RADIO TEST REPORT

Test Report No. : 13153638S-C-R1

Applicant	:	**Yokogawa Electric Corporation**
Type of EUT	:	**Wireless Communication Module**
Model Number of EUT	:	**XS110A**
FCC ID	:	**SGJ-WFC017**
Test regulation	:	**FCC Part 15 Subpart C: 2020** * Tx 500 kHz mode
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.
10. This report is a revised version of 13153638S-C. 13153638S-C is replaced with this report.

Date of test: February 14 to 17, 2020

Representative test engineer:

Hiromasa Sato
Engineer
Consumer Technology Division

Approved by:

Kazutaka Takeyama
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".

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REVISION HISTORY

Original Test Report No.: 13153638S-C

Revision	Test report No.	Date	Page revised	Contents
- (Original)	13153638S-C	April 17, 2020	-	-
1	13153638S-C-R1	May 13, 2020	1	Update of test specification From "FCC Part 15 Subpart C: 2019" To "FCC Part 15 Subpart C: 2020"
			6	Update of test specification From "FCC Part 15 final revised on July 19, 2019 and effective August 19, 2019 except 15.258" To "FCC Part 15 final revised on April 1, 2020 and effective June 1, 2020 except 15.258 * The revision does not affect the test result conducted before its effective date."
			13	Addition of remarks "*5)"

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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

CONTENTS **PAGE**

SECTION 1: Customer information

Company Name	:	Yokogawa Electric Corporation
Address	:	2-9-32 Nakacho, Musashino-shi, Tokyo 180-8750 Japan
Telephone Number	:	+81-422-52-5885
Facsimile Number	:	+81-422-52-2102
Contact Person	:	Atsunori Okada

The information provided from the customer is as follows;
- Applicant, Type of EUT, Model Number of EUT, 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 (EUT)
- SECTION 4: Operation of EUT 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 (EUT)

2.1 Identification of EUT

Type of Equipment	:	Wireless Communication Module
Model No.	:	XS110A
Serial No.	:	Refer to SECTION 4.2
Rating	:	DC 3.6 V
Receipt Date of Sample (Information from test lab.)	:	January 30, 2020
Country of Mass-production	:	Japan
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: XS110A (referred to as the EUT in this report) is a Wireless Communication Module.

General Specification

Clock frequencies in the system	:	CPU: 11 MHz External CLK HIGH: 12 MHz External CLK LOW: 32.768 kHz TCXO: 32 MHz

Radio Specification

Radio Type	:	Transceiver
Frequency of Operation	:	902 MHz - 928 MHz * 902.3 MHz - 914.9 MHz (Tx 125 kHz mode) * 903.0 MHz - 914.2 MHz (Tx 500 kHz mode)
Modulation	:	LoRa, CSS
Antenna type	:	Built-in omni-directinal antenna
Antenna Gain	:	-1.4 dBi
Clock frequency (Maximum)	:	-40 deg.C to +85 deg.C

SECTION 3: Test specification, procedures & results

3.1 Test Specification

Test Specification	:	FCC Part 15 Subpart C FCC Part 15 final revised on April 1, 2020 and effective June 1, 2020 except 15.258 * The revision does not affect the test result conducted before its effective date.
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	*1)
	ISED: RSS-Gen 8.8	**ISED:** RSS-Gen 8.8			
6 dB 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)	7.4 dB 9078.000 MHz, AV, Hori. Tx 907.8 MHz	Complied d), e)	Conducted (below 30 MHz)/ 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 has no AC mains.
*2) 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 is a battery-operated device and test was performed with the full-charged battery. Therefore, this 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 antenna 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
Conducted emission (AC Mains) LISN	150 kHz-30 MHz	2.6 dB	2.6 dB	2.5 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.

3.5 Test Location

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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

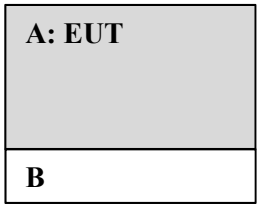
Refer to APPENDIX.

SECTION 4: Operation of EUT during testing

4.1 Operating Mode(s)

Mode	Tested frequency *1)
Tx (Transmitting), 500 kHz mode, SF8	903.0 MHz, 907.8 MHz, 914.2 MHz
*1) Tested frequency (Low channel/Middle channel/High channel) has been chosen from Tx 500 kHz mode. *Transmitting duty was 100 % on all tests.	
*Power of the EUT was set by the software as follows; Power settings: fixed Software (Firmware): XS110A Wireless Communication Module Version: R0.21.01r (Date: 2020/1/28) *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



* Test data was taken under worse case conditions.

Description of EUT

No.	Item	Model number	Serial number	Manufacturer	Remarks
A	Wireless Communication Module	XS110A	91V809468	Yokogawa Electric Corporation	EUT
B	Connector cover	-	-	Yokogawa Electric Corporation	-

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 urethane platform of nominal size, 1.0 m by 1.5 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.

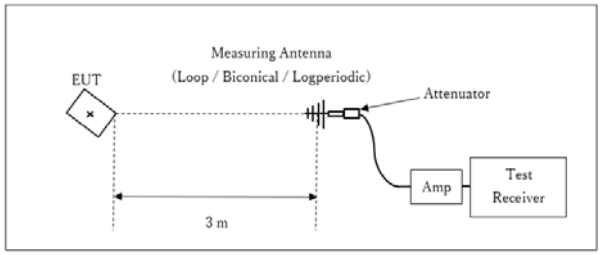
20 dBc was applied to the frequency over the limit of FCC 15.209 / Table 4 of RSS-Gen 8.9(ISED) and outside the restricted band of FCC15.205 / Table 6 of RSS-Gen 8.10 (ISED).

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 2: Test Setup

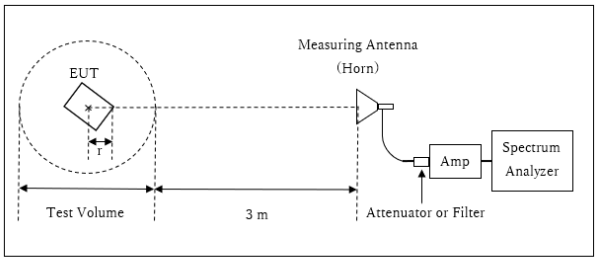
Below 1 GHz



× : Center of turn table

Test Distance: 3 m

1 GHz - 10 GHz



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

Distance Factor: 20 x log (3.93 m / 3.0 m) = 2.35 dB
* Test Distance: (3 + Test Volume /2) - r = 3.93 m

Test Volume : 2.0 m
(Test Volume has been calibrated based on CISPR 16-1-4.)
r = 0.07 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.

