



TEST REPORT

ETSI EN 302 502 V2.1.3 (2017-07)

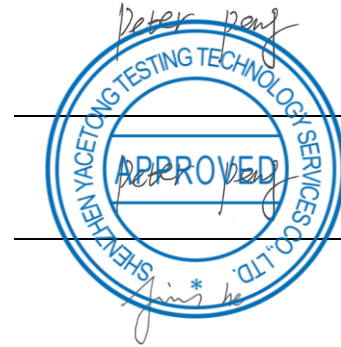
Report Reference No......: ATT2020SZ061005E5

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Date of issue: Jun.03,2020



Representative Laboratory Name: **Shenzhen Yacetong Testing Technology Services Co., Ltd.**

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Applicant's name.....: **SHENZHEN ITOONER TECHNOLOGY CO., LTD**

Address.....: Building 2&Building 3(The 3rd and 4th Floor) GangZai Road, Shangxing Community,Xinqiao Street,Baoan District, Shenzhen, Guangdong, China

Test specification.....:

Standard: **ETSI EN 302 502 V2.1.3 (2017-07)**

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Test item description: AP

Trade Mark.....: N/A

Manufacturer: **SHENZHEN ITOONER TECHNOLOGY CO., LTD**

Model/Type reference: GNT-AP290

List Model.....: GNT-AP260,GNT-AP270,GNT-AP290,GNT-AP670,GNT-AP690,GN-AP61M15
GNT-AP54ME5,GNT-CP535,GNT-CP570,GNT-CP970,GNT-CP980

Operation Frequency.....: From 5180MHz-5240MHz

Ratings.....: DC 12V From Adapter

Result.....: **PASS**



Test Report No:	ATT2020SZ061005E5	June.03, 2020 Date of issue
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Equipment under Test : AP

Model /Type : GNT-AP290
GNT-AP260,GNT-AP270,GNT-AP290,GNT-AP670,GNT-AP690,

Listed Models : GN-AP61M15,GNT-AP54ME5,GNT-CP535,GNT-CP570,GNT-CP970,
GNT-CP980

Applicant : SHENZHEN ITOONER TECHNOLOGY CO.,LTD

Address : Building 2&Building 3(The 3rd and 4th Floor) GangZai Road,Shangxing
Community,Xinqiao Street,Baoan District, Shenzhen, Guangdong,
China

Manufacturer : SHENZHEN ITOONER TECHNOLOGY CO.,LTD

Address : Building 2&Building 3(The 3rd and 4th Floor) GangZai Road,Shangxing
Community,Xinqiao Street,Baoan District, Shenzhen, Guangdong,
China

S T R E P O R T

Test Result:	PASS
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The test report merely corresponds to the test sample.It is not permitted to copy extracts of these test result without the written permission of the test laboratory.



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Test items for EN 302502

TestItems	TestRequirement	TestMethod	Limit /Severity	Result
Designation of centre frequencies and frequency error	Clause 4.1	Clause 5.3.2	±20ppm	PASS
Transmitter RF output power, EIRP and EIRP spectral density	Clause 4.2	Clause 5.3.3	Table 1	PASS
Transmitter unwanted emissions outside the 5 725 MHz to 5 875 MHz band	clause 4.3.1	Clause 5.3.4.1	Table 2	PASS
Transmitter unwanted emissions within the 5 725 MHz to 5 875 MHz band	clause 4.3.2	Clause 5.3.4.2	Figure 1	PASS
Transmitter Power Control (TPC)	clause 4.4	clause 5.3.3	Clause 4.4.2	N/A
Receiver spurious emissions	clause 4.5	clause 5.3.5	Table 3	PASS
Dynamic Frequency Selection (DFS)	clause 4.6	clause 5.3.8	Table 5	PASS
N/A : Not Applicable				

EN 302502	Wireless Access Systems (WAS); 5,8 GHz fixed broadband data transmitting systems; Harmonised Standard for access to radio spectrum.
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Information

21. General Description of E.U.T.

Product Name:	AP
Trade Mark:	N/A
Model/Type reference:	GNT-AP290
List Model:	GNT-AP260,GNT-AP270,GNT-AP290,GNT-AP670,GNT-AP690,GN-AP61M15 GNT-AP54ME5,GNT-CP535,GNT-CP570,GNT-CP970,GNT-CP980
Power supply:	Input 12V=== 0.5A(from external adapter)
WIFI	
Operation Frequency:	5G WIFI: 5850-5850GHz
Channel separation:	20MHz for 802.11a/802.11n(HT20)
Modulation technology:	DBPSK, DQPSK, CCK, 64QAM, 16QAM, QPSK, BPSK, 256QAM OFDM in 802.11ac only
Antenna transmitting power:	12DBI

22 Description of test

Operating band	20MHz	
	Channel	Frequency (MHz)
(5725MHz-5850MHz)	149	5745
	153	5765
	157	5785
	161	5805
	165	5825

The available channel of EUT:

According to EN 302 502 clause 5.1.3, for 802.11a and 802.11n-HT20 mode, we selected channel No.149,157and 165to perform the test.For 802.11n-HT20 mode, the EUT support 2x2 MIMO, for 802.11a mode, the EUT just support SISO.For conducted method test, the detail test plan as below:



TestItems	Testconditions	Ant.port	Testchannel
Designation of centre frequencies and frequency error	Normal & Extreme	Ant. Port1	Low&High
Transmitter RF output power, EIRP and EIRP spectral d	Normal	Ant. Port 1 & 2	Low&High
Transmitter Unwanted emission Outside 5GHz R-LAN Bands	Normal	Ant. Port 1 & 2	Low&High
Transmitter Unwanted emission within 5GHz R-LAN Bands	Normal	Ant. Port1	Low & High
Receiver Spurious Emissions	Normal	Enclosure	Middle

Note: For 802.11a mode, all tests were performed in Ant.port1.

23. Test Mode

Testmode	Keep the EUT in continuous transmitting mode (100% duty cycle)
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Remark: Pre-scan all data mode, MCS0 data rate was the worst case mode, so all tests were performed in this mode.

24. Description of Support Units

The EUT has been tested independently.

25. Address of the test laboratory Shenzhen VTC Testing Technology Co., Ltd.

211 Factory Room, No. 96, Yangchong Road, Tangxiachong Community,
Yanluo Street, Bao'an District, Shenzhen, Guangdong, China

26. Environmental conditions

During the measurement the environmental conditions were within the listed ranges:

Normal Temperature: 25°C High Temperature: 40°C Low Temperature: 5°C Normal



cription of Support Units

Test Equipment	Manufacturer	Model No.	Serial No.	Calibration Date	Calibration Due Date
ULTRA-BROADBAND ANTENNA	Schwarzbeck	VULB9163	000976	July.14,2019	July,13,2020
ULTRA-BROADBAND ANTENNA	Schwarzbeck	VULB9163	000975	July.14,2019	July,13,2020
Horn Antenna	Schwarzbeck	BBHA 9120D	01622	July.14,2019	July,13,2020
Horn Antenna	Schwarzbeck	BBHA 9120D	01623	July.14,2019	July,13,2020
EMI Test Receiver	Rohde&Schwarz	ESCI	101102	July.14,2019	July,13,2020
Spectrum Analyzer	Agilent	N9020A	MY48010425	July.14,2019	July,13,2020
Spectrum Analyzer	Agilent	E4407B	MY45108355	July.14,2019	July,13,2020
Pre-Amplifier	Schwarzbeck	BBV 9743	#202	July.14,2019	July,13,2020
Pre-Amplifier	Chenyi	EMC051845B	980355	July.14,2019	July,13,2020
Horn Antenna	Schwarzbeck	BBHA9170	25841	July.14,2019	July,13,2020
High pass filter	Compliance Direction systems	BSU-6	34202	July.14,2019	July,13,2020
Signal Generator	Rohde&Schwarz	SMB100A	177649	July.14,2019	July,13,2020
4 Ch. Simultaneous Sampling 14 Bits 2 MS/s	Agilent	U2531A	TW54063513	July.14,2019	July,13,2020
X-series USB Peak and Average Power Sensor	Agilent	U2021XA	MY54080019	July.14,2019	July,13,2020
X-series USB Peak and Average Power Sensor	Agilent	U2021XA	MY54080012	July.14,2019	July,13,2020
X-series USB Peak and Average Power Sensor	Agilent	U2021XA	MY53340004	July.14,2019	July,13,2020
X-series USB Peak and Average Power Sensor	Agilent	U2021XA	MY53340008	July.14,2019	July,13,2020
Vector Signal generator	Agilent	N5181A	MY49060502	July.14,2019	July,13,2020
Signal generator	Agilent	E4421B	3610AO1069	July.14,2019	July,13,2020
Radio Communication Tester	Rohde&Schwarz	CMW500	115406	July.14,2019	July,13,2020



Essential Radio Test Suites Specification in EN30 2502.

