

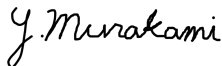
ADDENDUM TEST REPORT


Test Report No. : 13512441S

Applicant : Panasonic Corporation
Type of EUT : Seat Back ECU
Model Number of EUT : AT2002
Test standard : EN 300 328 V2.2.2
Test item : Receiver Blocking
Test Result : Complied (Refer to SECTION 3.2)

1. This test report shall not be reproduced in full or partial, without the written approval of UL Japan, Inc.
2. The results in this report apply only to the sample tested.
3. This sample tested is in compliance with the limits of the above standard.
4. The test results in this test 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. Shonan EMC Lab.
7. The opinions and the interpretations to the result of the description in this report are outside scopes where UL Japan has been accredited.
8. The information provided from the customer for this report is identified in SECTION 1.

Date of test: September 17, 2020

Representative test engineer: 
Yosuke Murakami
Engineer
Consumer Technology Division

Approved by : 
Shinichi Takano
Engineer
Consumer Technology Division



- ☐ The testing in which "Non-accreditation" is displayed is outside the accreditation scopes in UL Japan.
☒ There is no testing item of "Non-accreditation".

REVISION HISTORY

Original Test Report No.: 13512441S

Revision	Test report No.	Date	Page revised	Contents
- (Original)	13512441S	October 14, 2020	-	-

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Reference: Abbreviations (Including words undescribed in this report)

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

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SECTION 1: Customer information

Company Name : Panasonic Corporation
Address : 4261, Ikonobe-cho, Tsuzuki-ku, Yokohama-shi, Kanagawa-ken,
224-8520, Japan
Telephone Number : +81-50-3380-5341
Facsimile Number : +81-45-931-0806
Contact Person : Yuki Tojo

The information provided from the customer is as follows;

- Applicant, Type of EUT, Model Number of EUT 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
 - 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

Type : Seat Back ECU
Model Number : AT2002
Serial Number : Refer to SECTION 4.2
Rating : DC 13.2 V
Receipt Date : September 17, 2020
Country of Mass-production : Japan
Condition : Engineering prototype
(Not for Sale: This sample is equivalent to mass-produced items.)
Modification : No Modification by the test lab.

2.2 Product Description

Model: AT2002 (referred to as the EUT in this report) is a Seat Back ECU.

Radio Specification

Radio Type : Transceiver
Frequency of Operation : 2412 MHz - 2472 MHz
Modulation : DSSS, OFDM
Antenna type : Dipole
Antenna Gain : 0.85 dBi
Clock frequency (Maximum) : 48 MHz
Operating Temperature : -30 deg. C to +65 deg. C

List of Model No.

Model: AT2002 includes the following models:

CR-ET3BX0AJ (Tested model), CR-ET3BX1AJ, CR-ET3BX0BJ, CR-ET3BX1BJ

Difference of these models: Vehicle type, Destination

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SECTION 3: Test specification, procedures & results

3.1 Test Specification

Radio : EN 300 328 V2.2.2

Title : Wideband transmission systems;
Data transmission equipment operating in the 2,4 GHz band;
Harmonised Standard for access to radio spectrum

Purpose of test : Compliance with the harmonized RE directive 2014/53/EU.

Test reports: 13273483S-B and 13512441S (this report) include information of all the requirements in EN 300 328 V2.2.2.

13512441S is for updating the test standard: EN 300 328 from V2.1.1 to V2.2.2 and it only includes the requirements newly introduced in EN 300 328 V2.2.2.

Therefore only following test was performed in this report (See clause 3.2).

3.2 Procedures and results

Item	Test Procedure	Limit	Test method	Worst margin	Results	Remarks
Receiver Blocking	Clause 5.4.11	Clause 4.3.2.11	Conducted	-	Complied a)	-
Note: UL Japan, Inc.'s EMI Work Procedure 13-EM-W0420.						
a) Refer to APPENDIX 1 (data of Receiver Blocking)						
Symbols:						
Complied		The data of this test item has enough margin, more than the measurement uncertainty.				
Complied#		The data of this test item meets the limits unless the measurement uncertainty is taken into consideration.				

