

TEST REPORT

Applicant: Dragino Technology Co., Limited.

Address of Applicant: Room 202, BaoChengTai industrial park, No.8 CaiYun LongCheng Street, LongGang District, Shenzhen 518116, China

Manufacturer: Dragino Technology Co., Limited.

Address of Manufacturer: Room 202, BaoChengTai industrial park, No.8 CaiYun LongCheng Street, LongGang District, Shenzhen 518116, China

Equipment Under Test (EUT)

Product Name: LoRaWAN Gateway

Model No.: DLOS8

Trade Mark: Dragino

Applicable standards: ETSI EN 300 328 V2.2.2 (2019-07)

Date of sample receipt: Oct. 12, 2020

Date of Test: Oct. 12 – Nov. 03, 2020

Date of report issue: Nov. 04, 2020

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 Luo
Laboratory Manager



2 Version

Version No.	Date	Description
00	Nov. 04, 2020	Original

Prepared By:

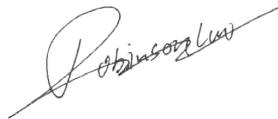


Date:

Nov. 04, 2020

Project Engineer

Check By:



Date:

Nov. 04, 2020

Reviewer

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4 Test Summary

Radio Spectrum Matter (RSM) Part of Tx					
Test	Test Requirement	Test method	Limit/Severity	Uncertainty	Result
RF Output Power	Clause 4.3.2.2	Clause 5.4.2.2	20dBm	±1.5dB	PASS
Power Spectral Density	Clause 4.3.2.3	Clause 5.4.3.2	10dBm/MHz	±3dB	PASS
Duty Cycle, Tx-sequence, Tx-gap	Clause 4.3.2.4	Clause 5.4.2.2.1.3	Clause 4.3.2.4.3	±5 %	N/A
Medium Utilisation (MU) factor	Clause 4.3.2.5	Clause 5.4.2.2.1.4	≤ 10%	±5 %	N/A
Adaptivity	Clause 4.3.2.6	Clause 5.4.6.2	Clause 4.3.2.6.2.2 & Clause 4.3.2.6.3.2 & Clause 4.3.2.6.4.2	--	PASS
Occupied Channel Bandwidth	Clause 4.3.2.7	Clause 5.4.7.2	Clause 4.3.2.7.3	±5 %	PASS
Transmitter unwanted emissions in the OOB domain	Clause 4.3.2.8	Clause 5.4.8.2	Clause 4.3.2.8.3	±3dB	PASS
Transmitter unwanted emissions in the spurious domain	Clause 4.3.2.9	Clause 5.4.9.2	Clause 4.3.2.9.3	±6dB	PASS
Radio Spectrum Matter (RSM) Part of Rx					
Receiver spurious emissions	Clause 4.3.2.10	Clause 5.4.10.2	Clause 4.3.2.10.3	±6dB	PASS
Receiver Blocking	Clause 4.3.2.11	Clause 5.4.11.2	Clause 4.3.2.11.4	--	PASS
Geo-location capability	Clause 4.3.2.12	--	--	--	N/A

Remark:

Tx: In this whole report Tx (or tx) means Transmitter.

Rx: In this whole report Rx (or rx) means Receiver.

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

Uncertainty: □ 3%(for DC and low frequency voltages)

5 General Information

5.1 General Description of EUT

Product Name:	LoRaWAN Gateway
Model No.:	DLOS8
Test model:	DLOS8
Power supply:	AC/DC Adapter Model: TP02-120100E Input:AC100-240V, 50/60Hz Output: DC 12V, 1A
2.4G WiFi:	
Operation Frequency:	2412MHz~2472MHz(802.11b/802.11g/802.11n(HT20)) 2422MHz~2462MHz(802.11n(HT40))
Channel Separation:	13 for 802.11b/802.11g/802.11n(HT20) 9 for 802.11n(HT40)
Channel separation:	5MHz
Modulation Technology: (IEEE 802.11b)	Direct Sequence Spread Spectrum(DSSS)
Modulation Technology: (IEEE 802.11g/802.11n)	Orthogonal Frequency Division Multiplexing(OFDM)
Antenna Type:	Integral Antenna
Antenna gain:	0dBi

WIFI Operation Frequency each of channel							
Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
1	2412MHz	5	2432MHz	9	2452MHz	13	2472MHz
2	2417MHz	6	2437MHz	10	2457MHz		
3	2422MHz	7	2442MHz	11	2462MHz		
4	2427MHz	8	2447MHz	12	2467MHz		

The EUT operation in above frequency list, and used test software to control the EUT for staying in continuous transmitting and receiving mode. So test frequency is below:

Test channel	Frequency (MHz)	
	802.11b/802.11g/802.11n(HT20)	802.11n(HT40)
Lowest channel	2412MHz	2422MHz
Middle channel	2442MHz	2442MHz
Highest channel	2472MHz	2462MHz

We have verified the construction and function in typical operation. All the test modes were carried out with the EUT in transmitting operation, which was shown in this test report and defined as follows:

Per-scan all kind of data rate in lowest channel, and found the follow list which it was worst case.

Mode	802.11b	802.11g	802.11n(HT20)	802.11n(HT40)
Data rate	1Mbps	6Mbps	6.5Mbps	13Mbps

5.2 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 fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in files. Registration 381383.

- **IC —Registration No.: 9079A**

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

- **NVLAP (LAB CODE:600179-0)**

Global United Technology Services Co., Ltd., is accredited by the National Voluntary Laboratory Accreditation Program (NVLAP). LAB CODE:600179-0.

5.3 Test Location

All tests were performed at:

Global United Technology Services Co., Ltd.