Frequency / Antenna polarization	Spurious		
	Carrier	Below 1 GHz	1 GHz – 10 GHz
Horizontal	Y	Z	Y
Vertical	X	Y	Z

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

Measurement range : 30 MHz - 10 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	3 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) *5)	9 kHz to 150 kHz	200 Hz	620 Hz	Auto	Peak	Max Hold	Spectrum Analyzer
	150 kHz to 30 MHz	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 not detected as shown in the chart.
*5) The limits in CFR 47, Part 15, Subpart C, paragraph 15.209(a), are identical to those in RSS-Gen section 8.9, Table 6, since the measurements are performed in terms of magnetic field strength and converted to electric field strength levels (as reported in the table) using the free space impedance of 377 Ohmes. For example, the measurement at frequency 9 kHz resulted in a level of 45.5 dBuV/m, which is equivalent to 45.5 – 51.5 = -6.0 dBuA/m, which has the same margin, 3 dB, to the corresponding RSS-Gen Table 6 limit as it has to 15.209(a) limit.

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

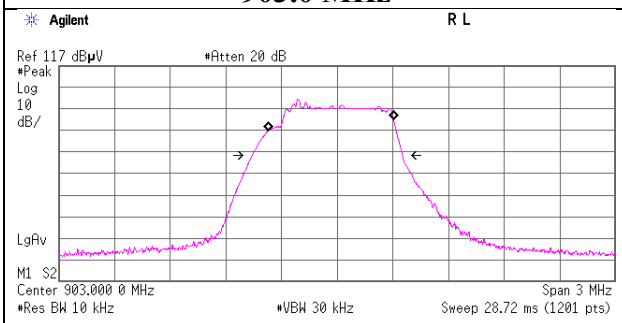
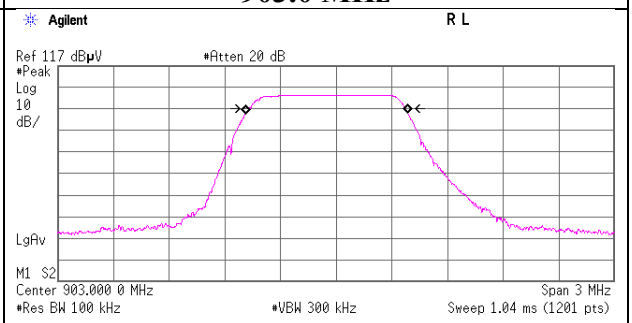
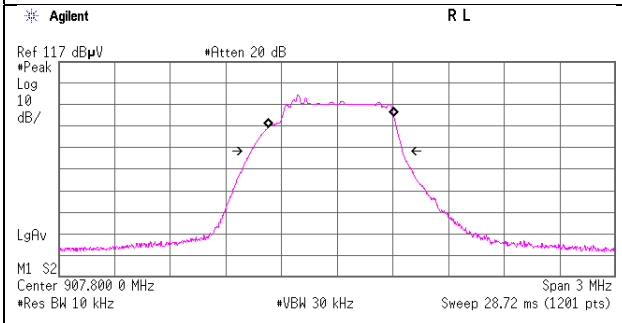
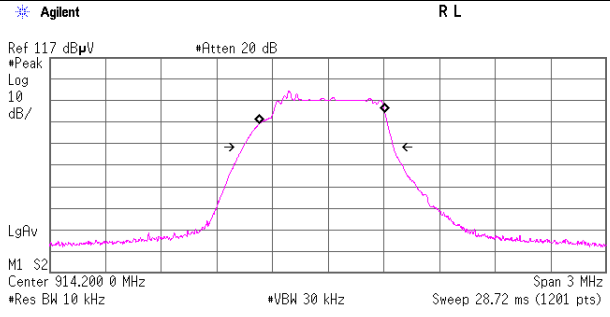
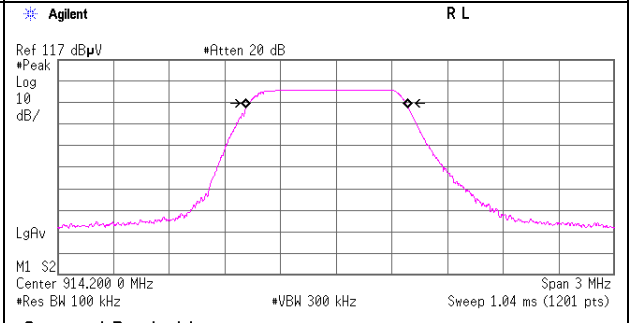
APPENDIX 1: Test data

6 dB Bandwidth and 99 % Occupied Bandwidth

Report No.	13153638S-C-R1
Test place	Shonan EMC Lab. No.5 Shield Room
Date	February 14, 2020
Temperature / Humidity	25 deg. C / 53 % RH
Engineer	Makoto Hosaka
Mode	Tx

Mode	Frequency [MHz]	99 % Occupied Bandwidth [kHz]	6 dB Bandwidth [MHz]	Limit for 6 dB Bandwidth [MHz]
SF8	903.0	678.8	0.842	> 0.5000
	907.8	678.7	0.846	> 0.5000
	914.2	676.1	0.841	> 0.5000

99 %Occupied Bandwidth and 6 dB Bandwidth

99 %Occupied Bandwidth	6 dB Bandwidth
903.0 MHz	903.0 MHz
	
907.8 MHz	907.8 MHz
	
914.2 MHz	914.2 MHz
	

Maximum Peak Output Power

Report No.	13153638S-C-R1
Test place	Shonan EMC Lab. No.5 Shield Room
Date	February 14, 2020
Temperature / Humidity	25 deg. C / 53 % RH
Engineer	Makoto Hosaka
Mode	Tx

				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]
903.0	-3.88	0.90	9.85	6.87	4.86	30.00	1000	23.13	-1.40	5.47	3.52	36.02	4000	30.55
907.8	-3.97	0.90	9.85	6.78	4.76	30.00	1000	23.22	-1.40	5.38	3.45	36.02	4000	30.64
914.2	-4.08	0.91	9.85	6.68	4.66	30.00	1000	23.32	-1.40	5.28	3.37	36.02	4000	30.74

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

Average Output Power
(Reference data for RF Exposure)

Report No.	13153638S-C-R1
Test place	Shonan EMC Lab. No.5 Shield Room
Date	February 14, 2020
Temperature / Humidity	25 deg. C / 53 % RH
Engineer	Makoto Hosaka
Mode	Tx

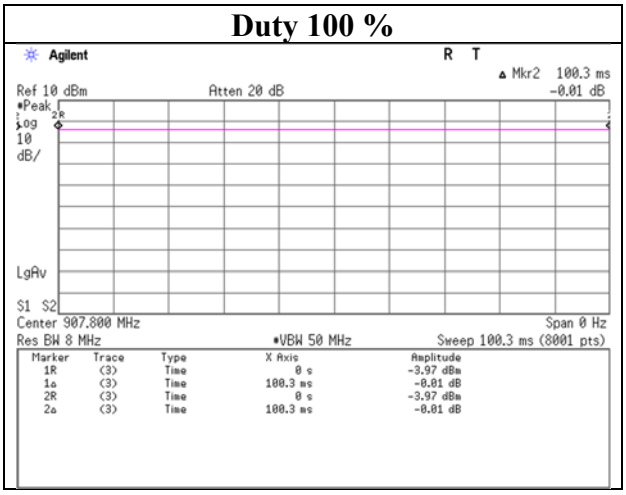
Freq.	Reading	Cable Loss	Atten. Loss	Result (Time average)		Duty factor	Result (Burst power average)	
[MHz]	[dBm]	[dB]	[dB]	[dBm]	[mW]	[dB]	[dBm]	[mW]
903.0	-4.02	0.90	9.85	6.73	4.71	0.00	6.73	4.71
907.8	-4.10	0.90	9.85	6.65	4.62	0.00	6.65	4.62
914.2	-4.21	0.91	9.85	6.55	4.52	0.00	6.55	4.52

