

Appendix A
RF Test Data for BT(BDR/EDR) (Conducted Measurement)

Product Name: TRUE WIRELESS EARBUDS

Trade Mark: N/A

Test Model: RT09

FCC ID: 2ATOY-RT09

Environmental Conditions

Temperature:	22.7° C
Relative Humidity:	50%
ATM Pressure:	100.0 kPa
Test Engineer:	Gary Qian
Supervised by:	Eden Hu

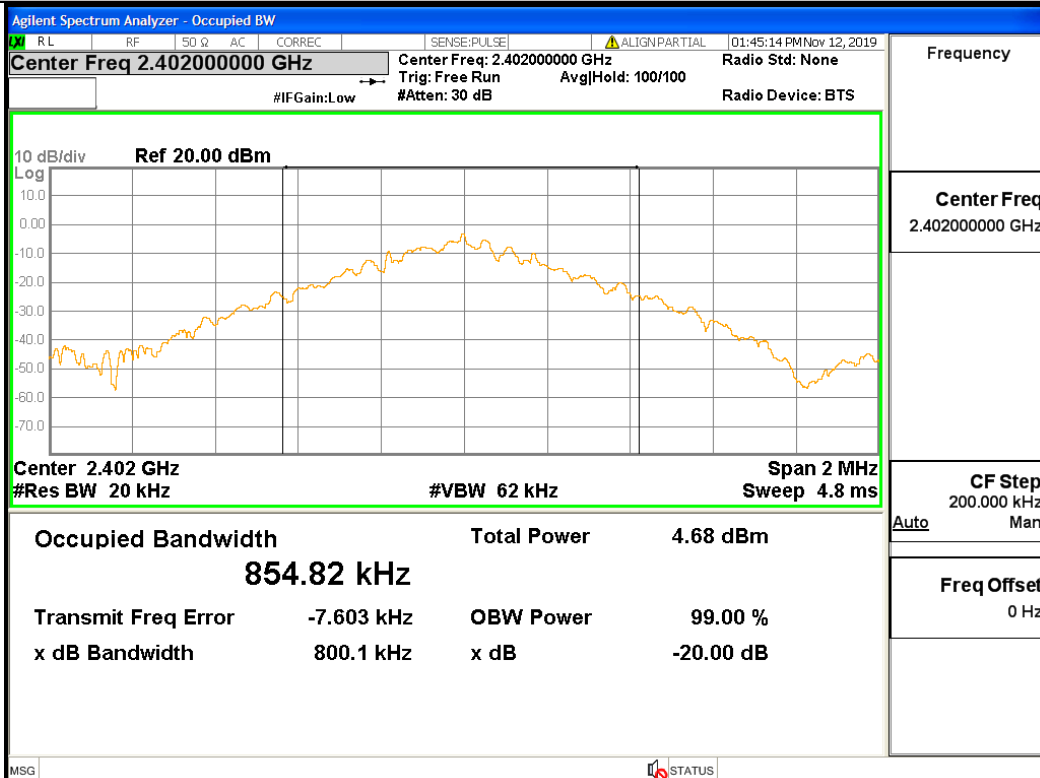
A.1 20 dB Bandwidth

Mode	Channel.	20dB Bandwidth [MHz]	Limit(MHz)	Verdict
GFSK	LCH	0.800	Not Specified	PASS
GFSK	MCH	0.798	Not Specified	PASS
GFSK	HCH	0.857	Not Specified	PASS
$\pi/4$ DQPSK	LCH	1.241	Not Specified	PASS
$\pi/4$ DQPSK	MCH	1.193	Not Specified	PASS
$\pi/4$ DQPSK	HCH	1.192	Not Specified	PASS

