

TEST REPORT

For

UNIT COMP REMOTE

In conformity with

FCC CFR 47 Part15 Subpart C

Product Marketing Name(PMN)
: UNIT COMP REMOTE

Hardware Version Identification Number(HVIN)
: UNIT COMP REMOTE

FCC ID : OUCGGM-M010

Report No. : WE180702BB2-32

Issue Date : December 26, 2018

Prepared for

OMRON Automotive Electronics Co. Ltd.
6368 Nenjozaka, Okusa, Komaki-city, Aichi-pref, 485-0802 Japan

Prepared by

SGS Japan Inc.
3-5-23, Kitayamata, Tsuzuki-ku, Yokohama, 224-0021, Japan
Telephone: +81-(0)45-550-3502
Faximile: +81-(0)45-592-7506

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Table of contents

1	General information.....	3
1.1	Product description	3
1.2	Test(s) performed/ Summary of test result	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	Occupied Bandwidth (6 dB)	11
2.3	Power Spectral Density.....	13
2.4	Peak Output Power	15
2.5	Conducted Spurious Emissions.....	18
2.6	Radiated emissions (for restricted frequency band).....	23
2.7	AC power line conducted emissions.....	34
3	Test setup photographs	36
3.1	Radiated emissions	36
4	List of utilized test equipment / calibration	42

History

Report No.	Date	Revisions	Issued By
WE180702BB2-31	December 21, 2018	Initial Issue	T.Yonemura
WE180702BB2-32	December 26, 2018	Error correction of FCC ID	T.Yonemura

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1 General information

1.1 Product description

Test item	: UNIT COMP REMOTE
Manufacturer	: OMRON Automotive Electronics Co. Ltd.
Address	: 6368 Nenjozaka, Okusa, Komaki-city, Aichi-pref, 485-0802 Japan
Product Marketing Name(PMN)	: UNIT COMP REMOTE
Hardware Version Identification Number(HVIN)	: UNIT COMP REMOTE
FCC ID	: OUCGGM-M010
Serial number	: SN019 (for conducted test), SN008 (for radiated test)
Hardware version	: 0301 (for conducted and radiated test)
Software version	: 57 FF 05, CE1.1 (for conducted test) 57 FF 05, CE1.0 (for radiated test)
Operating frequency	: 2402 - 2480 MHz
Type of modulation	: DSSS (GFSK)
Antenna Gain	: 0.19 dBi
Receipt date of EUT	: November 2, 2018 (radiated sample) November 12, 2018 (conducted sample)
Nominal power source voltages	: 12 Vdc

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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. 2017)
Test method(s) : ANSI C63.10: 2013
Test(s) started : November 13, 2018
Test(s) completed : December 20, 2018

Summary of test result : Complied

Note: The above judgment is only based on the measurement data and it does not include the measurement uncertainty. Accordingly, the statement below is applied to the test result.

The EUT complies with the limit required in the standard in case that the margin is not less than the measurement uncertainty in the Laboratory.

Compliance of the EUT is more probable than non-compliance is case that the margin is less than the measurement uncertainty in the Laboratory.

Test engineer

: 
T. Yonemura
Engineer
Wireless testing laboratory

Reviewer

: 
K. Onishi
Testing leader
Wireless testing laboratory

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JP 014052

1.3 Test facility

[Yokohama Laboratory]

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

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

Registered by ISED Number: The registered facility number is as follows;
Test site (Semi-Anechoic chamber 3m): 6974A-1

Registered by Voluntary Control Council for Interference by Information Technology Equipment (VCCI)
Each registered facility number is as follows;
Test site A-0045

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



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1.4 Measurement uncertainty

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

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

Conducted emission (150 kHz - 30 MHz):	± 3.3 dB
Radiated emission (9 kHz - 30 MHz):	± 5.03 dB
Radiated emission (30 MHz - 1000 MHz):	± 5.22 dB
Radiated emission (1 GHz - 6 GHz):	± 4.87 dB
Radiated emission (6 GHz - 18 GHz):	± 4.93 dB
Radiated emission (18 GHz - 26 GHz):	± 5.47 dB
Antenna conducted measurement	
RF Conducted Power:	± 0.78 dB
Conducted Spurious (9 kHz – 3 GHz):	± 0.87 dB
Conducted Spurious (3 GHz – 25 GHz):	± 1.27 dB

1.5 Summary of test results

Requirement	Section in FCC	Result	Section in this report
Occupied Bandwidth (99 %)	2.1049	Complied	2.1
Occupied Bandwidth (6 dB)	15.247 (a)(2)	Complied	2.2
Power Spectral Density	15.247 (e)	Complied	2.3
Peak Output Power	15.247 (b)(3)	Complied	2.4
Conducted Spurious Emissions	15.247 (d)	Complied	2.5
Tx Radiated Spurious Emissions	15.205 (d)/15.209	Complied	2.6
Tx AC Power Line Spurious Emissions	15.207	N/A(*1)	2.7

(*1) Since EUT is connected to an in-vehicle battery, this EUT have no AC power port.

FCC Part 15.31 (e)

This EUT provides stable voltage (DC 3.3 V) constantly to the wireless transmitter regardless of input voltage. Therefore, the equipment complied with the requirement.

FCC Part 15.203 Antenna requirement

The antenna is not removable from EUT.

Therefore, the equipment complied with the antenna requirement.

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1.6 Setup of equipment under test (EUT)

1.6.1 Test configuration of EUT

Equipment(s) under test

No.	Item	Manufacture	Model No.	Serial No.
A	UNIT COMP REMOTE	OMRON Automotive Electronics Co. Ltd.	GGM-M010	SN019(for conducted test), SN008(for radiated test)

Support Equipment(s)

No.	Item	Manufacture	Model No.	Serial No.
B	Control Box	OMRON	-	-

Connected cable(s)

No.	Item	Identification (Manu.etc.)	Cable Shielded	Ferrite Core	Length [m]
1	Harness (DC+Singal)	-	Unshielded	None	0.2
2	DC	-	Unshielded	None	2.8

1.6.2 Operating condition

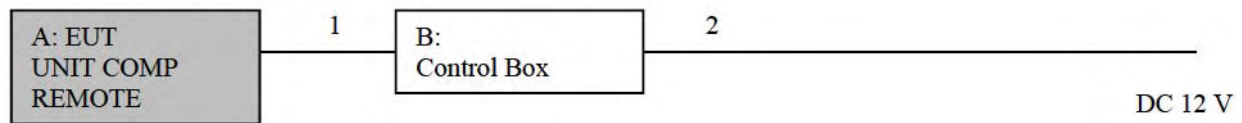
Operating Mode	Power Setting	Remarks
Continuous Tx, LE, 1 Mbps	0	-

Tested Frequency [MHz]	Remarks
2402	-
2440	-
2480	-

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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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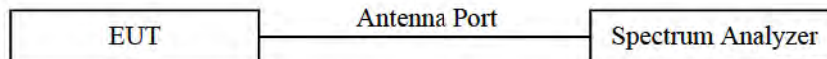
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2 Test procedure and test data

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)

SA09R	CL31				
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Test Date

Tested Date: December 20, 2018 Temperature: 22 deg.C
Humidity: 42 % Atmos. Press: 1022 hPa

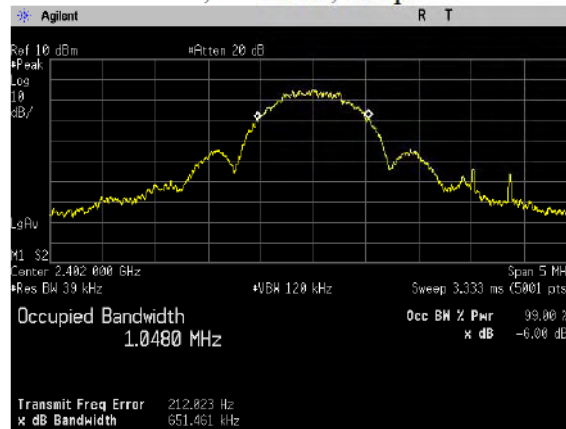
Test results

Operating Mode	Frequency [MHz]	99% Occupied Bandwidth [MHz]
LE, 1Mbps	2402	1.0480
LE, 1Mbps	2440	1.0592
LE, 1Mbps	2480	1.0797

