RADIO TEST REPORT

Test Report No. : 12046116H-B-R1

Applicant	:	**DENSO TEN Limited**
Type of Equipment	:	**Car Audio**
Model No.	:	**FT0106B**
FCC ID	:	**BABFT0106B**
Test regulation	:	**FCC Part 15 Subpart C: 2017** **For Permissive Change** ***Bluetooth part** **(Radiated Spurious Emission test only)**
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 covers Radio technical requirements. It does not cover administrative issues such as Manual or non-Radio test related Requirements. (if applicable)
6. The all test items in this test report are conducted by UL Japan, Inc. Ise EMC Lab.
7. This test report must not be used by the customer to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.
8. This report is a revised version of 12046116H-B. 12046116H-B is replaced with this report.

Date of test: November 6 and 7, 2017

Representative test engineer:
Takumi Shimada
Engineer
Consumer Technology Division

Approved by:
Tsubasa Takayama
Leader
Consumer Technology Division

NVLAP LAB CODE: 200572-0

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

☐ 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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REVISION HISTORY

Original Test Report No.: 12046116H-B

Revision	Test report No.	Date	Page revised	Contents
- (Original)	12046116H-B	December 27, 2017	-	-
1	12046116H-B-R1	May 17, 2018	P1	Addition of note 6
1	12046116H-B-R1	May 17, 2018	P6	Correction of the worst margin; From “10.1 dB” to “10.0 dB”

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SECTION 1: Customer information

Company Name	:	DENSO TEN Limited
Address	:	2-28, Gosho-dori 1-Chome, Hyogo-ku, Kobe, 652-8510 JAPAN
Telephone Number	:	+81-78-682-2159
Facsimile Number	:	+81-78-671-7160
Contact Person	:	DAISUKE FUKII

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

2.1 Identification of E.U.T.

Type of Equipment	:	Car Audio
Model No.	:	FT0106B
Serial No.	:	Refer to Section 4, Clause 4.2
Rating	:	DC 12 V
Receipt Date of Sample	:	November 1, 2017
Country of Mass-production	:	Mexico, Japan
Condition of EUT	:	Production prototype (Not for Sale: This sample is equivalent to mass-produced items.)
Modification of EUT	:	No Modification by the test lab

2.2 Product Description

Model: FT0106B (referred to as the EUT in this report) is a Car Audio.

General Specification

Clock frequency(ies)	:	48 MHz (Crystal)
Operating Temperature	:	-20 deg. C- +65 deg. C

Radio Specification

WLAN (IEEE802.11b/g/n-20)

Radio Type	:	Transceiver
Frequency of Operation	:	2412 MHz - 2462 MHz
Modulation	:	DSSS/OFDM
Power Supply (inner)	:	DC 1.8 V, DC 3.3 V
Antenna type	:	Inverted F Antenna
Antenna Gain	:	0.96 dBi

Bluetooth (Ver.4.1 + EDR)

Equipment Type	:	Transceiver
Frequency of Operation	:	2402 MHz - 2480 MHz
Type of Modulation	:	FHSS, GFSK, π/4 DQPSK, 8 DPSK
Power Supply (inner)	:	DC 1.8 V, DC 3.3 V
Antenna Type	:	Inverted F Antenna
Antenna Gain	:	0.96 dBi

GPS Receiver

Type of Receiver	:	GPS Receiver
Frequency of Operation	:	1575.42 MHz
Modulation	:	DSSS
Power Supply (inner)	:	DC 1.8 V
Antenna type	:	GPS Antenna
Antenna Gain	:	29 dBi

*This test report applies to Bluetooth Ver.4.1 with EDR function.
*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 FCC Part 15 final revised on November 2, 2017
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

* Also the EUT complies with FCC Part 15 Subpart B.

3.2 Procedures and results

Item	Test Procedure	Specification	Worst Margin	Results	Remarks
Spurious Emission & Band Edge Compliance	**FCC:** FCC Public Notice DA 00-705	**FCC:** Section15.247(d)	10.0 dB 926.234 MHz, Vertical, QP	Complied	Radiated (above 30 MHz) *1)
	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) Radiated test was selected over 30 MHz based on section 15.247(d).					

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

FCC Part 15.31 (e)
This EUT provides stable voltage (DC 1.8 V, 3.3 V) constantly to RF Module regardless of input voltage. Therefore, this 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 of Section 15.203.

3.3 Addition to standard

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.

Polarity	Radiated emission (Below 1 GHz)			
	(3 m*) (+/-)		(10 m*) (+/-)	
	30 MHz - 200 MHz	200 MHz - 1000 MHz	30 MHz - 200 MHz	200 MHz - 1000 MHz
Horizontal	5.0 dB	5.3 dB	5.0 dB	5.0 dB
Vertical	5.2 dB	6.3 dB	5.0 dB	5.0 dB

Radiated emission (Above 1 GHz)				
(3 m*) (+/-)		(1 m*) (+/-)		(10 m*) (+/-)
1 GHz - 6 GHz	6 GHz - 18 GHz	10 GHz - 26.5 GHz	26.5 GHz - 40 GHz	1 GHz - 18 GHz
5.2 dB	5.5 dB	5.5 dB	5.4 dB	5.5 dB

*Measurement distance

Radiated emission test

The data listed in this test report has enough margin, more than the site margin.

3.5 Test Location

UL Japan, Inc. Ise EMC Lab.
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN
Telephone: +81 596 24 8999, Facsimile: +81 596 24 8124
NVLAP Lab. code: 200572-0 / FCC Test Firm Registration Number: 199967

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

* Size of vertical conducting plane (for Conducted Emission test) : 2.0 m x 2.0 m 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)

