



RF/EMC COMPLIANCE TEST REPORT

Technical Statement of Conformity
in accordance with EN 300 328 V1.8.1 (2012-04)

The product

Equipment Under Test	: Bluetooth Headset
Model Number	: BTH-300
Product Series	: N/A
Report Number	: HA150540-RF
Issue Date	: 11-Aug-2015
Test Result	: Compliance

is produced by

Mobility Sound Technology Ltd.

5F, NO.100, Jian 1st Road, ZhongHe Dist., New Taipei City #235, Taiwan



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Verification

Applicant :	Mobility Sound Technology Ltd.
Address of Applicant :	5F, NO.100, Jian 1 st Road, ZhongHe Dist., New Taipei City #235, Taiwan
Manufacturer :	Mobility Sound Technology Ltd.
Address of Manufacturer :	5F, NO.100, Jian 1 st Road, ZhongHe Dist., New Taipei City #235, Taiwan
Trade Name :	MobilitySound
Equipment Under Test :	Bluetooth Headset
Model Number :	BTH-300
Serial Number :	N/A
Product Series :	N/A
Working Frequency :	Bluetooth : 2402~2480MHz
Rated Output Power :	Bluetooth: -7.78 dBm
Type of Modulation :	Bluetooth : GFSK Bluetooth EDR : $\pi/4$ -DQPSK, 8-DPSK
Sample Received Date :	16-Jul-2015
Test Standard :	EN 300 328 V1.8.1 (2012-04)

Deviations from standard test methods & any other specifications : NONE

Remark:

WE HEREBY CERTIFY THAT: The data shown in this report were made in accordance with the procedures given in EN 300 328 V1.8.1 (2012-04), and the energy emitted by the device was founded to be within the limits applicable. We assume full responsibility for accuracy and completeness of these data.

Note:

1. This report details the results of the test carried out on one sample.
2. This report applies to the above sample only and shall not be reproduced in part without written approval of HongAn Technology Co., Ltd..

Documented by:

Jody Peng/ ADM. Dept Staff

Date: 2015-08-11

Tested by:

Eason Hsieh/ ENG. Dept. Staff

Date: 2015-08-04

Approved by:

Peter Chin / Section Manager

Date: 2015-08-12

List of Measurements

Technical requirements for Frequency Hopping Equipment		
Sub Clause	Parameter to be measured	Result
	Transmitter Parameters	
4.3.1.1 or 4.3.2.1	RF Output Power	Compliance
4.3.1.2 or 4.3.2.3	Duty Cycle, Tx-Sequence, Tx-gap (Non-adaptive equipment)	N/A
4.3.1.3	Dwell time, Minimum Frequency Occupation & Hopping Sequence (FHSS equipment)	Compliance
4.3.1.4	Hopping Frequency Separation (FHSS equipment)	Compliance
4.3.1.5 or 4.3.2.4	Medium Utilisation (Non-adaptive equipment)	N/A
4.3.1.7 or 4.3.2.6	Occupied Channel Bandwidth	Compliance
4.3.1.8 or 4.3.2.7	Transmitter unwanted emission in the OOB domain	Compliance
4.3.1.9 or 4.3.2.8	Transmitter unwanted emissions in the spurious domain	Compliance
	Receiver Parameters	
4.3.1.10 or 4.3.2.9	Receiver Spurious Emissions	Compliance

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.
- The clause numbers are referenced to ETSI EN 300 328 V1.8.1 (2012-04)

1 General Description

1.1 Information of Applicant

Name : Mobility Sound Technology Ltd.
Address : 5F, NO.100, Jian 1st Road, ZhongHe Dist., New Taipei City #235, Taiwan

1.2 Information of Manufacturer

Name : Mobility Sound Technology Ltd.
Address : 5F, NO.100, Jian 1st Road, ZhongHe Dist., New Taipei City #235, Taiwan

1.3 Description of EUT

Equipment Under Test	:	Bluetooth Headset									
Model Number of EUT	:	BTH-300									
Product Series	:	N/A									
Power Supply	:	5V dc (through USB port)									
Frequency Range	:	Bluetooth : 2402~2480MHz									
Number of Channels	:	Bluetooth : 79 Channels									
Carrier Frequency of Each Channel	:	Bluetooth :									
		Ch.	Fre. (MHz)	Ch.	Fre. (MHz)	Ch.	Fre. (MHz)	Ch.	Fre. (MHz)	Ch.	Fre. (MHz)
		00	2402	16	2418	32	2434	48	2450	64	2466
		01	2403	17	2419	33	2435	49	2451	65	2467
		02	2404	18	2420	34	2436	50	2452	66	2468
		03	2405	19	2421	35	2437	51	2453	67	2469
		04	2406	20	2422	36	2438	52	2454	68	2470
		05	2407	21	2423	37	2439	53	2455	69	2471
		06	2408	22	2424	38	2440	54	2456	70	2472
		07	2409	23	2425	39	2441	55	2457	71	2473
		08	2410	24	2426	40	2442	56	2458	72	2474
		09	2411	25	2427	41	2443	57	2459	73	2475
		10	2412	26	2428	42	2444	58	2460	74	2476
		11	2413	27	2429	43	2445	59	2461	75	2477
		12	2414	28	2430	44	2446	60	2462	76	2478
		13	2415	29	2431	45	2447	61	2463	77	2479
		14	2416	30	2432	46	2448	62	2464	78	2480
		15	2417	31	2433	47	2449	63	2465	--	--
Antenna Specification	:	Chip Antenna/ 2.5 dBi									



Modulation Technique	:	Bluetooth : GFSK Bluetooth EDR : $\pi/4$ -DQPSK, 8-DPSK
Transmit Data Rate	:	Bluetooth : 1Mbps Bluetooth EDR : 2/3 Mbps
Temperature Range	:	-15°C ~ +50°C
Specification	:	Dimensions : 65 mm (L) X 31 mm (W) X 25 mm (H) Weight : 25g Function : The EUT is a Bluetooth headset. ※For more detail specification, please refer to the User Manual.



1.4 Test Instruments

Instrument Name	Manufacture Mode	Model Number	Serial Number	Last Cal. Date	Next Cal. Date
Wideband Power Sensor	R&S	NRP-Z11	111731	05-Dec-2014	05-Dec-2015
Spectrum Analyzer	R&S	FSV K30	101629	11-JUN-2015	11-JUN-2016
Temp. & Humidity Chamber	Giant Force	GTH-150-20-SP-AR	MMA0907-012	22-JUL-2015	22-JUL-2016
WIDEBAND RADIO COMMUNICATION TESTER	ROHDE&SCHWARZ	CMW-500	141958	05-NOV-2014	05-NOV-2015

※ The test equipments used are calibrated and can be traced to National ITRI and International Standards.

1.5 Auxiliary Equipments

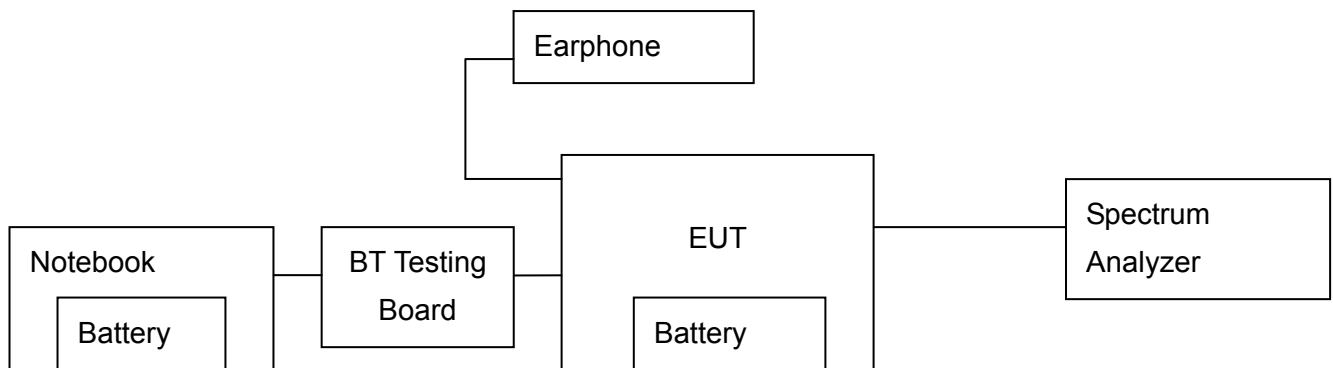
1.5.1. Provided by HongAn Technology Co., Ltd. for RF Test.

No.	Equipment	Model No.	Serial No.	EMC Approved	Brand	Description	
						Data Cable	Power Cable
1	Notebook	N61J	N61JV-021A520M	FCC	ASUS	Adapter to Notebook Unshielded*1.8 m	AC to Adapter Unshielded*1.8 m
2	Bluetooth Test Board	N/A	N/A	N/A	N/A	N/A	N/A

1.5.2. Provided by the Manufacturer

No.	Equipment	Model No.	Serial No.	EMC Approved	Brand	Description	
						Data Cable	Power Cable
1	Bluetooth Testing Board	N/A	N/A	N/A	N/A	N/A	N/A

1.6 EUT SETUP



Note: The EUT has been tested as an independent unit.

1.7 Description of Test Mode

The EUT had been tested under the operating condition.

There are three channels have been tested as following:

Bluetooth	
Channel	Frequency (MHz)
Low	2402
Middle	2441
High	2480

Software used to control the EUT for staying in continuous transmitting and receiving mode is programmed.

1.8 Identifying the Final Test Mode

Bluetooth 4.0 Classic						
Applicability	Test Item	Available Channel	Tested Channel	Modulation Technology	Modulation Type	Packet Type
☒	ROP	0 to 78	0, 39, 78	FHSS	GFSK, $\pi/4$ -DQPSK, 8-DPSK	DH1
☒	DC/TS/TG	0 to 78	Hopping mode	FHSS	GFSK, $\pi/4$ -DQPSK, 8-DPSK	DH1
☒	DT/MFO/HS	0 to 78	Hopping mode	FHSS	GFSK, $\pi/4$ -DQPSK, 8-DPSK	DH1/3/5
☒	HFS	0 to 78	Hopping mode	FHSS	GFSK, $\pi/4$ -DQPSK, 8-DPSK	DH1
☐	MU	-	-	-	-	-
☒	OCB	0 to 78	0, 39, 78	FHSS	GFSK, $\pi/4$ -DQPSK, 8-DPSK	DH1
☒	EOB	0 to 78	0, 78	FHSS	GFSK, $\pi/4$ -DQPSK, 8-DPSK	DH1
☒	SE<1G	0 to 78	Hopping mode	FHSS	GFSK, $\pi/4$ -DQPSK, 8-DPSK	DH1
☒	SE≥1G	0 to 78	0, 78	FHSS	GFSK, $\pi/4$ -DQPSK, 8-DPSK	DH1

Note:

ROP	RF Output Power	OCB	Occupied Channel Bandwidth
DC/TS/TG	Duty Cycle/ Tx-Sequence/ Tx-gap	PSD	Power Spectral Density
DT/MFO/HS	Dwell time/ Minimum Frequency Occupation/ Hopping Sequence	EOB	Transmitter unwanted emissions in the out-of-band domain
HFS	Hopping Frequency Separation	SE<1G	Spurious Emissions below 1GHz
MU	Medium Utilisation	SE≥1G	Spurious Emissions above 1GHz
RB	Receiver Blocking		

1.9 Condition of Power Supply



Power Condition	Voltage (V)
V nor	3.7
V min	3.7
V max	4.2

1.10 EUT Configuration

1. Setup the EUT as shown in Sec.1.4 Block Diagram.
2. Turn on the power of all equipments.
3. Activate the selected Final Test Mode.

