

## **RED-Radio Test Report**

For

Bluetooth Speaker

Model No.: A103, A104, A105, A106, A107, A108, A109mini

Prepared For : Address :

Prepared By : Shenzhen Anbotek Compliance Laboratory Limited

Address : 1/F, Building D, Sogood Science and Technology Park, Sanwei

community, Hangcheng Street, Bao'an District, Shenzhen, Guangdong,

China.518102

Tel: (86) 755-26066440 Fax: (86) 755-26014772

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# TEST REPORT

Applicant :

Manufacturer :

Product Name : Bluetooth Speaker

Model No. : A103, A104, A105, A106, A107, A108, A109mini

Trade Mark : N.A.

Rating(s) : Input: DC 5V, 500mA (with DC 3.7V, 530mAh Battery inside)

Test Standard(s) : ETSI EN 300 328 V2.2.0 (2017-11)

The device described above is tested by Shenzhen Anbotek Compliance Laboratory Limited to determine the maximum emission levels emanating from the device and the severe levels of the device can endure and its performance criterion. The measurement results are contained in this test report and Shenzhen Anbotek Compliance Laboratory Limited is assumed full of responsibility for the accuracy and completeness of these measurements. Also, this report shows that the EUT (Equipment Under Test) is technically compliant with the ETSI EN 300 328 V2.2.0 requirements.

This report applies to above tested sample only and shall not be reproduced in part without written approval of Shenzhen Anbotek Compliance Laboratory Limited.

Date of Test

Prepared By



Apr. 12~19, 2018

(Tested Engineer / Winkey Wang)

Reviewer

(Project Manager / May Lu)

Approved & Authorized Signer

(Manager / Tom Chen)



## 1. General Information

## 1.1. Client Information

Applicant		(b			*notek	Anbotek	
Address	:	- 10			VII.	Anboten	Anbo
Manufacturer	:	Ans	No.	-MO	Dr.	ak Anboten	K Anos hotek
Address	:	D.(1)				otek Anbo	ie. Aug Post

### 1.2. Description of Device (EUT)

Product Name	:	Bluetooth Speaker				
Model No.	:	A103, A104, A105, A106, A107, (Note: All samples are the same 6 only.)	A108, A109mini except the name, so we prepare "A103" for test			
Trade Mark	:	N.A. Anboten Anbotek	Anbotek Anbote An botek An			
Test Power Supply	:	C 3.7V Battery inside				
		Operation Frequency:	2402MHz~2480MHz			
		Transfer Rate:	1/2/3 Mbits/s			
Product		Number of Channel:	79 Channels			
Description	:	Modulation Type:	GFSK, π/4-DQPSK, 8-DPSK			
		Antenna Type:	PCB Antenna			
		Antenna Gain(Peak):	0 dBi nbotek Anbote Ambotek			

**Remark:** 1) For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.

## 1.3. Auxiliary Equipment Used During Test

37/4	2000	VIII	V	oter.	VUPO	No.	You	hole	DO
N/A	, ak								



#### 1.4. Description of Test Modes

Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).

Following channel(s) was (were) selected for the final test as listed below:

#### **RF Output Power Test**

EUT configure	Available	Tested Channel	Modulation	Modulation	Packet
mode	Channel		Technology	Type	Type
Y. Jek	0 to 78	0, 39, 78	FHSS	GFSK	DH5
Aup.	0 to 78	0, 39, 78	FHSS	8DPSK	DH5

#### Accumulated Transmit Time/ Frequency Occupation/ Hopping Sequence:

10	EUT configure mode	Available Channel	Tested Channel	Modulation Technology	Modulation Type	Packet Type
Br.	us stek-	0 to 78	39	FHSS	GFSK	DH1/3/5

#### **Hopping Frequency Separation:**

EUT configure	Available	Tested Channel	Modulation	Modulation	Packet
mode	Channel		Technology	Type	Type
otek - Anbo	0 to 78	0, 39, 78	FHSS	GFSK	DH5
tek - abote	0 to 78	0, 39, 78	FHSS	8DPSK	DH5

#### **Occupied Channel Bandwidth Test:**

	EUT configure	Available	Tagtad Chammal	Modulation	Modulation	Packet
	mode	Channel	Tested Channel	Technology	Туре	Type
Vs	Arboro	0 to 78	0, 78	FHSS	GFSK	DH5
	- wotek	0 to 78	0, 78	FHSS	8DPSK	DH5

### Transmitter unwanted emissioin in the out-of-band domain Test:

7	EUT configure mode	Available Channel	Tested Channel	Modulation Technology	Modulation Type	Packet Type
	mode P	0 to 78	0, 78	FHSS	GFSK	DH5
	Bir FEK	0 to 78	0, 78	tel FHSS no	8DPSK	DH5

#### **Spurious Emissions Test:**

EUT configure mode	Available Channel	Tested Channel	Modulation Technology	Modulation Type	Packet Type
- nbotek - Anbe	0 to 78	tek 78 nbotek	FHSS	GFSK	DH5

#### **Receiver Blocking Test:**

4	EUT configure	Available	Tested Channel	Modulation	Modulation	Packet
	mode	Channel	rested Chamber	Technology	Type	Type
0	VIII.	0 to 78	0, 78	FHSS	GFSK	DH5
	notek - Anbot	0 to 78	0, 78	FHSS	8DPSK	DH5



### 1.5. List of channels

Channel	Freq.	Channel	Freq.	Channel	Freq.	Channel	Freq.	Channel	Freq.
<u> </u>	(MHz)		(MHz)		(MHz)		(MHz)		(MHz)
00	2402	Anb 17	2419	34	2436	51	2453	68,000	2470
01	2403	18-	2420	35	2437	52	2454	69	2471
02	2404	19	2421	36	2438	53	2455	70	2472
03	2405	20	2422	37	2439	54	2456	71	2473
04	2406	21 🗥	2423	38	2440	55	2457	72	2474
05	2407	o <sup>te</sup> 22	2424	39	2441	56	2458	73	2475
06	2408	23	2425	40	2442	57	2459	74	2476
cek 07 Ar	2409	24	2426	41 Anb	2443	58	2460	75	2477
08	2410	25	2427	42 N	2444	59	2461	76 Ant	2478
09	2411	26	2428	43	2445	60	2462	ote <sup>k</sup> 77	2479
Anio 10	2412	× 27 Ant	2429	44	2446	61 nbo	2463	78	2480
Al Porto	2413	28	2430	45	2447	62 <sub>M</sub>	2464	AND AND A	obote
12,000	2414	29	2431	46	2448	63	2465	1000	
13	2415	30	2432	47,000	2449	64	2466	Alloon	
14	2416	31	2433	48	2450	65	2467	dn A	otek
15	2417	32	2434	49	2451	66	2468		Jan 191
16	2418	33	2435	50	2452	67	2469		olek .

