



# **TEST REPORT**

Applicant Name : Address :

Report Number : FCC ID: INFINIX MOBILITY LIMITED FLAT 39 8/F BLOCK D WAH LOK INDUSTRIAL CENTRE 31-35 SHAN MEI STREET FOTAN NT Hong Kong SZNS211123-60257E-RF-00A 2AIZN-X689F

Test Standard (s)

FCC PART 15.247

# **Sample Description**

Product Type: Model No.: Multiple Model(s) No.: Trade Mark: Date Received: Date of Test: Report Date: Mobile Phone X689F N/A Infinix 2021/11/23 2021/12/09~2021/12/14 2021/12/17

Test Result:

Pass\*

\* In the configuration tested, the EUT complied with the standards above.

Prepared and Checked By:

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Fan Yang EMC Engineer

Approved By:

Candry . Li

Candy Li EMC Engineer

Note: This report may contain data that are not covered by the A2LA accreditation and are marked with an asterisk "\* ".

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# **GENERAL INFORMATION**

Frequency Range	Bluetooth: 2402~2480MHz	
Maximum conducted Peak output power	Bluetooth: 5.56dBm	
Modulation Technique	Bluetooth: GFSK, $\pi/4$ -DQPSK, 8DPSK	
Antenna Specification*	1.2 dBi (provided by the applicant)	
Voltage Range	DC 3.85V from battery or DC 5V from adapter	
Sample serial number	SZNS211123-60257E-RF-S1 for RF conducted SZNS211123-60257E-RF-S5 for CE&RE (Assigned by ATC)	
Sample/EUT Status	Good condition	
Adapter information	Model: U100XSA Input: AC 100-240V~50/60Hz, 0.3A Output: DC 5.0V, 2.0A	

#### **Product Description for Equipment under Test (EUT)**

## Objective

This test report is in accordance with Part 2-Subpart J, Part 15-Subparts A and C of the Federal Communication Commission rules.

The tests were performed in order to determine compliance with FCC Part 15, Subpart C, section 15.203, 15.205, 15.207, 15.209 and 15.247 rules.

## **Test Methodology**

All measurements contained in this report were conducted with ANSI C63.10-2013, American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices.

All emissions measurement was performed at Shenzhen Accurate Technology Co., Ltd. The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

## **Measurement Uncertainty**

Parameter		Uncertainty	
Occupied Cha	nnel Bandwidth	5%	
RF output po	wer, conducted	0.73dB	
Unwanted Emi	ssion, conducted	1.6dB	
AC Line Conducted emission		2.72dB	
	30MHz - 1GHz	4.28dB	
Emissions, Radiated	1GHz - 18GHz	4.98dB	
Tudiated	18GHz - 26.5GHz	5.06dB	
Temperature		1 °C	
Humidity		6%	
Supply	voltages	0.4%	

Note: The extended uncertainty given in this report is obtained by combining the standard uncertainty times the coverage factor K with the 95% confidence interval. Otherwise required by the applicant or Product Regulations, Decision Rule in this report did not consider the uncertainty.

# **Test Facility**

The test site used by Shenzhen Accurate Technology Co., Ltd. to collect test data is located on the 1/F., Building A, Changyuan New Material Port, Science & Industry Park, Nanshan District, Shenzhen, Guangdong, P.R. China.

The test site has been approved by the FCC under the KDB 974614 D01 and is listed in the FCC Public Access Link (PAL) database, FCC Registration No.: 708358, the FCC Designation No.: CN1189. Accredited by American Association for Laboratory Accreditation (A2LA) The Certificate Number is 429 7.01.

Listed by Innovation, Science and Economic Development Canada (ISEDC), the Registration Number is 5077A.

# SYSTEM TEST CONFIGURATION

# **Description of Test Configuration**

The system was configured for testing in an engineering mode.

## **EUT Exercise Software**

EUT was test in engineering mode and the power level is 6\*, which provided by manufacturer.

# **Special Accessories**

No special accessory.

# **Equipment Modifications**

No modification was made to the EUT tested.

# **Support Equipment List and Details**

Manufacturer	Description	Model	Serial Number
Rohde & Schwarz	Wideband Radio Communication Tester	CMW500	154606

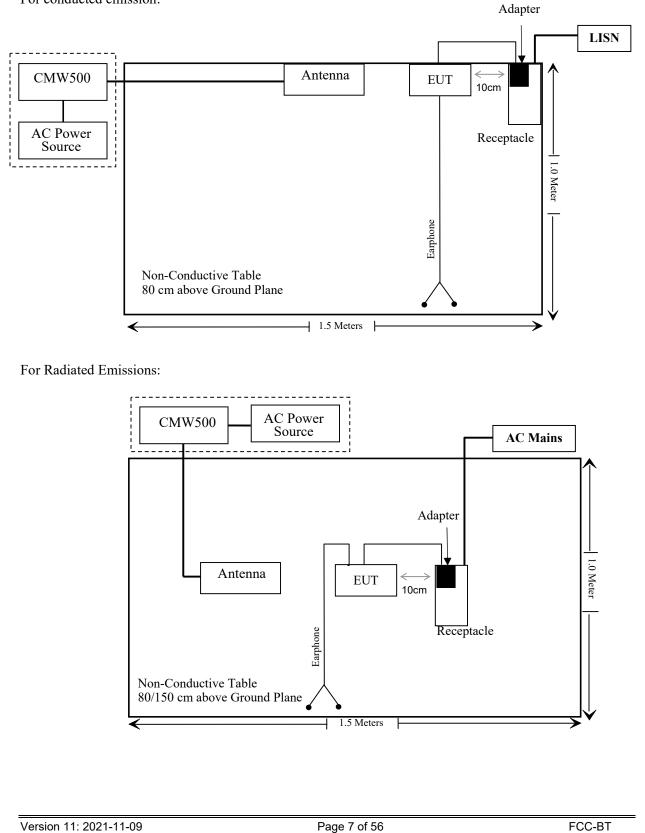
## External I/O Cable

Cable Description	Length (m)	From Port	То
Un-shielding Detachable USB Cable	1.0	EUT	Adapter
Un-shielded Un-detachable AC cable	1.2	AC Power	CMW500

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## **Block Diagram of Test Setup**

For conducted emission:



# SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
§15.247 (i), §1.1307 (b) (1)& §2.1093	RF Exposure	Compliant
§15.203	Antenna Requirement	Compliant
§15.207(a)	AC Line Conducted Emissions	Compliant
§15.205, §15.209 & §15.247(d)	Radiated Emissions	Compliant
§15.247(a)(1)	20 dB Emission Bandwidth & 99% Occupied Bandwidth	Compliant
§15.247(a)(1)	Channel Separation Test	Compliant
§15.247(a)(1)(iii)	Time of Occupancy (Dwell Time)	Compliant
§15.247(a)(1)(iii)	Quantity of hopping channel Test	Compliant
§15.247(b)(1)	Peak Output Power Measurement	Compliant
§15.247(d)	Band edges	Compliant

# **TEST EQUIPMENT LIST**

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date	
Conducted emission test						
Rohde& Schwarz	EMI Test Receiver	ESCI	100784	2021/02/03	2022/02/02	
R & S	L.I.S.N.	ENV216	101314	2020/12/25	2021/12/24	
Anritsu Corp	50ΩCoaxial Switch	MP59B	6200506474	2020/12/25	2021/12/24	
Unknown	RF Coaxial Cable	N-2m	No.2	2020/12/25	2021/12/24	
Conducted Emission	Test Software: e3 19821	b (V9)				
		Radiated emiss	ion test			
Rohde& Schwarz	Test Receiver	ESR	102725	2020/12/25	2021/12/24	
Rohde&Schwarz	Spectrum Analyzer	FSV40	101949	2021/5/18	2022/5/17	
SONOMA INSTRUMENT	Amplifier	310 N	186131	2020/12/25	2021/12/24	
A.H. Systems, inc.	Preamplifier	PAM-0118P	531	2021/11/09	2022/11/08	
Quinstar	Amplifier	QLW- 18405536-J0	15964001002	2021/11/11	2022/11/10	
Anritsu Corp	50 Coaxial Switch	MP59B	6100237248	2020/12/25	2021/12/24	
Schwarzbeck	Bilog Antenna	VULB9163	9163-323	2020/01/05	2023/01/04	
Schwarzbeck	Horn Antenna	BBHA9120D	9120D-1067	2020/01/05	2023/01/04	
Schwarzbeck	HORN ANTENNA	BBHA9170	9170-359	2020/01/05	2023/01/04	
Unknown	RF Coaxial Cable	N-5m	No.3	2020/12/25	2021/12/24	
Unknown	RF Coaxial Cable	N-1m	No.5	2020/12/25	2021/12/24	
Unknown	RF Coaxial Cable	N-10m	No.7	2021/11/09	2022/11/08	
Unknown	RF Coaxial Cable	N-2m	No.8	2021/11/09	2022/11/08	
Wainwright	High Pass Filter	WHKX3.6/18 G-10SS	5	2020/12/25	2021/12/24	
Radiated Emission Test Software: e3 19821b (V9)						

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Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
		RF conducted	l test		
Rohde & Schwarz	Spectrum Analyzer	FSV-40	101495	2020/12/24	2021/12/23
Tonscend	RF Control Unit	JS0806-2	19G8060182	2021/07/06	2022/07/05
Rohde & Schwarz	Wideband Radio Communication Tester	CMW500	154606	2020/12/25	2021/12/24

\* **Statement of Traceability:** Shenzhen Accurate Technology Co., Ltd. attests that all calibrations have been performed in accordance to requirements that traceable to National Primary Standards and International System of Units (SI).

# FCC§15.247 (i), §1.1307 (b) (1) &§2.1093 – RF EXPOSURE

#### **Applicable Standard**

According to FCC §2.1093 and §1.1307(b) (1), systems operating under the provisions of this section shall be operated in a manner that ensure that the public is not exposed to radio frequency energy level in excess of the Commission's guideline.

According to KDB 447498 D01 General RF Exposure Guidance

The 1-g and 10-g SAR test exclusion thresholds for 100 MHz to 6 GHz at test separation distances  $\leq$  50 mm are determined by:

[(max. power of channel, including tune-up tolerance, mW)/(min. test separation distance, mm)]  $\cdot$  [ $\sqrt{f(GHz)}$ ]  $\leq 3.0$  for 1-g SAR and  $\leq 7.5$  for 10-g extremity SAR, where

1. f(GHz) is the RF channel transmit frequency in GHz.

2. Power and distance are rounded to the nearest mW and mm before calculation.

3. The result is rounded to one decimal place for comparison.

4. When the minimum test separation distance is < 5 mm, a distance of 5 mm is applied to determine SAR test Exclusion.

#### For worst case:

Frequency	Maximun pov		Calculated Distance	Calculated	Threshold	SAR Test
(MHz)	(dBm)	(mW)	(mm)	Value	(1-g SAR)	Exclusion
2402-2480	6.0	3.98	5	1.3	3.0	Yes

**Result:** Compliant.

# FCC §15.203 – ANTENNA REQUIREMENT

## **Applicable Standard**

According to FCC § 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. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

## **Antenna Connector Construction**

The EUT has one internal antenna, which was permanently attached, and the maximum antenna gain is 1.2dBi, fulfill the requirement of this section. Please refer to the EUT photos.

