

# **Test Report**

**Report No.:** MTi240509006-09E1

**Date of issue:** 2024-05-25

**Applicant:** Shenzhen Baseus Technology Co., Ltd.

**Product:** Baseus Portable Wireless Speaker

**Model(s):** Baseus AeQur 35 Pro Air

**FCC ID:** 2A482-35PROAIR

Shenzhen Microtest Co., Ltd. http://www.mtitest.cn



# Instructions

- 1. This test report shall not be partially reproduced without the written consent of the laboratory.
- 2. The test results in this test report are only responsible for the samples submitted
- 3. This test report is invalid without the seal and signature of the laboratory.
- This test report is invalid if transferred, altered, or tampered with in any form without authorization.
- 5. Any objection to this test report shall be submitted to the laboratory within 15 days from the date of receipt of the report.

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Test Result Certification				
Applicant:	Shenzhen Baseus Technology Co., Ltd.			
Address:	2nd Floor, Building B, Baseus Intelligence Park, No.2008, Xuegang Rd, Gangtou Community, Bantian Street, Longgang District, Shenzhen, China.			
Manufacturer:	Shenzhen Baseus Technology Co., Ltd.			
Address:	2nd Floor, Building B, Baseus Intelligence Park, No.2008, Xuegang Rd, Gangtou Community, Bantian Street, Longgang District, Shenzhen, China.			
Factory:	Dolphin Electronics(DongGuan)CoLtd.			
Address:	Building 3,No.2 Baolong Road,Houjie Town, Dongguan City,Guangdong Province			
Product description				
Product name:	Baseus Portable Wireless Speaker			
Trademark:	baseus			
Model name:	Baseus AeQur 35 Pro Air			
Series Model(s):	N/A			
Standards:	47 CFR Part 15.247			
Test Method:	KDB 558074 D01 15.247 Meas Guidance v05r02 ANSI C63.10-2020			
Date of Test				
Date of test:	2024-05-14 to 2024-05-22			
Test result:	Pass			

Test Engineer :	:	Yanice Xie
		(Yanice.Xie)
Reviewed By :	:	Dowid. Cee
		(David Lee)
Approved By :	:	leon chan
		(Leon Chen)



# 1 General Description

# 1.1 Description of the EUT

Product name:	Baseus Portable Wireless Speaker
Model name:	Baseus AeQur 35 Pro Air
Series Model(s):	N/A
Model difference:	N/A
Electrical rating:	Input:5V□1000mA Speaker capacity:DC 3.7V 1200mAh/4.44Wh
Accessories:	N/A
Hardware version:	V1.1
Software version:	V26
Test sample(s) number:	MTi240509006-09S1001
RF specification	
Bluetooth version:	V5.4
Operating frequency range:	2402-2480MHz
Channel number:	79
Modulation type:	GFSK,π/4-DQPSK,8DPSK
Antenna(s) type:	PCB Antenna
Antenna(s) gain:	2.36 dBi
1.0 December of toot	

## 1.2 Description of test modes

No.	Emission test modes
Mode1	TX-GFSK
Mode2	TX-π/4-DQPSK
Mode3	TX-8DPSK

#### 1.2.1 Operation channel list

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
0	2402	20	2422	40	2442	60	2462
1	2403	21	2423	41	2443	61	2463
2	2404	22	2424	42	2444	62	2464
3	2405	23	2425	43	2445	63	2465
4	2406	24	2426	44	2446	64	2466
5	2407	25	2427	45	2447	65	2467
6	2408	26	2428	46	2448	66	2468
7	2409	27	2429	47	2449	67	2469
8	2410	28	2430	48	2450	68	2470

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9	2411	29	2431	49	2451	69	2471
10	2412	30	2432	50	2452	70	2472
11	2413	31	2433	51	2453	71	2473
12	2414	32	2434	52	2454	72	2474
13	2415	33	2435	53	2455	73	2475
14	2416	34	2436	54	2456	74	2476
15	2417	35	2437	55	2457	75	2477
16	2418	36	2438	56	2458	76	2478
17	2419	37	2439	57	2459	77	2479
18	2420	38	2440	58	2460	78	2480
19	2421	39	2441	59	2461	-	-

#### **Test Channel List**

Operation Band: 2400-2483.5 MHz

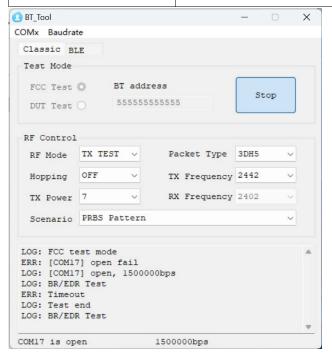
	Bandwidth Lowest Channel (LCH)		Middle Channel (MCH)	Highest Channel (HCH)
	(MHz)	(MHz)	(MHz)	(MHz)
Ī	/	2402	2441	2480

Note: The test software provided by manufacturer is used to control EUT for working in engineering mode, that enables selectable channel, and capable of continuous transmitting mode.

#### **Test Software:**

For power setting, refer to below table.

Mode	2402MHz	2441MHz	2480MHz		
GFSK	7	7	7		
π/4-DQPSK 7		7	7		
8DPSK	7	7	7		





#### 1.3 Environmental Conditions

During the measurement the environmental conditions were within the listed ranges:

Temperature:	15°C ~ 35°C
Humidity:	20% RH ~ 75% RH
Atmospheric pressure:	98 kPa ~ 101 kPa

#### 1.4 Description of support units

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

Support equipment list					
Description	Model	Serial No.	Manufacturer		
Mobile phone(iQOO V2061A		/	Vivo		
Support cable list					
Description	Length (m)	From	То		
/	/	/	/		

#### 1.5 Measurement uncertainty

Measurement	Uncertainty
Conducted emissions (AMN 150kHz~30MHz)	±3.1dB
Occupied channel bandwidth	±3 %
RF output power, conducted	±1 dB
Time	±1 %
Unwanted Emissions, conducted	±1 dB
Radiated spurious emissions (above 1GHz)	±5.3dB
Radiated spurious emissions (9kHz~30MHz)	±4.3dB
Radiated spurious emissions (30MHz~1GHz)	±4.7dB
Temperature	±1 °C
Humidity	±5%

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



# 2 Summary of Test Result

No.	Item	Standard	Requirement	Result
1	Antenna requirement	47 CFR Part 15.247	47 CFR 15.203	Pass
2	Conducted Emission at AC power line	47 CFR Part 15.247	47 CFR 15.207(a)	Pass
3	Occupied Bandwidth	47 CFR Part 15.247	47 CFR 15.215(c)	Pass
4	Maximum Conducted Output Power	47 CFR Part 15.247	47 CFR 15.247(b)(1)	Pass
5	Channel Separation	47 CFR Part 15.247	47 CFR 15.247(a)(1)	Pass
6	Number of Hopping Frequencies	47 CFR Part 15.247	47 CFR 15.247(a)(1)(iii)	Pass
7	Dwell Time	47 CFR Part 15.247	47 CFR 15.247(a)(1)(iii)	Pass
8	RF conducted spurious emissions and band edge measurement	47 CFR Part 15.247	47 CFR 15.247(d), 15.209, 15.205	Pass
9	Band edge emissions (Radiated)	47 CFR Part 15.247	47 CFR 15.247(d), 15.209, 15.205	Pass
10	Radiated emissions (below 1GHz)	47 CFR Part 15.247	47 CFR 15.247(d), 15.209, 15.205	Pass
11	Radiated emissions (above 1GHz)	47 CFR Part 15.247	47 CFR 15.247(d), 15.209, 15.205	Pass