Address: No. 123- 128, Tower A, Jinyuan Business Building, No.2, Laodong Industrial Zone, Xixiang Road, Baoan District, Shenzhen, Guangdong, China

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	9.2(L)*6.2(W)* 6.4(H)	GTS250	July. 02 2020	July. 01 2025
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. 25 2020	June. 24 2021
4	BiConiLog Antenna	SCHWARZBECK MESS-ELEKTRONIK	VULB9163	GTS214	June. 25 2020	June. 24 2021
5	Double -ridged waveguide horn	SCHWARZBECK MESS-ELEKTRONIK	BBHA 9120 D	GTS208	June. 25 2020	June. 24 2021
6	Horn Antenna	ETS-LINDGREN	3160	GTS217	June. 25 2020	June. 24 2021
7	EMI Test Software	AUDIX	E3	N/A	N/A	N/A
8	Coaxial Cable	GTS	N/A	GTS213	June. 25 2020	June. 24 2021
9	Coaxial Cable	GTS	N/A	GTS211	June. 25 2020	June. 24 2021
10	Coaxial cable	GTS	N/A	GTS210	June. 25 2020	June. 24 2021
11	Coaxial Cable	GTS	N/A	GTS212	June. 25 2020	June. 24 2021
12	Amplifier(100kHz-3GHz)	HP	8347A	GTS204	June. 25 2020	June. 24 2021
13	Amplifier(2GHz-20GHz)	HP	84722A	GTS206	June. 25 2020	June. 24 2021
14	Amplifier (18-26GHz)	Rohde & Schwarz	AFS33-18002 650-30-8P-44	GTS218	June. 25 2020	June. 24 2021
15	Band filter	Amindeon	82346	GTS219	June. 25 2020	June. 24 2021
16	Power Meter	Anritsu	ML2495A	GTS540	June. 25 2020	June. 24 2021
17	Power Sensor	Anritsu	MA2411B	GTS541	June. 25 2020	June. 24 2021
18	Wideband Radio Communication Tester	Rohde & Schwarz	CMW500	GTS575	June. 25 2020	June. 24 2021
19	Splitter	Agilent	11636B	GTS237	June. 25 2020	June. 24 2021
20	Loop Antenna	ZHINAN	ZN30900A	GTS534	June. 25 2020	June. 24 2021
21	Breitband hornantenne	SCHWARZBECK	BBHA 9170	GTS579	Oct. 18 2020	Oct. 17 2021
22	Amplifier	TDK	PA-02-02	GTS574	Oct. 18 2020	Oct. 17 2021
23	Amplifier	TDK	PA-02-03	GTS576	Oct. 18 2020	Oct. 17 2021
24	PSA Series Spectrum Analyzer	Rohde & Schwarz	FSP	GTS578	June. 25 2020	June. 24 2021

Conducted:						
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Cal.Date (mm-dd-yy)	Cal.Due date (mm-dd-yy)
1	MXA Signal Analyzer	Agilent	N9020A	GTS566	June. 25 2020	June. 24 2021
2	EMI Test Receiver	R&S	ESCI 7	GTS552	June. 25 2020	June. 24 2021
3	Spectrum Analyzer	Agilent	E4440A	GTS533	June. 25 2020	June. 24 2021
4	MXG vector Signal Generator	Agilent	N5182A	GTS567	June. 25 2020	June. 24 2021
5	ESG Analog Signal Generator	Agilent	E4428C	GTS568	June. 25 2020	June. 24 2021
6	USB RF Power Sensor	DARE	RPR3006W	GTS569	June. 25 2020	June. 24 2021
7	RF Switch Box	Shongyi	RFSW3003328	GTS571	June. 25 2020	June. 24 2021
8	Programmable Constant Temp & Humi Test Chamber	WEWON	WHTH-150L-40-880	GTS572	June. 25 2020	June. 24 2021

General used equipment:						
Item	Test Equipment	Manufacturer	Model No.	Inventory No.	Cal.Date (mm-dd-yy)	Cal.Due date (mm-dd-yy)
1	Humidity/ Temperature Indicator	KTJ	TA328	GTS243	June. 25 2020	June. 24 2021
2	Barometer	ChangChun	DYM3	GTS255	June. 25 2020	June. 24 2021

7 Radio Technical Specification in ETSI EN 300 328

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	
		HT	LT
Temperature	+15°C to + 35°C	+40C	0°C
Voltage(AC)	230V		
Humidity	20%-95%		
Atmospheric Pressure:	1008 mbar		

7.2 Transmitter Requirement

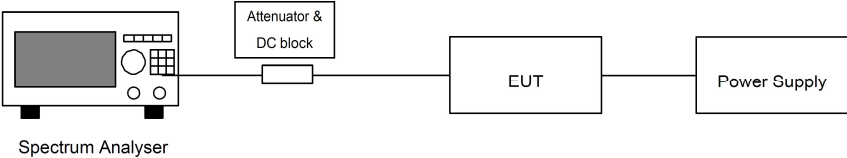
7.2.1 RF Output Power

Test Requirement:	ETSI EN 300 328 clause 4.3.2.2
Test Method:	ETSI EN 300 328 clause 5.4.2.2.1.2
Limit:	20dBm
Test setup:	
Measurement Record:	Uncertainty: 0.65dB
Test Instruments:	See section 6.0
Test mode:	Transmitting mode

Measurement Data:

Test conditions	Channel	Measured Power(dBm)				Limit (dBm)	Result
		B	G	N(HT20)	N(HT40)		
Normal	Lowest	15.77	15.46	15.53	13.99	20	Pass
	Middle	15.59	15.33	15.47	13.84		
	Highest	16.13	15.42	15.36	13.92		
NVHT	Lowest	15.53	15.36	15.41	13.89		
	Middle	15.44	15.16	15.37	13.82		
	Highest	15.52	15.24	15.19	13.75		
NVLT	Lowest	15.16	15.32	15.30	13.92		
	Middle	15.00	15.28	15.05	13.78		
	Highest	15.52	15.23	15.27	13.79		

