
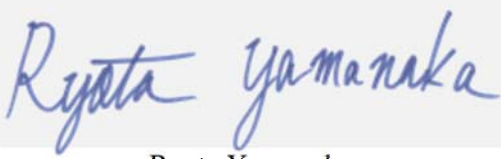






RADIO TEST REPORT

Test Report No.: 14617448H-C-R2

Customer	DENSO TEN Limited
Description of EUT	Car Audio
Model Number of EUT	TN0036B
FCC ID	BABTN0036B
Test Regulation	FCC Part 15 Subpart E
Test Result	Complied (Refer to SECTION 3)
Issue Date	July 18, 2023
Remarks	-

Representative Test Engineer	Approved By
	
Keiya Ido Engineer	Ryota Yamanaka Engineer
 	
CERTIFICATE 5107.02	
<input type="checkbox"/> The testing in which "Non-accreditation" is displayed is outside the accreditation scopes in UL Japan, Inc.	
<input checked="" type="checkbox"/> There is no testing item of "Non-accreditation".	

Report Cover Page - Form-ULID-003532 (DCS:13-EM-F0429) Issue# 21.0

ANNOUNCEMENT

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- The results in this report apply only to the sample tested. (Laboratory was not involved in sampling.)
- This sample tested is in compliance with the limits of the above regulation.
- The test results in this test report are traceable to the national or international standards.
- This test report must not be used by the customer to claim product certification, approval, or endorsement by the A2LA accreditation body.
- This test report covers Radio technical requirements.
It does not cover administrative issues such as Manual or non-Radio test related Requirements. (if applicable)
- The all test items in this test report are conducted by UL Japan, Inc. Ise EMC Lab.
- The opinions and the interpretations to the result of the description in this report are outside scopes where UL Japan, Inc. has been accredited.
- The information provided from the customer for this report is identified in Section 1.
- For test report(s) referred in this report, the latest version (including any revisions) is always referred.

REVISION HISTORY

Original Test Report No.: 14617448H-C

This report is a revised version of 14617448H-C-R1. 14617448H-C-R1 is replaced with this report.

Revision	Test Report No.	Date	Page Revised Contents
- (Original)	14617448H-C	February 20, 2023	-
1	14617448H-C-R1	July 14, 2023	P.6 Correction of Frequency of Operation (WLAN) from 5755 MHz to 5775 MHz to 5765 MHz
2	14617448H-C-R2	July 18, 2023	P.23, 24 Deletion of “+ Duty Factor” in the Calculation formula of Conducted Power Result
2	14617448H-C-R2	July 18, 2023	P.27 Correction of Duty factor from 0.28 to 0.34, and re-calculation of Result (Burst power average)
2	14617448H-C-R2	July 18, 2023	P.28 Re-calculation Duty factor for 11n-20 MCS0 SGI
2	14617448H-C-R2	July 18, 2023	P.36 Correction of Plot data

Reference: Abbreviations (Including words undescribed in this report)

A2LA	The American Association for Laboratory Accreditation	ICES	Interference-Causing Equipment Standard
AC	Alternating Current	IEC	International Electrotechnical Commission
AFH	Adaptive Frequency Hopping	IEEE	Institute of Electrical and Electronics Engineers
AM	Amplitude Modulation	IF	Intermediate Frequency
Amp, AMP	Amplifier	ILAC	International Laboratory Accreditation Conference
ANSI	American National Standards Institute	ISED	Innovation, Science and Economic Development Canada
Ant, ANT	Antenna	ISO	International Organization for Standardization
AP	Access Point	JAB	Japan Accreditation Board
ASK	Amplitude Shift Keying	LAN	Local Area Network
Atten., ATT	Attenuator	LIMS	Laboratory Information Management System
AV	Average	MCS	Modulation and Coding Scheme
BPSK	Binary Phase-Shift Keying	MRA	Mutual Recognition Arrangement
BR	Bluetooth Basic Rate	N/A	Not Applicable
BT	Bluetooth	NIST	National Institute of Standards and Technology
BT LE	Bluetooth Low Energy	NS	No signal detect.
BW	BandWidth	NSA	Normalized Site Attenuation
Cal Int	Calibration Interval	NVLAP	National Voluntary Laboratory Accreditation Program
CCK	Complementary Code Keying	OBW	Occupied Band Width
Ch., CH	Channel	OFDM	Orthogonal Frequency Division Multiplexing
CISPR	Comité International Special des Perturbations Radioelectriques	P/M	Power meter
CW	Continuous Wave	PCB	Printed Circuit Board
DBPSK	Differential BPSK	PER	Packet Error Rate
DC	Direct Current	PHY	Physical Layer
D-factor	Distance factor	PK	Peak
DFS	Dynamic Frequency Selection	PN	Pseudo random Noise
DQPSK	Differential QPSK	PRBS	Pseudo-Random Bit Sequence
DSSS	Direct Sequence Spread Spectrum	PSD	Power Spectral Density
EDR	Enhanced Data Rate	QAM	Quadrature Amplitude Modulation
EIRP, e.i.r.p.	Equivalent Isotropically Radiated Power	QP	Quasi-Peak
EMC	ElectroMagnetic Compatibility	QPSK	Quadri-Phase Shift Keying
EMI	ElectroMagnetic Interference	RBW	Resolution Band Width
EN	European Norm	RDS	Radio Data System
ERP, e.r.p.	Effective Radiated Power	RE	Radio Equipment
EU	European Union	RF	Radio Frequency
EUT	Equipment Under Test	RMS	Root Mean Square
Fac.	Factor	RSS	Radio Standards Specifications
FCC	Federal Communications Commission	Rx	Receiving
FHSS	Frequency Hopping Spread Spectrum	SA, S/A	Spectrum Analyzer
FM	Frequency Modulation	SG	Signal Generator
Freq.	Frequency	SVSWR	Site-Voltage Standing Wave Ratio
FSK	Frequency Shift Keying	TR	Test Receiver
GFSK	Gaussian Frequency-Shift Keying	Tx	Transmitting
GNSS	Global Navigation Satellite System	VBW	Video BandWidth
GPS	Global Positioning System	Vert.	Vertical
Hori.	Horizontal	WLAN	Wireless LAN

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SECTION 1: Customer Information

Company Name	DENSO TEN Limited
Address	2-28, Goshō-dori 1-chome, Hyōto-ku, Kobe 652-8510 Japan
Telephone Number	+81 78 682 2159
Contact Person	Kaoru Abe

The information provided from the customer is as follows;

- Customer, Description of EUT, Model Number of EUT, FCC ID on the cover and other relevant pages
 - Operating/Test Mode(s) (Mode(s)) on all the relevant pages
 - SECTION 1: Customer Information
 - SECTION 2: Equipment Under Test (EUT) other than the Receipt Date and Test Date
 - SECTION 4: Operation of EUT during testing
- * The laboratory is exempted from liability of any test results affected from the above information in SECTION 2 and 4.

SECTION 2: Equipment Under Test (EUT)

2.1 Identification of EUT

Description	Car Audio
Model Number	TN0036B
Serial Number	Refer to SECTION 4.2
Condition	Production prototype (Not for Sale: This sample is equivalent to mass-produced items.)
Modification	No Modification by the test lab
Receipt Date	December 20, 2022
Test Date	December 22, 2022 to January 11, 2023

2.2 Product Description

General Specification

Rating	DC 12 V
Operating temperature	-20 deg. C to +65 deg. C

Radio Specification

WLAN (IEEE802.11a/11n-20)

Equipment Type	Transceiver
Frequency of Operation	5765 MHz
Type of Modulation	OFDM
Antenna Gain	0.72 dBi

Bluetooth (BR / EDR)

Equipment Type	Transceiver
Frequency of Operation	2402 MHz to 2480 MHz
Type of Modulation	FHSS (GFSK, $\pi/4$ DQPSK, 8 DPSK)
Antenna Gain	0.14 dBi

AM / FM (incl. RDS) / DAB

Equipment Type	Receiver
Frequency of Operation	AM: 531 kHz to 1602 kHz FM: 87.5 MHz to 108.0 MHz DAB (Band III): 174.928 MHz to 229.072 MHz
Type of Modulation	AM FM DAB: OFDM
Antenna Connector Type	HFC IV
Impedance	AM, FM: 75 ohm DAB: 50 ohm

SECTION 3: Test specification, Procedures & Results

3.1 Test Specification

Test Specification	FCC Part 15 Subpart E The latest version on the first day of the testing period
Title	FCC 47 CFR Part 15 Radio Frequency Device Subpart E Unlicensed National Information Infrastructure Devices Section 15.407 General technical requirements

3.2 Procedures and Results

Item	Test Procedure	Specification	Worst Margin	Results	Remarks
Conducted Emission	FCC: ANSI C63.10-2013	FCC: 15.407 (b) (6) / 15.207	-	N/A	*1)
	ISED: RSS-Gen 8.8	ISED: RSS-Gen 8.8			
26 dB Emission Bandwidth	FCC: KDB Publication Number 789033	FCC: 15.407 (a) (1) (2) (3)	See data	N/A	*2)
	ISED: -	ISED: -			
Maximum Conducted Output Power	FCC: KDB Publication Number 789033	FCC: 15.407 (a) (1) (2) (3)		Complied a)	Conducted
	ISED: -	ISED: RSS-247 6.2.1.1 6.2.2.1 6.2.3.1 6.2.4.1			
Maximum Power Spectral Density	FCC: KDB Publication Number 789033	FCC : 15.407 (a) (1) (2) (3)		N/A b)	Conducted
	ISED: -	ISED: RSS-247 6.2.1.1 6.2.2.1 6.2.3.1 6.2.4.1			
Spurious Emission Restricted Band Edge	FCC: ANSI C63.10-2013 KDB Publication Number 789033	FCC: 15.407 (b), 15.205 and 15.209	4.4 dB 243.7 MHz, QP, Hori.	Complied c) / d)	Conducted (< 30 MHz) / Radiated (> 30 MHz) *3)
	ISED: -	ISED: RSS-247 6.2.1.2 6.2.2.2 6.2.3.2 6.2.4.2			
6 dB Emission Bandwidth	FCC: ANSI C63.10-2013	FCC: 15.407 (e)	See data	Complied e)	Conducted
	ISED: -	ISED: RSS-247 6.2.4.1			

Note: UL Japan, Inc.'s EMI Work Procedures: Work Instructions-ULID-003591 and Work Instructions-ULID-003593.

