TEST REPORT

For

RX23W module

In conformity with

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

Model	**: R5F523W8DDLN**
	: R5F523W8CDLN
FCC ID	**: 2AEMXRX23W8DLN**
ISED ID	**: 20194-RX23W8DLN**
Report No.	**: WE200512BB2-11**
Issue Date	**: October 12, 2020**

Prepared for

Renesas Electronics Corporation
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Prepared by

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Table of contents

1 General information 3
1.1 Product information from applicant 3
1.2 Test(s) performed/ Summary of test result 4
1.3 Test facility 5
1.4 Measurement uncertainty 6
1.5 Summary of test results 6
1.6 Setup of equipment under test (EUT) 7
1.6.1 Test configuration of EUT 7
1.6.2 Operating condition: 7
1.6.3 Setup diagram of tested system 8
1.7 Equipment modifications 8
1.8 Deviation from the standard 8
2 Test procedure and test data 9
2.1 Occupied Bandwidth (99%) 9
2.2 6dB Bandwidth 11
2.3 Peak Output Power 13
2.4 Conducted Spurious Emissions 15
2.5 Power Spectral density 20
2.6 Transmitter Radiated Spurious Emissions 22
2.7 AC power line conducted emissions 47
2.8 Radiated emissions (Receiver) 51
2.9 AC power line conducted emissions (Receiver) 59
3 Test setup photographs 62
3.1 Radiated emissions 62
3.2 AC power line conducted emissions 63
3.3 RF conducted test 63
4 List of utilized test equipment / calibration 64

History

Report No.	Date	Revisions	Issued By
WE200512BB2-11	October 12, 2020	Initial Issue	K. Onishi

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1 General information

1.1 Product information from applicant

Test item	: RX23W module
Manufacturer	: Advanced Semiconductor Engineering Inc.
Address	: No. 26, Chin 3rd Road, Nantze Export Processing Zone, Kaohsiung, Taiwan, R.O.C.
Model	: R5F523W8DDLN
PMN	: R5F523W8DDLN
Host Marketing Name (HMN)	: N/A
FCC ID	: 2AEMXRX23W8DLN
ISED ID	: 20194-RX23W8DLN
Serial number	: No. 51
Hardware version (HVIN)	: R5F523W8DDLN
Software version (FVIN)	: Ver. 1.0
Operating frequency	: 2402 - 2480 MHz
Modulation	: GFSK (Bluetooth Ver. 5.0 LE)
Antenna Gain	: -7.3 dBi
Receipt date of EUT	: September 3, 2020
Nominal power source voltages	: DC 5.0 V (USB)
Family model (HVIN/PMN)	: R5F523W8CDLN / R5F523W8CDLN (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. 2019) RSS-247 Issue 2, RSS-Gen Issue 5
Test method(s)	: ANSI C63.10: 2013
Test(s) started	: September 8, 2020
Test(s) completed	: September 11, 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
RF Operation RF/EMC Lab.

Reviewer : Y. Taki
Y. Taki
Manager, RF Operation RF/EMC Lab.

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1.3 Test facility

[Yokohama Laboratory]

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FAX: +81-45-592-7506

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Each registered facility number is as follows;
Test site A-0045

[Kitayamata laboratory]

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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	RX23W module	R5F523W8DDLN	Renesas	No. 51
-	-	-	-	-

Support Equipment(s)

No.	Item	Model No.	Manufacture	Serial No.
B	RX23W Module Daughter Board	RX23W _MODULE_SMD_Eva.6	Renesas	No. 51
C	RX23W module MOTHER Board	RX23W _MODULE_MOTHER_Eva.1	Renesas	No. 13
D	PC	R63/B	Toshiba	ZG081213H
E	AC Adaptor	PA5177U-1ACA	Toshiba	G71C000GX210

Connected cable(s)

No.	Item	From	To	Length [m]	Shield	Ferrite Core
1	USB cable	B	C	1.2	Yes	Yes
2	DC cable	C	D	1.8	No	No
3	AC cable	D	AC mains	0.9	No	No

1.6.2 Operating condition:

- Power setting: High 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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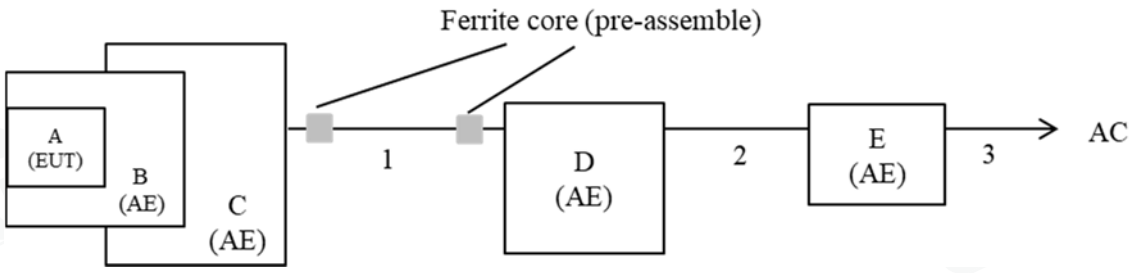
1.6.3 Setup diagram of tested system



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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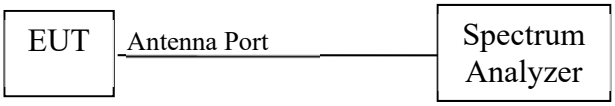
2 Test procedure and test data

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	1.030	2.052
2442	1.034	2.056
2480	1.036	2.060

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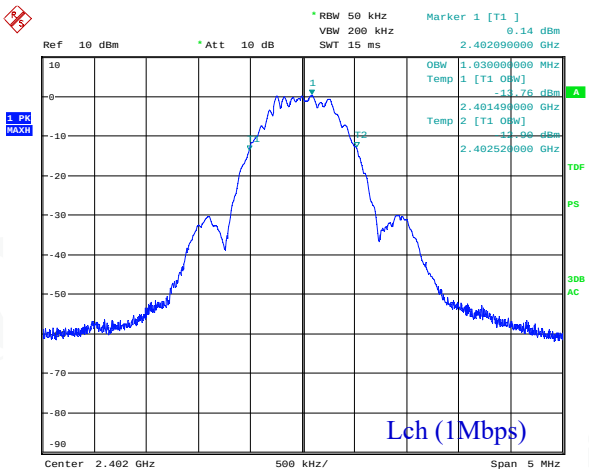

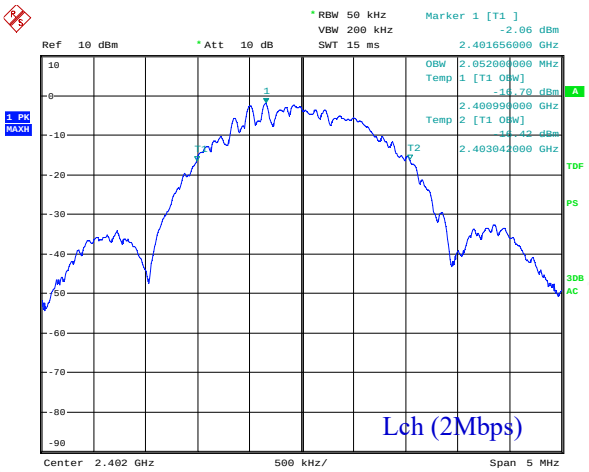

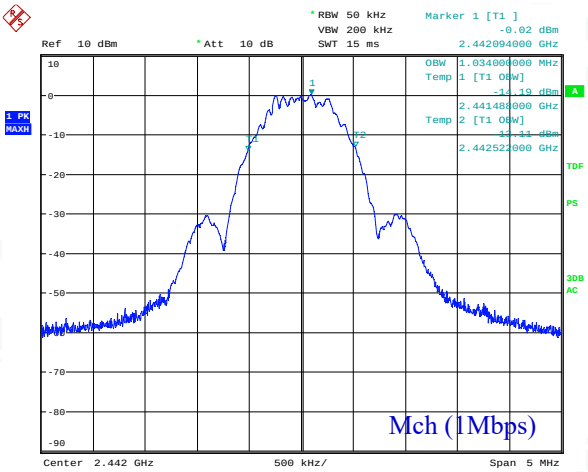

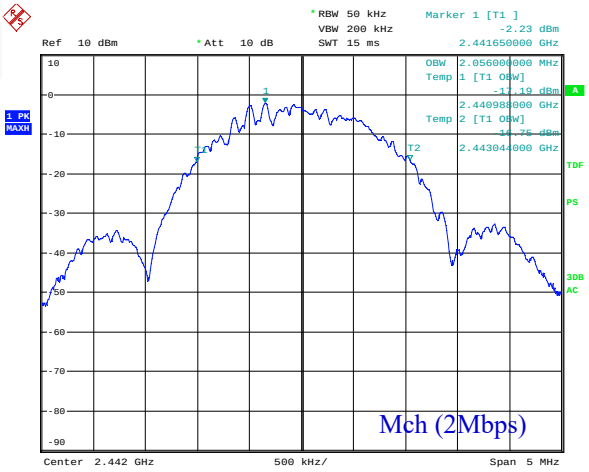

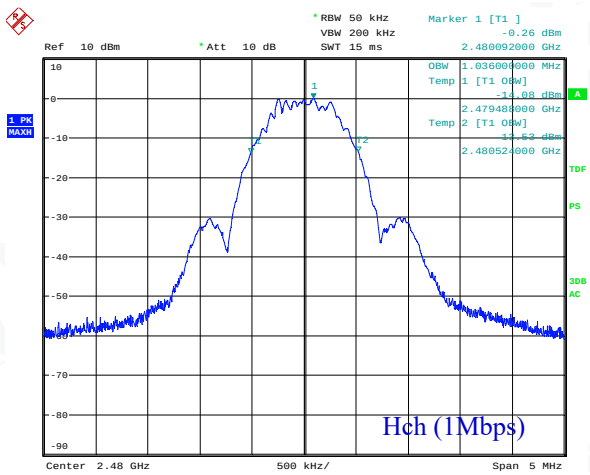

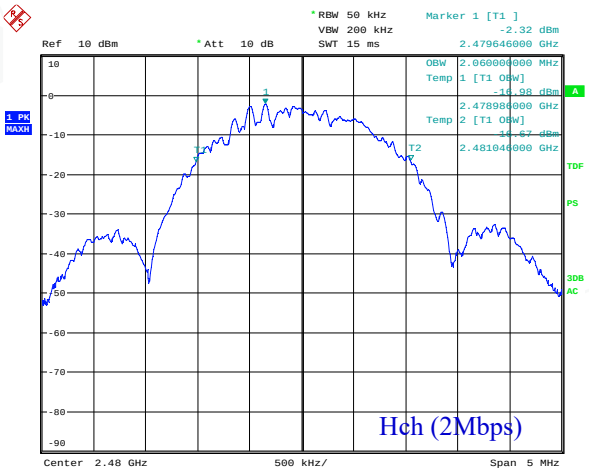

Tested Date:	September 8, 2020	Temperature:	22 degC
Humidity:	49 %	Atmos. Press:	1017 hPa

