Report No.: GTS201705000233E04

SPECTRUM REPORT

Applicant:	SHENZHEN WLINK TECHNOLOGY CO., LIMITED
Address of Applicant:	319,YiBen Electronic Business Building, NO.1063 ChaGuang Road, XiLi, NanShan District, ShenZhen, China
Manufacturer:	SHENZHEN WLINK TECHNOLOGY CO., LIMITED
Address of Manufacturer:	319,YiBen Electronic Business Building, NO.1063 ChaGuang Road, XiLi, NanShan District, ShenZhen, China
Factory:	SHENZHEN WLINK TECHNOLOGY CO., LIMITED
Address of Factory:	319,YiBen Electronic Business Building, NO.1063 ChaGuang Road, XiLi, NanShan District, ShenZhen, China

Equipment Under Test (EUT)

Product Name:	Industrial 3G/4G Cellular Router
Model No.:	WL-G500
Applicable standards:	ETSI EN 301 893 V2.1.1 (2017-05)
Date of sample receipt:	May 27, 2017
Date of Test:	May 27-June 23, 2017
Date of report issue:	June 28, 2017
Test Result :	PASS *

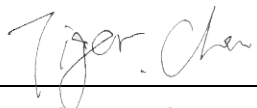
* In the configuration tested, the EUT detailed in this report complied with the standards specified above.

The CE mark as shown below can be used, under the responsibility of the manufacturer, after completion of an EC Declaration of Conformity and compliance with all relevant EC Directives. The protection requirements with respect to electromagnetic compatibility contained in Directive 2014/53/EU are considered.

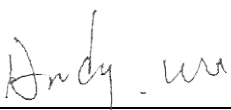
Robinson Lo
Laboratory Manager

2 Version

Version No.	Date	Description
00	*June 28,2017*	*Original*

Prepared By:  ***Date:*** June 28, 2017

Project Engineer

Check By:  ***Date:*** June 28, 2017

Reviewer

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4 Test Summary

Radio Spectrum Matter (RSM) Part of Transmitter					
Test	**Test Requirement**	**Test method**	**Limit/Severity**	**Uncertainty**	**Result**
Nominal Centre Frequency	EN 301 893 clause 4.2.1	EN 301 893 clause 5.4.2.2.1	20ppm	$\pm 1\times10^{-6}$	Pass
Occupied Channel Bandwidth	EN 301 893 clause 4.2.2	EN 301 893 clause 5.4.3.2.1	80% and 100% of the declared nominal bandwidth	$\pm 1\times10^{-6}$	Pass
Equivalent Isotropically Radiated Power	EN 301 893 clause 4.2.3.1.1	EN 301 893 clause 5.4.4.2.1.2	Table 2 & Table 3	±1,5 dB	Pass
Power density	EN 301 893 clause 4.2.3.1.3	EN 301 893 clause 5.4.4.2.1.3	Table 2	±1,5 dB	Pass
Transmitter Unwanted Emissions Outside the 5GHz RLAN Band	EN 301 893 clause 4.2.4.1	EN 301 893 clause 5.4.5.2.2	Table 4	± 6 dB	Pass
Transmitter Unwanted Emissions Within the 5GHz RLAN Band	EN 301 893 clause 4.2.4.2	EN 301 893 clause 5.4.6.2.1	Figure 1	± 1.5 dB	Pass
Dynamic Frequency Selection (DFS)	EN 301 893 clause 4.2.6	EN 301 893 clause 5.4.8.2	N/A		N/A
Adaptivity (Channel Access Mechanism)	EN 301 893 clause 4.2.7	EN 301 893 clause 5.4.9.3	Clause 4.2.7.3.2	N/A	Pass
Radio Spectrum Matter (RSM) Part of Receiver					
Receiver spurious emissions	EN 301 893 clause 4.2.5	EN 301 893 clause 5.4.7.2.2	<2nW <1GHz, <20nW >1GHz	± 6dB	Pass
Receive Blocking	EN 301 893 clause 4.2.8	EN 301 893 clause 5.4.10	Table 9	N/A	Pass
Geo-location capability	EN 301 893 clause 4.2.10	N/A	N/A	N/A	N/A

Remark:

Temperature (Uncertainty): ±1°C Humidity(Uncertainty): ±5%

5 General Information

5.1 General Description of EUT

Product Name:	Industrial 3G/4G Cellular Router
Model No.:	WL-G500
Operation Frequency:	5180MHz ~ 5240MHz for 802.11a/802.11n(HT20)/802.11ac(HT20); 5190MHz ~ 5230MHz for 802.11n(HT40)/802.11ac(HT40) 5210MHz for 802.11ac(HT80)
Channel numbers:	4 channels for 802.11a/802.11n(HT20); 2 channels for 802.11n(HT40)
Channel separation:	20MHz for 802.11a/802.11n(HT20) 40MHz for 802.11n(HT40)
Modulation technology:	802.11a/n/ac: OFDM
Antenna Type:	Integrated antenna
Antenna gain:	Main Antenna: 3.0dBi(declared by Applicant) Aux Antenna: 3.0dBi(declared by Applicant)
Power supply:	Adapter Model:RD1201500-C55-1OG INPUT: AC 100-240V,50/60Hz,0.6A Max OUTPUT: DC 12V1.5A

Channel List							
802.11a, 802.11n(HT20)							
Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)
36	5180	40	5200	44	5220	48	5240
802.11n(HT40)							
Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)
38	5190	46	5230				
802.11n(HT40)							
Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)
39	5210						

5.2 Test Facility

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

● **FCC —Registration No.: 600491**

Global United Technology Services Co., Ltd., Shenzhen EMC Laboratory has been registered and fuly described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in files. Registration 600491, June 22, 2016.

● **Industry Canada (IC) —Registration No.: 9079A-2**

The 3m Semi-anechoic chamber of Global United Technology Services Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 9079A-2, August 15, 2016

5.3 Test Location

All tests were performed at:

Global United Technology Services Co., Ltd.
Address: No. 301-309, 3/F., Jinyuan Business Building, No.2, Laodong Industrial Zone,
Xixiang Road, Baoan District, Shenzhen, Guangdong, China 518102
Tel: 0755-27798480
Fax: 0755-27798960

5.4 Description of Support Units

The EUT has been tested as an independent unit.

5.5 Deviation from Standards

None.

5.6 Abnormalities from Standard Conditions

None.

5.7 Other Information Requested by the Customer

None.

6 Test Instruments List

Radiated Emission:						
Item	**Test Equipment**	**Manufacturer**	**Model No.**	**Inventory No.**	**Cal.Date (mm-dd-yy)**	**Cal.Due date (mm-dd-yy)**
1	3m Semi- Anechoic Chamber	ZhongYu Electron	9.0(L)*6.0(W)* 6.0(H)	GTS250	July. 03 2015	July. 02 2020
2	Control Room	ZhongYu Electron	6.2(L)*2.5(W)* 2.4(H)	GTS251	N/A	N/A
3	ESU EMI Test Receiver	R&S	ESU26	GTS203	June. 29 2016	June. 28 2017
4	BiConiLog Antenna	SCHWARZBECK	VULB9163	GTS214	June. 29 2016	June. 28 2017
5	Double-ridged horn antenna	SCHWARZBECK	9120D	GTS208	June. 29 2016	June. 28 2017
6	Horn Antenna	ETS-LINDGREN	3160-09	GTS218	June. 29 2016	June. 28 2017
7	RF Amplifier	HP	8347A	GTS204	June. 29 2016	June. 28 2017
8	RF Amplifier	HP	8349B	GTS206	June. 29 2016	June. 28 2017
9	Broadband Preamplifier	SCHWARZBECK	BBV9718	GTS535	June. 29 2016	June. 28 2017
10	PSA Series Spectrum Analyzer	Agilent	E4440A	GTS536	June. 29 2016	June. 28 2017
11	Universal Radio Communication tester	ROHDE&SCHWARZ	CMU 200	GTS538	June. 29 2016	June. 28 2017
12	EMI Test Software	AUDIX	E3	N/A	N/A	N/A
13	Coaxial cable	GTS	N/A	GTS210	N/A	N/A
14	Coaxial Cable	GTS	N/A	GTS211	N/A	N/A
15	Thermo meter	N/A	N/A	GTS256	June. 29 2016	June. 28 2017
16	Wideband Radio Communication Tester	Rohde & Schwarz	CMW500	GTS588	June. 29 2016	June. 28 2017

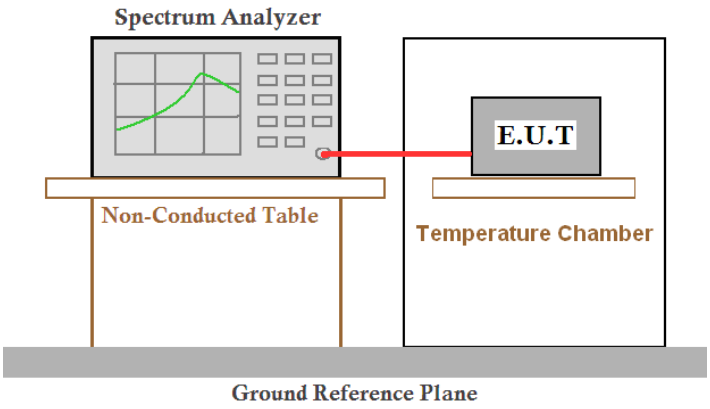
7 Radio Technical Requirements Specification in EN 301893

7.1 Test Environment and Mode

Test mode:					
Transmitting mode:	Keep the EUT in transmitting mode with modulation.				
Receiving mode	Keep the EUT in receiving mode.				
Operating Environment:					
Item	**Normal condition**	**Extreme condition**			
		HVHT	**LVHT**	**HVLT**	**LVLT**
Temperature	+25ºC	+45ºC	+45ºC	0ºC	0ºC
Voltage	AC 230V	AC 253V	AC 207V	AC 253V	AC 207V
Humidity	20%-95%				
Atmospheric Pressure:	1008 mbar				

