



RADIO TEST REPORT

Test Report No.: 14487239H-A-R1

Customer	Rockwell Automation, Inc.
Description of EUT	UHF RFID Transceiver 58UHF Long US Band
Model Number of EUT	58UHF-TR-200-LR50US
FCC ID	USM-58UHF-LR
Test Regulation	FCC Part 15 Subpart C
Test Result	Complied (Refer to SECTION 3)
Issue Date	February 3, 2023
Remarks	-

Representative Test Engineer

Junya Okuno
Engineer

Approved By

Ryota Yamanaka
Engineer



CERTIFICATE 5107.02

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

Report Cover Page - Form-ULID-003532 (DCS:13-EM-F0429) Issue# 21.0

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- The information provided from the customer for this report is identified in Section 1.
- For test report(s) referred in this report, the latest version (including any revisions) is always referred.

REVISION HISTORY

Original Test Report No.: 14487239H-A

This report is a revised version of 14487239H-A. 14487239H-A is replaced with this report.

Revision	Test Report No.	Date	Page Revised Contents
- (Original)	14487239H-A	October 28, 2022	-
1	14487239H-A-R1	February 3, 2023	Addition of the Profile Index value corresponding to each Mode in Clause 4.1.
1	14487239H-A-R1	February 3, 2023	Addition of note *2) in Details of Operating Mode(s) table of Clause 4.1
1	14487239H-A-R1	February 3, 2023	The following corrections in Section 4.2 - Correction of the configuration diagram. - Addition of the note *1) in the configuration diagram and List of cables used (Cable No.2). - Changed the name of Cable No.2; from "Signal Cable" to "DC & Signal Cable"

Reference: Abbreviations (Including words undescribed in this report)

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

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SECTION 1: Customer Information

Company Name	Rockwell Automation, Inc.
Address	2 Executive Drive, Chelmsford, MA 01824, United States
Telephone Number	+1-978-446-3283
Contact Person	Albertino Mendonca

The information provided from the customer is as follows;

- Customer, Description of EUT, Model Number of EUT, FCC ID on the cover and other relevant pages
- Operating/Test Mode(s) (Mode(s)) on all the relevant pages
- SECTION 1: Customer Information
- SECTION 2: Equipment Under Test (EUT) other than the Receipt Date and Test Date
- SECTION 4: Operation of EUT during testing

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

SECTION 2: Equipment Under Test (EUT)

2.1 Identification of EUT

Description	UHF RFID Transceiver 58UHF Long US Band
Model Number	58UHF-TR-200-LR50US
Serial Number	Refer to SECTION 4.2
Condition	Engineering prototype (Not for Sale: This sample is equivalent to mass-produced items.)
Modification	No Modification by the test lab
Receipt Date	September 20, 2022
Test Date	September 20 to October 5, 2022

2.2 Product Description

General Specification

Rating	DC 24 V
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Radio Specification

Equipment Type	Transceiver
Frequency of Operation	902.75 MHz to 927.25 MHz
Type of Modulation	FHSS
Antenna Gain	6.14 dBi

SECTION 3: Test Specification, Procedures & Results

3.1 Test Specification

Test Specification	FCC Part 15 Subpart C The latest version on the first day of the testing period
Title	FCC 47 CFR Part 15 Radio Frequency Device Subpart C Intentional Radiators Section 15.207 Conducted limits Section 15.247 Operation within the bands 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz

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

3.2 Procedures and Results

Item	Test Procedure	Specification	Worst Margin	Results	Remarks
Conducted Emission	FCC: ANSI C63.10-2013 6. Standard test methods ISED: RSS-Gen 8.8	FCC: Section 15.207 ISED: RSS-Gen 8.8	0.83 dB 6.36433 MHz, Phase L, AV (Mode: FM0)	Complied a)	-
Carrier Frequency Separation	FCC: KDB 558074 D01 15.247 Meas Guidance v05r02 ISED: -	FCC: Section15.247(a)(1) ISED: RSS-247 5.1 (c)	See data.	Complied b)	Conducted
20dB Bandwidth	FCC: KDB 558074 D01 15.247 Meas Guidance v05r02 ISED: -	FCC: Section15.247(a)(1) ISED: RSS-247 5.1 (a)		Complied b)	Conducted
Number of Hopping Frequency	FCC: KDB 558074 D01 15.247 Meas Guidance v05r02 ISED: -	FCC: Section15.247(a)(1)(i) ISED: RSS-247 5.1 (c)		Complied c)	Conducted
Dwell time	FCC: KDB 558074 D01 15.247 Meas Guidance v05r02 ISED: -	FCC: Section15.247(a)(1)(i) ISED: RSS-247 5.1 (c)		Complied d)	Conducted
Maximum Peak Output Power	FCC: KDB 558074 D01 15.247 Meas Guidance v05r02 ISED: RSS-Gen 6.12	FCC: Section15.247(b)(2) ISED: RSS-247 5.4 (a)		Complied e)	Conducted
Spurious Emission & Band Edge Compliance	FCC: KDB 558074 D01 15.247 Meas Guidance v05r02 ISED: RSS-Gen 6.13	FCC: Section15.247(d) ISED: RSS-247 5.5 RSS-Gen 8.9 RSS-Gen 8.10	3.5 dB 2708 MHz, Vertical, AV (Mode: Miller-2)	Complied f) / g)	Conducted/ Radiated (above 30 MHz) *1)
Note: UL Japan, Inc.'s EMI Work Procedures: Work Instructions-ULID-003591 and Work Instructions-ULID-003593. * In case any questions arise about test procedure, ANSI C63.10: 2013 is also referred. *1) Radiated test was selected over 30 MHz based on section 15.247(d). a) Refer to APPENDIX 1 (data of Conducted Emission) b) Refer to APPENDIX 1 (data of 20dB Bandwidth, 99%Occupied Bandwidth and Carrier Frequency Separation) c) Refer to APPENDIX 1 (data of Number of Hopping Frequency) d) Refer to APPENDIX 1 (data of Dwell time) e) Refer to APPENDIX 1 (data of Maximum Peak Output Power) f) Refer to APPENDIX 1 (data of Conducted Spurious Emission) g) Refer to APPENDIX 1 (data of Radiated Spurious Emission)					

FCC Part 15.31 (e)

This EUT provides the stable voltage constantly to RF part regardless of input voltage.
Therefore, this EUT complies with the requirement.

FCC Part 15.203 Antenna requirement

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

3.3 Addition to Standard

Item	Test Procedure	Specification	Worst Margin	Results	Remarks
99% Occupied Bandwidth	ISED: RSS-Gen 6.7	ISED: -	N/A	-	Conducted

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

3.4 Uncertainty

Measurement uncertainty is not taken into account when stating conformity with a specified requirement.

Note: When margins obtained from test results are less than the measurement uncertainty, the test results may exceed the limit.

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

Conducted emission

Using Item	Frequency range	Uncertainty (+/-)
AMN (LISN)	0.009 MHz to 0.15 MHz	3.7 dB
	0.15 MHz to 30 MHz	3.3 dB

Radiated emission

Measurement distance	Frequency range		Uncertainty (+/-)
3 m	9 kHz to 30 MHz		3.2 dB
10 m			3.0 dB
3 m	30 MHz to 200 MHz	Horizontal	4.8 dB
		Vertical	5.0 dB
	200 MHz to 1000 MHz	Horizontal	5.1 dB
		Vertical	6.2 dB
10 m	30 MHz to 200 MHz	Horizontal	4.8 dB
		Vertical	4.8 dB
	200 MHz to 1000 MHz	Horizontal	5.0 dB
		Vertical	5.0 dB
3 m	1 GHz to 6 GHz		4.9 dB
	6 GHz to 18 GHz		5.2 dB
1 m	10 GHz to 26.5 GHz		5.4 dB
	26.5 GHz to 40 GHz		5.4 dB
10 m	1 GHz to 18 GHz		5.4 dB

Antenna Terminal test

Test Item	Uncertainty (+/-)
20 dB Bandwidth / 99 % Occupied Bandwidth	0.96 %
Maximum Peak Output Power / Average Output Power	1.5 dB
Carrier Frequency Separation	0.42 %
Dwell time / Burst rate	0.10 %
Conducted Spurious Emission	2.7 dB

3.5 Test Location

UL Japan, Inc. Ise EMC Lab.

*A2LA Certificate Number: 5107.02 / FCC Test Firm Registration Number: 884919

ISED Lab Company Number: 2973C / CAB identifier: JP0002

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

Telephone: +81-596-24-8999

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.10 shielded room	3.8 x 2.8 x 2.8	3.8 x 2.8	-	-
No.11 measurement room	4.0 x 3.4 x 2.5	N/A	-	-
No.12 measurement room	2.6 x 3.4 x 2.5	N/A	-	-
Large Chamber	16.9 x 22.1 x 10.17	16.9 x 22.1	-	10 m
Small Chamber	5.3 x 6.69 x 3.59	5.3 x 6.69	-	-

* 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 Test Data, Test Instruments, and Test Set Up

Refer to APPENDIX.

SECTION 4: Operation of EUT during testing

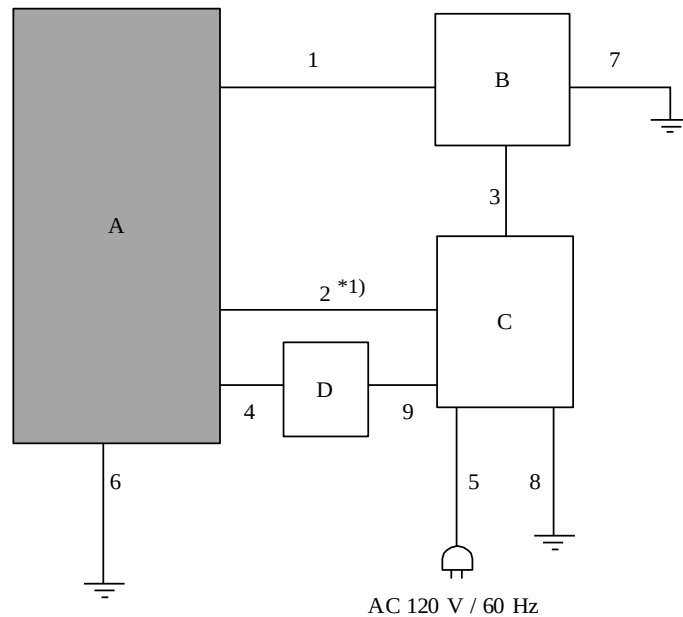
4.1 Operating Mode(s)

Mode	Remarks*
Transmitting (Tx) - Miller-4 (Profile Index 2) - Miller-2 (Profile Index 4) - FM0 (Profile Index 5)	-
*EUT has the power settings by the software as follows; Power Setting: 29.0 dBm Software: V1.3.907 (for other tests except for Dwell time test) V1.5.2 (for Dwell time test only) (Date: 2022.09 20, Storage location: Driven by connected PC) *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.	

Details of Operating Mode(s)

Test Item	Mode	Hopping	Tested Frequency
Conducted Emission *2), Radiated Spurious Emission (Below 1 GHz) *2)	Tx Miller-4 Tx Miller-2 Tx FM0	Off	902.75 MHz *1)
20dB Bandwidth, Carrier Frequency Separation, Maximum Peak Output Power, Conducted Spurious Emission, Radiated Spurious Emission (Above 1 GHz) *2)	Tx Miller-4 Tx Miller-2 Tx FM0	Off	902.75 MHz 915.25 MHz 927.25 MHz
Number of Hopping Frequency	Tx Miller-4 Tx Miller-2 Tx FM0	On	-
Dwell time	Tx Miller-4 Tx Miller-2 Tx FM0	On	902.75 MHz 915.25 MHz 927.25 MHz
Band Edge Compliance (Conducted)	Tx Miller-4 Tx Miller-2 Tx FM0	On ----- Off	902.75 MHz ----- 927.25 MHz
99% Occupied Bandwidth	Tx Miller-4 Tx Miller-2 Tx FM0	On ----- Off	902.75 MHz ----- 915.25 MHz ----- 927.25 MHz
*1) Conducted emissions for frequencies below 1 GHz was limited to the channel that had the highest power during the antenna terminal test, as preliminary testing indicated that changing the operating frequency had no significant impact on the emissions in those frequency bands. *2) Conducted Emission and Radiated Spurious Emission tests were performed with Circle polarized wave. Other test items were tested with the horizontal polarized wave.			

4.2 Configuration and Peripherals



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

Description of EUT and Support equipment

No.	Item	Model number	Serial number	Manufacturer	Remarks
A	UHF RFID Transceiver 58UHF Long US Band	58UHF-TR-200-LR50 US	No.12	Rockwell Automation, Inc.	EUT
B	Controller	5069-L430ERM	56048033	Rockwell Automation, Inc.	-
C	DC Supply	1606-XLE120EN	20801139	Rockwell Automation, Inc.	-
D	Resistance	BGR20	-	KOA	-

List of cables used

No.	Name	Length (m)	Shield		Remarks
			Cable	Connector	
1	LAN Cable	10.0	Shielded	Shielded	-
2	DC & Signal Cable	5.7	Unshielded	Unshielded	*1) Tested by Conducted Emission
3	DC Cable	3.5	Unshielded	Unshielded	-
4	Signal Cable	6.8	Unshielded	Unshielded	-
5	AC Cable	2.0	Unshielded	Unshielded	-
6	Earth Cable	2.0	Unshielded	Unshielded	-
7	Earth Cable	1.0	Unshielded	Unshielded	-
8	Earth Cable	1.0	Unshielded	Unshielded	-
9	Signal Cable	1.1	Unshielded	Unshielded	-

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.

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.

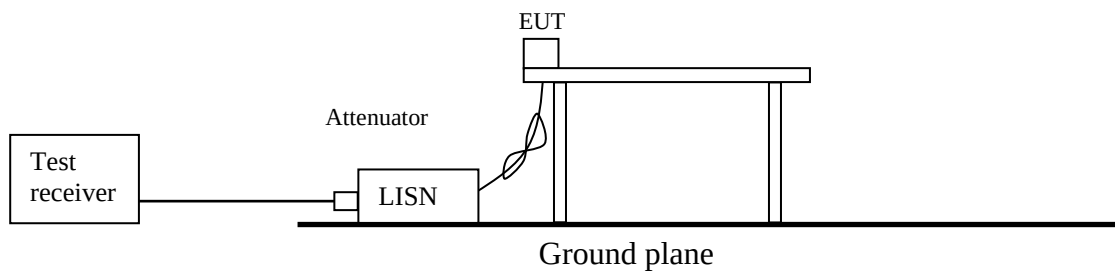
The EUT was connected to a LISN (AMN).

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 to 30 MHz
Test Data	: APPENDIX
Test Result	: Pass

Figure 1: Test Setup



SECTION 6: Radiated Spurious Emission

Test Procedure

[For below 1 GHz]

EUT was placed on a urethane platform of nominal size, 1.0 m by 1.5 m, raised 0.8 m above the conducting ground plane. The Radiated Electric Field Strength has been measured in a Semi Anechoic Chamber with a ground plane.

[For above 1 GHz]

EUT was placed on a urethane platform of nominal size, 0.5 m by 0.5 m, raised 1.5 m above the conducting ground plane.

The Radiated Electric Field Strength has been measured in a Semi Anechoic Chamber with absorbent materials lined on a ground plane.

The height of the measuring antenna varied between 1 m and 4 m and EUT was rotated a full revolution in order to obtain the maximum value of the electric field strength.

Test antenna was aimed at the EUT for receiving the maximum signal and always kept within the illumination area of the 3 dB beamwidth of the antenna.

The measurements were performed for both vertical and horizontal antenna polarization with the Test Receiver, or the Spectrum Analyzer.

The measurements were made with the following detector function of the test receiver and the Spectrum analyzer (in linear mode).

The test was made with the detector (RBW/VBW) in the following table.

When using Spectrum analyzer, the test was made with adjusting span to zero by using peak hold.

Test Antennas are used as below;

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

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

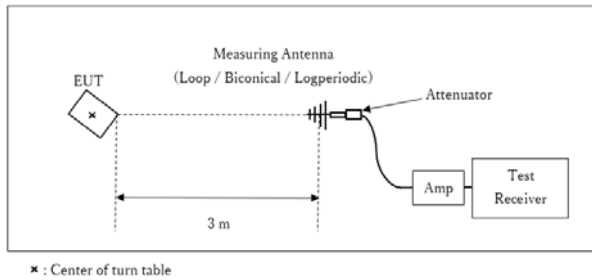
20 dBc was applied to the frequency over the limit of FCC 15.209 / Table 4 of RSS-Gen 8.9 (ISED) and outside the restricted band of FCC15.205 / Table 6 of RSS-Gen 8.10 (ISED).

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

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

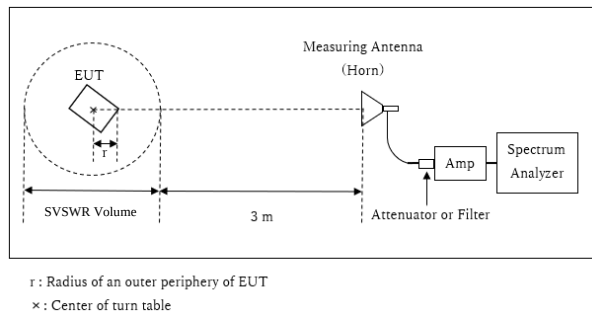
Figure 2: Test Setup

Below 1 GHz



Test Distance: 3 m

1 GHz to 10 GHz



Distance Factor: $20 \times \log(3.85 \text{ m} / 3.0 \text{ m}) = 2.17 \text{ dB}$
* Test Distance: $(3 + \text{SVSWR Volume} / 2) - r = 3.85 \text{ m}$

SVSWR Volume : 2.0 m
(SVSWR Volume has been calibrated based on CISPR 16-1-4.)

$r = 0.15 \text{ m}$

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

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

Measurement Range : 30 MHz to 10 GHz
Test Data : APPENDIX
Test Result : Pass

SECTION 7: Antenna Terminal Conducted Tests

Test Procedure

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

Test	Span	RBW	VBW	Sweep time	Detector	Trace	Instrument Used
20dB Bandwidth	100 kHz	1 kHz	3 kHz	Auto	Peak	Max Hold	Spectrum Analyzer
99% Occupied Bandwidth *1)	Enough width to display emission skirts	1 to 5 % of OBW	Three times of RBW	Auto	Peak	Max Hold	Spectrum Analyzer
Maximum Peak Output Power	-	-	-	Auto	Peak Average *2)	-	Power Meter (Sensor: 50 MHz BW)
Carrier Frequency Separation	1.5 MHz	10 kHz	30 kHz	Auto	Peak	Max Hold	Spectrum Analyzer
Number of Hopping Frequency	40 MHz	68 kHz	200 kHz	Auto	Peak	Max Hold	Spectrum Analyzer
Dwell Time	Zero Span	100 kHz, 1 MHz	300 kHz, 3 MHz	As necessary capture the entire dwell time per hopping channel	Peak	Clear Write	Spectrum Analyzer
Conducted Spurious Emission *3) *4)	9 kHz to 150 kHz	200 Hz	620 Hz	Auto	Peak	Max Hold	Spectrum Analyzer
	150 kHz to 30 MHz	9.1 kHz	27 kHz				
	30 MHz to 25 GHz	100 kHz	300 kHz				
Conducted Spurious Emission Band Edge compliance	10 MHz	100 kHz	300 kHz	Auto	Peak	Max Hold	Spectrum Analyzer
*1) Peak hold was applied as Worst-case measurement. *2) Reference data *3) In the frequency range below 30MHz, RBW was narrowed to separate the noise contents. Then, wide-band noise near the limit was checked separately, however the noise was low enough as shown in the chart. (9 kHz - 150 kHz: RBW = 200 Hz, 150 kHz - 30 MHz: RBW = 9.1 kHz). *4) The limits in CFR 47, Part 15, Subpart C, paragraph 15.209(a), are identical to those in RSS-Gen section 8.9, Table 6, since the measurements are performed in terms of magnetic field strength and converted to electric field strength levels (as reported in the table) using the free space impedance of 377 Ohms. For example, the measurement at frequency 9 kHz resulted in a level of 45.5 dBuV/m, which is equivalent to 45.5 – 51.5 = -6.0 dBuA/m, which has the same margin, 3 dB, to the corresponding RSS-Gen Table 6 limit as it has to 15.209(a) limit.							

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

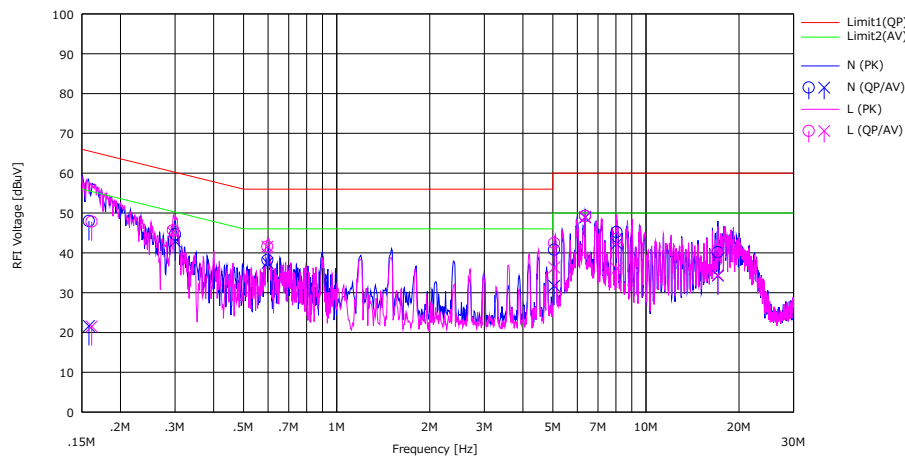
Test Data : APPENDIX
Test Result : Pass

APPENDIX 1: Test data

Conducted Emission

Test place Ise EMC Lab. No.2 Semi Anechoic Chamber
Date September 22, 2022
Temperature / Humidity 23 deg. C / 51 % RH
Engineer Takumi Nishida
Mode Tx, Hopping Off, Miller-4, 902.75 MHz

Limit : FCC_Part 15 Subpart C(15.207)



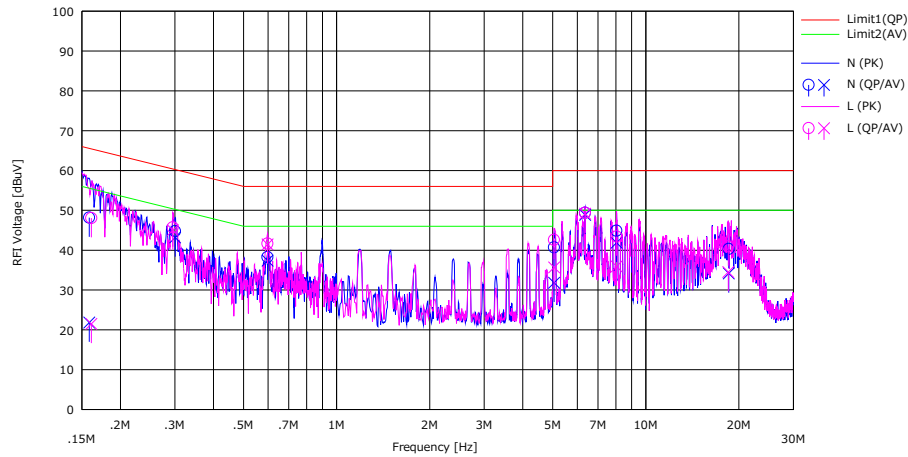
No.	Freq. [MHz]	Reading		LISN [dB]	LOSS [dB]	Results		Limit		Margin		Phase	Comment
		<QP> [dBuV]	<AV> [dBuV]			<QP> [dBuV]	<AV> [dBuV]	<QP> [dBuV]	<AV> [dBuV]	<QP> [dB]	<AV> [dB]		
1	0.15823	34.78	8.41	0.05	13.14	47.97	21.60	65.56	55.56	17.59	33.96	N	
2	0.30046	31.44	29.65	0.05	13.16	44.65	42.86	60.23	50.23	15.58	7.37	N	
3	0.59782	24.92	24.23	0.06	13.19	38.17	37.48	56.00	46.00	17.83	8.52	N	
4	5.05031	27.17	18.12	0.14	13.46	40.77	31.72	60.00	50.00	19.23	18.28	N	
5	6.36451	35.61	35.19	0.16	13.51	49.28	48.86	60.00	50.00	10.72	1.14	N	
6	8.03809	31.45	28.54	0.19	13.56	45.20	42.29	60.00	50.00	14.80	7.71	N	
7	17.08193	26.02	20.12	0.33	13.80	40.15	34.25	60.00	50.00	19.85	15.75	N	
8	0.16141	34.66	8.34	0.02	13.14	47.82	21.50	65.39	55.39	17.57	33.89	L	
9	0.29567	32.43	31.87	0.04	13.16	45.63	45.07	60.36	50.36	14.73	5.29	L	
10	0.59702	28.31	28.31	0.05	13.19	41.55	41.55	56.00	46.00	14.45	4.45	L	
11	5.05041	28.87	22.73	0.12	13.46	42.45	36.31	60.00	50.00	17.55	13.69	L	
12	6.36453	35.56	35.41	0.14	13.51	49.21	49.06	60.00	50.00	10.79	0.94	L	
13	8.04732	29.78	22.31	0.17	13.56	43.51	36.04	60.00	50.00	16.49	13.96	L	
14	17.08051	26.55	20.29	0.33	13.80	40.68	34.42	60.00	50.00	19.32	15.58	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

