RADIO TEST REPORT

Test Report No. : 12890237H-B-R2

Applicant	:	**Sony Corporation**
Type of Equipment	:	**UHF SYNTHESIZED TRANSMITTER**
Model No.	:	**UTX-P40**
FCC ID	:	**AK8UTXP40**
Test regulation	:	**FCC Part 74: 2018**
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.
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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 12890237H-B-R1. 12890237H-B-R1 is replaced with this report.

Date of test: July 18 to November 6, 2019

Representative test engineer:
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REVISION HISTORY

Original Test Report No.: 12890237H-B

Revision	Test report No.	Date	Page revised	Contents
- (Original)	12890237H-B	September 27, 2019	-	-
1	12890237H-B-R1	November 5, 2019	P 7	Addition of Worst margin for Field strength of spurious radiation test.
1	12890237H-B-R1	November 5, 2019	P 12, 13	Addition to explanatory note *1), *2), *3)
1	12890237H-B-R1	November 5, 2019	P 21, 23	Correction of high channel frequency on chart in conducted emission data; From 608.875 MHz to 607.875 MHz
1	12890237H-B-R1	November 5, 2019	P 39	Correction of bandwidth of 941.625 MHz (40 mW) in Occupied Bandwidth data; From 78.7558 kHz to 78.7578 kHz
1	12890237H-B-R1	November 5, 2019	P 42	Correction of frequency of 607.875 MHz (40 mW) in Spurious emissions at antenna terminals data; From 3121 kHz to 3131 kHz
1	12890237H-B-R1	November 5, 2019	P 60	Replacement of chart in Necessary bandwidth data
2	12890237H-B-R2	November 12, 2019	P 11	Addition of 954.625 MHz (Mid2) for RF power output in Clause 4.1 (The details of Operating mode(s))
2	12890237H-B-R2	November 12, 2019	P 13	Addition of 954.625 MHz(Mid2) of explanatory note *3) in Configuration and peripherals for antenna terminal conducted tests
2	12890237H-B-R2	November 12, 2019	P 29	Addition of data of 954.625 MHz
2	12890237H-B-R2	November 12, 2019	P70, 71	Addition of Plot data in APPENDIX 1: Field strength of spurious radiation test
2	12890237H-B-R2	November 12, 2019	P 74	Addition of LIMS ID: 141809 and 141830 in APPENDIX 2: Test instruments

Reference: Abbreviations (Including words undescribed in this report)

A2LA	The American Association for Laboratory Accreditation
AC	Alternating Current
AFH	Adaptive Frequency Hopping
AM	Amplitude Modulation
Amp, AMP	Amplifier
ANSI	American National Standards Institute
Ant, ANT	Antenna
AP	Access Point
Atten., ATT	Attenuator
AV	Average
BPSK	Binary Phase-Shift Keying
BR	Bluetooth Basic Rate
BT	Bluetooth
BT LE	Bluetooth Low Energy
BW	BandWidth
Cal Int	Calibration Interval
CCK	Complementary Code Keying
Ch., CH	Channel
CISPR	Comite International Special des Perturbations Radioelectriques
CW	Continuous Wave
DBPSK	Differential BPSK
DC	Direct Current
DFS	Dynamic Frequency Selection
DQPSK	Differential QPSK
DSSS	Direct Sequence Spread Spectrum
EDR	Enhanced Data Rate
EIRP, e.i.r.p.	Equivalent Isotropically Radiated Power
EMC	ElectroMagnetic Compatibility
EMI	ElectroMagnetic Interference
EN	European Norm
ERP, e.r.p.	Effective Radiated Power
EU	European Union
EUT	Equipment Under Test
Fac.	Factor
FCC	Federal Communications Commission
FHSS	Frequency Hopping Spread Spectrum
FM	Frequency Modulation
Freq.	Frequency
GFSK	Gaussian Frequency-Shift Keying
GNSS	Global Navigation Satellite System
GPS	Global Positioning System
Hori.	Horizontal
ICES	Interference-Causing Equipment Standard
IEC	International Electrotechnical Commission
IEEE	Institute of Electrical and Electronics Engineers
IF	Intermediate Frequency
ILAC	International Laboratory Accreditation Conference
ISED	Innovation, Science and Economic Development Canada
ISO	International Organization for Standardization
JAB	Japan Accreditation Board
LAN	Local Area Network
LIMS	Laboratory Information Management System
MCS	Modulation and Coding Scheme
MRA	Mutual Recognition Arrangement
NIST	National Institute of Standards and Technology
NS	No signal detect.
NSA	Normalized Site Attenuation
NVLAP	National Voluntary Laboratory Accreditation Program
OBW	Occupied Band Width
OFDM	Orthogonal Frequency Division Multiplexing
P/M	Power meter
PCB	Printed Circuit Board
PER	Packet Error Rate
PHY	Physical Layer
PK	Peak
PN	Pseudo random Noise
PRBS	Pseudo-Random Bit Sequence
PSD	Power Spectral Density
QAM	Quadrature Amplitude Modulation
QP	Quasi-Peak
QPSK	Quadri-Phase Shift Keying
RBW	Resolution Band Width
RDS	Radio Data System
RE	Radio Equipment
RF	Radio Frequency
RMS	Root Mean Square
RSS	Radio Standards Specifications
Rx	Receiving
SA, S/A	Spectrum Analyzer
SG	Signal Generator
SVSWR	Site-Voltage Standing Wave Ratio
TR	Test Receiver
Tx	Transmitting
VBW	Video BandWidth
Vert.	Vertical
WLAN	Wireless LAN

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SECTION 1: Customer information

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

*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	:	UHF SYNTHESIZED TRANSMITTER
Model No.	:	UTX-P40
Serial No.	:	Refer to Section 4, Clause 4.2
Rating	:	DC 3.0 V (Battery), DC 5.0V (USB)
Receipt Date of Sample (Information from test lab.)	:	July 10, 2019
Country of Mass-production	:	Korea
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: UTX-P40 (referred to as the EUT in this report) is a UHF SYNTHESIZED TRANSMITTER.

General Specification

Clock frequency(ies) in the system	:	DSP: 12MHz (SPXO)
Operating temperature	:	0 deg. C to 50 deg. C

Radio Specification

[Radio microphone part] *1)

Radio type	:	Transmitter
Modulation type	:	Frequency modulation
Emission designator	:	116KF3E
Necessary bandwidth	:	116 kHz = 2M + 2D where M: Maximum modulation frequency = 18 kHz D: Peak deviation = 40 kHz
Channel spacing	:	125 kHz
Frequency of operation	:	UTX-P40 (UC14) : 470.125 MHz - 541.875 MHz UTX-P40 (UC25) : 536.125 MHz - 607.875 MHz UTX-P40 (U90) : 941.625 MHz - 951.875 MHz, 953.000 MHz - 956.125 MHz, 956.625 MHz - 959.625 MHz
Clock frequency(ies)	:	PLL: 26 MHz (TCXO)
RF power	:	High: 40 mW, Low: 5 mW
Antenna type	:	1/4 Lambda Monopole antenna (integral type)
Antenna gain	:	1.5 dBi
Power Supply (radio part input)	:	DC 3.0 V, DC 5.3 V
AF Specification	:	40 Hz - 18000 Hz, Maximum input: -24 dBV (MIC level, ATT 0 dB)

[NFC part]

Radio Type	:	Transceiver
Modulation type	:	ASK (amplitude-shift keying)
Frequency of Operation	:	13.56 MHz
Method of frequency generation	:	Crystal unit (SPXO)
Antenna Type	:	Loop Antenna
Antenna Gain	:	-72.44 dBi

*1) This test report applies to Radio microphone part.

SECTION 3: Test specification, procedures & results

3.1 Test Specification

Test Specification : FCC Part 74: 2018

Title : FCC 47CFR Part74
EXPERIMENTAL RADIO, AUXILIARY, SPECIAL BROADCAST AND OTHER PROGRAM DISTRIBUTIONAL SERVICES

* 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	10.44 dB 0.71697 MHz, AV, N	Complied a)	-
	ISED: RSS-Gen 8.8	ISED: RSS-Gen 8.8			
RF power output	FCC: Section 2.1046	FCC: Section 74.861 (e) (1) / (d) (1)	See data.	Complied b)	Conducted
	ISED: RSS-Gen Section 6.12 RSS-210 A1 Section 5.1	ISED: RSS-210 G 3.1			
Modulation Characteristics	FCC: Section 2.1047	FCC: Section 74.861 (e) (3)	See data.	Complied c)	Conducted
	ISED: RSS-210 A1 Section 5.3	ISED: RSS-210 G 3.5			
Occupied Bandwidth	FCC: Section 2.1049	FCC: Section 74.861 (e) (5)	See data.	Complied d)	Conducted
	ISED: RSS-Gen Section 6.6	ISED: RSS-210 G 3.2			
Spurious emissions at antenna terminals	EN 300 422-1 V 1.4.2 Clause 8.4	FCC: Section 74.861 (e) (6)	See data.	Complied e)	Conducted
		ISED: RSS-210 G 3.4			
Necessary bandwidth	EN 300 422-1 V 1.4.2 Clause 8.3	FCC: Section 74.861 (e) (7) / (d) (4)	See data.	Complied f)	Conducted
		ISED: RSS-210 G 3.4			
Field strength of spurious radiation	EN 300 422-1 V 1.4.2 Clause 8.4	KDB 206256 D1 Section III (c), (e) (2)	9.9 dB 3647.25 MHz, Horizontal/ 4753.13 MHz, Horizontal	Complied g)	Radiated
		ISED: RSS-210 G 3.4			
Frequency stability	FCC: Section 2.1055	FCC: Section 74.861 (e) (4)	See data.	Complied h)	Conducted
	ISED: RSS-Gen Section 6.11	ISED: RSS-210 G 3.3			

Note: UL Japan, Inc.'s EMI Work Procedure No. 13-EM-W0420.
This EUT does not have receiving part. Therefore Receiver Spurious Emission test was not performed.

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 Modulation Characteristics)
d) Refer to APPENDIX 1 (data of Occupied Bandwidth)
e) Refer to APPENDIX 1 (data of Spurious emissions at antenna terminals)
f) Refer to APPENDIX 1 (data of Necessary bandwidth)
g) Refer to APPENDIX 1 (data of Field strength of spurious radiation)
h) Refer to APPENDIX 1 (data of Frequency stability)

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, KDB 206256 D01 Wireless Microphones v02 and ANSI C63.26: 2015 are also referred.

Supplied Voltage Information
The test was performed with the New Battery and the stable voltage was supplied to the EUT during the tests.

Antenna Information
The antenna is not removable from the EUT.

3.3 Addition to standard

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 $k = 2$.

Ise EMC Lab.

Conducted emission

using Item	Frequency range	Uncertainty (+/-)
AMN (LISN)	0.009 MHz to 0.15 MHz	3.8 dB
	0.15 MHz to 30 MHz	3.4 dB

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

Antenna terminal test	Uncertainty (+/-)
RF output power	1.3 dB
Occupied bandwidth	
Span 1 MHz	0.96%
Emission mask	1.9 dB
Frequency stability	0.0154 ppm
Spurious emissions at antenna terminals	2.3 dB

3.5 Test Location

UL Japan, Inc. Ise EMC Lab.
*NVLAP Lab. code: 200572-0 / FCC Test Firm Registration Number: 199967 / ISED Lab Company Number: 2973C
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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: 5 mW	Typ. 5 mW
Transmitting (Tx), Power setting: 40 mW	Typ. 40 mW
*Transmitting duty was 100 % on all tests.	
*Power of the EUT was set by the software as follows; Power settings: Low (5 mW), High (40 mW) Software: T.107 *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 without 5 mW or 40 mW settings.	

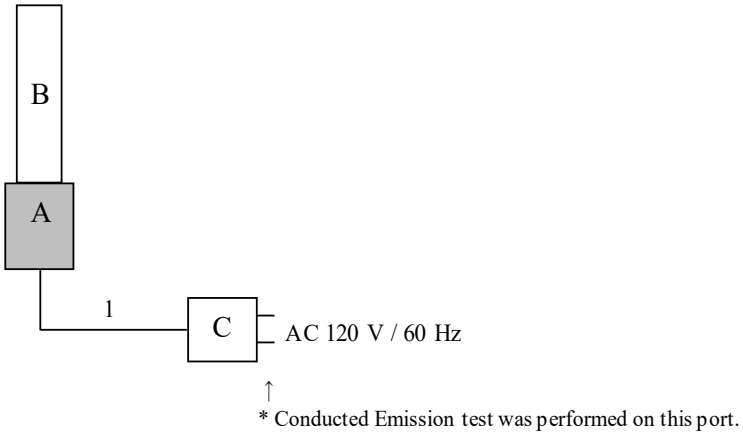
*The details of Operating mode(s)

Test Item	Tested frequency		Power setting	Modulation	Remarks
Conducted emission	470.125 MHz	(Low) *4)	5 mW, 40 mW	None (No modulation)	-
	941.625 MHz	(Low) *4)	5 mW, 40 mW		
Modulation Characteristics	539.000 MHz	(Mid)	5 mW, 40 mW	See data.	*1)
	950.625 MHz	(Mid1)	5 mW, 40 mW		
RF power output	470.125 MHz 539.000 MHz 607.875 MHz	(Low) (Mid) (High)	5 mW, 40 mW	None (No modulation)	-
	941.625 MHz 950.625 MHz 954.625 MHz 959.625 MHz	(Low) (Mid1) (Mid2) (High)	5 mW, 40 mW		
Occupied Bandwidth	470.125 MHz 539.000 MHz 607.875 MHz	(Low) (Mid) (High)	5 mW, 40 mW	-19.7 dBV, 2500 Hz, Sine wave	*2)
	941.625 MHz 950.625 MHz 959.625 MHz	(Low) (Mid1) (High)	5 mW, 40 mW		
Spurious emissions at antenna terminals	470.125 MHz 539.000 MHz 607.875 MHz	(Low) (Mid) (High)	5 mW, 40 mW	-19.7 dBV, 2500 Hz, Sine wave	*2)
Necessary bandwidth	470.125 MHz 539.000 MHz 607.875 MHz	(Low) (Mid) (High)	5 mW, 40 mW	See SECTION 9	-
	941.625 MHz 950.625 MHz 959.625 MHz	(Low) (Mid1) (High)	5 mW, 40 mW		
Field strength of spurious radiation	470.125 MHz 539.000 MHz 607.875 MHz	(Low) (Mid) (High)	40 mW	None (No modulation)	-
	941.625 MHz 950.625 MHz 959.625 MHz	(Low) (Mid1) (High)	40 mW		
Frequency stability	539.000 MHz	(Mid)	40 mW	None (No modulation)	*3)
	950.625 MHz	(Mid1)	40 mW		

*The isolator of RF filter circuit is consisted of passive component. It does not contain non-linear component.
Therefore the test was performed on lowest, near middle and highest frequency that was chosen from available frequency band.
*1) There is no difference in audio part on each channel. Therefore the test was performed on Mid channel as a representative.
*2) When modulated by a 2500 Hz tone at an input level 16 dB greater than that necessary to produce 50 percent modulation.
*3) There is no difference in frequency generating method on each frequency. Therefore the test was performed on Mid channel as a representative.
*4) The mode was tested as a representative, because it had the highest power at antenna terminal test.

4.2 Configuration and peripherals

For 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

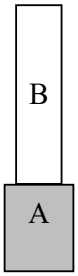
No.	Item	Model number	Serial number	Manufacturer	Remarks
A	UHF SYNTHESIZED TRANSMITTER	UTX-P40	No.001(UC14) *1) No.001(UC25) *2) No.001(UC90) *3)	Sony Corporation	EUT
B	Microphone (Mic)	F-112	14282	Sony Corporation	-
C	AC Adapter	CP-AD2	5385990	Sony Corporation	-

*1) For tested frequency 470.125 MHz(Low), 539.000 MHz(Mid)
*2) For tested frequency 607.875 MHz(High)
*3) For tested frequency 941.625 MHz(Low), 950.625 MHz(Mid1), 959.625 MHz (High)

List of cables used

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

For Field strength of spurious radiation test



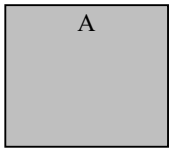
* Cabling and setup(s) were taken into consideration and test data was taken under worse case conditions.
* This EUT has two patterns of power supply, USB supply and Battery supply. The test was conducted on the EUT with USB supply had the worst level of spurious.

Description of EUT and Support equipment

No.	Item	Model number	Serial number	Manufacturer	Remarks
A	UHF SYNTHESIZED TRANSMITTER	UTX-P40	No.001(UC14) *1) No.001(UC25) *2) No.001(UC90) *3)	Sony Corporation	EUT
B	Microphone (Mic)	F-112	14282	Sony Corporation	-

*1) For tested frequency 470.125 MHz(Low), 539.000 MHz(Mid)
*2) For tested frequency 607.875 MHz(High)
*3) For tested frequency 941.625 MHz(Low), 950.625 MHz(Mid1), 959.625 MHz (High)

For Antenna terminal conducted tests



* Setup was taken into consideration and test data was taken under worse case conditions.

Description of EUT

No.	Item	Model number	Serial number	Manufacturer	Remark
A	UHF SYNTHESIZED TRANSMITTER	UTX-P40	No.001(UC14) *1) No.001(UC25) *2) No.001(UC90) *3)	Sony Corporation	EUT

*1) For tested frequency 470.125 MHz(Low), 539.000 MHz(Mid)
*2) For tested frequency 607.875 MHz(High)
*3) For tested frequency 941.625 MHz(Low), 950.625 MHz(Mid1), 954.625 MHz(Mid2), 959.625 MHz (High)

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.

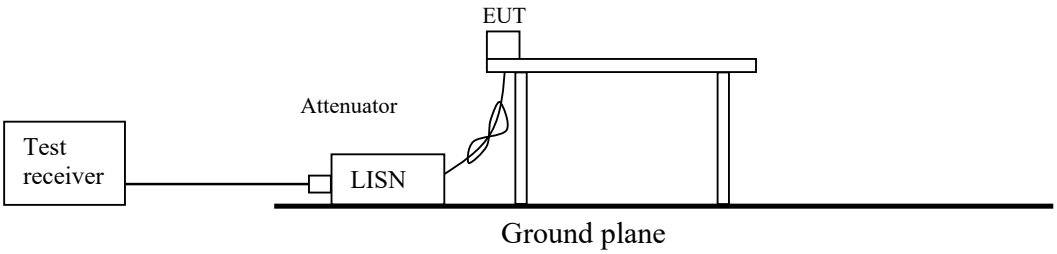
1) For the tests on EUT with other peripherals (as a whole system)
I/O cables that were connected to the peripherals were bundled in center. They were folded back and forth forming a bundle 30 cm to 40 cm long and were hanged at a 40 cm height to the ground plane. All unused 50 ohm connectors of the 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: Field strength of spurious radiation

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.

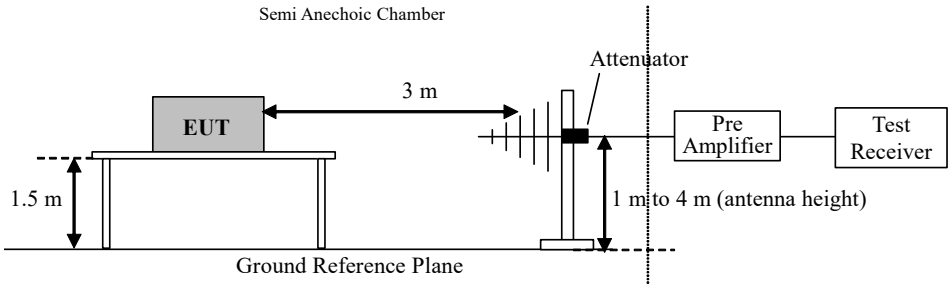
3) Effective radiated power was calculated by subtracting the cable loss and the attenuator loss connected between the Signal Generator and the Substitution Antenna from the Output power of the Signal Generator recorded in 2).
For the usage of the Antenna (Horn Antenna) except for the Half wave dipole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

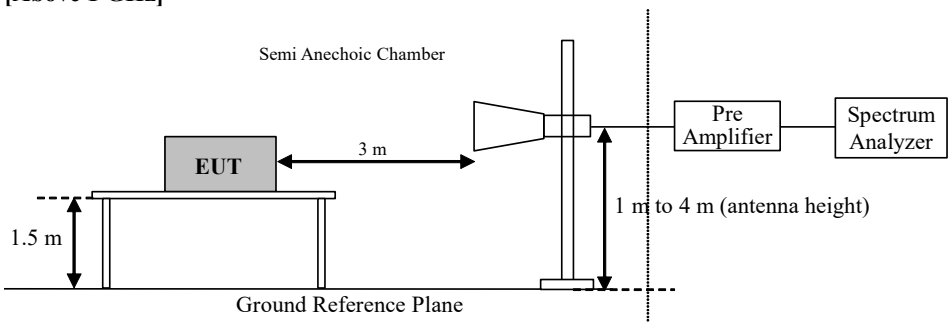
Frequency	25 MHz to 30 MHz	30 MHz to 1 GHz	Above 1 GHz
Instrument used	Spectrum Analyzer		
Detector	RMS Average		
IF Bandwidth	RBW: 10 kHz VBW: 30 kHz	RBW: 100 kHz VBW: 300 kHz	RBW: 1 MHz VBW: 3 MHz
Test Distance	3 m		

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 condition (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 - 10 GHz
Test data : APPENDIX
Test result : Pass

SECTION 7: Modulation Characteristics

Deviation versus Audio input level and Audio Frequency

Test Procedure

The frequency deviations were measured when input level and frequency were varied. It was measured with Spectrum analyzer and signal generator.

Audio input level	-80 dBV to -20 dBV, 5 dB step
Audio frequency	40 Hz, 100 Hz, 300 Hz, 500 Hz, 700 Hz, 1 kHz, 3 kHz, 5 kHz, 7 kHz, 10 kHz, 18 kHz

Audio Frequency Response

Test Procedure

The audio input level was measured when frequency deviation indicates 50% modulation which measured with Test receiver and Audio Analyzer.

Audio frequency	40 Hz, 70 Hz, 100 Hz, 300 Hz, 500 Hz, 700 Hz, 1 kHz, 2 kHz, 3 kHz, 5 kHz, 7 kHz, 10 kHz, 15 kHz, 18 kHz

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

Test data : APPENDIX
Test result : Pass

SECTION 8: Antenna terminal 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
RF power output	-	-	-	Auto	Average	-	Power Meter (Sensor: 50 MHz BW)
Occupied Bandwidth	Enough width to display emission skirts	1 to 5% of Occupied bandwidth	Three times of RBW	Auto	Peak *1)	Max Hold *1)	Spectrum Analyzer
Spurious emissions at antenna terminals	9 kHz -150 kHz	200 Hz	620 Hz	Auto	Peak	Max Hold	Spectrum Analyzer *2)
	150 kHz - 30 MHz	10 kHz	30 kHz				
	30 MHz - 1 GHz	100 kHz	300 kHz				
	Above 1 GHz	1 MHz	3 MHz				
Frequency stability	-	-	-	-	-	-	Frequency Counter

*1) The measurement was performed with Peak and Max Hold since the modulation method was FM.
*2) In the frequency range below 30 MHz, 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.

[Frequency stability]
The power supply set to 100 % nominal setting, raise EUT operating temperature to 50 deg. C.
Record the frequency of the EUT.
Repeat measurements at each 10 deg. C decrement to -30 deg. C.

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 additional test was performed at battery end point voltage.

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

Test data : APPENDIX
Test result : Pass

SECTION 9: Necessary bandwidth

Test procedure

In accordance with section 8.3 of ETSI EN 300 422-1, a weighted noise source through a weighting filter based on ITU-R Recommendation BS.559-2 was applied to the audio input of transmitter.
The transmitter RF output spectrums were measured at each channel using a receiving antenna and a spectrum analyzer with settings specified in the section 8.3.1 of ETSI EN 300 422-1.The input level of both white noise and filter to EUT was -12 dBV according to the following result.

	lim-8dB	lim	lim+12dB	Difference of Demodulation level lim-8dB and lim+12dB	White noise +Filter input level
EUT input level	-32.0 dBV	-24 dBV	-12.0 dBV		-12 dBV
Demodulation level	-28.2 dBV	-	-19.6 dBV	8.6 dB < 10 dB	
"lim" means "audio limiting threshold" declared by manufacturer.					

