RADIO TEST REPORT

Test Report No. : 11081928H-B

Applicant	:	**DENSO CORPORATION**
Type of Equipment	:	**Control Box**
Model No.	:	**DNNS087**
FCC ID	:	**HYQDNNS087**
Test regulation	:	**FCC Part 15 Subpart C: 2015 (WLAN, Bluetooth Low Energy parts)**
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. This test report must not be used by the customer to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.
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: February 15 to 19, 2016

Representative test engineer:
Kazuya Yoshioka
Engineer
Consumer Technology Division

Approved by:
Takayuki Shimada
Engineer
Consumer Technology Division

NVLAP LAB CODE: 200572-0

This laboratory is accredited by the NVLAP LAB CODE 200572-0, U.S.A. The tests reported herein have been performed in accordance with its terms of accreditation.
*As for the range of Accreditation in NVLAP, you may refer to the WEB address,
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REVISION HISTORY

Original Test Report No.: 11081928H-B

Revision	Test report No.	Date	Page revised	Contents
- (Original)	11081928H-B	March 22, 2016	-	-

CONTENTS PAGE

SECTION 1: Customer information....4
SECTION 2: Equipment under test (E.U.T.)....4
SECTION 3: Test specification, procedures & results....6
SECTION 4: Operation of E.U.T. during testing....9
SECTION 5: Radiated Spurious Emission....11
SECTION 6: Antenna Terminal Conducted Tests....13
APPENDIX 1: Test data....14
6dB Bandwidth....14
Maximum Peak Output Power....19
Average Output Power....23
Radiated Spurious Emission....28
Conducted Spurious Emission....45
Power Density....49
99%Occupied Bandwidth....55
APPENDIX 2: Test instruments....58
APPENDIX 3: Photographs of test setup....59
Radiated Spurious Emission....59

SECTION 1: Customer information

Company Name	:	DENSO CORPORATION
Address	:	1-1 Showa-cho, Kariya-shi, Aichi-ken, 448-8661 Japan
Telephone Number	:	+81-566-26-5919
Facsimile Number	:	+81-566-25-4920
Contact Person	:	Isamu Suzuki

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

2.1 Identification of E.U.T.

Type of Equipment	:	Control Box
Model No.	:	DNNS087
Serial No.	:	Refer to Section 4, Clause 4.2
Rating	:	DC 12 V
Receipt Date of Sample	:	February 11, 2016
Country of Mass-production	:	United States of America
Condition of EUT	:	Production prototype (Not for Sale: This sample is equivalent to mass-produced items.)
Modification of EUT	:	No Modification by the test lab

2.2 Product Description

Model: DNNS087 (referred to as the EUT in this report) is a Control Box.

General Specification

Clock frequency(ies) in the system	:	533 MHz 32.768 kHz, 37.4 MHz (Crystal)
Operating Temperature	:	-30 deg. C - +70 deg. C

Radio Specification

Radio Type	:	Transceiver
Power Supply (inner)	:	DC 3.3 V (VDD) DC 1.8 V (VIO)

	IEEE802.11b *1)	IEEE802.11g/n *1) (20 M band)	IEEE802.11a/n/ac (20 M band)	IEEE802.11n/ac (40 M band)	IEEE802.11ac (80 M band)
Frequency of operation	2412 MHz - 2462 MHz	2412 MHz - 2462 MHz	5180 MHz - 5240 MHz 5260 MHz - 5320 MHz 5500 MHz - 5720 MHz 5745 MHz - 5825 MHz	5190 MHz - 5230 MHz 5270 MHz - 5310 MHz 5510 MHz - 5710 MHz 5755 MHz - 5795 MHz	5210 MHz 5290 MHz 5530 MHz - 5690 MHz 5775 MHz
Type of modulation	DSSS (CCK, DQPSK, DBPSK)	OFDM-CCK (64QAM, 16QAM, QPSK, BPSK)	OFDM (64QAM, 16QAM, QPSK, BPSK, 256QAM(IEEE802.11ac only))		
Channel spacing	5MHz		20MHz	40MHz	80MHz
Antenna type	ASSEMBLY WiFi Antenna				
Antenna Connector type	MHF PLUG				
Antenna Gain	-3.2 dBi				

	GPS	Bluetooth Ver.4.1 with EDR function *1)
Frequency of operation	1575.42 MHz	2402 MHz - 2480 MHz
Type of modulation	BPSK	BT: FHSS (GFSK, π/4-DQPSK, 8-DPSK) LE: GFSK
Channel spacing	-	BT: 1 MHz LE: 2 MHz
Antenna type	ANTENNA ASSY, GPS	ASSEMBLY WiFi Antenna
Antenna Connector type	FAKRA	MHF PLUG
Antenna Gain	26.5 dBi	-3.2 dBi

*1) This test report applies to WLAN (2.4 GHz band) and Bluetooth Low Energy.
*Wireless LAN and Bluetooth do not transmit simultaneously.

SECTION 3: Test specification, procedures & results

3.1 Test Specification

Test Specification	:	FCC Part 15 Subpart C: 2015, final revised on November 23, 2015 *Some parts are effective on and after December 17, 2015 or December 23, 2015. The revision does not affect the test specification applied to the EUT.
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 EUT complies with FCC Part 15 Subpart B: 2015, final revised on November 23, 2015.

3.2 Procedures and results

Item	Test Procedure	Specification	Worst margin	Results	Remarks
Conducted Emission	**FCC:** ANSI C63.10-2013 6. Standard test methods	**FCC:** Section 15.207	N/A	N/A *1)	-
	IC: RSS-Gen 8.8	**IC:** RSS-Gen 8.8			
6dB Bandwidth	**FCC:** KDB 558074 D01 DTS Meas Guidance v03r04	**FCC:** Section 15.247(a)(2)	See data.	Complied	Conducted
	IC: -	**IC:** RSS-247 5.2(1)			
Maximum Peak Output Power	**FCC:** KDB 558074 D01 DTS Meas Guidance v03r04	**FCC:** Section 15.247(b)(3)		Complied	Conducted
	IC: RSS-Gen 6.12	**IC:** RSS-247 5.4(4)			
Power Density	**FCC:** KDB 558074 D01 DTS Meas Guidance v03r04	**FCC:** Section 15.247(e)		Complied	Conducted
	IC: -	**IC:** RSS-247 5.2(2)			
Spurious Emission Restricted Band Edges	**FCC:** KDB 558074 D01 DTS Meas Guidance v03r04	**FCC:** Section15.247(d)	3.6 dB 797.998 MHz, QP, Vert.	Complied	Conducted (below 30 MHz)/ Radiated (above 30 MHz) *2)
	IC: RSS-Gen 6.13	**IC:** RSS-247 5.5 RSS-Gen 8.9 RSS-Gen 8.10			

Note: UL Japan, Inc.'s EMI Work Procedures No. 13-EM-W0420 and 13-EM-W0422.
*1) The test is not applicable since the EUT is not the device that is designed to be connected to the public utility (AC) power line.
*2) Radiated test was selected over 30 MHz based on section 15.247(d) and KDB 558074 D01 DTS Meas Guidance v03r04 12.2.7.

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

FCC 15.31 (e)

The EUT provides stable voltage (DC 1.8 V / DC 3.3.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 vehicle. Therefore, the equipment complies with the antenna requirement of Section 15.203.

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

EMI

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

Ise EMC Lab.

Antenna terminal test Uncertainty (+/-)							
Power meter		Conducted emission and Power density			Conducted emission		Channel power
Below 1 GHz	Above 1 GHz	Below 1 GHz	1 GHz -3 GHz	3 GHz -18 GHz	18 GHz -26.5 GHz	26.5 GHz -40 GHz	
0.9 dB	1.0 dB	1.4 dB	1.7 dB	2.8 dB	2.8 dB	2.9 dB	2.6 dB

Test distance	Radiated emission (±dB) 9 kHz - 30 MHz
3m	3.8 dB
10m	3.7 dB

Polarity	Radiated emission (Below 1GHz)			
	(3 m*)(±dB)		(10 m*)(±dB)	
	30 – 300 MHz	300 – 1000MHz	30 – 300 MHz	300 – 1000MHz
Horizontal	4.8 dB	5.2 dB	4.8 dB	5.0 dB
Vertical	4.5 dB	5.9 dB	4.8 dB	5.1 dB

Radiated emission				
(3 m*)(±dB)		(1 m*)(±dB)	(0.5 m*)(±dB)	(10 m*)(±dB)
1 – 6GHz	6 – 18GHz	10 – 26.5 GHz	26.5 – 40GHz	1 -18 GHz
5.1 dB	5.3 dB	5.1 dB	5.1 dB	5.3 dB

*Measurement distance

Radiated emission test

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

3.5 Test Location

UL Japan, Inc. Ise EMC Lab. *NVLAP Lab. code: 200572-0
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN
Telephone: +81 596 24 8999, Facsimile: +81 596 24 8124

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

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

3.6 Test data, Test instruments, and Test set up

Refer to APPENDIX.

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

4.1 Operating Mode(s)

Test operating mode was determined as follows according to "Section 1 of 6 802.11 a/b/g/n testing - Managing Complex Regulatory Approvals - " of TCB Council Workshop October 2009 and also was judged the necessity of 802.11ac mode by the pre-test.

Mode	Remarks*
IEEE 802.11b (11b)	11 Mbps, PN9
IEEE 802.11g (11g)	48 Mbps, PN9
IEEE 802.11n SISO 20 MHz BW (11n-20)	MCS 3, PN9
Bluetooth Low Energy (BT LE)	Maximum Packet Size, PN9
*The worst condition was determined based on the test result of Maximum Peak Output Power (Mid Channel)	

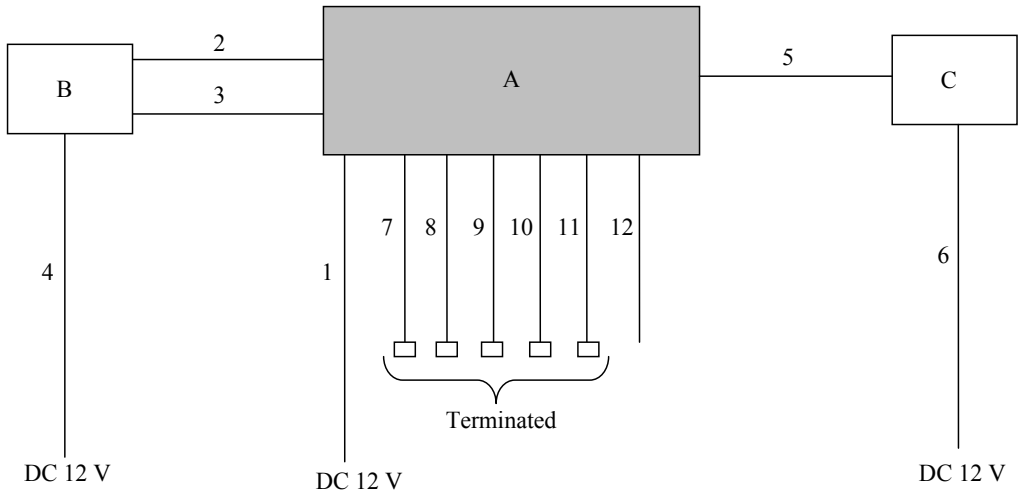
*Power of the EUT was set by the software as follows;
[WLAN]
Power settings: 11b 15dBm
11g 11dBm
11n-20 MCS0-6 11dBm MCS7 10dBm
Software: bcmcX Ver1.0.4.3
[BT LE]
Power settings: 0dBm
Software: Bluetool Ver 1.8.7.3
*This setting of software is the worst case.
Any conditions under the normal use do not exceed the condition of setting.
In addition, end users cannot change the settings of the output power of the product.

*The details of Operating mode(s)

Test Item	Operating Mode	Tested frequency
Radiated Spurious Emission (Above 1GHz)	11b Tx 11n-20 Tx *1)	2412 MHz 2437 MHz 2462 MHz
	BT LE Tx	2402 MHz 2440 MHz 2480 MHz
6dB Bandwidth Maximum Peak Output Power Power Density 99% Occupied Bandwidth	11b Tx 11g Tx 11n-20 Tx	2412 MHz 2437 MHz 2462 MHz
	BT LE Tx	2402 MHz 2440 MHz 2480 MHz
Conducted Spurious Emission, Radiated Spurious Emission (Below 1GHz)	11n-20 Tx *2)	2462 MHz
	BT LE Tx	2402 MHz 2440 MHz 2480 MHz

*1) Since 11g and 11n-20 have the same modulation method and no differences in transmitting specification, test was performed on the representative mode that had the highest peak output power.
*2) The mode was tested as a representative, because it had the highest power at antenna terminal test.

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 and Support equipment

No.	Item	Model number	Serial number	Manufacturer	Remarks
A	Control Box	DNNS087	002 *1) 001 *2)	DENSO CORPORATION	EUT
B	Jig	-	-	-	-
C	Display	703748	AUO-1507019	SPECTRUM DIGITAL INCORPORATED	-

*1) Used for Antenna Terminal conducted tests
*2) Used for Conducted Emission and Radiated Spurious Emission tests

List of cables used

No.	Name	Length (m)	Shield		Remarks
			Cable	Connector	
1	DC Cable	2.0	Unshielded	Unshielded	-
2	MOST Cable (Red)	2.0	Shielded	Shielded	-
3	MOST Cable (Green)	2.0	Shielded	Shielded	-
4	DC Cable	2.0	Unshielded	Unshielded	-
5	LVDS Cable	2.0	Shielded	Shielded	-
6	DC Cable	2.0	Unshielded	Unshielded	-
7	GPS Cable	2.0	Shielded	Shielded	-
8	Camera Cable	2.0	Unshielded	Unshielded	-
9	USB Cable	2.0	Shielded	Shielded	-
10	USB Cable	2.0	Shielded	Shielded	-
11	USB Cable	2.0	Shielded	Shielded	-
12	HDMI Cable	2.0	Shielded	Shielded	-

SECTION 5: Radiated Spurious Emission

Test Procedure

It was measured based on "11.0 Emissions in non-restricted frequency bands" of "558074 D01 DTS Meas Guidance v03r04".

[For below 1GHz]
EUT was placed on a urethane platform of nominal size, 1.0 m by 1.5 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 1GHz]
EUT was placed on a urethane platform of nominal size, 0.5 m by 0.5 m, raised 1.5 m above the conducting ground plane.
The Radiated Electric Field Strength has been measured in a Semi Anechoic Chamber with absorbent materials lined on a ground plane.

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

Test Antennas are used as below;

Frequency	30 MHz to 300 MHz	300 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: 12.2.5.2 RBW: 1 MHz VBW: 3 MHz Detector: Power Averaging (RMS) Trace: 100 traces Duty factor was added to the results.	RBW: 100 kHz VBW: 300kHz
Test Distance	3m	4.4 m *2) (1 GHz – 10GHz), 1 m *3) (10 GHz – 26.5 GHz)		4.4 m *2) (1 GHz – 10GHz), 1 m *3) (10 GHz – 26.5 GHz)

*1) Average Power Measurement was performed based on 6.0 & 12.2.5 of "KDB 558074 D01 DTS Meas Guidance v03r04"
*2) Distance Factor: 20 x log (4.4 m / 3.0 m) = 3.3 dB
*3) Distance Factor: 20 x log (1.0 m / 3.0 m) = -9.5 dB

The test was made on EUT at the normal use position.

