RADIO TEST REPORT

Test Report No. : 12950066S-A

Applicant	:	**CASIO COMPUTER CO., LTD.**
Type of Equipment	:	**Watch**
Model No.	:	**GBD-100**
FCC ID	:	**BBQS0KW**
Test regulation	:	**FCC Part 15 Subpart C: 2019**
Test Result	:	**Complied (Refer to SECTION 3.2)**

1. This test report shall not be reproduced in full or partial, without the written approval of UL Japan, Inc.
2. The results in this report apply only to the sample tested.
3. This sample tested is in compliance with the limits of the above regulation.
4. The test results in this test report are traceable to the national or international standards.
5. This test report must not be used by the customer to claim product certification, approval, or endorsement by the A2LA accreditation body.
6. This test report covers Radio technical requirements.
   It does not cover administrative issues such as Manual or non-Radio test related Requirements. (if applicable)
7. The all test items in this test report are conducted by UL Japan, Inc. Shonan EMC Lab.
8. The opinions and the interpretations to the result of the description in this report are outside scopes where UL Japan has been accredited.
9. The information provided from the customer for this report is identified in SECTION 1.

Date of test: October 2 to 21, 2019

Representative test engineer:
Toshinori Yamada
Engineer
Consumer Technology Division

Approved by:
Akio Hayashi
Leader
Consumer Technology Division

CERTIFICATE 1266.03

☐ The testing in which "Non-accreditation" is displayed is outside the accreditation scopes in UL Japan.
☒ There is no testing item of "Non-accreditation".

UL Japan, Inc.
Shonan EMC Lab.
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REVISION HISTORY

Original Test Report No.: 12950066S-A

Revision	Test report No.	Date	Page revised	Contents
- (Original)	12950066S-A	December 19, 2019	-	-

Reference: Abbreviations (Including words undescribed in this report)

A2LA	The American Association for Laboratory Accreditation
AC	Alternating Current
AFH	Adaptive Frequency Hopping
AM	Amplitude Modulation
Amp, AMP	Amplifier
ANSI	American National Standards Institute
Ant, ANT	Antenna
AP	Access Point
ASK	Amplitude Shift Keying
Atten., ATT	Attenuator
AV	Average
BPSK	Binary Phase-Shift Keying
BR	Bluetooth Basic Rate
BT	Bluetooth
BT LE	Bluetooth Low Energy
BW	BandWidth
Cal Int	Calibration Interval
CCK	Complementary Code Keying
Ch., CH	Channel
CISPR	Comite International Special des Perturbations Radioelectriques
CW	Continuous Wave
DBPSK	Differential BPSK
DC	Direct Current
D-factor	Distance factor
DFS	Dynamic Frequency Selection
DQPSK	Differential QPSK
DSSS	Direct Sequence Spread Spectrum
EDR	Enhanced Data Rate
EIRP, e.i.r.p.	Equivalent Isotropically Radiated Power
EMC	ElectroMagnetic Compatibility
EMI	ElectroMagnetic Interference
EN	European Norm
ERP, e.r.p.	Effective Radiated Power
EU	European Union
EUT	Equipment Under Test
Fac.	Factor
FCC	Federal Communications Commission
FHSS	Frequency Hopping Spread Spectrum
FM	Frequency Modulation
Freq.	Frequency
FSK	Frequency Shift Keying
GFSK	Gaussian Frequency-Shift Keying
GNSS	Global Navigation Satellite System
GPS	Global Positioning System
Hori.	Horizontal
ICES	Interference-Causing Equipment Standard
IEC	International Electrotechnical Commission
IEEE	Institute of Electrical and Electronics Engineers
IF	Intermediate Frequency
ILAC	International Laboratory Accreditation Conference
ISED	Innovation, Science and Economic Development Canada
ISO	International Organization for Standardization
JAB	Japan Accreditation Board
LAN	Local Area Network
LIMS	Laboratory Information Management System
MCS	Modulation and Coding Scheme
MRA	Mutual Recognition Arrangement
N/A	Not Applicable
NIST	National Institute of Standards and Technology
NS	No signal detect.
NSA	Normalized Site Attenuation
NVLAP	National Voluntary Laboratory Accreditation Program
OBW	Occupied Band Width
OFDM	Orthogonal Frequency Division Multiplexing
P/M	Power meter
PCB	Printed Circuit Board
PER	Packet Error Rate
PHY	Physical Layer
PK	Peak
PN	Pseudo random Noise
PRBS	Pseudo-Random Bit Sequence
PSD	Power Spectral Density
QAM	Quadrature Amplitude Modulation
QP	Quasi-Peak
QPSK	Quadri-Phase Shift Keying
RBW	Resolution Band Width
RDS	Radio Data System
RE	Radio Equipment
RF	Radio Frequency
RMS	Root Mean Square
RSS	Radio Standards Specifications
Rx	Receiving
SA, S/A	Spectrum Analyzer
SG	Signal Generator
SVSWR	Site-Voltage Standing Wave Ratio
TR	Test Receiver
Tx	Transmitting
VBW	Video BandWidth
Vert.	Vertical
WLAN	Wireless LAN

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SECTION 1: Customer information

Company Name	:	CASIO COMPUTER CO., LTD.
Address	:	2-1, Sakaecho 3 chome, Hamura-shi, Tokyo 205-8555 Japan
Telephone Number	:	+81-42-579-7282
Facsimile Number	:	+81-42-579-7702
Contact Person	:	Hiroaki Suzuki

The information provided from the customer is as follows;
- Applicant, Type of Equipment, Model No., FCC ID on the cover and other relevant pages
- Operating/Test Mode(s) (Mode(s)) on all the relevant pages
- SECTION 1: Customer information
- SECTION 2: Equipment under test (E.U.T.)
- SECTION 4: Operation of E.U.T. during testing

* The laboratory is exempted from liability of any test results affected from the above information in SECTION 2 and 4.

SECTION 2: Equipment under test (E.U.T.)

2.1 Identification of E.U.T.

Type of Equipment	:	Watch
Model No.	:	GBD-100
Serial No.	:	Refer to SECTION 4.2
Rating	:	Typical: DC 3.0 V, Min.: DC 1.9 V, Max.: DC 3.3 V CW3481 (Module) : Typical: DC 3.0 V, Min.: DC 1.9 V, Max.: DC 3.3 V
Receipt Date of Sample (Information from test lab.)	:	September 26, 2019
Country of Mass-production	:	China, Thailand, Japan
Condition of EUT	:	Production prototype (Not for Sale: This sample is equivalent to mass-produced items.)
Modification of EUT	:	No Modification by the test lab.

2.2 Product Description

Model: GBD-100 (referred to as the EUT in this report) is a Watch.
* GBD-100 has alternative name as R023.

Radio Specification

Equipment Type	:	Transceiver
Frequency of Operation	:	2402 MHz – 2480 MHz
Type of Modulation	:	GFSK
Channel spacing	:	2 MHz
Antenna Type	:	Chip (Mono Pole)
Antenna Gain	:	2.5 dBi
Clock frequency (Maximum)	:	32 MHz

SECTION 3: Test specification, procedures & results

3.1 Test Specification

Test Specification : FCC Part 15 Subpart C
FCC Part 15 final revised on July 19, 2019 and effective August 19, 2019 except 15.258

Title : FCC 47 CFR Part 15 Radio Frequency Device Subpart C Intentional Radiators
Section 15.207 Conducted limits
Section 15.247 Operation within the bands 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz

* Also the EUT complies with FCC Part 15 Subpart B.

3.2 Procedures and results

Item	Test Procedure	Specification	Worst margin	Results	Remarks
Conducted Emission	**FCC:** ANSI C63.10-2013 6. Standard test methods	**FCC:** Section 15.207	-	N/A	-
	ISED: RSS-Gen 8.8	**ISED:** RSS-Gen 8.8			
6dB Bandwidth	**FCC:** KDB 558074 D01 15.247 Meas Guidance v05r02	**FCC:** Section 15.247(a)(2)	See data.	Complied a)	Conducted
	ISED: -	**ISED:** RSS-247 5.2(a)			
Maximum Peak Output Power	**FCC:** KDB 558074 D01 15.247 Meas Guidance v05r02	**FCC:** Section 15.247(b)(3)		Complied b)	Conducted
	ISED: RSS-Gen 6.12	**ISED:** RSS-247 5.4(d)			
Power Density	**FCC:** KDB 558074 D01 15.247 Meas Guidance v05r02	**FCC:** Section 15.247(e)		Complied c)	Conducted
	ISED: -	**ISED:** RSS-247 5.2(b)			
Spurious Emission Restricted Band Edges	**FCC:** KDB 558074 D01 15.247 Meas Guidance v05r02	**FCC:** Section15.247(d)	5.2 dB 9920.00 MHz, AV, Vertical, Mode: Tx 2480 MHz	Complied# d), e)	Conducted (below 30 MHz)/ Radiated (above 30 MHz) *1)
	ISED: RSS-Gen 6.13	**ISED:** RSS-247 5.5 RSS-Gen 8.9 RSS-Gen 8.10			

Note: UL Japan, Inc.'s EMI Work Procedures No. 13-EM-W0420 and 13-EM-W0422.
*1) Radiated test was selected over 30 MHz based on section 15.247(d) and KDB 558074 D01 15.247 Meas Guidance v05r02 8.5 and 8.6.

a) Refer to APPENDIX 1 (data of 6 dB Bandwidth and 99 % Occupied Bandwidth)
b) Refer to APPENDIX 1 (data of Maximum Peak Output Power)
c) Refer to APPENDIX 1 (data of Power Density)
d) Refer to APPENDIX 1 (data of Conducted Spurious Emission)
e) Refer to APPENDIX 1 (data of Radiated Spurious Emission)

Symbols:
Complied The data of this test item has enough margin, more than the measurement uncertainty.
Complied# The data of this test item meets the limits unless the measurement uncertainty is taken into consideration.