#### 1.6. Test Conditions

	Normal Test Conditions	Extreme Test Conditions
Temperature	15°C - 35°C	-10°C ~ 45°C Note: (1)
Relative Humidity	20% - 75%	N/A
Supply Voltage	DC 3.7V Battery inside	N/A
Note: (1) The HT 45°C a	and LT -10°C was declarated by manufacture;	k Anbotek Anbot K notek



## 1.7. Test Equipment List

br.	v - coter	Anbo	rek "por	Ans	tek	rupo.
Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interva
tek 1. ibotek	L.I.S.N. Artificial Mains Network	Rohde & Schwarz	ENV216	100055	Nov. 17, 2017	1 Year
2,00	EMI Test Receiver	Rohde & Schwarz	ESCI	100627	Nov. 17, 2017	1 Yea
3. An	RF Switching Unit	Compliance Direction	RSU-M2	38303	Nov. 17, 2017	1 Yea
4.	Spectrum Analysis	Agilent	E4407B	US39390582	Nov. 17, 2017	1 Year
5.	Spectrum Analysis	Agilent	N9038A	MY53227295	Nov. 17, 2017	1 Year
6.	Preamplifier	SKET Electronic	BK1G18G30 D	KD17503	Nov. 17, 2017	1 Year
7.	EMI Test Receiver	Rohde & Schwarz	ESPI	101604	Nov. 17, 2017	1 Year
8.	Double Ridged Horn Antenna	Instruments corporation	GTH-0118	351600	Nov. 20, 2017	1 Year
9.K	Bilog Broadband Antenna	Schwarzbeck	VULB9163	VULB 9163-289	Nov. 20, 2017	1 Yea
10.	Loop Antenna	Schwarzbeck	HFH2-Z2	100047	Nov. 17, 2017	1 Year
11.,,\	Horn Antenna	Schewarzbeck	BBHA9170	9170-375	Nov. 17, 2017	1 Year
12.	Pre-amplifier	SONOMA	310N	186860	Nov. 17, 2017	1 Yea
13.	EMI Test Software EZ-EMC	SHURPLE	N/A	Anbote N/A Anbot	N/A	N/A
14.	RF Test Control System	YIHENG	YH3000	2017430	Nov. 18, 2017	1 Year
15.	Power Sensor	DAER	RPR3006W	15I00041SN045	Nov. 17, 2017	1 Year
16.	Power Sensor	DAER	RPR3006W	15I00041SN046	Nov. 17, 2017	1 Year
17.	MXA Spectrum Analysis	Agilent	N9020A	MY51170037	Nov. 18, 2017	1 Year
18.	MXG RF Vector Signal Generator	Agilent	N5182A	MY48180656	Nov. 18, 2017	1 Year
19.00	Signal Generator	Agilent Agilent	E4421B	MY41000743	Nov. 18, 2017	1 Year
20.	DC Power Supply	LW Ant	TPR-6410D	349315	Nov. 01, 2017	1 Year
21.	Constant Temperature Humidity Chamber	Sertep	ZJ-HWHS80 B	ZJ-17042804	Nov. 01, 2017	1 Year



#### 1.8. Measurement Uncertainty

For the test methods, according to ETSI EN 300 328 standard, the measurement uncertainty figures shall be calculated in accordance with ETR 100 028-1 [4] and shall correspond to an expansion factor (coverage factor) k = 1,96 or k = 2 (which provide confidence levels of respectively 95 % and 95,45 % in the case where the distributions characterizing the actual measurement uncertainties are normal (Gaussian)).

Parameter	Uncertainty
Occupied Channel Bandwidth	±5 %
RF output power, conducted	±1,5 dB
Power Spectral Density, conducted	±3 dB
Unwanted Emissions, conducted	±3 dB
All emissions, radiated	±6 dB
Temperature	±1 °C
Humidity	±5 %
DC and low frequency voltages	±3 %
Time Anbotek Anbotek	±5 %
Duty Cycle	±5 %

#### 1.9. Description of Test Facility

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

#### FCC-Registration No.: 184111

Shenzhen Anbotek Compliance Laboratory Limited, EMC Laboratory has been registed and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration No. 184111, July 31, 2017.

#### ISED-Registration No.: 8058A-1

Shenzhen Anbotek Compliance Laboratory Limited, EMC Laboratory has been registered and fully described in a report filed with the (ISED) Innovation, Science and Economic Development Canada. The acceptance letter from the ISED is maintained in our files. Registration 8058A-1, June 13, 2016.

#### **Test Location**

All Emissions tests were performed at

Shenzhen Anbotek Compliance Laboratory Limited.

