RADIO TEST REPORT

Test Report No. : 12952598S-A-R1

Applicant	:	**Panasonic Corporation**
Type of Equipment	:	**AV Control Unit for In-Vehicle Infotainment**
Model No.	:	**AM1904**
FCC ID	:	**ACJ932AM1904**
Test regulation	:	**FCC Part 15 Subpart C: 2019 (*Bluetooth BDR/EDR part)**
Test Result	:	**Complied (Refer to SECTION 3.2)**

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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.
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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.
10. This report is a revised version of 12952598S-A. 12952598S-A is replaced with this report.

Date of test: September 20 to October 3, 2019

Representative test engineer: T. Kawakami
Takahiro Kawakami
Engineer
Consumer Technology Division

Approved by: S. Takano
Shinichi Takano
Engineer
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".

REVISION HISTORY

Original Test Report No.: 12952598S-A

Revision	Test report No.	Date	Page revised	Contents
- (Original)	12952598S-A	January 24, 2020	-	-
1	12952598S-A-R1	January 27, 2020	P.25,27,28,30,32,33,35	Modification of the frequency range: from: “30 GHz” to: “30 MHz”
			P.9	Addition of Software information: (Date: 2019.9.20, Storage location: EUT memory)
			P.13	Modification of mode "3DH5" of "99%Occupied Bandwidth": from: “1.185” to: “1184.9” from: “1.183” to: “1182.5” from: “1.185” to: “1185.2”

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
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
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
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
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	:	Panasonic Corporation
Address	:	4261 Ikonobe-cho, Tsuzuki-ku, Yokohama-shi, Kanagawa 224-8520 Japan
Telephone Number	:	+81-50-3689-7389
Facsimile Number	:	+81-45-931-0806
Contact Person	:	Yoshinori Nagatani

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	:	AV Control Unit for In-Vehicle Infotainment
Model No.	:	AM1904
Serial No.	:	Refer to SECTION 4.2
Rating	:	DC 13.2 V
Receipt Date of Sample (Information from test lab.)	:	August 7, 2019
Country of Mass-production	:	Thailand, Mexico
Condition of EUT	:	Engineering 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: AM1904 (referred to as the EUT in this report) is a AV Control Unit for In-Vehicle Infotainment.

Radio Specification

Bluetooth (BDR / EDR function)

Radio Type	:	Transceiver
Frequency of Operation	:	2402 MHz - 2480 MHz
Modulation	:	FHSS
Antenna type	:	Pattern antenna
Antenna Gain	:	2 dBi
Clock frequency (Maxmum)	:	48 MHz

WLAN (IEEE802.11a/b/g/ac-20/ac-40/ac-80/n-20/n-40)

Radio Type	:	Transceiver
Frequency of Operation	:	2412 MHz - 2462 MHz, 5180 MHz - 5240 MHz, 5745 MHz - 5825 MHz
Modulation	:	DSSS, OFDM
Antenna type	:	Pattern antenna
Antenna Gain	:	2 dBi (2.4 GHz), 6 dBi (5 GHz)

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

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	N/A	N/A *1)
	ISED: RSS-Gen 8.8	**ISED:** RSS-Gen 8.8			
Carrier Frequency Separation	**FCC:** KDB 558074 D01 15.247 Meas Guidance v05r02	**FCC:** Section15.247(a)(1)	See data.	Complied a)	Conducted
	ISED: -	**ISED:** RSS-247 5.1 (b)			
20dB Bandwidth	**FCC:** KDB 558074 D01 15.247 Meas Guidance v05r02	**FCC:** Section15.247(a)(1)		Complied a)	Conducted
	ISED: -	**ISED:** RSS-247 5.1 (a)			
Number of Hopping Frequency	**FCC:** KDB 558074 D01 15.247 Meas Guidance v05r02	**FCC:** Section15.247(a)(1)(iii)		Complied b)	Conducted
	ISED: -	**ISED:** RSS-247 5.1 (d)			
Dwell time	**FCC:** KDB 558074 D01 15.247 Meas Guidance v05r02	**FCC:** Section15.247(a)(1)(iii)		Complied c)	Conducted
	ISED: -	**ISED:** RSS-247 5.1 (d)			
Maximum Peak Output Power	**FCC:** KDB 558074 D01 15.247 Meas Guidance v05r02	**FCC:** Section15.247(a)(b)(1)		Complied d)	Conducted
	ISED: RSS-Gen 6.12	**ISED:** RSS-247 5.4 (b)			
Spurious Emission & Band Edge Compliance	**FCC:** KDB 558074 D01 15.247 Meas Guidance v05r02	**FCC:** Section15.247(d)	6.6 dB 4804.000 MHz, AV, Hori. Mode: Tx, DH5 2402 MHz	Complied e) /f)	Conducted/ Radiated (above 30 MHz) *2)
	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) The test is not applicable since the EUT does not have AC power ports.
*2) Radiated test was selected over 30 MHz based on section 15.247(d).
a) Refer to APPENDIX 1 (data of 20dB Bandwidth, 99%Occupied Bandwidth and Carrier Frequency Separation)
b) Refer to APPENDIX 1 (data of Number of Hopping Frequency)
c) Refer to APPENDIX 1 (data of Dwell time)
d) Refer to APPENDIX 1 (data of Maximum Peak Output Power)
e) Refer to APPENDIX 1 (data of Conducted Spurious Emission)
f) 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 equipment provides the wireless transmitter with stable power supply.
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
The equipment and its antenna comply with the requirement since the antenna is built in the equipment and it cannot be replaced by end users. Therefore, the equipment complies with the antenna requirement of Section 15.203.

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 20dB Bandwidth, 99%Occupied Bandwidth and Carrier Frequency Separation)					

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
Radiated emission	9 kHz-30 MHz	3.0 dB	3.0 dB	3.0 dB	-
(Measurement distance: 3 m)	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	-
Radiated emission	1 GHz-18 GHz	5.8 dB	5.8 dB	5.8 dB	-
(Measurement distance: 1 m)	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

UL Japan, Inc. Shonan EMC Lab.
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)

Bluetooth (BT): Transmitting (Tx), Payload: PRBS9

Details of Operating Mode(s)

Test Item	Mode	Tested frequency
Spurious Emission (Conducted/Radiated)	Tx (Hopping Off) DH5, 3DH5	2402 MHz 2441 MHz 2480 MHz
Carrier Frequency Separation	Tx (Hopping On) DH5, 3DH5	2402 MHz 2441 MHz 2480 MHz
20dB Bandwidth	Tx (Hopping Off) DH5, 3DH5	2402 MHz 2441 MHz 2480 MHz
Number of Hopping Frequency	Tx (Hopping On) DH5, 3DH5	-
Dwell time	Tx (Hopping On), -DH1, DH3, DH5 -3DH1, 3DH3, 3DH5	-
Maximum Peak Output Power	Tx (Hopping Off) DH5, 2DH5, 3DH5	2402 MHz 2441 MHz 2480 MHz
Band Edge Compliance (Conducted)	Tx DH5, 3DH5 -Hopping On -Hopping Off	2402 MHz 2480 MHz
99% Occupied Bandwidth	Tx DH5, 3DH5 -Hopping On -Hopping Off	2402 MHz 2441 MHz 2480 MHz

*As a result of preliminary test, the formal test was performed with the above modes, which had the maximum payload length (except Dwell time test)
*2DH mode (2Mb/s EDR: pi/4DQPSK) was excluded for other tests than power measurement by using 3DH mode (3 Mb/s EDR: 8DPSK) as a representative.
* It is considered that the non-tested packet type (e.g. inquiry) can be omitted as it is complied with above all test items based on Bluetooth Core specification.

*EUT has the power settings by the software as follows;
Power settings: Fixed
Software: 03218
(Date: 2019.9.20, Storage location: EUT memory)

*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

This page has been submitted for separate exhibit (refer to APPENDIX 4).

SECTION 5: Radiated Spurious Emission

Test Procedure

[For below 1 GHz]
EUT was placed on a urethane platform of nominal size, 2.0 m by 1.0 m, raised 0.8 m above the conducting ground plane. 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.

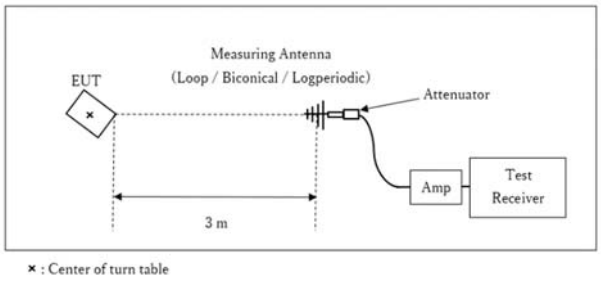
20 dBc was applied to the frequency over the limit of FCC 15.209 / Table 4 of RSS-Gen 8.9 (IC) and outside the restricted band of FCC15.205 / Table 6 of RSS-Gen 8.10 (IC).

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	RBW: 1 MHz VBW: 1/T (T: burst length, refer to Burst rate confirmation sheet) Detector: Peak	RBW: 100 kHz VBW: 300 kHz

*1) Average Power Measurement was performed based on KDB 558074 D01 15.247 Meas Guidance v05r02.

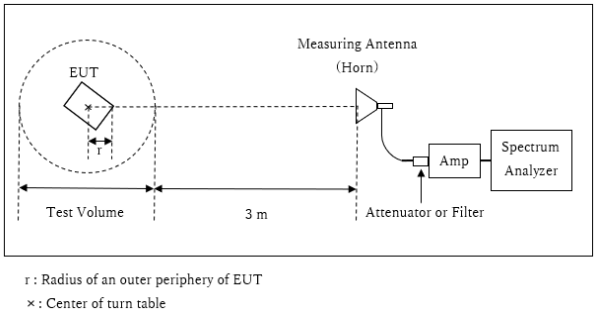
Figure 1: Test Setup

Below 1 GHz



Test Distance: 3 m

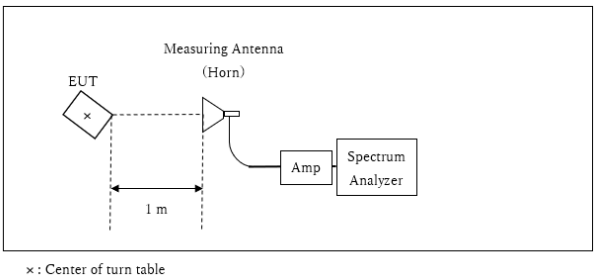
1 GHz - 13 GHz



Distance Factor: 20 x log (3.94 m / 3.0 m) = 2.36 dB
* Test Distance: (3 + Test Volume /2) - r = 3.94 m

Test Volume : 2.0 m
(Test Volume has been calibrated based on CISPR 16-1-4.)
r = 0.06 m

13 GHz - 40 GHz



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 0 deg. and 28 deg. of EUT to see the position of maximum noise, and the test was made at the position that has the maximum noise.

Antenna polarization	Frequency			
	Below 1 GHz	1 GHz - 2.8 GHz	2.8 GHz - 13 GHz	13 GHz - 26.5 GHz
Horizontal	0 deg.	28 deg.	0 deg.	0 deg.
Vertical	0 deg.	28 deg.	0 deg.	0 deg.

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
20dB Bandwidth	3 MHz	30 kHz	100 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:160MHz BW)
Carrier Frequency Separation	3 MHz	100 kHz	300 kHz	Auto	Peak	Max Hold	Spectrum Analyzer
Number of Hopping Frequency	30 MHz	100 kHz	300 kHz	Auto	Peak	Max Hold	Spectrum Analyzer
Dwell Time	Zero Span	100 kHz, 1 MHz	300 kHz, 3 MHz	As necessary capture the entire dwell time per hopping channel	Peak	Clear Write	Spectrum Analyzer
Conducted Spurious Emission *3)	9 kHz to 150 kHz	200 Hz	620 Hz	Auto	Peak	Max Hold	Spectrum Analyzer
	150 kHz to 30 MHz	10 kHz	30 kHz				
	30 MHz to 25 GHz	100 kHz	300 kHz				
Conducted Spurious Emission Band Edge compliance	10 MHz	100 kHz	300 kHz	Auto	Peak	Max Hold	Spectrum Analyzer

*1) The measurement was performed with Max Hold since the duty cycle was not 100 %. Peak hold was applied as Worst-case measurement.
*2) Reference data
*3) In the frequency range below 30MHz, RBW was narrowed to separate the noise contents.

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

20dB Bandwidth, 99%Occupied Bandwidth and Carrier Frequency Separation

Report No.	12952598S-A-R1
Test place	Shonan EMC Lab. No.5 Shielded Room
Date	September 20, 2019
Temperature / Humidity	24 deg. C / 54 % RH
Engineer	Takahiro Kawakami
Mode	Tx, Hopping On/Off

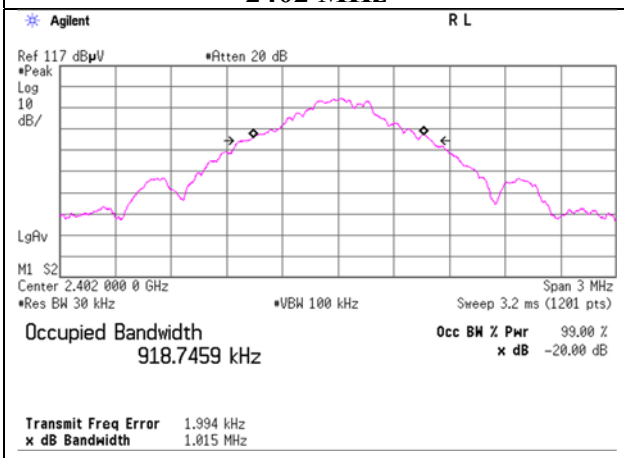
Mode	Freq. [MHz]	20dB Bandwidth [MHz]	99% Occupied Bandwidth [kHz]	Carrier Frequency Separation [MHz]	Limit for Carrier Frequency separation [MHz]
DH5	2402.0	1.015	918.746	1.000	>= 0.677
DH5	2441.0	1.020	920.751	1.000	>= 0.680
DH5	2480.0	0.967	916.555	1.000	>= 0.644
DH5	Hopping On	-	78597.0	-	-
3DH5	2402.0	1.300	1184.9	1.000	>= 0.867
3DH5	2441.0	1.298	1182.5	1.000	>= 0.865
3DH5	2480.0	1.302	1185.2	1.000	>= 0.868
3DH5	Hopping On	-	78709.8	-	-

Limit: Two-thirds of 20dB Bandwidth or 25kHz (whichever is greater).
No limit applies to 20dB Bandwidth.