3.3 Additions or deviations to standards

No addition, exclusion nor deviation has been made from the standard.

3.4 Uncertainty

Although this standard determines only the limit value of uncertainty, there is no applicable rule of uncertainty in this. Therefore, the results are derived depending on whether or not laboratory uncertainty is applied.

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

Antenna terminal test	Uncertainty (+/-)
Power Measurement above 1 GHz (Average Detector)_SPM-06	0.98 dB
Power Measurement above 1 GHz (Average Detector)_SPM-07	0.89 dB
Power Measurement above 1 GHz (Average Detector)_SPM-08, 09, 10, 11	1.30 dB
Power Measurement above 1 GHz (Average Detector)_SPM-13	1.06 dB
Conducted emissions Measurement (below 1 GHz)	0.9 dB
Conducted emissions Power Density Measurement (1 GHz-3 GHz)	0.9 dB
Conducted emissions Measurement (3 GHz-18 GHz)	2.9 dB
Conducted emissions Measurement (18 GHz-26.5 GHz)	2.6 dB
Frequency Measurement (Spectrum Analyzer)	1.2×10^{-8}
Bandwidth Measurement	0.07 %
Duty cycle and Time Measurement	0.262 %
Temperature	0.95 deg.C.
Voltage	0.83 %
Humidity	4.2 %
Receiver Blocking (Wanted RF Level)_SWT-02	2.73 dB
Receiver Blocking (Blocking Signal Level)_SWT-02	1.95 dB
Receiver Blocking (Wanted RF Level)_SSG-12	2.58 dB
Receiver Blocking (Blocking Signal Level)_SSG-12	1.96 dB
Receiver Blocking (Wanted RF Level)_SBT-01	2.71 dB
Receiver Blocking (Blocking Signal Level)_SBT-01	1.88 dB
Receiver Blocking (Blocking Signal Level)_without tester	1.19 dB

3.5 Test Location

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JAB Accreditation No. RTL02610

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

3.6 Test data, Test instruments, and Test set up

Refer to APPENDIX.

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SECTION 4: Operation of EUT during testing

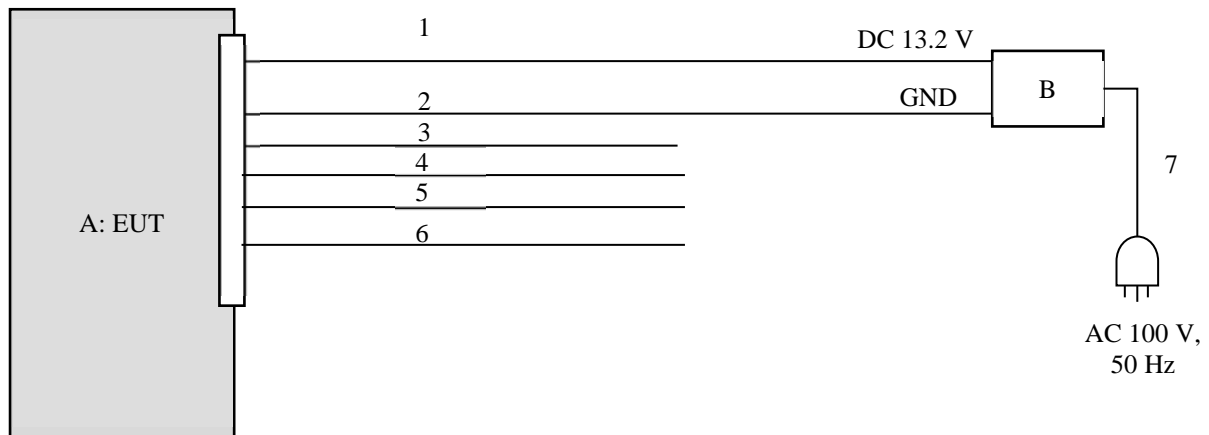
4.1 Operating Mode(s)

Mode	Remarks
IEEE 802.11b	1 Mbps, PN9
IEEE 802.11g	6 Mbps, PN9
*EUT has the power settings by the software as follows; Power settings: Fixed Software: WIFI Diag ver.9.75 Any conditions under the normal use do not exceed the condition of setting.	

