Test eport issued under the responsibility of:

中鉴检测 CCTI TESTING

RADIO TEST REPORT

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

Report reference No ..... :	CCTI-2021111212-1E
Date of issue ..... :	Nov. 23, 2021
Total number of pages..... :	43
Testing Laboratory name..... :	Shenzhen CCTI Technology Co., Ltd.
Address..... :	7th Floor, Block A, Building E, Yongwei Industrial Park, No. 118, Yongfu Road, Qiaotou, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China
Applicant's name ..... :	XonTel Technology Trd. Co. W.L.L.
Address..... :	Office 21 - Justice Tower - Ali Al Salem St. - Qibla - Kuwait City - State Of Kuwait P.O. Box 20065 Safat 13061 KUWAIT

Test specification

Standard..... :	ETSI EN 300 328 V2.2.2 (2019-07)
Test Result ..... :	Pass
Non-standard test method ..... :	N/A

Test Report Form No..... :	--
TRF Originator ..... :	CCTI testing
Master TRF ..... :	Dated 2018-03

This device described above has been tested by CCTI, and the test results show that the equipment under test (EUT) is in compliance with the 2014/53/EU RED Directive Art.3.2 requirements. And it is applicable only to the tested sample identified in the report.

Test item description ..... :	Ceiling speaker
Trademark ..... :	XonTel
Manufacturer's name ..... :	XonTel Technology Trd. Co. W.L.L.
Address..... :	Office 21 - Justice Tower - Ali Al Salem St. - Qibla - Kuwait City - State Of Kuwait P.O. Box 20065 Safat 13061 KUWAIT
Model type reference..... :	XT-20BA XT-20BP
Rating(s) ..... :	Input: 15V d.c. 2A(Supplied by approved adapter)

Testing procedure and testing location:

Testing Laboratory.....:	**Shenzhen CCTI Technology Co., Ltd.**
Address.....:	7th Floor, Block A, Building E, Yongwei Industrial Park, No. 118, Yongfu Road, Qiaotou, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China
Date of Test.....:	Nov. 12, 2021 to Nov. 23, 2021
Tested by (name + signature).....:	Peter Huang
Reviewed by (name + signature).....:	Sendy Wang
Approved by (name + signature).....:	Corey Mao

SHENZHEN CCTI TECHNOLOGY CO., LTD. APPROVED

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1. General Information

1.1. Description of Device (EUT)

EUT Name	:	Ceiling speaker
Model No.	:	XT-20BA
Series No.	:	XT-20BP
Model Difference	:	The product is different for model number and outlook color.
Trademark	:	XonTel
Power supply	:	Input: 15V d.c. 2A(Supplied by approved adapter)
Operation frequency	:	BT: 2402MHz-2480MHz
Modulation	:	BT: GFSK, ∏/4-DQPSK, 8-DPSK
Antenna Type	:	Internal Antenna
Intend use environment	:	Residential, commercial and light industrial environment

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: 79 The minimum number of Hopping Frequencies: 79
The Dwell Time: 386.6ms maximum
The Minimum Channel Occupation Time: 1548.6ms maximum

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: 1548.6ms
□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: ..... μs 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.): 1.43 dBm
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 GFSK
- Power Spectral Density

.....

- Duty cycle, Tx-Sequence, Tx-gap

.....

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

.....

- Adaptivity & Receiver Blocking

.....

- Occupied Channel Bandwidth GFSK
- Transmitter unwanted emissions in the OOB domain GFSK
- Transmitter unwanted emissions in the spurious domain GFSK
- Receiver spurious emissions GFSK

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 1: 2402 MHz to 2480 MHz
- Operating Frequency Range 2: ..... MHz to ..... MHz

NOTE: Add more lines if more Frequency Ranges are supported.

j) Occupied Channel Bandwidth(s):

Occupied Channel Bandwidth 1: 0.871MHz
Occupied Channel Bandwidth 2: 0.889MHz
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 to 55° C

Operating voltage range: 13.5V to 16.5V □AC ■DC

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

■Integral Antenna

Antenna Gain: 0dBi

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 V
■DC State DC voltage : 15V

In case of DC, indicate the type of power source
□Internal Power Supply
■External Power Supply or AC/DC adapter
□Battery: V
□Other: .....

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

The EUT can transmit with test software which named CSR BlueSuite

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

Bluetooth

2. Summary of test

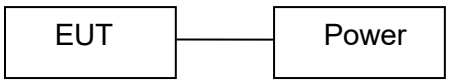
2.1. Test Standard description:

ETSI EN 300 328 V2.2.2 :Electromagnetic compatibility and Radio spectrum Matters (ERM); Wideband transmission systems; Data transmission equipment operating in the 2,4 GHz ISM band and using wide band modulation techniques; Harmonized EN covering the essential requirements of article 3.2 of the RED Directive

2.2. Summary of test result

The following essential requirements and test specifications are relevant to the presumption of conformity under Article 3.2 of the RED Directive			
No	Test Parameter	Clause No	Results
Transmitter Parameters			
1	RF output power	4.3.2.1	PASS
2	Power Spectral Density	4.3.2.2	N/A
3	Duty Cycle, Tx-sequence, Tx-gap	4.3.2.3	N/A
4	Dwell time, Minimum Frequency Occupation & Hopping Sequence	4.3.1.3	PASS
5	Hopping Frequency Separation	4.3.1.4	PASS
6	Medium Utilisation (MU) factor	4.3.2.4	N/A
7	Adaptivity (adaptive equipment using modulations other than FHSS)	4.3.2.5	N/A
8	Occupied Channel Bandwidth	4.3.2.6	PASS
9	Transmitter unwanted emissions in the out-of-band domain	4.3.2.7	PASS
10	Transmitter unwanted emissions in the spurious domain	4.3.2.8	PASS
Receiver Parameters			
11	Receiver spurious emissions	4.3.2.9	PASS
12	Receiver Blocking	4.3.2.10	N/A
Note: N/A is an abbreviation for Not Applicable and means this test item is not applicable for this device according to the technology characteristic of device.			

2.3. Block Diagram of Configuration for test



2.4. Test mode

The special RF test software was used to control EUT work in Continuous Bluetooth TX mode, and select test channel, wireless mode.

Mode	data rate (Mpbs)	Channel	Frequency (MHz)
GFSK	1	Low :CH0	2402
	1	Middle: CH39	2441
	1	High: CH78	2480
∏/4-DQPSK	2	Low :CH0	2402
	2	Middle: CH39	2441
	2	High: CH78	2480
8-DPSK	3	Low :CH0	2402
	3	Middle: CH39	2441
	3	High: CH78	2480

2.5. Test Conditions

	Normal Conditions	Extreme Conditions
Temperature range	15-35℃	-20℃ and 55℃
Humidity range	20-75%	20-75%
Pressure range	86-106kPa	86-106kPa
Power supply	DC 15V	13.5V and 16.5V (declared by the manufacturer.)
Note 1: The test procedure described in clause 5.1.1 of EN300 328 was used for extreme test procedure. ..2: The Extreme Temperature and Extreme Voltages declared by the manufacturer.		

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

Item	MU	Remark
Uncertainty for Conducted Emission Test	2.50dB	
Uncertainty for Radiation Emission test in 3m chamber (30MHz to 1GHz)	3.04 dB	Polarize: V
	3.02dB	Polarize: H
Uncertainty for Radiation Emission test in 3m chamber (1GHz to 25GHz)	3.56dB	Polarize: H
	3.84dB	Polarize: V
Uncertainty for radio frequency	1×10^{-9}	
Uncertainty for conducted RF Power	0.65dB	
Uncertainty for temperature	0.6℃	
Uncertainty for humidity	1%	

2.7. Test Equipment

Equipment	Manufacture	Model No.	Serial No.	Last cal.	Cal Interval
3m Semi-Anechoic	ETS-LINDGREN	N/A	SEL0017	2022.03.11	1Year
Spectrum analyzer	Agilent	E4407B	MY46185649	2022.03.11	1Year
Receiver	R&S	ESCI	1166.5950K03 -1011	2022.03.11	1Year
Receiver	R&S	ESCI	101202	2022.03.11	1Year
Bilog Antenna	Schwarzbeck	VULB 9168	VULB9168-43 8	2022.03.11	1Year
Horn Antenna	EMCO	3115	640201028-06	2022.03.11	1Year
Power Meter	Anritsu	ML2495A	1204003	2022.03.11	1Year
Power Sensor	Anritsu	MA2411B	100309	2022.03.11	1Year
Active Loop Antenna	Beijing Daze	ZN30900A	SEL0097	2022.03.11	1Year
Cable	Resenberger	N/A	No.1	2022.03.11	1Year
Cable	SCHWARZBECK	N/A	No.2	2022.03.11	1Year
Cable	SCHWARZBECK	N/A	No.3	2022.03.11	1Year
Pre-Ceiling speaker	Schwarzbeck	BBV9743	9743-019	2022.03.11	1Year
Pre-Ceiling speaker	R&S	AFS33-1800 2650-30-8P- 44	SEL0080	2022.03.11	1Year
Base station	Agilent	E5515C	GB44300243	2022.03.11	1 Year
Temperature controller	Terchy	MHQ	120	2022.03.11	1Year
Power divider	Anritsu	K240C	020346	2022.03.11	1 Year
Signal Generator	HP	83732B	VS3449051	2022.03.11	1 Year
Attenuator	Agilent	8491B	MY39262165	2022.03.11	1 Year
vector Signal Generator	Agilent	E4438C	MY49070163	2022.03.11	1 Year
splitter	Mini-Circuits	ZAP-50W	NN256400424	2022.03.11	1 Year
Directional Coupler	Agilent	87300C	MY44300299	2022.03.11	1 Year
vector Signal Generator	Agilent	E4438C	US44271917	2022.03.11	1 Year

X-series USB Peak and Average Power Sensor	Agilent	U2021XA	MY54080020	2022.03.11	1 Year
X-series USB Peak and Average Power Sensor	Agilent	U2021XA	MY54110001	2022.03.11	1 Year
X-series USB Peak and Average Power Sensor	Agilent	U2021XA	MY53480008	2022.03.11	1 Year
X-series USB Peak and Average Power Sensor	Agilent	U2021XA	MY54080019	2022.03.11	1 Year
4 Ch.Simultaneous Sampling 14 Bits 2 MS/s	Agilent	U2531A	TW54063507	2022.03.11	1 Year
4 Ch.Simultaneous Sampling 14 Bits 2 MS/s	Agilent	U2531A	TW54063513	2022.03.11	1 Year
splitter	Mini	PS3-7	4463	2022.03.11	1 Year
Signal Analyzer	Agilent	N9010A	MY48030494	2022.03.11	1 Year

3. RF output power

3.1. Limit

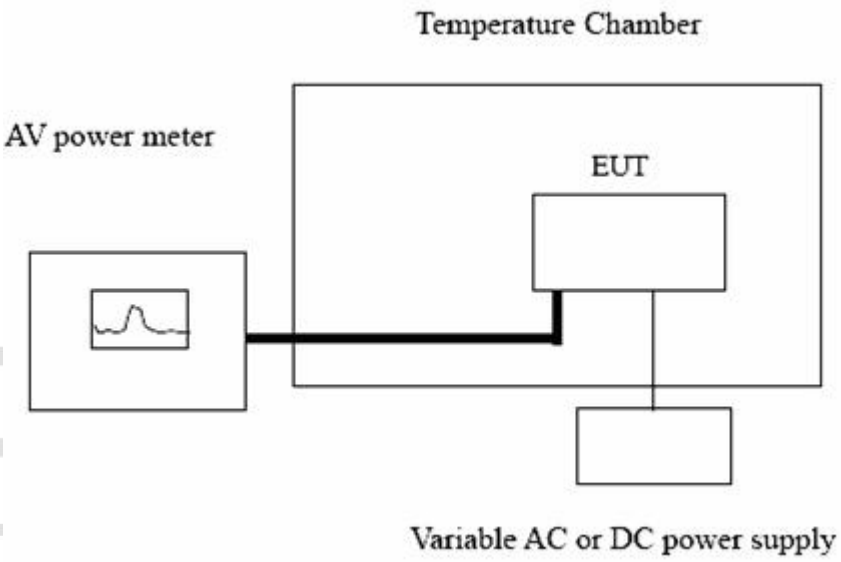
For adaptive equipment using wide band modulations other than FHSS, the maximum RF output power shall be 20 dBm.

