



RADIO TEST REPORT

Test Report No. : 12112130S-A-R3

Applicant : CASIO COMPUTER CO., LTD.
Type of Equipment : Watch
Model No. : GR-B100
FCC ID : BBQS0EW
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)
7. This report is a revised version of 12112130S-A-R2. 12112130S-A-R2 is replaced with this report.

Date of test: February 8 to 18, 2018

Representative test engineer:



Kenichi Adachi

Engineer

Consumer Technology Division

Approved by:



Akio Hayashi

Leader

Consumer Technology Division



JAB
Testing
RTL02610

☐ The testing in which "Non-accreditation" is displayed is outside the accreditation scopes in UL Japan.

☒ There is no testing item of "Non-accreditation".

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Shonan EMC Lab.

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13-EM-F0429

REVISION HISTORY

Original Test Report No.: 12112130S-A

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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.	:	GR-B100
Serial No.	:	Refer to Section 4, Clause 4.2
Rating	:	Typical: Normal : DC 2.5 V, Min.: DC 1.9 V, Max.: DC 2.7 V CW5537 (Module): Normal: DC 3.0 V, Min.: DC 1.9 V, Max.: DC 3.3 V
Receipt Date of Sample	:	February 6, 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: GR-B100 (referred to as the EUT in this report) is a Watch.

* GR-B100 has alternative name as R010.

General Specification

Clock frequency(ies) in the system	:	26 MHz, 32.768 kHz
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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 March 12, 2018 and effective April 11, 2018

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

* 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	1.08 dB 9608.00 MHz, PK, Vertical 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 the stable voltage constantly to the wireless transmitter regardless of input voltage. Instead of a new battery, DC power supply was used for the test. That does not affect the test result, therefore the EUT complies with the requirement.

FCC Part 15.203 Antenna requirement

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 test report has enough margin, more than the site margin.

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

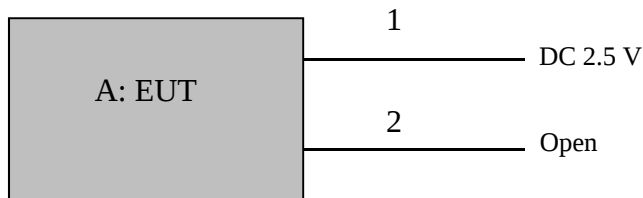
Refer to APPENDIX.

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 *The test was performed with the worst case that can be set in Test mode, The worst case in actual operation mode is applied to Peak with Duty factor of Spurious emission. 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	GR-B100	58 *1) 60 *2)	Casio Computer Co., Ltd.	EUT

*1) Used for Radiated testing

*2) Used for Antenna terminated testing

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 1.0 m, raised 0.8 m above the conducting ground plane. The Radiated Electric Field Strength has been measured in a Semi Anechoic Chamber with a ground plane.

[For above 1 GHz]

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

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

The height of the measuring antenna varied between 1 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) *4)	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 and Averaging factor were added to the results.	RBW: 100 kHz VBW: 300kHz
Test Distance	3 m	3.975 m *2) (1 GHz – 13 GHz), 1 m *3) (13 GHz – 26.5 GHz)		3.975 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: $20 \times \log(3.975 \text{ m} / 3.0 \text{ m}) = 2.44 \text{ dB}$

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

*4) As for Carrier related spurious emissions, "Averaging factor" based on FCC section 15.35(c) / RSS-Gen section 6.10 were used.

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

Combinations of the worst case

Antenna polarization	Frequency				
	Below 1 GHz	1 GHz – 2.8 GHz	2.8 GHz – 13 GHz	13 GHz-18 GHz	18 GHz-26 GHz
Horizontal	X	Y	Y	X	X
Vertical	X	Y	X	X	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

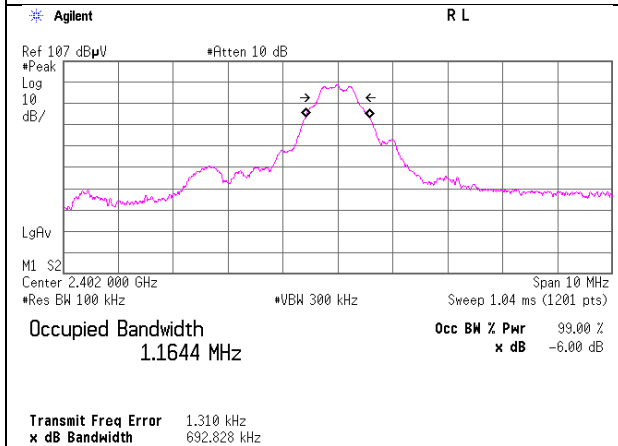
Test place Shonan EMC Lab. No.6 Shielded Room
Report No. 12112130S-A-R3
Date February 8, 2018
Temperature / Humidity 23 deg. C / 36 % RH
Engineer Kazutaka Takeyama
Mode Tx BT LE

Mode	Frequency [MHz]	99 % Occupied Bandwidth [kHz]	6 dB Bandwidth [MHz]	Limit for 6 dB Bandwidth [MHz]
BTLE	2402	1091.4	0.693	> 0.5000
	2440	1096.1	0.699	> 0.5000
	2480	1097.9	0.691	> 0.5000

