RADIO TEST REPORT

Test Report No. 15501726S-A-R5

Customer	**SATO CORPORATION**
Description of EUT	**UHF RFID Module**
Model Number of EUT	**TPURID2100**
FCC ID	**MMFTPURID2100**
Test Regulation	**FCC Part 15 Subpart C**
Test Result	**Complied**
Issue Date	**July 30, 2025**
Remarks	**-**

Representative Test Engineer	Approved By
Takayuki Kobayashi Engineer	Kazutaka Takeyama Leader

CERTIFICATE 1266.03

☐ 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".

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REVISION HISTORY

Original Test Report No. 15501726S-A

This report is a revised version of 15501726S-A-R4. 15501726S-A-R4 is replaced with this report.

Revision	Test Report No.	Date	Page Revised Contents
- (Original)	15501726S-A	April 14, 2025	-
1	15501726S-A-R1	June 4, 2025	P1,5,11: Correction of Description of EUT: From “UHF RFID Transceiver” to “UHF RFID Module”
2	15501726S-A-R2	July 25, 2025	P5, Update of Antenna Gain: From “-15.02 dBi (ANT1)” to “-15.02 dBi (CN2 (ANT 2)) From “-26.56 dBi (ANT2)” to “-26.56 dBi (CN3 (ANT 3))”
			P6, Correction in the table in 3.2: Specification: RSS-247 “5.1 (a)” to “5.1 (c)” FCC Section ”15.247(a)(1)(iii)” to “15.247(a)(1)(i)” FCC Section “15.247(b)(1)” to “15.247(b)(2)” Worst Margin in Conducted emission: “AV” to “QP” Worst Margin in Radiated emission: “ANT 1” to “ANT 2”, “ANT 2” to “ANT 3”
			P6, Correction FCC Part 15.203/212 Antenna requirement in 3.2: Deletion of “or U.FL”
			P9: Addition of the table “Combination of antenna ports” in 4.1
			P9: Change of “ANT1” to “ANT 2”, “ANT2” to “ANT 3” in 4.1
			P10, Correction in the figures in 4.2: Connection of destination of Cable No.9 from “G” to “F” Addition of antenna ports (CN2 and CN3) Addition “I” (Jig)
			P11, Correction in the table in 4.2: Change of “A”’s Serial Number “No.011” to “No.030” Change of Remarks of “F” from “ANT 1” to “ANT 2”, of “G” from “ANT 2” to “ANT 3” Addition “I” (Jig)
			P14,16 to 18, 33 to 37,39: Change of “ANT 2” to “ANT 3”
			P16 to18: Addition of Lab No. (No.2 Shielded room)
			P25,26: Change of “ANT 1” to “ANT 2”, “ANT 2” to “ANT 3”
			P28 to 32,38: Change of “ANT 1” to “ANT 2”
			P28,30,31,33,35,36,38,39, Correction of Date: From “2017” to “2025”
			P31, Correction of Reading in the table of 20 dBc Data Sheet: From “67.85” to “67.35”
			P38, Correction the data: Mode “915.25 MHz” to “927.25 MHz” Replace the plot data
			P39, Correction the data: Mode “927.25 MHz” to “915.25 MHz” Replace the plot data
			P44: Deletion of Dipole Antenna
			P47,48,50,51: Change of “ANT 1” to “ANT 2”, “ANT 2” to “ANT 3”
3	15501726S-A-R3	July 28, 2025	P9: Correction of worst antenna “ANT2” to “ANT 3” in the table in 4.1
			P17, Correction of Frequency: From “915.75” to “915.25”
			P28 to 37: Addition “(below 1 GHz: with Tag, above 1 GHz: without Tag)” to Mode
			P28 to 37: Swapping the test data of ANT2 and ANT3
			P38,39: Replacement of the plot data
4	15501726S-A-R4	July 29, 2025	P6, Correction of Frequency: From “915.75” to “915.25”
5	15501726S-A-R5	July 30, 2025	P11: Addition of “Conducted Emission” to *2)
			P16 to 18: Addition of “(without Tag)” to Mode

Reference: Abbreviations (Including words undescribed in this report)

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

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SECTION 1: Customer Information

Company Name	SATO CORPORATION
Address	1-207, Onari-cho, Omiya-ku, Saitama-shi, Saitama 330-0852 Japan
Telephone Number	+81-48-663-8116
Contact Person	Shoken Yamasaki

The information provided by 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

SECTION 2: Equipment Under Test (EUT)

2.1 Identification of EUT

Description	UHF RFID Module
Model Number	TPURID2100
Serial Number	Refer to SECTION 4.2
Condition	Production prototype (Not for Sale: This sample is equivalent to mass-produced items.)
Modification	No Modification by the test lab
Receipt Date	October 18, 2024
Test Date	October 24, 2024 to March 13, 2025

2.2 Product Description

General Specification

Rating	DC 5 V +/- 5 %
Operating temperature	-20 deg. C to +60 deg. C

Radio Specification

Equipment Type	Transceiver
Frequency of Operation	902.75 MHz to 927.25 MHz
Type of Modulation	ASK
Antenna Gain	-15.02 dBi (CN2 (ANT 2)) -26.56 dBi (CN3 (ANT 3))

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

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	26.8 dB 1) 0.40032 MHz, QP, N Mode: Tx, 915.25 MHz, 2) 0.21428 MHz, QP, N Mode: Tx, 927.25 MHz	Complied	-
Carrier Frequency Separation	**FCC:** KDB 558074 D01 15.247 Meas Guidance v05r02 **ISED:** -	**FCC:** Section15.247(a)(1) **ISED:** RSS-247 5.1 (b)	See data.	Complied	Conducted
20dB Bandwidth	**FCC:** KDB 558074 D01 15.247 Meas Guidance v05r02 **ISED:** -	**FCC:** Section15.247(a)(1) **ISED:** RSS-247 5.1 (c)		Complied	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	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	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	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	ANT2: 5.0 dB 4576.250 MHz, AV, Horizontal Mode: Tx, 915.25 MHz ANT3: 5.5 dB 4513.750 MHz, AV, Horizontal Mode: Tx, 902.75 MHz	Complied	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).

FCC Part 15.31 (e)
The RF Module has its own regulator.
The RF Module is constantly provided with voltage through the regulator regardless of input voltage.
Therefore, this EUT complies with the requirement.

FCC Part 15.203/212 Antenna requirement
The EUT has a unique coupling/antenna connector (MMCX).
Therefore the equipment complies with the requirement.

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.

Item	Frequency range	Uncertainty (+/-)
Conducted Emission (AC Mains) LISN	150 kHz to 30 MHz	3.2 dB
Radiated Emission (Measurement distance: 3 m)	9 kHz to 30 MHz	3.3 dB
	30 MHz to 200 MHz	4.9 dB
	200 MHz to 1 GHz	6.2 dB
	1 GHz to 6 GHz	4.7 dB
	6 GHz to 18 GHz	5.3 dB
	18 GHz to 40 GHz	5.5 dB
Radiated Emission (Measurement distance: 1 m)	1 GHz to 18 GHz	5.6 dB
	18 GHz to 40 GHz	5.8 dB

Antenna terminal test	Uncertainty (+/-)
Power Measurement above 1 GHz (Average Detector)	1.3 dB
Power Measurement above 1 GHz (Peak Detector)	1.8 dB
Spurious Emission (Conducted) below 1 GHz	0.91 dB
Conducted Emissions Power Density Measurement 1 GHz to 3 GHz	1.3 dB
Conducted Emissions Power Density Measurement 3 GHz to 18 GHz	2.5 dB
Spurious Emission (Conducted) 18 GHz to 26.5 GHz	2.8 dB
Spurious Emission (Conducted) 26.5 GHz to 40 GHz	2.6 dB
Bandwidth Measurement	0.012 %
Duty Cycle and Time Measurement	0.27 %
Temperature	2.2 deg.C.
Humidity	4.0 %
Voltage	0.74 %

3.5 Test Location

UL Japan, Inc. Shonan EMC Lab.
1-22-3, Megumigaoka, Hiratsuka-shi, Kanagawa-ken 259-1220 Japan
Telephone: +81-463-50-6400
A2LA Certificate Number: 1266.03
(FCC test firm registration number: 626366, ISED lab company number: 2973D / CAB identifier: JP0001)

Test room	Width x Depth x Height (m)	Size of reference ground plane (m) / horizontal conducting plane	Maximum measurement distance
No.1 Semi-anechoic chamber (SAC1)	20.6 x 11.3 x 7.65	20.6 x 11.3	10 m
No.2 Semi-anechoic chamber (SAC2)	20.6 x 11.3 x 7.65	20.6 x 11.3	10 m
No.3 Semi-anechoic chamber (SAC3)	12.7 x 7.7 x 5.35	12.7 x 7.7	5 m
No.4 Semi-anechoic chamber (SAC4)	8.1 x 5.1 x 3.55	8.1 x 5.1	-
Wireless anechoic chamber 1 (WAC1)	9.5 x 6.0 x 5.4	9.5 x 6.0	3 m
Wireless anechoic chamber 2 (WAC2)	9.5 x 6.0 x 5.4	9.5 x 6.0	3 m
No.1 Shielded room	6.8 x 4.1 x 2.7	6.8 x 4.1	-
No.2 Shielded room	6.8 x 4.1 x 2.7	6.8 x 4.1	-
No.3 Shielded room	6.3 x 4.7 x 2.7	6.3 x 4.7	-
No.4 Shielded room	4.4 x 4.7 x 2.7	4.4 x 4.7	-
No.5 Shielded room	7.8 x 6.4 x 2.7	7.8 x 6.4	-
No.6 Shielded room	7.8 x 6.4 x 2.7	7.8 x 6.4	-
No.8 Shielded room	3.45 x 5.5 x 2.4	3.45 x 5.5	-
No.1 Measurement room	2.55 x 4.1 x 2.5	-	-
No.2 Measurement room	4.5 x 3.5 x 2.5	-	-
Wireless shielded room 1	3.0 x 4.5 x 2.7	3.0 x 4.5	-
Wireless shielded room 2	3.0 x 4.5 x 2.7	3.0 x 4.5	-

3.6 Test Data, Test Instruments, and Test Set Up

Refer to APPENDIX.

SECTION 4: Operation of EUT during testing

4.1 Operating Mode(s)

Mode	Remarks
Transmitting (Tx), with modulation	-

EUT has the power settings by the software as follows;

Combination of antenna ports

Port	Status
CN1	Not Connected (Open) Antenna is not physically connected to this port.
CN2	CLSXR RFID FRONT COUPLER
CN3	CLSXR RFID SRA COUPLER

Power Setting: 30 dBm
Software: TPURID2100 supporttool
(Date: 2024.05.07, Storage location: EUT memory)

*This setting of software is the worst case .
Any conditions under the normal use do not exceed the condition of setting.
In addition, end users cannot change the settings of the output power of the product.

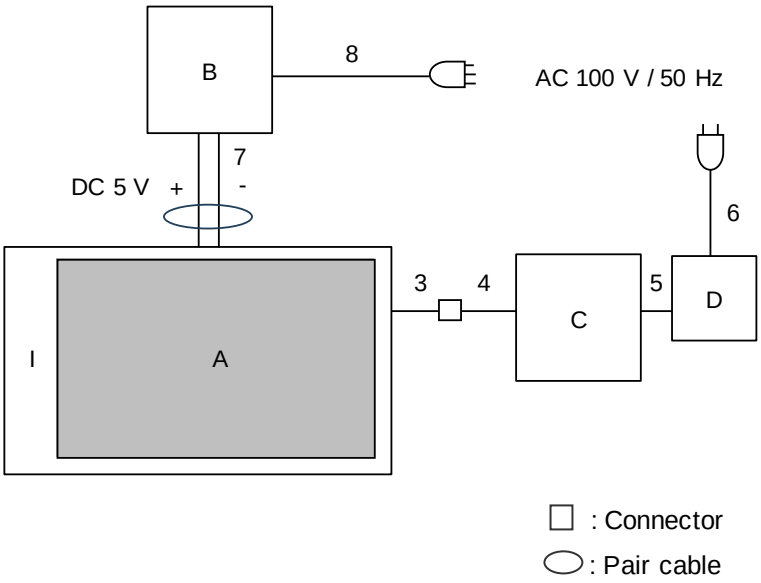
Details of Operating Mode(s)

Test Item	Antenna	Hopping	Tested Frequency
Conducted Emission	ANT 3 *1)	Off	902.75 MHz 915.25 MHz 927.25 MHz
Radiated Spurious Emission	ANT 2 ANT 3	Off	902.75 MHz 915.25 MHz 927.25 MHz
Conducted Spurious Emission, 20 dB Bandwidth, Carrier Frequency Separation	ANT 3 *1)	Off	902.75 MHz 915.25 MHz 927.25 MHz
Number of Hopping Frequency, Dwell time	ANT 3 *1)	On	-
Maximum Peak Output Power	ANT 2 ANT 3	Off	902.75 MHz 915.25 MHz 927.25 MHz
Band Edge Compliance (Conducted)	ANT 3 *1)	On Off	902.75 MHz 927.25 MHz
99 % Occupied Bandwidth	ANT 3 *1)	On Off	902.75 MHz 915.25 MHz 927.25 MHz

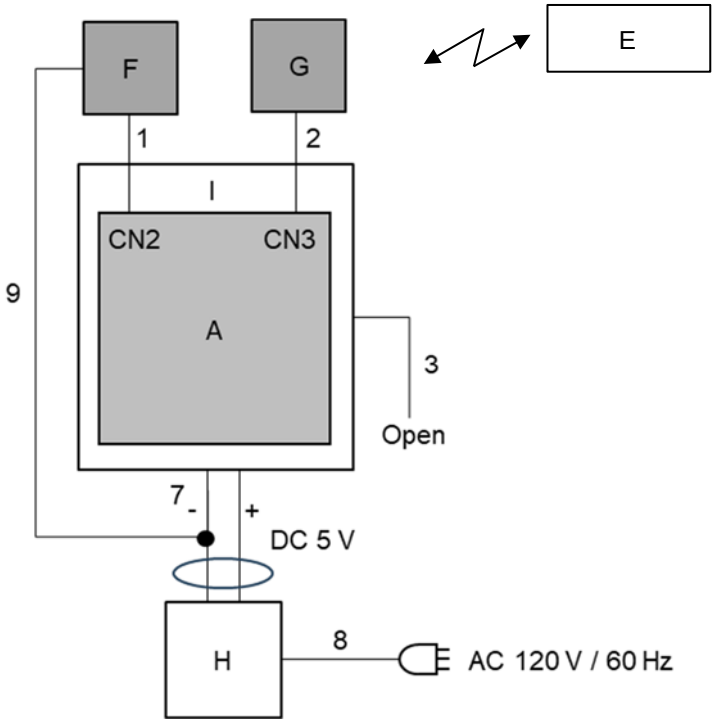
*1) The worst antenna (ANT 3) was determined based on the test result of Maximum Peak Output Power (Conducted Power).