Bluetooth (BT): Transmitting (Tx), Payload: PRBS9

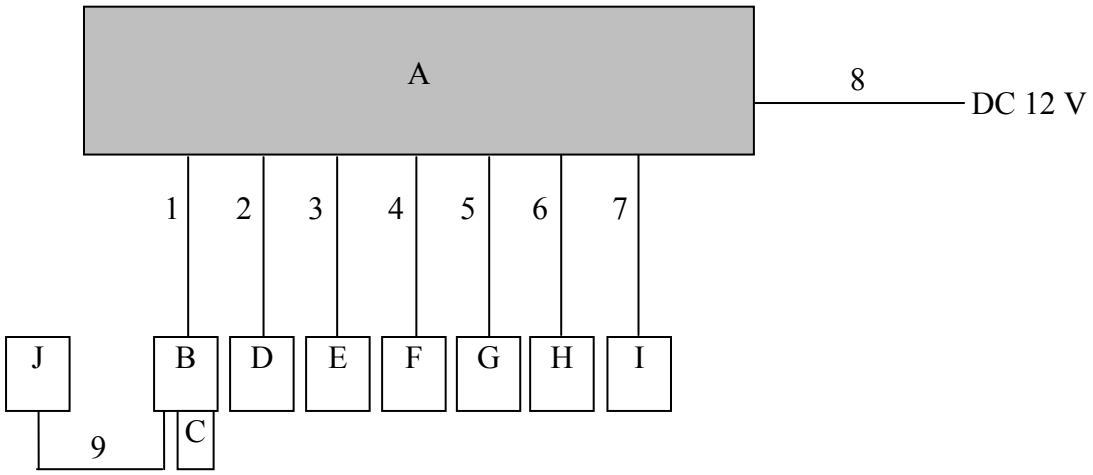
Details of Operating Mode(s)

Test Item	Mode	Tested frequency
Spurious Emission (Radiated)	Tx (Hopping Off) DH5, 3DH5	2402 MHz 2441 MHz 2480 MHz

*As a result of preliminary test, the formal test was performed with the above modes, which had the maximum payload length.
*2DH mode (2Mb/s EDR: pi/4DQPSK) was excluded for other tests than power measurement by using 3DH mode (3 Mb/s EDR: 8DPSK) as a representative.
* It is considered that the non-tested packet type (e.g. inquiry) can be omitted as it is complied with above all test items based on Bluetooth Core specification.

*EUT has the power settings by the software as follows;
- Power settings: 0 dBm
- Software: BSDT Ver. 2.0.0.12
*This setting of software is the worst case.
Any conditions under the normal use do not exceed the condition of setting.
In addition, end users cannot change the settings of the output power of the product.

4.2 Configuration and peripherals



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

Description of EUT and Suppor equipment

No.	Item	Model number	Serial number	Manufacturer	Remarks
A	Car Audio	FT0106B	AP700034	DENSO TEN Limited	EUT
B	USB/Audio Connector	-	-	-	
C	USB Memory	RFU2-JV4GS	P11103	BUFFALO	-
D	Radio Antenna AMP	PP100021	86300-06250	-	-
E	GPS Antenna	-	27580071	-	-
F	Microphone	-	38	-	-
G	Camera	GP-KD7301RC	64F000034	-	-
H	Steering switch	75E717	-	-	-
I	AMP	-	-	-	-
J	iPod	A1367	CCQG50WDDCPC	Apple	-

List of cables used

No.	Name	Length (m)	Shield		Remarks
			Cable	Connector	
1	USB Cable	2.0	Shielded	Shielded	-
2	Signal Cable	4.2	Unshielded	Unshielded	-
3	Signal Cable	7.0	Unshielded	Unshielded	-
4	Signal Cable	2.5	Unshielded	Unshielded	-
5	Signal Cable	2.8	Unshielded	Unshielded	-
6	Signal Cable	2.5	Unshielded	Unshielded	-
7	Signal Cable	3.0	Unshielded	Unshielded	-
8	DC Cable	1.3	Unshielded	Unshielded	-
9	Audio Cable	1.5	Unshielded	Unshielded	-

SECTION 5: Radiated Spurious Emission

Test Procedure

[For below 1 GHz]
EUT was placed on a urethane platform of nominal size, 1.0 m by 2.0 m, raised 0.8 m above the conducting ground plane. The Radiated Electric Field Strength has been measured in a Semi Anechoic Chamber with a ground plane.

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

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

Test Antennas are used as below;

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

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

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

Frequency	Below 1 GHz	Above 1 GHz		20 dBc
Instrument used	Test Receiver	Spectrum Analyzer		Spectrum Analyzer
Detector	QP	PK	AV	PK
IF Bandwidth	BW 120 kHz	RBW: 1 MHz VBW: 3 MHz	RBW: 1 MHz VBW: 10 Hz *1)	RBW: 100 kHz VBW: 300 kHz
Test Distance	3 m	4.5 m*2) (1 GHz - 10 GHz), 1 m*3) (10 GHz - 26.5 GHz)		4.5 m*2) (1 GHz - 10 GHz), 1 m*3) (10 GHz - 26.5 GHz)

*1) Although DA 00-705 accepts VBW = 10 Hz for AV measurements, it was confirmed that superfluous smoothing was not performed.
*2) Distance Factor: 20 x log (4.5 m/3.0 m) = 3.53 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 MHz - 26.5 GHz
Test data : APPENDIX
Test result : Pass

APPENDIX 1: Test data

Radiated Spurious Emission

Report No.	12046116H		
Test place	Ise EMC Lab.		
Semi Anechoic Chamber	No.3	No.3	No.3
Date	November 6, 2017	November 7, 2017	November 7, 2017
Temperature / Humidity	23 deg. C / 48 % RH	22 deg. C / 44 % RH	23 deg. C / 47 % RH
Engineer	Takumi Shimada	Yuta Moriya	Takumi Shimada
	(1 GHz - 10 GHz)	(Above 10 GHz)	(Below 1 GHz)
Mode	Tx, Hopping Off, DH5 2402 MHz		