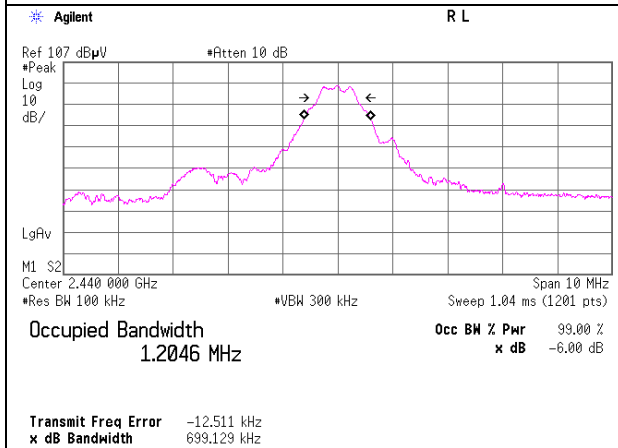
6 dB Bandwidth

BTLE

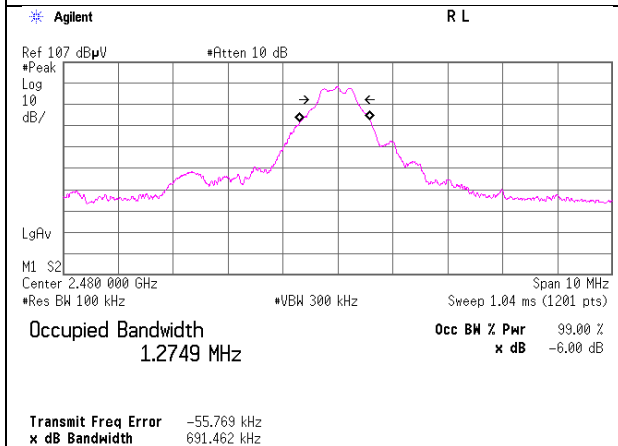
2402 MHz



2440 MHz



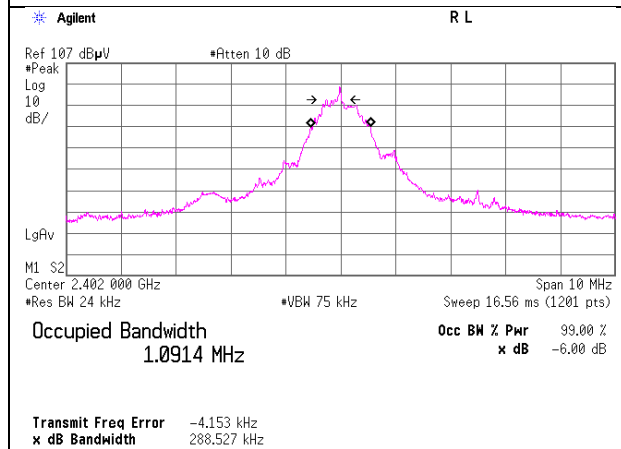
2480 MHz



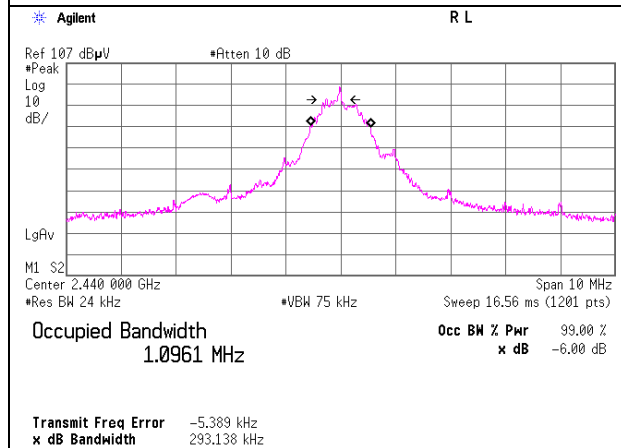
99 % Occupied Bandwidth

BTLE

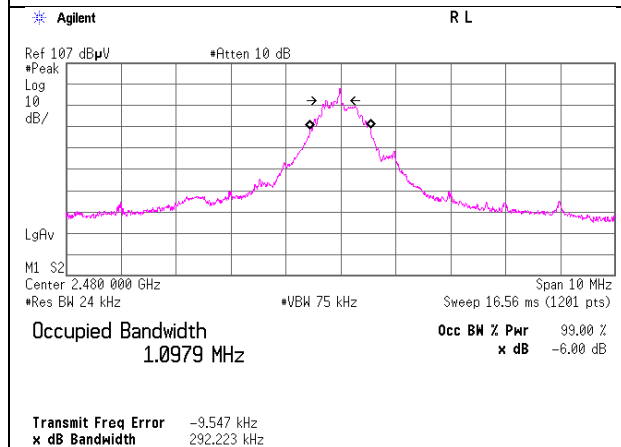
2402 MHz



2440 MHz



2480 MHz



Maximum Peak Output Power

Test place Shonan EMC Lab. No.6 Shielded Room
Report No. 12112130S-A-R3
Date February 8, 2018
Temperature / Humidity 23 deg. C / 36 % 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	-10.97	1.22	9.68	-0.07	0.98	30.00	1000	30.07
2440	-10.81	1.22	9.67	0.08	1.02	30.00	1000	29.92
2480	-11.49	1.23	9.67	-0.59	0.87	30.00	1000	30.59

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.

Average Output Power
(Reference data for RF Exposure)

Test place Shonan EMC Lab. No.6 Shielded Room
Report No. 12112130S-A-R3
Date February 8, 2018
Temperature / Humidity 23 deg. C / 36 % 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	-12.80	1.22	9.68	-1.90	0.65	0.83	-1.07	0.78
2440	-12.64	1.22	9.67	-1.75	0.67	0.83	-0.92	0.81
2480	-13.37	1.23	9.67	-2.47	0.57	0.83	-1.64	0.69

Sample Calculation:

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

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

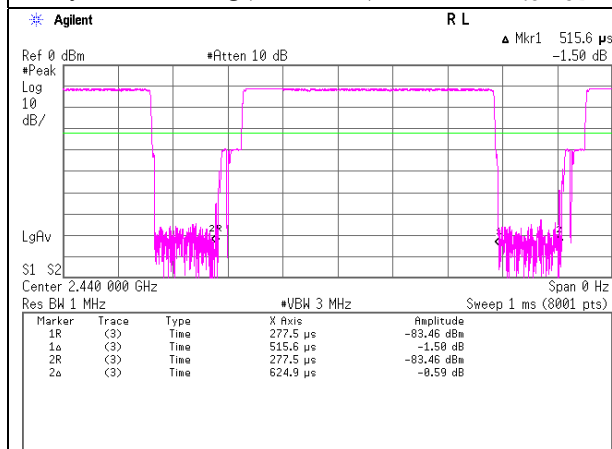
*The equipment and cables were not used for factor 0 dB of the data sheets.

Duty factor Calculation chart

Test place Shonan EMC Lab. No.6 Shielded Room
Report No. 12112130S-A-R3
Date February 8, 2018
Temperature / Humidity 23 deg. C / 36 % RH
Engineer Kazutaka Takeyama
Mode Tx BT LE 2440 MHz

BTLE

$Tx\ on / (Tx\ on + Tx\ off) = 0.825$
 $Tx\ on / (Tx\ on + Tx\ off) * 100 = 82.5\ \%$
for Average Output Poert
 $Duty\ factor = 10 * \log (624.9 / 515.6) = 0.83\ dB$
for Radiated Emission
 $Duty\ factor = 20 * \log (624.9 / 515.6) = 1.67\ dB$