4.2 Configuration and Peripherals

< Antenna Terminal Conducted test >



< Radiated Emission test and Conducted Emission test >



* Cabling and setup(s) were taken into consideration and test data was taken under worse case conditions. After the comparison of the test data between with Tag and without Tag, the tests were performed with the worst case.

Description of EUT and Support Equipment

No.	Item	Model number	Serial Number	Manufacturer	Remarks
A	UHF RFID Module	TPURID2100	No.004 *1) No.030 *2)	TelePower	EUT
B	Power Supply (DC)	PW8-5ADPS	14086035	TEXIO	-
C	Laptop Computer	PC-VJ23LLZGR	66000071A	NEC	-
D	AC Adapter	ADP-45TD E	6115924DB	NEC	-
E	Tag	ALN-9640	No.1	Alien Technology	-
F	Printed Pattern Antenna	CLSXR-RFID-FRONT COUPLER	H04336100	SATO	EUT (ANT 2)
G	Printed Pattern Antenna	CLSXR-RFID-SRA COUPLER	H04336200	SATO	EUT (ANT 3)
H	Power Supply (DC)	PAN55-20A	DD000084	KIKUSUI	-
I	Jig	-	-	TelePower	-

List of Cables Used

No.	Name	Length (m)	Shield		Remarks
			Cable	Connector	
1	Coaxial	0.2	Shielded	Shielded	-
2	Coaxial	0.2	Shielded	Shielded	-
3	Signal	0.1	Unshielded	Unshielded	-
4	USB	1.8	Shielded	Shielded	-
5	DC	1.8	Unshielded	Unshielded	-
6	AC	0.9	Unshielded	Unshielded	-
7	DC	0.6 *1) 2.3 *2)	Unshielded	Unshielded	-
8	AC	1.8	Unshielded	Unshielded	-
9	GND	0.2	Unshielded	Unshielded	-

*1) Used for Antenna Terminal conducted test.
*2) Used for Conducted Emission and Radiated Emission tests.

SECTION 5: Conducted Emission

Test Procedure and Conditions

EUT was placed on a urethane platform of nominal size, 2.0 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 was 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.

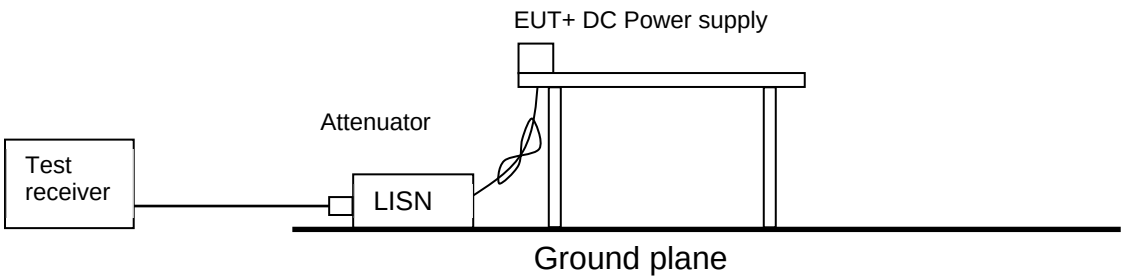
For the tests on EUT with other peripherals (as a whole system)
I/O cables that were connected to the peripherals were bundled in center. They were folded back and forth forming a bundle 30 cm to 40 cm long and were hanged at a 40 cm height to the ground plane.

The AC Mains Terminal Continuous disturbance Voltage has been measured with the EUT in a Shielded Room.
The EUT was connected to a LISN (AMN) via DC Power Supply.
An overview sweep with peak detection has been performed.

Test results are rounded off and limit are rounded down, 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 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. 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 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.
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

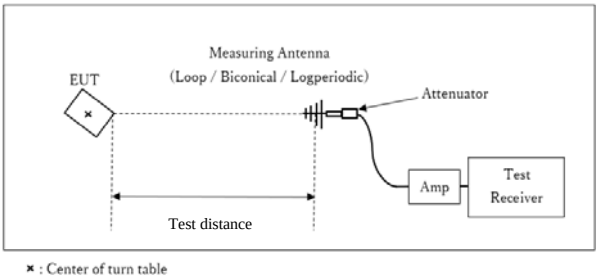
In any 100 kHz bandwidth outside the restricted band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator confirmed 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired 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	PK
IF Bandwidth	BW 120 kHz	RBW: 1 MHz VBW: 3 MHz	RBW: 1 MHz VBW: 1/T (T: burst length, refer to Burst rate confirmation sheet) Detector: Peak	RBW: 100 kHz VBW: 300 kHz

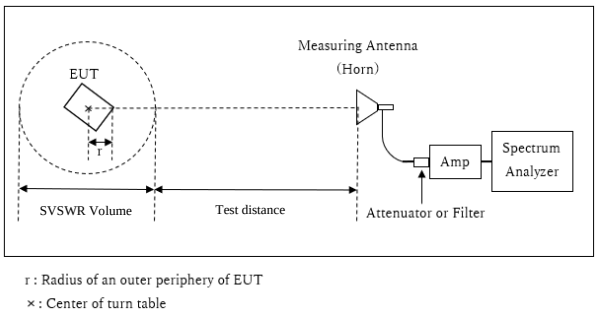
Figure 2: Test Setup

Below 1 GHz



Test Distance: 3 m

1 GHz to 10 GHz



Distance Factor: 20 x log (3.86 m / 3.0 m) = 2.19 dB
* Test Distance: (3 + SVSWR Volume /2) - r = 3.86 m

SVSWR Volume : 2.0 m
(SVSWR Volume has been calibrated based on CISPR 16-1-4.)
r = 0.14 m

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

ANT 2

Test Range	Item	Horizontal	Vertical
Below 1 GHz (Carrier)	Module	X	Z
	Antenna	X	X
Below 1 GHz (Spurious)	Module	X	X
	Antenna	X	X
Above 1 GHz	Module	Y	Y
	Antenna	Y	X

ANT 3

Test Range	Item	Horizontal	Vertical
Below 1 GHz (Carrier)	Module	X	Z
	Antenna	Y	X
Below 1 GHz (Spurious)	Module	X	X
	Antenna	X	X
Above 1 GHz	Module	Y	Y
	Antenna	X	X

Test results are rounded off and limit are rounded down, 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
20 dB Bandwidth	300 kHz	3 kHz	10 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 *1)	Spectrum Analyzer
Maximum Peak Output Power	-	-	-	Auto	Peak/ Average *2)	-	Power Meter (Sensor: 160 MHz BW)
Carrier Frequency Separation	1.2 MHz	10 kHz	30 kHz	Auto	Peak	Max Hold	Spectrum Analyzer
Number of Hopping Frequency	30 MHz	75 kHz	240 kHz	Auto	Peak	Max Hold	Spectrum Analyzer
Dwell Time	Zero Span	100 kHz	300 kHz	As necessary capture the entire dwell time per hopping channel	Peak	Clear Write	Spectrum Analyzer
Conducted Spurious Emission *3)	9 kHz to 150 kHz	200 Hz	620 Hz	Auto	Peak	Max Hold	Spectrum Analyzer
	150 kHz to 30 MHz	10 kHz	30 kHz				
	30 MHz to 10 GHz	100 kHz	300 kHz				
Conducted Spurious Emission Band Edge compliance	5 MHz	100 kHz	300 kHz	Auto	Peak	Max Hold	Spectrum Analyzer

*1) The measurement was performed with Max Hold since the duty cycle was not 100 %. Peak hold was applied as Worst-case measurement.
*2) Reference data
*3) In the frequency range below 30MHz, RBW was narrowed to separate the noise contents.
Then, wide-band noise near the limit was checked separately, however the noise was not detected as shown in the chart.

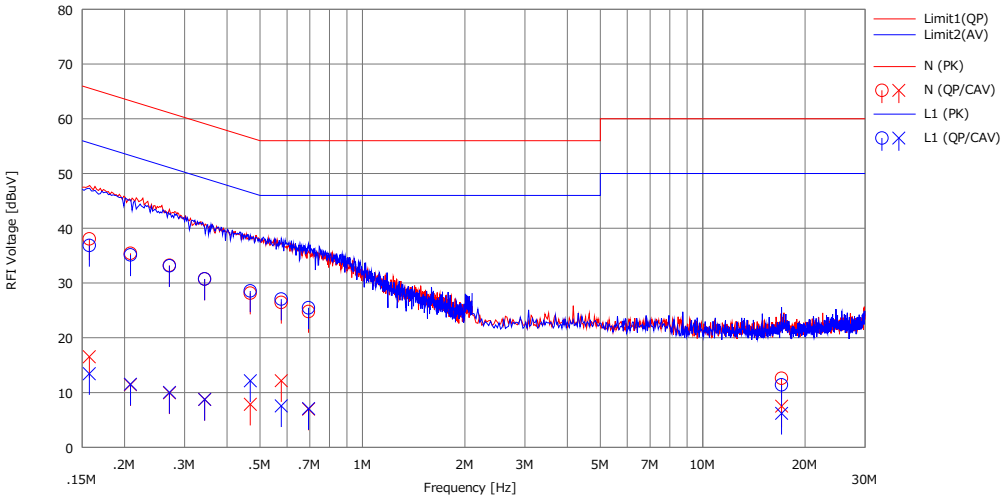
Test results are rounded off and limit are rounded down, so some differences might be observed.
The equipment and cables were not used for factor 0 dB of the data sheets.

Test Data : APPENDIX
Test Result : Pass

APPENDIX 1: Test data

Conducted Emission

Test place	Shonan EMC Lab. No.2 Sheilded Room
Date	March 13, 2025
Temperature / Humidity	20 deg. C / 57 % RH
Engineer	Kouki Yamada
Mode	Tx, 902.75 MHz, ANT3 (without Tag)

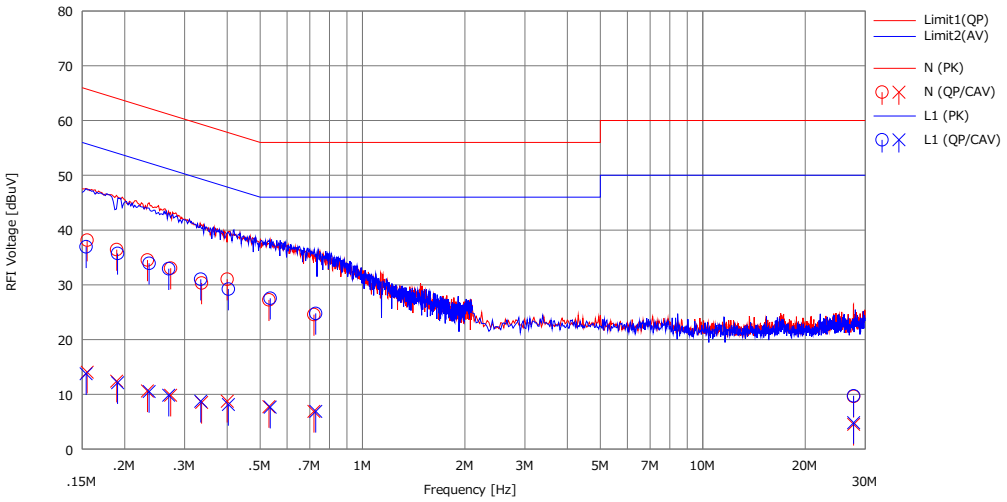


No.	Freq.	Reading		C.Fac	Results		Limit		Margin		Phase	Comment
		(QP)	(CAV)		(QP)	(CAV)	(QP)	(AV)	(QP)	(AV)		
	[MHz]	[dBuV]	[dBuV]	[dB]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dB]	[dB]		
1	0.15751	22.60	1.10	15.44	38.04	16.54	65.59	55.59	27.5	39.0	N	
2	0.20806	20.00	-4.00	15.42	35.42	11.42	63.28	53.28	27.8	41.8	N	
3	0.27089	17.80	-5.50	15.43	33.23	9.93	61.09	51.09	27.8	41.1	N	
4	0.34369	15.30	-6.70	15.43	30.73	8.73	59.11	49.11	28.3	40.3	N	
5	0.46781	12.70	-7.60	15.44	28.14	7.84	56.55	46.55	28.4	38.7	N	
6	0.57706	11.00	-3.30	15.46	26.46	12.16	56.00	46.00	29.5	33.8	N	
7	0.69405	9.30	-8.50	15.47	24.77	6.97	56.00	46.00	31.2	39.0	N	
8	17.05439	-3.50	-8.60	16.11	12.61	7.51	60.00	50.00	47.3	42.4	N	
9	0.15751	21.40	-2.00	15.44	36.84	13.44	65.59	55.59	28.7	42.1	L1	
10	0.20806	19.70	-3.90	15.42	35.12	11.52	63.28	53.28	28.1	41.7	L1	
11	0.27089	17.70	-5.40	15.43	33.13	10.03	61.09	51.09	27.9	41.0	L1	
12	0.34369	15.30	-6.70	15.43	30.73	8.73	59.11	49.11	28.3	40.3	L1	
13	0.46781	13.10	-3.30	15.44	28.54	12.14	56.55	46.55	28.0	34.4	L1	
14	0.57706	11.60	-7.90	15.46	27.06	7.56	56.00	46.00	28.9	38.4	L1	
15	0.69405	10.00	-8.40	15.47	25.47	7.07	56.00	46.00	30.5	38.9	L1	
16	17.05439	-4.70	-9.90	16.11	11.41	6.21	60.00	50.00	48.5	43.7	L1	

Calculation:Result[dBuV]=Reading[dBuV]+C.Fac(LISN(AMN)+Cable+ATT)[dB]
LISN(AMN):LIMS ID 145540

Conducted Emission

Test place	Shonan EMC Lab. No.2 Shielded room
Date	March 13, 2025
Temperature / Humidity	20 deg. C / 57 % RH
Engineer	Kouki Yamada
Mode	Tx, 915.25 MHz, ANT3 (without Tag)