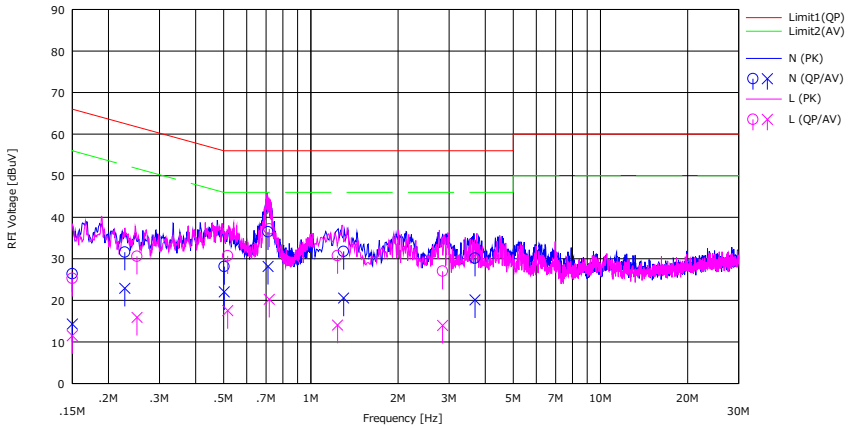
Test data **APPENDIX.**
Test result **Pass**

APPENDIX 1: Data of EMI test

Conducted Emission

Report No.	12890237H
Test place	Ise EMC Lab.
Semi Anechoic Chamber	No.3
Date	August 31, 2019
Temperature / Humidity	23 deg. C / 70 % RH
Engineer	Yuichiro Yamazaki
Mode	Tx 470.125 MHz , 5 mW

Limit : FCC_Part 15 Subpart C(15.207)



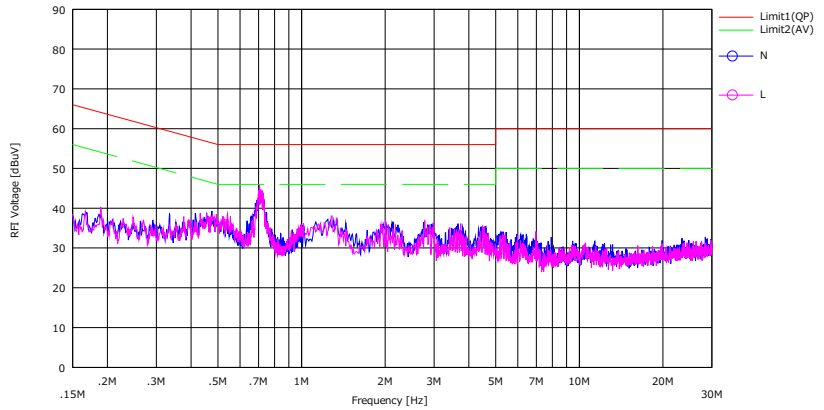
No.	Freq.	Reading ⟨QP⟩	Reading ⟨AV⟩	LISN	LOSS	Results ⟨QP⟩	Results ⟨AV⟩	Limit ⟨QP⟩	Limit ⟨AV⟩	Margin ⟨QP⟩	Margin ⟨AV⟩	Phase	Comment
	[MHz]	[dBuV]	[dBuV]	[dB]	[dB]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dB]	[dB]		
1	0.15000	13.10	1.00	0.14	13.15	26.39	14.29	66.00	56.00	39.61	41.71	N	
2	0.22765	18.30	9.60	0.14	13.16	31.60	22.90	62.50	52.50	30.90	29.60	N	
3	0.50234	14.80	8.70	0.15	13.18	28.13	22.03	56.00	46.00	27.87	23.97	N	
4	0.71103	23.10	14.80	0.16	13.20	36.46	28.16	56.00	46.00	19.54	17.84	N	
5	1.29722	18.30	7.10	0.21	13.25	31.76	20.56	56.00	46.00	24.24	25.44	N	
6	3.68888	16.40	6.40	0.35	13.38	30.13	20.13	56.00	46.00	25.87	25.87	N	
7	0.15000	12.00	-1.80	0.14	13.15	25.29	11.49	66.00	56.00	40.71	44.51	L	
8	0.25095	17.30	2.60	0.14	13.16	30.60	15.90	61.70	51.70	31.10	35.80	L	
9	0.51635	17.40	4.20	0.15	13.18	30.73	17.53	56.00	46.00	25.27	28.47	L	
10	0.71827	23.80	6.90	0.16	13.20	37.16	20.26	56.00	46.00	18.84	25.74	L	
11	1.23603	17.30	0.60	0.20	13.24	30.74	14.04	56.00	46.00	25.26	31.96	L	
12	2.85088	13.40	0.30	0.29	13.34	27.03	13.93	56.00	46.00	28.97	32.07	L	

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

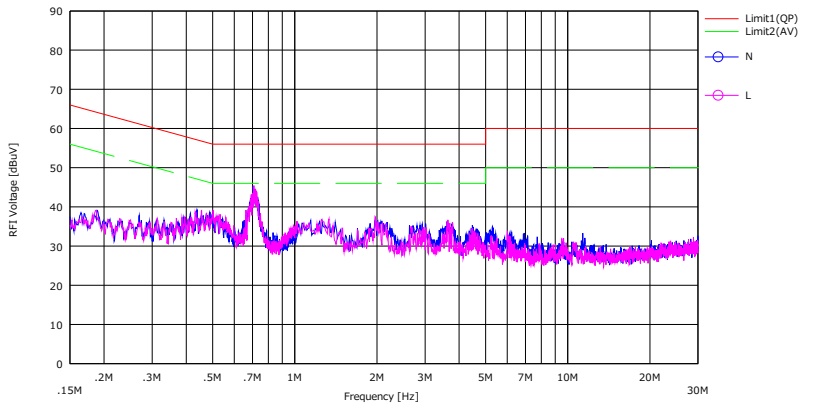
Conducted Emission

Report No.	12890237H
Test place	Ise EMC Lab.
Semi Anechoic Chamber	No.3
Date	August 31, 2019
Temperature / Humidity	23 deg. C / 70 % RH
Engineer	Yuichiro Yamazaki
Mode	Tx, 5 mW

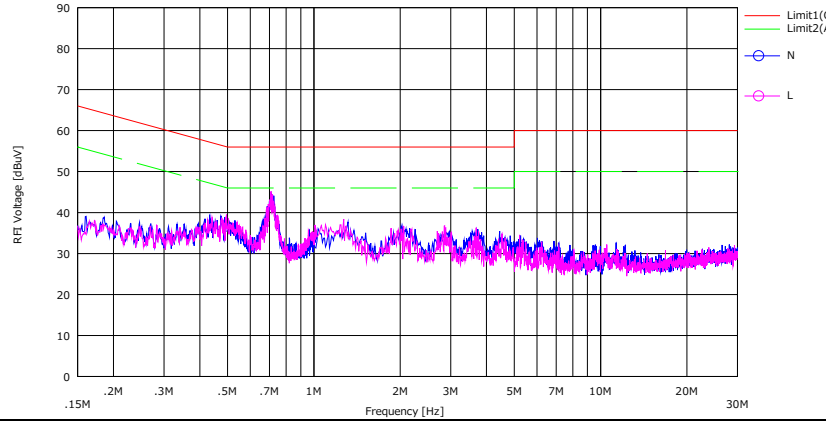
Tx 470.125 MHz , 5 mW



Tx 539.000 MHz , 5 mW



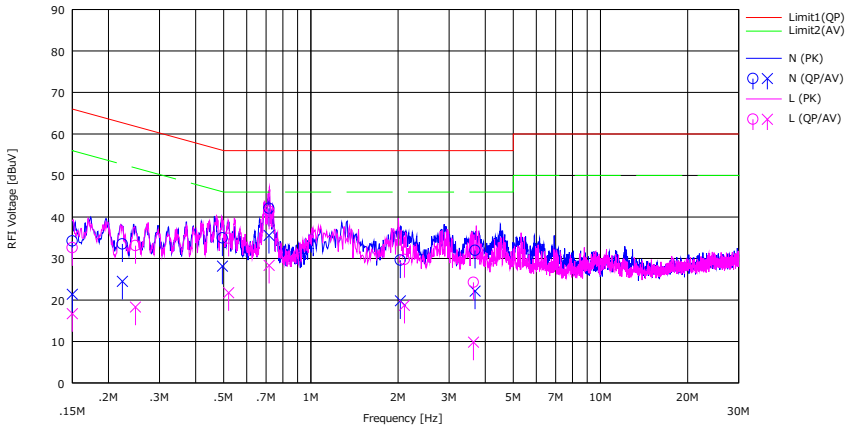
Tx 607.875 MHz , 5 mW



Conducted Emission

Report No.	12890237H
Test place	Ise EMC Lab.
Semi Anechoic Chamber	No.3
Date	August 31, 2019
Temperature / Humidity	23 deg. C / 70 % RH
Engineer	Yuichiro Yamazaki
Mode	Tx 470.125 MHz , 40 mW

Limit : FCC_Part 15 Subpart C(15.207)



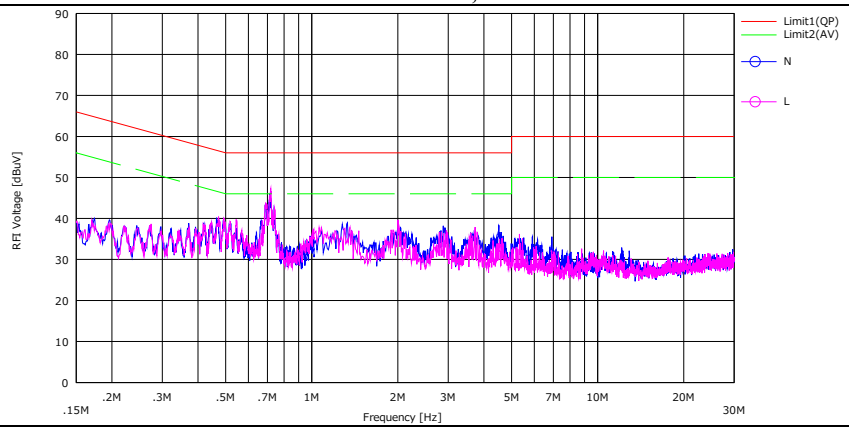
No.	Freq.	Reading ⟨QP⟩	Reading ⟨AV⟩	LISN	LOSS	Results ⟨QP⟩	Results ⟨AV⟩	Limit ⟨QP⟩	Limit ⟨AV⟩	Margin ⟨QP⟩	Margin ⟨AV⟩	Phase	Comment
	[MHz]	[dBuV]	[dBuV]	[dB]	[dB]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dB]	[dB]		
1	0.15000	20.90	8.10	0.14	13.15	34.19	21.39	66.00	56.00	31.81	34.61	N	
2	0.22331	20.20	11.20	0.14	13.15	33.49	24.49	62.70	52.70	29.21	28.21	N	
3	0.49524	21.60	14.80	0.15	13.18	34.93	28.13	56.10	46.10	21.17	17.97	N	
4	0.71697	28.70	22.20	0.16	13.20	42.06	35.56	56.00	46.00	13.94	10.44	N	
5	2.03805	16.00	6.20	0.31	13.29	29.60	19.80	56.00	46.00	26.40	26.20	N	
6	3.69066	18.20	8.40	0.35	13.38	31.93	22.13	56.00	46.00	24.07	23.87	N	
7	0.15000	19.30	3.40	0.14	13.15	32.59	16.69	66.00	56.00	33.41	39.31	L	
8	0.24796	19.80	5.00	0.14	13.16	33.10	18.30	61.80	51.80	28.70	33.50	L	
9	0.51988	21.50	8.40	0.15	13.18	34.83	21.73	56.00	46.00	21.17	24.27	L	
10	0.71724	28.00	15.00	0.16	13.20	41.36	28.36	56.00	46.00	14.64	17.64	L	
11	2.10334	16.10	5.10	0.31	13.30	29.71	18.71	56.00	46.00	26.29	27.29	L	
12	3.64451	10.50	-3.90	0.35	13.38	24.23	9.83	56.00	46.00	31.77	36.17	L	

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

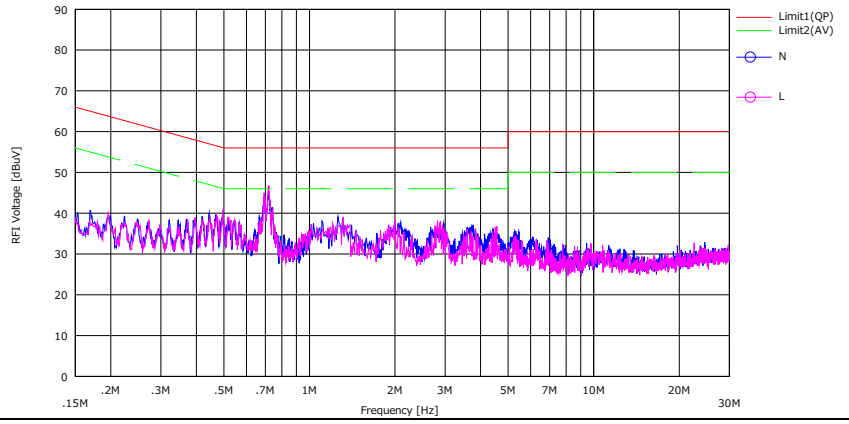
Conducted Emission

Report No.	12890237H
Test place	Ise EMC Lab.
Semi Anechoic Chamber	No.3
Date	August 31, 2019
Temperature / Humidity	23 deg. C / 70 % RH
Engineer	Yuichiro Yamazaki
Mode	Tx, 40 mW

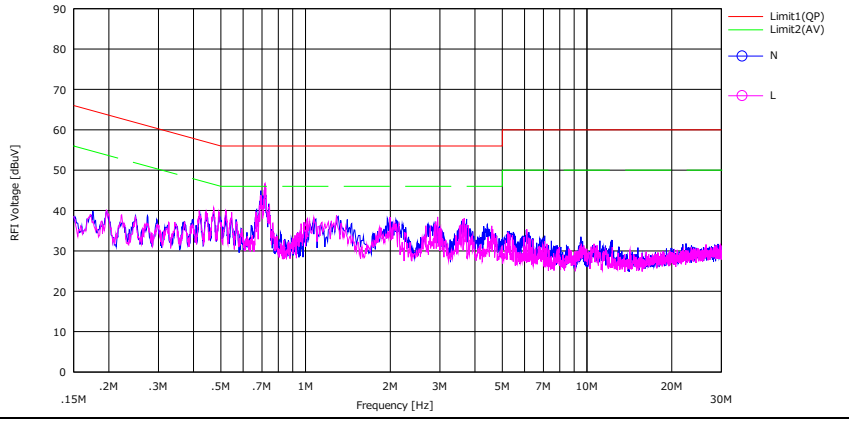
Tx 470.125 MHz , 40 mW



Tx 539.000 MHz , 40 mW



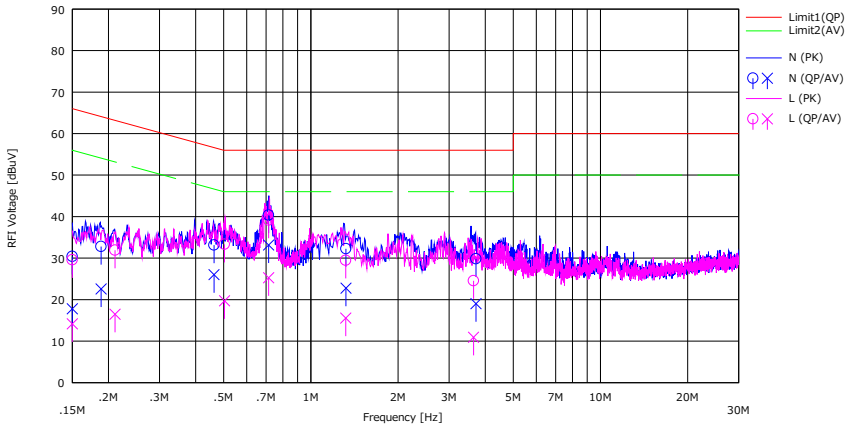
Tx 607.875 MHz , 40 mW



Conducted Emission

Report No.	12890237H
Test place	Ise EMC Lab.
Semi Anechoic Chamber	No.3
Date	August 31, 2019
Temperature / Humidity	23 deg. C / 70 % RH
Engineer	Yuichiro Yamazaki
Mode	Tx 941.625 MHz , 5 mW

Limit : FCC_Part 15 Subpart C(15.207)



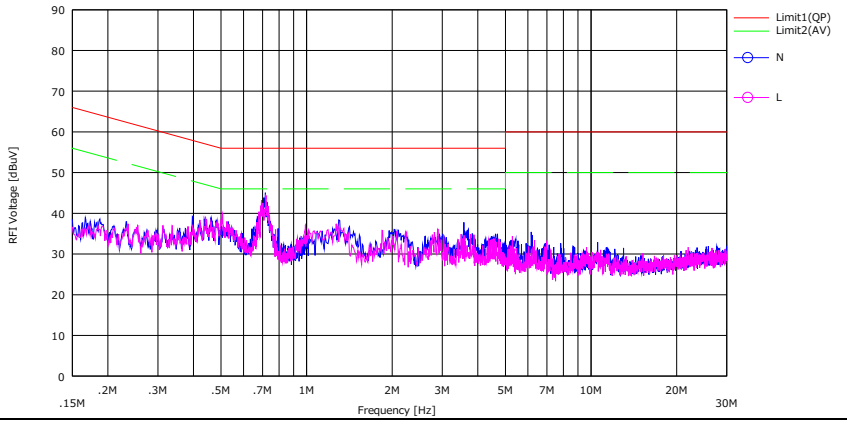
No.	Freq.	Reading ⟨QP⟩	Reading ⟨AV⟩	LISN	LOSS	Results ⟨QP⟩	Results ⟨AV⟩	Limit ⟨QP⟩	Limit ⟨AV⟩	Margin ⟨QP⟩	Margin ⟨AV⟩	Phase	Comment
	[MHz]	[dBuV]	[dBuV]	[dB]	[dB]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dB]	[dB]		
1	0.15000	17.10	4.50	0.14	13.15	30.39	17.79	66.00	56.00	35.61	38.21	N	
2	0.18861	19.50	9.30	0.14	13.15	32.79	22.59	64.10	54.10	31.31	31.51	N	
3	0.46293	19.80	12.70	0.15	13.18	33.13	26.03	56.60	46.60	23.47	20.57	N	
4	0.71459	27.00	19.80	0.16	13.20	40.36	33.16	56.00	46.00	15.64	12.84	N	
5	1.32124	18.80	9.30	0.21	13.25	32.26	22.76	56.00	46.00	23.74	23.24	N	
6	3.71742	16.10	5.30	0.35	13.38	29.83	19.03	56.00	46.00	26.17	26.97	N	
7	0.15000	16.30	0.90	0.14	13.15	29.59	14.19	66.00	56.00	36.41	41.81	L	
8	0.21069	18.60	3.20	0.14	13.15	31.89	16.49	63.20	53.20	31.31	36.71	L	
9	0.50323	20.00	6.40	0.15	13.18	33.33	19.73	56.00	46.00	22.67	26.27	L	
10	0.71453	25.80	11.90	0.16	13.20	39.16	25.26	56.00	46.00	16.84	20.74	L	
11	1.31942	16.00	2.10	0.21	13.25	29.46	15.56	56.00	46.00	26.54	30.44	L	
12	3.64662	10.80	-2.80	0.35	13.38	24.53	10.93	56.00	46.00	31.47	35.07	L	

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

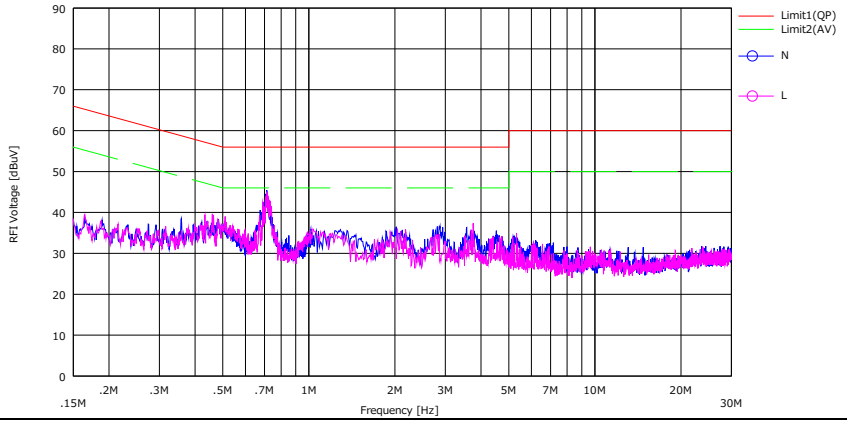
Conducted Emission

Report No.	12890237H
Test place	Ise EMC Lab.
Semi Anechoic Chamber	No.3
Date	August 31, 2019
Temperature / Humidity	23 deg. C / 70 % RH
Engineer	Yuichiro Yamazaki
Mode	Tx, 5 mW

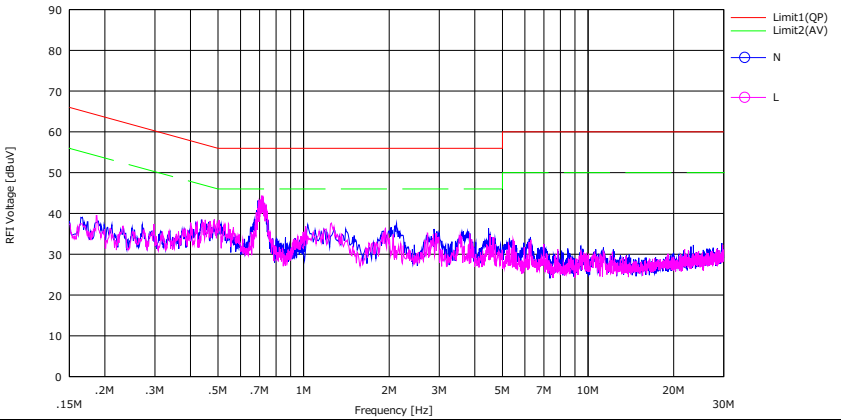
Tx 941.625 MHz , 5 mW



Tx 950.625 MHz , 5 mW



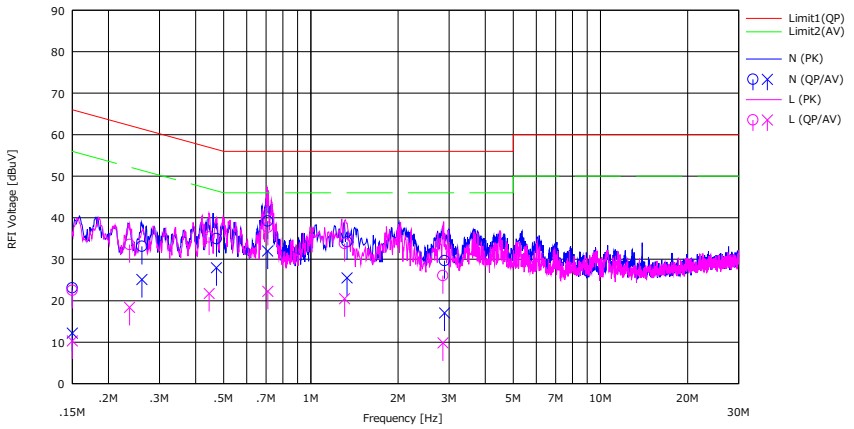
Tx 959.625 MHz , 5 mW



Conducted Emission

Report No.	12890237H
Test place	Ise EMC Lab.
Semi Anechoic Chamber	No.3
Date	August 31, 2019
Temperature / Humidity	23 deg. C / 70 % RH
Engineer	Yuichiro Yamazaki
Mode	Tx 941.625 MHz , 40 mW

Limit : FCC_Part 15 Subpart C(15.207)



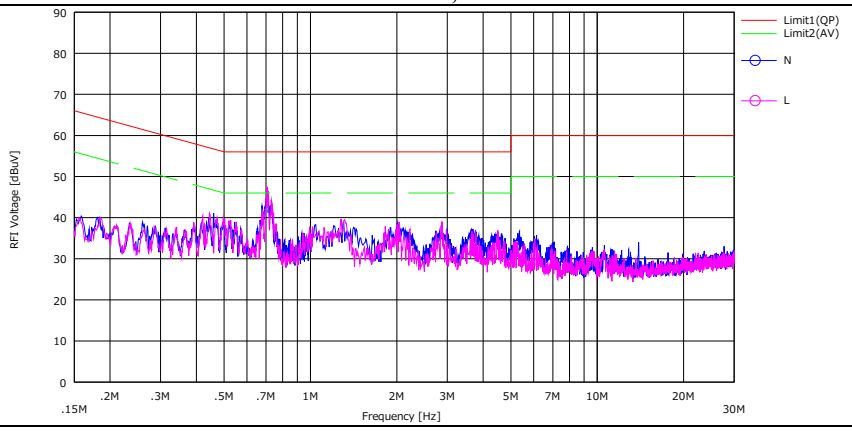
No.	Freq.	Reading ⟨QP⟩	Reading ⟨AV⟩	LISN	LOSS	Results ⟨QP⟩	Results ⟨AV⟩	Limit ⟨QP⟩	Limit ⟨AV⟩	Margin ⟨QP⟩	Margin ⟨AV⟩	Phase	Comment
	[MHz]	[dBuV]	[dBuV]	[dB]	[dB]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dB]	[dB]		
1	0.15000	9.80	-1.10	0.14	13.15	23.09	12.19	66.00	56.00	42.91	43.81	N	
2	0.26100	19.80	11.80	0.14	13.16	33.10	25.10	61.40	51.40	28.30	26.30	N	
3	0.47214	21.60	14.60	0.15	13.18	34.93	27.93	56.50	46.50	21.57	18.57	N	
4	0.70933	25.80	18.60	0.16	13.20	39.16	31.96	56.00	46.00	16.84	14.04	N	
5	1.33306	20.70	12.00	0.22	13.25	34.17	25.47	56.00	46.00	21.83	20.53	N	
6	2.89375	16.00	3.40	0.29	13.34	29.63	17.03	56.00	46.00	26.37	28.97	N	
7	0.15000	9.20	-3.00	0.14	13.15	22.49	10.29	66.00	56.00	43.51	45.71	L	
8	0.23646	20.20	5.10	0.14	13.16	33.50	18.40	62.20	52.20	28.70	33.80	L	
9	0.44543	22.00	8.40	0.15	13.18	35.33	21.73	57.00	47.00	21.67	25.27	L	
10	0.71014	24.30	8.90	0.16	13.20	37.66	22.26	56.00	46.00	18.34	23.74	L	
11	1.30746	20.30	7.00	0.21	13.25	33.76	20.46	56.00	46.00	22.24	25.54	L	
12	2.85594	12.40	-3.80	0.29	13.34	26.03	9.83	56.00	46.00	29.97	36.17	L	

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

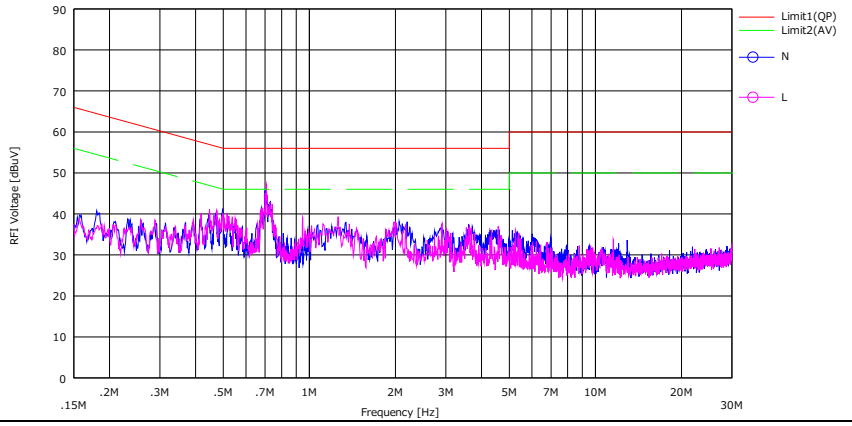
Conducted Emission

Report No.	12890237H
Test place	Ise EMC Lab.
Semi Anechoic Chamber	No.3
Date	August 31, 2019
Temperature / Humidity	23 deg. C / 70 % RH
Engineer	Yuichiro Yamazaki
Mode	Tx, 40 mW

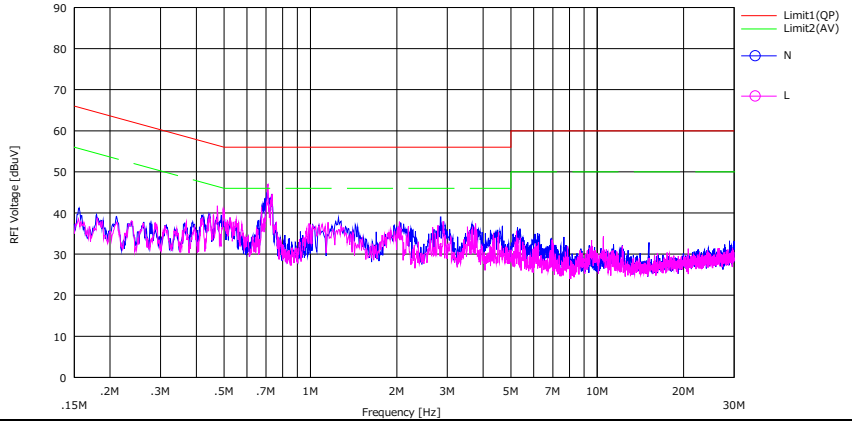
Tx 941.625 MHz , 40 mW



Tx 950.625 MHz , 40 mW



Tx 959.625 MHz , 40 mW



RF Output Power

Report No.	12890237H
Test place	Ise EMC Lab. No.6 Measurement Room
Date	August 26, 2019
Temperature/ Humidity	25 deg. C / 49 % RH
Engineer	Akihiko Maeda
Mode	Tx (470.125 MHz – 607.875 MHz)

Power Setting	Channel	Freq. [MHz]	Reading Average [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result Average [Conducted] [dBm]	[mW]	Limit [Conducted] [mW]	Margin [dB]	Remarks
5 mW	Low	470.125	-14.03	0.87	19.90	6.74	4.72	250	17.24	
	Mid	539.000	-13.77	0.85	19.90	6.98	4.99	250	17.00	
	High	607.875	-13.83	0.82	19.90	6.89	4.89	250	17.09	
40 mW	Low	470.125	-6.22	0.87	19.90	14.55	28.51	250	9.43	
	Mid	539.000	-5.87	0.85	19.90	14.88	30.76	250	9.10	
	High	607.875	-5.80	0.82	19.90	14.92	31.05	250	9.06	

Calculation formula:
Result = Reading + Cable Loss + Atten. Loss

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

RF Output Power

Report No.	12890237H	
Test place	Ise EMC Lab. No.6 Measurement Room	
Date	August 26, 2019	November 6, 2019
Temperature/ Humidity	25 deg. C / 49 % RH	22 deg. C / 41 % RH
Engineer	Akihiko Maeda	Akihiko Maeda
Mode	Tx (941.625 MHz – 959.625 MHz)	

