

RADIO TEST REPORT

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

For

Applicant : Hyperkin, Inc.

Address : 1939 West Mission Blvd. Pomona, CA 91766

Product Name : Pixelbyte Controller

Model Name : M09999,M09999-AOT,M09999-OPxx, M09999-APxx, M09999-Fnxx

Brand Name : Hyperkin

Report No. RLT2608027-03

Date of Issue : Aug.11, 2026

Issued by : Rhenish-Lab Certification & Testing (Shenzhen) Co., Ltd.

Address : 101, Building B, Bailu Plaza, No. 48, Gonghe Industrial Road, Gongle Community, Xixiang Street, Baoan District, Shenzhen, Guangdong, China

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TEST RESULT CERTIFICATION

Applicant Name:	Hyperkin, Inc.
Address:	Yantian Road ,Yandong Logistics Park,XiantangTown, Dongyuan County,Heyuan City, Guangdong China
Manufacturer Name:	DONGGUAN KING SHENG ELECTRONICS TECHNOLOGY CO.,LTD
Address:	No 39,XinFu Road, Lin Cun Village,TangXia Town, Dongguan City,Guangdong province, China
Equipment Under Test:	Pixelbyte Controller
Brand Name:	Hyperkin
Model Number:	M09999
Series Model Number:	M09999-AOT,M09999-OPxx, M09999-APxx, M09999-Fnxx
Difference description:	N/A
Test Standard	ETSI EN 300 328 V2.2.2 (2019-07)
Date of Test:	Aug.11, 2026

We (Rhenish-Lab), for compliance with the requirements set forth in the European Standard ETSI EN 300 328 V2.2.2 The results of testing in this report apply to the product/system which was tested only. Other similar equipment will not necessarily produce the same results due to production tolerance and measurement uncertainties.

Tested by (+ signature):

Quinn

Quinn (Engineer)

Review by (+ signature):

Cindy yang

Cindy Yang (Engineer)

Approved by (+ signature)

Daniel Wan

Daniel Wan (Manager)



1. Technical Information

Note: the following data is based on the information by the applicant.

1.1 EUT Description

Product	Pixelbyte Controller
Trade Name	Hyperkin
Model Number	M09999,M09999-AOT,M09999-OPxx, M09999-APxx, M09999-Fnxx
Frequency Range	Bluetooth: 2402-2480MHz
Modulation Type:	BluetoothV5.2
Number of Channels:	GFSK / π /4DQPSK
Antenna Type:	79 channel
Power Supply	PIFA antenna, Antenna Gain: -0.58dBi
Test Voltage:	Input: DC5V, 1A

Note:

1. For more details, please refer to the User's manual of the EUT.
2. The EUT can powered by the Adapter as listed below:

Adapter	
Brand Name	/
Model Number	/
Input	/
Output	/

1.2 Objective

Perform Radio Spectrum tests for CE Marking according to the provisions of article 3.2 of the RED Directive (2014/53/EU) for the bluetooth function of the EUT.

1.3 Test Standards and Results

The EUT has been tested according to ETSI EN 300 328 V2.2.2 (2019-07)

ETSI EN 300 328 V2.2.2 (2019-07)	Wideband transmission systems; Data transmission equipment operating in the 2,4 GHz ISM band and using wide band modulation techniques; Harmonised Standard covering the essential requirements of article 3.2 of Directive 2014/53/EU
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Test items and the results are as below:

No.	Basic Standard	Test Item	Result
1	ETSI EN 300 328 4.3.2.2	RF Output Power	Pass
2	ETSI EN 300 328 4.3.2.3	Power Spectral Density	Pass
3	ETSI EN 300 328 4.3.2.4	Duty Cycle, Tx-sequence, Tx-gap	Not Applicable
4	ETSI EN 300 328 4.3.2.5	Medium Utilisation (MU) Factor	Not Applicable
5	ETSI EN 300 328 4.3.2.6	Adaptivity	Note
6	ETSI EN 300 328 4.3.2.7	Occupied Channel Bandwidth	Pass
7	ETSI EN 300 328 4.3.2.8	Transmitter Unwanted Emissions in the Out-of-band Domain	Pass
8	ETSI EN 300 328 4.3.2.9	Transmitter Unwanted Emissions in the Spurious Domain	Pass
9	ETSI EN 300 328 4.3.2.10	Receiver Spurious Emissions	Pass
10	ETSI EN 300 328 4.3.2.11	Receiver Blocking	Pass
11	ETSI EN 300 328 4.3.2.12	Geo-location capability	Not Applicable

Note:

These requirements do not apply for equipment with a maximum declared RF Output power of less than 10 dBm EIRP or for equipment when operating in a mode where the RF Output power is less than 10 dBm EIRP.

2. Details of Test

2.1 Identification of the Responsible Testing Laboratory

Company Name:	Rhenish-Lab Certification & Testing (Shenzhen) Co., Ltd.
Address:	101, Building B, Bailu Plaza, No. 48, Gonghe Industrial Road, Gonghe Community, Xixiang Street, Baoan District, Shenzhen, Guangdong, China

2.2 Identification of the Responsible Testing Location

Test Site:	Rhenish-Lab Certification & Testing (Shenzhen) Co., Ltd.
Address:	101, Building B, Bailu Plaza, No. 48, Gonghe Industrial Road, Gonghe Community, Xixiang Street, Baoan District, Shenzhen, Guangdong, China

2.3 List of Test Equipments

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.
1	Spectrum Analyzer	Agilent	E4407B	MY45108355
2	Test Receiver	R&S	ESCI	103710
3	Bilog Antenna	TESEQ	CBL6111D	31216
4	50Ω Coaxial Switch	Anritsu	MP59B	6200983705
5	Spectrum Analyzer	ADVANTES T	R3132	150900201
6	Horn Antenna	Sunol Sciences Corp.	DRH-118	A062013
7	Horn Ant	Sunol Sciences Corp.	DRH-118	A062014
8	Pre-Amplifier	Agilent	8349B	3008A02306
9	Loop Antenna	ARA	PLA-2030/B	1029
10	Power Sensor	Rohde&Schwarz	OSP-120 (including B157)	115683
11	Signal Generator	HP	8647A	3200A00852
12	Temperature & Humidity Chamber	GIANT FORCE	GTH-056P	GF-94454-1
13	Power Sensor	R&S	URV5-Z4	0395.1619.05
14	MXA Signal Analyzer	Agilent	N9010A	MY49100188

a) The type of modulation used by the equipment:

☐ FHSS

☒ other forms of modulation

b) In case of FHSS modulation:

- In case of non-Adaptive Frequency Hopping equipment:

The number of Hopping Frequencies:

- In case of Adaptive Frequency Hopping Equipment:

The maximum number of Hopping Frequencies:

The minimum number of Hopping Frequencies:

The Dwell Time:

The Minimum Channel Occupation Time:

c) Adaptive / non-adaptive equipment:

☐ non-adaptive Equipment

☒ adaptive Equipment without the possibility to switch to a non-adaptive mode

☐ adaptive Equipment which can also operate in a non-adaptive mode

d) In case of adaptive equipment:

The Channel Occupancy Time implemented by the equipment:

☐ The equipment has implemented an LBT based DAA mechanism

- In case of equipment using modulation different from FHSS:

☐ The equipment is Frame Based equipment

☐ The equipment is Load Based equipment

☐ The equipment can switch dynamically between Frame Based and Load Based equipment

The CCA time implemented by the equipment: μ s

The value q as referred to in clause 4.3.2.5.2.2.2

☒ The equipment has implemented an non-LBT based DAA mechanism

☐ The equipment can operate in more than one adaptive mode

e) In case of non-adaptive Equipment:

The maximum RF Output Power (e.i.r.p.): -0.58dBm

The maximum (corresponding) Duty Cycle: %

Equipment with dynamic behaviour, that behaviour is described here. (e.g. the different combinations of duty cycle and corresponding power levels to be declared):

f) The worst case operational mode for each of the following tests:

- RF Output Power

DSSS

- Power Spectral Density

DSSS

- Duty cycle, Tx-Sequence, Tx-gap

- Dwell time, Minimum Frequency Occupation & Hopping Sequence (only for FHSS equipment)

- Hopping Frequency Separation (only for FHSS equipment)

- Medium Utilisation

-
- Adaptivity & Receiver Blocking

-
- Occupied Channel Bandwidth

DSSS

- Transmitter unwanted emissions in the OOB domain

DSSS

Quality-Assured

- Transmitter unwanted emissions in the spurious domain
DSSS
- Receiver spurious emissions
DSSS

g) The different transmit operating modes (tick all that apply):

- ☒ Operating mode 1: Single Antenna Equipment
- ☒ Equipment with only 1 antenna
- ☐ Equipment with 2 diversity antennas but only 1 antenna active at any moment in time
- ☐ Smart Antenna Systems with 2 or more antennas, but operating in a (legacy) mode where only 1 antenna is used. (e.g. IEEE 802.11™ [i.3] legacy mode in smart antenna systems)
- ☐ Operating mode 2: Smart Antenna Systems - Multiple Antennas without beam forming
- ☐ Single spatial stream / Standard throughput / (e.g. IEEE 802.11™ [i.3] legacy mode)
- ☐ High Throughput (> 1 spatial stream) using Occupied Channel Bandwidth 1
- ☐ High Throughput (> 1 spatial stream) using Occupied Channel Bandwidth 2
- NOTE: Add more lines if more channel bandwidths are supported.
- ☐ Operating mode 3: Smart Antenna Systems - Multiple Antennas with beam forming
- ☐ Single spatial stream / Standard throughput (e.g. IEEE 802.11™ [i.3] legacy mode)
- ☐ High Throughput (> 1 spatial stream) using Occupied Channel Bandwidth 1
- ☐ High Throughput (> 1 spatial stream) using Occupied Channel Bandwidth 2
- NOTE: Add more lines if more channel bandwidths are supported.

h) In case of Smart Antenna Systems:

- The number of Receive chains:
- The number of Transmit chains:
- ☐ symmetrical power distribution
- ☐ asymmetrical power distribution
- In case of beam forming, the maximum beam forming gain:
- NOTE: Beam forming gain does not include the basic gain of a single antenna.

i) Operating Frequency Range(s) of the equipment:

- Operating Frequency Range : 2405 MHz to 2480 MHz
- NOTE: Add more lines if more Frequency Ranges are supported.

j) Occupied Channel Bandwidth(s):

Occupied Channel Bandwidth : 1.0011MHz
NOTE: Add more lines if more channel bandwidths are supported.

k) Type of Equipment (stand-alone, combined, plug-in radio device, etc.):

- ☒ Stand-alone
- ☐ Combined Equipment (Equipment where the radio part is fully integrated within another type of equipment)
- ☐ Plug-in radio device (Equipment intended for a variety of host systems)
- Other.....

l) The extreme operating conditions that apply to the equipment:

Operating temperature range: -20°C ~ 45°C
Operating voltage range: 220-240V
NOTE: This limit temperature and the limit voltage are defined by the customer.

- ☐ Details provided are for the: ☒ stand-alone equipment
- ☐ combined (or host) equipment
- ☐ test jig

m) The intended combination(s) of the radio equipment power settings and one or more

antenna assemblies and their corresponding e.i.r.p levels:

- Antenna Type

■ PIFA antenna:-0.58 dBi

If applicable, additional beamforming gain (excluding basic antenna gain): dB

☐ Temporary RF connector provided

☐ No temporary RF connector provided

☐ Dedicated Antennas (equipment with antenna connector)

☐ Single power level with corresponding antenna(s)

☐ Multiple power settings and corresponding antenna(s)

Number of different Power Levels:

Power Level 1: dBm

Power Level 2: dBm

Power Level 3: dBm

NOTE 1: Add more lines in case the equipment has more power levels.