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

Radiated Spurious Emission

Report No.	12112130S-A-R3	
Test place	Shonan EMC Lab.	
Semi Anechoic Chamber	No.3	No.3
Date	February 16, 2018	February 18, 2018
Temperature / Humidity	25 deg. C / 32 % RH	22 deg. C / 30 % RH
Engineer	Hiroyuki Morikawa	Kenichi Adachi
	(1 GHz - 18 GHz)	(below 1 GHz, above 18 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.	52.000	QP	22.25	10.14	6.94	32.12	0.00	7.21	40.00	32.79	100	0	noise floor level
Hori.	182.000	QP	22.09	16.08	7.96	32.01	0.00	14.12	43.50	29.38	100	0	noise floor level
Hori.	260.000	QP	21.75	11.93	8.50	31.92	0.00	10.26	46.00	35.74	100	0	noise floor level
Hori.	936.000	QP	21.14	21.97	11.16	30.60	0.00	23.67	46.00	22.33	100	0	noise floor level
Hori.	988.000	QP	20.58	22.25	11.31	30.18	0.00	23.96	53.90	29.94	100	0	noise floor level
Hori.	2390.000	PK	47.96	27.26	14.56	44.13	2.44	48.09	73.90	25.81	151	126	*1)
Hori.	4804.000	PK	52.49	31.40	7.16	44.45	2.44	49.04	73.90	24.86	106	200	
Hori.	12010.000	PK	49.55	39.30	11.50	43.36	2.44	59.43	73.90	14.47	100	0	
Vert.	52.000	QP	22.24	10.14	6.94	32.12	0.00	7.20	40.00	32.80	100	0	noise floor level
Vert.	182.000	QP	22.08	16.08	7.96	32.01	0.00	14.11	43.50	29.39	100	0	noise floor level
Vert.	260.000	QP	21.73	11.93	8.50	31.92	0.00	10.24	46.00	35.76	100	0	noise floor level
Vert.	936.000	QP	21.17	21.97	11.16	30.60	0.00	23.70	46.00	22.30	100	0	noise floor level
Vert.	988.000	QP	20.61	22.25	11.31	30.18	0.00	23.99	53.90	29.91	100	0	noise floor level
Vert.	2390.000	PK	47.66	27.26	14.56	44.13	2.44	47.79	73.90	26.11	155	239	*1)
Vert.	4804.000	PK	53.32	31.40	7.16	44.45	2.44	49.87	73.90	24.03	160	27	
Vert.	12010.000	PK	48.78	39.30	11.50	43.36	2.44	58.66	73.90	15.24	150	0	

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

Distance factor : 1 GHz - 13 GHz : $20\log(3.975\text{ m} / 3.0\text{ m}) = 2.44\text{ dB}$

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

Peak measurement value with duty factor

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Averaging factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2390.000	PK	47.96	27.26	14.56	44.13	2.44	-7.11	40.98	53.90	12.92	*1)
Hori.	4804.000	PK	52.49	31.40	7.16	44.45	2.44	-7.11	41.93	53.90	11.97	
Hori.	12010.000	PK	49.55	39.30	11.50	43.36	2.44	-7.11	52.32	53.90	1.58	
Vert.	2390.000	PK	47.66	27.26	14.56	44.13	2.44	-7.11	40.68	53.90	13.22	*1)
Vert.	4804.000	PK	53.32	31.40	7.16	44.45	2.44	-7.11	42.76	53.90	11.14	
Vert.	12010.000	PK	48.78	39.30	11.50	43.36	2.44	-7.11	51.55	53.90	2.35	

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

Distance factor : 1 GHz - 13 GHz : $20\log(3.975\text{ m} / 3.0\text{ m}) = 2.44\text{ dB}$

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

Averaging factor refer to APPENDIX 4.

*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	76.56	27.29	14.57	44.14	2.44	76.72	-	-	carrier
Hori.	2400.000	PK	39.06	27.29	14.57	44.14	2.44	39.22	56.72	17.50	
Hori.	7206.000	PK	42.76	36.56	8.90	43.99	2.44	46.67	56.72	10.05	
Hori.	9608.000	PK	45.45	38.61	10.34	43.83	2.44	53.01	56.72	3.71	
Vert.	2402.000	PK	74.07	27.29	14.57	44.14	2.44	74.23	-	-	carrier
Vert.	2400.000	PK	38.70	27.29	14.57	44.14	2.44	38.86	54.23	15.37	
Vert.	7206.000	PK	42.97	36.56	8.90	43.99	2.44	46.88	54.23	7.35	
Vert.	9608.000	PK	45.59	38.61	10.34	43.83	2.44	53.15	54.23	1.08	

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

Distance factor : 1 GHz - 13 GHz : $20\log(3.975\text{ m} / 3.0\text{ m}) = 2.44\text{ dB}$

