



# **RADIO TEST REPORT**

**Test Report No. : 12404720H-A-R1**

**Applicant** : FALTEC CO., LTD.  
**Type of Equipment** : Remote Transmitter  
**Model No.** : PZ170-21721  
**FCC ID** : WKE-721721  
**Test regulation** : FCC Part 15 Subpart C: 2018  
**Test Result** : Complied

1. This test report shall not be reproduced in full or partial, without the written approval of UL Japan, Inc.
2. The results in this report apply only to the sample tested.
3. This sample tested is in compliance with the above regulation.
4. The test results in this report are traceable to the national or international standards.
5. This test report covers Radio technical requirements. It does not cover administrative issues such as Manual or non-Radio test related Requirements. (if applicable)
6. The all test items in this test report are conducted by UL Japan, Inc. Ise EMC Lab.
7. This test report must not be used by the customer to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.
8. This report is a revised version of 12404720H-A. 12404720H-A is replaced with this report.

**Date of test:** October 2 to 4, 2018

**Representative test engineer:**

*T. Nakagawa*

Tomohisa Nakagawa  
Engineer  
Consumer Technology Division

**Approved by:**

*M. Imura*

Motoya Imura  
Leader  
Consumer Technology Division



NVLAP LAB CODE: 200572-0

This laboratory is accredited by the NVLAP LAB CODE 200572-0, U.S.A. The tests reported herein have been performed in accordance with its terms of accreditation.

\*As for the range of Accreditation in NVLAP, you may refer to the WEB address,  
[http://japan.ul.com/resources/emc\\_accredited/](http://japan.ul.com/resources/emc_accredited/)

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

Telephone : +81 596 24 8999

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13-EM-F0429

## REVISION HISTORY

# Original Test Report No.: 12404720H-A

[illegible]

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## **SECTION 1: Customer information**

Company Name	:	FALTEC CO., LTD.
Address	:	Solid Square West Tower 19th Floor 580 Horikawa-cho, Saiwai-ku, Kawasaki-city Kanagawa, 212- 0013 Japan
Telephone Number	:	+81- 44-520-0019
Facsimile Number	:	+81- 44-520-0018
Contact Person	:	Hiroshi Kurumagawa

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

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

Type of Equipment	:	Remote Transmitter
Model No.	:	PZ170-21721
Serial No.	:	Refer to Section 4, Clause 4.2
Rating	:	DC 6.0 V
Receipt Date of Sample	:	September 21, 2018
Country of Mass-production	:	Japan
Condition of EUT	:	Production prototype (Not for Sale: This sample is equivalent to mass-produced items.)
Modification of EUT	:	No Modification by the test lab

### **2.2 Product Description**

Model: PZ170-21721 (referred to as the EUT in this report) is a Remote Transmitter.

### **Radio Specification**

Radio Type	:	Transceiver
Frequency of Operation	:	922.8 MHz
Modulation	:	spread spectrum
Antenna type	:	1/4λ helical antenna
Antenna Gain	:	0 dBi
Clock frequency	:	32 MHz(RF Transceiver)

## **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	Test Procedure	Specification	Worst margin	Results	Remarks
Conducted Emission	FCC: ANSI C63.10-2013 6. Standard test methods	FCC: Section 15.207	N/A	N/A *1)	-
	IC: RSS-Gen 8.8	IC: RSS-Gen 8.8			
6dB Bandwidth	FCC: KDB 558074 D01 15.247 Meas Guidance v05	FCC: Section 15.247(a)(2)	See data.	Complied	Conducted
	IC: -	IC: RSS-247 5.2(a)			
Maximum Peak Output Power	FCC: KDB 558074 D01 15.247 Meas Guidance v05	FCC: Section 15.247(b)(3)		Complied	Conducted
	IC: RSS-Gen 6.12	IC: RSS-247 5.4(d)			
Power Density	FCC: KDB 558074 D01 15.247 Meas Guidance v05	FCC: Section 15.247(e)		Complied	Conducted
	IC: -	IC: RSS-247 5.2(b)			
Spurious Emission Restricted Band Edges	FCC: KDB 558074 D01 15.247 Meas Guidance v05	FCC: Section15.247(d)	0.1 dB 1845.600 MHz, AV, Horizontal	Complied#	Conducted (below 30 MHz)/ Radiated (above 30 MHz) *2)
	IC: RSS-Gen 6.13	IC: RSS-247 5.5 RSS-Gen 8.9 RSS-Gen 8.10			

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

\*1) The test is not applicable since the EUT is not the device that is designed to be connected to the public utility (AC) power line.

\*2) Radiated test was selected over 30 MHz based on section 15.247(d) and KDB 558074 D01 15.247 Meas Guidance v05 8.5 and 8.6.

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.

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

The EUT provides stable voltage constantly to the wireless transmitter regardless of input voltage.

Instead of a new battery, DC power supply was used for the test.

That does not affect the test result, therefore the EUT complies with the requirement.

#### **FCC Part 15.203 Antenna requirement**

The antenna is not removable from the EUT. Therefore, the equipment complies with the antenna requirement of Section 15.203.

