

# CERTIFICATION TEST REPORT

**Report Number.** : 4790976555-E7V3

**Applicant** : SAMSUNG ELECTRONICS CO., LTD.  
129 SAMSUNG-RO, YEONGTONG-GU, SUWON-SI,  
GYEONGGI-DO, 16677, KOREA

**Model** : SM-S921B/DS, SM-S921B

**FCC ID** : A3LSMS921B

**EUT Description** : GSM/WCDMA/LTE 5G NR Phone + BT/BLE, DTS/UNII a/b/g/n/ac/ax,  
NFC and WPT

**Test Standard(s)** : FCC 47 CFR PART 15 SUBPART C

**Date Of Issue:**

2023-10-25

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Revision History

<u>Rev.</u>	<u>Issue Date</u>	<u>Revisions</u>	<u>Revised By</u>
V1	2023-10-17	Initial issue	Dexter(Hyunsik) Yun
V2	2023-10-24	Updated to address TCB's question	Dexter(Hyunsik) Yun
V3	2023-10-25	Updated to address TCB's question	Dexter(Hyunsik) Yun

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# 1. ATTESTATION OF TEST RESULTS

**COMPANY NAME:** SAMSUNG ELECTRONICS CO., LTD.  
**EUT DESCRIPTION:** GSM/WCDMA/LTE 5G NR Phone + BT/BLE, DTS/UNII a/b/g/n/ac/ax, NFC and WPT  
**MODEL:** SM-S921B/DS, SM-S921B  
**SERIAL NUMBER:** R3CW80FKQ6B, R3CW80FKP9Y, R3CW80FKNYD (CONDUCTED); R3CW80FLMSJ, R3CW90M7N2J, R3CW90M7MSN (RADIATED);  
**DATE TESTED:** 2023-08-30 ~ 2023-10-25

APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
47 CFR Part 15 Subpart C	Complies

UL KOREA LTD. tested the above equipment in accordance with the requirements set forth in the above standards. All indications of Pass/Fail in this report are opinions expressed by UL KOREA LTD. based on interpretations and/or observations of test results. Measurement Uncertainties were not taken into account and are published for informational purposes only. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

**Note:** The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. This document may not be altered or revised in any way unless done so by UL KOREA LTD. and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL KOREA LTD. will constitute fraud and shall nullify the document. This report must not be used by the client to claim product certification, approval, or endorsement by IAS, any agency of the Federal Government, or any agency of any government.

Approved & Released For  
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Seokhwan Hong  
Suwon Lab Engineer  
UL KOREA LTD.

Tested By:



Dexter(Hyunsik) Yun  
Suwon Lab Engineer  
UL KOREA LTD.

## 2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with following methods.

1. FCC 47 CFR Part 2.
2. FCC 47 CFR Part 15.
3. KDB 558074 D01 15.247 Meas Guidance v05r02.
4. KDB 662911 D01 v02r01
5. ANSI C63.10-2013.

## 3. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 218 Maeyeong-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16675, Korea. Line conducted emissions are measured only at the 218 address. The following table identifies which facilities were utilized for radiated emission measurements documented in this report. Specific facilities are also identified in the test results sections.

218 Maeyeong-ro	
<input checked="" type="checkbox"/>	Chamber 1(3m semi-anechoic chamber)
<input checked="" type="checkbox"/>	Chamber 2(3m semi-anechoic chamber)
<input checked="" type="checkbox"/>	Chamber 3(3m semi-anechoic chamber)
<input type="checkbox"/>	Chamber 4(3m Full-anechoic chamber)
<input type="checkbox"/>	Chamber 5(3m Full-anechoic chamber)

UL KOREA LTD. is accredited by IAS, Laboratory Code TL-637. The full scope of accreditation can be viewed at <https://www.iasonline.org/wp-content/uploads/2017/05/TL-637-cert-New.pdf>.

## 4. DECISION RULES AND MEASUREMENT UNCERTAINTY

### 4.1. METROLOGICAL TRACEABILITY

The measuring equipment utilized to perform the tests documented in this report has been calibrated in accordance with the manufacturer's recommendations, and is traceable to recognized national standards.

### 4.2. SAMPLE CALCULATION

Where relevant, the following sample calculation is provided:

$$\begin{aligned} \text{Field Strength (dBuV/m)} &= \text{Measured Voltage (dBuV)} + \text{Antenna Factor (dB/m)} + \\ &\text{Cable Loss (dB)} - \text{Preamp Gain (dB)} \\ 36.5 \text{ dBuV} + 18.7 \text{ dB/m} + 0.6 \text{ dB} - 26.9 \text{ dB} &= 28.9 \text{ dBuV/m} \end{aligned}$$

$$\begin{aligned} \text{AC Corrected Reading (dBuV)} &= \text{Measured Voltage (dBuV)} + \text{Extension Cord} \\ &\text{Loss (dB)} + \text{Cable Loss (dB)} \\ 44.72 \text{ dBuV} &= 34.72 \text{ dBuV} + 9.9 \text{ dB} + 0.1 \text{ dB} \end{aligned}$$

### 4.3. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

PARAMETER	UNCERTAINTY
Conducted Disturbance, 0.15 to 30 MHz	2.80 dB
Radiated Disturbance, 30 MHz to 1 GHz	3.92 dB
Radiated Disturbance, 1 GHz to 18 GHz	5.06 dB
Radiated Disturbance, 18 GHz to 40 GHz	6.02 dB

Uncertainty figures are valid to a confidence level of 95%.

### 4.4. DECISION RULES

Decision rule for statement(s) of conformity is based on Procedure 2, Clause 4.4.3 in IEC Guide 115:2021.

## 5. EQUIPMENT UNDER TEST

### 5.1. EUT DESCRIPTION

The EUT is a GSM/WCDMA/LTE 5G NR Phone + BT/BLE, DTS/UNII a/b/g/n/ac/ax, NFC and WPT. This test report addresses the DSS(Bluetooth) operational mode.

Representative model	Difference	Derivative model
		SM-S921B
SM-S921B/DS	Hardware	Different Sim Card tray
	Software	Same

The model SM-S921B/DS was used for final testing and is representative of the test results in this report.

### 5.2. MAXIMUM OUTPUT POWER

The transmitter has a maximum peak conducted output power as follows:

Frequency Range [MHz]	Mode	Power Mode	Output Power [dBm]	Output Power [mW]
2 402 ~ 2 480	Basic GFSK	Peak	19.010	79.616
		Average	18.715	74.388
	Enhanced Pi/4-DPSK	Peak	17.400	54.954
		Average	14.344	27.189
	Enhanced 8PSK	Peak	17.980	62.806
		Average	14.332	27.114



### 5.3. DESCRIPTION OF AVAILABLE ANTENNAS

An intentional radiator antenna shall be designed to ensure that no antenna other than that furnished by the responsible party can 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 internal antenna was Permanently attached.  
 Therefore this E.U.T Complies with the requirement of §15.203.**

The radio utilizes a internal antenna, with a maximum gain of:

Frequency Band[MHz]	ANT1 Gain [dBi]	ANT2 Gain [dBi]	Correlated Chains Directional Gain[dBi]
DTS 2400 – 2483.5	-2.44	-3.89	-0.12

Directional gain for the MIMO operations is determined using KDB 662911 D01 Multiple Transmitter Output section F (2)(d)(1) for *Unequal antenna gains, with equal transmit powers*. The gain is calculated using the formula for correlated transmissions across the two transmit antennas.

$$\text{Directional gain} = 10 \log[(10^{G_1/20} + 10^{G_2/20} + \dots + 10^{G_N/20})^2 / N_{\text{ANT}}] \text{ dBi.}$$

Sample calculation for this device with  $N_{\text{ANT}} = 2$

$$\text{Directional gain} = 10 \log[(10^{-3.5/20} + 10^{-7.1/20})^2 / 2] = -2.1 \text{ dBi}$$

“Wi-Fi1 - SUB4 ANT” and “Wi-Fi2 - SUB6/SUB1 ANT” as indicated in antenna specification are written as ANT1 and ANT2 in this report.

#### 5.4. WORST-CASE CONFIGURATION AND MODE

Both Bluetooth Diversity mode and DUAL mode have been investigated and confirmed.

The fundamentals of the EUT were investigated in three orthogonal orientations X, Y and Z. It was determined that below table's orientation was the worst-case orientation.

ANT1	ANT2	DUAL
X	Z	X

For conducted power test, both Diversity and DUAL mode were verified and reported. In DUAL mode, except power test, no noticeable data was found. Tests was performed on Diversity mode.

Diversity mode test was performed on ePA(PL11) and DUAL mode on iPA(PL 10).

Radiated and power line conducted tests were performed with EUT connected to AC power adapter as the worst-case configuration. Radiated harmonics spurious 1~18 GHz Low/Mid/High channels, 18-26GHz were performed with the EUT set at the Diversity and DUAL mode. Radiated emission below 1GHz and power line conducted emission were performed with the EUT set to transmit at the channel with highest output power as worst-case scenario.

For Radiated band-edge and spurious test, tests were performed on Diversity mode and DUAL mode.

All radiated and power line conducted tests were performed attached with travel adapter for the worst-case condition mode.

GFSK, Pi/4-DQPSK, 8PSK average Power are all investigated, The GFSK & 8PSK Power are the worst case. Testing is based on this mode to showing compliance.

## 5.5. DESCRIPTION OF TEST SETUP

### SUPPORT EQUIPMENT

Support Equipment List				
Description	Manufacturer	Model	Serial Number	FCC ID
Charger	SAMSUNG	EP-TA800	R37T53J8459SEA	N/A
Data Cable	SAMSUNG	EP-DN980	GH39-02111A	N/A

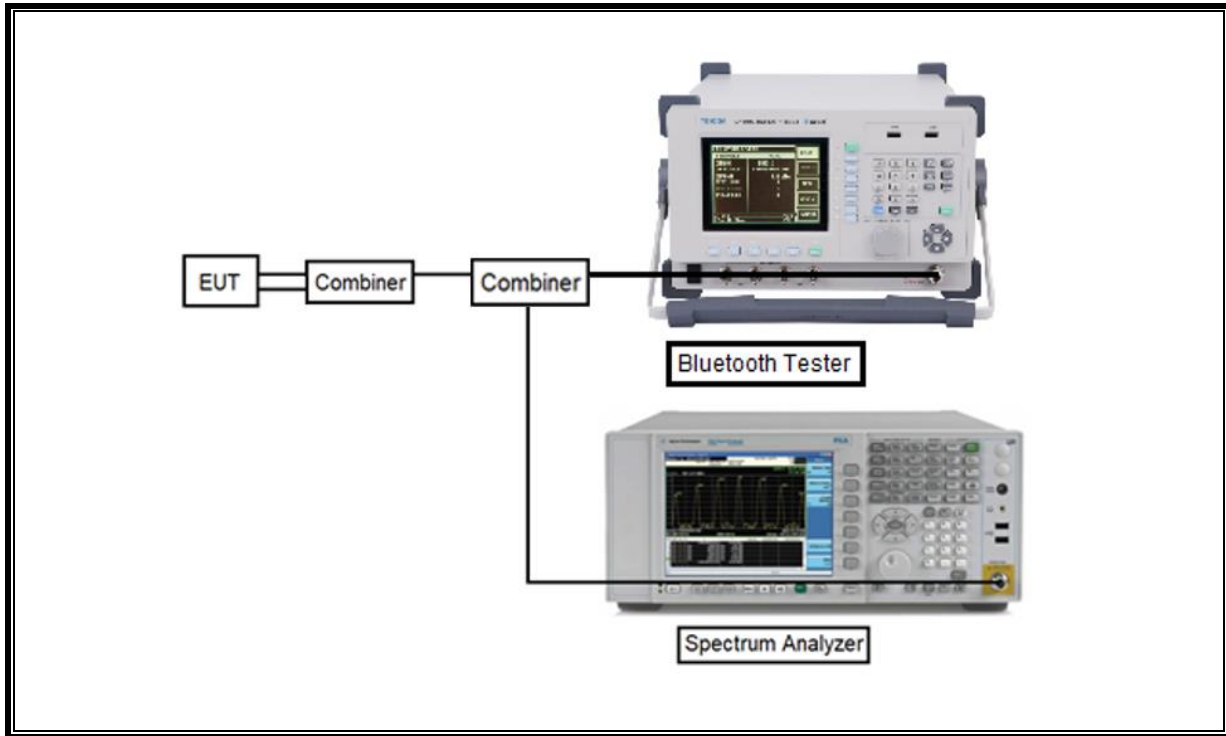
### I/O CABLE

I/O Cable List						
Cable No.	Port	# of identical ports	Connector Type	Cable Type	Cable Length (m)	Remarks
1	DC Power	1	C Type	Shielded	1.0 m	N/A

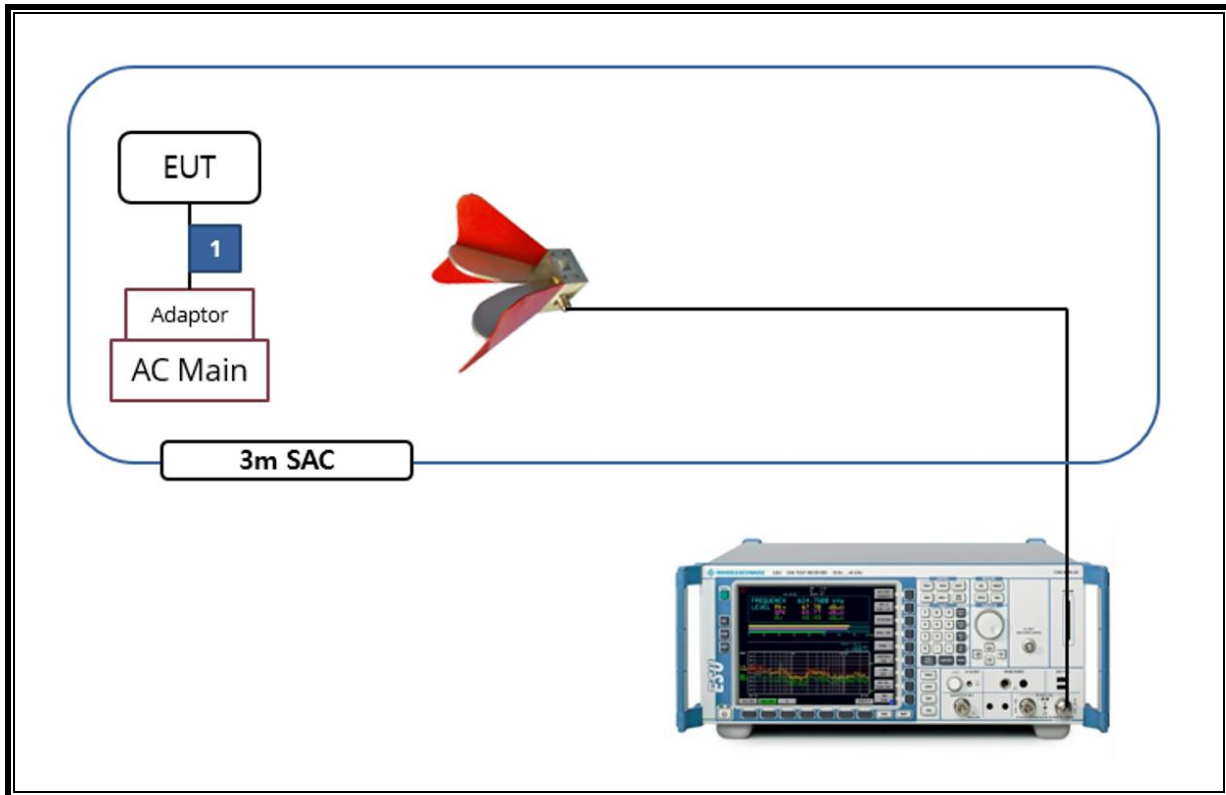
### TEST SETUP

The EUT is continuously communicating to the Bluetooth tester during the tests.  
Test software enable BT communications.