NOTE 2: These power levels are conducted power levels (at antenna connector).

n) The nominal voltages of the stand-alone radio equipment or the nominal voltages of the combined (host) equipment or test jig in case of plug-in devices:

Details provided are for the: ■ stand-alone equipment

☐ combined (or host) equipment

☐ test jig Supply Voltage

☐ AC mains State AC voltage

■ DC State DC voltage :12V

In case of DC, indicate the type of power source

☐ Internal Power Supply

☐ External Power Supply or AC/DC adapter

☐ Battery:

☐ Other:

o) Describe the test modes available which can facilitate testing:

The EUT can transmit with test software which Engineering command code “***#3646633#**”

p) The equipment type (e.g. Bluetooth®, IEEE 802.11™ [i.3], proprietary, etc.):

Bluetooth

2.4 Environmental Conditions

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

- Temperature: 15-35°C
- Humidity: 30-60 %
- Atmospheric pressure: 86-106 k Pa

2.5 Measurement Uncertainty (95% confidence levels, k=2)

Parameter	Uncertainty
Duty cycle	0.38%
Total RF power, conducted	0.76dB
RF power density, conducted	2.80dB
Spurious emissions, conducted	0.76dB
Radiated Spurious emission test	3.15dB
Temperature test	1°C
Humidity test	3%
DC and low frequency voltages	3%

3. Transmitter Parameters

3.1 RF Output Power

3.1.1 Limit of Effective Isotropic Radiated Power

SUBCLAUSE 4.3.2.2.3	
Test Condition	Limit
Normal and Extreme Temperature Conditions	20dBm (e.i.r.p)

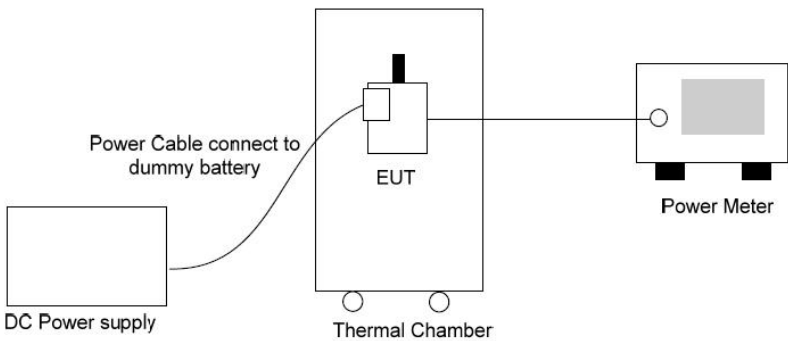
3.1.2 Measuring Instruments

The measuring equipment is listed in the section 2.3 of this test report.

3.1.3 Test Procedure

1. The measurement procedure follows the clause 5.4.2.2 of the ETSI EN 300 328 V2.2.2 (2019-07) .
2. Placing the EUT in thermal chamber
3. The EUT is connected to external power supply.
4. Setting thermal chamber temperature and power supply voltage at suitable values.
5. The EIRP = A+G+Y, where A is the power measured, G is the assembly gain of the individual antenna of the EUT in dBi and Y is the additional beamforming gain of the EUT in dB if applicable, here, Y=0
6. Use a fast power sensor suitable for 2.4 GHz and capable of 1 MS/s.
7. Use the following settings:
 - Sample speed 1 MS/s or faster.
 - The samples must represent the power of the signal.
 - Measurement duration: For non-adaptive equipment: equal to the observation period defined in clauses 4.3.1.3.2 or 4.3.2.4.2 For adaptive equipment, the measurement duration shall be long enough to ensure a minimum number of bursts (at least 10) are captured.

3.1.4 Test Setup



3.1.5 Test Result

Test Item:	EIRP Power	Temperature :	24° C
Test Engineer:	Joe	Relative Humidity :	96k Pa

Test Conditions		Mode	Gain (dBi)	EIRP(dBm)			Limit (dBm)	Pass /Fail
Temp (°C)	Volt (V DC)			CH11 2405MHz	CH20 2450MHz	CH26 2480MHz		
Normal (25.0)	Normal	M09999	0	4.11	4.47	3.66	20	Pass
-20		M09999		4.95	5.5	5.34	20	Pass
		M09999		4.46	4.6	5.68	20	Pass
45		M09999		4.33	3.63	4.4	20	Pass
		M09999		4.55	4.64	4.19	20	Pass
Remark: EIRP= read level(dBm) +cable loss+ Product antenna gain								

3.2 Power Spectral Density

3.2.1 Limit of Maximum Power Spectral Density

SUBCLAUSE 4.3.2.3.3	
Test Condition	Limit
Normal Conditions	10dBm/MHz

Remark: This test item is not applicable to FHSS device.

3.2.2 Measuring Instruments

The measuring equipment is listed in the section 2.3 of this test report.

3.2.3 Test Procedure

1. The measurement procedure follows the clause 5.4.2.2.1 of the ETSI EN 300 328 V2.2.2 (2019-07) .
2. These measurements shall only be performed at normal test conditions.
3. The measurement shall be repeated for the equipment being configured to operate at the lowest, the middle, and the highest frequency of the stated frequency range.
4. The test procedure shall be as follows:

Step 1:

Connect the EUT to the spectrum analyzer and use the following settings:

Start Frequency	2400MHz
Stop Frequency	2483.5MHz
Resolution BW	10kHz
Video BW	30kHz
Sweep Points	>8350
Detector	RMS
Trace Mode	Max Hold
Sweep time	Auto

Step 2:

Add up the values for amplitude (power) for all the samples in the file.

Step 3:

Normalize the individual values for amplitude so that the sum is equal to the RF Output Power (e.i.r.p.) measured.

Step 4:

Starting from the first sample in the file (lowest frequency), add up the power of the following samples representing a 1 MHz segment and record the results for power and position (i.e. sample #1 to #100). This is the Power Spectral Density (e.i.r.p.) for the first 1 MHz segment which shall be recorded.

