



RADIO TEST REPORT

Test Report No.: 12305800S-R2

Applicant : **Fukuda Denshi Co., Ltd.**
Type of Equipment : **ECG & Respiration Transmitter**
Model No. : **LX-8100(G)**
FCC ID : **DV8LX8100G**
Test regulation : **FCC Part 95 Subpart H: 2017**
FCC Part 2 Subpart J: 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 limits of the above regulation.
4. The test results in this test report are traceable to the national or international standards.
5. This test report must not be used by the customer to claim product certification, approval, or endorsement by any agency of the Federal Government.
6. This test report covers Radio technical requirements.
It does not cover administrative issues such as Manual or non-Radio 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. This report is a revised version of 12305800S-R1. 12305800S-R1 is replaced with this report.

Date of test: May 16 to 24, 2018

Representative test engineer: *Y. Ishikawa*
Yosuke Ishikawa
Engineer
Consumer Technology Division

Approved by : *T. Imamura*
Toyokazu Imamura
Leader
Consumer Technology Division



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

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

13-EM-F0429

REVISION HISTORY

Original Test Report No.: 12305800S

Revision	Test report No.	Date	Page revised	Contents
- (Original)	12305800S	June 13, 2018	-	-
1	12305800S-R1	August 1, 2018	p.4, p.21-23, p.25-27	Corrected error (power value). Added antenna gain value.
2	12305800S-R2	August 6, 2018	p.21-23, p.25-27	Added RF output power (EIRP value).

Contents

	<u>Page</u>
SECTION 1: Customer information	4
SECTION 2: Equipment under test (E.U.T.)	4
SECTION 3: Test specification, procedures and results	5
SECTION 4: Operation of E.U.T. during testing.....	7
SECTION 5: Bandwidth & Occupied bandwidth (99 %)	8
SECTION 6: Frequency Stability	8
SECTION 7: Field Strength (Fundamental Emission & Out of band emissions).....	9
APPENDIX 1: Data of Radio tests.....	11
APPENDIX 2: Test instruments	29
APPENDIX 3: Photographs of test setup.....	30

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

SECTION 1: Customer information

Company Name : Fukuda Denshi Co., Ltd.
Address : 35-8, Hongo 2-chome, Bunkyo-ku, Tokyo 113-8420, Japan
Telephone Number : +81-3-5684-1300
Facsimile Number : +81-3-5684-1449
Contact Person : Yasuhiro Yonekawa

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

2.1 Identification of E.U.T.

Type of Equipment : ECG & Respiration Transmitter
Model No. : LX-8100(G)
Serial No. : Refer to Section 4.2
Rating : DC 1.5 V (Battery)
Country of Mass-production : Japan
Receipt Date of Sample : May 16, 2018
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 No: LX-8100(G), referred to as the EUT in this report, is the ECG & Respiration Transmitter.

Clock frequency(ies) in the system : 84 kHz, 8 MHz, 13 MHz

Radio specification:

Radio Type : Transmitter
Frequency of Operation : 1395.0375 MHz to 1399.9625 MHz,
1427.0375 MHz to 1431.4625 MHz
Modulation : DFSK
RF Output Power : 5 mW \pm 2 dB *1)
RF Output Power Limit : 740 mV/m at 3 m (= 117.3 dBuV/m at 3 m)
Antenna type : Dielectric antenna
Antenna gain : -11.8 dBi (1395-1400 MHz), -13.9 dBi (1427-1432 MHz)
Frequency stability : \pm 2.5 ppm

*1) RF Output Power is fixed as shown in the document "Theory of Operation" and this product is shipped.
(* maximum measurement value was 6.873 mW. Refer to APPENDIX 1.)

Supplied voltage:

The EUT is a battery-operated device and test was performed with the new battery. Therefore, the EUT complies with power supply regulation.

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

SECTION 3: Test specification, procedures and results

3.1 Test specification

Test specification : FCC Part 95 Subpart H,
FCC Part 95 final revised on September 20, 2017 and effective October 20, 2017
Title : FCC 47CFR Part 95 Personal Radio Services
Subpart H Wireless Medical Telemetry Service

Test specification : FCC Part 2 Subpart J,
FCC Part 2 final revised on May 7, 2018 and effective June 6, 2018
Title : FCC 47CFR
Part 2 Frequency Allocations and Radio Treaty Matters; General Rules and Regulations
Subpart J Equipment Authorization Procedures

* The revision after testing does not affect the test specification applied to the EUT.

The EUT is used for the purpose of being related with medical treatment. Therefore this device applies to §15.103(e), exempted from FCC Part 15 Subpart B.

3.2 Procedures & results

Item	Test Procedure *1)	Specification	Remarks	Deviation	Worst margin	Results
Conducted emissions	ANSI C63.4: 2014	FCC 15.207	-	N/A *2)	-	N/A
WMTS field strength limits	FCC 2.1046, ANSI/TIA-603-E	FCC 95.2369 (b)	Radiated	N/A	25.6 dB (Horizontal, Average, Tx, 1395.0375 MHz)	Complied
WMTS unwanted emissions limits	FCC 2.1053, ANSI/TIA-603-E	FCC 95.2379	Radiated	N/A	3.9 dB (9782.588 MHz, Vertical, AV, Tx, 1397.5125 MHz)	Complied#
WMTS frequency accuracy	FCC 2.1055, ANSI/TIA-603-E	FCC 95.2365	Radiated	N/A	-	Complied
Bandwidth	FCC 2.1049, ANSI/TIA-603-E	Applicant specification	Radiated	N/A	-	Complied
Spurious emission at antenna terminals	FCC 2.1051, ANSI/TIA-603-E	-	Conducted	N/A *3)	-	N/A

Note: UL Japan, Inc.'s EMI Work Test Procedure 13-EM-W0420.

*1) These tests were also referred to "Land Mobile FM or PM Communications Equipment Measurement and Performance Standards" (TIA-603-E: 2016).

*2) The test is not applicable since the EUT has no AC mains.

*3) The test is not applicable since the EUT has no antenna terminals.

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.

3.3 Addition to standard

No addition, deviation or exclusion has been made from standards.

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

3.4 Uncertainty

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

Item	Frequency range	No.1 SAC* ¹ (±)	No.2 SAC(±)	No.3 SAC (±)
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

*1: SAC=Semi-Anechoic Chamber

*2: SR= Shielded Room is applied besides radiated emission.

Frequency Measurement uncertainty for this test was: (±) 2.1×10^{-7}

Bandwidth Measurement uncertainty for this test was: (±) 1.01 %

3.5 Test location

UL Japan, Inc. Shonan EMC Lab.

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

Telephone number: +81 463 50 6400, Facsimile number: +81 463 50 6401

JAB Accreditation No.: RTL02610, FCC Test Firm Registration Number: 839876

	IC Registration No.	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 setup, Test data & Test instruments

Refer to APPENDIX 1 to 3.

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

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

4.1 Operating mode

The EUT exercise program used during testing was designed to exercise the various system components in a manner similar to typical use.

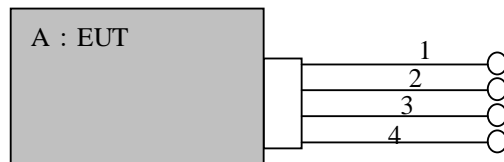
Test item	Operating mode	Tested frequency
All items	Transmitting (Modulated)	1395.0375 MHz 1397.5125 MHz 1399.9625 MHz 1427.0375 MHz 1429.2625 MHz 1431.4625 MHz

Software: V01-01

Power setting: Fixed

Justification: The system was configured in typical fashion (as customer would normally use it) for testing.

4.2 Configuration and peripherals



* Test data was taken under worse case conditions.

Description of EUT and support equipment

No.	Item	Model number	Serial number	Manufacturer	Remarks
A	ECG & Respiration Transmitter	LX-8100(G)	G6	FUKUDA DENSHI	EUT

List of cables used

No.	Name	Length (m)	Shield (Cable)	Shield (Connector)	Remarks
1	Signal	0.7	Shielded	Shielded	-
2	Signal	0.7	Shielded	Shielded	-
3	Signal	0.7	Shielded	Shielded	-
4	Signal	0.7	Shielded	Shielded	-

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

SECTION 5: Bandwidth & Occupied bandwidth (99 %)

Test procedure

The bandwidth was measured with a spectrum analyzer.

Summary of the test results:Pass
Refer to the APPENDIX 1

SECTION 6: Frequency Stability

Test procedure

The frequency stability was measured with a spectrum analyzer.
The temperature test was started after the temperature stabilization time of 30 minutes.

Summary of the test results:Pass
Refer to the APPENDIX 1

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

SECTION 7: Field Strength (Fundamental Emission & Out of band emissions)

7.1 Operating environment

Test place : Refer to the APPENDIX 1
Temperature : Refer to the APPENDIX 1
Humidity : Refer to the APPENDIX 1

7.2 Test configuration

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. Photographs of the setup are shown in APPENDIX 3.

7.3 Test conditions

Frequency range : 9 kHz - 15 GHz
EUT position : Table top

7.4 Test procedure

The Radiated Electric Field Strength intensity has been measured with a ground plane and at a distance of 3 m. The measuring antenna height was 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 intensity.

The measurements were performed for both vertical and horizontal antenna polarization.

Measurements were performed with QP and AV detector.

The radiated emission measurements were made with the following detector function of the test receiver.

Frequency	Below 1 GHz	Above 1 GHz
Instrument used	Test Receiver	Spectrum Analyzer *1)
Detector IF Bandwidth	QP: RBW 200 Hz (9 kHz -150 kHz), QP: RBW 9 kHz (150 kHz -30 MHz), QP: BW 120 kHz (30 MHz – 1000 MHz),	AV: RBW: 1 MHz VBW: 10 Hz (No pulse emission detected)
Measuring antenna	Loop (9 kHz – 30 MHz), Biconical (30 MHz - 300 MHz) Logperiodic (300 MHz - 1 GHz)	Horn

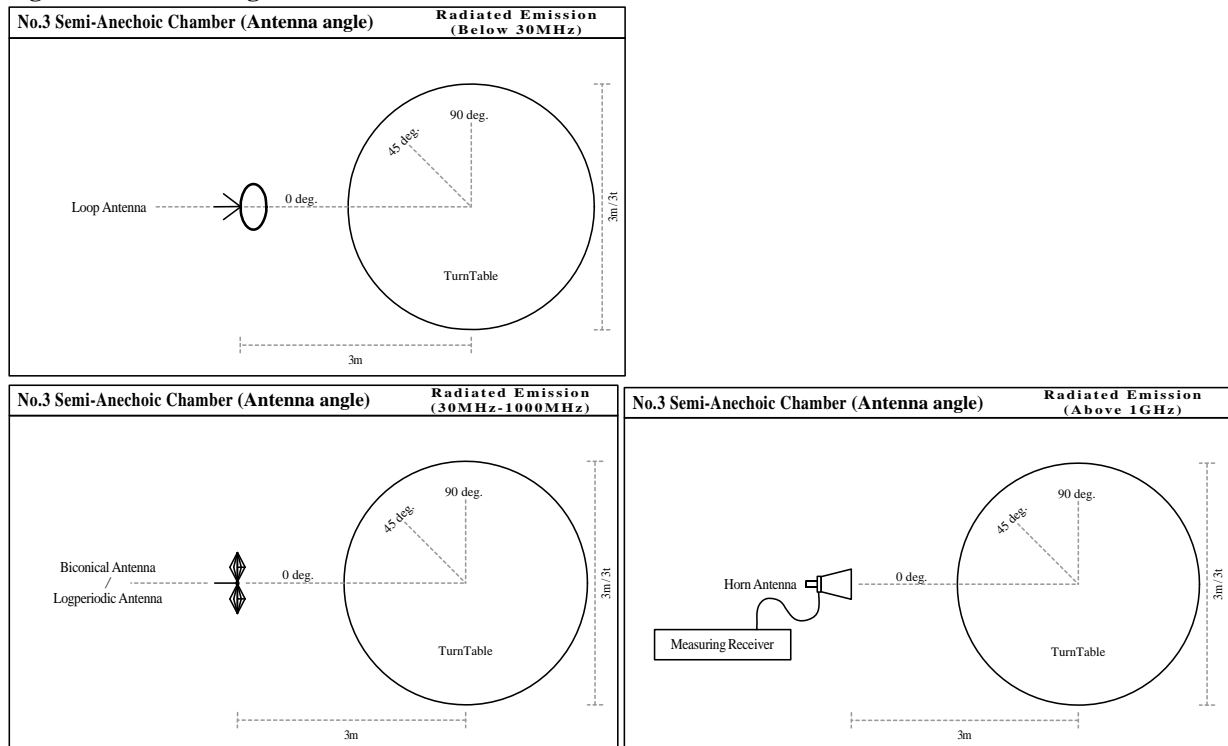
*1) When using Spectrum analyzer, the test was made with adjusting span to zero by using peak hold.

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.

Antenna polarization	Carrier (Band edge)	Spurious (Below 1 GHz)	Spurious (1 GHz - 15 GHz)
Horizontal	Z	X	Z
Vertical	Y	X	Y

* The definition of each position is shown in a 'Pre-check of the worst position' in APPENDIX 3.

Figure 1. Antenna angle



7.5 Band edge

To determine the level of band-edge spurious, we use the following procedure:

Set the resolution bandwidth to 1 kHz in the peak detector mode.

Because we don't want to include in-band emission at BandEdge measurement if center frequencies are "1395.0375 MHz" or "1399.9625 MHz" or "1427.0375 MHz" or "1431.4625 MHz" and BandEdges are "1395 MHz" or "1400 MHz" or "1427 MHz" or "1432 MHz"..

(The supplementation: There are some granted test report that were measured by 3 kHz RBW for the equipment that has 350 kHz for 26 dB bandwidth in similar case.)

*As we started at section 7.5, we used RBW = 1 kHz (greater than 1 % bandwidth) to prevent to detect in-band emission. Refer to KDB 971168 (971168 D01 Power Meas License Digital Systems v03r01).

Measure the maximum level of the in-band channel closest to the band edge and the maximum level of the out-of-band emissions close to the same band edge.