Power Setting	Channel	Freq. [MHz]	Reading Average [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result Average [Conducted] [dBm]	[mW]	Limit [Conducted] [mW]	Margin [dB]	Remarks
5 mW	Low	941.625	-13.98	1.00	19.90	6.92	4.92	1000	23.08	
	Mid 1	950.625	-14.07	1.00	19.90	6.83	4.82	1000	23.17	
	Mid 2	954.625	-14.11	1.00	19.90	6.79	4.78	1000	23.21	
	High	959.625	-14.15	1.01	19.91	6.77	4.75	1000	23.23	
40 mW	Low	941.625	-6.22	1.00	19.90	14.68	29.38	1000	15.32	
	Mid 1	950.625	-6.29	1.00	19.90	14.61	28.91	1000	15.39	
	Mid 2	954.625	-6.33	1.00	19.90	14.57	28.64	1000	15.43	
	High	959.625	-6.38	1.01	19.91	14.54	28.44	1000	15.46	

Calculation formula:

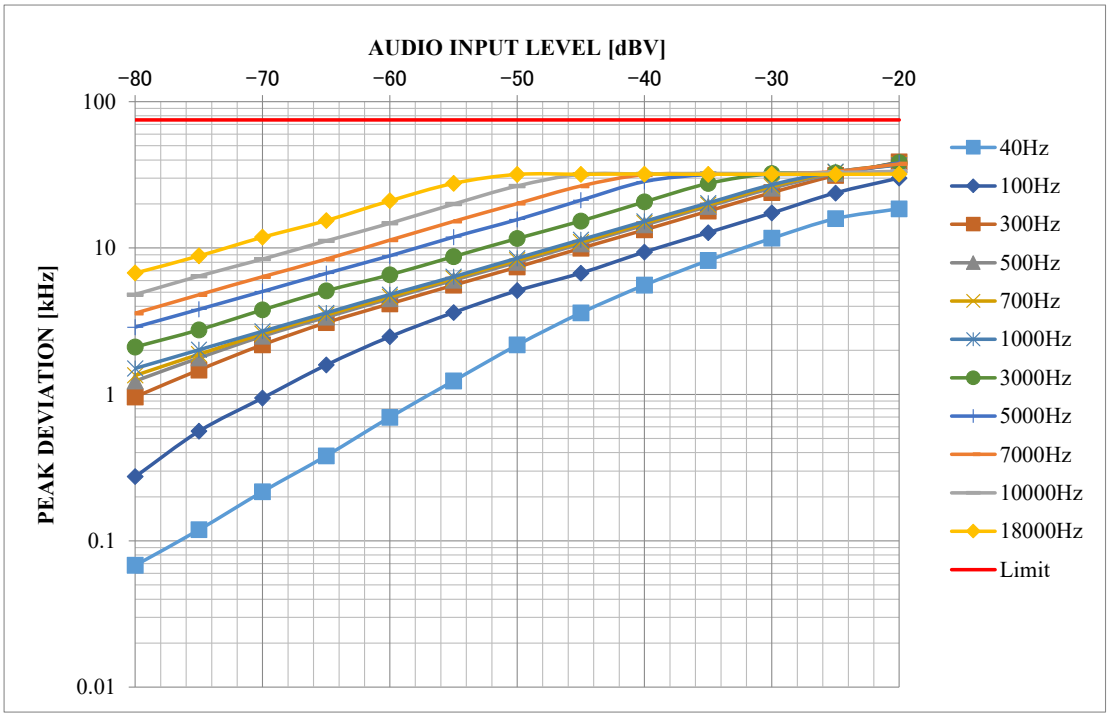
Result = Reading + Cable Loss + Atten. Loss

Modulation Characteristics

[Deviation versus Audio input level and Audio Frequency]

Report No.	12890237H
Test place	Ise EMC Lab. No.6 Shielded Room
Date	September 14, 2019
Temperature / Humidity	25 deg. C / 51 % RH
Engineer	Akihiko Maeda
Mode	Tx 539.000 MHz, 5 mW

AF Level	AF Frequency [Hz] / Peak Deviation [kHz]											Limit
[dBV]	40	100	300	500	700	1000	3000	5000	7000	10000	18000	[kHz]
-80	0.068	0.275	0.962	1.234	1.352	1.507	2.110	2.882	3.584	4.815	6.763	75
-75	0.119	0.561	1.469	1.776	1.885	2.016	2.760	3.810	4.797	6.431	8.847	75
-70	0.217	0.946	2.183	2.501	2.598	2.697	3.780	5.054	6.366	8.407	11.864	75
-65	0.381	1.591	3.092	3.370	3.500	3.609	5.099	6.714	8.390	11.186	15.439	75
-60	0.699	2.482	4.160	4.516	4.643	4.815	6.568	8.853	11.325	14.758	21.026	75
-55	1.237	3.630	5.571	6.023	6.205	6.366	8.753	11.881	15.200	19.982	27.634	75
-50	2.177	5.117	7.421	8.002	8.279	8.532	11.645	15.658	20.137	26.521	31.827	75
-45	3.604	6.740	9.980	10.695	10.988	11.380	15.298	21.210	26.563	31.902	31.911	75
-40	5.583	9.396	13.328	14.373	14.810	15.211	20.715	28.457	31.779	32.072	32.036	75
-35	8.223	12.749	17.902	19.256	19.741	20.299	27.646	31.746	32.005	32.384	31.865	75
-30	11.661	17.345	23.964	25.636	26.412	27.053	32.330	31.786	32.075	32.264	31.956	75
-25	15.890	23.780	31.359	32.362	33.022	33.193	32.750	32.556	33.417	32.764	31.883	75
-20	18.556	30.023	38.756	37.362	37.392	36.853	38.431	38.186	37.557	33.454	32.012	75



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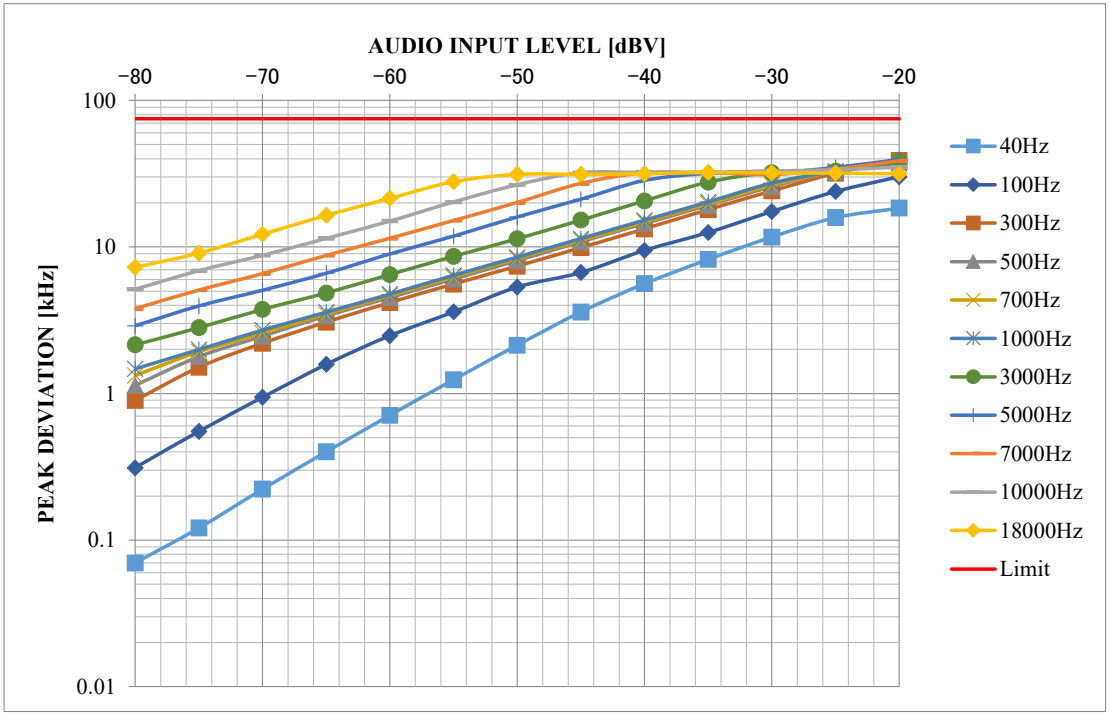
Modulation Characteristics

[Deviation versus Audio input level and Audio Frequency]

Report No.	12890237H
Test place	Ise EMC Lab. No.6 Shielded Room
Date	September 13, 2019
Temperature / Humidity	23 deg. C / 58 % RH
Engineer	Akihiko Maeda
Mode	Tx 539.000 MHz, 40 mW

AF Level	AF Frequency [Hz] / Peak Deviation [kHz]											Limit
[dBV]	40	100	300	500	700	1000	3000	5000	7000	10000	18000	[kHz]
-80	0.070	0.312	0.899	1.136	1.330	1.476	2.150	2.895	3.789	5.150	7.260	75
-75	0.121	0.552	1.511	1.785	1.925	1.994	2.814	3.957	5.081	6.886	9.090	75
-70	0.223	0.944	2.203	2.459	2.589	2.709	3.754	5.068	6.580	8.765	12.232	75
-65	0.400	1.581	3.069	3.384	3.475	3.589	4.857	6.614	8.760	11.427	16.432	75
-60	0.711	2.483	4.179	4.511	4.655	4.773	6.493	8.962	11.449	15.006	21.494	75
-55	1.243	3.603	5.590	6.037	6.220	6.400	8.632	11.850	15.145	20.255	27.884	75
-50	2.140	5.323	7.410	8.058	8.353	8.517	11.377	16.028	20.105	26.552	31.361	75
-45	3.600	6.693	9.895	10.834	11.097	11.405	15.259	21.163	27.125	32.126	31.351	75
-40	5.627	9.483	13.301	14.432	14.813	15.233	20.654	28.452	32.025	32.201	31.598	75
-35	8.237	12.568	18.004	19.199	19.649	20.290	27.704	31.725	32.067	32.351	32.321	75
-30	11.705	17.471	24.122	25.759	26.359	27.242	32.185	31.927	31.195	32.991	31.987	75
-25	15.868	23.882	31.819	32.729	32.749	32.858	32.955	34.915	33.975	33.621	31.967	75
-20	18.416	30.194	39.019	38.129	37.169	37.328	38.375	39.515	38.635	35.041	31.576	75

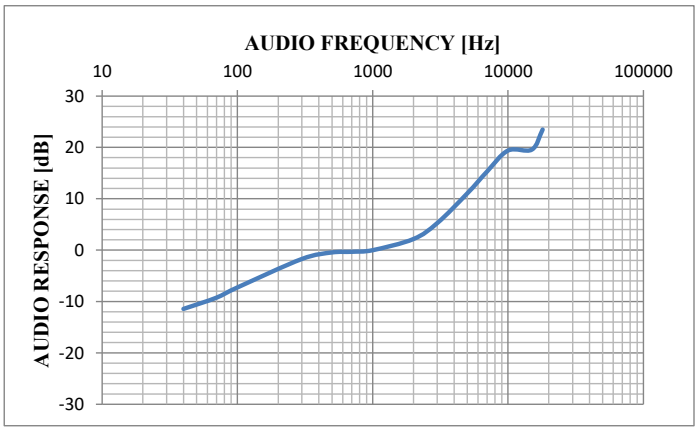


Modulation Characteristics
[Audio Frequency Response]

Report No.	12890237H
Test place	Ise EMC Lab. No.6 Shielded Room
Date	September 15, 2019
Temperature / Humidity	25 deg. C / 54 % RH
Engineer	Yuta Moriya
Mode	Tx 539.000 MHz

[Power Setting: High]

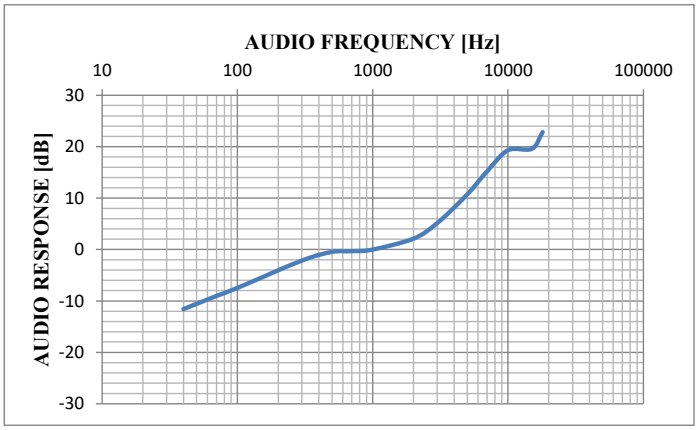
AF Frequency [Hz]	AF Level [mV]	AF Response [dB]
40	68.12	-11.46
70	52.90	-9.26
100	42.10	-7.28
300	22.20	-1.72
500	19.20	-0.46
700	18.90	-0.32
1000	18.21	0.00
2000	14.21	2.15
3000	9.91	5.28
5000	5.11	11.04
7000	3.12	15.32
10000	1.95	19.41
15000	1.91	19.59
18000	1.22	23.48



Calculation formula:
AF Response = 20 * log(AF Level of 1kHz / AF level)

[Power Setting: Low]

AF Frequency [Hz]	AF Level [mV]	AF Response [dB]
40	69.32	-11.56
70	51.80	-9.03
100	43.20	-7.46
300	23.40	-2.13
500	19.32	-0.47
700	18.99	-0.32
1000	18.31	0.00
2000	14.32	2.13
3000	10.11	5.16
5000	5.32	10.74
7000	3.18	15.21
10000	1.98	19.32
15000	1.92	19.59
18000	1.32	22.84



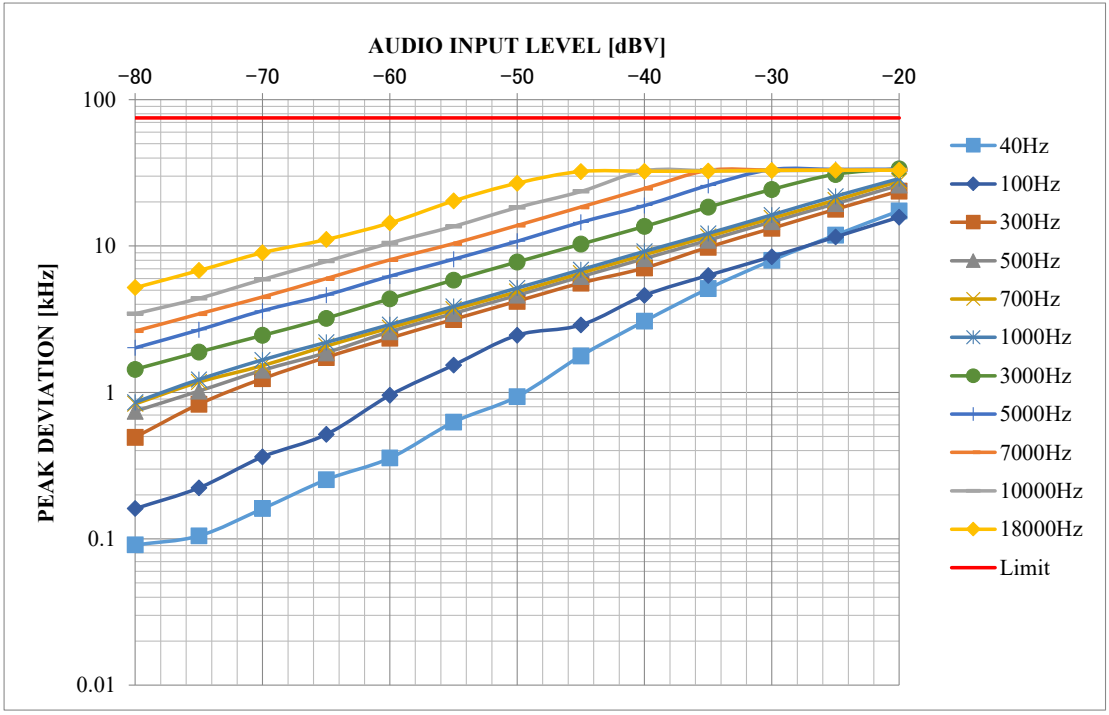
Calculation formula:
AF Response = 20 * log(AF Level of 1kHz / AF level)

Modulation Characteristics

[Deviation versus Audio input level and Audio Frequency]

Report No.	12890237H
Test place	Ise EMC Lab. No.6 Shielded Room
Date	September 15, 2019
Temperature / Humidity	25 deg. C / 54 % RH
Engineer	Yuta Moriya
Mode	Tx 950.625 MHz, 5 mW

AF Level	AF Frequency [Hz] / Peak Deviation [kHz]											Limit
[dBV]	40	100	300	500	700	1000	3000	5000	7000	10000	18000	[kHz]
-80	0.091	0.161	0.494	0.744	0.838	0.858	1.438	2.018	2.628	3.458	5.209	75
-75	0.105	0.223	0.831	1.020	1.178	1.225	1.888	2.678	3.438	4.399	6.808	75
-70	0.161	0.363	1.240	1.417	1.528	1.669	2.454	3.618	4.498	5.922	9.018	75
-65	0.254	0.517	1.735	1.866	2.078	2.199	3.210	4.629	5.995	7.872	11.102	75
-60	0.357	0.957	2.349	2.600	2.767	2.910	4.360	6.228	8.065	10.513	14.407	75
-55	0.628	1.538	3.148	3.465	3.697	3.872	5.850	8.136	10.405	13.643	20.347	75
-50	0.938	2.458	4.194	4.617	4.881	5.166	7.780	10.797	13.852	18.356	26.907	75
-45	1.778	2.888	5.584	6.171	6.548	6.888	10.300	14.537	18.475	23.624	32.294	75
-40	3.068	4.599	7.074	8.210	8.732	9.199	13.604	18.886	24.719	32.701	32.434	75
-35	5.118	6.300	9.810	10.963	11.645	12.179	18.407	25.976	32.853	32.784	32.494	75
-30	7.988	8.461	13.203	14.672	15.531	16.332	24.353	33.336	33.036	32.833	32.887	75
-25	11.888	11.531	17.803	19.498	20.621	21.892	30.853	33.393	33.094	32.999	32.990	75
-20	17.388	15.756	23.730	26.018	27.771	28.932	33.679	33.439	33.098	33.011	32.989	75

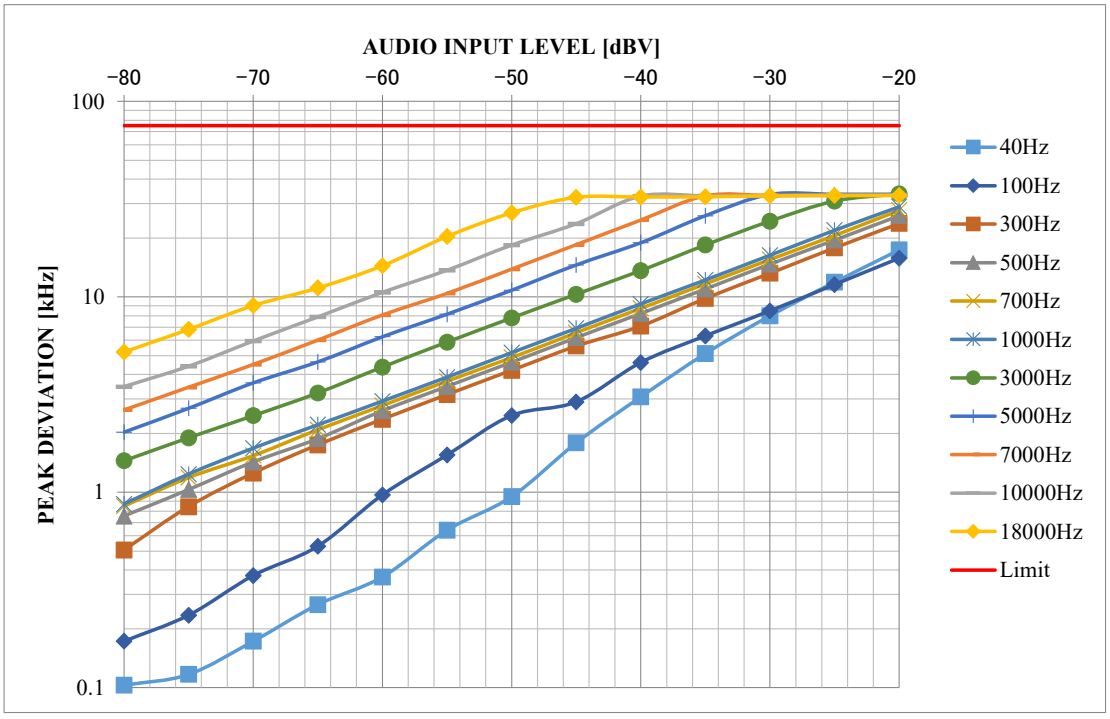


Modulation Characteristics

[Deviation versus Audio input level and Audio Frequency]

Report No.	12890237H
Test place	Ise EMC Lab. No.6 Shielded Room
Date	September 15, 2019
Temperature / Humidity	25 deg. C / 54 % RH
Engineer	Yuta Moriya
Mode	Tx 950.625 MHz, 40 mW

AF Level	AF Frequency [Hz] / Peak Deviation [kHz]											Limit
[dBV]	40	100	300	500	700	1000	3000	5000	7000	10000	18000	[kHz]
-80	0.103	0.173	0.506	0.756	0.850	0.870	1.450	2.030	2.640	3.470	5.221	75
-75	0.117	0.235	0.843	1.032	1.190	1.237	1.900	2.690	3.450	4.411	6.820	75
-70	0.173	0.375	1.252	1.429	1.540	1.681	2.466	3.630	4.510	5.934	9.030	75
-65	0.266	0.529	1.747	1.878	2.090	2.211	3.222	4.641	6.007	7.884	11.114	75
-60	0.369	0.969	2.361	2.612	2.779	2.922	4.372	6.240	8.077	10.525	14.419	75
-55	0.640	1.550	3.160	3.477	3.709	3.884	5.862	8.148	10.417	13.655	20.359	75
-50	0.950	2.470	4.206	4.629	4.893	5.178	7.792	10.809	13.864	18.368	26.919	75
-45	1.790	2.900	5.596	6.183	6.560	6.900	10.312	14.549	18.487	23.636	32.306	75
-40	3.080	4.611	7.086	8.222	8.744	9.211	13.616	18.898	24.731	32.713	32.446	75
-35	5.130	6.312	9.822	10.975	11.657	12.191	18.419	25.988	32.865	32.796	32.506	75
-30	8.000	8.473	13.215	14.684	15.543	16.344	24.365	33.348	33.048	32.845	32.899	75
-25	11.900	11.543	17.815	19.510	20.633	21.904	30.865	33.405	33.106	33.011	33.002	75
-20	17.400	15.768	23.742	26.030	27.783	28.944	33.691	33.451	33.110	33.023	33.001	75



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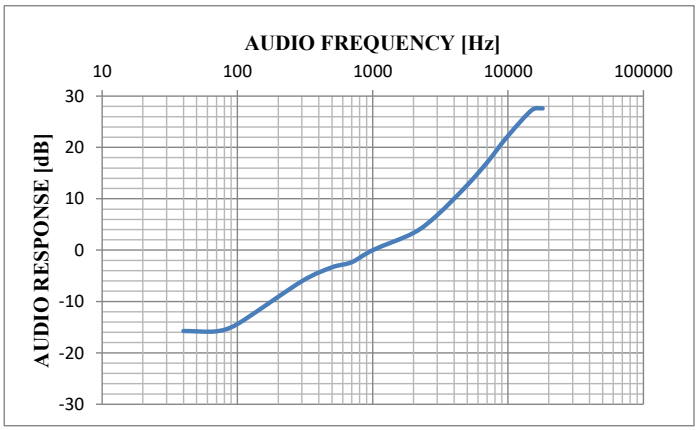
Modulation Characteristics
[Audio Frequency Response]

Report No.	12890237H
Test place	Ise EMC Lab. No.6 Shielded Room
Date	September 15, 2019
Temperature / Humidity	25 deg. C / 54 % RH
Engineer	Yuta Moriya
Mode	Tx 950.625 MHz

[Power Setting: High]

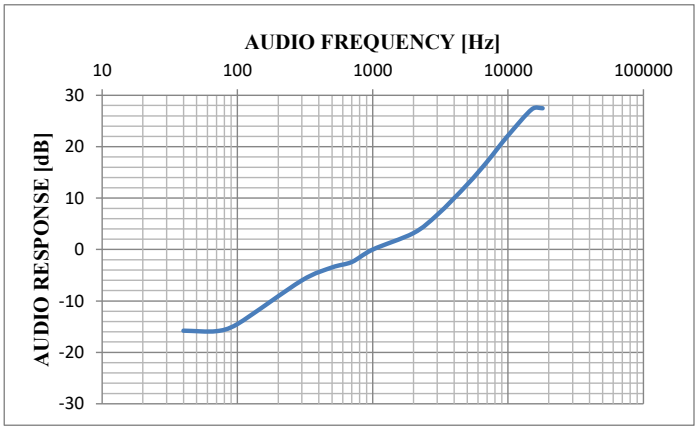
AF Frequency [Hz]	AF Level [mV]	AF Response [dB]
40	280.00	-15.74
70	282.00	-15.80
100	240.10	-14.41
300	91.80	-6.05
500	67.30	-3.36
700	59.80	-2.33
1000	45.72	0.00
2000	31.10	3.35
3000	20.80	6.84
5000	10.61	12.69
7000	6.40	17.08
10000	3.51	22.30
15000	1.97	27.31
18000	1.90	27.62



Calculation formula:
AF Response = 20 * log(AF Level of 1kHz / AF level)

[Power Setting: Low]

AF Frequency [Hz]	AF Level [mV]	AF Response [dB]
40	278.30	-15.79
70	281.20	-15.88
100	239.80	-14.49
300	90.10	-5.99
500	67.44	-3.48
700	59.70	-2.42
1000	45.20	0.00
2000	31.23	3.21
3000	20.74	6.77
5000	10.53	12.65
7000	6.32	17.09
10000	3.52	22.17
15000	1.95	27.30
18000	1.91	27.48



Calculation formula:
AF Response = 20 * log(AF Level of 1kHz / AF level)

Occupied Bandwidth

Report No. 12890237H
Test place Ise EMC Lab. No.6 Measurement Room
Date August 26, 2019
Temperature/ Humidity 25 deg. C / 49 % RH
Engineer Akihiko Maeda
Mode Tx (470.125 MHz – 607.875 MHz)

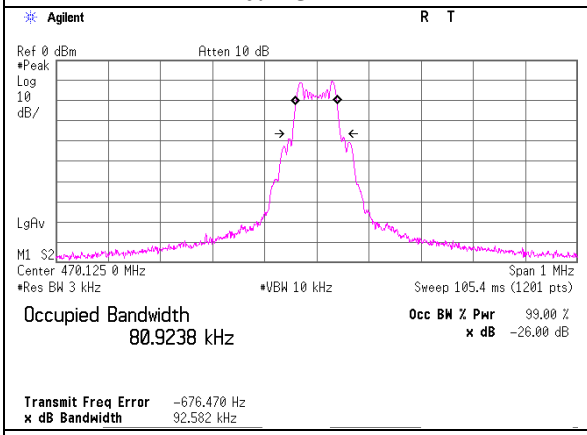
Power Setting	Channel	Freq. [MHz]	99% Occupied Bandwidth [kHz]	Limit [kHz]	Margin [kHz]
5 mW	Low	470.125	80.9238	200	119.0762
	Mid	539.000	80.5562	200	119.4438
	High	607.875	81.7863	200	118.2137
40 mW	Low	470.125	80.9020	200	119.0980
	Mid	539.000	80.6056	200	119.3944
	High	607.875	81.8148	200	118.1852

Occupied Bandwidth

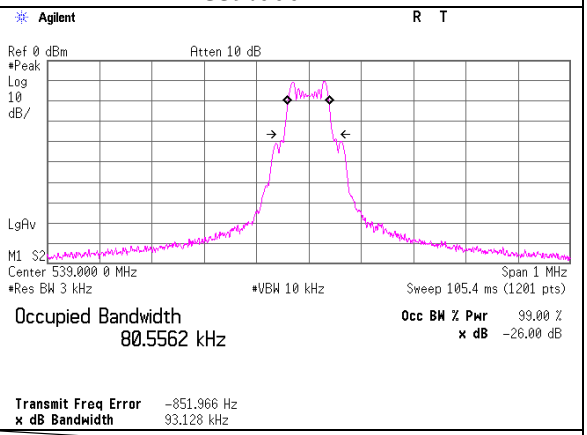
Report No.	12890237H
Test place	Ise EMC Lab. No.6 Measurement Room
Date	August 26, 2019
Temperature/ Humidity	25 deg. C / 49 % RH
Engineer	Akihiko Maeda
Mode	Tx (470.125 MHz – 607.875 MHz)