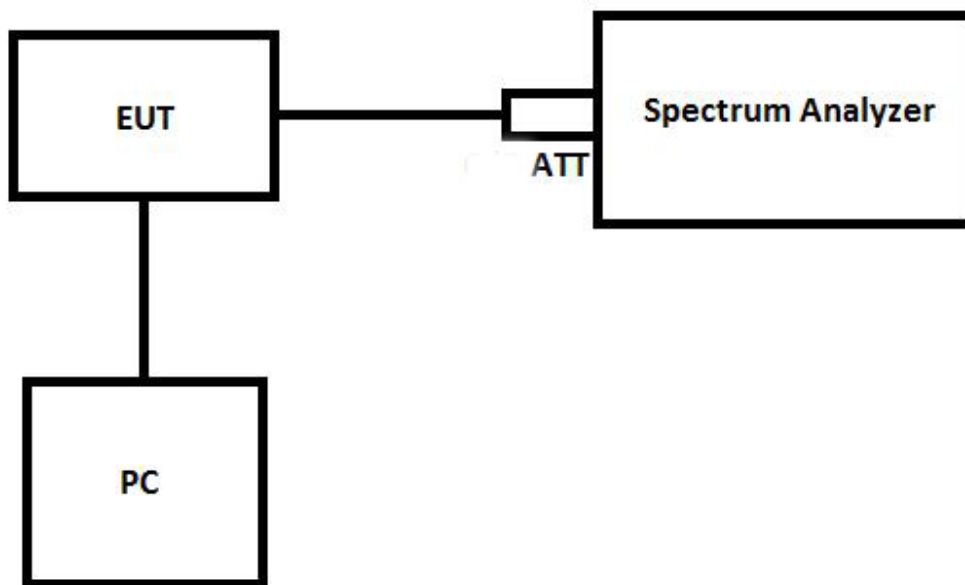
3.1. Designation of centre frequencies and frequency error

3.1.1 Test Limit

EN 302 502: clause 4.2.2

The manufacturer shall declare the centre frequencies on which the equipment can operate. The equipment shall only operate in channels centred on any of those frequencies identified in clause 4.1.1. The actual carrier centre frequency shall be maintained within the range $f_c \pm 20$ ppm of the nominal channel centre frequency.

3.1.2 Test Setup



3.1.3 Measurement Record:

Designation of centre frequencies

The manufacturer declared that the frequency range of EUT is 5725MHz to 5840MHz, and the frequency spacing is 5MHz, meet the requirement of centre frequencies for CHS=20MHz, and the Occupied Bandwidth was tested as below:



Antenna B Power, Both antenna A and B have been test, Only show the worst data of Antenna A 802.11a

802.11a(CH149)



TEST CONDITIONS	CENTRE FREQUENCIES (ppm)		
	5180MHz		
	Frequency(MHz)	Frequency Error	
(KHz)		(ppm)	
T nom (°C)	5745.05120	51.20	8.91
T min (°C)	5745.05170	51.70	9.00
T max (°C)	5745.05180	51.80	9.02
Max Frequency Error	51.20(KHz)		
Limits	± 20 ppm=Limit(105K)		
Result	Complies		

802.11a(CH157)

TEST CONDITIONS	CENTRE FREQUENCIES (ppm)		
	5180MHz		
	Frequency(MHz)	Frequency Error	
(KHz)		(ppm)	
T nom (°C)	5785.05130	51.30	8.93
T min (°C)	5785.05150	51.50	8.96
T max (°C)	5785.05120	51.20	8.91
Max Frequency Error	51.20(KHz)		
Limits	± 20 ppm=Limit(105K)		
Result	Complies		

802.11a(CH165)

TEST CONDITIONS	CENTRE FREQUENCIES (ppm)		
	5180MHz		
	Frequency(MHz)	Frequency Error	
(KHz)		(ppm)	
T nom (°C)	5825.05150	51.50	8.96
T min (°C)	5825.05130	51.30	8.93
T max (°C)	5825.05140	51.40	8.95
Max Frequency Error	51.20(KHz)		
Limits	± 20 ppm=Limit(105K)		
Result	Complies		



Transmitter RF Output Power and EIRP

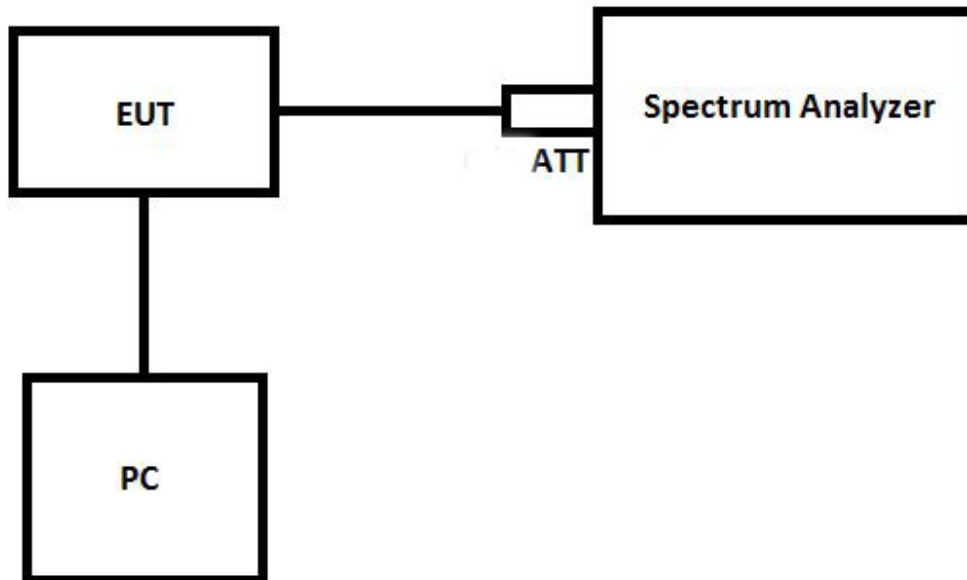
3.2.1 Test Limit

Refer EN 302 502: clause 4.2.2.