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

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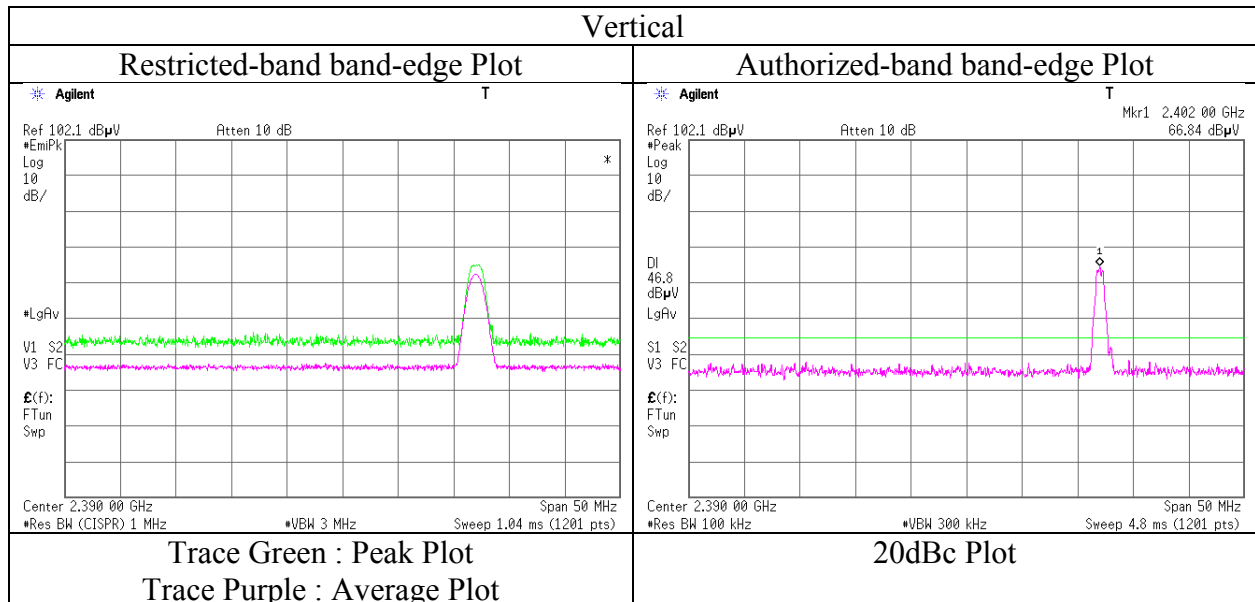
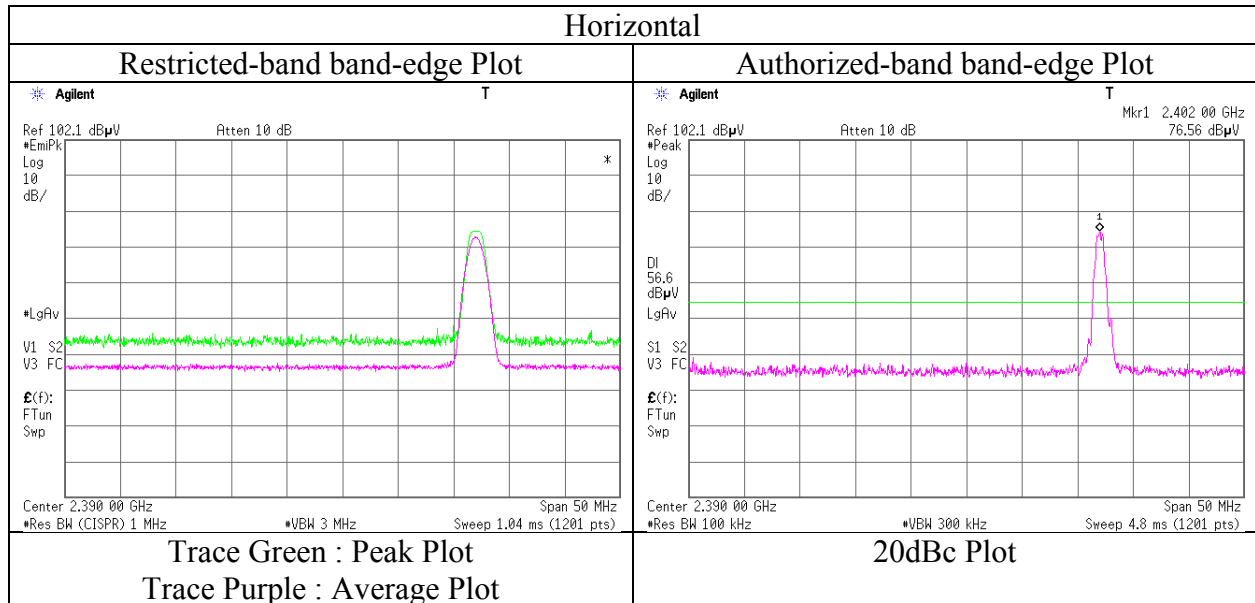
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Radiated Spurious Emission (Reference Plot for band-edge)

Report No.	12112130S-A-R3
Test place	Shonan EMC Lab.
Semi Anechoic Chamber	No.3
Date	February 16, 2018
Temperature / Humidity	25 deg. C / 32 % RH
Engineer	Hiroyuki Morikawa (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. 12112130S-A-R3
Test place Shonan EMC Lab.
Semi Anechoic Chamber No.3 No.3
Date February 16, 2018 February 18, 2018
Temperature / Humidity 25 deg. C / 32 % RH 22 deg. C / 30 % RH
Engineer Hiroyuki Morikawa Kenichi Adachi
(1 GHz - 18 GHz) (below 1 GHz, above 18 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.	52.000	QP	22.33	10.14	6.94	32.12	0.00	7.29	40.00	32.71	100	0	noise floor level
Hori.	182.000	QP	22.08	16.08	7.96	32.01	0.00	14.11	43.50	29.39	100	0	noise floor level
Hori.	260.000	QP	21.74	11.93	8.50	31.92	0.00	10.25	46.00	35.75	100	0	noise floor level
Hori.	936.000	QP	21.15	21.97	11.16	30.60	0.00	23.68	46.00	22.32	100	0	noise floor level
Hori.	988.000	QP	20.63	22.25	11.31	30.18	0.00	24.01	53.90	29.89	100	0	noise floor level
Hori.	4880.000	PK	52.86	31.61	7.24	44.48	2.44	49.67	73.90	24.23	128	45	
Hori.	7320.000	PK	49.10	36.76	9.04	44.03	2.44	53.31	73.90	20.59	150	0	
Hori.	12200.000	PK	47.17	39.28	11.89	43.36	2.44	57.42	73.90	16.48	150	0	
Vert.	52.000	QP	22.31	10.14	6.94	32.12	0.00	7.27	40.00	32.73	100	0	noise floor level
Vert.	182.000	QP	22.09	16.08	7.96	32.01	0.00	14.12	43.50	29.38	100	0	noise floor level
Vert.	260.000	QP	21.68	11.93	8.50	31.92	0.00	10.19	46.00	35.81	100	0	noise floor level
Vert.	936.000	QP	21.13	21.97	11.16	30.60	0.00	23.66	46.00	22.34	100	0	noise floor level
Vert.	4880.000	PK	53.23	31.61	7.24	44.48	2.44	50.04	73.90	23.86	133	25	
Vert.	7320.000	PK	50.48	36.76	9.04	44.03	2.44	54.69	73.90	19.21	216	28	
Vert.	12200.000	PK	47.83	39.28	11.89	43.36	2.44	58.08	73.90	15.82	150	0	

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

Distance factor : 1 GHz - 13 GHz : 20log (3.975 m / 3.0 m) = 2.44 dB

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

Peak measurement value with duty factor

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Averaging factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	4880.000	PK	52.86	31.61	7.24	44.48	2.44	-7.11	42.56	53.90	11.34	
Hori.	7320.000	PK	49.10	36.76	9.04	44.03	2.44	-7.11	46.20	53.90	7.70	
Hori.	12200.000	PK	47.17	39.28	11.89	43.36	2.44	-7.11	50.31	53.90	3.59	
Vert.	4880.000	PK	53.23	31.61	7.24	44.48	2.44	-7.11	42.93	53.90	10.97	
Vert.	7320.000	PK	50.48	36.76	9.04	44.03	2.44	-7.11	47.58	53.90	6.32	
Vert.	12200.000	PK	47.83	39.28	11.89	43.36	2.44	-7.11	50.97	53.90	2.93	

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

Distance factor : 1 GHz - 13 GHz : 20log (3.975 m / 3.0 m) = 2.44 dB

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

Averaging factor refer to APPENDIX 4.

