



TEST REPORT

Application No.: GZCR2108020804AT
Applicant: Thundercomm Technology Co.,Ltd
Address of Applicant: Building 4, No. 99, Data Valley Middle Road, Xiantao District, Yubei District, Chongqing, China.
Manufacturer: Thundercomm Technology Co.,Ltd
Address of Manufacturer: Building 4, No. 99, Middle Road, Xiantao Data, Yubei District, Chongqing
Factory: ZEGNA DAIDONG LIMITED CORPORATION
Factory of Manufacturer: No. 41 Gangjian Road, Changping Town, Dongguan City, Guangdong Province, China.
Equipment Under Test (EUT):
EUT Name: EB5 Edge AI Box
Model No.: EB5
Standard(s) : 47 CFR Part 15, Subpart E 15.407 (h)
KDB 905462 D02 UNII DFS Compliance Procedures New Rules v02.
KDB 905462 D03 Client Without DFS New Rules v01r02.
Date of Receipt: 2021-08-02
Date of Test: 2021-08-02 to 2021-08-13
Date of Issue: 2021-08-26

Test Result:	Pass*
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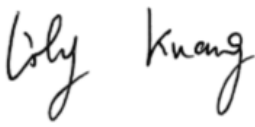
* In the configuration tested, the EUT complied with the standards specified above.

Kobe Jian
EMC Laboratory Manager



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Revision Record				
Version	Chapter	Date	Modifier	Remark
01		2021-08-26		Original

Authorized for issue by:			
			
		Lily Kuang/Project Engineer	
			
		Ricky Liu/Reviewer	

2 Test Summary

Radio Spectrum Matter Part				
Item	Standard	Method	Requirement	Result
Non-occupancy period	47 CFR Part 15, Subpart E 15.407	KDB 905462 D02 Section 7.8.3	KDB 905462 D02 Section 5.1	Pass
Channel Move Time		KDB 905462 D02 Section 7.8.3	KDB 905462 D02 Section 5.1	Pass
Channel Closing Transmission Time		KDB 905462 D02 Section 7.8.3	KDB 905462 D02 Section 5.1	Pass

Note:

E.U.T./EUT means Equipment Under Test.

Pass means the test result passed the test standard requirement, please find the detailed decision rule in the report relative section.

KDB 789033 D02 General U-NII Test Procedures New Rules v02r01.

KDB 905462 D02 UNII DFS Compliance Procedures New Rules v02.

3 Contents

	Page
1 Cover Page	1
2 Test Summary	3
3 Contents	4
4 General Information.....	5
4.1 Details of E.U.T.	5
4.2 Description of Support Units	6
4.3 Measurement Uncertainty	6
4.4 Test Location.....	6
4.5 Test Facility	7
4.6 Deviation from Standards.....	7
4.7 Abnormalities from Standard Conditions	7
5 Equipment List.....	8
6 Radio Spectrum Matter Test Results	10
6.1 Non-occupancy period	10
6.1.1 E.U.T. Operation	10
6.1.2 Test Mode Description	11
6.1.3 Test Setup Diagram	12
6.1.4 Measurement Procedure and Data.....	13
6.2 Channel Move Time	14
6.2.1 E.U.T. Operation	14
6.2.2 Test Mode Description	15
6.2.3 Test Setup Diagram	16
6.2.4 Measurement Procedure and Data.....	17
6.3 Channel Closing Transmission Time	18
6.3.1 E.U.T. Operation	18
6.3.2 Test Mode Description	19
6.3.3 Test Setup Diagram	20
6.3.4 Measurement Procedure and Data.....	21
7 Test Setup Photo	22
8 EUT Constructional Details (EUT Photos)	23
9 Appendix.....	24
9.1 DFS Non-occupancy period and Channel Move Time; Channel Closing Transmission Time	24
9.1.1 Test Result.....	24

4 General Information

4.1 Details of E.U.T.

Power supply: Adapter
Model: HKA09019047-6U
Input: AC 100-240V, 50/60Hz, 1.5A
Output: DC 19.0V, 4.74A, 90.06W

Test voltage: AC 120V, 60Hz or AC 240V, 50Hz
Note: Both nominal AC 120V, 60Hz and AC 240 V, 50Hz are required for testing in accordance with FCC KDB174176, this report only shows the results of the worst test result(AC 120V, 60Hz);

Cable(s): DC cable:145cm with a ferrite core
AC cable:137cm unshielded

Internal Source: More than 108MHz

Operation Frequency:

Band	Mode	Frequency Range(MHz)	Number of channels
UNII Band I	802.11a/n/ax(HT20)	5180-5240	4
	802.11n/ax(HT40)	5190-5230	2
	802.11ac/ax(HT80)	5210	1
UNII Band II-A	802.11a/n/ax(HT20)	5260-5320	4
	802.11n/ax(HT40)	5270-5310	2
	802.11ac/ax(HT80)	5290	1
UNII Band II-C	802.11a/n/ax(HT20)	5500-5700	11
	802.11n/ax(HT40)	5510-5670	5
	802.11ac/ax(HT80)	5530-5610	2
UNII Band III	802.11a/n/ax(HT20)	5745-5825	5
	802.11n/ax(HT40)	5755-5795	2
	802.11ac/ax(HT80)	5775	1

Modulation Type: 802.11a: OFDM (BPSK, QPSK, 16QAM, 64QAM)
802.11n: OFDM (BPSK, QPSK, 16QAM, 64QAM)
802.11ac: OFDM (256QAM, 64QAM, 16QAM, QPSK, BPSK)
802.11ax: OFDM (1024QAM, 256QAM, 64QAM, 16QAM, QPSK, BPSK)

DFS Function: Slave without radar detection

TPC Function: Not support

Antenna Type: Monopole Antenna

Antenna Gain: Antenna1: 2.4dBi, Antenna2: 2.4dBi
Note: MIMO for 802.11n/ac/ax.



4.2 Description of Support Units

Description	Manufacturer	Model No.	Serial No.
Mobile Phone	SAMSUNG	SM-G9810	RFCN309Q9QF
Note Book PC	LENOVO	Lenovo Xiaoxinchao 5000	PF0TLJX7
Wireless Router	Honor	HiRouter-CD30	AWTEQ20C04001295

4.3 Measurement Uncertainty

Test Item	Measurement Uncertainty
Conducted Emissions at AC Power Line (150kHz-30MHz)	3.12dB
Duty Cycle	± 0.37%
99% Bandwidth	± 3%
26dB Emission bandwidth	± 3%
Minimum 6 dB bandwidth (5.725-5.85 GHz band)	± 3%
Maximum Conducted output power	± 0.75dB
Peak Power spectrum density	± 2.84dB
Radiated Emissions	5.06dB (30MHz-1GHz ; 3m) 4.46dB (30MHz-1GHz ; 10m) 5.08dB (1GHz-6GHz) 5.14dB (above 6GHz)
Radiated Emissions which fall in the restricted bands	5.06dB (30MHz-1GHz ; 3m) 4.46dB (30MHz-1GHz ; 10m) 5.08dB (1GHz-6GHz) 5.14dB (above 6GHz)
Frequency Stability	± 7.25 x 10 ⁻⁸

4.4 Test Location

All tests were performed at:

SGS-CSTC Standards Technical Services Co., Ltd., Guangzhou Branch EMC Laboratory,
198 Kezhu Road, Sciencetech Park, Guangzhou Economic & Technology Development District,
Guangzhou, China 510663

Tel: +86 20 82155555 Fax: +86 20 82075059

No tests were sub-contracted.



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4.5 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

- **NVLAP (Lab Code: 200611-0)**

SGS-CSTC Standards Technical Services Co., Ltd., Guangzhou EMC Laboratory is accredited by the National Voluntary Laboratory Accreditation Program (NVLAP/NIST). NVLAP Code: 200611-0.

The report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.

- **ACMA**

SGS-CSTC Standards Technical Services Co., Ltd., EMC Laboratory can also perform testing for the Australian/New Zealand Regulatory Compliance Mark (RCM).

