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Test Report for FCC

FCC ID : 2A2JFZENITHZ5

Report Number		ESTRFC2108-005		
Applicant	Company name	EZDS Co., Ltd.		
	Address	Suite 1405,A Tower,11 Beobwon-ro 11-gil,Songpa-gu Seoul South Korea		
	Telephone	+82-70-7733-7774		
	Contact person	Jungho CHO		
Product	Product name	Automotive Diagnostic Scan tool		
	Model No.	ZENITH Z5	Manufacturer	EZDS Co., Ltd.
	Serial No.	None	Country of origin	KOREA
Test date	13-Aug-21 ~ 25-Aug-21		Date of issue	30-Aug-21
Testing location	347-69, Jungbu-daero 147beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do 467-811, R. O. Korea			
Standard	FCC PART 15 Subpart E (15.407) , ANSI C 63.10 , KDB 905462			
Measurement facility registration number	659627			
Tested by	Senior Engineer H.K. Lee	(Signature)		
Reviewed by	Engineering Manager I.K. Hong	(Signature)		
Abbreviation	OK, Pass = Passed, Fail = Failed, N/A = not applicable			

* Note

- This test report is not permitted to copy partly without our permission
- This test result is dependent on only equipment to be used
- This test result based on a single evaluation of one sample of the above mentioned

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Contents

1. Laboratory Information

1.1 General

This EUT (Equipment Under Test) has been shown to be capable of compliance with the applicable technical standards and is tested in accordance with the measurement procedures as indicated in this report.
ESTECH Lab attests to accuracy of test data. All measurement reported herein were performed by ESTECH Co., Ltd.
ESTECH Lab assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them.

1.2 Test Lab.

Corporation Name : ESTECH Co., Ltd.

Head Office : Suite 1015 World Meridian II, 123 Gasan Digital 2-ro, Geumcheon-gu, Seoul 153-759, R. O. Korea

EMC/Telecom/Safety Test Lab : 347-69, Jungbu-daero 147beon-gil, Majang-myeon, Icheon-si,
Gyeonggi-do 467-811, R. O. Korea

1.3 Official Qualification(s)

MSIP : Granted Accreditation from Ministry of Information & Communication for EMC, Safety and Telecommunication
KOLAS : Accredited Lab By Korea Laboratory Accreditation Schema base on CENELEC requirements
FCC : Conformity Assessment Body(CAB) with registration number 659627 under APEC TEL MRA between the RRA and the FCC
VCCI : Granted Accreditation from Voluntary Control Council for Interference from ITE

2. Description of EUT

Produnt	Automotive Diagnostic Scan tool
Model Name	ZENITH Z5
Power supply rating	DC 3.85 V
Modulation type	OFDM
Transfer Rate	802.11a : 6 ~ 54 Mbps, 802.11n(HT20) : MCS 0 ~ MCS 7, 802.11ac(VHT20) : MCS 0 ~ MCS 8, 802.11n(HT40) : MCS 0 ~ MCS 7, 802.11ac(VHT40) : MCS 0 ~ MCS 9, 802.11ac(VHT80) : MCS 0 ~ MCS 9
Antenna Type	Internal antenna

3. Test Standards

Test Standard : FCC PART 15 Subpart E (15.407)

This Standard sets out the regulations under which an intentional, unintentional, or incidental radiator may be operated without an individual license. It also contains the technical specifications, administrative requirements and other conditions relating to the marketing of Part 15 devices.

3.1Summary of Test Results

Applied Satandard : 47 CFR Part 15			
Standard	Test Type	Test Result	Remark
15.407(h)	DFS -Channel closing transmission time -channel move time -Non occupied period	Pass	Meet the requirement of limit.