# 3 Test Facilities and accreditations

## 3.1 Test laboratory

Test laboratory:	Shenzhen Microtest Co., Ltd.
Test site location:	101, No.7, Zone 2, Xinxing Industrial Park, Fuhai Avenue, Xinhe Community, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China
Telephone:	(86-755)88850135
Fax:	(86-755)88850136
CNAS Registration No.:	CNAS L5868
FCC Registration No.:	448573
IC Registration No.:	21760
CABID:	CN0093



# 4 List of test equipment

	List of test equipm					
No.	Equipment	Manufacturer	Model	Serial No.	Cal. date	Cal. Due
		Conducted En	nission at AC po	wer line		
1	EMI Test Receiver	Rohde&schwarz	ESCI3	101368	2024-03-20	2025-03-19
2	Artificial mains network	Schwarzbeck	NSLK 8127	183	2024-03-21	2025-03-20
3	Artificial Mains Network	Rohde & Schwarz	ESH2-Z5	100263	2024-03-20	2025-03-19
		Number of	Hopping Freque	ncies		
		Emissions in non- Occu Maximum Co		•		
1	Wideband Radio Communication Tester	Rohde&schwarz	CMW500	149155	2024-03-20	2025-03-19
2	ESG Series Analog Ssignal Generator	Agilent	E4421B	GB40051240	2024-03-21	2025-03-20
3	PXA Signal Analyzer	Agilent	N9030A	MY51350296	2024-03-21	2025-03-20
4	Synthesized Sweeper	Agilent	83752A	3610A01957	2024-03-21	2025-03-20
5	MXA Signal Analyzer	Agilent	N9020A	MY50143483	2024-03-21	2025-03-20
6	RF Control Unit	Tonscend	JS0806-1	19D8060152	2024-03-21	2025-03-20
7	Band Reject Filter Group	Tonscend	JS0806-F	19D8060160	2024-03-21	2025-03-20
8	ESG Vector Signal Generator	Agilent	N5182A	MY50143762	2024-03-20	2025-03-19
9	DC Power Supply	Agilent	E3632A	MY40027695	2024-03-21	2025-03-20
		Band edge Emissions in frequency	emissions (Radi uency bands (ab			
1	EMI Test Receiver	Rohde&schwarz	ESCI7	101166	2024-03-20	2025-03-19
2	Double Ridged Broadband Horn Antenna	schwarabeck	BBHA 9120 D	2278	2023-06-17	2025-06-16
3	Amplifier	Agilent	8449B	3008A01120	2024-03-20	2025-03-19
4	MXA signal analyzer	Agilent	N9020A	MY54440859	2024-03-21	2025-03-20
5	PXA Signal Analyzer	Agilent	N9030A	MY51350296	2024-03-21	2025-03-20
6	Horn antenna	Schwarzbeck	BBHA 9170	00987	2023-06-17	2025-06-16
7	Pre-amplifier	Space-Dtronics	EWLAN1840 G	210405001	2024-03-21	2025-03-20
		Emissions in freq	uency bands (be	elow 1GHz)		
1	EMI Test Receiver	Rohde&schwarz	ESCI7	101166	2024-03-20	2025-03-19
2	TRILOG Broadband Antenna	schwarabeck	VULB 9163	9163-1338	2023-06-11	2025-06-10
3	Active Loop Antenna	Schwarzbeck	FMZB 1519 B	00066	2024-03-23	2025-03-22
4	Amplifier	Hewlett-Packard	8447F	3113A06184	2024-03-20	2025-03-19



# 5 Evaluation Results (Evaluation)

# 5.1 Antenna requirement

Test Requirement:	Refer to 47 CFR Part 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section.
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#### 5.1.1 Conclusion:

The antenna of the EUT is permanently attached.

The EUT complies with the requirement of FCC PART 15.203.



# 6 Radio Spectrum Matter Test Results (RF)

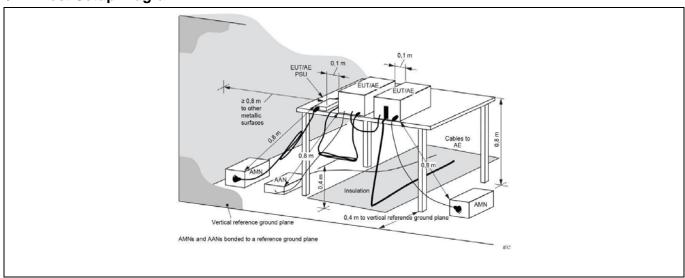
# 6.1 Conducted Emission at AC power line

Test Requirement:	Refer to 47 CFR 15.207(a), Excessection, for an intentional radiated public utility (AC) power line, the back onto the AC power line on a 150 kHz to 30 MHz, shall not exame as ured using a 50 µH/50 ohm (LISN).	or that is designed to be radio frequency voltage any frequency or frequenceed the limits in the foll	connected to the that is conducted ncies, within the baowing table, as	
Test Limit:	Frequency of emission (MHz)	Conducted limit (dBµ\	/)	
		Quasi-peak	Average	
	0.15-0.5	66 to 56*	56 to 46*	
	0.5-5	56	46	
	5-30	60	50	
	*Decreases with the logarithm of	the frequency.	_	
Test Method:	ANSI C63.10-2020 section 6.2			
Procedure:	Refer to ANSI C63.10-2020 sect line conducted emissions from u			r-

#### 6.1.1 E.U.T. Operation:

Operating Envi	ironment:					
Temperature:	25.6 °C		Humidity:	56 %	Atmospheric Pressure:	101 kPa
Pre test mode:		Mode	e1, Mode2,	Mode3		
Final test mode	e:	All of the listed pre-test mode were tested, only the data of the worst mode (Mode1) is recorded in the report				

