Report No.: GTS201807000209E03

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

Equipment Under Test (EUT)

Product Name:	Industrial 3G/4G Router
Model No.:	WL-G510
Applicable standards:	Draft ETSI EN 300 440 V2.2.0 (2017-09)
Date of sample receipt:	July 27, 2018
Date of Test:	July 28-August 05, 2018
Date of report issue:	August 06, 2018
Test Result :	PASS *

***In the configuration tested, the EUT 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	*August 06, 2018*	*Original*

Prepared By: Bill. Yuan ***Date:*** *August 06, 2018*

Project Engineer

Check By: Andy. Wu ***Date:*** *August 06, 2018*

Reviewer

3 Contents

Page

4 Test Summary

Radio Spectrum Matter (RSM) Part of Transmitter					
Test	**Test Requirement**	**Test method**	**Limit/Severity**	**Uncertainty**	**Result**
Equivalent isotropically radiated power(e.i.r.p.)	Clause 4.2.2.1	Clause 4.2.2.3	Table 2 25mW/ 14Bm	± 3dB	PASS
Permitted Range of Operating Frequencies	Clause 4.2.3.1	Clause 4.2.3.3	Table 2	± 10^{-7}	PASS
Duty cycle	Clause 4.2.5.1	Clause 4.2.5.3	Table 4	N/A	N/A
Transmitter spurious emissions	Clause 4.2.4.1	Clause 4.2.4.3	Table 3	± 6 dB	PASS
Radio Spectrum Matter (RSM) Part of Receiver					
Receiver spurious emissions	Clause 4.3.5.1	Clause 4.3.5.3	<2nW <1GHz, <20nW >1GHz	± 6dB	PASS

Remark:

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

5 General Information

5.1 General Description of EUT

Product Name:	Industrial 3G/4G Router
Model No.:	WL-G510
Operation Frequency:	5745MHz ~ 5825MHz
Channel separation:	20MHz for 802.11a/802.11n(HT20)/ 802.11ac(HT20) 40MHz for 802.11n(HT40) /802.11ac(HT40) 80MHz for 802.11ac(HT80)
Modulation technology:	Orthogonal Frequency Division Multiplexing(OFDM)
Antenna Type:	External antenna
Antenna gain:	Main Antenna: 3.00dBi (Max.), for TX/RX (WIFI) Aux Antenna: 3.00dBi(Max.), for TX/RX (WIFI)
Directional Gain	3.00+10log(2)=6.01dBi for MIMO 3.00dBi for SISO
Power Supply:	Adapter: Model: TS-A018-120015EJ Input: AC 100-240V, 50/60Hz, 0.6A Output: DC 12V, 1.5A

5.2 Description of Support Units

The EUT was test as an independent unit

Channel List for SRD (20MHz bandwidth) @ 5.8G band							
1	5745	2	5765	3	5785	4	5805
5	5825						
Channel List for SRD (40MHz bandwidth) @ 5.8G band							
Channel No.	Channel No.	Channel No.	Channel No.	Channel No.	Channel No.	Channel No.	Channel No.
1	5755	2	5795				
Channel List for SRD (80MHz bandwidth) @ 5.8G band							
Channel No.	Channel No.	Channel No.	Channel No.	Channel No.	Channel No.	Channel No.	Channel No.
1	5775						

5.3 Test Facility

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

● **FCC —Registration No.: 381383**

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 381383, January 08, 2018.

● **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

5.4 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

5.5 Description of Support Units

The EUT has been tested as an independent unit.

5.6 Deviation from Standards

None.

5.7 Abnormalities from Standard Conditions

None.

5.8 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	9.2(L)*6.2(W)* 6.4(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	EMI Test Receiver	Rohde & Schwarz	ESU26	GTS203	June. 27 2018	June. 26 2019
4	BiConiLog Antenna	SCHWARZBECK MESS-ELEKTRONIK	VULB9163	GTS214	June. 27 2018	June. 26 2019
5	Double -ridged waveguide horn	SCHWARZBECK MESS-ELEKTRONIK	BBHA 9120 D	GTS208	June. 27 2018	June. 26 2019
6	Horn Antenna	ETS-LINDGREN	3160	GTS217	June. 27 2018	June. 26 2019
7	EMI Test Software	AUDIX	E3	N/A	N/A	N/A
8	Coaxial Cable	GTS	N/A	GTS213	June. 27 2018	June. 26 2019
9	Coaxial Cable	GTS	N/A	GTS211	June. 27 2018	June. 26 2019
10	Coaxial cable	GTS	N/A	GTS210	June. 27 2018	June. 26 2019
11	Coaxial Cable	GTS	N/A	GTS212	June. 27 2018	June. 26 2019
12	Amplifier(100kHz-3GHz)	HP	8347A	GTS204	June. 27 2018	June. 26 2019
13	Amplifier(2GHz-20GHz)	HP	84722A	GTS206	June. 27 2018	June. 26 2019
14	Amplifier (18-26GHz)	Rohde & Schwarz	AFS33-18002 650-30-8P-44	GTS218	June. 27 2018	June. 26 2019
15	Band filter	Amindeon	82346	GTS219	June. 27 2018	June. 26 2019
16	Power Meter	Anritsu	ML2495A	GTS540	June. 27 2018	June. 26 2019
17	Power Sensor	Anritsu	MA2411B	GTS541	June. 27 2018	June. 26 2019
18	Wideband Radio Communication Tester	Rohde & Schwarz	CMW500	GTS575	June. 27 2018	June. 26 2019
19	Splitter	Agilent	11636B	GTS237	June. 27 2018	June. 26 2019
20	Loop Antenna	ZHINAN	ZN30900A	GTS534	June. 27 2018	June. 26 2019