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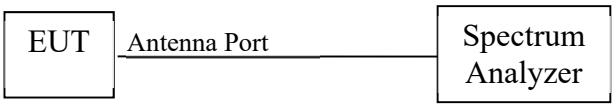
2.2 6dB Bandwidth

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) / 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	720.0	1392.0	500
2442	722.0	1394.0	500
2480	730.0	1394.0	500

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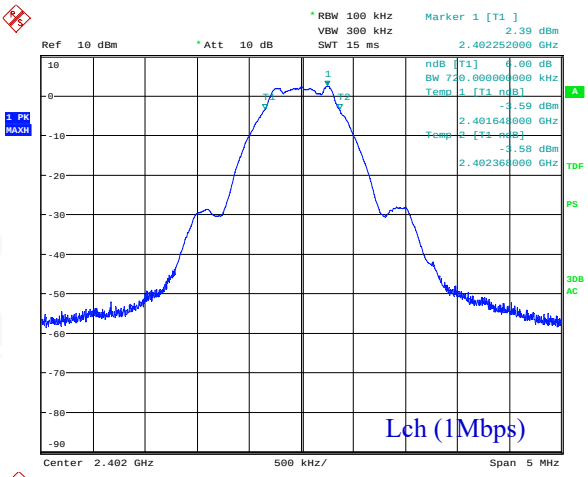

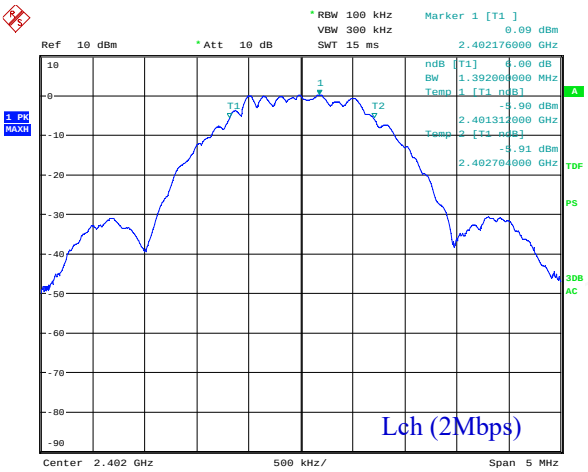

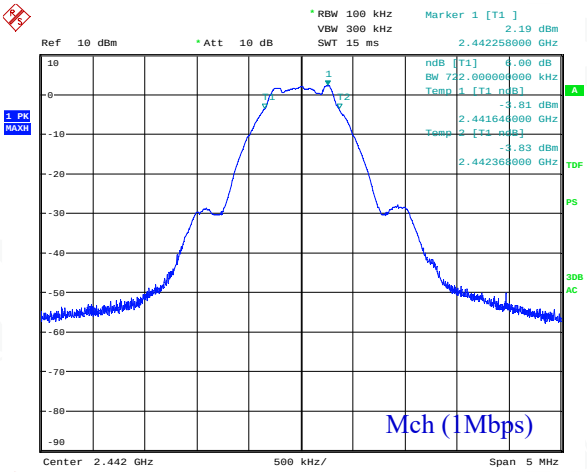

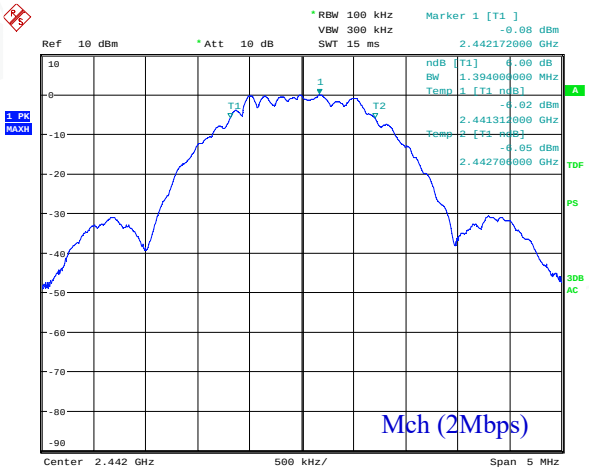

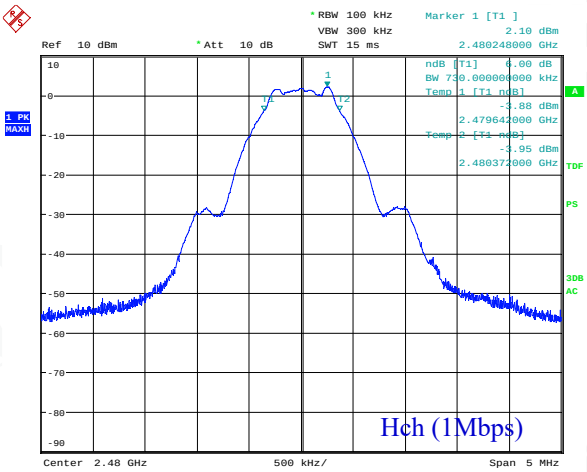

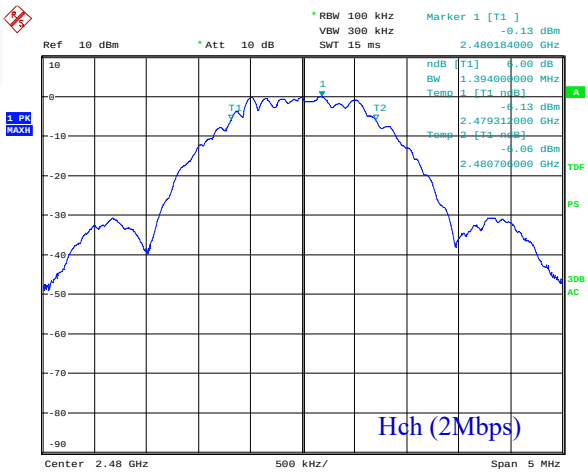

Tested Date:	September 8, 2020	Temperature:	22 degC
Humidity:	49 %	Atmos. Press:	1017 hPa

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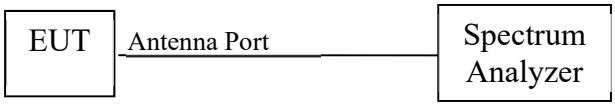
2.3 Peak Output Power

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
- 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	3.28	3.30	30
2442	3.12	3.16	30
2480	3.04	3.04	30

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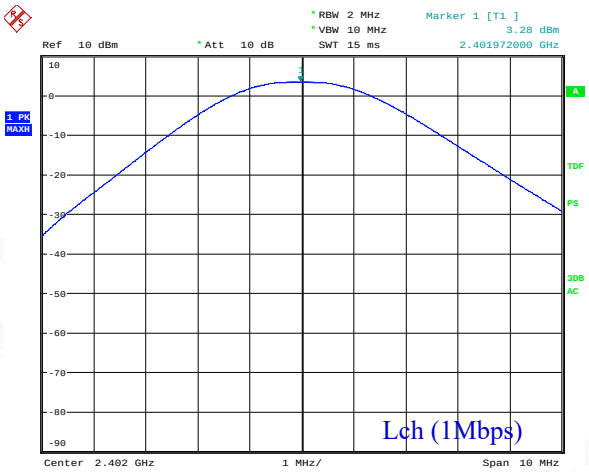

