RADIO TEST REPORT

Test Report No. : 12699044S-AN

Applicant	:	**Canon Inc**
Type of Equipment	:	**Wireless module**
Model No.	:	**ES203**
FCC ID	:	**AZD240**
Test regulation	:	**FCC Part 15 Subpart E: 2019** **Section 15.407 (DFS test only)** *Client without radar detection
Test Result	:	**Complied (Refer to SECTION 4.2)**

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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 limits of the above regulation.
4. The test results in this test report are traceable to the national or international standards.
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6. This test report covers Radio technical requirements.
   It does not cover administrative issues such as Manual or non-Radio test related Requirements. (if applicable)
7. The all test items in this test report are conducted by UL Japan, Inc. Shonan EMC Lab.
8. The opinions and the interpretations to the result of the description in this report are outside scopes where UL Japan has been accredited.
9. The information provided from the customer for this report is identified in SECTION 1.

Date of test : August 5, 2019

Representative test engineer:

Kenichi Adachi
Engineer
Consumer Technology Division

Approved by :

Toyokazu Imamura
Leader
Consumer Technology Division

CERTIFICATE 1266.03

☐ 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.: 12699044S-AN

Revision	Test report No.	Date	Page revised	Contents
- (Original)	12699044S-AN	September 6, 2019	-	-

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Reference: Abbreviations (Including words undescribed in this report)

A2LA	The American Association for Laboratory Accreditation
AC	Alternating Current
AFH	Adaptive Frequency Hopping
AM	Amplitude Modulation
Amp, AMP	Amplifier
ANSI	American National Standards Institute
Ant, ANT	Antenna
AP	Access Point
Atten., ATT	Attenuator
AV	Average
BPSK	Binary Phase-Shift Keying
BR	Bluetooth Basic Rate
BT	Bluetooth
BT LE	Bluetooth Low Energy
BW	BandWidth
Cal Int	Calibration Interval
CCK	Complementary Code Keying
Ch., CH	Channel
CISPR	Comite International Special des Perturbations Radioelectriques
CW	Continuous Wave
DBPSK	Differential BPSK
DC	Direct Current
DFS	Dynamic Frequency Selection
DQPSK	Differential QPSK
DSSS	Direct Sequence Spread Spectrum
EDR	Enhanced Data Rate
EIRP, e.i.r.p.	Equivalent Isotropically Radiated Power
EMC	ElectroMagnetic Compatibility
EMI	ElectroMagnetic Interference
EN	European Norm
ERP, e.r.p.	Effective Radiated Power
EU	European Union
EUT	Equipment Under Test
Fac.	Factor
FCC	Federal Communications Commission
FHSS	Frequency Hopping Spread Spectrum
FM	Frequency Modulation
Freq.	Frequency
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
MCS	Modulation and Coding Scheme
MRA	Mutual Recognition Arrangement
NIST	National Institute of Standards and Technology
NS	No signal detect.
NSA	Normalized Site Attenuation
NVLAP	National Voluntary Laboratory Accreditation Program
OBW	Occupied Band Width
OFDM	Orthogonal Frequency Division Multiplexing
P/M	Power meter
PCB	Printed Circuit Board
PER	Packet Error Rate
PHY	Physical Layer
PK	Peak
PN	Pseudo random Noise
PRBS	Pseudo-Random Bit Sequence
PSD	Power Spectral Density
QAM	Quadrature Amplitude Modulation
QP	Quasi-Peak
QPSK	Quadri-Phase Shift Keying
RBW	Resolution Band Width
RDS	Radio Data System
RE	Radio Equipment
RF	Radio Frequency
RMS	Root Mean Square
RSS	Radio Standards Specifications
Rx	Receiving
SA, S/A	Spectrum Analyzer
SG	Signal Generator
SVSWR	Site-Voltage Standing Wave Ratio
TR	Test Receiver
Tx	Transmitting
VBW	Video BandWidth
Vert.	Vertical
WLAN	Wireless LAN

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CONTENTS **PAGE**

SECTION 1: Customer information

Company Name	:	Canon Inc
Address	:	30-2, Shimomaruko 3-chome, Ohta-ku, Tokyo 146-8501 Japan
Telephone Number	:	+81-3-3757-6798
Facsimile Number	:	+81-3-5482-4053
Contact Person	:	Tomohiro Suzuki

The information provided from the customer is as follows;
- Applicant, Type of Equipment, Model No., 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 (E.U.T.)
- SECTION 4: Operation of E.U.T. 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 (E.U.T.)

2.1 Identification of E.U.T.

Type of Equipment	:	Wireless module
Model No.	:	ES203
Serial No.	:	Refer to SECTION 4.2
Rating	:	DC 3.3 V
Receipt Date of Sample (Information from test lab.)	:	January 25, 2019
Country of Mass-production	:	China, Japan
Condition of EUT	:	Engineering prototype (Not for Sale: This sample is equivalent to mass-produced items.)
Modification of EUT	:	No Modification by the test lab

2.2 Product description

Model: ES203 (referred to as the EUT in this report) is a Wireless module.