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

Burst rate confirmation

Report No.	13153638S-C-R1
Test place	Shonan EMC Lab. No.5 Shield Room
Date	February 14, 2020
Temperature / Humidity	25 deg. C / 53 % RH
Engineer	Makoto Hosaka
Mode	Tx

Duty 100 %



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

Radiated Spurious Emission

Report No.	13153638S-C-R1	
Test place	Shonan EMC Lab.	
Semi Anechoic Chamber	No.1	No.2
Date	February 17, 2020	February 16, 2020
Temperature / Humidity	22 deg. C / 38 % RH	22 deg. C / 41% RH
Engineer	Toshinori Yamada	Kazuya Noda
	(30 MHz - 1 GHz)	(1 GHz - 10 GHz)
Mode	Tx 903.0 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.	400.627	QP	39.28	15.81	8.03	31.81	0.00	31.31	46.0	14.6	100	135	
Hori.	1806.000	PK	47.79	25.67	4.39	38.95	2.35	41.25	73.9	32.6	145	154	
Hori.	2709.000	PK	48.28	28.35	4.83	38.53	2.35	45.28	73.9	28.6	104	211	
Hori.	3612.000	PK	48.75	29.46	5.55	38.17	2.35	47.94	73.9	25.9	288	265	
Hori.	4515.000	PK	46.72	31.07	6.12	38.54	2.35	47.72	73.9	26.1	100	197	
Hori.	5418.000	PK	48.28	32.21	6.78	38.78	2.35	50.84	73.9	23.0	102	41	
Hori.	6321.000	PK	49.55	34.07	7.42	39.03	2.35	54.36	73.9	19.5	116	79	
Hori.	7224.000	PK	45.52	37.30	7.80	39.18	2.35	53.79	73.9	20.1	127	155	
Hori.	8127.000	PK	45.21	37.96	8.26	39.43	2.35	54.35	73.9	19.5	110	356	
Hori.	9030.000	PK	46.42	37.98	8.87	39.81	2.35	55.81	73.9	18.0	104	214	
Hori.	1806.000	AV	39.35	25.67	4.39	38.95	2.35	32.81	53.9	21.0	145	154	
Hori.	2709.000	AV	40.42	28.35	4.83	38.53	2.35	37.42	53.9	16.4	104	211	
Hori.	3612.000	AV	41.29	29.46	5.55	38.17	2.35	40.48	53.9	13.4	288	265	
Hori.	4515.000	AV	37.70	31.07	6.12	38.54	2.35	38.70	53.9	15.2	100	197	
Hori.	5418.000	AV	38.22	32.21	6.78	38.78	2.35	40.78	53.9	13.1	102	41	
Hori.	6321.000	AV	40.08	34.07	7.42	39.03	2.35	44.89	53.9	9.0	116	79	
Hori.	7224.000	AV	35.84	37.30	7.80	39.18	2.35	44.11	53.9	9.7	127	155	
Hori.	8127.000	AV	35.28	37.96	8.26	39.43	2.35	44.42	53.9	9.4	110	356	
Hori.	9030.000	AV	36.39	37.98	8.87	39.81	2.35	45.78	53.9	**8.1**	104	214	
Vert.	400.627	QP	38.94	15.81	8.03	31.81	0.00	30.97	46.0	15.0	140	97	
Vert.	1806.000	PK	47.88	25.67	4.39	38.95	2.35	41.34	73.9	32.5	110	184	
Vert.	2709.000	PK	49.48	28.35	4.83	38.53	2.35	46.48	73.9	27.4	123	257	
Vert.	3612.000	PK	48.93	29.46	5.55	38.17	2.35	48.12	73.9	25.7	280	231	
Vert.	4515.000	PK	46.43	31.07	6.12	38.54	2.35	47.43	73.9	26.4	104	125	
Vert.	5418.000	PK	47.26	32.21	6.78	38.78	2.35	49.82	73.9	24.0	100	294	
Vert.	6321.000	PK	48.79	34.07	7.42	39.03	2.35	53.60	73.9	20.3	108	26	
Vert.	7224.000	PK	45.82	37.30	7.80	39.18	2.35	54.09	73.9	19.8	106	23	
Vert.	8127.000	PK	45.11	37.96	8.26	39.43	2.35	54.25	73.9	19.6	112	3	
Vert.	9030.000	PK	46.76	37.98	8.87	39.81	2.35	56.15	73.9	17.7	272	256	
Vert.	1806.000	AV	39.30	25.67	4.39	38.95	2.35	32.76	53.9	21.1	110	184	
Vert.	2709.000	AV	43.51	28.35	4.83	38.53	2.35	40.51	53.9	13.3	123	257	
Vert.	3612.000	AV	41.40	29.46	5.55	38.17	2.35	40.59	53.9	13.3	280	231	
Vert.	4515.000	AV	36.94	31.07	6.12	38.54	2.35	37.94	53.9	15.9	104	125	
Vert.	5418.000	AV	37.58	32.21	6.78	38.78	2.35	40.14	53.9	13.7	100	294	
Vert.	6321.000	AV	38.76	34.07	7.42	39.03	2.35	43.57	53.9	10.3	108	26	
Vert.	7224.000	AV	35.99	37.30	7.80	39.18	2.35	44.26	53.9	9.6	106	23	
Vert.	8127.000	AV	35.31	37.96	8.26	39.43	2.35	44.45	53.9	9.4	112	3	
Vert.	9030.000	AV	36.33	37.98	8.87	39.81	2.35	45.72	53.9	**8.1**	272	256	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)) - Gain(Amprifier) + Distance factor
Distance factor : 1 GHz - 10 GHz : 20log (3.93 m / 3.0 m) = 2.35 dB