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**Ise EMC Lab.**

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

Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

### 3.3 Addition to standard

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

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

### 3.4 Uncertainty

#### EMI

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

#### Antenna Terminal test

Test Item	Uncertainty (+/-)
RF output power	1.3 dB
Antenna terminal conducted emission / Power density /	2.7 dB
Adjacent channel power / Channel power	
Below 3GHz	1.9 dB
3 GHz ot 6 GHz	2.1 dB

#### Conducted emission

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

#### Radiated emission

Measurement distance	Frequency range	Uncertainty (+/-)
3 m	9 kHz to 30 MHz	3.3 dB
10 m		3.2 dB
3 m	30 MHz to 200 MHz (Horizontal) (Vertical)	4.8 dB
		5.0 dB
	200 MHz to 1000 MHz (Horizontal) (Vertical)	5.2 dB
		6.3 dB
10 m	30 MHz to 200 MHz (Horizontal) (Vertical)	4.8 dB
		4.9 dB
	200 MHz to 1000 MHz (Horizontal) (Vertical)	5.0 dB
		5.0 dB
3 m	1 GHz to 6 GHz	5.0 dB
	6 GHz to 18 GHz	5.3 dB
1 m	10 GHz to 26.5 GHz	5.8 dB
	26.5 GHz to 40 GHz	5.8 dB
10 m	1 GHz to 18 GHz	5.2 dB

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

Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

### 3.5 Test Location

UL Japan, Inc. Ise EMC Lab.

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

Telephone: +81 596 24 8999, Facsimile: +81 596 24 8124

NVLAP Lab. code: 200572-0 / FCC Test Firm Registration Number: 199967

Test site	IC Registration Number	Width x Depth x Height (m)	Size of reference ground plane (m) / horizontal conducting plane	Other rooms	Maximum measurement distance
No.1 semi-anechoic chamber	2973C-1	19.2 x 11.2 x 7.7	7.0 x 6.0	No.1 Power source room	10 m
No.2 semi-anechoic chamber	2973C-2	7.5 x 5.8 x 5.2	4.0 x 4.0	-	3 m
No.3 semi-anechoic chamber	2973C-3	12.0 x 8.5 x 5.9	6.8 x 5.75	No.3 Preparation room	3 m
No.3 shielded room	-	4.0 x 6.0 x 2.7	N/A	-	-
No.4 semi-anechoic chamber	2973C-4	12.0 x 8.5 x 5.9	6.8 x 5.75	No.4 Preparation room	3 m
No.4 shielded room	-	4.0 x 6.0 x 2.7	N/A	-	-
No.5 semi-anechoic chamber	-	6.0 x 6.0 x 3.9	6.0 x 6.0	-	-
No.6 shielded room	-	4.0 x 4.5 x 2.7	4.0 x 4.5	-	-
No.6 measurement room	-	4.75 x 5.4 x 3.0	4.75 x 4.15	-	-
No.7 shielded room	-	4.7 x 7.5 x 2.7	4.7 x 7.5	-	-
No.8 measurement room	-	3.1 x 5.0 x 2.7	N/A	-	-
No.9 measurement room	-	8.8 x 4.6 x 2.8	2.4 x 2.4	-	-
No.11 measurement room	-	6.2 x 4.7 x 3.0	4.8 x 4.6	-	-

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

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

Refer to APPENDIX.

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

Telephone : +81 596 24 8999

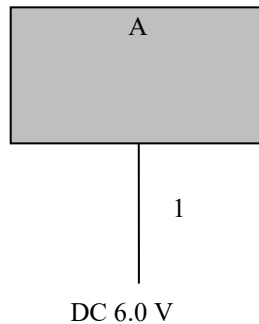
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## SECTION 4: Operation of E.U.T. during testing

### 4.1 Operating Mode(s)

Test Item	Mode	Tested frequency
6dB Bandwidth, 99% Occupied Bandwidth, Maximum Peak Output Power, Power Density, Spurious Emission (Conducted / Radiated)	Transmitting mode (Tx)	922.8 MHz
<p>The system was configured in typical fashion (as a customer would normally use it) for testing.</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



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

#### Description of EUT

No.	Item	Model number	Serial number	Manufacturer	Remarks
A	Remote Transmitter	PZ170-21721	211	FALTEC CO., LTD.	EUT

#### List of cables used

No.	Name	Length (m)	Shield		Remarks
			Cable	Connector	
1	DC Cable	2.0	Unshielded	Unshielded	*1)

\*1) This cable was attached just for testing.

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**Ise EMC Lab.**

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

Telephone : +81 596 24 8999

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## **SECTION 5: Radiated Spurious Emission**

### **Test Procedure**

It was measured based on "8.5 and 8.6 of KDB 558074 D01 15.247 Meas Guidance v05".

[For below 1 GHz]

EUT was placed on a urethane platform of nominal size, 0.5 m by 1.0 m, raised 0.8 m above the conducting ground plane. The Radiated Electric Field Strength has been measured in a Semi Anechoic Chamber with a ground plane.

[For above 1 GHz]

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

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

The height of the measuring antenna varied between 1 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 *1)	PK
IF Bandwidth	BW 120 kHz	RBW: 1 MHz VBW: 3 MHz	<u>11.12.2.5.1</u> RBW: 1 MHz VBW: 3 MHz Detector: Power Averaging (RMS) Trace: 100 traces <u>11.12.2.5.2</u> The duty cycle was less than 98% for detected noise, a duty factor was added to the 11.12.2.5.1 results.	RBW: 100 kHz VBW: 300kHz

\*1) Average Power Measurement was performed based on ANSI C63.10-2013.