Step 5:

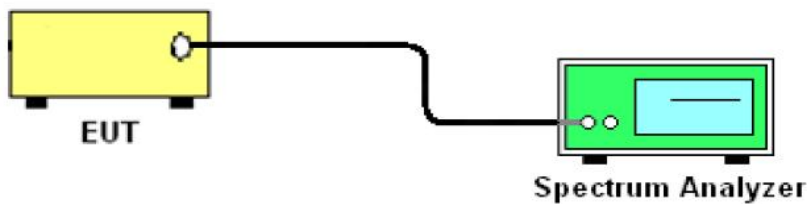
Shift the start point of the samples added up in step 4 by 1 sample and repeat the procedure in step 4 (i.e. sample #2 to #101).

Step 6:

Repeat step 5 until the end of the data set and record the radiated Power Spectral Density values for each of the 1 MHz segments.

From all the recorded results, the highest value is the maximum Power Spectral Density for the EUT. This value shall be recorded in the test report.

3.2.4 Test Setup



3.2.5 Test Result

Test Item:	Power Spectral Density	Temperature :	25° C
Test Engineer:	Sunny	Relative Humidity :	96k Pa

Mode	Power Density(dBm/1MHz)			Limit (dBm/1MHz)	Pass /Fail
	CH11 2405MHz	CH20 2450MHz	CH26 2480MHz		
M09999	2.35	2.35	3.65	10	Pass

3.3 Occupied Channel Bandwidth

3.3.1 Limit of Occupied Channel Bandwidth

SUBCLAUSE 4.3.2.7.3	
Test Condition	Limit
Normal and Extreme Temperature Conditions	The occupied channel bandwidth shall fall completely within the band in table 1, 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.

3.3.2 Measuring Instruments

The measuring equipment is listed in the section 2.3 of this test report.

3.3.3 Test Procedure

1. The measurement procedure follows the clause 5.4.7.2.1 of the ETSI EN 300 328 V2.2.2 (2019-07) .
2. The measurement shall be performed only on the lowest and the highest frequency within the stated frequency range.
3. The analyzer shall be set as follows:

Step 1:

Connect the EUT to the spectrum analyzer and use the following settings:

Center Frequency	Channel under test
Resolution BW	1 % of the span
Video BW	3xRBW
Frequency Span	2 x Occupied Channel Bandwidth (e.g. 40 MHz for a 20 MHz channel)
Detector	RMS
Trace Mode	Max Hold

Step 2:

Wait until the trace is completed.

Find the peak value of the trace and place the analyzer marker on this peak.

Step 3:

Use the 99 % bandwidth function of the spectrum analyzer to measure the Occupied Channel Bandwidth of the EUT.

3.3.4 Test Setup



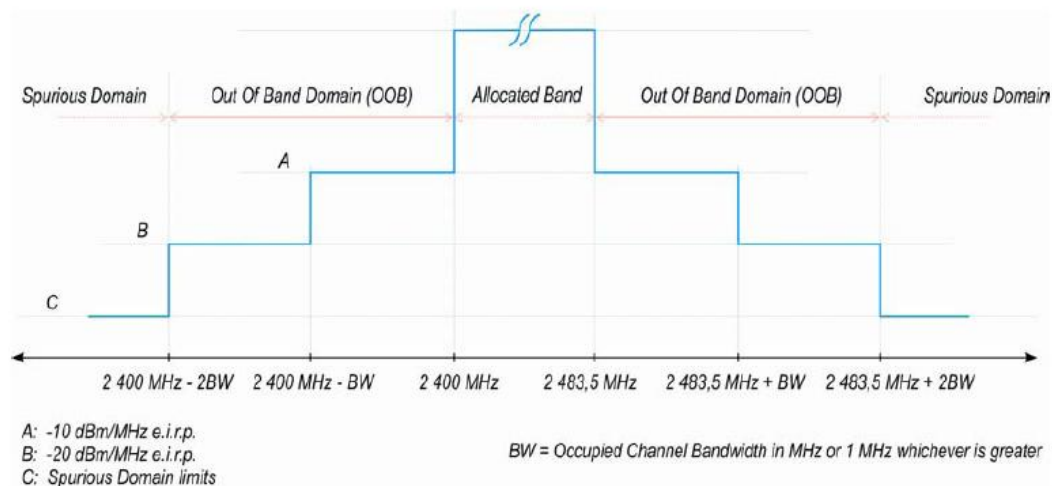
3.3.5 Test Result

Test Item:	99% Occupied BW	Temperature :	25° C
Test Engineer:	Sunny	Relative Humidity :	96k Pa

Mod.	Channel	Frequency (MHz)	99% Occupied Bandwidth (MHZ)	FL (MHz)	FH (MHz)	Limit (MHz)	Pass /Fail
M09999	11	2405	0.9958	2403.2281	2404.2239	FL>2400 and FH<2483.5	Pass
	26	2480	1.0011	2480.3169	2481.318		Pass

3.4 Transmitter unwanted emissions in the out-of-band domain

3.4.1 Transmitter unwanted emissions in the out-of-band domain Limit



3.4.2 Measuring Instruments

The measuring equipment is listed in the section 2.3 of this test report.

3.4.3 Test Procedure

1. The measurement procedure follows the clause 5.4.8.2.1 of the ETSI EN 300 328 V2.2.2 (2019-07) .
2. These measurements shall be performed at both normal environmental conditions and at the operating temperature range..
3. For conducted measurements on devices with multiple transmit chains using the results for each of the transmit chains for the corresponding 1 MHz segments shall be added and compared with the transmit mask limit.
4. The test procedure shall be as follows:

Step 1:

Connect the EUT to the spectrum analyzer and use the following settings:

Centre Frequency	2484MHz
Span	0Hz
Resolution BW	1MHz
Video BW	3MHz
Sweep Points	>5000
Detector	RMS
Trace Mode	Clear/Write
Sweep time	Auto

Step 2: (segment 2 483,5 MHz to 2 483,5 MHz + BW)

- Adjust the trigger level to select the transmissions with the highest power level.
- For frequency hopping equipment operating in a normal hopping mode, the different hops will result in signal bursts with different power levels. In this case the burst with the highest power level shall be selected.
- 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.

