

CERTIFICATION TEST REPORT

Report Number. : 4790776103-E2V2

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

Model : SM-X710

FCC ID : A3LSMX710

IC : 649E-SMX710

EUT Description : BT/BLE Tablet + DTS/UNII a/b/g/n/ac/ax and WPT.

Test Standard(s) : FCC 47 CFR PART 15 SUBPART C
INDUSTRY CANADA RSS-247 Issue 2
INDUSTRY CANADA RSS-GEN Issue 5

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Prepared by:
UL KOREA LTD.
26th floor, 152, Teheran-ro, Gangnam-gu Seoul, 06236, Korea

Suwon Test Site: UL KOREA LTD. Suwon Laboratory
218 Maeyeong-ro, Yeongtong-gu,
Suwon-si, Gyeonggi-do, 16675, Korea
TEL: (031) 337-9902
FAX: (031) 213-5433

Revision History

<u>Rev.</u>	<u>Issue Date</u>	<u>Revisions</u>	<u>Revised By</u>
V1	2023-05-14	Initial issue	Yujin Kim
V2	2023-05-31	Updated to address TCB's question	Yujin Kim

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: SAMSUNG ELECTRONICS CO., LTD.
EUT DESCRIPTION: BT/BLE Tablet + DTS/UNII a/b/g/n/ac/ax and WPT.
MODEL: SM-X710
SERIAL NUMBER: R32W300FP4W (CONDUCTED, Original);
R32W300H3JA (RADIATED, Original);
R32W300H3JA (RADIATED, Spot-check);
DATE TESTED: 2023-04-03 ~ 2023-05-30(Original);
2023-04-03 ~ 2023-05-30(Spot-check);

APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
47 CFR Part 15 Subpart C	Complies
INDUSTRY CANADA RSS-247 Issue 2	Complies
INDUSTRY CANADA RSS-GEN Issue 5	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
UL KOREA LTD. By:



Seokhwan Hong
Suwon Lab Engineer
UL KOREA LTD.

Tested By:



Yujin Kim
Suwon Lab Engineer
UL KOREA LTD.

1.1. INTRODUCTION OF TEST DATA DEVIATION

This report referenced from the FCC ID: A3LSMX716B DSS Bluetooth (FCC CFR 47 Part 15C). And the applicant takes full responsibility that the test data as referenced in this report represent compliance for this FCC ID.

1.2. DIFFERENCE

Except for removing WWAN RF components, The SM-X710(IC: 649E-SMX710) model shares the same enclosure and circuit board as SM-X716B
 The WLAN antennas and surrounding circuitry and layout are identical between these two units.

After confirming through preliminary radiated emissions that the performance of the SM-X710 (IC: 649E-SMX710) remains representative of SM-X716B. The test data of SM-X716B being submitted for this application to cover WLAN features.

1.3. SPOT CHECK VERIFICATION DATA

(Worst case of the radiated band-edge and radiated spurious emissions)

Band	Test Item	Mode	Frequency	Test Limit	Original model	Spot check model	Deviation	Remark
					SM-X716B Results	SM-X710 Results		
					FCC ID : A3LSMX716B	FCC ID : A3LSMX710		
DSS BT (2.4GHz)	Band Edge	GFSK 2480_ANT1	2480 MHz	54 dBuV/m	42.23 dBuV/m	41.81 dBuV/m	-0.42 dB	
	RSE	GFSK 2402_ANT1	4804 MHz	54 dBuV/m	40.79 dBuV/m	43.50 dBuV/m	2.71 dB	
	Band Edge	GFSK 2480_ANT2	2480 MHz	54 dBuV/m	40.97 dBuV/m	40.54 dBuV/m	-0.43 dB	
	RSE	GFSK 2402_ANT2	4804 MHz	54 dBuV/m	36.78 dBuV/m	38.63 dBuV/m	1.85 dB	

Comparison of two models, upper deviation is within 3 dB range and all test results are under FCC Technical Limits.

1.4. REFERENCE DETAIL

Reference application that contains the reused reference data in the individual test reports:

Equipment Class	Reference FCC ID (Parent)	Application Type	Reference Test report number	Exhibit Type	Spot-Check Test Report Number
DSS	A3LSMX716B	Original Grant	4790776103-E6V1 (Bluetooth)	Test Report	4790776099-E2V1 (Bluetooth)

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. ANSI C63.10-2013.
5. IC RSS-GEN Issue 5.
6. IC RSS-247 Issue 2.
7. KDB 484596 D01 Referencing Test Data v01

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>.

Used ISED Test Site Reg.(company number) : 2324L
CAB Identifier: KR0161

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:

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

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, 9 kHz to 30 MHz	1.69 dB
Radiated Disturbance, 30 MHz to 1 GHz	3.92 dB
Radiated Disturbance, 1 GHz to 18 GHz	5.06 dB
Radiated Disturbance, Above 18 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 BT/BLE Tablet + DTS/UNII a/b/g/n/ac/ax and WPT.
This test report addresses the BT(DSS) operational mode.

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	Average	17.652	58.237
		Peak	17.877	61.334
	Enhanced Pi/4-DPSK	Average	15.678	36.966
		Peak	18.033	63.577
	Enhanced 8PSK	Average	15.684	37.017
		Peak	18.497	70.746

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 an internal antennas, with "BT/WIFI 1" maximum gain of 0.43 dBi and "BT/WIFI 2" maximum gain of 0.64 dBi.

5.4. WORST-CASE CONFIGURATION AND 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.

Radiated emission above 1GHz was performed with the EUT set to transmit low/mid/high channels.

- Worst axis

ANT1 (BT/WIFI 1)	ANT2 (BT/WIFI 2)
X	X

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	R37T7CAG0XRASEA	N/A
Data Cable	SAMSUNG	EP-DW767	GH39-02132A	N/A

