



RADIO TEST REPORT

Test Report No. : 12717683H-B-R3

Applicant : Sony Corporation
Type of Equipment : Digital Wireless Transmitter
Model No. : DWT-B30
FCC ID : AK8DWTB30
Test regulation : FCC Part 15 Subpart C: 2019
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 above regulation.
4. The test results in this report are traceable to the national or international standards.
5. This test report covers Radio technical requirements. It does not cover administrative issues such as Manual or non-Radio test related Requirements. (if applicable)
6. The all test items in this test report are conducted by UL Japan, Inc. Ise EMC Lab.
7. This test report must not be used by the customer to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.
8. The information provided from the customer for this report is identified in SECTION 1.
9. This report is a revised version of 12717683H-B-R2. 12717683H-B-R2 is replaced with this report.

Date of test: August 7 to September 1, 2019

Representative test engineer:

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REVISION HISTORY

Original Test Report No.: 12717683H-B

Revision	Test report No.	Date	Page revised	Contents
- (Original)	12717683H-B	September 26, 2019	-	-
1	12717683H-B-R1	October 28, 2019	P 7	Correction of FCC Part 15.203 Antenna requirement in Clause 3.2; From KDB 206256 D1 to KDB 206256 D01
1	12717683H-B-R1	October 28, 2019	P 10	Correction of tested frequency of Conducted Emission in Clause 4.1 (The details of Operating mode(s)). Addition of explanatory note *3) in Clause 4.1 (The details of Operating mode(s)).
1	12717683H-B-R1	October 28, 2019	P 17 to 20	Correction of Mode of Conducted Emission data in APPENDIX 1.
2	12717683H-B-R2	November 1, 2019	P 10	Correction of tested frequency of Conducted Emission in Clause 4.1 (The details of Operating mode(s)).; From 615.000 MHz to 615.875 MHz
2	12717683H-B-R2	November 1, 2019	P 19	Correction of Mode of Conducted Emission data in APPENDIX 1.; From 615.000 MHz to 615.875 MHz
3	12717683H-B-R3	November 7, 2019	P 10	Correction of tested frequency of Conducted Emission in Clause 4.1 (The details of Operating mode(s)).; From 615.875 MHz (Mid2) to 615.875 MHz (High2)

Reference: Abbreviations (Including words undescribed in this report)

A2LA	The American Association for Laboratory Accreditation	NS	No signal detect.
AC	Alternating Current	NSA	Normalized Site Attenuation
AFH	Adaptive Frequency Hopping	NVLAP	National Voluntary Laboratory Accreditation Program
AM	Amplitude Modulation	OBW	Occupied Band Width
Amp, AMP	Amplifier	OFDM	Orthogonal Frequency Division Multiplexing
ANSI	American National Standards Institute	P/M	Power meter
Ant, ANT	Antenna	PCB	Printed Circuit Board
AP	Access Point	PER	Packet Error Rate
Atten., ATT	Attenuator	PHY	Physical Layer
AV	Average	PK	Peak
BPSK	Binary Phase-Shift Keying	PN	Pseudo random Noise
BR	Bluetooth Basic Rate	PRBS	Pseudo-Random Bit Sequence
BT	Bluetooth	PSD	Power Spectral Density
BT LE	Bluetooth Low Energy	QAM	Quadrature Amplitude Modulation
BW	BandWidth	QP	Quasi-Peak
Cal Int	Calibration Interval	QPSK	Quadri-Phase Shift Keying
CCK	Complementary Code Keying	RBW	Resolution Band Width
Ch., CH	Channel	RDS	Radio Data System
CISPR	Comite International Special des Perturbations Radioelectriques	RE	Radio Equipment
CW	Continuous Wave	RF	Radio Frequency
DBPSK	Differential BPSK	RMS	Root Mean Square
DC	Direct Current	RSS	Radio Standards Specifications
DFS	Dynamic Frequency Selection	Rx	Receiving
DQPSK	Differential QPSK	SA, S/A	Spectrum Analyzer
DSSS	Direct Sequence Spread Spectrum	SG	Signal Generator
EDR	Enhanced Data Rate	SVSWR	Site-Voltage Standing Wave Ratio
EIRP, e.i.r.p.	Equivalent Isotropically Radiated Power	TR	Test Receiver
EMC	ElectroMagnetic Compatibility	Tx	Transmitting
EMI	ElectroMagnetic Interference	VBW	Video BandWidth
EN	European Norm	Vert.	Vertical
ERP, e.r.p.	Effective Radiated Power	WLAN	Wireless LAN
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		

CONTENTS	PAGE
SECTION 1: Customer information.....	5
SECTION 2: Equipment under test (E.U.T.).....	5
SECTION 3: Test specification, procedures & results.....	6
SECTION 4: Operation of E.U.T. during testing.....	10
SECTION 5: Conducted Emission.....	13
SECTION 6: Radiated Spurious Emission	14
SECTION 7: Emission Bandwidth and Frequency Tolerance.....	16
APPENDIX 1: Test data	17
Conducted Emission	17
RF Output Power	21
Emission Bandwidth	22
Emission Mask.....	29
Radiated Spurious Emission	44
Frequency Tolerance.....	50
APPENDIX 2: Test instruments	54
APPENDIX 3: Photographs of test setup	55
Conducted Emission	55
Radiated Spurious Emission	56
Worst Case Position	58

SECTION 1: Customer information

Company Name	:	Sony Global Manufacturing & Operations Corporation
Address	:	8-4 Shiomi Kisarazu-shi, Chiba, 292-0834 Japan
Telephone Number	:	+81-438-37-4704
Contact Person	:	Masayuki Sakakura

***Remarks**

Sony Global Manufacturing & Operations Corporation (Subsidiary Company Name) is on behalf of the applicant: Sony Corporation.

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	:	Digital Wireless Transmitter
Model No.	:	DWT-B30
Serial No.	:	Refer to Section 4, Clause 4.2
Rating	:	DC 3.0 V (Battery (2 x AA Batteries)), DC 5.0 V (USB)
Receipt Date of Sample (Information from test lab.)	:	August 6, 2019
Country of Mass-production	:	Japan
Condition of EUT	:	Production prototype
	:	(Not for Sale: This sample is equivalent to mass-produced items.)
Modification of EUT	:	No Modification by the test lab

2.2 Product Description

Model: DWT-B30 (referred to as the EUT in this report) is a Digital Wireless Transmitter

General Specification

Clock frequency(ies) in the system	:	X400	8MHz
		X202	12.288MHz
		X2000	16MHz
		X801 (TCXO)	19.2MHz
		IC600	480 - 720kHz
		IC601	1250 - 1500kHz
		IC202	600 - 1000kHz
		IC702	1000 - 1600kHz
		IC721	1536kHz
		VCO802 (VCO: change by a transmission frequency)	
		UC	470.125-607.875MHz, 614.125-615.875 MHz
		CE	
		(L)	470.025-614.000MHz
		(H)	566.025-714.000MHz

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Radio Specification (Radio microphone part)

Radio type : Transmitter
Modulation type : $\pi/4$ shift QPSK
Emission designator : 192KG1D, 192KG1E
Channel spacing : 25 kHz
Frequency of operation : 470.125 MHz - 607.875 MHz
614.125 MHz - 615.875 MHz
RF power : 25 mW / 10 mW / 2 mW (470.125 MHz - 607.875 MHz)
10 mW / 2 mW (614.125 MHz - 615.875 MHz)
Antenna type : $\lambda/4$ flexible wire
Antenna gain : 2.14 dBi max
Power Supply (radio part input) : DC 2.8 V, DC 3.1 V, DC 5.2 V
AF Specification : 20 Hz - 22000 Hz, Maximum input: -22 dBu (MIC level, ATT 0 dB)
Operating temperature : 0 deg. C to 50 deg. C

Radio Specification (RF remote part)

Radio Type : Transceiver
Modulation type : DSSS
Frequency of Operation : 2405 MHz to 2475 MHz
Channel spacing : 5 MHz
Method of frequency generation : Synthesizer
Power Supply (radio part input) : DC 2.8 V
Antenna Type : Chip antenna
Antenna Gain : -1.0 dBi max
Operating temperature : 0 deg. C to 50 deg. C

*This test report applies to Radio microphone part.

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 47CFR Part15 Radio Frequency Device Subpart C Intentional Radiators
Section 15.236 Operation of wireless microphones in the bands 54-72 MHz, 76-88 MHz, 174-216 MHz, 470-608 MHz and 614-698 MHz.

* The revisions made after testing date do not affect the test specification applied to the EUT.

** The EUT complies with FCC Part 15 Subpart B.

3.2 Procedures and results

Item	Test Procedure	Specification	Worst margin	Results	Remarks
Conducted Emission	ANSI C63.10-2013 6. Standard test methods	FCC: Section 15.207	9.76 dB 0.19652 MHz, QP, L	Complied a)	Conducted
RF Output Power	ANSI C63.10:2013 Clause 11.9.2.3	FCC: Section 15.236 (d) (1) (2)	See data.	Complied b)	Conducted
Emission Bandwidth (99% Occupied Bandwidth)	ANSI C63.10:2013 Clause 6.9	FCC: Section 15.236 (f) (1) (2)	See data.	Complied c)	Conducted
Radiated Spurious Emission	EN 300 422-1 V1.4.2 Clause 8.4	FCC: Section 15.236 (g)	5.5 dB 522.66 MHz, Vertical See IC report.	Complied d)	Radiated
Emission mask	EN 300 422-1 V1.4.2 Clause 8.3	FCC: Section 15.236 (g)	See data.	Complied e)	Conducted
Frequency Tolerance	ANSI C63.10:2013 Clause 6.8	FCC: Section 15.236 (f) (3)	See data.	Complied f)	Conducted
a) Refer to APPENDIX 1 (data of Conducted Emission) b) Refer to APPENDIX 1 (data of RF power output) c) Refer to APPENDIX 1 (data of Emission Bandwidth (99% Occupied Bandwidth)) d) Refer to APPENDIX 1 (data of Radiated Spurious Emission) e) Refer to APPENDIX 1 (data of Emission mask) f) Refer to APPENDIX 1 (data of Frequency Tolerance)					
Note: UL Japan, Inc.'s EMI Work Procedure No. 13-EM-W0420.					

* In case any questions arise about test procedure, KDB 206256 D01 Wireless Microphones v02 is also referred.

*1) Frequency selections are offsetted from the upper or the lower band limit by 125 kHz.

FCC Part 15.31 (e)

The test was performed with the New Battery and the stable voltage was supplied to the EUT during the tests.
However frequency tolerance test was performed according to section 15.236.

FCC Part 15.203 Antenna requirement

This section does not apply to device operated under section 15.236 (KDB 206256 D01).

3.3 Addition to standard

No addition, exclusion nor deviation has been made from the standard.

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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 $k = 2$.

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Spurious Emission (EUT height: 1.5m)	dB
Mesurment Distance 3m	
• 25MHz-200MHz	5.6
• 200MHz-1000MHz	4.0
• 1GHz-12.75GHz	4.6

Antenna terminal test	Uncertainty (+/-)
RF output power	1.3 dB
Emission Bandwidth	
Span 1 MHz	0.96%
Emission mask	
Below 1 GHz	1.9 dB
Frequency Tolerance	0.0154 ppm

3.5 Test Location

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Test site	Width x Depth x Height (m)	Size of reference ground plane (m) / horizontal conducting plane	Other rooms	Maximum measurement distance
No.1 semi-anechoic chamber	19.2 x 11.2 x 7.7	7.0 x 6.0	No.1 Power source room	10 m
No.2 semi-anechoic chamber	7.5 x 5.8 x 5.2	4.0 x 4.0	-	3 m
No.3 semi-anechoic chamber	12.0 x 8.5 x 5.9	6.8 x 5.75	No.3 Preparation room	3 m
No.3 shielded room	4.0 x 6.0 x 2.7	N/A	-	-
No.4 semi-anechoic chamber	12.0 x 8.5 x 5.9	6.8 x 5.75	No.4 Preparation room	3 m
No.4 shielded room	4.0 x 6.0 x 2.7	N/A	-	-
No.5 semi-anechoic chamber	6.0 x 6.0 x 3.9	6.0 x 6.0	-	-
No.5 measurement room	6.4 x 6.4 x 3.0	6.4 x 6.4	-	-
No.6 shielded room	4.0 x 4.5 x 2.7	4.0 x 4.5	-	-
No.6 measurement room	4.75 x 5.4 x 3.0	4.75 x 4.15	-	-
No.7 shielded room	4.7 x 7.5 x 2.7	4.7 x 7.5	-	-
No.8 measurement room	3.1 x 5.0 x 2.7	3.1 x 5.0	-	-
No.9 measurement room	8.8 x 4.6 x 2.8	2.4 x 2.4	-	-
No.11 measurement room	6.2 x 4.7 x 3.0	4.8 x 4.6	-	-

* Size of vertical conducting plane (for Conducted Emission test) : 2.0 x 2.0 m for No.1, No.2, No.3, and No.4 semi-anechoic chambers and No.3 and No.4 shielded rooms.

3.6 Data of Radio, Test instruments, and Test set up

Refer to APPENDIX.

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

4.1 Operating Mode(s)

Mode	Remarks
Transmitting (Tx), Power setting: 2 mW	Typ. 2 mW
Transmitting (Tx), Power setting: 10 mW	Typ. 10 mW
Transmitting (Tx), Power setting: 25 mW	Typ. 25 mW
*Transmitting duty was 100% on all tests.	
*Power of the EUT was set by the software as follows; Software setting: Low (2 mW), Middle (10 mW), High (25 mW) *1) Software version: 0.11 *This setting of software is the worst case. Any conditions under the normal use do not exceed the condition of setting.	

*1) High power (25 mW) was set only from Frequency band 470 MHz to 608 MHz.

*The details of Operating mode(s)

Test Item	Tested frequency	Power setting	Modulation	Remarks
Conducted Emission	539.000 MHz (Mid) *3) 615.875 MHz (High2) *3)	25 mW 10 mW	Digital modulation (PN9 data packet)	-
RF Output Power	470.125 MHz (Low) 539.000 MHz (Mid) 607.875 MHz (High) 614.125 MHz (Low2) 615.000 MHz (Mid2) 615.875 MHz (High2)	2 mW, 10 mW, 25 mW 2 mW, 10 mW	Digital modulation (PN9 data packet)	-
Emission Bandwidth	470.125 MHz (Low) 539.000 MHz (Mid) 607.875 MHz (High) 614.125 MHz (Low2) 615.000 MHz (Mid2) 615.875 MHz (High2)	2 mW, 10 mW, 25 mW 2 mW, 10 mW	Digital modulation (PN9 data packet)	*1)
Emission Mask	470.125 MHz (Low) 539.000 MHz (Mid) 607.875 MHz (High) 614.125 MHz (Low2) 615.000 MHz (Mid2) 615.875 MHz (High2)	2 mW, 10 mW, 25 mW 2 mW, 10 mW	Digital modulation (PN9 data packet)	*1)
Radiated Spurious Emission	470.125 MHz (Low) 539.000 MHz (Mid) 607.875 MHz (High) 614.125 MHz (Low2) 615.000 MHz (Mid2) 615.875 MHz (High2)	25 mW 10 mW	Digital modulation (PN9 data packet)	-
Frequency Tolerance	539.000 MHz (Mid) 615.000 MHz (Mid2)	25 mW 10 mW	No modulation	*2)

*1) The tests were performed at both edges of allocated bands. (470 MHz - 608 MHz and 614 MHz - 616 MHz)

*2) There is no difference in frequency generating method on each frequency. Therefore the test was performed on Mid channel as a representative.

*3) The mode was tested as a representative, because it had the highest power at antenna terminal test.

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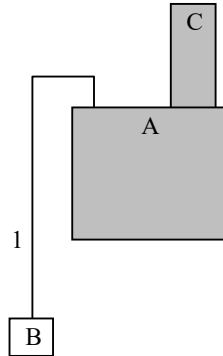
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4.2 Configuration and peripherals

【All tests except for conducted Emission test】



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

**This EUT has two patterns of power supply, USB power Supply and Battery power Supply.

The test was conducted on the EUT with Battery power Supply had the worst level of spurious.

Description of EUT and Support equipment

No.	Item	Model number	Serial number	Manufacturer	Remarks
A	Digital Wireless Transmitter	DWT-B30	UC00002	Sony Corporation	EUT
B	Lavalier Microphone	ECM-77BC	-	Sony Corporation	-
C	Antenna	1-522-049-11	1001	Musashidenshi co.,ltd.	EUT

List of cables used

No.	Name	Length (m)	Shield		Remarks
			Cable	Connector	
1	Microphone Cable	1.2	Shielded	Shielded	-

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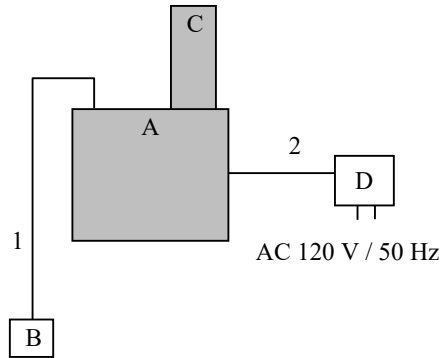
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4.3 Configuration and peripherals

【Conducted Emission test】



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

Description of EUT and Support equipment

No.	Item	Model number	Serial number	Manufacturer	Remarks
A	Digital Wireless Transmitter	DWT-B30	UC00002	Sony Corporation	EUT
B	Lavalier Microphone	ECM-77BC	-	Sony Corporation	-
C	Antenna	1-522-049-11	1001	Musashidenshi co.,ltd.	EUT
D	AC Adapter	AC-UD20	18106000262	Sony Corporation	-

List of cables used

No.	Name	Length (m)	Shield		Remarks
			Cable	Connector	
1	Microphone Cable	1.2	Shielded	Shielded	-
2	USB Cable	1.0	Shielded	Shielded	-

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SECTION 5: Conducted Emission

Test Procedure and conditions

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 rear of tabletop was located 40 cm to the vertical conducting plane. The rear of EUT, including peripherals aligned and flushed with rear of tabletop. All other surfaces of tabletop were at least 80 cm from any other grounded conducting surface. EUT was located 80 cm from a Line Impedance Stabilization Network (LISN) / Artificial mains Network (AMN) and excess AC cable was bundled in center.

1) For the tests on EUT with other peripherals (as a whole system)

I/O cables that were connected to the peripherals were bundled in center. They were folded back and forth forming a bundle 30 cm to 40 cm long and were hanged at a 40 cm height to the ground plane. All unused 50 ohm connectors of the LISN (AMN) were resistivity terminated in 50 ohm when not connected to the measuring equipment.

The AC Mains Terminal Continuous disturbance Voltage has been measured with the EUT in a Semi Anechoic Chamber.

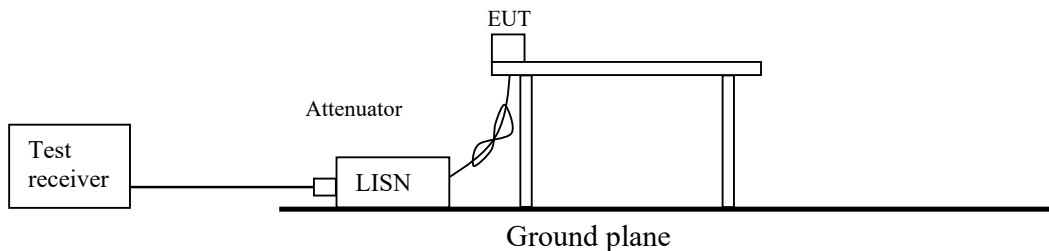
The EUT was connected to a LISN (AMN).

An overview sweep with peak detection has been performed.