Radio Specification

WLAN module	:	ES203
Radio Type	:	Transceiver
Clock frequency (Maximum)	:	40 MHz

WLAN

	IEEE802.11b	**IEEE802.11g**	**IEEE802.11n (20 MHz band)**	**IEEE802.11n (40 MHz band)**
Frequency of operation	2412 MHz - 2462 MHz	2412 MHz - 2462 MHz	2412 MHz - 2462 MHz 5180 MHz - 5240 MHz 5260 MHz - 5320 MHz 5500 MHz - 5700 MHz 5745 MHz - 5825 MHz	2422 MHz - 2452 MHz 5190 MHz - 5230 MHz 5270 MHz - 5310 MHz 5510 MHz - 5670 MHz 5755 MHz - 5795 MHz
Channel spacing	5 MHz		2.4 GHz band 5 MHz 5 GHz band 20 MHz	2.4 GHz band 5 MHz 5 GHz band 40 MHz
Modulation	DSSS: DBPSK, DQPSK, CCK	OFDM: BPSK, QPSK, 16QAM, 64QAM		
	IEEE802.11a	**IEEE802.11ac (20 MHz band)**	**IEEE802.11ac (40 MHz band)**	**IEEE802.11ac (80 MHz band)**
Frequency of operation	5180 MHz - 5240 MHz 5260 MHz - 5320 MHz 5500 MHz - 5700 MHz 5745 MHz - 5825 MHz	5180 MHz - 5240 MHz 5260 MHz - 5320 MHz 5500 MHz - 5700 MHz 5745 MHz - 5825 MHz	5190 MHz - 5230 MHz 5270 MHz - 5310 MHz 5510 MHz - 5670 MHz 5755 MHz - 5795 MHz	5210 MHz 5290 MHz 5530 MHz - 5610 MHz 5775 MHz
Channel spacing	20 MHz	20 MHz	40 MHz	80 MHz
Modulation	OFDM: BPSK, QPSK, 16QAM, 64QAM, 256QAM (*256QAM is only for IEEE802.11ac 80 MHz band)			

Antenna	**Antenna A**	**Antenna B**
Antenna quantity	2 pcs. (*. Separation distance between the antenna A and the antenna B: ≈5 mm) *. The single antenna transmitting mode could not be allowed.	
Antenna type / connector type	Invert-L Pattern antenna / Printed on the PCB.	Invert-L Flexible printed circuit (FPC) antenna / PCB side: U.FL, Antenna side: soldered
Antenna gain	-1.77 dBi (2.4GHz band), 1.52 dBi (U-NII-1 band), 1.78 dBi (U-NII-2A band), 2.04 dBi (U-NII-2C band), 2.26 dBi (U-NII-3 band), (*.including cable loss)	-3.92 dBi (2.4GHz band), 1.39 dBi (U-NII-1 band), 1.59 dBi (U-NII-2A band), 0.79 dBi (U-NII-2C band), 1.42 dBi (U-NII-3 band), (*.including cable loss)

SECTION 3: Scope of Report

The EUT has the channels from 5180 MHz to 5320 MHz and 5500 MHz to 5700 MHz.
This report only covers DFS requirement subject to 5250 MHz to 5350 MHz and 5470 MHz to 5725 MHz bands, as specified by the following referenced procedures.

SECTION 4: Test specification, procedures & results

4.1 Test Specification

Test Specification	:	FCC Part 15 Subpart E FCC Part 15 final revised on June 4, 2019 and effective July 5, 2019 except 15.258
Title	:	FCC 47CFR Part15 Radio Frequency Device Subpart E Unlicensed National Information Infrastructure Devices Section 15.407 General technical requirements

Test Specification	:	KDB 905462 D02 v02
Title	:	COMPLIANCE MEASUREMENT PROCEDURES FOR UNILICENSED -NATIONAL INFORMATION INFRASTRUCTURE DEVICES OPERATING IN THE 5250 - 5350 MHz AND 5470 - 5725 MHz BANDS INCORPORATING DYNAMIC FREQUENCY SELECTION

4.2 Procedures and results

Table 2: Applicability of DFS Requirements

Requirement	Operating Mode Client without Radar Detection	Test Procedures & Limits	Deviation	Results
U-NII Detection Bandwidth	Not required	FCC, KDB 905462 D02 Section 7.8.1	N/A	N/A
Initial Channel Availability Check Time	Not required	FCC15.407 (h)(2) FCC, KDB 905462 D02 Section 7.8.2.1 RSS-247 6.3	N/A	N/A
Radar Burst at the Beginning of the Channel Availability Check Time	Not required	FCC15.407 (h)(2) FCC, KDB 905462 D02 Section 7.8.2.2 RSS-247 6.3	N/A	N/A
Radar Burst at the End of the Channel Availability Check Time	Not required	FCC15.407 (h)(2) FCC, KDB 905462 D02 Section 7.8.2.3 RSS-247 6.3	N/A	N/A
In-Service Monitoring for Channel Move Time, Channel Closing Transmission Time	Yes	FCC15.407 (h)(2) FCC, KDB 905462 D02 Section 7.8.3 RSS-247 6.3	N/A	Complied a)
In-Service Monitoring for Non-Occupancy period	Yes *	FCC15.407 (h)(2) FCC, KDB 905462 D02 Section 7.8.3 RSS-247 6.3	N/A	Complied b)
Statistical Performance Check	Not required	FCC15.407 (h)(2) FCC, KDB 905462 D02 Section 7.8.4	N/A	N/A

*Although this test was not required in FCC, KDB 905462 D02, it was performed as additional test.

a) Refer to SECTION 6 (data of In-Service Monitoring for Channel Move Time, Channel Closing Transmission Time)
b) Refer to SECTION 7 (data of In-Service Monitoring for Non-Occupancy Period)

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.