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

Measurement range : 30 M - 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	20 MHz / 10 MHz	100 kHz / 30 kHz	300 kHz / 100 kHz	Auto	Peak	Max Hold	Spectrum Analyzer
99% Occupied Bandwidth *1)	Enough width to display emission skirts	1 to 5 % of OBW	Three times of RBW	Auto	Peak	Max Hold	Spectrum Analyzer
Maximum Peak Output Power	-	-	-	Auto	Peak/ Average *2)	-	Power Meter (Sensor: 50 MHz BW)
Peak Power Density	1.5 times the 6dB Bandwidth	3 kHz	10 kHz	Auto	Peak	Max Hold	Spectrum Analyzer *3)
Conducted Spurious Emission *4)	9kHz to 150kHz	200 Hz	620 Hz	Auto	Peak	Max Hold	Spectrum Analyzer
	150kHz to 30MHz	9.1 kHz	27 kHz				

*1) Peak hold was applied as Worst-case measurement.
*2) Reference data
*3) Section 10.2 Method PKPSD (peak PSD) of "KDB 558074 D01 DTS Meas Guidance v03r04".
*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 = 9.1 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

APPENDIX 1: Test data

6dB Bandwidth

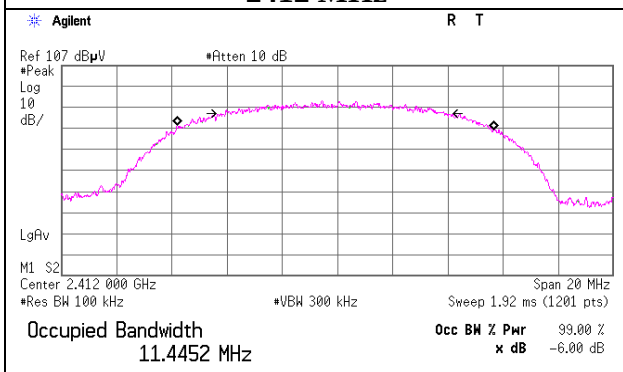
Test place	Ise EMC Lab. No.6 Measurement Room
Report No.	11081928H
Date	February 19, 2016
Temperature / Humidity	21deg. C / 41 % RH
Engineer	Ken Fujita
Mode	Tx

Mode	Frequency [MHz]	6dB Bandwidth [MHz]	Limit [kHz]
11b	2412	7.921	> 500
	2437	8.443	> 500
	2462	8.259	> 500
11g	2412	16.455	> 500
	2437	16.450	> 500
	2462	16.457	> 500
11n-20	2412	17.763	> 500
	2437	17.715	> 500
	2462	17.710	> 500

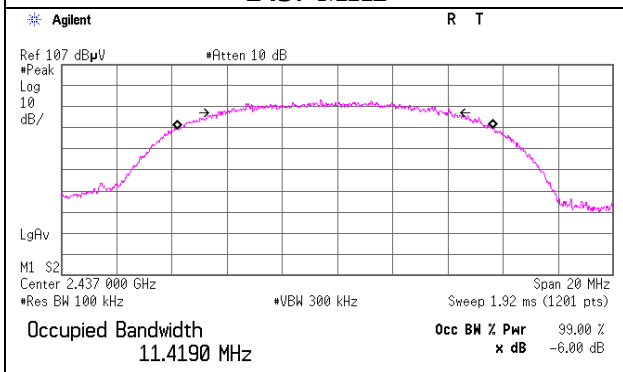
6dB Bandwidth

11b

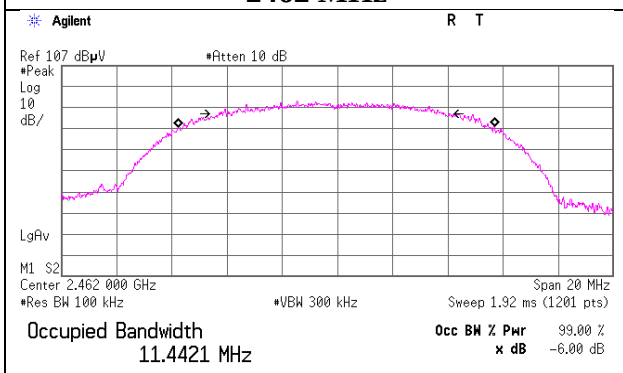
2412 MHz



2437 MHz

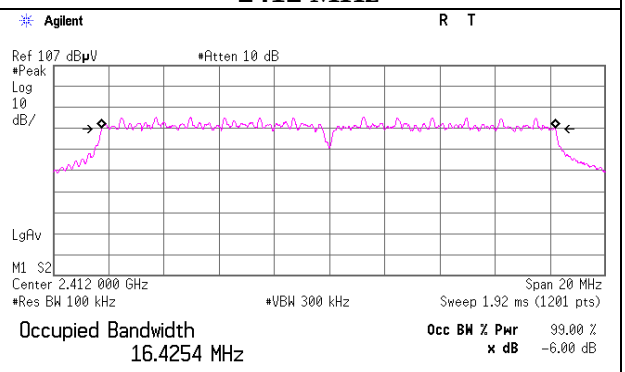


2462 MHz

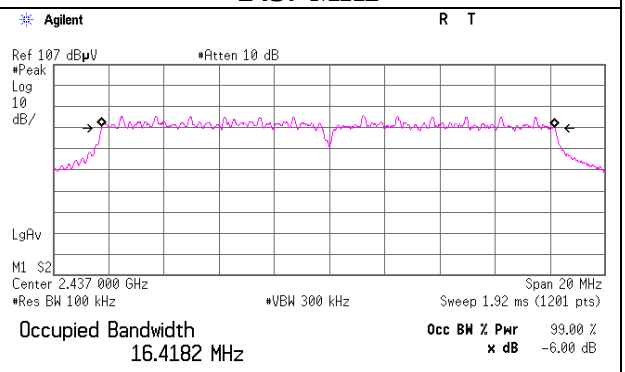


11g

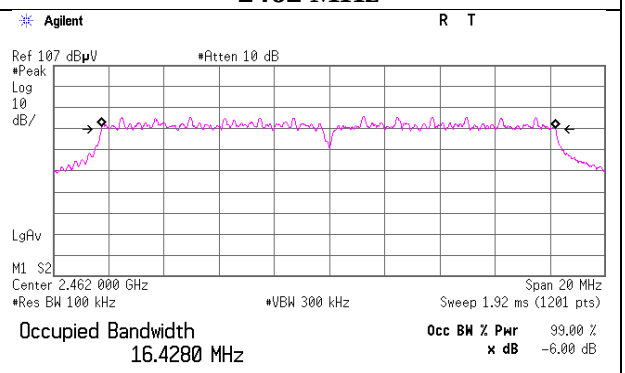
2412 MHz



2437 MHz



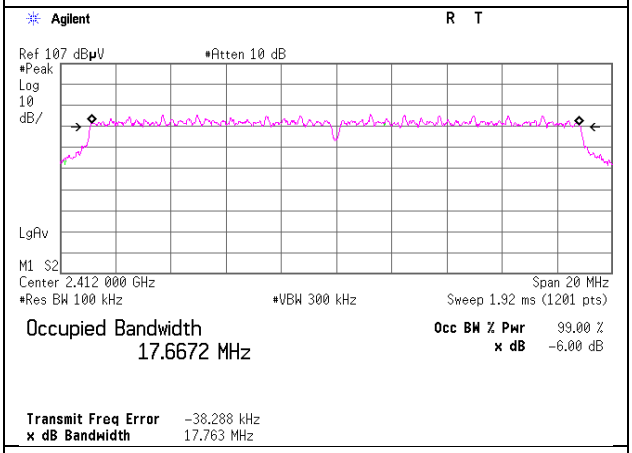
2462 MHz



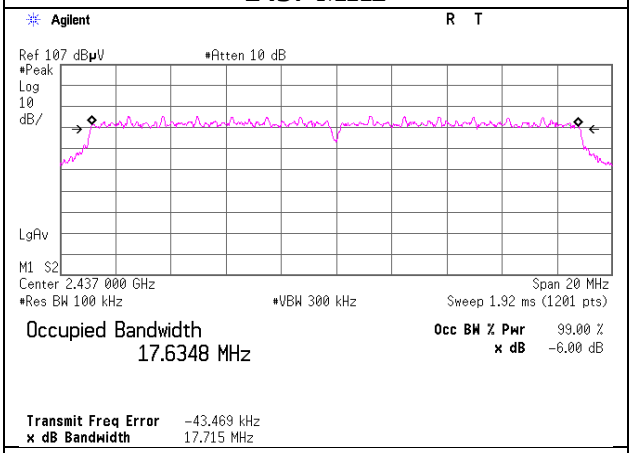
6dB Bandwidth

11n-20

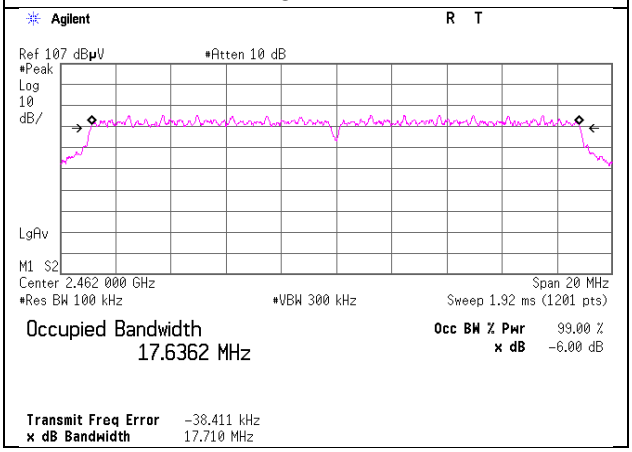
2412 MHz



2437 MHz



2462 MHz



6dB Bandwidth

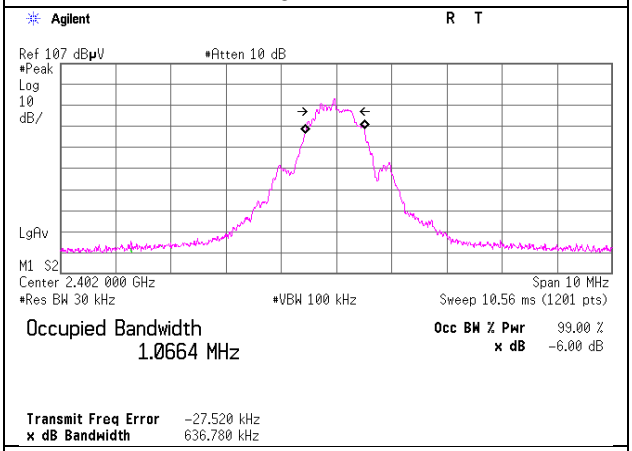
Test place	Ise EMC Lab. No.6 Measurement Room
Report No.	11081928H
Date	February 19, 2016
Temperature / Humidity	21deg. C / 41 % RH
Engineer	Ken Fujita
Mode	Tx BT LE

Frequency [MHz]	6dB Bandwidth [MHz]	Limit [kHz]
2402	0.637	> 500
2440	0.644	> 500
2480	0.638	> 500

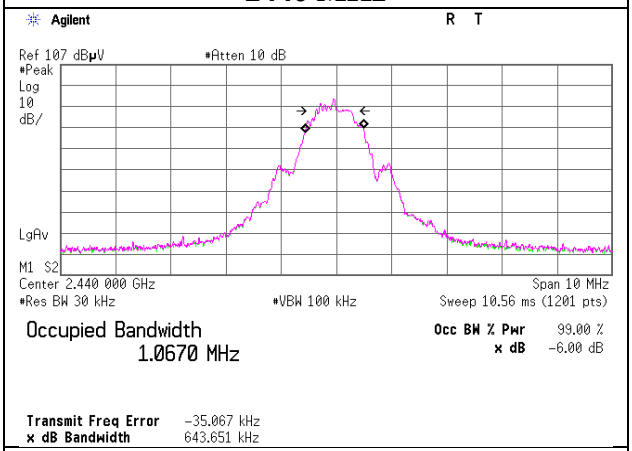
6dB Bandwidth

BT LE

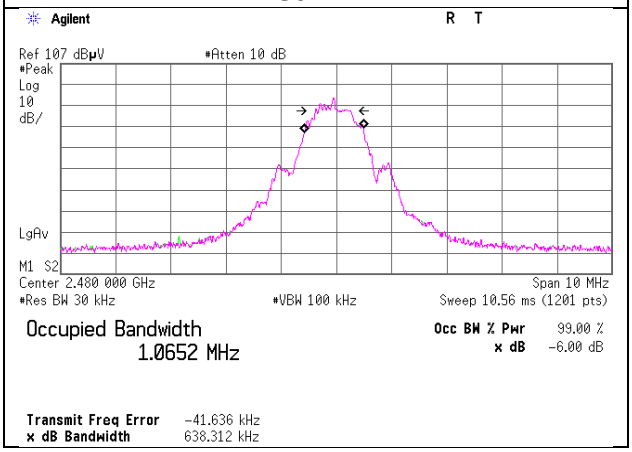
2402 MHz



2440 MHz



2480 MHz



Maximum Peak Output Power

Test place	Ise EMC Lab. No.6 Measurement Room
Report No.	11081928H
Date	February 15, 2016
Temperature / Humidity	23deg. C / 39 % RH
Engineer	Kazuya Yoshioka
Mode	Tx 11b

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result [dBm]	Result [mW]	Limit [dBm]	Limit [mW]	Margin [dB]
2412	4.77	3.43	9.54	17.74	59.43	30.00	1000	12.26
2437	4.71	3.50	9.54	17.75	59.57	30.00	1000	12.25
2462	4.98	3.52	9.54	18.04	63.68	30.00	1000	11.96

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

2437MHz

Rate [Mbps]	Reading [dBm]	Remark
1	4.25	
2	4.52	
5.5	4.51	
11	4.71	*

*: Worst Rate
All comparison were carried out on same frequency and measurement factors.

Maximum Peak Output Power

Test place	Ise EMC Lab. No.6 Measurement Room
Report No.	11081928H
Date	February 15, 2016
Temperature / Humidity	23deg. C / 39 % RH
Engineer	Kazuya Yoshioka
Mode	Tx 11g

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result [dBm]	Result [mW]	Limit [dBm]	Limit [mW]	Margin [dB]
2412	6.52	3.43	9.54	19.49	88.92	30.00	1000	10.51
2437	6.15	3.50	9.54	19.19	82.99	30.00	1000	10.81
2462	6.60	3.52	9.54	19.66	92.47	30.00	1000	10.34

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

2437 MHz

Rate [Mbps]	Reading [dBm]	Remark
6	3.88	
9	3.64	
12	3.59	
18	3.52	
24	5.70	
36	6.03	
48	6.15	*
54	5.37	

*: Worst Rate
All comparison were carried out on same frequency and measurement factors.

Maximum Peak Output Power

Test place	Ise EMC Lab. No.6 Measurement Room
Report No.	11081928H
Date	February 15, 2016
Temperature / Humidity	23deg. C / 39 % RH
Engineer	Kazuya Yoshioka
Mode	Tx 11n-20

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result [dBm]	Result [mW]	Limit [dBm]	Limit [mW]	Margin [dB]
2412	6.60	3.43	9.54	19.57	90.57	30.00	1000	10.43
2437	6.55	3.50	9.54	19.59	90.99	30.00	1000	10.41
2462	6.75	3.52	9.54	19.81	95.72	30.00	1000	10.19

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

2437 MHz

MCS Number	Reading [dBm]	Remark
0	3.99	
1	3.94	
2	3.97	
3	6.55	*
4	6.26	
5	6.22	
6	6.36	
7	5.37	

*: Worst Rate
All comparison were carried out on same frequency and measurement factors.

Maximum Peak Output Power

Test place	Ise EMC Lab. No.6 Measurement Room
Report No.	11081928H
Date	February 19, 2016
Temperature / Humidity	21deg. C / 41 % RH
Engineer	Ken Fujita
Mode	Tx BT LE

Freq.	Reading	Cable Loss	Atten. Loss	Result		Limit		Margin
[MHz]	[dBm]	[dB]	[dB]	[dBm]	[mW]	[dBm]	[mW]	[dB]
2402	-14.02	3.43	9.53	-1.06	0.78	30.00	1000	31.06
2440	-13.49	3.50	9.54	-0.45	0.90	30.00	1000	30.45
2480	-13.84	3.52	9.54	-0.78	0.84	30.00	1000	30.78

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

Average Output Power
(Reference data)

Test place	Ise EMC Lab. No.6 Measurement Room
Report No.	11081928H
Date	February 15, 2016
Temperature / Humidity	23deg. C / 39 % RH
Engineer	Kazuya Yoshioka
Mode	Tx

11b **1 Mbps**

Freq.	Reading	Cable Loss	Atten. Loss	Result (Frame power)		Duty factor	Result (Burst power)	
[MHz]	[dBm]	[dB]	[dB]	[dBm]	[mW]	[dB]	[dBm]	[mW]
2412	1.06	3.43	9.54	14.03	25.29	0.04	14.07	25.53
2437	0.94	3.50	9.54	13.98	25.00	0.04	14.02	25.23
2462	1.15	3.52	9.54	14.21	26.36	0.04	14.25	26.61

11g **6 Mbps**

Freq.	Reading	Cable Loss	Atten. Loss	Result (Frame power)		Duty factor	Result (Burst power)	
[MHz]	[dBm]	[dB]	[dB]	[dBm]	[mW]	[dB]	[dBm]	[mW]
2412	-3.59	3.43	9.54	9.38	8.67	0.29	9.67	9.27
2437	-3.54	3.50	9.54	9.50	8.91	0.29	9.79	9.53
2462	-3.40	3.52	9.54	9.66	9.25	0.29	9.95	9.89

11n-20 **MCS 0**

Freq.	Reading	Cable Loss	Atten. Loss	Result (Frame power)		Duty factor	Result (Burst power)	
[MHz]	[dBm]	[dB]	[dB]	[dBm]	[mW]	[dB]	[dBm]	[mW]
2412	-3.62	3.43	9.54	9.35	8.61	0.31	9.66	9.25
2437	-3.77	3.50	9.54	9.27	8.45	0.31	9.58	9.08
2462	-3.55	3.52	9.54	9.51	8.93	0.31	9.82	9.59

Sample Calculation:
Result (Frame power) = Reading + Cable Loss (including the cable(s) customer supplied) + Attenuator
Result (Burst power) = Frame power + Duty factor

The test was performed with condition that obtained the maximum frame power in pre-check.