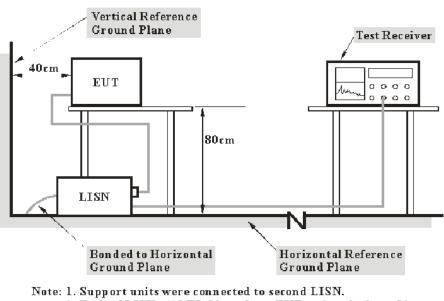
Result: Compliant.

# FCC §15.207 (a) – AC LINE CONDUCTED EMISSIONS

# **Applicable Standard**

FCC §15.207(a)

# **EUT Setup**



Both of LISNs (AMN) 80 cm from EUT and at the least 80 cm from other units and other metal planes support units.

The measurement procedure of EUT setup is according with ANSI C63.10-2013. The related limit was specified in FCC Part 15.207.

The spacing between the peripherals was 10 cm.

# **EMI Test Receiver Setup**

The EMI test receiver was set to investigate the spectrum from 150 kHz to 30 MHz.

During the conducted emission test, the EMI test receiver was set with the following configurations:

Frequency Range	IF B/W
150 kHz – 30 MHz	9 kHz

## **Test Procedure**

During the conducted emission test, the adapter was connected to the outlet of the LISN.

Maximizing procedure was performed on the six (6) highest emissions of the EUT.

All final data was recorded in the Quasi-peak and average detection mode.

## **Transd Factor & Margin Calculation**

The Transd factor is calculated by adding LISN VDF (Voltage Division Factor) and Cable Loss. The basic equation is as follows:

Transd Factor = LISN VDF + Cable Loss

The "**Over limit**" column of the following data tables indicates the degree of compliance with the applicable limit. For example, an Over limit of -7 dB means the emission is 7 dB below the limit. The equation for calculation is as follows:

Over Limit = Level – Limit Level = Read Level + Factor

#### **Test Data**

#### **Environmental Conditions**

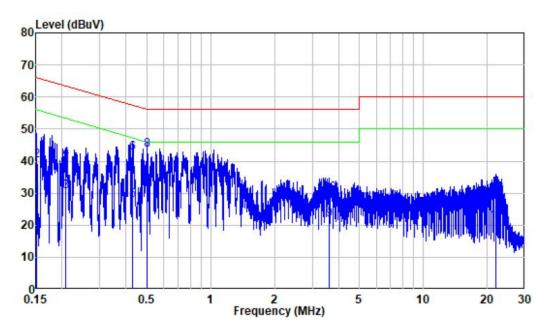
Temperature:	25 °C
<b>Relative Humidity:</b>	64 %
ATM Pressure:	101.0 kPa

The testing was performed by Bin Deng on 2021-12-09.

EUT operation mode: Transmitting (the worst case is 8DPSK Mode, Low channel)

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## AC 120V/60 Hz, Line

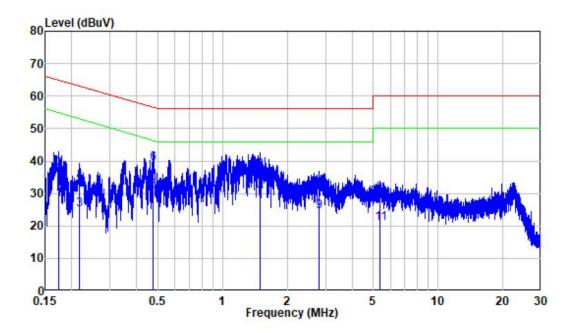


Site :		Shielding Room
Condition		Line
Mode :		BT
Model :	:	X689F
Power		AC 120V 60Hz

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
8-	MHz	dB	dBuV	dBuV	dBuV	dB	-
1	0.152	9.90	19.99	29.89	55.90	-26.01	Average
2	0.152	9.90	30.25	40.15	65.90	-25.75	QP
3	0.207	9.80	20.59	30.39	53.33	-22.94	Average
4	0.207	9.80	30.89	40.69	63.33	-22.64	QP
5	0.429	9.80	18.12	27.92	47.27	-19.35	Average
6	0.429	9.80	32.78	42.58	57.27	-14.69	QP
7	0.501	9.80	21.77	31.57	46.00	-14.43	Average
8	0.501	9.80	33.57	43.37	56.00	-12.63	QP
9	3.618	9.94	11.80	21.74	46.00	-24.26	Average
10	3.618	9.94	19.87	29.81	56.00	-26.19	QP
11	21.874	10.26	10.96	21.22	50.00	-28.78	Average
12	21.874	10.26	19.54	29.80	60.00	-30.20	QP

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# AC 120V/60 Hz, Neutral



Site :	Shielding Room
Condition:	Neutral
Mode :	BT
Model :	X689F
Power :	AC 120V 60Hz

			Read		Limit	Over	
	Freq	Factor	Level	Level	Line	Limit	Remark
2	MHz	dB	dBuV	dBuV	dBuV	dB	A
1	0.174	9.95	18.03	27.98	54.76	-26.78	Average
2	0.174	9.95	27.60	37.55	64.76	-27.21	QP
3	0.217	9.99	15.17	25.16	52.91	-27.75	Average
4	0.217	9.99	23.55	33.54	62.91	-29.37	QP
5	0.476	9.91	20.88	30.79	46.40	-15.61	Average
6	0.476	9.91	29.46	39.37	56.40	-17.03	QP
7	1.489	9.91	18.61	28.52	46.00	-17.48	Average
8	1.489	9.91	27.31	37.22	56.00	-18.78	QP
9	2.791	9.98	14.40	24.38	46.00	-21.62	Average
10	2.791	9.98	21.88	31.86	56.00	-24.14	QP
11	5.386	10.05	10.79	20.84	50.00	-29.16	Average
12	5.386	10.05	18.18	28.23	60.00	-31.77	QP

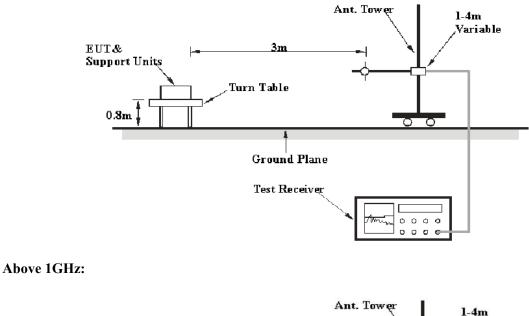
# FCC §15.205, §15.209 & §15.247(d) – RADIATED EMISSIONS

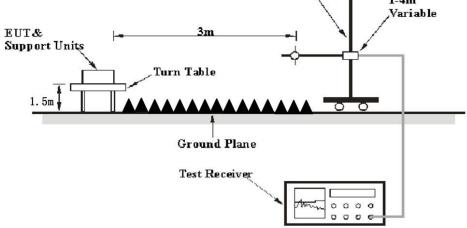
# Applicable Standard

FCC §15.205; §15.209; §15.247(d)

# **EUT Setup**

Below 1 GHz:





The radiated emission tests were performed in the 3 meters, using the setup accordance with the ANSI C63.10-2013. The specification used was the FCC 15.209 and FCC 15.247 limits.

## EMI Test Receiver & Spectrum Analyzer Setup

The EMI test receiver & Spectrum Analyzer Setup were set with the following configurations:

Frequency Range	RBW	Video B/W	IF B/W	Measurement
30 MHz - 1000 MHz	100 kHz	300 kHz	120 kHz	QP
Above 1 GHz	1 MHz	3 MHz	/	РК
Above I GHZ	1 MHz	10 Hz	/	Average

#### **Test Procedure**

Maximizing procedure was performed on the highest emissions to ensure that the EUT complied with all installation combinations.

All final data was recorded in Quasi-peak detection mode for frequency range of 30 MHz -1 GHz and peak and Average detection modes for frequencies above 1 GHz.

## Factor & Margin Calculation

The Factor is calculated by adding the Antenna Factor and Cable Loss, and subtracting the Amplifier Gain. The basic equation is as follows:

Factor = Antenna Factor + Cable Loss - Amplifier Gain

The "**Over Limit/Margin**" column of the following data tables indicates the degree of compliance with the applicable limit. For example, an Over Limit/margin of -7dB means the emission is 7dB below the limit. The equation for calculation is as follows:

Over Limit/Margin = Level / Corrected Amplitude – Limit Level / Corrected Amplitude = Read Level + Factor

## **Test Data**

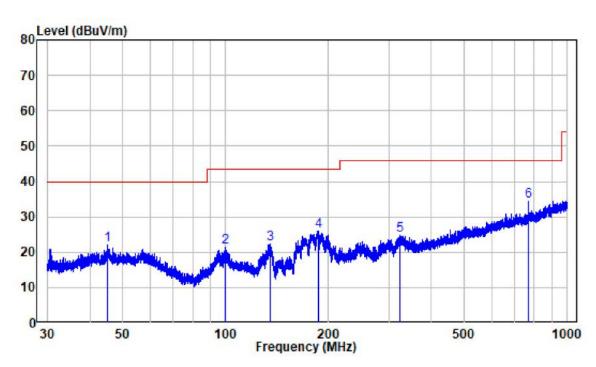
#### **Environmental Conditions**

Temperature:	25 °C
<b>Relative Humidity:</b>	64 %
ATM Pressure:	101.0 kPa

The testing was performed by Bin Deng on 2021-12-13.

EUT operation mode: Transmitting (Pre-scan in the X,Y and Z axes of orientation, the worst case of Z orientation was recorded)

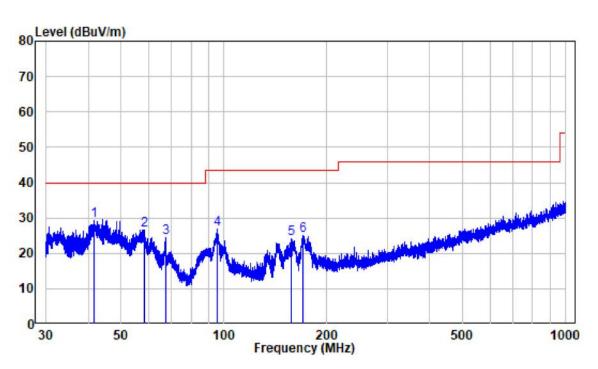
#### **30MHz-1GHz:** (worst case is 8DPSK Mode, Low channel)



Horizontal:

Site : chamber Condition: 3m HORIZONTAL Job NO : : szns211123-60257e-rf Test Mode: BT

	Freq	Factor	Read Level	Level		Over Limit	Remark
_	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	45.02	-9.94	31.86	21.92	40.00	-18.08	Peak
2	99.92	-11.82	33.27	21.45	43.50	-22.05	Peak
3	135.15	-15.03	37.45	22.42	43.50	-21.08	Peak
4	187.10	-11.93	37.95	26.02	43.50	-17.48	Peak
5	323.32	-8.33	33.17	24.84	46.00	-21.16	Peak
6	768.07	-0.28	34.82	34.54	46.00	-11.46	Peak



Vertical

Site : chamber Condition: 3m VERTICAL Job NO : : szns211123-60257e-rf Test Mode: BT

	Freq	Factor	Read Level		Limit Line		Remark
-	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	1
1	41.55	-10.10	39.49	29.39	40.00	-10.61	Peak
2	58.41	-10.05	36.64	26.59	40.00	-13.41	Peak
3	67.32	-13.50	37.87	24.37	40.00	-15.63	Peak
4	95.51	-12.39	39.14	26.75	43.50	-16.75	Peak
5	157.63	-14.56	38.63	24.07	43.50	-19.43	Peak
6	170.64	-13.52	38.62	25.10	43.50	-18.40	Peak