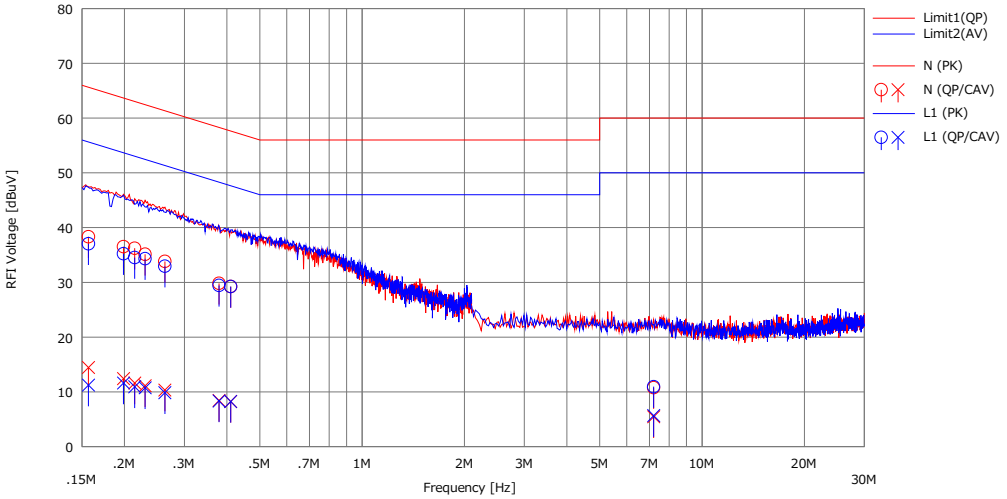


No.	Freq.	Reading		C.Fac	Results		Limit		Margin		Phase	Comment
		〈QP〉	〈CAV〉		〈QP〉	〈CAV〉	〈QP〉	〈AV〉	〈QP〉	〈AV〉		
	[MHz]	[dBuV]	[dBuV]	[dB]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dB]	[dB]		
1	0.15512	22.70	-1.40	15.44	38.14	14.04	65.72	55.72	27.5	41.6	N	
2	0.18940	21.00	-3.00	15.42	36.42	12.42	64.06	54.06	27.6	41.6	N	
3	0.23340	19.10	-4.80	15.42	34.52	10.62	62.33	52.33	27.8	41.7	N	
4	0.27300	17.60	-5.60	15.43	33.03	9.83	61.03	51.03	28.0	41.2	N	
5	0.33660	14.90	-6.90	15.43	30.33	8.53	59.29	49.29	28.9	40.7	N	
6	0.40032	15.60	-6.70	15.43	31.03	8.73	57.85	47.85	26.8	39.1	N	
7	0.53103	11.80	-7.70	15.45	27.25	7.75	56.00	46.00	28.7	38.2	N	
8	0.71967	9.10	-8.60	15.47	24.57	6.87	56.00	46.00	31.4	39.1	N	
9	27.73924	-6.90	-12.00	16.52	9.62	4.52	60.00	50.00	50.3	45.4	N	
10	0.15402	21.50	-1.70	15.45	36.95	13.75	65.78	55.78	28.8	42.0	L1	
11	0.19067	20.30	-3.30	15.42	35.72	12.12	64.01	54.01	28.2	41.8	L1	
12	0.23594	18.50	-4.90	15.42	33.92	10.52	62.24	52.24	28.3	41.7	L1	
13	0.26940	17.50	-5.60	15.43	32.93	9.83	61.14	51.14	28.2	41.3	L1	
14	0.33480	15.60	-6.70	15.43	31.03	8.73	59.33	49.33	28.3	40.6	L1	
15	0.40350	13.80	-7.30	15.43	29.23	8.13	57.78	47.78	28.5	39.6	L1	
16	0.53550	12.10	-7.80	15.45	27.55	7.65	56.00	46.00	28.4	38.3	L1	
17	0.72890	9.30	-8.60	15.47	24.77	6.87	56.00	46.00	31.2	39.1	L1	
18	27.73924	-6.80	-11.70	16.52	9.72	4.82	60.00	50.00	50.2	45.1	L1	

Calculation:Result[dBuV]=Reading[dBuV]+C.Fac(LISN(AMN)+Cable+ATT)[dB]
LISN(AMN):LIMS ID 145540

Conducted Emission

Test place	Shonan EMC Lab. No.2 Shielded room
Date	March 13, 2025
Temperature / Humidity	20 deg. C / 57 % RH
Engineer	Kouki Yamada
Mode	Tx, 927.25 MHz, ANT3 (without Tag)



No.	Freq.	Reading		C.Fac	Results		Limit		Margin		Phase	Comment
		(QP)	(CAV)		(QP)	(CAV)	(QP)	(AV)	(QP)	(AV)		
	[MHz]	[dBuV]	[dBuV]	[dB]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dB]	[dB]		
1	0.15675	22.90	-1.00	15.44	38.34	14.44	65.63	55.63	27.2	41.1	N	
2	0.19879	21.10	-3.00	15.42	36.52	12.42	63.66	53.66	27.1	41.2	N	
3	0.21428	20.80	-3.80	15.42	36.22	11.62	63.04	53.04	26.8	41.4	N	
4	0.23000	19.70	-4.30	15.42	35.12	11.12	62.45	52.45	27.3	41.3	N	
5	0.26305	18.40	-5.10	15.43	33.83	10.33	61.33	51.33	27.5	41.0	N	
6	0.37953	14.40	-7.00	15.43	29.83	8.43	58.29	48.29	28.4	39.8	N	
7	0.41067	13.80	-7.20	15.43	29.23	8.23	57.63	47.63	28.4	39.4	N	
8	7.20462	-5.00	-10.30	15.75	10.75	5.45	60.00	50.00	49.2	44.5	N	
9	0.15675	21.60	-4.20	15.44	37.04	11.24	65.63	55.63	28.5	44.3	L1	
10	0.19879	19.80	-3.80	15.42	35.22	11.62	63.66	53.66	28.4	42.0	L1	
11	0.21428	19.10	-4.50	15.42	34.52	10.92	63.04	53.04	28.5	42.1	L1	
12	0.23000	18.90	-4.70	15.42	34.32	10.72	62.45	52.45	28.1	41.7	L1	
13	0.26305	17.50	-5.60	15.43	32.93	9.83	61.33	51.33	28.4	41.5	L1	
14	0.37953	14.00	-7.10	15.43	29.43	8.33	58.29	48.29	28.8	39.9	L1	
15	0.41067	13.80	-7.20	15.43	29.23	8.23	57.63	47.63	28.4	39.4	L1	
16	7.20462	-4.80	-10.10	15.75	10.95	5.65	60.00	50.00	49.0	44.3	L1	

Calculation:Result[dBuV]=Reading[dBuV]+C.Fac(LISN(AMN)+Cable+ATT)[dB]
LISN(AMN):LIMS ID 145540

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

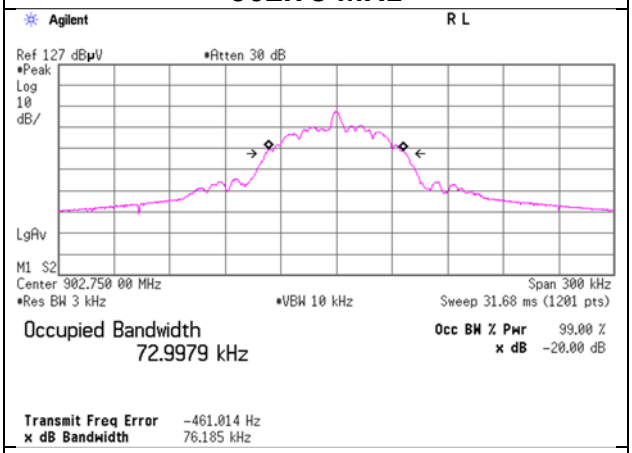
Test place	Shonan EMC Lab. No.5 Shielded Room
Date	October 24, 2024
Temperature / Humidity	24 deg. C / 60 % RH
Engineer	Takayuki Kobayashi
Mode	Tx, Hopping Off, Tx, Hopping On

Freq. [MHz]	20 dB Bandwidth [MHz]	Limit for 20 dB Bandwidth [MHz]	99 % Occupied Bandwidth [kHz]	Carrier Frequency Separation [MHz]	Limit for Carrier Frequency separation [MHz]
902.75	0.076	0.250	72.998	0.500	>= 0.076
915.25	0.076	0.250	***73.232***	0.500	>= 0.076
927.25	0.076	0.250	73.101	0.500	>= 0.076
Hopping On	-	-	24858.40	-	-

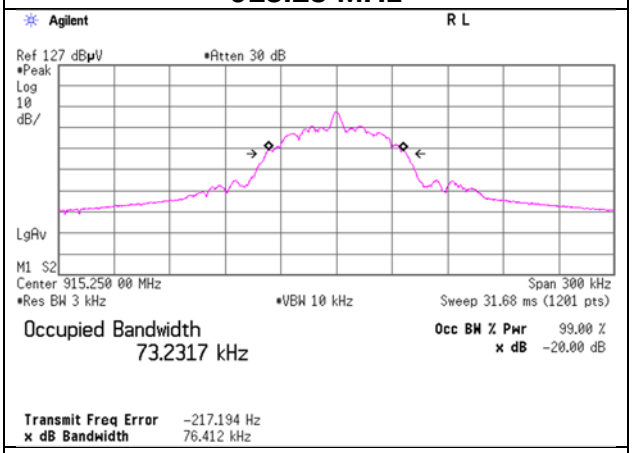
Limit for Carrier Frequency separation: 20 dB Bandwidth or 25 kHz (whichever is greater).

20dB Bandwidth and 99% Occupied Bandwidth

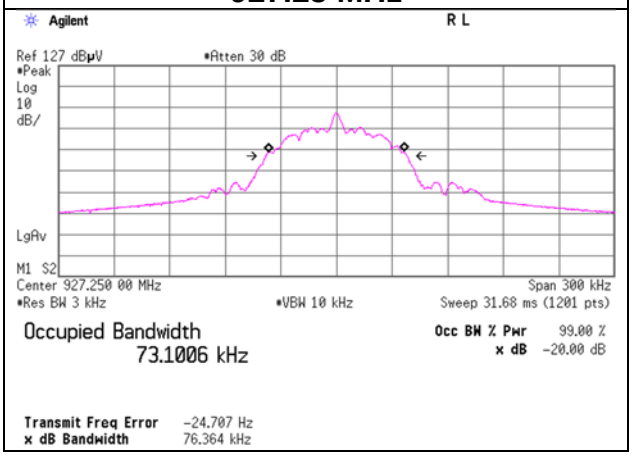
902.75 MHz



915.25 MHz

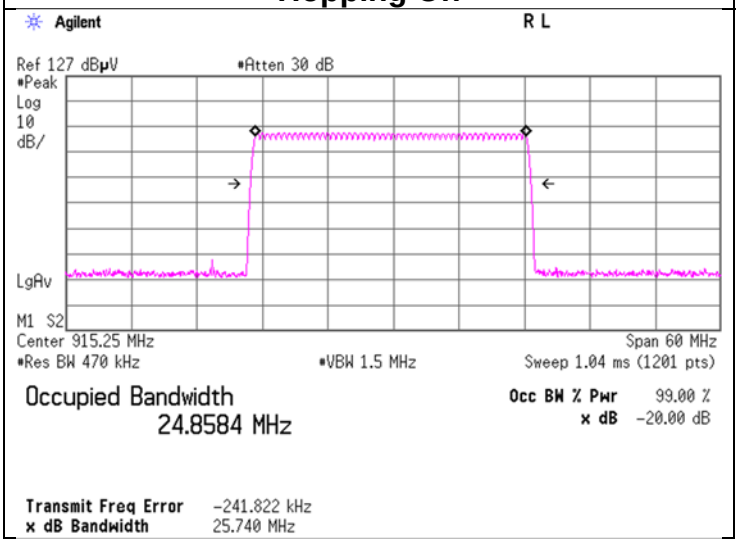


927.25 MHz



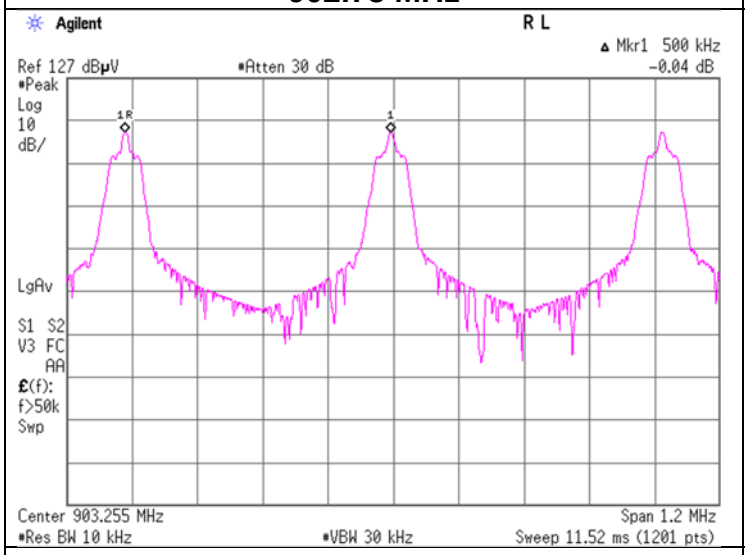
20dB Bandwidth and 99% Occupied Bandwidth