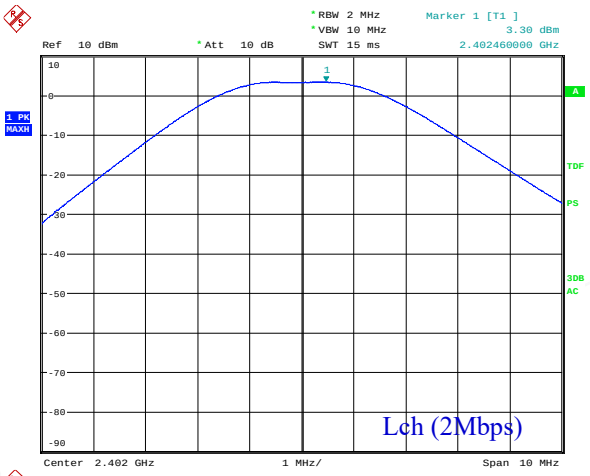

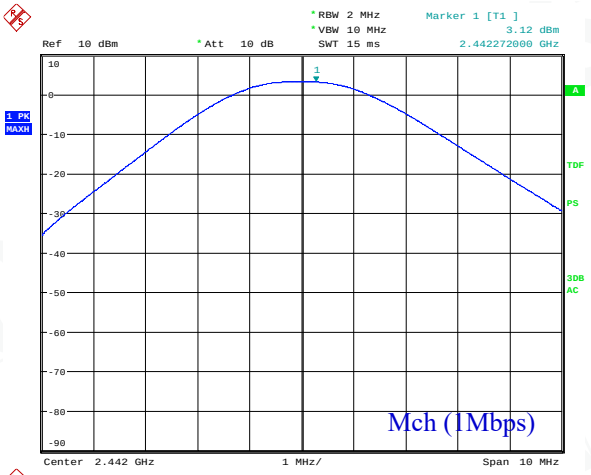

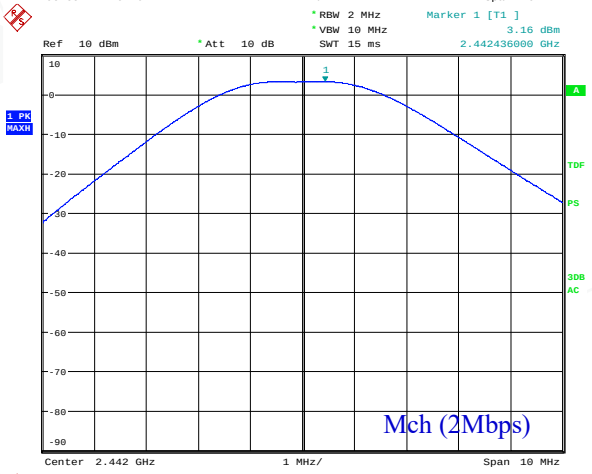

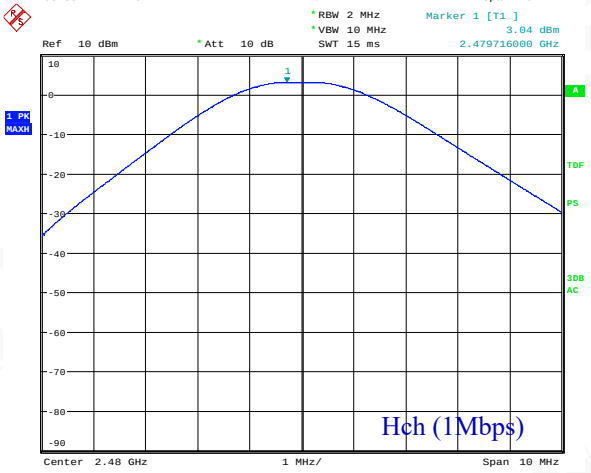

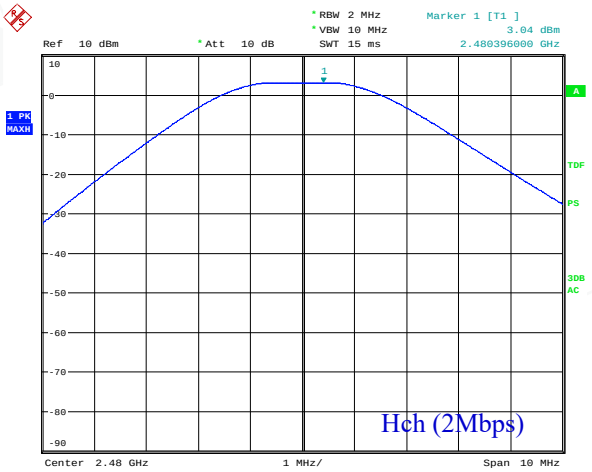

Tested Date:	September 8, 2020	Temperature:	22 degC
Humidity:	49 %	Atmos. Press:	1017 hPa

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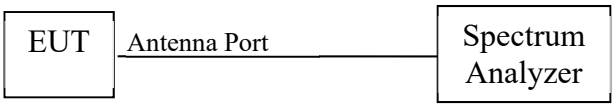
2.4 Conducted Spurious Emissions

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) / 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
4.804	-52.52	2.41	-17.59	Pass
7.206	-49.78	2.41	-17.59	Pass
9.609	-41.34	2.41	-17.59	Pass
12.008	-56.93	2.41	-17.59	Pass
14.410	-46.22	2.41	-17.59	Pass
16.815	-51.47	2.41	-17.59	Pass
19.218	-53.03	2.41	-17.59	Pass

Operating mode: Tx (2442MHz, 1Mbps)

Frequency [GHz]	Spurious level [dBm]	Carrier level [dBm]	Limit (-20dBc) [dBm]	Result
4.883	-52.20	2.28	-17.72	Pass
7.326	-50.89	2.28	-17.72	Pass
9.767	-41.61	2.28	-17.72	Pass
12.211	-54.50	2.28	-17.72	Pass
14.650	-45.71	2.28	-17.72	Pass
17.092	-52.25	2.28	-17.72	Pass
19.534	-53.96	2.28	-17.72	Pass

Operating mode: Tx (2480MHz, 1Mbps)

Frequency [GHz]	Spurious level [dBm]	Carrier level [dBm]	Limit (-20dBc) [dBm]	Result
4.959	-50.98	2.17	-17.83	Pass
7.440	-50.79	2.17	-17.83	Pass
9.921	-42.03	2.17	-17.83	Pass
12.398	-54.55	2.17	-17.83	Pass
14.878	-46.01	2.17	-17.83	Pass
17.358	-52.24	2.17	-17.83	Pass
19.838	-57.78	2.17	-17.83	Pass

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Operating mode: Tx (2402MHz, 2Mbps)

Frequency [GHz]	Spurious level [dBm]	Carrier level [dBm]	Limit (-20dBc) [dBm]	Result
4.803	-54.22	0.15	-19.85	Pass
7.204	-52.84	0.15	-19.85	Pass
9.610	-43.94	0.15	-19.85	Pass
12.012	-58.85	0.15	-19.85	Pass
14.409	-48.25	0.15	-19.85	Pass
16.810	-54.11	0.15	-19.85	Pass
19.212	-54.17	0.15	-19.85	Pass

Operating mode: Tx (2442MHz, 2Mbps)

Frequency [GHz]	Spurious level [dBm]	Carrier level [dBm]	Limit (-20dBc) [dBm]	Result
4.883	-53.80	0.09	-19.91	Pass
7.324	-52.89	0.09	-19.91	Pass
9.770	-45.19	0.09	-19.91	Pass
12.207	-58.23	0.09	-19.91	Pass
14.649	-47.39	0.09	-19.91	Pass
17.090	-53.67	0.09	-19.91	Pass
19.532	-57.29	0.09	-19.91	Pass

Operating mode: Tx (2480MHz, 2Mbps)

Frequency [GHz]	Spurious level [dBm]	Carrier level [dBm]	Limit (-20dBc) [dBm]	Result
4.959	-51.52	-0.05	-20.05	Pass
7.441	-52.52	-0.05	-20.05	Pass
9.918	**-43.70**	**-0.05**	**-20.05**	**Pass**
12.402	-56.35	-0.05	-20.05	Pass
14.877	-48.32	-0.05	-20.05	Pass
17.363	-56.19	-0.05	-20.05	Pass
19.836	-59.97	-0.05	-20.05	Pass

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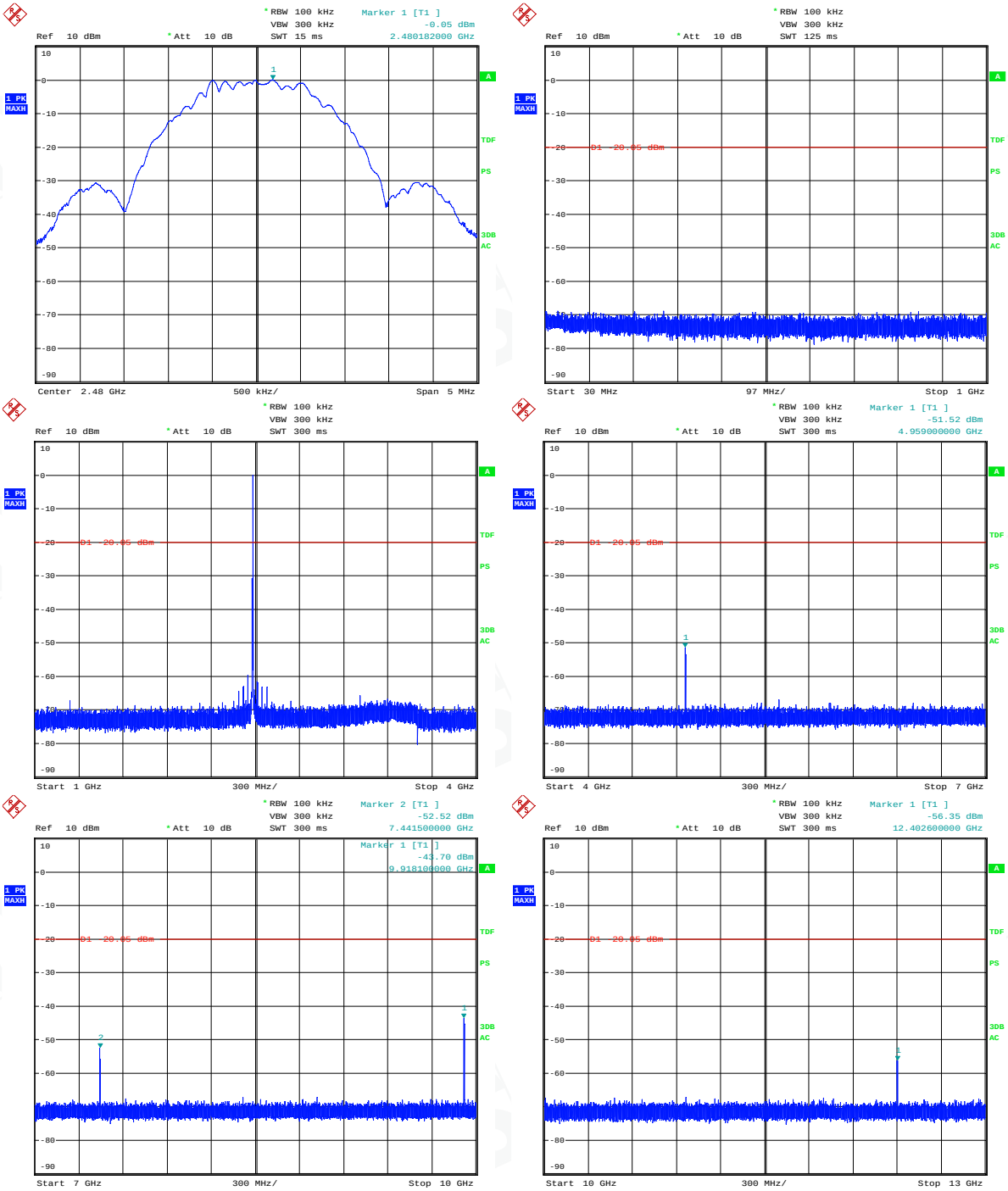
[Chart]

Tx (2480MHz, 2Mbps)



