



# RADIO TEST REPORT

**Test Report No. : 12439951S-A-R2**

**Applicant** : Mitsumi Electric Co., Ltd.  
**Type of Equipment** : RF module  
**Model No.** : DRT-W031  
**FCC ID** : EW4DRTW031  
**Test regulation** : FCC Part 15 Subpart C: 2018  
**Test Result** : Complied (Refer to Section 3.2)

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2. The results in this report apply only to the sample tested.
3. This sample tested is in compliance with the limits of the above regulation.
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6. This test report covers EMC technical requirements.  
It does not cover administrative issues such as Manual or non-EMC test related Requirements. (if applicable)
7. The all test items in this test report are conducted by UL Japan, Inc. Shonan EMC Lab.
8. The opinions and the interpretations to the result of the description in this report are outside scopes where UL Japan has been accredited.
9. The information provided from the customer for this report is identified in Section 1.
10. This report is a revised version of 12439951S-A-R1. 12439951S-A-R1 is replaced with this report.

**Date of test:** August 1 to 3, 2018

**Representative test engineer:**

*K. Adachi*

Kenichi Adachi  
Engineer  
Consumer Technology Division

**Approved by:**

*A. Sato*

Akira Sato  
Engineer  
Consumer Technology Division



**JAB**  
Testing  
RTL02610

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

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1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN  
Telephone : +81 463 50 6400  
Facsimile : +81 463 50 6401



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## **SECTION 1: Customer information**

Company Name : Mitsumi Electric Co., Ltd.  
Address : 2-11-2, Tsurumaki, Tama-shi, Tokyo, 206-8567, JAPAN  
Telephone Number : +81-42-310-4716  
Facsimile Number : +81-42-310-5598  
Contact Person : Masashi Tsuchida

The information provided from the customer is as follows:

- Applicant, Type of Equipment, Model No., FCC ID on the cover page and other relevant pages
- SECTION 1: Customer information
- SECTION 2: Equipment under test (E.U.T.)
- SECTION 4: Operation of E.U.T. during testing

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

## **SECTION 2: Equipment under test (E.U.T.)**

### **2.1 Identification of E.U.T.**

Type of Equipment : RF module  
Model No. : DRT-W031  
Serial No. : Refer to Section 4, Clause 4.2  
Rating : DC 3.3 V  
Receipt Date of Sample : August 1, 2018  
(Information from test lab.)  
Country of Mass-production : Philippines  
Condition of EUT : Engineering prototype  
(Not for Sale: This sample is equivalent to mass-produced items.)  
Modification of EUT : No Modification by the test lab.

### **2.2 Product Description**

Model: DRT-W031 (referred to as the EUT in this report) is an RF module.

### **Radio Specification**

Radio Type : Transceiver  
Frequency of Operation : 902.42 MHz - 927.58 MHz  
Modulation : FHSS  
Antenna type : Internal Antenna  
Antenna Gain : -3 dBi  
Clock frequency (Maximum) : 50 MHz

## SECTION 3: Test specification, procedures & results

### 3.1 Test Specification

Test Specification : FCC Part 15 Subpart C  
FCC Part 15 final revised on March 12, 2018 and effective April 11, 2018

Title : FCC 47CFR Part15 Radio Frequency Device Subpart C Intentional Radiators  
Section 15.207 Conducted limits  
Section 15.247 Operation within the bands 902-928MHz,  
2400-2483.5MHz, and 5725-5850MHz

### 3.2 Procedures and results

Item	Procedure	Specification	Worst Margin	Results	Remarks
Conducted Emission	FCC: ANSI C63.10-2013 6. Standard test methods IC: RSS-Gen 8.8	FCC: Section 15.207 IC: RSS-Gen 8.8	19.1 dB, QP, 0.31912 MHz, N 0.45787 MHz, N & L1 Tx 902.42 MHz	Complied a)	-
Carrier Frequency Separation	FCC: FCC Public Notice DA 00-705 *1) IC: -	FCC: Section15.247(a)(1) IC: RSS-247 5.1 (c)	See data.	Complied b)	Conducted
20 dB Bandwidth	FCC: FCC Public Notice DA 00-705 *1) IC: -	FCC: Section15.247(a)(1) IC: RSS-247 5.1 (a),(c)		Complied b)	Conducted
Number of Hopping Frequency	FCC: FCC Public Notice DA 00-705 *1) IC: -	FCC: Section15.247(a)(1)(iii) IC: RSS-247 5.1 (c)		Complied c)	Conducted
Dwell time	FCC: FCC Public Notice DA 00-705 *1) IC: -	FCC: Section15.247(a)(1)(iii) IC: RSS-247 5.1 (c)		Complied d)	Conducted
Maximum Peak Output Power	FCC: FCC Public Notice DA 00-705 *1) IC: RSS-Gen 6.12	FCC: Section15.247(b)(1) IC: RSS-247 5.4 (a)		Complied e)	Conducted
Spurious Emission & Band Edge Compliance	FCC: FCC Public Notice DA 00-705 *1) IC: RSS-Gen 6.13	FCC: Section15.247(d) IC: RSS-247 5.5 RSS-Gen 8.9 RSS-Gen 8.10	0.2 dB 7420.640 MHz, AV, Vertical Tx 927.58 MHz	Complied# f) / g)	Conducted/ Radiated (above 30 MHz) *2)

Note: UL Japan, Inc.'s EMI Work Procedures No. 13-EM-W0420 and 13-EM-W0422.

\*1) Although this test report was issued after issue of KDB558074 v05r01, the measurement was performed before issue of KDB558074 v05.

\*2) 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)

Symbols:

Complied The data of this test item has enough margin, more than the measurement uncertainty.

Complied# The data of this test item meets the limits unless the measurement uncertainty is taken into consideration.

\* In case any questions arise about test procedure, ANSI C63.10: 2013 is also referred.

**UL Japan, Inc.**

**Shonan EMC Lab.**

1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN

Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

### **FCC Part 15.31 (e)**

The stable voltage was provided to the EUT during the tests.  
Therefore, this EUT complies with the requirement.

### **FCC Part 15.203/212 Antenna requirement**

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

### **3.3 Addition to standard**

Item	Test Procedure	Specification	Worst margin	Results	Remarks
99% Occupied Bandwidth	IC: RSS-Gen 6.7	IC: -	N/A	- b)	Conducted

b) Refer to APPENDIX 1 (data of 20dB Bandwidth, 99%Occupied Bandwidth and Carrier Frequency Separation)

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

### **3.4 Uncertainty**

There is no applicable rule of uncertainty in this applied standard. Therefore, the results are derived depending on whether or not laboratory uncertainty is applied.

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

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Item	Frequency range	Uncertainty (+/-)				
		No. 1 SAC / SR	No. 2 SAC / SR	No. 3 SAC / SR	No. 4 SAC / SR	No. 5,6,8 SR
Conducted emission (AC Mains) LISN	150 kHz-30 MHz	2.5 dB	2.5 dB	2.5 dB	2.6 dB	2.6 dB
Radiated emission (Measurement distance: 3 m)	9 kHz-30 MHz	3.2 dB	3.2 dB	3.3 dB	-	-
	30 MHz-200 MHz	4.9 dB	4.8 dB	4.9 dB	-	-
	200 MHz-1 GHz	6.1 dB	6.1 dB	6.1 dB	-	-
	1 GHz-6 GHz	4.7 dB	4.7 dB	4.7 dB	-	-
	6 GHz-18 GHz	5.3 dB	5.3 dB	5.3 dB	-	-
Radiated emission (Measurement distance: 1 m)	18 GHz-40 GHz	5.6 dB	5.6 dB	5.6 dB	-	-
	1 GHz-18 GHz	5.6 dB	5.6 dB	5.6 dB	-	-
	18 GHz-40 GHz	5.9 dB	5.9 dB	5.9 dB	-	-

SAC=Semi-Anechoic Chamber

SR= Shielded Room is applied besides radiated emission

Antenna terminal test	Uncertainty (+/-)
Power Measurement above 1 GHz (Average Detector)_SPM-06	0.48 dB
Power Measurement above 1 GHz (Peak Detector)_SPM-06	0.66 dB
Power Measurement above 1 GHz (Average Detector)_SPM-07	0.47 dB
Power Measurement above 1 GHz (Peak Detector)_SPM-07	0.64 dB
Power Measurement above 1 GHz (Average Detector)_SPM-13	0.90 dB
Power Measurement above 1 GHz (Peak Detector)_SPM-13	1.04 dB
Spurious emission (Conducted) below 1GHz	1.8 dB
Spurious emission (Conducted) 1 GHz-3 GHz	1.7 dB
Spurious emission (Conducted) 3 GHz-18 GHz	2.5 dB
Spurious emission (Conducted) 18 GHz-26.5 GHz	2.5 dB
Spurious emission (Conducted) 26.5 GHz-40 GHz	2.7 dB
Bandwidth Measurement	1.01 %
Duty cycle and Time Measurement	0.012 %

**UL Japan, Inc.**

**Shonan EMC Lab.**

1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN

Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

### 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, Facsimile: +81 463 50 6401  
JAB Accreditation No. RTL02610  
FCC Test Firm Registration Number: 839876

Test site	IC Registration Number	Width x Depth x Height (m)	Size of reference ground plane (m) / horizontal conducting plane	Maximum measurement distance
No.1 Semi-anechoic chamber	2973D-1	20.6 x 11.3 x 7.65	20.6 x 11.3	10 m
No.2 Semi-anechoic chamber	2973D-2	20.6 x 11.3 x 7.65	20.6 x 11.3	10 m
No.3 Semi-anechoic chamber	2973D-3	12.7 x 7.7 x 5.35	12.7 x 7.7	5 m
No.4 Semi-anechoic chamber	-	8.1 x 5.1 x 3.55	8.1 x 5.1	-
No.1 Shielded room	-	6.8 x 4.1 x 2.7	6.8 x 4.1	-
No.2 Shielded room	-	6.8 x 4.1 x 2.7	6.8 x 4.1	-
No.3 Shielded room	-	6.3 x 4.7 x 2.7	6.3 x 4.7	-
No.4 Shielded room	-	4.4 x 4.7 x 2.7	4.4 x 4.7	-
No.5 Shielded room	-	7.8 x 6.4 x 2.7	7.8 x 6.4	-
No.6 Shielded room	-	7.8 x 6.4 x 2.7	7.8 x 6.4	-
No.8 shielded room	-	3.45 x 5.5 x 2.4	3.45 x 5.5	-
No.1 Measurement room	-	2.55 x 4.1 x 2.5	-	-

### 3.6 Test data, Test instruments, and Test set up

Refer to APPENDIX.

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

### **4.1 Operating Mode(s)**

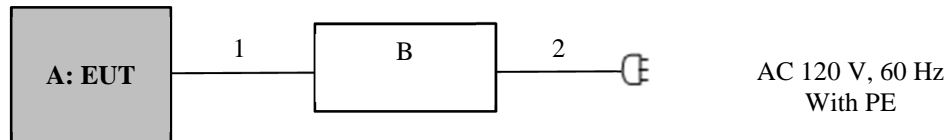
Details of Operating Mode(s)

<b>Test Item</b>	<b>Mode</b>	<b>Tested frequency</b>
Conducted Emission, Spurious Emission (Conducted/Radiated)	Transmitting (Tx), Hopping Off	902.42 MHz 915.00 MHz 927.58 MHz
Carrier Frequency Separation	Transmitting (Tx), Hopping On	902.42 MHz 915.00 MHz 927.58 MHz
20 dB Bandwidth	Transmitting (Tx), Hopping Off	902.42 MHz 915.00 MHz 927.58 MHz
Number of Hopping Frequency	Transmitting (Tx), Hopping On	-
Dwell time	Transmitting (Tx), Hopping On	-
Maximum Peak Output Power	Transmitting (Tx), Hopping Off	902.42 MHz 915.00 MHz 927.58 MHz
Band Edge Compliance (Conducted)	Transmitting (Tx) -Hopping On -Hopping Off	902.42 MHz 927.58 MHz
99 % Occupied Bandwidth	Transmitting (Tx) -Hopping On -Hopping Off	902.42 MHz 915.00 MHz 927.58 MHz
<p>*Transmitting duty was 100 % on except FHSS requirement tests.  *As a result of preliminary test, the formal test was performed with the above modes, which had the maximum payload length (except Dwell time test)  *EUT has the power settings by the software as follows;  Power settings: 18  Software: PEstone Ver. 3.3  Test tool: Radio tester 1.9.10</p> <p>*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.</p>		

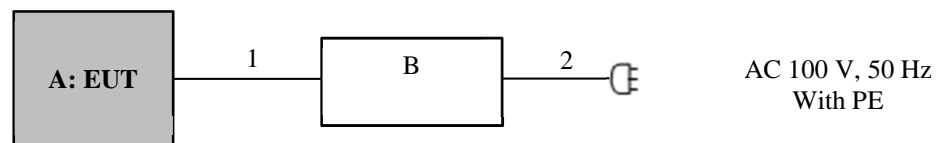


## 4.2 Configuration and peripherals

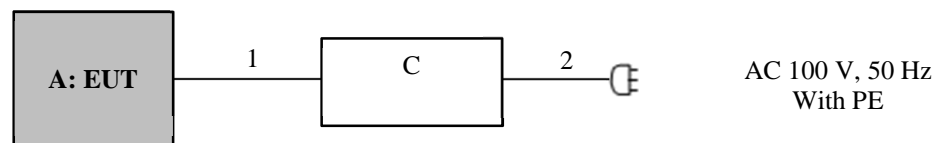
[AC Line Conducted test]



[Radiated Emission test]



[Antenna terminal conducted tests]



\* 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	RF module	DRT-W031	451 *1) 459 *2)	MITSUMI ELECTRIC CO., LTD.	EUT
B	DC Power Supply	PW8-5ADPS	14086035	TEXIO	-
C	DC Power Supply	PAN35-10A	DE001677	Kikusui Corp.	-

\*1) Used for Antenna Terminal conducted test

\*2) Used for Conducted Emission test and Radiated Emission test

### List of cables used

No.	Cable Name	Length (m)	Shield		Remarks
			Cable	Connector	
1	DC	1.0 *3) 2.5 *4)	Unshielded	Unshielded	-
2	AC	2.0	Unshielded	Unshielded	-

\*3) Used for Antenna Terminal conducted test and below 1 GHz of Radiated Emission test

\*4) Used for above 1 GHz of Radiated Emission test

## **SECTION 5: Conducted Emission**

### **Test Procedure and conditions**

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 table is made of expanded polystyrol and expanded polypropylene and the table top is covered with polycarbonate. That has very low permittivity. 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.

