SPECTRUM REPORT (Bluetooth)

Applicant:

Address of Applicant:

Manufacturer/Factory:

Address of Manufacturer/Factory:

Equipment Under Test (EUT)

Product Name:	Bluetooth headphone
Model No.:	B1
Applicable standards:	ETSI EN 300 328 V2.1.1 (2016-11)
Date of sample receipt:	December 25, 2017
Date of Test:	December 26, 2017-January 02, 2018
Date of report issue:	January 02, 2018
Test Result :	PASS *

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

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

Robinson Lo
Laboratory Manager

This results shown in this test report refer only to the sample(s) tested, this test report cannot be reproduced, except in full, without prior written permission of the company. The report would be invalid without specific stamp of test institute and the signatures of compiler and approver.

2 Version

Version No.	Date	Description
00	*January 02, 2018*	*Original*

Prepared By:		***Date:***	*January 02, 2018*
	Project Engineer		
Check By:		***Date:***	*January 02, 2018*
	Reviewer		

3 Contents

4 Test Summary

Radio Spectrum Matter (RSM) Part of Tx					
Test	**Test Requirement**	**Test method**	**Limit/Severity**	**Uncertainty**	**Result**
RF Output Power	Clause 4.3.1.2	Clause 5.4.2.2	20dBm	±1.5dB	PASS
Duty cycle, Tx-Sequence, Tx-gap	Clause 4.3.1.3	Clause 5.4.3.2	Clause 4.3.1.3.3	±5 %	N/A
Accumulated Transmit Time, Frequency Occupation and Hopping Sequence	Clause 4.3.1.4	Clause 5.4.4.2	Clause 4.3.1.4.3	±5 %	PASS
Hopping Frequency Separation	Clause 4.3.1.5	Clause 5.4.5.2	Clause 4.3.1.5.3	±5 %	PASS
Medium Utilisation	Clause 4.3.1.6	Clause 5.3.2.2.1.4	Clause 4.3.1.6.3	--	N/A
Adaptivity	Clause 4.3.1.7	Clause 5.4.6.2	Clause 4.3.1.7.2.2 & Clause 4.3.1.7.3.2 & Clause 4.3.1.7.4.2	--	N/A
Occupied Channel Bandwidth	Clause 4.3.1.8	Clause 5.4.7.2	Clause 4.3.1.8.3	±5 %	PASS
Transmitter unwanted emissions in the out-of-band domain	Clause 4.3.1.9	Clause 5.4.8.2	Clause 4.3.1.9.3	±1.5dB	PASS
Transmitter unwanted emissions in the spurious domain	Clause 4.3.1.10	Clause 5.4.9.2	Clause 4.3.1.10.3	±6dB	PASS
Radio Spectrum Matter (RSM) Part of Rx					
Receiver spurious emissions	Clause 4.3.1.11	Clause 5.4.10.2	Clause 4.3.1.11.3	±6dB	PASS
Receiver Blocking	Clause 4.3.1.12	Clause 5.4.11.2	Clause 4.3.1.12.4	--	PASS
Geo-location capability	Clause 4.3.1.13	--	Clause 4.3.1.13.3	--	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)

N/A:Not applicable

5 General Information

5.1 General Description of EUT

Product Name:	Bluetooth headphone
Model No.:	B1
Operation Frequency:	2402~2480MHz
Channel numbers:	79
Channel separation:	1MHz
Modulation technology:	GFSK, Pi/4 QPSK, 8DPSK
Antenna Type:	Integral antenna
Antenna gain:	0.0dBi(declare by Applicant)
Power Supply:	Rechargeable battery:DC3.7V , 250mAh Battery charge by USB DC5V

Operation Frequency each of channel							
Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
1	2402MHz	21	2422MHz	41	2442MHz	61	2462MHz
2	2403MHz	22	2423MHz	42	2443MHz	62	2463MHz
3	2404MHz	23	2424MHz	43	2444MHz	63	2464MHz
4	2405MHz	24	2425MHz	44	2445MHz	64	2465MHz
5	2406MHz	25	2426MHz	45	2446MHz	65	2466MHz
6	2407MHz	26	2427MHz	46	2447MHz	66	2467MHz
7	2408MHz	27	2428MHz	47	2448MHz	67	2468MHz
8	2409MHz	28	2429MHz	48	2449MHz	68	2469MHz
9	2410MHz	29	2430MHz	49	2450MHz	69	2470MHz
10	2411MHz	30	2431MHz	50	2451MHz	70	2471MHz
11	2412MHz	31	2432MHz	51	2452MHz	71	2472MHz
12	2413MHz	32	2433MHz	52	2453MHz	72	2473MHz
13	2414MHz	33	2434MHz	53	2454MHz	73	2474MHz
14	2415MHz	34	2435MHz	54	2455MHz	74	2475MHz
15	2416MHz	35	2436MHz	55	2456MHz	75	2476MHz
16	2417MHz	36	2437MHz	56	2457MHz	76	2477MHz
17	2418MHz	37	2438MHz	57	2458MHz	77	2478MHz
18	2419MHz	38	2439MHz	58	2459MHz	78	2479MHz
19	2420MHz	39	2440MHz	59	2460MHz	79	2480MHz
20	2421MHz	40	2441MHz	60	2461MHz		

The test frequencies are below:

Channel	**Frequency (MHz)**
Lowest:	2402
Middle:	2441
Highest:	2480

5.2 Test Facility

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

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

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

5.3 Test Location

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

5.4 Description of Support Units

The EUT has been tested as an independent unit.

5.5 Deviation from Standards

None.

5.6 Abnormalities from Standard Conditions

None.

5.7 Other Information Requested by the Customer

None.

6 Test Instruments List

Radiated Emission:						
Item	**Test Equipment**	**Manufacturer**	**Model No.**	**Inventory No.**	**Cal.Date (mm-dd-yy)**	**Cal.Due date (mm-dd-yy)**
1	3m Semi- Anechoic Chamber	ZhongYu Electron	9.0(L)*6.0(W)* 6.0(H)	GTS250	July. 03 2015	July. 02 2020
2	Control Room	ZhongYu Electron	6.2(L)*2.5(W)* 2.4(H)	GTS251	N/A	N/A
3	ESU EMI Test Receiver	R&S	ESU26	GTS203	June. 28 2017	June. 27 2018
4	BiConiLog Antenna	SCHWARZBECK	VULB9163	GTS214	June. 28 2017	June. 27 2018
5	Double-ridged horn antenna	SCHWARZBECK	9120D	GTS208	June. 28 2017	June. 27 2018
6	Horn Antenna	ETS-LINDGREN	3160-09	GTS218	June. 28 2017	June. 27 2018
7	RF Amplifier	HP	8347A	GTS204	June. 28 2017	June. 27 2018
8	RF Amplifier	HP	8349B	GTS206	June. 28 2017	June. 27 2018
9	Broadband Preamplifier	SCHWARZBECK	BBV9718	GTS535	June. 28 2017	June. 27 2018
10	PSA Series Spectrum Analyzer	Agilent	E4440A	GTS536	June. 28 2017	June. 27 2018
11	Universal Radio Communication tester	ROHDE&SCHWARZ	CMU 200	GTS538	June. 28 2017	June. 27 2018
12	EMI Test Software	AUDIX	E3	N/A	N/A	N/A
13	Coaxial cable	GTS	N/A	GTS210	N/A	N/A
14	Coaxial Cable	GTS	N/A	GTS211	N/A	N/A
15	Thermo meter	N/A	N/A	GTS256	June. 28 2017	June. 27 2018

Conducted:

Item	Test Equipment	Manufacturer	Model No.	Serial No.	Cal.Date (mm-dd-yy)	Cal.Due date (mm-dd-yy)
1	Signal Analyzer	Agilent	N9010A	MY48030494	June. 28 2017	June. 27 2018
2	vector Signal Generator	Agilent	E4438C	MY49070163	June. 28 2017	June. 27 2018
3	splitter	Mini-Circuits	ZAP-50W	NN256400424	June. 28 2017	June. 27 2018
4	Directional Coupler	Agilent	87300C	MY44300299	June. 28 2017	June. 27 2018
5	vector Signal Generator	Agilent	E4438C	US44271917	June. 28 2017	June. 27 2018
6	X-series USB Peak and Average Power Sensor	Agilent	U2021XA	MY54080020	June. 28 2017	June. 27 2018
7	X-series USB Peak and Average Power Sensor	Agilent	U2021XA	MY54110001	June. 28 2017	June. 27 2018
8	X-series USB Peak and Average Power Sensor	Agilent	U2021XA	MY53480008	June. 28 2017	June. 27 2018
9	X-series USB Peak and Average Power Sensor	Agilent	U2021XA	MY54080019	June. 28 2017	June. 27 2018
10	4 Ch.Simultaneous Sampling 14 Bits 2 MS/s	Agilent	U2531A	TW54063507	June. 28 2017	June. 27 2018
11	4 Ch.Simultaneous Sampling 14 Bits 2 MS/s	Agilent	U2531A	TW54063513	June. 28 2017	June. 27 2018
12	splitter	Mini	PS3-7	4463	June. 28 2017	June. 27 2018

7 Radio Technical Specification in ETSI EN 300 328

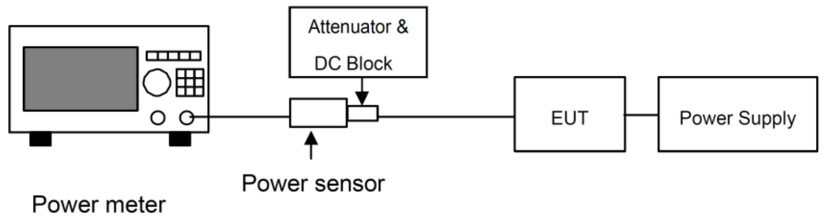
7.1 Test Environment and Mode

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**	
		NVHT	**NVLT**
Temperature	+25ºC	+40ºC	0ºC
Humidity	20%-95%		
Atmospheric Pressure:	1008 mbar		

Setting	Value
Modulation	GFSK, Pi/4QPSK, 8DPSK
Adaptive	Yes
Antenna Gain 1	0.0dBi
Nominal Channel Bandwidth	1MHz/1.2MHz
DUT Frequency not configurable	No
Frequency Low	2402MHz
Frequency Mid	2441MHz
Frequency High	2480MHz

7.2 Transmitter Requirement

7.2.1 RF Output Power

Test Requirement:	ETSI EN 300 328 clause 4.3.1.2
Test Method:	ETSI EN 300 328 clause 5.4.2.2
Limit:	20dBm
Test setup:	
Test procedure:	**Step 1:** Use a fast power sensor suitable for 2,4 GHz and capable of 1 MS/s. 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. For adaptive equipment, to increase the measurement accuracy, a higher number of bursts may be used. **Step 2:** For conducted measurements on devices with one transmit chain: -Connect the power sensor to the transmit port, sample the transmit signal and store the raw data.Use these stored samples in all following steps. For conducted measurements on devices with multiple transmit chains: -Connect one power sensor to each transmit port for a synchronous measurement on all transmit ports. -Trigger the power sensors so that they start sampling at the same time. Make sure the time difference between the samples of all sensors is less than 500ns. -For each individual smpling point(time domain), sum the coincident power samples of all ports and store them. Use these summed samples in all following steps. **Step 3:** Find the start and stop times of each burst in the stored measurement samples. The start and stop times are defined as the points where the power is at least 30 dB below the highest value of the stored samples in step 2. In case of insufficient dynamic range,the value of 30dB may need to be

<table>
<tr><td></td><td>reduced appropriately.
Step 4:
Between the start and stop times of each individual burst calculate the RMS power over the burst using the formula below. The start and stop points shall be included.Save these P_{burst} values, as well as the start and stop times for each burst.
$$P_{burst} = \frac{1}{k}\sum_{n=1}^{k} P_{sample}(n)$$
With “k” being the total number of samples and “n” the actual sample number
Step 5:
The highest of all P_{burst} values (value "A" in dBm) will be used for maximum e.i.r.p. calculations.
Step 6:
Add the (stated) antenna assembly gain "G" in dBi of the individual antenna.
If applicable, add the additional beamforming gain "Y" in dB.
If more than one antenna assembly is intended for this power setting, the maximum overall antenna gain (G or G + Y) shall be used.
The RF Output Power (P) shall be calculated using the formula below:
P = A + G + Y
Step 7:
This value, which shall comply with the limit given in clause 4.3.1.2.3 or clause 4.3.2.2.3, shall be recorded in the test report.</td></tr>
<tr><td>Measurement Record:</td><td>Uncertainty: ± 1.5dB</td></tr>
<tr><td>Test Instruments:</td><td>See section 6.0</td></tr>
<tr><td>Test mode:</td><td>Transmitting mode</td></tr>
</table>

Measurement Data

GFSK modulation

Test conditions	Channel	Burst RMS power (dBm)	Antenna Gain(dBi)	Calculated Power (dBm)	Limit (dBm)	Result
Normal	Lowest	-0.10	0.00	-0.10	20	Pass
	Middle	-0.10	0.00	-0.10		
	Highest	-0.20	0.00	-0.20		
NVHT	Lowest	-0.17	0.00	-0.17		
	Middle	-0.20	0.00	-0.20		
	Highest	-0.30	0.00	-0.30		
NVLT	Lowest	-0.12	0.00	-0.12		
	Middle	-0.12	0.00	-0.12		
	Highest	-0.22	0.00	-0.22		

Remark:

1>. Volt= Voltage, Temp= Temparature

2>. Antenna Gain=0.00dBi

Pi/4 QPSK modulation

Test conditions	Channel	Burst RMS power (dBm)	Antenna Gain(dBi)	Calculated Power (dBm)	Limit (dBm)	Result
Normal	Lowest	-1.70	0.00	-1.70	20	Pass
	Middle	-1.70	0.00	-1.70		
	Highest	-1.60	0.00	-1.60		
NVHT	Lowest	-1.77	0.00	-1.77		
	Middle	-1.80	0.00	-1.80		
	Highest	-1.70	0.00	-1.70		
NVLT	Lowest	-1.72	0.00	-1.72		
	Middle	-1.72	0.00	-1.72		
	Highest	-1.62	0.00	-1.62		

Remark:

1>. Volt= Voltage, Temp= Temparature

2>. Antenna Gain=0.00dBi

8DPSK modulation

Test conditions	Channel	Burst RMS power (dBm)	Antenna Gain(dBi)	Calculated Power (dBm)	Limit (dBm)	Result
Normal	Lowest	-1.90	0.00	-1.90	20	Pass
	Middle	-1.90	0.00	-1.90		
	Highest	-1.80	0.00	-1.80		
NVHT	Lowest	-1.97	0.00	-1.97		
	Middle	-2.00	0.00	-2.00		
	Highest	-1.90	0.00	-1.90		
NVLT	Lowest	-1.92	0.00	-1.92		
	Middle	-1.92	0.00	-1.92		
	Highest	-1.82	0.00	-1.82		

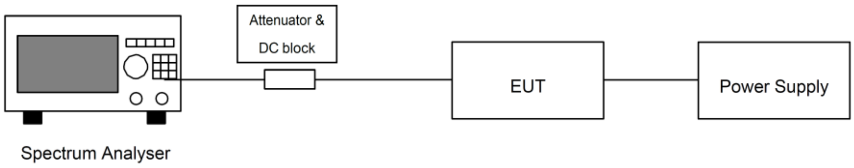
Remark:

1>. Volt= Voltage, Temp= Temparature

2>. Antenna Gain=0.00dBi

7.2.2 Accumulated Transmit Time, Frequency Occupation and Hopping Sequence

Test Requirement:	ETSI EN 300 328 clause 4.3.1.4
Test Method:	ETSI EN 300 328 clause 5.4.4.2
Limit:	Non-adaptive frequency hopping systems The Accumulated Transmit Time on any hopping frequency shall not be greater than 15 ms within any observation period of 15 ms multiplied by the minimum number of hopping frequencies (N) that have to be used. In order for the equipment to comply with the Frequency Occupation requirement, it shall meet either of the following two options: Option 1: Each hopping frequency of the hopping sequence shall be occupied at least once within a period not exceeding four times the product of the dwell time and the number of hopping frequencies in use. Option 2: The occupation probability for each frequency shall be between ((1 / U) × 25 %) and 77 % where U is the number of hopping frequencies in use. The hopping sequence(s) shall contain at least N hopping frequencies where N is either 5 or the result of 15 MHz divided by the minimum Hopping Frequency Separation in MHz, whichever is the greater. According to clause 4.3.1.5.3.1 the minimum Hopping Frequency Separation for non-adaptive equipment is equal to the Occupied Channel Bandwidth with a minimum of 100 kHz. Adaptive frequency hopping systems Adaptive Frequency Hopping equipment shall be capable of operating over a minimum of 70 % of the band specified in table 1. The Accumulated Transmit Time on any hopping frequency shall not be greater than 400 ms within any observation period of 400 ms multiplied by the minimum number of hopping frequencies (N) that have to be used. In order for the equipment to comply with the Frequency Occupation requirement, it shall meet either of the following two options: Option 1: Each hopping frequency of the hopping sequence shall be occupied at least once within a period not exceeding four times the product of the dwell time and the number of hopping frequencies in use. Option 2: The occupation probability for each frequency shall be between ((1 / U) × 25 %) and 77 % where U is the number of hopping frequencies in use. The hopping sequence(s) shall contain at least N hopping frequencies at all times, where N is either 15 or the result of 15 MHz divided by the minimum Hopping Frequency Separation in MHz, whichever is the greater.

<table>
<tr><td>Test setup:</td><td>
</td></tr>
<tr><td>Test procedure:</td><td>The test procedure shall be as follows:

Step 1:
The output of the transmitter shall be connected to a spectrum analyzer or equivalent.
The analyzer shall be set as follows:
Centre Frequency: Equal to the hopping frequency being investigated
Frequency Span: 0 Hz
RBW: ~ 50 % of the Occupied Channel Bandwidth
VBW: ≥ RBW
Detector Mode: RMS
Sweep time: Equal to the applicable observation period (see clause 4.3.1.4.3.1 or clause 4.3.1.4.3.2)
Number of sweep points: 30000
Trace mode: Clear / Write
Trigger: Free Run

Step 2:
Save the trace data to a file for further analysis by a computing device using an appropriate software application or program.

Step 3:
Indentify the data points related to the frequency being investigated by applying a threshold.
The data points resulting from transmissions on the hopping frequency being investigated are assumed to have much higher levels compared to data points resulting from transmissions on adjacent hopping frequencies. If a clear determination between these transmissions is not possible, the RBW in step 1 shall be further reduced. In addition, a channel filter may be used.
Count the number of data points identified as resulting from transmissions on the frequency being investigated and multiply this number by the time difference between two consecutive data points.

Step 4:
The result in step 3 is the Accumulated Transmit Time which shall comply with the limit provided in clause 4.3.1.4.3.1 or clause 4.3.1.4.3.2 and which shall be recorded in the test report.

Step 5:
This step is only applicable for equipment implementing Option 1 in clause 4.3.1.4.3.1 or clause 4.3.1.4.3.2 for complying with the Frequency Occupation requirement and the manufacturer decides to demonstrate</td></tr>
</table>

	compliance with this requirement via measurement. Make the following changes on the analyzer and repeat steps 2 and 3. Sweep time: 4 × Dwell Time × Actual number of hopping frequencies in use The hopping frequencies occupied by the equipment without having transmissions during the dwell time (blacklisted frequencies) should be taken into account in the actual number of hopping frequencies in use. If this number cannot be determined (number of blacklisted frequencies unknown) it shall be assumed that the equipment uses the maximum possible number of hopping frequencies. The result shall be compared to the limit for the Frequency Occupation defined in clause 4.3.1.4.3.1 or clause 4.3.1.4.3.2. The result of this comparison shall be recorded in the test report. **Step 6:** Make the following changes on the analyzer: Start Frequency: 2400MHz Stop Frequency: 2483.5MHz RBW: ~ 50 % of the Occupied Channel Bandwidth (single hopping frequency) VBW: ≥ RBW Detector Mode: RMS Sweep time: 1s;this setting may result in long measuring times. To avoid such long measuring times, an FFT analyser may be used Trace mode: Max Hold Trigger: Free Run Wait for the trace to stabilize. Identify the number of hopping frequencies used by the hopping sequence. The result shall be compared to the limit (value N) defined in clause 4.3.1.4.3.1 or clause 4.3.1.4.3.2. This value shall be recorded in the test report. For equipment with blacklisted frequencies, it might not be possible to verify the number of hopping frequencies in use. However they shall comply with the requirement for Accumulated Transmit Time and Frequency Occupation assuming the minimum number of hopping frequencies (N) defined in clause 4.3.1.4.3.1 or clause 4.3.1.4.3.2 is used. **Step 7:** For adaptive frequency hopping equipment, it shall be verified whether the equipment uses 70 % of the band specified in table 1. This verification can be done using the lowest and highest -20 dB points from the total spectrum envelope obtained in step 6. The result shall be recorded in the test report.
Measurement Record:	Uncertainty: ±5 %
Test Instruments:	See section 6.0
Test mode:	Transmitting mode

Spectrum Setting for Dwell time:					
RBW:	500kHz	VBW:	500kHz	Span:	0Hz

Global United Technology Services Co., Ltd.
No. 301-309, 3/F., Jinyuan Business Building, No.2, Laodong Industrial Zone,
Xixiang Road, Baoan District, Shenzhen, Guangdong, China 518102
Telephone: +86 (0) 755 2779 8480 Fax: +86 (0) 755 2779 8960

Measurement Data:

Dwell Time:

Mode	Frenquency (MHz)	Data Packet Type	Single hop time (ms)	Minimum number of hop frequency	400ms* minimum number of hopping frequencies (s)	Maximum accumulated dwell time (ms)	Limit (ms)	Result
GFSK	2441	DH1	0.37	79	31.6	118.40	400	Pass
	2441	DH3	1.63	79	31.6	260.80		Pass
	2441	DH5	2.88	79	31.6	307.20		Pass
Pi/4QPSK	2441	2DH1	0.38	79	31.6	121.60		Pass
	2441	2DH3	1.64	79	31.6	262.40		Pass
	2441	2DH5	2.88	79	31.6	307.20		Pass
8DPSK	2441	3DH1	0.38	79	31.6	121.60		Pass
	2441	3DH3	1.64	79	31.6	262.40		Pass
	2441	3DH5	2.89	79	31.6	308.27		Pass
Note: Dwell time = (1600/(79*DHT))*79*0.4*Single hop time, where DHT=2/4/6 for DH1/DH3/DH5.								

