The aggregate is the average of the percentage of successful detections of short pulse radar types 1-4

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

Table 2-Long	Pulse	Radar	Test	Waveform
	1 0100	i taaai	1000	

#### **Table 3-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 Trials
6	1	333	9	0.333	300	70%	30

In-Service Monitoring: Channel Move Time, Channel Closing Transmission Time and Non-Occupancy Period

### Limit of In-Service Monitoring:

Reference to DFS Radar Signal Parameter Values.

#### **Test Procedures:**

- a) One frequency will be chosen from the Operating Channels of the EUT within the 5250-5350 MHz or 5470-5725 MHz bands. For 802.11 devices, the test frequency must contain control signals. This can be verified by disabling channel loading and monitoring the spectrum analyzer. If no control signals are detected, another frequency must be selected within the emission bandwidth where control signals are detected.
- b) In case the EUT is a Master Device, a U-NII device operating as a Client Device will be used and it is assumed that the Client will associate with the EUT (Master). For radiated tests, the emissions of the Radar Waveform generator will be directed towards the Master Device. If the Master Device has antenna gain, the main beam of the antenna will be directed toward the radar emitter. Vertical polarization is used for testing.
- c) The TCP protocol unicast data stream was generated by the iperf software command line with at least 17% activity ratio over any 100ms period.
- d) Timing plots are reported with calculations demonstrating a minimum channel loading of approximately 17% or greater. For example, channel loading can be estimated by setting the spectrum analyzer for zero span and approximate the Time On/ (Time On + Off Time).
- e) At time T0 the Radar Waveform generator sends a Burst of pulses for one of the Short Pulse Radar Types 1-4 at DFS Detection Threshold levels 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.
- f) Observe the transmissions of the EUT at the end of the radar Burst on the Operating Channel for duration greater than 10 seconds. Measure and record the transmissions from the EUT during the observation time (Channel Move Time). Measure and record the Channel Move Time and Channel Closing Transmission Time if radar detection occurs.
- g) When operating as a Master Device, monitor the EUT for more than 30 minutes following instant T2 to verify that the EUT does not resume any transmissions on this Channel. Perform this test once and record the measurement result.



Figure 17: Channel Closing Transmission Time, Channel Move Time and Non-Occupancy Period

### Conducted test setup



### Setup for Client with injection at the Master

**Equipment Used:** 

Refer to section 3 for details.

Result of Channel Move Time, Channel Closing Transmission Time and Non-**Test Result: Occupancy Period for Client Beacon Tes** 

The measurement data as follows:

BW / Channel	Test Item	Test Result	Limit	Pass/Fail
	Channel Move Time	0.6149 s	< 10s	Pass
20 MHz / 5300 MHz	Channel Closing Transmission Time	10 ms	< 200+60ms	Pass
	Non-Occupancy Period	No transmission	30 minutes	Pass
	Channel Move Time	0.5821 s	< 10s	Pass
20 MHz / 5500 MHz	Channel Closing Transmission Time	2.4 ms < 200+60ms		Pass
	Non-Occupancy Period	No transmission	30 minutes	Pass
	Channel Move Time	0.6071 s	< 10s	Pass
40 MHz / 5310 MHz	Channel Closing Transmission Time	10.8 ms	< 200+60ms	Pass
	Non-Occupancy Period	No transmission	30 minutes	Pass
	Channel Move Time	0.5965 s	< 10s	Pass
40 MHz / 5510 MHz	Channel Closing Transmission Time	5.2 ms	< 200+60ms	Pass
	Non-Occupancy Period	No transmission	30 minutes	Pass

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#### **Radar Waveform calibration Plot**