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	147.459	QP	30.4	14.8	8.7	32.1	21.8	43.5	21.7	
Hori	294.902	QP	33.7	13.2	10.0	32.0	24.9	46.0	21.1	
Hori	331.761	QP	31.7	14.2	10.2	32.0	24.1	46.0	21.9	
Hori	487.499	QP	30.8	17.4	11.3	32.0	27.5	46.0	18.5	
Hori	926.242	QP	30.3	22.2	13.6	30.8	35.3	46.0	10.7	
Hori	2390.000	PK	42.3	27.7	6.7	32.4	44.3	73.9	29.6	
Hori	4804.000	PK	43.5	31.6	9.0	31.4	52.7	73.9	21.2	
Hori	7206.000	PK	42.5	36.0	10.4	32.1	56.8	73.9	17.1	Floor noise
Hori	9608.000	PK	43.2	38.5	10.9	32.9	59.7	73.9	14.2	Floor noise
Hori	2390.000	AV	31.3	27.7	6.7	32.4	33.3	53.9	20.6	
Hori	4804.000	AV	31.0	31.6	9.0	31.4	40.2	53.9	13.7	
Hori	7206.000	AV	29.0	36.0	10.4	32.1	43.3	53.9	10.6	Floor noise
Hori	9608.000	AV	28.4	38.5	10.9	32.9	44.9	53.9	9.0	Floor noise
Vert	147.459	QP	32.3	14.8	8.7	32.1	23.7	43.5	19.8	
Vert	294.902	QP	34.0	13.2	10.0	32.0	25.2	46.0	20.8	
Vert	331.761	QP	30.2	14.2	10.2	32.0	22.6	46.0	23.4	
Vert	487.499	QP	29.4	17.4	11.3	32.0	26.1	46.0	19.9	
Vert	926.242	QP	30.8	22.2	13.6	30.8	35.8	46.0	10.2	
Vert	2390.000	PK	42.4	27.7	6.7	32.4	44.4	73.9	29.5	
Vert	4804.000	PK	43.3	31.6	9.0	31.4	52.5	73.9	21.4	
Vert	7206.000	PK	41.9	36.0	10.4	32.1	56.2	73.9	17.7	Floor noise
Vert	9608.000	PK	42.3	38.5	10.9	32.9	58.8	73.9	15.1	Floor noise
Vert	2390.000	AV	29.6	27.7	6.7	32.4	31.6	53.9	22.3	
Vert	4804.000	AV	32.3	31.6	9.0	31.4	41.5	53.9	12.4	
Vert	7206.000	AV	29.2	36.0	10.4	32.1	43.5	53.9	10.4	Floor noise
Vert	9608.000	AV	28.4	38.5	10.9	32.9	44.9	53.9	9.0	Floor noise

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter+Distance factor(above 1 GHz)) - Gain(Amplifier)
*Other frequency noises omitted in this report were not seen or had enough margin (more than 20 dB).

Distance factor: 1 GHz - 10 GHz 20log (4.5 m / 3.0 m) = 3.53 dB
10 GHz - 26.5 GHz 20log (1.0 m / 3.0 m) = -9.5 dB

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	92.4	27.7	6.8	32.4	94.5	-	-	Carrier
Hori	2400.000	PK	38.7	27.7	6.8	32.4	40.8	74.5	33.7	
Vert	2402.000	PK	91.3	27.7	6.8	32.4	93.4	-	-	Carrier
Vert	2400.000	PK	36.8	27.7	6.8	32.4	38.9	73.4	34.5	

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

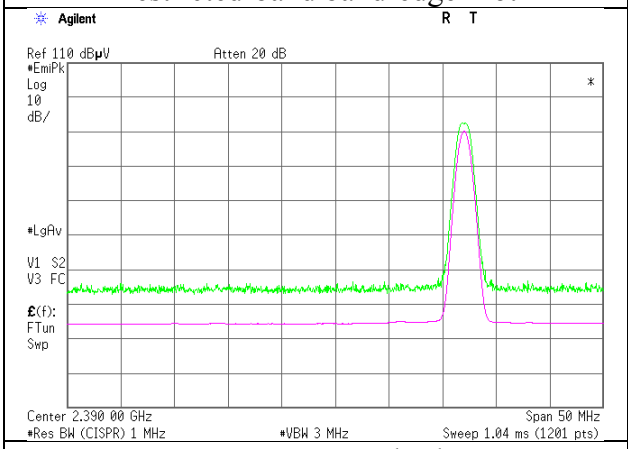
***These results have sufficient margin without taking account Dwell time factor.**

Radiated Spurious Emission
(Reference Plot for band-edge)

Report No.	12046116H
Test place	Ise EMC Lab.
Semi Anechoic Chamber	No.3
Date	November 6, 2017
Temperature / Humidity	23 deg. C / 48 % RH
Engineer	Takumi Shimada
	(1 GHz - 10 GHz)
Mode	Tx, Hopping Off, DH5 2402 MHz

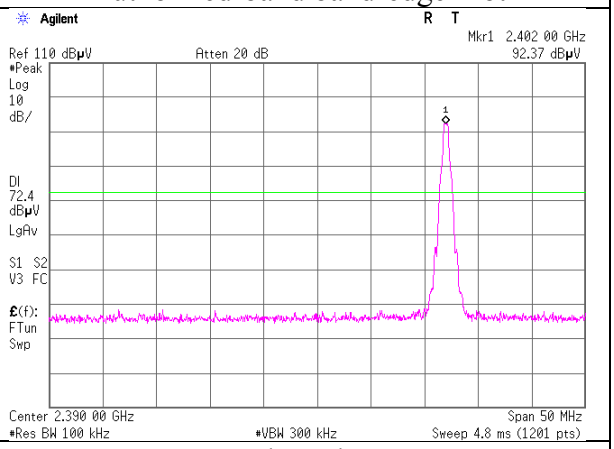
Horizontal

Restricted-band band-edge Plot



Trace Green : Peak Plot
Trace Purple : Average Plot

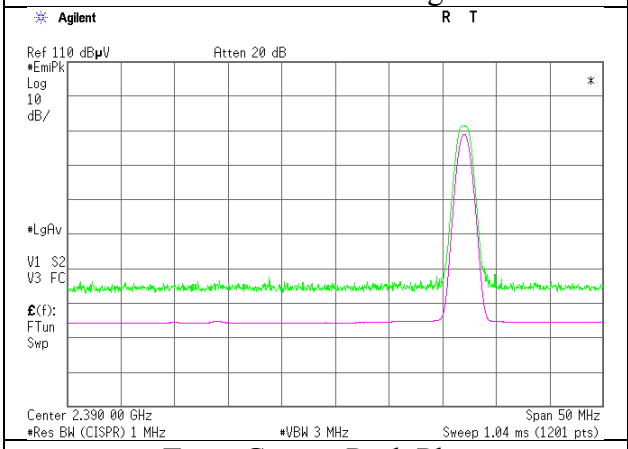
Authorized-band band-edge Plot



20dBc Plot

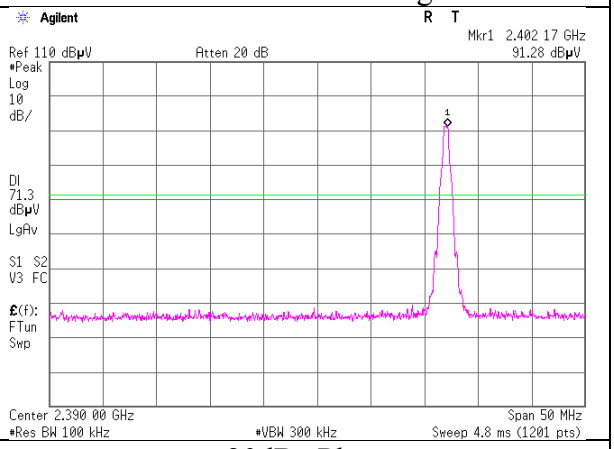
Vertical

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

Report No.	12046116H		
Test place	Ise EMC Lab.		
Semi Anechoic Chamber	No.3	No.3	No.3
Date	November 6, 2017	November 7, 2017	November 7, 2017
Temperature / Humidity	23 deg. C / 48 % RH	22 deg. C / 44 % RH	23 deg. C / 47 % RH
Engineer	Takumi Shimada	Yuta Moriya	Takumi Shimada
	(1 GHz - 10 GHz)	(Above 10 GHz)	(Below 1 GHz)
Mode	Tx, Hopping Off, DH5 2441 MHz		