7.2.2 Power Spectral Density

Test Requirement:	ETSI EN 300 328 clause 4.3.2.3
Test Method:	ETSI EN 300 328 clause 5.4.3.2.1
Limit:	10dBm/MHz
Test setup:	 <pre> graph LR SA[Spectrum Analyser] --- A[Attenuator & DC block] A --- EUT[EUT] EUT --- PS[Power Supply] </pre>
Measurement Record:	Uncertainty: 1.31dB
Test Instruments:	See section 6.0
Test mode:	Transmitting mode

Measurement Data:

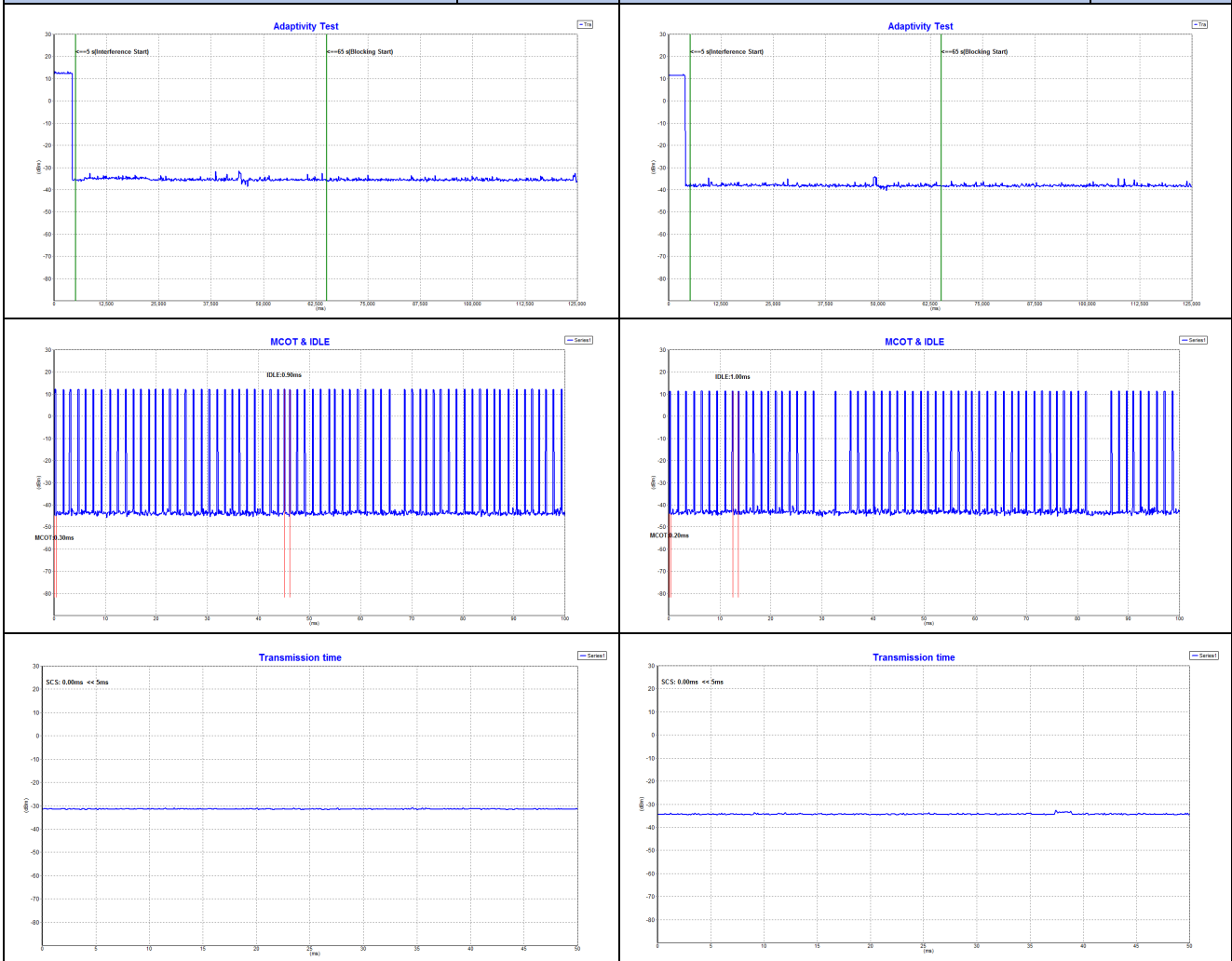
Test conditions	Channel	Measured Power(dBm/MHz)				Limit (dBm/MHz)	Result
		B	G	N(HT20)	N(HT40)		
Normal	Lowest	-8.57	-11.03	-10.41	-13.58	10	Pass
	Middle	-8.41	-10.92	-10.04	-12.92		
	Highest	-8.59	-10.18	-10.39	-13.57		

7.2.3 Adaptivity

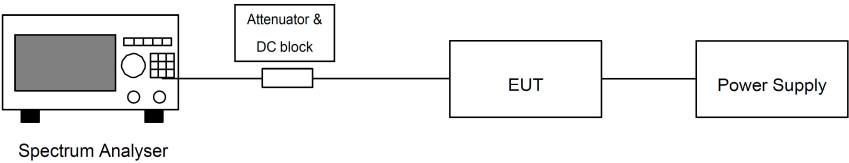
Test Requirement:	ETSI EN 300 328 clause 4.3.2.6
Test Method:	ETSI EN 300 328 clause 5.3.7.2.1
Limit:	Clause 4.3.2.6.2.2 & Clause 4.3.2.6.3.2 & Clause 4.3.2.6.4.2
Test setup:	
Measurement Record:	Uncertainty: N/A
Test Instruments:	See section 6.0
Test mode:	Normal link mode