1/F, Building D, Sogood Science and Technology Park, Sanwei community, Hangcheng Street, Bao'an District, Shenzhen, Guangdong, China.518102



## 2. Summary of Test Results

	List of Measurements		
No	Test Items	Clause No.	Results
otek	Transmitter Items	YUL 3K VUL	otek Anbot
1 ote	RF output power	4.3.1.2	PASS
2	Duty Cycle, Tx-sequence, Tx-gap	4.3.1.3	N/A
3	Accumulated Transmit Time, Frequency Occupation and Hopping Sequence	4.3.1.4 otek	PASS
4	Hopping Frequency Separation	4.3.1.5	PASS
5	Medium Utilization (MU) factor	4.3.1.6	N/A
6	Adaptivity (Adaptive Frequency Hopping)	4.3.1.7	N/A
$\Delta_{Up}$	Occupied Channel Bandwidth	4.3.1.8	PASS
8	Transmitter unwanted emissions in the out-of-band domain	4.3.1.9	PASS
9	Transmitter unwanted emissions in the spurious domain	4.3.1.10	PASS
nbotel	Receiver Items	An nbotek A	nbotek Anb
10	Receiver spurious emissions	4.3.1.11	PASS
11	Receiver Blocking	4.3.2.12	PASS
12	Geo-location capability	4.3.2.13	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.

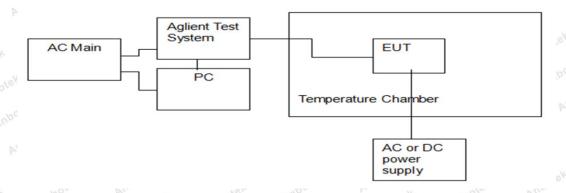


## 3. RF Output Power

#### 3.1. RF Output Power Limit

Condition	Limit
Non-adaptive frequency hopping systems	Equal to or less than the value declared bythe manufacturer. This declared value shall be equal to or less than 20 dBm.
Adaptive frequency hopping systems	20dBm

#### 3.2. Test Setup



#### 3.3. Test Procedure

Refer to chapter 5.4.2.2.1 of EN 300 328 V2.2.0.

- 1. Run a test program to control EUT transmitting at specific channel
- 2. Connect the power sensor to the transmit port
- 3. Power Meter was setting as below:

Sample speed: 1 MS/s

Number of bursts: at least 10bursts

Detector: RMS

- 4. A power meter was used to read the response of the power sensor
- 5. Define Start time and Stop time of a burst by 30dB below the highest value of thestores samples.
- 6. Find the highest burst value
- 7. Record the power level
- 8. EIRP = antenna gain + power level of step 7.

#### 3.4. Test Data

Please to see the following pages



Temperature:	See below	Relative Humidity:	60 %
Pressure:	1012 hPa	Test Voltage:	DC 3.7V Battery inside

Pr.	20.0			1.0 V	DI.	101
Test N	Mode:	TX(CH00/0	СН39/СН78)-С	GFSK	tek Anbotek	Anbor A
sotek A	TEGT CO	AIDITIONG	K	LOTE AND	Total e.i.r.p ( dBm )	Anbote
in botek	TEST CO.	NDITIONS		CH00	CH39	CH78
T nom (°C)	25.00	V nom (V)	DC 3.7V	-0.37	-0.42	-0.22
T min (°C)	-10.00	V nom (V)	DC 3.7V	-0.44	-0.42	-0.29 And
T max (°C)	45.00	V nom (V)	DC 3.7V	otek -0.13 potek	-0.18	-0.11 AT
oter Aup	Max R	F Power	inpore Vi	-botek Anbot	-0.11	hotek
inpoter. An	tek Lii	nitspotek	Anbore	An botek An	20dBm	k abotek
Anbotel	And Re Re	sult notek	Anbote	An	PASS	tek abotek

Test M	ode: Maria	TX(CH00/Cl	H39/CH78)- π/	4DQPSK	nbotek	Anbote Am
tek anbot	TEGT CC	ONDITIONS	rek no	poten Anbo	Total e.i.r.p ( dBm )	Aupore K An
	TEST CC	MDITIONS		СН00	CH39	CH78
T nom (°C)	25.00	V nom (V)	DC 3.7V	-0.71	-0.86	-0.79
T min (°C)	-10.00	V nom (V)	DC 3.7V	-0.69	-0.72	-0.76
T max (°C)	45.00	V nom (V)	DC 3.7V	-0.93	-0.58	otek -0.75 Anbot
Anbos	Max F	RF Power	Yes Aug	otek Anbotek	-0.58	botek Ani
tek Vupo.	Li	mits	upote, K	rotek anbot	20dBm	All
botek Ant	R	esult	Anbores	And stek and	PASS	An hotek

Test M	ode:	TX(CH00/CH	H39/CH78)-8D	PSK MOOD FOR	abotek Anb	oter And
nbotek	TEST CO	ONDITIONS	ek Anbote	Aupor 1	Гotal e.i.r.p ( dВm )	'upoter Aup
ek hote	K TEST CC	INDITIONS	otek Anh	CH00	СН39	CH78
T nom (°C)	25.00	V nom (V)	DC 3.7V	mbotek -1.01 Anbot	-1.39	-1.16
T min (°C)	-10.00	V nom (V)	DC 3.7V	-1.20	-1.20	-1.35
T max (°C)	45.00	V nom (V)	DC 3.7V	-1.16	-1.18	-1.24
Aupor	Max I	RF Power	Anbo	k nbotek	Anbot-1.01	hotek Anbote
Anhot	r L	imits Anbot	Anbo	otek Anbotek	20dBm	notek Anb
ek Anbot	R R	esult	poter And	stek nbotek	PASS	Ans hotek



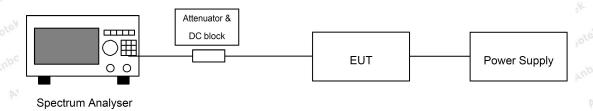
## 4. Accumulated Transmit Time, Frequency Occupation and Hopping

## Sequence

## 4.1. Test Limit

Test Item	Limit
Accumulated Transmit Time	n ≤ 0.4s
Frequency Occupation	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.
Hopping Sequence	The hopping sequence(s) shall contain at least N hopping frequencies at all times, where N is either 15 or the result of 15MHz divided by the minimum Hopping Frequency Separation in MHz, whichever is the greater.

#### 4.2. Test Setup



### **4.3. Test Procedure**

Refer to EN 300 328, clause 5.4.4 for the test conditions and the measurement method.