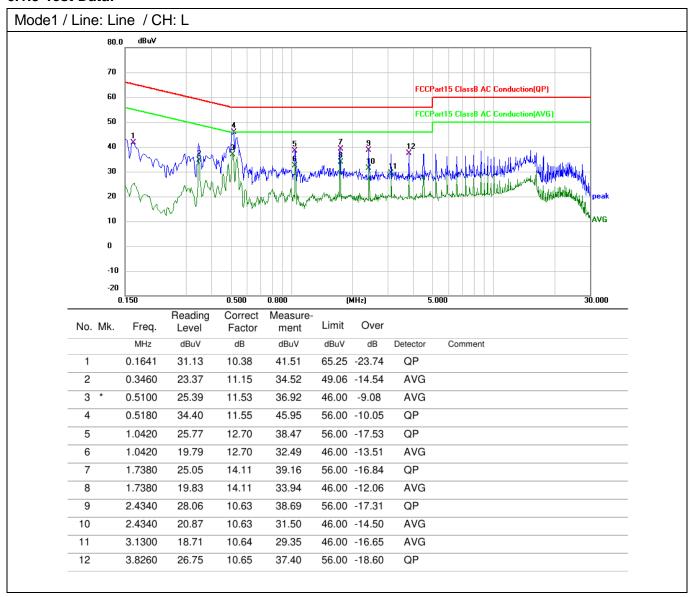
#### 6.1.2 Test Setup Diagram:

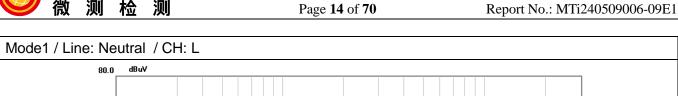


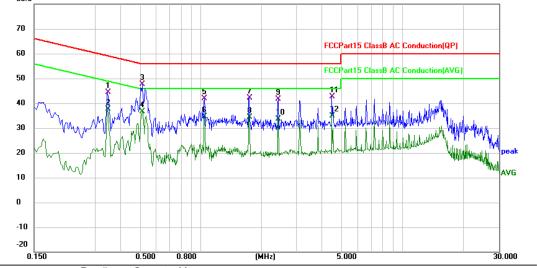
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#### 6.1.3 Test Data:







						,,			
No. M	k. Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over			
	MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment	
1	0.3460	33.28	11.15	44.43	59.06	-14.63	QP		
2	0.3460	26.56	11.15	37.71	49.06	-11.35	AVG		
3 *	0.5140	36.12	11.53	47.65	56.00	-8.35	QP		
4	0.5140	25.22	11.53	36.75	46.00	-9.25	AVG		
5	1.0460	29.08	12.72	41.80	56.00	-14.20	QP		
6	1.0460	21.88	12.72	34.60	46.00	-11.40	AVG		
7	1.7420	28.03	14.11	42.14	56.00	-13.86	QP		
8	1.7420	20.21	14.11	34.32	46.00	-11.68	AVG		
9	2.4380	31.10	10.63	41.73	56.00	-14.27	QP		
10	2.4380	22.99	10.63	33.62	46.00	-12.38	AVG		
11	4.4940	31.91	10.65	42.56	56.00	-13.44	QP		
12	4.4940	24.24	10.65	34.89	46.00	-11.11	AVG		



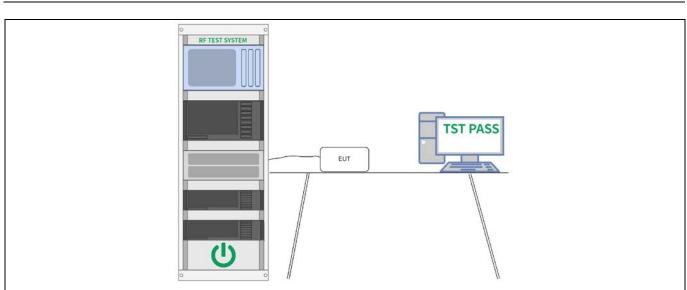
## 6.2 Occupied Bandwidth

Test Requirement:	47 CFR 15.215(c)
Test Limit:	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 ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated.
Test Method:	ANSI C63.10-2020, section 7.8.6, For occupied bandwidth measurements, use the procedure in 6.9.3. Frequency hopping shall be disabled for this test. KDB 558074 D01 15.247 Meas Guidance v05r02
Procedure:	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 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 (OBW/RBW)] below the reference level. Specific guidance is given in 4.1.6.2.  d) Step a) through step c) might require iteration to adjust within the 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 clearl

#### 6.2.1 E.U.T. Operation:

Operating Envi	ironment	•				
Temperature:	25 °C		Humidity:	56 %	Atmospheric Pressure:	99 kPa
Pre test mode:		Mode	e1, Mode2,	Mode3		
Final test mode	e:	Mode	e1, Mode2,	Mode3		

#### 6.2.2 Test Setup Diagram:



6.2.3 Test Data:



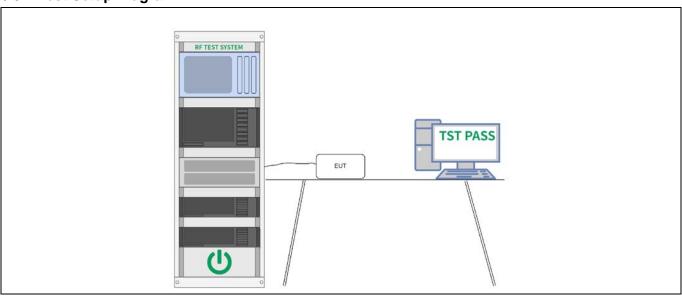
## 6.3 Maximum Conducted Output Power

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 KDB 558074 D01 15.247 Meas Guidance v05r02
Procedure:	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.  f) Trace: Max-hold.  g) Allow trace to stabilize.  h) Use the marker-to-peak function to set the marker to the peak of the emission.  i) The indicated level is the peak output power, after any corrections for 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.

#### 6.3.1 E.U.T. Operation:

Operating Envi	ironment					
Temperature:	25 °C		Humidity:	56 %	Atmospheric Pressure:	99 kPa
Pre test mode:		Mode	e1, Mode2,	Mode3		
Final test mode	e:	Mode	e1, Mode2,	Mode3		

## 6.3.2 Test Setup Diagram:



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#### 6.3.3 Test Data:



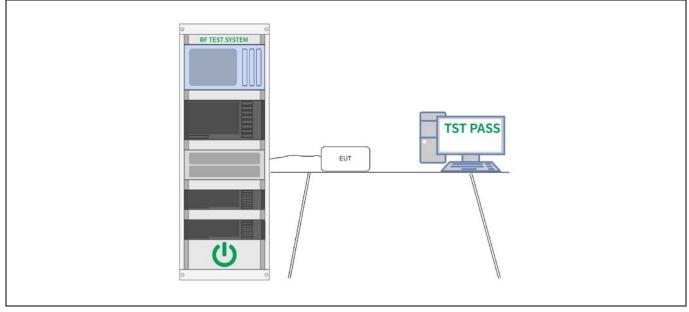
#### 6.4 Channel Separation

Test Method:  Procedure:  hop the Alte bar kH: is get that AN KD  The analysis and the Anal	Ifer to 47 CFR 15.247(a)(1), Frequency hopping systems shall have pping channel carrier frequencies separated by a minimum of 25 kHz or 20 dB bandwidth of the hopping channel, whichever is greater. ernatively, frequency hopping systems operating in the 2400-2483.5 MHz and may have hopping channel carrier frequencies that are separated by 25 z or two-thirds of the 20 dB bandwidth of the hopping channel, whichever greater, provided the systems operate with an output power no greater in 125 mW.  ISI C63.10-2020, section 7.8.2  ISI C63.10-2020, section 7.8.2  ISI C63.10-2020, section 7.8.2
Procedure: KD	·
ana	
spa cha c) V d) S e) I f) T g) /	e EUT shall have its hopping function enabled. Use the following spectrum alyzer settings:  Span: Wide enough to capture the peaks of two adjacent channels.  RBW: Start with the RBW set to approximately 30% of the channel acing; adjust as necessary to best identify the center of each individual annel.  Video (or average) bandwidth (VBW) ≥ RBW.  Sweep: No faster than coupled (auto) time.  Detector function: Peak.  Trace: Max-hold.  Allow the trace to stabilize.  e the marker-delta function to determine the separation between the peaks the adjacent channels. Compliance of an EUT with the appropriate gulatory limit shall be determined. A spectral plot of the data shall be

## 6.4.1 E.U.T. Operation:

Operating Env	ironment					
Temperature:	25 °C		Humidity:	56 %	Atmospheric Pressure:	99 kPa
Pre test mode:		Mode	e1, Mode2,	Mode3		
Final test mode	e:	Mode	e1, Mode2,	Mode3		

#### 6.4.2 Test Setup Diagram:



#### 6.4.3 Test Data:



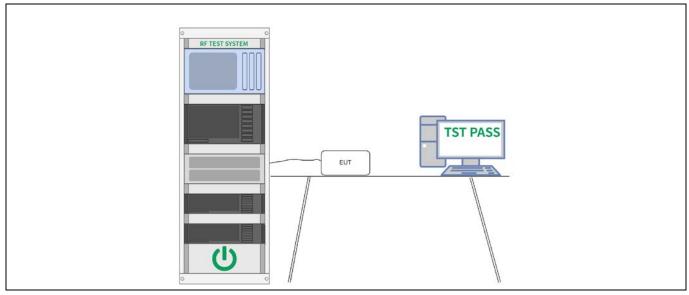
## 6.5 Number of Hopping Frequencies

Test Requirement:	47 CFR 15.247(a)(1)(iii)
Test Limit:	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 KDB 558074 D01 15.247 Meas Guidance v05r02
Procedure:	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.

#### 6.5.1 E.U.T. Operation:

Operating Envi	ironment	ı				
Temperature:	25 °C		Humidity:	56 %	Atmospheric Pressure:	99 kPa
Pre test mode:		Mode	e1, Mode2,	Mode3		
Final test mode	э:	Mode	e1, Mode2,	Mode3		

#### 6.5.2 Test Setup Diagram:



#### 6.5.3 Test Data:



#### 6.6 Dwell Time

Test Requirement:	47 CFR 15.247(a)(1)(iii)
Test Limit:	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 KDB 558074 D01 15.247 Meas Guidance v05r02
Procedure:	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.
	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 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.</li> <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> <li>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 these two markers.</li> </ul>
	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.

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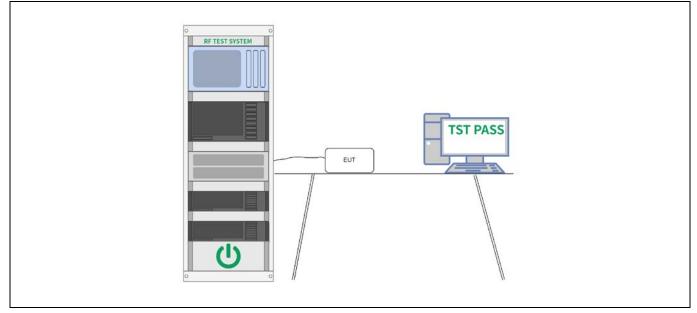
The average number of hops on the same channel within the regulatory observation period is calculated from the number of hops on the channel divided by the spectrum analyzer sweep time multiplied by the regulatory observation period. For example, if three hops are counted with an analyzer sweep time 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.

#### 6.6.1 E.U.T. Operation:

Operating Envi	ronment:						
Temperature:	25 °C		Humidity:	56 %	·	Atmospheric Pressure:	99 kPa
Pre test mode:		Mode	e1, Mode2,	Mode3			
Final test mode	<b>)</b> :	Mode	e1, Mode2,	Mode3			

#### 6.6.2 Test Setup Diagram:



#### 6.6.3 Test Data:



6.7 RF conducted spurious emissions and band edge measurement

Test Requirement:	47 CFR 15.247(d), 15.209, 15.205
Test Limit:	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 KDB 558074 D01 15.247 Meas Guidance v05r02
Procedure:	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.
	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 inband 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 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.

Report No.: MTi240509006-09E1

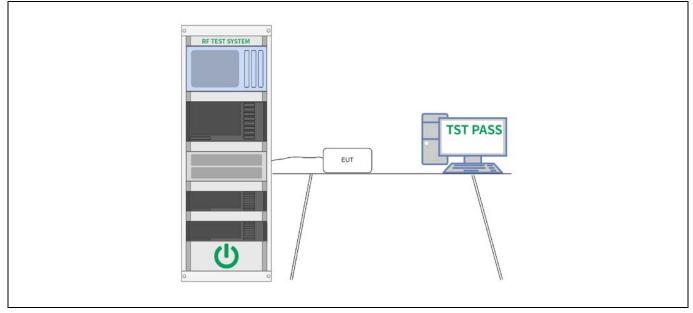
For measurements with the hopping disabled the analyzer screen shall clearly show compliance with the requirement within 10 MHz of the allocated band-edge.

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.

#### 6.7.1 E.U.T. Operation:

Operating Envi	ronment:					
Temperature:	25 °C		Humidity:	56 %	Atmospheric Pressure:	99 kPa
Pre test mode:		Mode	e1, Mode2,	Mode3		
Final test mode	<b>)</b> :	Mode	e1, Mode2,	Mode3		

#### 6.7.2 Test Setup Diagram:



#### 6.7.3 Test Data:



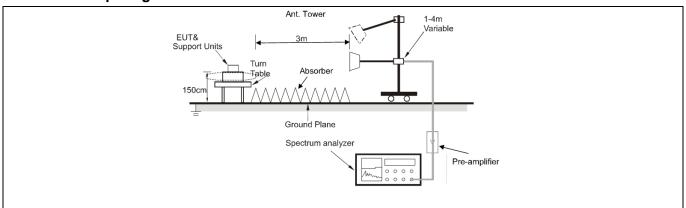
## 6.8 Band edge emissions (Radiated)