Measurement Data:

802.11b mode lowest channel		802.11b mode highest channel	
AWGN Interference Level (dBm)	-65.72	AWGN Interference Level (dBm)	-65.58
Unwanted CW Signal Level (dBm)	-35	Unwanted CW Signal Level (dBm)	-35
AWGN Interference Start Time (s)	5.00	AWGN Interference Start Time (ms)	5.00
Unwanted CW Signal Start Time (ms)	65.00	Unwanted CW Signal Start Time (ms)	65.00
Max COT (ms)	0.3	Max COT (ms)	0.2
CCA Time (ms)	0.90	CCA Time (ms)	1.0
Short Control Signalling(ms)	1.30	Short Control Signalling(ms)	3.00



7.2.4 Occupied Channel Bandwidth

Test Requirement:	ETSI EN 300 328 clause 4.3.2.7
Limit:	The Occupied Channel Bandwidth for each hopping frequency shall fall completely within the band 2400MHz ~ 2483.5MHz. In addition, for non-adaptive equipment using wide band modulations other than FHSS and with e.i.r.p. greater than 10 dBm, the occupied channel bandwidth shall be less than 20 MHz.
Test setup:	 <pre> graph LR SA[Spectrum Analyser] --- ABC[Attenuator & DC block] ABC --- EUT[EUT] EUT --- PS[Power Supply] </pre>
Test Instruments:	See section 6.0
Test mode:	Transmitting mode

Measurement Data:

802.11b					
Test Channel	99% Bandwidth (MHz)	Declared Bandwidth (MHz)	F _L /F _H (MHz)	Limit	Result
Lowest	13.546	20	2405.4	2400MHz ~ 2483.5MHz	Pass
Highest	13.517	20	2478.64		Pass
802.11g					
Test Channel	99% Bandwidth (MHz)	Declared Bandwidth (MHz)	F _L /F _H (MHz)	Limit	Result
Lowest	16.855	20	2403.6	2400MHz ~ 2483.5MHz	Pass
Highest	16.757	20	2480.4		Pass
802.11n(H20)					
Test Channel	99% Bandwidth (MHz)	Declared Bandwidth (MHz)	F _L /F _H (MHz)	Limit	Result
Lowest	18.640	20	2402.8	2400MHz ~ 2483.5MHz	Pass
Highest	18.620	20	2481.12		Pass
802.11n(H40)					
Test Channel	99% Bandwidth (MHz)	Declared Bandwidth (MHz)	F _L /F _H (MHz)	Limit	Result
Lowest	36.616	40	2403.92	2400MHz ~ 2483.5MHz	Pass
Highest	36.707	40	2480.16		Pass

7.2.5 Transmitter unwanted emissions in the OOB domain

Test Requirement:	ETSI EN 300 328 clause 4.3.2.8
Test Method:	ETSI EN 300 328 clause 5.4.8.2
Limit:	<p>The transmitter unwanted emissions in the out-of-band domain but outside the allocated band, shall not exceed the values provided by the mask in figure 1</p> <p>Within the band specified in table 1, the Out-of-band emissions are fulfilled by compliance with the Occupied Channel Bandwidth requirement in clause 4.3.1.8.</p> <p>A: -10 dBm/MHz e.i.r.p. B: -20 dBm/MHz e.i.r.p. C: Spurious Domain limits</p> <p>BW = Occupied Channel Bandwidth in MHz or 1 MHz whichever is greater</p>
Test setup:	
Measurement Record:	Uncertainty: $\pm 1.5\text{dB}$
Test Instruments:	See section 6.0
Test mode:	Transmitting mode
Test results:	Pass

Measurement Data:

Test Condition:				Normal condition			
Mode:	802.11b	Channel:	Lowest	Mode:	802.11b	Channel:	Highest
Mode:	802.11g	Channel:	Lowest	Mode:	802.11g	Channel:	Highest
Mode:	802.11n(HT20)	Channel:	Lowest	Mode:	802.11n(HT20)	Channel:	Highest
Mode:	802.11n(HT40)	Channel:	Lowest	Mode:	802.11n(HT40)	Channel:	Highest

7.2.6 Transmitter unwanted emissions in the spurious domain

Test Requirement:	ETSI EN 300 328 clause 4.3.2.9		
Test Method:	ETSI EN 300 328 clause 5.4.9.2		
Limit:	Frequency Range	Maximum power e.r.p. (≤ 1 GHz) e.i.r.p. (> 1 GHz)	Bandwidth
	30 MHz to 47 MHz	-36 dBm	100 kHz
	47 MHz to 74 MHz	-54 dBm	100 kHz
	74 MHz to 87.5 MHz	-36 dBm	100 kHz
	87.5 MHz to 118 MHz	-54 dBm	100 kHz
	118 MHz to 174 MHz	-36 dBm	100 kHz
	174 MHz to 230 MHz	-54 dBm	100 kHz
	230 MHz to 470 MHz	-36 dBm	100 kHz
	470 MHz to 694 MHz	-54 dBm	100 kHz
	694 MHz to 1 GHz	-36 dBm	100 kHz
1 GHz to 12.75 GHz	-30 dBm	1 MHz	
Test Frequency range:	30MHz to 12.75GHz		
Test setup:	Below 1GHz		
Test setup:	Above 1GHz		
Measurement Record:	Uncertainty: 4.64dB		
Test Instruments:	See section 6.0		
Test mode:	Transmitting mode		