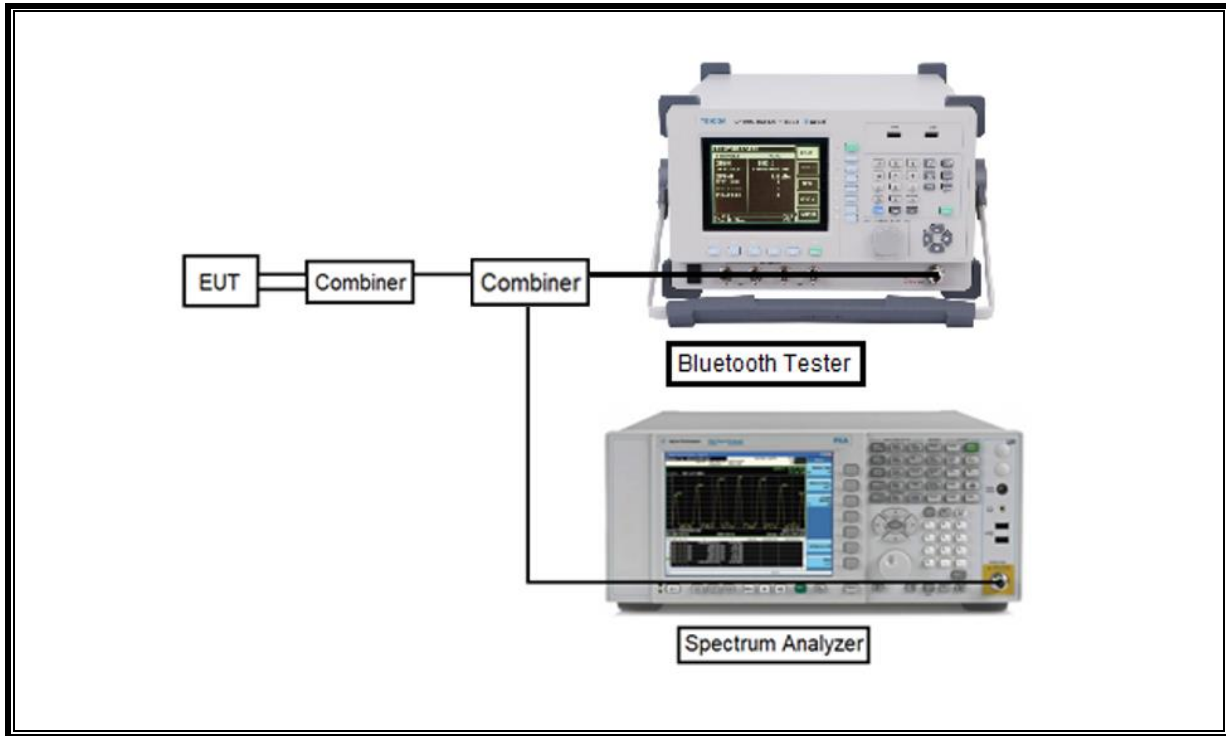
I/O CABLE

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	1.8 m	N/A

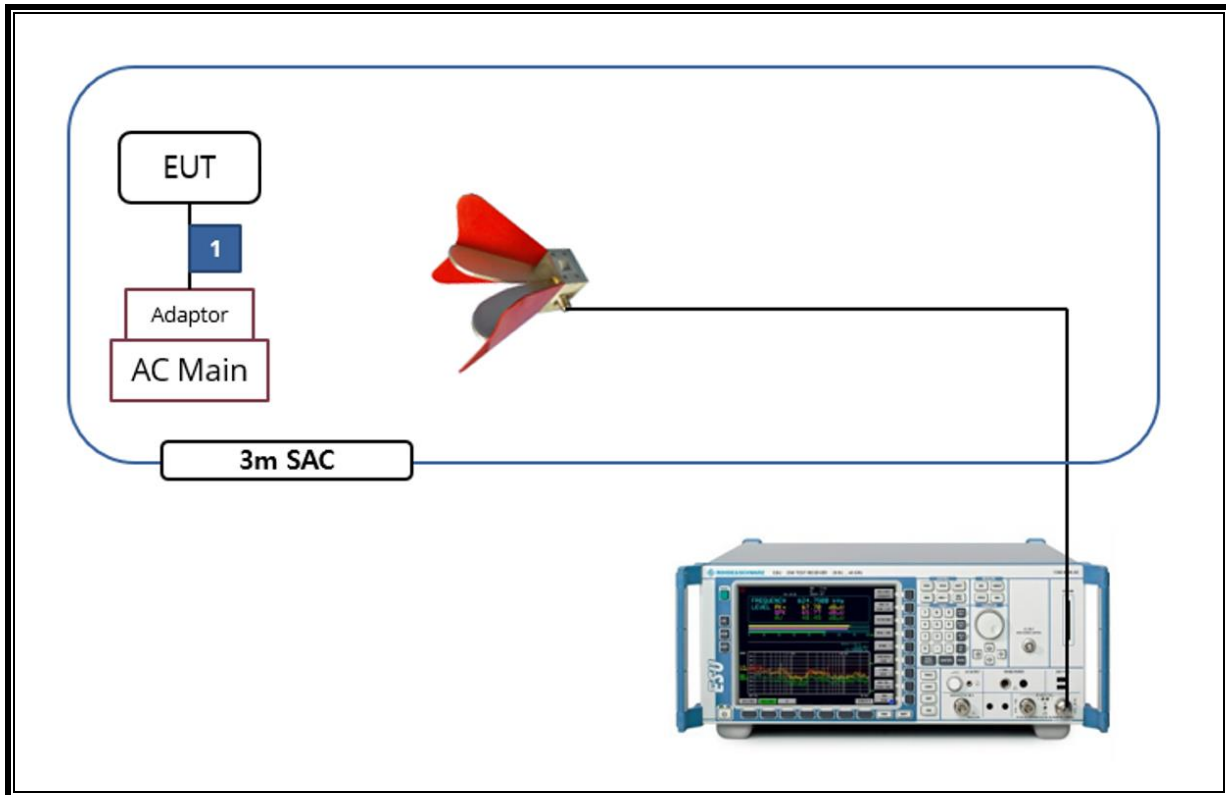
TEST SETUP

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, Bilog, 30MHz-1GHz	SCHWARZBECK	VULB9163	749	2024-08-15
Antenna, Bilog, 30MHz-1GHz	SCHWARZBECK	VULB9163	845	2024-08-15
Antenna, Loop, 9kHz-30MHz	R&S	HFH2-Z2	100418	2023-10-06
Antenna, Horn, 18 GHz	ETS	3115	00167211	2024-08-04
Antenna, Horn, 18 GHz	ETS	3115	00161451	2024-08-21
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	2023-08-04
Preamplifier	ETS	3116C-PA	00168841	2023-08-04
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	2023-08-02
Preamplifier, 1000 MHz	Sonoma	310N	351741	2023-08-02
Preamplifier, 1000 MHz	Sonoma	310N	370599	2023-08-02
Preamplifier, 18 GHz	Miteq	AFS42-00101800-25-S-42	1896138	2023-08-01
Preamplifier, 18 GHz	Miteq	AFS42-00101800-25-S-42	2029169	2023-08-01
Spectrum Analyzer, 44 GHz	Agilent / HP	N9030A	MY54170614	2023-08-03
Spectrum Analyzer, 44 GHz	Agilent / HP	N9030A	MY54490312	2023-08-01
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	2023-08-03
Average Power Sensor	Agilent / HP	U2000	MY54260010	2023-08-03
Bluetooth Tester	TESCOM	TC-3000C	3000C000546	2023-08-02
Power Splitter	MINI-CIRCUITS	WA1534	UL003	2024-01-09
Power Splitter	MINI-CIRCUITS	WA1534	UL004	2024-01-09
Attenuator	PASTERNAK	PE7087-10	A009	2023-08-03
Attenuator	PASTERNAK	PE7087-10	A001	2023-08-03
Attenuator	PASTERNAK	PE7087-10	A008	2023-08-03
Attenuator	PASTERNAK	PE7004-10	2	2023-08-01
EMI Test Receive, 40 GHz	R&S	ESU40	100439	2023-08-02
EMI Test Receive, 40 GHz	R&S	ESU40	100457	2023-07-29
Low Pass Filter 5GHz	Micro-Tronics	LPS17541	009	2023-08-02
Low Pass Filter 5GHz	Micro-Tronics	LPS17541	015	2023-08-01
Low Pass Filter 5GHz	Micro-Tronics	LPS17541	020	2023-08-01
High Pass Filter 3GHz	Micro-Tronics	HPM17543	010	2023-08-02
High Pass Filter 3GHz	Micro-Tronics	HPM17543	015	2023-08-01
High Pass Filter 3GHz	Micro-Tronics	HPM17543	020	2023-08-01
High Pass Filter 6GHz	Micro-Tronics	HPS17542	009	2023-08-02
High Pass Filter 6GHz	Micro-Tronics	HPS17542	016	2023-08-01
High Pass Filter 6GHz	Micro-Tronics	HPS17542	021	2023-08-01
LISN	R&S	ENV-216	101837	2023-08-04
Termination	WEINSCHL	M1406A	T09	2023-08-03
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	IC Part Section	Test Description	Test Limit	Test Condition	Test Result
2.1051, 15.247(d)	RSS-247 5.5	Band Edge / Conducted Spurious Emission	-20 dBc	Conducted	Complies
15.247 (b)(1)	RSS-247 5.1(b)	TX conducted output power	< 21 dBm		Complies
15.247 (a)(1)	RSS-247 5.1(b)	Hopping frequency separation	> two-thirds of the 20 dB bandwidth		Complies
15.247 (a)(1)(iii)	RSS-247 5.1(d)	Number of Hopping channels	More than 15 non-overlapping channels		Complies
15.247 (a)(1)(iii)	RSS-247 5.1(d)	Avg Time of Occupancy	< 0.4 s		Complies
15.207(a)	RSS-GEN Clause 7.2 & 8.8	AC Power Line conducted emissions	Section 11	Power Line conducted	Complies
15.205, 15.209	RSS-GEN Clause 8.9 & 8.10	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]
BDR	2.880	3.750	76.80	0.35
EDR	2.883	3.750	76.88	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.

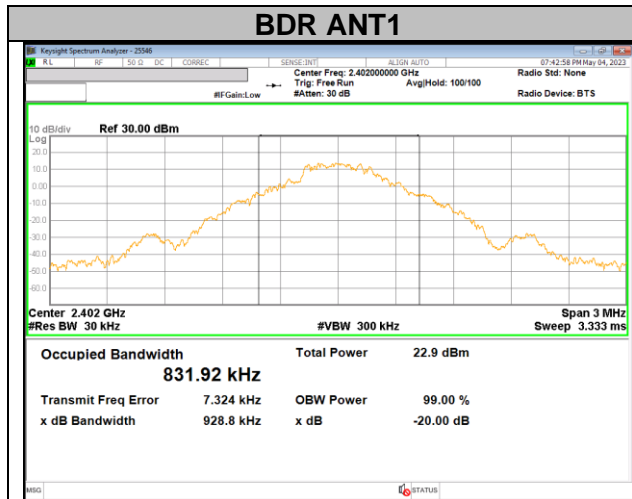
RESULTS

9.2.1. BLUETOOTH BASIC DATA RATE GFSK MODULATION

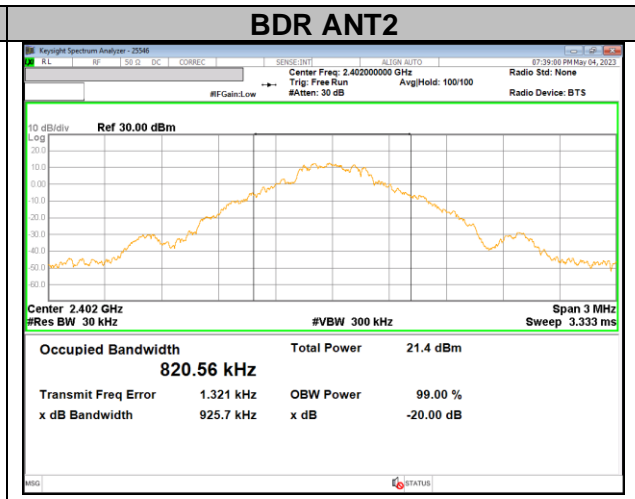
Ant.	Channel	Frequency [MHz]	20 dB Bandwidth [kHz]
ANT1	0	2 402	928.8
	39	2 441	920.5
	78	2 480	907.0
ANT2	0	2 402	925.7
	39	2 441	925.2
	78	2 480	917.9
Worst			928.8

9.2.2. BLUETOOTH ENHANCED DATA RATE 8PSK MODULATION

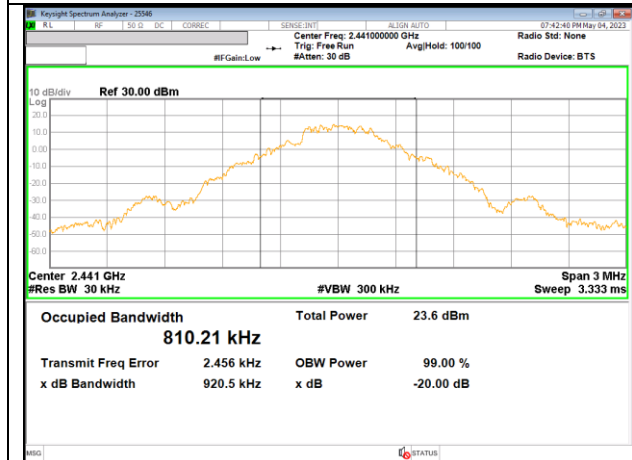
Ant.	Channel	Frequency [MHz]	20 dB Bandwidth [kHz]
ANT1	0	2 402	1 259.0
	39	2 441	1 245.0
	78	2 480	1 254.0
ANT2	0	2 402	1 241.0
	39	2 441	1 271.0
	78	2 480	1 256.0
Worst			1 271.0