Determine the ratio of the in-band signal to the out-of-band emissions. Then, measure the level of the in-band channel in peak mode with 1 MHz bandwidth. Using the ratio obtained, we calculate the equivalent level of the out-of-band emissions to determine compliance with the limits.

The emission tests, except for the band edge, were performed with the quasi-peak mode of the test receiver. (Bandwidth: 1 MHz)

7.6 Results

Summary of the test results : Pass

Refer to the APPENDIX 1

APPENDIX 1: Data of Radio tests

WMTS frequency accuracy

Test place	UL Japan, Inc. Shonan EMC Lab.	No.5 Shielded Room	
Date	May 18, 2018	May 21, 2018	May 24, 2018
Temperature / Humidity	26 deg.C / 48 %RH	26 deg.C / 35 %RH	25 deg.C / 50 %RH
Engineer	Yosuke Ishikawa	Yosuke Ishikawa	Kenichi Adachi
Mode	Transmitting		

Test Condition deg.C Voltage	Test Timing	Measured frequency [MHz]	Frequency error [MHz]	Result [ppm]	Limit [+/- ppm]	Margin [ppm]	
20 deg.C	DC 0.9 V (Vmin)	Power on	1395.037140	-0.000360	-0.26	2.50	2.24
		on 2 min.	1395.037477	-0.000023	-0.02	2.50	2.48
		on 5 min.	1395.036664	-0.000836	-0.60	2.50	1.90
		on 10 min.	1395.036598	-0.000902	-0.65	2.50	1.85
	DC 1.5 V (Vnom)	Power on	1395.038041	0.000541	0.39	2.50	2.11
		on 2 min.	1395.037319	-0.000181	-0.13	2.50	2.37
		on 5 min.	1395.037816	0.000316	0.23	2.50	2.27
		on 10 min.	1395.037150	-0.000350	-0.25	2.50	2.25
	-	Power on	-	-	-	-	-
		on 2 min.	-	-	-	-	-
		on 5 min.	-	-	-	-	-
		on 10 min.	-	-	-	-	-
50 deg.C.	Power on	1395.037876	0.000376	0.27	2.50	2.23	
	on 2 min.	1395.037661	0.000161	0.12	2.50	2.38	
	on 5 min.	1395.037324	-0.000176	-0.13	2.50	2.37	
	on 10 min.	1395.037642	0.000142	0.10	2.50	2.40	
40 deg.C.	Power on	1395.037489	-0.000011	-0.01	2.50	2.49	
	on 2 min.	1395.038015	0.000515	0.37	2.50	2.13	
	on 5 min.	1395.037691	0.000191	0.14	2.50	2.36	
	on 10 min.	1395.037191	-0.000309	-0.22	2.50	2.28	
30 deg.C.	Power on	1395.037901	0.000401	0.29	2.50	2.21	
	on 2 min.	1395.037248	-0.000252	-0.18	2.50	2.32	
	on 5 min.	1395.037214	-0.000286	-0.21	2.50	2.29	
	on 10 min.	1395.037520	0.000020	0.01	2.50	2.49	
20 deg.C.	Power on	1395.038041	0.000541	0.39	2.50	2.11	
	on 2 min.	1395.037319	-0.000181	-0.13	2.50	2.37	
	on 5 min.	1395.037816	0.000316	0.23	2.50	2.27	
	on 10 min.	1395.037150	-0.000350	-0.25	2.50	2.25	
10 deg.C.	Power on	1395.037672	0.000172	0.12	2.50	2.38	
	on 2 min.	1395.037528	0.000028	0.02	2.50	2.48	
	on 5 min.	1395.037588	0.000088	0.06	2.50	2.44	
	on 10 min.	1395.037394	-0.000106	-0.08	2.50	2.42	
0 deg.C.	Power on	1395.036438	-0.001062	-0.76	2.50	1.74	
	on 2 min.	1395.037310	-0.000190	-0.14	2.50	2.36	
	on 5 min.	1395.037210	-0.000290	-0.21	2.50	2.29	
	on 10 min.	1395.037057	-0.000444	-0.32	2.50	2.18	
-10deg.C.	Power on	1395.037135	-0.000365	-0.26	2.50	2.24	
	on 2 min.	1395.037369	-0.000131	-0.09	2.50	2.41	
	on 5 min.	1395.038385	0.000885	0.63	2.50	1.87	
	on 10 min.	1395.037913	0.000413	0.30	2.50	2.20	
-20 deg.C	Power on	1395.037785	0.000285	0.20	2.50	2.30	
	on 2 min.	1395.037526	0.000025	0.02	2.50	2.48	
	on 5 min.	1395.037294	-0.000206	-0.15	2.50	2.35	
	on 10 min.	1395.036969	-0.000531	-0.38	2.50	2.12	
-30 deg.C	Power on	1395.038709	0.001209	0.87	2.50	1.63	
	on 2 min.	1395.037494	-0.000006	0.00	2.50	2.50	
	on 5 min.	1395.037353	-0.000147	-0.11	2.50	2.39	
	on 10 min.	1395.037394	-0.000106	-0.08	2.50	2.42	
Limit :	1395.0375	MHz +/-0.00025 % (+/-2.5 ppm) =		+/- 0.003488 MHz			

WMTS frequency accuracy

Test place UL Japan, Inc. Shonan EMC Lab. No.5 Shielded Room
Date May 18, 2018 May 21, 2018 May 24, 2018
Temperature / Humidity 26 deg.C / 48 %RH 26 deg.C / 35 %RH 25 deg.C / 50 %RH
Engineer Yosuke Ishikawa Yosuke Ishikawa Kenichi Adachi
Mode Transmitting

Test Condition deg.C Voltage	Test Timing	Measured frequency [MHz]	Frequency error [MHz]	Result [ppm]	Limit [+/- ppm]	Margin [ppm]	
20 deg.C	DC 0.9 V (Vmin)	Power on	1397.512361	-0.000139	-0.10	2.50	2.40
		on 2 min.	1397.511877	-0.000624	-0.45	2.50	2.05
		on 5 min.	1397.512121	-0.000380	-0.27	2.50	2.23
		on 10 min.	1397.511497	-0.001003	-0.72	2.50	1.78
	DC 1.5 V (Vnom)	Power on	1397.512197	-0.000303	-0.22	2.50	2.28
		on 2 min.	1397.512332	-0.000168	-0.12	2.50	2.38
		on 5 min.	1397.512147	-0.000353	-0.25	2.50	2.25
		on 10 min.	1397.512366	-0.000134	-0.10	2.50	2.40
	-	Power on	-	-	-	-	-
		on 2 min.	-	-	-	-	-
		on 5 min.	-	-	-	-	-
		on 10 min.	-	-	-	-	-
50 deg.C.	DC 1.5V	Power on	1397.513054	0.000554	0.40	2.50	2.10
		on 2 min.	1397.512223	-0.000277	-0.20	2.50	2.30
		on 5 min.	1397.512511	0.000010	0.01	2.50	2.49
		on 10 min.	1397.512774	0.000274	0.20	2.50	2.30
40 deg.C.	DC 1.5V	Power on	1397.512569	0.000069	0.05	2.50	2.45
		on 2 min.	1397.512252	-0.000249	-0.18	2.50	2.32
		on 5 min.	1397.512170	-0.000330	-0.24	2.50	2.26
		on 10 min.	1397.512305	-0.000196	-0.14	2.50	2.36
30 deg.C.	DC 1.5V	Power on	1397.511775	-0.000726	-0.52	2.50	1.98
		on 2 min.	1397.512689	0.000189	0.14	2.50	2.36
		on 5 min.	1397.512405	-0.000096	-0.07	2.50	2.43
		on 10 min.	1397.512252	-0.000249	-0.18	2.50	2.32
20 deg.C.	DC 1.5V	Power on	1397.512197	-0.000303	-0.22	2.50	2.28
		on 2 min.	1397.512332	-0.000168	-0.12	2.50	2.38
		on 5 min.	1397.512147	-0.000353	-0.25	2.50	2.25
		on 10 min.	1397.512366	-0.000134	-0.10	2.50	2.40
10 deg.C.	DC 1.5V	Power on	1397.512457	-0.000043	-0.03	2.50	2.47
		on 2 min.	1397.512591	0.000091	0.07	2.50	2.43
		on 5 min.	1397.512707	0.000207	0.15	2.50	2.35
		on 10 min.	1397.512307	-0.000193	-0.14	2.50	2.36
0 deg.C.	DC 1.5V	Power on	1397.512800	0.000300	0.21	2.50	2.29
		on 2 min.	1397.512484	-0.000016	-0.01	2.50	2.49
		on 5 min.	1397.511953	-0.000547	-0.39	2.50	2.11
		on 10 min.	1397.512003	-0.000497	-0.36	2.50	2.14
-10deg.C.	DC 1.5V	Power on	1397.513031	0.000531	0.38	2.50	2.12
		on 2 min.	1397.512425	-0.000075	-0.05	2.50	2.45
		on 5 min.	1397.512563	0.000063	0.04	2.50	2.46
		on 10 min.	1397.512591	0.000091	0.06	2.50	2.44
-20 deg.C	DC 1.5V	Power on	1397.512728	0.000228	0.16	2.50	2.34
		on 2 min.	1397.513016	0.000516	0.37	2.50	2.13
		on 5 min.	1397.512741	0.000241	0.17	2.50	2.33
		on 10 min.	1397.512785	0.000285	0.20	2.50	2.30
-30 deg.C	DC 1.5V	Power on	1397.512430	-0.000070	-0.05	2.50	2.45
		on 2 min.	1397.512112	-0.000388	-0.28	2.50	2.22
		on 5 min.	1397.512447	-0.000053	-0.04	2.50	2.46
		on 10 min.	1397.512637	0.000137	0.10	2.50	2.40

Limit : 1397.5125 MHz +/-0.00025 % (+/-2.5 ppm) = +/- 0.003494 MHz

WMTS frequency accuracy

Test place	UL Japan, Inc. Shonan EMC Lab.	No.5 Shielded Room	
Date	May 18, 2018	May 21, 2018	May 24, 2018
Temperature / Humidity	26 deg.C / 48 %RH	26 deg.C / 35 %RH	25 deg.C / 50 %RH
Engineer	Yosuke Ishikawa	Yosuke Ishikawa	Kenichi Adachi
Mode	Transmitting		

Test Condition deg.C	Voltage	Test Timing	Measured frequency [MHz]	Frequency error [MHz]	Result [ppm]	Limit [+/- ppm]	Margin [ppm]
20 deg.C	DC 0.9 V (Vmin)	Power on	1399.962273	-0.000228	-0.16	2.50	2.34
		on 2 min.	1399.962229	-0.000271	-0.19	2.50	2.31
		on 5 min.	1399.962662	0.000162	0.12	2.50	2.38
		on 10 min.	1399.961989	-0.000512	-0.37	2.50	2.13
	DC 1.5 V (Vnom)	Power on	1399.962685	0.000185	0.13	2.50	2.37
		on 2 min.	1399.961963	-0.000537	-0.38	2.50	2.12
		on 5 min.	1399.962700	0.000200	0.14	2.50	2.36
		on 10 min.	1399.962291	-0.000209	-0.15	2.50	2.35
	-	Power on	-	-	-	-	-
		on 2 min.	-	-	-	-	-
		on 5 min.	-	-	-	-	-
		on 10 min.	-	-	-	-	-
50 deg.C.	DC 1.5V	Power on	1399.962392	-0.000109	-0.08	2.50	2.42
		on 2 min.	1399.962583	0.000082	0.06	2.50	2.44
		on 5 min.	1399.962220	-0.000280	-0.20	2.50	2.30
		on 10 min.	1399.962454	-0.000046	-0.03	2.50	2.47
40 deg.C.		Power on	1399.963376	0.000876	0.63	2.50	1.87
		on 2 min.	1399.962702	0.000202	0.14	2.50	2.36
		on 5 min.	1399.962727	0.000226	0.16	2.50	2.34
		on 10 min.	1399.962430	-0.000071	-0.05	2.50	2.45
30 deg.C.		Power on	1399.962539	0.000038	0.03	2.50	2.47
		on 2 min.	1399.962242	-0.000259	-0.18	2.50	2.32
		on 5 min.	1399.962630	0.000129	0.09	2.50	2.41
		on 10 min.	1399.962589	0.000089	0.06	2.50	2.44
20 deg.C.	Power on	1399.962685	0.000185	0.13	2.50	2.37	
	on 2 min.	1399.961963	-0.000537	-0.38	2.50	2.12	
	on 5 min.	1399.962700	0.000200	0.14	2.50	2.36	
	on 10 min.	1399.962291	-0.000209	-0.15	2.50	2.35	
10 deg.C.	Power on	1399.962991	0.000491	0.35	2.50	2.15	
	on 2 min.	1399.962069	-0.000431	-0.31	2.50	2.19	
	on 5 min.	1399.962578	0.000078	0.06	2.50	2.44	
	on 10 min.	1399.962244	-0.000256	-0.18	2.50	2.32	
0 deg.C.	Power on	1399.962497	-0.000003	0.00	2.50	2.50	
	on 2 min.	1399.962085	-0.000415	-0.30	2.50	2.20	
	on 5 min.	1399.962319	-0.000181	-0.13	2.50	2.37	
	on 10 min.	1399.962235	-0.000265	-0.19	2.50	2.31	
-10deg.C.	Power on	1399.963375	0.000875	0.63	2.50	1.87	
	on 2 min.	1399.962779	0.000278	0.20	2.50	2.30	
	on 5 min.	1399.962807	0.000307	0.22	2.50	2.28	
	on 10 min.	1399.962307	-0.000193	-0.14	2.50	2.36	
-20 deg.C	Power on	1399.962891	0.000391	0.28	2.50	2.22	
	on 2 min.	1399.963116	0.000616	0.44	2.50	2.06	
	on 5 min.	1399.962603	0.000103	0.07	2.50	2.43	
	on 10 min.	1399.962663	0.000163	0.12	2.50	2.38	
-30 deg.C	Power on	1399.962488	-0.000012	-0.01	2.50	2.49	
	on 2 min.	1399.962766	0.000266	0.19	2.50	2.31	
	on 5 min.	1399.962407	-0.000094	-0.07	2.50	2.43	
	on 10 min.	1399.962394	-0.000106	-0.08	2.50	2.42	