Measurement Data:

802.11b mode					
The lowest channel					
Frequency (MHz)	Spurious Emission		Limit (dBm)	Test Result	
	polarization	Level(dBm)			
95.68	Vertical	-71.98	-54.00	Pass	
487.39	V	-68.12	-54.00		
4824.00	V	-43.96	-30.00		
7236.00	V	-47.14	-30.00		
9648.00	V	-43.85	-30.00		
12060.00	V	-44.16	-30.00		
178.36	Horizontal	-70.83	-54.00		
672.76	H	-66.25	-54.00		
4824.00	H	-46.25	-30.00		
7236.00	H	-47.19	-30.00		
9648.00	H	-43.37	-30.00		
12060.00	H	-45.65	-30.00		
The highest channel					
Frequency (MHz)	Spurious Emission		Limit (dBm)		Test Result
	polarization	Level(dBm)			
143.55	Vertical	-73.42	-36.00	Pass	
636.30	V	-64.44	-54.00		
4944.00	V	-44.47	-30.00		
7416.00	V	-46.61	-30.00		
9888.00	V	-45.53	-30.00		
12360.00	V	-44.28	-30.00		
256.05	Horizontal	-70.89	-36.00		
838.36	H	-63.74	-36.00		
4944.00	H	-45.61	-30.00		
7416.00	H	-46.97	-30.00		
9888.00	H	-44.54	-30.00		
12360.00	H	-45.10	-30.00		

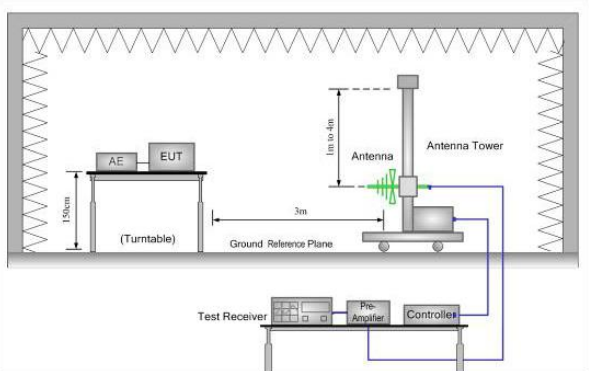
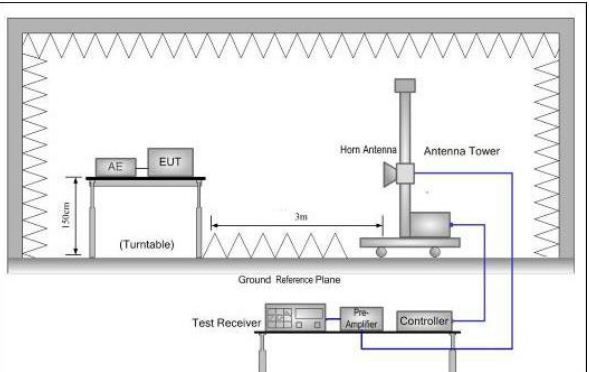
802.11g mode					
The lowest channel					
Frequency (MHz)	Spurious Emission		Limit (dBm)	Test Result	
	polarization	Level(dBm)			
101.38	Vertical	-72.91	-54.00	Pass	
405.04	V	-69.33	-36.00		
4824.00	V	-53.44	-30.00		
7236.00	V	-47.37	-30.00		
9648.00	V	-44.28	-30.00		
12060.00	V	-45.74	-30.00		
128.29	Horizontal	-71.00	-36.00		
730.72	H	-70.17	-36.00		
4824.00	H	-52.48	-30.00		
7236.00	H	-46.73	-30.00		
9648.00	H	-43.71	-30.00		
12060.00	H	-46.69	-30.00		
The highest channel					
Frequency (MHz)	Spurious Emission		Limit (dBm)		Test Result
	polarization	Level(dBm)			
157.00	Vertical	-72.05	-36.00	Pass	
991.09	V	-64.29	-36.00		
4944.00	V	-53.16	-30.00		
7416.00	V	-46.73	-30.00		
9888.00	V	-44.88	-30.00		
12360.00	V	-44.26	-30.00		
126.39	Horizontal	-71.39	-36.00		
797.26	H	-73.08	-36.00		
4944.00	H	-52.40	-30.00		
7416.00	H	-47.16	-30.00		
9888.00	H	-43.26	-30.00		
12360.00	H	-43.35	-30.00		

802.11n(HT20) mode					
The lowest channel					
Frequency (MHz)	Spurious Emission		Limit (dBm)	Test Result	
	polarization	Level(dBm)			
197.38	Vertical	-71.32	-54.00	Pass	
802.84	V	-65.49	-36.00		
4824.00	V	-53.84	-30.00		
7236.00	V	-46.95	-30.00		
9648.00	V	-45.38	-30.00		
12060.00	V	-44.57	-30.00		
205.99	Horizontal	-71.63	-54.00		
744.61	H	-63.73	-36.00		
4824.00	H	-53.79	-30.00		
7236.00	H	-47.80	-30.00		
9648.00	H	-44.59	-30.00		
12060.00	H	-46.29	-30.00		
The highest channel					
Frequency (MHz)	Spurious Emission		Limit (dBm)		Test Result
	polarization	Level(dBm)			
287.00	Vertical	-70.69	-36.00	Pass	
932.85	V	-67.20	-36.00		
4944.00	V	-53.35	-30.00		
7416.00	V	-45.97	-30.00		
9888.00	V	-44.98	-30.00		
12360.00	V	-45.17	-30.00		
146.25	Horizontal	-73.61	-36.00		
904.92	H	-72.86	-36.00		
4944.00	H	-52.01	-30.00		
7416.00	H	-48.32	-30.00		
9888.00	H	-44.28	-30.00		
12360.00	H	-46.83	-30.00		