Each EUT current-carrying power lead, except the ground (safety) lead, was individually connected through a LISN / (AMN) to the input power source.

The AC Mains Terminal Continuous disturbance Voltage has been measured with the EUT via DC power supply in a Shielded room.

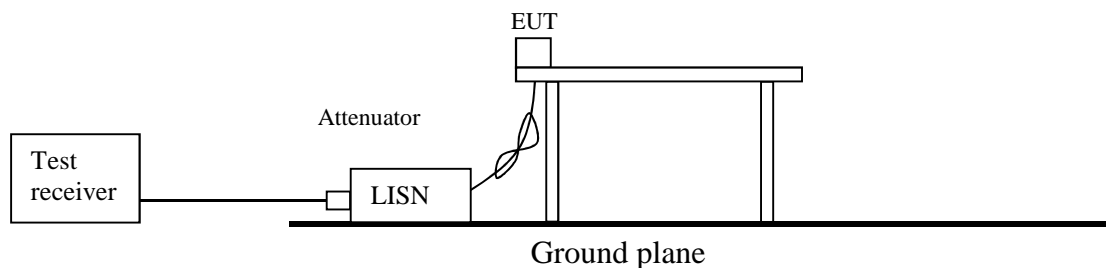
The EUT via DC power supply was connected to a LISN (AMN).

An overview sweep with peak detection has been performed.

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

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

**Figure 1: Test Setup**



## **SECTION 6: Radiated Spurious Emission**

### **Test Procedure**

[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 table is made of expanded polystyrol and expanded polypropylene and the table top is covered with polycarbonate. That has very low permittivity. 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.

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 (IC) and outside the restricted band of FCC15.205 / Table 6 of RSS-Gen 8.10 (IC).**

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: 10 Hz *1)	RBW: 100 kHz VBW: 300 kHz

\*1) Although DA 00-705 accepts VBW = 10 Hz for AV measurements, it was confirmed that superfluous smoothing was not performed.

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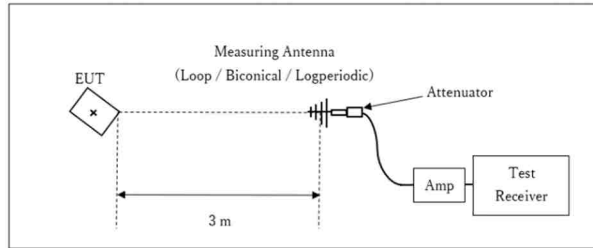
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN

Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

**Figure 2: Test Setup**

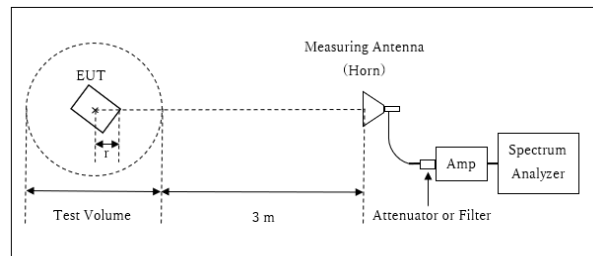
Below 1 GHz



× : Center of turn table

Test Distance: 3 m

1 GHz - 10 GHz



r : Radius of an outer periphery of EUT

× : Center of turn table

Distance Factor:  $20 \times \log(3.965 \text{ m}^*/3.0 \text{ m}) = 2.43 \text{ dB}$

\* Test Distance:  $(3 + \text{Test Volume} / 2) - r = 3.965 \text{ m}$

Test Volume: 2 m

(Test Volume has been calibrated based on CISPR 16-1-4.)

$r = 0.035 \text{ m}$

- 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.

**Combinations of the worst case**

Antenna polarization	Frequency	Carrier *2)	Spurious	
			Below 1 GHz	1 GHz - 10 GHz
Horizontal		Z	Z	Z
Vertical		X	X	Y

\*2) with spurious emissions near carrier frequency.

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

**Measurement range** : 30 MHz - 10 GHz  
**Test data** : APPENDIX  
**Test result** : Pass

## **SECTION 7: Antenna Terminal Conducted Tests**

### **Test Procedure**

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

<b>Test</b>	<b>Span</b>	<b>RBW</b>	<b>VBW</b>	<b>Sweep time</b>	<b>Detector</b>	<b>Trace</b>	<b>Instrument used</b>
20 dB Bandwidth	500 kHz	3 kHz	9.1 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: 50MHz BW)
Carrier Frequency Separation	800 kHz	10 kHz	30 kHz	Auto	Peak	Max Hold	Spectrum Analyzer
Number of Hopping Frequency	10 MHz	100 kHz	300 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)	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	10 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.							

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

**Test data** : APPENDIX  
**Test result** : Pass

**APPENDIX 1: Test data**

**Conducted Emission**

**DATA OF CONDUCTED EMISSION TEST**

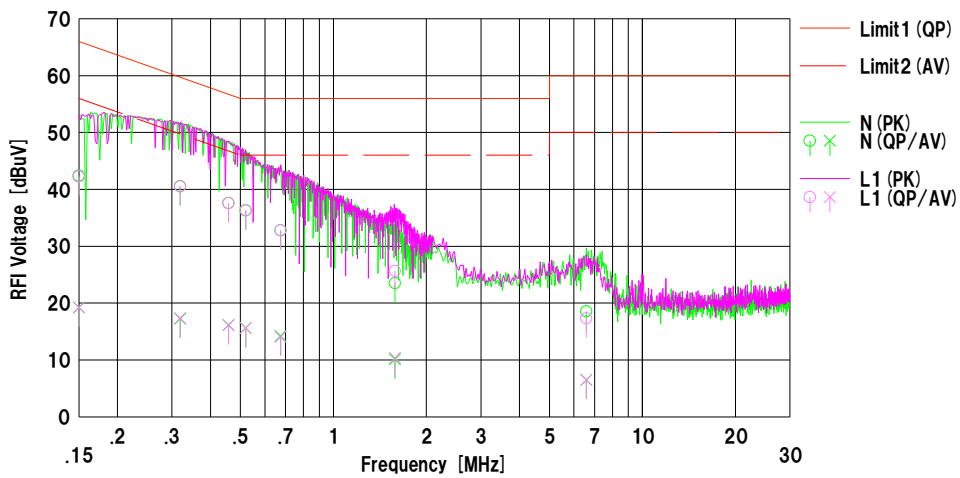
UL Japan, Inc. Shonan EMC Lab. No.2 Shielded Room  
Date : 2018/08/03

Company : MITSUMI ELECTRIC CO., LTD.  
Kind of EUT : RF module  
Model No. : DRT-W031  
Serial No. : 459  
Remarks : -

Mode : Tx 902.42 MHz  
Order No. : 12439951S  
Power : DC 3.3 V (AC 120 V/ 60 Hz)  
Temp./Humi. : 26 deg.C / 53 %RH

Limit1 : FCC 15C (15.207) QP  
Limit2 : FCC 15C (15.207) AV

Engineer : Makoto Hosaka



No.	Freq. [MHz]	Reading		C. Fac [dB]	Results		Limit		Margin		Phase	Comment
		<QP> [dBuV]	<AV> [dBuV]		<QP> [dBuV]	<AV> [dBuV]	<QP> [dBuV]	<AV> [dBuV]	<QP> [dB]	<AV> [dB]		
1	0.15000	29.96	6.80	12.45	42.41	19.25	66.00	56.00	23.5	36.7	N	
2	0.31912	28.09	4.80	12.48	40.57	17.28	59.73	49.73	19.1	32.4	N	
3	0.45787	25.09	3.60	12.52	37.61	16.12	56.73	46.73	19.1	30.6	N	
4	0.52047	23.77	3.10	12.52	36.29	15.62	56.00	46.00	19.7	30.3	N	
5	0.67413	20.24	1.70	12.54	32.78	14.24	56.00	46.00	23.2	31.7	N	
6	1.58271	10.93	-2.50	12.59	23.52	10.09	56.00	46.00	32.4	35.9	N	
7	6.59188	5.65	-6.40	12.91	18.56	6.51	60.00	50.00	41.4	43.4	N	
8	0.15000	29.80	6.80	12.45	42.25	19.25	66.00	56.00	23.7	36.7	L1	
9	0.31912	28.02	4.90	12.48	40.50	17.30	59.73	49.73	19.2	32.3	L1	
10	0.45787	25.07	3.60	12.52	37.59	16.12	56.73	46.73	19.1	30.6	L1	
11	0.52047	23.84	3.10	12.52	36.36	15.62	56.00	46.00	19.6	30.3	L1	
12	0.67413	20.28	1.50	12.54	32.82	14.04	56.00	46.00	23.1	31.9	L1	
13	1.58271	13.06	-2.20	12.59	25.65	10.39	56.00	46.00	30.3	35.6	L1	
14	6.59188	4.42	-6.40	12.91	17.33	6.51	60.00	50.00	42.6	43.4	L1	

Calculation: Result [dBuV] = Reading [dBuV] + C.Fac (LISN (AMN) + Cable + ATT) [dB]  
LISN (AMN) = SLS-03

## Conducted Emission

### DATA OF CONDUCTED EMISSION TEST

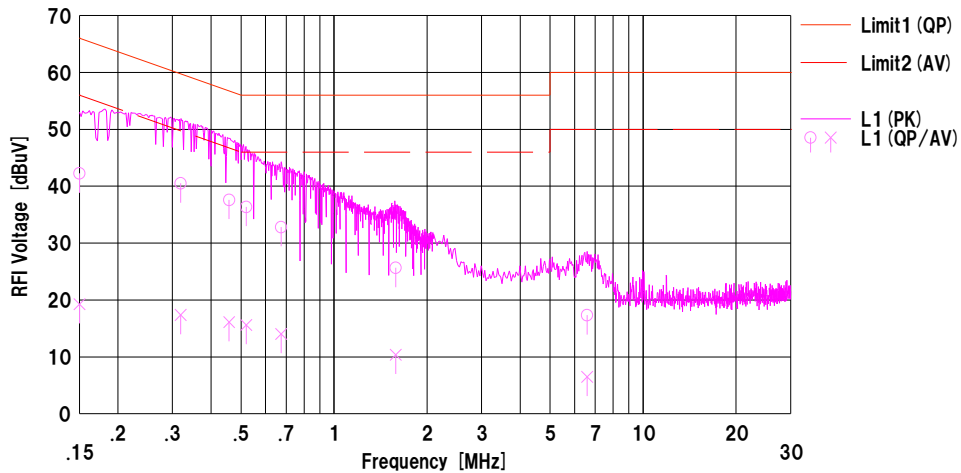
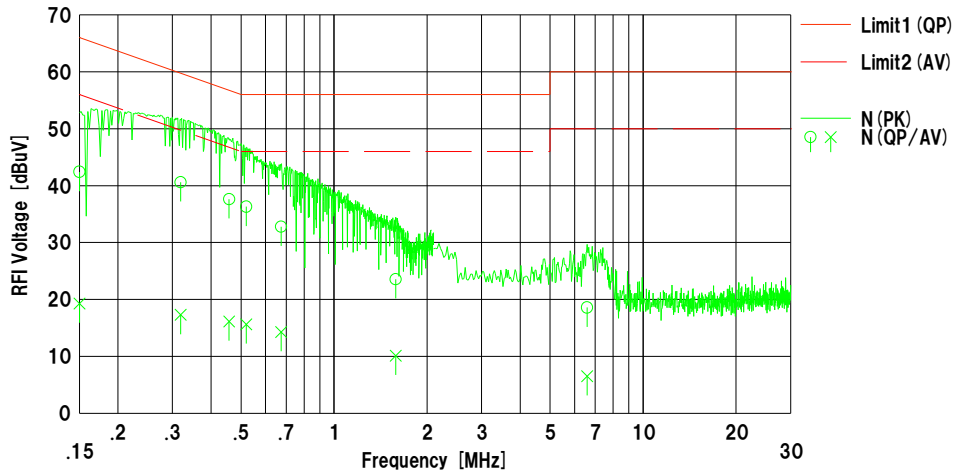
UL Japan, Inc. Shonan EMC Lab. No.2 Shielded Room  
 Date : 2018/08/03