7.2 Transmitter requirement

7.2.1 Nominal Centre frequencies

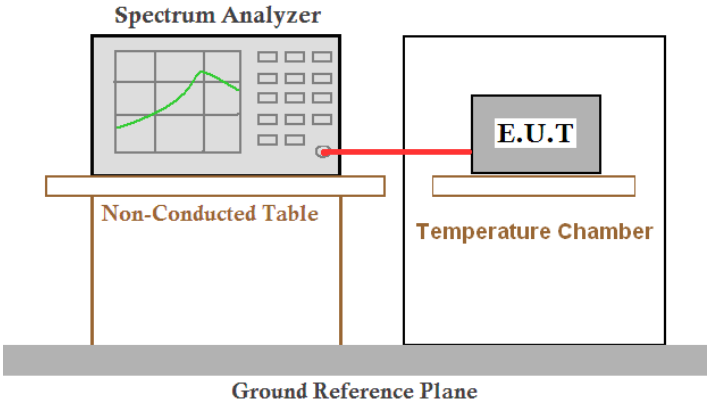
Test Requirement:	EN 301 893 clause 4.2.1
Test Method:	EN 301 893 clause 5.4.2.2.1
Limit:	fc±20ppm
Test setup:	
Test procedure:	1. The UUT shall be connected to spectrum analyser. 2. The settings of the spectrum analyser shall be adjusted to optimize the instruments frequency accuracy. 3. Max Hold shall be selected and the centre frequency adjusted to that of the UUT. 4. The peak value of the power envelope shall be measured and noted. The span shall be reduced and the marker moved in a positive frequency increment until the upper, (relative to the centre frequency), -10 dBc point is reached. This value shall be noted as f1. 5. The marker shall then be moved in a negative frequency increment until the lower, (relative to the centre frequency), -10 dBc point is reached. This value shall be noted as f2. 6. The centre frequency is calculated as (f1 + f2) / 2.
Test mode:	Keep the EUT in transmitting with un-modulation.
Test Instruments:	Refer to section 6.0 for details
Measurement Record:	Uncertainty: ± 1 x 10^{-6}

Measurement Data

Mode:			**802.11a**			
Test conditions		Channel (MHz)	Measured Frequency(MHz)	Drift(ppm)	Limit (ppm)	Result
Volt (V)	Temp(°C)					
NVNT		5180	5180.0071	1.38	±20	Pass
HVHT		5180	5180.0697	13.45		
LVHT		5180	5179.9243	-14.62		
HVLT		5180	5179.9107	-17.23		
LVLT		5180	5179.9590	-7.92		
Mode:			**802.11n(HT20)**			
Test conditions		Channel (MHz)	Measured Frequency(MHz)	Drift(ppm)	Limit (ppm)	Result
Volt (V)	Temp(°C)					
NVNT		5180	5180.0385	7.43	±20	Pass
HVHT		5180	5180.0177	3.41		
LVHT		5180	5179.9520	-9.26		
HVLT		5180	5179.9277	-13.96		
LVLT		5180	5179.9829	-3.30		
Mode:			**802.11n(HT40)**			
Test conditions		Channel (MHz)	Measured Frequency(MHz)	Drift(ppm)	Limit (ppm)	Result
Volt (V)	Temp(°C)					
NVNT		5190	5189.9401	-11.55	±20	Pass
HVHT		5190	5190.0595	11.46		
LVHT		5190	5190.0623	12.00		
HVLT		5190	5189.9228	-14.88		
LVLT		5190	5189.9920	-1.54		
Mode:			**802.11ac(HT40)**			
Test conditions		Channel (MHz)	Measured Frequency(MHz)	Drift(ppm)	Limit (ppm)	Result
Volt (V)	Temp(°C)					
NVNT		5210	5209.9892	-2.06	±20	Pass
HVHT		5210	5209.9959	-0.79		
LVHT		5210	5209.9511	-9.40		
HVLT		5210	5210.0880	16.90		
LVLT		5210	5210.0688	13.21		

Note: For centre frequencies test, in case of more than 1 channel plan has been declared, testing of these specific requirements need only be performed using one of the declared channel plans. (Refer to EN 301893 V2.1.1 Table 11, Note1)

7.2.2 Occupied Channel Bandwidth

Test Requirement:	EN 301893 clause 4.2.2
Test Method:	EN 301893 clause 5.4.3.2.1
Limit:	Between 80 % and 100 % of the declared nominal channel bandwidth
Test setup:	
Test procedure:	**Step 1:** Connect the UUT to the spectrum analyser and use the following settings: Centre Frequency: The centre frequency of the channel under test Resolution BW: 100kHz Video BW: 300kHz Frequency Span: 2 × Nominal Bandwidth (e.g. 40 MHz for a 20 MHz channel) Sweep Time: > 1 s; for larger Nominal Bandwidths, the sweep time may be increased until a value where the sweep time has no impact on the RMS value of the signal Detector Mode: RMS Trace mode: Max Hold **Step 2:** Wait for the trace to stabilize. **Step 3:** Make sure that the power envelope is sufficiently above the noise floor of the analyser to avoid the noise signals left and right from the power envelope being taken into account by this measurement. Use the 99 % bandwidth function of the spectrum analyser to measure the Occupied Channel Bandwidth of the UUT. This value shall be recorded. The measurement described in step 1 to step 3 above shall be repeated in case of simultaneous transmissions in non-adjacent channels.
Test mode:	Keep the EUT in transmitting with modulation.
Test Instruments:	Refer to section 6.0 for details

Measurement Record:	Uncertainty: ± 1 x 10^{-6}

Measurement Data

Main antenna:

Mode:				**802.11a(HT20)**		
Frequency (MHz)	Occupied Channel Bandwidth (MHz)	Nominal Channel Bandwidth (MHz)	Limit (MHz)	Occupied Channel Bandwidth (%)	Limit (%)	Result
5180.00	16.78	20	16~20	83.90	80 - 100	Pass
5200.00	16.63			83.15		
5240.00	16.33			81.65		

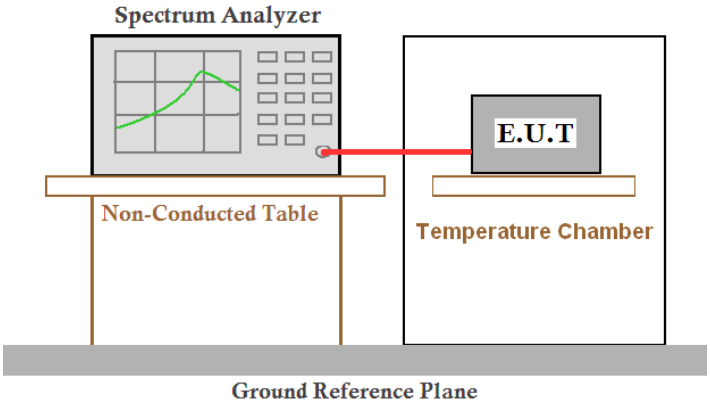
Aux antenna:

Mode:				**802.11a(HT20)**		
Frequency (MHz)	Occupied Channel Bandwidth (MHz)	Nominal Channel Bandwidth (MHz)	Limit (MHz)	Occupied Channel Bandwidth (%)	Limit (%)	Result
5180.00	16.57	20	16~20	82.85	80 - 100	Pass
5200.00	16.59			82.95		
5240.00	16.21			81.05		

MIMO:

Mode:			**802.11ac(HT20)**			
Frequency (MHz)	Occupied Channel Bandwidth (MHz)	Nominal Channel Bandwidth (MHz)	Limit (MHz)	Occupied Channel Bandwidth (%)	Limit (%)	Result
5180.00	17.63	20	16~20	88.15	80 - 100	Pass
5200.00	17.58			87.90		
5240.00	17.66			88.30		
Mode:			**802.11ac(HT40)**			
Frequency (MHz)	Occupied Channel Bandwidth (MHz)	Nominal Channel Bandwidth (MHz)	Limit (MHz)	Occupied Channel Bandwidth (%)	Limit (%)	Result
5190.00	35.79	40	32~40	89.48	80 - 100	Pass
5230.00	36.23			90.57		
Mode:			**802.11n(HT40)**			
Frequency (MHz)	Occupied Channel Bandwidth (MHz)	Nominal Channel Bandwidth (MHz)	Limit (MHz)	Occupied Channel Bandwidth (%)	Limit (%)	Result
5190.00	36.36	40	32~40	90.90	80 - 100	Pass
5230.00	36.48			91.20		
Mode:			**802.11ac(HT80)**			
Frequency (MHz)	Occupied Channel Bandwidth (MHz)	Nominal Channel Bandwidth (MHz)	Limit (MHz)	Occupied Channel Bandwidth (%)	Limit (%)	Result
5210	75.96	80	64~80	94.95	80 - 100	Pass

7.2.3 RF output power

Test Requirement:	EN 301893 clause 4.2.3.1.1
Test Method:	EN 301893 clause 5.4.4.2.1.1
Limit:	Clause 4.2.3.2.2 & 4.2.3.2.3
Test setup:	
Test procedure:	1>. The RF output power shall be determined using a wideband RF power meter with a thermocouple detector or an equivalent thereof and with an integration period that exceeds the repetition period of the transmitter by a factor 5 or more. The observed value shall be noted as "A" (in dBm). 2>. In case of conducted measurements on smart antenna systems operating in a mode with multiple transmit chains active simultaneously, the output power of each transmit chain shall be measured separately to calculate the total power (value "A" in dBm) for the EUT. 3>. The RF output power at the highest power level P_H (e.i.r.p.) shall be calculated from the above measured power output A (in dBm), the observed duty cycle x, the stated antenna gain "G" in dBi and if applicable the beamforming gain "Y" in dB, according to the formula below. This value shall be recorded in the test report. If more than one antenna assembly is intended for this power setting or TPC range, the gain of the antenna assembly with the highest gain shall be used. $P_H = A + G + Y + 10 \log (1/x)$ 4>. Repeated the test in extreme test conditions.
Test mode:	Keep the EUT in transmitting with modulation.
Test Instruments:	Refer to section 6.0 for details
Measurement Record:	Uncertainty: ± 1.5dB