* In case any questions arise about test procedure, ANSI C63.10: 2013 is also referred.

FCC Part 15.31 (e)
The EUT provides stable voltage constantly to the wireless transmitter regardless of input voltage.
Instead of a new battery, DC power supply was used for the test. That does not affect the test result, therefore the EUT complies with the requirement.

FCC Part 15.203 Antenna requirement
It is impossible for end users to replace the antenna, because the antenna is mounted inside of the EUT. Therefore, the equipment complies with the requirement.

3.3 Addition to standard

Item	Test Procedure	Specification	Worst margin	Results	Remarks
99% Occupied Bandwidth	RSS-Gen 6.7	**ISED:** -	N/A	- a)	Conducted
a) Refer to APPENDIX 1 (data of 6 dB Bandwidth and 99 % Occupied Bandwidth)					

Other than above, no addition, exclusion nor deviation has been made from the standard.

3.4 Uncertainty

There is no applicable rule of uncertainty in this applied standard. Therefore, the results are derived depending on whether or not laboratory uncertainty is applied.

The following uncertainties have been calculated to provide a confidence level of 95 % using a coverage factor *k*=2.

Shonan EMC Lab.

Item	Frequency range	Uncertainty (+/-)			
		No. 1 SAC / SR	No. 2 SAC / SR	No. 3 SAC / SR	No. 4,5,6,8 SR
Conducted emission (AC Mains) LISN	150 kHz-30 MHz	2.6 dB	2.6 dB	2.5 dB	2.6 dB
Radiated emission (Measurement distance: 3 m)	9 kHz-30 MHz	3.0 dB	3.0 dB	3.0 dB	-
	30 MHz-200 MHz	4.6 dB	4.6 dB	4.6 dB	-
	200 MHz-1 GHz	6.0 dB	6.0 dB	6.0 dB	-
	1 GHz-6 GHz	4.9 dB	4.9 dB	4.9 dB	-
	6 GHz-18 GHz	5.5 dB	5.5 dB	5.5 dB	-
	18 GHz-40 GHz	5.4 dB	5.4 dB	5.4 dB	-
Radiated emission (Measurement distance: 1 m)	1 GHz-18 GHz	5.8 dB	5.8 dB	5.8 dB	-
	18 GHz-40 GHz	5.7 dB	5.7 dB	5.7 dB	-

SAC=Semi-Anechoic Chamber

SR= Shielded Room is applied besides radiated emission

Antenna terminal test	Uncertainty (+/-)
Power Measurement above 1 GHz (Average Detector)_SPM-06	0.98 dB
Power Measurement above 1 GHz (Peak Detector)_SPM-06	1.75 dB
Power Measurement above 1 GHz (Average Detector)_SPM-07	0.89 dB
Power Measurement above 1 GHz (Peak Detector)_SPM-07	1.12 dB
Power Measurement above 1 GHz (Average Detector)_SPM-13	1.06 dB
Power Measurement above 1 GHz (Peak Detector)_SPM-13	1.24 dB
Spurious emission (Conducted) below 1GHz	0.9 dB
Spurious emission (Conducted) 1 GHz-3 GHz	0.9 dB
Spurious emission (Conducted) 3 GHz-18 GHz	2.9 dB
Spurious emission (Conducted) 18 GHz-26.5 GHz	2.6 dB
Spurious emission (Conducted) 26.5 GHz-40 GHz	2.0 dB
Bandwidth Measurement	0.07 %
Duty cycle and Time Measurement	0.262 %
Temperature	0.95 deg.C.
Voltage	0.83 %

3.5 Test Location

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1-22-3, Megumigaoka, Hiratsuka-shi, Kanagawa-ken 259-1220 JAPAN
Telephone: +81 463 50 6400, Facsimile: +81 463 50 6401
A2LA Certificate Number: 1266.03 (FCC Test Firm Registration Number: 626366, ISED Lab Company Number: 2973D)

Test site	Width x Depth x Height (m)	Size of reference ground plane (m) / horizontal conducting plane	Maximum measurement distance
No.1 Semi-anechoic chamber	20.6 x 11.3 x 7.65	20.6 x 11.3	10 m
No.2 Semi-anechoic chamber	20.6 x 11.3 x 7.65	20.6 x 11.3	10 m
No.3 Semi-anechoic chamber	12.7 x 7.7 x 5.35	12.7 x 7.7	5 m
No.4 Semi-anechoic chamber	8.1 x 5.1 x 3.55	8.1 x 5.1	-
No.1 Shielded room	6.8 x 4.1 x 2.7	6.8 x 4.1	-
No.2 Shielded room	6.8 x 4.1 x 2.7	6.8 x 4.1	-
No.3 Shielded room	6.3 x 4.7 x 2.7	6.3 x 4.7	-
No.4 Shielded room	4.4 x 4.7 x 2.7	4.4 x 4.7	-
No.5 Shielded room	7.8 x 6.4 x 2.7	7.8 x 6.4	-
No.6 Shielded room	7.8 x 6.4 x 2.7	7.8 x 6.4	-
No.8 shielded room	3.45 x 5.5 x 2.4	3.45 x 5.5	-
No.1 Measurement room	2.55 x 4.1 x 2.5	-	-

3.6 Test data, Test instruments, and Test set up

Refer to APPENDIX.

SECTION 4: Operation of E.U.T. during testing

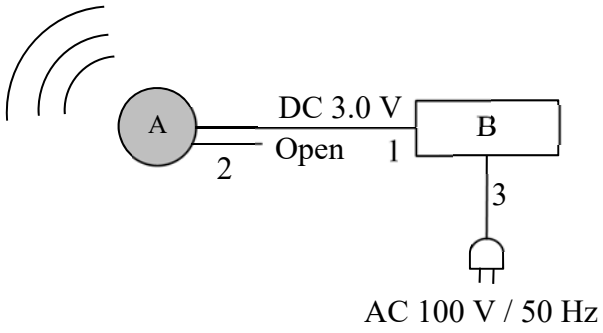
4.1 Operating Mode(s)

Mode	Frequency	Remarks*
Transmitting, Bluetooth Low Energy	2402 MHz, 2440 MHz, 2480 MHz	PRBS9

*Power of the EUT was set by the software as follows;
- Power Setting: Fixed
- Software: BLE RF Test Version 9.9

*This setting of software is the worst case.
Any conditions under the normal use do not exceed the condition of setting.
In addition, end users cannot change the settings of the output power of the product.

4.2 Configuration and peripherals



* Cabling and setup(s) were taken into consideration and test data was taken under worse case conditions.

Description of EUT and Support equipment

No.	Item	Model number	Serial number	Manufacturer	Remarks
A	Watch	GBD-100	59 *1) 51 *2)	CASIO COMPUTER CO., LTD.	EUT
B	Power Supply (DC)	PAN35-10A	DE001677	Kikusui	-

*1) Used for Antenna Terminal conducted test
*2) Used for Radiated Emission test

List of cables used

No.	Name	Length (m)	Shield		Remarks
			Cable	Connector	
1	DC Cable	0.1 + 2.2	Unshielded	Unshielded	*3)
2	Signal Cable	0.1	Unshielded	Unshielded	*4)
3	AC Cable	1.8	Unshielded	Unshielded	-

*3) Cable for test operation
*4) Cable for system reset during the development, not used for the product

SECTION 5: Radiated Spurious Emission

Test Procedure

It was measured based on "8.5 and 8.6 of KDB 558074 D01 15.247 Meas Guidance v05r02".

[For below 1 GHz]
EUT was placed on a platform of nominal size, 1.0 m by 1.5 m, raised 0.8 m above the conducting ground plane.
The table is made of expanded polystyrol and expanded polypropylene and the table top is covered with polycarbonate. That has very low permittivity.
The Radiated Electric Field Strength has been measured in a Semi Anechoic Chamber with a ground plane.

[For above 1 GHz]
EUT was placed on a urethane platform of nominal size, 0.5 m by 0.5 m, raised 1.5 m above the conducting ground plane. The Radiated Electric Field Strength has been measured in a Semi Anechoic Chamber with absorbent materials lined on a ground plane.

The height of the measuring antenna varied between 1 m and 4 m and EUT was rotated a full revolution in order to obtain the maximum value of the electric field strength.
Test antenna was aimed at the EUT for receiving the maximum signal and always kept within the illumination area of the 3 dB beamwidth of the antenna.
The measurements were performed for both vertical and horizontal antenna polarization with the Test Receiver, or the Spectrum Analyzer.
The measurements were made with the following detector function of the test receiver and the Spectrum analyzer (in linear mode).
The test was made with the detector (RBW/VBW) in the following table.
When using Spectrum analyzer, the test was made with adjusting span to zero by using peak hold.

Test Antennas are used as below;

Frequency	30 MHz to 200 MHz	200 MHz to 1 GHz	Above 1 GHz
Antenna Type	Biconical	Logperiodic	Horn

In any 100 kHz bandwidth outside the restricted band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator confirmed 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on a radiated measurement.