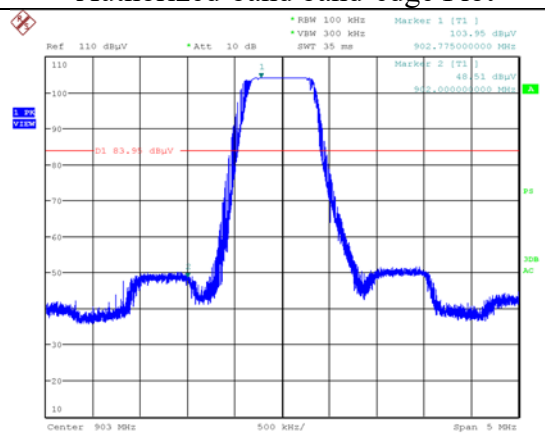
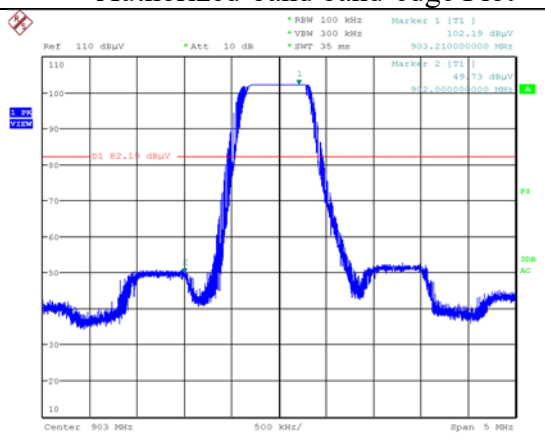
20 dBc Data Sheet (RBW 100 kHz, VBW 300 kHz)

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.	903.000	PK	104.43	22.10	9.86	31.32	0.00	105.07	-	-	Carrier
Hori.	902.000	PK	50.47	22.10	9.86	31.33	0.00	51.10	85.07	33.9	
Vert.	903.000	PK	102.35	22.10	9.86	31.32	0.00	102.99	-	-	Carrier
Vert.	902.000	PK	50.55	22.10	9.86	31.33	0.00	51.18	82.99	31.8	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)) - Gain(Amprifier) + Distance factor
Distance factor : 1 GHz - 10 GHz : 20log (3.93 m / 3.0 m) = 2.35 dB

Radiated Spurious Emission
(Reference Plot for band-edge)

Report No.	13153638S-C-R1
Test place	Shonan EMC Lab.
Semi Anechoic Chamber	No.1
Date	February 17, 2020
Temperature / Humidity	22 deg. C / 38 % RH
Engineer	Toshinori Yamada
	(30 MHz - 1 GHz)
Mode	Tx 903.0 MHz

Horizontal	Vertical
Authorized-band band-edge Plot	Authorized-band band-edge Plot
	
20 dBc Plot	20 dBc 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.	13153638S-C-R1	
Test place	Shonan EMC Lab.	
Semi Anechoic Chamber	No.1	No.2
Date	February 17, 2020	February 16, 2020
Temperature / Humidity	22 deg. C / 38 % RH	22 deg. C / 41% RH
Engineer	Toshinori Yamada	Kazuya Noda
	(30 MHz - 1 GHz)	(1 GHz - 10 GHz)
Mode	Tx 907.8 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.	400.672	QP	39.39	15.81	8.03	31.81	0.00	31.42	46.0	14.5	100	138	
Hori.	902.000	QP	27.25	22.10	9.86	31.33	0.00	27.88	46.0	18.1	100	223	
Hori.	928.000	QP	25.57	22.00	9.96	31.11	0.00	26.42	46.0	19.5	100	223	
Hori.	1815.600	PK	47.24	25.72	4.39	38.95	2.35	40.75	73.9	33.1	154	150	
Hori.	2723.400	PK	48.86	28.39	4.84	38.53	2.35	45.91	73.9	27.9	110	221	
Hori.	3631.200	PK	49.09	29.53	5.55	38.17	2.35	48.35	73.9	25.5	301	259	
Hori.	4539.000	PK	47.13	31.12	6.13	38.54	2.35	48.19	73.9	25.7	181	159	
Hori.	5446.800	PK	47.45	32.25	6.79	38.79	2.35	50.05	73.9	23.8	100	43	
Hori.	6354.600	PK	48.39	34.22	7.44	39.02	2.35	53.38	73.9	20.5	215	14	
Hori.	7262.400	PK	45.56	37.34	7.84	39.24	2.35	53.85	73.9	20.0	112	113	
Hori.	8170.200	PK	45.07	37.76	8.28	39.45	2.35	54.01	73.9	19.8	118	329	
Hori.	9078.000	PK	46.41	38.13	8.91	39.81	2.35	55.99	73.9	17.9	105	235	
Hori.	1815.600	AV	38.75	25.72	4.39	38.95	2.35	32.26	53.9	21.6	154	150	
Hori.	2723.400	AV	41.17	28.39	4.84	38.53	2.35	38.22	53.9	15.6	110	221	
Hori.	3631.200	AV	42.14	29.53	5.55	38.17	2.35	41.40	53.9	12.5	301	259	
Hori.	4539.000	AV	37.95	31.12	6.13	38.54	2.35	39.01	53.9	14.8	181	159	
Hori.	5446.800	AV	38.20	32.25	6.79	38.79	2.35	40.80	53.9	13.1	100	43	
Hori.	6354.600	AV	39.48	34.22	7.44	39.02	2.35	44.47	53.9	9.4	215	14	
Hori.	7262.400	AV	35.25	37.34	7.84	39.24	2.35	43.54	53.9	10.3	112	113	
Hori.	8170.200	AV	36.00	37.76	8.28	39.45	2.35	44.94	53.9	8.9	118	329	
Hori.	9078.000	AV	36.86	38.13	8.91	39.81	2.35	46.44	53.9	**7.4**	105	235	
Vert.	400.672	QP	38.79	15.81	8.03	31.81	0.00	30.82	46.0	15.1	138	82	
Vert.	902.000	QP	27.14	22.10	9.86	31.33	0.00	27.77	46.0	18.2	117	124	
Vert.	928.000	QP	25.54	22.00	9.96	31.11	0.00	26.39	46.0	19.6	117	124	
Vert.	1815.600	PK	47.51	25.72	4.39	38.95	2.35	41.02	73.9	32.8	115	165	
Vert.	2723.400	PK	49.74	28.39	4.84	38.53	2.35	46.79	73.9	27.1	102	258	
Vert.	3631.200	PK	48.95	29.53	5.55	38.17	2.35	48.21	73.9	25.6	298	222	
Vert.	4539.000	PK	46.47	31.12	6.13	38.54	2.35	47.53	73.9	26.3	378	28	
Vert.	5446.800	PK	47.16	32.25	6.79	38.79	2.35	49.76	73.9	24.1	100	305	
Vert.	6354.600	PK	48.62	34.22	7.44	39.02	2.35	53.61	73.9	20.2	100	19	
Vert.	7262.400	PK	45.31	37.34	7.84	39.24	2.35	53.60	73.9	20.3	105	17	
Vert.	8170.200	PK	45.41	37.76	8.28	39.45	2.35	54.35	73.9	19.5	150	1	
Vert.	9078.000	PK	45.69	38.13	8.91	39.81	2.35	55.27	73.9	18.6	321	259	
Vert.	1815.600	AV	39.16	25.72	4.39	38.95	2.35	32.67	53.9	21.2	115	165	
Vert.	2723.400	AV	44.29	28.39	4.84	38.53	2.35	41.34	53.9	12.5	102	258	
Vert.	3631.200	AV	42.53	29.53	5.55	38.17	2.35	41.79	53.9	12.1	298	222	
Vert.	4539.000	AV	37.06	31.12	6.13	38.54	2.35	38.12	53.9	15.7	378	28	
Vert.	5446.800	AV	37.77	32.25	6.79	38.79	2.35	40.37	53.9	13.5	100	305	
Vert.	6354.600	AV	39.40	34.22	7.44	39.02	2.35	44.39	53.9	9.5	100	19	
Vert.	7262.400	AV	35.48	37.34	7.84	39.24	2.35	43.77	53.9	10.1	105	17	
Vert.	8170.200	AV	35.77	37.76	8.28	39.45	2.35	44.71	53.9	9.1	150	1	
Vert.	9078.000	AV	36.46	38.13	8.91	39.81	2.35	46.04	53.9	7.8	321	259	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)) - Gain(Amprifier) + Distance factor
Distance factor : 1 GHz - 10 GHz : 20log (3.93 m / 3.0 m) = 2.35 dB