**SETUP DIAGRAM FOR TESTS (CONDUCTED TEST SETUP)**



**SETUP DIAGRAM FOR TESTS (RADIATED TEST SETUP)**



## 6. TEST AND MEASUREMENT EQUIPMENT

The following test and measurement equipment was utilized for the tests documented in this report:

Test Equipment List				
Description	Manufacturer	Model	S/N	Cal Due
Antenna, Bilog, 30MHz-1GHz	SCHWARZBECK	VULB9163	750	2024-08-15
Antenna, Loop, 9kHz-30MHz	R&S	HFH2-Z2	100418	2025-09-06
Antenna, Horn, 18 GHz	ETS	3117	00168724	2024-08-04
Antenna, Horn, 18 GHz	ETS	3117	00168717	2024-08-21
Antenna, Horn, 40 GHz	ETS	3116C	00166155	2024-08-02
Preamplifier	ETS	3115-PA	00167475	2024-07-25
Preamplifier	ETS	3116C-PA	00168841	2024-07-25
Directional Antenna	Cobham	FPA3-0.8-6.0R/1329	80108-0004	N/A
Directional Antenna	Cobham	FPA3-0.8-6.0R/1329	110367-0003	N/A
Preamplifier, 1000 MHz	Sonoma	310N	341282	2024-07-24
Preamplifier, 18 GHz	Miteq	AFS42-00101800-25-S-42	1896138	2024-07-25
Preamplifier, 18 GHz	Miteq	AFS42-00101800-25-S-42	2029169	2024-07-24
Spectrum Analyzer, 44 GHz	KEYSIGHT	N9030B	MY60070693	2024-01-09
Spectrum Analyzer, 44 GHz	KEYSIGHT	N9040B	MY60080268	2024-01-09
Average Power Sensor	Agilent / HP	U2000	MY54270007	2024-07-23
Average Power Sensor	Agilent / HP	U2000	MY54260010	2024-07-24
Bluetooth Tester	TESCOM	TC-3000C	3000C000546	2024-07-24
Power Splitter	MINI-CIRCUITS	WA1534	UL003	2024-01-09
Power Splitter	MINI-CIRCUITS	WA1534	UL004	2024-01-09
Attenuator	PASTERNAK	PE7087-10	A009	2024-07-24
Attenuator	PASTERNAK	PE7087-10	A001	2024-07-23
EMI Test Receive, 40 GHz	R&S	ESU40	100439	2024-07-23
EMI Test Receive, 40 GHz	R&S	ESU40	100457	2024-07-24
Low Pass Filter 5GHz	Micro-Tronics	LPS17541	009	2024-07-23
High Pass Filter 3GHz	Micro-Tronics	HPM17543	010	2024-07-23
High Pass Filter 6GHz	Micro-Tronics	HPS17542	009	2024-07-23
LISN	R&S	ENV-216	101836	2024-07-23
Termination	WEINSCHEL	M1406A	T09	2024-07-23
UL Software				
Description	Manufacturer	Model	Version	
Radiated software	UL	UL EMC	Ver 9.5	
AC Line Conducted software	UL	UL EMC	Ver 9.5	

## 7. TEST RESULTS SUMMARY

FCC Part Section	Test Description	Test Limit	Test Condition	Test Result
2.1051, 15.247(d)	Band Edge / Conducted Spurious Emission	-20 dBc	Conducted	Complies
15.247 (b)(1)	TX conducted output power	< 21 dBm		Complies
15.247 (a)(1)	Hopping frequency separation	> two-thirds of the 20 dB bandwidth		Complies
15.247 (a)(1)(iii)	Number of Hopping channels	More than 15 non-overlapping channels		Complies
15.247 (a)(1)(iii)	Avg Time of Occupancy	< 8 dBm		Complies
15.207(a)	AC Power Line conducted emissions	Section 11	Power Line conducted	Complies
15.205, 15.209	Radiated Spurious Emission	< 54dBuV/m(Av)	Radiated	Complies

## 8. MEASUREMENT METHODS

20dB BW : ANSI C63.10, Section 6.9.2

99% BW : ANSI C63.10, Section 6.9.3

HOPPING FREQUENCY SEPARATION : ANSI C63.10, Section 7.8.2

NUMBER OF HOPPING CHANNELS : ANSI C63.10, Section 7.8.3

AVERAGE TIME OF OCCUPANCY : ANSI C63.10, Section 7.8.4

OUTPUT POWER : ANSI C63.10, Section 7.8.5.

Out-of-band EMISSIONS (Conducted) : ANSI C63.10, Section 7.8.6, 7.8.8

Out-of-band EMISSIONS IN NON-RESTRICTED BANDS: ANSI C63.10, Section 6.

Out-of-band EMISSIONS IN RESTRICTED BANDS : ANSI C63.10, Section 6.

AC Power Line Conducted Emission : ANSI C63.10-2013, Section 6.2.

## 9. ANTENNA PORT TEST RESULTS

### 9.1. ON TIME AND DUTY CYCLE

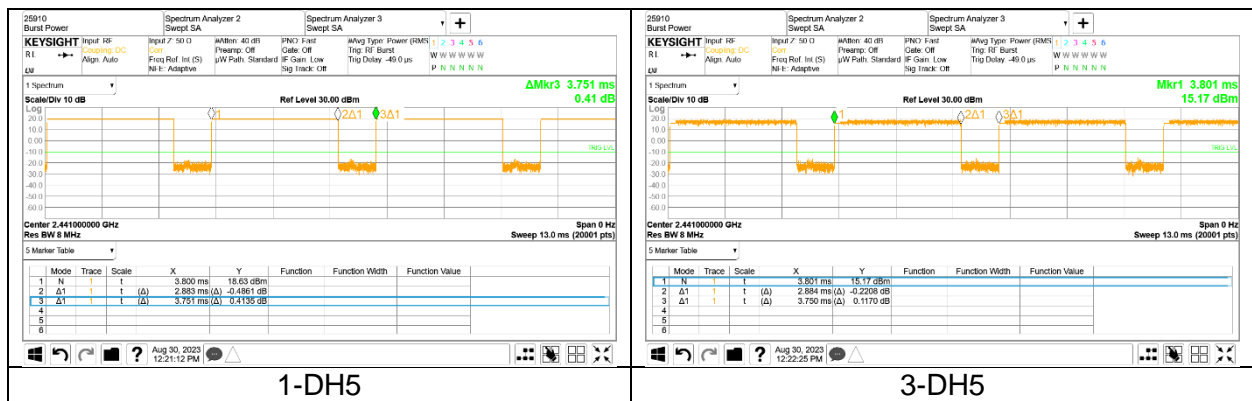
#### LIMITS

None; for reporting purposes only.

#### PROCEDURE

ANSI C63.10, Section 11.6 : Zero-Span Spectrum Analyzer Method.

#### ON TIME AND DUTY CYCLE RESULTS



Mode	On time [msec]	Period [msec]	Duty Cycle [%]	1/T Minimum VBW [kHz]
<b>2 400 ~ 2 483.5 MHz Band</b>				
BDR	2.883	3.751	76.860	0.35
EDR	2.884	3.750	76.907	0.35



## 9.2. 20 dB BANDWIDTH

### LIMITS

None; for reporting purposes only.

### TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The nominal IF filter bandwidth (3 dB RBW) shall be in the range of 1% to 5% of the OBW and video bandwidth (VBW) shall be approximately three times RBW, unless otherwise specified by the applicable requirement. The sweep time is coupled.

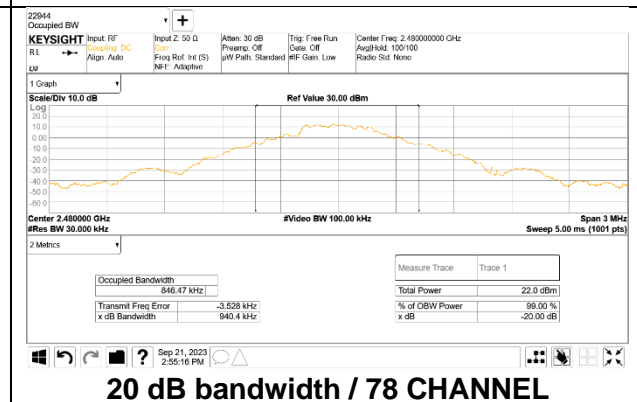
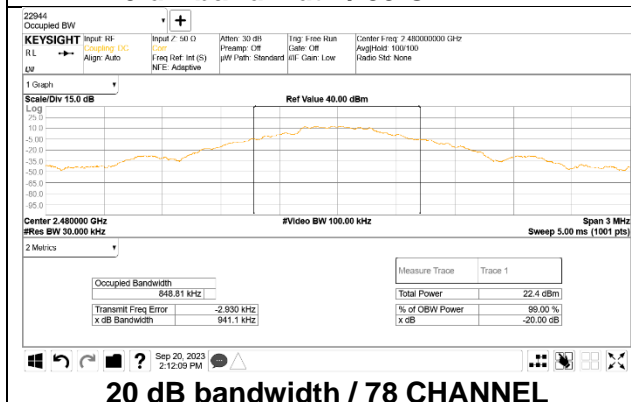
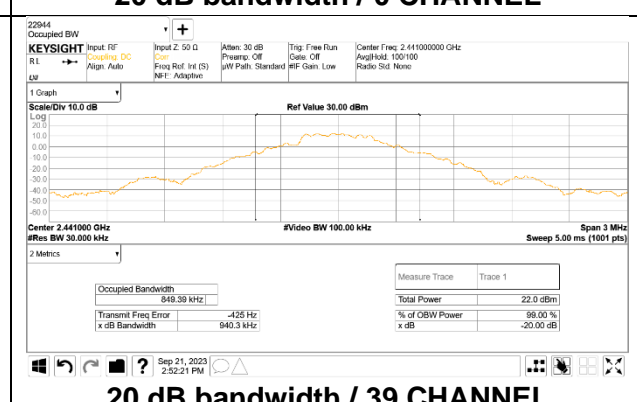
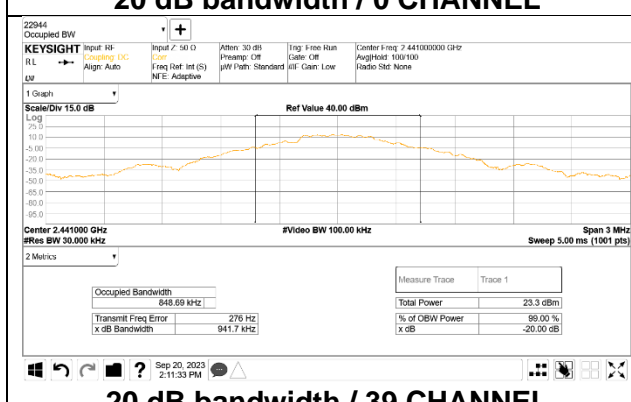
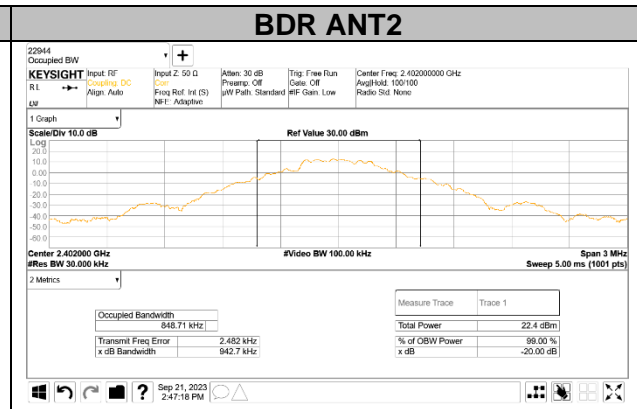
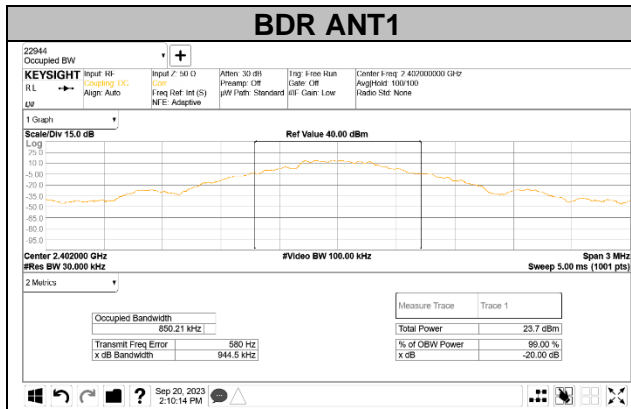
### RESULTS

