



# RADIO TEST REPORT


Test Report No. : 12107213S-A

**Applicant** : CASIO COMPUTER CO., LTD.  
**Type of Equipment** : Watch  
**Model No.** : GBD-800  
**FCC ID** : BBQS0FW  
**Test regulation** : FCC Part 15 Subpart C: 2018  
**Test Result** : Complied


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2. The results in this report apply only to the sample tested.
3. This sample tested is in compliance with the above regulation.
4. The test results in this report are traceable to the national or international standards.
5. The opinions and the interpretations to the result of the description in this report are outside scopes where UL Japan has been accredited.
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)

**Date of test:** January 18 to 23, 2018

**Representative test engineer:**

  
Kazutaka Takeyama  
Engineer  
Consumer Technology Division

**Approved by:**

  
Akio Hayashi  
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".



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**Shonan EMC Lab.**

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13-EM-F0429



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## **SECTION 1: Customer information**

Company Name : CASIO COMPUTER CO., LTD.  
Address : 2-1, Sakaecho 3 chome, Hamura-shi, Tokyo 205-8555 Japan  
Telephone Number : +81-42-579-7282  
Facsimile Number : +81-42-579-7702  
Contact Person : Hiroaki Suzuki

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

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

Type of Equipment : Watch  
Model No. : GBD-800  
Serial No. : Refer to Section 4, Clause 4.2  
Rating : Typical: Nom : DC 3 V, Min.: DC 1.9 V, Max.: DC 3.3 V  
CW3464 (Module): Min.: DC 1.9 V, Max.: DC 3.3 V  
Receipt Date of Sample : January 17, 2018  
Country of Mass-production : China, Thailand, Japan  
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: GBD-800 (referred to as the EUT in this report) is a Watch.

\* GBD-800 has alternative name as R016.

### **General Specification**

Clock frequency(ies) in the system : 26 MHz, 32.768 kHz

### **Radio Specification**

<Bluetooth part>

Equipment Type : Transceiver  
Frequency of Operation : 2402 MHz - 2480 MHz  
Type of Modulation : GFSK  
Channel spacing : 2 MHz  
Antenna Type : Chip antenna (Mono Pole)  
Antenna Gain : 2.5 dBi

## **SECTION 3: Test specification, procedures & results**

### **3.1 Test Specification**

Test Specification : FCC Part 15 Subpart C  
FCC Part 15 final revised on February 2, 2018 and effective March 5, 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

\* The revisions made after testing date do not affect the test specification applied to the EUT.

### **3.2 Procedures and results**

Item	Test Procedure	Specification	Worst margin	Results	Remarks
Conducted Emission	FCC: ANSI C63.10-2013 6. Standard test methods IC: RSS-Gen 8.8	FCC: Section 15.207 IC: RSS-Gen 8.8	-	-	N/A *1)
6dB Bandwidth	FCC: KDB 558074 D01 DTS Meas Guidance v04 IC: -	FCC: Section 15.247(a)(2) IC: RSS-247 5.2(a)	See data.	Complied	Conducted
Maximum Peak Output Power	FCC: KDB 558074 D01 DTS Meas Guidance v04 IC: RSS-Gen 6.12	FCC: Section 15.247(b)(3) IC: RSS-247 5.4(d)		Complied	Conducted
Power Density	FCC: KDB 558074 D01 DTS Meas Guidance v04 IC: -	FCC: Section 15.247(e) IC: RSS-247 5.2(b)		Complied	Conducted
Spurious Emission Restricted Band Edges	FCC: KDB 558074 D01 DTS Meas Guidance v04 IC: RSS-Gen 6.13	FCC: Section 15.247(d) IC: RSS-247 5.5 RSS-Gen 8.9 RSS-Gen 8.10	5.0 dB 9608.00 MHz, AV, Horizontal Tx 2402 MHz	Complied	Conducted (below 30 MHz)/ Radiated (above 30 MHz) *2)

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 has no AC mains.

\*2) Radiated test was selected over 30 MHz based on section 15.247(d) and KDB 558074 D01 DTS Meas Guidance v04 12.2.7.

\* 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 (DC 1.35 V) 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**

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

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### 3.3 Addition to standard

Item	Test Procedure	Specification	Worst margin	Results	Remarks
99% Occupied Bandwidth	IC: RSS-Gen 6.6	IC: -	N/A	-	Conducted

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

### 3.4 Uncertainty

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

Item	Frequency range	Uncertainty (+/-)				
		No. 1 SAC / SR	No. 2 SAC / SR	No. 3 SAC / SR	No. 4 SAC / SR	No. 5,6,8 SR
Conducted emission (AC Mains) LISN	150 kHz-30 MHz	2.5 dB	2.5 dB	2.5 dB	2.6 dB	2.6 dB
Radiated emission (Measurement distance: 3 m)	9 kHz-30 MHz	3.2 dB	3.2 dB	3.3 dB	-	-
	30 MHz-200 MHz	4.3 dB	4.3 dB	4.3 dB	-	-
	200 MHz-1 GHz	5.9 dB	5.9 dB	5.9 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	-	-
	18 GHz-40 GHz	5.6 dB	5.6 dB	5.6 dB	-	-
Radiated emission (Measurement distance: 1 m)	1 GHz-18 GHz	5.6 dB	5.6 dB	5.6 dB	-	-
	18 GHz-40 GHz	5.9 dB	5.9 dB	5.9 dB	-	-

SAC=Semi-Anechoic Chamber

SR= Shielded Room is applied besides radiated emission

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

#### Radiated emission test

The data listed in this report meets the limits unless the uncertainty is taken into consideration.

### 3.5 Test Location

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

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

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

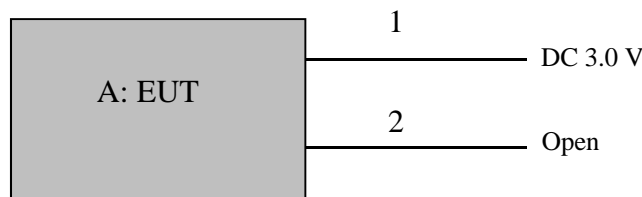
Refer to APPENDIX.

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

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

Mode	Frequency	Remarks*
Bluetooth Low Energy (BT LE)	2402 MHz, 2440 MHz, 2480 MHz	PRBS9
*Power of the EUT was set by the software as follows; - Power Setting: Fixed - Software: BLE RF Test Version 9.9  *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.		

### **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	Watch	GBD-800	No.27 *1) No.19 *2)	Casio Computer Co., Ltd.	EUT

\*1) Used for Antenna Terminal conducted test

\*2) Used for Radiated Emission test

### **List of cables used**

No.	Name	Length (m)	Shield		Remarks
			Cable	Connector	
1	DC Cable	0.1 + 2.0	Unshielded	Unshielded	*3)
2	Signal Cable	0.1	Unshielded	Unshielded	*4)

\*3) Cable for test operation

\*4) Cable for system reset during the development, not used for the product



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

### **Test Procedure**

It was measured based on "11.0 Emissions in non-restricted frequency bands" of "KDB 558074 D01 DTS Meas Guidance v04".

[For below 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 a ground plane.

[For above 1 GHz]

EUT was placed on a urethane platform of nominal size, 0.5 m by 0.5 m, raised 1.5 m above the conducting ground plane. The Radiated Electric Field Strength has been measured in a Semi Anechoic Chamber with absorbent materials lined on a ground plane.

The height of the measuring antenna varied between 1 m and 4 m and EUT was rotated a full revolution in order to obtain the maximum value of the electric field strength. The measurements were performed for both vertical and horizontal antenna polarization with the Test Receiver, or the Spectrum Analyzer. The measurements were made with the following detector function of the test receiver and the Spectrum analyzer (in linear mode).