Table 3: DFS Detection Thresholds for Master Devices and Client Devices With Radar

Maximum Transmit Power	Value (See Notes 1, 2 and 3)
E.I.R.P. ≥ 200 milliwatt	-64 dBm
E.I.R.P. < 200 milliwatt and power spectral density < 10dBm/MHz	-62 dBm
E.I.R.P. < 200 milliwatt that do not meet the power spectral density requirement	-64 dBm
Note 1: This is the level at the input of the receiver assuming a 0 dBi receive antenna. Note 2: Throughout these test procedures an additional 1 dB has been added to the amplitude of the test transmission waveforms to account for variations in measurement equipment. This will ensure that the test signal is at or above the detection threshold level to trigger a DFS response. Note 3: E.I.R.P. is based on the highest antenna gain. For MIMO devices refer to KDB Publication 662911 D01.	

Table 4: DFS Response Requirement Values

Parameter	Value
Non-occupancy period	Minimum 30 minutes
Channel Availability Check Time	60 seconds
Channel Move Time	10 seconds See Note 1
Channel Closing Transmission Time	200 milliseconds + an aggregate of 60 milliseconds over remaining 10 second period. See Notes 1 and 2
U-NII Detection Bandwidth	Minimum 100 % of the U-NII 99 % transmission power bandwidth See Note 3
Note 1: The Channel Move Time and the Channel Closing Transmission Time should be performed with Radar Type 0. The measurement timing begins at the end of the Radar Type 0 burst. **Note 2:** The Channel Closing Transmission Time is comprised of 200 milliseconds starting at the beginning of the Channel Move Time plus any additional intermittent control signals required to facilitate a Channel move (an aggregate of 60 milliseconds) during the remainder of the 10 second period. The aggregate duration of control signal will not count quiet periods in between transmissions. **Note 3:** During the U-NII Detection Bandwidth detection test, radar type 0 should be used. For each frequency step the minimum percentage of detection is 90 percent. Measurements are performed with no data traffic.	

Table 5 Short Pulse Radar Test Waveform

Radar Type	Pulse Width [µs]	PRI [µs]	Number of Pulses	Minimum Percentage of Successful Detection	Minimum Number of Traials
0	1	1428	18	See Note 1	See Note 1
1	1	Test A: 15 unique PRI values randomly selected from the list of 23 PRI values in Table 5a	Roundup ((1 / 360) x ((19 x 10^6) / PRI [micro sec.]))	60 %	30
		Test B: 15 unique PRI values randomly selected within the range of 518 - 3066 micro sec., with a minimum increment of 1 micro sec., excluding PRI values selected in Test A			
2	1 - 5	150 - 230	23 - 29	60 %	30
3	6 - 10	200 - 500	16 - 18	60 %	30
4	11 - 20	200 - 500	12 - 16	60 %	30
Aggregate (Rader Types 1-4)				80 %	120
Note 1: Short Pulse Radar Type 0 should be used for the detection bandwidth test, channel move time, and channel closing time tests.					

Table 5a Pulse Repetition Interval Values for Test A

Pulse Repetition Frequency Number	Pulse Repetition Frequency (Pulses Per Second)	Pulse Repetition Interval (Micro seconds)
1	1930.5	518
2	1858.7	538
3	1792.1	558
4	1730.1	578
5	1672.2	598
6	1618.1	618
7	1567.4	638
8	1519.8	658
9	1474.9	678
10	1432.7	698
11	1392.8	718
12	1355	738
13	1319.3	758
14	1285.3	778
15	1253.1	798
16	1222.5	818
17	1193.3	838
18	1165.6	858
19	1139	878
20	1113.6	898
21	1089.3	918
22	1066.1	938
23	326.2	3066

Table 6 Long Pulse Radar Test Waveform

Radar Type	Pulse Width [µs]	Chip Width [MHz]	PRI [µs]	Number of Pulses per *Burst*	Number of *Burst*	Minimum Percentage of Successful Detection	Minimum Number of Trials
5	50 - 100	5 - 20	1000 - 2000	1 - 3	8 - 20	80 %	30

Table 7 Frequency Hopping Radar Test Waveform

Radar Type	Pulse Width [µs]	PRI [µs]	Pulse per Hop [kHz]	Hopping Rate [kHz]	Hopping Sequence Length [ms]	Minimum Percentage of Successful Detection	Minimum Number of Trials
6	1	333	9	0.333	300	70 %	30

4.3 Test Location

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A2LA Certificate Number: 1266.03 (FCC Test Firm Registration Number: 626366, ISED Lab Company Number: 2973D)

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	-	-

4.4 Uncertainty

There is no applicable rule of uncertainty in this applied standard. Therefore, the following 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.

Time Measurement uncertainty for this test was: (±) 0.012 %

4.5 Test set up, Data of DFS test, and Test instruments of DFS

Refer to APPENDIX.

SECTION 5: Operation of E.U.T. during testing

5.1 Operating Modes

The EUT, which is a Client Device without Radar detection capability, operates over the 5260 MHz - 5320 MHz and 5500 MHz - 5700 MHz.

The EUT uses one transmitter connected to a 50 ohm coaxial antenna ports. The antenna port is connected to the test system.