- Select RMS power to be measured within the selected window and note the result which is the RMS power

within this 1 MHz segment (2 483,5 MHz to 2 484,5 MHz). Compare this value with the applicable limit provided by the mask.

- Increase the centre frequency in steps of 1 MHz and repeat this measurement for every 1 MHz segment within the range 2 483,5 MHz to 2 483,5 MHz + BW. The centre frequency of the last 1 MHz segment shall be set to 2 483,5 MHz + BW - 0,5 MHz (which means this may partly overlap with the previous 1 MHz segment).

Step 3: (segment 2 483,5 MHz + BW to 2 483,5 MHz + 2BW)

- Change the centre frequency of the analyser to 2 484 MHz + BW and perform the measurement for the first 1 MHz segment within range 2 483,5 MHz + BW to 2 483,5 MHz + 2BW. Increase the centre frequency in 1 MHz steps and repeat the measurements to cover this whole range. The centre frequency of the last 1 MHz segment shall be set to 2 483,5 MHz + 2 BW - 0,5 MHz.

Step 4: (segment 2 400 MHz - BW to 2 400 MHz)

- Change the centre frequency of the analyser to 2 399,5 MHz and perform the measurement for the first 1 MHz segment within range 2 400 MHz - BW to 2 400 MHz. Reduce the centre frequency in 1 MHz steps and repeat the measurements to cover this whole range. The centre frequency of the last 1 MHz segment shall be set to 2 400 MHz - 2BW + 0,5 MHz.

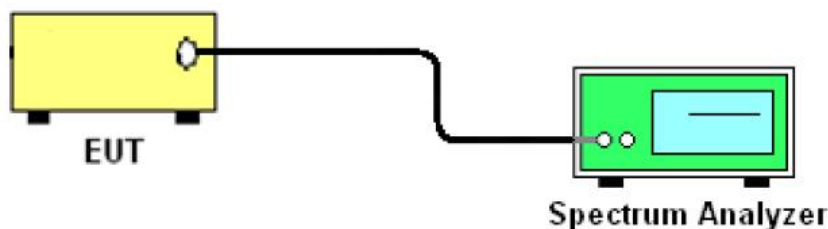
Step 5: (segment 2 400 MHz - 2BW to 2 400 MHz - BW)

- Change the centre frequency of the analyser to 2 399,5 MHz - BW and perform the measurement for the first 1 MHz segment within range 2 400 MHz - 2BW to 2 400 MHz - BW. Reduce the centre frequency in 1 MHz steps and repeat the measurements to cover this whole range. The centre frequency of the last 1 MHz segment shall be set to 2 400 MHz - 2BW + 0,5 MHz.

Step 6:

- In case of conducted measurements on equipment with a single transmit chain, the declared antenna assembly gain "G" in dBi shall be added to the results for each of the 1 MHz segments and compared with the limits provided by the mask given in figures 1 or 3. If more than one antenna assembly is intended for this power setting, the antenna with the highest gain shall be considered.
- In case of conducted measurements on smart antenna systems (equipment with multiple transmit chains), the measurements need to be repeated for each of the active transmit chains. The declared antenna assembly gain "G" in dBi for a single antenna shall be added to these results. If more than one antenna assembly is intended for this power setting, the antenna with the highest gain shall be considered. Comparison with the applicable limits shall be done using any of the options given below:
 - Option 1: the results for each of the transmit chains for the corresponding 1 MHz segments shall be added. The additional beamforming gain "Y" in dB shall be added as well and the resulting values compared with the limits provided by the mask given in figures 1 or 3.
 - Option 2: the limits provided by the mask given in figures 1 or 3 shall be reduced by $10 \times \log_{10}(A_{ch})$ and the additional beamforming gain "Y" in dB. The results for each of the transmit chains shall be individually compared with these reduced limits.

3.4.4 Test Setup



3.4.5 Test Result

Test Item:		OOB Emissions		Temperature :		23° C	
Test Engineer:		Joe		Relative Humidity :		96k Pa	

Test Conditions		Mode	Frequency (MHz)	Test Segment (MHz)	Max. Reading (dBm/MHz)	Limit (dBm /MHz)	Pass /Fail
Temp (°C)	Volt (V DC)						
Normal (25.0)	Normal	M09999	2405	2400-2BW to 2400-BW	-59.78	-20	Pass
				2400-BW to 2400	-39.27	-10	Pass
			2480	2483.5 to 2483.5+BW	-39.87	-10	Pass
				2483.5+BW to 2483.5+2BW	-59.33	-20	Pass

3.5 Transmitter spurious emissions

3.5.1 Limit of Transmitter spurious emissions

Spurious emission limits for transmitter:

SUBCLAUSE 4.3.1.10.3 and 4.3.2.9.3		
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
118MHzto174MHz	-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 862 MHz	-54 dBm	100 kHz
862 MHz to 1 GHz	-36 dBm	100 kHz
1 GHz to 12,75 GHz	-30 dBm	1 MHz