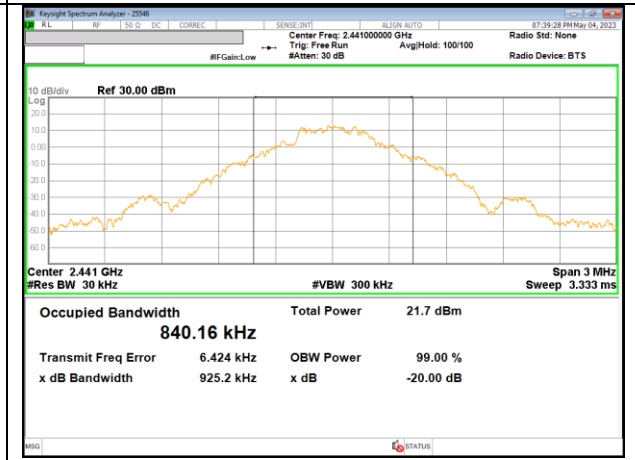
20 dB bandwidth / 0 CHANNEL



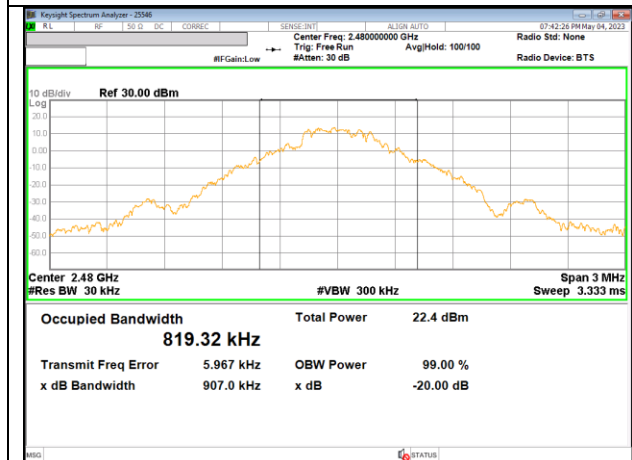
20 dB bandwidth / 0 CHANNEL



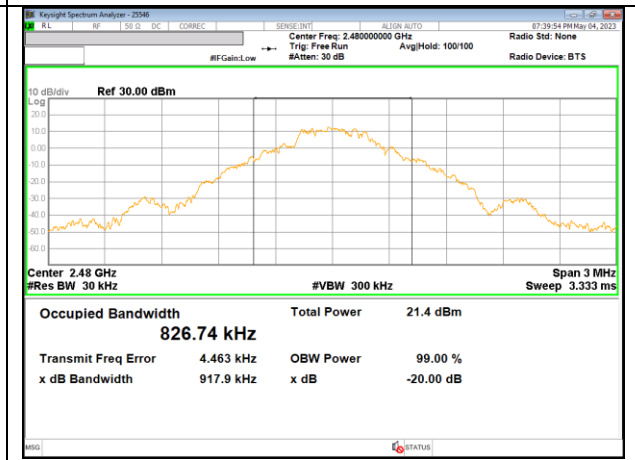
20 dB bandwidth / 39 CHANNEL



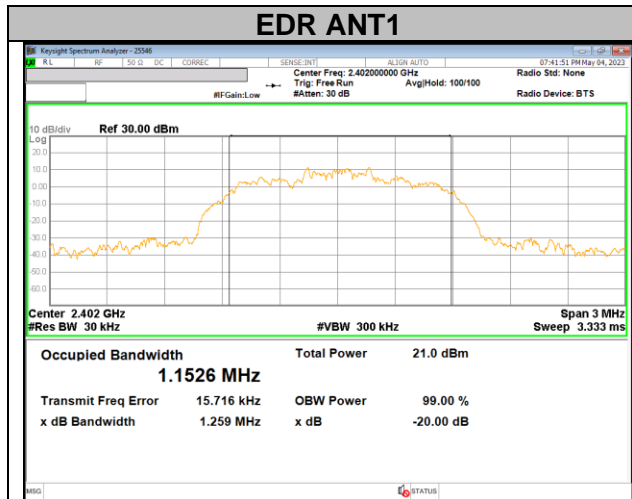
20 dB bandwidth / 39 CHANNEL



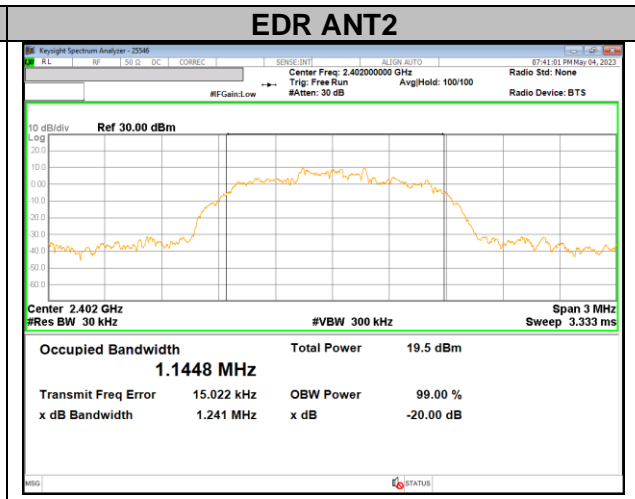
20 dB bandwidth / 78 CHANNEL



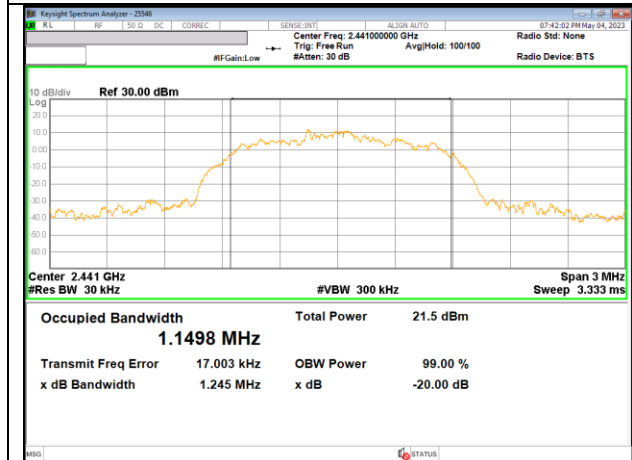
20 dB bandwidth / 78 CHANNEL



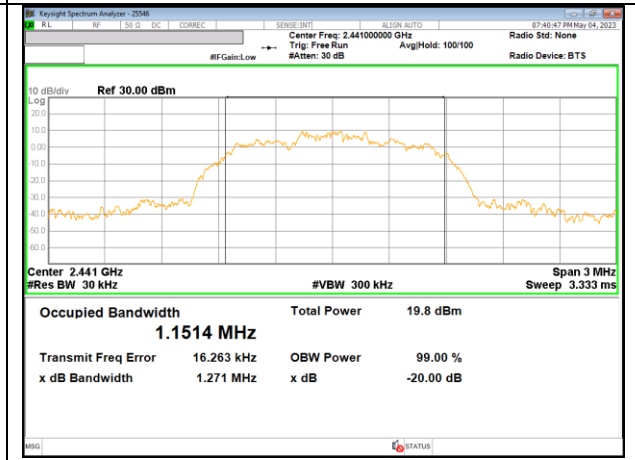
20 dB bandwidth / 0 CHANNEL



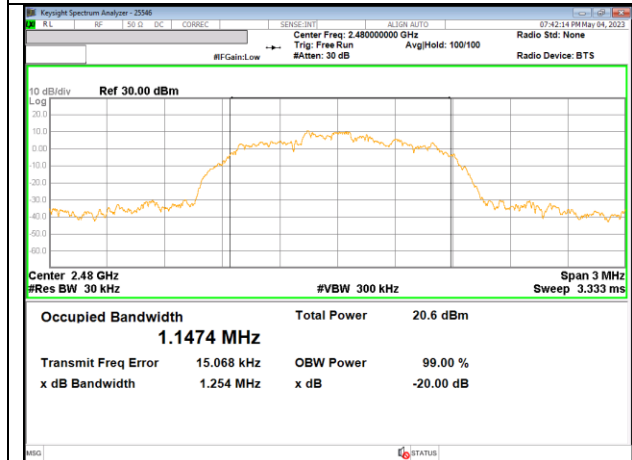
20 dB bandwidth / 0 CHANNEL



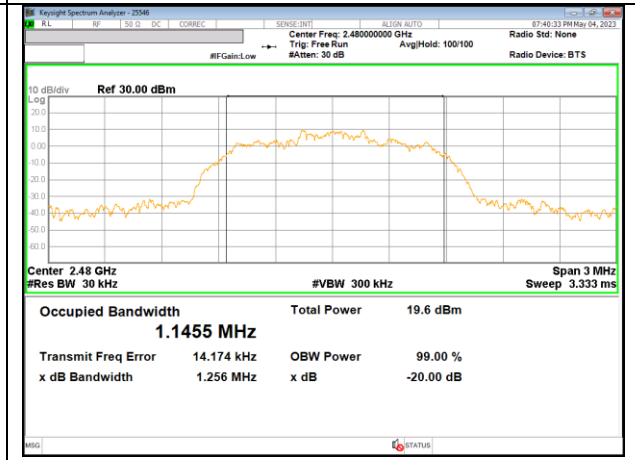
20 dB bandwidth / 39 CHANNEL



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)

RSS-247 (5.1) (b)

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.

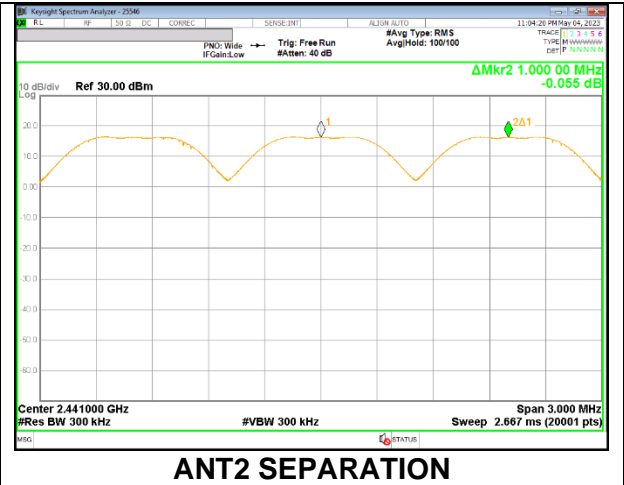
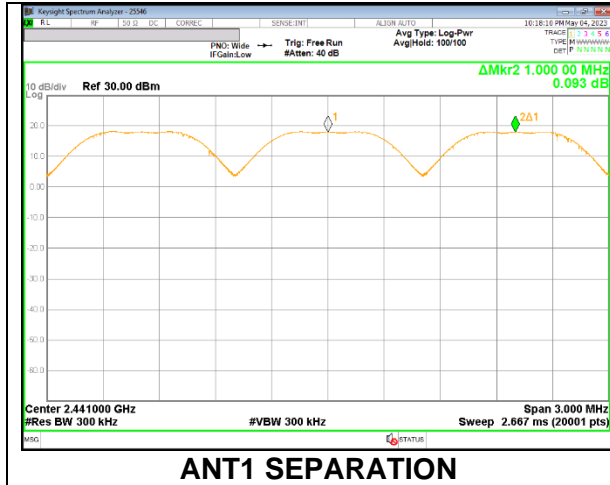
Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than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

TEST PROCEDURE

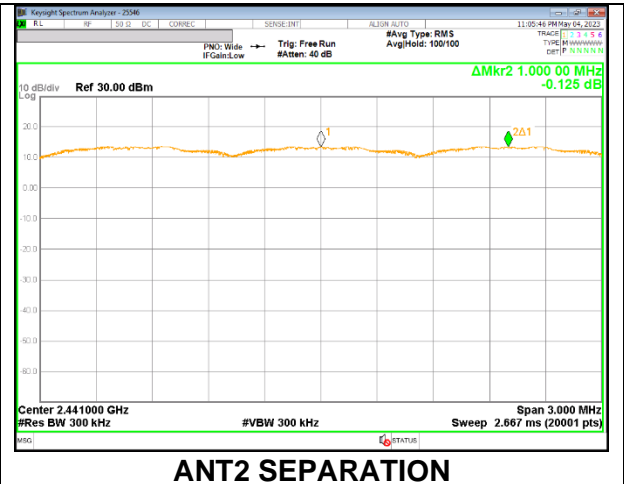
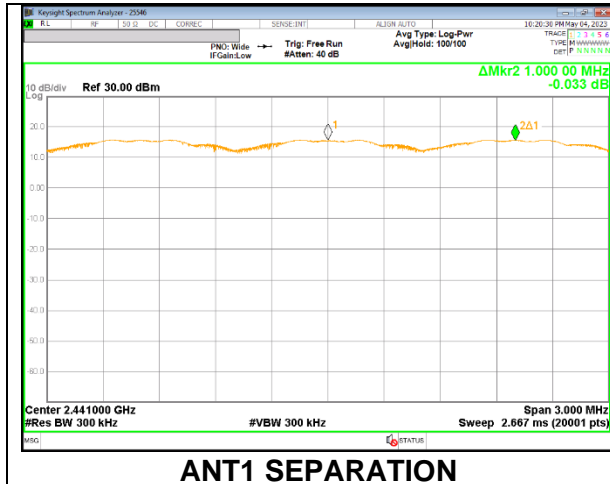
The transmitter output is connected to a spectrum analyzer. Start with the RBW set to approximately 30% of the channel spacing; adjust as necessary to best identify the center of each individual channel. The VBW is set to $VBW \geq RBW$. The sweep time is coupled.

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)

RSS-247 (5.1) (d)

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

TEST PROCEDURE

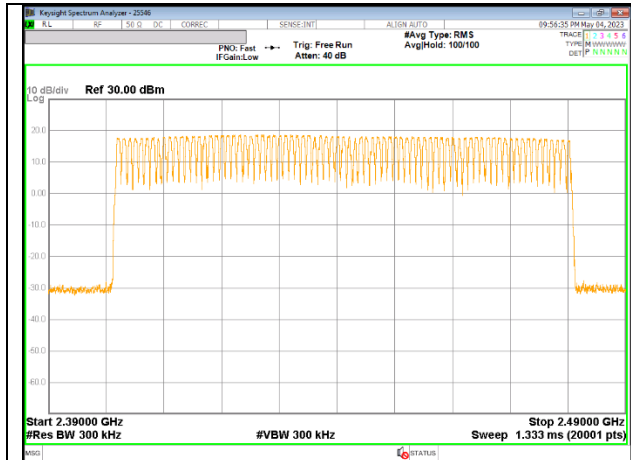
The transmitter output is connected to a spectrum analyzer. The span is set to cover the entire authorized band, in either a single sweep or in multiple contiguous sweeps. The RBW is set to a maximum of 1 % of the span. The analyzer is set to Max Hold.