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

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

### **Test Antennas are used as below;**

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

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

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

Frequency	Below 1 GHz	Above 1 GHz		20 dBc
Instrument used	Test Receiver	Spectrum Analyzer		Spectrum Analyzer
Detector	QP	PK	AV *1)	PK
IF Bandwidth	BW 120 kHz	RBW: 1 MHz VBW: 3 MHz	Average Power Method: <u>12.2.5.2</u> RBW: 1 MHz VBW: 3 MHz Detector: Power Averaging (Linear voltage) Trace: 100 traces Duty factor was added to the results.	RBW: 100 kHz VBW: 300 kHz
Test Distance	3 m	3.98 m *2) (1 GHz – 13 GHz), 1 m *3) (13 GHz – 26.5 GHz)		3.98 m *2) (1 GHz – 13 GHz), 1 m *3) (13 GHz – 26.5 GHz)

\*1) Average Power Measurement was performed based on 6.0 & 12.2.5 of "KDB 558074 D01 DTS Meas Guidance v04".

\*2) Distance Factor:  $20 \times \log(3.98 \text{ m} / 3.0 \text{ m}) = 2.45 \text{ dB}$

\*3) Distance Factor:  $20 \times \log(1.0 \text{ m} / 3.0 \text{ m}) = -9.54 \text{ dB}$

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	Spurious (Below 1 GHz)	Spurious (1 GHz -13 GHz)	Spurious (13 GHz -26.5 GHz)
Horizontal	Y	X	X	X
Vertical	X	X	Y	X

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

Measurement range : 30 MHz - 26.5 GHz  
Test data : APPENDIX  
Test result : Pass

## **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	10 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	9.1 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	10 kHz	30 kHz				

\*1) Peak hold was applied as Worst-case measurement.  
\*2) Reference data  
\*3) Section 10.2 Method PKPSD (peak PSD) of "KDB 558074 D01 DTS Meas Guidance v04".  
\*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 not detected as shown in the chart.  
(9 kHz - 150 kHz: RBW = 200 Hz, 150 kHz - 30 MHz: RBW = 10 kHz)

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

Test data : APPENDIX  
Test result : Pass

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## APPENDIX 1: Test data

### 6 dB Bandwidth and 99 % Occupied Bandwidth

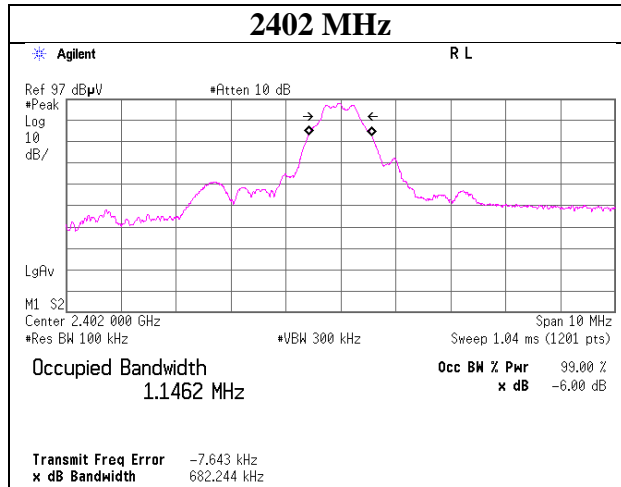
Test place                      Shonan EMC Lab. No.1 Measurement Room  
Report No.                      12107213S-A  
Date                              January 23, 2018  
Temperature / Humidity      24 deg. C / 50 % RH  
Engineer                        Kazutaka Takeyama  
Mode                              Tx BT LE

Mode	Frequency [MHz]	99% Occupied Bandwidth [kHz]	6dB Bandwidth [kHz]	Limit for 6dB Bandwidth [kHz]
BTLE	2402	1061.0	682.244	> 500
	2440	1065.5	676.859	> 500
	2480	1071.9	689.558	> 500

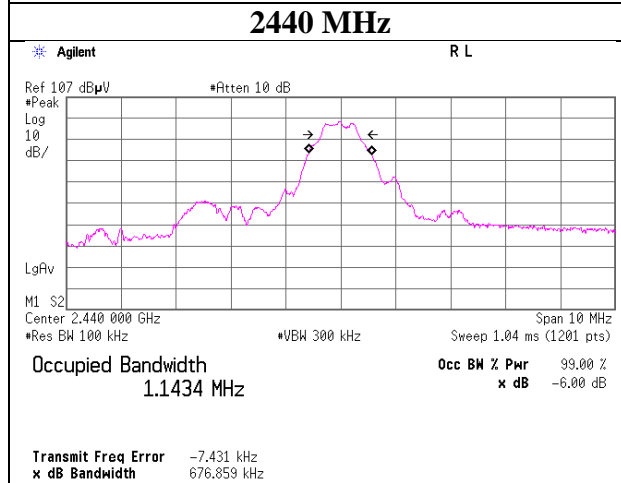
## 6dB Bandwidth

### BTLE

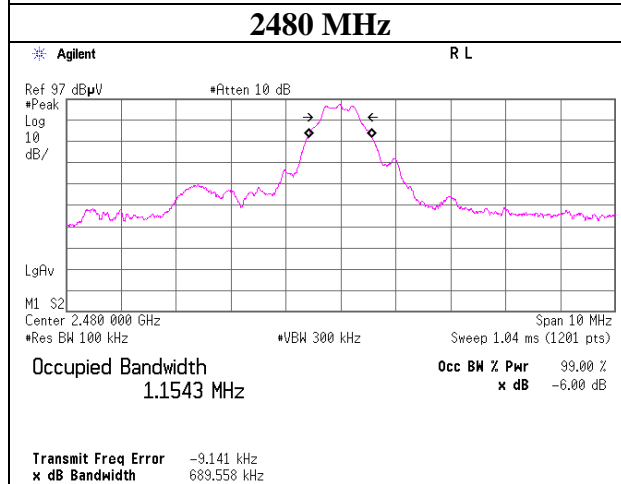
#### 2402 MHz



#### 2440 MHz



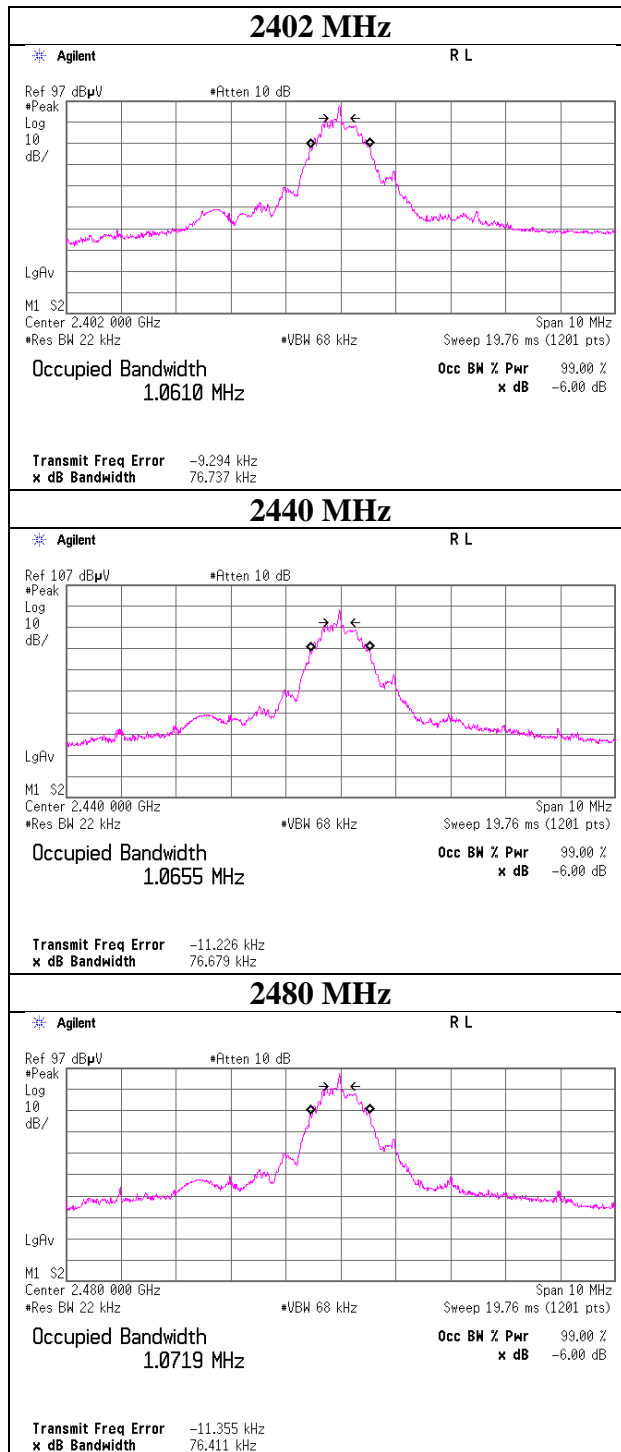
#### 2480 MHz



## 99%Occupied Bandwidth

Test place	Shonan EMC Lab. No.1 Measurement Room
Report No.	12107213S-A
Date	January 23, 2018
Temperature / Humidity	24 deg. C / 50 % RH
Engineer	Kazutaka Takeyama
Mode	Tx BT LE