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	147.465	QP	30.3	14.8	8.7	32.1	21.7	43.5	21.8	
Hori	294.914	QP	33.8	13.2	10.0	32.0	25.0	46.0	21.0	
Hori	331.765	QP	31.4	14.2	10.2	32.0	23.8	46.0	22.2	
Hori	487.493	QP	30.7	17.4	11.3	32.0	27.4	46.0	18.6	
Hori	926.237	QP	30.4	22.2	13.6	30.8	35.4	46.0	10.6	
Hori	4882.000	PK	43.1	31.9	9.0	31.4	52.6	73.9	21.3	
Hori	7323.000	PK	42.8	36.2	10.4	32.2	57.2	73.9	16.7	Floor noise
Hori	9764.000	PK	42.2	38.7	11.0	33.0	58.9	73.9	15.0	Floor noise
Hori	4882.000	AV	30.2	31.9	9.0	31.4	39.7	53.9	14.2	
Hori	7323.000	AV	30.3	36.2	10.4	32.2	44.7	53.9	9.2	Floor noise
Hori	9764.000	AV	29.9	38.7	11.0	33.0	46.6	53.9	7.3	Floor noise
Vert	147.465	QP	32.5	14.8	8.7	32.1	23.9	43.5	19.6	
Vert	294.914	QP	34.0	13.2	10.0	32.0	25.2	46.0	20.8	
Vert	331.765	QP	30.3	14.2	10.2	32.0	22.7	46.0	23.3	
Vert	487.493	QP	29.5	17.4	11.3	32.0	26.2	46.0	19.8	
Vert	926.237	QP	30.5	22.2	13.6	30.8	35.5	46.0	10.5	
Vert	4882.000	PK	42.5	31.9	9.0	31.4	52.0	73.9	21.9	
Vert	7323.000	PK	42.2	36.2	10.4	32.2	56.6	73.9	17.3	Floor noise
Vert	9764.000	PK	41.8	38.7	11.0	33.0	58.5	73.9	15.4	Floor noise
Vert	4882.000	AV	30.2	31.9	9.0	31.4	39.7	53.9	14.2	
Vert	7323.000	AV	30.2	36.2	10.4	32.2	44.6	53.9	9.3	Floor noise
Vert	9764.000	AV	29.8	38.7	11.0	33.0	46.5	53.9	7.4	Floor noise

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

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

Distance factor: 1 GHz - 10 GHz 20log (4.5 m / 3.0 m) = 3.53 dB
10 GHz - 26.5 GHz 20log (1.0 m / 3.0 m) = -9.5 dB

***These results have sufficient margin without taking account Dwell time factor.**

Radiated Spurious Emission

Report No.	12046116H		
Test place	Ise EMC Lab.		
Semi Anechoic Chamber	No.3	No.3	No.3
Date	November 6, 2017	November 7, 2017	November 7, 2017
Temperature / Humidity	23 deg. C / 48 % RH	22 deg. C / 44 % RH	23 deg. C / 47 % RH
Engineer	Takumi Shimada	Yuta Moriya	Takumi Shimada
	(1 GHz - 10 GHz)	(Above 10 GHz)	(Below 1 GHz)
Mode	Tx, Hopping Off, DH5 2480 MHz		

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	147.453	QP	30.5	14.8	8.7	32.1	21.9	43.5	21.6	
Hori	294.904	QP	33.7	13.2	10.0	32.0	24.9	46.0	21.1	
Hori	331.684	QP	32.3	14.2	10.2	32.0	24.7	46.0	21.3	
Hori	487.493	QP	30.4	17.4	11.3	32.0	27.1	46.0	18.9	
Hori	926.228	QP	30.8	22.2	13.6	30.8	35.8	46.0	10.2	
Hori	2483.500	PK	42.6	27.8	6.8	32.4	44.8	73.9	29.1	
Hori	4960.000	PK	43.3	32.1	9.1	31.3	53.2	73.9	20.7	
Hori	7440.000	PK	42.6	36.4	10.3	32.2	57.1	73.9	16.8	Floor noise
Hori	9920.000	PK	41.8	38.9	11.0	33.1	58.6	73.9	15.3	Floor noise
Hori	2483.500	AV	28.6	27.8	6.8	32.4	30.8	53.9	23.1	
Hori	4960.000	AV	30.8	32.1	9.1	31.3	40.7	53.9	13.2	
Hori	7440.000	AV	29.3	36.4	10.3	32.2	43.8	53.9	10.1	Floor noise
Hori	9920.000	AV	28.4	38.9	11.0	33.1	45.2	53.9	8.7	Floor noise
Vert	147.453	QP	32.7	14.8	8.7	32.1	24.1	43.5	19.4	
Vert	294.904	QP	34.2	13.2	10.0	32.0	25.4	46.0	20.6	
Vert	331.684	QP	30.8	14.2	10.2	32.0	23.2	46.0	22.8	
Vert	487.493	QP	29.3	17.4	11.3	32.0	26.0	46.0	20.0	
Vert	926.228	QP	30.9	22.2	13.6	30.8	35.9	46.0	10.1	
Vert	2483.500	PK	42.2	27.8	6.8	32.4	44.4	73.9	29.5	
Vert	4960.000	PK	43.4	32.1	9.1	31.3	53.3	73.9	20.6	
Vert	7440.000	PK	43.3	36.4	10.3	32.2	57.8	73.9	16.1	Floor noise
Vert	9920.000	PK	41.2	38.9	11.0	33.1	58.0	73.9	15.9	Floor noise
Vert	2483.500	AV	29.8	27.8	6.8	32.4	32.0	53.9	21.9	
Vert	4960.000	AV	32.2	32.1	9.1	31.3	42.1	53.9	11.8	
Vert	7440.000	AV	29.2	36.4	10.3	32.2	43.7	53.9	10.2	Floor noise
Vert	9920.000	AV	29.3	38.9	11.0	33.1	46.1	53.9	7.8	Floor noise

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter+Distance factor(above 1 GHz)) - Gain(Amplifier)
*Other frequency noises omitted in this report were not seen or had enough margin (more than 20 dB).