The maximum RF output power for non-adaptive equipment shall be declared by the supplier and shall not exceed 20 dBm. See clause 5.3.1 m). For non-adaptive equipment using wide band modulations other than FHSS, the maximum RF output power shall be equal to or less than the value declared by the supplier.

This limit shall apply for any combination of power level and intended antenna assembly.

Limit
20dBm

3.2. Test Setup



3.3. Test Procedure

Refer to ETSI EN 300 328 V2.2.2 (2019-07) Clause 5.3.2.2

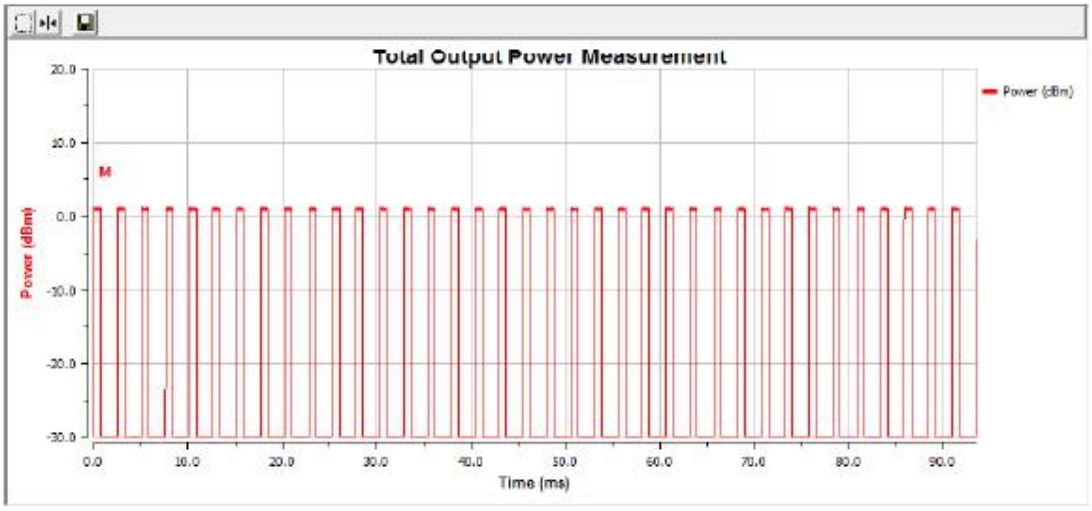
3.4. Test Result

EUT: Ceiling speaker			M/N: XT-20BA	
Test date: Nov. 19, 2021			Test Engineer: Peter Huang	
Test site: RF site				
Temperature：25℃	Humidity: 60 %		Pressure: 100.6 KPa	
Cable loss: 0.6dB	Attenuator loss: 20dB		Antenna Gain: 0dBi	
Sample speed	Sample speed 1 MS/s for power sensor			

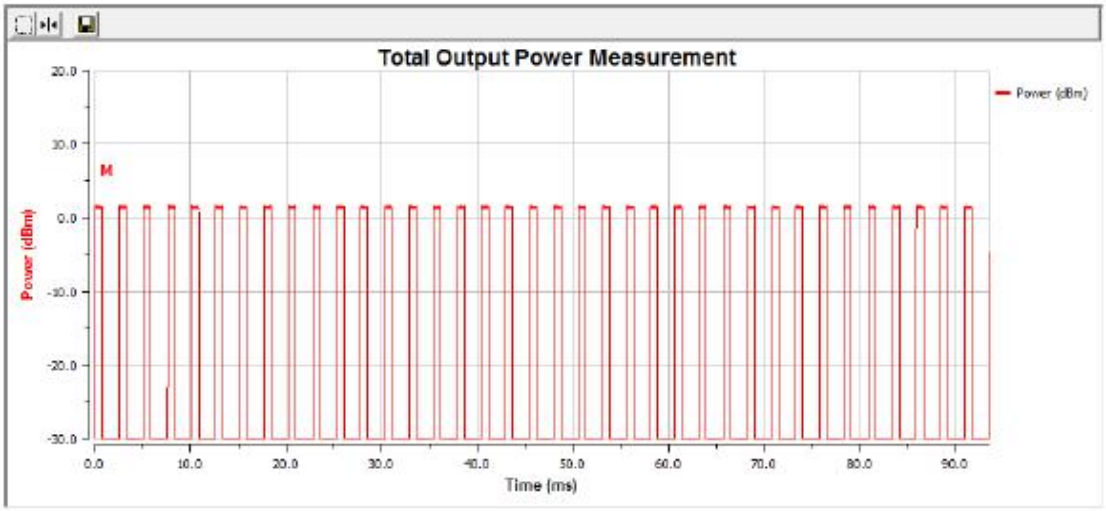
Mode	Condition	CH	Result	Limit
			Total e.i.r.p（dBm）	e.i.r.p (dBm)
GFSK	Normal 25℃/15V	CH0	1.25	20
		CH39	1.29	20
		CH78	1.18	20
	-20℃/13.5V	CH0	1.17	20
		CH39	1.19	20
		CH78	1.18	20
	-20℃/16.5V	CH0	1.16	20
		CH39	1.17	20
		CH78	1.15	20
	55℃/13.5V	CH0	1.16	20
		CH39	1.17	20
		CH78	1.09	20
	55℃/16.5V	CH0	1.04	20
		CH39	1.28	20
		CH78	1.21	20
Conclusion: PASS				

Remark: This Report only show the test plots of the worst case.

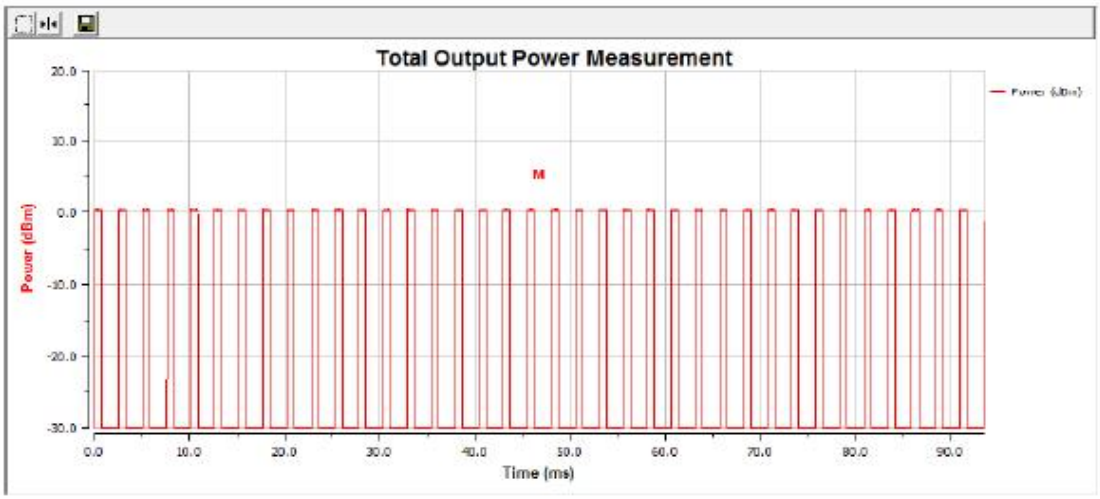
CH Low



CH Middle



CH high

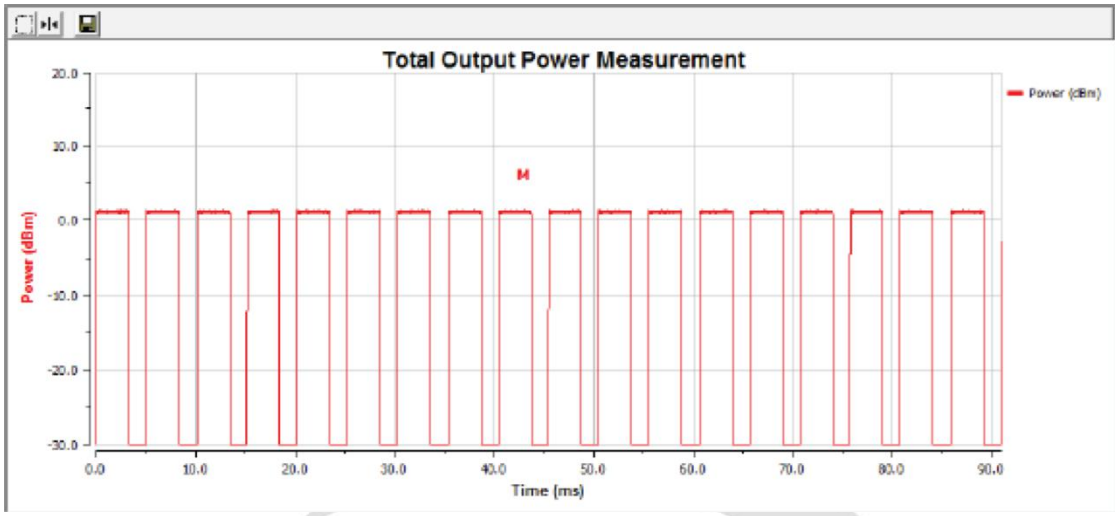


EUT: Ceiling speaker			M/N: XT-20BA	
Test date: Nov. 19, 2021			Test Engineer: Peter Huang	
Test site: RF site				
Temperature：25℃	Humidity: 60 %		Pressure: 100.6 KPa	
Cable loss: 0.6dB	Attenuator loss: 20dB		Antenna Gain: 0dBi	
Sample speed	Sample speed 1 MS/s for power sensor			