RESULTS

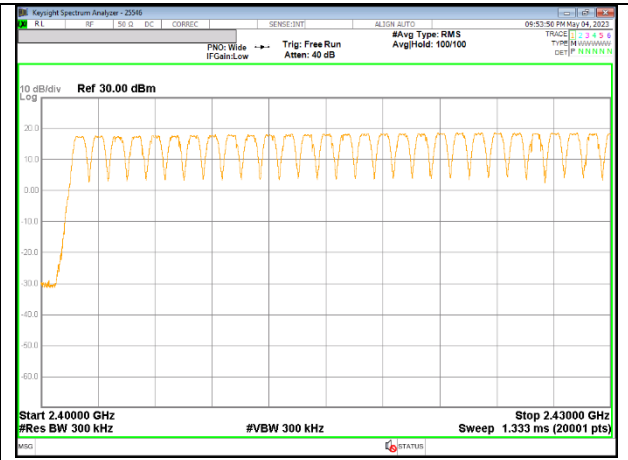
Normal Mode: All Channels Observed

9.4.1. BLUETOOTH BASIC DATA RATE GFSK MODULATION

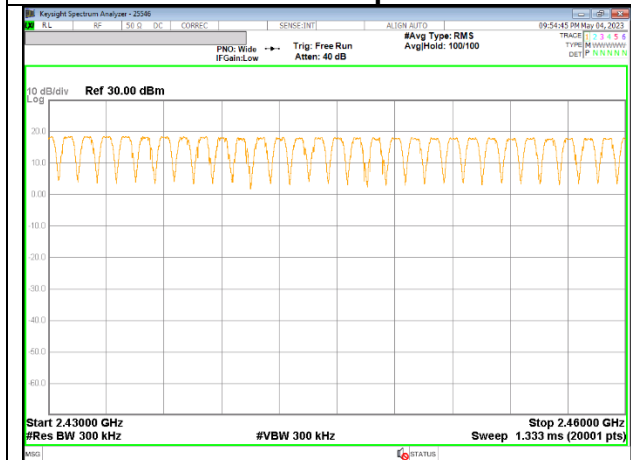
- ANT1



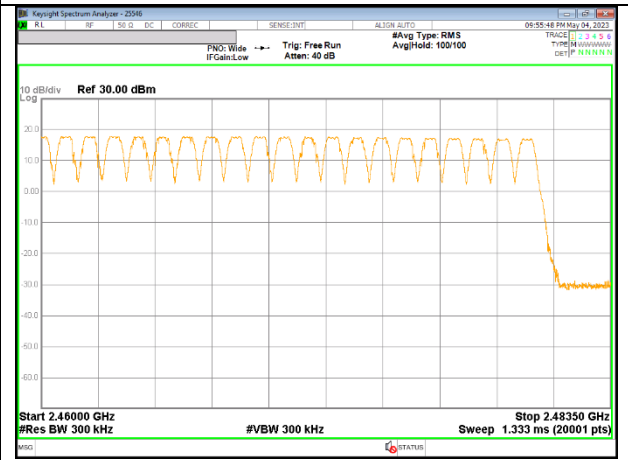
100 MHz Span



30MHz SPAN, SEGMENT 1 OF 3

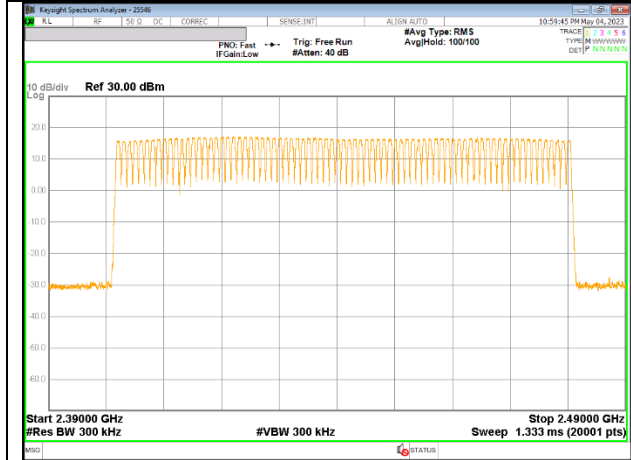


30MHz SPAN, SEGMENT 2 OF 3

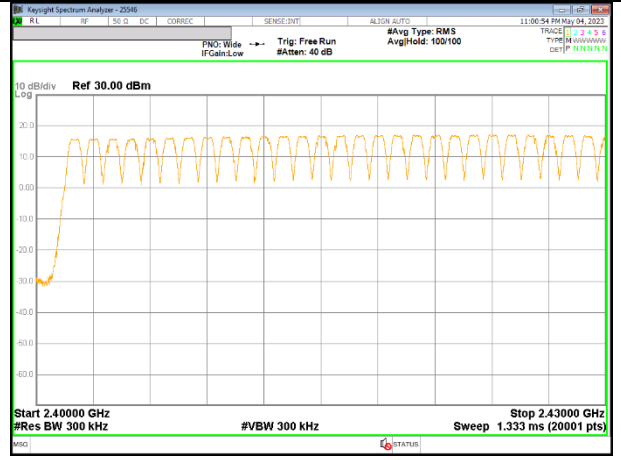


30MHz SPAN, SEGMENT 3 OF 3

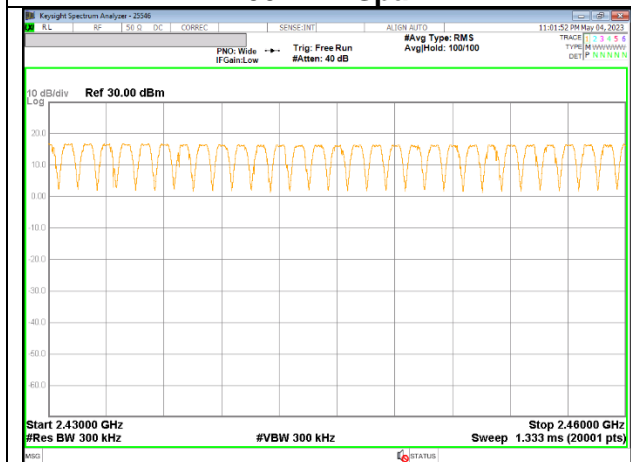
- ANT2



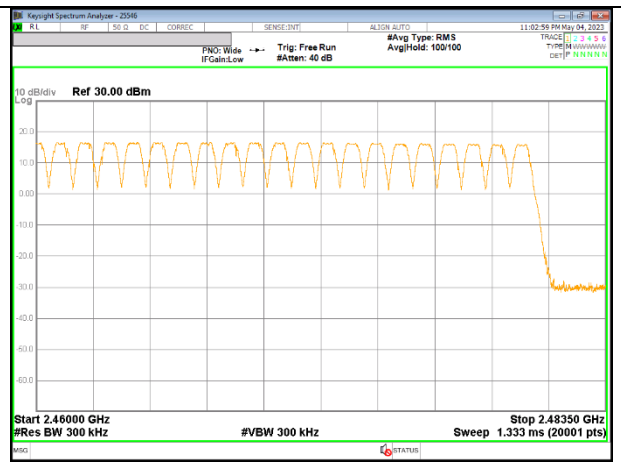
100 MHz Span



30MHz SPAN, SEGMENT 1 OF 3



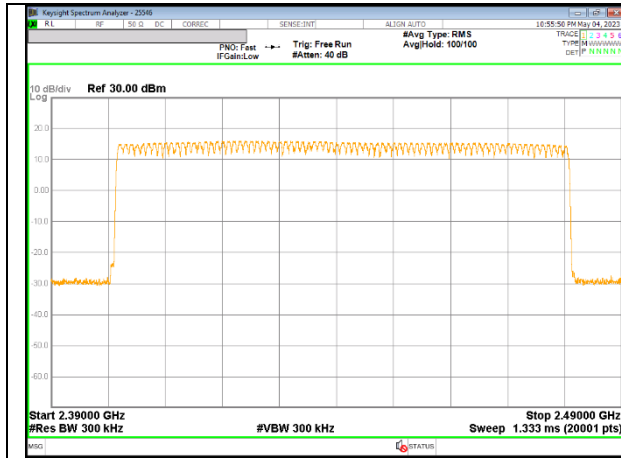
30MHz SPAN, SEGMENT 2 OF 3



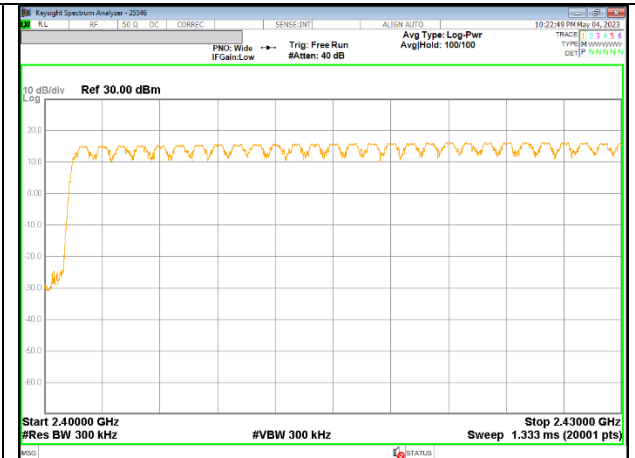
30MHz SPAN, SEGMENT 3 OF 3

9.4.2. BLUETOOTH ENHANCED DATA RATE 8PSK MODULATION

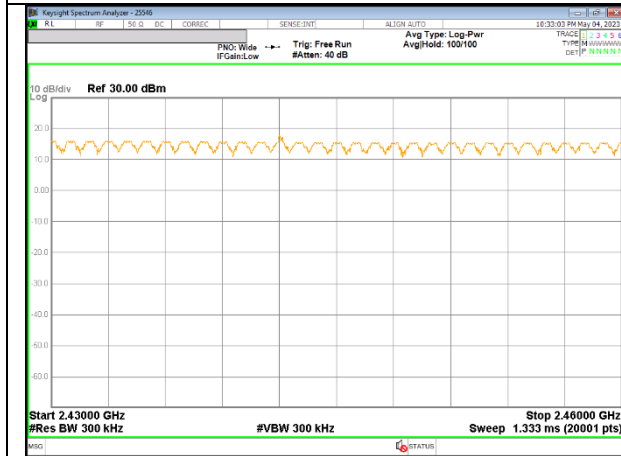
- ANT1



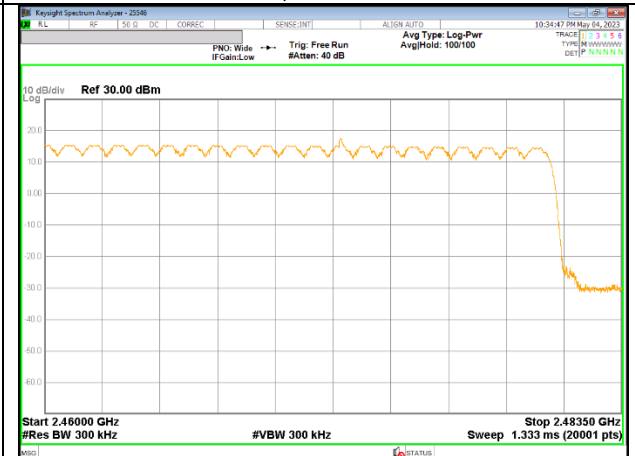
100 MHz Span



30MHz SPAN, SEGMENT 1 OF 3

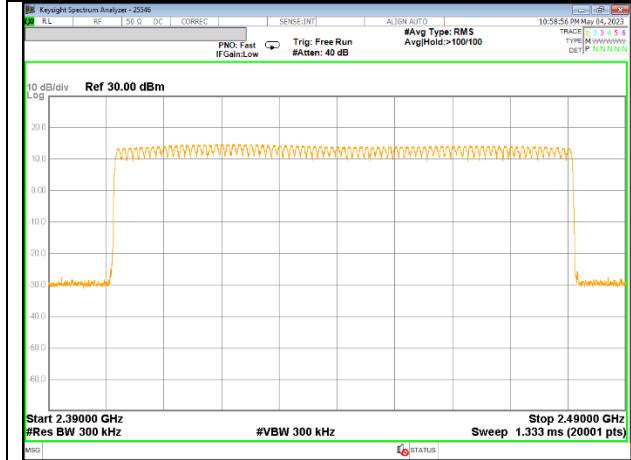


30MHz SPAN, SEGMENT 2 OF 3

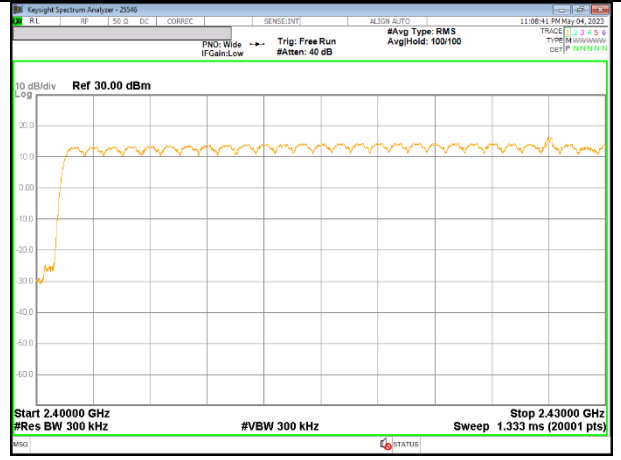


30MHz SPAN, SEGMENT 3 OF 3

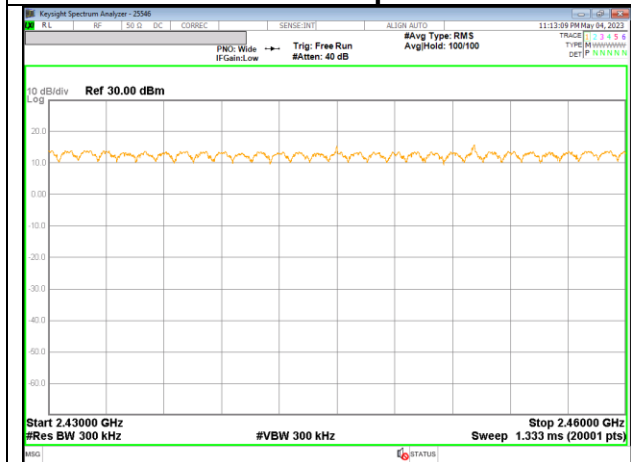
- ANT2



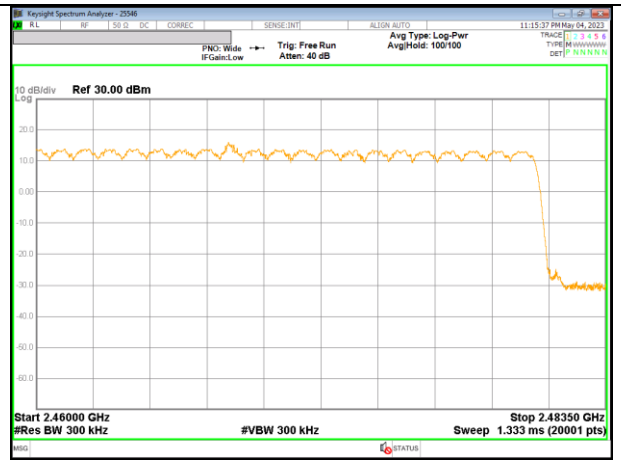
100 MHz Span



30MHz SPAN, SEGMENT 1 OF 3



30MHz SPAN, SEGMENT 2 OF 3



30MHz SPAN, SEGMENT 3 OF 3

9.5. AVERAGE TIME OF OCCUPANCY

LIMITS

FCC §15.247 (a) (1) (iii)

RSS-247 (5.1) (d)

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.

