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# **FCC Test Report**

Applicant : TRUSTSTONE GROUP, LLC

Address 1370 Broadway, 9th floor, New York, NY 10018,

**United States** 

Product Name : KARAOKE WIRELESS MIC

Report Date : Aug. 21, 2023

Shenzhen Anbotek Compliance Laboratory Limited







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# TEST REPORT

Applicant : TRUSTSTONE GROUP, LLC

Manufacturer : TRUSTSTONE GROUP, LLC

Product Name : KARAOKE WIRELESS MIC

Test Model No. : PY-KRK

Reference Model No. : PY-KRK-BLK, PY-KRK-LAV, PY-KRK-SKY, PY-KRK-GLD, PY-KRK-RGLD,

PY-KRK-UV-NEPNK, PY-KRK-WHT

Trade Mark : N/A

Rating(s) : Input: 5V= 1A( with DC 3.7V, 1200mAh battery inside)

Test Standard(s) : 47 CFR Part 15.247 2022

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 above listed standard(s) 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 Receipt:	Jul. 21, 2023
Date of Test:	Jul. 21, 2023 to Jul. 26, 2023
porek Anborek Anborek Anborek Anborek Anborek Anborek Anborek	Nian xiu Chen
Anbotek Anbotek Anbotek	(Nianxiu Chen)
	All stek anbotek Anbo
	Bolward pan
Approved & Authorized Signer:	Anborek Anborek
	(Edward Pan)







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# **Revision History**

	Report Version	Description	Issued Date
	Anbore R00 potek Ant	Original Issue.	Aug. 21, 2023
9,	Anbotek Anbotek	Anbotek Anbotek Anbotek	K Anbotek Anbotek Ant
10	ore Ambotek Anbotek	Anbotek Anbotek Anbot	tek Anbotek Anboter





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# 1. General Information

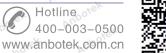
# 1.1. Client Information

~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~	K No. K. The Man of th
Applicant	: TRUSTSTONE GROUP, LLC
Address	: 1370 Broadway, 9th floor, New York, NY 10018, United States
Manufacturer	: TRUSTSTONE GROUP, LLC
Address	: 1370 Broadway, 9th floor, New York, NY 10018, United States
Factory	: TRUSTSTONE GROUP, LLC
Address	: 1370 Broadway, 9th floor, New York, NY 10018, United States

# 1.2. Description of Device (EUT)

Product Name	:	KARAOKE WIRELESS MIC
Test Model No.	:	PY-KRK Anborek Anborek Anborek
Reference Model No.	:	PY-KRK-BLK, PY-KRK-LAV, PY-KRK-SKY, PY-KRK-GLD, PY-KRK-RGLD, PY-KRK-UV-NEPNK, PY-KRK-WHT  (Note: All samples are the same except the model number, appearance
		and color, so we prepare "PY-KRK" for test only.)
Trade Mark	:	N/A And otek Anborek Anbore An
Test Power Supply	:	AC 120V, 60Hz for Adapter/ DC 3.7V battery inside
Test Sample No.	:	1-2-1(Normal Sample), 1-2-2(Engineering Sample)
Adapter	:	N/A of the Andrew Andrew Andrew Andrew Andrew
RF Specification		
Operation Frequency	:	2402MHz to 2480MHz
Number of Channel	:	79 Channels
Modulation Type	:	GFSK, π/4 DQPSK, 8DPSK
Antenna Type	:	PCB Antenna
Antenna Gain(Peak)	:	-0.6 dBi (Provided by customer)
Remark: (1) For a mo		detailed features description, please refer to the manufacturer's

specifications or the User's Manual.







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# 1.3. Auxiliary Equipment Used During Test

Title Manufacturer		Model No.	Serial No.	
Xiaomi 33W adapter	Xiaomi	MDY-11-EX	SA62212LA04358J	

# 1.4. Channel List

Channel	Freq. (MHz)	Channel	Freq. (MHz)	Channel	Freq. (MHz)	Channel	Freq. (MHz)	Channel	Freq. (MHz)
100 00 O	2402	17,bote	2419	34	2436	51	2453	68	2470
AC 01	2403	18	2420	35	2437	52	2454	69	2471
02	2404	× 19	2421	36	2438	53 pm	2455	70	2472
030000	2405	20	2422	37	2439	o <sup>tel*</sup> 54	2456	71 otek	2473
ek 04 Ank	2406	21	2423	38	2440	55	2457	72	× 2474
o <sup>10</sup> 05	2407	22	2424	39	2441	56	2458	73	2475
06	2408	23	2425	40	2442	57°	2459	74	2476
07	2409	24	2426	Anbola	2443	58 And	2460	75	2477
08/2018	2410	25	2427	42	2444	ote <sup>)(</sup> 59	2461	76	2478
<sup>k</sup> 09 knb	2411	26	2428	43	2445	60	2462	77	2479
otel 10	2412	27 otek	2429	44	2446	61	2463	78	2480
nb 11	2413	28	2430	45	2447	62	2464 <sup>100</sup>		
12 ek	2414	29	2431	46	2448	63,000	2465		
130010	2415	30	2432	47	2449	64	2466	Aribo	, nbot
4 14 Anbo	2416	31	2433	48	2450	65	2467	Aribb	M
otel 15 p	2417	32	2434	49 🗥	2451	66	2468		otel
<sub>200</sub> 116	2418	33	2435	50	2452	67	2469		
. V	~046c	Dille	-	-40*	" Upo.		, V.	101°	YLL.



Hotline

www.anbotek.com.cn

400-003-0500



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# 1.5. Description of Test Modes

Pretest Modes	Descriptions
Anborek TM1nboren A	Keep the EUT in continuously transmitting mode (non-hopping) with GFSK modulation.
TM2 Anborek	Keep the EUT in continuously transmitting mode (non-hopping) with π/4 DQPSK modulation.
otek Anborek	Keep the EUT in continuously transmitting mode (non-hopping) with 8DPSK modulation.
Inbotes And TM4 And	Keep the EUT in continuously transmitting mode (hopping) with GFSK modulation,.
Anborek TM5 borek Ar	Keep the EUT in continuously transmitting mode (hopping) with $\pi/4$ DQPSK modulation.
Anborek TM6 Anborek	Keep the EUT in continuously transmitting mode (hopping) with 8DPSK modulation.

# 1.6. Measurement Uncertainty

Parameter	Uncertainty
Conducted emissions (AMN 150kHz~30MHz)	Anbotek Anbotek 3.4dBinb tek Anbotek
Occupied Bandwidth	Anbotek Anbote 925Hz Anbote
Conducted Output Power	0.76dB
Conducted Spurious Emission	1.24dB
Radiated spurious emissions (above 1GHz)	1G-6GHz: 4.78dB; 6G-18GHz: 4.88dB
Radiated spurious emissions (30MHz~1GHz)	Horizontal: 3.92dB; Vertical: 4.52dB

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.







