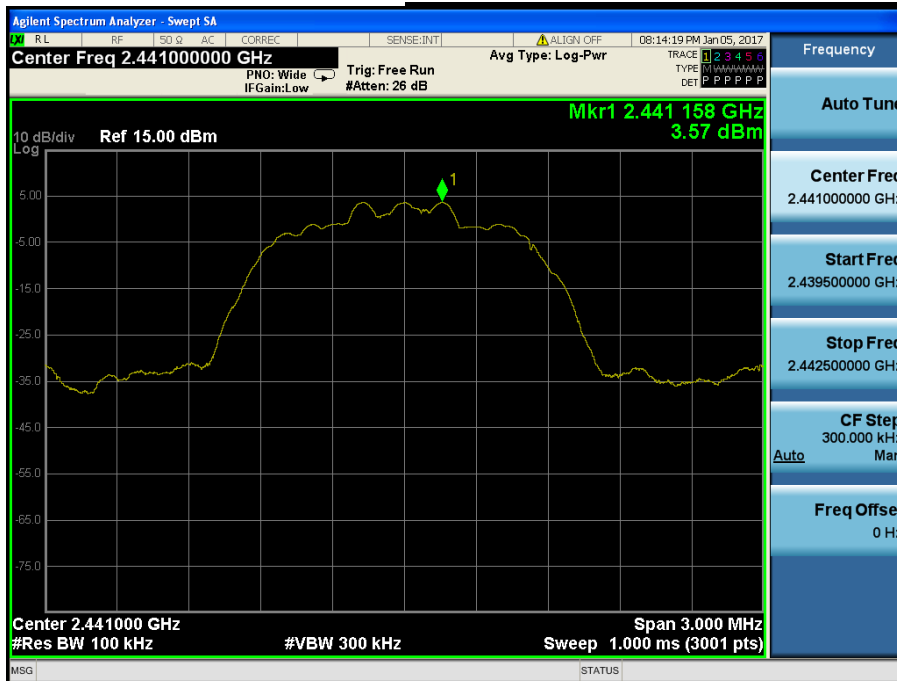


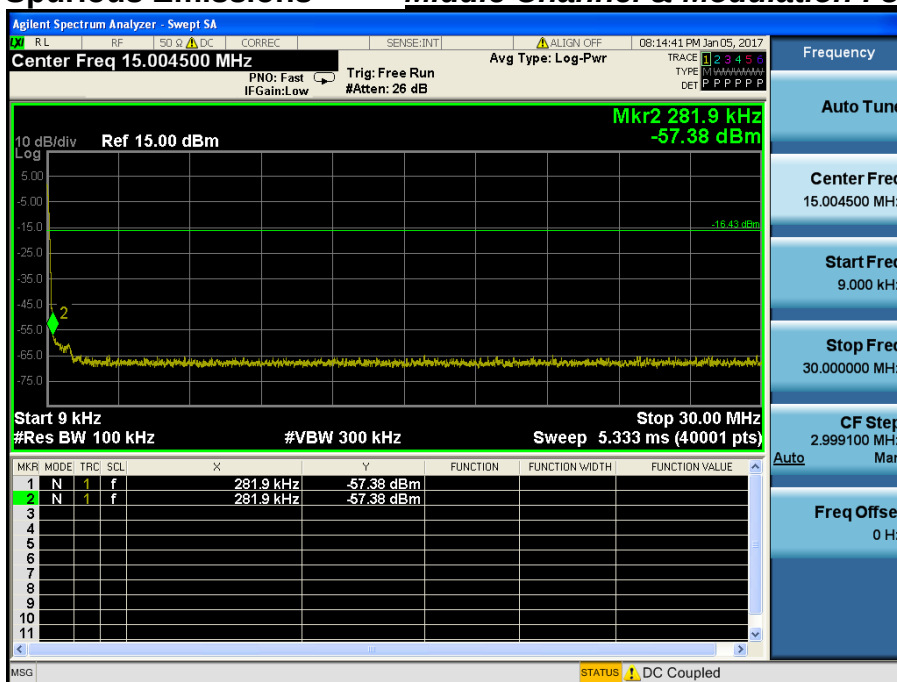
Reference for limit

Middle Channel & Modulation : 8DPSK



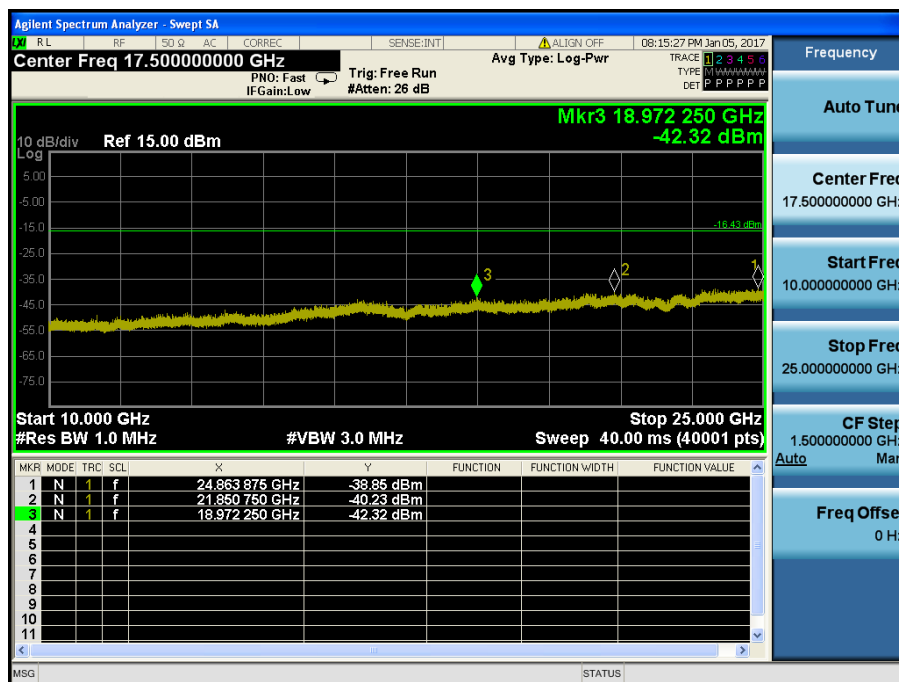
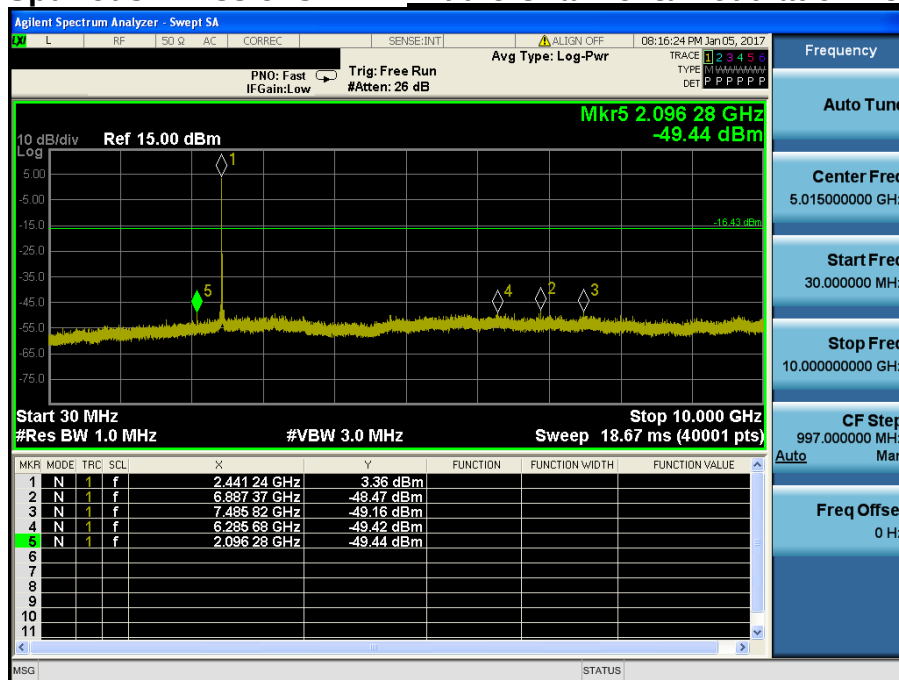
Conducted Spurious Emissions