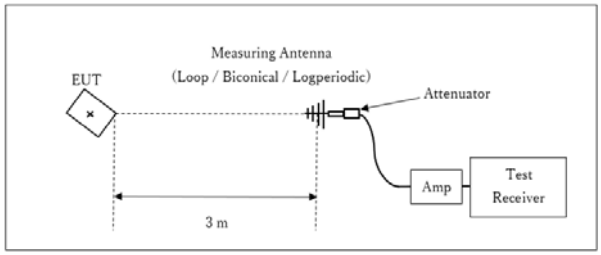
20 dBc was applied to the frequency over the limit of FCC 15.209 / Table 4 of RSS-Gen 8.9(ISED) and outside the restricted band of FCC15.205 / Table 6 of RSS-Gen 8.10 (ISED).

Frequency	Below 1 GHz	Above 1 GHz		20 dBc
Instrument used	Test Receiver	Spectrum Analyzer		Spectrum Analyzer
Detector	QP	PK	AV *1)	PK
IF Bandwidth	BW 120 kHz	RBW: 1 MHz VBW: 3 MHz	11.12.2.5.2 RBW: 1 MHz VBW: 3 MHz Detector: Power Averaging (Linear voltage) Trace: 100 traces Duty factor was added to the results.	RBW: 100 kHz VBW: 300 kHz

*1) Average Power Measurement was performed based on ANSI C63.10-2013.

Figure 1: Test Setup

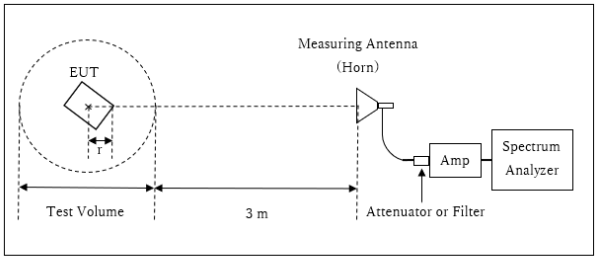
Below 1 GHz



× : Center of turn table

Test Distance: 3 m

1 GHz - 13 GHz

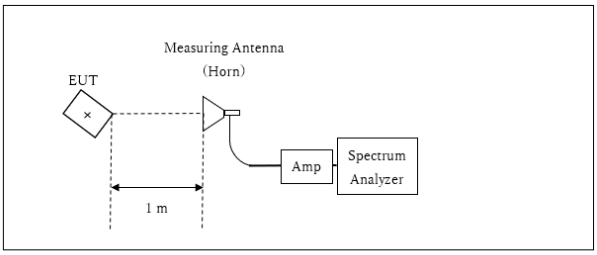


r : Radius of an outer periphery of EUT
× : Center of turn table

Distance Factor: 20 x log (3.95 m / 3.0 m) = 2.39 dB
* Test Distance: (3 + Test Volume /2) - r = 3.95 m

Test Volume : 2.0 m
(Test Volume has been calibrated based on CISPR 16-1-4.)
r = 0.05 m

13 GHz – 26.5 GHz



× : Center of turn table

Distance Factor: 20 x log (1.0 m / 3.0 m) = -9.54 dB
*Test Distance: 1 m

The carrier level and noise levels were confirmed at each position of X, Y and Z axes of EUT to see the position of maximum noise, and the test was made at the position that has the maximum noise.

Antenna polarization	Carrier	Spurious (30 MHz to 1 GHz)	Spurious (1 GHz -2.8 GHz)	Spurious (2.8 GHz -26.5 GHz)
Horizontal	X	X	X	X
Vertical	Y	X	Y	X

The test results and limit are rounded off to one decimal place, so some differences might be observed.

Measurement range : 30 MHz - 26.5 GHz
Test data : APPENDIX
Test result : Pass

SECTION 6: Antenna Terminal Conducted Tests

Test Procedure

The tests were made with below setting connected to the antenna port.

Test	Span	RBW	VBW	Sweep time	Detector	Trace	Instrument used
6dB Bandwidth	10 MHz	100 kHz	300 kHz	Auto	Peak	Max Hold	Spectrum Analyzer
99% Occupied Bandwidth *1)	Enough width to display emission skirts	1 to 5 % of OBW	Three times of RBW	Auto	Peak	Max Hold	Spectrum Analyzer
Maximum Peak Output Power	-	-	-	Auto	Peak/ Average *2)	-	Power Meter (Sensor: 160 MHz BW)
Peak Power Density	1.5 times the 6dB Bandwidth	3 kHz	9.1 kHz	Auto	Peak	Max Hold	Spectrum Analyzer *3)
Conducted Spurious Emission *4)	9kHz to 150kHz	200 Hz	620 Hz	Auto	Peak	Max Hold	Spectrum Analyzer
	150kHz to 30MHz	10 kHz	30 kHz				

*1) Peak hold was applied as Worst-case measurement.
*2) Reference data
*3) Section 11.10.2 Method PKPSD (peak PSD) of "ANSI C63.10-2013".
*4) In the frequency range below 30MHz, RBW was narrowed to separate the noise contents.
Then, wide-band noise near the limit was checked separately, however the noise was low enough as shown in the chart.
(9 kHz - 150 kHz: RBW = 200 Hz, 150 kHz - 30 MHz: RBW = 10 kHz)

The test results and limit are rounded off to two decimals place, so some differences might be observed.
The equipment and cables were not used for factor 0 dB of the data sheets.

Test data : APPENDIX
Test result : Pass

APPENDIX 1: Test data

6 dB Bandwidth and 99 % Occupied Bandwidth

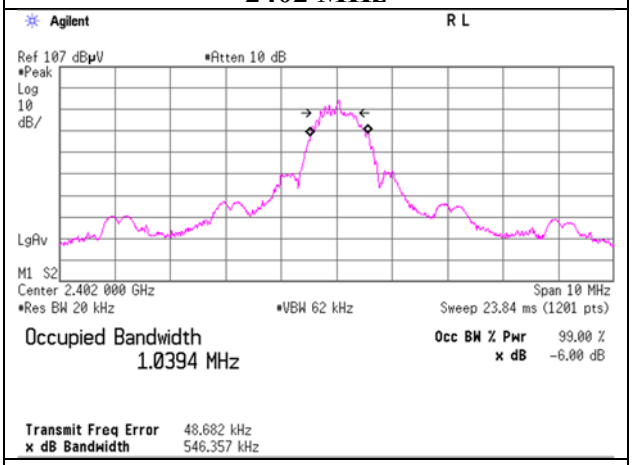
Report No.	12950066S-A
Test place	Shonan EMC Lab. No.5 Shielded Room
Date	October 20, 2019
Temperature / Humidity	24 deg. C / 56 % RH
Engineer	Toshinori Yamada
Mode	Tx BT LE

Mode	Frequency [MHz]	99% Occupied Bandwidth [kHz]	6dB Bandwidth [MHz]	Limit for 6dB Bandwidth [MHz]
BT LE	2402	1039.4	0.713	> 0.5000
	2440	1024.7	0.700	> 0.5000
	2480	1026.6	0.712	> 0.5000

