule and limitation

15.247(b) (3) / RSS-247 5.4 (d): 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)

TR06	CL31	-	-	-	-

Test results - *Complied with requirement*

Test Data

Transmission Frequency [MHz]	Output Power [dBm]		Limit [dBm]
	1Mbps	2Mbps	
2402	-3.17	-3.12	30
2442	-2.92	-2.87	30
2480	-2.52	-2.54	30

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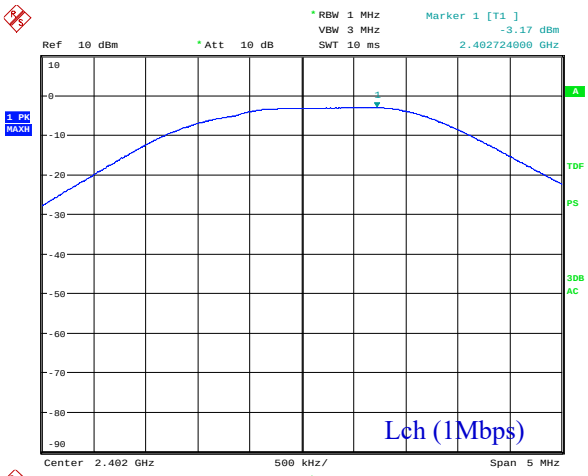

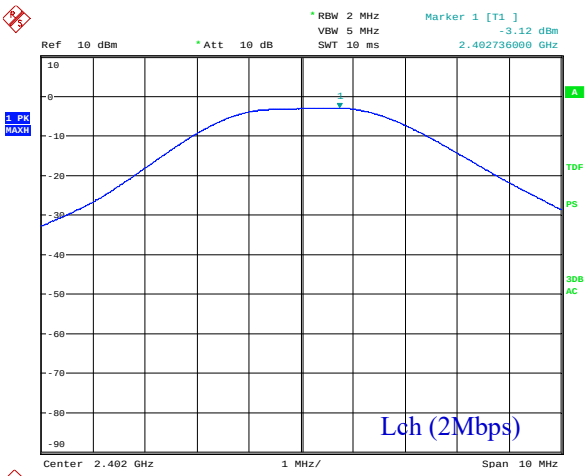

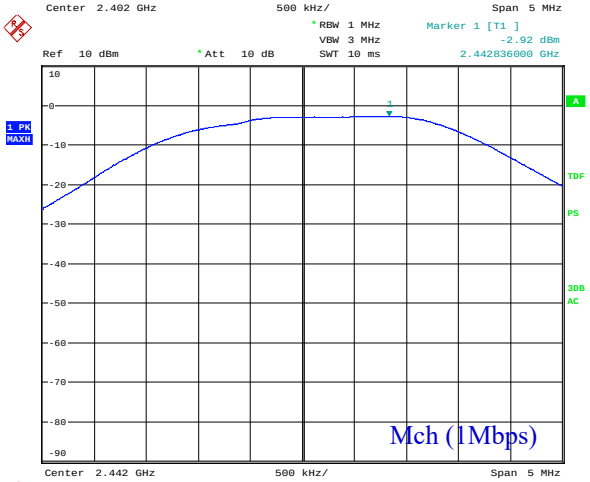

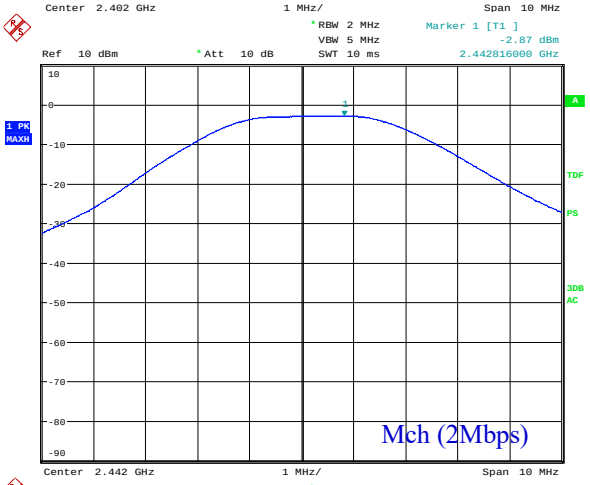

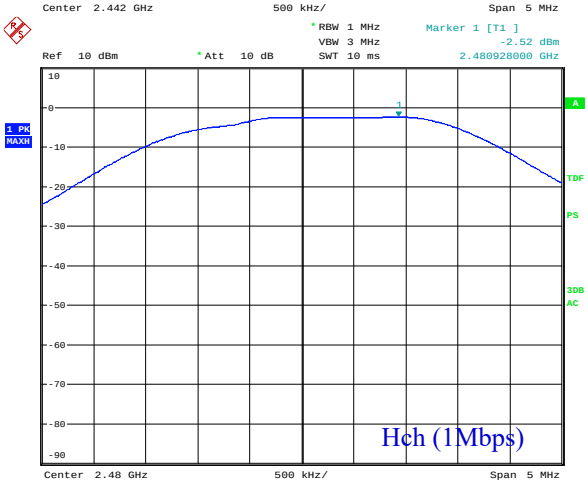

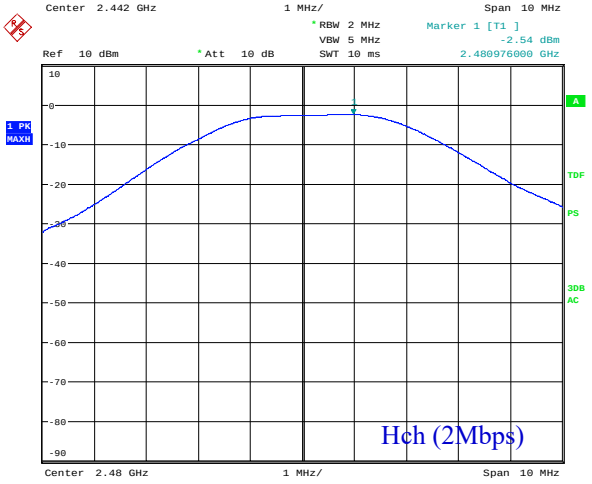

Tested Date:	February 18, 2020	Temperature:	20 degC
Humidity:	56 %	Atmos. Press:	1013 hPa

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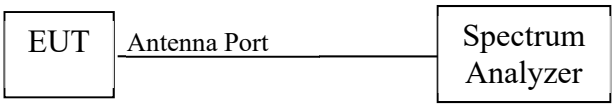
2.4 Conducted Spurious Emissions

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) / RSS-247 5.5: 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)

TR06	CL31	-	-	-	-

Test results - *Complied with requirement*

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Test Data

Operating mode: Tx (2402MHz, 1Mbps)

Frequency [GHz]	Spurious level [dBm]	Carrier level [dBm]	Limit (-20dBc) [dBm]	Result
9.608	-50.45	-3.56	-23.56	Pass
14.413	-50.12	-3.56	-23.56	Pass
16.813	-61.72	-3.56	-23.56	Pass
19.216	-57.91	-3.56	-23.56	Pass

Operating mode: Tx (2442MHz, 1Mbps)

Frequency [GHz]	Spurious level [dBm]	Carrier level [dBm]	Limit (-20dBc) [dBm]	Result
9.769	-46.06	-3.34	-23.34	Pass
14.653	-53.45	-3.34	-23.34	Pass
17.094	-63.45	-3.34	-23.34	Pass
19.532	-63.60	-3.34	-23.34	Pass

Operating mode: Tx (2480MHz, 1Mbps)

Frequency [GHz]	Spurious level [dBm]	Carrier level [dBm]	Limit (-20dBc) [dBm]	Result
9.920	-40.79	-3.00	-23.00	Pass
12.400	-63.74	-3.00	-23.00	Pass
14.881	-53.40	-3.00	-23.00	Pass
17.360	-62.18	-3.00	-23.00	Pass

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Operating mode: Tx (2402MHz, 2Mbps)

Frequency [GHz]	Spurious level [dBm]	Carrier level [dBm]	Limit (-20dBc) [dBm]	Result
9.608	-51.09	-3.49	-23.49	Pass
14.411	-49.06	-3.49	-23.49	Pass
16.813	-63.79	-3.49	-23.49	Pass
19.216	-60.04	-3.49	-23.49	Pass

Operating mode: Tx (2442MHz, 2Mbps)

Frequency [GHz]	Spurious level [dBm]	Carrier level [dBm]	Limit (-20dBc) [dBm]	Result
9.769	-48.44	-3.31	-23.31	Pass
14.651	-51.05	-3.31	-23.31	Pass
17.094	-63.98	-3.31	-23.31	Pass

Operating mode: Tx (2480MHz, 2Mbps)

Frequency [GHz]	Spurious level [dBm]	Carrier level [dBm]	Limit (-20dBc) [dBm]	Result
9.920	**-40.53**	**-2.97**	**-22.97**	**Pass**
12.402	-62.96	-2.97	-22.97	Pass
14.876	-57.38	-2.97	-22.97	Pass

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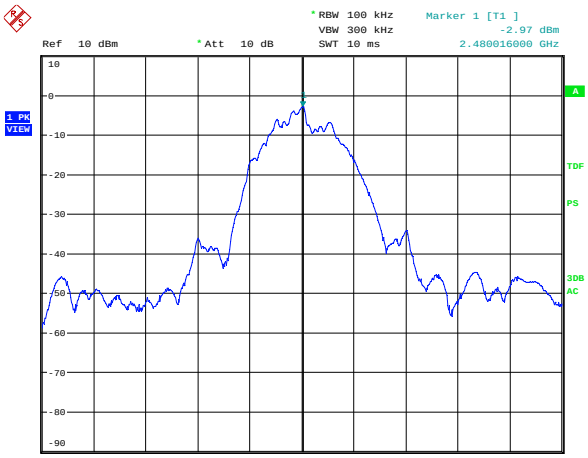
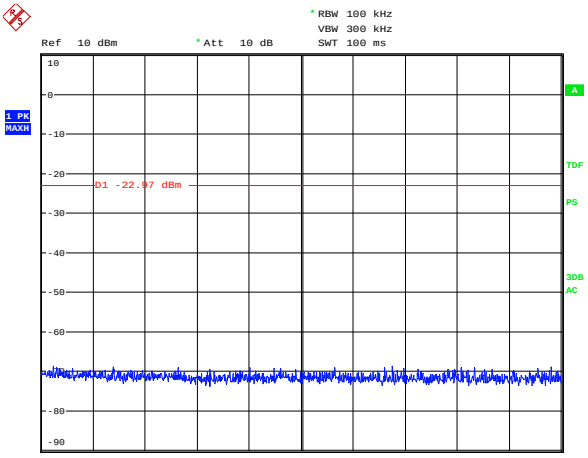
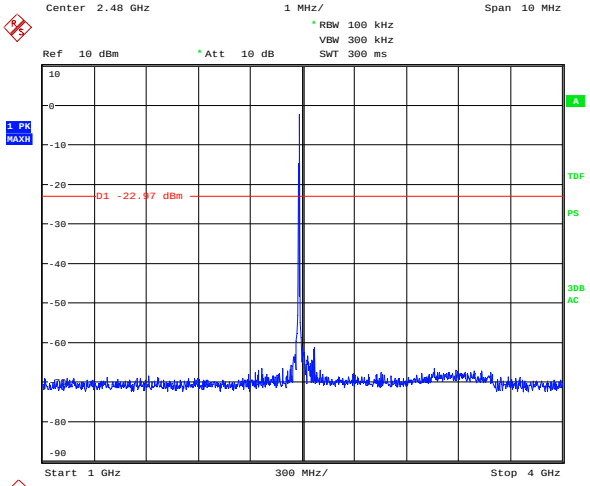
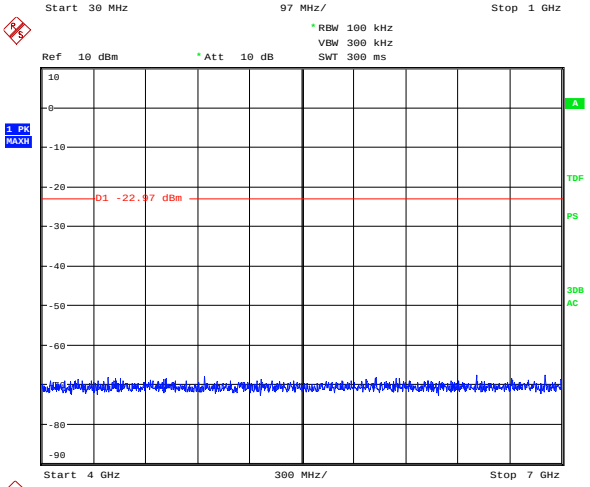
[Chart]