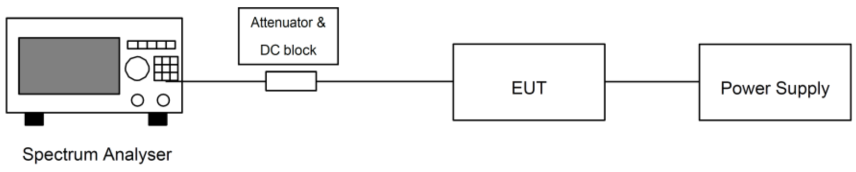
Minimum Frequency Occupation

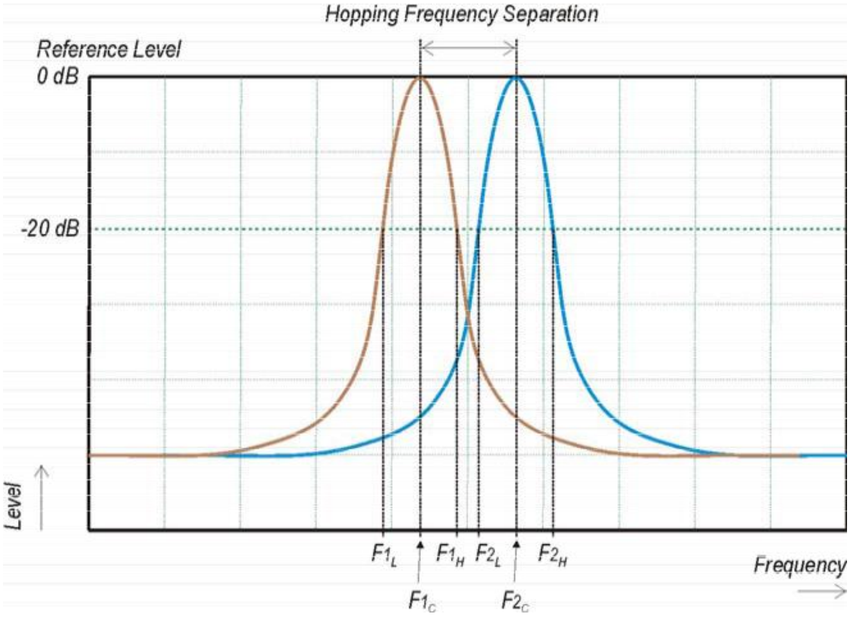
Mode	Frenquency (MHz)	Data Packet Type	Dwell time per hop (ms)	Minimum number of hop frequency (N)	Number of hop in [4*Dwell time per hop*N]	[4*Dwell time per hop*N] (ms)	Dwell Time in [[4*Dwell time per hop*N]] (ms)	Result
GFSK	2441	DH1	0.37	79	2	116.92	0.74	Pass
	2441	DH3	1.63	79	3	515.08	4.89	Pass
	2441	DH5	2.88	79	4	910.08	11.52	Pass
Pi/4QPSK	2441	2DH1	0.38	79	2	120.08	0.76	Pass
	2441	2DH3	1.64	79	3	518.24	4.92	Pass
	2441	2DH5	2.88	79	4	910.08	11.52	Pass
8DPSK	2441	3DH1	0.38	79	2	120.08	0.76	Pass
	2441	3DH3	1.64	79	3	518.24	4.92	Pass
	2441	3DH5	2.89	79	4	910.08	11.56	Pass

Hopping Sequence & Minimum Occupied Frequency:

Mode	Hopping Sequence		Minimum Occupied Frequency		Result
	Number of hopping frequencies	Limit	Minimum Occupied Frequency	Limit	
GFSK	79	≥15	78.810	≥58.45	Pass
Pi/4QPSK	79	≥15	79.048	≥58.45	Pass
8DPSK	79	≥15	79.084	≥58.45	Pass

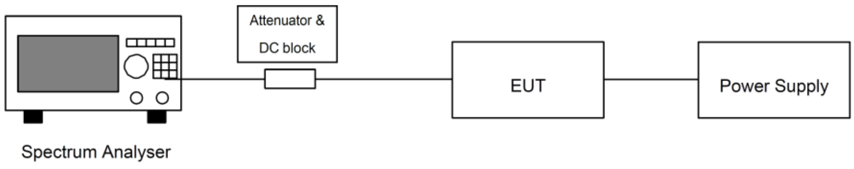
7.2.3 Hopping Frequency Separation

Test Requirement:	ETSI EN 300 328 clause 4.3.1.5
Limit:	**For non-adaptive Frequency Hopping equipment**, the Hopping Frequency Separation shall be equal or greater than the Occupied Channel Bandwidth (see clause 4.3.1.8), with a minimum separation of 100 kHz. For equipment with a maximum declared RF Output power level of less than 10 dBm e.i.r.p. or for non-adaptive Frequency Hopping equipment operating in a mode where the RF Output power is less than 10 dBm e.i.r.p. only the minimum Hopping Frequency Separation of 100 kHz applies **For adaptive Frequency Hopping equipment**, the minimum Hopping Frequency Separation shall be 100 kHz
Test setup:	
Test procedure:	The test procedure shall be as follows: **Step 1:** The output of the transmitter shall be connected to a spectrum analyzer or equivalent. The analyzer shall be set as follows: Centre Frequency: Centre of the two adjacent hopping frequencies Frequency Span: Sufficient to see the complete power envelope of both hopping frequencies RBW: 1 % of the Span VBW: 3 x RBW Detector Mode: Max peak Trace mode: Max Hold Sweep time: Auto **Step 2:** Wait for the trace to stabilize. Use the marker function of the analyser to define the frequencies corresponding to the lower -20 dBr point and the upper -20 dBr point for both hopping frequencies F1 and F2. This will result in F1L and F1H for hopping frequency F1 and in $F2_L$ and $F2_H$ for hopping frequency F2. These values shall be recorded in the report. **Step 3:** Calculate the centre frequencies $F1_C$ and $F2_C$ for both hopping frequencies using the formulas below. These values shall be recorded in the report. $F1_C = (F1_L + F1_H) / 2$; $F2_C = (F2_L + F2_H) / 2$ Calculate the Hopping Frequency Separation (FHS) using the formula below. This value shall be recorded in the report. F_{HS}=F2c-F1c

	Compare the measured Hopping Frequency Separation with the limit defined in clause 4.3.1.5.3. In addition,for non-Adaptive Frequency Hopping equipment, the Hopping Frequency Separation shall be equal to or greater than the Occupied Channel Bandwidth as defined in clause 4.3.1.8 or: $F_{HS} \geq$ Occupied Channel Bandwidth See figure 4:  Figure 4: Hopping Frequency Separation For adaptive systems, in case of overlapping channels which will prevent the definition of the -20 dBr reference points $F1_H$ and $F2_L$, a higher reference level (e.g. -10 dBr or - 6 dBr) may be chosen to define the reference points $F1_L$; $F1_H$; $F2_L$ and $F2_H$. Alternatively, special test software may be used to: force the UUT to hop or transmit on a single Hopping Frequency by which the -20 dBr reference points can be measured separately for the 2 adjacent Hopping Frequencies; and/or force the UUT to operate without modulation by which the centre frequencies $F1_C$ and $F2_C$ can be measured directly. The method used to measure the Hopping Frequency Separation shall be documented in the test report.
Test Instruments:	See section 6.0
Test mode:	Transmitting mode

Mode	Frequency (MHz)	Hopping Frequency Separation (MHz)	Limit (MHz)	Result
GFSK	Lowest	1.000	0.10 (100kHz)	Pass
	Middle	0.917		Pass
	Highest	1.000		Pass
Pi/4QPSK	Lowest	1.001		Pass
	Middle	1.000		Pass
	Highest	0.999		Pass
8DPSK	Lowest	1.000		Pass
	Middle	1.000		Pass
	Highest	1.000		Pass