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

Detector	: QP and CISPR AV
Measurement range	: 0.15 MHz - 30 MHz
Test data	: APPENDIX
Test result	: Pass

Figure 1: Test Setup



SECTION 6: Radiated Spurious Emission

Test Procedure

- 1) EUT was placed on a platform of nominal size, 0.5 m by 0.5 m, raised 1.5 m above the conducting ground plane. Test was made with the antenna positioned in both the horizontal and vertical planes of polarization. The Radiated Electric Field Strength has been measured in semi anechoic chamber at a distance of 3 m. The measuring antenna height was varied between 1 to 4 m and the turn table was rotated a full revolution in order to obtain the maximum value of the electric field strength. The measurements were performed for both vertical and horizontal antenna polarization.

- 2) Exchanged the EUT to the Substitution Antenna, the measurement was set for the same height 1.5 m as the EUT. The frequency below 1 GHz of the Substitution Antenna was used the Half wave dipole Antenna, which was tuned the measured frequency in 1). The frequency above 1 GHz of the Substitution Antenna was used Horn Antenna. The Substitution Antenna was connected to the Signal Generator, and the polarized electromagnetic radiation of the Substitution Antenna was matched with the one of the measuring Antenna, which was set with the Signal Generator to the measured frequency in 1). Then, we set with the Output power (CW) of the Signal Generator where the measuring electromagnetic field strength is equal to the measured value in 1) by means of varying the measuring antenna height between 1 to 4 m to obtain maximum receiving level. Its Output power of Signal Generator was recorded.

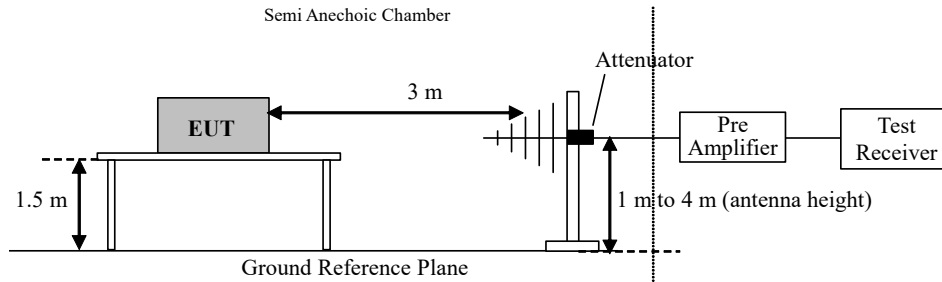
- 3) Effective radiated power was calculated by subtracting the cable loss and the attenuator loss connected between the Signal Generator and the Substitution Antenna from the Output power of the Signal Generator recorded in 2).
For the usage of the Antenna (Horn Antenna) except for the Half wave dipole Antenna (2.15dBi) for the Substitution Antenna, the Effective radiated power was calculated by compensating the finite difference in the Antenna gain of the Half wave dipole Antenna, and Substitution Antenna.

Frequency	25 MHz to 200 MHz	200 MHz to 1 GHz	Above 1 GHz
Antenna Type	Biconical	Logperiodic	Horn

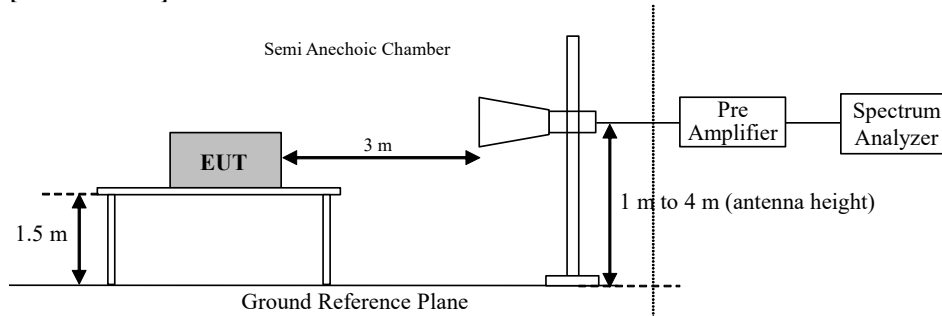
Frequency	25 MHz to 30 MHz	30 MHz to 1 GHz	Above 1 GHz
Instrument used	Test Receiver		Spectrum Analyzer
Detector	QP		RMS Average
IF Bandwidth	BW: 9 kHz	BW: 120 kHz	RBW: 1 MHz VBW: 3 MHz
Test Distance	3 m		

Figure 1: Test Setup

[25 MHz - 1 GHz]



[Above 1 GHz]



- 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.

-EUT has 2 kinds of power supply conditions (USB power Supply/ Battery power Supply), the test was performed with the worst case which was confirmed in pre-check.

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

Measurement range : 25 MHz - 7 GHz
Test data : APPENDIX
Test result : Pass

*Test was performed with 10th harmonics of fundamental.

SECTION 7: Emission Bandwidth and Frequency Tolerance

Test Procedure

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

Test	Span	RBW	VBW	Sweep time	Detector	Trace	Instrument used
RF Output Power	-	-	-	Auto	Average	-	Power Meter (Sensor: 50 MHz BW)
Emission Bandwidth	2 times to 5 times of occupied bandwidth	1 to 5% of Occupied bandwidth	Three times of RBW	Auto	Peak *1)	Max Hold *1)	Spectrum Analyzer
Frequency Tolerance	-	-	-	-	-	-	Frequency Counter
*1) The measurement was performed with Peak and Max Hold. (Worst-case measurement)							

[Side band spectrum measurement (Emission mask)]

The EUT was modulated with PN9 audio data packet.

The spectrum mask was measured in accordance with section 8.3.2 of EN 300 422-1.

The measurements were made under normal condition.

[Frequency Tolerance]

The EUT was tested with a new or fully charged battery.

The frequency of the EUT was recorded over a temperature variation of +50 deg. C to -20 deg. C by 10 deg. C step.

For Battery End Point, test was performed at the voltage just before the battery has run out.

EUT power supply was varied between 85 % and 115 % of nominal and the frequency of the EUT was recorded when temperature is 20 deg. C.

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

Test data : APPENDIX
Test result : Pass

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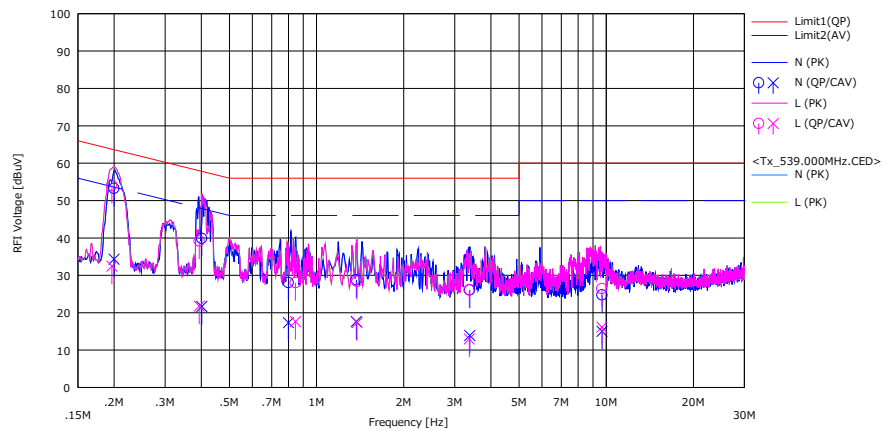
Facsimile : +81 596 24 8124

APPENDIX 1: Test data

Conducted Emission

Report No. 12717683H
Test place Ise EMC Lab. No.6 Semi Anechoic Chamber
Date September 1, 2019
Temperature / Humidity 23 deg. C / 69 % RH
Engineer Junki Nagatomi
Mode Tx 539.000 MHz

Limit : FCC_Part 15 Subpart C(15.207)

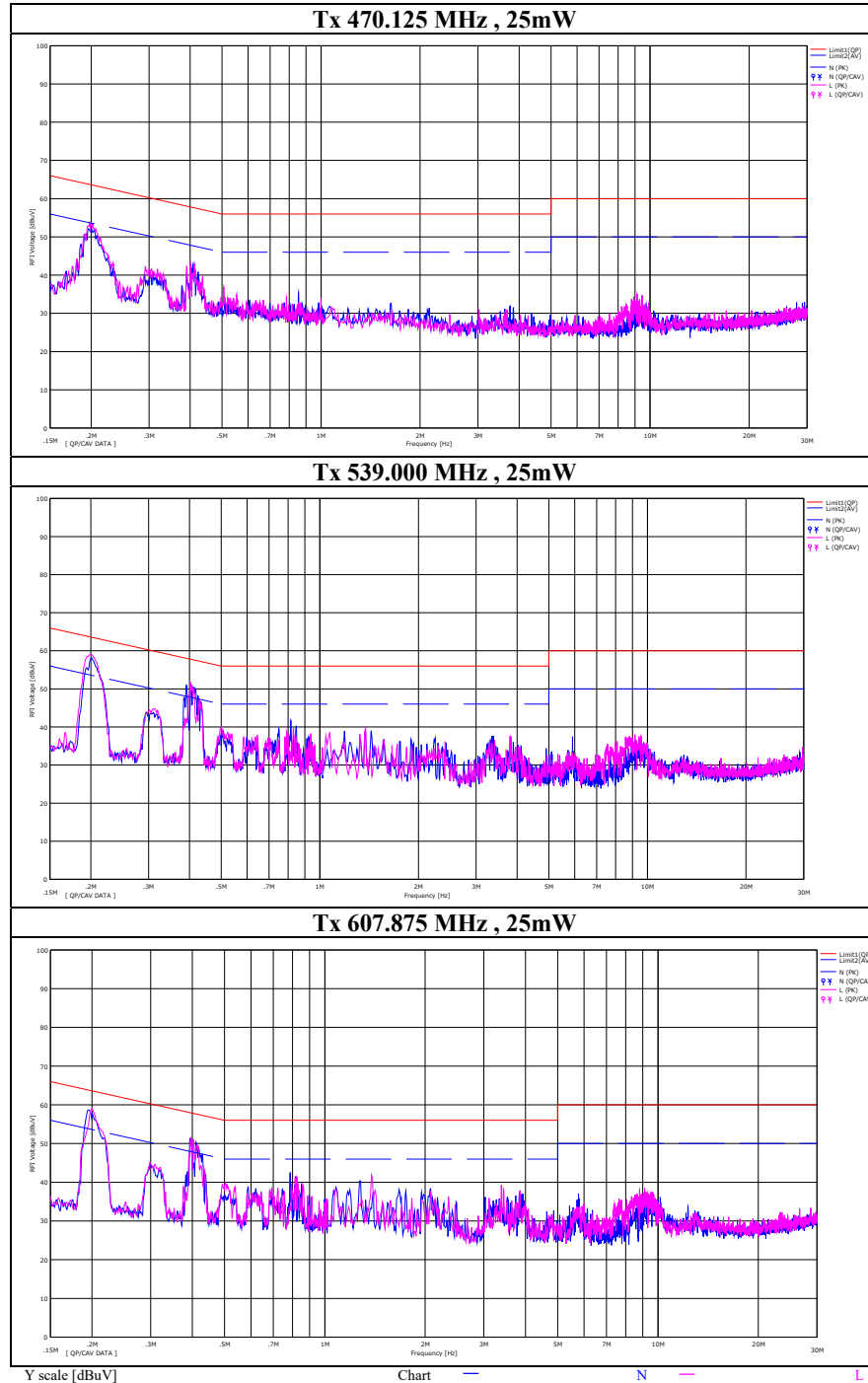


No.	Freq. [MHz]	Reading		USN [dB]	LOSS [dB]	Results		Limit		Margin		Phase	Comment
		<QP> [dBuV]	<CAV> [dBuV]			<QP> [dBuV]	<CAV> [dBuV]	<QP> [dBuV]	<AV> [dBuV]	<QP> [dB]	<AV> [dB]		
1	0.19980	39.80	20.90	0.15	13.29	53.24	34.34	63.60	53.60	10.36	19.26	N	
2	0.40141	26.40	8.20	0.15	13.31	39.86	21.66	57.80	47.80	17.94	26.14	N	
3	0.79951	14.50	3.80	0.18	13.34	28.02	17.32	56.00	46.00	27.98	28.68	N	
4	1.37162	15.20	4.00	0.23	13.39	28.82	17.62	56.00	46.00	27.18	28.38	N	
5	3.37945	12.20	0.04	0.34	13.51	26.05	13.89	56.00	46.00	29.95	32.11	N	
6	9.67742	9.90	0.20	1.07	13.76	24.73	15.03	60.00	50.00	35.27	34.97	N	
7	0.19652	40.60	19.00	0.15	13.29	54.04	32.44	63.80	53.80	9.76	21.36	L	
8	0.39350	25.70	8.30	0.15	13.31	39.16	21.76	58.00	48.00	18.84	26.24	L	
9	0.84492	14.50	4.10	0.18	13.34	28.02	17.62	56.00	46.00	27.98	28.38	L	
10	1.37904	14.70	3.70	0.23	13.39	28.32	17.32	56.00	46.00	27.68	28.68	L	
11	3.36634	12.20	-0.90	0.34	13.51	26.05	12.95	56.00	46.00	29.95	33.05	L	
12	9.66143	11.60	1.30	1.07	13.76	26.43	16.13	60.00	50.00	33.57	33.87	L	

CHART: WITH FACTOR Peak hold data. CALCULATION : RESULT = READING + C.F (LISN + CABLE + ATT)
Except for the above table: adequate margin data below the limits.

Conducted Emission

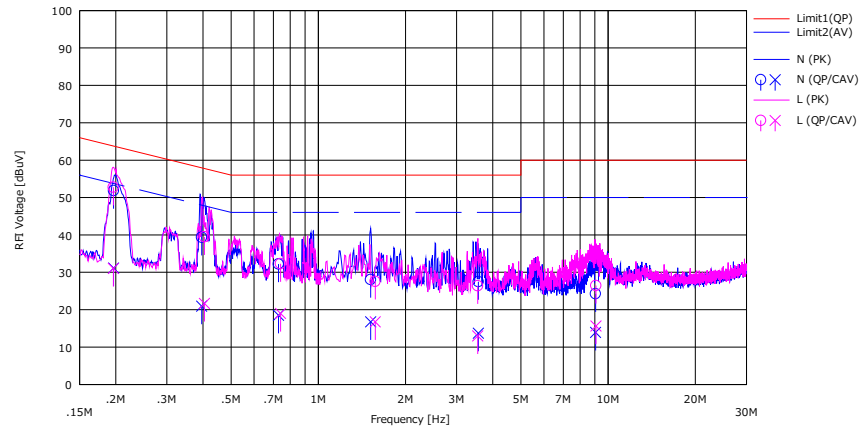
Report No. 12717683H
Test place Ise EMC Lab. No.4 Semi Anechoic Chamber
Date September 1, 2019
Temperature / Humidity 23 deg. C / 69 % RH
Engineer Junki Nagatomi
Mode Tx



Conducted Emission

Report No. 12717683H
Test place Ise EMC Lab. No.6 Semi Anechoic Chamber
Date September 1, 2019
Temperature / Humidity 23 deg. C / 69 % RH
Engineer Junki Nagatomi
Mode Tx 615.875 MHz

Limit : FCC_Part 15 Subpart C(15.207)

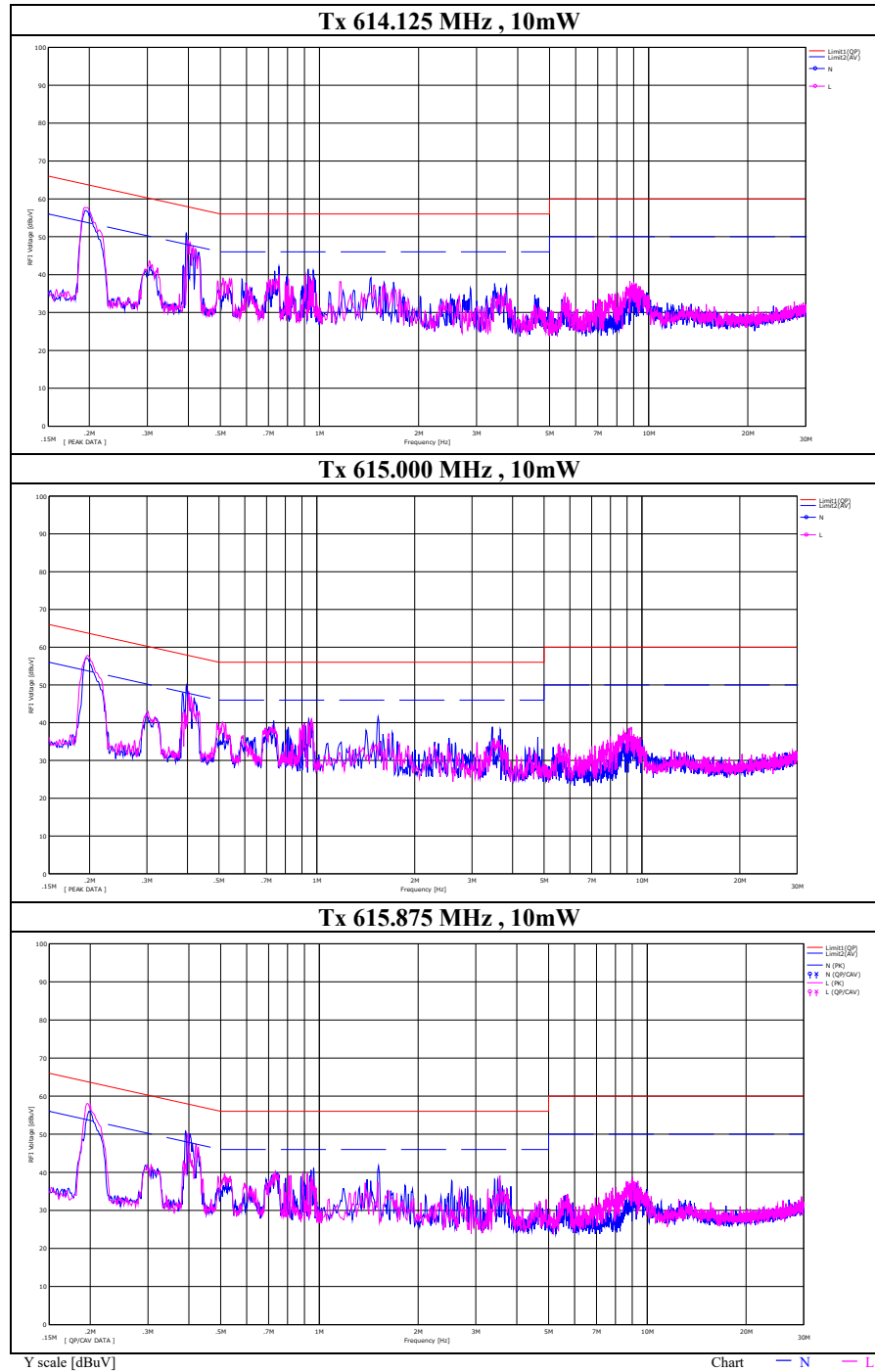


No.	Freq. [MHz]	Reading		LISN	LOSS	Results		Limit		Margin		Phase	Comment
		(QP)	(CAV)			(QP)	(CAV)	(QP)	(AV)	(QP)	(AV)		
		[dBuV]	[dBuV]			[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dB]	[dB]		
1	0.19660	38.40	17.70	0.15	13.29	51.84	31.14	63.80	53.80	11.96	22.66	N	
2	0.39582	25.90	7.50	0.15	13.31	39.36	20.96	57.90	47.90	18.54	26.94	N	
3	0.72851	18.70	5.00	0.17	13.33	32.20	18.50	56.00	46.00	23.80	27.50	N	
4	1.51513	14.40	3.10	0.24	13.40	28.04	16.74	56.00	46.00	27.96	29.26	N	
5	3.56532	13.60	-0.20	0.37	13.52	27.49	13.69	56.00	46.00	28.51	32.31	N	
6	9.05173	9.50	-0.80	1.00	13.74	24.24	13.94	60.00	50.00	35.76	36.06	N	
7	0.19621	39.30	17.60	0.15	13.29	52.74	31.04	63.80	53.80	11.06	22.76	L	
8	0.40448	26.00	8.20	0.15	13.31	39.46	21.66	57.80	47.80	18.34	26.14	L	
9	0.74064	18.80	5.50	0.17	13.33	32.30	19.00	56.00	46.00	23.70	27.00	L	
10	1.57206	13.90	3.10	0.25	13.40	27.55	16.75	56.00	46.00	28.45	29.25	L	
11	3.54768	12.50	-0.90	0.36	13.51	26.37	12.97	56.00	46.00	29.63	33.03	L	
12	9.07373	11.70	0.90	1.00	13.74	26.44	15.64	60.00	50.00	33.56	34.36	L	

CHART: WITH FACTOR Peak hold data. CALCULATION : RESULT = READING + C.F (LISN + CABLE + ATT)
Except for the above table: adequate margin data below the limits.