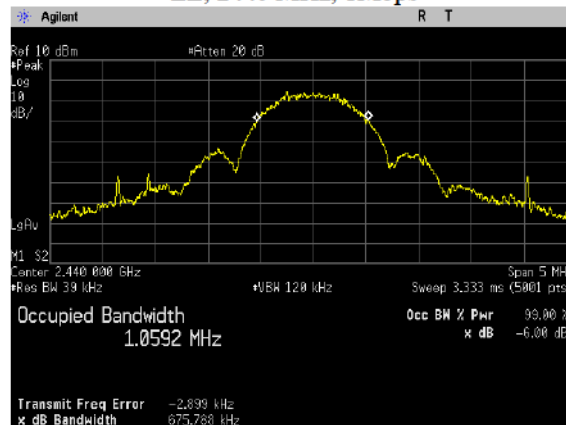
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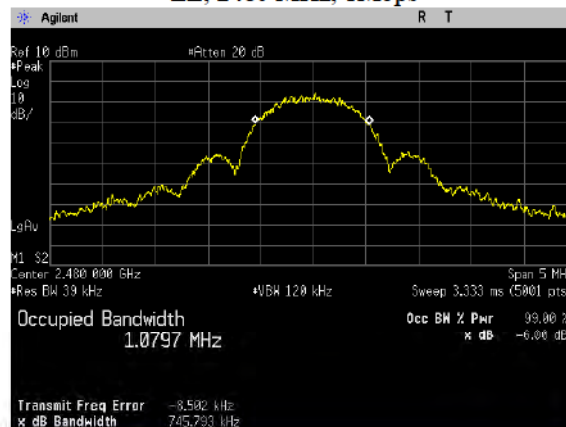
LE, 2402 MHz, 1Mbps



LE, 2440 MHz, 1Mbps



LE, 2480 MHz, 1Mbps



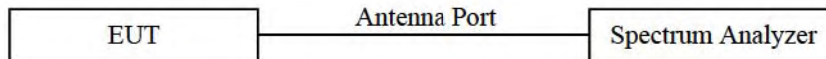
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2.2 Occupied Bandwidth (6 dB)

Test setup

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



Test procedure

Test procedure is set as below according to KDB 558074 D01 DTS Meas Guidance v05

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

Applicable rule and limitation

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

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

SA09R	CL31				
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Test Date

Tested Date: November 13, 2018 Temperature: 22 deg.C
Humidity: 42 % Atmos. Press: 1022 hPa

Test results - Complied with requirement

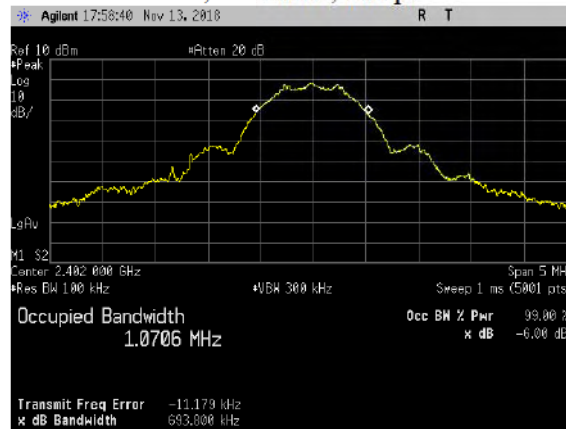
Test Data

Operation Mode	Frequency [MHz]	6 dB Occupied Bandwidth [MHz]
LE, 1Mbps	2402	0.693800
LE, 1Mbps	2440	0.742938
LE, 1Mbps	2480	0.735943

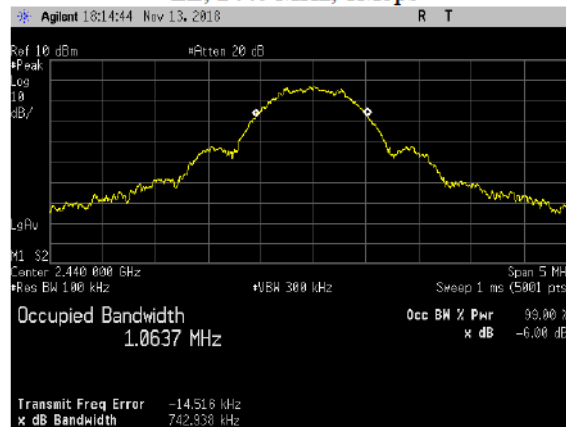
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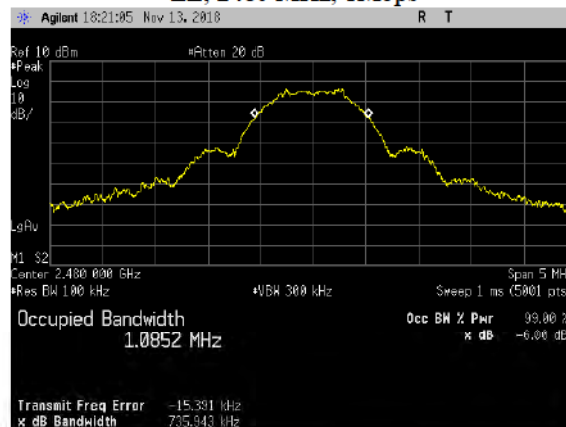
LE, 2402 MHz, 1Mbps



LE, 2440 MHz, 1Mbps



LE, 2480 MHz, 1Mbps



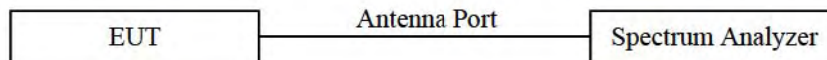
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2.3 Power Spectral Density

Test setup

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



Test procedure

Test procedure is set as below according to KDB 558074 D01 DTS Meas Guidance v05

Span: OBW x 1.5
 RBW: 3 kHz
 VBW: 9 kHz
 Detector: Peak
 Trace: Max Hold

Applicable rule and limitation

15.247 (e) For digitally modulation 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. This power spectral density shall be determined in accordance with the provisions of paragraph (b) of this section. The same method of determining the conducted output power shall be used to determine the power spectral density.

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

SA09R	CL31				
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Test Date

Tested Date: November 13, 2018 Temperature: 22 deg.C
 Humidity: 42 % Atmos. Press: 1022 hPa

Test results - Complied with requirement

Test Data

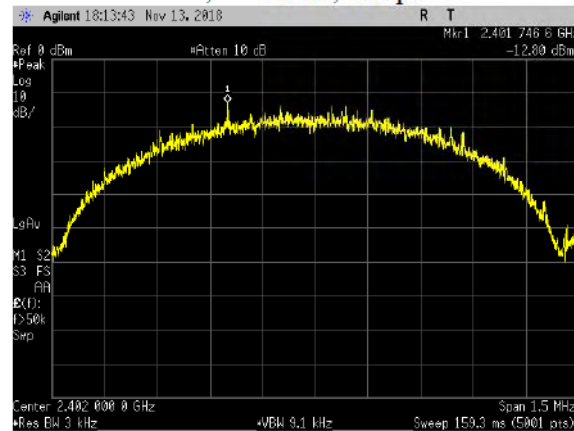
Operation Mode	Frequency [MHz]	Reading [dBm]	Cable Loss [dB]	Attenuator [dB]	Result Power Spectral Density [dBm]	[mW]
LE, 1Mbps	2402	-12.80	0.50	0.00	-12.30	0.059
LE, 1Mbps	2440	-13.41	0.50	0.00	-12.91	0.051
LE, 1Mbps	2480	-15.25	0.50	0.00	-14.75	0.033

* Sample calculation: Result [dBm] = Reading [dBm] + Cable Loss [dB] + Attenuator [dB]