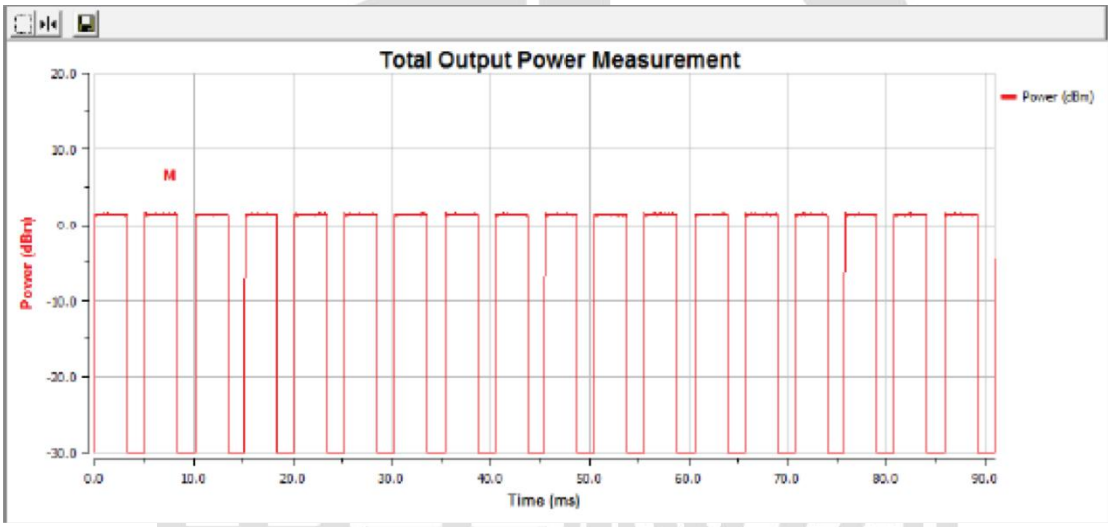
Mode	Condition	CH	Result	Limit
			Total e.i.r.p（dBm）	e.i.r.p (dBm)
∏/4-DQPSK	Normal 25℃/15V	CH0	1.14	20
		CH39	1.09	20
		CH78	1.11	20
	-20℃/13.5V	CH0	1.14	20
		CH39	1.17	20
		CH78	1.08	20
	-20℃/16.5V	CH0	1.21	20
		CH39	1.98	20
		CH78	1.18	20
	55℃/13.5V	CH0	1.39	20
		CH39	1.13	20
		CH78	1.11	20
	55℃/16.5V	CH0	0.95	20
		CH39	0.99	20
		CH78	0.99	20
Conclusion: PASS				

Remark: This Report only show the test plots of the worst case.

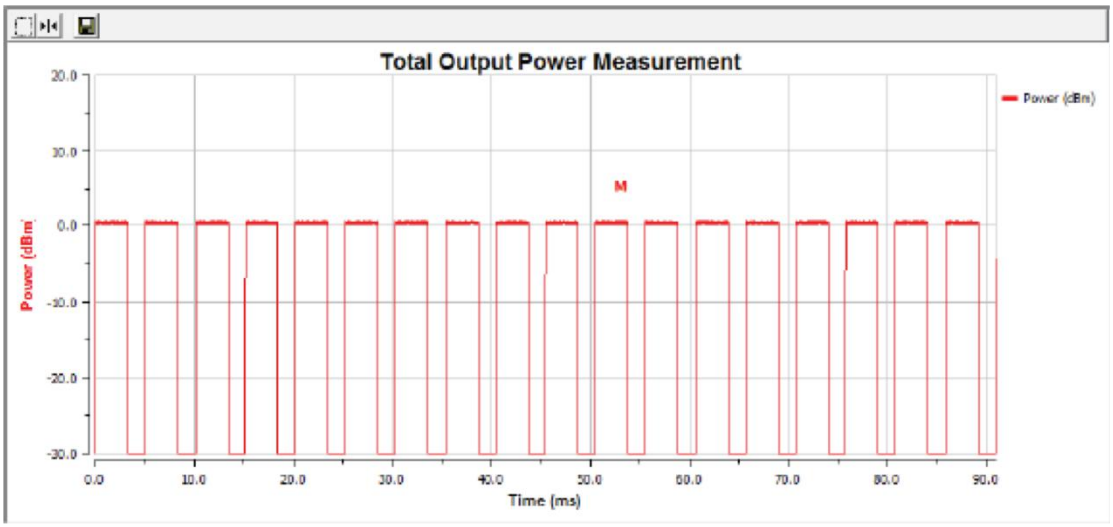
CH Low



CH Middle



CH high

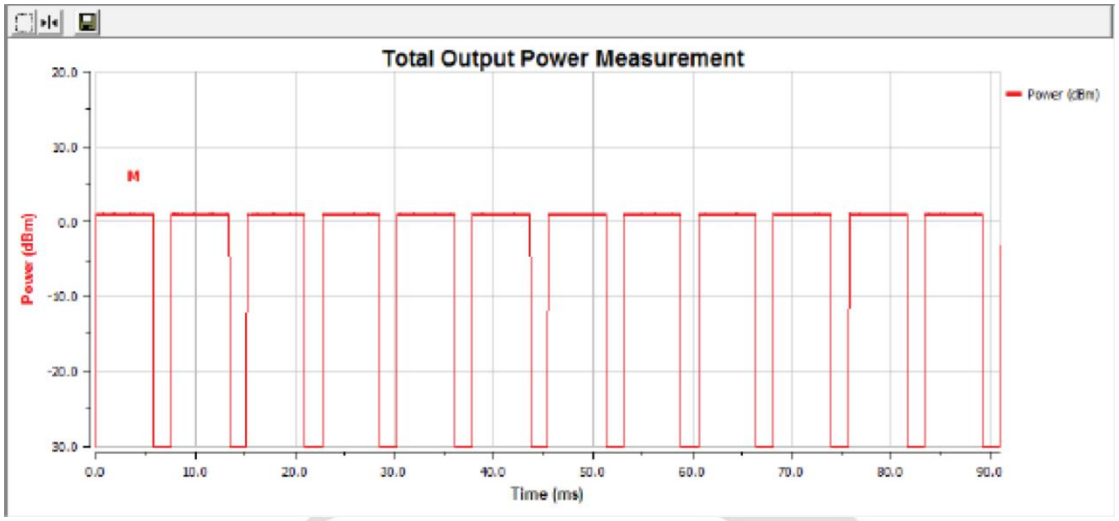


EUT: Ceiling speaker			M/N: XT-20BA	
Test date: Nov. 19, 2021			Test Engineer: Peter Huang	
Test site: RF site				
Temperature：25℃		Humidity: 60 %		Pressure: 100.6 KPa
Cable loss: 0.6dB		Attenuator loss: 20dB		Antenna Gain: 0dBi
Sample speed	Sample speed 1 MS/s for power sensor			

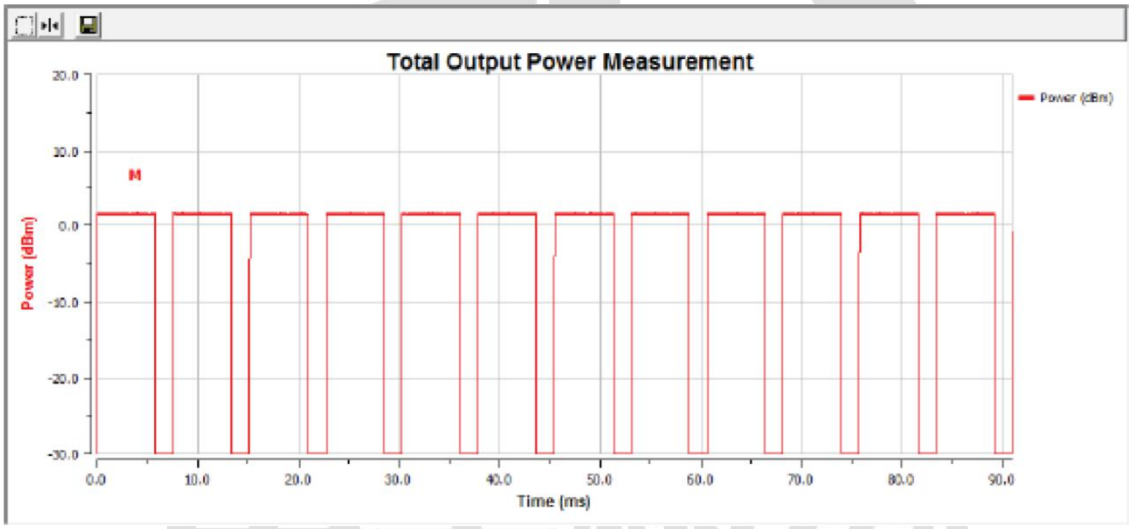
Mode	Condition	CH	Result	Limit
			Total e.i.r.p（dBm）	e.i.r.p (dBm)
8-DPSK	Normal 25℃/15V	CH0	1.15	20
		CH39	1.18	20
		CH78	1.19	20
	-20℃/13.5V	CH0	1.04	20
		CH39	0.98	20
		CH78	1.56	20
	-20℃/16.5V	CH0	1.07	20
		CH39	1.09	20
		CH78	0.99	20
	55℃/13.5V	CH0	0.97	20
		CH39	0.96	20
		CH78	1.05	20
	55℃/16.5V	CH0	0.89	20
		CH39	1.08	20
		CH78	0.99	20
Conclusion: PASS				

Remark: This Report only show the test plots of the worst case.

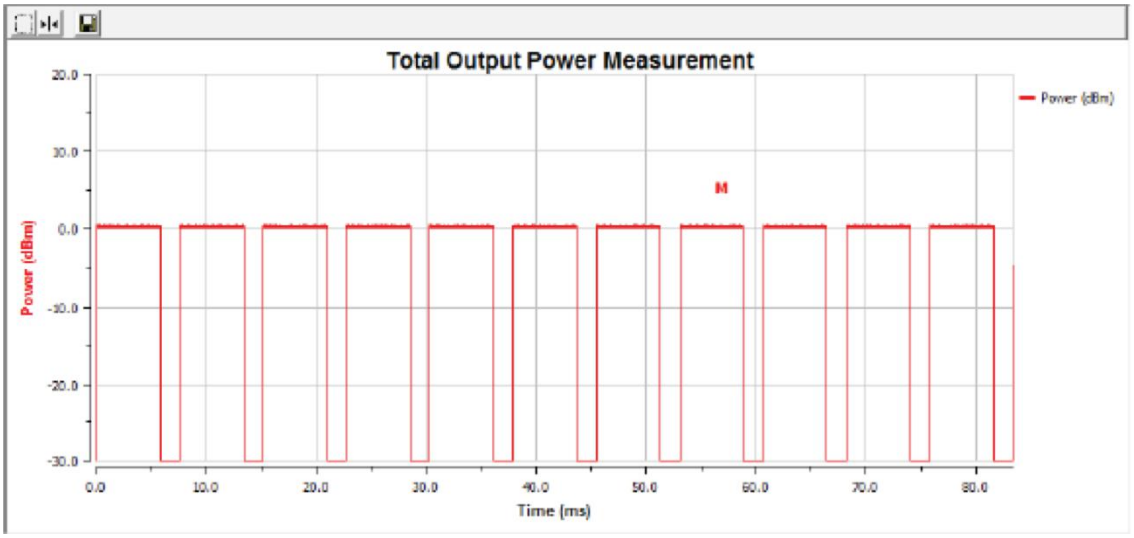
CH Low



CH Middle



CH high



4. Dwell time, Minimum Frequency Occupation and Hopping Sequence

4.1. Limit

For Adaptive frequency hopping systems

Adaptive Frequency Hopping systems shall be capable of operating over a minimum of 70 % of the band specified in clause 1.

The maximum accumulated dwell time on any hopping frequency shall be 400 ms within any period of 400 ms multiplied by the minimum number of hopping frequencies (N) that have to be used.

The hopping sequence(s) shall contain at least N hopping frequencies at all times, where N is 15 or 15 divided by the minimum Hopping Frequency Separation in MHz, whichever is the greater.