Test place Ise EMC Lab. No.2 Semi Anechoic Chamber
Date September 22, 2022
Temperature / Humidity 23 deg. C / 51 % RH
Engineer Takumi Nishida
Mode Tx, Hopping Off, Miller-2, 902.75 MHz

Limit : FCC_Part 15 Subpart C(15.207)



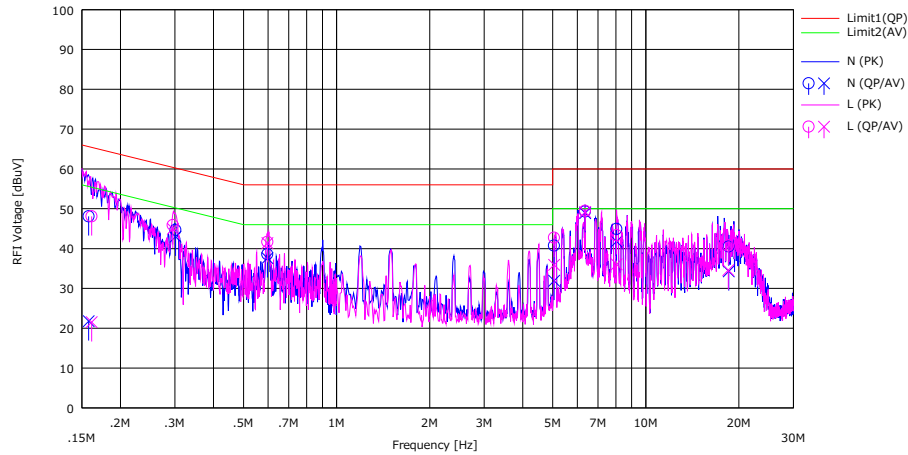
No.	Freq. [MHz]	Reading		LISN	LOSS	Results		Limit		Margin		Phase	Comment
		<QP> [dBuV]	<AV> [dBuV]			<QP> [dBuV]	<AV> [dBuV]	<QP> [dBuV]	<AV> [dBuV]	<QP> [dB]	<AV> [dB]		
1	0.15851	34.98	8.64	0.05	13.14	48.17	21.83	65.54	55.54	17.37	33.71	N	
2	0.30045	31.52	29.97	0.05	13.16	44.73	43.18	60.23	50.23	15.50	7.05	N	
3	0.59795	25.00	24.12	0.06	13.19	38.25	37.37	56.00	46.00	17.75	8.63	N	
4	5.05021	27.10	18.21	0.14	13.46	40.70	31.81	60.00	50.00	19.30	18.19	N	
5	6.36404	35.70	35.20	0.16	13.51	49.37	48.87	60.00	50.00	10.63	1.13	N	
6	8.03881	31.10	28.10	0.19	13.56	44.85	41.85	60.00	50.00	15.15	8.15	N	
7	18.54040	26.10	20.00	0.34	13.83	40.27	34.17	60.00	50.00	19.73	15.83	N	
8	0.16105	34.87	8.32	0.02	13.14	48.03	21.48	65.41	55.41	17.38	33.93	L	
9	0.29535	32.50	31.80	0.04	13.16	45.70	45.00	60.37	50.37	14.67	5.37	L	
10	0.59795	28.40	28.20	0.05	13.19	41.64	41.44	56.00	46.00	14.36	4.56	L	
11	5.05023	29.00	22.10	0.12	13.46	42.58	35.68	60.00	50.00	17.42	14.32	L	
12	6.36412	35.70	35.50	0.14	13.51	49.35	49.15	60.00	50.00	10.65	0.85	L	
13	8.04701	29.70	22.20	0.17	13.56	43.43	35.93	60.00	50.00	16.57	14.07	L	
14	18.48032	26.76	20.34	0.34	13.83	40.93	34.51	60.00	50.00	19.07	15.49	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

Test place Ise EMC Lab. No.2 Semi Anechoic Chamber
Date September 22, 2022
Temperature / Humidity 23 deg. C / 51 % RH
Engineer Takumi Nishida
Mode Tx, Hopping Off, FM0, 902.75 MHz

Limit : FCC_Part 15 Subpart C(15.207)



No.	Freq. [MHz]	Reading		LISN	LOSS	Results		Limit		Margin		Phase	Comment
		<QP> [dBuV]	<AV> [dBuV]			<QP> [dBuV]	<AV> [dBuV]	<QP> [dBuV]	<AV> [dBuV]	<QP> [dB]	<AV> [dB]		
1	0.15785	34.89	8.56	0.05	13.14	48.08	21.75	65.58	55.58	17.50	33.83	N	
2	0.30131	31.44	29.78	0.05	13.16	44.65	42.99	60.21	50.21	15.56	7.22	N	
3	0.59700	25.31	24.35	0.06	13.19	38.56	37.60	56.00	46.00	17.44	8.40	N	
4	5.05103	27.12	18.31	0.14	13.46	40.72	31.91	60.00	50.00	19.28	18.09	N	
5	6.36424	35.62	35.24	0.16	13.51	49.29	48.91	60.00	50.00	10.71	1.09	N	
6	8.03912	31.15	28.02	0.19	13.56	44.90	41.77	60.00	50.00	15.10	8.23	N	
7	18.54042	26.34	20.11	0.34	13.83	40.51	34.28	60.00	50.00	19.49	15.72	N	
8	0.16132	34.92	8.36	0.02	13.14	48.08	21.52	65.40	55.40	17.32	33.88	L	
9	0.29541	32.66	31.78	0.04	13.16	45.86	44.98	60.37	50.37	14.51	5.39	L	
10	0.59782	28.42	28.14	0.05	13.19	41.66	41.38	56.00	46.00	14.34	4.62	L	
11	5.05053	29.14	22.32	0.12	13.46	42.72	35.90	60.00	50.00	17.28	14.10	L	
12	6.36433	35.82	35.52	0.14	13.51	49.47	49.17	60.00	50.00	10.53	0.83	L	
13	8.04712	29.63	22.31	0.17	13.56	43.36	36.04	60.00	50.00	16.64	13.96	L	
14	18.48032	26.56	20.41	0.34	13.83	40.73	34.58	60.00	50.00	19.27	15.42	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.

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

Test place	Ise EMC Lab.	
Measurement Room	No.4	No.6
Date	September 22, 2022	October 5, 2022
Temperature / Humidity	22 deg. C / 50 % RH	22 deg. C / 50 % RH
Engineer	Junya Okuno	Takumi Nishida
Mode	Tx, Hopping Off / Tx, Hopping On	

Miller-4

Freq. [MHz]	20 dB Bandwidth [MHz]	Limit for 20dB Bandwidth [MHz]	99 % Occupied Bandwidth [kHz]	Carrier Frequency Separation [MHz]	Limit for Carrier Frequency separation [MHz]
902.75	0.003	0.500	2.945	0.500	>= 0.025
915.25	0.003	0.500	2.613	0.500	>= 0.025
927.25	0.003	0.500	2.713	0.500	>= 0.025
Hopping On	-	-	25523.000	-	-

Limit: 20dB Bandwidth or 25 kHz (whichever is greater).

Miller-2

Freq. [MHz]	20 dB Bandwidth [MHz]	Limit for 20dB Bandwidth [MHz]	99 % Occupied Bandwidth [kHz]	Carrier Frequency Separation [MHz]	Limit for Carrier Frequency separation [MHz]
902.75	0.003	0.500	2.939	0.500	>= 0.025
915.25	0.003	0.500	2.657	0.500	>= 0.025
927.25	0.003	0.500	2.734	0.500	>= 0.025
Hopping On	-	-	25510.200	-	-

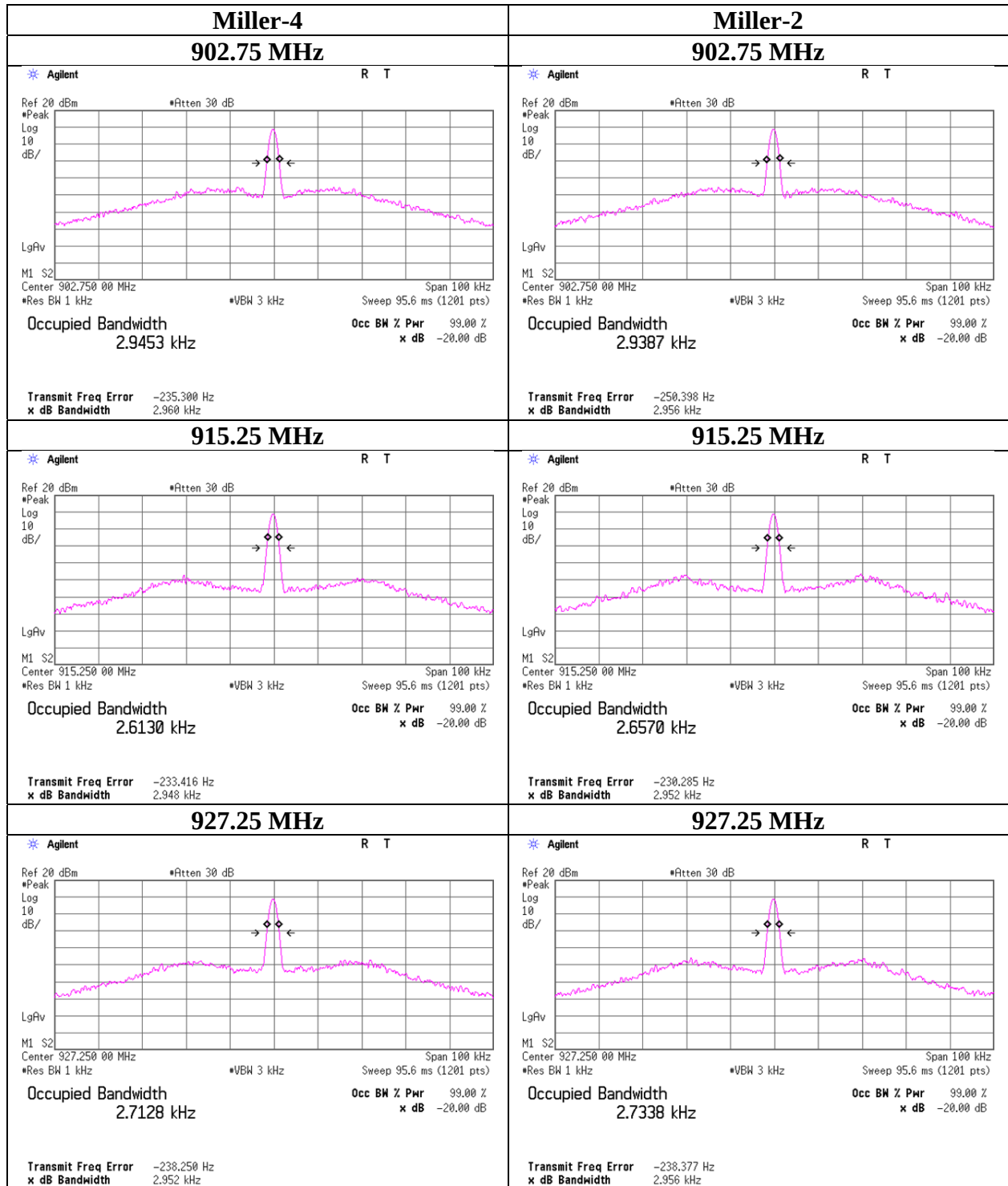
Limit: 20dB Bandwidth or 25 kHz (whichever is greater).

FM0

Freq. [MHz]	20 dB Bandwidth [MHz]	Limit for 20dB Bandwidth [MHz]	99 % Occupied Bandwidth [kHz]	Carrier Frequency Separation [MHz]	Limit for Carrier Frequency separation [MHz]
902.75	0.003	0.500	2.916	0.500	>= 0.025
915.25	0.003	0.500	2.653	0.500	>= 0.025
927.25	0.003	0.500	2.696	0.500	>= 0.025
Hopping On	-	-	25565.500	-	-

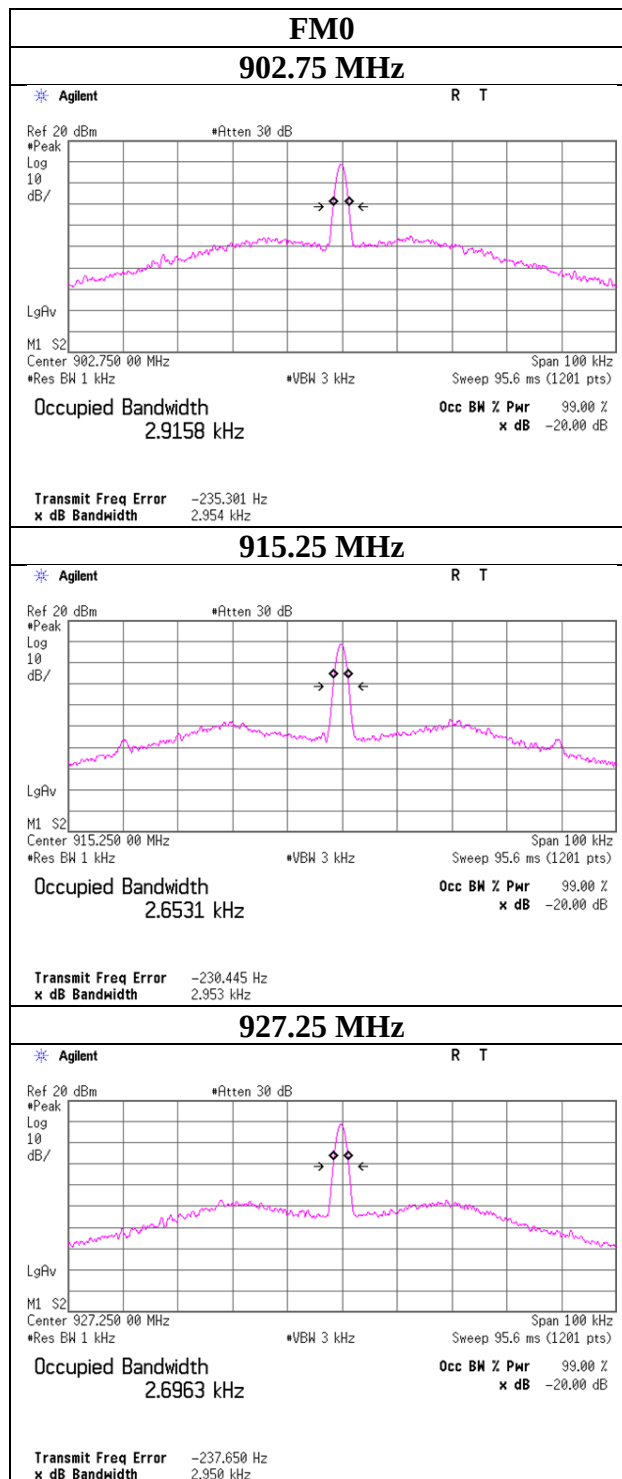
Limit: 20dB Bandwidth or 25 kHz (whichever is greater).

20dB Bandwidth and 99% Occupied Bandwidth



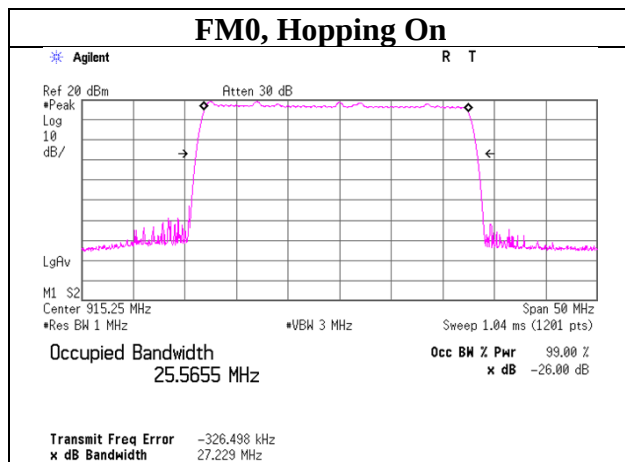
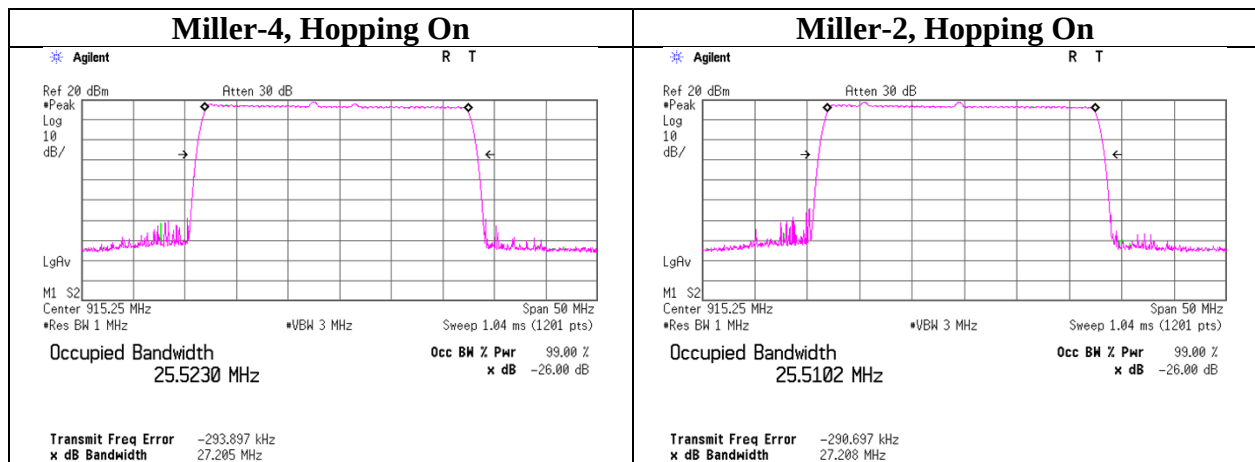
Since the transmitter signal is CW-like it is impractical to use a RBW setting of 1 % - 5% of the emission bandwidth since the emission bandwidth will be proportional to the RBW

20dB Bandwidth and 99% Occupied Bandwidth

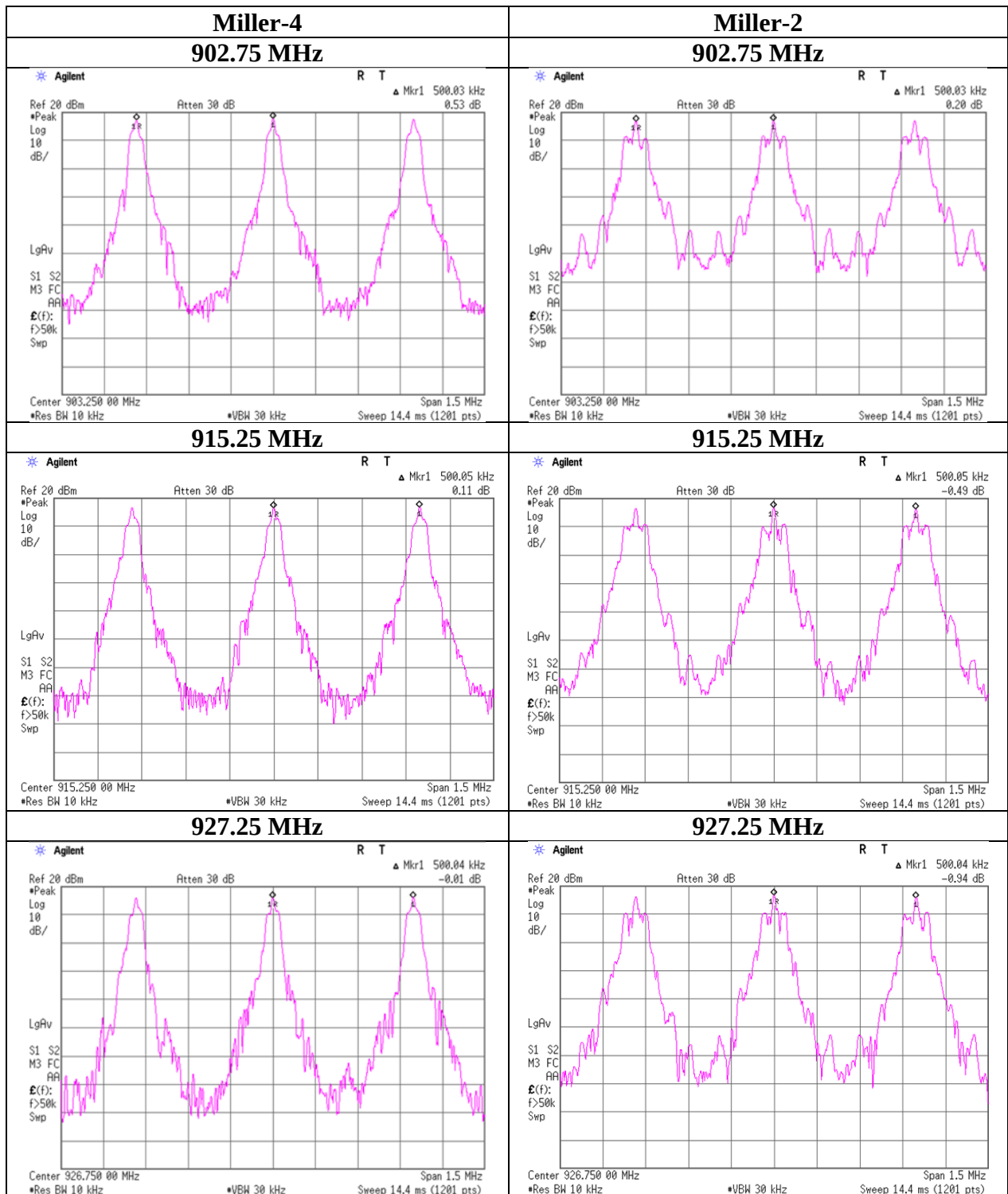


Since the transmitter signal is CW-like it is impractical to use a RBW setting of 1 % - 5% of the emission bandwidth since the emission bandwidth will be proportional to the RBW.