The setting of the Spectrum Analyzer

Frequency Center	Equal to the hopping frequency being investigated
Frequency Span	OHz And tek potek Anbout Anti-
Trace Mode	Clear / Write
Trigger Mode	Free Run
Detector	RMS Anbotek Anbotek Anbotek
Sweep Point / Sweep Time	30000 / Equal to the applicable observation period
RBW	~ 50 % of the Occupied Channel Bandwidth
VBW	≥RBW Anbote And Anbote



#### 4.4. Test Data

Temperature:	25° C	nbotek	Relative Humidity:	60 %
Pressure:	1012 hPa	-otel	Test Voltage:	DC 3.7V Battery inside

#### (1) Accumulated Transmit Time

· /					
Package Type	Pulse width (ms)	Time slot length(ms)	Dwell time (ms)	Limit (s)	Result
DH1	0.364	time slot length *1600/2 /79 * 31.6	116.48	0.4	Pass
DH3	1.625	time slot length *1600/4 /79 * 31.6	260.00	0.4	Pass (bol)
DH5	2.840	time slot length *1600/6 /79 * 31.6	302.93	0.4	Pass And
3DH1	0.376	time slot length *1600/2 /79 * 31.6	120.32	0.4	Pass
3DH3	1.625	time slot length *1600/4 /79 * 31.6	260.00	0.4	Pass
3DH5	2.880	time slot length *1600/6 /79 * 31.6	307.20	0.4	Pass
		500	1		0.17

Remark: The EDR was tested on  $(\pi/4DQPSK, 8DPSK)$  modes, only the worst data of (8DPSK) is attached in the following pages.

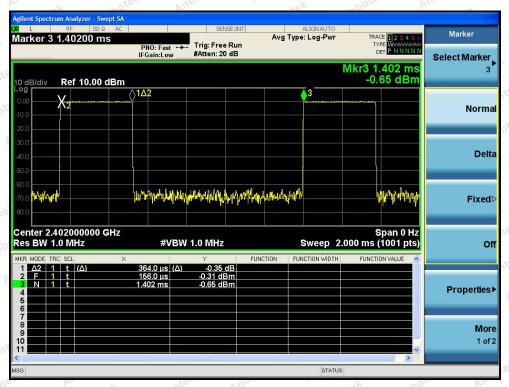
#### (2) Hopping Sequence&Occupied Frequency

Hopping	Hopping Sequence  Number of hopping frequencies Limit		Minimum Occupied I	D - self	
Mode			Occupied Frequency	Limit	Result
DH1 to	Amborott 79 not	≥15	79.00	≥58.45	Pass

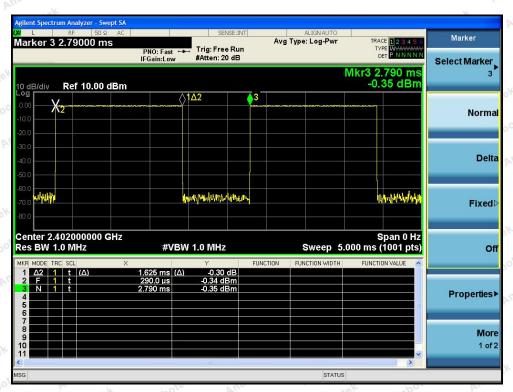


Number of Hopping Frequency



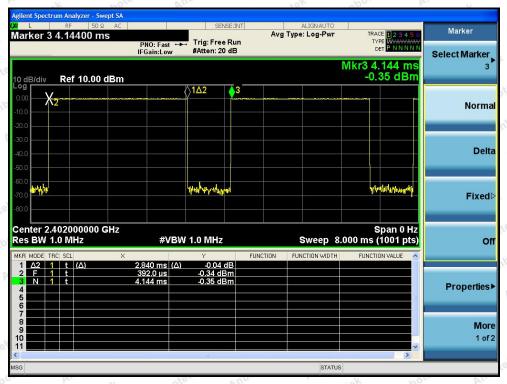


Test Mode: BDR---DH1

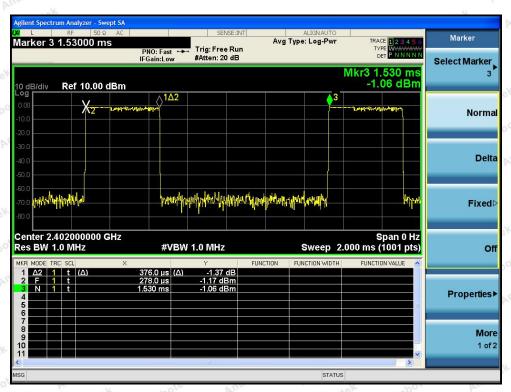


Test Mode: BDR---DH3



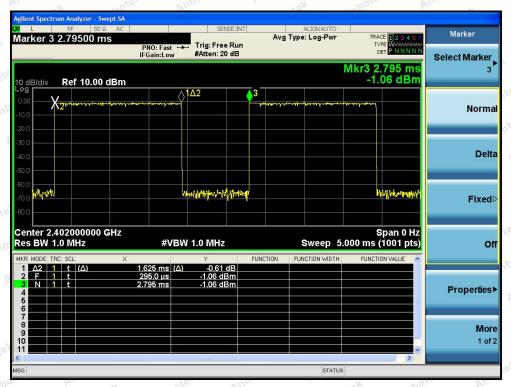


Test Mode: BDR—DH5



Test Mode: EDR---3DH1





Test Mode: EDR---3DH3



Test Mode: EDR—3DH5



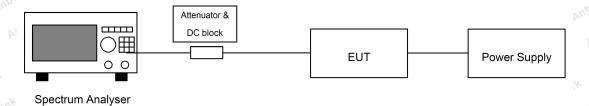
## 5. Hopping Frequency Separation

#### 5.1. Test Limit

No.	a) For non-adaptive Frequency Hopping equipment, the Hopping Frequency Separation
T	shall be equal or greater than the
Test Limit	b) For adaptive Frequency Hopping equipment, the minimum Hopping Frequency
	Separation shall be 100 kHz

Condition	Limit	
ak botek Anbote Anti	The Hopping Frequency Separation shall beequal or greater	
■ Non-adaptive frequency hopping systems	than the Occupied ChannelBandwidth of a single hop, with a	
ibotek Anbo kek botek Anbote	minimumseparation of 100 kHz.	
Adaptive frequency hopping systems	The minimum Hopping Frequency Separationshall be 100 kHz.	