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		802.11a 5	300 MHz	mission time	•	
	Agilent Spectrum Analyzer - Swept SA OT RL RF 50Ω DC Marker 5 1.31477 s	A SENSE:INT SOU PNO: Fast → Trig: Free Run IFGain:Low Atten: 10 dB	RCE OFF ALIGN OFF	10:07:03 AM Jan 18, 2019 TRACE 1 2 3 4 5 6 TYPE WWWWWW DET N N N N N	Marker	
	10 dB/div Ref 0.00 dBm			Mkr5 1.315 s -15.94 dBm	5	
	-20.0 (to mb/ <b>x 2</b> ) -30.0				Normal Delta	
	-50.0 -70.0 -80.0 -90.0				Fixed⊳	
	Center 5.300000000 GHz Res BW 3.0 MHz	VBW 3.0 MHz × Y FU	Sweep 12.	Span 0 Hz 00 s (30000 pts) FUNCTION VALUE	Off	
	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	10,00 s1 (Δ) 48,02 dB 700,1 ms -16.05 dBm 200,0 ms (Δ) 47.95 dB 700,1 ms -16.05 dBm 1.315 s -15.94 dBm			Properties▶	
	7 8 9 10 11			×	More 1 of 2	
	MSG					
1) Mark1 ] 2) Dwell = 3) CMT =	Time: 700.1 ms, Mar S/B = 12000ms/300 1.315 s – 0.7001 s =	k2 Time: 10700.1 ms, C 000 = 0.4 ms, C = N x D = 0.6149s <b>Non-Occupancy Perio</b>	Ontime Points: 25 well = 25x 0.4 = d_802.11a_5300	5 10ms D MHz		
1) Mark1 ⊺ 2) Dwell = 3) CMT =	Time: 700.1 ms, Mar S/B = 12000ms/300 1.315 s – 0.7001 s = Agilent Spectrum Analyzer - Swept S/ D2 RL RE S02 DC Marker 1 A 1.80007 ks	rk2 Time: 10700.1 ms, C    000 = 0.4 ms, C = N x D    = 0.6149s    Non-Occupancy Perio    Sense::NT so    PR0: Fast Trig: Free Run    PR0: Fast Trig: Free Run	Ontime Points: 25 well = 25x 0.4 = d_802.11a_5300	0 MHz	Marker	
1) Mark1 1 2) Dwell = 3) CMT =	Fime: 700.1 ms, Mar S/B = 12000ms/300 1.315 s - 0.7001 s = Agilent Spectrum Analyzer - Swept S/ $Marker 1 \Delta 1.80007 ks$ 10 dB/div Ref 0.00 dBm	ck2 Time: 10700.1 ms, C    000 = 0.4 ms, C = N x D    = 0.6149s    Non-Occupancy Perio    A    SENSE:INT SO    PN0: Fast ↔    IFGain:Low	Ontime Points: 25 well = 25x 0.4 = d_802.11a_530( RCE OFFALIGN OFF Avg Type: Log-Pwr	0 10ms 0 MHz 10:46:37 AM Jan 19, 2019 TRACE 12 3 4 5 6 TYPE WWWWWW DET IN IN IN IN IN 11.1.800 ks -47.06 dB	Marker Select Marker 1	
1) Mark1 1 2) Dwell = 3) CMT =	Time: 700.1 ms, Mar S/B = 12000ms/300 1.315 s - 0.7001 s = Agient Spectrum Analyzer - Swept S/ $Marker 1 \Delta 1.80007 ks$ 10 dB/div Ref 0.00 dBm 10 dB/div Ref 0.00 dBm 20.0	ck2 Time: 10700.1 ms, C    000 = 0.4 ms, C = N x D    = 0.6149s    Non-Occupancy Perio    Non-Occupancy Perio    PN0: Fast    FGain:Low	Ontime Points: 25 well = 25x 0.4 = d_802.11a_5300 d_802.11a_5300 RCE OFF ▲ALIGN OFF 3 Avg Type: Log-Pwr	10ms 0 MHz 10:46:37 AMJan 18, 2019 TRACE 12 3 4 5 0 TYPE WWWWWA Ibrit 12 3 4 5 0 TYPE WWWWWA Ibrit 12 3 4 5 0 TYPE WWWWA Ibrit 12 3 4 5 0 TYPE WWWWWA Ibrit 12 3 4 5 0 TYPE WWWWWWWWWWWWWWWWWWWWWWWWWWWWWWWWWWWW	Marker Select Marker 1 Normal	
1) Mark1 2) Dwell = 3) CMT =	Fime: 700.1 ms, Mar S/B = 12000ms/300 1.315 s - 0.7001 s = Agilent Spectrum Analyzer - Swept S/ 20 RL RE 502 DC Marker 1 $\Delta$ 1.80007 ks 10 dB/div Ref 0.00 dBm 10 dB/div Ref 0.00 dBm 10 dB/div Ref 0.00 dBm 10 dB/div Ref 0.00 dBm	ck2 Time: 10700.1 ms, C    000 = 0.4 ms, C = N x D    = 0.6149s    Non-Occupancy Perio    A    PNO: Fast →    IFGain:Low	Ontime Points: 25    well = 25x 0.4 =    d_802.11a_5300    RCE OFF  AulgN OFF    Avg Type: Log-Pwr	5 10ms 0 MHz 10:46:37 AM Jan 18, 2019 TRACE 12 3 4 5 0 PET NA NA NA NA 1Kr1 1,800 ks -47.06 dB	Marker Select Marker 1 Normal Delta	