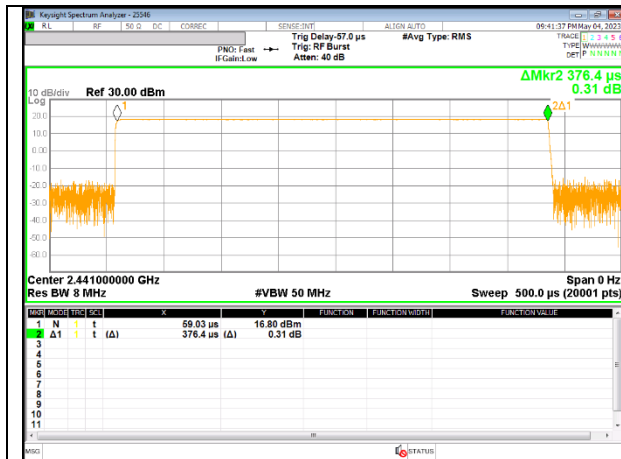
The average time of occupancy in the specified 3.16 second period (79 channels * 0.4 s) is equal to $10 * (\# \text{ of pulses in } 3.16 \text{ s}) * \text{ pulse width}$.

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 ANT1 Normal					
DH1	0.376	32	0.120	0.4	-0.280
DH3	1.631	16	0.261	0.4	-0.139
DH5	2.880	12	0.346	0.4	-0.054
GFSK ANT1 AFH					
DH Packet	Pulse Width [msec]	Number of Pulses in 0.8 seconds	Average Time of Occupancy [sec]	Limit [sec]	Margin [sec]
GFSK ANT1 AFH					
DH1	0.376	8	0.030	0.4	-0.370
DH3	1.631	4	0.065	0.4	-0.335
DH5	2.880	3	0.087	0.4	-0.313



PULSE WIDTH – DH1



NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – DH1



PULSE WIDTH – DH3



NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – DH3

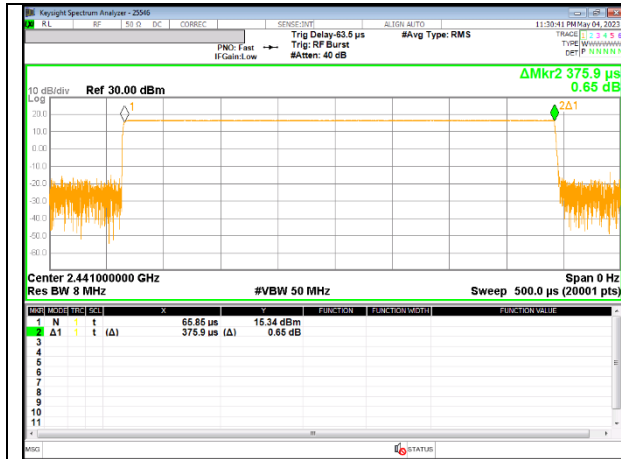


PULSE WIDTH – DH5



NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – DH5

DH Packet	Pulse Width [msec]	Number of Pulses in 3.16 seconds	Average Time of Occupancy [sec]	Limit [sec]	Margin [sec]
GFSK ANT2 Normal					
DH1	0.376	32	0.120	0.4	-0.280
DH3	1.631	16	0.261	0.4	-0.139
DH5	2.879	11	0.317	0.4	-0.083
GFSK ANT2 AFH					
DH Packet	Pulse Width [msec]	Number of Pulses in 0.8 seconds	Average Time of Occupancy [sec]	Limit [sec]	Margin [sec]
GFSK ANT2 AFH					
DH1	0.376	8	0.030	0.4	-0.370
DH3	1.631	4	0.065	0.4	-0.335
DH5	2.879	2.75	0.079	0.4	-0.321



PULSE WIDTH – DH1



NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – DH1



PULSE WIDTH – DH3



NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – DH3



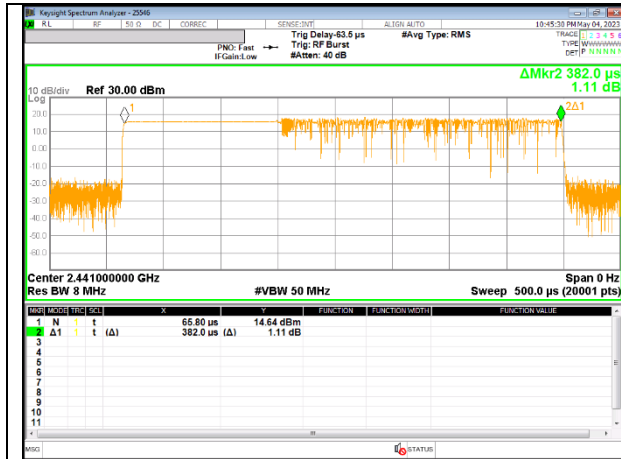
PULSE WIDTH – DH5



NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – DH5

9.5.2. BLUETOOTH ENHANCED DATA RATE 8PSK MODULATION

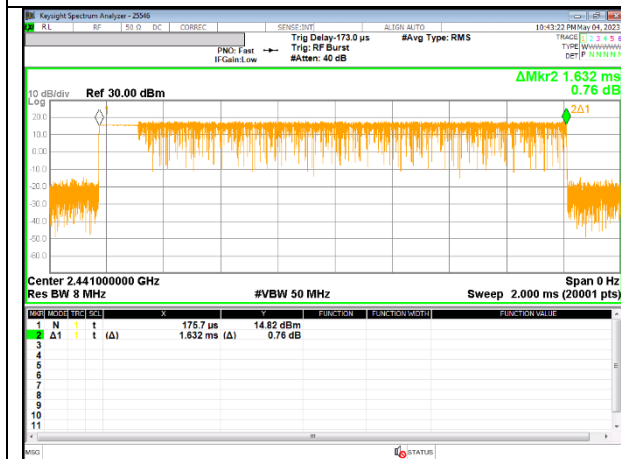
DH Packet	Pulse Width [msec]	Number of Pulses in 3.16 seconds	Average Time of Occupancy [sec]	Limit [sec]	Margin [sec]
8PSK ANT1 Normal					
DH1	0.382	32	0.122	0.4	-0.278
DH3	1.632	16	0.261	0.4	-0.139
DH5	2.879	12	0.345	0.4	-0.055
8PSK ANT1 AFH					
DH Packet	Pulse Width [msec]	Number of Pulses in 0.8 seconds	Average Time of Occupancy [sec]	Limit [sec]	Margin [sec]
8PSK ANT1 AFH					
DH1	0.382	8	0.031	0.4	-0.369
DH3	1.632	4	0.065	0.4	-0.335
DH5	2.879	3	0.086	0.4	-0.314



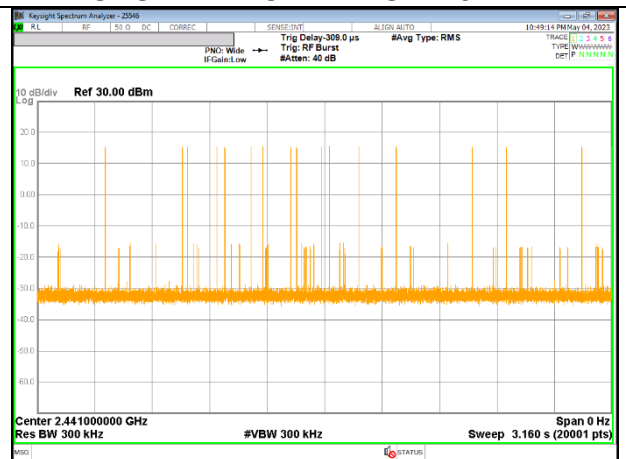
PULSE WIDTH – 3-DH1



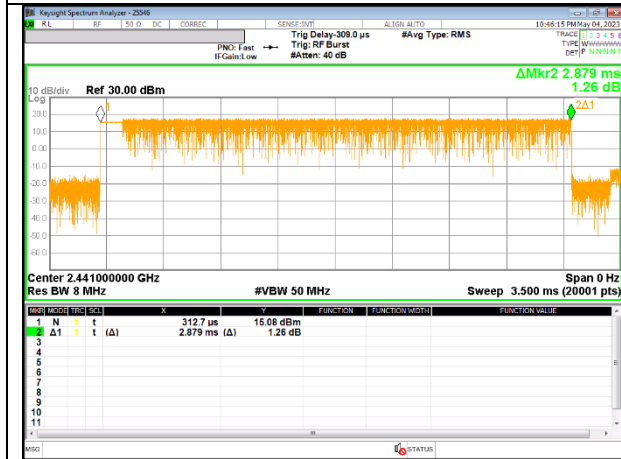
NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – 3-DH1



PULSE WIDTH – 3-DH3



NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – 3-DH3

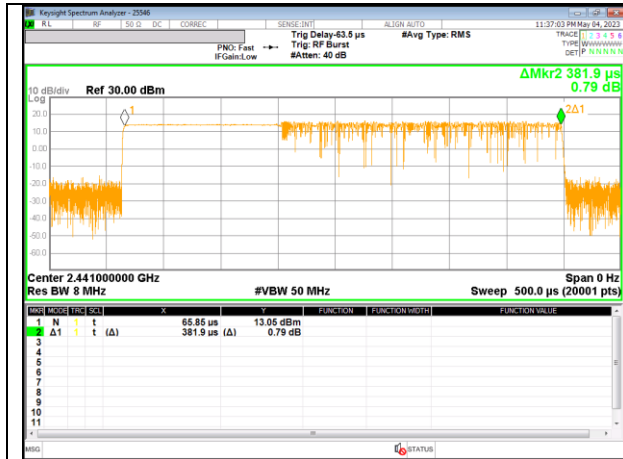


PULSE WIDTH – 3-DH5



NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – 3-DH5

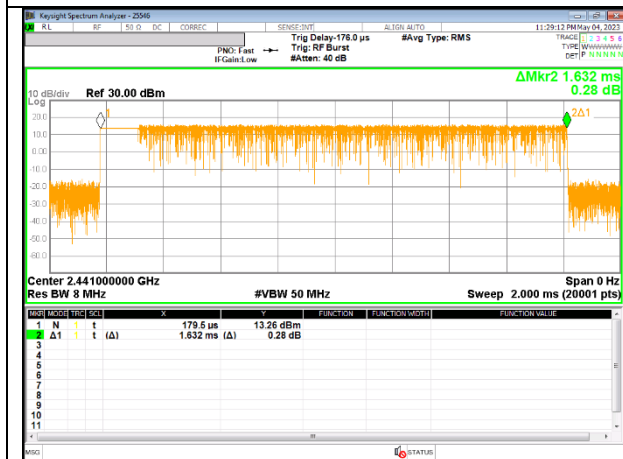
DH Packet	Pulse Width [msec]	Number of Pulses in 3.16 seconds	Average Time of Occupancy [sec]	Limit [sec]	Margin [sec]
8PSK ANT2 Normal					
DH1	0.382	32	0.123	0.4	-0.278
DH3	1.632	16	0.261	0.4	-0.139
DH5	2.884	11	0.317	0.4	-0.083
8PSK ANT2 AFH					
DH Packet	Pulse Width [msec]	Number of Pulses in 0.8 seconds	Average Time of Occupancy [sec]	Limit [sec]	Margin [sec]
8PSK ANT2 AFH					
DH1	0.382	8	0.031	0.4	-0.369
DH3	1.632	4	0.065	0.4	-0.335
DH5	2.884	2.75	0.079	0.4	-0.321



PULSE WIDTH – 3-DH1



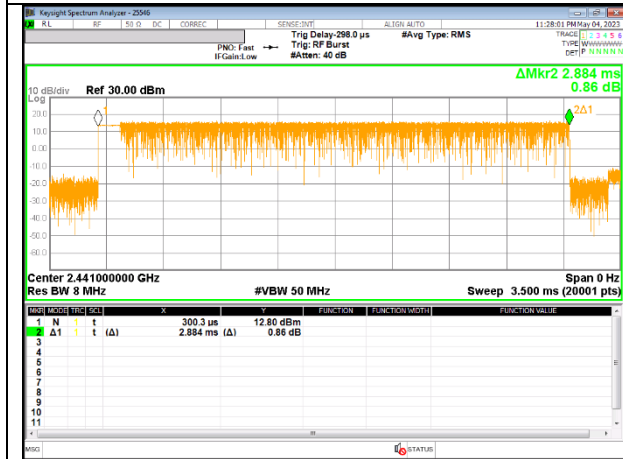
NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – 3-DH1



PULSE WIDTH – 3-DH3



NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – 3-DH3



PULSE WIDTH – 3-DH5



NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – 3-DH5

9.6. OUTPUT POWER

LIMITS

§15.247 (b) (1)

