

Report on the RF Testing of:

KYOCERA Corporation
Mobile Phone, Model: EB1190EM
FCC ID: JOYPC9699



In accordance with FCC Part15 Subpart E (DFS)

Prepared for: KYOCERA Corporation
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EXECUTIVE SUMMARY – Result: Complied
A sample(s) of this product was tested and the result above was confirmed in accordance with FCC Part15 Subpart E.

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1 Summary of Test

1.1 Modification history of the test report

Document Number	Modification History	Issue Date
JPD-TR-241120	First Issue	Refer to the cover page

1.2 Standards

CFR47 FCC Part 15 Subpart E
FCC 14-30

1.3 Test methods

ANSI C63.10-2013
KDB905462 D02 UNII DFS Compliance Procedures New Rules v02
KDB905462 D03 UNII Clients Without Radar Detection New Rules v01r02

1.4 Deviation from standards

None

1.5 List of applied test(s) of the EUT

Test item section	Test item	Condition	Result	Remark
KDB905462 D02 (8.2)	DFS Detection Threshold Levels	Radiated	PASS	-
KDB905462 D02 (7.7, 8.3)	Channel Loading/Data Streaming	Radiated	PASS	-
KDB905462 D02 (5.1, 5.2, 5.3, 6.1, 7.3.3, 7.6.1, 7.8.3)	Channel Closing Transmission Time and Channel Move Time	Radiated	PASS	-
KDB905462 D02 (5.1.2, 5.2, 5.3, 6.1, 7.3.3, 7.6.1, 7.8.3) KDB905462 D03	Non-Occupancy Period	Radiated	PASS	-

1.6 Test information

None

1.7 Test set up

Table-top

1.8 Test period

31-May-2024 - 3-June-2024

2 Equipment Under Test

All information in this chapter was provided by the applicant.

2.1 EUT information

Applicant	KYOCERA Corporation Yokohama Office 2-1-1 Kagahara, Tsuzuki-ku Yokohama-shi, Kanagawa, Japan Phone: +81-45-943-6253 Fax: +81-45-943-6314
Equipment Under Test (EUT)	Mobile Phone
Model number	EB1190EM
Serial number	353343640002991, 353343640002918, 353343640002926
Trade name	Kyocera
Number of sample(s)	3
EUT condition	Pre-Production
Power rating	Battery: DC 3.87 V
Size	(W) 73.0 mm × (D) 157.0 mm × (H) 11.43 mm
Environment	Indoor and Outdoor use
Terminal limitation	-20°C to 60°C
Hardware version	DMT1
Software version	0.151BX.0025.a
Firmware version	Not applicable
RF Specification	
Protocol	IEEE802.11a, IEEE802.11n (HT20), IEEE802.11n (HT40) IEEE802.11ac (VHT20), IEEE802.11ac (VHT40), IEEE802.11ac (VHT80)
Frequency range	IEEE802.11a/n/ac (HT20/VHT20): 5180 MHz-5320 MHz, 5500 MHz-5720 MHz IEEE802.11n/ac (HT40/VHT40): 5190 MHz-5310 MHz, 5510 MHz-5710 MHz IEEE802.11ac (VHT80): 5210 MHz, 5290 MHz, 5530 MHz, 5610 MHz, 5690 MHz
Number of RF Channels	IEEE802.11a/n/ac (HT20/VHT20): 20 Channels IEEE802.11n/ac (HT40/VHT40): 10 Channels IEEE802.11ac (VHT80): 5 Channels
Modulation type	IEEE802.11a/n/ac: OFDM (BPSK, QPSK, 16QAM, 64QAM, 256QAM)
Channel separation	IEEE802.11a/n(HT20) / IEEE802.11ac (VHT20): 20 MHz IEEE802.11n (HT40) / IEEE802.11ac (VHT40): 40 MHz IEEE802.11ac (VHT80): 80 MHz
Output power (W53 or W56)	33.435 mW (IEEE802.11a) 34.108 mW (IEEE802.11n: HT20) 35.440 mW (IEEE802.11n: HT40) 34.029 mW (IEEE802.11ac: VHT80)



DFS Function	Client (Without Radar Detection)
TPC Function	500mW not required
Antenna type	Internal antenna
Antenna gain	5.15-5.35 GHz band: 4.8 dBi 5.47-5.725 GHz band: 5.4 dBi

2.2 Modification to the EUT

The table below details modifications made to the EUT during the test project.

Modification State	Description of Modification	Modification fitted by	Date of Modification
Model: EB1190EM, Serial Number: 353343640002991, 353343640002918, 353343640002926			
0	As supplied by the applicant	Not Applicable	Not Applicable

2.3 Variation of family model(s)

2.3.1 List of family model(s)

EUT

Model number	EB1190EM *1	EB1201	EB1190	EB1190NC
Memory	expansion	standard	standard	standard
Camera	with	with	with	without
Fingerprint Sensor	with	with	without	without
NFC	with	with	without	without
size	73.0 × 157.0 × 11.43 [mm]			

*1:Tested model

2.3.2 Reason for selection of EUT

The applicant decided that the differences between the design had no EMC impact and selected EB1190EM with full function.

2.4 Description of EUT

Operational Mode	Operational Frequency Range	
	5250-5350MHz	5470-5725MHz
Client without radar detection and adhoc function	Applicable	Applicable

For FCC and IC the EUT operates over the 5250-5350 MHz and 5470-5725 MHz ranges excluding the 5600-5650 MHz range.