Distance factor: 1 GHz - 10 GHz 20log (4.5 m / 3.0 m) = 3.53 dB
10 GHz - 26.5 GHz 20log (1.0 m / 3.0 m) = -9.5 dB

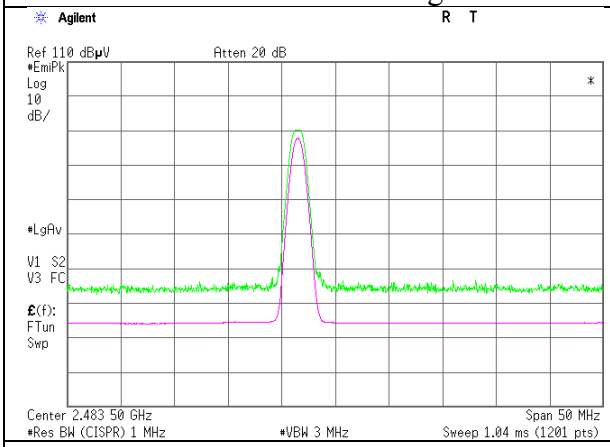
***These results have sufficient margin without taking account Dwell time factor.**

Radiated Spurious Emission
(Reference Plot for band-edge)

Report No.	12046116H
Test place	Ise EMC Lab.
Semi Anechoic Chamber	No.3
Date	November 6, 2017
Temperature / Humidity	23 deg. C / 48 % RH
Engineer	Takumi Shimada
	(1 GHz - 10 GHz)
Mode	Tx, Hopping Off, DH5 2480 MHz

Horizontal

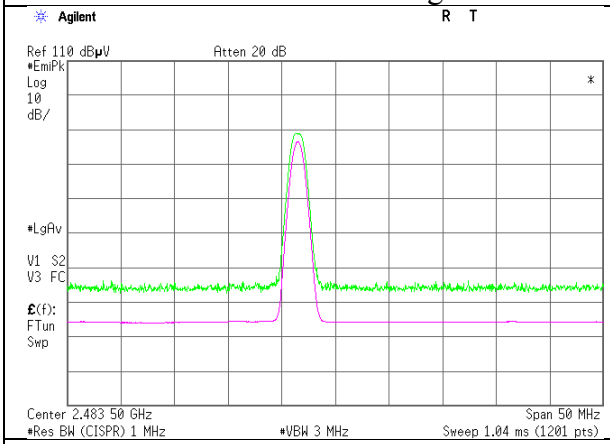
Restricted-band band-edge Plot



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

Report No.	12046116H		
Test place	Ise EMC Lab.		
Semi Anechoic Chamber	No.3	No.3	No.3
Date	November 6, 2017	November 7, 2017	November 7, 2017
Temperature / Humidity	23 deg. C / 48 % RH	22 deg. C / 44 % RH	23 deg. C / 47 % RH
Engineer	Takumi Shimada	Yuta Moriya	Takumi Shimada
	(1 GHz - 10 GHz)	(Above 10 GHz)	(Below 1 GHz)
Mode	Tx, Hopping Off, 3DH5 2402 MHz		

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	147.464	QP	30.3	14.8	8.7	32.1	21.7	43.5	21.8	
Hori	294.907	QP	33.6	13.2	10.0	32.0	24.8	46.0	21.2	
Hori	331.676	QP	32.1	14.2	10.2	32.0	24.5	46.0	21.5	
Hori	487.499	QP	30.2	17.4	11.3	32.0	26.9	46.0	19.1	
Hori	926.231	QP	30.5	22.2	13.6	30.8	35.5	46.0	10.5	
Hori	2390.000	PK	43.1	27.7	6.7	32.4	45.1	73.9	28.8	
Hori	4804.000	PK	42.5	31.6	9.0	31.4	51.7	73.9	22.2	
Hori	7206.000	PK	42.7	36.0	10.4	32.1	57.0	73.9	16.9	Floor noise
Hori	9608.000	PK	42.3	38.5	10.9	32.9	58.8	73.9	15.1	Floor noise
Hori	2390.000	AV	29.7	27.7	6.7	32.4	31.7	53.9	22.2	
Hori	4804.000	AV	31.5	31.6	9.0	31.4	40.7	53.9	13.2	
Hori	7206.000	AV	29.4	36.0	10.4	32.1	43.7	53.9	10.2	Floor noise
Hori	9608.000	AV	28.9	38.5	10.9	32.9	45.4	53.9	8.5	Floor noise
Vert	147.464	QP	32.6	14.8	8.7	32.1	24.0	43.5	19.5	
Vert	294.907	QP	34.3	13.2	10.0	32.0	25.5	46.0	20.5	
Vert	331.676	QP	30.9	14.2	10.2	32.0	23.3	46.0	22.7	
Vert	487.499	QP	29.5	17.4	11.3	32.0	26.2	46.0	19.8	
Vert	926.231	QP	30.8	22.2	13.6	30.8	35.8	46.0	10.2	
Vert	2390.000	PK	41.7	27.7	6.7	32.4	43.7	73.9	30.2	
Vert	4804.000	PK	43.3	31.6	9.0	31.4	52.5	73.9	21.4	
Vert	7206.000	PK	42.4	36.0	10.4	32.1	56.7	73.9	17.2	Floor noise
Vert	9608.000	PK	41.8	38.5	10.9	32.9	58.3	73.9	15.6	Floor noise
Vert	2390.000	AV	29.5	27.7	6.7	32.4	31.5	53.9	22.4	
Vert	4804.000	AV	32.0	31.6	9.0	31.4	41.2	53.9	12.7	
Vert	7206.000	AV	29.5	36.0	10.4	32.1	43.8	53.9	10.1	Floor noise
Vert	9608.000	AV	28.8	38.5	10.9	32.9	45.3	53.9	8.6	Floor noise

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter+Distance factor(above 1 GHz)) - Gain(Amplifier)
*Other frequency noises omitted in this report were not seen or had enough margin (more than 20 dB).