- **SGS UK(Certificate No.: 32), SGS-TUV SAARLAND and SGS-FIMKO**

Have approved SGS-CSTC Standards Technical Services Co., Ltd., EMC Laboratory as a supplier of EMC TESTING SERVICES and SAFETY TESTING SERVICES.

- **CNAS (Lab Code: L0167)**

SGS-CSTC Standards Technical Services Co., Ltd., EMC Laboratory has been assessed and in compliance with CNAS-CL01:2018 accreditation criteria for testing laboratories (identical to ISO/IEC 17025:2017 General Requirements) for the Competence of Testing Laboratories.

- **FCC Recognized Accredited Test Firm(Registration No.: 486818)**

SGS-CSTC Standards Technical Services Co., Ltd., EMC Laboratory has been accredited and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Designation Number: CN5016, Test Firm Registration Number: 486818.

- **ISED (Registration No.: 4620B, CAB identifier: CN0052)**

SGS-CSTC Standards Technical Services Co., Ltd., has been registered by Innovation Science and Economic Development Canada for Wireless Device Testing laboratories to test to Canadian radio equipment requirements. Registration No. 4620B, CAB identifier: CN0052.

- **VCCI (Registration No.: R-12460, C-12584, G-20107 and T-11179)**

The 10m Semi-anechoic chamber, 966 Anechoic Chamber and Shielded Room of SGS-CSTC Standards Technical Services Co., Ltd. have been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: R-12460, C-12584, G-20107 and T-11179 respectively.

- **CBTL (Lab Code: TL129)**

SGS-CSTC Standards Technical Services Co., Ltd., E&E Laboratory has been assessed and fully comply with the requirements of ISO/IEC 17025:2017, the Basic Rules, IECEE 01 and Rules of procedure IECEE 02, and the relevant IECEE CB-Scheme Operational documents.

4.6 Deviation from Standards

None

4.7 Abnormalities from Standard Conditions

None



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5 Equipment List

Non-occupancy period					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
MXA Signal Analyzer(10Hz-8.4GHz)	Agilent Technologies	N9020A	SEM004-10	2021-03-02	2022-03-01
ESG Vector Signal Generator(250kHz-6GHz)	Keysight	E4438C	SEM006-03	2021-03-12	2022-03-11
EXG Analog Signal Generator(9kHz-3GHz)	Agilent Technologies	N5171B	SEM006-04	2020-07-14	2021-07-13
				2021-07-12	2022-07-11
Power Meter (U2021XA_Ch2)	Agilent Technologies	U2021XA_Ch2	SEM009-02	2021-05-19	2022-05-18
Power Meter (U2021XA_Ch3)	Agilent Technologies	U2021XA_Ch3	SEM009-03	2021-05-19	2022-05-18
EXA Signal Analyzer(10Hz-44GHz)	Agilent Technologies	N9010A	EMC2138	2020-09-17	2021-09-16
6dB Attenuator	HP	8491A	EMC2062	2020-04-15	2022-04-14
Test Software JS1120-3	HangTianXing	V2.6	GZE100-69	N/A	N/A
MI CABLE	SGS-EMC	0.8M	EMC2136	2019-11-02	2021-11-01
MI CABLE	SGS-EMC	0.8M	EMC2137	2019-11-02	2021-11-01
VARIABLE ATTENUATOR	TAMAGAWA ELECTRONICS CO.LTD	TRA-801	EMC02077	/	/
BENCHTOP ATTEMUATOR	JFW INDUSTRIES INC.	50BR-068 SMA	EMC02076	/	/

Channel Move Time					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
MXA Signal Analyzer(10Hz-8.4GHz)	Agilent Technologies	N9020A	SEM004-10	2021-03-02	2022-03-01
ESG Vector Signal Generator(250kHz-6GHz)	Keysight	E4438C	SEM006-03	2021-03-12	2022-03-11
EXG Analog Signal Generator(9kHz-3GHz)	Agilent Technologies	N5171B	SEM006-04	2020-07-14	2021-07-13
				2021-07-12	2022-07-11
Power Meter (U2021XA_Ch2)	Agilent Technologies	U2021XA_Ch2	SEM009-02	2021-05-19	2022-05-18
Power Meter (U2021XA_Ch3)	Agilent Technologies	U2021XA_Ch3	SEM009-03	2021-05-19	2022-05-18
EXA Signal Analyzer(10Hz-44GHz)	Agilent Technologies	N9010A	EMC2138	2020-09-17	2021-09-16
6dB Attenuator	HP	8491A	EMC2062	2020-04-15	2022-04-14



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Test Software JS1120-3	HangTianXing	V2.6	GZE100-69	N/A	N/A
MI CABLE	SGS-EMC	0.8M	EMC2136	2019-11-02	2021-11-01
MI CABLE	SGS-EMC	0.8M	EMC2137	2019-11-02	2021-11-01
VARIABLE ATTENUATOR	TAMAGAWA ELECTRONICS CO.LTD	TRA-801	EMC02077	/	/
BENCHTOP ATTEMUATOR	JFW INDUSTRIES INC.	50BR-068 SMA	EMC02076	/	/

Channel Closing Transmission Time					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
MXA Signal Analyzer(10Hz-8.4GHz)	Agilent Technologies	N9020A	SEM004-10	2021-03-02	2022-03-01
ESG Vector Signal Generator(250kHz-6GHz)	Keysight	E4438C	SEM006-03	2021-03-12	2022-03-11
EXG Analog Signal Generator(9kHz-3GHz)	Agilent Technologies	N5171B	SEM006-04	2020-07-14	2021-07-13
				2021-07-12	2022-07-11
Power Meter (U2021XA_Ch2)	Agilent Technologies	U2021XA_Ch2	SEM009-02	2021-05-19	2022-05-18
Power Meter (U2021XA_Ch3)	Agilent Technologies	U2021XA_Ch3	SEM009-03	2021-05-19	2022-05-18
EXA Signal Analyzer(10Hz-44GHz)	Agilent Technologies	N9010A	EMC2138	2020-09-17	2021-09-16
6dB Attenuator	HP	8491A	EMC2062	2020-04-15	2022-04-14
Test Software JS1120-3	HangTianXing	V2.6	GZE100-69	N/A	N/A
MI CABLE	SGS-EMC	0.8M	EMC2136	2019-11-02	2021-11-01
MI CABLE	SGS-EMC	0.8M	EMC2137	2019-11-02	2021-11-01
VARIABLE ATTENUATOR	TAMAGAWA ELECTRONICS CO.LTD	TRA-801	EMC02077	/	/
BENCHTOP ATTEMUATOR	JFW INDUSTRIES INC.	50BR-068 SMA	EMC02076	/	/

General used equipment					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
DMM	Fluke	73	EMC0006	2020-07-07	2021-07-06
				2021-07-05	2022-07-05
DMM	Fluke	73	EMC0007	2020-07-07	2021-07-06
				2021-07-05	2022-07-05



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6 Radio Spectrum Matter Test Results

6.1 Non-occupancy period

Test Requirement KDB 905462 D02 Section 5.1
Test Method: KDB 905462 D02 Section 7.8.3
Limit:

Test item	Limit	Applicability	
		Master Device or client with Radar Detection	Client without Radar Detection
Non-occupancy period	Minimum 30 minutes	Yes	Not required
Channel Availability Check Time	60 seconds	Yes	Not required
Channel Move Time	10 seconds See Note 1.	Yes	Yes
Channel Closing Transmission Time	200 milliseconds + an aggregate of 60 milliseconds over remaining 10 second period. See Notes 1 and 2.	Yes	Yes
U-NII Detection Bandwidth	Minimum 100% of the U-NII 99% transmission power bandwidth. See Note 3.	Yes	Not required

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.