Power setting: 5 mW

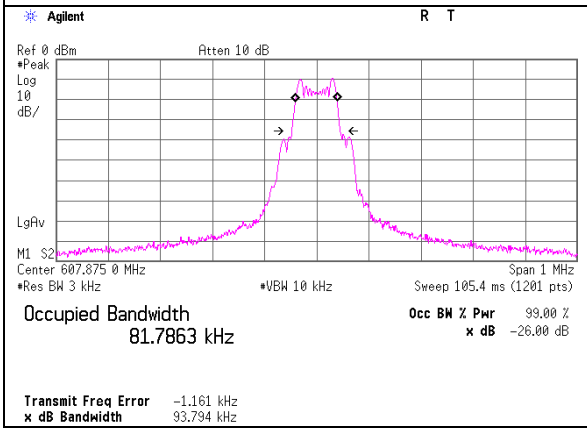
470.125 MHz



539.000 MHz



607.875 MHz

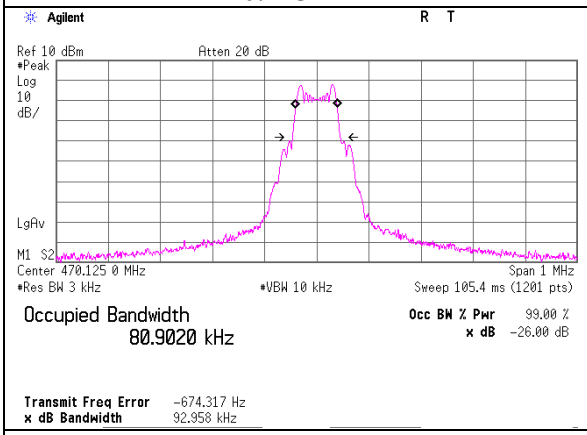


Occupied Bandwidth

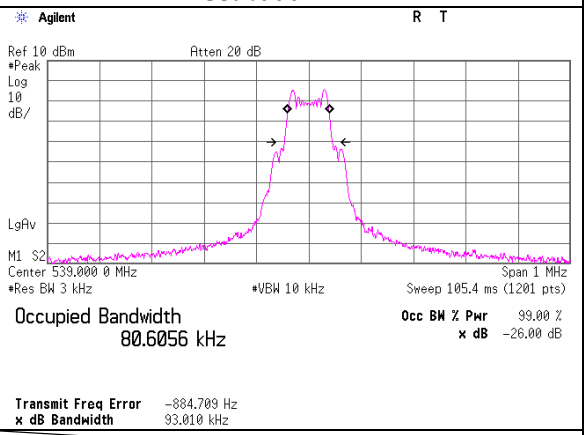
Report No.	12890237H
Test place	Ise EMC Lab. No.6 Measurement Room
Date	August 26, 2019
Temperature/ Humidity	25 deg. C / 49 % RH
Engineer	Akihiko Maeda
Mode	Tx (470.125 MHz – 607.875 MHz)

Power setting: 40 mW

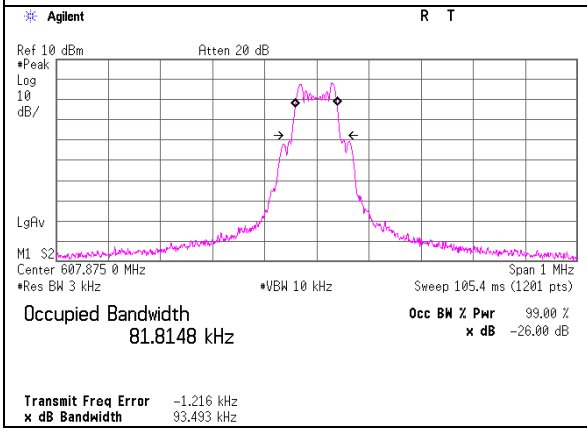
470.125 MHz



539.000 MHz



607.875 MHz



Occupied Bandwidth

Report No.	12890237H
Test place	Ise EMC Lab. No.6 Measurement Room
Date	August 26, 2019
Temperature/ Humidity	25 deg. C / 49 % RH
Engineer	Akihiko Maeda
Mode	Tx (941.625 MHz – 959.625 MHz)

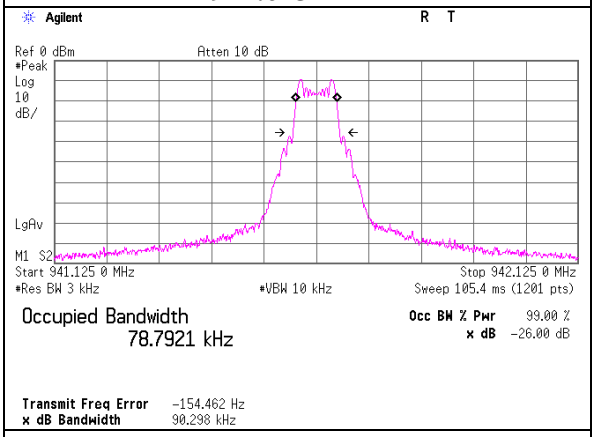
Power Setting	Frequency [MHz]	Bandwidth [kHz]	Frequency Error [Hz]	Result [MHz]	Limit [MHz]
5 mW	941.625	78.7921	-154.462	941.5854	> 941.5
	959.625	75.0791	-149.826	959.6624	< 959.85
40 mW	941.625	78.7578	-140.985	941.5855	> 941.5
	959.625	75.0986	-167.594	959.6624	< 959.85

Occupied Bandwidth

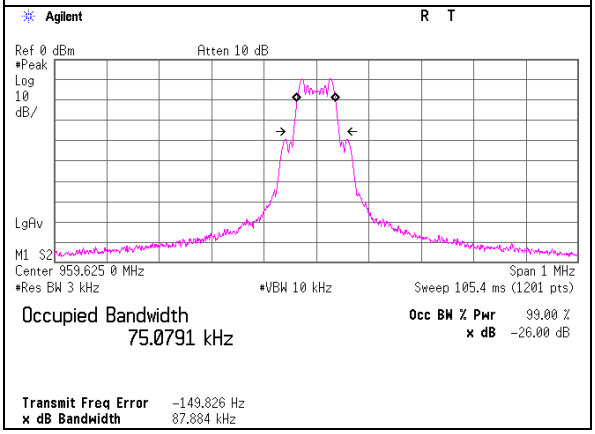
Report No.	12890237H
Test place	Ise EMC Lab. No.6 Measurement Room
Date	August 26, 2019
Temperature/ Humidity	25 deg. C / 49 % RH
Engineer	Akihiko Maeda
Mode	Tx (941.625 MHz – 959.625 MHz)

Power setting: 5 mW

941.625 MHz



959.625 MHz

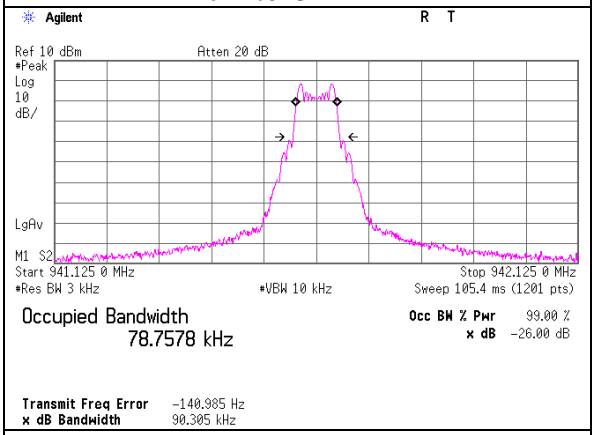


Occupied Bandwidth

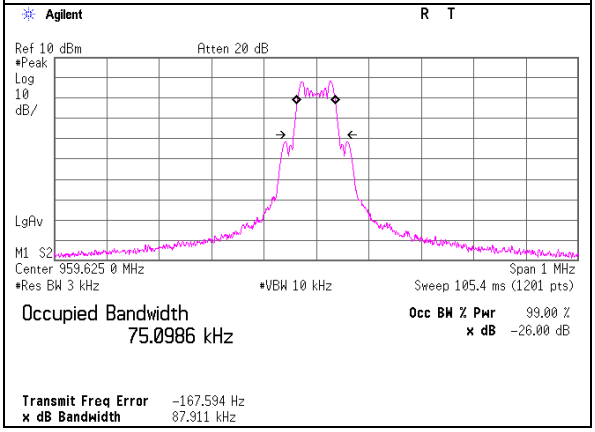
Report No.	12890237H
Test place	Ise EMC Lab. No.6 Measurement Room
Date	August 26, 2019
Temperature/ Humidity	25 deg. C / 49 % RH
Engineer	Akihiko Maeda
Mode	Tx (941.625 MHz – 959.625 MHz)

Power setting: 40 mW

941.625 MHz



959.625 MHz



Spurious emissions at antenna terminals

Report No.	12890237H
Test place	Ise EMC Lab. No.6 Measurement Room
Date	August 26, 2019
Temperature/ Humidity	25 deg. C / 49 % RH
Engineer	Akihiko Maeda
Mode	Tx (470.125 MHz – 607.875 MHz)

Power Setting	Channel	Tested Freq. [MHz]	Reading Freq. [MHz]	Reading Level [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result [dBm]	Limit [dBm]	Margin [dB]
5 mW	Low	470.125	0.01206	-75.38	0.10	9.84	-65.44	-13	52.44
			0.523	-91.49	0.11	9.81	-81.57	-13	68.57
			940.2	-70.17	1.00	9.90	-59.27	-13	46.27
			3117	-68.38	1.25	10.02	-57.11	-13	44.11
	Mid	539.000	0.01206	-74.96	0.10	9.84	-65.02	-13	52.02
			0.15	-89.15	0.11	9.81	-79.23	-13	66.23
			606.3	-73.97	0.82	9.88	-63.27	-13	50.27
			1078.75	-65.07	0.79	9.99	-54.29	-13	41.29
	High	607.875	0.01206	-75.31	0.10	9.84	-65.37	-13	52.37
			0.2	-90.19	0.11	9.81	-80.27	-13	67.27
			853.7	-82.12	0.82	9.88	-71.42	-13	58.42
			1949	-64.28	1.02	9.98	-53.28	-13	40.28
40 mW	Low	470.125	0.01206	-75.43	0.10	9.84	-65.49	-13	52.49
			0.15	-89.25	0.11	9.81	-79.33	-13	66.33
			940.2	-63.90	1.00	9.90	-53.00	-13	40.00
			3077	-59.17	1.25	10.02	-47.90	-13	34.90
	Mid	539.000	0.01206	-75.26	0.10	9.84	-65.32	-13	52.32
			0.15	-89.74	0.11	9.81	-79.82	-13	66.82
			374.4	-71.38	0.76	9.86	-60.76	-13	47.76
			1078.75	-58.41	0.79	9.99	-47.63	-13	34.63
	High	607.875	0.01206	-75.18	0.10	9.84	-65.24	-13	52.24
			0.175	-90.65	0.11	9.81	-80.73	-13	67.73
			444.7	-71.99	0.85	9.87	-61.27	-13	48.27
			3131	-58.76	1.26	10.02	-47.48	-13	34.48

Calculation formula:

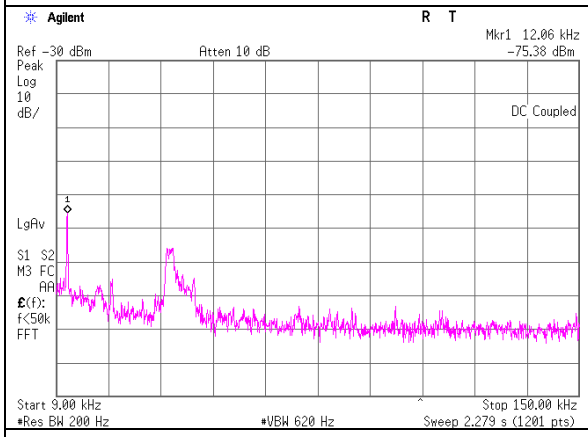
Result = Reading + Cable Loss + Attenuator Loss

Limit = mean output power in dBm - (43+10log$_{10}$ (mean output power in watts)) dB = -13dBm

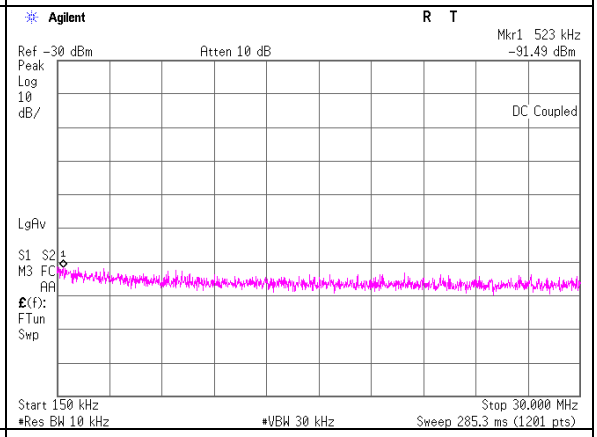
Spurious emissions at antenna terminals

Report No.	12890237H
Test place	Ise EMC Lab. No.6 Measurement Room
Date	August 26, 2019
Temperature/ Humidity	25 deg. C / 49 % RH
Engineer	Akihiko Maeda
Mode	Tx 470.125 MHz, 5 mW

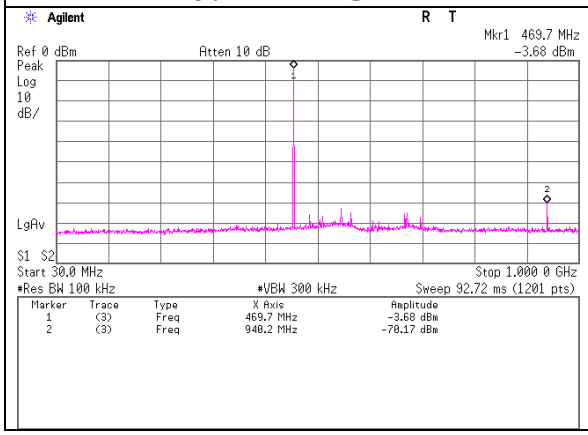
9 kHz - 150 kHz



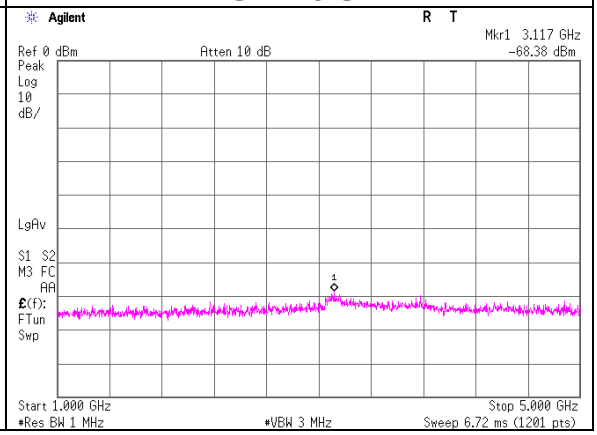
150 kHz - 30 MHz



30 MHz - 1 GHz



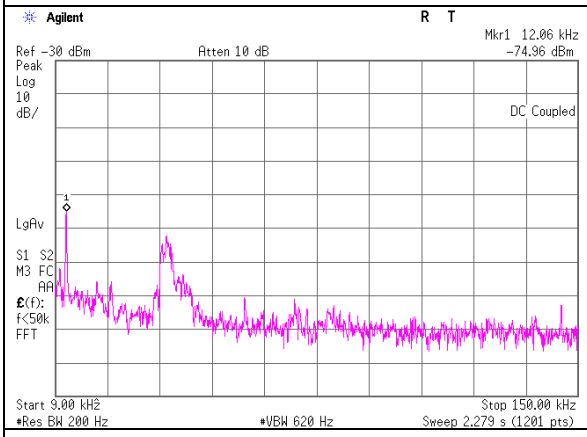
1 GHz - 5 GHz



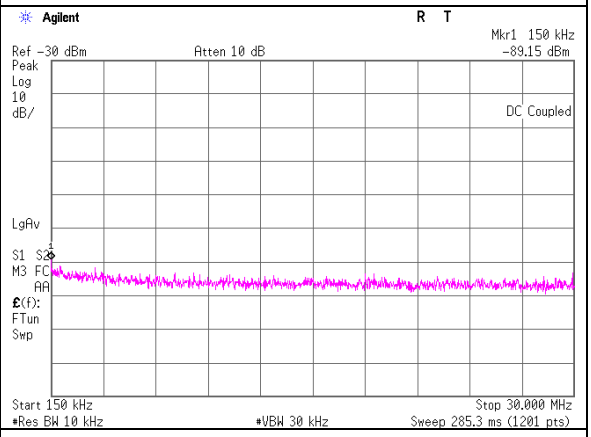
Spurious emissions at antenna terminals

Report No.	12890237H
Test place	Ise EMC Lab. No.6 Measurement Room
Date	August 26, 2019
Temperature/ Humidity	25 deg. C / 49 % RH
Engineer	Akihiko Maeda
Mode	Tx 539.000 MHz, 5 mW

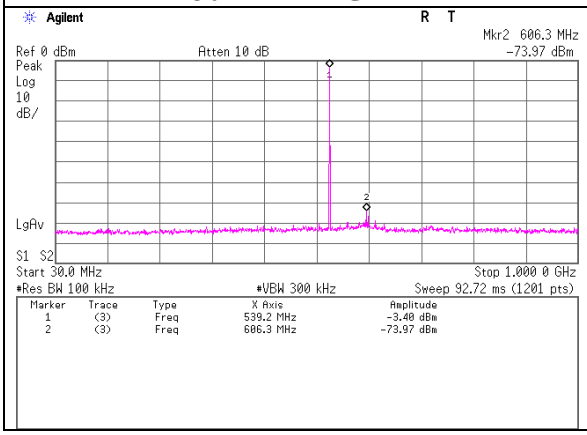
9 kHz - 150 kHz



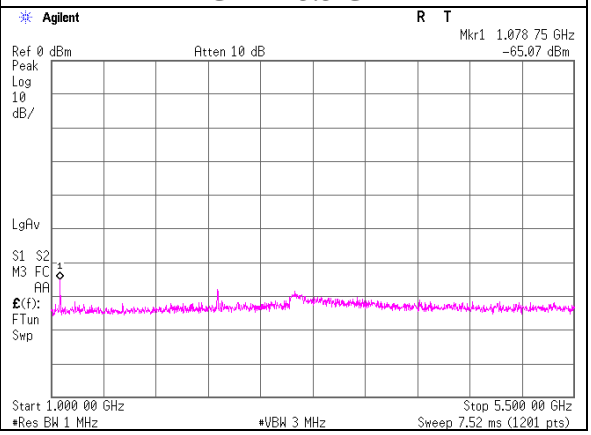
150 kHz - 30 MHz



30 MHz - 1 GHz



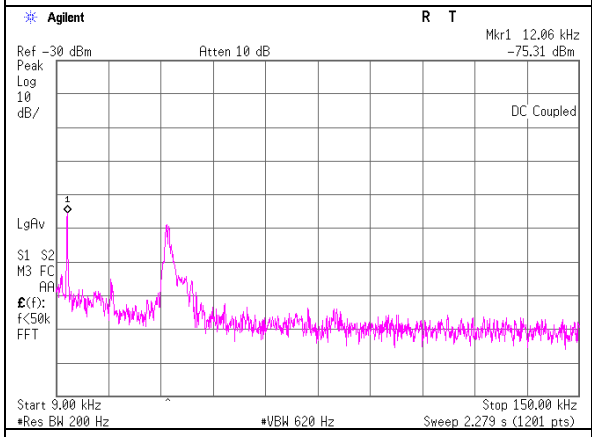
1 GHz – 5.5 GHz



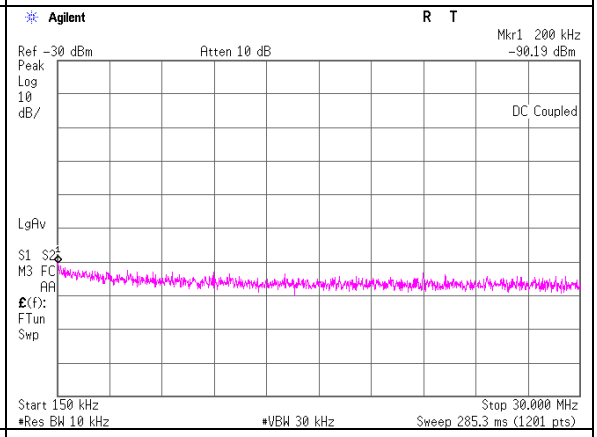
Spurious emissions at antenna terminals

Report No.	12890237H
Test place	Ise EMC Lab. No.6 Measurement Room
Date	August 26, 2019
Temperature/ Humidity	25 deg. C / 49 % RH
Engineer	Akihiko Maeda
Mode	Tx 607.875 MHz, 5 mW

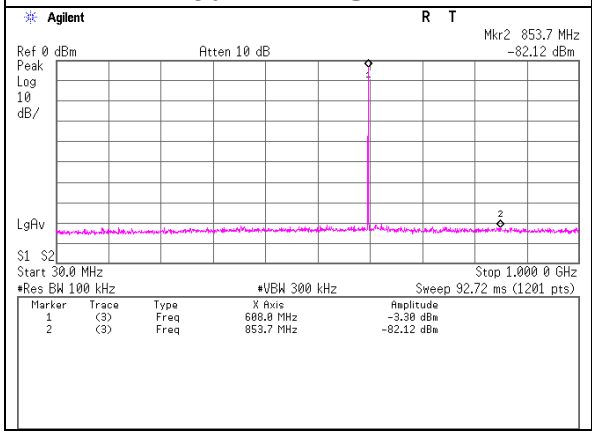
9 kHz - 150 kHz



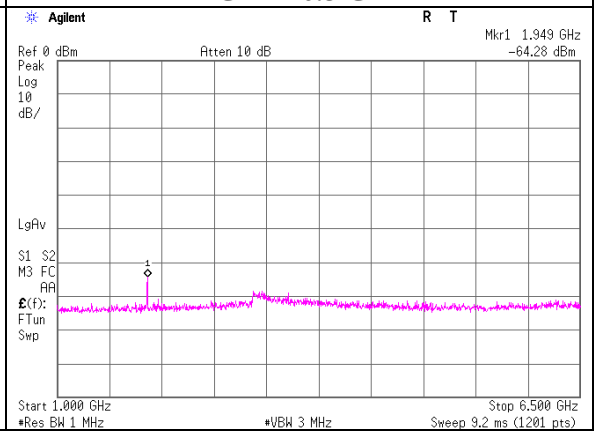
150 kHz - 30 MHz



30 MHz - 1 GHz



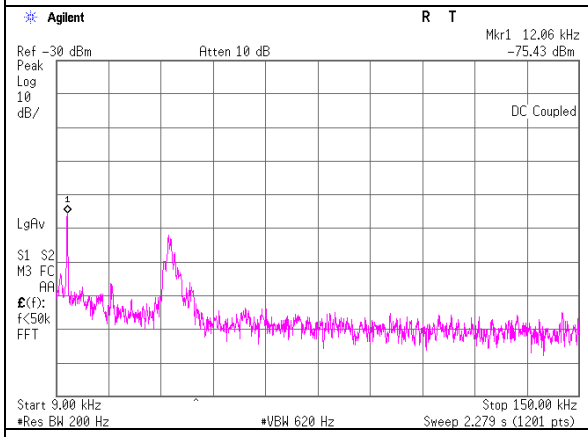
1 GHz - 6.5 GHz



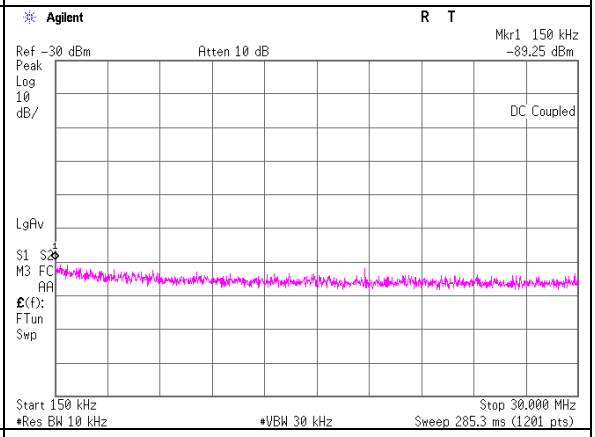
Spurious emissions at antenna terminals

Report No.	12890237H
Test place	Ise EMC Lab. No.6 Measurement Room
Date	August 26, 2019
Temperature/ Humidity	25 deg. C / 49 % RH
Engineer	Akihiko Maeda
Mode	Tx 470.125 MHz, 40 mW

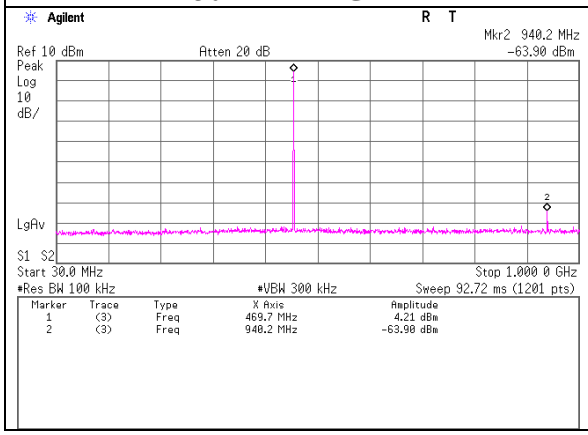
9 kHz - 150 kHz



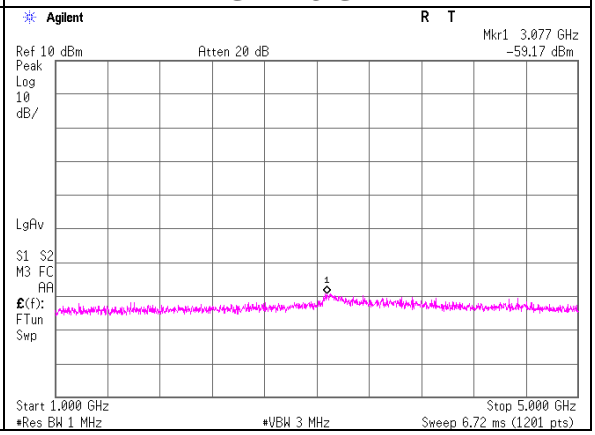
150 kHz - 30 MHz



30 MHz - 1 GHz



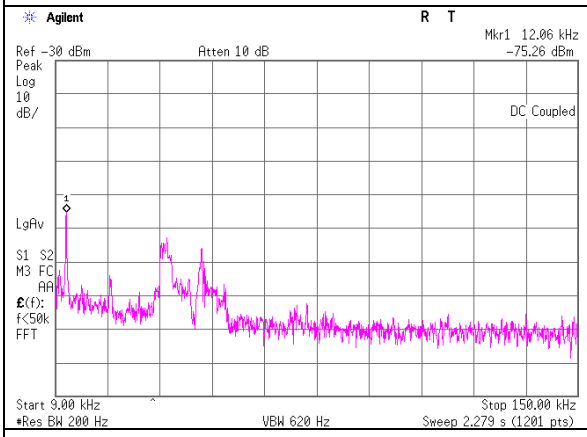
1 GHz - 5 GHz



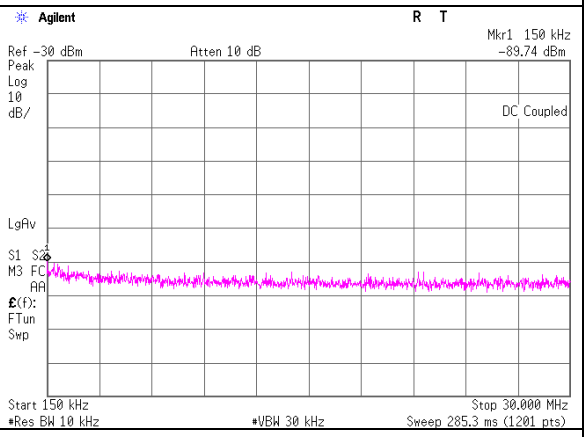
Spurious emissions at antenna terminals

Report No.	12890237H
Test place	Ise EMC Lab. No.6 Measurement Room
Date	August 26, 2019
Temperature/ Humidity	25 deg. C / 49 % RH
Engineer	Akihiko Maeda
Mode	Tx 539.000 MHz, 40 mW