Test Graph

Graphs

GFSK/LCH



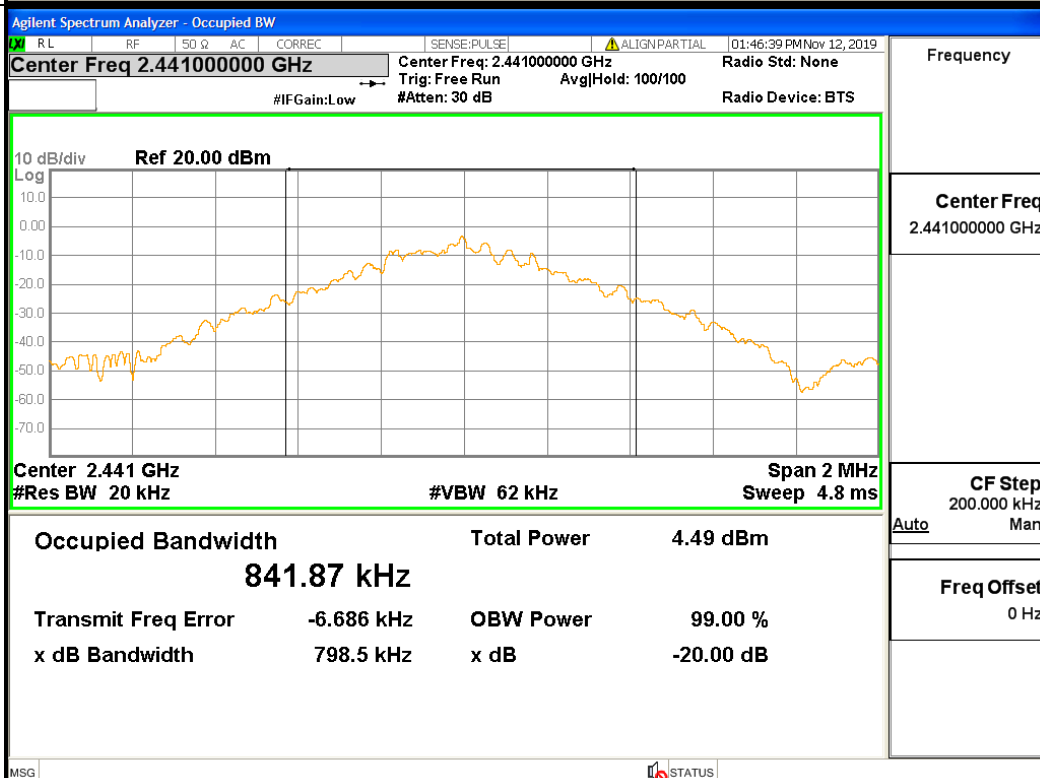
Frequency

Center Freq
2.40200000 GHz

CF Step
200.000 kHz
Auto Man

Freq Offset
0 Hz

GFSK/MCH



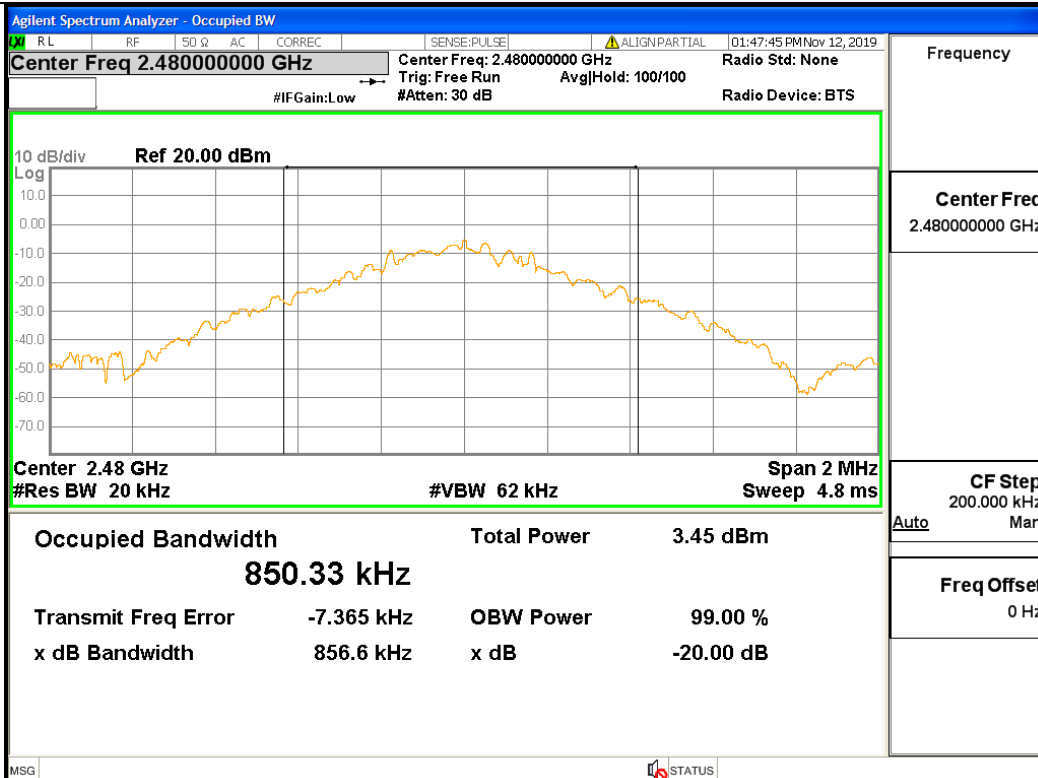
Frequency

Center Freq
2.44100000 GHz

CF Step
200.000 kHz
Auto Man

Freq Offset
0 Hz

GFSK/HCH



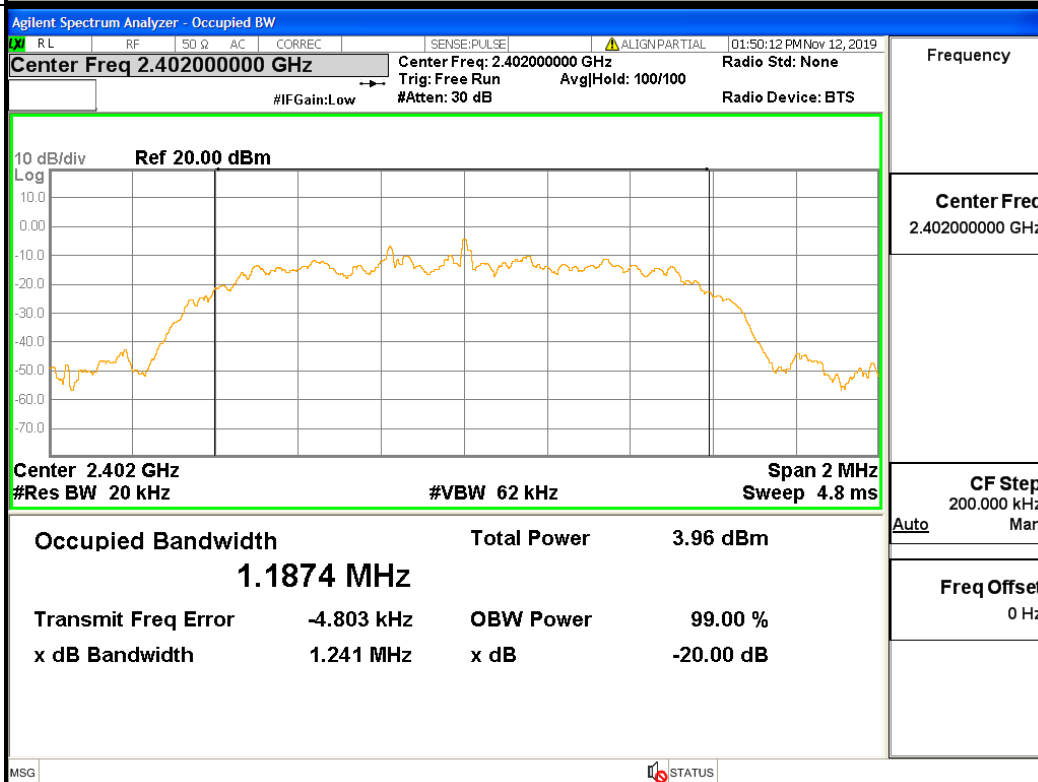
Frequency

Center Freq
2.480000000 GHz

CF Step
200.000 kHz
Auto Man

Freq Offset
0 Hz

π /4DQPSK/LCH



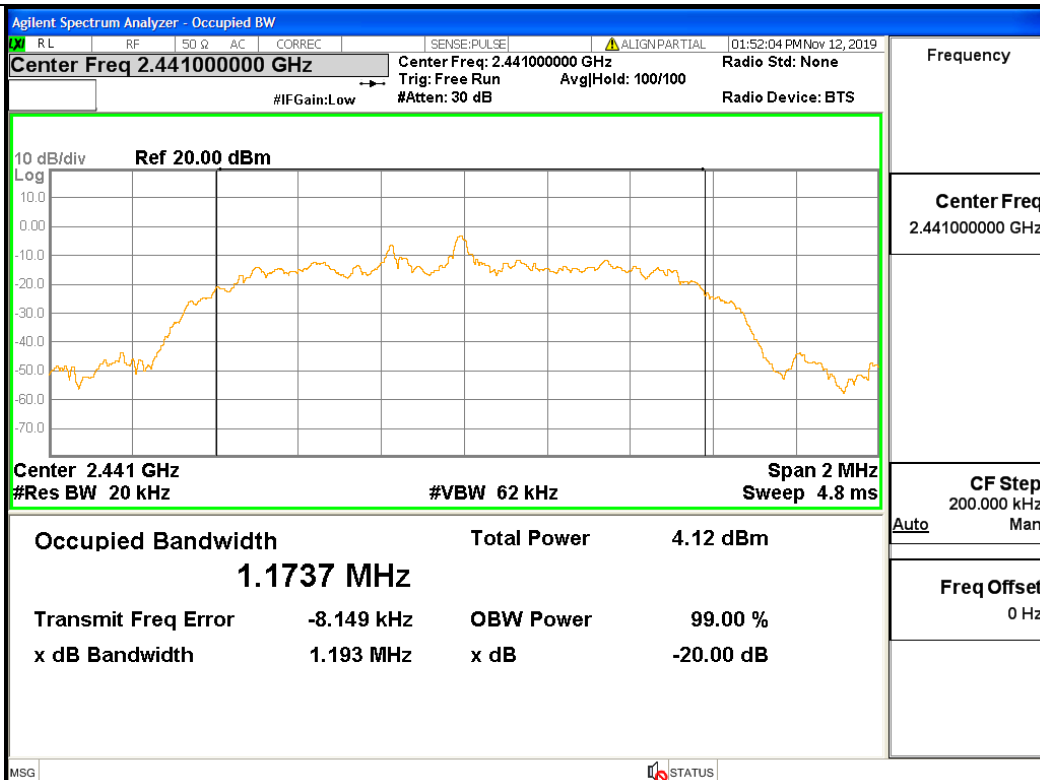
Frequency

Center Freq
2.402000000 GHz

CF Step
200.000 kHz
Auto Man

Freq Offset
0 Hz

$\pi/4$ DQPSK/MCH



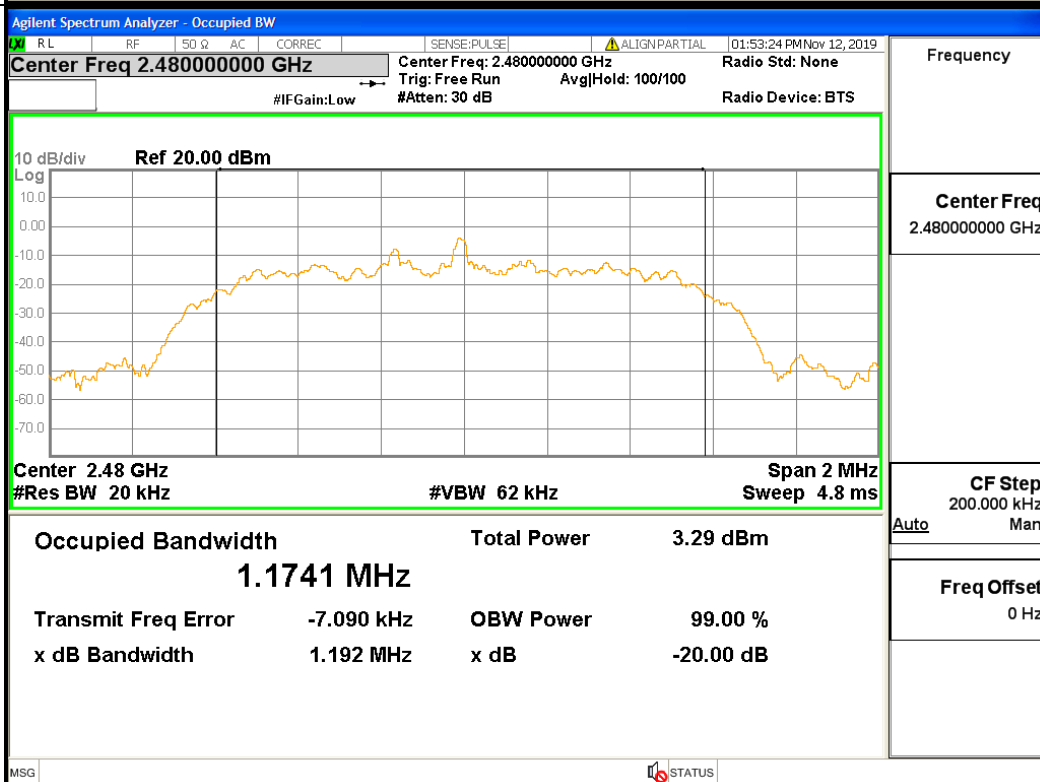
Frequency

Center Freq
2.441000000 GHz

CF Step
200.000 kHz
Auto Man

Freq Offset
0 Hz

$\pi/4$ DQPSK/HCH



Frequency

Center Freq
2.480000000 GHz

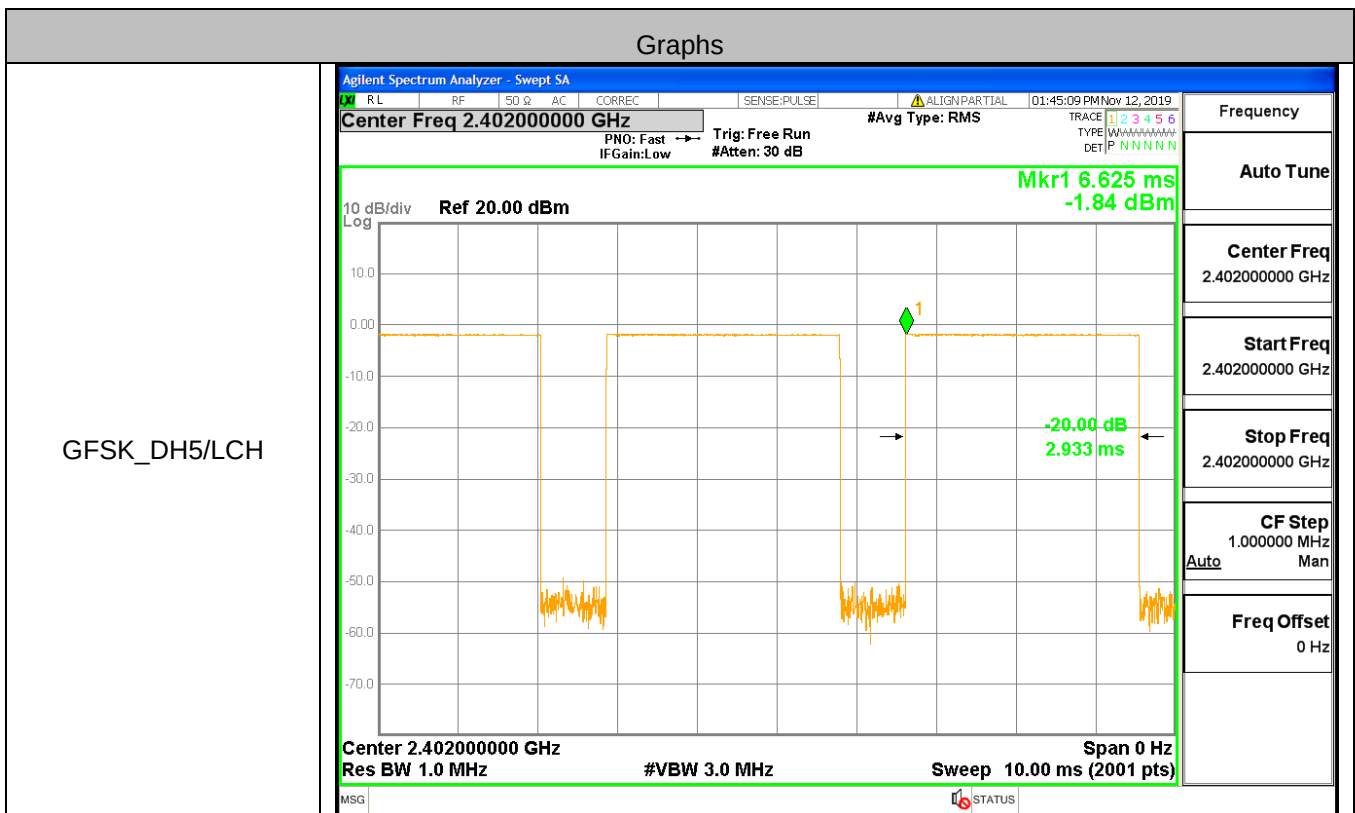
CF Step
200.000 kHz
Auto Man

Freq Offset
0 Hz

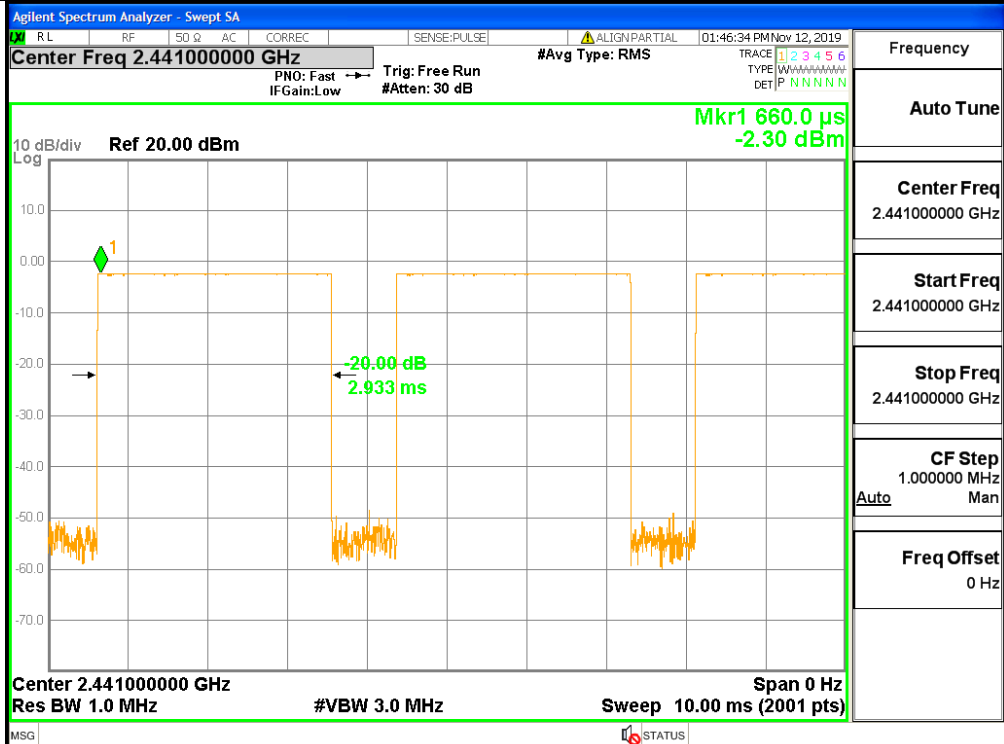
A.2 Dwell Time

Mode	Packet	Channel	Burst Width [s/hop/ch]	Total Hops[hop*ch]	Dwell Time[s]	Limit [s]	Verdict
GFSK	DH5	LCH	0.002934	106.7	0.313013	0.4	PASS
GFSK	DH5	MCH	0.002931	106.7	0.312731	0.4	PASS
GFSK	DH5	HCH	0.002930	106.7	0.312642	0.4	PASS
$\pi/4$ DQPSK	2DH5	LCH	0.002938	106.7	0.313522	0.4	PASS
$\pi/4$ DQPSK	2DH5	MCH	0.002936	106.7	0.313223	0.4	PASS
$\pi/4$ DQPSK	2DH5	HCH	0.002938	106.7	0.313515	0.4	PASS