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

*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) The test is not applicable since the EUT does not support W53 and W56 bands.

*3) Radiated test was selected over 30 MHz based on RSS-247 6.2 and KDB 789033 D02 G.3.b).

a) Refer to APPENDIX 1 (data of Maximum Conducted Output Power)

b) Refer to APPENDIX 1 (data of Maximum Power Spectral Density)

c) Refer to APPENDIX 1 (data of Radiated Spurious Emission)

d) Refer to APPENDIX 1 (data of Conducted Spurious Emission)

e) Refer to APPENDIX 1 (data of 6 dB Bandwidth)

FCC Part 15.31 (e)

This EUT provides the stable voltage constantly to RF part 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

Item	Test Procedure	Specification	Worst Margin	Results	Remarks
99 % Occupied Band Width	ISED: RSS-Gen 6.7	ISED: -	N/A	- a)	Conducted
a) Refer to APPENDIX 1 (data of 26 dB Emission Bandwidth and 99 % Occupied Bandwidth)					

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

3.4 Uncertainty

Measurement uncertainty is not taken into account when stating conformity with a specified requirement.

Note: When margins obtained from test results are less than the measurement uncertainty, the test results may exceed the limit.

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

Radiated emission

Measurement distance	Frequency range		Uncertainty (+/-)
3 m	9 kHz to 30 MHz		3.2 dB
10 m			3.0 dB
3 m	30 MHz to 200 MHz	Horizontal	4.8 dB
		Vertical	5.0 dB
	200 MHz to 1000 MHz	Horizontal	5.1 dB
		Vertical	6.2 dB
10 m	30 MHz to 200 MHz	Horizontal	4.8 dB
		Vertical	4.8 dB
	200 MHz to 1000 MHz	Horizontal	4.9 dB
		Vertical	5.0 dB
3 m	1 GHz to 6 GHz		4.9 dB
	6 GHz to 18 GHz		5.2 dB
1 m	10 GHz to 26.5 GHz		5.5 dB
	26.5 GHz to 40 GHz		5.4 dB
0.5m	26.5 GHz to 40 GHz		5.4 dB
10 m	1 GHz to 18 GHz		5.3 dB

Antenna Terminal test

Test Item	Uncertainty (+/-)
20 dB Bandwidth / 99 % Occupied Bandwidth	0.96 %
Maximum Peak Output Power / Average Output Power	1.5 dB
Carrier Frequency Separation	0.42 %
Dwell time / Burst rate	0.10 %
Conducted Spurious Emission	2.7 dB

3.5 Test Location

UL Japan, Inc. Ise EMC Lab.

*A2LA Certificate Number: 5107.02 / FCC Test Firm Registration Number: 884919

ISED Lab Company Number: 2973C / CAB identifier: JP0002

4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 Japan

Telephone: +81-596-24-8999

Test site	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	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	7.5 x 5.8 x 5.2	4.0 x 4.0	-	3 m
No.3 semi-anechoic chamber	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	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.5 measurement room	6.4 x 6.4 x 3.0	6.4 x 6.4	-	-
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	3.1 x 5.0	-	-
No.9 measurement room	8.8 x 4.6 x 2.8	2.4 x 2.4	-	-
No.10 shielded room	3.8 x 2.8 x 2.8	3.8 x 2.8	-	-
No.11 measurement room	4.0 x 3.4 x 2.5	N/A	-	-
No.12 measurement room	2.6 x 3.4 x 2.5	N/A	-	-
Large Chamber	16.9 x 22.1 x 10.17	16.9 x 22.1	-	10 m
Small Chamber	5.3 x 6.69 x 3.59	5.3 x 6.69	-	-

3.6 Test Data, Test Instruments, and Test Set Up

Refer to APPENDIX.

SECTION 4: Operation of EUT during testing

4.1 Operating Mode(s)

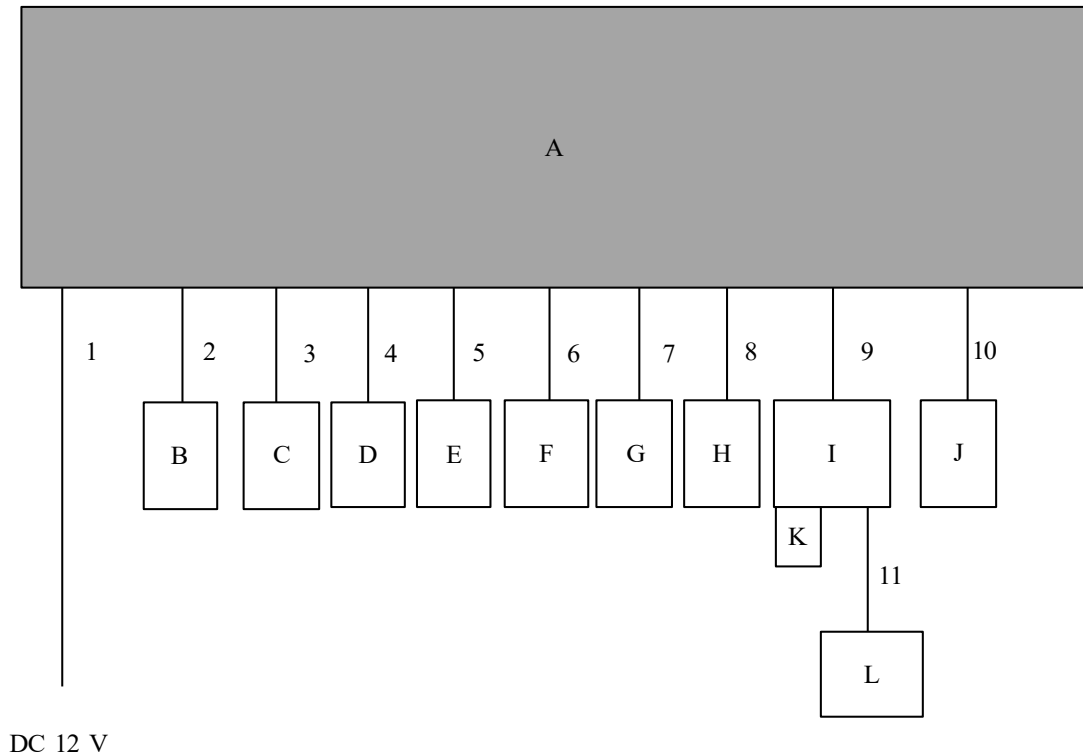
Mode	Remarks*
IEEE 802.11a (11a)	6 Mbps, PN9
IEEE 802.11n SISO 20 MHz BW (11n-20)	MCS 7 (Short GI), PN9
<p>*Power of the EUT was set by the software as follows; Power Setting: 11a: 6.5 dBm 11n-20: 6.5 dBm Software: Wi-Fi Test FW_WF1 Version: WF1 (Date: December 1, 2022, Storage location: EUT memory)</p> <p>*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.</p>	

*The Details of Operation Mode(s)

Test Item	Operating Mode	Tested Frequency			
		Lower Band	Middle Band	Additional Band	Upper Band
99 % Occupied Bandwidth, 6 dB Bandwidth Maximum Conducted Output Power, Maximum Power Spectral Density, Radiated Spurious Emission (Above 1 GHz)	Tx 11a Tx 11n-20	-	-	-	5765 MHz
Radiated Spurious Emission (Below 1 GHz) Conducted Spurious Emission	Tx 11n-20 *1)	-	-	-	5765 MHz
*1) The mode was tested as a representative, because it had the highest power at antenna terminal test.					

4.2 Configuration and Peripherals

for Radiated Spurious Emission test



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

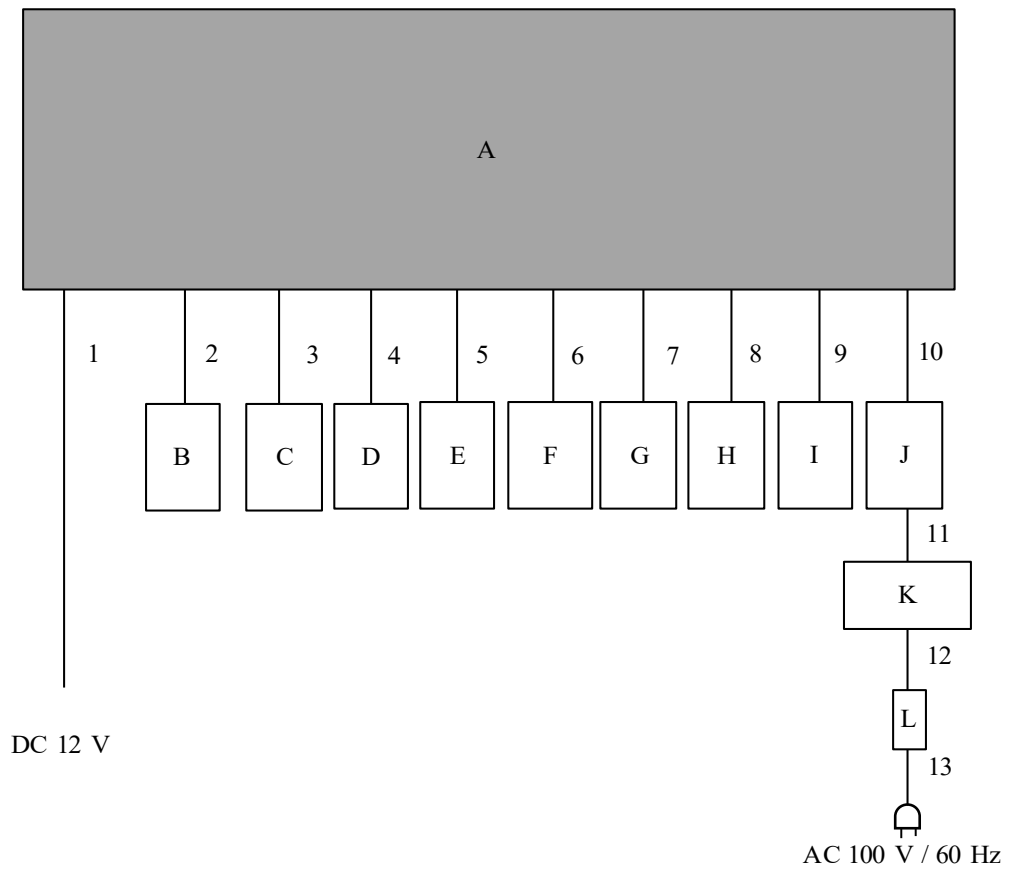
Description of EUT and Support Equipment