Table 1: Mean RF output power, EIRP and power density limits at the highest power level

Channel Width (MHz) ChS	Mean RF power into antenna (dBm)	mean EIRP (dBm)	Mean EIRP spectral density (dBm/MHz)
10	27	33	23
20	30	36	23

3.2.2 Test Setup





asurmentRecord

802.11a HT 20							
Test conditions		Channel/ Frequency	ANT A e.i.r.p (dBm)	ANT B e.i.r.p (dBm)	ANT A +ANTB e.i.r.p (dBm)	Limit (dBm)	Result
Temperatur e (°C)	Voltage (V)						
+25°C	230	149/5745	8.56	8.23	--	36	PASS
-10°C	240		8.33	8.59	--		
	207		8.27	8.42	--		
+40°C	240		8.42	8.37	--		
	207	8.14	8.65	--			
+25°C	230	157/5785	8.78	8.78	--		
-10°C	240		8.50	8.61	--		
	207		8.63	8.56	--		
+40°C	240		8.93	8.63	--		
	207	8.54	8.42	--			
+25°C	230	165/5825	8.60	8.77	--		
-10°C	240		8.51	8.56	--		
	207		8.77	8.73	--		
+40°C	240		8.25	8.51	--		
	207	8.67	8.69	--			

802.11n HT 20							
Test conditions		Channel/ Frequency	ANT A e.i.r.p (dBm)	ANT B e.i.r.p (dBm)	ANT A +ANTB e.i.r.p (dBm)	Limit (dBm)	Result
Temperatur e (°C)	Voltage (V)						
+25°C	230	149/5745	8.70	8.81	11.77	36	PASS
-10°C	240		8.63	8.71	11.68		
	207		9.14	9.20	12.18		
+40°C	240		8.61	8.64	11.64		
	207	8.68	8.73	11.72			
+25°C	230	157/5785	8.45	8.47	11.47		
-10°C	240		8.65	8.77	11.72		
	207		8.44	8.50	11.48		
+40°C	240		8.47	8.56	11.53		
	207	8.85	8.83	11.85			
+25°C	230	165/5825	8.60	8.70	11.66		
-10°C	240		9.03	9.15	12.10		
	207		9.02	9.10	12.07		
+40°C	240		8.92	8.98	11.77		
	207	8.68	8.75	11.68			





Power Spectrum Density

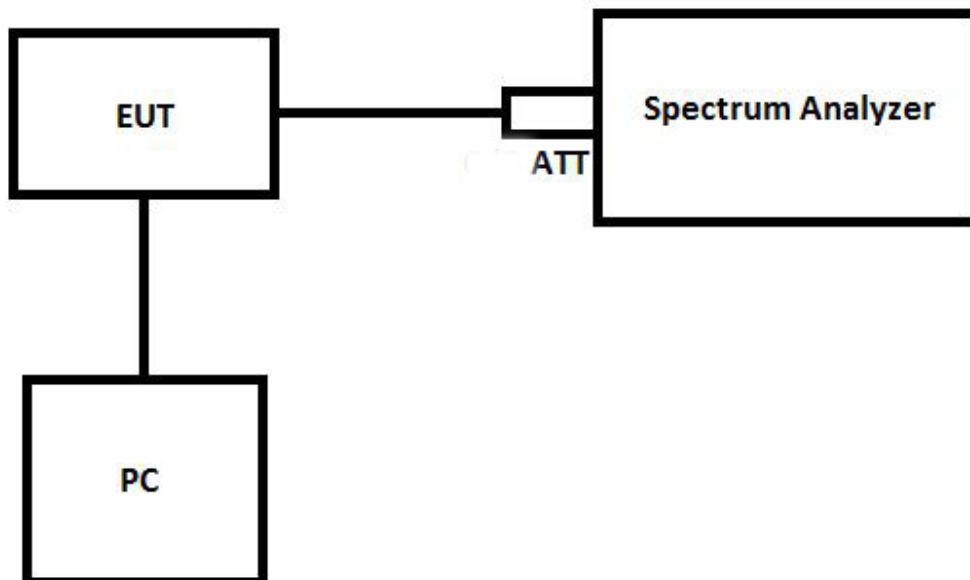
3.3.1 Test Limit

Refer EN 302 502-15: clause 4.4.2.

Table 1: Mean RF output power, EIRP and power density limits at the highest power level

Channel Width (MHz) ChS	Mean RF power into antenna (dBm)	mean EIRP (dBm)	Mean EIRP spectral density (dBm/MHz)
10	27	33	23
20	30	36	23

3.3.2 Test Setup





stLimit

802.11a HT 20							
Test conditions		Channel/ Frequency	ANT A e.i.r.p (dBm)	ANT B e.i.r.p (dBm)	ANT A +ANTB e.i.r.p (dBm)	Limit (dBm)	Result
Temperature (°C)	Voltage (V)						
+25°C	230	149/5745	-3.67	-4.86	--	23	PASS
-10°C	240		-3.92	-4.57	--		
	207		-3.96	-4.67	--		
+40°C	240		-3.81	-4.72	--		
	207		-4.06	-4.44	--		
+25°C	230		157/5785	-3.46	-4.31		
-10°C	240	-3.75		-4.48	--		
	207	-3.63		-4.53	--		
+40°C	240	-3.35		-4.46	--		
	207	-3.66		-4.67	--		
+25°C	230	165/5825		-3.63	-4.32		
-10°C	240		-3.72	-4.53	--		
	207		-3.46	-4.36	--		
+40°C	240		-3.98	-4.58	--		
	207		-3.56	-4.42	--		

802.11n HT 20							
Test conditions		Channel/ Frequency	ANT A e.i.r.p (dBm)	ANT B e.i.r.p (dBm)	ANT A +ANTB e.i.r.p (dBm)	Limit (dBm)	Result
Temperature (°C)	Voltage (V)						
+25°C	230	149/5745	8.70	8.81	-0.88	23	PASS
-10°C	240		8.63	8.71	-0.96		
	207		9.14	9.20	-0.46		
+40°C	240		8.61	8.64	-1.00		
	207		8.68	8.73	-0.93		
+25°C	230		157/5785	8.45	8.47		
-10°C	240	8.65		8.77	-0.92		
	207	8.44		8.50	-1.16		
+40°C	240	8.47		8.56	-1.12		
	207	8.85		8.83	-0.79		
+25°C	230	165/5825		8.60	8.70		
-10°C	240		9.03	9.15	-0.54		
	207		9.02	9.10	-0.57		
+40°C	240		8.92	8.98	-0.68		
	207		8.68	8.75	-0.92		



Transmitter Unwanted emission Outside 5725MHz to 5850MHz Band

3.4.1 TestLimit

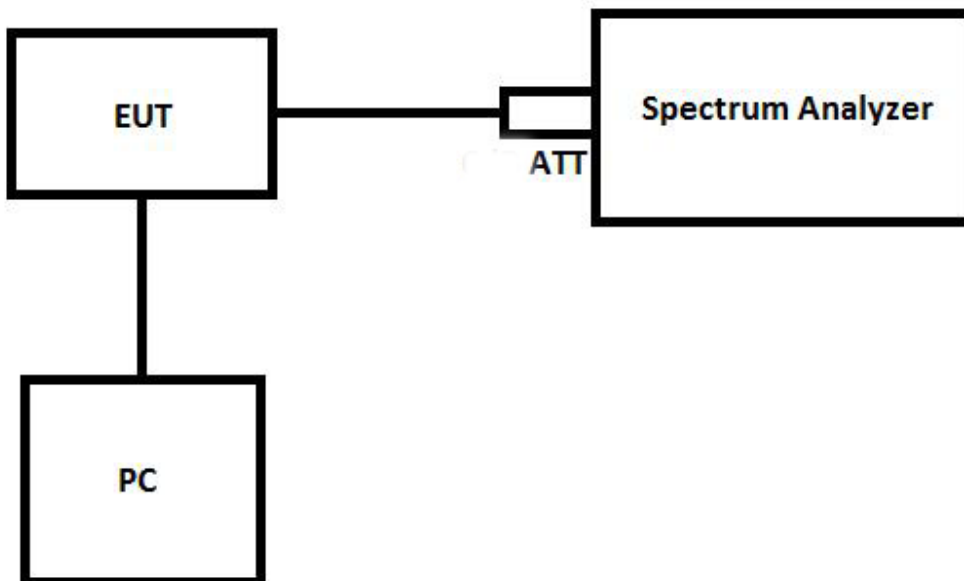
Refer EN 302 8502 : clause4.3.1.2

Table 2: Transmitter unwanted emission limits

Frequency range (MHz)	Limit (dBm)	Bandwidth (kHz) (see note)
30 to 1 000	-36	100
1 000 to 5 725	-30	1 000
5 875 to 26 500	-30	1 000

NOTE: At frequencies just below 5 725 MHz or just above 5 875 MHz, account shall be taken of the spacing between the emission centre frequency and the measurement centre frequency to evaluate the appropriate reference bandwidth given in annex 2 of CEPT/ERC Recommendation 74-01 [10].