Limit : 1399.9625 MHz +/-0.00025 % (+/-2.5 ppm) = +/- 0.003500 MHz

WMTS frequency accuracy

Test place	UL Japan, Inc. Shonan EMC Lab.	No.5 Shielded Room	
Date	May 18, 2018	May 21, 2018	May 24, 2018
Temperature / Humidity	26 deg.C / 48 %RH	26 deg.C / 35 %RH	25 deg.C / 50 %RH
Engineer	Yosuke Ishikawa	Yosuke Ishikawa	Kenichi Adachi
Mode	Transmitting		

Test Condition deg.C Voltage		Test Timing	Measured frequency [MHz]	Frequency error [MHz]	Result [ppm]	Limit [+/- ppm]	Margin [ppm]
20 deg.C	DC 0.9 V (Vmin)	Power on	1427.037170	-0.000330	-0.23	2.50	2.27
		on 2 min.	1427.037015	-0.000485	-0.34	2.50	2.16
		on 5 min.	1427.037157	-0.000343	-0.24	2.50	2.26
		on 10 min.	1427.037282	-0.000218	-0.15	2.50	2.35
	DC 1.5 V (Vnom)	Power on	1427.037619	0.000119	0.08	2.50	2.42
		on 2 min.	1427.037534	0.000034	0.02	2.50	2.48
		on 5 min.	1427.037926	0.000425	0.30	2.50	2.20
		on 10 min.	1427.037469	-0.000031	-0.02	2.50	2.48
	-	Power on	-	-	-	-	-
		on 2 min.	-	-	-	-	-
		on 5 min.	-	-	-	-	-
		on 10 min.	-	-	-	-	-
50 deg.C.	DC 1.5V	Power on	1427.037615	0.000115	0.08	2.50	2.42
		on 2 min.	1427.037480	-0.000020	-0.01	2.50	2.49
		on 5 min.	1427.037627	0.000127	0.09	2.50	2.41
		on 10 min.	1427.037662	0.000162	0.11	2.50	2.39
40 deg.C.		Power on	1427.037496	-0.000004	0.00	2.50	2.50
		on 2 min.	1427.037417	-0.000083	-0.06	2.50	2.44
		on 5 min.	1427.036583	-0.000918	-0.64	2.50	1.86
		on 10 min.	1427.037343	-0.000157	-0.11	2.50	2.39
30 deg.C.		Power on	1427.036909	-0.000591	-0.41	2.50	2.09
		on 2 min.	1427.037524	0.000024	0.02	2.50	2.48
		on 5 min.	1427.037381	-0.000119	-0.08	2.50	2.42
		on 10 min.	1427.036965	-0.000535	-0.37	2.50	2.13
20 deg.C.	Power on	1427.037619	0.000119	0.08	2.50	2.42	
	on 2 min.	1427.037534	0.000034	0.02	2.50	2.48	
	on 5 min.	1427.037926	0.000425	0.30	2.50	2.20	
	on 10 min.	1427.037469	-0.000031	-0.02	2.50	2.48	
10 deg.C.	Power on	1427.037853	0.000353	0.25	2.50	2.25	
	on 2 min.	1427.037141	-0.000359	-0.25	2.50	2.25	
	on 5 min.	1427.037672	0.000172	0.12	2.50	2.38	
	on 10 min.	1427.037500	0.000000	0.00	2.50	2.50	
0 deg.C.	Power on	1427.037225	-0.000275	-0.19	2.50	2.31	
	on 2 min.	1427.037209	-0.000291	-0.20	2.50	2.30	
	on 5 min.	1427.037206	-0.000294	-0.21	2.50	2.29	
	on 10 min.	1427.037522	0.000022	0.02	2.50	2.48	
-10deg.C.	Power on	1427.037566	0.000066	0.05	2.50	2.45	
	on 2 min.	1427.037912	0.000412	0.29	2.50	2.21	
	on 5 min.	1427.037778	0.000278	0.19	2.50	2.31	
	on 10 min.	1427.037483	-0.000017	-0.01	2.50	2.49	
-20 deg.C	Power on	1427.038263	0.000763	0.53	2.50	1.97	
	on 2 min.	1427.038054	0.000554	0.39	2.50	2.11	
	on 5 min.	1427.037285	-0.000215	-0.15	2.50	2.35	
	on 10 min.	1427.037432	-0.000068	-0.05	2.50	2.45	
-30 deg.C	Power on	1427.037841	0.000341	0.24	2.50	2.26	
	on 2 min.	1427.037707	0.000207	0.14	2.50	2.36	
	on 5 min.	1427.037191	-0.000309	-0.22	2.50	2.28	
	on 10 min.	1427.037570	0.000070	0.05	2.50	2.45	

Limit : 1427.0375 MHz +/-0.00025 % (+/-2.5 ppm) = +/- 0.003568 MHz

UL Japan, Inc.
Shonan EMC Lab.

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

Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

WMTS frequency accuracy

Test place UL Japan, Inc. Shonan EMC Lab. No.5 Shielded Room
 Date May 18, 2018 May 21, 2018 May 24, 2018
 Temperature / Humidity 26 deg.C / 48 %RH 26 deg.C / 35 %RH 25 deg.C / 50 %RH
 Engineer Yosuke Ishikawa Yosuke Ishikawa Kenichi Adachi
 Mode Transmitting

Test Condition deg.C Voltage	Test Timing	Measured frequency [MHz]	Frequency error [MHz]	Result [ppm]	Limit [+/- ppm]	Margin [ppm]	
20 deg.C	DC 0.9 V (Vmin)	Power on	1429.261843	-0.000657	-0.46	2.50	2.04
		on 2 min.	1429.261740	-0.000761	-0.53	2.50	1.97
		on 5 min.	1429.262089	-0.000411	-0.29	2.50	2.21
		on 10 min.	1429.262267	-0.000233	-0.16	2.50	2.34
	DC 1.5 V (Vnom)	Power on	1429.262578	0.000078	0.05	2.50	2.45
		on 2 min.	1429.262766	0.000266	0.19	2.50	2.31
		on 5 min.	1429.262475	-0.000025	-0.02	2.50	2.48
		on 10 min.	1429.262647	0.000147	0.10	2.50	2.40
	-	Power on	-	-	-	-	-
		on 2 min.	-	-	-	-	-
		on 5 min.	-	-	-	-	-
		on 10 min.	-	-	-	-	-
50 deg.C.	DC 1.5V	Power on	1429.263482	0.000981	0.69	2.50	1.81
		on 2 min.	1429.262824	0.000324	0.23	2.50	2.27
		on 5 min.	1429.262758	0.000258	0.18	2.50	2.32
		on 10 min.	1429.262543	0.000043	0.03	2.50	2.47
40 deg.C.	DC 1.5V	Power on	1429.263651	0.001150	0.80	2.50	1.70
		on 2 min.	1429.262255	-0.000246	-0.17	2.50	2.33
		on 5 min.	1429.261974	-0.000527	-0.37	2.50	2.13
		on 10 min.	1429.262127	-0.000374	-0.26	2.50	2.24
30 deg.C.	DC 1.5V	Power on	1429.261769	-0.000732	-0.51	2.50	1.99
		on 2 min.	1429.262442	-0.000058	-0.04	2.50	2.46
		on 5 min.	1429.262636	0.000136	0.10	2.50	2.40
		on 10 min.	1429.262196	-0.000305	-0.21	2.50	2.29
20 deg.C.	DC 1.5V	Power on	1429.262578	0.000078	0.05	2.50	2.45
		on 2 min.	1429.262766	0.000266	0.19	2.50	2.31
		on 5 min.	1429.262475	-0.000025	-0.02	2.50	2.48
		on 10 min.	1429.262647	0.000147	0.10	2.50	2.40
10 deg.C.	DC 1.5V	Power on	1429.262222	-0.000278	-0.19	2.50	2.31
		on 2 min.	1429.262053	-0.000447	-0.31	2.50	2.19
		on 5 min.	1429.262638	0.000138	0.10	2.50	2.40
		on 10 min.	1429.262132	-0.000368	-0.26	2.50	2.24
0 deg.C.	DC 1.5V	Power on	1429.262384	-0.000116	-0.08	2.50	2.42
		on 2 min.	1429.262144	-0.000356	-0.25	2.50	2.25
		on 5 min.	1429.262400	-0.000100	-0.07	2.50	2.43
		on 10 min.	1429.262131	-0.000369	-0.26	2.50	2.24
-10deg.C.	DC 1.5V	Power on	1429.262547	0.000047	0.03	2.50	2.47
		on 2 min.	1429.262960	0.000460	0.32	2.50	2.18
		on 5 min.	1429.262807	0.000307	0.21	2.50	2.29
		on 10 min.	1429.262788	0.000288	0.20	2.50	2.30
-20 deg.C	DC 1.5V	Power on	1429.262500	0.000000	0.00	2.50	2.50
		on 2 min.	1429.262384	-0.000116	-0.08	2.50	2.42
		on 5 min.	1429.262762	0.000262	0.18	2.50	2.32
		on 10 min.	1429.262697	0.000197	0.14	2.50	2.36
-30 deg.C	DC 1.5V	Power on	1429.262913	0.000413	0.29	2.50	2.21
		on 2 min.	1429.262444	-0.000056	-0.04	2.50	2.46
		on 5 min.	1429.262240	-0.000260	-0.18	2.50	2.32
		on 10 min.	1429.262694	0.000194	0.14	2.50	2.36

Limit : 1429.2625 MHz +/-0.00025 % (+/-2.5 ppm) = +/- 0.003573 MHz

WMTS frequency accuracy

Test place	UL Japan, Inc. Shonan EMC Lab.	No.5 Shielded Room	
Date	May 18, 2018	May 21, 2018	May 24, 2018
Temperature / Humidity	26 deg.C / 48 %RH	26 deg.C / 35 %RH	25 deg.C / 50 %RH
Engineer	Yosuke Ishikawa	Yosuke Ishikawa	Kenichi Adachi
Mode	Transmitting		

Test Condition deg.C	Voltage	Test Timing	Measured frequency [MHz]	Frequency error [MHz]	Result [ppm]	Limit [+/- ppm]	Margin [ppm]
20 deg.C	DC 0.9 V (Vmin)	Power on	1431.462506	0.000006	0.00	2.50	2.50
		on 2 min.	1431.462465	-0.000035	-0.02	2.50	2.48
		on 5 min.	1431.462230	-0.000270	-0.19	2.50	2.31
		on 10 min.	1431.462011	-0.000489	-0.34	2.50	2.16
	DC 1.5 V (Vnom)	Power on	1431.462969	0.000469	0.33	2.50	2.17
		on 2 min.	1431.462707	0.000206	0.14	2.50	2.36
		on 5 min.	1431.462660	0.000160	0.11	2.50	2.39
		on 10 min.	1431.462510	0.000010	0.01	2.50	2.49
	-	Power on	-	-	-	-	-
		on 2 min.	-	-	-	-	-
		on 5 min.	-	-	-	-	-
		on 10 min.	-	-	-	-	-
50 deg.C.	DC 1.5V	Power on	1431.462470	-0.000030	-0.02	2.50	2.48
		on 2 min.	1431.462305	-0.000195	-0.14	2.50	2.36
		on 5 min.	1431.461986	-0.000515	-0.36	2.50	2.14
		on 10 min.	1431.462905	0.000405	0.28	2.50	2.22
40 deg.C.		Power on	1431.462854	0.000354	0.25	2.50	2.25
		on 2 min.	1431.462399	-0.000102	-0.07	2.50	2.43
		on 5 min.	1431.462011	-0.000490	-0.34	2.50	2.16
		on 10 min.	1431.462171	-0.000330	-0.23	2.50	2.27
30 deg.C.		Power on	1431.462291	-0.000209	-0.15	2.50	2.35
		on 2 min.	1431.462752	0.000252	0.18	2.50	2.32
		on 5 min.	1431.462649	0.000148	0.10	2.50	2.40
		on 10 min.	1431.462402	-0.000099	-0.07	2.50	2.43
20 deg.C.	Power on	1431.462969	0.000469	0.33	2.50	2.17	
	on 2 min.	1431.462707	0.000206	0.14	2.50	2.36	
	on 5 min.	1431.462660	0.000160	0.11	2.50	2.39	
	on 10 min.	1431.462510	0.000010	0.01	2.50	2.49	
10 deg.C.	Power on	1431.462381	-0.000119	-0.08	2.50	2.42	
	on 2 min.	1431.462456	-0.000044	-0.03	2.50	2.47	
	on 5 min.	1431.462606	0.000106	0.07	2.50	2.43	
	on 10 min.	1431.462553	0.000053	0.04	2.50	2.46	
0 deg.C.	Power on	1431.462578	0.000078	0.05	2.50	2.45	
	on 2 min.	1431.462475	-0.000025	-0.02	2.50	2.48	
	on 5 min.	1431.462503	0.000003	0.00	2.50	2.50	
	on 10 min.	1431.462019	-0.000482	-0.34	2.50	2.16	
-10deg.C.	Power on	1431.463619	0.001119	0.78	2.50	1.72	
	on 2 min.	1431.462663	0.000163	0.11	2.50	2.39	
	on 5 min.	1431.462188	-0.000312	-0.22	2.50	2.28	
	on 10 min.	1431.462504	0.000004	0.00	2.50	2.50	
-20 deg.C	Power on	1431.462656	0.000156	0.11	2.50	2.39	
	on 2 min.	1431.463000	0.000500	0.35	2.50	2.15	
	on 5 min.	1431.462666	0.000166	0.12	2.50	2.38	
	on 10 min.	1431.462366	-0.000134	-0.09	2.50	2.41	
-30 deg.C	Power on	1431.463234	0.000734	0.51	2.50	1.99	
	on 2 min.	1431.462690	0.000190	0.13	2.50	2.37	
	on 5 min.	1431.462312	-0.000188	-0.13	2.50	2.37	
	on 10 min.	1431.462650	0.000150	0.10	2.50	2.40	