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	R	eceiver		Rx An	itenna	Corrected	Corrected			
Frequency (MHz)	Reading (dBµV)	PK/QP/Ave.	Turntable Degree	Height (m)	Polar (H/V)	Factor (dB/m)	Amplitude (dBµV/m)	Limit (dBµV/m)	Margin (dB)	
	Low Channel (2402 MHz)									
2310	68.13	РК	240	1.9	Н	-7.24	60.89	74	-13.11	
2310	53.56	AV	240	1.9	Н	-7.24	46.32	54	-7.68	
2310	68.06	РК	81	1.0	V	-7.24	60.82	74	-13.18	
2310	53.51	AV	81	1.0	V	-7.24	46.27	54	-7.73	
2390	68.73	РК	38	1.8	Н	-7.22	61.51	74	-12.49	
2390	54.16	AV	38	1.8	Н	-7.22	46.94	54	-7.06	
2390	68.56	РК	156	2.3	V	-7.22	61.34	74	-12.66	
2390	54.14	AV	156	2.3	V	-7.22	46.92	54	-7.08	
4804	57.39	РК	38	2.0	Н	-3.52	53.87	74	-20.13	
4804	55.55	РК	24	1.6	V	-3.52	52.03	74	-21.97	
			Middle (	Channel (	2441 M	Hz)				
4882	55.85	РК	337	1.2	Н	-3.37	52.48	74	-21.52	
4882	55.48	РК	308	1.3	V	-3.37	52.11	74	-21.89	
			High C	hannel (2	480 MH	[z)				
2483.5	69.89	РК	325	2.0	Н	-7.20	62.69	74	-11.31	
2483.5	54.86	AV	325	2.0	Н	-7.20	47.66	54	-6.34	
2483.5	69.65	РК	340	1.8	V	-7.20	62.45	74	-11.55	
2483.5	54.81	AV	340	1.8	V	-7.20	47.61	54	-6.39	
2500	69.15	РК	93	1.5	Н	-7.18	61.97	74	-12.03	
2500	54.73	AV	93	1.5	Н	-7.18	47.55	54	-6.45	
2500	69.06	РК	59	2.1	V	-7.18	61.88	74	-12.12	
2500	54.67	AV	59	2.1	V	-7.18	47.49	54	-6.51	
4960	54.67	РК	185	2.4	Н	-3.01	51.66	74	-22.34	
4960	54.40	РК	347	1.5	V	-3.01	51.39	74	-22.61	

#### Above 1GHz: (worst case is 8DPSK Mode)

#### Note:

 $Corrected \ Factor = Antenna \ factor \ (RX) + Cable \ Loss - Amplifier \ Factor$ Corrected Amplitude = Corrected Factor + Reading Margin = Corrected. Amplitude - Limit

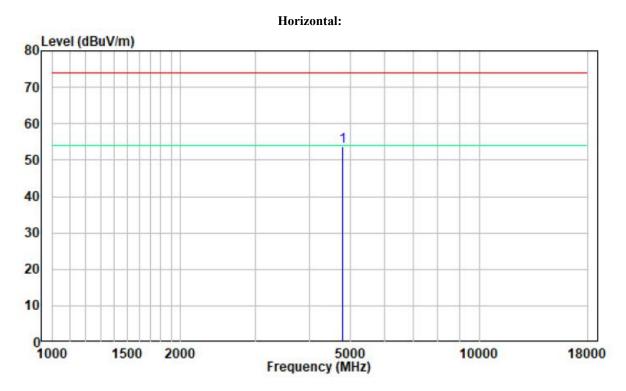
The other spurious emission which is in the noise floor level was not recorded.

The test result of peak was less than the limit of average, so just peak value were recorded.

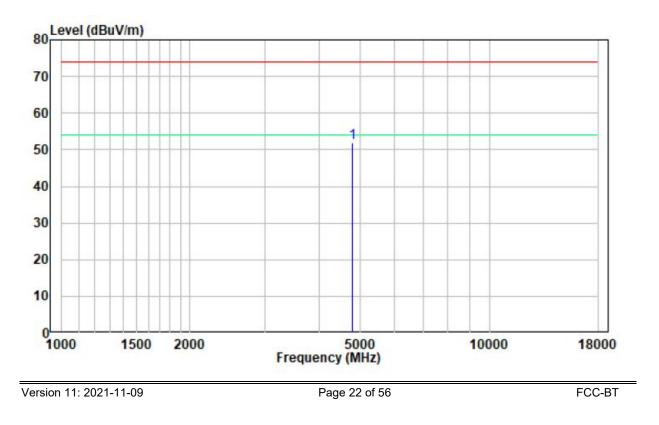
Report No.: SZNS211123-60257E-RF-00A

## 1-18GHz

Pre-scan plots for Low channel



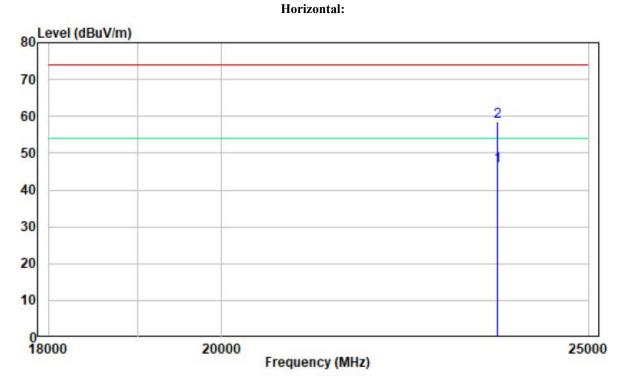
#### Vertical:



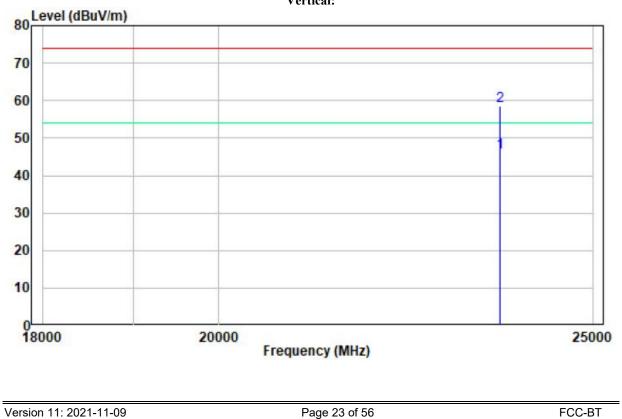
Report No.: SZNS211123-60257E-RF-00A

## 18-25GHz

Pre-scan plots for Low channel







# FCC §15.247(a) (1)-CHANNEL SEPARATION TEST

#### **Applicable Standard**

Frequency hopping systems shall have hoping 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. The system shall hop to channel frequencies that are selected at the system hopping rate from a pseudo randomly ordered list of hopping frequencies. Each frequency must be used equally on the average by each transmitter. The system receivers shall have input bandwidths that match the hopping channel bandwidths of their corresponding transmitters and shall shift frequencies in synchronization with the transmitted signals.

#### **Test Procedure**

- 1. Set the EUT in transmitting mode, maxhold the channel.
- 2. Set the adjacent channel of the EUT and maxhold another trace.
- 3. Measure the channel separation.

#### **Test Data**

#### **Environmental Conditions**

Temperature:	22 °C
<b>Relative Humidity:</b>	55 %
ATM Pressure:	101.0 kPa

The testing was performed by Paul Liu on 2021-12-09.

EUT operation mode: Transmitting

# FCC §15.247(a) (1) – 20 dB EMISSION BANDWIDTH & 99% OCCUPIED BANDWIDTH

#### **Applicable Standard**

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 Procedure**

The following conditions shall be observed for measuring the occupied bandwidth and 20 dB bandwidth:

• The transmitter shall be operated at its maximum carrier power measured under normal test conditions.

• The span of the spectrum analyzer shall be set large enough to capture all products of the modulation process, including the emission skirts, around the carrier frequency, but small enough to avoid having other emissions (e.g. on adjacent channels) within the span.

• The detector of the spectrum analyzer shall be set to "Sample". However, a peak, or peak hold, may be used in place of the sampling detector since this usually produces a wider bandwidth than the actual bandwidth (worst-case measurement). Use of a peak hold (or "Max Hold") may be necessary to determine the occupied / 20 dB bandwidth if the device is not transmitting continuously.

• The resolution bandwidth (RBW) shall be in the range of 1% to 5% of the actual occupied / 20 dB bandwidth and the video bandwidth (VBW) shall not be smaller than three times the RBW value. Video averaging is not permitted.

Note: It may be necessary to repeat the measurement a few times until the RBW and VBW are in compliance with the above requirement.

For the 99% emission bandwidth, the trace data points are recovered and directly summed in linear power level 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, and that frequency recorded. The process is repeated for the highest frequency data points (starting at the highest frequency, at the right side of the span, and going down in frequency). This frequency is then recorded. The difference between the two recorded frequencies is the occupied bandwidth (or the 99% emission bandwidth).

EUT	Attenuator		EMI Test Receiver
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# **Test Data**

## **Environmental Conditions**

Temperature:	22 °C
<b>Relative Humidity:</b>	55 %
ATM Pressure:	101.0 kPa

The testing was performed by Paul Liu on 2021-12-09.

EUT operation mode: Transmitting

# FCC §15.247(a) (1) (iii)-QUANTITY OF HOPPING CHANNEL TEST

#### **Applicable Standard**

Frequency 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 Procedure**

- 1. Check the calibration of the measuring instrument (SA) using either an internal calibrator or a known signal from an external generator.
- 2. Set the EUT in hopping mode from first channel to last.
- 3. By using the max-hold function record the quantity of the channel.

## **Test Data**

#### **Environmental Conditions**

Temperature:	22 °C	
<b>Relative Humidity:</b>	55 %	
ATM Pressure:	101.0 kPa	

The testing was performed by Paul Liu on 2021-12-14.

EUT operation mode: Transmitting

# FCC §15.247(a) (1) (iii) - TIME OF OCCUPANCY (DWELL TIME)

#### **Applicable Standard**

Frequency hopping systems in the 2400-2483.5 MHz 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 Procedure**

- 1. The EUT was worked in channel hopping.
- 2. Set the RBW to: 1MHz.
- 3. Set the VBW  $\geq 3 \times RBW$ .
- 4. Set the span to 0Hz.
- 5. Detector = peak.
- 6. Sweep time = auto couple.
- 7. Trace mode = max hold.
- 8. Allow trace to fully stabilize.
- 9. Recorded the time of single pulses

# **Test Data**

#### **Environmental Conditions**

Temperature:	22 °C	
<b>Relative Humidity:</b>	55 %	
ATM Pressure:	101.0 kPa	

The testing was performed by Paul Liu on 2021-12-09.

EUT operation mode: Transmitting

# FCC §15.247(b) (1) - PEAK OUTPUT POWER MEASUREMENT

#### Applicable Standard

According to §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. And for all other frequency hopping systems in the 2400–2483.5 MHz band: 0.125 watts.

## **Test Procedure**

- 1. Place the EUT on a bench and set in transmitting mode.
- 2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to one test equipment.
- 3. Add a correction factor to the display.