Company : MITSUMI ELECTRIC CO., LTD.  
 Kind of EUT : RF module  
 Model No. : DRT-W031  
 Serial No. : 459  
 Remarks : -

Mode : Tx 902.42 MHz  
 Order No. : 12439951S  
 Power : DC 3.3 V (AC 120 V / 60 Hz)  
 Temp./Humi. : 26 deg.C / 53 %RH

Limit1 : FCC 15C (15.207) QP  
 Limit2 : FCC 15C (15.207) AV

Engineer : Makoto Hosaka



Calculation: Result [dBuV] = Reading [dBuV] + C.Fac (LISN (AMN) + Cable + ATT) [dB]  
 LISN (AMN) = SLS-03

## Conducted Emission

### DATA OF CONDUCTED EMISSION TEST

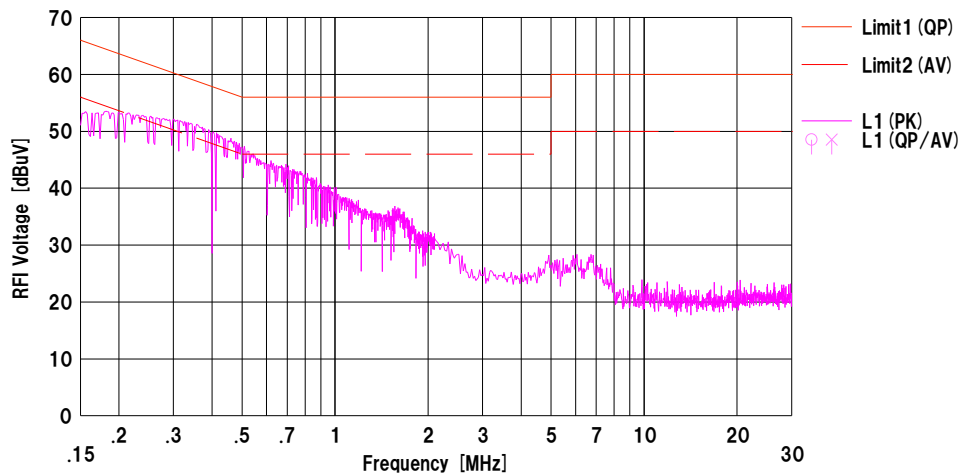
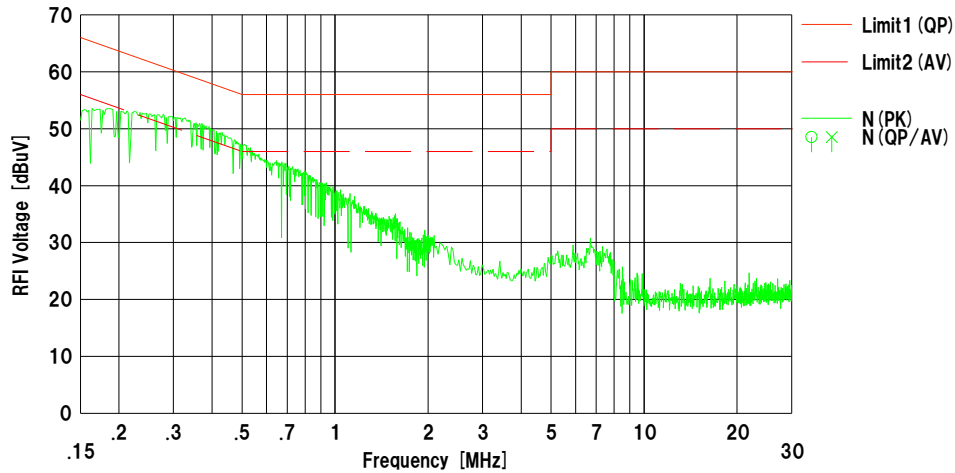
UL Japan, Inc. Shonan EMC Lab. No.2 Shielded Room  
 Date : 2018/08/03

Company : MITSUMI ELECTRIC CO., LTD.  
 Kind of EUT : RF module  
 Model No. : DRT-W031  
 Serial No. : 459  
 Remarks : -

Mode : Tx 915.00 MHz  
 Order No. : 12439951S  
 Power : DC 3.3 V (AC 120 V / 60 Hz)  
 Temp./Humi. : 26 deg.C / 53 %RH

Limit1 : FCC 15C (15.207) QP  
 Limit2 : FCC 15C (15.207) AV

Engineer : Makoto Hosaka



Calculation: Result [dBuV] = Reading [dBuV] + C.Fac (LISN (AMN) + Cable + ATT) [dB]  
 LISN (AMN) = SLS-03



## Conducted Emission

### DATA OF CONDUCTED EMISSION TEST

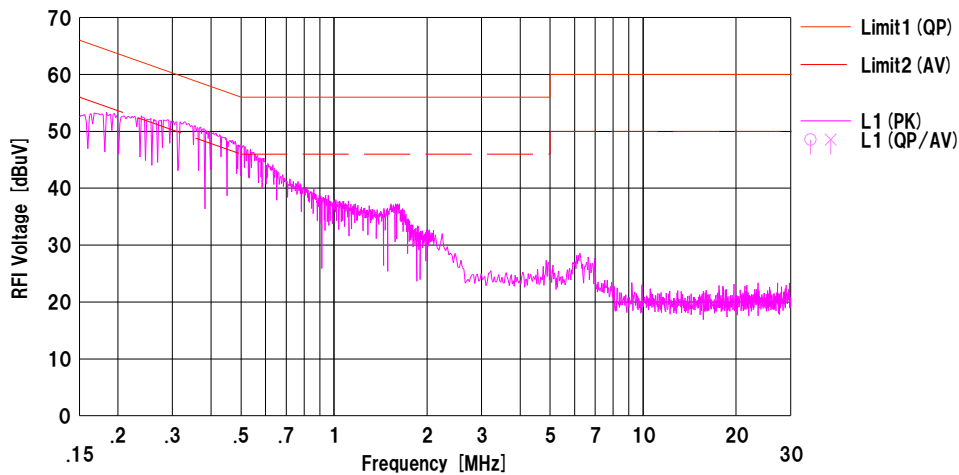
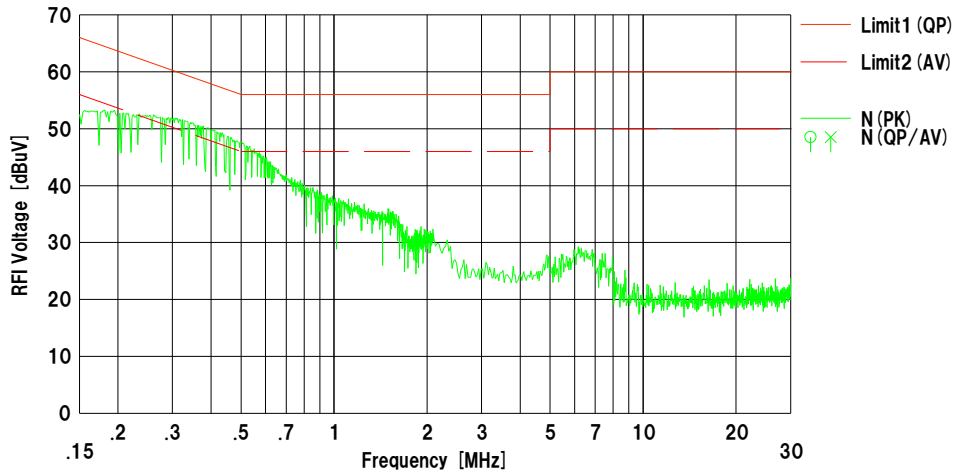
UL Japan, Inc. Shonan EMC Lab. No.2 Shielded Room  
Date : 2018/08/03

Company : MITSUMI ELECTRIC CO., LTD.  
Kind of EUT : RF module  
Model No. : DRT-W031  
Serial No. : 459  
Remarks : -

Mode : Tx 927.58 MHz  
Order No. : 12439951S  
Power : DC 3.3 V (AC 120 V / 60 Hz)  
Temp./Humi. : 26 deg.C / 53 %RH

Limit1 : FCC 15C (15.207) QP  
Limit2 : FCC 15C (15.207) AV

Engineer : Makoto Hosaka



Calculation: Result [dBuV] = Reading [dBuV] + C.Fac (LISN (AMN) + Cable + ATT) [dB]  
LISN (AMN) = SLS-03

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

Report No.	12439951S-A-R2
Test place	Shonan EMC Lab. No.1 Measurement Room
Date	August 1, 2018
Temperature / Humidity	25 deg. C / 53 % RH
Engineer	Kenichi Adachi
Mode	Tx, Hopping Off, Tx, Hopping On

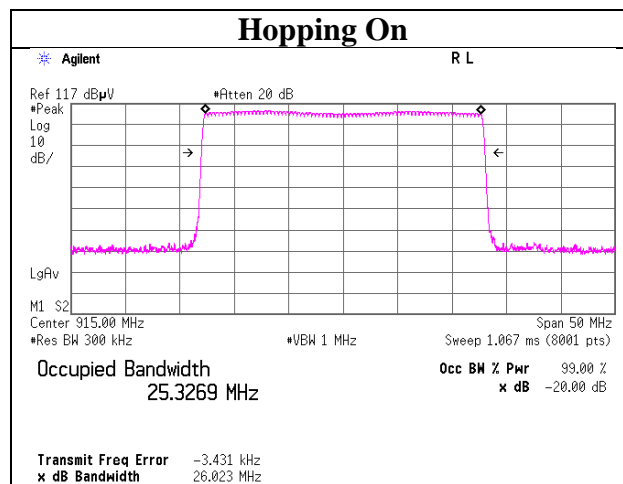
Freq. [MHz]	20 dB Bandwidth [kHz]	Limit of *1) 20 dB Bandwidth [kHz]	99 % Occupied Bandwidth [kHz]	Carrier Frequency Separation [kHz]	Limit for Carrier Frequency separation [kHz]
902.420	173.902	500.000	181.131	340.000	>= 173.902
915.000	173.645	500.000	180.042	340.000	>= 173.645
927.580	173.602	500.000	180.267	340.000	>= 173.602
Hopping On	26023.000	-	25326.900	-	-

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

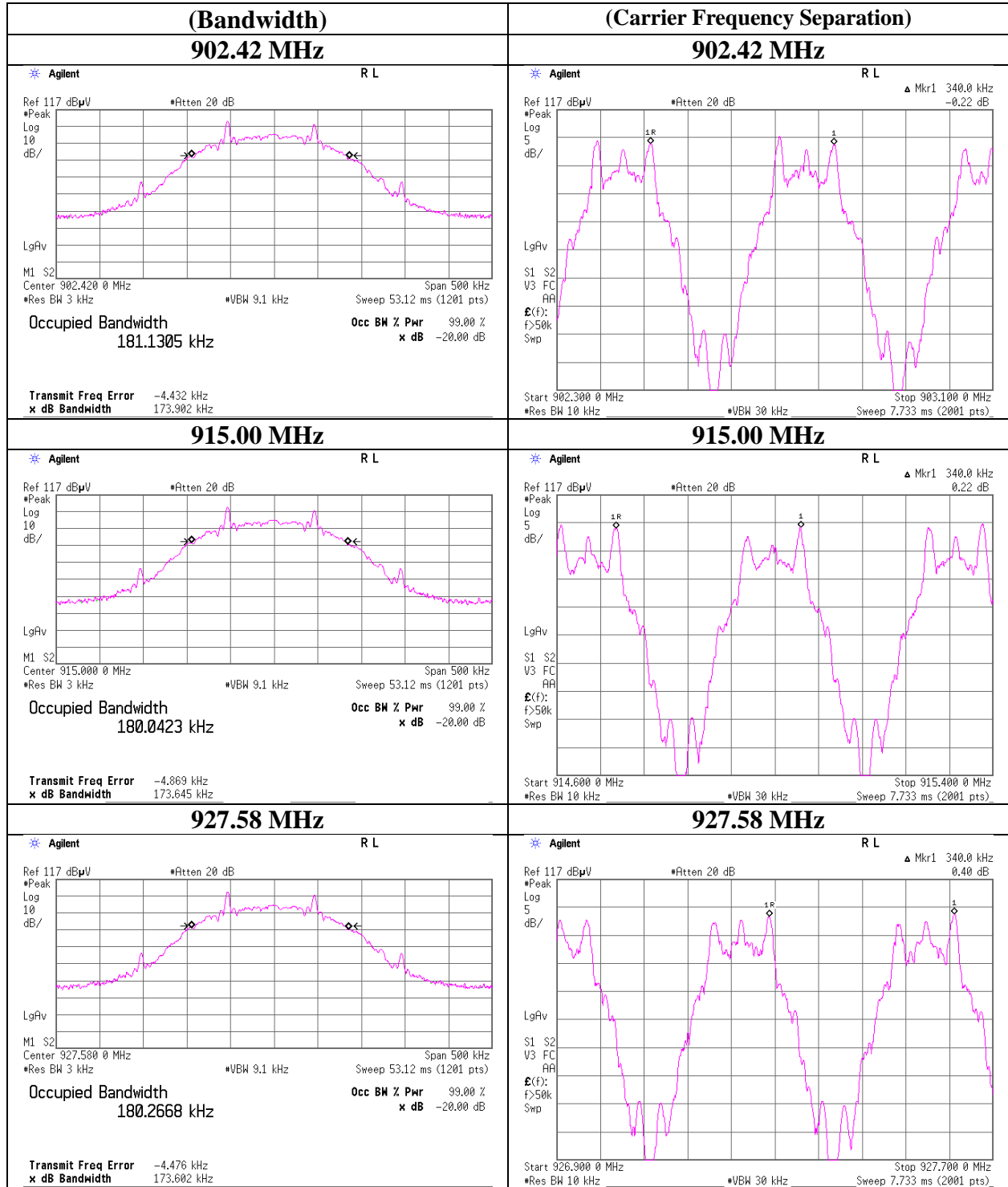
\*1) 20 dB bandwidth limit is in 500 kHz or less than (for 902 MHz to 928 MHz)