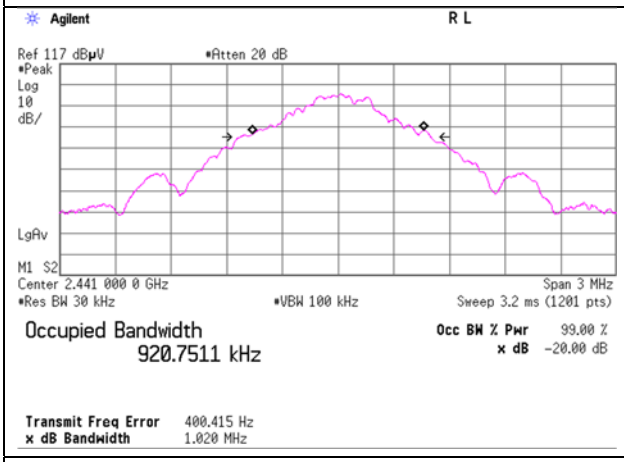
20dB Bandwidth and 99% Occupied Bandwidth

DH5

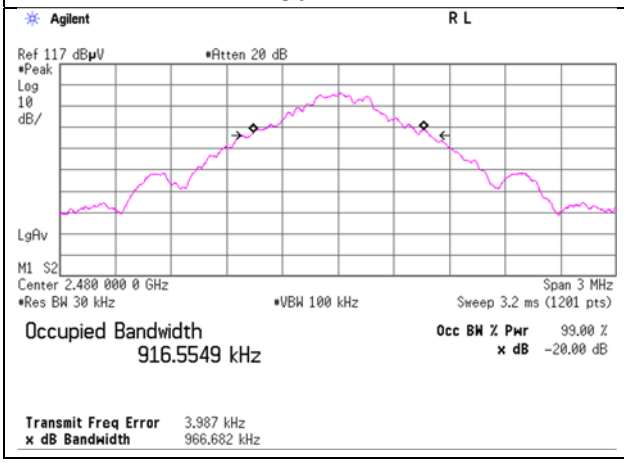
2402 MHz



2441 MHz

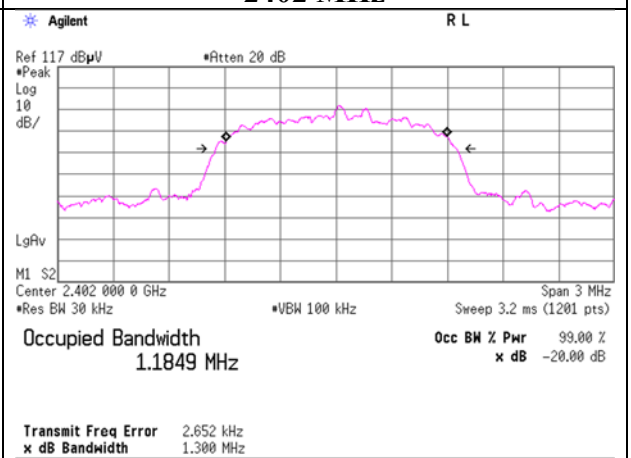


2480 MHz

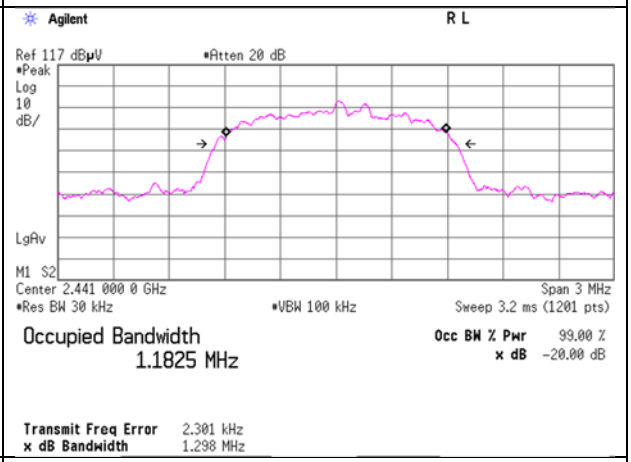


3DH5

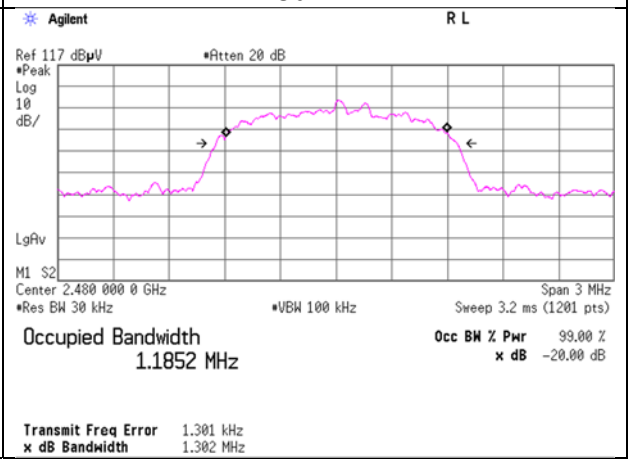
2402 MHz



2441 MHz

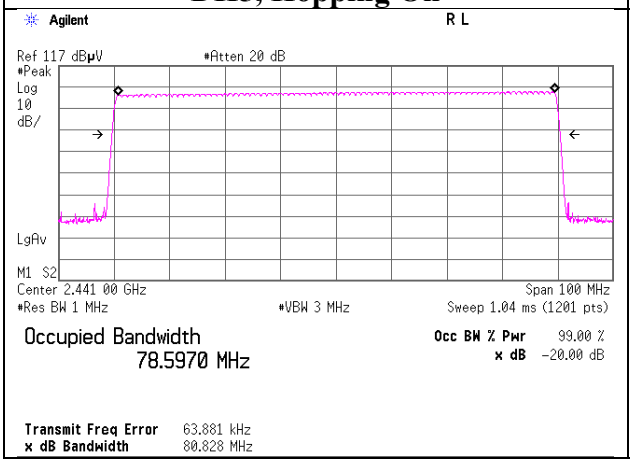


2480 MHz

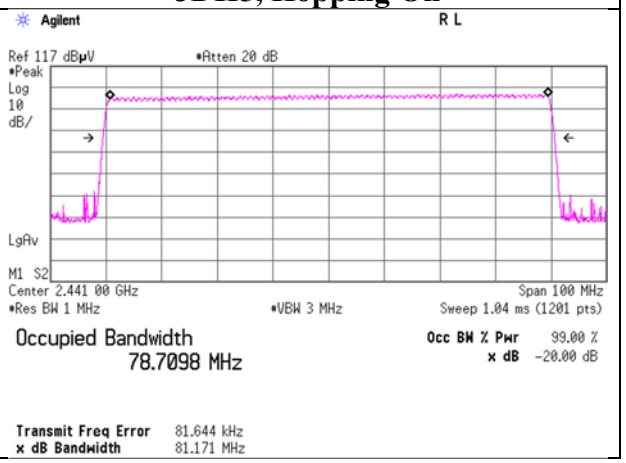


20dB Bandwidth and 99% Occupied Bandwidth

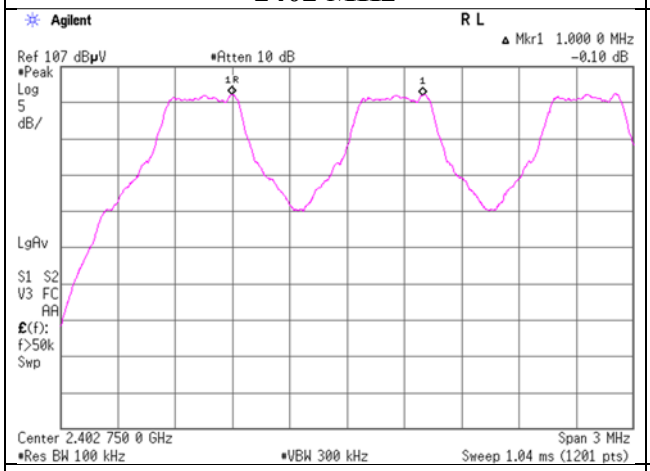
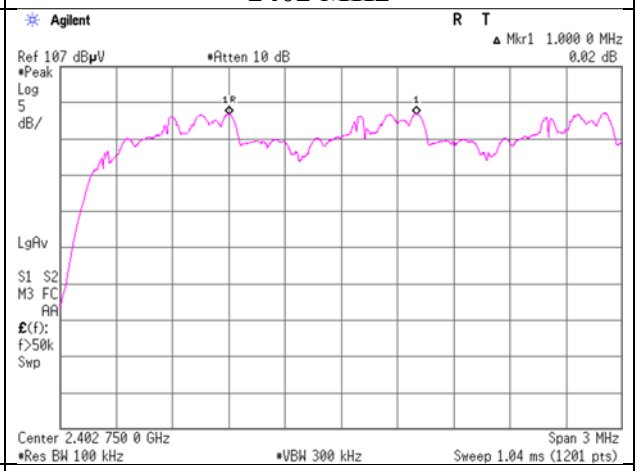
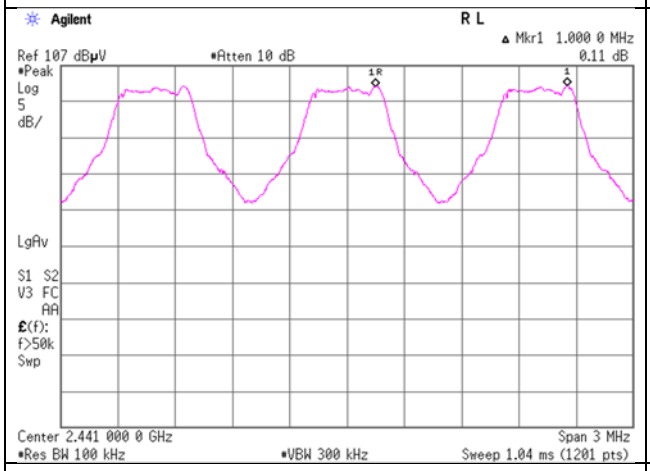
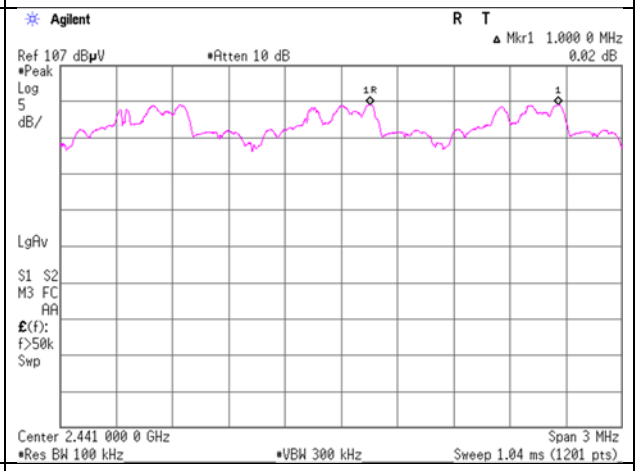
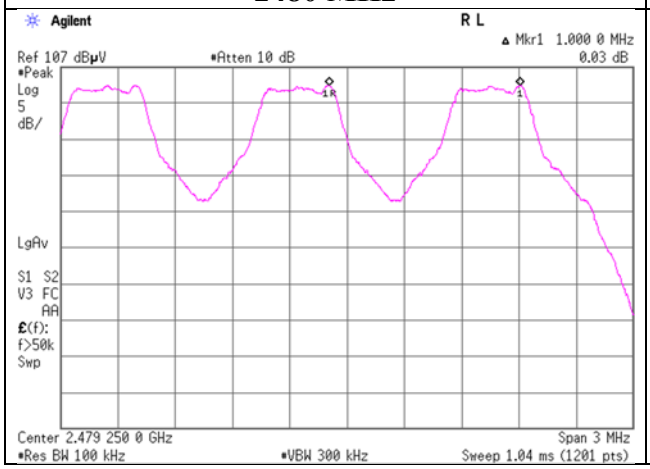
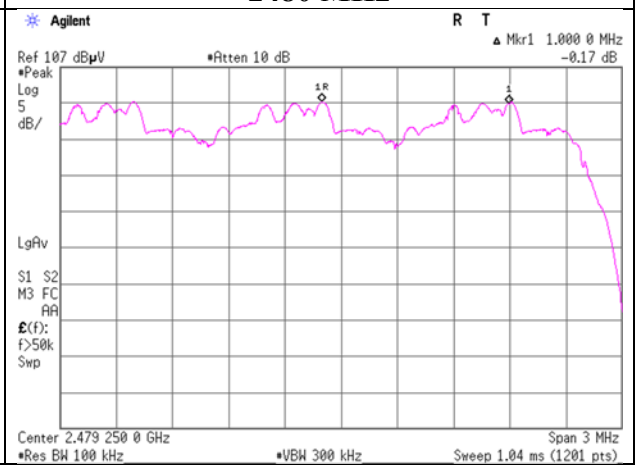
DH5, Hopping On



3DH5, Hopping On



Carrier Frequency Separation

DH5	3DH5
2402 MHz	**2402 MHz**
	
2441 MHz	**2441 MHz**
	
2480 MHz	**2480 MHz**
	

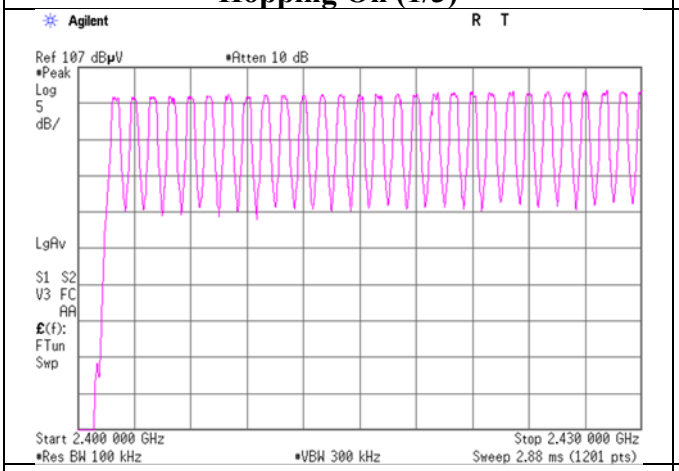
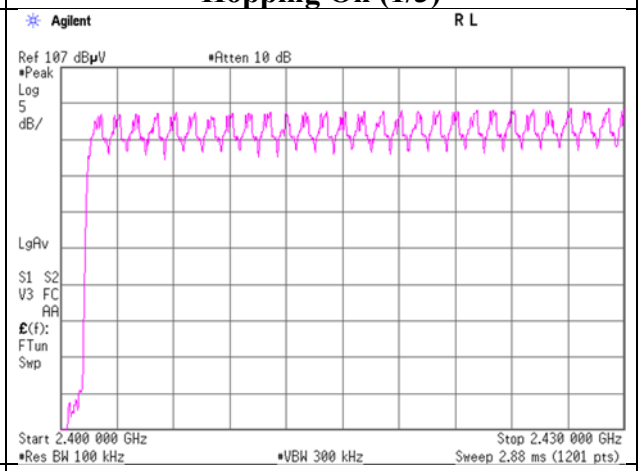
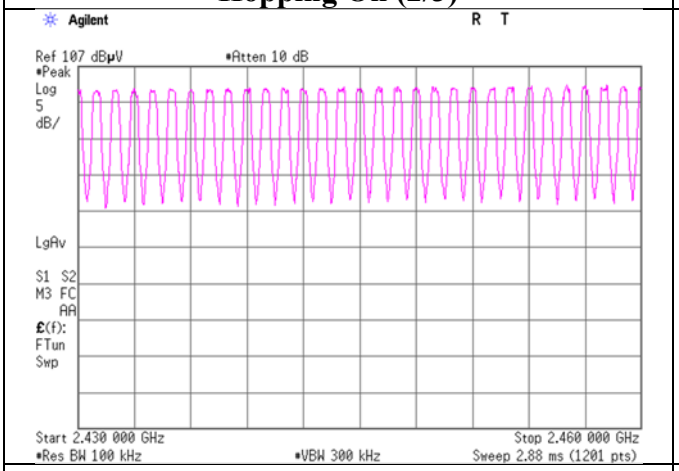
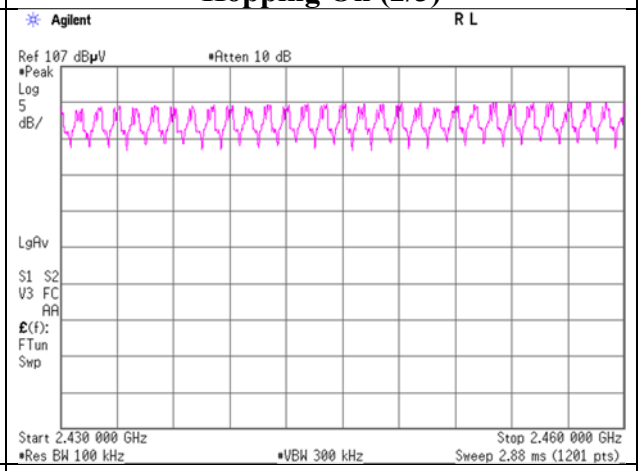
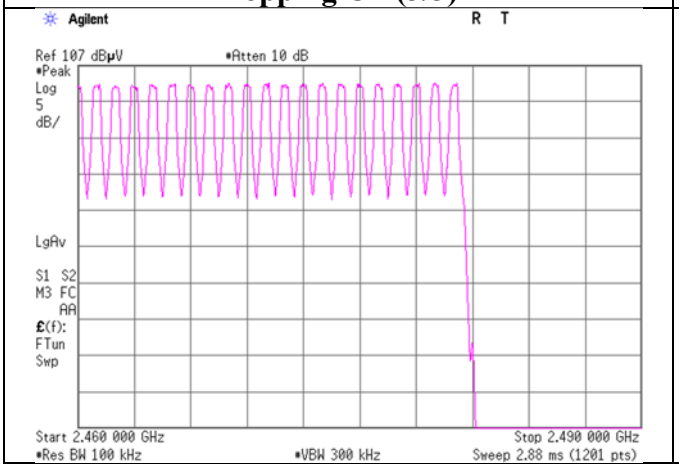
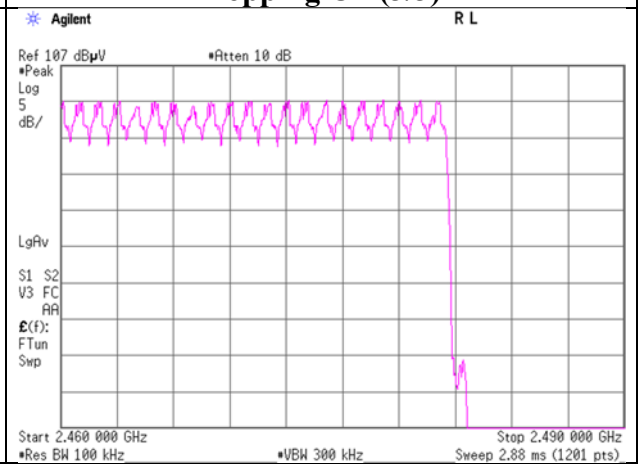
Number of Hopping Frequency

Report No.	12952598S-A-R1
Test place	Shonan EMC Lab. No.5 Shielded Room
Date	September 20, 2019
Temperature / Humidity	24 deg. C / 54 % RH
Engineer	Takahiro Kawakami
Mode	Tx, Hopping On

Mode	Number of channel [channels]	Limit [channels]
DH5	79	>= 15
3DH5	79	>= 15

Test was not performed at AFH mode whose number of hopping channel is 20 channels because this Bluetooth radio is in compliance of Bluetooth Specification.