1.11 Qualification of Test Facility

TAF Accreditation No. : 1163

Measurement Uncertainty

The following relevant measurement uncertainties have been estimated and determined following the ETSI Technical Report, ETR 028:

Parameter	Uncertainty
Radio Frequency	$\pm 8 \times 10^{-6}$
Total RF power, conducted	+ 0.28dB/ - 0.30dB
RF power density, conducted	+1.5dB/ -1.4dB
Spurious emissions, conducted	+1.2dB/ -1.1dB
All emissions, radiated	± 3.84 dB
Temperature	$\pm 0.5^{\circ}\text{C}$
Humidity	$\pm 2\%$
DC and low frequency voltages	$\pm 1\%$

This reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor of $k = 2$, providing a level of confidence of approximately 95%.

2 RF OUTPUT POWER

2.1 Test Instruments

Refer to Sec. 1.4 Test Instruments.

2.2 Limit

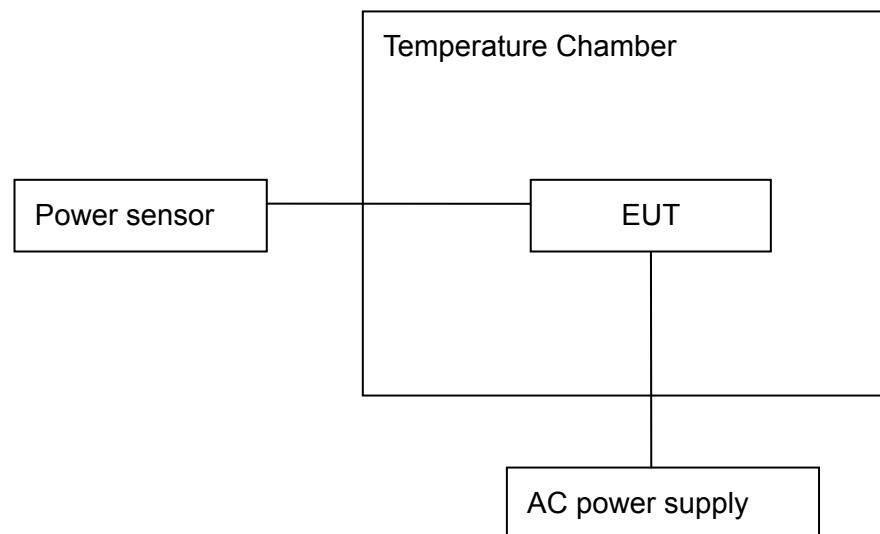
Condition	Frequency Band	Limit (e.i.r.p)
Under all test conditions	2400-2483.5	20 dBm

2.3 Test Procedures

Please refer to ETSI EN 300 328 (V1.8.1) clause 5.3.2.2.

Measurement	
☒ Conducted measurement	☐ Radiated measurement

2.4 Test Setup



2.5 Test Setup

The measurements for RF output power was performed at both normal environmental conditions and at the extremes of the operating temperature and voltage range. Controlling software has been activated to set the EUT on hopping channel and maximum power level.

2.6 Test Result

Compliance

The final test data are shown on the following page(s).



Test Conditions		EIRP Power (dBm) / Bluetooth 1Mbps		
		Low	Mid	High
		EIRP	EIRP	EIRP
$T_{nom}(25)^{\circ}C$	$V_{nom}(3.7Vdc)$	-11.49	-9.92	-7.78
$T_{min}(-15)^{\circ}C$	$V_{min}(3.7Vdc)$	-11.67	-10.49	-8.65
	$V_{max}(4.2Vdc)$	-12.08	-10.83	-8.97
$T_{max}(+50)^{\circ}C$	$V_{min}(3.7Vdc)$	-11.85	-10.35	-8.81
	$V_{max}(4.2Vdc)$	-11.76	-10.52	-8.58
Limit		20dBm		
Measurement uncertainty (dB)		+ 0.28/ -0.30		

Test Conditions		EIRP Power (dBm) / Bluetooth 2Mbps		
		Low	Mid	High
		EIRP	EIRP	EIRP
$T_{nom}(25)^{\circ}C$	$V_{nom}(3.7Vdc)$	-13.97	-11.51	-8.73
$T_{min}(-15)^{\circ}C$	$V_{min}(3.7Vdc)$	-14.19	-11.85	-9.17
	$V_{max}(4.2Vdc)$	-14.25	-12.13	-8.91
$T_{max}(+50)^{\circ}C$	$V_{min}(3.7Vdc)$	-14.31	-11.94	-9.35
	$V_{max}(4.2Vdc)$	-14.04	-12.02	-9.24
Limit		20dBm		
Measurement uncertainty (dB)		+ 0.28/ -0.30		

Test Conditions		EIRP Power (dBm) / Bluetooth 3Mbps		
		Low	Mid	High
		EIRP	EIRP	EIRP
$T_{nom}(25)^{\circ}C$	$V_{nom}(3.7Vdc)$	-13.88	-11.47	-8.72
$T_{min}(-15)^{\circ}C$	$V_{min}(3.7Vdc)$	-14.09	-12.16	-9.35
	$V_{max}(4.2Vdc)$	-14.22	-11.92	-9.11
$T_{max}(+50)^{\circ}C$	$V_{min}(3.7Vdc)$	-14.11	-11.98	-9.23
	$V_{max}(4.2Vdc)$	-13.97	-11.75	-9.07
Limit		20dBm		
Measurement uncertainty (dB)		+ 0.28/ -0.30		

3 Duty Cycle, Tx-Sequence, Tx-Gap (Not Apply)

3.1 Test Instruments

Refer to Sec. 1.4 Test Instruments.

3.2 Limit

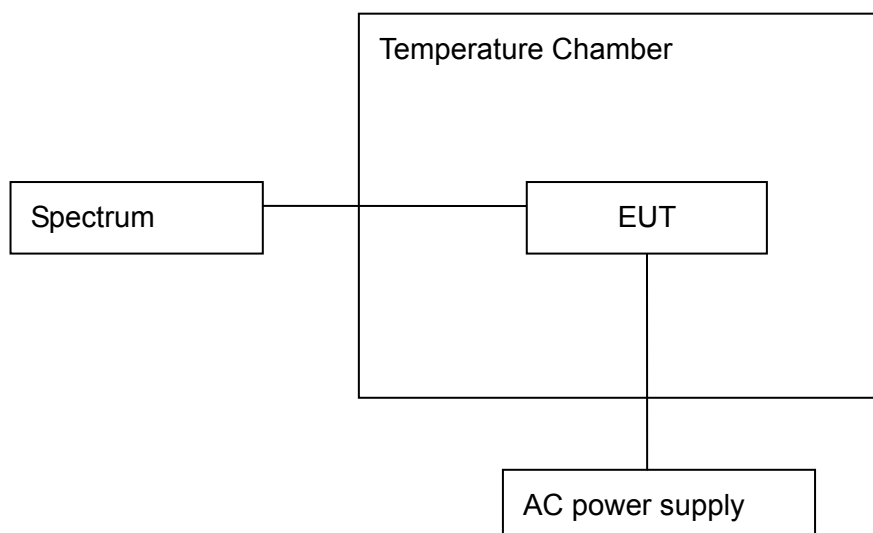
Condition	Type of EUT	Limit
Under normal environment conditions	☐ For non-adaptive FHSS equipment	Maximum Tx-sequence time shall be 5 ms while the minimum Tx-gap time shall be 5 ms.
		Duty cycle shall be equal or less than the maximum value declared by the supplier.
	☒ For non-adaptive using wide band modulations other than FHSS.	Maximum Tx-Sequence Time = Minimum Tx-gap Time = M (where M is in the range of 3.5 ms to 10 ms.)
		Duty cycle shall be equal or less than the maximum value declared by the supplier.

3.3 Test Procedures

Please refer to ETSI EN 300 328 (V1.8.1) clause 5.3.2.2.

Measurement	
☒ Conducted measurement	☐ Radiated measurement

3.4 Test Configuration





3.5 Test Setup

The test setup has been constructed as the normal test conditions. The measurement was performed during normal operation. In case of conducted measurements, the transmitter shall be connected to the measuring equipment via a suitable attenuator. Controlling software has been activated to set the EUT on specific status.

3.6 Test Result

N/A

Not applicable for this kind of EUT.

4 DWELL TIME, MINIMUM FREQUENCY OCCUPATION AND HOPPING SEQUENCE

4.1 Test Instruments

Refer to Sec. 1.4 Test Instruments.

4.2 Limit

Dwell Time	
Condition	Limit
Non-adaptive frequency hopping systems	≤ 15 ms
Adaptive frequency hopping systems	≤ 400 ms

Minimum Frequency Occupation Time	
Condition	Limit
Non-adaptive frequency hopping systems	Equal to one dwell time within a period not exceeding four times the product of the dwell time per hop and the number of hopping frequencies in use
Adaptive frequency hopping systems	

Hopping Sequence(s)	
Condition	Limit
Non-adaptive frequency hopping systems	≥ 15 hopping frequencies or 15/ Minimum Hopping Frequency Separation in MHz, whichever is the greater.
Adaptive frequency hopping systems	Operating frequency band ≥ 58.45 MHz (Operating over a minimum of 70% of the operating in the band 2.4 GHz to 2.4835 GHz)
	≥ 15 hopping frequencies or 15/ Minimum Hopping Frequency Separation in MHz, whichever is the greater.

4.3 Test Procedures

Please refer to ETSI EN 300 328 (V1.8.1) clause 5.3.4.2.

Measurement	
☒ Conducted measurement	☐ Radiated measurement

4.4 Test Setup

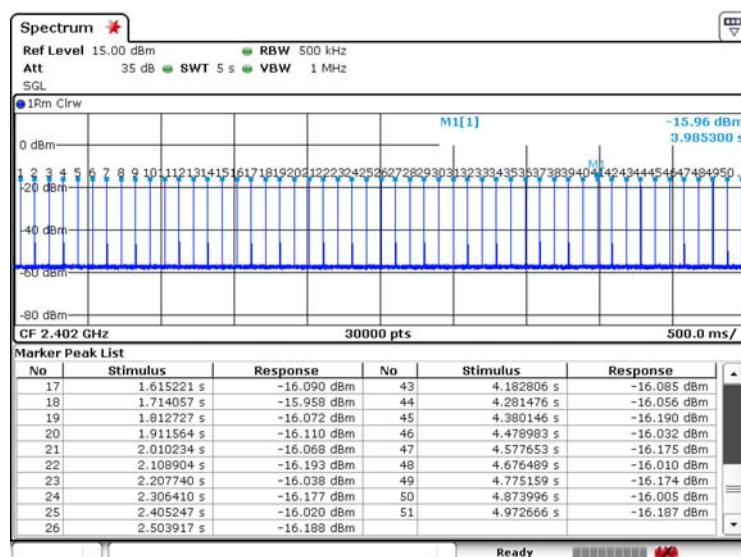
The measurements were only performed at normal test conditions. The equipment was configured to operated at its maximum Dwell Time and maximum Duty Cycle. The measurement was performed on a minimum of 2 hopping frequencies chosen arbitrary from the actual hopping sequence. In case of conducted measurements the transmitter shall be connected to the measuring equipment via a suitable attenuator. Controlling software has been activated to set the EUT on specific status.