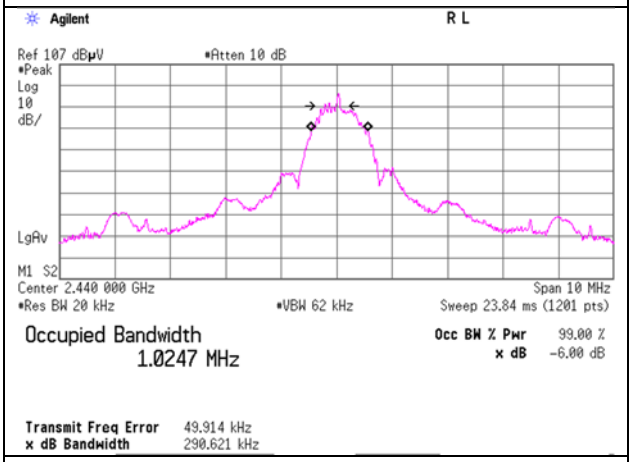
99%Occupied Bandwidth

BT LE

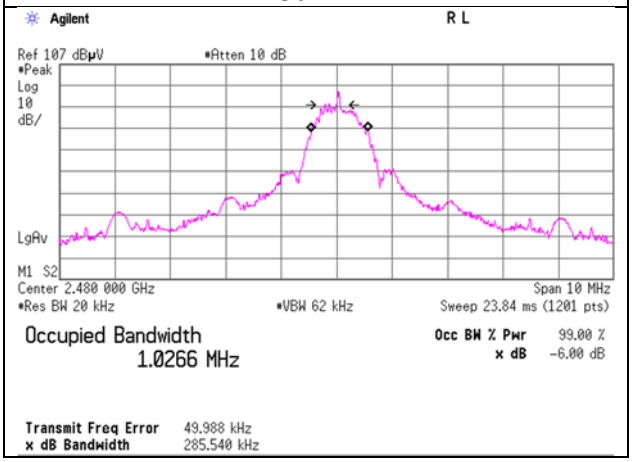
2402 MHz



2440 MHz



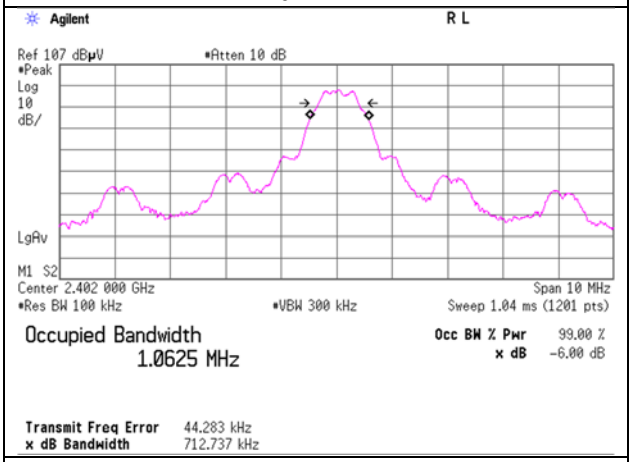
2480 MHz



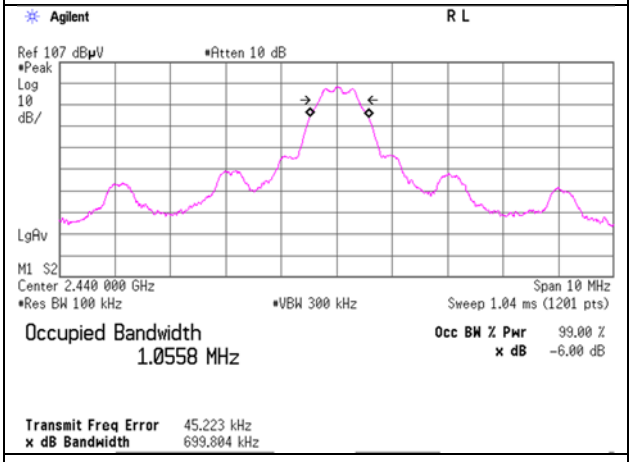
6dB Bandwidth

BT LE

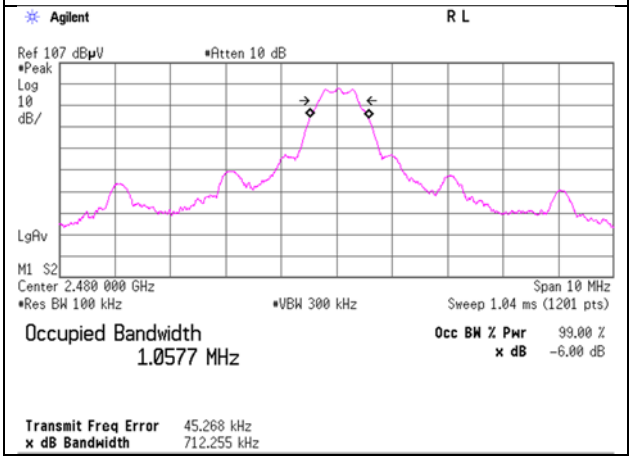
2402 MHz



2440 MHz



2480 MHz



Maximum Peak Output Power

Report No.	12950066S-A
Test place	Shonan EMC Lab. No.5 Shielded Room
Date	October 20, 2019
Temperature / Humidity	24 deg. C / 56 % RH
Engineer	Toshinori Yamada
Mode	Tx BT LE

				Conducted Power					e.i.r.p. for RSS-247					
Freq.	Reading	Cable Loss	Atten. Loss	Result		Limit		Margin	Antenna Gain	Result		Limit		Margin
[MHz]	[dBm]	[dB]	[dB]	[dBm]	[mW]	[dBm]	[mW]	[dB]	[dBi]	[dBm]	[mW]	[dBm]	[mW]	[dB]
2402	-11.32	1.23	9.69	-0.40	0.91	30.00	1000	30.40	2.50	2.10	1.62	36.02	4000	33.92
2440	-11.39	1.24	9.69	-0.46	0.90	30.00	1000	30.46	2.50	2.04	1.60	36.02	4000	33.98
2480	-11.37	1.25	9.70	-0.42	0.91	30.00	1000	30.42	2.50	2.08	1.61	36.02	4000	33.94

Sample Calculation:
Result = Reading + Cable Loss (including the cable(s) customer supplied) + Attenuator Loss
e.i.r.p. Result = Conducted Power Result + Antenna Gain
*The equipment and cables were not used for factor 0 dB of the data sheets.

Average Output Power
(Reference data for RF Exposure)

Report No.	12950066S-A
Test place	Shonan EMC Lab. No.5 Shielded Room
Date	October 20, 2019
Temperature / Humidity	24 deg. C / 56 % RH
Engineer	Toshinori Yamada
Mode	Tx BT LE

BT LE

Freq.	Reading	Cable Loss	Atten. Loss	Result (Time average)		Duty factor	Result (Burst power average)	
[MHz]	[dBm]	[dB]	[dB]	[dBm]	[mW]	[dB]	[dBm]	[mW]
2402	-13.68	1.23	9.69	-2.76	0.53	1.49	-1.27	0.75
2440	-13.72	1.24	9.69	-2.79	0.53	1.49	-1.30	0.74
2480	-13.71	1.25	9.70	-2.76	0.53	1.49	-1.27	0.75

Sample Calculation:
Result (Time average) = Reading + Cable Loss (including the cable(s) customer supplied) + Attenuator Loss
Result (Burst power average) = Time average + Duty factor

*The equipment and cables were not used for factor 0 dB of the data sheets.

Burst rate confirmation

Report No.	12950066S-A
Test place	Shonan EMC Lab. No.5 Shielded Room
Date	October 20, 2019
Temperature / Humidity	24 deg. C / 56 % RH
Engineer	Toshinori Yamada
Mode	Tx BT LE

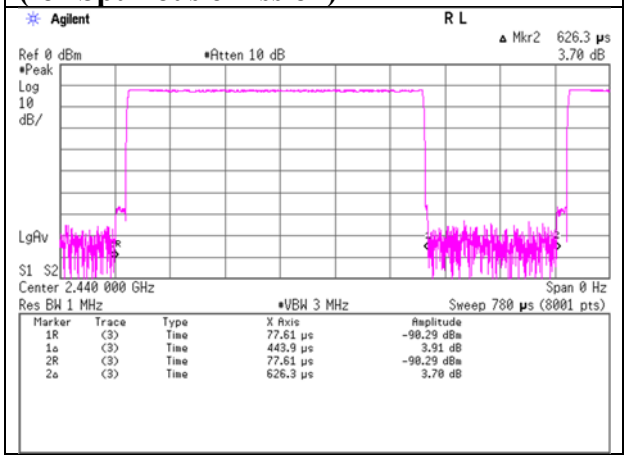
BT LE

Tx on / (Tx on + Tx off) =	**0.709**
Tx on / (Tx on + Tx off) * 100 =	**70.9 %**
Duty factor = 10 * log (0.626 / 0.444) =	**1.49 dB**

(for Average power)

Tx on / (Tx on + Tx off) =	**0.709**
Tx on / (Tx on + Tx off) * 100 =	**70.9 %**
Duty factor = 20 * log (0.626 / 0.444) =	**2.98 dB**

(for Spurious emission)



* Since the burst rate is not different between the channels, the data has been obtained on the representative channel.

Radiated Spurious Emission

Report No.	12950066S-A	
Test place	Shonan EMC Lab.	
Semi Anechoic Chamber	No.3	No.3
Date	October 2, 2019	October 3, 2019
Temperature / Humidity	23 deg. C / 58 % RH	24 deg. C / 60 % RH
Engineer	Hiromasa Sato	Hiromasa Sato
	(30 MHz – 1 GHz)	(1 GHz – 26.5 GHz)
Mode	Tx BT LE 2402 MHz	

(* PK: Peak, AV: Average, QP: Quasi-Peak)

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg]	Remark
Hori.	57.252	QP	22.22	8.76	6.67	32.18	0.00	5.47	40.00	34.5	196	358	-
Hori.	195.092	QP	22.16	16.33	7.89	32.07	0.00	14.31	43.50	29.1	160	131	-
Hori.	888.165	QP	21.47	21.60	10.98	31.16	0.00	22.89	46.00	23.1	143	301	-
Hori.	914.498	QP	21.58	21.61	11.06	30.96	0.00	23.29	46.00	22.7	100	152	-
Hori.	2390.000	PK	47.88	28.33	13.57	41.59	2.39	50.58	73.90	23.3	158	150	-
Hori.	4804.000	PK	50.25	31.62	5.67	42.88	2.39	47.05	73.90	26.8	246	328	-
Hori.	7206.000	PK	48.69	37.23	7.14	42.92	2.39	52.53	73.90	21.3	217	243	-
Hori.	9608.000	PK	48.40	38.84	8.08	43.17	2.39	54.54	73.90	19.3	165	194	-
Vert.	32.324	QP	21.72	17.53	6.52	32.19	0.00	13.58	40.00	26.4	111	173	-
Vert.	814.818	QP	21.65	20.42	10.76	31.55	0.00	21.28	46.00	24.7	100	18	-
Vert.	959.301	QP	21.17	21.66	11.20	30.57	0.00	23.46	46.00	22.5	100	4	-
Vert.	2390.000	PK	48.47	28.33	13.57	41.59	2.39	51.17	73.90	22.7	231	203	-
Vert.	4804.000	PK	50.55	31.62	5.67	42.88	2.39	47.35	73.90	26.5	193	184	-
Vert.	7206.000	PK	49.44	37.23	7.14	42.92	2.39	53.28	73.90	20.6	144	262	-
Vert.	9608.000	PK	48.73	38.84	8.08	43.17	2.39	54.87	73.90	**19.0**	184	139	-

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amprifier) + Distance factor
Distance factor : 1 GHz - 13 GHz : 20log (3.95 m / 3.0 m) = 2.39 dB
13 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

Average measurement value with duty factor

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2390.000	AV	38.35	28.33	13.57	41.59	2.98	2.39	44.03	53.90	9.8	*1)
Hori.	4804.000	AV	40.23	31.62	5.67	42.88	2.98	2.39	40.01	53.90	13.8	-
Hori.	7206.000	AV	39.18	37.23	7.14	42.92	2.98	2.39	46.00	53.90	7.9	-
Hori.	9608.000	AV	38.98	38.84	8.08	43.17	2.98	2.39	48.10	53.90	5.8	-
Vert.	2390.000	AV	38.24	28.33	13.57	41.59	2.98	2.39	43.92	53.90	9.9	*1)
Vert.	4804.000	AV	40.74	31.62	5.67	42.88	2.98	2.39	40.52	53.90	13.3	-
Vert.	7206.000	AV	39.28	37.23	7.14	42.92	2.98	2.39	46.10	53.90	7.8	-
Vert.	9608.000	AV	39.12	38.84	8.08	43.17	2.98	2.39	48.24	53.90	**5.6**	-