The Minimum Frequency Occupation Time shall be 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.

For Non-adaptive frequency hopping systems

The accumulated Dwell Time on any hopping frequency shall not be greater than 15 ms within any period of 15 ms multiplied by the minimum number of hopping frequencies (N) that have to be used.

Non-adaptive medical devices requiring reverse compatibility with other medical devices placed on the market when earlier versions of the present document were harmonised, are allowed to have an operating mode in which the maximum dwell time is 400 ms.

The hopping sequence(s) shall contain at least N hopping frequencies where N is 15 or 15 divided by the minimum

Hopping Frequency Separation in MHz, whichever is the greater. The Minimum Frequency Occupation Time shall be 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.

4.2. Test Setup

4.3. Test Procedure

Refer to ETSI EN 300 328 V2.2.2 (2019-07) Clause 5.3.4

Centre Frequency	Equal to the hopping frequency being investigated
Frequency Span	0 Hz
RBW	~ 50% of the Occupied Channel
VBW	≥RBW(500KHz)
Detector	RMS
Sweep points	30000
Trace	Clear/Write
Trigger	Free Run

4.4. Test Result

Hopping channel

EUT: Ceiling speaker		M/N: XT-20BA	
Test Date: Nov. 19, 2021	Test site: RF site		Tested by: Peter Huang
Mode	Number of hopping channel	Limit	Conclusion
GFSK	79	>15	PASS
∏/4-DQPSK	79	>15	PASS
8-DPSK	79	>15	PASS

Dwell time

EUT: Ceiling speaker		M/N: XT-20BA			
Test Date: Nov. 19, 2021		Test site: RF site		Tested by: Peter Huang	
Mode	Channel	Pulse time (ms)	Dwell time(ms)	Limit	Conclusion
DH1	Low	0.38	118.4	<400ms	PASS
	Mid	0.38	118.4		
	High	0.38	118.4		
DH3	Low	1.63	260.8		
	Mid	1.63	260.8		
	High	1.63	260.8		
DH5	Low	2.87	306.13		
	Mid	2.87	306.13		
	High	2.87	306.13		
Note: DH1=1600/(79*(DH))*79*0.4* Pulse time .(DH1=2, DH3=4, DH5=6)					

Mini Frequency Occupation Time

EUT: Ceiling speaker		M/N: XT-20BA		
Test Date: Nov. 19, 2021	Test site: RF site			Tested by: Peter Huang
Mode	Channel	Dwell time(ms)	Mini frequency occupation Time(ms)	Conclusion
DH1	Low/Mid/High	118.40	473.60	PASS
DH3	Low/Mid/High	260.80	1043.20	
DH5	Low/Mid/High	306.13	1224.53	
Remark: Mini frequency occupation Time(ms)=4*Dwell time(ms)				

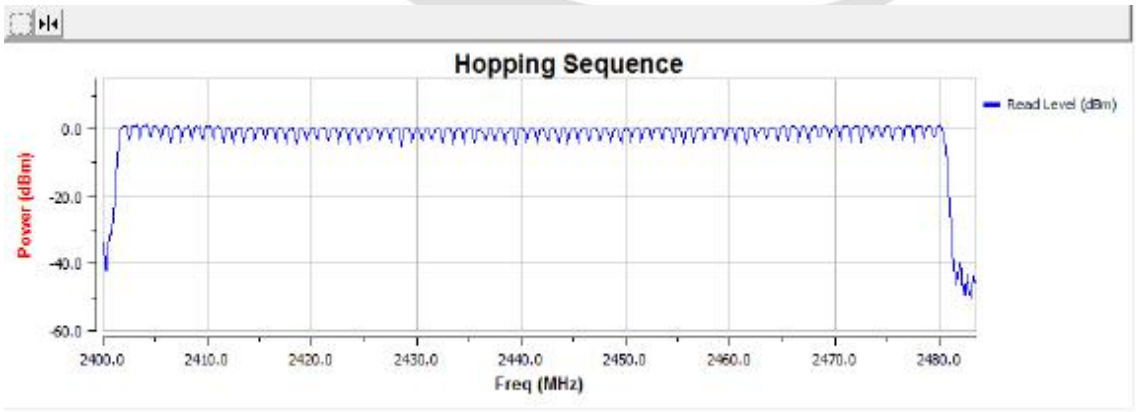
Operating hopping Bandwidth:

EUT: Ceiling speaker		M/N: XT-20BA	
Test date: Nov. 19, 2021	Test site: RF site	Tested by: Peter Huang	
Mode	Bandwidth (MHz)	Limit(MHz)	Conclusion
GFSK	81.08	58.45	PASS

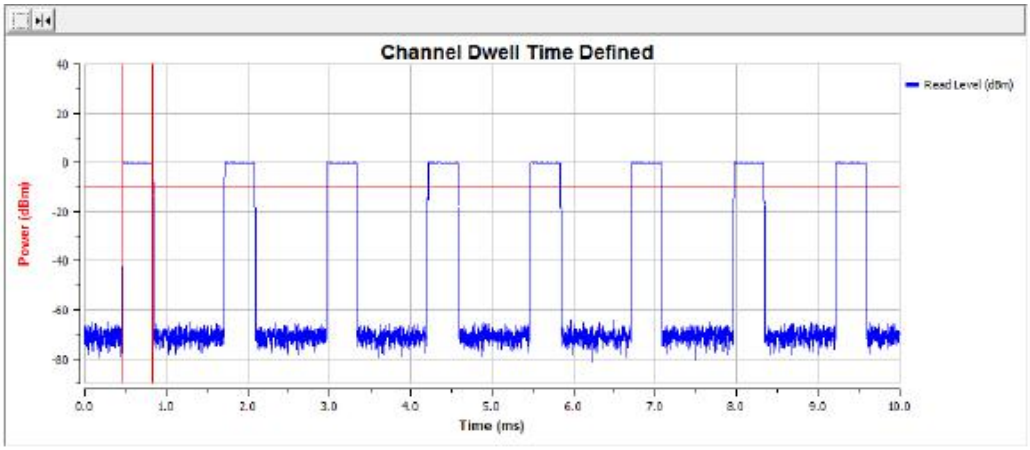
Hopping sequence

EUT: Ceiling speaker		M/N: XT-20BA	
Test date: Nov. 19, 2021	Test site: RF site	Tested by: Peter Huang	
Mode	Hopping Sequence(%)	Limit	Conclusion
GFSK	97.10%	>70%	PASS
Note: 1. For adaptive systems, using the lowest and highest -20 dB points from the total spectrum envelope, it shall be verified whether the system uses 70 % of the band specified. 2. Hopping Sequence(%) = (20dB BW/83.5)*100			

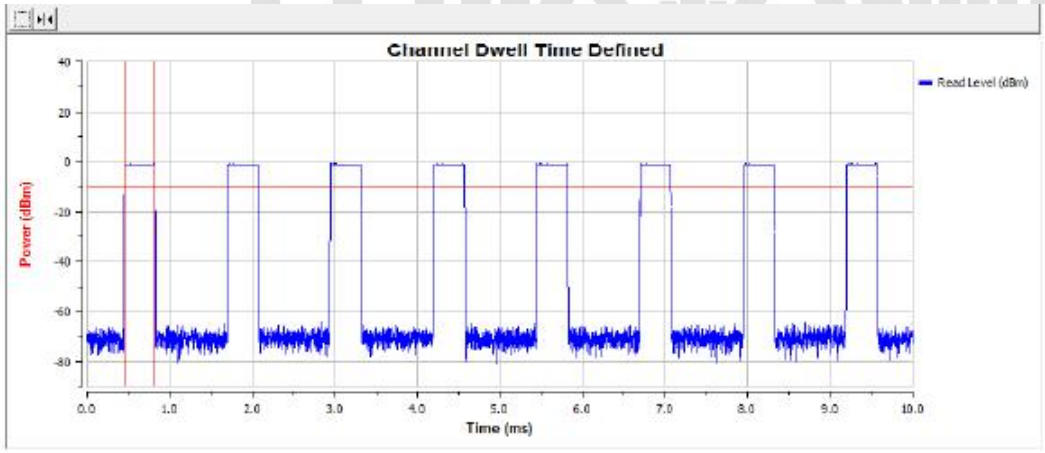
Hopping Number	**79**



1*GFSK(1M) DH1:CH Low-2402:	
Pulse Time (ms)	0.38
Dwell Time (ms)	118.40
Minimum Frequency Occupation (ms)	473.60

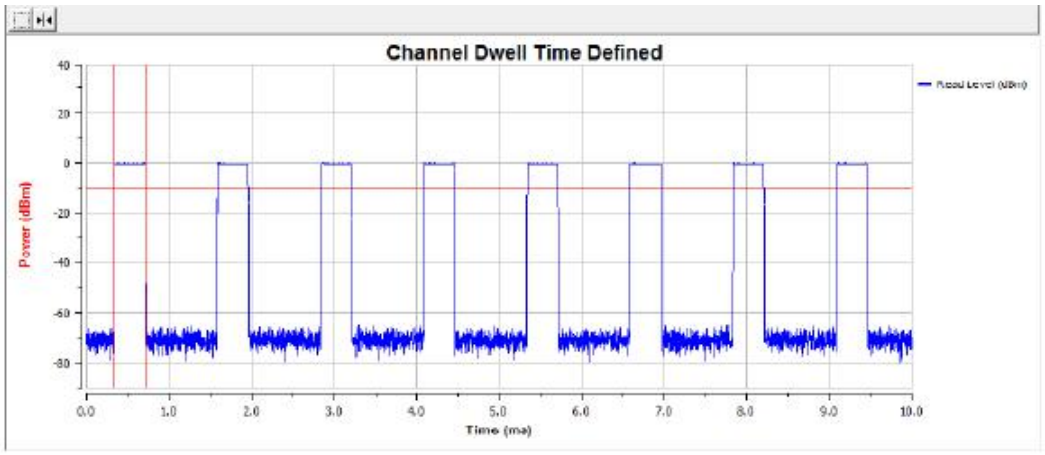


2*GFSK(1M) DH1:CH Mid-2441:	
Pulse Time (ms)	0.38
Dwell Time (ms)	118.40
Minimum Frequency Occupation (ms)	473.60