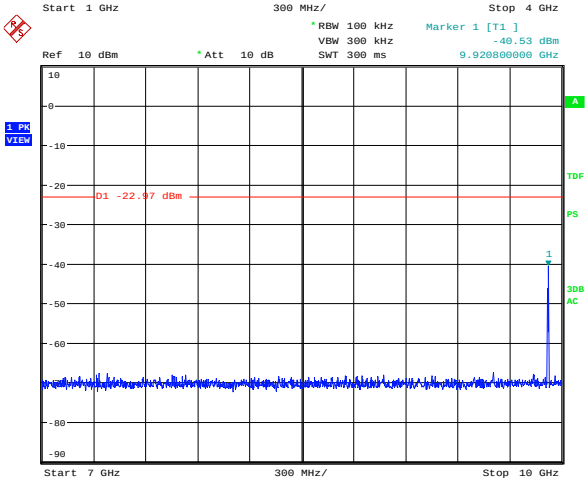
Tx (2480MHz, 2Mbps)

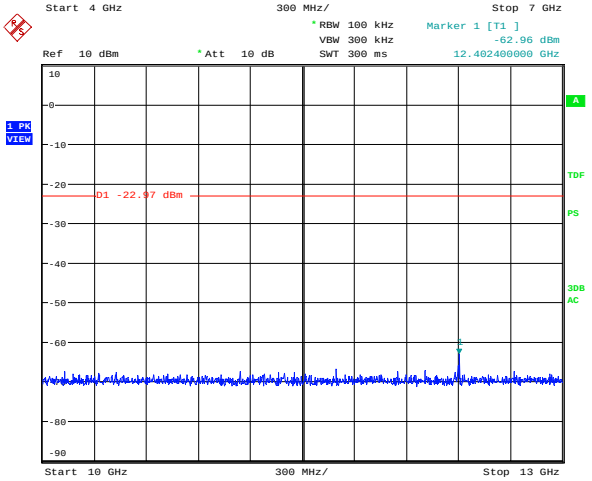












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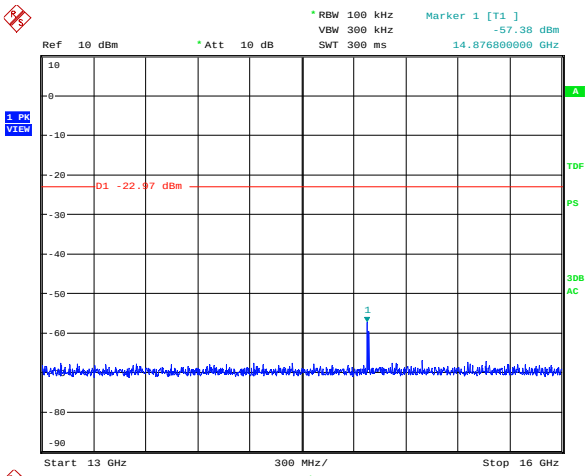

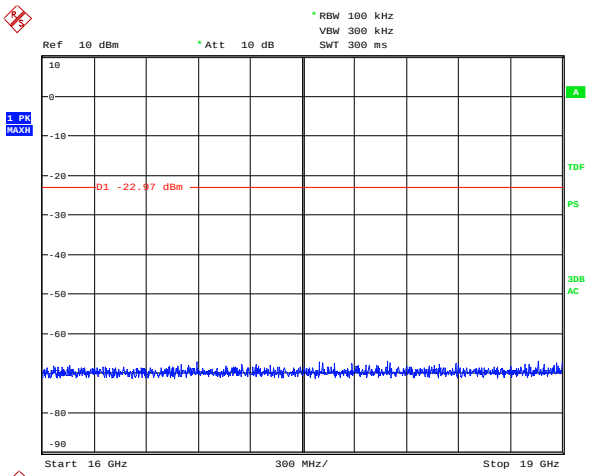

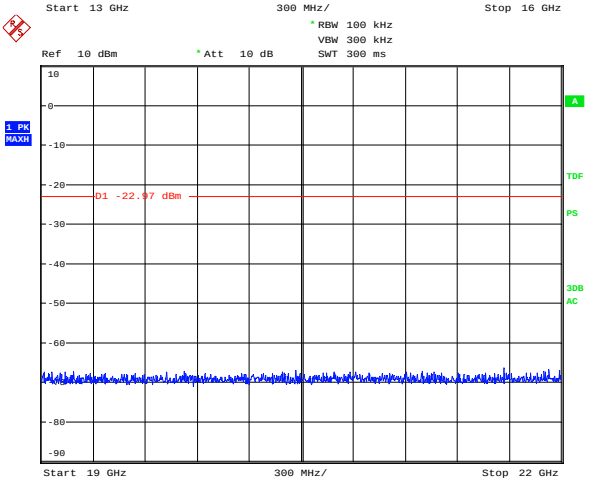

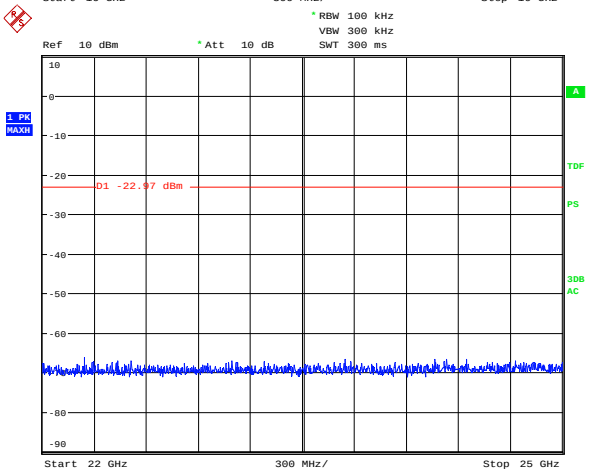

Tested Date:	February 18, 2020	Temperature:	20 degC
Humidity:	56 %	Atmos. Press:	1013 hPa

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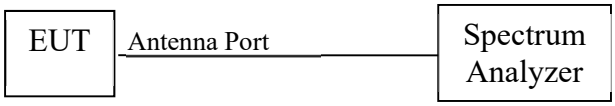
2.5 Power Spectral density

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

Limitation

15.247(e) / RSS-247 5.2 (b): 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)

TR06	CL31	-	-	-	-

Test results - *Complied with requirement*

Test Data

Transmission Frequency [MHz]	Spectral Density [dBm]		Limit [dBm]
	1Mbps	2Mbps	
2402	-17.32	-17.64	8
2442	-16.87	-17.11	8
2480	-17.30	-17.32	8

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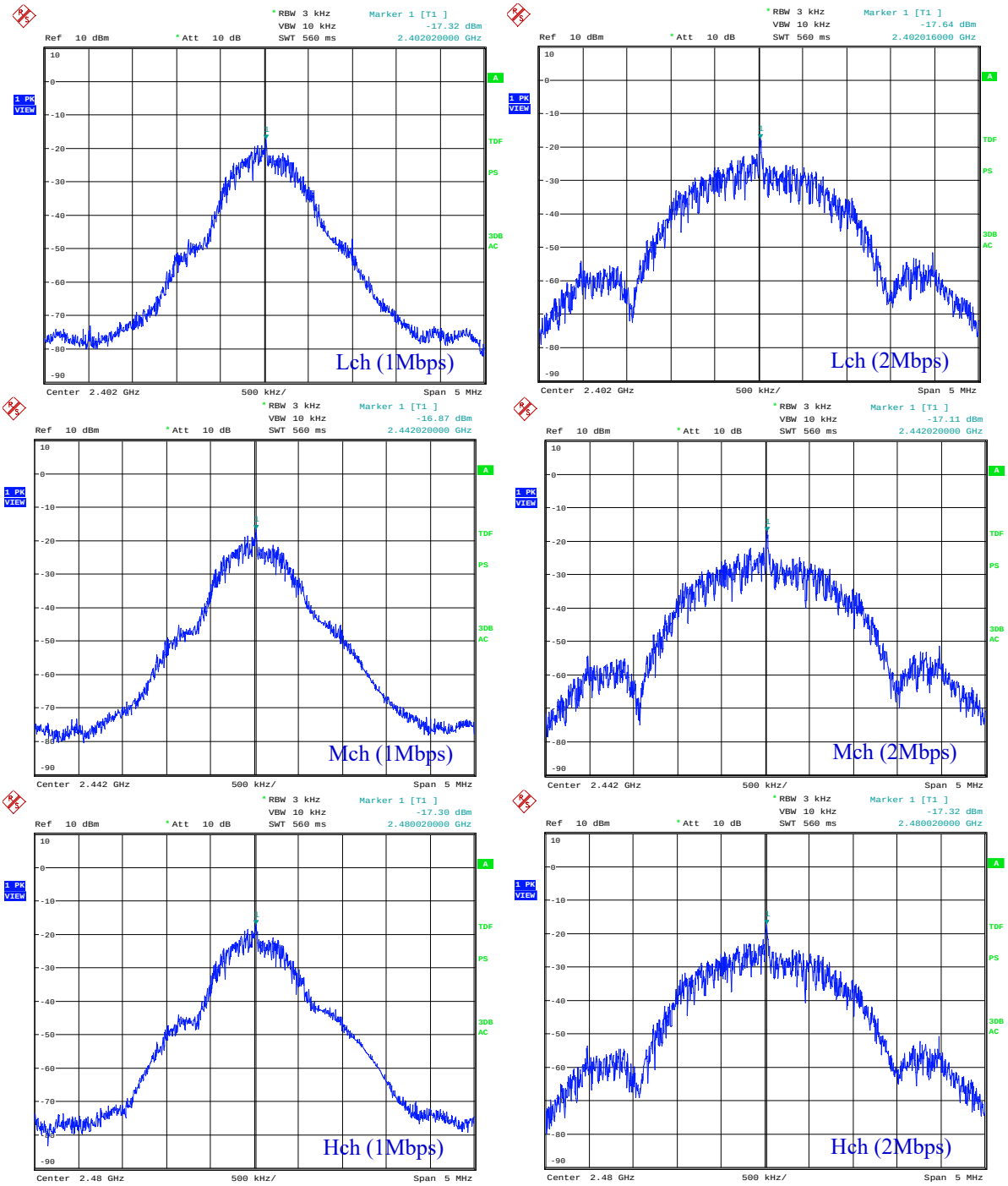

Tested Date:	February 18, 2020	Temperature:	20 degC
Humidity:	56 %	Atmos. Press:	1013 hPa

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2.6 Transmitter Radiated Spurious Emissions

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

Except as shown in paragraph 15.205 (d) of this section, only spurious emissions are permitted in any of the frequency bands listed (FCC 15.205 / RSS-Gen 8.10)

The field strength of emissions appearing within these frequency bands shall not exceed the limits shown in FCC 15.209 / RSS-Gen 8.9. At frequencies equal to or less than 1000 MHz, compliance with the limits in FCC 15.209 / RSS-Gen 8.9 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.

FCC 15.209: Field strength limits below 30 MHz

Frequency [MHz]	Field Strength [µV/m]	Measurement Distance [m]
0.009 – 0.490	2400/F(kHz)	300
0.490 – 1.705	24000/F(kHz)	30
1.705 – 30.0	30	30

RSS-Gen 8.9: Field strength limits below 30 MHz

Frequency	Field Strength [µA/m]	Measurement Distance [m]
9 – 490 kHz	6.37/F(kHz)	300
490 – 1705 kHz	63.7/F(kHz)	30
1.705 – 30.0 MHz	0.08	30

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Extrapolation factor of 3m test distance (ANSI C63.10-2013 6.4.4)

Frequency [MHz]	D (λ/2π) [m]	D (Limit) [m]	Extrapolation Factor
0.009	5305.16	300	80.00
0.159	300.29	300	80.00
0.160	298.42	300	79.95
0.490	97.44	300	70.23
0.490	97.44	30	40.00
1.591	30.01	30	40.00
1.592	29.99	30	40.00
10.000	4.77	30	24.04
13.560	3.52	30	21.39
15.910	3.00	30	20.00
30.000	1.59	30	20.00

FCC 15.209 / RSS-Gen 8.9: Field strength limits above 30 MHz

Frequency [MHz]	Field Strength [μV/m]	Measurement Distance [m]	Field Strength [dBμV/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	BA07	BRF12	CL11	CL31	CL38	CL39	DH06
HPF4	LP06	PR12	PR21	SH01	TR06	-	-

Test software used

EMI1 Ver. 5.9

Calculation method

The Correction Factor and Result are calculated as followings.

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

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Test Data (9 kHz - 30MHz)

Test site: Yokohama Laboratory
Measurement distance: 3 m

Operating frequency: 2402MHz
Data rate: 1Mbps

[X-plane]

No.	Frequency [MHz]	Reading [dBμV]	Factor [dB/m]	Loss [dB]	Gain [dB]	Result [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Ant.
1	20.45274	14.7	9.3	0.8	0.0	24.8	49.5	24.7	90deg

[Y-plane]

No.	Frequency [MHz]	Reading [dBμV]	Factor [dB/m]	Loss [dB]	Gain [dB]	Result [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Ant.
-	-	-	-	-	-	-	-	-	-

There are no spurious emissions greater than noise floor or 20dB below the limit.