Conducted Emission

Report No. 12717683H
Test place Ise EMC Lab. No.4 Semi Anechoic Chamber
Date September 1, 2019
Temperature / Humidity 23 deg. C / 69 % RH
Engineer Junki Nagatomi
Mode Tx



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RF Output Power

Test place : Ise EMC Lab. No.5 Measurement Room
Report No. : 120717683H
Date : August 7, 2019
Temperature/ Humidity : 23 deg. C / 61 % RH
Engineer : Koji Yamamoto
Mode : Tx

Power Setting	Channel	Freq. [MHz]	Reading Average [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Ant Gain [dBi]	Result Average [EIRP]		Limit [EIRP] [mW]	Margin [dB]	Remarks
							[dBm]	[mW]			
2mW	Low	470.125	2.98	0.00	0.00	2.14	5.12	3.25	50	11.87	
	Mid	539.000	3.03	0.00	0.00	2.14	5.17	3.29	50	11.82	
	High	607.875	2.92	0.00	0.00	2.14	5.06	3.21	50	11.93	
10mW	Low	470.125	7.99	0.00	0.00	2.14	10.13	10.30	50	6.86	
	Mid	539.000	8.18	0.00	0.00	2.14	10.32	10.76	50	6.67	
	High	607.875	7.81	0.00	0.00	2.14	9.95	9.89	50	7.04	
25mW	Low	470.125	14.01	0.00	0.00	2.14	16.15	41.21	50	0.84	
	Mid	539.000	14.10	0.00	0.00	2.14	16.24	42.07	50	0.75	
	High	607.875	13.99	0.00	0.00	2.14	16.13	41.02	50	0.86	

Calculation formula:

$$\text{Result} = \text{Reading} + \text{Cable Loss} + \text{Atten. Loss} + \text{Ant Gain}$$

Cable or Atten. was not used for factor 0.00 dB of the above table.

Power Setting	Channel	Freq. [MHz]	Reading Average [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Ant Gain [dBi]	Result Average [EIRP]		Limit [EIRP] [mW]	Margin [dB]	Remarks
							[dBm]	[mW]			
2mW	Low	614.125	2.88	0.00	0.00	2.14	5.02	3.18	20	7.99	
	Mid	615.000	2.95	0.00	0.00	2.14	5.09	3.23	20	7.92	
	High	615.875	2.95	0.00	0.00	2.14	5.09	3.23	20	7.92	
10mW	Low	614.125	7.81	0.00	0.00	2.14	9.95	9.89	20	3.06	
	Mid	615.000	7.79	0.00	0.00	2.14	9.93	9.84	20	3.08	
	High	615.875	7.86	0.00	0.00	2.14	10.00	10.00	20	3.01	

Calculation formula:

$$\text{Result} = \text{Reading} + \text{Cable Loss} + \text{Atten. Loss} + \text{Ant Gain}$$

Cable or Atten. was not used for factor 0.00 dB of the above table.

Emission Bandwidth

Test place : Ise EMC Lab. No.5 Measurement Room
Report No. : 120717683H
Date : August 8, 2019
Temperature/ Humidity : 23 deg. C / 57 % RH
Engineer : Koji Yamamoto
Mode : Tx (470.125 MHz – 607.875 MHz)

Power Setting	Channel	Freq. [MHz]	99 % Occupied Bandwidth [kHz]	Limit [kHz]	Margin [kHz]
2 mW	Low	470.125	164.7658	200	35.2342
	Mid	539.000	163.3338	200	36.6662
	High	607.875	164.0758	200	35.9242
10 mW	Low	470.125	163.5998	200	36.4002
	Mid	539.000	163.1695	200	36.8305
	High	607.875	163.5426	200	36.4574
25 mW	Low	470.125	163.4652	200	36.5348
	Mid	539.000	163.6549	200	36.3451
	High	607.875	163.8412	200	36.1588

Power Setting	Channel	Freq. [MHz]	20 dB Bandwidth [kHz]	Limit [kHz]	Margin [kHz]
2 mW	Low	470.125	181.767	200	18.233
	Mid	539.000	181.367	200	18.633
	High	607.875	181.709	200	18.291
10 mW	Low	470.125	181.006	200	18.994
	Mid	539.000	181.457	200	18.543
	High	607.875	181.039	200	18.961
25 mW	Low	470.125	181.597	200	18.403
	Mid	539.000	181.293	200	18.707
	High	607.875	181.630	200	18.370

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Emission Bandwidth

Test place : Ise EMC Lab. No.5 Measurement Room
Report No. : 120717683H
Date : August 8, 2019
Temperature/ Humidity : 23 deg. C / 57 % RH
Engineer : Koji Yamamoto
Mode : Tx (614.125 MHz – 615.875 MHz)

Power Setting	Channel	Freq. [MHz]	99 % Occupied Bandwidth [kHz]	Limit [kHz]	Margin [kHz]
2 mW	Low	614.125	163.6317	200	36.3683
	Mid	615.000	163.8225	200	36.1775
	High	615.875	163.8400	200	36.1600
10 mW	Low	614.125	163.3580	200	36.6420
	Mid	615.000	163.3757	200	36.6243
	High	615.875	163.3989	200	36.6011

Power Setting	Channel	Freq. [MHz]	20 dB Bandwidth [kHz]	Limit [kHz]	Margin [kHz]
2 mW	Low	614.125	181.728	200	18.272
	Mid	615.000	181.302	200	18.698
	High	615.875	181.562	200	18.438
10 mW	Low	614.125	181.427	200	18.573
	Mid	615.000	181.200	200	18.800
	High	615.875	181.188	200	18.812

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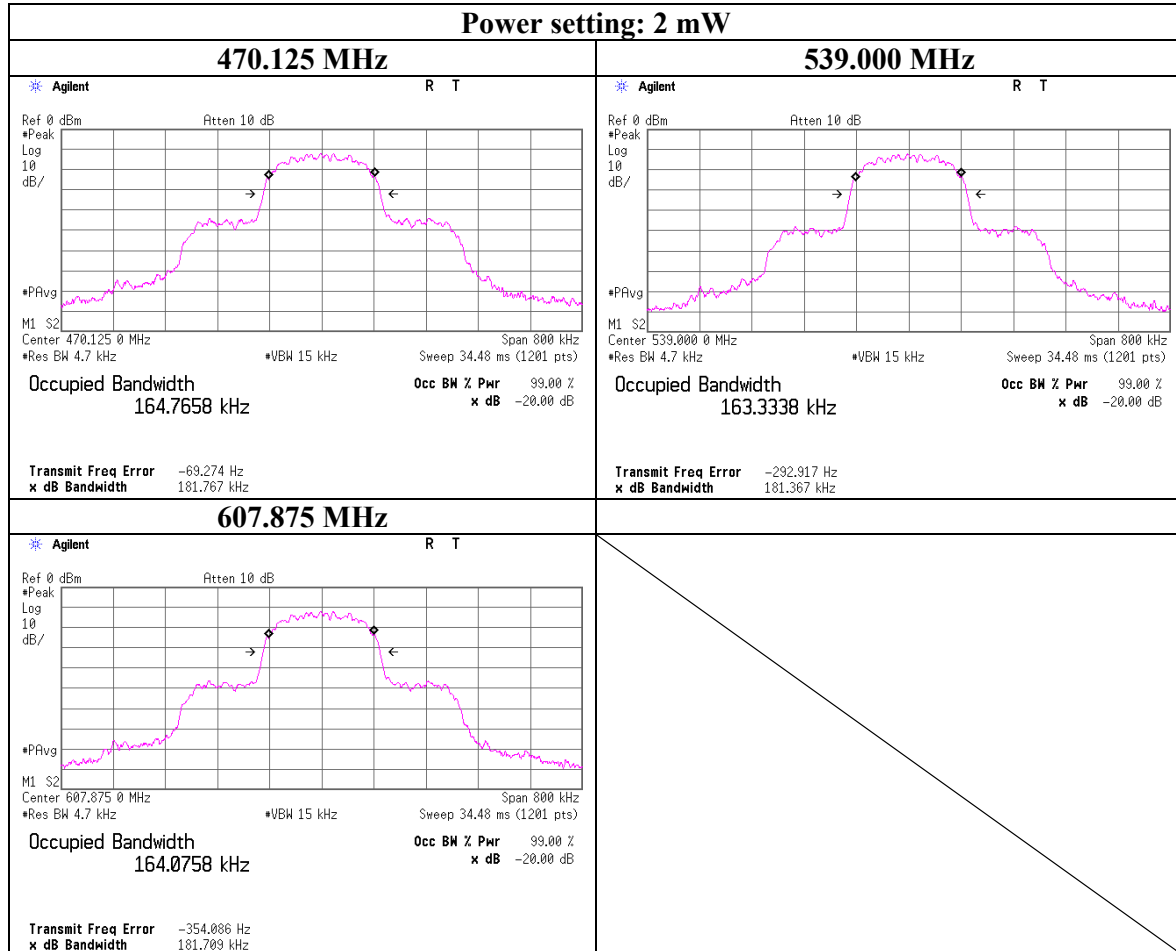
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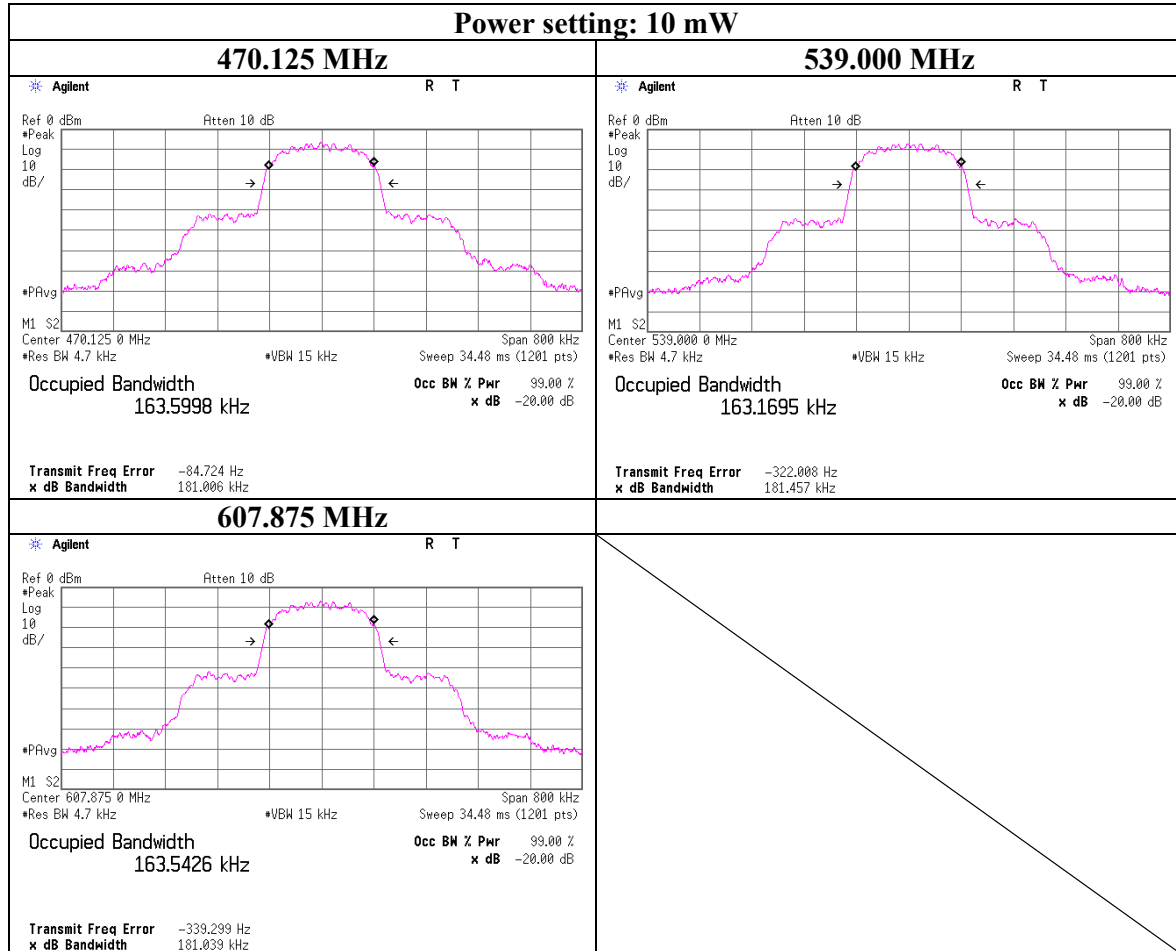
Emission Bandwidth

Test place	Ise EMC Lab. No.5 Measurement Room
Report No.	120717683H
Date	August 8, 2019
Temperature/ Humidity	23 deg. C / 57 % RH
Engineer	Koji Yamamoto
Mode	Tx (470.125 MHz – 607.875 MHz)



Emission Bandwidth

Test place	Ise EMC Lab. No.5 Measurement Room
Report No.	120717683H
Date	August 8, 2019
Temperature/ Humidity	23 deg. C / 57 % RH
Engineer	Koji Yamamoto
Mode	Tx (470.125 MHz – 607.875 MHz)



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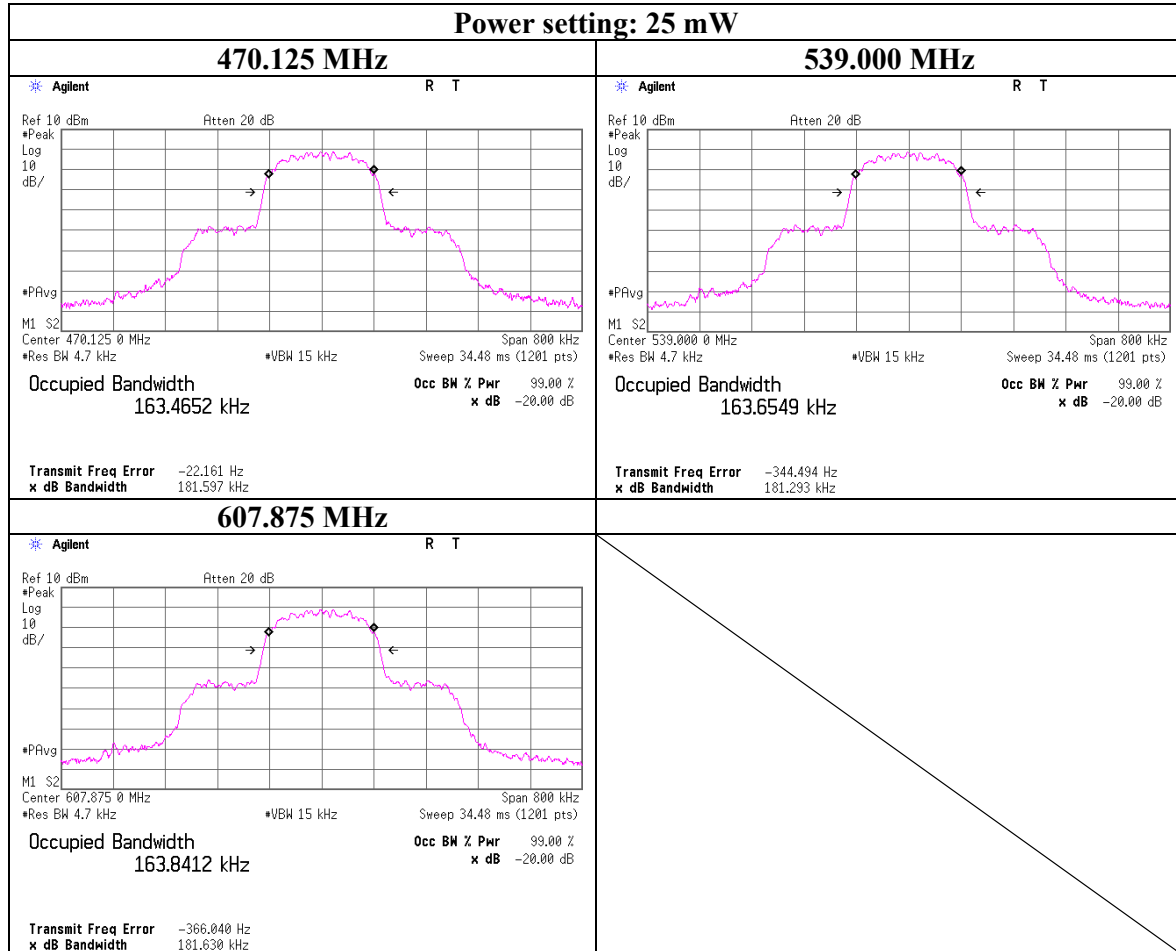
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

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Emission Bandwidth

Test place	Ise EMC Lab. No.5 Measurement Room
Report No.	120717683H
Date	August 8, 2019
Temperature/ Humidity	23 deg. C / 57 % RH
Engineer	Koji Yamamoto
Mode	Tx (470.125 MHz – 607.875 MHz)