3.2Test procedure

-KDB 905462 D02 UNII DFS compliance procedure new rules

-KDB 905462 D03 UNII client without radar detection new rules

4. Dynamic Frequency Selection

Applicability of DFS Requirements Prior to Use of a Channel

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

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

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

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.		

a) A Client Device will not transmit before having received appropriate control signals from a Master Device.

b) A Client Device will stop all its transmissions whenever instructed by a Master Device to which it is associated and will meet the Channel Move Time and Channel Closing Transmission Time requirements. The Client Device will not resume any transmissions until it has again received control signals from a Master Device.

c) If a Client Device is performing In-Service Monitoring and detects a Radar Waveform above the DFS Detection Threshold, it will inform the Master Device. This is equivalent to the Master Device detecting the Radar Waveform and d) through f) of section 5.1.1 apply.

d) Irrespective of Client Device or Master Device detection the Channel Move Time and Channel Closing Transmission Time requirements remain the same.

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

Table 4: DFS Response Requirement Values

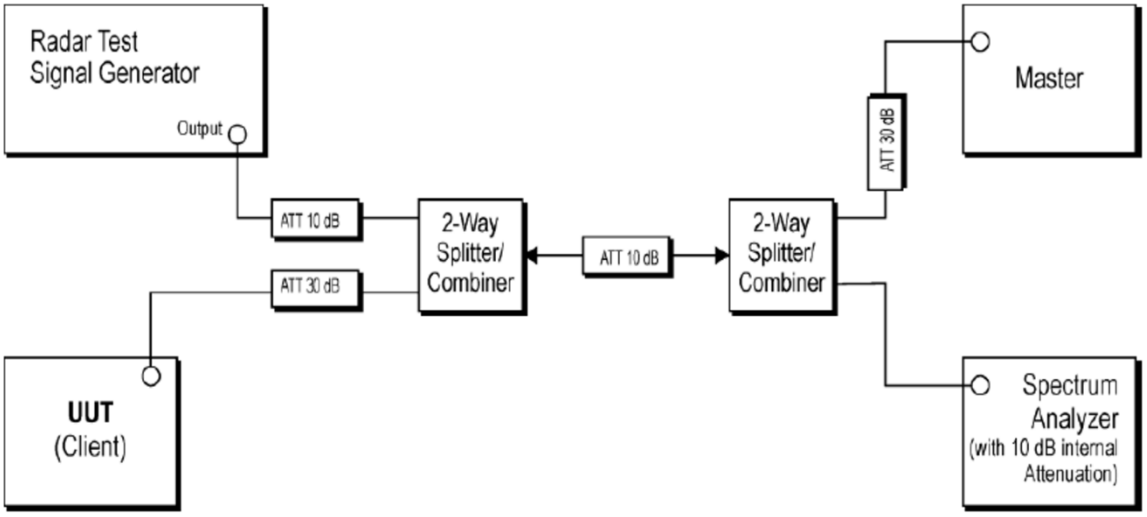
Parameter	Value
Non-occupancy period	Minimum 30 minutes
Channel Availability Check Time	60 seconds
Channel Move Time	10 seconds See Note 1.
Channel Closing Transmission Time	200 milliseconds + an aggregate of 60 milliseconds over remaining 10 second period. See Notes 1 and 2.
U-NII Detection Bandwidth	Minimum 100% of the U-NII 99% transmission power bandwidth. See Note 3.
Note 1: *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 signals 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 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
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. **Note3:** EIRP is based on the highest antenna gain. For MIMO devices refer to KDB Publication 662911 D01.	

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 $\left\{\left(\frac{1}{360}\right)\cdot\left(\frac{19\cdot 10^6}{PRI_{\mu sec}}\right)\right\}$	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.					



Test measurement setup

1. 3 MHz RBW and 3 MHz VBW

2. Dectector Peak

3. Span zero span

Conducted test procedure

1. One frequency will be chosen from the Operating Channels of the UUT within the 5250-5350 MHz or 5470-5725 MHz bands.

2. The Client Device is set up the above diagram and communications between the master device and the client is established.