20 dB bandwidth limit is 250 kHz for hopping number is 50 hop / 500 kHz for hopping number is 25 hop.

## 20 dB Bandwidth and 99 % Occupied Bandwidth



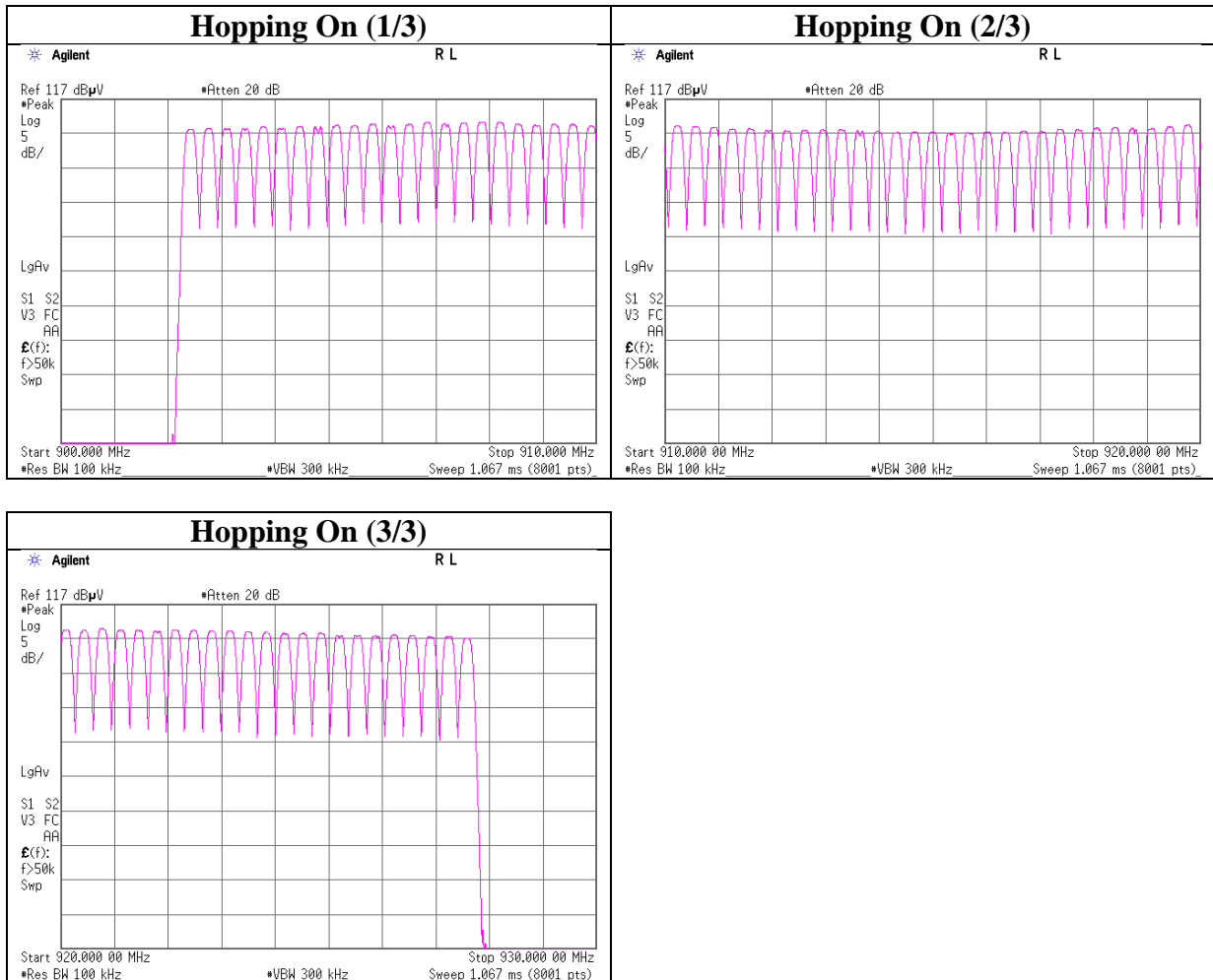
**20 dB Bandwidth and 99% Occupied Bandwidth and Carrier Frequency Separation**



### Number of Hopping Frequency

Report No.	12439951S-A-R2
Test place	Shonan EMC Lab. No.1 Measurement Room
Date	August 1, 2018
Temperature / Humidity	25 deg. C / 53 % RH
Engineer	Kenichi Adachi
Mode	Tx, Hopping On

Mode	Number of channel [channels]	Limit [channels]
Transmitting	75	>= 50



### Dwell time

Report No. 12439951S-A-R2  
 Test place Shonan EMC Lab. No.1 Measurement Room  
 Date August 1, 2018  
 Temperature / Humidity 25 deg. C / 53 % RH  
 Engineer Kenichi Adachi  
 Mode Tx, Hopping On

Mode	Number of transmission in 20 s periods	Length of transmission [ms]	Result [ms]	Limit [ms]
Transmitting	18.0 times / 20 s x 20.0 s = 18 times	21.000	378	400

Sample Calculation

Result = Number of transmission x Length of transmission

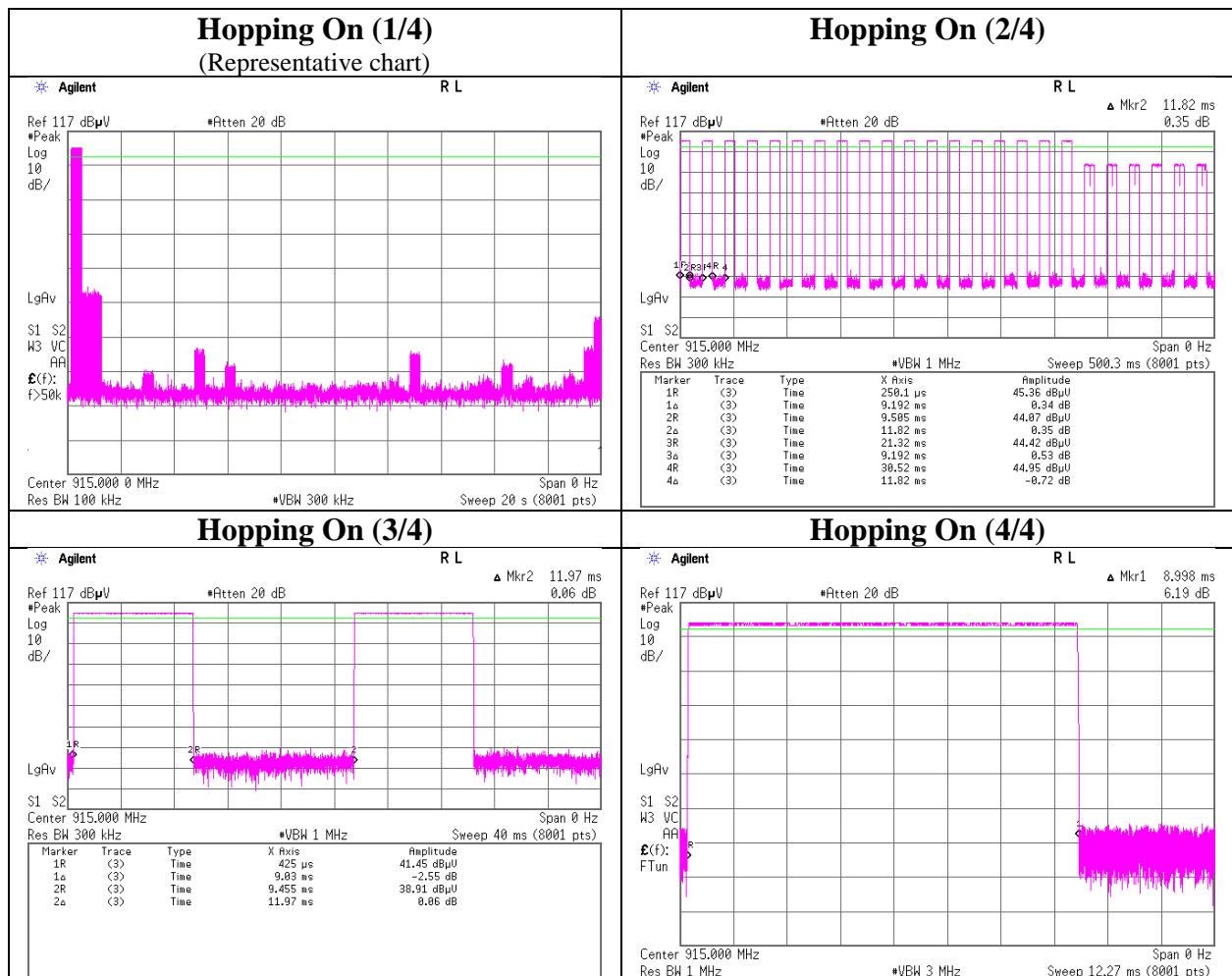
Length of transmission [ms] = 1 pulse on time (9.03 ms) + 1 pulse off time (11.97 ms) (refer to "Hopping On (3/4)" chart)

\*Average data of 5 tests.(except Inquiry)

Mode	Sampling [times]					Average [times]
	1	2	3	4	5	
Transmitting	18 pulse x 1	18 pulse x 1	18 pulse x 1	18 pulse x 1	18 pulse x 1	18

Sample Calculation

Average = Summation (Sampling 1 to 5) / 5



## Maximum Peak Output Power

Report No. 12439951S-A-R2  
Test place Shonan EMC Lab. No.1 Measurement Room  
Date August 1, 2018  
Temperature / Humidity 25 deg. C / 53 % RH  
Engineer Kenichi Adachi  
Mode Tx, Hopping Off

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Conducted Power			e.i.r.p. for RSS-247							
				Result		Limit		Margin [dB]	Antenna Gain [dBi]	Result		Limit		Margin [dB]
				[dBm]	[mW]	[dBm]	[mW]			[dBm]	[mW]	[dBm]	[mW]	
902.42	5.01	1.27	20.20	26.48	444.63	30.00	1000	3.52	-3.00	23.48	222.84	36.02	4000	12.54
915.00	4.59	1.28	20.20	26.07	404.58	30.00	1000	3.93	-3.00	23.07	202.77	36.02	4000	12.95
927.58	4.46	1.28	20.20	25.94	392.64	30.00	1000	4.06	-3.00	22.94	196.79	36.02	4000	13.08

Sample Calculation:

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

## Average Output Power (Reference data for RF Exposure / SAR testing)

Report No. 12439951S-A-R2  
Test place Shonan EMC Lab. No.1 Measurement Room  
Date August 1, 2018  
Temperature / Humidity 25 deg. C / 53 % RH  
Engineer Kenichi Adachi  
Mode Tx, Hopping Off

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result (Time average)		Duty factor [dB]	Result (Burst power average)	
				[dBm]	[mW]		[dBm]	[mW]
902.42	4.96	1.27	20.20	26.43	439.54	0.00	26.43	439.54
915.00	4.54	1.28	20.20	26.02	399.94	0.00	26.02	399.94
927.58	4.41	1.28	20.20	25.89	388.15	0.00	25.89	388.15

Sample Calculation:

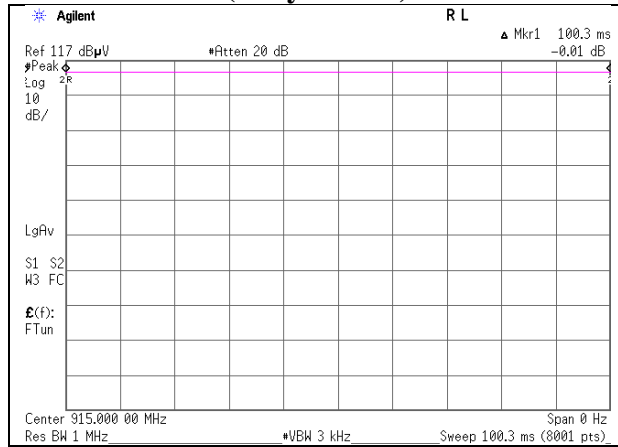
Result (Time average) = Reading + Cable Loss (including the cable(s) customer supplied) + Attenuator Loss  
Result (Burst power average) = Time average + Duty factor

\*The equipment and cables were not used for factor 0 dB of the data sheets.