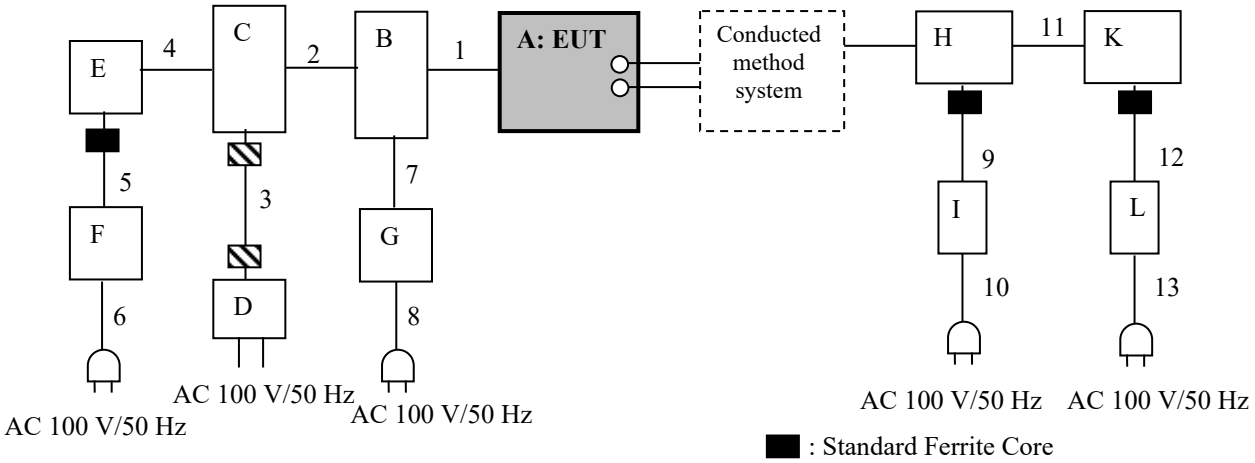
WLAN traffic is generated by streaming the ping data with ExPing.exe (ver.1.33) from the Master to the Client. (Channel loading was over 17 %)

The EUT utilizes the 802.11a, 802.11n and 802.11ac architecture, with a nominal channel bandwidth.
The EUT had used IEEE 802.11ac VHT80 (widest mode).

The FCC ID for the Master Device used with EUT for DFS testing is LDK102073.

The rated output power of the Master unit is > 200 mW (23 dBm). Therefore the required interference threshold level is -64 dBm. After correction for antenna gain and procedural adjustments, the required conducted threshold at the antenna port is - 64 + 1 + 4= -59 dBm (threshold level + additional 1 dB + antenna gain *1)).
*1) Minimum antenna gain of Master Device (FCC ID: LDK102087, IC No.: 2461B-102087)

5.2 Configuration and peripherals



Description of EUT and Support equipment

No.	Item	Model number	Serial number	Manufacturer	Remarks
A	Wireless module	ES203	9	Canon Inc	EUT
B	Jig Board	W-USB-JIG	-	Canon Inc	-
C	Jig Board	-	-	Canon Inc	-
D	AC Adaptor	AD-A60P228	-	XIAMEN UME ELECTRONIC Co.Ltd	-
E	Laptop Computer	20CLS8P200	PC0DLESK	Lenovo	-
F	AC Adapter	ADLX45DLC2A	8SSA10E75792L1C Z65S15R7	Lenovo	-
G	DC power supply	PW18-2ATP	19050351	TEXIO	-
H	Wireless LAN access point (Master Device)	AIR-AP1262N-A-K9	FTX1619E5EZ	Cisco Systems	FCC ID: LDK102073
I	AC Adapter	EADP-18MB	DAB1528MANP	Cisco Systems	-
K	Notebook Computer	DELL Vostro V1510	29090510205	Dell	-
L	AC Adapter	LA65NS1-00	71615-93B-385D	Dell	-

List of cables used

No.	Cable Name	Length (m)	Shield	
			Cable	Connector
1	Signal	0.1	Unshielded	Unshielded
2	USB	1.4	Shielded	Shielded
3	DC	1.4	Unshielded	Unshielded
4	USB	1.0	Shielded	Shielded
5	DC	1.5	Unshielded	Unshielded
6	AC	0.8	Unshielded	Unshielded
7	DC	1.0	Unshielded	Unshielded
8	AC	2.0	Unshielded	Unshielded
9	Access Point DC Power	1.8	Unshielded	Unshielded
10	Access Point AC Power	2.0	Unshielded	Unshielded
11	LAN	3.0	Unshielded	Unshielded
12	DELL PC DC Power	1.8	Unshielded	Unshielded
13	DELL PC AC Power	0.7	Unshielded	Unshielded

5.3 Test and Measurement System

SYSTEM OVERVIEW

The measurement system is based on a conducted test method.