4.5 Test Result

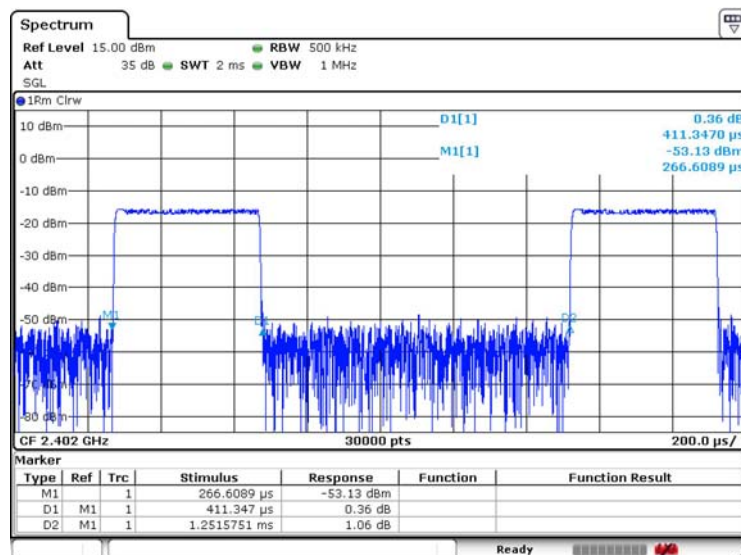
Compliance

Dwell Time BT CH00 (1Mbps) (worst case)									
DH packet	Number of Hopping Channel	Number of transmission in a period (channel number*0.015 sec)				Length of transmission time (ms)	Result (ms)	Limit (ms)	Pass/Fail
		Period (sec)	Sweep Time (sec)	Times in a sweep	Times in a period				
DH1	79	1.185	5	51	12.087	0.4113470	4.972	≤ 15	Pass
DH3	79	1.185	5	25	5.925	1.664689	9.863	≤ 15	Pass
DH5	79	1.185	5	17	4.029	2.928731	11.80	≤ 15	Pass
Dwell Time (sec) = 79 (Total Channel) * 0.4 (sec) * NP * Pulse Time (sec)									

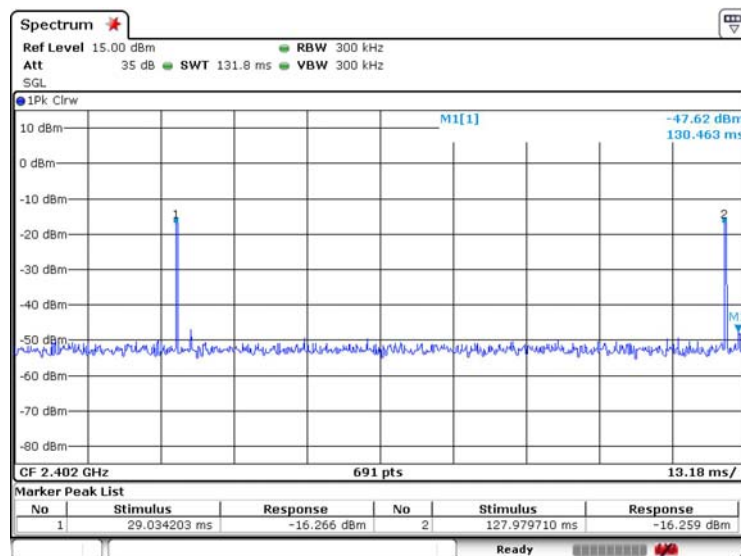
Minimum Frequency Occupation Time BT CH00 (1Mbps)						
DH packet	Number of Hopping Channel	Number of transmission in a period of 4*Dwell Time*number of hopping channel	Length of transmission time (ms)	Result (ms)	Minimum Limit (ms)	Pass/Fail
DH1	79	2	0.4113470	0.823	0.4113470	Pass
DH3	79	3	1.664689	4.994	1.664689	Pass
DH5	79	3	2.928731	8.786	2.928731	Pass



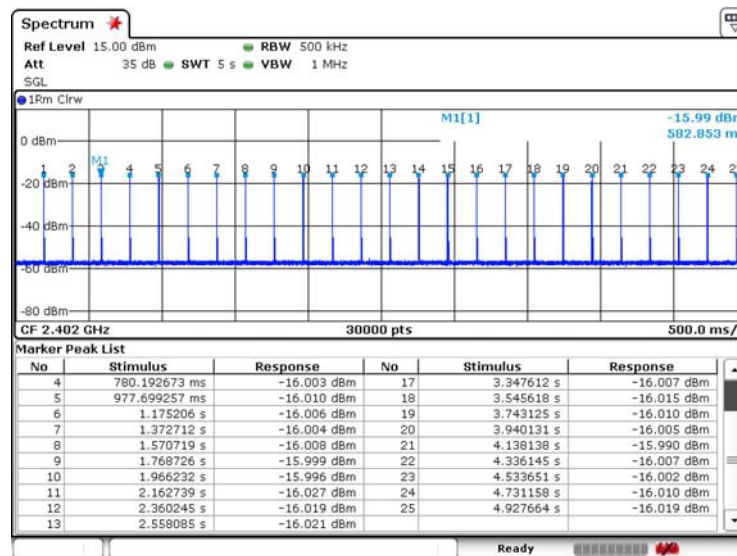
Times in a Sweep (DH1)



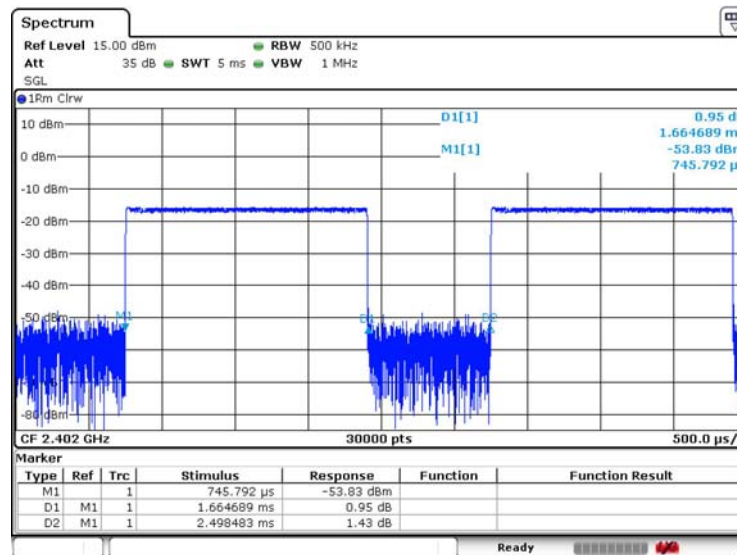
Length of Transmission Time (DH1)



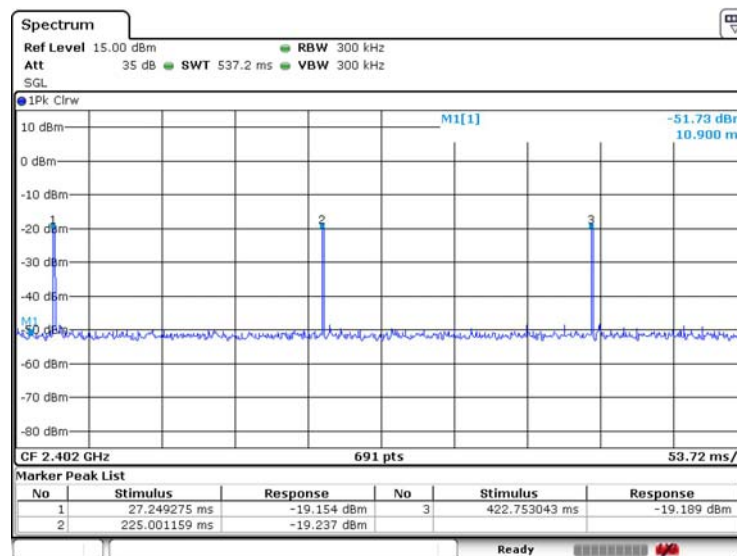
Minimum Frequency Occupation Time (DH1)



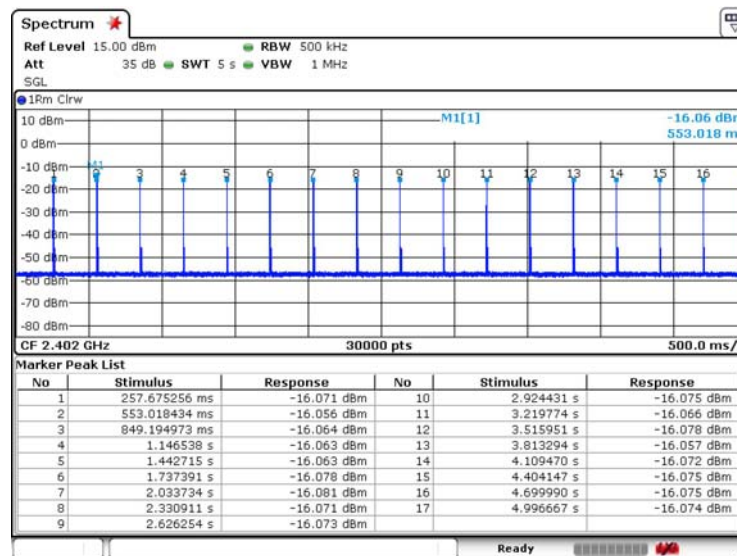
Times in a Sweep (DH3)



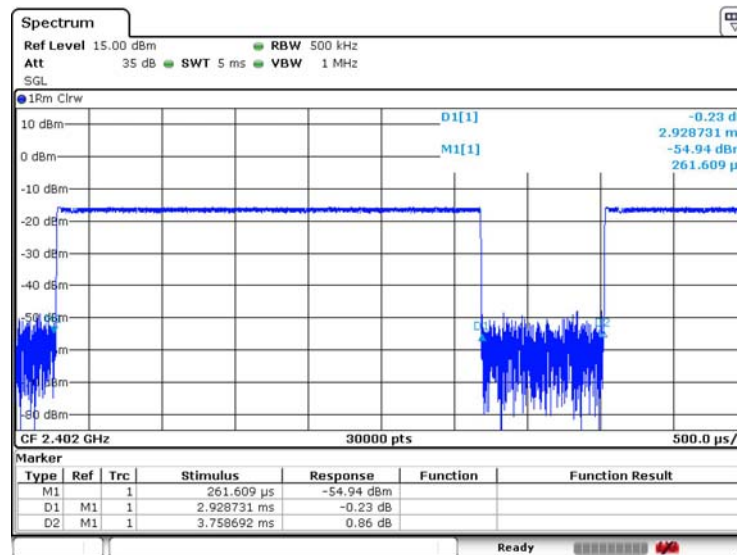
Length of Transmission Time (DH3)



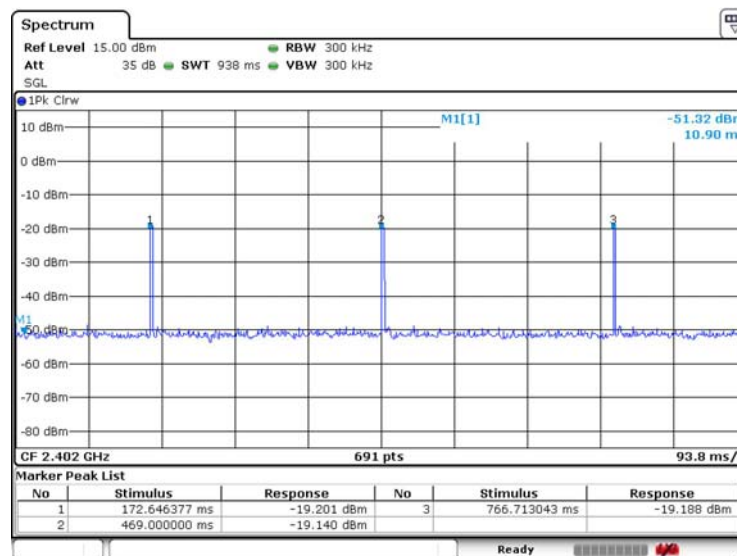
Minimum Frequency Occupation Time (DH3)