Details of Operating Mode(s)

Test item	Operating mode	Tested frequency
Receiver blocking	Communication IEEE 802.11b/g *1)	2412 MHz 2472 MHz
*1) Since 11g and 11n-20 have the same nominal channel bandwidth and no differences in transmitting specification, test was performed on the 11g mode that had the lowest data rate.		

4.2 Configuration and peripherals



Description of EUT and Support equipment

No.	Item	Model number	Serial number	Manufacturer	Remark
A	Seat Back ECU	AT2002	ECU2_060 *1) ECU2_058 *2)	Panasonic	EUT
B	Power Supply (DC)	PAN35-10A	ML002085	KIKUSUI	-

*1) Used for Occupied Channel Bandwidth

*2) Used for Receiver Blocking

List of cables used

No.	Name	Length (m)	Shield		Remark
			Cable	Connector	
1	DC+	3.0	Unshielded	Unshielded	-
2	GND	3.0	Unshielded	Unshielded	-
3	Signal	2.0	Unshielded	Unshielded	-
4	Earphone	2.0	Shielded	Shielded	-
5	Earphone	2.0	Shielded	Shielded	-
6	Signal	2.0	Unshielded	Unshielded	-
7	AC	2.0	Unshielded	Unshielded	-

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SECTION 5: Antenna Terminal Conducted Tests

Test Procedure

The tests were made with below setting connected to the antenna port.

Test	Instrument used	Remark
Receiver Blocking	Wireless Test Set	Normal condition

The test results are rounded off to two decimals place, so some differences might be observed.
The equipment and cables were not used for factor 0.0 dB of the data sheets.

Test data : APPENDIX
Test result : Pass

APPENDIX 1: Test data

Receiver Blocking

Report No. 13512441S
Test place Shonan EMC Lab. No.5 Shielded Room
Date September 17, 2020
Temperature / Humidity 24 deg. C / 54 % RH
Engineer Yosuke Murakami
Mode Communication 11b

Receiver Category 1 equipment

Wanted signal mean power from companion device (dBm)		
	Lowest Channel	Highest Channel
-133 dBm + 10 × log10(OCBW)	-61.99	-61.99
-139 dBm + 10 × log10(OCBW)	-67.99	-67.99

OCBW=Refer to Occupied Channel Bandwidth

Operating Channel	Blocking signal power (dBm)	Blocking signal power (corrected by the actual antenna assembly gain) (dBm) *3)	Wanted signal mean power from companion device (dBm)	Wanted signal mean power from companion device (corrected by the actual antenna assembly gain) (dBm) *3)	Blocking signal frequency (MHz)	Result PER (%)	Remarks	Limit PER (%)
Lowest Channel	-34.00	-33.15	-68.00 *1)	-67.15	2380	0.00	-	≤ 10
			-74.00 *2)	-73.15	2300	0.02	-	
					2330	10.02	1st	
					2342.6122	0.27	2nd *4)	
					2360	0.14	-	
Highest Channel	-34.00	-33.15	-68.00 *1)	-67.15	2504	0.26	-	≤ 10
			-74.00 *2)	-73.15	2524	0.00	-	
					2584	0.20	-	
					2674	0.00	-	

*1) Wanted signal mean power from companion device was
(-133 dBm + 10 × log10(OCBW)) or -68 dBm whichever is less

*2) Wanted signal mean power from companion device was
(-139 dBm + 10 × log10(OCBW)) or -74 dBm whichever is less