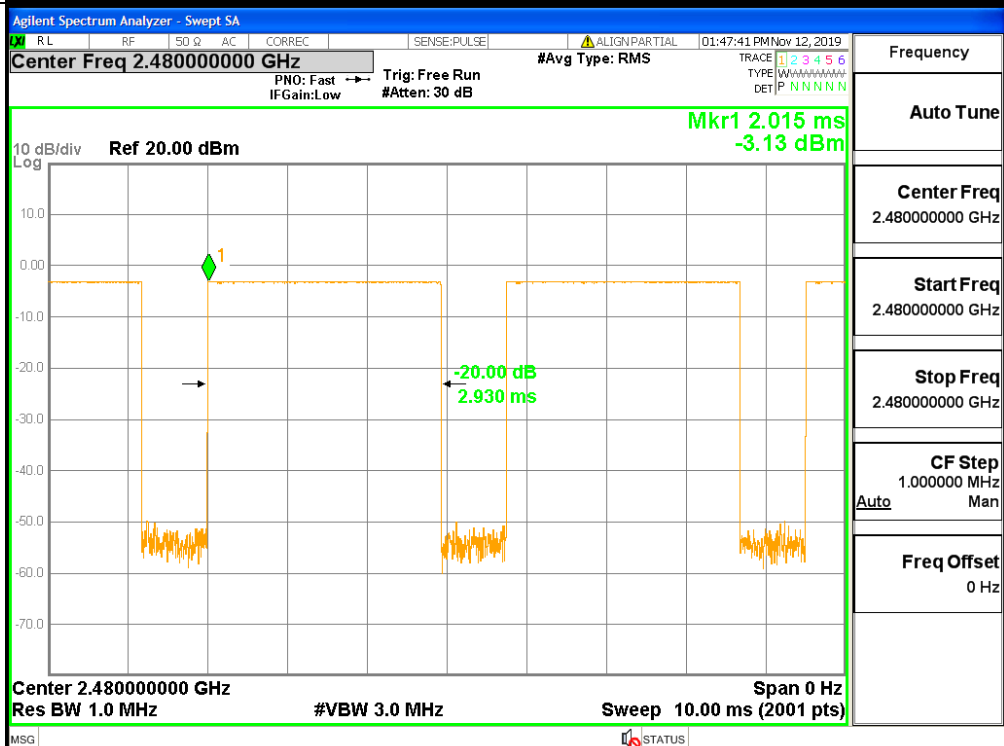
Test Graph



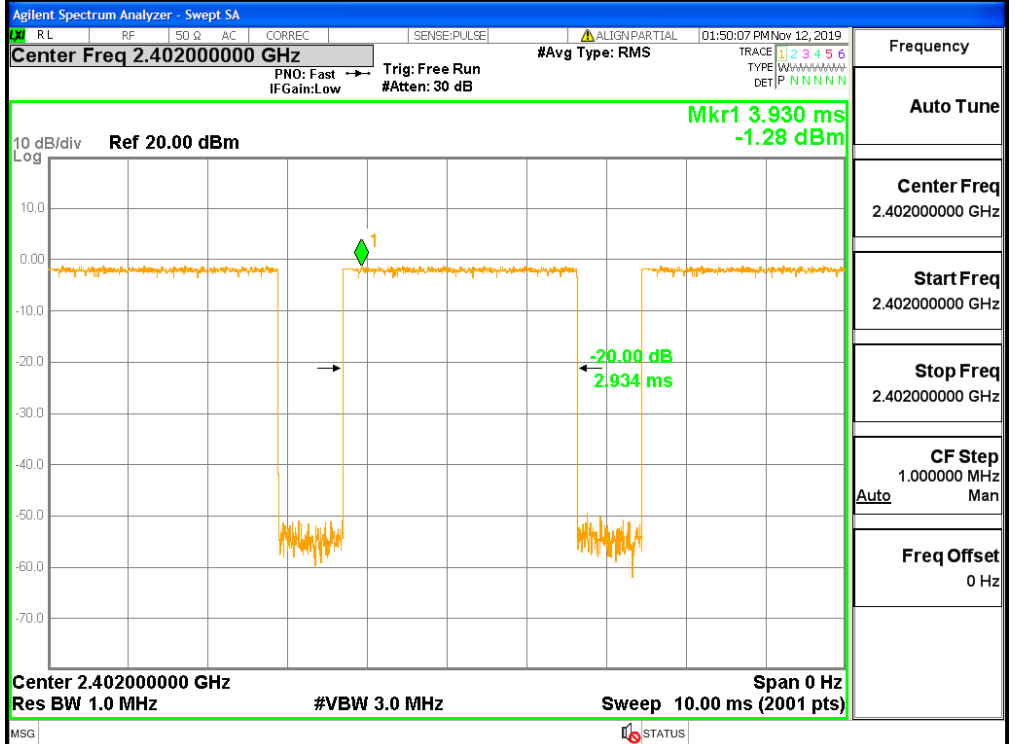
GFSK_DH5/MCH



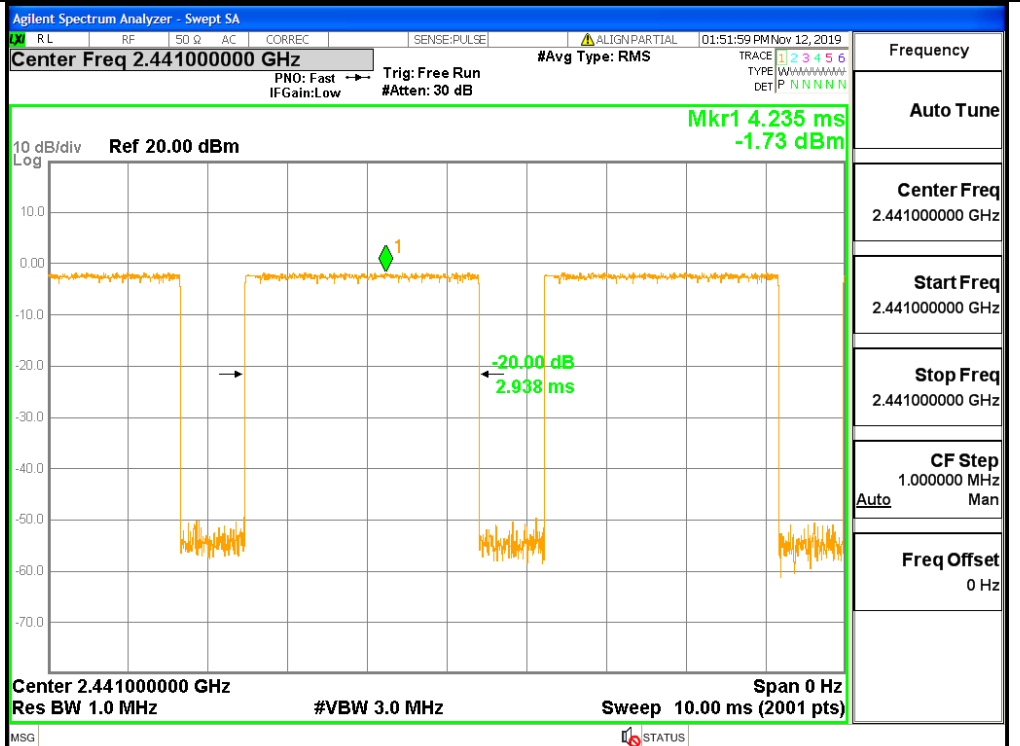
GFSK_DH5/HCH



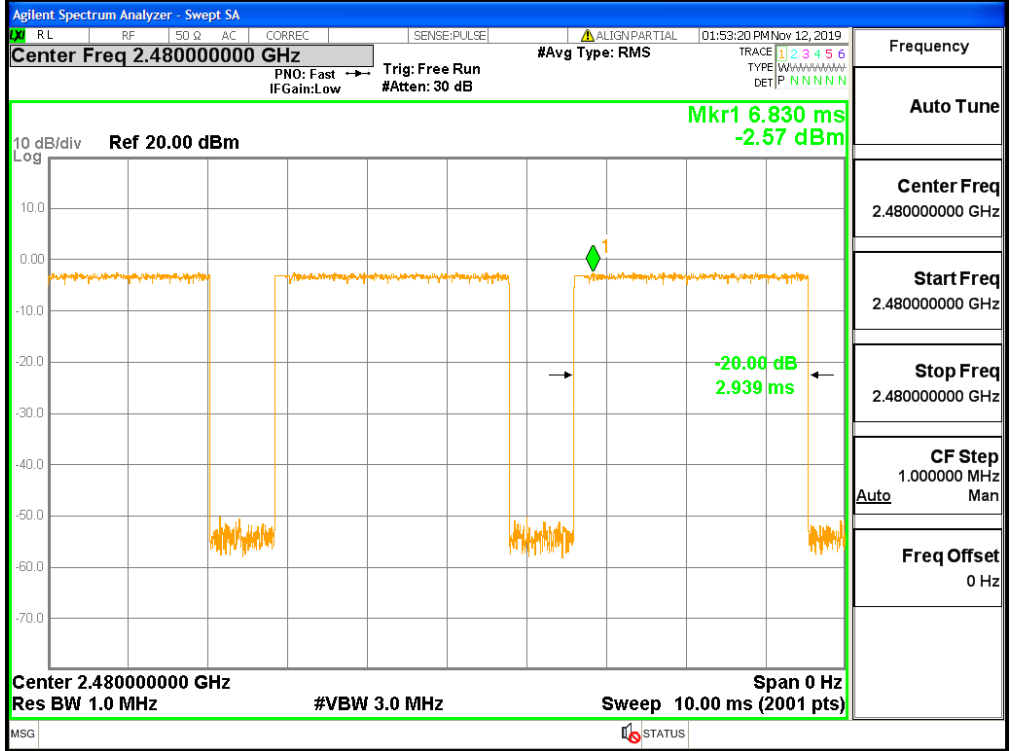
$\pi/4$ DQPSK
_2DH5/LCH



$\pi/4$ DQPSK
_2DH5/MCH



$\pi/4$ DQPSK
_2DH5/HCH

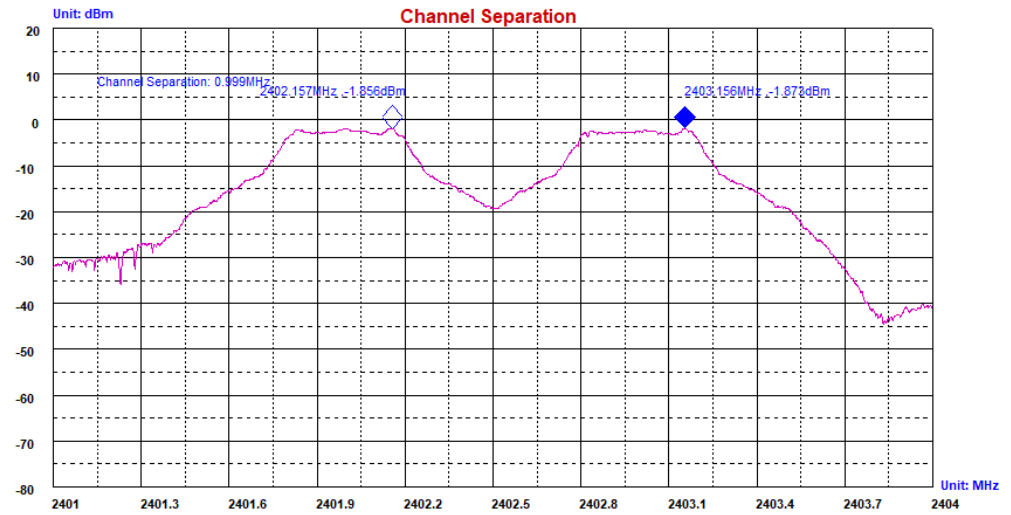


A.3 Carrier Frequency Separation

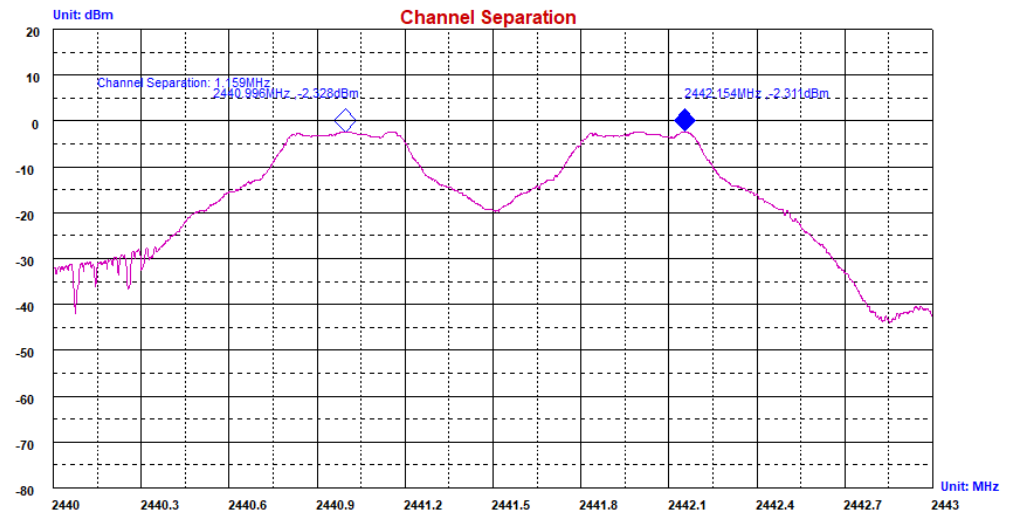
Mode	Channel.	Carrier Frequency Separation [MHz]	Limit [MHz]	Verdict
GFSK	LCH	0.999	0.533	PASS
GFSK	MCH	1.003	0.529	PASS
GFSK	HCH	1.003	0.571	PASS
$\pi/4$ DQPSK	LCH	1.000	0.793	PASS
$\pi/4$ DQPSK	MCH	1.000	0.837	PASS
$\pi/4$ DQPSK	HCH	1.001	0.795	PASS

Graphs

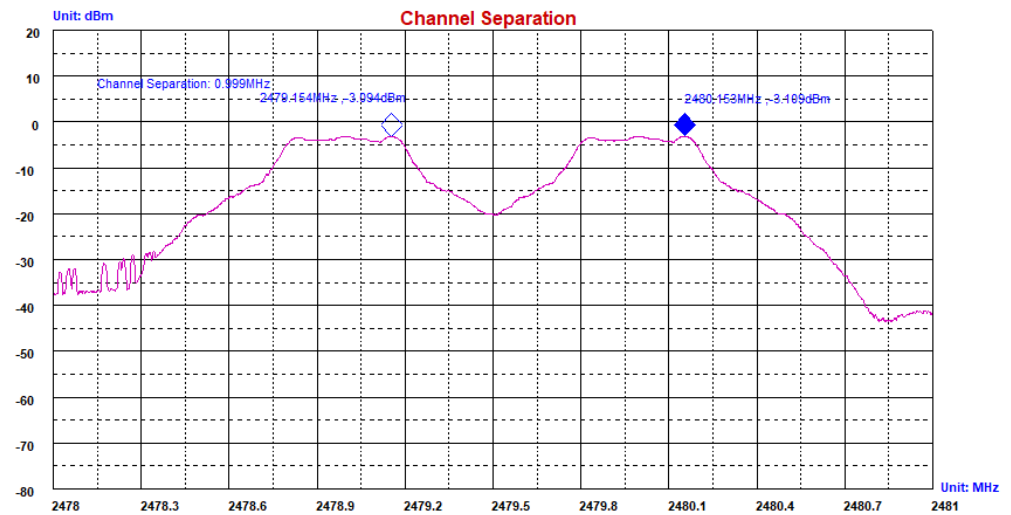
GFSK/LCH

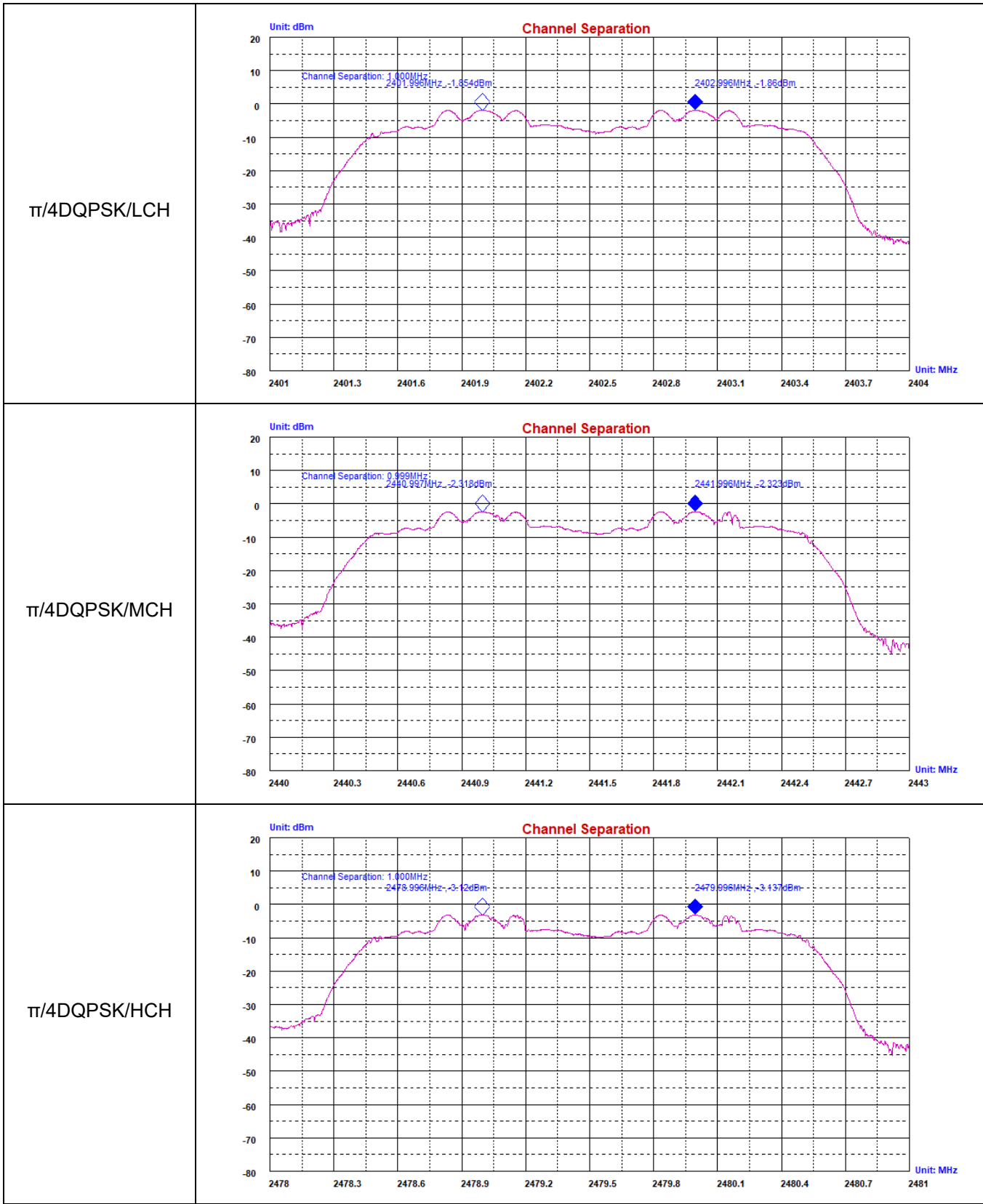


GFSK/MCH



GFSK/HCH

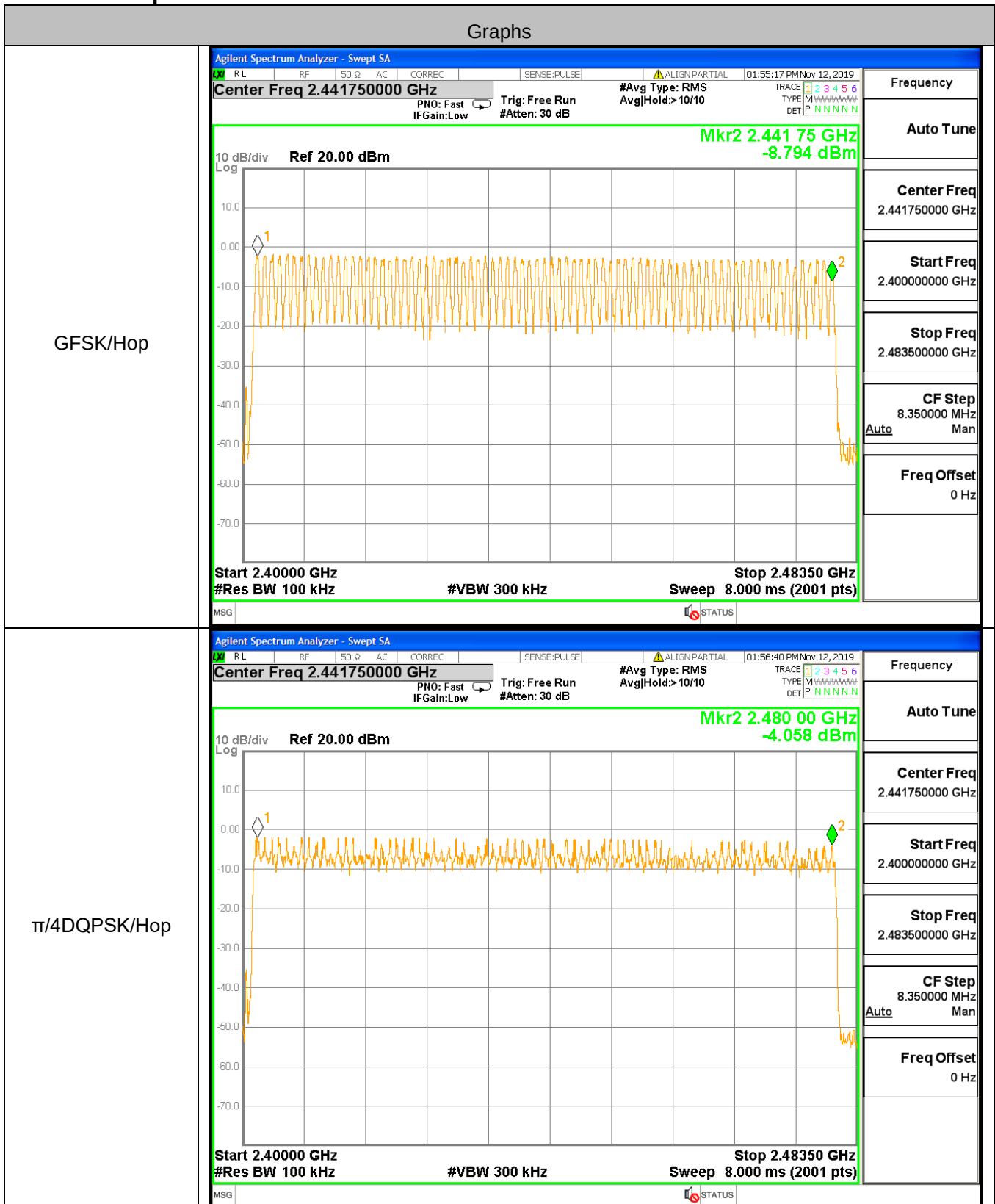




A.4 Hopping Channel Number

Mode	Channel.	Number of Hopping Channel[N]	Limit[N]	Verdict
GFSK	Hop	79	≥ 15	PASS
$\pi/4$ DQPSK	Hop	79	≥ 15	PASS