### BTLE



### Maximum Peak Output Power

Test place Shonan EMC Lab. No.1 Measurement Room  
Report No. 12107213S-A  
Date January 23, 2018  
Temperature / Humidity 24 deg. C / 50 % RH  
Engineer Kazutaka Takeyama  
Mode Tx BT LE

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result		Limit		Margin [dB]
				[dBm]	[mW]	[dBm]	[mW]	
2402	-12.58	1.82	9.68	-1.08	0.78	30.00	1000	31.08
2440	-12.11	1.83	9.67	-0.61	0.87	30.00	1000	30.61
2480	-12.90	1.84	9.67	-1.39	0.73	30.00	1000	31.39

Sample Calculation:

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

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

Test place                      Shonan EMC Lab. No.1 Measurement Room  
Report No.                      12107213S-A  
Date                              January 23, 2018  
Temperature / Humidity        24 deg. C / 50 % RH  
Engineer                        Kazutaka Takeyama  
Mode                              Tx BT LE

BTLE

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result (Time average)		Duty factor [dB]	Result (Burst power average)	
				[dBm]	[mW]		[dBm]	[mW]
2402	-14.48	1.82	9.68	-2.98	0.50	0.89	-2.09	0.62
2440	-13.95	1.83	9.67	-2.45	0.57	0.89	-1.56	0.70
2480	-14.83	1.84	9.67	-3.32	0.47	0.89	-2.43	0.57

Sample Calculation:

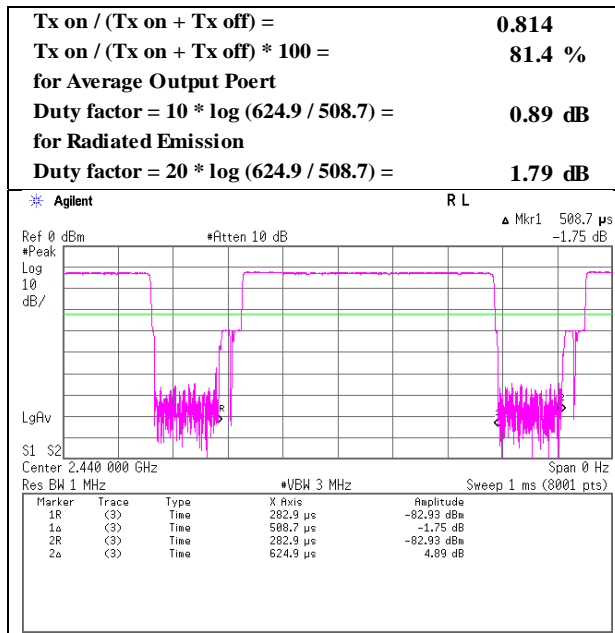
Result (Time average) = Reading + Cable Loss (including the cable(s) customer supplied) + Attenuator Loss

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

## Burst rate confirmation

Test place	Shonan EMC Lab. No.1 Measurement Room
Report No.	12107213S-A
Date	January 23, 2018
Temperature / Humidity	24 deg. C / 50 % RH
Engineer	Kazutaka Takeyama
Mode	Tx BT LE 2440 MHz

### BTLE



\* Since the burst rate is not different between the channels, the data has been obtained on the representative channel.



## Radiated Spurious Emission

Report No.	12107213S-A		
Test place	Shonan EMC Lab.		
Semi Anechoic Chamber	No.3	No.3	No.3
Date	January 18, 2018	January 20, 2018	January 20, 2018
Temperature / Humidity	23 deg. C / 38 % RH	22 deg. C / 37 % RH	22 deg. C / 37 % RH
Engineer	Shiro Kobayashi	Hiroyuki Morikawa	Hiroyuki Morikawa
	(1 GHz - 18 GHz)	(30 MHz - 1 GHz)	(18 GHz - 26 GHz)
Mode	Tx BT LE 2402 MHz		

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

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg]	Remark
Hori.	100.000	QP	22.50	10.04	7.52	32.08	0.00	7.98	43.50	35.5	100	0	
Hori.	105.818	QP	22.50	10.89	7.44	32.07	0.00	8.76	43.50	34.7	100	0	
Hori.	300.000	QP	21.90	13.39	8.72	31.92	0.00	12.09	46.00	33.9	100	0	
Hori.	400.000	QP	21.90	15.62	9.21	31.87	0.00	14.86	46.00	31.1	100	0	
Hori.	500.000	QP	22.00	17.64	9.64	31.84	0.00	17.44	46.00	28.5	100	0	
Hori.	600.000	QP	21.40	18.95	10.02	31.82	0.00	18.55	46.00	27.4	100	0	
Hori.	700.000	QP	21.50	19.58	10.39	31.74	0.00	19.73	46.00	26.2	100	0	
Hori.	2390.000	PK	48.74	27.26	14.14	44.13	2.45	48.46	73.90	25.4	124	202	
Hori.	4804.000	PK	55.52	31.40	6.75	44.45	2.45	51.67	73.90	22.2	166	335	
Hori.	7206.000	PK	47.90	36.56	8.29	43.99	2.45	51.21	73.90	22.6	150	0	
Hori.	9608.000	PK	50.03	38.61	9.37	43.83	2.45	56.63	73.90	17.2	240	52	
Hori.	14412.000	PK	53.43	41.65	10.61	42.94	-9.54	53.21	73.90	20.6	157	300	
Vert.	100.000	QP	22.70	10.04	7.52	32.08	0.00	8.18	43.50	35.3	100	0	
Vert.	105.818	QP	22.40	10.89	7.44	32.07	0.00	8.66	43.50	34.8	100	0	
Vert.	300.000	QP	21.90	13.39	8.72	31.92	0.00	12.09	46.00	33.9	100	0	
Vert.	400.000	QP	21.90	15.62	9.21	31.87	0.00	14.86	46.00	31.1	100	0	
Vert.	500.000	QP	21.90	17.64	9.64	31.84	0.00	17.34	46.00	28.6	100	0	
Vert.	600.000	QP	21.50	18.95	10.02	31.82	0.00	18.65	46.00	27.3	100	0	
Vert.	700.000	QP	21.50	19.58	10.39	31.74	0.00	19.73	46.00	26.2	100	0	
Vert.	2390.000	PK	49.06	27.26	14.14	44.13	2.45	48.78	73.90	25.1	121	202	
Vert.	4804.000	PK	55.10	31.40	6.75	44.45	2.45	51.25	73.90	22.6	154	322	
Vert.	7206.000	PK	47.84	36.56	8.29	43.99	2.45	51.15	73.90	22.7	150	0	
Vert.	9608.000	PK	48.99	38.61	9.37	43.83	2.45	55.59	73.90	18.3	153	3	
Vert.	14412.000	PK	49.22	41.65	10.61	42.94	-9.54	49.00	73.90	24.9	149	312	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor

Distance factor : 1 GHz - 13 GHz : 20log(3.98 m / 3.0 m) = 2.45 dB

13 GHz - 40 GHz : 20log(1.0 m / 3.0 m) = -9.54 dB

### Average measurement value with duty factor

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2390.000	AV	38.93	27.26	14.14	44.13	1.79	2.45	40.44	53.90	13.5	*1)
Hori.	4804.000	AV	49.40	31.40	6.75	44.45	1.79	2.45	47.34	53.90	6.6	
Hori.	7206.000	AV	38.21	36.56	8.29	43.99	1.79	2.45	43.31	53.90	10.6	
Hori.	9608.000	AV	40.48	38.61	9.37	43.83	1.79	2.45	48.87	53.90	5.0	
Hori.	14412.000	AV	43.54	41.65	10.61	42.94	1.79	-9.54	45.11	53.90	8.8	
Vert.	2390.000	AV	38.28	27.26	14.14	44.13	1.79	2.45	39.79	53.90	14.1	*1)
Vert.	4804.000	AV	49.22	31.40	6.75	44.45	1.79	2.45	47.16	53.90	6.7	
Vert.	7206.000	AV	38.19	36.56	8.29	43.99	1.79	2.45	43.29	53.90	10.6	
Vert.	9608.000	AV	39.49	38.61	9.37	43.83	1.79	2.45	47.88	53.90	6.0	
Vert.	14412.000	AV	39.58	41.65	10.61	42.94	1.79	-9.54	41.15	53.90	12.8	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Duty factor + Distance factor

Distance factor : 1 GHz - 13 GHz : 20log(3.98 m / 3.0 m) = 2.45 dB

13 GHz - 40 GHz : 20log(1.0 m / 3.0 m) = -9.54 dB

Duty factor refer to "Duty factor Calculation chart" sheet.