2.5 EUT Maximum Conducted Power

Mode	Frequency Band (MHz)	Maximum Conducted Output Power		Maximum EIRP	
		Test Result (dBm)	Test Result (mW)	Antenna Gain (dBi)	Result (mW)
802.11a	5250-5350	13.737	23.643	4.8	71.400
	5470-5725	14.477	28.035	5.4	97.208

Mode	Frequency Band (MHz)	Maximum Conducted Output Power		Maximum EIRP	
		Test Result (dBm)	Test Result (mW)	Antenna Gain (dBi)	Result (mW)
802.11n (20MHz)	5250-5350	13.720	23.550	4.8	71.121
	5470-5725	14.580	28.708	5.4	99.541

Mode	Frequency Band (MHz)	Maximum Conducted Output Power		Maximum EIRP	
		Test Result (dBm)	Test Result (mW)	Antenna Gain (dBi)	Result (mW)
802.11n (40MHz)	5250-5350	13.767	23.807	4.8	71.895
	5470-5725	14.777	30.040	5.4	104.160

Mode	Frequency Band (MHz)	Maximum Conducted Output Power		Maximum EIRP	
		Test Result (dBm)	Test Result (mW)	Antenna Gain (dBi)	Result (mW)
802.11ac (80MHz)	5250-5350	13.728	23.594	4.8	71.252
	5470-5725	14.568	28.629	5.4	99.266

2.6 Transmit Power Control (TPC)

U-NII devices operating in the 5.25-5.35 GHz band and the 5.47-5.725 GHz band shall employ a TPC mechanism. The U-NII device is required to have the capability to operate at least 6 dB below the mean EIRP value of 30 dBm. A TPC mechanism is not required for systems with an E.I.R.P. of less than 500 mW.

Maximum EIRP of this device is 104.160 mW which less than 500mW, therefore it's not require TPC function.

2.7 Statement of Manufacturer

Manufacturer statement confirming that information regarding the parameters of the detected Radar Waveforms is not available to the end user. And the device doesn't have Ad Hoc mode on DFS frequency band.

2.8 U-NII DFS Rule Requirements

The manufacturer shall state whether the UUT is capable of operating as a Master and/or a Client. If the UUT is capable of operating in more than one operating mode then each operating mode shall be tested separately.

DFS Requirements Prior to Use of a Channel

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Table 1: Applicability of DFS Requirements Prior to Use of a Channel

Requirement	Operational Mode		
	Master	Client Without Radar Detection	Client With Radar Detection
Non-Occupancy Period	Yes	Not required	Yes
DFS Detection Threshold	Yes	Not required	Yes
Channel Availability Check Time	Yes	Not required	Not required
U-NII Detection Bandwidth	Yes	Not required	Yes

DFS requirements during normal operation

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Table 2: Applicability of DFS requirements during normal operation

Requirement	Operational Mode	
	Master Device or Client with Radar Detection	Client Without Radar Detection
DFS Detection Threshold	Yes	Not required
Channel Closing Transmission Time	Yes	Yes
Channel Move Time	Yes	Yes
U-NII Detection Bandwidth	Yes	Not required

Additional requirements for devices with multiple bandwidth modes	Master Device or Client with Radar Detection	Client Without Radar Detection
U-NII Detection Bandwidth and Statistical Performance Check	All BW modes must be tested	Not required
Channel Move Time and Channel Closing Transmission Time	Test using widest BW mode available	Test using the widest BW mode available for the link
All other tests	Any single BW mode	Not required

Note: Frequencies selected for statistical performance check (Section 7.8.4) should include several frequencies within the radar detection bandwidth and frequencies near the edge of the radar detection bandwidth. For 802.11 devices it is suggested to select frequencies in each of the bonded 20 MHz channels and the channel center frequency.

DFS Detection Thresholds

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

Maximum Transmit Power	Value (See Notes 1, 2, and 3)
EIRP ≥ 200 milliwatt	-64 dBm
EIRP < 200 milliwatt and power spectral density < 10 dBm/MHz	-62 dBm
EIRP < 200 milliwatt that do not meet the power spectral density requirement	-64 dBm
<p>Note 1: This is the level at the input of the receiver assuming a 0 dBi receive antenna.</p> <p>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.</p>	

Response Requirements

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Table 4: provides the response requirements for Master and Client Devices incorporating DFS.

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	NII 99% transmission power bandwidth. See Note 3.
<p>Note 1: 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.</p> <p>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 signals will not count quiet periods in between transmissions.</p> <p>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.</p>	

2.9 Parameters of DFS Test Signals

Short Pulse Radar Test Waveforms

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Table 5: Short Pulse Radar Test Waveforms

Radar Type	Pulse Width (μsec)	PRI (μsec)	Number of Pulses	Minimum Percentage of Successful Detection	Minimum Number of Trials
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: $\{(1/360) \times (19 \times 10^6 \text{ PRI}_{\mu\text{sec}})\}$	60%	30
		Test B: 15 unique PRI values randomly selected within the range of 518-3066 μsec, with a minimum increment of 1 μsec, 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 (Radar 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.					

Long Pulse Radar Test Waveform

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Table 6: Long Pulse Radar Test Waveform

Radar Type	Pulse Width (μsec)	Chirp Width (MHz)	PRI (μsec)	Number of Pulses per Burst	Number of Bursts	Minimum Percentage of Successful Detection	Minimum Number of Trials
5	50-100	5-20	1000-2000	1-3	8-20	80%	30

Frequency Hopping Radar Test Waveform

KDB905462 D02

Table 7: Frequency Hopping Radar Test Waveform

Radar Type	Pulse Width (μsec)	PRI (μsec)	Pulses per Hop	Hopping Rate (kHz)	Hopping Sequence Length (msec)	Minimum Percentage of Successful Detection	Minimum Number of Trials
6	1	333	9	0.333	300	70%	30

3 Configuration of Equipment

This test configuration is based on the manufacture's instruction.