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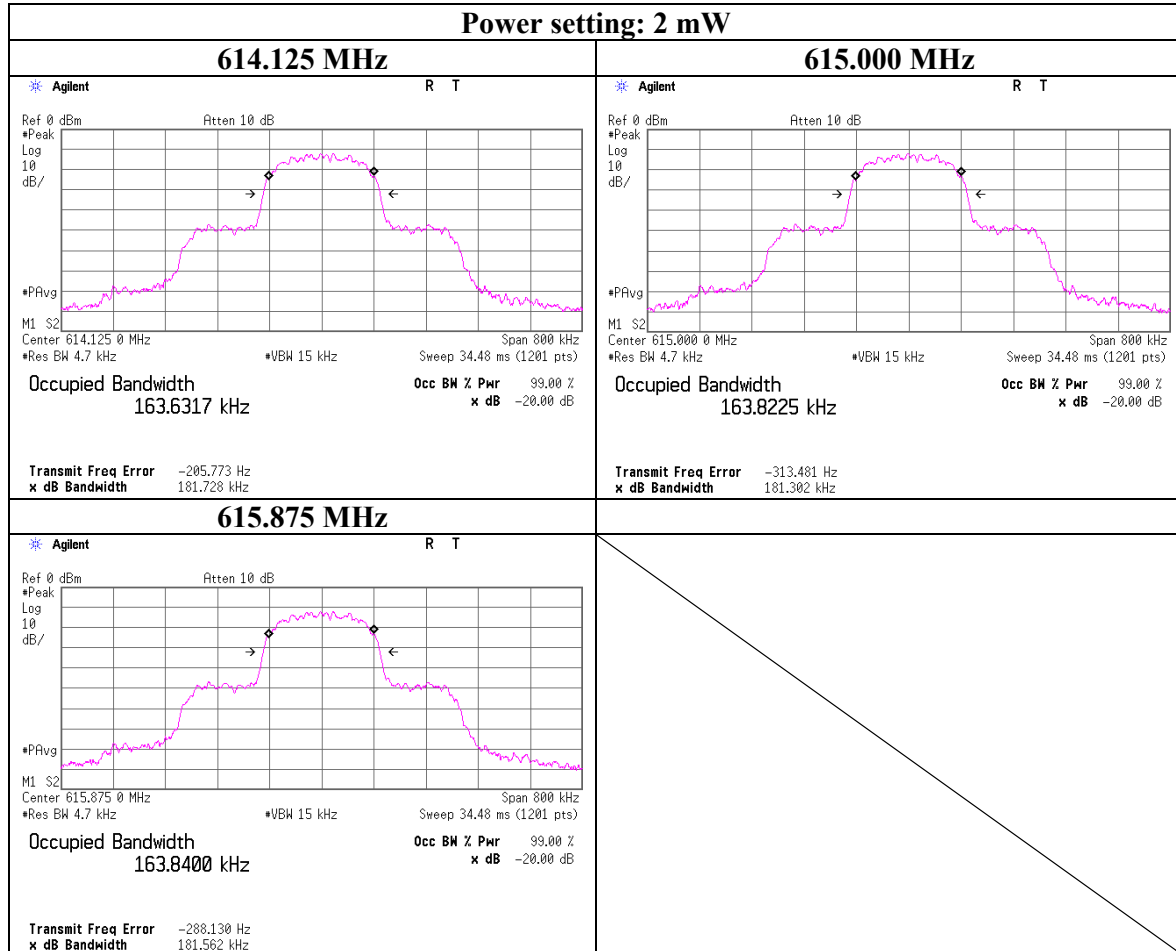
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Emission Bandwidth

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Temperature/ Humidity : 23 deg. C / 57 % RH
Engineer : Koji Yamamoto
Mode : Tx (614.125 MHz – 615.875 MHz)



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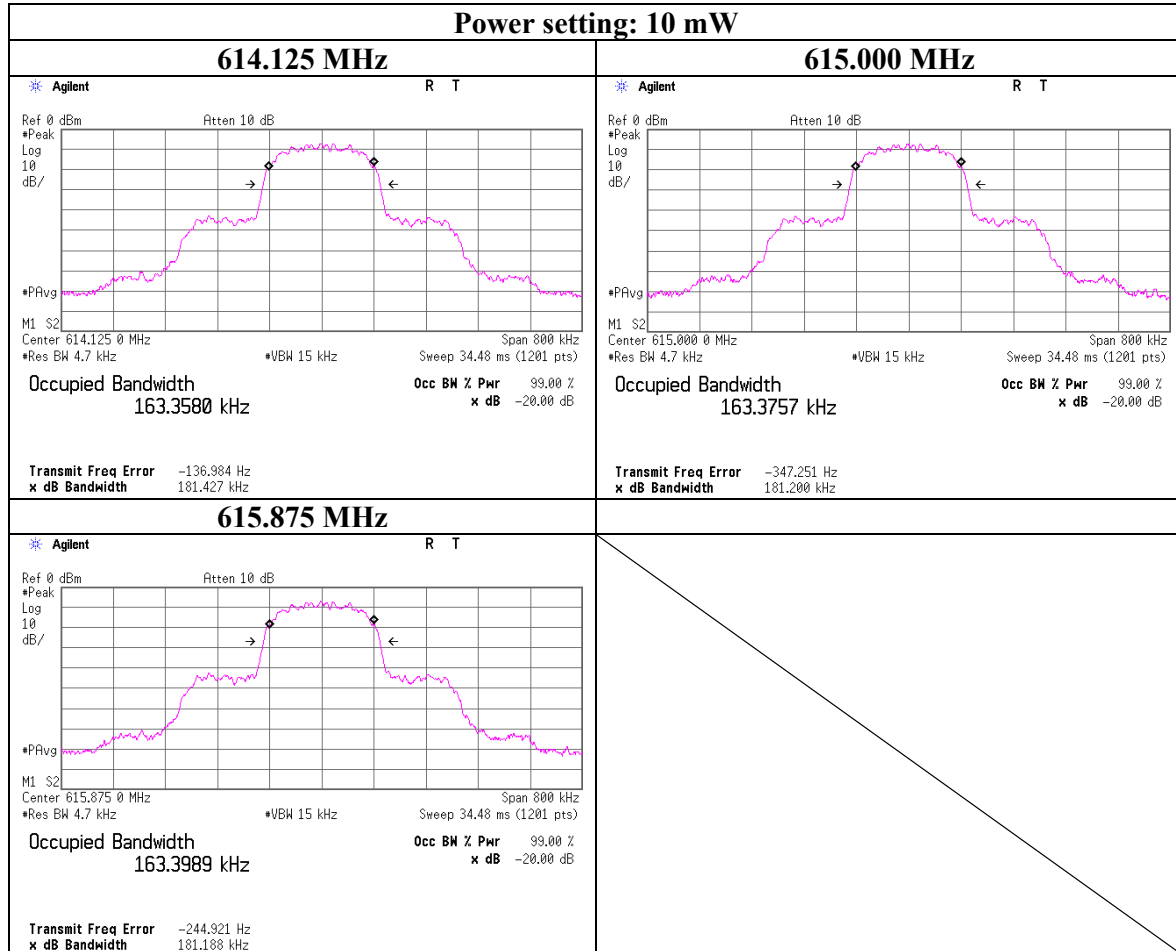
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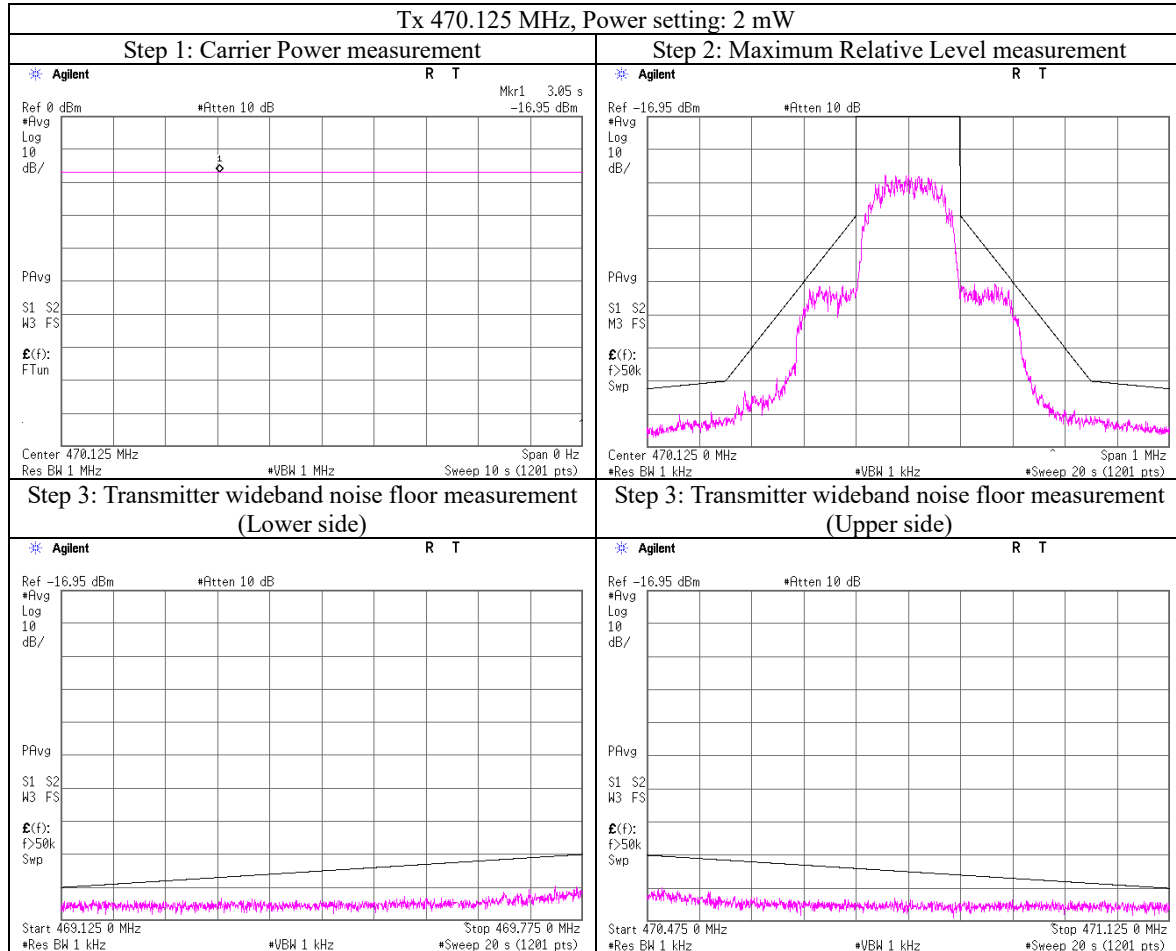
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Emission Mask

Test place	Ise EMC Lab. No.5 Measurement Room
Report No.	120717683H
Date	August 8, 2019
Temperature/ Humidity	23 deg. C / 57 % RH
Engineer	Koji Yamamoto
Mode	Tx



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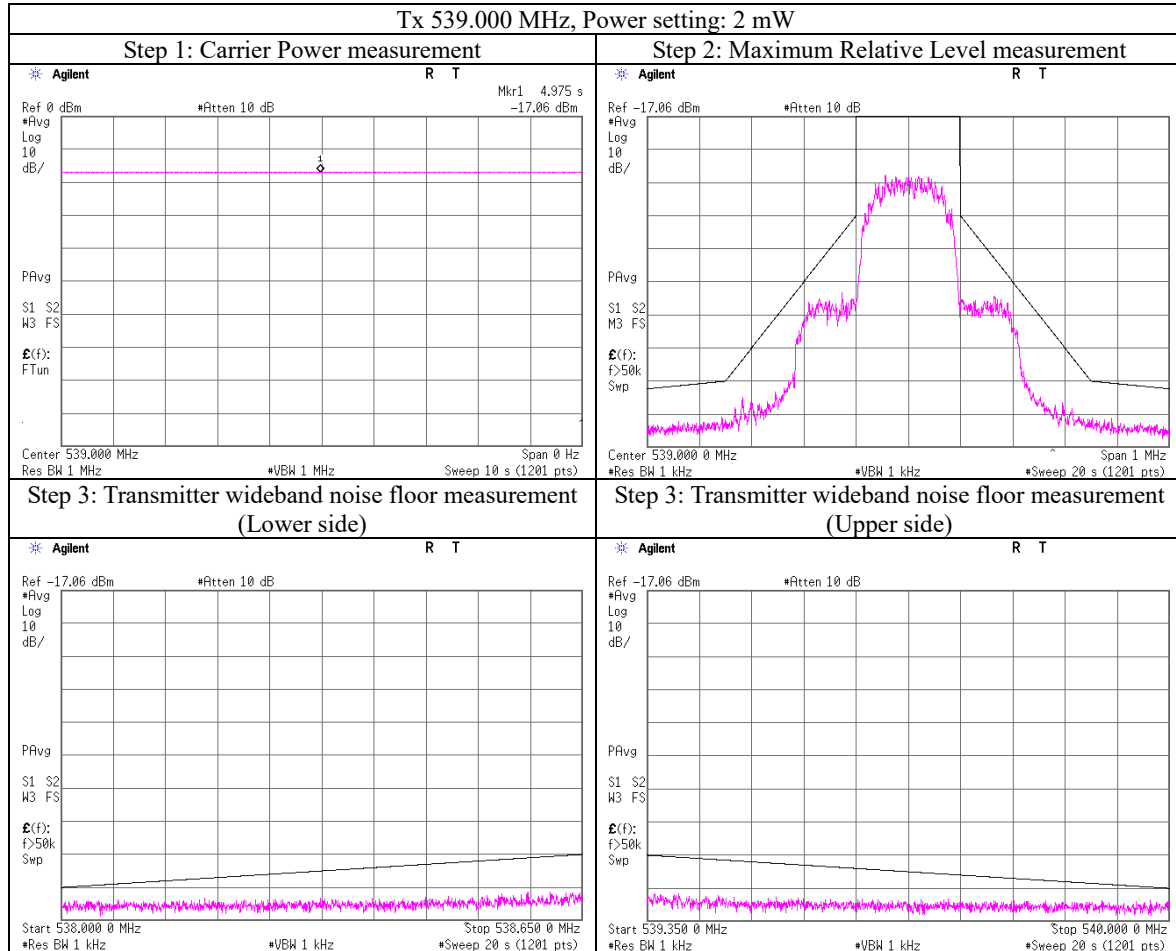
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Emission Mask

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Date	August 8, 2019
Temperature/ Humidity	23 deg. C / 57 % RH
Engineer	Koji Yamamoto
Mode	Tx



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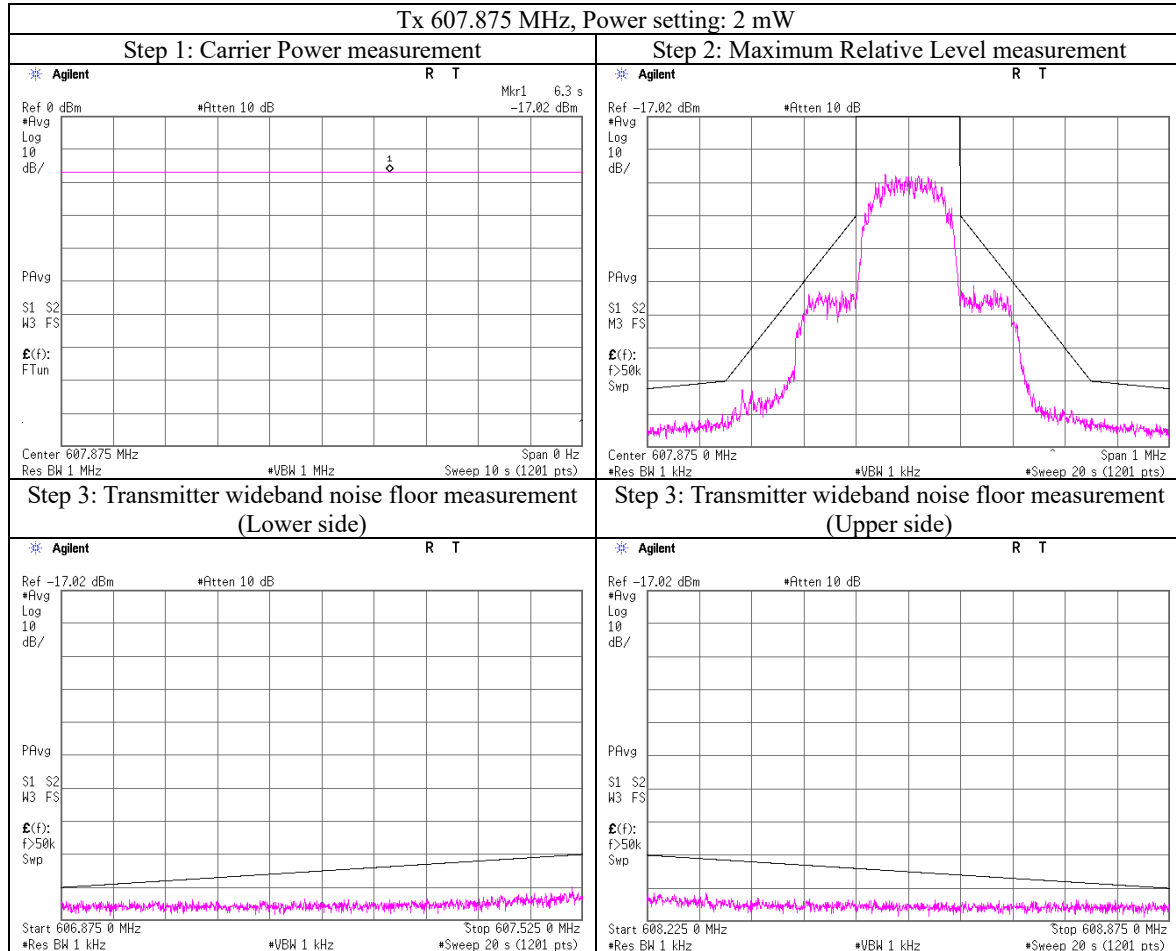
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Emission Mask

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Report No.	120717683H
Date	August 8, 2019
Temperature/ Humidity	23 deg. C / 57 % RH
Engineer	Koji Yamamoto
Mode	Tx



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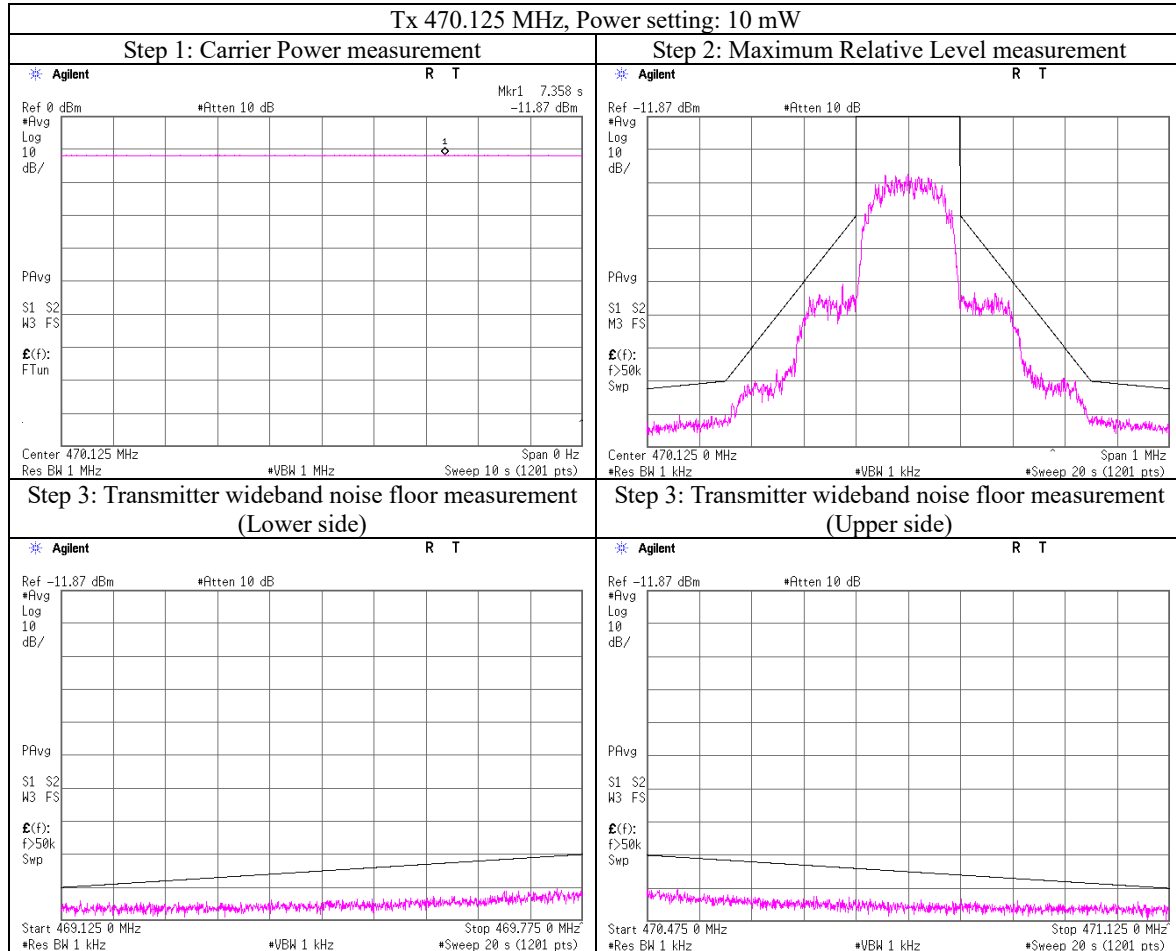
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

Telephone : +81 596 24 8999

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Emission Mask

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Temperature/ Humidity	23 deg. C / 57 % RH
Engineer	Koji Yamamoto
Mode	Tx



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Ise EMC Lab.