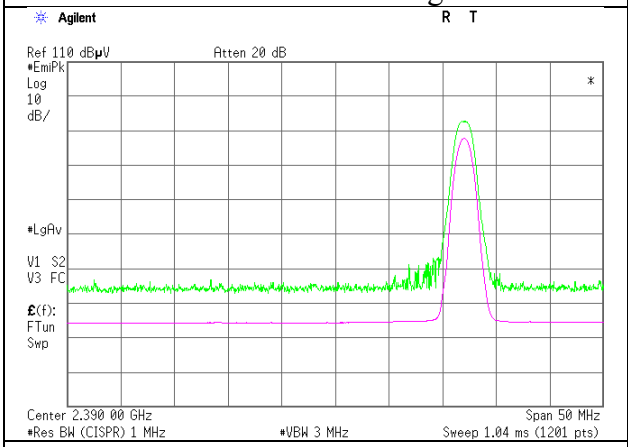
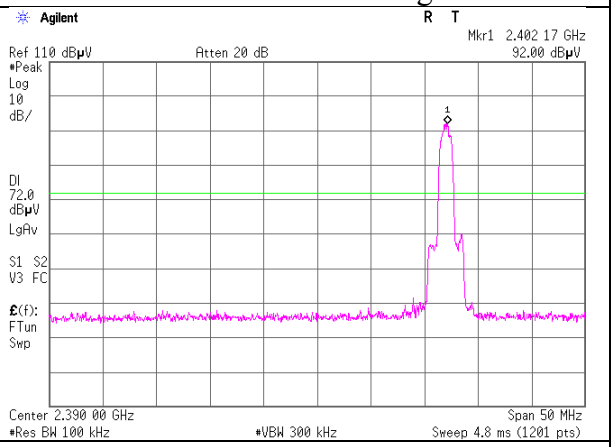
Distance factor: 1 GHz - 10 GHz 20log (4.5 m / 3.0 m) = 3.53 dB
10 GHz - 26.5 GHz 20log (1.0 m / 3.0 m) = -9.5 dB

***These results have sufficient margin without taking account Dwell time factor.**

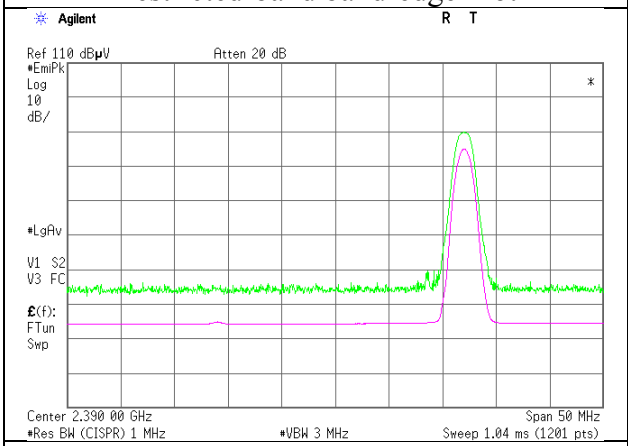
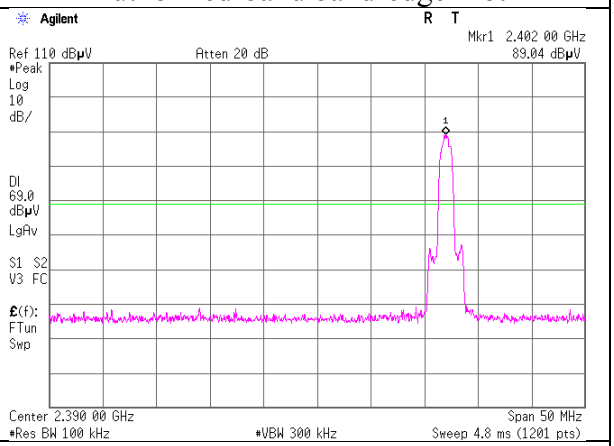
Radiated Spurious Emission
(Reference Plot for band-edge)

Report No.	12046116H
Test place	Ise EMC Lab.
Semi Anechoic Chamber	No.3
Date	November 6, 2017
Temperature / Humidity	23 deg. C / 48 % RH
Engineer	Takumi Shimada
	(1 GHz - 10 GHz)
Mode	Tx, Hopping Off, 3DH5 2402 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

Report No.	12046116H		
Test place	Ise EMC Lab.		
Semi Anechoic Chamber	No.3	No.3	No.3
Date	November 6, 2017	November 7, 2017	November 7, 2017
Temperature / Humidity	23 deg. C / 48 % RH	22 deg. C / 44 % RH	23 deg. C / 47 % RH
Engineer	Takumi Shimada	Yuta Moriya	Takumi Shimada
	(1 GHz - 10 GHz)	(Above 10 GHz)	(Below 1 GHz)
Mode	Tx, Hopping Off, 3DH5 2441 MHz		

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	147.463	QP	30.7	14.8	8.7	32.1	22.1	43.5	21.4	
Hori	294.901	QP	33.2	13.2	10.0	32.0	24.4	46.0	21.6	
Hori	331.668	QP	32.3	14.2	10.2	32.0	24.7	46.0	21.3	
Hori	487.494	QP	30.4	17.4	11.3	32.0	27.1	46.0	18.9	
Hori	926.236	QP	30.3	22.2	13.6	30.8	35.3	46.0	10.7	
Hori	4882.000	PK	41.2	31.9	9.0	31.4	50.7	73.9	23.2	
Hori	7323.000	PK	42.5	36.2	10.4	32.2	56.9	73.9	17.0	Floor noise
Hori	9764.000	PK	42.3	38.7	11.0	33.0	59.0	73.9	14.9	Floor noise
Hori	4882.000	AV	30.2	31.9	9.0	31.4	39.7	53.9	14.2	
Hori	7323.000	AV	30.1	36.2	10.4	32.2	44.5	53.9	9.4	Floor noise
Hori	9764.000	AV	29.7	38.7	11.0	33.0	46.4	53.9	7.5	Floor noise
Vert	147.463	QP	32.3	14.8	8.7	32.1	23.7	43.5	19.8	
Vert	294.901	QP	34.1	13.2	10.0	32.0	25.3	46.0	20.7	
Vert	331.668	QP	30.7	14.2	10.2	32.0	23.1	46.0	22.9	
Vert	487.494	QP	29.2	17.4	11.3	32.0	25.9	46.0	20.1	
Vert	926.236	QP	30.9	22.2	13.6	30.8	35.9	46.0	10.1	
Vert	4882.000	PK	42.5	31.9	9.0	31.4	52.0	73.9	21.9	
Vert	7323.000	PK	42.4	36.2	10.4	32.2	56.8	73.9	17.1	Floor noise
Vert	9764.000	PK	41.6	38.7	11.0	33.0	58.3	73.9	15.6	Floor noise
Vert	4882.000	AV	29.8	31.9	9.0	31.4	39.3	53.9	14.6	
Vert	7323.000	AV	30.1	36.2	10.4	32.2	44.5	53.9	9.4	Floor noise
Vert	9764.000	AV	29.8	38.7	11.0	33.0	46.5	53.9	7.4	Floor noise