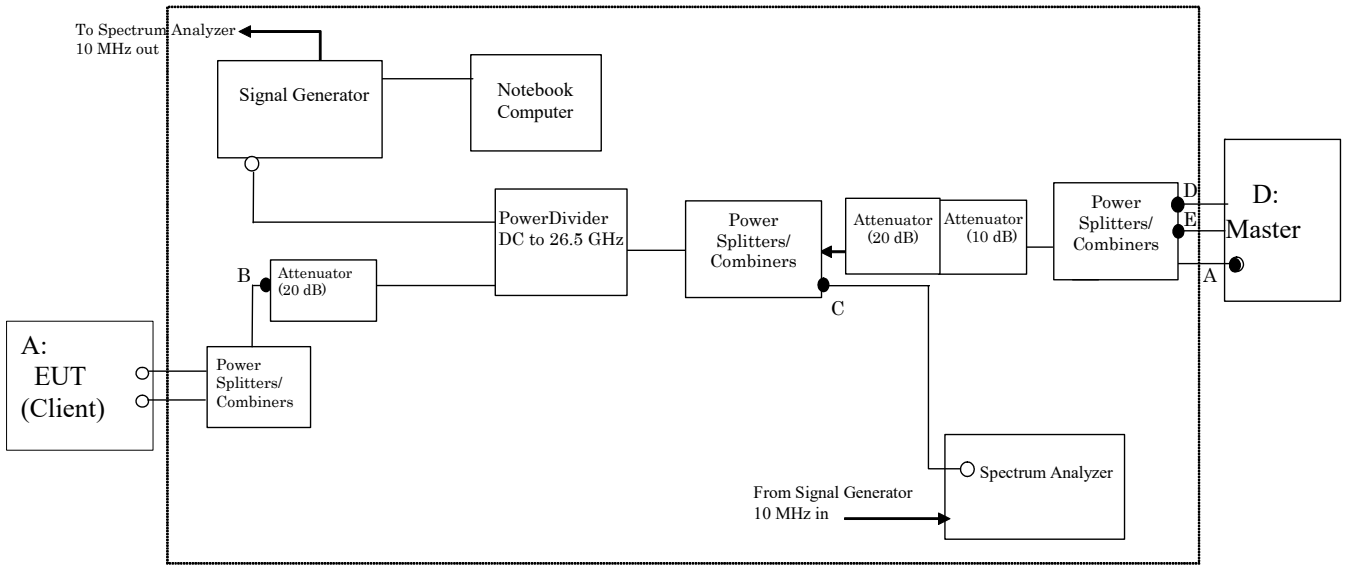
The software selects waveform parameters from within the bounds of the signal type on a random basis using uniform distribution. The short pulse types 2, 3, and 4, the long pulse type 5, and the frequency hopping type 6 parameters are randomized at run-time.

The signal monitoring equipment consists of a spectrum analyzer with the capacity to display 8001 bins on the horizontal axis. A time-domain resolution of 2 ms/bin is achievable with a 16 seconds sweep time, meeting the 10 seconds short pulse reporting criteria. The aggregate ON time is calculated by multiplying the number of bins above a threshold during a particular observation period by the dwell time per bin, with the analyzer set to peak detection. A time-domain resolution of 3 ms/bin is achievable with a 24 seconds sweep time, meeting the 22 seconds long pulse reporting criteria and allowing a minimum of 10 seconds after the end of the long pulse waveform.

FREQUENCY HOPPING RADAR WAVEFORM GENERATING SUBSYSTEM

The first 100 frequencies are selected out of the hopping sequence of the randomized 475 hop frequencies.
Only a *Burst* that has the frequency falling within the receiver bandwidth of the tested U-NII device is selected among those frequencies. (Frequency-domain simulation). The radar waveform generated at the start time of the selected *Burst* (Time-domain simulation) is download to the Signal Generator.
If all of the randomly selected 100 frequencies do not fall within the receiver bandwidth of the U-NII device, the radar waveform is not used for the test.

CONDUCTED METHODS SYSTEM BLOCK DIAGRM



MEASUREMENT SYSTEM FREQUENCY REFERENCE

Lock the signal generator and the spectrum analyzer to the same reference sources as follows: Connect the 10 MHz OUT on the signal generator to the 10 MHz IN on the spectrum analyzer and set the spectrum analyzer 10 MHz In to On.

SYSTEM CALIBRATION

Step 1: Set the system as shown in Figure 4 of KDB 905462 D02 7.2.3.

Step 2: Adjust each attenuator to fulfill the following three conditions:
- WLAN can be communicated, and
- Rader detection threshold level is bigger than Client Device traffic level on the spectrum analyzer, and
- Master Device traffic level is not displayed on the spectrum analyzer.

Step 3: Terminate 50 ohm at B, C, D and E points, and connect the spectrum analyzer to the point A.
(See the figure on Section 5.3)
At the point A, adjust the signal generator and spectrum analyzer to the center frequency of the channel to be measured. Download the applicable radar waveforms to the signal generator. Select the radar waveform, trigger a burst manually and measure the amplitude on the spectrum analyzer. Readjust the amplitude of the signal generator as required so that the peak level of the waveform is at a displayed level equal to the required or desired interference detection threshold. Separate signal generator amplitude settings are determined as required for each radar type.

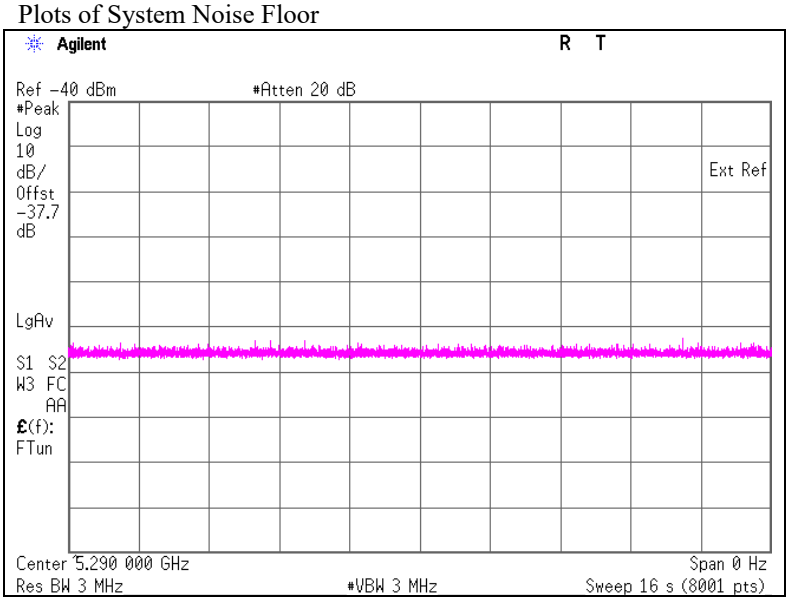
Step 4: Without changing any of the instrument settings, restore the system setting to Step 2 and adjust the Reference Level Offset of the spectrum analyzer to the level at Step 3.