No.	Item	Model number	Serial Number	Manufacturer	Remarks
A	Car Audio	TN0036B	1100229982-0011	DENSO TEN Limited	EUT
B	Microphone module	86730-78010	No.5	Panasonic	-
C	Back camera	867B0-78070	No.5	Panasonic	-
D	Steering switch	84250-58150-BO	No.4	TOKAI RIKA	-
E	Speaker Dummy Load	SP Dummy	-	DENSO TEN Limited	-
F	AM/FM Sharkfin AMP	86760-K0010	-	YOKOWO	-
G	DAB Antenna AMP	863C0-60050	No.2	DENSO TEN Limited	-
H	GNSS Antenna	86880-78010	UI034346	HARADA	-
I	USB I/F Box	86190-78020	501002	Panasonic	-
J	Jig Board	-	-	-	-
K	USB Memory	RUF3-K16GB	P10416	Buffalo Inc.	-
L	iPhone6 64GB	MG4H2J/A	F78P6KZCG5MT	Apple	-

List of Cables Used

No.	Name	Length (m)	Shield		Remarks
			Cable	Connector	
1	DC Cable	4.0	Unshielded	Unshielded	-
2	Audio Cable	3.0	Shielded	Shielded	-
3	Signal Cable	4.0	Unshielded	Unshielded	-
4	Signal Cable	3.0	Unshielded	Unshielded	-
5	Speaker Cable	3.0	Unshielded	Unshielded	-
6	Antenna Cable	3.2	Shielded	Shielded	-
7	Antenna Cable	3.0	Shielded	Shielded	-
8	Antenna Cable	3.0	Shielded	Shielded	-
9	Signal Cable	2.8	Unshielded	Unshielded	-
10	Signal Cable	0.2	Unshielded	Unshielded	-
11	USB Cable	1.0	Shielded	Shielded	-

for Antenna Terminal Conducted Tests



* 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	Car Audio	TN0036B	115000-40690000	DENSO TEN Limited	EUT
B	Microphone module	86730-78010	No.5	Panasonic	-
C	Back camera	867B0-78070	No.5	Panasonic	-
D	Steering switch	84250-58150-BO	No.4	TOKAI RIKA	-
E	Speaker Dummy Load	SP Dummy	-	DENSO TEN Limited	-
F	AM/FM Sharkfin AMP	86760-K0010	-	YOKOWO	-
G	DAB Antenna AMP	863C0-60050	No.2	DENSO TEN Limited	-
H	GNSS Antenna	86880-78010	UI034346	HARADA	-
I	USB I/F Box	86190-78020	501002	Panasonic	-
J	Jig Board	-	-	-	-
K	Laptop PC	PR63PBAA337AD7X	6F053913H	TOSHIBA	-
L	AC Adapter	PA51770-1ACA	FX10800NSKACC	TOSHIBA	-

List of Cables Used

No.	Name	Length (m)	Shield		Remarks
			Cable	Connector	
1	DC Cable	4.0	Unshielded	Unshielded	-
2	Audio Cable	3.0	Shielded	Shielded	-
3	Signal Cable	4.0	Unshielded	Unshielded	-
4	Signal Cable	3.0	Unshielded	Unshielded	-
5	Speaker Cable	3.0	Unshielded	Unshielded	-
6	Antenna Cable	3.2	Shielded	Shielded	-
7	Antenna Cable	3.0	Shielded	Shielded	-
8	Antenna Cable	3.0	Shielded	Shielded	-
9	Signal Cable	2.8	Unshielded	Unshielded	-
10	Signal Cable	0.2	Unshielded	Unshielded	-
11	USB Cable	1.0	Shielded	Shielded	-
12	DC Cable	1.7	Unshielded	Unshielded	-
13	AC Cable	0.8	Unshielded	Unshielded	-

SECTION 5: Radiated Spurious Emission and Band Edge Compliance

Test Procedure

< Below 1 GHz >

EUT was placed on a urethane platform of nominal size, 0.5 m by 1.0 m, raised 0.8 m above the conducting ground plane. The Radiated Electric Field Strength has been measured in a Semi Anechoic Chamber with a ground plane.

< 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. Test antenna was aimed at the EUT for receiving the maximum signal and always kept within the illumination area of the 3 dB beamwidth of the antenna.

The height of the measuring antenna varied between 1 m and 4 m and EUT was rotated a full revolution in order to obtain the maximum value of the electric field strength.

The measurements were performed for both vertical and horizontal antenna polarization with the Test Receiver, or the Spectrum Analyzer.

The measurements were made with the following detector function of the test receiver and the Spectrum analyzer (in linear mode).

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

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

< Below 1 GHz >

The result also satisfied with the general limits specified in section 15.209 (a).

< Above 1 GHz >

Inside of restricted bands (Section 15.205):

Apply to limit in the Section 15.209 (a).

Outside of the restricted bands:

Apply to limit 68.2 dBuV/m, 3 m (-27 dBm e.i.r.p.*) in the Section 15.407 (b) (1) (2) (3).

For W58 Bandedge

-27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge in the section 15.407(b)(4)(i).

Restricted band edge:

Apply to limit in the Section 15.209 (a).

Since this limit is severer than the limit of the inside of restricted bands.

*Electric field strength to e.i.r.p. conversion:

$$E = \frac{1000000 \sqrt{30 P}}{3} \text{ (uV/m)} \quad : P \text{ is the e.i.r.p. (Watts)}$$

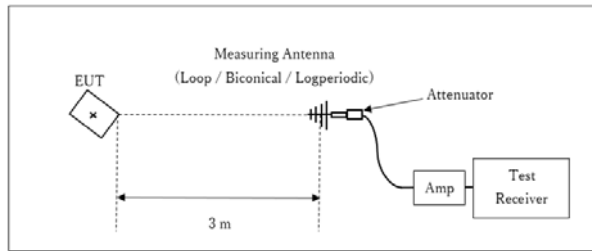
Test Antennas are used as below;

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

Frequency	Below 1 GHz	Above 1 GHz	
Instrument Used	Test Receiver	Spectrum Analyzer	
Detector	QP	Peak	Average
IF Bandwidth	BW: 120 kHz	RBW: 1 MHz VBW: 3 MHz	Method AD RBW: 1 MHz VBW: 3 MHz Detector: Power Averaging (RMS) Trace: ≥ 100 traces If duty cycle was less than 98%, a duty factor was added to the results.

Figure 1: Test Setup

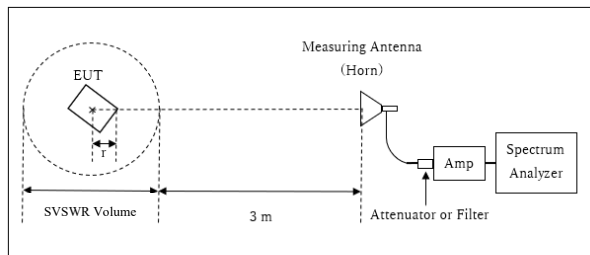
Below 1 GHz



× : Center of turn table

Test Distance: 3 m

1 GHz to 10 GHz



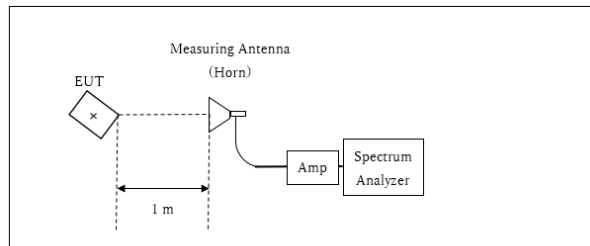
r : Radius of an outer periphery of EUT
× : Center of turn table

Distance Factor: $20 \times \log(3.85 \text{ m} / 3.0 \text{ m}) = 2.17 \text{ dB}$
* Test Distance: $(3 + \text{SVSWR Volume} / 2) - r = 3.85 \text{ m}$

SVSWR Volume : 2.0 m
(SVSWR Volume has been calibrated based on CISPR 16-1-4.)
 $r = 0.15 \text{ m}$

* The test was performed with $r = 0.0 \text{ m}$ since EUT is small and it was the rather conservative condition.

10 GHz to 40 GHz



× : Center of turn table

Distance Factor: $20 \times \log(1.0 \text{ m} / 3.0 \text{ m}) = -9.5 \text{ dB}$
* Test Distance: 1 m

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 to 40 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 and Test method
99 % Occupied Bandwidth *1)	Enough width to display emission skirts	1 % to 5 % of OBW	≥ 3 RBW	Auto	Peak	Max Hold	Spectrum Analyzer
6 dB Bandwidth	Enough to capture the emission	100 kHz	300 kHz	Auto	Peak	Max Hold	Spectrum Analyzer
Maximum Conducted Output Power	-	-	-	Auto	Average	-	Power Meter (Sensor: 80 MHz BW) (Method PM-G)
Maximum Power Spectral Density	Encompass the entire EBW	1 MHz or 470 kHz *2)	≥ 3 RBW	Auto	RMS Power Averaging (200 times)	Clear Write	Spectrum Analyzer
Conducted Spurious Emission*3) *4)	9 kHz to 150 kHz	200 Hz	620 Hz	Auto	Peak	Max Hold	Spectrum Analyzer
	150 kHz to 30 MHz	9.1 kHz	27 kHz				

*1) Peak hold was applied as Worst-case measurement.

*2) KDB 789033 D02 says that RBW is set to be 500 kHz for 5.725 GHz to 5.850 GHz, but it is not possible with spectrum analyzer, so RBW Correction Factor ($10 \log(500 \text{ kHz} / 470 \text{ kHz})$) was added to the test result.

*3) In the frequency range below 30 MHz, 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 to 150 kHz: RBW = 200 Hz, 150 kHz to 30 MHz: RBW = 9.1 kHz)

*4) The limits in CFR 47, Part 15, Subpart C, paragraph 15.209(a), are identical to those in RSS-Gen section 8.9, Table 6, since the measurements are performed in terms of magnetic field strength and converted to electric field strength levels (as reported in the table) using the free space impedance of 377 Ohms. For example, the measurement at frequency 9 kHz resulted in a level of 45.5 dBuV/m, which is equivalent to $45.5 - 51.5 = -6.0$ dBuA/m, which has the same margin, 3 dB, to the corresponding RSS-Gen Table 6 limit as it has to 15.209(a) limit.