6.1.1 E.U.T. Operation

Operating Environment:

Temperature: 24.7 °C Humidity: 46.3 % RH Atmospheric Pressure: 1010 mbar



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6.1.2 Test Mode Description

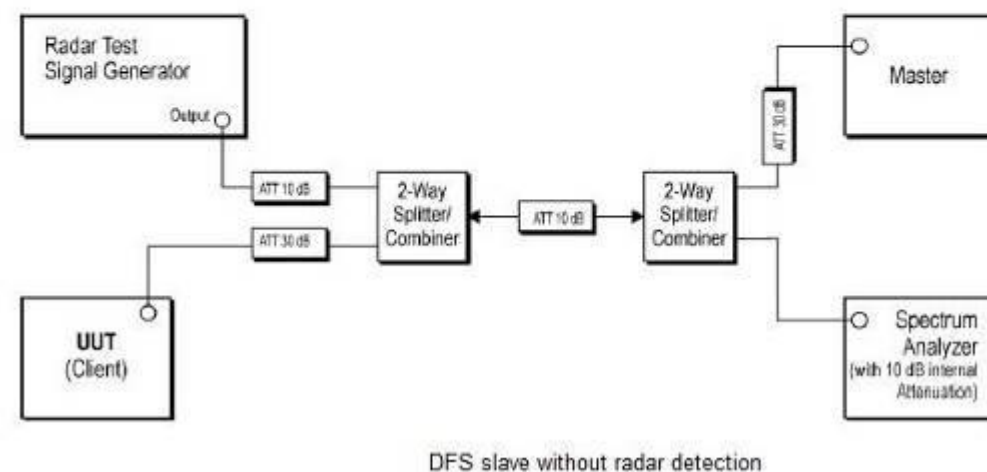
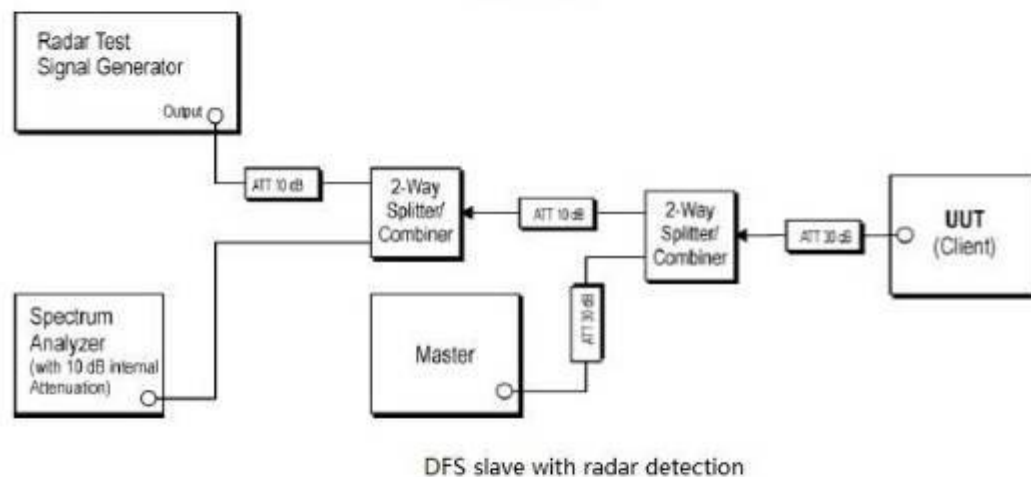
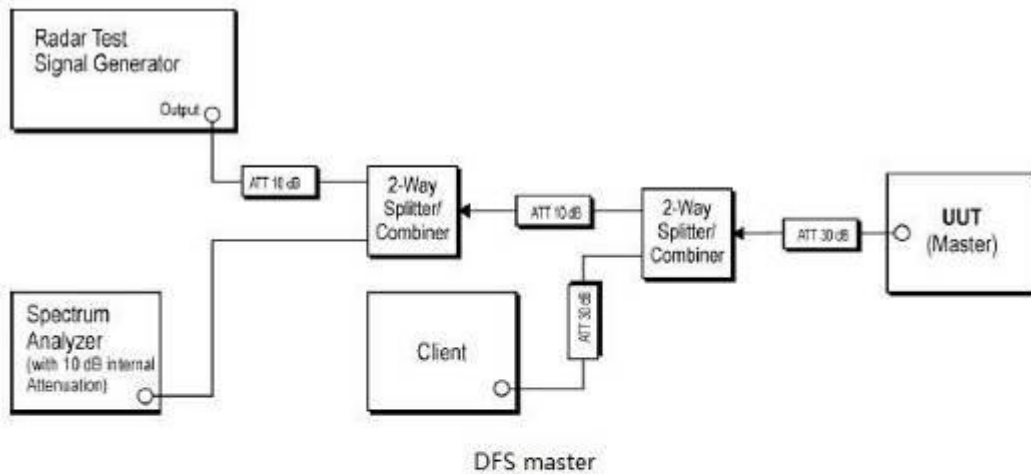
Pre-scan / Final test	Mode Code	Description
Final test	03	TX mode (U-NII-2A)_Keep the EUT in continuously transmitting mode with all modulation types.All data rates for each modulation type have been tested and found the data rate @ 6Mbps is the worst case of IEEE 802.11a; data rate @ MCS0 is the worst case of IEEE 802.11n(HT20); data rate @ MCS0 is the worst case of IEEE 802.11n(HT40); data rate @ MCS0 is the worst case of IEEE 802.11ac(VHT20); data rate @ MCS0 is the worst case of IEEE 802.11ac(VHT40); data rate @ MCS0 is the worst case of IEEE 802.11ac(VHT80); data rate @ MCS0 is the worst case of IEEE 802.11ax(HE20); data rate @ MCS0 is the worst case of IEEE 802.11ax(HE40); data rate @ MCS0 is the worst case of IEEE 802.11ax(HE80). Only the data of worst case is recorded in the report. TX mode (U-NII-2C)_Keep the EUT in continuously transmitting mode with all modulation types.All data rates for each modulation type have been tested and found the data rate @ 6Mbps is the worst case of IEEE 802.11a; data rate @ MCS0 is the worst case of IEEE 802.11n(HT20); data rate @ MCS0 is the worst case of IEEE 802.11n(HT40); data rate @ MCS0 is the worst case of IEEE 802.11ac(VHT20); data rate @ MCS0 is the worst case of IEEE 802.11ac(VHT40); data rate @ MCS0 is the worst case of IEEE 802.11ac(VHT80); data rate @ MCS0 is the worst case of IEEE 802.11ax(HE20); data rate @ MCS0 is the worst case of IEEE 802.11ax(HE40); data rate @ MCS0 is the worst case of IEEE 802.11ax(HE80). Only the data of worst case is recorded in the report.
Final test	04	



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6.1.3 Test Setup Diagram



6.1.4 Measurement Procedure and Data

- 1) The radar pulse generator is setup to provide a pulse at frequency that the master and client are operating. A type 0 radar pulse with a 1us pulse width and a 1428us PRI is used for the testing.
- 2) The vector signal generator is adjusted to provide the radar burst (18 pulses) at the level of approximately -61dBm at the antenna port of the master device.
- 3) A trigger is provided from the pulse generator to the DFS monitoring system in order to capture the traffic and the occurrence of the radar pulse.
- 4) EUT will associate with the master at channel. The file "iperf.exe" specified by the FCC is streamed from the PC 2 through the master and the client device to the PC 1 and played in full motion video using Media Player Classic Ver. 6.4.8.6 in order to properly load the network for the entire period of the test.
- 5) When radar burst with a level equal to the DFS Detection Threshold +1dB is generated on the operating channel of the U-NII device. At time T0 the radar waveform generator sends a burst of pulse of the radar waveform at Detection Threshold +1dB.
- 6) Observe the transmissions of the EUT at the end of the radar Burst on the Operating Channel. Measure and record the transmissions from the UUT during the observation time (Channel Move Time). One 15 seconds plot is reported for the Short Pulse Radar Type 0. The plot for the Short Pulse Radar Types start at the end of the radar burst. The Channel Move Time will be calculated based on the zoom in 600ms plot of the Short Pulse Radar Type.
- 7) Measurement of the aggregate duration of the Channel Closed Transmission Time method. With the spectrum analyzer set to zero span tuned to the center frequency of the EUT operating channel at the radar simulated frequency, peak detection, and max hold, the dwell time per bin is given by: $Dwell (0.3ms) = S (12000ms) / B (4000)$; where Dwell is the dwell time per spectrum analyzer sampling bin, S is sweep time and 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: $C (ms) = N \times Dwell (0.3ms)$; where 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.
- 8) Measurement the EUT for more than 30 minutes following the channel move time to verify that no transmission or beacons occur on this channel.