Measurement Data

Main antenna:

Mode:		**802.11a(HT20)**				
Test conditions		Frequency (MHz)	Measured Power (dBm)	EIRP (dBm)	Limit (dBm)	Result
Volt (V)	Temp (°C)					
NVNT		5180	8.77	11.85	23.00	Pass
HVHT		5180	8.27	11.35	23.00	
LVHT		5180	8.65	11.73	23.00	
HVLT		5180	8.77	11.85	23.00	
LVLT		5180	8.93	12.01	23.00	

Aux antenna:

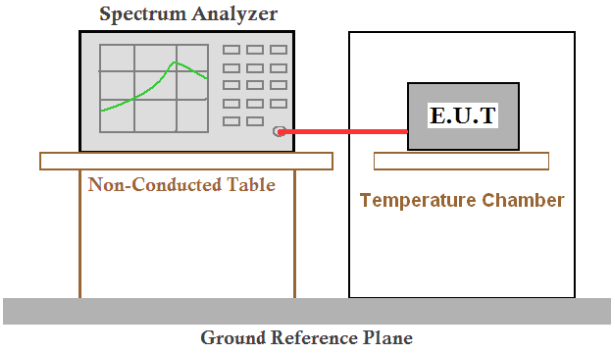
Mode:		**802.11a(HT20)**				
Test conditions		Frequency (MHz)	Measured Power (dBm)	EIRP (dBm)	Limit (dBm)	Result
Volt (V)	Temp (°C)					
NVNT		5180	8.63	11.71	23.00	Pass
HVHT		5180	8.41	11.49	23.00	
LVHT		5180	8.05	11.13	23.00	
HVLT		5180	8.12	11.20	23.00	
LVLT		5180	8.86	11.94	23.00	

MIMO:

Mode:			**802.11ac(HT20)**			
Test conditions		Frequency (MHz)	Measured Power (dBm)	EIRP (dBm)	Limit (dBm)	Result
Volt (V)	Temp (°C)					
NVNT		5180	7.35	13.44	23.00	Pass
HVHT		5180	7.42	13.51	23.00	
LVHT		5180	7.53	13.62	23.00	
HVLT		5180	7.22	13.31	23.00	
LVLT		5180	7.08	13.17	23.00	
Mode:			**802.11n(HT20)**			
Test conditions		Frequency (MHz)	Measured Power (dBm)	EIRP (dBm)	Limit (dBm)	Result
Volt (V)	Temp (°C)					
NVNT		5180	6.98	13.07	23.00	Pass
HVHT		5180	7.02	13.11	23.00	
LVHT		5180	7.27	13.36	23.00	
HVLT		5180	6.87	12.96	23.00	
LVLT		5180	7.34	13.43	23.00	
Mode:			**802.11 ac(HT40)**			
Test conditions		Frequency (MHz)	Measured Power (dBm)	EIRP (dBm)	Limit (dBm)	Result
Volt (V)	Temp (°C)					
NVNT		5190	6.78	12.87	23.00	Pass
HVHT		5190	6.89	12.98	23.00	
LVHT		5190	7.14	13.23	23.00	
HVLT		5190	7.33	13.42	23.00	
LVLT		5190	7.64	13.73	23.00	

Mode:			802.11n(HT40)			
Test conditions		Frequency (MHz)	Measured Power (dBm)	EIRP (dBm)	Limit (dBm)	Result
Volt (V)	Temp (°C)					
NVNT		5190	6.45	12.54	23.00	Pass
HVHT		5190	6.79	12.88	23.00	
LVHT		5190	6.35	12.44	23.00	
HVLT		5190	6.55	12.64	23.00	
LVLT		5190	6.83	12.92	23.00	
Mode:			**802.11ac(HT80)**			
Test conditions		Frequency (MHz)	Measured Power (dBm)	EIRP (dBm)	Limit (dBm)	Result
Volt (V)	Temp (°C)					
NVNT		5210	6.34	12.43	23.00	Pass
HVHT		5210	6.76	12.85	23.00	
LVHT		5210	6.33	12.42	23.00	
HVLT		5210	7.02	13.11	23.00	
LVLT		5210	6.89	12.98	23.00	

7.2.4 Power Density

Test Requirement:	EN 301893 clause 4.2.3.1.3
Test Method:	EN 301893 clause 5.4.4.2.1.3
Limit:	Clause 4.2.3.2.2
Test setup:	
Test procedure:	**Step 1:** Connect the UUT to the spectrum analyser and use the following settings: Center Frequency: The centre frequency of the channel under test Resolution BW: 1MHz Video BW: 3MHz Span: 2 × Nominal Bandwidth (e.g. 40 MHz for a 20 MHz channel) Detector: Peak Trace Mode: Max Hold Sweep time: Auto **Step 2:** When the trace is complete, find the peak value of the power envelope and record the frequency. **Step 3:** Center Frequency: Equal to the frequency recorded in step 2 Span: 3 MHz Resolution BW: 1MHz Video BW: 3MHz Detector: RMS Trace Mode: Max Hold Sweep time: 1 minute **Step 4:** When the trace is complete, the trace shall be captured using the "Hold" or "View" option on the spectrum analyser. Find the peak value of the trace and place the analyser marker on this peak. This level is recorded as the highest mean power (power density) D in a 1 MHz band. Alternatively, where a spectrum analyser is equipped with a function to measure spectral power density, this function may be used to display the

	power density D in dBm / MHz. In case of conducted measurements on smart antenna systems operating in a mode with multiple transmit chains active simultaneously, the power density of each transmit chain shall be measured separately to calculate the total power density (value D in dBm / MHz) for the UUT. **Step 5:** The maximum spectral power density e.i.r.p. is calculated from the above measured power density D, the observed duty cycle x (see clause 5.4.4.2.1.1.2, step 1), the applicable antenna assembly gain G in dBi and if applicable the beamforming gain Y in dB, according to the formula below. This value shall be recorded in the test report. If more than one antenna assembly is intended for this power setting, the gain of the antenna assembly with the highest gain shall be used. PD = D + G + Y + 10 × log (1 / x) (dBm / MHz)
Test mode:	Keep the EUT in transmitting mode with modulation.
Test Instruments:	Refer to section 6.0 for details
Measurement Record:	Uncertainty: ± 1.5dB

Measurement Data

Main antenna:

Mode:		**802.11a(HT20)**		
Frequency (MHz)	Measured Power density (dBm/MHz)	Total Power density (dBm/MHz)	Limit (dBm/MHz)	Result
5180.00	-4.26	2.33	10.00	Pass
5200.00	-4.33	2.26		
5240.00	-4.42	2.17		

Remark:1>. Volt= Voltage, Temp= Temperature

2>. Duty cycle=99%, Cable loss=0.5dB, Antenna Gain=3.0dBi

3>. Total PSD = Measured PSD + Antenna Gain + 10 log (1/Duty Cycle)

Aux antenna:

Mode:		**802.11a(HT20)**		
Frequency (MHz)	Measured Power density (dBm/MHz)	Total Power density (dBm/MHz)	Limit (dBm/MHz)	Result
5180.00	-4.14	2.45	10.00	Pass
5200.00	-4.56	2.03		
5240.00	-4.73	1.86		

Remark:1>. Volt= Voltage, Temp= Temperature

2>. Duty cycle=99%, Cable loss=0.5dB, Antenna Gain=3.0dBi

3>. Total PSD = Measured PSD + Antenna Gain + 10 log (1/Duty Cycle)

MIMO:

Mode:		**802.11ac(HT20)**		
Frequency (MHz)	Measured Power density (dBm/MHz)	Total Power density (dBm/MHz)	Limit (dBm/MHz)	Result
5180.00	-4.43	2.16	10.00	Pass
5200.00	-4.28	2.31		
5240.00	-4.89	1.70		

Remark:1>. Volt= Voltage, Temp= Temperature

2>. Duty cycle=99%, Cable loss=0.5dB, Antenna Gain=3.0dBi

3>. Total PSD = Measured PSD + Antenna Gain + 10 log (1/Duty Cycle)

Mode:		802.11n(HT20)		
Frequency (MHz)	Measured Power density (dBm/MHz)	Total Power density (dBm/MHz)	Limit (dBm/MHz)	Result
5180.00	-4.35	2.24	10.00	Pass
5200.00	-4.48	2.11		
5240.00	-4.63	1.96		

Remark:1>. Volt= Voltage, Temp= Temperature

2>. Duty cycle=99%, Cable loss=0.5dB, Antenna Gain=6.01dBi

3>. Total PSD = Measured PSD + Antenna Gain + 10 log (1/Duty Cycle)

Mode:		802.11ac(HT40)		
Frequency (MHz)	Measured Power density (dBm/MHz)	Total Power density (dBm/MHz)	Limit (dBm/MHz)	Result
5190.00	-7.58	-0.99	10.00	Pass
5230.00	-7.46	-0.87		

Remark:1>. Volt= Voltage, Temp= Temperature

2>. Duty cycle=99%, Cable loss=0.5dB, Antenna Gain=6.01dBi

3>. Total PSD = Measured PSD + Antenna Gain + 10 log (1/Duty Cycle)

Mode:		802.11n(HT40)		
Frequency (MHz)	Measured Power density (dBm/MHz)	Total Power density (dBm/MHz)	Limit (dBm/MHz)	Result
5190.00	-7.63	-1.04	10.00	Pass
5230.00	-7.49	-0.90		

Remark:1>. Volt= Voltage, Temp= Temperature

2>. Duty cycle=99%, Cable loss=0.5dB, Antenna Gain=6.01dBi

3>. Total PSD = Measured PSD + Antenna Gain + 10 log (1/Duty Cycle)