### 5.2. Test Setup



#### 5.3. Test Procedure

Refer as EN 300 328, clause 5.4.5 for the test conditions and the measurement method.

The test procedure shall be as follows:

#### Step 1:

- The output of the transmitter shall be connected to a spectrum analyser or equivalent.
- The analyser 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 (30KHz)
  - VBW:  $3 \times RBW (100KHz)$
- Detector Mode: Max PeakTrace Mode: Max Hold
- Sweep Time: Auto

#### Step 2:

- Wait for the trace to stabilize.
- Use the marker-delta function to determine the Hopping Frequency Separation between the centres of the two adjacent hopping frequencies (e.g. by identifying peaks or notches at the centre of the power envelope for the two adjacent signals). This value shall be compared with the limits defined in clause 4.3.1.5.3 and shall be recorded in the test report.



### 5.4. Test Data

Temperature:	25° C	nbotek	Relative Humidity:	60 %
Pressure:	1012 hPa	-otek	Test Voltage:	DC 3.7V Battery inside

Channal	Frequency	Separation Read	Limit	Modulation	
Channel	(MHz)	Value (kHz)	(kHz)	Mode	
Low	2402	998	100kHz	BDR	
Middle	2441	999	100kHz	BDR	
High	2480	998	100kHz	BDR	
Low	2402	1001	100kHz	EDR	
Middle	2441	1000	100kHz	EDR	
High	2480	1003	100kHz	EDR	
- 10 C					

Remark: The EDR was tested on ( $\pi$ /4DQPSK, 8DPSK) modes, only the worst data of (8DPSK) is attached in the following pages.

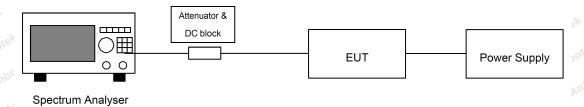


## 6. Occupied Channel Bandwidth

## 6.1. Test Limit

	Condition	Limit
Anbotek Anb	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 > 10dBm.	Less than 20MHz
requirement	For non-adaptive Frequency Hopping system and e.i.r.p > 10dBm.	Less than 5MHz

### 6.2. Test Setup



#### **6.3. Test Procedure**

Refer to EN 300 328, clause 5.4.7 for the test conditions and the measurement method.

The setting of the Spectrum Analyzer

Center Frequency	The centre frequency of the channel under test			
Frequency Span	2 × Nominal Channel Bandwidth (e.g. 2MHz for BT)			
Detector	RMS hotek Anbotek Anbotek Anbotek			
RBW	~ 1 % of the span without going below 1 %			
VBW	3 × RBW Andore Andore Andore Andore			
Trace	Max hold Anootek Anbott Anbott Anbott Anbott			
Sweep time	1S hotek Anbotek Anbotek Anbotek			

#### 6.4. Test Data



Temperature:	otek Anbo 25° C	Relative Humidity:	60 %
Pressure:	1012 hPa	Test Voltage:	DC 3.7V Battery inside

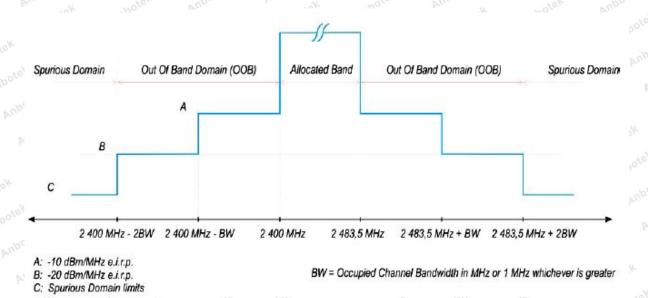
Modulation Type	Test Channel	99% Bandwidth (MHz)	FL/FH (MHz)	Limit	Result
Anbotek Anbe	Lowest	0.87	2401.00	2400MHz ~	Pass
GFSK	Highest	0.90	2480.27	2483.5MHz	Pass
-/4DODGK	Lowest	0.95	2401.15	2400MHz ~	Pass
π/4DQPSK	Highest	1.31	2480.42	2483.5MHz	Pass And
ODDCK	Lowest	1.36	2401.38	2400MHz ~	Pass
8DPSK	Highest	1.47 And	2480.56	2483.5MHz	Pass



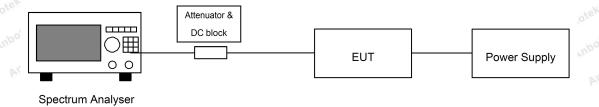
## 7. Transmitter Unwanted Emissions in the out-of-band Domain

#### 7.1. Test 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 of clause 4.3.1.9



#### 7.2. Test Setup



#### 7.3. Test Procedure

Refer as EN 300 328, clause 5.4.8 for the test conditions and the measurement method.