Times in a Sweep (DH5)



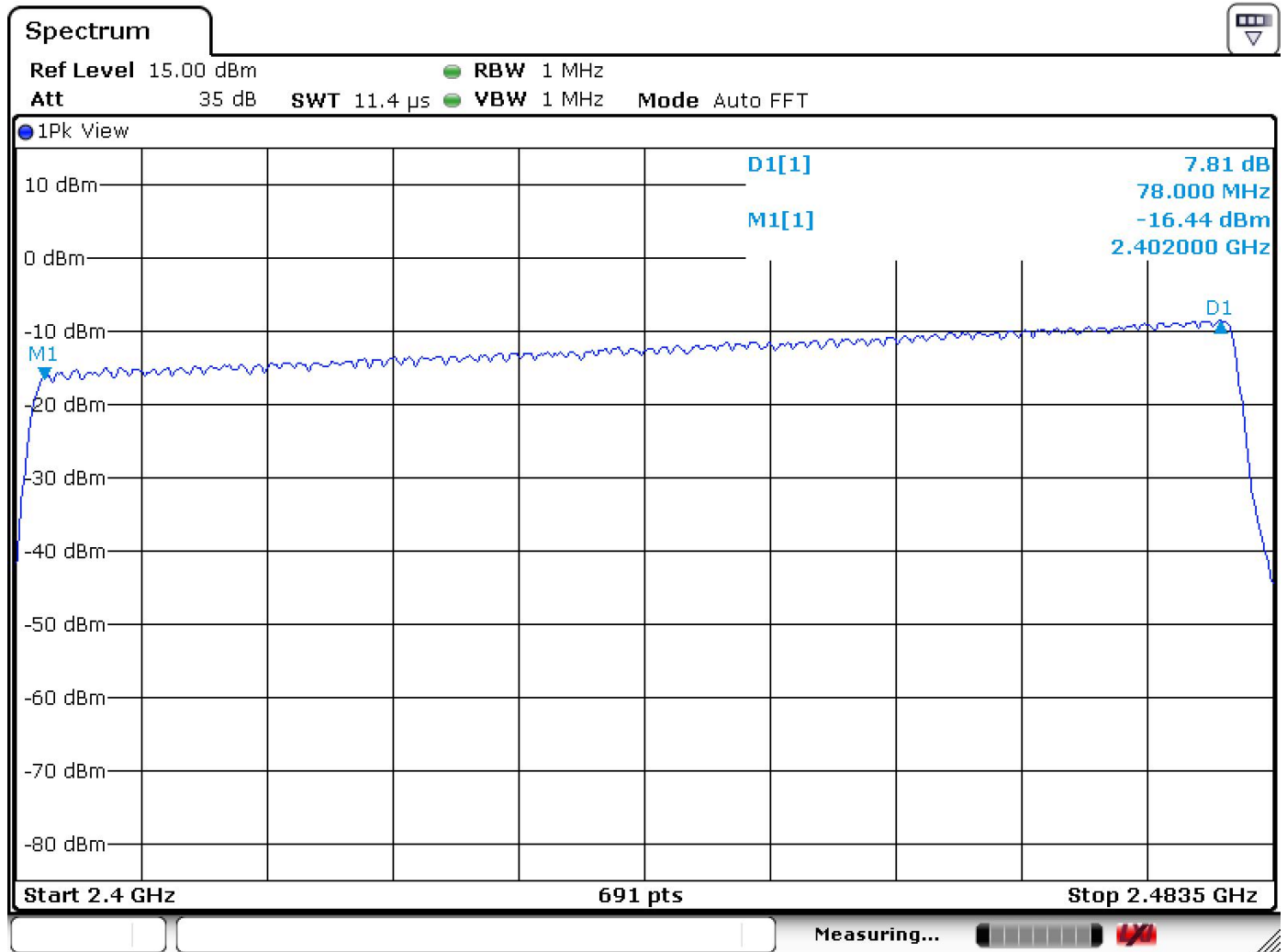
Length of Transmission Time (DH5)



Minimum Frequency Occupation Time (DH5)



Hopping Sequence(s)			
Mode	Amount of Hopping frequency	Limit	Pass/ Fail
GFSK	79	≥15 hopping frequencies	Pass



5 MEDIUM UTILISATION (MU) FACTOR

5.1 Test Instruments

Refer to Sec. 1.4 Test Instruments.

5.2 Limit

Condition	Type of EUT	Limit
Under normal environment conditions	☐ For non-adaptive FHSS equipment	The maximum MU factor shall be 10%.
	☒ For non-adaptive using wide band modulations other than FHSS.	The maximum MU factor shall be 10%.

5.3 Test Procedures

Please refer to ETSI EN 300 328 (V1.8.1) clause 5.3.2.2.

Measurement	
☒ Conducted measurement	☐ Radiated measurement



5.4 Test Setup

The measurements were only performed at normal test conditions.

5.5 Test Result

N/A

This requirement does not apply to adaptive equipment unless operating in a non-adaptive mode.

In addition, this requirement does not apply for equipment with a maximum declared RF Output power level of less than 10 dBm E.I.R.P. or for equipment when operating in a mode where the RF Output power is less than 10 dBm E.I.R.P.

6 ADAPTIVITY (adaptive equipment using modulations other than FHSS)

6.1 Test Instruments

Refer to Sec. 1.4 Test Instruments.

6.2 Limit

Condition	
Under normal environment conditions	
Type of adaptive mode	Limit
☐ Non-LBT based Detect and Avoid	- The channel shall remain unavailable for a minimum time equal to 1s after which the channel may be considered again as an 'available' channel; $COT \leq 40 \text{ ms}$; - Idle Period shall be minimum 5% of COT with a minimum of 100us; - Detection threshold level = $-70 \text{ dBm/MHz} + 20 - P_{out \text{ E.I.R.P (dBm)}}$
☒ LBT based Detect and Avoid (Frame Based Equipment	- The CCA observation time shall be not less than 20us; - The CCA time used by the equipment shall be declared by the supplier; $COT = 1 \sim 10 \text{ ms}$; - Idle Period = 5% of COT; - Detection threshold level = $-70 \text{ dBm/MHz} + 20 - P_{out \text{ E.I.R.P (dBm)}}$
☐ LBT based Detect and Avoid (Load Based Equipment	- The CCA observation time shall be not less than 20us; - The CCA time used by the equipment shall be declared by the supplier; $COT \leq (13/32) * q \text{ ms}$; $q = [4 \sim 32]$; 1.625ms~13ms; - R= number of clear idle slots are randomly [1~q]. Every time an Extended CCA is required and the 'R' value stored in a counter. - Detection threshold level = $-70 \text{ dBm/MHz} + 20 - P_{out \text{ E.I.R.P (dBm)}}$
☐ Short Control Signalling Transmissions.	Short Control Signalling Transmissions shall have a maximum duty cycle of 10% within an observation period of 50ms.

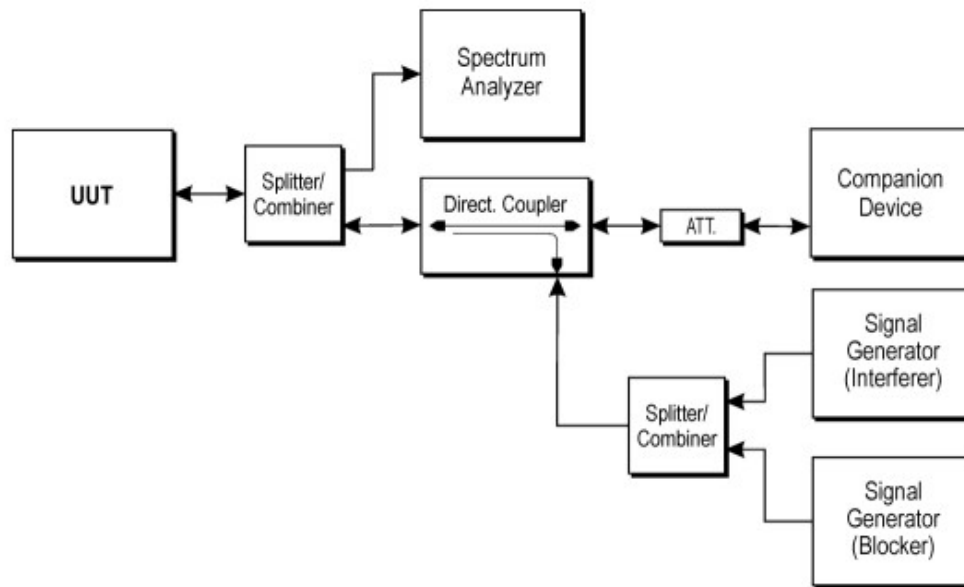
6.3 Test Procedures

Please refer to ETSI EN 300 328 (V1.8.1) clause 5.3.7.2.

Measurement	
☒ Conducted measurement	☐ Radiated measurement



6.4 Test Setup



6.5 Test Result

N/A

This requirement does not apply to adaptive equipment unless operating in a non-adaptive mode providing the equipment complies with the requirements and/or restrictions applicable to non-adaptive equipment.

In addition, this requirement does not apply for equipment with a maximum declared RF Output power level of less than 10 dBm E.I.R.P. or for equipment when operating in a mode where the RF Output power is less than 10 dBm E.I.R.P.

7 OCCUPIED CHANNEL BANDWIDTH

7.1 Test Instruments

Refer to Sec. 1.4 Test Instruments.

7.2 Limit

Condition		Limit
All types of equipment		Shall fall completely within the band 2400 to 2483.5 MHz
Additional requirement	For non-adaptive using wide band modulations other than FHSS system and e.i.r.p > 10 dBm.	Less than 20 MHz
	For non-adaptive Frequency Hopping system and e.i.r.p > 10 dBm	Less than 5 MHz

7.3 Test Procedures

Please refer to ETSI EN 300 328 (V1.8.1) clause 5.3.8.2.

Measurement	
☒ Conducted measurement	☐ Radiated measurement

7.4 Test Setup

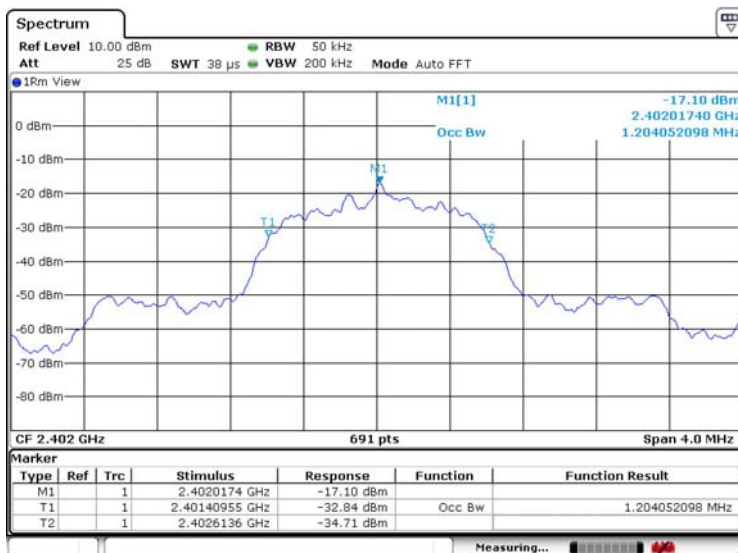
The measurements were only performed at normal test conditions. The measurement shall be performed only on the highest frequency within the stated frequency range. Use software to force the EUT to transmit on the lowest and highest frequencies. In case of conducted measurements the transmitter shall be connected to the measuring equipment via a suitable attenuator. Controlling software has been activated to set the EUT on specific status.