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

Test place	Ise EMC Lab. No.6 Measurement Room
Report No.	11081928H
Date	February 19, 2016
Temperature / Humidity	21deg. C / 41 % RH
Engineer	Ken Fujita
Mode	Tx BT LE

Freq.	Reading	Cable Loss	Atten. Loss	Result (Frame power)		Duty factor	Result (Burst power)	
[MHz]	[dBm]	[dB]	[dB]	[dBm]	[mW]	[dB]	[dBm]	[mW]
2402	-16.83	3.43	9.54	-3.86	0.41	1.97	-1.89	0.65
2440	-16.22	3.50	9.54	-3.18	0.48	1.97	-1.21	0.76
2480	-16.59	3.52	9.54	-3.53	0.44	1.97	-1.56	0.70

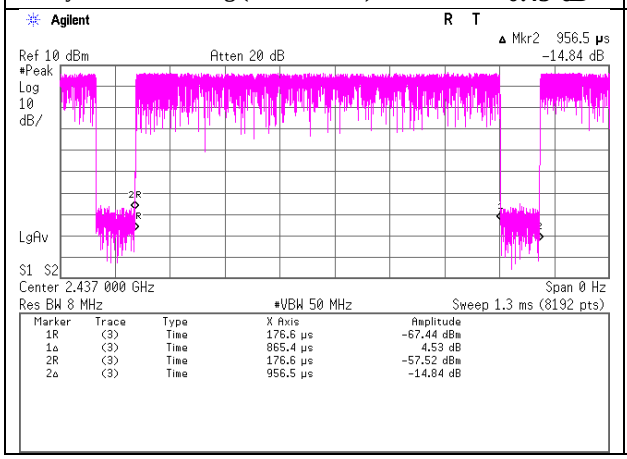
Sample Calculation:
Result (Frame power) = Reading + Cable Loss (including the cable(s) customer supplied) + Attenuator
Result (Burst power) = Frame power + Duty factor

Burst rate confirmation

Test place	Ise EMC Lab. No.6 Measurement Room
Report No.	11081928H
Date	February 15, 2016
Temperature / Humidity	23deg. C / 39 % RH
Engineer	Kazuya Yoshioka
Mode	Tx

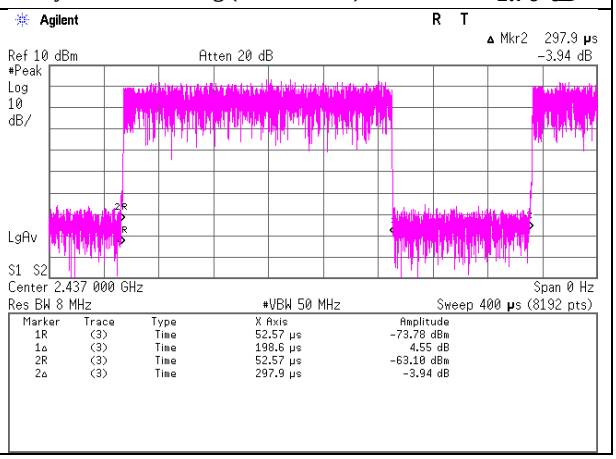
11b 11 Mbps

Tx on / (Tx on + Tx off) =	**0.905**
Tx on / (Tx on + Tx off) * 100 =	**90.5 %**
Duty factor = 10 * log (956.5 / 865.4) =	**0.43 dB**



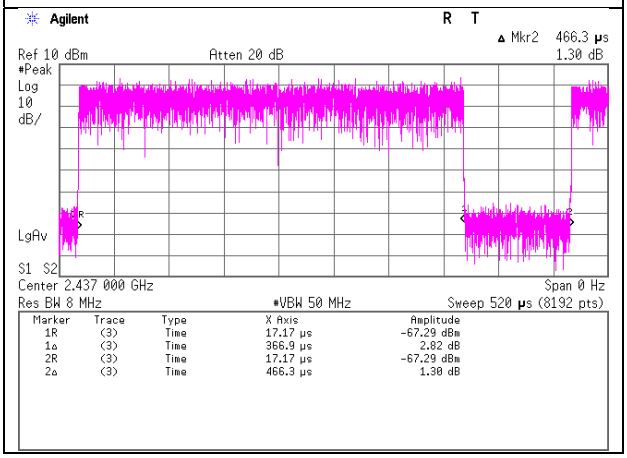
11g 48 Mbps

Tx on / (Tx on + Tx off) =	**0.667**
Tx on / (Tx on + Tx off) * 100 =	**66.7 %**
Duty factor = 10 * log (297.9 / 198.6) =	**1.76 dB**



11n-20 MCS 3

Tx on / (Tx on + Tx off) =	**0.787**
Tx on / (Tx on + Tx off) * 100 =	**78.7 %**
Duty factor = 10 * log (466.3 / 366.9) =	**1.04 dB**

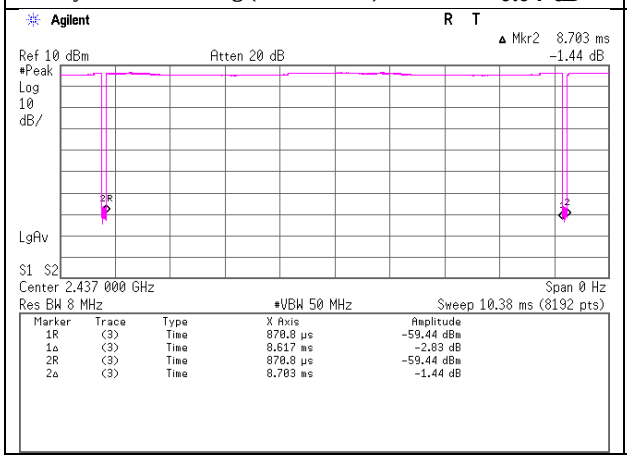


Burst rate confirmation

Test place	Ise EMC Lab. No.6 Measurement Room
Report No.	11081928H
Date	February 15, 2016
Temperature / Humidity	23deg. C / 39 % RH
Engineer	Kazuya Yoshioka
Mode	Tx

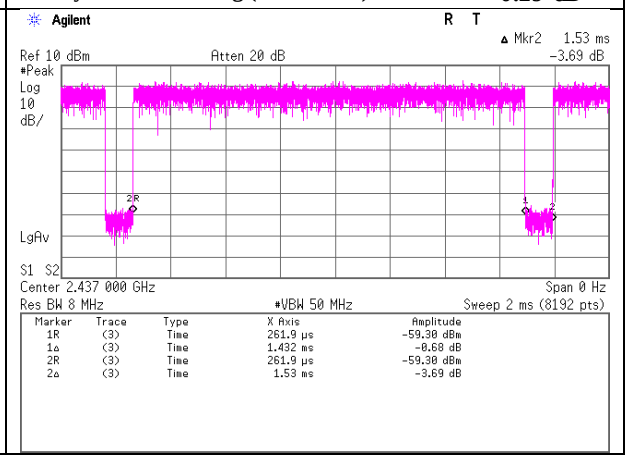
11b 1 Mbps

Tx on / (Tx on + Tx off) =	**0.990**
Tx on / (Tx on + Tx off) * 100 =	**99.0 %**
Duty factor = 10 * log (8.703 / 8.617) =	**0.04 dB**



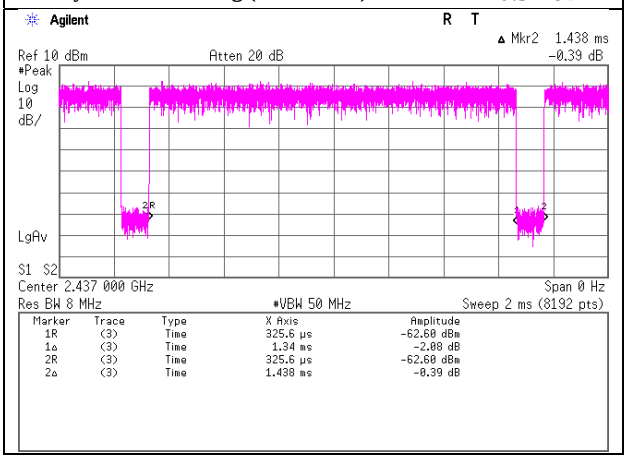
11g 6 Mbps

Tx on / (Tx on + Tx off) =	**0.936**
Tx on / (Tx on + Tx off) * 100 =	**93.6 %**
Duty factor = 10 * log (1.53 / 1.432) =	**0.29 dB**



11n-20 MCS 0

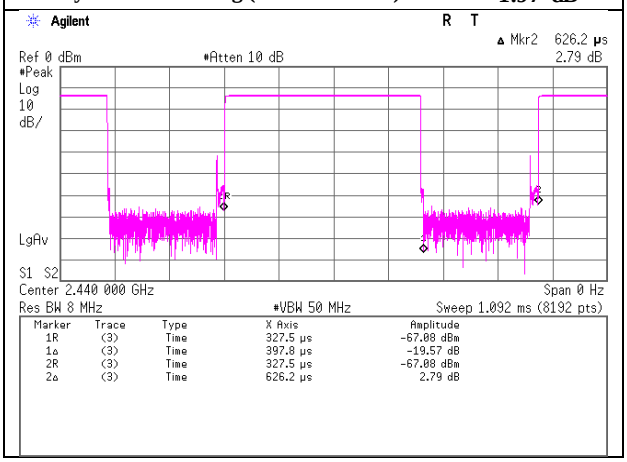
Tx on / (Tx on + Tx off) =	**0.932**
Tx on / (Tx on + Tx off) * 100 =	**93.2 %**
Duty factor = 10 * log (1.438 / 1.34) =	**0.31 dB**



Burst rate confirmation

Test place	Ise EMC Lab. No.6 Measurement Room
Report No.	11081928H
Date	February 19, 2016
Temperature / Humidity	21deg. C / 41 % RH
Engineer	Ken Fujita
Mode	Tx BT LE

Tx on / (Tx on + Tx off) =	**0.635**
Tx on / (Tx on + Tx off) * 100 =	**63.5 %**
Duty factor = 10 * log (0.6262 / 0.3978) =	**1.97 dB**



Radiated Spurious Emission

Test place	Ise EMC Lab. No.4 Semi Anechoic Chamber	
Report No.	11081928H	
Date	February 16, 2016	February 18, 2016
Temperature / Humidity	24 deg. C / 34 % RH	24 deg. C / 32 % RH
Engineer	Shinichi Miyazono (1 GHz - 10 GHz)	Hiroyuki Furutaka (10 GHz - 26.5 GHz)
Mode	Tx 11b 2412 MHz	

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	2390.000	PK	48.7	27.9	6.6	32.1	-	51.1	73.9	22.8	
Hori	4824.000	PK	40.0	32.9	9.0	31.3	-	50.6	73.9	-	Floor Noise
Hori	7236.000	PK	41.0	36.8	10.2	32.6	-	55.4	73.9	-	Floor Noise
Hori	9648.000	PK	42.3	38.1	11.0	32.6	-	58.8	73.9	-	Floor Noise
Hori	2390.000	AV	35.5	27.9	6.6	32.1	0.4	38.3	53.9	15.6	*1)
Hori	4824.000	AV	30.5	32.9	9.0	31.3	-	41.1	53.9	-	Floor Noise
Hori	7236.000	AV	32.6	36.8	10.2	32.6	-	47.0	53.9	-	Floor Noise
Hori	9648.000	AV	33.0	38.1	11.0	32.6	-	49.5	53.9	-	Floor Noise
Vert	2390.000	PK	52.1	27.9	6.6	32.1	-	54.5	73.9	19.4	
Vert	4824.000	PK	40.8	32.9	9.0	31.3	-	51.4	73.9	-	Floor Noise
Vert	7236.000	PK	41.4	36.8	10.2	32.6	-	55.8	73.9	-	Floor Noise
Vert	9648.000	PK	43.0	38.1	11.0	32.6	-	59.5	73.9	-	Floor Noise
Vert	2390.000	AV	37.9	27.9	6.6	32.1	0.4	40.7	53.9	13.2	*1)
Vert	4824.000	AV	30.4	32.9	9.0	31.3	-	41.0	53.9	-	Floor Noise
Vert	7236.000	AV	32.2	36.8	10.2	32.6	-	46.6	53.9	-	Floor Noise
Vert	9648.000	AV	32.8	38.1	11.0	32.6	-	49.3	53.9	-	Floor Noise

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter+Distance factor(above 1 GHz)) - Gain(Amplifier) + Duty factor
*Other frequency noises omitted in this report were not seen or had enough margin (more than 20 dB).
*The 10th harmonic was not seen so the result was its base noise level.
Distance factor: 1 GHz - 10 GHz 20log (4.4 m / 3.0 m) = 3.3 dB
10 GHz - 26.5 GHz 20log (1.0 m / 3.0 m) = -9.5 dB
*1) Not Out of Band emission(Leakage Power)

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	2412.000	PK	92.6	28.0	6.6	32.1	95.1	-	-	Carrier
Hori	2400.000	PK	48.9	28.0	6.6	32.1	51.4	75.1	23.7	
Vert	2412.000	PK	95.8	28.0	6.6	32.1	98.3	-	-	Carrier
Vert	2400.000	PK	53.4	28.0	6.6	32.1	55.9	78.3	22.4	

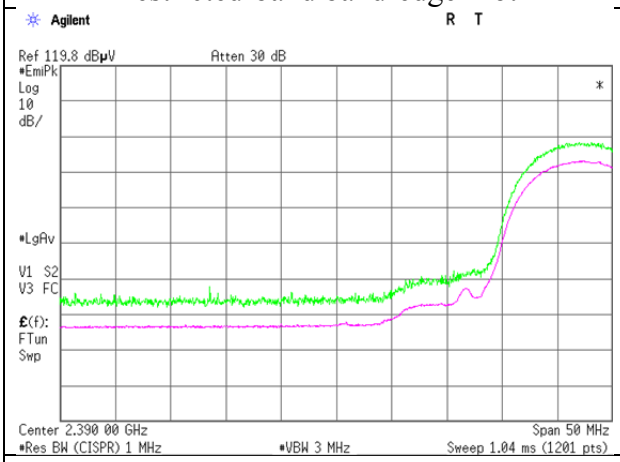
Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter+Distance factor(above 1 GHz)) - Gain(Amprifier)

Radiated Spurious Emission
(Reference Plot for band-edge)

Test place	Ise EMC Lab. No.4 Semi Anechoic Chamber
Report No.	11081928H
Date	February 16, 2016
Temperature / Humidity	24 deg. C / 34 % RH
Engineer	Shinichi Miyazono (1 GHz - 10 GHz)
Mode	Tx 11b 2412 MHz

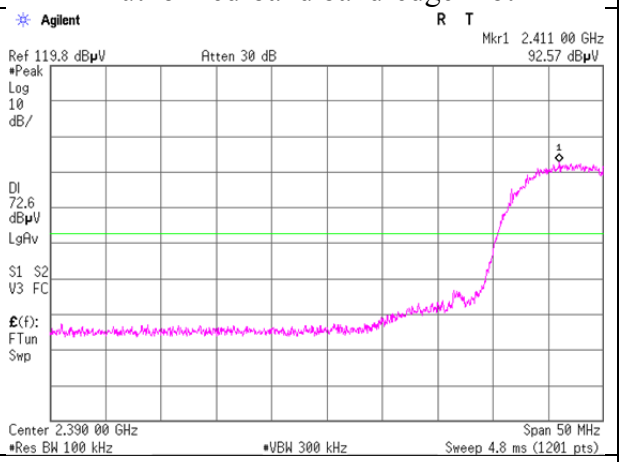
Horizontal

Restricted-band band-edge Plot



Trace Green : Peak Plot
Trace Purple : Average Plot

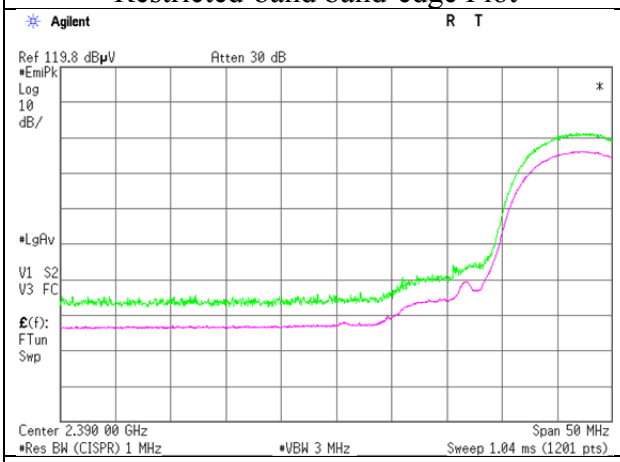
Authorized-band band-edge Plot



20dBc Plot

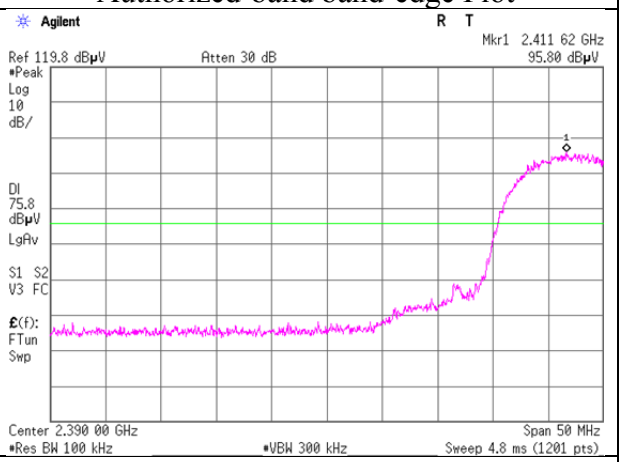
Vertical

Restricted-band band-edge Plot



Trace Green : Peak Plot
Trace Purple : Average Plot

Authorized-band band-edge Plot



20dBc Plot

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

Radiated Spurious Emission

Test place	Ise EMC Lab. No.4 Semi Anechoic Chamber	
Report No.	11081928H	
Date	February 16, 2016	February 18, 2016
Temperature / Humidity	24 deg. C / 34 % RH	24 deg. C / 32 % RH
Engineer	Shinichi Miyazono (1 GHz - 10 GHz)	Hiroyuki Furutaka (10 GHz - 26.5 GHz)
Mode	Tx 11b 2437 MHz	

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	4874.000	PK	40.3	33.1	9.0	31.3	-	51.1	73.9	-	Floor Noise
Hori	7311.000	PK	40.9	36.8	10.2	32.6	-	55.3	73.9	-	Floor Noise
Hori	9748.000	PK	42.1	38.2	11.0	32.7	-	58.6	73.9	-	Floor Noise
Hori	4874.000	AV	30.6	33.1	9.0	31.3	-	41.4	53.9	-	Floor Noise
Hori	7311.000	AV	32.5	36.8	10.2	32.6	-	46.9	53.9	-	Floor Noise
Hori	9748.000	AV	33.1	38.2	11.0	32.7	-	49.6	53.9	-	Floor Noise
Vert	4874.000	PK	40.6	33.1	9.0	31.3	-	51.4	73.9	-	Floor Noise
Vert	7311.000	PK	41.5	36.8	10.2	32.6	-	55.9	73.9	-	Floor Noise
Vert	9748.000	PK	42.9	38.2	11.0	32.7	-	59.4	73.9	-	Floor Noise
Vert	4874.000	AV	30.3	33.1	9.0	31.3	-	41.1	53.9	-	Floor Noise
Vert	7311.000	AV	32.4	36.8	10.2	32.6	-	46.8	53.9	-	Floor Noise
Vert	9748.000	AV	32.7	38.2	11.0	32.7	-	49.2	53.9	-	Floor Noise

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter+Distance factor(above 1 GHz)) - Gain(Amplifier)
*Other frequency noises omitted in this report were not seen or had enough margin (more than 20 dB).
*The 10th harmonic was not seen so the result was its base noise level.