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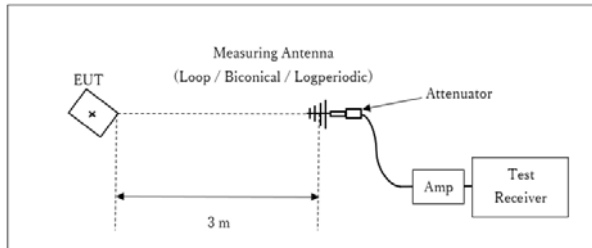
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Facsimile : +81 596 24 8124

**Figure 1: Test Setup**

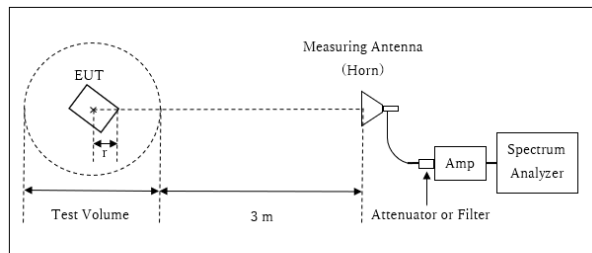
Below 1 GHz



x : Center of turn table

Test Distance: 3 m

1 GHz - 10 GHz



r : Radius of an outer periphery of EUT

x : Center of turn table

Distance Factor:  $20 \times \log (4.5 \text{ m} / 3.0 \text{ m}) = 3.53 \text{ dB}$

\* Test Distance:  $(3 + \text{Test Volume} / 2) - r = 4.5 \text{ m}$

Test Volume : 3.0 m

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

$r = 0.0 \text{ m}$

\* The test was performed with  $r = 0.0 \text{ m}$  since EUT is small and it was the rather conservative condition.

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

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

<b>Measurement range</b>	<b>: 30 MHz - 10 GHz</b>
<b>Test data</b>	<b>: APPENDIX</b>
<b>Test result</b>	<b>: Pass</b>

## **SECTION 6: 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
6dB Bandwidth	3 MHz	100 kHz	300 kHz	Auto	Peak	Max Hold	Spectrum Analyzer
99% Occupied Bandwidth *1)	Enough width to display emission skirts	1 to 5 % of OBW	Three times of RBW	Auto	Peak	Max Hold	Spectrum Analyzer
Maximum Peak Output Power	-	-	-	Auto	Peak/ Average *2)	-	Power Meter (Sensor: 50 MHz BW)
Peak Power Density	1.5 times the 6dB Bandwidth	3 kHz	10 kHz	Auto	Peak	Max Hold	Spectrum Analyzer *3)
Conducted Spurious Emission *4)	9kHz to 150kHz	200 Hz	620 Hz	Auto	Peak	Max Hold	Spectrum Analyzer
	150kHz to 30MHz	9.1 kHz	27 kHz				
*1) Peak hold was applied as Worst-case measurement. *2) Reference data *3) Section 11.10.2 Method PKPSD (peak PSD) of "ANSI C63.10-2013". *4) In the frequency range below 30MHz, RBW was narrowed to separate the noise contents. Then, wide-band noise near the limit was checked separately, however the noise was low enough as shown in the chart. (9 kHz - 150 kHz: RBW = 200 Hz, 150 kHz - 30 MHz: RBW = 9.1 kHz).							

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

<b>Test data</b>	<b>: APPENDIX</b>
<b>Test result</b>	<b>: Pass</b>

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

Telephone : +81 596 24 8999

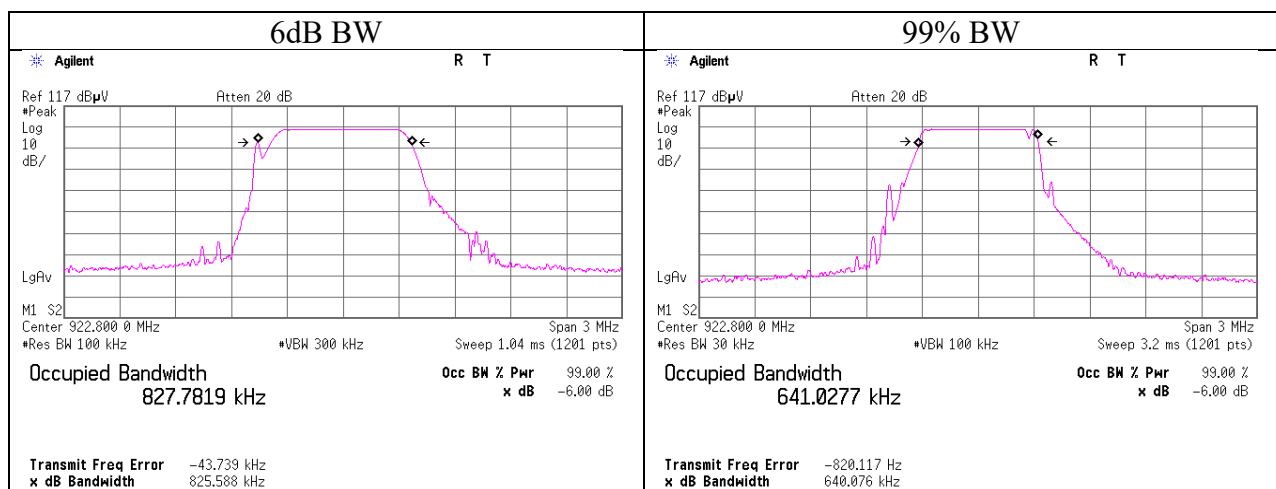
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## APPENDIX 1: Test data