Number of Hopping Frequency

DH5	3DH5
Hopping On (1/3)	**Hopping On (1/3)**
	
Hopping On (2/3)	**Hopping On (2/3)**
	
Hopping On (3/3)	**Hopping On (3/3)**
	

Dwell time

Report No.	12952598S-A-R1
Test place	Shonan EMC Lab. No.5 Shielded Room
Date	September 20, 2019
Temperature / Humidity	24 deg. C / 54 % RH
Engineer	Takahiro Kawakami
Mode	Tx, Hopping On

Mode	Number of transmission in a 31.6(79 Hopping x 0.4) / 12.8 (32 Hopping x 0.4) second period	Length of transmission [msec]	Result [msec]	Limit [msec]
DH1	45.8 times / 5 sec. x 31.6 sec. = 290 times	0.400	116	400
DH3	26.0 times / 5 sec. x 31.6 sec. = 165 times	1.658	274	400
DH5	19.4 times / 5 sec. x 31.6 sec. = 123 times	2.912	358	400
3DH1	47.6 times / 5 sec. x 31.6 sec. = 301 times	0.410	123	400
3DH3	26.6 times / 5 sec. x 31.6 sec. = 169 times	1.677	283	400
3DH5	17.2 times / 5 sec. x 31.6 sec. = 109 times	2.916	318	400

Sample Calculation
Result = Number of transmission x Length of transmission

*Average data of 5 tests.(except Inquiry)

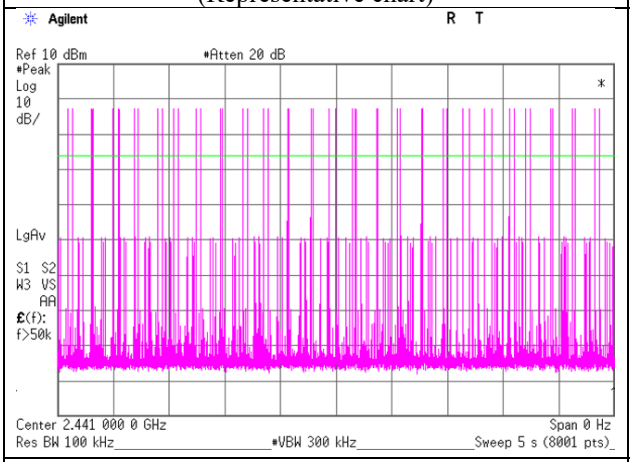
Mode	Sampling [times] 1	2	3	4	5	Average [times]
DH1	45	42	49	45	48	45.8
DH3	26	21	28	30	25	26
DH5	19	23	19	18	18	19.4
3DH1	50	47	46	46	49	47.6
3DH3	30	25	25	27	26	26.6
3DH5	17	19	17	16	17	17.2

Sample Calculation
Average = Summation (Sampling 1 to 5) / 5

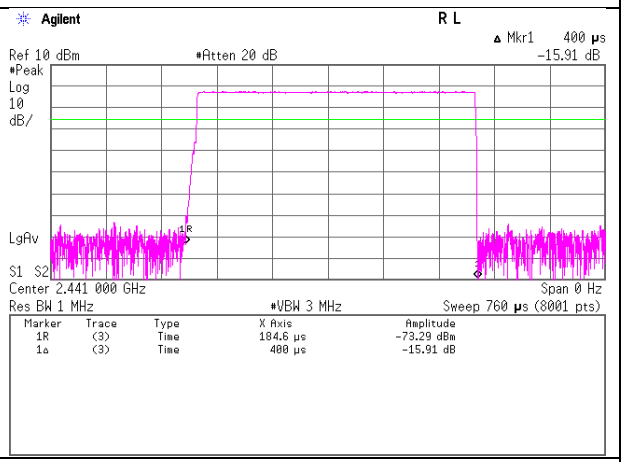
This device complies with the Bluetooth protocol for FHSS operation, employing a pseudo random channel selection and hopping rate to ensure that the occupancy time in N x 0.4s, where N is the number of channels being used in the hopping sequence ($20 \leq N \leq 79$), is always less than 0.4s regardless of packet size. This is confirmed in the test report for N = 79.

Dwell time

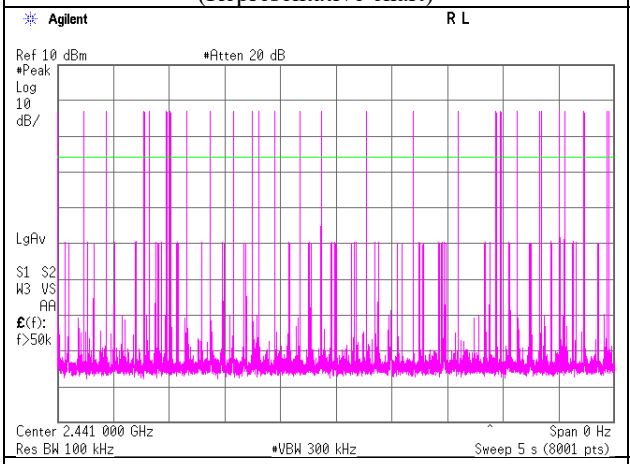
DH1 (1/2)
(Representative chart)



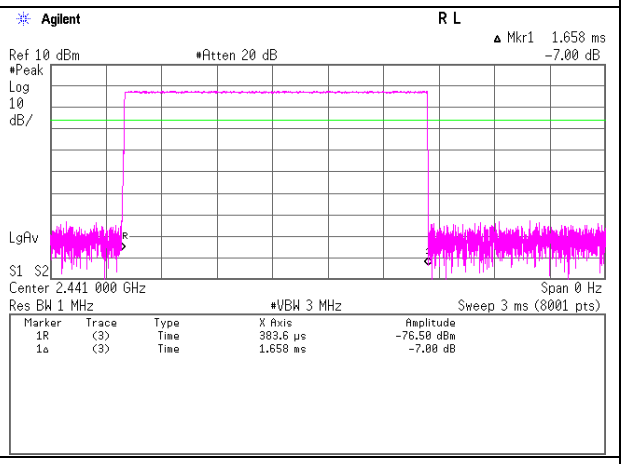
DH1 (2/2)



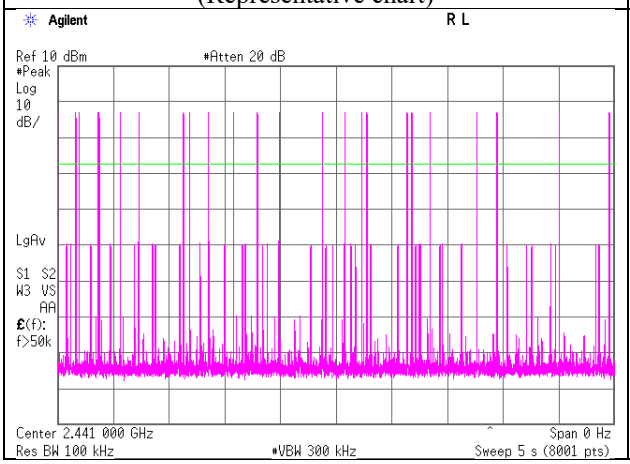
DH3 (1/2)
(Representative chart)



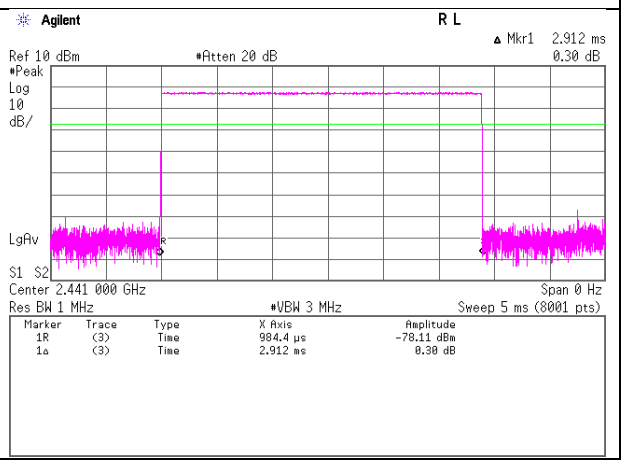
DH3 (2/2)



DH5 (1/2)
(Representative chart)

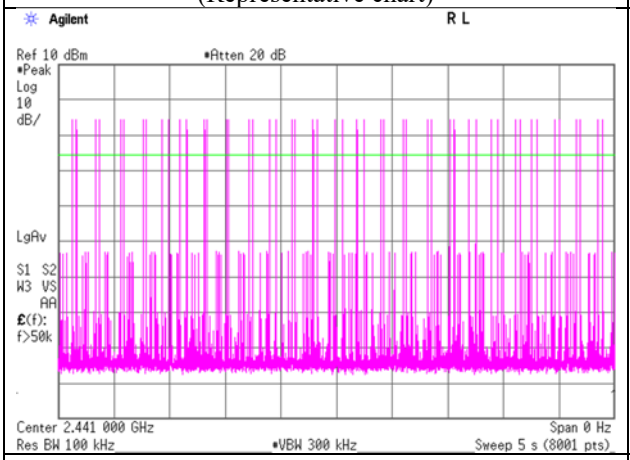


DH5 (2/2)

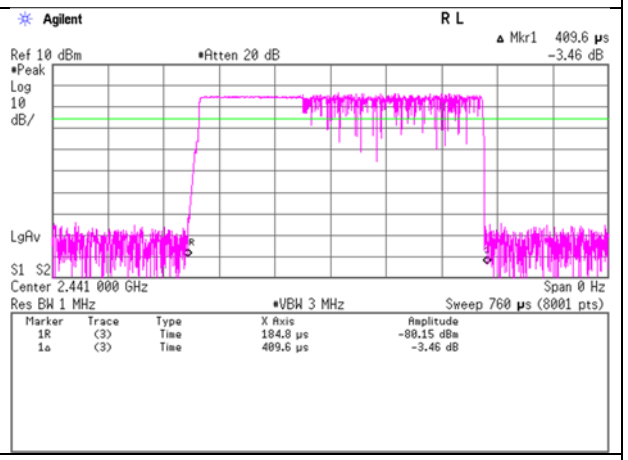


Dwell time

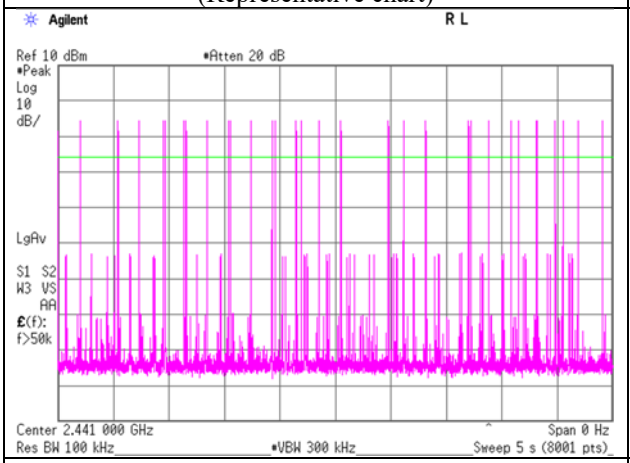
3DH1 (1/2)
(Representative chart)



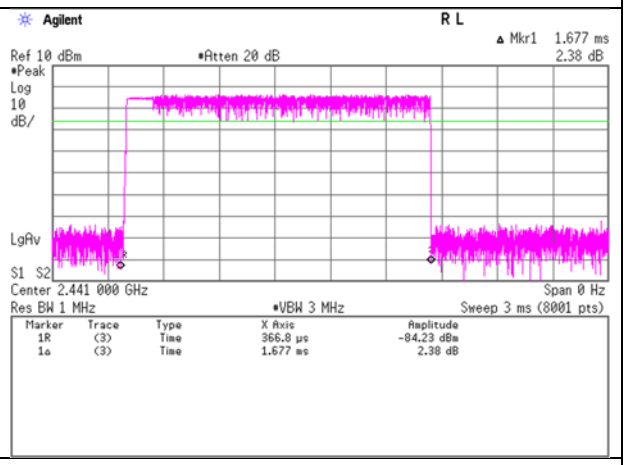
3DH1 (2/2)



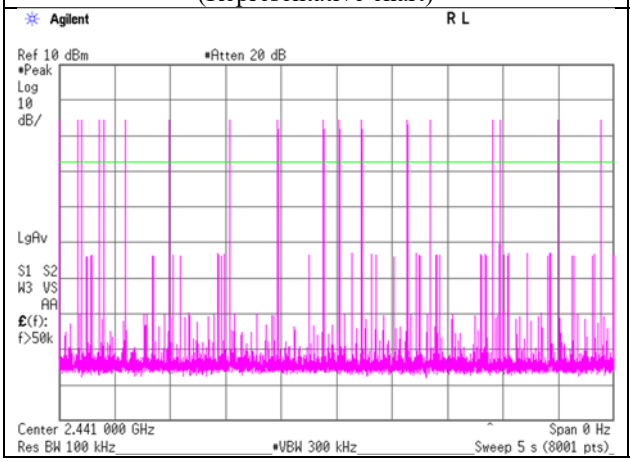
3DH3 (1/2)
(Representative chart)



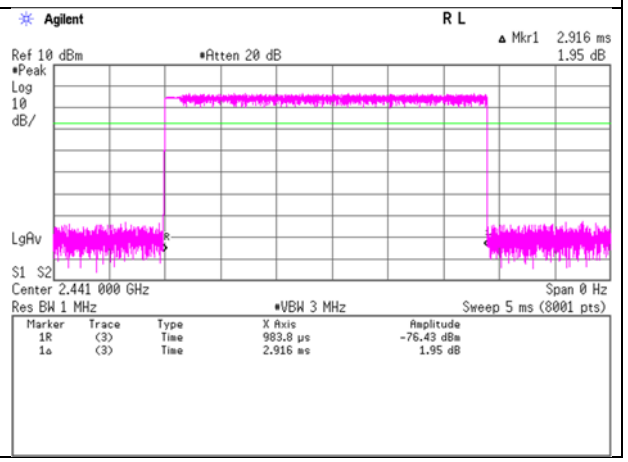
3DH3 (2/2)



3DH5 (1/2)
(Representative chart)



3DH5 (2/2)



Maximum Peak Output Power

Report No.	12952598S-A-R1
Test place	Shonan EMC Lab. No.5 Shielded Room
Date	September 20, 2019
Temperature / Humidity	24 deg. C / 54 % RH
Engineer	Takahiro Kawakami
Mode	Tx, Hopping Off

					Conducted Power					e.i.r.p. for RSS-247					
Mode	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]
DH5	2402.0	-3.42	1.83	9.69	8.10	6.46	20.96	125	12.86	2.00	10.10	10.23	36.02	4000	25.92
DH5	2441.0	-2.59	1.84	9.69	8.94	7.83	20.96	125	12.02	2.00	10.94	12.42	36.02	4000	25.08
DH5	2480.0	-2.16	1.85	9.70	9.39	8.69	20.96	125	11.57	2.00	11.39	13.77	36.02	4000	24.63
2DH5	2402.0	-4.28	1.83	9.69	7.24	5.30	20.96	125	13.72	2.00	9.24	8.39	36.02	4000	26.78
2DH5	2441.0	-3.36	1.84	9.69	8.17	6.56	20.96	125	12.79	2.00	10.17	10.40	36.02	4000	25.85
2DH5	2480.0	-2.87	1.85	9.70	8.68	7.38	20.96	125	12.28	2.00	10.68	11.69	36.02	4000	25.34
3DH5	2402.0	-3.90	1.83	9.69	7.62	5.78	20.96	125	13.34	2.00	9.62	9.16	36.02	4000	26.40
3DH5	2441.0	-2.97	1.84	9.69	8.56	7.18	20.96	125	12.40	2.00	10.56	11.38	36.02	4000	25.46
3DH5	2480.0	-2.53	1.85	9.70	9.02	7.98	20.96	125	11.94	2.00	11.02	12.65	36.02	4000	25.00

Sample Calculation:
Result = Reading + Cable Loss (including the cable(s) customer supplied) + Attenuator Loss
e.i.r.p. Result = Conducted Power Result + Antenna Gain

Test was not performed at AFH mode, because the decrease of number of channel (min: 20ch) at AFH mode does not influence on the output power and bandwidth of the EUT.
As this device had AFH mode and frequency separation could not meet the requirement of over 20dB BW without 2/3 relaxation, 125mW power limit was applied to it.