[Z-plane]

No.	Frequency [MHz]	Reading [dBμV]	Factor [dB/m]	Loss [dB]	Gain [dB]	Result [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Ant.
-	-	-	-	-	-	-	-	-	-

There are no spurious emissions greater than noise floor or 20dB below the limit.

Operating frequency: 2442MHz
Data rate: 1Mbps

[X-plane]

No.	Frequency [MHz]	Reading [dBμV]	Factor [dB/m]	Loss [dB]	Gain [dB]	Result [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Ant.
1	20.45522	14.7	9.3	0.8	0.0	24.8	49.5	24.7	90deg

[Y-plane]

No.	Frequency [MHz]	Reading [dBμV]	Factor [dB/m]	Loss [dB]	Gain [dB]	Result [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Ant.
-	-	-	-	-	-	-	-	-	-

There are no spurious emissions greater than noise floor or 20dB below the limit.

[Z-plane]

No.	Frequency [MHz]	Reading [dBμV]	Factor [dB/m]	Loss [dB]	Gain [dB]	Result [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Ant.
-	-	-	-	-	-	-	-	-	-

There are no spurious emissions greater than noise floor or 20dB below the limit.

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Operating frequency: 2480MHz
Data rate: 1Mbps

[X-plane]

No.	Frequency [MHz]	Reading [dBμV]	Factor [dB/m]	Loss [dB]	Gain [dB]	Result [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Ant.
1	20.31516	15.0	9.4	0.8	0.0	25.2	49.5	24.3	90deg

[Y-plane]

No.	Frequency [MHz]	Reading [dBμV]	Factor [dB/m]	Loss [dB]	Gain [dB]	Result [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Ant.
-	-	-	-	-	-	-	-	-	-

There are no spurious emissions greater than noise floor or 20dB below the limit.

[Z-plane]

No.	Frequency [MHz]	Reading [dBμV]	Factor [dB/m]	Loss [dB]	Gain [dB]	Result [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Ant.
-	-	-	-	-	-	-	-	-	-

There are no spurious emissions greater than noise floor or 20dB below the limit.

Operating frequency: 2402MHz
Data rate: 2Mbps

[X-plane]

No.	Frequency [MHz]	Reading [dBμV]	Factor [dB/m]	Loss [dB]	Gain [dB]	Result [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Ant.
1	20.38519	14.8	9.3	0.8	0.0	24.9	49.5	24.6	90deg

[Y-plane]

No.	Frequency [MHz]	Reading [dBμV]	Factor [dB/m]	Loss [dB]	Gain [dB]	Result [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Ant.
-	-	-	-	-	-	-	-	-	-

There are no spurious emissions greater than noise floor or 20dB below the limit.

[Z-plane]

No.	Frequency [MHz]	Reading [dBμV]	Factor [dB/m]	Loss [dB]	Gain [dB]	Result [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Ant.
-	-	-	-	-	-	-	-	-	-

There are no spurious emissions greater than noise floor or 20dB below the limit.

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Operating frequency: 2442MHz
Data rate: 2Mbps

[X-plane]

No.	Frequency [MHz]	Reading [dBμV]	Factor [dB/m]	Loss [dB]	Gain [dB]	Result [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Ant.
-	-	-	-	-	-	-	-	-	-

There are no spurious emissions greater than noise floor or 20dB below the limit.

[Y-plane]

No.	Frequency [MHz]	Reading [dBμV]	Factor [dB/m]	Loss [dB]	Gain [dB]	Result [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Ant.
-	-	-	-	-	-	-	-	-	-

There are no spurious emissions greater than noise floor or 20dB below the limit.

[Z-plane]

No.	Frequency [MHz]	Reading [dBμV]	Factor [dB/m]	Loss [dB]	Gain [dB]	Result [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Ant.
-	-	-	-	-	-	-	-	-	-

There are no spurious emissions greater than noise floor or 20dB below the limit.

Operating frequency: 2480MHz
Data rate: 2Mbps

[X-plane]

No.	Frequency [MHz]	Reading [dBμV]	Factor [dB/m]	Loss [dB]	Gain [dB]	Result [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Ant.
-	-	-	-	-	-	-	-	-	-

There are no spurious emissions greater than noise floor or 20dB below the limit.

[Y-plane]

No.	Frequency [MHz]	Reading [dBμV]	Factor [dB/m]	Loss [dB]	Gain [dB]	Result [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Ant.
-	-	-	-	-	-	-	-	-	-

There are no spurious emissions greater than noise floor or 20dB below the limit.

[Z-plane]

No.	Frequency [MHz]	Reading [dBμV]	Factor [dB/m]	Loss [dB]	Gain [dB]	Result [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Ant.
-	-	-	-	-	-	-	-	-	-

There are no spurious emissions greater than noise floor or 20dB below the limit.

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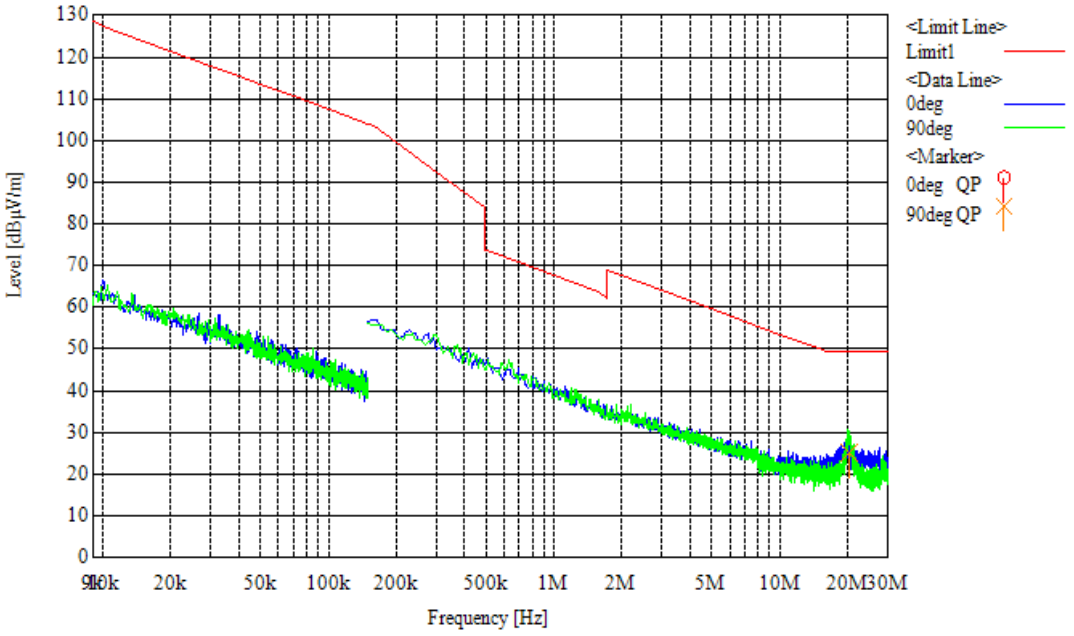
[Chart (2480MHz, 1Mbps, X-plane)]



Tested Date:	February 14, 2020	Temperature:	16 degC
Humidity:	49 %	Atmos. Press:	1020 hPa

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Test Data (30 - 1000MHz)

Test site: Yokohama Laboratory
Measurement distance: 3 m

Operating frequency: 2402MHz
Data rate: 1Mbps

[X-plane]

No.	Frequency [MHz]	Reading [dBμV]	Factor [dB/m]	Loss [dB]	Gain [dB]	Result [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Ant.
1	**30.097**	**32.3**	**22.6**	**6.8**	**30.4**	**31.3**	**40.0**	**8.7**	**Vert.**
2	42.805	36.0	16.4	7.0	30.4	29.0	40.0	11.0	Vert.
3	56.845	39.5	11.3	7.2	30.3	27.7	40.0	12.3	Vert.
4	197.030	37.8	11.5	8.6	30.1	27.8	43.5	15.7	Vert.
5	262.488	36.4	12.8	9.1	30.2	28.1	46.0	17.9	Vert.
6	328.443	33.2	14.3	9.7	30.2	27.0	46.0	19.0	Vert.

[Y-plane]

No.	Frequency [MHz]	Reading [dBμV]	Factor [dB/m]	Loss [dB]	Gain [dB]	Result [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Ant.
1	30.679	31.8	22.3	6.8	30.4	30.5	40.0	9.5	Vert.
2	42.872	37.0	16.3	7.0	30.4	29.9	40.0	10.1	Vert.
3	55.945	39.1	11.6	7.2	30.3	27.6	40.0	12.4	Vert.
4	196.993	38.0	11.4	8.6	30.1	27.9	43.5	15.6	Vert.
5	262.676	36.0	12.8	9.1	30.2	27.7	46.0	18.3	Vert.
6	328.442	32.6	14.3	9.7	30.2	26.4	46.0	19.6	Vert.

[Z-plane]

No.	Frequency [MHz]	Reading [dBμV]	Factor [dB/m]	Loss [dB]	Gain [dB]	Result [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Ant.
1	30.485	30.8	22.4	6.8	30.4	29.6	40.0	10.4	Vert.
2	42.763	35.9	16.4	7.0	30.4	28.9	40.0	11.1	Vert.
3	56.003	38.5	11.6	7.2	30.3	27.0	40.0	13.0	Vert.
4	196.992	36.3	11.4	8.6	30.1	26.2	43.5	17.3	Vert.
5	263.579	34.7	12.9	9.1	30.2	26.5	46.0	19.5	Vert.
6	326.572	32.3	14.2	9.6	30.2	25.9	46.0	20.1	Vert.

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Operating frequency: 2442MHz
Data rate: 1Mbps

[X-plane]

No.	Frequency [MHz]	Reading [dBμV]	Factor [dB/m]	Loss [dB]	Gain [dB]	Result [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Ant.
1	30.097	32.2	22.6	6.8	30.4	31.2	40.0	8.8	Vert.
2	42.803	35.9	16.4	7.0	30.4	28.9	40.0	11.1	Vert.
3	56.579	38.7	11.4	7.2	30.3	27.0	40.0	13.0	Vert.
4	197.063	37.4	11.5	8.6	30.1	27.4	43.5	16.1	Vert.
5	262.429	36.4	12.8	9.1	30.2	28.1	46.0	17.9	Vert.
6	327.988	32.5	14.3	9.6	30.2	26.2	46.0	19.8	Vert.

[Y-plane]

No.	Frequency [MHz]	Reading [dBμV]	Factor [dB/m]	Loss [dB]	Gain [dB]	Result [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Ant.
1	30.582	31.9	22.3	6.8	30.4	30.6	40.0	9.4	Vert.
2	42.486	36.9	16.5	7.0	30.4	30.0	40.0	10.0	Vert.
3	55.915	38.9	11.6	7.2	30.3	27.4	40.0	12.6	Vert.
4	197.485	36.9	11.5	8.6	30.1	26.9	43.5	16.6	Vert.
5	263.376	34.0	12.9	9.1	30.2	25.8	46.0	20.2	Vert.
6	326.444	32.3	14.2	9.6	30.2	25.9	46.0	20.1	Vert.

[Z-plane]

No.	Frequency [MHz]	Reading [dBμV]	Factor [dB/m]	Loss [dB]	Gain [dB]	Result [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Ant.
1	30.582	30.9	22.3	6.8	30.4	29.6	40.0	10.4	Vert.
2	41.192	35.0	17.1	7.0	30.4	28.7	40.0	11.3	Vert.
3	55.436	39.0	11.7	7.2	30.3	27.6	40.0	12.4	Vert.
4	131.384	34.3	12.7	8.0	30.2	24.8	43.5	18.7	Vert.
5	196.793	33.6	11.4	8.6	30.1	23.5	43.5	20.0	Vert.
6	280.383	32.9	13.1	9.3	30.2	25.1	46.0	20.9	Vert.

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Operating frequency: 2480MHz
Data rate: 1Mbps

[X-plane]

No.	Frequency [MHz]	Reading [dBμV]	Factor [dB/m]	Loss [dB]	Gain [dB]	Result [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Ant.
1	30.970	31.8	22.1	6.8	30.4	30.3	40.0	9.7	Vert.
2	34.268	32.4	20.6	6.9	30.4	29.5	40.0	10.5	Vert.
3	56.844	39.4	11.3	7.2	30.3	27.6	40.0	12.4	Vert.
4	196.787	38.0	11.4	8.6	30.1	27.9	43.5	15.6	Vert.
5	262.398	36.5	12.8	9.1	30.2	28.2	46.0	17.8	Vert.
6	328.021	32.6	14.3	9.6	30.2	26.3	46.0	19.7	Vert.