The setting of the Spectrum Analyzer

an Thaif 201
1MHz/3MHz
0Hz Anbotek Anbotek Anbotek
Channel filter
Continuous Andrew Andrew Andrew
Sweep Time[s]/(1us) or 5000 points, whichever is greater
RMS potes Andrew Andrew
Max Hold
Video trigger



## 7.4. Test Data

Temperature:	25° C	nbotek	Relative Humidity:	60 %
Pressure:	1012 hPa	-otel	Test Voltage:	DC 3.7V Battery inside

Mode: BDR

Channel frequency			2402MHz		2480MHz	
you otek	Anbotek	VUp.	OOB Emiss	sion(MHz)	OOB Emission(MHz)	
Anbotek	Test cor	ndition	2400-BW ~2400	2400-2BW ~2400-BW	2483.5 ~ 2483.5+BW	2483.5+BW ~ 2483.5+2BW
Kek Anbo			Maximum power (dBm)	Maximum power (dBm)	Maximum power (dBm)	Maximum power (dBm)
V no	om (V)	DC 3.7V	-68.13	-71.32	-71.28	-70.56
Wpo.	Lim	its Anbotes Anb	-10.00	-20.00	-10.00	-20.00
Anbor	PASS/FAIL		PASS	pote PASS Ande	PASS	PASS

Mode: EDR

Channel frequency		2402MHz		2480MHz	
bote. And stek	potes Anti-		OOB Emission(MHz)		sion(MHz)
Anbotek Anbo		2400-BW	2400-2BW	2483.5 ~	2483.5+BW ~
Test cor	ndition	~2400	~2400-BW	2483.5+BW	2483.5+2BW
Anbotek Anbo		Maximum power (dBm)	Maximum power (dBm)	Maximum power (dBm)	Maximum power (dBm)
V nom (V)	DC 3.7V	-68.14	-70.37	-66.42	-70.19
potek Anbot Lim	its hotek Anbot	-10.00	-20.00	-10.00	-20.00
PASS/I	FAIL	PASS	PASS	PASS	PASS



## 8. Transmitter Unwanted Emissions in the Spurious Domain

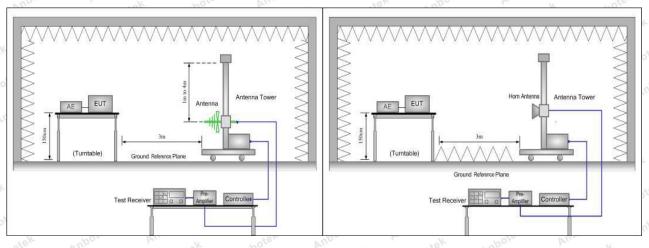
#### 8.1. Test Limit

Frequency Range	Maximum Power	Bandwidth
30 MHz to 47 MHz	-36dBm	100kHz
47 MHz to 74 MHz	-54dBm	100kHz
74 MHz to 87,5 MHz	-36dBm	100kHz
87,5 MHz to 118 MHz	-54dBm	100kHz
118 MHz to 174 MHz	-36dBm	100kHz
174 MHz to 230 MHz	-54dBm	100kHz
230 MHz to 470 MHz	-36dBm	100kHz
470 MHz to 862 MHz	-54dBm	100kHz
862 MHz to 1 GHz	-36dBm	100kHz
1GHz ~ 12.75GHz	-30dBm	1MHz

#### 8.2. Test Setup

(A) Radiated Emission Test Set-Up Frequency Bellow 1 GHz.

(B) Radiated Emission Test Set-Up Frequency Above 1 GHz



#### 8.3. Test Procedure

Refer to chapter 5.4.9.2.2 of EN 300 328 V2.2.0 for radiated measurement.

- 1. For the actual test configuration, please refer to the related Item in this test report (Photographs of the Test Configuration).
- 2. The measurements were performed when normal hopping was disabled. In this case measurements were performed when operating at the lowest and the highest hopping frequency.
- 3. The equipment was configured to operate under its worst case situation with respect to output power.
- 4. The test setup has been constructed as the normal use condition. Controlling software has been activated to set the EUT on specific status.



#### 8.4. Test Data

Temperature:	25° C	Anbor	Relative Humidity:	60 %
Pressure:	1012 hPa	ote	Test Voltage:	DC 3.7V Battery inside

worst case: GFSK modulation

The low channel					
Frequency (MHz)	Level(dBm)	Limit (dBm)	Margin(dB)	Polarization	Test Result
69.82	-66.06	-54.00	-12.06	otek H Anbot	And
127.50	-66.73	-36.00	-30.73	" hotelH Anl	otek Anbo
251.49	-68.13	-36.00	-32.13	H.K	Anbotek Ant
793.72	-66.69	-54.00	-12.69	And H tek	nbotek
4804.16	-64.55	-30.00	-34.55	HA	A. botek
7206.89	-59.11	-30.00	-29.11	otek Hanbor	PASS
73.90	-73.33	-54.00	-19.33	abotek V Anbote	PASS
157.24	-68.60	-36.00	-32.60	hotelV Ant	oten Anbe
461.41	-67.45	-36.00	-31.45	VE	inbotek Anb
589.28	-71.20	-54.00	-17.20	V	anbotek A
4804.25	-58.82	-30.00	-28.82	V	hotek
7206.32	-59.67	-30.00	-29.67	Vandore	k hotek

The high channel					
Frequency (MHz)	Level(dBm)	Limit (dBm)	Margin(dB)	Polarization	Test Result
69.82	-66.06	-54.00	-12.06	AnH How	A. Anbotek
127.50	-66.73	-36.00	-30.73	ek Huporg	Ann
251.49	-68.13	-36.00	-32.13	ootek H Anbote	And
793.72	-66.69	-54.00	-12.69	notek H Anbo	LEK Anbo
4804.16	-64.55	-30.00	-34.55	H	botek Anbo
7206.89	-59.11	-30.00	-29.11	And Hek	anbotek Ar
73.90	-73.33	-54.00	-19.33	ANV	PASS
157.24	-68.60	-36.00	-32.60	S <sub>K</sub> N <sub>pore</sub>	An
461.41	-67.45	-36.00	-31.45	potek V Anbole	And
589.28	-71.20	-54.00	-17.20	hotek V Anbo	er Anbe
4804.25	-58.82	-30.00	-28.82	NoteV AV	potek Anbot
7206.32	-59.67	-30.00	-29.67	V	anbotek An



## 9. Receiver Spurious Emissions

### 9.1. Test Limit

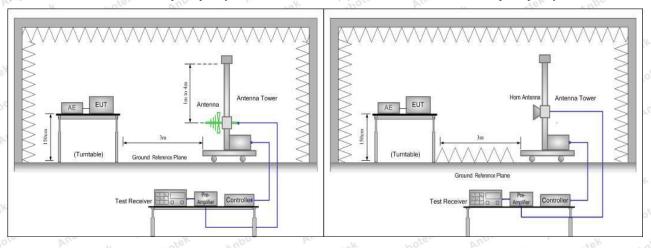
The spurious emissions of the receiver shall not exceed the values given in table.