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### 1.7. Test Summary

Test Items	Test Modes	Status
Antenna requirement	Anbotek / Anbote	P
Conducted Emission at AC power line	Mode1,2,3	P <sup>Anbo</sup>
Occupied Bandwidth	Mode1,2,3	P
Maximum Conducted Output Power	Mode1,2,3	upote Br
Channel Separation	Mode4,5,6	Anbore P
Number of Hopping Frequencies	Mode4,5,6	AP C
Dwell Time	Mode4,5,6	P <sup>Anbo</sup>
Emissions in non-restricted frequency bands	Mode1,2,3,4,5,6	P An
Band edge emissions (Radiated)	Mode1,2,3	boton P
Emissions in restricted frequency bands (below 1GHz)	Mode1,2,3	Aupole B
Emissions in restricted frequency bands (above 1GHz)	Mode1,2,3	ALD.
Note: P: Pass N: N/A, not applicable	k Anbotek Anbotek	ek <sup>Vu</sup> po <sub>se</sub>

### 1.8. 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 registered 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.

### ISED-Registration No.: 8058A

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.

### **Test Location**

Shenzhen Anbotek Compliance Laboratory Limited.

1/F, Building D, Sogood Science and Technology Park, Sanwei community, Hangcheng Street, Bao'an District, Shenzhen, Guangdong, China.518128





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# 1.9. Test Equipment List

Cond	ucted Emission at A	C power line	An	k abotel	Anbo.	, soick
Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal.Due Date
1	L.I.S.N. Artificial Mains Network	Rohde & Schwarz	ENV216	100055	2022-10-23	2023-10-22
žek 2	Three Phase V- type Artificial Power Network	CYBERTEK	EM5040DT	E215040D T001	2023-07-05	2024-07-04
3	EMI Test Receiver	Rohde & Schwarz	ESCI	100627	2022-10-13	2023-10-12
4	RF Switching Unit	Compliance Direction	RSU-M2	38303	2022-10-22	2023-10-21
5	Software Name EZ-EMC	Farad Technology	ANB-03A	N/A	Potek   Vupo	otek / Anbote

	edge emissions (Ra sions in restricted fre	idiated) equency bands (above	e 1GHz)	Anbotek	Anbotek	Vupor Vi
Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal.Due Date
1	EMI Test Receiver	Rohde & Schwarz	ESR26	101481	2022-10-23	2023-10-22
2	EMI Preamplifier	SKET Electronic	LNPA- 0118G-45	SKET-PA- 002	2022-10-13	2023-10-12
3	Double Ridged Horn Antenna	SCHWARZBECK	BBHA 9120D	02555	2022-10-16	2025-10-15
o <sup>tek</sup> 4	EMI Test Software EZ-EMC	SHURPLE	N/A	N/A	Anbolek	Anborek
Anbore 5	Horn Antenna	A-INFO	LB-180400- KF	J21106062 8	2022-10-23	2023-10-22
6	Spectrum Analyzer	Rohde & Schwarz	FSV40-N	101792	2023-05-26	2024-05-25
× 7	Amplifier	Talent Microwave	TLLA18G40 G-50-30	23022802	2023-05-25	2024-05-24

Emis	sions in restricted fre	equency bands (below	1GHz)	Aupor	An Anbotek	Anboton A
Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal.Due Date
Aup.	EMI Test Receiver	Rohde & Schwarz	ESR26	101481	2022-10-23	2023-10-22
2	Pre-amplifier	SONOMA	310N	186860	2022-10-23	2023-10-22
3	Bilog Broadband Antenna	Schwarzbeck	VULB9163	345	2022-10-23	2025-10-22
4ek	EMI Test Software EZ-EMC	SHURPLE	N/A	N/A	Pup Liek	Vupo, Volek







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**Dwell Time** 

Emissions in non-restricted frequency bands

Occupied Bandwidth

Maximum Conducted Output Power

Channel Separation

Number of Hopping Frequencies

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal.Due Date
1 1	MXG RF Vector Signal Generator	Agilent	N5182A	MY481806 56	2022-10-13	2023-10-12
2	Power Meter	Agilent	N1914A	MY500011 02	2022-10-26	2023-10-25
3	DC Power Supply	IVYTECH	IV3605	1804D360 510	2022-10-22	2023-10-21
4	MXA Spectrum Analysis	KEYSIGHT	N9020A	MY505318 23	2023-02-23	2024-02-22
**5	Oscilloscope	Tektronix	MDO3012	C020298	2022-10-19	2023-10-18





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# 2. Antenna requirement

Test Standard	FCC Part15 Section 15.203 /247(c)
Arr. Stek Anboiek	1) 15.203 requirement:
Anbo	An intentional radiator shall be designed to ensure that no antenna other
k hotek Anbo.	than that furnished by the responsible party shall be used with the device.
And ok	The use of a permanently attached antenna or of an antenna that uses a
stek subote. An	unique coupling to the intentional radiator, the manufacturer may design
o. M. Stek	the unit so that a broken antenna can be replaced by the user, but the use
Test Requirement:	of a standard antenna jack or electrical connector is prohibited.
West Hadallallallak	2) 15.247(c) (1)(i) requirement:
Anbore Ans	Systems operating in the 2400-2483.5 MHz band that is used exclusively for
otek Aupore	fixed. Point-to-point operations may employ transmitting antennas with
And	directional gain greater than 6dBi provided the maximum conducted output
k abover And	power of the intentional radiator is reduced by 1 dB for every 3 dB that the
V. Sek	directional gain of the antenna exceeds 6 dBi.
rok po, b.	directional gain of the differnia execute of dbl.

# 3. Conducted Emission at AC power line

Test Requirement:	Refer to 47 CFR 15.207(a), Excep section, for an intentional radiator public utility (AC) power line, the raback onto the AC power line on an band 150 kHz to 30 MHz, shall not measured using a 50 µH/50 ohms (LISN).	that is designed to be con adio frequency voltage tha y frequency or frequencie exceed the limits in the fo	nected to the at is conducted as, within the collowing table, as
iek społek	Frequency of emission (MHz)	Conducted limit (dBµV)	k Vupo,
	abotek Ande k sot	Quasi-peak	Average
- hotek Anbor	0.15-0.5	66 to 56*	56 to 46*
Test Limit:	0.5-5	56	46
	5-30 And And	60 ex	50
ek abotek Anbo	*Decreases with the logarithm of the	ne frequency.	Anbo. A
Test Method:	ANSI C63.10-2020 section 6.2	Anbok Abotek	Vupole, Vu
Procedure:	Refer to ANSI C63.10-2020 section line conducted emissions from unli		od for ac power-

# 3.1. EUT Operation

Operating Environment:						Anboie!
otek Anbotek Anbo	1: TX-GFSK ( mode (non-ho 2: TX-π/4 DQ	pping) with GF	SK modulatio	n. 🖺 📑	iek anboie	ting And
Test mode:	transmitting m 3: TX-8DPSK mode (non-ho	node (non-hop) (Non-Hopping	oing) with π/4 i): Keep the El	DQPSK mo UT in contin	dulation.	itting
Ar. aboten						AUL