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amprifier) + Duty factor + Distance factor
Distance factor : 1 GHz - 13 GHz : 20log (3.95 m / 3.0 m) = 2.39 dB
13 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB
Duty factor refer to "Duty factor Calculation chart" sheet.
*1) Not out of band emission (Leakage Power)

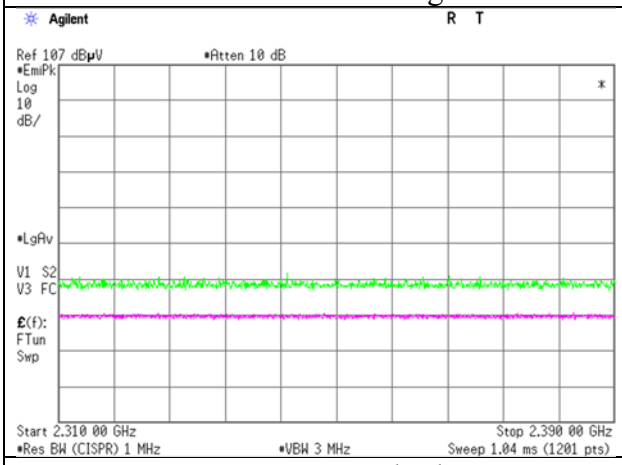
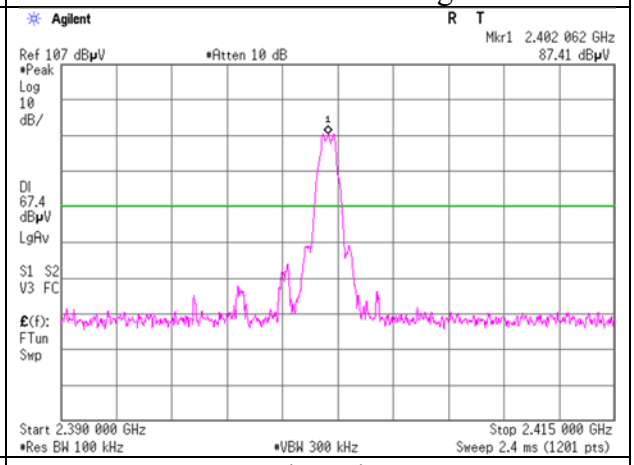
20 dBc Data Sheet **(RBW 100 kHz, VBW 300 kHz)**

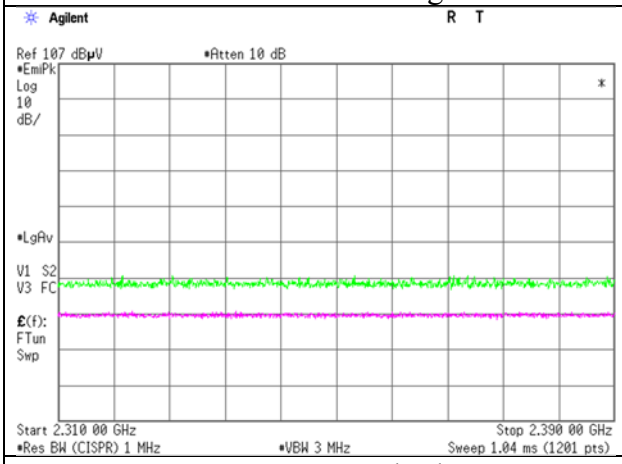
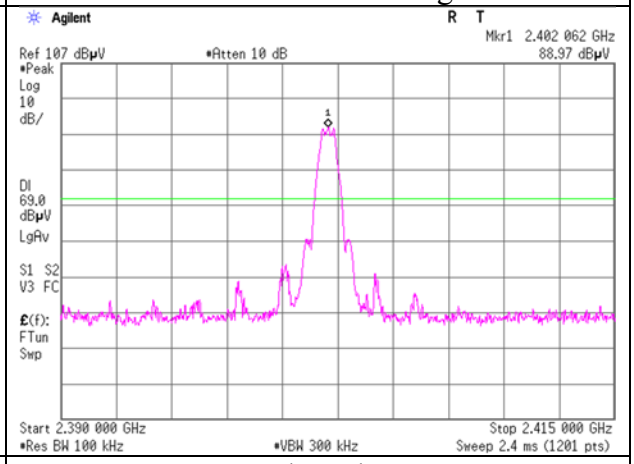
Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2402.000	PK	87.98	28.31	13.58	41.60	2.39	90.66	-	-	Carrier
Hori.	2400.000	PK	49.66	28.31	13.57	41.60	2.39	52.33	70.66	18.3	-
Vert.	2402.000	PK	89.13	28.31	13.58	41.60	2.39	91.81	-	-	Carrier
Vert.	2400.000	PK	50.64	28.31	13.57	41.60	2.39	53.31	71.81	18.5	-

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amprifier) + Distance factor
Distance factor : 1 GHz - 13 GHz : 20log (3.95 m / 3.0 m) = 2.39 dB
13 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

Radiated Spurious Emission
(Reference Plot for band-edge)

Report No.	12950066S-A	
Test place	Shonan EMC Lab.	
Semi Anechoic Chamber	No.3	No.3
Date	October 2, 2019	October 3, 2019
Temperature / Humidity	23 deg. C / 58 % RH	24 deg. C / 60 % RH
Engineer	Hiromasa Sato	Hiromasa Sato
	(30 MHz – 1 GHz)	(1 GHz – 26.5 GHz)
Mode	Tx BT LE 2402 MHz	

Horizontal	
Restricted-band band-edge Plot	Authorized-band band-edge Plot
	
Trace Green : Peak Plot Trace Purple : Average Plot	20dBc Plot

Vertical	
Restricted-band band-edge Plot	Authorized-band band-edge Plot
	
Trace Green : Peak Plot Trace Purple : Average Plot	20dBc Plot

* The measurement was conducted for a sufficiently long enough time to detect any possible spurious emissions.
Final result of restricted band edge was shown in tabular data.

Radiated Spurious Emission

Report No.	12950066S-A	
Test place	Shonan EMC Lab.	
Semi Anechoic Chamber	No.3	No.3
Date	October 2, 2019	October 3, 2019
Temperature / Humidity	23 deg. C / 58 % RH	24 deg. C / 60 % RH
Engineer	Hiromasa Sato	Hiromasa Sato
	(30 MHz – 1 GHz)	(1 GHz – 26.5 GHz)
Mode	Tx BT LE 2440 MHz	

(* PK: Peak, AV: Average, QP: Quasi-Peak)

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg]	Remark
Hori.	52.872	QP	22.15	10.08	6.78	32.19	0.00	6.82	40.0	33.1	188	357	-
Hori.	181.369	QP	21.93	15.94	7.87	32.09	0.00	13.65	43.5	29.8	231	200	-
Hori.	808.509	QP	21.73	20.41	10.74	31.58	0.00	21.30	46.0	24.7	166	203	-
Hori.	903.836	QP	21.26	21.53	11.02	31.06	0.00	22.75	46.0	23.2	100	54	-
Hori.	4880.000	PK	50.45	31.71	5.68	42.89	2.39	47.34	73.9	26.5	257	229	-
Hori.	7320.000	PK	49.03	37.38	7.12	43.15	2.39	52.77	73.9	21.1	227	223	-
Hori.	9760.000	PK	48.27	39.33	8.10	43.01	2.39	55.08	73.9	**18.8**	171	138	-
Vert.	32.657	QP	22.33	17.44	6.52	32.19	0.00	14.10	40.0	25.9	113	351	-
Vert.	760.428	QP	21.94	19.88	10.58	31.75	0.00	20.65	46.0	25.3	100	2	-
Vert.	955.587	QP	21.32	21.57	11.19	30.60	0.00	23.48	46.0	22.5	100	15	-
Vert.	4880.000	PK	49.56	31.71	5.68	42.89	2.39	46.45	73.9	27.4	322	267	-
Vert.	7320.000	PK	48.80	37.38	7.12	43.15	2.39	52.54	73.9	21.3	251	216	-
Vert.	9760.000	PK	47.98	39.33	8.10	43.01	2.39	54.79	73.9	19.1	200	157	-

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amprifier) + Distance factor
Distance factor : 1 GHz - 13 GHz : 20log (3.95 m / 3.0 m) = 2.39 dB
13 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

Average measurement value with duty factor

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	4880.000	AV	40.65	31.71	5.68	42.89	2.98	2.39	40.52	53.9	13.3	-
Hori.	7320.000	AV	39.35	37.38	7.12	43.15	2.98	2.39	46.07	53.9	7.8	-
Hori.	9760.000	AV	38.21	39.33	8.10	43.01	2.98	2.39	48.00	53.9	5.9	-
Vert.	4880.000	AV	40.28	31.71	5.68	42.89	2.98	2.39	40.15	53.9	13.7	-
Vert.	7320.000	AV	39.22	37.38	7.12	43.15	2.98	2.39	45.94	53.9	7.9	-
Vert.	9760.000	AV	38.78	39.33	8.10	43.01	2.98	2.39	48.57	53.9	**5.3**	-

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amprifier) + Duty factor + Distance factor
Distance factor : 1 GHz - 13 GHz : 20log (3.95 m / 3.0 m) = 2.39 dB
13 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB
Duty factor refer to "Duty factor Calculation chart" sheet.
*1) Not out of band emission (Leakage Power)