*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.	2440.000	PK	81.03	27.41	14.61	44.15	2.44	81.34	-	-	carrier
Hori.	9760.000	PK	45.37	38.79	10.40	43.85	2.44	53.15	61.34	8.19	
Vert.	2440.000	PK	76.23	27.41	14.61	44.15	2.44	76.54	-	-	carrier
Vert.	9760.000	PK	45.90	38.79	10.40	43.85	2.44	53.68	56.54	2.86	

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

Distance factor : 1 GHz - 13 GHz : 20log (3.975 m / 3.0 m) = 2.44 dB

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

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Radiated Spurious Emission

Report No.	12112130S-A-R3	
Test place	Shonan EMC Lab.	
Semi Anechoic Chamber	No.3	No.3
Date	February 16, 2018	February 18, 2018
Temperature / Humidity	25 deg. C / 32 % RH	22 deg. C / 30 % RH
Engineer	Hiroyuki Morikawa	Kenichi Adachi
	(1 GHz - 18 GHz)	(below 1 GHz, above 18 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.	52.000	QP	22.26	10.14	6.94	32.12	0.00	7.22	40.00	32.78	100	0	noise floor level
Hori.	182.000	QP	22.07	16.08	7.96	32.01	0.00	14.10	43.50	29.40	100	0	noise floor level
Hori.	260.000	QP	22.69	11.93	8.50	31.92	0.00	11.20	46.00	34.80	100	0	noise floor level
Hori.	936.000	QP	21.12	21.97	11.16	30.60	0.00	23.65	46.00	22.35	100	0	noise floor level
Hori.	988.000	QP	20.60	22.25	11.31	30.18	0.00	23.98	53.90	29.92	100	0	noise floor level
Hori.	2483.500	PK	51.57	27.55	14.66	44.16	2.44	52.06	73.90	21.84	147	157	*1)
Hori.	4960.000	PK	53.22	31.83	7.31	44.51	2.44	50.29	73.90	23.61	162	32	
Hori.	7440.000	PK	54.25	36.97	9.21	44.08	2.44	58.79	73.90	15.11	102	0	
Hori.	12400.000	PK	47.18	39.26	12.28	43.36	2.44	57.80	73.90	16.10	100	0	
Vert.	52.000	QP	22.23	10.14	6.94	32.12	0.00	7.19	40.00	32.81	100	0	noise floor level
Vert.	182.000	QP	22.08	16.08	7.96	32.01	0.00	14.11	43.50	29.39	100	0	noise floor level
Vert.	260.000	QP	22.72	11.93	8.50	31.92	0.00	11.23	46.00	34.77	100	0	noise floor level
Vert.	936.000	QP	21.11	21.97	11.16	30.60	0.00	23.64	46.00	22.36	100	0	noise floor level
Vert.	988.000	QP	20.58	22.25	11.31	30.18	0.00	23.96	53.90	29.94	100	0	noise floor level
Vert.	2483.500	PK	48.65	27.55	14.66	44.16	2.44	49.14	73.90	24.76	150	195	*1)
Vert.	4960.000	PK	53.50	31.83	7.31	44.51	2.44	50.57	73.90	23.33	100	29	
Vert.	7440.000	PK	55.38	36.97	9.21	44.08	2.44	59.92	73.90	13.98	163	30	
Vert.	12400.000	PK	46.72	39.26	12.28	43.36	2.44	57.34	73.90	16.56	150	0	

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

Distance factor : 1 GHz - 13 GHz : 20log (3.975 m / 3.0 m) = 2.44 dB

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

Peak measurement value with duty factor

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Averaging factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2483.500	PK	51.57	27.55	14.66	44.16	2.44	-7.11	44.95	53.90	8.95	*1)
Hori.	4960.000	PK	53.22	31.83	7.31	44.51	2.44	-7.11	43.18	53.90	10.72	
Hori.	7440.000	PK	54.25	36.97	9.21	44.08	2.44	-7.11	51.68	53.90	2.22	
Hori.	12400.000	PK	47.18	39.26	12.28	43.36	2.44	-7.11	50.69	53.90	3.21	
Vert.	2483.500	PK	48.65	27.55	14.66	44.16	2.44	-7.11	42.03	53.90	11.87	*1)
Vert.	4960.000	PK	53.50	31.83	7.31	44.51	2.44	-7.11	43.46	53.90	10.44	
Vert.	7440.000	PK	55.38	36.97	9.21	44.08	2.44	-7.11	52.81	53.90	1.09	
Vert.	12400.000	PK	46.72	39.26	12.28	43.36	2.44	-7.11	50.23	53.90	3.67	

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

Distance factor : 1 GHz - 13 GHz : 20log (3.975 m / 3.0 m) = 2.44 dB

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

Averaging factor refer to APPENDIX 4.

*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.	2480.000	PK	80.98	27.54	14.65	44.16	2.44	81.45	-	-	carrier
Hori.	9920.000	PK	42.04	38.98	10.46	43.87	2.44	50.05	61.45	11.40	
Vert.	2480.000	PK	74.32	27.54	14.65	44.16	2.44	74.79	-	-	carrier
Vert.	9920.000	PK	41.68	38.98	10.46	43.87	2.44	49.69	54.79	5.10	

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

Distance factor : 1 GHz - 13 GHz : 20log (3.975 m / 3.0 m) = 2.44 dB

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

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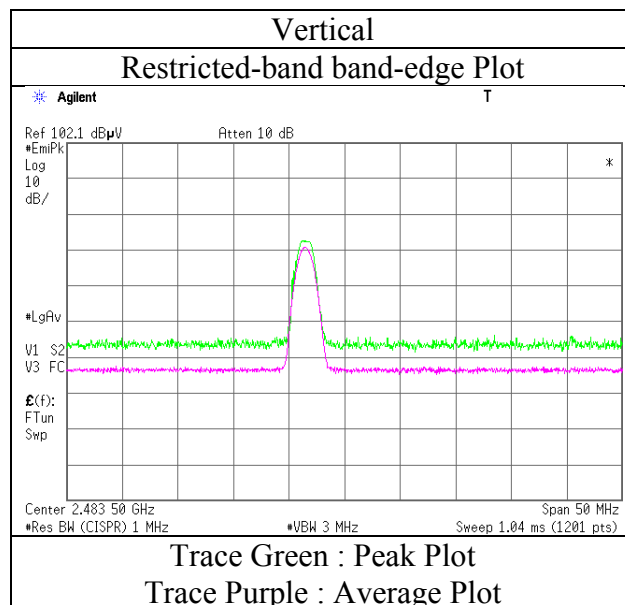
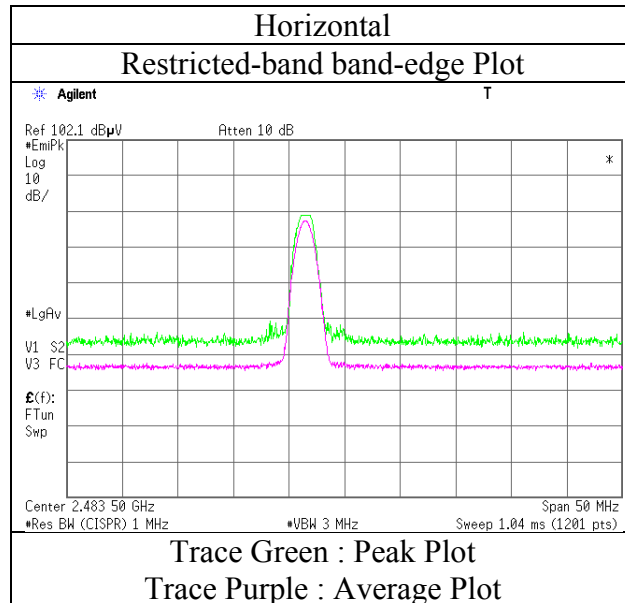
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Radiated Spurious Emission (Reference Plot for band-edge)