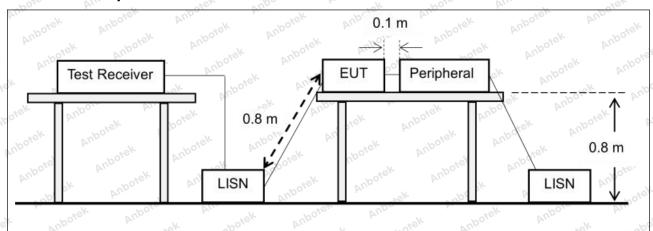






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### 3.2. Test Setup



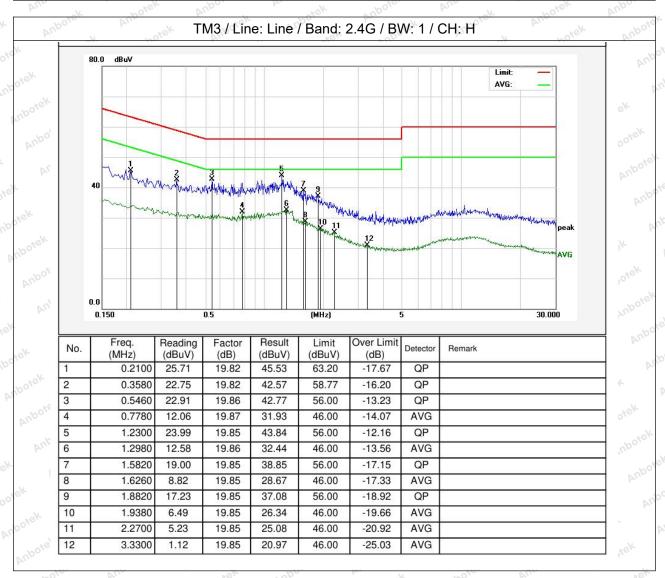




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### 3.3. Test Data

Temperature: 24 °C Humidity: 59 % Atmospheric Pressure: 96 kPa



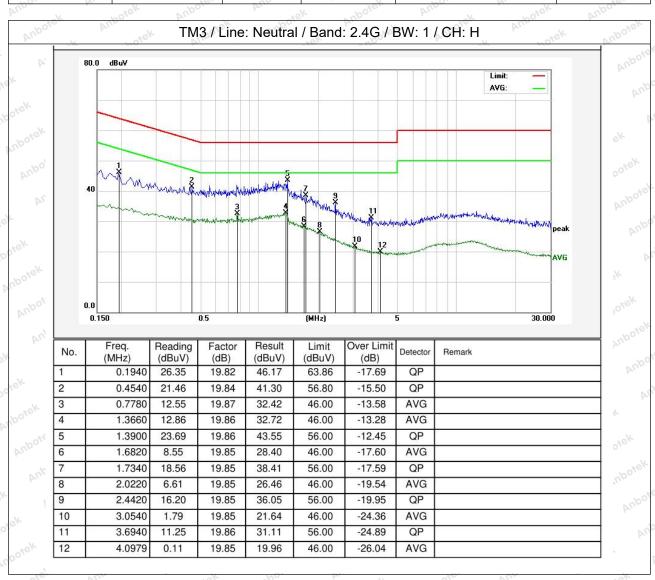






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Temperature: 24 °C Humidity: 59 % Atmospheric Pressure: 96 kPa



Note: Only record the worst data in the report.







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# 4. Occupied Bandwidth

Test Requirement:	47 CFR 15.215(c)
rest requirement.	
abotek Anbo.	Refer to 47 CFR 15.215(c), intentional radiators operating under the
	alternative provisions to the general emission limits, as contained in §§ 15.217 through 15.257 and in subpart E of this part, must be designed to
Test Limit:	ensure that the 20 dB bandwidth of the emission, or whatever bandwidth
rest Limit.	may otherwise be specified in the specific rule section under which the
	equipment operates, is contained within the frequency band designated in
upotek Aupo,	the rule section under which the equipment is operated.
To Selvetto al Anboren	ANSI C63.10-2020, section 7.8.6, For occupied bandwidth measurements,
Test Method:	use the procedure in 6.9.3. Frequency hopping shall be disabled for this test.
Anbo	The occupied bandwidth is the frequency bandwidth such that, below its
	lower and above its upper frequency limits, the mean powers are each equal
	to 0.5% of the total mean power of the given emission. The following
	procedure shall be used for measuring 99% power bandwidth:
	a) The instrument center frequency is set to the nominal EUT channel center
	frequency. The frequency span for the spectrum analyzer shall be between
	1.5 times and 5.0 times the OBW.
	b) The nominal IF filter bandwidth (3 dB RBW) shall be in the range of 1% to
	5% of the OBW, and VBW shall be at least three times the RBW, unless
Sorek Anbore	otherwise specified by the applicable requirement.
	c) Set the reference level of the instrument as required, keeping the signal
	from exceeding the maximum input mixer level for linear operation. In
	general, the peak of the spectral envelope shall be more than [10 log
otek Aupa	(OBW/RBW)] below the reference level. Specific guidance is given in
	4.1.6.2.
Dragadura, "otek	d) Step a) through step c) might require iteration to adjust within the
Procedure:	specified range.
	e) Video averaging is not permitted. Where practical, a sample detection and
	single sweep mode shall be used. Otherwise, peak detection and max-hold mode (until the trace stabilizes) shall be used.
	f) Use the 99% power bandwidth function of the instrument (if available) and
	report the measured bandwidth.
	g) If the instrument does not have a 99% power bandwidth function, then the
	trace data points are recovered and directly summed in linear power terms.
	The recovered amplitude data points, beginning at the lowest frequency, are
	placed in a running sum until 0.5% of the total is reached; that frequency is
	recorded as the lower frequency. The process is repeated until 99.5% of the
	total is reached; that frequency is recorded as the upper frequency. The 99%
	power bandwidth is the difference between these two frequencies.
	h) The occupied bandwidth shall be reported by providing spectral plot(s) of
	the measuring instrument display; the plot axes and the scale units per
	division shall be clearly labeled. Tabular data may be reported in addition to
	the plot(s).
	1 20

# 4.1. EUT Operation

C	Operating Environment:	anbotek	Aupo.	Projek	Anbore	Yun Ulek	Anbore
T		1: TX-GFSK mode (non-h				nuously transmi	tting Anb







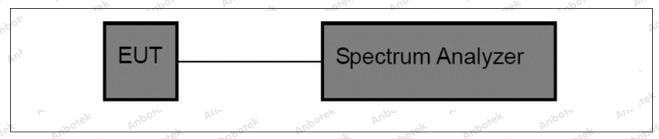


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2: TX- $\pi$ /4 DQPSK (Non-Hopping): Keep the EUT in continuously transmitting mode (non-hopping) with  $\pi$ /4 DQPSK modulation.

3: TX-8DPSK (Non-Hopping): Keep the EUT in continuously transmitting mode (non-hopping) with 8DPSK modulation.

### 4.2. Test Setup



### 4.3. Test Data

Temperature:	22.7 °C	Humidity:	50.2 %	Atmospheric Pressure:	102 kPa
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Please Refer to Appendix for Details.