\*1) Not out of band emission (Leakage Power)

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

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2402.000	PK	87.52	27.29	14.15	44.14	2.45	87.27	-	-	Carrier
Hori.	2399.611	PK	48.41	27.29	14.14	44.14	2.45	48.15	67.27	19.1	
Hori.	2400.000	PK	42.79	27.29	14.14	44.14	2.45	42.53	67.27	24.7	
Vert.	2402.000	PK	86.07	27.29	14.15	44.14	2.45	85.82	-	-	Carrier
Vert.	2399.607	PK	47.60	27.29	14.14	44.14	2.45	47.34	65.82	18.5	
Vert.	2400.000	PK	41.18	27.29	14.14	44.14	2.45	40.92	65.82	24.9	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor

Distance factor : 1 GHz - 13 GHz : 20log(3.98 m / 3.0 m) = 2.45 dB

13 GHz - 40 GHz : 20log(1.0 m / 3.0 m) = -9.54 dB

**UL Japan, Inc.**

**Shonan EMC Lab.**

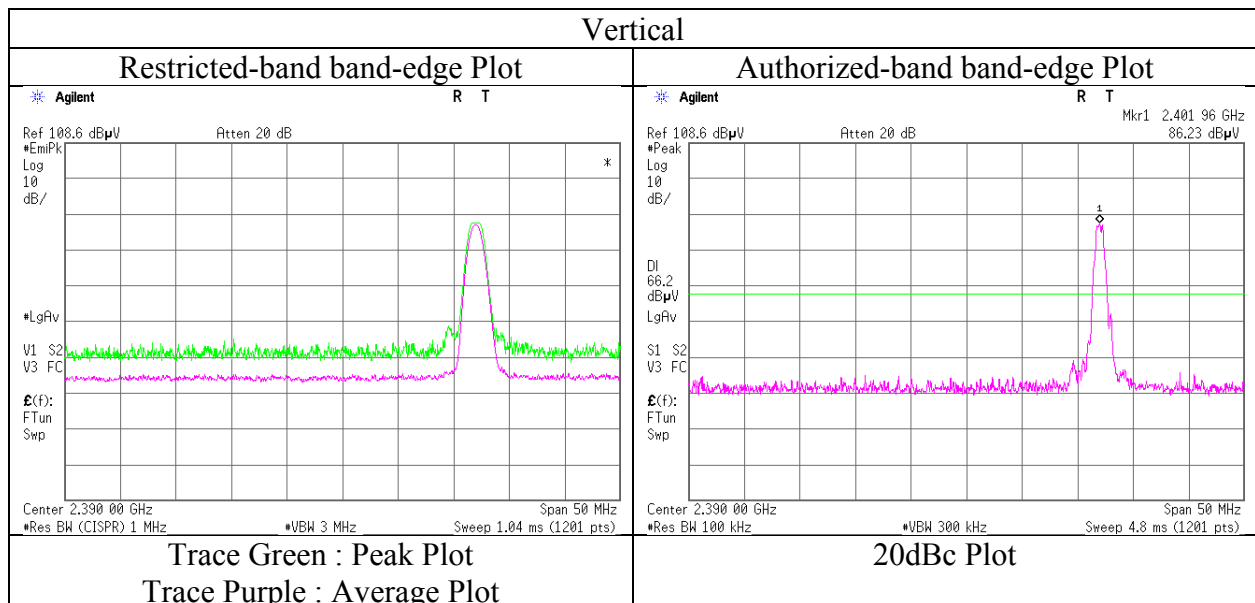
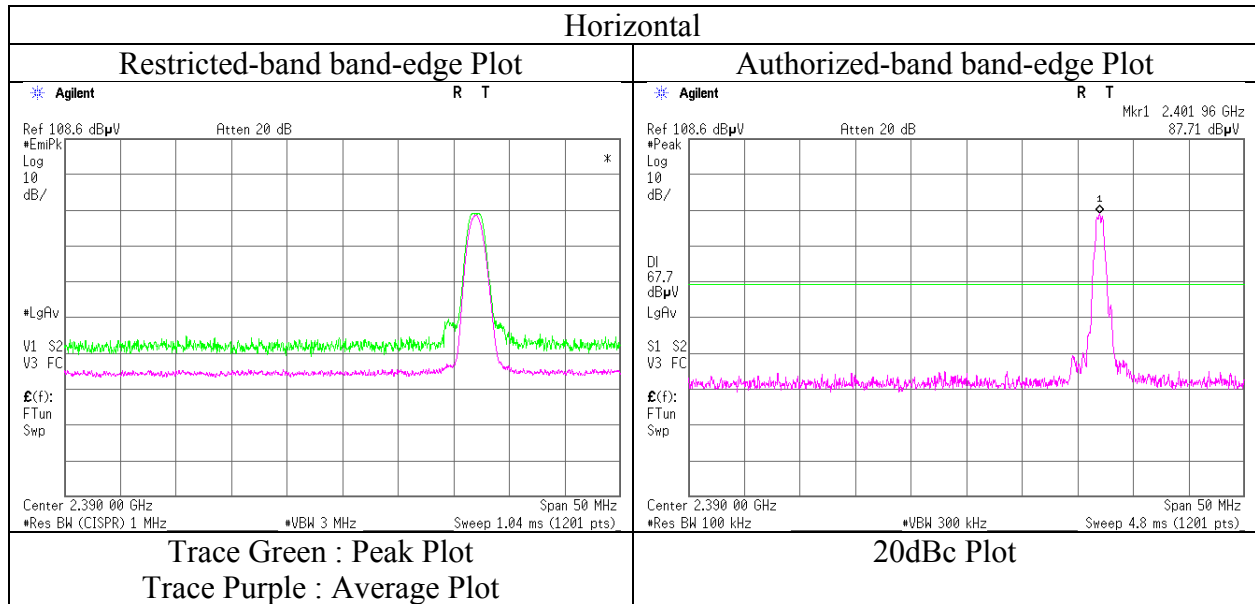
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**Radiated Spurious Emission**  
**(Reference Plot for band-edge)**

Report No. 12107213S-A  
Test place Shonan EMC Lab.  
Semi Anechoic Chamber No.3  
Date January 18, 2018  
Temperature / Humidity 23 deg. C / 38 % RH  
Engineer Shiro Kobayashi  
(1 GHz - 13 GHz)  
Mode Tx BT LE 2402 MHz



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

## Radiated Spurious Emission

Report No.	12107213S-A		
Test place	Shonan EMC Lab.		
Semi Anechoic Chamber	No.3	No.3	No.3
Date	January 18, 2018	January 20, 2018	January 20, 2018
Temperature / Humidity	23 deg. C / 38 % RH	22 deg. C / 37 % RH	22 deg. C / 37 % RH
Engineer	Shiro Kobayashi (1 GHz - 18 GHz)	Hiroyuki Morikawa (30 MHz - 1 GHz)	Hiroyuki Morikawa (18 GHz - 26 GHz)
Mode	Tx BT LE 2440 MHz		