3.4.2 TestSetup





3.4.2 MeasurementRecord:

802.11n HT 20, CH 149,Horizontal/Vertical

Fre.(MHz)	ANT.Pol.	Result (dBm)	Limit	Margin	Conclusion
Below1GHz:					
162.71	V	-75.77	-36	-39.77	PASS
207.02	V	-74.04	-54	-20.04	PASS
298.87	V	-76.82	-36	-40.82	PASS
375.52	V	-74.19	-36	-38.19	PASS
479.73	V	-73.84	-36	-37.84	PASS
788.51	V	-76.38	-54	-22.38	PASS
178.35	H	-74.33	-36	-38.33	PASS
208.07	H	-76.63	-54	-22.63	PASS
318.87	H	-73.24	-36	-37.24	PASS
415.88	H	-75.22	-36	-39.22	PASS
546.67	H	-72.51	-54	-18.51	PASS
810.97	H	-75.63	-54	-21.63	PASS
Note: 1.Cable loss and antenna gain was combined in the calculatedresult. 2. Otherpointofthemeasurementsarebelow20dBfromthelimit.					



Remark: All test modes were test and recorded worst case at 802.11n HT20 MIMO mode

We test 25MHz to 10thharmonic of fundamental frequency and recorded worst at below:

Lowest Frequency: 5745MHz					
Frequency (MHz)	Res. Bandwidth (kHz)	Maximum Emission Observed (dB)	Limit (dBm)	Margin (dB)	Polarization
11490.00	1000	-44.32	-30	14.32	H
17235.00	1000	-43.49	-30	13.49	H
--	--	--	--	--	--
11490.00	1000	-45.47	-30	15.47	V
17235.00	1000	-42.56	-30	12.56	V
--	--	--	--	--	--
Highest Frequency: 5825MHz					
11650.00	1000	-44.39	-30	14.39	H
17475.00	1000	-41.42	-30	11.42	H
--	--	--	--	--	--
11650.00	1000	-46.68	-30	16.68	V
17475.00	1000	-43.75	-30	13.75	V
--	--	--	--	--	--

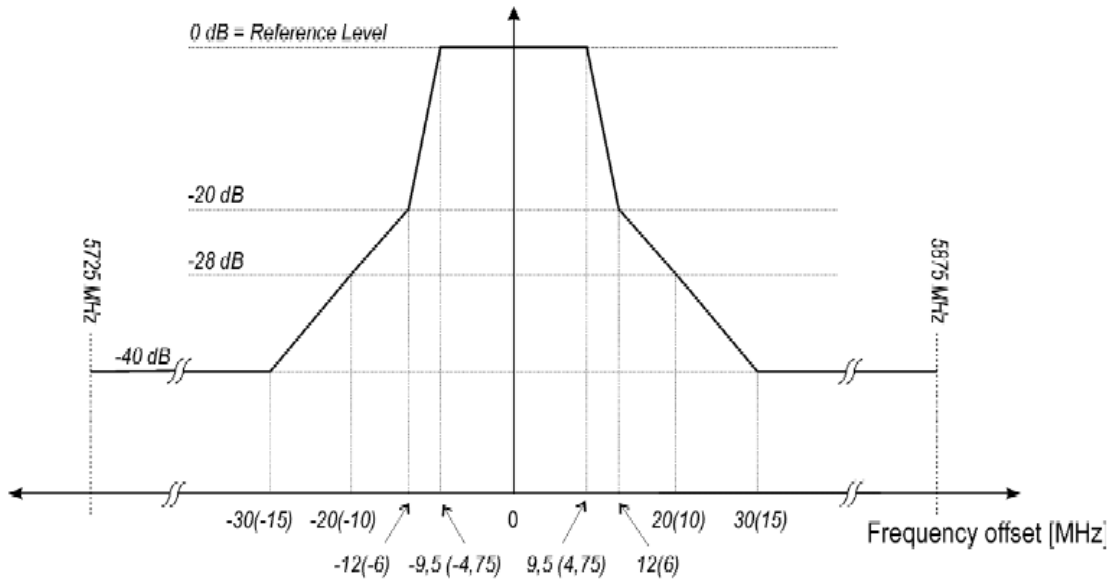
Note: "--"Other emission levels were very low against the limit and not reported.



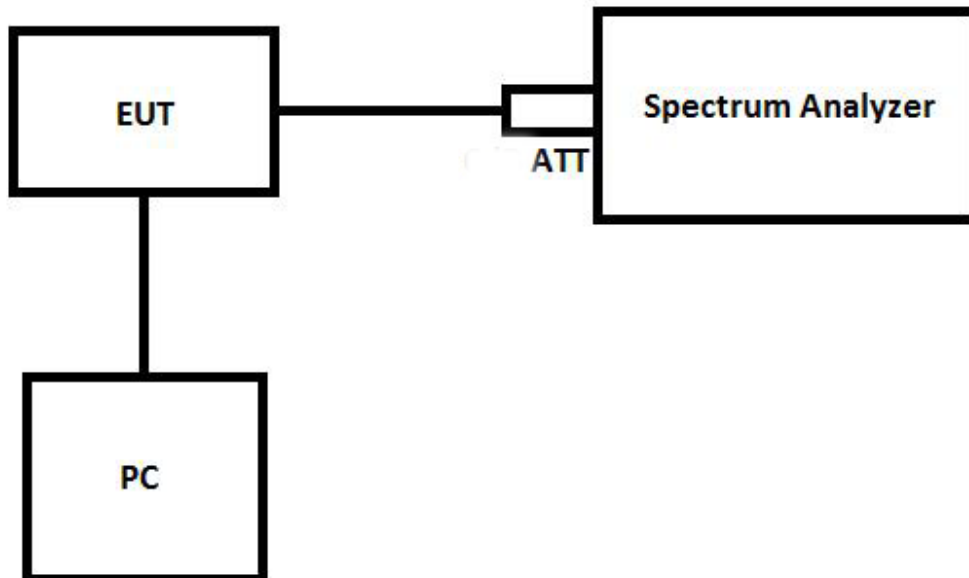
Transmitter Unwanted emission Within 5850MHz to 5875MHz Band

3.5.1 TestLimit

Refer EN 302 502 : clause 4.3.2.2:

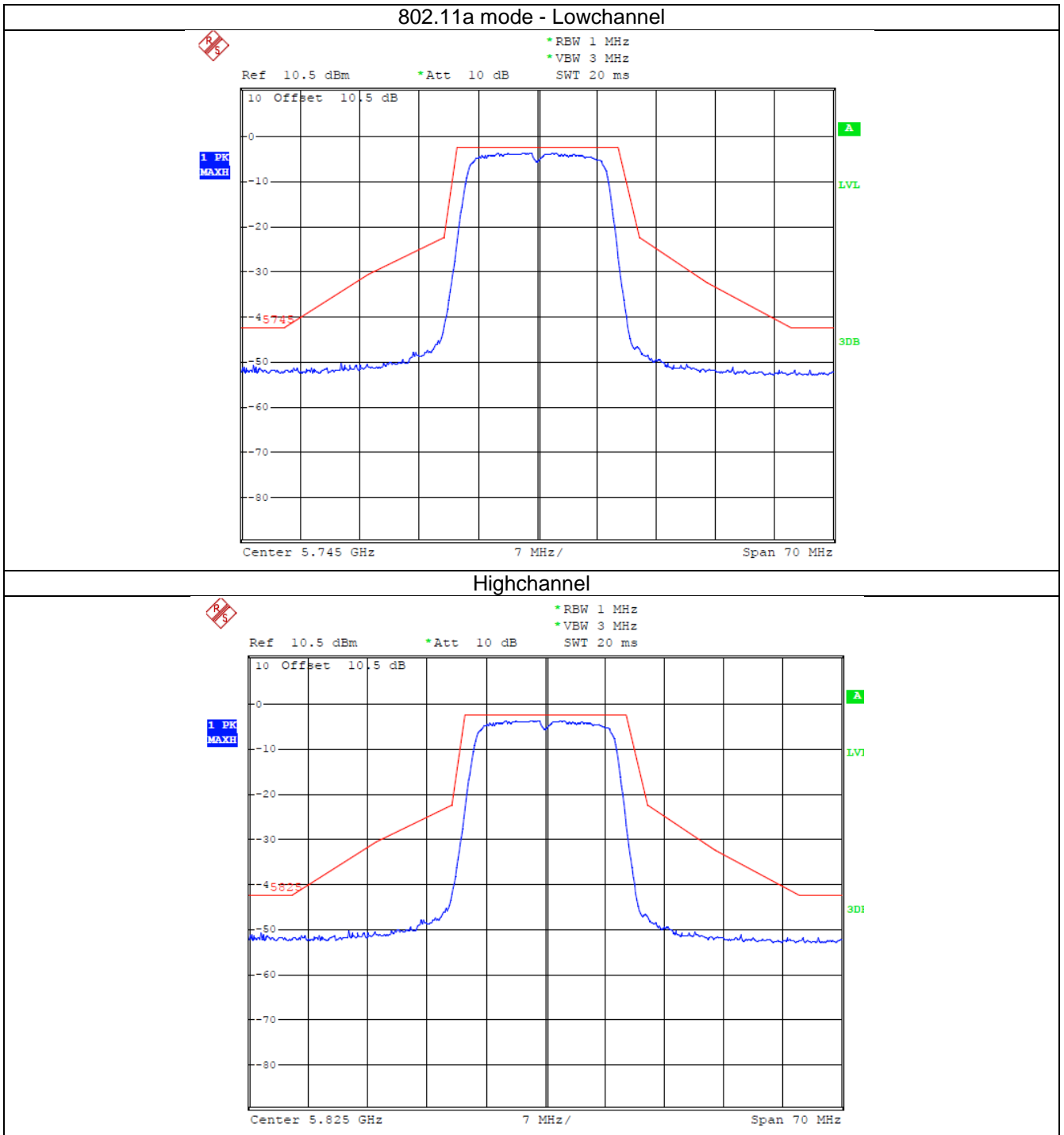


3.5.2 TestSetup



3.5.2 MeasurementRecord:

Ant1

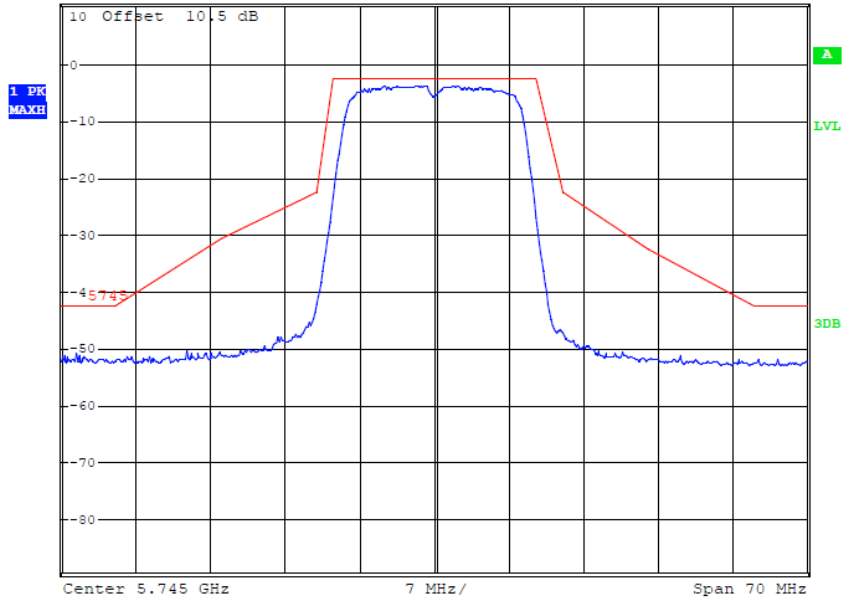


802.11n - HT20mode

Lowchannel



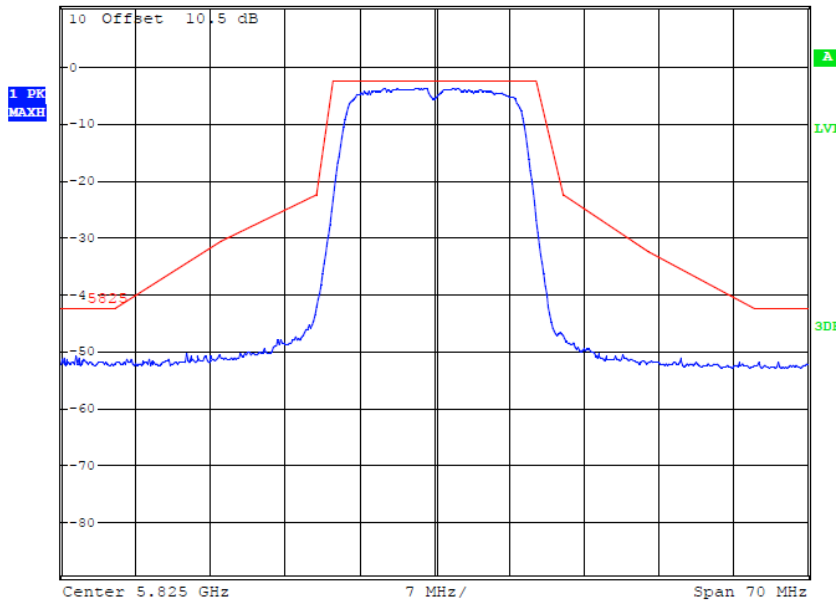
Ref 10.5 dBm *Att 10 dB *RBW 1 MHz
*V BW 3 MHz SWT 20 ms