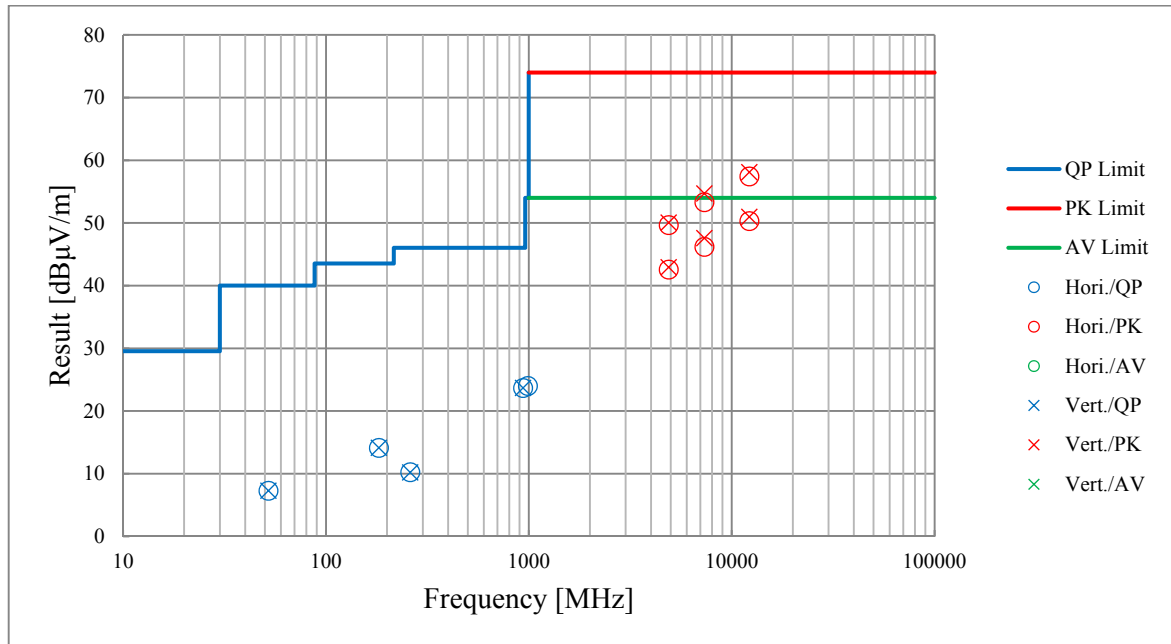
Report No.	12112130S-A-R3
Test place	Shonan EMC Lab.
Semi Anechoic Chamber	No.3
Date	February 16, 2018
Temperature / Humidity	25 deg. C / 32 % RH
Engineer	Hiroyuki Morikawa (1 GHz - 13 GHz)
Mode	Tx BT LE 2480 MHz



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

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

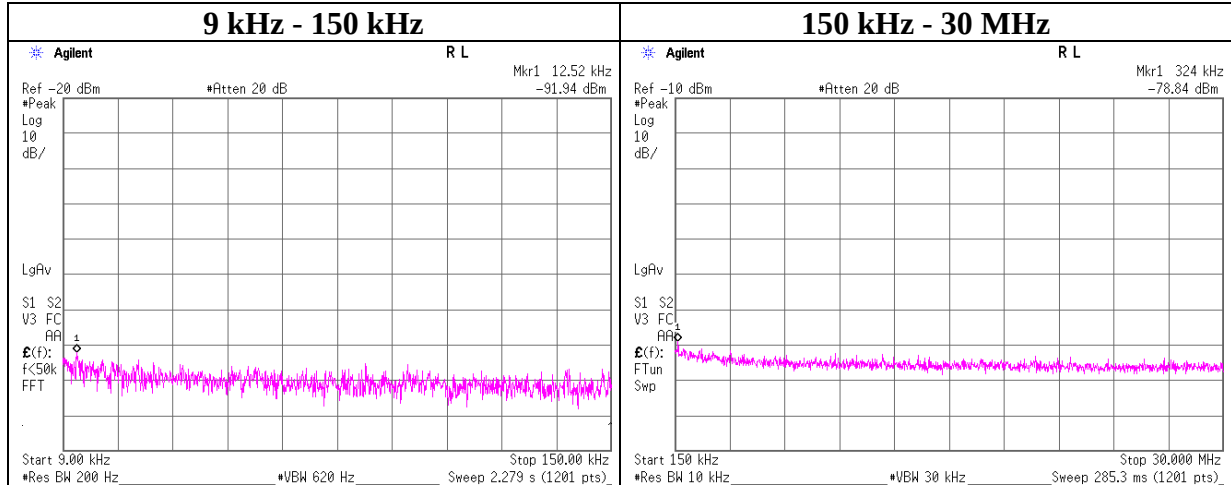
Report No.	12112130S-A-R3	
Test place	Shonan EMC Lab.	
Semi Anechoic Chamber	No.3	No.3
Date	February 16, 2018	February 18, 2018
Temperature / Humidity	25 deg. C / 32 % RH	22 deg. C / 30 % RH
Engineer	Hiroyuki Morikawa (1 GHz - 18 GHz)	Kenichi Adachi (below 1 GHz, above 18 GHz)
Mode	Tx BT LE 2440 MHz	



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

Conducted Spurious Emission

Test place : Shonan EMC Lab. No.6 Shielded Room
Report No. : 12112130S-A-R3
Date : February 8, 2018
Temperature / Humidity : 23 deg. C / 36 % 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
12.52	-91.9	0.51	9.5	2.5	1	-79.4	300	6.0	-18.1	45.6	63.7	
324.00	-78.8	0.51	9.5	2.5	1	-66.3	300	6.0	-5.0	17.3	22.3	