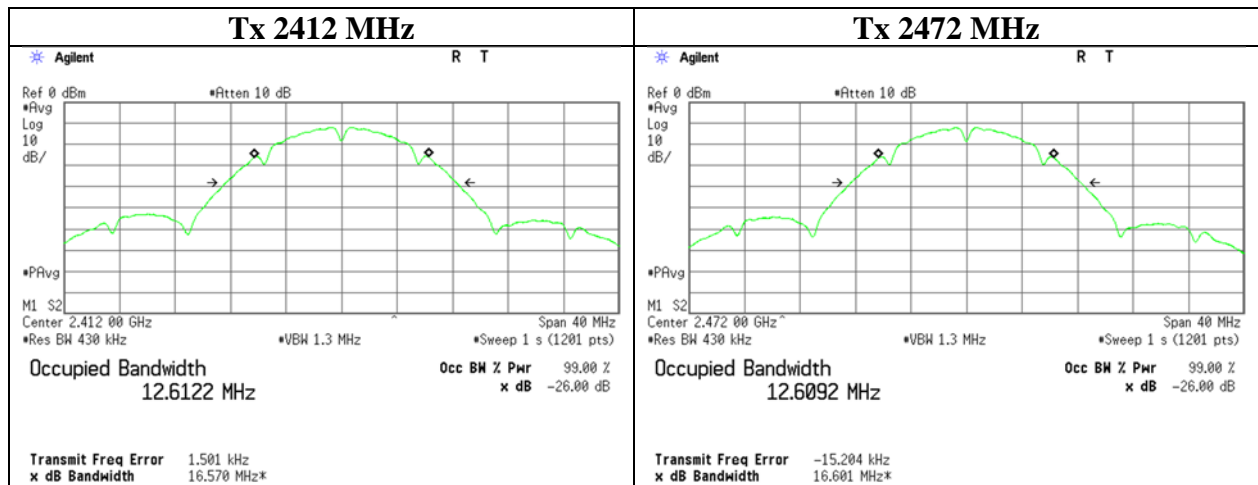
*3) Adjusted by product antenna gain 0.85dBi.

*4) The blocking signal was offset in clause 5.4.11.2.1 step 5 of EN 300 328 V2.2.2.

Occupied Channel Bandwidth

Report No. 13512441S
Test place Shonan EMC Lab. No.5 Shielded Room
Date September 17, 2020
Temperature / Humidity 24 deg. C / 54 % RH
Engineer Yosuke Murakami
Mode Tx 11b

Frequency [MHz]	Bandwidth [MHz]	Result [MHz]	Limit [MHz]
2412	12.6122	2405.6939	> 2400
2472	12.6092	2478.3046	< 2483.5



Receiver Blocking

Report No. 13512441S
Test place Shonan EMC Lab. No.5 Shielded Room
Date September 17, 2020
Temperature / Humidity 24 deg. C / 54 % RH
Engineer Yosuke Murakami
Mode Communication 11g

Receiver Category 1 equipment

Wanted signal mean power from companion device (dBm)		
	Lowest Channel	Highest Channel
-133 dBm + $10 \times \log_{10}(\text{OCBW})$	-60.82	-60.83
-139 dBm + $10 \times \log_{10}(\text{OCBW})$	-66.82	-66.83

OCBW=Refer to Occupied Channel Bandwidth

Operating Channel	Blocking signal power (dBm)	Blocking signal power (corrected by the actual antenna assembly gain) (dBm) *3)	Wanted signal mean power from companion device (dBm)	Wanted signal mean power from companion device (corrected by the actual antenna assembly gain) (dBm) *3)	Blocking signal frequency (MHz)	Result PER (%)	Remarks	Limit PER (%)
Lowest Channel	-34.00	-33.15	-68.00 *1)	-67.15	2380	0.68	-	≤ 10
			-74.00 *2)	-73.15	2300	0.00	-	
					2330	16.58	1st	
					2346.5043	0.35	2nd *4)	
					2360	0.08	-	
Highest Channel	-34.00	-33.15	-68.00 *1)	-67.15	2504	0.62	-	≤ 10
			-74.00 *2)	-73.15	2524	0.94	-	
					2584	0.82	-	
					2674	0.00	-	