Radiated Spurious Emission

Report No.	12950066S-A	
Test place	Shonan EMC Lab.	
Semi Anechoic Chamber	No.3	No.3
Date	October 2, 2019	October 3, 2019
Temperature / Humidity	23 deg. C / 58 % RH	24 deg. C / 60 % RH
Engineer	Hiromasa Sato	Hiromasa Sato
	(30 MHz – 1 GHz)	(1 GHz – 26.5 GHz)
Mode	Tx BT LE 2480 MHz	

(* PK: Peak, AV: Average, QP: Quasi-Peak)

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg]	Remark
Hori.	54.602	QP	22.81	9.52	6.76	32.19	0.00	6.90	40.0	33.1	289	359	-
Hori.	181.956	QP	22.15	15.94	7.87	32.09	0.00	13.87	43.5	29.6	161	91	-
Hori.	812.712	QP	21.79	20.42	10.75	31.56	0.00	21.40	46.0	24.6	100	251	-
Hori.	903.387	QP	21.42	21.52	11.02	31.06	0.00	22.90	46.0	23.1	100	184	-
Hori.	2483.500	PK	47.88	28.24	13.65	41.62	2.39	50.54	73.9	23.3	144	156	-
Hori.	2484.090	PK	51.17	28.24	13.65	41.62	2.39	53.83	73.9	20.0	144	156	-
Hori.	4960.000	PK	49.07	31.96	5.70	42.91	2.39	46.21	73.9	27.6	262	315	-
Hori.	7440.000	PK	48.88	37.56	7.10	43.38	2.39	52.55	73.9	21.3	184	178	-
Hori.	9920.000	PK	47.95	39.18	8.12	42.84	2.39	54.80	73.9	19.1	201	153	-
Vert.	36.873	QP	22.19	15.89	6.60	32.19	0.00	12.49	40.0	27.5	136	58	-
Vert.	875.654	QP	21.67	21.60	10.95	31.23	0.00	22.99	46.0	23.0	100	129	-
Vert.	956.838	QP	21.26	21.61	11.19	30.59	0.00	23.47	46.0	22.5	100	185	-
Vert.	2483.500	PK	48.11	28.24	13.65	41.62	2.39	50.77	73.9	23.1	272	196	-
Vert.	2484.052	PK	50.51	28.24	13.65	41.62	2.39	53.17	73.9	20.7	272	196	-
Vert.	4960.000	PK	49.13	31.96	5.70	42.91	2.39	46.27	73.9	27.6	212	135	-
Vert.	7440.000	PK	48.33	37.56	7.10	43.38	2.39	52.00	73.9	21.9	231	158	-
Vert.	9920.000	PK	48.16	39.18	8.12	42.84	2.39	55.01	73.9	**18.8**	173	161	-

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amprifier) + Distance factor
Distance factor : 1 GHz - 13 GHz : 20log (3.95 m / 3.0 m) = 2.39 dB
13 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

Average measurement value with duty factor

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2483.500	AV	38.47	28.24	13.65	41.62	2.98	2.39	44.11	53.9	9.7	*1)
Hori.	2484.090	AV	38.35	28.24	13.65	41.62	2.98	2.39	43.99	53.9	9.9	-
Hori.	4960.000	AV	40.33	31.96	5.70	42.91	2.98	2.39	40.45	53.9	13.4	-
Hori.	7440.000	AV	39.68	37.56	7.10	43.38	2.98	2.39	46.33	53.9	7.5	-
Hori.	9920.000	AV	38.70	39.18	8.12	42.84	2.98	2.39	48.53	53.9	5.3	-
Vert.	2483.500	AV	38.66	28.24	13.65	41.62	2.98	2.39	44.30	53.9	9.6	*1)
Vert.	2484.052	AV	38.54	28.24	13.65	41.62	2.98	2.39	44.18	53.9	9.7	-
Vert.	4960.000	AV	40.08	31.96	5.70	42.91	2.98	2.39	40.20	53.9	13.7	-
Vert.	7440.000	AV	39.76	37.56	7.10	43.38	2.98	2.39	46.41	53.9	7.4	-
Vert.	9920.000	AV	38.84	39.18	8.12	42.84	2.98	2.39	48.67	53.9	**5.2**	-

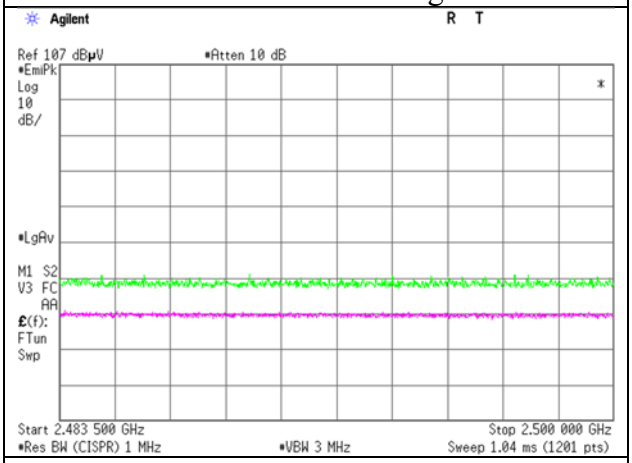
Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amprifier) + Duty factor + Distance factor
Distance factor : 1 GHz - 13 GHz : 20log (3.95 m / 3.0 m) = 2.39 dB
13 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB
Duty factor refer to "Duty factor Calculation chart" sheet.
*1) Not out of band emission (Leakage Power)

Radiated Spurious Emission
(Reference Plot for band-edge)

Report No.	12950066S-A	
Test place	Shonan EMC Lab.	
Semi Anechoic Chamber	No.3	No.3
Date	October 2, 2019	October 3, 2019
Temperature / Humidity	23 deg. C / 58 % RH	24 deg. C / 60 % RH
Engineer	Hiromasa Sato	Hiromasa Sato
	(30 MHz – 1 GHz)	(1 GHz – 26.5 GHz)
Mode	Tx BT LE 2480 MHz	

Horizontal

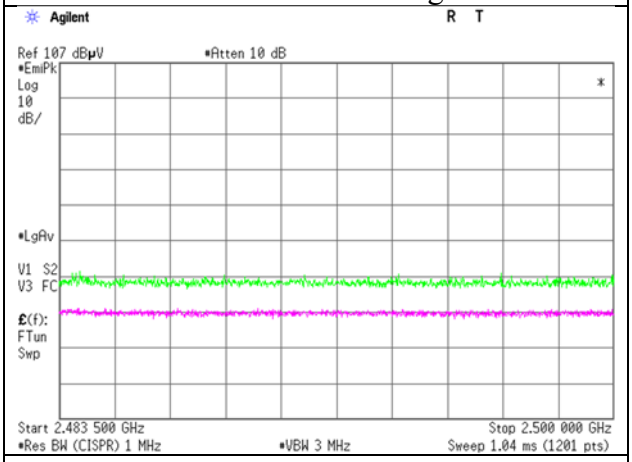
Restricted-band band-edge Plot



Trace Green : Peak Plot
Trace Purple : Average Plot

Vertical

Restricted-band band-edge Plot

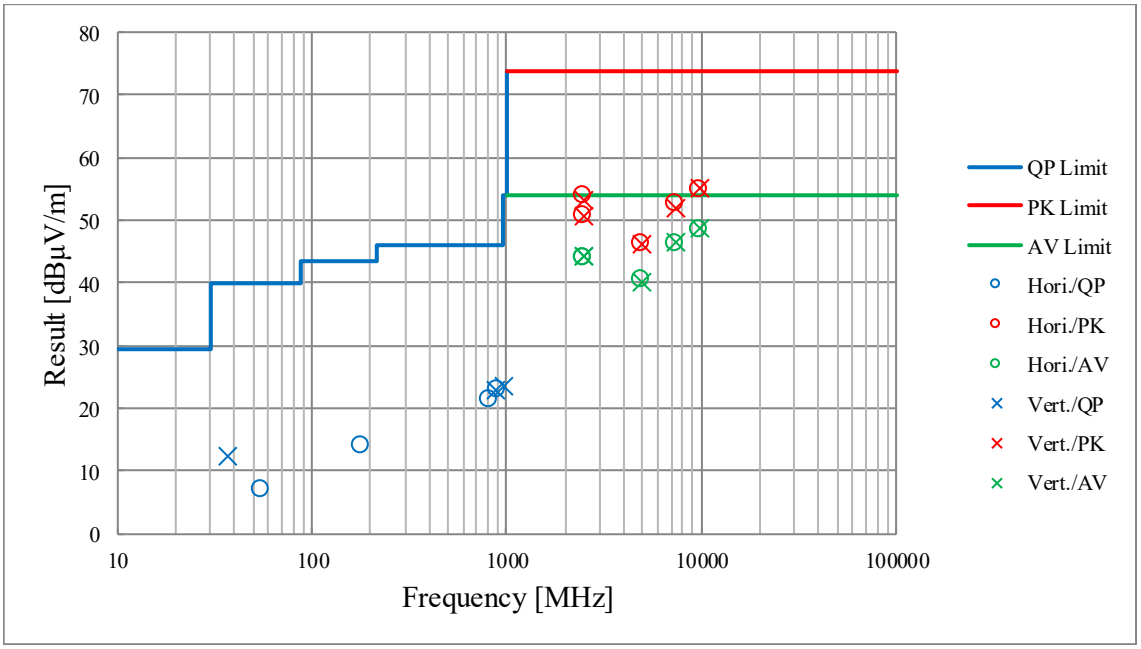


Trace Green : Peak Plot
Trace Purple : Average Plot

* The measurement was conducted for a sufficiently long enough time to detect any possible spurious emissions.
Final result of restricted band edge was shown in tabular data.