Hopping On

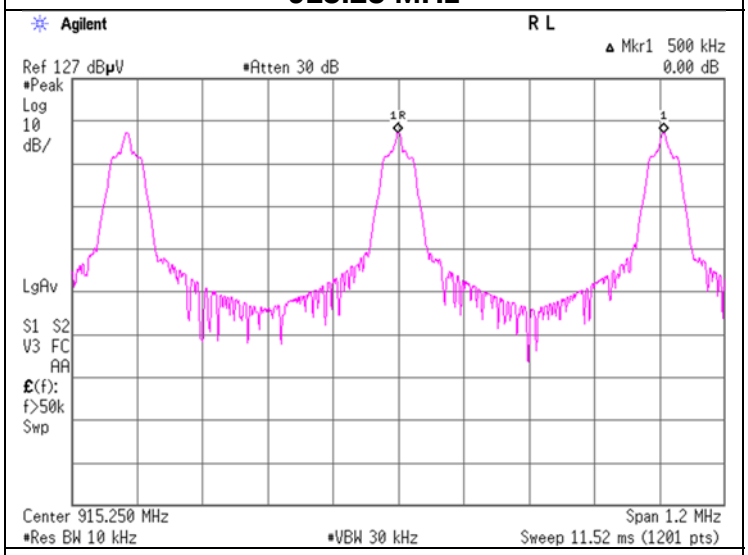


Carrier Frequency Separation

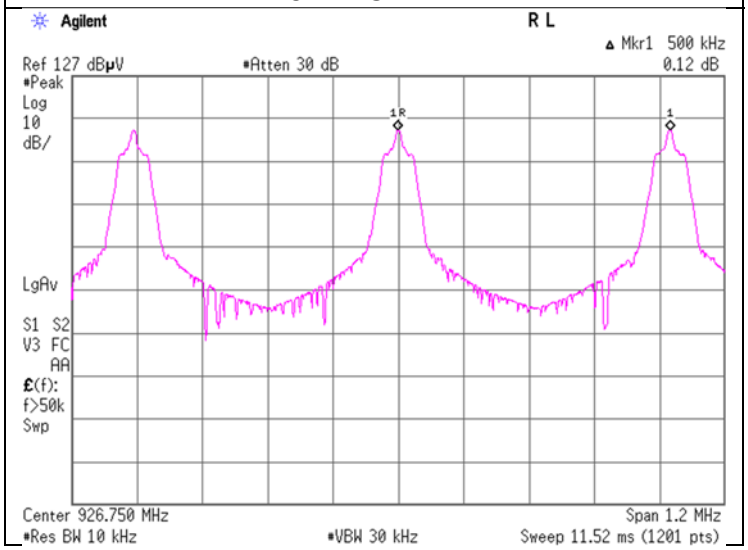
902.75 MHz



915.25 MHz



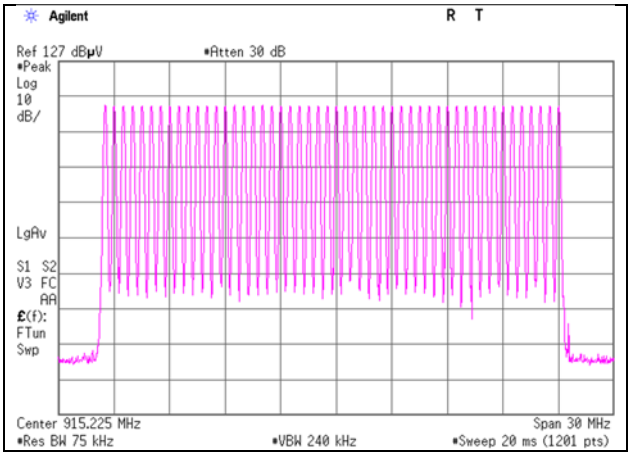
927.25 MHz



Number of Hopping Frequency

Test place	Shonan EMC Lab. No.5 Shielded Room
Date	October 24, 2024
Temperature / Humidity	24 deg. C / 60 % RH
Engineer	Takayuki Kobayashi
Mode	Tx, Hopping On

Number of channel [channels]	Limit [channels]
50	>= 50



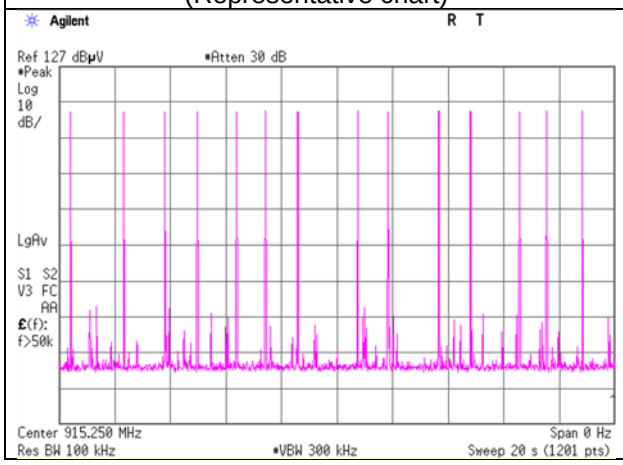
Dwell time

Test place	Shonan EMC Lab. No.5 Shielded Room
Date	October 24, 2024
Temperature / Humidity	24 deg. C / 60 % RH
Engineer	Takayuki Kobayashi
Mode	Tx, Hopping On

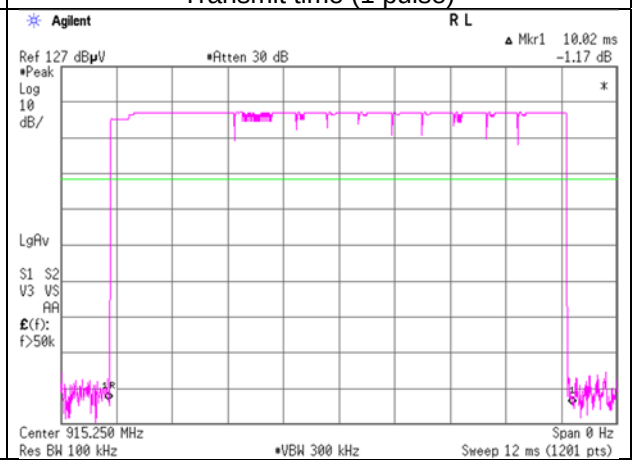
Number of transmiusson in 20 s period	Length of transmission [ms]	Result [ms]	Limit [ms]
14	10.020	140.3	400

Sample Calculation
Result = Number of transmission x Length of transmission

(Representative chart)



Transmit time (1 pulse)



*) Maximum dwell time in actual operation.

Maximum Peak Output Power

Test place	Shonan EMC Lab. No.5 Shielded Room
Date	October 24, 2024
Temperature / Humidity	24 deg. C / 60 % RH
Engineer	Takayuki Kobayashi
Mode	Tx, Hopping Off

					Conducted Power					e.i.r.p. for RSS-247					
PORT	Freq.	Reading	Cable Loss	Atten. Loss	Result		Limit		Margin	Antenna Gain	Result		Limit		Margin
	[MHz]	[dBm]	[dB]	[dB]	[dBm]	[mW]	[dBm]	[mW]	[dB]	[dBi]	[dBm]	[mW]	[dBm]	[mW]	[dB]
ANT2	902.75	7.59	1.21	19.96	28.77	753.04	30.00	1000	1.23	-15.02	13.75	23.70	36.02	4000	22.27
	915.25	7.63	1.22	19.97	28.82	761.65	30.00	1000	1.18	-15.02	13.80	23.97	36.02	4000	22.22
	927.25	7.63	1.23	19.97	28.83	763.23	30.00	1000	1.17	-15.02	***13.81***	***24.02***	36.02	4000	22.21
ANT3	902.75	7.44	1.37	19.96	28.77	753.53	30.00	1000	1.23	-26.56	2.21	1.66	36.02	4000	33.81
	915.25	7.49	1.37	19.97	***28.83***	***763.67***	30.00	1000	1.17	-26.56	***2.27***	***1.69***	36.02	4000	33.75
	927.25	7.40	1.38	19.97	28.75	749.34	30.00	1000	1.25	-26.56	2.19	1.65	36.02	4000	33.83

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

Average Output Power
(Reference data for RF Exposure)

Test place	Shonan EMC Lab. No.5 Shielded Room
Date	October 24, 2024
Temperature / Humidity	24 deg. C / 60 % RH
Engineer	Takayuki Kobayashi
Mode	Tx, Hopping Off

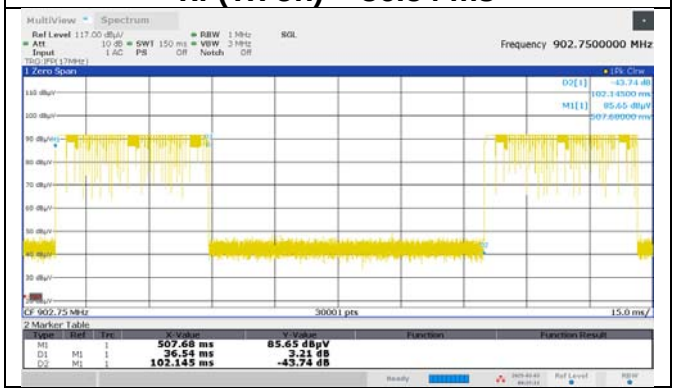
	Freq. [MHz]	P/M (Average) Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result [dBm]	Result [mW]
ANT2	902.75	6.86	1.21	19.96	28.04	636.53
	915.25	6.92	1.22	19.97	28.11	646.78
	927.25	6.93	1.23	19.97	28.13	649.62
ANT3	902.75	6.70	1.37	19.96	28.03	635.48
	915.25	6.76	1.37	19.97	28.10	645.52
	927.25	6.67	1.38	19.97	28.02	633.40

Sample Calculation:
Result (Burst power average) = Reading + Cable Loss (including the cable(s) customer supplied) + Attenuator
*) Power was measured with using the gate function of power meter.

Burst Rate Confirmation

Test place	Shonan EMC Lab.
Semi Anechoic Chamber	SAC3
Date	March 3, 2025
Temperature / Humidity	22 deg. C / 35 % RH
Engineer	Makoto Hosaka
Mode	Tx, Hopping Off

VBW: 1/x = 27.37 Hz < 30 Hz
x: (Tx on) = 36.54 ms



*) Maximum duty cycle in test mode, used only Radiated Emission test.

Radiated Spurious Emission

Test place	Shonan EMC Lab.	
Semi Anechoic Chamber	SAC3	SAC3
Date	March 11, 2025	March 8, 2025
Temperature / Humidity	22 deg. C / 36 % RH	24 deg. C / 22 % RH
Engineer	Takahiro Suzuki (Below 1 GHz)	Miku Ikudome (1 GHz to 10 GHz)
Mode	Tx, Hopping Off 902.75 MHz, ANT2 (below 1 GHz: with Tag, above 1 GHz: without Tag)	

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

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Fac. [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg.]	Remark
Hori.	40.412	QP	21.68	14.66	6.68	32.18	0.00	10.84	40.0	29.1	100	0	-
Hori.	85.827	QP	21.62	7.34	7.72	32.15	0.00	4.53	40.0	35.4	100	0	-
Hori.	138.134	QP	20.89	14.22	7.79	32.12	0.00	10.78	43.5	32.7	100	0	-
Hori.	190.592	QP	21.66	16.30	8.12	32.06	0.00	14.02	43.5	29.4	100	0	-
Hori.	457.735	QP	21.07	16.24	9.91	31.96	0.00	15.26	46.0	30.7	100	0	-
Hori.	4513.750	PK	58.69	30.41	5.97	42.95	2.19	54.31	73.9	19.5	163	74	-
Hori.	5416.500	PK	56.64	31.79	6.56	43.43	2.19	53.75	73.9	20.1	246	115	-
Hori.	9027.500	PK	52.81	37.77	8.62	43.13	2.19	58.26	73.9	15.6	135	134	-
Hori.	4513.750	AV	52.78	30.41	5.97	42.95	2.19	48.40	53.9	**5.5**	163	74	VBW: 30 Hz
Hori.	5416.500	AV	50.27	31.79	6.56	43.43	2.19	47.38	53.9	6.5	246	115	VBW: 30 Hz
Hori.	9027.500	AV	42.57	37.77	8.62	43.13	2.19	48.02	53.9	5.8	135	134	VBW: 30 Hz
Vert.	37.165	QP	20.93	15.89	6.62	32.19	0.00	11.25	40.0	28.7	100	0	-
Vert.	52.464	QP	21.56	10.31	6.83	32.18	0.00	6.52	40.0	33.4	100	0	-
Vert.	95.236	QP	22.08	9.23	7.61	32.14	0.00	6.78	43.5	36.7	100	0	-
Vert.	138.557	QP	20.85	14.23	7.80	32.12	0.00	10.76	43.5	32.7	100	0	-
Vert.	174.258	QP	22.03	15.75	8.11	32.08	0.00	13.81	43.5	29.6	100	0	-
Vert.	4513.750	PK	57.38	30.41	5.97	42.95	2.19	53.00	73.9	20.9	183	111	-
Vert.	5416.500	PK	54.98	31.79	6.56	43.43	2.19	52.09	73.9	21.8	134	146	-
Vert.	9027.500	PK	51.73	37.77	8.62	43.13	2.19	57.18	73.9	16.7	221	140	-
Vert.	4513.750	AV	51.33	30.41	5.97	42.95	2.19	46.95	53.9	6.9	183	111	VBW: 30 Hz
Vert.	5416.500	AV	48.21	31.79	6.56	43.43	2.19	45.32	53.9	8.5	134	146	VBW: 30 Hz
Vert.	9027.500	AV	41.86	37.77	8.62	43.13	2.19	47.31	53.9	6.5	221	140	VBW: 30 Hz

Result = Reading + Ant.Fac. + Loss (Cable + (Atten or Filter)(below 18 GHz)) - Gain(Amp) + Distance Fac.
*Other frequency noises omitted in this report were not seen or have enough margin (more than 20 dB).
Distance Fac. : 1 GHz to 10 GHz : 20log (3.86 [m] / 3.0 [m]) = 2.19 [dB]

20 dBc Data Sheet

(RBW 100 kHz, VBW 300 kHz)

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Fac. [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	902.750	PK	70.70	22.19	11.37	0.00	0.00	104.26	-	-	Carrier
Hori.	902.000	PK	29.95	22.19	11.37	0.00	0.00	63.51	84.2	20.6	-
Vert.	902.750	PK	64.91	22.19	11.37	0.00	0.00	98.47	-	-	Carrier
Vert.	902.000	PK	23.96	22.19	11.37	0.00	0.00	57.52	78.4	20.8	-

Result = Reading + Ant.Fac. + Loss (Cable + (Atten or Filter)(below 18 GHz)) - Gain(Amp) + Distance Fac.
Distance Fac. : 1 GHz to 10 GHz : 20log (3.86 [m] / 3.0 [m]) = 2.19 [dB]

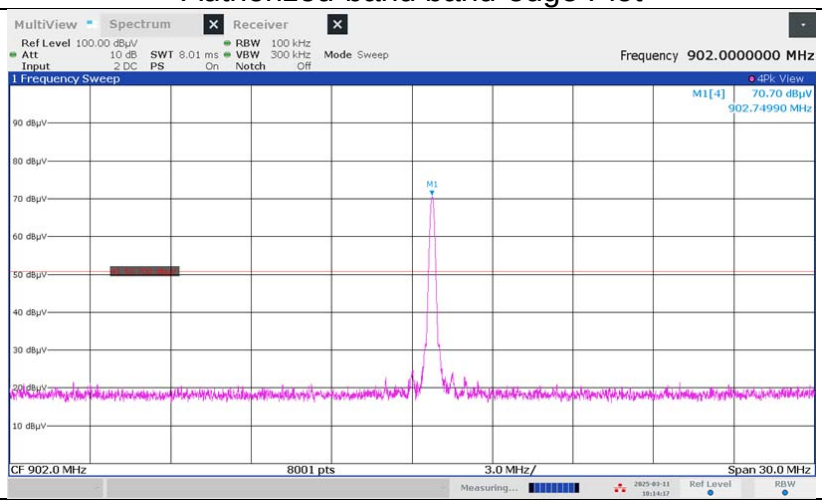
*) For frequencies where the Gain is 0, Measurements were taken without using an Amp.