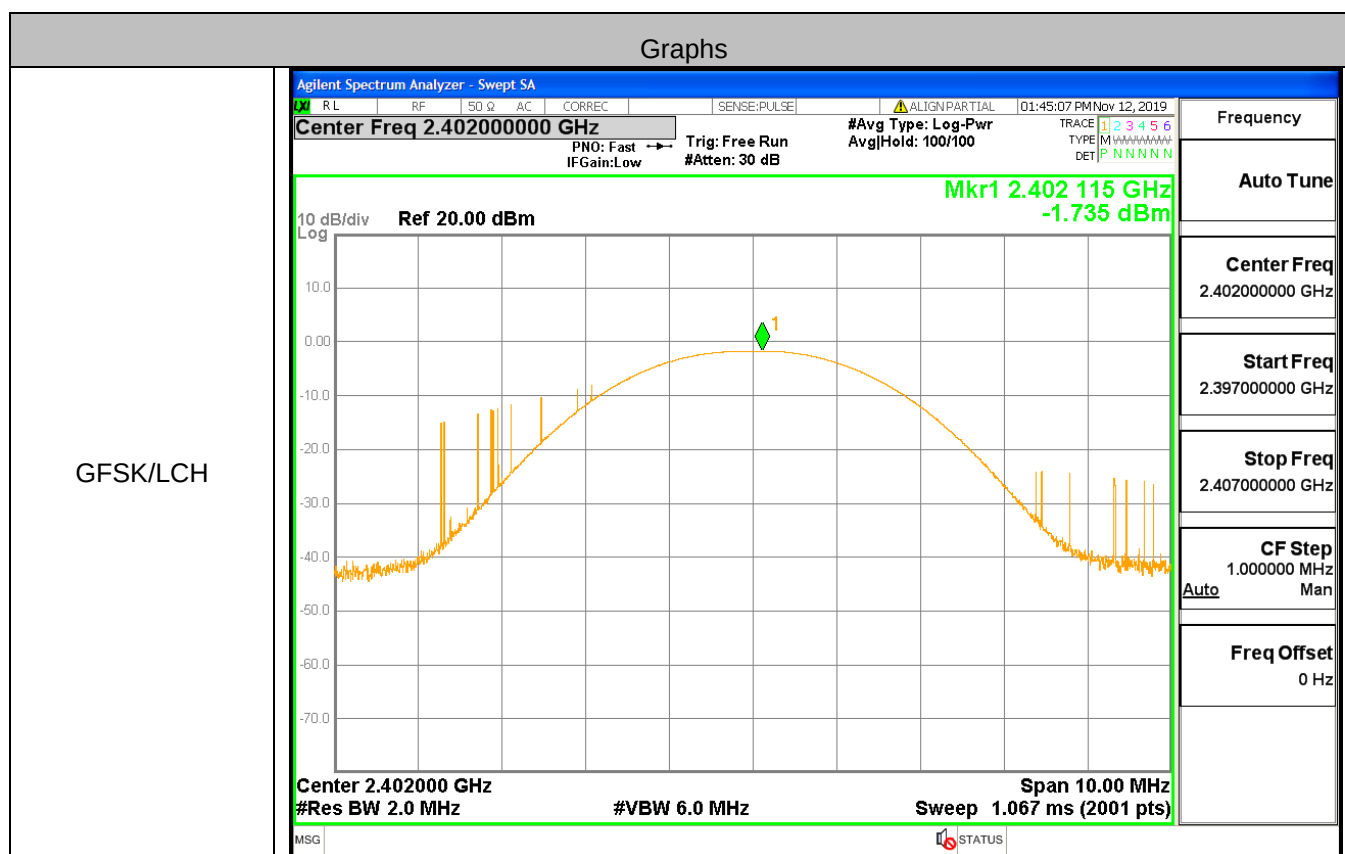
Test Graph



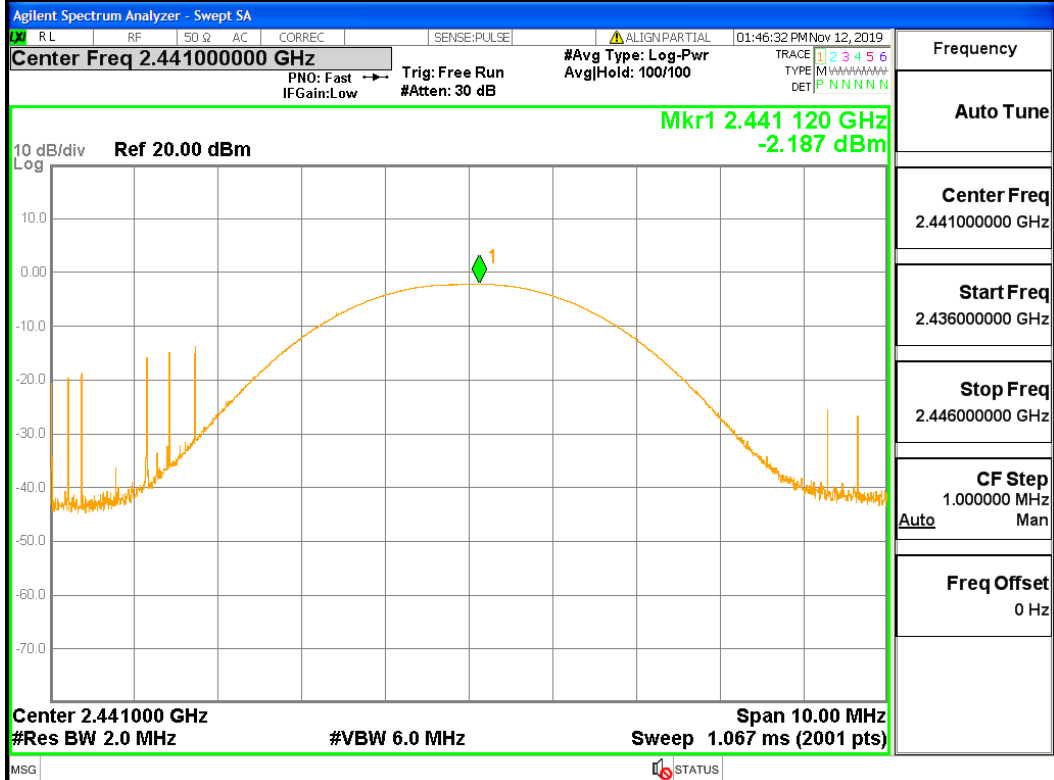
A.5 Conducted Peak Output Power

Mode	Channel.	Maximum Peak Output Power [dBm]	Limit [dBm]	Verdict
GFSK	LCH	-1.735	21	PASS
GFSK	MCH	-2.187	21	PASS
GFSK	HCH	-3.013	21	PASS
$\pi/4$ DQPSK	LCH	-0.838	21	PASS
$\pi/4$ DQPSK	MCH	-1.293	21	PASS
$\pi/4$ DQPSK	HCH	-2.166	21	PASS

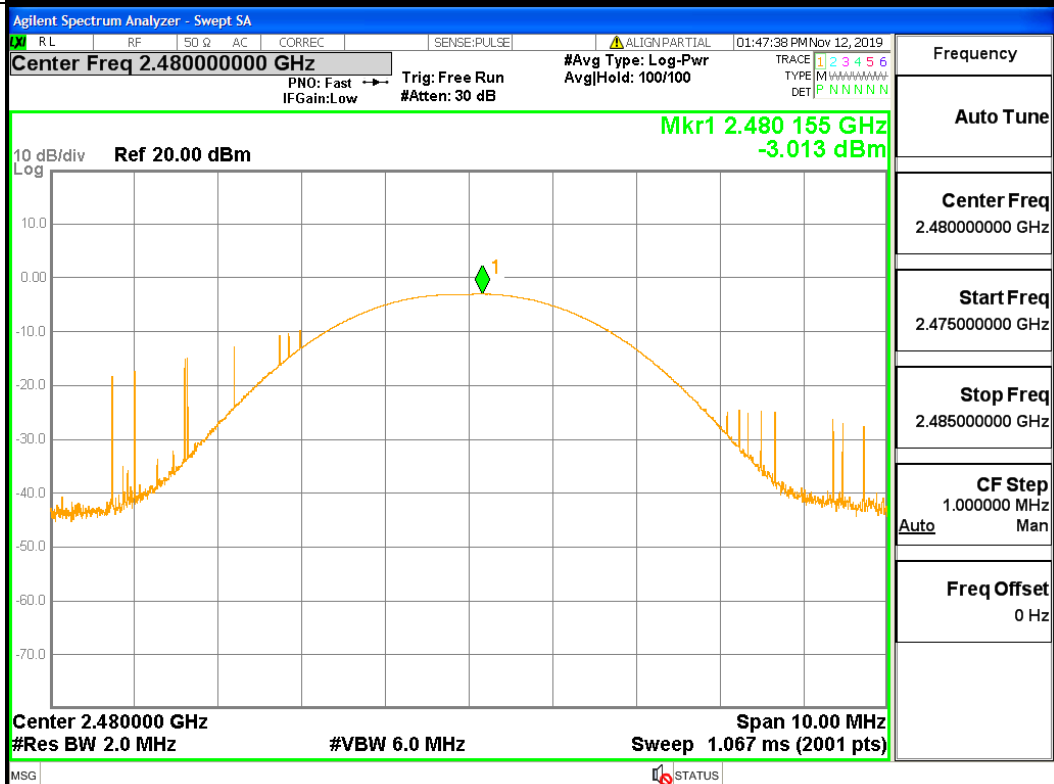
Test Graph



GFSK/MCH



GFSK/HCH



Agilent Spectrum Analyzer - Swept SA

Center Freq 2.402000000 GHz

PNO: Fast → Trig: Free Run
IFGain: Low #Atten: 30 dB

#Avg Type: Log-Pwr
AvgHold: 100/100

Mkr1 2.402 155 GHz
-0.838 dBm

10 dB/div Ref 20.00 dBm

Center 2.402000 GHz Span 10.00 MHz
#Res BW 2.0 MHz #VBW 6.0 MHz
Sweep 1.067 ms (2001 pts)

Frequency

Auto Tune

Center Freq
2.402000000 GHz

Start Freq
2.397000000 GHz

Stop Freq
2.407000000 GHz

CF Step
1.000000 MHz
Auto Man

Freq Offset
0 Hz

Agilent Spectrum Analyzer - Swept SA

Center Freq 2.441000000 GHz

Mkr1 2.441 080 GHz -1.293 dBm

10 dB/div Log

Ref 20.00 dBm

Center Freq 2.441000000 GHz

Start Freq 2.436000000 GHz

Stop Freq 2.446000000 GHz

CF Step 1.000000 MHz

Freq Offset 0 Hz

Span 10.00 MHz

Sweep 1.067 ms (2001 pts)

#Res BW 2.0 MHz

#VBW 6.0 MHz

Trig: Free Run

#Atten: 30 dB

#Avg Type: Log-Pwr

AvgHold: 100/100

Trig: PNO: Fast

IFGain: Low

ALIGN PARTIAL

01:51:57 PM Nov 12, 2019

TRACE 1 2 3 4 5 6

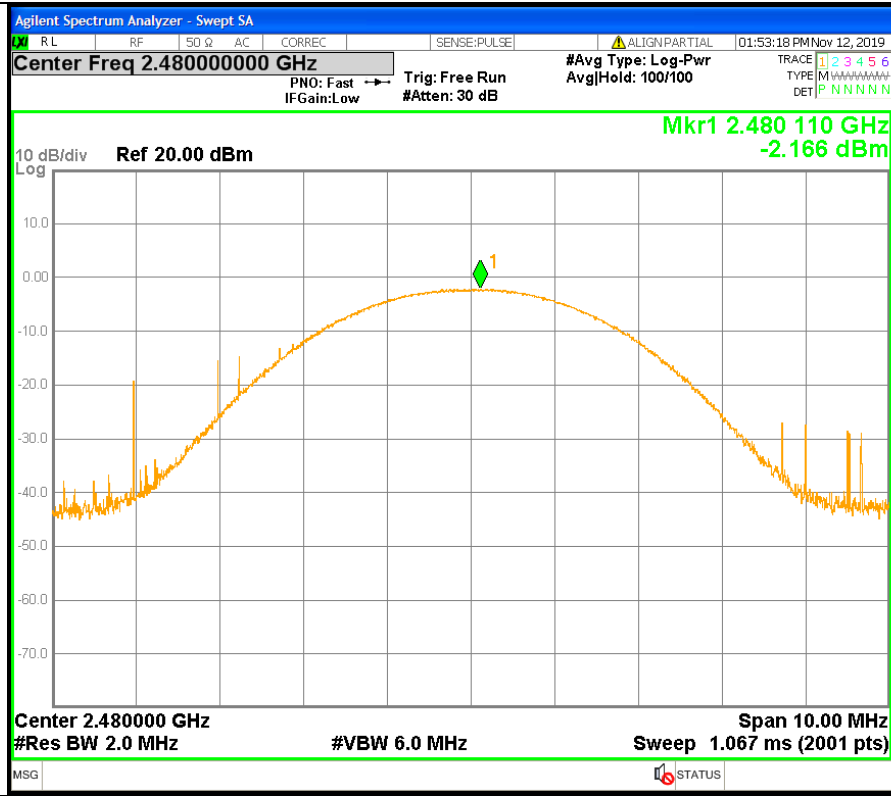
TYPE M N N N N N

DET P N N N N N

MSG STATUS

10/12/2019

$\pi/4$ DQPSK/HCH



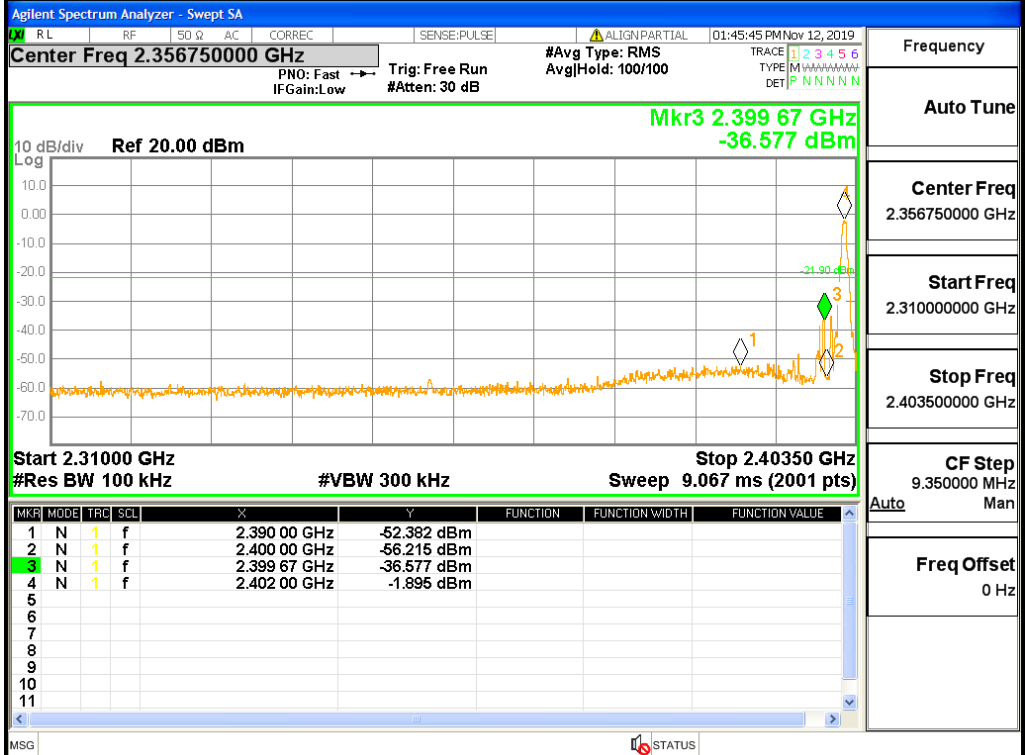
A.6 Band-edge for RF Conducted Emissions

Type	Carrier Frequency(MHz)	Frequency(MHz)	Carrier Frequency Power [dBm]	Bandedge Peak(dBm)	Upper limit(dBm)	Conclusion
1DH5	2402	2399.667	-1.895	-36.577	-21.895	Pass
1DH5	2480	2483.5	-3.371	-48.400	-23.371	Pass
2DH5	2402	2399.854	-5.596	-37.920	-25.596	Pass
2DH5	2480	2483.5	-3.182	-50.020	-23.182	Pass
1DH5-Hopping	2402	2399.49	-1.822	-48.110	-21.822	Pass
1DH5-Hopping	2480	2483.5	-2.582	-49.000	-22.582	Pass
2DH5-Hopping	2402	2399.85	-2.002	-40.404	-22.002	Pass
2DH5-Hopping	2480	2483.5	-2.502	-54.560	-22.502	Pass