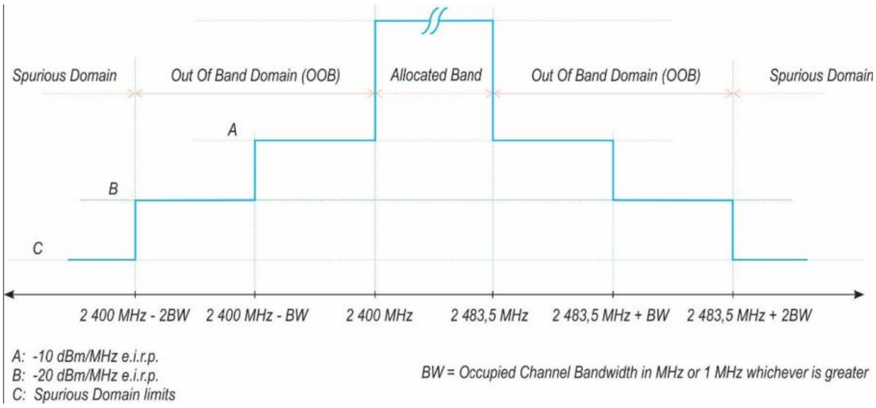
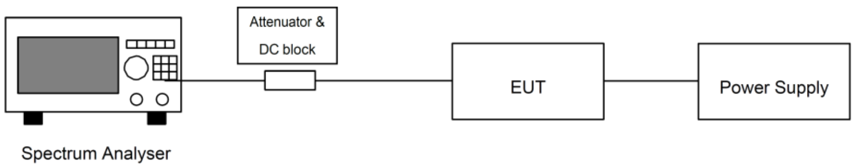
7.2.4 Occupied Channel Bandwidth

Test Requirement:	ETSI EN 300 328 clause 4.3.1.8
Limit:	The Occupied Channel Bandwidth for each hopping frequency shall fall completely within the band given in table 1. For non-adaptive Frequency Hopping equipment with e.i.r.p greater than 10 dBm, the Occupied Channel Bandwidth for every occupied hopping frequency shall be equal to or less than the Nominal Channel Bandwidth declared by the supplier. See clause 5.4.1 j). This declared value shall not be greater than 5 MHz.
Test setup:	
Test Precedure:	**Step 1:** Connect the UUT to the spectrum analyser and use the following settings: Centre Frequency: The centre frequency of the channel under test Resolution BW: ~ 1 % of the span without going below 1 % Video BW: 3 × RBW Frequency Span 2 × Nominal Channel Bandwidth Detector Mode: RMS Trace mode: Max Hold Sweep time: 1 s **Step 2:** Wait for the trace to stabilize. Find the peak value of the trace and place the analyser marker on this peak. **Step 3:** Use the 99 % bandwidth function of the spectrum analyser to measure the Occupied Channel Bandwidth of the UUT. This value shall be recorded. Make sure that the power envelope is sufficiently above the noise floor of the analyser to avoid the noise signals left and right from the power envelope being taken into account by this measurement.
Test Instruments:	See section 6.0
Test mode:	Transmitting mode

Measurement Data:

Modulation Type	Test Channel	99% Bandwidth (MHz)	Declared Bandwidth (MHz)	F_L/F_H (MHz)	Limit	Result
GFSK	Lowest	0.8097	1.0	2401.594	2400MHz ~ 2483.5MHz	Pass
	Highest	0.8215	1.0	2480.404		
Pi/4QPSK	Lowest	1.0464	1.2	2401.470		
	Highest	1.0466	1.2	2480.518		
8DPSK	Lowest	1.0856	1.2	2401.450		
	Highest	1.0862	1.2	2480.534		

7.2.5 Transmitter unwanted emissions in the OOB domain

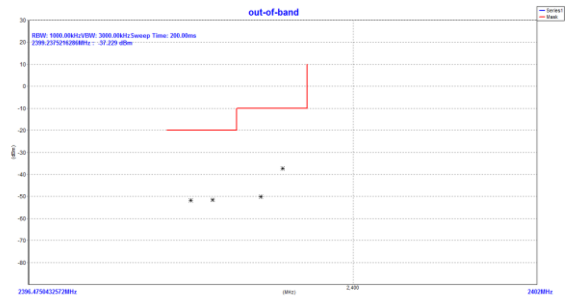
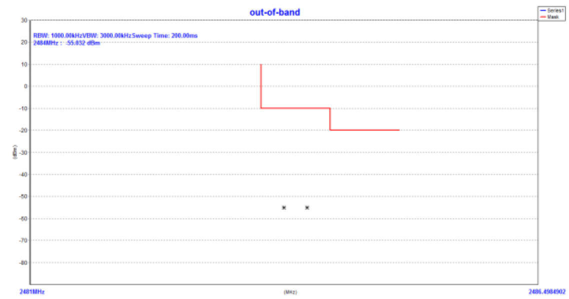
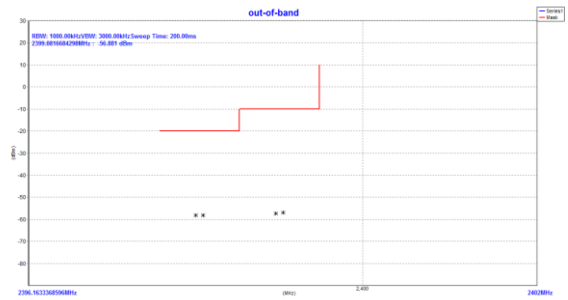
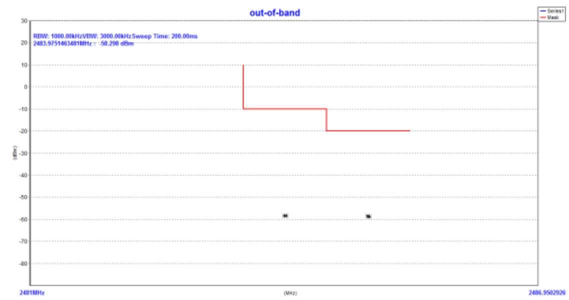
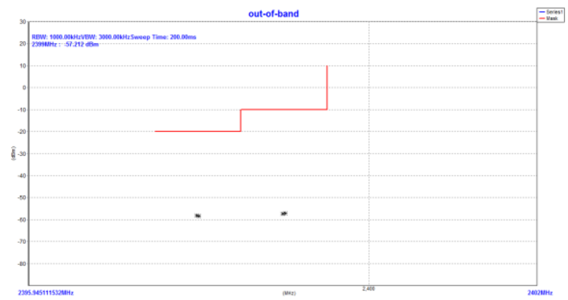
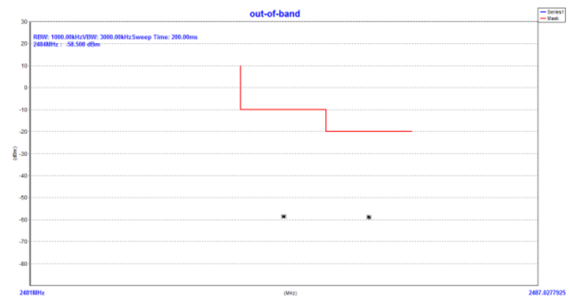
Test Requirement:	ETSI EN 300 328 clause 4.3.1.9
Test Method:	ETSI EN 300 328 clause 5.4.8.2
Limit:	The transmitter unwanted emissions in the out-of-band domain but outside the allocated band, shall not exceed the values provided by the mask in figure 1 Within the band specified in table 1, the Out-of-band emissions are fulfilled by compliance with the Occupied Channel Bandwidth requirement in clause 4.3.1.8. 
Test setup:	
Test procedure:	The applicable mask is defined by the measurement results from the tests performed under clause 5.4.7 (Occupied Channel Bandwidth). The Out-of-band emissions within the different horizontal segments of the mask provided in figures 1 and 3 shall be measured using the step 1 to step 6 below. This method assumes the spectrum analyser is equipped with the Time Domain Power option. **Step 1:** Connect the UUT to the spectrum analyser and use the following settings: Centre Frequency: 2 484 MHz Span: 0Hz Resolution BW: 1 MHz Filter mode: Channel filter Video BW: 3 MHz Detector Mode: RMS Trace Mode: Max Hold Sweep Mode: Continuous Sweep Points: Sweep Time [s] / (1 μs) or 5 000 whichever is greater Trigger Mode: Video trigger