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

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg]	Remark
Hori.	100.000	QP	22.50	10.04	7.52	32.08	0.00	7.98	43.50	35.5	100	0	
Hori.	105.818	QP	22.50	10.89	7.44	32.07	0.00	8.76	43.50	34.7	100	0	
Hori.	300.000	QP	21.90	13.39	8.72	31.92	0.00	12.09	46.00	33.9	100	0	
Hori.	400.000	QP	21.90	15.62	9.21	31.87	0.00	14.86	46.00	31.1	100	0	
Hori.	500.000	QP	21.90	17.64	9.64	31.84	0.00	17.34	46.00	28.6	100	0	
Hori.	600.000	QP	21.40	18.95	10.02	31.82	0.00	18.55	46.00	27.4	100	0	
Hori.	700.000	QP	21.40	19.58	10.39	31.74	0.00	19.63	46.00	26.3	100	0	
Hori.	4880.000	PK	55.02	31.61	6.84	44.48	2.45	51.44	73.90	22.4	161	352	
Hori.	7320.000	PK	48.65	36.76	8.38	44.03	2.45	52.21	73.90	21.6	150	0	
Hori.	9760.000	PK	49.60	38.79	9.45	43.85	2.45	56.44	73.90	17.4	211	50	
Hori.	14640.000	PK	52.34	41.96	11.08	42.74	-9.54	53.10	73.90	20.8	139	304	
Vert.	100.000	QP	22.60	10.04	7.52	32.08	0.00	8.08	43.50	35.4	100	0	
Vert.	105.818	QP	22.40	10.89	7.44	32.07	0.00	8.66	43.50	34.8	100	0	
Vert.	300.000	QP	21.90	13.39	8.72	31.92	0.00	12.09	46.00	33.9	100	0	
Vert.	400.000	QP	21.90	15.62	9.21	31.87	0.00	14.86	46.00	31.1	100	0	
Vert.	500.000	QP	21.90	17.64	9.64	31.84	0.00	17.34	46.00	28.6	100	0	
Vert.	600.000	QP	21.40	18.95	10.02	31.82	0.00	18.55	46.00	27.4	100	0	
Vert.	700.000	QP	21.40	19.58	10.39	31.74	0.00	19.63	46.00	26.3	100	0	
Vert.	4880.000	PK	54.98	31.61	6.84	44.48	2.45	51.40	73.90	22.5	153	319	
Vert.	7320.000	PK	48.11	36.76	8.38	44.03	2.45	51.67	73.90	22.2	150	0	
Vert.	9760.000	PK	49.42	38.79	9.45	43.85	2.45	56.26	73.90	17.6	150	4	
Vert.	14640.000	PK	49.08	41.96	11.08	42.74	-9.54	49.84	73.90	24.0	148	304	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor

Distance factor : 1 GHz - 13 GHz :  $20\log(3.98\text{ m} / 3.0\text{ m}) = 2.45\text{ dB}$

13 GHz - 40 GHz :  $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.54\text{ dB}$

### Average measurement value with duty factor

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	4880.000	AV	49.26	31.61	6.84	44.48	1.79	2.45	47.47	53.90	6.4	
Hori.	7320.000	AV	38.78	36.76	8.38	44.03	1.79	2.45	44.13	53.90	9.8	
Hori.	9760.000	AV	40.17	38.79	9.45	43.85	1.79	2.45	48.80	53.90	5.1	
Hori.	14640.000	AV	42.74	41.96	11.08	42.74	1.79	-9.54	45.29	53.90	8.6	
Vert.	4880.000	AV	48.80	31.61	6.84	44.48	1.79	2.45	47.01	53.90	6.9	
Vert.	7320.000	AV	38.76	36.76	8.38	44.03	1.79	2.45	44.11	53.90	9.8	
Vert.	9760.000	AV	39.55	38.79	9.45	43.85	1.79	2.45	48.18	53.90	5.7	
Vert.	14640.000	AV	39.43	41.96	11.08	42.74	1.79	-9.54	41.98	53.90	11.9	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Duty factor + Distance factor

Distance factor : 1 GHz - 13 GHz :  $20\log(3.98\text{ m} / 3.0\text{ m}) = 2.45\text{ dB}$

13 GHz - 40 GHz :  $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.54\text{ dB}$

Duty factor refer to "Duty factor Calculation chart" sheet.

\*1) Not out of band emission (Leakage Power)

## Radiated Spurious Emission

Report No.	12107213S-A		
Test place	Shonan EMC Lab.		
Semi Anechoic Chamber	No.3	No.3	No.3
Date	January 18, 2018	January 20, 2018	January 20, 2018
Temperature / Humidity	23 deg. C / 38 % RH	22 deg. C / 37 % RH	22 deg. C / 37 % RH
Engineer	Shiro Kobayashi (1 GHz - 18 GHz)	Hiroyuki Morikawa (30 MHz - 1 GHz)	Hiroyuki Morikawa (18 GHz - 26 GHz)
Mode	Tx BT LE 2480 MHz		

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

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg]	Remark
Hori.	100.000	QP	22.50	10.04	7.52	32.08	0.00	7.98	43.50	35.5	100	0	
Hori.	105.818	QP	22.50	10.89	7.44	32.07	0.00	8.76	43.50	34.7	100	0	
Hori.	300.000	QP	21.90	13.39	8.72	31.92	0.00	12.09	46.00	33.9	100	0	
Hori.	400.000	QP	21.90	15.62	9.21	31.87	0.00	14.86	46.00	31.1	100	0	
Hori.	500.000	QP	21.90	17.64	9.64	31.84	0.00	17.34	46.00	28.6	100	0	
Hori.	600.000	QP	21.40	18.95	10.02	31.82	0.00	18.55	46.00	27.4	100	0	
Hori.	700.000	QP	21.40	19.58	10.39	31.74	0.00	19.63	46.00	26.3	100	0	
Hori.	2483.500	PK	50.04	27.55	14.21	44.16	2.45	50.09	73.90	23.8	145	190	
Hori.	4960.000	PK	54.23	31.83	6.91	44.51	2.45	50.91	73.90	22.9	145	327	
Hori.	7440.000	PK	48.48	36.97	8.51	44.08	2.45	52.33	73.90	21.5	150	0	
Hori.	9920.000	PK	49.27	38.98	9.54	43.87	2.45	56.37	73.90	17.5	220	46	
Hori.	14880.000	PK	51.97	42.29	11.95	42.57	-9.54	54.10	73.90	19.8	143	311	
Vert.	100.000	QP	22.60	10.04	7.52	32.08	0.00	8.08	43.50	35.4	100	0	
Vert.	105.818	QP	22.50	10.89	7.44	32.07	0.00	8.76	43.50	34.7	100	0	
Vert.	300.000	QP	21.90	13.39	8.72	31.92	0.00	12.09	46.00	33.9	100	0	
Vert.	400.000	QP	21.90	15.62	9.21	31.87	0.00	14.86	46.00	31.1	100	0	
Vert.	500.000	QP	21.90	17.64	9.64	31.84	0.00	17.34	46.00	28.6	100	0	
Vert.	600.000	QP	21.30	18.95	10.02	31.82	0.00	18.45	46.00	27.5	100	0	
Vert.	700.000	QP	21.40	19.58	10.39	31.74	0.00	19.63	46.00	26.3	100	0	
Vert.	2483.500	PK	49.93	27.55	14.21	44.16	2.45	49.98	73.90	23.9	115	212	
Vert.	4960.000	PK	55.61	31.83	6.91	44.51	2.45	52.29	73.90	21.6	132	316	
Vert.	7440.000	PK	48.71	36.97	8.51	44.08	2.45	52.56	73.90	21.3	150	0	
Vert.	9920.000	PK	49.22	38.98	9.54	43.87	2.45	56.32	73.90	17.5	151	5	
Vert.	14880.000	PK	48.65	42.29	11.95	42.57	-9.54	50.78	73.90	23.1	145	308	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor

Distance factor : 1 GHz - 13 GHz : 20log(3.98 m / 3.0 m) = 2.45 dB

13 GHz - 40 GHz : 20log(1.0 m / 3.0 m) = -9.54 dB

### Average measurement value with duty factor

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2483.500	AV	39.94	27.55	14.21	44.16	1.79	2.45	41.78	53.90	12.1	*1)
Hori.	4960.000	AV	47.82	31.83	6.91	44.51	1.79	2.45	46.29	53.90	7.6	
Hori.	7440.000	AV	39.38	36.97	8.51	44.08	1.79	2.45	45.02	53.90	8.9	
Hori.	9920.000	AV	39.92	38.98	9.54	43.87	1.79	2.45	48.81	53.90	5.1	
Hori.	14880.000	AV	42.78	42.29	11.95	42.57	1.79	-9.54	46.70	53.90	7.2	
Vert.	2483.500	AV	39.78	27.55	14.21	44.16	1.79	2.45	41.62	53.90	12.3	*1)
Vert.	4960.000	AV	49.47	31.83	6.91	44.51	1.79	2.45	47.94	53.90	6.0	
Vert.	7440.000	AV	39.91	36.97	8.51	44.08	1.79	2.45	45.55	53.90	8.4	
Vert.	9920.000	AV	39.41	38.98	9.54	43.87	1.79	2.45	48.30	53.90	5.6	
Vert.	14880.000	AV	39.60	42.29	11.95	42.57	1.79	-9.54	43.52	53.90	10.4	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Duty factor + Distance factor

Distance factor : 1 GHz - 13 GHz : 20log(3.98 m / 3.0 m) = 2.45 dB

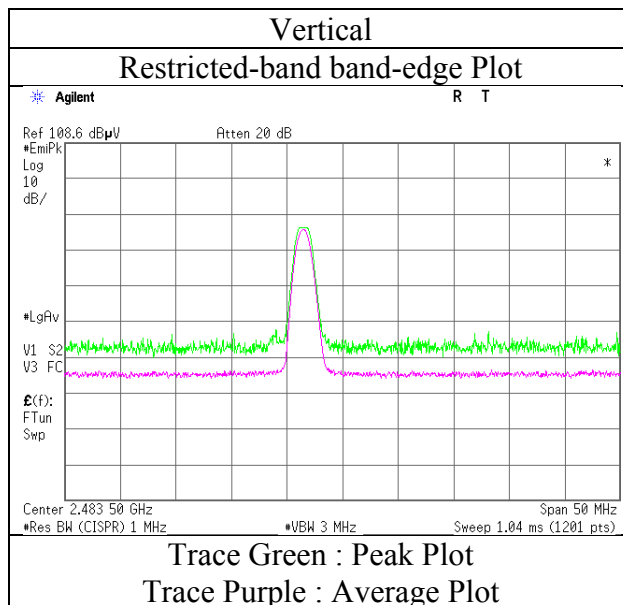
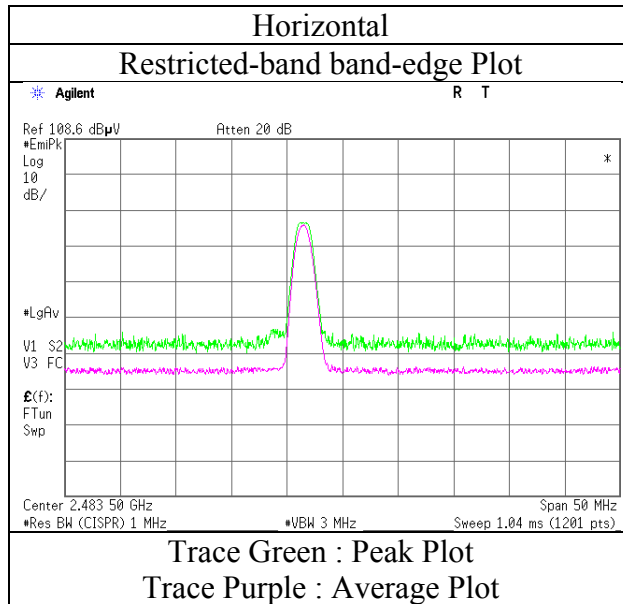
13 GHz - 40 GHz : 20log(1.0 m / 3.0 m) = -9.54 dB

Duty factor refer to "Duty factor Calculation chart" sheet.

\*1) Not out of band emission (Leakage Power)

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

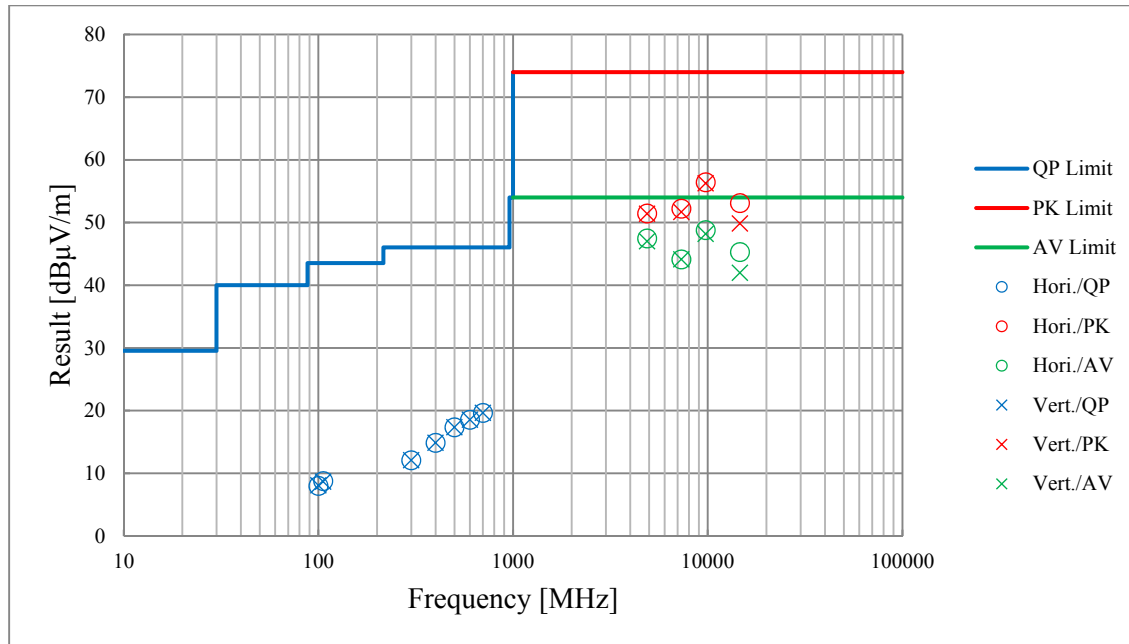
Report No. 12107213S-A  
Test place Shonan EMC Lab.  
Semi Anechoic Chamber No.3  
Date January 18, 2018  
Temperature / Humidity 23 deg. C / 38 % RH  
Engineer Shiro Kobayashi  
(1 GHz - 13 GHz)  
Mode Tx BT LE 2480 MHz



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

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

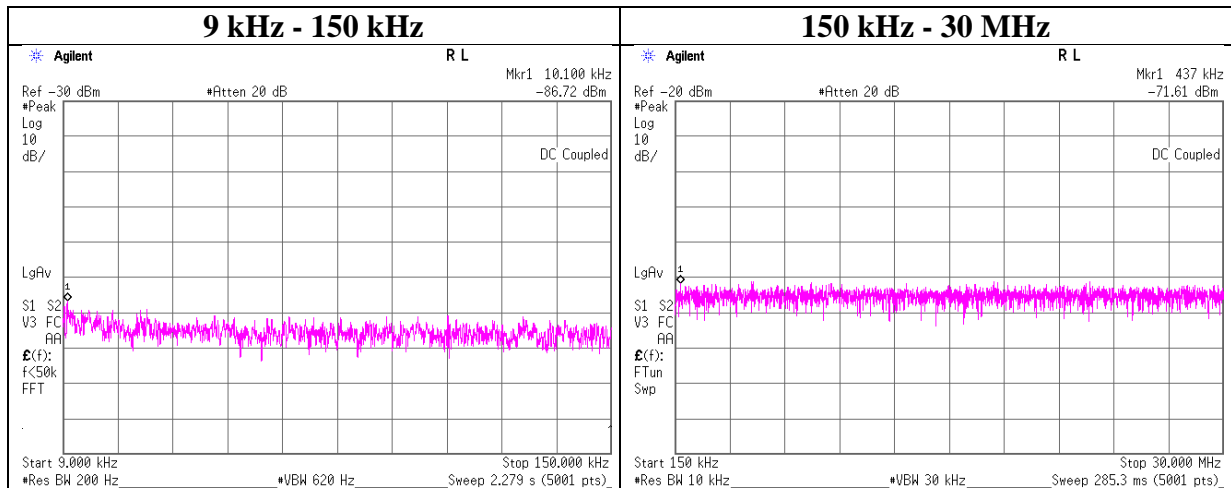
Report No.	12107213S-A		
Test place	Shonan EMC Lab.		
Semi Anechoic Chamber	No.3	No.3	No.3
Date	January 18, 2018	January 20, 2018	January 20, 2018
Temperature / Humidity	23 deg. C / 38 % RH	22 deg. C / 37 % RH	22 deg. C / 37 % RH
Engineer	Shiro Kobayashi (1 GHz - 18 GHz)	Hiroyuki Morikawa (30 MHz - 1 GHz)	Hiroyuki Morikawa (18 GHz - 26 GHz)
Mode	Tx BT LE 2440 MHz		