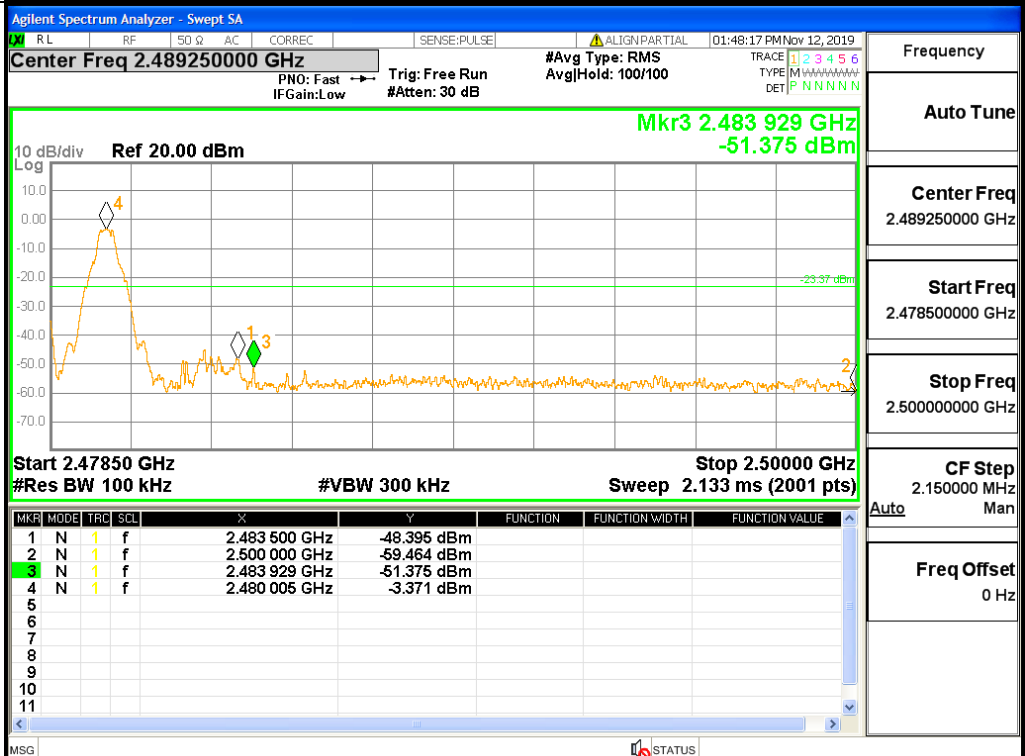
Test Graph

Graphs

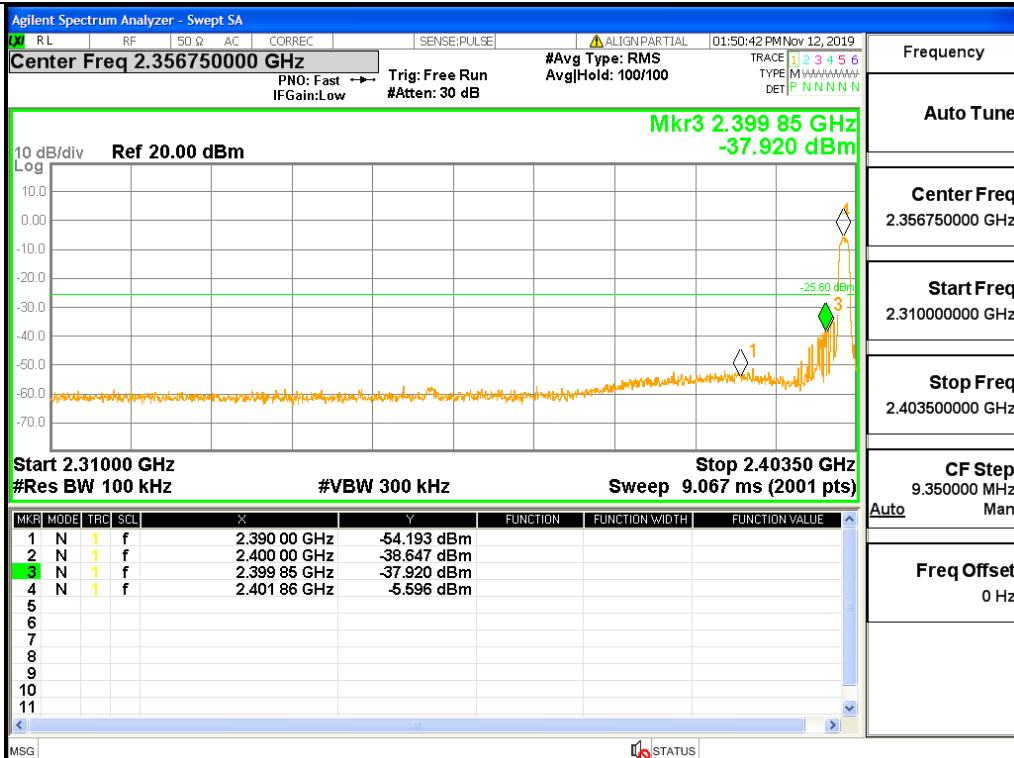
GFSK/LCH/No Hop



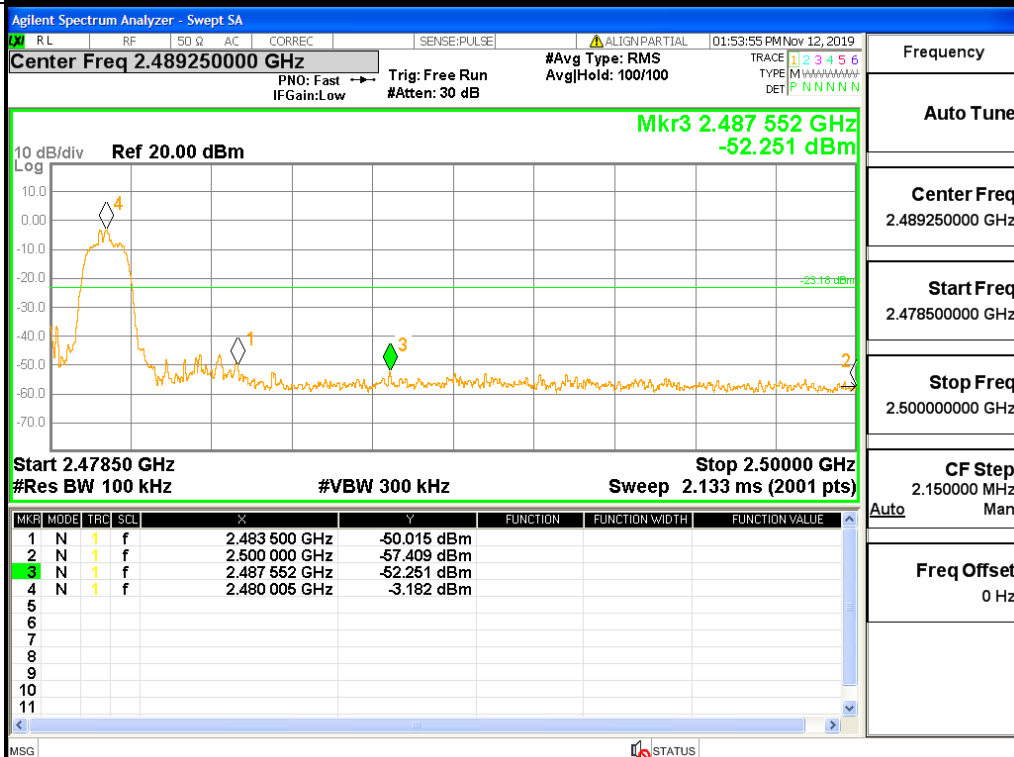
GFSK/HCH/No Hop



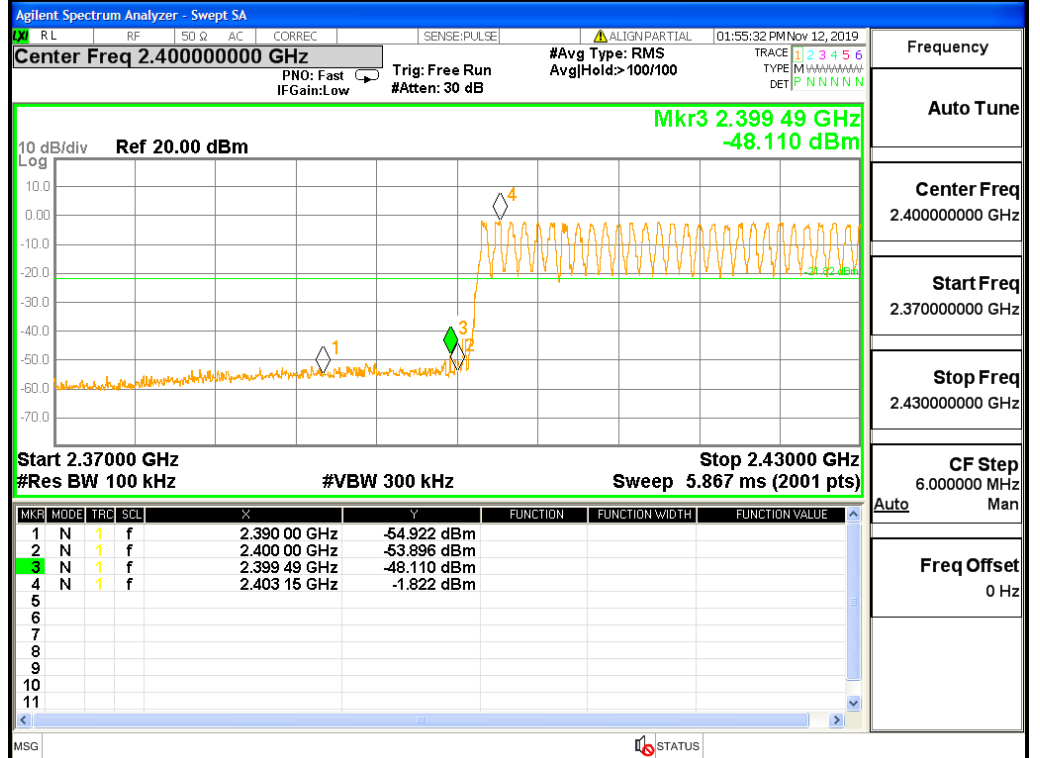
$\pi/4$ DQPSK/LCH/No
Hop



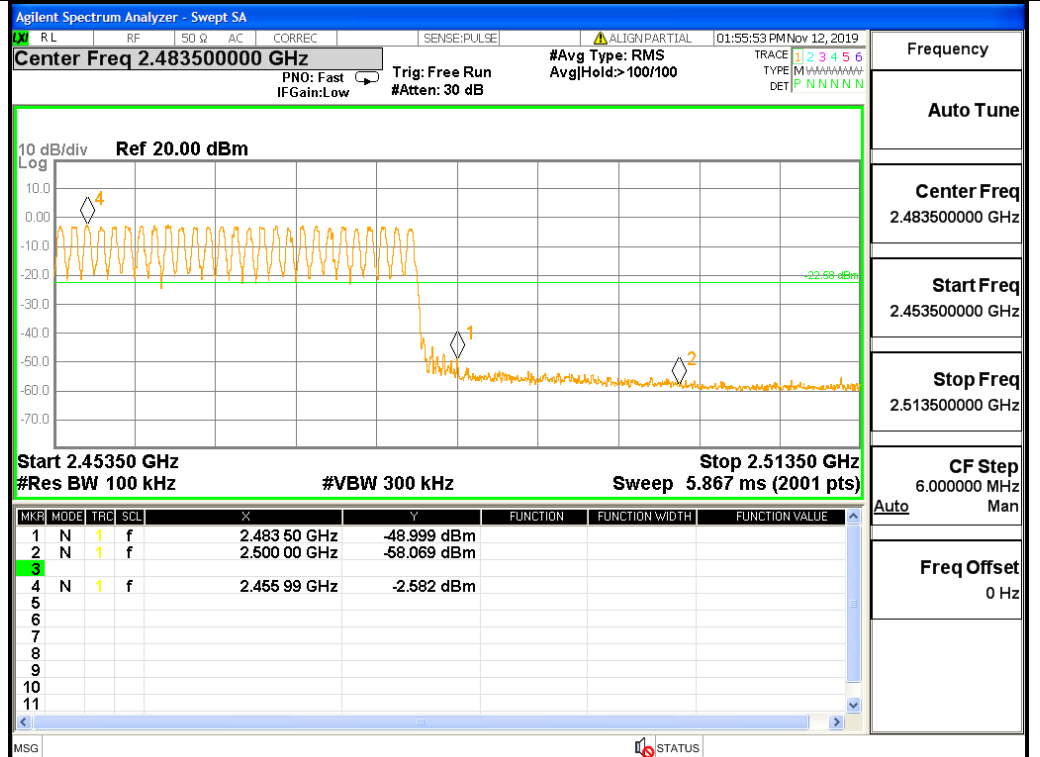
$\pi/4$ DQPSK/HCH/No
Hop



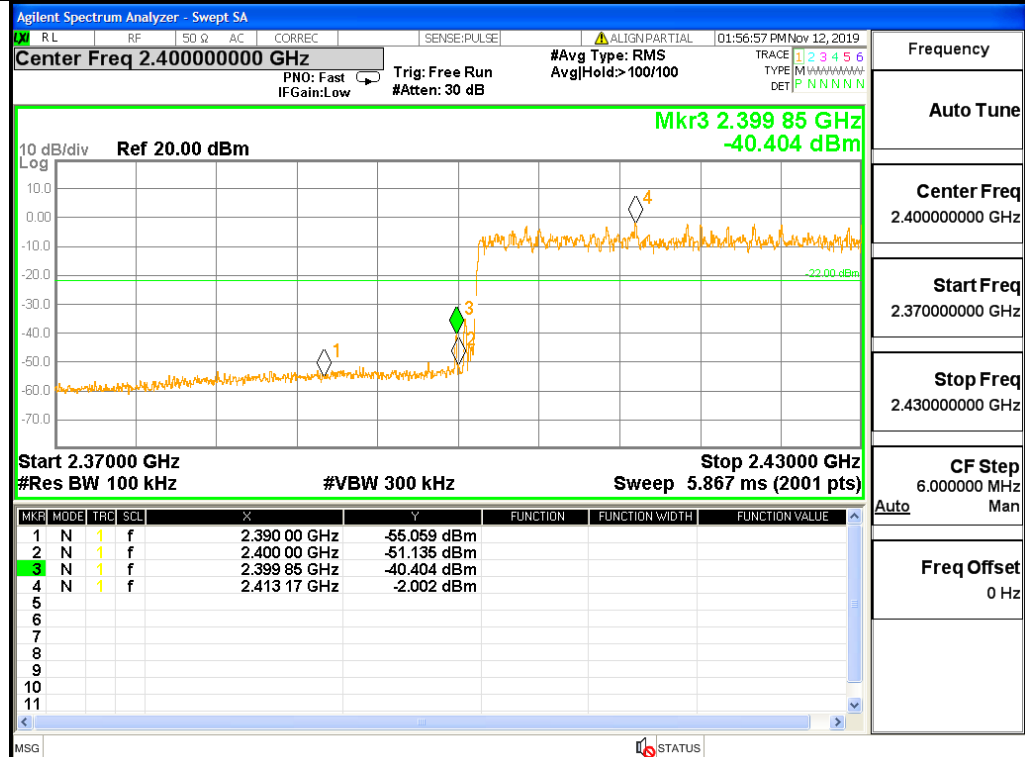
GFSK/LCH/Hop



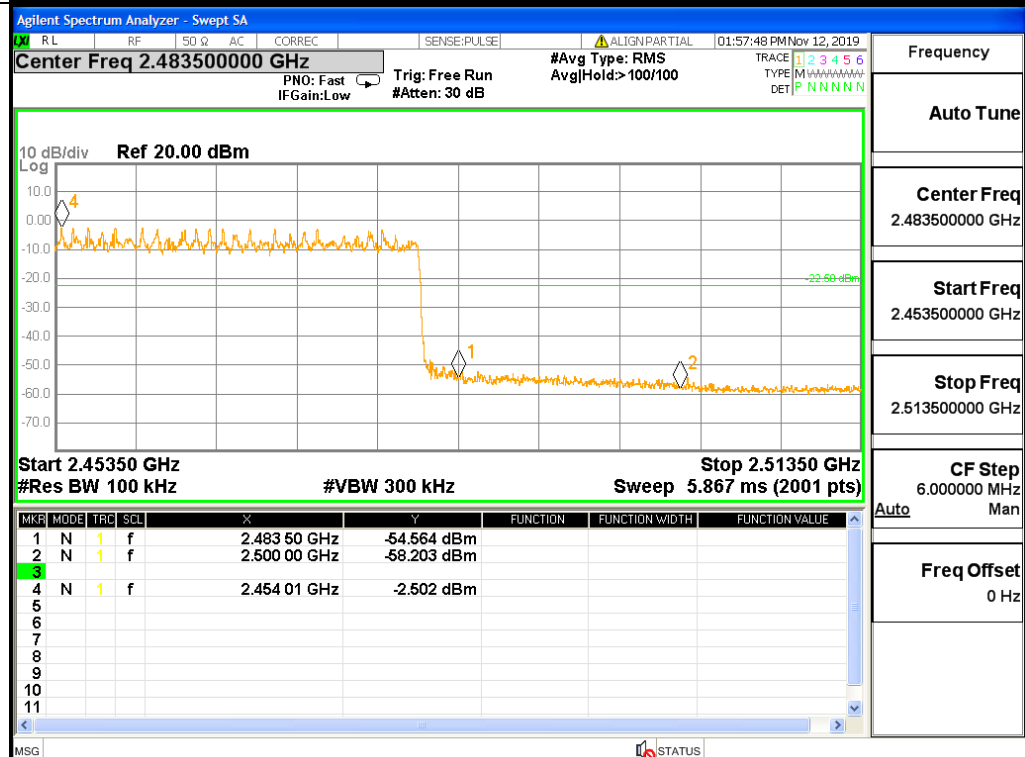
GFSK/HCH/Hop



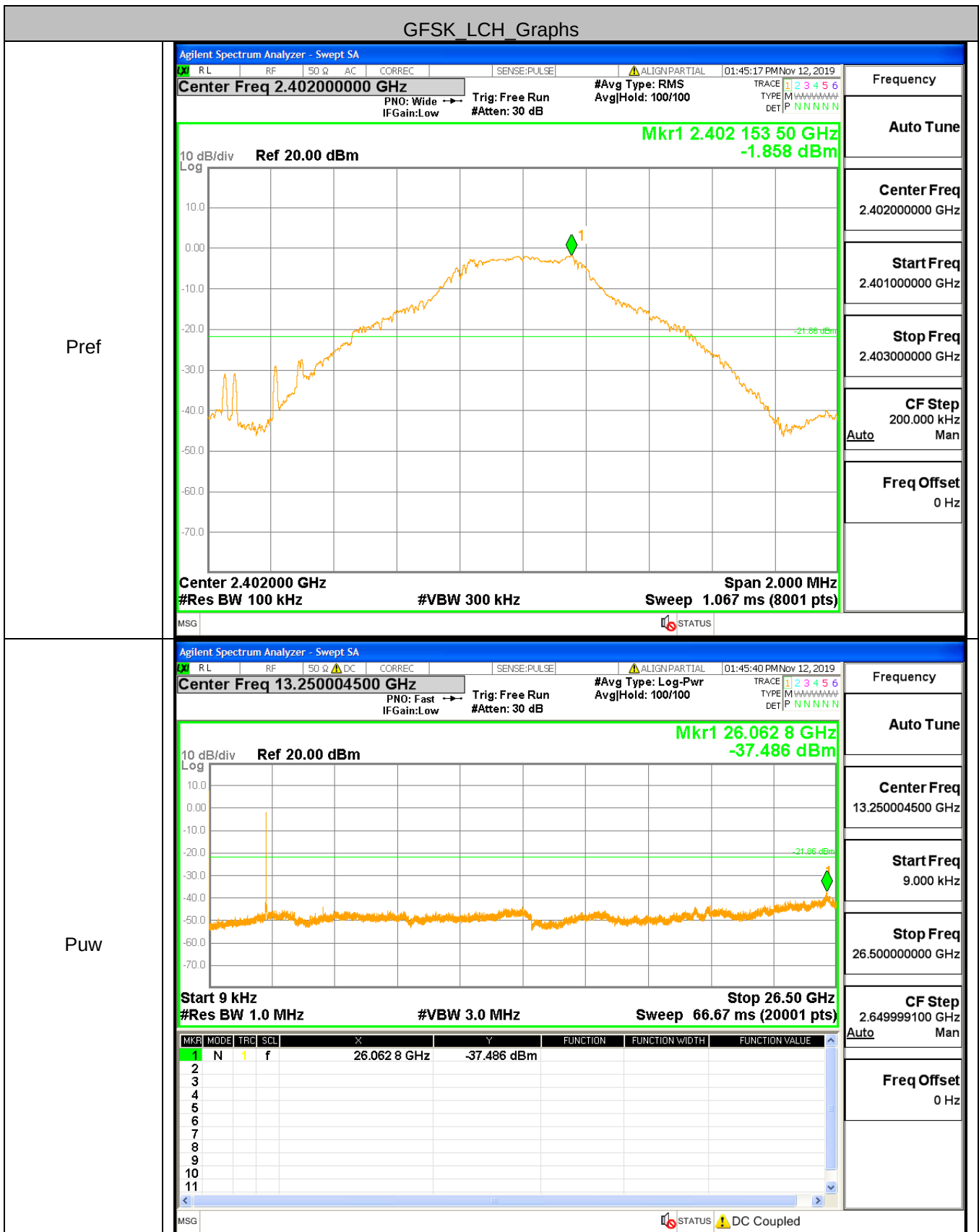
$\pi/4$ DQPSK/LCH/Hop



$\pi/4$ DQPSK/HCH/Hop

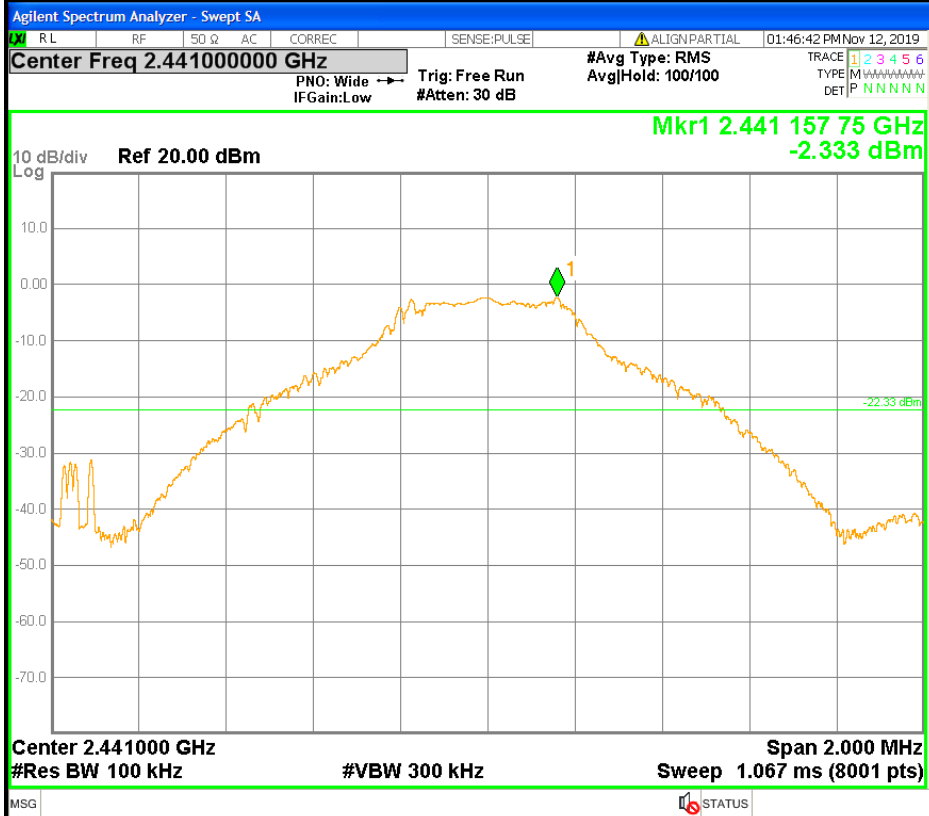


A.7 RF Conducted Spurious Emissions Test Graph



GFSK MCH Graphs

Pref



Frequency

Auto Tune

Center Freq
2.441000000 GHz

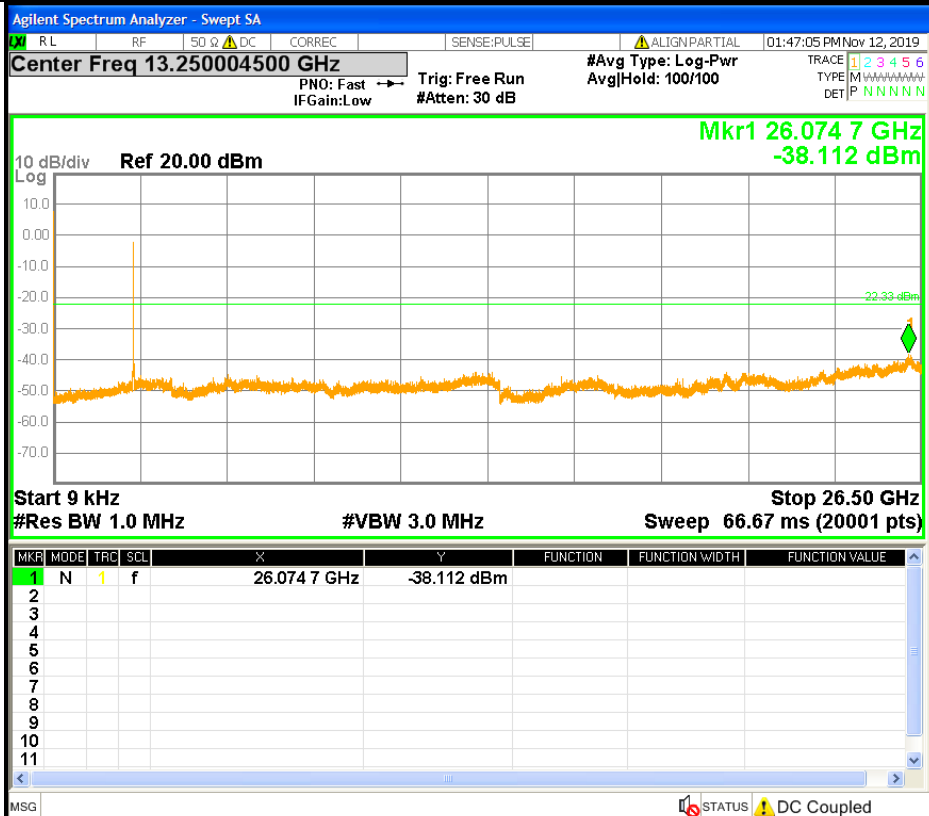
Start Freq
2.440000000 GHz

Stop Freq
2.442000000 GHz

CF Step
200.000 kHz
Auto Man

Freq Offset
0 Hz

Puw