*1) Wanted signal mean power from companion device was
(-133 dBm + $10 \times \log_{10}(\text{OCBW})$) or -68 dBm whichever is less

*2) Wanted signal mean power from companion device was
(-139 dBm + $10 \times \log_{10}(\text{OCBW})$) or -74 dBm whichever is less

*3) Adjusted by product antenna gain 0.85dBi.

*4) The blocking signal was offset in clause 5.4.11.2.1 step 5 of EN 300 328 V2.2.2.

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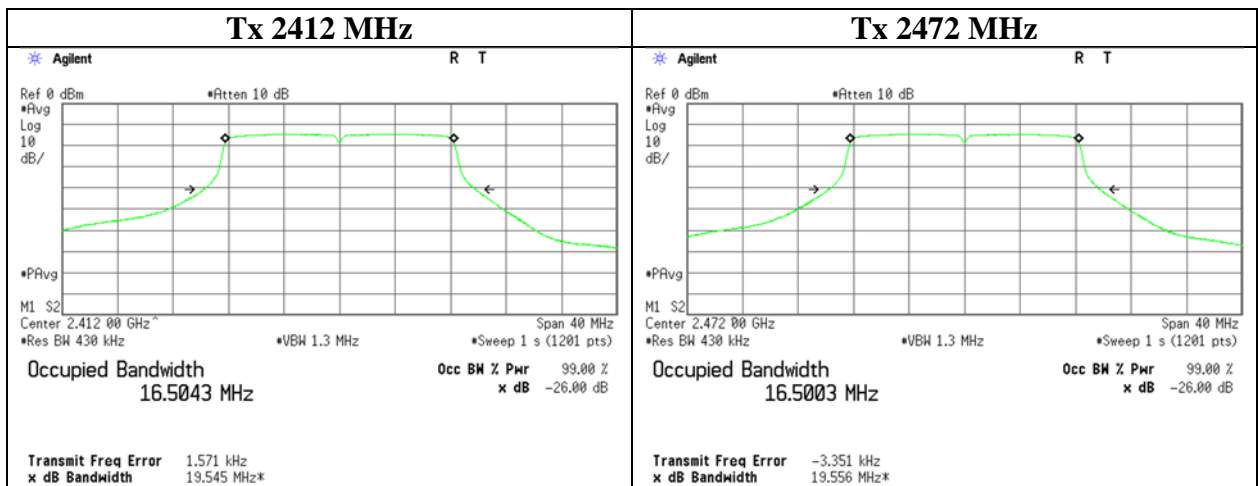
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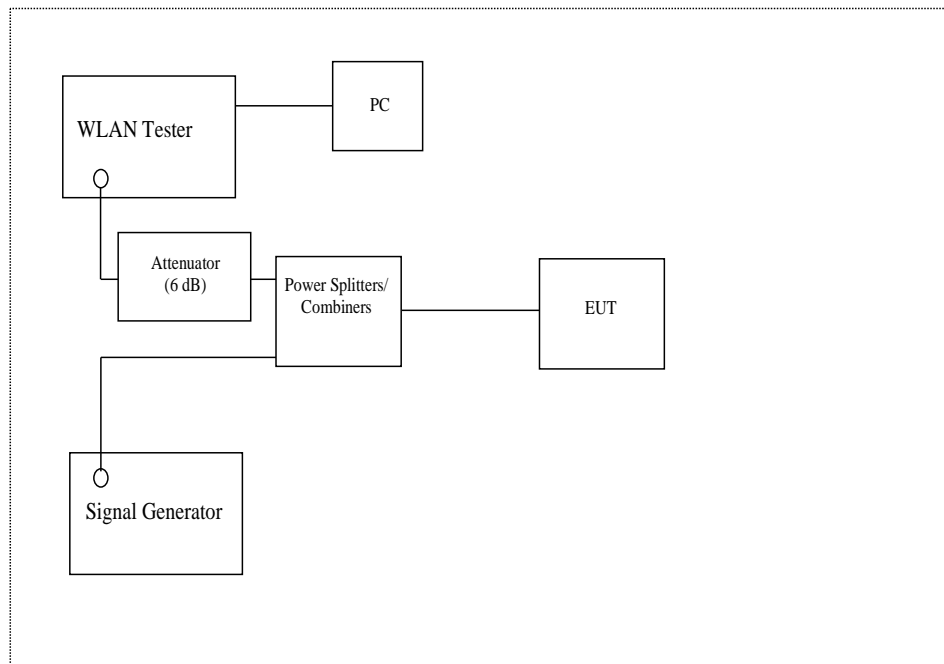
Occupied Channel Bandwidth