Middle Channel & Modulation : 8DPSK



Conducted Spurious Emissions

Middle Channel & Modulation : 8DPSK



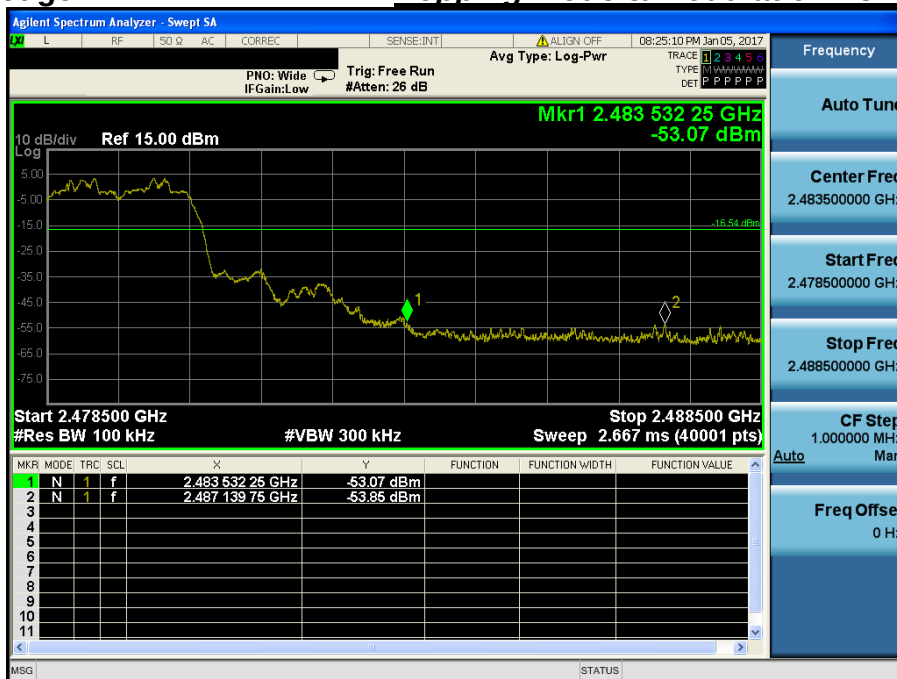
High Band-edge

Highest Channel & Modulation : 8DPSK



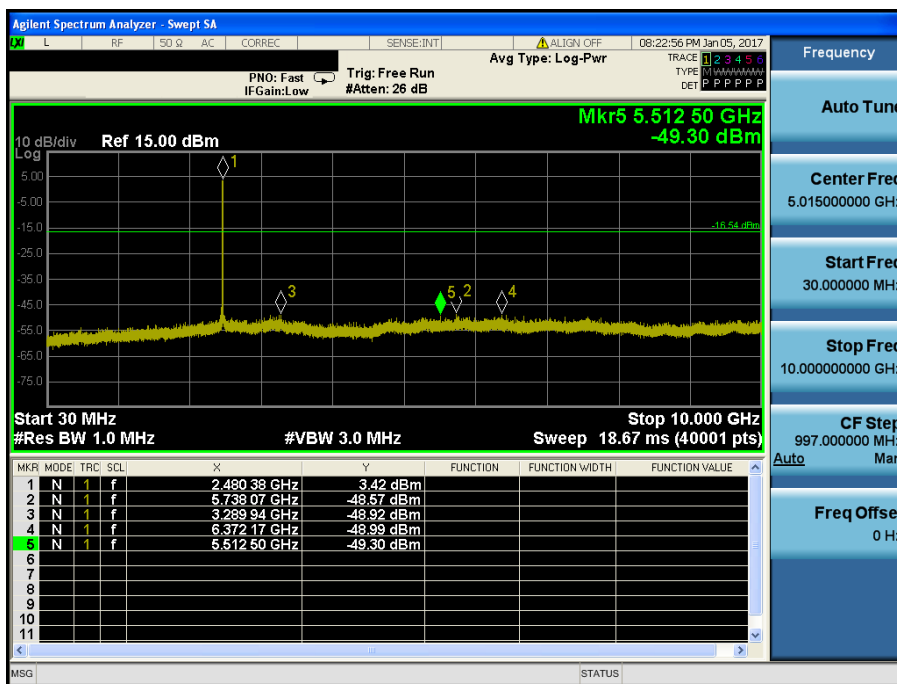
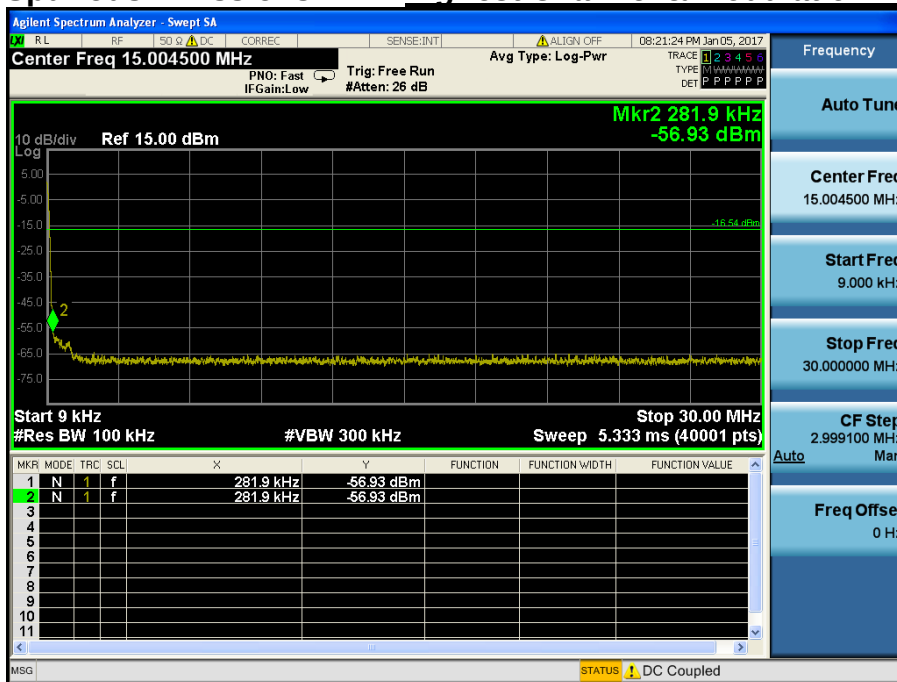
High Band-edge

Hopping mode & Modulation : 8DPSK



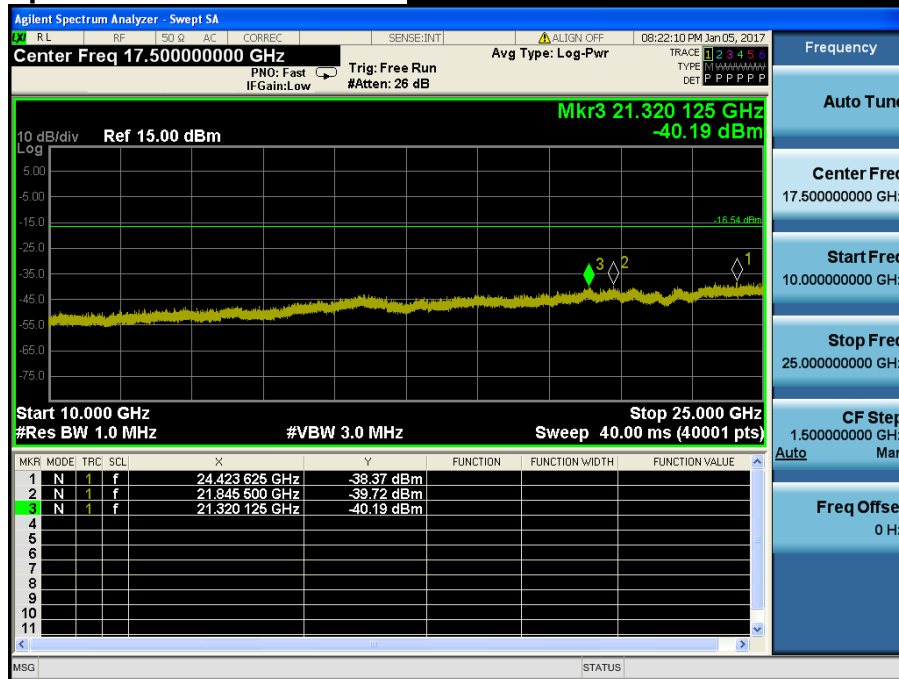
Conducted Spurious Emissions

Highest Channel & Modulation : 8DPSK



Conducted Spurious Emissions

Highest Channel & Modulation : 8DPSK



8. Transmitter AC Power Line Conducted Emission

8.1 Test Setup

Refer to test setup photo.

8.2 Limit

According to §15.207(a) for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table, as measured using a 50 uH/50 ohm line impedance stabilization network (LISN).

Compliance with the provision of this paragraph shall on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower applies at the boundary between the frequency ranges.

Frequency Range (MHz)	Conducted Limit (dBuV)	
	Quasi-Peak	Average
0.15 ~ 0.5	66 to 56 *	56 to 46 *
0.5 ~ 5	56	46
5 ~ 30	60	50

* Decreases with the logarithm of the frequency

8.3 Test Procedures

Conducted emissions from the EUT were measured according to the ANSI C63.10.

1. The test procedure is performed in a 6.5 m × 3.5 m × 3.5 m (L × W × H) shielded room. The EUT along with its peripherals were placed on a 1.0 m (W) × 1.5 m (L) and 0.8 m in height wooden table and the EUT was adjusted to maintain a 0.4 meter space from a vertical reference plane.
2. The EUT was connected to power mains through a line impedance stabilization network (LISN) which provides 50 ohm coupling impedance for measuring instrument and the chassis ground was bounded to the horizontal ground plane of shielded room.
3. All peripherals were connected to the second LISN and the chassis ground also bounded to the horizontal ground plane of shielded room.
4. The excess power cable between the EUT and the LISN was bundled. The power cables of peripherals were unbundled. All connecting cables of EUT and peripherals were moved to find the maximum emission.