3. Stream the channel loading test file from the master device to the client device on the test channel for the entire period of the test

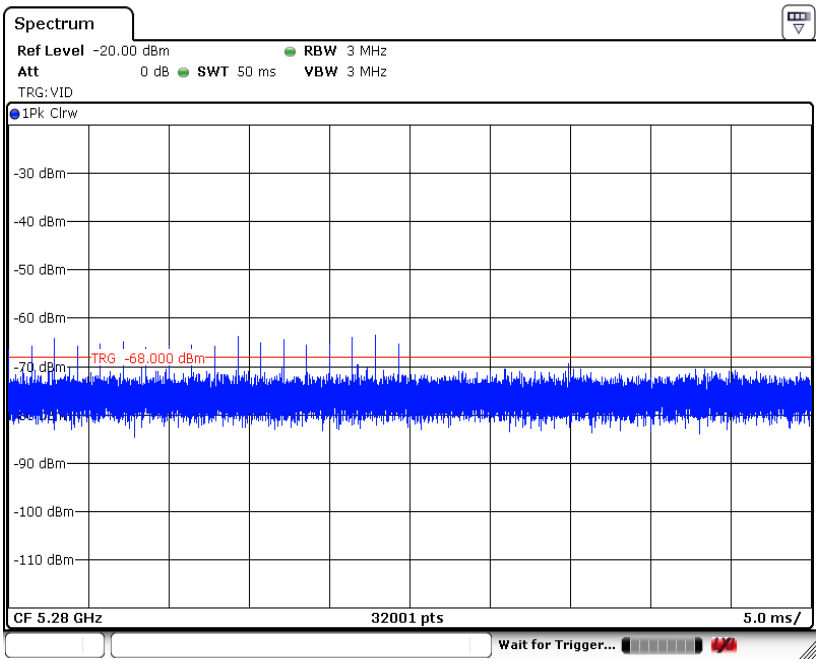
4. an additional 1 dB is added to the radar test signal to ensure it is at or aboce the DFS detection threshold,accounting for equipment variations/errors.

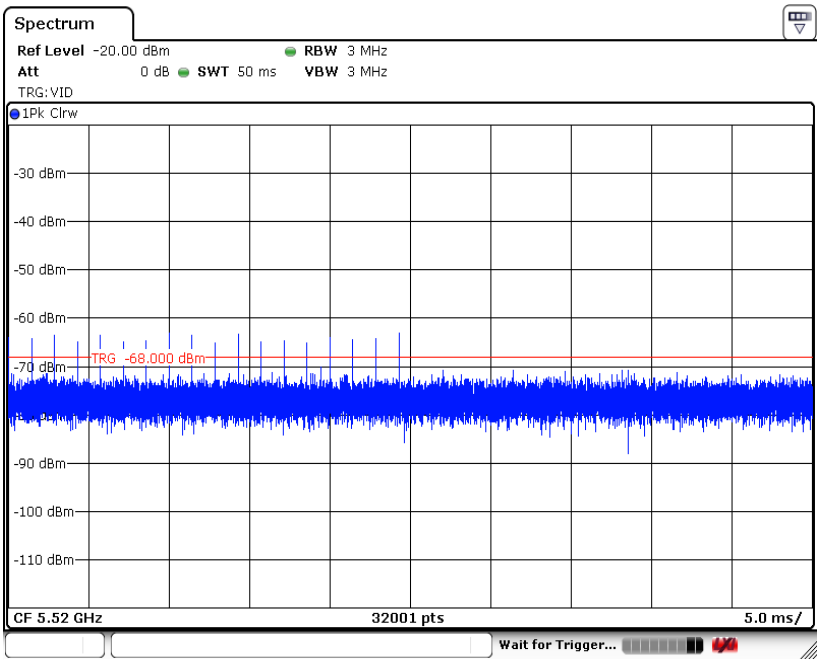
5. observe the transmissions of the UUT at the end of the bust on the operating channel for duration greater than 12 seconds for Radar Type 0 to ensure detection occurs.