Test Requirement:	restricted bands, as de	17(d), In addition, radiated emerined in § 15.205(a), must als specified in § 15.209(a)(see	so comply with the
Test Limit:	Frequency (MHz)	Field strength (microvolts/meter)	Measuremen t distance (meters)
	0.009-0.490	2400/F(kHz)	300
	0.490-1.705	24000/F(kHz)	30
	1.705-30.0	30	30
	30-88	100 **	3
	88-216	150 **	3
	216-960	200 **	3
	Above 960	500	3
	intentional radiators of frequency bands 54-75. However, operation with sections of this part, each of the emission limits shadow and the employing a CISPR quality of the emission of the employing a CISPR quality and the employing a CISPR quality of the employing	in paragraph (g), fundamenta perating under this section shows 2 MHz, 76-88 MHz, 174-216 thin these frequency bands is a.g., §§ 15.231 and 15.241. Above, the tighter limit applies own in the above table are basi-peak detector except for a above 1000 MHz. Radiated to n measurements employing	all not be located in the MHz or 470-806 MHz. s permitted under other at the band edges. ased on measurements the frequency bands 9–90 emission limits in these
Test Method:	ANSI C63.10-2020 se KDB 558074 D01 15.2	ction 6.10 247 Meas Guidance v05r02	
Procedure:	ANSI C63.10-2020 se	ction 6.10.5.2	

#### 6.8.1 E.U.T. Operation:

Operating Envi	ironment:	1				
Temperature:	24 °C		Humidity:	54 %	Atmospheric Pressure:	101 kPa
Pre test mode:		Mode	e1, Mode2,	Mode3		
Final test mode	ə:			re-test mode w ded in the repo	rere tested, only the data ort	of the worst mode
Note: The amplitude reported.	of spurio	us em	issions whic	ch are attenuate	ed more than 20 dB below	v the limits are not

#### 6.8.2 Test Setup Diagram:





#### 6.8.3 Test Data:

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1		2310.000	54.20	-12.92	41.28	74.00	-32.72	peak
2		2310.000	43.49	-12.92	30.57	54.00	-23.43	AVG
3		2390.000	56.29	-12.49	43.80	74.00	-30.20	peak
4	*	2390.000	46.59	-12.49	34.10	54.00	-19.90	AVG

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1		2310.000	54.12	-12.92	41.20	74.00	-32.80	peak
2		2310.000	44.23	-12.92	31.31	54.00	-22.69	AVG
3		2390.000	52.75	-12.49	40.26	74.00	-33.74	peak
4	*	2390.000	44.10	-12.49	31.61	54.00	-22.39	AVG



No.	No. Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1		2483.500	62.93	-12.50	50.43	74.00	-23.57	peak
2	*	2483.500	51.40	-12.50	38.90	54.00	-15.10	AVG
3		2500.000	58.04	-12.41	45.63	74.00	-28.37	peak
4		2500.000	47.88	-12.41	35.47	54.00	-18.53	AVG

No.	Mk.	. Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1		2483.500	56.57	-12.50	44.07	74.00	-29.93	peak
2	*	2483.500	46.98	-12.50	34.48	54.00	-19.52	AVG
3		2500.000	55.21	-12.41	42.80	74.00	-31.20	peak
4		2500.000	44.92	-12.41	32.51	54.00	-21.49	AVG



#### 6.9 Radiated emissions (below 1GHz)

Test Requirement:	restricted bands, as de	7(d), In addition, radiated enfined in § 15.205(a), must als specified in § 15.209(a)(se	so comply with the
Test Limit:	Frequency (MHz)	Field strength (microvolts/meter)	Measuremen t distance (meters)
	0.009-0.490	2400/F(kHz)	300
	0.490-1.705	24000/F(kHz)	30
	1.705-30.0	30	30
	30-88	100 **	3
	88-216	150 **	3
	216-960	200 **	3
	Above 960	500	3
	intentional radiators op frequency bands 54-72 However, operation with sections of this part, e. In the emission table a The emission limits she employing a CISPR qu kHz, 110–490 kHz and	In paragraph (g), fundamental perating under this section shows the perating under this section shows the perating under this section shows the peration of th	hall not be located in the MHz or 470-806 MHz. It is permitted under other at the band edges. It is assed on measurements the frequency bands 9–90 emission limits in these
Test Method:	ANSI C63.10-2020 sec KDB 558074 D01 15.2	ction 6.6.4 47 Meas Guidance v05r02	
Procedure:	ANSI C63.10-2020 sec	ction 6.6.4	

#### 6.9.1 E.U.T. Operation:

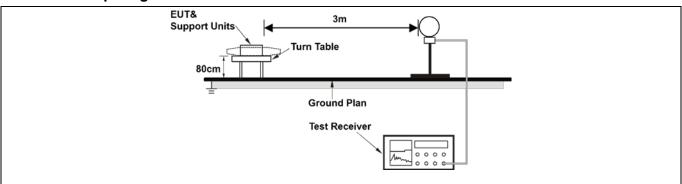
Operating Envi	ronment	ı				
Temperature:	24 °C		Humidity:	54 %	Atmospheric Pressure:	101 kPa
Pre test mode:		Mode	e1, Mode2,	Mode3		
Final test mode	e:		•	re-test mode w ded in the repo	vere tested, only the data or	of the worst mode
Mata.						

#### Note:

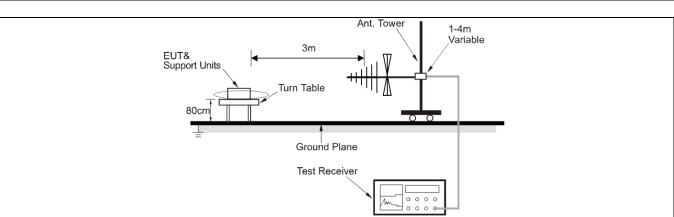
The amplitude of spurious emissions which are attenuated more than 20 dB below the limits are not reported.

All modes of operation of the EUT were investigated, and only the worst-case results are reported. There were no emissions found below 30MHz within 20dB of the limit.

#### 6.9.2 Test Setup Diagram:

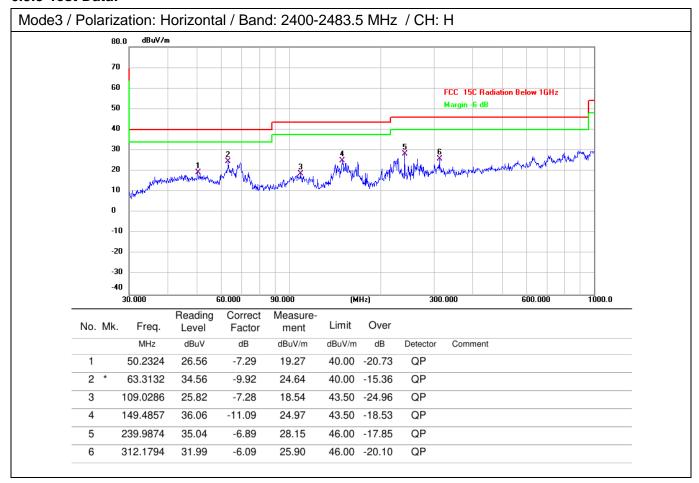


Address: 101, No. 7, Zone 2, Xinxing Industrial Park, Fuhai Avenue, Xinhe Community, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China. Tel: (86-755)88850135 Fax: (86-755) 88850136 Web: www.mtitest.cn E-mail: mti@51mti.com