7 Radio Technical Requirements Specification in EN 300 440

7.1 Test environment

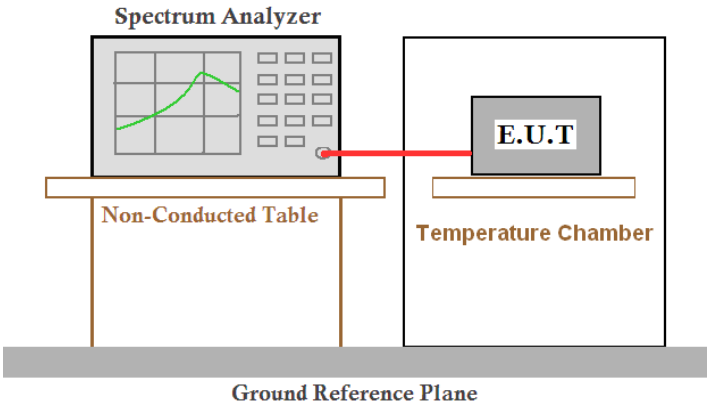
Test Condition	Temperature	Relative Humidity	Voltage		
			AC mains	Lead-acid battery on vehicles	Other power sources
Normal	+15°C to +35°C	20% to 75%	nominal	1,1 times the nominal voltage	nominal
Extreme	-20°C to +55°C (General use) -20°C to +55°C (Portable use) 5°C to +35°C (Indoor use)	20% to 75%	▼ 0,9 times ▲ 1,1 times	▼ 0,9 times ▲ 1,3 times	▼0,85 times (Leclanché or lithium) 0,9 times (mercury or nickel-cadmium) ▲1,15 times

7.2 Test mode

Transmitting mode:	Keep the EUT in transmitting mode with modulation.

7.3 Transmitter requirement

7.3.1 Equivalent Isotropically Radiated Power

Test Requirement:	ETSI EN 300 440 clause 4.2.2.1
Test Method:	ETSI EN 300 440 clause 4.2.2.3
Limit:	14dBm
Test setup:	
Test procedure:	1>. The output of the transmitter shall be connected to the spectrum analyzer. 2>. Set the Spectrum Analyzer as below: RBW=VBW=1MHz, Span=0Hz, Detector=Peak; read out the duty cycle(X) of the transmitter. 3>. Adjust the test Frequency in spectrum analyzer, use the channel power function of Spectrum Analyzer, and the spectrum analyzer was set as below: RBW=VBW=1MHz, Detector=average, read out the average output power A. 4>. The E.I.R.P. shall be calculated from the above measured power output A, the observed duty cycle x, cable loss, and the applicable antenna assembly gain "G" in dBi, according to the formula: P = A + G + Cable loss + 10 log (1/x); 5>. Repeated the test in extreme test conditions.
Test mode:	Refer to section 7.2 for details
Test Instruments:	Refer to section 6.0 for details
Measurement Record:	**Uncertainty: ± 1.5dB**

Measurement Data

Main antenna:

802.11a(HT20)								
Test conditions		Frequency (MHz)	Read Level (dBm)	Antenna Gain(dBi)	Cable Loss (dB)	EIRP (dBm)	Limit (dBm)	Result
Volt(AC)	Temp							
230V	25°C	5745	7.96	3.0	0.50	11.50	14	PASS
		5785	8.71	3.0	0.50	12.25		
		5825	8.24	3.0	0.50	11.78		
207V	55°C	5745	8.64	3.0	0.50	12.18		
		5785	8.01	3.0	0.50	11.55		
		5825	7.36	3.0	0.50	10.90		
253V	55°C	5745	7.06	3.0	0.50	10.60		
		5785	7.55	3.0	0.50	11.09		
		5825	7.67	3.0	0.50	11.21		
207V	-20°C	5745	8.86	3.0	0.50	12.40		
		5785	6.57	3.0	0.50	10.11		
		5825	7.94	3.0	0.50	11.48		
253V	-20°C	5745	7.04	3.0	0.50	10.58		
		5785	7.68	3.0	0.50	11.22		
		5825	8.13	3.0	0.50	11.67		