## **Test Data**

#### **Environmental Conditions**

Temperature:	22 °C	
<b>Relative Humidity:</b>	55 %	
ATM Pressure:	101.0 kPa	

The testing was performed by Paul Liu on 2021-12-09.

EUT operation mode: Transmitting

# FCC §15.247(d) - BAND EDGES TESTING

#### **Applicable Standard**

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. In addition, radiated emissions which fall in the restricted bands, as defined in \$15.205(a), must also comply with the radiated emission limits specified in \$15.209(a) (see \$15.205(c)).

# **Test Procedure**

- 1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
- 2. Remove the antenna from the EUT and then connect to a low loss RF cable from the antenna port to a EMI test receiver, then turn on the EUT and make it operate in transmitting mode. Then set it to Low Channel and High Channel within its operating range, and make sure the instrument is operated in its linear range.
- 3. Set RBW of spectrum analyzer to 100 kHz with a convenient frequency span including 100 kHz bandwidth from band edge.
- 4. Measure the highest amplitude appearing on spectral display and set it as a reference level. Plot the graph with marking the highest point and edge frequency.
- 5. Repeat above procedures until all measured frequencies were complete.

## **Test Data**

#### **Environmental Conditions**

Temperature:	22 °C	
<b>Relative Humidity:</b>	55 %	
ATM Pressure:	101.0 kPa	

The testing was performed by Paul Liu on 2021-12-09.

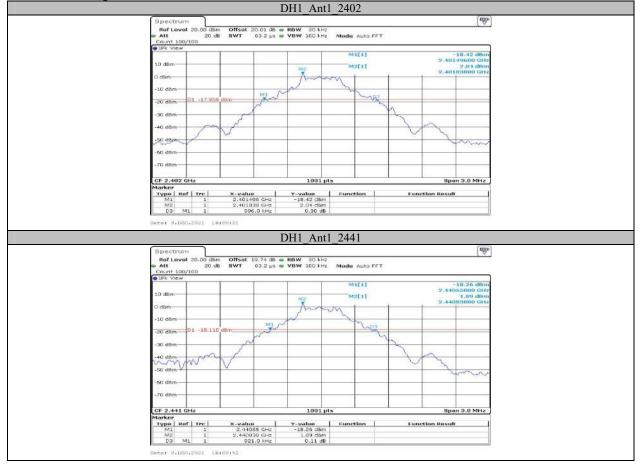
#### EUT operation mode: Transmitting

# APPENDIX

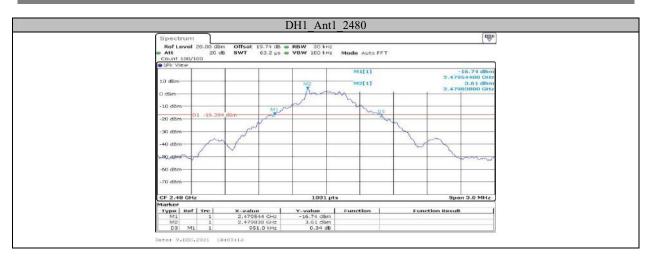
# Appendix A: 20dB Emission Bandwidth Test Result

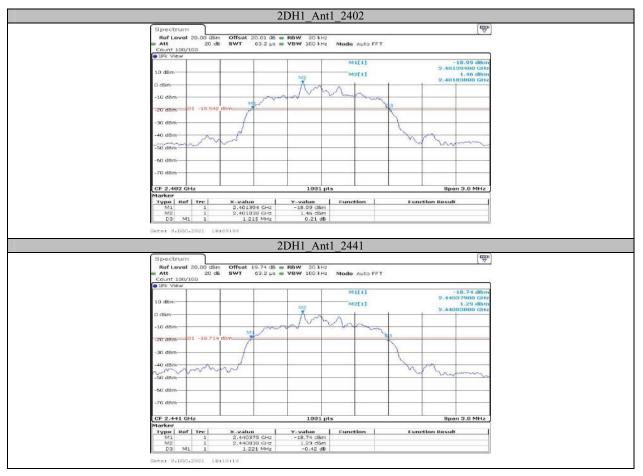
Test Mode	Antenna	Channel	20db EBW[MHz]	Limit[MHz]	Verdict
DH1	Antl	2402	0.996		PASS
		2441	0.921		PASS
		2480	0.951		PASS
2DH1	Antl	2402	1.215		PASS
		2441	1.221		PASS
		2480	1.233		PASS
3DH1	Antl	2402	1.224		PASS
		2441	1.236		PASS
		2480	1.239		PASS

# **Test Graphs**



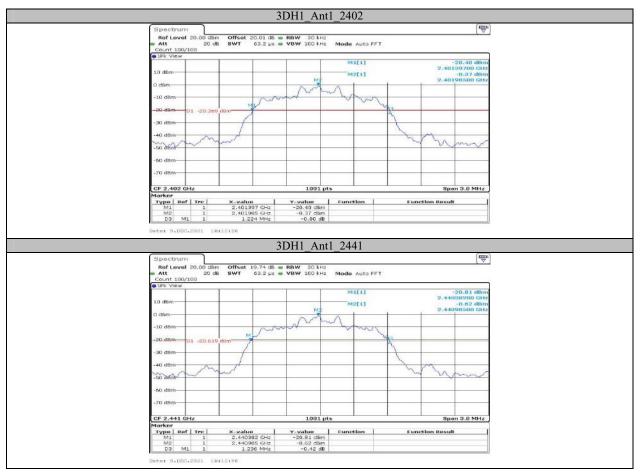
Report No.: SZNS211123-60257E-RF-00A





Report No.: SZNS211123-60257E-RF-00A





Report No.: SZNS211123-60257E-RF-00A

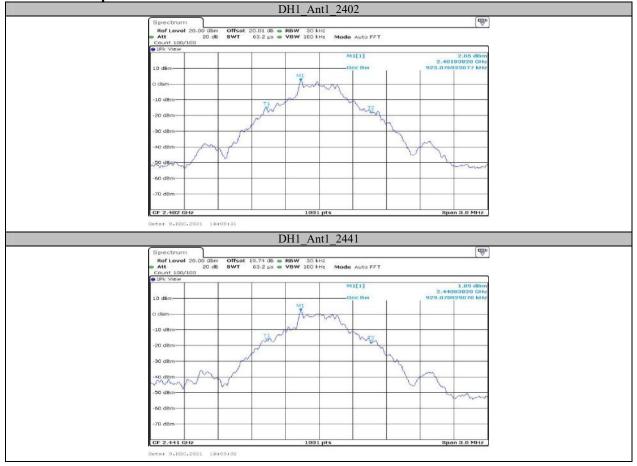


#### Report No.: SZNS211123-60257E-RF-00A

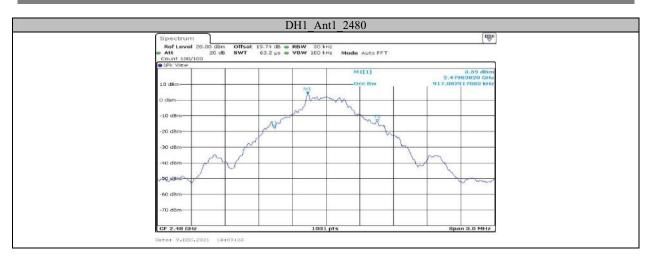
# Appendix B: Occupied Channel Bandwidth Test Result

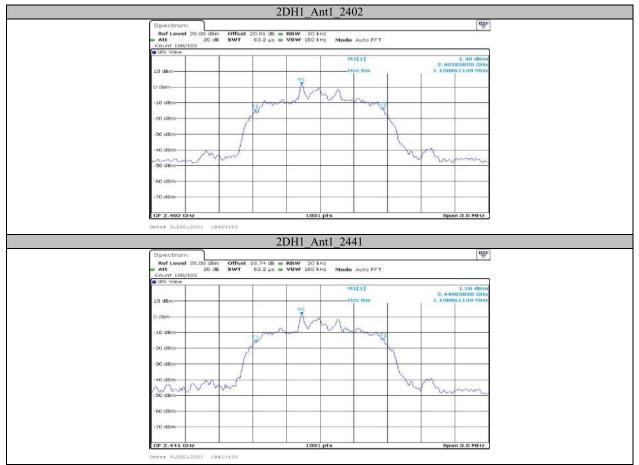
Test Mode	Antenna	Channel	OCB [MHz]	Limit[MHz]	Verdict
DH1	Ant1	2402	0.923		PASS
		2441	0.929		PASS
		2480	0.917		PASS
2DH1	Antl	2402	1.139		PASS
		2441	1.139		PASS
		2480	1.148		PASS
3DH1	Antl	2402	1.139		PASS
		2441	1.121		PASS
		2480	1.121		PASS

# **Test Graphs**



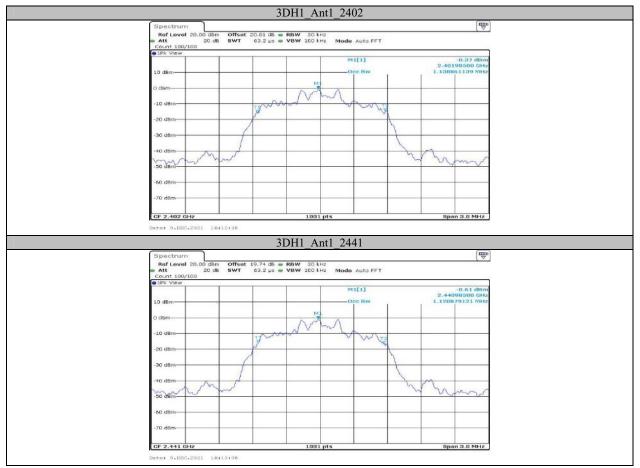
Report No.: SZNS211123-60257E-RF-00A





Report No.: SZNS211123-60257E-RF-00A





Report No.: SZNS211123-60257E-RF-00A

Spectrum				(B)
Count 100/100	dBm Offset 19.74 dB ● Rt 0 dB SWT 63.2 µs ● VI		2	
1Pk Yiew				
10 dBm	7	M1[1] Occ Bw		1.27 dBm 998500 GHz 79121 MHz
O dBm		NAN	-	
-10 dBm	Jun	v. Jund	ž,	
-20 dBm	- A			
-30 dBm				
-40 dBm	ma		m	mar
-50 dBm-				0.0
-60 dBm				
-70 dBm-				
CF 2.48 GHz		1001 pts	Sna	in 3.0 MHz

# Appendix C: Maximum conducted Peak output power Test Result

Test Mode	Antenna	Channel	Result[dBm]	Limit[dBm]	Verdict
		2402	4.01	≤20.97	PASS
DH1	Antl	2441	3.74	≤20.97	PASS
		2480	5.56	≤20.97	PASS
		2402	3.27	≤20.97	PASS
2DH1	Antl	2441	2.98	≤20.97	PASS
		2480	4.90	≤20.97	PASS
		2402	3.30	≤20.97	PASS
3DH1	3DH1 Ant1	2441	2.98	≤20.97	PASS
		2480	4.87	≤20.97	PASS