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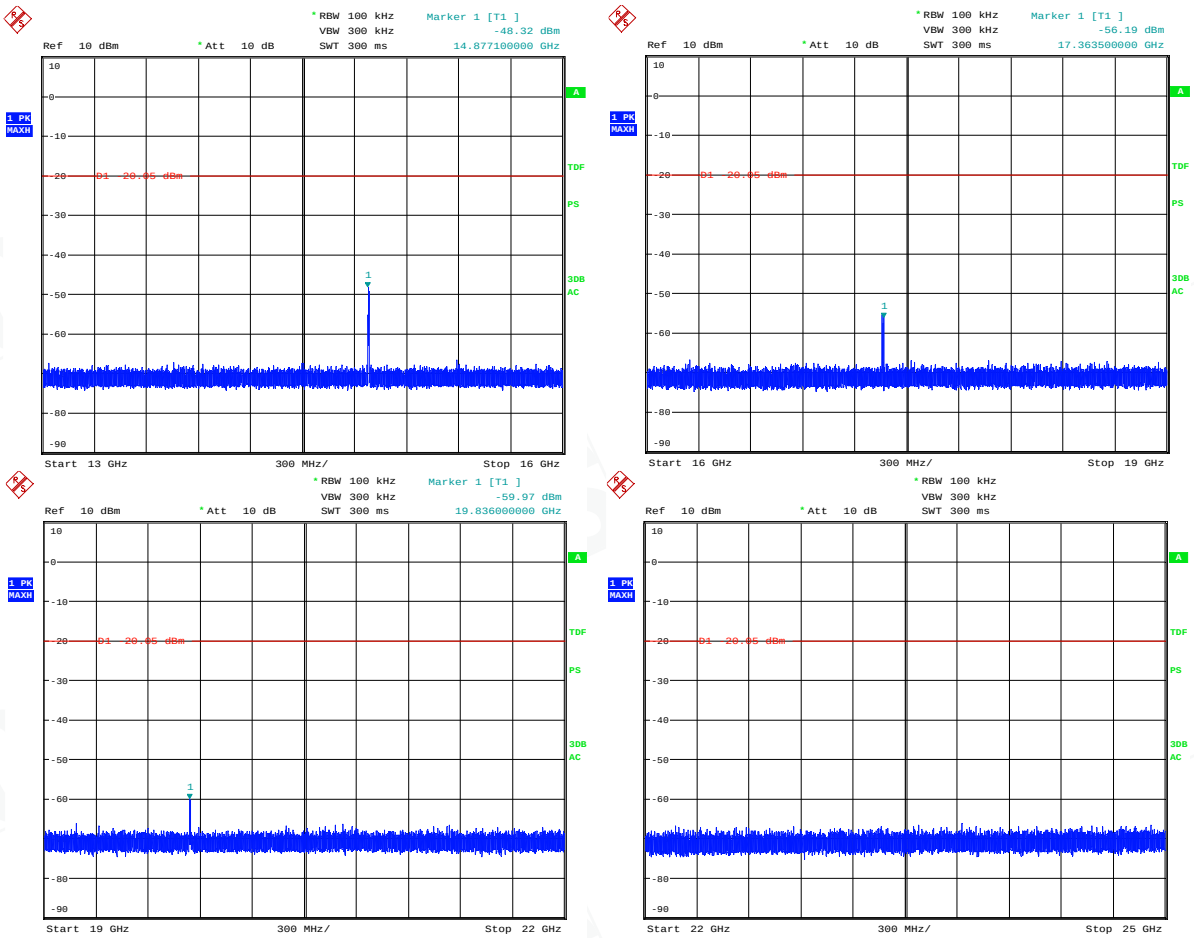

Tested Date:	September 8, 2020	Temperature:	22 degC
Humidity:	49 %	Atmos. Press:	1017 hPa

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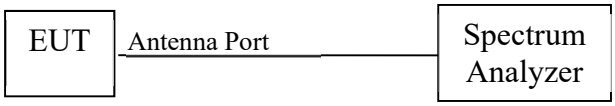
2.5 Power Spectral density

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
- 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	-13.55	-18.49	8
2442	-13.70	-18.79	8
2480	-13.77	-18.88	8

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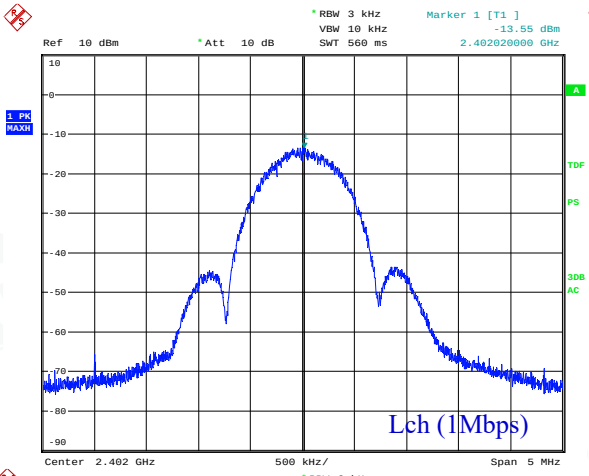

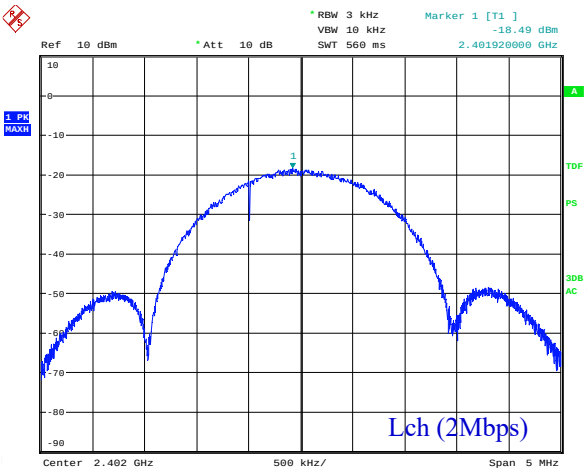

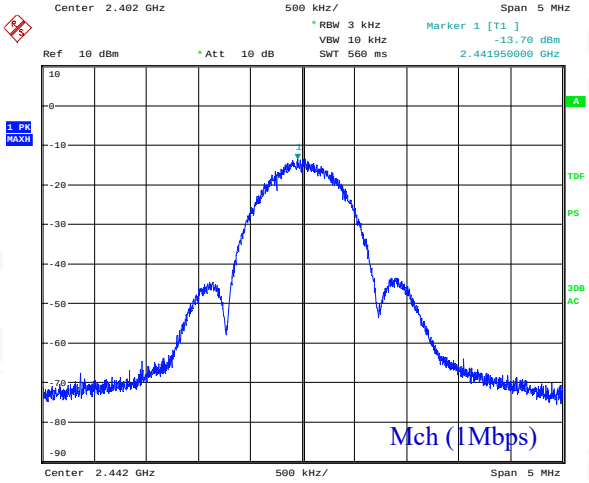

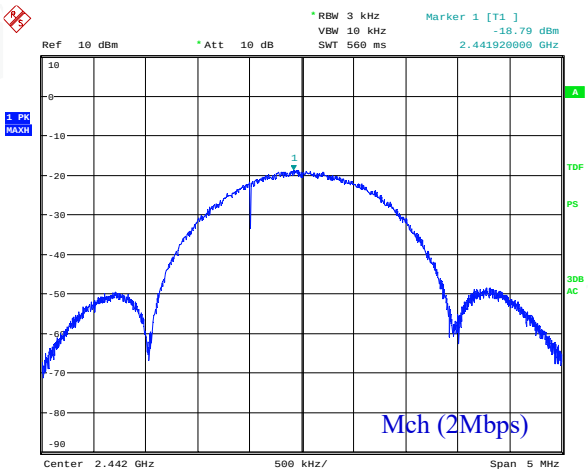

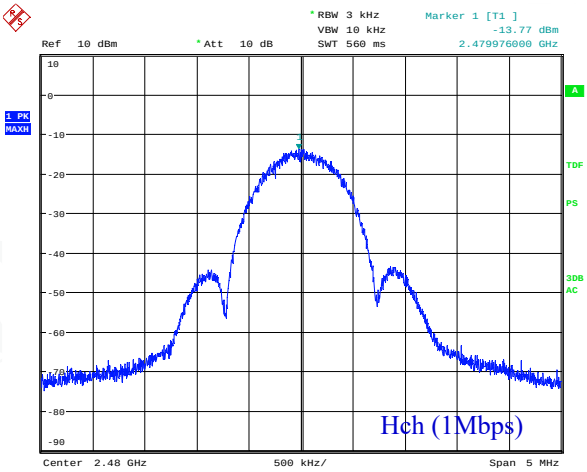

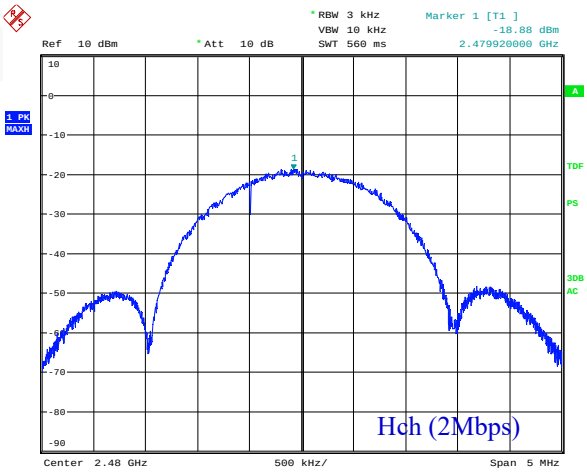

Tested Date:	September 8, 2020	Temperature:	22 degC
Humidity:	49 %	Atmos. Press:	1017 hPa

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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
HPF11	LP06	PR12	PR21	SH01	TR06	-	-

Test software used

EMI1 Ver. 6.1

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.
-	-	-	-	-	-	-	-	-	-

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: 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.
-	-	-	-	-	-	-	-	-	-

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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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.
-	-	-	-	-	-	-	-	-	-

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: 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.
-	-	-	-	-	-	-	-	-	-

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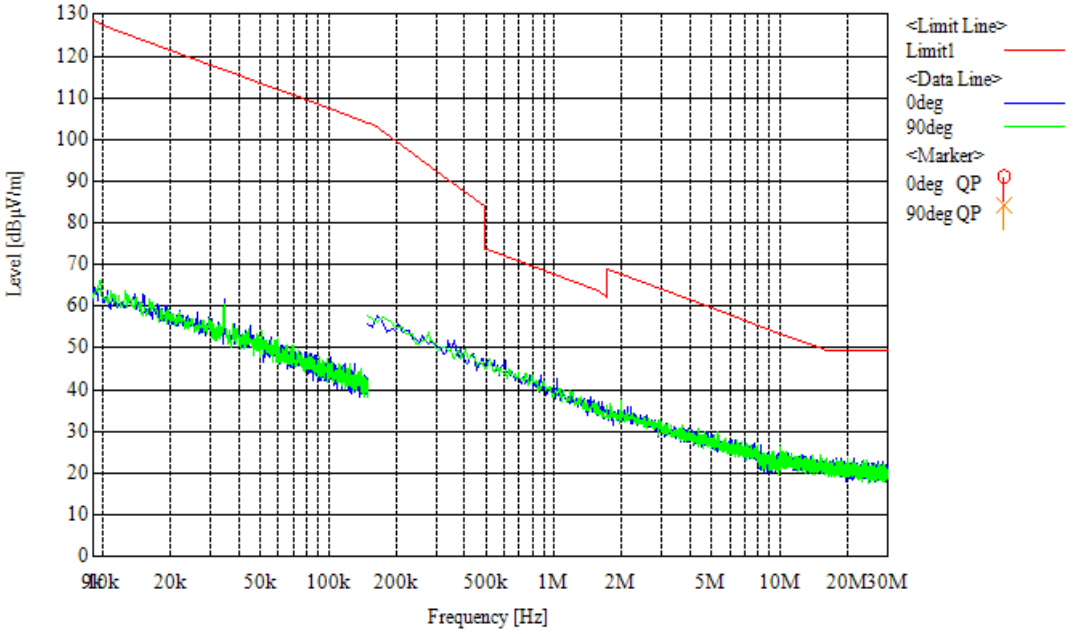
[Chart (2402MHz, 1Mbps, X-plane)]



Tested Date:	September 11, 2020	Temperature:	21 degC
Humidity:	60 %	Atmos. Press:	1015 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.
-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-

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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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.
-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-

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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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.
-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-

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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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.
-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-

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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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.