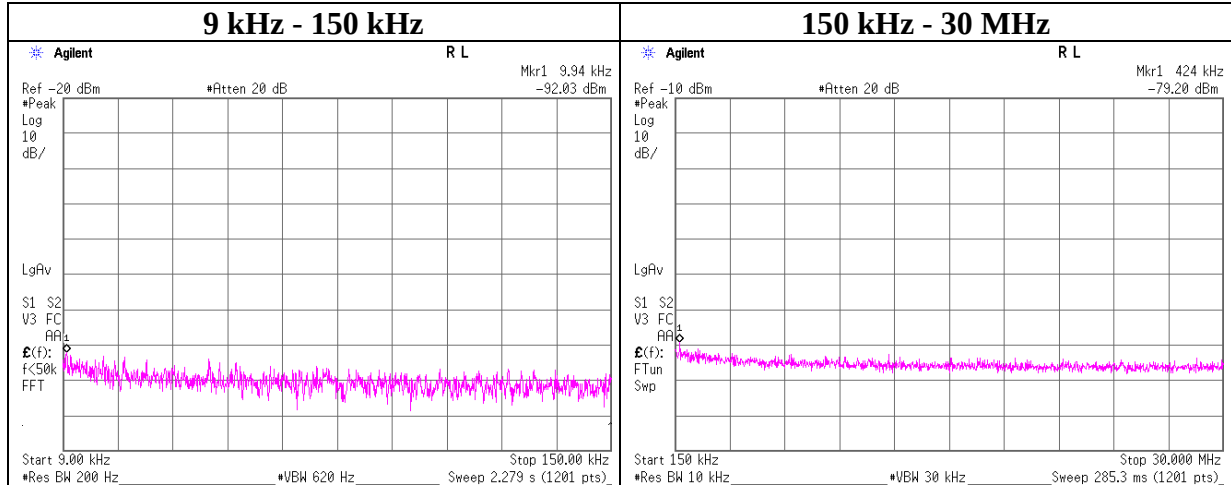
$E \text{ [dBuV/m]} = \text{EIRP [dBm]} - 20 \log (\text{Distance [m]}) + \text{Ground bounce [dB]} + 104.8 \text{ [dBuV/m]}$

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

N: Number of output

Conducted Spurious Emission

Test place : Shonan EMC Lab. No.6 Shielded Room
Report No. : 12112130S-A-R3
Date : February 8, 2018
Temperature / Humidity : 23 deg. C / 36 % 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
9.94	-92.0	0.51	9.5	2.5	1	-79.5	300	6.0	-18.2	47.6	65.8	
424.00	-79.2	0.51	9.5	2.5	1	-66.7	300	6.0	-5.4	15.0	20.4	

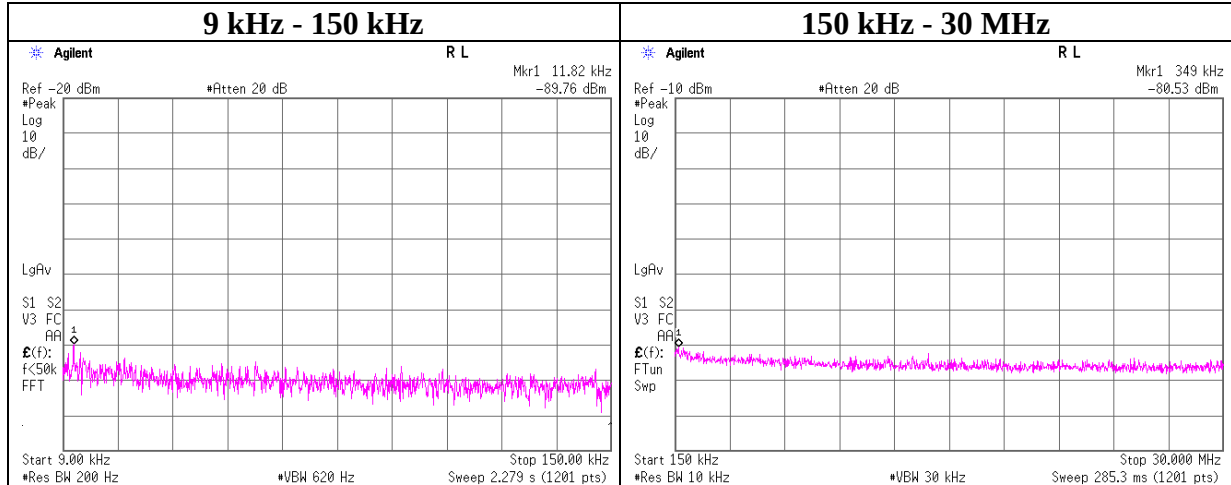
$E \text{ [dBuV/m]} = \text{EIRP [dBm]} - 20 \log (\text{Distance [m]}) + \text{Ground bounce [dB]} + 104.8 \text{ [dBuV/m]}$

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

N: Number of output

Conducted Spurious Emission

Test place : Shonan EMC Lab. No.6 Shielded Room
Report No. : 12112130S-A-R3
Date : February 8, 2018
Temperature / Humidity : 23 deg. C / 36 % 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
11.82	-89.8	0.51	9.5	2.5	1	-77.2	300	6.0	-16.0	46.1	62.1	
349.00	-80.5	0.51	9.5	2.5	1	-68.0	300	6.0	-6.7	16.7	23.4	

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

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

N: Number of output

Power Density

Test place Shonan EMC Lab. No.6 Shielded Room
Report No. 12112130S-A-R3
Date February 8, 2018
Temperature / Humidity 23 deg. C / 36 % RH
Engineer Kazutaka Takeyama
Mode Tx BT LE

BTLE

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result [dBm]	Limit [dBm]	Margin [dB]
2402.00	-20.71	1.22	9.68	-9.81	8.00	17.81
2440.00	-20.22	1.22	9.67	-9.33	8.00	17.33
2480.00	-20.72	1.23	9.67	-9.82	8.00	17.82

Sample Calculation:

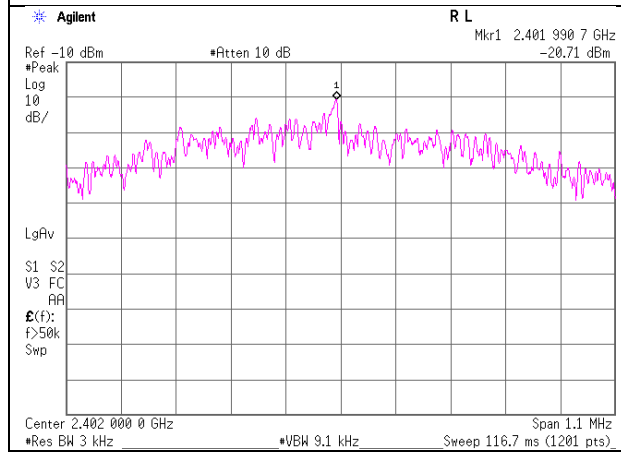
Result = Reading + Cable Loss (including the cable(s) customer supplied) + Attenuator Loss