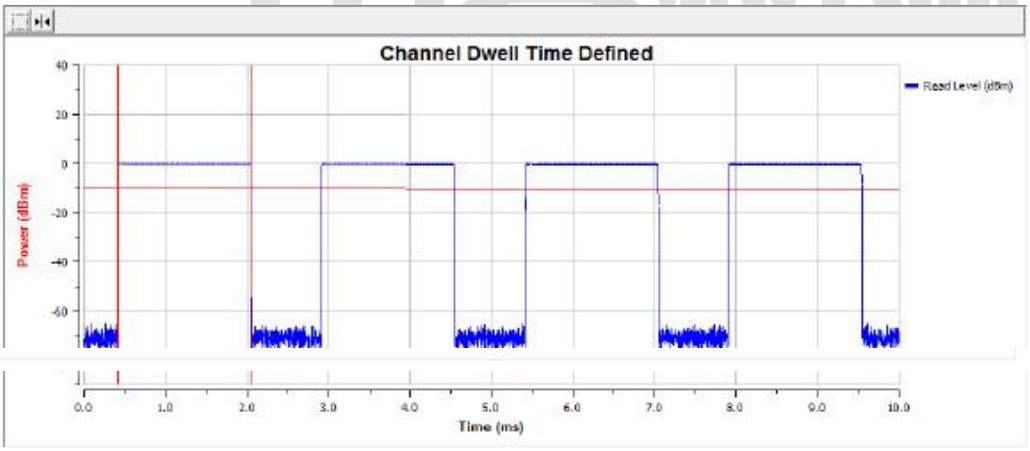


3*GFSK(1M) DH1:CH High-2480

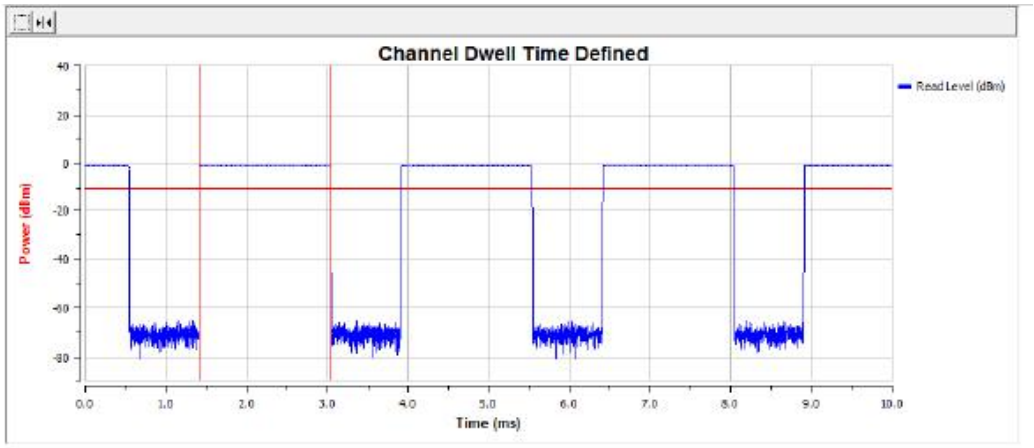
Pulse Time (ms)	0.38
Dwell Time (ms)	118.40
Minimum Frequency Occupation (ms)	473.60



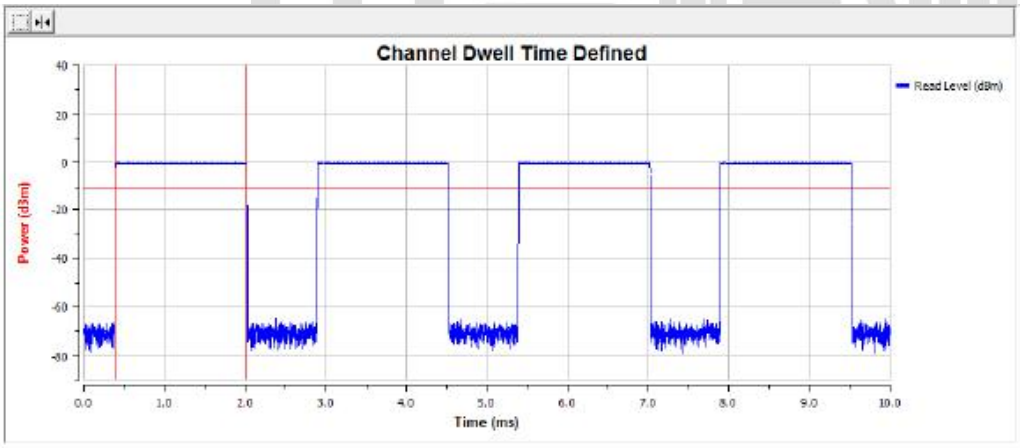
4*GFSK(1M) DH3:CH Low-2402:	
Pulse Time (ms)	1.63
Dwell Time (ms)	260.80
Minimum Frequency Occupation (ms)	1043.20



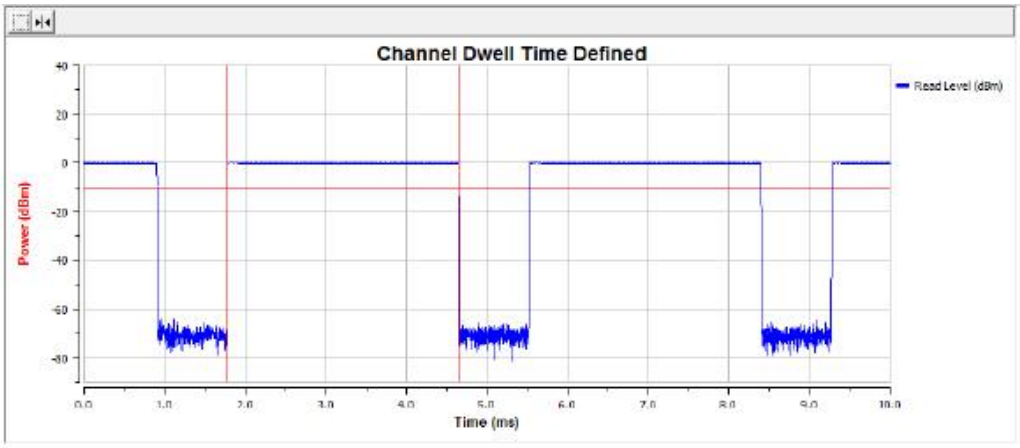
5*GFSK(1M) DH3:CH Mid-2441:	
Pulse Time (ms)	1.63
Dwell Time (ms)	260.80
Minimum Frequency Occupation (ms)	1043.20



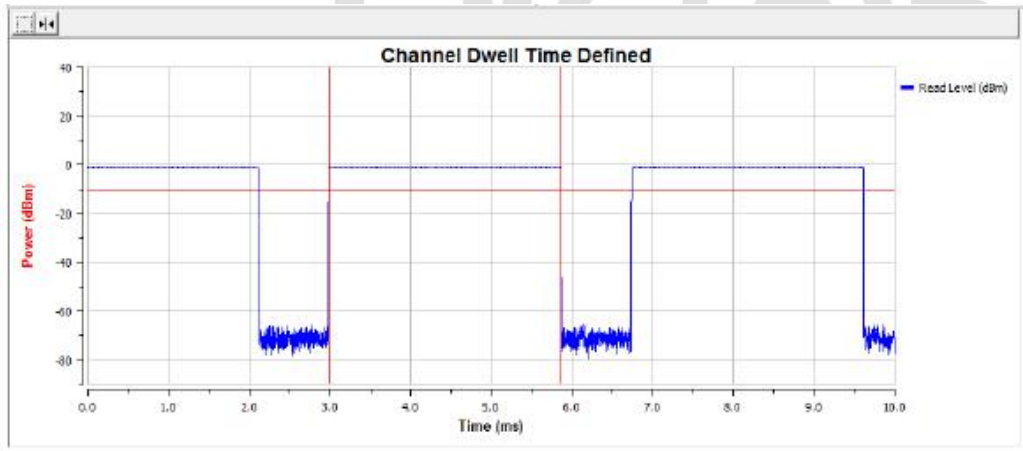
6*GFSK(1M) DH3:CH High-2480:	
Pulse Time (ms)	1.63
Dwell Time (ms)	260.80
Minimum Frequency Occupation (ms)	1043.20



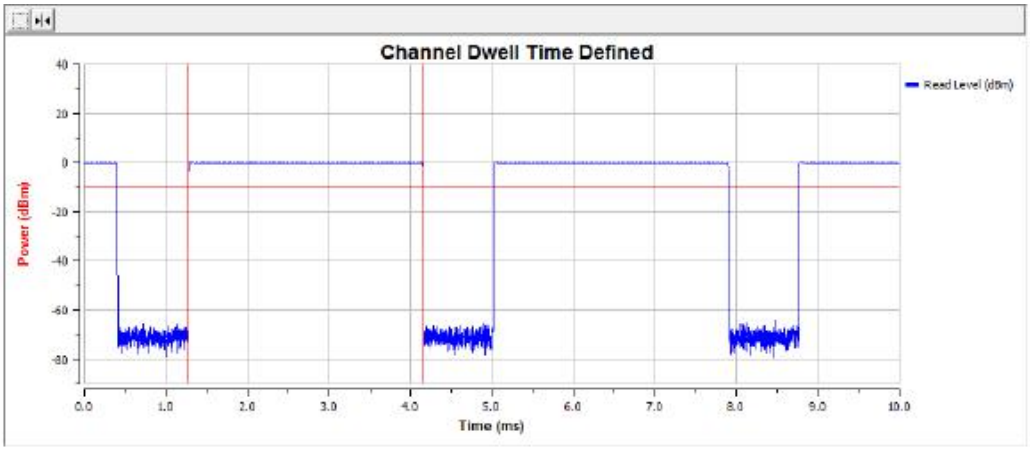
7*GFSK(1M) DH5:CH Low-2402:	
Pulse Time (ms)	2.87
Dwell Time (ms)	306.13
Minimum Frequency Occupation (ms)	1224.53



8*GFSK(1M) DH5:CH Mid-2441:	
Pulse Time (ms)	2.87
Dwell Time (ms)	306.13
Minimum Frequency Occupation (ms)	1224.53



9*GFSK(1M) DH5:CH High-2480:	
Pluse Time (ms)	2.87
Dwell Time (ms)	306.13
Minimum Frequency Occupation (ms)	1224.53



5. Hopping Frequency Separation

5.1. Limit

For Non-adaptive frequency hopping systems

The minimum Hopping Frequency Separation shall be equal to Occupied Channel Bandwidth (see clause 4.3.1.7) of a single hop, with a minimum separation of 100 kHz.

For Adaptive frequency hopping systems

The minimum Hopping Frequency Separation shall be 100 kHz.

5.2. Test setup

5.3. Test Procedure

Refer to ETSI EN 300 328 V2.2.2 (2019-07) Clause 5.3.5

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

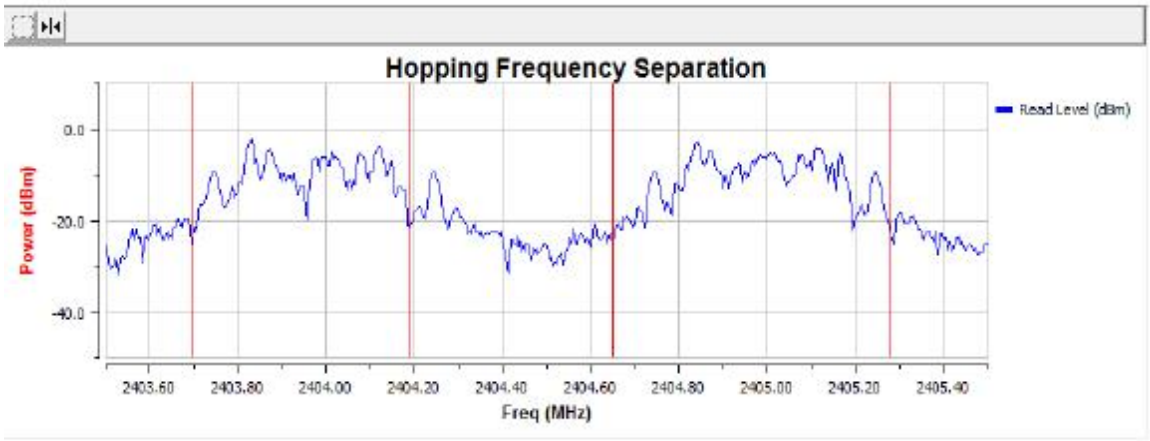
Centre Frequency	Centre of the two adjacent hopping frequencies
Frequency Span	Sufficient to see the complete power envelope of both hopping frequencies
RBW	1 % of the Span
VBW	3 × RBW (20KHz)
Detector	RMS(62(KHz)
Trace	Max hold
Sweep time	Auto