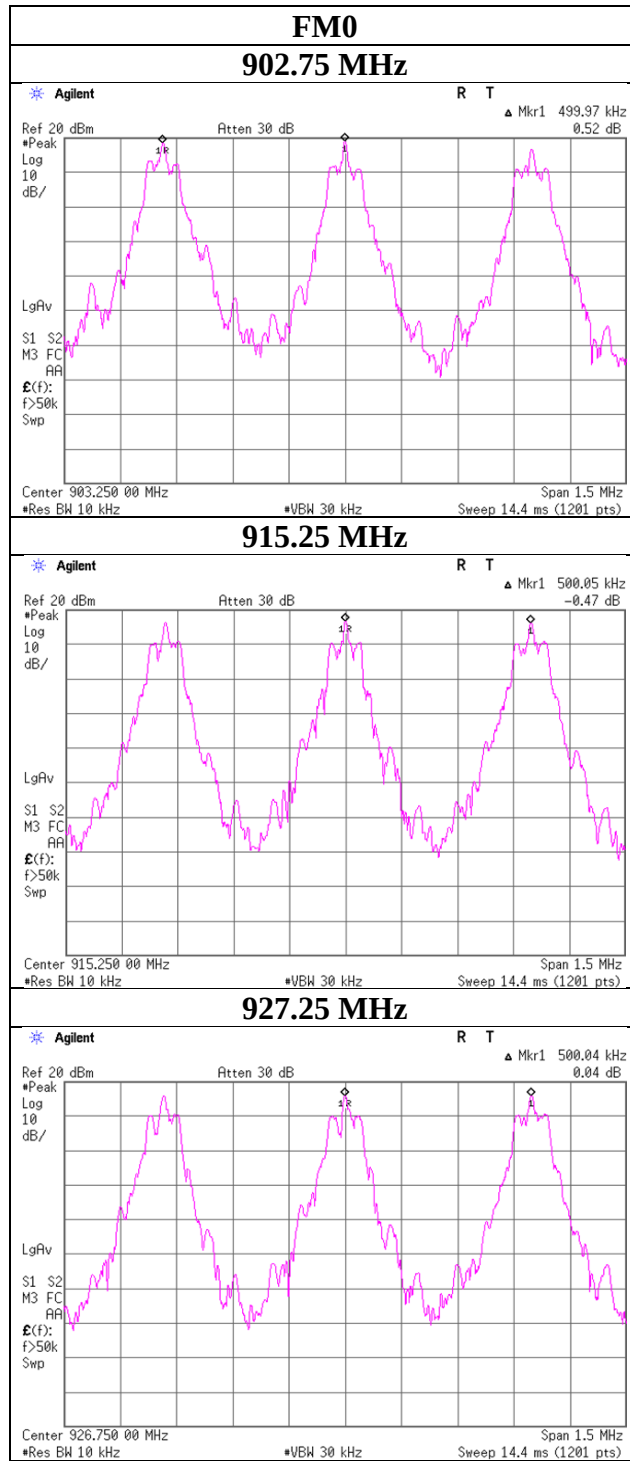
20dB Bandwidth and 99% Occupied Bandwidth



Carrier Frequency Separation



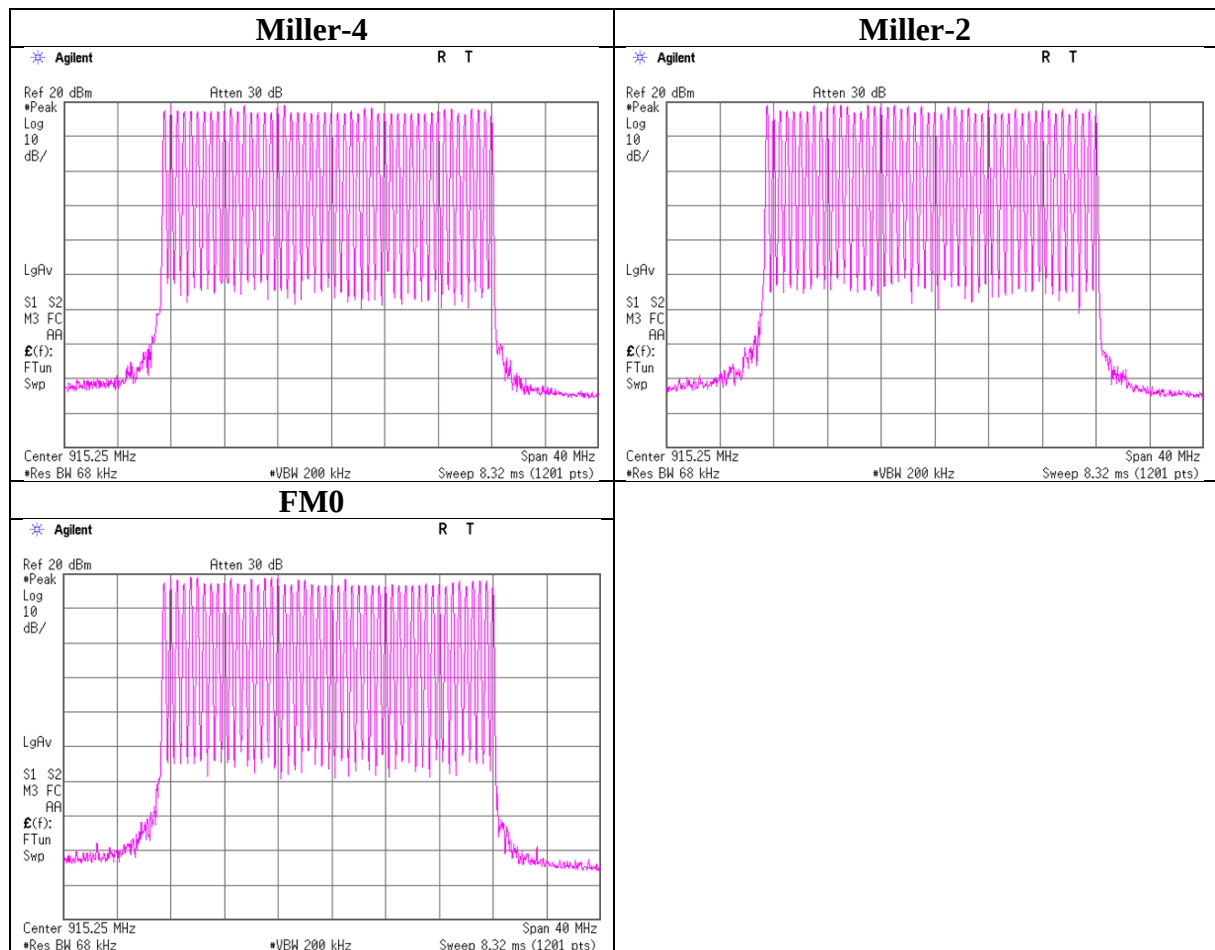
Carrier Frequency Separation



Number of Hopping Frequency

Test place Ise EMC Lab. No.6
Date October 5, 2022
Temperature / Humidity 22 deg. C / 50 % RH
Engineer Takumi Nishida
Mode Tx, Hopping On

Mode	Number of channel [channels]	Limit [channels]
Miller-4	50	>= 50
Miller-2	50	>= 50
FM0	50	>= 50



Dwell time

Test place	Ise EMC Lab. No.6
Date	October 5, 2022
Temperature / Humidity	22 deg. C / 50 % RH
Engineer	Takumi Nishida
Mode	Tx, Hopping On

Miller-4

Mode	Number of transmission in 20 sec period	Length of transmission [msec]	Result [msec]	Limit [msec]
902.75	1	399.200	399.2	400
915.25	1	399.200	399.2	400
927.25	1	399.200	399.2	400

Miller-2

Mode	Number of transmission in 20 sec period	Length of transmission [msec]	Result [msec]	Limit [msec]
902.75	1	399.200	399.2	400
915.25	1	399.200	399.2	400
927.25	1	399.200	399.2	400

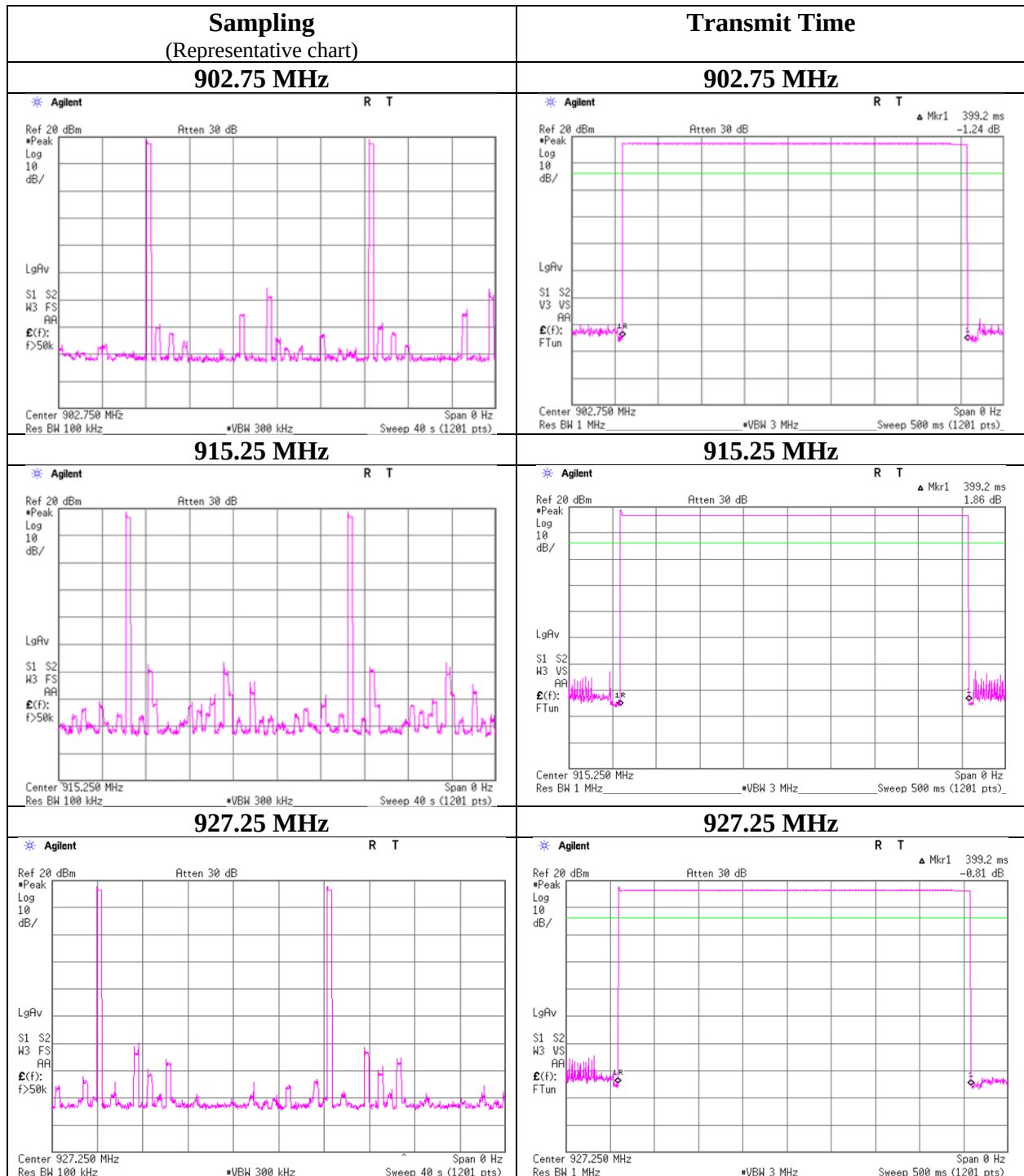
FM0

Mode	Number of transmission in 20 sec period	Length of transmission [msec]	Result [msec]	Limit [msec]
902.75	1	399.200	399.2	400
915.25	1	399.200	399.2	400
927.25	1	399.200	399.2	400

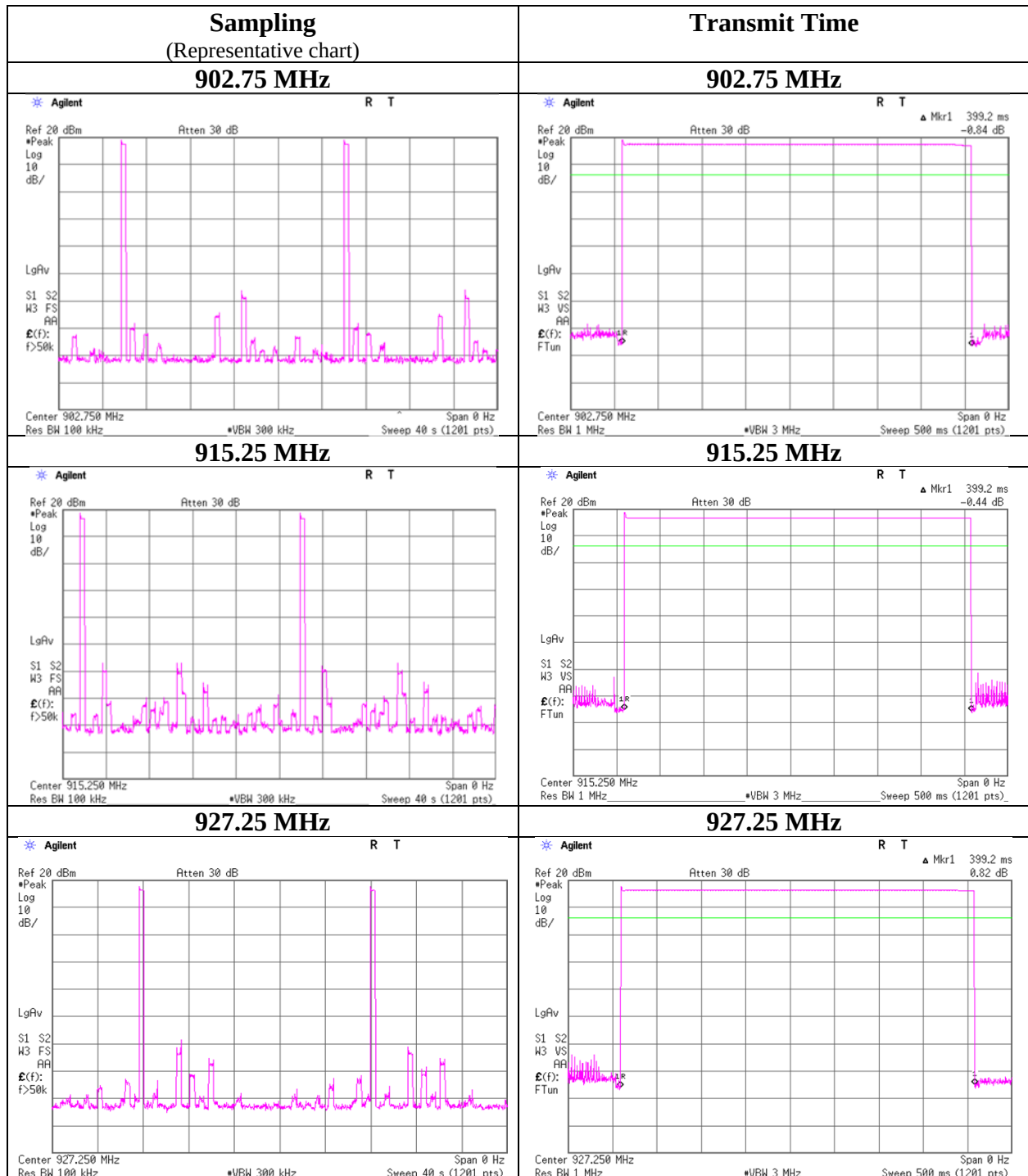
Sample Calculation

Result = Number of transmission x Length of transmission

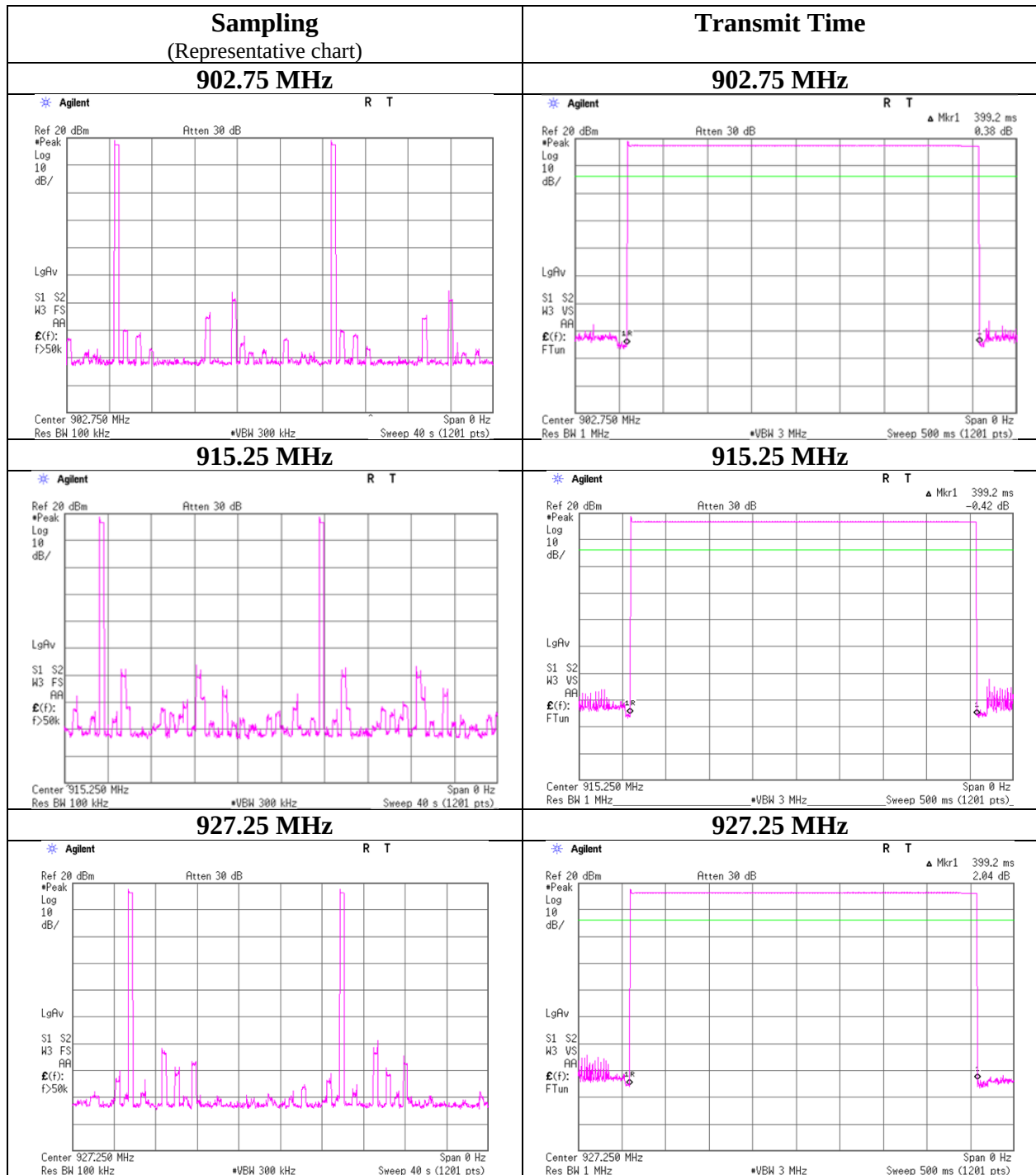
Dwell time
(Miller-4)



Dwell time
(Miller-2)



Dwell time (FM0)



Maximum Peak Output Power

Test place Ise EMC Lab. No.4 Measurement Room
Date September 22, 2022
Temperature / Humidity 22 deg. C / 50 % RH
Engineer Junya Okuno
Mode Tx, Hopping Off

					Conducted Power					e.i.r.p. for RSS-247					
Mode	Freq.	Reading	Cable Loss	Atten. Loss	Result		Limit		Margin	Antenna Gain	Result		Limit		Margin
	[MHz]	[dBm]	[dB]	[dB]	[dBm]	[mW]	[dBm]	[mW]	[dB]		[dBi]	[dBm]	[mW]	[dBm]	
Miller-4	902.75	8.92	0.41	19.89	29.22	835.60	29.86	968	0.64	6.14	35.36	3435.58	36.02	4000	0.66
	915.25	8.82	0.41	19.89	29.12	816.58	29.86	968	0.74	6.14	35.26	3357.38	36.02	4000	0.76
	927.25	8.80	0.42	19.89	29.11	814.70	29.86	968	0.75	6.14	35.25	3349.65	36.02	4000	0.77
Miler-2	902.75	8.91	0.41	19.89	29.21	833.68	29.86	968	0.65	6.14	35.35	3427.68	36.02	4000	0.67
	915.25	8.80	0.41	19.89	29.10	812.83	29.86	968	0.76	6.14	35.24	3341.95	36.02	4000	0.78
	927.25	8.76	0.42	19.89	29.07	807.24	29.86	968	0.79	6.14	35.21	3318.94	36.02	4000	0.81
FM0	902.75	8.88	0.41	19.89	29.18	827.94	29.86	968	0.68	6.14	35.32	3404.08	36.02	4000	0.70
	915.25	8.78	0.41	19.89	29.08	809.10	29.86	968	0.78	6.14	35.22	3326.60	36.02	4000	0.80
	927.25	8.76	0.42	19.89	29.07	807.24	29.86	968	0.79	6.14	35.21	3318.94	36.02	4000	0.81

Sample Calculation:

Result = Reading + Cable Loss + Attenuator Loss

e.i.r.p. Result = Conducted Power Result + Antenna Gain

Average Output Power
(Reference data for RF Exposure)

Test place Ise EMC Lab. No.4 Measurement Room
Date September 22, 2022
Temperature / Humidity 22 deg. C / 50 % RH
Engineer Junya Okuno
Mode Tx, Hopping Off

Mode	Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result (Time average)		Duty factor [dB]	Result (Burst power average)	
					[dBm]	[mW]		[dBm]	[mW]
Miller-4	902.75	8.85	0.41	19.89	29.15	822.24	0.00	29.15	822.24
	915.25	8.74	0.41	19.89	29.04	801.68	0.00	29.04	801.68
	927.25	8.72	0.42	19.89	29.03	799.83	0.00	29.03	799.83
Miller-2	902.75	8.84	0.41	19.89	29.14	820.35	0.00	29.14	820.35
	915.25	8.73	0.41	19.89	29.03	799.83	0.00	29.03	799.83
	927.25	8.71	0.42	19.89	29.02	797.99	0.00	29.02	797.99
FM0	902.75	8.83	0.41	19.89	29.13	818.46	0.00	29.13	818.46
	915.25	8.73	0.41	19.89	29.03	799.83	0.00	29.03	799.83
	927.25	8.71	0.42	19.89	29.02	797.99	0.00	29.02	797.99

Sample Calculation:

Result (Time average) = Reading + Cable Loss + Attenuator Loss

Result (Burst power average) = Time average + Duty factor

Maximum Peak Output Power (Worst Polarization Check)

Test place Ise EMC Lab. No.4 Measurement Room
Date September 22, 2022
Temperature / Humidity 22 deg. C / 50 % RH
Engineer Junya Okuno
Mode Tx, Hopping Off

Miller-4

Antenna Polarization	Freq. [MHz]	Reading Hori. [dBm]	Reading Vert. [dBm]	Sum [dBm]	Remarks
Circle	915.25	5.78	5.59	8.70	*Sum is Hori + Vert
Hori.	915.25	8.82	-	-	
Vert.	915.25	-	8.80	-	

Miller-2

Antenna Polarization	Freq. [MHz]	Reading Hori. [dBm]	Reading Vert. [dBm]	Sum [dBm]	Remarks
Circle	915.25	5.73	5.60	8.68	*Sum is Hori + Vert
Hori.	915.25	8.80	-	-	
Vert.	915.25	-	8.70	-	

FM0

Antenna Polarization	Freq. [MHz]	Reading Hori. [dBm]	Reading Vert. [dBm]	Sum [dBm]	Remarks
Circle	915.25	5.75	5.52	8.65	*Sum is Hori + Vert
Hori.	915.25	8.78	-	-	
Vert.	915.25	-	8.67	-	

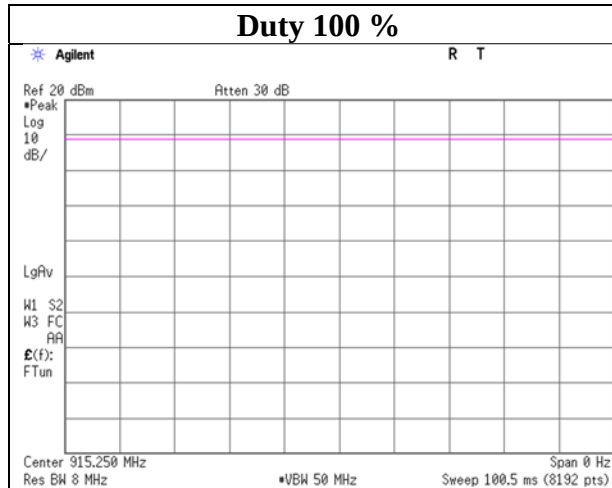
Difference between worst rate check data and formal test result is due to the different test condition.
All comparison was carried out on same frequency and measurement factors.