The maximum antenna 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	17.559	21.000	-3.441
	39	2 441	17.877		-3.123
	78	2 480	16.693		-4.307
ANT2	0	2 402	15.851		-5.149
	39	2 441	16.016		-4.984
	78	2 480	15.423		-5.577
Worst			17.877		-3.123

9.6.2. ENHANCED DATA RATE Pi/4-DPSK MODULATION

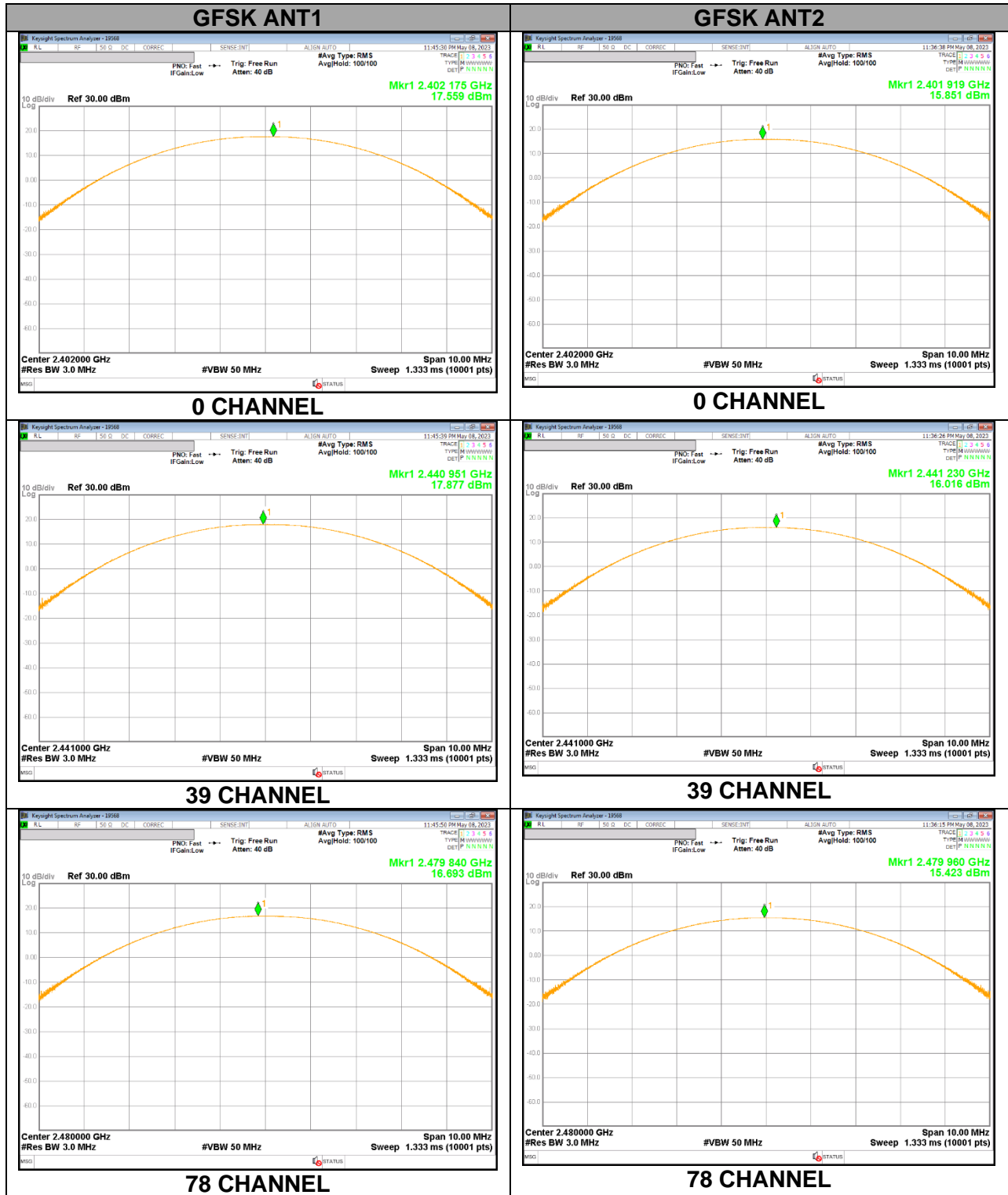
Antenna	Channel	Frequency [MHz]	Peak Output Power [dBm]	Limit [dBm]	Margin [dB]
ANT1	0	2 402	17.684	21.000	-3.316
	39	2 441	18.033		-2.967
	78	2 480	16.827		-4.173
ANT2	0	2 402	15.968		-5.032
	39	2 441	16.135		-4.865
	78	2 480	15.515		-5.485
Worst			18.033		-2.967

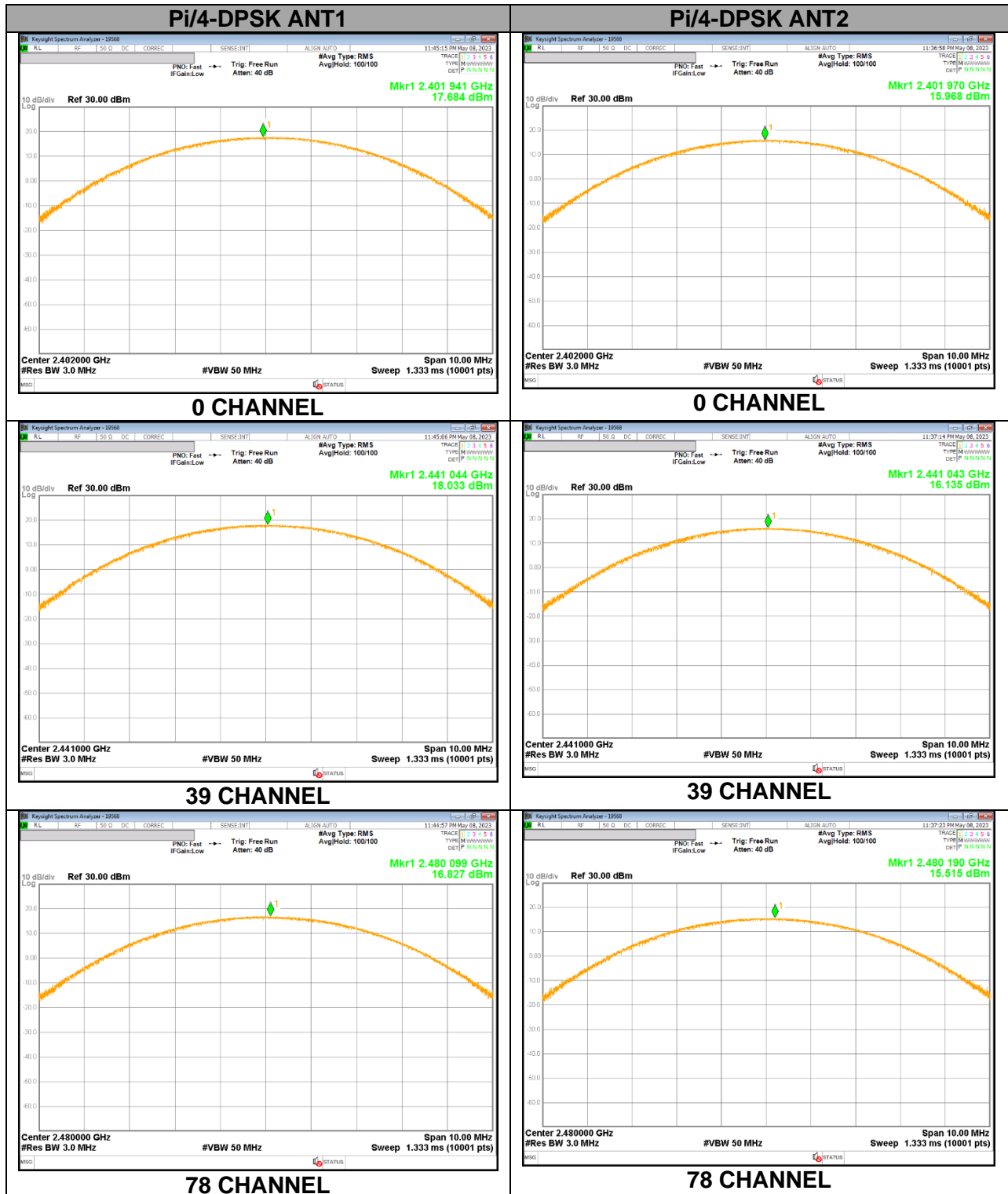
9.6.3. ENHANCED DATA RATE 8PSK MODULATION

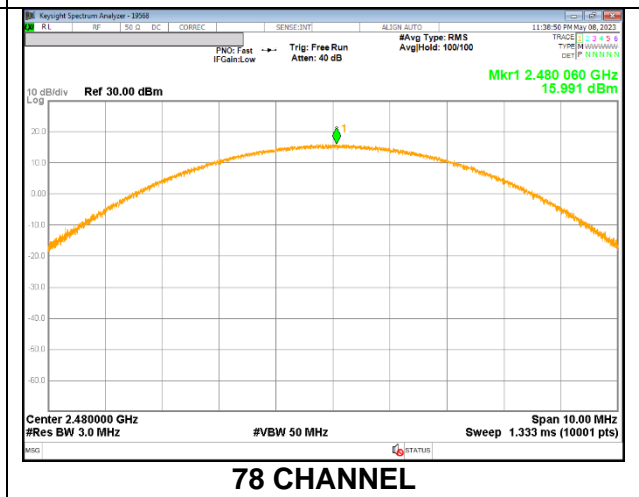
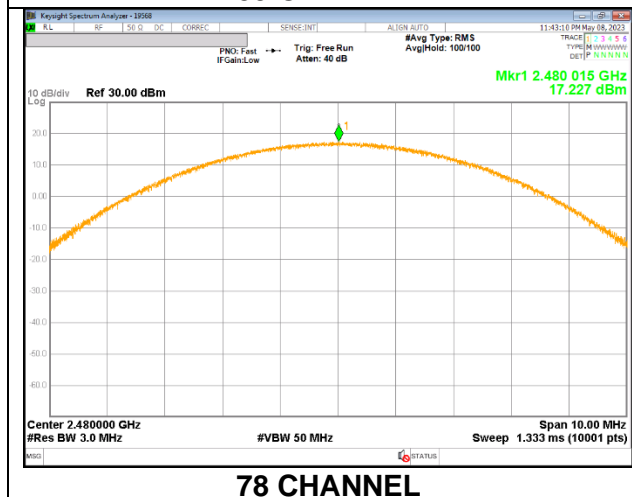
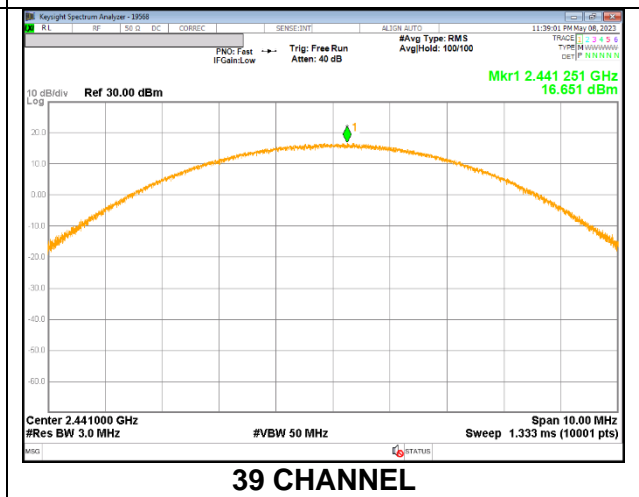
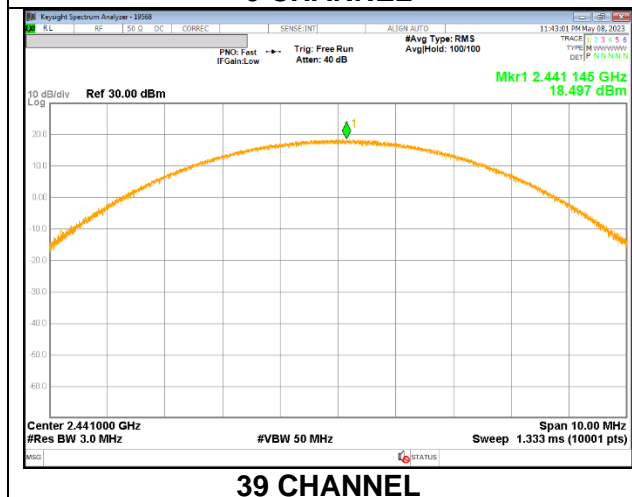
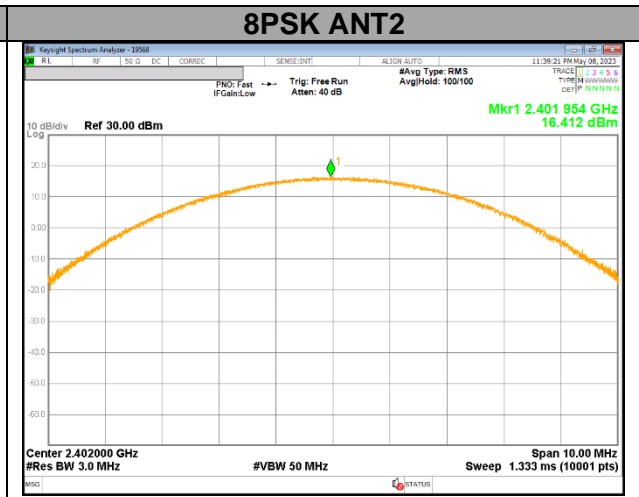
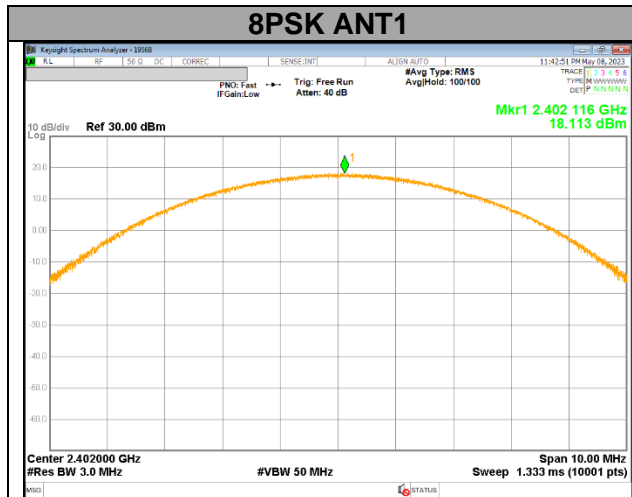
Antenna	Channel	Frequency [MHz]	Peak Output Power [dBm]	Limit [dBm]	Margin [dB]
ANT1	0	2 402	18.113	21.000	-2.887
	39	2 441	18.497		-2.503
	78	2 480	17.227		-3.773
ANT2	0	2 402	16.412		-4.588
	39	2 441	16.651		-4.349
	78	2 480	15.991		-5.009
Worst			18.497		-2.503