7.5 Test Result

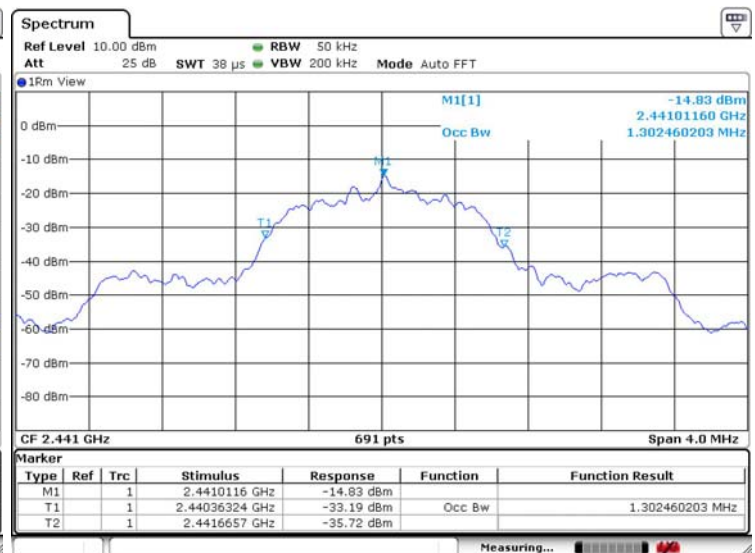
Compliance

Bluetooth 2Mbps (worst case)

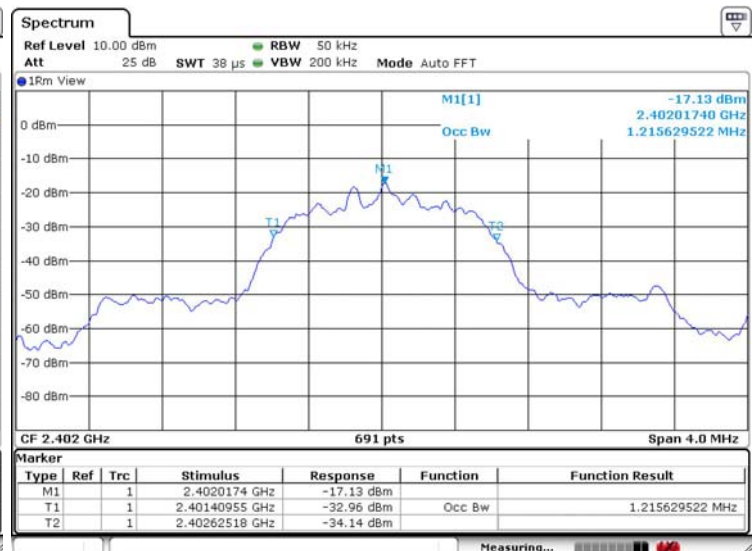
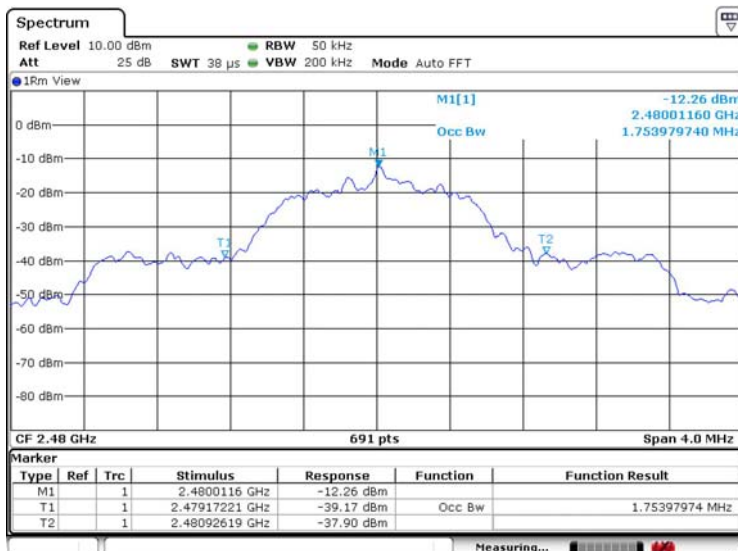
Test Condition		Frequency (MHz)		
		FL(T1)	FH(T2)	99%BW
$T_{nom}(25)^{\circ}C$ $V_{nom}(3.7)V_{dc}$	DH1 (LOW)	2401.40955	2402.6136	1.204052098
	DH1 (MID)	2440.36324	2441.6657	1.302460203
	DH1 (HIGH)	2479.17221	2480.92619	1.75397974
	DH3 (LOW)	2401.40955	2402.62518	1.215629522
	DH3 (MID)	2440.34588	2441.67149	1.325615051
	DH3 (HIGH)	2479.09117	2480.96093	1.86975398
	DH5 (LOW)	2401.40955	2402.62518	1.215629522
	DH5 (MID)	2440.34588	2441.67728	1.331403763
	DH5 (HIGH)	2479.10275	2480.98987	1.887120116
Limit	Less than 20 MHz			



DH1 (low)

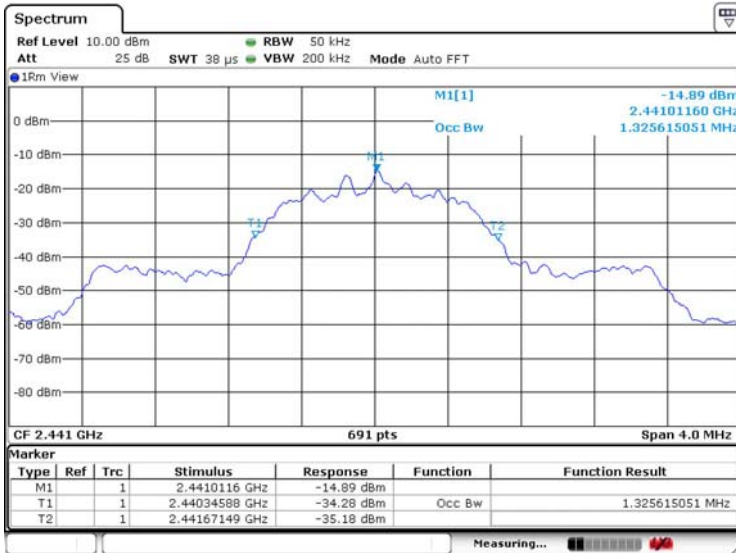


DH1 (mid)

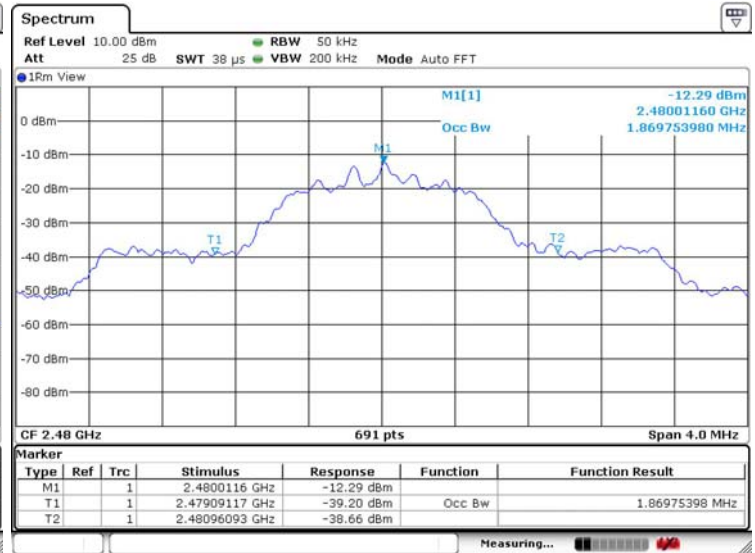




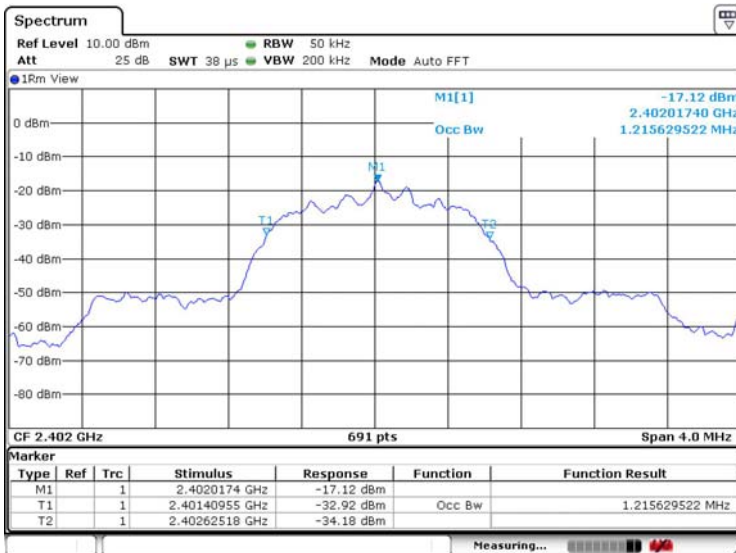
DH1 (high)



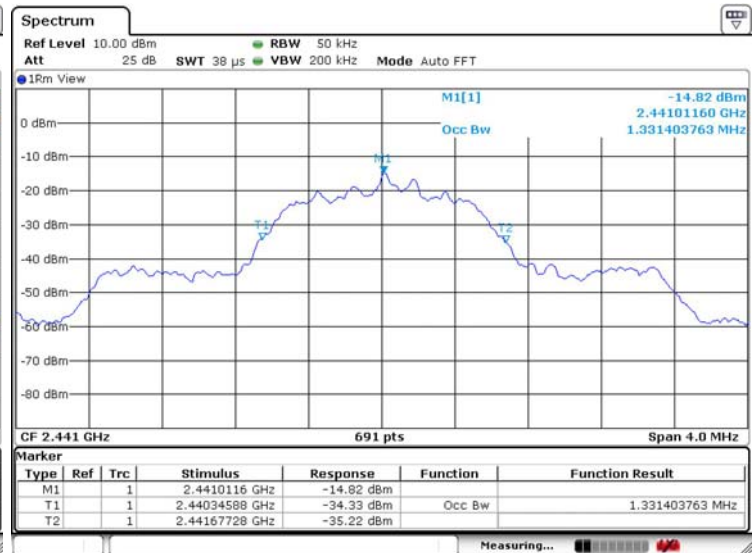
DH3 (low)



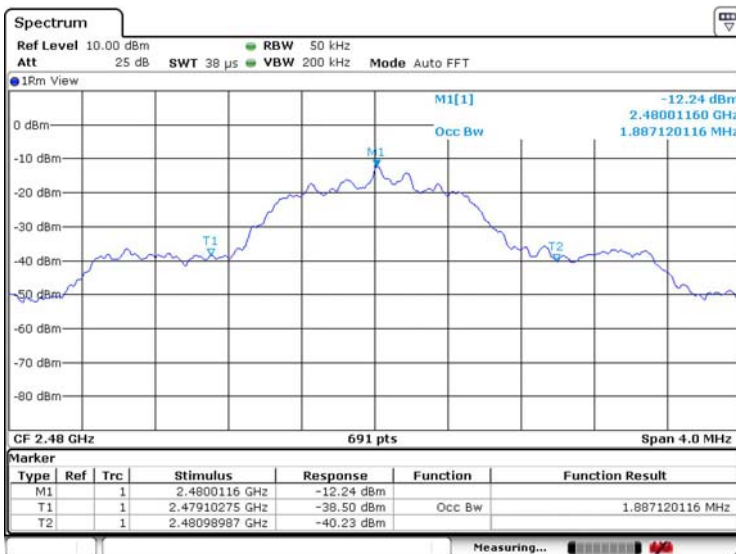
DH3 (mid)



DH3 (high)



DH5 (low)



DH5 (mid)

DH5 (high)

8 HOPPING FREQUENCY SEPARATION

8.1 Test Instruments

Refer to Sec. 1.4 Test Instruments.