### 6 dB Bandwidth and 99 % Occupied Bandwidth

Report No.	12404720H
Test place	Ise EMC Lab. No.5 Shielded Room
Date	October 3, 2018
Temperature / Humidity	25 deg. C / 47 % RH
Engineer	Tomohisa Nakagawa
Mode	Tx

Mode	Frequency [MHz]	99% Occupied Bandwidth [kHz]	6dB Bandwidth [kHz]	Limit for 6dB Bandwidth [kHz]
Tx	922.82	641.028	825.588	> 500



## Maximum Peak Output Power

Report No. 12404720H  
Test place Ise EMC Lab. No.5 Shielded Room  
Date October 3, 2018  
Temperature / Humidity 25 deg. C / 47 % RH  
Engineer Tomohisa Nakagawa  
Mode Tx

Freq.	Reading	Cable Loss	Atten. Loss	Conducted Power					e.i.r.p. for RSS-247					
				Result		Limit		Margin	Antenna Gain	Result		Limit		Margin
				[dBm]	[mW]	[dBm]	[mW]	[dB]	[dBi]	[dBm]	[mW]	[dBm]	[mW]	[dB]
922.8	0.56	0.54	9.91	11.01	12.62	30.00	1000	18.99	0.00	11.01	12.62	36.02	4000	25.01

Sample Calculation:

Result = Reading + Cable Loss + Attenuator Loss

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

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

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**Average Output Power**  
**(Reference data for RF Exposure)**

Report No. 12404720H  
Test place Ise EMC Lab. No.5 Shielded Room  
Date October 3, 2018  
Temperature / Humidity 25 deg. C / 47 % RH  
Engineer Tomohisa Nakagawa  
Mode Tx

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result (Time average)		Duty factor [dB]	Result (Burst power average)	
				[dBm]	[mW]		[dBm]	[mW]
922.8	0.44	0.54	9.91	10.89	12.27	0.00	10.89	12.27

Sample Calculation:

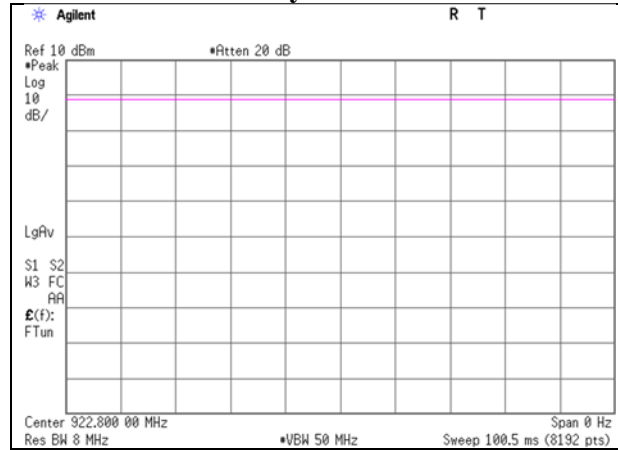
Result (Time average) = Reading + Cable Loss + Attenuator Loss

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

## Burst rate confirmation

Report No. 12404720H  
Test place Ise EMC Lab. No.5 Shielded Room  
Date October 3, 2018  
Temperature / Humidity 25 deg. C / 47 % RH  
Engineer Tomohisa Nakagawa  
Mode Tx

### **Duty 100 %**



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

Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

## Radiated Spurious Emission

Report No. 12404720H  
Test place Ise EMC Lab.  
Semi Anechoic Chamber No.4  
Date October 4, 2018  
Temperature / Humidity 23 deg. C / 67 % RH  
Engineer Akihiko Maeda  
Mode Tx 922.8 MHz