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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.
-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-

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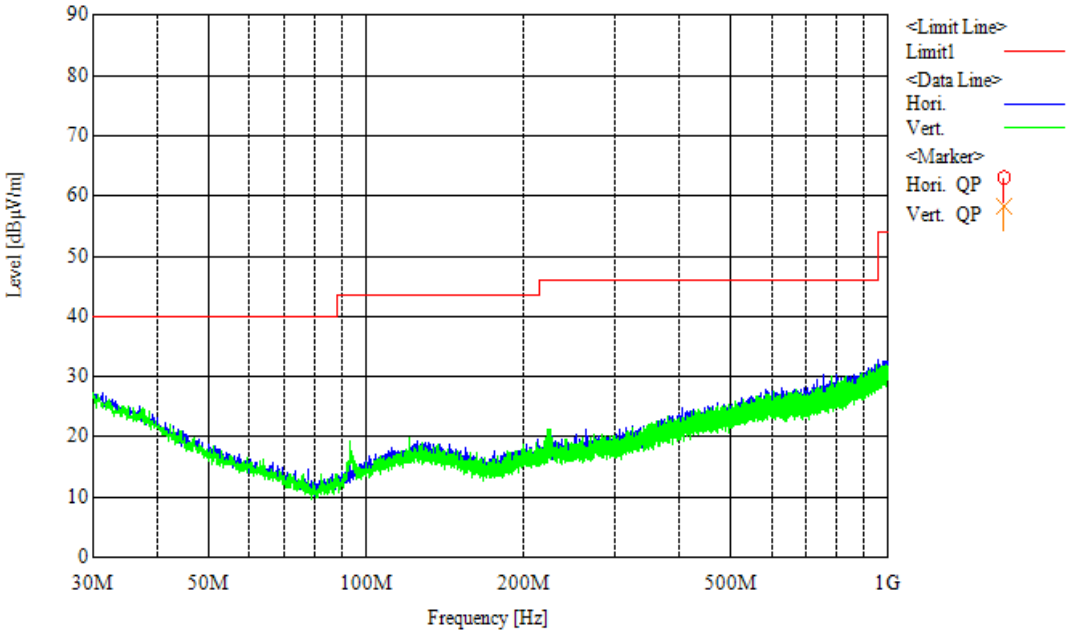
[Chart (2402MHz, 1Mbps, X-plane)]



Tested Date:	September 10, 2020	Temperature:	21 degC
Humidity:	59 %	Atmos. Press:	1012 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	4803.511	46.3	34.5	2.1	48.4	36.6	73.9	53.9	25.5	17.3	Hori.
2	4803.511	46.0	32.9	2.1	48.1	35.0	73.9	53.9	25.8	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	4803.512	47.4	35.8	2.1	49.5	37.9	73.9	53.9	24.4	16.0	Hori.
2	4803.512	46.6	34.9	2.1	48.7	37.0	73.9	53.9	25.2	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	4803.512	45.5	33.1	2.1	47.6	35.2	73.9	53.9	26.3	18.7	Hori.
2	4803.512	46.3	34.2	2.1	48.4	36.3	73.9	53.9	25.5	17.6	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	4883.511	46.5	34.4	2.6	49.1	37.0	73.9	53.9	24.8	16.9	Hori.
2	4883.511	45.8	33.5	2.6	48.4	36.1	73.9	53.9	25.5	17.8	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	4883.511	48.0	37.6	2.6	50.6	40.2	73.9	53.9	23.3	13.7	Hori.
2	4883.511	46.3	34.3	2.6	48.9	36.9	73.9	53.9	25.0	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	4883.512	46.1	34.4	2.6	48.7	37.0	73.9	53.9	25.2	16.9	Hori.
2	4883.512	47.0	36.0	2.6	49.6	38.6	73.9	53.9	24.3	15.3	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	4959.511	46.3	34.3	2.8	49.1	37.1	73.9	53.9	24.8	16.8	Hori.
2	4959.511	45.7	33.1	2.8	48.5	35.9	73.9	53.9	25.4	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	**4959.513**	**48.4**	**38.1**	**2.8**	**51.2**	**40.9**	**73.9**	**53.9**	**22.7**	**13.0**	**Hori.**
2	4959.513	46.1	34.2	2.8	48.9	37.0	73.9	53.9	25.0	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	4959.514	46.5	34.9	2.8	49.3	37.7	73.9	53.9	24.6	16.2	Hori.
2	4959.514	47.4	36.6	2.8	50.2	39.4	73.9	53.9	23.7	14.5	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	4803.010	46.6	34.1	2.1	48.7	36.2	73.9	53.9	25.2	17.7	Hori.
2	4803.010	45.4	32.2	2.1	47.5	34.3	73.9	53.9	26.4	19.6	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	4803.013	47.1	34.6	2.1	49.2	36.7	73.9	53.9	24.7	17.2	Hori.
2	4803.013	46.5	34.1	2.1	48.6	36.2	73.9	53.9	25.3	17.7	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	4803.012	45.6	32.3	2.1	47.7	34.4	73.9	53.9	26.2	19.5	Hori.
2	4803.012	46.3	33.3	2.1	48.4	35.4	73.9	53.9	25.5	18.5	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	4883.011	46.4	33.3	2.6	49.0	35.9	73.9	53.9	24.9	18.0	Hori.
2	4883.011	45.3	32.6	2.6	47.9	35.2	73.9	53.9	26.0	18.7	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	4883.013	47.9	36.5	2.6	50.5	39.1	73.9	53.9	23.4	14.8	Hori.
2	4883.013	45.8	33.4	2.6	48.4	36.0	73.9	53.9	25.5	17.9	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	4883.012	46.5	33.5	2.6	49.1	36.1	73.9	53.9	24.8	17.8	Hori.
2	4883.012	46.8	34.9	2.6	49.4	37.5	73.9	53.9	24.5	16.4	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	4959.012	46.3	33.6	2.8	49.1	36.4	73.9	53.9	24.8	17.5	Hori.
2	4961.012	45.8	33.1	2.8	48.6	35.9	73.9	53.9	25.3	18.0	Vert.

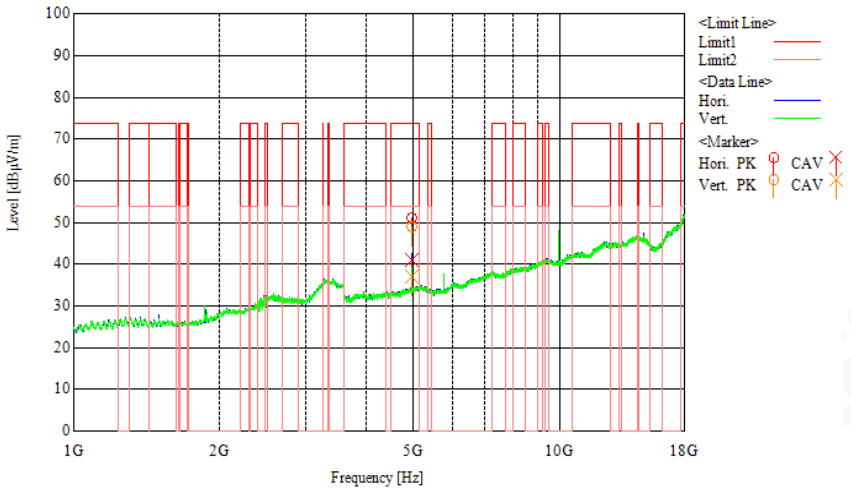
[Y-plane]

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	4961.013	48.3	36.9	2.8	51.1	39.7	73.9	53.9	22.8	14.2	Hori.
2	4961.013	45.6	33.5	2.8	48.4	36.3	73.9	53.9	25.5	17.6	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	4959.014	46.7	34.0	2.8	49.5	36.8	73.9	53.9	24.4	17.1	Hori.
2	4959.014	47.5	35.6	2.8	50.3	38.4	73.9	53.9	23.6	15.5	Vert.