8.2 Limits

Condition	Limit
Non-adaptive frequency hopping systems	The minimum Hopping Frequency Separation shall be equal to Occupied Channel Bandwidth of a single hop, with a minimum separation of 100 kHz.
Adaptive frequency hopping systems	The minimum Hopping Frequency Separation shall be 100 kHz.

8.3 Test Procedures

Please refer to ETSI EN 300 328 (V1.8.1) clause 5.3.5.2

Measurement	
☒ Conducted measurement	☐ Radiated measurement

8.4 Test Setup

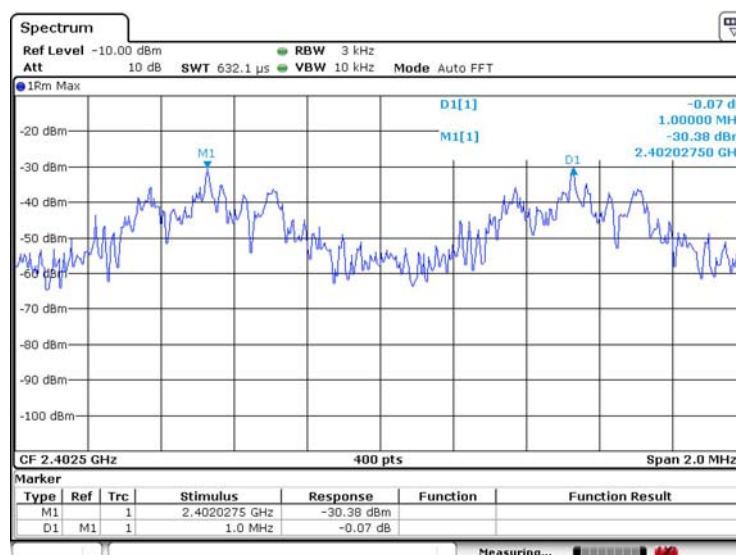
The measurements were performed at normal test conditions. The measurement was performed on 2 adjacent hopping frequencies. In case of conducted measurements the transmitter shall be connected to the measuring equipment via a suitable attenuator. Controlling software has been activated to set the EUT on specific status.

8.5 Test Result

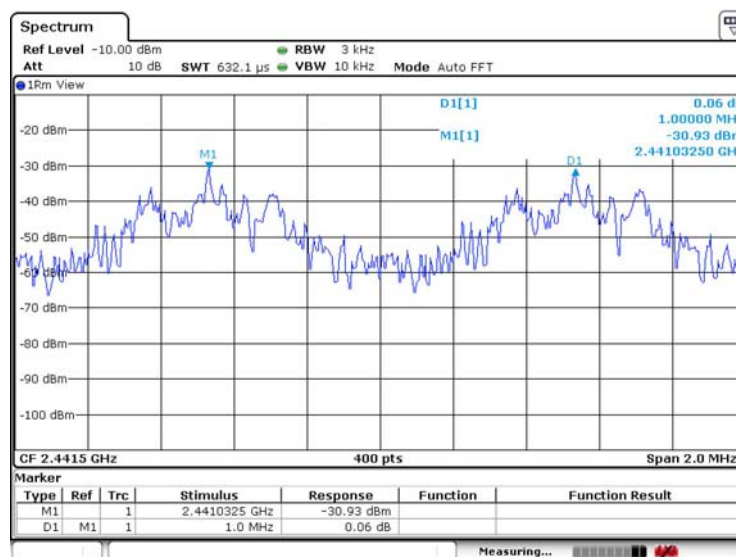
Compliance

Channel Number	Frequency (MHz)	Channel Separation (MHz)	Limit (kHz)	Pass/ Fail
0	2402	1	1000	Pass
39	2441	1	1000	Pass
78	2480	1	1000	Pass

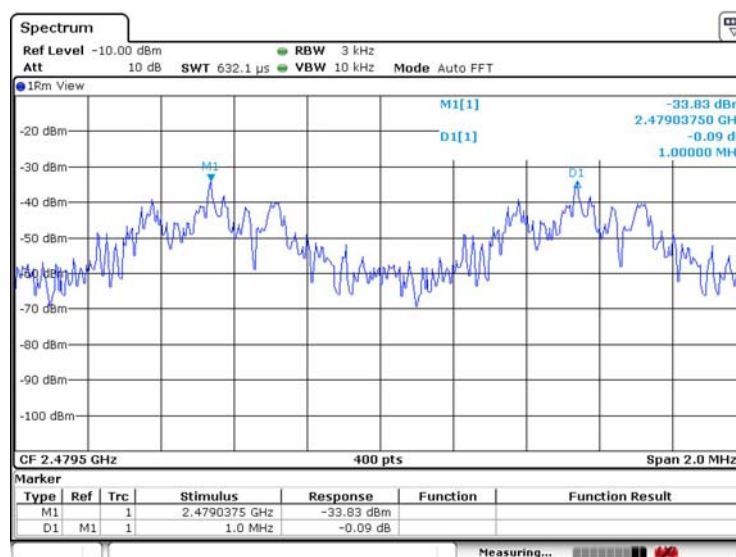
Note: The minimum Hopping Frequency Separation shall be equal to Occupied Channel Bandwidth of a single hop, with a minimum separation of 100 kHz. Further, for non-adaptive Frequency Hopping equipment, the Occupied Channel Band width is declared by the supplier which is 1MHz in this case.



Channel 00



Channel 39



Channel 78

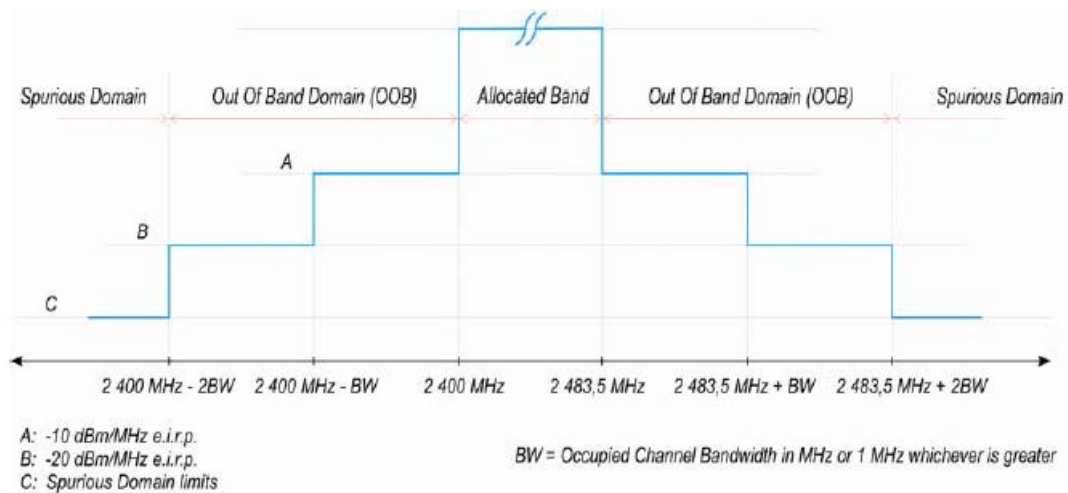
9 TRANSMITTER UNWANTED EMISSIONS IN THE OUT-OF-BAND DOMAIN

9.1 Test Instruments

Refer to Sec. 1.4 Test Instruments.

9.2 Limit

Condition	Limit
Under all test conditions	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 below figure.



9.3 Test Setup

The measurements were performed at normal environmental conditions and shall be repeated at the extremes of the operating temperature and voltage range. The equipment was configured to operated under its worst case situation with respect to output power. In case of conducted measurements the transmitter shall be connected to the measuring equipment via a suitable attenuator. The power source of the EUT has to be connected with the power supply for voltage change. The frequency has to be recorded for the right and left end above threshold of highest and lowest channel respectively.

9.4 Test Result

Compliance

Test Conditions 1Mbps		Frequency Range (MHz)	Frequency (MHz)	Transmitter unwanted emission EIRP (dBm/MHz)	Limit (dBm/MHz)
V _{nom} (3.7)Vdc	T _{nom} (25)°C	2372.52 to 2386.26	2396.29	-52.98	-20
		2386.26 to 2400	2399.273	-53.69	-10
		2483.5 to 2497.22	2483.50	-53.66	-10
		2497.22 to 2510.94	2485.81	-52.94	-20
	T _{min} (-15)°C	2372.52 to 2386.26	2396.57	-54.49	-20
		2386.26 to 2400	2400	-54.73	-10
		2483.5 to 2497.22	2483.57	-54.91	-10
		2497.22 to 2510.94	2485.62	-54.23	-20
	T _{max} (50)°C	2372.52 to 2386.26	23963.63	-55.11	-20
		2386.26 to 2400	2399.51	-54.66	-10
		2483.5 to 2497.22	2483.5	-54.59	-10
		2497.22 to 2510.94	2485.74	-54.85	-20

Test Conditions 2Mbps		Frequency Range (MHz)	Frequency (MHz)	Transmitter unwanted emission EIRP (dBm/MHz)	Limit (dBm/MHz)
V _{nom} (3.7)Vdc	T _{nom} (25)°C	2372.52 to 2386.26	2397.70	-54.06	-20
		2386.26 to 2400	2399.24	-52.67	-10
		2483.5 to 2497.22	2485.10	-53.37	-10
		2497.22 to 2510.94	2487.26	-54.13	-20
	T _{min} (-15)°C	2372.52 to 2386.26	2396.84	-54.23	-20
		2386.26 to 2400	2400	-54.93	-10
		2483.5 to 2497.22	2485.27	-54.74	-10
		2497.22 to 2510.94	2487.55	-54.78	-20
	T _{max} (50)°C	2372.52 to 2386.26	2397.35	-54.58	-20
		2386.26 to 2400	2400	-55.22	-10
		2483.5 to 2497.22	2483.5	-55.01	-10
		2497.22 to 2510.94	2487.56	-54.14	-20



Test Conditions 3Mbps		Frequency Range (MHz)	Frequency (MHz)	Transmitter unwanted emission EIRP (dBm/MHz)	Limit (dBm/MHz)
V _{nom} (3.7)Vdc	T _{nom} (25)°C	2372.52 to 2386.26	2397.60	-54.17	-20
		2386.26 to 2400	2400	-54.75	-10
		2483.5 to 2497.22	2485.26	-53.59	-10
		2497.22 to 2510.94	2486.98	-54.38	-20
	T _{min} (-15)°C	2372.52 to 2386.26	2397.47	-54.41	-20
		2386.26 to 2400	2400	-54.93	-10
		2483.5 to 2497.22	2485.43	-54.22	-10
		2497.22 to 2510.94	2486.39	-54.44	-20
	T _{max} (50)°C	2372.52 to 2386.26	2397.71	-55.12	-20
		2386.26 to 2400	2400	-54.66	-10
		2483.5 to 2497.22	2483.5	-54.77	-10
		2497.22 to 2510.94	2486.74	-54.96	-20



10 TRANSMITTER SPURIOUS EMISSIONS

10.1 Test Instruments

Refer to Sec. 1.4 Test Instruments.