	In case video triggering is not possible, an external trigger source may be used. Sweep Time: >120 % of the duration of the longest burst detected during the measurement of the RF Output Power **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. (which means this may partly overlap with the previous 1 MHz segment). **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 - BW + 0,5 MHz (which means this may partly overlap with the previous 1 MHz segment). **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. (which means this may partly overlap with the previous 1 MHz segment). **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

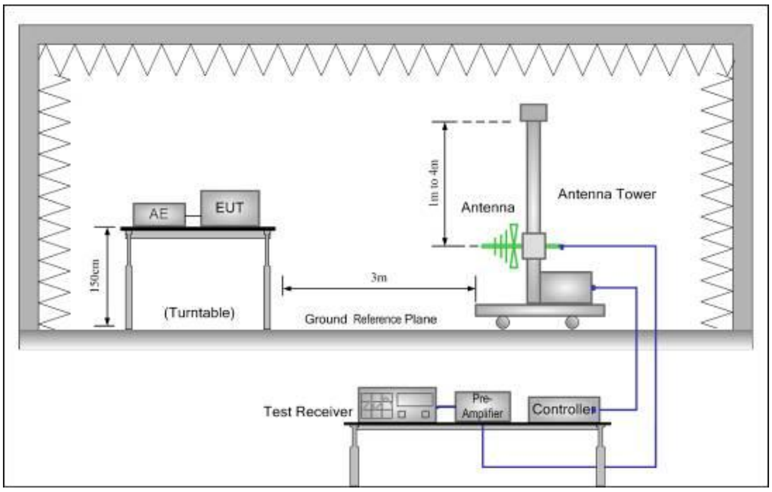
	the results for each of the 1 MHz segments and compared with the limits provided by the mask given in figures 1 or figure 3. If more than one antenna assembly is intended for this power setting, the antenna with the highest gain shall be considered. In case of conducted measurements on smart antenna 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 figure 1 or figure 3. Option 2: the limits provided by the mask given in figure 1 or figure 3 shall be reduced by 10 x log10(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. NOTE: A_{ch} refers to the number of active transmit chains. It shall be recorded whether the equipment complies with the mask provided in figure 1 or figure 3.
Measurement Record:	Uncertainty: ± 1.5dB
Test Instruments:	See section 6.0
Test mode:	Transmitting mode(GFSK modulation)

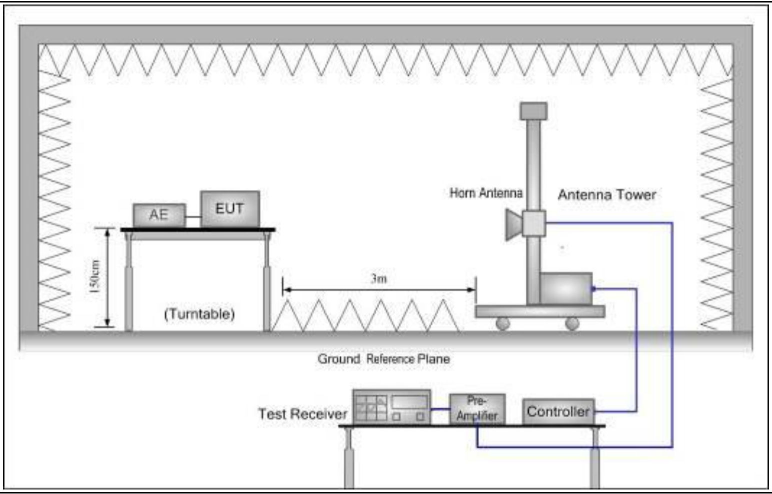
Measurement Data:

Test plots at normal condition:

<table>
<tr><td>Condition:</td><td>Normal</td></tr>
<tr><td>CH Low (Normal Temp) 1M
</td><td>CH High (Normal Temp) 1M
</td></tr>
<tr><td>CH Low (Normal Temp) 2M
</td><td>CH High (Normal Temp) 2M
</td></tr>
<tr><td>CH Low (Normal Temp) 3M
</td><td>CH High (Normal Temp) 3M
</td></tr>
</table>

7.2.6 Transmitter unwanted emissions in the spurious domain

<table>
<tr><td>Test Requirement:</td><td>ETSI EN 300 328 clause 4.3.1.10</td></tr>
<tr><td>Test Method:</td><td>ETSI EN 300 328 clause 5.4.9.2</td></tr>
<tr><td>Limit:</td><td>
<table>
<tr><th>Frequency Range</th><th>Maximum power
e.r.p. (≤ 1 GHz)
e.i.r.p. (> 1 GHz)</th><th>Bandwidth</th></tr>
<tr><td>30 MHz to 47 MHz</td><td>-36 dBm</td><td>100 kHz</td></tr>
<tr><td>47 MHz to 74 MHz</td><td>-54 dBm</td><td>100 kHz</td></tr>
<tr><td>74 MHz to 87.5 MHz</td><td>-36 dBm</td><td>100 kHz</td></tr>
<tr><td>87.5 MHz to 118 MHz</td><td>-54 dBm</td><td>100 kHz</td></tr>
<tr><td>118 MHz to 174 MHz</td><td>-36 dBm</td><td>100 kHz</td></tr>
<tr><td>174 MHz to 230 MHz</td><td>-54 dBm</td><td>100 kHz</td></tr>
<tr><td>230 MHz to 470 MHz</td><td>-36 dBm</td><td>100 kHz</td></tr>
<tr><td>470 MHz to 862 MHz</td><td>-54 dBm</td><td>100 kHz</td></tr>
<tr><td>862 MHz to 1 GHz</td><td>-36 dBm</td><td>100 kHz</td></tr>
<tr><td>1 GHz to 12.75 GHz</td><td>-30 dBm</td><td>1 MHz</td></tr>
</table>
</td></tr>
<tr><td>Test Frequency range:</td><td>30MHz to 12.75GHz</td></tr>
<tr><td>Test setup:</td><td>Below 1GHz

Above 1GHz</td></tr>
</table>

	
Test procedure:	**1. Pre-scan** The test procedure below shall be used to identify potential unwanted emissions of the UUT. **Step 1:** The sensitivity of the measurement set-up should be such that the noise floor is at least 12 dB below the limits given in table 4 or table 12. **Step 2:** The emissions over the range 30 MHz to 1 000 MHz shall be identified. Spectrum analyser settings: Resolution BW: 100 kHz Video BW 300 kHz Filter type: 3 dB (Gaussian) Detector mode: Peak Trace Mode: Max Hold Sweep Points: ≥19 400 For spectrum analysers not supporting this high number of sweep points, the frequency band may need to be segmented. Sweep time: For non continuous transmissions (duty cycle less than 100 %), the sweep time shall be sufficiently long, such that for each 100 kHz frequency step, the measurement time is greater than two transmissions of the UUT.on any channel For Frequency Hopping equipment operating in a normal operating (hopping not disabled) mode, the sweep time shall be further increased to capture multiple transmissions on the same hopping frequency in different hopping sequences. The above sweep time setting may result in long measuring times in case of frequency hopping equipment. To avoid such long measuring times, an FFT analyser could be used. Allow the trace to stabilize. Any emissions identified during the sweeps above and that fall within the 6 dB range below the applicable limit or above, shall be individually measured using the procedure in clause