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

## Conducted Spurious Emission

Test place	Shonan EMC Lab. No.1 Measurement Room
Report No.	12107213S-A
Date	January 23, 2018
Temperature / Humidity	24 deg. C / 50 % RH
Engineer	Kazutaka Takeyama
Mode	Tx BT LE 2402 MHz



Frequency [kHz]	Reading [dBm]	Cable Loss [dB]	Attenuator Loss [dB]	Antenna Gain [dBi]	N (Number of Output)	EIRP [dBm]	Distance [m]	Ground bounce [dB]	E (field strength) [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
10.10	-86.7	0.51	9.5	2.5	1	-74.2	300	6.0	-12.9	47.5	60.4	
437.00	-71.6	0.51	9.5	2.5	1	-59.1	300	6.0	2.2	14.7	12.5	

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

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

N: Number of output

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**Shonan EMC Lab.**

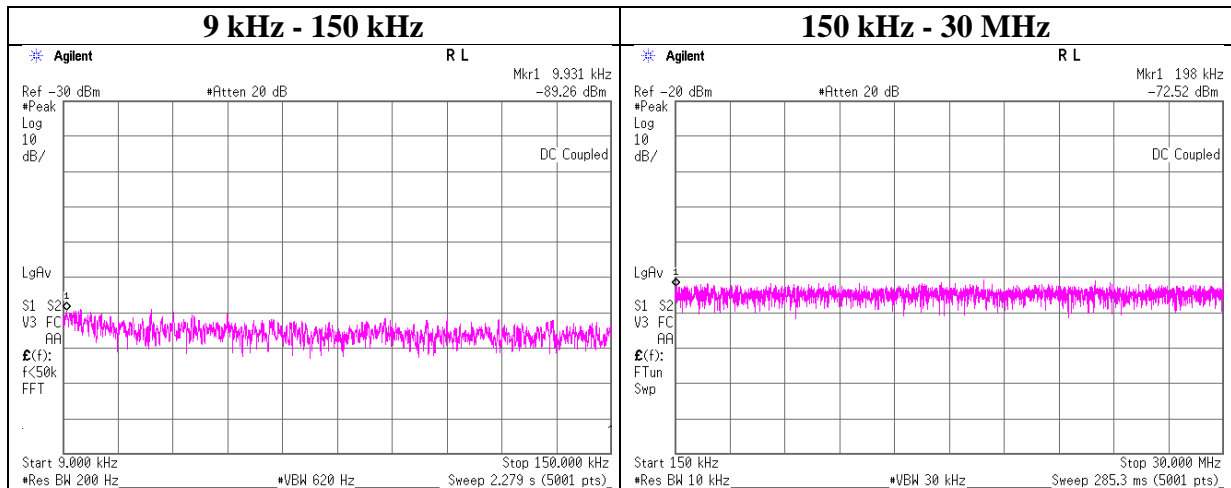
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## Conducted Spurious Emission

Test place	Shonan EMC Lab. No.1 Measurement Room
Report No.	12107213S-A
Date	January 23, 2018
Temperature / Humidity	24 deg. C / 50 % RH
Engineer	Kazutaka Takeyama
Mode	Tx BT LE 2440 MHz



Frequency [kHz]	Reading [dBm]	Cable Loss [dB]	Attenuator Loss [dB]	Antenna Gain [dBi]	N (Number of Output)	EIRP [dBm]	Distance [m]	Ground bounce [dB]	E (field strength) [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
9.93	-89.3	0.51	9.5	2.5	1	-76.7	300	6.0	-15.5	47.6	63.1	
198.00	-72.5	0.51	9.5	2.5	1	-60.0	300	6.0	1.3	21.6	20.3	

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

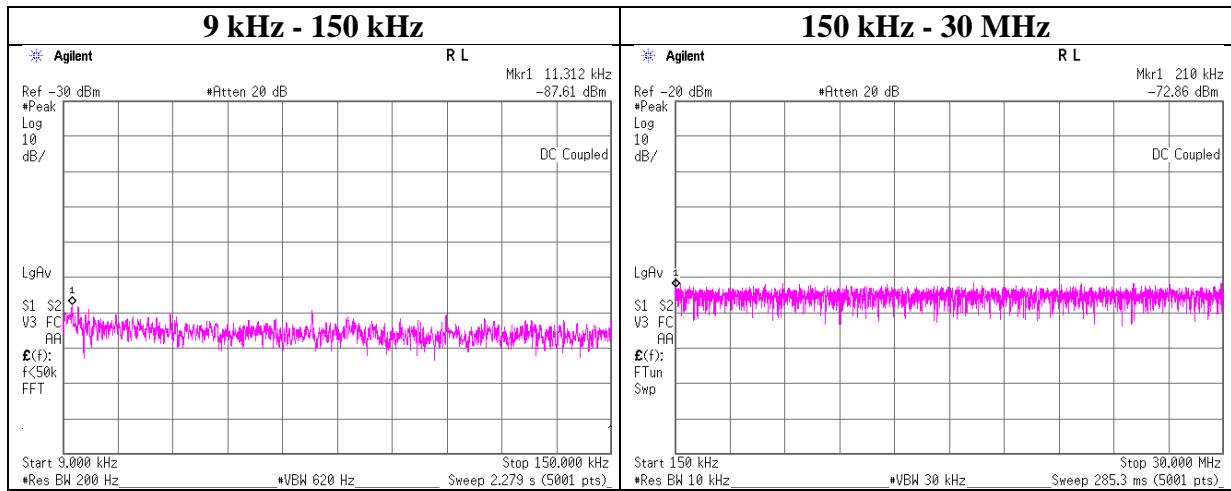
$$\text{EIRP [dBm]} = \text{Reading [dBm]} + \text{Cable loss [dB]} + \text{Attenuator Loss [dB]} + \text{Antenna gain [dBi]} + 10 * \log (N)$$

N: Number of output



## Conducted Spurious Emission

Test place	Shonan EMC Lab. No.1 Measurement Room
Report No.	12107213S-A
Date	January 23, 2018
Temperature / Humidity	24 deg. C / 50 % RH
Engineer	Kazutaka Takeyama
Mode	Tx BT LE 2480 MHz



Frequency [kHz]	Reading [dBm]	Cable Loss [dB]	Attenuator Loss [dB]	Antenna Gain [dBi]	N (Number of Output)	EIRP [dBm]	Distance [m]	Ground bounce [dB]	E (field strength) [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
11.31	-87.6	0.51	9.5	2.5	1	-75.1	300	6.0	-13.8	46.5	60.3	
210.00	-72.9	0.51	9.5	2.5	1	-60.3	300	6.0	0.9	21.1	20.2	

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

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

N: Number of output

### Power Density

Test place                   Shonan EMC Lab. No.1 Measurement Room  
Report No.                 12107213S-A  
Date                         January 23, 2018  
Temperature / Humidity   24 deg. C / 50 % RH  
Engineer                  Kazutaka Takeyama  
Mode                        Tx BT LE