### Burst Rate Confirmation

Report No. 12439951S-A-R2  
Test place Shonan EMC Lab. No.1 Measurement Room  
Date August 1, 2018  
Temperature / Humidity 25 deg. C / 53 % RH  
Engineer Kenichi Adachi  
Mode Tx, Hopping Off

(Duty 100 %)



## Radiated Spurious Emission

Report No. 12439951S-A-R2  
Test place Shonan EMC Lab.  
Semi Anechoic Chamber 2 2  
Date August 3, 2018 August 2, 2018  
Temperature / Humidity 26 deg. C / 66 % RH 24 deg. C / 64 % RH  
Engineer Makoto Hosaka Makoto Hosaka  
(30 MHz -1 GHz) (1 GHz -10 GHz)  
Mode Tx, Hopping Off 902.42 MHz

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

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg]	Remark
Hori.	61.622	QP	23.20	7.80	17.17	31.90	0.00	16.27	40.00	23.7	300	265	
Hori.	189.303	QP	22.80	16.47	18.63	31.79	0.00	26.11	43.50	17.3	200	80	
Hori.	336.778	QP	22.80	14.76	16.38	31.67	0.00	22.27	46.00	23.7	100	1	
Hori.	563.154	QP	22.90	18.11	17.53	31.71	0.00	26.83	46.00	19.1	150	2	
Hori.	707.236	QP	33.20	19.93	18.14	31.58	0.00	39.69	46.00	6.3	114	328	
Hori.	960.000	QP	22.60	22.05	19.19	30.47	0.00	33.37	46.00	12.6	100	0	
Hori.	1097.885	PK	51.54	24.03	15.68	37.08	2.43	56.60	73.90	17.3	149	139	
Hori.	1804.840	PK	48.54	25.26	14.60	36.91	2.43	53.92	73.90	19.9	152	207	
Hori.	2707.260	PK	44.84	27.89	15.62	36.55	2.43	54.23	73.90	19.6	134	158	
Hori.	7219.360	PK	47.19	36.78	8.74	37.28	2.43	57.86	73.90	16.0	384	184	
Hori.	8121.780	PK	48.15	37.53	10.08	37.60	2.43	60.59	73.90	13.3	196	175	
Hori.	1097.885	AV	39.81	24.03	15.68	37.08	2.43	44.87	53.90	9.0	149	139	
Hori.	1804.840	AV	43.41	25.26	14.60	36.91	2.43	48.79	53.90	5.1	152	207	
Hori.	2707.260	AV	33.63	27.89	15.62	36.55	2.43	43.02	53.90	10.8	134	158	
Hori.	7219.360	AV	37.53	36.78	8.74	37.28	2.43	48.20	53.90	5.7	384	184	
Hori.	8121.780	AV	38.15	37.53	10.08	37.60	2.43	50.59	53.90	3.3	196	175	
Vert.	61.622	QP	23.20	7.80	17.17	31.90	0.00	16.27	40.00	23.7	100	159	
Vert.	189.303	QP	22.80	16.47	18.63	31.79	0.00	26.11	43.50	17.3	100	332	
Vert.	336.778	QP	22.70	14.76	16.38	31.67	0.00	22.17	46.00	23.8	100	337	
Vert.	563.154	QP	22.90	18.11	17.53	31.71	0.00	26.83	46.00	19.1	100	172	
Vert.	706.686	QP	32.20	19.92	18.14	31.58	0.00	38.68	46.00	7.3	100	106	
Vert.	960.000	QP	22.70	22.05	19.19	30.47	0.00	33.47	46.00	12.5	100	0	
Vert.	1804.840	PK	48.23	25.26	14.60	36.91	2.43	53.61	73.90	20.2	240	185	
Vert.	2707.260	PK	44.03	27.89	15.62	36.55	2.43	53.42	73.90	20.4	144	187	
Vert.	7219.360	PK	47.16	36.78	8.74	37.28	2.43	57.83	73.90	16.0	167	168	
Vert.	8121.780	PK	48.31	37.53	10.08	37.60	2.43	60.75	73.90	13.1	170	198	
Vert.	1804.840	AV	42.07	25.26	14.60	36.91	2.43	47.45	53.90	6.4	240	185	
Vert.	2707.260	AV	33.28	27.89	15.62	36.55	2.43	42.67	53.90	11.2	144	187	
Vert.	7219.360	AV	37.29	36.78	8.74	37.28	2.43	47.96	53.90	5.9	167	168	
Vert.	8121.780	AV	38.77	37.53	10.08	37.60	2.43	51.21	53.90	2.6	170	198	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor  
Distance factor : 1 GHz - 10 GHz : 20log (3.965 m / 3.0 m) = 2.43 dB

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

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	902.420	QP	104.27	22.02	18.97	30.90	0.00	114.36	-	-	
Hori.	896.934	QP	32.80	22.00	18.95	30.93	0.00	42.82	94.36	51.5	
Hori.	902.000	QP	63.94	22.02	18.97	30.90	0.00	74.03	94.36	20.3	
Hori.	6316.940	PK	46.66	33.65	8.28	36.96	2.43	54.06	94.36	40.3	
Vert.	902.420	QP	103.80	22.02	18.97	30.90	0.00	113.89	-	-	
Vert.	896.938	QP	38.41	22.00	18.95	30.93	0.00	48.43	93.89	45.5	
Vert.	902.000	QP	62.85	22.02	18.97	30.90	0.00	72.94	93.89	21.0	
Vert.	6316.940	PK	43.34	33.65	8.28	36.96	2.43	50.74	93.89	43.2	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor  
Distance factor : 1 GHz - 10 GHz : 20log (3.965 m / 3.0 m) = 2.43 dB

**UL Japan, Inc.**

**Shonan EMC Lab.**

1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN

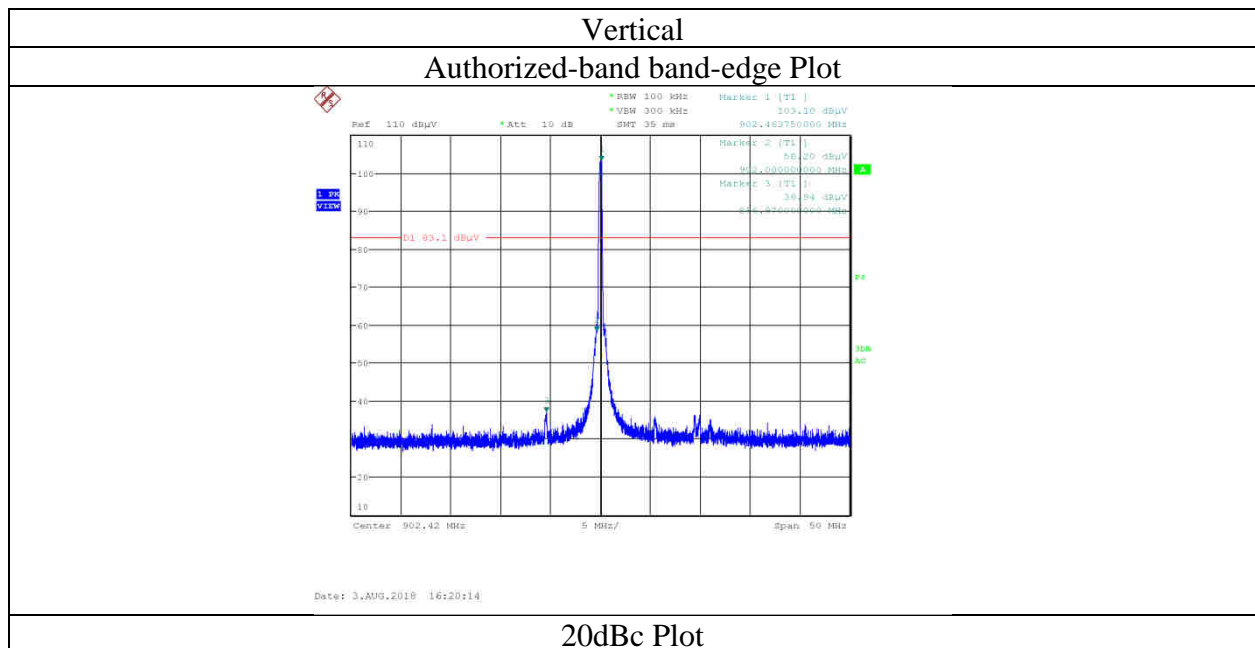
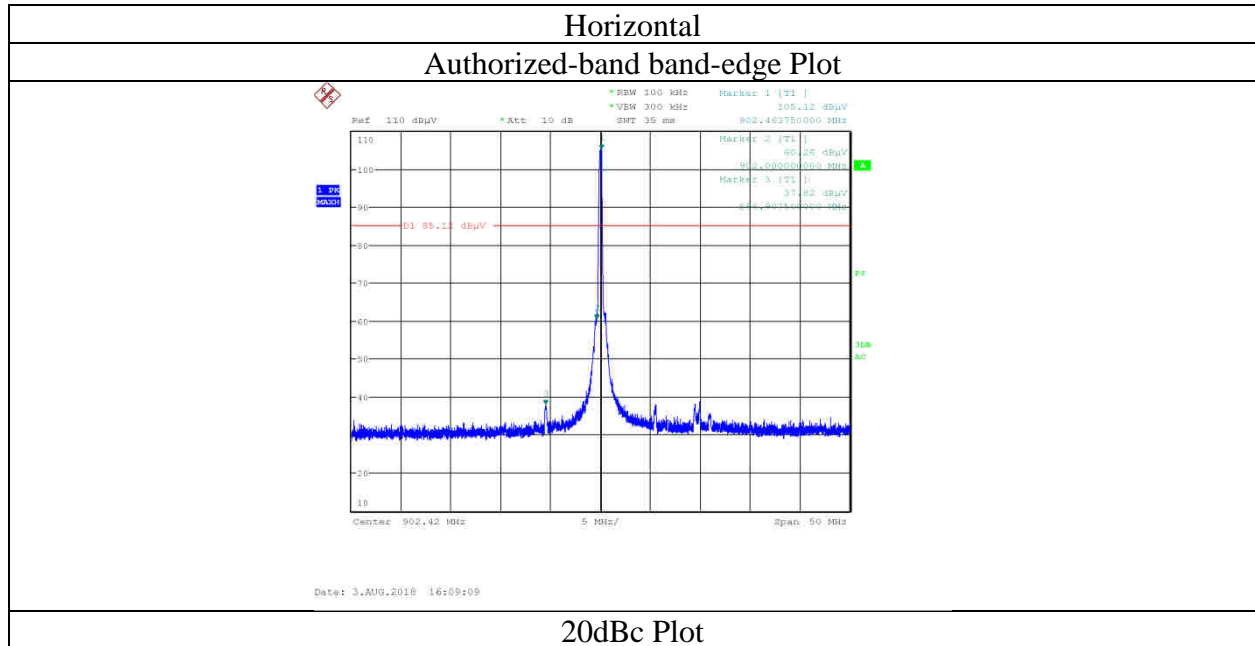
Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401



**Radiated Spurious Emission**  
**(Reference Plot for band-edge)**

Report No. 12439951S-A-R2  
Test place Shonan EMC Lab.  
Semi Anechoic Chamber 2  
Date August 3, 2018  
Temperature / Humidity 26 deg. C / 66 % RH  
Engineer Makoto Hosaka  
(30 MHz -1 GHz)  
Mode Tx, Hopping Off 902.42 MHz



\* Final result of restricted band edge was shown in tabular data.