5.4. Test Result

EUT: Ceiling speaker		M/N: XT-20BA		
Test date: Nov. 19, 2021		Test site: RF site	Tested by: Peter Huang	
Mode		Result (MHz)	Limit (MHz)	Conclusion
GFSK	DH1	1.01	0.1	PASS
	DH3	0.98	0.1	
	DH5	1.13	0.1	

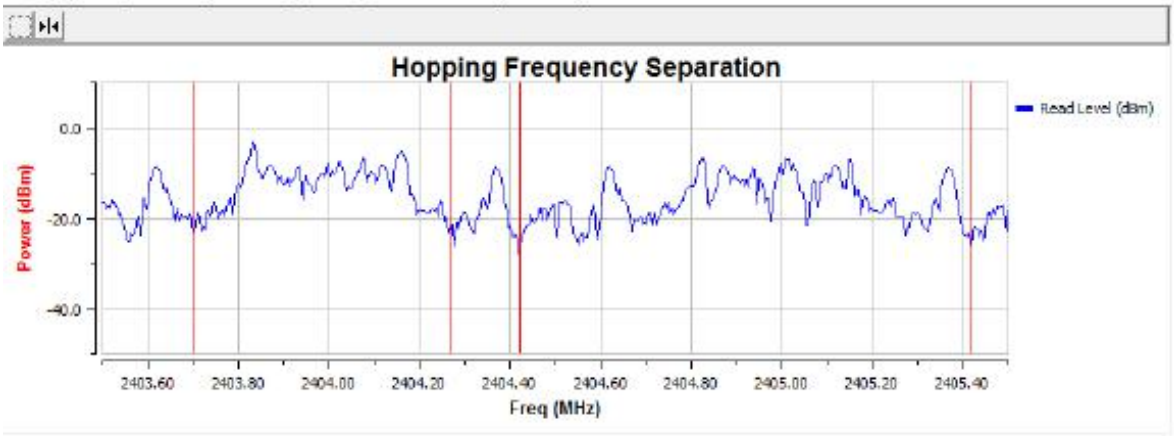
DH1

Hopping Frequency Separation (MHz) 1.01



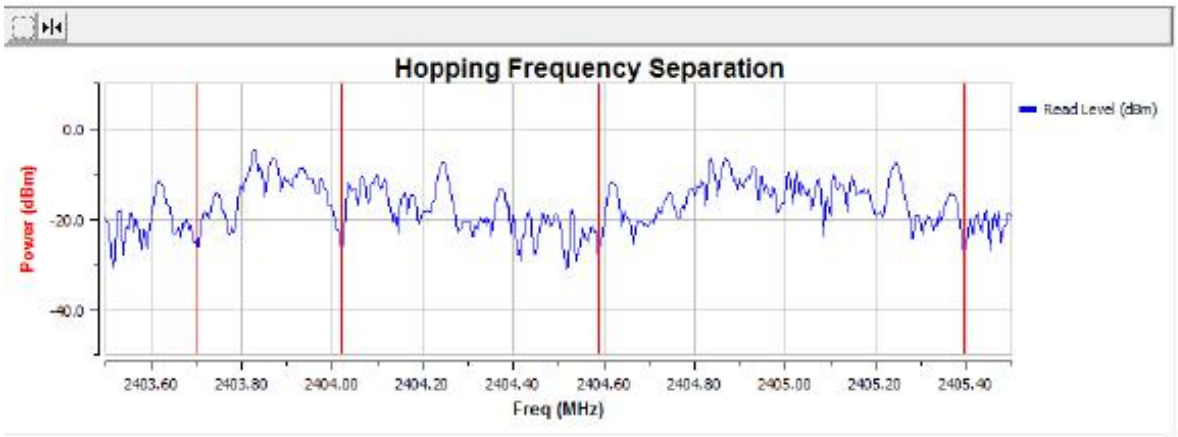
DH3

Hopping Frequency Separation (MHz) 0.98



DH5

Hopping Frequency Separation (MHz) 1.13



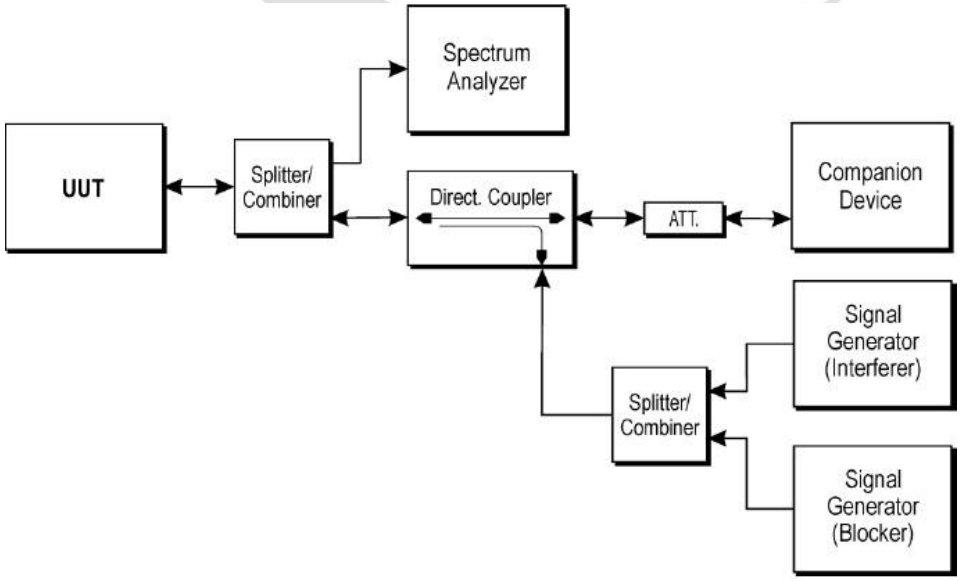
6. Adaptivity

6.1. Limit

The frequency range of the equipment is determined by the lowest and highest

Non-LBT based Detect and Avoid: 1 The frequency shall remain unavailable for a minimum time equal to 1 second after which the channel maybe considered again as an 'available' channel; 2 COT ≤ 40 ms; 3 Idle Period = 5% of COT; 4 Detection threshold level = -70dBm/MHz + 20 – Pout E.I.R.P (Pout in dBm);
LBT based Detect and Avoid (Frame Based Equipment): 1 Minimum Clear Channel Assessment (CCA) time = 20 us; 2 CCA observation time declared by the supplier; 3 COT = 1~10 ms; 4 Idle Period = 5% of COT; 5 Detection threshold level = -70dBm/MHz + 20 – Pout E.I.R.P (Pout in dBm);
LBT based Detect and Avoid (Load Based Equipment): 1 Minimum Clear Channel Assessment (CCA) time = 20 us; 2 CCA declared by the manufacturer; 3 COT ≤ (13 / 32) * q ms; q = [4~32]; 1.625ms~13ms; 4 Detection threshold level = -73dBm/MHz + 20 – Pout 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.

6.2. Test Setup



6.3. Test Procedure

Refer to ETSI EN 300 328 V2.2.2 (2019-07) Clause 5.3.7.

6.4. Test Result

Not applicable

Note : The maximum ouput power of EUT less than 10dBm, so not applicable.

7. Occupied Channel Bandwidth

7.1. Limit

The Occupied Channel Bandwidth shall fall completely within the band given in 2.4GHz to 2.4835GHz.

In addition, for non-adaptive systems 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.

7.2. Test Setup

7.3. Test Procedure

Refer to ETSI EN 300 328 V2.2.2 (2019-07) Clause 5.3.8.

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

Centre Frequency	The centre frequency of the channel Under test
Frequency Span	2 × Occupied Channel Bandwidth (e.g. 2MHzfora BT)
RBW	~1%ofthespanwithoutgoingbelow 1%(20KHz)
VBW	3×RBW (62KHz)
Detector	RMS
Trace	Max hold
Centre Frequency	The centre frequency of the channel Under test

7.4. Test Result

EUT: Ceiling speaker		M/N: XT-20BA		
Test site: RF site		Test date: Nov. 19, 2021		Tested by: Peter Huang
Frequency Rang				
Test mode		CH	Result	Limit
			MHz	MHz
GFSK	DH1	CH0	2401.60	>2400.0
		CH78	2480.40	<2483.5
8-DPSK	DH3	CH0	2401.48	>2400.0
		CH78	2480.52	<2483.5
Test Result: PASS.				

EUT: Ceiling speaker	M/N: XT-20BA	
Test site: RF site	Test date: Nov. 19, 2021	Tested by: Peter Huang
Occupied Bandwidth		
Test mode	Occupied Bandwidth (MHz)	
	Lowest frequency	Highest frequency
GFSK	0.802	0.814
8-DPSK	1.0388	1.0439
Test Result: PASS.		

GFSK

CH Low

CH High

8-DPSK

Ch Low

Ch High

8. Transmitter unwanted emissions in the out-of-band domain

8.1. 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 3.

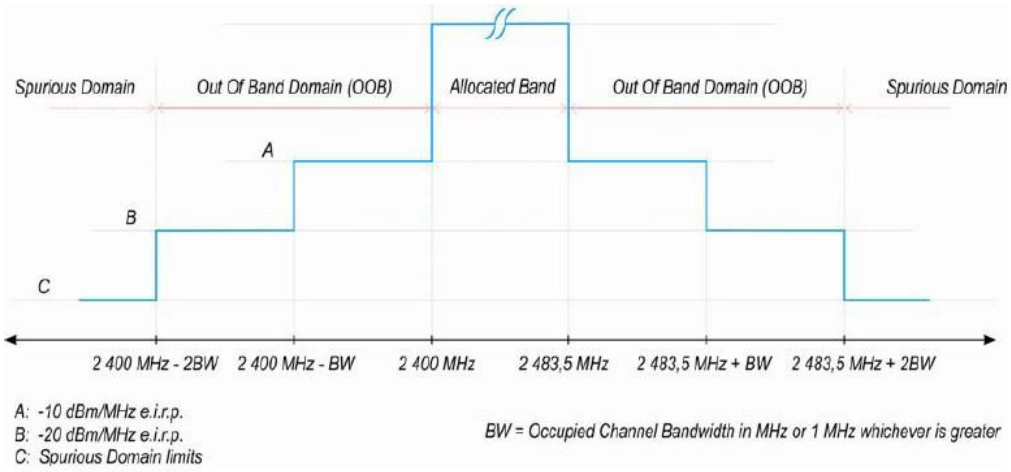
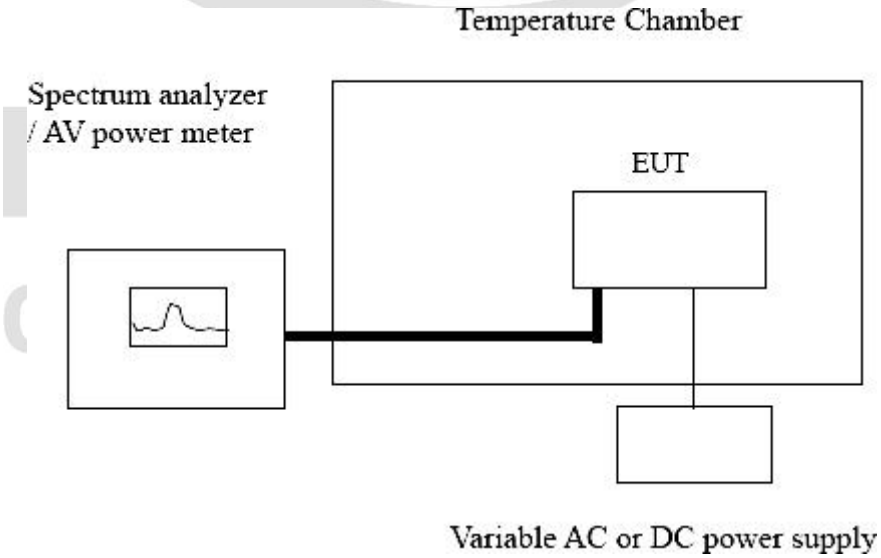


Figure 3: Transmit mask

8.2. Test Setup



8.3. Test Procedure

Refer to ETSI EN 300 328 V2.2.2 (2019-07) Clause 5.3.9.