8.4. Test Results

AC Line Conducted Emissions (Graph) = Modulation : GFSK Antenna 1

Results of Conducted Emission

DT&C

Date 2017-02-09

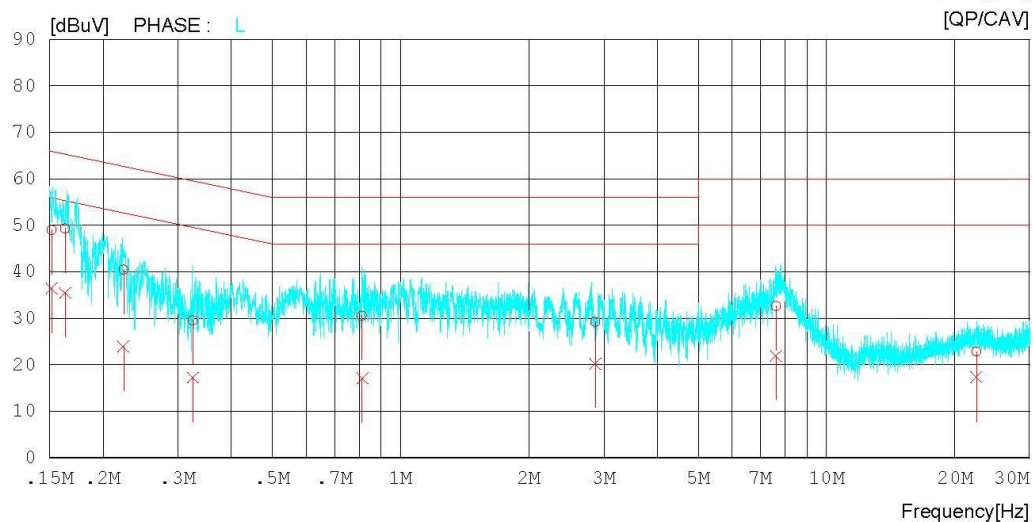
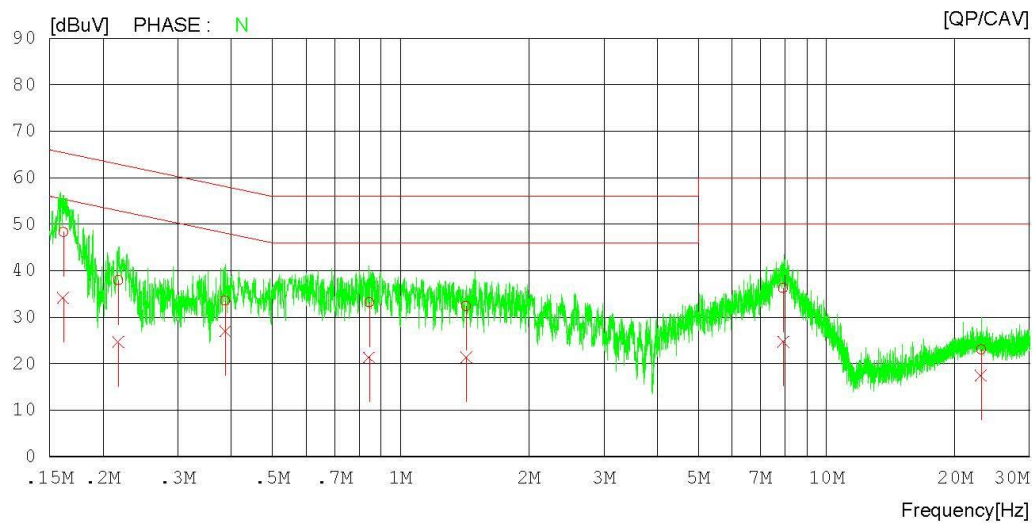
Model IW09
Function BT
Mode 1Mbps
Test condition Hopping

Temp/Humi.
Power Supply
Operator

23 'C 48 %
AC 120 V 60 Hz
J.W.Kim

Memo Antenna-1

LIMIT : FCC P15.207 QP
FCC P15.207 AV



AC Line Conducted Emissions (List) = Modulation : GFSK Antenna 1

Results of Conducted Emission

DT&C Date 2017-02-09

Model	IW09	Temp/Humi.	23 'C	48 %
Function	BT	Power Supply	AC 120 V	60 Hz
Mode	1Mbps	Operator	J.W.Kim	
Test condition	Hopping			
Memo	Antenna-1			

LIMIT : FCC P15.207 QP
FCC P15.207 AV

NO	FREQ [MHz]	READING		C.FACTOR [dB]	RESULT		LIMIT		MARGIN		PHASE
		QP	CAV		QP	CAV	QP	CAV	QP	CAV	
		[dBuV]	[dBuV]		[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	
1	0.16144	45.31	31.17	2.97	48.28	34.14	65.39	55.39	17.11	21.25	N
2	0.21713	36.07	22.69	1.86	37.93	24.55	62.93	52.93	25.00	28.38	N
3	0.38723	32.61	26.04	0.91	33.52	26.95	58.12	48.12	24.60	21.17	N
4	0.84415	32.68	20.91	0.45	33.13	21.36	56.00	46.00	22.87	24.64	N
5	1.42500	32.04	21.09	0.35	32.39	21.44	56.00	46.00	23.61	24.56	N
6	7.91000	35.92	24.30	0.37	36.29	24.67	60.00	50.00	23.71	25.33	N
7	23.03320	22.49	16.88	0.54	23.03	17.42	60.00	50.00	36.97	32.58	N
8	0.15155	45.57	33.06	3.34	48.91	36.40	65.91	55.91	17.00	19.51	L
9	0.16313	46.35	32.49	2.93	49.28	35.42	65.30	55.30	16.02	19.88	L
10	0.22357	38.60	22.02	1.83	40.43	23.85	62.69	52.69	22.26	28.84	L
11	0.32528	28.38	16.07	1.14	29.52	17.21	59.57	49.57	30.05	32.36	L
12	0.81176	30.07	16.55	0.49	30.56	17.04	56.00	46.00	25.44	28.96	L
13	2.86520	28.76	19.89	0.35	29.11	20.24	56.00	46.00	26.89	25.76	L
14	7.60760	32.21	21.48	0.41	32.62	21.89	60.00	50.00	27.38	28.11	L
15	22.45320	22.13	16.68	0.63	22.76	17.31	60.00	50.00	37.24	32.69	L

AC Line Conducted Emissions (Graph) = Modulation : GFSK Antenna 2

Results of Conducted Emission

DT&C

Date 2017-02-09

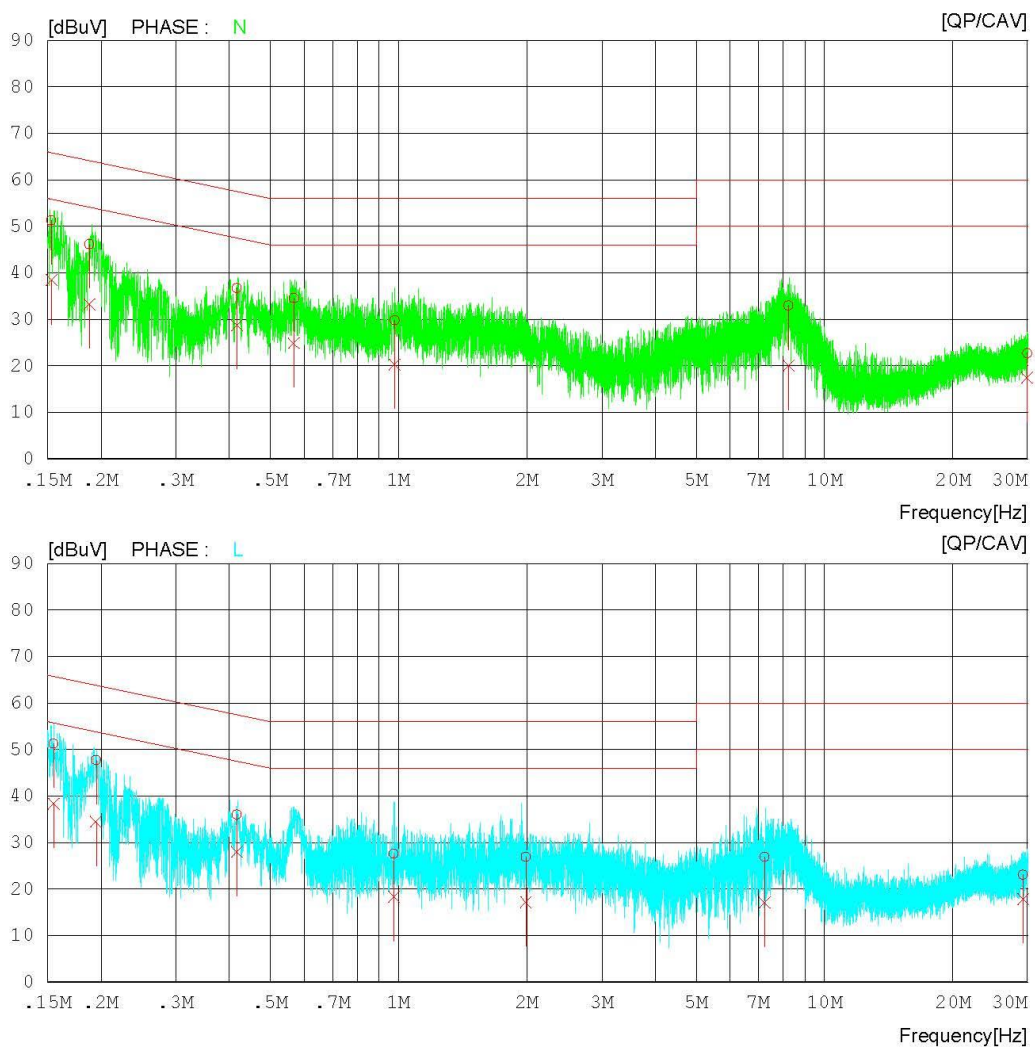
Model IW09
Function BT
Mode 1Mbps
Test condition Hopping

Temp/Humi.
Power Supply
Operator

23 'C 48 %
AC 120 V 60 Hz
J.W.Kim

Memo Antenna-2

LIMIT : FCC P15.207 QP
FCC P15.207 AV



AC Line Conducted Emissions (List) = Modulation : GFSK Antenna 2

Results of Conducted Emission

DT&C

Date 2017-02-09

Model IW09
Function BT
Mode 1Mbps
Test condition Hopping

Temp/Humi. 23 'C 48 %
Power Supply AC 120 V 60 Hz
Operator J.W.Kim

Memo Antenna-2

LIMIT : FCC P15.207 QP
FCC P15.207 AV

NO	FREQ [MHz]	READING		C.FACTOR [dB]	RESULT		LIMIT		MARGIN		PHASE
		QP	CAV		QP	CAV	QP	CAV	QP	CAV	
		[dBuV]	[dBuV]		[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	
1	0.15316	48.05	35.21	3.25	51.30	38.46	65.83	55.83	14.53	17.37	N
2	0.18814	43.89	30.94	2.29	46.18	33.23	64.12	54.12	17.94	20.89	N
3	0.41707	35.88	27.90	0.84	36.72	28.74	57.51	47.51	20.79	18.77	N
4	0.56702	33.97	24.26	0.62	34.59	24.88	56.00	46.00	21.41	21.12	N
5	0.97845	29.31	19.87	0.42	29.73	20.29	56.00	46.00	26.27	25.71	N
6	8.23100	32.59	19.72	0.37	32.96	20.09	60.00	50.00	27.04	29.91	N
7	29.89500	22.17	16.86	0.62	22.79	17.48	60.00	50.00	37.21	32.52	N
8	0.15494	48.02	35.05	3.22	51.24	38.27	65.73	55.73	14.49	17.46	L
9	0.19498	45.51	32.25	2.18	47.69	34.43	63.82	53.82	16.13	19.39	L
10	0.41668	35.09	27.08	0.87	35.96	27.95	57.51	47.51	21.55	19.56	L
11	0.97494	27.09	17.89	0.44	27.53	18.33	56.00	46.00	28.47	27.67	L
12	1.98900	26.56	16.82	0.36	26.92	17.18	56.00	46.00	29.08	28.82	L
13	7.22740	26.50	16.67	0.40	26.90	17.07	60.00	50.00	33.10	32.93	L
14	29.27060	22.28	17.02	0.79	23.07	17.81	60.00	50.00	36.93	32.19	L