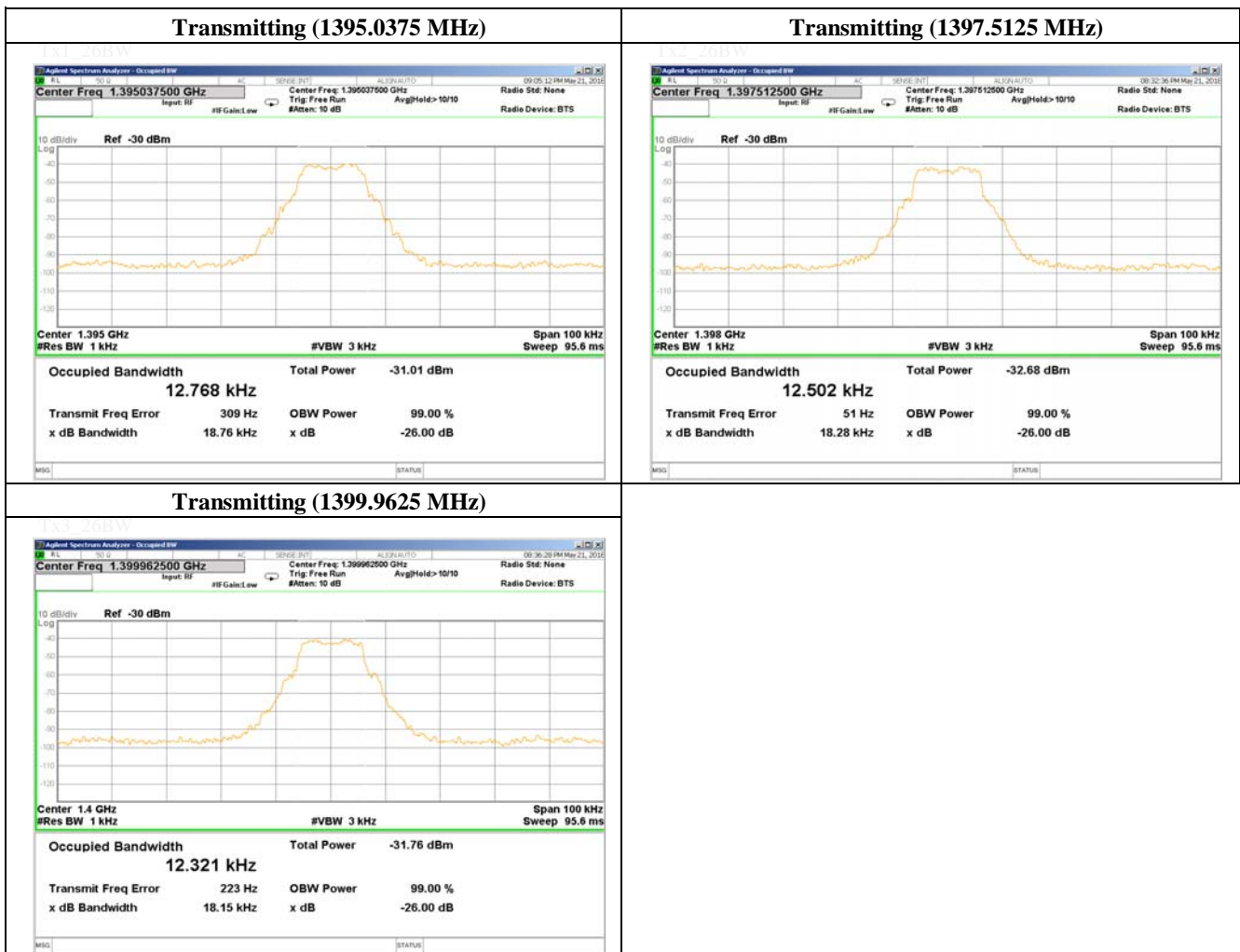
Limit : 1431.4625 MHz +/-0.00025 % (+/-2.5 ppm) = +/- 0.003579 MHz

-26 dB Bandwidth

Test place	UL Japan, Inc. Shonan EMC Lab.	No.5 Shielded Room
Date	May 21, 2018	
Temperature / Humidity	26 deg.C / 35 %RH	
Engineer	Yosuke Ishikawa	
Mode	Transmitting	

Freq. [MHz]	-26 dB Bandwidth [kHz]
1395.0375	18.76
1397.5125	18.28
1399.9625	18.15

No limit applies to -26 dB Bandwidth.



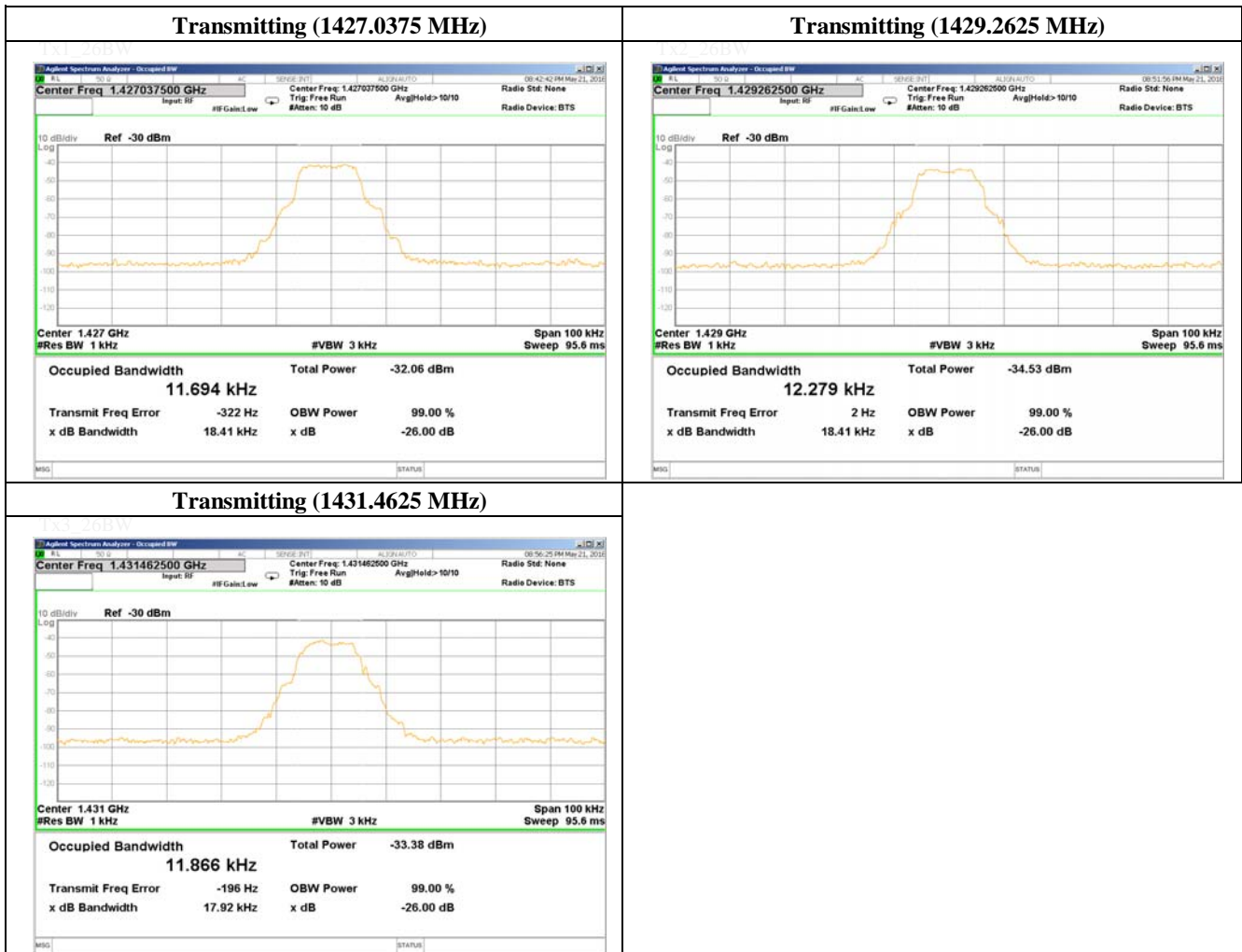
UL Japan, Inc.
Shonan EMC Lab.
 1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa 259-1220 JAPAN
 Telephone : +81 463 50 6400
 Facsimile : +81 463 50 6401

-26 dB Bandwidth

Test place	UL Japan, Inc. Shonan EMC Lab.	No.5 Shielded Room
Date	May 21, 2018	
Temperature / Humidity	26 deg.C / 35 %RH	
Engineer	Yosuke Ishikawa	
Mode	Transmitting	

Freq. [MHz]	-26 dB Bandwidth [kHz]
1427.0375	18.41
1429.2625	18.41
1431.4625	17.92

No limit applies to -26 dB Bandwidth.

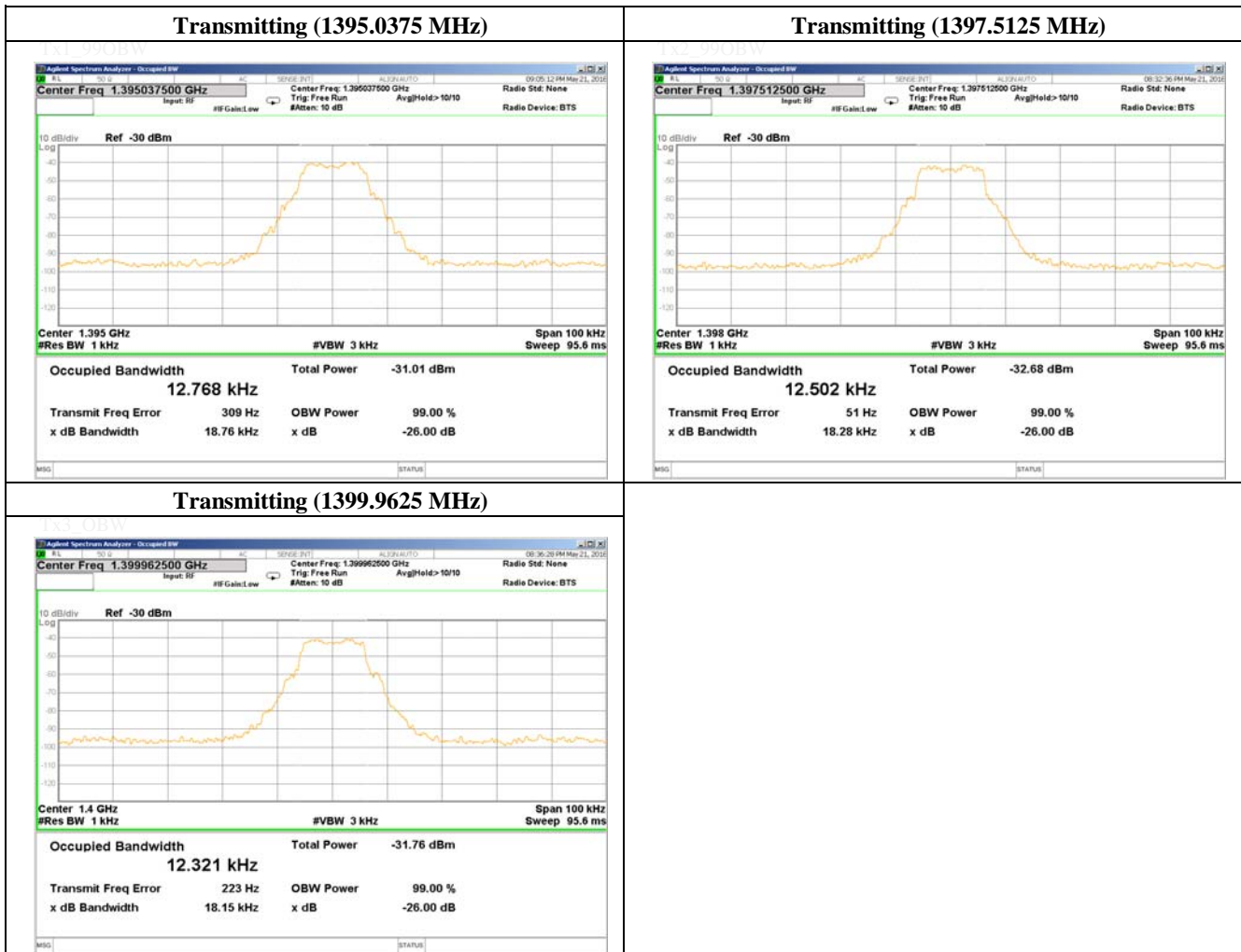


UL Japan, Inc.
Shonan EMC Lab.
 1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa 259-1220 JAPAN
 Telephone : +81 463 50 6400
 Facsimile : +81 463 50 6401

99 % Occupied Bandwidth

Test place	UL Japan, Inc. Shonan EMC Lab.	No.5 Shielded Room
Date	May 21, 2018	
Temperature / Humidity	26 deg.C / 35 %RH	
Engineer	Yosuke Ishikawa	
Mode	Transmitting	

Freq. [MHz]	99 % Occupied Bandwidth [kHz]
1395.0375	12.768
1397.5125	12.502
1399.9625	12.321