10.2 Limit

Frequency Range	Maximum Power Limit (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 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

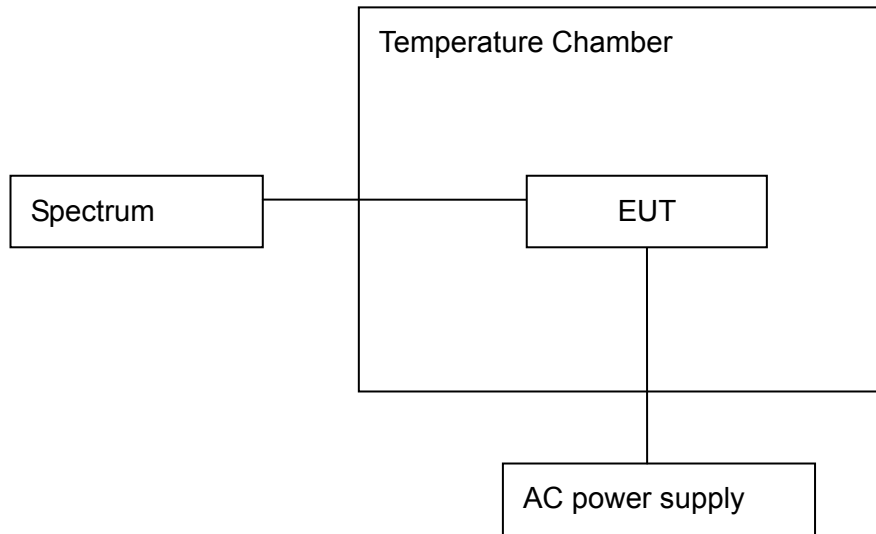
10.3 Test Procedures

Please refer to ETSI EN 300 328 (V1.8.1) clause 5.3.10.2.

Measurement	
☒ Conducted measurement	☐ Radiated measurement



10.4 Test Configuration



10.5 Test Setup

The measurements were performed at normal test conditions. In case of conducted measurements the transmitter shall be connected to the measuring equipment via a suitable attenuator. Controlling software has been activated to set the EUT on specific status.

10.6 Test Result

Compliance

The final test data are shown on the following page(s).



Test Conditions		Frequency (MHz)	Transmitter unwanted emission in spurious domain (dBm)	Limit (dBm)
T _{nom} (25)°C V _{nom} (3.7)Vdc 30 to 1000 MHz	1Mbps (Low)	943.781	-66.73	☐ -54 ☒ -36
	1Mbps (High)	944.181	-66.74	☐ -54 ☒ -36
T _{nom} (25)°C V _{nom} (3.7)Vdc 1 to 12.75 GHz	1Mbps (Low)	1860.5	-50.01	-30
	1Mbps (High)	2143.5	-50.15	-30

11 RECEIVER SPURIOUS RADIATION

11.1 Test Instruments

Refer to Sec. 1.4 Test Instruments.

11.2 Limit

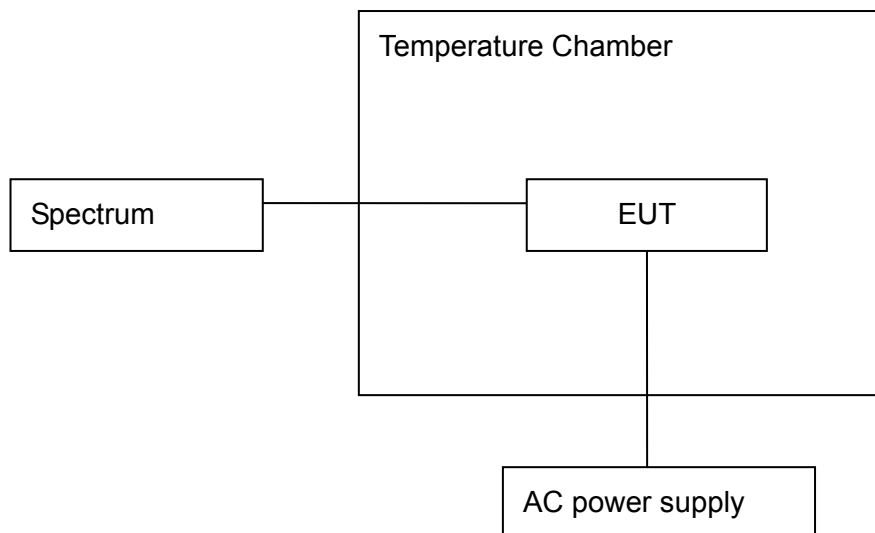
Frequency Range	Maximum Power Limit (e.r.p. (≤ 1 GHz) e.i.r.p. (>1 GHz))
30 MHz ~ 1 GHz	-57 dBm
1 GHz ~ 12.75 GHz	-47 dBm

11.3 Test Procedures

Please refer to ETSI EN 300 328 (V1.8.1) clause 5.3.11.2.

Measurement	
☒ Conducted measurement	☐ Radiated measurement

11.4 Test Configuration



11.5 Test Setup

The measurements were performed at normal test conditions. In case of conducted measurements the transmitter shall be connected to the measuring equipment via a suitable attenuator. Controlling software has been activated to set the EUT on specific status.



11.6 Test Result

Compliance

The final test data are shown on the following page(s).

Test Conditions Bluetooth		Frequency (MHz)	Transmitter unwanted emission in spurious domain (dBm)	Limit (dBm)
T _{nom} (25)°C V _{nom} (3.7)Vac 30 to 1000 MHz	1Mbps (Low)	945.991	-68.54	-57
	1Mbps (High)	943.481	-66.15	-57
	2Mbps (Low)	773.971	-70.31	-57
	2Mbps (High)	746.891	-74.54	-57
	3Mbps (Low)	944.681	-67.11	-57
	3Mbps (High)	943.081	-65.58	-57
T _{nom} (25)°C V _{nom} (3.7)Vac 1 to 12.75 GHz	1Mbps (Low)	1852.5	-49.85	-47
	1Mbps (High)	2151.5	-51.58	-47
	2Mbps (Low)	1857.5	-49.73	-47
	2Mbps (High)	2142.5	-50.52	-47
	3Mbps (Low)	4865.5	-51.41	-47
	3Mbps (High)	4844.5	-53.59	-47

12 RECEIVER BLOCKING

12.1 Test Instruments

Refer to Sec. 1.4 Test Instruments.

12.2 Limit

Adaptive equipment using wide band modulations other than FHSS, shall comply with the requirements defined in clauses 4.3.2.5.1 (non-LBT based DAA) or 4.3.2.5.2 (LBT based DAA) in the presence of a blocking signal with characteristics as provided in table 6.

Table 6: Receiver Blocking parameters

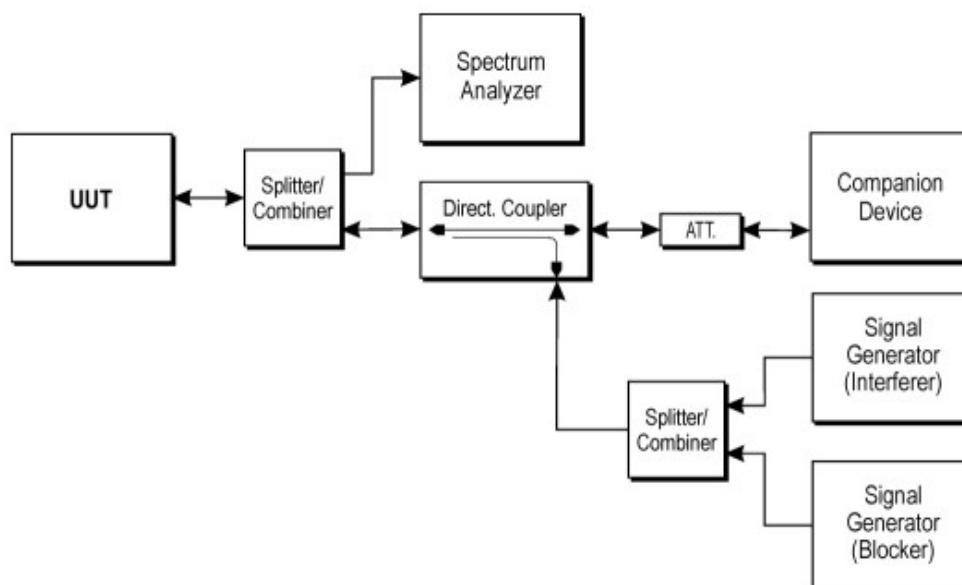
Equipment Type (LBT/ non-LBT)	Wanted signal mean power from companion device	Blocking signal frequency [MHz]	Blocking signal power [dBm]	Type of interfering signal
LBT	Sufficient to maintain the link (see note 2)	2 395 or 2488.5 (see note 1)	-30	CW
Non-LBT	-30 dBm			
Note 1: The highest blocking frequency shall be used for testing the lowest operating channel, while the lowest blocking frequency shall be used for testing the highest operating channel.				
Note 2: A typical value which can be used in most cases is -50 dBm/MHz.				

12.3 Test Procedures

Please refer to ETSI EN 300 328 (V1.8.1) clause 5.3.7.

Measurement	
☒ Conducted measurement	☐ Radiated measurement

12.4 Test Configuration





12.5 Test Setup

The measurements were performed at normal test conditions. In case of conducted measurements the transmitter shall be connected to the measuring equipment via a suitable attenuator. Controlling software has been activated to set the EUT on specific status.

12.6 Test Result

N/A

This requirement does not apply to adaptive equipment unless operating in a non-adaptive mode providing the equipment complies with the requirements and/or restrictions applicable to non-adaptive equipment.

In addition, this requirement does not apply for equipment with a maximum declared RF Output power level of less than 10 dBm E.I.R.P. or for equipment when operating in a mode where the RF Output power is less than 10 dBm E.I.R.P.