## Radiated Spurious Emission

Report No. 12439951S-A-R2  
Test place Shonan EMC Lab.  
Semi Anechoic Chamber 2 2  
Date August 3, 2018 August 2, 2018  
Temperature / Humidity 26 deg. C / 66 % RH 24 deg. C / 64 % RH  
Engineer Makoto Hosaka Makoto Hosaka  
(30 MHz -1 GHz) (1 GHz -10 GHz)  
Mode Tx, Hopping Off 915.00 MHz

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

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg]	Remark
Hori.	192.004	QP	22.90	16.45	18.66	31.79	0.00	26.22	43.50	17.2	300	257	
Hori.	356.796	QP	23.10	15.08	16.54	31.66	0.00	23.06	46.00	22.9	100	356	
Hori.	490.432	QP	22.70	17.52	17.24	31.64	0.00	25.82	46.00	20.1	100	0	
Hori.	631.133	QP	22.80	19.40	17.82	31.65	0.00	28.37	46.00	17.6	150	357	
Hori.	712.385	QP	28.10	20.02	18.16	31.57	0.00	34.71	46.00	11.2	130	153	
Hori.	960.000	QP	22.60	22.05	19.19	30.47	0.00	33.37	46.00	12.6	100	0	
Hori.	1830.000	PK	48.87	25.22	14.61	36.90	2.43	54.23	73.90	19.6	100	0	
Hori.	2745.000	PK	45.64	28.12	15.64	36.55	2.43	55.28	73.90	18.6	151	134	
Hori.	7320.000	PK	47.38	36.84	8.71	37.44	2.43	57.92	73.90	15.9	237	171	
Hori.	8235.000	PK	47.28	37.06	10.09	37.67	2.43	59.19	73.90	14.7	206	168	
Hori.	9150.000	PK	45.82	37.70	10.05	38.27	2.43	57.73	73.90	16.1	179	192	
Hori.	1830.000	AV	44.00	25.22	14.61	36.90	2.43	49.36	53.90	4.5	100	0	
Hori.	2745.000	AV	33.91	28.12	15.64	36.55	2.43	43.55	53.90	10.3	151	134	
Hori.	7320.000	AV	40.28	36.84	8.71	37.44	2.43	50.82	53.90	3.0	237	171	
Hori.	8235.000	AV	38.63	37.06	10.09	37.67	2.43	50.54	53.90	3.3	206	168	
Hori.	9150.000	AV	34.50	37.70	10.05	38.27	2.43	46.41	53.90	7.4	179	192	
Vert.	118.232	QP	23.00	12.92	17.91	31.86	0.00	21.97	43.50	21.5	100	273	
Vert.	192.004	QP	22.90	16.45	18.66	31.79	0.00	26.22	43.50	17.2	100	337	
Vert.	356.796	QP	22.70	15.08	16.54	31.66	0.00	22.66	46.00	23.3	100	355	
Vert.	490.432	QP	22.70	17.52	17.24	31.64	0.00	25.82	46.00	20.1	100	41	
Vert.	631.133	QP	22.80	19.40	17.82	31.65	0.00	28.37	46.00	17.6	100	72	
Vert.	712.675	QP	27.40	20.02	18.16	31.57	0.00	34.01	46.00	11.9	100	93	
Vert.	960.000	QP	22.50	22.05	19.19	30.47	0.00	33.27	46.00	12.7	100	0	
Vert.	1830.000	PK	47.47	25.22	14.61	36.90	2.43	52.83	73.90	21.0	236	235	
Vert.	2745.000	PK	43.46	28.12	15.64	36.55	2.43	53.10	73.90	20.8	141	192	
Vert.	7320.000	PK	47.63	36.84	8.71	37.44	2.43	58.17	73.90	15.7	121	166	
Vert.	8235.000	PK	47.32	37.06	10.09	37.67	2.43	59.23	73.90	14.6	168	196	
Vert.	9150.000	PK	45.43	37.70	10.05	38.27	2.43	57.34	73.90	16.5	303	188	
Vert.	1830.000	AV	41.08	25.22	14.61	36.90	2.43	46.44	53.90	7.4	236	235	
Vert.	2745.000	AV	32.98	28.12	15.64	36.55	2.43	42.62	53.90	11.2	141	192	
Vert.	7320.000	AV	39.27	36.84	8.71	37.44	2.43	49.81	53.90	4.0	121	166	
Vert.	8235.000	AV	38.28	37.06	10.09	37.67	2.43	50.19	53.90	3.7	168	196	
Vert.	9150.000	AV	34.72	37.70	10.05	38.27	2.43	46.63	53.90	7.2	303	188	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor  
Distance factor : 1 GHz - 10 GHz : 20log (3.965 m / 3.0 m) = 2.43 dB

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

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	915.000	QP	101.68	22.12	19.02	30.81	0.00	112.01	-	-	
Hori.	6405.000	PK	48.35	34.12	8.27	36.98	2.43	56.19	92.01	35.8	
Vert.	915.000	QP	104.88	22.12	19.02	30.81	0.00	115.21	-	-	
Vert.	6405.000	PK	43.98	34.12	8.27	36.98	2.43	51.82	95.21	43.4	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor  
Distance factor : 1 GHz - 10 GHz : 20log (3.965 m / 3.0 m) = 2.43 dB

**UL Japan, Inc.**

**Shonan EMC Lab.**

1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN

Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

## Radiated Spurious Emission

Report No. 12439951S-A-R2  
Test place Shonan EMC Lab.  
Semi Anechoic Chamber 2 2  
Date August 3, 2018 August 2, 2018  
Temperature / Humidity 26 deg. C / 66 % RH 24 deg. C / 64 % RH  
Engineer Makoto Hosaka Makoto Hosaka  
(30 MHz -1 GHz) (1 GHz -10 GHz)  
Mode Tx, Hopping Off 927.58 MHz

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

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg]	Remark
Hori.	192.002	QP	22.70	16.45	18.66	31.79	0.00	26.02	43.50	17.4	150	207	
Hori.	771.173	QP	22.60	20.41	18.40	31.45	0.00	29.96	46.00	16.0	150	115	
Hori.	820.052	QP	22.50	20.86	18.61	31.30	0.00	30.67	46.00	15.3	100	197	
Hori.	960.000	QP	22.40	22.05	19.19	30.47	0.00	33.17	46.00	12.8	100	0	
Hori.	1855.160	PK	56.55	25.21	4.71	36.89	2.43	52.01	73.90	21.8	132	192	
Hori.	2782.740	PK	47.97	28.22	5.80	36.56	2.43	47.86	73.90	26.0	182	171	
Hori.	3710.320	PK	46.09	29.22	6.02	36.58	2.43	47.18	73.90	26.7	230	202	
Hori.	7420.640	PK	48.84	36.92	7.88	37.59	2.43	58.48	73.90	15.4	244	180	
Hori.	8348.220	PK	47.60	36.80	9.24	37.74	2.43	58.33	73.90	15.5	208	177	
Hori.	9275.800	PK	47.57	38.27	9.70	38.30	2.43	59.67	73.90	14.2	180	203	
Hori.	1855.160	AV	54.81	25.21	4.71	36.89	2.43	50.27	53.90	3.6	132	192	
Hori.	2782.740	AV	41.54	28.22	5.80	36.56	2.43	41.43	53.90	12.4	182	171	
Hori.	3710.320	AV	39.35	29.22	6.02	36.58	2.43	40.44	53.90	13.4	230	202	
Hori.	7420.640	AV	42.06	36.92	7.88	37.59	2.43	51.70	53.90	2.2	244	180	
Hori.	8348.220	AV	38.47	36.80	9.24	37.74	2.43	49.20	53.90	4.7	208	177	
Hori.	9275.800	AV	37.59	38.27	9.70	38.30	2.43	49.69	53.90	4.2	180	203	
Vert.	192.002	QP	22.70	16.45	18.66	31.79	0.00	26.02	43.50	17.4	100	77	
Vert.	218.399	QP	22.70	11.08	15.39	31.76	0.00	17.41	46.00	28.5	100	291	
Vert.	455.229	QP	22.60	16.70	17.12	31.67	0.00	24.75	46.00	21.2	100	219	
Vert.	771.173	QP	22.60	20.41	18.40	31.45	0.00	29.96	46.00	16.0	100	38	
Vert.	820.052	QP	22.70	20.86	18.61	31.30	0.00	30.87	46.00	15.1	100	5	
Vert.	960.000	QP	22.50	22.05	19.19	30.47	0.00	33.27	46.00	12.7	100	0	
Vert.	1855.160	PK	56.55	25.21	4.71	36.89	2.43	52.01	73.90	21.8	309	171	
Vert.	2782.740	PK	46.48	28.22	5.80	36.56	2.43	46.37	73.90	27.5	141	193	
Vert.	3710.320	PK	44.75	29.22	6.02	36.58	2.43	45.84	73.90	28.0	184	172	
Vert.	7420.640	PK	49.32	36.92	7.88	37.59	2.43	58.96	73.90	14.9	388	140	
Vert.	8348.220	PK	47.34	36.80	9.24	37.74	2.43	58.07	73.90	15.8	168	192	
Vert.	9275.800	PK	47.80	38.27	9.70	38.30	2.43	59.90	73.90	14.0	360	186	
Vert.	1855.160	AV	53.28	25.21	4.71	36.89	2.43	48.74	53.90	5.1	309	171	
Vert.	2782.740	AV	39.88	28.22	5.80	36.56	2.43	39.77	53.90	14.1	141	193	
Vert.	3710.320	AV	37.68	29.22	6.02	36.58	2.43	38.77	53.90	15.1	184	172	
Vert.	7420.640	AV	44.03	36.92	7.88	37.59	2.43	53.67	53.90	0.2	388	140	
Vert.	8348.220	AV	38.59	36.80	9.24	37.74	2.43	49.32	53.90	4.5	168	192	
Vert.	9275.800	AV	37.58	38.27	9.70	38.30	2.43	49.68	53.90	4.2	360	186	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor  
Distance factor : 1 GHz - 10 GHz : 20log (3.965 m / 3.0 m) = 2.43 dB

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

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	927.580	QP	105.96	22.03	19.06	30.72	0.00	116.33	-	-	
Hori.	928.000	QP	62.54	22.03	19.07	30.71	0.00	72.93	96.33	23.4	
Hori.	933.082	QP	41.75	22.01	19.09	30.68	0.00	52.17	96.33	44.2	
Hori.	6493.060	PK	49.33	34.52	7.68	37.01	2.43	56.95	96.33	39.4	
Vert.	927.580	QP	105.49	22.03	19.06	30.72	0.00	115.86	-	-	
Vert.	928.000	QP	66.59	22.03	19.07	30.71	0.00	76.98	95.86	18.9	
Vert.	932.982	QP	40.77	22.01	19.09	30.68	0.00	51.19	95.86	44.7	
Vert.	6493.060	PK	45.20	34.52	7.68	37.01	2.43	52.82	95.86	43.0	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor  
Distance factor : 1 GHz - 10 GHz : 20log (3.965 m / 3.0 m) = 2.43 dB