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

3.1 Equipment used

No.	Equipment	Company	Model No.	Serial No.	FCC ID / DoC	Comment
1	Mobile Phone	KYOCERA	EB1190EM	353343640002991, 353343640002918, 353343640002926	JOYPC9699	EUT

3.2 Support Unit used

No.	Equipment	Company	Model No.	Serial No.	FCC ID	Comment
a	Access Point	Cisco	AIR-CAP3702E-A-K9	FJC1938F0NV	LDK102087	*1, *2

NOTE: 1. This device was functioned as a Master device during the DFS test.

NOTE: 2. The rated output power of the Master unit is > 23dBm (EIRP). Therefore the required interference threshold level is -64 dBm. After correction for procedural adjustments, the required radiated threshold at the antenna port is -64 + 1 = -63 dBm.

4 Test Result

4.1 DFS Detection Threshold Levels

4.1.1 Measurement procedure

[KDB905462 D02(8.2)]

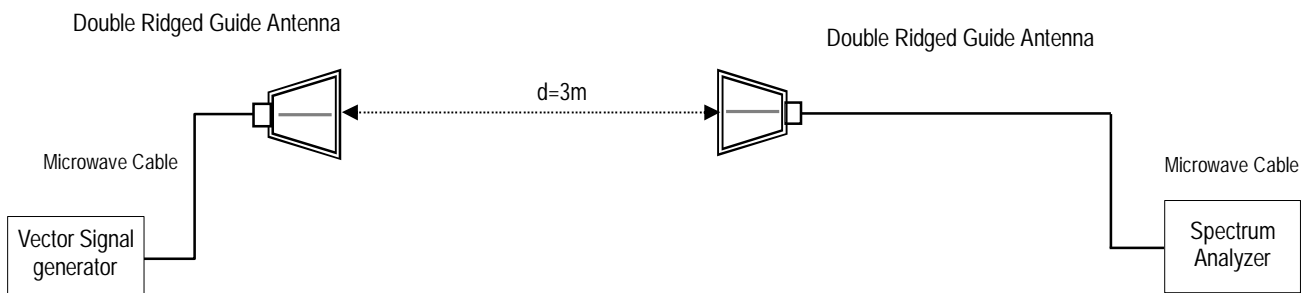
Spectrum analyzer is connected to a horn antenna via a coaxial cable, with the reference level offset set to (horn antenna gain - coaxial cable loss). The signal generator is set to CW mode. The amplitude of the signal generator is adjusted to yield a level of -63 dBm as measured on the spectrum analyzer.

The rated output power of the Master unit is > 23dBm (EIRP). Therefore the required interference threshold level is -64 dBm. After correction for procedural adjustments, the required radiated threshold at the antenna port is $-64 + 1 = -63$ dBm.

The spectrum analyzer is set to;

- RBW=3 MHz, VBW=3 MHz, Span=Zero span
- Sweep=10ms, Detector=Peak, Trace mode=Clear / write

- Test configuration



4.1.2 Limit

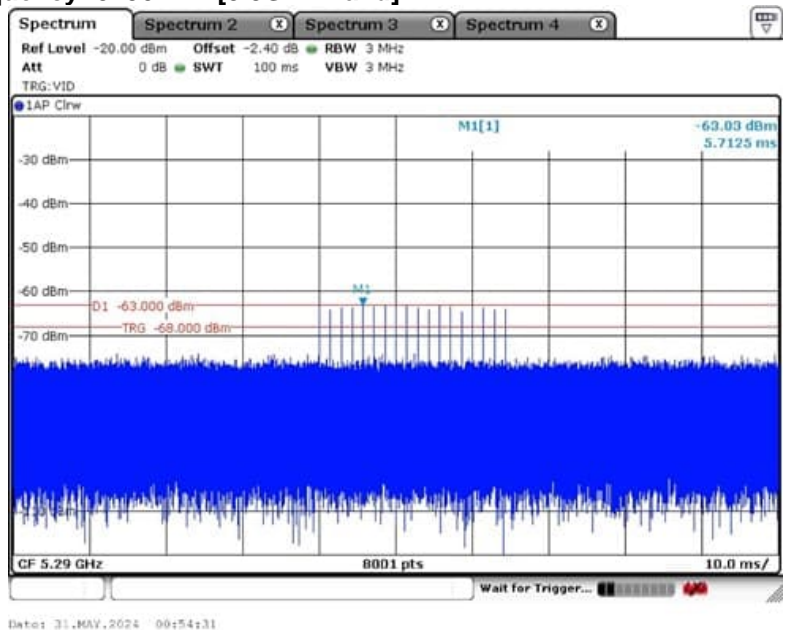
None

4.1.3 Radar Waveform

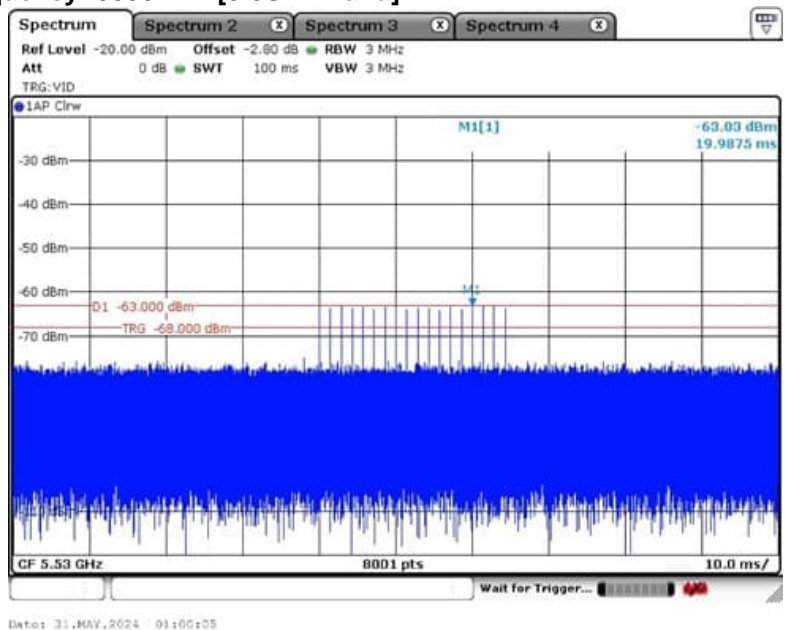
Date : 31-May-2024
Temperature : 22.5 [°C]
Humidity : 51.8 [%] Test engineer : Tadahiro Seino
Test place : 3m Semi-anechoic chamber