13 Photographs of the Tests



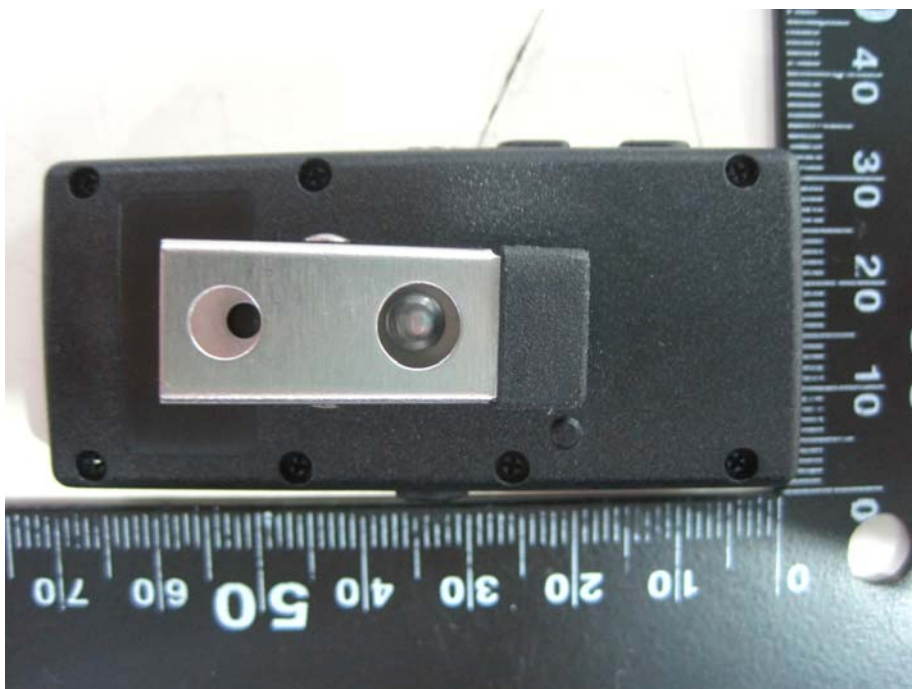
Inside View of Temperature Chamber



14 Photographs of the EUT



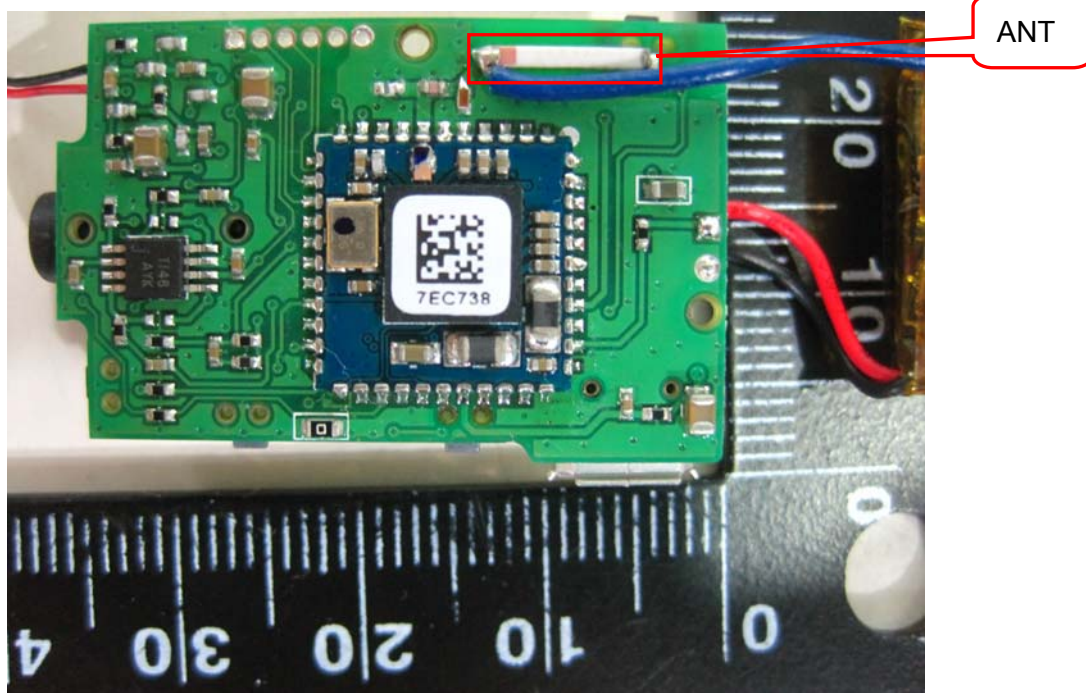
Front View of the EUT



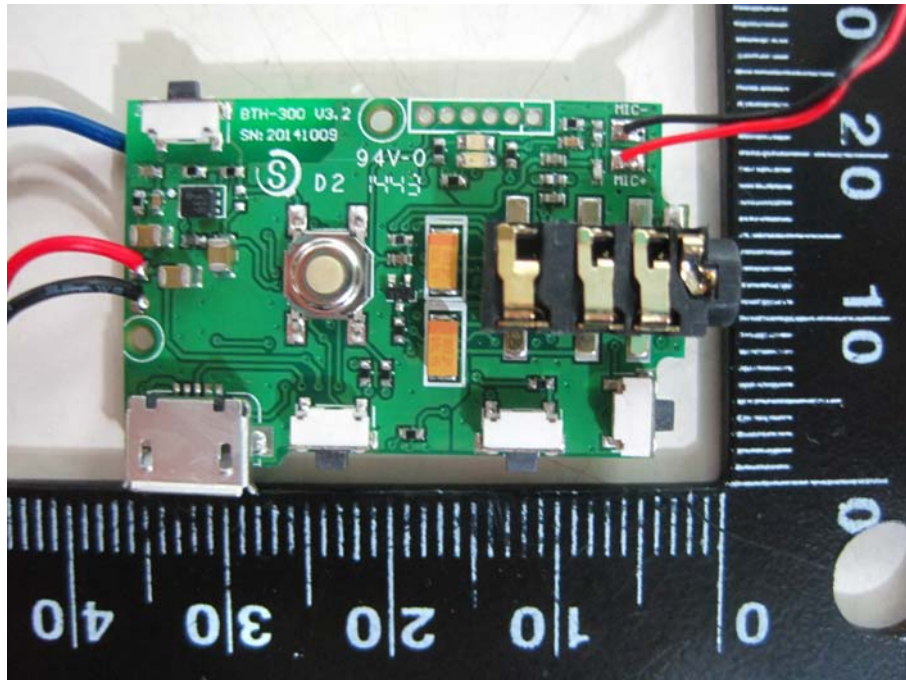
Rear View of the EUT



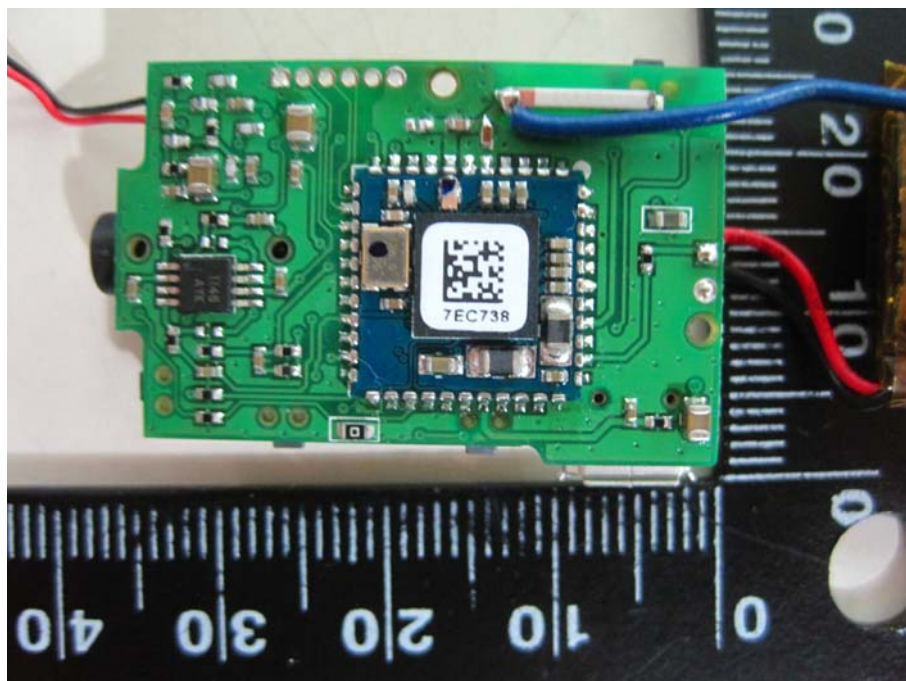
Inside View of the EUT



Closer View of the BT Module



Front View of the PCB1



Rear View of the PCB1



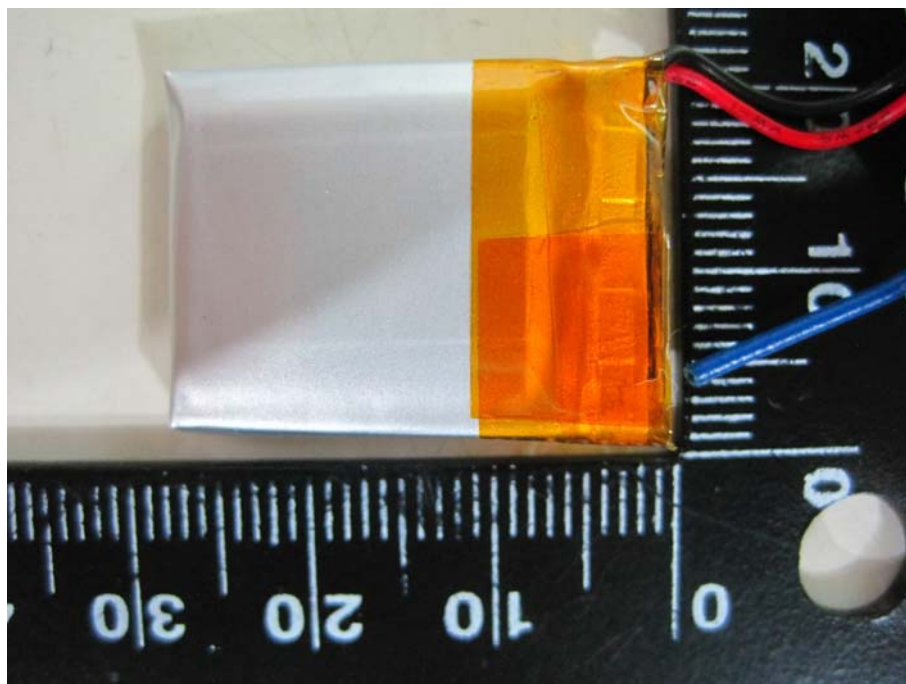
Closer View of the micro USB port



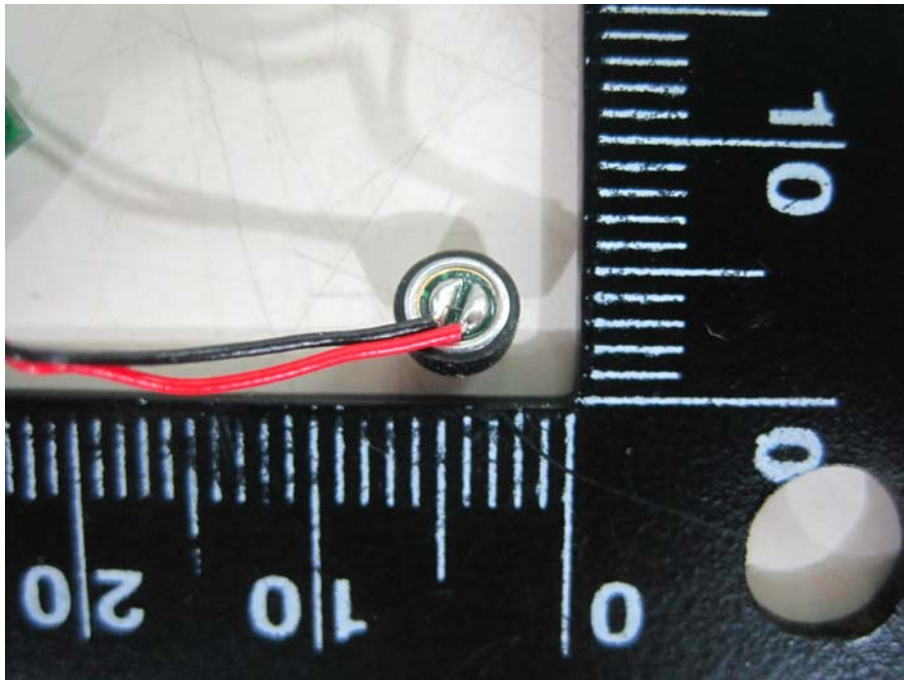
Closer View of the earphone port



Front View of the Battery



Rear View of the Battery



Front View of the microphone



Front view of the earphone



Micro USB cable (provided by the Manufacturer)



Photo of the BT test board