Average Output Power
(Reference data for RF Exposure)

Report No.	12952598S-A-R1
Test place	Shonan EMC Lab. No.5 Shielded Room
Date	September 20, 2019
Temperature / Humidity	24 deg. C / 54 % RH
Engineer	Takahiro Kawakami
Mode	Tx, Hopping Off

Mode	Freq.	Reading	Cable Loss	Atten. Loss	Result (Time average)		Duty factor	Result (Burst power average)	
	[MHz]	[dBm]	[dB]	[dB]	[dBm]	[mW]	[dB]	[dBm]	[mW]
DH5	2402.0	-4.94	1.83	9.69	6.58	4.55	1.09	7.67	5.85
DH5	2441.0	-4.02	1.84	9.69	7.51	5.64	1.09	8.60	7.24
DH5	2480.0	-3.58	1.85	9.70	7.97	6.27	1.09	9.06	8.05
2DH5	2402.0	-8.09	1.83	9.69	3.43	2.20	1.10	4.53	2.84
2DH5	2441.0	-7.01	1.84	9.69	4.52	2.83	1.10	5.62	3.65
2DH5	2480.0	-6.50	1.85	9.70	5.05	3.20	1.10	6.15	4.12
3DH5	2402.0	-8.08	1.83	9.69	3.44	2.21	1.10	4.54	2.84
3DH5	2441.0	-7.00	1.84	9.69	4.53	2.84	1.10	5.63	3.66
3DH5	2480.0	-6.48	1.85	9.70	5.07	3.21	1.10	6.17	4.14

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

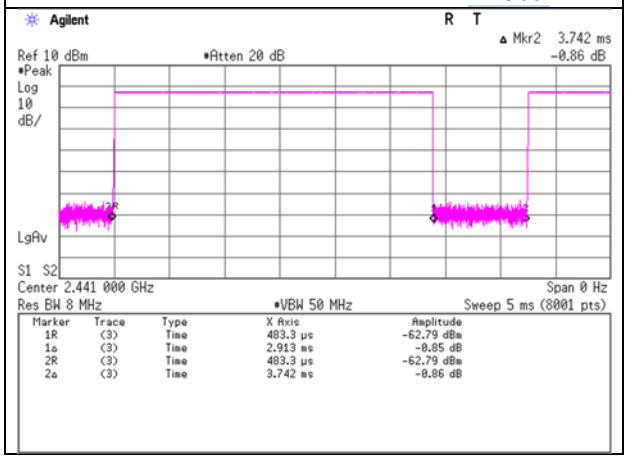
*The equipment and cables were not used for factor 0 dB of the data sheets.

Burst Rate Confirmation

Report No.	12952598S-A-R1
Test place	Shonan EMC Lab. No.5 Shielded Room
Date	September 20, 2019
Temperature / Humidity	24 deg. C / 54 % RH
Engineer	Takahiro Kawakami
Mode	Tx, Hopping Off

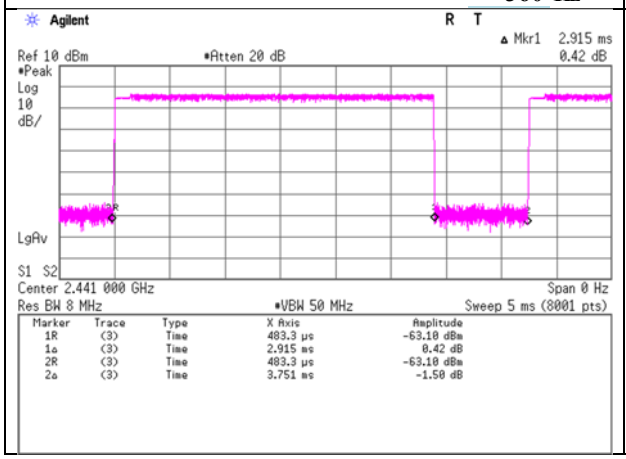
DH5

Tx on / (Tx on + Tx off) =	0.778	
Tx on / (Tx on + Tx off) * 100 =	77.8	%
Duty factor = 10 * log (3.742 / 2.913) =	1.09	dB
VBW = 1 Tx on = 343.3 Hz <	360	Hz



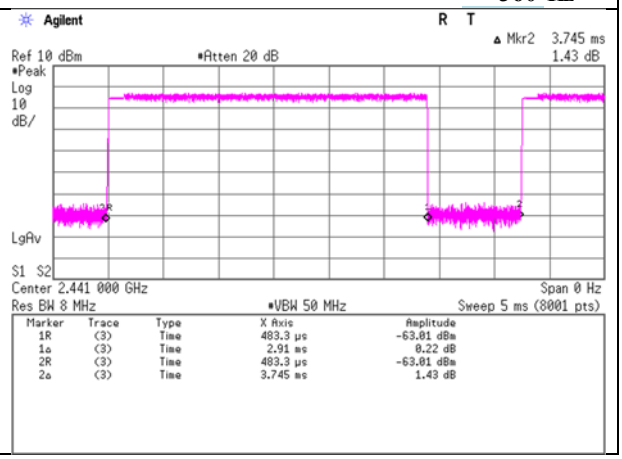
2DH5

Tx on / (Tx on + Tx off) =	0.777	
Tx on / (Tx on + Tx off) * 100 =	77.7	%
Duty factor = 10 * log (3.751 / 2.915) =	1.10	dB
VBW = 1 Tx on = 343.1 Hz <	360	Hz



3DH5

Tx on / (Tx on + Tx off) =	0.777	
Tx on / (Tx on + Tx off) * 100 =	77.7	%
Duty factor = 10 * log (3.745 / 2.91) =	1.10	dB
VBW = 1 Tx on = 343.6 Hz <	360	Hz



Radiated Spurious Emission

Report No.	12952598S-A-R1		
Test place	Shonan EMC Lab.		
Semi Anechoic Chamber	2	1	1
Date	October 3, 2019	September 24, 2019	September 25, 2019
Temperature / Humidity	21 deg. C / 61 % RH	25 deg. C / 56 % RH	24 deg. C / 53 % RH
Engineer	Kazuya Noda	Hiromasa Sato	Hiromasa Sato
	(30 MHz -1000 MHz)	(1 GHz -2.8 GHz)	(2.8 GHz -26.5 GHz)
Mode	Tx, Hopping Off, DH5 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.	114.049	QP	41.20	12.39	8.01	31.87	0.00	29.73	43.5	13.7	273	228	
Hori.	116.165	QP	42.80	12.70	8.03	31.87	0.00	31.66	43.5	11.8	278	225	
Hori.	118.281	QP	44.40	12.87	8.04	31.87	0.00	33.44	43.5	10.0	270	253	
Hori.	122.485	QP	40.80	13.25	8.10	31.86	0.00	30.29	43.5	13.2	259	242	
Hori.	124.610	QP	44.20	13.56	8.15	31.86	0.00	34.05	43.5	9.4	256	242	
Hori.	135.175	QP	42.10	14.18	8.38	31.85	0.00	32.81	43.5	10.6	259	244	
Hori.	552.968	QP	35.20	17.90	8.32	31.66	0.00	29.76	46.0	16.2	100	277	
Hori.	2390.000	PK	45.13	28.31	14.62	39.59	2.36	50.83	73.9	23.0	144	20	
Hori.	4804.000	PK	51.38	31.60	7.05	39.75	2.36	52.64	73.9	21.2	113	308	
Hori.	7206.000	PK	44.66	37.15	8.73	39.53	2.36	53.37	73.9	20.5	150	0	
Hori.	9608.000	PK	45.33	38.53	10.28	39.67	2.36	56.83	73.9	17.0	150	0	
Hori.	2390.000	AV	33.85	28.31	14.62	39.59	2.36	39.55	53.9	14.3	144	20	VBW: 360 Hz
Hori.	4804.000	AV	45.96	31.60	7.05	39.75	2.36	47.22	53.9	**6.6**	113	308	VBW: 360 Hz
Hori.	7206.000	AV	33.43	37.15	8.73	39.53	2.36	42.14	53.9	11.7	150	0	VBW: 360 Hz
Hori.	9608.000	AV	33.31	38.53	10.28	39.67	2.36	44.81	53.9	9.0	150	0	VBW: 360 Hz
Vert.	32.684	QP	33.10	17.63	6.90	31.93	0.00	25.70	40.0	14.3	100	4	
Vert.	135.180	QP	39.30	14.18	8.38	31.85	0.00	30.01	43.5	13.4	100	134	
Vert.	541.910	QP	37.40	17.72	8.27	31.65	0.00	31.74	46.0	14.2	120	248	
Vert.	2390.000	PK	44.55	28.31	14.62	39.59	2.36	50.25	73.9	23.6	291	249	
Vert.	4804.000	PK	51.61	31.60	7.05	39.75	2.36	52.87	73.9	21.0	148	322	
Vert.	7206.000	PK	45.19	37.15	8.73	39.53	2.36	53.90	73.9	20.0	150	0	
Vert.	9608.000	PK	45.32	38.53	10.28	39.67	2.36	56.82	73.9	17.0	150	0	
Vert.	2390.000	AV	33.80	28.31	14.62	39.59	2.36	39.50	53.9	14.4	291	249	VBW: 360 Hz
Vert.	4804.000	AV	45.28	31.60	7.05	39.75	2.36	46.54	53.9	7.3	148	322	VBW: 360 Hz
Vert.	7206.000	AV	33.57	37.15	8.73	39.53	2.36	42.28	53.9	11.6	150	0	VBW: 360 Hz
Vert.	9608.000	AV	33.77	38.53	10.28	39.67	2.36	45.27	53.9	8.6	150	0	VBW: 360 Hz

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amprifier) + Distance factor
Distance factor : 1 GHz - 13 GHz : 20log (3.94 m / 3.0 m) = 2.36 dB
13 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB
* These results have sufficient margin without taking account Dwell time factor.

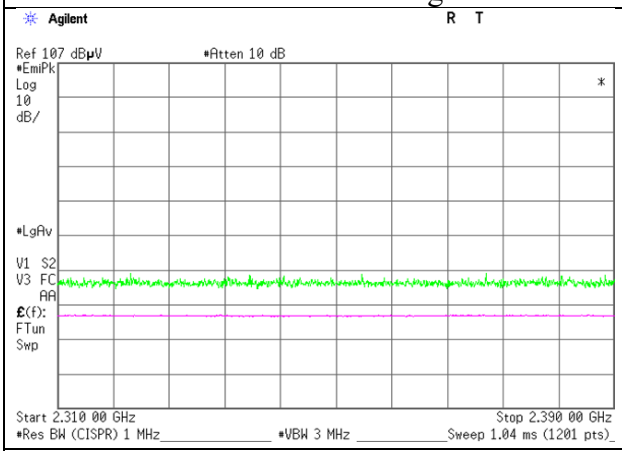
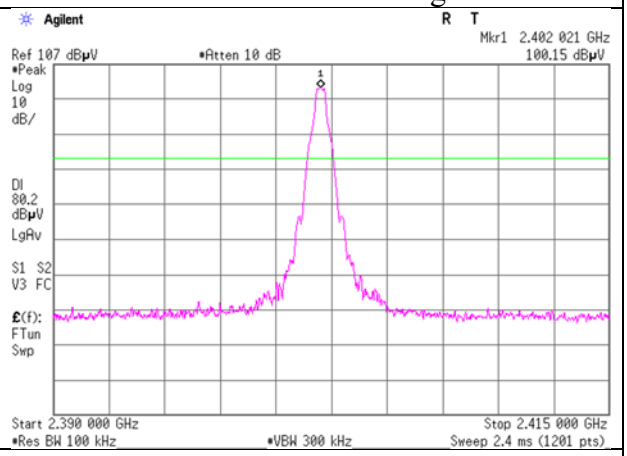
20 dBc Data Sheet (RBW 100 kHz, VBW 300 kHz)