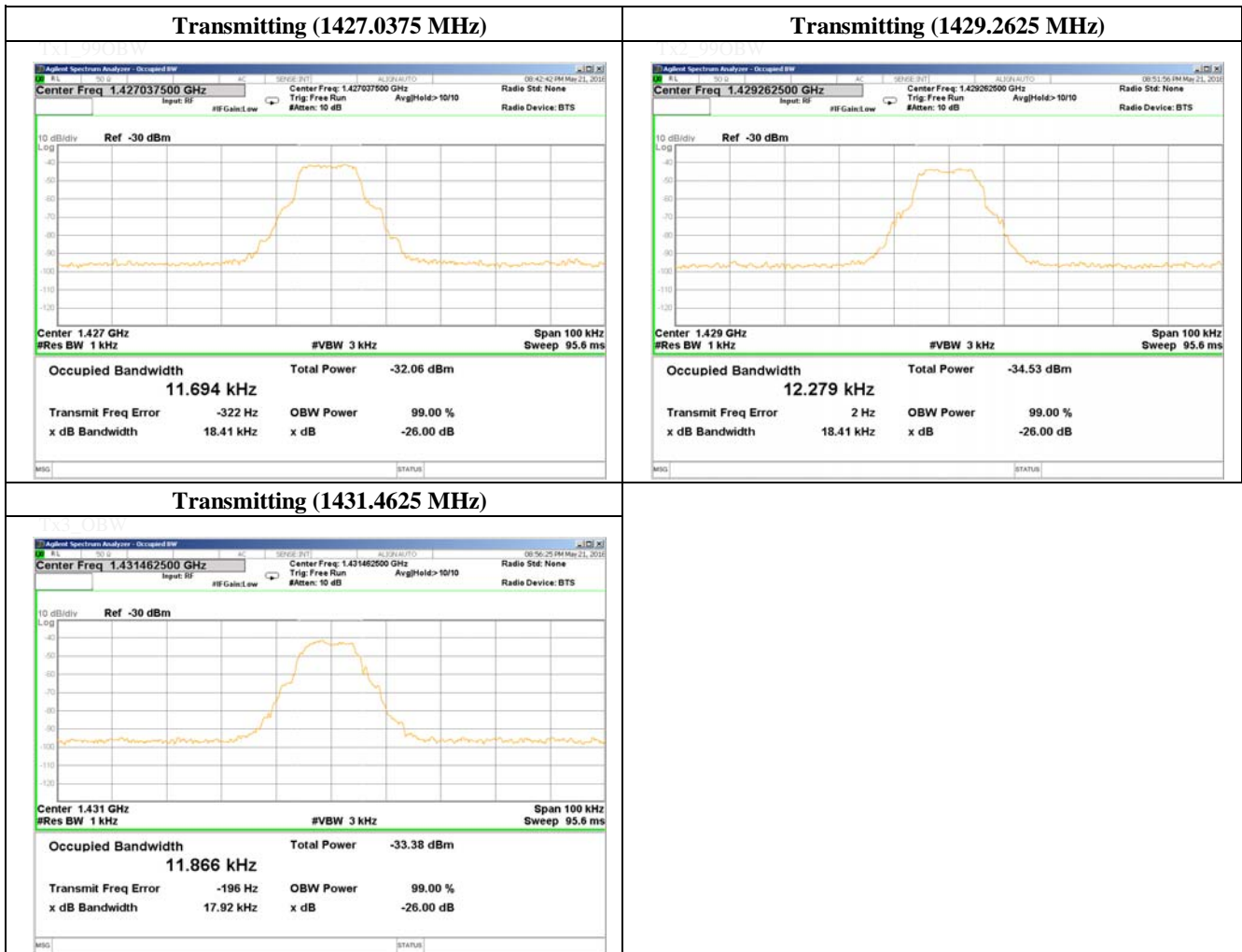


UL Japan, Inc.
Shonan EMC Lab.
 1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa 259-1220 JAPAN
 Telephone : +81 463 50 6400
 Facsimile : +81 463 50 6401

99 % Occupied Bandwidth

Test place	UL Japan, Inc. Shonan EMC Lab.	No.5 Shielded Room
Date	May 21, 2018	
Temperature / Humidity	26 deg.C / 35 %RH	
Engineer	Yosuke Ishikawa	
Mode	Transmitting	

Freq. [MHz]	99 % Occupied Bandwidth [kHz]
1427.0375	11.694
1429.2625	12.279
1431.4625	11.866



UL Japan, Inc.
Shonan EMC Lab.
 1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa 259-1220 JAPAN
 Telephone : +81 463 50 6400
 Facsimile : +81 463 50 6401

Field Strength(Electric Field Strength of Fundamental Emission, Spurious Emission and Band Edge Compliance)

Test place UL Japan, Inc. Shonan EMC Lab. No.3 Semi Anechoic Chamber
 Date May 17, 2018 May 16, 2018
 Temperature / Humidity 23 deg.C / 37 %RH 24 deg.C / 47 %RH
 Engineer Shiro Kobayashi Kazuya Noda
 (9 kHz to 1000 MHz) (1 GHz to 15 GHz)
 Mode Tx, 1395.0375 MHz

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg.]	Remark
Hori.	0.564	QP	37.6	19.5	6.1	32.2	31.0	46.0	15.1	100	270	
Hori.	3.574	QP	33.9	19.4	6.3	32.2	27.4	46.0	18.6	100	191	
Hori.	130.000	QP	22.0	13.7	7.7	32.1	11.2	46.0	34.8	300	0	
Hori.	689.000	QP	22.5	19.4	10.6	31.9	20.6	46.0	25.4	135	307	
Hori.	715.000	QP	22.9	19.7	10.7	31.9	21.3	46.0	24.7	127	304	
Hori.	1395.000	AV	-	-	-	-	-	53.9	-	-	-	Refer to Marker Delta Method
Hori.	1395.0375	AV	98.0	24.9	12.7	43.8	91.7	117.3	25.6	93	93	Carrier, VBW 10 Hz
Hori.	2790.075	AV	46.7	28.3	13.9	44.1	44.7	53.9	9.2	102	92	VBW 10 Hz
Hori.	4185.112	AV	53.5	30.1	5.6	44.2	45.0	53.9	8.9	105	127	VBW 10 Hz
Hori.	5580.150	AV	49.2	32.3	6.4	44.9	43.0	53.9	10.9	104	15	VBW 10 Hz
Hori.	6975.188	AV	47.9	36.1	7.2	44.0	47.2	53.9	6.7	103	15	VBW 10 Hz
Hori.	8370.225	AV	41.4	37.9	8.1	44.3	43.1	53.9	10.8	127	84	VBW 10 Hz
Hori.	9765.263	AV	46.4	38.8	8.3	43.9	49.6	53.9	4.3	136	167	VBW 10 Hz
Hori.	11160.300	AV	36.8	40.1	9.5	43.6	42.8	53.9	11.1	100	0	VBW 10 Hz
Hori.	12555.338	AV	36.8	39.3	10.3	43.3	43.0	53.9	10.9	100	0	VBW 10 Hz
Hori.	13950.375	AV	35.7	41.0	9.8	43.3	43.2	53.9	10.8	119	20	VBW 10 Hz
Vert.	0.557	QP	42.3	19.5	6.1	32.2	35.6	46.0	10.4	100	250	Loop: 0 deg.
Vert.	130.000	QP	22.0	13.7	7.7	32.1	11.2	46.0	34.8	100	0	
Vert.	689.000	QP	21.2	19.4	10.6	31.9	19.3	46.0	26.7	134	2	
Vert.	715.000	QP	21.5	19.7	10.7	31.9	19.9	46.0	26.1	140	5	
Vert.	1395.000	AV	-	-	-	-	-	53.9	-	-	-	Refer to Marker Delta Method
Vert.	1395.0375	AV	97.2	24.9	12.7	43.8	91.0	117.3	26.3	127	96	Carrier, VBW 10 Hz
Vert.	2790.075	AV	46.5	28.3	13.9	44.1	44.6	53.9	9.3	132	106	VBW 10 Hz
Vert.	4185.112	AV	56.7	30.1	5.6	44.2	48.2	53.9	5.7	143	85	VBW 10 Hz
Vert.	5580.150	AV	55.3	32.3	6.4	44.9	49.1	53.9	4.8	125	59	VBW 10 Hz
Vert.	6975.188	AV	49.0	36.1	7.2	44.0	48.3	53.9	5.6	137	309	VBW 10 Hz
Vert.	8370.225	AV	41.5	37.9	8.1	44.3	43.2	53.9	10.8	134	295	VBW 10 Hz
Vert.	9765.263	AV	46.6	38.8	8.3	43.9	49.8	53.9	4.1	121	324	VBW 10 Hz
Vert.	11160.300	AV	37.2	40.1	9.5	43.6	43.2	53.9	10.8	100	0	VBW 10 Hz
Vert.	12555.338	AV	36.8	39.3	10.3	43.3	43.1	53.9	10.8	100	0	VBW 10 Hz
Vert.	13950.375	AV	34.9	41.0	9.8	43.3	42.4	53.9	11.5	100	154	VBW 10 Hz

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter) - Gain(Amplifier)

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

*The 10th harmonic was not seen so the result was its base noise level.

(for RF Exposure sheet)

[RF output power]

	Result1 [dBuV/m]	Result1 [mW]	Result2 [mW]
carrier	91.7	6.716	0.444
Level			

Calculation:

Result1 [mW] = (((10^{(Result [dBuV/m]) / 20}) x 10⁽⁻⁶⁾) x (distance=) 3 [m]) ^2) / (30 x (gain=) 10^(-11.8 dBi / 10)) x 10³

* antenna gain value is average value. (refer to Antenna Specifications.)
 (for frequency range 1395-1400 MHz)

Result2 [mW] = (((10^{(Result [dBuV/m]) / 20}) x 10⁽⁻⁶⁾) x (distance=) 3 [m]) ^2) / (30 x 1) x 10³

(* Result1: Antenna power value, Result2: EIRP value)

Marker Delta Method(Test distance 3 m)

	Polarity	AV				
		Hor.		Ver.		
		[dBuV]	[dBuV/m]	[dBuV]	[dBuV/m]	
Step1	Fundamental(1395.0375 MHz)	98.0	91.7	97.2	91.0	
Step2	Fundamental(1395.0375 MHz)	1 kHz/3 kHz	96.0	89.8	95.4	89.2
	Band-edge(1395 MHz)	1 kHz/3 kHz	36.2	30.0	35.4	29.2
Step3	Amplitude delta	-	59.8	59.8	60.0	60.0
	Field strength of band-edge	-	-	31.9	-	31.1
	Limit	-	-	53.9	-	53.9
	Margin	-	-	22.0	-	22.9

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter) - Gain(Amplifier)

*1 Amplitude delta = Fundamental(RBW:1 kHz,VBW:3 kHz) - Band-edge(RBW:1 kHz,VBW:3 kHz)

*2 Field strength of band-edge = Fundamental(AV) - Amplitude delta

*As we started at section 7.5, we used RBW = 1 kHz (greater than 1 % bandwidth) to prevent to detect in-band emission. Refer to KDB 971168 D01 (971168 D01 Power Meas License Digital Systems D03r01).

UL Japan, Inc.

Shonan EMC Lab.

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

Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

Field Strength(Electric Field Strength of Fundamental Emission , Spurious Emission)

Test place UL Japan, Inc. Shonan EMC Lab. No.3 Semi Anechoic Chamber
Date May 17, 2018 May 17, 2018
Temperature / Humidity 23 deg.C / 37 %RH 23 deg.C / 56 %RH
Engineer Shiro Kobayashi Kenichi Adachi
(9 kHz to 1000 MHz) (1 GHz to 15 GHz)
Mode Tx, 1397.5125 MHz

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg.]	Remark
Hori.	0.564	QP	37.8	19.5	6.1	32.2	31.1	46.0	14.9	100	282	
Hori.	3.574	QP	34.1	19.4	6.3	32.2	27.5	46.0	18.5	100	152	
Hori.	130.000	QP	22.0	13.7	7.7	32.1	11.3	46.0	34.8	300	0	
Hori.	689.000	QP	23.2	19.4	10.6	31.9	21.3	46.0	24.7	135	285	
Hori.	715.000	QP	22.9	19.7	10.7	31.9	21.3	46.0	24.7	127	294	
Hori.	1397.5125	AV	95.9	24.9	12.7	43.8	89.7	117.3	27.6	102	86	Carrier, VBW 10 Hz
Hori.	2795.025	AV	42.1	28.3	13.9	44.1	40.2	53.9	13.7	110	92	VBW 10 Hz
Hori.	4192.538	AV	52.5	30.1	5.6	44.2	44.0	53.9	9.9	170	90	VBW 10 Hz
Hori.	5590.050	AV	47.8	32.3	6.4	44.9	41.6	53.9	12.3	158	311	VBW 10 Hz
Hori.	6987.563	AV	42.4	36.2	7.2	43.9	41.8	53.9	12.1	156	189	VBW 10 Hz
Hori.	8385.075	AV	38.1	37.9	8.1	44.3	39.8	53.9	14.2	159	186	VBW 10 Hz
Hori.	9782.588	AV	41.8	38.8	8.3	43.9	45.0	53.9	8.9	143	173	VBW 10 Hz
Hori.	11180.100	AV	36.2	40.1	9.5	43.6	42.3	53.9	11.7	100	0	VBW 10 Hz
Hori.	12577.613	AV	36.1	39.3	10.3	43.3	42.3	53.9	11.6	100	0	VBW 10 Hz
Hori.	13975.125	AV	35.9	41.0	9.8	43.4	43.4	53.9	10.5	100	0	VBW 10 Hz
Vert.	0.560	QP	42.3	13.7	7.7	32.1	31.5	46.0	14.5	100	250	Loop: 0 deg.
Vert.	130.000	QP	22.0	19.4	10.6	31.9	20.1	46.0	25.9	100	0	
Vert.	689.000	QP	21.5	19.7	10.7	31.9	19.9	46.0	26.1	138	0	
Vert.	715.000	QP	21.6	18.6	9.6	31.9	17.9	46.0	28.2	135	1	
Vert.	1397.5125	AV	96.4	24.9	12.7	43.8	90.2	117.3	27.1	131	43	Carrier, VBW 10 Hz
Vert.	2795.025	AV	44.6	28.3	13.9	44.1	42.7	53.9	11.2	129	47	VBW 10 Hz
Vert.	4192.538	AV	53.1	30.1	5.6	44.2	44.5	53.9	9.4	125	99	VBW 10 Hz
Vert.	5590.050	AV	51.9	32.3	6.4	44.9	45.7	53.9	8.2	113	59	VBW 10 Hz
Vert.	6987.563	AV	42.5	36.2	7.2	43.9	41.9	53.9	12.0	146	68	VBW 10 Hz
Vert.	8385.075	AV	36.4	37.9	8.1	44.3	38.1	53.9	15.8	144	121	VBW 10 Hz
Vert.	9782.588	AV	46.7	38.8	8.3	43.9	50.0	53.9	3.9	112	212	VBW 10 Hz
Vert.	11180.100	AV	36.2	40.1	9.5	43.6	42.2	53.9	11.7	100	0	VBW 10 Hz
Vert.	12577.613	AV	36.0	39.3	10.3	43.3	42.3	53.9	11.6	100	0	VBW 10 Hz
Vert.	13975.125	AV	35.8	41.0	9.8	43.4	43.3	53.9	10.6	100	0	VBW 10 Hz

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter) - Gain(Amplifier)

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

*The 10th harmonic was not seen so the result was its base noise level.