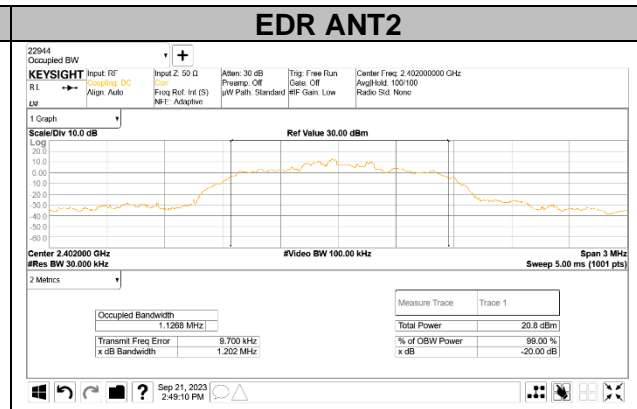
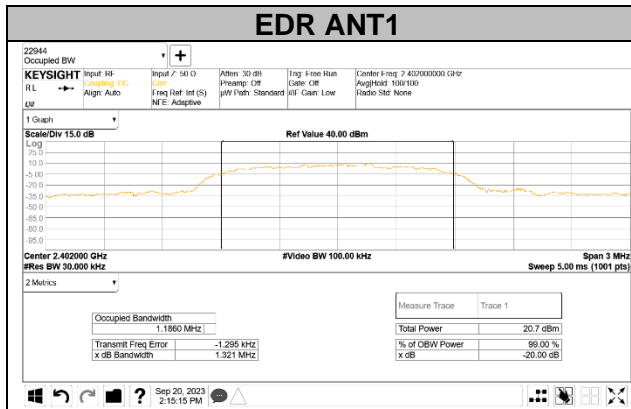
#### 9.2.1. BLUETOOTH BASIC DATA RATE GFSK MODULATION

Antenna	Channel	Frequency [MHz]	20 dB Bandwidth [kHz]
ANT1	0	2 402	944.5
	39	2 441	941.7
	78	2 480	941.1
ANT2	0	2 402	942.7
	39	2 441	940.3
	78	2 480	940.4
<b>Worst</b>			<b>944.5</b>

#### 9.2.2. BLUETOOTH ENHANCED DATA RATE 8PSK MODULATION

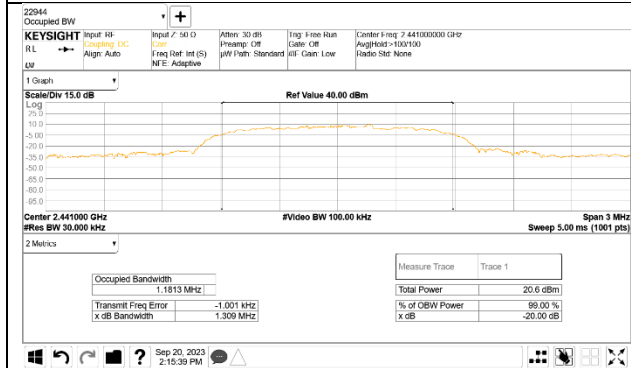
Channel		Frequency [MHz]	20 dB Bandwidth [kHz]
ANT1	0	2 402	1 321.0
	39	2 441	1 309.0
	78	2 480	1 307.0
ANT2	0	2 402	1 202.0
	39	2 441	1 276.0
	78	2 480	1 270.0
<b>Worst</b>			<b>1 309.0</b>



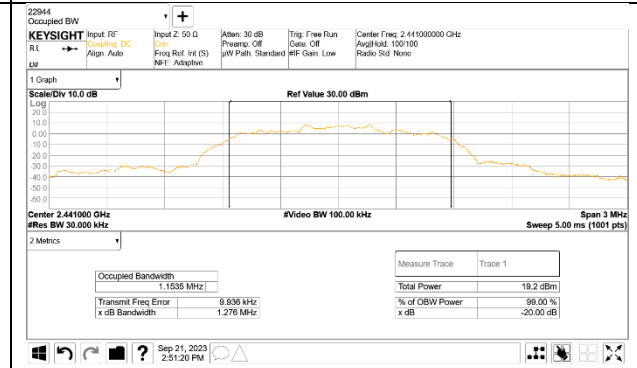


**20 dB bandwidth / 0 CHANNEL**

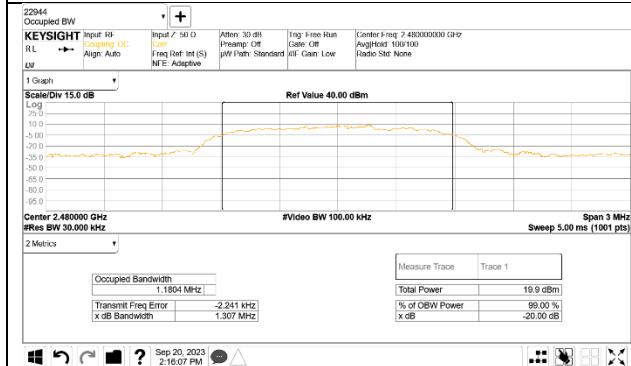
**20 dB bandwidth / 0 CHANNEL**



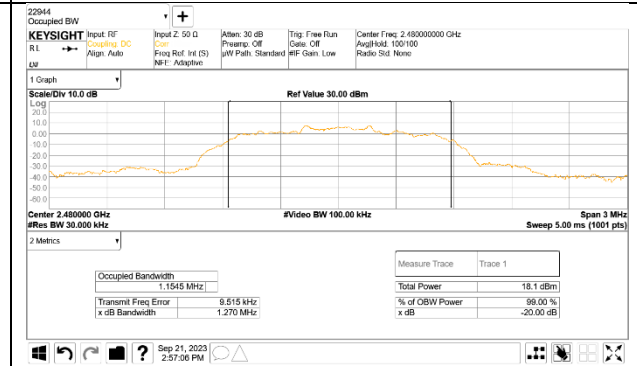
**20 dB bandwidth / 39 CHANNEL**



**20 dB bandwidth / 39 CHANNEL**



**20 dB bandwidth / 78 CHANNEL**



**20 dB bandwidth / 78 CHANNEL**

### **9.3. HOPPING FREQUENCY SEPARATION**

#### **LIMITS**

FCC §15.247 (a) (1)

Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater.

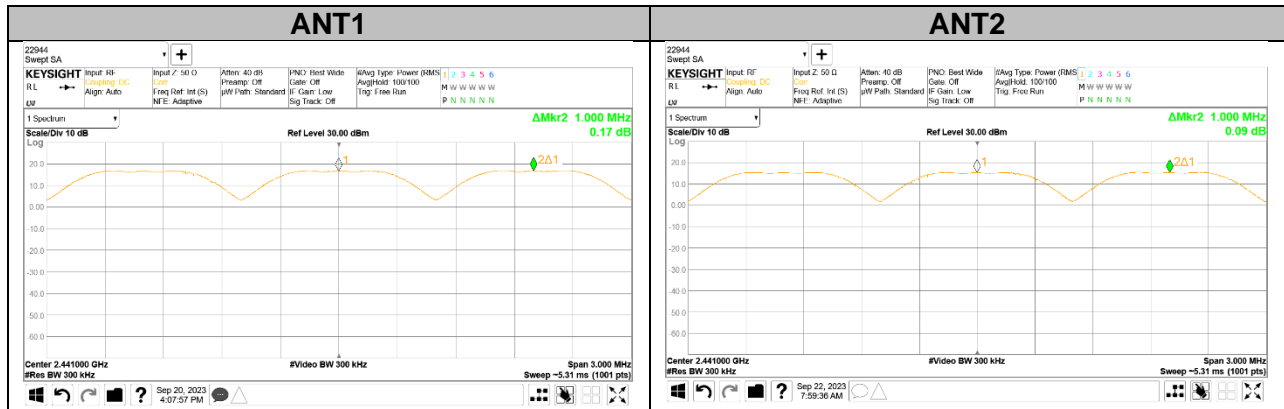
Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW.

#### **TEST PROCEDURE**

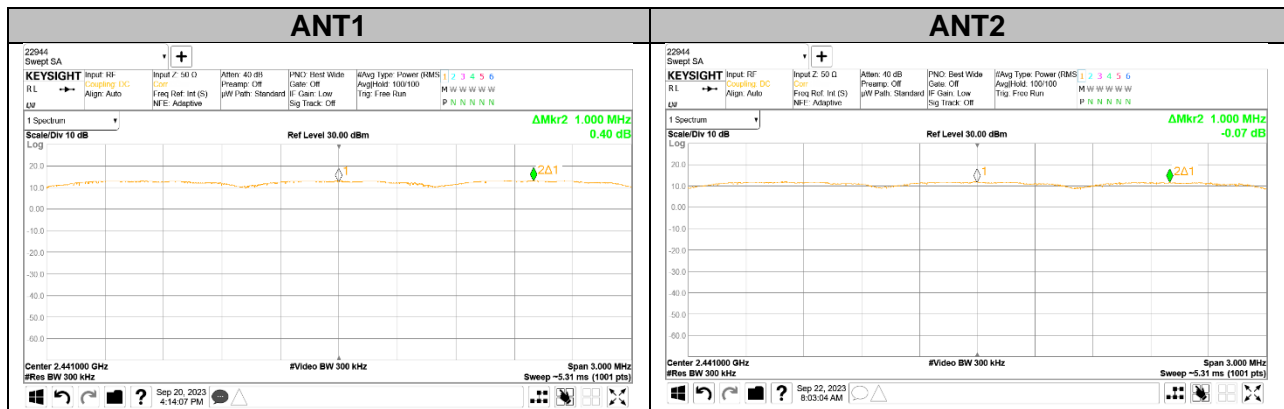
The transmitter output is connected to a spectrum analyzer. Start with the RBW set to approximately 30% of the channel spacing; adjust as necessary to best identify the center of each individual channel. The VBW is set to  $VBW \geq RBW$ . The sweep time is coupled.

#### **RESULTS**

### 9.3.1. BLUETOOTH BASIC DATA RATE GFSK MODULATION



### 9.3.2. BLUETOOTH ENHANCED DATA RATE 8PSK MODULATION



## **9.4. NUMBER OF HOPPING CHANNELS**

### **LIMITS**

FCC §15.247 (a) (1) (iii)

Frequency hopping systems in the 2400 – 2483.5 MHz band shall use at least 15 non-overlapping channels.