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	32.134	QP	21.3	17.5	7.3	32.1	-	14.0	40.0	26.0	
Hori	46.012	QP	21.7	12.6	7.5	32.1	-	9.7	40.0	30.3	
Hori	186.033	QP	20.9	16.4	9.1	32.0	-	14.4	43.5	29.1	
Hori	400.002	QP	20.3	15.9	10.6	32.0	-	14.8	46.0	31.2	
Hori	565.598	QP	20.4	18.4	11.6	32.1	-	18.3	46.0	27.7	
Hori	891.002	QP	20.7	22.1	13.2	31.3	-	24.7	46.0	21.3	
Hori	1845.600	PK	57.5	25.8	6.7	32.6	-	57.4	73.9	16.5	
Hori	2768.400	PK	50.6	28.5	7.0	31.9	-	54.2	73.9	19.7	
Hori	3691.200	PK	47.9	29.1	7.4	31.6	-	52.8	73.9	21.1	
Hori	4614.000	PK	47.1	30.7	7.8	31.3	-	54.3	73.9	19.6	
Hori	5536.800	PK	43.8	32.0	8.2	31.4	-	52.6	73.9	21.3	
Hori	6459.600	PK	41.1	33.8	8.7	31.8	-	51.8	73.9	22.1	
Hori	7382.400	PK	41.4	36.3	8.9	32.5	-	54.1	73.9	19.8	Floor noise
Hori	8305.200	PK	42.6	36.3	9.1	32.6	-	55.4	73.9	18.5	
Hori	9228.000	PK	41.2	37.5	9.6	32.4	-	55.9	73.9	18.0	Floor noise
Hori	1845.600	AV	53.9	25.8	6.7	32.6	-	53.8	53.9	0.1	
Hori	2768.400	AV	46.5	28.5	7.0	31.9	-	50.1	53.9	3.8	
Hori	3691.200	AV	42.9	29.1	7.4	31.6	-	47.8	53.9	6.1	
Hori	4614.000	AV	40.5	30.7	7.8	31.3	-	47.7	53.9	6.2	
Hori	5536.800	AV	35.4	32.0	8.2	31.4	-	44.2	53.9	9.7	
Hori	6459.600	AV	33.5	33.8	8.7	31.8	-	44.2	53.9	9.7	
Hori	7382.400	AV	33.4	36.3	8.9	32.5	-	46.1	53.9	7.8	Floor noise
Hori	8305.200	AV	34.6	36.3	9.1	32.6	-	47.4	53.9	6.5	
Hori	9228.000	AV	32.8	37.5	9.6	32.4	-	47.5	53.9	6.4	Floor noise
Vert	32.134	QP	21.6	17.5	7.3	32.1	-	14.3	40.0	25.7	
Vert	46.012	QP	21.5	12.6	7.5	32.1	-	9.5	40.0	30.5	
Vert	186.033	QP	20.7	16.4	9.1	32.0	-	14.2	43.5	29.3	
Vert	400.002	QP	21.0	15.9	10.6	32.0	-	15.5	46.0	30.5	
Vert	565.598	QP	20.4	18.4	11.6	32.1	-	18.3	46.0	27.7	
Vert	891.002	QP	21.0	22.1	13.2	31.3	-	25.0	46.0	21.0	
Vert	1845.600	PK	57.3	25.8	6.7	32.6	-	57.2	73.9	16.7	
Vert	2768.400	PK	49.8	28.5	7.0	31.9	-	53.4	73.9	20.5	
Vert	3691.200	PK	46.1	29.1	7.4	31.6	-	51.0	73.9	22.9	
Vert	4614.000	PK	45.2	30.7	7.8	31.3	-	52.4	73.9	21.5	
Vert	5536.800	PK	42.1	32.0	8.2	31.4	-	50.9	73.9	23.0	
Vert	6459.600	PK	40.2	33.8	8.7	31.8	-	50.9	73.9	23.0	Floor noise
Vert	7382.400	PK	41.2	36.3	8.9	32.5	-	53.9	73.9	20.0	Floor noise
Vert	8305.200	PK	40.9	36.3	9.1	32.6	-	53.7	73.9	20.2	Floor noise
Vert	9228.000	PK	40.4	37.5	9.6	32.4	-	55.1	73.9	18.8	Floor noise
Vert	1845.600	AV	53.6	25.8	6.7	32.6	-	53.5	53.9	0.4	
Vert	2768.400	AV	45.7	28.5	7.0	31.9	-	49.3	53.9	4.6	
Vert	3691.200	AV	40.5	29.1	7.4	31.6	-	45.4	53.9	8.5	
Vert	4614.000	AV	37.9	30.7	7.8	31.3	-	45.1	53.9	8.8	
Vert	5536.800	AV	34.9	32.0	8.2	31.4	-	43.7	53.9	10.2	
Vert	6459.600	AV	32.3	33.8	8.7	31.8	-	43.0	53.9	10.9	Floor noise
Vert	7382.400	AV	33.4	36.3	8.9	32.5	-	46.1	53.9	7.8	Floor noise
Vert	8305.200	AV	33.5	36.3	9.1	32.6	-	46.3	53.9	7.6	Floor noise
Vert	9228.000	AV	32.8	37.5	9.6	32.4	-	47.5	53.9	6.4	Floor noise

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

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

Distance factor: 1 GHz - 10 GHz 20log (4.5 m / 3.0 m) = 3.53 dB

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**Ise EMC Lab.**

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

Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124



## Radiated Spurious Emission

Report No.	12404720H
Test place	Ise EMC Lab.
Semi Anechoic Chamber	No.4
Date	October 4, 2018
Temperature / Humidity	23 deg. C / 67 % RH
Engineer	Akihiko Maeda
Mode	Tx 922.8 MHz

**20dBc Data Sheet**

Polarity	Frequency	Detector	Reading	Ant Factor	Loss	Gain	Result	Limit	Margin	Remark
	[MHz]		[dBuV]	[dB/m]	[dB]	[dB]	[dBuV/m]	[dBuV/m]	[dB]	
Hori	922.800	PK	100.1	22.1	13.3	31.1	104.4	-	-	Carrier
Hori	902.000	PK	27.6	22.1	13.2	31.2	31.7	84.4	52.7	
Hori	928.000	PK	25.9	22.1	13.3	31.1	30.2	84.4	54.2	
Vert	922.800	PK	100.3	22.1	13.3	31.1	104.6	-	-	Carrier
Vert	902.000	PK	28.2	22.1	13.2	31.2	32.3	84.6	52.3	
Vert	928.000	PK	26.7	22.1	13.3	31.1	31.0	84.6	53.6	