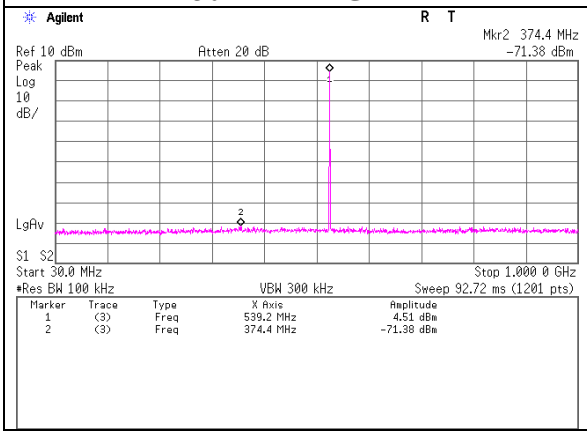
9 kHz - 150 kHz



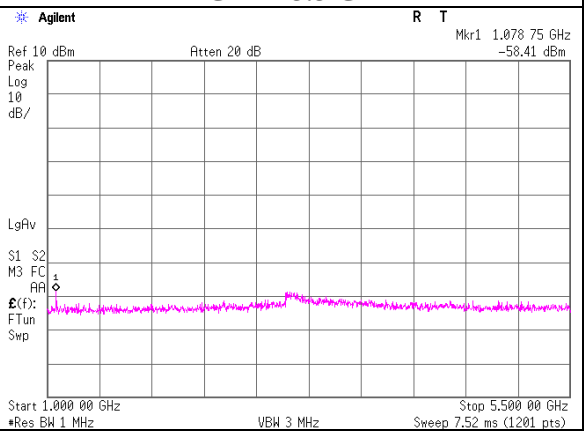
150 kHz - 30 MHz



30 MHz - 1 GHz



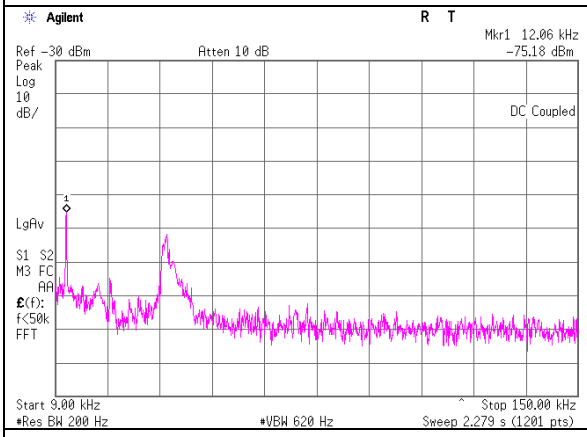
1 GHz - 5.5 GHz



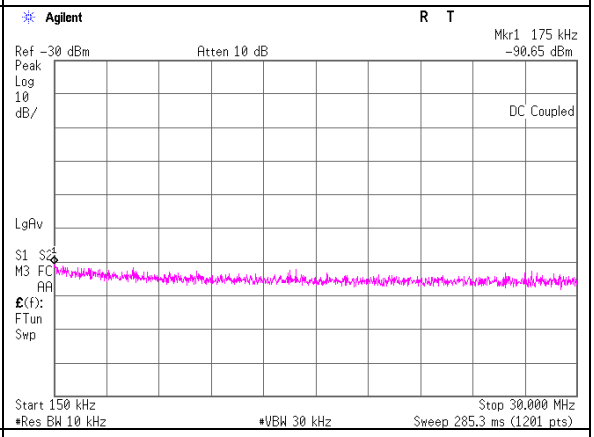
Spurious emissions at antenna terminals

Report No.	12890237H
Test place	Ise EMC Lab. No.6 Measurement Room
Date	August 26, 2019
Temperature/ Humidity	25 deg. C / 49 % RH
Engineer	Akihiko Maeda
Mode	Tx 607.875 MHz, 40 mW

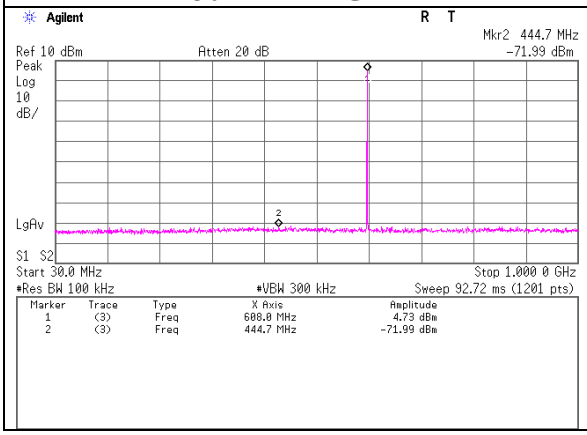
9 kHz - 150 kHz



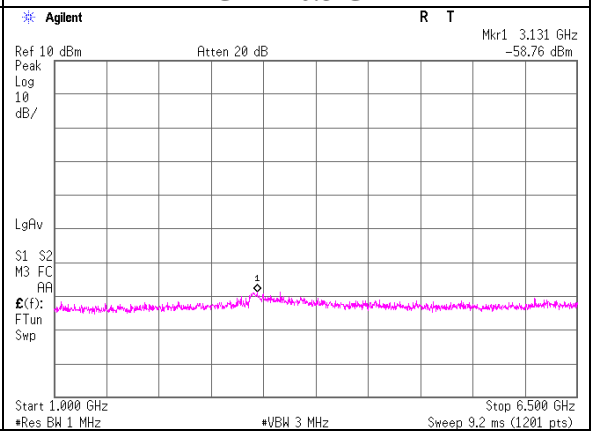
150 kHz - 30 MHz



30 MHz - 1 GHz



1 GHz - 6.5 GHz



Spurious emissions at antenna terminals

Report No.	12890237H
Test place	Ise EMC Lab. No.6 Measurement Room
Date	August 26, 2019
Temperature/ Humidity	25 deg. C / 49 % RH
Engineer	Akihiko Maeda
Mode	Tx (941.625 MHz – 959.625 MHz)

Power Setting	Channel	Tested Freq. [MHz]	Reading Freq. [MHz]	Reading Level [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result [dBm]	Limit [dBm]	Margin [dB]
5 mW	Low	941.625	0.01206	-73.22	0.10	9.84	-63.28	-13	50.28
			0.25	-91.35	0.11	9.81	-81.43	-13	68.43
			366.3	-81.91	0.74	9.86	-71.31	-13	58.31
			1953	-68.21	0.10	9.98	-58.13	-13	45.13
			6638	-68.10	1.82	10.08	-56.20	-13	43.20
	Mid	950.625	0.01206	-73.06	0.10	9.84	-63.12	-13	50.12
			0.225	-88.89	0.11	9.81	-78.97	-13	65.97
			421.2	-82.46	0.83	9.87	-71.76	-13	58.76
			1943	-65.33	1.02	9.98	-54.33	-13	41.33
			8758	-68.23	2.14	10.16	-55.93	-13	42.93
	High	959.625	0.01206	-72.78	0.10	9.84	-62.84	-13	49.84
			0.2	-90.28	0.11	9.81	-80.36	-13	67.36
			404.3	-82.41	0.81	9.86	-71.74	-13	58.74
			1943	-67.17	1.02	9.98	-56.17	-13	43.17
			7871	-68.24	2.14	10.16	-55.94	-13	42.94
40 mW	Low	941.625	0.01206	-72.77	0.10	9.84	-62.83	-13	49.83
			0.15	-89.74	0.11	9.81	-79.82	-13	66.82
			717.1	-71.48	0.85	9.89	-60.74	-13	47.74
			3103	-59.08	1.25	10.02	-47.81	-13	34.81
			7321	-58.20	1.92	10.10	-46.18	-13	33.18
	Mid	950.625	0.01206	-73.45	0.10	9.84	-63.51	-13	50.51
			0.797	-90.25	0.12	9.81	-80.32	-13	67.32
			636.2	-72.97	0.82	9.88	-62.27	-13	49.27
			3183	-58.89	1.27	10.03	-47.59	-13	34.59
			8546	-58.27	2.11	10.15	-46.01	-13	33.01
	High	959.625	0.01206	-72.35	0.10	9.84	-62.41	-13	49.41
			0.15	-90.27	0.11	9.81	-80.35	-13	67.35
			432.6	-71.45	0.84	9.87	-60.74	-13	47.74
			1920	-61.04	1.01	9.99	-50.04	-13	37.04
			7300	-58.28	1.91	10.10	-46.27	-13	33.27

Calculation formula:

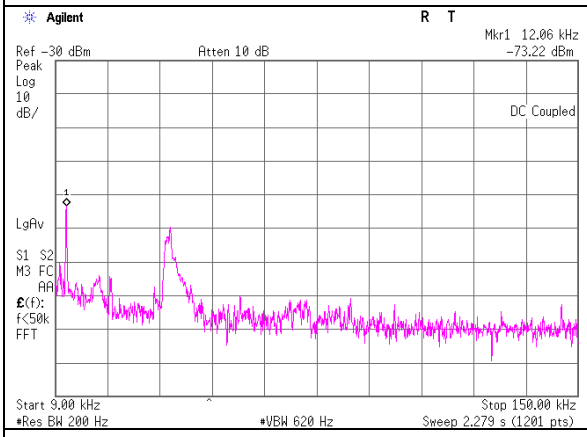
Result = Reading + Cable Loss + Attenuator Loss

Limit = mean output power in dBm - (43+10log$_{10}$ (mean output power in watts)) dB = -13dBm

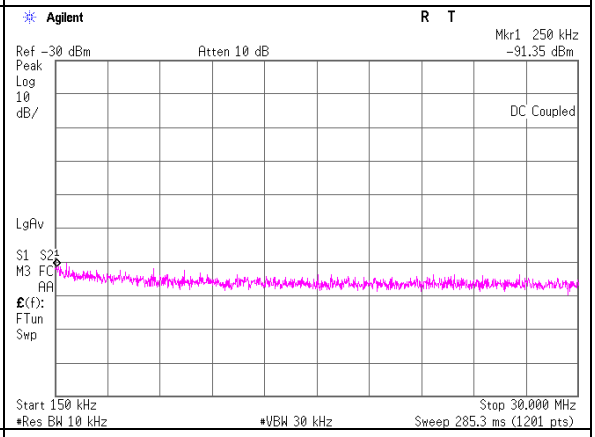
Spurious emissions at antenna terminals

Report No.	12890237H
Test place	Ise EMC Lab. No.6 Measurement Room
Date	August 26, 2019
Temperature/ Humidity	25 deg. C / 49 % RH
Engineer	Akihiko Maeda
Mode	Tx 941.625 MHz, 5 mW

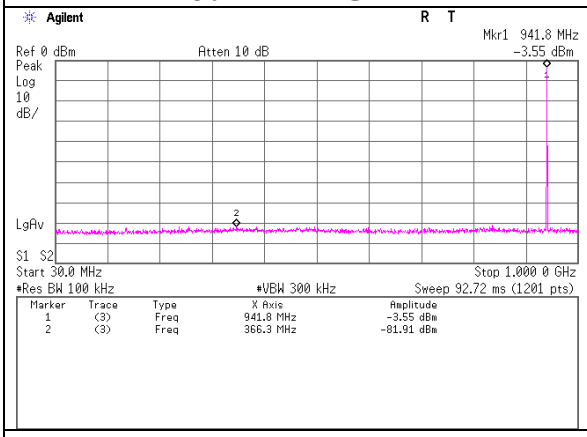
9 kHz - 150 kHz



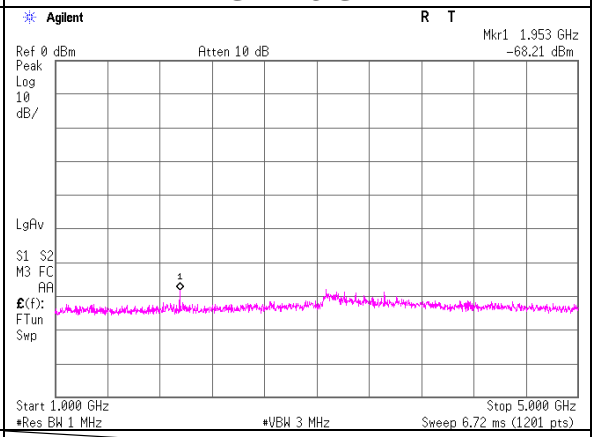
150 kHz - 30 MHz



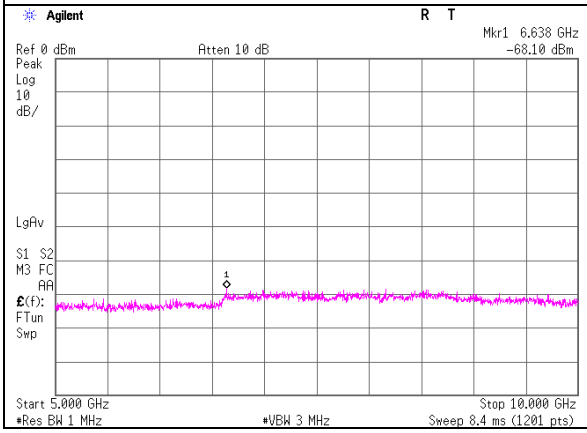
30 MHz - 1 GHz



1 GHz - 5 GHz



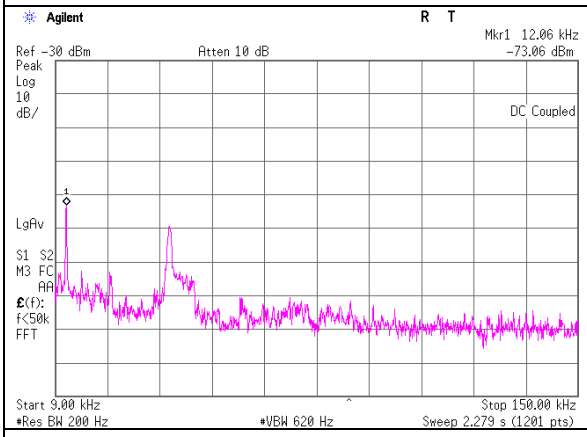
5 GHz - 10 GHz



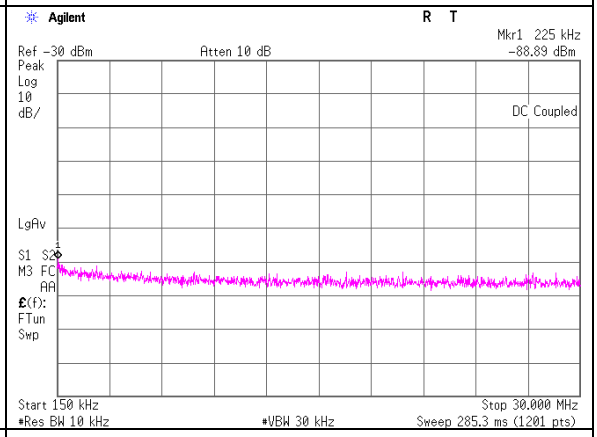
Spurious emissions at antenna terminals

Report No.	12890237H
Test place	Ise EMC Lab. No.6 Measurement Room
Date	August 26, 2019
Temperature/ Humidity	25 deg. C / 49 % RH
Engineer	Akihiko Maeda
Mode	Tx 950.625 MHz, 5 mW

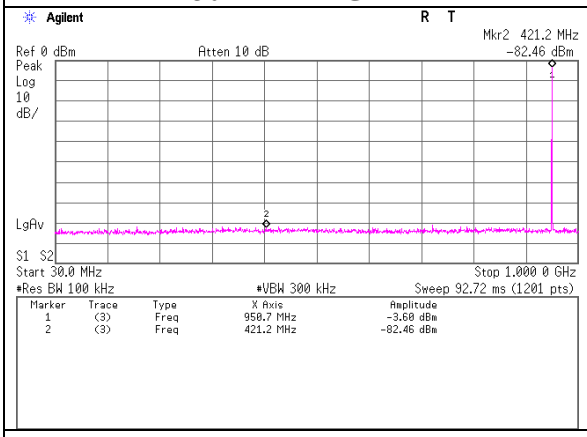
9 kHz - 150 kHz



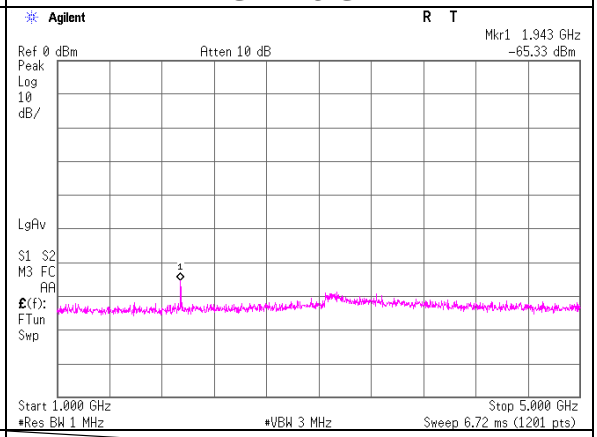
150 kHz - 30 MHz



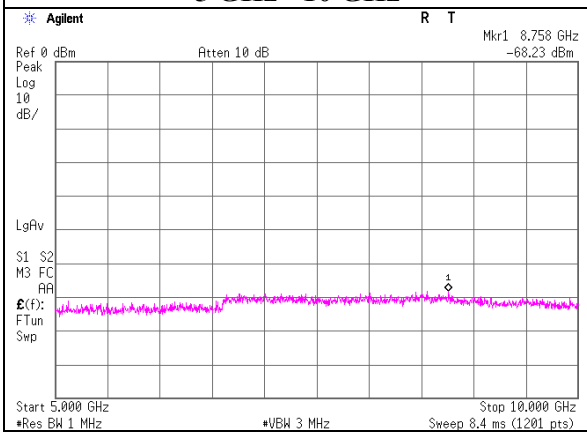
30 MHz - 1 GHz



1 GHz - 5 GHz



5 GHz - 10 GHz



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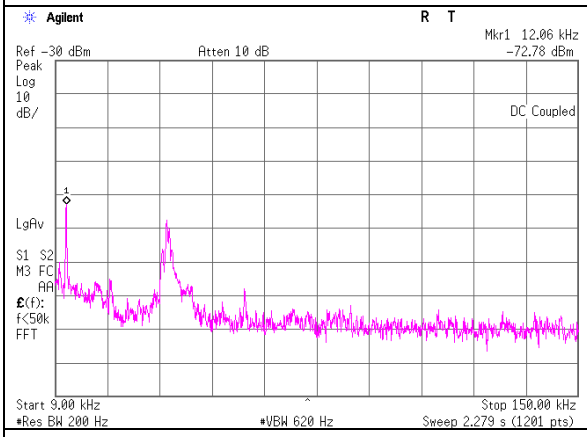
Ise EMC Lab.
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN
Telephone : +81 596 24 8999
Facsimile : +81 596 24 8124

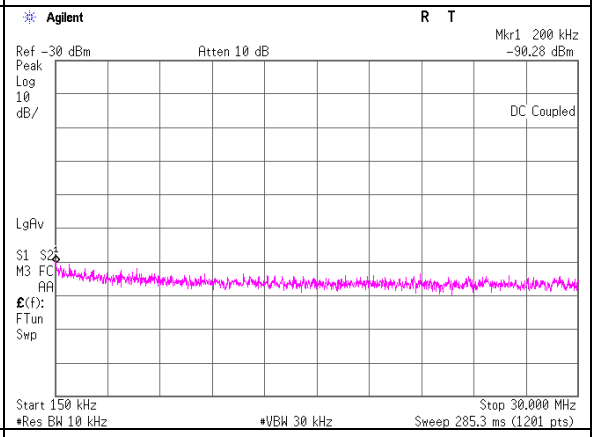
Spurious emissions at antenna terminals

Report No.	12890237H
Test place	Ise EMC Lab. No.6 Measurement Room
Date	August 26, 2019
Temperature/ Humidity	25 deg. C / 49 % RH
Engineer	Akihiko Maeda
Mode	Tx 959.625 MHz, 5 mW

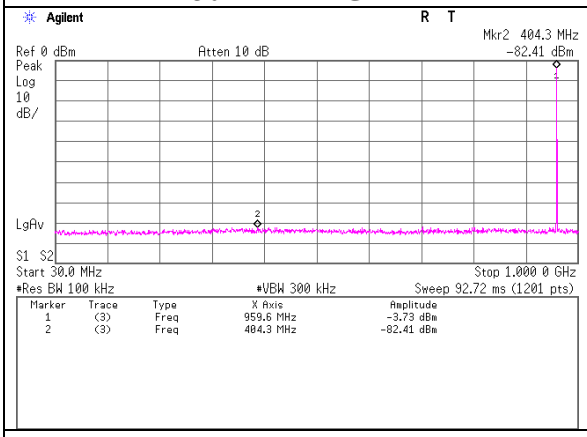
9 kHz - 150 kHz



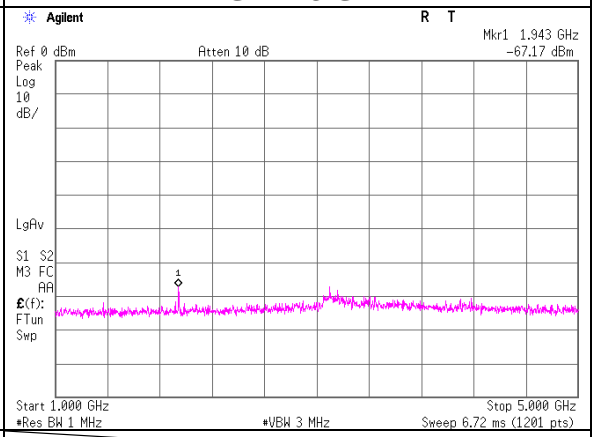
150 kHz - 30 MHz



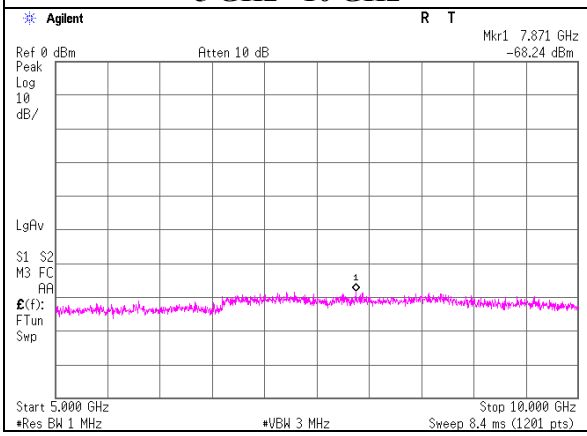
30 MHz - 1 GHz



1 GHz - 5 GHz



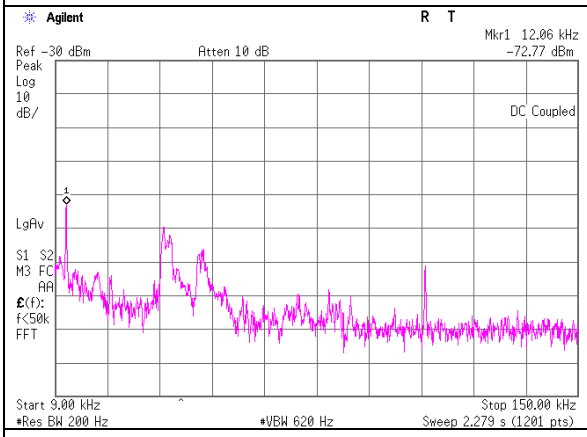
5 GHz - 10 GHz



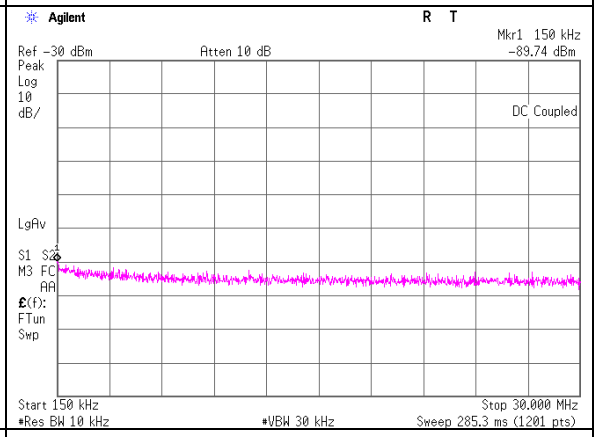
Spurious emissions at antenna terminals

Report No.	12890237H
Test place	Ise EMC Lab. No.6 Measurement Room
Date	August 26, 2019
Temperature/ Humidity	25 deg. C / 49 % RH
Engineer	Akihiko Maeda
Mode	Tx 941.625 MHz, 40 mW

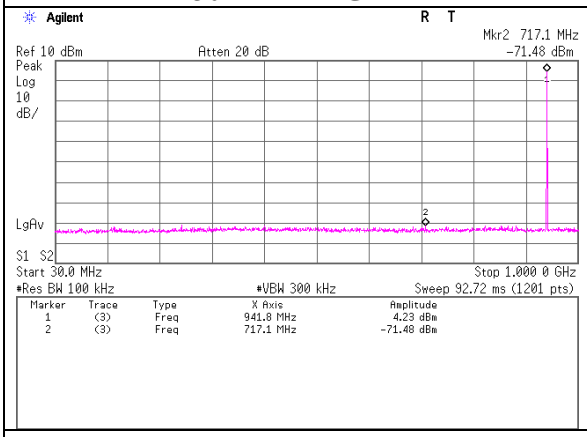
9 kHz - 150 kHz



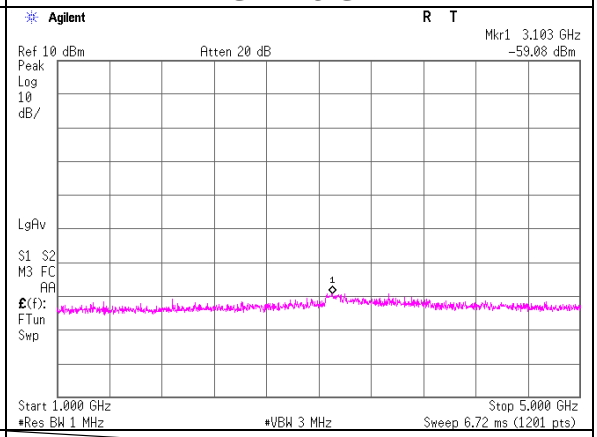
150 kHz - 30 MHz



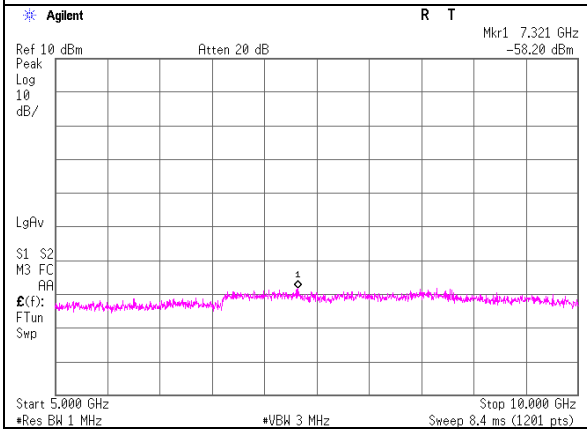
30 MHz - 1 GHz



1 GHz - 5 GHz



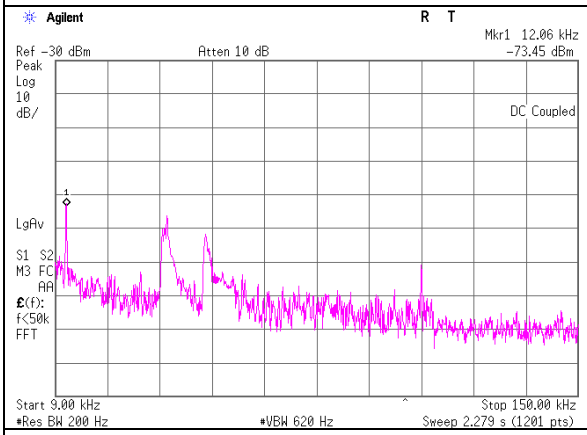
5 GHz - 10 GHz



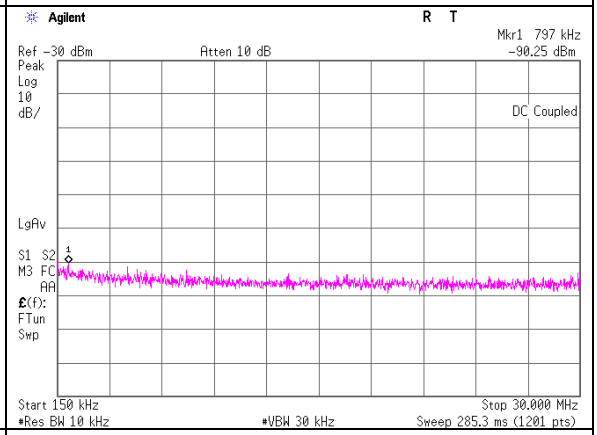
Spurious emissions at antenna terminals

Report No.	12890237H
Test place	Ise EMC Lab. No.6 Measurement Room
Date	August 26, 2019
Temperature/ Humidity	25 deg. C / 49 % RH
Engineer	Akihiko Maeda
Mode	Tx 950.625 MHz, 40 mW