	5.4.9.2.1.3 and compared to the limits given in table 4 or table 12. **Step 3:** The emissions over the range 1 GHz to 12,75 GHz shall be identified. Spectrum analyser settings: Resolution BW: 1 MHz Video BW 3 MHz Filter type: 3 dB (Gaussian) Detector mode: Peak Trace Mode: Max Hold Sweep Points: ≥ 23 500 For spectrum analysers not supporting this high number of sweep points, the frequency band may need to be segmented. Sweep time: For non continuous transmissions (duty cycle less than 100 %), the sweep time shall be sufficiently long, such that for each 1 MHz frequency step, the measurement time is greater than two transmissions of the UUT.on any channel For Frequency Hopping equipment operating in a normal operating (hopping not disabled) mode, the sweep time shall be further increased to capture multiple transmissions on the same hopping frequencies The above sweep time setting may result in long measuring times in case of frequency hopping equipment. To avoid such long measuring times, an FFT analyser could be used. Allow the trace to stabilize. Any emissions identified during the sweeps above that fall within the 6 dB range below the applicable limit or above, shall be individually measured using the procedure in clause 5.4.9.2.1.3 and compared to the limits given in table 4 or table 12. Frequency Hopping equipment may generate a block (or several blocks) of spurious emissions anywhere within the spurious domain. If this is the case, only the highest peak of each block of emissions shall be measured using the procedure in clause 5.4.9.2.1.3. **Step 4:** In case of conducted measurements on smart antenna systems (equipment with multiple transmit chains), the steps 2 and 3 need to be repeated for each of the active transmit chains (A_{ch}).The limits used to identify emissions during this pre-scan need to be reduced by $10 \times \log_{10}(A_{ch})$ **2. Measurement of the emissions identified during the pre-scan** The procedure in step 1 to step 4 below shall be used to accurately measure the individual unwanted emissions identified during the pre-scan measurements above. This method assumes the spectrum analyser has a Time Domain Power function. **Step 1:** The level of the emissions shall be measured using the following spectrum analyser settings:

	Measurement Mode: Time Domain Power Centre Frequency: Frequency of emission identified during the pre-scan Resolution BW: 100 kHz (< 1 GHz) / 1 MHz (> 1 GHz) Video BW 300 kHz (< 1 GHz) / 3 MHz (> 1 GHz) Frequency Span: Zero Span Sweep mode: Single Sweep Sweep time: > 120 % of the duration of the longest burst detected during the measurement of the RF Output Power Sweep points: Sweep time [μs] / (1 μs) with a maximum of 30 000 Trigger: Video (burst signals) or Manual (continuous signals) Detector: RMS **Step 2:** Set a window where the start and stop indicators match the start and end of the burst with the highest level and record the value of the power measured within this window.If the spurious emission to be measured is a continuous transmission, the measurement window shall be set to match the start and stop times of the sweep. **Step 3:** In case of conducted measurements on smart antenna systems (equipment with multiple transmit chains), step 2 needs to be repeated for each of the active transmit chains (A_{ch}). Sum the measured power (within the observed window) for each of the active transmit chains. **Step 4:** The value defined in step 3 shall be compared to the limits defined in table 4 or table 12.
Measurement Record:	Uncertainty: ± 6dB
Test Instruments:	See section 6.0
Test mode:	Transmitting mode

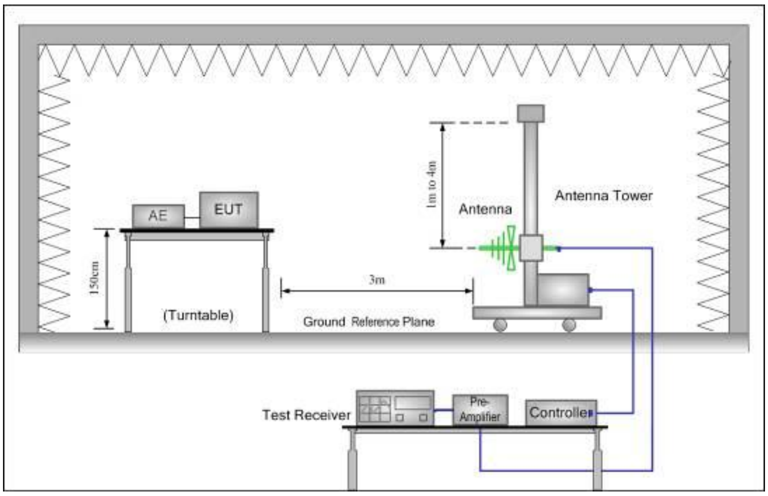
Measurement Data

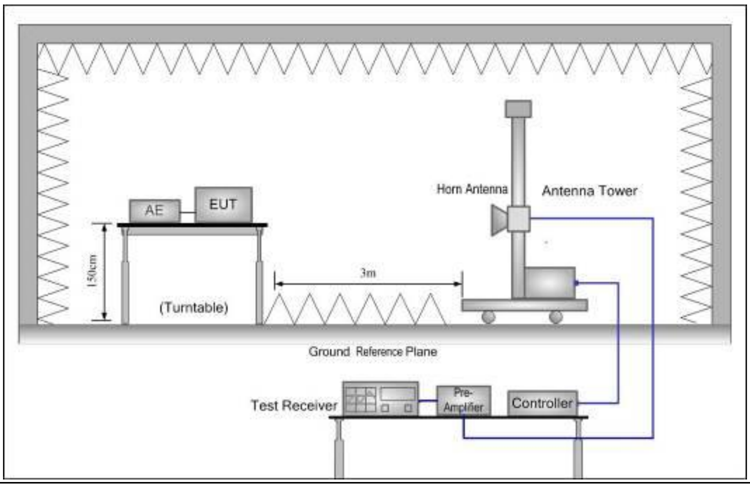
Wosrt Case: GFSK modulation

The lowest channel				
Frequency (MHz)	Spurious Emission		Limit (dBm)	Test Result
	polarization	Level(dBm)		
110.14	Vertical	-67.47	-54.00	Pass
557.08	V	-63.67	-54.00	
4804.00	V	-44.98	-30.00	
7206.00	V	-46.97	-30.00	
9608.00	V	-48.54	-30.00	
12010.00	V	-50.29	-30.00	
101.87	Horizontal	-68.78	-54.00	
846.27	H	-66.04	-54.00	
4804.00	H	-46.38	-30.00	
7206.00	H	-48.13	-30.00	
9608.00	H	-49.49	-30.00	
12010.00	H	-51.22	-30.00	
The highest channel				
Frequency (MHz)	Spurious Emission		Limit (dBm)	Test Result
	polarization	Level(dBm)		
83.80	Vertical	-69.67	-36.00	Pass
708.02	V	-66.10	-54.00	
4960.00	V	-44.36	-30.00	
7440.00	V	-45.58	-30.00	
9920.00	V	-47.53	-30.00	
12400.00	V	-49.20	-30.00	
90.24	Horizontal	-69.37	-54.00	
870.12	H	-66.87	-36.00	
4960.00	H	-45.66	-30.00	
7440.00	H	-46.91	-30.00	
9920.00	H	-48.49	-30.00	
12400.00	H	-50.32	-30.00	

7.3 Receiver Requirement

7.3.1 Spurious Emissions

<table>
<tr><td>Test Requirement:</td><td>ETSI EN 300 328 clause 4.3.1.11</td></tr>
<tr><td>Test Method:</td><td>ETSI EN 300 328 clause 5.4.10.2</td></tr>
<tr><td>Limit:</td><td>
<table>
<tr><th>Frequency</th><th>Maximum power
e.r.p. (≤ 1 GHz)
e.i.r.p. (> 1 GHz)</th><th>Measurement bandwidth</th></tr>
<tr><td>30MHz to 1000 MHz</td><td>-57 dBm</td><td>100 kHz</td></tr>
<tr><td>1GHz to 12.75GHz</td><td>-47 dBm</td><td>1 MHz</td></tr>
</table>
</td></tr>
<tr><td>Test Frequency range:</td><td>30MHz to 12.75GHz</td></tr>
<tr><td>Test setup:</td><td>Below 1GHz


