



CERTIFICATION TEST REPORT

Report Number. : 4790089626-E5V1

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

Model : SM-S906B/DS

FCC ID : A3LSMS906B

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

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

Date Of Issue:

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Revision History

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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, WPT and UWB

MODEL: SM-S906B/DS

SERIAL NUMBER: R3CR80TBT6V (CONDUCTED);
R3CR80TBVVV (RADIATED);

DATE TESTED: 2021-09-24 ~ 2021-10-29

APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
CFR 47 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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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 CFR 47 Part 2.
2. FCC CFR 47 Part 15.
3. KDB 558074 D01 15.247 Meas Guidance v05r02.
4. 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	
☒	Chamber 1
☒	Chamber 2
☒	Chamber 3

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:

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

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	3.02 dB
Radiated Disturbance, 30 MHz to 1 GHz	4.05 dB
Radiated Disturbance, 1 GHz to 18 GHz	5.78 dB
Radiated Disturbance, 18 GHz to 40 GHz	5.58 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 115:2007.

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, WPT and UWB. 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	17.740	59.429
		Peak	18.649	73.266
	Enhanced Pi/4-DPSK	Average	17.161	52.012
		Peak	19.821	95.962
	Enhanced 8PSK	Average	17.178	52.216
		Peak	20.334	107.994

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 ANT 1's maximum gain of -6.4 dBi and ANT 2's maximum gain of -1.9 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.

For Antenna 1, the fundamental of the EUT was investigated in three orthogonal orientations X, Y and Z it was determined that Y orientation was worst-case orientation; therefore, all final radiated testing was performed with the EUT in Y orientation.

For Antenna 2, the fundamental of the EUT was investigated in three orthogonal orientations X, Y and Z it was determined that X orientation was worst-case orientation; therefore, all final radiated testing was performed with the EUT in X orientation.

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.

- Supported PA modes:

ANT. Pre-Amp.	ANT1	ANT2	Bluetooth-Dual
ePA	O	O	
iPA			O

Since the summed target power of Bluetooth-Dual mode is lower than the target power of ePA SISO, the test was performed in ePA SISO mode.

5.5. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	Manufacturer	Model	Serial Number	FCC ID
Charger	SAMSUNG	EP-TA800	R37N9BV0382HM3	N/A
Data Cable	SAMSUNG	EP-DN980BBE	N/A	N/A

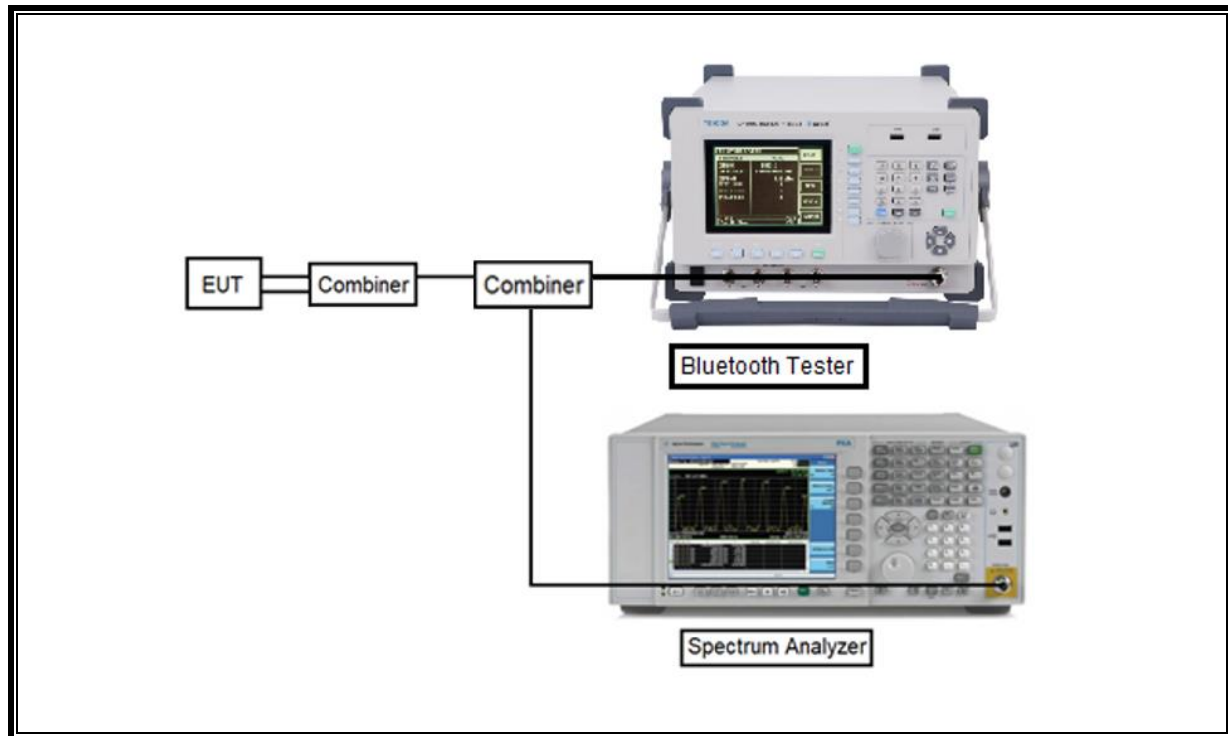
I/O CABLE

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

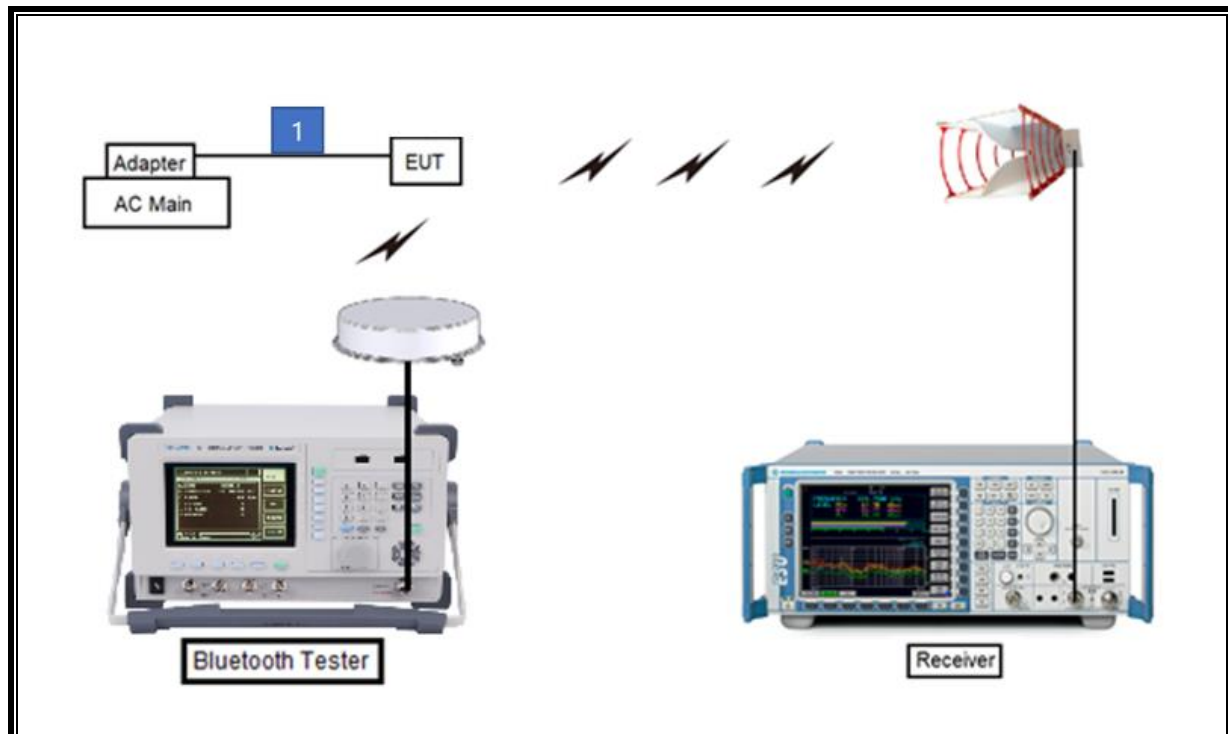
TEST SETUP

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	2022-08-19
Antenna, Bilog, 30MHz-1GHz	SCHWARZBECK	VULB9163	749	2022-08-13
Antenna, Bilog, 30MHz-1GHz	SCHWARZBECK	VULB9163	845	2022-08-13
Antenna, Horn, 18 GHz	ETS	3115	00167211	2022-07-27
Antenna, Horn, 18 GHz	ETS	3115	00161451	2022-08-15
Antenna, Horn, 18 GHz	ETS	3117	00168724	2022-07-27
Antenna, Horn, 18 GHz	ETS	3117	00168717	2022-08-15
Antenna, Horn, 40 GHz	ETS	3116C	00166155	2022-08-04
Preamplifier	ETS	3116C-PA	00168841	2022-08-04
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	2022-08-02
Preamplifier, 1000 MHz	Sonoma	310N	351741	2022-08-02
Preamplifier, 1000 MHz	Sonoma	310N	370599	2022-08-02
Preamplifier, 18 GHz	Miteq	AFS42-00101800-25-S-42	1876511	2022-08-02
Preamplifier, 18 GHz	Miteq	AFS42-00101800-25-S-42	1896138	2022-08-02
Preamplifier, 18 GHz	Miteq	AFS42-00101800-25-S-42	2029168	2022-08-02
Spectrum Analyzer, 44 GHz	Agilent / HP	N9030A	MY54170614	2022-08-04
Spectrum Analyzer, 44 GHz	Agilent / HP	N9030A	MY54490312	2022-08-04
Average Power Sensor	Agilent / HP	U2000	MY54270007	2022-08-04
Average Power Sensor	Agilent / HP	U2000	MY54260010	2022-08-04
Bluetooth Tester	TESCOM	TC-3000C	3000C000546	2022-08-04
Power Splitter	MINI-CIRCUITS	WA1534	UL001	2022-01-27
Power Splitter	MINI-CIRCUITS	WA1534	UL002	2022-01-27
Attenuator	PASTERNAK	PE7087-10	A009	2022-08-03
Attenuator	PASTERNAK	PE7087-10	A001	2022-08-03
Attenuator	PASTERNAK	PE7087-10	A008	2022-08-03
Attenuator	PASTERNAK	PE7004-10	2	2022-08-02
EMI Test Receive, 40 GHz	R&S	ESU40	100439	2022-08-02
EMI Test Receive, 40 GHz	R&S	ESU40	100457	2022-08-02
Low Pass Filter 5GHz	Micro-Tronics	LPS17541	009	2022-08-02
Low Pass Filter 5GHz	Micro-Tronics	LPS17541	015	2022-08-02
Low Pass Filter 5GHz	Micro-Tronics	LPS17541	019	2022-08-02
High Pass Filter 3GHz	Micro-Tronics	HPM17543	010	2022-08-02
High Pass Filter 3GHz	Micro-Tronics	HPM17543	015	2022-08-02
High Pass Filter 3GHz	Micro-Tronics	HPM17543	020	2022-08-02
High Pass Filter 6GHz	Micro-Tronics	HPS17542	009	2022-08-02
High Pass Filter 6GHz	Micro-Tronics	HPS17542	016	2022-08-02
High Pass Filter 6GHz	Micro-Tronics	HPS17542	020	2022-08-02
LISN	R&S	ENV-216	101837	2022-08-05
Termination	WEINSCHEL	M1406A	T09	2022-08-03
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	Test Description	Test Limit	Test Condition	Test Result
2.1051, 15.247(d)	Band Edge / Conducted Spurious Emission	-20 dBc	Conducted	PASS
15.247 (b)(1)	TX conducted output power	< 21 dBm		PASS
15.247 (a)(1)	Hopping frequency separation	> two-thirds of the 20 dB bandwidth		PASS
15.247 (a)(1)(iii)	Number of Hopping channels	More than 15 non-overlapping channels		PASS
15.247 (a)(1)(iii)	Avg Time of Occupancy	< 8 dBm		PASS
15.207(a)	AC Power Line conducted emissions	Section 11	Power Line conducted	PASS
15.205, 15.209	Radiated Spurious Emission	< 54dBuV/m(Av)	Radiated	PASS

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

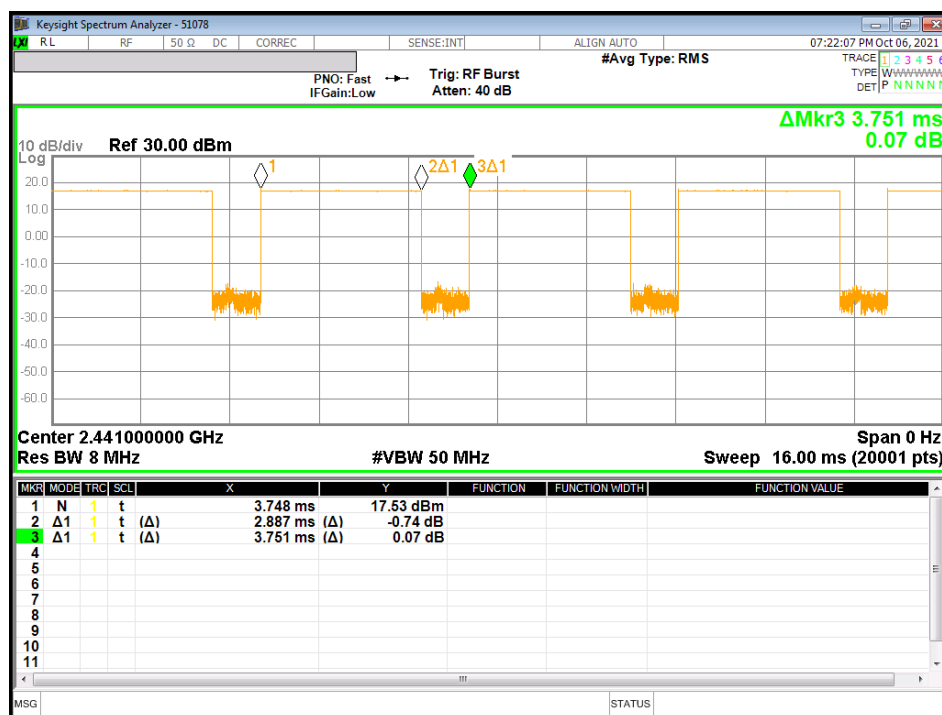
None; for reporting purposes only.