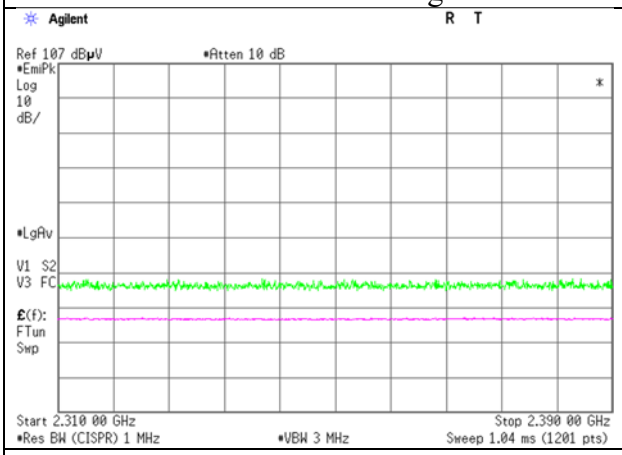
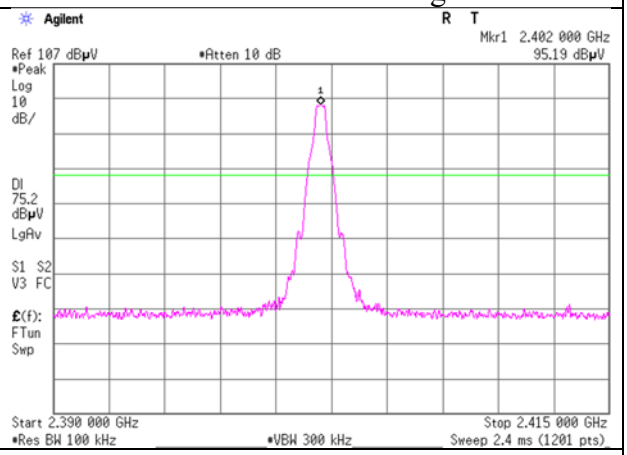
Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Vert.	2402.000	PK	96.06	28.28	14.63	39.59	2.36	101.74	-	-	Carrier
Vert.	2400.000	PK	38.92	28.29	14.63	39.59	2.36	44.61	81.74	37.1	
Hori.	2402.000	PK	101.50	28.28	14.63	39.59	2.36	107.18	-	-	Carrier
Hori.	2400.000	PK	40.78	28.29	14.63	39.59	2.36	46.47	87.18	40.7	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amprifier) + Distance factor
Distance factor : 1 GHz - 13 GHz : 20log (3.94 m / 3.0 m) = 2.36 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.	12952598S-A-R1
Test place	Shonan EMC Lab.
Semi Anechoic Chamber	1
Date	September 24, 2019
Temperature / Humidity	25 deg. C / 56 % RH
Engineer	Hiromasa Sato (1 Hz -2.8 GHz)
Mode	Tx, Hopping Off, DH5 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.	12952598S-A-R1		
Test place	Shonan EMC Lab.		
Semi Anechoic Chamber	2	1	1
Date	October 3, 2019	September 24, 2019	September 25, 2019
Temperature / Humidity	21 deg. C / 61 % RH	25 deg. C / 56 % RH	24 deg. C / 53 % RH
Engineer	Kazuya Noda	Hiromasa Sato	Hiromasa Sato
	(30 MHz -1000 MHz)	(1 GHz -2.8 GHz)	(2.8 GHz -26.5 GHz)
Mode	Tx, Hopping Off, DH5 2441 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.	114.045	QP	41.10	12.39	8.01	31.87	0.00	29.63	43.5	13.8	272	225	
Hori.	116.166	QP	42.50	12.70	8.03	31.87	0.00	31.36	43.5	12.1	270	225	
Hori.	118.279	QP	44.40	12.87	8.04	31.87	0.00	33.44	43.5	10.0	266	249	
Hori.	122.489	QP	40.90	13.25	8.10	31.86	0.00	30.39	43.5	13.1	269	237	
Hori.	124.616	QP	43.90	13.56	8.15	31.86	0.00	33.75	43.5	9.7	253	244	
Hori.	135.175	QP	41.90	14.18	8.38	31.85	0.00	32.61	43.5	10.8	262	241	
Hori.	552.978	QP	34.90	17.90	8.32	31.66	0.00	29.46	46.0	16.5	100	276	
Hori.	4882.000	PK	51.05	31.66	7.11	39.74	2.36	52.44	73.9	21.4	131	329	
Hori.	7323.000	PK	45.46	37.24	8.83	39.60	2.36	54.29	73.9	19.6	150	0	
Hori.	9764.000	PK	44.78	39.13	10.24	39.48	2.36	57.03	73.9	16.8	150	0	
Hori.	4882.000	AV	45.08	31.66	7.11	39.74	2.36	46.47	53.9	**7.4**	131	329	VBW: 360 Hz
Hori.	7323.000	AV	34.43	37.24	8.83	39.60	2.36	43.26	53.9	10.6	150	0	VBW: 360 Hz
Hori.	9764.000	AV	33.68	39.13	10.24	39.48	2.36	45.93	53.9	7.9	150	0	VBW: 360 Hz
Vert.	32.645	QP	33.10	17.65	6.90	31.93	0.00	25.72	40.0	14.2	100	2	
Vert.	124.612	QP	40.90	13.56	8.15	31.86	0.00	30.75	43.5	12.7	100	316	
Vert.	135.174	QP	38.80	14.18	8.38	31.85	0.00	29.51	43.5	13.9	100	135	
Vert.	541.909	QP	36.10	17.72	8.27	31.65	0.00	30.44	46.0	15.5	128	245	
Vert.	4882.000	PK	49.73	31.66	7.11	39.74	2.36	51.12	73.9	22.7	110	342	
Vert.	7323.000	PK	45.03	37.24	8.83	39.60	2.36	53.86	73.9	20.0	150	0	
Vert.	9764.000	PK	44.09	39.13	10.24	39.48	2.36	56.34	73.9	17.5	150	0	
Vert.	4882.000	AV	43.34	31.66	7.11	39.74	2.36	44.73	53.9	9.1	110	342	VBW: 360 Hz
Vert.	7323.000	AV	33.45	37.24	8.83	39.60	2.36	42.28	53.9	11.6	150	0	VBW: 360 Hz
Vert.	9764.000	AV	33.62	39.13	10.24	39.48	2.36	45.87	53.9	8.0	150	0	VBW: 360 Hz

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amprifier) + Distance factor
Distance factor : 1 GHz - 13 GHz : 20log (3.94 m / 3.0 m) = 2.36 dB
13 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB
* These results have sufficient margin without taking account Dwell time factor.

Radiated Spurious Emission

Report No.	12952598S-A-R1		
Test place	Shonan EMC Lab.		
Semi Anechoic Chamber	2	1	1
Date	October 3, 2019	September 24, 2019	September 25, 2019
Temperature / Humidity	21 deg. C / 61 % RH	25 deg. C / 56 % RH	24 deg. C / 53 % RH
Engineer	Kazuya Noda	Hiromasa Sato	Hiromasa Sato
	(30 MHz -1000 MHz)	(1 GHz -2.8 GHz)	(2.8 GHz -26.5 GHz)
Mode	Tx, Hopping Off, DH5 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.	114.050	QP	41.00	12.39	8.01	31.87	0.00	29.53	43.5	13.9	276	223	
Hori.	116.166	QP	42.60	12.70	8.03	31.87	0.00	31.46	43.5	12.0	269	227	
Hori.	118.275	QP	44.50	12.87	8.04	31.87	0.00	33.54	43.5	9.9	266	251	
Hori.	122.494	QP	41.00	13.25	8.10	31.86	0.00	30.49	43.5	13.0	269	239	
Hori.	124.610	QP	44.00	13.56	8.15	31.86	0.00	33.85	43.5	9.6	253	239	
Hori.	135.177	QP	41.90	14.18	8.38	31.85	0.00	32.61	43.5	10.8	259	242	
Hori.	552.967	QP	34.90	17.90	8.32	31.66	0.00	29.46	46.0	16.5	100	278	
Hori.	2483.500	PK	52.33	28.16	14.71	39.62	2.36	57.94	73.9	15.9	151	13	
Hori.	4960.000	PK	48.86	31.83	7.17	39.72	2.36	50.50	73.9	23.4	104	294	
Hori.	7440.000	PK	46.56	37.38	8.91	39.68	2.36	55.53	73.9	18.3	150	0	
Hori.	9920.000	PK	44.73	39.17	10.20	39.28	2.36	57.18	73.9	16.7	150	0	
Hori.	2483.500	AV	34.94	28.16	14.71	39.62	2.36	40.55	53.9	13.3	151	13	VBW: 360 Hz
Hori.	4960.000	AV	41.76	31.83	7.17	39.72	2.36	43.40	53.9	10.5	104	294	VBW: 360 Hz
Hori.	7440.000	AV	36.35	37.38	8.91	39.68	2.36	45.32	53.9	8.5	150	0	VBW: 360 Hz
Hori.	9920.000	AV	33.33	39.17	10.20	39.28	2.36	45.78	53.9	**8.1**	150	0	VBW: 360 Hz
Vert.	32.720	QP	32.40	17.62	6.90	31.93	0.00	24.99	40.0	15.0	100	5	
Vert.	124.614	QP	40.50	13.56	8.15	31.86	0.00	30.35	43.5	13.1	100	313	
Vert.	541.912	QP	37.10	17.72	8.27	31.65	0.00	31.44	46.0	14.5	118	252	
Vert.	2483.500	PK	48.61	28.16	14.71	39.62	2.36	54.22	73.9	19.6	285	241	
Vert.	4960.000	PK	48.34	31.83	7.17	39.72	2.36	49.98	73.9	23.9	114	350	
Vert.	7440.000	PK	45.23	37.38	8.91	39.68	2.36	54.20	73.9	19.7	150	0	
Vert.	9920.000	PK	45.30	39.17	10.20	39.28	2.36	57.75	73.9	16.1	150	0	
Vert.	2483.500	AV	34.32	28.16	14.71	39.62	2.36	39.93	53.9	13.9	285	241	VBW: 360 Hz
Vert.	4960.000	AV	41.61	31.83	7.17	39.72	2.36	43.25	53.9	10.6	114	350	VBW: 360 Hz
Vert.	7440.000	AV	33.77	37.38	8.91	39.68	2.36	42.74	53.9	11.1	150	0	VBW: 360 Hz
Vert.	9920.000	AV	33.00	39.17	10.20	39.28	2.36	45.45	53.9	8.4	150	0	VBW: 360 Hz

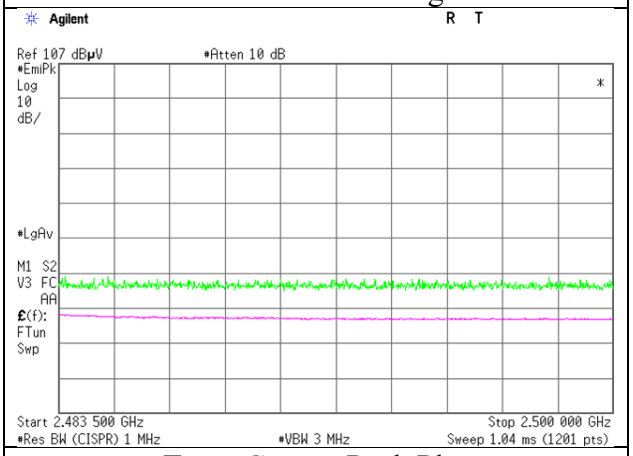
Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amprifier) + Distance factor
Distance factor : 1 GHz - 13 GHz : 20log (3.94 m / 3.0 m) = 2.36 dB
13 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB
* These results have sufficient margin without taking account Dwell time factor.

Radiated Spurious Emission
(Reference Plot for band-edge)

Report No.	12952598S-A-R1
Test place	Shonan EMC Lab.
Semi Anechoic Chamber	1
Date	September 24, 2019
Temperature / Humidity	25 deg. C / 56 % RH
Engineer	Hiromasa Sato (1 GHz -2.8 GHz)
Mode	Tx, Hopping Off, DH5 2480 MHz

Horizontal

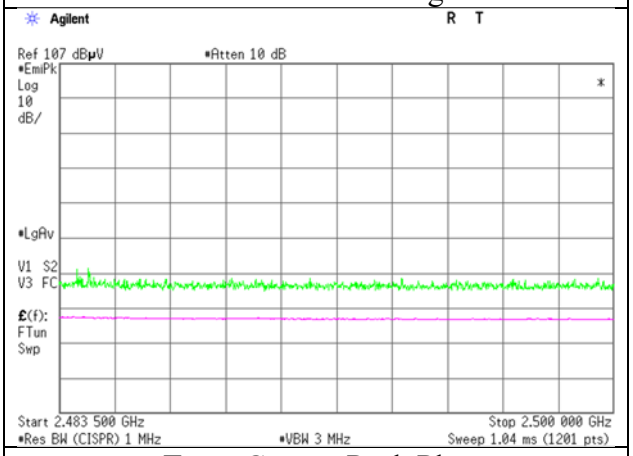
Restricted-band band-edge Plot



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

Report No.	12952598S-A-R1		
Test place	Shonan EMC Lab.		
Semi Anechoic Chamber	2	1	1
Date	October 3, 2019	September 24, 2019	September 25, 2019
Temperature / Humidity	21 deg. C / 61 % RH	25 deg. C / 56 % RH	24 deg. C / 53 % RH
Engineer	Kazuya Noda	Hiromasa Sato	Hiromasa Sato
	(30 MHz -1000 MHz)	(1 GHz -2.8 GHz)	(2.8 GHz -26.5 GHz)
Mode	Tx, Hopping Off, 3DH5 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.	114.047	QP	41.50	12.39	8.01	31.87	0.00	30.03	43.5	13.4	274	222	
Hori.	116.164	QP	42.40	12.70	8.03	31.87	0.00	31.26	43.5	12.2	269	227	
Hori.	118.279	QP	44.30	12.87	8.04	31.87	0.00	33.34	43.5	10.1	265	251	
Hori.	122.485	QP	41.50	13.25	8.10	31.86	0.00	30.99	43.5	12.5	272	241	
Hori.	124.612	QP	43.60	13.56	8.15	31.86	0.00	33.45	43.5	10.0	253	239	
Hori.	135.175	QP	41.80	14.18	8.38	31.85	0.00	32.51	43.5	10.9	253	239	
Hori.	552.959	QP	34.60	17.90	8.32	31.66	0.00	29.16	46.0	16.8	100	277	
Hori.	2390.000	PK	44.98	28.31	14.62	39.59	2.36	50.68	73.9	23.2	178	34	
Hori.	4804.000	PK	47.49	31.60	7.05	39.75	2.36	48.75	73.9	25.1	114	330	
Hori.	7206.000	PK	46.30	37.15	8.73	39.53	2.36	55.01	73.9	18.8	150	0	
Hori.	9608.000	PK	46.65	38.53	10.28	39.67	2.36	58.15	73.9	15.7	150	0	
Hori.	2390.000	AV	33.91	28.31	14.62	39.59	2.36	39.61	53.9	14.2	178	34	VBW: 360 Hz
Hori.	4804.000	AV	39.30	31.60	7.05	39.75	2.36	40.56	53.9	13.3	114	330	VBW: 360 Hz
Hori.	7206.000	AV	33.59	37.15	8.73	39.53	2.36	42.30	53.9	11.6	150	0	VBW: 360 Hz
Hori.	9608.000	AV	34.01	38.53	10.28	39.67	2.36	45.51	53.9	8.3	150	0	VBW: 360 Hz
Vert.	32.583	QP	32.70	17.68	6.90	31.93	0.00	25.35	40.0	14.6	100	5	
Vert.	124.611	QP	40.20	13.56	8.15	31.86	0.00	30.05	43.5	13.4	100	318	
Vert.	541.910	QP	36.50	17.72	8.27	31.65	0.00	30.84	46.0	15.1	125	251	
Vert.	2390.000	PK	46.13	28.31	14.62	39.59	2.36	51.83	73.9	22.0	261	253	
Vert.	4804.000	PK	49.41	31.60	7.05	39.75	2.36	50.67	73.9	23.2	117	329	
Vert.	7206.000	PK	46.21	37.15	8.73	39.53	2.36	54.92	73.9	18.9	150	0	
Vert.	9608.000	PK	46.05	38.53	10.28	39.67	2.36	57.55	73.9	16.3	150	0	
Vert.	2390.000	AV	33.13	28.31	14.62	39.59	2.36	38.83	53.9	15.0	261	253	VBW: 360 Hz
Vert.	4804.000	AV	42.89	31.60	7.05	39.75	2.36	44.15	53.9	9.7	117	329	VBW: 360 Hz
Vert.	7206.000	AV	33.41	37.15	8.73	39.53	2.36	42.12	53.9	11.7	150	0	VBW: 360 Hz
Vert.	9608.000	AV	34.27	38.53	10.28	39.67	2.36	45.77	53.9	**8.1**	150	0	VBW: 360 Hz

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amprifier) + Distance factor
Distance factor : 1 GHz - 13 GHz : 20log (3.94 m / 3.0 m) = 2.36 dB
13 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB
* These results have sufficient margin without taking account Dwell time factor.