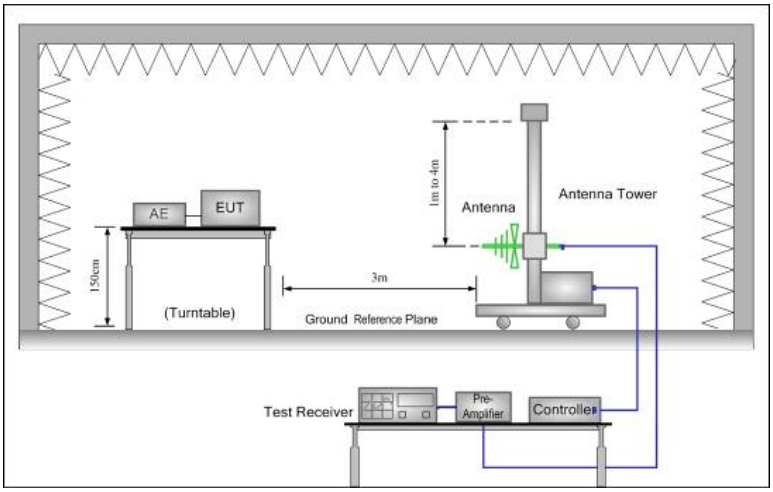
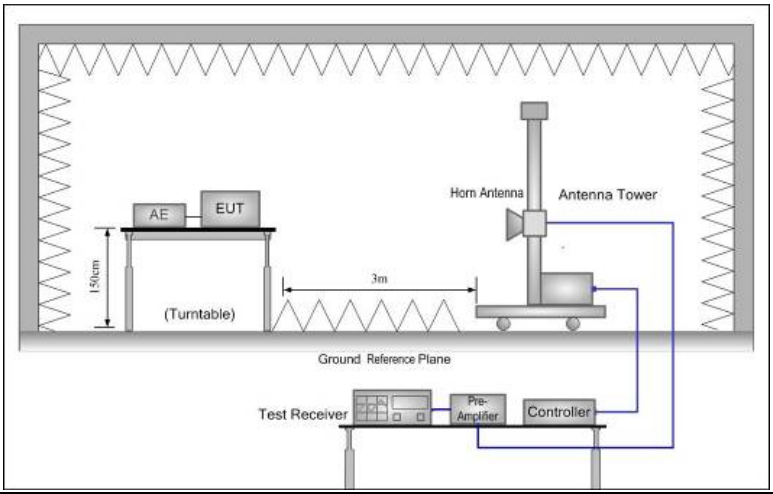
Mode:		802.11ac(HT80)		
Frequency (MHz)	Measured Power density (dBm/MHz)	Total Power density (dBm/MHz)	Limit (dBm/MHz)	Result
5210.00	-10.22	-3.63	10.00	Pass

Remark:1>. Volt= Voltage, Temp= Temperature

2>. Duty cycle=99%, Cable loss=0.5dB, Antenna Gain=6.01dBi

3>. Total PSD = Measured PSD + Antenna Gain + 10 log (1/Duty Cycle)

7.2.5 Transmitter unwanted emissions outside 5GHz RLAN band

Test Requirement:	EN 301893 clause 4.2.4.1
Test Method:	EN 301893 clause 5.4.5.2.2
Limit:	EN 301893 clause 4.2.4.1.2 table 4
Test setup:	Below 1GHz  Above 1GHz 
Test procedure:	**1. Pre-scan** The test procedure below shall be used to identify potential unwanted emissions of the UUT. **Step 1:** The sensitivity of the spectrum analyser should be such that the noise floor is at least 12 dB below the limits given in table 4. **Step 2:** The emissions over the range 30 MHz to 1 000 MHz shall be identified. Spectrum analyser settings: Resolution BW: 100 kHz Video BW 300 kHz Detector mode: Peak

	Trace Mode: Max Hold Sweep Points: ≥ 9970 For spectrum analysers not supporting this number of sweep points, the frequency band may be segmented. For spectrum analysers capable of supporting twice this number of sweep points, the frequency adjustment in clause 5.4.5.2.1.2 (step 1, last bullet) may be omitted Sweep time: For non-continuous transmissions (duty cycle less than 100 %), the sweep time shall be sufficiently long, such that for each 100 kHz frequency step, the measurement time is greater than two transmissions of the UUT EXAMPLE: For non-continuous transmissions, if the UUT is using a test sequence as described in clause 5.3.1.1 with a transmitter on + off time of 2 ms, then the sweep time has to be greater than 4 ms per 100 kHz. Allow the trace to stabilize. Any emissions identified that have a margin of less than 6 dB with respect to the limits given in clause 4.2.4.1.2, table 4 shall be individually measured using the procedure in clause 5.4.5.2.1.2 and compared to the limits given in clause 4.2.4.1.2, table 4. **Step 3:** The emissions over the range 1 GHz to 26 GHz shall be identified. Spectrum analyser settings: Resolution BW: 1 MHz Video BW 3 MHz Detector mode: Peak Trace Mode: Max Hold Sweep Points: ≥ 25000 For spectrum analysers not supporting this number of sweep points, the frequency band may be segmented. For spectrum analysers capable of supporting twice this number of sweep points, the frequency adjustment in clause 5.4.5.2.1.2 (step 1, last bullet) may be omitted. Sweep time: For non-continuous transmissions (duty cycle less than 100 %), the sweep time shall be sufficiently long, such that for each 1 MHz frequency step, the measurement time is greater than two transmissions of the UUT. EXAMPLE: For non-continuous transmissions, if the UUT is using a test sequence as described in clause 5.3.1.1 with a transmitter on + off time of 2 ms, then the sweep time has to be greater than 4 ms per 1 MHz. Allow the trace to stabilize. Any emissions identified that have a margin of less than 6 dB with respect to the limits given in clause 4.2.4.1.2, table 3 shall be individually measured using the procedure in clause 5.4.5.2.1.2 and compared to the limits given in clause 4.2.4.1.2, table 3.

2. Measurement of the emissions identified during the pre-scan

The limits for transmitter unwanted emissions in clause 4.5.1 refer to average power levels.

The steps below shall be used to accurately measure the individual unwanted emissions identified during the pre-scan measurements above.

Continuous transmit signals:

For continuous transmit signals, a simple measurement using the RMS detector of the spectrum analyser is permitted. The measured values shall be recorded and compared with the limits in clause 4.2.4.1.2, table 4.

Non-continuous transmit signals:

For non-continuous transmit signals, the measurement shall be made only over the "on" part of the burst.

Step 1:

The level of the emissions shall be measured using the following spectrum analyser settings:

Centre Frequency:	Frequency of emission identified during the pre-scan
Resolution BW:	100 kHz (< 1 GHz) / 1 MHz (> 1 GHz)
Video BW	300 kHz (< 1 GHz) / 3 MHz (> 1 GHz)
Frequency Span:	0 Hz
Sweep mode:	Single Sweep
Sweep time:	Suitable to capture one transmission burst. Additional measurements may be needed to identify the length of the transmission burst. In case of continuous signals, the Sweep Time shall be set to 30 ms
Sweep points:	Sweep time [µs] / 1 µs with a maximum of 30 000
Trigger:	Video (burst signals) or Manual (continuous signals)
Detector:	RMS
Trace Mode:	Clear/Write

Adjust the centre frequency (fine tune) to capture the highest level of one burst of the emission to be measured. This fine tuning can be omitted for spectrum analysers capable of supporting twice this number of sweep points required in step 2 and step 3 from the pre-scan procedure in clause 5.4.5.2.1.1.

Step 2:

Adjust the trigger level to select the transmissions with the highest power level.

Set a window (start and stop lines) to match with the start and end of the burst and in which the RMS power shall be measured using the Time Domain Power function. If the spurious emission to be measured is a continuous signal, the measurement window shall be set to match the start and stop times of the sweep.

Select RMS power to be measured within the selected window and note

	the result which is the RMS power of this particular spurious emission. Compare this value with the applicable limit provided by clause 4.2.4.1.2, table 4. Repeat this procedure for every emission identified during the pre-scan. The values and corresponding frequencies shall be recorded. In case of conducted measurements on smart antenna systems (equipment with multiple transmit chains), the measurements shall be repeated for each of the active transmit chains. Comparison with the applicable limits shall be done using either of the options given below: Option 1: the results for each of the transmit chains for the corresponding 1 MHz segments shall be added and compared with the limits provided by table 3 in clause 4.2.4.1.2. Option 2: the results for each of the transmit chains shall be individually compared with the limits provided by table 3 in clause 4.2.4.1.2 after these limits have been reduced by 10 × log10 (Tch) (number of active transmit chains).
Test mode:	Keep the EUT in transmitting with modulation.
Test Instruments:	Refer to section 6.0 for details
Measurement Record:	Uncertainty: ±6dB

Measurement Data

Main antenna:

Mode:		**802.11a**		
Frequency (MHz)	**Spurious Emission**		**Limit (dBm)**	**Test Result**
	polarization	**Level(dBm)**		
5180MHz				
35.60	Vertical	-70.92	-36	Pass
211.69	V	-70.45	-54	
10360.00	V	-47.06	-30	
15540.00	V	-51.04	-30	
373.22	Horizontal	-67.96	-36	
517.34	H	-69.63	-54	
10360.00	H	-52.34	-30	
15540.00	H	-48.50	-30	
Mode:		**802.11a**		
Frequency (MHz)	**Spurious Emission**		**Limit (dBm)**	**Test Result**
	polarization	**Level(dBm)**		
5200MHz				
33.60	Vertical	-67.52	-36	Pass
216.39	V	-64.74	-54	
10400.00	V	-43.32	-30	
15600.00	V	-45.31	-30	
348.51	Horizontal	-66.95	-36	
762.17	H	-65.91	-54	
10400.00	H	-50.41	-30	
15600.00	H	-49.72	-30	
Mode:		**802.11a**		
Frequency (MHz)	**Spurious Emission**		**Limit (dBm)**	**Test Result**
	polarization	**Level(dBm)**		
5240MHz				
45.62	Vertical	-67.34	-36	Pass
198.52	V	-65.93	-54	
10480.00	V	-43.14	-30	
15720.00	V	-44.02	-30	
349.45	Horizontal	-62.38	-36	
583.36	H	-65.77	-54	
10480.00	H	-44.91	-30	
15720.00	H	-48.82	-30	