3.5.2 Measuring Instruments

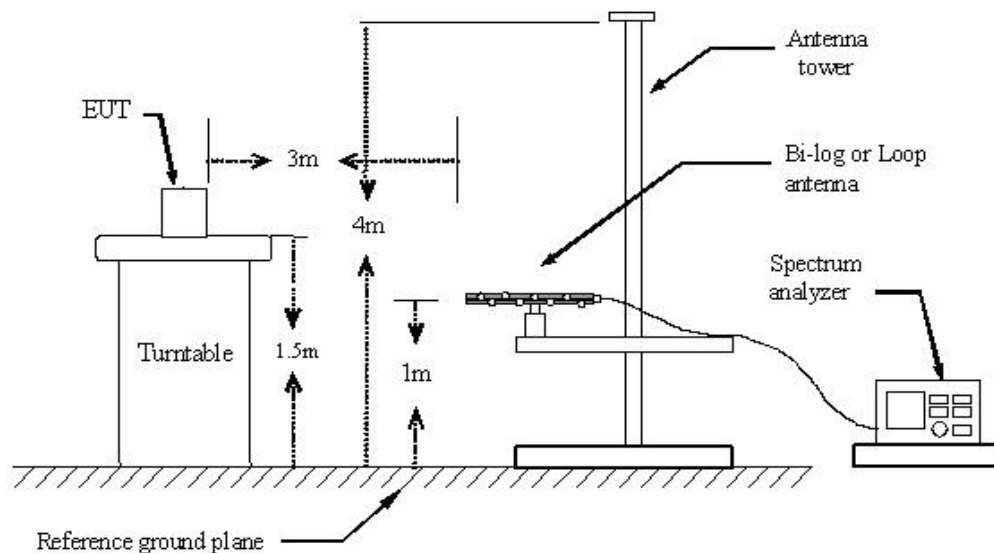
The measuring equipment is listed in the section 2.3 of this test report.

3.5.3 Test Procedures

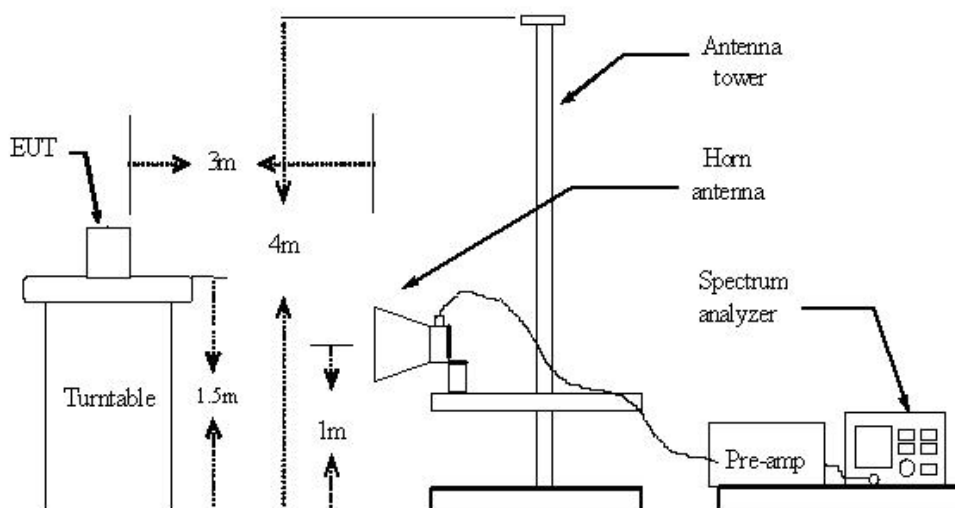
1. The measurement procedure follows the clause 5.4.9.2.1.2 of the ETSI EN 300 328 V2.2.2 (2019-07) .
2. The EUT was placed on a turntable with 1.5m height.
3. The test distance between the receiving antenna and the EUT is 3meter below 1 GHz frequency range, and 3 meter which is in far field test condition for measured frequency above 1GHz, while the receiving (test) antenna is kept at 1.5 meter height.
4. Set EUT in continuous transmitting with maximum output power.
5. The table was rotated from 0 to 360 degree to search the highest radiated emission.
6. Repeating step 3 and 4 for each polarization and channel to find the worst emission level.
7. The results obtained are compared to the limits in order to prove compliance with the requirement.

3.5.4 Test Setup

Below 1GHz



Above 1GHz



3.5.5 Radiated measurement test Result:

Channel	Frequency MHz	Antenna Polarization	Level (dBm)	Limit (dBm)	Margin (dB)
Mode: M09999					
11	71.54	H	-68.99	-54	14.99
	136.57	H	-50.08	-36	14.08
	2749.8	H	-49.08	-30	19.08
	9695.38	H	-40.33	-30	10.33
	86.2	V	-49.75	-36	13.75
	90.98	V	-66.85	-54	12.85
	718.09	V	-41.02	-36	5.02
	1354.64	V	-46.15	-30	16.15
26	62.24	H	-62.13	-54	8.13
	140.06	H	-51.41	-36	15.41
	1554.97	H	-41.88	-30	11.88
	9296.8	H	-50.76	-30	20.76
	86.43	V	-53.28	-36	17.28
	110.82	V	-65.08	-54	11.08
	716.48	V	-55.5	-36	19.5
	4214.81	V	-41.28	-30	11.28

Note: The test frequency range is 30MHz to 12.75GHz.

Conducted measurement test Result:

Channel.	Frequency	Measurement Bandwidth	Emissions Level	Limit	Margin
	MHz	KHz	dBm	dBm	dB
Mode: M09999					
11	52.41	100	-63.34	-54	9.34
	123.53	100	-53.44	-36	17.44
	3765.47	1000	-49.88	-30	19.88
	other	\	\	\	\
26	114.89	100	-63.1	-54	9.1
	872.15	100	-54.85	-36	18.85
	1319.72	1000	-51.66	-30	21.66
	other	\	\	\	\
Measurement uncertainty: ± 3.2 dB					

Notes:

"\" in the table above means that the emissions are too small to be measured and are at least 20 dB below the limit

4. Receiver spurious emissions

4.1 Receiver spurious emissions

4.1.1 Limit of Receiver spurious emissions

Spurious emission limits for receivers:

SUBCLAUSE 4.3.2.10.3		
FREQUENCY RANGE	MAXIMUM POWER E.R.P. (< 1 GHz) E.I.R.P. (> 1 GHz)	MEASUREMENT BANDWIDTH
30 MHz to 1 GHz	-57 dBm	100kHz
1 GHz to 12,75 GHz	-47 dBm	1MHz