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

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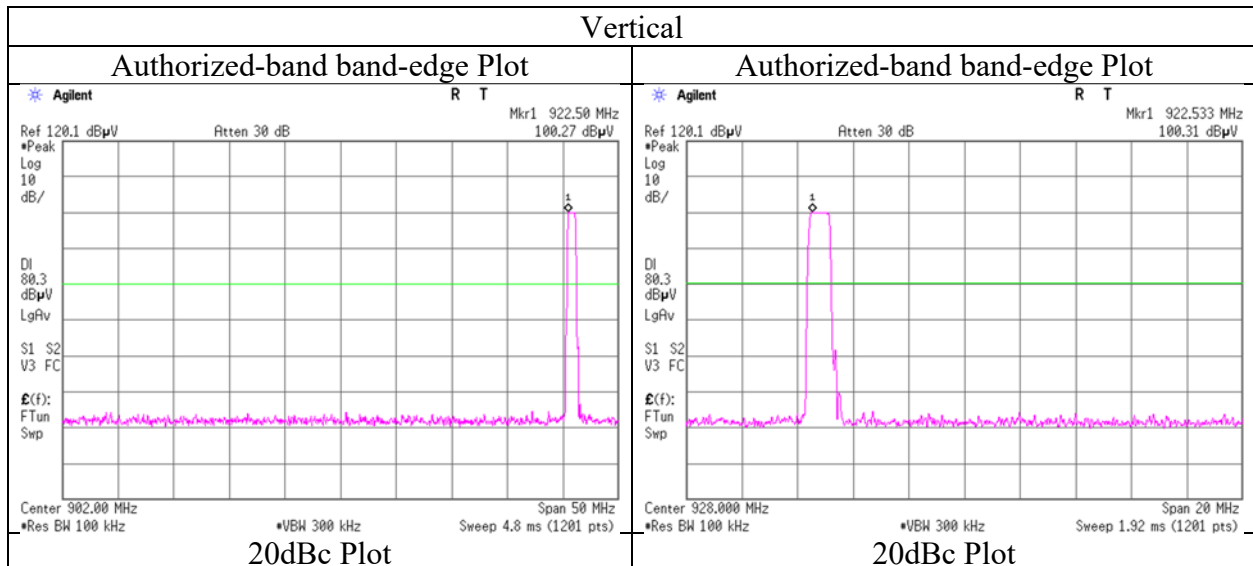
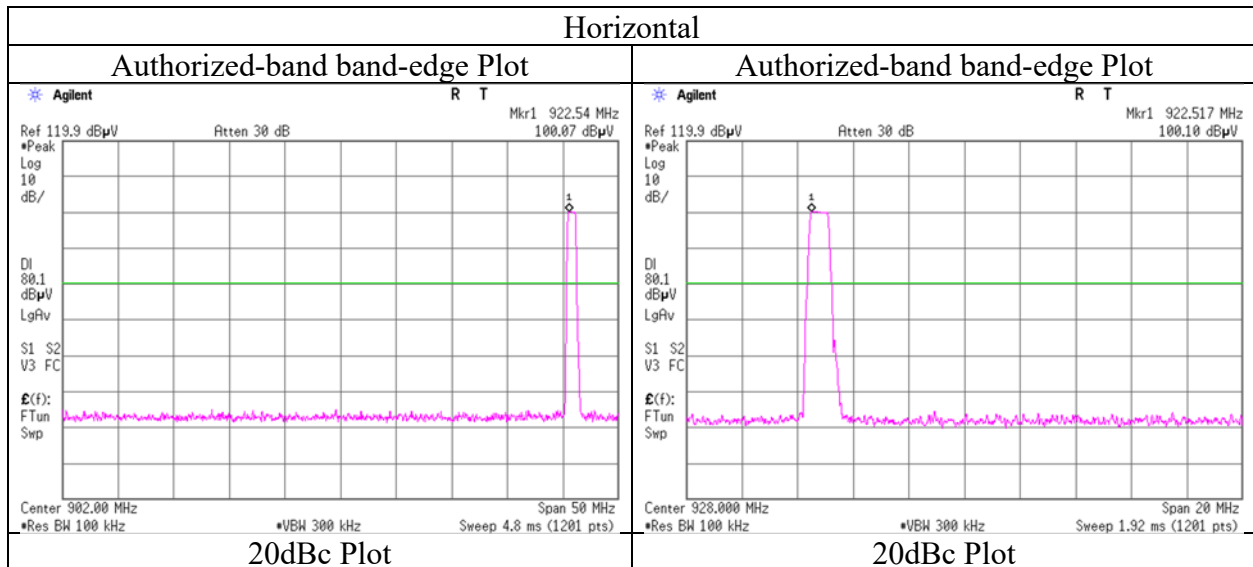
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Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