[Y-plane]

No.	Frequency [MHz]	Reading [dBμV]	Factor [dB/m]	Loss [dB]	Gain [dB]	Result [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Ant.
1	30.291	31.6	22.5	6.8	30.4	30.5	40.0	9.5	Vert.
2	42.282	36.5	16.6	7.0	30.4	29.7	40.0	10.3	Vert.
3	55.325	39.3	11.7	7.2	30.3	27.9	40.0	12.1	Vert.
4	196.936	37.0	11.4	8.6	30.1	26.9	43.5	16.6	Vert.
5	262.567	34.3	12.8	9.1	30.2	26.0	46.0	20.0	Vert.
6	328.263	32.5	14.3	9.7	30.2	26.3	46.0	19.7	Vert.

[Z-plane]

No.	Frequency [MHz]	Reading [dBμV]	Factor [dB/m]	Loss [dB]	Gain [dB]	Result [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Ant.
1	30.097	31.0	22.6	6.8	30.4	30.0	40.0	10.0	Vert.
2	42.656	35.8	16.4	7.0	30.4	28.8	40.0	11.2	Vert.
3	55.281	39.1	11.8	7.2	30.3	27.8	40.0	12.2	Vert.
4	118.683	33.8	12.6	7.9	30.2	24.1	43.5	19.4	Vert.
5	196.998	34.0	11.4	8.6	30.1	23.9	43.5	19.6	Vert.
6	328.266	31.8	14.3	9.7	30.2	25.6	46.0	20.4	Vert.

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Operating frequency: 2402MHz
Data rate: 2Mbps

[X-plane]

No.	Frequency [MHz]	Reading [dBμV]	Factor [dB/m]	Loss [dB]	Gain [dB]	Result [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Ant.
1	30.485	31.3	22.4	6.8	30.4	30.1	40.0	9.9	Vert.
2	42.437	35.9	16.5	7.0	30.4	29.0	40.0	11.0	Vert.
3	56.738	39.2	11.4	7.2	30.3	27.5	40.0	12.5	Vert.
4	197.056	38.0	11.5	8.6	30.1	28.0	43.5	15.5	Vert.
5	262.732	36.4	12.8	9.1	30.2	28.1	46.0	17.9	Vert.
6	328.417	32.5	14.3	9.7	30.2	26.3	46.0	19.7	Vert.

[Y-plane]

No.	Frequency [MHz]	Reading [dBμV]	Factor [dB/m]	Loss [dB]	Gain [dB]	Result [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Ant.
1	30.970	32.3	22.1	6.8	30.4	30.8	40.0	9.2	Vert.
2	42.314	36.5	16.6	7.0	30.4	29.7	40.0	10.3	Vert.
3	56.728	39.6	11.4	7.2	30.3	27.9	40.0	12.1	Vert.
4	196.848	41.2	11.4	8.6	30.1	31.1	43.5	12.4	Vert.
5	262.503	34.2	12.8	9.1	30.2	25.9	46.0	20.1	Vert.
6	275.347	33.3	13.0	9.2	30.2	25.3	46.0	20.7	Vert.

[Z-plane]

No.	Frequency [MHz]	Reading [dBμV]	Factor [dB/m]	Loss [dB]	Gain [dB]	Result [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Ant.
1	30.582	30.7	22.3	6.8	30.4	29.4	40.0	10.6	Vert.
2	42.856	35.7	16.3	7.0	30.4	28.6	40.0	11.4	Vert.
3	55.417	38.5	11.7	7.2	30.3	27.1	40.0	12.9	Vert.
4	131.411	34.2	12.7	8.0	30.2	24.7	43.5	18.8	Vert.
5	196.891	33.4	11.4	8.6	30.1	23.3	43.5	20.2	Vert.
6	280.397	33.7	13.1	9.3	30.2	25.9	46.0	20.1	Vert.

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Operating frequency: 2442MHz
Data rate: 2Mbps

[X-plane]

No.	Frequency [MHz]	Reading [dBμV]	Factor [dB/m]	Loss [dB]	Gain [dB]	Result [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Ant.
1	30.679	31.3	22.3	6.8	30.4	30.0	40.0	10.0	Vert.
2	42.478	35.8	16.5	7.0	30.4	28.9	40.0	11.1	Vert.
3	56.522	38.8	11.4	7.2	30.3	27.1	40.0	12.9	Vert.
4	197.005	37.8	11.4	8.6	30.1	27.7	43.5	15.8	Vert.
5	262.359	35.8	12.8	9.1	30.2	27.5	46.0	18.5	Vert.
6	327.956	32.9	14.3	9.6	30.2	26.6	46.0	19.4	Vert.

[Y-plane]

No.	Frequency [MHz]	Reading [dBμV]	Factor [dB/m]	Loss [dB]	Gain [dB]	Result [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Ant.
1	30.582	32.0	22.3	6.8	30.4	30.7	40.0	9.3	Vert.
2	43.253	35.8	16.2	7.0	30.4	28.6	40.0	11.4	Vert.
3	56.786	39.8	11.4	7.2	30.3	28.1	40.0	11.9	Vert.
4	196.838	36.6	11.4	8.6	30.1	26.5	43.5	17.0	Vert.
5	262.397	34.0	12.8	9.1	30.2	25.7	46.0	20.3	Vert.
6	328.039	32.2	14.3	9.6	30.2	25.9	46.0	20.1	Vert.

[Z-plane]

No.	Frequency [MHz]	Reading [dBμV]	Factor [dB/m]	Loss [dB]	Gain [dB]	Result [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Ant.
1	30.776	31.2	22.2	6.8	30.4	29.8	40.0	10.2	Vert.
2	42.802	35.6	16.4	7.0	30.4	28.6	40.0	11.4	Vert.
3	55.383	38.4	11.7	7.2	30.3	27.0	40.0	13.0	Vert.
4	118.676	33.8	12.6	7.9	30.2	24.1	43.5	19.4	Vert.
5	131.428	33.9	12.7	8.0	30.2	24.4	43.5	19.1	Vert.
6	196.814	34.1	11.4	8.6	30.1	24.0	43.5	19.5	Vert.

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Operating frequency: 2480MHz
Data rate: 2Mbps

[X-plane]

No.	Frequency [MHz]	Reading [dBμV]	Factor [dB/m]	Loss [dB]	Gain [dB]	Result [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Ant.
1	30.873	31.6	22.2	6.8	30.4	30.2	40.0	9.8	Vert.
2	42.520	36.3	16.5	7.0	30.4	29.4	40.0	10.6	Vert.
3	56.835	39.8	11.3	7.2	30.3	28.0	40.0	12.0	Vert.
4	197.446	38.5	11.5	8.6	30.1	28.5	43.5	15.0	Vert.
5	263.213	35.6	12.8	9.1	30.2	27.3	46.0	18.7	Vert.
6	329.089	32.8	14.3	9.7	30.2	26.6	46.0	19.4	Vert.

[Y-plane]

No.	Frequency [MHz]	Reading [dBμV]	Factor [dB/m]	Loss [dB]	Gain [dB]	Result [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Ant.
1	30.291	31.6	22.5	6.8	30.4	30.5	40.0	9.5	Vert.
2	42.226	36.4	16.6	7.0	30.4	29.6	40.0	10.4	Vert.
3	57.301	38.1	11.2	7.2	30.3	26.2	40.0	13.8	Vert.
4	196.789	36.9	11.4	8.6	30.1	26.8	43.5	16.7	Vert.
5	262.292	34.4	12.8	9.1	30.2	26.1	46.0	19.9	Vert.
6	328.420	33.8	14.3	9.7	30.2	27.6	46.0	18.4	Vert.

[Z-plane]

No.	Frequency [MHz]	Reading [dBμV]	Factor [dB/m]	Loss [dB]	Gain [dB]	Result [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Ant.
1	30.291	31.0	22.5	6.8	30.4	29.9	40.0	10.1	Vert.
2	42.187	35.3	16.7	7.0	30.4	28.6	40.0	11.4	Vert.
3	55.490	38.4	11.7	7.2	30.3	27.0	40.0	13.0	Vert.
4	118.653	34.5	12.6	7.9	30.2	24.8	43.5	18.7	Vert.
5	131.379	34.6	12.7	8.0	30.2	25.1	43.5	18.4	Vert.
6	327.896	34.3	14.3	9.6	30.2	28.0	46.0	18.0	Vert.

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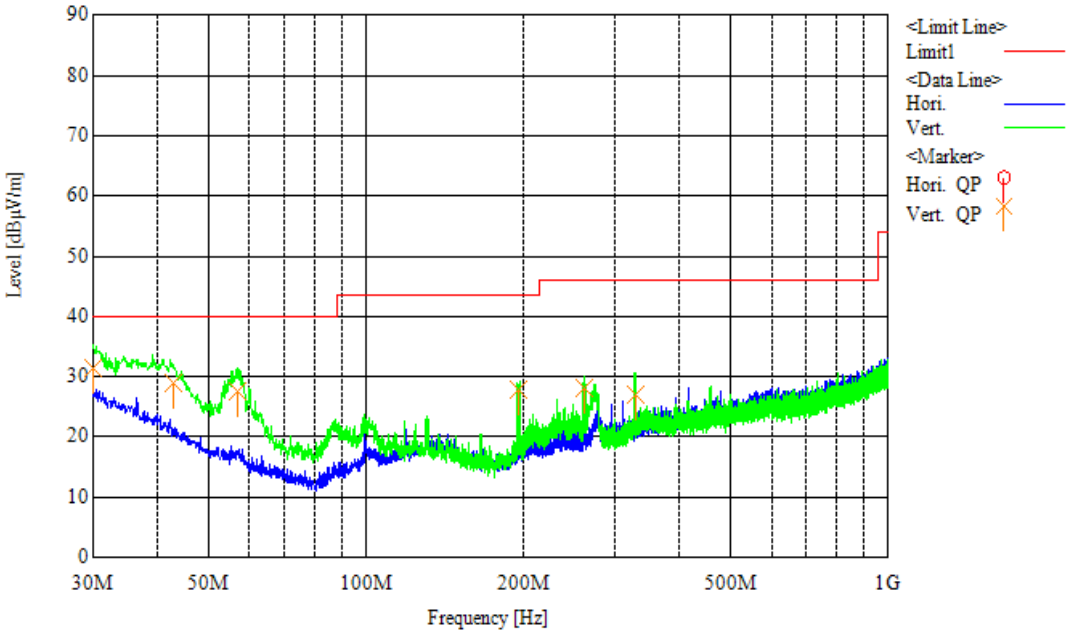
[Chart (2402MHz, 1Mbps, X-plane)]



Tested Date:	February 14, 2020	Temperature:	16 degC
Humidity:	49 %	Atmos. Press:	1020 hPa

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Test Data (1-18GHz)

Test site: Yokohama Laboratory
Measurement distance: 3 m

Operating frequency: 2402MHz
Data rate: 1Mbps

[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	4803.952	51.0	45.0	2.2	53.2	47.2	73.9	53.9	20.7	6.7	Hori.
2	4803.952	46.7	38.0	2.2	48.9	40.2	73.9	53.9	25.0	13.7	Vert.

[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	4804.016	49.8	42.8	2.2	52.0	45.0	73.9	53.9	21.9	8.9	Hori.
2	4804.016	51.6	45.6	2.2	53.8	47.8	73.9	53.9	20.1	6.1	Vert.

[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	**4803.992**	**51.5**	**45.8**	**2.2**	**53.7**	**48.0**	**73.9**	**53.9**	**20.2**	**5.9**	**Hori.**
2	4804.040	49.8	42.7	2.2	52.0	44.9	73.9	53.9	21.9	9.0	Vert.

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Operating frequency: 2442MHz
Data rate: 1Mbps

[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	4884.063	49.3	42.2	2.6	51.9	44.8	73.9	53.9	22.0	9.1	Hori.
2	7326.148	46.0	35.5	6.5	52.5	42.0	73.9	53.9	21.4	11.9	Hori.
3	4884.136	46.2	37.2	2.6	48.8	39.8	73.9	53.9	25.1	14.1	Vert.

[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	4883.920	49.2	42.2	2.6	51.8	44.8	73.9	53.9	22.1	9.1	Hori.
2	4884.080	50.0	43.6	2.6	52.6	46.2	73.9	53.9	21.3	7.7	Vert.

[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	4884.072	49.9	43.5	2.6	52.5	46.1	73.9	53.9	21.4	7.8	Hori.
2	4884.016	49.1	41.6	2.6	51.7	44.2	73.9	53.9	22.2	9.7	Vert.