Radiated Spurious Emission

Report No.	13153638S-C-R1	
Test place	Shonan EMC Lab.	
Semi Anechoic Chamber	No.1	No.2
Date	February 17, 2020	February 16, 2020
Temperature / Humidity	22 deg. C / 38 % RH	22 deg. C / 41% RH
Engineer	Toshinori Yamada	Kazuya Noda
	(30 MHz - 1 GHz)	(1 GHz - 10 GHz)
Mode	Tx 914.2 MHz	

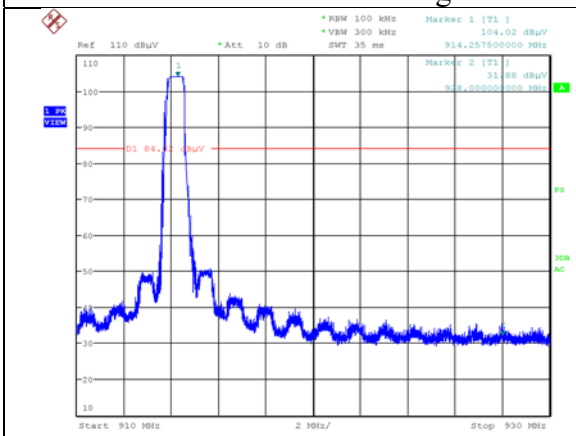
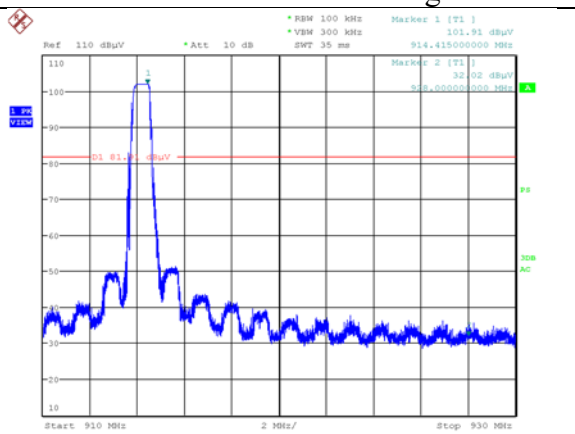
(* PK: Peak, AV: Average, QP: Quasi-Peak)

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.	400.661	QP	39.36	15.81	8.03	31.81	0.00	31.39	46.0	14.6	100	136	
Hori.	928.000	QP	26.89	22.00	9.96	31.11	0.00	27.74	46.0	18.2	100	221	
Hori.	1828.400	PK	47.46	25.80	4.38	38.95	2.35	41.04	73.9	32.8	139	145	
Hori.	2742.600	PK	49.27	28.44	4.85	38.52	2.35	46.39	73.9	27.5	103	212	
Hori.	3656.800	PK	49.92	29.62	5.57	38.16	2.35	49.30	73.9	24.6	327	248	
Hori.	4571.000	PK	47.63	31.19	6.17	38.54	2.35	48.80	73.9	25.1	100	215	
Hori.	5485.200	PK	47.45	32.27	6.83	38.81	2.35	50.09	73.9	23.8	100	39	
Hori.	6399.400	PK	47.70	34.42	7.46	39.01	2.35	52.92	73.9	20.9	113	79	
Hori.	7313.600	PK	44.45	37.41	7.85	39.32	2.35	52.74	73.9	21.1	134	23	
Hori.	8227.800	PK	44.71	37.51	8.32	39.48	2.35	53.41	73.9	20.4	103	324	
Hori.	9142.000	PK	45.81	38.36	8.94	39.81	2.35	55.65	73.9	18.2	101	234	
Hori.	1828.400	AV	39.69	25.80	4.38	38.95	2.35	33.27	53.9	20.6	139	145	
Hori.	2742.600	AV	42.39	28.44	4.85	38.52	2.35	39.51	53.9	14.3	103	212	
Hori.	3656.800	AV	43.33	29.62	5.57	38.16	2.35	42.71	53.9	11.1	327	248	
Hori.	4571.000	AV	38.01	31.19	6.17	38.54	2.35	39.18	53.9	14.7	100	215	
Hori.	5485.200	AV	37.64	32.27	6.83	38.81	2.35	40.28	53.9	13.6	100	39	
Hori.	6399.400	AV	37.95	34.42	7.46	39.01	2.35	43.17	53.9	10.7	113	79	
Hori.	7313.600	AV	34.91	37.41	7.85	39.32	2.35	43.20	53.9	10.7	134	23	
Hori.	8227.800	AV	35.95	37.51	8.32	39.48	2.35	44.65	53.9	9.2	103	324	
Hori.	9142.000	AV	35.71	38.36	8.94	39.81	2.35	45.55	53.9	**8.3**	101	234	
Vert.	400.661	QP	38.92	15.81	8.03	31.81	0.00	30.95	46.0	15.0	142	89	
Vert.	928.000	QP	27.33	22.00	9.96	31.11	0.00	28.18	46.0	17.8	117	114	
Vert.	1828.400	PK	46.94	25.80	4.38	38.95	2.35	40.52	73.9	33.3	119	174	
Vert.	2742.600	PK	51.02	28.44	4.85	38.52	2.35	48.14	73.9	25.7	120	264	
Vert.	3656.800	PK	50.24	29.62	5.57	38.16	2.35	49.62	73.9	24.2	163	236	
Vert.	4571.000	PK	45.59	31.19	6.17	38.54	2.35	46.76	73.9	27.1	147	30	
Vert.	5485.200	PK	47.12	32.27	6.83	38.81	2.35	49.76	73.9	24.1	100	292	
Vert.	6399.400	PK	47.63	34.42	7.46	39.01	2.35	52.85	73.9	21.0	102	27	
Vert.	7313.600	PK	44.63	37.41	7.85	39.32	2.35	52.92	73.9	20.9	101	19	
Vert.	8227.800	PK	45.26	37.51	8.32	39.48	2.35	53.96	73.9	19.9	100	2	
Vert.	9142.000	PK	45.82	38.36	8.94	39.81	2.35	55.66	73.9	18.2	284	249	
Vert.	1828.400	AV	38.81	25.80	4.38	38.95	2.35	32.39	53.9	21.5	119	174	
Vert.	2742.600	AV	44.81	28.44	4.85	38.52	2.35	41.93	53.9	11.9	120	264	
Vert.	3656.800	AV	42.88	29.62	5.57	38.16	2.35	42.26	53.9	11.6	163	236	
Vert.	4571.000	AV	36.12	31.19	6.17	38.54	2.35	37.29	53.9	16.6	147	30	
Vert.	5485.200	AV	37.29	32.27	6.83	38.81	2.35	39.93	53.9	13.9	100	292	
Vert.	6399.400	AV	37.98	34.42	7.46	39.01	2.35	43.20	53.9	10.7	102	27	
Vert.	7313.600	AV	35.16	37.41	7.85	39.32	2.35	43.45	53.9	10.4	101	19	
Vert.	8227.800	AV	35.65	37.51	8.32	39.48	2.35	44.35	53.9	9.5	100	2	
Vert.	9142.000	AV	35.67	38.36	8.94	39.81	2.35	45.51	53.9	**8.3**	284	249	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)) - Gain(Amprifier) + Distance factor
Distance factor : 1 GHz - 10 GHz : 20log (3.93 m / 3.0 m) = 2.35 dB