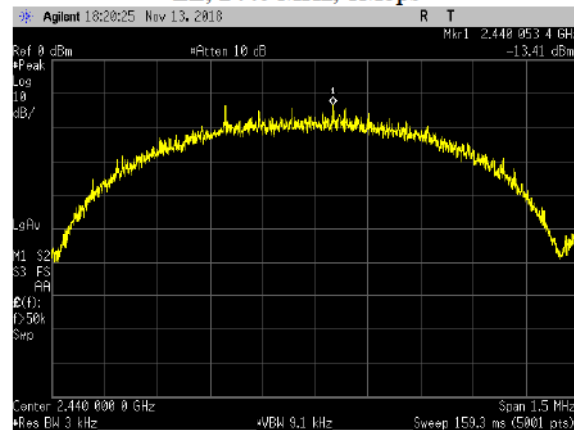
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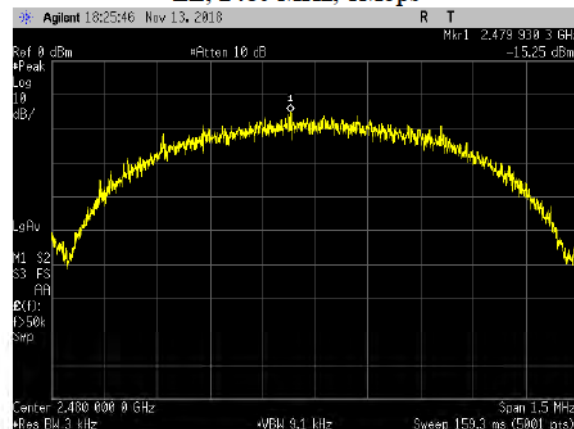
LE, 2402 MHz, 1Mbps



LE, 2440 MHz, 1Mbps



LE, 2480 MHz, 1Mbps



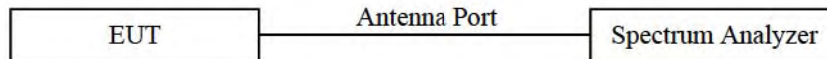
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2.4 Peak Output Power

Test setup

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



Test procedure

Test procedure is set as below according to KDB 558074 D01 DTS Meas Guidance v05

Span: RBW x 3
 RBW: OBW
 VBW: RBW x 3
 Detector: Peak
 Trace: Max Hold

Applicable rule and limitation

15.247(a) (2) Systems using digital modulation techniques may operate in the 902 – 928 MHz, 2400 – 2483.5 MHz and 5725 – 5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.
 (3) For systems using digital modulation in the 902 – 928 MHz, 2400 – 2483.5 MHz and 5725 – 5850 MHz bands: 1 Watt (30 dBm).

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

SA09R	CL31				
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Test Date

Tested Date: November 13, 2018 Temperature: 22 deg.C
 Humidity: 42 % Atmos. Press: 1022 hPa

Test results – Complied with requirement

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Test Data

Operating Mode	Frequency [MHz]	Reading [dBm]	Cable Loss [dB]	Attenuator [dB]	Result Peak Output Power	
					[dBm]	[mW]
LE, 1Mbps	2402	-1.87	0.50	0.00	-1.37	0.729
LE, 1Mbps	2440	-2.39	0.50	0.00	-1.89	0.647
LE, 1Mbps	2480	-2.55	0.50	0.00	-2.05	0.623

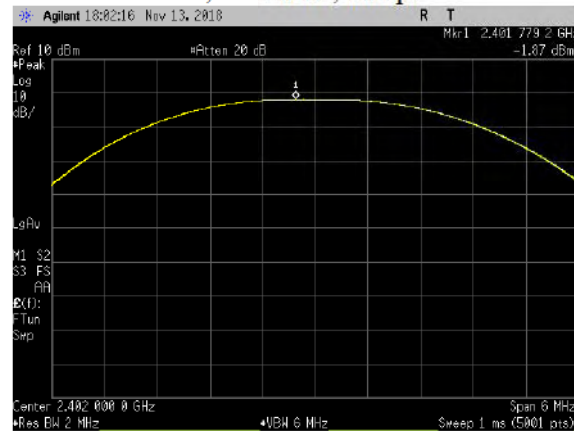
*Average output power (for reference)

Operating Mode	Frequency [MHz]	Reading [dBm]	Cable Loss [dB]	Attenuator [dB]	Result Average Output Power	
					[dBm]	[mW]
LE, 1Mbps	2402	-1.99	0.50	0.00	-1.49	0.710
LE, 1Mbps	2440	-2.62	0.50	0.00	-2.12	0.614
LE, 1Mbps	2480	-2.71	0.50	0.00	-2.21	0.601

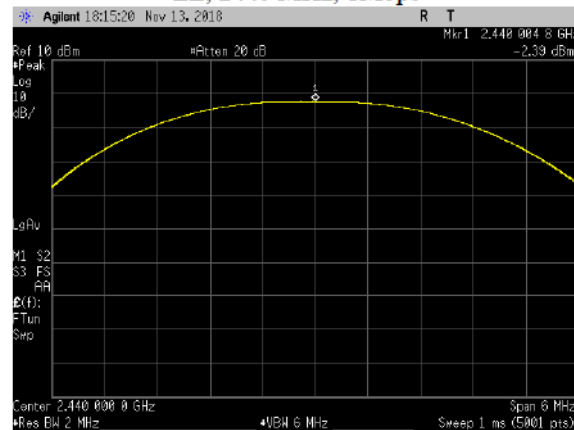
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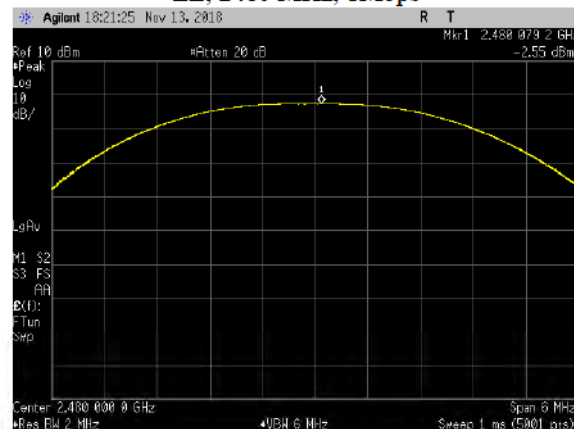
LE, 2402 MHz, 1Mbps



LE, 2440 MHz, 1Mbps



LE, 2480 MHz, 1Mbps



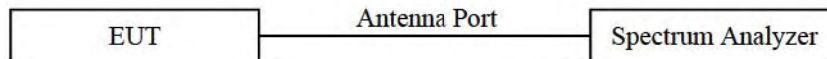
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2.5 Conducted Spurious Emissions

Test setup

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



Test procedure

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

RBW: 100 kHz
VBW: 300 kHz
Detector: Peak
Trace: Max Hold

Limitation

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

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

SA09R	CL31				
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Test Date

Tested Date: November 13, 2018 Temperature: 22 deg.C
Humidity: 42 % Atmos. Press: 1022 hPa

Test results - Complied with requirement

Test Data

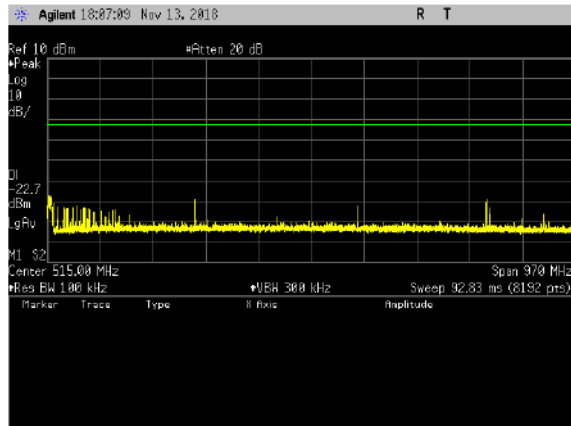
Refer to chart.