Highchannel

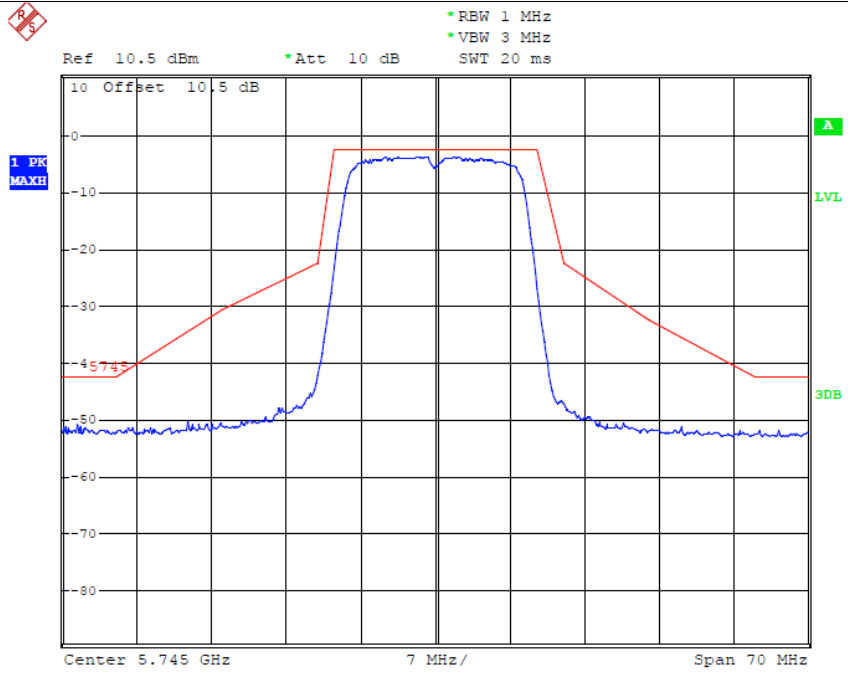


Ref 10.5 dBm *Att 10 dB *RBW 1 MHz
*V BW 3 MHz SWT 20 ms

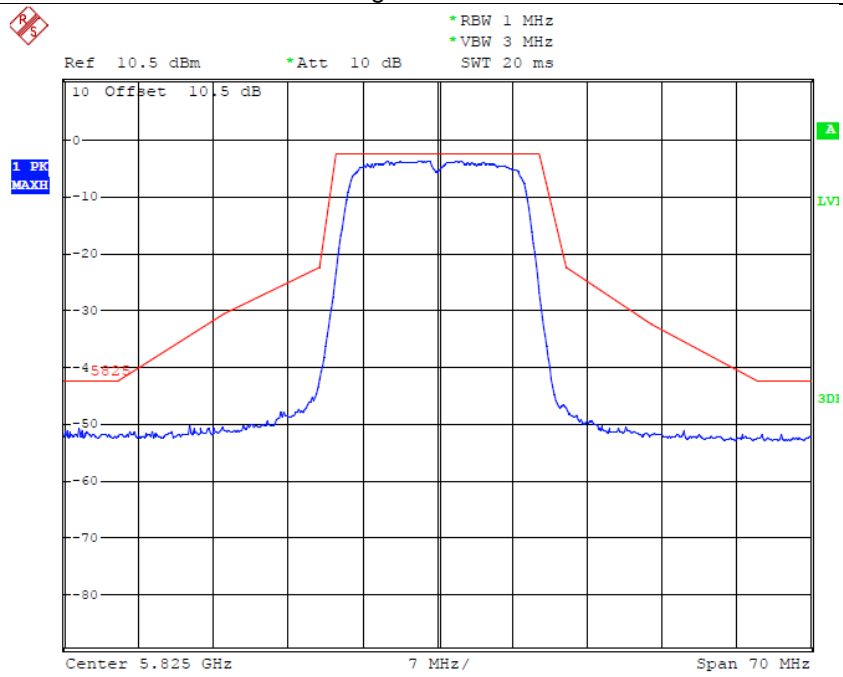


Ant2

802.11a mode - Lowchannel



Highchannel

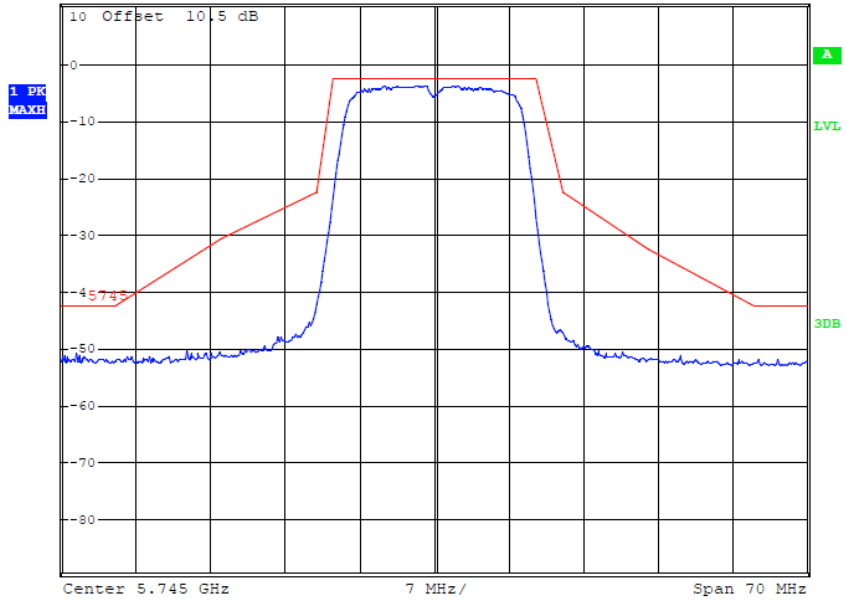


802.11n - HT20mode

Lowchannel



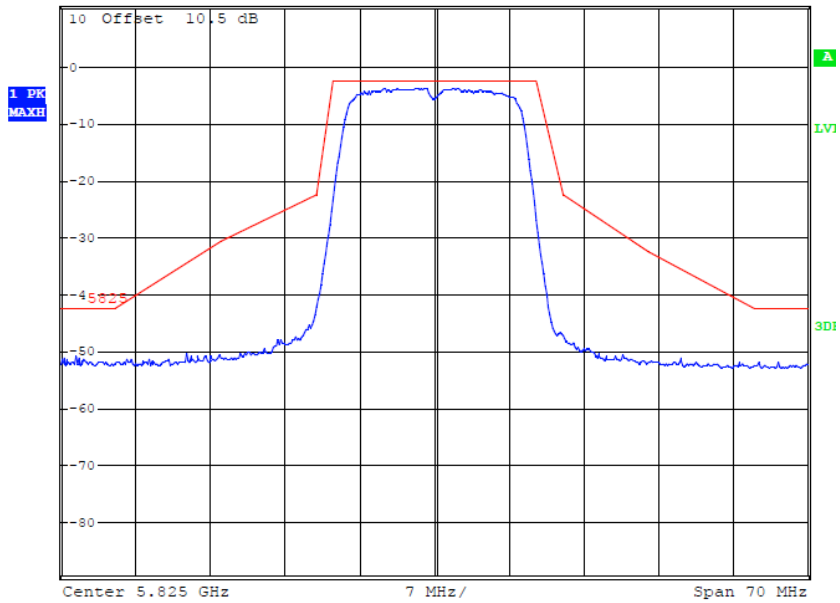
Ref 10.5 dBm *Att 10 dB RBW 1 MHz
*VBW 3 MHz
SWT 20 ms



Highchannel



Ref 10.5 dBm *Att 10 dB RBW 1 MHz
*VBW 3 MHz
SWT 20 ms



36 Receiver Spurious Emissions

3.6.1 Test Limit

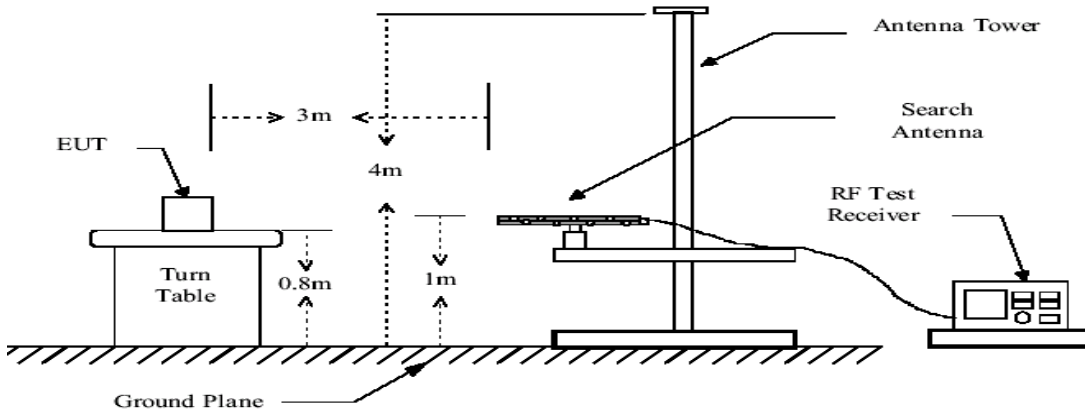
Refer EN 302 502 : clause 4.5.2:

Table 3: Spurious radiated emission limits

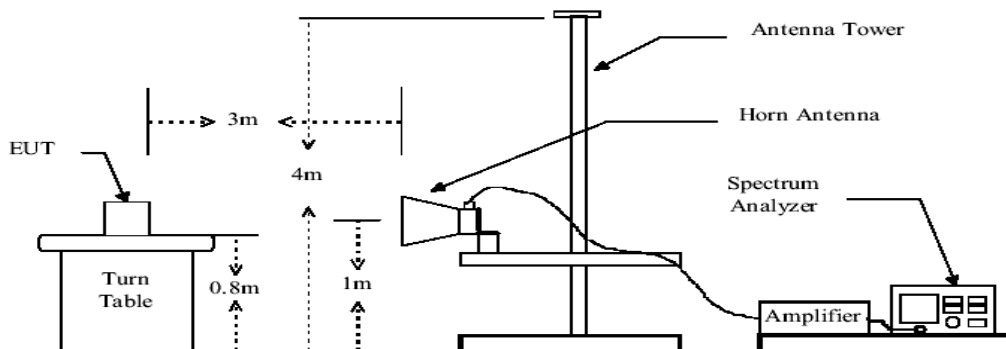
Frequency range	Maximum power	ERP measurement bandwidth
30 MHz to 1 GHz	-57 dBm	100 kHz
1 GHz to 26,5 GHz	-47 dBm	1 MHz

3.6.2 Test Setup

Below 1GHz



Above 1GHz





mentRecord:

Remark: All test modes were test and recorded worst case at 802.11n HT20 MIMO mode

We test 25MHz to 10th harmonic of fundamental frequency and recorded worst below:

Lowest Frequency: 5745MHz					
Frequency (MHz)	Res. Bandwidth (kHz)	Maximum Emission Observed (dB)	Limit (dBm)	Margin (dB)	Polarization
526.00	100	-73.38	-57	16.38	H
2426.13	1000	-64.45	-47	17.45	H
--	--	--	--	--	--
128.00	100	-72.59	-57	15.59	V
2609.00	1000	-67.67	-47	20.67	V
--	--	--	--	--	--
Highest Frequency: 5825MHz					
185.00	100	-75.77	-57	18.77	H
2369.00	1000	-67.92	-47	20.92	H
--	--	--	--	--	--
746.00	100	-72.35	-57	15.35	V
3625.00	1000	-64.43	-47	17.43	V
--	--	--	--	--	--

Note: "--"Other emission levels were very low against the limit and not reported.



PARAMETERS AND RADAR WAVEFORMS CALIBRATION

3.7.1 DFS PARAMETERS

Table D.1: DFS requirement values

Parameter	Value
Channel Availability Check Time	60 s
Channel Move Time	10 s
Channel Closing Transmission Time	260 ms
Non-Occupancy Period	30 minutes
Channel Revalidation Period	24 hours

Table D.2: Interference Threshold values

Spectral Density (dBm/MHz)	Value (see note 1 and note 2)
23	-69 dBm
NOTE 1: This is the level at the input of the receiver assuming a 0 dBi receive antenna. NOTE 2: For FWA devices employing lower EIRP spectral density and a receive antenna gain G (dBi) the threshold follows the following relationships: DFS Detection Threshold (dBm) = -69 + 23 - EIRP Spectral Density (dBm/MHz) + G (dBi). See table D.4 for example calculations.	



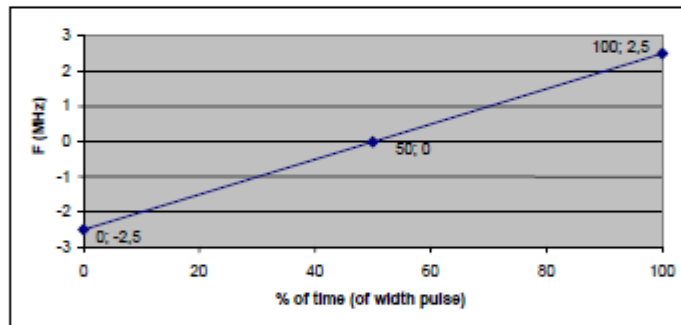
Radarsign (see no
1 - Fixe
2 - Vari
3 - Vari
4 - Vari
5 - Vari
6 - Vari modula (see no
NOTE 1
NOTE 2
NOTE 3
NOTE 4
NOTE 5
NOTE 6



Table D.4: Parameters of radar testsignals

Radar test signal # (see note 1 to note 3)	Pulse width W [μ s]		Pulse repetition frequency PRF (PPS)		Number of different PRFs	Pulses per burst for each PRF (PPB) (see note 5)
	Min	Max	Min	Max		
1	0,5	5	200	1 000	1	10 (see note 6)
2	0,5	15	200	1 600	1	15 (see note 6)
3	0,5	15	2 300	4 000	1	25
4	20	30	2 000	4 000	1	20
5	0,5	2	300	400	2/3	10 (see note 6)
6	0,5	2	400	1 200	2/3	15 (see note 6)

NOTE 1: Radar test signals #1 to #4 are constant PRF based signals. See figure D.1. These radar test signals are intended to simulate also radars using a packet based Staggered PRF. See figure D.2.
 NOTE 2: Radar test signal #4 is a modulated radar test signal. The modulation to be used is a chirp modulation with a $\pm 2,5$ MHz frequency deviation which is described below.



NOTE 3: Radar test signals #5 and #6 are single pulse based Staggered PRF radar test signals using 2 or 3 different PRF values. For radar test signal #5, the difference between the PRF values chosen shall be between 20 PPS and 50 PPS. For radar test signal #6, the difference between the PRF values chosen shall be between 80 PPS and 400 PPS. See figure D.3.
 NOTE 4: Apart for the Off-Channel CAC testing, the radar test signals above shall only contain a single burst of pulses. See figure D.1, figure D.3 and figure D.4. For the Off-Channel CAC testing, repetitive bursts shall be used for the total duration of the test. See figure D.2 and figure D.5. See also clause 4.7.2.3, clause 5.3.8.2.1.4.2 and clause 5.3.8.2.1.4.3.
 NOTE 5: The total number of pulses in a burst is equal to the number of pulses for a single PRF multiplied by the number of different PRFs used.
 NOTE 6: For the CAC and Off-Channel CAC requirements, the minimum number of pulses (for each PRF) for any of the radar test signals to be detected in the band 5 600 MHz to 5 650 MHz shall be 18.