Radiated Spurious Emission
(Reference Plot for band-edge)

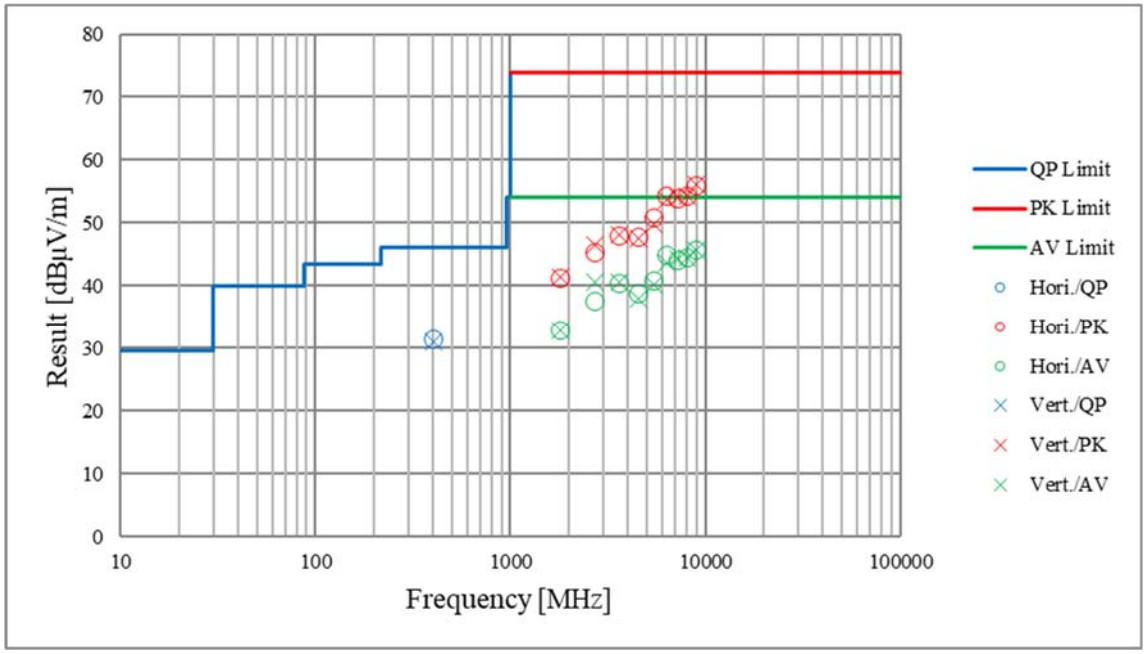
Report No.	13153638S-C-R1
Test place	Shonan EMC Lab.
Semi Anechoic Chamber	No.1
Date	February 17, 2020
Temperature / Humidity	22 deg. C / 38 % RH
Engineer	Toshinori Yamada
	(30 MHz - 1 GHz)
Mode	Tx 914.2 MHz

Horizontal	Vertical
Authorized-band band-edge Plot	Authorized-band band-edge Plot
	
20 dBc Plot	20 dBc 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.	13153638S-C-R1	
Test place	Shonan EMC Lab.	
Semi Anechoic Chamber	No.1	No.2
Date	February 17, 2020	February 16, 2020
Temperature / Humidity	22 deg. C / 38 % RH	22 deg. C / 41% RH
Engineer	Toshinori Yamada	Kazuya Noda
	(30 MHz - 1 GHz)	(1 GHz - 10 GHz)
Mode	Tx 903.0 MHz	

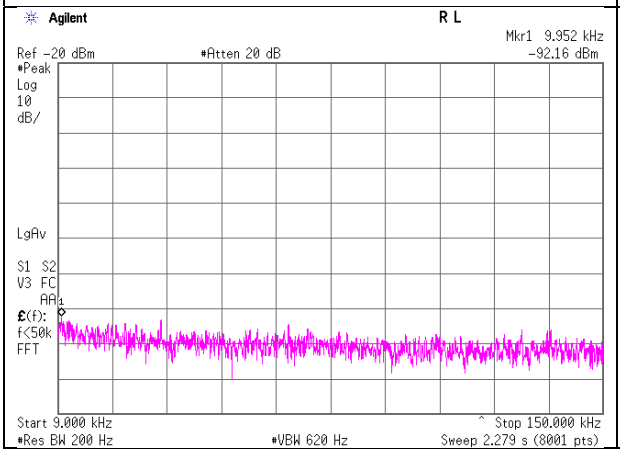


*These plots data contains sufficient number to show the trend of characteristic features for EUT.

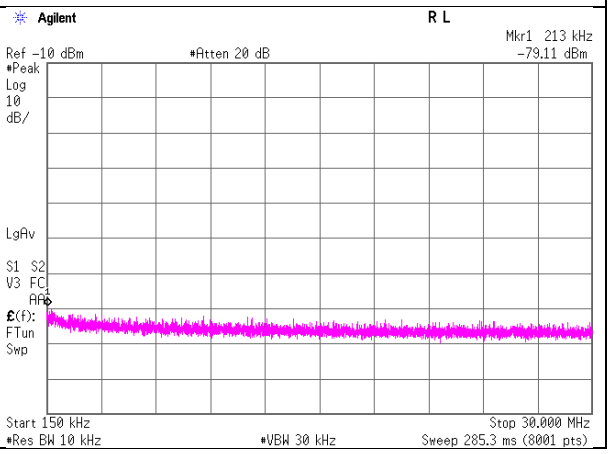
Conducted Spurious Emission

Report No.	13153638S-C-R1
Test place	Shonan EMC Lab. No.5 Shield Room
Date	February 15, 2020
Temperature / Humidity	23 deg. C / 47 % RH
Engineer	Hiromasa Sato
Mode	Tx 903.0 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
9.952	-92.16	0.01	9.83	2.0	1	-80.3	300	6.0	-19.1	47.6	66.7	
213	-79.11	0.01	9.83	2.0	1	-67.3	300	6.0	-6.0	21.0	27.0	