6. After the initial radar bust the channel is monitored for 30 minutes to ensure no transmissions or beacons occur. A second monitoring setup is used to verify thay the master and client have both moved to different ch

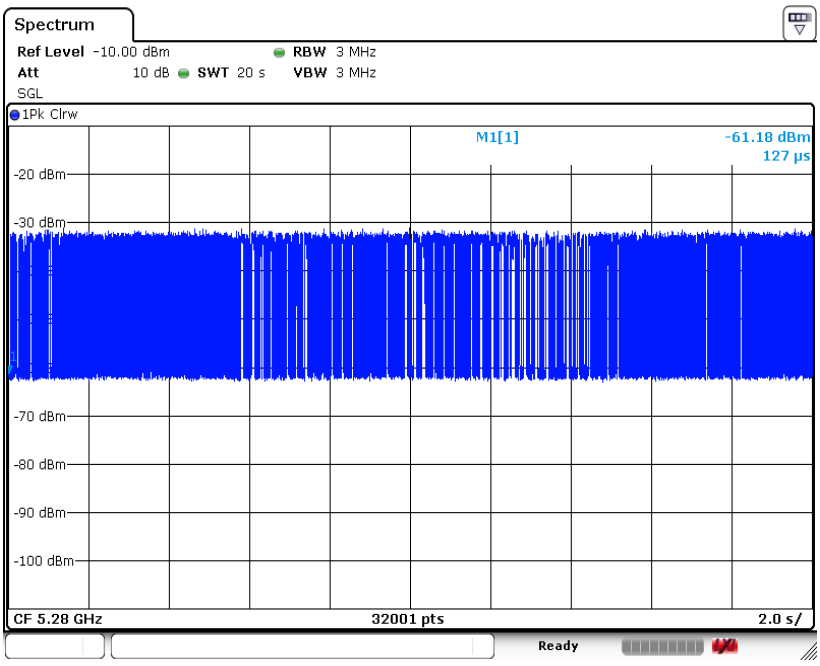
4.1 Test result plot

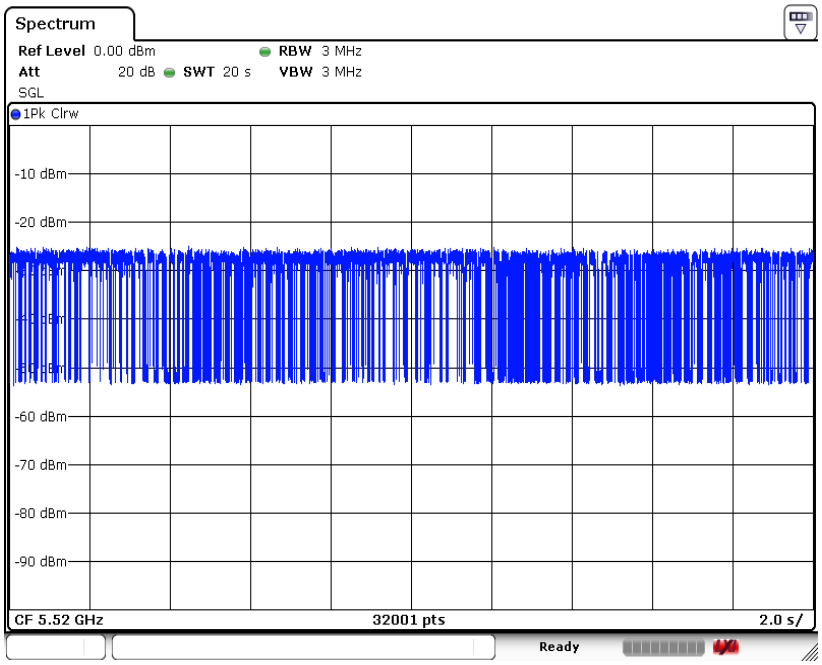
Radar waveform



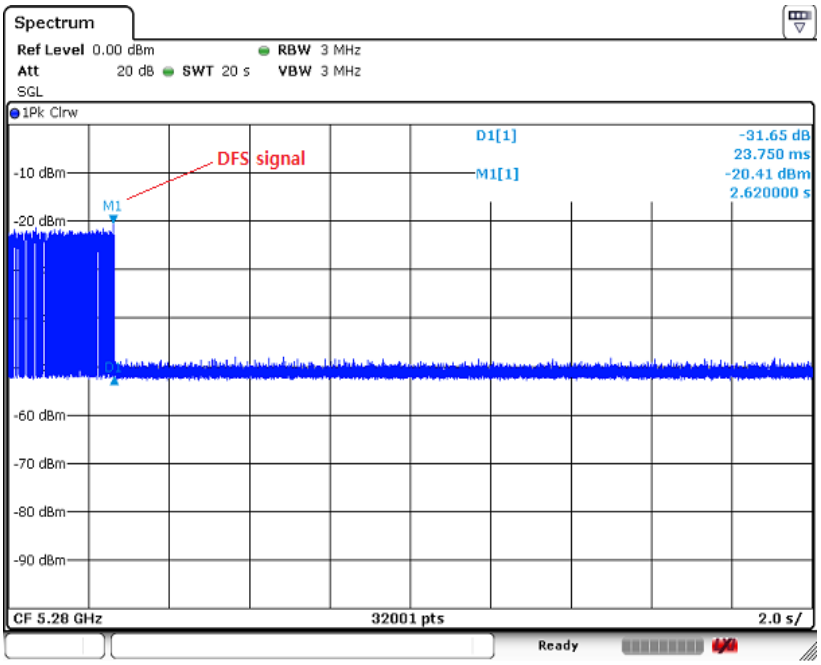


Traffic waveform



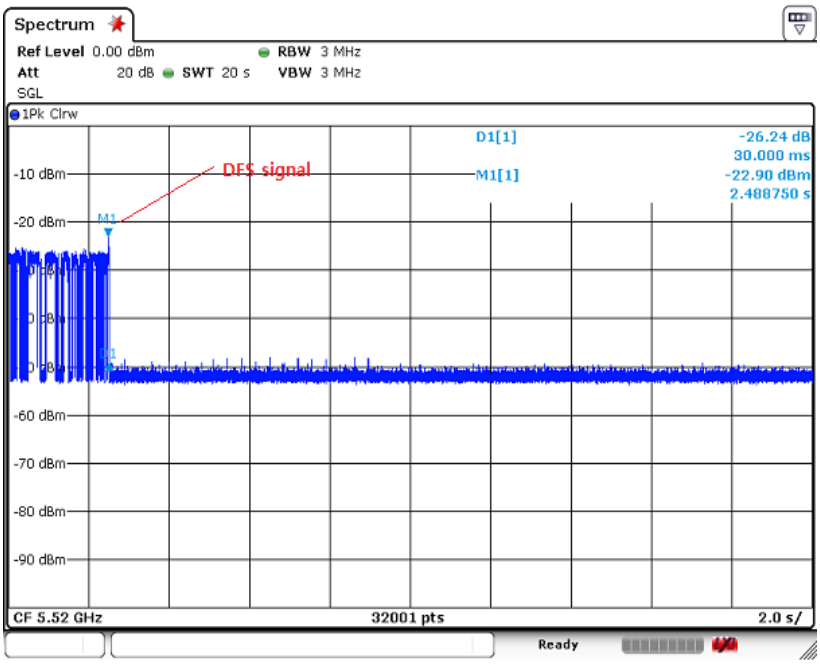