Burst Rate Confirmation

Test place	Ise EMC Lab. No.4 Measurement Room
Date	September 22, 2022
Temperature / Humidity	22 deg. C / 50 % RH
Engineer	Junya Okuno
Mode	Tx, Hopping Off

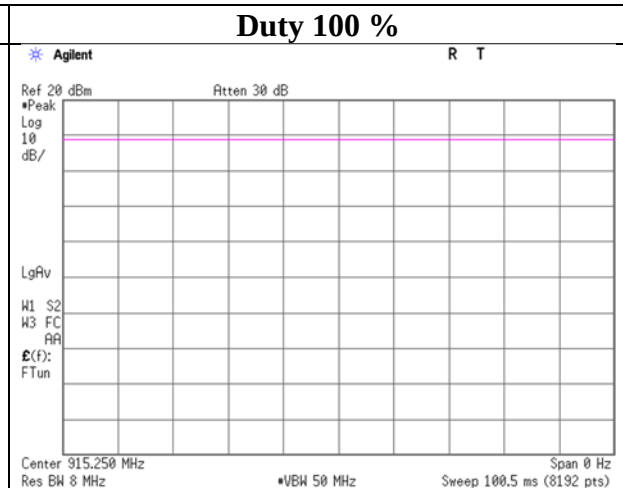
Miller-4

Duty 100 %



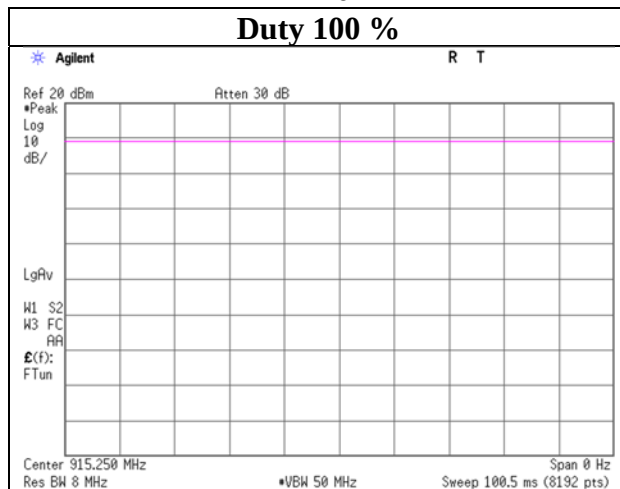
Miller-2

Duty 100 %



FM0

Duty 100 %



Radiated Spurious Emission

Test place	Ise EMC Lab.	No.4
Semi Anechoic Chamber	No.4	No.4
Date	September 20, 2022	September 21, 2022
Temperature / Humidity	23 deg. C / 50 % RH	23 deg. C / 50 % RH
Engineer	Junya Okuno	Takumi Nishida
	(Below 1 GHz)	(Above 1 GHz)
Mode	Tx, Hopping Off, Miller-4, 902.75 MHz	

Polarity	Frequency	Reading (QP / PK)	Reading (AV)	Ant. Factor	Loss	Gain	Duty Factor	Result (QP / PK)	Result (AV)	Limit (QP / PK)	Limit (AV)	Margin (QP / PK)	Margin (AV)	Remark
[Hori/Vert]	[MHz]	[dBuV]	[dBuV]	[dB/m]	[dB]	[dB]	[dB]	[dBuV/m]	[dBuV/m]	[dBuV/m]	[dBuV/m]	[dB]	[dB]	
Hori.	93.5	50.0	-	9.2	7.9	32.1	-	35.0	-	43.5	-	8.5	-	
Hori.	97.6	47.0	-	9.9	7.9	32.1	-	32.7	-	43.5	-	10.8	-	
Hori.	109.9	45.7	-	11.7	8.0	32.1	-	33.4	-	43.5	-	10.1	-	
Hori.	165.4	40.8	-	15.6	8.6	32.0	-	33.0	-	43.5	-	10.5	-	
Hori.	302.2	49.6	-	13.5	9.6	32.0	-	40.7	-	46.0	-	5.3	-	
Hori.	880.5	35.0	-	21.9	12.9	31.4	-	38.5	-	46.0	-	7.5	-	
Hori.	1805.5	51.3	48.8	25.2	5.5	32.5	-	49.5	47.0	73.9	53.9	24.4	6.9	
Hori.	2500.0	48.7	44.9	27.5	5.8	31.7	-	50.2	46.4	73.9	53.9	23.7	7.5	
Hori.	2708.3	48.3	44.2	28.0	5.8	31.6	-	50.6	46.5	73.9	53.9	23.3	7.4	
Hori.	3611.0	43.7	36.0	29.1	6.3	31.2	-	47.9	40.2	73.9	53.9	26.0	13.7	
Hori.	4513.8	40.3	32.7	30.8	6.7	30.9	-	46.9	39.2	73.9	53.9	27.0	14.7	Floor noise
Hori.	5416.5	42.1	34.8	31.8	7.3	30.9	-	50.3	43.0	73.9	53.9	23.6	10.9	
Hori.	6319.3	40.4	32.7	33.2	7.7	31.3	-	50.0	42.3	73.9	53.9	23.9	11.6	Floor noise
Hori.	7222.0	41.7	33.5	35.7	7.9	31.9	-	53.4	45.2	73.9	53.9	20.5	8.7	
Hori.	8124.8	41.7	33.2	36.6	8.2	32.4	-	54.1	45.7	73.9	53.9	19.8	8.3	Floor noise
Hori.	9027.5	42.0	33.0	37.6	8.6	32.0	-	56.2	47.3	73.9	53.9	17.7	6.6	Floor noise
Vert.	30.2	37.0	-	18.5	7.1	32.1	-	30.5	-	40.0	-	9.5	-	
Vert.	140.8	38.5	-	14.5	8.4	32.0	-	29.3	-	43.5	-	14.2	-	
Vert.	144.9	35.5	-	14.7	8.4	32.0	-	26.6	-	43.5	-	16.9	-	
Vert.	260.9	45.8	-	12.2	9.3	32.0	-	35.3	-	46.0	-	10.7	-	
Vert.	873.3	34.8	-	21.9	12.8	31.4	-	38.1	-	46.0	-	7.9	-	
Vert.	880.5	33.8	-	21.9	12.9	31.4	-	37.3	-	46.0	-	8.7	-	
Vert.	1805.5	51.9	49.0	25.2	5.5	32.5	-	50.1	47.2	73.9	53.9	23.8	6.7	
Vert.	2500.0	48.6	44.6	27.5	5.8	31.7	-	50.1	46.1	73.9	53.9	23.8	7.8	
Vert.	2708.3	50.7	47.9	28.0	5.8	31.6	-	53.0	50.2	73.9	53.9	20.9	3.7	
Vert.	3611.0	45.4	40.6	29.1	6.3	31.2	-	49.7	44.8	73.9	53.9	24.2	9.1	
Vert.	4513.8	40.6	32.9	30.8	6.7	30.9	-	47.1	39.4	73.9	53.9	26.8	14.5	Floor noise
Vert.	5416.5	43.8	37.5	31.8	7.3	30.9	-	52.0	45.7	73.9	53.9	21.9	8.2	
Vert.	6319.3	40.8	32.8	33.2	7.7	31.3	-	50.4	42.4	73.9	53.9	23.5	11.5	Floor noise
Vert.	7222.0	42.8	36.0	35.7	7.9	31.9	-	54.5	47.7	73.9	53.9	19.4	6.2	
Vert.	8124.8	41.8	32.9	36.6	8.2	32.4	-	54.3	45.3	73.9	53.9	19.7	8.6	Floor noise
Vert.	9027.5	41.8	33.0	37.6	8.6	32.0	-	56.1	47.2	73.9	53.9	17.8	6.7	Floor noise

Result (QP / PK) = Reading + Ant Factor + Loss (Cable+Attenuator+Filter+Distance factor(above 1 GHz)) - Gain(Amplifier)

Result (AV)= Reading + Ant Factor + Loss (Cable+Attenuator+Filter+Distance factor(above 1 GHz)) - Gain(Amplifier) + Duty factor

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

*QP detector was used up to 1GHz.

20dBc Data Sheet

Polarity	Frequency	Reading (PK)	Ant Factor	Loss	Gain	Result	Limit	Margin	Remark
[Hori/Vert]	[MHz]	[dBuV]	[dB/m]	[dB]	[dB]	[dBuV/m]	[dBuV/m]	[dB]	
Hori.	902.8	95.9	22.0	12.4	0.0	130.3	-	-	Carrier
Hori.	902.0	27.3	22.0	12.4	0.0	61.7	110.3	48.6	
Vert.	902.8	95.6	22.0	12.4	0.0	129.9	-	-	Carrier
Vert.	902.0	27.6	22.0	12.4	0.0	62.0	109.9	47.9	

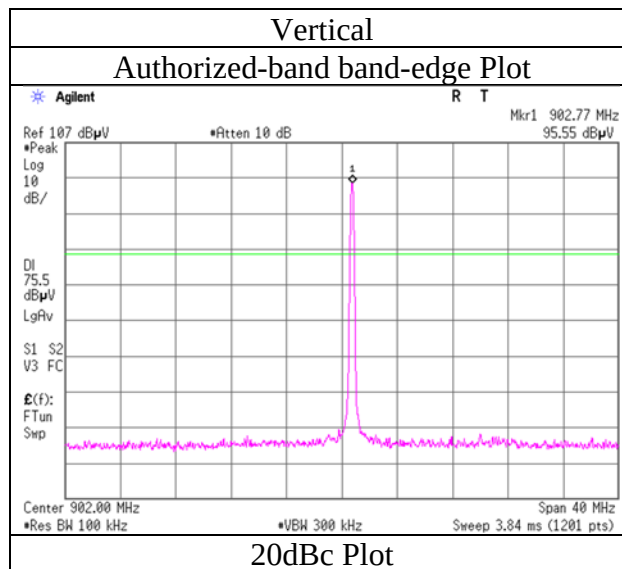
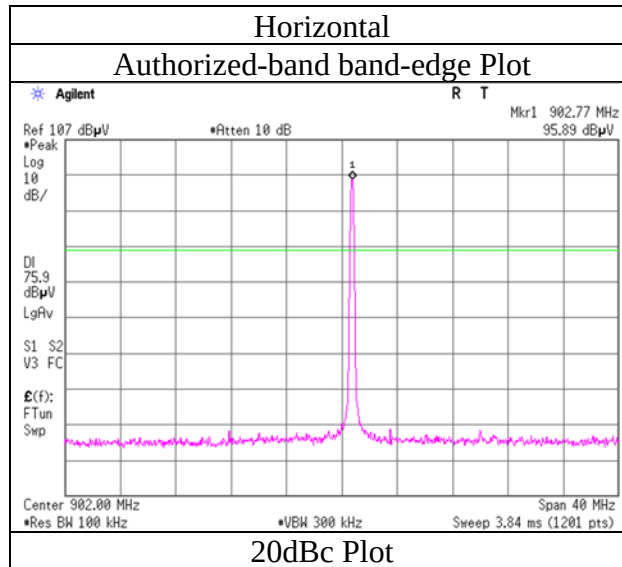
Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter+Distance factor(above 1 GHz)) - Gain(Amplifier)

Distance factor: 1 GHz - 10 GHz 20log (3.85 m / 3.0 m) = 2.17 dB

***These results have sufficient margin without taking account Duty cycle correction factor.**

Radiated Spurious Emission
(Reference Plot for band-edge)

Test place	Ise EMC Lab.
Semi Anechoic Chamber	No.4
Date	September 20, 2022
Temperature / Humidity	23 deg. C / 50 % RH
Engineer	Junya Okuno
	(Below 1 GHz)
Mode	Tx, Hopping Off, Miller-4, 902.75 MHz



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

Radiated Spurious Emission

Test place	Ise EMC Lab.	No.4
Semi Anechoic Chamber	No.4	No.4
Date	September 20, 2022	September 21, 2022
Temperature / Humidity	23 deg. C / 50 % RH	23 deg. C / 50 % RH
Engineer	Junya Okuno	Takumi Nishida
	(Below 1 GHz)	(Above 1 GHz)
Mode	Tx, Hopping Off, Miller-4, 915.25 MHz	

Polarity	Frequency	Reading (QP / PK)	Reading (AV)	Ant. Factor	Loss	Gain	Duty Factor	Result (QP / PK)	Result (AV)	Limit (QP / PK)	Limit (AV)	Margin (QP / PK)	Margin (AV)	Remark
[Hori/Vert]	[MHz]	[dBuV]	[dBuV]	[dB/m]	[dB]	[dB]	[dB]	[dBuV/m]	[dBuV/m]	[dBuV/m]	[dBuV/m]	[dB]	[dB]	
Hori.	1830.5	50.4	47.4	25.2	5.5	32.4	-	48.8	45.7	73.9	53.9	25.1	8.2	
Hori.	2500.0	48.6	44.8	27.5	5.8	31.7	-	50.1	46.3	73.9	53.9	23.8	7.6	
Hori.	2745.8	46.3	41.4	28.2	5.8	31.5	-	48.8	43.9	73.9	53.9	25.1	10.0	
Hori.	3661.0	42.2	35.2	29.2	6.3	31.2	-	46.6	39.6	73.9	53.9	27.3	14.3	
Hori.	4576.3	40.6	32.2	30.9	6.8	30.9	-	47.3	39.0	73.9	53.9	26.6	14.9	Floor noise
Hori.	5491.5	43.3	37.4	31.9	7.3	30.9	-	51.7	45.7	73.9	53.9	22.2	8.2	
Hori.	6406.8	39.8	32.4	33.6	7.7	31.3	-	49.7	42.4	73.9	53.9	24.2	11.5	Floor noise
Hori.	7322.0	42.6	34.2	35.9	8.0	32.0	-	54.4	46.0	73.9	53.9	19.5	7.9	
Hori.	8237.3	41.4	33.5	36.3	8.3	32.3	-	53.6	45.7	73.9	53.9	20.3	8.2	Floor noise
Hori.	9152.5	41.0	32.3	38.2	8.7	32.1	-	55.8	47.1	73.9	53.9	18.1	6.8	Floor noise
Vert.	1830.5	50.6	46.7	25.2	5.5	32.4	-	49.0	45.1	73.9	53.9	24.9	8.8	
Vert.	2500.0	48.7	44.7	27.5	5.8	31.7	-	50.2	46.2	73.9	53.9	23.7	7.7	
Vert.	2745.8	49.7	46.7	28.2	5.8	31.5	-	52.2	49.2	73.9	53.9	21.7	4.7	
Vert.	3661.0	44.5	38.6	29.2	6.3	31.2	-	48.9	42.9	73.9	53.9	25.0	11.0	
Vert.	4576.3	40.3	32.0	30.9	6.8	30.9	-	47.1	38.8	73.9	53.9	26.8	15.1	Floor noise
Vert.	5491.5	43.5	38.5	31.9	7.3	30.9	-	51.9	46.8	73.9	53.9	22.0	7.1	
Vert.	6406.8	40.0	32.5	33.6	7.7	31.3	-	49.9	42.4	73.9	53.9	24.0	11.5	Floor noise
Vert.	7322.0	43.5	36.0	35.9	8.0	32.0	-	55.3	47.8	73.9	53.9	18.6	6.1	
Vert.	8237.3	41.3	33.2	36.3	8.3	32.3	-	53.5	45.5	73.9	53.9	20.4	8.4	Floor noise
Vert.	9152.5	41.3	32.4	38.2	8.7	32.1	-	56.1	47.2	73.9	53.9	17.8	6.7	Floor noise

Result (QP / PK) = Reading + Ant Factor + Loss (Cable+Attenuator+Filter+Distance factor(above 1 GHz)) - Gain(Amplifier)

Result (AV)= Reading + Ant Factor + Loss (Cable+Attenuator+Filter+Distance factor(above 1 GHz)) - Gain(Amplifier) + Duty factor

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

*QP detector was used up to 1GHz.

Distance factor: 1 GHz - 10 GHz 20log (3.85 m / 3.0 m) = 2.17 dB

***These results have sufficient margin without taking account Duty cycle correction factor.**

Radiated Spurious Emission

Test place	Ise EMC Lab.	
Semi Anechoic Chamber	No.4	No.4
Date	September 20, 2022	September 21, 2022
Temperature / Humidity	23 deg. C / 50 % RH	23 deg. C / 50 % RH
Engineer	Junya Okuno	Takumi Nishida
	(Below 1 GHz)	(Above 1 GHz)
Mode	Tx, Hopping Off, Miller-4, 927.25 MHz	

Polarity	Frequency	Reading (QP / PK)	Reading (AV)	Ant. Factor	Loss	Gain	Duty Factor	Result (QP / PK)	Result (AV)	Limit (QP / PK)	Limit (AV)	Margin (QP / PK)	Margin (AV)	Remark
[Hori/Vert]	[MHz]	[dBuV]	[dBuV]	[dB/m]	[dB]	[dB]	[dB]	[dBuV/m]	[dBuV/m]	[dBuV/m]	[dBuV/m]	[dB]	[dB]	
Hori.	1854.5	48.7	45.0	25.3	5.5	32.3	-	47.2	43.6	73.9	53.9	26.7	10.3	
Hori.	2500.0	48.9	44.9	27.5	5.8	31.7	-	50.4	46.4	73.9	53.9	23.5	7.5	
Hori.	2781.8	46.0	41.9	28.3	5.9	31.5	-	48.7	44.6	73.9	53.9	25.2	9.3	
Hori.	3709.0	43.4	38.0	29.3	6.3	31.1	-	48.0	42.5	73.9	53.9	26.0	11.4	
Hori.	4636.3	40.6	31.6	31.0	6.8	30.9	-	47.5	38.5	73.9	53.9	26.4	15.4	Floor noise
Hori.	5563.5	41.9	35.5	31.9	7.4	30.9	-	50.2	43.8	73.9	53.9	23.7	10.1	
Hori.	6490.8	40.8	32.1	33.9	7.7	31.4	-	51.0	42.3	73.9	53.9	22.9	11.6	Floor noise
Hori.	7418.0	42.5	33.7	36.1	8.0	32.1	-	54.5	45.7	73.9	53.9	19.5	8.2	
Hori.	8345.3	41.3	33.4	36.2	8.3	32.3	-	53.5	45.6	73.9	53.9	20.4	8.3	Floor noise
Hori.	9272.5	41.2	32.3	38.8	8.7	32.1	-	56.6	47.7	73.9	53.9	17.3	6.3	Floor noise
Vert.	1854.5	50.3	47.3	25.3	5.5	32.3	-	48.9	45.9	73.9	53.9	25.0	8.0	
Vert.	2500.0	48.7	44.8	27.5	5.8	31.7	-	50.2	46.3	73.9	53.9	23.7	7.6	
Vert.	2781.8	48.5	44.6	28.3	5.9	31.5	-	51.2	47.2	73.9	53.9	22.7	6.7	
Vert.	3709.0	45.9	41.9	29.3	6.3	31.1	-	50.4	46.4	73.9	53.9	23.5	7.5	
Vert.	4636.3	40.2	31.6	31.0	6.8	30.9	-	47.2	38.5	73.9	53.9	26.7	15.4	Floor noise
Vert.	5563.5	43.8	38.3	31.9	7.4	30.9	-	52.1	46.7	73.9	53.9	21.8	7.2	
Vert.	6490.8	40.7	32.0	33.9	7.7	31.4	-	50.9	42.2	73.9	53.9	23.0	11.7	Floor noise
Vert.	7418.0	43.4	35.7	36.1	8.0	32.1	-	55.4	47.7	73.9	53.9	18.5	6.3	
Vert.	8345.3	41.6	33.2	36.2	8.3	32.3	-	53.8	45.4	73.9	53.9	20.1	8.5	Floor noise
Vert.	9272.5	41.3	32.4	38.8	8.7	32.1	-	56.7	47.8	73.9	53.9	17.2	6.1	Floor noise

Result (QP / PK) = Reading + Ant Factor + Loss (Cable+Attenuator+Filter+Distance factor(above 1 GHz)) - Gain(Amplifier)

Result (AV)= Reading + Ant Factor + Loss (Cable+Attenuator+Filter+Distance factor(above 1 GHz)) - Gain(Amplifier) + Duty factor

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

*QP detector was used up to 1GHz.