Radar Type 0 Calibration Plot

Frequency: 5290MHz [5.3GHz Band]



Frequency: 5530MHz [5.6GHz Band]



4.2 Channel Loading/Data Streaming

4.2.1 Measurement procedure

[KDB905462 D02(7.7, 8.3)]

System testing will be performed with channel-loading using means appropriate to the data types that are used by the unlicensed device. The following requirements apply:

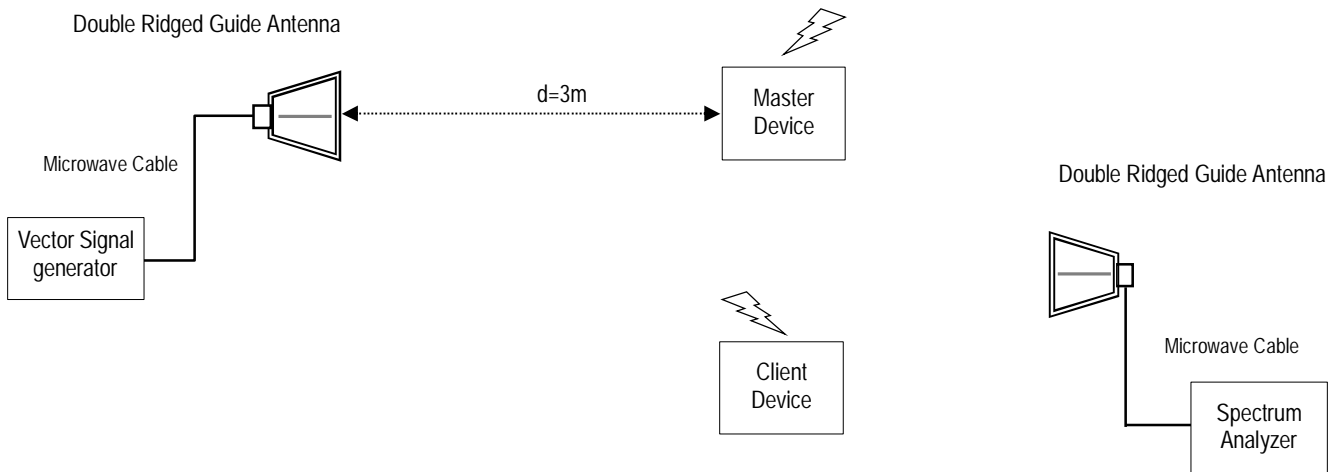
-The data file must be of a type that is typical for the device (i.e., MPEG-2, MPEG-4, WAV, MP3, MP4, AVI, etc.) and must generally be transmitting in a streaming mode.

-Timing plots are required with calculations demonstrating a minimum channel loading of approximately 17% or greater.

The spectrum analyzer is set to;

- RBW=3 MHz, VBW=3 MHz, Span=Zero span
- Sweep=10ms, Detector=Peak, Trace mode=Clear / write

- Test configuration



4.2.2 Limit

Timing plot duty cycle greater than 17%

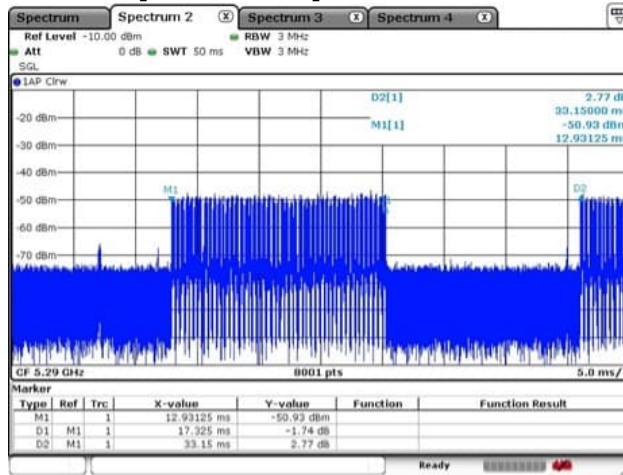
4.2.3 Measurement result

Date : 31-May-2024
 Temperature : 22.5 [°C]
 Humidity : 51.8 [%]
 Test place : 3m Semi-anechoic chamber

Test engineer : Tadahiro Seino

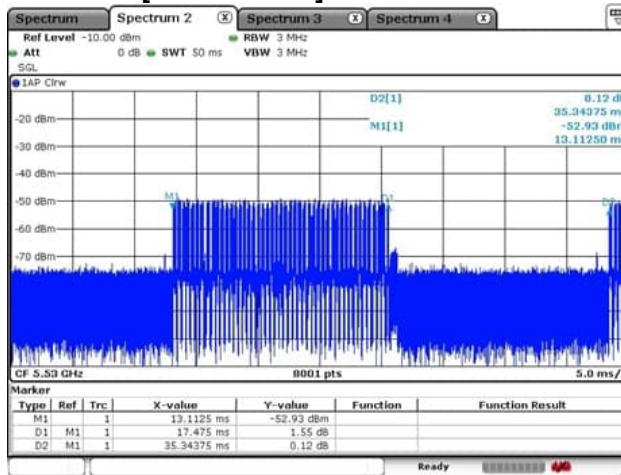
Client device Data Traffic Plot

Frequency: 5290MHz [5.3GHz Band]