9.6.4. 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	17.338	54.175
	39	2 441	17.652	58.237
	78	2 480	16.436	44.015
ANT2	0	2 402	15.586	36.191
	39	2 441	15.747	37.558
	78	2 480	15.139	32.651

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	15.437	34.970
	39	2 441	15.678	36.966
	78	2 480	14.500	28.184
ANT2	0	2 402	13.725	23.578
	39	2 441	13.800	23.988
	78	2 480	13.214	20.960

9.7.3. ENHANCED DATA RATE 8PSK MODULATION

Antenna	Channel	Frequency [MHz]	Average Output Power [dBm]	Average Output Power [mW]
ANT1	0	2 402	15.434	34.946
	39	2 441	15.684	37.017
	78	2 480	14.511	28.255
ANT2	0	2 402	13.735	23.632
	39	2 441	13.812	24.055
	78	2 480	13.232	21.047

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.

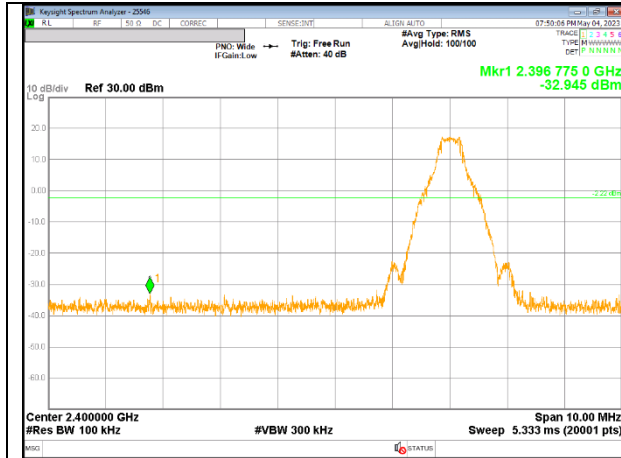
The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels.

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

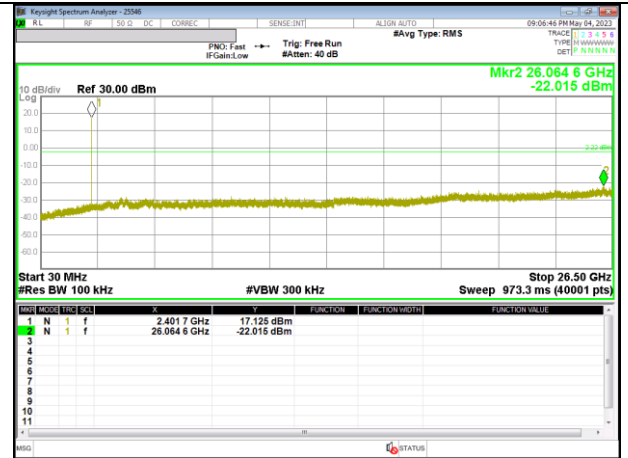
RESULTS

9.8.1. BLUETOOTH BASIC DATA RATE GFSK MODULATION

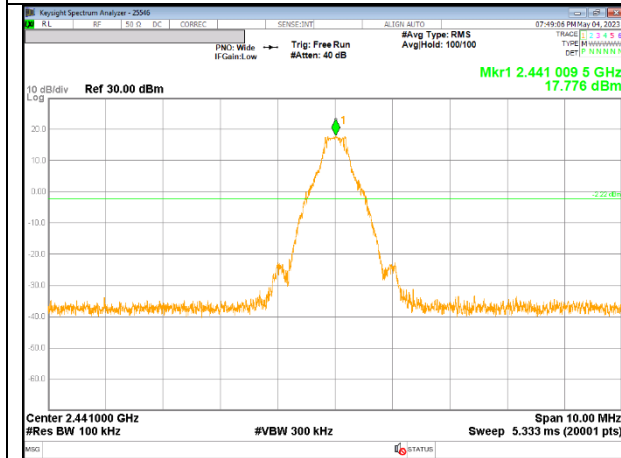
SPURIOUS EMISSIONS, NON-HOPPING - ANT1



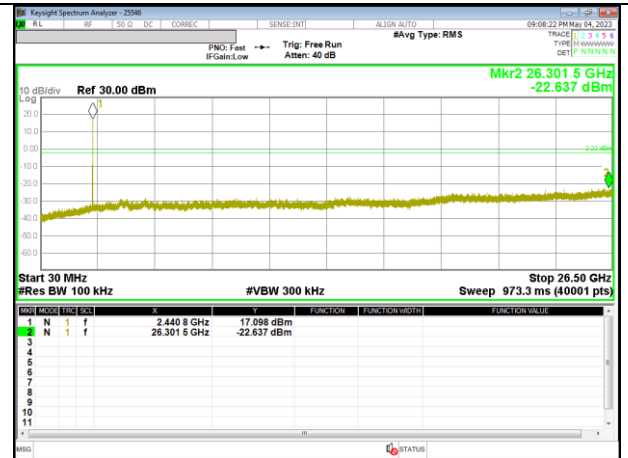
0 CHANNEL BANDEGE



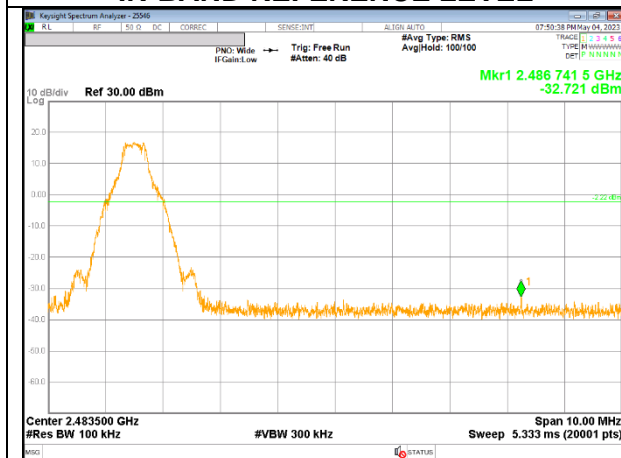
OUT-OF-BAND 0 CHANNEL



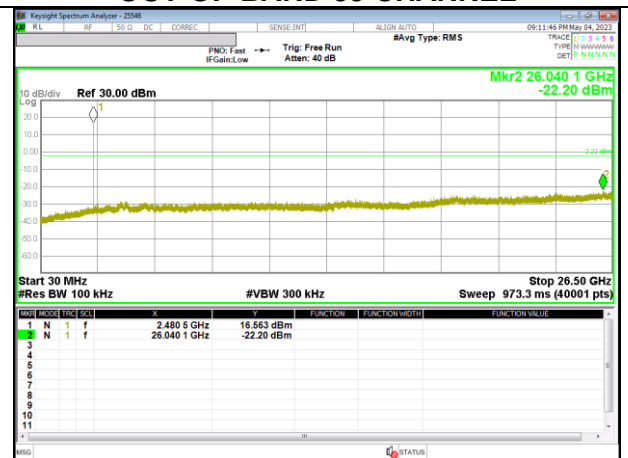
IN-BAND REFERENCE LEVEL



OUT-OF-BAND 39 CHANNEL

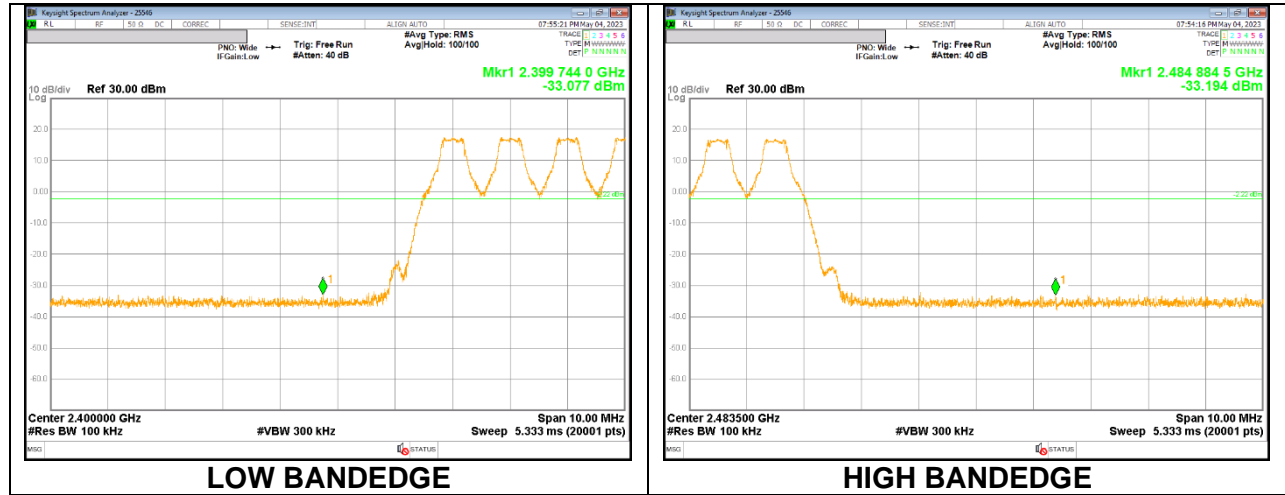


78 CHANNEL BANDEGE

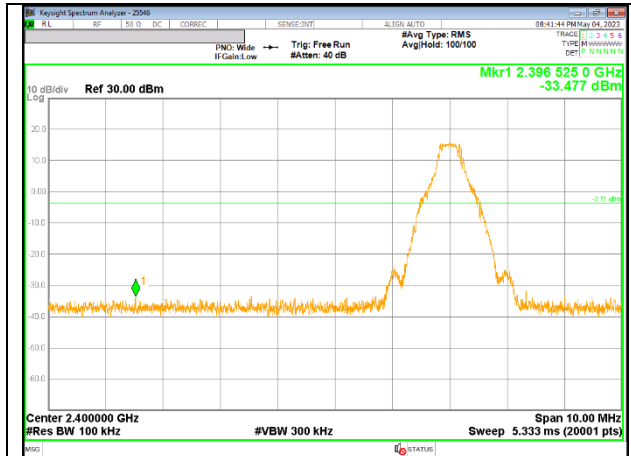


OUT-OF-BAND 78 CHANNEL

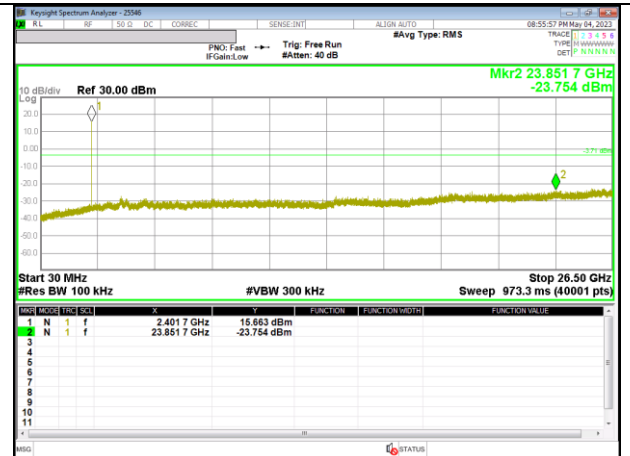
SPURIOUS BANDEGE EMISSIONS WITH HOPPING ON