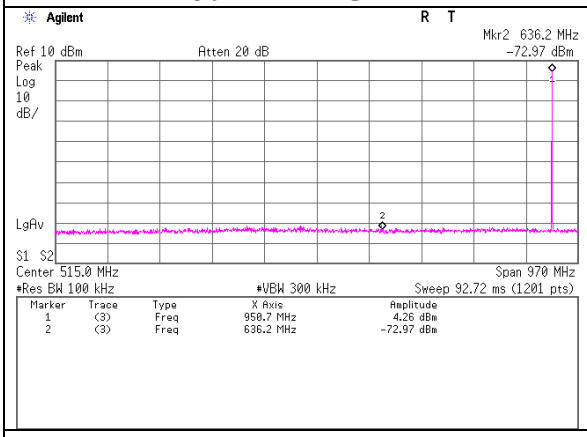
9 kHz - 150 kHz



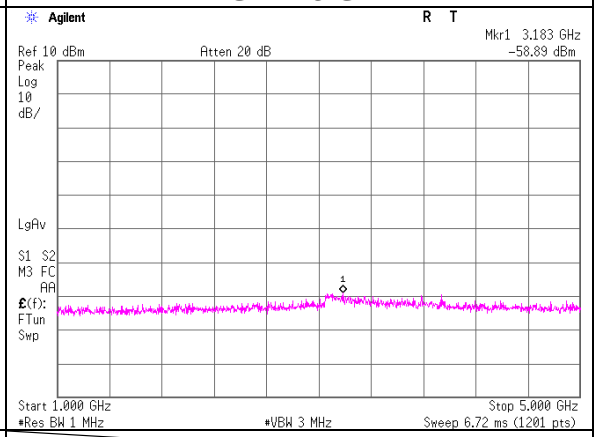
150 kHz - 30 MHz



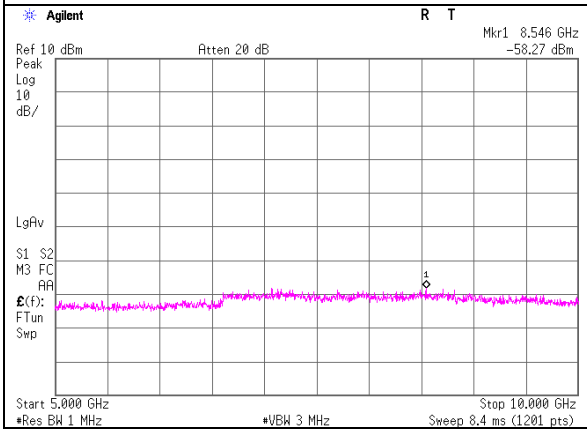
30 MHz - 1 GHz



1 GHz - 5 GHz



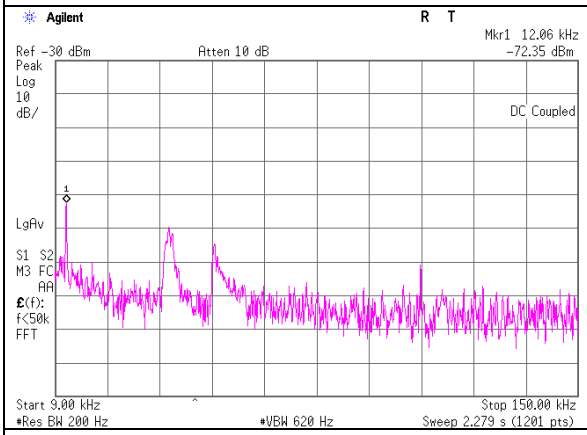
5 GHz - 10 GHz



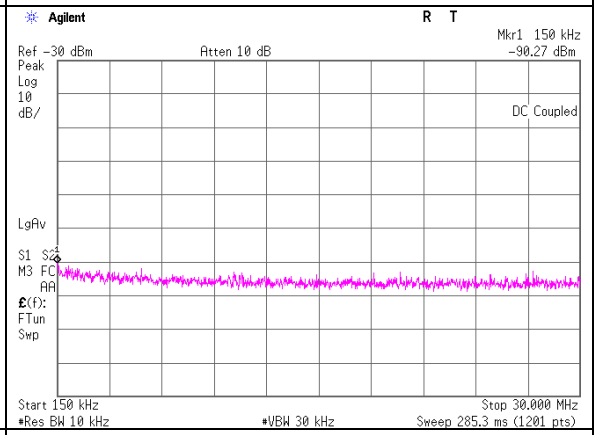
Spurious emissions at antenna terminals

Report No.	12890237H
Test place	Ise EMC Lab. No.6 Measurement Room
Date	August 26, 2019
Temperature/ Humidity	25 deg. C / 49 % RH
Engineer	Akihiko Maeda
Mode	Tx 959.625 MHz, 40 mW

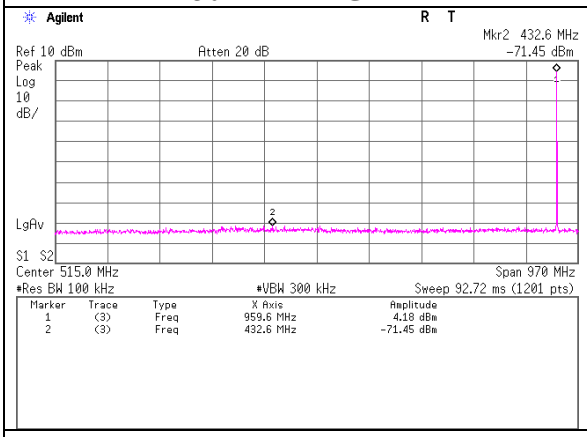
9 kHz - 150 kHz



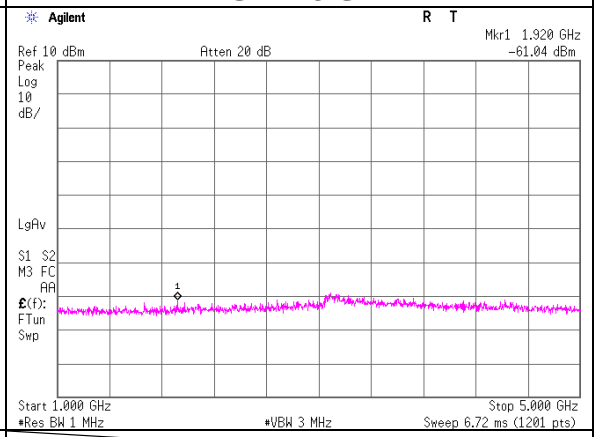
150 kHz - 30 MHz



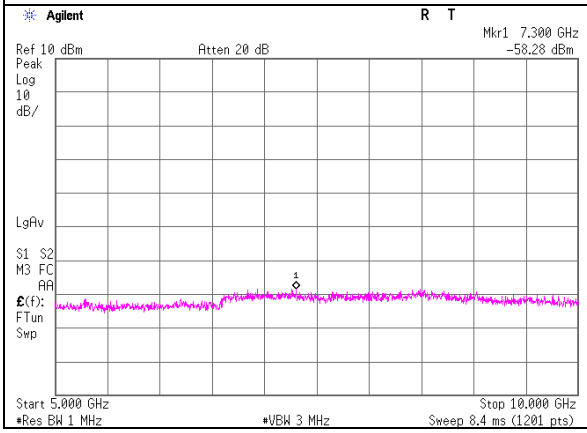
30 MHz - 1 GHz



1 GHz - 5 GHz



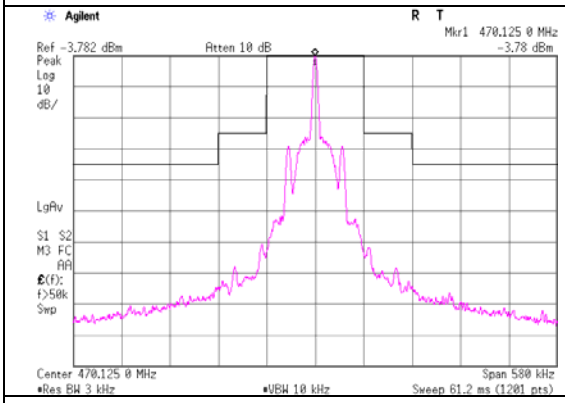
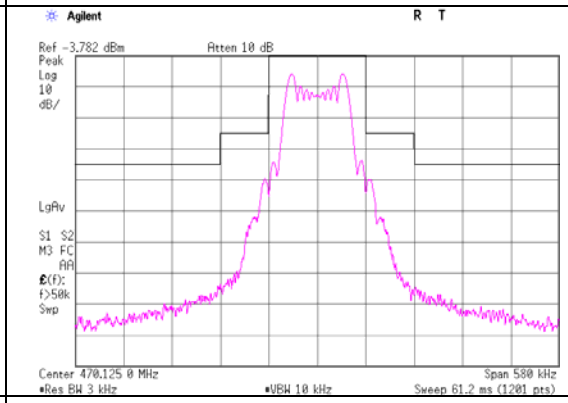
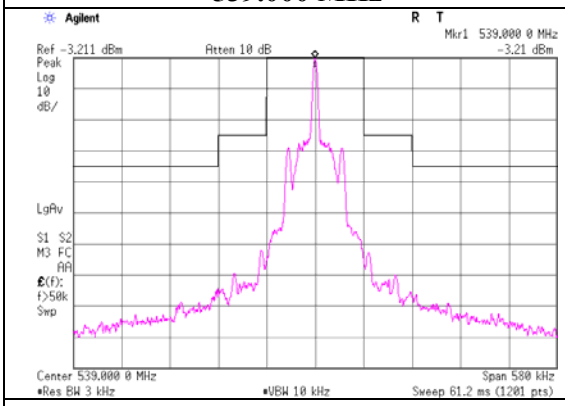
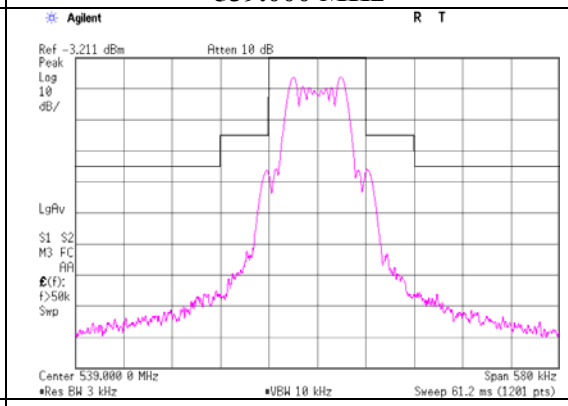
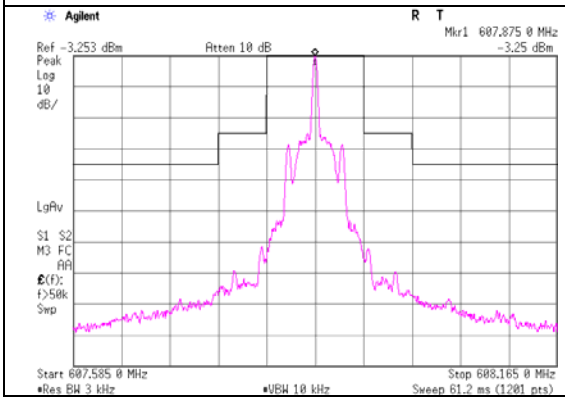
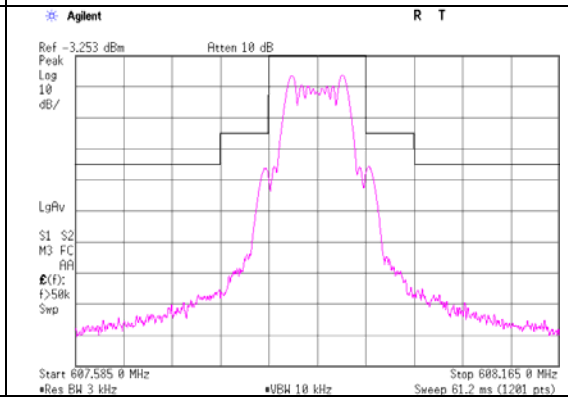
5 GHz - 10 GHz



Spurious emissions at antenna terminals

[Side band spectrum measurement]

Report No.	12890237H
Test place	Ise EMC Lab. No.7 Measurement Room
Date	August 30, 2019
Temperature/ Humidity	23 deg. C / 55 % RH
Engineer	Akihiko Maeda
Mode	Tx (470.125 MHz – 607.875 MHz), 5 mW

Reference	Result
470.125 MHz	**470.125 MHz**
	
539.000 MHz	**539.000 MHz**
	
607.875 MHz	**607.875 MHz**
	

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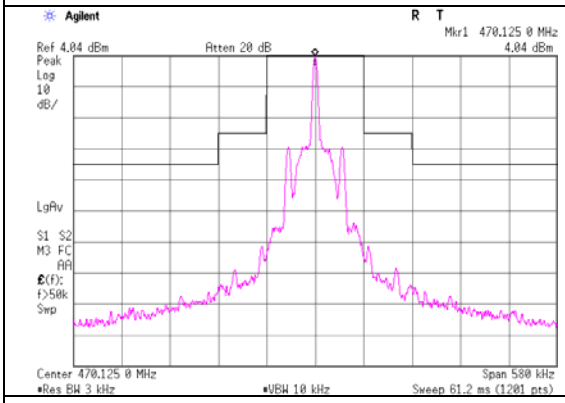
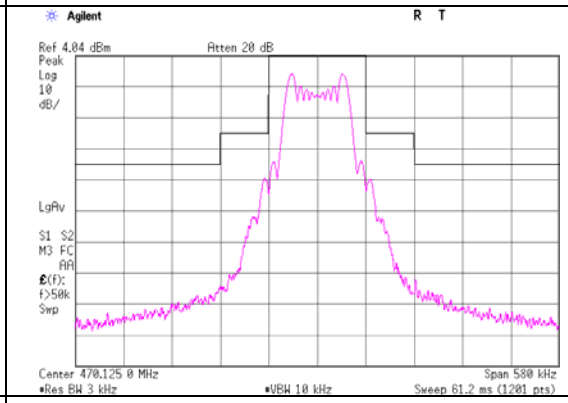
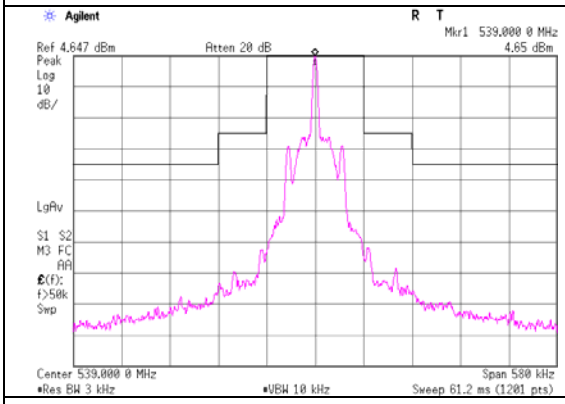
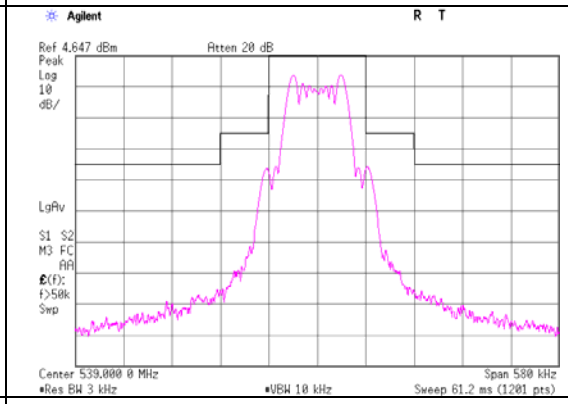
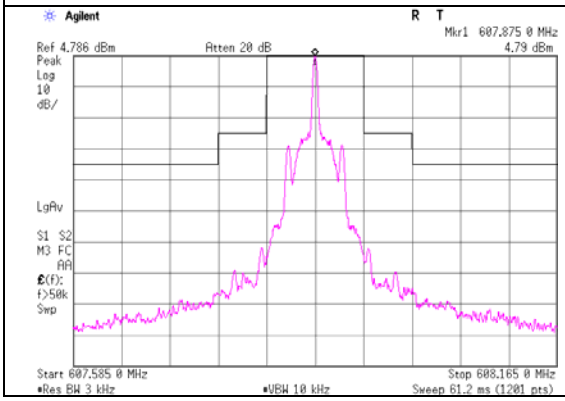
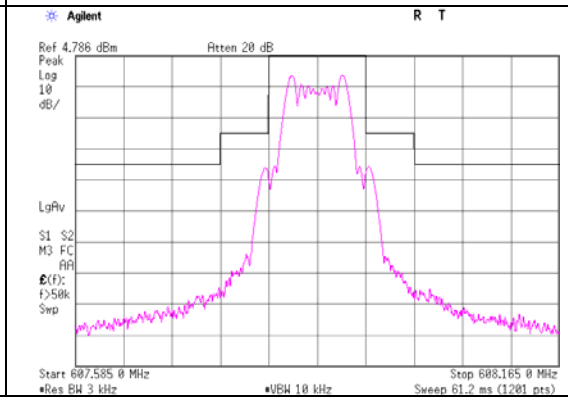
Spurious emissions at antenna terminals

[Side band spectrum measurement]

Report No.	12890237H
Test place	Ise EMC Lab. No.7 Measurement Room
Date	August 30, 2019
Temperature/ Humidity	23 deg. C / 55 % RH
Engineer	Akihiko Maeda
Mode	Tx (470.125 MHz – 607.875 MHz), 40 mW

Reference	Result
470.125 MHz	**470.125 MHz**
	
539.000 MHz	**539.000 MHz**
	
607.875 MHz	**607.875 MHz**
	

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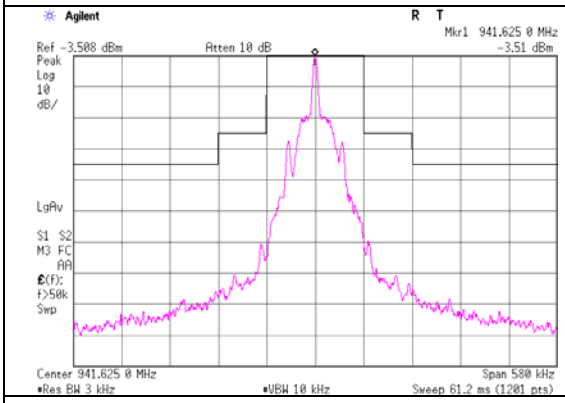
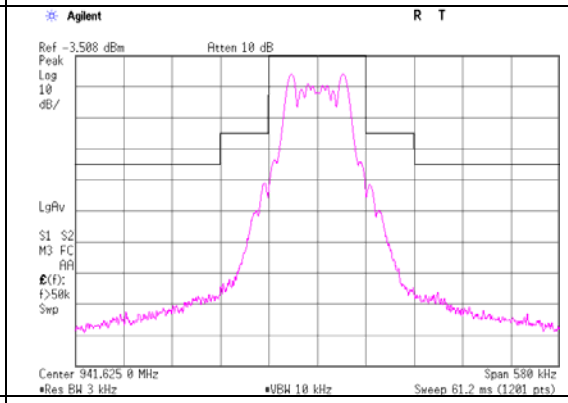
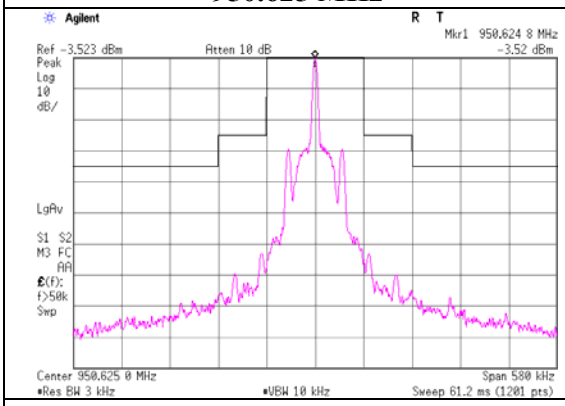
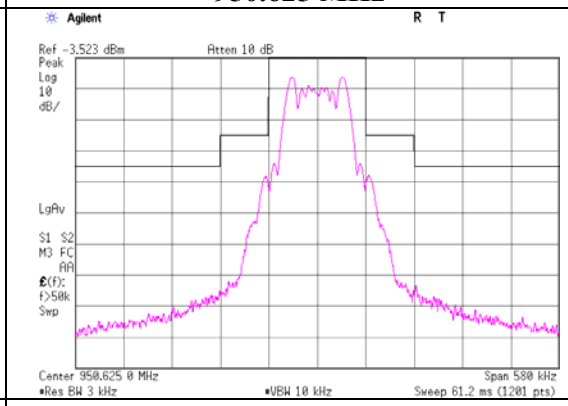
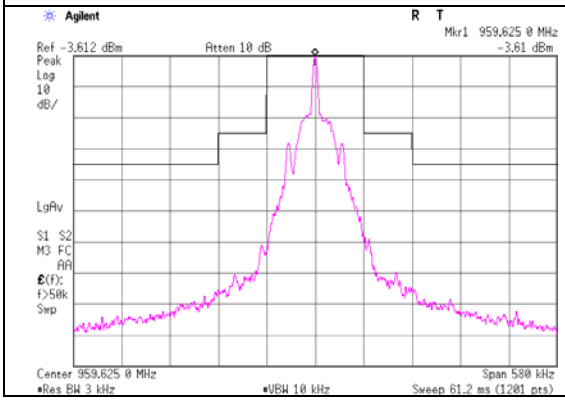
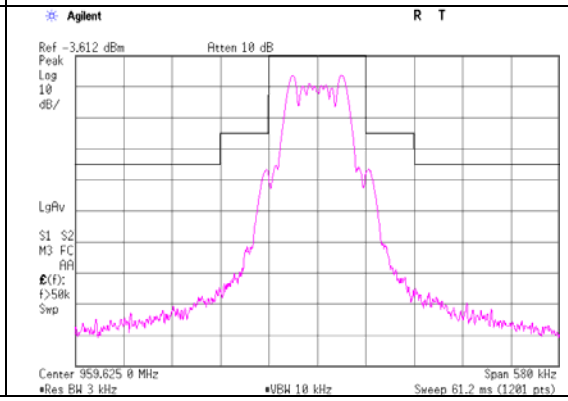
Spurious emissions at antenna terminals

[Side band spectrum measurement]

Report No.	12890237H
Test place	Ise EMC Lab. No.7 Measurement Room
Date	August 30, 2019
Temperature/ Humidity	23 deg. C / 55 % RH
Engineer	Akihiko Maeda
Mode	Tx (941.625 MHz – 959.625 MHz), 5 mW

Reference	Result
941.625 MHz	**941.625 MHz**
	
950.625 MHz	**950.625 MHz**
	
959.625 MHz	**959.625 MHz**
	

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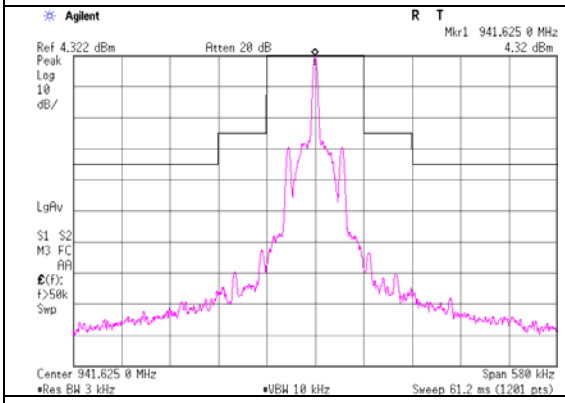
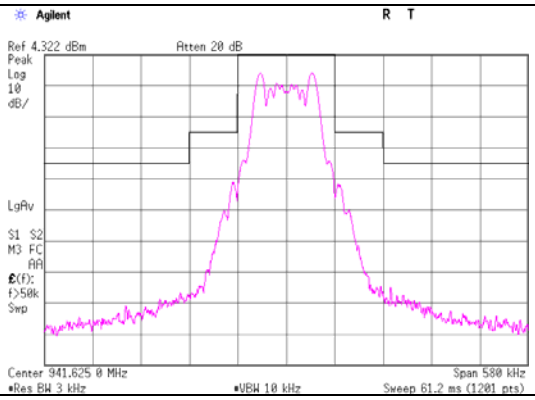
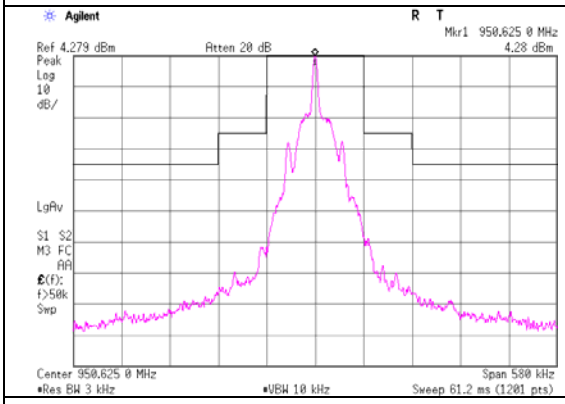
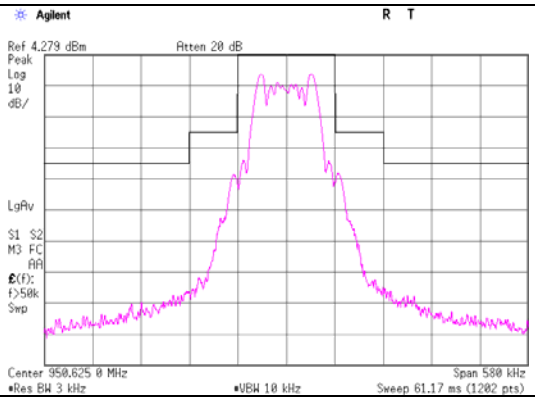
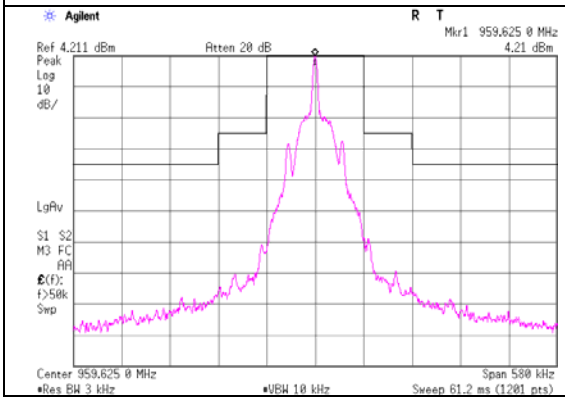
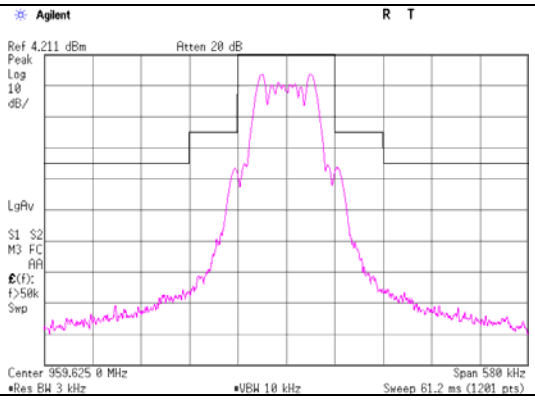
Spurious emissions at antenna terminals