Please Refer To Appendix_FCC U-II BANDS Test Results for SISO Mode For Details.

6.2 Channel Move Time

Test Requirement KDB 905462 D02 Section 5.1
Test Method: KDB 905462 D02 Section 7.8.3
Limit:

Test item	Limit	Applicability	
		Master Device or client with Radar Detection	Client without Radar Detection
Non-occupancy period	Minimum 30 minutes	Yes	Not required
Channel Availability Check Time	60 seconds	Yes	Not required
Channel Move Time	10 seconds See Note 1.	Yes	Yes
Channel Closing Transmission Time	200 milliseconds + an aggregate of 60 milliseconds over remaining 10 second period. See Notes 1 and 2.	Yes	Yes
U-NII Detection Bandwidth	Minimum 100% of the U-NII 99% transmission power bandwidth. See Note 3.	Yes	Not required

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.

6.2.1 E.U.T. Operation

Operating Environment:

Temperature: 24.7 °C Humidity: 46.3 % RH Atmospheric Pressure: 1010 mbar



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6.2.2 Test Mode Description

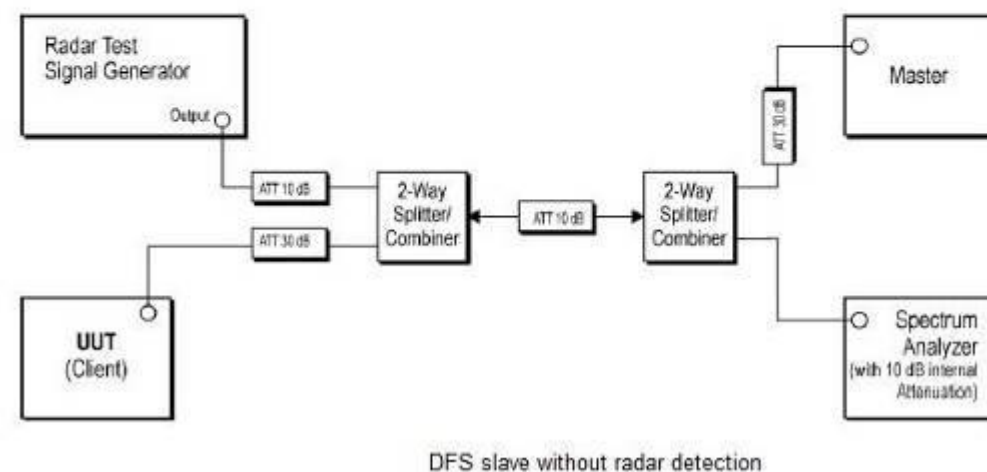
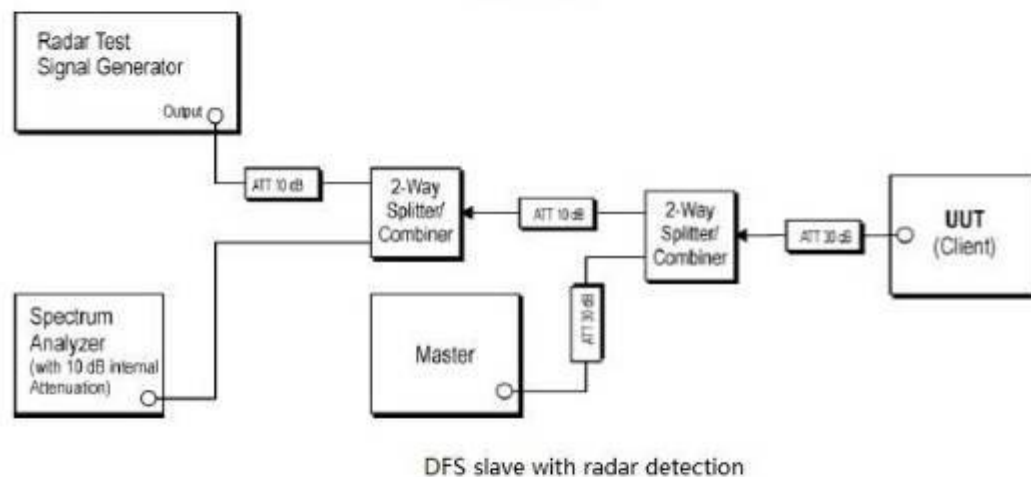
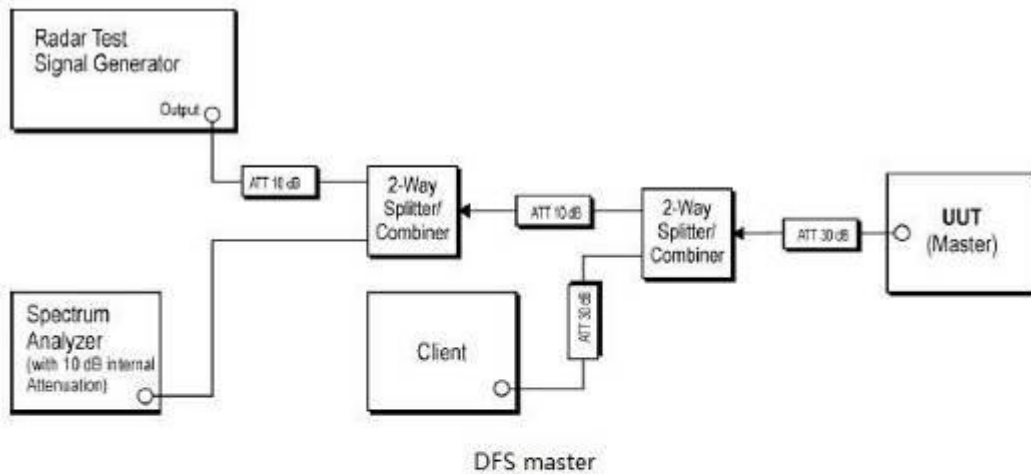
Pre-scan / Final test	Mode Code	Description
Final test	03	TX mode (U-NII-2A)_Keep the EUT in continuously transmitting mode with all modulation types.All data rates for each modulation type have been tested and found the data rate @ 6Mbps is the worst case of IEEE 802.11a; data rate @ MCS0 is the worst case of IEEE 802.11n(HT20); data rate @ MCS0 is the worst case of IEEE 802.11n(HT40); data rate @ MCS0 is the worst case of IEEE 802.11ac(VHT20); data rate @ MCS0 is the worst case of IEEE 802.11ac(VHT40); data rate @ MCS0 is the worst case of IEEE 802.11ac(VHT80); data rate @ MCS0 is the worst case of IEEE 802.11ax(HE20); data rate @ MCS0 is the worst case of IEEE 802.11ax(HE40); data rate @ MCS0 is the worst case of IEEE 802.11ax(HE80). Only the data of worst case is recorded in the report. TX mode (U-NII-2C)_Keep the EUT in continuously transmitting mode with all modulation types.All data rates for each modulation type have been tested and found the data rate @ 6Mbps is the worst case of IEEE 802.11a; data rate @ MCS0 is the worst case of IEEE 802.11n(HT20); data rate @ MCS0 is the worst case of IEEE 802.11n(HT40); data rate @ MCS0 is the worst case of IEEE 802.11ac(VHT20); data rate @ MCS0 is the worst case of IEEE 802.11ac(VHT40); data rate @ MCS0 is the worst case of IEEE 802.11ac(VHT80); data rate @ MCS0 is the worst case of IEEE 802.11ax(HE20); data rate @ MCS0 is the worst case of IEEE 802.11ax(HE40); data rate @ MCS0 is the worst case of IEEE 802.11ax(HE80). Only the data of worst case is recorded in the report.
Final test	04	