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# 5. Maximum Conducted Output Power

Test Requirement:	47 CFR 15.247(b)(1)
Test Limit:	Refer to 47 CFR 15.247(b)(1), For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725-5850 MHz band: 1 watt. For all other frequency hopping systems in the 2400-2483.5 MHz band: 0.125 watts.
Test Method:	ANSI C63.10-2020, section 7.8.5
Anbotek	This is an RF-conducted test to evaluate maximum peak output power. Use a direct connection between the antenna port of the unlicensed wireless device and the spectrum analyzer, through suitable attenuation. Frequency hopping shall be disabled for this test. Use the following spectrum analyzer settings:  a) Span: Approximately five times the 20 dB bandwidth, centered on a hopping channel. b) RBW > 20 dB bandwidth of the emission being measured. c) VBW ≥ RBW. d) Sweep: No faster than coupled (auto) time. e) Detector function: Peak.
Procedure:	f) Trace: Max-hold. g) Allow trace to stabilize.
	<ul><li>h) Use the marker-to-peak function to set the marker to the peak of the emission.</li><li>i) The indicated level is the peak output power, after any corrections for</li></ul>
	external attenuators and cables. j) A spectral plot of the test results and setup description shall be included in the test report.
	NOTE—A peak responding power meter may be used, where the power meter and sensor system video bandwidth is greater than the occupied bandwidth of the unlicensed wireless device, rather than a spectrum analyzer.

# 5.1. EUT Operation

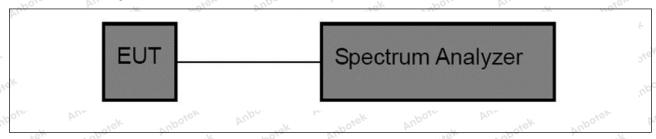
Operating Environment:	Anbore Amborek Anborek Anborek Anborek
Aupotek Aupotek	1: TX-GFSK (Non-Hopping): Keep the EUT in continuously transmitting mode (non-hopping) with GFSK modulation.
Alek above.	2: TX-π/4 DQPSK (Non-Hopping): Keep the EUT in continuously
Test mode:	transmitting mode (non-hopping) with $\pi/4$ DQPSK modulation.
tek Anbotek Anbor	3: TX-8DPSK (Non-Hopping): Keep the EUT in continuously transmitting
rek nob	mode (non-hopping) with 8DPSK modulation.
hotek Anbo	tek upote Am ofek Anbo kek





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### 5.2. Test Setup



### 5.3. Test Data

Temperature:   22.7 °C   Humidity:   50.2 %   Atmospheric Pressure:	102 kPa	Pressure:	Atmospheric	boten	50.2 %	Humidity.	VUPOLO	22.7 °C	Temperature:
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Please Refer to Appendix for Details.





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# 6. Channel Separation

india in its	1 700, W. A. 2046, W.D. 1 36K 700,
Test Requirement:	47 CFR 15.247(a)(1)
Test Limit:  Anbotek  Anbotek  Anbotek  Anbotek  Anbotek  Anbotek	Refer to 47 CFR 15.247(a)(1), Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW.
Test Method:	ANSI C63.10-2020, section 7.8.2
Anborek	The EUT shall have its hopping function enabled. Use the following spectrum analyzer settings:  a) Span: Wide enough to capture the peaks of two adjacent channels. b) RBW: Start with the RBW set to approximately 30% of the channel spacing; adjust as necessary to best identify the center of each individual channel. c) Video (or average) bandwidth (VBW) ≥ RBW. d) Sweep: No faster than coupled (auto) time. e) Detector function: Peak. f) Trace: Max-hold. g) Allow the trace to stabilize.  Use the marker-delta function to determine the separation between the peaks of the adjacent channels. Compliance of an EUT with the appropriate regulatory limit shall be determined. A spectral plot of the data shall be included in the test report.

# 6.1. EUT Operation

3/6-	Operating Environment:	k Anbore Ant otek Anborek Anbo
,01	ek Anbore And	4: TX-GFSK (Hopping): Keep the EUT in continuously transmitting mode (hopping) with GFSK modulation,.
70	poter. Vun	5: TX-π/4 DQPSK (Hopping): Keep the EUT in continuously transmitting
	Test mode:	mode (hopping) with π/4 DQPSK modulation.
	Anbo K hotek	6: TX-8DPSK (Hopping): Keep the EUT in continuously transmitting mode
	anboter Anb	(hopping) with 8DPSK modulation.
	Anborek Anbore	And tek abotek Anbo, K. Lotek Anbote And

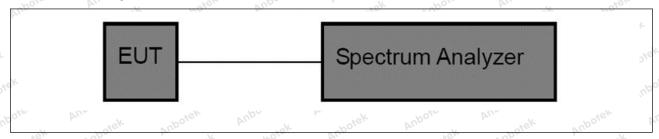






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### 6.2. Test Setup



### 6.3. Test Data

Tomporatura	22.7°C	2/001/0	Lumiditu	EO 2 0/	Atmosphoria Progrums	402 kD
Temperature:	ZZ.1 C		Humidity:	50.2 %	Atmospheric Pressure:	102 kPa

Please Refer to Appendix for Details.





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# 7. Number of Hopping Frequencies

Test Requirement:	47 CFR 15.247(a)(1)(iii)
Test Limit:  Anbotek  Anbotek  Anbotek  Anbotek	Refer to 47 CFR 15.247(a)(1)(iii), Fequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels. The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed. Frequency hopping systems may avoid or suppress transmissions on a particular hopping frequency provided that a minimum of 15 channels are used.
Test Method:	ANSI C63.10-2020, section 7.8.3
Anborek	The EUT shall have its hopping function enabled. Use the following spectrum analyzer settings:  a) Span: The frequency band of operation. Depending on the number of channels the device supports, it could be necessary to divide the frequency range of operation across multiple spans, to allow the individual channels to be clearly seen.  b) RBW: To identify clearly the individual channels, set the RBW to less than 30% of the channel spacing or the 20 dB bandwidth, whichever is smaller.  c) VBW ≥ RBW.  d) Sweep: No faster than coupled (auto) time.  e) Detector function: Peak.  f) Trace: Max-hold.  g) Allow the trace to stabilize.
	It might prove necessary to break the span up into subranges to show clearly all of the hopping frequencies. Compliance of an EUT with the appropriate regulatory limit shall be determined for the number of hopping channels. A spectral plot of the data shall be included in the test report.

# 7.1. EUT Operation

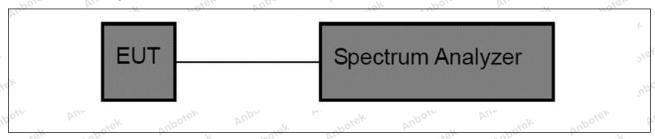
2	Operating Environment:	Anbotek Anbotek Anbotek Anbotek Anbo
2,0	botek Anbotek Anb	4: TX-GFSK (Hopping): Keep the EUT in continuously transmitting mode (hopping) with GFSK modulation,.
	Sotek Anbore A	5: TX-π/4 DQPSK (Hopping): Keep the EUT in continuously transmitting
	Test mode:	mode (hopping) with π/4 DQPSK modulation.
	abotek And	6: TX-8DPSK (Hopping): Keep the EUT in continuously transmitting mode
	All Otek Anboten	(hopping) with 8DPSK modulation.
-	Aupr	Auport Air ek abotek Aupo





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# 7.2. Test Setup



### 7.3. Test Data

Temperature:   22.7 °C   Humidity:   50.2 %   Atmospheric Pressure:	102 kPa	Pressure:	Atmospheric	boten	50.2 %	Humidity.	VUPOLO	22.7 °C	Temperature:
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Please Refer to Appendix for Details.