#### BTLE

Freq.	Reading	Cable Loss	Atten. Loss	Result	Limit	Margin
[MHz]	[dBm]	[dB]	[dB]	[dBm]	[dBm]	[dB]
2402.00	-23.15	1.22	9.68	-12.25	8.00	20.25
2440.00	-21.41	1.22	9.67	-10.52	8.00	18.52
2480.00	-22.39	1.23	9.67	-11.49	8.00	19.49

Sample Calculation:

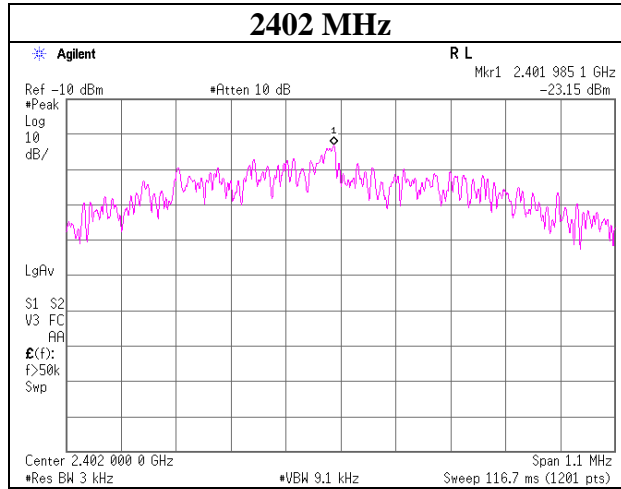
Result = Reading + Cable Loss (including the cable(s) customer supplied) + Attenuator Loss

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

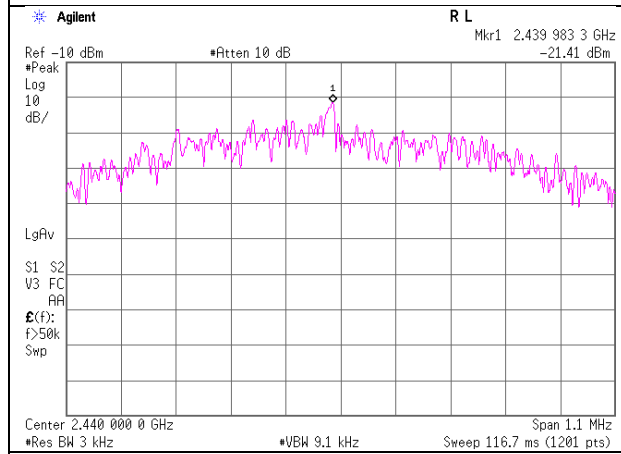
## Power Density

### BTLE

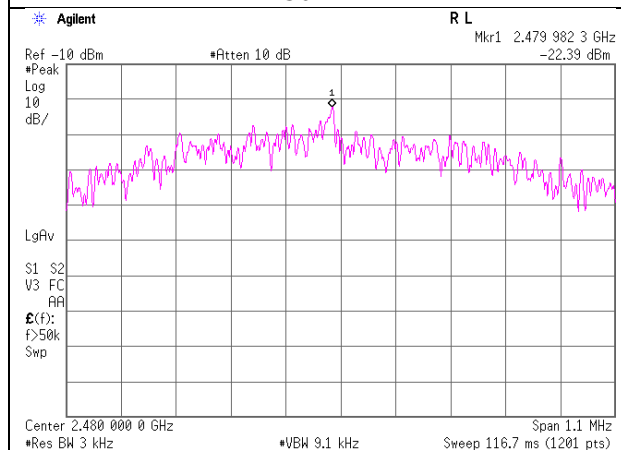
#### 2402 MHz



#### 2440 MHz



#### 2480 MHz



## **APPENDIX 2: Test instruments**

### **Test Instruments**

Control No.	Instrument	Manufacturer	Model No	Serial No	Test Item	Calibration Date * Interval(month)
SAF-06	Pre Amplifier	TOYO Corporation	TPA0118-36	2046104	RE	2017/09/22 * 12
SCC-G05	Coaxial Cable	Junkosha	J12J102207-00	APR-30-15-037	RE	2017/01/08 * 12
SCC-G22	Coaxial Cable	Suhner	SUCOFLEX 104	296199/4	RE	2017/05/08 * 12
SCC-G41	Coaxial Cable	Junkosha	MWX221-01000 NFSNMS/B	1612S006	RE	2017/01/08 * 12
SHA-03	Horn Antenna	Schwarzbeck	BBHA9120D	9120D-739	RE	2017/08/23 * 12
SOS-05	Humidity Indicator	A&D	AD-5681	4062518	RE	2017/10/30 * 12
SRENT-08	Spectrum Analyzer	Agilent	E4448A	MY50180019	RE	2017/10/12 * 12
SJM-02	Measure	KOMELON	KMC-36	-	RE	-
SAEC-03(SVSW R)	Semi-Anechoic Chamber	TDK	SAEC-03(SVSW R)	3	RE	2017/07/17 * 12
COTS-SEMI-1	EMI Software	TSJ	TEPTO-DV(RE,C E,RFI,MF)	-	RE	-
STS-03	Digital Hitester	Hioki	3805-50	080997823	RE	2017/10/16 * 12
SAT10-05	Attenuator(above1G Hz)	Agilent	8493C-010	74864	RE	2017/11/22 * 12
SFL-02	Highpass Filter	MICRO-TRONICS	HPM50111	051	RE	2017/11/16 * 12
SAEC-03(NSA)	Semi-Anechoic Chamber	TDK	SAEC-03(NSA)	3	RE	2017/06/11 * 12
SBA-03	Biconical Antenna	Schwarzbeck	BBA9106	91032666	RE	2017/10/02 * 12
SLA-07	Logperiodic Antenna	Schwarzbeck	VUSLP9111B	196	RE	2017/01/26 * 12
SAT6-08	Attenuator	HIROSE ELECTRIC CO.,LTD.	AT-406(40)	-	RE	2017/08/24 * 12
SCC-C1/C2/C3/C 4/C5/C10/SRSE- 03	Coaxial Cable&RF Selector	Fujikura/Fujikura/Suhne r/Suhner/Suhner/Suhner/ TOYO	8D2W/12DSFA/1 41PE/141PE/141P E/141PE/NS4906	-/0901-271(RF Selector)	RE	2017/04/07 * 12
SAF-03	Pre Amplifier	SONOMA	310N	290213	RE	2017/02/09 * 12
STR-08	Test Receiver	Rohde & Schwarz	ESW44	101581	RE	2017/11/24 * 12
SSA-02	Spectrum Analyzer	Agilent	E4448A	MY48250106	RE	2017/03/07 * 12
SHA-05	Horn Antenna	ETS LINDGREN	3160-09	LM4210	RE	2017/03/15 * 12
SAF-09	Pre Amplifier	TOYO Corporation	HAP18-26W	00000018	RE	2017/09/22 * 12
SCC-G19	Coaxial Cable	Suhner	SUCOFLEX 102A	1188/2A	RE	2017/03/23 * 12
SCC-G33	Coaxial Cable	Junkosha	MWX241-01000 KMSKMS	-	RE	2017/04/20 * 12
SRENT-09	Spectrum Analyzer	Agilent	E4440A	MY46186392	AT	2017/11/08 * 12
SPM-06	Power Meter	Anritsu	ML2495A	0850009	AT	2017/04/25 * 12
SPSS-03	Power sensor	Anritsu	MA2411B	0917063	AT	2017/04/25 * 12
SAT10-09	Attenuator	Weinschel Corp.	54A-10	W5692	AT	2017/11/22 * 12
SCC-G14	Coaxial Cable	Suhner	SUCOFLEX 102	31600/2	AT	2017/03/23 * 12
SOS-13	Humidity Indicator	Custom	CTH-202	Q.C.17	AT	2017/12/21 * 12
KTS-08	Digital Tester	SANWA	PC500	7019224	AT	2017/03/08 * 12
SCC-G12	Coaxial Cable	Suhner	SUCOFLEX 102	30790/2	AT	2017/03/23 * 12

\*Hyphens for 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

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