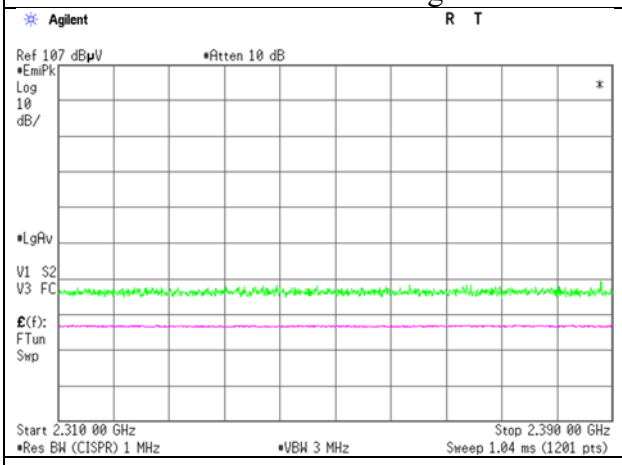
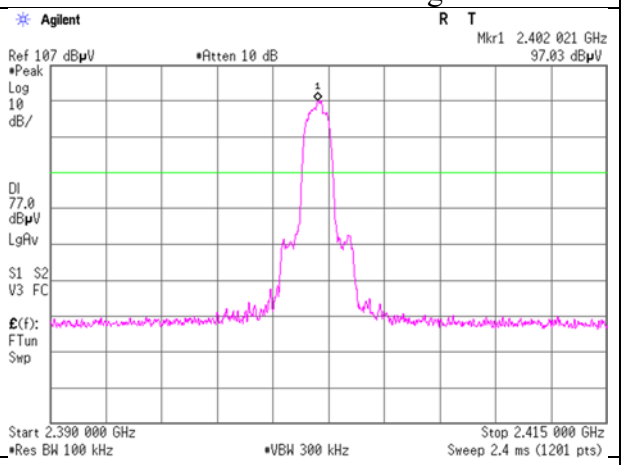
20 dBc Data Sheet (RBW 100 kHz, VBW 300 kHz)

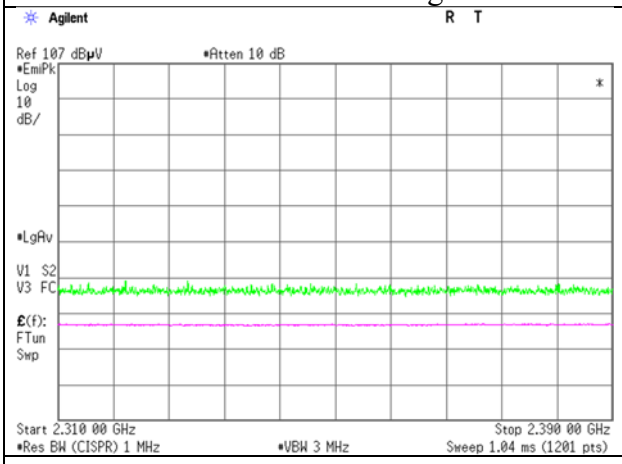
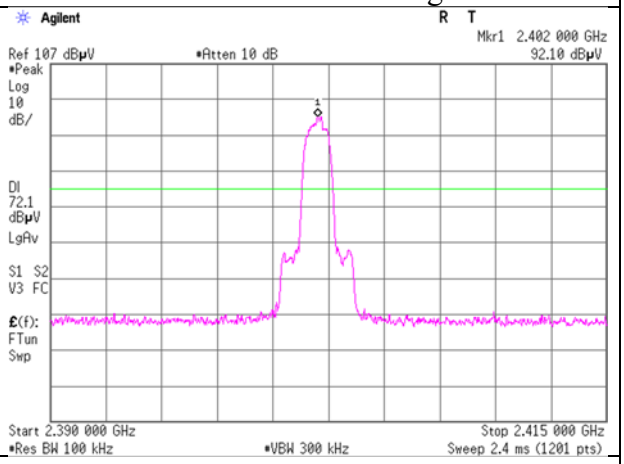
Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2402.000	PK	96.89	28.28	14.63	39.59	2.36	102.57	-	-	Carrier
Hori.	2400.000	PK	39.84	28.29	14.63	39.59	2.36	45.53	82.57	37.0	
Vert.	2402.000	PK	92.21	28.28	14.63	39.59	2.36	97.89	-	-	Carrier
Vert.	2400.000	PK	37.50	28.29	14.63	39.59	2.36	43.19	77.89	34.7	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amprifier) + Distance factor
Distance factor : 1 GHz - 13 GHz : 20log (3.94 m / 3.0 m) = 2.36 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.	12952598S-A-R1
Test place	Shonan EMC Lab.
Semi Anechoic Chamber	1
Date	September 24, 2019
Temperature / Humidity	25 deg. C / 56 % RH
Engineer	Hiromasa Sato (1 GHz -2.8 GHz)
Mode	Tx, Hopping Off, 3DH5 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.	12952598S-A-R1		
Test place	Shonan EMC Lab.		
Semi Anechoic Chamber	2	1	1
Date	October 3, 2019	September 24, 2019	September 25, 2019
Temperature / Humidity	21 deg. C / 61 % RH	25 deg. C / 56 % RH	24 deg. C / 53 % RH
Engineer	Kazuya Noda	Hiromasa Sato	Hiromasa Sato
	(30 MHz -1000 MHz)	(1 GHz -2.8 GHz)	(2.8 GHz -26.5 GHz)
Mode	Tx, Hopping Off, 3DH5 2441 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.	114.048	QP	41.10	12.39	8.01	31.87	0.00	29.63	43.5	13.8	272	226	
Hori.	116.166	QP	42.50	12.70	8.03	31.87	0.00	31.36	43.5	12.1	268	227	
Hori.	118.280	QP	44.60	12.87	8.04	31.87	0.00	33.64	43.5	9.8	267	247	
Hori.	122.485	QP	40.40	13.25	8.10	31.86	0.00	29.89	43.5	13.6	271	238	
Hori.	124.611	QP	43.90	13.56	8.15	31.86	0.00	33.75	43.5	9.7	253	243	
Hori.	135.176	QP	41.80	14.18	8.38	31.85	0.00	32.51	43.5	10.9	264	245	
Hori.	552.971	QP	34.90	17.90	8.32	31.66	0.00	29.46	46.0	16.5	100	279	
Hori.	4882.000	PK	47.68	31.66	7.11	39.74	2.36	49.07	73.9	24.8	108	329	
Hori.	7323.000	PK	45.52	37.24	8.83	39.60	2.36	54.35	73.9	19.5	150	0	
Hori.	9764.000	PK	44.39	39.13	10.24	39.48	2.36	56.64	73.9	17.2	150	0	
Hori.	4882.000	AV	39.45	31.66	7.11	39.74	2.36	40.84	53.9	13.0	108	329	VBW: 360 Hz
Hori.	7323.000	AV	33.26	37.24	8.83	39.60	2.36	42.09	53.9	11.8	150	0	VBW: 360 Hz
Hori.	9764.000	AV	33.62	39.13	10.24	39.48	2.36	45.87	53.9	**8.0**	150	0	VBW: 360 Hz
Vert.	32.731	QP	33.20	17.61	6.90	31.93	0.00	25.78	40.0	14.2	100	7	
Vert.	124.612	QP	40.60	13.56	8.15	31.86	0.00	30.45	43.5	13.0	100	317	
Vert.	541.911	QP	36.50	17.72	8.27	31.65	0.00	30.84	46.0	15.1	120	248	
Vert.	4882.000	PK	47.74	31.66	7.11	39.74	2.36	49.13	73.9	24.7	106	342	
Vert.	7323.000	PK	45.39	37.24	8.83	39.60	2.36	54.22	73.9	19.6	150	0	
Vert.	9764.000	PK	45.93	39.13	10.24	39.48	2.36	58.18	73.9	15.7	150	0	
Vert.	4882.000	AV	38.31	31.66	7.11	39.74	2.36	39.70	53.9	14.2	106	342	VBW: 360 Hz
Vert.	7323.000	AV	33.32	37.24	8.83	39.60	2.36	42.15	53.9	11.7	150	0	VBW: 360 Hz
Vert.	9764.000	AV	33.63	39.13	10.24	39.48	2.36	45.88	53.9	**8.0**	150	0	VBW: 360 Hz

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amprifier) + Distance factor
Distance factor : 1 GHz - 13 GHz : 20log (3.94 m / 3.0 m) = 2.36 dB
13 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB
* These results have sufficient margin without taking account Dwell time factor.

Radiated Spurious Emission

Report No.	12952598S-A-R1		
Test place	Shonan EMC Lab.		
Semi Anechoic Chamber	2	1	1
Date	October 3, 2019	September 24, 2019	September 25, 2019
Temperature / Humidity	21 deg. C / 61 % RH	25 deg. C / 56 % RH	24 deg. C / 53 % RH
Engineer	Kazuya Noda	Hiromasa Sato	Hiromasa Sato
	(30 MHz -1000 MHz)	(1 GHz -2.8 GHz)	(2.8 GHz -26.5 GHz)
Mode	Tx, Hopping Off, 3DH5 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.	114.047	QP	41.00	12.39	8.01	31.87	0.00	29.53	43.5	13.9	272	223	
Hori.	116.167	QP	42.40	12.70	8.03	31.87	0.00	31.26	43.5	12.2	270	226	
Hori.	118.278	QP	44.40	12.87	8.04	31.87	0.00	33.44	43.5	10.0	267	257	
Hori.	122.489	QP	40.20	13.25	8.10	31.86	0.00	29.69	43.5	13.8	269	238	
Hori.	124.613	QP	43.80	13.56	8.15	31.86	0.00	33.65	43.5	9.8	250	240	
Hori.	135.175	QP	41.90	14.18	8.38	31.85	0.00	32.61	43.5	10.8	261	246	
Hori.	552.952	QP	34.70	17.90	8.32	31.66	0.00	29.26	46.0	16.7	100	279	
Hori.	2483.500	PK	52.63	28.16	14.71	39.62	2.36	58.24	73.9	15.6	154	24	
Hori.	4960.000	PK	47.05	31.83	7.17	39.72	2.36	48.69	73.9	25.2	114	313	
Hori.	7440.000	PK	46.01	37.38	8.91	39.68	2.36	54.98	73.9	18.9	150	0	
Hori.	9920.000	PK	46.45	39.17	10.20	39.28	2.36	58.90	73.9	15.0	150	0	
Hori.	2483.500	AV	34.98	28.16	14.71	39.62	2.36	40.59	53.9	13.3	154	24	VBW: 360 Hz
Hori.	4960.000	AV	35.75	31.83	7.17	39.72	2.36	37.39	53.9	16.5	114	313	VBW: 360 Hz
Hori.	7440.000	AV	33.27	37.38	8.91	39.68	2.36	42.24	53.9	11.6	150	0	VBW: 360 Hz
Hori.	9920.000	AV	33.95	39.17	10.20	39.28	2.36	46.40	53.9	**7.5**	150	0	VBW: 360 Hz
Vert.	32.583	QP	32.30	17.68	6.90	31.93	0.00	24.95	40.0	15.0	100	7	
Vert.	124.613	QP	40.60	13.56	8.15	31.86	0.00	30.45	43.5	13.0	100	318	
Vert.	541.912	QP	36.70	17.72	8.27	31.65	0.00	31.04	46.0	14.9	117	252	
Vert.	2483.500	PK	48.96	28.16	14.71	39.62	2.36	54.57	73.9	19.3	275	248	
Vert.	4960.000	PK	46.87	31.83	7.17	39.72	2.36	48.51	73.9	25.3	107	355	
Vert.	7440.000	PK	45.67	37.38	8.91	39.68	2.36	54.64	73.9	19.2	150	0	
Vert.	9920.000	PK	45.50	39.17	10.20	39.28	2.36	57.95	73.9	15.9	150	0	
Vert.	2483.500	AV	34.10	28.16	14.71	39.62	2.36	39.71	53.9	14.1	275	248	VBW: 360 Hz
Vert.	4960.000	AV	36.19	31.83	7.17	39.72	2.36	37.83	53.9	16.0	107	355	VBW: 360 Hz
Vert.	7440.000	AV	33.43	37.38	8.91	39.68	2.36	42.40	53.9	11.5	150	0	VBW: 360 Hz
Vert.	9920.000	AV	33.27	39.17	10.20	39.28	2.36	45.72	53.9	8.1	150	0	VBW: 360 Hz

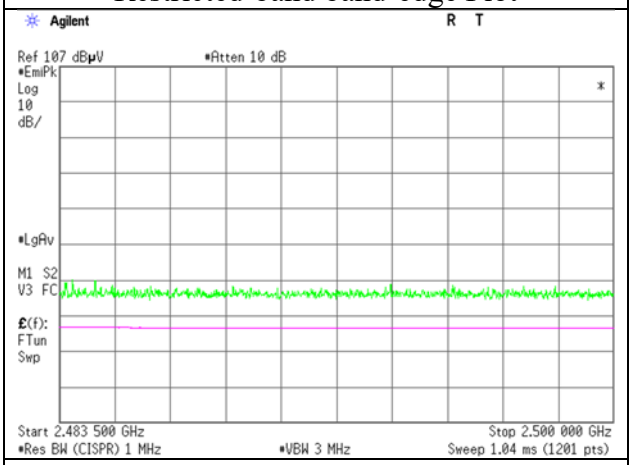
Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amprifier) + Distance factor
Distance factor : 1 GHz - 13 GHz : 20log (3.94 m / 3.0 m) = 2.36 dB
13 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB
* These results have sufficient margin without taking account Dwell time factor.

Radiated Spurious Emission
(Reference Plot for band-edge)

Report No.	12952598S-A-R1
Test place	Shonan EMC Lab.
Semi Anechoic Chamber	1
Date	September 24, 2019
Temperature / Humidity	25 deg. C / 56 % RH
Engineer	Hiromasa Sato (1 GHz -2.8 GHz)
Mode	Tx, Hopping Off, 3DH5 2480 MHz

Horizontal

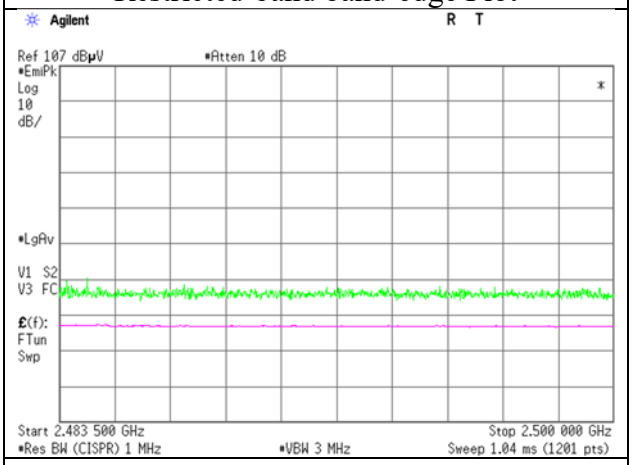
Restricted-band band-edge Plot



Trace Green : Peak Plot
Trace Purple : Average Plot

Vertical

Restricted-band band-edge Plot

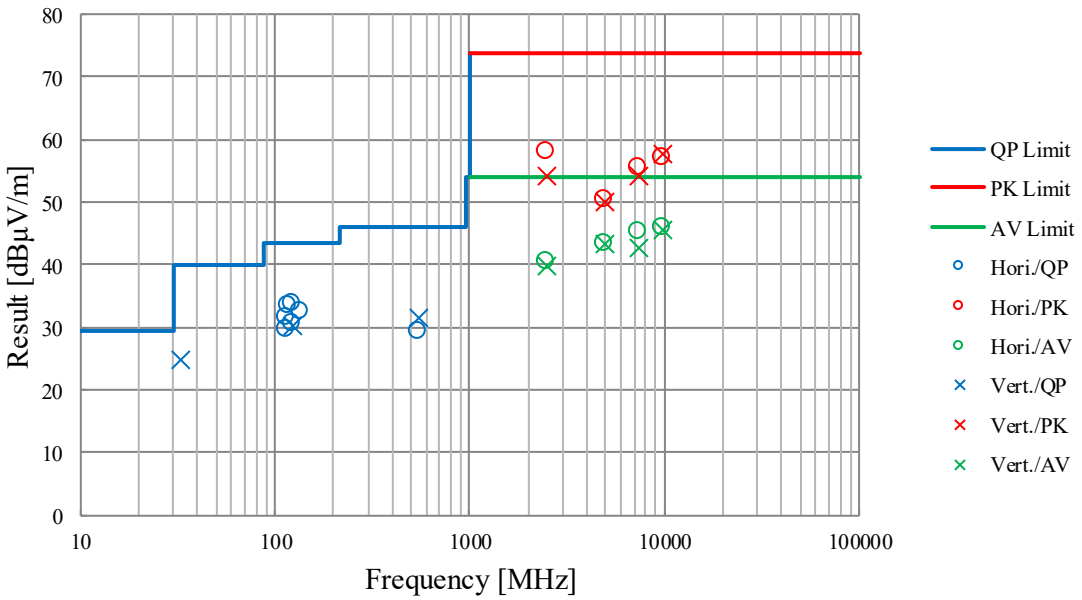


Trace Green : Peak Plot
Trace Purple : Average Plot

* 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.	12952598S-A-R1		
Test place	Shonan EMC Lab.		
Semi Anechoic Chamber	2	1	1
Date	October 3, 2019	September 24, 2019	September 25, 2019
Temperature / Humidity	21 deg. C / 61 % RH	25 deg. C / 56 % RH	24 deg. C / 53 % RH
Engineer	Kazuya Noda	Hiromasa Sato	Hiromasa Sato
	(30 MHz -1000 MHz)	(1 GHz -2.8 GHz)	(2.8 GHz -26.5 GHz)
Mode	Tx, Hopping Off, DH5 2480 MHz		



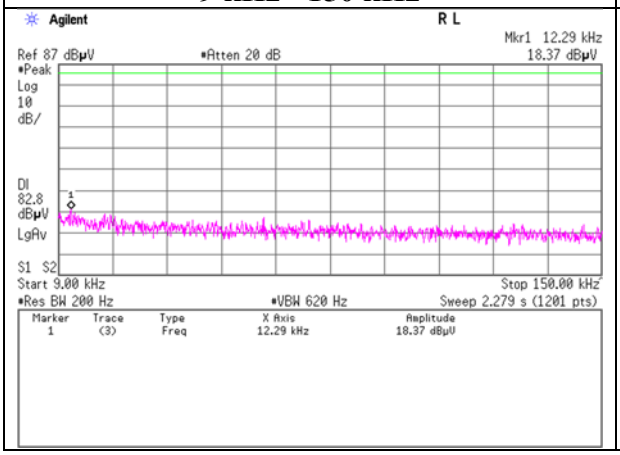
*These plots data contains sufficient number to show the trend of characteristic features for EUT.