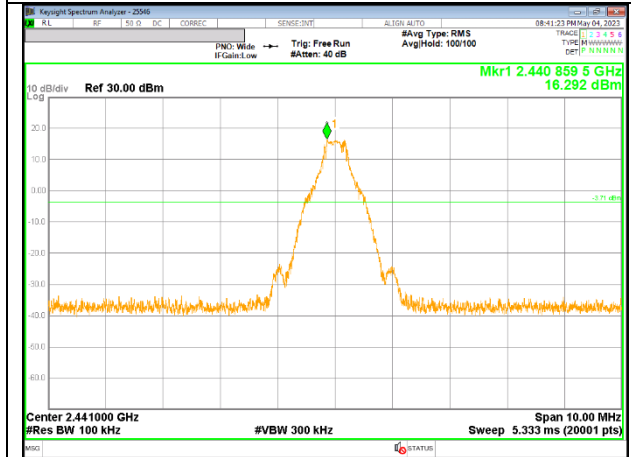
SPURIOUS EMISSIONS, NON-HOPPING - ANT2



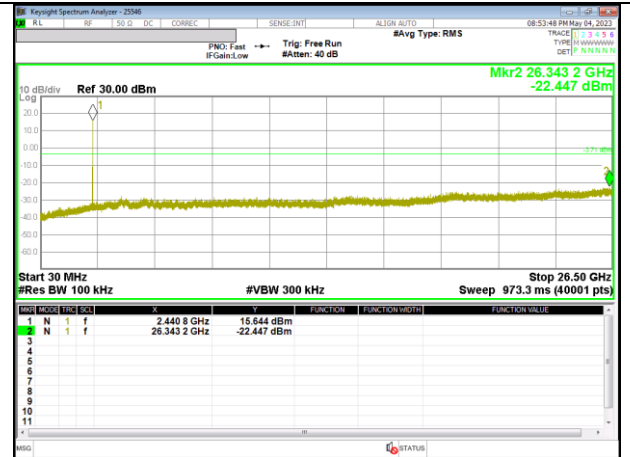
0 CHANNEL BANDEDGE



OUT-OF-BAND 0 CHANNEL



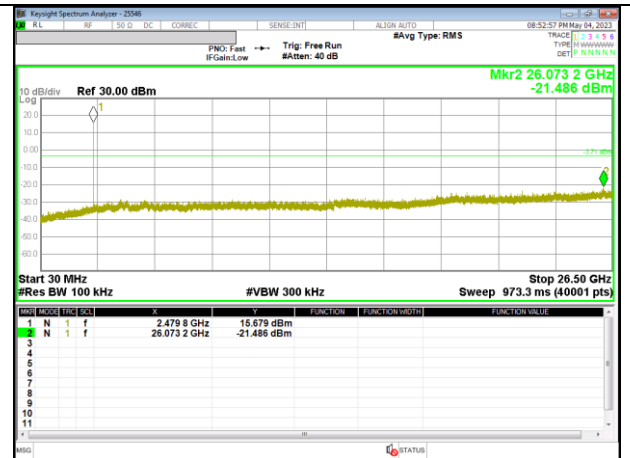
IN-BAND REFERENCE LEVEL



OUT-OF-BAND 39 CHANNEL

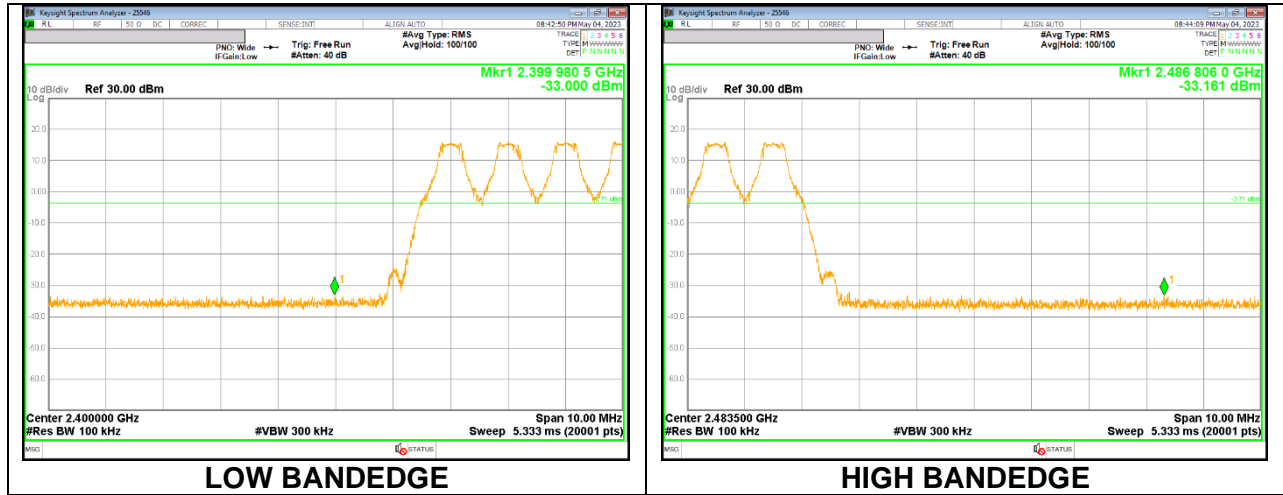


78 CHANNEL BANDEDGE



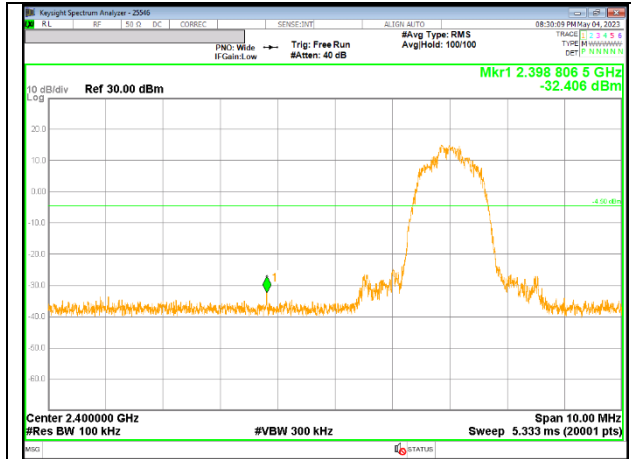
OUT-OF-BAND 78 CHANNEL

SPURIOUS BANDEGE EMISSIONS WITH HOPPING ON

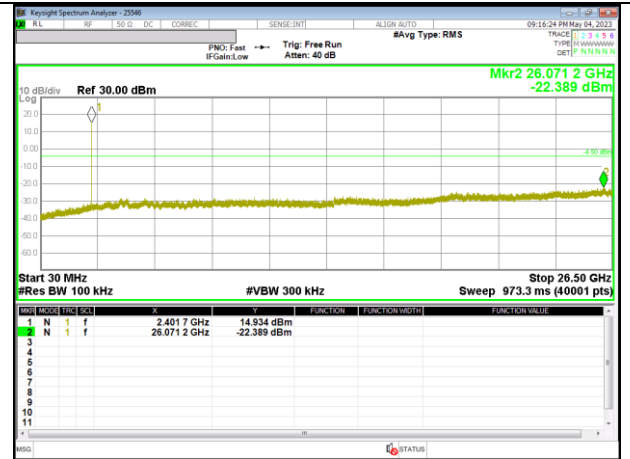


9.8.2. BLUETOOTH ENHANCED DATA RATE 8PSK MODULATION

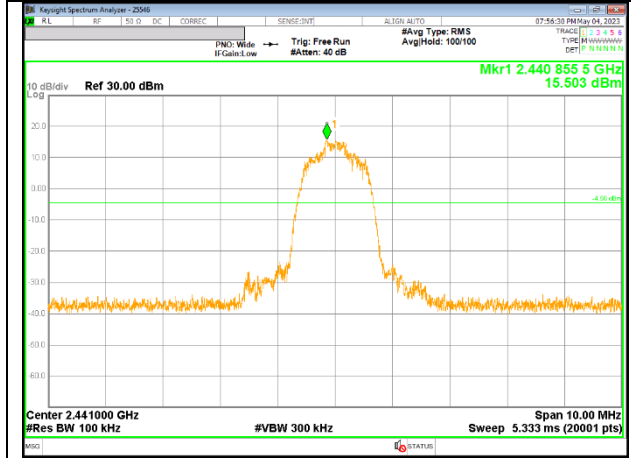
SPURIOUS EMISSIONS, NON-HOPPING - ANT1



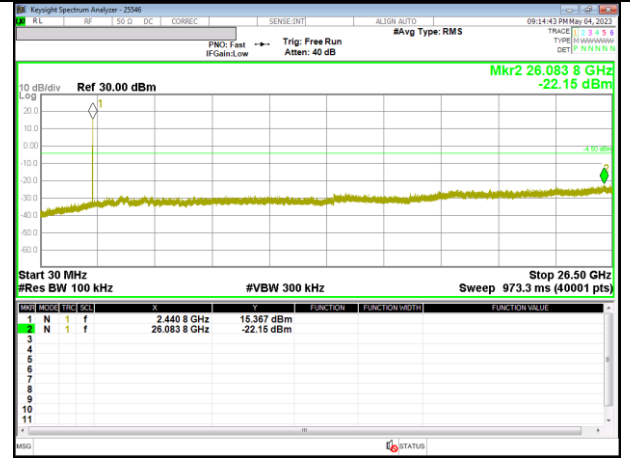
0 CHANNEL BANDEDGE



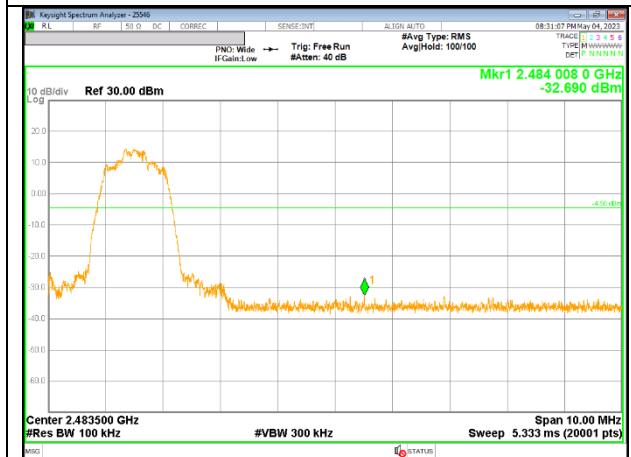
OUT-OF-BAND 0 CHANNEL



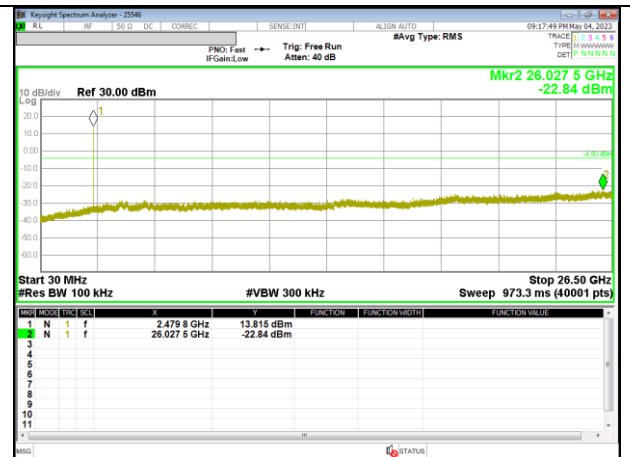
IN-BAND REFERENCE LEVEL



OUT-OF-BAND 39 CHANNEL



78 CHANNEL BANDEDGE



OUT-OF-BAND 78 CHANNEL

SPURIOUS BANDEGE EMISSIONS WITH HOPPING ON