[Chart (2480MHz, 1Mbps, Y-plane]



Tested Date: September 8, 2020 Temperature: 22 degC
Humidity: 49 % Atmos. Press: 1017 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	19218.043	45.0	31.7	11.2	56.2	42.9	73.9	53.9	17.7	11.0	Hori.
2	19218.043	44.8	31.7	11.2	56.0	42.9	73.9	53.9	17.9	11.0	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	19218.049	45.8	32.9	11.2	57.0	44.1	73.9	53.9	16.9	9.8	Hori.
2	**19218.049**	**46.8**	**33.9**	**11.2**	**58.0**	**45.1**	**73.9**	**53.9**	**15.9**	**8.8**	**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	19214.051	45.4	32.0	11.2	56.6	43.2	73.9	53.9	17.3	10.7	Hori.
2	19217.051	46.1	32.4	11.2	57.3	43.6	73.9	53.9	16.6	10.3	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.
-	-	-	-	-	-	-	-	-	-	-	-

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

[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	19538.047	45.4	32.5	10.6	56.0	43.1	73.9	53.9	17.9	10.8	Hori.
2	19538.047	46.0	33.7	10.6	56.6	44.3	73.9	53.9	17.3	9.6	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	19538.045	45.5	32.8	10.6	56.1	43.4	73.9	53.9	17.8	10.5	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.
-	-	-	-	-	-	-	-	-	-	-	-

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

[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.
-	-	-	-	-	-	-	-	-	-	-	-

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

[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.
-	-	-	-	-	-	-	-	-	-	-	-

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

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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.
-	-	-	-	-	-	-	-	-	-	-	-

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

[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	19220.045	46.0	33.3	11.2	57.2	44.5	73.9	53.9	16.7	9.4	Hori.
2	19220.045	45.8	32.3	11.2	57.0	43.5	73.9	53.9	16.9	10.4	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.
-	-	-	-	-	-	-	-	-	-	-	-

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

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.
-	-	-	-	-	-	-	-	-	-	-	-

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

[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.
-	-	-	-	-	-	-	-	-	-	-	-

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

[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.
-	-	-	-	-	-	-	-	-	-	-	-

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

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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.
-	-	-	-	-	-	-	-	-	-	-	-

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

[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.
-	-	-	-	-	-	-	-	-	-	-	-

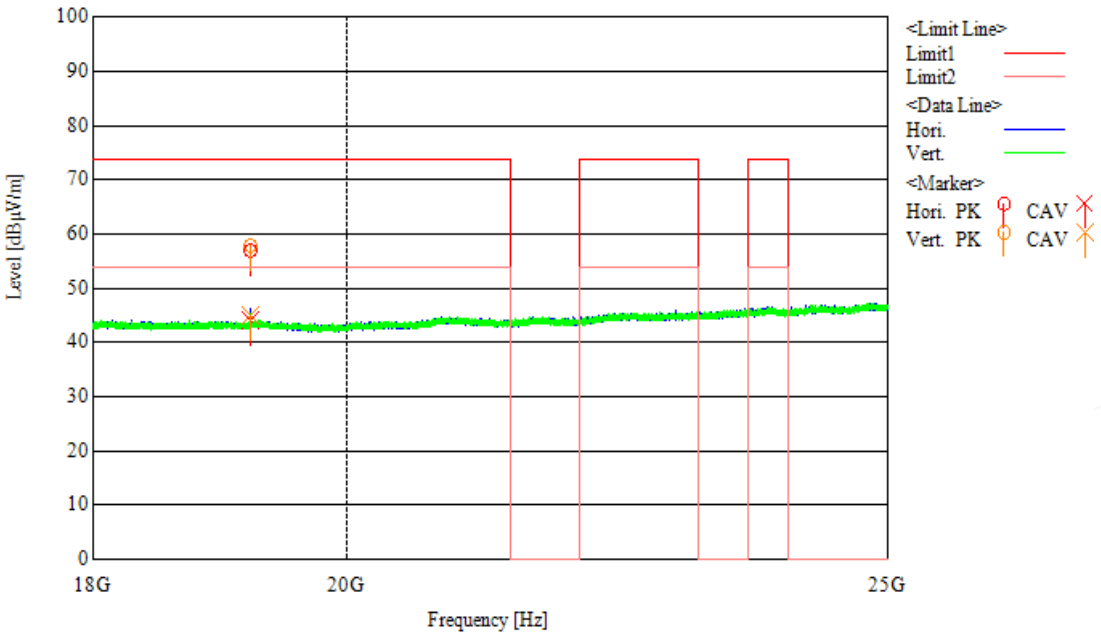
There are no spurious emissions greater than noise floor or 20dB below the limit.

[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.
-	-	-	-	-	-	-	-	-	-	-	-

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

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



Tested Date: September 10, 2020 Temperature: 21 degC
Humidity: 59 % Atmos. Press: 1012 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	43.1	30.5	4.6	47.7	35.1	73.9	53.9	26.2	18.8	Hori.
2	2390.000	44.3	30.5	4.6	48.9	35.1	73.9	53.9	25.0	18.8	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	2390.000	44.1	30.5	4.6	48.7	35.1	73.9	53.9	25.2	18.8	Hori.
2	2390.000	43.6	30.4	4.6	48.2	35.0	73.9	53.9	25.7	18.9	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	2390.000	44.3	30.5	4.6	48.9	35.1	73.9	53.9	25.0	18.8	Hori.
2	2390.000	43.4	30.5	4.6	48.0	35.1	73.9	53.9	25.9	18.8	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	43.7	30.5	4.6	48.3	35.1	73.9	53.9	25.6	18.8	Hori.
2	2390.000	43.8	30.5	4.6	48.4	35.1	73.9	53.9	25.5	18.8	Vert.

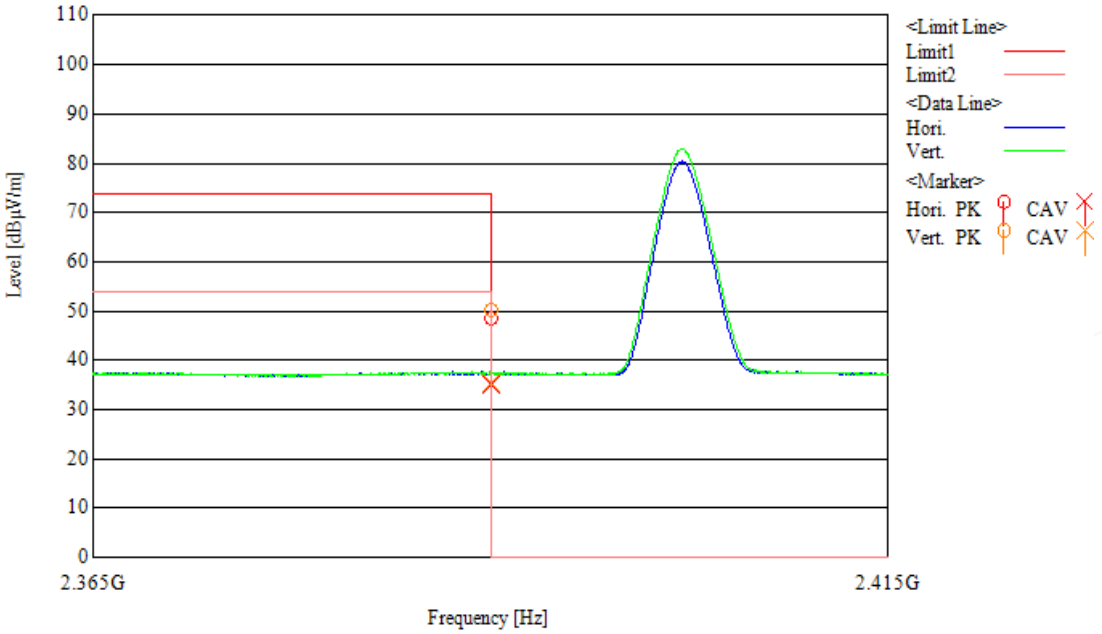
[Y-plane]

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	2390.000	44.0	30.5	4.6	48.6	35.1	73.9	53.9	25.3	18.8	Hori.
2	2390.000	43.6	30.5	4.6	48.2	35.1	73.9	53.9	25.7	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	44.0	30.5	4.6	48.6	35.1	73.9	53.9	25.3	18.8	Hori.
2	**2390.000**	**45.7**	**30.7**	**4.6**	**50.3**	**35.3**	**73.9**	**53.9**	**23.6**	**18.6**	**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	44.2	30.7	5.5	49.7	36.2	73.9	53.9	24.2	17.7	Hori.
2	2483.500	44.2	30.5	5.5	49.7	36.0	73.9	53.9	24.2	17.9	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	2483.500	44.3	30.5	5.5	49.8	36.0	73.9	53.9	24.1	17.9	Hori.
2	2483.500	44.3	30.7	5.5	49.8	36.2	73.9	53.9	24.1	17.7	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	2483.500	44.8	30.6	5.5	50.3	36.1	73.9	53.9	23.6	17.8	Hori.
2	2483.500	44.6	30.6	5.5	50.1	36.1	73.9	53.9	23.8	17.8	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**	**44.4**	**30.9**	**5.5**	**49.9**	**36.4**	**73.9**	**53.9**	**24.0**	**17.5**	**Hori.**
2	2483.500	44.5	30.6	5.5	50.0	36.1	73.9	53.9	23.9	17.8	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	2483.500	44.1	30.6	5.5	49.6	36.1	73.9	53.9	24.3	17.8	Hori.
2	**2483.500**	**44.6**	**30.9**	**5.5**	**50.1**	**36.4**	**73.9**	**53.9**	**23.8**	**17.5**	**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	2483.500	44.8	30.7	5.5	50.3	36.2	73.9	53.9	23.6	17.7	Hori.
2	2483.500	44.5	30.8	5.5	50.0	36.3	73.9	53.9	23.9	17.6	Vert.