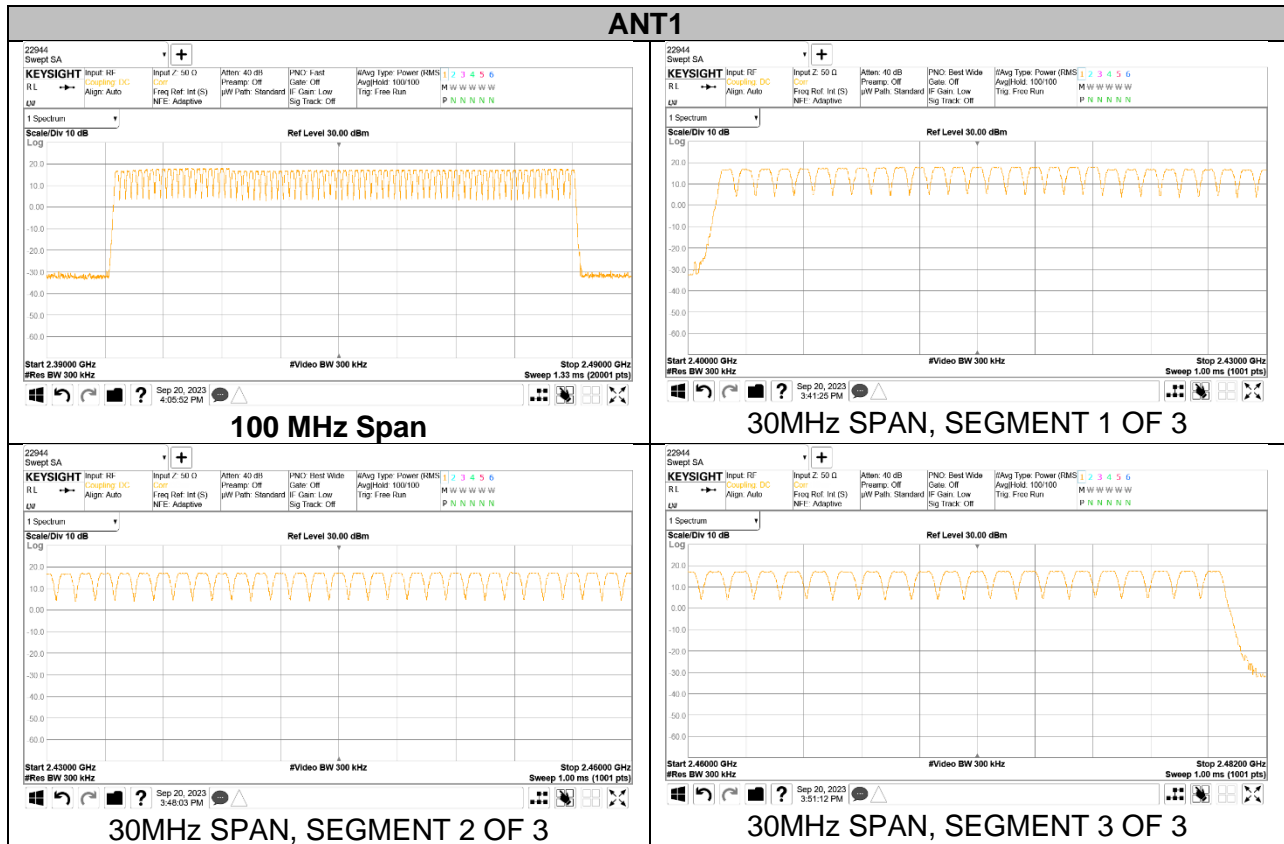
### **TEST PROCEDURE**

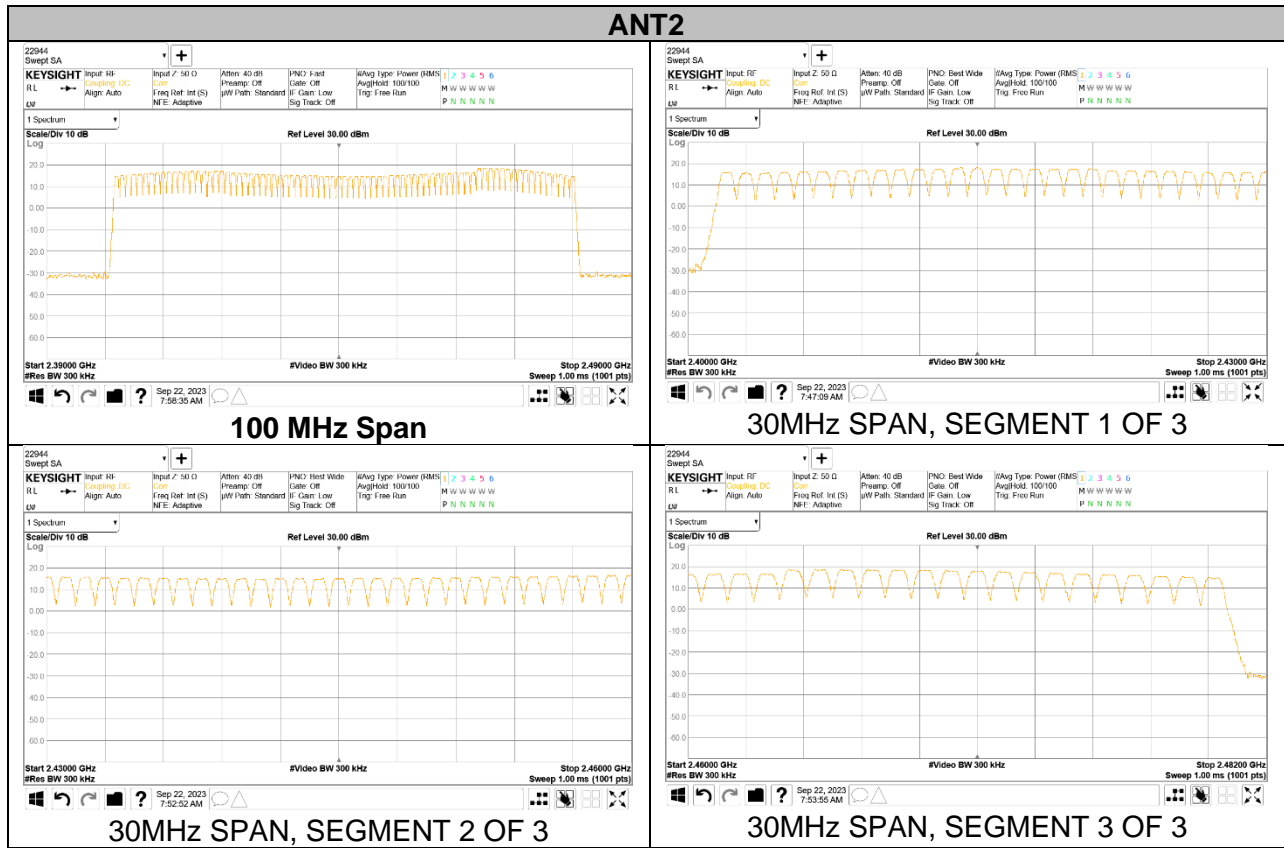
The transmitter output is connected to a spectrum analyzer. The span is set to cover the entire authorized band, in either a single sweep or in multiple contiguous sweeps. To identify clearly the individual channels, set the RBW to less than 30% of the channel spacing or the 20 dB bandwidth, whichever is smaller. The analyzer is set to Max Hold.

### **RESULTS**

Normal Mode: All Channels Observed

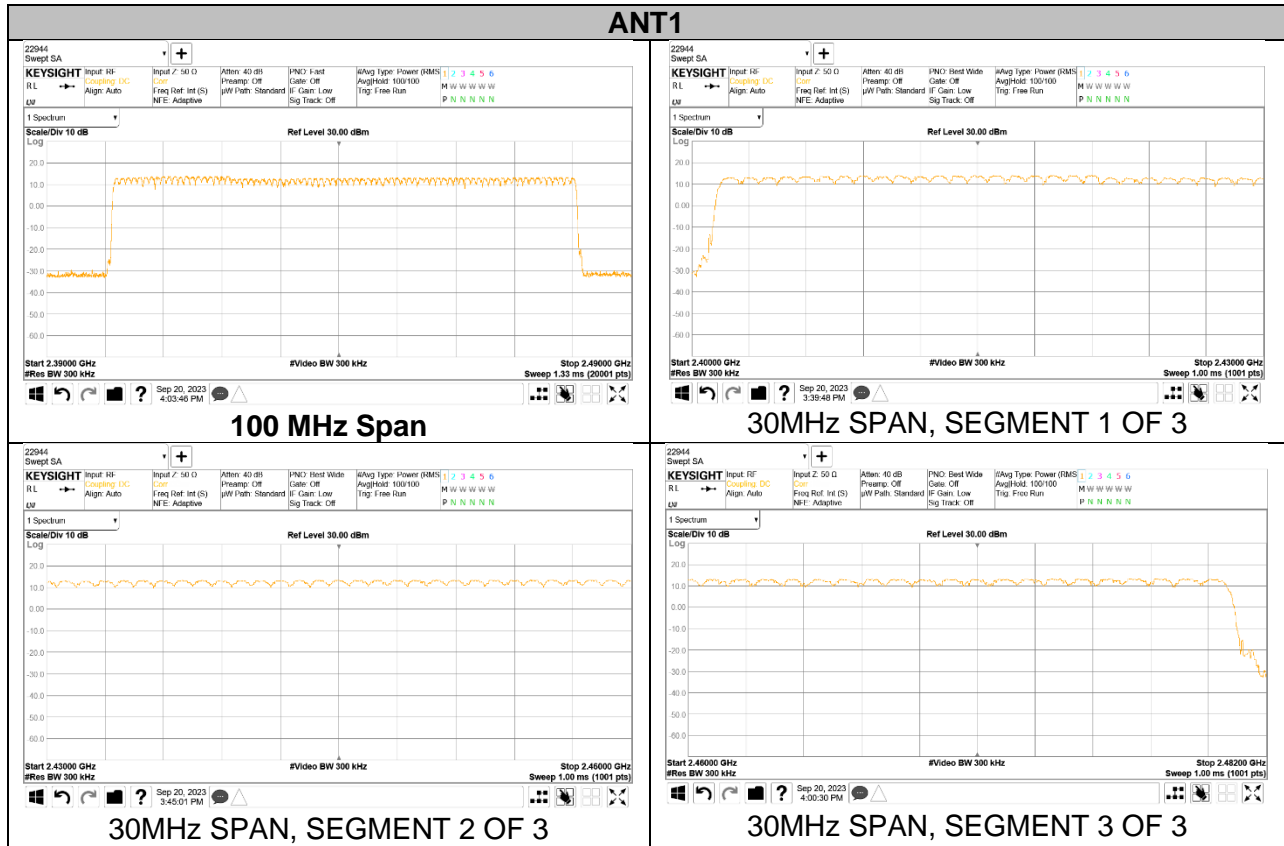
### 9.4.1. BLUETOOTH BASIC DATA RATE GFSK MODULATION

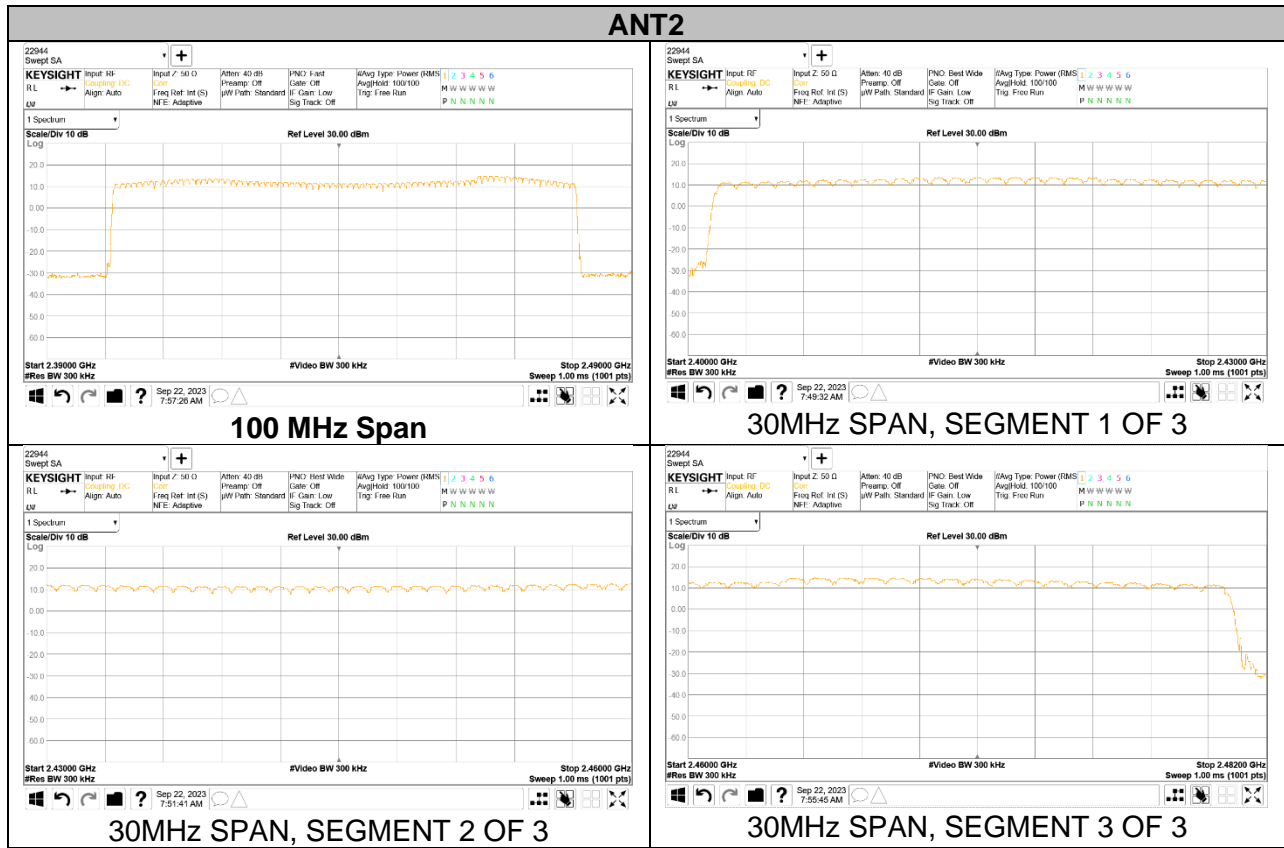






### 9.4.2. BLUETOOTH ENHANCED DATA RATE 8PSK MODULATION





## 9.5. AVERAGE TIME OF OCCUPANCY

### LIMITS

FCC §15.247 (a) (1) (iii)

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.

### TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The span is set to 0 Hz, centered on a single, selected hopping channel. The width of a single pulse is measured in a fast scan. The number of pulses is measured in a 3.16 second scan, to enable resolution of each occurrence.

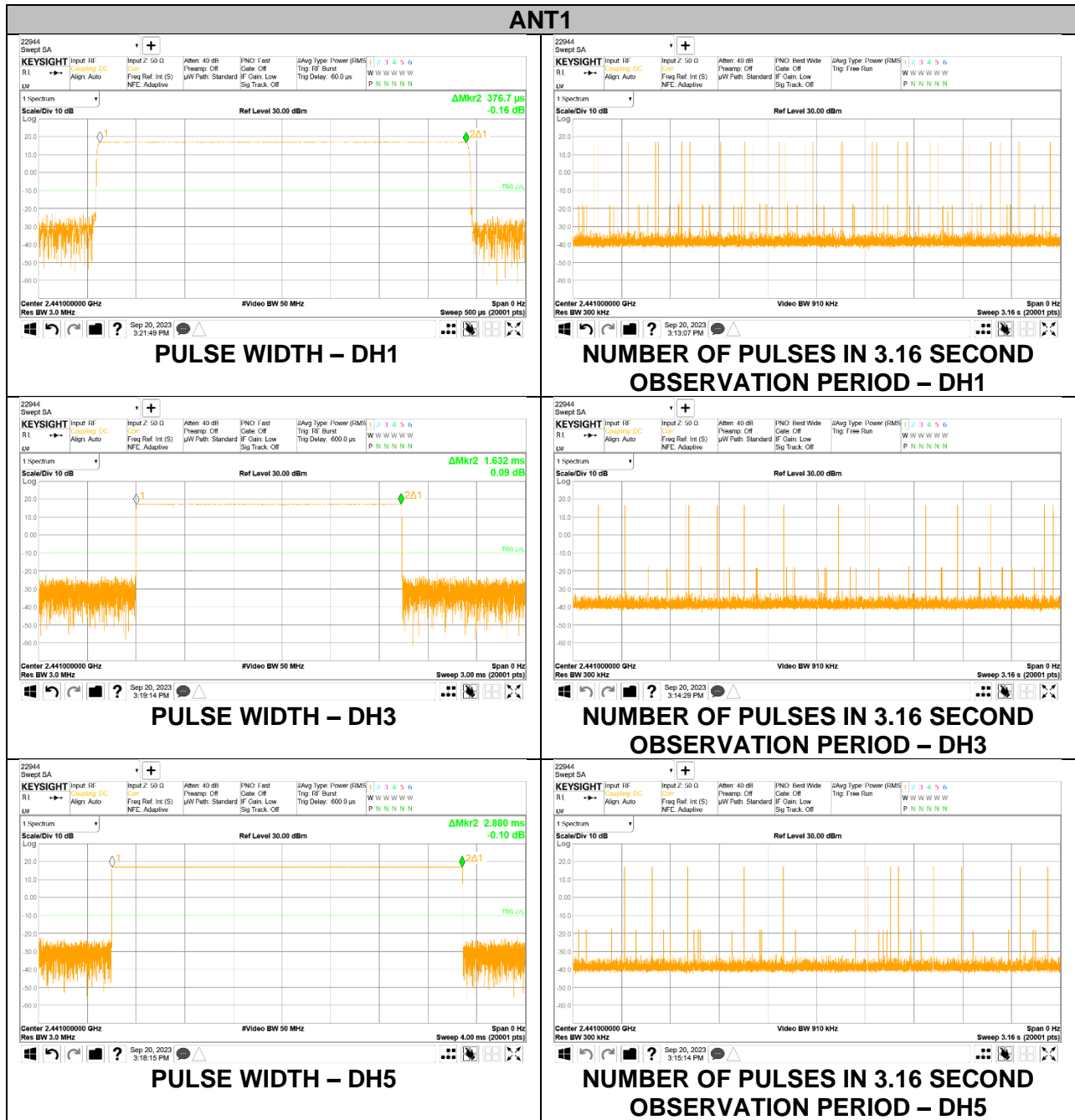
The average time of occupancy in the specified 3.16 second period (79 channels \* 0.4 s) is equal to  $10 * (\# \text{ of pulses in } 3.16 \text{ s}) * \text{ pulse width}$ .