AC Line Conducted Emissions (Graph) = Modulation : GFSK Antenna 3

Results of Conducted Emission

DT&C

Date 2017-02-09

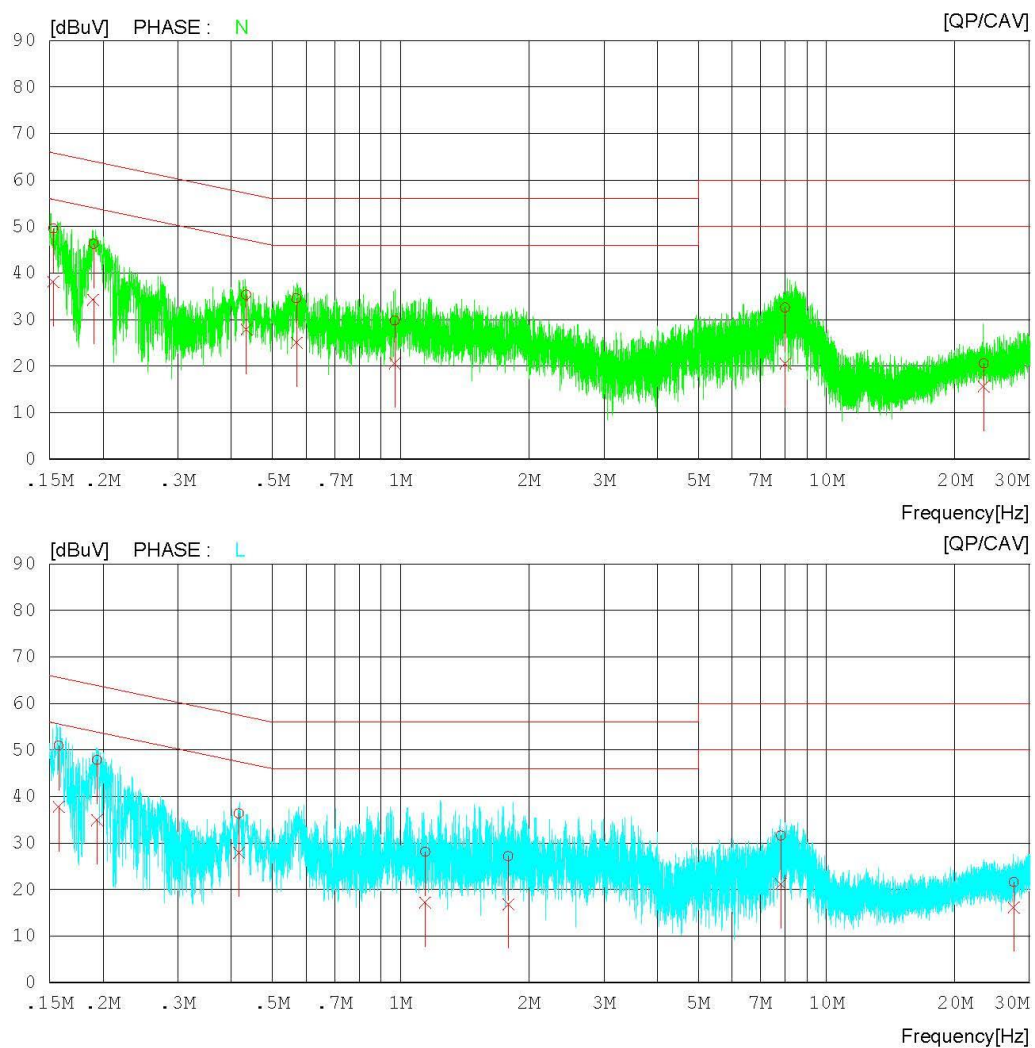
Model IW09
Function BT
Mode 1Mbps
Test condition Hopping

Temp/Humi.
Power Supply
Operator

23 'C 48 %
AC 120 V 60 Hz
J.W.Kim

Memo Antenna-3

LIMIT : FCC P15.207 QP
FCC P15.207 AV



AC Line Conducted Emissions (List) = Modulation : GFSK Antenna 3

Results of Conducted Emission

DT&C

Date 2017-02-09

Model IW09
Function BT
Mode 1Mbps
Test condition Hopping
Memo Antenna-3

Temp/Humi. 23 'C 48 %
Power Supply AC 120 V 60 Hz
Operator J.W.Kim

LIMIT : FCC P15.207 QP
FCC P15.207 AV

NO	FREQ [MHz]	READING		C.FACTOR [dB]	RESULT		LIMIT		MARGIN		PHASE
		QP	CAV		QP	CAV	QP	CAV	QP	CAV	
		[dBuV]	[dBuV]		[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	
1	0.15289	46.29	34.90	3.26	49.55	38.16	65.84	55.84	16.29	17.68	N
2	0.18996	44.01	32.03	2.25	46.26	34.28	64.04	54.04	17.78	19.76	N
3	0.43450	34.58	27.12	0.81	35.39	27.93	57.17	47.17	21.78	19.24	N
4	0.56947	33.95	24.42	0.61	34.56	25.03	56.00	46.00	21.44	20.97	N
5	0.96843	29.30	20.20	0.42	29.72	20.62	56.00	46.00	26.28	25.38	N
6	7.99680	32.23	20.27	0.37	32.60	20.64	60.00	50.00	27.40	29.36	N
7	23.38440	20.05	15.06	0.54	20.59	15.60	60.00	50.00	39.41	34.40	N
8	0.15757	47.72	34.59	3.13	50.85	37.72	65.59	55.59	14.74	17.87	L
9	0.19387	45.60	32.66	2.20	47.80	34.86	63.87	53.87	16.07	19.01	L
10	0.41754	35.43	27.02	0.87	36.30	27.89	57.50	47.50	21.20	19.61	L
11	1.14180	27.65	16.75	0.41	28.06	17.16	56.00	46.00	27.94	28.84	L
12	1.79140	26.78	16.46	0.37	27.15	16.83	56.00	46.00	28.85	29.17	L
13	7.80780	31.08	20.73	0.41	31.49	21.14	60.00	50.00	28.51	28.86	L
14	27.51860	20.83	15.45	0.74	21.57	16.19	60.00	50.00	38.43	33.81	L

9. Antenna Requirement

Describe how the EUT complies with the requirement that either its antenna is permanently attached, or that it employs a unique antenna connector, for every antenna proposed for use with the EUT.

Conclusion: **Comply**

Antenna 1, 2, 3

The External antenna employs a unique antenna connector.

- Minimum Standard :

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions.

10. Occupied Bandwidth (99 %)

10.1 Test Setup

Refer to the APPENDIX I.

10.2 Limit

Limit : Not Applicable

10.3 Test Procedure

The 99 % power bandwidth was measured with a calibrated spectrum analyzer.

The resolution bandwidth (RBW) shall be in the range of 1 % to 5 % of the occupied bandwidth (OBW) and video bandwidth (VBW) shall be approximately $3 \times \text{RBW}$.

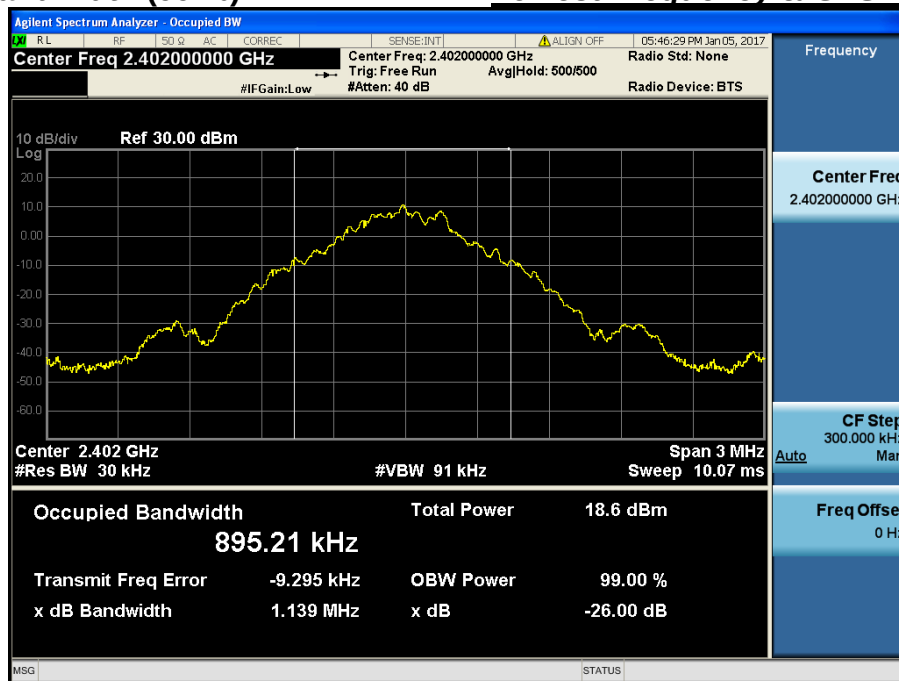
Spectrum analyzer plots are included on the following pages.