The test results and limit are rounded off to two decimals place, so some differences might be observed. The equipment and cables were not used for factor 0 dB of the data sheets.

Test Data : APPENDIX
Test Result : Pass

APPENDIX 1: Test Data

99 % Occupied Bandwidth

Test place	Ise EMC Lab. No.8 Measurement Room
Date	December 23, 2022
Temperature / Humidity	22 deg. C / 38 % RH
Engineer	Tetsuro Yoshida
Mode	Tx

11a

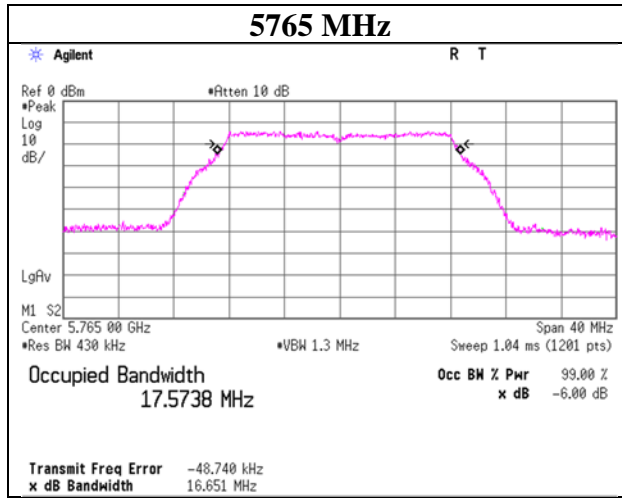
Tested Frequency [MHz]	99 % Occupied Bandwidth [kHz]
5765	17573.8

11n-20

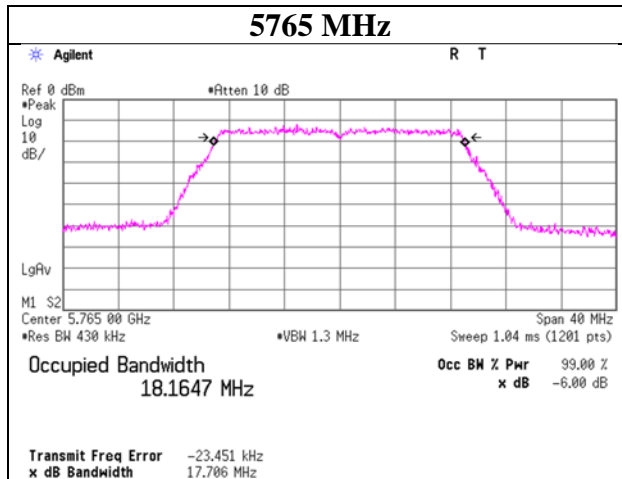
Tested Frequency [MHz]	99 % Occupied Bandwidth [kHz]
5765	18164.7

99 % Occupied Bandwidth

11a



11n-20



6 dB Bandwidth

Test place Ise EMC Lab. No.8 Measurement Room
Date December 23, 2022
Temperature / Humidity 22 deg. C / 38 % RH
Engineer Tetsuro Yoshida
Mode Tx

11a

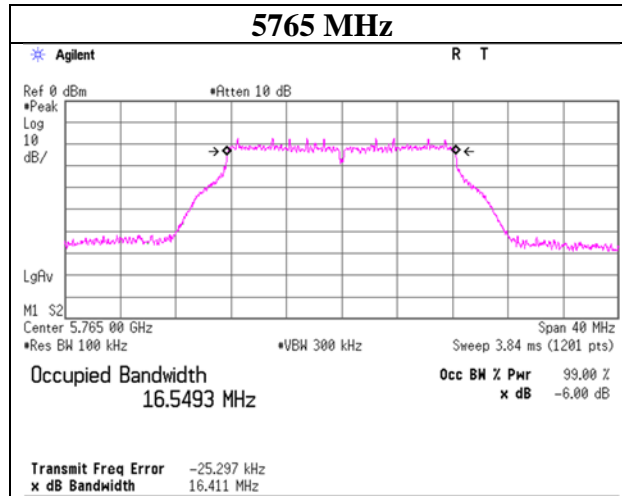
Tested Frequency [MHz]	6 dB Bandwidth [MHz]	Limit [MHz]
5765	16.411	> 0.500

11n-20

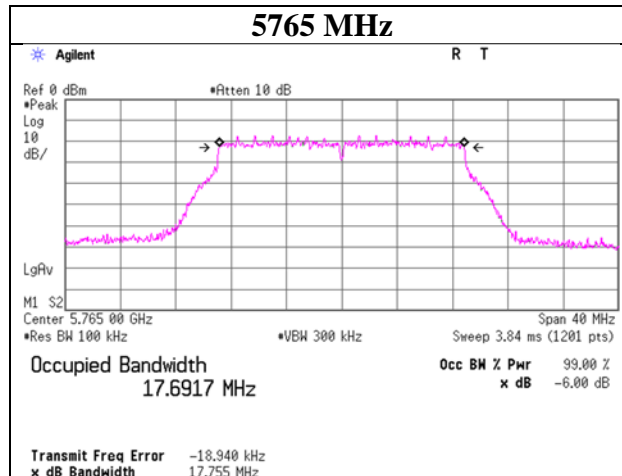
Tested Frequency [MHz]	6 dB Bandwidth [MHz]	Limit [MHz]
5765	17.755	> 0.500

6 dB Bandwidth

11a



11n-20



Maximum Conducted Output Power

Test place	Ise EMC Lab. No.8 Measurement Room
Date	December 22, 2022
Temperature / Humidity	23 deg. C / 45 % RH
Engineer	Tetsuro Yoshida
Mode	Tx 11a

11a

Applied limit: 15.407, mobile and portable client device

Tested Frequency [MHz]	Power Meter Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Antenna Gain [dBi]	26 dB EBW (B for FCC) [MHz]	99% OBW (B for IC) [MHz]	Conducted Power			e.i.r.p.				
							Result [dBm]	Limit [dBm]	Margin [dB]	Result [dBm]	Limit [dBm]	Margin [dB]		
5765	-5.55	0.75	10.07	0.72	-	17.574	5.27	3.37	30.00	24.73	5.99	3.97	36.00	30.01

Sample Calculation:

Conducted Power Result = Reading + Cable Loss (including the cable(s) customer supplied) + Atten. Loss

e.i.r.p. Result = Conducted Power Result + Antenna Gain

Conducted Power Limit (5725 MHz-5850 MHz) = 1W

Maximum Conducted Output Power

Test place	Ise EMC Lab. No.8 Measurement Room
Date	December 22, 2022
Temperature / Humidity	23 deg. C / 45 % RH
Engineer	Tetsuro Yoshida
Mode	Tx 11n-20

11n-20

Applied limit: 15.407, mobile and portable client device

Tested Frequency [MHz]	Power Meter Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Antenna Gain [dBi]	26 dB EBW (B for FCC) [MHz]	99% OBW (B for IC) [MHz]	Conducted Power				e.i.r.p.			
							Result [dBm]	Limit [dBm]	Margin [dB]	Result [dBm]	Limit [dBm]	Margin [dB]		
5765	-5.30	0.75	10.07	0.72	-	18.165	5.52	3.57	30.00	24.48	6.24	4.21	36.00	29.76

Sample Calculation:

Conducted Power Result = Reading + Cable Loss (including the cable(s) customer supplied) + Atten. Loss

e.i.r.p. Result = Conducted Power Result + Antenna Gain

Conducted Power Limit (5725 MHz-5850 MHz) = 1W

Maximum Conducted Output Power

Test place	Ise EMC Lab. No.8 Measurement Room
Date	December 22, 2022
Temperature / Humidity	23 deg. C / 45 % RH
Engineer	Tetsuro Yoshida
Mode	Tx

5765 MHz

Mode	Rate Mbps	Reading (Burst average) [dBm]	Remarks
11a	6	-5.55	*
	9	-6.00	
	12	-5.75	
	18	-5.90	
	24	-5.59	
	36	-5.57	
	48	-5.77	
	54	-6.01	

* Worst rate

This test was conducted by the use of Gate function.
All comparison were carried out on same frequency and measurement factors.

5765 MHz

Mode	MCS Number	Reading (Burst average)		Remarks
		SGI [dBm]	LGI [dB]	
11n-20	0	-5.75		
	1	-5.63		
	2	-5.46		
	3	-5.57		
	4	-5.46		
	5	-5.40		
	6	-5.35		
	7	-5.30	-5.33	*

* Worst rate

This test was conducted by the use Gate function.
All comparison were carried out on same frequency and measurement factors.

Average Output Power
(Reference data for RF Exposure)

Test place	Ise EMC Lab. No.8 Measurement Room
Date	December 22, 2022
Temperature / Humidity	23 deg. C / 45 % RH
Engineer	Tetsuro Yoshida
Mode	Tx 11a

Tested Frequency [MHz]	Power Meter Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result (Timed average)		Duty factor [dB]	Result (Burst power average)	
				[dBm]	[mW]		[dBm]	[mW]
5765	-6.26	0.75	10.07	4.56	2.86	0.28	4.84	3.05

Sample Calculation:

Result (Timed average) = Reading + Cable Loss (including the cable(s) customer supplied) + Atten. Loss

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

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

The average output power was measured with the lowest order modulation and lowest data rate configuration in each IEEE 802.11 mode based on KDB 248227 D01.