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

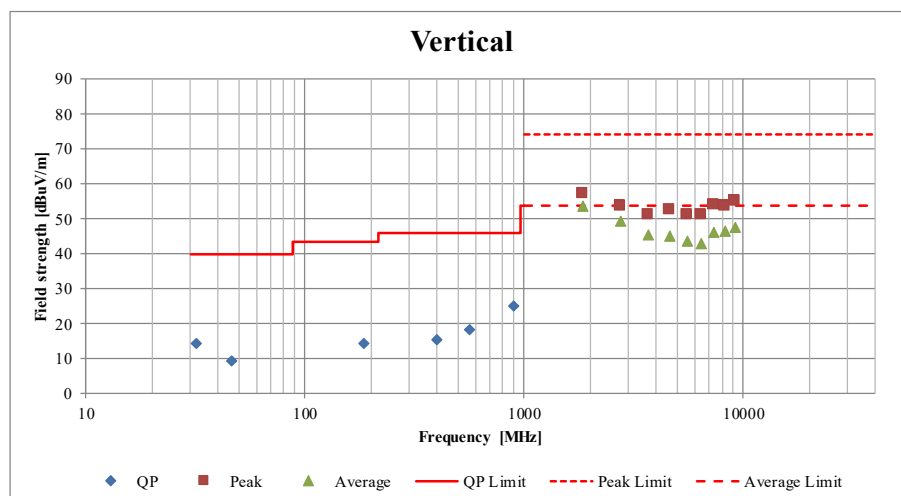
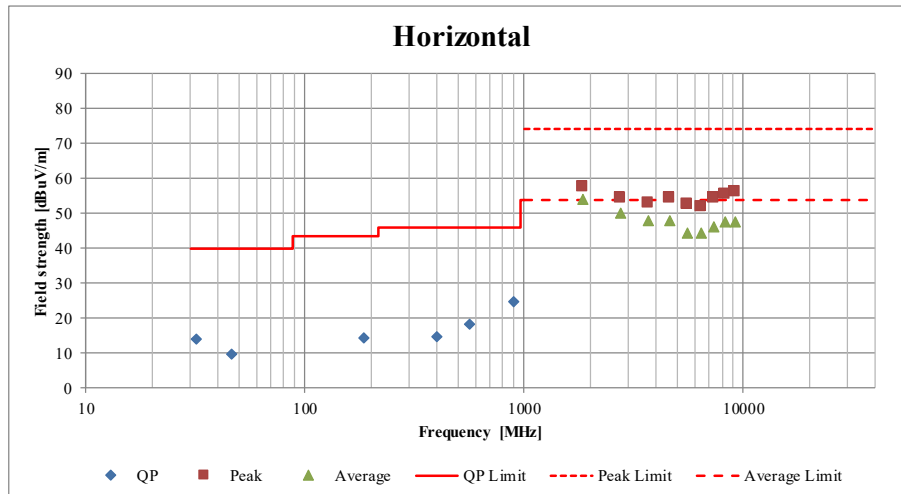
Report No.	12404720H
Test place	Ise EMC Lab.
Semi Anechoic Chamber	No.4
Date	October 4, 2018
Temperature / Humidity	23 deg. C / 67 % RH
Engineer	Akihiko Maeda
Mode	Tx 922.8 MHz



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

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

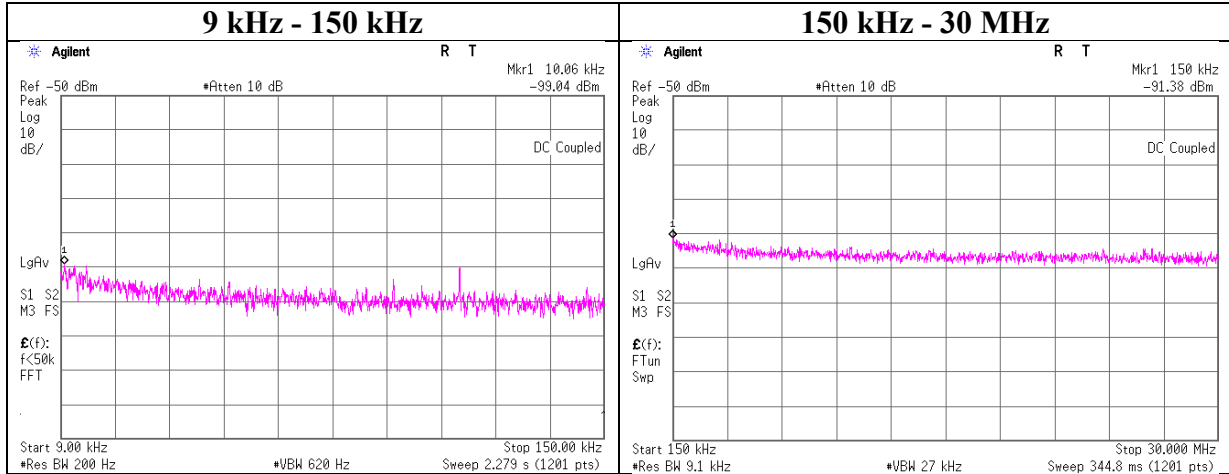
Report No. 12404720H  
Test place Ise EMC Lab.  
Semi Anechoic Chamber No.4  
Date October 4, 2018  
Temperature / Humidity 23 deg. C / 67 % RH  
Engineer Akihiko Maeda  
Mode Tx 922.8 MHz



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

## Conducted Spurious Emission

Report No.	12404720H
Test place	Ise EMC Lab. No.5 Shielded Room
Date	October 3, 2018
Temperature / Humidity	25 deg. C / 47 % RH
Engineer	Tomohisa Nakagawa
Mode	Tx



Frequency	Reading	Cable Loss	Attenuator Loss	Antenna Gain*	N (Number of Output)	EIRP	Distance	Ground bounce	E (field strength)	Limit	Margin	Remark
[kHz]	[dBm]	[dB]	[dB]	[dBi]		[dBm]	[m]	[dB]	[dBuV/m]	[dBuV/m]	[dB]	
10.06	-99.0	0.07	9.8	2.0	1	-87.1	300	6.0	-25.9	47.5	73.4	
150.00	-91.4	0.07	9.8	2.0	1	-79.5	300	6.0	-18.2	24.0	42.2	

$E \text{ [dBuV/m]} = \text{EIRP [dBm]} - 20 \log (\text{Distance [m]}) + \text{Ground bounce [dB]} + 104.8 \text{ [dBuV/m]}$

$\text{EIRP [dBm]} = \text{Reading [dBm]} + \text{Cable loss [dB]} + \text{Attenuator Loss [dB]} + \text{Antenna gain [dBi]} + 10 * \log (N)$

N: Number of output

\*2.0 dBi was applied to the test result based on KDB 558074 since antenna gain was less than 2.0 dBi.