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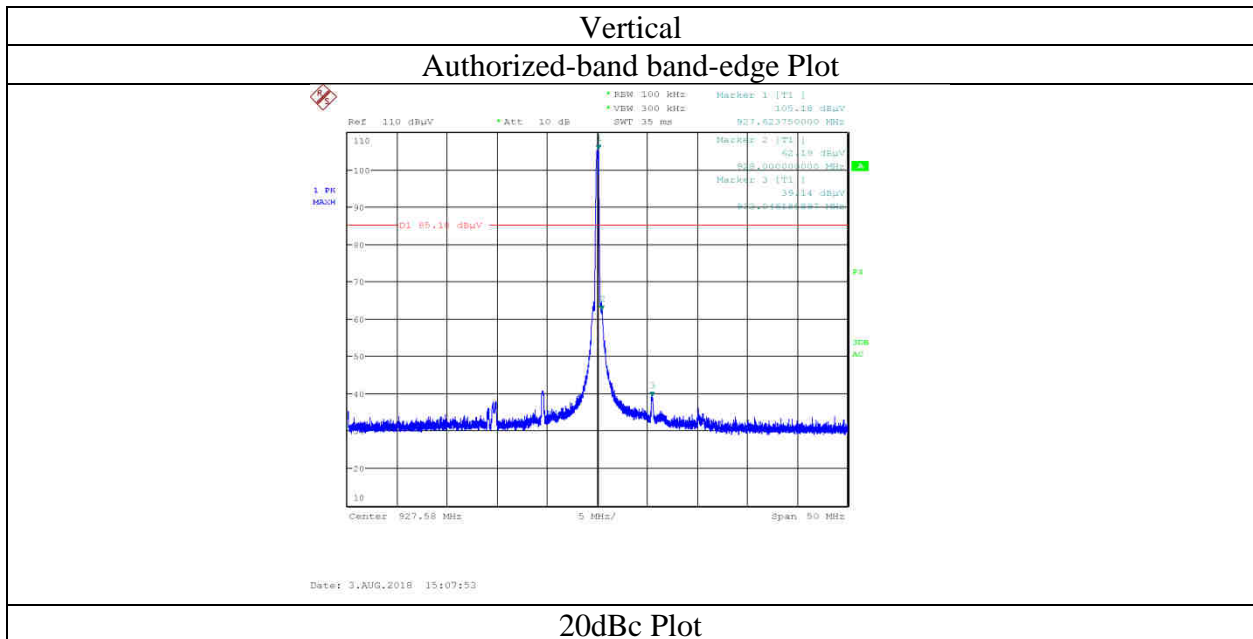
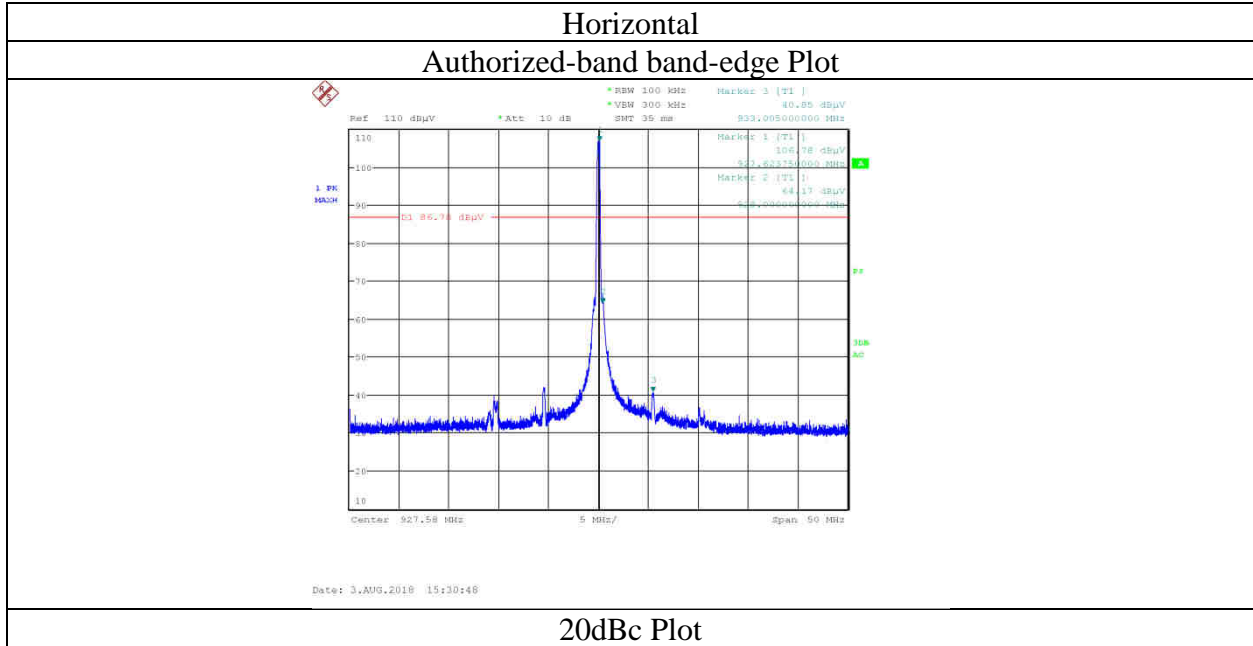
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN

Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

**Radiated Spurious Emission**  
**(Reference Plot for band-edge)**

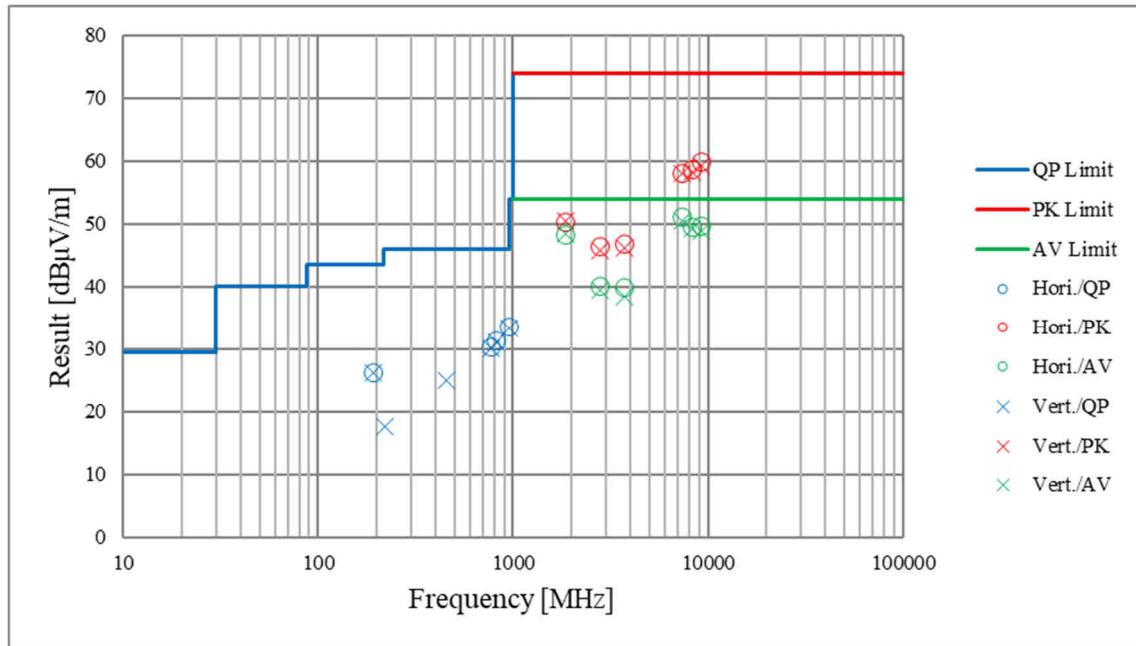
Report No. 12439951S-A-R2  
Test place Shonan EMC Lab. 2  
Semi Anechoic Chamber 2  
Date August 3, 2018  
Temperature / Humidity 26 deg. C / 66 % RH  
Engineer Makoto Hosaka  
(30 MHz -1 GHz)  
Mode Tx, Hopping Off 927.58 MHz



\* Final result of restricted band edge was shown in tabular data.

### Radiated Spurious Emission (Plot data, Worst case)

Report No.	12439951S-A-R2	
Test place	Shonan EMC Lab.	
Semi Anechoic Chamber	2	2
Date	August 3, 2018	August 2, 2018
Temperature / Humidity	26 deg. C / 66 % RH	24 deg. C / 64 % RH
Engineer	Makoto Hosaka	Makoto Hosaka
	(30 MHz -1 GHz)	(1 GHz -10 GHz)
Mode	Tx, Hopping Off 902.42 MHz	

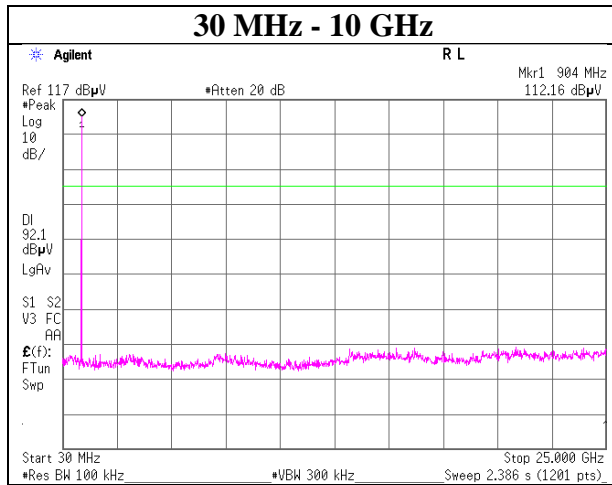
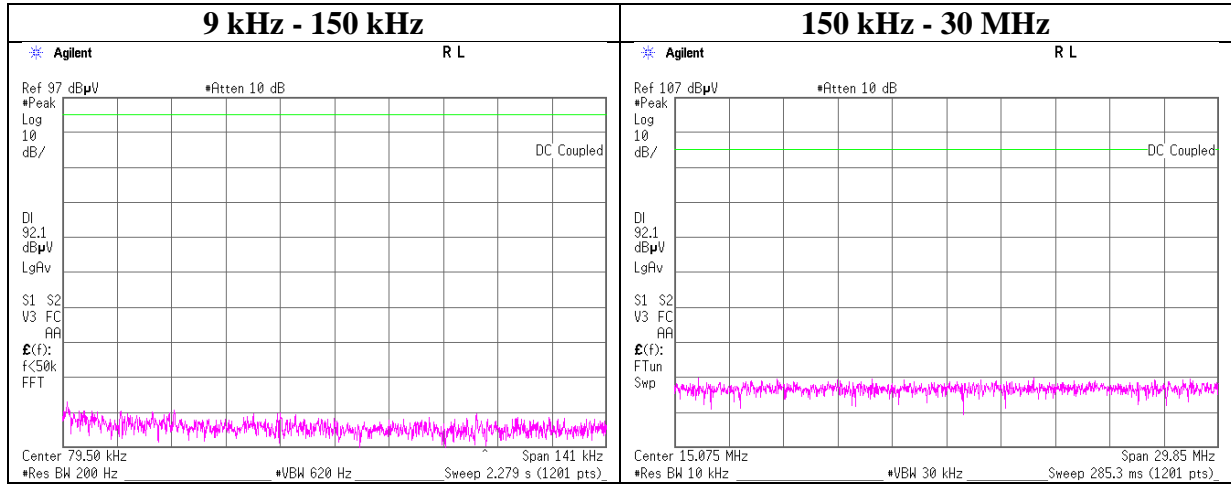


\*These plots data contains sufficient number to show the trend of characteristic features for EUT.

### Conducted Spurious Emission

Report No. 12439951S-A-R2  
 Test place Shonan EMC Lab. No.1 Measurement Room  
 Date August 1, 2018  
 Temperature / Humidity 25 deg. C / 53 % RH  
 Engineer Kenichi Adachi  
 Mode Tx, Hopping Off

#### 902.42 MHz

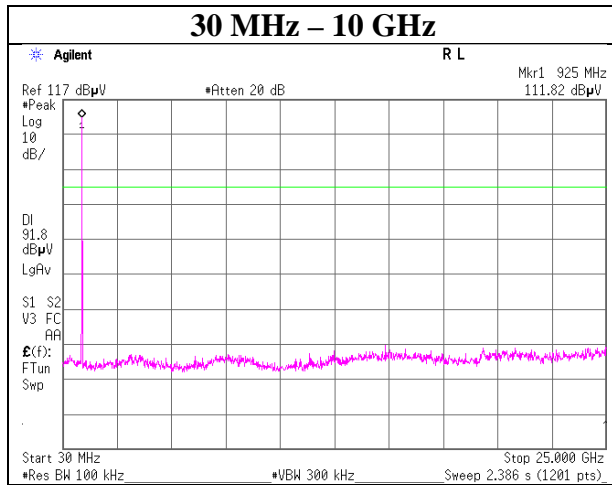
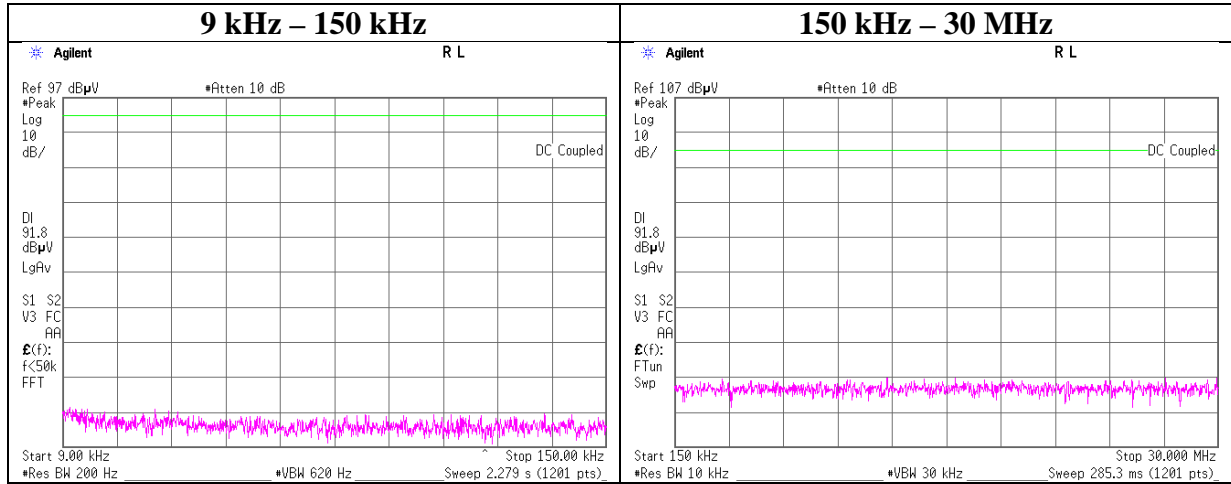


\* This chart was measured by the transmission operation at the correct transmission frequency.