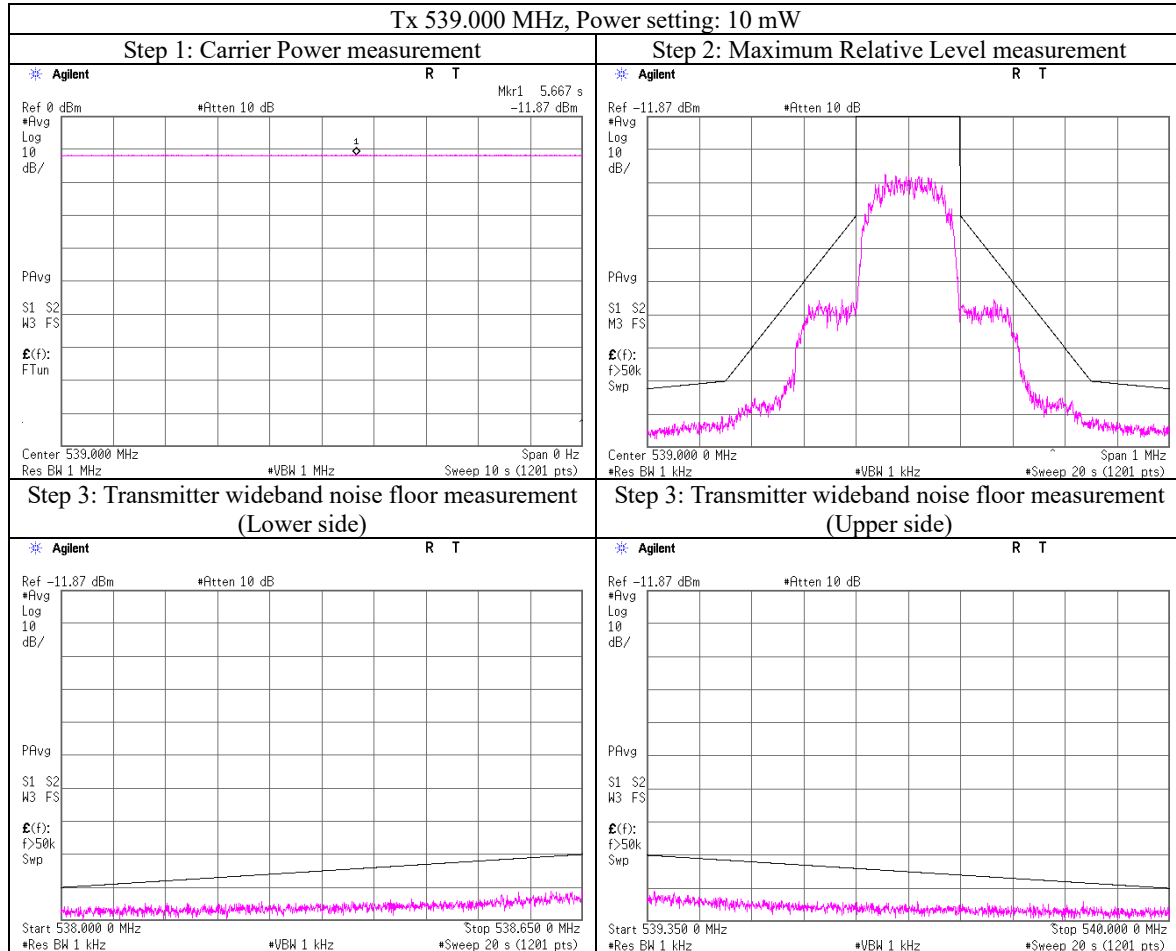
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

Telephone : +81 596 24 8999

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Emission Mask

Test place	Ise EMC Lab. No.5 Measurement Room
Report No.	120717683H
Date	August 8, 2019
Temperature/ Humidity	23 deg. C / 57 % RH
Engineer	Koji Yamamoto
Mode	Tx



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Ise EMC Lab.

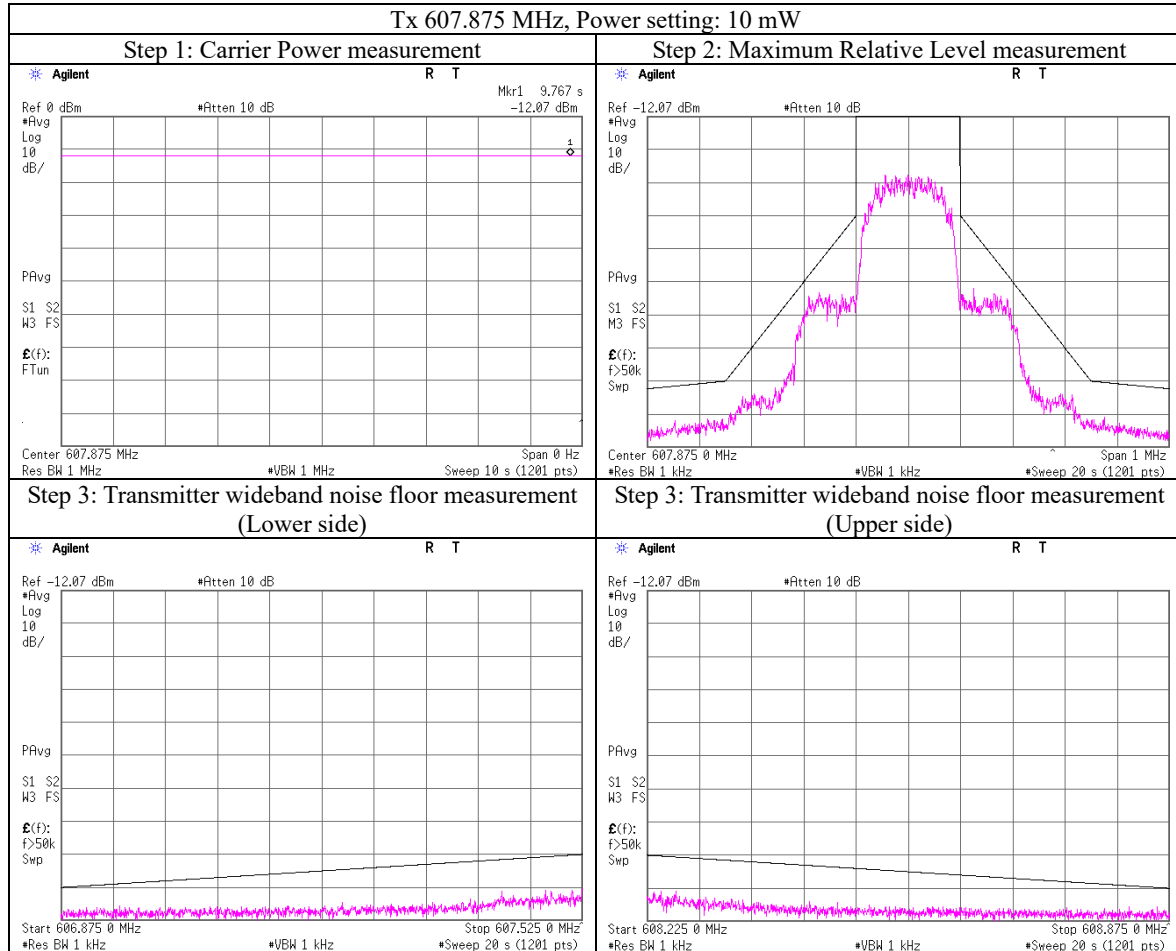
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

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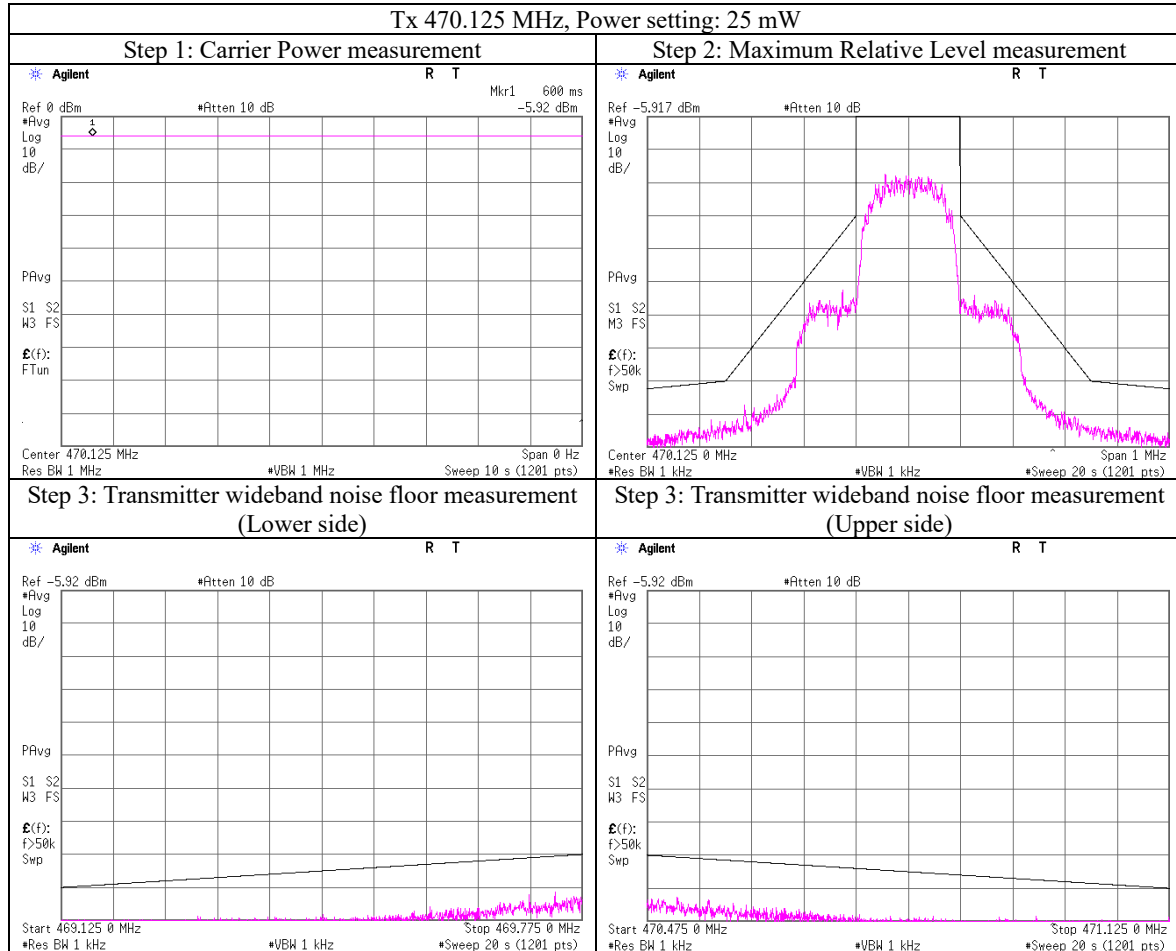
Emission Mask

Test place	Ise EMC Lab. No.5 Measurement Room
Report No.	120717683H
Date	August 8, 2019
Temperature/ Humidity	23 deg. C / 57 % RH
Engineer	Koji Yamamoto
Mode	Tx



Emission Mask

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Engineer	Koji Yamamoto
Mode	Tx



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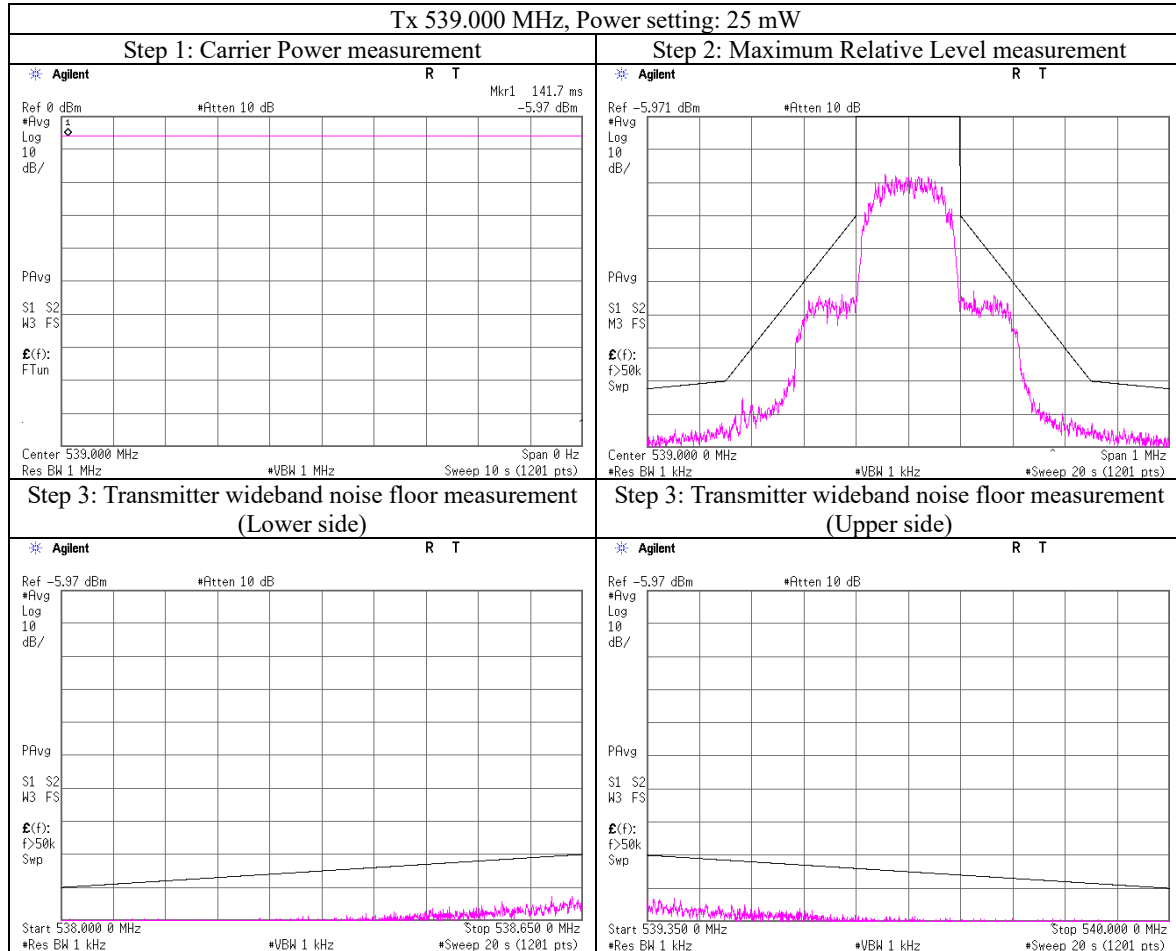
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Emission Mask

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Engineer	Koji Yamamoto
Mode	Tx



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Ise EMC Lab.

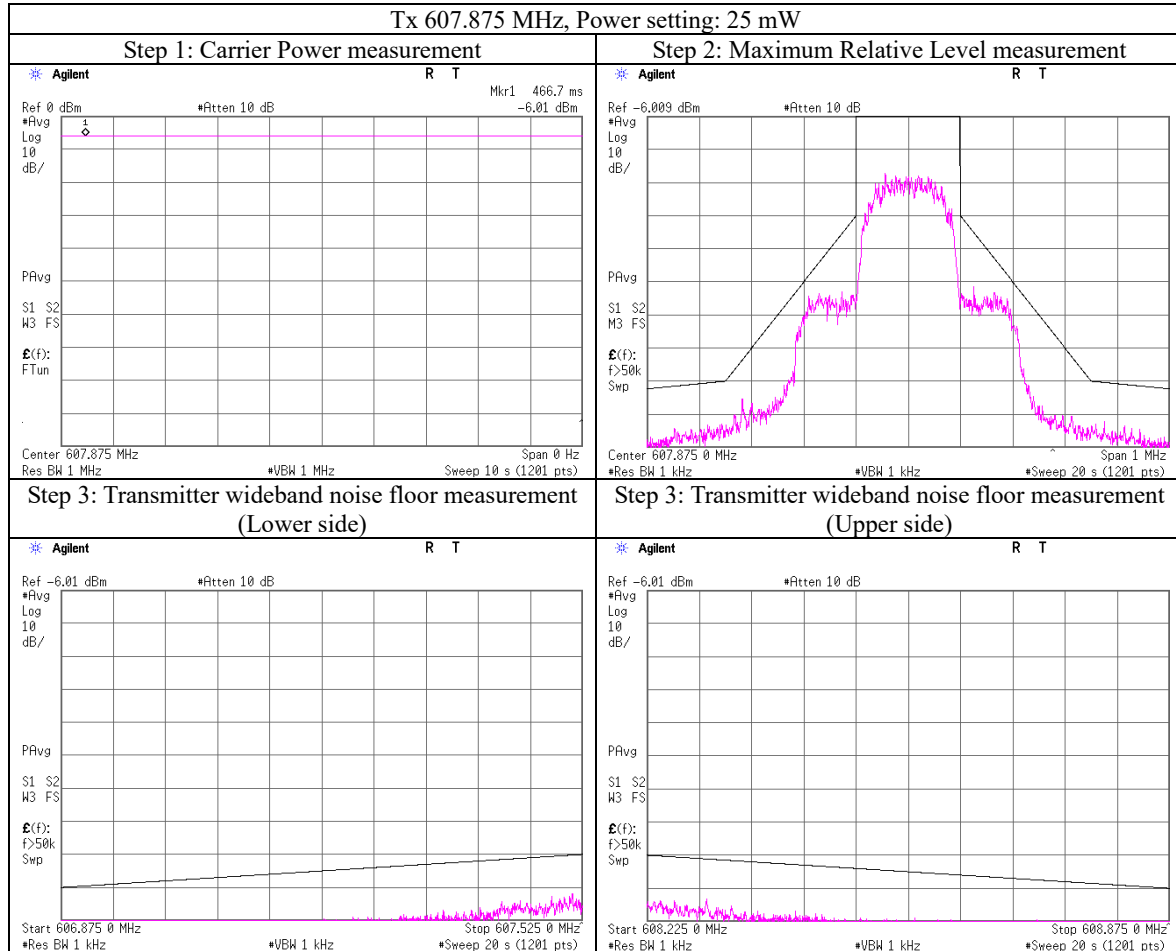
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Emission Mask

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Temperature/ Humidity	23 deg. C / 57 % RH
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Ise EMC Lab.