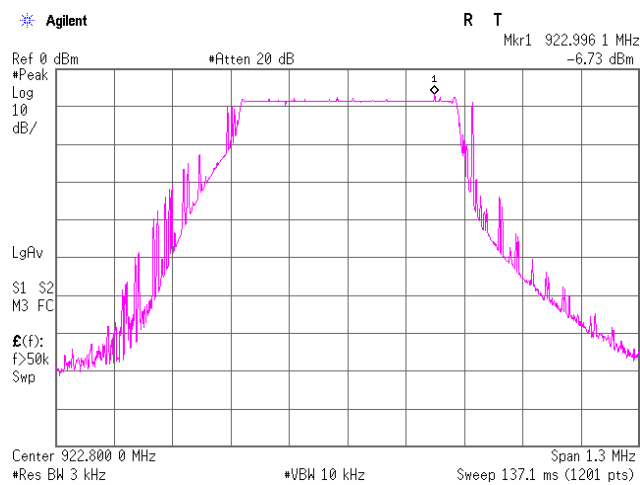
## Power Density

Report No.	12404720H
Test place	Ise EMC Lab. No.5 Shielded Room
Date	October 3, 2018
Temperature / Humidity	25 deg. C / 47 % RH
Engineer	Tomohisa Nakagawa
Mode	Tx

Freq.	Reading	Cable Loss	Atten. Loss	Result	Limit	Margin
[MHz]	[dBm]	[dB]	[dB]	[dBm]	[dBm]	[dB]
922.80	-6.73	0.54	9.91	3.72	8.00	4.28

Sample Calculation:

Result = Reading + Cable Loss + Attenuator Loss



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

Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

## APPENDIX 2: Test instruments

### Test Instruments

Test item	LIMS ID	Description	Manufacturer	Model	Serial	Last Calibration Date	Calibration Due Date	Cal Int
RE	141397	Coaxial Cable	UL Japan	-	-	6/13/2018	6/30/2019	12
RE	141545	DIGITAL HiTESTER	HIOKI	3805	51201148	1/9/2018	1/31/2019	12
RE	141951	EMI Test Receiver	Rohde & Schwarz	ESR26	101408	1/30/2018	1/31/2019	12
RE	141902	Spectrum Analyzer	AGILENT	E4440A	MY46187105	10/4/2018	10/31/2019	12
RE	142227	Measure	KOMELON	KMC-36	-	-	-	-
RE	141562	Thermo-Hygrometer	CUSTOM	CTH-180	1501	1/24/2018	1/31/2019	12
RE	148898	Attenuator	KEYSIGHT	8491A	MY52462282	10/3/2018	10/31/2019	12
RE	142017	AC4 Semi Anechoic Chamber(SVSWR)	TDK	Semi Anechoic Chamber 3m	DA-10005	4/7/2018	4/30/2019	12
RE	141412	Microwave Cable	Junkosha	MWX221	1305S002R(1m) / 1405S146(5m)	6/14/2018	6/30/2019	12
RE	141152	EMI measurement program	TSJ	TEPTO-DV	-	-	-	-
RE	142011	AC4 Semi Anechoic Chamber(NSA)	TDK	Semi Anechoic Chamber 3m	DA-10005	6/28/2018	6/30/2020	24
RE	141297	High Pass Filter(1.1-10GHz)	TOKYO KEIKI	TF219CD1	1001	1/18/2018	1/31/2019	12
RE	141508	Horn Antenna 1-18GHz	Schwarzbeck	BBHA9120D	9120D-557	6/8/2018	6/30/2019	12
RE	141267	Logperiodic Antenna(200-1000M Hz)	Schwarzbeck	VUSLP9111B	911B-192	6/1/2018	6/30/2019	12
RE	141425	Biconical Antenna	Schwarzbeck	BBA9106	1302	6/1/2018	6/30/2019	12
AT	141343	Barometer	Sunoh	SBR121	596	2/8/2018	2/28/2021	36
AT	141812	Power Meter	AGILENT	8990B	MY51000271	8/21/2018	8/31/2019	12
AT	141156	Attenuator(10dB)	Weinschel Corp	2	BL1173	11/14/2017	11/30/2018	12
AT	141900	Spectrum Analyzer	AGILENT	E4440A	MY46185823	11/16/2017	11/30/2018	12
AT	141415	Microwave Cable	Murata	MXGS83RK3 000	-	11/8/2017	11/30/2018	12
AT	141842	Power sensor	AGILENT	N1923A	MY54070003	8/21/2018	8/31/2019	12
AT	141563	Thermo-Hygrometer	CUSTOM	CTH-180	1701	1/24/2018	1/31/2019	12

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

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

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

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

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

**UL Japan, Inc.**

**Ise EMC Lab.**

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

Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124