Conducted Spurious Emission

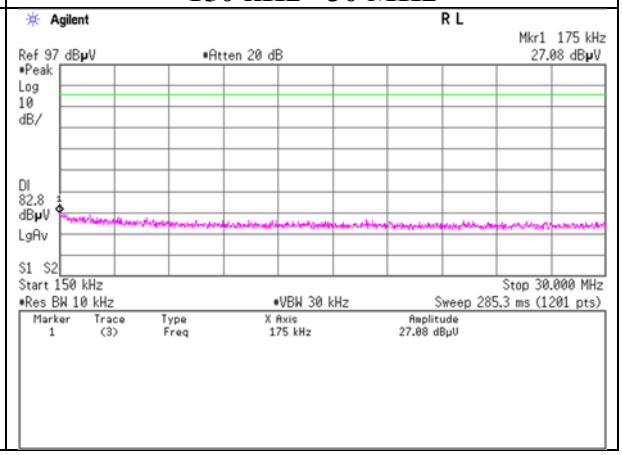
Report No.	12952598S-A-R1
Test place	Shonan EMC Lab. No.5 Shielded Room
Date	September 20, 2019
Temperature / Humidity	24 deg. C / 54 % RH
Engineer	Takahiro Kawakami
Mode	Tx, Hopping Off, DH5

2402 MHz

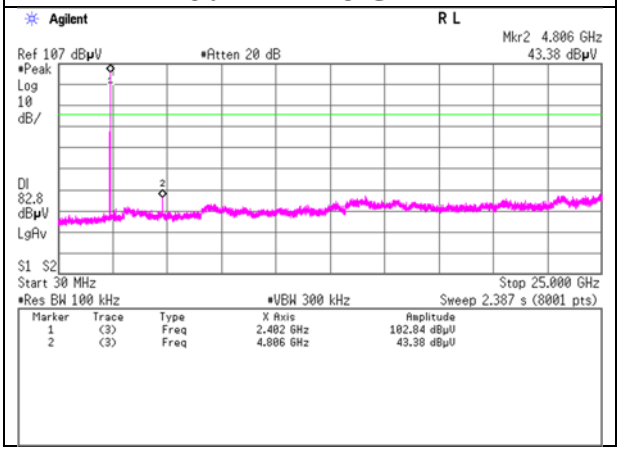
9 kHz - 150 kHz



150 kHz - 30 MHz



30 MHz - 25 GHz

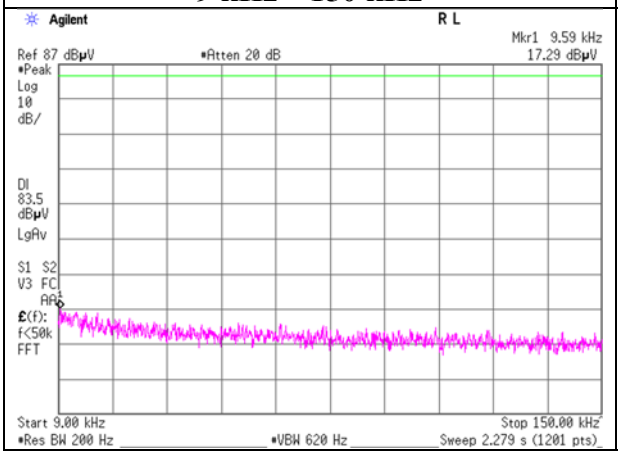


Conducted Spurious Emission

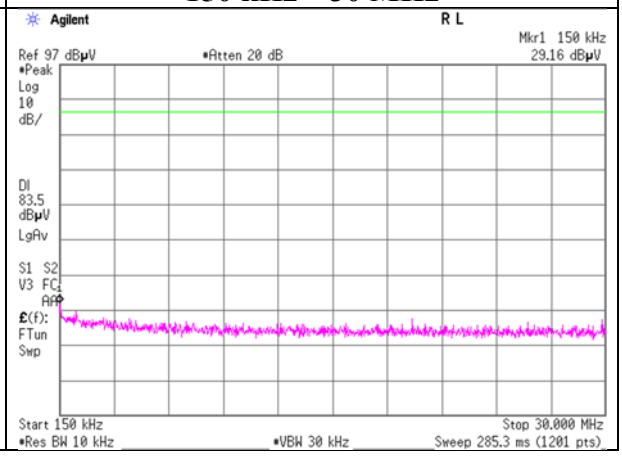
Report No.	12952598S-A-R1
Test place	Shonan EMC Lab. No.5 Shielded Room
Date	September 20, 2019
Temperature / Humidity	24 deg. C / 54 % RH
Engineer	Takahiro Kawakami
Mode	Tx, Hopping Off, DH5

2441 MHz

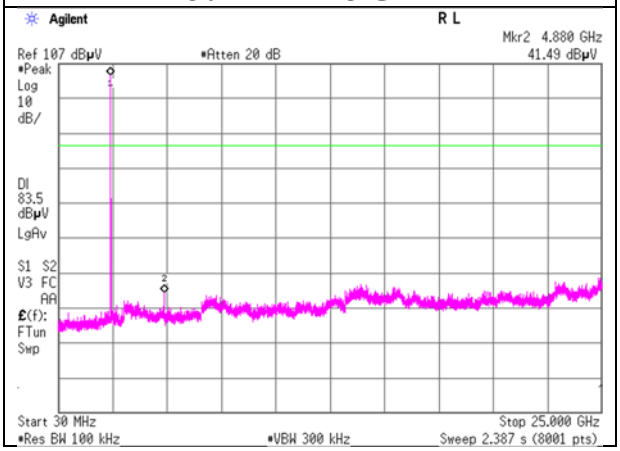
9 kHz – 150 kHz



150 kHz – 30 MHz



30 MHz – 25 GHz

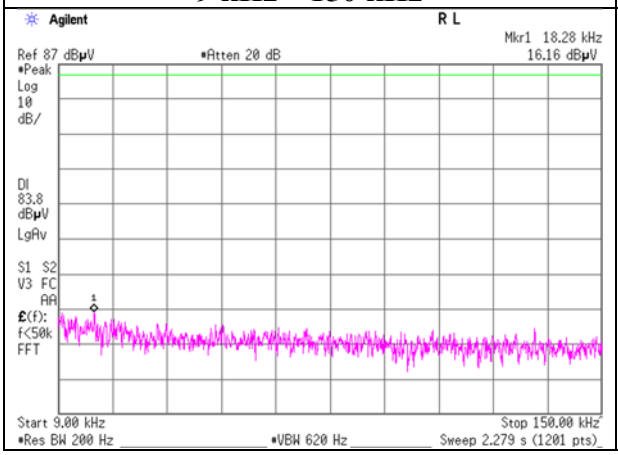


Conducted Spurious Emission

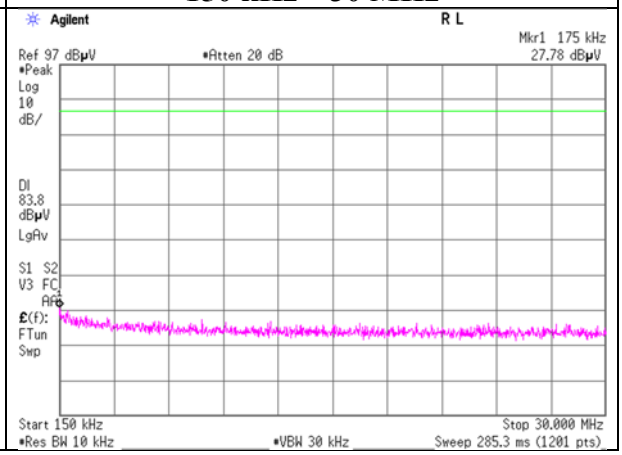
Report No.	12952598S-A-R1
Test place	Shonan EMC Lab. No.5 Shielded Room
Date	September 20, 2019
Temperature / Humidity	24 deg. C / 54 % RH
Engineer	Takahiro Kawakami
Mode	Tx, Hopping Off, DH5

2480 MHz

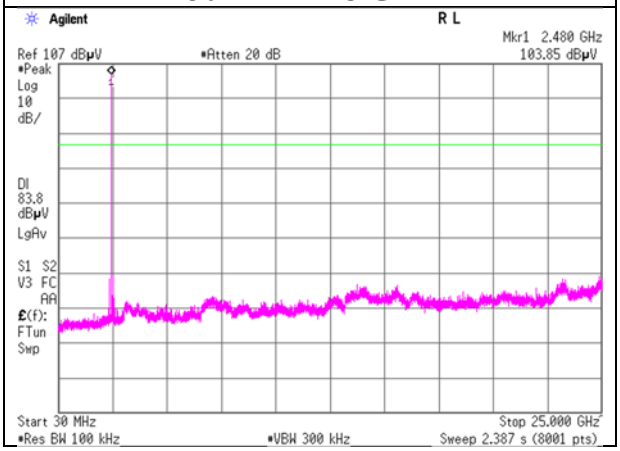
9 kHz – 150 kHz



150 kHz – 30 MHz



30 MHz – 25 GHz

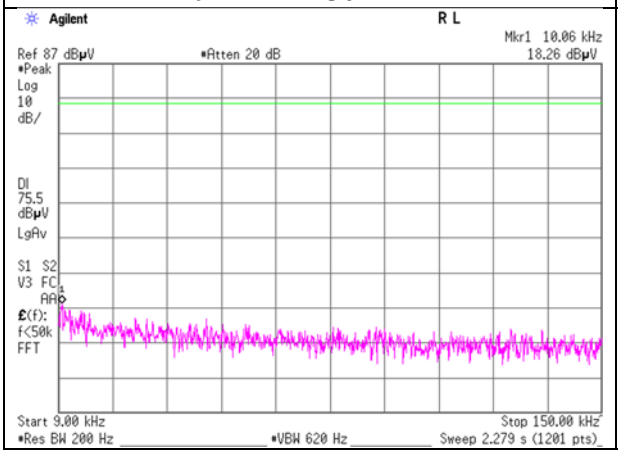


Conducted Spurious Emission

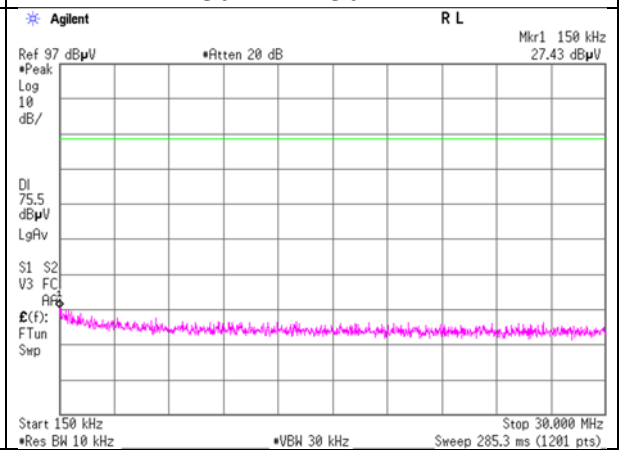
Report No.	12952598S-A-R1
Test place	Shonan EMC Lab. No.5 Shielded Room
Date	September 20, 2019
Temperature / Humidity	24 deg. C / 54 % RH
Engineer	Takahiro Kawakami
Mode	Tx, Hopping Off, 3DH5

2402 MHz

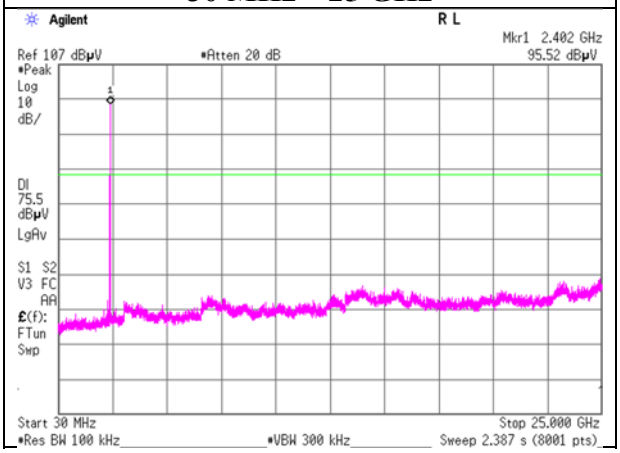
9 kHz – 150 kHz



150 kHz – 30 MHz



30 MHz – 25 GHz

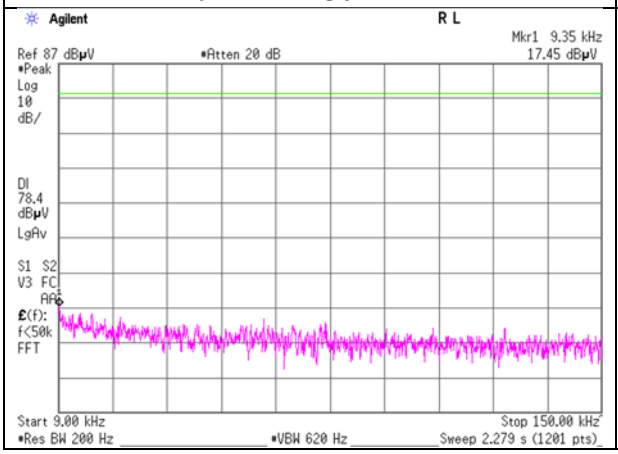


Conducted Spurious Emission

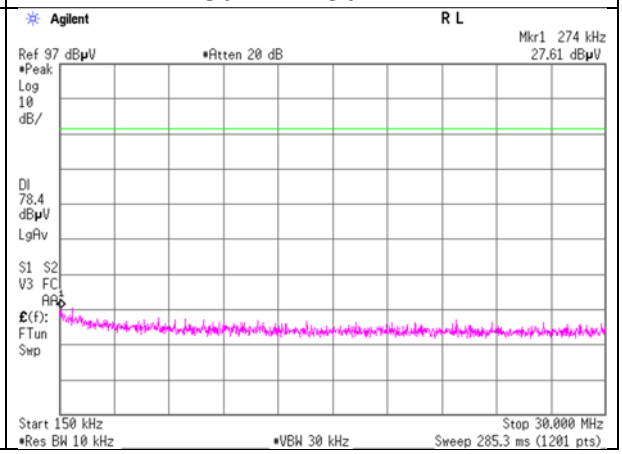
Report No.	12952598S-A-R1
Test place	Shonan EMC Lab. No.5 Shielded Room
Date	September 20, 2019
Temperature / Humidity	24 deg. C / 54 % RH
Engineer	Takahiro Kawakami
Mode	Tx, Hopping Off, 3DH5