Operating frequency: 2480MHz
Data rate: 1Mbps

[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	4960.044	48.7	41.1	2.8	51.5	43.9	73.9	53.9	22.4	10.0	Hori.
2	4960.012	46.6	38.3	2.8	49.4	41.1	73.9	53.9	24.5	12.8	Vert.

[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	4959.876	48.7	41.0	2.8	51.5	43.8	73.9	53.9	22.4	10.1	Hori.
2	4959.876	50.0	43.6	2.8	52.8	46.4	73.9	53.9	21.1	7.5	Vert.

[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	4960.036	50.0	43.5	2.8	52.8	46.3	73.9	53.9	21.1	7.6	Hori.
2	4960.036	48.2	41.0	2.8	51.0	43.8	73.9	53.9	22.9	10.1	Vert.

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Operating frequency: 2402MHz
Data rate: 2Mbps

[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	4804.144	50.3	39.5	2.2	52.5	41.7	73.9	53.9	21.4	12.2	Hori.
2	4803.880	46.7	35.8	2.2	48.9	38.0	73.9	53.9	25.0	15.9	Vert.

[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	4804.048	49.3	38.3	2.2	51.5	40.5	73.9	53.9	22.4	13.4	Hori.
2	4804.048	51.8	40.5	2.2	54.0	42.7	73.9	53.9	19.9	11.2	Vert.

[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	4803.968	51.8	40.7	2.2	54.0	42.9	73.9	53.9	19.9	11.0	Hori.
2	4804.056	49.5	38.5	2.2	51.7	40.7	73.9	53.9	22.2	13.2	Vert.

Operating frequency: 2442MHz
Data rate: 2Mbps

[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	4883.948	49.1	38.0	2.6	51.7	40.6	73.9	53.9	22.2	13.3	Hori.
2	7325.911	45.4	34.2	6.5	51.9	40.7	73.9	53.9	22.0	13.2	Hori.
3	4883.827	46.9	35.6	2.6	49.5	38.2	73.9	53.9	24.4	15.7	Vert.

[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	4884.156	48.9	38.0	2.6	51.5	40.6	73.9	53.9	22.4	13.3	Hori.
2	4883.896	49.7	38.8	2.6	52.3	41.4	73.9	53.9	21.6	12.5	Vert.

[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	4884.032	50.0	38.9	2.6	52.6	41.5	73.9	53.9	21.3	12.4	Hori.
2	4883.996	48.3	37.5	2.6	50.9	40.1	73.9	53.9	23.0	13.8	Vert.

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Operating frequency: 2480MHz
Data rate: 2Mbps

[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	4960.024	48.7	37.1	2.8	51.5	39.9	73.9	53.9	22.4	14.0	Hori.
2	4959.864	47.1	35.1	2.8	49.9	37.9	73.9	53.9	24.0	16.0	Vert.

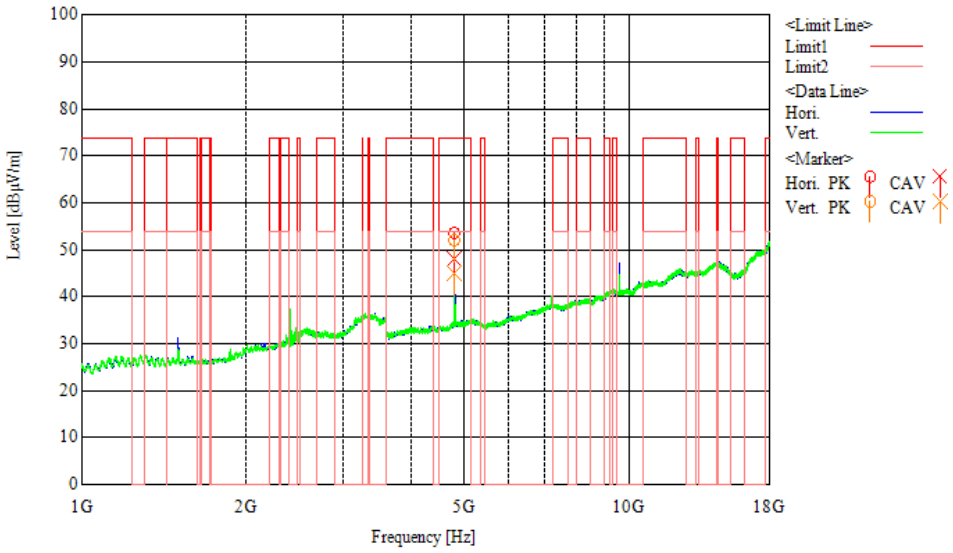
[Y-plane]

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	4960.052	49.2	37.8	2.8	52.0	40.6	73.9	53.9	21.9	13.3	Hori.
2	4960.124	50.0	38.8	2.8	52.8	41.6	73.9	53.9	21.1	12.3	Vert.

[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	4960.112	49.9	38.9	2.8	52.7	41.7	73.9	53.9	21.2	12.2	Hori.
2	4960.060	48.5	37.2	2.8	51.3	40.0	73.9	53.9	22.6	13.9	Vert.

[Chart (2402MHz, 1Mbps, Z-plane]



Tested Date: February 12, 2020 Temperature: 14 degC
Humidity: 32 % Atmos. Press: 1028 hPa

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Test Data (18-25GHz)

Test site: Yokohama Laboratory
Measurement distance: 3 m

Operating frequency: 2402MHz
Data rate: 1Mbps

[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	19216.152	42.7	31.8	10.9	53.6	42.7	73.9	53.9	20.3	11.2	Vert.

[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	19216.170	44.3	33.3	10.9	55.2	44.2	73.9	53.9	18.7	9.7	Hori.
2	**19216.160**	45.6	**34.0**	**10.9**	56.5	**44.9**	73.9	**53.9**	17.4	**9.0**	**Vert.**

[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	19216.131	44.2	33.0	10.9	55.1	43.9	73.9	53.9	18.8	10.0	Hori.
2	19216.221	43.0	32.4	10.9	53.9	43.3	73.9	53.9	20.0	10.6	Vert.

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Operating frequency: 2442MHz
Data rate: 1Mbps

[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	19536.154	44.1	33.2	10.3	54.4	43.5	73.9	53.9	19.5	10.4	Vert.

[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	19536.186	44.6	33.3	10.3	54.9	43.6	73.9	53.9	19.0	10.3	Hori.
2	19536.166	45.2	34.1	10.3	55.5	44.4	73.9	53.9	18.4	9.5	Vert.

[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	19536.162	45.1	33.8	10.3	55.4	44.1	73.9	53.9	18.5	9.8	Hori.
2	19536.189	43.8	33.0	10.3	54.1	43.3	73.9	53.9	19.8	10.6	Vert.

Operating frequency: 2480MHz
Data rate: 1Mbps

[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	19840.164	45.0	33.5	10.0	55.0	43.5	73.9	53.9	18.9	10.4	Vert.

[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	19840.191	44.2	33.3	10.0	54.2	43.3	73.9	53.9	19.7	10.6	Hori.
2	19840.172	44.5	33.3	10.0	54.5	43.3	73.9	53.9	19.4	10.6	Vert.

[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	19840.195	44.5	33.4	10.0	54.5	43.4	73.9	53.9	19.4	10.5	Hori.

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Operating frequency: 2402MHz
Data rate: 2Mbps

[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	19216.156	43.0	31.6	10.9	53.9	42.5	73.9	53.9	20.0	11.4	Vert.

[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	19216.191	45.0	32.5	10.9	55.9	43.4	73.9	53.9	18.0	10.5	Hori.
2	19216.148	45.0	33.0	10.9	55.9	43.9	73.9	53.9	18.0	10.0	Vert.

[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	19216.176	44.0	32.3	10.9	54.9	43.2	73.9	53.9	19.0	10.7	Hori.
2	19216.176	43.3	31.9	10.9	54.2	42.8	73.9	53.9	19.7	11.1	Vert.

Operating frequency: 2442MHz
Data rate: 2Mbps

[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	19536.170	44.0	32.8	10.3	54.3	43.1	73.9	53.9	19.6	10.8	Vert.

[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	19536.186	44.9	33.0	10.3	55.2	43.3	73.9	53.9	18.7	10.6	Hori.
2	19536.170	45.5	33.6	10.3	55.8	43.9	73.9	53.9	18.1	10.0	Vert.

[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	19536.189	45.3	33.4	10.3	55.6	43.7	73.9	53.9	18.3	10.2	Hori.

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Operating frequency: 2480MHz
Data rate: 2Mbps

[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	19840.164	44.9	33.0	10.0	54.9	43.0	73.9	53.9	19.0	10.9	Vert.

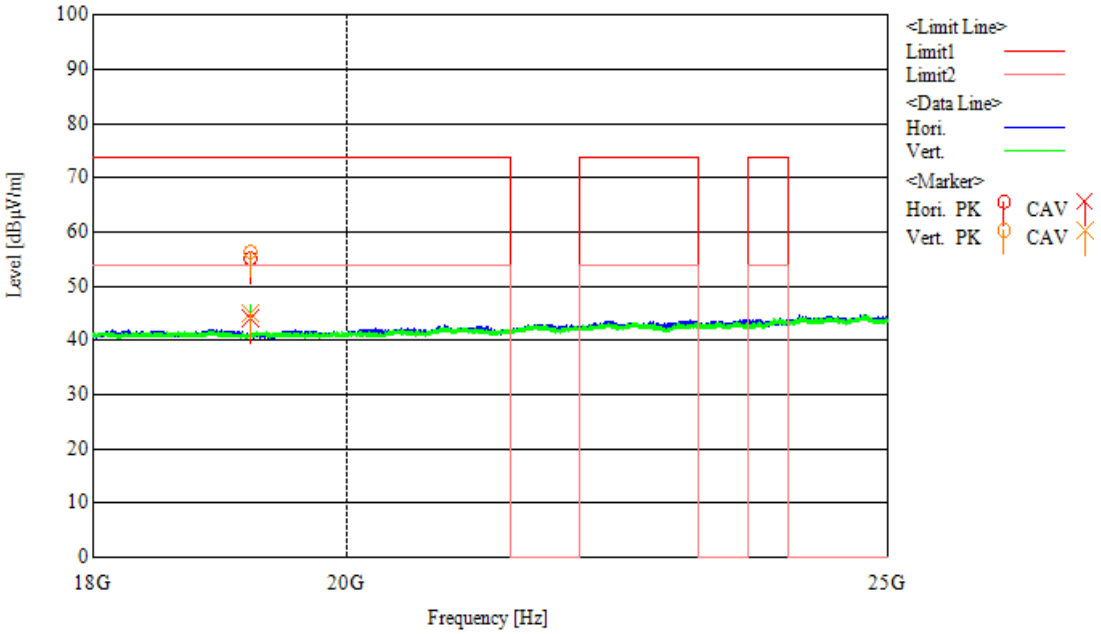
[Y-plane]

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	19840.199	44.5	32.9	10.0	54.5	42.9	73.9	53.9	19.4	11.0	Hori.
2	19840.213	44.3	32.9	10.0	54.3	42.9	73.9	53.9	19.6	11.0	Vert.

[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	19840.184	44.6	33.0	10.0	54.6	43.0	73.9	53.9	19.3	10.9	Hori.

[Chart (2402MHz, 1Mbps, Y-plane)]



Tested Date: February 13, 2020 Temperature: 17 degC
Humidity: 40 % Atmos. Press: 1017 hPa

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Restricted bandedge measurement

Test site: Yokohama Laboratory
Measurement distance: 3 m

Operating frequency: 2402MHz
Data rate: 1Mbps

[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	2390.000	45.6	30.5	4.6	50.2	35.1	73.9	53.9	23.7	18.8	Hori.
2	2390.000	44.6	30.4	4.6	49.2	35.0	73.9	53.9	24.7	18.9	Vert.

[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	2390.000	46.9	30.6	4.6	51.5	35.2	73.9	53.9	22.4	18.7	Hori.
2	2390.000	45.6	30.5	4.6	50.2	35.1	73.9	53.9	23.7	18.8	Vert.

[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	2390.000	44.8	30.5	4.6	49.4	35.1	73.9	53.9	24.5	18.8	Hori.
2	2390.000	46.6	30.6	4.6	51.2	35.2	73.9	53.9	22.7	18.7	Vert.

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Operating frequency: 2402MHz
Data rate: 2Mbps

[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	2390.000	46.1	30.5	4.6	50.7	35.1	73.9	53.9	23.2	18.8	Hori.
2	2390.000	44.2	30.4	4.6	48.8	35.0	73.9	53.9	25.1	18.9	Vert.