For AFH mode, the average time of occupancy in the specified 8 second period (20 channels \* 0.4 seconds) is equal to  $10 * (\# \text{ of pulses in } 0.8 \text{ s}) * \text{ pulse width}$ .

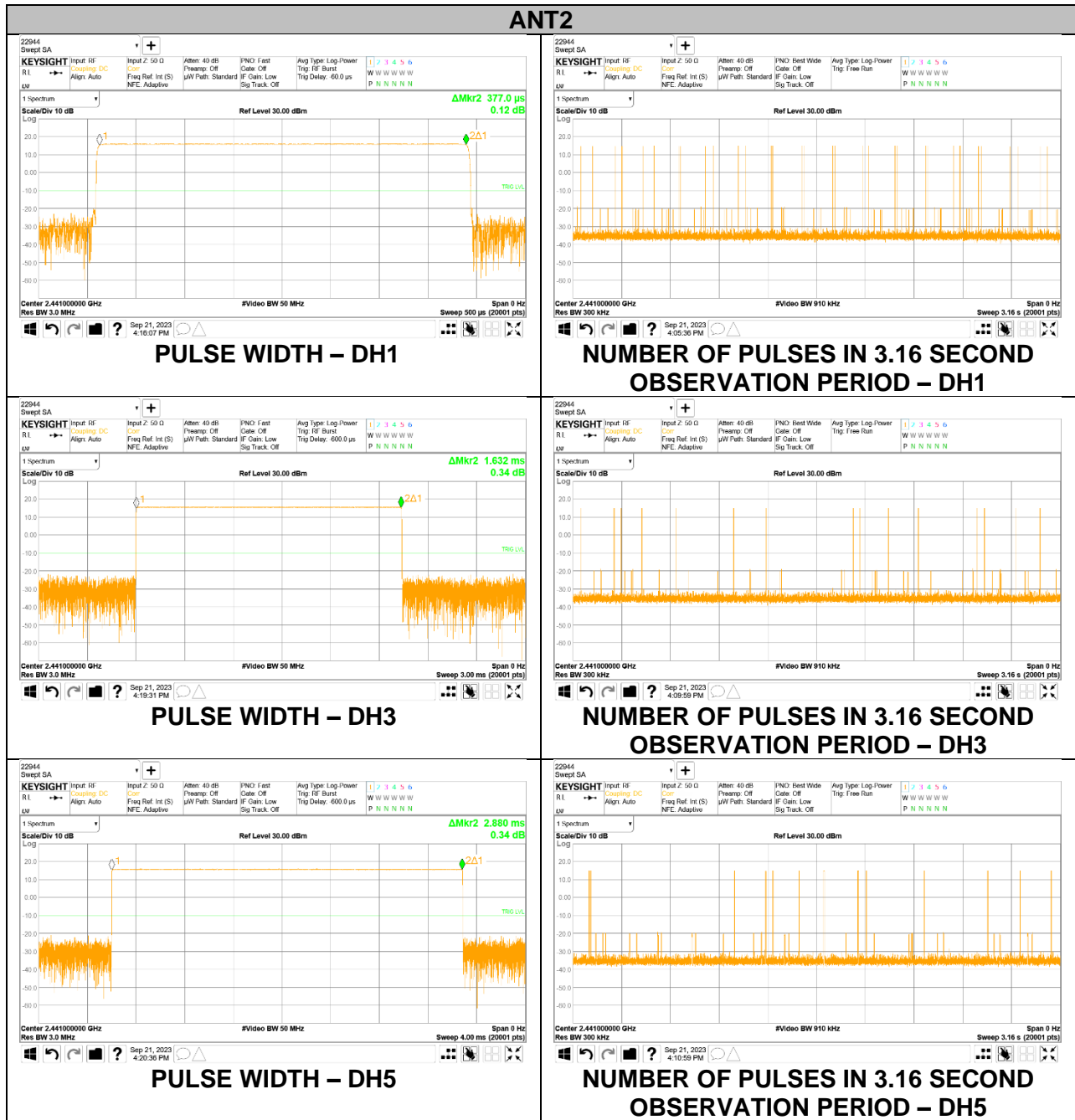
### RESULTS

### 9.5.1. BLUETOOTH BASIC DATA RATE GFSK MODULATION

DH Packet	Pulse Width [msec]	Number of Pulses in 3.16 seconds	Average Time of Occupancy [sec]	Limit [sec]	Margin [sec]
GFSK Normal ANT1					
DH1	0.377	32	0.121	0.4	-0.279
DH3	1.632	15	0.245	0.4	-0.155
DH5	2.880	12	0.346	0.4	-0.054
DH Packet	Pulse Width [msec]	Number of Pulses in 0.8 seconds	Average Time of Occupancy [sec]	Limit [sec]	Margin [sec]
GFSK AFH ANT1					
DH1	0.377	8	0.030	0.4	-0.370
DH3	1.632	3.75	0.061	0.4	-0.339
DH5	2.880	3	0.086	0.4	-0.314



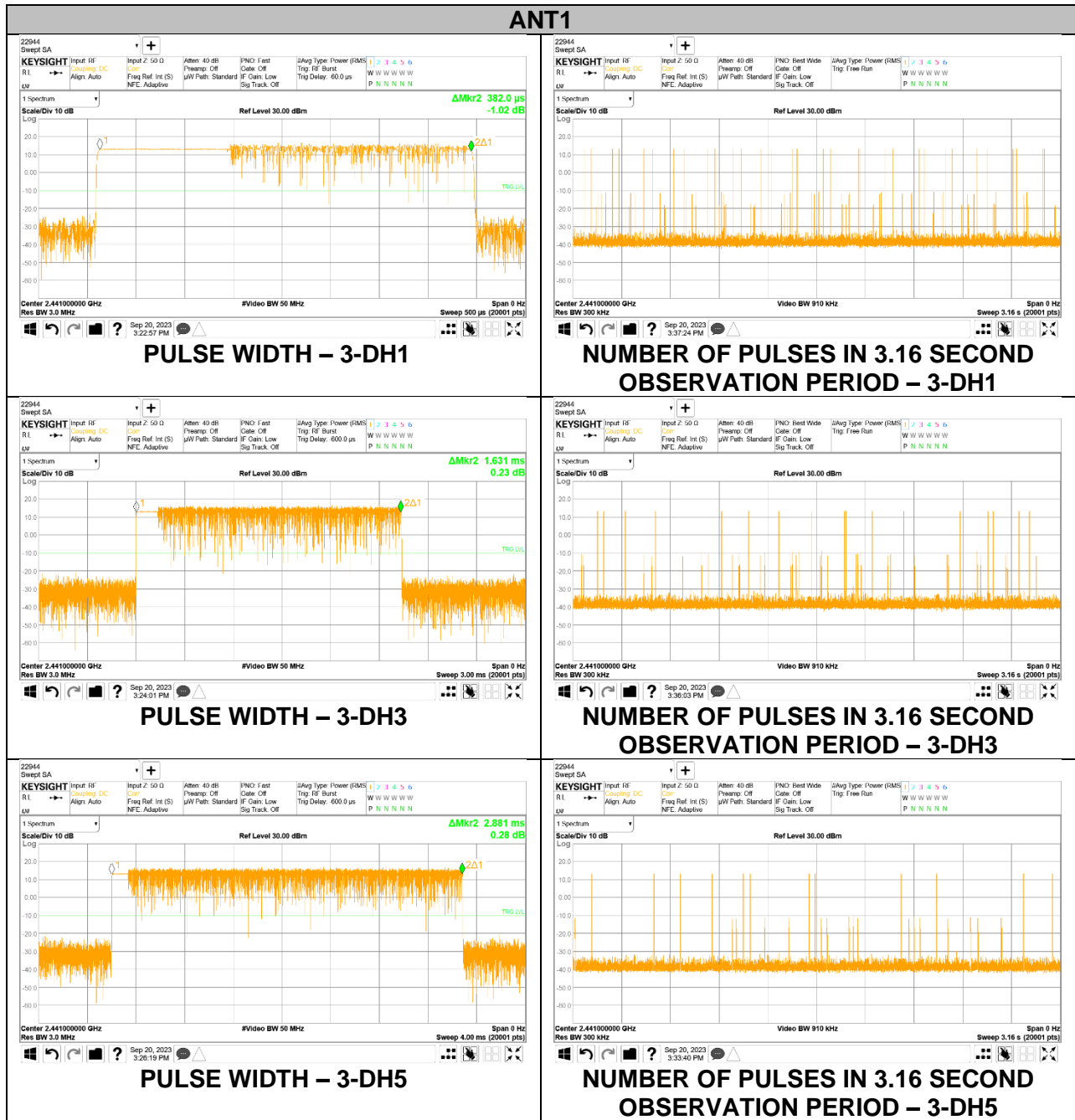
<b>DH Packet</b>	<b>Pulse Width [msec]</b>	<b>Number of Pulses in 3.16 seconds</b>	<b>Average Time of Occupancy [sec]</b>	<b>Limit [sec]</b>	<b>Margin [sec]</b>
GFSK Normal ANT2					
DH1	0.377	32	0.121	0.4	-0.279
DH3	1.632	15	0.245	0.4	-0.155
DH5	2.880	13	0.374	0.4	-0.026
GFSK AFH ANT2					
<b>DH Packet</b>	<b>Pulse Width [msec]</b>	<b>Number of Pulses in 0.8 seconds</b>	<b>Average Time of Occupancy [sec]</b>	<b>Limit [sec]</b>	<b>Margin [sec]</b>
GFSK AFH ANT2					
DH1	0.377	8	0.030	0.4	-0.370
DH3	1.632	3.75	0.061	0.4	-0.339
DH5	2.880	3.25	0.094	0.4	-0.306



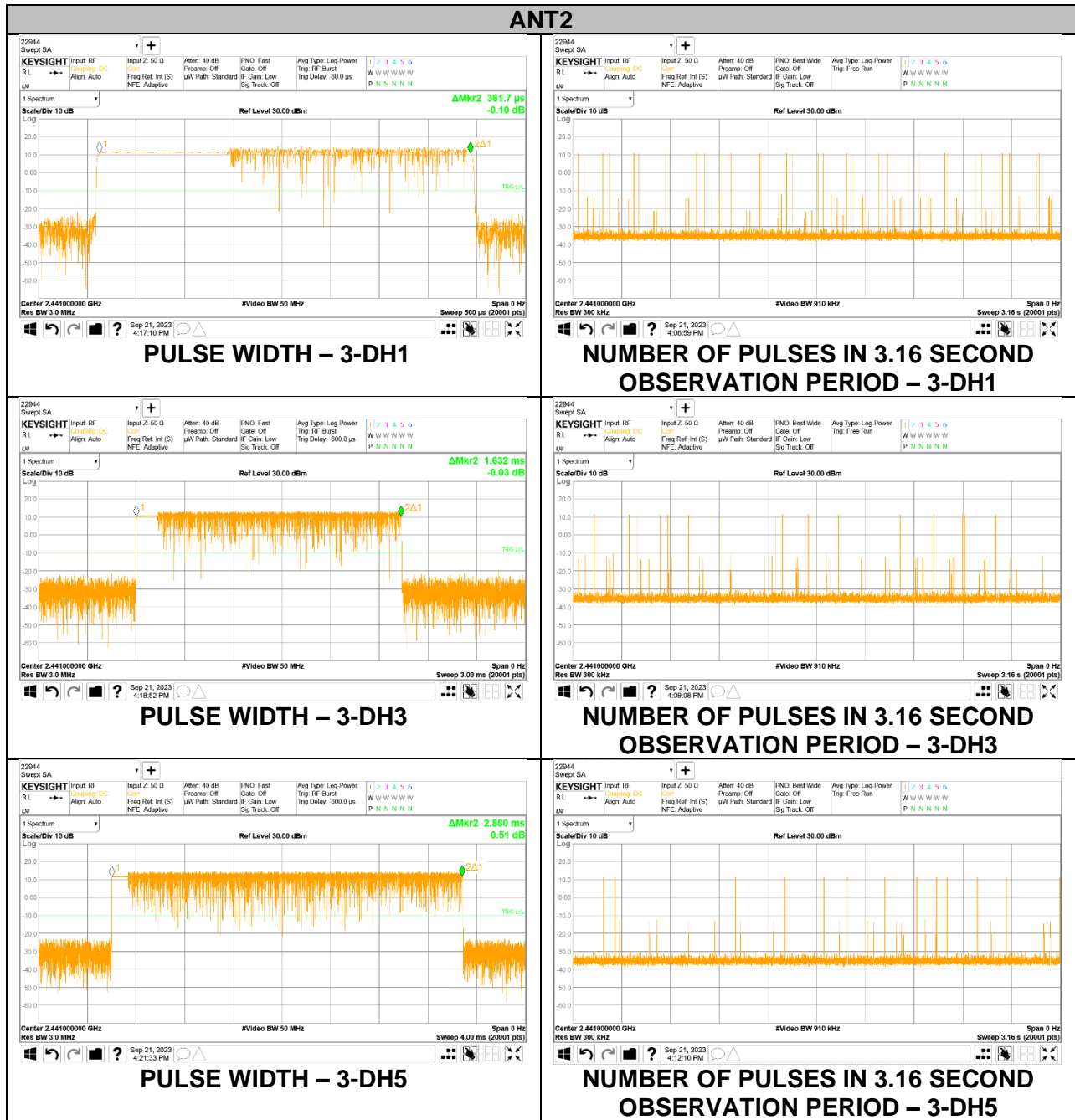
### 9.5.2. BLUETOOTH ENHANCED DATA RATE 8PSK MODULATION

DH Packet	Pulse Width [msec]	Number of Pulses in 3.16 seconds	Average Time of Occupancy [sec]	Limit [sec]	Margin [sec]
8PSK Normal ANT1					
DH1	0.382	32	0.122	0.4	-0.278
DH3	1.631	17	0.277	0.4	-0.123
DH5	2.881	12	0.346	0.4	-0.054
DH Packet	Pulse Width [msec]	Number of Pulses in 0.8 seconds	Average Time of Occupancy [sec]	Limit [sec]	Margin [sec]
8PSK AFH ANT1					
DH1	0.382	8	0.031	0.4	-0.369
DH3	1.631	4.25	0.069	0.4	-0.331
DH5	2.881	3	0.086	0.4	-0.314





DH Packet	Pulse Width [msec]	Number of Pulses in 3.16 seconds	Average Time of Occupancy [sec]	Limit [sec]	Margin [sec]
8PSK Normal ANT2					
DH1	0.382	32	0.122	0.4	-0.278
DH3	1.632	17	0.277	0.4	-0.123
DH5	2.880	12	0.346	0.4	-0.054
DH Packet	Pulse Width [msec]	Number of Pulses in 0.8 seconds	Average Time of Occupancy [sec]	Limit [sec]	Margin [sec]
8PSK AFH ANT2					
DH1	0.382	8	0.031	0.4	-0.369
DH3	1.632	4.25	0.069	0.4	-0.331
DH5	2.880	3	0.086	0.4	-0.314



## 9.6. OUTPUT POWER

### LIMITS

§15.247 (b) (1)

The correlated maximum antenna gain + Beamforming gain is less than 6 dBi, therefore the limit is 21 dBm.

### TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer the analyzer bandwidth is set to a value greater than the 20 dB bandwidth of the EUT.

### RESULTS

#### 9.6.1. BASIC DATA RATE GFSK MODULATION

Antenna	Channel	Frequency [MHz]	Peak Output Power [dBm]	Limit [dBm]	Margin [dB]	
ANT1	0	2 402	18.730	21.00	-2.270	
	39	2 441	18.740		-2.260	
	78	2 480	19.010		-1.990	
ANT2	0	2 402	15.810		-5.190	
	39	2 441	15.500		-5.500	
	78	2 480	15.930		-5.070	
Worst			<b>19.010</b>			<b>-1.990</b>

#### 9.6.2. ENHANCED DATA RATE Pi/4-DPSK MODULATION

Antenna	Channel	Frequency [MHz]	Peak Output Power [dBm]	Limit [dBm]	Margin [dB]	
ANT1	0	2 402	16.710	21.00	-4.290	
	39	2 441	17.220		-3.780	
	78	2 480	17.400		-3.600	
ANT2	0	2 402	14.610		-6.390	
	39	2 441	14.080		-6.920	
	78	2 480	14.020		-6.980	
Worst			<b>17.400</b>			<b>-3.600</b>

#### 9.6.3. ENHANCED DATA RATE 8PSK MODULATION

Antenna	Channel	Frequency [MHz]	Peak Output Power [dBm]	Limit [dBm]	Margin [dB]	
ANT1	0	2 402	17.230	21.00	-3.770	
	39	2 441	17.840		-3.160	
	78	2 480	17.980		-3.020	
ANT2	0	2 402	15.260		-5.740	
	39	2 441	14.770		-6.230	
	78	2 480	14.560		-6.440	
Worst			<b>17.980</b>			<b>-3.020</b>

### 9.6.4. BASIC DATA RATE GFSK MODULATION(DUAL)

Antenna	Channel	Frequency [MHz]	Peak Output Power [dBm]	Limit [dBm]	Margin [dB]
DUAL ANT1	0	2 402	12.32	21.00	
	39	2 441	13.02		
	78	2 480	13.04		
DUAL ANT2	0	2 402	10.95		
	39	2 441	10.87		
	78	2 480	12.03		
DUAL ANT1+2	0	2 402	14.70		-6.30
	39	2 441	15.09		-5.91
	78	2 480	15.57		-5.43
Worst			<b>15.57</b>		<b>-5.43</b>

### 9.6.1. ENHANCED DATA RATE Pi/4-DPSK MODULATION(DUAL)

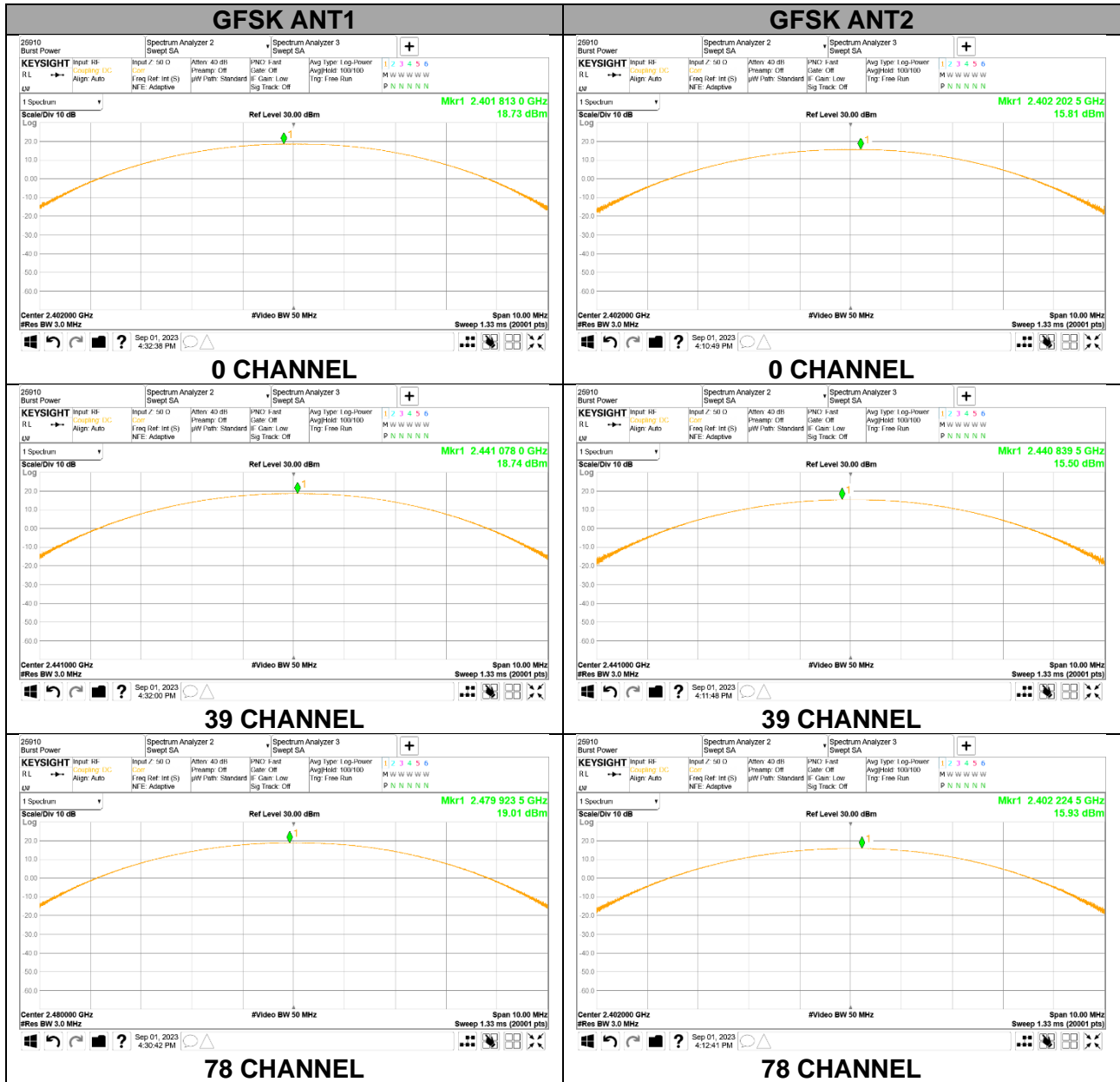
Antenna	Channel	Frequency [MHz]	Peak Output Power [dBm]	Limit [dBm]	Margin [dB]
DUAL ANT1	0	2 402	11.69	21.00	
	39	2 441	11.82		
	78	2 480	12.31		
DUAL ANT2	0	2 402	9.64		
	39	2 441	9.49		
	78	2 480	10.39		
DUAL ANT1+2	0	2 402	13.80		-7.20
	39	2 441	13.82		-7.18
	78	2 480	14.47		-6.53
Worst			<b>14.47</b>		<b>-6.53</b>

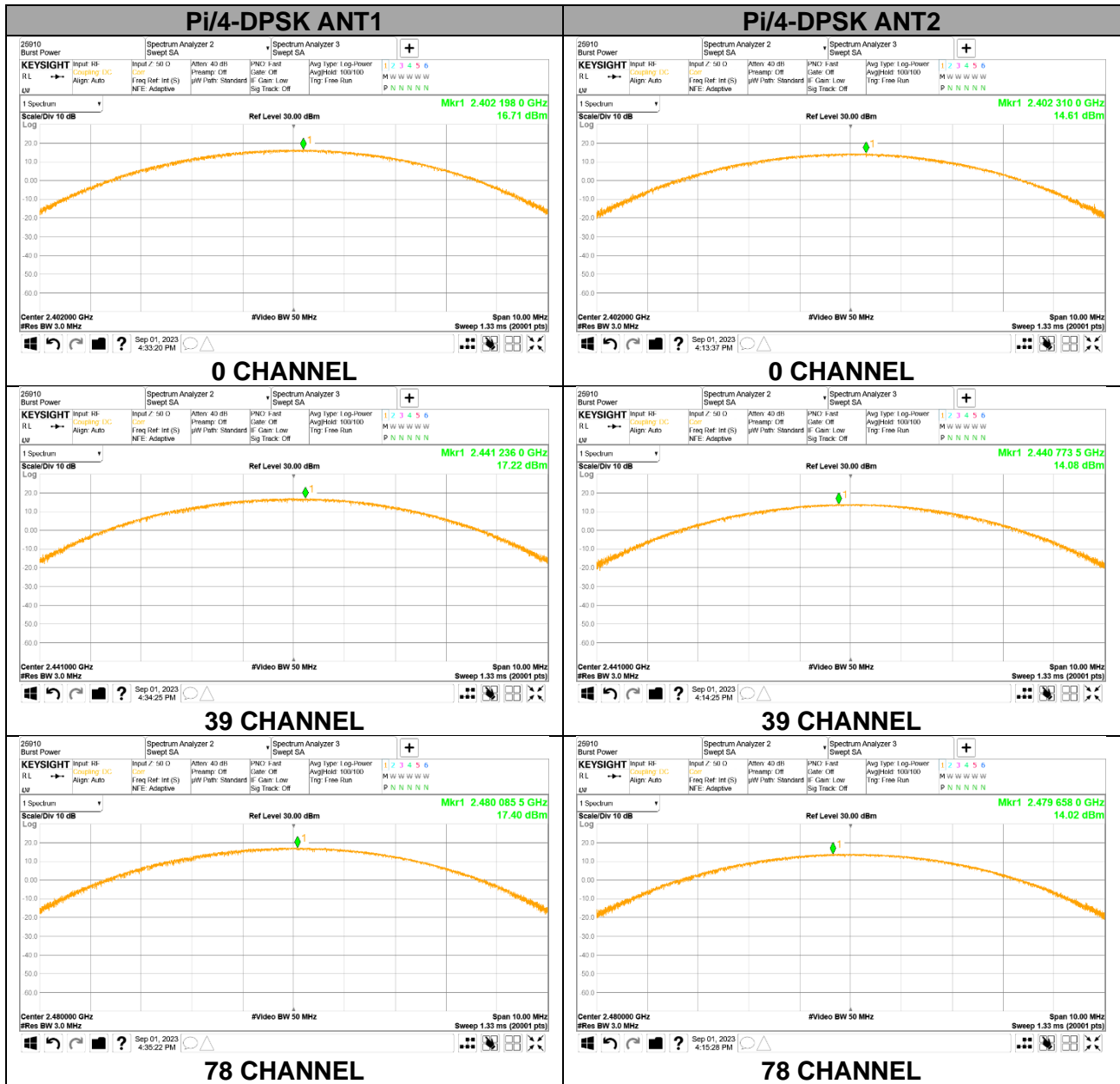
### 9.6.2. ENHANCED DATA RATE 8PSK MODULATION(DUAL)

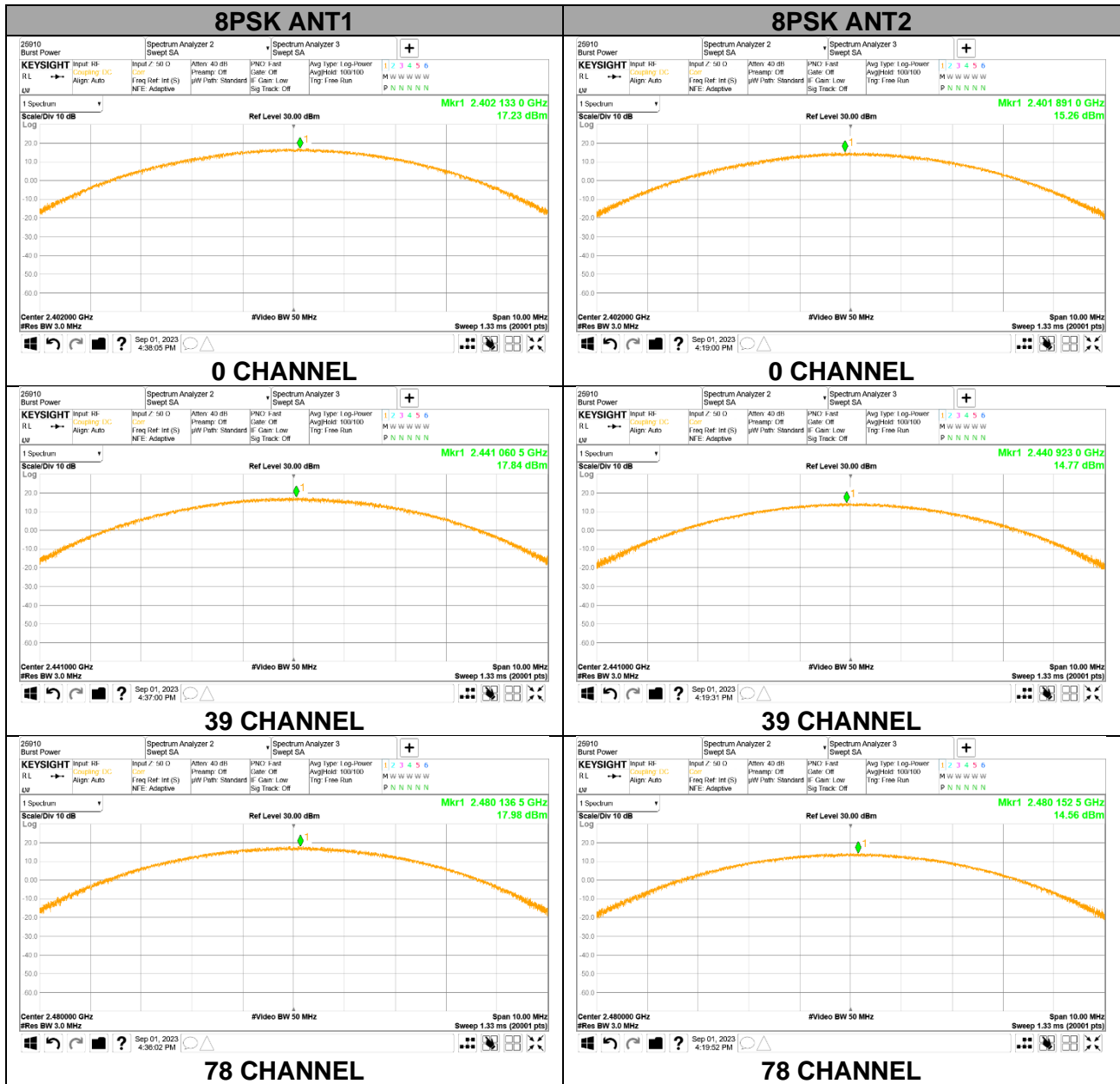
Antenna	Channel	Frequency [MHz]	Peak Output Power [dBm]	Limit [dBm]	Margin [dB]
DUAL ANT1	0	2 402	12.34	21.00	
	39	2 441	12.42		
	78	2 480	12.93		
DUAL ANT2	0	2 402	9.79		
	39	2 441	9.64		
	78	2 480	10.66		
DUAL ANT1+2	0	2 402	14.26		-6.74
	39	2 441	14.26		-6.74
	78	2 480	14.95		-6.05
Worst			<b>14.95</b>		<b>-6.05</b>