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

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

Distance factor: 1 GHz - 10 GHz 20log (4.5 m / 3.0 m) = 3.53 dB
10 GHz - 26.5 GHz 20log (1.0 m / 3.0 m) = -9.5 dB

***These results have sufficient margin without taking account Dwell time factor.**

Radiated Spurious Emission

Report No.	12046116H		
Test place	Ise EMC Lab.		
Semi Anechoic Chamber	No.3	No.3	No.3
Date	November 6, 2017	November 7, 2017	November 7, 2017
Temperature / Humidity	23 deg. C / 48 % RH	22 deg. C / 44 % RH	23 deg. C / 47 % RH
Engineer	Takumi Shimada	Yuta Moriya	Takumi Shimada
	(1 GHz - 10 GHz)	(Above 10 GHz)	(Below 1 GHz)
Mode	Tx, Hopping Off, 3DH5 2480 MHz		

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	147.459	QP	30.5	14.8	8.7	32.1	21.9	43.5	21.6	
Hori	294.904	QP	33.2	13.2	10.0	32.0	24.4	46.0	21.6	
Hori	331.673	QP	32.6	14.2	10.2	32.0	25.0	46.0	21.0	
Hori	487.497	QP	30.1	17.4	11.3	32.0	26.8	46.0	19.2	
Hori	926.234	QP	30.1	22.2	13.6	30.8	35.1	46.0	10.9	
Hori	2483.500	PK	45.6	27.8	6.8	32.4	47.8	73.9	26.1	
Hori	4960.000	PK	43.9	32.1	9.1	31.3	53.8	73.9	20.1	
Hori	7440.000	PK	42.8	36.4	10.3	32.2	57.3	73.9	16.6	Floor noise
Hori	9920.000	PK	42.0	38.9	11.0	33.1	58.8	73.9	15.1	Floor noise
Hori	2483.500	AV	28.6	27.8	6.8	32.4	30.8	53.9	23.1	
Hori	4960.000	AV	30.9	32.1	9.1	31.3	40.8	53.9	13.1	
Hori	7440.000	AV	29.2	36.4	10.3	32.2	43.7	53.9	10.2	Floor noise
Hori	9920.000	AV	28.5	38.9	11.0	33.1	45.3	53.9	8.6	Floor noise
Vert	147.459	QP	32.4	14.8	8.7	32.1	23.8	43.5	19.7	
Vert	294.904	QP	33.9	13.2	10.0	32.0	25.1	46.0	20.9	
Vert	331.673	QP	30.3	14.2	10.2	32.0	22.7	46.0	23.3	
Vert	487.497	QP	29.5	17.4	11.3	32.0	26.2	46.0	19.8	
Vert	926.234	QP	31.0	22.2	13.6	30.8	36.0	46.0	10.0	
Vert	2483.500	PK	42.5	27.8	6.8	32.4	44.7	73.9	29.2	
Vert	4960.000	PK	43.6	32.1	9.1	31.3	53.5	73.9	20.4	
Vert	7440.000	PK	42.7	36.4	10.3	32.2	57.2	73.9	16.7	Floor noise
Vert	9920.000	PK	42.0	38.9	11.0	33.1	58.8	73.9	15.1	Floor noise
Vert	2483.500	AV	29.7	27.8	6.8	32.4	31.9	53.9	22.0	
Vert	4960.000	AV	33.0	32.1	9.1	31.3	42.9	53.9	11.0	
Vert	7440.000	AV	29.5	36.4	10.3	32.2	44.0	53.9	9.9	Floor noise
Vert	9920.000	AV	29.4	38.9	11.0	33.1	46.2	53.9	7.7	Floor noise

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter+Distance factor(above 1 GHz)) - Gain(Amplifier)
*Other frequency noises omitted in this report were not seen or had enough margin (more than 20 dB).

Distance factor: 1 GHz - 10 GHz 20log (4.5 m / 3.0 m) = 3.53 dB
10 GHz - 26.5 GHz 20log (1.0 m / 3.0 m) = -9.5 dB

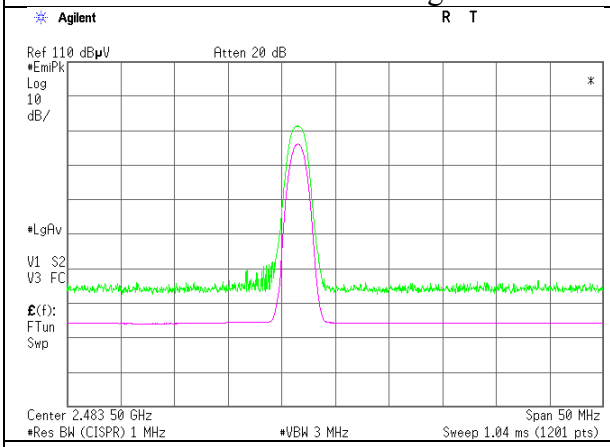
***These results have sufficient margin without taking account Dwell time factor.**

Radiated Spurious Emission
(Reference Plot for band-edge)

Report No.	12046116H
Test place	Ise EMC Lab.
Semi Anechoic Chamber	No.3
Date	November 6, 2017
Temperature / Humidity	23 deg. C / 48 % RH
Engineer	Takumi Shimada
	(1 GHz - 10 GHz)
Mode	Tx, Hopping Off, 3DH5 2480 MHz