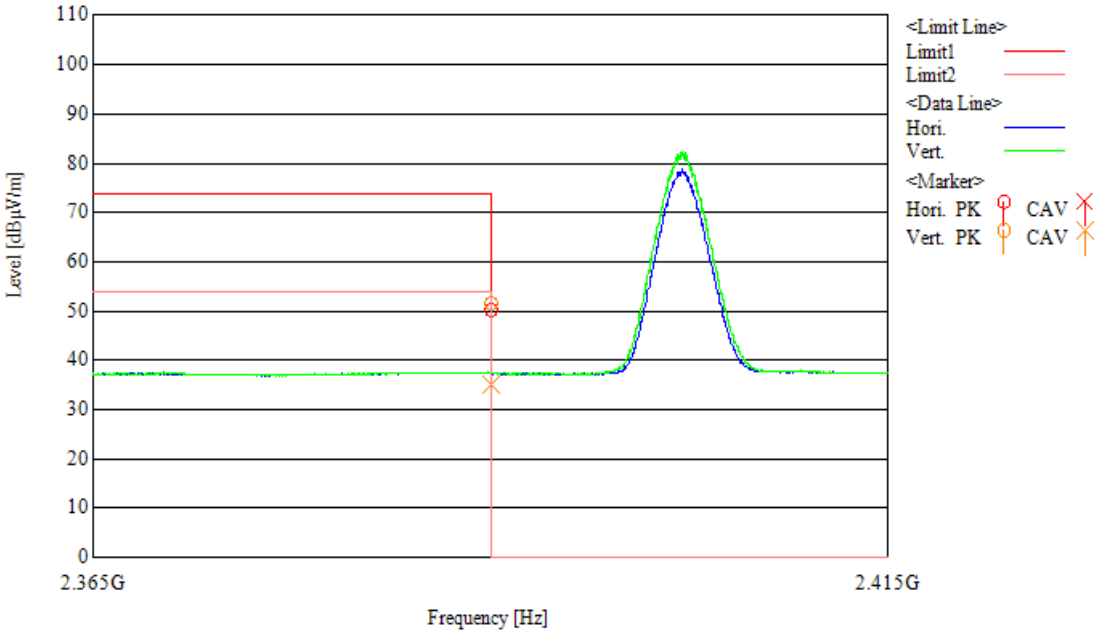
[Y-plane]

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	2390.000	46.7	30.6	4.6	51.3	35.2	73.9	53.9	22.6	18.7	Hori.
2	2390.000	45.8	30.5	4.6	50.4	35.1	73.9	53.9	23.5	18.8	Vert.

[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	2390.000	45.5	30.5	4.6	50.1	35.1	73.9	53.9	23.8	18.8	Hori.
2	2390.000	46.8	30.6	4.6	51.4	35.2	73.9	53.9	22.5	18.7	Vert.

[Chart (2402MHz, 2Mbps, Z-plane]



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Operating frequency: 2480MHz
Data rate: 1Mbps

[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	2483.500	53.7	31.2	5.3	59.0	36.5	73.9	53.9	14.9	17.4	Hori.
2	2483.500	45.8	30.6	5.3	51.1	35.9	73.9	53.9	22.8	18.0	Vert.

[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	2483.500	57.3	31.9	5.3	62.6	37.2	73.9	53.9	11.3	16.7	Hori.
2	2483.500	54.9	31.4	5.3	60.2	36.7	73.9	53.9	13.7	17.2	Vert.

[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	2483.500	53.1	31.1	5.3	58.4	36.4	73.9	53.9	15.5	17.5	Hori.
2	2483.500	56.9	31.8	5.3	62.2	37.1	73.9	53.9	11.7	16.8	Vert.

Operating frequency: 2480MHz
Data rate: 2Mbps

[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	2483.500	54.1	31.2	5.3	59.4	36.5	73.9	53.9	14.5	17.4	Hori.
2	2483.500	45.6	30.5	5.3	50.9	35.8	73.9	53.9	23.0	18.1	Vert.

[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	2483.500	57.7	31.9	5.3	63.0	37.2	73.9	53.9	10.9	16.7	Hori.
2	2483.500	55.1	31.4	5.3	60.4	36.7	73.9	53.9	13.5	17.2	Vert.

[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	2483.500	53.3	31.1	5.3	58.6	36.4	73.9	53.9	15.3	17.5	Hori.
2	2483.500	57.0	31.8	5.3	62.3	37.1	73.9	53.9	11.6	16.8	Vert.

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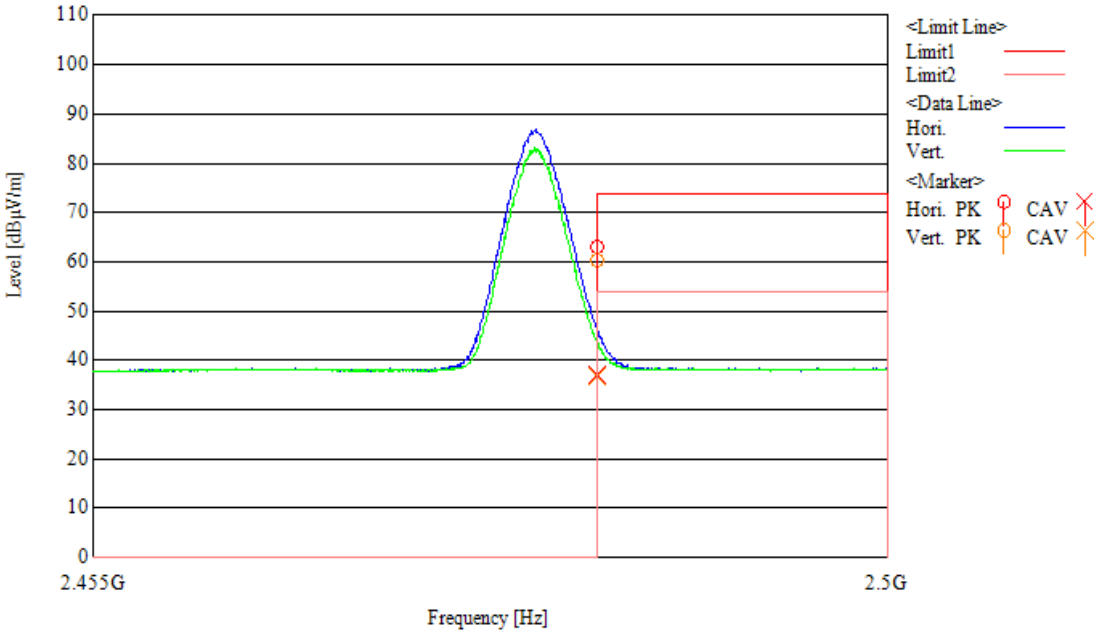
[Chart (2480MHz, 2Mbps, Y-plane]



Tested Date:	February 13, 2020	Temperature:	17 degC
Humidity:	40 %	Atmos. Press:	1017 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 / RSS-Gen 8.8: 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

EMI1 Ver. 5.9

Calculation method

The Correction Factor and Result are calculated as followings.

Correction Factor [dB] = ISN Factor [dB] + Loss [dB]
Result [dBμV] = Reading [dBμV] + Correction Factor [dB]

Test results - *Complied with requirement*

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Test Data

Test site: Yokohama Laboratory

[Operating mode: 2402MHz, 1Mbps]

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	0.15119	32.7	7.2	10.3	43.0	17.5	65.9	55.9	22.9	38.4	Va
2	**0.19483**	**39.9**	22.4	**10.2**	**50.1**	32.6	**63.8**	53.8	**13.7**	21.2	**Va**
3	0.40716	29.3	17.2	10.1	39.4	27.3	57.7	47.7	18.3	20.4	Va
4	2.89502	26.8	18.0	10.1	36.9	28.1	56.0	46.0	19.1	17.9	Va
5	0.19453	39.2	21.4	10.2	49.4	31.6	63.8	53.8	14.4	22.2	Vb
6	0.41770	28.9	16.8	10.1	39.0	26.9	57.5	47.5	18.5	20.6	Vb
7	2.63767	27.2	17.7	10.1	37.3	27.8	56.0	46.0	18.7	18.2	Vb

[Operating mode: 2442MHz, 1Mbps]

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	0.19147	38.2	19.5	10.2	48.4	29.7	64.0	54.0	15.6	24.3	Va
2	0.41379	30.3	18.4	10.1	40.4	28.5	57.6	47.6	17.2	19.1	Va
3	2.73125	28.3	19.2	10.1	38.4	29.3	56.0	46.0	17.6	16.7	Va
4	0.19657	37.8	21.1	10.2	48.0	31.3	63.8	53.8	15.8	22.5	Vb
5	0.40155	28.6	16.5	10.1	38.7	26.6	57.8	47.8	19.1	21.2	Vb
6	2.67007	28.9	18.3	10.1	39.0	28.4	56.0	46.0	17.0	17.6	Vb

[Operating mode: 2480MHz, 1Mbps]

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	0.15153	31.7	6.2	10.3	42.0	16.5	65.9	55.9	23.9	39.4	Va
2	0.19351	38.0	20.8	10.2	48.2	31.0	63.9	53.9	15.7	22.9	Va
3	0.39628	29.0	17.1	10.1	39.1	27.2	57.9	47.9	18.8	20.7	Va
4	2.73125	27.6	18.5	10.1	37.7	28.6	56.0	46.0	18.3	17.4	Va
5	0.19742	37.1	21.0	10.2	47.3	31.2	63.7	53.7	16.4	22.5	Vb
6	0.39509	28.4	16.6	10.1	38.5	26.7	58.0	48.0	19.5	21.3	Vb
7	2.52789	28.5	17.3	10.1	38.6	27.4	56.0	46.0	17.4	18.6	Vb

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[Operating mode: 2402MHz, 2Mbps]

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	0.19572	37.1	21.0	10.2	47.3	31.2	63.8	53.8	16.5	22.6	Va
2	0.38625	28.6	16.7	10.1	38.7	26.8	58.1	48.1	19.4	21.3	Va
3	2.67007	29.4	18.9	10.1	39.5	29.0	56.0	46.0	16.5	17.0	Va
4	0.19045	36.4	17.0	10.2	46.6	27.2	64.0	54.0	17.4	26.8	Vb
5	0.40206	28.6	16.6	10.1	38.7	26.7	57.8	47.8	19.1	21.1	Vb
6	2.45951	28.4	17.2	10.1	38.5	27.3	56.0	46.0	17.5	18.7	Vb

[Operating mode: 2442MHz, 2Mbps]

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	0.19130	36.8	18.2	10.2	47.0	28.4	64.0	54.0	17.0	25.6	Va
2	0.40053	29.6	17.6	10.1	39.7	27.7	57.8	47.8	18.1	20.1	Va
3	2.59628	29.0	18.6	10.1	39.1	28.7	56.0	46.0	16.9	17.3	Va
4	0.15170	31.0	5.7	10.3	41.3	16.0	65.9	55.9	24.6	39.9	Vb
5	0.19776	36.5	20.7	10.2	46.7	30.9	63.7	53.7	17.0	22.8	Vb
6	0.39849	28.5	16.6	10.1	38.6	26.7	57.9	47.9	19.3	21.2	Vb
7	2.72945	27.3	18.1	10.1	37.4	28.2	56.0	46.0	18.6	17.8	Vb

[Operating mode: 2480MHz, 2Mbps]

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	0.19113	35.4	16.8	10.2	45.6	27.0	64.0	54.0	18.4	27.0	Va
2	0.42704	29.4	15.8	10.1	39.5	25.9	57.3	47.3	17.8	21.4	Va
3	2.72945	27.6	19.2	10.1	37.7	29.3	56.0	46.0	18.3	16.7	Va
4	0.17295	33.4	17.1	10.3	43.7	27.4	64.8	54.8	21.1	27.4	Vb
5	0.43078	27.9	13.5	10.1	38.0	23.6	57.2	47.2	19.2	23.6	Vb
6	2.85723	26.4	18.0	10.1	36.5	28.1	56.0	46.0	19.5	17.9	Vb

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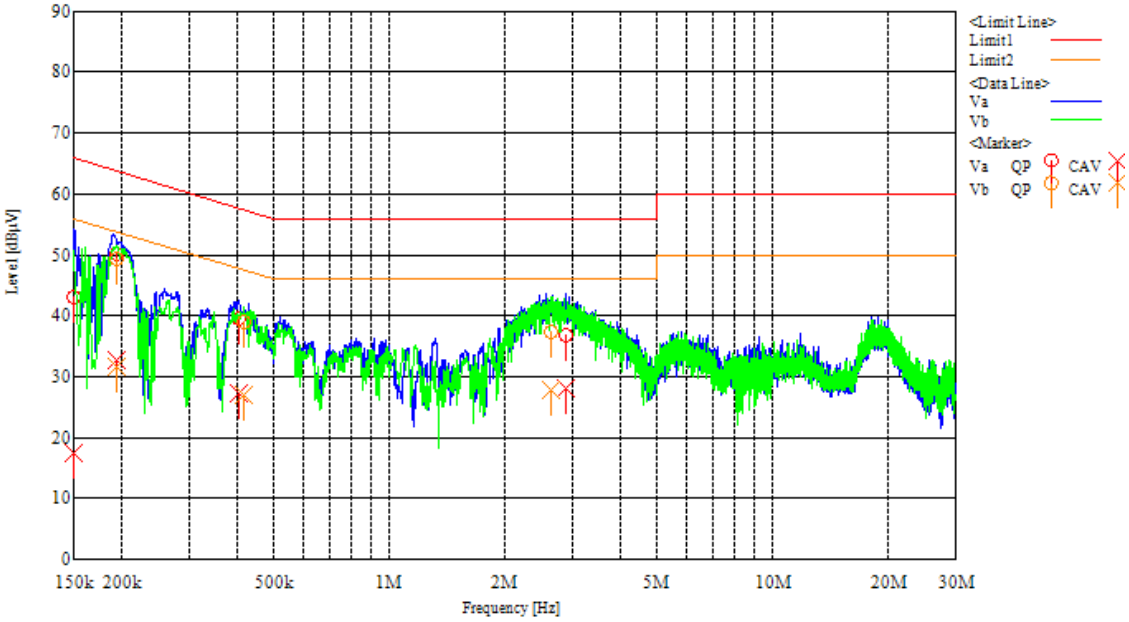
[Chart (2402MHz, 1Mbps)]



Tested Date:	February 18, 2020	Temperature:	20 degC
Humidity:	56 %	Atmos. Press:	1013 hPa

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2.8 Radiated emissions (Receiver)

Test setup

Test setup was implemented according to the method of ANSI C63.4 clause 6 "General requirements for EUT equipment arrangements and operation", clause 8.2 and Annex H.3 "Radiated emission measurements setup".