Aux antenna:

802.11a(HT20)								
Test conditions		Frequency (MHz)	Read Level (dBm)	Antenna Gain(dBi)	Cable Loss (dB)	EIRP (dBm)	Limit (dBm)	Result
Volt(AC)	Temp							
230V	25°C	5745	6.66	3.0	0.50	10.20	14	PASS
		5785	7.41	3.0	0.50	10.95		
		5825	8.28	3.0	0.50	11.82		
207V	55°C	5745	8.17	3.0	0.50	11.71		
		5785	7.61	3.0	0.50	11.15		
		5825	7.77	3.0	0.50	11.31		
253V	55°C	5745	8.03	3.0	0.50	11.57		
		5785	6.66	3.0	0.50	10.20		
		5825	7.58	3.0	0.50	11.12		
207V	-20°C	5745	7.12	3.0	0.50	10.66		
		5785	6.89	3.0	0.50	10.43		
		5825	7.47	3.0	0.50	11.01		
253V	-20°C	5745	7.10	3.0	0.50	10.64		
		5785	7.70	3.0	0.50	11.24		
		5825	7.29	3.0	0.50	10.83		

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

2>. Duty cycle=99%, Antenna Gain=3.0dBi ,Cable loss=0.50dB

3>. EIRP = Read Level + Antenna Gain + Cable Loss + 10 log (1/Duty Cycle)

MIMO:

802.11n(HT20)								
Test conditions		Frequency (MHz)	Read Level (dBm)	Antenna Gain(dBi)	Cable Loss (dB)	EIRP (dBm)	Limit (dBm)	Result
Volt(AC)	Temp							
230V	25°C	5745	4.63	6.01	0.50	11.18	14	PASS
		5785	5.20	6.01	0.50	11.75		
		5825	4.60	6.01	0.50	11.15		
207V	55°C	5745	5.04	6.01	0.50	11.59		
		5785	4.67	6.01	0.50	11.22		
		5825	5.38	6.01	0.50	11.93		
253V	55°C	5745	4.97	6.01	0.50	11.52		
		5785	4.54	6.01	0.50	11.09		
		5825	4.55	6.01	0.50	11.10		
207V	-20°C	5745	4.56	6.01	0.50	11.11		
		5785	4.87	6.01	0.50	11.42		
		5825	5.21	6.01	0.50	11.76		
253V	-20°C	5745	4.70	6.01	0.50	11.25		
		5785	4.92	6.01	0.50	11.47		
		5825	4.64	6.01	0.50	12.19		

802.11ac(HT20)								
Test conditions		Frequency (MHz)	Read Level (dBm)	Antenna Gain(dBi)	Cable Loss (dB)	EIRP (dBm)	Limit (dBm)	Result
Volt(AC)	Temp							
230V	25°C	5745	4.42	6.01	0.50	10.97	14	PASS
		5785	4.63	6.01	0.50	11.18		
		5825	4.22	6.01	0.50	10.77		
207V	55°C	5745	4.66	6.01	0.50	11.21		
		5785	4.45	6.01	0.50	11.00		
		5825	4.66	6.01	0.50	11.21		
253V	55°C	5745	4.51	6.01	0.50	11.06		
		5785	4.83	6.01	0.50	11.38		
		5825	5.19	6.01	0.50	11.74		
207V	-20°C	5745	4.79	6.01	0.50	11.34		
		5785	5.08	6.01	0.50	11.63		
		5825	5.03	6.01	0.50	11.58		
253V	-20°C	5745	4.05	6.01	0.50	10.60		
		5785	4.97	6.01	0.50	11.52		
		5825	4.32	6.01	0.50	10.87		

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

2>. Duty cycle=99%, Antenna Gain=6.01dBi ,Cable loss=0.50dB

3>. EIRP = Read Level + Antenna Gain + Cable Loss + 10 log (1/Duty Cycle)

802.11n(HT40)								
Test conditions		Frequency (MHz)	Read Level (dBm)	Antenna Gain(dBi)	Cable Loss (dB)	EIRP (dBm)	Limit (dBm)	Result
Volt(AC)	Temp							
230V	25°C	5755	4.17	6.01	0.50	10.72	14	PASS
		5795	4.38	6.01	0.50	10.93		
207V	55°C	5755	3.91	6.01	0.50	10.46		
		5795	3.82	6.01	0.50	10.37		
253V	55°C	5755	3.79	6.01	0.50	10.34		
		5795	4.09	6.01	0.50	10.64		
207V	-20°C	5755	4.28	6.01	0.50	10.83		
		5795	3.17	6.01	0.50	9.72		
253V	-20°C	5755	4.18	6.01	0.50	10.73		
		5795	3.83	6.01	0.50	10.38		