Average Output Power
(Reference data for RF Exposure)

Test place	Ise EMC Lab. No.8 Measurement Room
Date	December 22, 2022
Temperature / Humidity	23 deg. C / 45 % RH
Engineer	Tetsuro Yoshida
Mode	Tx 11n-20

Tested Frequency [MHz]	Power Meter Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result (Timed average)		Duty factor [dB]	Result (Burst power average)	
				[dBm]	[mW]		[dBm]	[mW]
5765	-6.33	0.75	10.07	4.49	2.81	0.34	4.83	3.04

Sample Calculation:

Result (Timed average) = Reading + Cable Loss (including the cable(s) customer supplied) + Atten. Loss

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

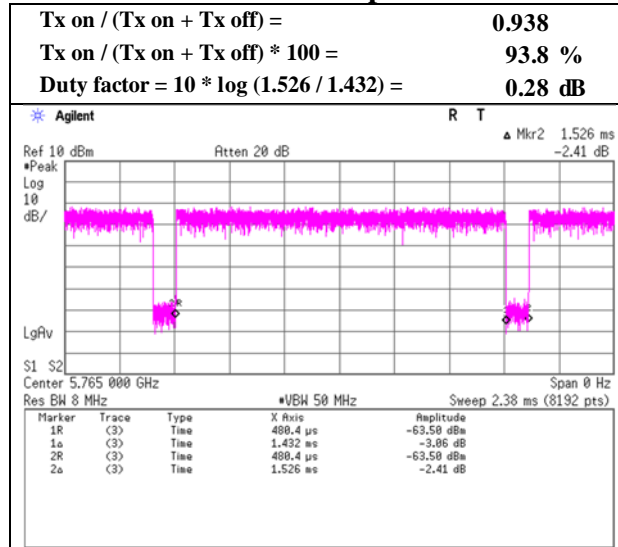
*The equipment and cables were not used for factor 0 dB of the data sheets.

The average output power was measured with the lowest order modulation and lowest data rate configuration in each IEEE 802.11 mode based on KDB 248227 D01.

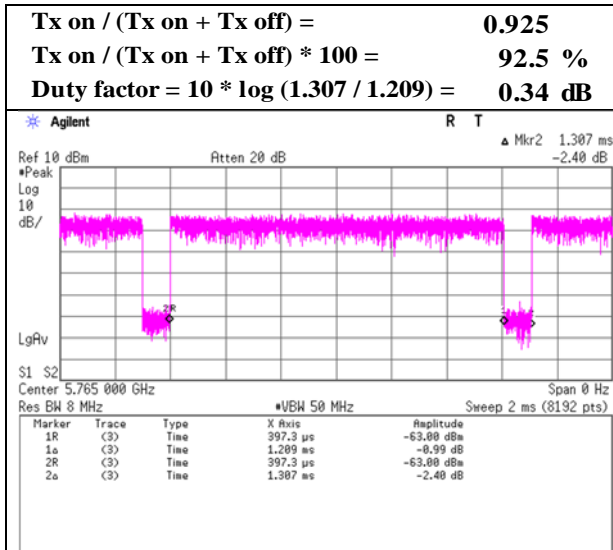
Burst rate confirmation

Test place	Ise EMC Lab. No.8 Measurement Room
Date	December 23, 2022
Temperature / Humidity	22 deg. C / 38 % RH
Engineer	Tetsuro Yoshida
Mode	Tx

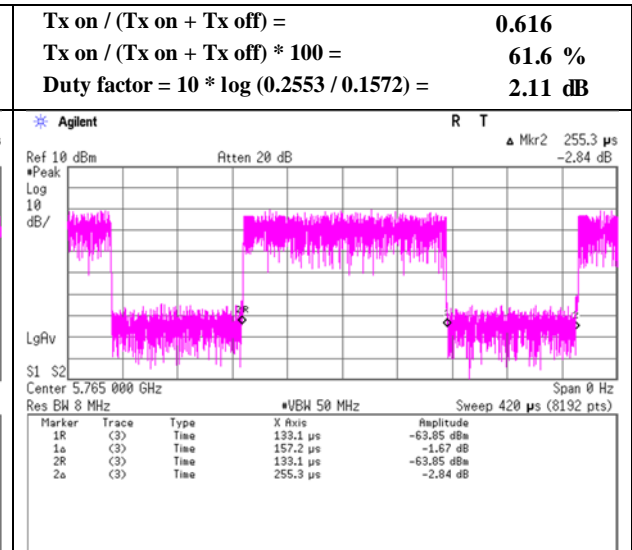
11a 6 Mbps



11n-20 MCS 0 SGI



11n-20 MCS 7 SGI



Maximum Power Spectral Density

Test place Ise EMC Lab. No.8 Measurement Room
Date December 23, 2022
Temperature / Humidity 22 deg. C / 38 % RH
Engineer Tetsuro Yoshida
Mode Tx 11a

Applied limit: 15.407, mobile and portable client device

Tested Frequency [MHz]	PSD Reading [dBm /MHz]	Cable Loss [dB]	Atten. Loss [dB]	Duty Factor [dB]	Antenna Gain [dBi]	RBW Correction Factor [dB]	PSD (Conducted)			PSD (e.i.r.p.)		
							Result [dBm /MHz]	Limit [dBm /MHz]	Margin [dB]	Result [dBm /MHz]	Limit [dBm /MHz]	Margin [dB]
5765	-21.04	0.75	10.07	0.28	0.72	0.27	-9.67	30.00	39.67	-8.95	36.00	44.95

Sample Calculation:

PSD: Power Spectral Density

The PSD within 5725 MHz to 5825 MHz are based on any 500 kHz band.

RBW Correction Factor = $10 * \log(\text{Specified bandwidth} / \text{Measured bandwidth})$

PSD Result (Conducted) = Reading + Cable Loss (including the cable(s) customer supplied) + Atten. Loss + Duty Factor + RBW Correction Factor

PSD Result (e.i.r.p.) = Conducted PSD Result + Antenna Gain

The conducted PSD limit was reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. (All frequencies for FCC, 5725 MHz-5850 MHz for IC)

Maximum Power Spectral Density

Test place Ise EMC Lab. No.8 Measurement Room
Date December 23, 2022
Temperature / Humidity 22 deg. C / 38 % RH
Engineer Tetsuro Yoshida
Mode Tx 11n-20

Applied limit: 15.407, mobile and portable client device

Tested Frequency [MHz]	PSD Reading [dBm] /MHz]	Cable Loss [dB]	Atten. Loss [dB]	Duty Factor [dB]	Antenna Gain [dBi]	RBW Correction Factor [dB]	PSD (Conducted)			PSD (e.i.r.p.)		
							Result [dBm] /MHz]	Limit [dBm] /MHz]	Margin [dB]	Result [dBm] /MHz]	Limit [dBm] /MHz]	Margin [dB]
5765	-22.70	0.75	10.07	2.11	0.72	0.27	-9.50	30.00	39.50	-8.78	36.00	44.78

Sample Calculation:

PSD: Power Spectral Density

The PSD within 5725 MHz to 5825 MHz are based on any 500 kHz band.

RBW Correction Factor = $10 * \log(\text{Specified bandwidth} / \text{Measured bandwidth})$

PSD Result (Conducted) = Reading + Cable Loss (including the cable(s) customer supplied) + Atten. Loss + Duty Factor + RBW Correction Factor

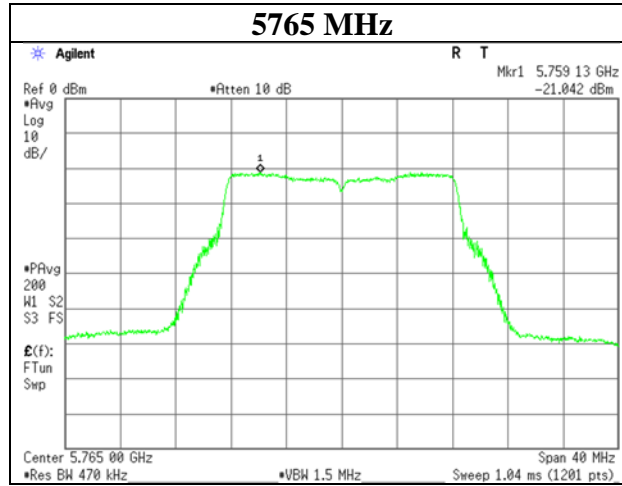
PSD Result (e.i.r.p.) = Conducted PSD Result + Antenna Gain

The conducted PSD limit was reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. (All frequencies for FCC, 5725 MHz-5850 MHz for IC)

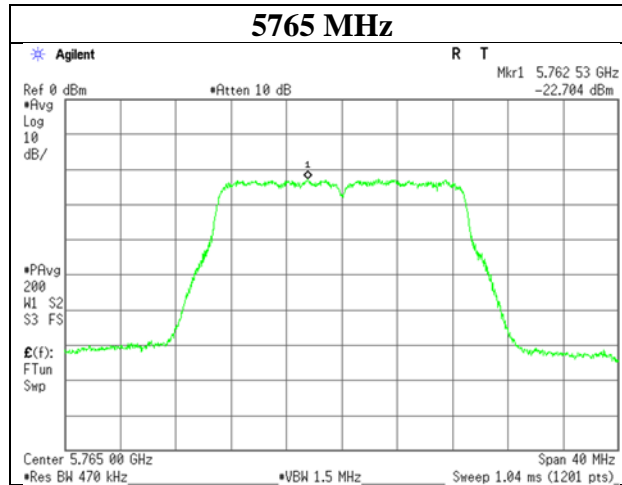
Maximum Power Spectral Density

Test place	Ise EMC Lab. No.8 Measurement Room
Date	December 23, 2022
Temperature / Humidity	22 deg. C / 38 % RH
Engineer	Tetsuro Yoshida
Mode	Tx

11a



11n-20



Radiated Spurious Emission

Test place	Ise EMC Lab.	
Semi Anechoic Chamber	No.1	No.1
Date	January 6, 2023	January 8, 2023
Temperature / Humidity	21 deg. C / 40 % RH	22 deg. C / 42 % RH
Engineer	Keiya Ido	Keiya Ido
	(1 GHz - 10 GHz)	(Above 10 GHz)
Mode	Tx 11a 5765 MHz	