		DHI	_Ant1_24	02				
Spectrum	]							
Ref Level 20.	00 dBm Offset 2	0.01 dB - RBW	3 MHz	1.110 B.100				
Count 100/100	20 dB SWT	I ms 🖷 VBW	10 MHz Mode	Auto sweep				
1Pk Yiew								
				41[1]	2.402	4.01 dBm 04000 GHz		
10 dBm			0.01	+ +				
			-					
O dBm								
-10 dBpa								
-20 dBm	-							
-30 dBm								
-40 dBm-								
-50 dBm	-			+ +				
-60 dBm								
-70 dBm								
			1001 pts	1	Spar	1 8.0 MHz		
GF 2.402 GHz Date: 9.DEC.202	1 10:23:25	DH1		41				
Date: 9.080.202	1 10153155	DH1	_Ant1_24	41				
Data: 9.050.202	1		_Ant1_24	41				
 Date: 9.DEC.202 Spectrum RofLevel 20.J	1	DH1 9.74 dē • RBW 1 ms • VBW	Ant1_24	41				
 Dete: 9.DEC.200 Spectrum RofLovel 20. Att Count 100/100	00 dBm Offset 1	9.74 dB 🕳 RBW	Ant1_24			(The second seco		
 Date: 9.DEC.202 Spectrum RofLevel 20.J	00 dBm Offset 1	9.74 dB 🕳 RBW	Ant1_24				_	
Dete: 9.DEC.200 Spectrum RofLovel 20. Att Count 100/100	00 dBm Offset 1	9.74 dB 🕳 RBW	Ant1_24	Auto Sweep	2,441	(♥) 3.74 d8m 34000 GHz		
 Date: 9.05C.203 Spectrum Rof Lovel 20. # Att Count 100/100 #1Pk View	00 dBm Offset 1	9.74 dB 🕳 RBW	Ant1_24	Auto Sweep	2,441			
Date: 9.05C.203 Spectrum Rof Lovel 20. # Att Count 100/100 #1Pk View	00 dBm Offset 1	9.74 dB 🕳 RBW	Ant1_24	Auto Sweep	2,441			
 Datai 9.056.203 Spectrum Ref Level 20. Att Court 100/100 FIFE View 10 dBm 0 dbm	00 dBm Offset 1	9.74 dB 🕳 RBW	Ant1_24	Auto Sweep	2.441	8,74 dBm 94000 GHz		
 Data: 9.05C.203 Spectrum Ref Lovel 20. • Att Count 100/100 • TPk View 10 dBm	00 dBm Offset 1	9.74 dB 🕳 RBW	Ant1_24	Auto Sweep	2.441			
 Datai 9.056.203 Spectrum Ref Level 20. Att Court 100/100 FIFE View 10 dBm 0 dbm	00 dBm Offset 1	9.74 dB 🕳 RBW	Ant1_24	Auto Sweep	2.441	8,74 dBm 94000 GHz		
Data: 9.05C.200 Spectrum Reflevel 20. • All Count 100/100 • IPk View 10 dBm -10 dBm -20 dBm	00 dBm Offset 1	9.74 dB 🕳 RBW	Ant1_24	Auto Sweep	2,441	8,74 dBm 94000 GHz		
 Date: 9.05C.200 Spectrum RofLevel 20. * Att Count 100/100 FPK View 10 dBm -10 dBm	00 dBm Offset 1	9.74 dB 🕳 RBW	Ant1_24	Auto Sweep	2,441	8,74 dBm 94000 GHz		
Data: 9.05C.200 Spectrum Ref Level 20. # All Count 100/100 # IPk View 10 dBm -10 dBm -20 dBm -30 dBm	00 dBm Offset 1	9.74 dB 🕳 RBW	Ant1_24	Auto Sweep	2,441	8,74 dBm 94000 GHz		
Data: 9.05C.200 Spectrum Reflevel 20. • All Count 100/100 • IPk View 10 dBm -10 dBm -20 dBm	00 dBm Offset 1	9.74 dB 🕳 RBW	Ant1_24	Auto Sweep	2,441	8,74 dBm 94000 GHz		
Data: 9.05C.200 Spectrum Ref Level 20. # All Count 100/100 # IPk View 10 dBm -10 dBm -20 dBm -30 dBm	00 dBm Offset 1	9.74 dB 🕳 RBW	Ant1_24	Auto Sweep	2,441	8,74 dBm 94000 GHz		
Data 9.050.200 Spectrum Ref Lovel 20. • Att Court 100/100 • TPk View 10 dBm -10 dBm -20 dBm -30 dBm -50 dBm	00 dBm Offset 1	9.74 dB 🕳 RBW	Ant1_24	Auto Sweep	2.443	8,74 dBm 94000 GHz		
Data: 9.05C.200 Spectrum Ref Level 20. • Att Count 100/DO • IPk View 10 dBm -10 dBm -20 dBm -30 dBm	00 dBm Offset 1	9.74 dB 🕳 RBW	Ant1_24	Auto Sweep	2,441	8,74 dBm 94000 GHz		
Data 9.050.203  Spectrum Ref Level 20.  Att Court 100/100  FPK View  10 dBm  -10 dBm  -20 dBm  -30 dBm  -50 dBm  -50 dBm  -50 dBm  -50 dBm -50	00 dBm Offset 1	9.74 dB 🕳 RBW	Ant1_24	Auto Sweep	2,441	8,74 dBm 94000 GHz		
Data 9.050.200 Spectrum Ref Lovel 20. • Att Court 100/100 • TPk View 10 dBm -10 dBm -20 dBm -30 dBm -50 dBm	00 dBm Offset 1	9.74 dB 🕳 RBW	Ant1_24	Auto Sweep	2.441	8,74 dBm 94000 GHz		
Data 9.050.203  Spectrum Ref Level 20.  Att Court 100/100  FPK View  10 dBm  -10 dBm  -20 dBm  -30 dBm  -50 dBm  -50 dBm  -50 dBm  -50 dBm -50	00 dBm Offset 1	9.74 dB 🕳 RBW	Ant1_24	Auto Sweep		8,74 dBm 94000 GHz		

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Spectrum								(₩)
Count 100/100	dBm Offset dB SWT		RBW 3 MH VBW 10 MH		uto Sweep			
IPk View								
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0 dam	-	-						
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-se dom	1		1					
-60 dBm-								
NOO GOM								
-70 d8m								
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CF 2.48 GHz			1001	pts			Span 8.0 M	IHZ

		$2DH1_A$	Ant1_2402			
 Spectrum						
Ref Level 20.00 Att 21	dBm Offset 20. 0 dB SWT	01 dB = RBW 3 1 ms = VBW 10	MH2 MHz Mode Auto Swee	p	609. s	
Count 100/100	101000 0000000	Another Actual (199		20	i	
	1		M1[1]	2000	3.27 dBm 1990 GHz	
10 dBm	-		1	2.4021	1990 (112	
			MI			
O dBm						
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-20 dBm						
Pad dola						
-30 dBm	-		+ +			
-40 d8m	_					
-50 dBm-						
-60 dBm						
~70 dBm						
-> 5 0511						
CF 2.402 GHz		10	01 pts	8pan	8.0 MHz	
Date: 9.DEC.2031	16:23:43					
Date: 9.050.2031	16123143	2011	Apt1 2441		_	
	16123143	2DH1_4	Ant1_2441			
Spectrum			_		(The second seco	
Spectrum Ref Level 20.00 Att	dBm <b>Offset</b> 19.	2DH1_A	MHz	p		
Spectrum Ref Level 20.00	dBm <b>Offset</b> 19.	74 dB = RBW 3	MH2 MH2 Mode Auto Swee			-
Spectrum Rof Loval 20.00 Att 21 Count 100/100 9 1PK View	dBm <b>Offset</b> 19.	74 dB = RBW 3	MHz		(∰) 2.90 dBm 4430 GHz	
Spectrum Ref Level 20.00 Att 21 Count 100/100	dBm <b>Offset</b> 19.	74 dB • RBW 3 1 ms • VBW 10	MH2 MH2 Mode Auto Swee M1[1]		2.98 dBm	
Spectrum Rof Loval 20.00 Att 21 Count 100/100 9 1PK View	dBm <b>Offset</b> 19.	74 dB = RBW 3	MH2 MH2 Mode Auto Swee M1[1]		2.98 dBm	
Spectrum Rof Level 20.00 Att 21 Count 100/UN 1Pk View 10 dBm 0 dBm	dBm <b>Offset</b> 19.	74 dB • RBW 3 1 ms • VBW 10	MH2 MH2 Mode Auto Swee M1[1]		2.98 dBm	
Spectrum Raf Lavel 200 e Att 20 Count 100/100 IFK View 10 dBm	dBm <b>Offset</b> 19.	74 dB • RBW 3 1 ms • VBW 10	MH2 MH2 Mode Auto Swee M1[1]		2.98 dBm	
Spectrum Rof Level 20.00 Att 21 Count 100/UN 1Pk View 10 dBm 0 dBm	dBm <b>Offset</b> 19.	74 dB • RBW 3 1 ms • VBW 10	MH2 MH2 Mode Auto Swee M1[1]		2.98 dBm	
Spectrum Rof Level 20.00 Att Count 100/100 9 IF/ View 10 dBm -10 dBm -20 dBm	dBm <b>Offset</b> 19.	74 dB • RBW 3 1 ms • VBW 10	MH2 MH2 Mode Auto Swee M1[1]		2.98 dBm	
Spectrum Rof Lavel 20.00 Att 22 Count 100/100 IP/ View 10 dBm -10 dBm	dBm <b>Offset</b> 19.	74 dB • RBW 3 1 ms • VBW 10	MH2 MH2 Mode Auto Swee M1[1]		2.98 dBm	
Spectrum Rof Level 20.00 Att Count 100/100 9 IF/ View 10 dBm -10 dBm -20 dBm	dBm <b>Offset</b> 19.	74 dB • RBW 3 1 ms • VBW 10	MH2 MH2 Mode Auto Swee M1[1]		2.98 dBm	
Spectrum Rof toxol 20.0 2 Att 20.0 2 Count 100/100 IFK View 10 dBm 0 dBm -10 dBm -20 dBm -30 dBm -40 dBm	dBm <b>Offset</b> 19.	74 dB • RBW 3 1 ms • VBW 10	MH2 MH2 Mode Auto Swee M1[1]		2.98 dBm	
Spectrum Rof Lovel 20.0 20 Att 20.0 20 Count 100/100 I D dBm 0 dBm -10 dBm -20 dBm -30 dBm -50 dBm	dBm <b>Offset</b> 19.	74 dB • RBW 3 1 ms • VBW 10	MH2 MH2 Mode Auto Swee M1[1]		2.98 dBm	
Spectrum Rof toxol 20.0 20 Att 20.0 20 PTF View 10 dBm 0 dBm -20 dBm -20 dBm -30 dBm	dBm <b>Offset</b> 19.	74 dB • RBW 3 1 ms • VBW 10	MH2 MH2 Mode Auto Swee M1[1]		2.98 dBm	
Spectrum Rof Lovel 20.0 20 Count 100/100 FF View 10 dBm -10 dBm -20 dBm -30 dBm -50 dBm	dBm <b>Offset</b> 19.	74 dB • RBW 3 1 ms • VBW 10	MH2 MH2 Mode Auto Swee M1[1]		2.98 dBm	
Spectrum Rof Lavel 20.00 Att 22 Count 100/100 B IFK View 10 dBm 0 dBm -10 dBm -20 dBm -30 dBm -50 dBm -60 dBm	dBm <b>Offset</b> 19.	74 dB • RBW 3 1 ms • VBW 10	MH2 MH2 Mode Auto Swee M1[1]		2.98 dBm	