20dBc Data Sheet

Polarity	Frequency	Reading (PK)	Ant Factor	Loss	Gain	Result	Limit	Margin	Remark
[Hori/Vert]	[MHz]	[dBuV]	[dB/m]	[dB]	[dB]	[dBuV/m]	[dBuV/m]	[dB]	
Hori.	927.3	92.2	22.1	12.5	0.0	126.7	-	-	Carrier
Hori.	928.0	24.9	22.1	12.5	0.0	59.5	106.7	47.3	
Vert.	927.3	92.9	22.1	12.5	0.0	127.4	-	-	Carrier
Vert.	928.0	25.3	22.1	12.5	0.0	59.9	107.4	47.5	

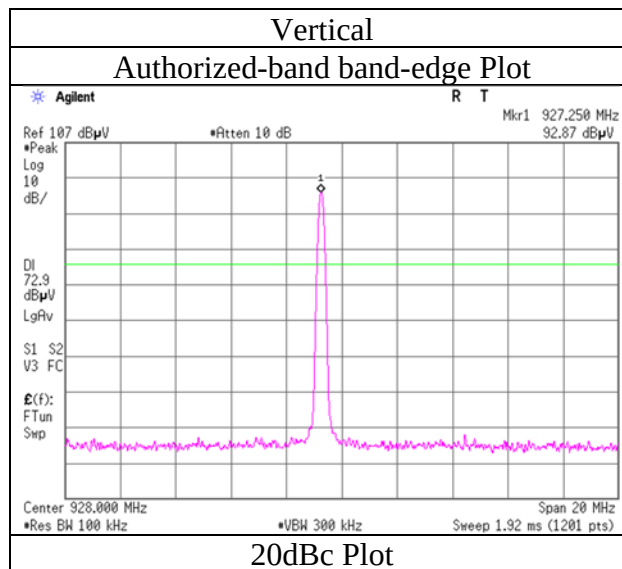
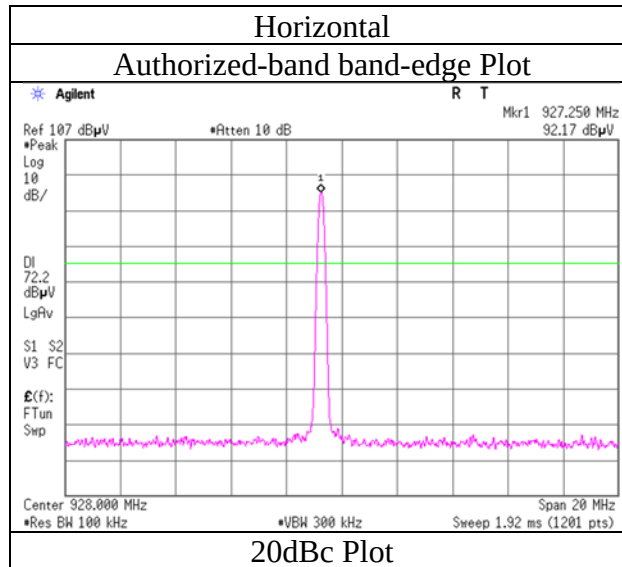
Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter+Distance factor(above 1 GHz)) - Gain(Amplifier)

Distance factor: 1 GHz - 10 GHz 20log (3.85 m / 3.0 m) = 2.17 dB

***These results have sufficient margin without taking account Duty cycle correction factor.**

Radiated Spurious Emission
(Reference Plot for band-edge)

Test place	Ise EMC Lab.
Semi Anechoic Chamber	No.4
Date	September 20, 2022
Temperature / Humidity	23 deg. C / 50 % RH
Engineer	Junya Okuno
	(Below 1 GHz)
Mode	Tx, Hopping Off, Miller-4, 927.25 MHz



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

Radiated Spurious Emission

Test place Ise EMC Lab.
Semi Anechoic Chamber No.4 No.4
Date September 20, 2022 September 21, 2022
Temperature / Humidity 23 deg. C / 50 % RH 23 deg. C / 50 % RH
Engineer Junya Okuno Takumi Nishida
 (Below 1 GHz) (Above 1 GHz)
Mode Tx, Hopping Off, Miller-2, 902.75 MHz

Polarity	Frequency	Reading (QP / PK)	Reading (AV)	Ant. Factor	Loss	Gain	Duty Factor	Result (QP / PK)	Result (AV)	Limit (QP / PK)	Limit (AV)	Margin (QP / PK)	Margin (AV)	Remark
[Hori/Vert]	[MHz]	[dBuV]	[dBuV]	[dB/m]	[dB]	[dB]	[dB]	[dBuV/m]	[dBuV/m]	[dBuV/m]	[dBuV/m]	[dB]	[dB]	
Hori.	93.5	50.1	-	9.2	7.9	32.1	-	35.1	-	43.5	-	8.4	-	
Hori.	94.6	49.9	-	9.4	7.9	32.1	-	35.1	-	43.5	-	8.4	-	
Hori.	164.5	40.6	-	15.6	8.6	32.0	-	32.7	-	43.5	-	10.8	-	
Hori.	302.3	49.3	-	13.5	9.6	32.0	-	40.4	-	46.0	-	5.6	-	
Hori.	873.3	36.7	-	21.9	12.8	31.4	-	40.0	-	46.0	-	6.0	-	
Hori.	880.5	35.5	-	21.9	12.9	31.4	-	39.0	-	46.0	-	7.0	-	
Hori.	1805.5	51.0	48.5	25.2	5.5	32.5	-	49.2	46.7	73.9	53.9	24.7	7.2	
Hori.	2500.0	48.8	44.7	27.5	5.8	31.7	-	50.4	46.2	73.9	53.9	23.6	7.7	
Hori.	2708.3	48.0	44.3	28.0	5.8	31.6	-	50.3	46.6	73.9	53.9	23.6	7.3	
Hori.	3611.0	43.3	36.3	29.1	6.3	31.2	-	47.5	40.5	73.9	53.9	26.4	13.4	
Hori.	4513.8	40.3	32.5	30.8	6.7	30.9	-	46.9	39.0	73.9	53.9	27.0	14.9	Floor noise
Hori.	5416.5	42.2	34.6	31.8	7.3	30.9	-	50.4	42.8	73.9	53.9	23.5	11.1	
Hori.	6319.3	40.4	32.6	33.2	7.7	31.3	-	50.0	42.2	73.9	53.9	23.9	11.8	Floor noise
Hori.	7222.0	41.6	33.7	35.7	7.9	31.9	-	53.3	45.4	73.9	53.9	20.6	8.5	
Hori.	8124.8	41.6	33.6	36.6	8.2	32.4	-	54.0	46.1	73.9	53.9	19.9	7.8	Floor noise
Hori.	9027.5	41.8	33.2	37.6	8.6	32.0	-	56.0	47.5	73.9	53.9	17.9	6.5	Floor noise
Vert.	30.2	36.5	-	18.5	7.1	32.1	-	30.0	-	40.0	-	10.0	-	
Vert.	39.5	31.8	-	15.0	7.2	32.1	-	22.0	-	40.0	-	18.1	-	
Vert.	66.7	36.1	-	6.6	7.6	32.1	-	18.2	-	40.0	-	21.8	-	
Vert.	140.8	38.3	-	14.5	8.4	32.0	-	29.1	-	43.5	-	14.4	-	
Vert.	873.3	34.9	-	21.9	12.8	31.4	-	38.2	-	46.0	-	7.8	-	
Vert.	880.5	33.7	-	21.9	12.9	31.4	-	37.2	-	46.0	-	8.8	-	
Vert.	1805.5	51.6	48.8	25.2	5.5	32.5	-	49.8	47.0	73.9	53.9	24.1	6.9	
Vert.	2500.0	48.7	44.5	27.5	5.8	31.7	-	50.2	46.0	73.9	53.9	23.7	7.9	
Vert.	2708.3	50.4	48.1	28.0	5.8	31.6	-	52.7	50.4	73.9	53.9	21.3	3.5	
Vert.	3611.0	45.4	41.6	29.1	6.3	31.2	-	49.6	45.8	73.9	53.9	24.3	8.1	
Vert.	4513.8	40.8	32.7	30.8	6.7	30.9	-	47.3	39.3	73.9	53.9	26.6	14.6	Floor noise
Vert.	5416.5	43.6	37.7	31.8	7.3	30.9	-	51.8	45.9	73.9	53.9	22.1	8.0	
Vert.	6319.3	40.9	32.6	33.2	7.7	31.3	-	50.5	42.2	73.9	53.9	23.4	11.7	Floor noise
Vert.	7222.0	42.8	36.0	35.7	7.9	31.9	-	54.5	47.7	73.9	53.9	19.4	6.2	
Vert.	8124.8	41.7	33.0	36.6	8.2	32.4	-	54.2	45.4	73.9	53.9	19.7	8.5	Floor noise
Vert.	9027.5	41.6	32.7	37.6	8.6	32.0	-	55.9	46.9	73.9	53.9	18.0	7.0	Floor noise

Result (QP / PK) = Reading + Ant Factor + Loss (Cable+Attenuator+Filter+Distance factor(above 1 GHz)) - Gain(Amplifier)

Result (AV)= Reading + Ant Factor + Loss (Cable+Attenuator+Filter+Distance factor(above 1 GHz)) - Gain(Amplifier) + Duty factor

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

*QP detector was used up to 1GHz.

20dBc Data Sheet

Polarity	Frequency	Reading (PK)	Ant Factor	Loss	Gain	Result	Limit	Margin	Remark
[Hori/Vert]	[MHz]	[dBuV]	[dB/m]	[dB]	[dB]	[dBuV/m]	[dBuV/m]	[dB]	
Hori.	902.8	96.0	22.0	12.4	0.0	130.4	-	-	Carrier
Hori.	902.0	27.2	22.0	12.4	0.0	61.6	110.4	48.8	
Vert.	902.8	95.6	22.0	12.4	0.0	130.0	-	-	Carrier
Vert.	902.0	27.2	22.0	12.4	0.0	61.6	110.0	48.4	

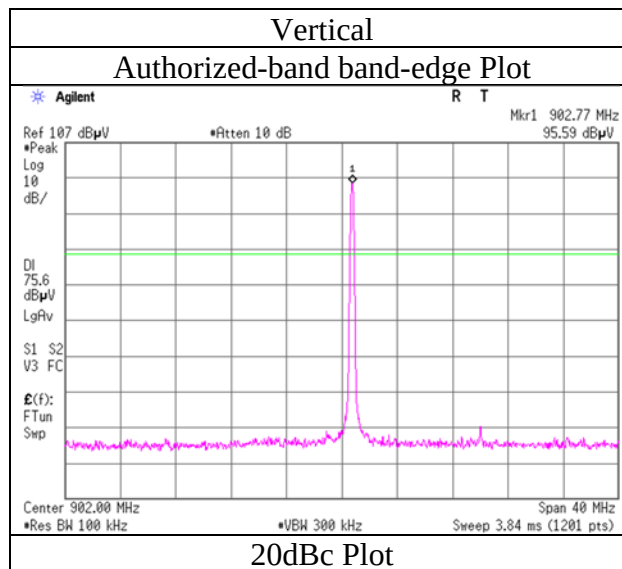
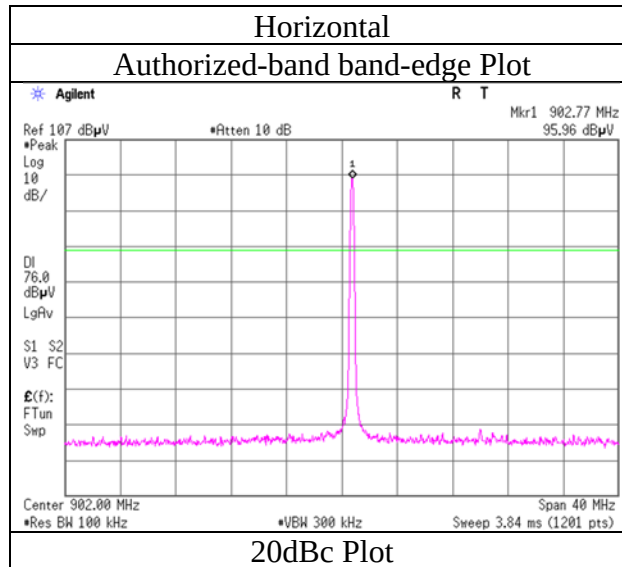
Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter+Distance factor(above 1 GHz)) - Gain(Amplifier)

Distance factor: 1 GHz - 10 GHz 20log (3.85 m / 3.0 m) = 2.17 dB

***These results have sufficient margin without taking account Duty cycle correction factor.**

Radiated Spurious Emission
(Reference Plot for band-edge)

Test place	Ise EMC Lab.
Semi Anechoic Chamber	No.4
Date	September 20, 2022
Temperature / Humidity	23 deg. C / 50 % RH
Engineer	Junya Okuno
	(Below 1 GHz)
Mode	Tx, Hopping Off, Miller-2, 902.75 MHz



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

Radiated Spurious Emission

Test place	Ise EMC Lab.	
Semi Anechoic Chamber	No.4	No.4
Date	September 20, 2022	September 21, 2022
Temperature / Humidity	23 deg. C / 50 % RH	23 deg. C / 50 % RH
Engineer	Junya Okuno	Takumi Nishida
	(Below 1 GHz)	(Above 1 GHz)
Mode	Tx, Hopping Off, Miller-2, 915.25 MHz	

Polarity	Frequency	Reading (QP / PK)	Reading (AV)	Ant. Factor	Loss	Gain	Duty Factor	Result (QP / PK)	Result (AV)	Limit (QP / PK)	Limit (AV)	Margin (QP / PK)	Margin (AV)	Remark
[Hori/Vert]	[MHz]	[dBuV]	[dBuV]	[dB/m]	[dB]	[dB]	[dB]	[dBuV/m]	[dBuV/m]	[dBuV/m]	[dBuV/m]	[dB]	[dB]	
Hori.	1830.5	50.7	47.5	25.2	5.5	32.4	-	49.0	45.8	73.9	53.9	24.9	8.1	
Hori.	2500.0	48.4	44.6	27.5	5.8	31.7	-	50.0	46.2	73.9	53.9	23.9	7.7	
Hori.	2745.8	46.3	41.6	28.2	5.8	31.5	-	48.8	44.1	73.9	53.9	25.2	9.8	
Hori.	3661.0	42.5	35.3	29.2	6.3	31.2	-	46.9	39.7	73.9	53.9	27.0	14.2	
Hori.	4576.3	40.7	32.4	30.9	6.8	30.9	-	47.4	39.2	73.9	53.9	26.5	14.7	Floor noise
Hori.	5491.5	43.5	37.5	31.9	7.3	30.9	-	51.8	45.8	73.9	53.9	22.1	8.1	
Hori.	6406.8	39.9	32.7	33.6	7.7	31.3	-	49.9	42.6	73.9	53.9	24.1	11.3	Floor noise
Hori.	7322.0	42.7	34.3	35.9	8.0	32.0	-	54.5	46.2	73.9	53.9	19.4	7.7	
Hori.	8237.3	41.3	33.4	36.3	8.3	32.3	-	53.5	45.6	73.9	53.9	20.4	8.3	Floor noise
Hori.	9152.5	41.2	32.4	38.2	8.7	32.1	-	56.0	47.2	73.9	53.9	17.9	6.7	Floor noise
Vert.	1830.5	50.7	46.6	25.2	5.5	32.4	-	49.1	44.9	73.9	53.9	24.8	9.0	
Vert.	2500.0	48.7	44.5	27.5	5.8	31.7	-	50.2	46.0	73.9	53.9	23.7	7.9	
Vert.	2745.8	49.6	46.7	28.2	5.8	31.5	-	52.1	49.2	73.9	53.9	21.8	4.7	
Vert.	3661.0	44.7	38.6	29.2	6.3	31.2	-	49.1	42.9	73.9	53.9	24.8	11.0	
Vert.	4576.3	40.4	32.1	30.9	6.8	30.9	-	47.1	38.9	73.9	53.9	26.8	15.0	Floor noise
Vert.	5491.5	43.5	38.6	31.9	7.3	30.9	-	51.8	46.9	73.9	53.9	22.1	7.0	
Vert.	6406.8	39.7	32.5	33.6	7.7	31.3	-	49.6	42.5	73.9	53.9	24.3	11.4	Floor noise
Vert.	7322.0	43.4	36.1	35.9	8.0	32.0	-	55.2	47.9	73.9	53.9	18.7	6.0	
Vert.	8237.3	41.4	33.5	36.3	8.3	32.3	-	53.6	45.8	73.9	53.9	20.3	8.1	Floor noise
Vert.	9152.5	41.3	32.2	38.2	8.7	32.1	-	56.1	47.0	73.9	53.9	17.8	6.9	Floor noise

Result (QP / PK) = Reading + Ant Factor + Loss (Cable+Attenuator+Filter+Distance factor(above 1 GHz)) - Gain(Amplifier)

Result (AV)= Reading + Ant Factor + Loss (Cable+Attenuator+Filter+Distance factor(above 1 GHz)) - Gain(Amplifier) + Duty factor

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

*QP detector was used up to 1GHz.

Distance factor: 1 GHz - 10 GHz 20log(3.85 m / 3.0 m) = 2.17 dB

***These results have sufficient margin without taking account Duty cycle correction factor.**

Radiated Spurious Emission

Test place	Ise EMC Lab.	No.4
Semi Anechoic Chamber	No.4	No.4
Date	September 20, 2022	September 21, 2022
Temperature / Humidity	23 deg. C / 50 % RH	23 deg. C / 50 % RH
Engineer	Junya Okuno	Takumi Nishida
	(Below 1 GHz)	(Above 1 GHz)
Mode	Tx, Hopping Off, Miller-2, 927.25 MHz	

Polarity	Frequency	Reading (QP / PK)	Reading (AV)	Ant. Factor	Loss	Gain	Duty Factor	Result (QP / PK)	Result (AV)	Limit (QP / PK)	Limit (AV)	Margin (QP / PK)	Margin (AV)	Remark
[Hori/Vert]	[MHz]	[dBuV]	[dBuV]	[dB/m]	[dB]	[dB]	[dB]	[dBuV/m]	[dBuV/m]	[dBuV/m]	[dBuV/m]	[dB]	[dB]	
Hori.	1854.5	48.6	45.2	25.3	5.5	32.3	-	47.1	43.7	73.9	53.9	26.8	10.2	
Hori.	2500.0	49.0	44.9	27.5	5.8	31.7	-	50.5	46.5	73.9	53.9	23.4	7.5	
Hori.	2781.8	45.7	41.6	28.3	5.9	31.5	-	48.4	44.2	73.9	53.9	25.5	9.7	
Hori.	3709.0	43.5	37.8	29.3	6.3	31.1	-	48.0	42.3	73.9	53.9	25.9	11.6	
Hori.	4636.3	40.4	31.7	31.0	6.8	30.9	-	47.3	38.6	73.9	53.9	26.6	15.3	Floor noise
Hori.	5563.5	41.7	35.6	31.9	7.4	30.9	-	50.0	43.9	73.9	53.9	23.9	10.0	
Hori.	6490.8	40.7	32.2	33.9	7.7	31.4	-	50.9	42.4	73.9	53.9	23.0	11.5	Floor noise
Hori.	7418.0	42.3	33.7	36.1	8.0	32.1	-	54.3	45.7	73.9	53.9	19.6	8.2	
Hori.	8345.3	41.2	33.5	36.2	8.3	32.3	-	53.4	45.7	73.9	53.9	20.5	8.2	Floor noise
Hori.	9272.5	41.4	32.4	38.8	8.7	32.1	-	56.7	47.7	73.9	53.9	17.2	6.2	Floor noise
Vert.	1854.5	50.2	47.5	25.3	5.5	32.3	-	48.8	46.0	73.9	53.9	25.1	7.9	
Vert.	2500.0	48.8	44.9	27.5	5.8	31.7	-	50.3	46.4	73.9	53.9	23.6	7.5	
Vert.	2781.8	48.6	44.7	28.3	5.9	31.5	-	51.3	47.4	73.9	53.9	22.7	6.5	
Vert.	3709.0	45.5	41.7	29.3	6.3	31.1	-	50.0	46.2	73.9	53.9	23.9	7.7	
Vert.	4636.3	40.4	31.6	31.0	6.8	30.9	-	47.3	38.6	73.9	53.9	26.6	15.3	Floor noise
Vert.	5563.5	43.5	38.4	31.9	7.4	30.9	-	51.9	46.8	73.9	53.9	22.1	7.1	
Vert.	6490.8	40.4	31.8	33.9	7.7	31.4	-	50.6	42.0	73.9	53.9	23.3	11.9	Floor noise
Vert.	7418.0	43.5	35.3	36.1	8.0	32.1	-	55.5	47.3	73.9	53.9	18.5	6.6	
Vert.	8345.3	41.9	33.1	36.2	8.3	32.3	-	54.1	45.3	73.9	53.9	19.8	8.6	Floor noise
Vert.	9272.5	41.5	32.2	38.8	8.7	32.1	-	56.8	47.6	73.9	53.9	17.1	6.3	Floor noise

Result (QP / PK) = Reading + Ant Factor + Loss (Cable+Attenuator+Filter+Distance factor(above 1 GHz)) - Gain(Amplifier)

Result (AV)= Reading + Ant Factor + Loss (Cable+Attenuator+Filter+Distance factor(above 1 GHz)) - Gain(Amplifier) + Duty factor

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

*QP detector was used up to 1GHz.

20dBc Data Sheet

Polarity	Frequency	Reading (PK)	Ant Factor	Loss	Gain	Result	Limit	Margin	Remark
[Hori/Vert]	[MHz]	[dBuV]	[dB/m]	[dB]	[dB]	[dBuV/m]	[dBuV/m]	[dB]	
Hori.	927.3	91.8	22.1	12.5	0.0	126.3	-	-	Carrier
Hori.	928.0	25.4	22.1	12.5	0.0	59.9	106.3	46.4	
Vert.	927.3	92.9	22.1	12.5	0.0	127.4	-	-	Carrier
Vert.	928.0	25.2	22.1	12.5	0.0	59.7	107.4	47.7	

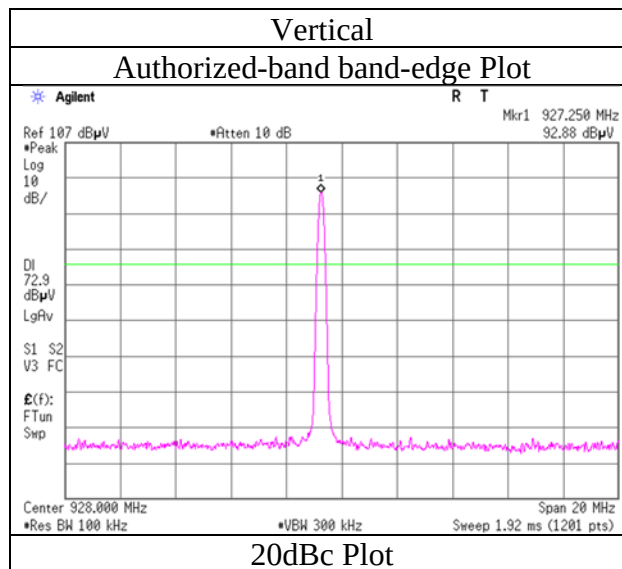
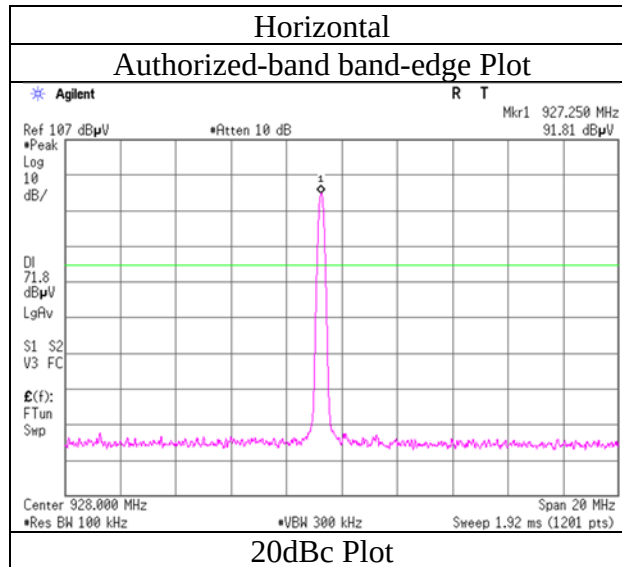
Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter+Distance factor(above 1 GHz)) - Gain(Amplifier)

Distance factor: 1 GHz - 10 GHz 20log(3.85 m / 3.0 m) = 2.17 dB

***These results have sufficient margin without taking account Duty cycle correction factor.**

Radiated Spurious Emission
(Reference Plot for band-edge)

Test place	Ise EMC Lab.
Semi Anechoic Chamber	No.4
Date	September 20, 2022
Temperature / Humidity	23 deg. C / 50 % RH
Engineer	Junya Okuno
	(Below 1 GHz)
Mode	Tx, Hopping Off, Miller-2, 927.25 MHz



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

Radiated Spurious Emission

Test place	Ise EMC Lab.	No.4
Semi Anechoic Chamber	No.4	No.4
Date	September 20, 2022	September 21, 2022
Temperature / Humidity	23 deg. C / 50 % RH	23 deg. C / 50 % RH
Engineer	Junya Okuno	Junya Okuno
	(Below 1 GHz)	(Above 1 GHz)
Mode	Tx, Hopping Off, FM0, 902.75 MHz	