10.4 Test Results

Test Mode	Tested Channel	Test Results (MHz)
<u>GFSK</u>	Lowest	0.895
	Middle	0.893
	Highest	0.902
<u>$\pi/4$DQPSK</u>	Lowest	1.177
	Middle	1.180
	Highest	1.179
<u>8DPSK</u>	Lowest	1.172
	Middle	1.172
	Highest	1.166

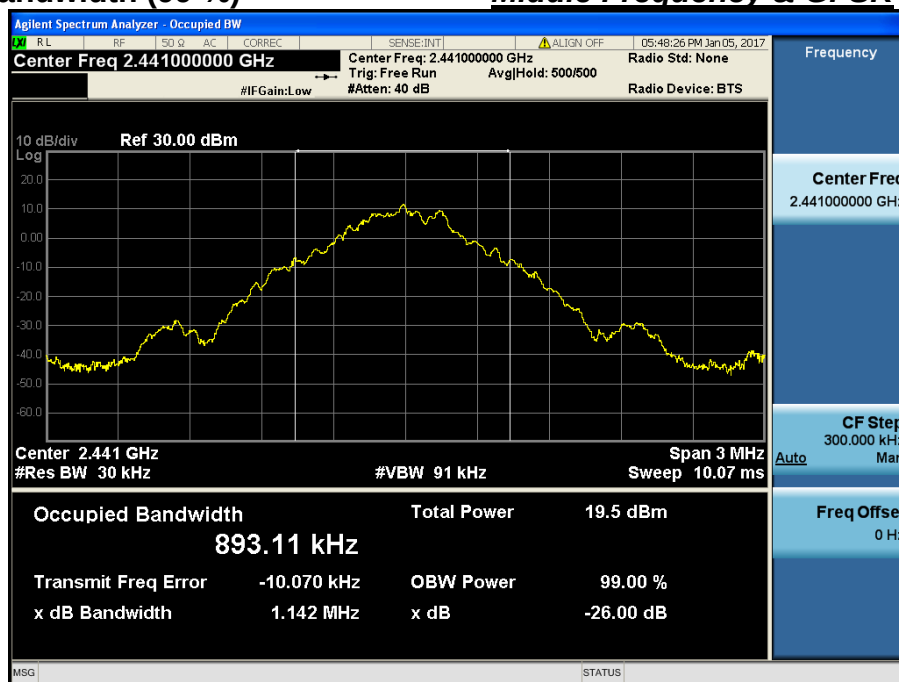
Occupied Bandwidth (99 %)

Lowest Frequency & GFSK



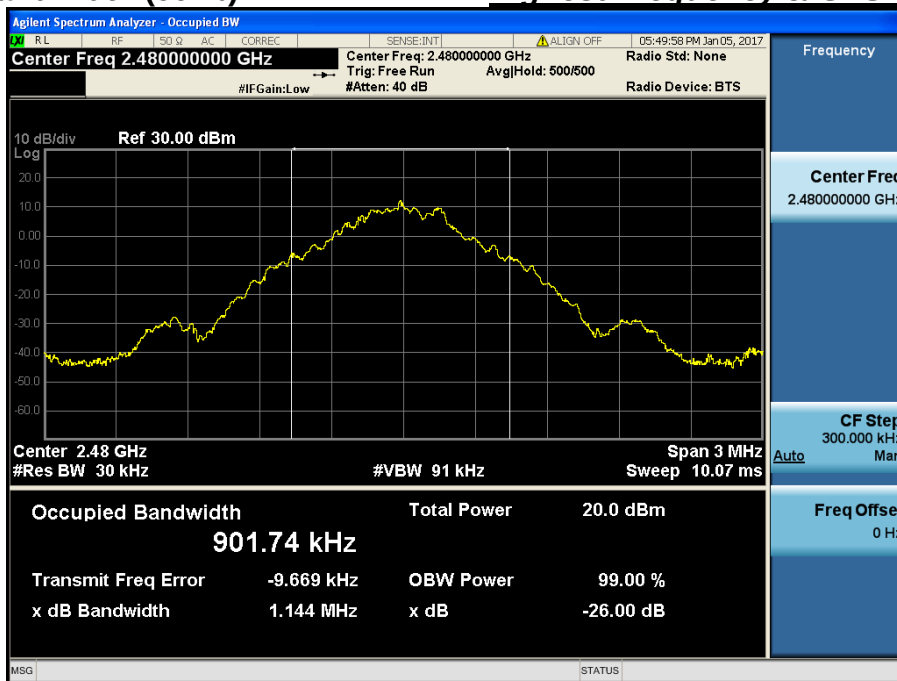
Occupied Bandwidth (99 %)

Middle Frequency & GFSK



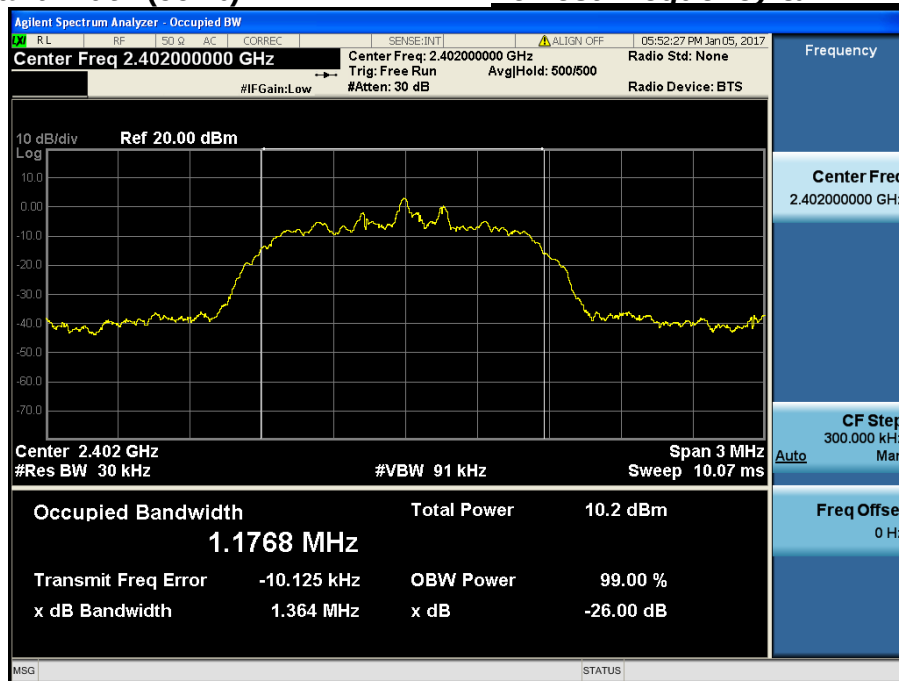
Occupied Bandwidth (99 %)

Highest Frequency & GFSK



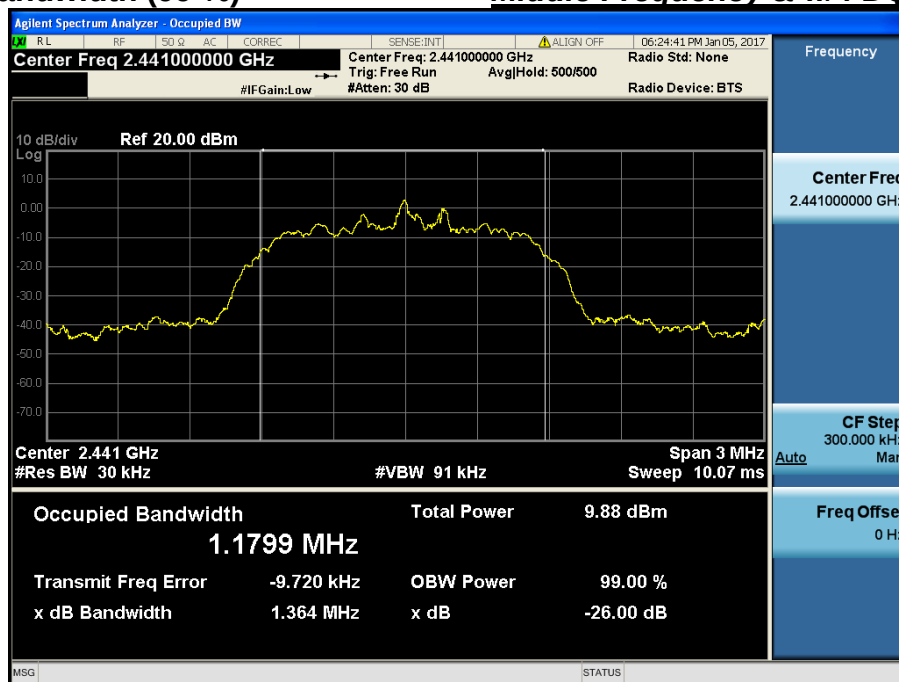
Occupied Bandwidth (99 %)

Lowest Frequency & $\pi/4$ DQPSK



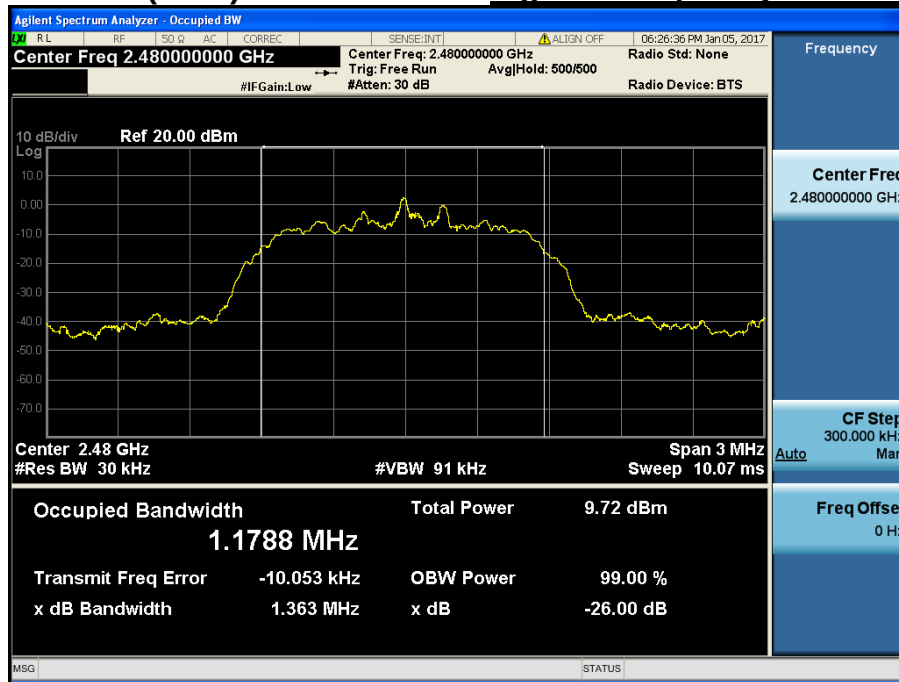
Occupied Bandwidth (99 %)