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

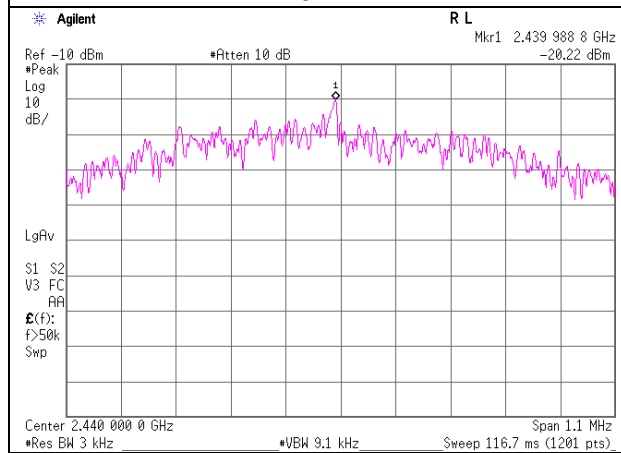
Power Density

BTLE

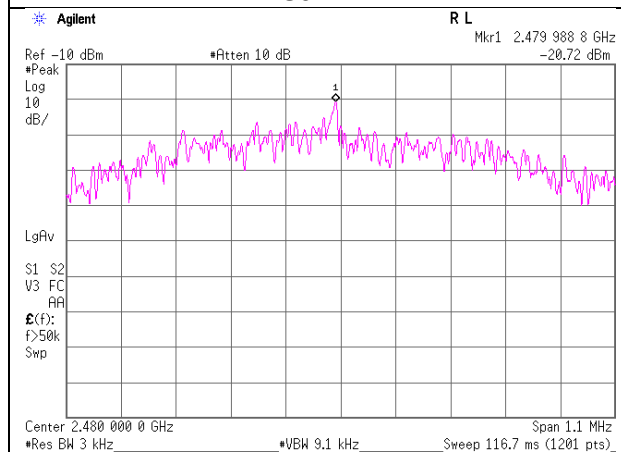
2402 MHz



2440 MHz



2480 MHz



APPENDIX 2: Test instruments

Test Instruments

Control No.	Instrument	Manufacturer	Model No	Serial No	Test Item	Calibration Date * Interval(month)
SSA-02	Spectrum Analyzer	Agilent	E4448A	MY48250106	AT, RE	2017/03/07 * 12
SAT10-09	Attenuator	Weinschel Corp.	54A-10	W5692	AT	2017/11/22 * 12
SCC-G12	Coaxial Cable	Suhner	SUCOFLEX 102	30790/2	AT	2017/03/23 * 12
SPM-07	Power Meter	Agilent	8990B	MY5100272	AT	2017/05/01 * 12
SPSS-04	Power sensor	Agilent	N1923A	MY5326009	AT	2017/05/01 * 12
SOS-10	Humidity Indicator	A&D	AD-5681	4064561	AT	2017/10/30 * 12
STS-06	Digital Hitester	Hioki	3805-50	080997830	AT	2017/03/08 * 12
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	2018/01/29 * 12
SCC-G22	Coaxial Cable	Suhner	SUCOFLEX 104	296199/4	RE	2017/05/08 * 12
SHA-03	Horn Antenna	Schwarzbeck	BBHA9120D	9120D-739	RE	2017/08/23 * 12
SAJ-02	Antenna Tilt Jig	Intelligent System Engineering Co., Ltd	Antenna Tilt Jig	T-S002	RE	Pre Check
SOS-05	Humidity Indicator	A&D	AD-5681	4062518	RE	2017/10/30 * 12
SJM-02	Measure	KOMELON	KMC-36	-	RE	-
SAEC-03(SVS WR)	Semi-Anechoic Chamber	TDK	SAEC-03(SVSWR)	3	RE	2017/07/17 * 12
COTS-SEMI-1	EMI Software	TSJ	TEPTO-DV(RE,CE,RFI,M F)	-	RE	-
STS-03	Digital Hitester	Hioki	3805-50	080997823	RE	2017/10/16 * 12
SCC-G40	Coaxial Cable	Junkosha	MWX221-01000NFSNMS/B	1612S005	RE	2018/01/29 * 12
SAT10-06	Attenuator	Agilent	8493C-010	74865	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	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/SRS E-03	Coaxial Cable&RF Selector	Fujikura/Fujikura/Suhner/Suhner/Suhner/T OYO	8D2W/12DSFA/141PE/141PE/141PE/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
SHA-04	Horn Antenna	ETS LINDGREN	3160-09	LM9861	RE	2017/07/11 * 12
SAF-08	Pre Amplifier	TOYO Corporation	HAP18-26W	00000019	RE	2017/03/17 * 12
SCC-G33	Coaxial Cable	Junkosha	MWX241-01000KMSKMS	-	RE	2017/04/20 * 12
SCC-G15	Coaxial Cable	Suhner	SUCOFLEX 102	32703/2	RE	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

UL Japan, Inc.

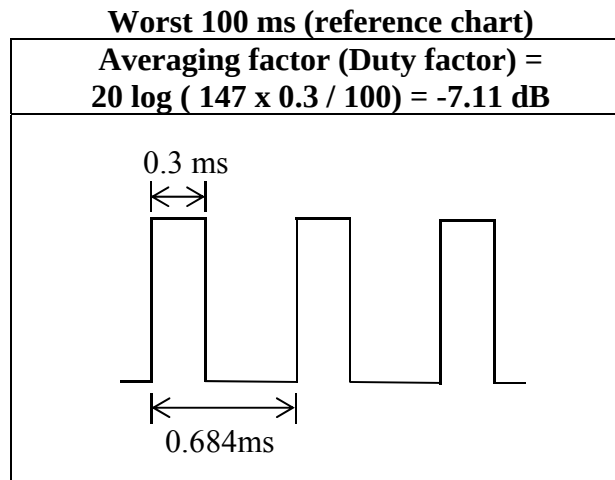
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APPENDIX 4: Average factor (Duty factor)



- * Worst Transmit Duty cycle BLE is Data communication mode which max on time is 0.3 ms and Minimum interval is 0.684 ms (Refer to BLE Worst Transmit Duty sheet).
The ON time (0.3 ms) appears 147 times (100 / 0.684) in 100 ms.
The actual measurement value was applied as Averaging factor (Duty factor).
(This specification is from customer)

End of Report