Report No. 13512441S
Test place Shonan EMC Lab. No.5 Shielded Room
Date September 17, 2020
Temperature / Humidity 24 deg. C / 54 % RH
Engineer Yosuke Murakami
Mode Tx 11g

Frequency [MHz]	Bandwidth [MHz]	Result [MHz]	Limit [MHz]
2412	16.5043	2403.7479	> 2400
2472	16.5003	2480.2502	< 2483.5



CONDUCTED METHODS SYSTEM BLOCK DIAGRAM of Receiver Blocking



APPENDIX 2: Test instruments

Test equipment

Test Item	Local ID	LIMS ID	Description	Manufacturer	Model	Serial	Last Calibration Date	Cal Int
RB	SAT10-14	154591	Attenuator	Weinschel Corp.	54A-10	81595	2020/04/01	12
RB	SCC-G14	145175	Coaxial Cable	Suhner	SUCOFLEX 102	31600/2	2019/12/12	12
RB	KTS-07	145111	Digital Tester	SANWA	PC500	7019232	2019/10/01	12
RB	SOS-19	175823	Humidity Indicator	CUSTOM. Inc	CTH-201	-	2019/12/19	12
RB	SRENT-15	160899	Spectrum Analyzer	Keysight Technologies Inc	E4440A	MY46185516	2020/01/15	12
RB	SAT6-10	145152	Attenuator	HIROSE ELECTRIC CO.,LTD.	AT-406(40)	-	2020/04/21	12
RB	SCC-G34	151611	Coaxial Cable	Junkosha	MWX241-01000KMSKMS/B	1612Q032	2019/12/23	12
RB	SCC-G35	151612	Coaxial Cable	Junkosha	MWX241-01000KMSKMS/B	1612Q033	2019/12/23	12
RB	SCC-G36	151613	Coaxial Cable	Junkosha	MWX241-01000KMSKMS/B	1612Q034	2019/12/23	12
RB	SPSC-02	146252	Power Splitters/Combiners	Mini-Circuits	ZFSC-2-10G+	-	2019/11/18	12
RB	SSG-12	146257	Signal Generator	Rohde & Schwarz	SMBV100A	262152	2020/08/24	12
RB	SWT-02	160830	WLAN Test Set	Anritsu	MT8862A	6261711746	2020/04/16	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.