4.1.2 Measuring Instruments

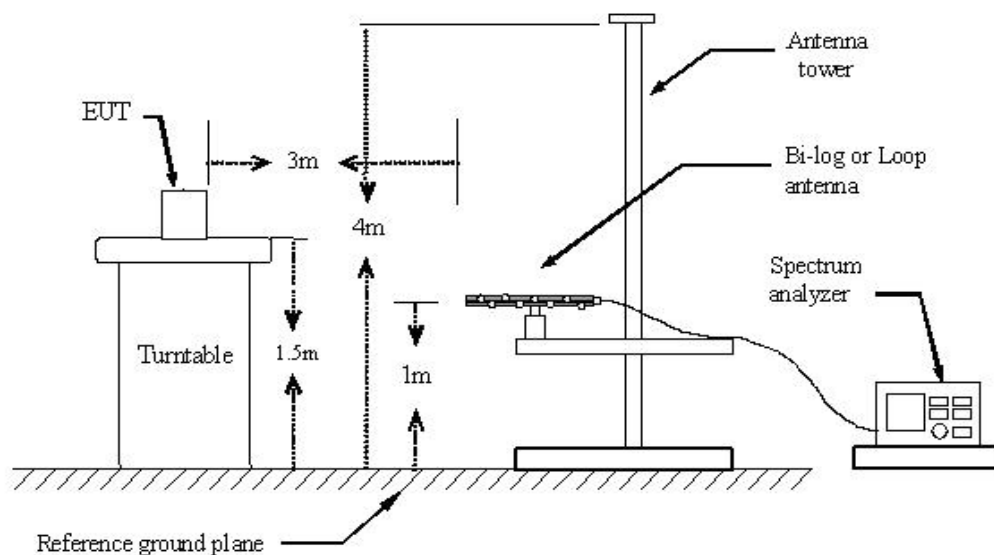
The measuring equipment is listed in the section 2.3 of this test report.

4.1.3 Test Procedures

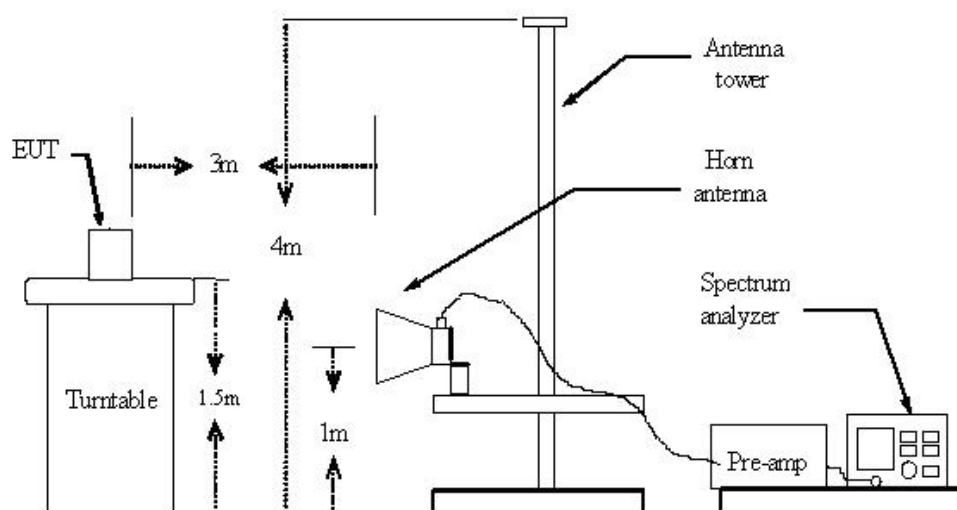
1. The measurement procedure follows the clause 5.4.10.2.1.2 of the ETSI EN 300 328 V2.2.2 (2019-07) .
2. The EUT was placed on a turntable with 1.5m height.
3. The test distance between the receiving antenna and the EUT is 3meter below 1GHz frequency range, and 3 meter which is in far field test condition for measured frequency above 1 GHz, while the receiving (test) antenna is kept at 1.5 meter height.
4. Set EUT in receiving mode.
5. The table was rotated from 0 to 360 degree to search the highest radiated emission.
6. Repeating step 3 and 4 for each polarization and channel to find the worst emission level.
7. The results obtained are compared to the limits in order to prove compliance with the requirement.

4.1.4 Test Setup

Below 1GHz



Above 1GHz



4.1.5 Radiated measurement test Result:

Channel	Frequency MHz	Antenna Polarization	Level (dBm)	Limit (dBm)	Margin (dB)
Mode: M09999					
11	267.35	H	-64.55	-57	7.55
	802.25	H	-68.04	-57	11.04
	2429.72	H	-61.59	-47	14.59
	8211.07	H	-63.72	-47	16.72
	470	V	-66.58	-57	9.58
	582.63	V	-68.97	-57	11.97
	2216.61	V	-62.88	-47	15.88
	8281.31	V	-62.68	-47	15.68
26	350.65	H	-64.7	-57	7.7
	982.73	H	-67.18	-57	10.18
	1140.03	H	-60.08	-47	13.08
	6489.54	H	-59.46	-47	12.46
	93.06	V	-63.26	-57	6.26
	592.72	V	-67.52	-57	10.52
	2236.44	V	-56.31	-47	9.31
	6236.47	V	-56.31	-47	9.31

Note: The test frequency range is 30MHz to 12.75GHz.

Conducted measurement test Result:

Channel.	Frequency	Measurement Bandwidth	Emissions Level	Limit	Margin
	MHz	KHz	dBm	dBm	dB
Mode: M09999					
11	745.89	100	-69.49	-57	12.49
	2207.13	1000	-59.21	-47	12.21
	other	\	\	\	\
26	675.61	100	-66.91	-57	9.91
	2103.85	1000	-57.97	-47	10.97
	other	\	\	\	\
Measurement uncertainty: ± 3.2 dB					

5. RECEIVER BLOCKING

5.1 LIMIT OF RECEIVER BLOCKING

This requirement applies to all receiver categories.

Receiver Category		
Category 1	Category 2	Category 3
Mimum performance criterion	PER ≤10%	
	Alternative performance criteria (See note)	
Note: The manufacturer was declared performance criteria is x% for the intended use of the equipment.		