Horizontal

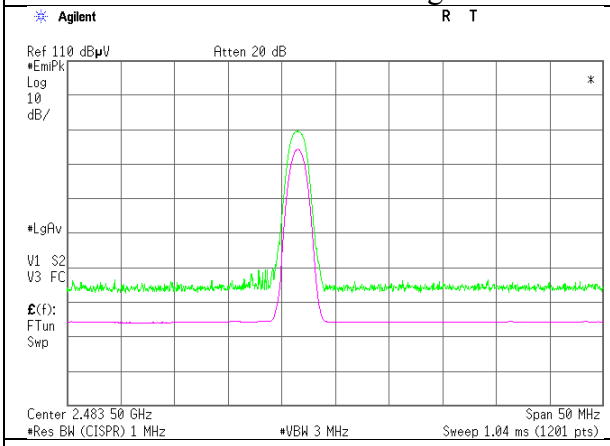
Restricted-band band-edge Plot



Trace Green : Peak Plot
Trace Purple : Average Plot

Vertical

Restricted-band band-edge Plot

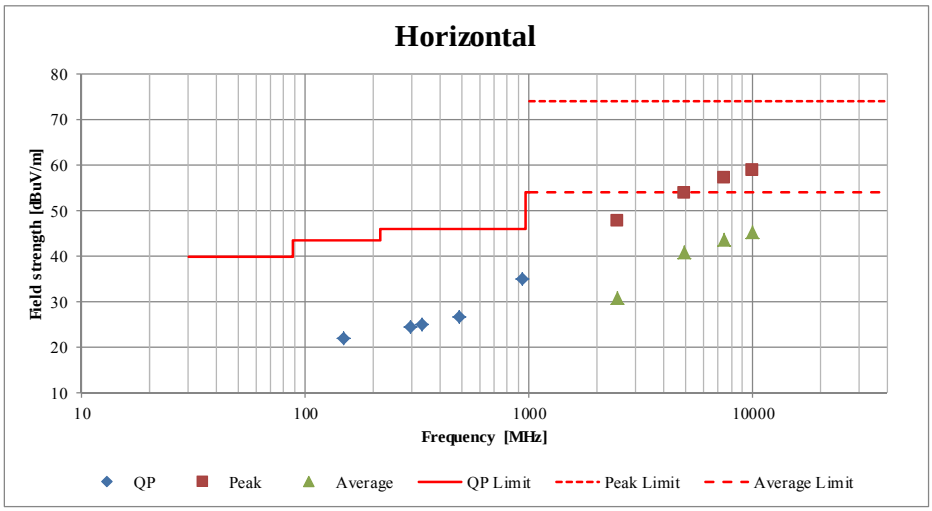


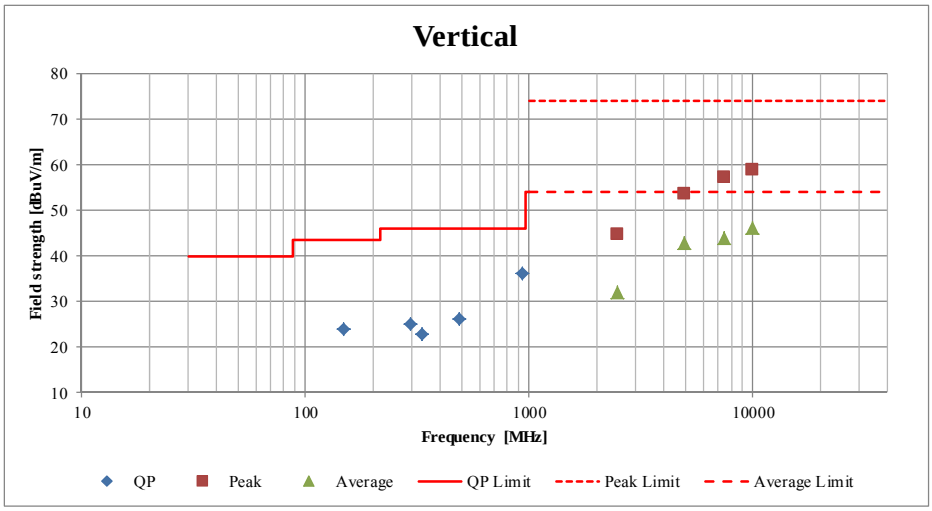
Trace Green : Peak Plot
Trace Purple : Average Plot

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

Radiated Spurious Emission
(Plot data, Worst case)

Report No.	12046116H		
Test place	Ise EMC Lab.		
Semi Anechoic Chamber	No.3	No.3	No.3
Date	November 6, 2017	November 7, 2017	November 7, 2017
Temperature / Humidity	23 deg. C / 48 % RH	22 deg. C / 44 % RH	23 deg. C / 47 % RH
Engineer	Takumi Shimada	Yuta Moriya	Takumi Shimada
	(1 GHz - 10 GHz)	(Above 10 GHz)	(Below 1 GHz)
Mode	Tx, Hopping Off, 3DH5 2480 MHz		





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

APPENDIX 2: Test instruments

Test equipment

Control No.	Instrument	Manufacturer	Model No	Serial No	Test Item	Calibration Date * Interval(month)
MAEC-03	Semi Anechoic Chamber(NSA)	TDK	Semi Anechoic Chamber 3m	DA-10005	RE	2017/10/31 * 12
MOS-13	Thermo-Hygrometer	Custom	CTH-180	1301	RE	2017/01/20 * 12
MJM-16	Measure	KOMELON	KMC-36	-	RE	-
COTS-MEMI	EMI measurement program	TSJ	TEPTO-DV	-	RE	-
MSA-10	Spectrum Analyzer	Agilent	E4448A	MY46180655	RE	2017/08/22 * 12
MHA-20	Horn Antenna 1-18GHz	Schwarzbeck	BBHA9120D	258	RE	2017/05/22 * 12
MCC-167	Microwave Cable	Junkosha	MWX221	1404S374(1m) / 1405S074(5m)	RE	2017/05/29 * 12
MPA-11	MicroWave System Amplifier	Agilent	83017A	MY39500779	RE	2017/03/21 * 12
MHF-25	High Pass Filter 3.5-18.0GHz	UL Japan	HPF SELECTOR	001	RE	2017/09/22 * 12
MHA-16	Horn Antenna 15-40GHz	Schwarzbeck	BBHA9170	BBHA9170306	RE	2017/05/14 * 12
MMM-08	DIGITAL HiTESTER	Hioki	3805	051201197	RE	2017/01/19 * 12
MHA-16	Horn Antenna 15-40GHz	Schwarzbeck	BBHA9170	BBHA9170306	RE	2017/05/14 * 12
MTR-08	Test Receiver	Rohde & Schwarz	ESCI	100767	RE	2017/08/22 * 12
MBA-03	Biconical Antenna	Schwarzbeck	BBA9106	1915	RE	2017/10/02 * 12
MLA-22	Logperiodic Antenna (200-1000MHz)	Schwarzbeck	VUSLP9111B	911B-191	RE	2017/01/26 * 12
MCC-51	Coaxial cable	UL Japan	-	-	RE	2017/07/12 * 12
MAT-98	Attenuator	KEYSIGHT	8491A	MY52462349	RE	2016/12/05 * 12
MPA-13	Pre Amplifier	SONOMA INSTRUMENT	310	260834	RE	2017/03/27 * 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