[Side band spectrum measurement]

Report No.	12890237H
Test place	Ise EMC Lab. No.7 Measurement Room
Date	August 30, 2019
Temperature/ Humidity	23 deg. C / 55 % RH
Engineer	Akihiko Maeda
Mode	Tx (941.625 MHz – 959.625 MHz), 40 mW

Reference	Result
941.625 MHz	**941.625 MHz**
	
950.625 MHz	**950.625 MHz**
	
959.625 MHz	**959.625 MHz**
	

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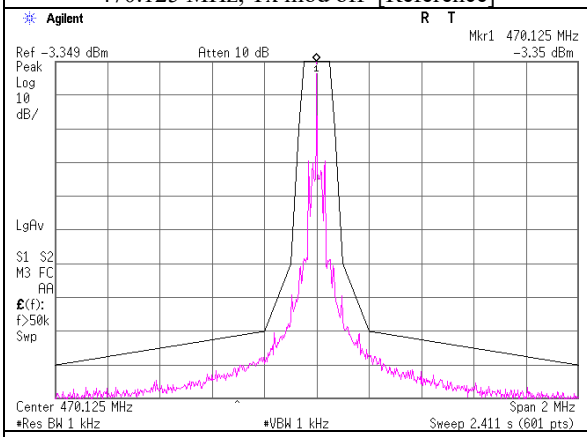
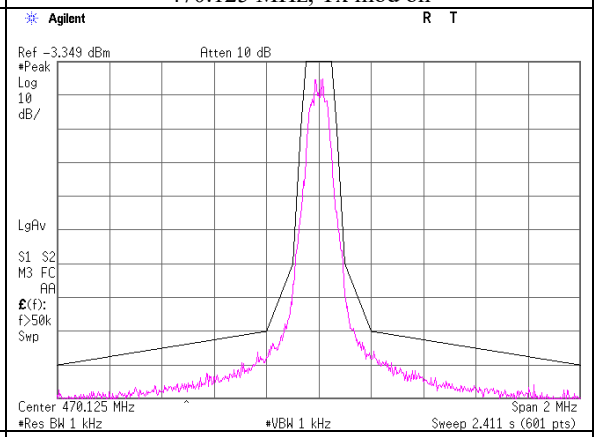
Necessary bandwidth

Report No.	12890237H
Test place	Ise EMC Lab. No.6 Measurement Room
Date	August 27, 2019
Temperature/ Humidity	25 deg. C / 43 % RH
Engineer	Akihiko Maeda
Mode	Tx (470.125 MHz – 607.875 MHz), 5 mW

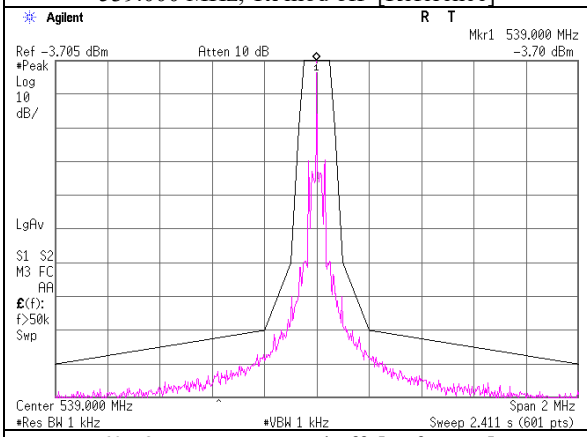
470.125 MHz, Tx mod off [Reference]



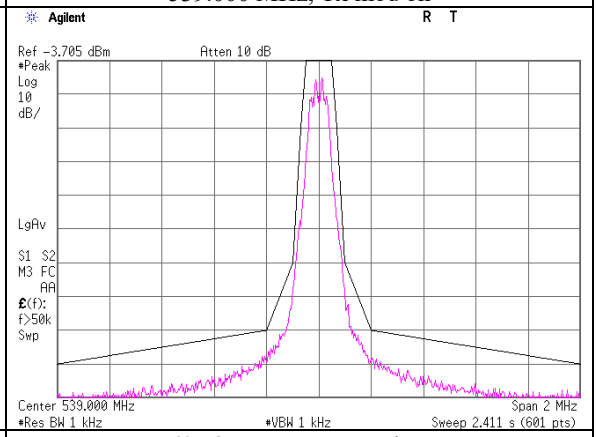
470.125 MHz, Tx mod on



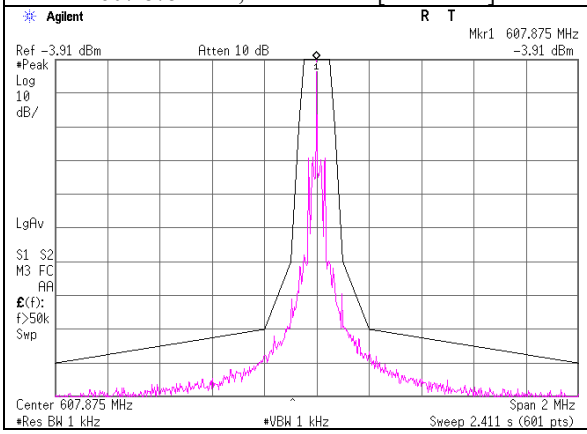
539.000 MHz, Tx mod off [Reference]



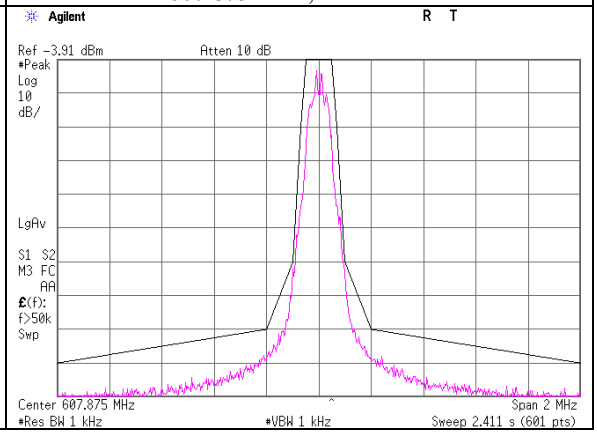
539.000 MHz, Tx mod on



607.875 MHz, Tx mod off [Reference]



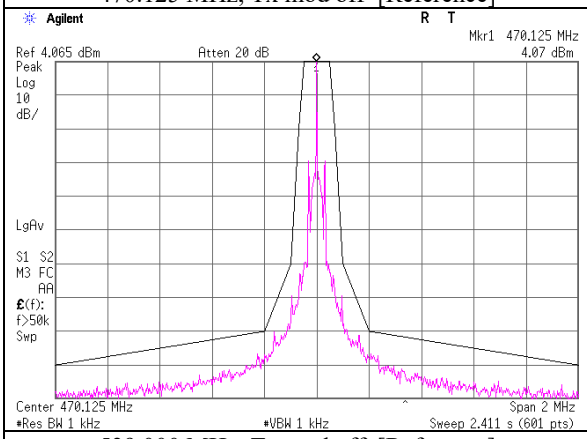
607.875 MHz, Tx mod on



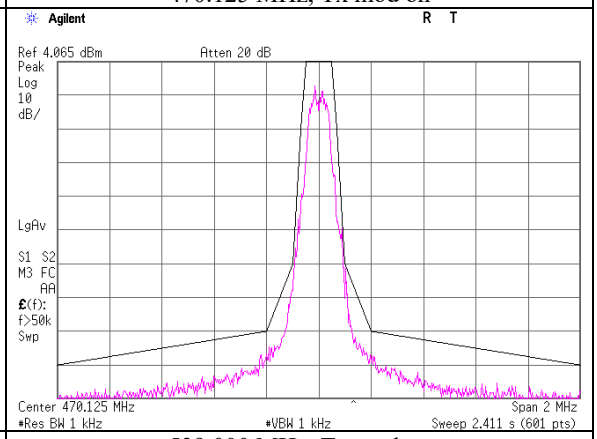
Necessary bandwidth

Report No.	12890237H
Test place	Ise EMC Lab. No.6 Measurement Room
Date	August 27, 2019
Temperature/ Humidity	25 deg. C / 43 % RH
Engineer	Akihiko Maeda
Mode	Tx (470.125 MHz – 607.875 MHz), 40 mW

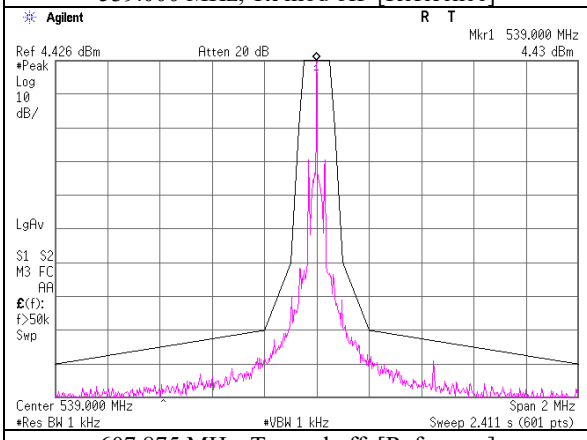
470.125 MHz, Tx mod off [Reference]



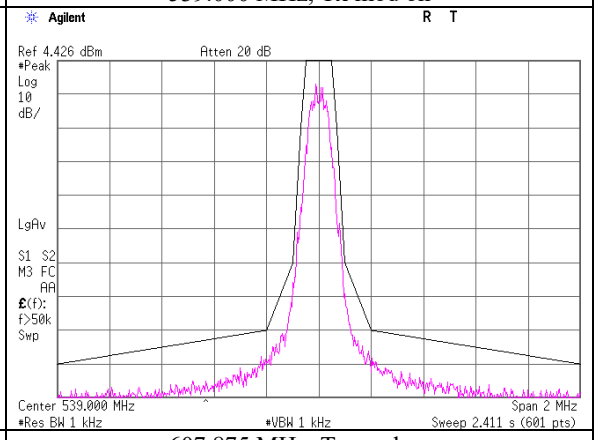
470.125 MHz, Tx mod on



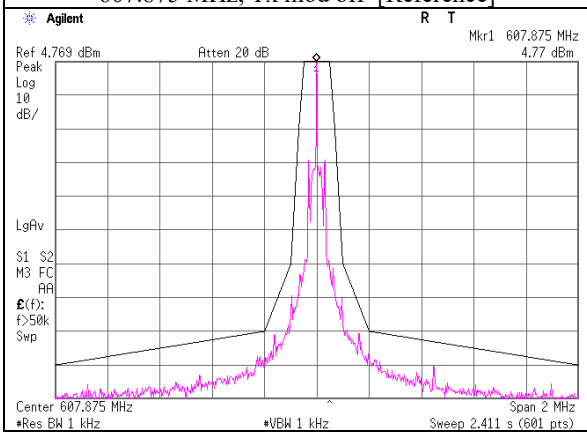
539.000 MHz, Tx mod off [Reference]



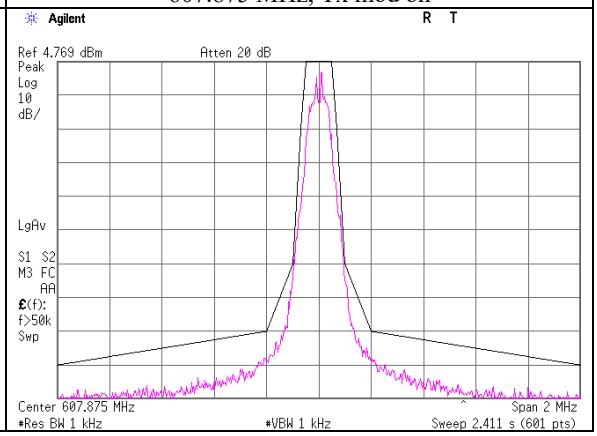
539.000 MHz, Tx mod on



607.875 MHz, Tx mod off [Reference]



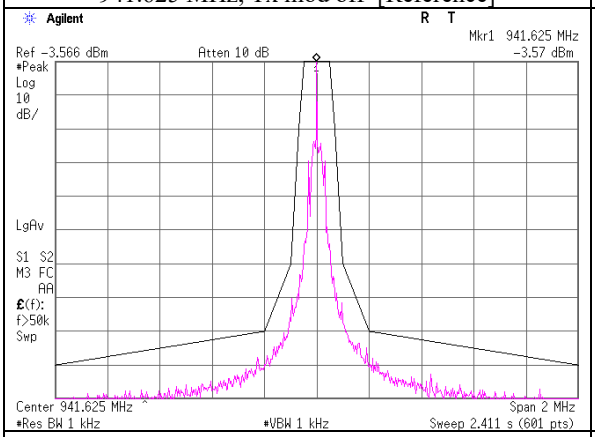
607.875 MHz, Tx mod on



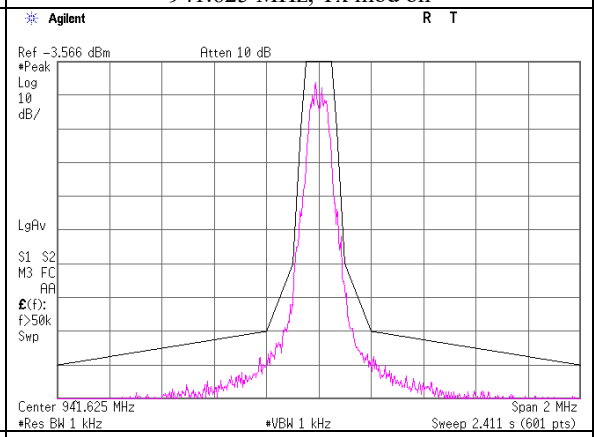
Necessary bandwidth

Report No.	12890237H
Test place	Ise EMC Lab. No.6 Measurement Room
Date	August 27, 2019
Temperature/ Humidity	25 deg. C / 43 % RH
Engineer	Akihiko Maeda
Mode	Tx (941.625 MHz – 959.625 MHz), 5 mW

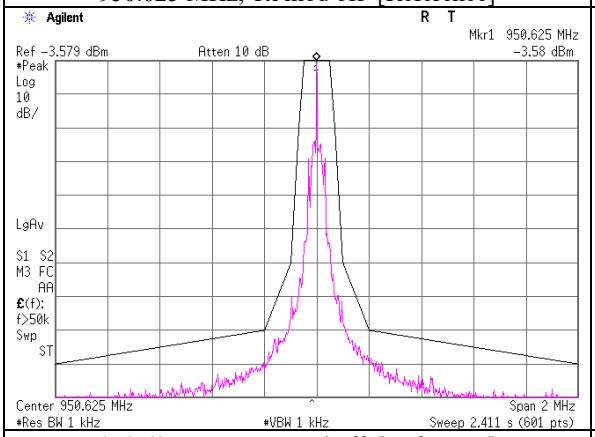
941.625 MHz, Tx mod off [Reference]



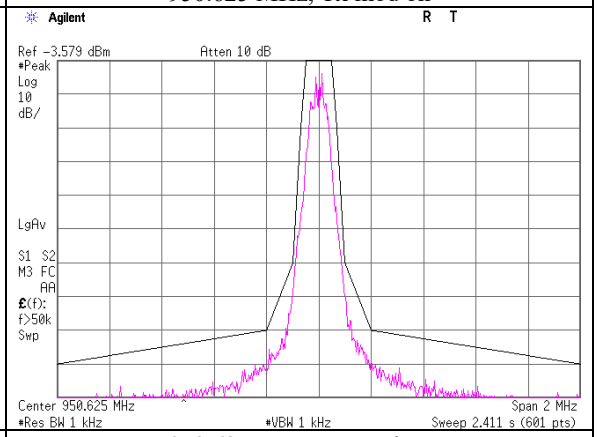
941.625 MHz, Tx mod on



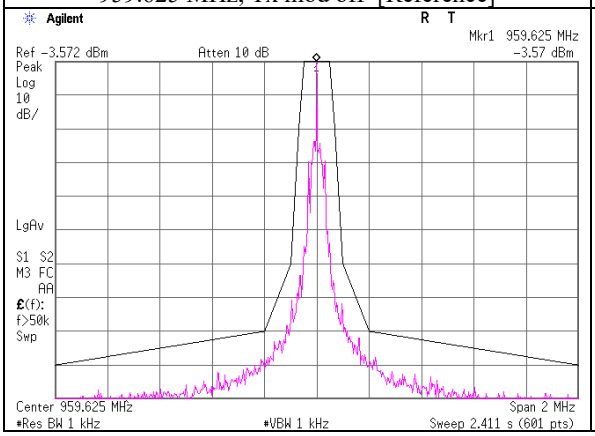
950.625 MHz, Tx mod off [Reference]



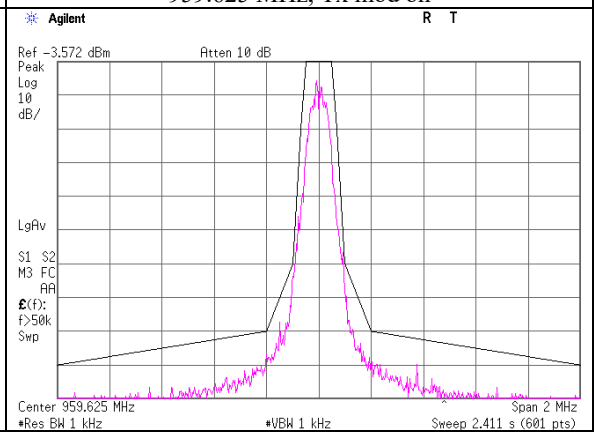
950.625 MHz, Tx mod on



959.625 MHz, Tx mod off [Reference]



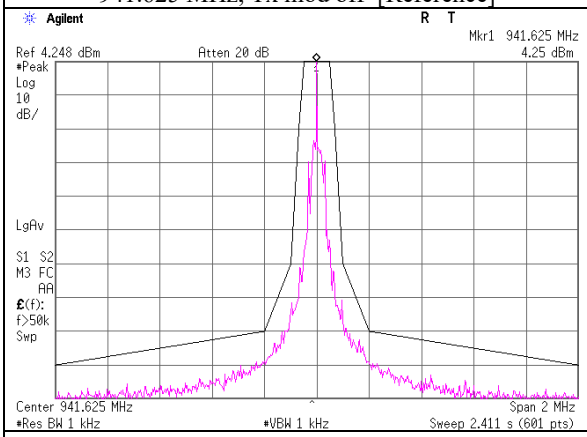
959.625 MHz, Tx mod on



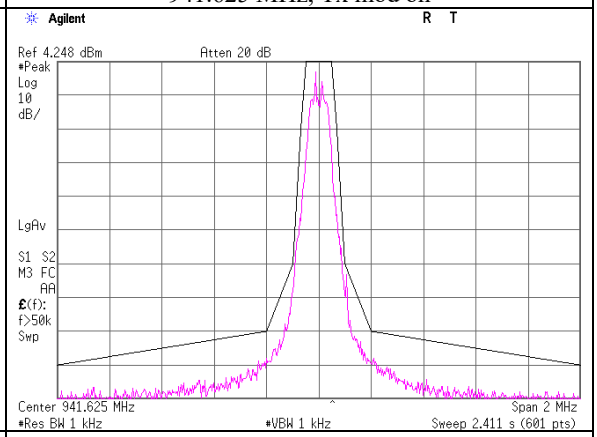
Necessary bandwidth

Report No.	12890237H
Test place	Ise EMC Lab. No.6 Measurement Room
Date	August 27, 2019
Temperature/ Humidity	25 deg. C / 43 % RH
Engineer	Akihiko Maeda
Mode	Tx (941.625 MHz – 959.625 MHz), 40 mW

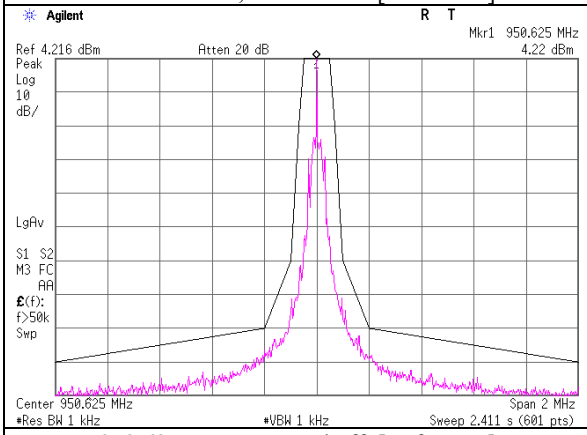
941.625 MHz, Tx mod off [Reference]



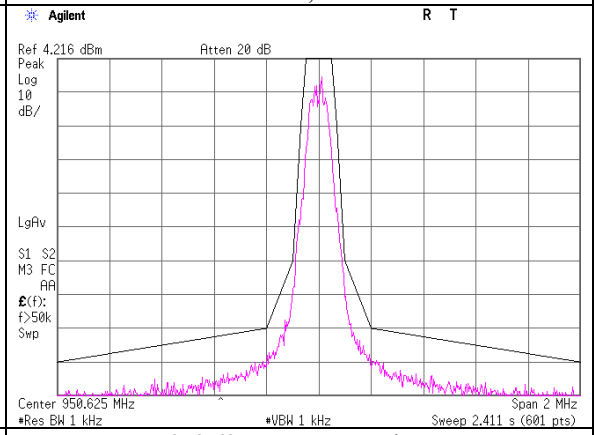
941.625 MHz, Tx mod on



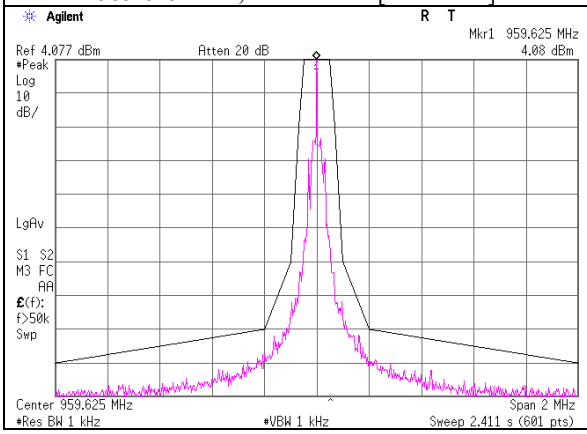
950.625 MHz, Tx mod off [Reference]



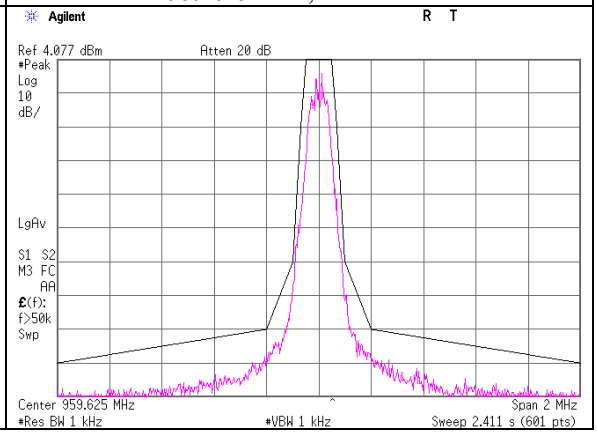
950.625 MHz, Tx mod on



959.625 MHz, Tx mod off [Reference]



959.625 MHz, Tx mod on



Field strength of spurious radiation

Report No.	12890237H	
Test place	Ise EMC Lab.	
Semi Anechoic Chamber	No.4	No.2
Date	July 19, 2019	July 18, 2019
Temperature / Humidity	20 deg. C / 66 % RH	21 deg. C / 74 % RH
Engineer	Koji Yamamoto	Akihiko Maeda
	Below 1 GHz	Above 1 GHz
Mode	Tx 470.125 MHz	

Frequency	Rx SA/TR Reading [dBuV]		Tx SG Reading [dBm]		Tx Cable Loss	Tx Ant. Gain	Result (ERP) [dBm]		Limit (ERP) [dBm]	Margin [dB]		Horizontal		Vertical		Remarks
												Rx Ant. Height	Turn Table	Rx Ant. Height	Turn Table	
[MHz]	HOR	VER	HOR	VER	[dB]	[dBi]	HOR	VER		HOR	VER	[cm]	[deg.]	[cm]	[deg.]	
940.25	NS	NS	-	-	-	-	-	-	-36.0	-	-	-	-	-	-	
1410.38	41.3	38.6	-68.1	-73.7	3.2	7.5	-65.9	-71.5	-30.0	35.9	41.5	112	46	270	359	
1880.50	NS	NS	-	-	-	-	-	-	-30.0	-	-	-	-	-	-	
2350.63	NS	NS	-	-	-	-	-	-	-30.0	-	-	-	-	-	-	
2820.75	36.6	35.9	-74.5	-75.0	4.5	10.4	-70.7	-71.2	-30.0	40.7	41.2	105	342	156	0	
3290.88	38.2	37.1	-69.7	-72.0	4.9	11.6	-65.1	-67.4	-30.0	35.1	37.4	148	333	211	355	
3761.00	40.4	39.7	-65.0	-66.2	5.2	12.3	-60.1	-61.3	-30.0	30.1	31.3	138	168	141	180	
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 - the tenth harmonic)
Tx-ANTENNA : 120 MHz tuned Dipole Antenna(30 MHz - 120 MHz), Dipole Antenna(120 MHz - 1000 MHz), Horn Antenna(1 GHz - the tenth harmonic)
Other frequency noises omitted in this report were not seen or had enough margin (more than 20 dB).
NS : No signal detect.
Detector : Below 1 GHz: Spectrum Analyzer RMS Average (RBW / VBW: 100 kHz), Above 1 GHz: Spectrum Analyzer RMS Average (RBW: 1 MHz / VBW: 3 MHz)

Field strength of spurious radiation

Report No.	12890237H	
Test place	Ise EMC Lab.	
Semi Anechoic Chamber	No.4	No.2
Date	July 19, 2019	July 18, 2019
Temperature / Humidity	20 deg. C / 66 % RH	21 deg. C / 74 % RH
Engineer	Koji Yamamoto	Akihiko Maeda
	Below 1 GHz	Above 1 GHz
Mode	Tx 539.000 MHz	