Aux antenna:

Mode:		802.11a		
Frequency (MHz)	Spurious Emission		Limit (dBm)	Test Result
	polarization	Level(dBm)		
5180MHz				
97.64	Vertical	-63.81	-54.00	Pass
525.44	V	-60.26	-54.00	
10360.00	V	-45.54	-30.00	
15540.00	V	-41.44	-30.00	
87.82	Horizontal	-61.31	-54.00	
823.45	H	-62.96	-54.00	
10360.00	H	-45.75	-30.00	
15540.00	H	-42.52	-30.00	
Mode:		802.11a		
Frequency (MHz)	Spurious Emission		Limit (dBm)	Test Result
	polarization	Level(dBm)		
5200MHz				
74.85	Vertical	-64.38	-36.00	Pass
665.58	V	-66.75	-54.00	
10400.00	V	-49.43	-30.00	
15600.00	V	-44.28	-30.00	
80.21	Horizontal	-66.03	-36.00	
152.48	H	-67.47	-54.00	
10400.00	H	-49.49	-30.00	
15600.00	H	-45.19	-30.00	
Mode:		802.11a		
Frequency (MHz)	Spurious Emission		Limit (dBm)	Test Result
	polarization	Level(dBm)		
5240MHz				
108.52	Vertical	-67.23	-54.00	Pass
456.82	V	-63.44	-54.00	
10480.00	V	-48.39	-30.00	
15720.00	V	-43.93	-30.00	
87.69	Horizontal	-64.55	-54.00	
235.43	H	-65.84	-54.00	
10480.00	H	-48.24	-30.00	
15720.00	H	-44.68	-30.00	

MIMO:

Mode:		802.11ac(HT20)		
Frequency (MHz)	Spurious Emission		Limit (dBm)	Test Result
	polarization	Level(dBm)		
5180MHz				
61.69	Vertical	-68.88	-54.00	Pass
436.39	V	-65.47	-36.00	
10360.00	V	-41.25	-30.00	
15540.00	V	-43.64	-30.00	
146.63	Horizontal	-67.61	-36.00	
628.29	H	-63.26	-54.00	
10360.00	H	-43.54	-30.00	
15540.00	H	-43.80	-30.00	
Mode:		**802.11ac(HT20)**		
Frequency (MHz)	Spurious Emission		Limit (dBm)	Test Result
	polarization	Level(dBm)		
5200MHz				
232.39	Vertical	-70.32	-54.00	Pass
801.25	V	-61.79	-54.00	
10400.00	V	-41.76	-30.00	
15600.00	V	-43.11	-30.00	
113.25	Horizontal	-67.67	-36.00	
594.36	H	-60.75	-54.00	
10400.00	H	-42.90	-30.00	
15600.00	H	-43.58	-30.00	
Mode:		**802.11ac(HT20)**		
Frequency (MHz)	Spurious Emission		Limit (dBm)	Test Result
	polarization	Level(dBm)		
5240MHz				
67.38	Vertical	-69.81	-54.00	Pass
354.04	V	-66.68	-36.00	
10480.00	V	-50.73	-30.00	
15720.00	V	-43.87	-30.00	
96.56	Horizontal	-67.78	-54.00	
686.25	H	-67.18	-54.00	
10480.00	H	-49.77	-30.00	
15720.00	H	-43.34	-30.00	

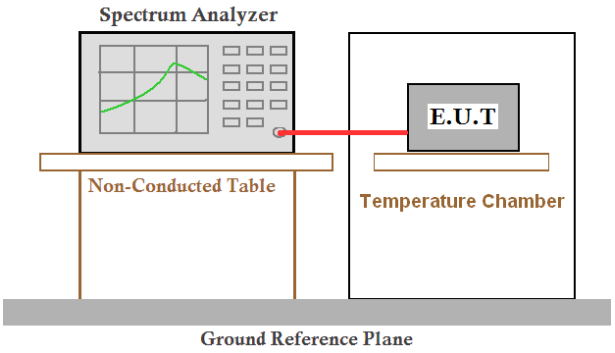
Mode:		802.11n(HT20)		
Frequency (MHz)	Spurious Emission		Limit (dBm)	Test Result
	polarization	Level(dBm)		
5180MHz				
124.77	Vertical	-68.95	-36.00	Pass
486.52	V	-61.64	-36.00	
10360.00	V	-50.45	-30.00	
15540.00	V	-43.23	-30.00	
102.52	Horizontal	-68.17	-54.00	
665.52	H	-70.09	-54.00	
10360.00	H	-49.69	-30.00	
15540.00	H	-43.77	-30.00	
Mode:		802.11n(HT20)		
Frequency (MHz)	Spurious Emission		Limit (dBm)	Test Result
	polarization	Level(dBm)		
5200MHz				
174.25	Vertical	-68.22	-36.00	Pass
636.42	V	-62.84	-54.00	
10400.00	V	-51.13	-30.00	
15600.00	V	-43.45	-30.00	
148.53	Horizontal	-68.41	-54.00	
685.25	H	-60.74	-54.00	
10400.00	H	-51.08	-30.00	
15600.00	H	-44.41	-30.00	
Mode:		802.11n(HT20)		
Frequency (MHz)	Spurious Emission		Limit (dBm)	Test Result
	polarization	Level(dBm)		
5240MHz				
245.25	Vertical	-67.59	-36.00	Pass
874.53	V	-64.55	-36.00	
10480.00	V	-50.64	-30.00	
15720.00	V	-42.47	-30.00	
122.58	Horizontal	-70.39	-36.00	
763.43	H	-69.87	-36.00	
10480.00	H	-49.30	-30.00	
15720.00	H	-44.93	-30.00	

Mode:		802.11ac(HT40)		
Frequency (MHz)	Spurious Emission		Limit (dBm)	Test Result
	polarization	Level(dBm)		
5190MHz				
83.96	Vertical	-68.00	-36.00	Pass
458.63	V	-59.00	-36.00	
10380.00	V	-50.92	-30.00	
15570.00	V	-43.72	-30.00	
123.54	Horizontal	-66.84	-36.00	
688.25	H	-61.94	-54.00	
10380.00	H	-50.62	-30.00	
15570.00	H	-43.90	-30.00	
Mode:		**802.11ac(HT40)**		
Frequency (MHz)	Spurious Emission		Limit (dBm)	Test Result
	polarization	Level(dBm)		
5230MHz				
87.92	Vertical	-67.70	-54.00	Pass
773.52	V	-60.97	-54.00	
10460.00	V	-50.71	-30.00	
15690.00	V	-44.04	-30.00	
173..20	Horizontal	-65.37	-36.00	
582.05	H	-62.60	-54.00	
10460.00	H	-48.82	-30.00	
15690.00	H	-44.46	-30.00	

Mode:		802.11ac(HT80)		
Frequency (MHz)	Spurious Emission		Limit (dBm)	Test Result
	polarization	Level(dBm)		
5210MHz				
85.25	Vertical	-68.56	-36.00	Pass
335.54	V	-65.19	-36.00	
10420.00	V	-40.97	-30.00	
15630.00	V	-43.28	-30.00	
159.85	Horizontal	-67.28	-36.00	
587.24	H	-62.95	-54.00	
10420.00	H	-43.26	-30.00	
15630.00	H	-43.45	-30.00	

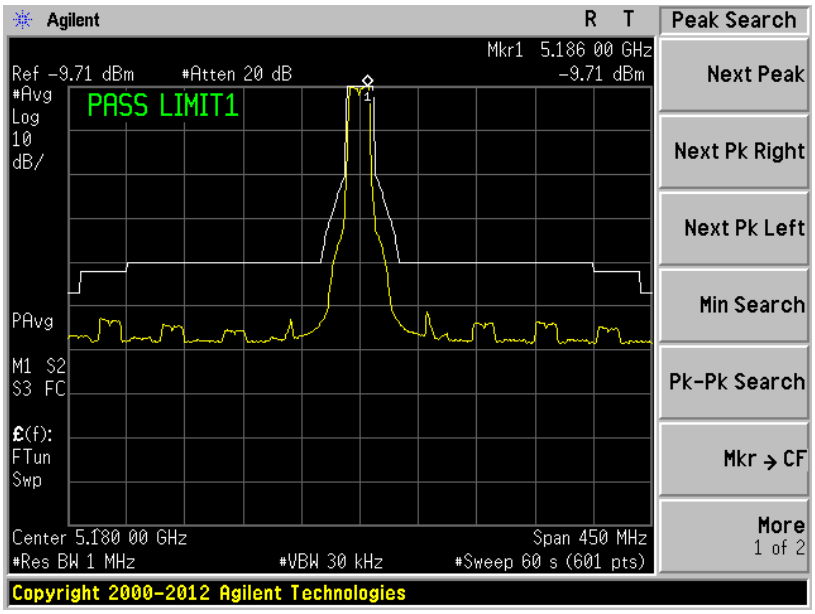
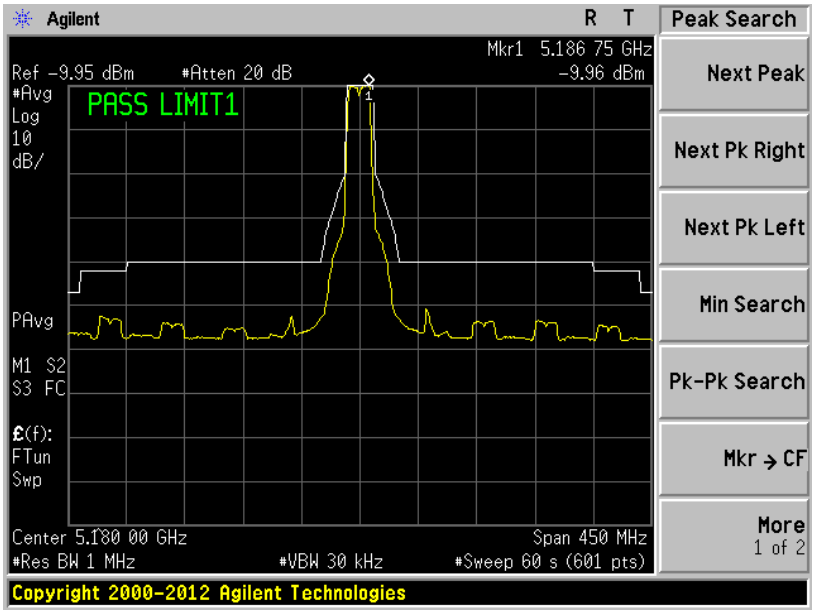
Mode:		802.11n(HT40)		
Frequency (MHz)	Spurious Emission		Limit (dBm)	Test Result
	polarization	Level(dBm)		
5190MHz				
124.55	Vertical	-70.00	-36.00	Pass
684.15	V	-61.51	-54.00	
10380.00	V	-41.48	-30.00	
15570.00	V	-42.75	-30.00	
245.63	Horizontal	-67.34	-36.00	
498.58	H	-60.44	-54.00	
10380.00	H	-42.62	-30.00	
15570.00	H	-43.23	-30.00	
Mode:		**802.11n(HT40)**		
Frequency (MHz)	Spurious Emission		Limit (dBm)	Test Result
	polarization	Level(dBm)		
5230MHz				
80.05	Vertical	-69.49	-36.00	Pass
345.21	V	-66.40	-36.00	
10460.00	V	-50.45	-30.00	
15690.00	V	-43.51	-30.00	
108.90	Horizontal	-67.45	-54.00	
548.25	H	-66.87	-54.00	
10460.00	H	-49.49	-30.00	
15690.00	H	-42.99	-30.00	