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 [%]	Duty Cycle Correction Factor[dB]	1/T Minimum VBW [kHz]
2 400 ~ 2 483.5 MHz Band					
Bluetooth	2.887	3.751	76.97	1.14	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 RBW is set to $\geq 1\%$ of the 20 dB bandwidth. The VBW is set to $\geq$ RBW. The sweep time is coupled.

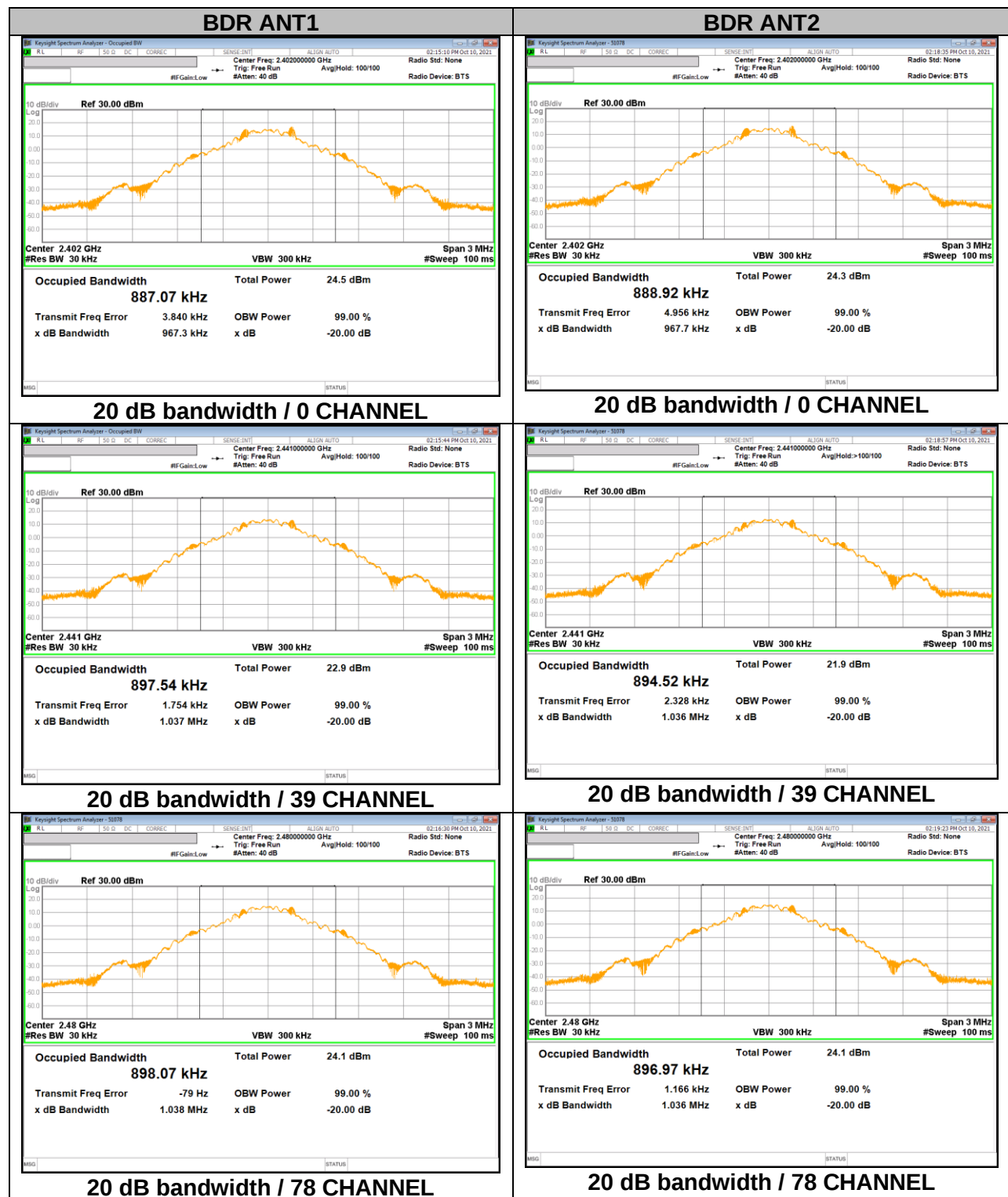
RESULTS

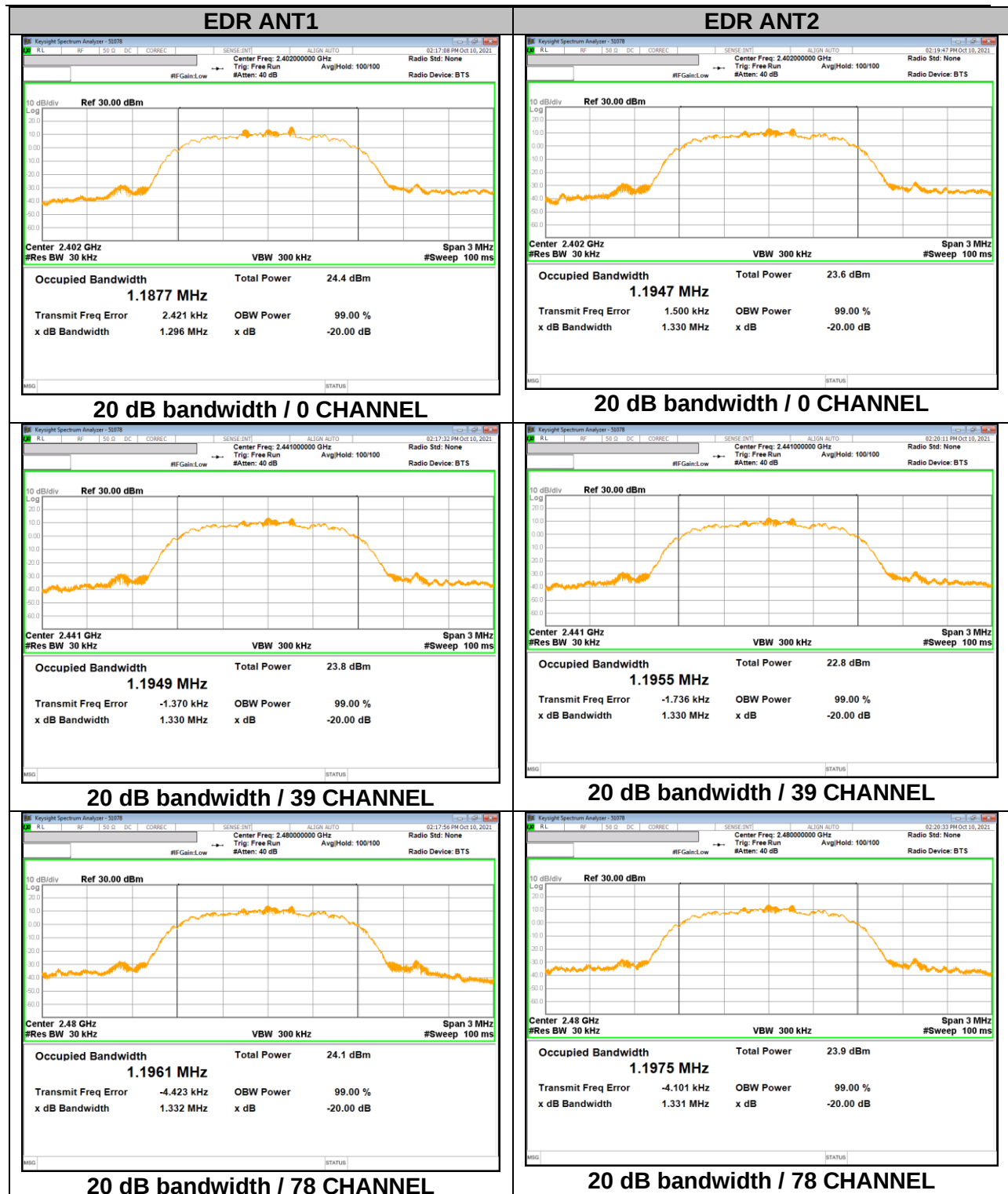
9.2.1. BLUETOOTH BASIC DATA RATE GFSK MODULATION

Ant.	Channel	Frequency [MHz]	20 dB Bandwidth [kHz]
ANT1	0	2 402	967.3
	39	2 441	1037.0
	78	2 480	1038.0
ANT2	0	2 402	967.7
	39	2 441	1036.0
	78	2 480	1036.0
Worst			1038.0

9.2.2. BLUETOOTH ENHANCED DATA RATE 8PSK MODULATION

Ant.	Channel	Frequency [MHz]	20 dB Bandwidth [kHz]
ANT1	0	2 402	1296.0
	39	2 441	1330.0
	78	2 480	1332.0
ANT2	0	2 402	1330.0
	39	2 441	1330.0
	78	2 480	1331.0
Worst			1332.0





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.

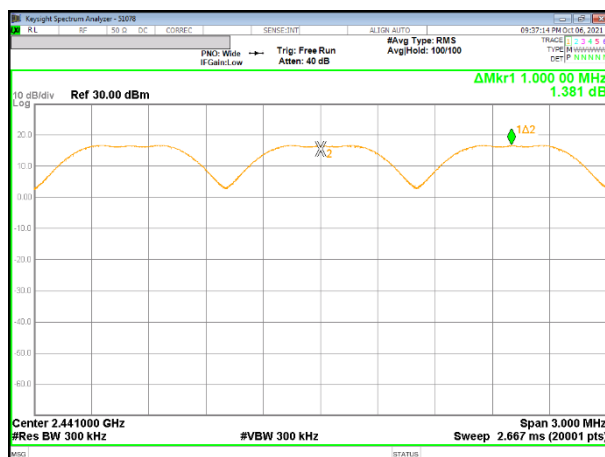
Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than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

TEST PROCEDURE

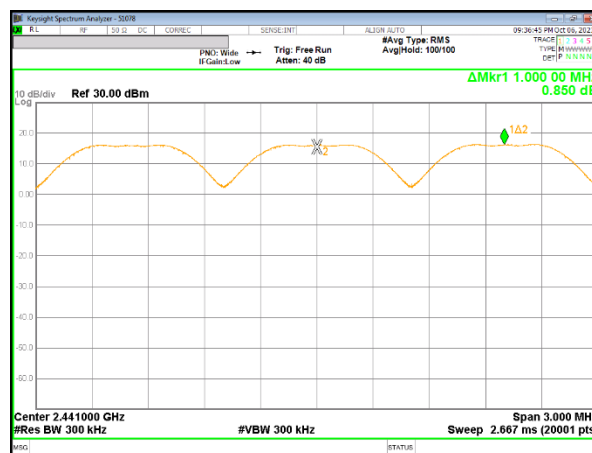
The transmitter output is connected to a spectrum analyzer. The RBW is set to 300 kHz and the VBW is set to VBW $\geq$ RBW. The sweep time is coupled.