ON Time [ms]	ON+OFF Time [ms]	Duty Cycle [%]
17.325	33.15	52.26

Frequency: 5530MHz [5.6GHz Band]



ON Time [ms]	ON+OFF Time [ms]	Duty Cycle [%]
17.475	35.34375	49.44

4.3 Channel Closing Transmission Time and Channel Move Time

4.3.1 Measurement procedure

[KDB905462 D02(5.1, 5.2, 5.3, 6.1, 7.3.3, 7.6.1, 7.8.3)]

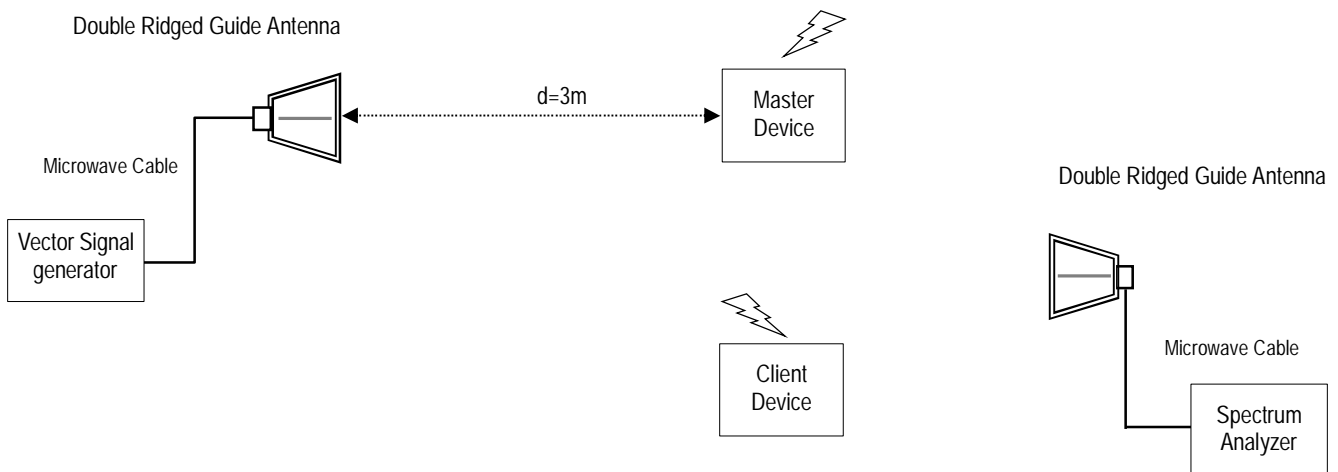
Channel Move Time and the Channel Closing Transmission Time should be performed with Radar Type 0. The measurement timing begins at the end of the Radar Type 0 burst.

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 signals will not count quiet periods in between transmissions.

The spectrum analyzer is set to;

- RBW=3 MHz, VBW=3 MHz, Span=Zero span
- Sweep=30 s, Detector=Peak, Trace mode=Clear / write

- Test configuration



4.3.2 Limit

(1) Channel Closing Transmission Time: The Aggregate Transmission Time is within 60ms within the Channel Move Time range excluding 200ms after the radar waveform is detected.

(2) Channel Move Time: The time to stop all transmissions on the current channel within 10 seconds when a radar waveform above the DFS detection threshold is detected.

4.3.3 Calculation method

Measurement of the aggregate duration of the Channel Closing Transmission Time method.

$$\text{Dwell[ms]} = \text{S[ms]} / \text{B[points]}$$

- Dwell is the dwell time per spectrum analyzer sampling bin.
- S is the sweep time.
- B is the number of spectrum analyzer sampling bins.

An upper bound of the aggregate duration of the intermittent control signals of Channel Closing Transmission Time is calculated by:

$$\text{C[ms]} = \text{N[bins]} \times \text{Dwell[ms]}$$

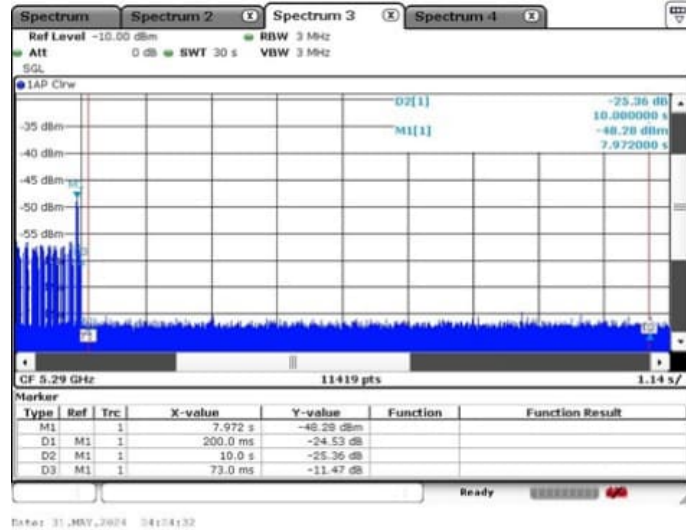
- C is the Closing Time.
- N is the number of spectrum analyzer sampling bins (intermittent control signals) showing a U-NII transmission and Dwell is the dwell time per bin.