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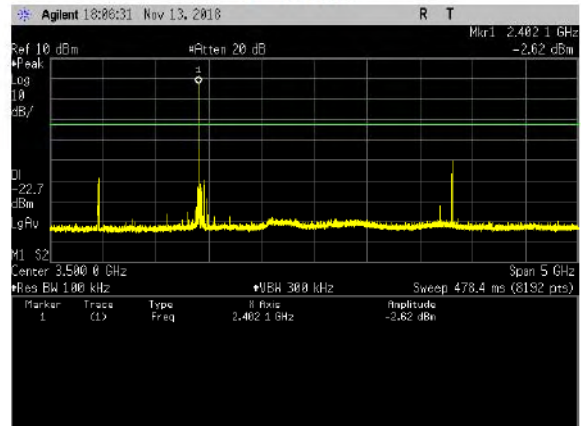
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LE, 2402 MHz, 1Mbps

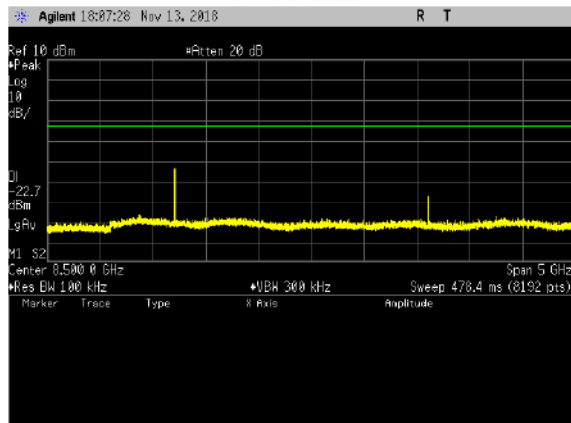
30 – 1000 MHz



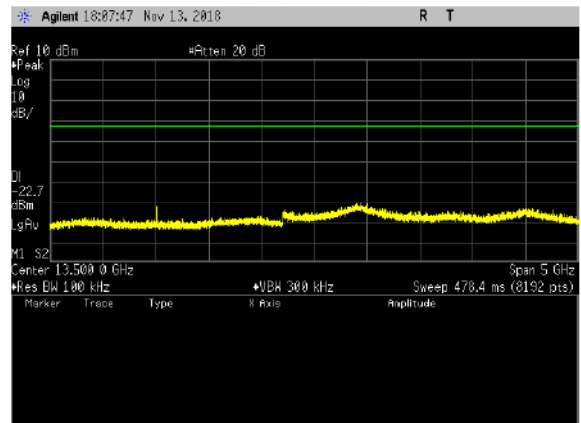
1 – 6 GHz



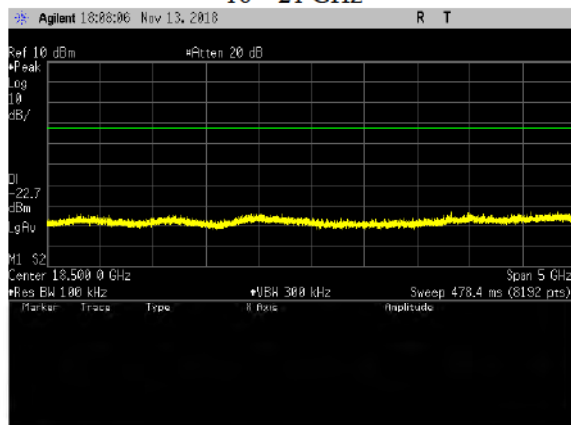
6 – 11 GHz



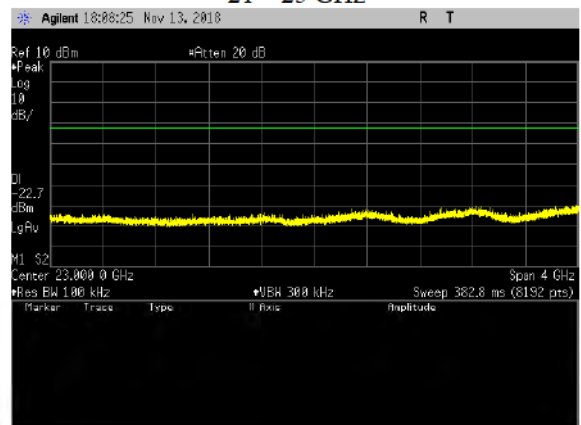
11 – 16 GHz



16 – 21 GHz



21 – 25 GHz

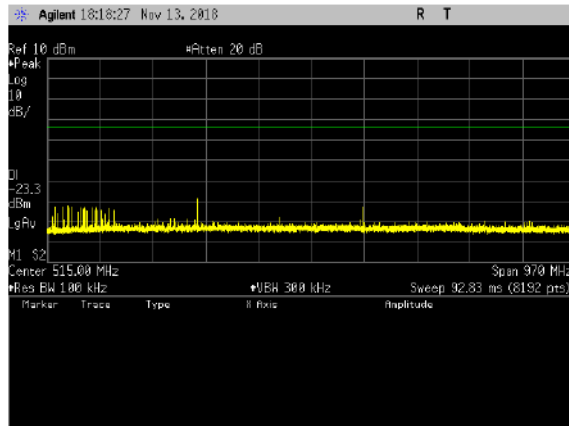


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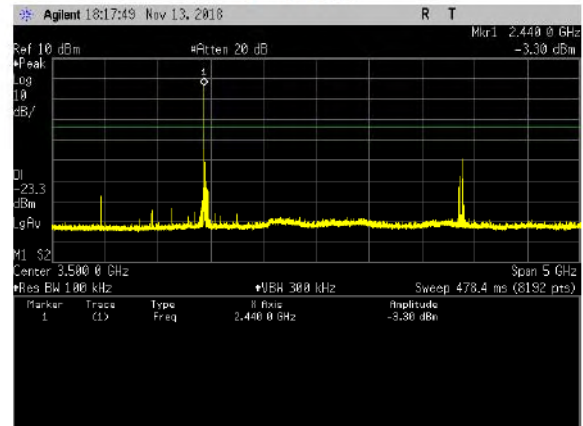
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LE, 2440 MHz, 1Mbps