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# 8. Dwell Time

O. Dweil Mille	Lanbotek Anbo Anbotek Anbotek Anbotek
Test Requirement:	47 CFR 15.247(a)(1)(iii)
Test Limit:  Anbotek  Anbotek  Anbotek  Anbotek  Anbotek	Refer to 47 CFR 15.247(a)(1)(iii), Fequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels. The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed. Frequency hopping systems may avoid or suppress transmissions on a particular hopping frequency provided that a minimum of 15 channels are used.
Test Method:	ANSI C63.10-2020, section 7.8.4
ek Anbotek Anbotek Anbotek	The dwell time per hop on a channel is the time from the start of the first transmission to the end of the last transmission for that hop. If the device has a single transmission per hop then the dwell time is the duration of that transmission. If the device has a multiple transmissions per hop then the dwell time is measured from the start of the first transmission to the end of the last transmission.
	The time of occupancy is the total time that the device dwells on a channel over an observation period specified in the regulatory requirement. To determine the time of occupancy the spectrum analyzer will be configured to measure both the dwell time per hop and the number of times the device transmits on a specific channel in a given period.
otek Anbotek	The EUT shall have its hopping function enabled. Compliance with the requirements shall be made with the minimum and with the maximum number of channels enabled. If the dwell time per channel does not vary with the number of channels than compliance with the requirements may be based on the minimum number of channels. If the device supports different dwell times per channel (example Bluetooth devices can dwell on a channel for 1, 3 or 5 time slots) then measurements can be limited to the longest dwell time with the minimum number of channels.
	Use the following spectrum analyzer settings to determine the dwell time per hop:
	<ul> <li>a) Span: Zero span, centered on a hopping channel.</li> <li>b) RBW shall be ≤ channel spacing and where possible RBW should be set &gt;&gt; 1 / T, where T is the expected transmission time per hop.</li> <li>c) Sweep time: Set so that the start of the first transmission and end of the last transmission for the last transmissi</li></ul>
	last transmission for the hop are clearly captured. Setting the sweep time to be slightly longer than the hopping period per channel (hopping period = 1/hopping rate) should achieve this.
	<ul> <li>d) Use a video trigger, where possible with a trigger delay, so that the start of the transmission is clearly observed. The trigger level might need adjustment to reduce the chance of triggering when the system hops on an adjacent channel.</li> <li>e) Detector function: Peak.</li> <li>f) Trace: Clear-write, single sweep.</li> </ul>
Anbotek Anbo	g) Place markers at the start of the first transmission on the channel and at the end of the last transmission. The dwell time per hop is the time between









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these two markers.

To determine the number of hops on a channel in the regulatory observation period repeat the measurement using a longer sweep time. When the device uses a single hopping sequence the period of measurement should be sufficient to capture at least 2 hops. When the device uses a dynamic hopping sequence, or the sequence varies, the period of measurement may need to capture multiple hops to better determine the average time of occupancy. Count the number of hops on the channel across the sweep time.

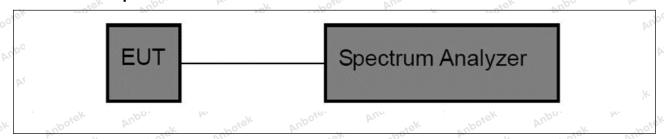
The average number of hops on the same channel within the regulatory observation period is calculated from the number of hops on the channel divided by the spectrum analyzer sweep time multiplied by the regulatory observation period. For example, if three hops are counted with an analyzer sweep time of 500 ms and the regulatory observation period is 10 s, then the number of hops in that ten seconds is  $3 / 0.5 \times 10$ , or 60 hops.

The average time of occupancy is calculated by multiplying the dwell time per hop by the number of hops in the observation period.

### 8.1. EUT Operation

Operating Environment:	k hotek Aupoter Aup tek Jupotek Aupot Au
otek Anbotek Anbot	4: TX-GFSK (Hopping): Keep the EUT in continuously transmitting mode (hopping) with GFSK modulation,.
hotek Anbotes Ant	5: TX-π/4 DQPSK (Hopping): Keep the EUT in continuously transmitting
Test mode:	mode (hopping) with π/4 DQPSK modulation.
Spotek Auge	6: TX-8DPSK (Hopping): Keep the EUT in continuously transmitting mode
All Otek Anborek	(hopping) with 8DPSK modulation.
Anbo	anbore Ans ak hotek Anbor Anbore

### 8.2. Test Setup



# 8.3. Test Data

N	Temperature:	22.7 °C	Humidity:	50.2 %	Atmospheric Pressure:	102 kPa

Please Refer to Appendix for Details.







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# 9. Emissions in non-restricted frequency bands

Test Requirement:	47 CFR 15.247(d)
Anbotek Anbotek Anbotek Anbotek  Test Limit: Anbotek Anbotek Anbotek Anbotek Anbotek Anbotek Anbotek Anbotek Anbotek	Refer to 47 CFR 15.247(d), In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in § 15.209(a) is not required.
Test Method:	ANSI C63.10-2020 section 7.8.7
	7.8.7.1 General considerations To demonstrate compliance with the relative out-of-band emissions requirements conducted spurious emissions shall be measured for the transmit frequencies, per 5.5 and 5.6, and at the maximum transmit powers. Frequency hopping shall be disabled for this test with the exception of measurements at the allocated band-edges which shall be repeated with hopping enabled.
	Connect the primary antenna port through an attenuator to the spectrum analyzer input; in the results, account for all losses between the unlicensed wireless device output and the spectrum analyzer. The frequency range of testing shall span 30 MHz to 10 times the operating frequency and this may be done in a single sweep or, to aid resolution, across a number of sweeps. The resolution bandwidth shall be 100 kHz, video bandwidth 300 kHz, and a coupled sweep time with a peak detector.
Procedure:  Anborek  Anborek  Anborek  Anborek	The limit is based on the highest in-band level across all channels measured using the same instrument settings (resolution bandwidth of 100 kHz, video bandwidth of 300 kHz, and a coupled sweep time with a peak detector). To help clearly demonstrate compliance a display line may be set at the required offset (typically 20 dB) below the highest in-band level. Where the highest in-band level is not clearly identified in the out-of-band measurements a separate spectral plot showing the in-band level shall be provided.
	When conducted measurements cannot be made (for example a device with integrated, non-removable antenna) radiated measurements shall be used. The reference level for determining the limit shall be established by maximizing the field strength from the highest power channel and measuring using the resolution and video bandwidth settings and peak detector as described above. The field strength limit for spurious emissions outside of restricted-bands shall then be set at the required offset (typically 20 dB) below the highest in-band level. Radiated measurements will follow the standards measurement procedures described in Clause 6 with the exception that the resolution bandwidth shall be 100 kHz, video bandwidth







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300 kHz, and a coupled sweep time with a peak detector. Note that use of wider measurement bandwidths are acceptable for measuring the spurious emissions provided that the peak detector is used and that the measured value of spurious emissions are compared to the highest in-band level measured with the 100 kHz / 300 kHz bandwidth settings to determine compliance.