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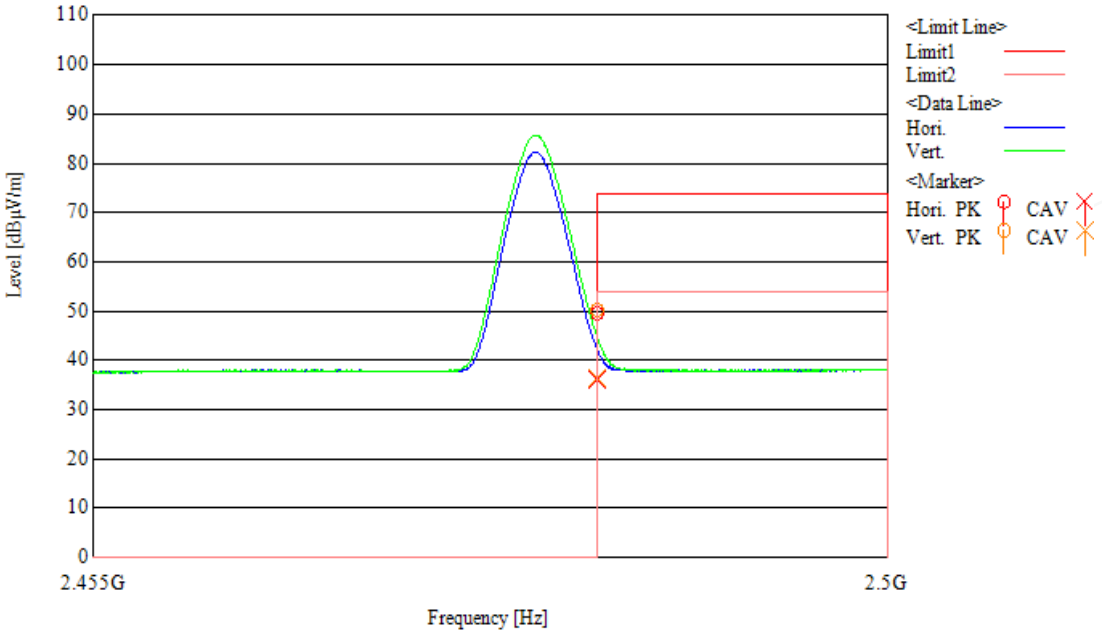
[Chart (2480MHz, 2Mbps, Y-plane]



Tested Date:	September 9, 2020	Temperature:	20 degC
Humidity:	59 %	Atmos. Press:	1012 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)

TR09	CL18	LN05

Test software used

EMI1 Ver. 6.1

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	**0.15493**	**42.0**	**24.6**	**10.2**	**52.2**	**34.8**	**65.7**	**55.7**	**13.5**	**20.9**	**Va**
2	3.51050	24.6	13.1	10.1	34.7	23.2	56.0	46.0	21.3	22.8	Va
3	3.67966	26.1	14.0	10.1	36.2	24.1	56.0	46.0	19.8	21.9	Va
4	3.88842	20.8	13.6	10.1	30.9	23.7	56.0	46.0	25.1	22.3	Va
5	0.15119	38.6	25.1	10.2	48.8	35.3	65.9	55.9	17.1	20.6	Vb
6	0.18773	34.5	21.8	10.2	44.7	32.0	64.1	54.1	19.4	22.1	Vb
7	3.33233	27.5	15.2	10.1	37.6	25.3	56.0	46.0	18.4	20.7	Vb
8	3.40408	27.8	13.7	10.1	37.9	23.8	56.0	46.0	18.1	22.2	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	0.15187	40.8	22.9	10.2	51.0	33.1	65.9	55.9	14.9	22.8	Va
2	0.15501	39.9	23.0	10.2	50.1	33.2	65.7	55.7	15.6	22.5	Va
3	0.15544	41.4	23.6	10.2	51.6	33.8	65.7	55.7	14.1	21.9	Va
4	0.18807	35.9	21.4	10.2	46.1	31.6	64.1	54.1	18.0	22.5	Va
5	0.15119	41.0	26.2	10.2	51.2	36.4	65.9	55.9	14.7	19.5	Vb
6	0.16955	37.8	26.7	10.2	48.0	36.9	65.0	55.0	17.0	18.1	Vb
7	2.98140	26.2	16.6	10.1	36.3	26.7	56.0	46.0	19.7	19.3	Vb
8	3.43491	29.9	14.1	10.1	40.0	24.2	56.0	46.0	16.0	21.8	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	0.15476	38.8	22.0	10.2	49.0	32.2	65.7	55.7	16.7	23.5	Va
2	0.16173	39.5	22.3	10.2	49.7	32.5	65.4	55.4	15.7	22.9	Va
3	3.63467	23.0	13.2	10.1	33.1	23.3	56.0	46.0	22.9	22.7	Va
4	0.15663	40.5	26.1	10.2	50.7	36.3	65.6	55.6	14.9	19.3	Vb
5	0.17414	35.8	24.9	10.2	46.0	35.1	64.8	54.8	18.8	19.7	Vb
6	3.40792	27.2	13.1	10.1	37.3	23.2	56.0	46.0	18.7	22.8	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	0.15068	40.1	23.2	10.2	50.3	33.4	66.0	56.0	15.7	22.6	Va
2	0.17668	38.1	24.1	10.2	48.3	34.3	64.6	54.6	16.3	20.3	Va
3	3.62388	23.0	13.4	10.1	33.1	23.5	56.0	46.0	22.9	22.5	Va
4	0.15782	37.9	24.7	10.2	48.1	34.9	65.6	55.6	17.5	20.7	Vb
5	3.11278	27.4	18.0	10.1	37.5	28.1	56.0	46.0	18.5	17.9	Vb
6	3.39532	29.0	18.0	10.1	39.1	28.1	56.0	46.0	16.9	17.9	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	0.15357	38.6	21.8	10.2	48.8	32.0	65.8	55.8	17.0	23.8	Va
2	3.19556	23.9	17.2	10.1	34.0	27.3	56.0	46.0	22.0	18.7	Va
3	3.54289	24.3	12.8	10.1	34.4	22.9	56.0	46.0	21.6	23.1	Va
4	0.15663	40.3	26.0	10.2	50.5	36.2	65.6	55.6	15.1	19.4	Vb
5	0.16564	37.2	24.9	10.2	47.4	35.1	65.2	55.2	17.8	20.1	Vb
6	3.29454	28.6	17.1	10.1	38.7	27.2	56.0	46.0	17.3	18.8	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	0.15187	40.4	23.7	10.2	50.6	33.9	65.9	55.9	15.3	22.0	Va
2	0.16258	37.6	20.9	10.2	47.8	31.1	65.3	55.3	17.5	24.2	Va
3	3.40252	24.7	16.6	10.1	34.8	26.7	56.0	46.0	21.2	19.3	Va
4	0.15000	41.0	26.1	10.3	51.3	36.4	66.0	56.0	14.7	19.6	Vb
5	0.15969	38.7	24.6	10.2	48.9	34.8	65.5	55.5	16.6	20.7	Vb
6	0.16666	36.6	24.6	10.2	46.8	34.8	65.1	55.1	18.3	20.3	Vb

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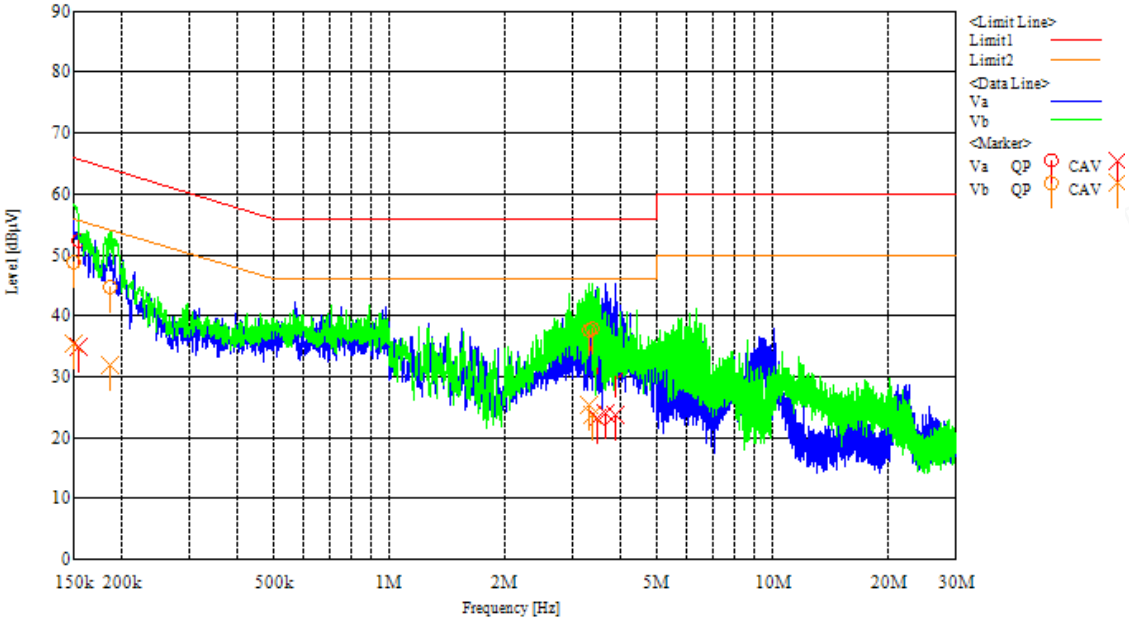
[Chart (2402MHz, 1Mbps)]



Tested Date:	September 8, 2020	Temperature:	22 degC
Humidity:	49 %	Atmos. Press:	1017 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. 6.1

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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.
-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-

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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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.
-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-

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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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.
-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-

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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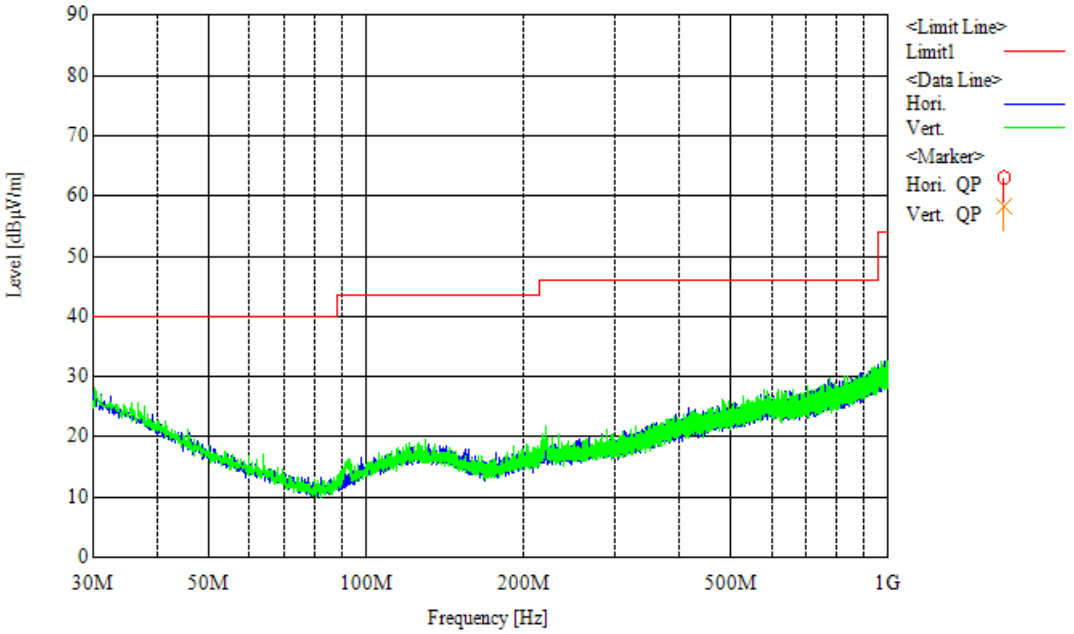
[Chart (2402MHz, X-plane)]



Tested Date:	September 10, 2020	Temperature:	21 degC
Humidity:	59 %	Atmos. Press:	1012 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.
-	-	-	-	-	-	-	-	-	-	-	-

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

[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	2401.874	47.6	30.3	-5.2	42.4	25.1	73.9	53.9	31.5	28.8	Hori.