By taking the above steps 1 to 4, the spectrum analyzer displays the level of the signal generator as received at the antenna ports of the Master Device.

See Clause 5.4 for Plots of Noise, Rader Waveforms, and WLAN signals.

5.4 Plots of Noise, Rader Waveforms, and WLAN signals

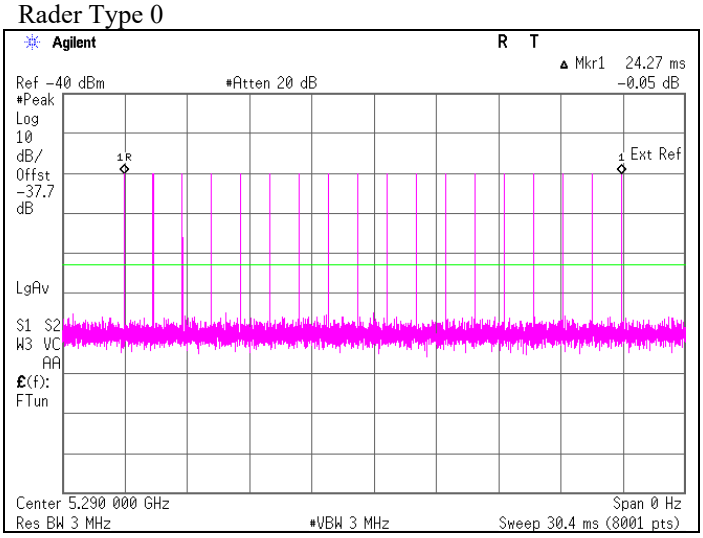
Plots of System Noise Floor



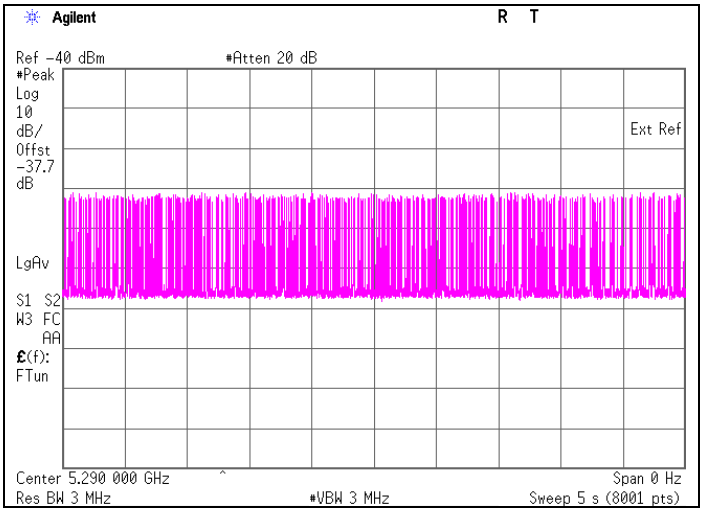
It was confirmed that the EUT did not transmit before having received appropriate control signals from a Master Device.

Plots of Radar Waveforms

Rader Type 0



Plots of WLAN Traffic



SECTION 6: In-Service Monitoring for Channel Move Time, Channel Closing Transmission Time

6.1 Operating environment

Test place : No.5 Shielded room
Temperature : 24 deg.C
Humidity : 58 %RH

6.2 Test Procedure

Transfer files from the Master Device to the Client Device on the tested channel during the entire period of the test. The Radar Waveform generator sends a Burst of pulses for one of the Short Pulse Radar Types 0 at levels defined , on the Operating Channel. An additional 1 dB is added to the radar test signal to ensure it is at or above the DFS Detection Threshold, accounting for equipment variations/errors.
Observe the transmissions of the EUT at the end of the radar Burst on the Operating Channel for duration greater than 10 seconds.