1) Mark1 1 2) Dwell = 3) CMT =	Fime: 700.1 ms, Mar S/B = 12000ms/300 1.315 s - 0.7001 s = Agilent Spectrum Analyzer - Swept S/ $Marker 1 \Delta 1.80007 ks$ 10 dB/div Ref 0.00 dBm 10 dB/div Ref 0.00 dBm -00 22 -00 22 -00 22 -00 22 -00 22 -00 20 -00	ck2 Time: 10700.1 ms, C    000 = 0.4 ms, C = N x D    = 0.6149s    Non-Occupancy Period    A	Ontime Points: 25 well = 25x 0.4 = d_802.11a_5300 Avg Type: Log-Pwr	5 10ms 0 MHz 10:46:37 AMJan 18, 2019 TRACE 12 3 4 5 0 TYPE WINNING DET WINNING PET WINNING AT7.06 dB	Marker Select Marker 1 Normal Delta Fixed⊳	
1) Mark1 2) Dwell = 3) CMT =	Time: 700.1 ms, Mar S/B = 12000ms/300 1.315 s - 0.7001 s =    Aglent Spectrum Analyzer - Swept S/ OX RL    RE  50.2 col    Marker 1 Δ 1.80007 ks    10 dB/div  Ref 0.00 dBm    -10.0  2    -20.0  2    -40.0  4    -50.0  -    -60.0  -    -70.0  -    -80.0  -    -90.0  -    Center 5.3000000000 GHz    Res BW 3.0 MHz	ck2 Time: 10700.1 ms, C    000 = 0.4 ms, C = N x D    = 0.6149s    Non-Occupancy Perio    A    PN0: Fast    IFGain:Low    Atten: 10 dB	Ontime Points: 25    well = 25x 0.4 =    d_802.11a_5300    CLIGN OFF    Avg Type: Log-Pwr	5 10ms 0 MHz 10:46:37 AM 3m 18, 2019 TRACE 2 3 4 5 0 10:47 AM 3m 18, 2019 TRACE 2 3 4 5 0 10:47 AM 3m 18, 2019 TRACE 2 3 4 5	Marker Select Marker 1 Normal Delta Fixed⊳ Off	
1) Mark1 1 2) Dwell = 3) CMT =	Fime: 700.1 ms, Mar S/B = 12000ms/300 1.315 s - 0.7001 s = Agilent Spectrum Analyzer - Swept S/ $Marker 1 \Delta 1.80007 ks$ 10 dB/div Ref 0.00 dBm 10 dB/div Ref 0.00 dBm 10 dB/div Ref 0.00 dBm 20 0 20	ck2 Time: 10700.1 ms, C    000 = 0.4 ms, C = N x D    = 0.6149s    Non-Occupancy Period    Non-Occupancy Period    PN0: Fast    PN0: Fast    Fig. Free Run    Atten: 10 dB    VBW 3.0 MHz    X    Y    1.800 ks (Δ)    47.06 dB    32.27 s    -15.15 dBm	Ontime Points: 25    well = 25x 0.4 =    d_802.11a_5300    CC OFF  ▲ALGN OFF    Avg Type: Log-Pwr    Avg    Sweep 2.00    NCTION    FUNCTION WIDTH	5 10ms D MHz 10:46:37 AM Jan 18, 2019 TRACE 12 3 4 5 0 TYPE VIEW VIEW OF A TYPE VIEW OF A TYPE VIEW OF A TYPE VIEW OF A TYPE VIEW OF A TACE 12 3 4 5 0 TYPE VIEW OF A TYPE V	Marker Select Marker 1 Normal Delta Fixed⊳ Off Properties►	
1) Mark1 1 2) Dwell = 3) CMT =	Fime: 700.1 ms, Mar S/B = 12000ms/300 1.315 s - 0.7001 s = Agilent Spectrum Analyzer - Swept S/ 20 RL RF 50.0 CC Marker 1 $\Delta$ 1.80007 ks 10 dB/div Ref 0.00 dBm -0.0 2 -0.0 2 -0.0 4 -0.0 4	ck2 Time: 10700.1 ms, C    000 = 0.4 ms, C = N x D    = 0.6149s    Non-Occupancy Period    A    SENSE:INT SO    PN0: Fast    PN0: Fast    From Atten: 10 dB	Ontime Points: 25    well = 25x 0.4 =    d_802.11a_5300    C    Avg Type: Log-Pwr    Avg    Sweep 2.00    NCTION    FUNCTION WIDTH	5 10ms D MHz Dr46:37 AM 3m 18, 2019 TRACE 2 3 4 5 0 TYPE WANNANA Ikr1 1, 800 ks -47.06 dB 10/2 10/2 10/2 FUNCTION VALUE	Marker Select Marker 1 Normal Delta Fixed⊳ Off Properties► More 1 of 2	