2441 MHz

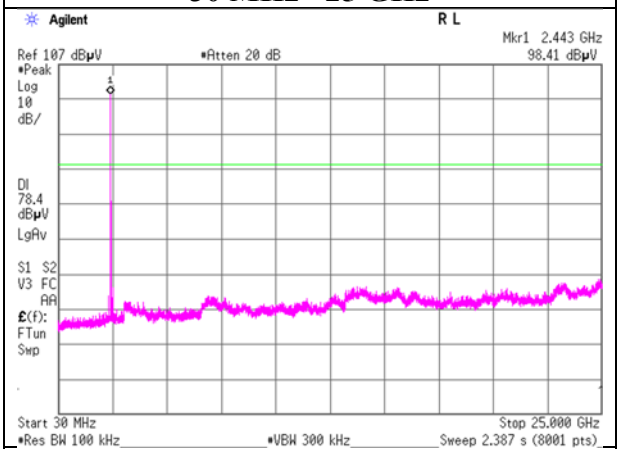
9 kHz - 150 kHz



150 kHz - 30 MHz



30 MHz - 25 GHz

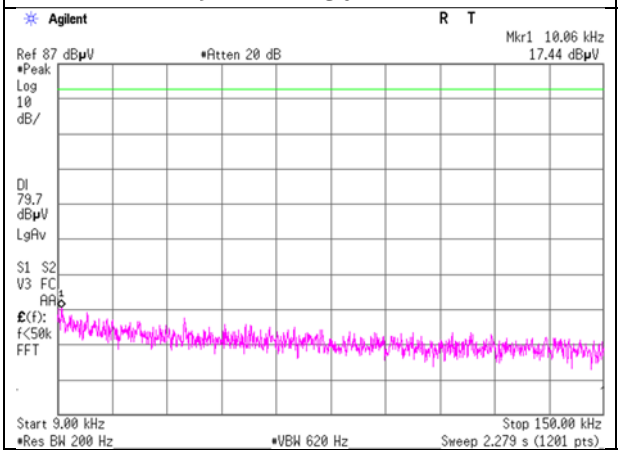


Conducted Spurious Emission

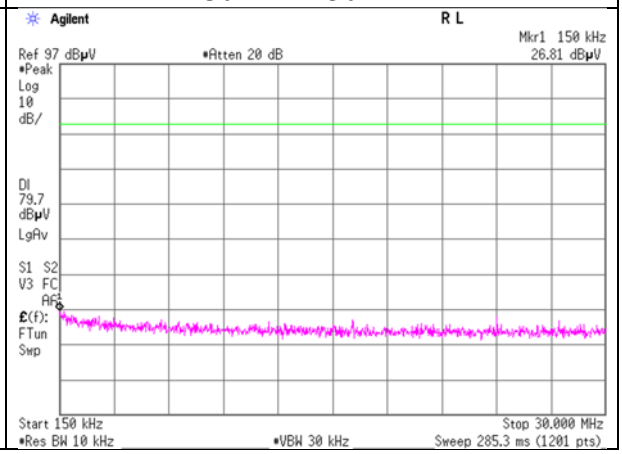
Report No.	12952598S-A-R1
Test place	Shonan EMC Lab. No.5 Shielded Room
Date	September 20, 2019
Temperature / Humidity	24 deg. C / 54 % RH
Engineer	Takahiro Kawakami
Mode	Tx, Hopping Off, 3DH5

2480 MHz

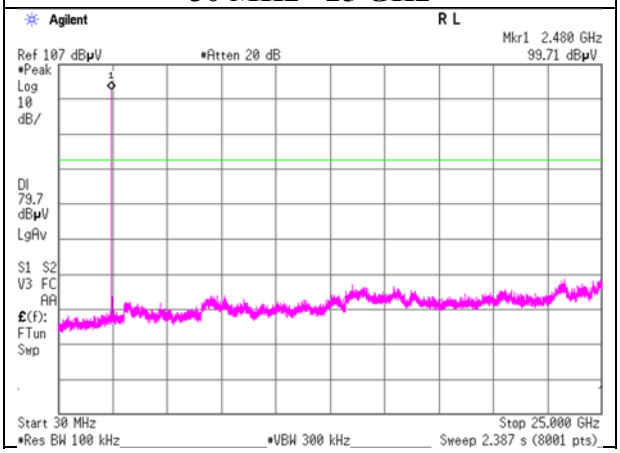
9 kHz - 150 kHz



150 kHz - 30 MHz



30 MHz - 25 GHz

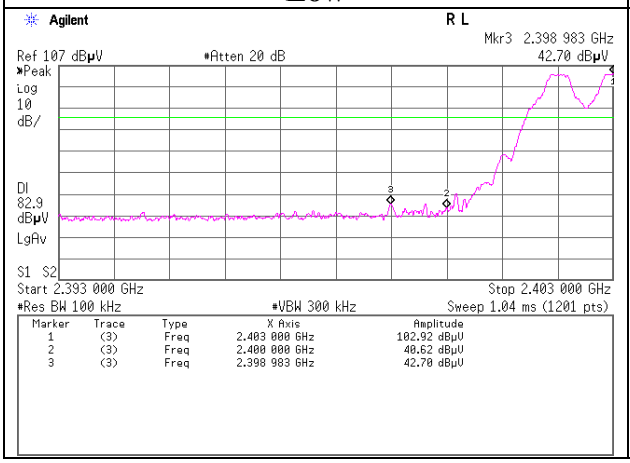


Conducted Emission Band Edge compliance

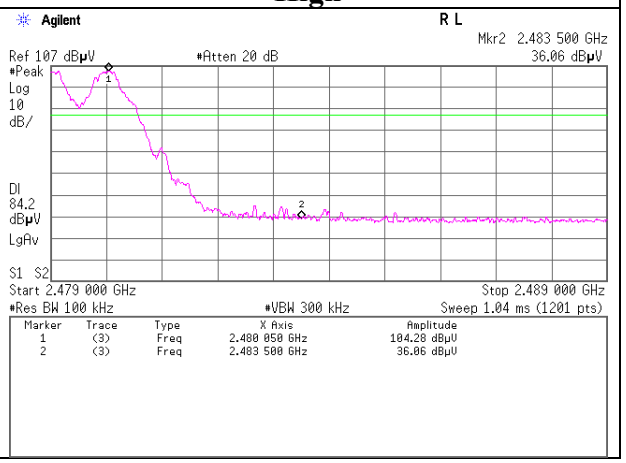
Report No.	12952598S-A-R1
Test place	Shonan EMC Lab. No.5 Shielded Room
Date	September 20, 2019
Temperature / Humidity	24 deg. C / 54 % RH
Engineer	Takahiro Kawakami
Mode	Tx, DH5

Hopping On

Low



High



Hopping Off

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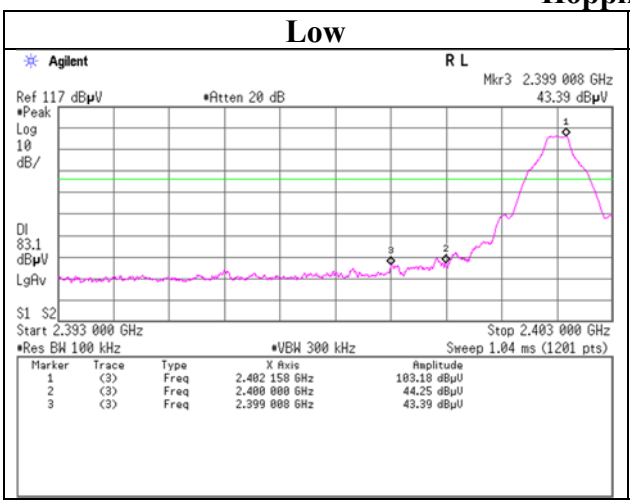

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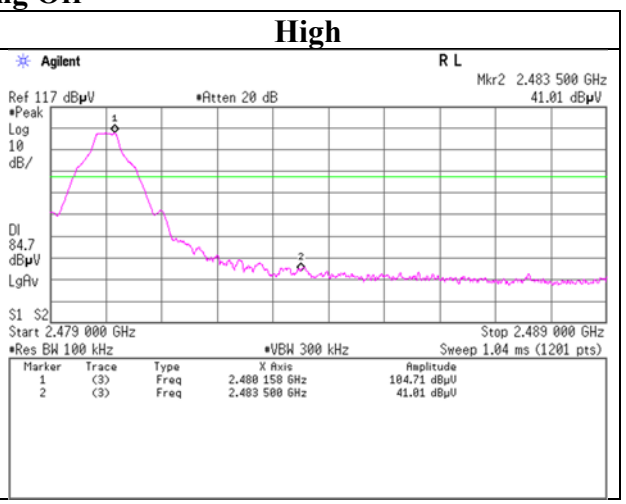
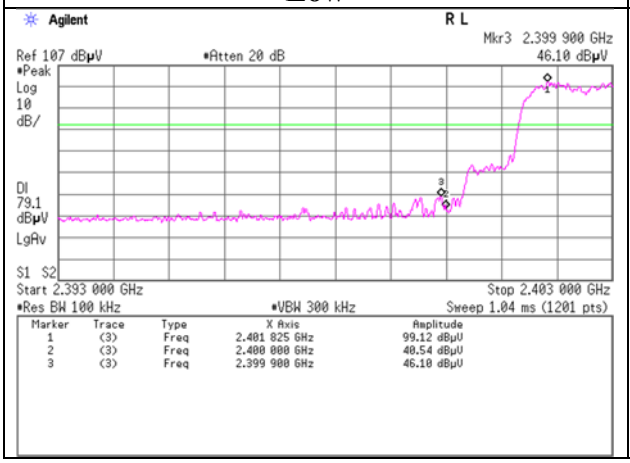


Conducted Emission Band Edge compliance

Report No.	12952598S-A-R1
Test place	Shonan EMC Lab. No.5 Shielded Room
Date	September 20, 2019
Temperature / Humidity	24 deg. C / 54 % RH
Engineer	Takahiro Kawakami
Mode	Tx, 3DH5

Hopping On

Low



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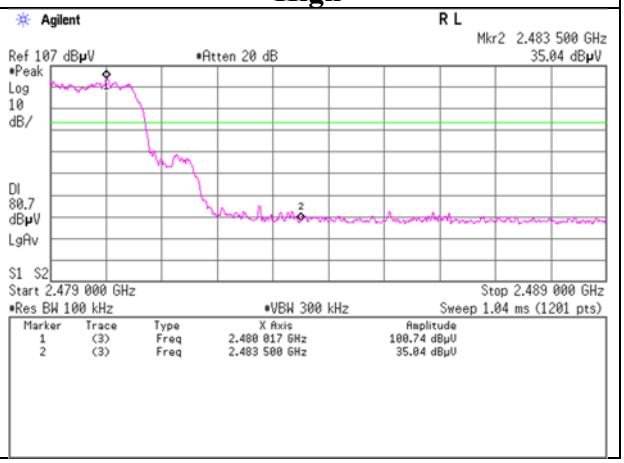

Hopping Off

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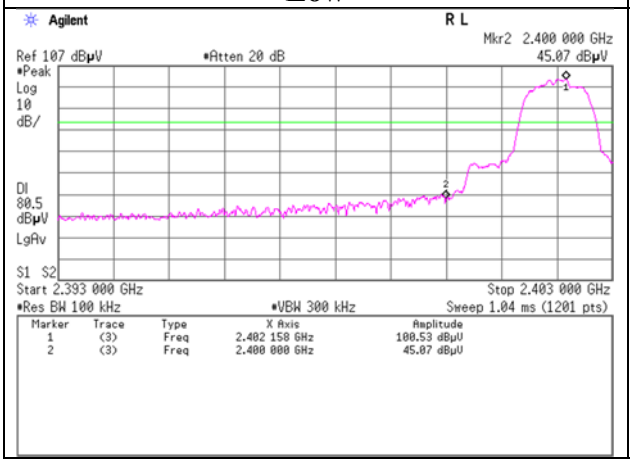

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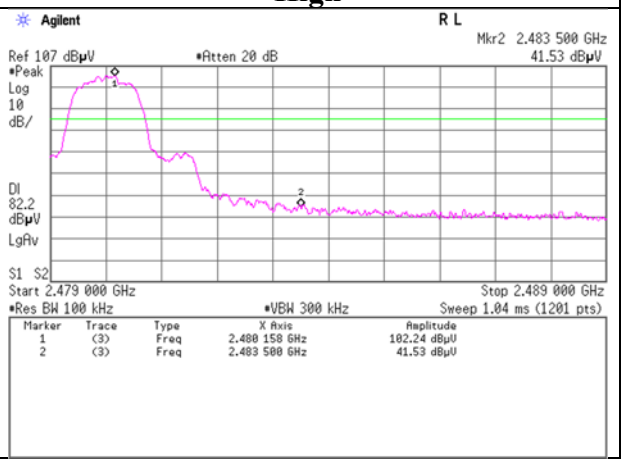

APPENDIX 2: Test instruments

Test Instruments

Local ID	Test Name	LIMS ID	Description	Manufacturer	Model	Serial	Last Calibration Date	Calibration Due Date	Calibration Interval (Month)
KTS-07	AT	145111	Digital Tester	SANWA	PC500	7019232	2019/10/1	2020/10/31	12
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-07	AT	146247	Power Meter	AGILENT	8990B	MY5100272	2019/7/16	2020/7/31	12
SPSS-04	AT	146310	Power sensor	AGILENT	N1923A	MY5326009	2019/7/16	2020/7/31	12
SSA-03	AT,RE	145801	Spectrum Analyzer	AGILENT	E4448A	MY48250152	2019/8/8	2020/8/31	12
COTS-SEMI-5	RE	170932	EMI Software	TSJ	TEPTO-DV3(RE,CE,ME,PE)	-	-	-	-
KJM-09	RE	145929	Measure	KOMELON	KMC-36	-	-	-	-
SAEC-01(NSA)	RE	145597	Semi-Anechoic Chamber	TDK	SAEC-01(NSA)	1	2019/4/2	2020/4/30	12
SAEC-01(SVSWR)	RE	145561	Semi-Anechoic Chamber	TDK	SAEC-01(SVSWR)	1	2019/5/6	2020/5/30	12
SAEC-02(NSA)	RE	145563	Semi-Anechoic Chamber	TDK	SAEC-02(NSA)	2	2019/4/4	2020/4/30	12
SAF-02	RE	145004	Pre Amplifier	SONOMA	310N	290212	2019/2/5	2020/2/29	12
SAF-04	RE	145127	Pre Amplifier	Toyo Corporation	TPA0118-36	2072554	2019/6/4	2020/6/30	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
SAT3-11	RE	150921	Attenuator	JFW	50HF-003N	-	2019/1/25	2020/1/31	12
SAT6-14	RE	167095	Attenuator	JFW	50HF-006N	-	2019/2/5	2020/2/29	12
SBA-02	RE	145022	Biconical Antenna	Schwarzbeck	BBA9106	91032665	2019/4/1	2020/4/30	12
SCC-B1/B3/B5/B7/B8/B13/SRSE-02	RE	144975	Coaxial Cable&RF Selector	Fujikura/Fujikura/Suhner/Suhner/Suhner/Suhner/TOYO	8D2W/12DSFA/141PE/141PE/141PE/141P	-/0901-270(RF Selector)	2019/4/19	2020/4/30	12
SCC-B2/B4/B6/B7/B8/B13/SRSE-02	RE	144976	Coaxial Cable&RF Selector	Fujikura/Fujikura/Suhner/Suhner/Suhner/Suhner/TOYO	8D2W/12DSFA/141PE/141PE/141PE/141P	-/0901-270(RF Selector)	2019/4/19	2020/4/30	12
SCC-G05	RE	145039	Coaxial Cable	Junkosha	J12J102207-00	APR-30-15-037	2019/1/25	2020/1/31	12
SCC-G15	RE	145176	Coaxial Cable	Suhner	SUCOFLEX 102	32703/2	2019/3/27	2020/3/31	12
SCC-G41	RE	151617	Coaxial Cable	Junkosha	MWX221-01000NFSNMS/B	1612S006	2019/1/25	2020/1/31	12
SCC-G56	RE	179539	Coaxial Cable	Huber+Suhner	SUCOFLEX 104	803289/4	2019/5/16	2020/5/31	12
SCC-G57	RE	179540	Coaxial Cable	Huber+Suhner	SUCOFLEX 102	802815/2	2019/5/16	2020/5/31	12
SFL-18	RE	145305	Highpass Filter	MICRO-TRONICS	HPM50111	119	2019/4/16	2020/4/30	12
SHA-01	RE	145383	Horn Antenna	Schwarzbeck	BBHA9120D	9120D-725	2019/5/9	2020/5/31	12
SHA-04	RE	145512	Horn Antenna	ETS LINDGREN	3160-09	00094868	2019/6/26	2020/6/30	12

Local ID	Test Name	LIMS ID	Description	Manufacturer	Model	Serial	Last Calibration Date	Calibration Due Date	Calibration Interval (Month)
SJM-09	RE	145336	Measure	PROMART	SEN1935	-	-	-	-
SLA-06	RE	145528	Logperiodic Antenna	Schwarzbeck	VUSLP9111B	195	2019/4/1	2020/4/30	12
SOS-01	RE	146316	Humidity Indicator	A&D	AD-5681	4062555	2018/10/25	2019/10/31	12
SOS-03	RE	146317	Humidity Indicator	A&D	AD-5681	4063325	2018/10/25	2019/10/31	12
STR-07	RE	146209	Test Receiver	Rohde & Schwarz	ESU26	100484	2019/9/13	2020/9/30	12
STS-01	RE	145792	Digital Hitester	HIOKI	3805-50	80997812	2019/10/1	2020/10/31	12
STS-02	RE	145793	Digital Hitester	HIOKI	3805-50	80997819	2019/4/2	2020/4/30	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