7.2.6 Transmitter unwanted emissions within 5GHz RLAN band

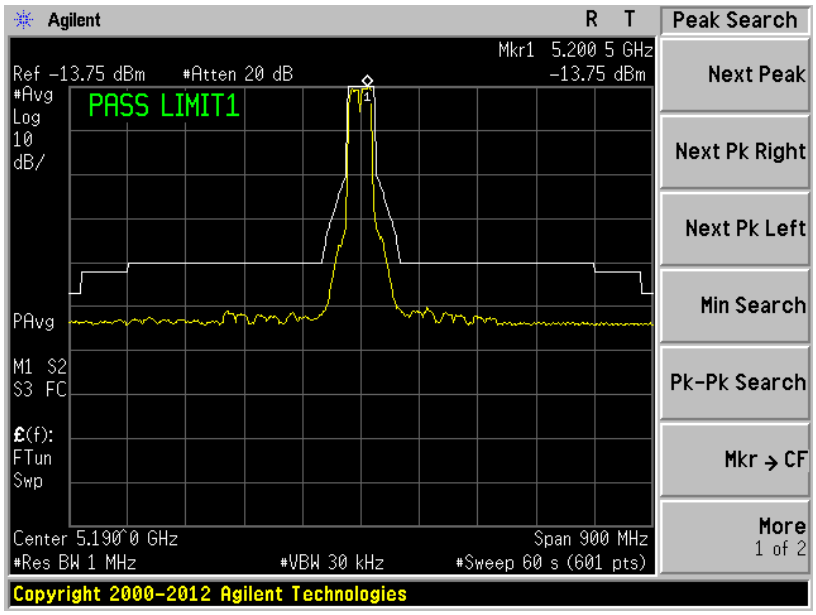
Test Requirement:	EN 301893 clause 4.2.4.2
Test Method:	EN 301893 clause 5.4.6.2.2
Limit:	EN 301893 clause 4.2.4.2.2 Figure 1
Test setup:	
Test procedure:	The UUT shall be configured for continuous transmit mode (duty cycle equal to 100 %). If this is not possible, then option 2 shall be used. **Step 1: Determination of the reference average power level.** Spectrum analyser settings: Resolution BW: 1 MHz Video BW: 30 kHz Detector Mode: Peak Trace Mode: Video Average Sweep time: Coupled Center Frequency: Centre frequency of the channel being tested Span: 2 × Nominal Channel Bandwidth Use the marker to find the highest average power level of the power envelope of the UUT. This level shall be used as the reference level for the relative measurements. **Step 2: Determination of the relative average power levels.** Adjust the frequency range of the spectrum analyser to allow the measurement to be performed within the sub-bands 5 150 MHz to 5 350 MHz and 5 470 MHz to 5 725 MHz. No other parameter of the spectrum analyser should be changed. Compare the relative power envelope of the UUT with the limits defined in clause 4.2.4.2.2.
Test mode:	Keep the EUT in transmitting with modulation.
Test Instruments:	Refer to section 6.0 for details
Measurement Record:	Uncertainty: ±6dB

Measurement Data

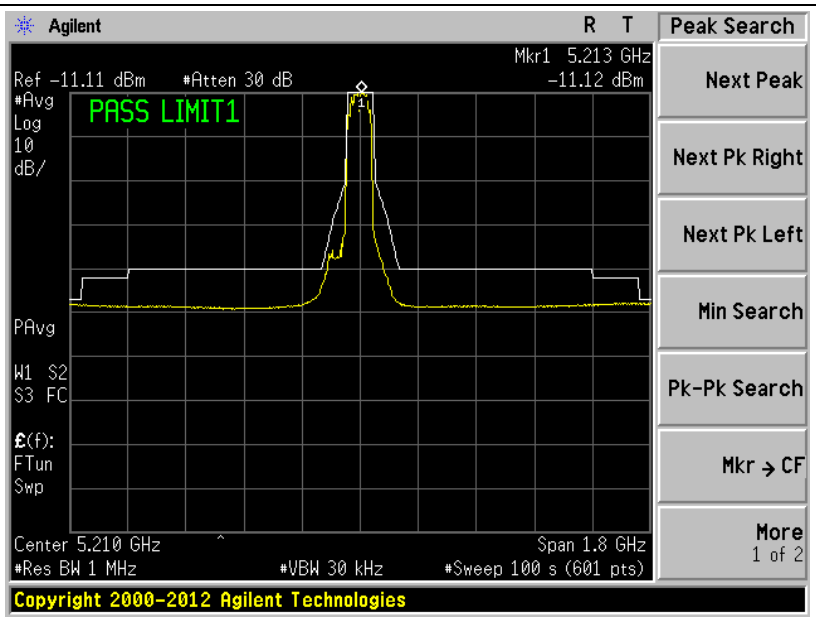
MIMO:

Mode:	**802.11a**
Channel 36 (5180MHz)	
	
Mode:	**802.11n(HT20)**
Channel 36 (5180MHz)	
	

Mode:	802.11n(HT40)
Channel 38 (5190MHz)	



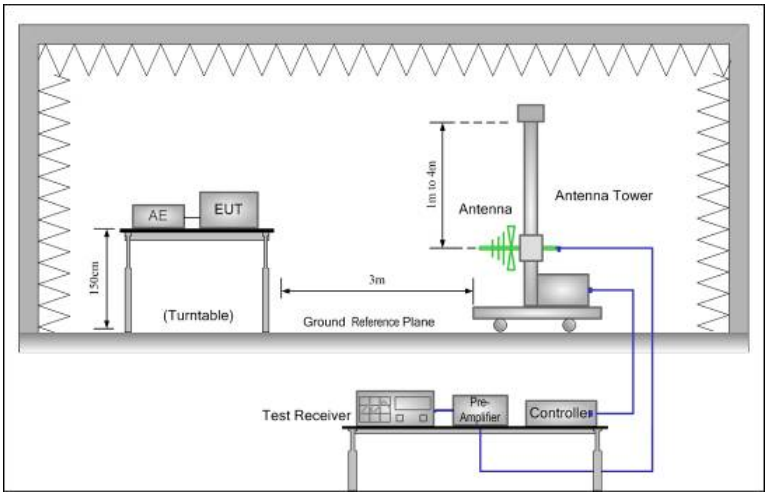
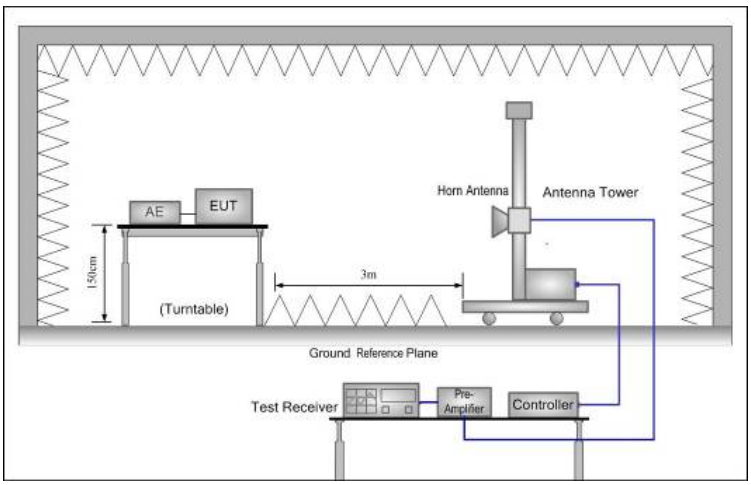
Mode:	802.11ac(HT80)
Channel 42 (5210MHz)	



Note1: When we test the channel 5180MHz, the right noises of the signal are lower than -47dBc, and satify the 5470-5725MHz band MASK.