Frequency Range	Maximum Power
30MHz ∼ 1GHz	-57dBm Anbout
1GHz ~ 12.75GHz	-47dBm

#### 9.2. Test Setup

(A) Radiated Emission Test Set-Up Frequency Bellow 1 GHz.

(B) Radiated Emission Test Set-Up Frequency Above 1 GHz



#### 9.3. Test Procedure

Refer as EN 300 328, Refer to chapter 5.4.10.2.2 for radiated measurement.

- 1. For the actual test configuration, please refer to the related Item in this test report (Photographs of the Test Configuration).
- 2. Testing was performed when the equipment was in a receive-only mode.
- 3. The measurements were performed when normal hopping was disabled. In this case measurements were performed when operating at the lowest and the highest hopping frequency.
- 4. The test setup has been constructed as the normal use condition. Controlling software has been activated to set the EUT on specific status.



#### 9.4. Test Data

Temperature:	rek.	25° C	Anbor	Relative Humidity:	60 %
Pressure:	Aupo.	1012 hPa	-0/8	Test Voltage:	DC 3.7V Battery inside

worst case: GFSK modulation

The low channel					
Frequency (MHz)	Level(dBm)	Limit (dBm)	Margin(dB)	Polarization	Test Result
61.46	-73.57	-57.00	-16.57	<sup>3</sup> <sup>k</sup> H Anbox	Lek hotel
148.62	-67.09	-57.00	-10.09	otekH Anb	Ans Ans
359.68	-69.88	-57.00	-12.88	H P	nbotek Anb
506.50	-72.49	-57.00	-15.49	Hatek	Anbotek A
3314.64	-57.47	-47.00	-10.47	H dek	Anbotek
5936.76	-59.41	-47.00	-12.41 ANDO	H <sup>mb</sup>	DAGG
59.12	-65.77	-57.00	-8.77	botek V Anbo	PASS
126.71	-65.75	-57.00	-8.75	nbotek V Anbr	K VIII
424.79	-68.00	-57.00	-11.00	No V	ipote, Aug
575.18	-72.27	-57.00	-15.27	Vick	Anbotek A
4001.53	-61.04	-47.00	-14.04	V tek	Anbotek
5820.34	-64.73	-47.00	-17.73	V	hotek

NO.	DI.	481	- 4pg	V0
Level(dBm)	Limit (dBm)	Margin(dB)	Polarization	Test Result
-68.35	-57.00	-11.35	And H stek	Anbotek
-69.50	-57.00	-12.50	H	hotek
-67.85	-57.00	-10.85	otek HAnbo	ek Air botek
-69.33	-57.00	-12.33	nbotek H Anboy	VK VO
-58.38	-47.00	-11.38	oboteH An	ote, Aug
-61.51	-47.00	-14.51	H	Anbotek Ar
-64.23	-57.00	-7.23	Votek	PASS
-66.91	-57.00	-9.91 nboto	V	Anbotek
-70.44	-57.00	-13.44	Vando	k A botek
-66.72	-57.00	-9.72	nbotek V Anbot	All.
-59.92	-47.00	-12.92	abote V Ant	ore And
-64.32	-47.00	-17.32	V	inboten An
	-68.35 -69.50 -67.85 -69.33 -58.38 -61.51 -64.23 -66.91 -70.44 -66.72 -59.92	-68.35     -57.00       -69.50     -57.00       -67.85     -57.00       -69.33     -57.00       -58.38     -47.00       -61.51     -47.00       -64.23     -57.00       -66.91     -57.00       -70.44     -57.00       -66.72     -57.00       -59.92     -47.00	-68.35       -57.00       -11.35         -69.50       -57.00       -12.50         -67.85       -57.00       -10.85         -69.33       -57.00       -12.33         -58.38       -47.00       -11.38         -61.51       -47.00       -14.51         -64.23       -57.00       -7.23         -66.91       -57.00       -9.91         -70.44       -57.00       -13.44         -66.72       -57.00       -9.72         -59.92       -47.00       -12.92	-68.35



## 10. Receiver Blocking

#### 10.1. Test Limit

This requirement applies to all receiver categories.

This requirement applies to an receiver	eategories.	an P
no stek anbotek - np-	RECEIVER CATEGORY	
Category 1	Category 2	Category 3  Category 3
Minimum performance criterion	PER ≤10 % 🔽	And tek and
Anboten Anb	Alternative pe mance criteria	otek Anbo ak

Table 14: Receiver Blocking parameters for Receiver Category 1 equipment

Wanted signal mean power from companion device (dBm) (see notes 1 and 4)	Blocking signal frequency (MHz)	Blocking signal power (dBm) (see note 5)	Type of blocking signal
(-139 dBm + 10 × log <sub>10</sub> (OCBW)) or -68 dBm whichever is less (see note 2)	2 380 2 503,5		CW
(-139 dBm + 10 × log <sub>10</sub> (OCBW)) or -74 dBm whichever is less (see note 3)	2 300 2 330 2 360 2 523,5 2 553,5 2 583,5 2 613,5 2 643,5 2 673,5	-34	

- NOTE 1: OCBW is in Hz.
- NOTE 2: As an alternative the test may be performed using a wanted signal equal to P<sub>min</sub> + 26 dB where P<sub>min</sub> 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 3: As an alternative the test may be performed using a wanted signal equal to P<sub>min</sub> + 20 dB where P<sub>min</sub> 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 4: In case of radiated measurements, this wanted signal level is the level in front of the UUT antenna with the UUT being configured/positioned as recorded in clause 5.4.3.2.2. In the case of conducted measurements this wanted signal level is the level applied at the antenna connector.
- NOTE 5: In case of radiated measurements, the blocking levels specified are levels in front of the UUT antenna with the UUT being configured/positioned as recorded in clause 5.4.3.2.2. In the case of conducted measurements this blocking level is the level applied at the antenna connector. Alternatively, in case the actual antenna performance at the blocking frequencies has been declared (see clause 5.4.1 m) ii)), the difference between the in-band antenna gain and the actual antenna gain at each of the blocking frequencies shall be taken into account.