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

RBW/VBW	1MHz/3MHz
Span	0Hz
Filter mode	Channel filter
Sweep mode	Continuous
Sweep Points	5000
Detector	RMS
Trace mode	Clear/Write
Trigger Mode	Video trigger

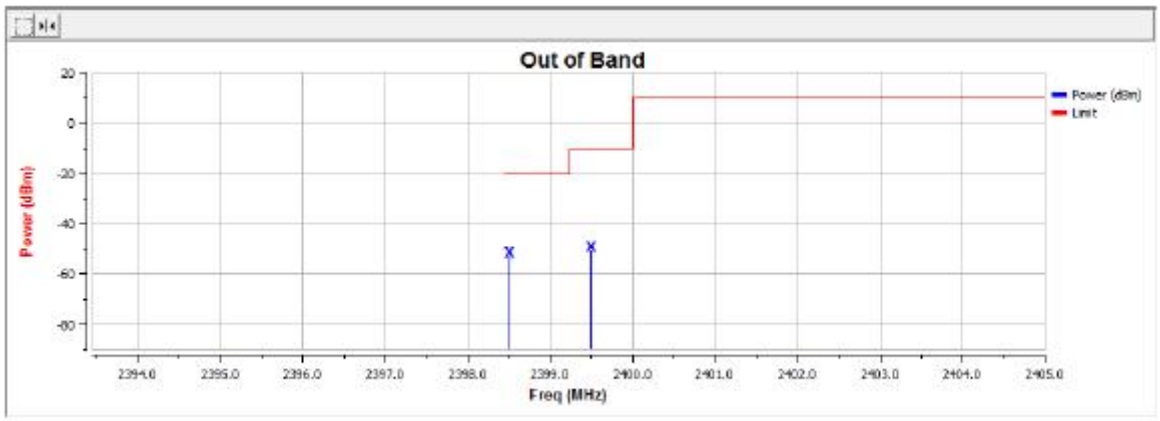
8.4. Test Result

GFSK Hopping mode:

Test Condition			Lower Band Edge		Higher Band Edge	
Test Mode	Temp	Voltage	Segment A (dBm/MHz)	Segment B (dBm/MHz)	Segment A (dBm/MHz)	Segment B (dBm/MHz)
GFSK	Normal	Normal	-50.52	-53.63	-58.62	-60.31
	55℃	3.15	-51.40	-54.94	-58.16	-59.42
	55℃	4.2	-51.57	-54.70	-58.62	-59.67
	-25℃	3.15	-51.12	-54.36	-57.80	-60.01
	-25℃	4.2	-51.41	-54.16	-57.67	-60.08
Limit			-10	-20	-10	-20
Conclusion			PASS			
Remark: All modulations of EUT have been tested, but only show the test data of the worst case in this report.						

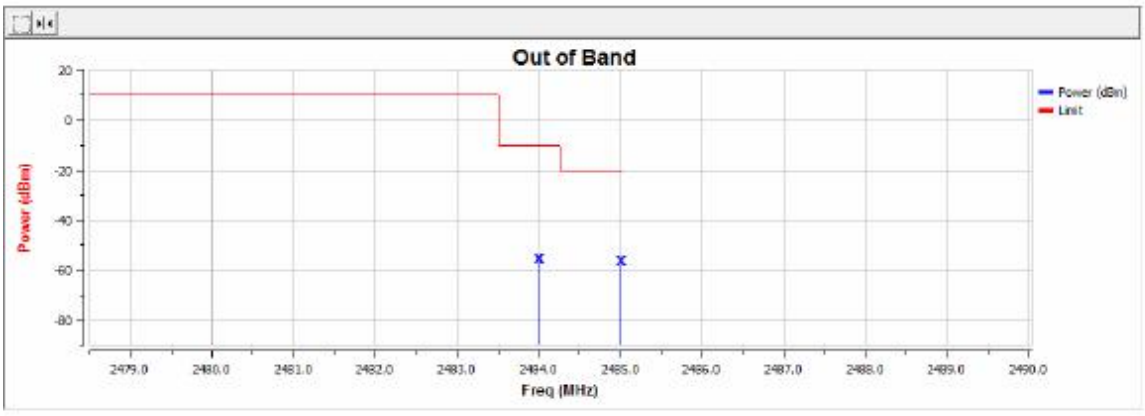
CH Low (Normal Temp)

Channel	Antenna	Frequency	Level	Limit
CH Low-2402	Antenna 1	2399.5	-50.52	-10
CH Low-2402	Antenna 1	2398.5	-53.63	-20



CH High (Normal Temp)

Channel	Antenna	Frequency	Level	Limit
CH Low-2480	Antenna 1	2484	-58.62	-10
CH Low-2480	Antenna 1	2485	-60.31	-20



9. Transmitter unwanted emissions in the spurious domain

9.1. Limit

The transmitter unwanted emissions in the spurious domain shall not exceed the values given in table 4.

Table 4: Transmitter limits for spurious emissions

Frequency range	Maximum power, e.r.p. (≤ 1 GHz) e.i.r.p. (> 1 GHz)	Bandwidth
30 MHz to 47 MHz	-36 dBm	100 kHz
47 MHz to 74 MHz	-54 dBm	100 kHz
74 MHz to 87,5 MHz	-36 dBm	100 kHz
87,5 MHz to 118 MHz	-54 dBm	100 kHz
118 MHz to 174 MHz	-36 dBm	100 kHz
174 MHz to 230 MHz	-54 dBm	100 kHz
230 MHz to 470 MHz	-36 dBm	100 kHz
470 MHz to 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

9.2. Test Procedure

Refer to ETSI EN 300 328 V2.2.2 (2019-07) Clause 5.3.10.

9.3. Test Result

Spurious emissions							
EUT: Ceiling speaker			M/N: XT-20BA				
Power: DC15V From Adapter Input AC 230V/50Hz							
Test Date: Nov. 19, 2021		Test site: RF Site			Tested by: Peter Huang		
Ambient Temperature: 25℃		Relative Humidity: 65%					
Test Mode: Tx in CH0 2400MHz, GFSK							
Frequency (MHz)	Ant H / V	EUT Axis (X/Y/Z)	TX/RX	Measured (FS) (dBm)	Limits (dBm)	Margins	Note
53.59	H	X	TX	-65.73	-54.00	-11.73	
92.63	H	X	TX	-63.43	-54.00	-9.43	
218.59	H	X	TX	-64.22	-54.00	-10.22	
528.49	H	X	TX	-65.35	-54.00	-11.35	
4804.000	V	X	TX	-42.41	-30.00	-12.41	
7206.000	V	X	TX	-40.28	-30.00	-10.28	
65.41	V	X	TX	-66.13	-54.00	-12.13	
103.39	V	X	TX	-64.32	-54.00	-10.32	
224.43	V	X	TX	-65.77	-54.00	-11.77	
563.15	V	X	TX	-64.69	-54.00	-10.69	
4804.000	V	X	TX	-43.43	-30.00	-13.43	
7206.000	V	X	TX	-41.19	-30.00	-11.19	

Test Mode: Tx in CH0 2483MHz, GFSK							
Frequency (MHz)	Ant H / V	EUT Axis (X/Y/Z)	TX/RX	Measured (FS) (dBm)	Limits (dBm)	Margins	Note
53.59	H	X	TX	-65.68	-54.00	-11.68	
92.63	H	X	TX	-63.53	-54.00	-9.53	
218.59	H	X	TX	-64.39	-54.00	-10.39	
528.49	H	X	TX	-65.42	-54.00	-11.42	
4960.000	V	X	TX	-43.47	-30.00	-13.47	
7440.000	V	X	TX	-41.17	-30.00	-11.17	
65.41	V	X	TX	-66.74	-54.00	-12.74	
103.39	V	X	TX	-64.58	-54.00	-10.58	
224.43	V	X	TX	-65.63	-54.00	-11.63	
563.15	V	X	TX	-64.27	-54.00	-10.24	
4960.000	V	X	TX	-43.64	-30.00	-13.64	
7440.000	V	X	TX	-40.32	-30.00	-10.32	

10 . Receiver Spurious emissions

10.1 Limit

The spurious emissions of the receiver shall not exceed the values given in table 5.

Table 5: Spurious emission limits for receivers

Frequency Range	Limit
30MHz to 1GHz	-57dBm
1GHz to 12.75GHz	-47dBm

10.2 Test Procedure

Refer to ETSI EN 300 328 V2.2.2 (2019-07) Clause 5.3.11.

10.3 Test Result

Spurious emissions							
EUT: Ceiling speaker			M/N: XT-20BA				
Power: DC15V From Adapter Input AC 230V/50Hz							
Test Date: Nov. 19, 2021		Test site: RF Site		Tested by: Peter Huang			
Ambient Temperature: 25℃		Relative Humidity: 65%					
Test Mode: Rx in CH0 2400MHz							
Frequency (MHz)	Antenna polarization	SG level (dBm)	Cable loss (dB)	Antenna Gain(dBi)	Result (dBm)	Limit (dBm)	Margin (dB)
163.40	H	-70.40	1.70	2.9	-71.35	-57	14.35
435.41	H	-75.270	2.66	7.5	-72.58	-57	15.58
2026.00	H	-61.02	5.40	230	-61.17	-47	14.17
2413.00	H	-59.77	6.03	7.7	-60.25	-47	16.55
163.40	V	-71.07	1.70	2.9	-72.02	-57	15.02
435.41	V	-74.07	2.66	7.5	-71.38	-57	14.38
2026.00	V	-62.90	5.40	230	-63.05	-47	16.05
2413.00	V	-61.46	6.03	7.7	-61.94	-47	14.94
Test Mode: Rx in CH78 2483MHz							
163.40	H	-71.25	1.70	2.9	-72.20	-57	15.20
435.41	H	-73.35	2.66	7.5	-70.66	-57	13.66
2026.00	H	-61.42	5.40	230	-61.57	-47	14.57
2413.00	H	-61.39	6.03	7.7	-61.87	-47	14.87
163.40	V	-70.02	1.70	2.9	-70.97	-57	13.97
435.41	V	-72.430	2.66	7.5	-69.74	-57	12.74
2026.00	V	-60.44	5.40	230	-60.59	-47	13.59
2413.00	V	-61.34	6.03	7.7	-61.82	-47	14.82
Note: Result =SG Level – Cable loss + Antenna Gain – 2.15							