Distance factor: 1 GHz - 10 GHz 20log (4.4 m / 3.0 m) = 3.3 dB
10 GHz - 26.5 GHz 20log (1.0 m / 3.0 m) = -9.5 dB

Radiated Spurious Emission

Test place	Ise EMC Lab. No.4 Semi Anechoic Chamber	
Report No.	11081928H	
Date	February 16, 2016	February 18, 2016
Temperature / Humidity	24 deg. C / 34 % RH	24 deg. C / 32 % RH
Engineer	Shinichi Miyazono (1 GHz - 10 GHz)	Hiroyuki Furutaka (10 GHz - 26.5 GHz)
Mode	Tx 11b 2462 MHz	

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	2483.500	PK	58.5	28.1	6.7	32.1	-	61.2	73.9	12.7	
Hori	4924.000	PK	40.5	33.3	9.1	31.3	-	51.6	73.9	-	Floor Noise
Hori	7386.000	PK	41.8	36.8	10.2	32.6	-	56.2	73.9	-	Floor Noise
Hori	9848.000	PK	42.8	38.2	11.0	32.7	-	59.3	73.9	-	Floor Noise
Hori	2483.500	AV	43.3	28.1	6.7	32.1	0.4	46.4	53.9	7.5	*1)
Hori	4924.000	AV	30.2	33.3	9.1	31.3	-	41.3	53.9	-	Floor Noise
Hori	7386.000	AV	31.8	36.8	10.2	32.6	-	46.2	53.9	-	Floor Noise
Hori	9848.000	AV	32.8	38.2	11.0	32.7	-	49.3	53.9	-	Floor Noise
Vert	2483.500	PK	56.2	28.1	6.7	32.1	-	58.9	73.9	15.0	
Vert	4924.000	PK	40.7	33.3	9.1	31.3	-	51.8	73.9	-	Floor Noise
Vert	7386.000	PK	41.9	36.8	10.2	32.6	-	56.3	73.9	-	Floor Noise
Vert	9848.000	PK	42.9	38.2	10.3	32.7	-	58.7	73.9	-	Floor Noise
Vert	2483.500	AV	41.2	28.1	6.7	32.1	0.4	44.3	53.9	9.6	*1)
Vert	4924.000	AV	30.3	33.3	8.2	31.3	-	40.5	53.9	-	Floor Noise
Vert	7386.000	AV	31.7	36.8	10.2	32.6	-	46.1	53.9	-	Floor Noise
Vert	9848.000	AV	32.9	38.2	11.0	32.7	-	49.4	53.9	-	Floor Noise

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

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

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

Distance factor: 1 GHz - 10 GHz 20log (4.4 m / 3.0 m) = 3.3 dB
10 GHz - 26.5 GHz 20log (1.0 m / 3.0 m) = -9.5 dB

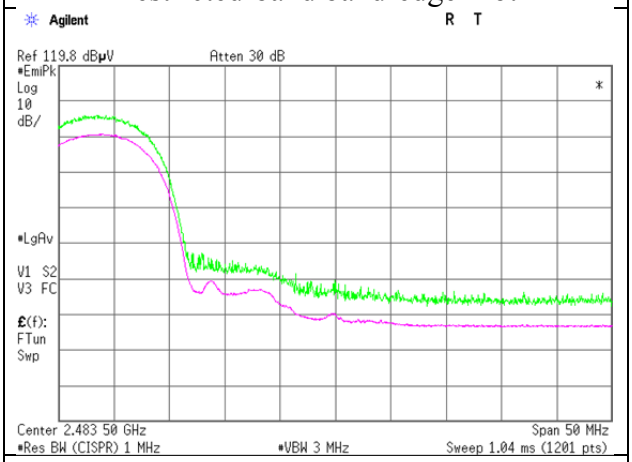
*1) Not Out of Band emission(Leakage Power)

Radiated Spurious Emission
(Reference Plot for band-edge)

Test place	Ise EMC Lab. No.4 Semi Anechoic Chamber
Report No.	11081928H
Date	February 16, 2016
Temperature / Humidity	24 deg. C / 34 % RH
Engineer	Shinichi Miyazono (1 GHz - 10 GHz)
Mode	Tx 11b 2462 MHz

Horizontal

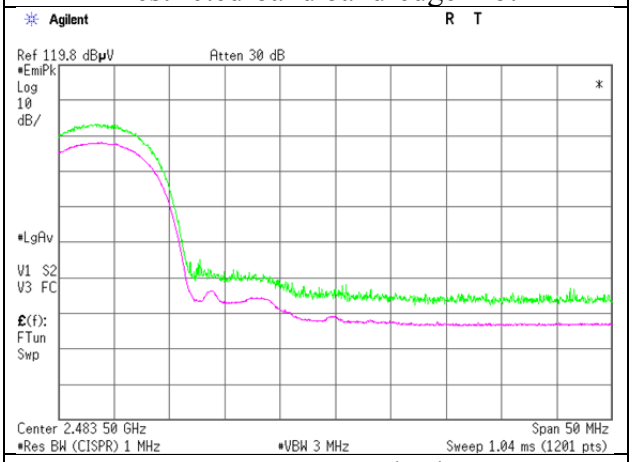
Restricted-band band-edge Plot



Trace Green : Peak Plot
Trace Purple : Average Plot

Vertical

Restricted-band band-edge Plot



Trace Green : Peak Plot
Trace Purple : Average Plot

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

Radiated Spurious Emission

Test place	Ise EMC Lab. No.4 Semi Anechoic Chamber	
Report No.	11081928H	
Date	February 16, 2016	February 18, 2016
Temperature / Humidity	24 deg. C / 34 % RH	24 deg. C / 32 % RH
Engineer	Shinichi Miyazono (1 GHz - 10 GHz)	Hiroyuki Furutaka (10 GHz - 26.5 GHz)
Mode	Tx 11n-20 2412 MHz	

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	2390.000	PK	55.0	27.9	6.6	32.1	-	57.4	73.9	16.5	
Hori	4824.000	PK	40.2	32.9	9.0	31.3	-	50.8	73.9	-	Floor Noise
Hori	7236.000	PK	41.1	36.8	10.2	32.6	-	55.5	73.9	-	Floor Noise
Hori	9648.000	PK	42.2	38.1	11.0	32.6	-	58.7	73.9	-	Floor Noise
Hori	2390.000	AV	38.3	27.9	6.6	32.1	1.0	41.7	53.9	12.2	*1)
Hori	4824.000	AV	30.4	32.9	9.0	31.3	-	41.0	53.9	-	Floor Noise
Hori	7236.000	AV	32.5	36.8	10.2	32.6	-	46.9	53.9	-	Floor Noise
Hori	9648.000	AV	32.9	38.1	11.0	32.6	-	49.4	53.9	-	Floor Noise
Vert	2390.000	PK	53.4	27.9	6.6	32.1	-	55.8	73.9	18.1	
Vert	4824.000	PK	40.7	32.9	9.0	31.3	-	51.3	73.9	-	Floor Noise
Vert	7236.000	PK	41.3	36.8	10.2	32.6	-	55.7	73.9	-	Floor Noise
Vert	9648.000	PK	43.0	38.1	11.0	32.6	-	59.5	73.9	-	Floor Noise
Vert	2390.000	AV	36.9	27.9	6.6	32.1	1.0	40.3	53.9	13.6	*1)
Vert	4824.000	AV	30.3	32.9	9.0	31.3	-	40.9	53.9	-	Floor Noise
Vert	7236.000	AV	32.1	36.8	10.2	32.6	-	46.5	53.9	-	Floor Noise
Vert	9648.000	AV	32.8	38.1	11.0	32.6	-	49.3	53.9	-	Floor Noise

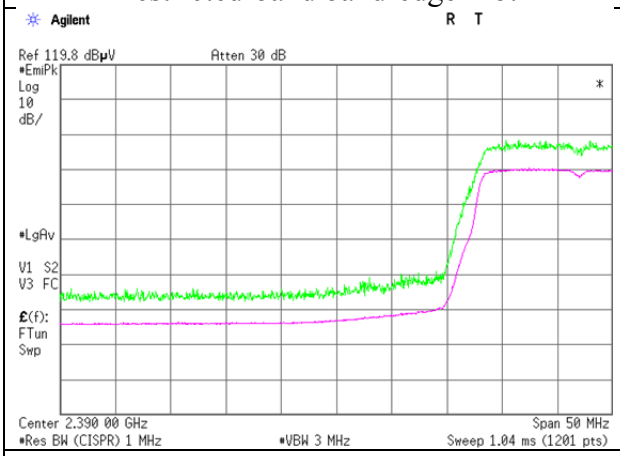
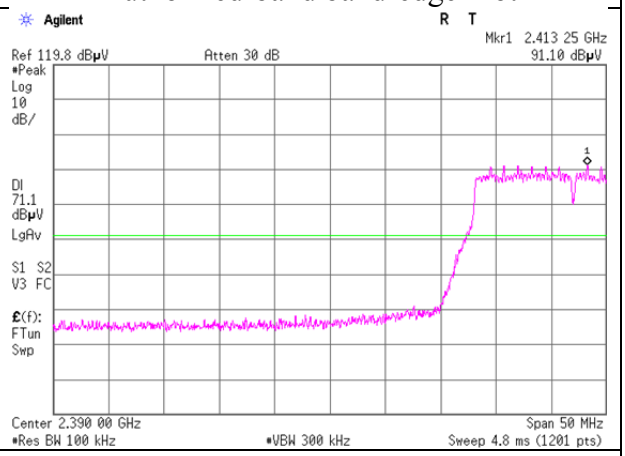
Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter+Distance factor(above 1 GHz)) - Gain(Amplifier) + Duty factor
*Other frequency noises omitted in this report were not seen or had enough margin (more than 20 dB).
*The 10th harmonic was not seen so the result was its base noise level.
Distance factor: 1 GHz - 10 GHz 20log (4.4 m / 3.0 m) = 3.3 dB
10 GHz - 26.5 GHz 20log (1.0 m / 3.0 m) = -9.5 dB
*1) Not Out of Band emission(Leakage Power)

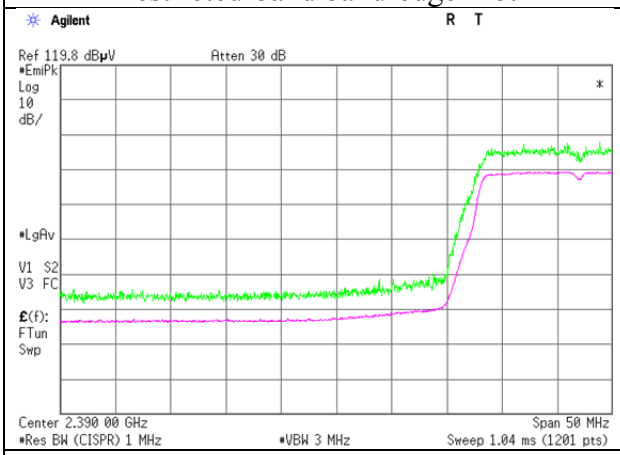
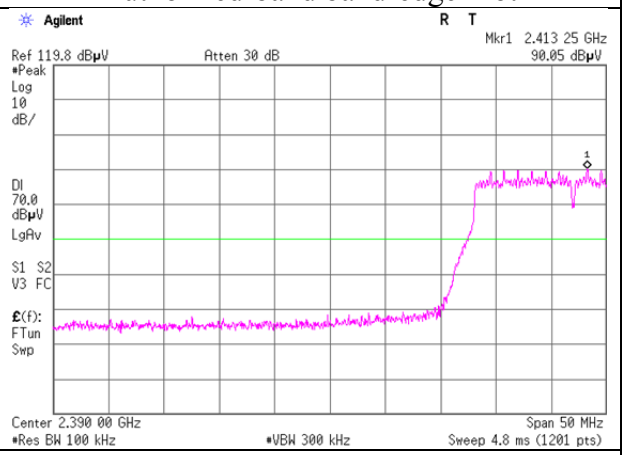
Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	2412.000	PK	91.1	28.0	6.6	32.1	93.6	-	-	Carrier
Hori	2400.000	PK	51.5	28.0	6.6	32.1	54.0	73.6	19.6	
Vert	2412.000	PK	90.1	28.0	6.6	32.1	92.6	-	-	Carrier
Vert	2400.000	PK	50.5	28.0	6.6	32.1	53.0	72.6	19.6	

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

Radiated Spurious Emission
(Reference Plot for band-edge)

Test place	Ise EMC Lab. No.4 Semi Anechoic Chamber
Report No.	11081928H
Date	February 16, 2016
Temperature / Humidity	24 deg. C / 34 % RH
Engineer	Shinichi Miyazono (1 GHz - 10 GHz)
Mode	Tx 11n-20 2412 MHz

Horizontal	
Restricted-band band-edge Plot	Authorized-band band-edge Plot
	
Trace Green : Peak Plot Trace Purple : Average Plot	20dBc Plot

Vertical	
Restricted-band band-edge Plot	Authorized-band band-edge Plot
	
Trace Green : Peak Plot Trace Purple : Average Plot	20dBc Plot

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

Radiated Spurious Emission

Test place	Ise EMC Lab. No.4 Semi Anechoic Chamber	
Report No.	11081928H	
Date	February 16, 2016	February 18, 2016
Temperature / Humidity	24 deg. C / 34 % RH	24 deg. C / 32 % RH
Engineer	Shinichi Miyazono (1 GHz - 10 GHz)	Hiroyuki Furutaka (10 GHz - 26.5 GHz)
Mode	Tx 11n-20 2437 MHz	

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	4874.000	PK	40.4	33.1	9.0	31.3	-	51.2	73.9	-	Floor Noise
Hori	7311.000	PK	41.3	36.8	10.2	32.6	-	55.7	73.9	-	Floor Noise
Hori	9748.000	PK	42.0	38.2	11.0	32.7	-	58.5	73.9	-	Floor Noise
Hori	4874.000	AV	30.7	33.1	9.0	31.3	-	41.5	53.9	-	Floor Noise
Hori	7311.000	AV	32.6	36.8	10.2	32.6	-	47.0	53.9	-	Floor Noise
Hori	9748.000	AV	32.9	38.2	11.0	32.7	-	49.4	53.9	-	Floor Noise
Vert	4874.000	PK	40.7	33.1	9.0	31.3	-	51.5	73.9	-	Floor Noise
Vert	7311.000	PK	41.6	36.8	10.2	32.6	-	56.0	73.9	-	Floor Noise
Vert	9748.000	PK	42.7	38.2	11.0	32.7	-	59.2	73.9	-	Floor Noise
Vert	4874.000	AV	30.5	33.1	9.0	31.3	-	41.3	53.9	-	Floor Noise
Vert	7311.000	AV	32.5	36.8	10.2	32.6	-	46.9	53.9	-	Floor Noise
Vert	9748.000	AV	32.6	38.2	11.0	32.7	-	49.1	53.9	-	Floor Noise

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter+Distance factor(above 1 GHz)) - Gain(Amplifier)
*Other frequency noises omitted in this report were not seen or had enough margin (more than 20 dB).
*The 10th harmonic was not seen so the result was its base noise level.

Distance factor:	1 GHz - 10 GHz	20log (4.4 m / 3.0 m) = 3.3 dB
	10 GHz - 26.5 GHz	20log (1.0 m / 3.0 m) = -9.5 dB

Radiated Spurious Emission

Test place	Ise EMC Lab. No.4 Semi Anechoic Chamber		
Report No.	11081928H		
Date	February 16, 2016	February 18, 2016	February 19, 2016
Temperature / Humidity	24 deg. C / 34 % RH	24 deg. C / 32 % RH	24 deg. C / 35 % RH
Engineer	Shinichi Miyazono (1 GHz - 10 GHz)	Hiroyuki Furutaka (10 GHz - 26.5 GHz)	Hiroyuki Furutaka (30 MHz - 1000 MHz)
Mode	Tx 11n-20 2462 MHz		

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	135.200	QP	31.4	14.1	8.5	28.0	-	26.0	43.5	17.5	
Hori	589.400	QP	33.4	20.4	11.7	28.5	-	37.0	46.0	9.0	
Hori	704.800	QP	33.0	22.5	12.3	28.0	-	39.8	46.0	6.2	
Hori	731.200	QP	31.1	22.6	12.5	28.0	-	38.2	46.0	7.8	
Hori	750.052	QP	25.6	22.8	12.6	28.0	-	33.0	46.0	13.0	
Hori	798.000	QP	33.4	23.0	12.8	27.9	-	41.3	46.0	4.7	
Hori	2483.500	PK	52.7	28.1	6.7	32.1	-	55.4	73.9	18.5	
Hori	4924.000	PK	40.6	33.3	9.1	31.3	-	51.7	73.9	-	Floor Noise
Hori	7386.000	PK	41.9	36.8	10.2	32.6	-	56.3	73.9	-	Floor Noise
Hori	9848.000	PK	42.7	38.2	11.0	32.7	-	59.2	73.9	-	Floor Noise
Hori	2483.500	AV	37.8	28.1	6.7	32.1	1.0	41.5	53.9	12.4	*1)
Hori	4924.000	AV	30.3	33.3	9.1	31.3	-	41.4	53.9	-	Floor Noise
Hori	7386.000	AV	31.9	36.8	10.2	32.6	-	46.3	53.9	-	Floor Noise
Hori	9848.000	AV	32.7	38.2	11.0	32.7	-	49.2	53.9	-	Floor Noise
Vert	48.400	QP	35.4	11.2	7.4	28.5	-	25.5	40.0	14.5	
Vert	56.700	QP	36.8	8.5	7.5	28.5	-	24.3	40.0	15.7	
Vert	233.890	QP	32.1	17.5	9.4	27.5	-	31.5	46.0	14.5	
Vert	589.810	QP	35.1	20.4	11.7	28.5	-	38.7	46.0	7.3	
Vert	711.598	QP	30.5	22.5	12.4	28.0	-	37.4	46.0	8.6	
Vert	798.000	QP	34.2	23.0	12.8	27.9	-	42.1	46.0	3.9	
Vert	2483.500	PK	50.5	28.1	6.7	32.1	-	53.2	73.9	20.7	
Vert	4924.000	PK	40.6	33.3	9.1	31.3	-	51.7	73.9	-	Floor Noise
Vert	7386.000	PK	41.8	36.8	10.2	32.6	-	56.2	73.9	-	Floor Noise
Vert	9848.000	PK	43.0	38.2	11.0	32.7	-	59.5	73.9	-	Floor Noise
Vert	2483.500	AV	37.1	28.1	6.7	32.1	1.0	40.8	53.9	13.1	*1)
Vert	4924.000	AV	30.4	33.3	9.1	31.3	-	41.5	53.9	-	Floor Noise
Vert	7386.000	AV	31.6	36.8	10.2	32.6	-	46.0	53.9	-	Floor Noise
Vert	9848.000	AV	33.0	38.2	11.0	32.7	-	49.5	53.9	-	Floor Noise