802.11n(HT40) mode					
The lowest channel					
Frequency (MHz)	Spurious Emission		Limit (dBm)	Test Result	
	polarization	Level(dBm)			
117.96	Vertical	-71.10	-54.00	Pass	
509.22	V	-61.65	-54.00		
4824.00	V	-53.63	-30.00		
7236.00	V	-47.22	-30.00		
9648.00	V	-44.80	-30.00		
12110.00	V	-46.20	-30.00		
155.73	Horizontal	-70.06	-36.00		
729.15	H	-64.93	-36.00		
4824.00	H	-53.33	-30.00		
7236.00	H	-47.29	-30.00		
9648.00	H	-43.34	-30.00		
12110.00	H	-46.26	-30.00		
The highest channel					
Frequency (MHz)	Spurious Emission		Limit (dBm)		Test Result
	polarization	Level(dBm)			
120.13	Vertical	-70.80	-36.00	Pass	
878.34	V	-63.62	-36.00		
4944.00	V	-53.42	-30.00		
7416.00	V	-47.54	-30.00		
9888.00	V	-44.14	-30.00		
12310.00	V	-46.04	-30.00		
196.87	Horizontal	-68.59	-54.00		
631.40	H	-65.59	-54.00		
4944.00	H	-51.53	-30.00		
7416.00	H	-47.85	-30.00		
9888.00	H	-45.20	-30.00		
12310.00	H	-47.37	-30.00		

7.3 Receiver Requirement

7.3.1 Spurious Emissions

Test Requirement:	ETSI EN 300 328 clause 4.3.2.10		
Test Method:	ETSI EN 300 328 clause 5.4.10.2		
Limit:	Frequency	Maximum power e.r.p. (≤ 1 GHz) e.i.r.p. (> 1 GHz)	Measurement bandwidth
	30MHz to 1000 MHz	-57 dBm	100 kHz
	1GHz to 12.75GHz	-47 dBm	1 MHz
Test Frequency range:	30MHz to 12.75GHz		
Test setup:	<p>Below 1GHz</p>  <p>Above 1GHz</p> 		
Measurement Record:	Uncertainty: 4.64dB		
Test mode:	Receiving mode		
Test Instruments:	See section 6.0		

Measurement Data:

802.11b mode						
The lowest channel						
Frequency (MHz)	Spurious Emission		Limit (dBm)	Test Result		
	polarization	Level(dBm)				
94.97	Vertical	-74.07	2nW/ -57dBm below 1GHz, 20nW/ -47dBm above 1GHz.	Pass		
789.16	V	-67.64				
4824.00	V	-66.85				
7236.00	V	-60.76				
9648.00	V	-57.48				
12060.00	V	-55.89				
209.42	Horizontal	-73.91				
508.55	H	-66.84				
4824.00	H	-63.78				
7236.00	H	-61.06				
9648.00	H	-57.47				
12060.00	H	-56.40				
The highest channel						
Frequency (MHz)	Spurious Emission				Limit (dBm)	Test Result
	polarization	Level(dBm)				
77.83	Vertical	-74.76	2nW/ -57dBm below 1GHz, 20nW/ -47dBm above 1GHz.	Pass		
614.63	V	-67.63				
4944.00	V	-65.29				
7416.00	V	-60.38				
9888.00	V	-57.35				
12360.00	V	-54.93				
163.94	Horizontal	-72.36				
531.31	H	-66.50				
4944.00	H	-65.08				
7416.00	H	-58.20				
9888.00	H	-54.20				
12360.00	H	-54.13				

802.11g mode					
The lowest channel					
Frequency (MHz)	Spurious Emission		Limit (dBm)	Test Result	
	polarization	Level(dBm)			
84.56	Vertical	-73.10	2nW/ -57dBm below 1GHz, 20nW/ -47dBm above 1GHz.	Pass	
644.90	V	-68.67			
4944.00	V	-65.15			
7416.00	V	-60.96			
9888.00	V	-56.94			
12360.00	V	-55.23			
102.60	Horizontal	-72.83			
579.75	H	-68.77			
4944.00	H	-63.92			
7416.00	H	-58.30			
9888.00	H	-55.75			
12360.00	H	-54.94			
The highest channel					
Frequency (MHz)	Spurious Emission				Limit (dBm)
	polarization	Level(dBm)			
122.86	Vertical	-74.61	2nW/ -57dBm below 1GHz, 20nW/ -47dBm above 1GHz.	Pass	
653.65	V	-75.01			
4944.00	V	-64.67			
7416.00	V	-59.58			
9888.00	V	-56.35			
12360.00	V	-54.82			
138.91	Horizontal	-73.63			
739.74	H	-70.47			
4944.00	H	-64.39			
7416.00	H	-59.62			
9888.00	H	-56.09			
12360.00	H	-54.15			

802.11n(HT20) mode					
The lowest channel					
Frequency (MHz)	Spurious Emission		Limit (dBm)	Test Result	
	polarization	Level(dBm)			
105.05	Vertical	-73.40	2nW/ -57dBm below 1GHz, 20nW/ -47dBm above 1GHz.	Pass	
602.19	V	-71.13			
4824.00	V	-58.33			
7236.00	V	-63.32			
9648.00	V	-61.00			
12060.00	V	-57.62			
112.81	Horizontal	-73.59			
737.98	H	-65.93			
4824.00	H	-57.73			
7236.00	H	-63.78			
9648.00	H	-60.45			
12060.00	H	-57.01			
The highest channel					
Frequency (MHz)	Spurious Emission				Limit (dBm)
	polarization	Level(dBm)			
219.97	Vertical	-72.01	2nW/ -57dBm below 1GHz, 20nW/ -47dBm above 1GHz.	Pass	
917.32	V	-69.08			
4944.00	V	-65.82			
7416.00	V	-62.43			
9888.00	V	-59.18			
12360.00	V	-56.44			
311.92	Horizontal	-68.53			
930.16	H	-65.32			
4944.00	H	-64.05			
7416.00	H	-59.55			
9888.00	H	-56.66			
12360.00	H	-55.40			