### 9.6.3. OUTPUT POWER PLOTS

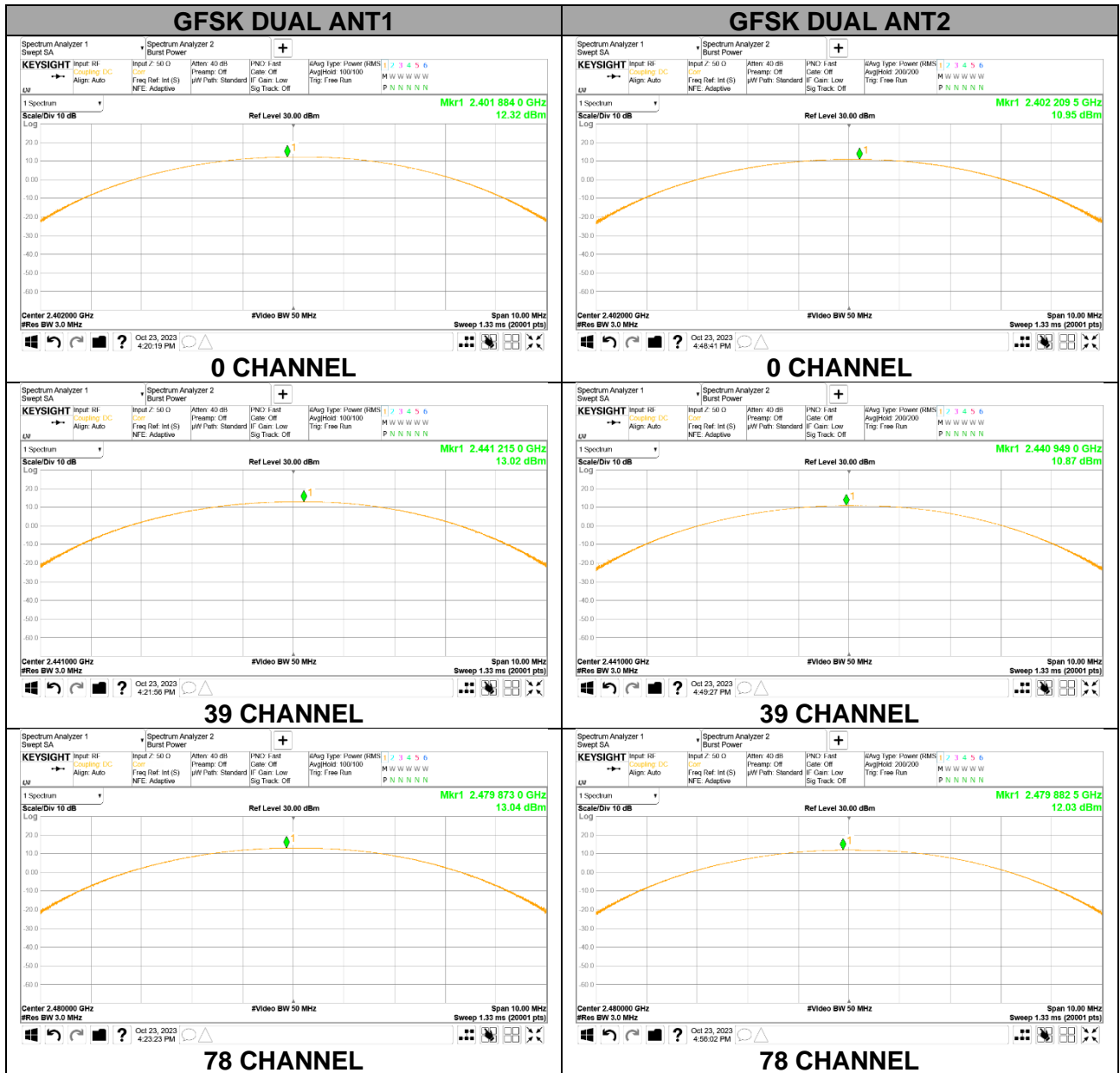
#### PEAK OUTPUT POWER

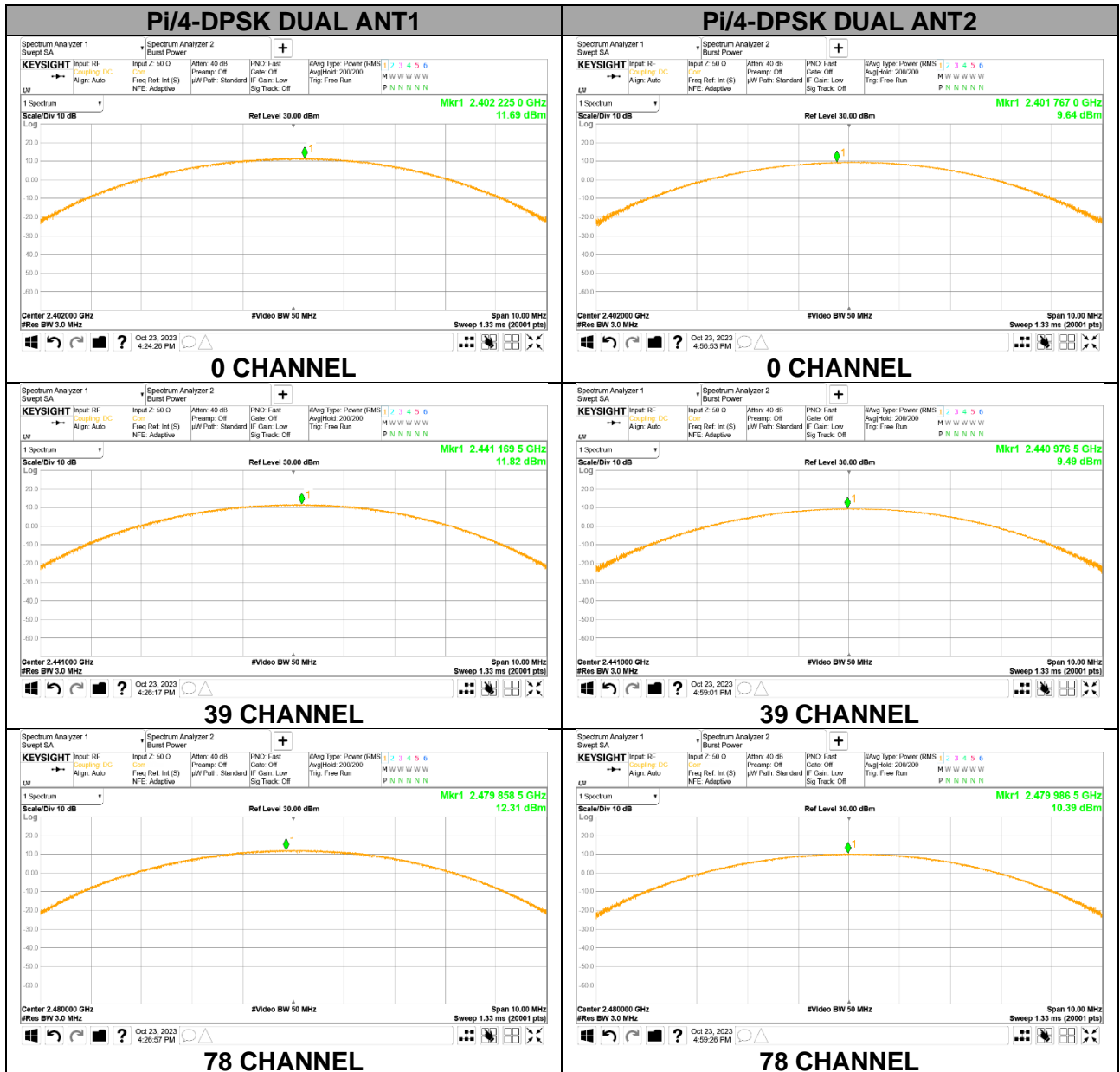


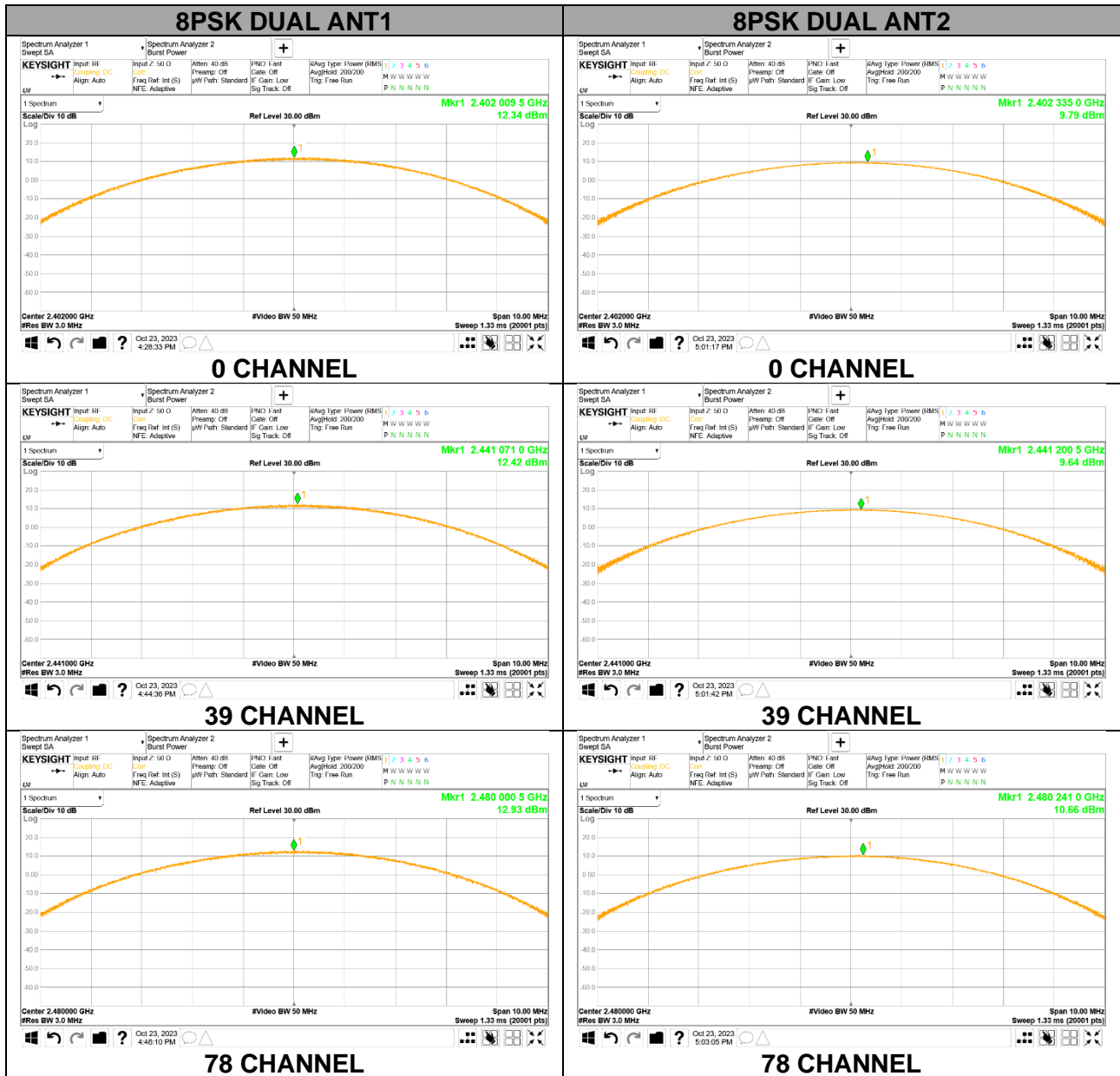












## 9.7. AVERAGE POWER

### LIMITS

None; for reporting purposes only

### TEST PROCEDURE

Measurements perform using a wideband gated RF power meter.  
 The cable assembly insertion loss was entered as an offset in the power meter to allow for direct reading of power.