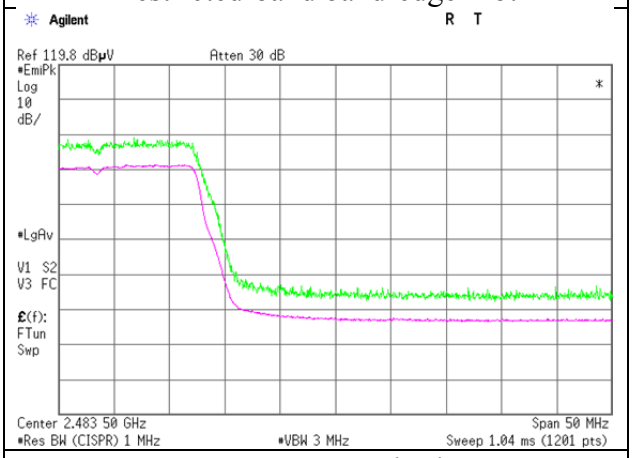
Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter+Distance factor(above 1 GHz)) - Gain(Amplifier) + Duty factor
*Other frequency noises omitted in this report were not seen or had enough margin (more than 20 dB).
*The 10th harmonic was not seen so the result was its base noise level.
Distance factor: 1 GHz - 10 GHz 20log (4.5 m / 3.0 m) = 3.3 dB
10 GHz - 26.5 GHz 20log (1.0 m / 3.0 m) = -9.5 dB
*1) Not Out of Band emission(Leakage Power)

Radiated Spurious Emission
(Reference Plot for band-edge)

Test place	Ise EMC Lab. No.4 Semi Anechoic Chamber
Report No.	11081928H
Date	February 16, 2016
Temperature / Humidity	24 deg. C / 34 % RH
Engineer	Shinichi Miyazono (1 GHz - 10 GHz)
Mode	Tx 11n-20 2462 MHz

Horizontal

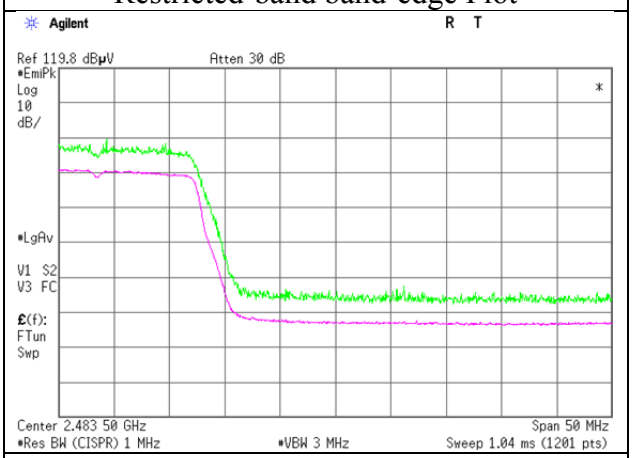
Restricted-band band-edge Plot



Trace Green : Peak Plot
Trace Purple : Average Plot

Vertical

Restricted-band band-edge Plot

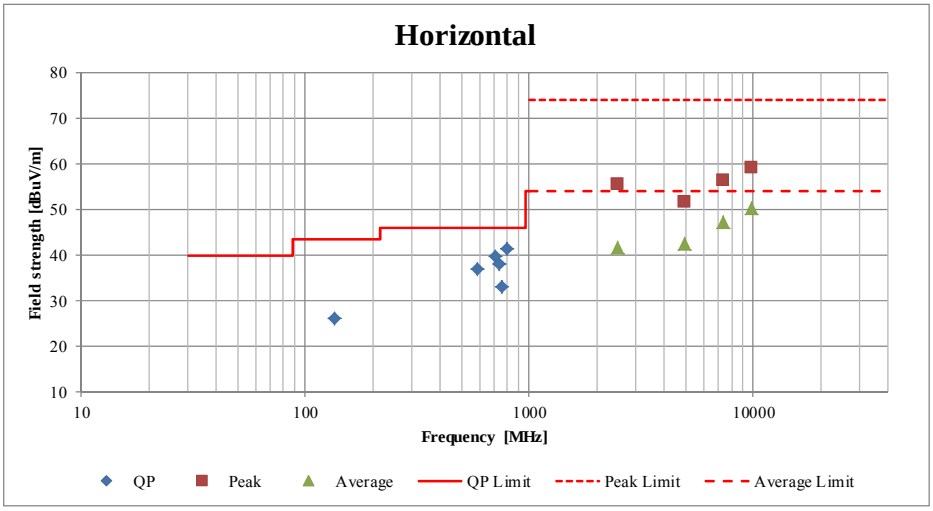


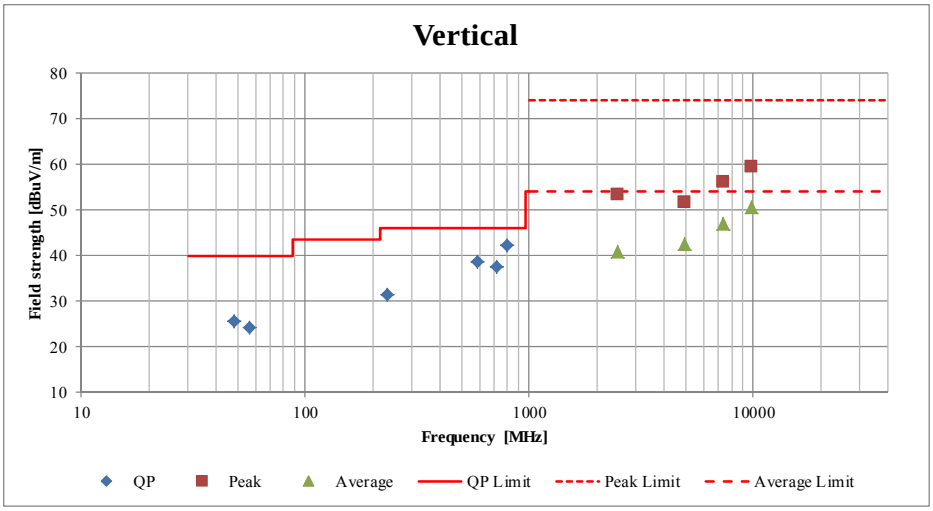
Trace Green : Peak Plot
Trace Purple : Average Plot

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

Radiated Spurious Emission
(Plot data, Worst case)

Test place	Ise EMC Lab. No.4 Semi Anechoic Chamber		
Report No.	11081928H		
Date	February 16, 2016	February 18, 2016	February 19, 2016
Temperature / Humidity	24 deg. C / 34 % RH	24 deg. C / 32 % RH	24 deg. C / 35 % RH
Engineer	Shinichi Miyazono (1 GHz - 10 GHz)	Hiroyuki Furutaka (10 GHz - 26.5 GHz)	Hiroyuki Furutaka (30 MHz - 1000 MHz)
Mode	Tx 11n-20 2462 MHz		





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

Radiated Spurious Emission

Test place	Ise EMC Lab. No.4 Semi Anechoic Chamber	
Report No.	11081928H	
Date	February 18, 2016	February 19, 2016
Temperature / Humidity	24 deg. C / 32 % RH	24 deg. C / 39 % RH
Engineer	Hiroyuki Furutaka	Kazuya Yoshioka
	(10 GHz - 26.5 GHz)	(30 MHz - 1000 MHz / 1 GHz - 10 GHz)
Mode	Tx BT LE 2402MHz	

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	57.054	QP	29.9	8.4	7.5	28.5	-	17.3	40.0	22.7	
Hori	86.018	QP	35.6	7.6	7.9	28.3	-	22.8	40.0	17.2	
Hori	540.679	QP	33.0	19.9	11.4	28.5	-	35.8	46.0	10.2	
Hori	589.829	QP	35.7	20.4	11.7	28.5	-	39.3	46.0	6.7	
Hori	731.666	QP	31.9	22.6	12.5	28.0	-	39.0	46.0	7.0	
Hori	798.001	QP	33.6	23.0	12.8	27.9	-	41.5	46.0	4.5	
Hori	2390.000	PK	41.3	27.9	6.6	32.1	-	43.7	73.9	30.2	
Hori	4804.000	PK	40.5	32.8	9.0	31.3	-	51.0	73.9	22.9	
Hori	7206.000	PK	42.2	36.8	10.2	32.6	-	56.6	73.9	17.3	
Hori	9608.000	PK	42.8	38.1	10.9	32.6	-	59.2	73.9	14.7	
Hori	2390.000	AV	28.1	27.9	6.6	32.1	2.0	32.5	53.9	21.4	*1)
Hori	4804.000	AV	27.1	32.8	9.0	31.3	-	37.6	53.9	16.3	Floor noise
Hori	7206.000	AV	28.8	36.8	10.2	32.6	-	43.2	53.9	10.7	Floor noise
Hori	9608.000	AV	29.0	38.1	10.9	32.6	-	45.4	53.9	8.5	Floor noise
Vert	49.038	QP	35.7	11.0	7.4	28.5	-	25.6	40.0	14.4	
Vert	86.016	QP	36.0	7.6	7.9	28.3	-	23.2	40.0	16.8	
Vert	540.675	QP	32.4	19.9	11.4	28.5	-	35.2	46.0	10.8	
Vert	589.829	QP	32.2	20.4	11.7	28.5	-	35.8	46.0	10.2	
Vert	733.887	QP	30.3	22.7	12.5	28.0	-	37.5	46.0	8.5	
Vert	797.998	QP	34.5	23.0	12.8	27.9	-	42.4	46.0	3.6	
Vert	2390.000	PK	40.3	27.9	6.6	32.1	-	42.7	73.9	31.2	
Vert	4804.000	PK	40.8	32.8	9.0	31.3	-	51.3	73.9	22.6	
Vert	7206.000	PK	42.4	36.8	10.2	32.6	-	56.8	73.9	17.1	
Vert	9608.000	PK	42.9	38.1	10.9	32.6	-	59.3	73.9	14.6	
Vert	2390.000	AV	28.4	27.9	6.6	32.1	2.0	32.8	53.9	21.1	*1)
Vert	4804.000	AV	27.1	32.8	9.0	31.3	-	37.6	53.9	16.3	Floor noise
Vert	7206.000	AV	28.8	36.8	10.2	32.6	-	43.2	53.9	10.7	Floor noise
Vert	9608.000	AV	29.0	38.1	10.9	32.6	-	45.4	53.9	8.5	Floor noise

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter+Distance factor(above 1 GHz)) - Gain(Amplifier) + Duty factor
*Other frequency noises omitted in this report were not seen or had enough margin (more than 20 dB).
*The 10th harmonic was not seen so the result was its base noise level.
Distance factor: 1 GHz - 10 GHz 20log (4.4 m / 3.0 m) = 3.3 dB
10 GHz - 26.5 GHz 20log (1.0 m / 3.0 m) = -9.5 dB
*1) Not Out of Band emission(Leakage Power)

20dBc Data Sheet

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant Factor [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	2402.000	PK	87.4	28.0	6.6	32.1	89.9	-	-	Carrier
Hori	2400.000	PK	32.4	28.0	6.6	32.1	34.9	69.9	35.0	
Vert	2402.000	PK	88.2	28.0	6.6	32.1	90.7	-	-	Carrier
Vert	2400.000	PK	31.5	28.0	6.6	32.1	34.0	70.7	36.7	

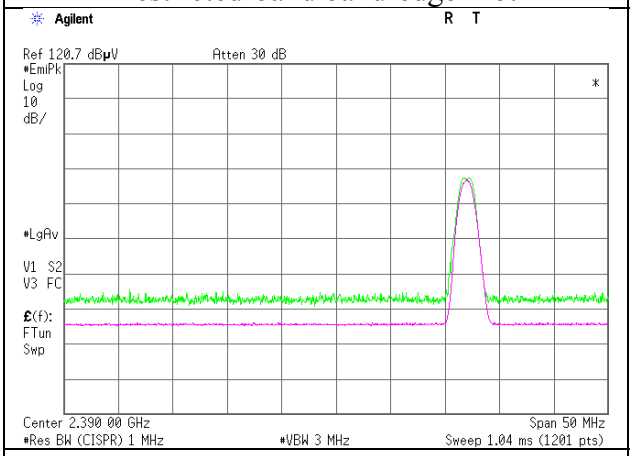
Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter+Distance factor(above 1 GHz)) - Gain(Amprifier)
Distance factor: 1GHz-10GHz 20log(4.4m/3.0m)= 3.3dB
10GHz-26.5GHz 20log(1.0m/3.0m)= -9.5dB

Radiated Spurious Emission
(Reference Plot for band-edge)

Test place	Ise EMC Lab. No.4 Semi Anechoic Chamber
Report No.	11081928H
Date	February 19, 2016
Temperature / Humidity	24 deg. C / 39 % RH
Engineer	Kazuya Yoshioka
Mode	Tx BT LE 2402MHz

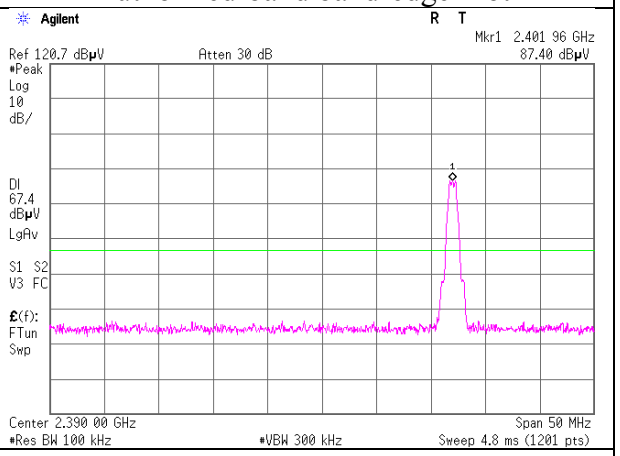
Horizontal

Restricted-band band-edge Plot



Trace Green : Peak Plot
Trace Purple : Average Plot

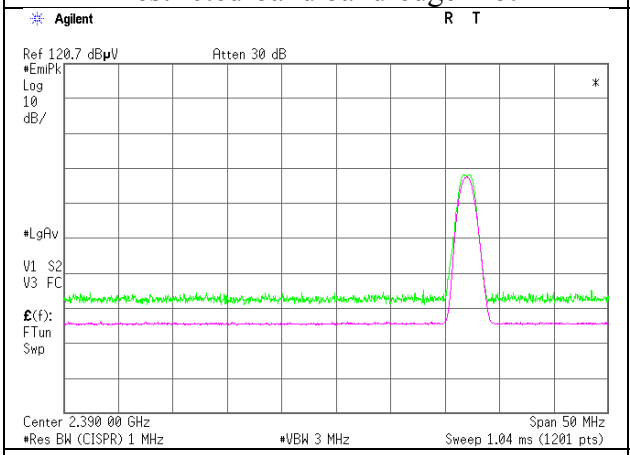
Authorized-band band-edge Plot



20dBc Plot

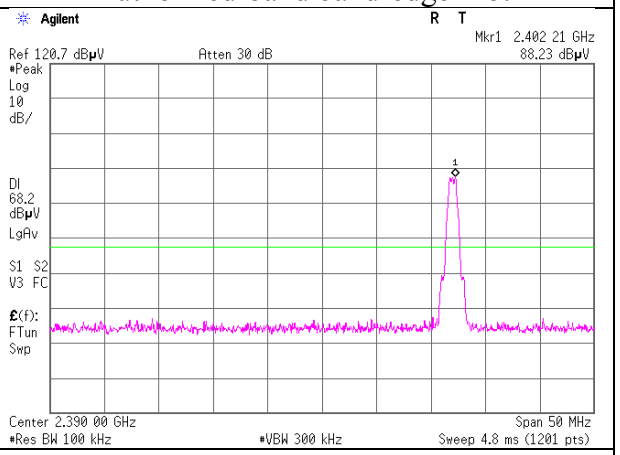
Vertical

Restricted-band band-edge Plot



Trace Green : Peak Plot
Trace Purple : Average Plot

Authorized-band band-edge Plot



20dBc Plot

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

Radiated Spurious Emission

Test place	Ise EMC Lab. No.4 Semi Anechoic Chamber	
Report No.	11081928H	
Date	February 18, 2016	February 19, 2016
Temperature / Humidity	24 deg. C / 32 % RH	24 deg. C / 39 % RH
Engineer	Hiroyuki Furutaka (10 GHz - 26.5 GHz)	Kazuya Yoshioka (30 MHz - 1000 MHz / 1 GHz - 10 GHz)
Mode	Tx BT LE 2440MHz	

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	55.919	QP	32.6	8.7	7.5	28.5	-	20.3	40.0	19.7	
Hori	86.015	QP	35.7	7.6	7.9	28.3	-	22.9	40.0	17.1	
Hori	540.682	QP	32.9	19.9	11.4	28.5	-	35.7	46.0	10.3	
Hori	589.827	QP	35.4	20.4	11.7	28.5	-	39.0	46.0	7.0	
Hori	732.171	QP	30.8	22.7	12.5	28.0	-	38.0	46.0	8.0	
Hori	797.729	QP	31.6	23.0	12.8	27.9	-	39.5	46.0	6.5	
Hori	4880.000	PK	39.9	33.1	9.1	31.3	-	50.8	73.9	23.1	
Hori	7320.000	PK	39.6	36.8	10.2	32.6	-	54.0	73.9	19.9	
Hori	9760.000	PK	40.1	38.2	11.0	32.7	-	56.6	73.9	17.3	
Hori	4880.000	AV	27.3	33.1	9.1	31.3	-	38.2	53.9	15.7	Floor noise
Hori	7320.000	AV	27.9	36.8	10.2	32.6	-	42.3	53.9	11.6	Floor noise
Hori	9760.000	AV	28.2	38.2	11.0	32.7	-	44.7	53.9	9.2	Floor noise
Vert	49.023	QP	36.0	11.0	7.4	28.5	-	25.9	40.0	14.1	
Vert	86.014	QP	36.0	7.6	7.9	28.3	-	23.2	40.0	16.8	
Vert	540.680	QP	31.9	19.9	11.4	28.5	-	34.7	46.0	11.3	
Vert	589.821	QP	32.1	20.4	11.7	28.5	-	35.7	46.0	10.3	
Vert	676.042	QP	30.7	22.0	12.2	28.1	-	36.8	46.0	9.2	
Vert	797.653	QP	32.8	23.0	12.8	27.9	-	40.7	46.0	5.3	
Vert	4880.000	PK	39.7	33.1	9.1	31.3	-	50.6	73.9	23.3	
Vert	7320.000	PK	39.9	36.8	10.2	32.6	-	54.3	73.9	19.6	
Vert	9760.000	PK	40.4	38.2	11.0	32.7	-	56.9	73.9	17.0	
Vert	4880.000	AV	27.3	33.1	9.1	31.3	-	38.2	53.9	15.7	Floor noise
Vert	7320.000	AV	27.9	36.8	10.2	32.6	-	42.3	53.9	11.6	Floor noise
Vert	9760.000	AV	28.2	38.2	11.0	32.7	-	44.7	53.9	9.2	Floor noise

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter+Distance factor(above 1 GHz)) - Gain(Amplifier)
*Other frequency noises omitted in this report were not seen or had enough margin (more than 20 dB).
*The 10th harmonic was not seen so the result was its base noise level.