Above 1GHz

</td></tr>
</table>

Test procedure:	**1. Pre-scan** The procedure in step 1 to step 4 below shall be used to identify potential unwanted emissions of the UUT. **Step 1:** The sensitivity of the spectrum analyser should be such that the noise floor is at least 12 dB below the limits given in tables 5 or table13. **Step 2:** The emissions over the range 30 MHz to 1 000 MHz shall be identified. Spectrum analyser settings: Resolution BW: 100 kHz Video BW 300 kHz Filter type: 3dB (Gaussian) Detector mode: Peak Trace Mode: Max Hold Sweep Points: ≥ 19 400 Sweep time: Auto Wait for the trace to stabilize. Any emissions identified during the sweeps above and that fall within the 6 dB range below the applicable limit or above, shall be individually measured using the procedure in clause 5.4.10.2.1.3 and compared to the limits given in table 5 or table 13. **Step 3:** The emissions over the range 1 GHz to 12,75 GHz shall be identified. Spectrum analyser settings: Resolution BW: 1 MHz Video BW 3 MHz Filter type: 3 dB (Gaussian) Detector mode: Peak Trace Mode: Max Hold Sweep Points: ≥ 23500; for spectrum analysers not supporting this high number of sweep points,the frequency band may be segmented Sweep time: Auto Wait for the trace to stabilize. Any emissions identified during the sweeps above that fall within the 6 dB range below, the applicable limit or above, shall be individually measured using the procedure in clause 5.4.10.2.1.3 and compared to the limits given in table 5 or table 13. Frequency Hopping equipment may generate a block (or several blocks) of spurious emissions anywhere within the spurious domain. If this is the case, only the highest peak of each block of emissions shall be measured using the procedure in clause 5.4.10.2.1.3. **Step 4:** In case of conducted measurements on smart antenna systems (equipment with multiple transmit chains), the steps 2 and 3 need to be repeated for each of the active transmit chains (A_{ch}).The limits used to identifyemissions during this pre-scan need to be reduced with $10 \times \log_{10} (A_{ch})$ **2. Measurement of the emissions identified during the pre-scan**

	The procedure in step 1 to step 4 below shall be used to accurately measure the individual unwanted emissions identified during the pre-scan measurements above. This method assumes the spectrum analyser has a Time Domain Power function. **Step 1:** The level of the emissions shall be measured using the following spectrum analyser settings: Measurement Mode: Time Domain Power Centre Frequency: Frequency of the emission identified during the pre-scan Resolution Bandwidth: 100 kHz (< 1 GHz) / 1 MHz (> 1 GHz) Video Bandwidth: 300 kHz (< 1 GHz) / 3 MHz (> 1 GHz) Frequency Span: Zero Span Sweep mode: Single Sweep Sweep time: 30 ms Sweep points: ⩾ 30 000 Trigger: Video (for burst signals) or Manual (for continuous signals Detector: RMS **Step 2:** Set a window where the start and stop indicators match the start and end of the burst with the highest level and record, the value of the power measured within this window. If the spurious emission to be measured is a continuous, transmission, the measurement window shall be set to the start and stop times of the sweep. **Step 3:** In case of conducted measurements on smart antenna systems (equipment with multiple receive chains), step 2 needs to be repeated for each of the active receive chains A_{ch}.Sum the measured power (within the observed window) for each of the active receive chains. **Step 4:** The value defined in step 3 shall be compared to the limits defined in table 5 and table 13.
Measurement Record:	Uncertainty: ± 6dB
Test mode:	Kept Rx in receiving mode
Test Instruments:	See section 6.0

Measurement Data:

Wosrt Case: GFSK modulation

The lowest channel				
Frequency (MHz)	Spurious Emission		Limit (dBm)	Test Result
	polarization	Level(dBm)		
89.78	Vertical	-71.31	2nW/ -57dBm below 1GHz, 20nW/ -47dBm above 1GHz.	Pass
512.58	V	-70.46		
4804.00	V	-55.82		
7206.00	V	-53.66		
9608.00	V	-52.34		
12010.00	V	-50.91		
81.62	Horizontal	-75.43		
817.81	H	-70.35		
4804.00	H	-55.86		
7206.00	H	-53.41		
9608.00	H	-52.19		
12010.00	H	-51.61		
The highest channel				
Frequency (MHz)	**Spurious Emission**		**Limit (dBm)**	**Test Result**
	polarization	**Level(dBm)**		
71.69	Vertical	-69.61	2nW/ -57dBm below 1GHz, 20nW/ -47dBm above 1GHz.	Pass
797.97	V	-67.65		
4960.00	V	-57.01		
7440.00	V	-54.09		
9920.00	V	-53.32		
12400.00	V	-51.39		
80.86	Horizontal	-75.46		
586.88	H	-69.96		
4960.00	H	-54.44		
7440.00	H	-53.41		
9920.00	H	-53.79		
12400.00	H	-52.72		

7.3.2 Receiver Blocking

Test Requirement:	ETSI EN 300 328 clause 4.3.1.12
Test Method:	ETSI EN 300 328 clause 5.4.11.2.
Limit:	While maintaining the minimum performance criteria as defined in clause 4.3.1.12.3, 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 6, table 7 or table 8.

Table 6: Receiver Blocking parameters for Receiver Category 1 equipment

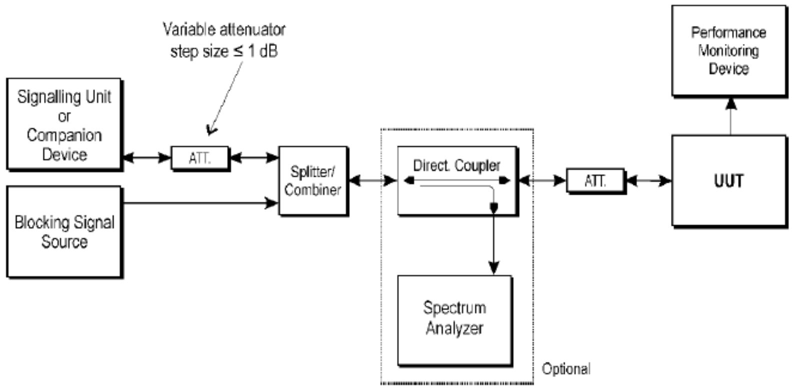
Wanted signal mean power from companion device (dBm)	Blocking signal frequency (MHz)	Blocking signal power (dBm) (see note 2)	Type of blocking signal
P_{min} + 6 dB	2 380 2 503,5	-53	CW
P_{min} + 6 dB	2 300 2 330 2 360	-47	CW
P_{min} + 6 dB	2 523,5 2 553,5 2 583,5 2 613,5 2 643,5 2 673,5	-47	CW
NOTE 1: P_{min} is the minimum level of wanted signal (in dBm) required to meet the minimum performance criteria as defined in clause 4.3.1.12.3 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.			

Table 7: Receiver Blocking parameters 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 dB	2 380 2 503,5	-57	CW
P_{min} + 6 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 4.3.1.12.3 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.			

Table 8: Receiver Blocking parameters 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
P_{min} + 12 dB	2 380 2 503,5	-57	CW
P_{min} + 12 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 4.3.1.12.3 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.			

Test setup:	
Test procedure:	Refer to the procedure of adaptivity
Measurement Record:	Uncertainty: N/A
Test Instruments:	See section 6.0
Test mode:	Normal link mode

Measurement Data:

Test Channel	P_{min}(dBm)	PER(%)	Limit of PER(%)	Wanted signal mean power companion (P_{min}+6dB)	Blocking signal frequency (MHz)	Blocking signal Power (dBm)	Type of blocking signal	Result
Lowest Channel	-77.56	9.20	10	-71.56	2300.00	-47	CW	Pass
				-71.56	2380.00	-57		
Highest Channel	-76.10	9.25		-70.10	2503.50	-57		
				-70.10	2583.50	-47		
Note: During the blocking test. The value of PER which display on the CMW 500 was no changed.Maybe the value of PER has a slight floating,but no bigger than 10%.								

8 Test setup photo

Radiated Emission

9 EUT Constructional Details

Reference to the test report No. : GTS201712000154E01

------End------