RESULTS

9.3.1. BLUETOOTH BASIC DATA RATE GFSK MODULATION

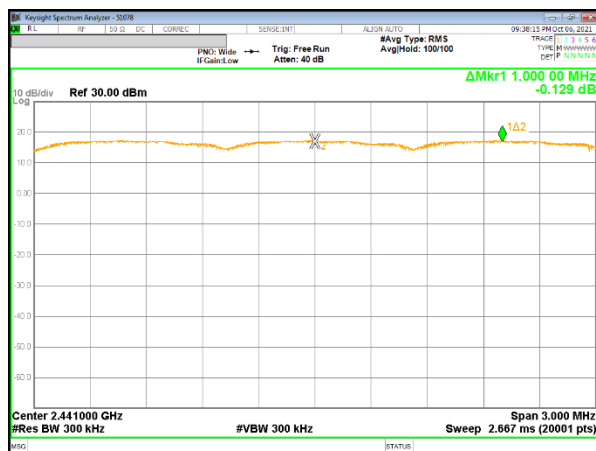


ANT1 SEPARATION

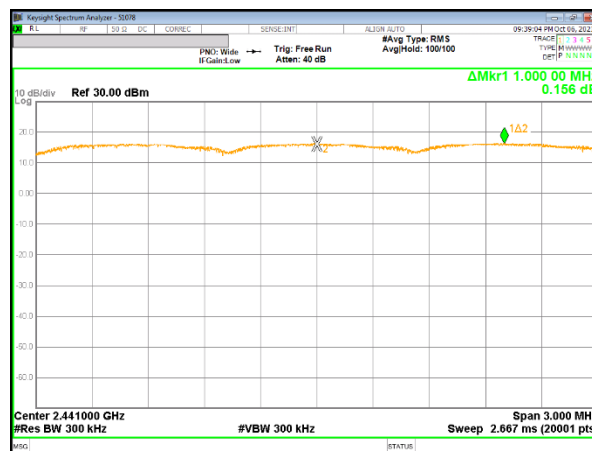


ANT2 SEPARATION

9.3.2. BLUETOOTH ENHANCED DATA RATE 8PSK MODULATION



ANT1 SEPARATION



ANT2 SEPARATION

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

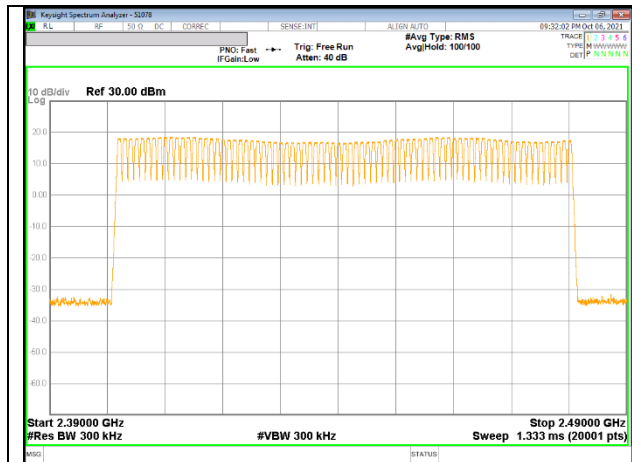
The transmitter output is connected to a spectrum analyzer. The span is set to cover the entire authorized band, in either a single sweep or in multiple contiguous sweeps. The RBW is set to a maximum of 1 % of the span. The analyzer is set to Max Hold.

RESULTS

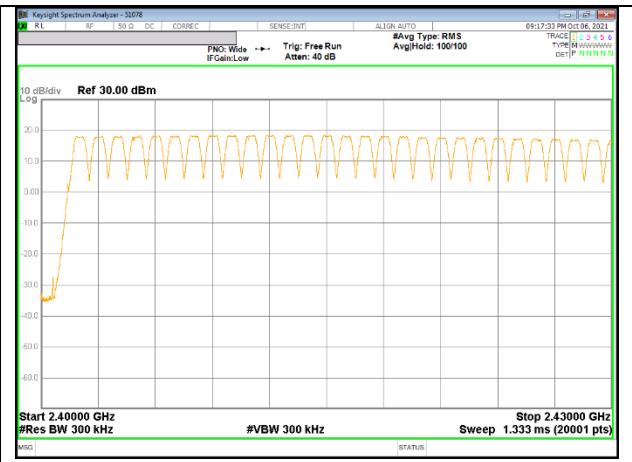
Normal Mode: All Channels Observed

9.4.1. BLUETOOTH BASIC DATA RATE GFSK MODULATION

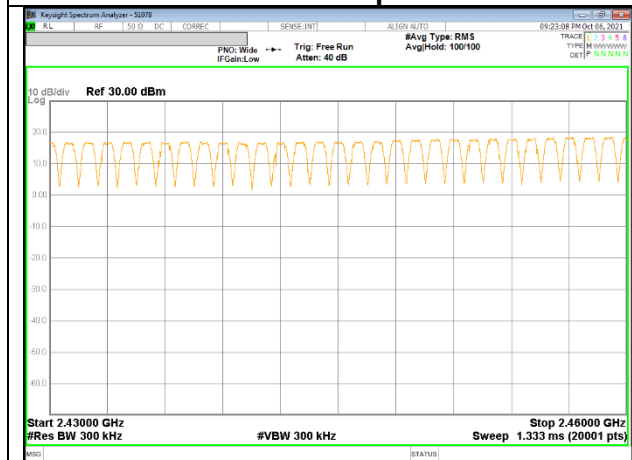
- ANT1



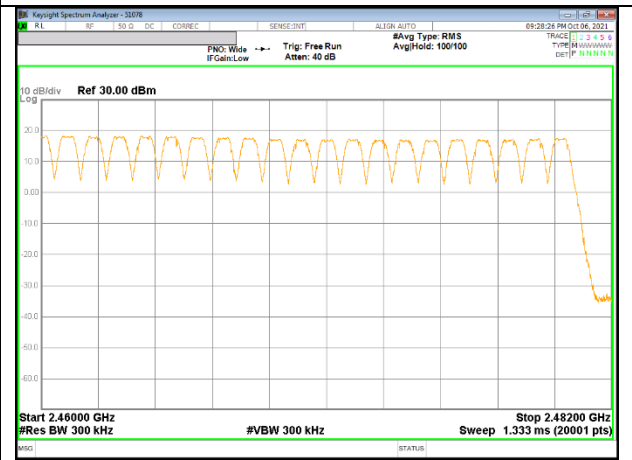
100 MHz Span



30MHz SPAN, SEGMENT 1 OF 3

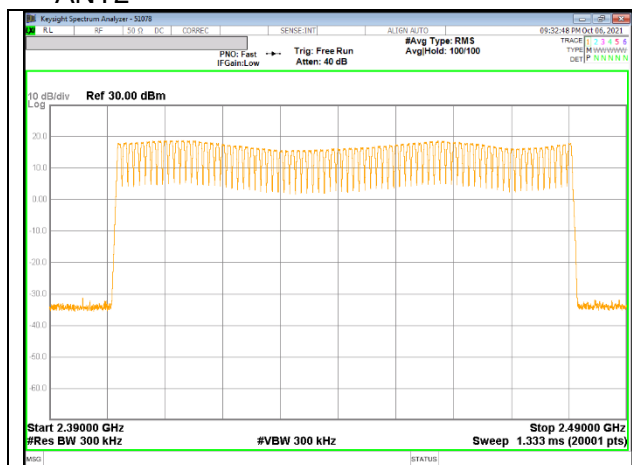


30MHz SPAN, SEGMENT 2 OF 3

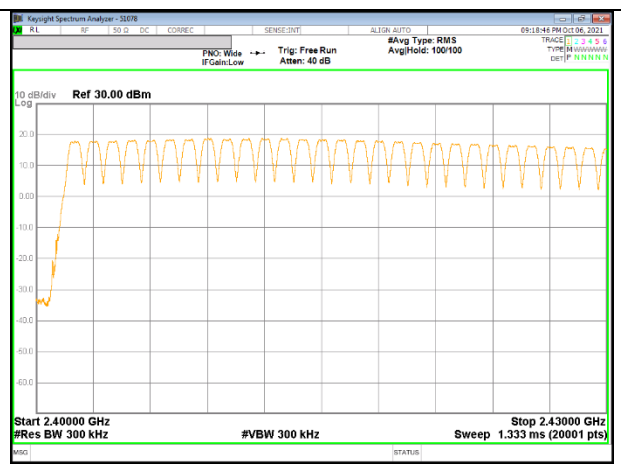


30MHz SPAN, SEGMENT 3 OF 3

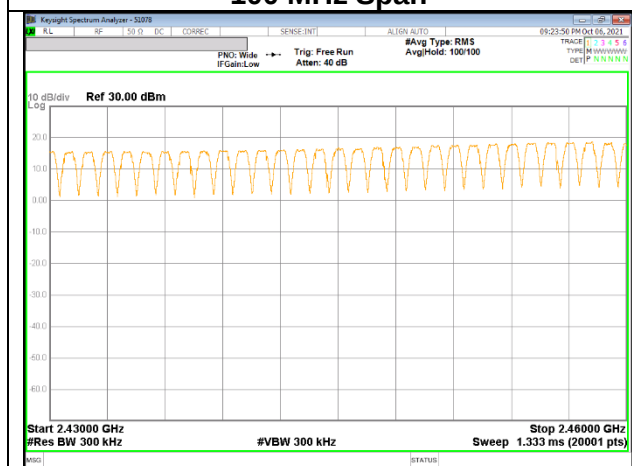
- ANT2



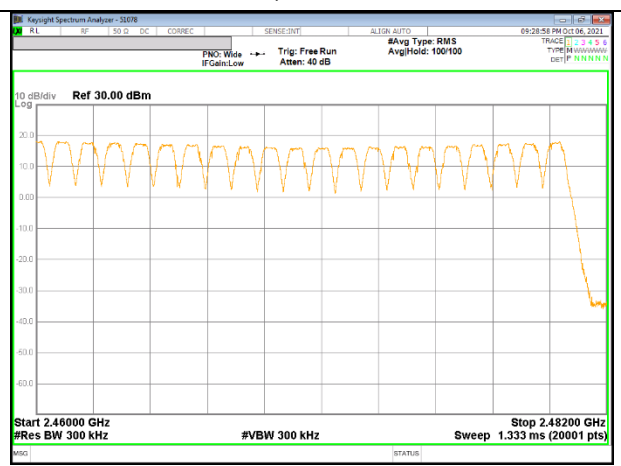
100 MHz Span



30MHz SPAN, SEGMENT 1 OF 3



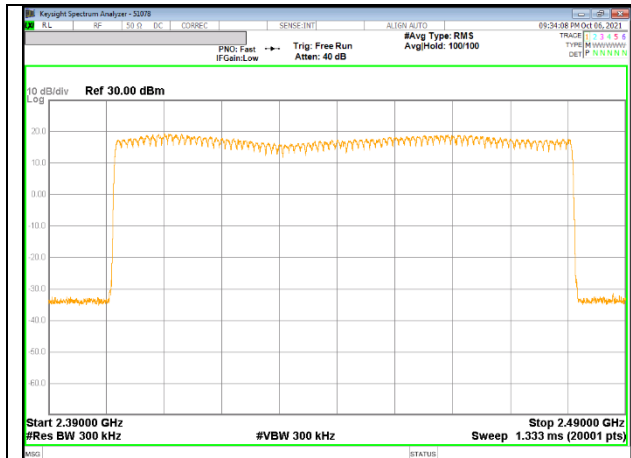
30MHz SPAN, SEGMENT 2 OF 3



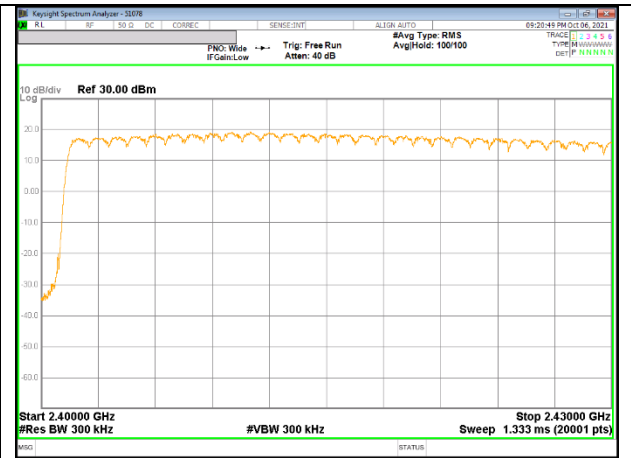
30MHz SPAN, SEGMENT 3 OF 3

9.4.2. BLUETOOTH ENHANCED DATA RATE 8PSK MODULATION

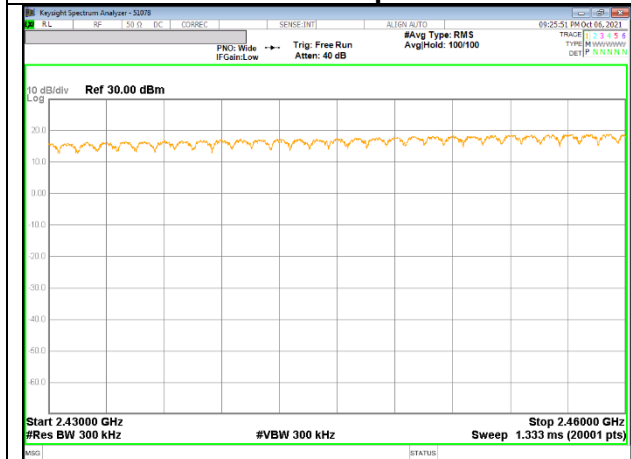
- ANT1



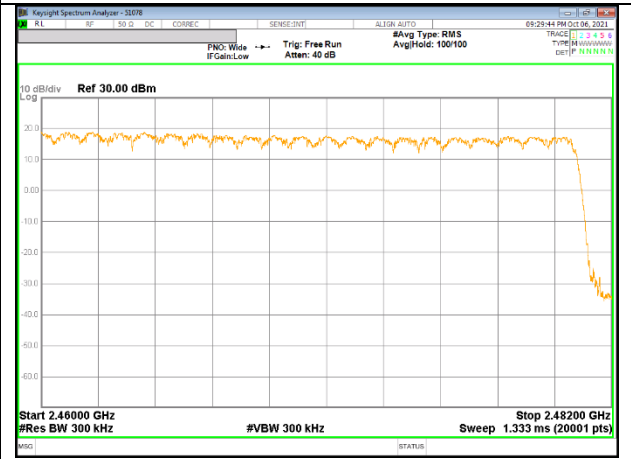
100 MHz Span



30MHz SPAN, SEGMENT 1 OF 3



30MHz SPAN, SEGMENT 2 OF 3



30MHz SPAN, SEGMENT 3 OF 3

Keyight Spectrum Analyzer - 5070

RL 8P 1.53 GHz CORREC SENSE INT ALIGN A/TO 09:38:47 PM Oct 06, 2021

PN0: Fast Trig: Free Run #Avg Type: RMS
IF Gain Low Atten: 40 dB Avg Hold: 100/100