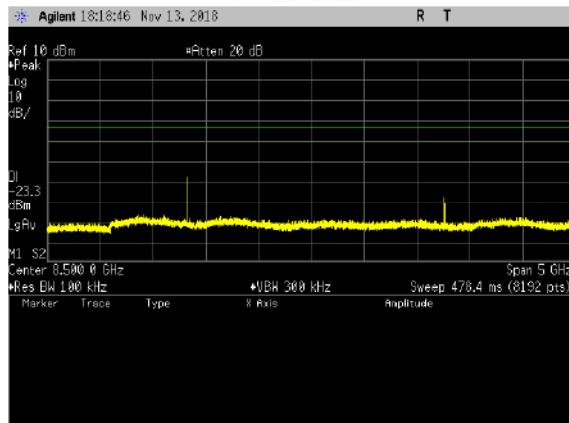
30 – 1000 MHz



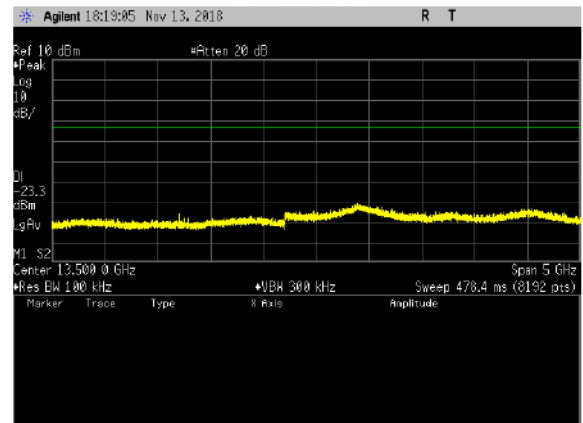
1 – 6 GHz



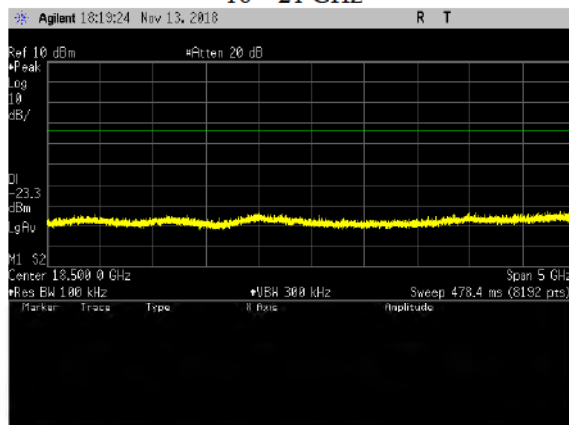
6 – 11 GHz



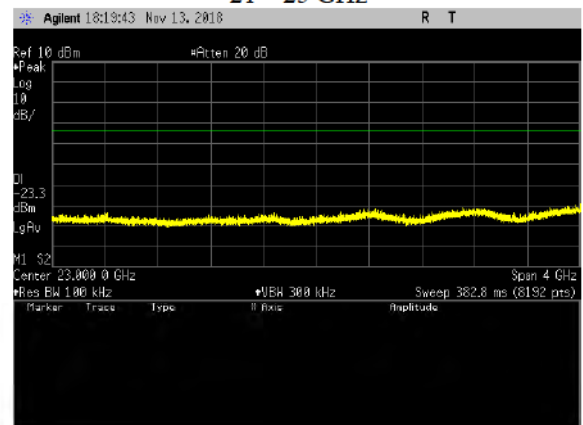
11 – 16 GHz



16 – 21 GHz



21 – 25 GHz

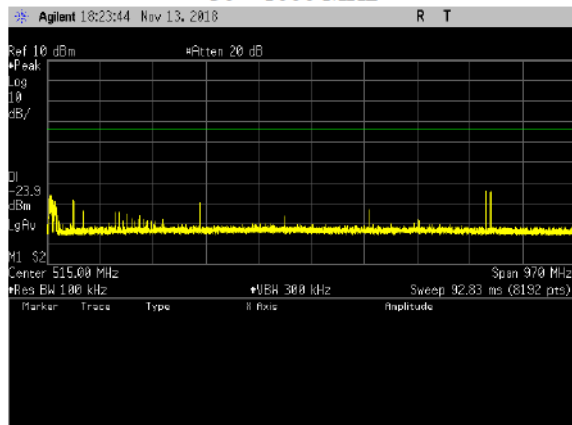


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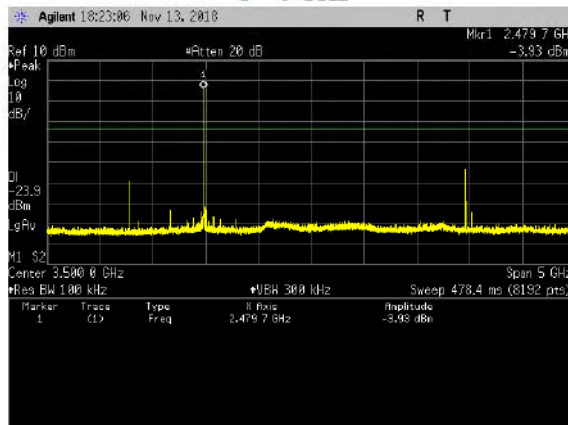
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LE, 2480 MHz, 1Mbps

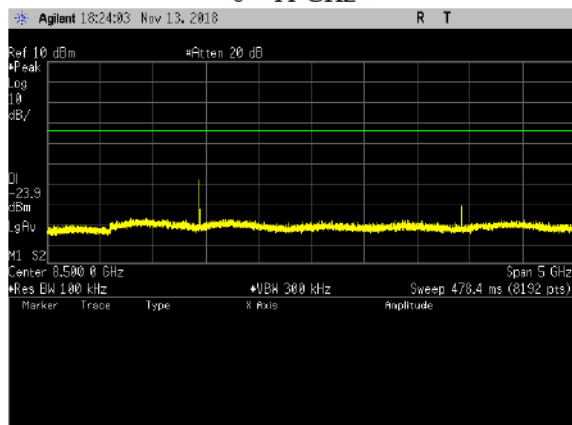
30 – 1000 MHz



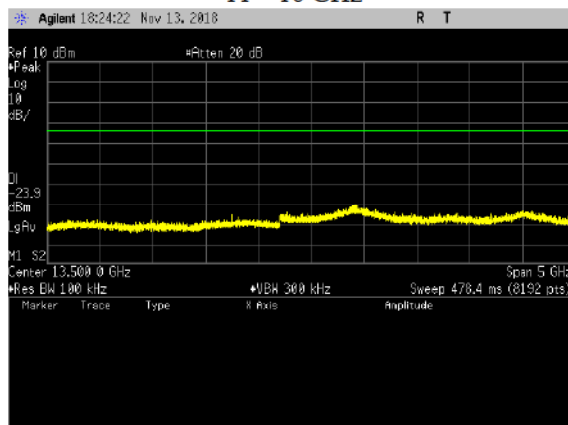
1 – 6 GHz



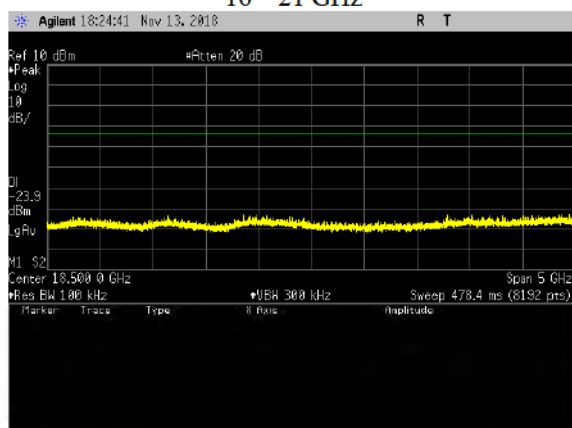
6 – 11 GHz



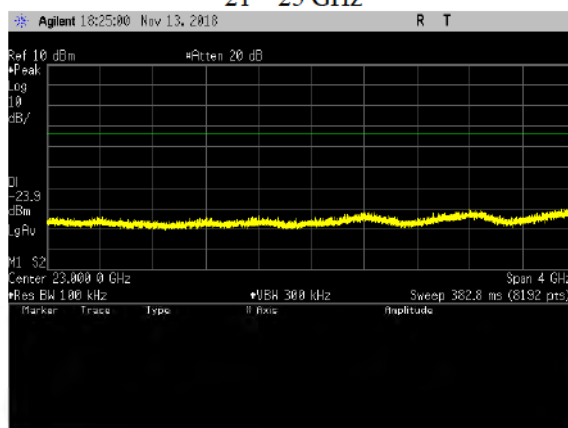
11 – 16 GHz



16 – 21 GHz



21 – 25 GHz

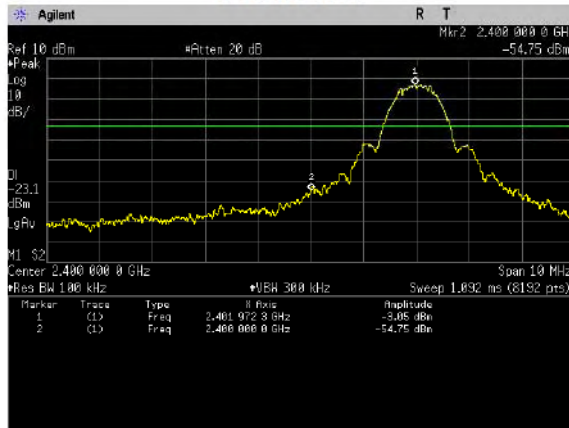


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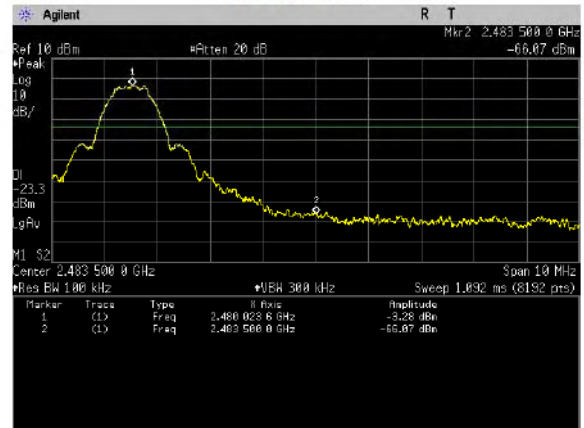
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LE, 1Mbps Bandedge

Tx 2402 MHz



Tx 2480 MHz



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2.6 Radiated emissions (for restricted frequency band)

Test setup

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

Test procedure

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

- [9 - 150 kHz]
RBW: 200 Hz, Detector: Quasi Peak
- [150 kHz - 30 MHz]
RBW: 9 kHz, Detector: Quasi Peak
- [30 - 1000 MHz]
RBW: 120 kHz, Detector: Quasi Peak
- [Above 1000 MHz]
RBW: 1 MHz, Detector: Average/Peak