Middle Frequency & $\pi/4$ DQPSK



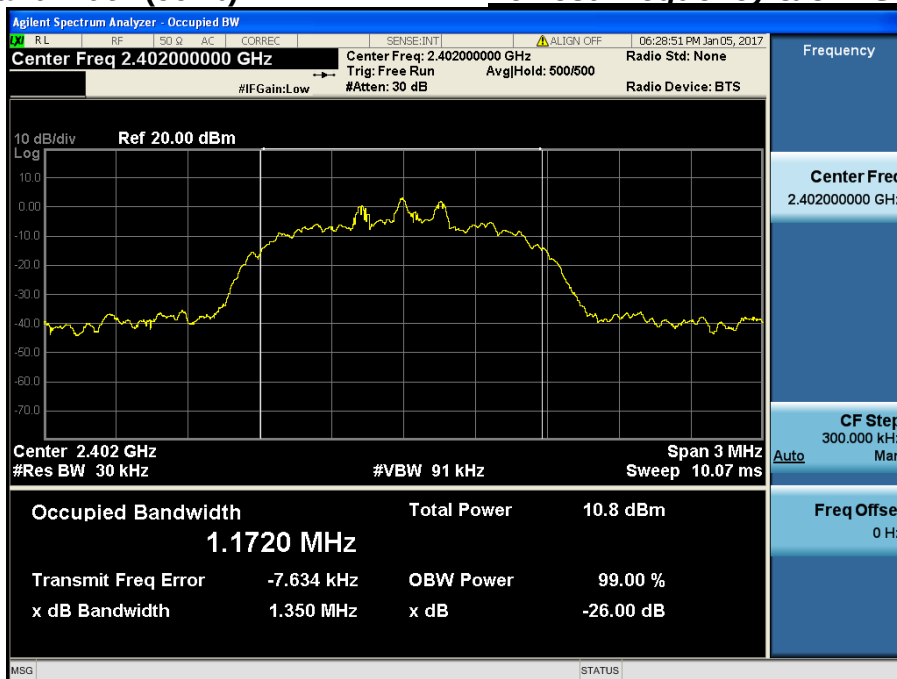
Occupied Bandwidth (99 %)

Highest Frequency & $\pi/4$ DQPSK



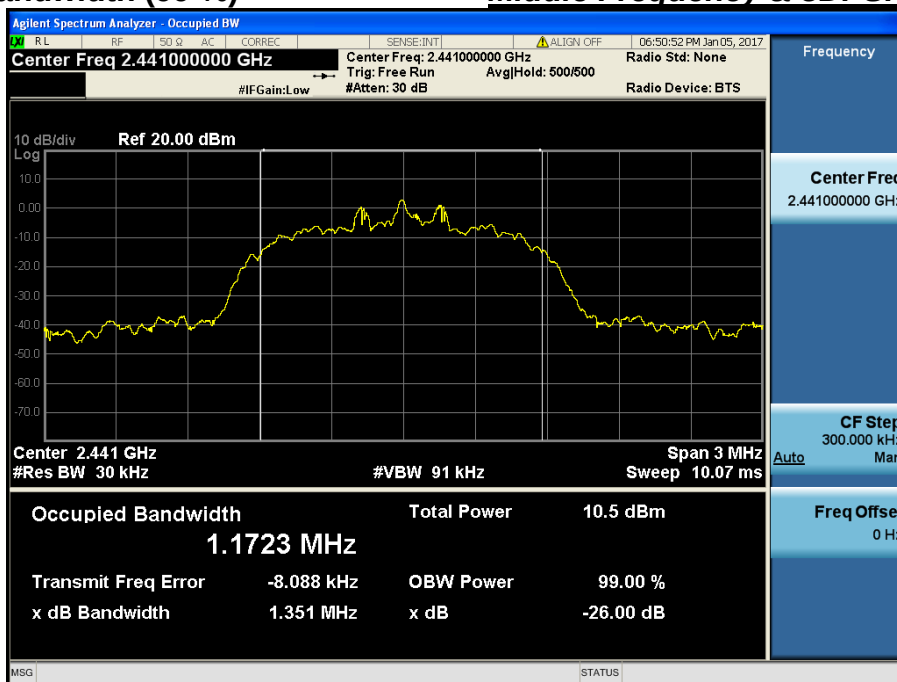
Occupied Bandwidth (99 %)

Lowest Frequency & 8DPSK



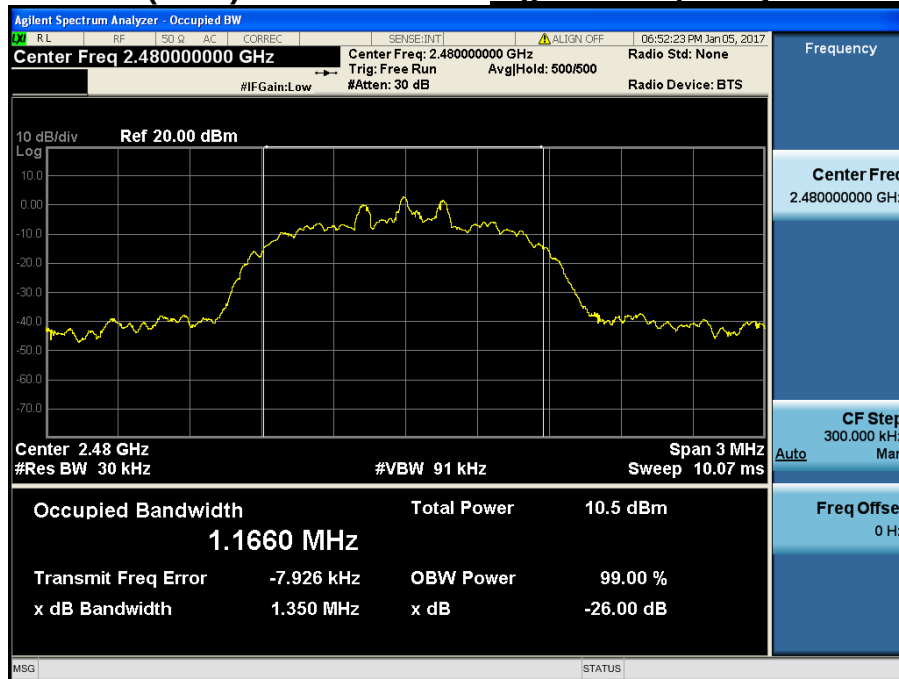
Occupied Bandwidth (99 %)

Middle Frequency & 8DPSK



Occupied Bandwidth (99 %)

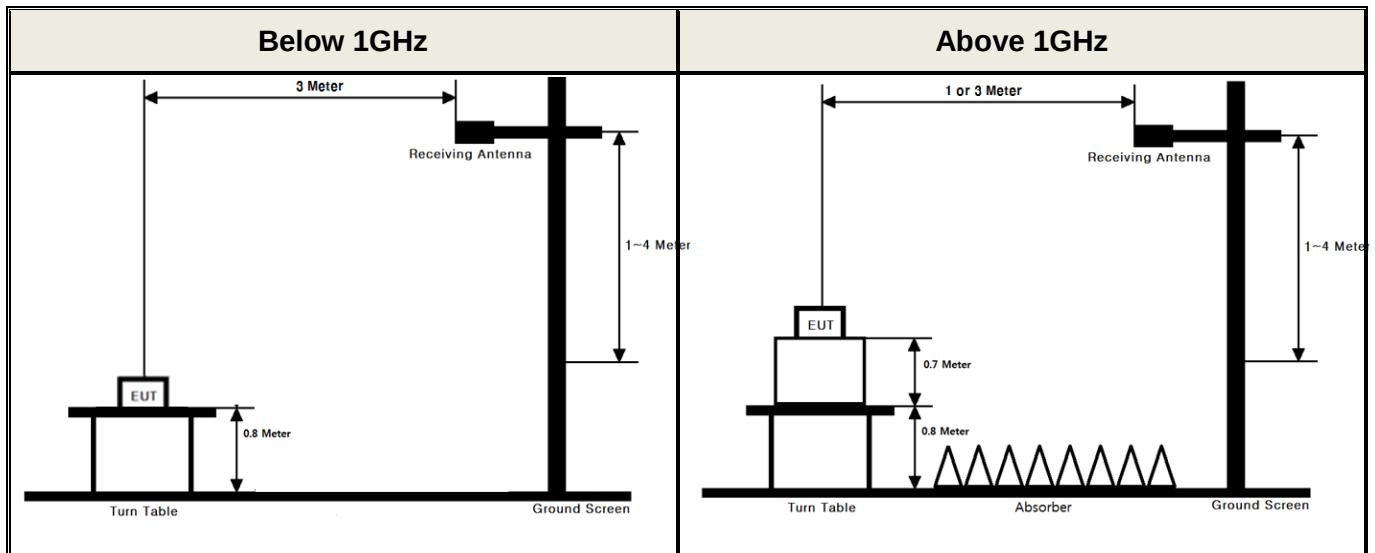
Highest Frequency & 8DPSK



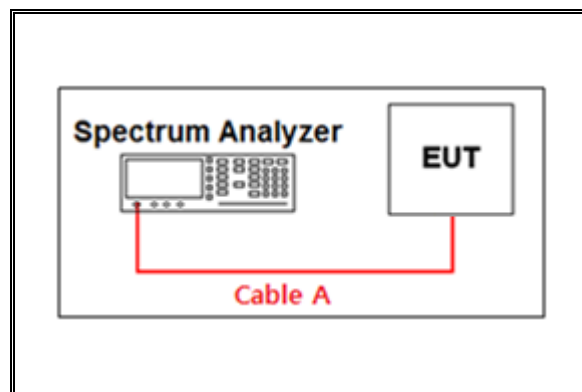
APPENDIX I

Test set up diagrams

▪ Radiated Measurement



▪ Conducted Measurement



Path loss information

Frequency (GHz)	Path Loss (dB)	Frequency (GHz)	Path Loss (dB)
0.03	0.19	15	3.50
1	0.80	20	4.86
2402 & 2441 & 2480	1.30	25	5.35
5	1.82	-	-
10	2.70	-	-

Note 1 : The path loss from EUT to Spectrum analyzer were measured and used for test.