Radiated Spurious Emission
(Reference Plot for band-edge)

Test place	Shonan EMC Lab.
Semi Anechoic Chamber	SAC3
Date	March 11, 2025
Temperature / Humidity	22 deg. C / 36 % RH
Engineer	Takahiro Suzuki
Mode	Tx, Hopping Off 902.75 MHz, ANT2 (below 1 GHz: with Tag, above 1 GHz: without Tag)

Horizontal

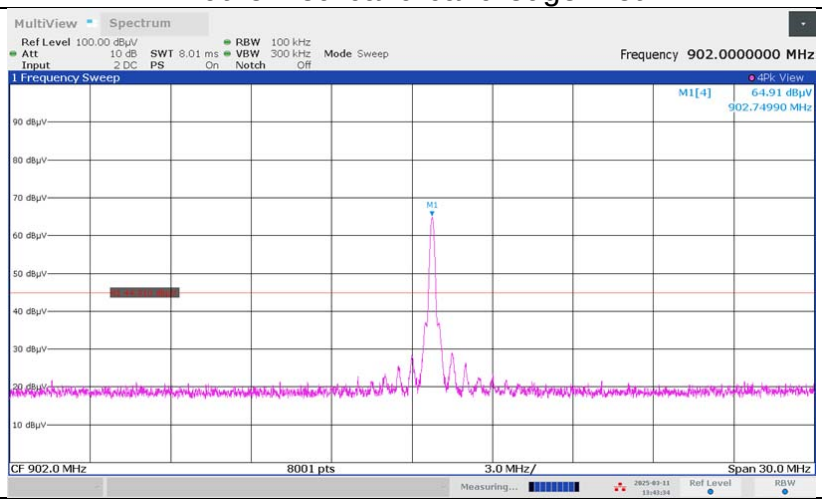
Authorized-band band-edge Plot



20 dBc Plot

Vertical

Authorized-band band-edge Plot



20 dBc Plot

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

Radiated Spurious Emission

Test place	Shonan EMC Lab.	
Semi Anechoic Chamber	SAC3	SAC3
Date	March 11, 2025	March 8, 2025
Temperature / Humidity	22 deg. C / 36 % RH	24 deg. C / 22 % RH
Engineer	Takahiro Suzuki (Below 1 GHz)	Miku Ikudome (1 GHz to 10 GHz)
Mode	Tx, Hopping Off 915.25 MHz, ANT2 (below 1 GHz: with Tag, above 1 GHz: without Tag)	

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

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Fac. [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg.]	Remark
Hori.	38.878	QP	21.55	15.25	6.65	32.19	0.00	11.26	40.0	28.7	100	0	-
Hori.	83.494	QP	21.78	6.94	7.72	32.15	0.00	4.29	40.0	35.7	100	0	-
Hori.	128.442	QP	21.00	13.67	7.58	32.12	0.00	10.13	43.5	33.3	100	0	-
Hori.	186.608	QP	21.28	16.19	8.11	32.07	0.00	13.51	43.5	29.9	100	0	-
Hori.	449.159	QP	21.19	15.98	9.88	31.96	0.00	15.09	46.0	30.9	100	2	-
Hori.	4576.250	PK	57.97	30.58	6.02	42.94	2.19	53.82	73.9	20.0	165	72	-
Hori.	9152.500	PK	50.60	38.24	8.71	43.16	2.19	56.58	73.9	17.3	252	114	-
Hori.	4576.250	AV	52.27	30.58	6.02	42.94	2.19	48.12	53.9	**5.7**	165	72	VBW: 30 Hz
Hori.	9152.500	AV	38.67	38.24	8.71	43.16	2.19	44.65	53.9	9.2	252	114	VBW: 30 Hz
Vert.	33.963	QP	20.76	17.12	6.54	32.19	0.00	12.23	40.0	27.7	100	0	-
Vert.	46.598	QP	21.86	12.37	6.81	32.18	0.00	8.86	40.0	31.1	100	0	-
Vert.	96.899	QP	21.93	9.56	7.58	32.14	0.00	6.93	43.5	36.5	100	0	-
Vert.	133.857	QP	20.77	14.02	7.68	32.12	0.00	10.35	43.5	33.1	100	0	-
Vert.	164.904	QP	21.87	15.29	8.13	32.09	0.00	13.20	43.5	30.3	100	0	-
Vert.	4576.250	PK	55.97	30.58	6.02	42.94	2.19	51.82	73.9	22.0	123	112	-
Vert.	9152.500	PK	50.12	38.24	8.71	43.16	2.19	56.10	73.9	17.8	173	153	-
Vert.	4576.250	AV	49.45	30.58	6.02	42.94	2.19	45.30	53.9	8.6	123	112	VBW: 30 Hz
Vert.	9152.500	AV	37.94	38.24	8.71	43.16	2.19	43.92	53.9	9.9	173	153	VBW: 30 Hz

Result = Reading + Ant.Fac. + Loss (Cable + (Atten or Filter)(below 18 GHz)) - Gain(Amp) + Distance Fac.
*Other frequency noises omitted in this report were not seen or have enough margin (more than 20 dB).
Distance Fac. : 1 GHz to 10 GHz : 20log (3.86 [m] / 3.0 [m]) = 2.19 [dB]

20 dBc Data Sheet

(RBW 100 kHz, VBW 300 kHz)

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Fac. [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	915.250	PK	66.28	22.19	11.41	0.00	0.00	99.88	-	-	Carrier
Hori.	5491.500	PK	52.43	31.91	6.61	43.53	2.19	49.61	79.8	30.1	-
Vert.	915.250	PK	61.85	22.19	11.41	0.00	0.00	95.45	-	-	Carrier
Vert.	5491.500	PK	51.69	31.91	6.61	43.53	2.19	48.87	75.4	26.5	-

Result = Reading + Ant.Fac. + Loss (Cable + (Atten or Filter)(below 18 GHz)) - Gain(Amp) + Distance Fac.
Distance Fac. : 1 GHz to 10 GHz : 20log (3.86 [m] / 3.0 [m]) = 2.19 [dB]

*) For frequencies where the Gain is 0, Measurements were taken without using an Amp.

Radiated Spurious Emission

Test place	Shonan EMC Lab.	
Semi Anechoic Chamber	SAC3	SAC3
Date	March 11, 2025	March 8, 2025
Temperature / Humidity	22 deg. C / 36 % RH	24 deg. C / 22 % RH
Engineer	Takahiro Suzuki (Below 1 GHz)	Miku Ikudome (1 GHz to 10 GHz)
Mode	Tx, Hopping Off 927.25 MHz, ANT2 (below 1 GHz: with Tag, above 1 GHz: without Tag)	

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

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Fac. [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg.]	Remark
Hori.	41.781	QP	21.54	14.13	6.71	32.18	0.00	10.20	40.0	29.8	100	0	-
Hori.	85.465	QP	21.72	7.27	7.73	32.15	0.00	4.57	40.0	35.4	100	0	-
Hori.	129.552	QP	20.67	13.81	7.60	32.12	0.00	9.96	43.5	33.5	100	0	-
Hori.	189.519	QP	21.55	16.22	8.11	32.06	0.00	13.82	43.5	29.6	100	0	-
Hori.	456.343	QP	20.87	16.20	9.91	31.96	0.00	15.02	46.0	30.9	100	0	-
Hori.	4636.250	PK	56.62	30.75	6.05	42.93	2.19	52.68	73.9	21.2	163	71	-
Hori.	4636.250	AV	50.56	30.75	6.05	42.93	2.19	46.62	53.9	**7.2**	163	71	VBW: 30 Hz
Vert.	37.913	QP	21.03	15.61	6.64	32.19	0.00	11.09	40.0	28.9	100	0	-
Vert.	53.891	QP	21.48	9.83	6.81	32.18	0.00	5.94	40.0	34.0	100	0	-
Vert.	92.651	QP	21.84	8.72	7.64	32.15	0.00	6.05	43.5	37.4	100	0	-
Vert.	130.264	QP	21.01	13.88	7.60	32.12	0.00	10.37	43.5	33.1	100	0	-
Vert.	170.800	QP	21.78	15.54	8.12	32.09	0.00	13.35	43.5	30.1	100	0	-
Vert.	4636.250	PK	54.87	30.75	6.05	42.93	2.19	50.93	73.9	22.9	196	112	-
Vert.	4636.250	AV	48.56	30.75	6.05	42.93	2.19	44.62	53.9	9.2	196	112	VBW: 30 Hz

Result = Reading + Ant.Fac. + Loss (Cable + (Atten or Filter)(below 18 GHz)) - Gain(Amp) + Distance Fac.
*Other frequency noises omitted in this report were not seen or have enough margin (more than 20 dB).
Distance Fac. : 1 GHz to 10 GHz : 20log (3.86 [m] / 3.0 [m]) = 2.19 [dB]

20 dBc Data Sheet

(RBW 100 kHz, VBW 300 kHz)

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Fac. [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	927.250	PK	64.46	22.11	11.47	0.00	0.00	98.04	-	-	Carrier
Hori.	928.000	PK	26.06	22.11	11.47	0.00	0.00	59.64	78.0	18.3	-
Hori.	5563.500	PK	49.39	31.98	6.66	43.52	2.19	46.70	78.0	31.3	-
Hori.	9272.500	PK	45.68	38.65	8.79	43.19	2.19	52.12	78.0	25.8	-
Vert.	927.250	PK	59.70	22.11	11.47	0.00	0.00	93.28	-	-	Carrier
Vert.	928.000	PK	25.36	22.11	11.47	0.00	0.00	58.94	73.2	14.2	-
Vert.	5563.500	PK	47.94	31.98	6.66	43.52	2.19	45.25	73.2	27.9	-
Vert.	9272.500	PK	44.53	38.65	8.79	43.19	2.19	50.97	73.2	22.2	-

Result = Reading + Ant.Fac. + Loss (Cable + (Atten or Filter)(below 18 GHz)) - Gain(Amp) + Distance Fac.
Distance Fac. : 1 GHz to 10 GHz : 20log (3.86 [m] / 3.0 [m]) = 2.19 [dB]

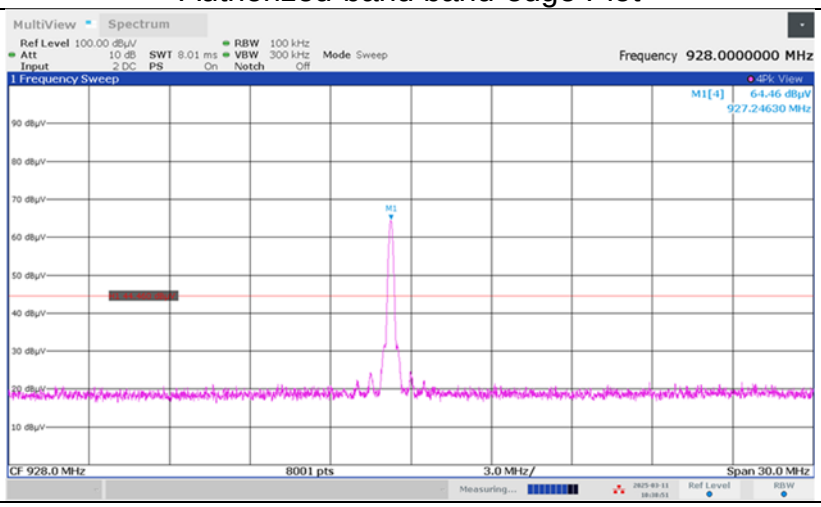
*) For frequencies where the Gain is 0, Measurements were taken without using an Amp.

Radiated Spurious Emission
(Reference Plot for band-edge)

Test place	Shonan EMC Lab.
Semi Anechoic Chamber	SAC3
Date	March 11, 2025
Temperature / Humidity	22 deg. C / 36 % RH
Engineer	Takahiro Suzuki
Mode	Tx, Hopping Off 927.25 MHz, ANT2 (below 1 GHz: with Tag, above 1 GHz: without Tag)

Horizontal

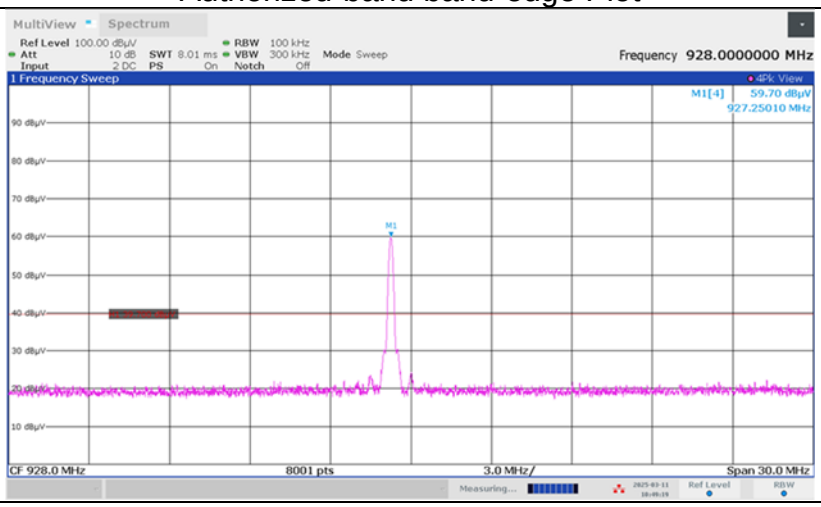
Authorized-band band-edge Plot



20 dBc Plot

Vertical

Authorized-band band-edge Plot



20 dBc Plot

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

Radiated Spurious Emission

Test place	Shonan EMC Lab.	
Semi Anechoic Chamber	SAC3	SAC3
Date	March 11, 2025	March 8, 2025
Temperature / Humidity	22 deg. C / 36 % RH	24 deg. C / 22 % RH
Engineer	Takahiro Suzuki (Below 1 GHz)	Miku Ikudome (1 GHz to 10 GHz)
Mode	Tx, Hopping Off 902.75 MHz, ANT3 (below 1 GHz: with Tag, above 1 GHz: without Tag)	