Applicable rule and limitation

FCC 15.205 restricted bands of operation

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

MHz	MHz	MHz	GHz
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
0.490 - 0.510	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.025 - 8.5
4.17725 - 4.17775	37.5 - 38.25	1435 - 1626.5	9.0 - 9.2
4.20725 - 4.20775	73 - 74.6	1645.5 - 1646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1660 - 1710	10.6 - 12.7
6.26775 - 6.26825	108 - 121.94	1718.8 - 1722.2	13.25 - 13.4
6.31175 - 6.31225	123 - 138	2200 - 2300	14.47 - 14.5
8.291 - 8.294	149.9 - 150.05	2310 - 2390	15.35 - 16.2
8.362 - 8.366	156.52475 - 156.52525	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.7 - 156.9	2690 - 2900	22.01 - 23.12
8.41425 - 8.41475	162.0125 - 167.17	3260 - 3267	23.6 - 24.0
12.29 - 12.293	167.72 - 173.2	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	240 - 285	3345.8 - 3358	36.43 - 36.5
12.57675 - 12.57725	322 - 335.4	3600 - 4100	38.6 -

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

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FCC 15.209; Field strength limits

Frequency [MHz]	Field Strength [$\mu\text{V/m}$]	Measurement Distance [m]	Field Strength [$\text{dB}\mu\text{V/m}$]
30 – 88	100	3	40.0
88 – 216	150	3	43.5
216 – 960	200	3	46.0
Above 960	500	3	53.9

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

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

Test results - Complied with requirement

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

AC01	CL11	TR06	PR21	BA07	CL30	CL38	PR12
DH06	CH01	SH01	LP06	AT33	HPF4	BRF12	

Test Date

Tested Date: December 14, 2018 Temperature: 21 degC
Humidity: 41 % Atmos. Press: 1021 hPa

Test software used

EMII Ver. 5.8

Calculation method

The Correction Factor and Result are calculated as followings.

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

Result [$\text{dB}\mu\text{V/m}$] = Reading [$\text{dB}\mu\text{V}$] + Correction Factor [dB/m]

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Test Data (9 kHz - 30 MHz)

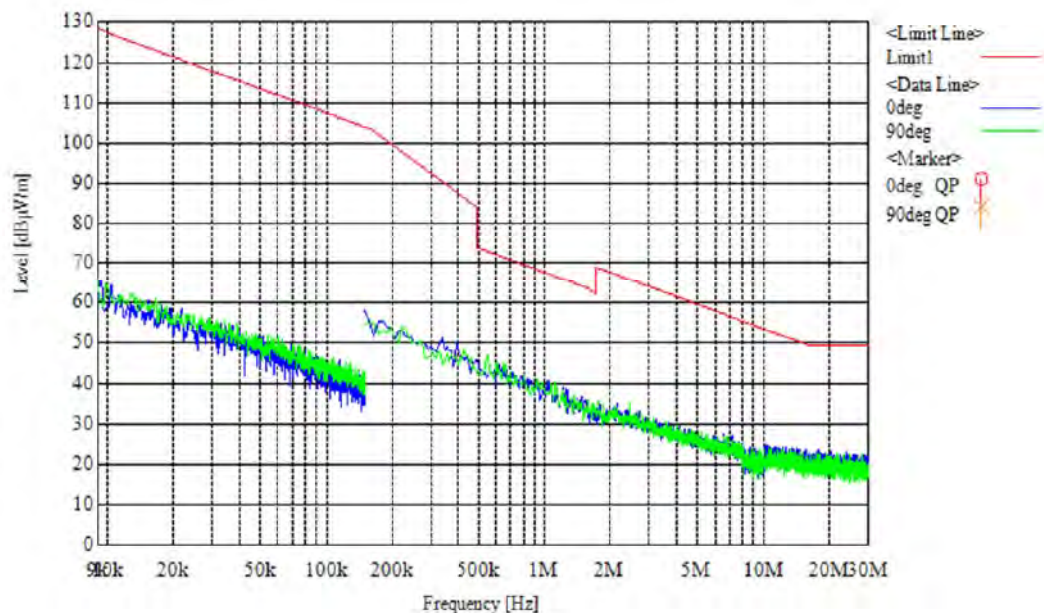
Operating mode: LE, 2402 MHz, 1Mbps, X-plane (Worst)
Test site: Yokohama Laboratory
Measurement distance: 3 m

[Emission level]

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

Note: All other emissions were under noise floor.

[Chart]



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Test Data (30 - 1000 MHz)

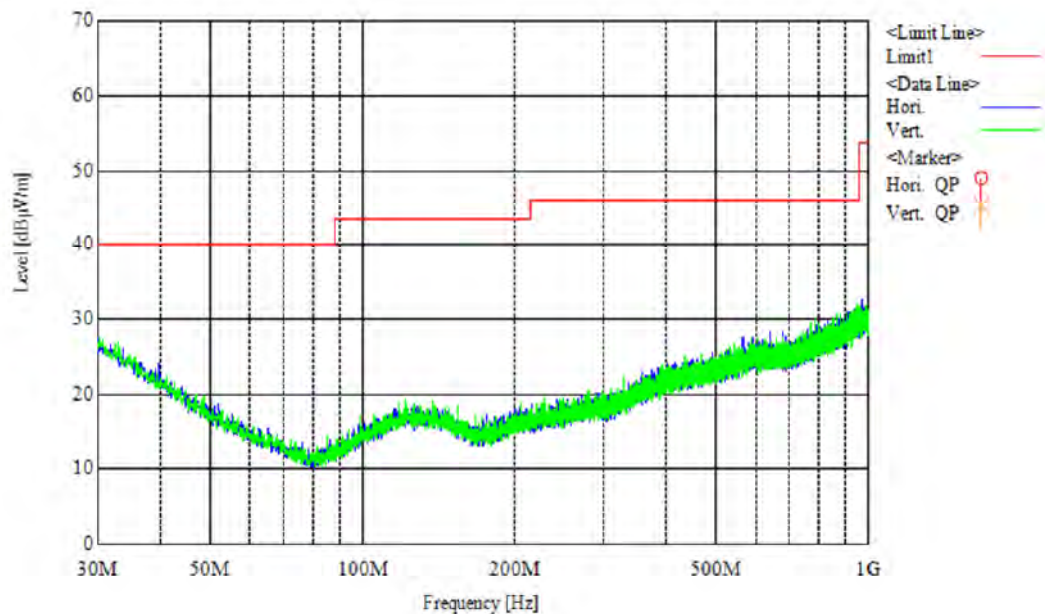
Operating mode: LE, 2440 MHz, 1Mbps, Y-plane (Worst)
Test site: Yokohama Laboratory
Measurement distance: 3 m

[Emission level]

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

Note: All other emissions were under noise floor.

[Chart]



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Test Data (Above 1000 MHz)

Operating mode: LE, 2402 MHz, 1 Mbps, X-plane
Test site: Yokohama Laboratory
Measurement distance: 3 m

[Emission level]

No.	Frequency [MHz]	Reading Peak [dBμV]	Reading Average [dBμV]	C.Factor [dB]	Result Peak [dBμV/m]	Result Average [dBμV/m]	Limit Peak [dBμV/m]	Limit Average [dBμV/m]	Margin Peak [dB]	Margin Average [dB]	Antenna Pola.
1	4804.000	42.7	31.2	2.8	45.5	34.0	73.9	53.9	28.4	19.9	Hori.
2	4804.000	42.9	31.2	2.8	45.7	34.0	73.9	53.9	28.2	19.9	Vert.

Operating mode: LE, 2440 MHz, 1 Mbps, X-plane
Test site: Yokohama Laboratory
Measurement distance: 3 m

[Emission level]

No.	Frequency [MHz]	Reading Peak [dBμV]	Reading Average [dBμV]	C.Factor [dB]	Result Peak [dBμV/m]	Result Average [dBμV/m]	Limit Peak [dBμV/m]	Limit Average [dBμV/m]	Margin Peak [dB]	Margin Average [dB]	Antenna Pola.
1	4880.000	43.1	32.3	3.2	46.3	35.5	73.9	53.9	27.6	18.4	Hori.
2	4880.000	42.3	30.9	3.2	45.5	34.1	73.9	53.9	28.4	19.8	Vert.

Operating mode: LE, 2480 MHz, 1 Mbps, X-plane
Test site: Yokohama Laboratory
Measurement distance: 3 m

[Emission level]

No.	Frequency [MHz]	Reading Peak [dBμV]	Reading Average [dBμV]	C.Factor [dB]	Result Peak [dBμV/m]	Result Average [dBμV/m]	Limit Peak [dBμV/m]	Limit Average [dBμV/m]	Margin Peak [dB]	Margin Average [dB]	Antenna Pola.
1	4960.000	42.2	31.0	3.4	45.6	34.4	73.9	53.9	28.3	19.5	Hori.
2	4960.000	41.9	31.1	3.4	45.3	34.5	73.9	53.9	28.6	19.4	Vert.