Report No.: SZNS211123-60257E-RF-00A

	2DH1_Ant1	_2480		
Spectrum				
Ref Level 20.00 dBm O Att 20 dB S Count 100/100	Miset 19.74 dB - RBW 3 MHz WT 1 ms - VBW 10 MHz	Mode Auto Sweep		
IPK View		and the second sec		
		M1[1]	4,90 dBm 2,47995200 GHz	
10 dBm	M			
0 dam				
-10 dBm				
-20 dBm				
-30 dBm-				
-30 05/1				
-40 d8m-				
-50 dBm-				
-60 dBm				
-70 dBm				
GF 2.48 GHz	1001 pts		Span 8.0 MHz	

3DH1_Ant1_2402	
 Spectrum 🕎	
Ref Level 20.00 dBm Offset 20.01 dB  RBW 3 MHz Att 20 dB SWT 1 ms VBW 10 MHz Mode Auto Sweep	
Count 100/100	
M1[1] 3.30 dBm	
2.40212790 GHz	
Mg3	
0 dBm	
-10 dBm	
-20 dBm	
-30 d8m	
-40 dem	
-50 dBm-	
-50 dBm-	
-70 d8m	
CF 2.402 CHz 1001 pts Span 8.0 MHz	
Date: 9.DEC.2021 10:24:01	
3DH1_Ant1_2441	
Spectrum 🕎	
Spectrum         Image: Construction of the section of the secti	
Spectrum         Image: Construction of the second sec	
Spectrum         Image: Spectrum           Rof Level 20:00 dBm         Offset 19.74 dB = RBW 3 MH2           Att         20 dB           SWT         1 ms = VBW 10 MH2           Count 100/100           IPk View	
Spectrum         Image: Spectrum           Rof Loval 20.00 dbm         Offset 19.74 db         RBW         3 MHz           Att         20 db         SWT         1 ms         VBW 10 MHz         Mode Auto Sweep           Count 100/100         I ms         VBW 10 MHz         Mode Auto Sweep         2.98 dbm           In K view         M1[1]         2.98 dbm         2.44101.000 GHz	
Spectrum         Imp           Rof Lovel 20.00 dBm         Offset 19.74 dB         RBW 3 MHz           Att         20 dB         SWT         1 mz         VBW 10 MHz         Mode Auto Sweep           Count 100/100         Imp         VBW 10 MHz         Mode Auto Sweep         2,4410,000 GHz           ID dBm         H1         2,4410,000 GHz         H1         2,4410,000 GHz	
Spectrum         Image: Spectrum           Rof Loval 20.00 dbm         Offset 19.74 db         RBW         3 MHz           Att         20 db         SWT         1 ms         VBW 10 MHz         Mode Auto Sweep           Count 100/100         I ms         VBW 10 MHz         Mode Auto Sweep         2.98 dbm           In K view         M1[1]         2.98 dbm         2.44101.000 GHz	
Spectrum         Image: Spectrum           Rof Lovel 20.00 dbm         Offset 19.74 db         RBW 3 MHz           Att         20 db         SWT         1 mz         VBW 10 MHz         Mode Auto Sweep           Count 100/100         Image: Spectrum         Image: Spectrum         Image: Spectrum         Image: Spectrum           I mz         VBW 10 MHz         Mode Auto Sweep         Image: Spectrum         Image: Spectrum           I dbm         Image: Spectrum         Image: Spectrum         Image: Spectrum         Image: Spectrum           I dbm         Image: Spectrum         Image: Spectrum         Image: Spectrum         Image: Spectrum           I dbm         Image: Spectrum         Image: Spectrum         Image: Spectrum         Image: Spectrum         Image: Spectrum           I dbm         Image: Spectrum         Image: Spectrum         Image: Spectrum         Image: Spectrum         Image: Spectrum           I dbm         Image: Spectrum         Image: Spectrum <td< td=""><td></td></td<>	
Spectrum         Image           Rof Lovel 20.00 dBm         Offset 19.74 db         RBW 3 MHz           Att         20.db         SWT         1 mz           Count 100/100         Image         VBW 10 MHz         Mode Auto Sweep           Count 100/100         Image         MI[1]         2.99 dbm           ID dBm         Image         MI[1]         2.44101609 GHz           0 dBm         Image         Image         Image	
Spectrum         Image: Spectrum           Rof Lovel 20.00 dbm         Offset 19.74 db         RBW 3 MHz           Att         20 db         SWT         1 mz         VBW 10 MHz         Mode Auto Sweep           Count 100/100         I mz         VBW 10 MHz         Mode Auto Sweep         2.98 dbm           I dbm         I mz         I mz         I mz         2.98 dbm           I dbm         I dbm         I mz         I mz         I mz	
Spectrum         Image           Rof Lovel 20.00 dBm         Offset 19.74 db         RBW 3 MHz           Att         20.db         SWT         1 mz           Count 100/100         Image         VBW 10 MHz         Mode Auto Sweep           Count 100/100         Image         MI[1]         2.99 dbm           ID dBm         Image         MI[1]         2.44101609 GHz           0 dBm         Image         Image         Image	
Spectrum         Image: Spectrum           Rof Lovel 20.00 dBm         Offset 19.74 dB = RBW 3 MHz           Att         20 dB           SWT         1 mz = VBW 10 MHz           Mode Auto Sweep           Count 100/100           IPk View           ID dBm           -0 dBm           -30 dBm	
Spectrum         Image: Spectrum           Rof Lovel 20.00 dbm         Offset 19.74 db = RBW 3 MHz           Att         20 db           SWT         1 ms = VBW 10 MHz           Mode Auto Sweep           Count 100/100           IPk View           ID dbm           0 dbm           -10 dbm	
Spectrum         Image: Spectrum           Rof Lovel 20.00 dBm         Offset 19.74 dB = RBW 3 MHz           Att         20 dB           Count 100/100           I Image: VBW 10 MHz           Mil[1]         2.98 dBm           10 dBm         H1           -20 dBm         -20 dBm           -30 dBm         -10 dBm	
Spectrum         Image: Spectrum           Rof Lovel 20.00 dBm         Offset 19.74 dB = RBW 3 MHz           Att         20 dB           Count 100/100           Filk Yiew           10 dBm           -0 dBm           -20 dBm           -30 dBm           -50 dBm	
Spectrum         Image: Spectrum           Rof Lovel 20.00 dBm         Offset 19.74 dB = RBW 3 MHz           Att         20 dB           Count 100/100           I Image: VBW 10 MHz           Mil[1]         2.98 dBm           10 dBm         H1           -20 dBm         -20 dBm           -30 dBm         -10 dBm	
Spectrum         Image: Spectrum           Raf Lavel 20.00 dBm         Offset 19.74 dB = RBW 3 MHz         Mode Auto Sweep           Count 100/100         SWT         1 mz = VBW 10 MHz         Mode Auto Sweep           Count 100/100         BWT         1 mz = VBW 10 MHz         Mode Auto Sweep           Count 100/100         BWT         1 mz = VBW 10 MHz         Mode Auto Sweep           Count 100/100         BWT         1 mz = VBW 10 MHz         Mode Auto Sweep           Count 100/100         BWT         1 mz = VBW 10 MHz         Mode Auto Sweep           Count 100/100         BWT         1 mz = VBW 10 MHz         Mode Auto Sweep           10 dBm         10 dBm         10 dBm         10 dBm         10 dBm           -20 dBm         -30 dBm         -40 dBm         -40 dBm         -40 dBm           -50 dBm         -50 dBm         -40 dBm         -40 dBm         -40 dBm	
Spectrum         Image: Spectrum           Rof Lovel 20.00 dBm         Offset 19.74 dB = RBW 3 MHz           Att         20 dB           Count 100/100           Filk Yiew           10 dBm           -0 dBm           -20 dBm           -30 dBm           -50 dBm	
Spectrum         Image: Spectrum           Raf Lavel 20.00 dBm         Offset 19.74 dB = RBW 3 MHz         Mode Auto Sweep           Count 100/100         SWT         1 mz = VBW 10 MHz         Mode Auto Sweep           Count 100/100         BWT         1 mz = VBW 10 MHz         Mode Auto Sweep           Count 100/100         BWT         1 mz = VBW 10 MHz         Mode Auto Sweep           Count 100/100         BWT         1 mz = VBW 10 MHz         Mode Auto Sweep           Count 100/100         BWT         1 mz = VBW 10 MHz         Mode Auto Sweep           Count 100/100         BWT         1 mz = VBW 10 MHz         Mode Auto Sweep           10 dBm         10 dBm         10 dBm         10 dBm         10 dBm           -20 dBm         -30 dBm         -40 dBm         -40 dBm         -40 dBm           -50 dBm         -50 dBm         -40 dBm         -40 dBm         -40 dBm	

Spectrum			[1_Ant1_24			(B)
Ref Level 20.00	dBm Offset	19.74 dB - RBV	V 3 MHz			[V.
	two dis swr	1 ms 🖷 VBV		Auto Sweep		
<ul> <li>IPk Yiew</li> </ul>						
				41[1]	2.48	4.87 dBm 009590 GHz
10 dBm			M1	+ +		
			*			
O dBm						
-10 dBm						-
-20 dBm-						
-30 dBm						
-40 dBm-						
-50 dBm-						
-60 dBm						
-70 dBm				-		
GF 2.48 GHz			1001 pts	1	Sp	an B.0 MHz

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## Appendix D: Carrier frequency separation Test Result

Test Mode	Antenna	Channel	Result[MHz]	Limit[MHz]	Verdict
DH1	Antl	Нор	1.003	≥0.614	PASS
2DH1	Antl	Нор	1.000	≥0.814	PASS
3DH1	Ant1	Нор	1.000	≥0.824	PASS