4.3.4 Measurement result

Date	:	31-May-2024	Test engineer	:	<u>Tadahiro Seino</u>
Temperature	:	22.5 [°C]			
Humidity	:	51.8 [%]			
Test place	:	3m Semi-anechoic chamber			

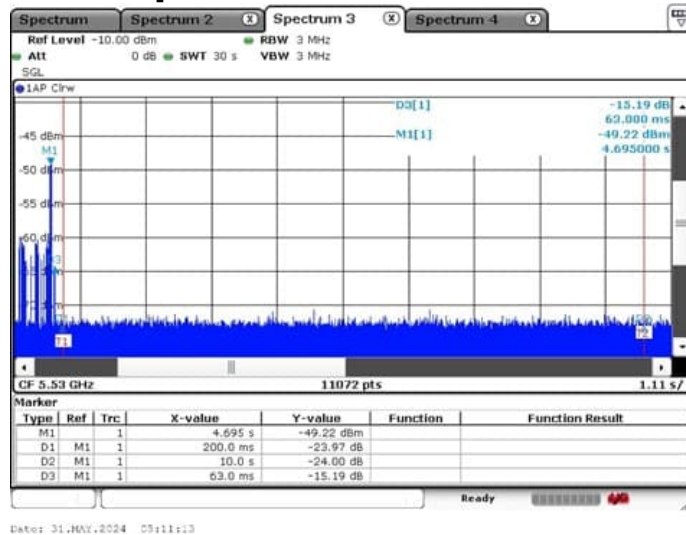
Channel Closing Transmission Time Plot

Frequency: 5290MHz [5.3GHz Band]



S [ms]	B [points]	Dwell [ms]	N [bins]	Aggregate Channel Closing Transmission Time [ms]	Limit [ms]
1140	11419	0.099834	0	0	60

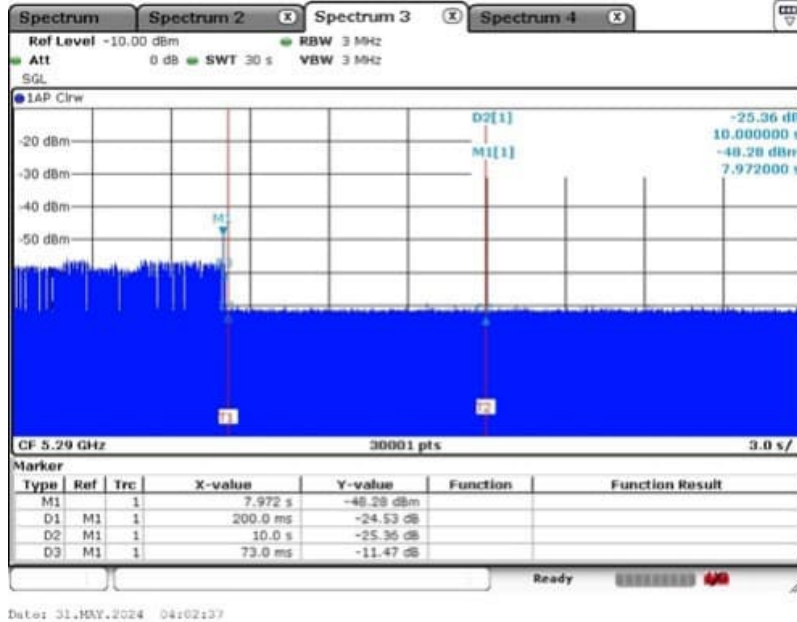
Frequency: 5530MHz [5.6GHz Band]



S [ms]	B [points]	Dwell [ms]	N [bins]	Aggregate Channel Closing Transmission Time [ms]	Limit [ms]
1110	11072	0.100253	0	0	60

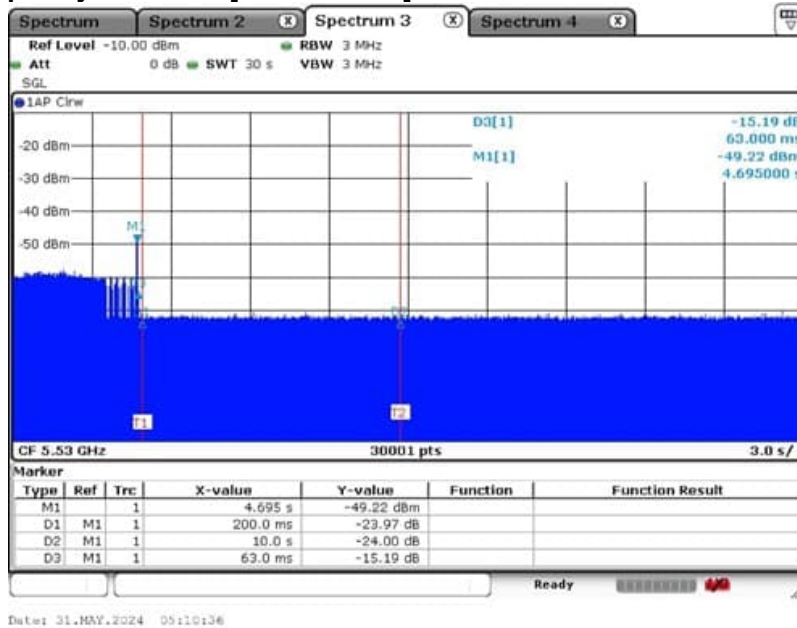
Channel Move Time Plot

Frequency: 5290MHz [5.3GHz Band]



Channel Move Time [s]	Limit [s]
0.073	10

Frequency: 5530MHz [5.6GHz Band]