802.11ac(HT40)								
Test conditions		Frequency (MHz)	Read Level (dBm)	Antenna Gain(dBi)	Cable Loss (dB)	EIRP (dBm)	Limit (dBm)	Result
Volt(AC)	Temp							
230V	25°C	5755	3.56	6.01	0.50	10.11	14	PASS
		5795	3.94	6.01	0.50	10.49		
207V	55°C	5755	3.89	6.01	0.50	10.44		
		5795	3.93	6.01	0.50	10.48		
253V	55°C	5755	4.35	6.01	0.50	10.90		
		5795	3.64	6.01	0.50	10.19		
207V	-20°C	5755	4.03	6.01	0.50	10.58		
		5795	4.39	6.01	0.50	10.94		
253V	-20°C	5755	3.45	6.01	0.50	10.00		
		5795	4.34	6.01	0.50	10.89		

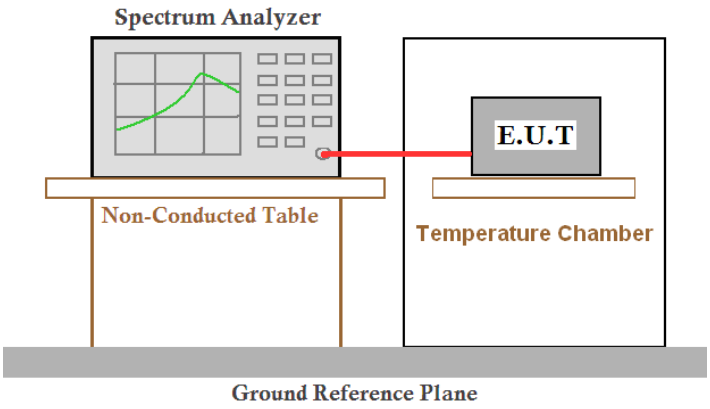
802.11ac(HT80)								
Test conditions		Frequency (MHz)	Read Level (dBm)	Antenna Gain(dBi)	Cable Loss (dB)	EIRP (dBm)	Limit (dBm)	Result
Volt(AC)	Temp							
230V	25°C	5775	3.17	6.01	0.50	9.72	14	PASS
207V	55°C	5775	3.98	6.01	0.50	10.53		
253V	55°C	5775	3.31	6.01	0.50	9.86		
207V	-20°C	5775	3.59	6.01	0.50	10.14		
253V	-20°C	5775	3.76	6.01	0.50	10.31		

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

2>. Duty cycle=99%, Antenna Gain=6.01dBi ,Cable loss=0.50dB

3>. EIRP = Read Level + Antenna Gain + Cable Loss + 10 log (1/Duty Cycle)

7.3.2 Frequency Range

Test Requirement:	ETSI EN 300 440 clause 4.2.3.1
Test Method:	ETSI EN 300 440 clause 4.2.3.3
Limit:	Within the band 5.725GHz to 5.875GHz
Test setup:	
Test procedure:	1>. The output of the transmitter shall be connected to the spectrum analyzer 2>. Offset the factor which it include antenna gain, cable loss and duty cycle in the spectrum analyzer; Remark: the factor=Antenna Gain + Cable Loss + Duty cycle 3>. Set the spectrum analyzer as below: RBW=30kHz, VBW=100 kHz, Detector: Average, Sweep time= 50Seconds, Span: Wide enough to capture the complete power envelope, including all sidebands 4>. Using the marker of the spectrum analyser, find the lowest frequency below the operating frequency at which the spectral power density drops below the level -30dBm. this frequency shall be recorded as fL. 5>. Select the highest operating frequency of the equipment under test, repeated the step 3 to step 4, and receoded the frequency as fH. 6>. The difference between the frequencies measured (fH - fL) is the frequency range which shall be recorded. 7>. Repeated the test in extreme test conditions.
Test mode:	Refer to section 7.2 for details
Test Instruments:	Refer to section 6.0 for details
Measurement Record:	**Uncertainty: ±1 x 10^{-7}**

Measurement Data

Main antenna:

802.11a(HT20)					
Test conditions		fL (MHz)	fH (MHz)	Limit	Result
Volt(AC)	Temp (°C)				
230V	25	5737.23	5832.53	fL≧5725MHz and fH≦5875MHz	Pass
207V	-20	5735.04	5833.18		
207V	55	5734.52	5835.29		
253V	-20	5737.11	5833.53		
253V	55	5735.68	5833.96		

Aux antenna:

802.11a(HT20)					
Test conditions		fL (MHz)	fH (MHz)	Limit	Result
Volt(AC)	Temp (°C)				
230V	25	5736.80	5832.45	fL≧5725MHz and fH≦5875MHz	Pass
207V	-20	5735.33	5833.61		
207V	55	5735.31	5833.05		
253V	-20	5736.08	5834.58		
253V	55	5736.21	5834.75		