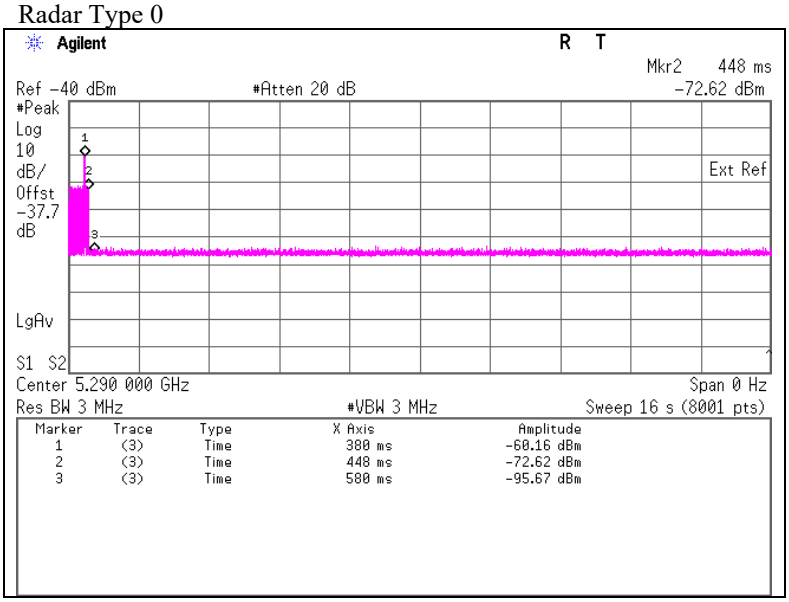
6.3 Test data

Test Item	Unit	Measurement Time	Limit	Results
Channel Move Time *1)	[s]	0.068	10.000	Pass
Channel Closing Transmission Time *2)	[ms]	0	60	Pass

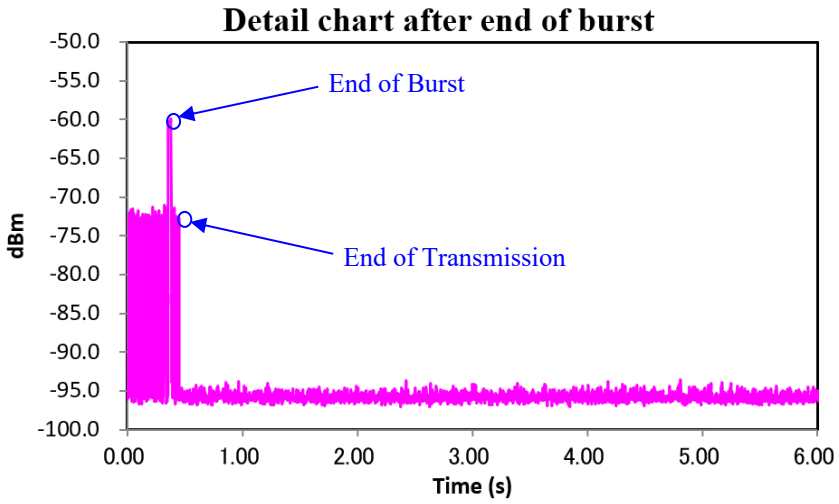
*1) Channel Move Time is calculated as follows:
(Channel Move Time) = (End of Transmission) - (End of Burst)

*2) Channel Closing Transmission Time is calculated from (End of Burst + 200 ms) to (End of Burst + 10 s)
(Channel Closing Transmission Time) = (Number of analyzer bins showing transmission) x (dwell time per bin)
= 0 x 2 [ms]

Radar Type 0



Marker 1: End of Burst : 0.380 s
Marker 2: End of Transmission : 0.448 s
Marker 3: End of Burst + 200 ms : 0.580 s



6.4 Test result

Test result: Pass

Date : August 5, 2019 Test engineer : Kenichi Adachi

SECTION 7: In-Service Monitoring for Non-Occupancy Period

7.1 Operating environment

Test place : No.5 Shielded room
Temperature : 24 deg.C
Humidity : 58 %RH

7.2 Test Procedure

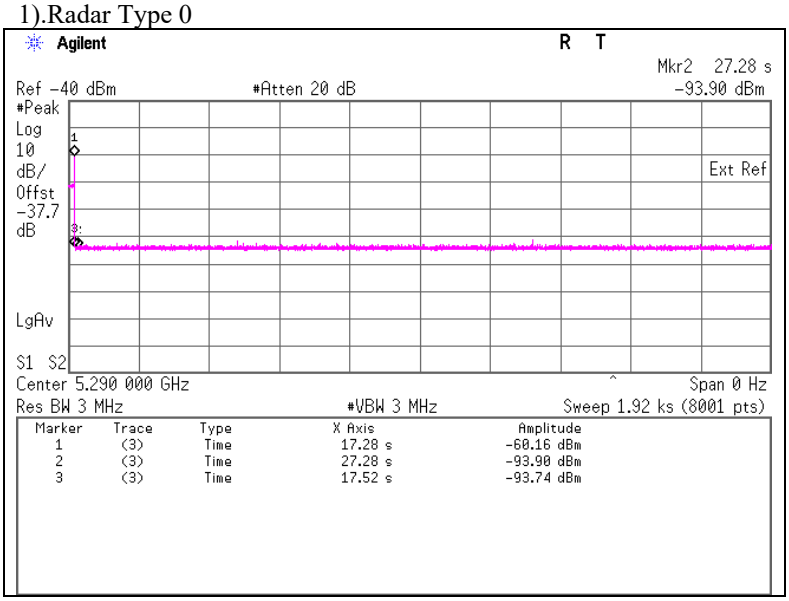
The following two tests are performed:

1). Transfer files from the Master Device to the Client Device on the tested channel during the entire period of the test. The Radar Waveform generator sends a Burst of pulses for one of the Radar Types 0 at levels defined on the Operating Channel. An additional 1 dB is added to the radar test signal to ensure it is at or above the DFS Detection Threshold, accounting for equipment variations/errors.
Observe the transmissions of the EUT after the Channel Move Time on the Operating Channel for duration greater than 30 minutes.

2). Transfer files from the Master Device to the Client Device on the tested channel during the entire period of the test. Observe the transmissions of the EUT on the Operating Channel for duration greater than 30 minutes after the Master Device is shut off.