802.11n(HT40) mode					
The lowest channel					
Frequency (MHz)	Spurious Emission		Limit (dBm)	Test Result	
	polarization	Level(dBm)			
102.59	Vertical	-70.79	2nW/ -57dBm below 1GHz, 20nW/ -47dBm above 1GHz.	Pass	
784.91	V	-74.18			
4844.00	V	-65.61			
7266.00	V	-59.59			
9688.00	V	-56.16			
12110.00	V	-55.28			
154.06	Horizontal	-69.94			
891.48	H	-73.78			
4844.00	H	-63.92			
7266.00	H	-60.37			
9688.00	H	-56.95			
12110.00	H	-55.12			
The highest channel					
Frequency (MHz)	Spurious Emission				Limit (dBm)
	polarization	Level(dBm)			
295.09	Vertical	-71.81	2nW/ -57dBm below 1GHz, 20nW/ -47dBm above 1GHz.	Pass	
638.85	V	-73.98			
4924.00	V	-65.29			
7386.00	V	-60.38			
9848.00	V	-57.35			
12310.00	V	-55.28			
357.97	Horizontal	-70.26			
648.39	H	-74.22			
4924.00	H	-64.75			
7386.00	H	-59.30			
9848.00	H	-56.12			
12310.00	H	-54.86			

7.3.2 Receiver Blocking

Test Requirement:	ETSI EN300 328clause 4.3.2.11																		
Test Method:	ETSI EN300 328clause 5.4.11.2.																		
Limit:	<p>While maintaining the minimum performance criteria as defined in clause 4.3.2.11.3, the blocking levels at specified frequency offsets shall be equal to or greater than the limits defined for the applicable receiver category provided in table 14, table 15 or table 16.</p> <p>Table 14: Receiver Blocking parameters for Receiver Category 1 equipment</p> <table border="1"> <thead> <tr> <th>Wanted signal mean power from companion device (dBm) (see notes 1 and 4)</th> <th>Blocking signal frequency (MHz)</th> <th>Blocking signal power (dBm) (see note 4)</th> <th>Type of blocking signal</th> </tr> </thead> <tbody> <tr> <td>$(-133 \text{ dBm} + 10 \times \log_{10}(\text{OCBW}))$ or -68 dBm whichever is less (see note 2)</td> <td>2 380 2 504</td> <td rowspan="2">-34</td> <td rowspan="2">CW</td> </tr> <tr> <td>$(-139 \text{ dBm} + 10 \times \log_{10}(\text{OCBW}))$ or -74 dBm whichever is less (see note 3)</td> <td>2 300 2 330 2 360 2 524 2 584 2 674</td> </tr> </tbody> </table> <p>NOTE 1: OCBW is in Hz. NOTE 2: In case of radiated measurements using a companion device and the level of the wanted signal from the companion device cannot be determined, a relative test may be performed using a wanted signal up to $P_{\text{min}} + 26 \text{ dB}$ where P_{min} is the minimum level of wanted signal required to meet the minimum performance criteria as defined in clause 4.3.1.12.3 in the absence of any blocking signal. NOTE 3: In case of radiated measurements using a companion device and the level of the wanted signal from the companion device cannot be determined, a relative test may be performed using a wanted signal up to $P_{\text{min}} + 20 \text{ dB}$ where P_{min} is the minimum level of wanted signal required to meet the minimum performance criteria as defined in clause 4.3.1.12.3 in the absence of any blocking signal. NOTE 4: The level specified is the level at the UUT receiver input assuming a 0 dBi antenna assembly gain. In case of conducted measurements, this level has to be corrected for the (in-band) antenna assembly gain (G). In case of radiated measurements, this level is equivalent to a power flux density (PFD) in front of the UUT antenna with the UUT being configured/positioned as recorded in clause 5.4.3.2.2.</p> <p>Table 15: Receiver Blocking parameters receiver Category 2 equipment</p> <table border="1"> <thead> <tr> <th>Wanted signal mean power from companion device (dBm) (see notes 1 and 3)</th> <th>Blocking signal frequency (MHz)</th> <th>Blocking signal power (dBm) (see note 3)</th> <th>Type of blocking signal</th> </tr> </thead> <tbody> <tr> <td>$(-139 \text{ dBm} + 10 \times \log_{10}(\text{OCBW}) + 10 \text{ dB})$ or $(-74 \text{ dBm} + 10 \text{ dB})$ whichever is less (see note 2)</td> <td>2 380 2 504 2 300 2 584</td> <td>-34</td> <td>CW</td> </tr> </tbody> </table> <p>NOTE 1: OCBW is in Hz. NOTE 2: In case of radiated measurements using a companion device and the level of the wanted signal from the companion device cannot be determined, a relative test may be performed using a wanted signal up to $P_{\text{min}} + 26 \text{ dB}$ where P_{min} is the minimum level of wanted signal required to meet the minimum performance criteria as defined in clause 4.3.1.12.3 in the absence of any blocking signal. NOTE 3: The level specified is the level at the UUT receiver input assuming a 0 dBi antenna assembly gain. In case of conducted measurements, this level has to be corrected for the (in-band) antenna assembly gain (G). In case of radiated measurements, this level is equivalent to a power flux density (PFD) in front of the UUT antenna with the UUT being configured/positioned as recorded in clause 5.4.3.2.2.</p>	Wanted signal mean power from companion device (dBm) (see notes 1 and 4)	Blocking signal frequency (MHz)	Blocking signal power (dBm) (see note 4)	Type of blocking signal	$(-133 \text{ dBm} + 10 \times \log_{10}(\text{OCBW}))$ or -68 dBm whichever is less (see note 2)	2 380 2 504	-34	CW	$(-139 \text{ dBm} + 10 \times \log_{10}(\text{OCBW}))$ or -74 dBm whichever is less (see note 3)	2 300 2 330 2 360 2 524 2 584 2 674	Wanted signal mean power from companion device (dBm) (see notes 1 and 3)	Blocking signal frequency (MHz)	Blocking signal power (dBm) (see note 3)	Type of blocking signal	$(-139 \text{ dBm} + 10 \times \log_{10}(\text{OCBW}) + 10 \text{ dB})$ or $(-74 \text{ dBm} + 10 \text{ dB})$ whichever is less (see note 2)	2 380 2 504 2 300 2 584	-34	CW
Wanted signal mean power from companion device (dBm) (see notes 1 and 4)	Blocking signal frequency (MHz)	Blocking signal power (dBm) (see note 4)	Type of blocking signal																
$(-133 \text{ dBm} + 10 \times \log_{10}(\text{OCBW}))$ or -68 dBm whichever is less (see note 2)	2 380 2 504	-34	CW																
$(-139 \text{ dBm} + 10 \times \log_{10}(\text{OCBW}))$ or -74 dBm whichever is less (see note 3)	2 300 2 330 2 360 2 524 2 584 2 674																		
Wanted signal mean power from companion device (dBm) (see notes 1 and 3)	Blocking signal frequency (MHz)	Blocking signal power (dBm) (see note 3)	Type of blocking signal																
$(-139 \text{ dBm} + 10 \times \log_{10}(\text{OCBW}) + 10 \text{ dB})$ or $(-74 \text{ dBm} + 10 \text{ dB})$ whichever is less (see note 2)	2 380 2 504 2 300 2 584	-34	CW																