Polarity	Frequency	Reading (QP / PK)	Reading (AV)	Ant. Factor	Loss	Gain	Duty Factor	Result (QP / PK)	Result (AV)	Limit (QP / PK)	Limit (AV)	Margin (QP / PK)	Margin (AV)	Remark
[Hori/Vert]	[MHz]	[dBuV]	[dBuV]	[dB/m]	[dB]	[dB]	[dB]	[dBuV/m]	[dBuV/m]	[dBuV/m]	[dBuV/m]	[dB]	[dB]	
Hori.	93.5	49.8	-	9.2	7.9	32.1	-	34.8	-	43.5	-	8.7	-	
Hori.	97.6	46.8	-	9.9	7.9	32.1	-	32.5	-	43.5	-	11.0	-	
Hori.	101.5	48.0	-	10.5	8.0	32.1	-	34.4	-	43.5	-	9.1	-	
Hori.	302.2	49.3	-	13.5	9.6	32.0	-	40.4	-	46.0	-	5.6	-	
Hori.	873.3	36.6	-	21.9	12.8	31.4	-	39.9	-	46.0	-	6.1	-	
Hori.	880.5	35.2	-	21.9	12.9	31.4	-	38.7	-	46.0	-	7.3	-	
Hori.	1200.0	49.3	43.3	25.2	6.1	34.1	-	46.6	40.5	73.9	53.9	27.4	13.4	
Hori.	1805.5	51.0	48.3	25.2	5.5	32.5	-	49.3	46.5	73.9	53.9	24.6	7.4	
Hori.	2500.0	48.1	43.8	27.5	5.8	31.7	-	49.6	45.3	73.9	53.9	24.3	8.6	
Hori.	2708.3	44.4	38.2	28.0	6.2	31.6	-	47.1	40.9	73.9	53.9	26.8	13.0	
Hori.	3611.0	43.2	35.9	29.1	6.3	31.2	-	47.5	40.2	73.9	53.9	26.4	13.7	
Hori.	4513.8	41.5	32.1	30.8	6.7	30.9	-	48.1	38.6	73.9	53.9	25.8	15.3	Floor noise
Hori.	5416.5	41.5	34.1	31.8	7.3	30.9	-	49.7	42.3	73.9	53.9	24.2	11.6	
Hori.	6319.3	41.1	32.2	33.2	7.7	31.3	-	50.7	41.8	73.9	53.9	23.2	12.1	Floor noise
Hori.	7222.0	41.5	33.3	35.7	7.9	31.9	-	53.3	45.0	73.9	53.9	20.6	8.9	
Hori.	8124.8	41.1	32.9	36.6	8.2	32.4	-	53.5	45.3	73.9	53.9	20.4	8.6	Floor noise
Hori.	9027.5	40.6	33.4	37.6	8.6	32.0	-	54.8	47.6	73.9	53.9	19.1	6.3	Floor noise
Vert.	30.2	36.8	-	18.5	7.1	32.1	-	30.3	-	40.0	-	9.7	-	
Vert.	39.2	31.6	-	15.2	7.2	32.1	-	21.9	-	40.0	-	18.1	-	
Vert.	140.8	38.8	-	14.5	8.4	32.0	-	29.6	-	43.5	-	13.9	-	
Vert.	260.9	45.5	-	12.2	9.3	32.0	-	35.0	-	46.0	-	11.0	-	
Vert.	873.3	35.0	-	21.9	12.8	31.4	-	38.3	-	46.0	-	7.7	-	
Vert.	880.5	33.6	-	21.9	12.9	31.4	-	37.1	-	46.0	-	8.9	-	
Vert.	1200.0	50.1	42.9	25.2	6.1	34.1	-	47.4	40.1	73.9	53.9	26.5	13.8	
Vert.	1805.5	50.7	47.9	25.2	5.5	32.5	-	48.9	46.1	73.9	53.9	25.0	7.8	
Vert.	2500.0	47.1	42.6	27.5	5.8	31.7	-	48.6	44.1	73.9	53.9	25.3	9.8	
Vert.	2708.3	48.6	44.6	28.0	6.2	31.6	-	51.3	47.3	73.9	53.9	22.6	6.6	
Vert.	3611.0	44.3	39.4	29.1	6.3	31.2	-	48.5	43.6	73.9	53.9	25.4	10.3	
Vert.	4513.8	41.2	31.8	30.8	6.7	30.9	-	47.8	38.3	73.9	53.9	26.1	15.6	Floor noise
Vert.	5416.5	42.6	36.5	31.8	7.3	30.9	-	50.8	44.7	73.9	53.9	23.1	9.2	
Vert.	6319.3	40.8	32.5	33.2	7.7	31.3	-	50.4	42.1	73.9	53.9	23.5	11.8	Floor noise
Vert.	7222.0	42.6	34.3	35.7	7.9	31.9	-	54.3	46.0	73.9	53.9	19.6	7.9	
Vert.	8124.8	41.7	33.0	36.6	8.2	32.4	-	54.1	45.5	73.9	53.9	19.8	8.4	Floor noise
Vert.	9027.5	40.9	33.2	37.6	8.6	32.0	-	55.2	47.5	73.9	53.9	18.8	6.4	Floor noise

Result (QP / PK) = Reading + Ant Factor + Loss (Cable+Attenuator+Filter+Distance factor(above 1 GHz)) - Gain(Amplifier)

Result (AV)= Reading + Ant Factor + Loss (Cable+Attenuator+Filter+Distance factor(above 1 GHz)) - Gain(Amplifier) + Duty factor

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

*QP detector was used up to 1GHz.

20dBc Data Sheet

Polarity	Frequency	Reading (PK)	Ant Factor	Loss	Gain	Result	Limit	Margin	Remark
[Hori/Vert]	[MHz]	[dBuV]	[dB/m]	[dB]	[dB]	[dBuV/m]	[dBuV/m]	[dB]	
Hori.	902.8	95.6	22.0	12.4	0.0	130.0	-	-	Carrier
Hori.	902.0	27.2	22.0	12.4	0.0	61.6	110.0	48.5	
Vert.	902.8	95.5	22.0	12.4	0.0	129.9	-	-	Carrier
Vert.	902.0	27.3	22.0	12.4	0.0	61.7	109.9	48.2	

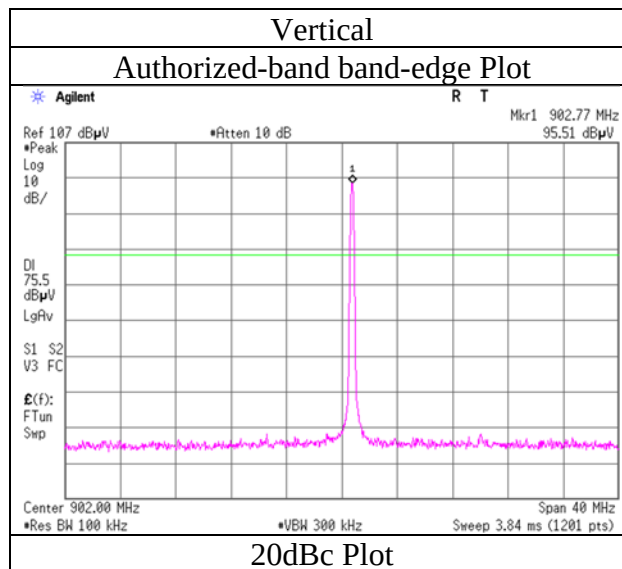
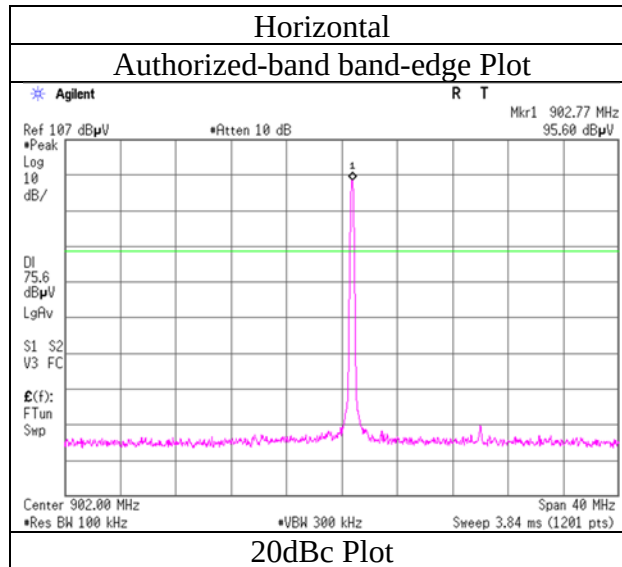
Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter+Distance factor(above 1 GHz)) - Gain(Amplifier)

Distance factor: 1 GHz - 10 GHz 20log (3.85 m / 3.0 m) = 2.17 dB

***These results have sufficient margin without taking account Duty cycle correction factor.**

Radiated Spurious Emission
(Reference Plot for band-edge)

Test place	Ise EMC Lab.
Semi Anechoic Chamber	No.4
Date	September 20, 2022
Temperature / Humidity	23 deg. C / 50 % RH
Engineer	Junya Okuno
	(Below 1 GHz)
Mode	Tx, Hopping Off, FM0, 902.75 MHz



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

Radiated Spurious Emission

Test place	Ise EMC Lab.	No.4
Semi Anechoic Chamber	No.4	No.4
Date	September 20, 2022	September 21, 2022
Temperature / Humidity	23 deg. C / 50 % RH	23 deg. C / 50 % RH
Engineer	Junya Okuno	Junya Okuno
	(Below 1 GHz)	(Above 1 GHz)
Mode	Tx, Hopping Off, FM0, 915.25 MHz	

Polarity	Frequency	Reading (QP / PK)	Reading (AV)	Ant. Factor	Loss	Gain	Duty Factor	Result (QP / PK)	Result (AV)	Limit (QP / PK)	Limit (AV)	Margin (QP / PK)	Margin (AV)	Remark
[Hori/Vert]	[MHz]	[dBuV]	[dBuV]	[dB/m]	[dB]	[dB]	[dB]	[dBuV/m]	[dBuV/m]	[dBuV/m]	[dBuV/m]	[dB]	[dB]	
Hori.	1200.0	49.2	43.2	25.2	6.1	34.1	-	46.5	40.4	73.9	53.9	27.5	13.5	
Hori.	1830.5	50.5	47.6	25.2	5.5	32.4	-	48.9	46.0	73.9	53.9	25.0	7.9	
Hori.	2500.0	48.2	43.7	27.5	5.8	31.7	-	49.7	45.2	73.9	53.9	24.2	8.7	
Hori.	2745.8	45.1	40.3	28.2	5.8	31.5	-	47.6	42.8	73.9	53.9	26.3	11.1	
Hori.	3661.0	43.3	37.0	29.2	6.3	31.2	-	47.6	41.3	73.9	53.9	26.3	12.6	
Hori.	4576.3	39.5	31.3	30.9	6.8	30.9	-	46.2	38.1	73.9	53.9	27.7	15.8	Floor noise
Hori.	5491.5	44.0	37.6	31.9	7.3	30.9	-	52.3	45.9	73.9	53.9	21.6	8.0	
Hori.	6406.8	39.9	32.1	33.6	7.7	31.3	-	49.8	42.0	73.9	53.9	24.1	11.9	Floor noise
Hori.	7322.0	42.3	33.9	35.9	8.0	32.0	-	54.1	45.7	73.9	53.9	19.8	8.2	
Hori.	8237.3	42.4	34.0	36.3	8.3	32.3	-	54.6	46.2	73.9	53.9	19.3	7.7	Floor noise
Hori.	9152.5	41.9	33.0	38.2	8.7	32.1	-	56.7	47.8	73.9	53.9	17.2	6.1	Floor noise
Vert.	1200.0	50.1	42.8	25.2	6.1	34.1	-	47.3	40.0	73.9	53.9	26.6	13.9	
Vert.	1830.5	50.2	47.0	25.2	5.5	32.4	-	48.5	45.4	73.9	53.9	25.4	8.5	
Vert.	2500.0	47.0	42.6	27.5	5.8	31.7	-	48.6	44.1	73.9	53.9	25.4	9.8	
Vert.	2745.8	50.1	47.3	28.2	5.8	31.5	-	52.6	49.8	73.9	53.9	21.3	4.1	
Vert.	3661.0	43.0	36.2	29.2	6.3	31.2	-	47.4	40.6	73.9	53.9	26.5	13.3	
Vert.	4576.3	39.6	31.5	30.9	6.8	30.9	-	46.4	38.3	73.9	53.9	27.6	15.7	Floor noise
Vert.	5491.5	43.7	37.5	31.9	7.3	30.9	-	52.1	45.9	73.9	53.9	21.8	8.1	
Vert.	6406.8	39.9	32.1	33.6	7.7	31.3	-	49.9	42.1	73.9	53.9	24.0	11.8	Floor noise
Vert.	7322.0	42.4	34.2	35.9	8.0	32.0	-	54.3	46.0	73.9	53.9	19.7	7.9	
Vert.	8237.3	42.3	33.4	36.3	8.3	32.3	-	54.5	45.7	73.9	53.9	19.4	8.2	Floor noise
Vert.	9152.5	41.6	32.9	38.2	8.7	32.1	-	56.4	47.7	73.9	53.9	17.5	6.2	Floor noise

Result (QP / PK) = Reading + Ant Factor + Loss (Cable+Attenuator+Filter+Distance factor(above 1 GHz)) - Gain(Amplifier)

Result (AV)= Reading + Ant Factor + Loss (Cable+Attenuator+Filter+Distance factor(above 1 GHz)) - Gain(Amplifier) + Duty factor

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

*QP detector was used up to 1GHz.

Distance factor: 1 GHz - 10 GHz 20log(3.85 m / 3.0 m) = 2.17 dB

***These results have sufficient margin without taking account Duty cycle correction factor.**

Radiated Spurious Emission

Test place	Ise EMC Lab.	No.4
Semi Anechoic Chamber	No.4	No.4
Date	September 20, 2022	September 21, 2022
Temperature / Humidity	23 deg. C / 50 % RH	23 deg. C / 50 % RH
Engineer	Junya Okuno	Junya Okuno
	(Below 1 GHz)	(Above 1 GHz)
Mode	Tx, Hopping Off, FM0, 927.25 MHz	

Polarity	Frequency	Reading (QP / PK)	Reading (AV)	Ant. Factor	Loss	Gain	Duty Factor	Result (QP / PK)	Result (AV)	Limit (QP / PK)	Limit (AV)	Margin (QP / PK)	Margin (AV)	Remark
[Hori/Vert]	[MHz]	[dBuV]	[dBuV]	[dB/m]	[dB]	[dB]	[dB]	[dBuV/m]	[dBuV/m]	[dBuV/m]	[dBuV/m]	[dB]	[dB]	
Hori.	1200.0	49.1	43.2	25.2	6.1	34.1	-	46.3	40.5	73.9	53.9	27.6	13.5	
Hori.	1854.5	50.5	48.2	25.3	5.5	32.3	-	49.0	46.8	73.9	53.9	24.9	7.2	
Hori.	2500.0	48.2	43.7	27.5	5.8	31.7	-	49.7	45.2	73.9	53.9	24.2	8.7	
Hori.	2781.8	45.0	39.6	28.3	5.9	31.5	-	47.7	42.2	73.9	53.9	26.2	11.7	
Hori.	3709.0	43.0	35.6	29.3	6.3	31.1	-	47.5	40.1	73.9	53.9	26.4	13.8	
Hori.	4636.3	39.8	31.4	31.0	6.8	30.9	-	46.8	38.4	73.9	53.9	27.1	15.5	Floor noise
Hori.	5563.5	42.7	35.2	31.9	7.4	30.9	-	51.0	43.5	73.9	53.9	22.9	10.4	
Hori.	6490.8	40.4	31.8	33.9	7.7	31.4	-	50.6	42.0	73.9	53.9	23.3	11.9	Floor noise
Hori.	7418.0	41.8	33.5	36.1	8.0	32.1	-	53.8	45.5	73.9	53.9	20.1	8.4	
Hori.	8345.3	41.7	33.7	36.2	8.3	32.3	-	53.9	45.9	73.9	53.9	20.0	8.0	Floor noise
Hori.	9272.5	40.7	32.3	38.8	8.7	32.1	-	56.1	47.7	73.9	53.9	17.8	6.2	Floor noise
Vert.	1200.0	50.2	42.9	25.2	6.1	34.1	-	47.4	40.1	73.9	53.9	26.5	13.8	
Vert.	1854.5	51.2	48.7	25.3	5.5	32.3	-	49.8	47.2	73.9	53.9	24.1	6.7	
Vert.	2500.0	47.0	42.5	27.5	5.8	31.7	-	48.5	44.0	73.9	53.9	25.4	9.9	
Vert.	2781.8	50.0	46.7	28.3	5.9	31.5	-	52.7	49.4	73.9	53.9	21.2	4.5	
Vert.	3709.0	45.2	40.1	29.3	6.3	31.1	-	49.7	44.6	73.9	53.9	24.2	9.3	
Vert.	4636.3	39.9	31.5	31.0	6.8	30.9	-	46.8	38.4	73.9	53.9	27.1	15.5	Floor noise
Vert.	5563.5	45.1	39.9	31.9	7.4	30.9	-	53.5	48.2	73.9	53.9	20.4	5.7	
Vert.	6490.8	40.6	31.8	33.9	7.7	31.4	-	50.9	42.1	73.9	53.9	23.0	11.9	Floor noise
Vert.	7418.0	42.9	35.5	36.1	8.0	32.1	-	54.9	47.5	73.9	53.9	19.0	6.4	
Vert.	8345.3	41.4	33.6	36.2	8.3	32.3	-	53.6	45.8	73.9	53.9	20.3	8.1	Floor noise
Vert.	9272.5	40.8	32.4	38.8	8.7	32.1	-	56.2	47.7	73.9	53.9	17.8	6.2	Floor noise

Result (QP / PK) = Reading + Ant Factor + Loss (Cable+Attenuator+Filter+Distance factor(above 1 GHz)) - Gain(Amplifier)

Result (AV)= Reading + Ant Factor + Loss (Cable+Attenuator+Filter+Distance factor(above 1 GHz)) - Gain(Amplifier) + Duty factor

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

*QP detector was used up to 1GHz.

20dBc Data Sheet

Polarity	Frequency	Reading (PK)	Ant Factor	Loss	Gain	Result	Limit	Margin	Remark
[Hori/Vert]	[MHz]	[dBuV]	[dB/m]	[dB]	[dB]	[dBuV/m]	[dBuV/m]	[dB]	
Hori.	927.3	91.5	22.1	12.5	0.0	126.0	-	-	Carrier
Hori.	928.0	24.9	22.1	12.5	0.0	59.4	106.0	46.6	
Vert.	927.3	93.0	22.1	12.5	0.0	127.5	-	-	Carrier
Vert.	928.0	24.7	22.1	12.5	0.0	59.2	107.5	48.3	

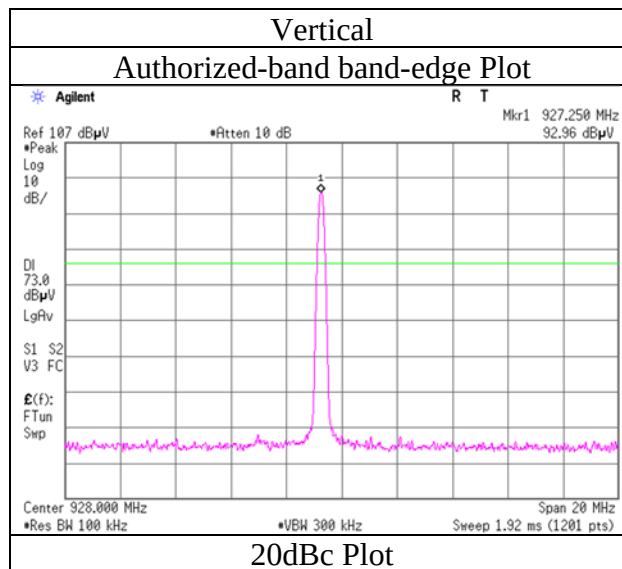
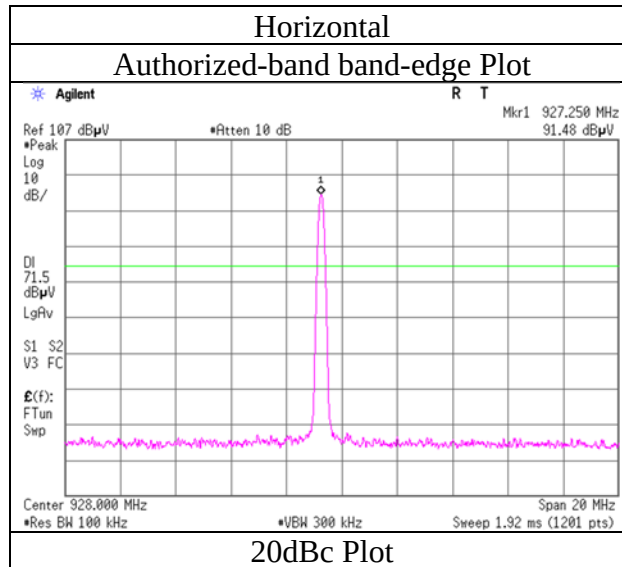
Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter+Distance factor(above 1 GHz)) - Gain(Amplifier)

Distance factor: 1 GHz - 10 GHz 20log(3.85 m / 3.0 m) = 2.17 dB

***These results have sufficient margin without taking account Duty cycle correction factor.**

Radiated Spurious Emission
(Reference Plot for band-edge)

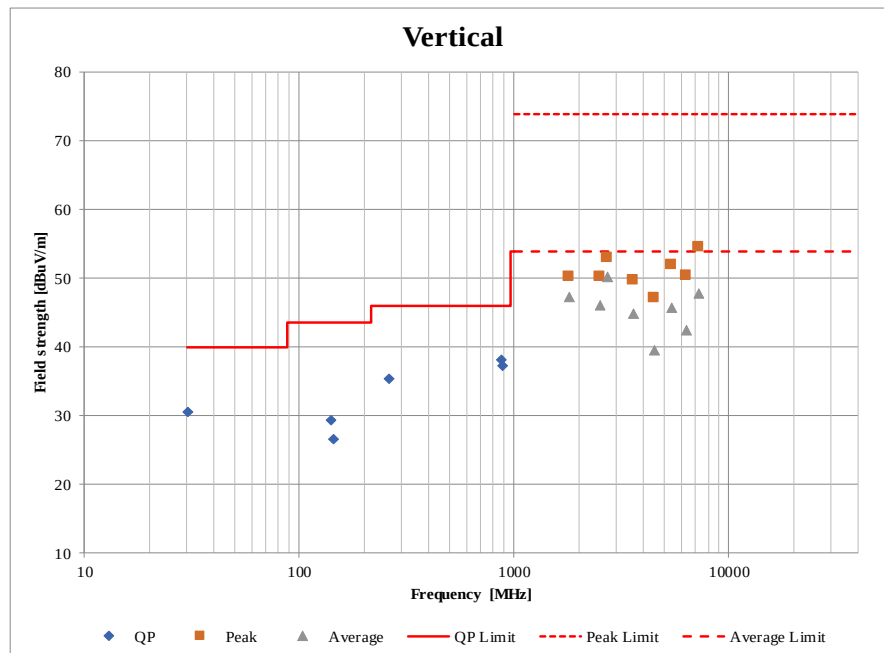
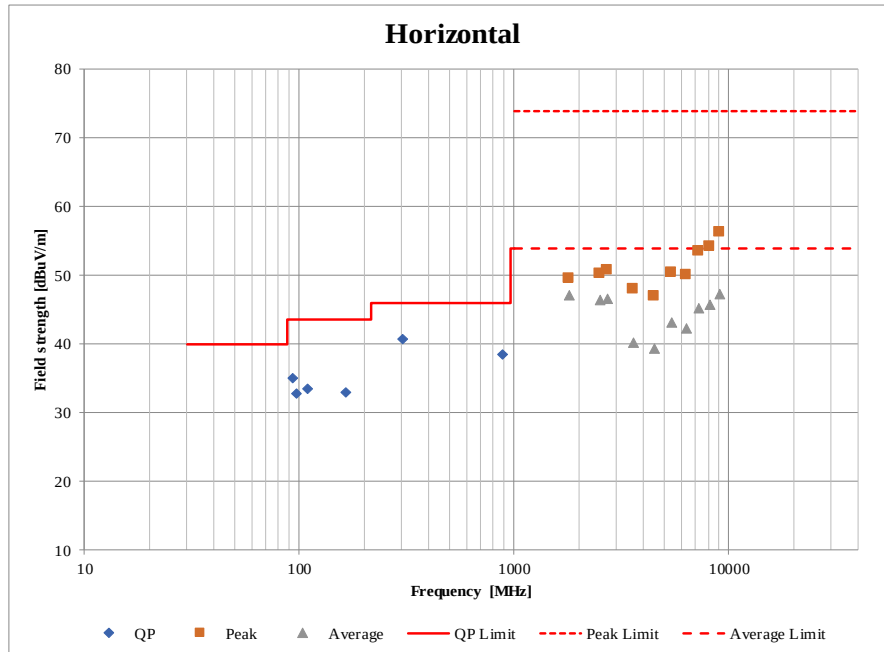
Test place	Ise EMC Lab.
Semi Anechoic Chamber	No.4
Date	September 20, 2022
Temperature / Humidity	23 deg. C / 50 % RH
Engineer	Junya Okuno
	(Below 1 GHz)
Mode	Tx, Hopping Off, FM0, 927.25 MHz