#### 6.9.3 Test Data:



168.4138

239.9874

333.6867

4 5

6

35.04

38.54

31.74

-11.01

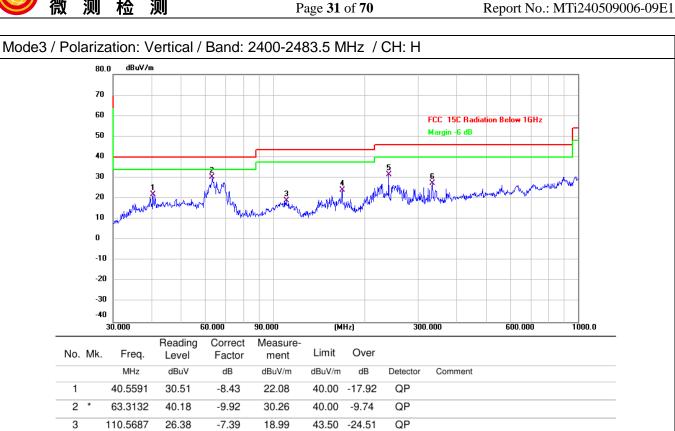
-6.89

-4.49

24.03

31.65

27.25



43.50 -19.47

46.00 -14.35

46.00 -18.75

QP

QP

QP



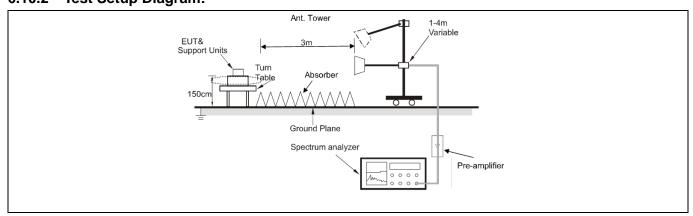
## 6.10 Radiated emissions (above 1GHz)

Test Requirement:		nissions which fall in the rest comply with the radiated em 5(c)).`	
Test Limit:	Frequency (MHz)	Field strength (microvolts/meter)	Measuremen t distance (meters)
	0.009-0.490	2400/F(kHz)	300
	0.490-1.705	24000/F(kHz)	30
	1.705-30.0	30	30
	30-88	100 **	3
	88-216	150 **	3
	216-960	200 **	3
	Above 960	500	3
	intentional radiators op frequency bands 54-72 However, operation wi sections of this part, e. In the emission table a The emission limits sh employing a CISPR qu kHz, 110-490 kHz and	in paragraph (g), fundamental perating under this section shows the perating under this section shows the perating under this section shows the peration of th	hall not be located in the MHz or 470-806 MHz. It is permitted under other at the band edges. It is assed on measurements the frequency bands 9–90 emission limits in these
Test Method:	ANSI C63.10-2020 see KDB 558074 D01 15.2	ction 6.6.4 47 Meas Guidance v05r02	
Procedure:	ANSI C63.10-2020 sec	ction 6.6.4	

#### 6.10.1 E.U.T. Operation:

Operating Envi	ronment	ı i						
Temperature:	24 °C		Humidity:	54 %	Atmospheric Pressure:	101 kPa		
Pre test mode:		Mode	e1, Mode2,	Mode3				
Final test mode	۶.				ere tested, only the data	of the worst mode		
		(Mode3) is recorded in the report						
Note: Test freq	uency are	e from	1GHz to 25	GHz, the ampl	itude of spurious emissior	ns which are		
attenuated mo	re than 2	0 dB b	elow the lim	its are not repo	orted.			
All modes of or	peration of	of the	EUT were in	vestigated, and	d only the worst-case resu	ults are reported.		

#### 6.10.2 Test Setup Diagram:





#### 6.10.3 Test Data:

Mode3 /	Polari	zatio	n: Horizonta	al / Band: 24	400-2483.5	MHz / CH:	L		
	No.	Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over	
			MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
	1		4804.000	48.63	-7.70	40.93	74.00	-33.07	peak
	2		4804.000	40.38	-7.70	32.68	54.00	-21.32	AVG
	3		7206.000	55.64	0.84	56.48	74.00	-17.52	peak
	4	*	7206.000	48.03	0.84	48.87	54.00	-5.13	AVG
	5		9608.000	48.61	1.81	50.42	74.00	-23.58	peak
	6		9608.000	40.55	1.81	42.36	54.00	-11.64	AVG

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1		4804.000	49.22	-7.70	41.52	74.00	-32.48	peak
2		4804.000	42.35	-7.70	34.65	54.00	-19.35	AVG
3		7206.000	51.17	0.84	52.01	74.00	-21.99	peak
4	*	7206.000	44.54	0.84	45.38	54.00	-8.62	AVG
5		9608.000	48.73	1.81	50.54	74.00	-23.46	peak
6		9608.000	41.81	1.81	43.62	54.00	-10.38	AVG



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1		4882.000	49.51	-7.84	41.67	74.00	-32.33	peak
2		4882.000	42.49	-7.84	34.65	54.00	-19.35	AVG
3		7323.000	54.86	0.61	55.47	74.00	-18.53	peak
4	*	7323.000	48.04	0.61	48.65	54.00	-5.35	AVG
5		9764.000	48.12	2.61	50.73	74.00	-23.27	peak
6		9764.000	41.04	2.61	43.65	54.00	-10.35	AVG

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1		4882.000	50.08	-7.84	42.24	74.00	-31.76	peak
2		4882.000	43.09	-7.84	35.25	54.00	-18.75	AVG
3		7323.000	51.20	0.61	51.81	74.00	-22.19	peak
4		7323.000	43.65	0.61	44.26	54.00	-9.74	AVG
5		9764.000	48.72	2.61	51.33	74.00	-22.67	peak
6	*	9764.000	41.67	2.61	44.28	54.00	-9.72	AVG



No	Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1		4960.000	50.39	-7.73	42.66	74.00	-31.34	peak
2		4960.000	42.31	-7.73	34.58	54.00	-19.42	AVG
3		7440.000	56.68	0.78	57.46	74.00	-16.54	peak
4	*	7440.000	48.84	0.78	49.62	54.00	-4.38	AVG
5		9920.000	47.77	2.47	50.24	74.00	-23.76	peak
6		9920.000	40.15	2.47	42.62	54.00	-11.38	AVG

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1		4960.000	50.02	-7.73	42.29	74.00	-31.71	peak
2		4960.000	42.38	-7.73	34.65	54.00	-19.35	AVG
3		7440.000	49.60	0.78	50.38	74.00	-23.62	peak
4	*	7440.000	41.87	0.78	42.65	54.00	-11.35	AVG
5		9920.000	48.04	2.47	50.51	74.00	-23.49	peak
6		9920.000	40.11	2.47	42.58	54.00	-11.42	AVG



# Photographs of the test setup

Refer to Appendix - Test Setup Photos.