(for RF Exposure sheet)

[RF output power]

	Result1 [dBuV/m]	Result1 [mW]	Result2 [mW]
carrier	90.2	4.755	0.314
Level			

Calculation:

$$\text{Result1 [mW]} = (((10^{\text{Result [dBuV/m]}} / 20) \times 10^{-6}) \times (\text{distance} \Rightarrow 3 \text{ [m]})^2) / (30 \times (\text{gain} \Rightarrow 10^{\text{(-11.8 dB)} / 10})) \times 10^3$$

* antenna gain value is average value. (refer to Antenna Specifications.)
(for frequency range 1395-1400 MHz)

$$\text{Result2 [mW]} = (((10^{\text{Result [dBuV/m]}} / 20) \times 10^{-6}) \times (\text{distance} \Rightarrow 3 \text{ [m]})^2) / (30 \times 1) \times 10^3$$

(* Result1: Antenna power value, Result2: EIRP value)

UL Japan, Inc.

Shonan EMC Lab.

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

Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

Field Strength(Electric Field Strength of Fundamental Emission, Spurious Emission and Band Edge Compliance)

Test place UL Japan, Inc. Shonan EMC Lab. No.3 Semi Anechoic Chamber
 Date May 17, 2018 May 17, 2018
 Temperature / Humidity 23 deg.C / 37 %RH 23 deg.C
 Engineer Shiro Kobayashi Kenichi Adachi
 (9 kHz to 1000 MHz) (1 GHz to 15 GHz)
 Mode Tx, 1399.9625 MHz

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg.]	Remark
Hori.	0.566	QP	37.8	19.5	6.1	32.2	31.1	46.0	14.9	100	274	
Hori.	3.577	QP	34.0	19.4	6.3	32.2	27.4	46.0	18.6	100	193	
Hori.	130.000	QP	22.0	13.7	7.7	32.1	11.2	46.0	34.8	300	0	
Hori.	689.000	QP	23.2	19.4	10.6	31.9	21.3	46.0	24.7	133	289	
Hori.	715.000	QP	22.9	19.7	10.7	31.9	21.4	46.0	24.6	127	276	
Hori.	1399.9625	AV	95.9	24.9	12.7	43.8	89.7	117.3	27.6	103	87	Carrier, VBW 10 Hz
Hori.	1400.000	AV	-	-	-	-	-	53.9	-	-	-	Refer to Marker Delta Method
Hori.	2799.925	AV	42.4	28.3	13.9	44.1	40.4	53.9	13.5	109	93	VBW 10 Hz
Hori.	4199.888	AV	52.5	30.1	5.6	44.2	44.0	53.9	9.9	174	91	VBW 10 Hz
Hori.	5599.850	AV	47.9	32.3	6.4	44.9	41.7	53.9	12.2	160	315	VBW 10 Hz
Hori.	6999.813	AV	42.4	36.2	7.2	43.9	41.8	53.9	12.1	158	191	VBW 10 Hz
Hori.	8399.775	AV	38.2	37.9	8.1	44.3	39.8	53.9	14.1	155	189	VBW 10 Hz
Hori.	9799.738	AV	42.2	38.8	8.3	43.9	45.5	53.9	8.4	144	171	VBW 10 Hz
Hori.	11199.700	AV	35.7	40.1	9.6	43.6	41.8	53.9	12.1	100	0	VBW 10 Hz
Hori.	12599.660	AV	35.7	39.3	10.3	43.2	42.0	53.9	11.9	100	0	VBW 10 Hz
Hori.	13999.625	AV	35.9	41.1	9.9	43.4	43.4	53.9	10.5	100	0	VBW 10 Hz
Vert.	0.560	QP	42.3	19.5	6.1	32.2	35.6	46.0	10.4	100	255	Loop: 0 deg.
Vert.	130.000	QP	22.0	13.7	7.7	32.1	11.3	46.0	34.7	100	0	
Vert.	689.000	QP	21.7	19.4	10.6	31.9	19.8	46.0	26.2	124	340	
Vert.	715.000	QP	21.7	19.7	10.7	31.9	20.1	46.0	25.9	137	335	
Vert.	1399.9625	AV	96.0	24.9	12.7	43.8	89.8	117.3	27.5	121	39	Carrier, VBW 10 Hz
Vert.	1400.000	AV	-	-	-	-	-	53.9	-	-	-	Refer to Marker Delta Method
Vert.	2799.925	AV	44.5	28.3	13.9	44.1	42.5	53.9	11.4	126	79	VBW 10 Hz
Vert.	4199.888	AV	53.0	30.1	5.6	44.2	44.5	53.9	9.4	126	100	VBW 10 Hz
Vert.	5599.850	AV	51.8	32.3	6.4	44.9	45.6	53.9	8.3	114	57	VBW 10 Hz
Vert.	6999.813	AV	42.5	36.2	7.2	43.9	42.0	53.9	11.9	147	66	VBW 10 Hz
Vert.	8399.775	AV	36.4	37.9	8.1	44.3	38.0	53.9	15.9	145	119	VBW 10 Hz
Vert.	9799.738	AV	44.2	38.8	8.3	43.9	47.5	53.9	6.4	118	137	VBW 10 Hz
Vert.	11199.700	AV	35.7	40.1	9.6	43.6	41.8	53.9	12.1	100	0	VBW 10 Hz
Vert.	12599.660	AV	35.7	39.3	10.3	43.2	42.0	53.9	11.9	100	0	VBW 10 Hz
Vert.	13999.625	AV	35.8	41.1	9.9	43.4	43.4	53.9	10.5	100	0	VBW 10 Hz

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter) - Gain(Amplifier)
 *Other frequency noises omitted in this report were not seen or have enough margin (more than 20 dB).
 *The 10th harmonic was not seen so the result was its base noise level.

(for RF Exposure sheet)

	Result1 [dBuV/m]	Result1 [mW]	Result2 [mW]
carrier	89.8	4.336	0.286
Level			

Calculation:
 Result1 [mW] = (((10^{Result [dBuV/m]} / 20) x 10⁽⁻⁶⁾) x (distance=) 3 [m]) ^2) / (30 x (gain=) 10^(-11.8 dB / 10)) x 10⁽³⁾
 * antenna gain value is average value. (refer to Antenna Specifications.)
 (for frequency range 1395-1400 MHz)
 Result2 [mW] = (((10^{Result [dBuV/m]} / 20) x 10⁽⁻⁶⁾) x (distance=) 3 [m]) ^2) / (30 x 1) x 10⁽³⁾
 (* Result1: Antenna power value, Result2: EIRP value)

Marker Delta Method(Test distance 3 m)

	Polarity	AV			
		Hor.		Ver.	
		[dBuV]	[dBuV/m]	[dBuV]	[dBuV/m]
Step1	Fundamental(1399.9625 MHz)	95.9	89.7	96.0	89.8
Step2	Fundamental(1399.9625 MHz)	94.5	97.7	95.8	99.1
	Band-edge(1400 MHz)	39.8	33.6	40.5	34.3
	Amplitude delta	-	54.7	55.3	64.8
Step3	Field strength of band-edge	-	-	25.6	25.1
	Limit	-	-	53.9	53.9
	Margin	-	-	28.3	28.9

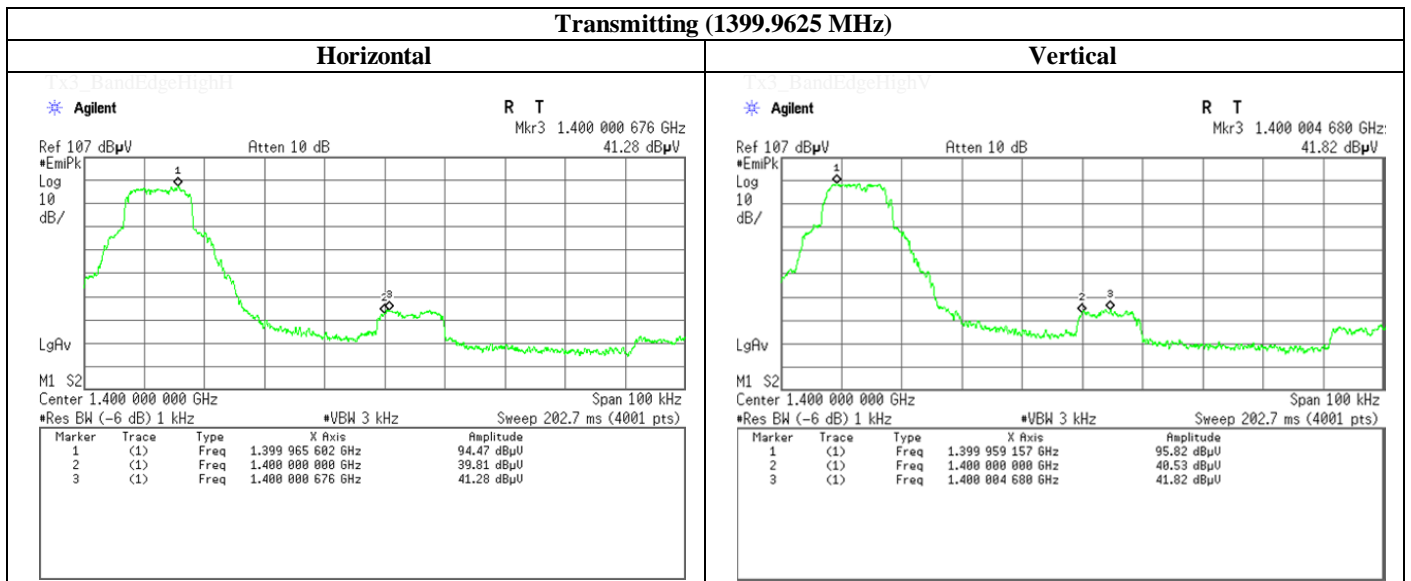
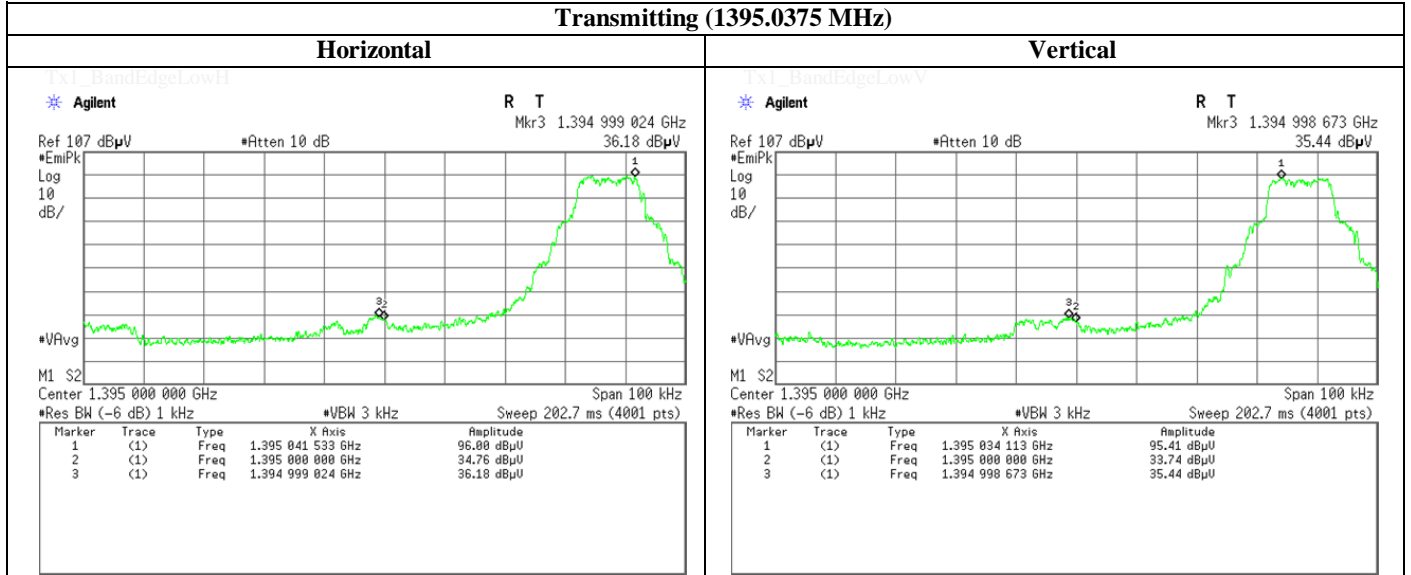
Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter) - Gain(Amplifier)
 *1 Amplitude delta = Fundamental(RBW:1 kHz,VBW:3 kHz) - Band-edge(RBW:1 kHz,VBW:3 kHz)
 *2 Field strength of band-edge = Fundamental(AV) - Amplitude delta
 *As we started at section 7.5, we used RBW = 1 kHz (greater than 1 % bandwidth) to prevent to detect in-band emission. Refer to KDB 971168 D01 (971168 D01 Power Meas License Digital Systems D03r01).