DH1_Ant1_Hop	
 Spectrum T	
Ref Level         20.00         dBm         Offset         19.74         dB         RBW         100 kHz           Att         20 dB         SWT         18.9 µs         VBW 300 kHz         Mode         Auto FFT           Count 100/100         500         KHz         Mode         Auto FFT	
IPk View	
10 dBm 02[1] 3.04 dBm 2.44115217 GHz 02[1] 0.20 dB	
0 dbm	
-10 gBm	
-20 dBm	
-30 dBm	
-50 dBm	
-60 dBm	
-70 d8m	
8tart 2.4405 GHz 691 pts 8tap 2.4425 GHz	
2DH1 Ant1 Hon	
2DH1_Ant1_Hop	
2DH1_Ant1_Hop	
Bit Level 20.00 dBm         Offset 19.74 dB         RBW 100 kH2         Image: Control (Control (Contro) (Contro) (Control (Control (Control (Control (Control (Control	
Bit Lovel 20.00 dBm         Offset 19.74 dB         RBW 100 kH2         Image: Control (Control (Contro) (Contro) (Control (Control (Control (Control (Control (Control	
2DH1 Antl Hop           Spectrum           Rof Loval 20.00 dbm         offsot 19.74 db = RBW 100 H42           Att         20 dB SWT 10.9 µs = VBW 300 H42           Count 100/100         Mil 11         2.54 dBm           0 1Pk: View         02[1]         2.44003623 GHz         0.21 HB           10 dBm         Mil 1         02[1]         2.44003623 GHz         0.21 HB	
2DH1_Ant1_Hop           Ref Level 20.00 dBm         Offset 19.74 dB = RBW 100 kH2 Att	
2DH1 Antl Hop           Spectrum           Rof Loval 20.00 dbm         offsot 19.74 db = RBW 100 H42           Att         20 dB SWT 10.9 µs = VBW 300 H42           Count 100/100         Mil 11         2.54 dBm           0 1Pk: View         02[1]         2.44003623 GHz         0.21 HB           10 dBm         Mil 1         02[1]         2.44003623 GHz         0.21 HB	
2DH1_Antl_Hop           Rof Level 20.00 dbm Offset 19.74 db = RBW 100 kHz           Rof Level 20.00 dbm Offset 19.74 db = RBW 100 kHz           Att         20 db SWT 18.9 µs = VBW 300 kHz           Auto FFT           Count 100/100           Difference         Mil 11 2.54 dbm           0 dbm         Mil         02(1)           0 dbm         Mil         02(1)           10 dbm         Mil         02(1)	
2DH1_Ant1_Hop           Ref Level 20.00 dbm Offset 19.74 db = RBW 100 kH2           Att         Colspan="2">Node Auto FFT           Cont 100/100           © JPK View         M113         2.44007023 GH2           10 dbm         M1         0.21 dB           -20 dbm         M1         0.21 dB	
2DH1 Antl_Hop           Term           Rof Level 20.00 dBm         Offset 10.74 dB = RBW 100 H4c           Att         20 dB         BWT         10.9 µs = VBW 300 H4c           Count 100/100         BWT         10.9 µs = VBW 300 H4c         Mode Auto FFT           Count 100/100         BWT         10.9 µs = VBW 300 H4c         Mode Auto FFT           Count 100/100         BWT         10.9 µs = VBW 300 H4c         Mode Auto FFT           0 dBm         02(1)         2.34 dBm         0.21 dBm           -0 dBm         -02(1)         1.000000 M4c         0.21 dBm           -30 dBm         -00 dBm         -00 dBm         -00 dBm         -00 dBm           -30 dBm         -00 dBm         -00 dBm         -00 dBm         -00 dBm	
2DH1 Antl_Hop           Term           Rof Loval 20.00 dBm         Offsot 19.74 db = RBW 100 HH2           Att         20. dB         SWT         18.9 µs = VBW 300 HH2         Mode Auto FFT           Count 100/100         BWT         18.9 µs = VBW 300 HH2         Mode Auto FFT           0 dBm         02(1)         2.54 dBm           0 dBm         02(1)         2.00000 MH2           0 dBm         02(1)         1.00000 MH2           -0 dBm         0         0           -0 dBm         0         0           -0 dBm         0         0           -0 dBm         0         0	
2DH1 Antl_Hop           Term           Rof Level 20.00 dBm         Offset 10.74 dB = RBW 100 H4c           Att         20 dB         BWT         10.9 µs = VBW 300 H4c           Count 100/100         BWT         10.9 µs = VBW 300 H4c         Mode Auto FFT           Count 100/100         BWT         10.9 µs = VBW 300 H4c         Mode Auto FFT           Count 100/100         BWT         10.9 µs = VBW 300 H4c         Mode Auto FFT           0 dBm         02(1)         2.34 dBm         0.21 dBm           -0 dBm         -02(1)         1.000000 M4c         0.21 dBm           -30 dBm         -00 dBm         -00 dBm         -00 dBm         -00 dBm           -30 dBm         -00 dBm         -00 dBm         -00 dBm         -00 dBm	

Spectrum			time
<ul> <li>Att 20 dB 8</li> <li>Count 100/100</li> </ul>	Offset 19.74 dB ● RBW 10 SWT 18.9 µs ● VBW 30	00 kH2 00 kHz Mode Auto FFT	(de 1
<ul> <li>1Pk View</li> </ul>			
10 dBm	M1	M1[1] 02[1]	2.56 dBm 2.44115797 GHz 0.23 dB 1.00000 MHz
0 dBm			
-20 dBm			
-30 dBm			
-40 d8m			
-50 dBm			
-60 dBm			
-70 d8m-			
8tart 2.4405 GHz		591 pts	Stop 2.4425 GHz

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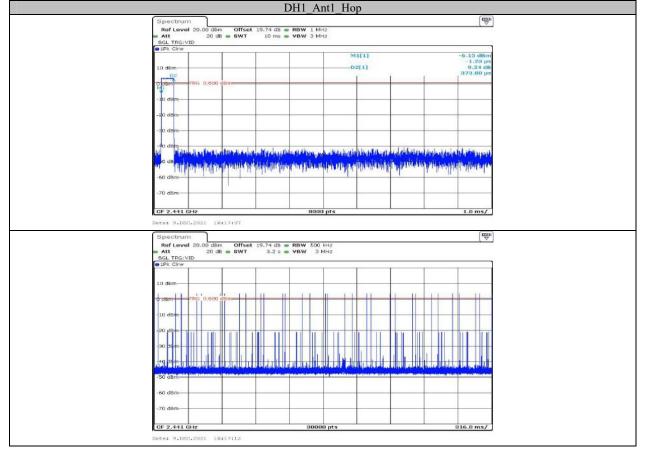
## Appendix E: Time of occupancy Test Result

Test Mode	Antenna	Channel	BurstWidth [ms]	TotalHops [Num]	Result[s]	Limit[s]	Verdict
DH1	Antl	Нор	0.37	320	0.120	≤0.4	PASS
DH3	Ant1	Нор	1.62	160	0.260	≤0.4	PASS
DH5	Ant1	Нор	2.86	120	0.344	≤0.4	PASS
2DH1	Ant1	Нор	0.38	290	0.111	≤0.4	PASS
2DH3	Ant1	Нор	1.63	150	0.244	≤0.4	PASS
2DH5	Ant1	Нор	2.87	110	0.315	≤0.4	PASS
3DH1	Ant1	Нор	0.38	310	0.119	≤0.4	PASS
3DH3	Ant1	Нор	1.62	150	0.244	≤0.4	PASS
3DH5	Ant1	Нор	2.87	130	0.373	≤0.4	PASS

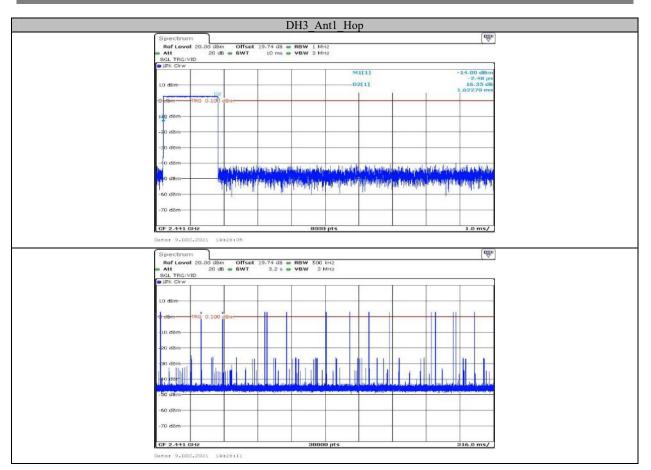
Note 1: A period time=0.4\*79=31.6(S), Result=BurstWidth\*Totalhops

Note 2: Totalhops=Hopping Number in 3.16s\*10

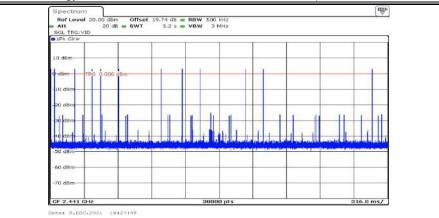
Note 3: Hopping Number in 3.16s=Total of highest signals in 3.16s(Second high signals were other channel)



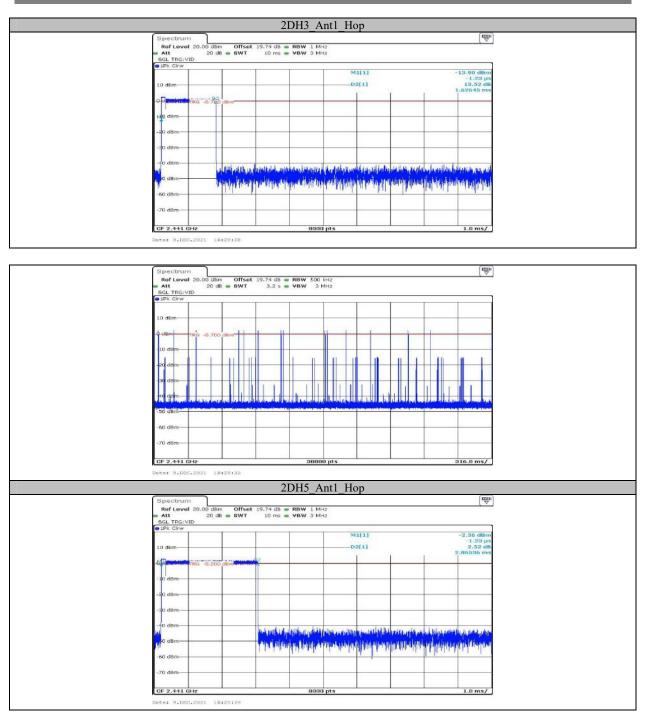
Report No.: SZNS211123-60257E-RF-00A

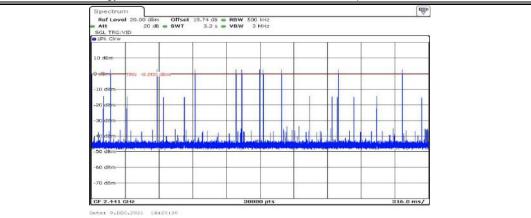


		Antl_Hop	(873)
Spectrum			(m)
Ref Level 20.00 dBm	Offset 19.74 dB - RBW		
SGL TRG: VID	SWT 10 ms . VBW	3 MH2	
a 1Pk Cirw			
		M1[1]	-8.67 dBm
			-1.23 µs
10 dBm		-D2[1]	11.00 dB 2.86286 ms
The second second second second second	02	1 1	2.86286 ms
-Odbm TRG 0.000 dBn	pp.		
MI			
- 10 dBm-			
-20 dBm			
-30 d@m-			
-40 d8m-			
at a	the first state and the state of the	فاعتلد بدفير والبالعان أشر أدران التدمينا والشاط	the international ration & local stars being being
C dBm-	and the second s	some number of an entropy of the second	it builden the same transferred with silica
1	A STATE OF STATE	Italian in the second second second second	and the man differences of the second states at
-60 dBm-		1.1.1.1.1.1.1	the first of the first states
-70 dBm			
GF 2.441 GHz		8000 pts	1.0 ms/