Polarity [Hori/Vert]	Frequency [MHz]	Reading (QP / PK) [dBuV]	Reading (AV) [dBuV]	Ant. Factor [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Result (QP / PK) [dBuV/m]	Result (AV) [dBuV/m]	Limit (QP / PK) [dBuV/m]	Limit (AV) [dBuV/m]	Margin (QP / PK) [dB]	Margin (AV) [dB]	Remark
Hori.	1300.0	58.5	47.2	26.0	4.0	36.7	-	51.8	40.5	73.9	53.9	22.1	13.4	
Hori.	5650.0	42.6	-	31.8	6.2	35.7	-	44.9	-	68.2	-	23.3	-	
Hori.	5700.0	42.7	-	31.9	6.2	35.7	-	45.1	-	105.2	-	60.1	-	
Hori.	5720.0	43.6	-	31.9	6.2	35.7	-	46.1	-	110.8	-	64.7	-	
Hori.	5725.0	44.1	-	31.9	6.2	35.7	-	46.6	-	122.2	-	75.6	-	
Hori.	5850.0	42.9	-	32.3	6.3	35.7	-	45.7	-	122.2	-	76.5	-	
Hori.	5855.0	43.0	-	32.3	6.3	35.7	-	45.8	-	110.8	-	65.0	-	
Hori.	5875.0	43.3	-	32.3	6.3	35.7	-	46.1	-	105.2	-	59.1	-	
Hori.	5925.0	43.3	-	32.4	6.3	35.7	-	46.3	-	68.2	-	21.9	-	
Hori.	11530.0	43.5	35.6	39.4	-1.7	35.7	-	45.5	37.6	73.9	53.9	28.4	16.3	Floor noise
Hori.	17295.0	45.3	-	43.0	-0.1	35.2	-	53.0	-	68.2	-	15.2	-	Floor noise
Vert.	1300.0	60.7	50.5	26.0	4.0	36.7	-	54.0	43.8	73.9	53.9	19.9	10.1	
Vert.	5650.0	42.4	-	31.8	6.2	35.7	-	44.7	-	68.2	-	23.5	-	
Vert.	5700.0	42.5	-	31.9	6.2	35.7	-	44.9	-	105.2	-	60.3	-	
Vert.	5720.0	42.6	-	31.9	6.2	35.7	-	45.1	-	110.8	-	65.7	-	
Vert.	5725.0	43.5	-	31.9	6.2	35.7	-	46.0	-	122.2	-	76.2	-	
Vert.	5850.0	42.8	-	32.3	6.3	35.7	-	45.6	-	122.2	-	76.6	-	
Vert.	5855.0	42.9	-	32.3	6.3	35.7	-	45.7	-	110.8	-	65.1	-	
Vert.	5875.0	42.9	-	32.3	6.3	35.7	-	45.8	-	105.2	-	59.4	-	
Vert.	5925.0	43.1	-	32.4	6.3	35.7	-	46.0	-	68.2	-	22.2	-	
Vert.	11530.0	44.2	35.5	39.4	-1.7	35.7	-	46.2	37.6	73.9	53.9	27.7	16.3	Floor noise
Vert.	17295.0	45.5	-	43.0	-0.1	35.2	-	53.3	-	68.2	-	14.9	-	Floor noise

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

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

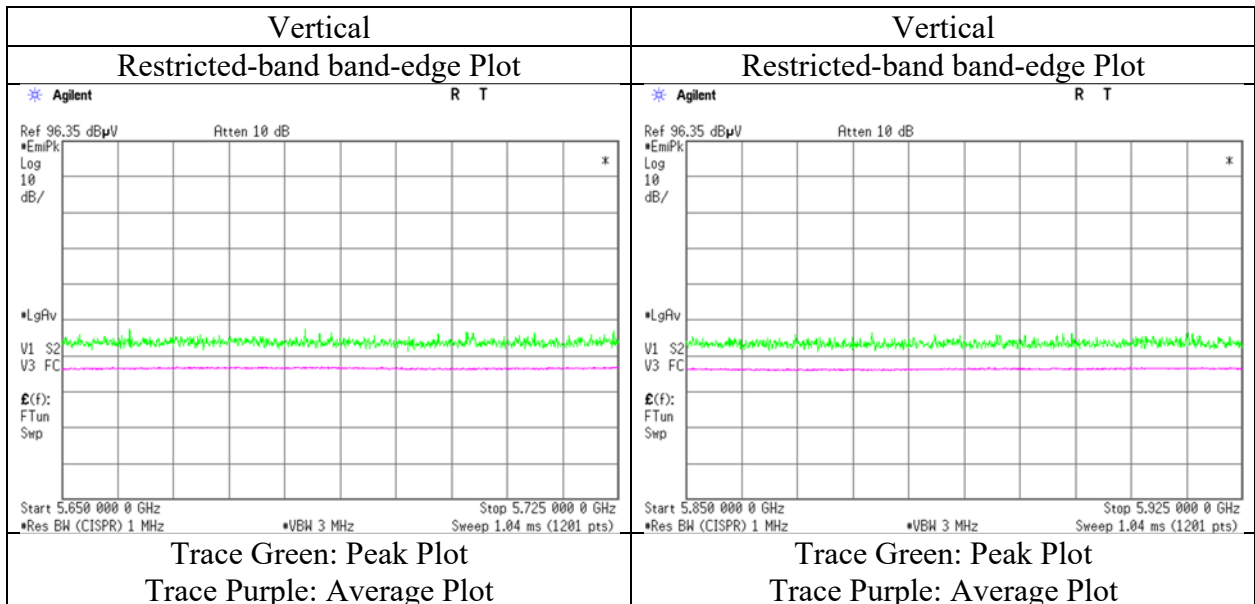
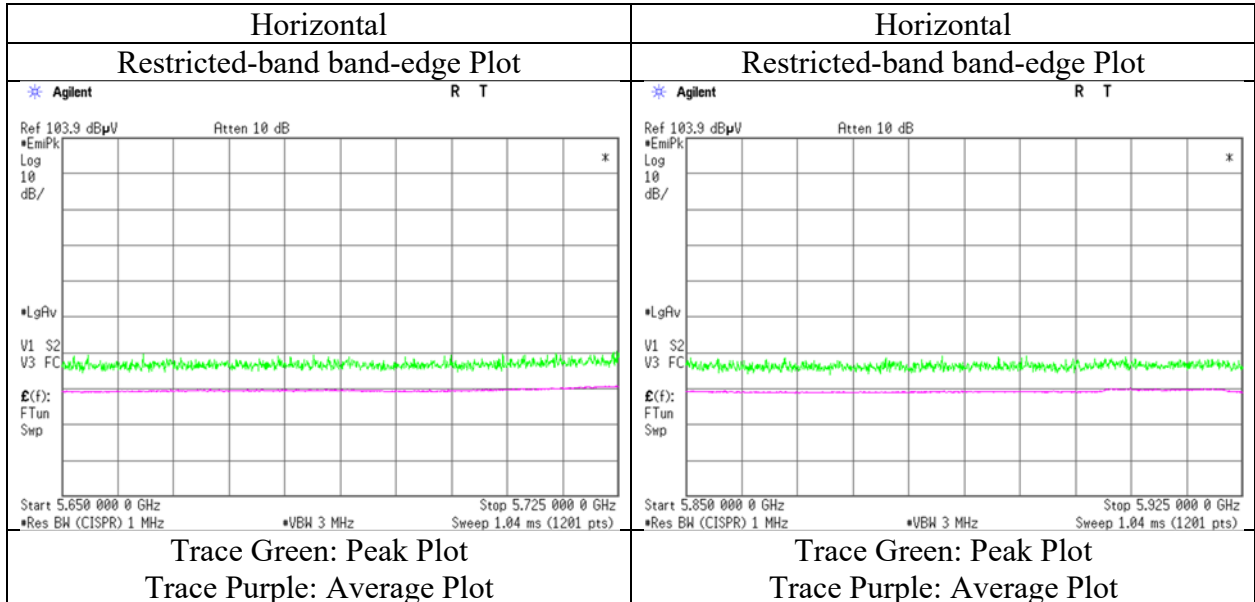
*Other frequency noises omitted in this report were not seen or had enough margin (more than 20 dB).

*QP detector was used up to 1GHz.

Distance factor: 1 GHz - 10 GHz 20log(3.85 m / 3.0 m) = 2.17 dB
 10 GHz - 40 GHz 20log(1.0 m / 3.0 m) = -9.5 dB

Radiated Spurious Emission

Test place	Ise EMC Lab.
Semi Anechoic Chamber	No.1
Date	January 6, 2023
Temperature / Humidity	21 deg. C / 40 % RH
Engineer	Keiya Ido
	(1 GHz - 10 GHz)
Mode	Tx 11a 5765 MHz



* The measurement was conducted for a sufficiently long enough time to detect any possible spurious emissions.
Final result of restricted band edge was shown in tabular data.

Radiated Spurious Emission

Test place	Ise EMC Lab.		
Semi Anechoic Chamber	No.1	No.1	No.1
Date	January 6, 2023	January 8, 2023	January 11, 2023
Temperature / Humidity	21 deg. C / 40 % RH	22 deg. C / 42 % RH	19 deg. C / 39 % RH
Engineer	Keiya Ido	Keiya Ido	Keiya Ido
	(1 GHz - 10 GHz)	(Above 10 GHz)	(Below 1 GHz)
Mode	Tx 11n-20 5765 MHz		