### 7.8.7.2 Band-edges

Compliance with a relative limit at the band-edges (e.g., -20 dBc) shall be made on the lowest and on the highest channels with frequency hopping disabled and repeated with frequency hopping enabled. For the latter test the hopping sequence shall include the lowest and highest channels.

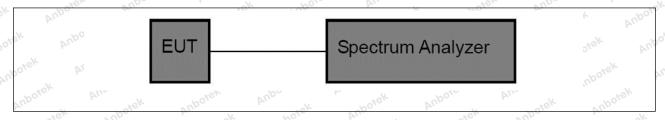
For measurements with the hopping disabled the analyzer screen shall clearly show compliance with the requirement within 10 MHz of the allocated band-edge.

For measurements with the hopping enabled the analyzer screen shall clearly show compliance with the requirement within 10 MHz of both of the allocated band-edges. This could require separate spectral plots for each band-edge.

# 9.1. EUT Operation

# Derating Environment: 1: TX-GFSK (Non-Hopping): Keep the EUT in continuously transmitting mode (non-hopping) with GFSK modulation. 2: TX-π/4 DQPSK (Non-Hopping): Keep the EUT in continuously transmitting mode (non-hopping) with π/4 DQPSK modulation. 3: TX-8DPSK (Non-Hopping): Keep the EUT in continuously transmitting mode (non-hopping) with 8DPSK modulation. 4: TX-GFSK (Hopping): Keep the EUT in continuously transmitting mode (hopping) with GFSK modulation,. 5: TX-π/4 DQPSK (Hopping): Keep the EUT in continuously transmitting mode (hopping) with π/4 DQPSK modulation. 6: TX-8DPSK (Hopping): Keep the EUT in continuously transmitting mode (hopping) with 8DPSK modulation.

### 9.2. Test Setup



### 9.3. Test Data

Temperature: 22.7 °C Humidity: 50.2 % Atmospheric Pressure: 1	102 kPa
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Please Refer to Appendix for Details.









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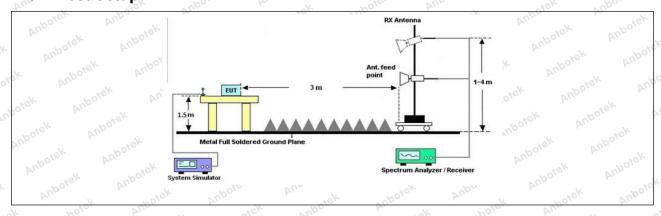
# 10. Band edge emissions (Radiated)

Test Requirement:	restricted bands, as defined	, In addition, radiated emissions d in § 15.205(a), must also comp ecified in § 15.209(a)(see § 15.2	ly with the
k Aupotek Aupo	Frequency (MHz)	Field strength (microvolts/meter)	Measurement distance (meters)
o. A. Stek	0.009-0.490	2400/F(kHz)	300 mbort
aborek Ando	0.490-1.705	24000/F(kHz)	30 Lotek
Ar. Anboter	1.705-30.0	30° , kek , nbo	30 And
Anbo. A. otek	30-88	100 **	3 ek nobore
- aborek Anbo	88-216	150 **	3
Test Limit:	216-960	200 **	3 boten And
V. Vipo,	Above 960	500 Morek Ambou	3 rek onb
nbotek Anbotek Anbotek Anbotek Anbotek Anbotek	intentional radiators operati frequency bands 54-72 MH	ragraph (g), fundamental emissi ing under this section shall not b z, 76-88 MHz, 174-216 MHz or hese frequency bands is permitt	e located in the 470-806 MHz.
Test Method:	ANSI C63.10-2020 section	6.10 Anbor	Anbore. And
Procedure:	ANSI C63.10-2020 section	6.10.5.2	Aupoter Aup

# 10.1. EUT Operation

Operating Environment:	Anbor An hotek Anbore Anborek Anbor
Anbotek Anbotek	1: TX-GFSK (Non-Hopping): Keep the EUT in continuously transmitting mode (non-hopping) with GFSK modulation. 2: TX-π/4 DQPSK (Non-Hopping): Keep the EUT in continuously
Test mode:	transmitting mode (non-hopping) with π/4 DQPSK modulation.
ek abotek Anbo	3: TX-8DPSK (Non-Hopping): Keep the EUT in continuously transmitting
AI,	mode (non-hopping) with 8DPSK modulation.
potek Anbo, Ar.	otek Aupoter Aun ek spotek Aupor, Ar. otek

# 10.2. Test Setup





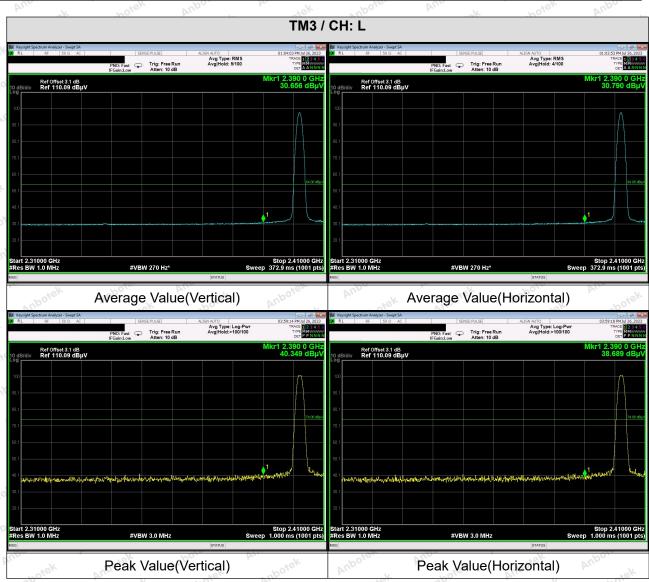




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# 10.3. Test Data

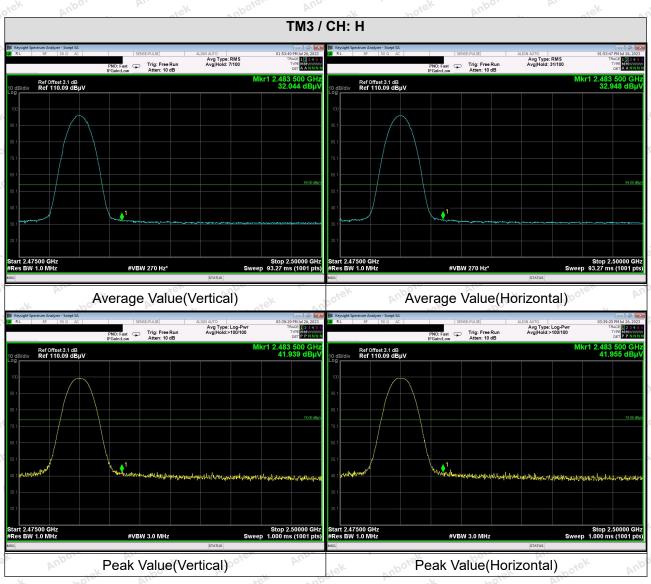
Temperature: 22.7 °C Humidity: 50.2 % Atmospheric Pressure: 102 kPa







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### Remark:

1. Only the worst case is recorded in the report.





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# 11. Emissions in restricted frequency bands (below 1GHz)

Test Requirement:	restricted bands, as defined	, In addition, radiated emissions d in § 15.205(a), must also comp ecified in § 15.209(a)(see § 15.2	ly with the
k Anbotek Anbot	Frequency (MHz)	Field strength (microvolts/meter)	Measurement distance (meters)
o k. Lotek	0.009-0.490	2400/F(kHz)	300 Mport
aboren And	0.490-1.705	24000/F(kHz)	30
atek Aubotes.	1.705-30.0	30° h	30
Anbo	30-88	100 **	3rek note
Tabotek Andre	88-216	150 **	3
Test Limit:	216-960	200 **	3 botes And
Anbo. A.	Above 960	500 Morell Ambou	3 rek ont
nbotek Anbotek Anbotek Anbotek Anbotek	intentional radiators operati frequency bands 54-72 MH	ragraph (g), fundamental emissi ing under this section shall not b lz, 76-88 MHz, 174-216 MHz or chese frequency bands is permitt	e located in the 470-806 MHz.
Test Method:	ANSI C63.10-2020 section	6.6.4 Andrew	Anbores And
Procedure:	ANSI C63.10-2020 section	6.6.4 Anbore	Aupotek Aup

# 11.1. EUT Operation

Operating Environment:	Aupor Annotek Aupore, Auporek Aupor
Anbotek Anbotek	1: TX-GFSK (Non-Hopping): Keep the EUT in continuously transmitting mode (non-hopping) with GFSK modulation. 2: TX-π/4 DQPSK (Non-Hopping): Keep the EUT in continuously
Test mode:	transmitting mode (non-hopping) with π/4 DQPSK modulation.
sek Anbotek Anbo	3: TX-8DPSK (Non-Hopping): Keep the EUT in continuously transmitting mode (non-hopping) with 8DPSK modulation.
potek Anbore And	Tiek Auborek Aubore Andre Andr

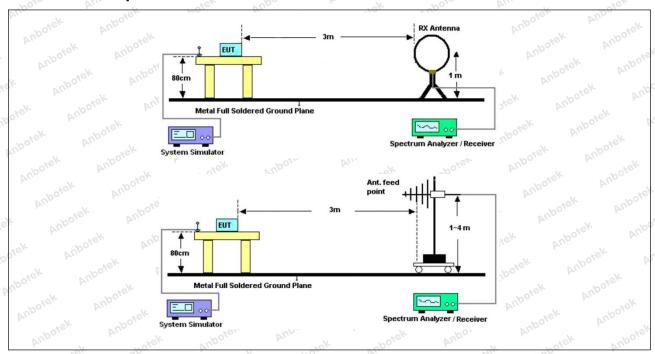






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# 11.2. Test Setup



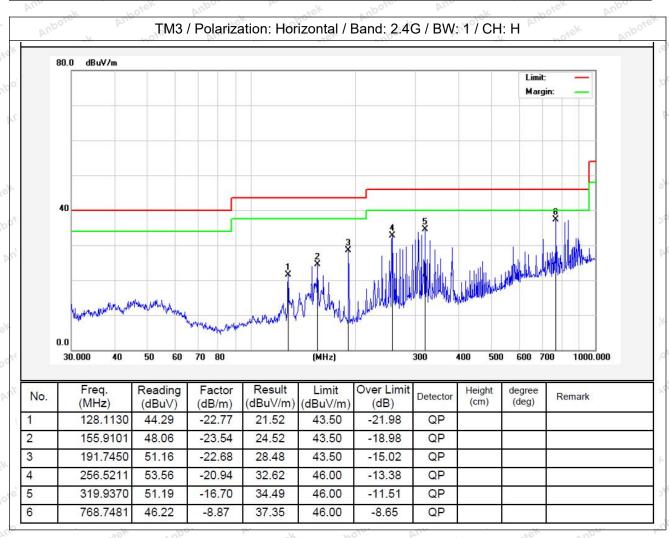




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### 11.3. Test Data

mperature: 24 °C	Humidity: 52.9 %	Atmospheric Pressure:	101 kPa
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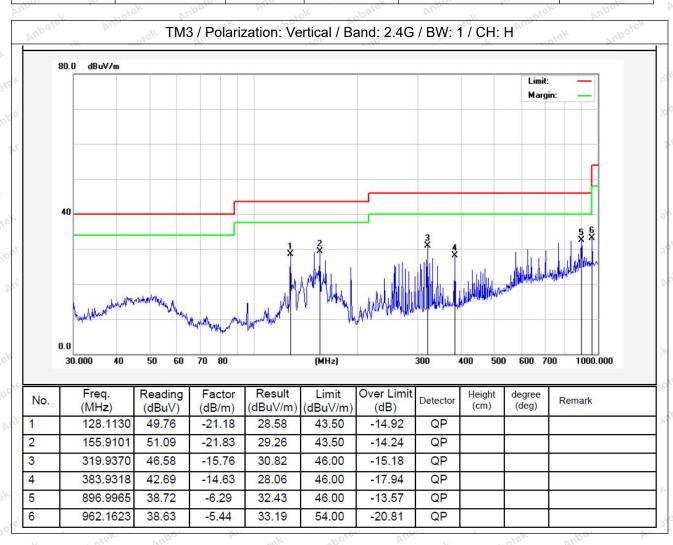






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Temperature: 24 °C Humidity: 52.9 % Atmospheric Pressure: 101 kPa



Note: Only record the worst data in the report.







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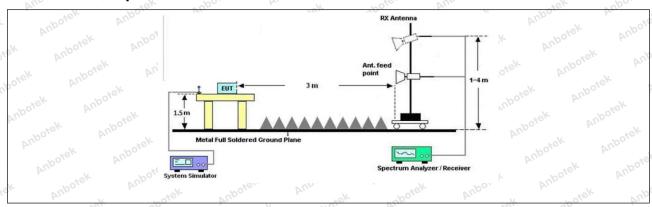
# 12. Emissions in restricted frequency bands (above 1GHz)

Test Requirement:	80'	ons which fall in the restricted background $5(c)$ .	· · · · · · · · · · · · · · · · · · ·
otek Anbotek An	Frequency (MHz)	Field strength (microvolts/meter)	Measurement distance (meters)
Aupor Ar. Stek	0.009-0.490	2400/F(kHz)	300
abotek Anbe	0.490-1.705	24000/F(kHz)	30
VII.	1.705-30.0	30 nbor	30 And
Anbo. Ar	30-88	100 **	3 rek abote
K- 11-botek Anbo.	88-216	150 **	3,000
Test Limit:	216-960	200 **	3 boten And
otek Anbor Ar.	Above 960	500 Anborr	3 A. Joh
nbotek Anbotek Anbotek Anbotek Anbotek Anbotek	intentional radiators operatifrequency bands 54-72 MH	ragraph (g), fundamental emissi ing under this section shall not b lz, 76-88 MHz, 174-216 MHz or hese frequency bands is permitt	e located in the 470-806 MHz.
Test Method:	ANSI C63.10-2020 section	6.6.4 Anbor An Morek	Aupoter Aup
Procedure:	ANSI C63.10-2020 section	6.6.4 Anbore And	Upotek b