Frequency	Rx SA/TR Reading [dBuV]		Tx SG Reading [dBm]		Tx Cable Loss	Tx Ant. Gain	Result (ERP) [dBm]		Limit (ERP) [dBm]	Margin [dB]		Horizontal Rx Ant. Height	Horizontal Turn Table	Vertical Rx Ant. Height	Vertical Turn Table	Remarks
[MHz]	HOR	VER	HOR	VER	[dB]	[dBi]	HOR	VER		HOR	VER	[cm]	[deg.]	[cm]	[deg.]	
1078.00	39.2	NS	-71.5	-	2.8	5.6	-70.8	-	-30.0	40.8	-	115	46	-	-	
1617.00	NS	NS	-	-	-	-	-	-	-30.0	-	-	-	-	-	-	
2156.00	38.8	NS	-70.7	-	3.9	10.8	-66.0	-	-30.0	36.0	-	106	31	-	-	
2695.00	38.4	37.4	-70.1	-72.7	4.4	10.2	-66.4	-69.0	-30.0	36.4	39.0	141	54	147	4	
3234.00	41.7	38.2	-64.6	-71.5	4.9	11.9	-59.7	-66.6	-30.0	29.7	36.6	137	230	168	359	
3773.00	47.4	43.4	-56.1	-61.3	5.3	12.3	-51.2	-56.4	-30.0	21.2	26.4	149	26	113	48	
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 - the tenth harmonic)
Tx-ANTENNA : 120 MHz tuned Dipole Antenna(30 MHz - 120 MHz), Dipole Antenna(120 MHz - 1000 MHz), Horn Antenna(1 GHz - the tenth harmonic)
Other frequency noises omitted in this report were not seen or had enough margin (more than 20 dB).
NS : No signal detect.
Detector : Below 1 GHz: Spectrum Analyzer RMS Average (RBW / VBW: 100 kHz), Above 1 GHz: Spectrum Analyzer RMS Average (RBW: 1 MHz / VBW: 3 MHz)

Field strength of spurious radiation

Report No.	12890237H	
Test place	Ise EMC Lab.	
Semi Anechoic Chamber	No.4	No.2
Date	July 19, 2019	July 18, 2019
Temperature / Humidity	20 deg. C / 66 % RH	21 deg. C / 74 % RH
Engineer	Koji Yamamoto	Akihiko Maeda
	Below 1 GHz	Above 1 GHz
Mode	Tx 607.875 MHz	

Frequency	Rx SA/TR Reading [dBuV]		Tx SG Reading [dBm]		Tx Cable Loss	Tx Ant. Gain	Result (ERP) [dBm]		Limit (ERP) [dBm]	Margin [dB]		Horizontal Rx Ant. Height	Horizontal Turn Table	Vertical Rx Ant. Height	Vertical Turn Table	Remarks
[MHz]	HOR	VER	HOR	VER	[dB]	[dBi]	HOR	VER		HOR	VER	[cm]	[deg.]	[cm]	[deg.]	
1215.75	44.5	41.8	-63.9	-68.3	3.0	6.3	-62.7	-67.1	-30.0	32.7	37.1	128	319	294	11	
1823.63	44.2	40.4	-65.0	-71.4	3.6	9.7	-61.1	-67.5	-30.0	31.1	37.5	105	277	248	0	
2431.50	49.2	48.2	-57.5	-57.8	4.2	10.5	-53.4	-53.7	-30.0	23.4	23.7	140	10	113	10	
3039.38	43.8	42.7	-60.6	-63.2	4.7	11.1	-56.4	-59.0	-30.0	26.4	29.0	124	345	173	10	
3647.25	58.6	56.8	-44.8	-47.2	5.2	12.2	-39.9	-42.3	-30.0	9.9	12.3	154	337	169	175	
4255.13	43.3	44.0	-58.5	-58.4	5.6	12.3	-54.0	-53.9	-30.0	24.0	23.9	102	186	143	209	
4863.00	44.0	39.6	-55.7	-61.2	6.0	12.3	-51.6	-57.1	-30.0	21.6	27.1	119	316	124	322	
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 - the tenth harmonic)
Tx-ANTENNA : 120 MHz tuned Dipole Antenna(30 MHz - 120 MHz), Dipole Antenna(120 MHz - 1000 MHz), Horn Antenna(1 GHz - the tenth harmonic)
Other frequency noises omitted in this report were not seen or had enough margin (more than 20 dB).
NS : No signal detect.
Detector : Below 1 GHz: Spectrum Analyzer RMS Average (RBW / VBW: 100 kHz), Above 1 GHz: Spectrum Analyzer RMS Average (RBW: 1 MHz / VBW: 3 MHz)

Field strength of spurious radiation

Report No.	12890237H	
Test place	Ise EMC Lab.	
Semi Anechoic Chamber	No.4	No.2
Date	July 19, 2019	July 18, 2019
Temperature / Humidity	20 deg. C / 66 % RH	21 deg. C / 74 % RH
Engineer	Koji Yamamoto	Akihiko Maeda
	Below 1 GHz	Above 1 GHz
Mode	Tx 941.625 MHz	

Frequency	Rx SA/TR Reading [dBuV]		Tx SG Reading [dBm]		Tx Cable Loss	Tx Ant. Gain	Result (ERP) [dBm]		Limit (ERP) [dBm]	Margin [dB]		Horizontal		Vertical		Remarks
												Rx Ant. Height	Turn Table	Rx Ant. Height	Turn Table	
[MHz]	HOR	VER	HOR	VER	[dB]	[dBi]	HOR	VER		HOR	VER	[cm]	[deg.]	[cm]	[deg.]	
1883.25	41.9	39.5	-67.0	-71.3	3.7	10.1	-62.8	-67.1	-30.0	32.8	37.1	121	38	110	0	
2824.88	50.3	49.4	-54.1	-56.4	4.5	10.4	-50.4	-52.7	-30.0	20.4	22.7	118	20	100	0	
3766.50	50.5	48.1	-52.7	-56.0	5.3	12.3	-47.8	-51.1	-30.0	17.8	21.1	117	240	123	324	
4708.13	54.1	51.6	-45.4	-48.7	5.9	11.9	-41.6	-44.9	-30.0	11.6	14.9	116	251	143	182	
5649.75	40.4	39.0	-60.1	-61.7	6.6	12.9	-55.9	-57.5	-30.0	25.9	27.5	138	225	145	348	
6591.38	NS	NS	-	-	-	-	-	-	-30.0	-	-	-	-	-	-	
7533.00	NS	NS	-	-	-	-	-	-	-30.0	-	-	-	-	-	-	
8474.63	39.5	39.6	-53.1	-54.1	8.2	11.9	-51.6	-52.6	-30.0	21.6	22.6	195	196	102	171	
9416.25	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 - the tenth harmonic)
Tx-ANTENNA : 120 MHz tuned Dipole Antenna(30 MHz - 120 MHz), Dipole Antenna(120 MHz - 1000 MHz), Horn Antenna(1 GHz - the tenth harmonic)
Other frequency noises omitted in this report were not seen or had enough margin (more than 20 dB).
NS : No signal detect.
Detector : Below 1 GHz: Spectrum Analyzer RMS Average (RBW / VBW: 100 kHz), Above 1 GHz: Spectrum Analyzer RMS Average (RBW: 1 MHz / VBW: 3 MHz)

Field strength of spurious radiation

Report No.	12890237H	
Test place	Ise EMC Lab.	
Semi Anechoic Chamber	No.4	No.2
Date	July 19, 2019	July 18, 2019
Temperature / Humidity	20 deg. C / 66 % RH	21 deg. C / 74 % RH
Engineer	Koji Yamamoto	Akihiko Maeda
	Below 1 GHz	Above 1 GHz
Mode	Tx 950.625 MHz	

Frequency	Rx SA/TR Reading [dBuV]		Tx SG Reading [dBm]		Tx Cable Loss	Tx Ant. Gain	Result (ERP) [dBm]		Limit (ERP) [dBm]	Margin [dB]		Horizontal		Vertical		Remarks
												Rx Ant. Height	Turn Table	Rx Ant. Height	Turn Table	
[MHz]	HOR	VER	HOR	VER	[dB]	[dBi]	HOR	VER		HOR	VER	[cm]	[deg.]	[cm]	[deg.]	
1901.25	47.0	44.4	-61.5	-65.1	3.7	10.1	-57.3	-60.9	-30.0	27.3	30.9	125	320	108	0	
2851.88	50.5	49.6	-53.6	-54.8	4.5	10.1	-50.2	-51.4	-30.0	20.2	21.4	117	24	111	0	
3802.50	48.7	47.2	-54.2	-56.1	5.3	12.2	-49.4	-51.3	-30.0	19.4	21.3	138	30	145	187	
4753.13	55.3	53.0	-43.9	-46.9	6.0	12.1	-39.9	-42.9	-30.0	9.9	12.9	106	256	141	182	
5703.75	39.0	39.2	-61.8	-61.3	6.6	12.8	-57.8	-57.3	-30.0	27.8	27.3	128	221	135	347	
6654.38	NS	NS	-	-	-	-	-	-	-30.0	-	-	-	-	-	-	
7605.00	NS	NS	-	-	-	-	-	-	-30.0	-	-	-	-	-	-	
8555.63	38.5	38.6	-56.0	-55.4	8.3	11.7	-54.8	-54.2	-30.0	24.8	24.2	100	158	106	170	
9506.25	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 - the tenth harmonic)
Tx-ANTENNA : 120 MHz tuned Dipole Antenna(30 MHz - 120 MHz), Dipole Antenna(120 MHz - 1000 MHz), Horn Antenna(1 GHz - the tenth harmonic)
Other frequency noises omitted in this report were not seen or had enough margin (more than 20 dB).
NS : No signal detect.
Detector : Below 1 GHz: Spectrum Analyzer RMS Average (RBW / VBW: 100 kHz), Above 1 GHz: Spectrum Analyzer RMS Average (RBW: 1 MHz / VBW: 3 MHz)

Field strength of spurious radiation

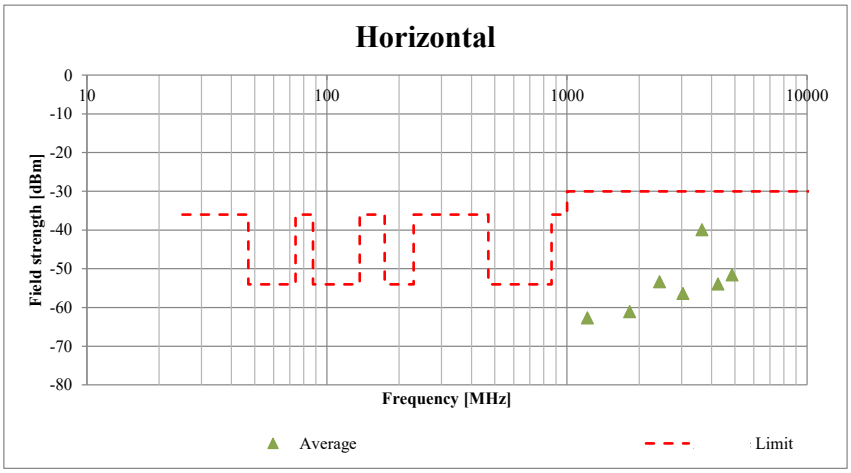
Report No.	12890237H	
Test place	Ise EMC Lab.	
Semi Anechoic Chamber	No.4	No.2
Date	July 19, 2019	July 18, 2019
Temperature / Humidity	20 deg. C / 66 % RH	21 deg. C / 74 % RH
Engineer	Koji Yamamoto	Akihiko Maeda
	Below 1 GHz	Above 1 GHz
Mode	Tx 959.625 MHz	

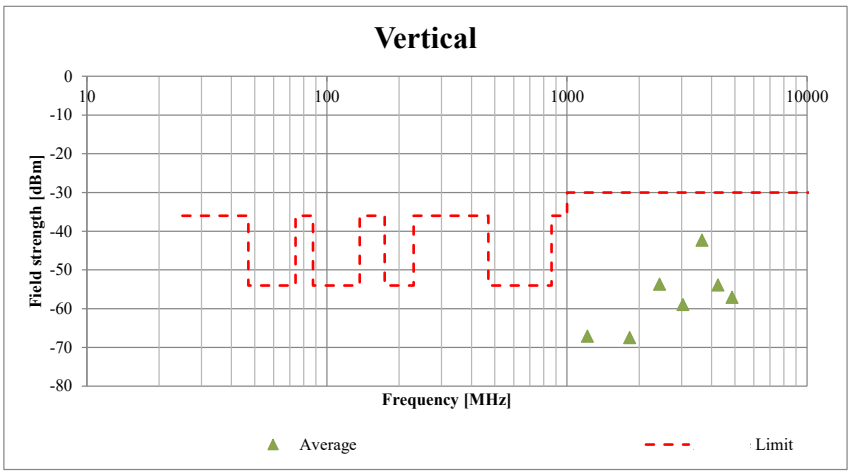
Frequency	Rx SA/TR Reading [dBuV]		Tx SG Reading [dBm]		Tx Cable Loss	Tx Ant. Gain	Result (ERP) [dBm]		Limit (ERP) [dBm]	Margin [dB]		Horizontal Rx Ant. Height	Horizontal Turn Table	Vertical Rx Ant. Height	Vertical Turn Table	Remarks
[MHz]	HOR	VER	HOR	VER	[dB]	[dBi]	HOR	VER		HOR	VER	[cm]	[deg.]	[cm]	[deg.]	
1919.25	56.3	48.6	-50.8	-59.5	3.7	9.8	-46.9	-55.6	-30.0	16.9	25.6	126	49	104	10	
2878.88	50.6	48.2	-53.3	-56.0	4.6	10.6	-49.4	-52.1	-30.0	19.4	22.1	130	24	110	359	
3838.50	49.4	45.2	-53.2	-59.0	5.3	12.2	-48.5	-54.3	-30.0	18.5	24.3	144	237	144	184	
4798.13	55.0	52.2	-44.0	-47.2	6.0	11.9	-40.2	-43.4	-30.0	10.2	13.4	113	249	139	182	
5757.75	38.3	38.8	-61.4	-65.9	6.6	13.0	-57.2	-61.7	-30.0	27.2	31.7	133	217	155	43	
6717.38	NS	NS	-	-	-	-	-	-	-30.0	-	-	-	-	-	-	
7677.00	NS	NS	-	-	-	-	-	-	-30.0	-	-	-	-	-	-	
8636.63	NS	NS	-	-	-	-	-	-	-30.0	-	-	-	-	-	-	
9596.25	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 - the tenth harmonic)
Tx-ANTENNA : 120 MHz tuned Dipole Antenna(30 MHz - 120 MHz), Dipole Antenna(120 MHz - 1000 MHz), Horn Antenna(1 GHz - the tenth harmonic)
Other frequency noises omitted in this report were not seen or had enough margin (more than 20 dB).
NS : No signal detect.
Detector : Below 1 GHz: Spectrum Analyzer RMS Average (RBW / VBW: 100 kHz), Above 1 GHz: Spectrum Analyzer RMS Average (RBW: 1 MHz / VBW: 3 MHz)

Field strength of spurious radiation
(Plot data, Worst case)

Report No.	12890237H	
Test place	Ise EMC Lab.	
Semi Anechoic Chamber	No.4	No.2
Date	July 19, 2019	July 18, 2019
Temperature / Humidity	20 deg. C / 66 % RH	21 deg. C / 74 % RH
Engineer	Koji Yamamoto	Akihiko Maeda
	Below 1 GHz	Above 1 GHz
Mode	Tx 607.875 MHz	

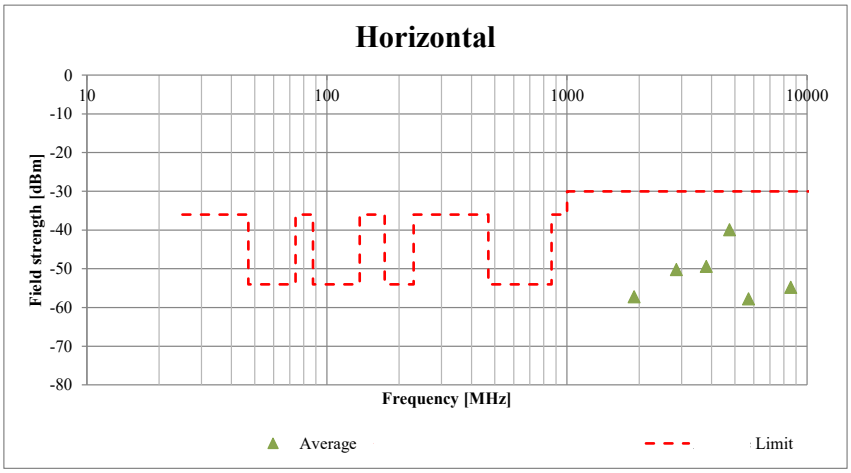


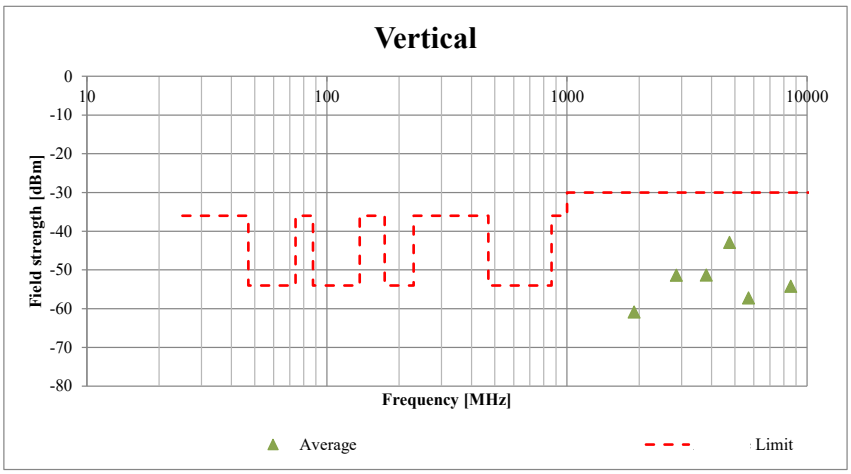


*These plots data contains sufficient number to show the trend of characteristic features for EUT.

Field strength of spurious radiation
(Plot data, Worst case)

Report No.	12890237H	
Test place	Ise EMC Lab.	
Semi Anechoic Chamber	No.4	No.2
Date	July 19, 2019	July 18, 2019
Temperature / Humidity	20 deg. C / 66 % RH	21 deg. C / 74 % RH
Engineer	Koji Yamamoto	Akihiko Maeda
	Below 1 GHz	Above 1 GHz
Mode	Tx 950.625 MHz	





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

Frequency stability

Report No.	12890237H
Test place	Ise EMC Lab. No.7 Measurement Room
Date	August 30, 2019
Temperature / Humidity	23 deg. C / 49 % RH
Engineer	Akihiko Maeda
Mode	Tx 539.000 MHz

Varying Temperature

Test condition		Tested	Measured	Frequency	Result	Limit	Remarks
Temp.	Voltage	frequency	frequency	error			
[deg. C]	[V]	[MHz]	[MHz]	[MHz]	[%]	[+/- %]	
50	3.00	539.000	538.999734	-0.000266	-0.00005	0.005	
40	3.00	539.000	538.999773	-0.000227	-0.00004	0.005	
30	3.00	539.000	538.999757	-0.000243	-0.00005	0.005	
20	3.00	539.000	538.999738	-0.000262	-0.00005	0.005	
10	3.00	539.000	538.999782	-0.000218	-0.00004	0.005	
0	3.00	539.000	538.999759	-0.000241	-0.00004	0.005	
-10	3.00	539.000	538.999788	-0.000212	-0.00004	0.005	
-20	3.00	539.000	538.999865	-0.000135	-0.00003	0.005	
-30	3.00	539.000	538.999990	-0.000010	0.00000	0.005	

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

Varying Supply Voltage

Test condition		Tested	Measured	Frequency	Result	Limit	Remarks
Temp.	Voltage	frequency	frequency	error			
[deg. C]	[V]	[MHz]	[MHz]	[MHz]	[%]	[+/- %]	
20	5.00	539.000	538.999736	-0.000264	-0.00005	0.005	USB Power (Nominal)
20	4.51	539.000	538.999736	-0.000264	-0.00005	0.005	USB Power (*)
20	5.75	539.000	538.999736	-0.000264	-0.00005	0.005	USB Power (+15 %)
20	3.00	539.000	538.999738	-0.000262	-0.00005	0.005	Battery Power
20	2.10	539.000	538.999736	-0.000264	-0.00005	0.005	Battery End Point

(*) Since the EUT could not operate at -15 % (4.25 V), the test was conducted at the minimum voltage at which the EUT could still operate.

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

Frequency stability

Report No.	12890237H
Test place	Ise EMC Lab. No.7 Measurement Room
Date	August 30, 2019
Temperature / Humidity	23 deg. C / 49 % RH
Engineer	Akihiko Maeda
Mode	Tx 950.625 MHz

Varying Temperature

Test condition		Tested	Measured	Frequency	Result	Limit	Remarks
Temp.	Voltage	frequency	frequency	error			
[deg. C]	[V]	[MHz]	[MHz]	[MHz]	[%]	[+/- %]	
50	3.00	950.625	950.624570	-0.000430	-0.00005	-	
40	3.00	950.625	950.624737	-0.000263	-0.00003	-	
30	3.00	950.625	950.624776	-0.000224	-0.00002	-	
20	3.00	950.625	950.624753	-0.000247	-0.00003	-	
10	3.00	950.625	950.624688	-0.000312	-0.00003	-	
0	3.00	950.625	950.624656	-0.000344	-0.00004	-	
-10	3.00	950.625	950.624755	-0.000245	-0.00003	-	
-20	3.00	950.625	950.624852	-0.000148	-0.00002	-	
-30	3.00	950.625	950.625069	0.000069	0.00001	-	

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

Varying Supply Voltage

Test condition		Tested	Measured	Frequency	Result	Limit	Remarks
Temp.	Voltage	frequency	frequency	error			
[deg. C]	[V]	[MHz]	[MHz]	[MHz]	[%]	[+/- %]	
20	5.00	950.625	950.624763	-0.000237	-0.00002	-	USB Power (Nominal)
20	4.49	950.625	950.624753	-0.000247	-0.00003	-	USB Power (*)
20	5.75	950.625	950.624759	-0.000241	-0.00003	-	USB Power (+15 %)
20	3.00	950.625	950.624753	-0.000247	-0.00003	-	Battery Power
20	2.19	950.625	950.624744	-0.000256	-0.00003	-	Battery End Point

(*) Since the EUT could not operate at -15 % (4.25 V), the test was conducted at the minimum voltage at which the EUT could still operate.

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

APPENDIX 2: Test instruments

Test Instruments (1/2)

Test Item	LIMS ID	Description	Manufacturer	Model	Serial	Last Calibration Date	Calibration Due Date	Cal Int
RE	141542	Digital Tester	Fluke Corporation	FLUKE 26-3	78030611	08/20/2019	08/31/2020	12
RE	141902	Spectrum Analyzer	AGILENT	E4440A	MY46187105	10/04/2018	10/31/2019	12
RE	142228	Measure	KOMELON	KMC-36	-	-	-	-
RE,CE	178648	EMI measurement program	TSJ	TEPTO-DV	-	-	-	-
RE	141579	Pre Amplifier	AGILENT	8449B	3008A02142	01/21/2019	01/31/2020	12
RE	141556	Thermo-Hygrometer	CUSTOM	CTH-201	0003	12/05/2018	12/31/2019	12
RE	141512	Horn Antenna 1-18GHz	Schwarzbeck	BBHA9120D	254	05/09/2019	05/31/2020	12
RE	141392	Microwave Cable	Junkosha	MWX221	1604S253(1 m) / 1608S087(5 m)	08/06/2019	08/31/2020	12
RE	141297	High Pass Filter(1.1-10GHz)	TOKYO KEIKI	TF219CD1	1001	01/10/2019	01/31/2020	12
RE	142004	AC2_Semi Anechoic Chamber(NSA)	TDK	Semi Anechoic Chamber 3m	DA-06902	06/29/2018	06/30/2020	24
AT	141855	Spectrum Analyzer	AGILENT	E4440A	MY46187750	11/09/2018	11/30/2019	12
AT	141805	Power Meter	ANRITSU	ML2495A	6K00003338	10/16/2018	10/31/2019	12
AT	141809	Power Meter	ANRITSU	ML2495A	825002	5/16/2019	5/31/2020	12
AT	141327	Coaxial Cable	UL Japan	-	-	02/07/2019	02/29/2020	12
AT	89845	Audio Analyzer	AUDIO PRECISION	APx525	APX2-270709	11/26/2018	11/30/2019	12
AT	141840	Power sensor	ANRITSU	MA2411B	11737	10/16/2018	10/31/2019	12
AT	141830	Power sensor	ANRITSU	MA2411B	738285	5/16/2019	5/31/2020	12
AT	141561	Thermo-Hygrometer	CUSTOM	CTH-201	1401	01/11/2019	01/31/2020	12
AT	141547	DIGITAL HiTESTER	HIOKI	3805	60500120	02/25/2019	02/29/2020	12
AT	141269	Attenuator(10dB) 1-18GHz	Orient Microwave	BX10-0476-00	-	03/26/2019	03/31/2020	12
AT	141414	Microwave Cable	Junkosha	MWX221	1207S407	08/06/2019	08/31/2020	12
AT	141156	Attenuator(10dB)	Weinschel Corp	2	BL1173	11/02/2018	11/30/2019	12
AT	141171	Attenuator(20dB)_DC-1GHz_N	Weinschel Corp	MODEL 1	BG0143	12/17/2018	12/31/2019	12
AT	141498	Microwave Counter	ADVANTEST	R5373	120100309	06/22/2019	06/30/2020	12
AT	141441	Temperature Chamber	ESPEC CORP.	SU-241	92013843	07/02/2019	07/31/2020	12
AT	142606	ITU-R BS, 559-2 Colored Noise Filter	UL Japan	-	-	-	-	-
AT	141897	Signal Generator	KEYSIGHT	N5182B	MY56200024	11/16/2018	11/30/2019	12
AT	142607	Video Amplifier	UNITEK ELECTROBICS INC.	UTK-200	505001	-	-	-
RE,CE	142183	Measure	KOMELON	KMC-36	-	-	-	-
RE,CE	142008	AC3_Semi Anechoic Chamber(NSA)	TDK	Semi Anechoic Chamber 3m	DA-10005	06/26/2018	06/30/2020	24
CE	141357	LISN(AMN)	Schwarzbeck	NSLK8127	8127-729	07/05/2019	07/31/2020	12
CE	141580	MicroWave System Amplifier	AGILENT	83017A	MY39500779	03/05/2019	03/31/2020	12
RE,CE	141554	Thermo-Hygrometer	CUSTOM	CTH-180	1301	01/11/2019	01/31/2020	12
RE,CE	141950	EMI Test Receiver	Rohde & Schwarz	ESU26	100412	06/27/2019	06/30/2020	12
RE,CE	141532	DIGITAL HiTESTER	HIOKI	3805	51201197	01/29/2019	01/31/2020	12
CE	141247	Attenuator(13dB)	JFW Industries, Inc.	50FP-013H2 N	-	12/06/2018	12/31/2019	12

Test Instruments (2/2)

Test Item	LIMS ID	Description	Manufacturer	Model	Serial	Last Calibration Date	Calibration Due Date	Cal Int
RE	141967	Signal Generator	Rohde & Schwarz	SMT02	51400043	08/01/2019	08/31/2020	12
RE	141425	Biconical Antenna	Schwarzbec	BBA9106	1302	08/24/2019	08/31/2020	12
RE	141267	Logperiodic Antenna(200-1000MHz)	Schwarzbeck	VUSLP9111B	911B-192	08/24/2019	08/31/2020	12
RE	141318	Coaxial Cable	UL Japan	-	-	07/01/2019	07/31/2020	12
RE	141454	Dipole Antenna	Schwarzbeck	UHAP	991	10/23/2018	10/31/2019	12
RE	141397	Coaxial Cable	UL Japan	-	-	06/18/2019	06/30/2020	12
RE	141562	Thermo-Hygrometer	CUSTOM	CTH-180	1501	01/11/2019	01/31/2020	12
RE	141583	Pre Amplifier	SONOMA INSTRUMENT	11/5/1900	260833	02/08/2019	02/29/2020	12
RE	142011	Semi Anechoic Chamber(NSA)	TDK	Semi Anechoic Chamber 3	DA-10005	-	-	-

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

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

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

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