MIMO:

802.11n(HT20)					
Test conditions		fL (MHz)	fH (MHz)	Limit	Result
Volt(AC)	Temp (°C)				
230V	25	5736.68	5834.84	fL≧5725MHz and fH≦5875MHz	Pass
207V	-20	5737.12	5832.18		
207V	55	5736.79	5832.05		
253V	-20	5737.52	5832.47		
253V	55	5736.40	5833.65		

802.11ac(HT20)					
Test conditions		fL (MHz)	fH (MHz)	Limit	Result
Volt(AC)	Temp (°C)				
230V	25	5736.84	5834.13	fL≧5725MHz and fH≦5875MHz	Pass
207V	-20	5735.68	5835.00		
207V	55	5735.59	5833.46		
253V	-20	5737.02	5833.42		
253V	55	5737.31	5833.30		

802.11n(HT40)					
Test conditions		fL (MHz)	fH (MHz)	Limit	Result
Volt(AC)	Temp (°C)				
230V	25	5735.04	5814.44	fL≧5725MHz and fH≦5875MHz	Pass
207V	-20	5735.52	5814.40		
207V	55	5736.67	5813.24		
253V	-20	5736.41	5813.42		
253V	55	5735.09	5813.42		

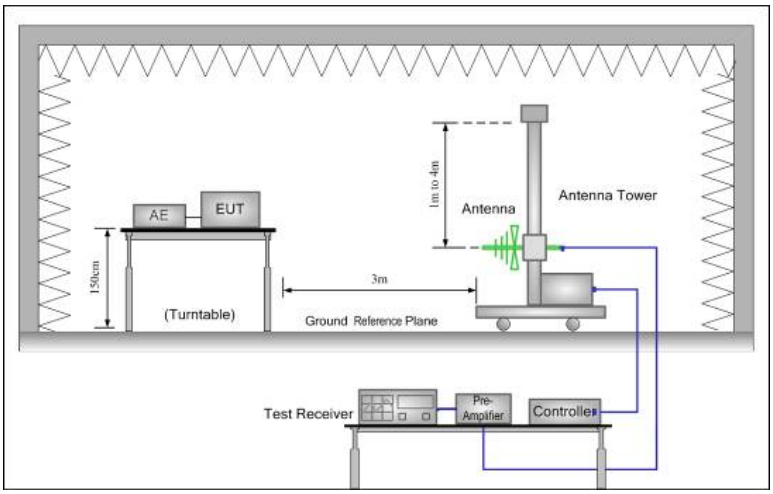
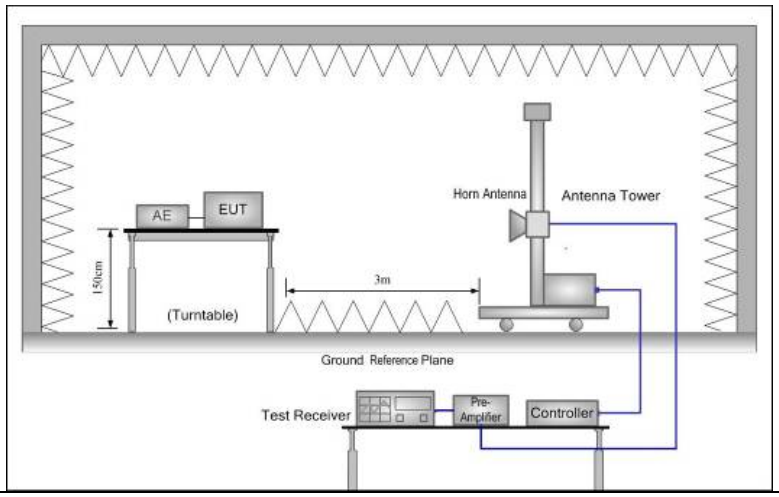
802.11ac(HT40)					
Test conditions		fL (MHz)	fH (MHz)	Limit	Result
Volt(AC)	Temp (°C)				
230V	25	5737.48	5814.34	fL≧5725MHz and fH≦5875MHz	Pass
207V	-20	5737.27	5815.55		
207V	55	5737.24	5813.22		
253V	-20	5736.90	5815.01		
253V	55	5736.54	5814.12		

802.11ac(HT80)					
Test conditions		fL (MHz)	fH (MHz)	Limit	Result
Volt(DC)	Temp (°C)				
3.7V	25	5737.55	5815.60	fL≧5725MHz and fH≦5875MHz	Pass
3.6V	-20	5735.39	5813.87		
3.6V	55	5735.04	5814.08		
4.2V	-20	5735.35	5814.54		
4.2V	55	5737.09	5815.77		