Frequency

Auto Tune

Center Freq
13.250004500 GHz

Start Freq
9.000 kHz

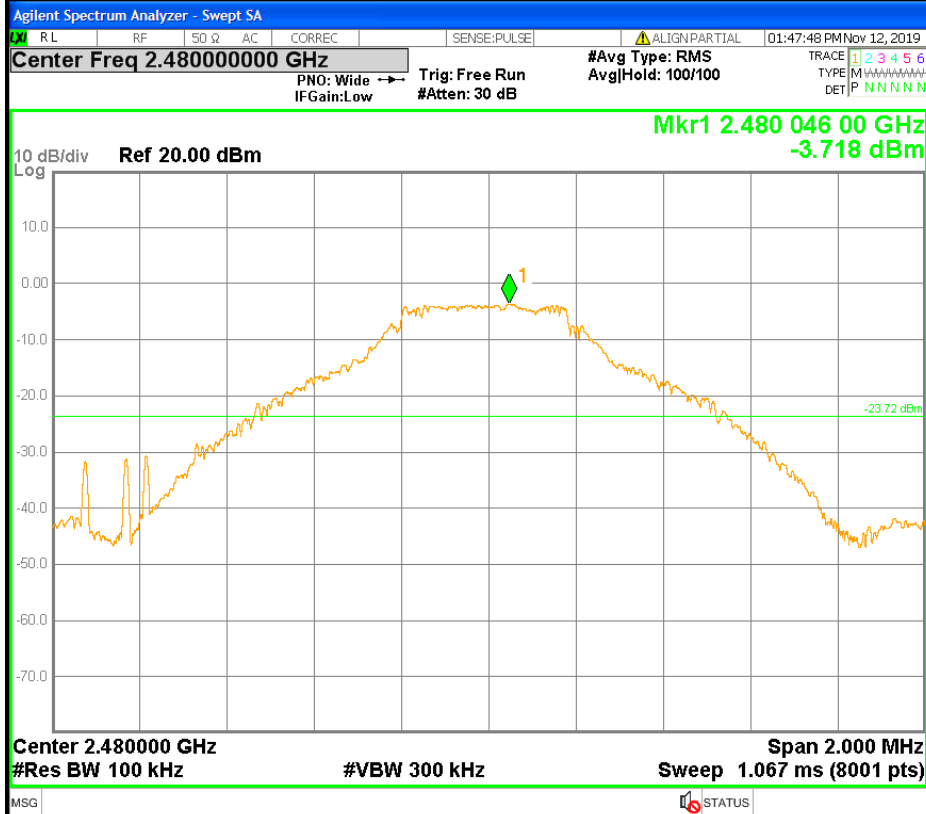
Stop Freq
26.500000000 GHz

CF Step
2.649999100 GHz
Auto Man

Freq Offset
0 Hz

GFSK HCH Graphs

Pref



Frequency

Auto Tune

Center Freq
2.480000000 GHz

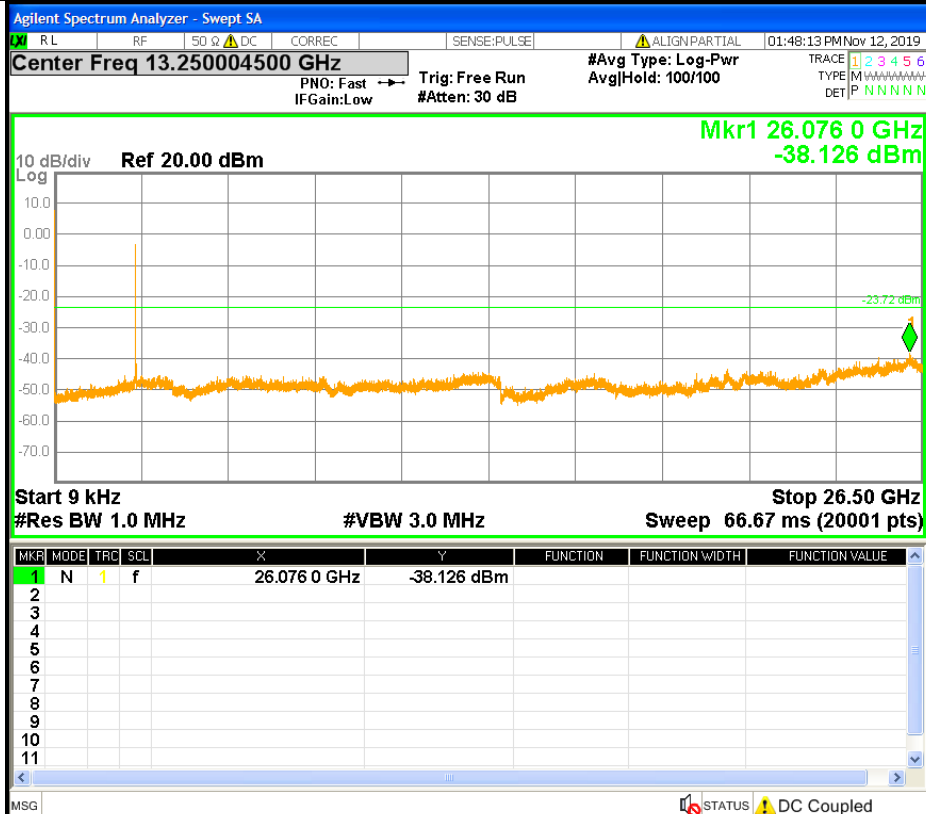
Start Freq
2.479000000 GHz

Stop Freq
2.481000000 GHz

CF Step
200.000 kHz
Auto Man

Freq Offset
0 Hz

Puw



Frequency

Auto Tune

Center Freq
13.250004500 GHz

Start Freq
9.000 kHz

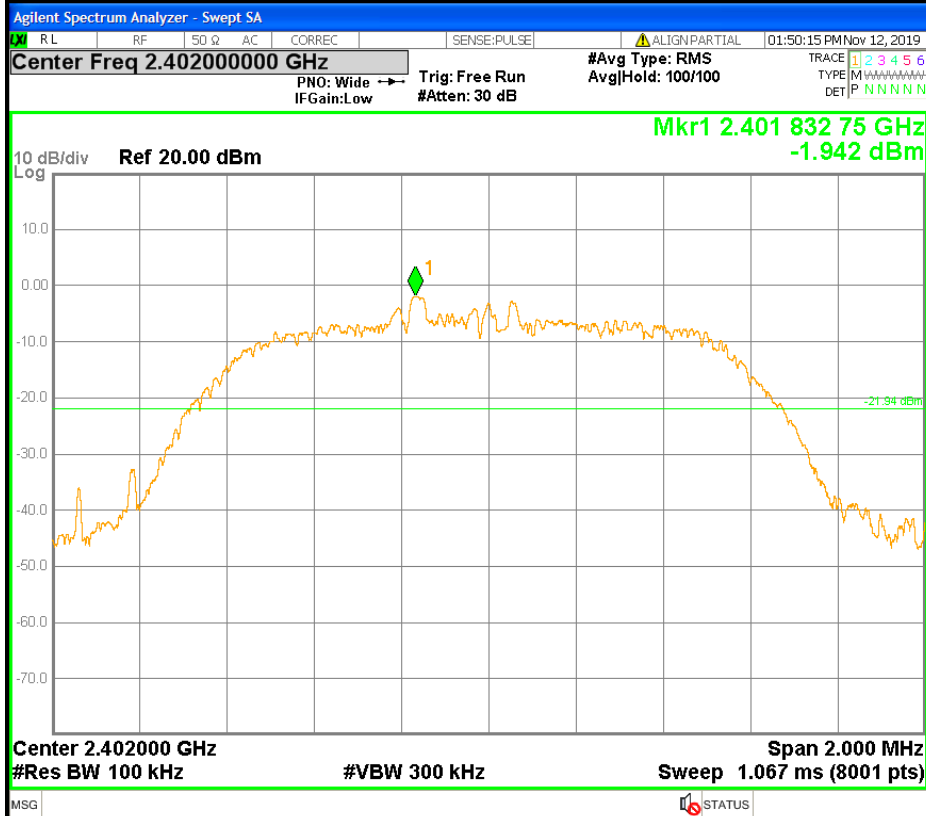
Stop Freq
26.500000000 GHz

CF Step
2.649999100 GHz
Auto Man

Freq Offset
0 Hz

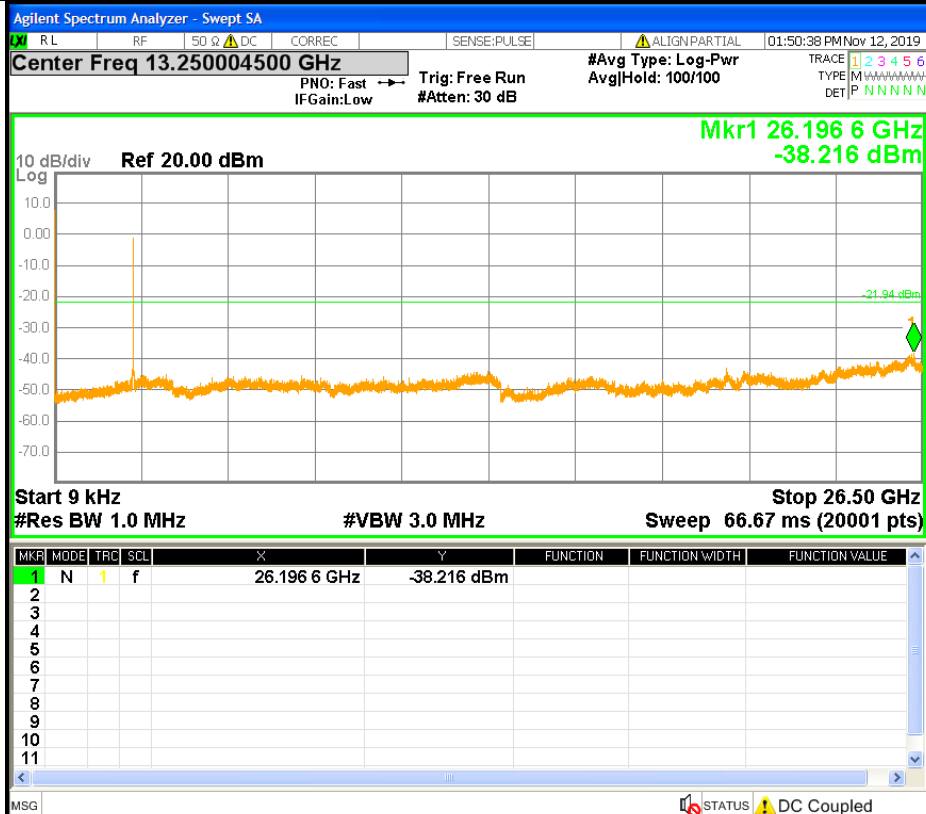
$\pi/4$ DQPSK LCH_Graphs

Pref



Frequency
Auto Tune
Center Freq 2.402000000 GHz
Start Freq 2.401000000 GHz
Stop Freq 2.403000000 GHz
CF Step 200.000 kHz Auto Man
Freq Offset 0 Hz