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Operating mode: LE, 2402 MHz, 1 Mbps, Y-plane
Test site: Yokohama Laboratory
Measurement distance: 3 m

[Emission level]

No.	Frequency [MHz]	Reading Peak [dBμV]	Reading Average [dBμV]	C.Factor [dB]	Result Peak [dBμV/m]	Result Average [dBμV/m]	Limit Peak [dBμV/m]	Limit Average [dBμV/m]	Margin Peak [dB]	Margin Average [dB]	Antenna Pola.
1	4804.000	42.2	30.1	2.8	45.0	32.9	73.9	53.9	28.9	21.0	Hori.
2	4804.000	43.5	33.2	2.8	46.3	36.0	73.9	53.9	27.6	17.9	Vert.

Operating mode: LE, 2440 MHz, 1 Mbps, Y-plane
Test site: Yokohama Laboratory
Measurement distance: 3 m

[Emission level]

No.	Frequency [MHz]	Reading Peak [dBμV]	Reading Average [dBμV]	C.Factor [dB]	Result Peak [dBμV/m]	Result Average [dBμV/m]	Limit Peak [dBμV/m]	Limit Average [dBμV/m]	Margin Peak [dB]	Margin Average [dB]	Antenna Pola.
1	4880.000	42.6	32.3	3.2	45.8	35.5	73.9	53.9	28.1	18.4	Hori.
2	4880.000	41.4	28.7	3.2	44.6	31.9	73.9	53.9	29.3	22.0	Vert.

Operating mode: LE, 2480 MHz, 1 Mbps, Y-plane
Test site: Yokohama Laboratory
Measurement distance: 3 m

[Emission level]

No.	Frequency [MHz]	Reading Peak [dBμV]	Reading Average [dBμV]	C.Factor [dB]	Result Peak [dBμV/m]	Result Average [dBμV/m]	Limit Peak [dBμV/m]	Limit Average [dBμV/m]	Margin Peak [dB]	Margin Average [dB]	Antenna Pola.
1	4960.000	41.8	29.7	3.4	45.2	33.1	73.9	53.9	28.7	20.8	Hori.
2	4960.000	42.4	31.0	3.4	45.8	34.4	73.9	53.9	28.1	19.5	Vert.

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Operating mode: LE, 2402 MHz, 1 Mbps, Z-plane
Test site: Yokohama Laboratory
Measurement distance: 3 m

[Emission level]

No.	Frequency [MHz]	Reading Peak [dBμV]	Reading Average [dBμV]	C.Factor [dB]	Result Peak [dBμV/m]	Result Average [dBμV/m]	Limit Peak [dBμV/m]	Limit Average [dBμV/m]	Margin Peak [dB]	Margin Average [dB]	Antenna Pola.
1	4804.000	43.0	32.3	2.8	45.8	35.1	73.9	53.9	28.1	18.8	Hori.
2	4804.000	43.7	33.2	2.8	46.5	36.0	73.9	53.9	27.4	17.9	Vert.

Operating mode: LE, 2440 MHz, 1 Mbps, Z-plane
Test site: Yokohama Laboratory
Measurement distance: 3 m

[Emission level]

No.	Frequency [MHz]	Reading Peak [dBμV]	Reading Average [dBμV]	C.Factor [dB]	Result Peak [dBμV/m]	Result Average [dBμV/m]	Limit Peak [dBμV/m]	Limit Average [dBμV/m]	Margin Peak [dB]	Margin Average [dB]	Antenna Pola.
1	4880.000	42.9	30.0	3.2	46.1	33.2	73.9	53.9	27.8	20.7	Hori.
2	4880.000	43.2	32.2	3.2	46.4	35.4	73.9	53.9	27.5	18.5	Vert.

Operating mode: LE, 2480 MHz, 1 Mbps, Z-plane
Test site: Yokohama Laboratory
Measurement distance: 3 m

[Emission level]

No.	Frequency [MHz]	Reading Peak [dBμV]	Reading Average [dBμV]	C.Factor [dB]	Result Peak [dBμV/m]	Result Average [dBμV/m]	Limit Peak [dBμV/m]	Limit Average [dBμV/m]	Margin Peak [dB]	Margin Average [dB]	Antenna Pola.
1	4960.000	41.6	29.9	3.4	45.0	33.3	73.9	53.9	28.9	20.6	Hori.
2	4960.000	42.4	31.1	3.4	45.8	34.5	73.9	53.9	28.1	19.4	Vert.

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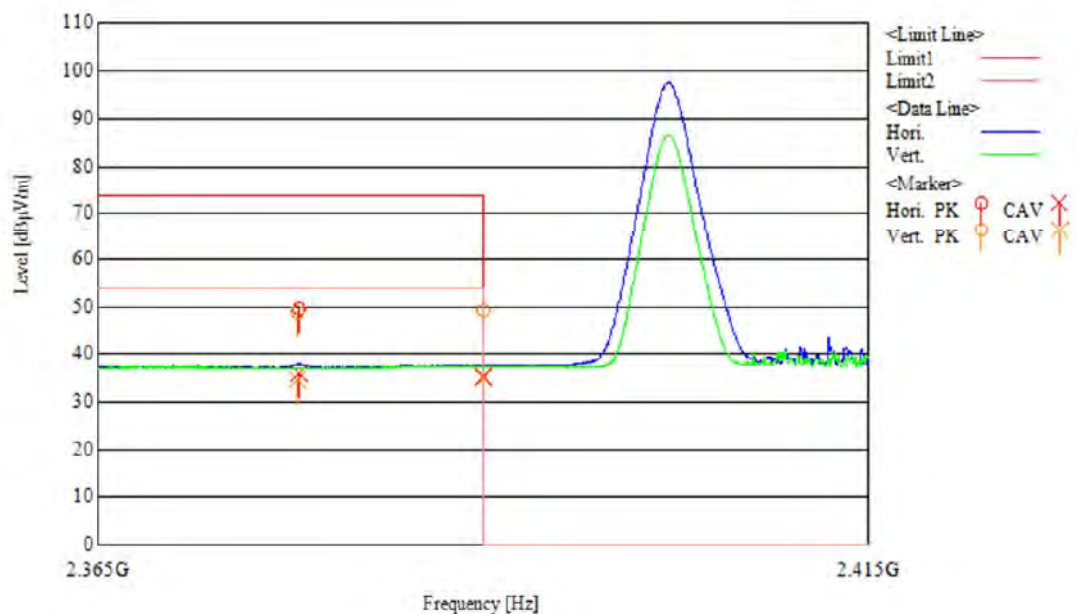
Restricted bandedge measurement

Operating mode: LE, 2402 MHz, 1 Mbps, X-plane
Test site: Yokohama Laboratory
Measurement distance: 3 m

[Emission level]

No.	Frequency [MHz]	Reading Peak [dBμV]	Reading Average [dBμV]	C.Factor [dB]	Result Peak [dBμV/m]	Result Average [dBμV/m]	Limit Peak [dBμV/m]	Limit Average [dBμV/m]	Margin Peak [dB]	Margin Average [dB]	Antenna Pola.
1	2377.950	44.7	31.2	4.9	49.6	36.1	73.9	53.9	24.3	17.8	Hori.
2	2390.000	44.3	30.4	5.0	49.3	35.4	73.9	53.9	24.6	18.5	Hori.
3	2377.870	44.1	29.9	4.9	49.0	34.8	73.9	53.9	24.9	19.1	Vert.
4	2390.000	44.1	30.1	5.0	49.1	35.1	73.9	53.9	24.8	18.8	Vert.

[Chart]



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Operating mode: LE, 2402 MHz, 1 Mbps, Y-plane
Test site: Yokohama Laboratory
Measurement distance: 3 m

[Emission level]

No.	Frequency [MHz]	Reading Peak [dBμV]	Reading Average [dBμV]	C.Factor [dB]	Result Peak [dBμV/m]	Result Average [dBμV/m]	Limit Peak [dBμV/m]	Limit Average [dBμV/m]	Margin Peak [dB]	Margin Average [dB]	Antenna Pola.
1	2390.000	44.1	30.4	5.0	49.1	35.4	73.9	53.9	24.8	18.5	Hori.
2	2390.000	42.8	30.0	5.0	47.8	35.0	73.9	53.9	26.1	18.9	Vert.