### RESULTS

#### 9.7.1. BASIC DATA RATE GFSK MODULATION

Antenna	Channel	Frequency [MHz]	Average Output Power [dBm]	Average Output Power [mW]
ANT1	0	2 402	18.420	69.502
	39	2 441	18.395	69.103
	78	2 480	18.715	74.388
ANT2	0	2 402	15.360	34.356
	39	2 441	15.058	32.048
	78	2 480	15.635	36.602

#### 9.7.2. ENHANCED DATA RATE PI/4-DQPSK MODULATION

Antenna	Channel	Frequency [MHz]	Average Output Power [dBm]	Average Output Power [mW]
ANT1	0	2 402	13.915	24.632
	39	2 441	14.146	25.978
	78	2 480	14.344	27.189
ANT2	0	2 402	11.657	14.645
	39	2 441	11.414	13.848
	78	2 480	11.340	13.614

#### 9.7.3. ENHANCED DATA RATE 8PSK MODULATION

Antenna	Channel	Frequency [MHz]	Average Output Power [dBm]	Average Output Power [mW]
ANT1	0	2 402	13.952	24.843
	39	2 441	14.135	25.912
	78	2 480	14.332	27.114
ANT2	0	2 402	11.989	15.809
	39	2 441	11.435	13.916
	78	2 480	11.359	13.674

### 9.7.4. BASIC DATA RATE GFSK MODULATION(DUAL)

Antenna	Channel	Frequency [MHz]	Average Output Power [dBm]	Average Output Power [mW]	
DUAL ANT1	0	2 402	12.12		
	39	2 441	12.79		
	78	2 480	12.83		
DUAL ANT2	0	2 402	10.57		
	39	2 441	10.63		
	78	2 480	11.88		
DUAL ANT1+2	0	2 402	14.42		27.69
	39	2 441	14.85		30.58
	78	2 480	15.39		<b>34.58</b>

### 9.7.5. ENHANCED DATA RATE PI/4-DQPSK MODULATION(DUAL)

Antenna	Channel	Frequency [MHz]	Average Output Power [dBm]	Average Output Power [mW]	
DUAL ANT1	0	2 402	8.48		
	39	2 441	8.99		
	78	2 480	9.39		
DUAL ANT2	0	2 402	7.64		
	39	2 441	7.38		
	78	2 480	7.85		
DUAL ANT1+2	0	2 402	11.09		12.85
	39	2 441	11.27		13.40
	78	2 480	11.70		<b>14.79</b>

### 9.7.6. ENHANCED DATA RATE 8PSK MODULATION(DUAL)

Antenna	Channel	Frequency [MHz]	Average Output Power [dBm]	Average Output Power [mW]	
DUAL ANT1	0	2 402	8.72		
	39	2 441	8.97		
	78	2 480	9.18		
DUAL ANT2	0	2 402	7.67		
	39	2 441	7.31		
	78	2 480	7.82		
DUAL ANT1+2	0	2 402	11.24		13.30
	39	2 441	11.23		13.27
	78	2 480	11.57		<b>14.34</b>

## **9.8. CONDUCTED SPURIOUS EMISSIONS**

### **LIMITS**

FCC §15.247 (d)

Limit = -20 dBc

### **TEST PROCEDURE**

The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

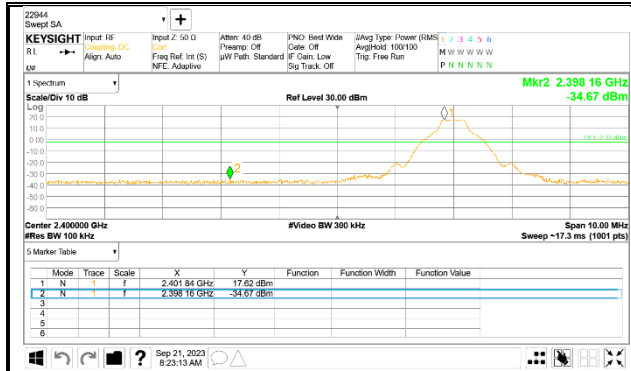
The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels.

The band-edges at 2.4 and 2.4835 GHz are investigated with the transmitter set to the normal hopping mode.

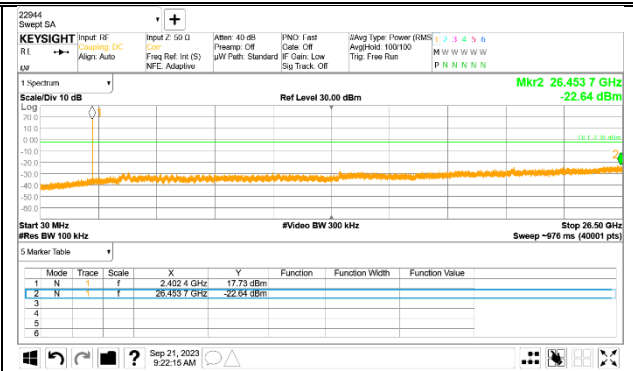
### **RESULTS**

## 9.8.1. BLUETOOTH BASIC DATA RATE GFSK MODULATION

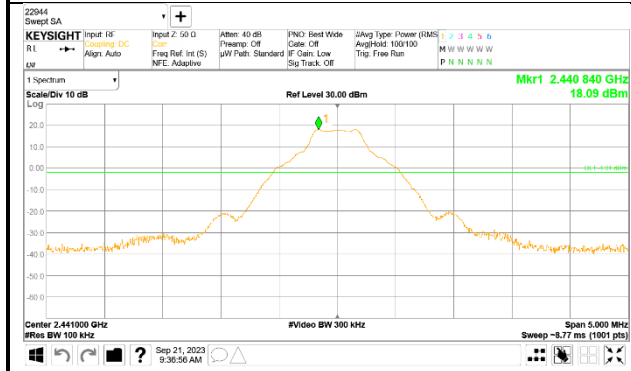
### SPURIOUS EMISSIONS, NON-HOPPING – ANT1



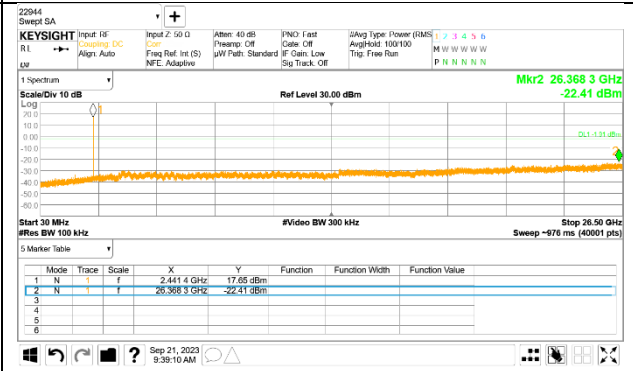
**0 CHANNEL BANDEDGE**



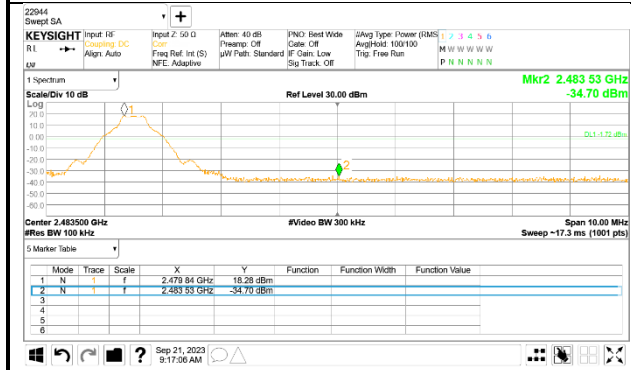
**OUT-OF-BAND 0 CHANNEL**



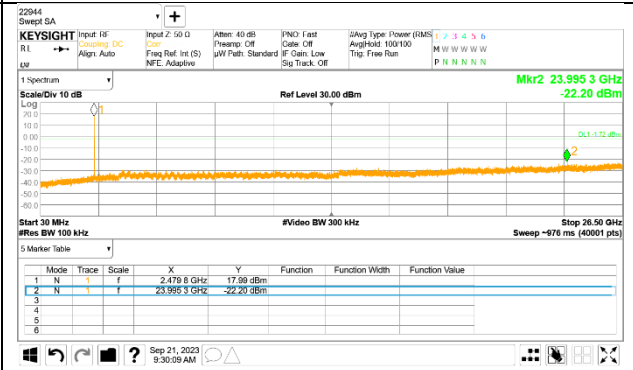
**IN-BAND REFERENCE LEVEL**



**OUT-OF-BAND 39 CHANNEL**

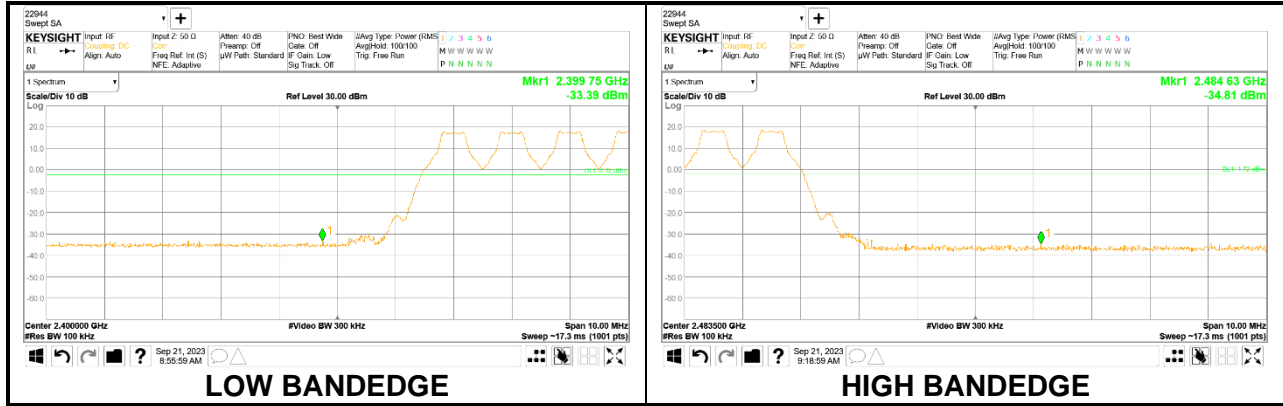


**78 CHANNEL BANDEDGE**



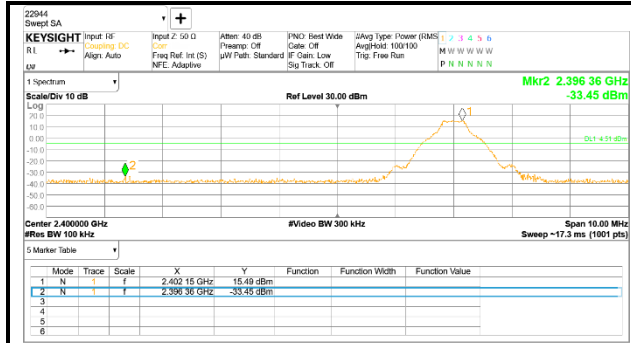
**OUT-OF-BAND 78 CHANNEL**

**SPURIOUS BANDEDGE EMISSIONS WITH HOPPING ON – ANT1**

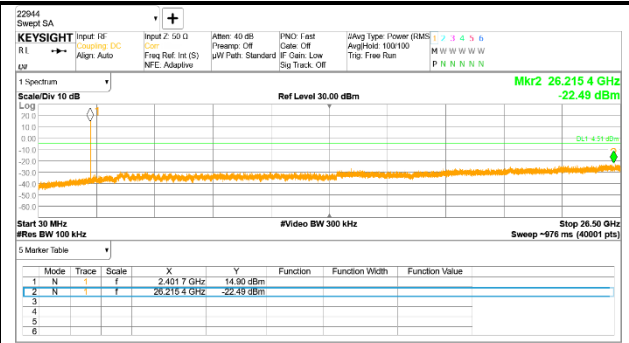




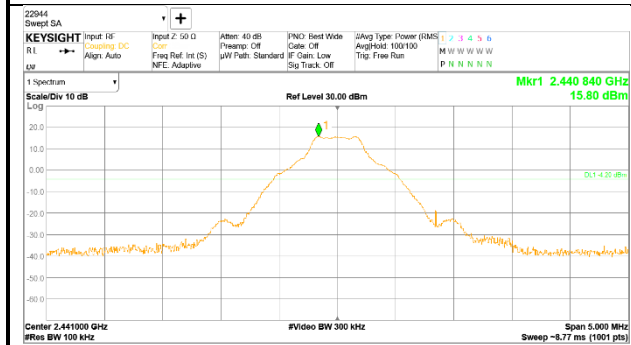
**SPURIOUS EMISSIONS, NON-HOPPING – ANT2**



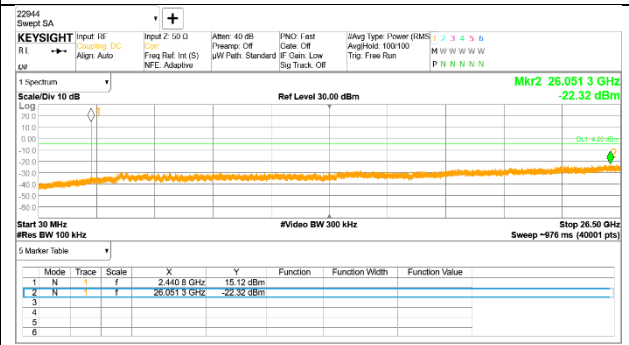
**0 CHANNEL BANDEDGE**



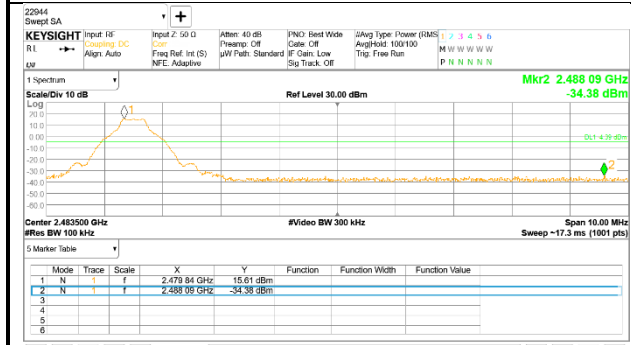
**OUT-OF-BAND 0 CHANNEL**



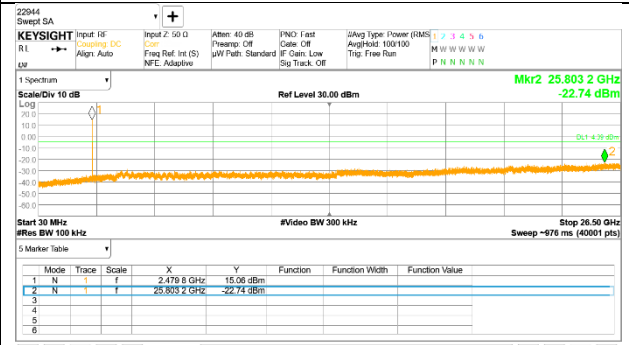
**IN-BAND REFERENCE LEVEL**



**OUT-OF-BAND 39 CHANNEL**



**78 CHANNEL BANDEDGE**



**OUT-OF-BAND 78 CHANNEL**

**SPURIOUS BANDEDGE EMISSIONS WITH HOPPING ON – ANT2**