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	Channel Mo	ve Time & Channe 802.11n40	I Closing Transmission 5310 MHz	n Time
	Agilent Spectrum Analyzer - Swept SA (20 RL RF 50 2 DC Marker 5 1.46839 s	0: Fast ↔ Trig: Free Run	RCE OFF ALIGN OFF 12:56:01 PM Jan Avg Type: Log-Pwr TRACE	8, 2019 19 4 5 - 8 19 Marker
	10 dB/div Ref 0.00 dBm	ain:Low Atten: 10 do	Mkr5 1.4 -28.43 (	Select Marker 5 1Bm
	-10.0 -20.0 -30.0 -40.0			Normal
	-50.0 304 -60.0 100 100 100 100 100 100 100 100 100	landandi para di una malanta se de terra inseta re		2 Delta
	-80.0 -90.0 Center 5.310000000 GHz		Span	Fixed⊳
	Res BW 3.0 MHz      MKR MODE TRC SCL    ×      1    Δ2    1    t    (Δ)    1      2    F    1    t    960	#VBW 3.0 MHz Y FU 0.00 s (Δ) -41.91 dB .9 ms -22.63 dBm	Sweep 12.00 s (3000 NCTION FUNCTION WIDTH FUNCTION VAL	0 pts) Off
	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	1.0 ms (Δ) -42.92 dB 1.9 ms -22.63 dBm .468 s -28.43 dBm		Properties►
	8 9 10 11	AI		More 1 of 2
7) Mark1 3) Dwell = 9) CMT =	Time: 860.9 ms, Mark2 T : S/B = 12000ms/30000 = 1.468 s – 0.8609 s = 0.6 Non-(	ime: 10860.9 ms,O = 0.4 ms, C = N x D 071s Dccupancy Period	ntime Points: 27 well = 27 x 0.4 = 10.8ms _802.11n40_ 5310 MHz	
	Agilent Spectrum Analyzer - Swept SA Agilent Spectrum Analyzer - Swept SA Agilent So Ω DC Marker 1 Δ 1.80007 ks Pi IFC	SENSE:INT SOU NO: Fast ↔→ Trig: Free Run Atten: 10 dB	RCE OFF ALIGN OFF 01:34:53 PM Jan 1 Avg Type: Log-Pwr TRACE T Type Det NN	8, 2019 3 4 5 6 NNNN Select Marker
	10 dB/div Ref 0.00 dBm		-41.6	Normal
	-30.0			∆2 Delta
	-70.0 -80.0 -90.0			Fixed⊳
	Center 5.310000000 GHz Res BW 3.0 MHz	#VBW 3.0 MHz	Span Sweep 2.000 ks (3000 Inction Function val	0 Hz 0 pts) <sup>JE</sup>
	2 F 1 t 3 3 4 5 5 7 9 9 9 9 9 10 10 10 10 10 10 10 10 10 10 10 10 10	9.87 s -21.51 dBm		Properties►
	8 9 10 11 <			More 1 of 2
	MSG		STATUS	