Radiated Spurious Emission
(Plot data, Worst case)

Report No.	12950066S-A	
Test place	Shonan EMC Lab.	
Semi Anechoic Chamber	No.3	No.3
Date	October 2, 2019	October 3, 2019
Temperature / Humidity	23 deg. C / 58 % RH	24 deg. C / 60 % RH
Engineer	Hiromasa Sato	Hiromasa Sato
	(30 MHz – 1 GHz)	(1 GHz – 26.5 GHz)
Mode	Tx BT LE 2402 MHz	

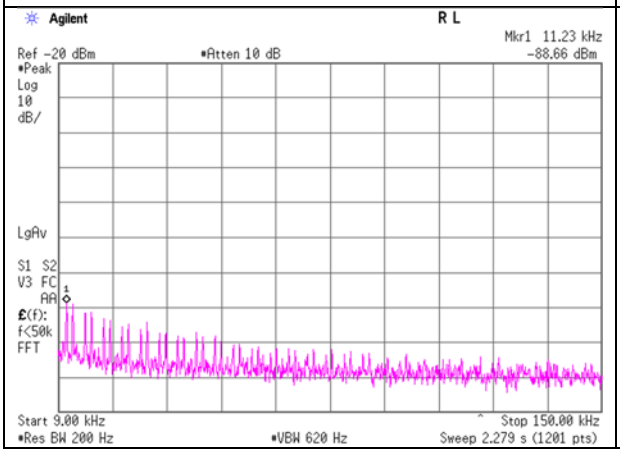


*These plots data contains sufficient number to show the trend of characteristic features for EUT.

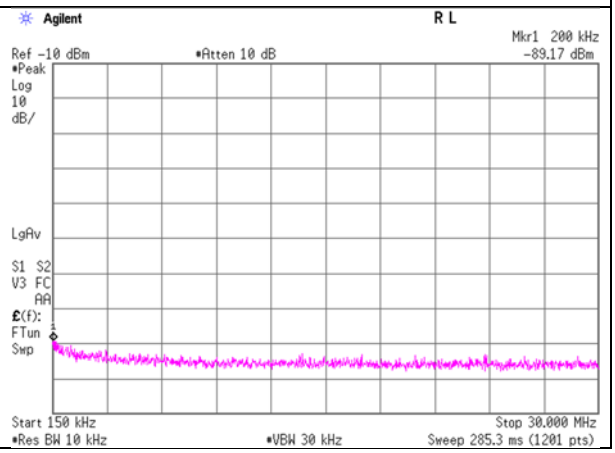
Conducted Spurious Emission

Report No.	12950066S-A
Test place	Shonan EMC Lab. No.5 Shielded Room
Date	October 20, 2019
Temperature / Humidity	24 deg. C / 56 % RH
Engineer	Toshinori Yamada
Mode	Tx BT LE 2402 MHz

9 kHz - 150 kHz



150 kHz - 30 MHz



Frequency [kHz]	Reading [dBm]	Cable Loss [dB]	Attenuator Loss [dB]	Antenna Gain [dBi]	N (Number of Output)	EIRP [dBm]	Distance [m]	Ground bounce [dB]	E (field strength) [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
11.23	-88.7	0.02	9.5	2.5	1	-76.6	300	6.0	-15.3	46.5	61.8	-
200.00	-89.2	0.02	9.5	2.5	1	-77.1	300	6.0	-15.8	21.5	37.3	-

E [dBuV/m] = EIRP [dBm] - 20 log (Distance [m]) + Ground bounce [dB] + 104.8 [dBuV/m]

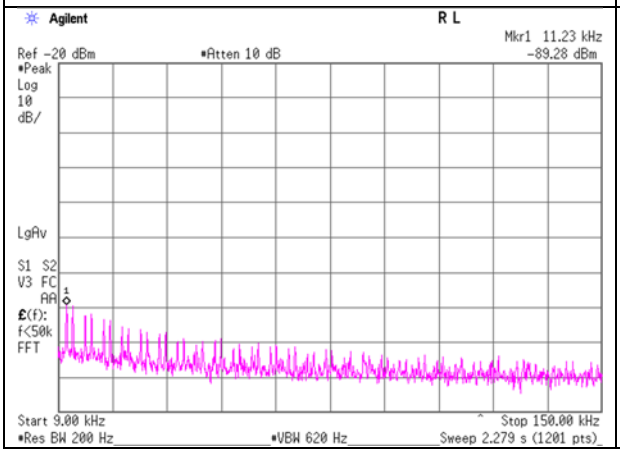
EIRP[dBm] = Reading [dBm] + Cable loss [dB] + Attenuator Loss [dB] + Antenna gain [dBi] + 10 * log (N)

N: Number of output

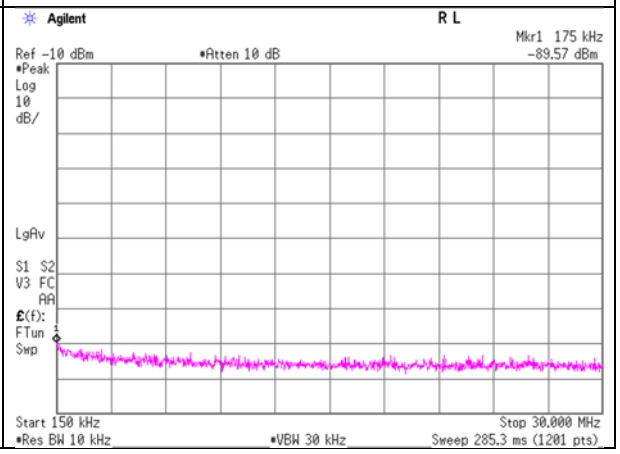
Conducted Spurious Emission

Report No.	12950066S-A
Test place	Shonan EMC Lab. No.5 Shielded Room
Date	October 20, 2019
Temperature / Humidity	24 deg. C / 56 % RH
Engineer	Toshinori Yamada
Mode	Tx BT LE 2440 MHz

9 kHz - 150 kHz



150 kHz - 30 MHz



Frequency [kHz]	Reading [dBm]	Cable Loss [dB]	Attenuator Loss [dB]	Antenna Gain [dBi]	N (Number of Output)	EIRP [dBm]	Distance [m]	Ground bounce [dB]	E (field strength) [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
11.23	-89.3	0.02	9.5	2.5	1	-77.2	300	6.0	-16.0	46.5	62.5	-
175.00	-89.6	0.02	9.5	2.5	1	-77.5	300	6.0	-16.2	22.7	38.9	-

E [dBuV/m] = EIRP [dBm] - 20 log (Distance [m]) + Ground bounce [dB] + 104.8 [dBuV/m]

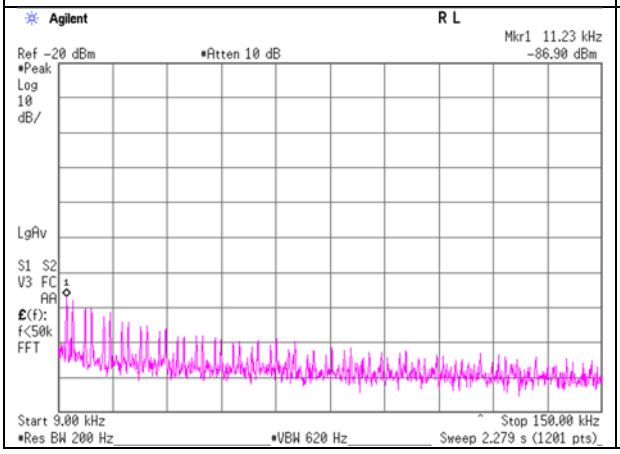
EIRP[dBm] = Reading [dBm] + Cable loss [dB] + Attenuator Loss [dB] + Antenna gain [dBi] + 10 * log (N)

N: Number of output

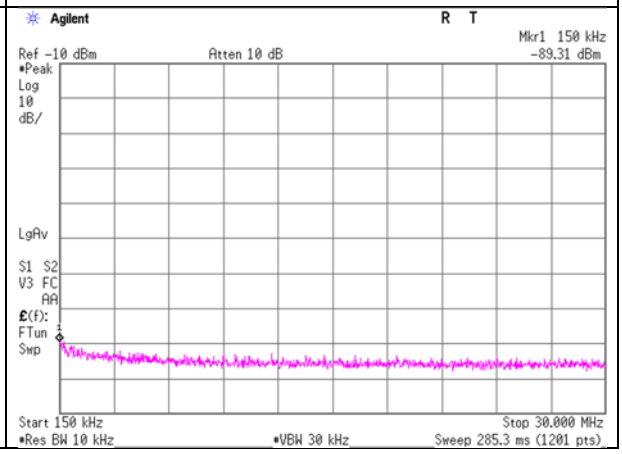
Conducted Spurious Emission

Report No.	12950066S-A
Test place	Shonan EMC Lab. No.5 Shielded Room
Date	October 20, 2019
Temperature / Humidity	24 deg. C / 56 % RH
Engineer	Toshinori Yamada
Mode	Tx BT LE 2480 MHz

9 kHz - 150 kHz



150 kHz - 30 MHz



Frequency [kHz]	Reading [dBm]	Cable Loss [dB]	Attenuator Loss [dB]	Antenna Gain [dBi]	N (Number of Output)	EIRP [dBm]	Distance [m]	Ground bounce [dB]	E (field strength) [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
11.23	-86.9	0.02	9.5	2.5	1	-74.8	300	6.0	-13.6	46.5	60.1	-
150.00	-89.3	0.02	9.5	2.5	1	-77.2	300	6.0	-16.0	24.0	40.0	-