Path loss (S/A's Correction factor) = Cable A

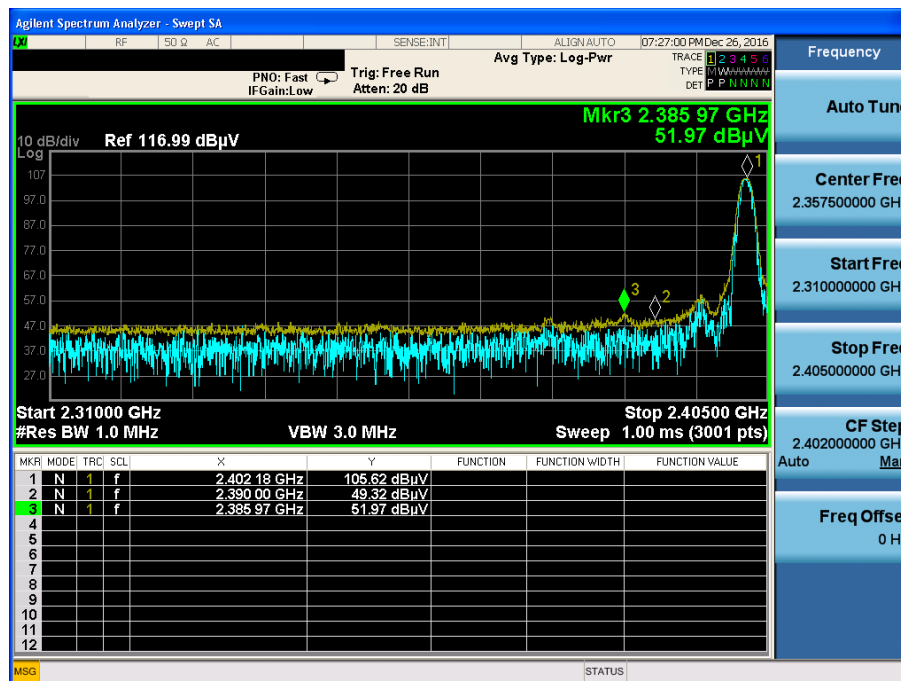
APPENDIX II

Unwanted Emissions (Radiated) Test Plot

Antenna 1

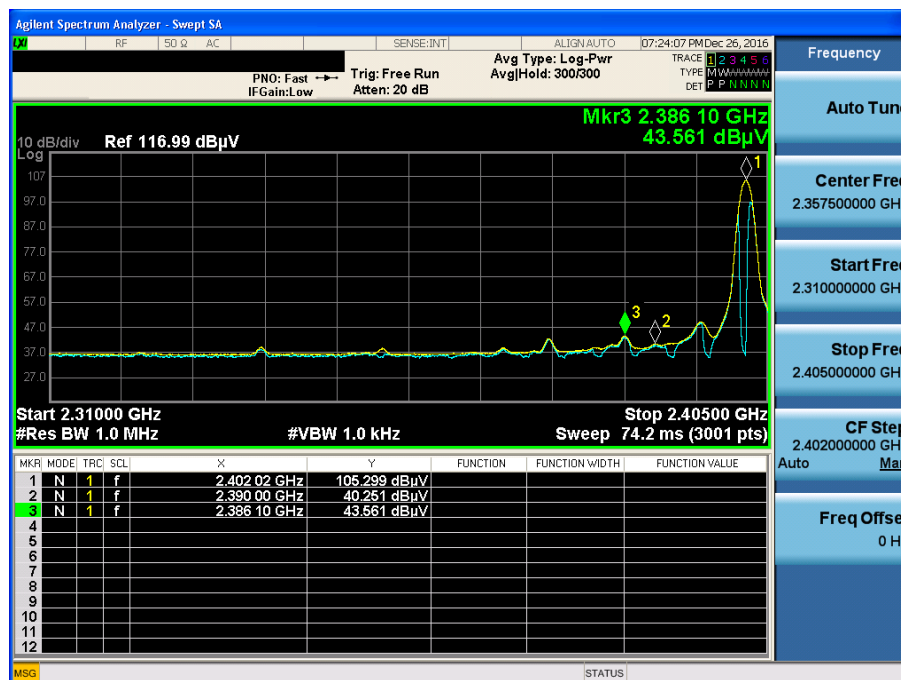
GFSK & Lowest & X & Hor

Detector Mode : PK



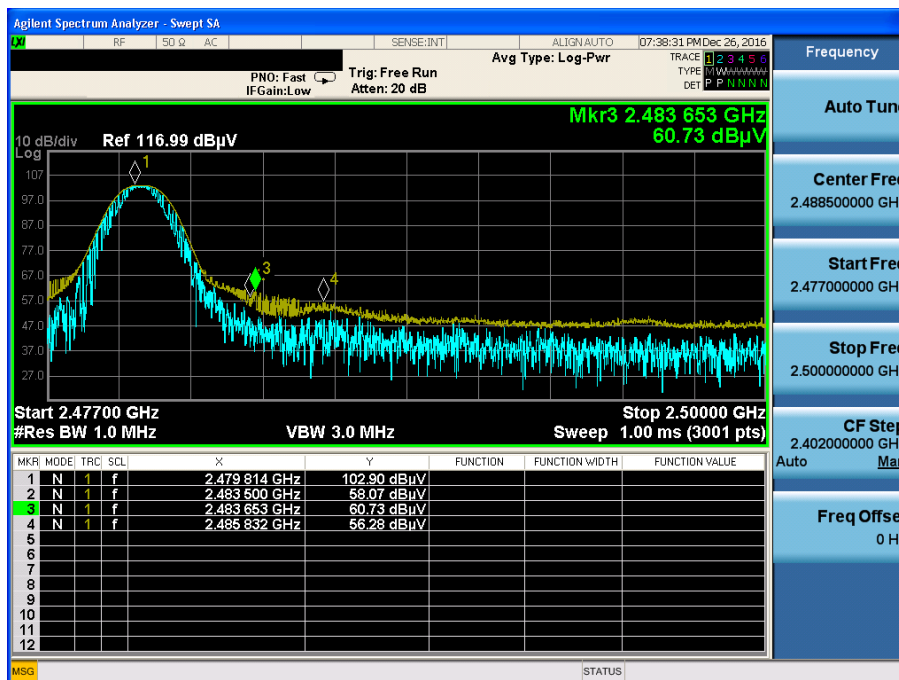
GFSK & Lowest & X & Hor

Detector Mode : AV



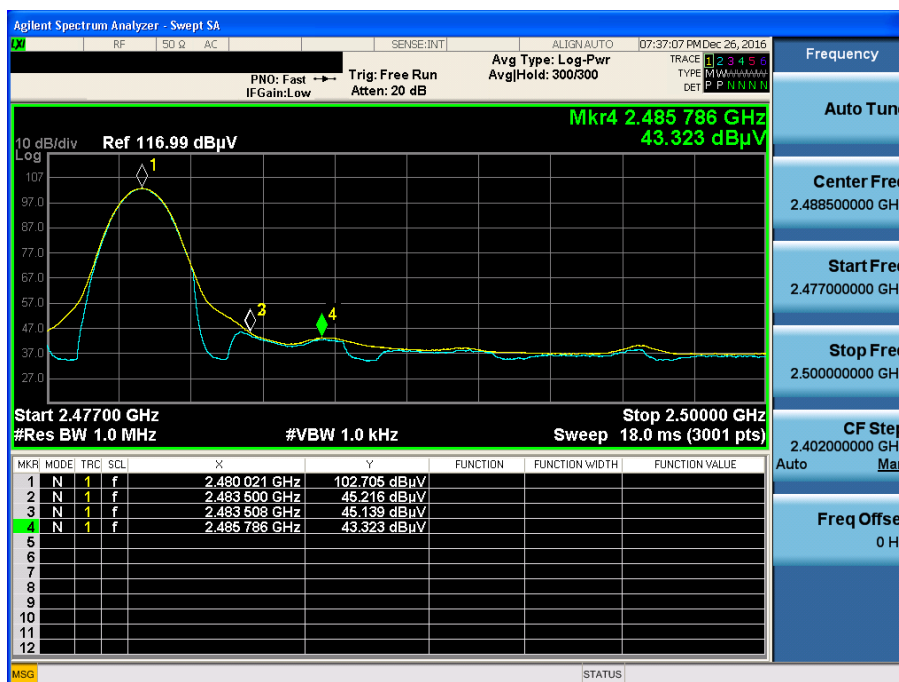
GFSK & Highest & X & Hor

Detector Mode : PK