7.3 Receiver Requirements

7.3.1 Receiver Spurious emissions

Test Requirement:	EN 301893 clause 4.2.5
Test Method:	EN 301893 clause 5.4.7.2.2
Receiver setup:	Frequency<1000MHz; RBW=100KHz, VBW=300KHz, Detector= peak Frequency>=1000MHz; RBW=1MHz, VBW=3MHz, Detector=peak.
Limit:	Frequency: 30MHz to 1000 MHz; Above 1GHz Limit: 2nW(-57dBm); 20nW(-47dBm)
Test Frequency range:	30MHz to 26GHz
Test setup:	Below 1GHz  Above 1GHz 
Test procedure:	Substitution method was performed to determine the actual ERP emission levels of the EUT. The following test procedure as below: 1>.Below 1GHz test procedure: 1. On the test site as test setup graph above, the EUT shall be placed at the 1.5m support on the turntable and in the position closest to normal

	use as declared by the provider. 2. The test antenna shall be oriented initially for vertical polarization and shall be chosen to correspond to the frequency of the transmitter.The output of the test antenna shall be connected to the measuring receiver. 3. The transmitter shall be switched on, if possible, without modulation and the measuring receiver shall be tuned to the frequency of the transmitter under test. 4. The test antenna shall be raised and lowered from 1m to 4m until a maximum signal level is detected by the measuring receiver. Then the turntable should be rotated through 360° in the horizontal plane, until the maximum signal level is detected by the measuring receiver. 5. Repeat step 4 for test frequency with the test antenna polarized horizontally. 6. Remove the transmitter and replace it with a substitution antenna (the antenna should be half-wavelength for each frequency involved). The center of the substitution antenna should be approximately at the same location as the center of the transmitter. At the lower frequencies, where the substitution antenna is very long, this will be impossible to achieve when the antenna is polarized vertically. In such case the lower end of the antenna should be 0.3 m above the ground. 7. Feed the substitution antenna at the transmitter end with a signal generator connected to the antenna by means of a nonradiating cable. With the antennas at both ends vertically polarized, and with the signal generator tuned to a particular test frequency, raise and lower the test antenna to obtain a maximum reading at the spectrum analyzer. Adjust the level of the signal generator output until the previously recorded maximum reading for this set of conditions is obtained. This should be done carefully repeating the adjustment of the test antenna and generator output. 8. Repeat step 7 with both antennas horizontally polarized for each test frequency. 9. Calculate power in dBm into a reference ideal half-wave dipole antenna by reducing the readings obtained in steps 7 and 8 by the power loss in the cable between the generator and the antenna, and further corrected for the gain of the substitution antenna used relative to an ideal half-wave dipole antenna by the following formula: ERP(dBm) = Pg(dBm) – cable loss (dB) + antenna gain (dBd) where: Pg is the generator output power into the substitution antenna. 2>.Above 1GHz test procedure: Different between above is the test site, change from Semi- Anechoic Chamber to fully Anechoic Chamber, and the test antenna do not need to raise from 1 to 4m, just test in 1.5m height.
Test mode:	Kept Rx in receive mode.
Test Instruments:	Refer to section 6.0 for details
Measurement Record:	Uncertainty: ± 6dB

Measurement Data

Remark: All of the mode were tested, only the data of worst case MIMO RX was shows below.

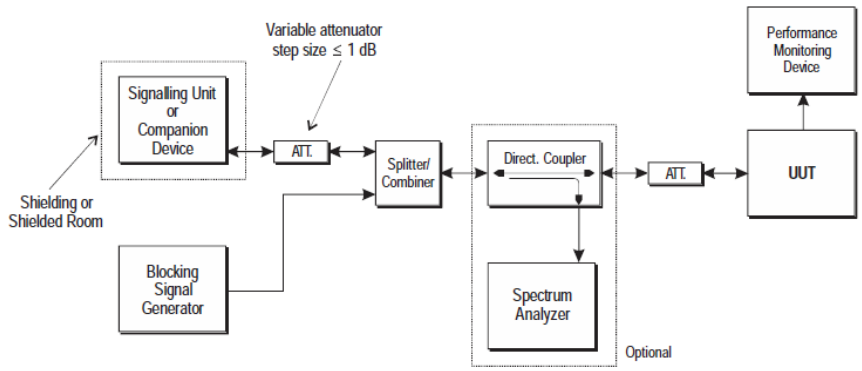
Mode:		**802.11a**		
Frequency (MHz)	**Spurious Emission**		**Limit (dBm)**	**Test Result**
	polarization	**Level(dBm)**		
Channel 36 (5180MHz)				
87.15	Vertical	-70.89	2nW/ -57dBm, Below 1GHz , 20nW/ -47dBm, Above 1GHz	Pass
625.44	V	-66.78		
10360.00	V	-63.22		
15540.00	V	-58.47		
105.36	Horizontal	-70.53		
535.76	H	-66.64		
10360.00	H	-61.99		
15540.00	H	-55.88		
Mode:		**802.11n(HT40)**		
Frequency (MHz)	**Spurious Emission**		**Limit (dBm)**	**Test Result**
	polarization	**Level(dBm)**		
Channel 38 (5190MHz)				
80.25	Vertical	-72.46	2nW/ -57dBm, Below 1GHz , 20nW/ -47dBm, Above 1GHz	Pass
591.33	V	-65.58		
10380.00	V	-63.20		
15570.00	V	-58.41		
165.84	Horizontal	-70.43		
511.52	H	-64.13		
10380.00	H	-62.63		
15570.00	H	-55.87		
Mode:		**802.11ac(HT80)**		
Frequency (MHz)	**Spurious Emission**		**Limit (dBm)**	**Test Result**
	polarization	**Level(dBm)**		
Channel 36 (5180MHz)				
97.58	Vertical	-71.86	2nW/ -57dBm, Below 1GHz , 20nW/ -47dBm, Above 1GHz	Pass
742.24	V	-65.75		
10420.00	V	-64.92		
15630.00	V	-58.27		
211.25	Horizontal	-71.61		
482.63	H	-64.71		
10420.00	H	-61.85		
15630.00	H	-58.64		

7.3.2 Receiver Blocking

Test Requirement:	ETSI EN 300 328 clause 4.2.8
Test Method:	ETSI EN 300 328 clause 5.4.10.2
Limit:	While maintaining the minimum performance criteria as defined in clause 4.2.8.3, the blocking levels at specified frequency offsets shall be equal to or greater than the limits defined in table 9.

Table 9: Receiver Blocking parameters

Wanted signal mean power from companion device (dBm)	Blocking signal frequency (MHz)	Blocking signal power (dBm) (see note 2)		Type of blocking signal
		Master or Slave with radar detection (see table D.2, note 2)	Slave without radar detection (see table D.2, note 2)	
Pmin + 6 dB	5 100	-53	-59	Continuous Wave
Pmin + 6 dB	4 900 5 000 5 975	-47	-53	Continuous Wave
NOTE 1: P_{min} is the minimum level of the wanted signal (in dBm) required to meet the minimum performance criteria as defined clause 4.2.8.3 in the absence of any blocking signal. NOTE 2: The levels specified are levels in front of the UUT antenna. In case of conducted measurements, the same levels should be used at the antenna connector irrespective of antenna gain.				

Test setup:	 **Figure 18: Test Set-up for receiver blocking**
Test procedure:	For systems using multiple receive chains only one chain need to be tested. All other receiver inputs shall be terminated. **Step 1:** • The UUT shall be set to the first operating frequency to be tested (see clause 5.3.2). **Step 2:** • The blocking signal generator is set to the first frequency as defined in table 9. **Step 3:** • With the blocking signal generator switched off a communication link is set up between the UUT and the associated companion device using the test setup shown in figure 18. The attenuation of the variable attenuator shall be increased in 1 dB steps to a value at which the minimum performance criteria as specified in clause 4.2.8.3 is still met. The resulting level for the wanted signal at the input of the UUT is P_{min}. • This signal level (P_{min}) is increased by 6 dB resulting in a new level (P_{min} + 6 dB) of the wanted signal at the UUT receiver input. **Step 4:** • The level of the blocking signal at the UUT input is set to the level

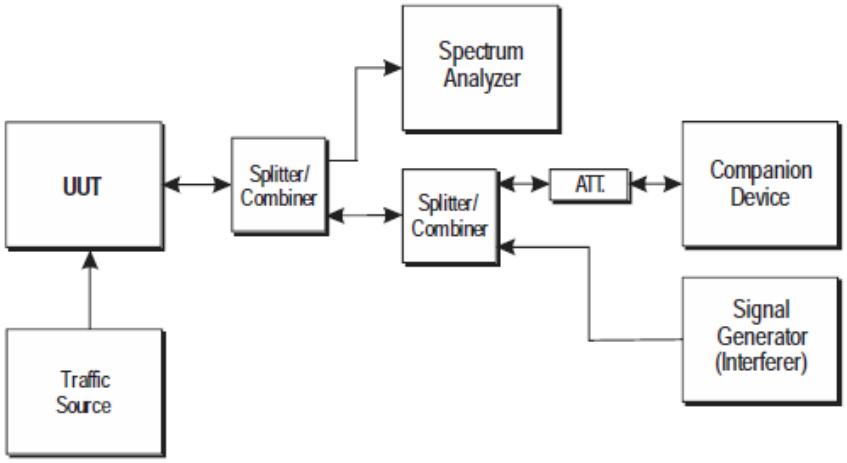
	provided in table 9. It shall be verified and recorded in the test report that the performance criteria as specified in clause 4.2.8.3 are met. • If the performance criteria as specified in clause 4.2.8.3 are met, the level of the blocking signal at the UUT may be further increased (e.g. in steps of 1 dB) until the level whereby the performance criteria as specified in clause 4.2.8.3 are no longer met. The highest level at which the performance criteria are met is recorded in thetest report. **Step 5:** • Repeat step 4 for each remaining combination of frequency and level as specified in table 9. **Step 6:** • Repeat step 2 to step 5 with the UUT operating at the other operating frequencies at which the blocking test has to be performed. See clause 5.3.2.
Measurement Record:	Uncertainty: N/A
Test mode:	Normal link mode
Test Instruments:	Refer to section 6.0 for details

Measurement Data:

Test Channel	P_{min}(dBm)	PER(%)	Limit of PER(%)	Wanted signal mean power companion (P_{min}+6dB)	Blocking signal frequency (MHz)	Blocking signal Power (dBm)	Type of blocking signal	Result
Lowest Channel	-86.40	9.42	10	-80.40	4900.00	-47	CW	Pass
				-80.40	5000.00	-47		
				-80.40	5100.00	-35		
Highest Channel	-85.10	9.37		-79.10	5975.00	-47		
Note: During the blocking test.The value of PER which display on the CMW 500 was no changed.Maybe the value of PER has a slight floating,but no bigger than 10%.								