Channel Move Time [s]	Limit [s]
0.063	10

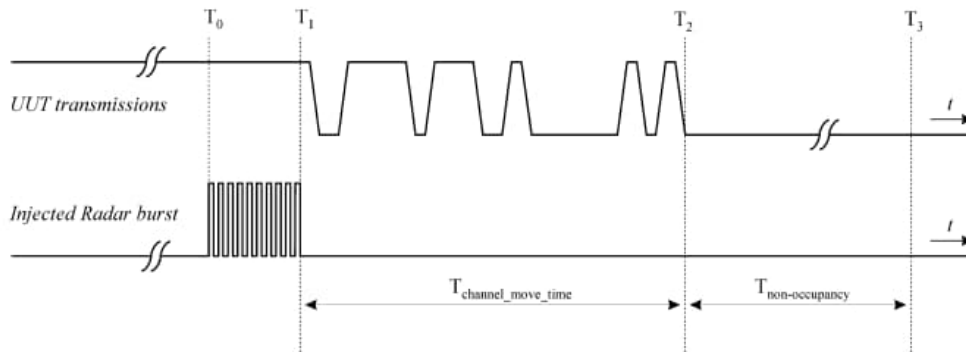
4.4 Non-Occupancy Period

4.4.1 Measurement procedure

[KDB905462 D02(5.1.2, 5.2, 5.3, 6.1, 7.3.3, 7.6.1, 7.8.3), KDB905462 D03]

The client test frequency must be monitored to ensure no transmission of any type has occurred for 30 minutes.

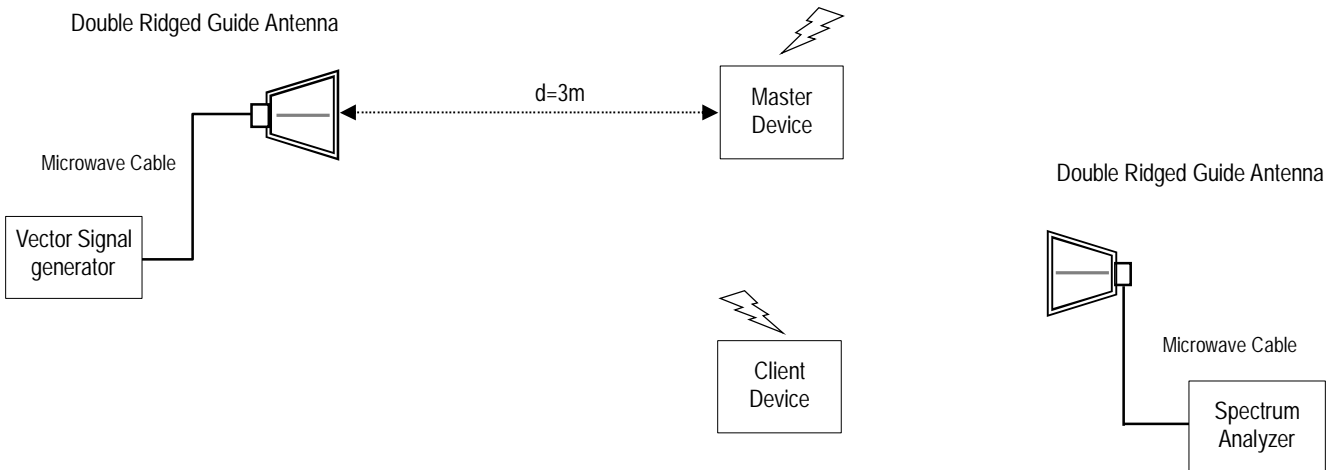
If the client moves with the master, the device is considered compliant if nothing appears in the client non-occupancy period test. For devices that shut down (rather than moving channels), no beacons should appear.



The spectrum analyzer is set to;

- RBW=3 MHz, VBW=3 MHz, Span=Zero span
- Sweep=2000 s, Detector=Peak, Trace mode=Clear / write

- Test configuration



4.4.2 Limit

The client has vacated the Channel in the specified time (Channel Closing Transmission Time and Channel Move Time) and does not transmit on a Channel for 30 minutes after the detection and Channel move (Non-Occupancy Period).

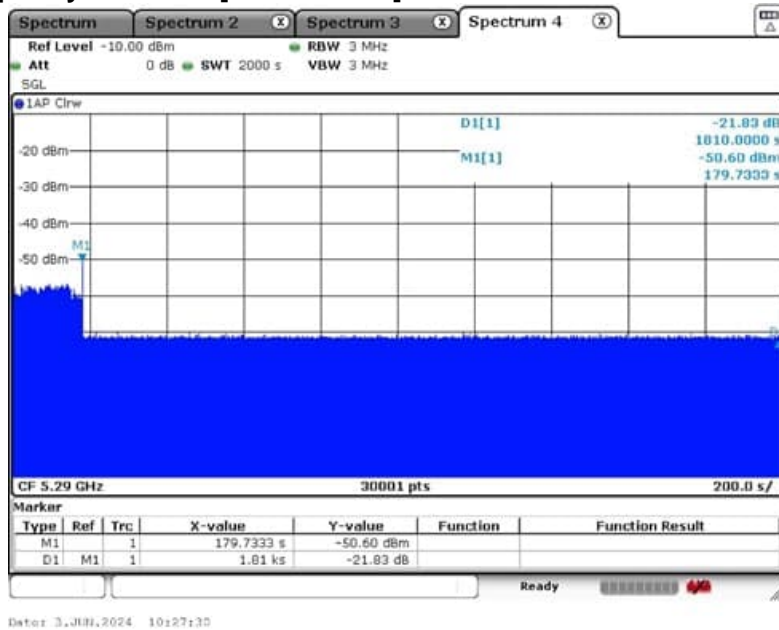
4.4.3 Measurement result

Date : 3-June-2024
 Temperature : 20.7 [°C]
 Humidity : 58.1 [%]
 Test place : 3m Semi-anechoic chamber