UL Japan, Inc.
Shonan EMC Lab.
 1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa 259-1220 JAPAN
 Telephone : +81 463 50 6400
 Facsimile : +81 463 50 6401

Test place UL Japan, Inc. Shonan EMC Lab. No.3 Semi Anechoic Chamber
 Date May 16, 2018 May 17, 2018
 Temperature / Humidity 24 deg.C , 47 %RH 23 deg.C / 56 %RH
 Engineer Kazuya Noda Kenichi Adachi

**Field Strength(Electric Field Strength of Fundamental Emission ,
 Spurious Emission and Band Edge Compliance)**

Band Edge compliance(for Marker Delta Method)



UL Japan, Inc.
Shonan EMC Lab.
 1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa 259-1220 JAPAN
 Telephone : +81 463 50 6400
 Facsimile : +81 463 50 6401

Field Strength(Electric Field Strength of Fundamental Emission, Spurious Emission and Band Edge Compliance)

Test place UL Japan, Inc. Shonan EMC Lab. No.3 Semi Anechoic Chamber
 Date May 17, 2018 May 17, 2018
 Temperature / Humidity 23 deg.C / 37 %RH 23 deg.C
 Engineer Shiro Kobayashi Kenichi Adachi
 (9 kHz to 1000 MHz) (1 GHz to 15 GHz)
 Mode Tx, 1427.0375 MHz

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg.]	Remark
Hori.	0.567	QP	37.7	19.5	6.1	32.2	31.1	46.0	14.9	100	282	
Hori.	3.585	QP	34.1	19.4	6.3	32.2	27.5	46.0	18.5	100	138	
Hori.	130.000	QP	22.0	13.7	7.7	32.1	11.2	46.0	34.8	300	0	
Hori.	689.000	QP	22.8	19.4	10.6	31.9	20.9	46.0	25.1	130	287	
Hori.	715.000	QP	22.8	19.7	10.7	31.9	21.3	46.0	24.7	123	277	
Hori.	1427.000	AV	-	-	-	-	-	53.9	-	-	-	Refer to Marker Delta Method
Hori.	1427.0375	AV	92.7	24.9	12.7	43.8	86.5	117.3	30.8	104	92	Carrier, VBW 10 Hz
Hori.	2854.075	AV	48.3	28.4	5.9	44.1	38.5	53.9	15.4	193	78	VBW 10 Hz
Hori.	4281.113	AV	50.2	30.2	5.6	44.3	41.8	53.9	12.1	152	68	VBW 10 Hz
Hori.	5708.150	AV	43.5	32.5	6.4	44.9	37.6	53.9	16.3	146	270	VBW 10 Hz
Hori.	7135.188	AV	36.4	36.4	7.3	44.0	36.2	53.9	17.7	144	171	VBW 10 Hz
Hori.	8562.225	AV	36.2	37.9	8.2	44.3	38.0	53.9	15.9	100	0	VBW 10 Hz
Hori.	9989.263	AV	35.3	39.1	8.3	43.9	38.8	53.9	15.1	100	0	VBW 10 Hz
Hori.	11416.300	AV	36.0	40.1	9.8	43.4	42.6	53.9	11.3	100	0	VBW 10 Hz
Hori.	12843.340	AV	35.1	39.2	10.0	42.9	41.6	53.9	12.4	100	0	VBW 10 Hz
Hori.	14270.375	AV	35.8	41.5	9.5	43.1	43.6	53.9	10.3	100	0	VBW 10 Hz
Vert.	0.560	QP	42.3	19.5	6.1	32.2	35.6	46.0	10.4	100	254	Loop: 0 deg.
Vert.	130.000	QP	22.0	13.7	7.7	32.1	11.2	46.0	34.8	100	0	
Vert.	689.000	QP	21.1	19.4	10.6	31.9	19.2	46.0	26.8	129	322	
Vert.	715.000	QP	21.4	19.7	10.7	31.9	19.8	46.0	26.2	134	338	
Vert.	1427.000	AV	-	-	-	-	-	53.9	-	-	-	Refer to Marker Delta Method
Vert.	1427.0375	AV	93.3	24.9	12.7	43.8	87.1	117.3	30.2	129	38	Carrier, VBW 10 Hz
Vert.	2854.075	AV	46.7	28.4	5.9	44.1	36.9	53.9	17.0	121	196	VBW 10 Hz
Vert.	4281.113	AV	49.3	30.2	5.6	44.3	40.9	53.9	13.0	141	63	VBW 10 Hz
Vert.	5708.150	AV	46.6	32.5	6.4	44.9	40.6	53.9	13.3	124	55	VBW 10 Hz
Vert.	7135.188	AV	35.4	36.4	7.3	44.0	35.2	53.9	18.7	143	349	VBW 10 Hz
Vert.	8562.225	AV	36.4	37.9	8.2	44.3	38.1	53.9	15.8	100	0	VBW 10 Hz
Vert.	9989.263	AV	35.4	39.1	8.3	43.9	39.0	53.9	14.9	100	0	VBW 10 Hz
Vert.	11416.300	AV	35.4	40.1	9.8	43.4	42.0	53.9	11.9	100	0	VBW 10 Hz
Vert.	12843.340	AV	34.9	39.2	10.0	42.9	41.3	53.9	12.6	100	0	VBW 10 Hz
Vert.	14270.375	AV	35.8	41.5	9.5	43.1	43.6	53.9	10.3	100	0	VBW 10 Hz

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter) - Gain(Amplifier)

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

*The 10th harmonic was not seen so the result was its base noise level.

(for RF Exposure sheet)

[RF output power]

	Result [dBuV/m]	Result1 [mW]	Result2 [mW]
carrier	87.1	3.777	0.154
Level			

Calculation:

Result1 [mW] = (((10^(Result [dBuV/m] / 20)) x 10^(-6)) x (distance=) 3 [m]) ^2) / (30 x (gain=) 10^(-13.9 dBi / 10)) x 10^3

* antenna gain value is average value. (refer to Antenna Specifications.)
 (for frequency range 1427-1432 MHz)

Result2 [mW] = (((10^(Result [dBuV/m] / 20)) x 10^(-6)) x (distance=) 3 [m]) ^2) / (30 x 1) x 10^3

(* Result1: Antenna power value, Result2: EIRP value)

Marker Delta Method(Test distance 3 m)

	Polarity	AV			
		Hor.		Ver.	
		[dBuV]	[dBuV/m]	[dBuV]	[dBuV/m]
Step1	Fundamental(1427.0375 MHz)	92.7	86.5	93.3	87.1
Step2	Fundamental(1427.0375 MHz)	91.9	85.7	93.5	87.3
	Band-edge(1427 MHz)	30.2	24.0	34.3	28.1
Step3	Amplitude delta	61.7	61.7	59.2	59.2
	Field strength of band-edge	-	24.8	-	27.9
	Limit	-	-	53.9	53.9
	Margin	-	29.1	-	26.0

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter) - Gain(Amplifier)

*1 Amplitude delta = Fundamental(RBW:1 kHz,VBW:3 kHz) - Band-edge(RBW:1 kHz,VBW:3 kHz)

*2 Field strength of band-edge = Fundamental(AV) - Amplitude delta

*As we started at section 7.5, we used RBW = 1 kHz (greater than 1 % bandwidth) to prevent to detect in-band emission. Refer to KDB 971168 D01

(971168 D01 Power Meas License Digital Systems D03r01).

UL Japan, Inc.

Shonan EMC Lab.

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

Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

Field Strength(Electric Field Strength of Fundamental Emission, Spurious Emission)

Test place UL Japan, Inc. Shonan EMC Lab. No.3 Semi Anechoic Chamber
 Date May 17, 2018 May 16, 2018
 Temperature / Humidity 23 deg.C / 37 %RH 24 deg.C
 Engineer Shiro Kobayashi Kazuya Noda
 (9 kHz to 1000 MHz) (1 GHz to 15 GHz)
 Mode Tx, 1429.2625 MHz

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg.]	Remark
Hori.	0.567	QP	37.7	19.5	6.1	32.2	31.0	46.0	15.0	100	273	
Hori.	3.565	QP	34.1	19.4	6.3	32.2	27.6	46.0	18.4	100	143	
Hori.	130.000	QP	22.0	13.7	7.7	32.1	11.2	46.0	34.8	300	0	
Hori.	689.000	QP	22.7	19.4	10.6	31.9	20.8	46.0	25.2	126	274	
Hori.	715.000	QP	22.7	19.7	10.7	31.9	21.1	46.0	24.9	136	289	
Hori.	1429.2625	AV	94.9	24.9	12.7	43.8	88.7	117.3	28.6	100	133	Carrier, VBW 10 Hz
Hori.	2858.525	AV	52.0	28.4	5.9	44.1	42.2	53.9	11.7	113	62	VBW 10 Hz
Hori.	4287.788	AV	51.5	30.2	5.7	44.3	43.1	53.9	10.8	150	78	VBW 10 Hz
Hori.	5717.050	AV	44.8	32.5	6.4	44.9	38.8	53.9	15.1	157	270	VBW 10 Hz
Hori.	7146.313	AV	37.2	36.5	7.3	44.0	37.0	53.9	17.0	120	43	VBW 10 Hz
Hori.	8575.575	AV	37.6	37.9	8.2	44.3	39.4	53.9	14.5	100	0	VBW 10 Hz
Hori.	10004.838	AV	35.9	39.1	8.3	43.9	39.4	53.9	14.5	100	0	VBW 10 Hz
Hori.	11434.100	AV	36.1	40.1	9.9	43.3	42.7	53.9	11.2	100	0	VBW 10 Hz
Hori.	12863.362	AV	37.2	39.2	10.0	42.8	43.7	53.9	10.3	100	0	VBW 10 Hz
Hori.	14292.625	AV	37.0	41.5	9.5	43.1	44.9	53.9	9.0	100	0	VBW 10 Hz
Vert.	0.560	QP	42.2	19.5	6.1	32.2	35.5	46.0	10.5	100	255	Loop: 0 deg.
Vert.	130.000	QP	22.0	13.7	7.7	32.1	11.2	46.0	34.8	100	0	
Vert.	689.000	QP	21.2	19.4	10.6	31.9	19.3	46.0	26.7	133	301	
Vert.	715.000	QP	21.3	19.7	10.7	31.9	19.7	46.0	26.3	135	353	
Vert.	1429.2625	AV	92.3	24.9	12.7	43.8	86.2	117.3	31.1	135	130	Carrier, VBW 10 Hz
Vert.	2858.525	AV	50.5	28.4	5.9	44.1	40.7	53.9	13.2	104	320	VBW 10 Hz
Vert.	4287.788	AV	50.9	30.2	5.7	44.3	42.5	53.9	11.4	109	71	VBW 10 Hz
Vert.	5717.050	AV	48.2	32.5	6.4	44.9	42.3	53.9	11.6	122	42	VBW 10 Hz
Vert.	7146.313	AV	37.4	36.5	7.3	44.0	37.2	53.9	16.7	153	338	VBW 10 Hz
Vert.	8575.575	AV	38.0	37.9	8.2	44.3	39.8	53.9	14.1	100	0	VBW 10 Hz
Vert.	10004.838	AV	35.7	39.1	8.3	43.9	39.3	53.9	14.6	100	0	VBW 10 Hz
Vert.	11434.100	AV	35.2	40.1	9.9	43.3	41.8	53.9	12.1	100	0	VBW 10 Hz
Vert.	12863.362	AV	36.7	39.2	10.0	42.8	43.1	53.9	10.8	100	0	VBW 10 Hz
Vert.	14292.625	AV	37.0	41.5	9.5	43.1	44.9	53.9	9.0	100	0	VBW 10 Hz

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter) - Gain(Amplifier)

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

*The 10th harmonic was not seen so the result was its base noise level.

(for RF Exposure sheet)

[RF output power]

	Result [dBuV/m]	Result1 [mW]	Result2 [mW]
carrier	88.7	5.459	0.222
Level			

Calculation:

$$\text{Result1 [mW]} = (((10^{\text{Result [dBuV/m]}} / 20) \times 10^{(-6)}) \times (\text{distance} \Rightarrow 3 \text{ [m]})^2) / (30 \times (\text{gain} \Rightarrow 10^{(-13.9 \text{ dBi} / 10)}) \times 10^3)$$

* antenna gain value is average value. (refer to Antenna Specifications.)
 (for frequency range 1427-1432 MHz)

$$\text{Result2 [mW]} = (((10^{\text{Result [dBuV/m]}} / 20) \times 10^{(-6)}) \times (\text{distance} \Rightarrow 3 \text{ [m]})^2) / (30 \times 1) \times 10^3$$

(* Result1: Antenna power value, Result2: EIRP value)

UL Japan, Inc.

Shonan EMC Lab.