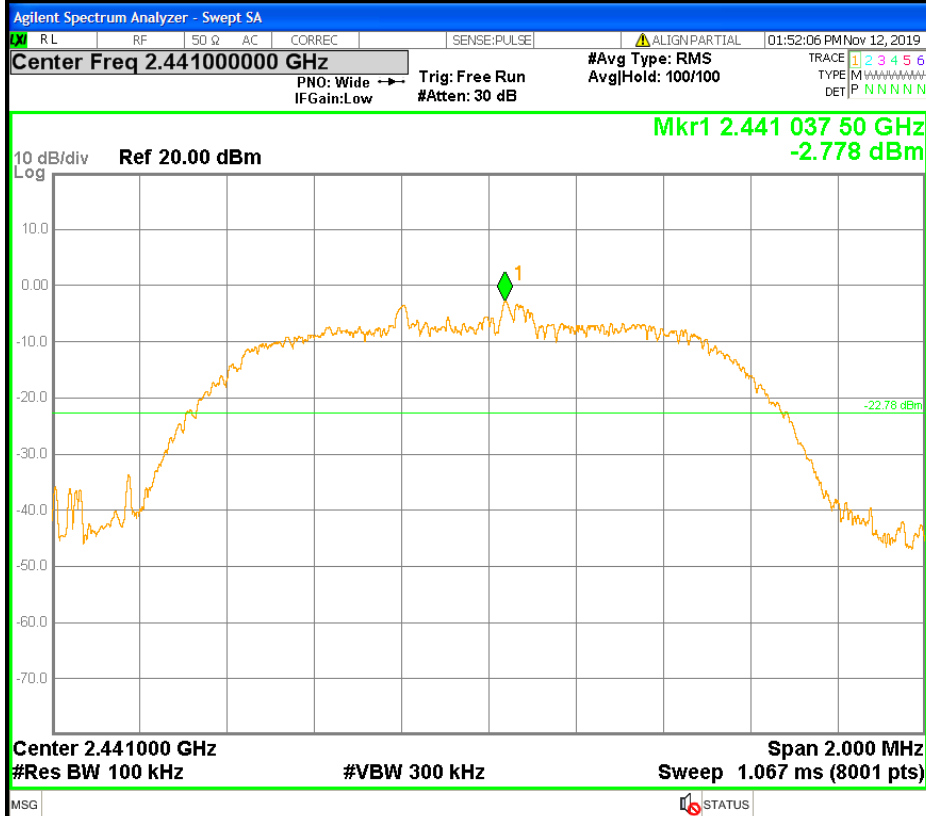
Puw



Frequency
Auto Tune
Center Freq 13.250004500 GHz
Start Freq 9.000 kHz
Stop Freq 26.500000000 GHz
CF Step 2.649999100 GHz Auto Man
Freq Offset 0 Hz

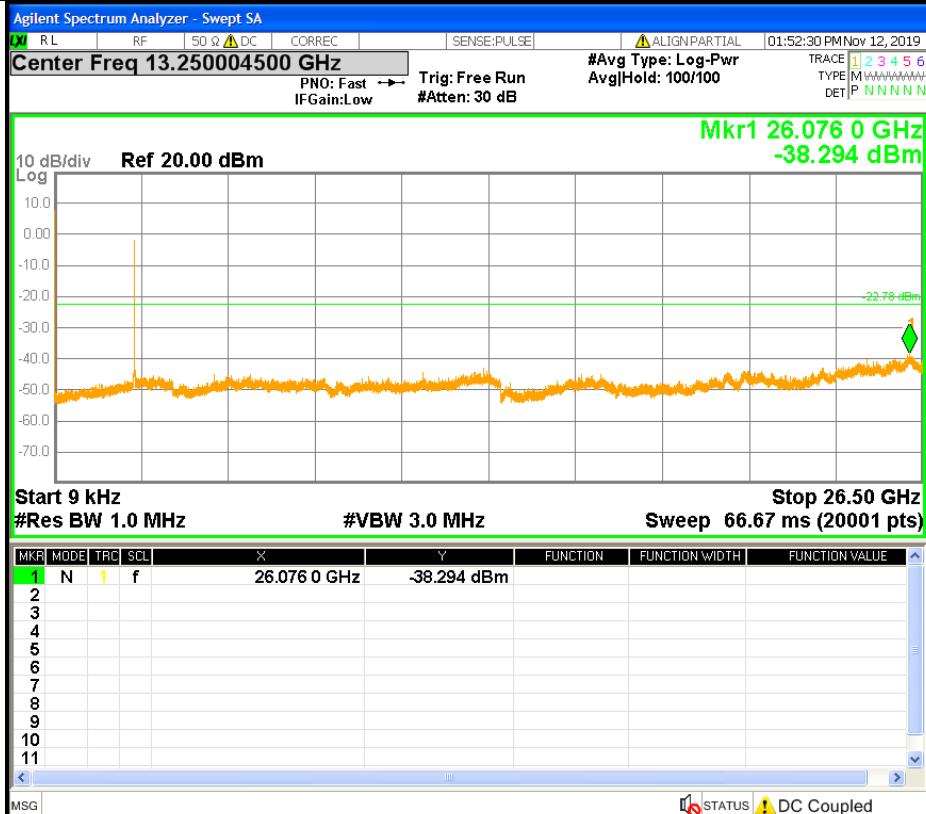
$\pi/4$ DQPSK MCH Graphs

Pref



Frequency
Auto Tune
Center Freq 2.441000000 GHz
Start Freq 2.440000000 GHz
Stop Freq 2.442000000 GHz
CF Step 200.000 kHz Auto Man
Freq Offset 0 Hz

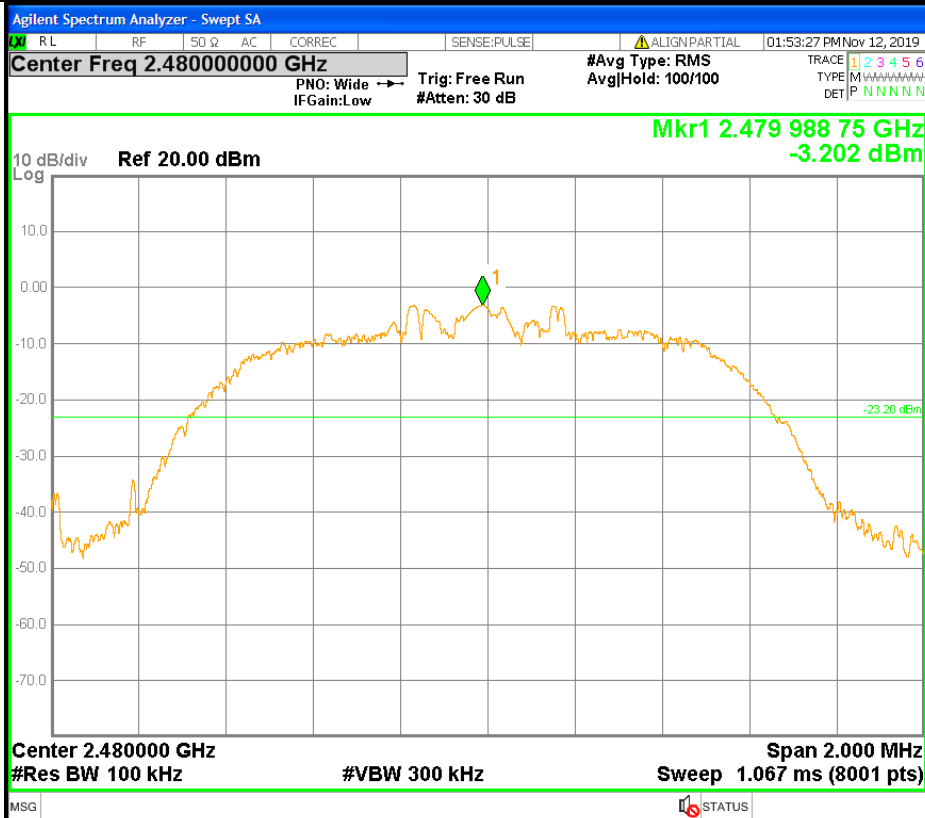
Puw



Frequency
Auto Tune
Center Freq 13.250004500 GHz
Start Freq 9.000 kHz
Stop Freq 26.500000000 GHz
CF Step 2.649999100 GHz Auto Man
Freq Offset 0 Hz

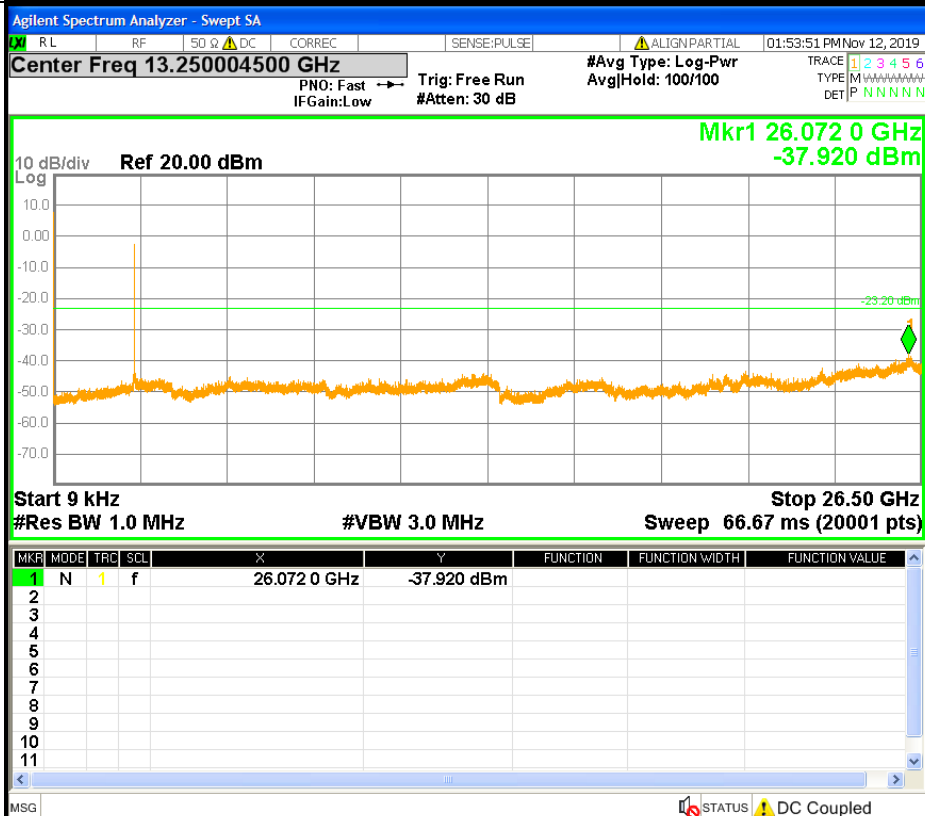
$\pi/4$ DQPSK HCH Graphs

Pref



Frequency
Auto Tune
Center Freq 2.480000000 GHz
Start Freq 2.479000000 GHz
Stop Freq 2.481000000 GHz
CF Step 200.000 kHz Auto Man
Freq Offset 0 Hz

Puw



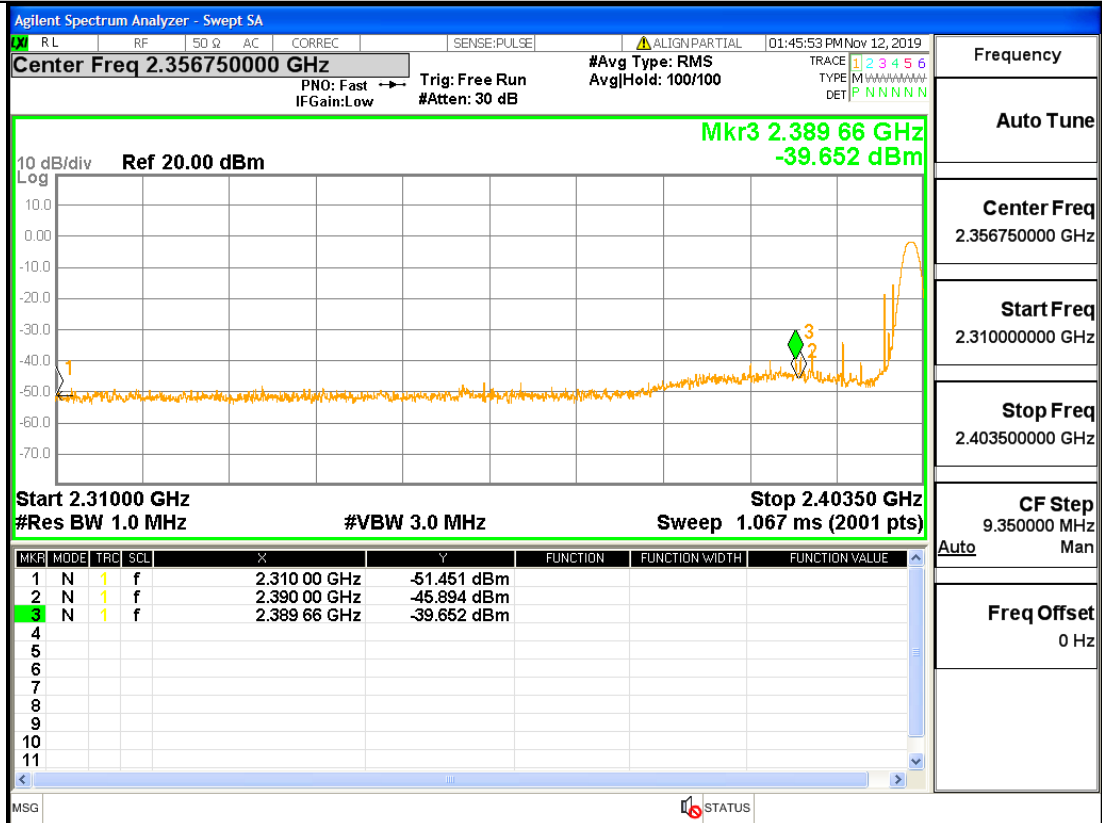
Frequency
Auto Tune
Center Freq 13.250004500 GHz
Start Freq 9.000 kHz
Stop Freq 26.500000000 GHz
CF Step 2.649999100 GHz Auto Man
Freq Offset 0 Hz

A.8 Restrict-band band-edge measurements

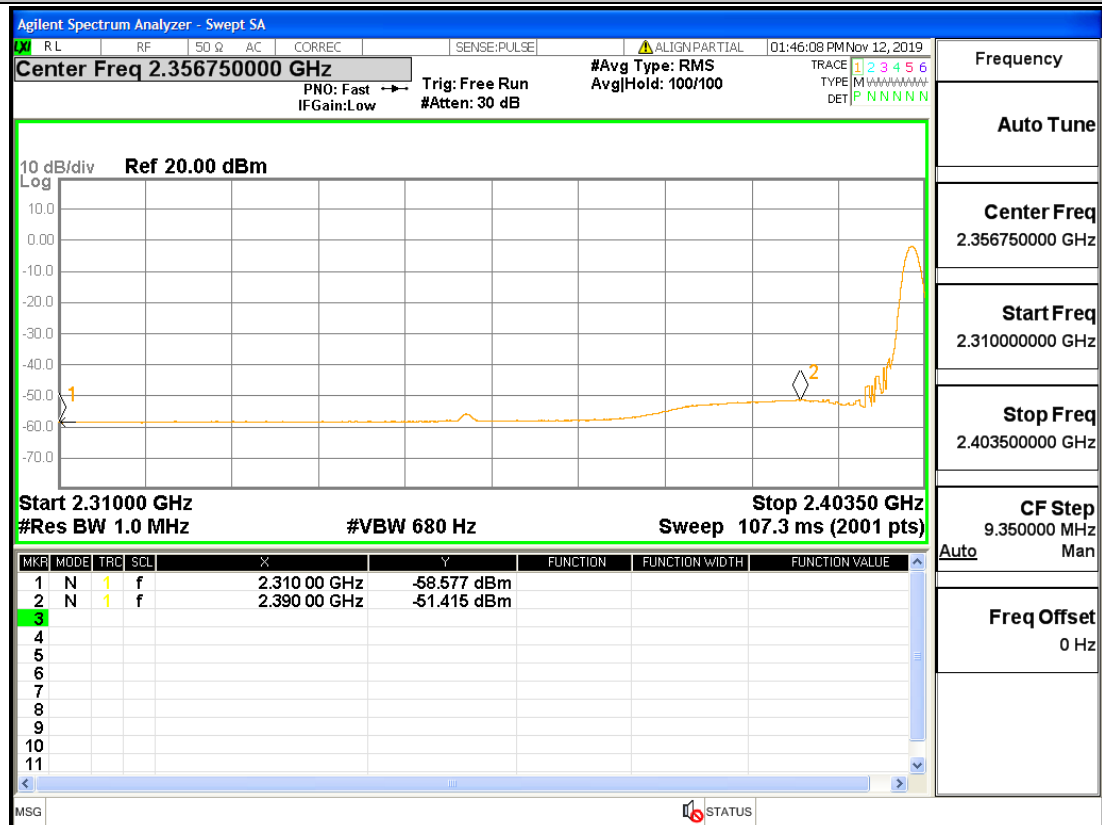
Type	Carrier Frequency (MHz)	Frequency(M Hz)	Gain (dBi)	Ground Factor(dB)	Peak Value(dBm)	E [dBuV/m]	Limit [dBuV/m]	Conclusion
1DH5	2402	2389.662	2.00	0.00	-39.65	57.55	74	Pass
1DH5	2480	2485.348	2.00	0.00	-35.89	61.31	74	Pass
2DH5	2402	2390.000	2.00	0.00	-43.96	53.24	74	Pass
2DH5	2480	2483.993	2.00	0.00	-32.91	64.29	74	Pass