TRACE TYPE: SSB (NOV) DET: P N N N N N N N

10 dB/div Ref 30.00 dBm

Log

Start 2.39000 GHz Stop 2.49000 GHz
#Res BW 300 kHz #VBW 300 kHz Sweep 1.333 ms (20001 pts)

MISO STATUS

Keysight Spectrum Analyzer - SD16

RL IF SFG DC CORREC SENSE INVT ALIGN AUTO

#Avg Type: RMS
AvgMode: 100/100

TRIG: Free Run
Atten: 40 dB

69-22-03 PM Oct 06, 2021

TRACE 1 2 3 4
TYPE: A W W W W W W W
DET: P N N N N N N

10 dBdiv
1.0g

Ref 30.00 dBm

Start 2.40000 GHz
#Res BW 300 kHz

#VBW 300 kHz

Stop 2.43000 GHz
Sweep 1.333 ms (2000/1 pts)

STOP

Keyight Spectrum Analyzer - 5070

RL 80° 1.53 Ω DC CORREC SENSE INT ALIGN AUTO 09:27:26 PM Oct 05, 2021

PNG: Wide Trig: Free Run AvgType: RMS
IFGain: Low Atten: 40 dB AvgHold: 100/100

TRACE 1 2 3 4 5 6
TYPE IN NOISEVIEW
DET P N N N N N N

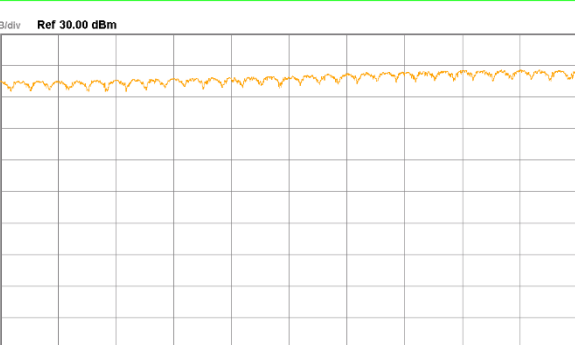
10 dB/div
0.5g

Ref 30.00 dBm

Start 2.43000 GHz
#Res BW 300 kHz

#VBW 300 kHz

Stop 2.46000 GHz
Sweep 1.333 ms (20001 pts)



Keysight Spectrum Analyzer - 5219a

RL RF S&G DC CORREC SENSE:INT ALIGN:ALTO 09-30-56 PM Oct 06, 2021

PNO: Wide Trig: Free Run #Avg Type: RMS
IFGain: Low Atten: 40 dB AvgHold: 100/100

TRACE 1 2 3 4 5 6
TIME 1.000000000
DET P N N N N N N

10 dBm
Log Ref 30.00 dBm

0.00
-10.00
-20.00
-30.00
-40.00
-50.00
-60.00

Start 2.46000 GHz #VBW 300 kHz Stop 2.48200 GHz
#Res BW 300 kHz Sweep 1.333 ms (20001 pts)

MODE STATUS

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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.

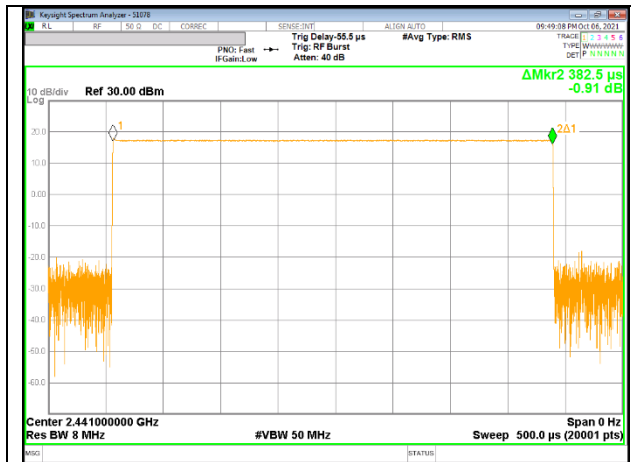
The average time of occupancy in the specified 3.16 second period (79 channels * 0.4 s) is equal to $10 * (\# \text{ of pulses in } 3.16 \text{ s}) * \text{pulse width}$.

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

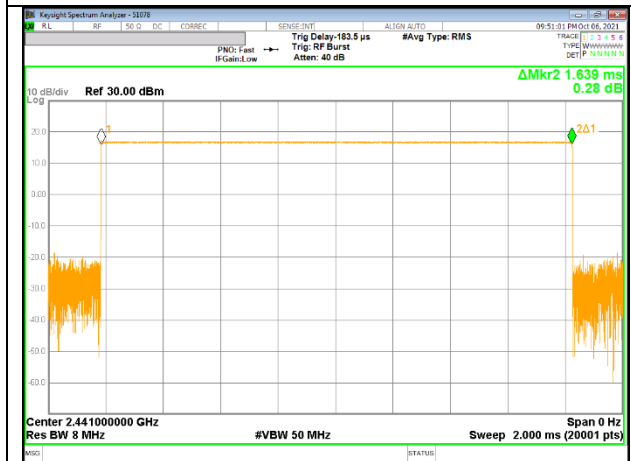
DH Packet	Pulse Width [msec]	Number of Pulses in 3.16 seconds	Average Time of Occupancy [sec]	Limit [sec]	Margin [sec]
GFSK ANT1 Normal					
DH1	0.383	32	0.122	0.4	-0.278
DH3	1.639	15	0.246	0.4	-0.154
DH5	2.886	12	0.346	0.4	-0.054
DH Packet	Pulse Width [msec]	Number of Pulses in 0.8 seconds	Average Time of Occupancy [sec]	Limit [sec]	Margin [sec]
GFSK ANT1 AFH					
DH1	0.383	8	0.031	0.4	-0.369
DH3	1.639	3.75	0.061	0.4	-0.339
DH5	2.886	3	0.087	0.4	-0.313



PULSE WIDTH – DH1



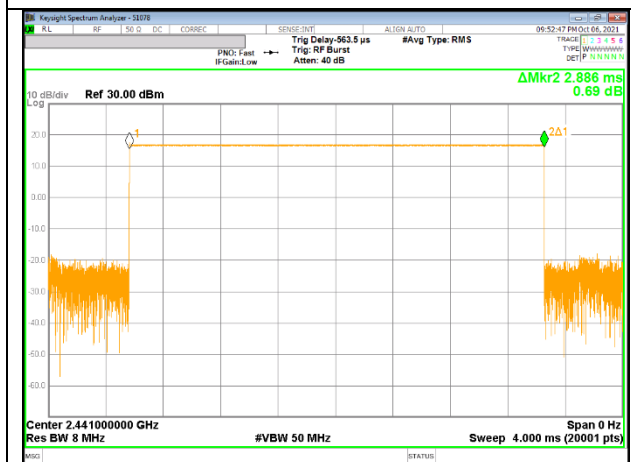
NUMBER OF PULSES IN 3.16 SECOND
OBSERVATION PERIOD – DH1



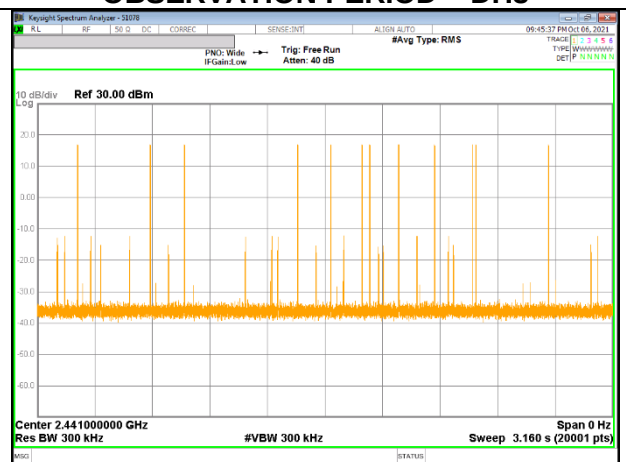
PULSE WIDTH – DH3



NUMBER OF PULSES IN 3.16 SECOND
OBSERVATION PERIOD – DH3

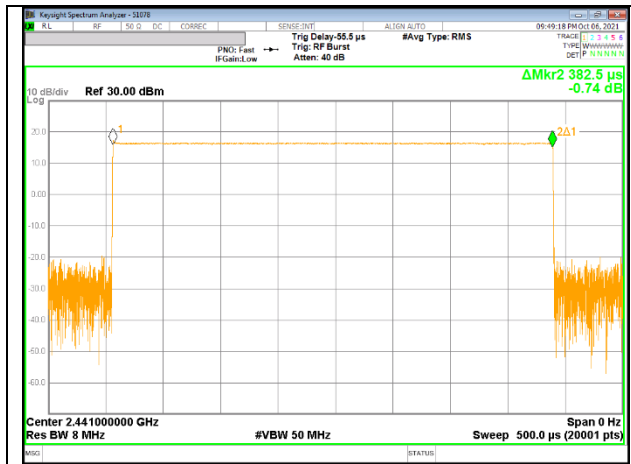


PULSE WIDTH – DH5

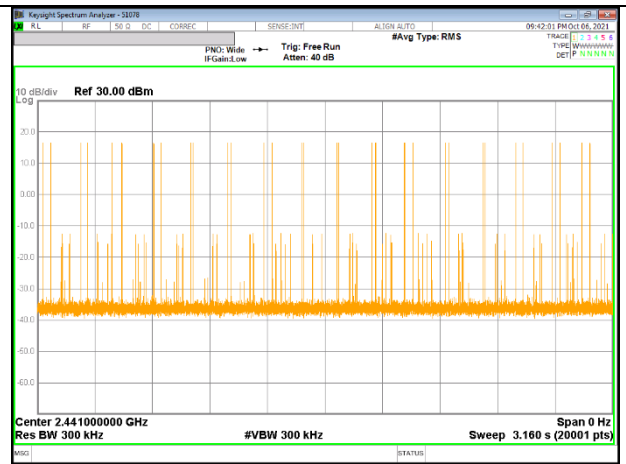


NUMBER OF PULSES IN 3.16 SECOND
OBSERVATION PERIOD – DH5

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	0.383	32	0.122	0.4	-0.278
DH3	1.639	15	0.246	0.4	-0.154
DH5	2.886	11	0.317	0.4	-0.083
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	0.383	8	0.031	0.4	-0.369
DH3	1.639	3.75	0.061	0.4	-0.339
DH5	2.886	2.75	0.079	0.4	-0.321



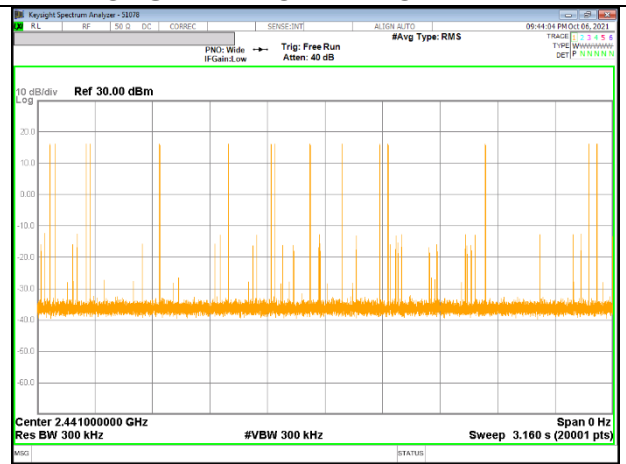
PULSE WIDTH – DH1



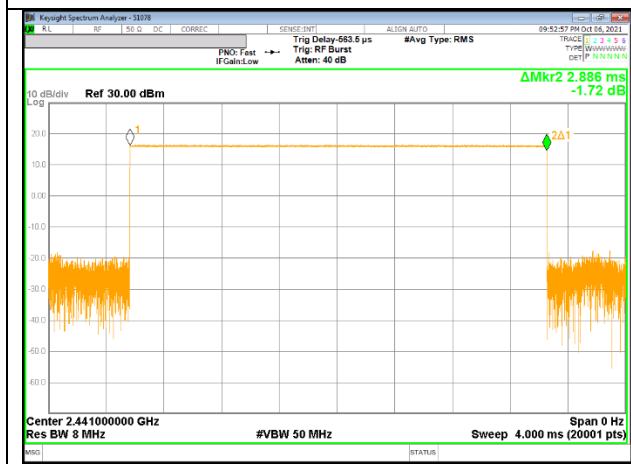
NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – DH1