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

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Fac. [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg.]	Remark
Hori.	41.209	QP	21.37	14.35	6.70	32.18	0.00	10.24	40.0	29.7	100	0	-
Hori.	85.731	QP	21.52	7.32	7.73	32.15	0.00	4.42	40.0	35.5	100	0	-
Hori.	135.421	QP	20.72	14.13	7.72	32.12	0.00	10.45	43.5	33.0	100	0	-
Hori.	192.432	QP	21.95	16.38	8.13	32.06	0.00	14.40	43.5	29.1	100	0	-
Hori.	450.583	QP	21.03	16.03	9.88	31.96	0.00	14.98	46.0	31.0	100	0	-
Hori.	4513.750	PK	59.10	30.41	5.97	42.95	2.19	54.72	73.9	19.1	152	71	-
Hori.	5416.500	PK	56.18	31.79	6.56	43.43	2.19	53.29	73.9	20.6	204	114	-
Hori.	9027.500	PK	52.96	37.77	8.62	43.13	2.19	58.41	73.9	15.4	131	125	-
Hori.	4513.750	AV	53.13	30.41	5.97	42.95	2.19	48.75	53.9	**5.1**	152	71	VBW: 30 Hz
Hori.	5416.500	AV	49.65	31.79	6.56	43.43	2.19	46.76	53.9	7.1	204	114	VBW: 30 Hz
Hori.	9027.500	AV	42.65	37.77	8.62	43.13	2.19	48.10	53.9	5.8	131	125	VBW: 30 Hz
Vert.	37.222	QP	21.00	15.87	6.62	32.19	0.00	11.30	40.0	28.7	100	0	-
Vert.	51.060	QP	21.37	10.77	6.84	32.18	0.00	6.80	40.0	33.2	100	0	-
Vert.	94.527	QP	22.02	9.09	7.62	32.14	0.00	6.59	43.5	36.9	100	0	-
Vert.	130.020	QP	20.69	13.87	7.60	32.12	0.00	10.04	43.5	33.4	100	0	-
Vert.	174.052	QP	21.84	15.76	8.11	32.08	0.00	13.63	43.5	29.8	100	0	-
Vert.	4513.750	PK	58.50	30.41	5.97	42.95	2.19	54.12	73.9	19.7	112	113	-
Vert.	5416.500	PK	54.95	31.79	6.56	43.43	2.19	52.06	73.9	21.8	128	142	-
Vert.	9027.500	PK	51.93	37.77	8.62	43.13	2.19	57.38	73.9	16.5	235	134	-
Vert.	4513.750	AV	52.60	30.41	5.97	42.95	2.19	48.22	53.9	5.6	112	113	VBW: 30 Hz
Vert.	5416.500	AV	48.29	31.79	6.56	43.43	2.19	45.40	53.9	8.5	128	142	VBW: 30 Hz
Vert.	9027.500	AV	42.01	37.77	8.62	43.13	2.19	47.46	53.9	6.4	235	134	VBW: 30 Hz

Result = Reading + Ant.Fac. + Loss (Cable + (Atten or Filter)(below 18 GHz)) - Gain(Amp) + Distance Fac.
*Other frequency noises omitted in this report were not seen or have enough margin (more than 20 dB).
Distance Fac. : 1 GHz to 10 GHz : 20log (3.86 [m] / 3.0 [m]) = 2.19 [dB]

20 dBc Data Sheet

(RBW 100 kHz, VBW 300 kHz)

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Fac. [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	902.750	PK	67.85	22.19	11.37	0.00	0.00	101.41	-	-	Carrier
Hori.	902.000	PK	21.09	22.19	11.37	0.00	0.00	54.65	81.4	26.7	-
Vert.	902.750	PK	67.91	22.19	11.37	0.00	0.00	101.47	-	-	Carrier
Vert.	902.000	PK	21.26	22.19	11.37	0.00	0.00	54.82	81.4	26.5	-

Result = Reading + Ant.Fac. + Loss (Cable + (Atten or Filter)(below 18 GHz)) - Gain(Amp) + Distance Fac.
Distance Fac. : 1 GHz to 10 GHz : 20log (3.86 [m] / 3.0 [m]) = 2.19 [dB]

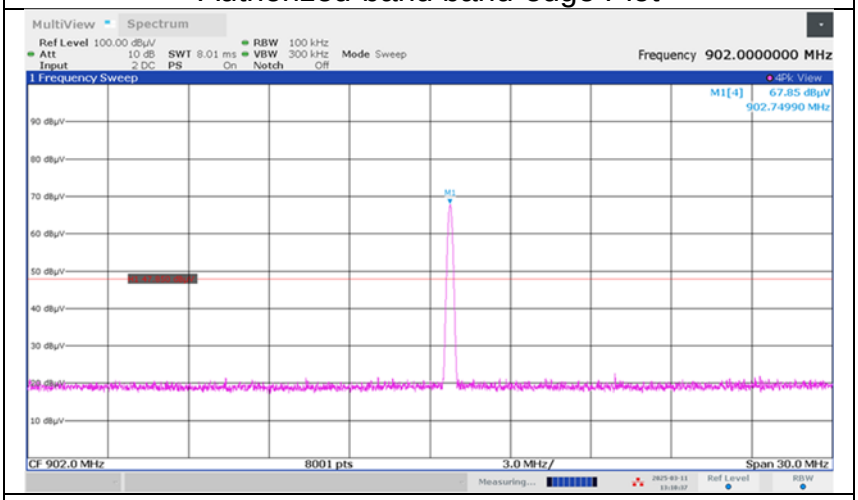
*) For frequencies where the Gain is 0, Measurements were taken without using an Amp.

Radiated Spurious Emission
(Reference Plot for band-edge)

Test place	Shonan EMC Lab.
Semi Anechoic Chamber	SAC3
Date	March 11, 2025
Temperature / Humidity	22 deg. C / 36 % RH
Engineer	Takahiro Suzuki
Mode	Tx, Hopping Off 902.75 MHz, ANT3 (below 1 GHz: with Tag, above 1 GHz: without Tag)

Horizontal

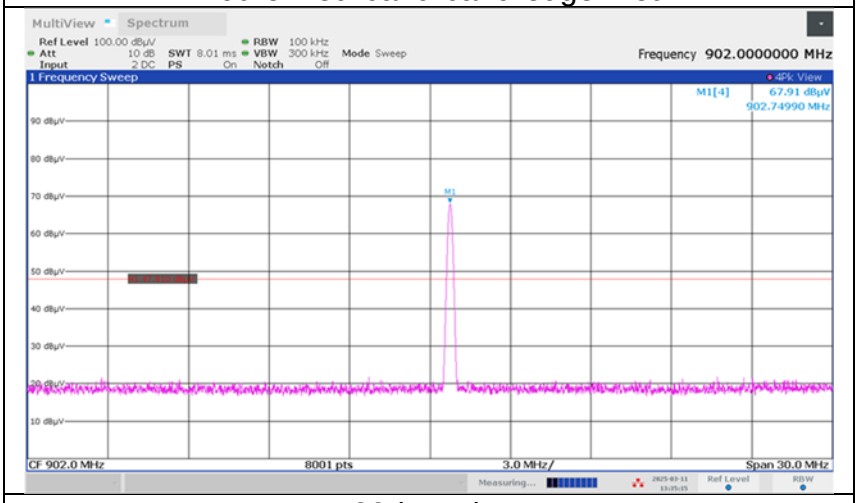
Authorized-band band-edge Plot



20dBc Plot

Vertical

Authorized-band band-edge Plot



20dBc Plot

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

Radiated Spurious Emission

Test place	Shonan EMC Lab.	
Semi Anechoic Chamber	SAC3	SAC3
Date	March 11, 2025	March 8, 2025
Temperature / Humidity	22 deg. C / 36 % RH	24 deg. C / 22 % RH
Engineer	Takahiro Suzuki (Below 1 GHz)	Miku Ikudome (1 GHz to 10 GHz)
Mode	Tx, Hopping Off 915.25 MHz, ANT3 (below 1 GHz: with Tag, above 1 GHz: without Tag)	

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

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Fac. [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg.]	Remark
Hori.	41.040	QP	21.53	14.41	6.70	32.18	0.00	10.46	40.0	29.5	100	0	-
Hori.	84.589	QP	21.36	7.11	7.73	32.15	0.00	4.05	40.0	35.9	100	0	-
Hori.	137.479	QP	20.77	14.21	7.76	32.12	0.00	10.62	43.5	32.8	100	0	-
Hori.	191.037	QP	21.59	16.33	8.12	32.06	0.00	13.98	43.5	29.5	100	0	-
Hori.	459.410	QP	21.19	16.30	9.92	31.97	0.00	15.44	46.0	30.5	100	0	-
Hori.	4576.250	PK	58.91	30.58	6.02	42.94	2.19	54.76	73.9	19.1	152	73	-
Hori.	9152.500	PK	50.92	38.24	8.71	43.16	2.19	56.90	73.9	17.0	221	105	-
Hori.	4576.250	AV	53.01	30.58	6.02	42.94	2.19	48.86	53.9	**5.0**	152	73	VBW: 30 Hz
Hori.	9152.500	AV	38.82	38.24	8.71	43.16	2.19	44.80	53.9	9.1	221	105	VBW: 30 Hz
Vert.	38.296	QP	20.74	15.47	6.64	32.19	0.00	10.66	40.0	29.3	100	0	-
Vert.	52.938	QP	21.28	10.15	6.82	32.18	0.00	6.07	40.0	33.9	100	0	-
Vert.	95.884	QP	22.12	9.37	7.60	32.14	0.00	6.95	43.5	36.5	100	0	-
Vert.	133.238	QP	20.76	13.97	7.67	32.12	0.00	10.28	43.5	33.2	100	0	-
Vert.	170.748	QP	22.18	15.54	8.12	32.09	0.00	13.75	43.5	29.7	100	0	-
Vert.	4576.250	PK	56.47	30.58	6.02	42.94	2.19	52.32	73.9	21.5	192	104	-
Vert.	9152.500	PK	51.08	38.24	8.71	43.16	2.19	57.06	73.9	16.8	168	133	-
Vert.	4576.250	AV	50.39	30.58	6.02	42.94	2.19	46.24	53.9	7.6	192	104	VBW: 30 Hz
Vert.	9152.500	AV	38.04	38.24	8.71	43.16	2.19	44.02	53.9	9.8	168	133	VBW: 30 Hz

Result = Reading + Ant.Fac. + Loss (Cable + (Atten or Filter)(below 18 GHz)) - Gain(Amp) + Distance Fac.
*Other frequency noises omitted in this report were not seen or have enough margin (more than 20 dB).
Distance Fac. : 1 GHz to 10 GHz : 20log (3.86 [m] / 3.0 [m]) = 2.19 [dB]

20 dBc Data Sheet

(RBW 100 kHz, VBW 300 kHz)

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Fac. [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	915.250	PK	66.32	22.19	11.41	0.00	0.00	99.92	-	-	Carrier
Hori.	5491.500	PK	52.41	31.91	6.61	43.53	2.19	49.59	79.9	30.3	-
Vert.	915.250	PK	65.47	22.19	11.41	0.00	0.00	99.07	-	-	Carrier
Vert.	5491.500	PK	51.74	31.91	6.61	43.53	2.19	48.92	79.0	30.0	-

Result = Reading + Ant.Fac. + Loss (Cable + (Atten or Filter)(below 18 GHz)) - Gain(Amp) + Distance Fac.
Distance Fac. : 1 GHz to 10 GHz : 20log (3.86 [m] / 3.0 [m]) = 2.19 [dB]

*) For frequencies where the Gain is 0, Measurements were taken without using an Amp.

Radiated Spurious Emission

Test place	Shonan EMC Lab.	
Semi Anechoic Chamber	SAC3	SAC3
Date	March 11, 2025	March 8, 2025
Temperature / Humidity	22 deg. C / 36 % RH	24 deg. C / 22 % RH
Engineer	Takahiro Suzuki (Below 1 GHz)	Miku Ikudome (1 GHz to 10 GHz)
Mode	Tx, Hopping Off 927.25 MHz, ANT3 (below 1 GHz: with Tag, above 1 GHz: without Tag)	

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

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Fac. [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg.]	Remark
Hori.	40.986	QP	21.52	14.44	6.70	32.18	0.00	10.48	40.0	29.5	100	0	-
Hori.	85.347	QP	21.46	7.25	7.72	32.15	0.00	4.28	40.0	35.7	100	0	-
Hori.	141.221	QP	20.78	14.37	7.86	32.12	0.00	10.89	43.5	32.6	100	0	-
Hori.	186.188	QP	21.95	16.17	8.11	32.07	0.00	14.16	43.5	29.3	100	0	-
Hori.	460.453	QP	21.23	16.34	9.93	31.97	0.00	15.53	46.0	30.4	100	0	-
Hori.	4636.250	PK	57.12	30.75	6.05	42.93	2.19	53.18	73.9	20.7	153	78	-
Hori.	4636.250	AV	51.20	30.75	6.05	42.93	2.19	47.26	53.9	**6.6**	153	78	VBW: 30 Hz
Vert.	38.803	QP	20.85	15.27	6.65	32.19	0.00	10.58	40.0	29.4	100	0	-
Vert.	53.156	QP	21.27	10.08	6.82	32.18	0.00	5.99	40.0	34.0	100	0	-
Vert.	96.931	QP	22.03	9.57	7.58	32.14	0.00	7.04	43.5	36.4	100	0	-
Vert.	134.065	QP	20.98	14.03	7.69	32.12	0.00	10.58	43.5	32.9	100	0	-
Vert.	176.271	QP	21.76	15.76	8.12	32.08	0.00	13.56	43.5	29.9	100	0	-
Vert.	4636.250	PK	55.97	30.75	6.05	42.93	2.19	52.03	73.9	21.8	194	106	-
Vert.	4636.250	AV	49.64	30.75	6.05	42.93	2.19	45.70	53.9	8.2	194	106	VBW: 30 Hz

Result = Reading + Ant.Fac. + Loss (Cable + (Atten or Filter)(below 18 GHz)) - Gain(Amp) + Distance Fac.
*Other frequency noises omitted in this report were not seen or have enough margin (more than 20 dB).
Distance Fac. : 1 GHz to 10 GHz : 20log (3.86 [m] / 3.0 [m]) = 2.19 [dB]

20 dBc Data Sheet

(RBW 100 kHz, VBW 300 kHz)

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Fac. [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	927.250	PK	67.35	22.11	11.47	0.00	0.00	100.93	-	-	Carrier
Hori.	928.000	PK	21.18	22.11	11.47	0.00	0.00	54.76	80.9	26.1	-
Hori.	5563.500	PK	49.47	31.98	6.66	43.52	2.19	46.78	80.9	34.1	-
Hori.	9272.500	PK	45.25	38.65	8.79	43.19	2.19	51.69	80.9	29.2	-
Vert.	927.250	PK	65.12	22.11	11.47	0.00	0.00	98.70	-	-	Carrier
Vert.	928.000	PK	21.34	22.11	11.47	0.00	0.00	54.92	78.7	23.7	-
Vert.	5563.500	PK	48.26	31.98	6.66	43.52	2.19	45.57	78.7	33.1	-
Vert.	9272.500	PK	44.85	38.65	8.79	43.19	2.19	51.29	78.7	27.4	-

Result = Reading + Ant.Fac. + Loss (Cable + (Atten or Filter)(below 18 GHz)) - Gain(Amp) + Distance Fac.
Distance Fac. : 1 GHz to 10 GHz : 20log (3.86 [m] / 3.0 [m]) = 2.19 [dB]

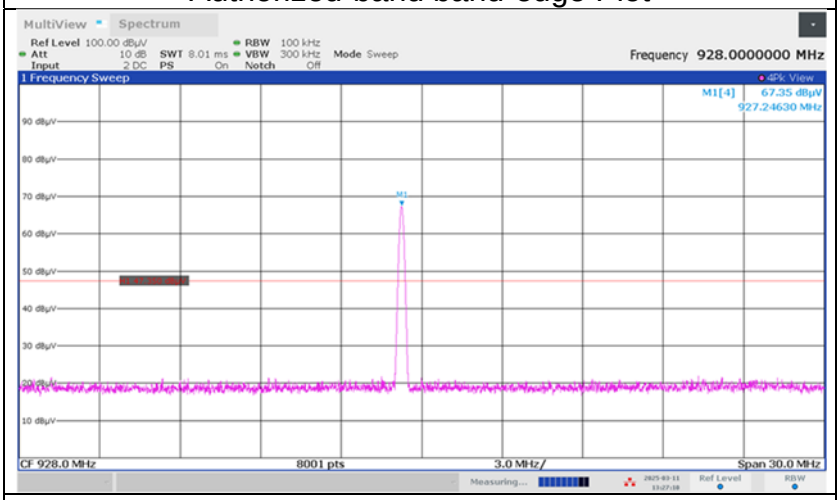
*) For frequencies where the Gain is 0, Measurements were taken without using an Amp.