Distance factor: 1 GHz - 10 GHz 20log (4.4 m / 3.0 m) = 3.3 dB
10 GHz - 26.5 GHz 20log (1.0 m / 3.0 m) = -9.5 dB

Radiated Spurious Emission

Test place	Ise EMC Lab. No.4 Semi Anechoic Chamber	
Report No.	11081928H	
Date	February 18, 2016	February 19, 2016
Temperature / Humidity	24 deg. C / 32 % RH	24 deg. C / 39 % RH
Engineer	Hiroyuki Furutaka	Kazuya Yoshioka
	(10 GHz - 26.5 GHz)	(30 MHz - 1000 MHz / 1 GHz - 10 GHz)
Mode	Tx BT LE 2480MHz	

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	55.888	QP	32.5	8.7	7.5	28.5	-	20.2	40.0	19.8	
Hori	86.017	QP	35.4	7.6	7.9	28.3	-	22.6	40.0	17.4	
Hori	540.675	QP	33.0	19.9	11.4	28.5	-	35.8	46.0	10.2	
Hori	589.831	QP	35.4	20.4	11.7	28.5	-	39.0	46.0	7.0	
Hori	732.901	QP	31.2	22.7	12.5	28.0	-	38.4	46.0	7.6	
Hori	797.896	QP	32.7	23.0	12.8	27.9	-	40.6	46.0	5.4	
Hori	2483.500	PK	42.2	28.1	6.7	32.1	-	44.9	73.9	29.0	
Hori	4960.000	PK	39.6	33.4	9.1	31.2	-	50.9	73.9	23.0	
Hori	7440.000	PK	41.4	36.8	10.2	32.7	-	55.7	73.9	18.2	
Hori	9920.000	PK	43.0	38.3	11.0	32.8	-	59.5	73.9	14.4	
Hori	2483.500	AV	28.4	28.1	6.7	32.1	2.0	33.1	53.9	20.8	*1)
Hori	4960.000	AV	27.1	33.4	9.1	31.2	-	38.4	53.9	15.5	Floor noise
Hori	7440.000	AV	28.6	36.8	10.2	32.7	-	42.9	53.9	11.0	Floor noise
Hori	9920.000	AV	28.8	38.3	11.0	32.8	-	45.3	53.9	8.6	Floor noise
Vert	48.804	QP	35.9	11.1	7.4	28.5	-	25.9	40.0	14.1	
Vert	86.016	QP	35.9	7.6	7.9	28.3	-	23.1	40.0	16.9	
Vert	540.672	QP	32.2	19.9	11.4	28.5	-	35.0	46.0	11.0	
Vert	589.832	QP	31.7	20.4	11.7	28.5	-	35.3	46.0	10.7	
Vert	733.013	QP	31.4	22.7	12.5	28.0	-	38.6	46.0	7.4	
Vert	797.931	QP	31.9	23.0	12.8	27.9	-	39.8	46.0	6.2	
Vert	2483.500	PK	40.8	28.1	6.7	32.1	-	43.5	73.9	30.4	
Vert	4960.000	PK	39.8	33.4	9.1	31.2	-	51.1	73.9	22.8	
Vert	7440.000	PK	41.7	36.8	10.2	32.7	-	56.0	73.9	17.9	
Vert	9920.000	PK	43.2	38.3	11.0	32.8	-	59.7	73.9	14.2	
Vert	2483.500	AV	29.1	28.1	6.7	32.1	2.0	33.8	53.9	20.1	*1)
Vert	4960.000	AV	27.1	33.4	9.1	31.2	-	38.4	53.9	15.5	Floor noise
Vert	7440.000	AV	28.6	36.8	10.2	32.7	-	42.9	53.9	11.0	Floor noise
Vert	9920.000	AV	28.8	38.3	11.0	32.8	-	45.3	53.9	8.6	Floor noise

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

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

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

Distance factor: 1 GHz - 10 GHz 20log (4.4 m / 3.0 m) = 3.3 dB
10 GHz - 26.5 GHz 20log (1.0 m / 3.0 m) = -9.5 dB

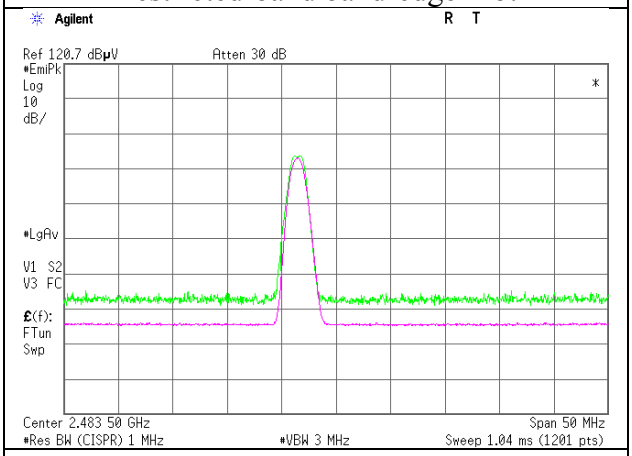
*1) Not Out of Band emission(Leakage Power)

Radiated Spurious Emission
(Reference Plot for band-edge)

Test place	Ise EMC Lab. No.4 Semi Anechoic Chamber
Report No.	11081928H
Date	February 19, 2016
Temperature / Humidity	24 deg. C / 39 % RH
Engineer	Kazuya Yoshioka
Mode	Tx BT LE 2480MHz

Horizontal

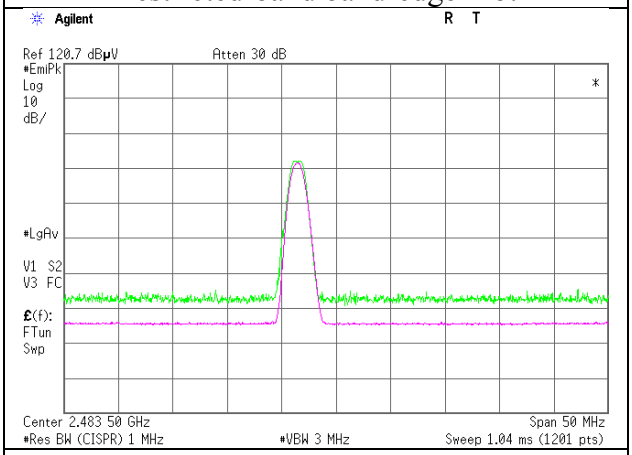
Restricted-band band-edge Plot



Trace Green : Peak Plot
Trace Purple : Average Plot

Vertical

Restricted-band band-edge Plot

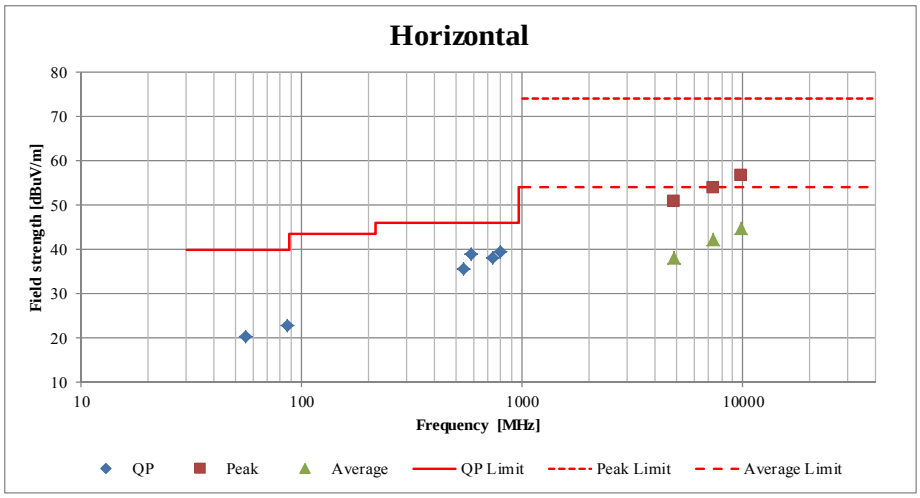


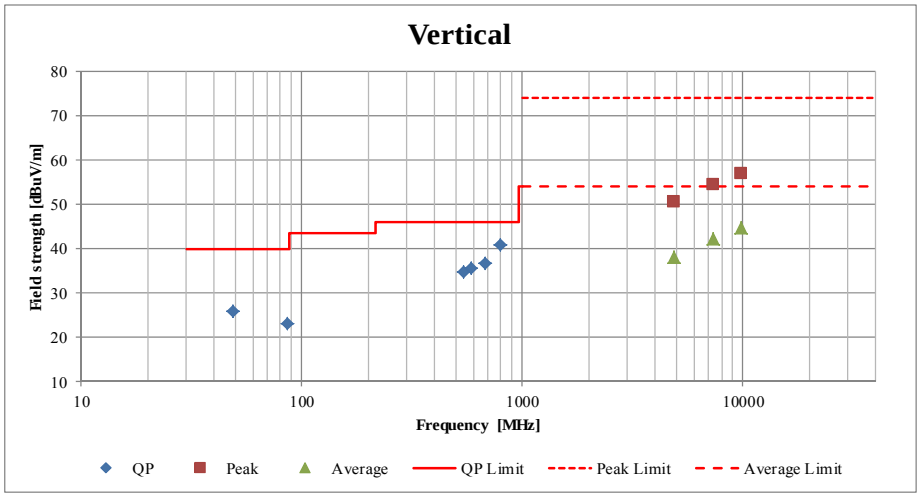
Trace Green : Peak Plot
Trace Purple : Average Plot

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

Radiated Spurious Emission
(Plot data, Worst case)

Test place	Ise EMC Lab. No.4 Semi Anechoic Chamber	
Report No.	11081928H	
Date	February 18, 2016	February 19, 2016
Temperature / Humidity	24 deg. C / 32 % RH	24 deg. C / 39 % RH
Engineer	Hiroyuki Furutaka (10 GHz - 26.5 GHz)	Kazuya Yoshioka (30 MHz - 1000 MHz / 1 GHz - 10 GHz)
Mode	Tx BT LE 2440MHz	





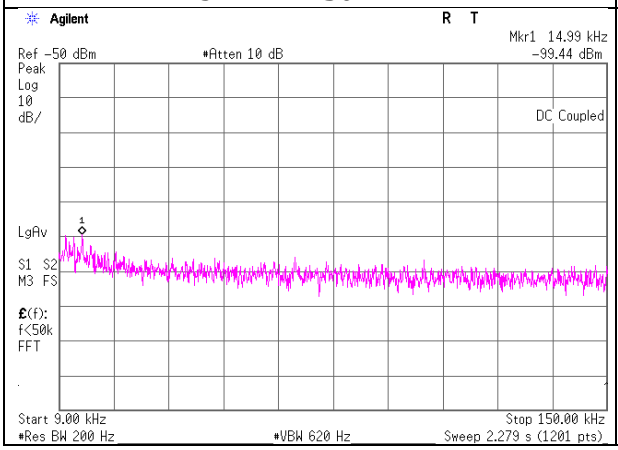
*These plots data contains sufficient number to show the trend of characteristic features for EUT.

Conducted Spurious Emission

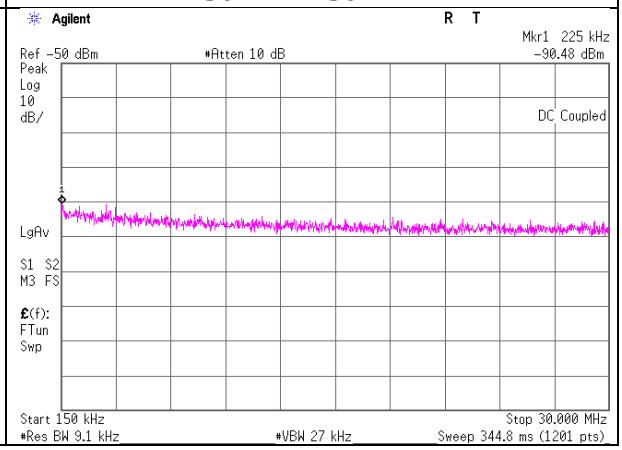
Test place	Ise EMC Lab. No.6 Measurement Room
Report No.	11081928H
Date	February 19, 2016
Temperature / Humidity	21deg. C / 41 % RH
Engineer	Ken Fujita
Mode	Tx 11n-20

11n-20 Tx 2462 MHz

9 kHz - 150 kHz



150 kHz - 30 MHz



Frequency [kHz]	Reading [dBm]	Cable Loss [dB]	Attenator 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
14.99	-99.4	0.01	9.95	2.0	1	-87.5	300	6.0	-26.2	44.0	70.2	
225.00	-90.5	0.03	9.95	2.0	1	-78.5	300	6.0	-17.2	20.5	37.7	

E = EIRP - 20 log (D) + Ground bounce + 104.8 [dBuV/m]

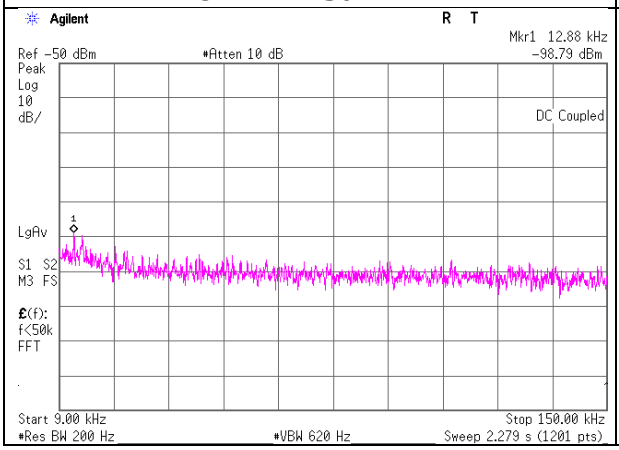
EIRP = Reading + Cable Loss + Attenator Loss + Antenna Gain + 10 * log (N)

Conducted Spurious Emission

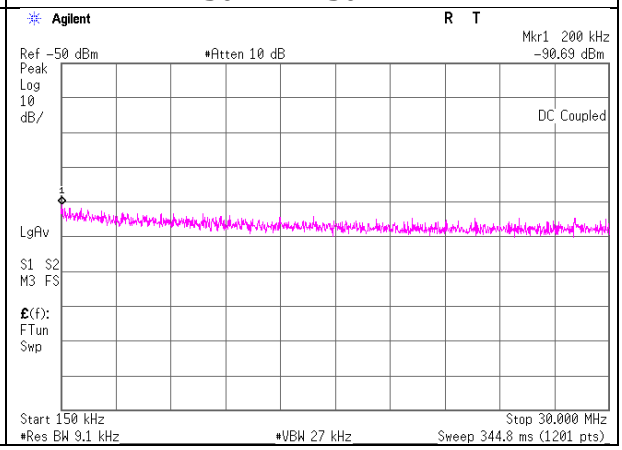
Test place	Ise EMC Lab. No.6 Measurement Room
Report No.	11081928H
Date	February 19, 2016
Temperature / Humidity	21deg. C / 41 % RH
Engineer	Ken Fujita
Mode	Tx BT LE

BT LE Tx 2402 MHz

9 kHz - 150 kHz



150 kHz - 30 MHz



Frequency [kHz]	Reading [dBm]	Cable Loss [dB]	Attenator 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
12.88	-98.8	0.01	9.94	2.0	1	-86.8	300	6.0	-25.6	45.4	71.0	
200.00	-90.7	0.03	9.95	2.0	1	-78.7	300	6.0	-17.5	21.5	39.0	