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6.2.3 Test Setup Diagram



6.2.4 Measurement Procedure and Data

- 1) The radar pulse generator is setup to provide a pulse at frequency that the master and client are operating. A type 0 radar pulse with a 1us pulse width and a 1428us PRI is used for the testing.
- 2) The vector signal generator is adjusted to provide the radar burst (18 pulses) at the level of approximately -61dBm at the antenna port of the master device.
- 3) A trigger is provided from the pulse generator to the DFS monitoring system in order to capture the traffic and the occurrence of the radar pulse.
- 4) EUT will associate with the master at channel. The file "iperf.exe" specified by the FCC is streamed from the PC 2 through the master and the client device to the PC 1 and played in full motion video using Media Player Classic Ver. 6.4.8.6 in order to properly load the network for the entire period of the test.
- 5) When radar burst with a level equal to the DFS Detection Threshold +1dB is generated on the operating channel of the U-NII device. At time T0 the radar waveform generator sends a burst of pulse of the radar waveform at Detection Threshold +1dB.
- 6) Observe the transmissions of the EUT at the end of the radar Burst on the Operating Channel. Measure and record the transmissions from the UUT during the observation time (Channel Move Time). One 15 seconds plot is reported for the Short Pulse Radar Type 0. The plot for the Short Pulse Radar Types start at the end of the radar burst. The Channel Move Time will be calculated based on the zoom in 600ms plot of the Short Pulse Radar Type.
- 7) Measurement of the aggregate duration of the Channel Closed Transmission Time method. With the spectrum analyzer set to zero span tuned to the center frequency of the EUT operating channel at the radar simulated frequency, peak detection, and max hold, the dwell time per bin is given by: $Dwell (0.3ms) = S (12000ms) / B (4000)$; where Dwell is the dwell time per spectrum analyzer sampling bin, S is sweep time and 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: $C (ms) = N \times Dwell (0.3ms)$; where 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.
- 8) Measurement the EUT for more than 30 minutes following the channel move time to verify that no transmission or beacons occur on this channel.

Please Refer To Appendix _ FCC U-II BANDS Test Results for SISO Mode For Details.



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6.3 Channel Closing Transmission Time

Test Requirement KDB 905462 D02 Section 5.1
Test Method: KDB 905462 D02 Section 7.8.3
Limit:

Test item	Limit	Applicability	
		Master Device or client with Radar Detection	Client without Radar Detection
Non-occupancy period	Minimum 30 minutes	Yes	Not required
Channel Availability Check Time	60 seconds	Yes	Not required
Channel Move Time	10 seconds See Note 1.	Yes	Yes
Channel Closing Transmission Time	200 milliseconds + an aggregate of 60 milliseconds over remaining 10 second period. See Notes 1 and 2.	Yes	Yes
U-NII Detection Bandwidth	Minimum 100% of the U-NII 99% transmission power bandwidth. See Note 3.	Yes	Not required

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.

6.3.1 E.U.T. Operation

Operating Environment:

Temperature: 24.7 °C Humidity: 46.3 % RH Atmospheric Pressure: 1010 mbar



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6.3.2 Test Mode Description

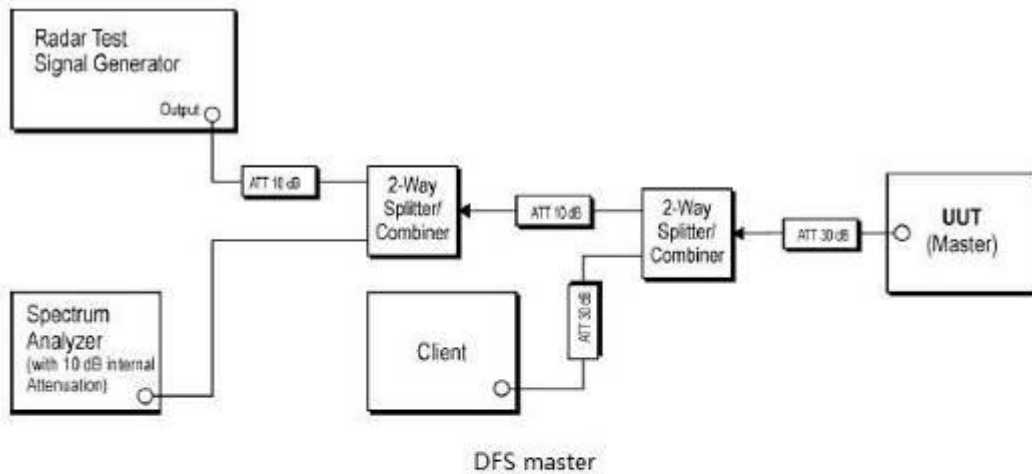
Pre-scan / Final test	Mode Code	Description
Final test	03	TX mode (U-NII-2A)_Keep the EUT in continuously transmitting mode with all modulation types.All data rates for each modulation type have been tested and found the data rate @ 6Mbps is the worst case of IEEE 802.11a; data rate @ MCS0 is the worst case of IEEE 802.11n(HT20); data rate @ MCS0 is the worst case of IEEE 802.11n(HT40); data rate @ MCS0 is the worst case of IEEE 802.11ac(VHT20); data rate @ MCS0 is the worst case of IEEE 802.11ac(VHT40); data rate @ MCS0 is the worst case of IEEE 802.11ac(VHT80); data rate @ MCS0 is the worst case of IEEE 802.11ax(HE20); data rate @ MCS0 is the worst case of IEEE 802.11ax(HE40); data rate @ MCS0 is the worst case of IEEE 802.11ax(HE80). Only the data of worst case is recorded in the report. TX mode (U-NII-2C)_Keep the EUT in continuously transmitting mode with all modulation types.All data rates for each modulation type have been tested and found the data rate @ 6Mbps is the worst case of IEEE 802.11a; data rate @ MCS0 is the worst case of IEEE 802.11n(HT20); data rate @ MCS0 is the worst case of IEEE 802.11n(HT40); data rate @ MCS0 is the worst case of IEEE 802.11ac(VHT20); data rate @ MCS0 is the worst case of IEEE 802.11ac(VHT40); data rate @ MCS0 is the worst case of IEEE 802.11ac(VHT80); data rate @ MCS0 is the worst case of IEEE 802.11ax(HE20); data rate @ MCS0 is the worst case of IEEE 802.11ax(HE40); data rate @ MCS0 is the worst case of IEEE 802.11ax(HE80). Only the data of worst case is recorded in the report.
Final test	04	



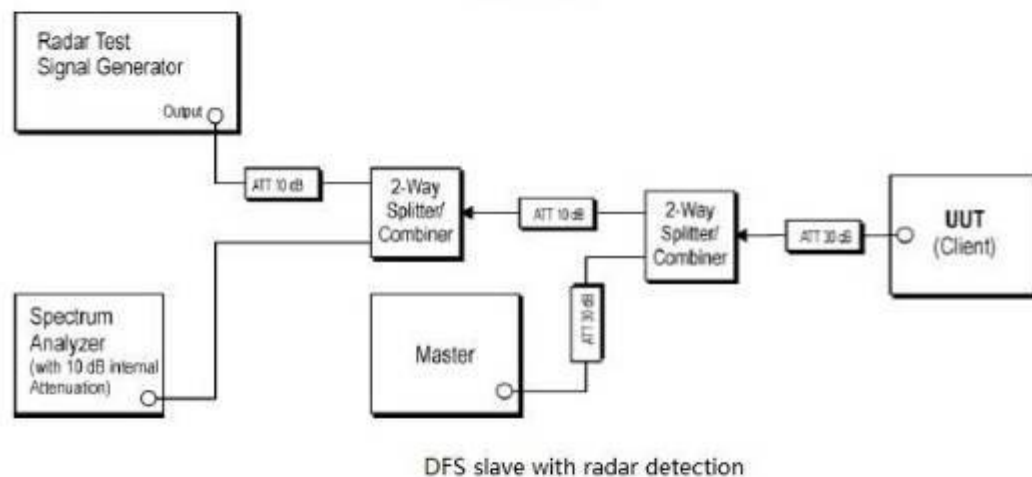
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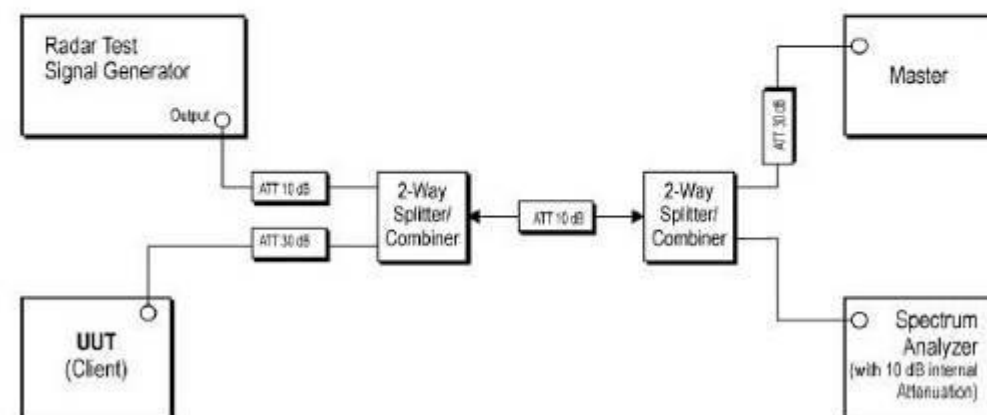
6.3.3 Test Setup Diagram