Polarity [Hori/Vert]	Frequency [MHz]	Reading (QP / PK) [dBuV]	Reading (AV) [dBuV]	Ant. Factor [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Result (QP / PK) [dBuV/m]	Result (AV) [dBuV/m]	Limit (QP / PK) [dBuV/m]	Limit (AV) [dBuV/m]	Margin (QP / PK) [dB]	Margin (AV) [dB]	Remark
Hori.	146.2	40.1	-	14.7	9.0	39.1	-	24.7	-	43.5	-	18.8	-	
Hori.	200.0	43.3	-	16.5	9.6	39.1	-	30.3	-	43.5	-	13.2	-	
Hori.	243.7	57.8	-	12.9	10.0	39.0	-	41.6	-	46.0	-	4.4	-	
Hori.	370.9	47.5	-	15.4	11.0	38.7	-	35.2	-	46.0	-	10.8	-	
Hori.	408.0	46.6	-	16.7	11.3	38.7	-	36.0	-	46.0	-	10.0	-	
Hori.	926.3	35.0	-	22.3	14.4	38.2	-	33.5	-	46.0	-	12.5	-	
Hori.	1300.0	58.6	47.3	26.0	4.0	36.7	-	51.9	40.6	73.9	53.9	22.0	13.3	
Hori.	5650.0	43.0	-	31.8	6.2	35.7	-	45.3	-	68.2	-	22.9	-	
Hori.	5700.0	43.4	-	31.9	6.2	35.7	-	45.8	-	105.2	-	59.4	-	
Hori.	5720.0	43.6	-	31.9	6.2	35.7	-	46.0	-	110.8	-	64.8	-	
Hori.	5725.0	45.0	-	31.9	6.2	35.7	-	47.5	-	122.2	-	74.7	-	
Hori.	5850.0	43.4	-	32.3	6.3	35.7	-	46.2	-	122.2	-	76.0	-	
Hori.	5855.0	43.2	-	32.3	6.3	35.7	-	46.1	-	110.8	-	64.8	-	
Hori.	5875.0	42.9	-	32.3	6.3	35.7	-	45.8	-	105.2	-	59.4	-	
Hori.	5925.0	43.3	-	32.4	6.3	35.7	-	46.3	-	68.2	-	21.9	-	
Hori.	11530.0	43.7	35.5	39.4	-1.7	35.7	-	45.8	37.5	73.9	53.9	28.2	16.4	Floor noise
Hori.	17295.0	45.1	-	43.0	-0.1	35.2	-	52.9	-	68.2	-	15.3	-	Floor noise
Vert.	146.2	35.9	-	14.7	9.0	39.1	-	20.5	-	43.5	-	23.0	-	
Vert.	200.0	37.9	-	16.5	9.6	39.1	-	24.9	-	43.5	-	18.6	-	
Vert.	243.7	51.7	-	12.9	10.0	39.0	-	35.5	-	46.0	-	10.5	-	
Vert.	370.9	43.3	-	15.4	11.0	38.7	-	31.0	-	46.0	-	15.0	-	
Vert.	408.0	43.8	-	16.7	11.3	38.7	-	33.2	-	46.0	-	12.8	-	
Vert.	926.3	33.6	-	22.3	14.4	38.2	-	32.1	-	46.0	-	13.9	-	
Vert.	1300.0	60.6	50.6	26.0	4.0	36.7	-	53.9	43.9	73.9	53.9	20.0	10.0	
Vert.	5650.0	42.6	-	31.8	6.2	35.7	-	44.9	-	68.2	-	23.3	-	
Vert.	5700.0	42.8	-	31.9	6.2	35.7	-	45.2	-	105.2	-	60.0	-	
Vert.	5720.0	42.6	-	31.9	6.2	35.7	-	45.0	-	110.8	-	65.8	-	
Vert.	5725.0	43.4	-	31.9	6.2	35.7	-	45.9	-	122.2	-	76.3	-	
Vert.	5850.0	43.1	-	32.3	6.3	35.7	-	45.9	-	122.2	-	76.3	-	
Vert.	5855.0	43.0	-	32.3	6.3	35.7	-	45.9	-	110.8	-	64.9	-	
Vert.	5875.0	42.9	-	32.3	6.3	35.7	-	45.8	-	105.2	-	59.5	-	
Vert.	5925.0	42.9	-	32.4	6.3	35.7	-	45.9	-	68.2	-	22.3	-	
Vert.	11530.0	44.4	35.6	39.4	-1.7	35.7	-	46.4	37.6	73.9	53.9	27.5	16.3	Floor noise
Vert.	17295.0	45.5	-	43.0	-0.1	35.2	-	53.3	-	68.2	-	15.0	-	Floor noise

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

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

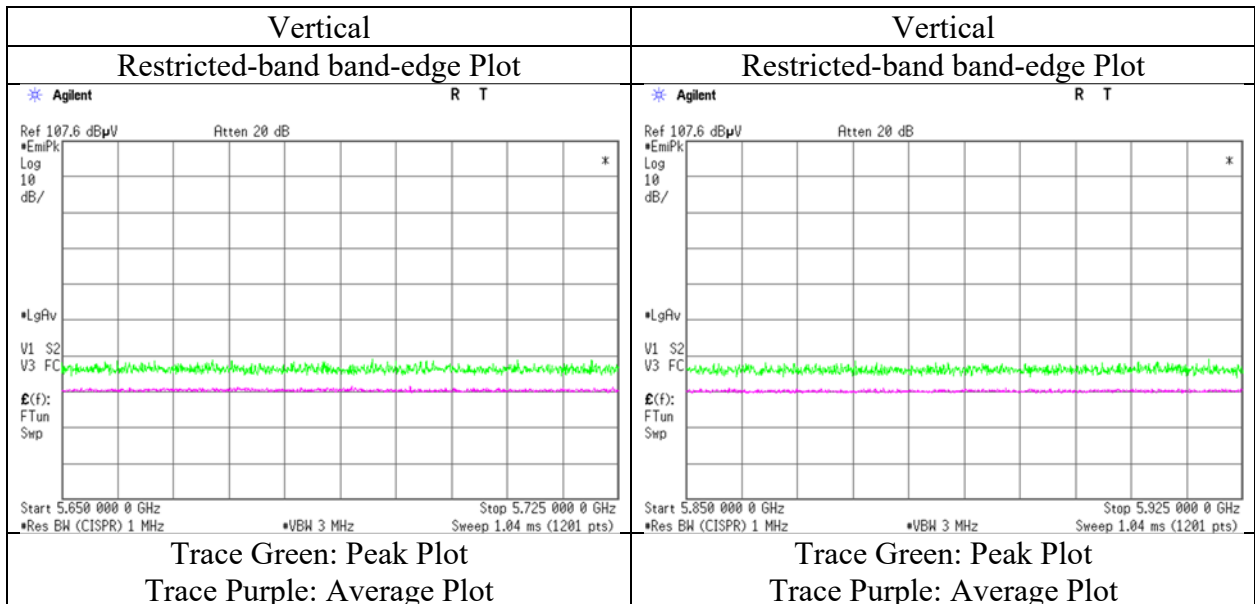
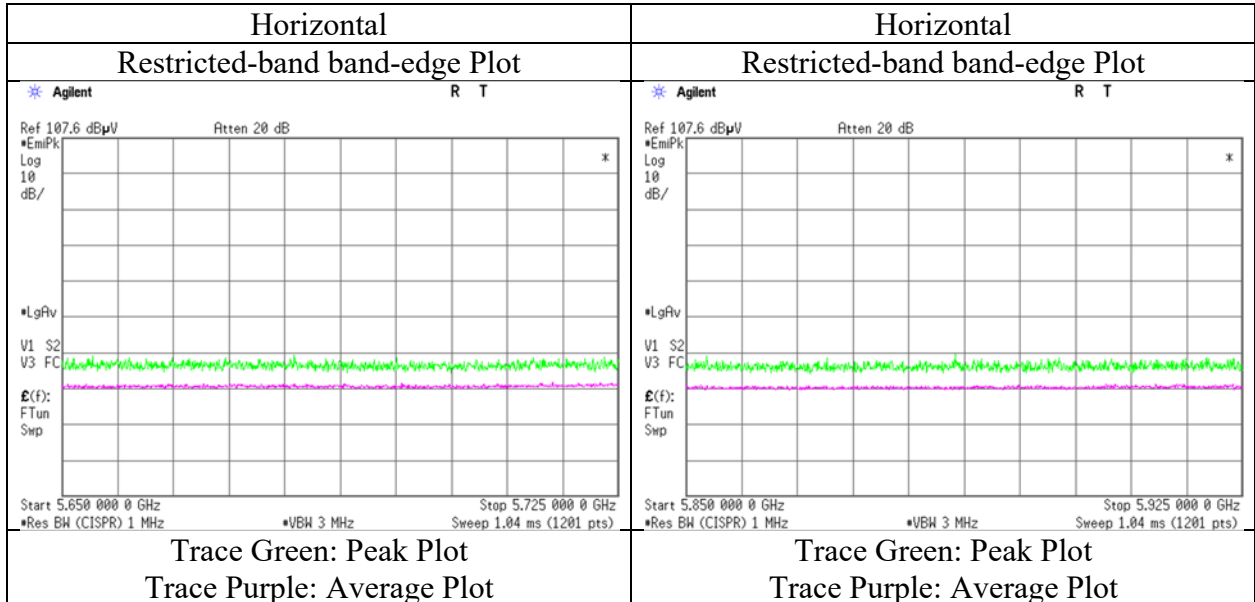
*Other frequency noises omitted in this report were not seen or had enough margin (more than 20 dB).

*QP detector was used up to 1GHz.

Distance factor: 1 GHz - 10 GHz 20log(3.85 m / 3.0 m) = 2.17 dB
 10 GHz - 40 GHz 20log(1.0 m / 3.0 m) = -9.5 dB

Radiated Spurious Emission

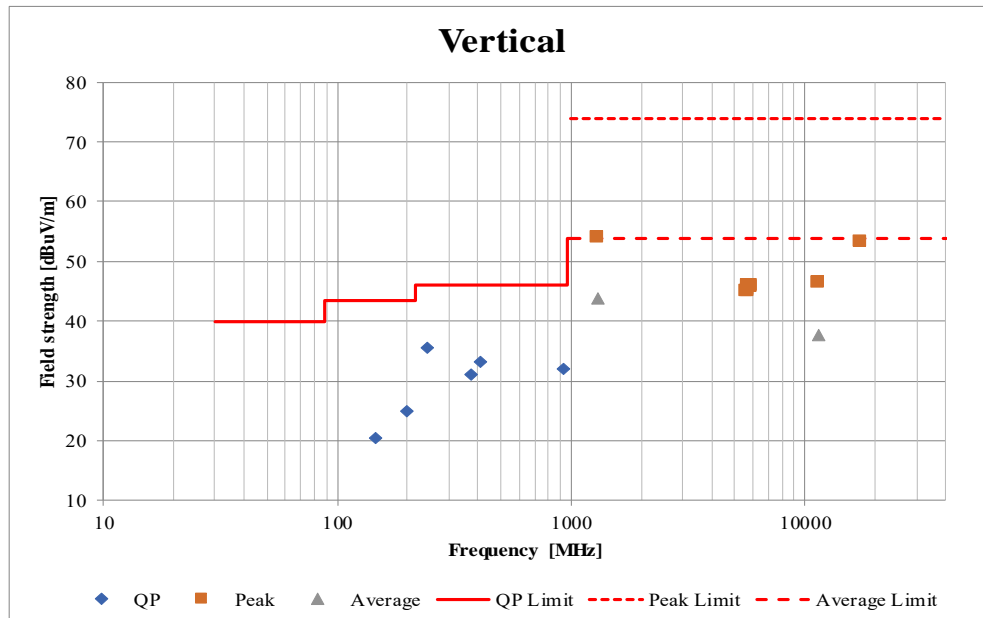
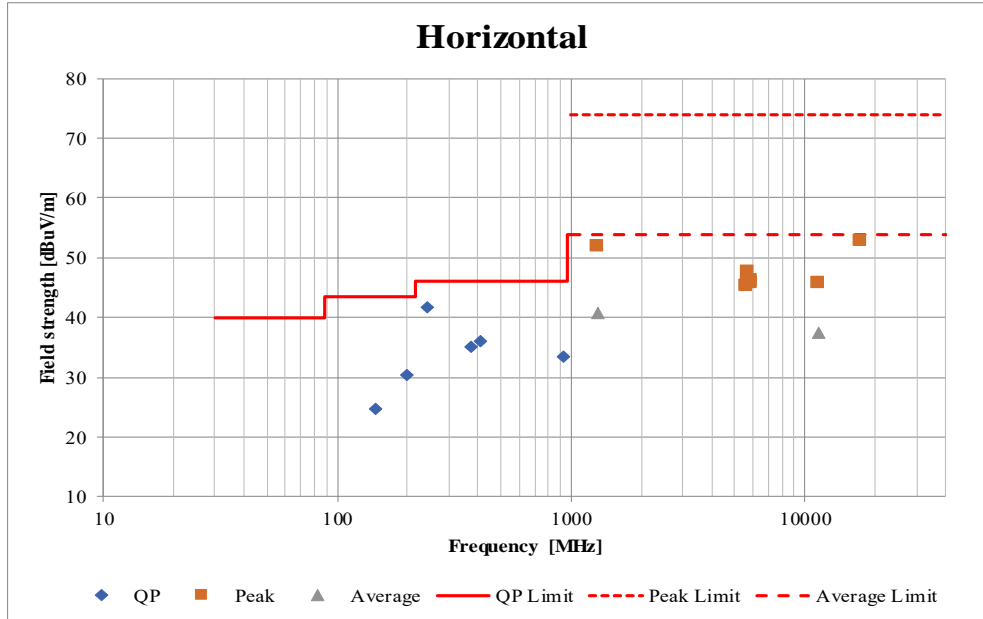
Test place	Ise EMC Lab.
Semi Anechoic Chamber	No.1
Date	January 6, 2023
Temperature / Humidity	21 deg. C / 40 % RH
Engineer	Keiya Ido
	(1 GHz - 10 GHz)
Mode	Tx 11n-20 5765 MHz