# 12.1. EUT Operation

Operating Environment:	Anbotek Anbotek Anbotek Anbotek Anbotek
Anbotek Anbotek	1: TX-GFSK (Non-Hopping): Keep the EUT in continuously transmitting mode (non-hopping) with GFSK modulation.
Test mode:	2: TX-π/4 DQPSK (Non-Hopping): Keep the EUT in continuously transmitting mode (non-hopping) with π/4 DQPSK modulation.
potek Anbotek Ant	3: TX-8DPSK (Non-Hopping): Keep the EUT in continuously transmitting mode (non-hopping) with 8DPSK modulation.
Sofek Anbore	And the hotek Anbore And thek

### 12.2. Test Setup









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# 12.3. Test Data

Temperature: 22.7 °C	Humidity: 50.2 %	Atmospheric Pressure:	102 kPa
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- Ac	POL VILLE	· · · · · · · · · · · · · · · · · · ·	TMO ( OUT !	**	-k <sub>010</sub>	b1
			TM3 / CH: L			
Peak value:						
Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	polarization
4804.00	29.43	15.27	44.70	74.00	-29.30	Vertical
7206.00	30.21	18.09	48.30	74.00	-25.70	Vertical
9608.00	31.81	23.76	55.57	74.00	-18.43	Vertical
12010.00	Aupole * Al	, e <sup>k</sup>	abotek Anb	74.00	otek Anbote	Vertical
14412.00	*Upo*sk	Anbo.	hotek b	74.00	iek onk	Vertical
4804.00	29.62	15.27	44.89	74.00	-29.11	Horizontal
7206.00	31.22	18.09	49.31	74.00	-24.69	Horizontal
9608.00	29.21	23.76	52.97	74.00	-21.03	Horizontal
12010.00	otek * Aupo	-k 20	ick Aupole	74.00	. nbotek	Horizontal
14412.00	woick* An	DOJE. VILL	sek spo	74.00	K hore	Horizontal
Average value: Frequency	Reading	Factor	Result	Limit	Over Limit	
(MHz)	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	polarization
4804.00	18.81	15.27	34.08	54.00	-19.92	Vertical
7206.00	19.24	18.09	37.33	54.00	-16.67	Vertical
9608.00	20.83	23.76	44.59	54.00	-9.41 pot <sup>el</sup>	Vertical
12010.00	NO tok	Anbore. An	iek	54.00 M	. by.	Vertical
14412.00	Ant *	anboiek	Aupo, ok	54.00	ipole, Aug	Vertical
4804.00	17.97	15.27	33.24	54.00	-20.76	Horizontal
7206.00	20.28	18.09	38.37	54.00	-15.63	Horizontal
9608.00	18.52	23.76	42.28	54.00	-11.72	Horizontal
12010.00	-10× *	otek Wipor	-K NOT	54.00	YUP.	Horizontal
14412.00	Vpo. *	sorek Ant	oto And	54.00	ek Aupo	Horizontal



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				botek	Anbor	rek
			TM3/ CH: M			
Peak value:						
Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	polarization
4882.00	29.45	15.42	44.87	74.00	-29.13	Vertical
7323.00	30.06	18.02	48.08	74.00	-25.92	Vertical
9764.00	30.82	23.80	54.62	74.00	-19.38	Vertical
12205.00	ek * nbotek	Anbor	hotek	74.00	And	Vertical
14646.00	* * *	ick Aupore	Vun	74.00	Vupo	Vertical
4882.00	29.32	15.42	44.74	74.00	-29.26	Horizontal
7323.00	31.21	18.02	49.23	74.00	-24.77	Horizontal
9764.00	28.91	23.80	52.71	74.00	-21.29	Horizontal
12205.00	* otek	Anboie	Ant	74.00	YUpo, ok	Horizontal
14646.00	A.* Otek	nbotek	Aupo.	74.00	Anbore	Horizontal
Average value:						
Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	polarization
4882.00	18.54	15.42	33.96	54.00	-20.04	Vertical
7323.00	19.34	18.02	37.36	54.00	-16.64	Vertical
9764.00	20.69	23.80	44.49	54.00	-9.51	Vertical
12205.00	k *upor	All Siek	anbotek	54.00	boiek	Vertical
14646.00	otek * Anboti	Andre	ek abotek	54.00	Riv Lotek	Vertical
4882.00	17.88	15.42 15.42	33.30	54.00	-20.70	Horizontal
7323.00	19.84	18.02	37.86	54.00	-16.14	Horizontal
9764.00	19.03	23.80	42.83	54.00	100tek-11.17 Anb	Horizontal
12205.00	Anb*otek	Aupo "GK	abotek	54.00	wotek b	Horizontal
14646.00	* botek	Anbo	B. Olek	54.00	And	Horizontal



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Ler, VUD	- rek	Vupo,	N. OK	-hote.	VUD.	rek.
		•	TM3 / CH: H			
Peak value:						
Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	polarization
4960.00	29.72	15.58	45.30	74.00	-28.70	Vertical
7440.00	30.07	17.93	48.00	74.00	-26.00	Vertical
9920.00	31.37	23.83	55.20	74.00	-18.80	Vertical
12400.00	* work	Aupoter	And	74.00	Aupo,	Vertical
14880.00	* And	rek Spotel	Aupo.	74.00	Anbore.	Vertical
4960.00	29.39	15.58	44.97	74.00	-29.03	Horizontal
7440.00	31.24	17.93	49.17	74.00	-24.83	Horizontal
9920.00	29.59	23.83	53.42	74.00	-20.58	Horizontal
12400.00	Anb * *ek	abotek	Aupo,	74.00	Aupore, Au	Horizontal
14880.00	MAP OF	hotek hotek	Anbores	74.00	anbotek	Horizontal
Average value:						
Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	polarization
4960.00	19.66	15.58	35.24	54.00	-18.76	Vertical
7440.00	20.35	17.93	38.28	54.00	15.72 M	Vertical
9920.00	21.24	23.83	45.07	54.00	-8.93	Vertical
12400.00	k anbotek	Anbo	hotek	54.00	And	Vertical
14880.00	ok hot	sk Pupole	Aur	54.00	Vupo.	Vertical
4960.00	19.32	15.58	34.90	54.00	-19.10	Horizontal
7440.00	21.21	17.93	39.14	54.00	-14.86	Horizontal
9920.00	18.93	23.83	42.76	54.00	-11.24	Horizontal
12400.00	* tek	Aupoles	Aug.	54.00	Ipo. by	Horizontal
14880 00	An*	hotek	Anbo	54 00	Aupore P	Horizontal

### Remark:

- 1. Result =Reading + Factor
- 2. "\*" means the test results were attenuated more than 20dB below the permissible limits, so the results don't record in the report.
- 3. Only the worst case is recorded in the report.







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# APPENDIX I -- TEST SETUP PHOTOGRAPH

Please refer to separated files Appendix I -- Test Setup Photograph\_RF

### APPENDIX II -- EXTERNAL PHOTOGRAPH

Please refer to separated files Appendix II -- External Photograph

# APPENDIX III -- INTERNAL PHOTOGRAPH

Please refer to separated files Appendix III -- Internal Photograph

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