DFS master



DFS slave with radar detection



DFS slave without radar detection

6.3.4 Measurement Procedure and Data

- 1) The radar pulse generator is setup to provide a pulse at frequency that the master and client are operating. A type 0 radar pulse with a 1us pulse width and a 1428us PRI is used for the testing.
- 2) The vector signal generator is adjusted to provide the radar burst (18 pulses) at the level of approximately -61dBm at the antenna port of the master device.
- 3) A trigger is provided from the pulse generator to the DFS monitoring system in order to capture the traffic and the occurrence of the radar pulse.
- 4) EUT will associate with the master at channel. The file "iperf.exe" specified by the FCC is streamed from the PC 2 through the master and the client device to the PC 1 and played in full motion video using Media Player Classic Ver. 6.4.8.6 in order to properly load the network for the entire period of the test.
- 5) When radar burst with a level equal to the DFS Detection Threshold +1dB is generated on the operating channel of the U-NII device. At time T0 the radar waveform generator sends a burst of pulse of the radar waveform at Detection Threshold +1dB.
- 6) Observe the transmissions of the EUT at the end of the radar Burst on the Operating Channel. Measure and record the transmissions from the UUT during the observation time (Channel Move Time). One 15 seconds plot is reported for the Short Pulse Radar Type 0. The plot for the Short Pulse Radar Types start at the end of the radar burst. The Channel Move Time will be calculated based on the zoom in 600ms plot of the Short Pulse Radar Type.
- 7) Measurement of the aggregate duration of the Channel Closed Transmission Time method. With the spectrum analyzer set to zero span tuned to the center frequency of the EUT operating channel at the radar simulated frequency, peak detection, and max hold, the dwell time per bin is given by: $Dwell (0.3ms) = S (12000ms) / B (4000)$; where Dwell is the dwell time per spectrum analyzer sampling bin, S is sweep time and 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: $C (ms) = N \times Dwell (0.3ms)$; where 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.
- 8) Measurement the EUT for more than 30 minutes following the channel move time to verify that no transmission or beacons occur on this channel.

Please Refer To Appendix_FCC U-II BANDS Test Results for SISO Mode For Details.

7 Test Setup Photo

Refer to test setup photos for GZCR2108020804AT

8 EUT Constructional Details (EUT Photos)

Refer to Appendix_ external and internal photos for GZCR2108020804AT

9 Appendix

9.1 DFS Non-occupancy period and Channel Move Time; Channel Closing Transmission Time

9.1.1 Test Result

Remark:

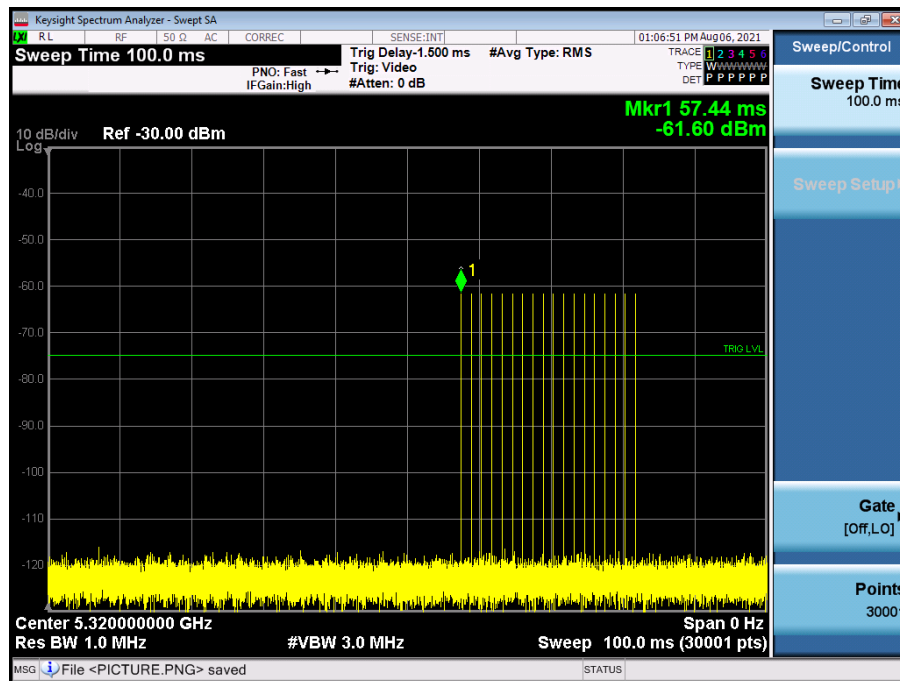
The antenna port 1 and antenna port 2 support 2x2 MIMO with identical RF transmission, therefor only antenna port 1 tested and record the data.

Only record the worst test result.

Test plots as follows:

Radar Waveform Calibration Result

Radar Type 0

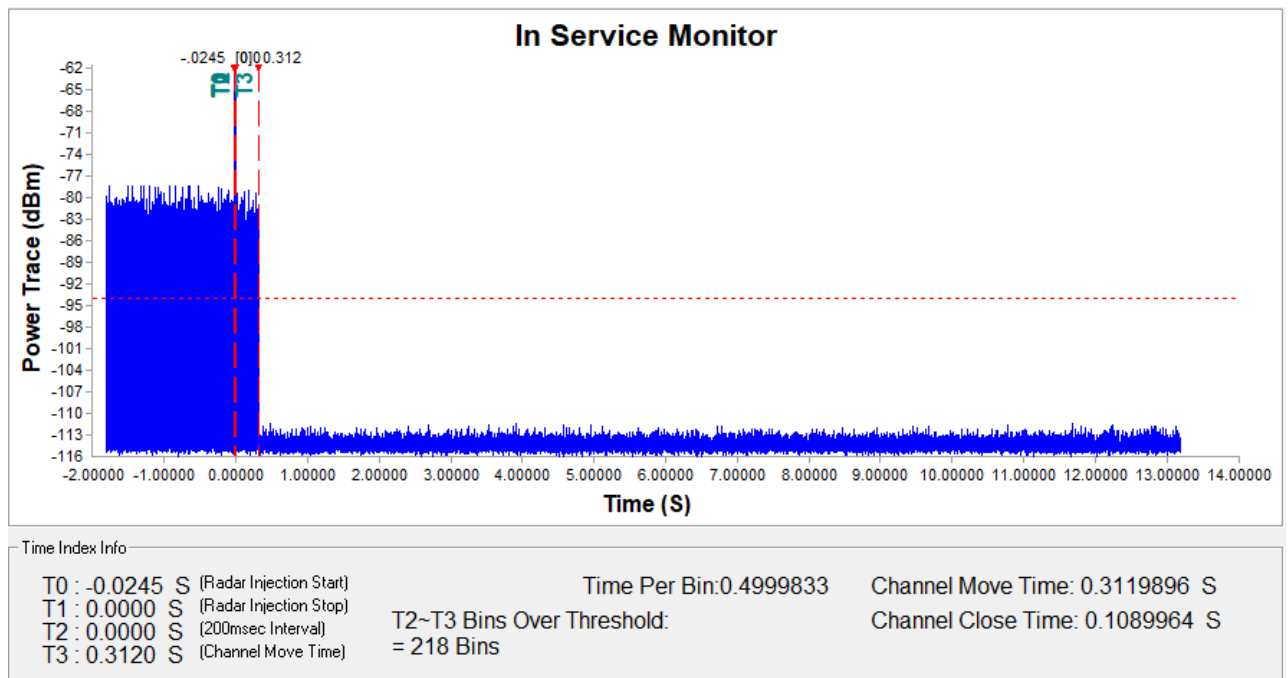
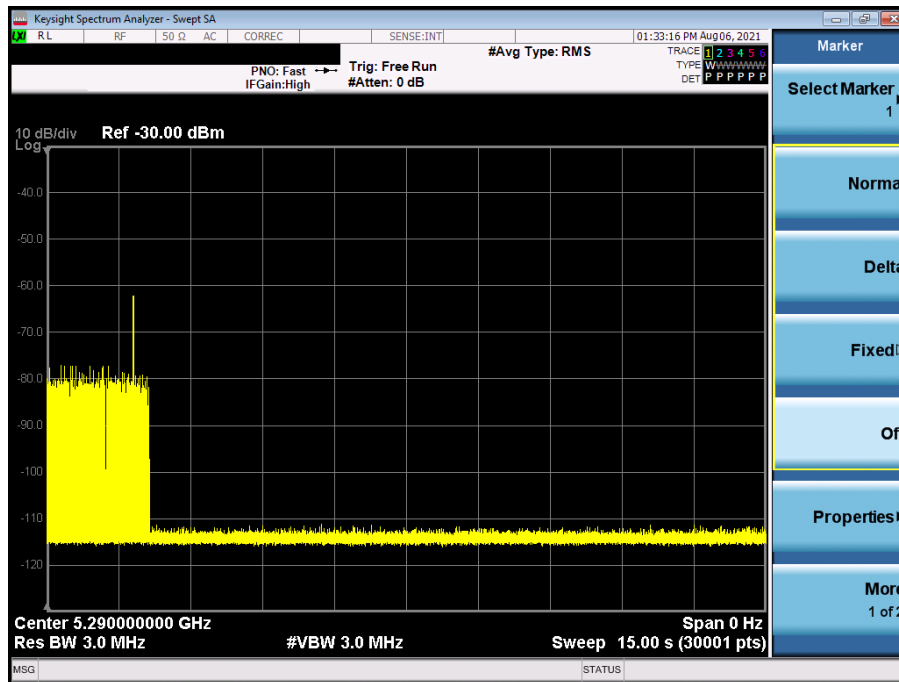


Test Data:

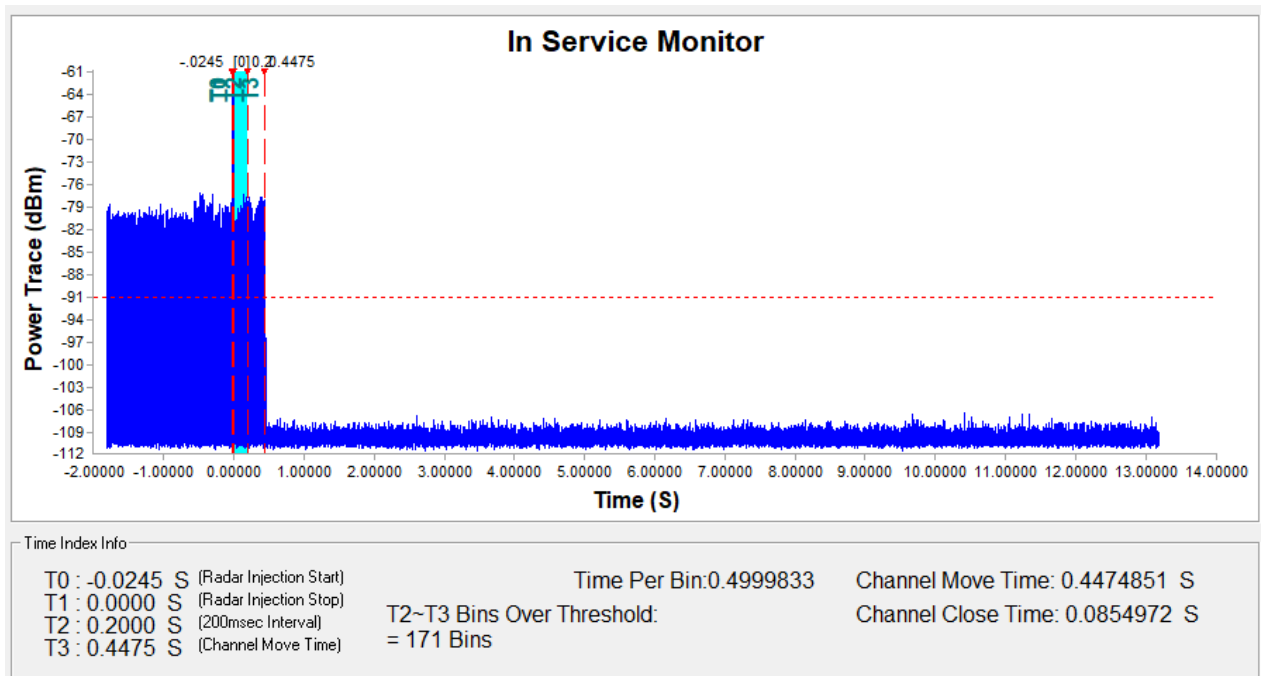
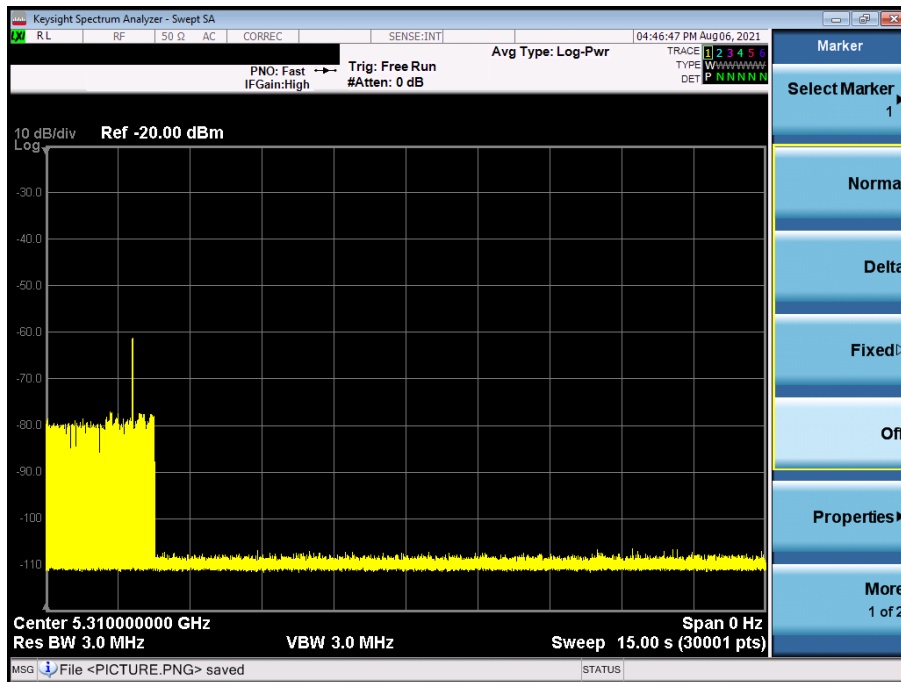
BW/Channel	Test Item	Test data	Limit	Results
80MHz/ 5290MHz	Non-occupancy period	Refer to test point	>30 min	pass
	Channel Move Time	0.3119s	<10 s	Pass
	Channel Closing Transmission Time	0.1089s	<60ms	Pass
40MHz/ 5310MHz	Non-occupancy period	Refer to test point	>30 min	pass
	Channel Move Time	0.4474s	<10 s	Pass
	Channel Closing Transmission Time	0.0854s	<60ms	Pass
20MHz/ 5320MHz	Non-occupancy period	Refer to test point	>30 min	pass
	Channel Move Time	0.3219s	<10 s	Pass
	Channel Closing Transmission Time	0.0554s	<60ms	Pass