Test procedure

Measurement procedures were implemented according to the method of ANSI C63.4 clauses 8.2.
The EUT is place on a non-conducted table which is 0.8 m height from a ground plane and the measurement antenna to EUT distance is 3 meters. The turn table is rotated for 360 degrees to determine the maximum emission level.
The antenna height scanned between 1 m and 4 m, and the antenna rotated to repeat the measurements for both the horizontal and vertical antenna polarizations.
The spectrum analyzer and receiver are set to the followings;

RBW=100 kHz (up to 1000 MHz) or 1 MHz (above 1000 MHz)
VBW= 300 kHz (up to 1000 MHz) or 3 MHz (above 1000 MHz)
Final measurement is carried out with a receiver RBW of 120 kHz (up to 1000 MHz), or 1 MHz (above 1000 MHz).

Applicable rule and limitation

RSS-Gen 7.3: Radiated emissions limits

Frequency [MHz]	Field Strength [μV/m]	Measurement Distance [m]	Field Strength [dBμV/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 QP detector (up to 1000 MHz) or AVE/PEAK detector (above 1000 MHz).

Test results - *Complied with requirement*

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

AC01	BA07	CL11	CL38	CL39	DH06	PR12	PR21
TR06	-	-	-	-	-	-	-

Test software used

EMI1 Ver. 5.9

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Calculation method

The Correction Factor and Result are calculated as followings.

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

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Test Data (below 1GHz)

Test site: Yokohama Laboratory
Measurement distance: 3 m

Operating frequency: 2402MHz

[X-plane]

No.	Frequency [MHz]	Reading [dBμV]	Factor [dB/m]	Loss [dB]	Gain [dB]	Result [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Ant.
1	233.235	36.8	12.3	8.9	30.1	27.9	46.0	18.1	Hori.
2	30.776	29.7	22.2	6.8	30.4	28.3	40.0	11.7	Vert.
3	41.092	33.7	17.2	7.0	30.4	27.5	40.0	12.5	Vert.
4	60.026	37.7	10.5	7.3	30.3	25.2	40.0	14.8	Vert.
5	196.957	38.8	11.4	8.6	30.1	28.7	43.5	14.8	Vert.
6	262.523	34.6	12.8	9.1	30.2	26.3	46.0	19.7	Vert.

[Y-plane]

No.	Frequency [MHz]	Reading [dBμV]	Factor [dB/m]	Loss [dB]	Gain [dB]	Result [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Ant.
1	233.219	36.7	12.3	8.9	30.1	27.8	46.0	18.2	Hori.
2	30.679	29.6	22.3	6.8	30.4	28.3	40.0	11.7	Vert.
3	40.960	33.8	17.2	7.0	30.4	27.6	40.0	12.4	Vert.
4	56.769	37.1	11.4	7.2	30.3	25.4	40.0	14.6	Vert.
5	195.853	38.0	11.4	8.6	30.1	27.9	43.5	15.6	Vert.
6	197.496	37.9	11.5	8.6	30.1	27.9	43.5	15.6	Vert.

[Z-plane]

No.	Frequency [MHz]	Reading [dBμV]	Factor [dB/m]	Loss [dB]	Gain [dB]	Result [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Ant.
1	30.194	27.3	22.5	6.8	30.4	26.2	40.0	13.8	Vert.
2	40.572	32.8	17.4	7.0	30.4	26.8	40.0	13.2	Vert.
3	57.642	36.4	11.1	7.2	30.3	24.4	40.0	15.6	Vert.
4	196.861	38.5	11.4	8.6	30.1	28.4	43.5	15.1	Vert.
5	262.429	33.7	12.8	9.1	30.2	25.4	46.0	20.6	Vert.
6	328.115	32.9	14.3	9.6	30.2	26.6	46.0	19.4	Vert.

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Operating frequency: 2442MHz

[X-plane]

No.	Frequency [MHz]	Reading [dBμV]	Factor [dB/m]	Loss [dB]	Gain [dB]	Result [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Ant.
1	233.208	37.1	12.3	8.9	30.1	28.2	46.0	17.8	Hori.
2	30.582	28.6	22.3	6.8	30.4	27.3	40.0	12.7	Vert.
3	41.109	33.6	17.2	7.0	30.4	27.4	40.0	12.6	Vert.
4	59.942	37.2	10.5	7.3	30.3	24.7	40.0	15.3	Vert.
5	196.973	39.1	11.4	8.6	30.1	29.0	43.5	14.5	Vert.
6	262.758	34.6	12.8	9.1	30.2	26.3	46.0	19.7	Vert.

[Y-plane]

No.	Frequency [MHz]	Reading [dBμV]	Factor [dB/m]	Loss [dB]	Gain [dB]	Result [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Ant.
1	233.218	36.8	12.3	8.9	30.1	27.9	46.0	18.1	Hori.
2	30.097	28.3	22.6	6.8	30.4	27.3	40.0	12.7	Vert.
3	37.177	31.8	19.1	6.9	30.4	27.4	40.0	12.6	Vert.
4	57.351	36.7	11.2	7.2	30.3	24.8	40.0	15.2	Vert.
5	196.970	36.2	11.4	8.6	30.1	26.1	43.5	17.4	Vert.
6	326.586	32.5	14.2	9.6	30.2	26.1	46.0	19.9	Vert.

[Z-plane]

No.	Frequency [MHz]	Reading [dBμV]	Factor [dB/m]	Loss [dB]	Gain [dB]	Result [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Ant.
1	**31.261**	**30.0**	**22.0**	**6.8**	**30.4**	**28.4**	**40.0**	**11.6**	**Vert.**
2	36.983	30.0	19.2	6.9	30.4	25.7	40.0	14.3	Vert.
3	60.058	36.8	10.5	7.3	30.3	24.3	40.0	15.7	Vert.
4	197.199	38.3	11.5	8.6	30.1	28.3	43.5	15.2	Vert.
5	262.517	33.6	12.8	9.1	30.2	25.3	46.0	20.7	Vert.
6	328.011	33.6	14.3	9.6	30.2	27.3	46.0	18.7	Vert.

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Operating frequency: 2480MHz

[X-plane]

No.	Frequency [MHz]	Reading [dBμV]	Factor [dB/m]	Loss [dB]	Gain [dB]	Result [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Ant.
1	30.485	28.8	22.4	6.8	30.4	27.6	40.0	12.4	Vert.
2	42.338	33.4	16.6	7.0	30.4	26.6	40.0	13.4	Vert.
3	59.955	38.2	10.5	7.3	30.3	25.7	40.0	14.3	Vert.
4	196.751	38.9	11.4	8.6	30.1	28.8	43.5	14.7	Vert.
5	262.697	35.1	12.8	9.1	30.2	26.8	46.0	19.2	Vert.
6	328.245	33.3	14.3	9.7	30.2	27.1	46.0	18.9	Vert.

[Y-plane]

No.	Frequency [MHz]	Reading [dBμV]	Factor [dB/m]	Loss [dB]	Gain [dB]	Result [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Ant.
1	233.211	37.3	12.3	8.9	30.1	28.4	46.0	17.6	Hori.
2	30.485	28.6	22.4	6.8	30.4	27.4	40.0	12.6	Vert.
3	41.154	33.8	17.1	7.0	30.4	27.5	40.0	12.5	Vert.
4	56.866	37.0	11.3	7.2	30.3	25.2	40.0	14.8	Vert.
5	196.846	38.0	11.4	8.6	30.1	27.9	43.5	15.6	Vert.
6	328.094	32.6	14.3	9.6	30.2	26.3	46.0	19.7	Vert.

[Z-plane]

No.	Frequency [MHz]	Reading [dBμV]	Factor [dB/m]	Loss [dB]	Gain [dB]	Result [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Ant.
1	30.485	27.9	22.4	6.8	30.4	26.7	40.0	13.3	Vert.
2	42.609	33.1	16.5	7.0	30.4	26.2	40.0	13.8	Vert.
3	59.776	36.3	10.6	7.3	30.3	23.9	40.0	16.1	Vert.
4	197.038	36.7	11.5	8.6	30.1	26.7	43.5	16.8	Vert.
5	262.617	33.6	12.8	9.1	30.2	25.3	46.0	20.7	Vert.
6	327.874	33.1	14.3	9.6	30.2	26.8	46.0	19.2	Vert.

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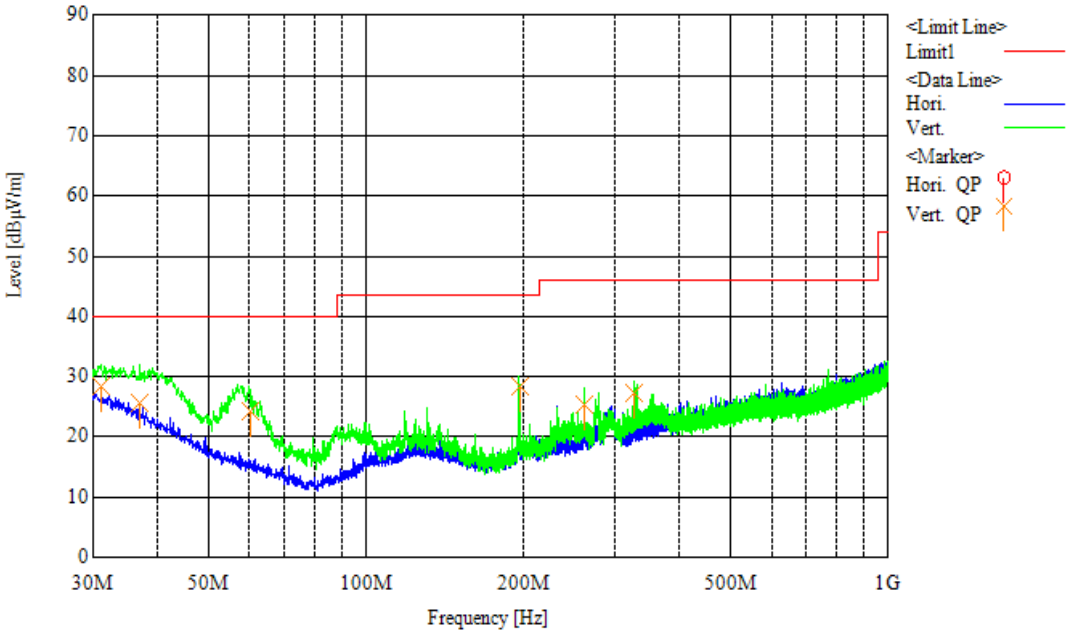
[Chart (2442MHz, Z-plane)]



Tested Date:	February 14, 2020	Temperature:	16 degC
Humidity:	49 %	Atmos. Press:	1020 hPa

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Test Data (Above 1000MHz)

Test site: Yokohama Laboratory
Measurement distance: 3 m

Operating frequency: 2402MHz

[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	1921.614	50.9	46.0	-7.6	43.3	38.4	73.9	53.9	30.6	15.5	Hori.