7.3.3 Duty Cycle

No Restriction

7.3.4 Transmitter Spurious emissions

Test Requirement:	ETSI EN 300 440 clause 4.2.4.1
Test Method:	ETSI EN 300 440 clause 4.2.4.3
Receiver setup:	Frequency<1000MHz; RBW=100KHz, VBW=300KHz, Detector= peak Frequency>=1000MHz; RBW=1MHz, VBW=3MHz, Detector=peak.
Limit:	Frequency: Limit (dBm) 47 MHz to 74 MHz, 87.5 MHz to 108 MHz, 174 MHz to 230 MHz, 470 MHz to 862 MHz: -54 Other frequencies ≤ 1 000 MHz: -36 Frequencies > 1 000 MHz: -30
Test Frequency range:	25MHz to 40GHz
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:	Refer to section 7.2 for details
Test Instruments:	Refer to section 6.0 for details
Measurement Record:	**Uncertainty: ± 6dB**

Measurement Data

Remark: All of the mode were tested, only the worst data shows below:

MIMO:

802.11ac(HT20)				
Frequency (MHz)	Spurious Emission		Limit (dBm)	Test Result
	polarization	Level(dBm)		
Lowest Channel				
213.29	Vertical	-65.31	-54	Pass
395.15	V	-67.39	-36	
11489.76	V	-58.78	-30	
17234.25	V	-59.46	-30	
154.46	Horizontal	-67.44	-54	
973.67	H	-67.34	-36	
11489.68	H	-59.72	-30	
17234.42	H	-53.87	-30	
Middle Channel				
249.73	Vertical	-65.90	-36	Pass
819.96	V	-67.46	-54	
11569.47	V	-58.96	-30	
17354.22	V	-59.35	-30	
72.00	Horizontal	-65.85	-54	
194.37	H	-66.74	-54	
11569.65	H	-59.48	-30	
17354.92	H	-53.12	-30	
Highest Channel				
103.86	Vertical	-65.92	-54	Pass
568.06	V	-66.61	-54	
11649.31	V	-58.54	-30	
17474.88	V	-59.80	-30	
82.65	Horizontal	-66.70	-36	
141.59	H	-66.88	-36	
11649.72	H	-59.20	-30	
17474.66	H	-52.60	-30	

802.11ac(HT40)				
Frequency (MHz)	Spurious Emission		Limit (dBm)	Test Result
	polarization	Level(dBm)		
Lowest Channel				
211.36	Vertical	-65.22	-54	Pass
352.29	V	-67.04	-36	
11490.00	V	-59.42	-30	
17235.00	V	-59.48	-30	
148.83	Horizontal	-67.04	-54	
952.14	H	-66.01	-36	
11490.00	H	-60.61	-30	
17235.00	H	-53.20	-30	
Highest Channel				
93.75	Vertical	-65.80	-54	Pass
494.61	V	-68.95	-54	
11650.00	V	-58.22	-30	
17475.00	V	-60.00	-30	
83.11	Horizontal	-66.43	-36	
151.12	H	-67.09	-36	
11650.00	H	-60.54	-30	
17475.00	H	-52.89	-30	

802.11ac(HT80)				
Frequency (MHz)	Spurious Emission		**Limit (dBm)**	**Test Result**
	polarization	**Level(dBm)**		
Middle Channel				
83.97	Vertical	-65.01	-36	Pass
186.53	V	-68.45	-54	
11550.00	V	-45.23	-30	
17325.00	V	-46.34	-30	
45.00	Horizontal	-66.41	-36	
492.09	H	-66.09	-54	
11550.00	H	-46.42	-30	
17325.00	H	-47.57	-30	