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)

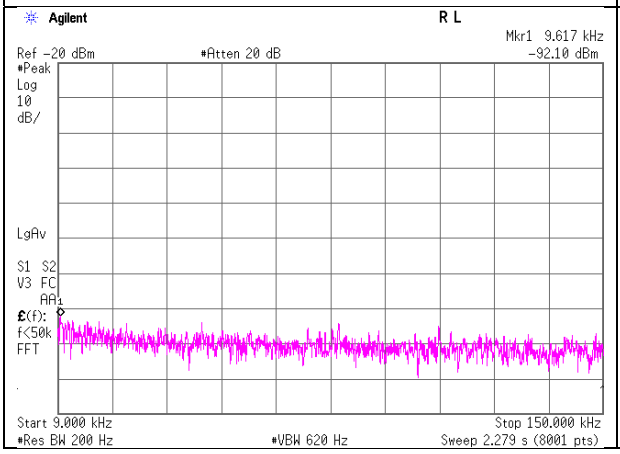
N: Number of output

*2.0 dBi was applied to the test result based on ANSI C63.10 since antenna gain was less than 2.0 dBi.

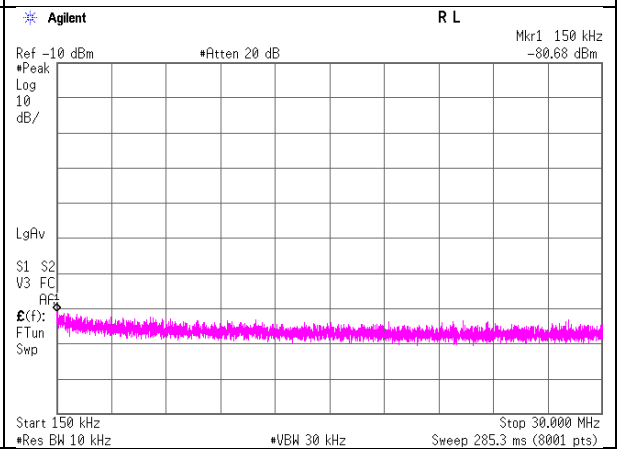
Conducted Spurious Emission

Report No.	13153638S-C-R1
Test place	Shonan EMC Lab. No.5 Shield Room
Date	February 15, 2020
Temperature / Humidity	23 deg. C / 47 % RH
Engineer	Hiromasa Sato
Mode	Tx 907.8 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
9.617	-92.10	0.01	9.83	2.0	1	-80.3	300	6.0	-19.0	47.9	66.9	
150	-80.68	0.01	9.83	2.0	1	-68.8	300	6.0	-7.6	24.0	31.6	

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)

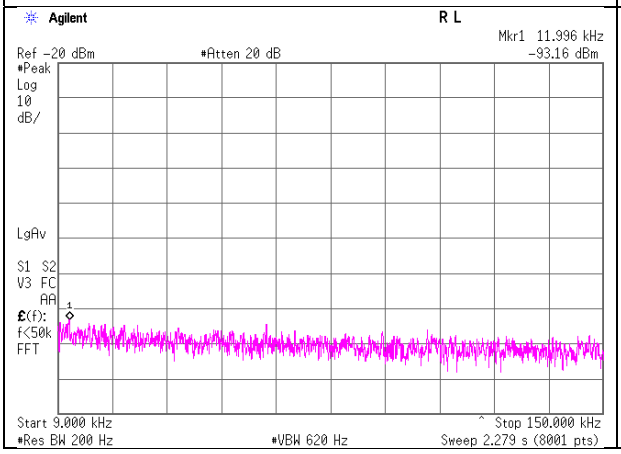
N: Number of output

*2.0 dBi was applied to the test result based on ANSI C63.10 since antenna gain was less than 2.0 dBi.

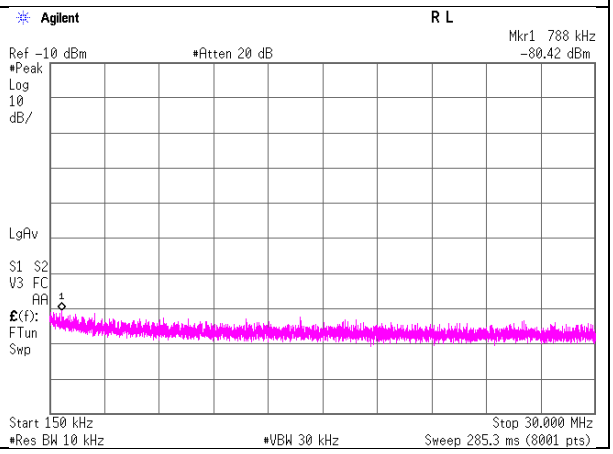
Conducted Spurious Emission

Report No.	13153638S-C-R1
Test place	Shonan EMC Lab. No.5 Shield Room
Date	February 15, 2020
Temperature / Humidity	23 deg. C / 47 % RH
Engineer	Hiromasa Sato
Mode	Tx 914.2 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
11.996	-93.16	0.01	9.83	2.0	1	-81.3	300	6.0	-20.1	46.0	66.1	
788	-80.42	0.02	9.83	2.0	1	-68.6	30	6.0	12.7	29.6	16.9	

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

*2.0 dBi was applied to the test result based on ANSI C63.10 since antenna gain was less than 2.0 dBi.

Power Density

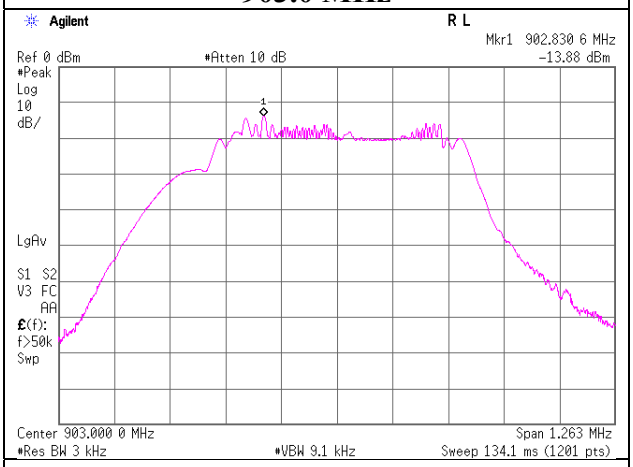
Report No.	13153638S-C-R1
Test place	Shonan EMC Lab. No.5 Shield Room
Date	February 15, 2020
Temperature / Humidity	23 deg. C / 47 % RH
Engineer	Hiromasa Sato
Mode	Tx

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result [dBm]	Limit [dBm]	Margin [dB]
903.0	-13.88	0.90	9.85	-3.13	8.00	11.13
907.8	-13.90	0.90	9.85	-3.15	8.00	11.15
914.2	-14.01	0.91	9.85	-3.25	8.00	11.25