E = EIRP - 20 log (D) + Ground bounce + 104.8 [dBuV/m]

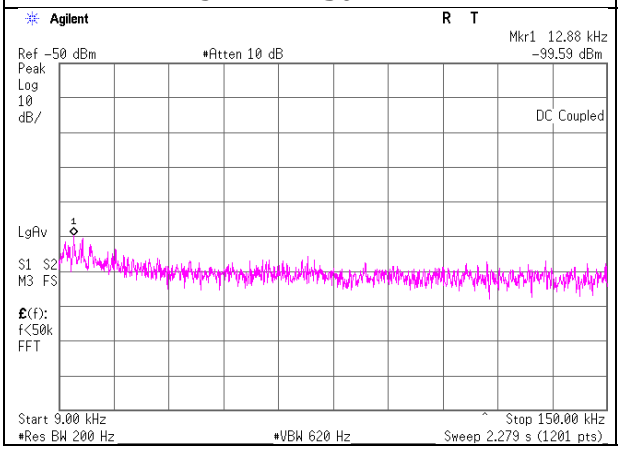
EIRP = Reading + Cable Loss + Attenator Loss + Antenna Gain + 10 * log (N)

Conducted Spurious Emission

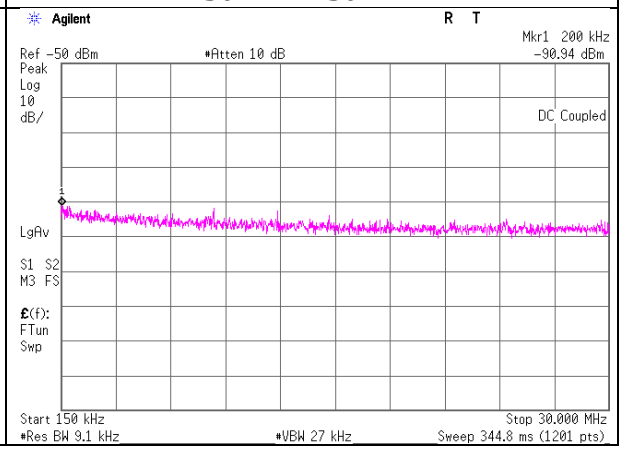
Test place	Ise EMC Lab. No.6 Measurement Room
Report No.	11081928H
Date	February 19, 2016
Temperature / Humidity	21deg. C / 41 % RH
Engineer	Ken Fujita
Mode	Tx BT LE

BT LE Tx 2440 MHz

9 kHz - 150 kHz



150 kHz - 30 MHz



Frequency [kHz]	Reading [dBm]	Cable Loss [dB]	Attenator 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
12.88	-99.6	0.01	9.94	2.0	1	-87.6	300	6.0	-26.4	45.4	71.8	
200.00	-90.9	0.03	9.95	2.0	1	-79.0	300	6.0	-17.7	21.5	39.2	

E = EIRP - 20 log (D) + Ground bounce + 104.8 [dBuV/m]

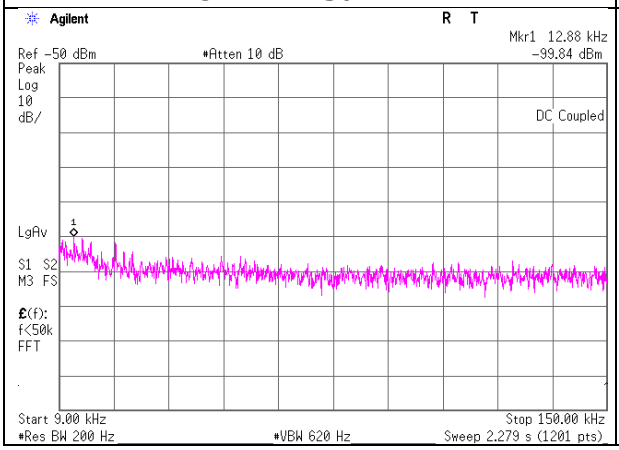
EIRP = Reading + Cable Loss + Attenator Loss + Antenna Gain + 10 * log (N)

Conducted Spurious Emission

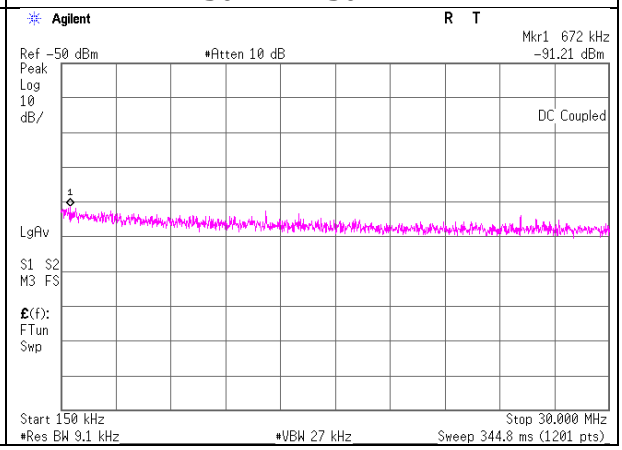
Test place	Ise EMC Lab. No.6 Measurement Room
Report No.	11081928H
Date	February 19, 2016
Temperature / Humidity	21deg. C / 41 % RH
Engineer	Ken Fujita
Mode	Tx BT LE

BT LE Tx 2480 MHz

9 kHz - 150 kHz



150 kHz - 30 MHz



Frequency [kHz]	Reading [dBm]	Cable Loss [dB]	Attenator 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
12.88	-99.8	0.01	9.94	2.0	1	-87.9	300	6.0	-26.6	45.4	72.0	
672.00	-91.2	0.03	9.88	2.0	1	-79.3	30	6.0	2.0	31.0	29.0	

E = EIRP - 20 log (D) + Ground bounce + 104.8 [dBuV/m]

EIRP = Reading + Cable Loss + Attenator Loss + Antenna Gain + 10 * log (N)

Power Density

Test place	Ise EMC Lab. No.6 Measurement Room
Report No.	11081928H
Date	February 19, 2016
Temperature / Humidity	21deg. C / 41 % RH
Engineer	Ken Fujita
Mode	Tx

11b

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result [dBm]	Limit [dBm]	Margin [dB]
2412.00	-32.30	3.43	20.00	-8.87	8.00	16.87
2437.00	-32.86	3.50	20.00	-9.36	8.00	17.36
2462.00	-32.10	3.52	20.00	-8.58	8.00	16.58

11g

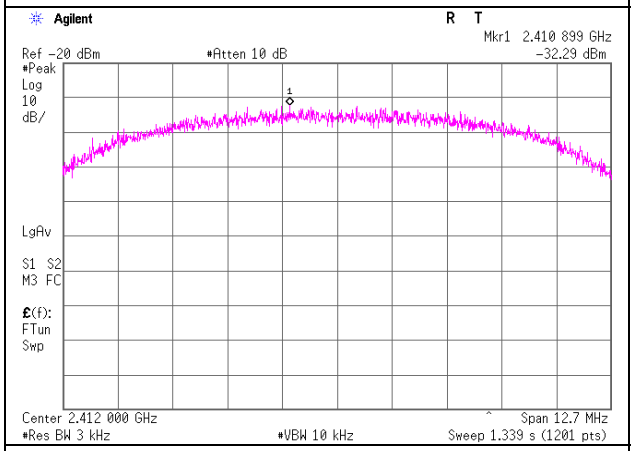
Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result [dBm]	Limit [dBm]	Margin [dB]
2412.00	-40.08	3.43	20.00	-16.65	8.00	24.65
2437.00	-40.08	3.50	20.00	-16.58	8.00	24.58
2462.00	-40.02	3.52	20.00	-16.50	8.00	24.50

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

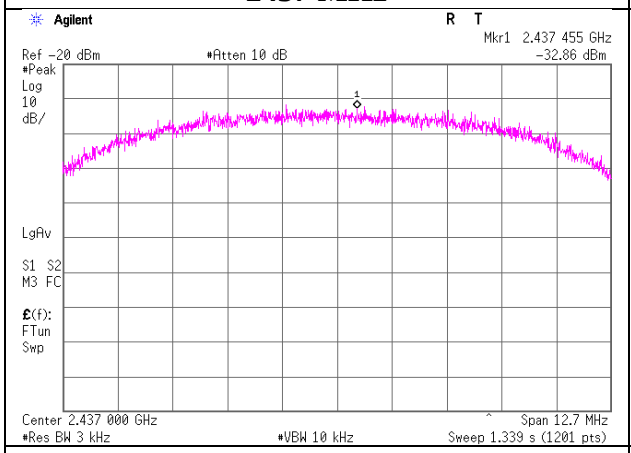
Power Density

11b

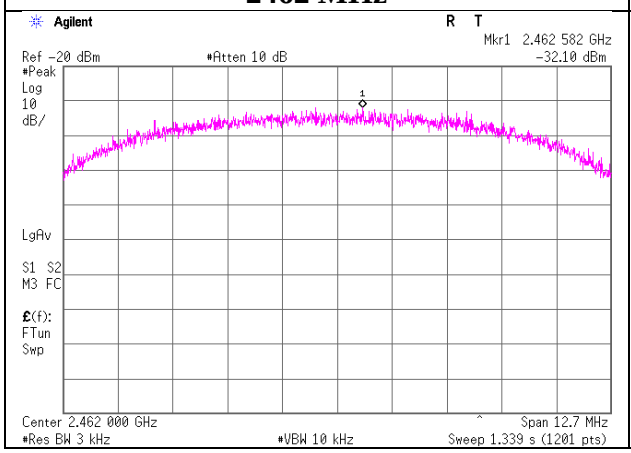
2412 MHz



2437 MHz

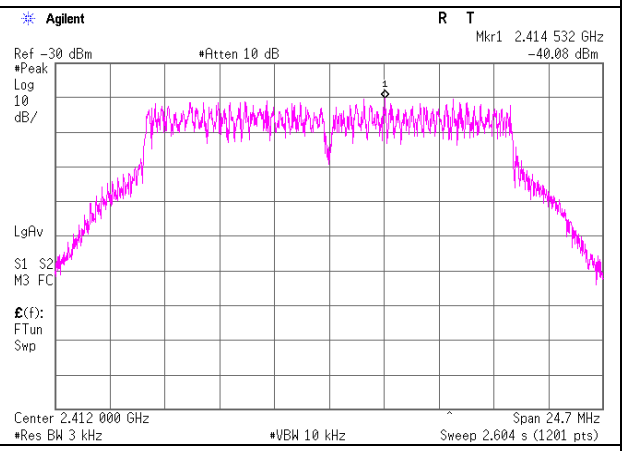


2462 MHz

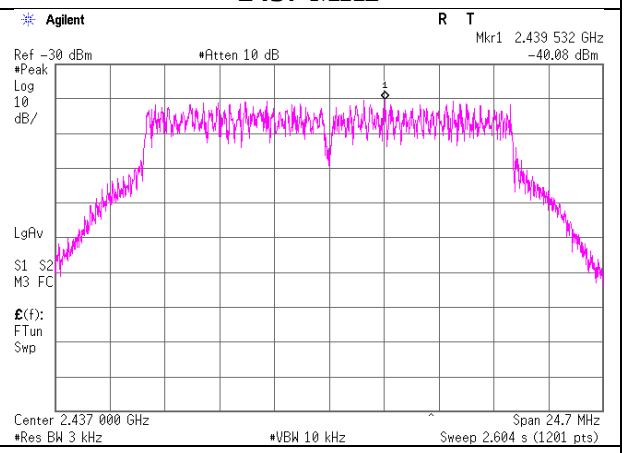


11g

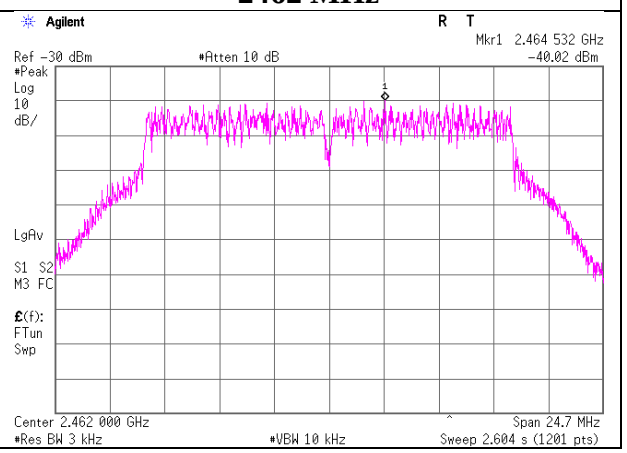
2412 MHz



2437 MHz



2462 MHz



Power Density

Test place	Ise EMC Lab. No.6 Measurement Room
Report No.	11081928H
Date	February 19, 2016
Temperature / Humidity	21deg. C / 41 % RH
Engineer	Ken Fujita
Mode	Tx

11n-20

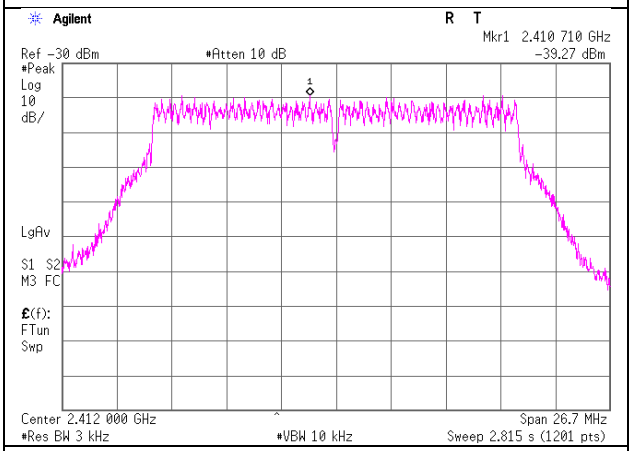
Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result [dBm]	Result [mW]	Limit [dBm]	Margin [dB]
2412.00	-39.27	3.43	20.00	-15.84	0.03	8.00	23.84
2437.00	-38.14	3.50	20.00	-14.64	0.03	8.00	22.64
2462.00	-39.69	3.52	20.00	-16.17	0.02	8.00	24.17

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

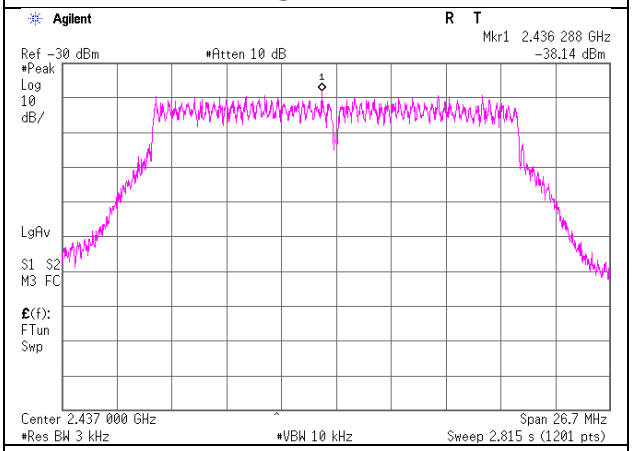
Power Density

11n-20

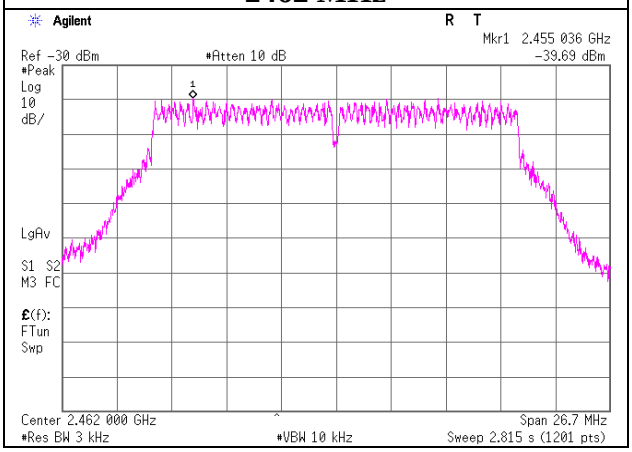
2412 MHz



2437 MHz



2462 MHz



Power Density

Test place	Ise EMC Lab. No.6 Measurement Room
Report No.	11081928H
Date	February 19, 2016
Temperature / Humidity	21deg. C / 41 % RH
Engineer	Ken Fujita
Mode	Tx BT LE

BT LE

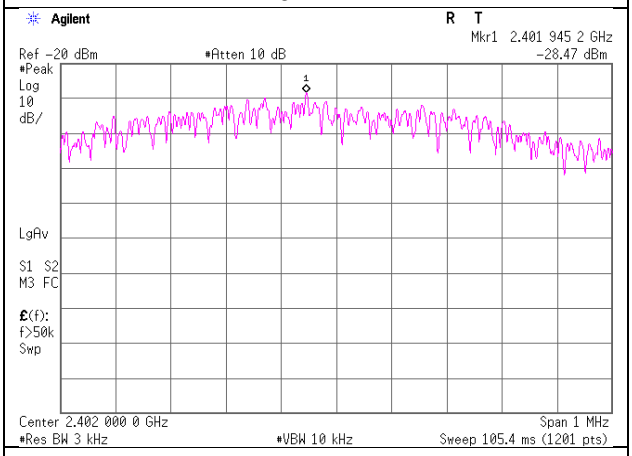
Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result [dBm]	Result [mW]	Limit [dBm]	Margin [dB]
2402.00	-28.47	0.21	10.00	-18.26	0.01	8.00	26.26
2440.00	-27.90	0.21	10.00	-17.69	0.02	8.00	25.69
2480.00	-28.23	0.21	10.00	-18.02	0.02	8.00	26.02