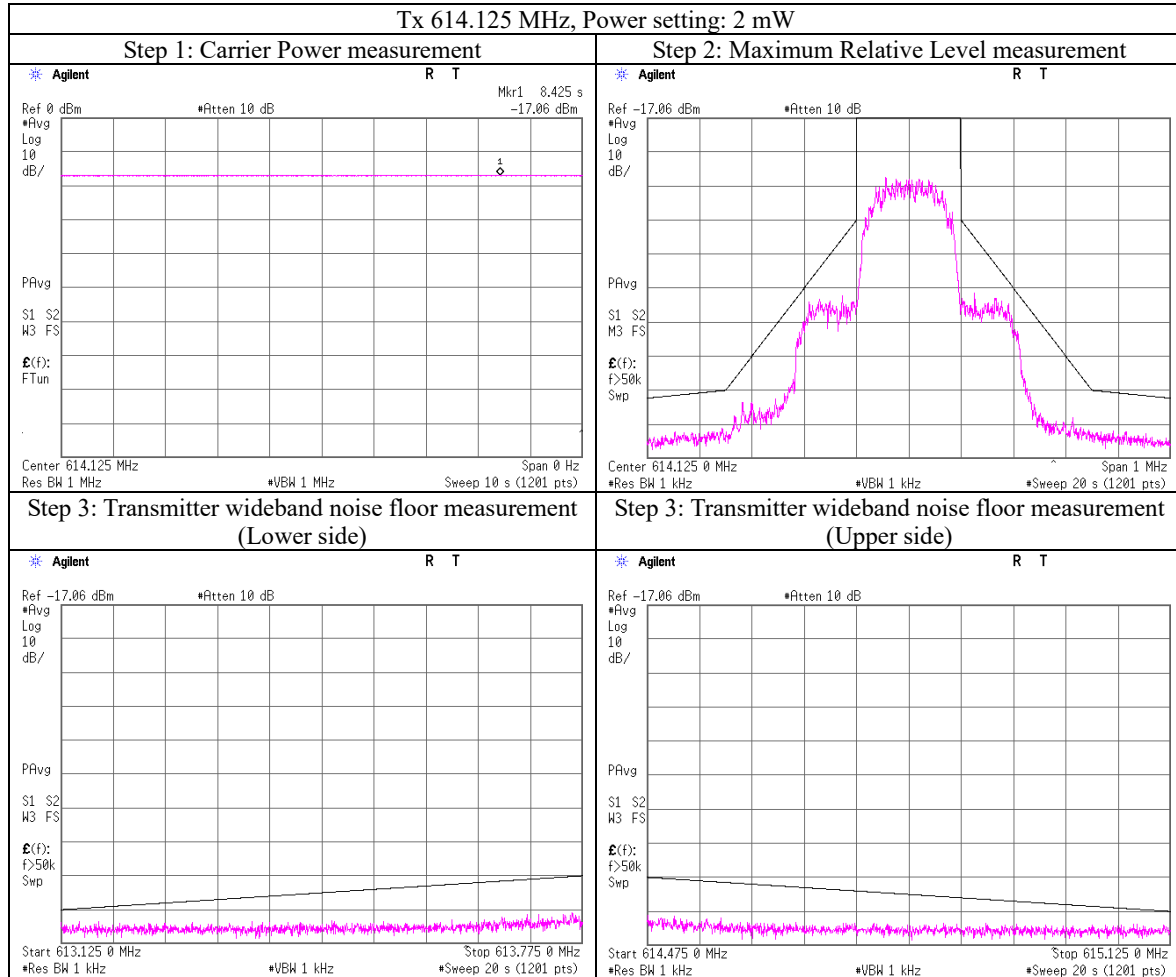
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Report No.	120717683H
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Engineer	Koji Yamamoto
Mode	Tx



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Ise EMC Lab.

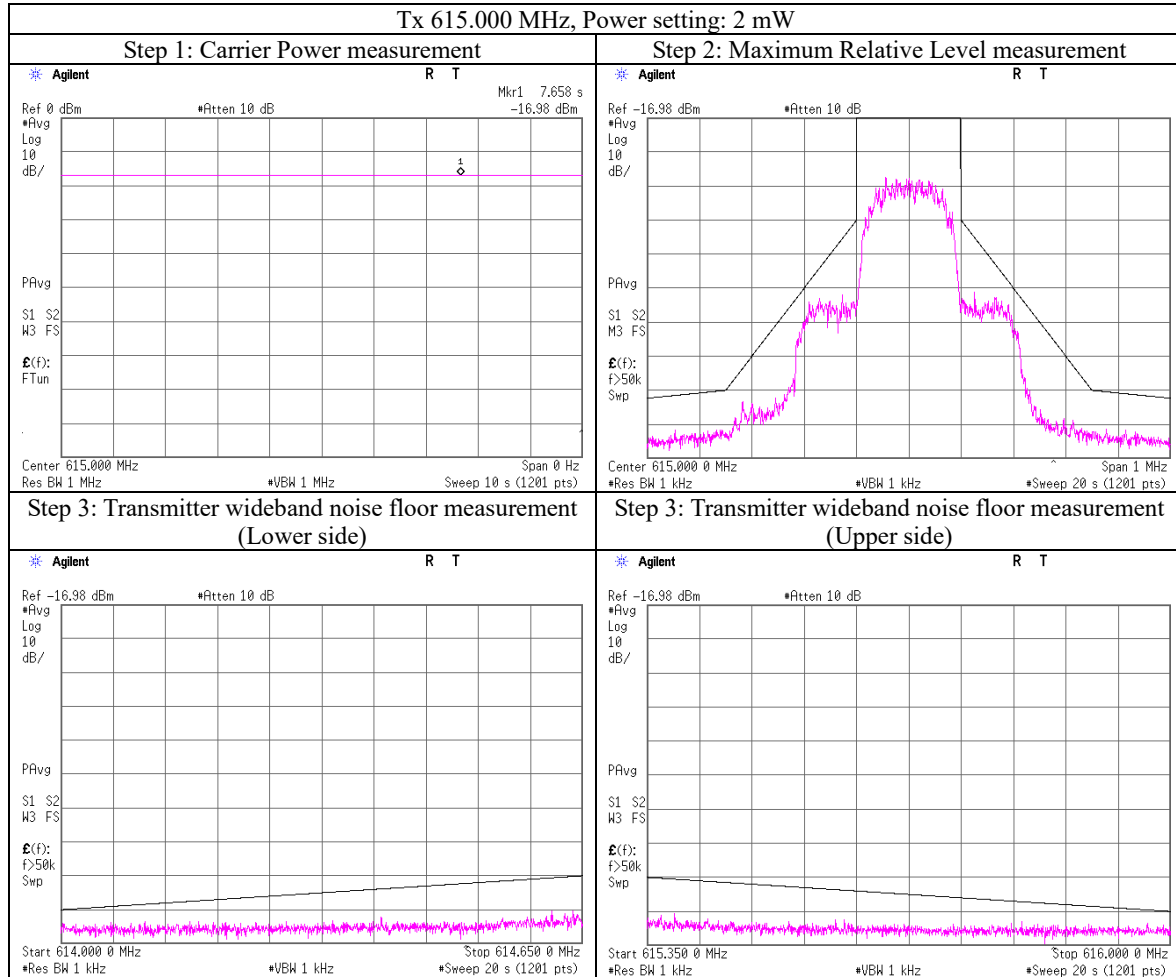
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Emission Mask

Test place	Ise EMC Lab. No.5 Measurement Room
Report No.	120717683H
Date	August 8, 2019
Temperature/ Humidity	23 deg. C / 57 % RH
Engineer	Koji Yamamoto
Mode	Tx



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Ise EMC Lab.

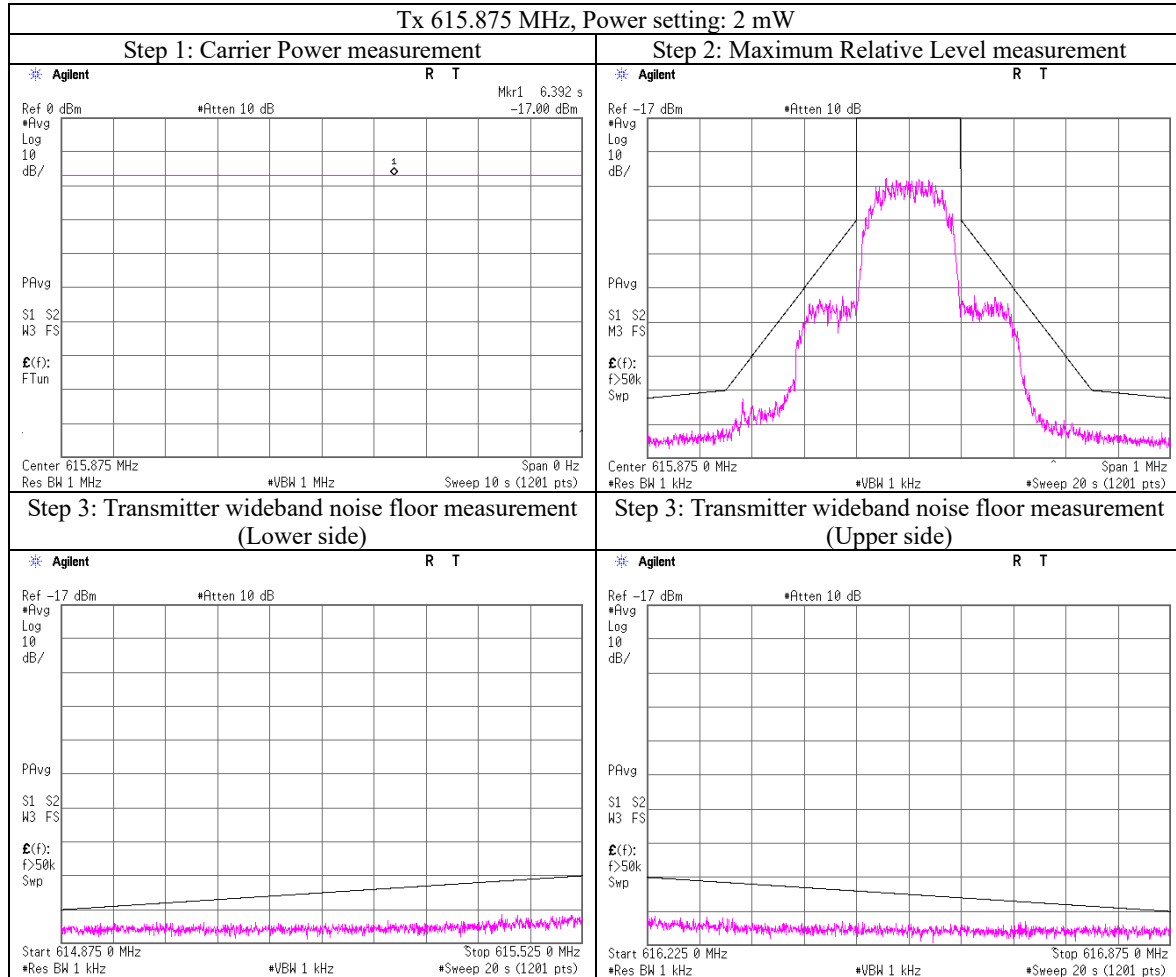
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Ise EMC Lab.

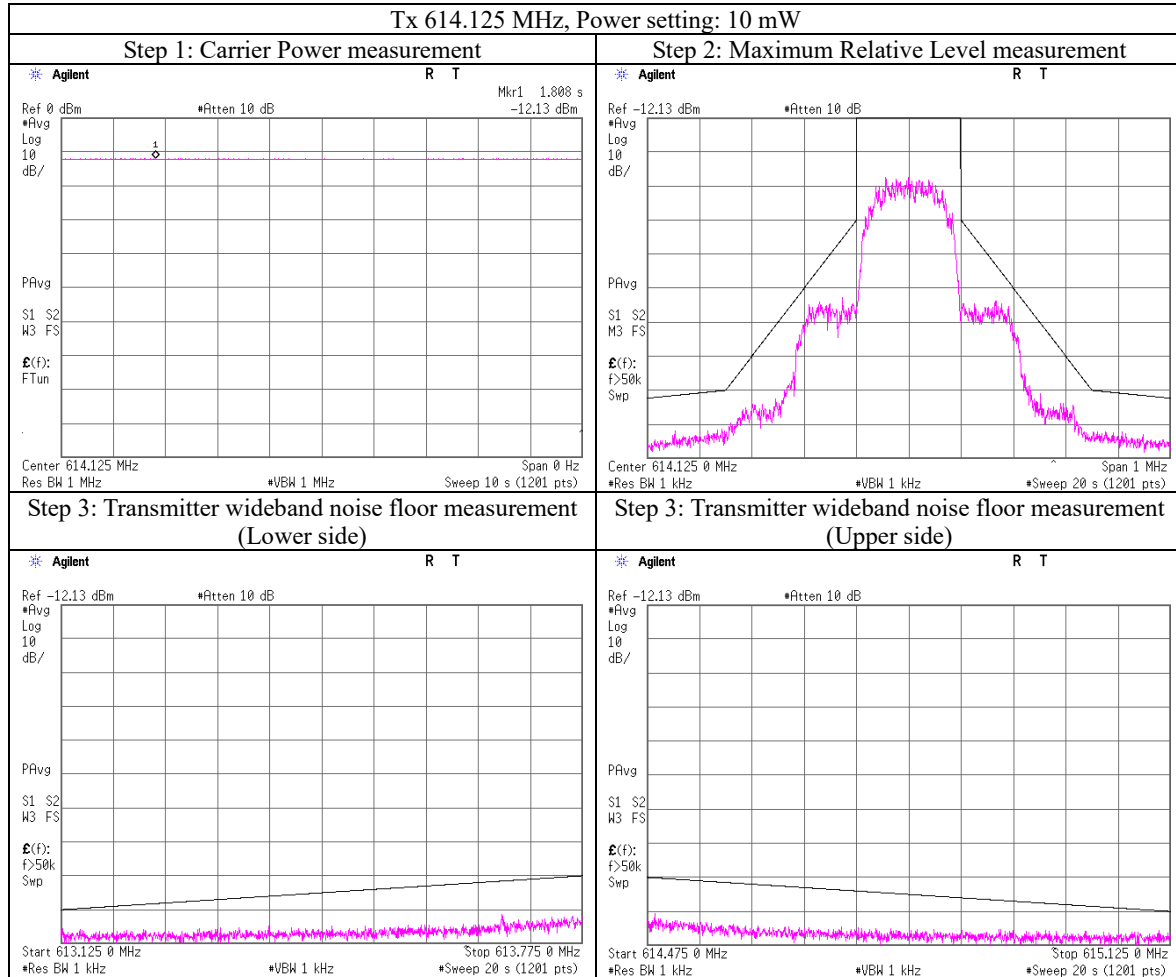
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Test place	Ise EMC Lab. No.5 Measurement Room
Report No.	120717683H
Date	August 8, 2019
Temperature/ Humidity	23 deg. C / 57 % RH
Engineer	Koji Yamamoto
Mode	Tx



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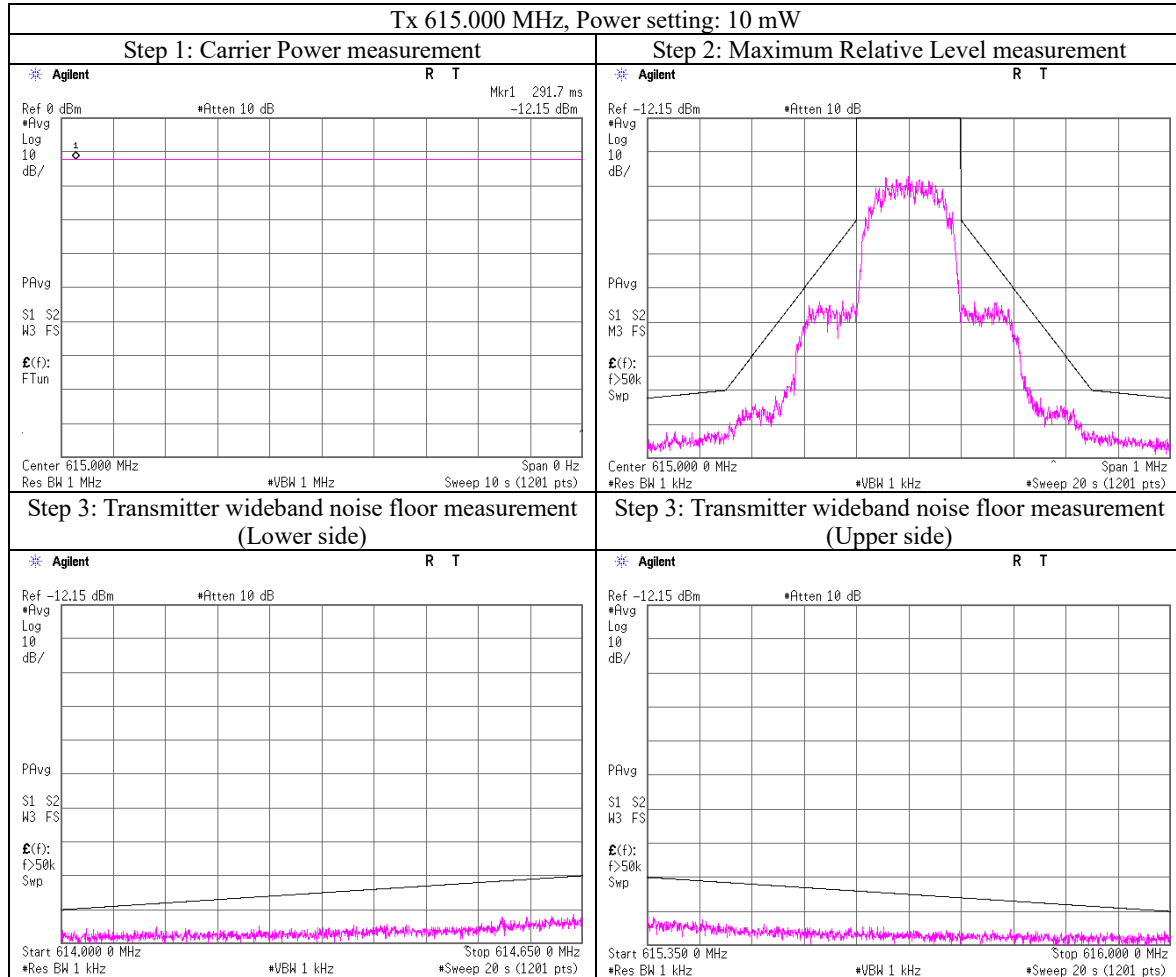
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

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Emission Mask

Test place	Ise EMC Lab. No.5 Measurement Room
Report No.	120717683H
Date	August 8, 2019
Temperature/ Humidity	23 deg. C / 57 % RH
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Mode	Tx