## Photographs of the EUT

Refer to Appendix - EUT Photos



# Appendix



# Appendix A: 20dB Emission Bandwidth

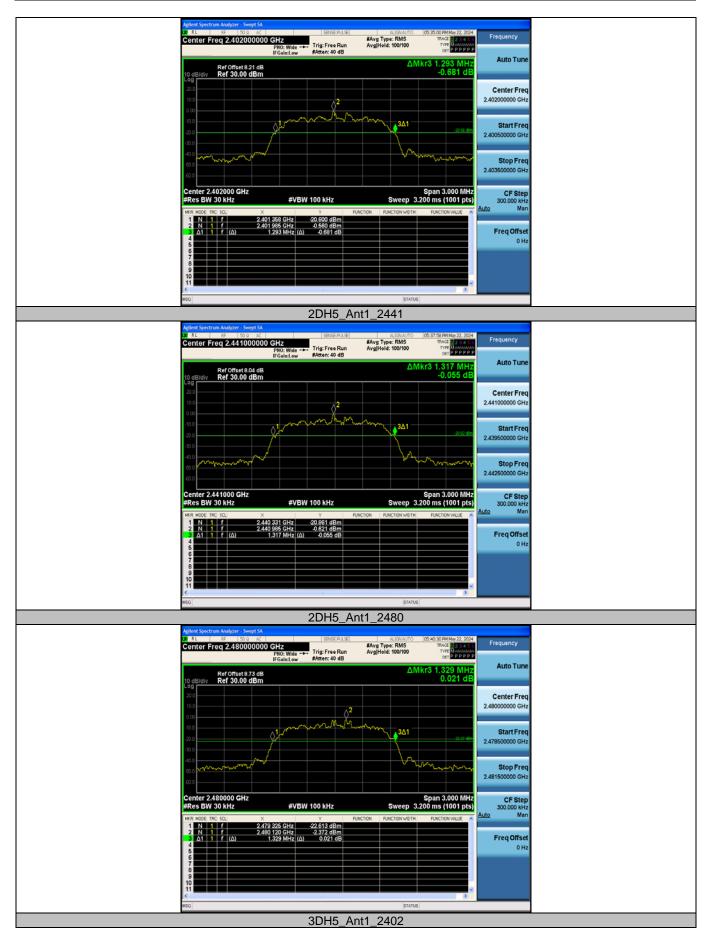
## Test Result

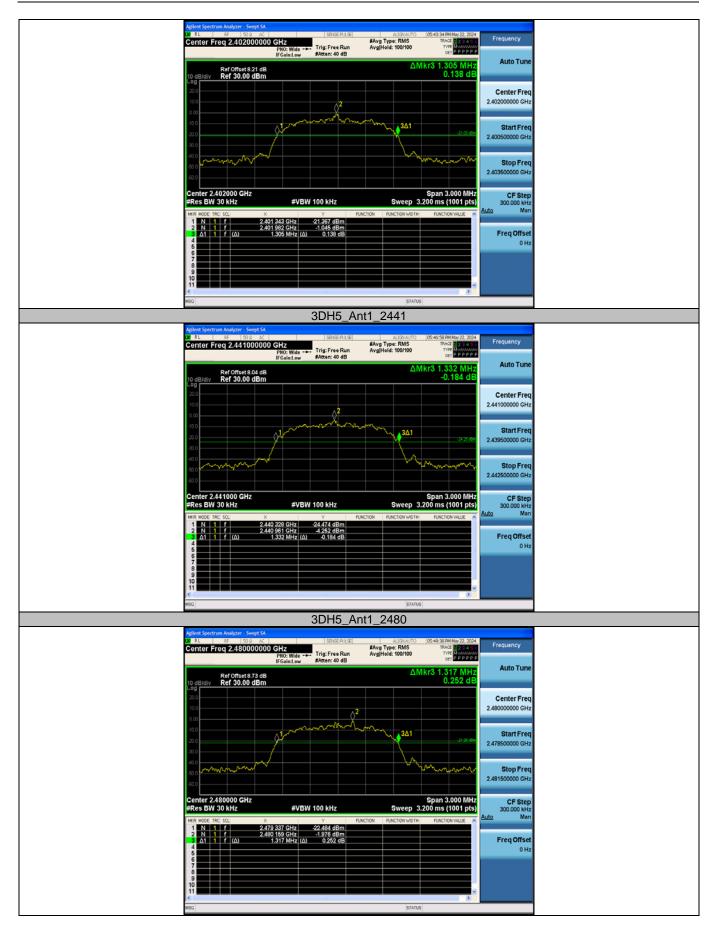
Test Mode	Antenna	Frequency [MHz]	20db EBW [MHz]
DH5		2402	0.957
	Ant1	2441	0.954
		2480	0.936
2DH5	Ant1	2402	1.293
		2441	1.317
		2480	1.329
3DH5	Ant1	2402	1.305
		2441	1.332
		2480	1.317