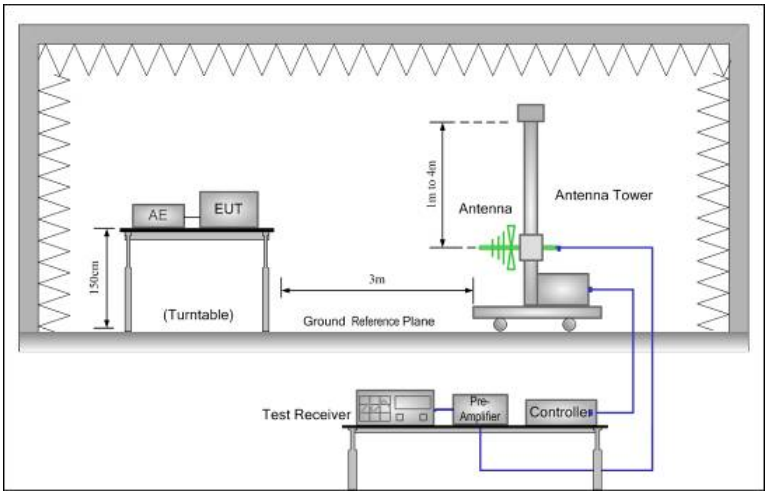
7.4 Receiver Requirements

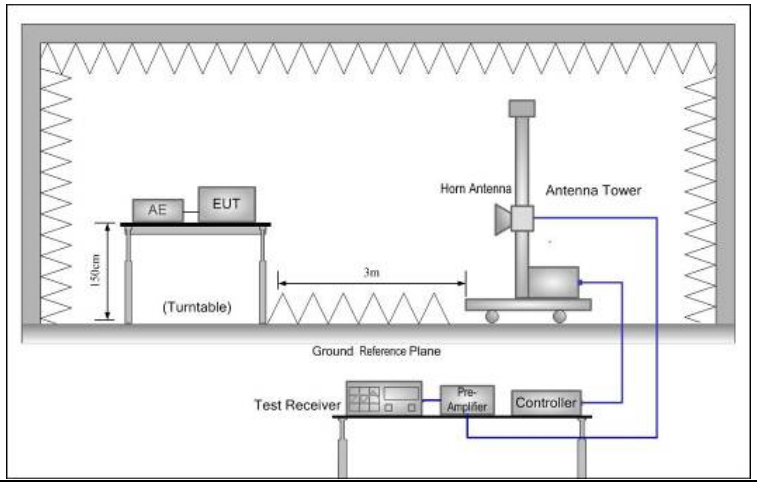
Receiver Classification, Table 5 of EN 300 440.

Rx Class	Relevant Rx Clauses	Risk assessment of Rx performance
1	**4.3.3, 4.3.4 and 4.3.5**	**Highly reliable SRD communication media; e.g. serving human life inherent systems (may result in a physical risk to a person).**
2	**4.3.4 and 4.3.5**	**Medium reliable SRD communication media e.g. causing Inconvenience to persons, which cannot simply be overcome by other means.**
3	**4.3.5**	**Standard reliable SRD communication media e.g. Inconvenience to persons, which can simply be overcome by other means (e.g. manual).**

The EUT (Rx part) belong to Class 3.

7.4.1 Receiver Spurious emissions

<table>
<tr><td>Test Requirement:</td><td>ETSI EN 300 440 Clause 4.3.5.1</td></tr>
<tr><td>Test Method:</td><td>ETSI EN 300 440 Clause 4.3.5.3</td></tr>
<tr><td>Receiver setup:</td><td>Frequency<1000MHz; RBW=100KHz, VBW=300KHz, Detector= peak
Frequency>=1000MHz; RBW=1MHz, VBW=3MHz, Detector=peak.</td></tr>
<tr><td>Limit:</td><td><table><tr><td>Frequency</td><td>Limit</td></tr><tr><td>30MHz to 1000 MHz</td><td>2nW(-57dBm)</td></tr><tr><td>Above 1GHz</td><td>20nW(-47dBm)</td></tr></table></td></tr>
<tr><td>Test Frequency range:</td><td>25MHz to 40GHz</td></tr>
<tr><td>Test setup:</td><td>Below 1GHz
 

Above 1GHz
 
</td></tr>
<tr><td>Test procedure:</td><td>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</td></tr>
</table>

	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 worst data shows below

MIMO:

802.11ac(HT20)				
Frequency (MHz)	Spurious Emission		**Limit (dBm)**	**Test Result**
	polarization	**Level(dBm)**		
Lowest Channel				
187.87	Vertical	-75.32	2nW/ -57dBm below 1GHz, 20nW/ -47dBm above 1GHz.	Pass
287.14	V	-69.33		
11490.00	V	-58.02		
17235.00	V	-50.13		
152.64	Horizontal	-72.01		
900.46	H	-69.24		
11490.00	H	-54.69		
17235.00	H	-56.08		
Middle Channel				
150.25	Vertical	-71.51	2nW/ -57dBm below 1GHz, 20nW/ -47dBm above 1GHz.	Pass
683.03	V	-69.26		
11570.00	V	-56.96		
17355.00	V	-55.04		
251.39	Horizontal	-72.46		
774.58	H	-68.08		
11570.00	H	-53.31		
17355.00	H	-56.02		
Highest Channel				
103.09	Vertical	-74.11	2nW/ -57dBm below 1GHz, 20nW/ -47dBm above 1GHz.	Pass
444.69	V	-68.94		
11650.00	V	-57.96		
17475.00	V	-54.54		
132.56	Horizontal	-71.11		
576.68	H	-67.19		
11650.00	H	-53.03		
17475.00	H	-53.59		