Test engineer : Tadahiro Seino

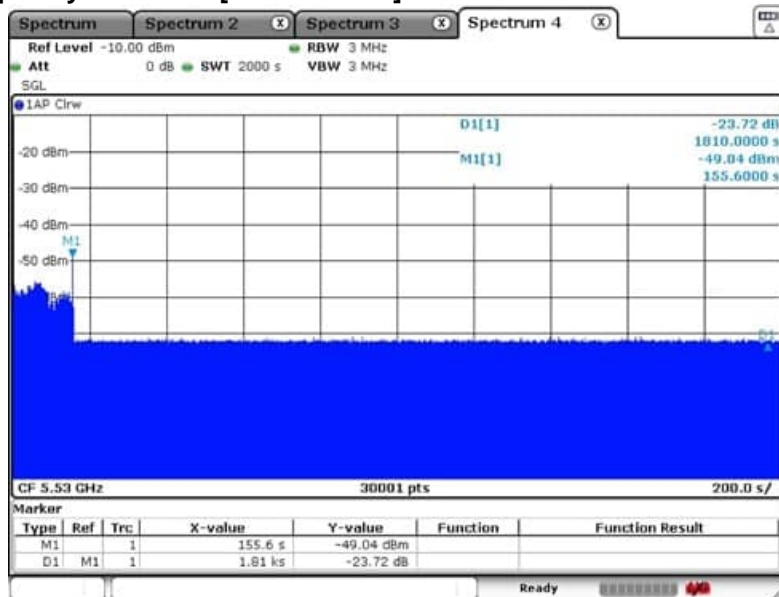
Non-Occupancy Period Plot

Frequency: 5290MHz [5.3GHz Band]



Date: 3.JUN.2024 10:27:30

Frequency: 5530MHz [5.6GHz Band]



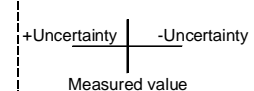



Date: 3.JUN.2024 11:54:36

5 Measurement uncertainty

The reported measurement uncertainty is based on a value obtained by multiplying standard uncertainty by coverage factor of k=2, and a level of confidence becomes 95 %.

3m Semi Anechoic Chamber	
Test item	Measurement uncertainty
Conducted emission, AMN (9 kHz – 150 kHz)	±3.7 dB
Conducted emission, AMN (150 kHz – 30 MHz)	±3.3 dB
Radiated emission (9kHz – 30 MHz)	±3.8 dB
Radiated emission (30 MHz – 1000 MHz)	±5.4 dB
Radiated emission (1 GHz – 6 GHz)	±4.6 dB
Radiated emission (6 GHz – 18 GHz)	±4.7 dB
Radiated emission (18 GHz – 40 GHz)	±6.3 dB
Radio Frequency	±1.3 * 10 ⁻⁸
RF power, conducted	±0.7 dB
Adjacent channel power	±1.5 dB
Temperature	±0.6 °C
Humidity	±1.2 %
Voltage (DC)	±0.4 %
Voltage (AC, <10kHz)	±0.2 %

Measurement uncertainty of not listed immunity tests is considered to suffice because requirements of relevant standards are met.

Judge	Measured value and standard limit value
PASS	<p>Standard limit value</p>  <p>Even if it takes uncertainty into consideration, a standard limit value is fulfilled.</p>
	 <p>Although measured value is in a standard limit value, a limit value won't be fulfilled if uncertainty is taken into consideration.</p>
FAIL	 <p>Although measured value exceeds a standard limit value, a limit value will be fulfilled if uncertainty is taken into consideration.</p>
	 <p>Even if it takes uncertainty into consideration, a standard limit value isn't fulfilled.</p>

6 Laboratory Information

Testing was performed and the report was issued at:

TÜV SÜD Japan Ltd. Yonezawa Testing Center

Address: 5-4149-7 Hachimanpara, Yonezawa-shi, Yamagata, 992-1128 Japan
Phone: +81-238-28-2881

Accreditation and Registration

A2LA

Certificate #3686.03

VLAC

Accreditation No.: VLAC-013

BSMI

Laboratory Code: SL2-IN-E-6018, SL2-A1-E-6018

Innovation, Science and Economic Development Canada

ISED#: 4224A

VCCI Council

Registration number: A-0166

Appendix A. Test Equipment

Radiated

Equipment	Company	Model No.	Serial No.	Cal. Due	Cal. Date
Spectrum analyzer	ROHDE&SCHWARZ	FSV40	101731	31-Aug-2024	16-Aug-2023
Vector Signal Generator	ROHDE&SCHWARZ	SMBV100A	257406	31-Mar-2025	07-Mar-2024
Double ridged guide antenna	ETS LINDGREN	3117	00218815	31-Dec-2024	07-Dec-2023
Attenuator	HUBER+SUHNER	6803.17.B	N/A(2340)	31-Dec-2024	20-Dec-2023
Double ridged guide antenna	ETS LINDGREN	3117	00058232	30-Jun-2024	20-Jun-2023
Microwave cable	HUBER+SUHNER	Sucoflex 102/2m	MY3385/2	31-Mar-2025	07-Mar-2024
Microwave cable	HUBER+SUHNER	SUCOFLEX106/7m	41625/6	31-Dec-2024	21-Dec-2023
PC	HP	HP ProBook 450 G2	JPA524M85J	N/A	N/A
Software	ROHDE&SCHWARZ	R&S Pulse Sequencer DFS	V1.4 Build:6130	N/A	N/A
3m Semi an-echoic Chamber	TOKIN	N/A	N/A(9002-NSA)	31-May-2025	14-May-2024
3m Semi an-echoic Chamber	TOKIN	N/A	N/A(9002-SVSWR)	31-May-2025	14-May-2024

*: The calibrations of the above equipment are traceable to NIST or equivalent standards of the reference organizations.