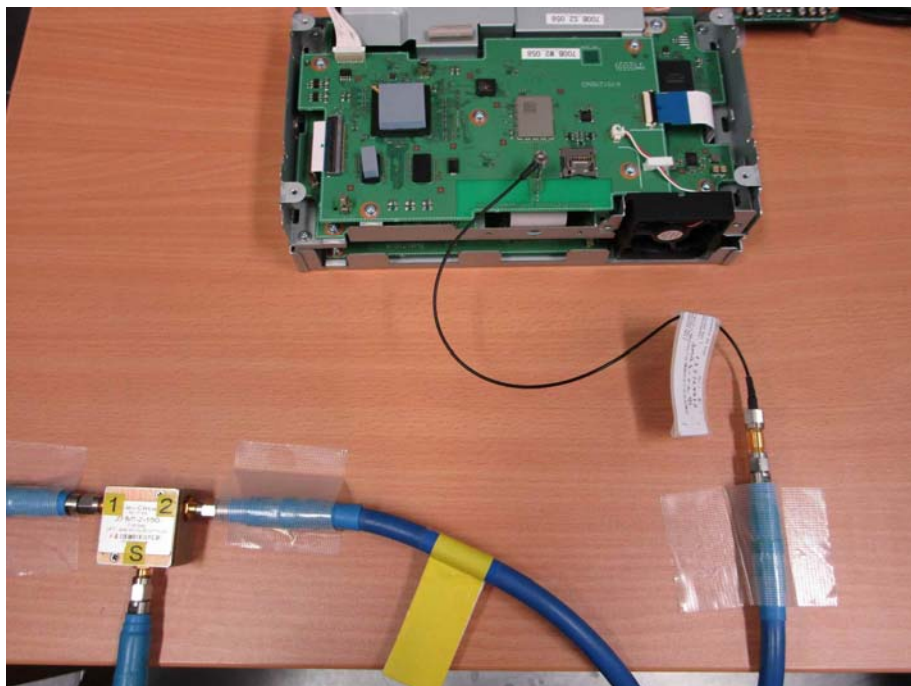
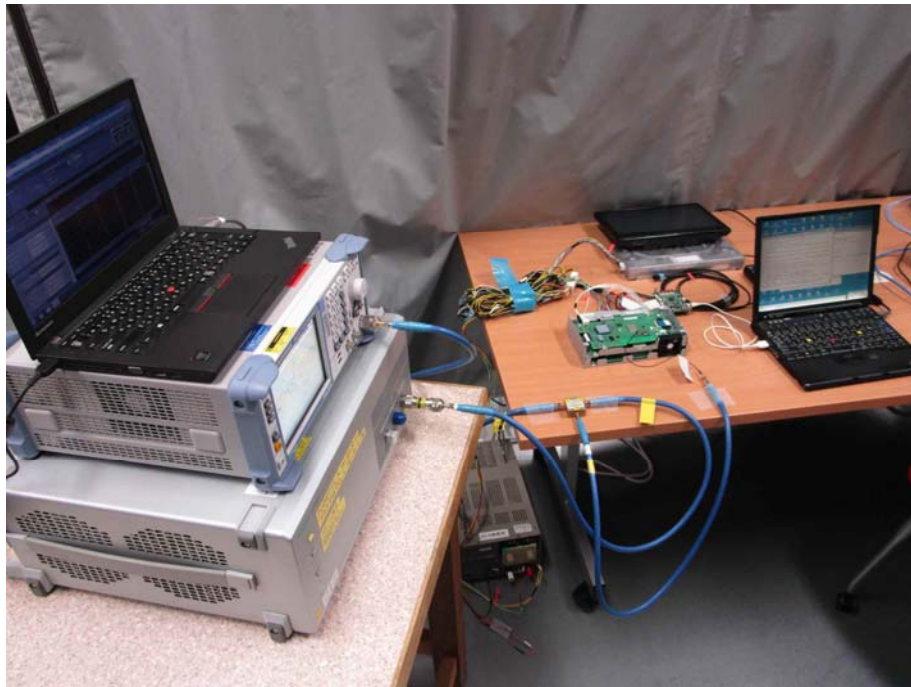
All equipment is calibrated with valid calibrations. Each measurement data is traceable to the national or international standards.

Test item:

RB: Receiver Blocking test

APPENDIX 3: Photographs of test setup

Receiver Blocking



End of Report