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

Radiated Spurious Emission
(Plot data, Worst case mode for Maximum Peak Output Power)

Test place	Ise EMC Lab.	
Semi Anechoic Chamber	No.4	No.4
Date	September 20, 2022	September 21, 2022
Temperature / Humidity	23 deg. C / 50 % RH	23 deg. C / 50 % RH
Engineer	Junya Okuno (Below 1 GHz)	Takumi Nishida (Above 1 GHz)
Mode	Tx, Hopping Off, Miller-4, 902.75 MHz	



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

Conducted Spurious Emission

Test place

Ise EMC Lab. No.4 Measurement Room

Date

No.4

Temperature / Humidity

September 22, 2022

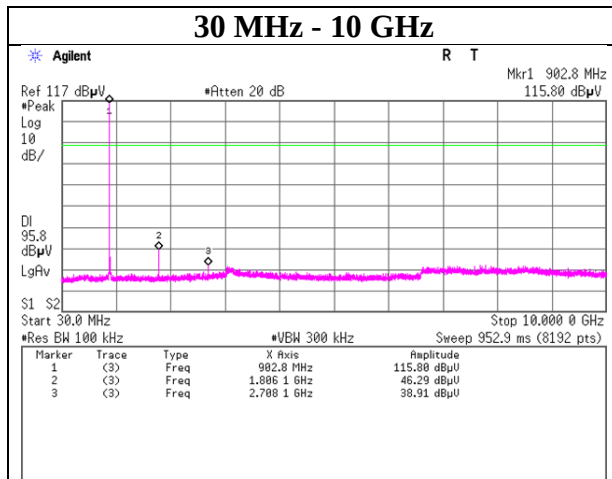
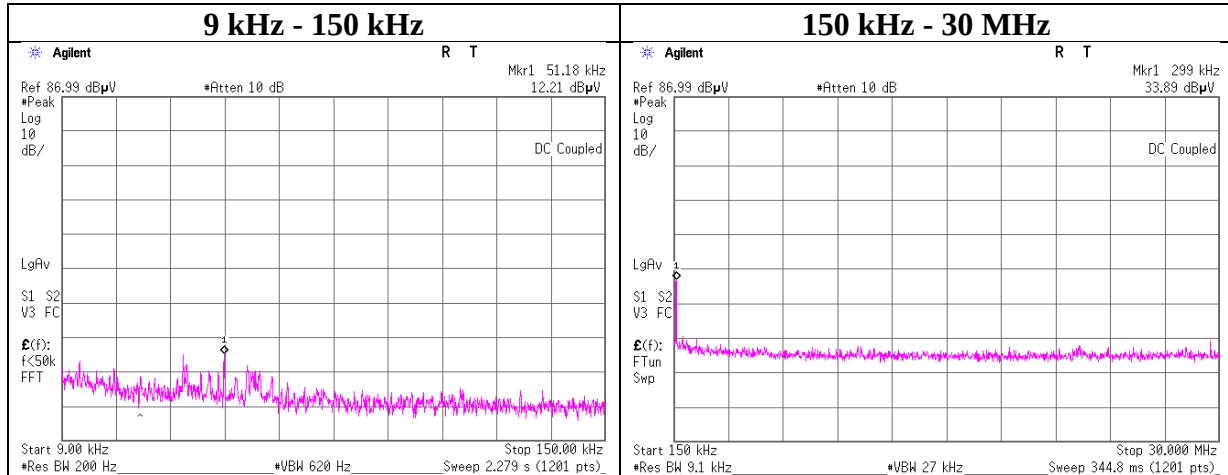
Engineer

22 deg. C / 50 % RH

Mode

Tx, Hopping Off, Miller-4

902.75 MHz



Conducted Spurious Emission

Test place

Ise EMC Lab. No.4 Measurement Room

Date

No.4

Temperature / Humidity

September 22, 2022

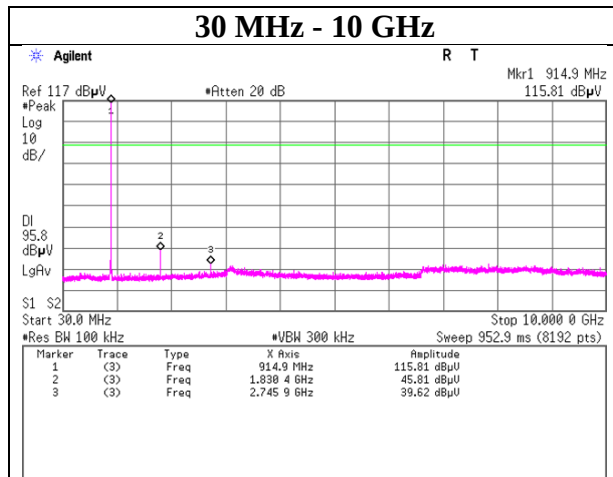
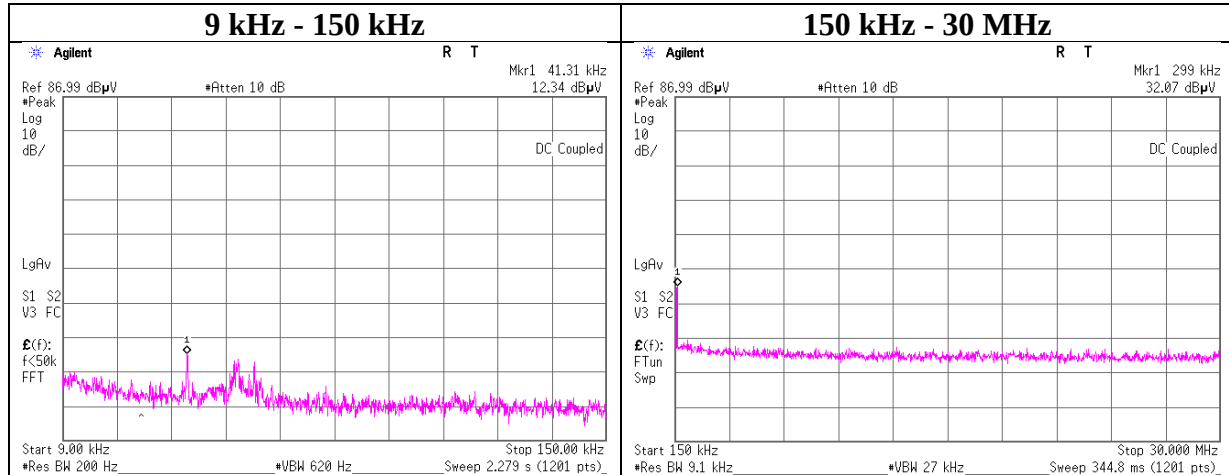
Engineer

22 deg. C / 50 % RH

Mode

Tx, Hopping Off, Miller-4

915.25 MHz



Conducted Spurious Emission

Test place

Ise EMC Lab. No.4 Measurement Room

Date

No.4

Temperature / Humidity

September 22, 2022

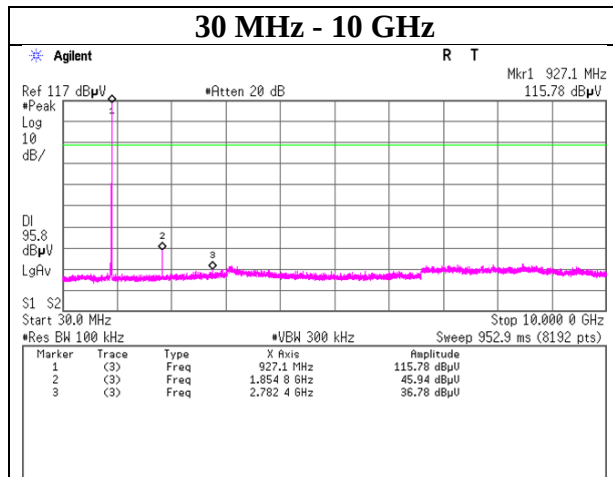
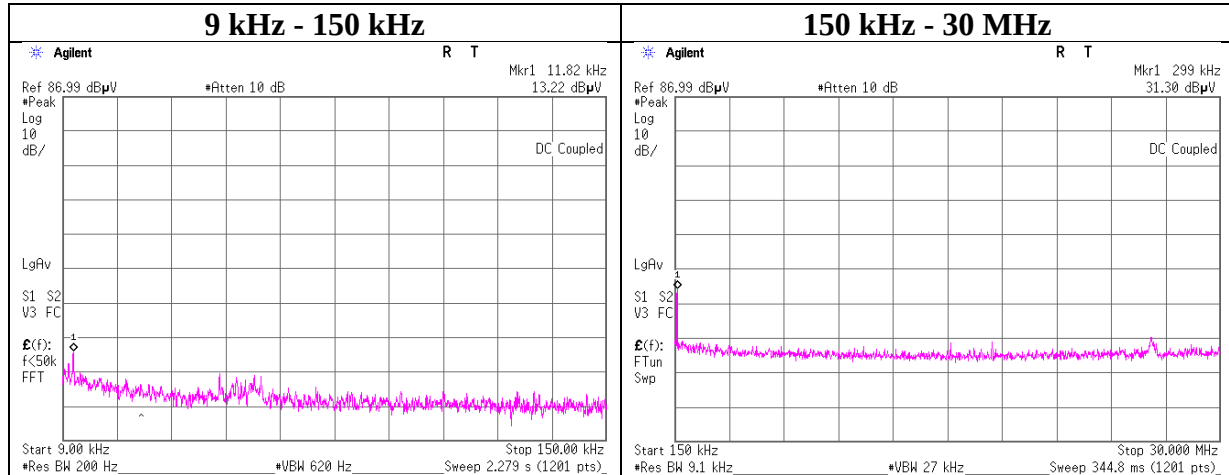
Engineer

22 deg. C / 50 % RH

Mode

Tx, Hopping Off, Miller-4

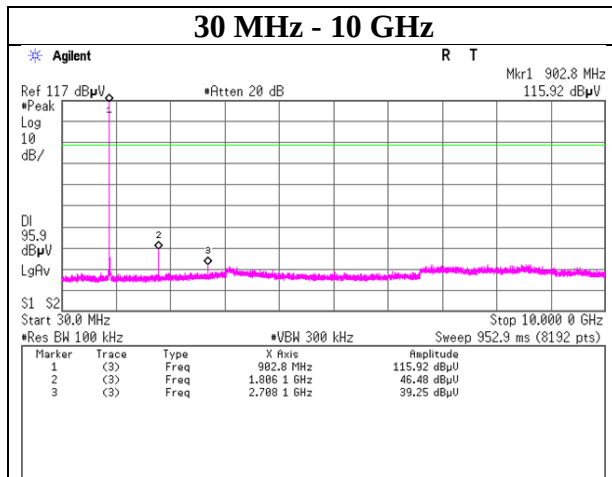
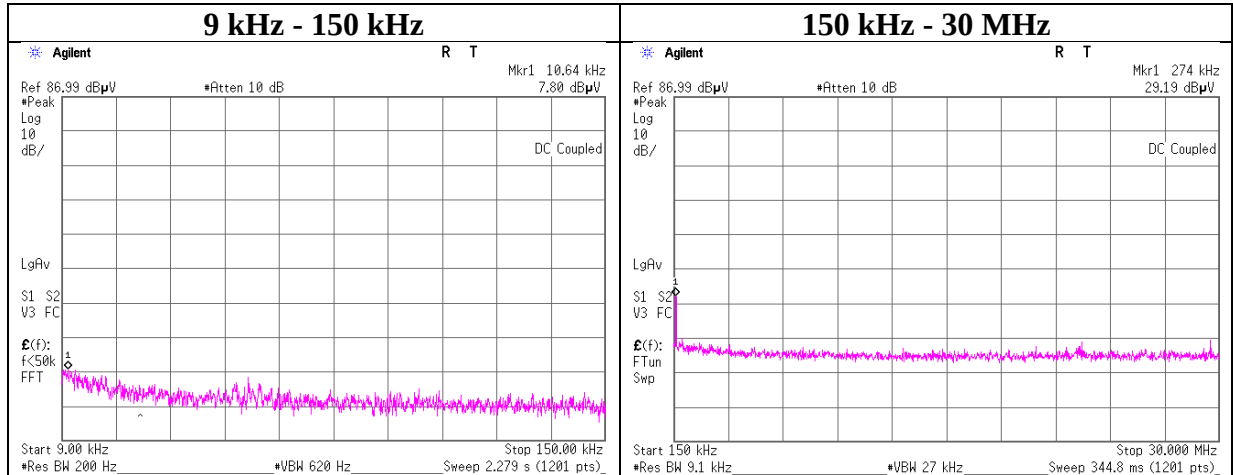
927.25 MHz



Conducted Spurious Emission

Test place : Ise EMC Lab. No.4 Measurement Room
Date : No.4
Temperature / Humidity : September 22, 2022
Engineer : 22 deg. C / 50 % RH
Mode : Tx, Hopping Off, Miller-2

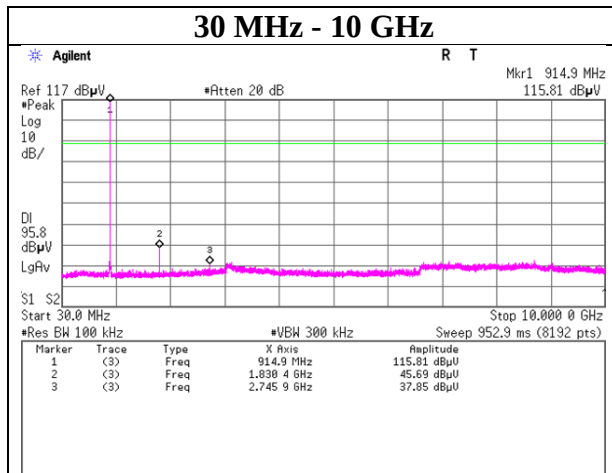
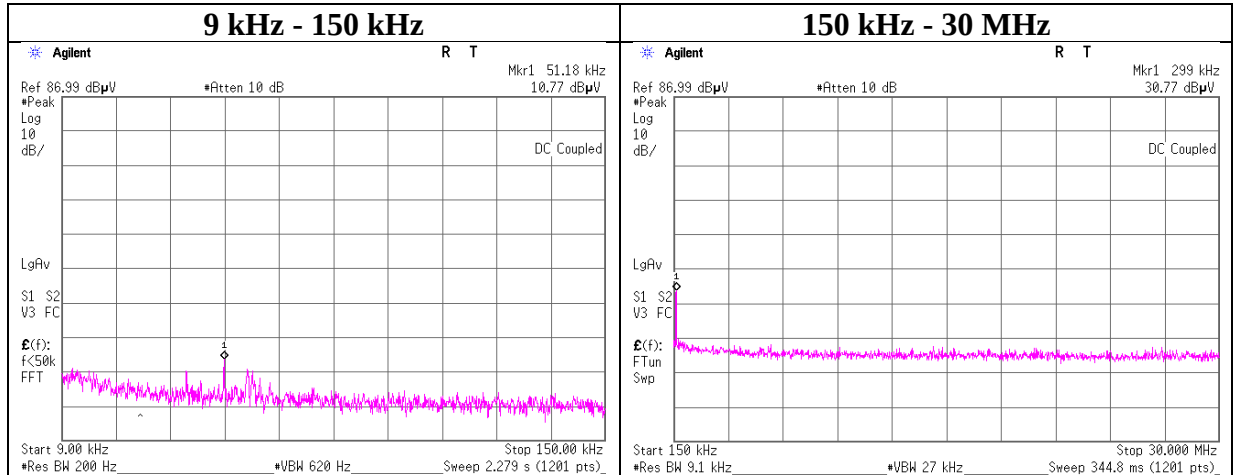
902.75 MHz



Conducted Spurious Emission

Test place : Ise EMC Lab. No.4 Measurement Room
Date : No.4
Temperature / Humidity : September 22, 2022
Engineer : 22 deg. C / 50 % RH
Mode : Tx, Hopping Off, Miller-2

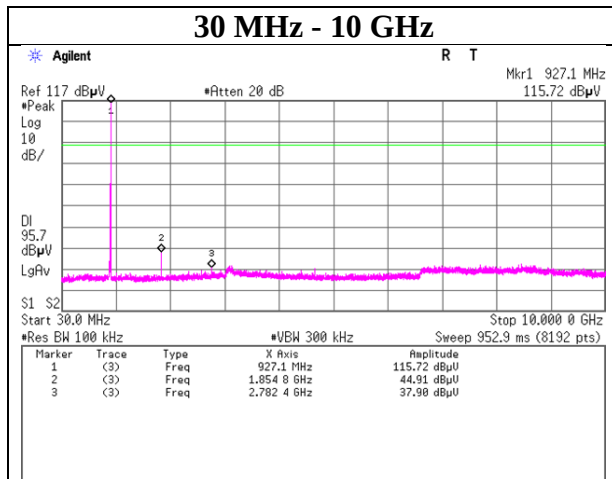
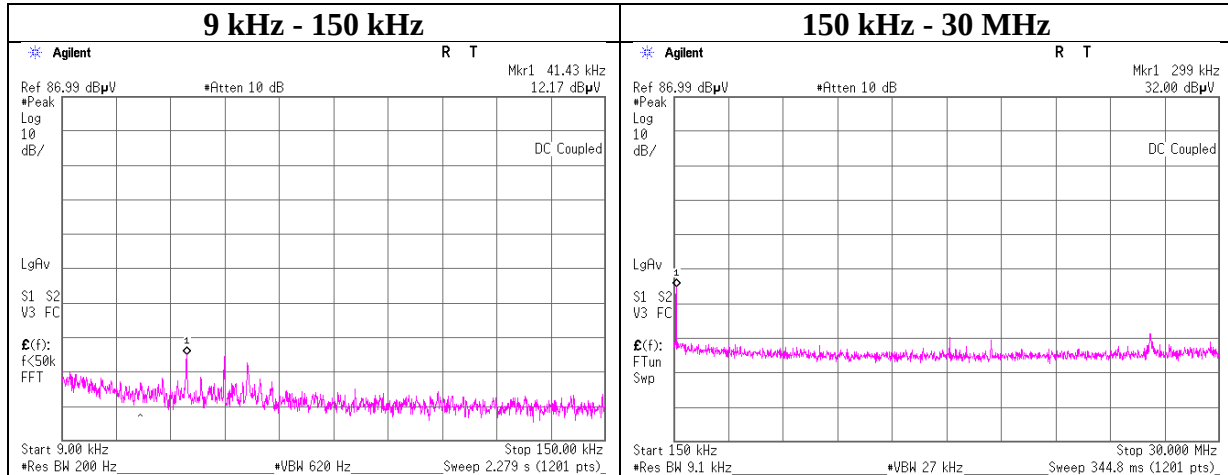
915.25 MHz



Conducted Spurious Emission

Test place : Ise EMC Lab. No.4 Measurement Room
Date : No.4
Temperature / Humidity : September 22, 2022
Engineer : 22 deg. C / 50 % RH
Mode : Tx, Hopping Off, Miller-2

927.25 MHz



Conducted Spurious Emission

Test place

Ise EMC Lab. No.4 Measurement Room

Date

No.4

Temperature / Humidity

September 22, 2022

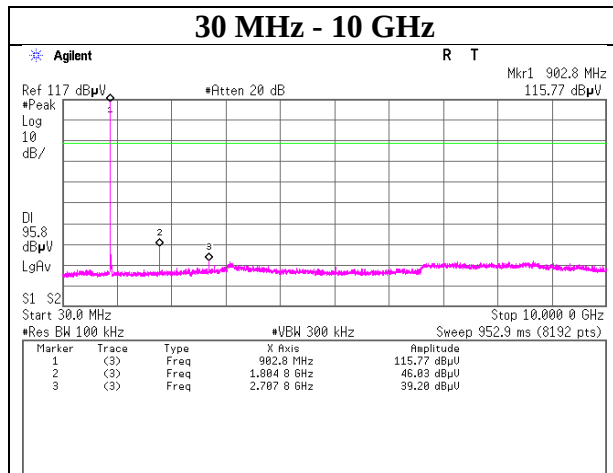
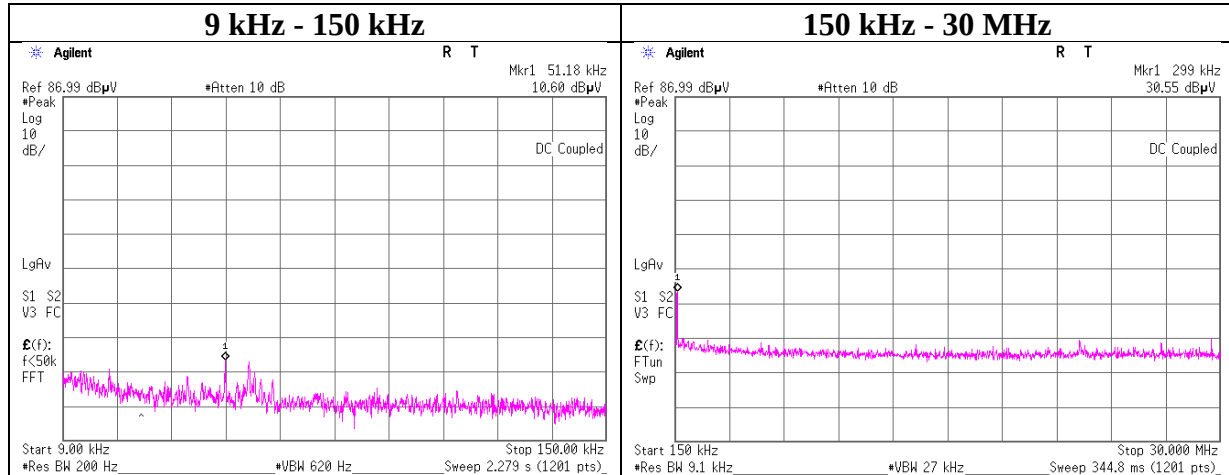
Engineer

22 deg. C / 50 % RH

Mode

Tx, Hopping Off, FM0

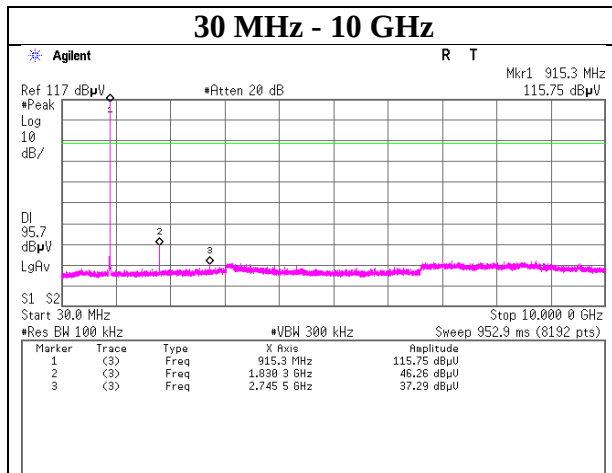
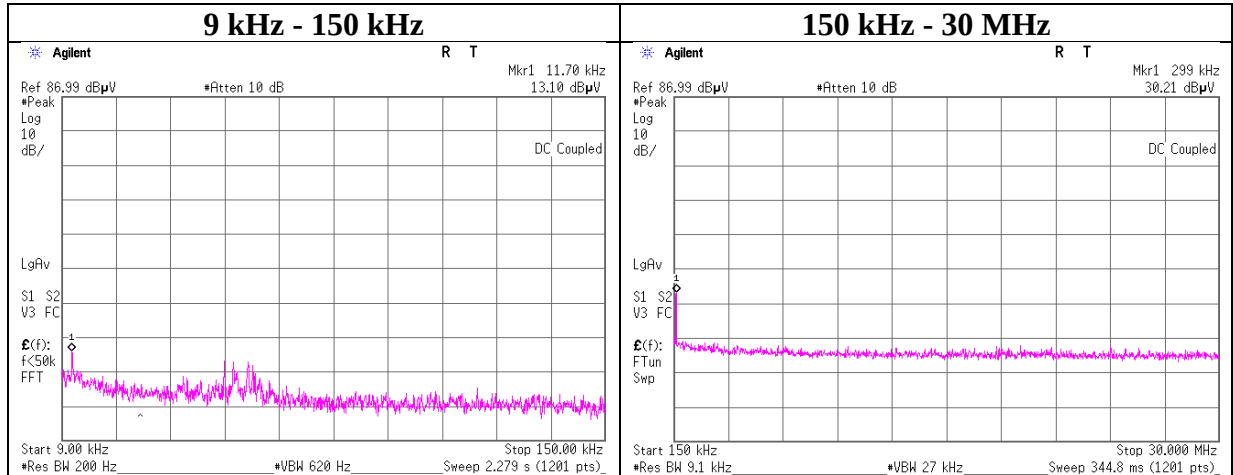
902.75 MHz