### Conducted Spurious Emission

Report No. 12439951S-A-R2  
 Test place Shonan EMC Lab. No.1 Measurement Room  
 Date August 1, 2018  
 Temperature / Humidity 25 deg. C / 53 % RH  
 Engineer Kenichi Adachi  
 Mode Tx, Hopping Off

#### 915.00 MHz

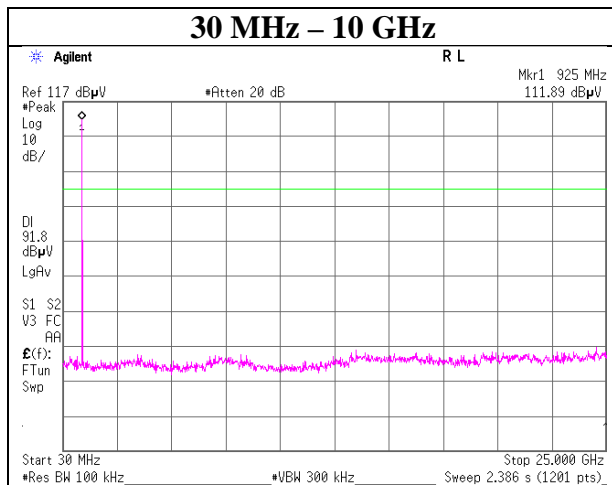
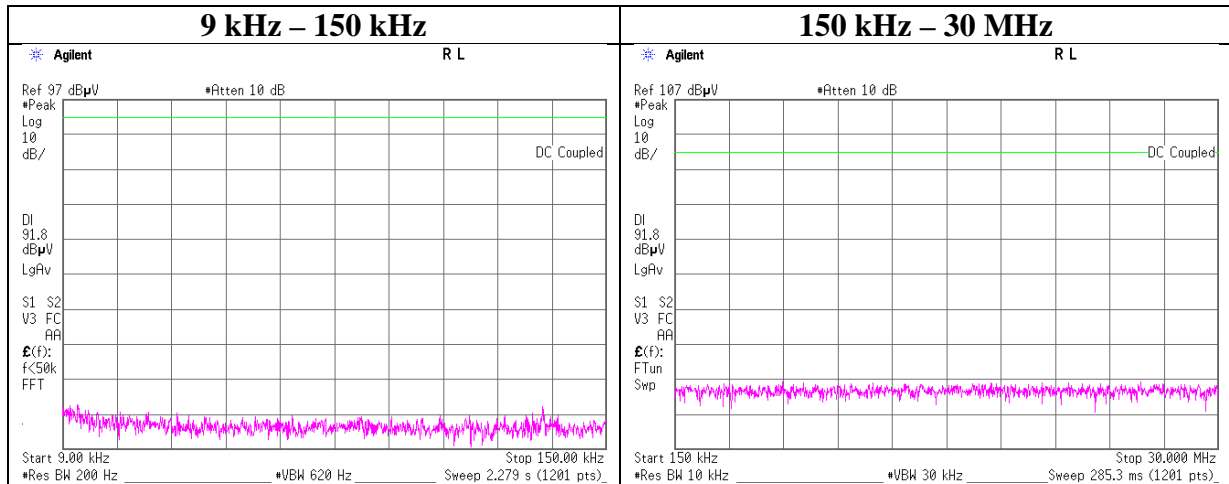


\* This chart was measured by the transmission operation at the correct transmission frequency.

### Conducted Spurious Emission

Report No. 12439951S-A-R2  
 Test place Shonan EMC Lab. No.1 Measurement Room  
 Date August 1, 2018  
 Temperature / Humidity 25 deg. C / 53 % RH  
 Engineer Kenichi Adachi  
 Mode Tx, Hopping Off

#### 927.58 MHz



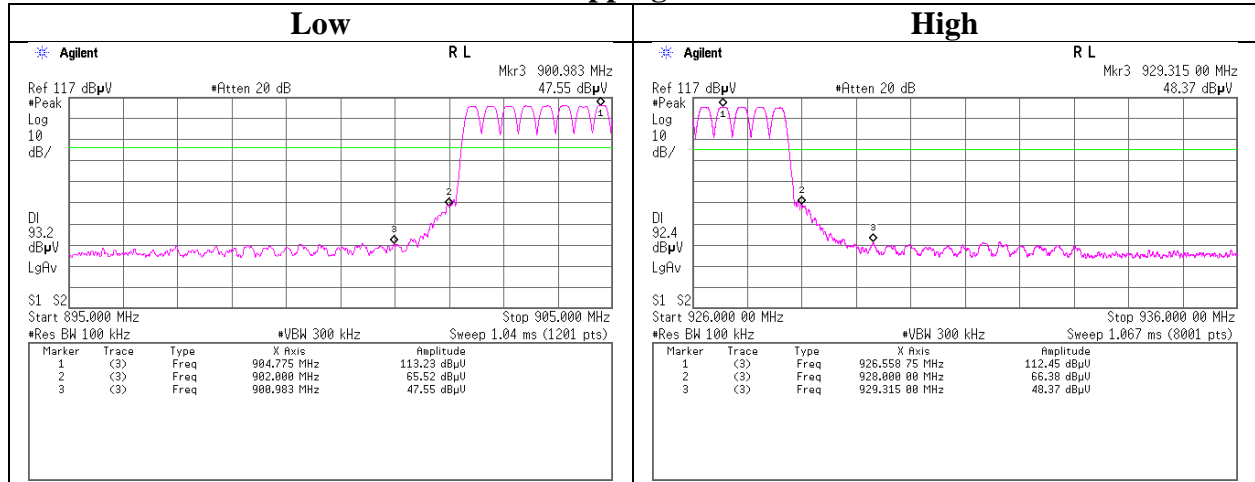
\* This chart was measured by the transmission operation at the correct transmission frequency.



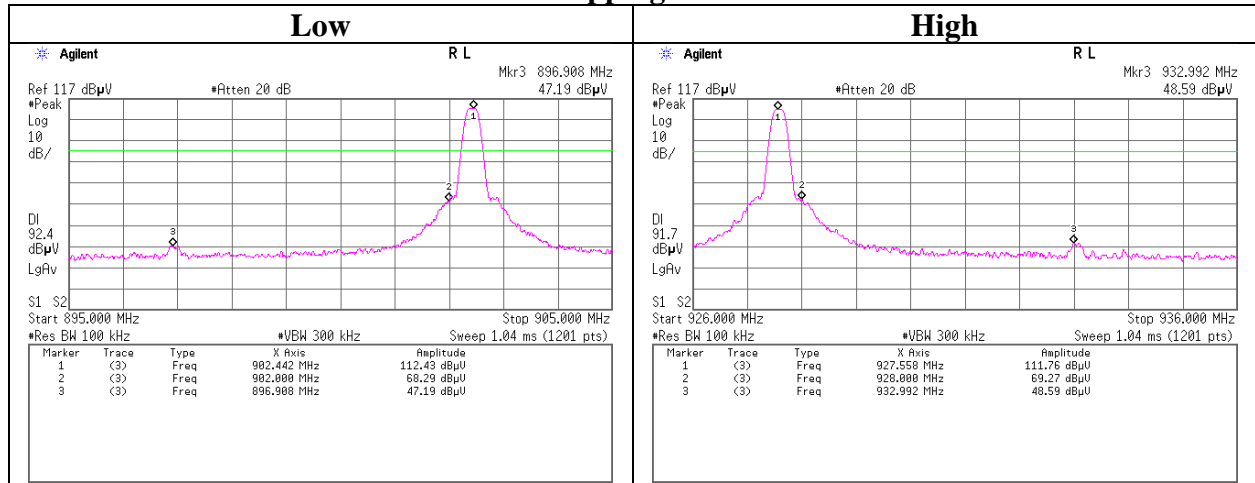
### Conducted Emission Band Edge compliance

Report No. 12439951S-A-R2  
 Test place Shonan EMC Lab. No.1 Measurement Room  
 Date August 1, 2018  
 Temperature / Humidity 25 deg. C / 53 % RH  
 Engineer Kenichi Adachi  
 Mode Tx, Hopping Off

#### Hopping On



#### Hopping Off



UL Japan, Inc.

Shonan EMC Lab.

1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN

Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

## APPENDIX 2: Test instruments

### Test Instruments

Control No.	Instrument	Manufacturer	Model No	Serial No	Test Item	Calibration Date * Interval(month)
SPM-06	Power Meter	Anritsu	ML2495A	0850009	AT	2018/05/10 * 12
SPSS-03	Power sensor	Anritsu	MA2411B	0917063	AT	2018/05/10 * 12
SRENT-09	Spectrum Analyzer	Agilent	E4440A	MY46186392	AT	2017/11/08 * 12
SAT20-07	Attenuator	Weinschel Corp.	54A-20	31484	AT	2018/04/20 * 12
SCC-G12	Coaxial Cable	Suhner	SUCOFLEX 102	30790/2	AT	2018/03/19 * 12
SOS-13	Humidity Indicator	Custom	CTH-202	Q.C.17	AT	2017/12/21 * 12
KTS-08	Digital Tester	SANWA	PC500	7019224	AT	2018/03/05 * 12
SSA-02	Spectrum Analyzer	Agilent	E4448A	MY48250106	RE	2018/03/05 * 12
SCC-G40	Coaxial Cable	Junkosha	MWX221-01000 NFSNMS/B	1612S005	RE	2018/01/29 * 12
SCC-G43	Coaxial Cable	HUBER+SUHNER	SUCOFLEX_10 4_E	SN MY 13406/4E	RE	2018/07/10 * 12
SCC-G44	Coaxial Cable	HUBER+SUHNER	SUCOFLEX 104	800070/4A	RE	2018/03/28 * 12
KFL-21	Highpass Filter	MICRO-TRONICS	HPM50115	002	RE	2018/06/19 * 12
SFL-01	Highpass Filter	MICRO-TRONICS	HPM50115	001	RE	2017/11/16 * 12
SFL-02	Highpass Filter	MICRO-TRONICS	HPM50111	051	RE	2017/11/16 * 12
SAT10-05	Attenuator(above 1 GHz)	Agilent	8493C-010	74864	RE	2017/11/22 * 12
SHA-02	Horn Antenna	Schwarzbeck	BBHA9120D	9120D-726	RE	2018/07/23 * 12
SAF-05	Pre Amplifier	TOYO Corporation	TPA0118-36	1440490	RE	2018/02/15 * 12
SOS-03	Humidity Indicator	A&D	AD-5681	4063325	RE	2017/10/30 * 12
STS-02	Digital Hitester	Hioki	3805-50	080997819	RE/CE	2018/03/08 * 12
SAEC-02(SVS WR)	Semi-Anechoic Chamber	TDK	SAEC-02(SVSW R)	2	RE	2018/07/15 * 12
COTS-SEMI-1	EMI Software	TSJ	TEPTO-DV(RE, CE,RFI,MF)	-	RE/CE	-
SAF-02	Pre Amplifier	SONOMA	310N	290212	RE	2018/02/16 * 12
SAT6-02	Attenuator	JFW	50HF-006N	-	RE	2018/02/16 * 12
SAT3-11	Attenuator	JFW	50HF-003N	-	RE	2018/02/22 * 12
SBA-02	Biconical Antenna	Schwarzbeck	BBA9106	91032665	RE	2018/06/05 * 12
SCC-B1/B3/B5/ B7/B8/B13/SRS E-02	Coaxial Cable&RF Selector	Fujikura/Fujikura/Suhn er/Suhner/Suhner/Suhn er/TOYO	8D2W/12DSFA/ 141PE/141PE/14 1PE/141PE/NS4 906	-/0901-270(RF Selector)	RE	2018/04/07 * 12
SCC-B2/B4/B6/ B7/B8/B13/SRS E-02	Coaxial Cable&RF Selector	Fujikura/Fujikura/Suhn er/Suhner/Suhner/Suhn er/TOYO	8D2W/12DSFA/ 141PE/141PE/14 1PE/141PE/NS4 906	-/0901-270(RF Selector)	RE	2018/04/07 * 12
SLA-06	Logperiodic Antenna	Schwarzbeck	VUSLP9111B	195	RE	2018/06/05 * 12
STR-07	Test Receiver	Rohde & Schwarz	ESU26	100484	RE/CE	2017/09/26 * 12
SJM-09	Measure	PROMART	SEN1935	-	RE/CE	-
SAEC-02(NSA)	Semi-Anechoic Chamber	TDK	SAEC-02(NSA)	2	RE	2018/05/31 * 12
SAT10-17	Attenuator	JFW	50HF-010N	-	RE	2018/02/09 * 12
SLS-03	LISN	Rohde & Schwarz	ENV216	100513	CE	2018/02/27 * 12
KAT3-12	Attenuator	JFW IND. INC.	50HF-003N	-	CE	2018/07/13 * 12
SOS-04	Humidity Indicator	A&D	AD-5681	4061512	CE	2017/12/21 * 12
SCC-B12/B13/S RSE-02	Coaxial Cable&RF Selector	Suhner/Suhner/TOYO	RG223U/141PE/ NS4906	-/0901-270(RF Selector)	CE	2018/04/07 * 12

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

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

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

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

UL Japan, Inc.

Shonan EMC Lab.

1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN

Telephone : +81 463 50 6400

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