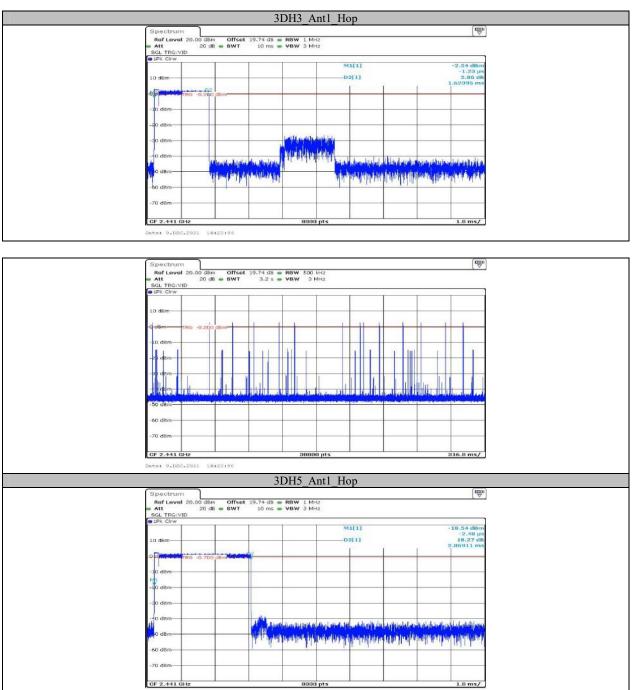
		2DH1 /	Antl Hop			
= Att	vel 20.00 dBm Offset 20 dB = SWT		142			
SGL TRI IPk Cir 10 dBm-	w		M1[1] 	11 F	-1.75 dBm -1.23 µs 1.88 dB 381.30 µs	
-10 dBm	TRG -0.200 dBm					
-20 dBm -20 dBm						
-40 dem 0 de	ina ang ang ang ang ang ang ang ang ang a		n and a start of the presidence. Physical providence of the presidence of	and developed a set in the set of	in a faith an	
-60 d8m -70 d8m						
GF 2.44 Date: 9.	DEC.2021 18:19:49	801	10 pts		1.0 ms/	
	vel 20.00 dBm Offset 20 dB = SWT S:VID					
10 dBm-	TRG -0.200 dpm				1 1 1	
- 0 diam - 10 diam						
man or. nan pit						
-50 dBm						
-70 dBm CF 2.44	1 GHz	300	00 pts		316.0 ms/	





3DH1_Ant1_Hop
Spectrum         Image: Spectrum           Ref Level 20.00 dbm         Offset 19.74 db         RBW 1 MHz           Att         20 db         SWT         10 ms         VBW 3 MHz           SGL TRG:VID         T0 ms         VBW 3 MHz         SMHz
Optimize         TRG -0.100 dBm           Hit            -10 dBm            -20 dBm
- 20 dem
OF 2.441 0Hz         B000 pts         1.0 ms/           Date: 9.050.2021         10422:27
Spectrum         Image: Constraint of the sector of th
-10 dam -0 ltm -0 ltm -0 ltm- -0 ltm
-50 dBm
GF 2.441 GHz 30000 pts 316.0 ms/

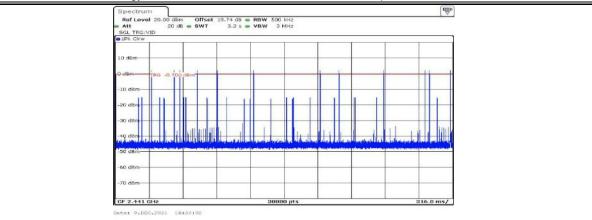
#### Report No.: SZNS211123-60257E-RF-00A



Date: 9.DEC.2021 16:29:57

Version 11: 2021-11-09

Report No.: SZNS211123-60257E-RF-00A



## Appendix F: Number of hopping channels Test Result

Test Mode	Antenna	Channel	Result[Num]	Limit[Num]	Verdict
DH1	Antl	Нор	79	≥15	PASS
2DH1	Antl	Нор	79	≥15	PASS
3DH1	Antl	Нор	79	≥15	PASS

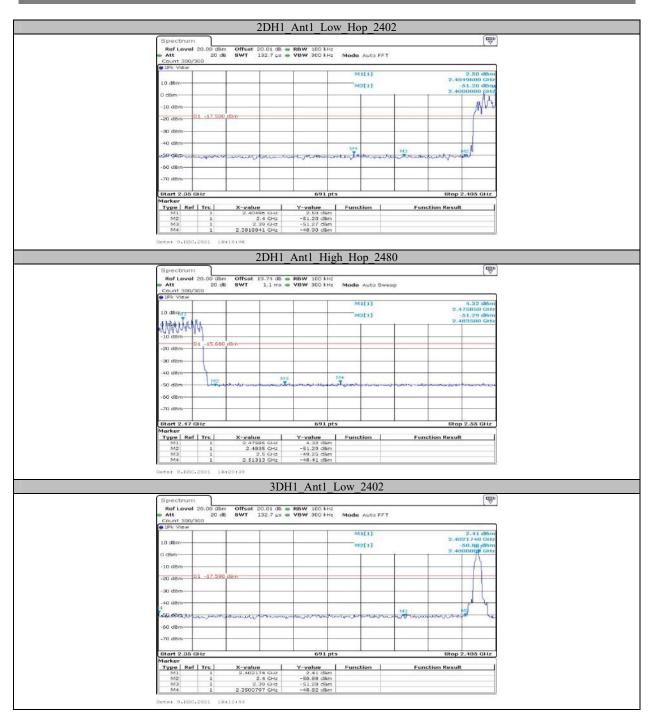
	DH1_Ant1_Hop	
	Spectrum	letter Etter
	Ref Level         20.00 dBm         Offset         20.01 dB         RBW         100 kHz           Att         20 dB         SWT         1 ms         VBW         300 kHz         Mode         Auto Sweep	1.
	IPk View	
	10 dBm	
		ANADA
		WWW
	-20 dBm	1
	-b0 d8m	
	-40 dBm	
	/-SO dBm	h
	-60 dBm	
	-70 dBm-	
	Start 2.4 GHz 691 pts Stop 2	.4835 GHz
	Date: 14.DEC.2021 09:15:45	
	2DH1_Ant1_Hop	
	Spectrum Ref Level 20.00 dBm Offset 20.01 dB  RBW 100 kHz	(B
	Att 20 dB SWT 1 ms VBW 300 kHz Mode Auto Sweep     IPk View	
	10 dBm	
	- คนั้น และ เป็น เป็น เป็น เป็น เป็น เป็น เป็น เป็น	hoah
		148890
	-10 dBm-	
	-20 dBm-	
	-10 dBm	
	140 dBm-	
	-50 dBm	L.
	-60 dBm	
	-70 dBm-	
	Start 2.4 GHz 691 pts Stop 2	.4835 GHz
	Date: 14.DEC.2021 09109149	
	3DH1_Ant1_Hop	
	Spectrum Ref Level 20.00 dBm Offset 20.01 dB  RBW 100 kHz	
	Att 20 dB SWT 1 ms VBW 300 kHz Mode Auto Sweep     IPk View	
	10 d8m ////////////////////////////////////	habba
	-benever and a second a second a second a second	MAAAAA
	-10 dBm	
	-20 dBm	
	-10 dBm	
	640 dBm	4
	-50 d8m	5
	-60 d8m	
	-70 dBm	
		.4835 GHz
	Listart 2.4 GH2 691 pts stop 2 Date: 14.DEC.2021 09:14:30	.adda GHZ
sion 11: 2021-11-09	Page 52 of 56	

# Appendix G: Band edge measurements Test Graphs

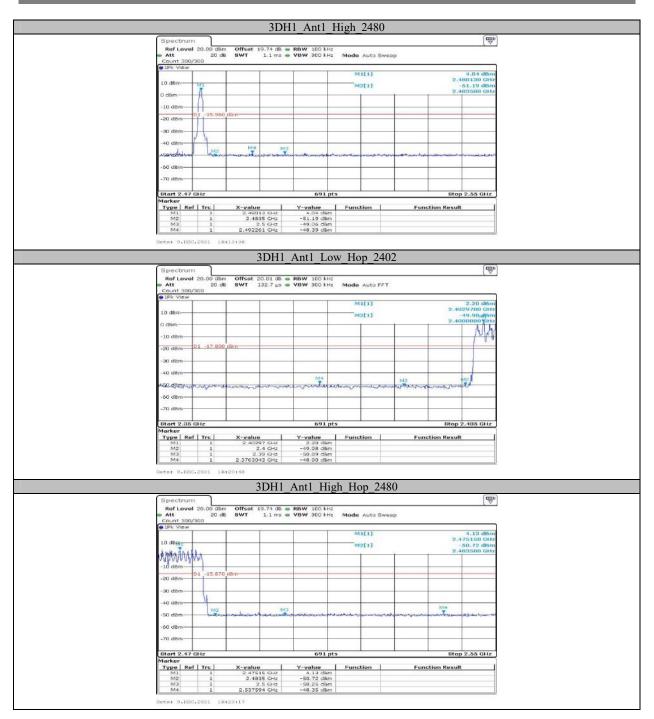
DH1 Ant1 Low 2402	
Spectrum	
RefLevel 20.00 dBm Offset 20.01 dB = RBW 100 kH2 Att 20 dB SWT 132.7 Us = VSW 200 kH2 Mode Auto FFT	
Count 300/300 • 1Pk View	
M1[1] 3.13 dBm 2.4018560 GH2	
10 d8m M2[1]	
-10 dBm	
-10 dam -20 dam 01 -16.870 dam	
-20 000	
-30 d8m	
14 Man 400	
TEG Eller the contraction of the second descendence of the second s	
-70 dBm	
8tert 2.35 GHz 691 pts 8top 2,405 GHz Marker	
Type         Ref         Trc         X-value         Y-value         Function         Function Result           M1         1         2.401955 GHz         2.13 dam	
M2         1         2.4 GHz         -50.58 dBm           M3         1         2.39 GHz         -51.39 dBm           M4         5         5         5         6	
M4 1 2.3504783 CHz -49.25 dBm	
 Date: 9.085.2021 18:08:40	_
DH1_Ant1_High_2480	
Spectrum Ref Level 20.00 dBm Offset 19.74 db • RBW 100 kHz	
Att 20 dB SWT 1.1 m₂	
● IPk View M1[1] 4.65 dBm	
2.479900 GHz	
10 dBm Nz_ 50.30 dBm 0 dBm 2,483500 GHz	
-10 dBm	
-20 dBm 01 -15.350 dBm	
-30 dbm	
-10.08m / 10 / 10 / 10 / 10 / 10 / 10 / 10 / 1	
Addition the second and the second a	
-00 dBm	
-70 dBm	
Biort 2.47 GHz 691 pts Btop 2.55 GHz	
Marker Type Ref Trc X-value Y-value Function Function Result	
Mil         1         2.4790         GHz         4.63         dBm           M2         1         2.4895         GHz         -50.30         dBm           M3         1         2.5         GHz         -50.47         dBm	
M4 1 2.532609 GHz -48.13 dBm	
Date: 9.DEC.2031 18:09:31	
DH1_Ant1_Low_Hop_2402	
Spectrum 🕎	
Ref Level 20.00 dBm Offset 20.01 dB RBW 100 kHz Att 20 dB SWT 132.7 µs VBW 300 kHz Mode Auto FFT	
Count 300/300 PIPk View	
10 d8m M2[1] 2.4038-60 GHz M2[1] -50.60 d8a	
10 Juni M2[1] -50.60 (해외) 0 d8m	
-10 dBm	
-20 dBm (1-16-320 dBm)	
-30 dBm	
-40 d8m-	
- 58 Alter and the adverse of the second of	
-60 dBm	
-70 d8m	
8tort 2.35 GHz 691 pts 8top 2.405 GHz	
Marker	
Type         Ref         Trc         X-value         Y-value         Function         Function Result           M1         1         2.403446 GHz         2.60 Ghm         Function         Function Result           M2         1         2.40 GHz         3.60 Ghm         Function         Function Result	
M2         1         2.9         GHz         -50.03         GBm           M3         1         2.9         GHz         -51.18         dfm           M4         1         2.370942         GHz         -48.03         dBm	
Date: 9.005.2021 (0:14:10	

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#### \*\*\*\*\* END OF REPORT \*\*\*\*\*