Remark: According to ETSI EN 301893 V2.1.0 clause 5.4.10.1. Only the lowest data rate of 802.11a mode was tested and recorded.

7.4 Adaptivity (Channel Access Mechanism)

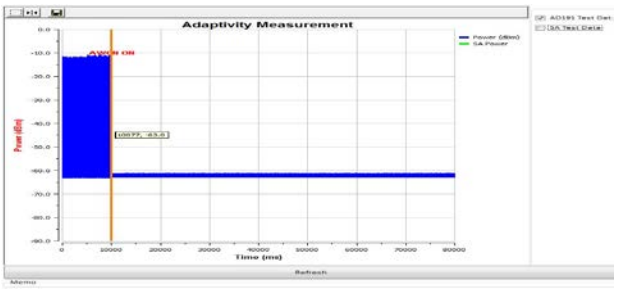
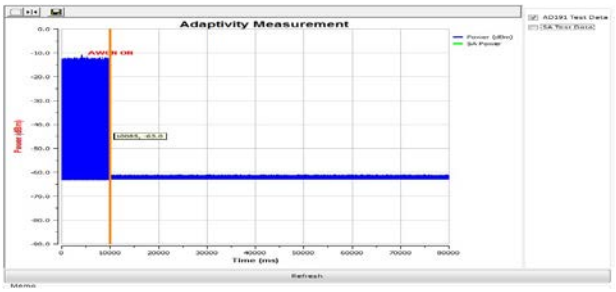
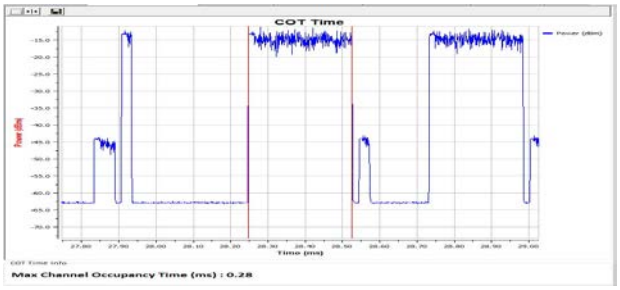
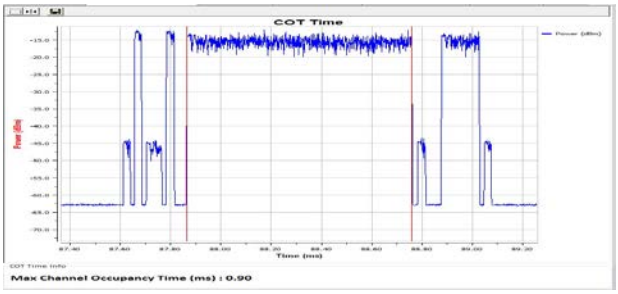
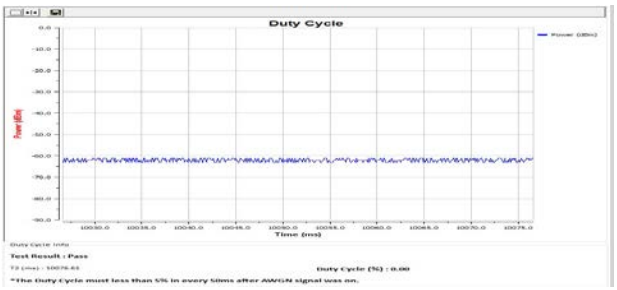
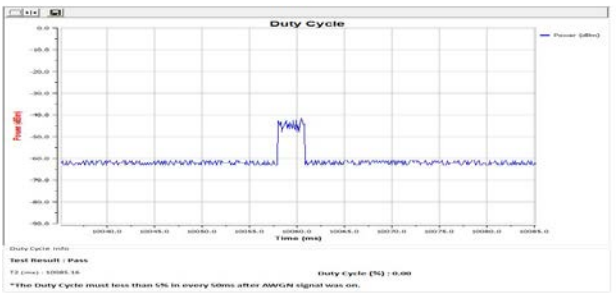
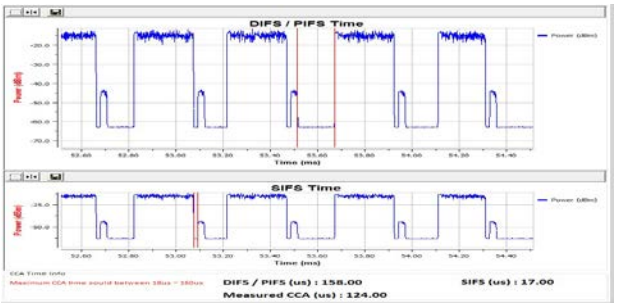
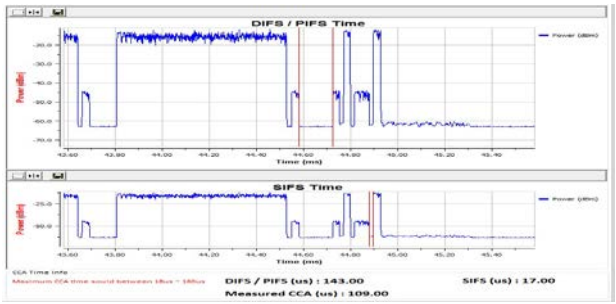
Test Requirement:	EN 301893 clause 4.2.7
Test Method:	EN 301893 clause 5.4.9.3
Limit:	Clause 4.2.7.3.2
Test setup:	
Test procedure:	1> 1. The UUT shall connect to a companion device during the test. The signal generator, the spectrum analyser, the UUT, the traffic source and the companion device are connected using a Set-up equivalent to the example given by figure 16 although the interference source is switched off at this point in time. The spectrum analyser is used to monitor the transmissions of the UUT in response to the interference signal. The traffic source might be part of the UUT itself. 2. The received signal level (wanted signal from the companion device) at the UUT shall be sufficient to maintain a reliable link for the duration of the test. A typical value for the received signal level which can be used in most cases is -50 dBm/MHz. 3. The analyser shall be set as follows: RBW:Occupied Channel Bandwidth (if the analyser does not support this setting, the highest available setting shall be used) VBW:3 × RBW (if the analyser does not support this setting, the highest available setting shall be used) Detector Mode: RMS Centre Frequency: Equal to the centre frequency of the operating channel Span: 0 Hz Sweep time: > Channel Occupancy Time Trace Mode: Clear/Write Trigger Mode: Video or RF/IF power 2> 1. Configure the traffic source so that it exceeds the UUT's theoretical radio performance. The traffic source shall fill the UUT's buffers causing the UUT to always have transmissions queued (full buffer condition) towards the companion device. To avoid adverse effects on the measurement results, a unidirectional traffic source should be

	used. An example of such a unidirectional traffic source not triggering reverse traffic on higher layer protocols is UDP. 2. Clause 5.4.9.3.2.2 is the procedure using to verify the capability to detect other RLAN transmissions on the operating channel when operating on a single channel 3> Adding the interference signal One of the three interference signals as defined in clause B.7 is injected on the current Operating Channel of the UUT. The bandwidth of this signal shall be such that it covers the current Operating Channel. The level (at the input of the UUT) of this interference signal shall be equal to the applicable ED Threshold Level (TL) defined in clause 4.2.7.3.2.5. 4> Verification of reaction to the interference signal. 1. The spectrum analyser shall be used to monitor the transmissions of the UUT on the selected operating channel after the interference signal was injected. This may require the spectrum analyser sweep to be triggered by the start of the interfering signal. 2. Using the procedure defined in clause 5.4.9.2.2, it shall be verified that: 3. The UUT stops transmissions on the current operating channel. The UUT is assumed to stop transmissions within a period equal to the maximum channel occupancy time that corresponds to the priority class being tested (see table 7 and table 8). The UUT is allowed to have short control signalling transmissions on the current operating channel, see ii) and iii). 4. Apart from Short Control Signalling Transmissions there shall be no subsequent transmissions while the interfering signal is present. 5. The Short Control Signalling Transmissions shall comply with the limits defined in clause 4.2.7.3.3. The verification of the Short Control Signalling Transmissions may require the analyser settings to be changed (e.g. sweep time). 6. To verify that the UUT is not resuming normal transmissions as long as the interference signal is present, the monitoring time may need to be 60 s or more, in which case a segmented measurement may need to be performed in order to achieve the required resolution. 7. Once the test is completed and the interference signal is removed, the UUT may start transmissions again on this channel however this is not a requirement and therefore does not require testing. 8. Step 2 and step 3 shall be repeated for each of the interference signals defined in clause B.7.
Test mode:	Keep the EUT in transmitting mode with modulation.
Test Instruments:	Refer to section 6.0 for details
Measurement Record:	Uncertainty: ± 1.5dB

Note: According to ETSI EN 301 893 V2.1.1 Annex B(B7). All of AWGN&OFDM. And found the AWGN signal was the worst case. So only this case was recorded on the report.

Only the worst-case shows below:

MIMO:

802.11ac(HT40) mode lowest channel		**802.11ac(H80) mode middle channel**	
AWGN Interference Level (dBm)	-63.24	AWGN Interference Level (dBm)	-64.53
AWGN Interference Start Time (ms)	10077.21	AWGN Interference Start Time (ms)	10211.42
Max COT (ms)	0.28	Max COT (ms)	0.90
DIFS/PIFS width (ms)	0.158	DIFS/PIFS (ms)	0.143
Duty Cycle (%)	0.00	Duty Cycle (%)	0.00
			
			
			
			

8 Test Setup Photo

9 EUT Constructional Details

Reference to the test report No.: GTS201705000233E01

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