* The measurement was conducted for a sufficiently long enough time to detect any possible spurious emissions.
Final result of restricted band edge was shown in tabular data.

Radiated Spurious Emission
(Plot data, Worst case mode for Maximum Conducted Output Power)

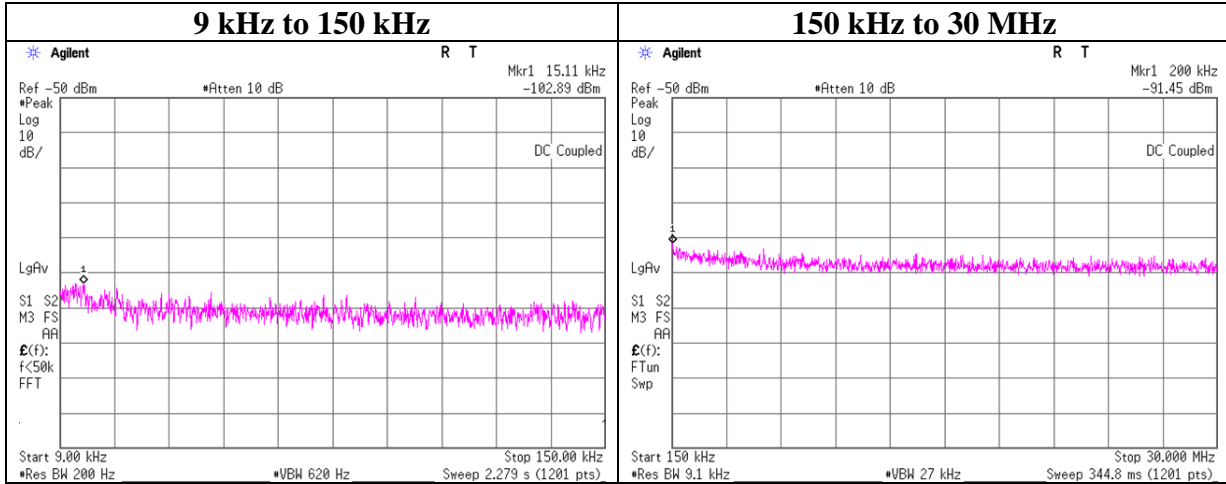
Test place	Ise EMC Lab.		
Semi Anechoic Chamber	No.1	No.1	No.1
Date	January 6, 2023	January 8, 2023	January 11, 2023
Temperature / Humidity	21 deg. C / 40 % RH	22 deg. C / 42 % RH	19 deg. C / 39 % RH
Engineer	Keiya Ido	Keiya Ido	Keiya Ido
Mode	(1 GHz - 10 GHz) Tx 11n-20 5765 MHz	(Above 10 GHz)	(Below 1 GHz)



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

Conducted Spurious Emission

Test place	Ise EMC Lab. No.8 Measurement Room
Date	December 23, 2022
Temperature / Humidity	22 deg. C / 38 % RH
Engineer	Tetsuro Yoshida
Mode	Tx 11n-20 5765 MHz



Frequency	Reading	Cable Loss	Attenuator	Antenna Gain*	N	EIRP	Distance	Ground bounce	E (field strength)	Limit	Margin	Remark
[kHz]	[dBm]	[dB]	[dB]	[dBi]	(Number of Output)	[dBm]	[m]	[dB]	[dBuV/m]	[dBuV/m]	[dB]	
15.11	-102.9	0.75	9.8	2.0	1	-90.3	300	6.0	-29.0	44.0	73.0	
200.00	-91.5	0.75	10.0	2.0	1	-78.7	300	6.0	-17.5	21.5	39.0	

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

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

N: Number of output

*2.0 dBi was applied to the test result based on KDB 789033 since antenna gain was less than 2.0 dBi.

APPENDIX 2: Test Instruments**Test Equipment**

Test Item	Local ID	LIMS ID	Description	Manufacturer	Model	Serial	Last Calibration Date	Cal Int
RE	COTS-MEMI-02	178648	EMI measurement program	TSJ (Techno Science Japan)	TEPTO-DV	-	-	-
RE	KBA-05	141198	Biconical Antenna	Schwarzbeck Mess-Elektronik OHG	VHA9103+BBA9106	2513	05/14/2022	12
RE	MAEC-01	141998	AC1_Semi Anechoic Chamber(NSA)	TDK	Semi Anechoic Chamber 10m	DA-06881	06/28/2022	24
RE	MAEC-01-SVSWR	141994	AC1_Semi Anechoic Chamber(SVSWR)	TDK	Semi Anechoic Chamber 10m	DA-06881	04/05/2021	24
RE	MAT-34	141331	Attenuator(6dB)	TME	UFA-01	-	02/25/2022	12
RE	MCC-02	141350	Coaxial Cable	Suhner/storm/Agilent/TSJ	-	-	03/08/2022	12
RE	MCC-176	141279	Microwave Cable	Junkosha	MMX221-00500DMSDMS	1502S303	03/15/2022	12
RE	MCC-217	141393	Microwave Cable	Junkosha	MWX221	1604S254(1 m) / 1608S088(5 m)	08/02/2022	12
RE	MCC-241	196413	Microwave Cable	Huber+Suhner	SF101EA/11PC24/11PC24/2500MM	SN 800094/1EA	01/20/2022	12
RE	MHA-05	141511	Horn Antenna 1-18GHz	Schwarzbeck Mess-Elektronik OHG	BBHA9120D	253	09/20/2022	12
RE	MHA-17	141506	Horn Antenna 15-40GHz	Schwarzbeck Mess-Elektronik OHG	BBHA9170	BBHA9170307	07/22/2022	12
RE	MHF-16	141406	High Pass Filter 7-20GHz	TOKIMEC	TF37NCCA	7001	09/07/2022	12
RE	MJM-25	142226	Measure, Tape, Steel	KOMELON	KMC-36	-	-	-
RE	MLA-20	141264	Logperiodic Antenna (200-1000MHz)	Schwarzbeck Mess-Elektronik OHG	VUSLP9111B	189	05/14/2022	12
RE	MMM-09	141533	DIGITAL HiTESTER	HIOKI E.E. CORPORATION	3805	51201195	01/16/2022	12
RE	MOS-27	141566	Thermo-Hygrometer	CUSTOM. Inc	CTH-201	A08Q26	01/10/2022	12
RE	MPA-01	141576	Pre Amplifier	Keysight Technologies Inc	8449B	3008A01671	02/22/2022	12
RE	MPA-19	141585	Pre Amplifier	MITEQ	MLA-10K01-B01-35	1237616	02/28/2022	12
RE	MPA-33	220253	Broadband Amplifier	SAGE Millimeter, Inc.	SBB-0115033218-2F2F-E3	0001	05/13/2022	12
RE	MSA-03	141884	Spectrum Analyzer	Keysight Technologies Inc	E4448A	MY44020357	03/31/2022	12
RE	MTR-09	141950	EMI Test Receiver	Rohde & Schwarz	ESU26	100412	10/11/2022	12
AT	MAT-10	141156	Attenuator(10dB)	Weinschel Corp	2	BL1173	11/10/2022	12
AT	MAT-57	141333	Attenuator(10dB)	Suhner	6810.19.A	-	12/21/2022	12
AT	MCC-38	141395	Coaxial Cable	UL Japan	-	-	11/18/2022	12
AT	MCC-98	141377	Microwave Cable 1G-40GHz	Suhner	SUCOFLEX102	30819/2	06/15/2022	12
AT	MMM-17	141557	DIGITAL HiTESTER	HIOKI E.E. CORPORATION	3805	70900530	01/16/2022	12
AT	MOS-28	141567	Thermo-Hygrometer	CUSTOM. Inc	CTH-201	0008	01/10/2022	12
AT	MPM-12	141809	Power Meter	Anritsu Corporation	ML2495A	825002	05/18/2022	12
AT	MPSE-17	141830	Power sensor	Anritsu Corporation	MA2411B	738285	05/18/2022	12
AT	MSA-14	141901	Spectrum Analyzer	Keysight Technologies Inc	E4440A	MY48250080	01/10/2022	12

*Hyphens for Last Calibration Date and Cal Int (month) are instruments that Calibration is not required (e.g. software), or instruments checked in advance before use.

The expiration date of the calibration is the end of the expired month.

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

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

Test item:

RE: Radiated Emission

AT: Antenna Terminal Conducted test