E [dBuV/m] = EIRP [dBm] - 20 log (Distance [m]) + Ground bounce [dB] + 104.8 [dBuV/m]

EIRP[dBm] = Reading [dBm] + Cable loss [dB] + Attenuator Loss [dB] + Antenna gain [dBi] + 10 * log (N)

N: Number of output

Power Density

Report No.	12950066S-A
Test place	Shonan EMC Lab. No.5 Shielded Room
Date	October 20, 2019
Temperature / Humidity	24 deg. C / 56 % RH
Engineer	Toshinori Yamada
Mode	Tx BT LE

BT LE

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result [dBm]	Limit [dBm]	Margin [dB]
2402	-27.23	1.23	9.69	-16.31	8.00	24.31
2440	-26.73	1.24	9.69	-15.80	8.00	23.80
2480	-25.42	1.25	9.70	-14.47	8.00	22.47

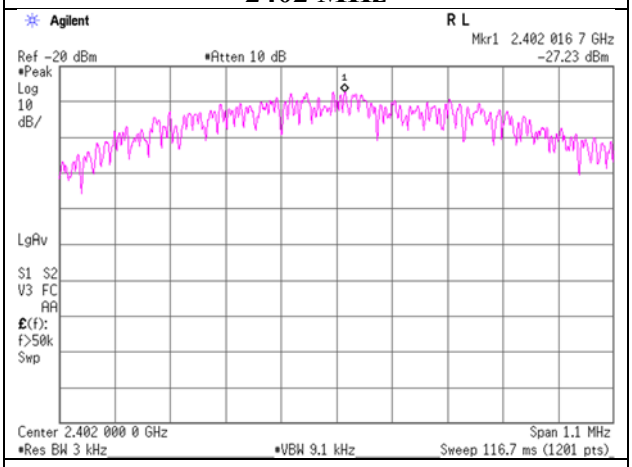
Sample Calculation:
Result = Reading + Cable Loss (including the cable(s) customer supplied) + Attenuator Loss

*The equipment and cables were not used for factor 0 dB of the data sheets.

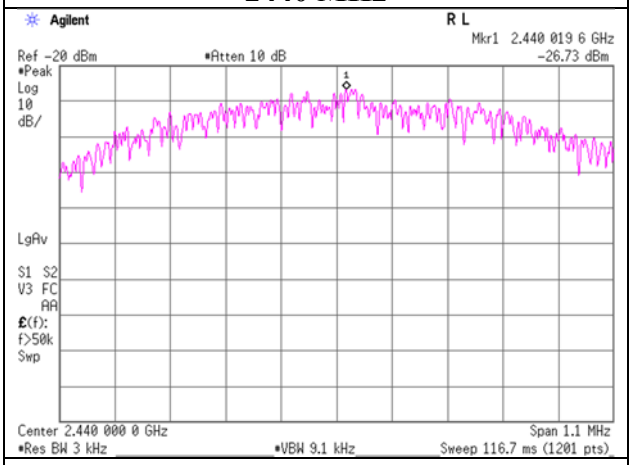
Power Density

BT LE

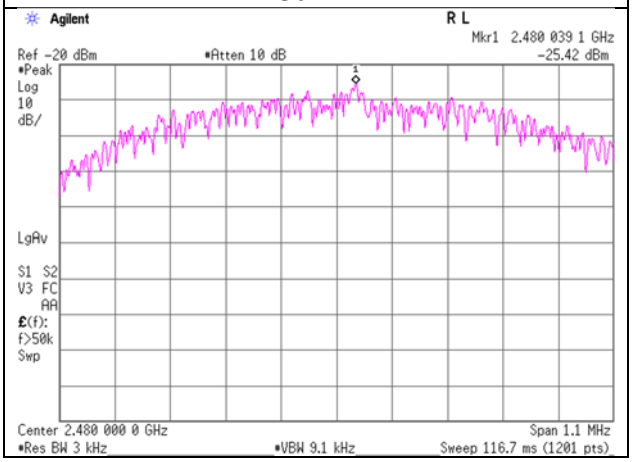
2402 MHz



2440 MHz



2480 MHz



APPENDIX 2: Test instruments

Test Instruments (1 / 2)

Local ID	Test Name	LIMS ID	Description	Manufacturer	Model	Serial	Last Calibration Date	Calibration Due Date	Calibration Interval (Month)
SAT10-09	AT	145132	Attenuator	Weinschel Corp.	54A-10	W5692	2018/11/25	2019/11/30	12
SCC-G31	AT	145042	Coaxial Cable	Junkosha	MWX241-01000KMSKMS	OCT-08-13-046	2019/4/16	2020/4/30	12
SOS-09	AT	146318	Humidity Indicator	A&D	AD-5681	4061484	2018/12/5	2019/12/31	12
SPM-13	AT	169910	Power Meter	EMC Instruments Corporation	8990B	MY51000448	2019/3/6	2020/3/31	12
SPSS-06	AT	169911	Power sensor	EMC Instruments Corporation	N1923A	MY57270004	2019/3/6	2020/3/31	12
SSA-03	AT	145801	Spectrum Analyzer	AGILENT	E4448A	MY48250152	2019/8/8	2020/8/31	12
STS-05	AT	146212	Digital Hitester	HIOKI	3805-50	80997828	2019/10/1	2020/10/31	12
COTS-SEMI-5	RE	170932	EMI Software	TSJ	TEPTO-DV3(RE,CE,ME,PE)	-	-	-	-
KJM-02	RE	146432	Measure	TAJIMA	GL19-55	-	-	-	-
KSA-08	RE	145089	Spectrum Analyzer	AGILENT	E4446A	MY46180525	2018/10/7	2019/10/31	12
SAEC-03(NSA)	RE	145565	Semi-Anechoic Chamber	TDK	SAEC-03(NSA)	3	2019/4/8	2020/4/30	12
SAEC-03(SVSWR)	RE	145566	Semi-Anechoic Chamber	TDK	SAEC-03(SVSWR)	3	2019/5/3	2020/5/31	12

Test Instruments (2 / 2)

Local ID	Test Name	LIMS ID	Description	Manufacturer	Model	Serial	Last Calibration Date	Calibration Due Date	Calibration Interval (Month)
SAF-03	RE	145126	Pre Amplifier	SONOMA	310N	290213	2019/2/5	2020/2/29	12
SAF-06	RE	145005	Pre Amplifier	Toyo Corporation	TPA0118-36	1440491	2019/2/8	2020/2/29	12
SAF-08	RE	145007	Pre Amplifier	Toyo Corporation	HAP18-26W	19	2019/3/5	2020/3/31	12
SAT10-05	RE	145136	Attenuator(above1GHz)	AGILENT	8493C-010	74864	2018/11/25	2019/11/30	12
SAT6-13	RE	167094	Attenuator	JFW	50HF-006N	-	2019/2/5	2020/2/29	12
SBA-03	RE	145023	Biconical Antenna	Schwarzbeck	BBA9106	91032666	2019/5/7	2020/5/31	12
SCC-C1/C2/C3/C4/C5/C10/SRSE-03	RE	145171	Coaxial Cable&RF Selector	Fujikura/Fujikura/Suhner/Suhner/Suhner/TOYO	8D2W/12DSFA/141PE/141PE/141PE/141P	-/0901-271(RF Selector)	2019/4/19	2020/4/30	12
SCC-G15	RE	145176	Coaxial Cable	Suhner	SUCOFLEX 102	32703/2	2019/3/27	2020/3/31	12
SCC-G40	RE	166491	Coaxial Cable	Junkosha	MWX221-01000NFSNMS/B	1612S005	2019/1/25	2020/1/31	12
SCC-G43	RE	156380	Coaxial Cable	HUBER+SUNER	SUCOFLEX_104_E	SN MY 13406/4E	2019/7/3	2020/7/31	12
SCC-G57	RE	179540	Coaxial Cable	Huber+Suhner	SUCOFLEX 102	802815/2	2019/5/16	2020/5/31	12
SCC-G58	RE	183047	Coaxial Cable	HUBER+SUNER	SUCOFLEX 104	800287/4A	2019/7/23	2020/7/31	12
SFL-02	RE	145301	Highpass Filter	MICRO-TRONICS	HPM50111	51	2018/11/16	2019/11/30	12
SHA-03	RE	145501	Horn Antenna	Schwarzbeck	BBHA9120D	9120D-739	2019/6/26	2020/6/30	12
SHA-04	RE	145512	Horn Antenna	ETS LINDGREN	3160-09	94868	2019/6/26	2020/6/30	12
SLA-07	RE	145529	Logperiodic Antenna	Schwarzbeck	VUSLP9111B	196	2019/5/7	2020/5/31	12
SOS-05	RE	146293	Humidity Indicator	A&D	AD-5681	4062518	2019/10/8	2020/10/31	12
STR-08	RE	150463	Test Receiver	Rohde & Schwarz	ESW44	101581	2018/11/28	2019/11/30	12
STS-03	RE	146210	Digital Hitester	HIOKI	3805-50	80997823	2019/10/1	2020/10/31	12

***Hyphens for Last Calibration Date, Calibration Due Date and Cal Int (month) are instruments that Calibration is not required (e.g. software), or instruments checked in advance before use.**

The expiration date of the calibration is the end of the expired month.
All equipment is calibrated with valid calibrations. Each measurement data is traceable to the national or international standards.

As for some calibrations performed after the tested dates, those test equipment have been controlled by means of an unbroken chains of calibrations.

Test item:

RE: Radiated Emission test
AT: Antenna Terminal Conducted test