802.11ac(HT40)				
Frequency (MHz)	Spurious Emission		**Limit (dBm)**	**Test Result**
	polarization	**Level(dBm)**		
Lowest Channel				
99.28	Vertical	-75.78	2nW/ -57dBm below 1GHz, 20nW/ -47dBm above 1GHz.	Pass
521.17	V	-69.88		
11510.00	V	-58.27		
17265.00	V	-54.01		
169.92	Horizontal	-76.19		
831.45	H	-70.27		
11510.00	H	-54.81		
17265.00	H	-59.03		
Highest Channel				
103.09	Vertical	-74.59	2nW/ -57dBm below 1GHz, 20nW/ -47dBm above 1GHz.	Pass
444.69	V	-69.53		
11590.00	V	-61.42		
17385.00	V	-56.75		
132.56	Horizontal	-74.77		
576.68	H	-73.54		
11590.00	H	-54.02		
17385.00	H	-56.40		

802.11ac(HT80)				
Frequency (MHz)	Spurious Emission		**Limit (dBm)**	**Test Result**
	polarization	**Level(dBm)**		
Middle Channel				
387.65	Vertical	-64.07	2nW/ -57dBm below 1GHz, 20nW/ -47dBm above 1GHz.	Pass
673.61	V	-66.39		
11550.00	V	-56.74		
17325.00	V	-59.28		
95.25	Horizontal	-65.65		
864.24	H	-66.40		
11550.00	H	-59.30		
17325.00	H	-55.85		

7.5 Additional Requirements

Not applicable, since not FHSS

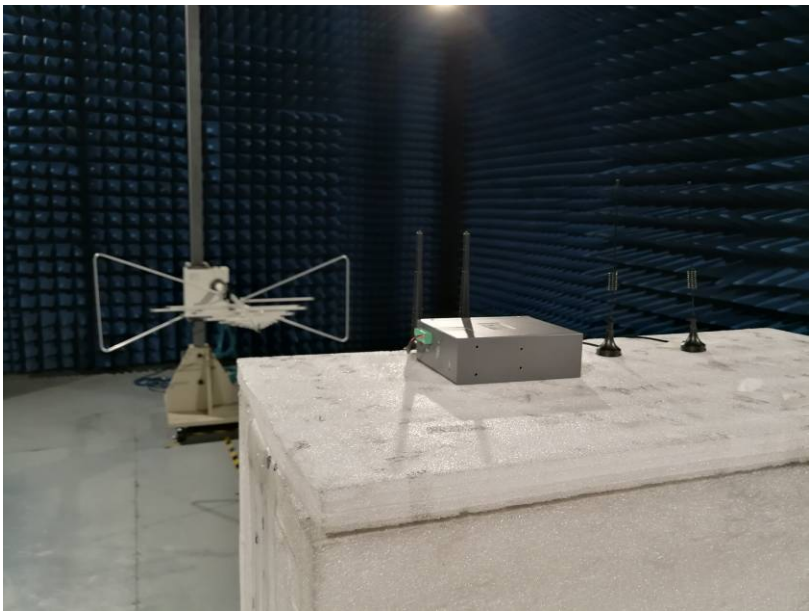
7.6 Adjacent Channel Selectivity

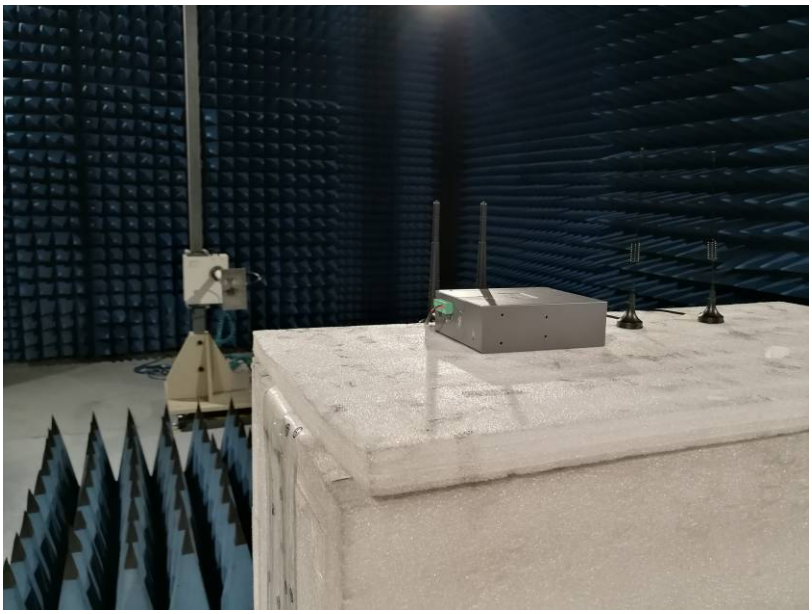
Not applicable, since the test applied to class 1 receivers only. Please refer to clause 4.3.3 of EN 300 440.

7.7 Blocking or Desensitization

Not applicable, since the test applied to class 1 and class 2 receivers only. Please refer to clause 4.3.4 of EN 300 440

8 Test Setup Photo





9 EUT Constructional Details

Reference to the test report No.: GTS201807000209E01

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