Radiated Spurious Emission
(Reference Plot for band-edge)

Test place	Shonan EMC Lab.
Semi Anechoic Chamber	SAC3
Date	March 11, 2025
Temperature / Humidity	22 deg. C / 36 % RH
Engineer	Takahiro Suzuki
Mode	Tx, Hopping Off 927.25 MHz, ANT2 (below 1 GHz: with Tag, above 1 GHz: without Tag)

Horizontal

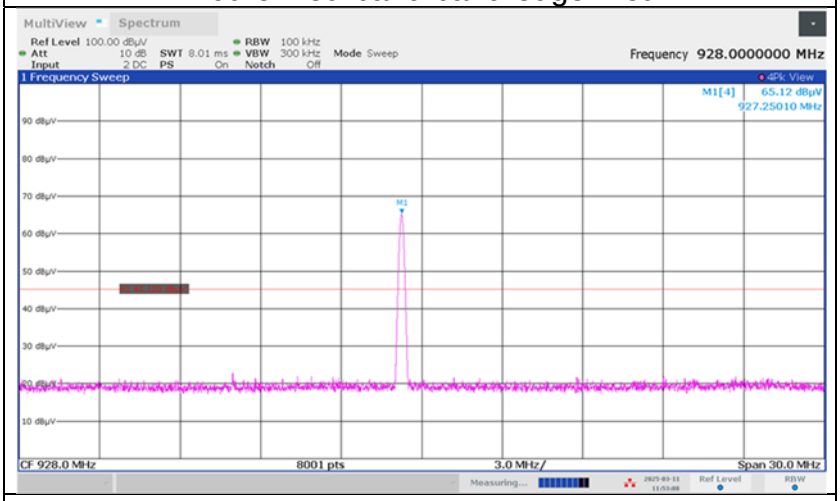
Authorized-band band-edge Plot



20 dBc Plot

Vertical

Authorized-band band-edge Plot

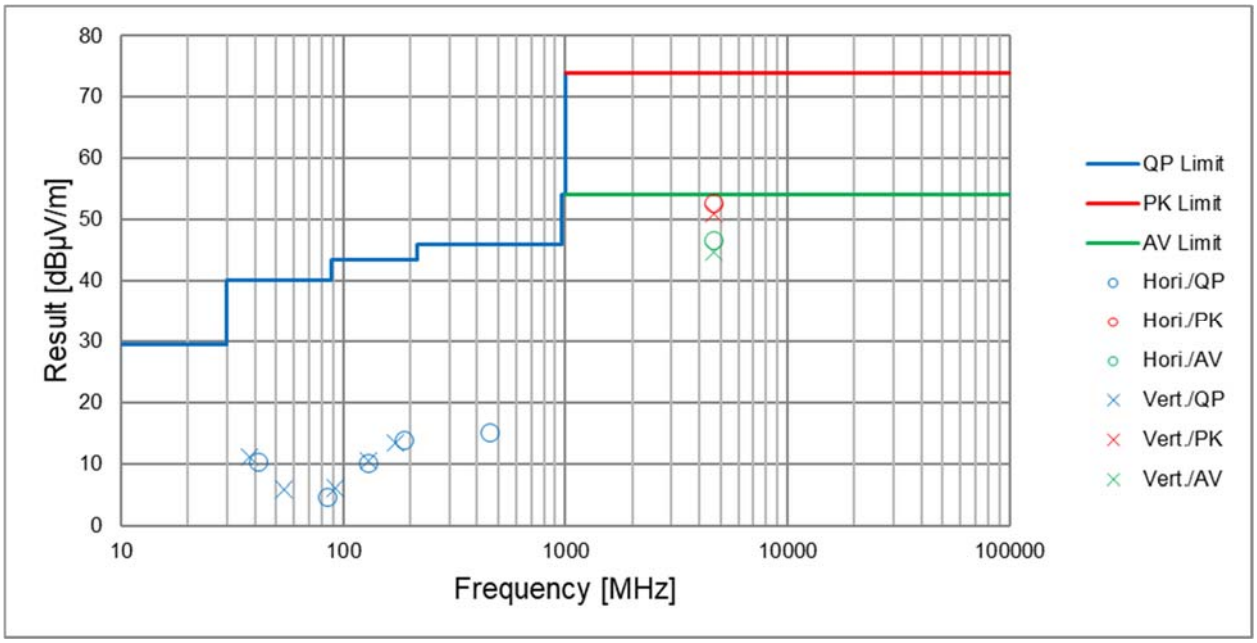


20 dBc Plot

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

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

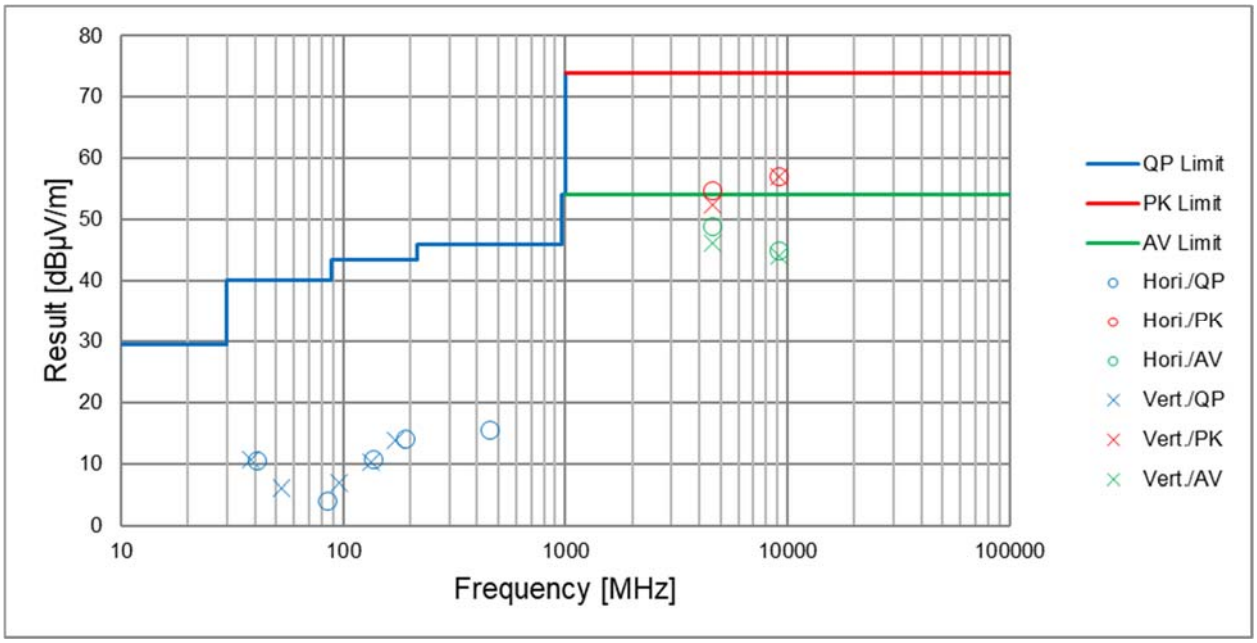
Test place	Shonan EMC Lab.	
Semi Anechoic Chamber	SAC3	SAC3
Date	March 11, 2025	March 8, 2025
Temperature / Humidity	22 deg. C / 36 % RH	24 deg. C / 22 % RH
Engineer	Takahiro Suzuki (Below 1 GHz)	Miku Ikudome (1 GHz to 10 GHz)
Mode	Tx, Hopping Off 927.25 MHz, ANT2 (below 1 GHz: with Tag, above 1 GHz: without Tag)	



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

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

Test place	Shonan EMC Lab.	
Semi Anechoic Chamber	SAC3	SAC3
Date	March 11, 2025	March 8, 2025
Temperature / Humidity	22 deg. C / 36 % RH	24 deg. C / 22 % RH
Engineer	Takahiro Suzuki (Below 1 GHz)	Miku Ikudome (1 GHz to 10 GHz)
Mode	Tx, Hopping Off 915.25 MHz, ANT3 (below 1 GHz: with Tag, above 1 GHz: without Tag)	



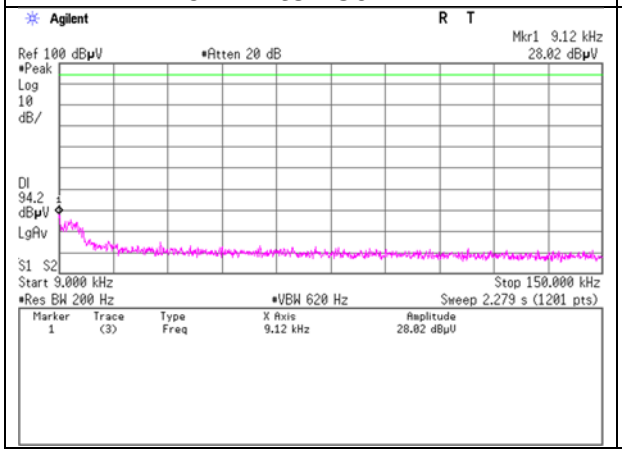
*These plots data contain sufficient number to show the trend of characteristic features for EUT.

Conducted Spurious Emission

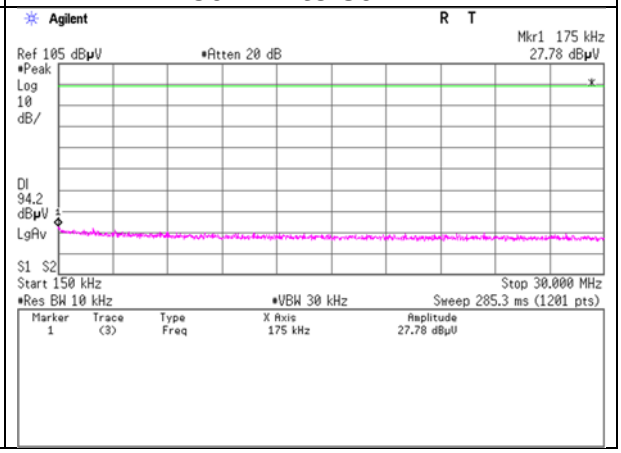
Test place	Shonan EMC Lab. No.5 Shielded Room
Date	October 24, 2024
Temperature / Humidity	24 deg. C / 60 % RH
Engineer	Takayuki Kobayashi
Mode	Tx, Hopping Off

902.75 MHz

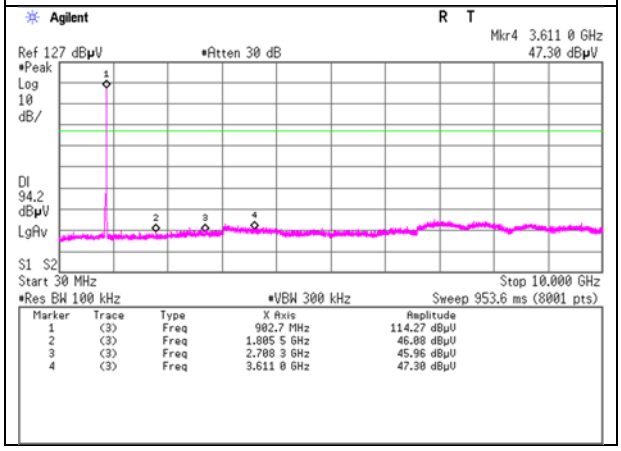
9 kHz to 150 kHz



150 kHz to 30 MHz



30 MHz to 10 GHz

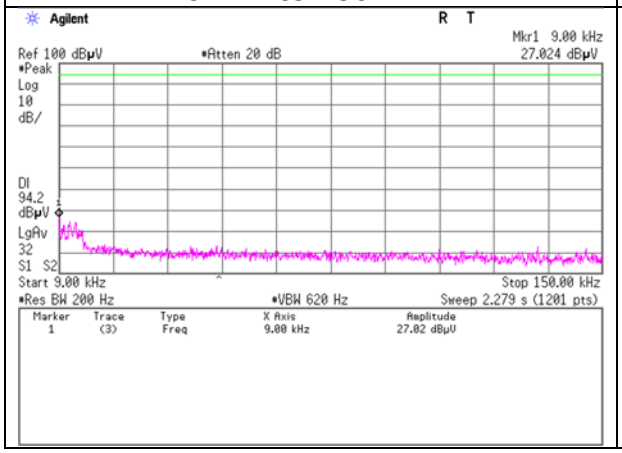


Conducted Spurious Emission

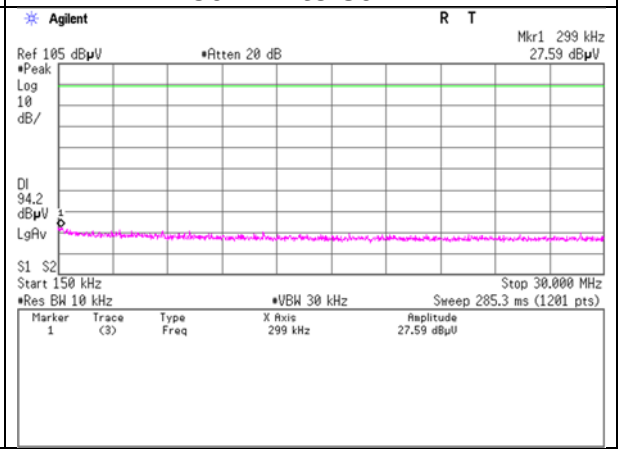
Test place	Shonan EMC Lab. No.5 Shielded Room
Date	October 24, 2024
Temperature / Humidity	24 deg. C / 60 % RH
Engineer	Takayuki Kobayashi
Mode	Tx, Hopping Off