11. Receiver Spurious emissions

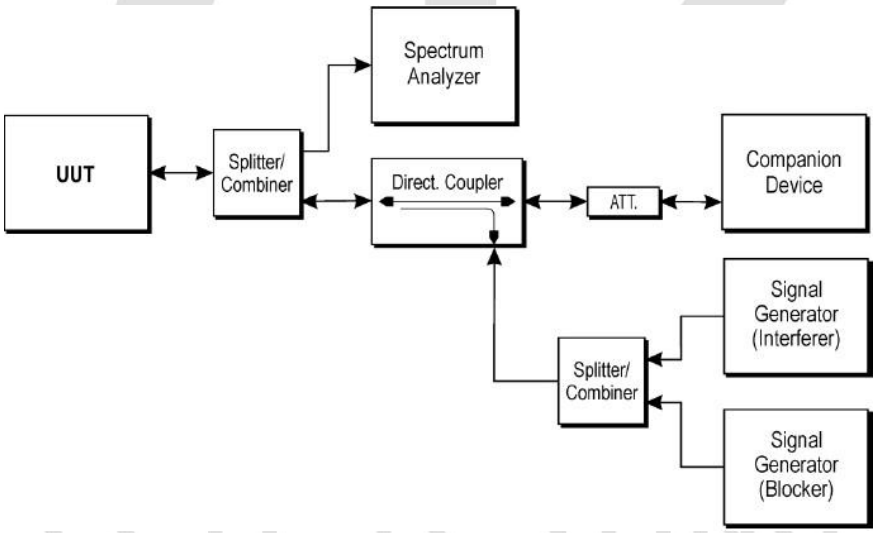
11.1 Limit

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 2 488,5 (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.				

11.2 Test Setup



11.3 Test Procedure

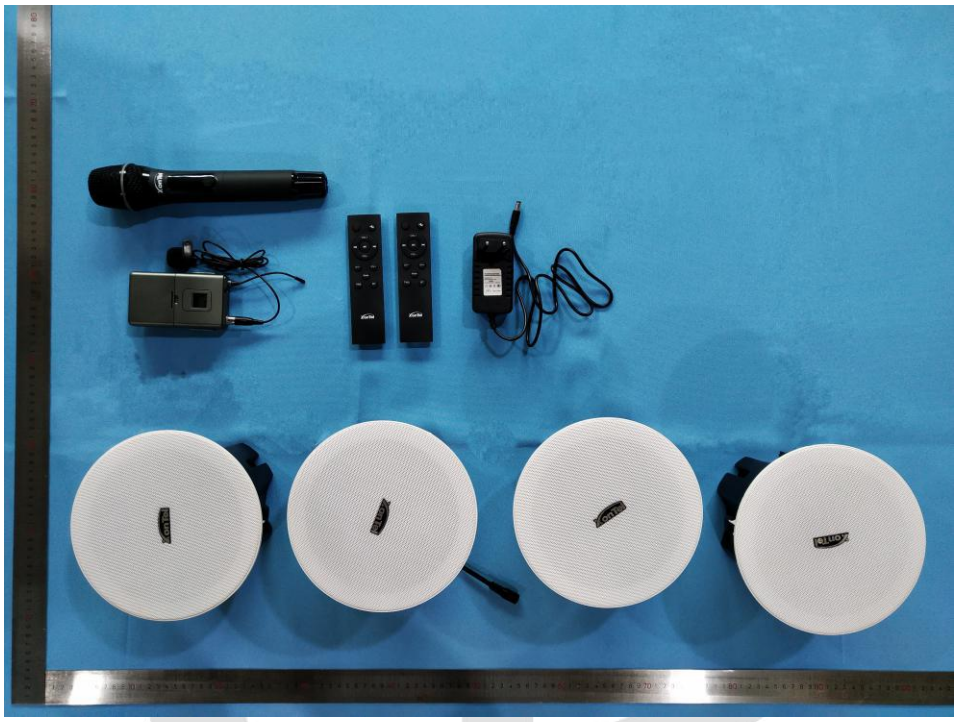
Refer to ETSI EN 300 328 V2.2.2 (2019-07) Clause 5.3.7.

11.4 Test Result

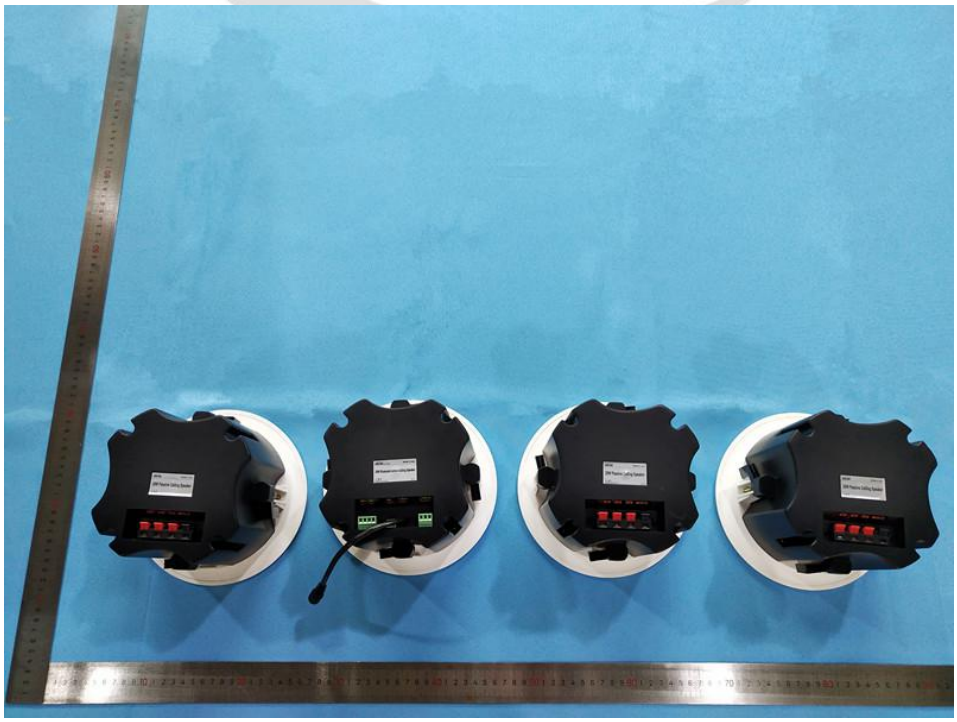
Not applicable

Note : The maximum ouput power of EUT less than 10dBm, so not applicable.

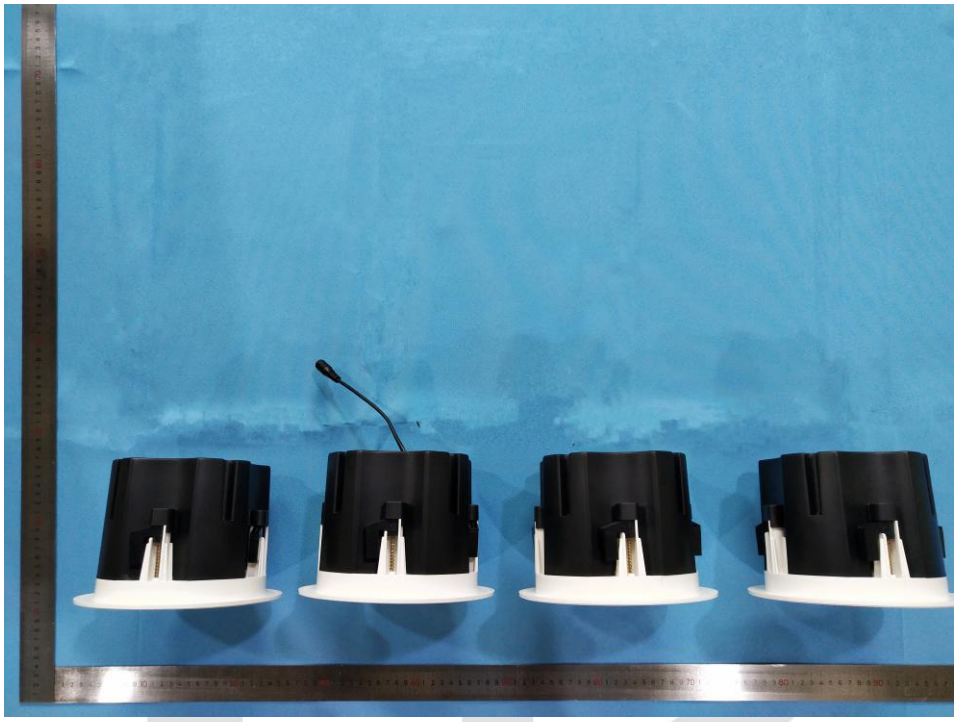
12. Photos of the EUT



EUT Photo 1



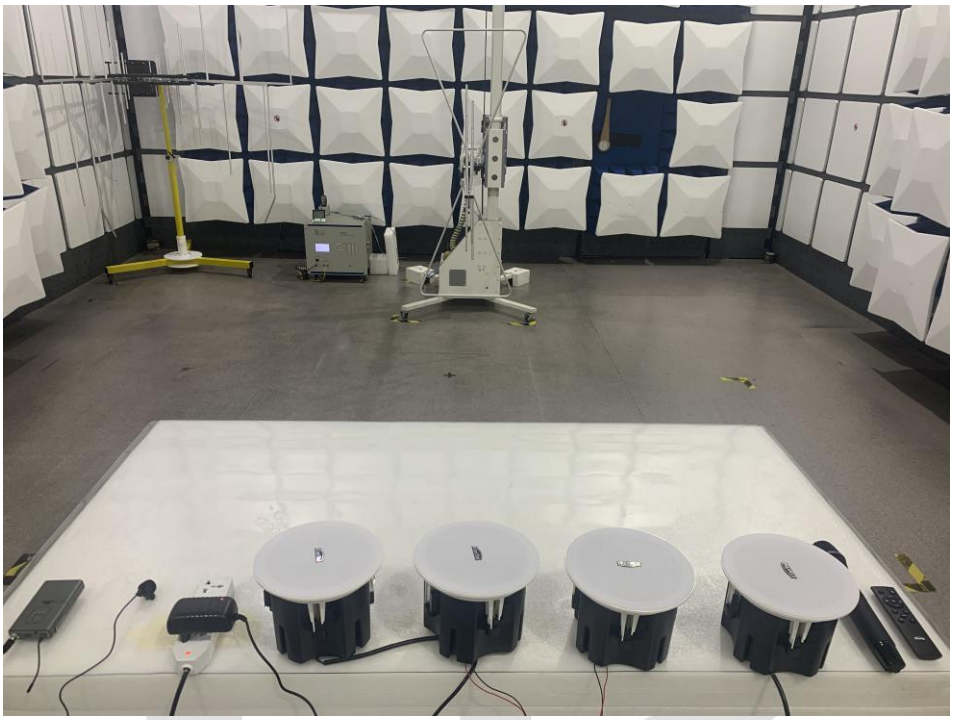
EUT Photo 2



EUT Photo 3

EUT Photo 4

13. Photos of the EUT



EUT Test Photo

※※※※※ END OF REPORT ※※※※※