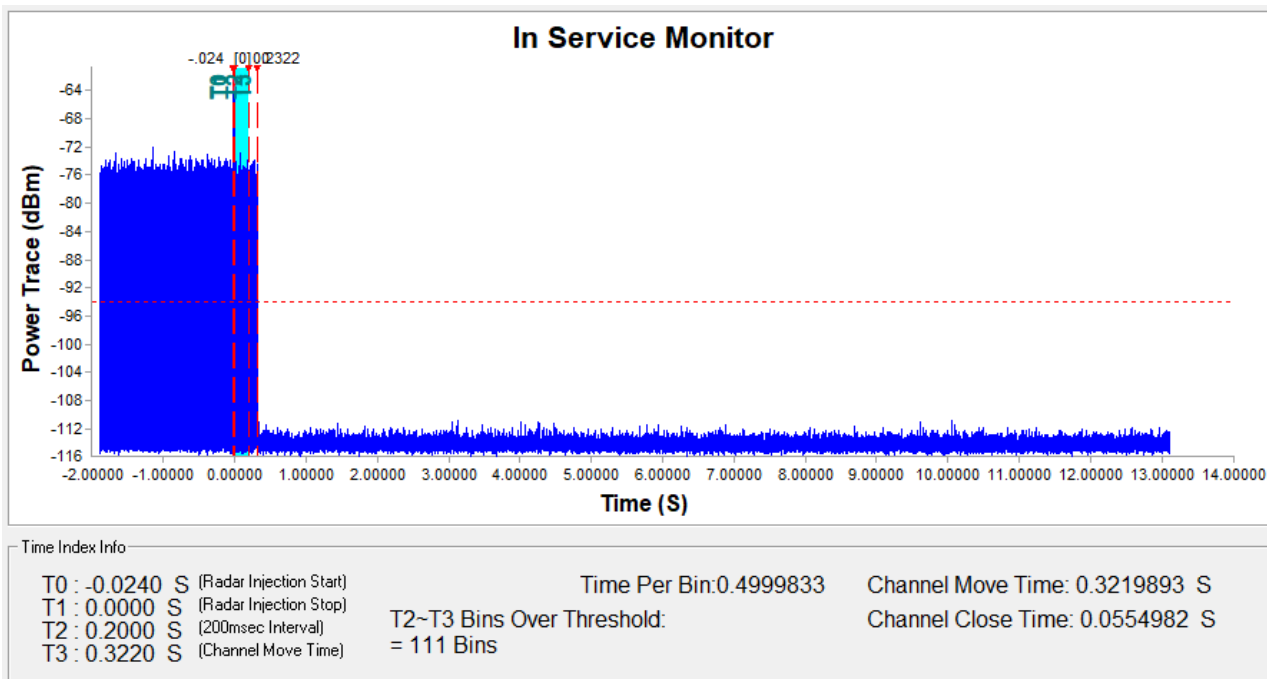
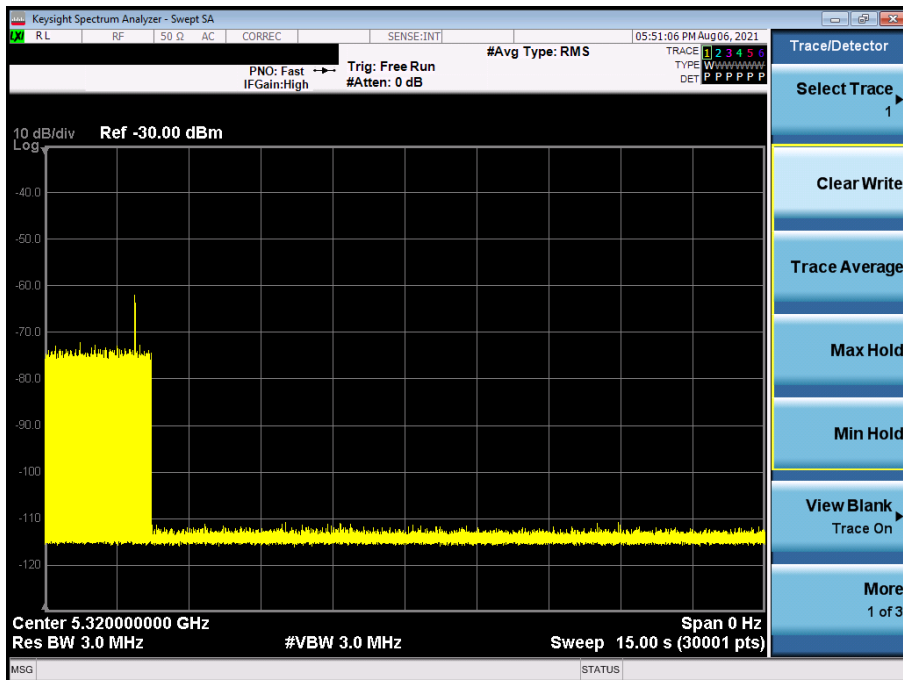
Test plots as follows(5290MHz):



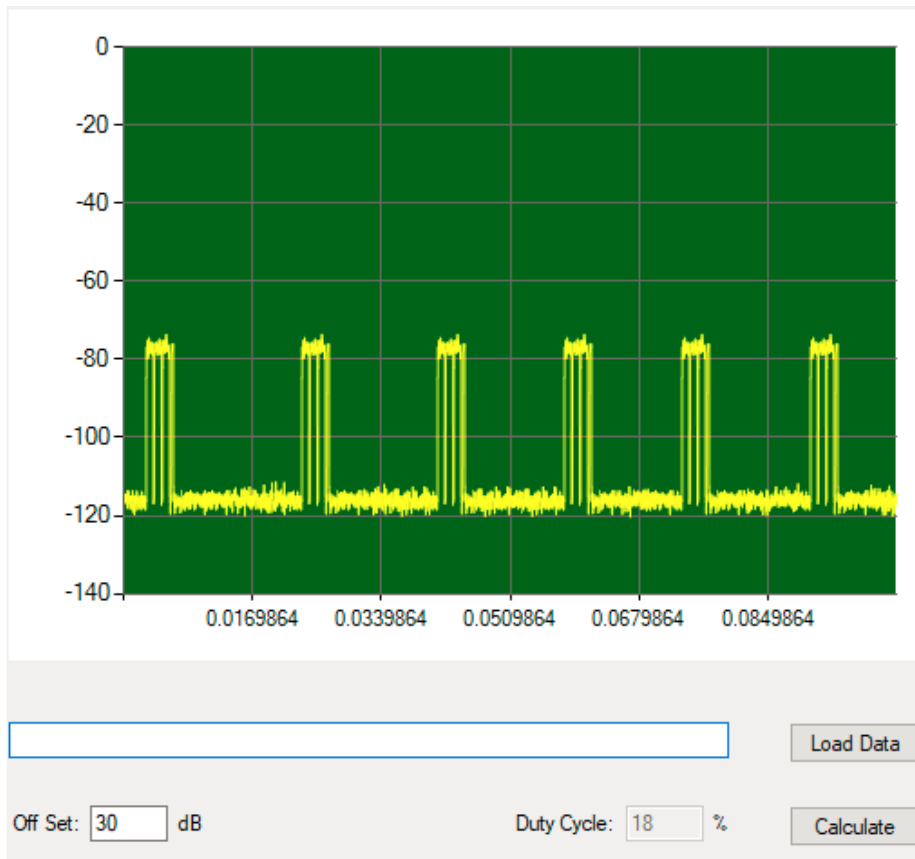
Test plots as follows(5310MHz):



Test plots as follows(5320MHz):



Duty Cycle:



- End of the Report -