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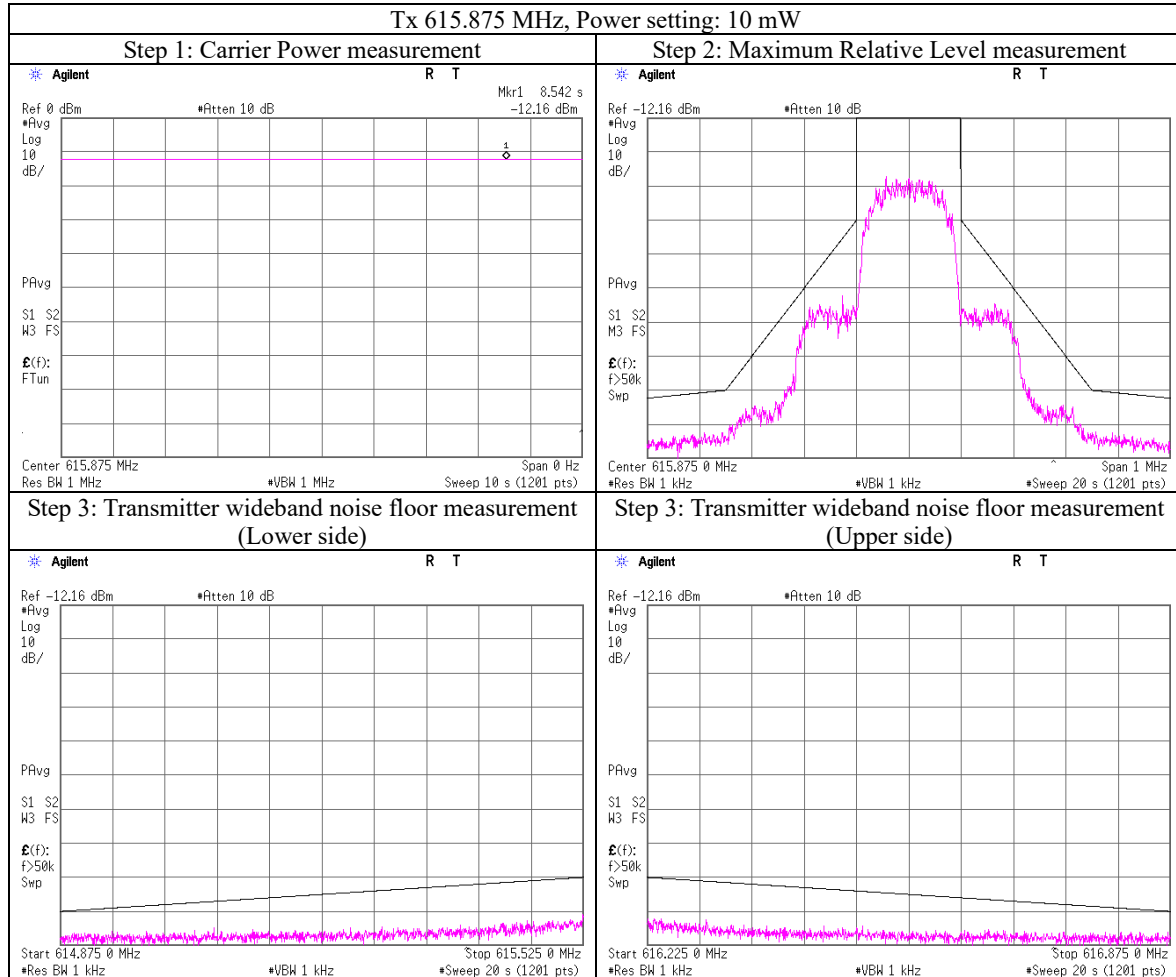
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Test place	Ise EMC Lab. No.5 Measurement Room
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Radiated Spurious Emission

Report No.	12717683H	
Test place	Ise EMC Lab.	
Semi Anechoic Chamber	No.4	No.4
Date	August 31, 2019	September 1, 2019
Temperature / Humidity	22 deg. C / 70 % RH	23 deg. C / 69 % RH
Engineer	Yuichiro Yamazaki	Junki Nagatomi
	(Below 1 GHz)	(Above 1 GHz)
Mode	Tx 470.125 MHz	

[Power setting: 25 mW]

Frequency	Rx SA/TR		Tx SG		Tx	Tx	Result		Limit	Margin		Horizontal		Vertical		Remarks
	Reading [dBuV]		Reading [dBm]		Cable Loss	Ant. Gain	(ERP) [dBm]		(ERP) [dBm]	(dB)		Rx Ant. Height	Turn Table	Rx Ant. Height	Turn Table	
	[MHz]	HOR	VER	HOR			VER	[dB]		[dBi]	HOR					
486.45	39.7	39.0	-53.0	-51.6	3.7	-8.0	-66.9	-65.5	-54.0	12.9	11.5	108	177	119	160	
940.25	47.6	47.5	-33.7	-31.4	5.3	-8.2	-49.3	-47.0	-36.0	13.3	11.0	204	168	177	90	
1410.38	48.8	47.6	-62.1	-67.1	3.2	6.6	-60.8	-65.8	-30.0	30.8	35.8	143	217	122	226	
1880.50	NS	NS	-	-	-	-	-	-	-30.0	-	-	-	-	-	-	
2350.63	NS	NS	-	-	-	-	-	-	-30.0	-	-	-	-	-	-	
2820.75	NS	NS	-	-	-	-	-	-	-30.0	-	-	-	-	-	-	
3290.88	NS	NS	-	-	-	-	-	-	-30.0	-	-	-	-	-	-	
3761.00	NS	NS	-	-	-	-	-	-	-30.0	-	-	-	-	-	-	
4231.13	NS	NS	-	-	-	-	-	-	-30.0	-	-	-	-	-	-	
4701.25	NS	NS	-	-	-	-	-	-	-30.0	-	-	-	-	-	-	

Calculation Result = SG Reading - Tx Cable Loss + Tx Antenna Gain - 2.15

Rx-ANTENNA : Biconical Antenna(25 MHz - 200 MHz), Logperiodic Antenna(200 MHz - 1000 MHz), Horn Antenna(1 GHz - 12.75 GHz)

Tx-ANTENNA : 120 MHz tuned Dipole Antenna(30 MHz - 120 MHz), Dipole Antenna(120 MHz - 1000 MHz), Horn Antenna(1 GHz - 12.75 GHz)

Other frequency noises omitted in this report were not seen or had enough margin (more than 20 dB).

NS : No signal detect.

Detector : 25 MHz to 30 MHz Test Receiver QP (BW : 9 kHz), 30 MHz to 1 GHz Test Receiver QP (BW : 120 kHz)

Above 1 GHz Spectrum Analyzer RMS Average (RBW : 1 MHz / VBW : 3 MHz)

*Emissions were investigated up to the 10th harmonic of the fundamental.

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Radiated Spurious Emission

Report No.	12717683H	
Test place	Ise EMC Lab.	
Semi Anechoic Chamber	No.4	No.4
Date	August 31, 2019	September 1, 2019
Temperature / Humidity	22 deg. C / 70 % RH	23 deg. C / 69 % RH
Engineer	Yuichiro Yamazaki	Junki Nagatomi
	(Below 1 GHz)	(Above 1 GHz)
Mode	Tx 539.000 MHz	

[Power setting:25 mW]

Frequency	Rx SA/TR		Tx SG		Tx	Tx	Result		Limit	Margin		Horizontal		Vertical		Remarks
	Reading [dBuV]		Reading [dBm]		Cable Loss	Ant. Gain	(ERP) [dBm]		(ERP) [dBmV]	[dB]		Rx Ant. Height	Turn Table	Rx Ant. Height	Turn Table	
	HOR	VER	HOR	VER			HOR	VER								
[MHz]	HOR	VER	HOR	VER	[dB]	[dB]	HOR	VER		HOR	VER	[cm]	[deg]	[cm]	[deg]	
522.66	40.6	41.0	-48.7	-45.5	3.8	-8.0	-62.7	-59.5	-54.0	8.7	5.5	100	358	125	293	
555.38	40.2	39.5	-50.8	-48.7	3.9	-7.9	-64.8	-62.7	-54.0	10.8	8.7	221	171	100	43	
1078.00	46.8	47.0	-68.7	-66.6	2.8	5.7	-67.9	-65.8	-30.0	37.9	35.8	144	0	190	106	
1617.00	50.5	51.3	-60.2	-58.9	3.4	8.6	-57.1	-55.8	-30.0	27.1	25.8	118	113	189	18	
2156.00	NS	NS	-	-	-	-	-	-	-30.0	-	-	-	-	-	-	
2695.00	NS	NS	-	-	-	-	-	-	-30.0	-	-	-	-	-	-	
3234.00	NS	NS	-	-	-	-	-	-	-30.0	-	-	-	-	-	-	
3773.00	NS	NS	-	-	-	-	-	-	-30.0	-	-	-	-	-	-	
4312.00	NS	NS	-	-	-	-	-	-	-30.0	-	-	-	-	-	-	
4851.00	NS	NS	-	-	-	-	-	-	-30.0	-	-	-	-	-	-	
5390.00	NS	NS	-	-	-	-	-	-	-30.0	-	-	-	-	-	-	

Calculation Result = SG Reading - Tx Cable Loss + Tx Antenna Gain - 2.15

Rx-ANTENNA : Biconical Antenna(25 MHz - 200 MHz), Logperiodic Antenna(200 MHz - 1000 MHz), Horn Antenna(1 GHz - 12.75 GHz)

Tx-ANTENNA : 120 MHz tuned Dipole Antenna(30 MHz - 120 MHz), Dipole Antenna(120 MHz - 1000 MHz), Horn Antenna(1 GHz - 12.75 GHz)

Other frequency noises omitted in this report were not seen or had enough margin (more than 20 dB).

NS : No signal detect.

Detector : 25 MHz to 30 MHz: Test Receiver QP (BW: 9 kHz), 30 MHz to 1 GHz: Test Receiver QP (BW: 120 kHz)

Above 1 GHz: Spectrum Analyzer RMS Average (RBW: 1 MHz / VBW: 3 MHz)

*Emissions were investigated up to the 10th harmonic of the fundamental.

Radiated Spurious Emission

Report No.	12717683H	
Test place	Ise EMC Lab.	
Semi Anechoic Chamber	No.4	No.4
Date	August 31, 2019	September 1, 2019
Temperature / Humidity	22 deg. C / 70 % RH	23 deg. C / 69 % RH
Engineer	Yuichiro Yamazaki	Junki Nagatomi
	(Below 1 GHz)	(Above 1 GHz)
Mode	Tx 607.875 MHz	

[Power setting: 25 mW]

Frequency	Rx SA/TR		Tx SG		Tx	Tx	Result		Limit	Margin		Horizontal		Vertical		Remarks
	Reading [dBuV]		Reading [dBm]		Cable Loss	Ant. Gain	(ERP) [dBm]	(ERP) [dBm]		[dB]		Rx Ant. Height [cm]	Turn Table [deg.]	Rx Ant. Height [cm]	Turn Table [deg.]	
	HOR	VER	HOR	VER	[dB]	[dBi]	HOR	VER		HOR	VER					
592.15	42.0	40.0	-47.7	-46.6	4.1	-7.7	-61.6	-60.5	-54.0	7.6	6.5	230	166	213	88	
624.22	38.9	39.3	-48.5	-47.4	4.2	-7.7	-62.5	-61.4	-54.0	8.5	7.4	188	154	157	268	
1215.75	NS	NS	-	-	-	-	-	-	-30.0	-	-	-	-	-	-	
1823.63	51.6	49.3	-56.9	-61.6	3.6	9.8	-52.8	-57.5	-30.0	22.8	27.5	148	75	149	270	
2431.50	NS	NS	-	-	-	-	-	-	-30.0	-	-	-	-	-	-	
3039.38	NS	NS	-	-	-	-	-	-	-30.0	-	-	-	-	-	-	
3647.25	NS	NS	-	-	-	-	-	-	-30.0	-	-	-	-	-	-	
4255.13	NS	NS	-	-	-	-	-	-	-30.0	-	-	-	-	-	-	
4863.00	NS	NS	-	-	-	-	-	-	-30.0	-	-	-	-	-	-	
5470.88	NS	NS	-	-	-	-	-	-	-30.0	-	-	-	-	-	-	
6078.75	NS	NS	-	-	-	-	-	-	-30.0	-	-	-	-	-	-	

Calculation Result = SG Reading - Tx Cable Loss + Tx Antenna Gain - 2.15

Rx-ANTENNA : Biconical Antenna(25 MHz - 200 MHz), Logperiodic Antenna(200 MHz - 1000 MHz), Horn Antenna(1 GHz - 12.75 GHz)

Tx-ANTENNA : 120 MHz tuned Dipole Antenna(30 MHz - 120 MHz), Dipole Antenna(120 MHz - 1000 MHz), Horn Antenna(1 GHz - 12.75 GHz)

Other frequency noises omitted in this report were not seen or had enough margin (more than 20 dB).

NS : No signal detect.

Detector : 25 MHz to 30 MHz: Test Receiver QP (BW: 9 kHz), 30 MHz to 1 GHz: Test Receiver QP (BW: 120 kHz)

Above 1 GHz: Spectrum Analyzer RMS Average (RBW: 1 MHz / VBW: 3 MHz)

*Emissions were investigated up to the 10th harmonic of the fundamental.

Radiated Spurious Emission

Report No.	12717683H	
Test place	Ise EMC Lab.	
Semi Anechoic Chamber	No.4	No.4
Date	August 31, 2019	September 1, 2019
Temperature / Humidity	22 deg. C / 70 % RH	23 deg. C / 69 % RH
Engineer	Yuichiro Yamazaki	Junki Nagatomi
	(Below 1 GHz)	(Above 1 GHz)
Mode	Tx 614.125 MHz	

[Power setting: 10 mW]

Frequency	Rx SA/TR		Tx SG		Tx	Tx	Result		Limit	Margin		Horizontal		Vertical		Remarks
	Reading [dBuV]		Reading [dBm]		Cable Loss	Ant. Gain	(ERP) [dBm]		(ERP) [dBm]	[dB]		Rx Ant.	Turn	Rx Ant.	Turn	
	[MHz]	HOR	VER	HOR	VER	[dB]	[dBi]	HOR	VER		HOR	VER	Height [cm]	Table [deg.]	Height [cm]	
597.76	33.7	32.6	-55.3	-54.5	4.1	-7.7	-69.2	-68.4	-54.0	15.2	14.4	141	359	169	270	
1228.25	NS	NS	-	-	-	-	-	-	-30.0	-	-	-	-	-	-	-
1842.38	50.3	50.0	-59.3	-60.6	3.6	10.0	-55.0	-56.3	-30.0	25.0	26.3	112	256	149	237	
2456.50	NS	NS	-	-	-	-	-	-	-30.0	-	-	-	-	-	-	-
3070.63	NS	NS	-	-	-	-	-	-	-30.0	-	-	-	-	-	-	-
3684.75	NS	NS	-	-	-	-	-	-	-30.0	-	-	-	-	-	-	-
4298.88	NS	NS	-	-	-	-	-	-	-30.0	-	-	-	-	-	-	-
4913.00	NS	NS	-	-	-	-	-	-	-30.0	-	-	-	-	-	-	-
5527.13	NS	NS	-	-	-	-	-	-	-30.0	-	-	-	-	-	-	-
6141.25	NS	NS	-	-	-	-	-	-	-30.0	-	-	-	-	-	-	-

Calculation Result = SG Reading - Tx Cable Loss + Tx Antenna Gain - 2.15

Rx-ANTENNA : Biconical Antenna(25 MHz - 200 MHz), Logperiodic Antenna(200 MHz - 1000 MHz), Horn Antenna(1 GHz - 12.75 GHz)

Tx-ANTENNA : 120 MHz tuned Dipole Antenna(30 MHz - 120 MHz), Dipole Antenna(120 MHz - 1000 MHz), Horn Antenna(1 GHz - 12.75 GHz)

Other frequency noises omitted in this report were not seen or had enough margin (more than 20 dB).

NS : No signal detect.

Detector : 25 MHz to 30 MHz Test Receiver QP (BW: 9 kHz), 30 MHz to 1 GHz: Test Receiver QP (BW: 120 kHz)

Above 1 GHz Spectrum Analyzer RMS Average (RBW: 1 MHz / VBW: 3 MHz)

*Emissions were investigated up to the 10th harmonic of the fundamental.

Radiated Spurious Emission

Report No.	12717683H	
Test place	Ise EMC Lab.	
Semi Anechoic Chamber	No.4	No.4
Date	August 31, 2019	September 1, 2019
Temperature / Humidity	22 deg. C / 70 % RH	23 deg. C / 69 % RH
Engineer	Yuichiro Yamazaki	Junki Nagatomi
	(Below 1 GHz)	(Above 1 GHz)
Mode	Tx 615.000 MHz	

[Power setting: 10 mW]

Frequency [MHz]	Rx SA/TR		Tx SG		Tx	Tx	Result		Limit	Margin		Horizontal		Vertical		Remarks
	Reading [dBuV]		Reading [dBm]		Cable Loss [dB]	Ant. Gain [dBi]	(ERP) [dBm]		(ERP) [dBm]	[dB]		Rx Ant. Height [cm]	Turn Table [deg]	Rx Ant. Height [cm]	Turn Table [deg]	
	HOR	VER	HOR	VER			HOR	VER								
598.63	34.5	32.5	-55.3	-54.5	4.1	-7.7	-69.2	-68.4	-54.0	15.2	14.4	205	158	210	94	
1230.00	NS	NS	-	-	-	-	-	-	-30.0	-	-	-	-	-	-	
1845.00	49.2	49.1	-61.0	-62.7	3.6	10.1	-56.7	-58.4	-30.0	26.7	28.4	127	121	162	107	
2460.00	NS	NS	-	-	-	-	-	-	-30.0	-	-	-	-	-	-	
3075.00	NS	NS	-	-	-	-	-	-	-30.0	-	-	-	-	-	-	
3690.00	NS	NS	-	-	-	-	-	-	-30.0	-	-	-	-	-	-	
4305.00	NS	NS	-	-	-	-	-	-	-30.0	-	-	-	-	-	-	
4920.00	NS	NS	-	-	-	-	-	-	-30.0	-	-	-	-	-	-	
5535.00	NS	NS	-	-	-	-	-	-	-30.0	-	-	-	-	-	-	
6150.00	NS	NS	-	-	-	-	-	-	-30.0	-	-	-	-	-	-	

Calculation Result = SG Reading - Tx Cable Loss + Tx Antenna Gain - 2.15

Rx-ANTENNA : Biconical Antenna(25 MHz - 200 MHz), Logperiodic Antenna(200 MHz - 1000 MHz), Horn Antenna(1 GHz - 12.75 GHz)

Tx-ANTENNA : 120 MHz tuned Dipole Antenna(30 MHz - 120 MHz), Dipole Antenna(120 MHz - 1000 MHz), Horn Antenna(1 GHz - 12.75 GHz)

Other frequency noises omitted in this report were not seen or had enough margin (more than 20 dB).

NS : No signal detect.

Detector : 25 MHz to 30 MHz Test Receiver QP (BW: 9 kHz), 30 MHz to 1 GHz: Test Receiver QP (BW: 120 kHz)
Above 1 GHz: Spectrum Analyzer RMS Average (RBW: 1 MHz / VBW: 3 MHz)

Radiated Spurious Emission

Report No.	12717683H	
Test place	Ise EMC Lab.	
Semi Anechoic Chamber	No.4	No.4
Date	August 31, 2019	September 1, 2019
Temperature / Humidity	22 deg. C / 70 % RH	23 deg. C / 69 % RH
Engineer	Yuichiro Yamazaki	Junki Nagatomi
	(Below 1 GHz)	(Above 1 GHz)
Mode	Tx 615.875 MHz	

[Power setting: 10 mW]

Frequency [MHz]	Rx SA/TR		Tx SG		Tx	Tx	Result		Limit	Margin		Horizontal		Vertical		Remarks
	Reading [dBuV]		Reading [dBm]		Cable Loss [dB]	Ant. Gain [dBi]	(ERP) [dBm]		(ERP) [dBm]	[dB]		Rx Ant. Height [cm]	Turn Table [deg.]	Rx Ant. Height [cm]	Turn Table [deg.]	
	HOR	VER	HOR	VER			HOR	VER		HOR	VER					
599.51	33.8	32.5	-56.3	-56.5	4.1	-7.7	-70.2	-70.4	-54.0	16.2	16.4	222	0	170	319	
1231.75	NS	NS	-	-	-	-	-	-	-30.0	-	-	-	-	-	-	
1847.63	50.2	48.8	-58.4	-53.1	3.6	10.1	-54.1	-48.8	-30.0	24.1	18.8	107	251	131	271	
2463.50	NS	NS	-	-	-	-	-	-	-30.0	-	-	-	-	-	-	
3079.38	NS	NS	-	-	-	-	-	-	-30.0	-	-	-	-	-	-	
3695.25	NS	NS	-	-	-	-	-	-	-30.0	-	-	-	-	-	-	
4311.13	NS	NS	-	-	-	-	-	-	-30.0	-	-	-	-	-	-	
4927.00	NS	NS	-	-	-	-	-	-	-30.0	-	-	-	-	-	-	
5542.88	NS	NS	-	-	-	-	-	-	-30.0	-	-	-	-	-	-	
6158.75	NS	NS	-	-	-	-	-	-	-30.0	-	-	-	-	-	-	

Calculation Result = SG Reading - Tx Cable Loss + Tx Antenna Gain - 2.15

Rx-ANTENNA : Biconical Antenna(25 MHz - 200 MHz), Logperiodic Antenna(200 MHz - 1000 MHz), Horn Antenna(1 GHz - 12.75 GHz)

Tx-ANTENNA : 120 MHz tuned Dipole Antenna(30 MHz - 120 MHz), Dipole Antenna(120 MHz - 1000 MHz), Horn Antenna(1 GHz - 12.75 GHz)

Other frequency noises omitted in this report were not seen or had enough margin (more than 20 dB).