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## 5.9 AC POWER LINE CONDUCTED EMISSION

Test Requirement: FCC 47 CFR Part 15 Subpart C Section 15.207 **Test Method:** ANSI C63.10-2013 Section 6.2

Limits:

Frequency range	Limits (dB(µV)			
(MHz)	Quasi-peak	Average		
0,15 to 0,50	66 to 56	56 to 46		
0,50 to 5	56	46		
5 to 30	60	50		

#### Remark:

- 1. The lower limit shall apply at the transition frequencies.
- The limit decreases linearly with the logarithm of the frequency in the range 0.15 to 0.50 MHz. 2.
- Test Setup: Refer to section 4.4.2 for details.

#### **Test Procedures:**

Test frequency range :150KHz-30MHz

- The mains terminal disturbance voltage test was conducted in a shielded room. 1)
- The EUT was connected to AC power source through a LISN 1 (Line Impedance Stabilization Network) 2) which provides a  $50\Omega/50\mu$ H +  $5\Omega$  linear impedance. The power cables of all other units of the EUT were connected to a second LISN 2, which was bonded to the ground reference plane in the same way as the LISN 1 for the unit being measured. A multiple socket outlet strip was used to connect multiple power cables to a single LISN provided the rating of the LISN was not exceeded.
- The tabletop EUT was placed upon a non-metallic table 0.8m above the ground reference plane. And for 3) floor-standing arrangement, the EUT was placed on the horizontal ground reference plane,
- The test was performed with a vertical ground reference plane. The rear of the EUT shall be 0.4 m from 4) the vertical ground reference plane. The vertical ground reference plane was bonded to the horizontal ground reference plane. The LISN 1 was placed 0.8 m from the boundary of the unit under test and bonded to a ground reference plane for LISNs mounted on top of the ground reference plane. This distance was between the closest points of the LISN 1 and the EUT. All other units of the EUT and associated equipment was at least 0.8 m from the LISN 2.
- In order to find the maximum emission, the relative positions of equipment and all of the interface cables 5) must be changed according to ANSI C63.10 on conducted measurement.

Equipment Used: Refer to section 3 for details. Pass

**Test Result:** 





### Remark:

1. An initial pre-scan was performed on the Phase and neutral lines with peak detector. Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission were detected.



## **APPENDIX 1 PHOTOS OF TEST SETUP**

See test photos attached in Appendix 1 for the actual connections between Product and support equipment.

# **APPENDIX 2 PHOTOS OF EUT CONSTRUCTIONAL DETAILS**

Refer to Appendix 2 for EUT external and internal photos.

\*\*\* End of Report \*\*\*

The test report is effective only with both signature and specialized stamp. The result(s) shown in this report refer only to the sample(s) tested. Without written approval of UnionTrust, this report can't be reproduced except in full.