Type	Carrier Frequency (MHz)	Frequency(M Hz)	Gain	Ground Factor	Average Value(dBm)	E [dBuV/m]	Limit [dBuV/m]	Conclusion
1DH5	2402	2389.662	2.00	0.00	-51.42	45.78	54	Pass
1DH5	2480	2485.348	2.00	0.00	-48.50	48.70	54	Pass
2DH5	2402	2390.000	2.00	0.00	-51.05	46.15	54	Pass
2DH5	2480	2483.993	2.00	0.00	-49.70	47.50	54	Pass

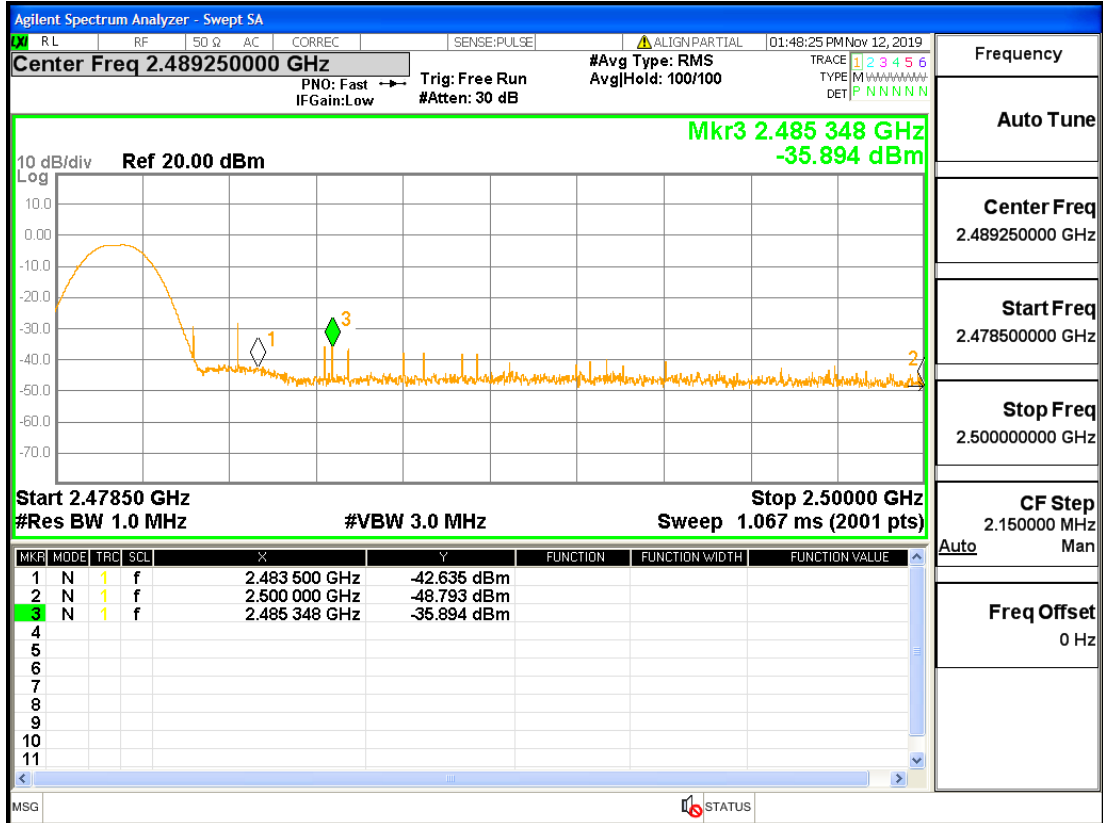
Restrict-band band-edge measurements_2402_PEAK_DH5



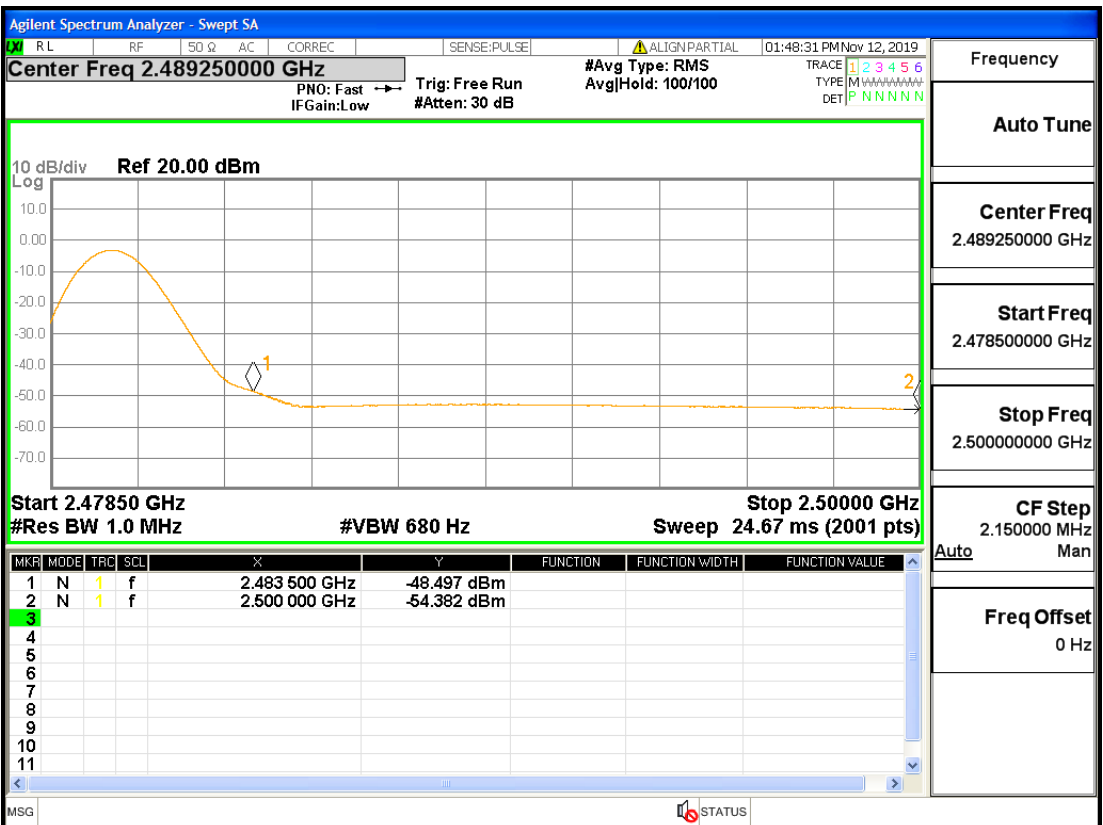
Restrict-band band-edge measurements_2402_AV_DH5



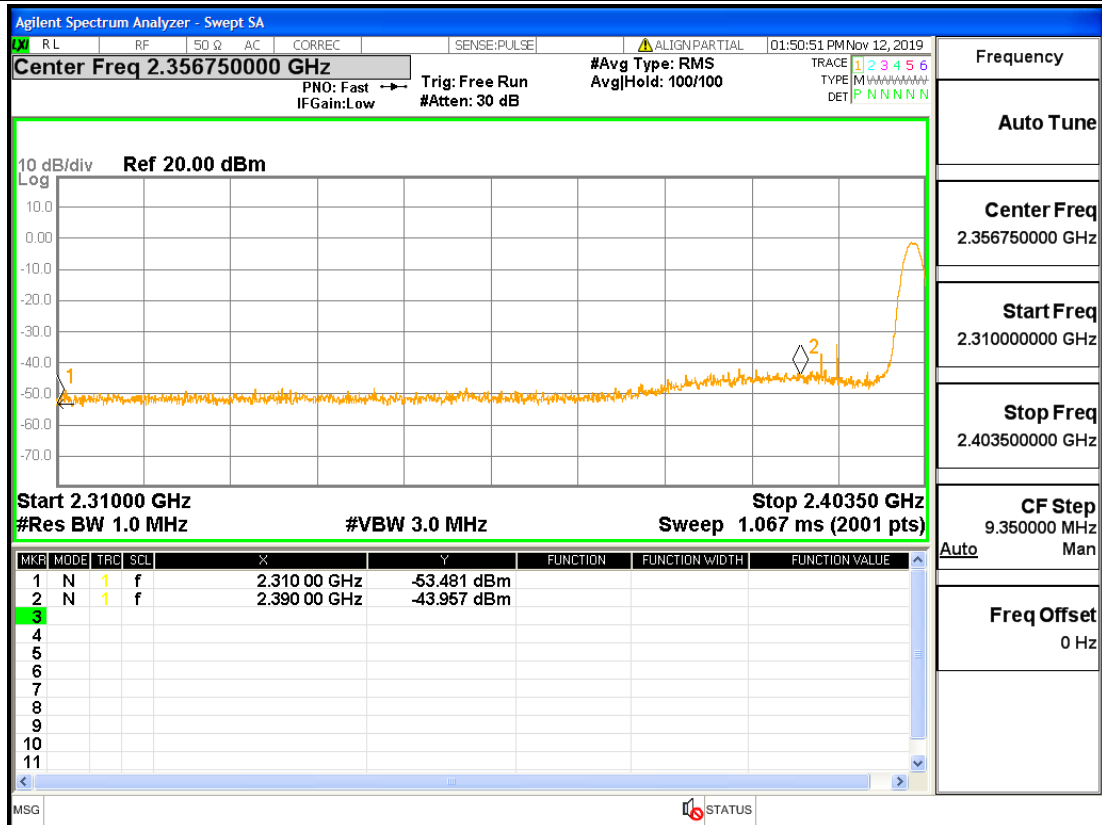
Restrict-band band-edge measurements_2480_PEAK_DH5



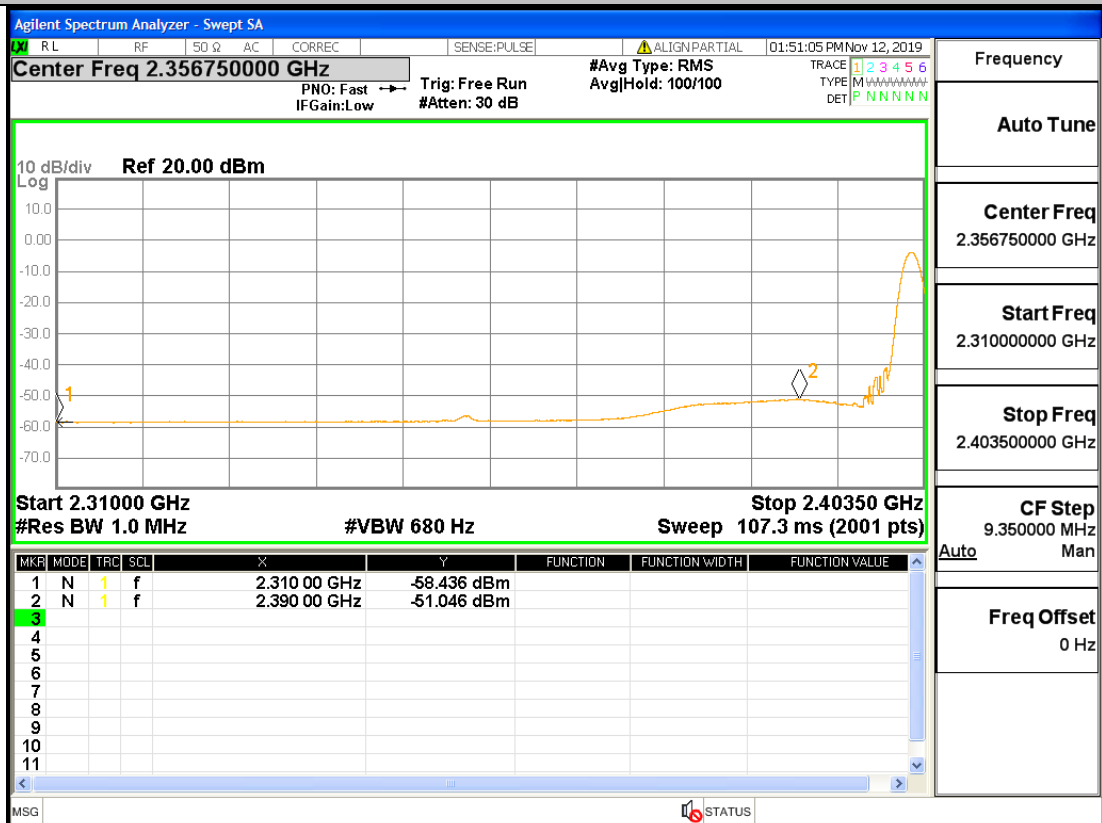
Restrict-band band-edge measurements_2480_AV_DH5



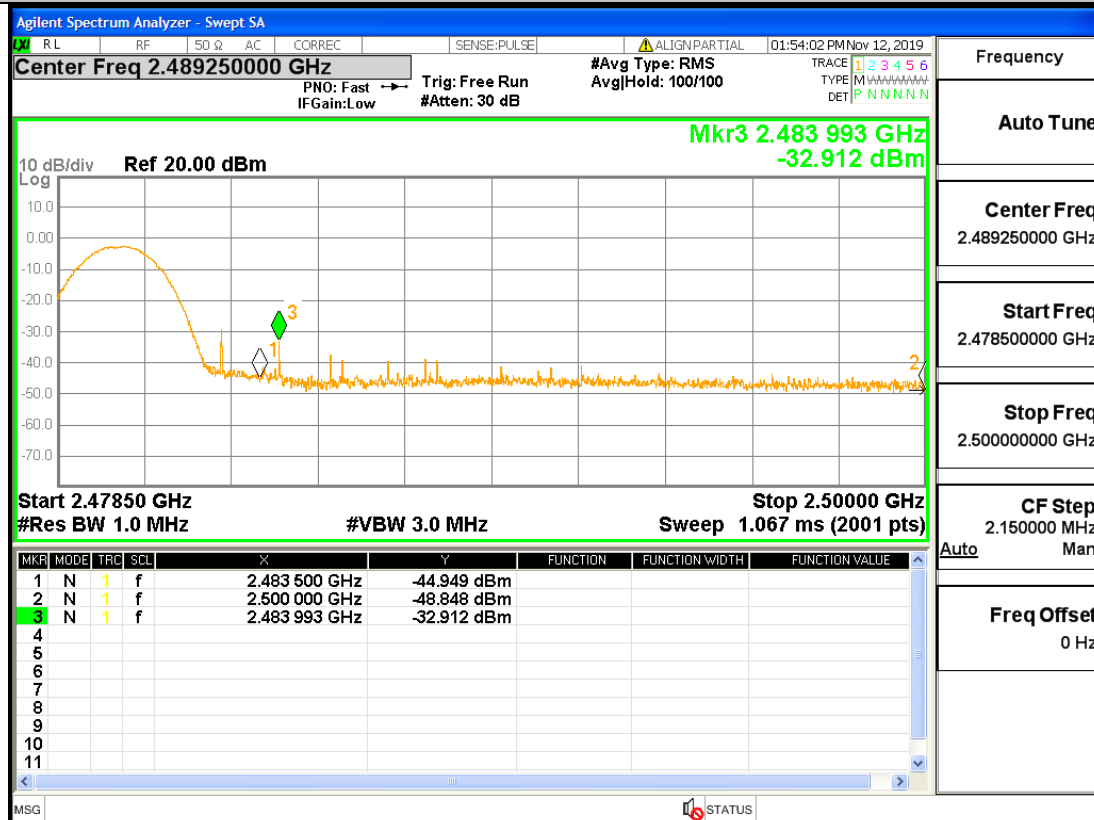
Restrict-band band-edge measurements_2402_PEAK_2DH5



Restrict-band band-edge measurements_2402_AV_2DH5



Restrict-band band-edge measurements_2480_PEAK_2DH5



Restrict-band band-edge measurements_2480_AV_2DH5