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

Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

Field Strength(Electric Field Strength of Fundamental Emission, Spurious Emission and Band Edge Compliance)

Test place UL Japan, Inc. Shonan EMC Lab. No.3 Semi Anechoic Chamber
 Date May 17, 2018 May 16, 2018
 Temperature / Humidity 23 deg.C / 37 %RH 24 deg.C
 Engineer Shiro Kobayashi Kazuya Noda
 (9 kHz to 1000 MHz) (1 GHz to 15 GHz)
 Mode Tx, 1431.4625 MHz

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg.]	Remark
Hori.	0.568	QP	37.7	19.5	6.1	32.2	31.1	46.0	14.9	100	288	
Hori.	3.590	QP	34.0	19.4	6.3	32.2	27.4	46.0	18.6	100	180	
Hori.	130.000	QP	22.0	13.7	7.7	32.1	11.2	46.0	34.8	300	0	
Hori.	689.000	QP	22.4	19.4	10.6	31.9	20.5	46.0	25.5	128	275	
Hori.	715.000	QP	22.8	19.7	10.7	31.9	21.2	46.0	24.8	100	287	
Hori.	1431.4625	AV	95.8	24.9	12.7	43.8	89.7	117.3	27.7	100	95	Carrier, VBW 10 Hz
Hori.	1432.000	AV	-	-	-	-	-	53.9	-	-	-	Refer to Marker Delta Method
Hori.	2862.925	AV	51.4	28.4	5.9	44.1	41.6	53.9	12.3	112	56	VBW 10 Hz
Hori.	4294.388	AV	51.9	30.2	5.7	44.3	43.5	53.9	10.4	151	73	VBW 10 Hz
Hori.	5725.850	AV	44.8	32.5	6.4	44.9	38.8	53.9	15.1	161	285	VBW 10 Hz
Hori.	7157.313	AV	37.7	36.5	7.3	44.0	37.6	53.9	16.4	150	36	VBW 10 Hz
Hori.	8588.775	AV	37.6	37.9	8.2	44.3	39.4	53.9	14.5	100	0	VBW 10 Hz
Hori.	10020.237	AV	36.2	39.1	8.4	43.9	39.8	53.9	14.1	100	0	VBW 10 Hz
Hori.	11451.700	AV	36.0	40.1	9.9	43.3	42.7	53.9	11.2	100	0	VBW 10 Hz
Hori.	12883.162	AV	37.1	39.2	10.0	42.8	43.5	53.9	10.4	100	0	VBW 10 Hz
Hori.	14314.625	AV	37.1	41.5	9.5	43.1	45.0	53.9	8.9	100	0	VBW 10 Hz
Vert.	0.561	QP	42.2	19.5	6.1	32.2	35.5	46.0	10.5	100	252	Loop: 0 deg.
Vert.	130.000	QP	22.0	13.7	7.7	32.1	11.2	46.0	34.8	100	0	
Vert.	689.000	QP	21.1	19.4	10.6	31.9	19.2	46.0	26.8	137	315	
Vert.	715.000	QP	21.3	19.7	10.7	31.9	19.8	46.0	26.2	123	52	
Vert.	1431.4625	AV	93.3	24.9	12.7	43.8	87.1	117.3	30.2	122	96	Carrier, VBW 10 Hz
Vert.	1432.000	AV	-	-	-	-	-	53.9	-	-	-	Refer to Marker Delta Method
Vert.	2862.925	AV	50.7	28.4	5.9	44.1	40.9	53.9	13.0	106	326	VBW 10 Hz
Vert.	4294.388	AV	51.2	30.2	5.7	44.3	42.8	53.9	11.1	138	65	VBW 10 Hz
Vert.	5725.850	AV	48.3	32.5	6.4	44.9	42.4	53.9	11.5	123	44	VBW 10 Hz
Vert.	7157.313	AV	37.4	36.5	7.3	44.0	37.2	53.9	16.7	134	75	VBW 10 Hz
Vert.	8588.775	AV	37.9	37.9	8.2	44.3	39.7	53.9	14.2	100	0	VBW 10 Hz
Vert.	10020.237	AV	36.0	39.1	8.4	43.9	39.6	53.9	14.3	100	0	VBW 10 Hz
Vert.	11451.700	AV	35.2	40.1	9.9	43.3	41.9	53.9	12.1	100	0	VBW 10 Hz
Vert.	12883.162	AV	36.5	39.2	10.0	42.8	42.9	53.9	11.0	100	0	VBW 10 Hz
Vert.	14314.625	AV	37.1	41.5	9.5	43.1	45.0	53.9	8.9	100	0	VBW 10 Hz

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter) - Gain(Amplifier)

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

*The 10th harmonic was not seen so the result was its base noise level.

(for RF Exposure sheet)

[RF output power]

	Result [dBuV/m]	Result1 [mW]	Result2 [mW]
carrier	89.7	6.873	0.280
Level			

Calculation:

Result1 [mW] = (((10^(Result [dBuV/m]) / 20) x 10^(-6)) x (distance=> 3 [m]) ^ 2) / (30 x (gain=> 10^(-13.9 dB / 10)) x 10^3

* antenna gain value is average value. (refer to Antenna Specifications.) (for frequency range 1427-1432 MHz)

Result2 [mW] = (((10^(Result [dBuV/m]) / 20) x 10^(-6)) x (distance=> 3 [m]) ^ 2) / (30 x 1) x 10^3

(* Result1: Antenna power value, Result2: EIRP value)

Marker Delta Method(Test distance 3 m)

	Polarity	AV			
		Hor.		Ver.	
		[dBuV]	[dBuV/m]	[dBuV]	[dBuV/m]
Step1	Fundamental(1431.4625 MHz)	95.8	89.7	93.3	87.1
Step2	Fundamental(1431.4625 MHz)	93.0	96.6	91.5	95.1
	Band-edge(1432 MHz)	19.2	13.1	16.2	10.0
	Amplitude delta	73.8	83.6	75.4	85.1
Step3	Field strength of band-edge	-	-	6.1	2.0
	Limit	-	-	53.9	53.9
	Margin	-	-	47.8	51.9

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter) - Gain(Amplifier)

*1 Amplitude delta = Fundamental(RBW:1 kHz,VBW:3 kHz) - Band-edge(RBW:1 kHz,VBW:3 kHz)

*2 Field strength of band-edge = Fundamental(AV) - Amplitude delta

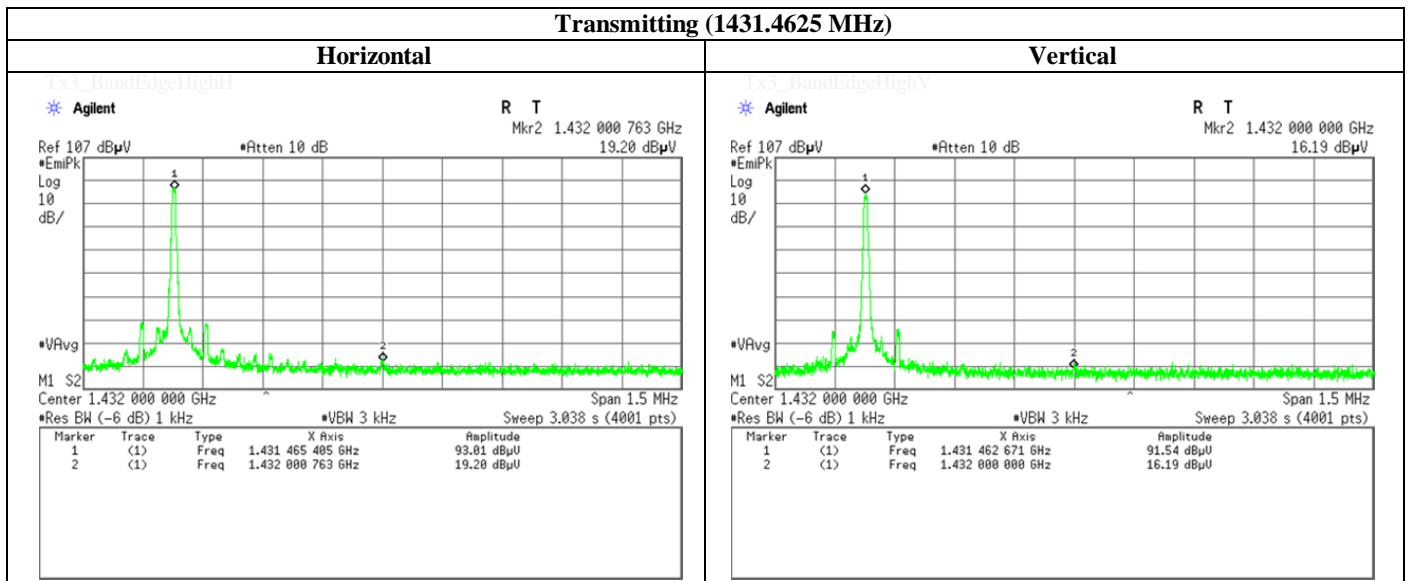
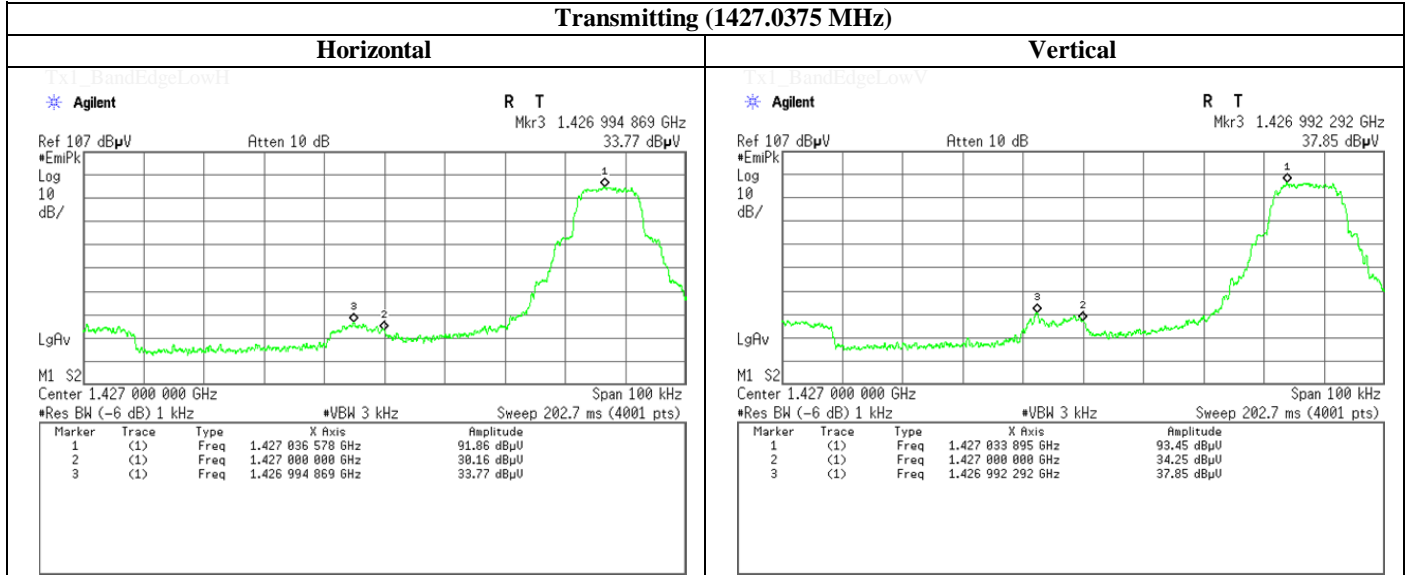
*As we started at section 7.5, we used RBW = 1 kHz (greater than 1 % bandwidth) to prevent to detect in-band emission. Refer to KDB 971168 D01 (971168 D01 Power Meas License Digital Systems D03r01).

UL Japan, Inc.
Shonan EMC Lab.
 1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa 259-1220 JAPAN
 Telephone : +81 463 50 6400
 Facsimile : +81 463 50 6401

Test place UL Japan, Inc. Shonan EMC Lab. No.3 Semi Anechoic Chamber
 Date May 17, 2018 May 16, 2018
 Temperature / Humidity 23 deg.C / 56 %RH 24 deg.C , 47 %RH
 Engineer Kenichi Adachi Kazuya Noda

**Field Strength(Electric Field Strength of Fundamental Emission ,
 Spurious Emission and Band Edge Compliance)**

Band Edge compliance(for Marker Delta Method)



UL Japan, Inc.
Shonan EMC Lab.
 1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa 259-1220 JAPAN
 Telephone : +81 463 50 6400
 Facsimile : +81 463 50 6401

APPENDIX 2 Test Instruments

EMI test equipment

Control No.	Instrument	Manufacturer	Model No	Serial No	Test Item	Calibration Date * Interval(month)
SAEC-03(NSA)	Semi-Anechoic Chamber	TDK	SAEC-03(NSA)	3	RE	2017/06/11 * 12
SHA-03	Horn Antenna	Schwarzbeck	BBHA9120D	9120D-739	RE	2017/08/23 * 12
SCC-G06	Coaxial Cable	Junkosha	J12J102207-00	MAY-23-16-09 1	RE	2017/06/13 * 12
SAT10-05	Attenuator(above1GHz)	Agilent	8493C-010	74864	RE	2017/11/22 * 12
SFL-02	Highpass Filter	MICRO-TRONICS	HPM50111	051	RE	2017/11/16 * 12
SAF-06	Pre Amplifier	TOYO Corporation	TPA0118-36	2046104	RE	2017/09/22 * 12
SCC-G23	Coaxial Cable	Suhner	SUCOFLEX 104	297342/4	RE	2018/05/11 * 12
STR-08	Test Receiver	Rohde & Schwarz	ESW44	101581	RE	2017/11/24 * 12
SSA-02	Spectrum Analyzer	Agilent	E4448A	MY48250106	RE	2018/03/05 * 12
COTS-SEMI-1	EMI Software	TSJ	TEPTO-DV(RE,CE, RFI,MF)	-	RE	-
SOS-05	Humidity Indicator	A&D	AD-5681	4062518	RE	2017/10/30 * 12
SJM-02	Measure	KOMELON	KMC-36	-	RE	-
STS-03	Digital Hitester	Hioki	3805-50	080997823	RE	2017/10/16 * 12
SBA-03	Biconical Antenna	Schwarzbeck	BBA9106	91032666	RE	2017/10/02 * 12
SLA-07	Logperiodic Antenna	Schwarzbeck	VUSLP9111B	196	RE	2018/01/30 * 12
SAT6-08	Attenuator	HIROSE ELECTRIC CO.,LTD.	AT-406(40)	-	RE	2017/08/24 * 12
SCC-C1/C2/C3/C4/C5/C10/SRSE-03	Coaxial Cable&RF Selector	Fujikura/Fujikura/Suhner/Suhner/Suhner/Suhner/TOYO	8D2W/12DSFA/141PE/141PE/141PE/141PE/NS4906	-/0901-271(RF Selector)	RE	2018/04/09 * 12
SAF-03	Pre Amplifier	SONOMA	310N	290213	RE	2018/02/16 * 12
SLP-02	Loop Antenna	Rohde & Schwarz	HFH2-Z2	100218	RE	2017/10/16 * 12
SSA-03	Spectrum Analyzer	Agilent	E4448A	MY48250152	TF	2017/08/20 * 12
SSA-01	Spectrum Analyzer	Agilent	N9010A-526	MY48031482	TF	2018/04/16 * 12
SCH-01	Temperature and Humidity Chamber	Espec	PL-1KT	14020837	TF	2018/04/11 * 12
SSCA-01	Search coil	LANGER	RF-R 400-1	02-0634	TF	Pre Check
SOS-09	Humidity Indicator	A&D	AD-5681	4061484	TF	2017/12/21 * 12
KTS-07	Digital Tester	SANWA	PC500	7019232	TF	2017/10/11 * 12

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

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

Test Item :

RE: Radiated emission ,
TF: Test fixture tests ,