915.25 MHz

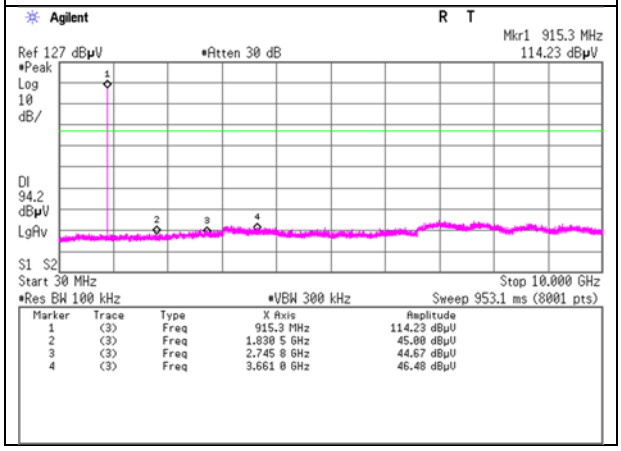
9 kHz to 150 kHz



150 kHz to 30 MHz



30 MHz to 10 GHz

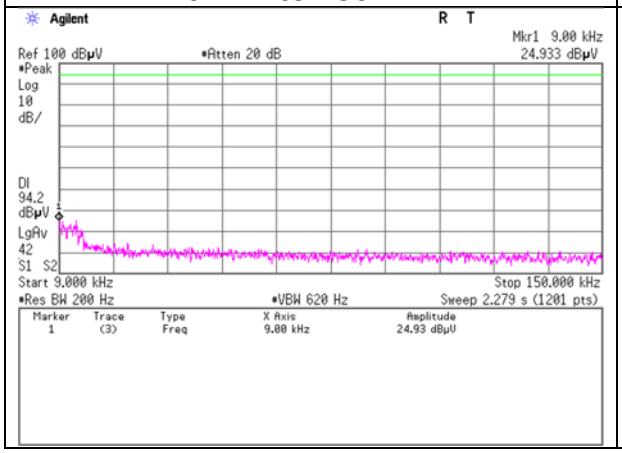


Conducted Spurious Emission

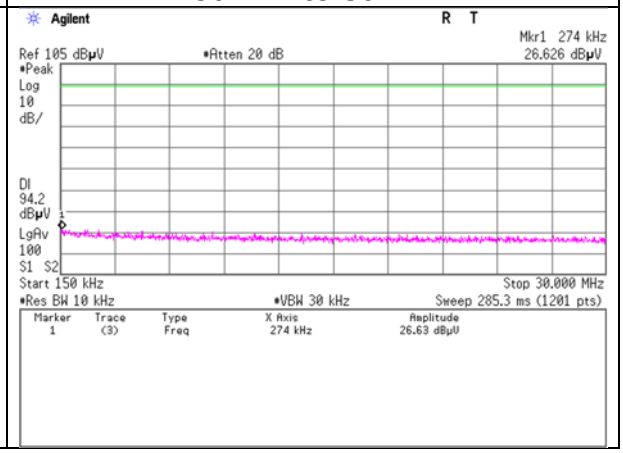
Test place	Shonan EMC Lab. No.5 Shielded Room
Date	October 24, 2024
Temperature / Humidity	24 deg. C / 60 % RH
Engineer	Takayuki Kobayashi
Mode	Tx, Hopping Off

927.25 MHz

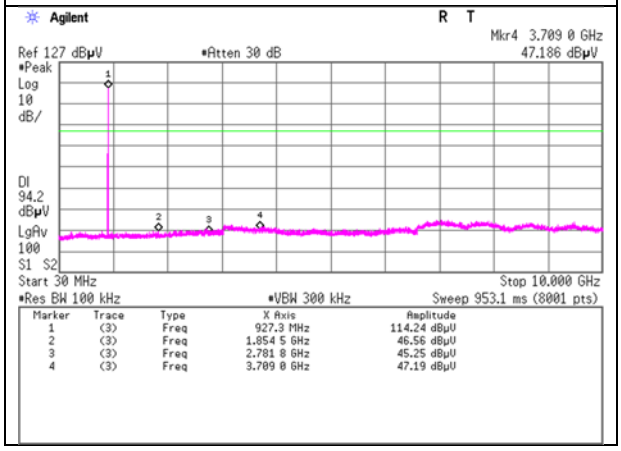
9 kHz to 150 kHz



150 kHz to 30 MHz



30 MHz to 10 GHz

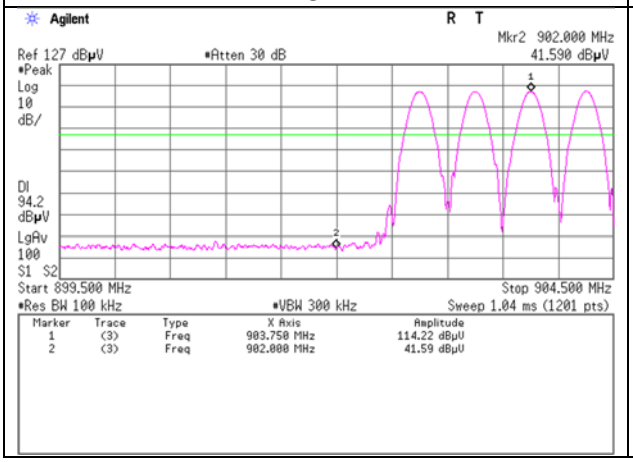


Conducted Emission Band Edge compliance

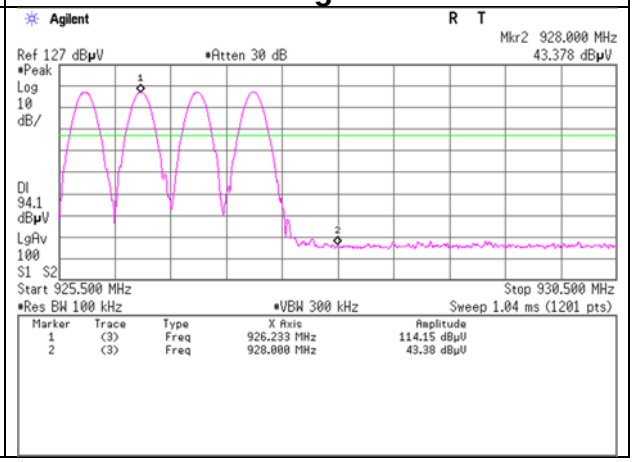
Test place	Shonan EMC Lab. No.5 Shielded Room
Date	October 24, 2024
Temperature / Humidity	24 deg. C / 60 % RH
Engineer	Takayuki Kobayashi
Mode	Tx Hopping Off

Hopping On

Low

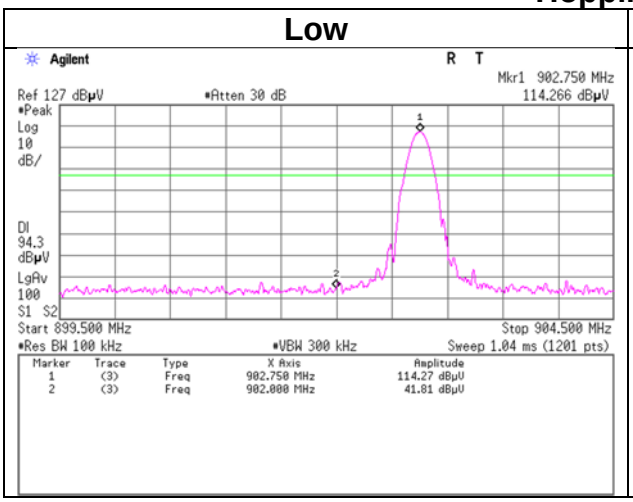


High

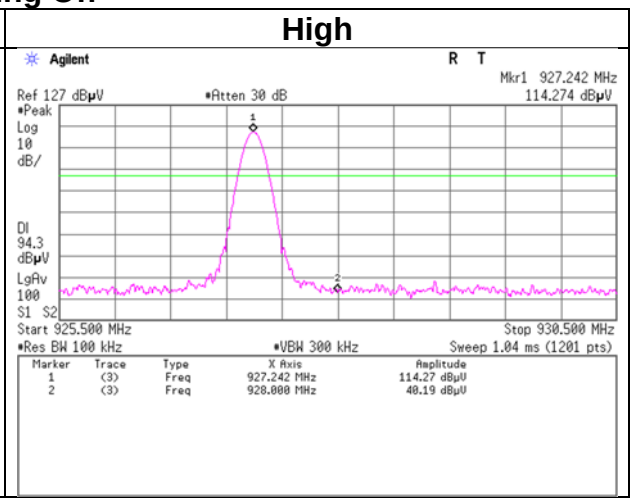


Hopping Off

Low



High



APPENDIX 2: Test Instruments

Test Equipment [1/2]

Test Item	LIMS ID	Description	Manufacturer	Model	Serial	Last Calibration Date	Cal Int
AT	145111	Digital Tester	SANWA	PC500	7019232	2024/09/24	12
AT	145800	Spectrum Analyzer	Keysight Technologies Inc	E4448A	MY48250106	2024/03/25	12
AT	159665	Attenuator	Pasternack Enterprises	PE7017-20	0200029075	2024/09/05	12
AT	159666	Attenuator	Anritsu Corporation	42N50A-30	022395	2024/09/05	12
AT	169910	Power Meter	Keysight Technologies Inc	8990B	MY51000448	2024/09/11	12
AT	169911	Power sensor	Keysight Technologies Inc	N1923A	MY57270004	2024/09/11	12
AT	175822	Thermo-Hygrometer	CUSTOM. Inc	CTH-201	-	2024/08/11	12
AT	196937	Coaxial Cable	Huber+Suhner	SUCOFLEX 102	803605/2	2024/03/07	12
AT	196949	Coaxial Cable	Huber+Suhner	SUCOFLEX 102	803480/2	2024/03/07	12
AT	246102	Microwave cable	RS Pro	R-132G7210 100CO	-	2024/03/12	12
CE	145035	Coaxial Cable	Suhner	RG223U	-	2024/04/01	12
CE	145540	LISN	Rohde & Schwarz	ENV216	100513	2025/02/01	12
CE	145793	Digital Hitester	HIOKI E. E. CORPORATION	3805-50	80997819	2024/05/29	12
CE	146208	Test Receiver	Rohde & Schwarz	ESCI	101259	2024/05/27	12
CE	199781	Attenuator	JFW	50HF-006N	-	2024/06/14	12
CE	207277	Tape Measure	ASKUL	-	-	-	-
CE	235739	Thermo-Hygrometer	CUSTOM. Inc	CTH-230	-	2024/04/28	12
CE,RE	170932	EMI Software	TSJ (Techno Science Japan)	TEPTO-DV3(RE,CE,ME,PE)	Ver 3.1.0546	-	-
RE	145005	Pre Amplifier	Toyo Corporation	TPA0118-36	2046104	2025/02/25	12
RE	145023	Biconical Antenna	Schwarzbeck Mess-Elektronik OHG	BBA9106	91032666	2024/05/10	12
RE	145031	Coaxial Cable	Fujikura Shoji Co., LTD	5D2W	-	2024/06/14	12
RE	145126	Pre Amplifier	SONOMA	310N	290213	2025/02/19	12
RE	145136	Attenuator	Keysight Technologies Inc	8493C-010	74864	2024/10/10	12
RE	145501	Horn Antenna	Schwarzbeck Mess-Elektronik OHG	BBHA9120D	9120D-739	2024/03/20	12
RE	145529	Logperiodic Antenna	Schwarzbeck Mess-Elektronik OHG	VUSLP9111B	196	2024/05/10	12
RE	145565	Semi-Anechoic Chamber	TDK	SAEC-03(NSA)	3	2024/04/03	12
RE	145566	Semi-Anechoic Chamber	TDK	SAEC-03(SVSWR)	3	2024/05/23	12
RE	146210	Digital Hitester	HIOKI E. E. CORPORATION	3805-50	80997823	2024/09/24	12

Test Equipment [2/2]

Test Item	LIMS ID	Description	Manufacturer	Model	Serial	Last Calibration Date	Cal Int
RE	146432	Tape Measure	TAJIMA	GL19-55	-	-	-
RE	150463	Test Receiver	Rohde & Schwarz	ESW44	101581	2024/08/06	12
RE	168802	Highpass Filter	Micro-Tronics	HPM50114	G035	2024/03/05	12
RE	178572	Coaxial Cable	Huber+Suhner	SUCOFLEX 104	800288 /4A	2025/02/28	12
RE	191840	Thermo-Hygrometer	CUSTOM. Inc	CTH-201	-	2024/08/12	12
RE	241390	Band Rejection Filter(902-928MHz)	Wakoh Communication Industrial Co., Ltd.	WFR-481	19122541	2024/10/11	12
RE	248303	Attenuator	JFW	50HFFA-006-2/18N	-	2024/05/06	12
RE	249679	Coaxial Cable	Hayashi-Repic co., Ltd.	SMS13-13A26-NMS13-0.5m	50736-01-01	2024/06/12	12
RE	253628	Coaxial Cable&RF Selector	Fujikura/Fujikura/Suhner/Suhner/Suhner/Suhner/TOYO	5D2W/12DSFA/141PE/141PE/141PE/141PE/141PE/NS4906	-/0901-271(RF Selector)	2024/10/16	12
RE	255497	Coaxial Cable	Hayashi-Repic co., Ltd.	SFS13-13A26-NMS13-1.0m	51221-02-01	2024/12/05	12

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

The expiration date of the calibration is the end of the expired month.
As for some calibrations performed after the tested dates, those test equipment have been controlled by means of an unbroken chains of calibrations.

The expiration*1) This test equipment was used for the tests before the expiration date of the calibration.
All equipment is calibrated with valid calibrations. Each measurement data is traceable to the national or international standards.

Test item:

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