Operating mode: LE, 2402 MHz, 1 Mbps, Z-plane
Test site: Yokohama Laboratory
Measurement distance: 3 m

[Emission level]

No.	Frequency [MHz]	Reading Peak [dBμV]	Reading Average [dBμV]	C.Factor [dB]	Result Peak [dBμV/m]	Result Average [dBμV/m]	Limit Peak [dBμV/m]	Limit Average [dBμV/m]	Margin Peak [dB]	Margin Average [dB]	Antenna Pola.
1	2390.000	42.8	30.6	5.0	47.8	35.6	73.9	53.9	26.1	18.3	Hori.
2	2390.000	43.2	30.4	5.0	48.2	35.4	73.9	53.9	25.7	18.5	Vert.

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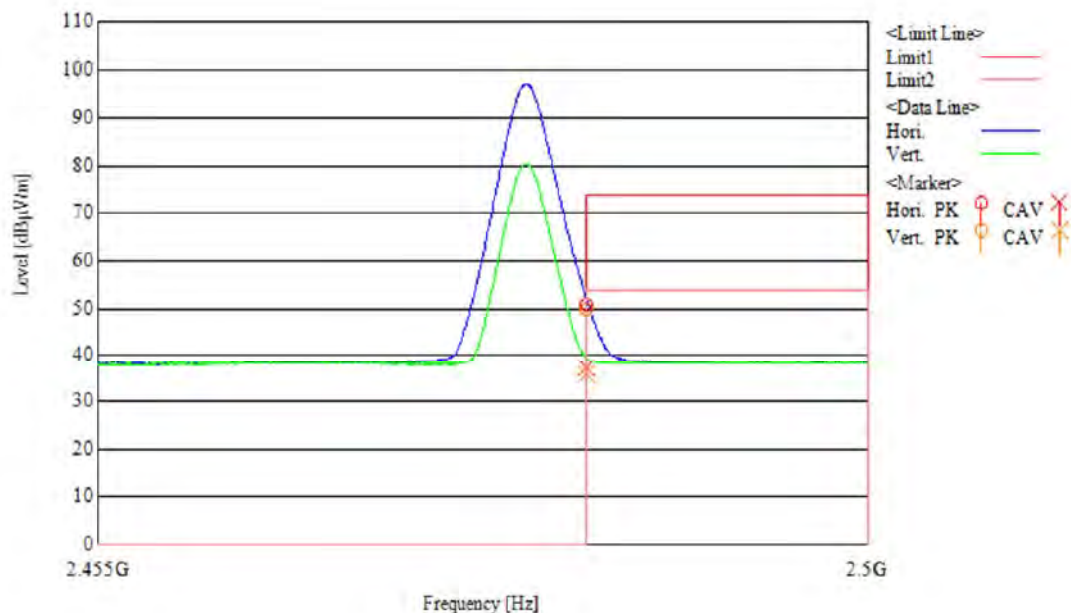
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Operating mode: LE, 2480 MHz, 1 Mbps, X-plane
Test site: Yokohama Laboratory
Measurement distance: 3 m

[Emission level]

No.	Frequency [MHz]	Reading Peak [dBμV]	Reading Average [dBμV]	C.Factor [dB]	Result Peak [dBμV/m]	Result Average [dBμV/m]	Limit Peak [dBμV/m]	Limit Average [dBμV/m]	Margin Peak [dB]	Margin Average [dB]	Antenna Pola.
1	2483.500	45.1	31.5	5.7	50.8	37.2	73.9	53.9	23.1	16.7	Hori.
2	2483.500	44.1	30.0	5.7	49.8	35.7	73.9	53.9	24.1	18.2	Vert.

[Chart]



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Operating mode: LE, 2480 MHz, 1 Mbps, Y-plane
Test site: Yokohama Laboratory
Measurement distance: 3 m

[Emission level]

No.	Frequency [MHz]	Reading Peak [dBμV]	Reading Average [dBμV]	C.Factor [dB]	Result Peak [dBμV/m]	Result Average [dBμV/m]	Limit Peak [dBμV/m]	Limit Average [dBμV/m]	Margin Peak [dB]	Margin Average [dB]	Antenna Pola.
1	2483.500	42.4	29.1	5.7	48.1	34.8	73.9	53.9	25.8	19.1	Hori.
2	2483.500	43.3	30.6	5.7	49.0	36.3	73.9	53.9	24.9	17.6	Vert.

Operating mode: LE, 2480 MHz, 1 Mbps, Z-plane
Test site: Yokohama Laboratory
Measurement distance: 3 m

[Emission level]

No.	Frequency [MHz]	Reading Peak [dBμV]	Reading Average [dBμV]	C.Factor [dB]	Result Peak [dBμV/m]	Result Average [dBμV/m]	Limit Peak [dBμV/m]	Limit Average [dBμV/m]	Margin Peak [dB]	Margin Average [dB]	Antenna Pola.
1	2483.500	44.3	30.6	5.7	50.0	36.3	73.9	53.9	23.9	17.6	Hori.
2	2483.500	44.0	29.7	5.7	49.7	35.4	73.9	53.9	24.2	18.5	Vert.

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2.7 AC power line conducted emissions

Test setup

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

Test procedure

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

Applicable rule and limitation

FCC 15.207; AC power line conducted emissions limits

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

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

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

-	-	-
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Test Date

Tested Date: - Temperature: - degC
Humidity: - % Atmos. Press: - hPa

Test software used

EMI Ver. 5.8

Calculation method

The Correction Factor and Result are calculated as followings.

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

Test results - *This item was not tested.*

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Test Data

Operating mode: -
Test site: -

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]	
-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-

[Chart]

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4 List of utilized test equipment / calibration

ID No.	Kind of Equipment	Manufacturer	Model No.	Serial Number	Cal. Date	Cal. until
AC01(EM)	Anechoic Chamber (1st test room)	JSE	203397C	-	2018/4/14	2019/4/30
AC01(EG)	Anechoic Chamber (1st test room)	JSE	203397C	-	2018/3/21	2019/3/31
BA07	Biological Antenna	TESEQ	CBL6143A	26670	2018/12/7	2019/12/31
BRF12	Band Reject Filter (2400MHz)	M-City	BRF2440-01	RF0012-02	2018/3/27	2019/3/31
CH01	Conical Horn Antenna (12-18GHz)	ETS-Lindgren	3163-05	00126641	2017/3/29	2019/3/31
CL11	RF Cable for RE	RFT	-	-	2018/3/26	2019/3/31
CL30	RF Cable 5 m	SUHNER	SUCOFLEX104PE	MY3599	2018/1/29	2019/1/31
CL31	RF Cable 1 m	Junkosha	MWX221	1303S118	2018/1/29	2019/1/31
CL38	RF Cable 2 m	Junkosha	MWX221	1603S626	2018/1/29	2019/1/31
CL40	RF Cable 1.0m (40GHz)	SUHNER	SUCOFLEX102	35102	2018/7/15	2019/7/31
CL41	RF Cable 1.0m (40GHz)	SUHNER	SUCOFLEX102	35107	2018/7/15	2019/7/31
DC03	Directional Coupler	Merrimac	CWM-10R-10.2G	83263 95-49	2018/7/13	2019/7/31
DH06	DRG Horn Antenna	A.H. Systems	SAS-571	1339	2018/6/19	2020/6/30
HPF4	High Pass Filter (3000MHz)	Tokyo KEIKI	TF23LCCZGA	9001	2018/12/4	2019/12/31
LP06	Loop Antenna	ETS-Lindgren	6502	00164299	2018/4/3	2019/4/30
PR12	Pre. Amplifier (1-26G)	Agilent Technologies	8449B	3008A02513	2018/1/29	2019/1/31
PR21	Pre. Amplifier	Anritsu	MH648A	6200467119	2018/12/4	2019/12/31
SH01	Standard Horn Antenna (18-26G)	A.H. Systems	SAS-572	208	2018/7/12	2020/7/31
TR06	Test Receiver (F/W : 4.73 SP4)	Rohde & Schwarz	ESU26	100002	2018/10/11	2019/10/31
SA09R	PSA Spectrum Analyzer 3Hz-50GHz	Agilent Technologies	E4448A	MY48250086	2018/2/14	2019/2/28

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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