7.3 Test data

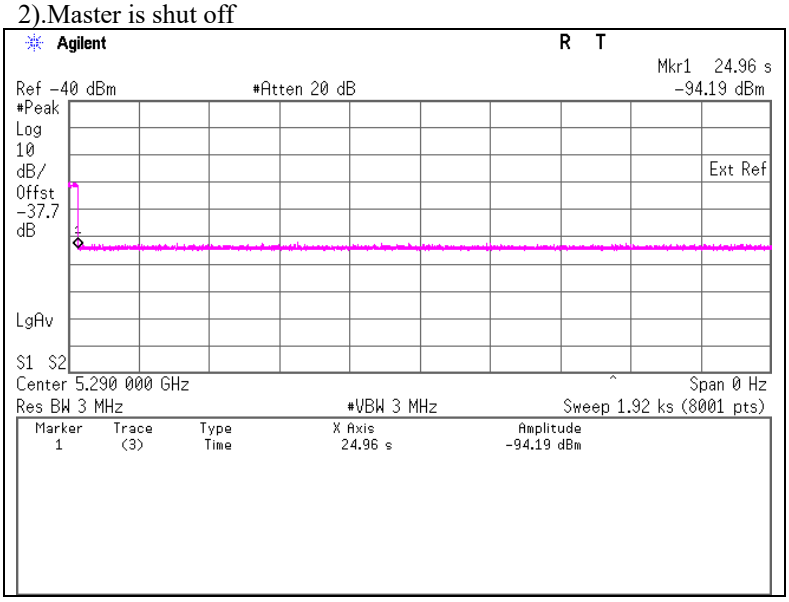
1).Radar Type 0



Marker 1 : End of Burst : 17.28 s
Marker 2 : End of Burst + 10 s : 27.28 s

* Measurement non-occupancy period: 31.54 minutes or more (1920 [s] – 27.28 [s] = 1892.72 [s] = 31.54 [minutes])

2).Master is shut off



Marker 1 : End of Burst : 24.96 s

* Measurement non-occupancy period: 31.58 minutes or more (1920 [s]– 24.96 [s] = 1895.04 [s] = 31.58 [minutes])

7.4 Test result

Test result: Pass

Date : August 5, 2019 Test engineer : Kenichi Adachi

APPENDIX 1: Test instruments

Test Equipment

Local ID	Test Name	LIMS ID	Description	Manufacturer	Model	Serial	Last Calibration Date	Calibration Due Date	Calibration Interval (Month)
SCC-G37	DFS	151614	Coaxial Cable	Junkosha	MWX241-01000KMSKMS/B	1612Q035	2018/12/25	2019/12/31	12
SAT10-14	DFS	154591	Attenuator	Weinschel Corp.	54A-10	81595	2019/4/16	2020/4/30	12
SCC-G38	DFS	151615	Coaxial Cable	Junkosha	MWX241-01000KMSKMS/B	1612Q036	2018/12/25	2019/12/31	12
SCC-G39	DFS	151616	Coaxial Cable	Junkosha	MWX241-01000KMSKMS/B	1612Q037	2018/12/25	2019/12/31	12
SOS-09	DFS	146318	Humidity Indicator	A&D	AD-5681	4061484	2018/12/5	2019/12/31	12
SRENT-15	DFS	160899	Spectrum Analyzer	AGILENT (KEYSIGHT)	E4440A	MY46185516	2019/1/21	2020/1/31	12
STS-05	DFS	146212	Digital Hitester	HIOKI	3805-50	80997828	2018/10/16	2019/10/31	12
COTS-SDFS-01	DFS	144863	Signal Studio Software for DFS	AGILENT	N7620A-101	5010-7739	-	-	-
SAT20-12	DFS	160495	Attenuator	Weinschel Corp.	54A-20	86752	2018/12/6	2019/12/30	12
SAT20-13	DFS	160496	Attenuator	Weinschel Corp.	54A-20	87636	2018/12/6	2019/12/30	12
SCC-G24	DFS	145181	Coaxial Cable	Suhner	141PE	-	2019/7/4	2020/7/31	12
SCC-G25	DFS	145182	Coaxial Cable	Suhner	141PE	-	2019/7/4	2020/7/31	12
SCC-G26	DFS	145041	Coaxial Cable	Suhner	141PE	-	2019/7/4	2020/7/31	12
SPD-01	DFS	146261	Power Divider	AGILENT	11636B	56998	2019/4/16	2020/4/30	12
SPSC-04	DFS	146273	Power Splitters/Combiners	Mini-Circuits	ZN4PD1-63-S+	-	2019/7/5	2020/7/31	12
SPSC-08	DFS	146277	Power Splitters/Combiners	Mini-Circuits	ZFSC-2-10G+	-	2019/7/5	2020/7/31	12
SPSC-14	DFS	157772	Power Splitters/Combiners	Mini-Circuits	ZFSC-2-10G-S+	-	2018/8/12	2019/8/31	12
SRE-157	DFS	145693	Wireless LAN access point	Cisco Systems	AIR-CAP3702E-A-K9	FTX18227609	-	-	-
SSG-01	DFS	145804	Signal Generator	AGILENT	E4438C	MY47271584	2019/4/23	2020/4/30	12
STM-G7	DFS	171614	Terminator	Weinschel - API Technologies Corp	M1459A	88995	2019/7/4	2020/7/31	12

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 :
DFS: Dynamic Frequency Selection