PULSE WIDTH – DH3



NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – DH3



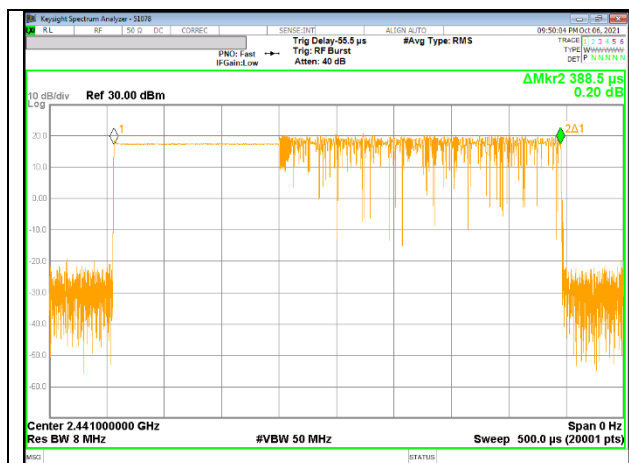
PULSE WIDTH – DH5



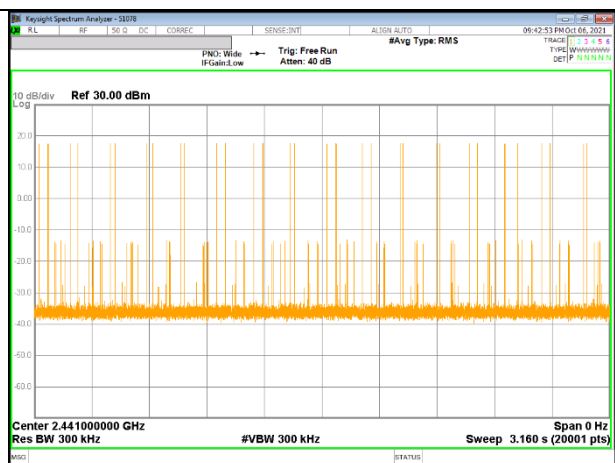
NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – DH5

9.5.2. BLUETOOTH ENHANCED DATA RATE 8PSK MODULATION

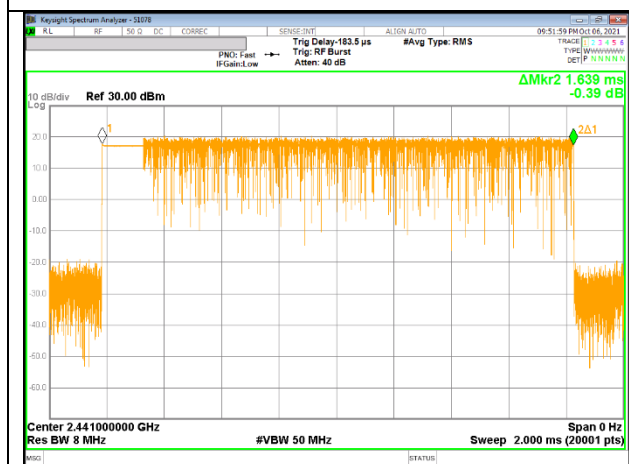
DH Packet	Pulse Width [msec]	Number of Pulses in 3.16 seconds	Average Time of Occupancy [sec]	Limit [sec]	Margin [sec]
8PSK ANT1 Normal					
DH1	0.389	32	0.124	0.4	-0.276
DH3	1.639	14	0.229	0.4	-0.171
DH5	2.89	11	0.318	0.4	-0.082
DH Packet	Pulse Width [msec]	Number of Pulses in 0.8 seconds	Average Time of Occupancy [sec]	Limit [sec]	Margin [sec]
8PSK ANT1 AFH					
DH1	0.389	8	0.031	0.4	-0.369
DH3	1.639	3.5	0.057	0.4	-0.343
DH5	2.890	2.75	0.079	0.4	-0.321



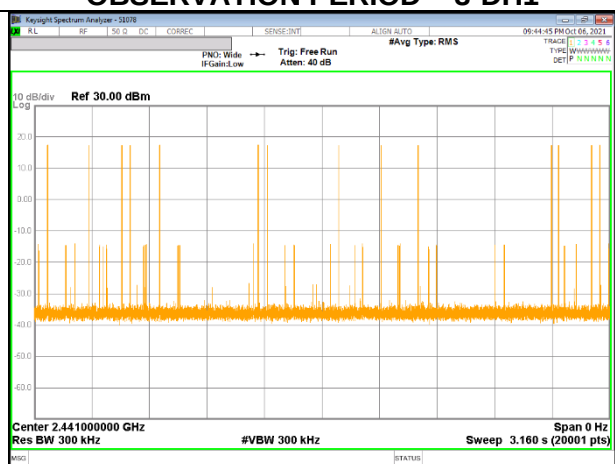
PULSE WIDTH – 3-DH1



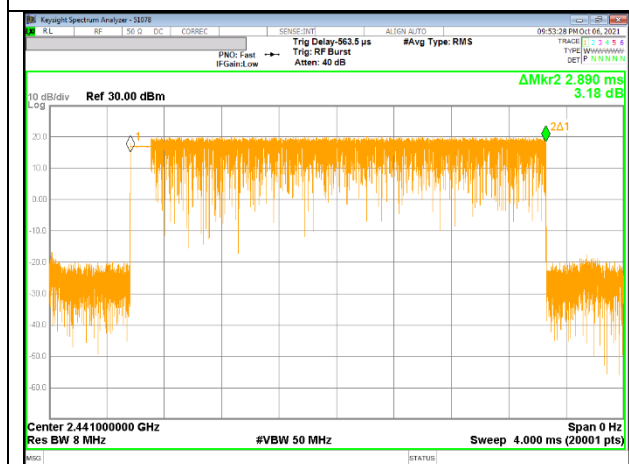
NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – 3-DH1



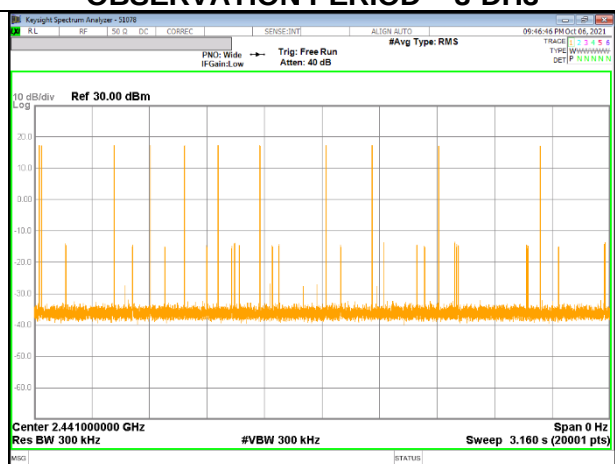
PULSE WIDTH – 3-DH3



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



PULSE WIDTH – 3-DH5

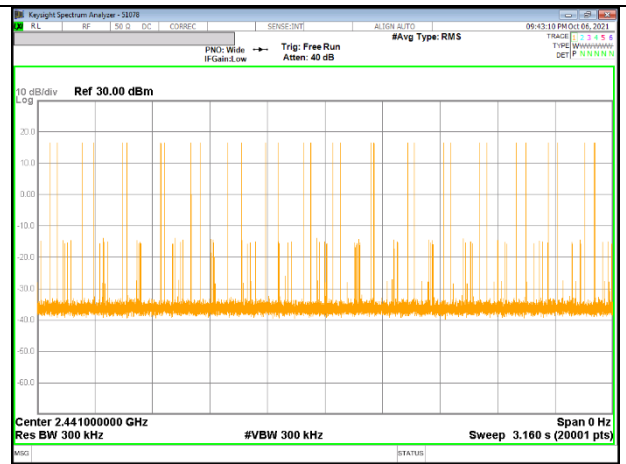


NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – 3-DH5

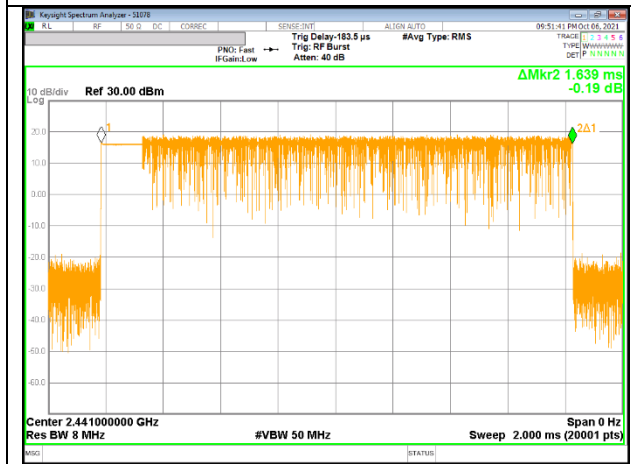
DH Packet	Pulse Width [msec]	Number of Pulses in 3.16 seconds	Average Time of Occupancy [sec]	Limit [sec]	Margin [sec]
8PSK ANT2 Normal					
DH1	0.389	32	0.124	0.4	-0.276
DH3	1.639	15	0.246	0.4	-0.154
DH5	2.890	13	0.376	0.4	-0.024
DH Packet	Pulse Width [msec]	Number of Pulses in 0.8 seconds	Average Time of Occupancy [sec]	Limit [sec]	Margin [sec]
8PSK ANT2 AFH					
DH1	0.389	8	0.031	0.4	-0.369
DH3	1.639	3.75	0.061	0.4	-0.339
DH5	2.890	3.25	0.094	0.4	-0.306



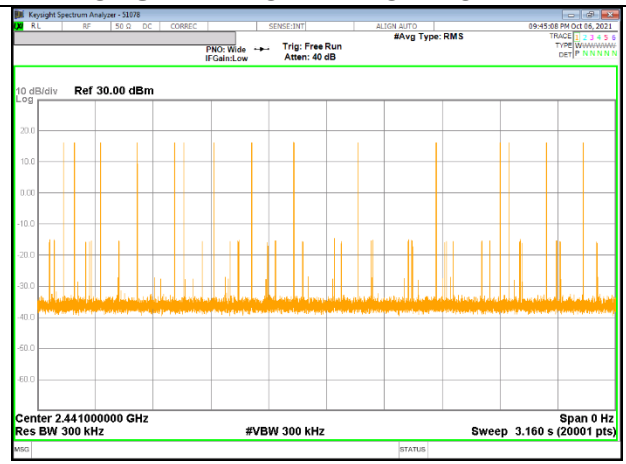
PULSE WIDTH – 3-DH1



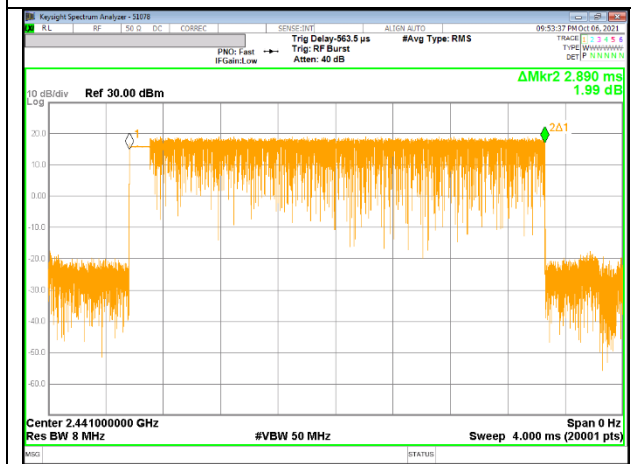
NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD – 3-DH1



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	PA.	Channel	Frequency [MHz]	Peak Output Power [dBm]	Limit [dBm]	Margin [dB]
ANT1	ePA	0	2 402	18.539	21.000	-2.461
		39	2 441	18.513		-2.487
		78	2 480	18.649		-2.351
ANT2		0	2 402	18.190		-2.810
		39	2 441	17.990		-3.010
		78	2 480	18.628		-2.372
DUAL- BT	iPA	0	2 402	15.450		-5.550
		39	2 441	15.150		-5.850
		78	2 480	15.040		-5.960
Worst				18.649		-2.351