Conducted Spurious Emission

Test place : Ise EMC Lab. No.4 Measurement Room
Date : No.4
Temperature / Humidity : September 22, 2022
Engineer : 22 deg. C / 50 % RH
Mode : Tx, Hopping Off, FM0

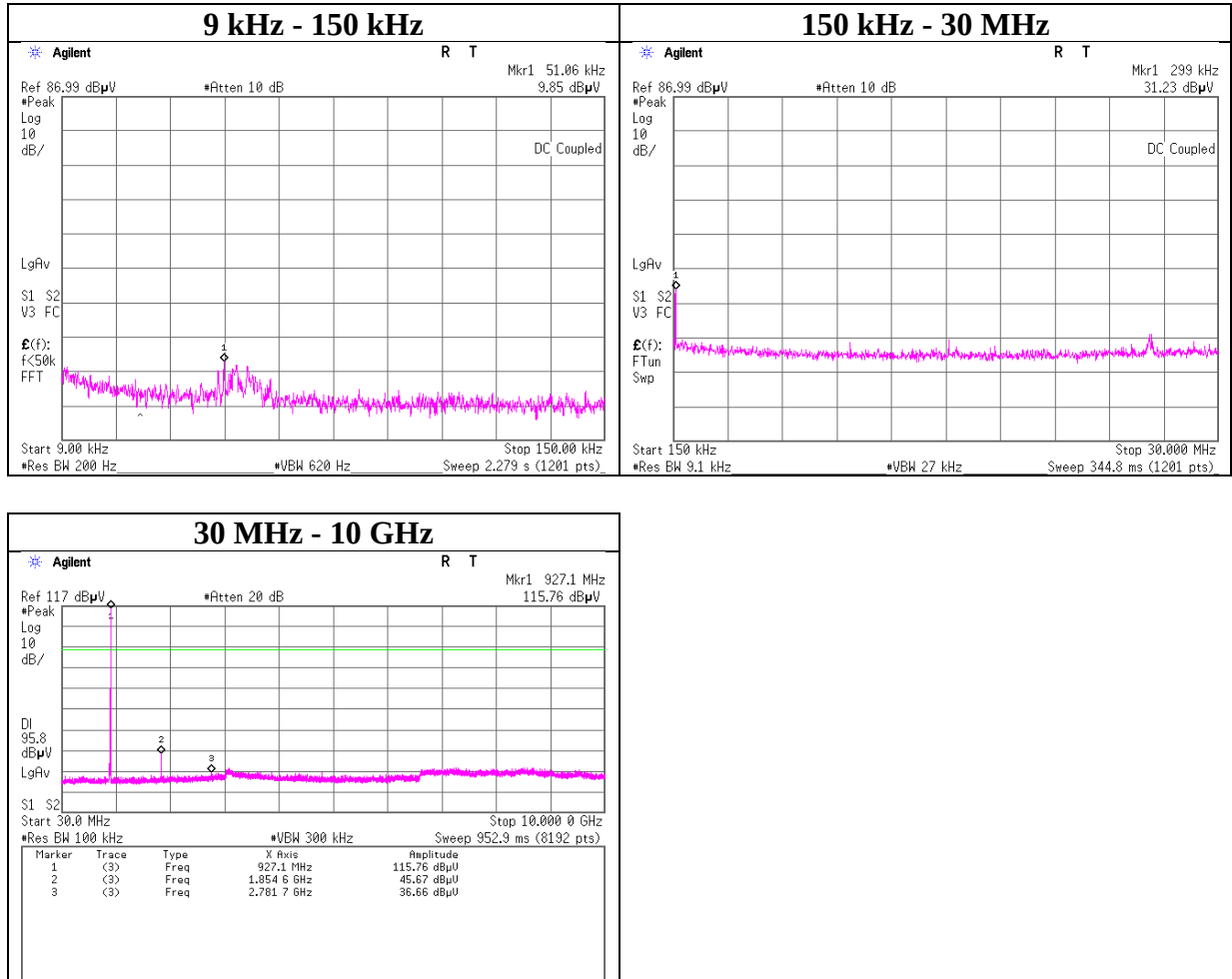
915.25 MHz



Conducted Spurious Emission

Test place : Ise EMC Lab. No.4 Measurement Room
Date : No.4
Temperature / Humidity : September 22, 2022
Engineer : 22 deg. C / 50 % RH
Mode : Tx, Hopping Off, FM0

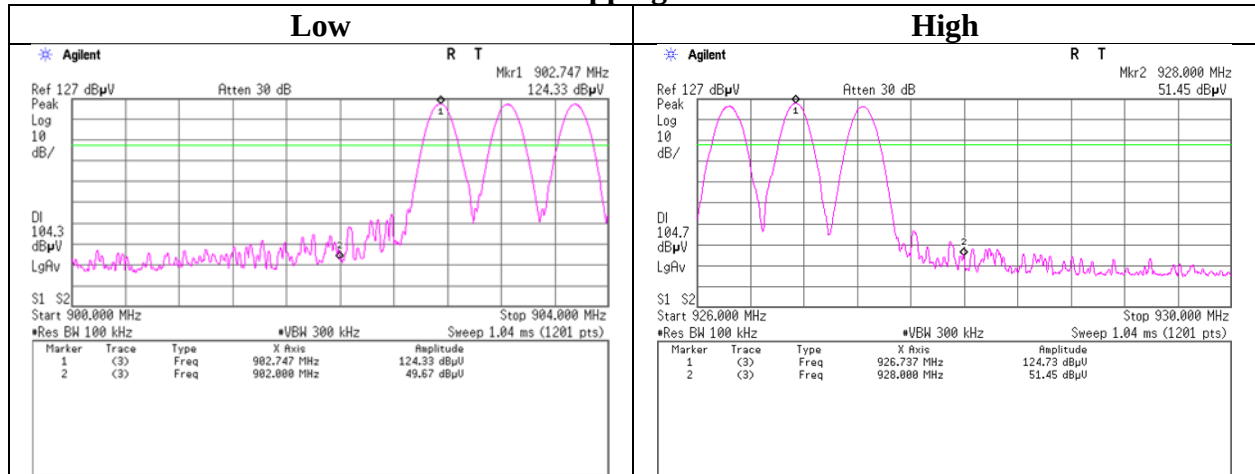
927.25 MHz



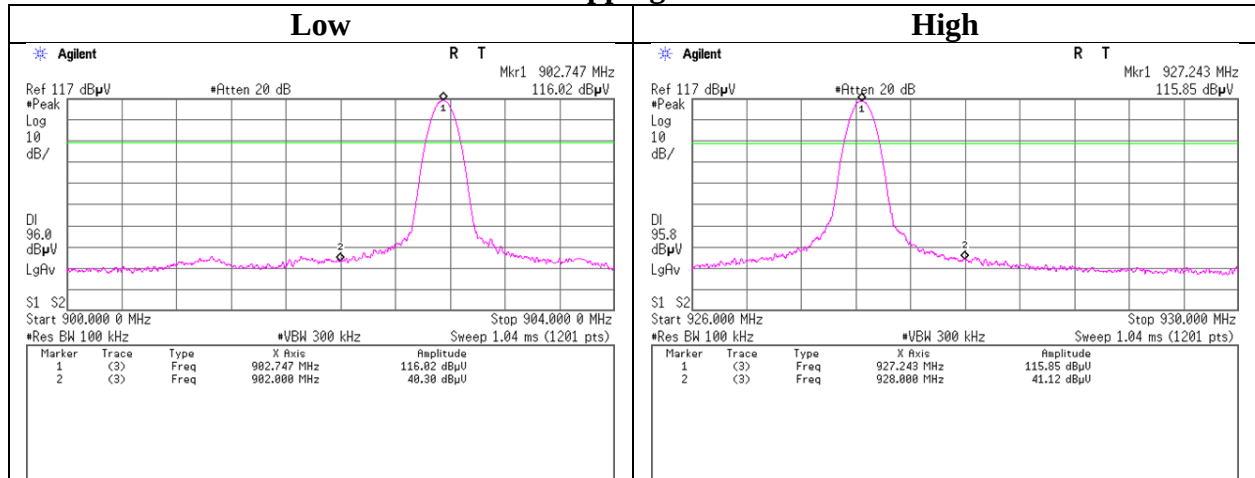
Conducted Emission Band Edge compliance
(Miller-4)

Test place	Ise EMC Lab.	
Measurement Room	No.4	No.6
Date	September 22, 2022	October 5, 2022
Temperature / Humidity	22 deg. C / 50 % RH	22 deg. C / 50 % RH
Engineer	Junya Okuno	Takumi Nishida
Mode	Tx, Hopping Off, Tx, Hopping On	

Hopping On



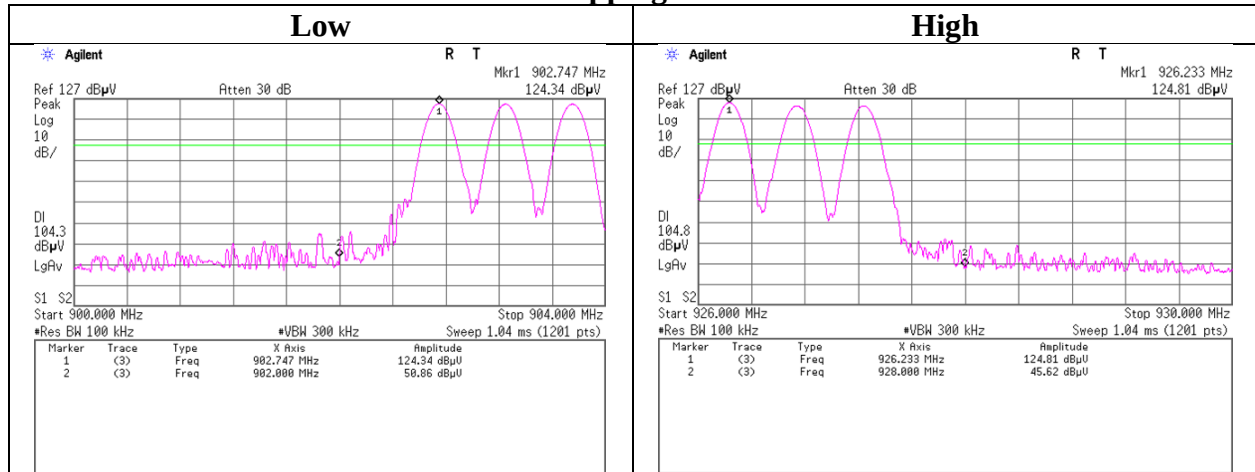
Hopping Off



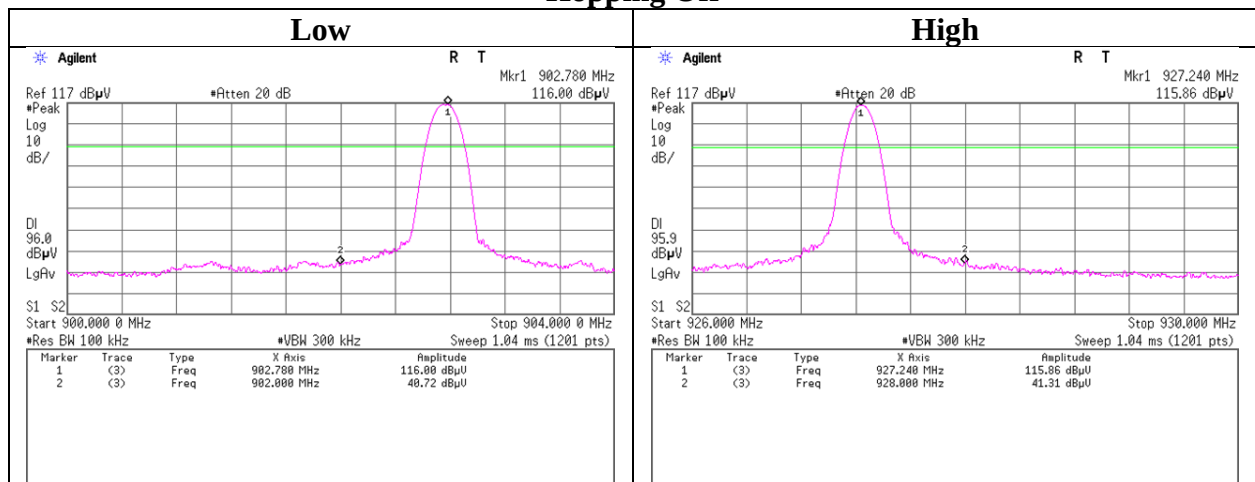
Conducted Emission Band Edge compliance
(Miller-2)

Test place	Ise EMC Lab.	
Measurement Room	No.4	No.6
Date	September 22, 2022	October 5, 2022
Temperature / Humidity	22 deg. C / 50 % RH	22 deg. C / 50 % RH
Engineer	Junya Okuno	Takumi Nishida
Mode	Tx, Hopping Off, Tx, Hopping On	

Hopping On



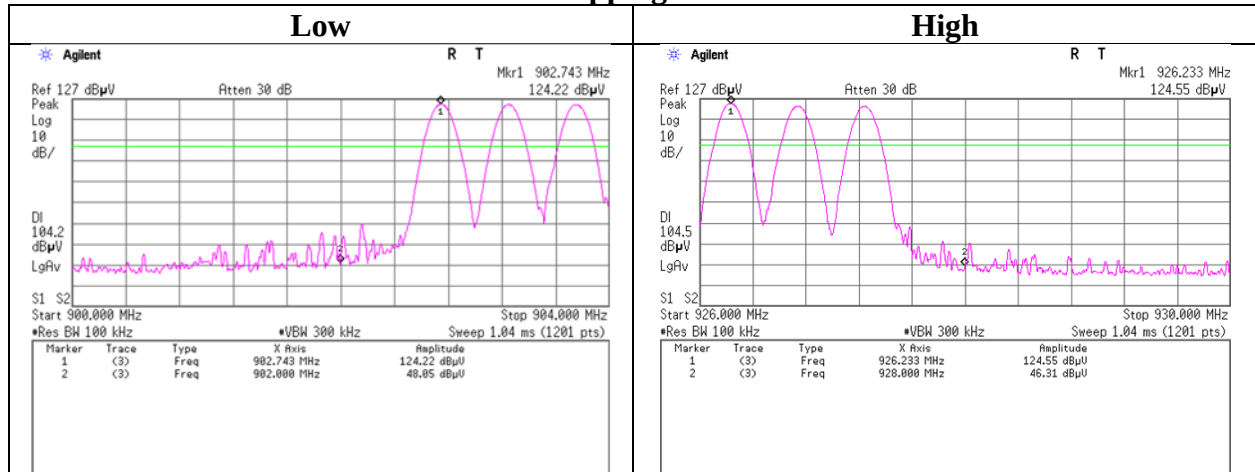
Hopping Off



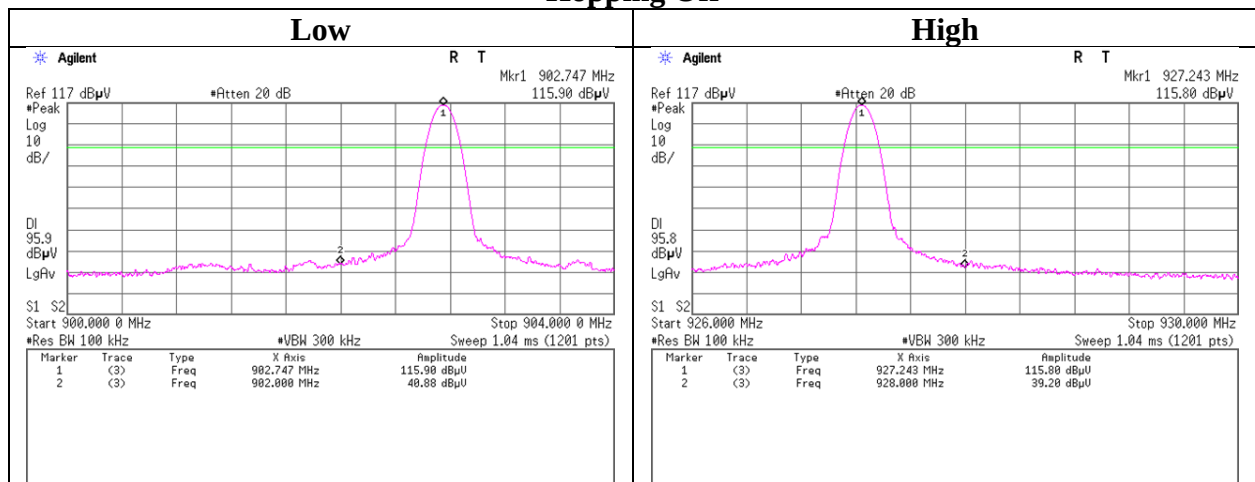
Conducted Emission Band Edge compliance (FM0)

Test place	Ise EMC Lab.	
Measurement Room	No.4	No.6
Date	September 22, 2022	October 5, 2022
Temperature / Humidity	22 deg. C / 50 % RH	22 deg. C / 50 % RH
Engineer	Junya Okuno	Takumi Nishida
Mode	Tx, Hopping Off, Tx, Hopping On	

Hopping On



Hopping Off



APPENDIX 2: Test Instruments

Test Equipment (1/2)

Test Item	Local ID	LIMS ID	Description	Manufacturer	Model	Serial	Last Calibration Date	Cal Int
CE	COTS-MEMI-02	178648	EMI measurement program	TSJ (Techno Science Japan)	TEPTO-DV	-	-	-
CE	MAEC-02	142004	AC2_Semi Anechoic Chamber(NSA)	TDK	Semi Anechoic Chamber 3m	DA-06902	05/30/2022	24
CE	MAT-64	141290	Attenuator(13dB)	JFW Industries, Inc.	50FP-013H2 N	-	12/17/2021	12
CE	MCC-13	141222	Coaxial Cable	Fujikura,HP, Mini-Circuits,Fujikura	3D-2W(12m)/ 5D-2W(5m)/ 5D-2W(0.8m)/ 5D-2W(1m)	-	02/20/2022	12
CE	MJM-27	142228	Measure	KOMELON	KMC-36	-	-	-
CE	MLS-23	141357	LISN(AMN)	Schwarzbeck Mess-Elektronik OHG	NSLK8127	8127-729	07/28/2022	12
CE	MMM-01	141542	Digital Tester	Fluke Corporation	FLUKE 26-3	78030611	08/12/2022	12
CE	MOS-41	192300	Thermo-Hygrometer	CUSTOM. Inc	CTH-201	0013	12/19/2021	12
CE	MTR-08	141949	Test Receiver	Rohde & Schwarz	ESCI	100767	07/29/2022	12
RE	COTS-MEMI-02	178648	EMI measurement program	TSJ (Techno Science Japan)	TEPTO-DV	-	-	-
RE	LA-17	160924	Logperiodic Antenna	Schwarzbeck Mess-Elektronik OHG	VUSLP9111B	225	11/13/2021	12
RE	MAEC-04	142011	AC4_Semi Anechoic Chamber(NSA)	TDK	Semi Anechoic Chamber 3m	DA-10005	05/22/2022	24
RE	MAEC-04-SVSWR	142017	AC4_Semi Anechoic Chamber(SVSWR)	TDK	Semi Anechoic Chamber 3m	DA-10005	04/12/2021	24
RE	MAT-34	141331	Attenuator(6dB)	TME	UFA-01	-	02/25/2022	12
RE	MBA-05	141425	Biconical Antenna	Schwarzbeck Mess-Elektronik OHG	VHA9103+ BBA9106	VHA 91031302	08/26/2022	12
RE	MCC-231	177964	Microwave Cable	Junkosha INC.	MMX221	1901S329(1m)/ 1902S579(5m)	03/15/2022	12
RE	MCC-38	141395	Coaxial Cable	UL Japan	-	-	11/19/2021	12
RE	MCC-50	141397	Coaxial Cable	UL Japan	-	-	11/03/2021	12
RE	MHA-20	141507	Horn Antenna 1-18GHz	Schwarzbeck Mess-Elektronik OHG	BBHA9120D	258	11/09/2021	12
RE	MHF-04	141403	High Pass Filter 1.22-4.60GHz	Mini-Circuits	VHF-1200	10435	08/01/2022	12
RE	MHF-27	141297	High Pass Filter (1.1-10GHz)	TOKYO KEIKI	TF219CD1	1001	01/23/2022	12
RE	MJM-29	142230	Measure	KOMELON	KMC-36	-	-	-
RE	MMM-10	141545	DIGITAL HiTESTER	HIOKI E.E. CORPORATION	3805	51201148	01/16/2022	12
RE	MOS-15	141562	Thermo-Hygrometer	CUSTOM. Inc	CTH-201	0010	01/10/2022	12
RE	MPA-12	141581	MicroWave System Amplifier	Keysight Technologies Inc	83017A	00650	10/07/2021	12
RE	MPA-14	141583	Pre Amplifier	SONOMA INSTRUMENT	310	260833	04/04/2022	12
RE	MRF-12	192072	Band Rejection Filter(902-928MHz)	Wakoh Communication Industrial Co., Ltd.	WFR-481	19122541	03/02/2022	12
RE	MSA-16	141903	Spectrum Analyzer	Keysight Technologies Inc	E4440A	MY46186390	01/07/2022	12
RE	MTR-03	141942	Test Receiver	Rohde & Schwarz	ESCI	100300	07/29/2022	12

Test Equipment (2/2)

Test Item	Local ID	LIMS ID	Description	Manufacturer	Model	Serial	Last Calibration Date	Cal Int
AT	MAT-17	141171	Attenuator(20dB)_DC-1GHz_N	Weinschel Corp	MODEL 1	BG0143	12/23/2021	12
AT	MCC-178	141227	Microwave Cable	Junkosha	MMX221-00500DM SDMS	1502S305	03/15/2022	12
AT	MCC-211	141322	Microwave Cable	RS Pro	R-132G7210200CD	-	04/14/2022	12
AT	MCC-212	141391	Microwave Cable	RS Pro	R-132G7210200CD	-	04/14/2022	12
AT	MCC-38	141395	Coaxial Cable	UL Japan	-	-	11/19/2021	12
AT	MMM-10	141545	DIGITAL HiTESTER	HIOKI E.E. CORPORATION	3805	51201148	01/16/2022	12
AT	MMM-18	141558	Digital Tester (TRUE RMS MULTIMETER)	Fluke Corporation	115	17930030	05/17/2022	12
AT	MOS-14	141561	Thermo-Hygrometer	CUSTOM. Inc	CTH-201	1401	01/10/2022	12
AT	MOS-42	192303	Thermo-Hygrometer	CUSTOM. Inc	CTH-201	0014	12/19/2021	12
AT	MPM-12	141809	Power Meter	Anritsu Corporation	ML2495A	825002	05/18/2022	12
AT	MPSE-17	141830	Power sensor	Anritsu Corporation	MA2411B	738285	05/18/2022	12
AT	MRENT-130	141855	Spectrum Analyzer	Keysight Technologies Inc	E4440A	MY46187750	11/28/2021	12
AT	MSA-16	141903	Spectrum Analyzer	Keysight Technologies Inc	E4440A	MY46186390	01/07/2022	12
AT	MTA-70	184337	SMA Terminator Plug(50 Ohms)	Amphenol	132360	-	-	-

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

The expiration date of the calibration is the end of the expired month.

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

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

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