Channel move time and aggregate time



Channel move time : 0.023 s

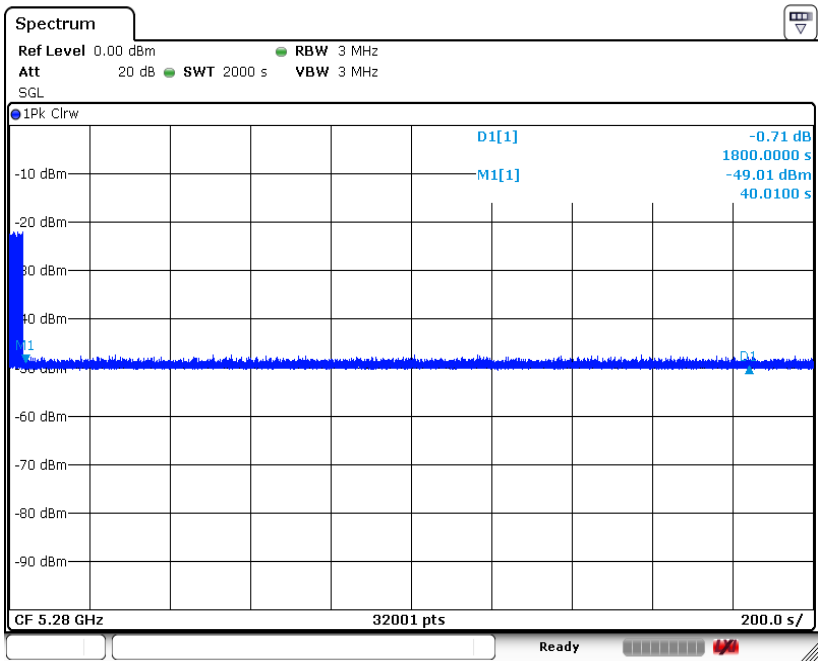
Closing time : Not detected

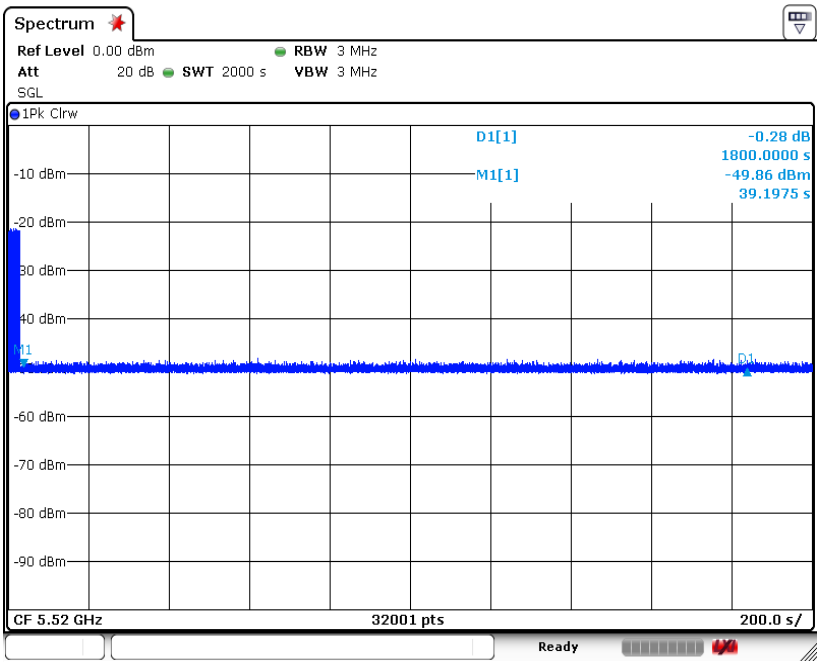


Channel move time : 0.03 s

Closing time : Not detected

Non-occupancy period





5. List of Test Equipment

Equipment Name	Manufacturer	Model No	Serial No	Cal. Due Date
Spectrum Analyzer	R&S	FSV40	100939	2021-12-01
Power divider	HP	11636B	10211	2021-12-03
POWER DIVIDER	WEINSCHEL	1580	SC323	2021-12-03
Attenuator	Bird Electronic Corp.	100-SA-MFN-30	138	2021-12-01
Attenuator	AGILENT	8493C	74537	2021-12-03
Attenuator	ROHDE&SCHWARZ	-	-	2021-12-01
Step Attenuator	AGILENT	8494B	US00430678	2021-12-01
Signal Generator	ROHDE &SCHWARZ	SMBV100A	256663	2021-12-01

5.1 Support equipment

Equipment Name	Model Name	S/N	Manufacturer	Remark (FCC ID)
Access Point	ZoneFlex 7363	-	Ruckus	U2M-ZF73XX-1