[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.
-	-	-	-	-	-	-	-	-	-	-	-

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

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.
-	-	-	-	-	-	-	-	-	-	-	-

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

[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	2401.966	48.3	30.3	-5.2	43.1	25.1	73.9	53.9	30.8	28.8	Hori.

[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.
-	-	-	-	-	-	-	-	-	-	-	-

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

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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	2401.952	48.3	30.3	-5.2	43.1	25.1	73.9	53.9	30.8	28.8	Hori.

[Y-plane]

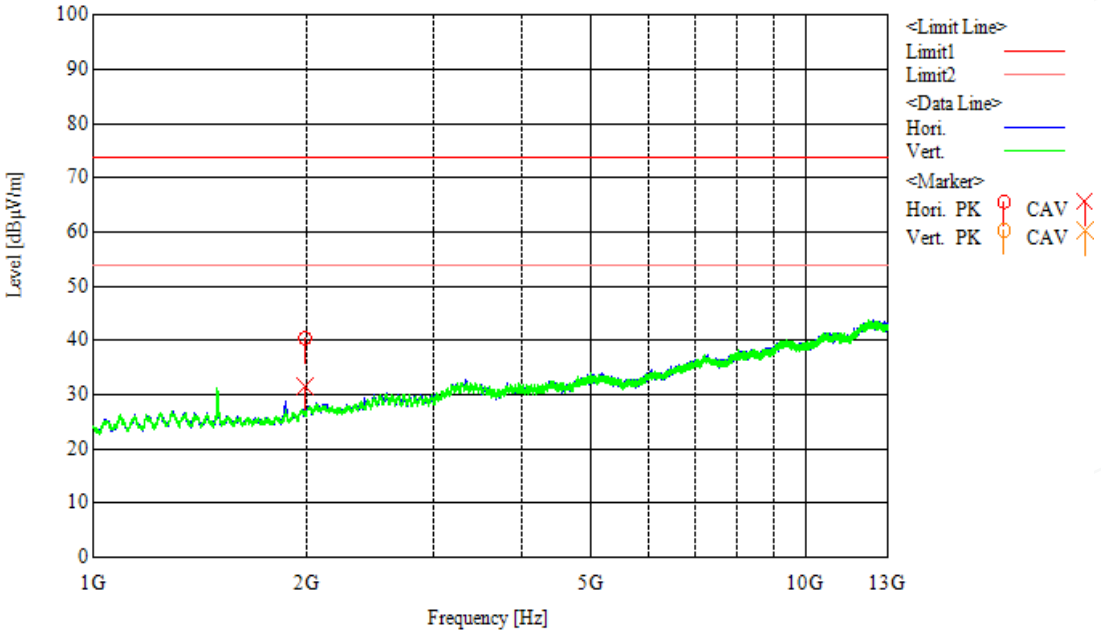
No.	Frequency [MHz]	Reading PK [dBμV]	Reading Ave [dBμV]	C.Factor [dB]	Result PK [dBμV/m]	Result Ave [dBμV/m]	Limit PK [dBμV/m]	Limit Ave [dBμV/m]	Margin PK [dB]	Margin Ave [dB]	Ant.
1	**1984.007**	**47.0**	**38.1**	**-6.7**	**40.3**	**31.4**	**73.9**	**53.9**	**33.6**	**22.5**	**Hori.**

[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.
-	-	-	-	-	-	-	-	-	-	-	-

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

[Chart (2480MHz, Y-plane)]



Tested Date: September 9, 2020 Temperature: 20 degC
Humidity: 59 % Atmos. Press: 1015 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)

TR09	CL18	LN05

Test software used

EMI1 Ver. 6.1

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	0.15119	39.0	21.7	10.2	49.2	31.9	65.9	55.9	16.7	24.0	Va
2	0.16326	40.0	22.7	10.2	50.2	32.9	65.3	55.3	15.1	22.4	Va
3	0.16921	36.8	25.4	10.2	47.0	35.6	65.0	55.0	18.0	19.4	Va
4	0.15153	38.1	25.3	10.2	48.3	35.5	65.9	55.9	17.6	20.4	Vb
5	0.15680	40.2	26.3	10.2	50.4	36.5	65.6	55.6	15.2	19.1	Vb
6	3.44931	27.9	15.1	10.1	38.0	25.2	56.0	46.0	18.0	20.8	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	0.15731	37.8	20.9	10.2	48.0	31.1	65.6	55.6	17.6	24.5	Va
2	0.16564	39.6	23.8	10.2	49.8	34.0	65.2	55.2	15.4	21.2	Va
3	0.86012	22.9	16.1	10.0	32.9	26.1	56.0	46.0	23.1	19.9	Va
4	0.15646	40.1	25.8	10.2	50.3	36.0	65.6	55.6	15.3	19.6	Vb
5	0.17278	35.7	25.5	10.2	45.9	35.7	64.8	54.8	18.9	19.1	Vb
6	0.18926	32.8	20.6	10.2	43.0	30.8	64.1	54.1	21.1	23.3	Vb
7	3.35393	27.8	14.4	10.1	37.9	24.5	56.0	46.0	18.1	21.5	Vb
8	3.45291	30.3	15.1	10.1	40.4	25.2	56.0	46.0	15.6	20.8	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	0.15017	40.7	22.5	10.2	50.9	32.7	66.0	56.0	15.1	23.3	Va
2	0.15867	40.1	22.1	10.2	50.3	32.3	65.5	55.5	15.2	23.2	Va
3	0.17940	34.7	21.1	10.2	44.9	31.3	64.5	54.5	19.6	23.2	Va
4	**0.15017**	**41.9**	**26.8**	**10.2**	**52.1**	**37.0**	**66.0**	**56.0**	**13.9**	**19.0**	**Vb**
5	0.17787	35.9	23.6	10.2	46.1	33.8	64.6	54.6	18.5	20.8	Vb
6	0.18977	32.4	20.5	10.2	42.6	30.7	64.0	54.0	21.4	23.3	Vb
7	3.40432	31.2	19.0	10.1	41.3	29.1	56.0	46.0	14.7	16.9	Vb
8	3.45651	30.9	17.4	10.1	41.0	27.5	56.0	46.0	15.0	18.5	Vb

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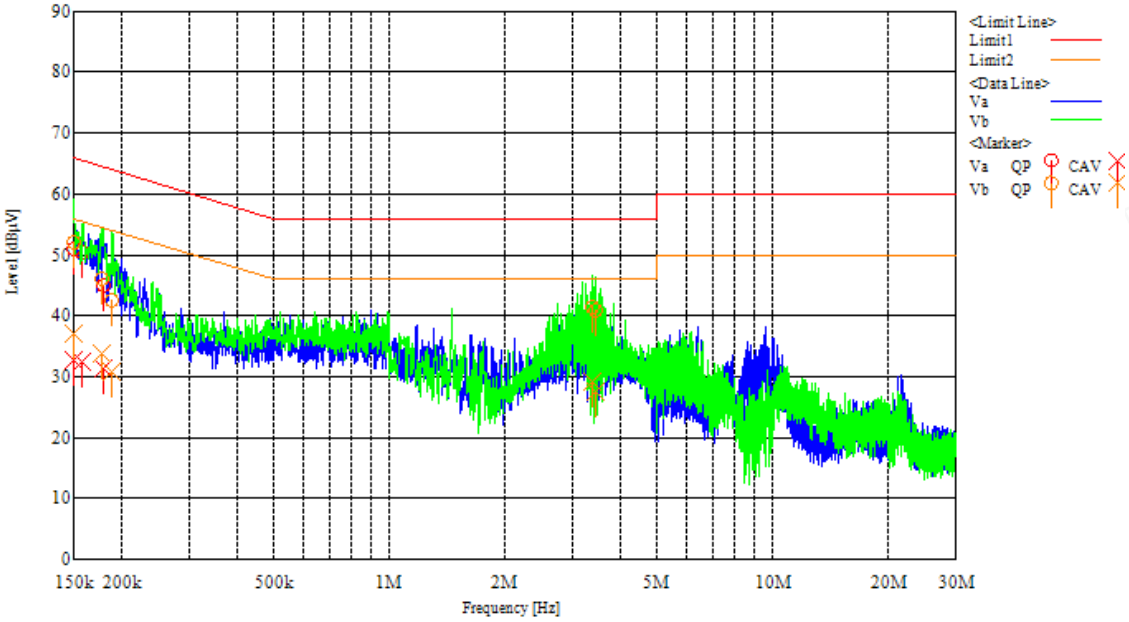
[Chart (2480MHz)]



Tested Date:	September 8, 2020	Temperature:	22 degC
Humidity:	49 %	Atmos. Press:	1017 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	-	2020/04/17	2021/04/30
AC01(EG)	Anechoic Chamber (1st test room)	JSE	203397C	-	2020/03/28	2021/03/31
BA07	Bilogical Antenna	TESEQ	CBL6143A	26670	2019/12/09	2020/12/31
BRF12	Band Reject Filter (2400MHz)	M-City	BRF2440-01	RF0012-02	2020/03/25	2021/03/31
CL11	RF Cable for RE	RFT	-	-	2020/03/25	2021/03/31
CL18	RF Cable for CE	RFT	-	-	2020/03/25	2021/03/31
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	2020/06/27	2022/06/30
HPF11	High Pass Filter (3500MHz)	Wainwright	WHNX6-2765-3500-26500-40CC	2	2020/04/28	2021/04/30
LN05	LISN	Kyoritsu	KNW-407F	8-1773-2	2020/05/19	2021/05/31
LP06	Loop Antenna	ETS-Lindgren	6502	00164299	2020/04/13	2021/04/30
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	2020/07/04	2022/07/31
TR06	Test Receiver (F/W : 4.73 SP4)	Rohde & Schwarz	ESU26	100002	2019/10/07	2020/10/31
TR09	Test Receiver (F/W : 4.43 SP3)	Rohde & Schwarz	ESU8	100386	2020/06/23	2021/06/30

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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