9.6.2. ENHANCED DATA RATE Pi/4-DPSK MODULATION

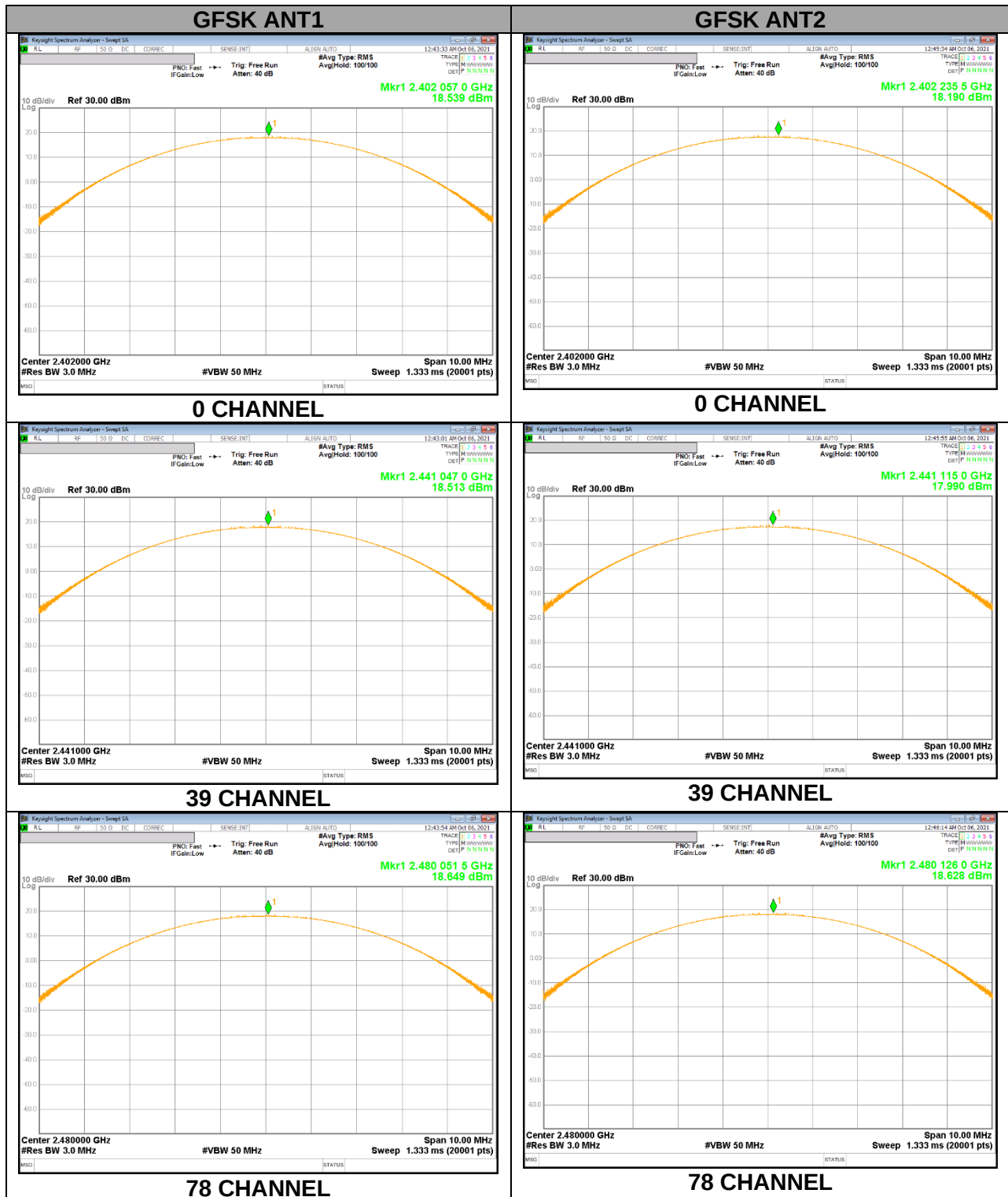
Antenna	PA.	Channel	Frequency [MHz]	Peak Output Power [dBm]	Limit [dBm]	Margin [dB]
ANT1	ePA	0	2 402	19.696	21.000	-1.304
		39	2 441	19.217		-1.783
		78	2 480	19.821		-1.179
ANT2		0	2 402	18.580		-2.420
		39	2 441	18.127		-2.873
		78	2 480	19.047		-1.953
DUAL- BT	iPA	0	2 402	14.160		-6.840
		39	2 441	14.070		-6.930
		78	2 480	14.010		-6.990
Worst				19.821		-1.179

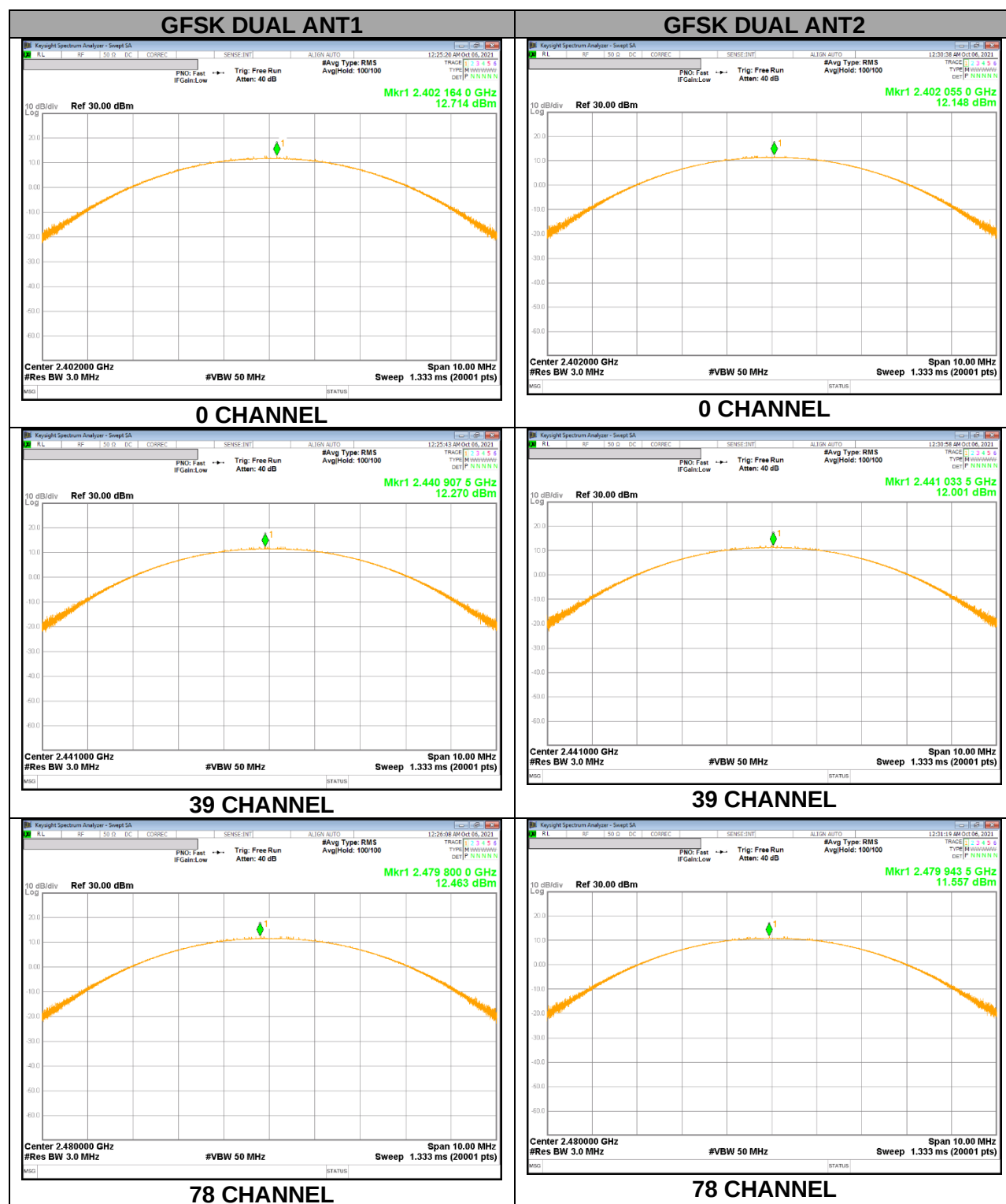
9.6.3. ENHANCED DATA RATE 8PSK MODULATION

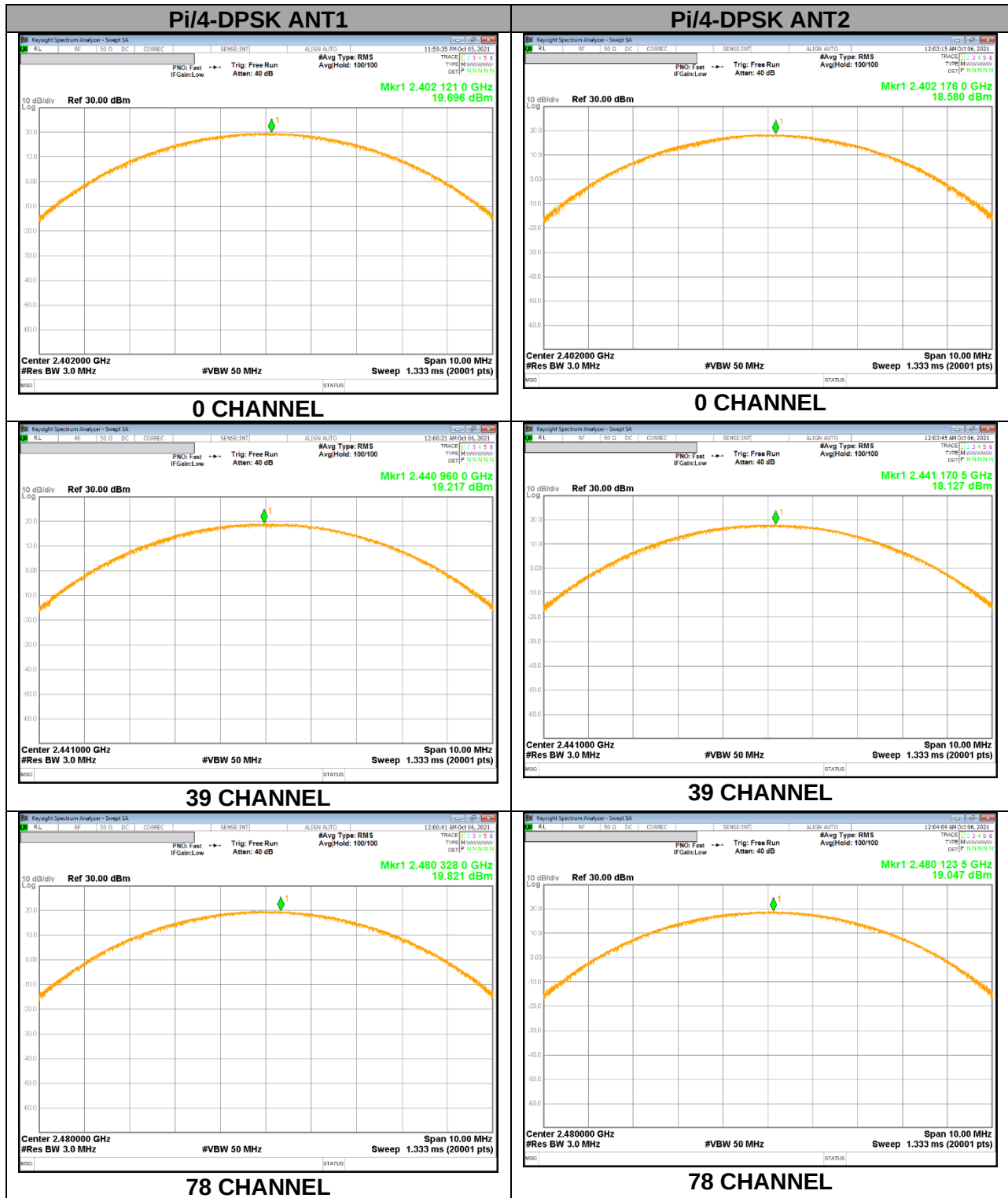
Antenna	PA.	Channel	Frequency [MHz]	Peak Output Power [dBm]	Limit [dBm]	Margin [dB]
ANT1	ePA	0	2 402	20.293	21.000	-0.707
		39	2 441	19.623		-1.377
		78	2 480	20.334		-0.666
ANT2		0	2 402	19.211		-1.789
		39	2 441	18.594		-2.406
		78	2 480	19.479		-1.521
DUAL- BT	iPA	0	2 402	14.390		-6.610
		39	2 441	14.280		-6.720
		78	2 480	14.410		-6.590
Worst				20.334		-0.666