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

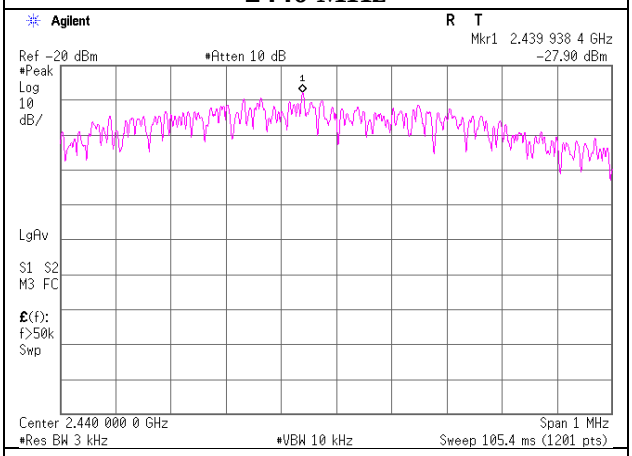
Power Density

BT LE

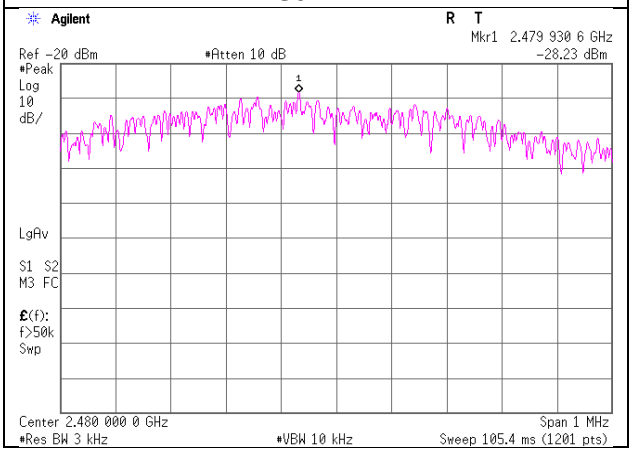
2402 MHz



2440 MHz



2480 MHz

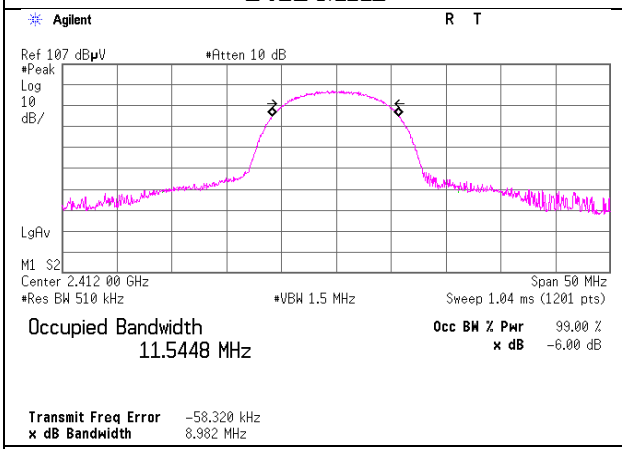


99%Occupied Bandwidth

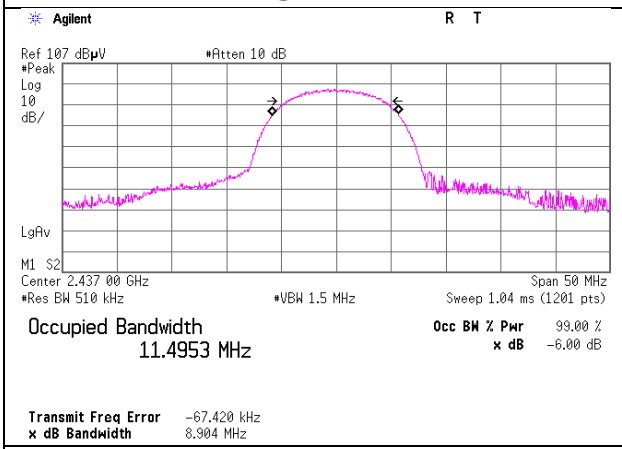
Test place	Ise EMC Lab. No.6 Measurement Room
Report No.	11081928H
Date	February 19, 2016
Temperature / Humidity	21deg. C / 41 % RH
Engineer	Ken Fujita
Mode	Tx

11b

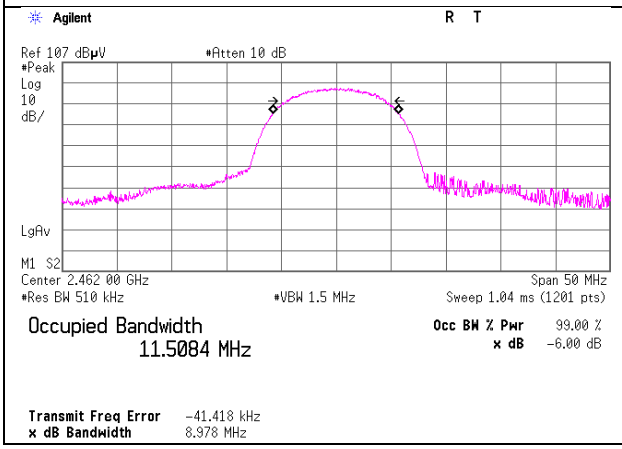
2412 MHz



2437 MHz

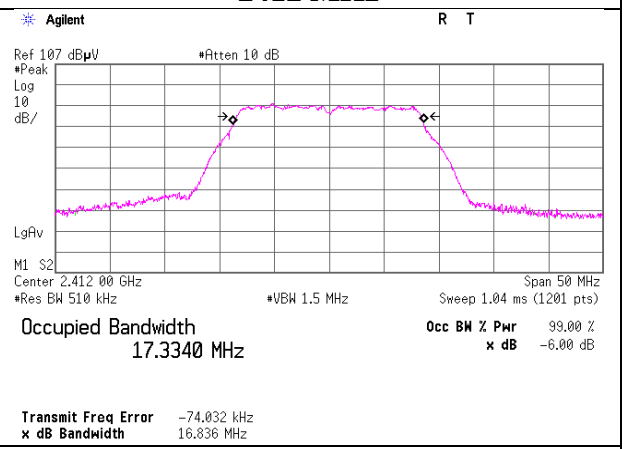


2462 MHz

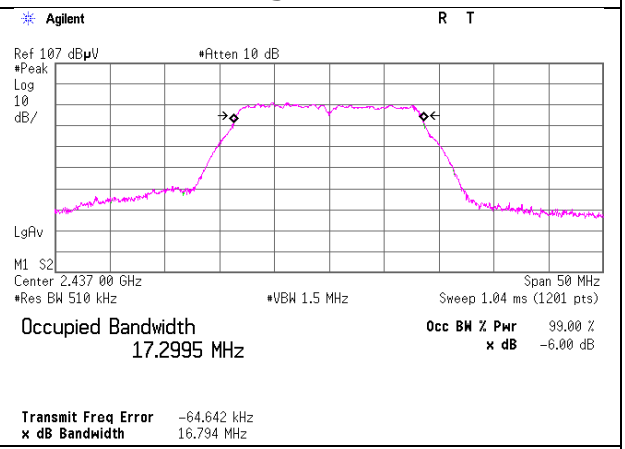


11g

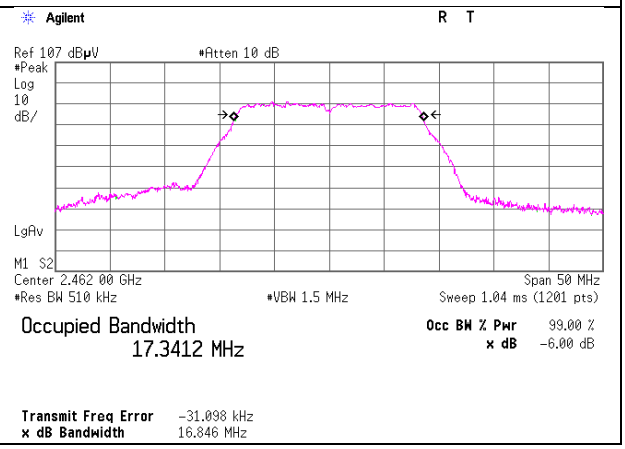
2412 MHz



2437 MHz



2462 MHz

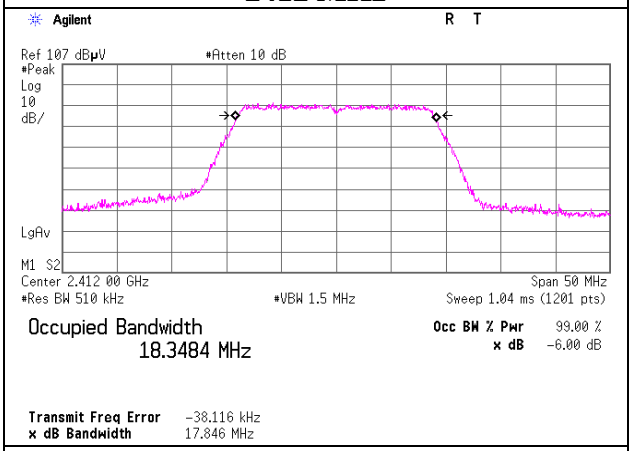


99% Occupied Bandwidth

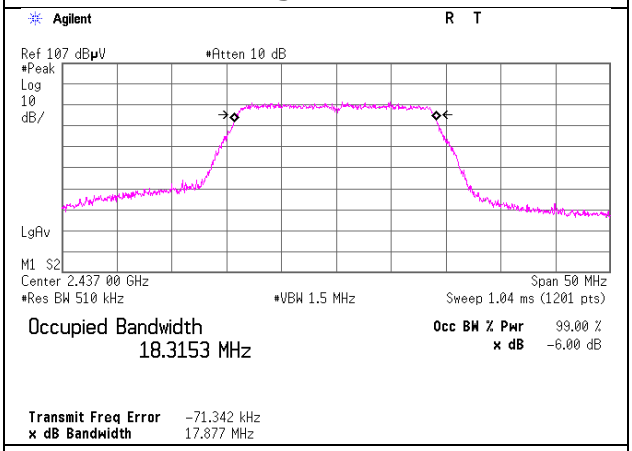
Test place	Ise EMC Lab. No.6 Measurement Room
Report No.	11081928H
Date	February 19, 2016
Temperature / Humidity	21deg. C / 41 % RH
Engineer	Ken Fujita
Mode	Tx

11n-20

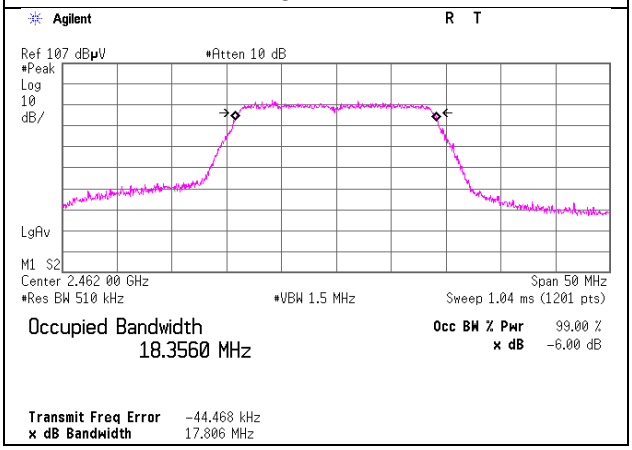
2412 MHz



2437 MHz



2462 MHz

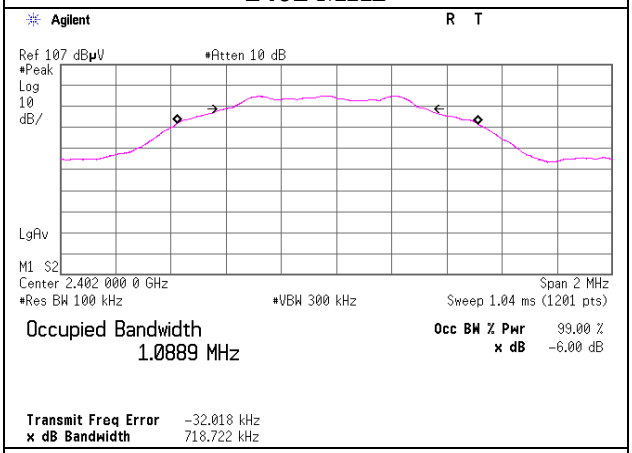


99% Occupied Bandwidth

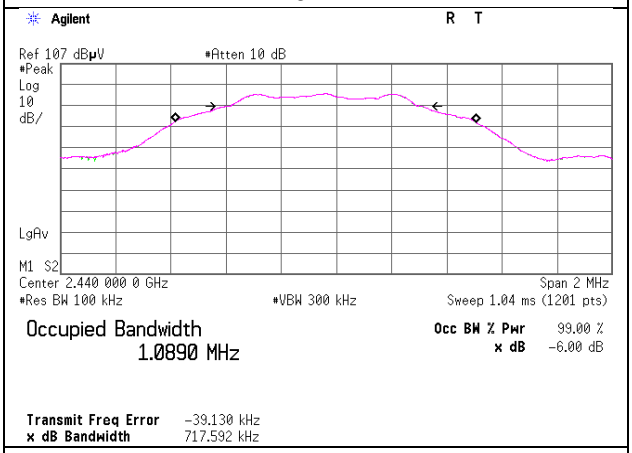
Test place	Ise EMC Lab. No.6 Measurement Room
Report No.	11081928H
Date	February 19, 2016
Temperature / Humidity	21deg. C / 41 % RH
Engineer	Ken Fujita
Mode	Tx

BT LE

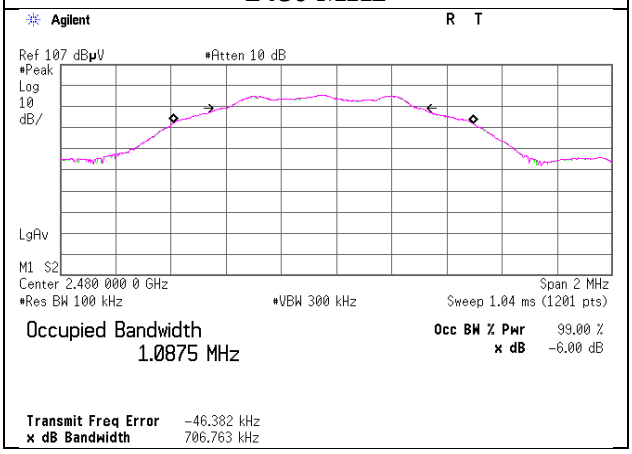
2402 MHz



2440 MHz



2480 MHz



APPENDIX 2: Test instruments

Test equipment

Control No.	Instrument	Manufacturer	Model No	Serial No	Test Item	Calibration Date * Interval(month)
MPM-08	Power Meter	Anritsu	ML2495A	6K00003338	AT	2015/10/08 * 12
MPSE-11	Power sensor	Anritsu	MA2411B	011737	AT	2015/10/08 * 12
MSA-14	Spectrum Analyzer	Agilent	E4440A	MY48250080	AT	2015/10/07 * 12
MCC-66	Microwave Cable 1G-40GHz	Suhner	SUCOFLEX102	28636/2	AT	2015/04/02 * 12
MAT-90	Attenuator	Weinschel Associates	WA56-10	56100306	AT	2015/06/01 * 12
MOS-14	Thermo-Hygrometer	Custom	CTH-201	1401	AT	2016/01/21 * 12
MMM-12	DIGITAL HiTESTER	Hioki	3805	060500120	AT	2016/02/23 * 12
MAT-86	Attenuator	Weinschel Associates	WA56-20	56200213	AT	2015/06/01 * 12
MPM-16	Power Meter	Agilent	8990B	MY51000271	AT	2015/04/01 * 12
MPSE-22	Power sensor	Agilent	N1923A	MY54070003	AT	2015/04/01 * 12
MAT-10	Attenuator(10dB)	Weinschel Corp	2	BL1173	AT	2015/11/10 * 12
MAEC-04	Semi Anechoic Chamber(NSA)	TDK	Semi Anechoic Chamber 3m	DA-10005	RE	2015/10/02 * 12
MOS-15	Thermo-Hygrometer	Custom	CTH-180	1501	RE	2016/01/21 * 12
MJM-26	Measure	KOMELON	KMC-36	-	RE	-
COTS-MEMI	EMI measurement program	TSJ	TEPTO-DV	-	RE	-
MSA-04	Spectrum Analyzer	Agilent	E4448A	US44300523	RE	2015/11/06 * 12
MHA-21	Horn Antenna 1-18GHz	Schwarzbeck	BBHA9120D	9120D-557	RE	2015/08/10 * 12
MCC-141	Microwave Cable	Junkosha	MWX221	1305S002R(1m) / 1405S146(5m)	RE	2015/06/22 * 12
MPA-12	MicroWave System Amplifier	Agilent	83017A	00650	RE	2015/10/01 * 12
MHA-17	Horn Antenna 15-40GHz	Schwarzbeck	BBHA9170	BBHA9170307	RE	2015/06/06 * 12
MMM-10	DIGITAL HiTESTER	Hioki	3805	051201148	RE	2016/01/18 * 12
MHF-26	High Pass Filter 3.5-18.0GHz	UL Japan	HPF SELECTOR	002	RE	2015/09/17 * 12
MTR-01	Test Receiver	Rohde & Schwarz	ESI40	100084	RE	2015/11/28 * 12
MBA-05	Biconical Antenna	Schwarzbeck	BBA9106	1302	RE	2015/11/02 * 12
MLA-08	Logperiodic Antenna	Schwarzbeck	UKLP9140-A	N/A	RE	2015/11/03 * 12
MCC-50	Coaxial Cable	UL Japan	-	-	RE	2015/06/19 * 12
MAT-68	Attenuator	Anritsu	MP721B	6200961025	RE	2015/11/12 * 12
MPA-09	Pre Amplifier	Agilent	8447D	2944A10845	RE	2015/09/04 * 12

The expiration date of the calibration is the end of the expired month.
All equipment is calibrated with valid calibrations. Each measurement data is traceable to the national or international standards.

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

Test Item: **RE: Radiated Emission test**
AT: Antenna Terminal Conducted test