NS : No signal detect.

Detector : 25 MHz to 30 MHz Test Receiver QP (BW: 9 kHz), 30 MHz to 1 GHz Test Receiver QP (BW: 120 kHz)

Above 1 GHz Spectrum Analyzer RMS Average (RBW: 1 MHz / VBW: 3 MHz)

*Emissions were investigated up to the 10th harmonic of the fundamental.

Frequency Tolerance

Test place	Ise EMC Lab. No.5 Measurement Room	
Report No.	120717683H	
Date	August 7, 2019	August 9, 2019
Temperature/ Humidity	23 deg. C / 61 % RH	22 deg. C / 57 % RH
Engineer	Koji Yamamoto	Koji Yamamoto
Mode	Tx 539.000 MHz, No modulation	

Varying Temperature

Test condition		Tested timing	Measured frequency [MHz]	Frequency error [MHz]	Result		Limit
Temp. [deg. C]	Voltage [V]				[%]	[ppm]	
50	3.00	Power on	539.000169	0.000169	0.00003	0.3	0.005
		+ 2 min.	539.000177	0.000177	0.00003	0.3	0.005
		+ 5 min.	539.000125	0.000125	0.00002	0.2	0.005
		+ 10 min.	539.000186	0.000186	0.00003	0.3	0.005
40	3.00	Power on	539.000121	0.000121	0.00002	0.2	0.005
		+ 2 min.	539.000135	0.000135	0.00003	0.3	0.005
		+ 5 min.	539.000143	0.000143	0.00003	0.3	0.005
		+ 10 min.	539.000141	0.000141	0.00003	0.3	0.005
30	3.00	Power on	539.000099	0.000099	0.00002	0.2	0.005
		+ 2 min.	539.000104	0.000104	0.00002	0.2	0.005
		+ 5 min.	539.000072	0.000072	0.00001	0.1	0.005
		+ 10 min.	539.000081	0.000081	0.00002	0.2	0.005
20	3.00	Power on	538.999921	-0.000079	-0.00001	-0.1	0.005
		+ 2 min.	538.999882	-0.000118	-0.00002	-0.2	0.005
		+ 5 min.	538.999863	-0.000137	-0.00003	-0.3	0.005
		+ 10 min.	538.999852	-0.000148	-0.00003	-0.3	0.005
10	3.00	Power on	539.000241	0.000241	0.00004	0.4	0.005
		+ 2 min.	539.000243	0.000243	0.00005	0.5	0.005
		+ 5 min.	539.000245	0.000245	0.00005	0.5	0.005
		+ 10 min.	539.000245	0.000245	0.00005	0.5	0.005
0	3.00	Power on	539.000286	0.000286	0.00005	0.5	0.005
		+ 2 min.	539.000301	0.000301	0.00006	0.6	0.005
		+ 5 min.	539.000249	0.000249	0.00005	0.5	0.005
		+ 10 min.	539.000292	0.000292	0.00005	0.5	0.005
-10	3.00	Power on	539.000256	0.000256	0.00005	0.5	0.005
		+ 2 min.	539.000251	0.000251	0.00005	0.5	0.005
		+ 5 min.	539.000253	0.000253	0.00005	0.5	0.005
		+ 10 min.	539.000257	0.000257	0.00005	0.5	0.005
-20	3.00	Power on	539.000096	0.000096	0.00002	0.2	0.005
		+ 2 min.	539.000065	0.000065	0.00001	0.1	0.005
		+ 5 min.	539.000057	0.000057	0.00001	0.1	0.005
		+ 10 min.	539.000063	0.000063	0.00001	0.1	0.005
-30	3.00	Power on	538.999959	-0.000041	-0.00001	-0.1	0.005
		+ 2 min.	538.999968	-0.000032	-0.00001	-0.1	0.005
		+ 5 min.	538.999921	-0.000079	-0.00001	-0.1	0.005
		+ 10 min.	538.999925	-0.000075	-0.00001	-0.1	0.005

Calculation formula:

Frequency error = Measured frequency - Tested frequency
Result [%] = Frequency error / Tested frequency * 100

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Ise EMC Lab.

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Frequency Tolerance

Test place : Ise EMC Lab. No.5 Measurement Room
Report No. : 120717683H
Date : August 7, 2019
Temperature/ Humidity : 23 deg. C / 61 % RH
Engineer : Koji Yamamoto
Mode : Tx 539.000 MHz, No modulation

Varying Supply Voltage

Test condition		Tested timing	Measured frequency [MHz]	Frequency error [MHz]	Result		Limit
Temp. [deg. C]	Voltage [V]				[%]	[ppm]	
20	3.00	Power on	538.999921	-0.000079	-0.00001	-0.1	0.005
		+ 2 min.	538.999882	-0.000118	-0.00002	-0.2	0.005
		+ 5 min.	538.999863	-0.000137	-0.00003	-0.3	0.005
		+ 10 min.	538.999852	-0.000148	-0.00003	-0.3	0.005
20	2.55 (3.0 V -15 %)	Power on	538.999936	-0.000064	-0.00001	-0.1	0.005
		+ 2 min.	538.999895	-0.000105	-0.00002	-0.2	0.005
		+ 5 min.	538.999878	-0.000122	-0.00002	-0.2	0.005
		+ 10 min.	538.999869	-0.000131	-0.00002	-0.2	0.005
20	3.45 (3.0 V +15 %)	Power on	538.999919	-0.000081	-0.00002	-0.2	0.005
		+ 2 min.	538.999874	-0.000126	-0.00002	-0.2	0.005
		+ 5 min.	538.999856	-0.000144	-0.00003	-0.3	0.005
		+ 10 min.	538.999838	-0.000162	-0.00003	-0.3	0.005
20	2.17 (Battery end point)	Power on	538.999923	-0.000077	-0.00001	-0.1	0.005
		+ 2 min.	538.999886	-0.000114	-0.00002	-0.2	0.005
		+ 5 min.	538.999859	-0.000141	-0.00003	-0.3	0.005
		+ 10 min.	538.999843	-0.000157	-0.00003	-0.3	0.005

Calculation formula: Frequency error = Measured frequency - Tested frequency
Result [%] = Frequency error / Tested frequency * 100

Varying Supply Voltage (USB)

Test condition		Tested timing	Measured frequency [MHz]	Frequency error [MHz]	Result		Limit
Temp. [deg. C]	Voltage [V]				[%]	[ppm]	
20	5.00	Power on	538.999929	-0.000071	-0.00001	-0.1	0.005
		+ 2 min.	538.999897	-0.000103	-0.00002	-0.2	0.005
		+ 5 min.	538.999891	-0.000109	-0.00002	-0.2	0.005
		+ 10 min.	538.999872	-0.000128	-0.00002	-0.2	0.005
20	4.25 (5.0 V -15 %)	Power on	538.999938	-0.000062	-0.00001	-0.1	0.005
		+ 2 min.	538.999906	-0.000094	-0.00002	-0.2	0.005
		+ 5 min.	538.999885	-0.000115	-0.00002	-0.2	0.005
		+ 10 min.	538.999869	-0.000131	-0.00002	-0.2	0.005
20	5.75 (5.0 V +15 %)	Power on	538.999935	-0.000065	-0.00001	-0.1	0.005
		+ 2 min.	538.999892	-0.000108	-0.00002	-0.2	0.005
		+ 5 min.	538.999880	-0.000120	-0.00002	-0.2	0.005
		+ 10 min.	538.999865	-0.000135	-0.00003	-0.3	0.005

Calculation formula: Frequency error = Measured frequency - Tested frequency
Result [%] = Frequency error / Tested frequency * 100

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Frequency Tolerance

Test place	Ise EMC Lab. No.5 Measurement Room	
Report No.	120717683H	
Date	August 7, 2019	August 9, 2019
Temperature/ Humidity	23 deg. C / 61 % RH	22 deg. C / 57 % RH
Engineer	Koji Yamamoto	Koji Yamamoto
Mode	Tx 615.000 MHz, No modulation	

Varying Temperature

Temp. [deg. C]	Test condition Voltage [V]	Tested timing	Measured frequency [MHz]	Frequency error [MHz]	Result		Limit [+/- %]
					[%]	[ppm]	
50	3.00	Power on	615.000189	0.000189	0.00003	0.3	0.005
		+ 2 min.	615.000178	0.000178	0.00003	0.3	0.005
		+ 5 min.	615.000175	0.000175	0.00003	0.3	0.005
		+ 10 min.	615.000201	0.000201	0.00003	0.3	0.005
40	3.00	Power on	615.000106	0.000106	0.00002	0.2	0.005
		+ 2 min.	615.000122	0.000122	0.00002	0.2	0.005
		+ 5 min.	615.000108	0.000108	0.00002	0.2	0.005
		+ 10 min.	615.000113	0.000113	0.00002	0.2	0.005
30	3.00	Power on	615.000071	0.000071	0.00001	0.1	0.005
		+ 2 min.	615.000059	0.000059	0.00001	0.1	0.005
		+ 5 min.	615.000082	0.000082	0.00001	0.1	0.005
		+ 10 min.	615.000083	0.000083	0.00001	0.1	0.005
20	3.00	Power on	615.000076	0.000076	0.00001	0.1	0.005
		+ 2 min.	615.000031	0.000031	0.00001	0.1	0.005
		+ 5 min.	615.000019	0.000019	0.00000	0.0	0.005
		+ 10 min.	614.999972	-0.000028	0.00000	0.0	0.005
10	3.00	Power on	615.000093	0.000093	0.00002	0.2	0.005
		+ 2 min.	615.000106	0.000106	0.00002	0.2	0.005
		+ 5 min.	615.000034	0.000034	0.00001	0.1	0.005
		+ 10 min.	614.999911	-0.000089	-0.00001	-0.1	0.005
0	3.00	Power on	615.000063	0.000063	0.00001	0.1	0.005
		+ 2 min.	615.000077	0.000077	0.00001	0.1	0.005
		+ 5 min.	615.000026	0.000026	0.00000	0.0	0.005
		+ 10 min.	615.000028	0.000028	0.00000	0.0	0.005
-10	3.00	Power on	615.000115	0.000115	0.00002	0.2	0.005
		+ 2 min.	615.000029	0.000029	0.00000	0.0	0.005
		+ 5 min.	615.000018	0.000018	0.00000	0.0	0.005
		+ 10 min.	614.999952	-0.000048	-0.00001	-0.1	0.005
-20	3.00	Power on	614.999911	-0.000089	-0.00001	-0.1	0.005
		+ 2 min.	614.999893	-0.000107	-0.00002	-0.2	0.005
		+ 5 min.	614.999902	-0.000098	-0.00002	-0.2	0.005
		+ 10 min.	614.999898	-0.000102	-0.00002	-0.2	0.005
-30	3.00	Power on	614.999832	-0.000168	-0.00003	-0.3	0.005
		+ 2 min.	614.999875	-0.000125	-0.00002	-0.2	0.005
		+ 5 min.	614.999911	-0.000089	-0.00001	-0.1	0.005
		+ 10 min.	614.999896	-0.000104	-0.00002	-0.2	0.005

Calculation formula:

Frequency error = Measured frequency - Tested frequency
Result [%] = Frequency error / Tested frequency * 100

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Frequency Tolerance

Test place : Ise EMC Lab. No.5 Measurement Room
Report No. : 120717683H
Date : August 7, 2019
Temperature/ Humidity : 23 deg. C / 61 % RH
Engineer : Koji Yamamoto
Mode : Tx 615.000 MHz, No modulation

Varying Supply Voltage

Test condition		Tested timing	Measured frequency [MHz]	Frequency error [MHz]	Result		Limit
Temp. [deg. C]	Voltage [V]				[%]	[ppm]	
20	3.00	Power on	615.000076	0.000076	0.00001	0.1	0.005
		+ 2 min.	615.000031	0.000031	0.00001	0.1	0.005
		+ 5 min.	615.000019	0.000019	0.00000	0.0	0.005
		+ 10 min.	614.999972	-0.000028	0.00000	0.0	0.005
20	2.55 (3.0 V -15 %)	Power on	615.000049	0.000049	0.00001	0.1	0.005
		+ 2 min.	615.000027	0.000027	0.00000	0.0	0.005
		+ 5 min.	614.999983	-0.000017	0.00000	0.0	0.005
		+ 10 min.	614.999966	-0.000034	-0.00001	-0.1	0.005
20	3.45 (3.0 V +15 %)	Power on	615.000059	0.000059	0.00001	0.1	0.005
		+ 2 min.	615.000035	0.000035	0.00001	0.1	0.005
		+ 5 min.	615.000011	0.000011	0.00000	0.0	0.005
		+ 10 min.	614.999969	-0.000031	-0.00001	-0.1	0.005
20	2.17 (Battery end point)	Power on	615.000048	0.000048	0.00001	0.1	0.005
		+ 2 min.	615.000027	0.000027	0.00000	0.0	0.005
		+ 5 min.	614.999989	-0.000011	0.00000	0.0	0.005
		+ 10 min.	614.999959	-0.000041	-0.00001	-0.1	0.005

Calculation formula: Frequency error = Measured frequency - Tested frequency
Result [%] = Frequency error / Tested frequency * 100

Varying Supply Voltage (USB)

Test condition		Tested timing	Measured frequency [MHz]	Frequency error [MHz]	Result		Limit
Temp. [deg. C]	Voltage [V]				[%]	[ppm]	
20	5.00	Power on	615.000049	0.000049	0.00001	0.1	0.005
		+ 2 min.	615.000043	0.000043	0.00001	0.1	0.005
		+ 5 min.	615.000018	0.000018	0.00000	0.0	0.005
		+ 10 min.	615.000016	0.000016	0.00000	0.0	0.005
20	4.25 (5.0 V -15 %)	Power on	615.000051	0.000051	0.00001	0.1	0.005
		+ 2 min.	615.000041	0.000041	0.00001	0.1	0.005
		+ 5 min.	615.000035	0.000035	0.00001	0.1	0.005
		+ 10 min.	615.000037	0.000037	0.00001	0.1	0.005
20	5.75 (5.0 V +15 %)	Power on	615.000067	0.000067	0.00001	0.1	0.005
		+ 2 min.	615.000055	0.000055	0.00001	0.1	0.005
		+ 5 min.	615.000049	0.000049	0.00001	0.1	0.005
		+ 10 min.	615.000028	0.000028	0.00000	0.0	0.005

Calculation formula: Frequency error = Measured frequency - Tested frequency
Result [%] = Frequency error / Tested frequency * 100

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APPENDIX 2: Test instruments

EMI Test Instruments

Test Item	LIMS ID	Description	Manufacturer	Model	Serial	Last Calibration Date	Calibration Due Date	Cal Int
AT	141563	Thermo-Hygrometer	CUSTOM	CTH-180	1701	01/11/2019	01/31/2020	12
AT	141805	Power Meter	ANRITSU	ML2495A	6K00003338	10/16/2018	10/31/2019	12
AT	141840	Power sensor	ANRITSU	MA2411B	11737	10/16/2018	10/31/2019	12
AT	141546	Digital HiTESTER	HIOKI	3805	60100600	05/21/2019	05/31/2020	12
AT	141441	Temperature Chamber	ESPEC CORP.	SU-241	92013843	07/02/2019	07/31/2020	12
AT	141327	Coaxial Cable	UL Japan	-	-	02/07/2019	02/29/2020	12
AT	141498	Microwave Counter	ADVANTEST	R5373	120100309	06/22/2019	06/30/2020	12
AT	141171	Attenuator(20dB)_ DC-1GHz N	Weinschel Corp	MODEL 1	BG0143	12/17/2018	12/31/2019	12
AT	141899	Spectrum Analyzer	AGILENT	E4448A	MY46180655	08/07/2019	08/31/2020	12
RE/CE	142011	AC4_Semi Anechoic Chamber(NSA)	TDK	Semi Anechoic Chamber 3m	DA-10005	06/28/2018	06/30/2020	24
RE	142227	Measure	KOMELON	KMC-36	-	-	-	-
RE/CE	141562	Thermo-Hygrometer	CUSTOM	CTH-201	0010	01/11/2019	01/31/2020	12
RE	141412	Microwave Cable	Junkosha	MWX221	1305S002R(1m) / 1405S146(5m)	06/17/2019	06/30/2020	12
RE	141581	MicroWave System Amplifier	AGILENT	83017A	650	10/04/2018	10/31/2019	12
RE	141508	Horn Antenna 1-18GHz	Schwarzbeck	BBHA9120D	9120D-557	05/16/2019	05/31/2020	12
RE	141152	EMI measurement program	TSJ	TEPTO-DV	-	-	-	-
RE/CE	141545	DIGITAL HiTESTER	HIOKI	3805	51201148	01/29/2019	01/31/2020	12
RE	141885	Spectrum Analyzer	AGILENT	E4448A	US44300523	11/07/2018	11/30/2019	12
RE	148898	Attenuator	KEYSIGHT	8491A	MY52462282	10/03/2018	10/31/2019	12
RE	141425	Biconical Antenna	Schwarzbeck	VHA9103+ BBA9106	1302	08/24/2019	08/31/2020	12
RE	141397	Coaxial Cable	UL Japan	-	-	06/18/2019	06/30/2020	12
RE	141952	Torque wrench	Huber+Suhner	74 Z-0-0-21	72536	03/12/2018	03/31/2021	36
RE	141267	Logperiodic Antenna(200-1000MHz)	Schwarzbeck	VUSLP9111B	9111B-192	08/24/2019	08/31/2020	12
RE	141583	Pre Amplifier	SONOMA INSTRUMENT	310	260833	02/08/2019	02/29/2020	12
RE	141454	Dipole Antenna	Schwarzbeck	UHAP	991	10/23/2018	10/31/2019	12
RE	141220	Coaxial Cable	UL Japan	-	-	07/05/2019	07/31/2020	12
RE	141967	Signal Generator	Rohde & Schwarz	SMT02	51400043	08/01/2019	08/31/2020	12
RE	141369	Band Pass Filter	M-City	BPF0950-01	UL0002	02/06/2019	02/29/2020	12
RE	141227	Microwave Cable	Junkosha	MMX221- 00500DMSDMS	1502S305	03/05/2019	03/31/2020	12
RE	141942	Test Receiver	Rohde & Schwarz	ESCI	100300	08/08/2019	08/31/2020	12
RE	141896	Signal Generator	Rohde & Schwarz	SMR40	100137	06/04/2019	06/30/2020	12
CE	141357	LISN(AMN)	Schwarzbeck	NSLK8127	8127-729	07/05/2019	07/31/2020	12
CE	141217	Coaxial cable	Fujikura/Suhner/ TSJ	5D-2W/SFM141/421- 010/sucoform141-P	-/04178	06/18/2019	06/30/2020	12
RE	141507	Horn Antenna 1-18GHz	Schwarzbeck	BBHA9120D	258	05/10/2019	05/31/2020	12
RE	141409	Microwave Cable (1-30GHz)	Huber+Suhner	SF103/11PC3.5- 31/11PC3.5-31/8.0m	54308/3	01/10/2019	01/31/2020	12
CE	141248	Attenuator	JFW Industries, Inc.	50FP-013H2 N	-	12/06/2018	12/31/2019	12

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: CE: Conducted Emission test
RE: Radiated Emission test
AT: Antenna Terminal Conducted test

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