Table 16: Receiver Blocking parameters receiver Category 3 equipment									
	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Wanted signal mean power from companion device (dBm) (see notes 1 and 3)</th> <th style="text-align: center;">Blocking signal frequency (MHz)</th> <th style="text-align: center;">Blocking signal power (dBm) (see note 3)</th> <th style="text-align: center;">Type of blocking signal</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">(-139 dBm + 10 × log₁₀(OCBW) + 20 dB) or (-74 dBm + 20 dB) whichever is less (see note 2)</td> <td style="text-align: center;">2 380 2 504 2 300 2 584</td> <td style="text-align: center;">-34</td> <td style="text-align: center;">CW</td> </tr> </tbody> </table> <p>NOTE 1: OCBW is in Hz. NOTE 2: In case of radiated measurements using a companion device and the level of the wanted signal from the companion device cannot be determined, a relative test may be performed using a wanted signal up to P_{min} + 30 dB where P_{min} is the minimum level of wanted signal required to meet the minimum performance criteria as defined in clause 4.3.1.12.3 in the absence of any blocking signal. NOTE 3: The level specified is the level at the UUT receiver input assuming a 0 dBi antenna assembly gain. In case of conducted measurements, this level has to be corrected for the (in-band) antenna assembly gain (G). In case of radiated measurements, this level is equivalent to a power flux density (PFD) in front of the UUT antenna with the UUT being configured/positioned as recorded in clause 5.4.3.2.2.</p>	Wanted signal mean power from companion device (dBm) (see notes 1 and 3)	Blocking signal frequency (MHz)	Blocking signal power (dBm) (see note 3)	Type of blocking signal	(-139 dBm + 10 × log ₁₀ (OCBW) + 20 dB) or (-74 dBm + 20 dB) whichever is less (see note 2)	2 380 2 504 2 300 2 584	-34	CW
Wanted signal mean power from companion device (dBm) (see notes 1 and 3)	Blocking signal frequency (MHz)	Blocking signal power (dBm) (see note 3)	Type of blocking signal						
(-139 dBm + 10 × log ₁₀ (OCBW) + 20 dB) or (-74 dBm + 20 dB) whichever is less (see note 2)	2 380 2 504 2 300 2 584	-34	CW						
Test setup:									
Measurement Record:	Uncertainty: N/A								
Test Instruments:	See section 6.0								
Test mode:	Normal link mode								

Measurement Data:

Receiver Category	Test Channel	Pmin (dBm)	Blocking signal frequency (MHz)	Blocking signal power (dBm)	PER (%)	Limit (%)	Result
1	Lowest	-74	2300	-34	2.3	10	Pass
		-74	2330	-34	0	10	Pass
		-74	2360	-34	0	10	Pass
		-68	2380	-34	1.4	10	Pass
		-68	2504	-34	1.5	10	Pass
		-74	2524	-34	2.6	10	Pass
		-74	2584	-34	0	10	Pass
	-74	2674	-34	3.5	10	Pass	
	Highest	-74	2300	-34	2.9	10	Pass

		-74	2330	-34	3.3	10	Pass
		-74	2360	-34	4.2	10	Pass
		-68	2380	-34	1.8	10	Pass
		-68	2504	-34	0	10	Pass
		-74	2524	-34	2.4	10	Pass
		-74	2584	-34	2.6	10	Pass
		-74	2674	-34	3.1	10	Pass

8 Test setup photo

Reference to the **appendix I** for details.

9 EUT Constructional Details

Reference to the **appendix II** for details.

-----End-----