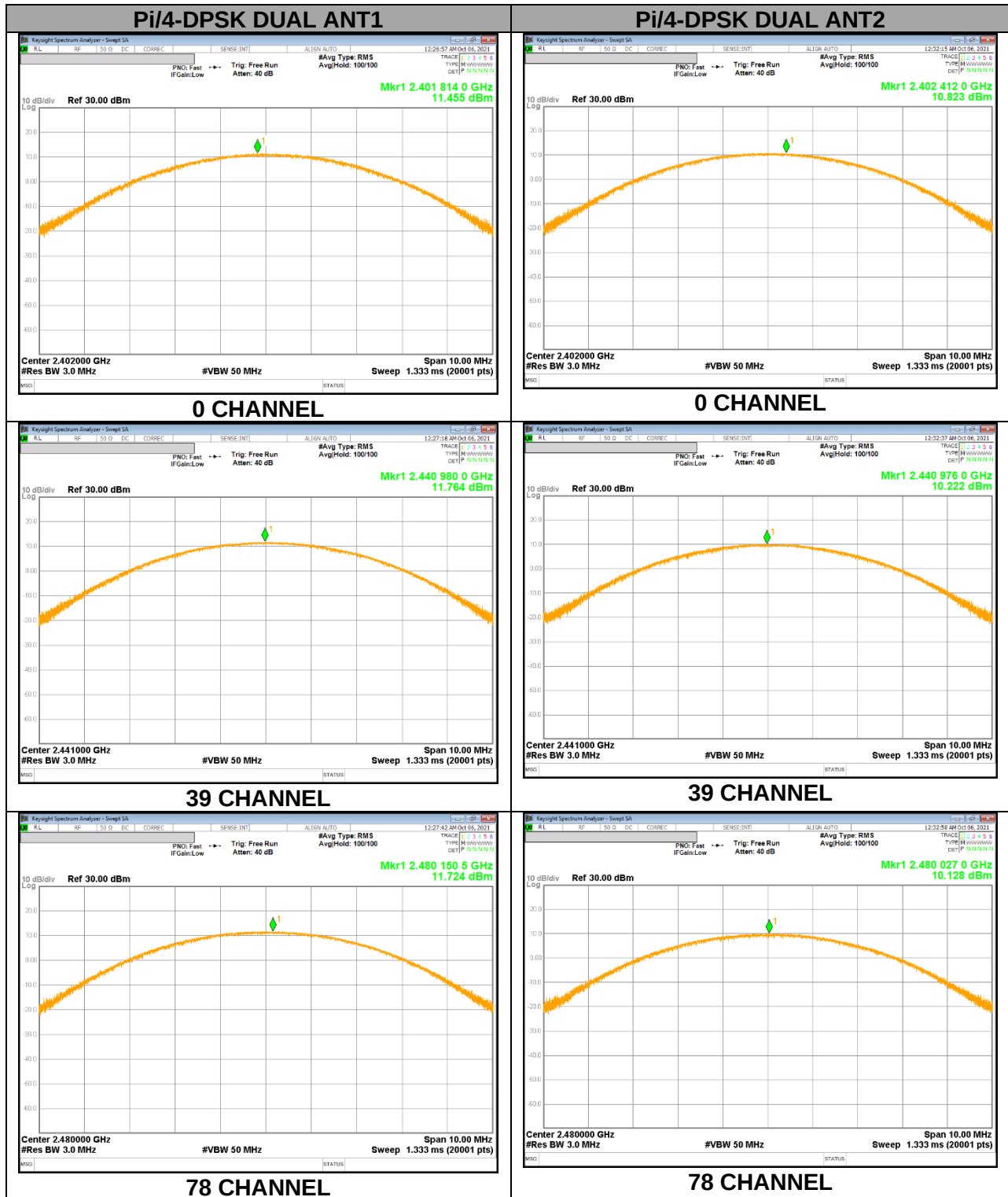
9.6.4. OUTPUT POWER PLOTS

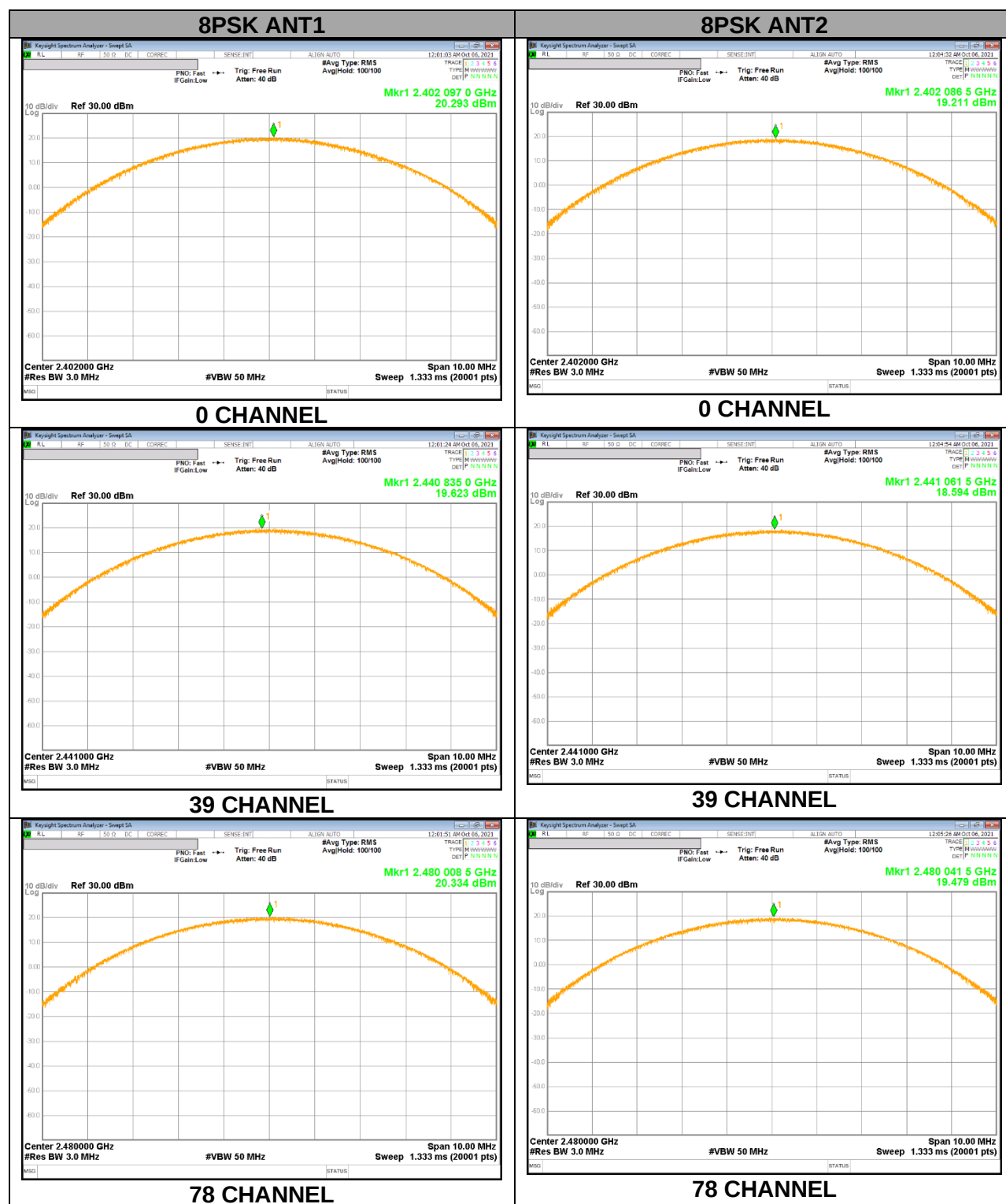
PEAK OUTPUT POWER

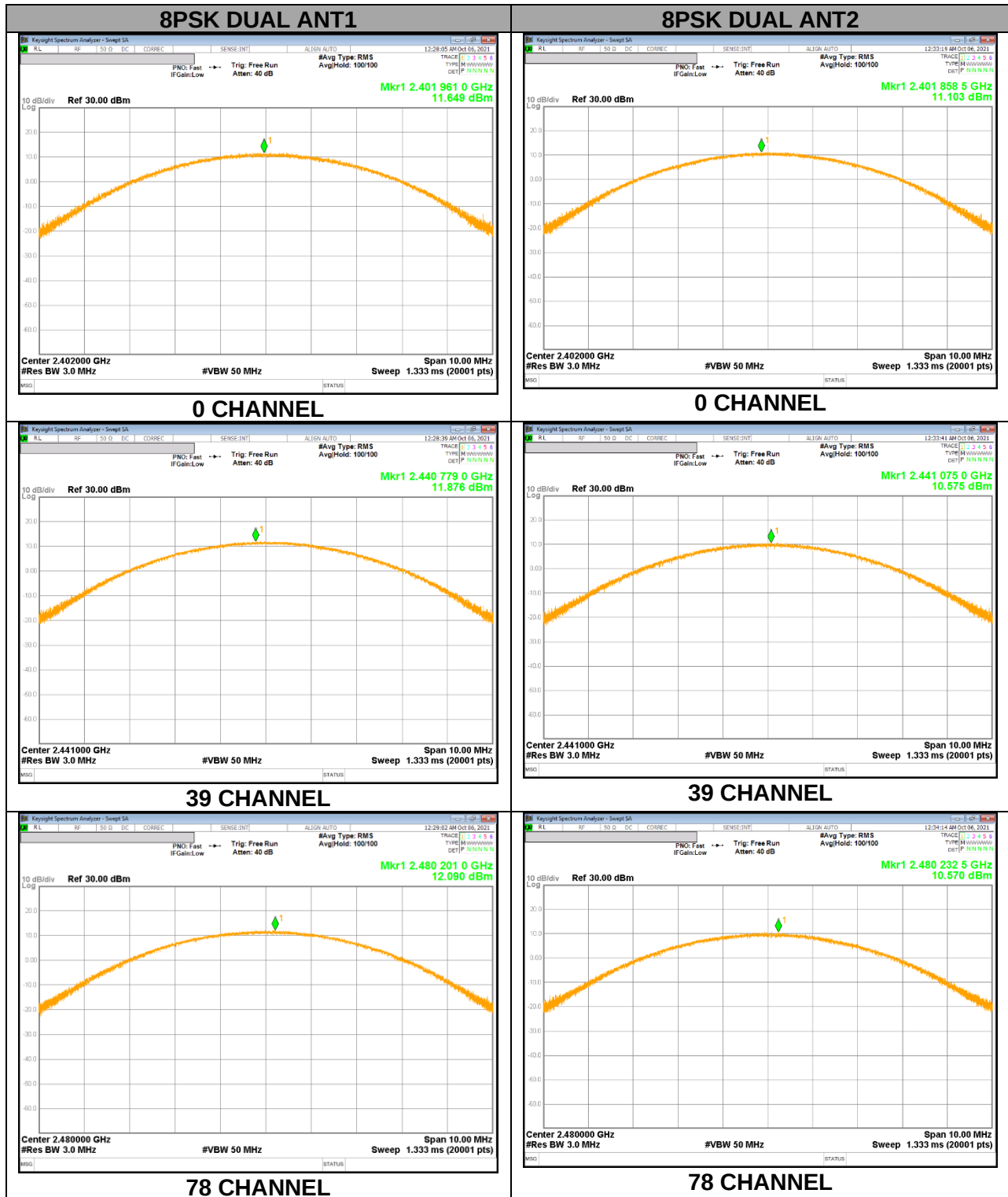












9.7. AVERAGE POWER

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	PA.	Channel	Frequency [MHz]	Average Output Power [dBm]	Average Output Power [mW]
ANT1	ePA	0	2 402	17.641	58.090
		39	2 441	17.337	54.163
		78	2 480	17.696	58.830
ANT2		0	2 402	17.261	53.223
		39	2 441	16.987	49.969
		78	2 480	17.740	59.429
DUAL- BT	iPA	0	2 402	14.160	26.062
		39	2 441	14.070	25.527
		78	2 480	13.930	24.717

9.7.2. ENHANCED DATA RATE PI/4-DQPSK MODULATION

Antenna	PA.	Channel	Frequency [MHz]	Average Output Power [dBm]	Average Output Power [mW]
ANT1	ePA	0	2 402	17.045	50.641
		39	2 441	16.528	44.957
		78	2 480	17.161	52.012
ANT2		0	2 402	15.912	39.012
		39	2 441	15.361	34.364
		78	2 480	16.393	43.581
DUAL- BT	iPA	0	2 402	11.540	14.256
		39	2 441	11.580	14.388
		78	2 480	11.540	14.256

9.7.3. ENHANCED DATA RATE 8PSK MODULATION

Antenna	PA.	Channel	Frequency [MHz]	Average Output Power [dBm]	Average Output Power [mW]
ANT1	ePA	0	2 402	17.060	50.816
		39	2 441	16.522	44.895
		78	2 480	17.178	52.216
ANT2		0	2 402	15.951	39.364
		39	2 441	15.486	35.367
		78	2 480	16.392	43.571
DUAL- BT	iPA	0	2 402	11.480	14.060
		39	2 441	11.580	14.388
		78	2 480	11.530	14.223

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.

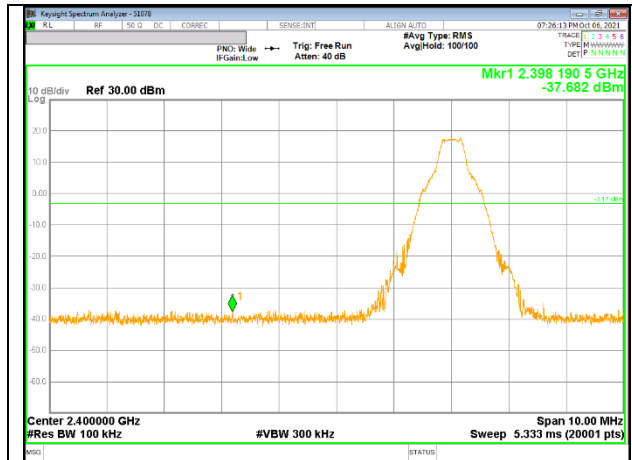
The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels.