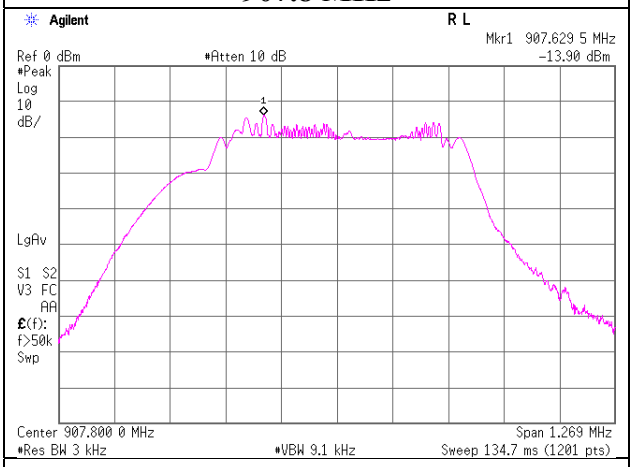
Sample Calculation:
Result = Reading + Cable Loss (including the cable(s) customer supplied) + Attenuator Loss

Power Density

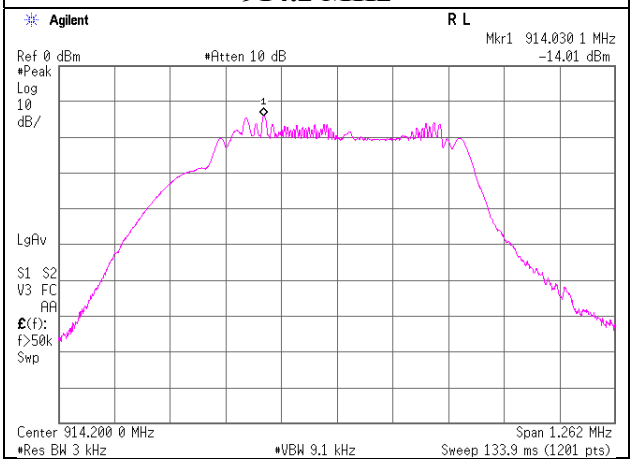
903.0 MHz



907.8 MHz



914.2 MHz



APPENDIX 2: Test instruments

Test equipment (1/2)

Test Name	Local ID	LIMS ID	Description	Manufacturer	Model	Serial	Last Calibration Date	Calibration Interval (Month)
RE	COTS-SEMI-5	170932	EMI Software	TSJ	TEPTO-DV3(RE,CE,ME,PE)	-	-	-
RE	KAT6-04	144899	Attenuator	Inmet	18N-6dB	-	2019/12/05	12
RE	KJM-09	145929	Measure	KOMELON	KMC-36	-	-	-
RE	SAEC-01(NSA)	145597	Semi-Anechoic Chamber	TDK	SAEC-01(NSA)	1	2019/04/02	12
RE	SAEC-02(SVSWR)	145598	Semi-Anechoic Chamber	TDK	SAEC-02(SVSWR)	2	2019/05/09	12
RE	SAF-01	145003	Pre Amplifier	SONOMA	310N	290211	2019/02/05	12
RE	SAF-05	145128	Pre Amplifier	Toyo Corporation	TPA0118-36	1440490	2019/07/12	12
RE	SAT20-01	145142	Attenuator(above1GHz)	Keysight Technologies Inc	8493C-020	74889	2019/11/06	12
RE	SAT3-09	144959	Attenuator	JFW	50HF-003N	-	2019/08/06	12
RE	SBA-01	145161	Biconical Antenna	Schwarzbeck	BBA9106	91032664	2019/04/01	12
RE	SCC-A1/A3/A5/A7/A8/A13/SRSE-01	144967	Coaxial Cable&RF Selector	Fujikura/Fujikura/Suhner/Suhner/Suhner/TOYO	8D2W/12DSFA/141PE/141PE/141PE/141PE/NS4906	-/0901-269(RF Selector)	2019/04/19	12
RE	SCC-A2/A4/A6/A7/A8/A13/SRSE-01	144968	Coaxial Cable&RF Selector	Fujikura/Fujikura/Suhner/Suhner/Suhner/TOYO	8D2W/12DSFA/141PE/141PE/141PE/141PE/NS4906	-/0901-269(RF Selector)	2019/04/19	12
RE	SCC-G41	151617	Coaxial Cable	Junkosha	MWX221-01000NFSNMS/B	1612S006	2020/01/08	12
RE	SCC-G50	178573	Coaxial Cable	HUBER+SUNER	SUCOFLEX_104_E	MY13407/4E	2019/03/26	12
RE	SCC-G51	178572	Coaxial Cable	HUBER+SUNER	SUCOFLEX 104	800288 /4A	2019/03/26	12
RE	SFL-22	168802	Highpass Filter	MICRO-TRONICS	HPM50114	G035	2019/04/16	12
RE	SHA-02	145384	Horn Antenna	Schwarzbeck	BBHA9120D	9120D-726	2019/06/26	12
RE	SJM-09	145336	Measure	PROMART	SEN1935	-	-	-
RE	SLA-05	145527	Logperiodic Antenna	Schwarzbeck	VUSLP9111B	193	2019/04/01	12
RE	SOS-20	191837	Humidity Indicator	CUSTOM	CTH-201	-	2019/12/12	12
RE	SOS-21	191838	Humidity Indicator	CUSTOM	CTH-201	-	2019/12/12	12
RE	STR-01	145790	Test Receiver	Rohde & Schwarz	ESU40	100093	2019/04/14	12
RE	STS-01	145792	Digital Hitester	HIOKI	3805-50	80997812	2019/10/01	12
RE	STS-02	145793	Digital Hitester	HIOKI	3805-50	80997819	2019/04/02	12

Test equipment (2/2)

Test Name	Local ID	LIMS ID	Description	Manufacturer	Model	Serial	Last Calibration Date	Calibration Interval (Month)
AT	SAT10-13	151610	Attenuator	Weinschel Corp.	54A-10	81626	2019/03/27	12
AT	SAT10-14	154591	Attenuator	Weinschel Corp.	54A-10	81595	2019/04/16	12
AT	SCC-G12	145040	Coaxial Cable	Suhner	SUCOFLEX 102	30790/2	2019/03/27	12
AT	SOS-27	191845	Humidity Indicator	Not Indicated or Known	CTH-201	-	2019/12/12	12
AT	SPM-13	169910	Power Meter	EMC Instruments Corporation	8990B	MY51000448	2020/01/28	12
AT	SPSS-06	169911	Power sensor	EMC Instruments Corporation	N1923A	MY57270004	2020/01/28	12
AT,RE	SSA-02	145800	Spectrum Analyzer	Keysight Technologies Inc	E4448A	MY48250106	2019/04/04	12

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

All equipment is calibrated with valid calibrations. Each measurement data is traceable to the national or international standards.

Test item: RE: Radiated Emission test
AT: Antenna Terminal Conducted test