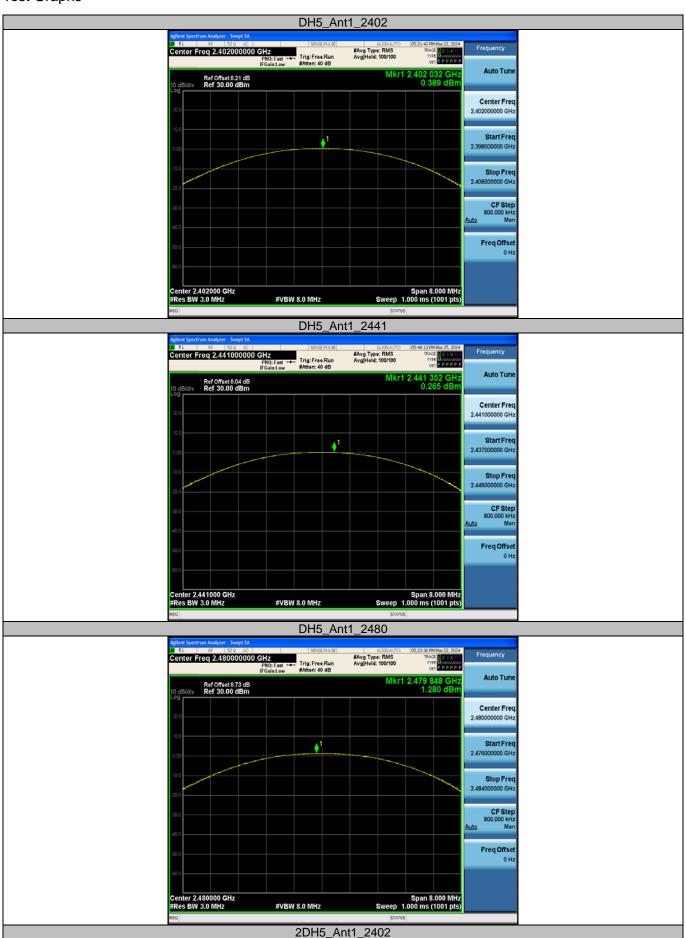


# Appendix B: Maximum conducted output power

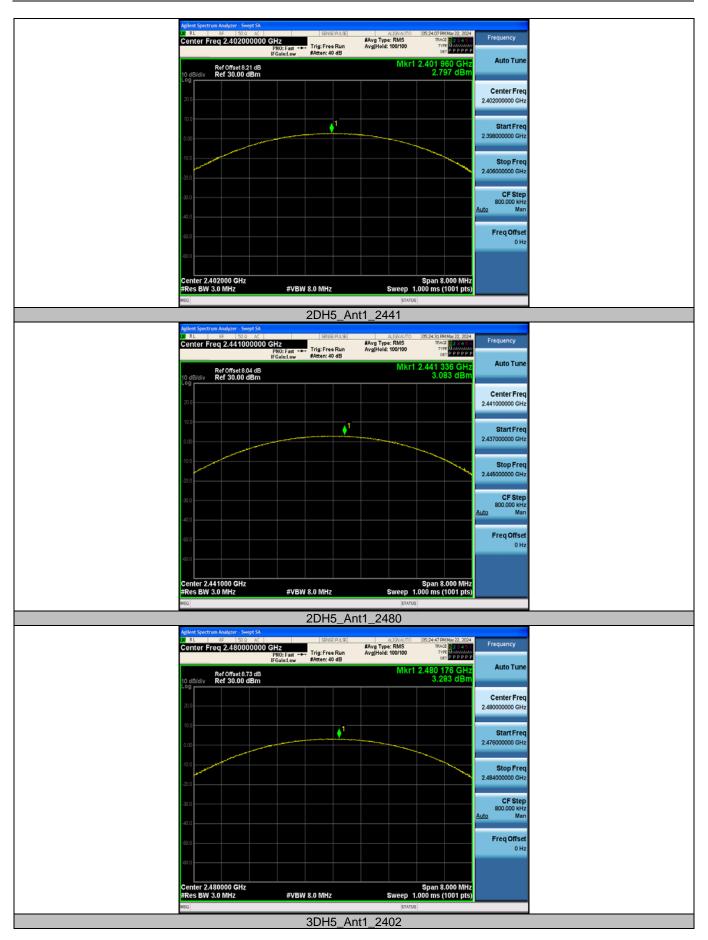
## Test Result Peak

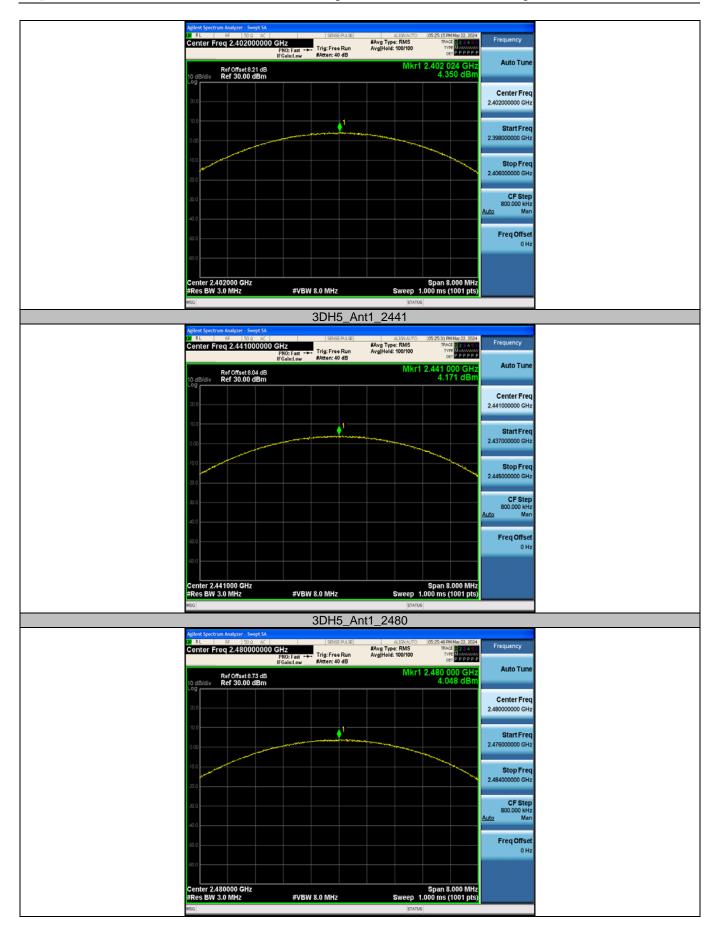
Test Mode	Antenna	Frequency [MHz]	Conducted Peak Power [dBm]	Limit [dBm]	Verdict
DH5	Ant1	2402	0.39	≤30	PASS
		2441	0.27	≤30	PASS
		2480	1.28	≤30	PASS
2DH5	Ant1	2402	2.80	≤20.97	PASS
		2441	3.08	≤20.97	PASS
		2480	3.28	≤20.97	PASS
3DH5	Ant1	2402	4.35	≤20.97	PASS
		2441	4.17	≤20.97	PASS
		2480	4.05	≤20.97	PASS













# **Appendix C: Carrier frequency separation**

## Test Result

Test Mode	Antenna	Frequency [MHz]	Result [MHz]	Limit [MHz]	Verdict
DH5	Ant1	Нор	0.998	≥0.638	PASS
2DH5	Ant1	Нор	0.998	≥0.886	PASS
3DH5	Ant1	Нор	1	≥0.888	PASS







## **Appendix D: Time of occupancy**

### Test Result

Test Mode	Antenna	Frequency [MHz]	BurstWidth [ms]	Hops in 31.6s [Num]	Result [s]	Limit [s]	Verdict
DH1	Ant1	Нор	0.405	317	0.128	≤0.4	PASS
DH3	Ant1	Нор	1.662	158	0.263	≤0.4	PASS
DH5	Ant1	Нор	2.911	99	0.288	≤0.4	PASS
2DH1	Ant1	Нор	0.415	316	0.131	≤0.4	PASS
2DH3	Ant1	Нор	1.667	152	0.253	≤0.4	PASS
2DH5	Ant1	Нор	2.915	110	0.321	≤0.4	PASS
3DH1	Ant1	Нор	0.415	317	0.132	≤0.4	PASS
3DH3	Ant1	Нор	1.664	161	0.268	≤0.4	PASS
3DH5	Ant1	Нор	2.917	107	0.312	≤0.4	PASS

### Notes:

- 1. Period time = 0.4s \* 79 = 31.6s
- 2. Result (Time of occupancy) = BurstWidth[ms] \* Hops in 31.6s [Num]