[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	1921.618	54.0	45.8	-7.6	46.4	38.2	73.9	53.9	27.5	15.7	Hori.
2	1921.618	53.5	44.5	-7.6	45.9	36.9	73.9	53.9	28.0	17.0	Vert.

[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	1921.618	52.2	45.5	-7.6	44.6	37.9	73.9	53.9	29.3	16.0	Vert.

Operating frequency: 2442MHz

[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	1953.615	50.6	45.2	-7.1	43.5	38.1	73.9	53.9	30.4	15.8	Hori.
2	3907.235	45.3	35.0	-0.4	44.9	34.6	73.9	53.9	29.0	19.3	Hori.

[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	1953.618	53.9	47.0	-7.1	46.8	39.9	73.9	53.9	27.1	14.0	Hori.
2	1953.618	52.6	44.5	-7.1	45.5	37.4	73.9	53.9	28.4	16.5	Vert.

[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	**1953.618**	**53.1**	**47.3**	**-7.1**	**46.0**	**40.2**	**73.9**	**53.9**	**27.9**	**13.7**	**Vert.**

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Operating frequency: 2480MHz

[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	1984.018	49.8	44.2	-6.8	43.0	37.4	73.9	53.9	30.9	16.5	Hori.
2	3968.036	45.4	35.3	-0.4	45.0	34.9	73.9	53.9	28.9	19.0	Hori.

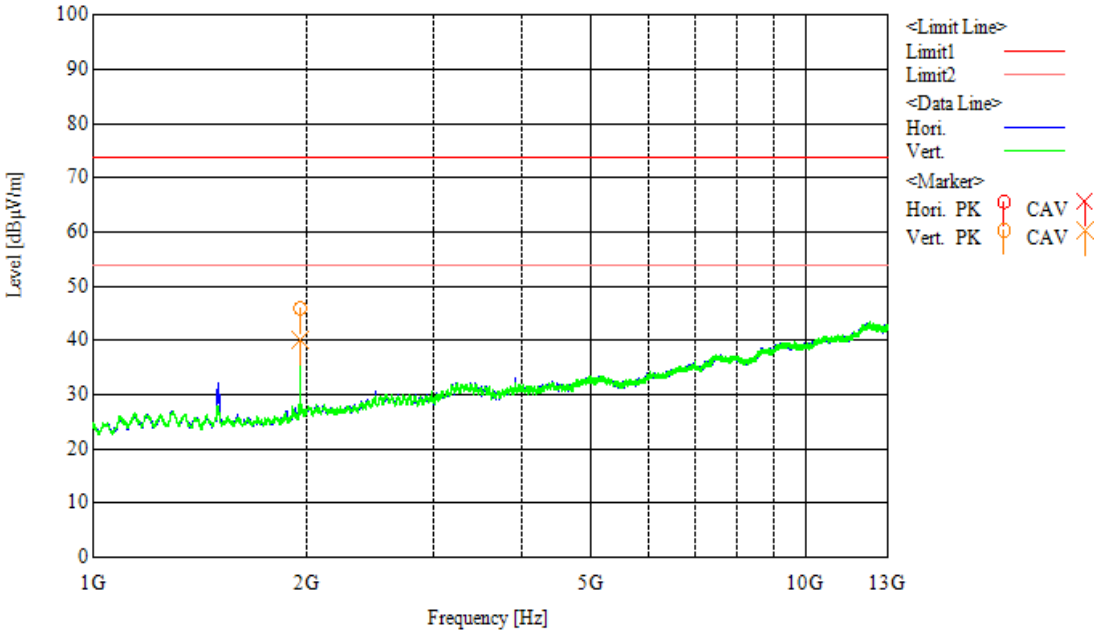
[Y-plane]

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	1984.018	51.2	46.4	-6.8	44.4	39.6	73.9	53.9	29.5	14.3	Hori.
2	1984.018	50.5	43.8	-6.8	43.7	37.0	73.9	53.9	30.2	16.9	Vert.

[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	1984.019	49.4	39.7	-6.8	42.6	32.9	73.9	53.9	31.3	21.0	Hori.
2	1984.018	50.7	46.1	-6.8	43.9	39.3	73.9	53.9	30.0	14.6	Vert.

[Chart (2442MHz, Z-plane)]



Tested Date: February 13, 2020 Temperature: 17 degC
Humidity: 40 % Atmos. Press: 1017 hPa

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2.9 AC power line conducted emissions (Receiver)

Test setup

Test setup was implemented according to the method of ANSI C63.4 clause 6 "General requirements for EUT equipment arrangements and operation" and Annex H.1 "AC power line conducted emission measurements setup".

Test procedure

Measurement procedures were implemented according to the method of ANSI C63.4 clauses 7, clause 13.1.3 and Annex H.2 "AC power line conducted emission measurements".
Exploratory measurements were used the spectrum analyzer to identify the frequency of the emission that has the highest amplitude relative to the limit by operating the EUT in a range of typical modes of operation, cable positions, and with a typical system equipment configuration and arrangement.
Final ac power line conducted emission measurements were performed based on the exploratory tests.
The EUT cable configuration and arrangement and mode of operation that produced the emission with the highest amplitude relative to the limit are selected for the final measurement.
When the measurement value is greater than average limitation the average detection measurements were performed.

Applicable rule and limitation

RSS-Gen 7.2: 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

EMI1 Ver. 5.9

Calculation method

The Correction Factor and Result are calculated as followings.

Correction Factor [dB] = ISN Factor [dB] + Loss [dB]
Result [dBμV] = Reading [dBμV] + Correction Factor [dB]

Test results - *Complied with requirement*

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Test Data

Test site: Yokohama Laboratory

[Operating mode: 2402MHz]

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	0.15289	37.1	14.3	10.3	47.4	24.6	65.8	55.8	18.4	31.2	Va
2	0.19946	34.7	17.1	10.2	44.9	27.3	63.6	53.6	18.7	26.3	Va
3	0.41787	30.2	20.3	10.1	40.3	30.4	57.5	47.5	17.2	17.1	Va
4	2.63227	26.8	19.5	10.1	36.9	29.6	56.0	46.0	19.1	16.4	Va
5	0.15442	37.2	14.1	10.3	47.5	24.4	65.8	55.8	18.3	31.4	Vb
6	0.18773	35.5	17.6	10.2	45.7	27.8	64.1	54.1	18.4	26.3	Vb
7	0.42042	29.4	19.3	10.1	39.5	29.4	57.4	47.4	17.9	18.0	Vb
8	2.69166	25.6	18.2	10.1	35.7	28.3	56.0	46.0	20.3	17.7	Vb

[Operating mode: 2442MHz]

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	0.15510	37.4	16.6	10.3	47.7	26.9	65.7	55.7	18.0	28.8	Va
2	0.17499	35.7	18.7	10.3	46.0	29.0	64.7	54.7	18.7	25.7	Va
3	0.41991	30.3	20.6	10.1	40.4	30.7	57.4	47.4	17.0	16.7	Va
4	2.45771	26.4	19.0	10.1	36.5	29.1	56.0	46.0	19.5	16.9	Va
5	0.15255	35.8	14.0	10.3	46.1	24.3	65.9	55.9	19.8	31.6	Vb
6	0.19436	34.4	14.7	10.2	44.6	24.9	63.8	53.8	19.2	28.9	Vb
7	0.40971	28.6	19.6	10.1	38.7	29.7	57.7	47.7	19.0	18.0	Vb
8	2.55309	24.1	17.4	10.1	34.2	27.5	56.0	46.0	21.8	18.5	Vb

[Operating mode: 2480MHz]

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	0.15255	38.3	20.1	10.3	48.6	30.4	65.9	55.9	17.3	25.5	Va
2	0.16989	33.7	18.7	10.3	44.0	29.0	65.0	55.0	21.0	26.0	Va
3	**0.42585**	30.4	**22.2**	**10.1**	40.5	**32.3**	57.3	**47.3**	16.8	**15.0**	**Va**
4	2.66287	25.0	18.6	10.1	35.1	28.7	56.0	46.0	20.9	17.3	Va
5	0.15238	38.8	19.6	10.3	49.1	29.9	65.9	55.9	16.8	26.0	Vb
6	0.41838	29.1	20.7	10.1	39.2	30.8	57.5	47.5	18.3	16.7	Vb
7	2.61248	23.7	17.4	10.1	33.8	27.5	56.0	46.0	22.2	18.5	Vb
1	0.15255	38.3	20.1	10.3	48.6	30.4	65.9	55.9	17.3	25.5	Va

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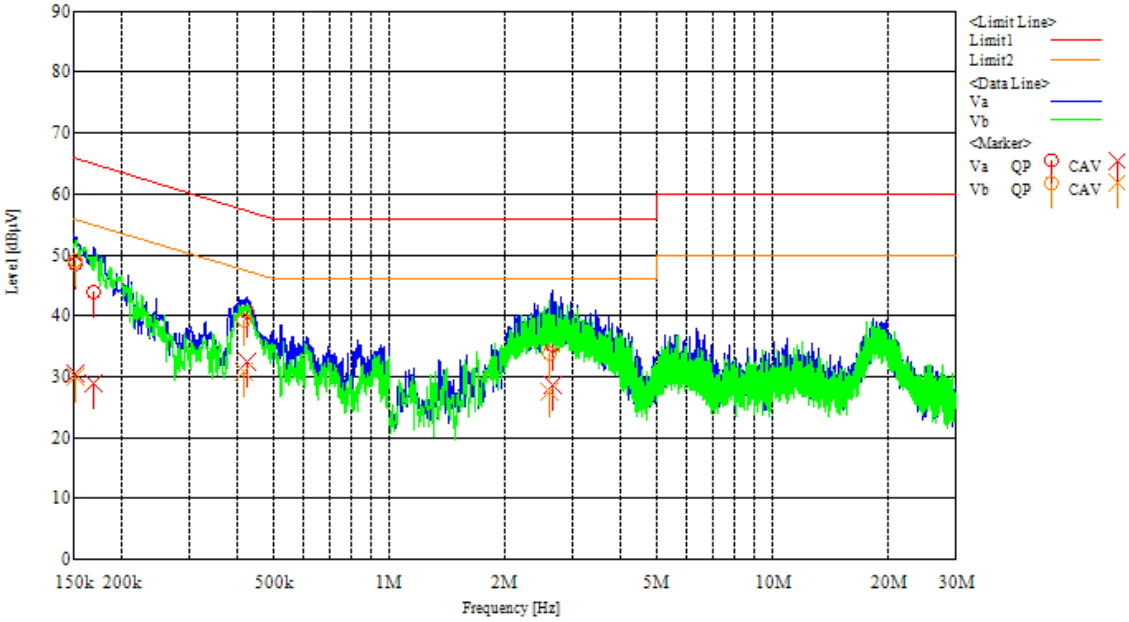
[Chart (2480MHz)]



Tested Date:	February 18, 2020	Temperature:	20 degC
Humidity:	56 %	Atmos. Press:	1013 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	-	2019/04/20	2020/04/30
AC01(EG)	Anechoic Chamber (1st test room)	JSE	203397C	-	2019/03/30	2020/03/31
BA07	Bilogical Antenna	TESEQ	CBL6143A	26670	2019/12/09	2020/12/31
BRF12	Band Reject Filter (2400MHz)	M-City	BRF2440-01	RF0012-02	2019/03/20	2020/03/31
CL11	RF Cable for RE	RFT	-	-	2019/03/19	2020/03/31
CL18	RF Cable for CE	RFT	-	-	2019/03/20	2020/03/31
CL31	RF Cable 1 m	Junkosha	MWX221	1303S118	2020/01/30	2021/01/31
CL38	RF Cable 2 m	Junkosha	MWX221	1603S626	2020/01/30	2021/01/31
CL39	RF Cable 5 m	SUHNER	SUCOFLEX126E	523222	2020/02/03	2021/02/28
DH06	DRG Horn Antenna	A.H. Systems	SAS-571	1339	2018/06/19	2020/06/30
HPF4	High Pass Filter (3000MHz)	Tokyo KEIKI	TF23LCCZGA	9001	2019/12/03	2020/12/31
LN05	LISN	Kyoritsu	KNW-407F	8-1773-2	2019/05/13	2020/05/31
LP06	Loop Antenna	ETS-Lindgren	6502	00164299	2019/04/13	2020/04/30
PR12	Pre. Amplifier (1-26G)	Agilent Technologies	8449B	3008A02513	2020/01/29	2021/01/31
PR21	Pre. Amplifier	Anritsu	MH648A	6200467119	2019/12/03	2020/12/31
SH01	Standard Horn Antenna (18-26G)	A.H. Systems	SAS-572	208	2018/07/12	2020/07/31
TR06	Test Receiver (F/W : 4.73 SP4)	Rohde & Schwarz	ESU26	100002	2019/10/07	2020/10/31

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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