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

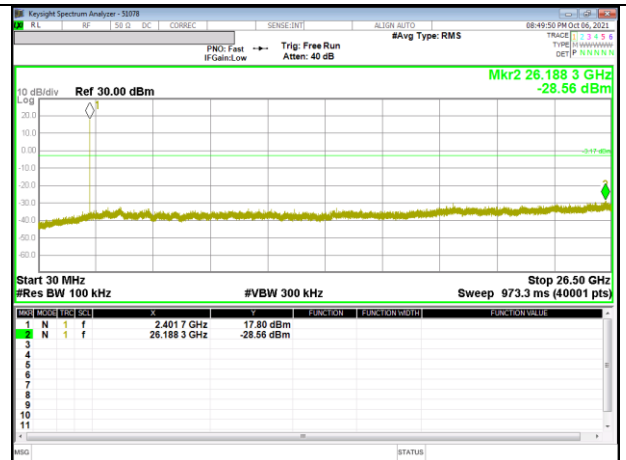
RESULTS

9.8.1. BLUETOOTH BASIC DATA RATE GFSK MODULATION

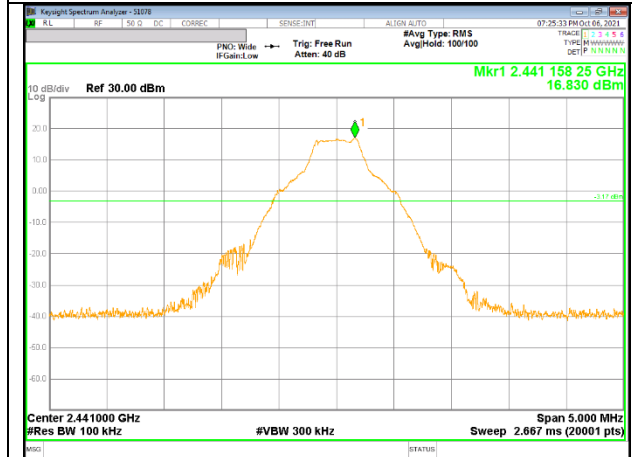
SPURIOUS EMISSIONS, NON-HOPPING - ANT1



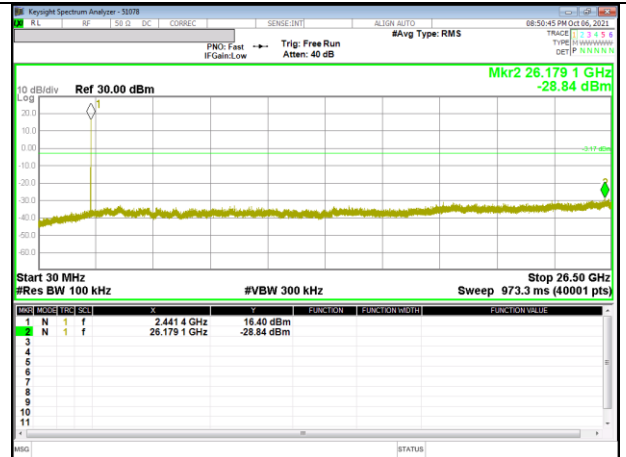
0 CHANNEL BANDEDGE



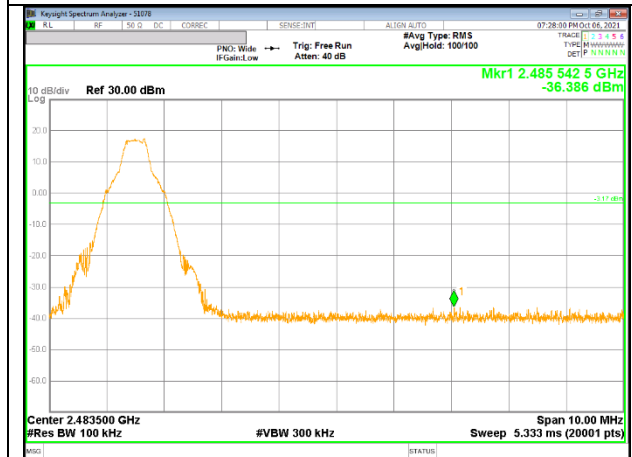
OUT-OF-BAND 0 CHANNEL



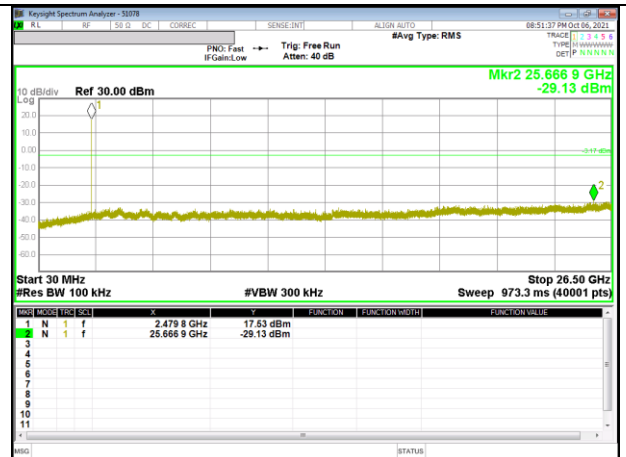
IN-BAND REFERENCE LEVEL



OUT-OF-BAND 39 CHANNEL

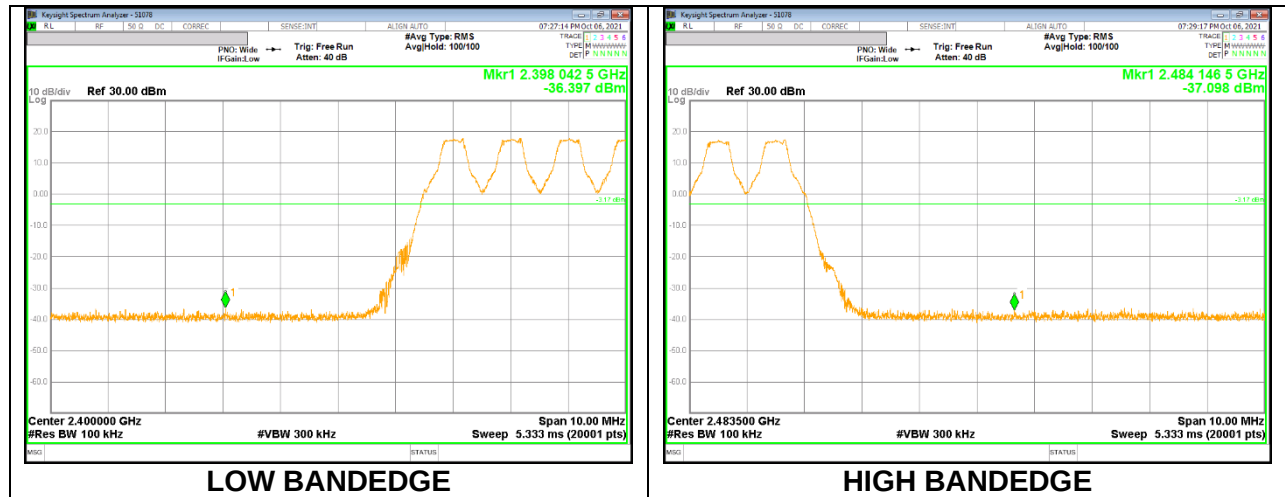


78 CHANNEL BANDEDGE

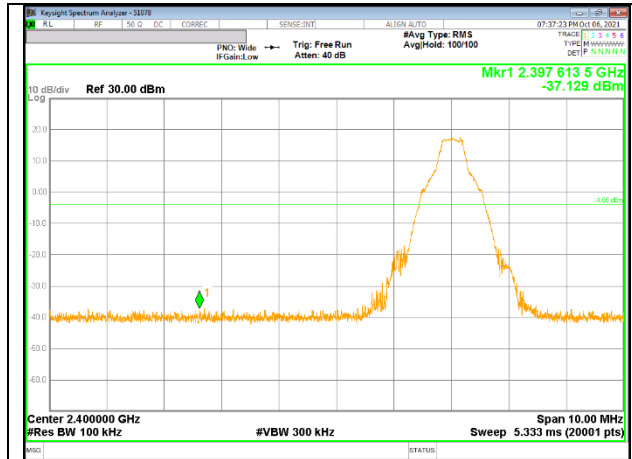


OUT-OF-BAND 78 CHANNEL

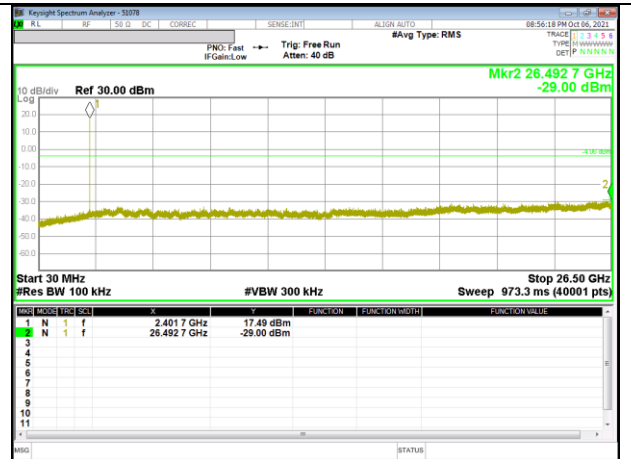
SPURIOUS BANDEDGE EMISSIONS WITH HOPPING ON



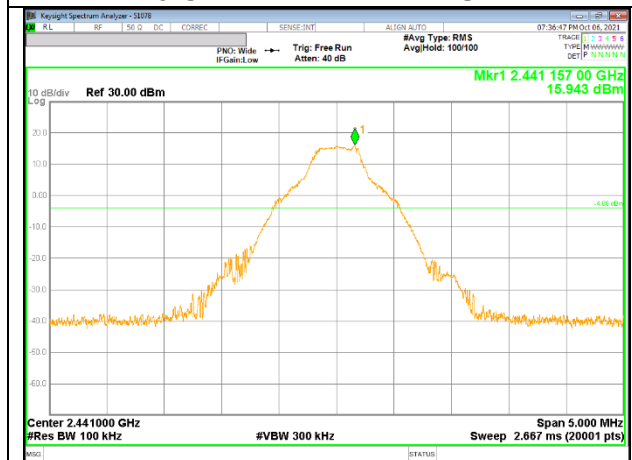
SPURIOUS EMISSIONS, NON-HOPPING - ANT2



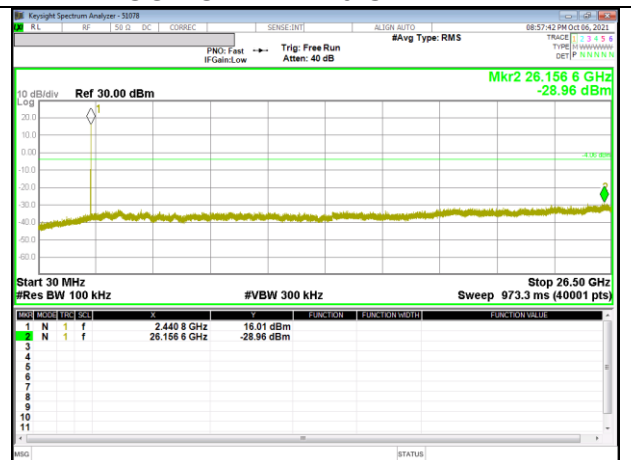
0 CHANNEL BANDEDGE



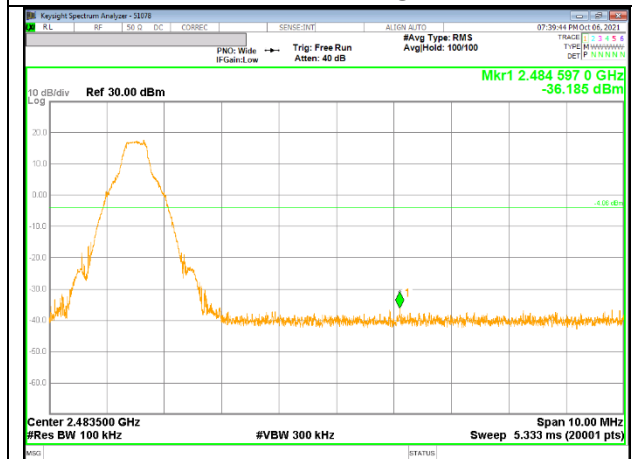
OUT-OF-BAND 0 CHANNEL



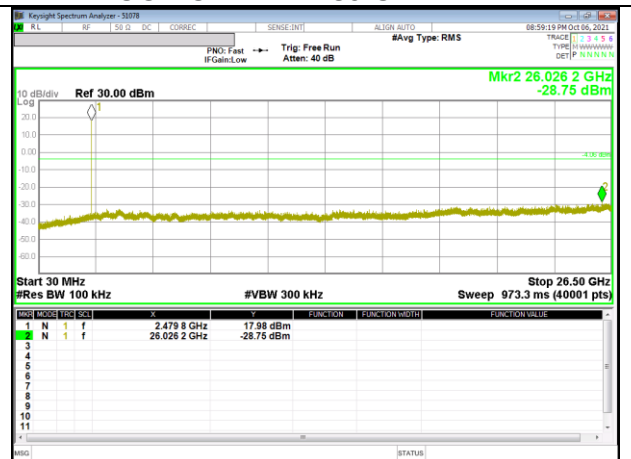
IN-BAND REFERENCE LEVEL



OUT-OF-BAND 39 CHANNEL



78 CHANNEL BANDEDGE



OUT-OF-BAND 78 CHANNEL