Receiver Category 1 Equipment			
Wanted signal mean power from companion device (dBm)	Blocking Signal Frequency (MHz)	Blocking Signal Power (dBm) (See note 2)	Type of blocking signal
$P_{\min} + 6 \text{ dB}$	2 380 2 503.5	-53	CW
$P_{\min} + 6 \text{ dB}$	2 300 2 330 2 360	-47	CW
$P_{\min} + 6 \text{ dB}$	2 523.5 2 553.5 2 583.5 2 613.5 2 643.5 2 673.5	-47	CW
NOTE 1: $P_{\min}$ is the minimum level of the wanted signal (in dBm) required to meet the minimum performance criteria as defined in clause 4.3.2.11.3 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 levels have to be corrected by the actual antenna assembly gain.			

Receiver Category 2 Equipment			
Wanted signal mean power from companion device (dBm)	Blocking Signal Frequency (MHz)	Blocking Signal Power (dBm) (See note 2)	Type of blocking signal
$P_{\min} + 6 \text{ dB}$	2 380 2 503.5	-57	CW
$P_{\min} + 6 \text{ dB}$	2 300 2 583.5	-47	CW
NOTE 1: $P_{\min}$ is the minimum level of the wanted signal (in dBm) required to meet the minimum performance criteria as defined in clause 4.3.2.11.3 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 levels have to be corrected by the actual antenna assembly gain.			

Receiver Category 3 Equipment			
Wanted signal mean power from companion device (dBm)	Blocking Signal Frequency (MHz)	Blocking Signal Power (dBm) (See note 2)	Type of blocking signal

Quality-Assured

$P_{min} + 12\text{ dB}$	2 380 2 503.5	-57	CW
$P_{min} + 12\text{ dB}$	2 300 2 583.5	-47	CW
NOTE 1: P_{min} is the minimum level of the wanted signal (in dBm) required to meet the minimum performance criteria as defined in clause 4.3.2.11.3 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 levels have to be corrected by the actual antenna assembly gain.			

5.2 TEST PROCEDURE

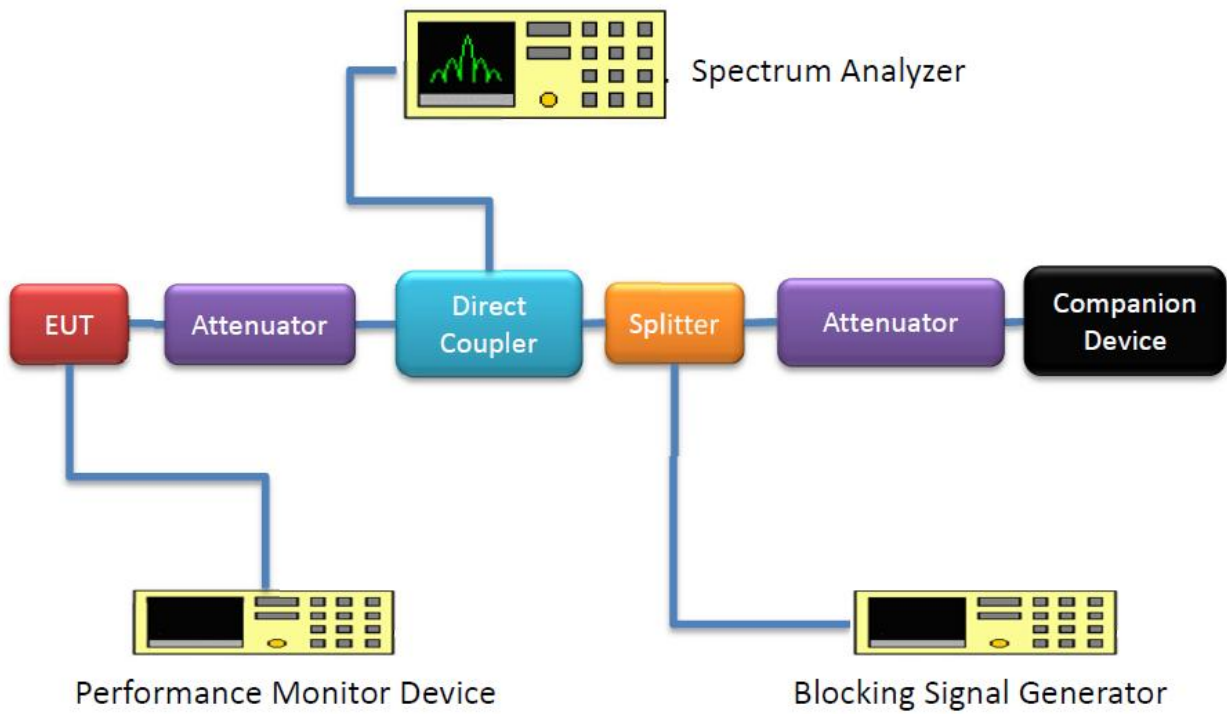
Refer to chapter 5.4.11 of ETSI EN 300 328 V2.2.2

Measurement	Method
Conducted measurement	Radiated measurement

5.3 DEVIATION FROM TEST STANDARD

No deviation.

5.4 TEST SETUP CONFIGURATION



5.5 TEST RESULTS

Receiver Category 2 Equipment

Receiver blocking performance when operating at Receiver mode				
P _{min} : -81.5dBm			BLW-ZBT antenna gain(G) : -0.58 dBi	
The actual blocking signal power(Note1)			at the antenna connector	
			in front of the antenna	
Note1: For the conducted measurements , the level shall be corrected as follows: the actual blocking signal power = blocking signal power + G				
Wanted signal mean power from companion device (dBm)	Blocking signal frequency (MHz))	The actual blocking signal power (dBm)	PER(%)	Pass/Fail
P _{min} +6 dB	2380	-57	0.39	PASS
	2503.5	-57	0.49	PASS
	2300	-47	0.56	PASS
	2583.5	-47	0.60	PASS

*** End of the Reports***