Table 15: Receiver Blocking parameters receiver Category 2 equipment

Wanted signal mean power from companion device (dBm) (see notes 1 and 3)	Blocking signal frequency (MHz)	Blocking signal power (dBm) (see note 4)	Type of blocking signal
(-139 dBm + 10 × log <sub>10</sub> (OCBW) + 10) or (-74 dBm + 10) whichever is less (see note 2)	2 380 2 503,5 2 300 2 583,5	-34	CW

NOTE 1: OCBW is in Hz

NOTE 2: As an alternative the test may be performed using a wanted signal equal to P<sub>min</sub> + 26 dB where P<sub>min</sub> 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 3: In case of radiated measurements, this wanted signal level is the level in front of the UUT antenna with the UUT being configured/positioned as recorded in clause 5.4.3.2.2. In the case of conducted measurements this wanted signal level is the level applied at the antenna connector.

NOTE 4: In case of radiated measurements, the blocking levels specified are levels in front of the UUT antenna with the UUT being configured/positioned as recorded in clause 5.4.3.2.2. In the case of conducted measurements this blocking level is the level applied at the antenna connector. Alternatively, in case the actual antenna performance at the blocking frequencies has been declared (see clause 5.4.1 m) ii)), the difference between the in-band antenna gain and the actual antenna gain at each of the blocking frequencies shall be taken into account.

Table 16: Receiver Blocking parameters receiver Category 3 equipment

Wanted signal mean power from companion device (dBm) (see notes 1 and 3)	Blocking signal frequency (MHz)	Blocking signal power (dBm) (see note 4)	Type of blocking signal
(-139 dBm + 10 × log <sub>10</sub> (OCBW) + 20) or (-74 dBm + 20) whichever is less (see note 2)	2 380 2 503,5 2 300 2 583,5	503,5 2 300 -34	cw

NOTE 1: OCBW is in Hz.

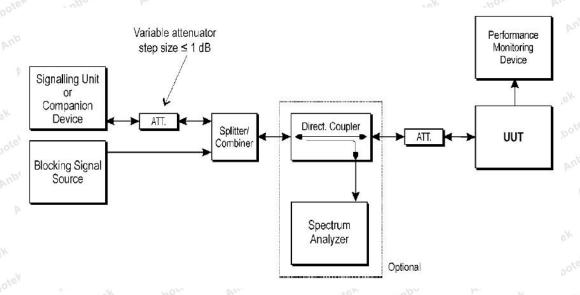
NOTE 2: As an alternative the test may be performed using a wanted signal equal to P<sub>min</sub> + 30 dB where P<sub>min</sub> is the minimum level of wanted signal (in dBm) required to meet the minimum performance criteria as defined in clause 4.3.1.12.3 in the absence of any blocking signal.

NOTE 3: In case of radiated measurements, this wanted signal level is the level in front of the UUT antenna with the UUT being configured/positioned as recorded in clause 5.4.3.2.2. In the case of conducted measurements this wanted signal level is the level applied at the antenna connector.

NOTE 4: In case of radiated measurements, the blocking levels specified are levels in front of the UUT antenna with the UUT being configured/positioned as recorded in clause 5.4.3.2.2. In the case of conducted measurements this blocking level is the level applied at the antenna connector. Alternatively, in case the actual antenna performance at the blocking frequencies has been declared (see clause 5.4.1 m) ii)), the difference between the in-band antenna gain and the actual antenna gain at each of the blocking frequencies shall be taken into account.



#### 10.2. Test Setup



#### 10.3. Test Procedure

Refer to chapter 5.4.11.2.1 of EN 300 328 V2.2.0

#### 10.4. Minimum Performance Declaration

101		le.	7.5		110	- W - WO -
	br.	CH		Pmin (dB	m) wotek	PER (≦10%)
CECK Anbo	Con Aul	0	bote	Anbore -91	Ann	Pass
GFSK	Potek	78	bu.	-91	Anbo	Pass Andore
8DPSK	hotek	Oogle	Anc	-91	K Aupo,	Pass
8DP8K	YUR	78	ek l	-91	stek an	Pass

Note: Pmin is the minimum level of the wanted signal (in dBm) required to meet the minimum performancecriteria.

### 10.5. Test Data

4	Temperature:	25° C	Anbor	Relative Humidity:	60 %
10	Pressure:	1012 hPa		Test Voltage:	DC 3.7V Battery inside



#### GFSK Mode

Wanted Signal Mean	Blocking Signal	Blocking	Type of	Pass / Fail
Power from	Frequency	Signal Power	Blocking Signal	Anbo
Companion Device	(MHz)	(dBm)	and sek abote	K Anboro A
(dBm/MHz)	- 4b-	.vov	Aupor Au	otek Anboten
Pmin + 26 dB	2380	-34	Ant CW And	PASS
Pillili + 20 db	2503.5	-34	CW	PASS

#### 8DPSK

Wanted Signal Mean	Blocking Signal	Blocking	Type of	Pass / Fail
Power from	Frequency	Signal Power	Blocking Signal	botek Anboten
Companion Device (dBm/MHz)	(MHz)	(dBm)	Anbote A	Anbotek Anbotek
ok Danbotek Anb	2380	Anbotek Anbo	sek Curabotek	PASS
Pmin + 26 dB	2503.5	-34	CW	PASS

Note: Antenna Gain(Peak) is 0dBi, so the above table is given with the calculated levels.



## APPENDIX I -- TEST SETUP PHOTOGRAPH

Photo of Radiation Emission Test





----- End of Report -----