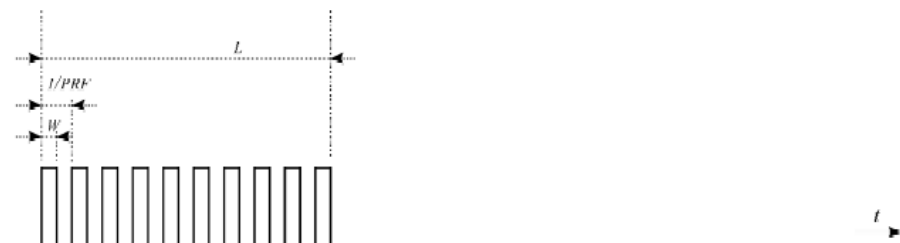


Figure D.1: General structure of a single burst DFS test transmission



Radar sign
1
2
NOTE 1
NOTE 2
NOTE 3
NOTE 4

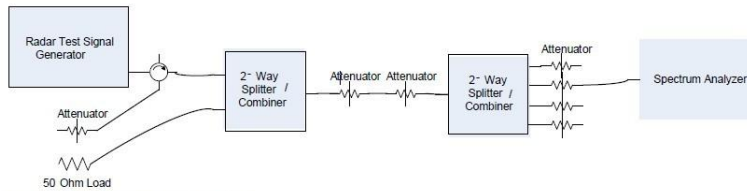
Table D.4: Example Interference Threshold values

Maximum EIRP (dBm)	Channel Width ChS (MHz)	EIRP Spectral Density (dBm/MHz)	Interference Threshold (dBm)	Antenna Gain (dBi)	DFS Detection Threshold (dBm)
36	20	23	-69	0	-69
36	20	23	-69	10	-59
33	20	20	-66	0	-66
33	10	23	-69	10	-59
30	20	17	-63	0	-63
30	10	20	-66	10	-56



WAVEFORM CALIBRATION

1. The following equipment setup was used to calibrate the conducted Radar Waveform. A spectrum analyzer was used to establish the test signal level for each radar type. During this process there were no transmissions by either the Master or Client Device. The spectrum analyzer was switched to the zero span (Time Domain) mode at the frequency of the Radar Waveform generator. Peak detection was utilized. The spectrum analyzer resolution bandwidth (RBW) and video bandwidth (VBW) were set to 3 MHz. The signal generator amplitude was set so that the power level measured at the spectrum analyzer was -63 dBm.



Conducted Calibration Setup

DFS – TEST PARAMETER DFS MEASUREMENT METHODS

Type Radar Reporting Notes

The delta marker is set at the end of the last WLAN transmission following the radar pulse. This delta is the channel move time. The aggregate channel closing transmission time is calculated as follows: $\text{Aggregate Transmission Time} = (\text{Number of analyzer bins showing transmission}) * (\text{dwell time per bin})$. The observation period over which the aggregate time is calculated Begins at (Reference Marker) And Ends no earlier than (Reference Marker + 10sec).

a. FS – CHANNEL CLOSING TRANSMISSION TIME AND CHANNEL MOVE TIME

b. Channel clearing and closing times are measured by applying a burst of radar with the device configured to change channel and by observing the channel for transmissions. The time between the end of the applied radar waveform and the final transmission on the channel is the channel move time.

The aggregate transmission closing time is measured in one of two ways: ETSI1 – the total time of all individual transmissions from the EUT that are observed from the end of the last radar pulse in the waveform. This value is required to be less than 1s.

c. DFS – CHANNEL NON-OCCUPANCY AND VERIFICATION OF PASSIVE SCANNING

The channel that was in use prior to radar detection by the master is additionally monitored for 30 minutes to ensure no transmissions on the vacated channel over the required non-occupancy period. This is achieved by tuning the spectrum analyzer to the vacated channel in zero-span mode and connecting the I/F output to an oscilloscope. The oscilloscope is triggered by the radar pulse and set to provide a single sweep (in peak detect mode) that lasts for at least 30 minutes after the end of the channel move time.



AVAILABILITY CHECKTIME

It is preferred that the EUT report when it starts the radar channel availability check. If the EUT does not report the start of the check time, then the time to start transmitting on a channel after switching the device on is measured to approximate the time from power on to the end of the channel availability check. The start of the channel availability check is assumed to be 60 seconds prior to the first transmission on the channel. To evaluate the channel availability check, a single burst of one radar type is applied within the first 2 seconds of the start of the channel availability check and it is verified that the device does not use the channel by continuing to monitor the channel for a period of at least 60 seconds. The test is repeated by applying a burst of radar in the last 2 seconds (i.e. between 58 and 60 seconds after the start of CAC) of the channel availability check.

e. CONTROL (TPC)

Compliance with the transmit power control requirements for devices is demonstrated through measurements showing multiple power levels and manufacturer statements explaining how the power control is implemented.

f. DETECTION PROBABILITY / SUCCESS RATE

The detection probability, or success rate, for any one radar waveform equals the number of successful trials divided by the total number of trials for that waveform.

g. SHOLD LEVEL

The threshold level is to simulate a radar waveform in free space. If the test is performed in a conducted fashion, then the level at the receiver input equals the level at the antenna plus the gain of the antenna assembly, in dB. The gain of the antenna assembly equals the gain of the antenna minus the loss of the cabling between the receiver input and the antenna. The lowest gain value for all antenna assemblies intended for use with the device is used when making this calculation. If the test is performed using the radiated method, then the threshold level is the level at the antenna.



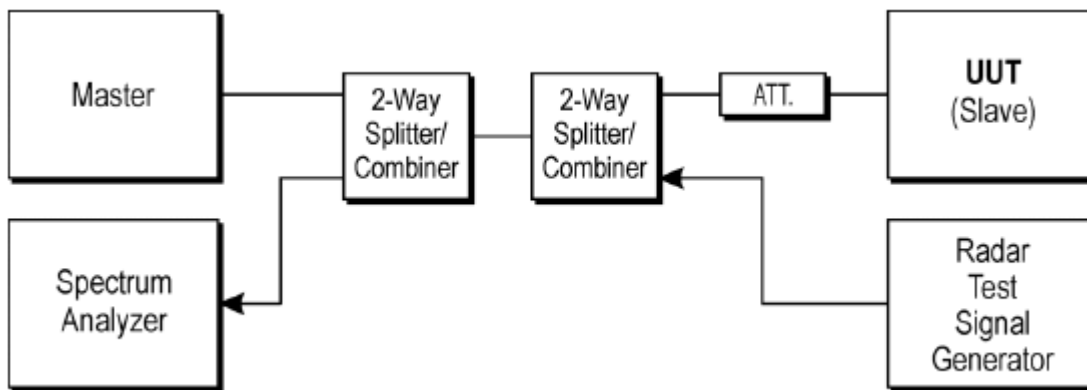
3.7.3 DFS CONDUCTION TESTMETHOD

a. The signal level of the simulated waveform is set to a reference level equal to the threshold level (plus 1 dB for testing against EU requirements). Lower levels may also be applied on request of the manufacturer.

The signal level is verified by measuring the CW signal level at the coupling point to the RDD antenna port. The radar signal level is calculated from the measured level, R (dBm) and the lowest gain antenna assembly intended for use with the RDD

If both master and client devices have radar detection capability then the radar level at the non RDD is verified to be at least 20 dB below the threshold level to ensure that any responses are due to the RDD detecting radar.

The antenna connected to the channel monitoring subsystem is positioned to allow both master and client transmissions to be observed, with the level of the EUT's transmissions between 6 and 10 dB higher than those from the other device.



b. Set-up B is a set-up whereby the UUT is an RLAN device operating in slave mode, with or without Radar Interference Detection function. This set-up also contains an RLAN device operating in master mode. The radar test signals are injected into the master device. The UUT (slave device) is associated with the master device. Figure 5 shows an example for Set-up B. The set-up used shall be documented in the test report.



3.7.4DFS –TESTRESULTS

CHANNELCLOSINGTRANSMISSIONTIMEANDCHANNELMOVETIME

Standard	Item	Requirement	Applicable
EN 301502	5.4.6	ToVerifyTheChannelShutdownProcessAndTo DetermineTheChannelClosingTransmission TimeAndChannelMoveTime.	Y

Note:Antenna A Power> Antenna B Power,Both antenna A and B have been test, Only show the worst data of Antenna A

Description	Radar Type	RadarFr equency	Measured Value	Requirement	Status
Channelclosingt ransmissiontime	1	5725	0.05s	<1s	Complies
		5850	0.05s		
Channelmove time	1	5725	0.59s	<10s	Complies
		5850	0.59s		

Remark:Testswereperformedusingtheconductiontestmethod



SetupPhotos



External and Internal Photos of the EUT

Reference to the test report No.ATT2020SZ061005E2

.....**End ofReport**.....