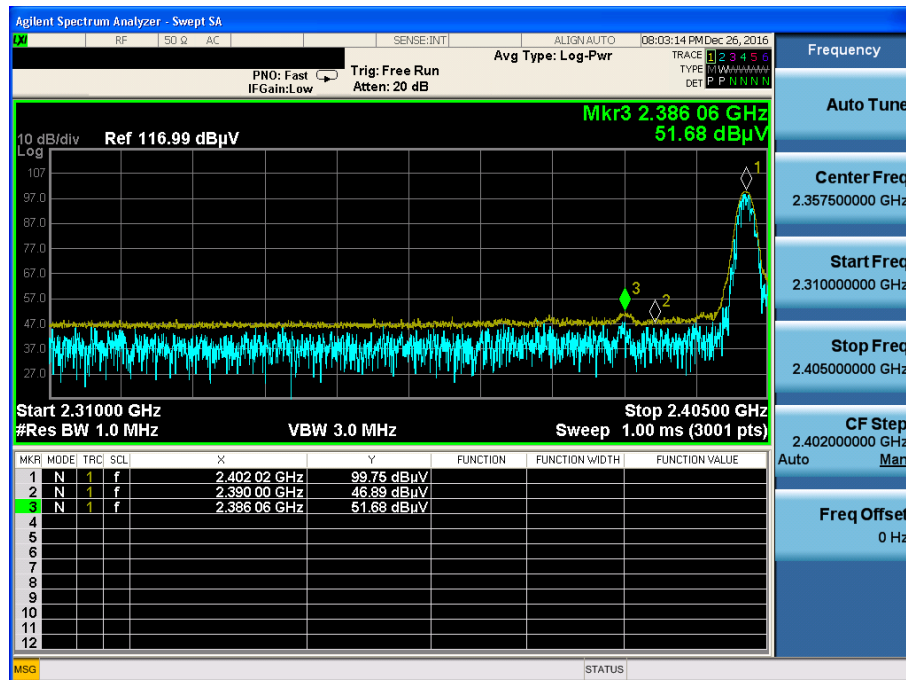
GFSK & Highest & X & Hor

Detector Mode : AV



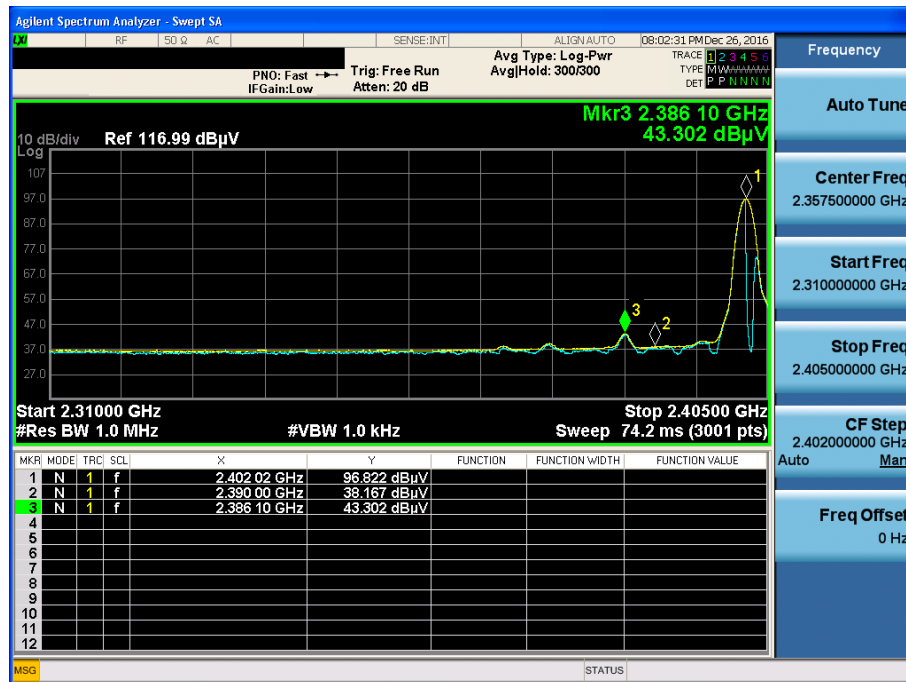
$\pi/4$ DQPSK & Lowest & X & Hor

Detector Mode : PK

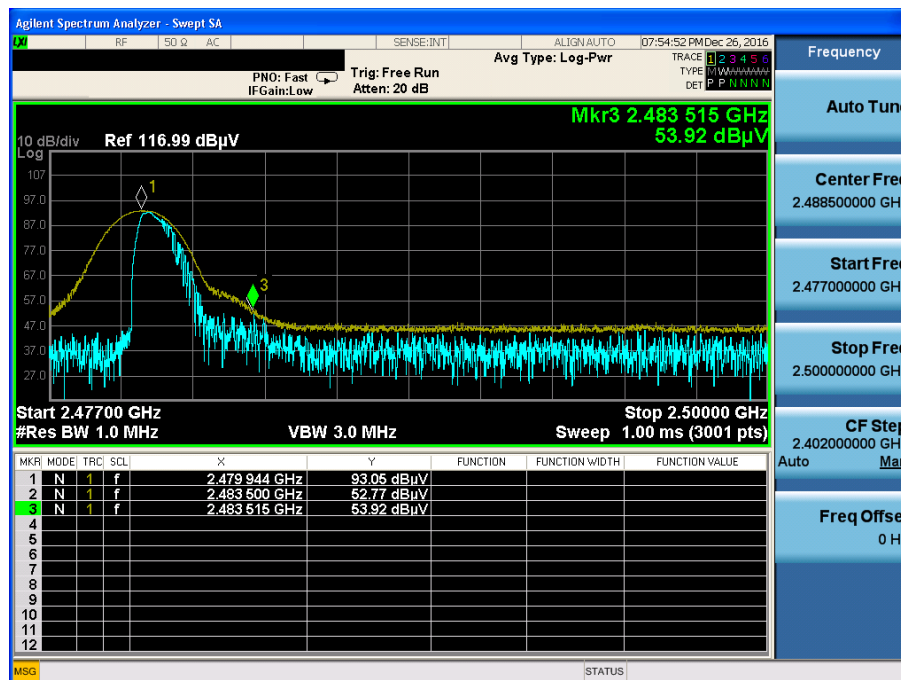


$\pi/4$ DQPSK & Lowest & X & Hor

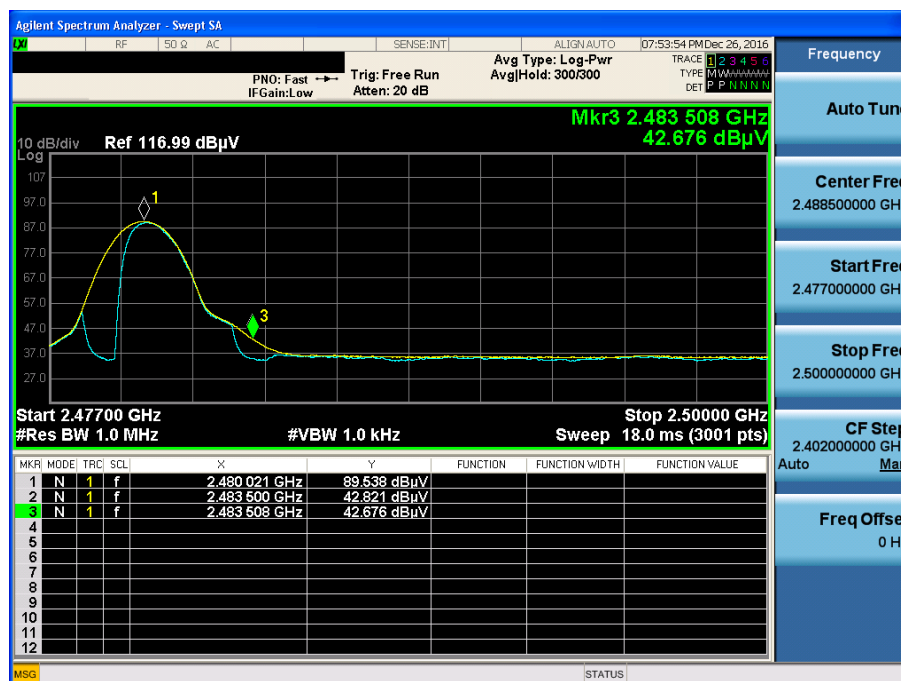
Detector Mode : AV



Detector Mode : PK

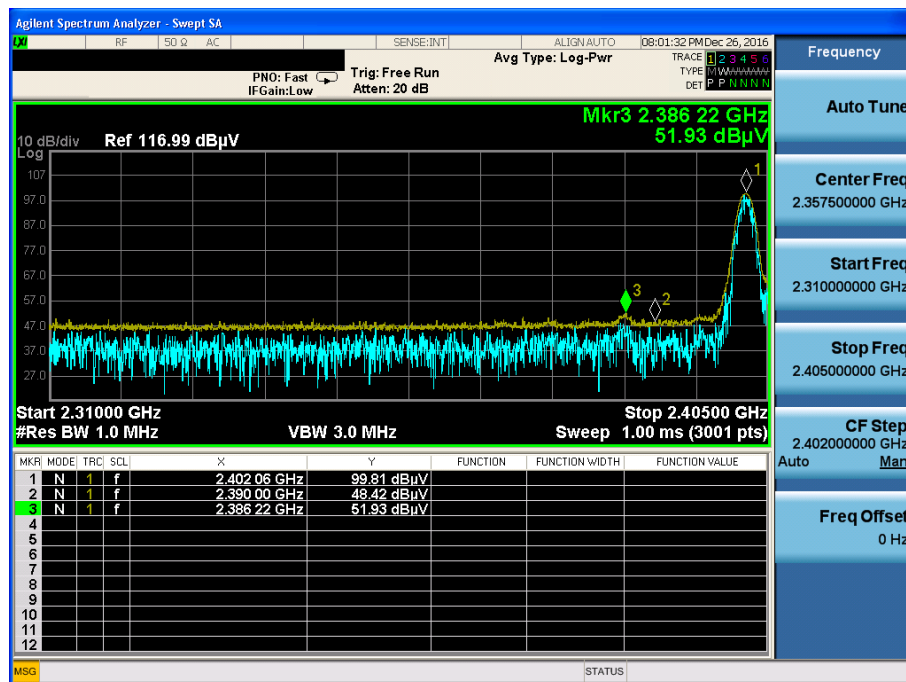


Detector Mode : AV



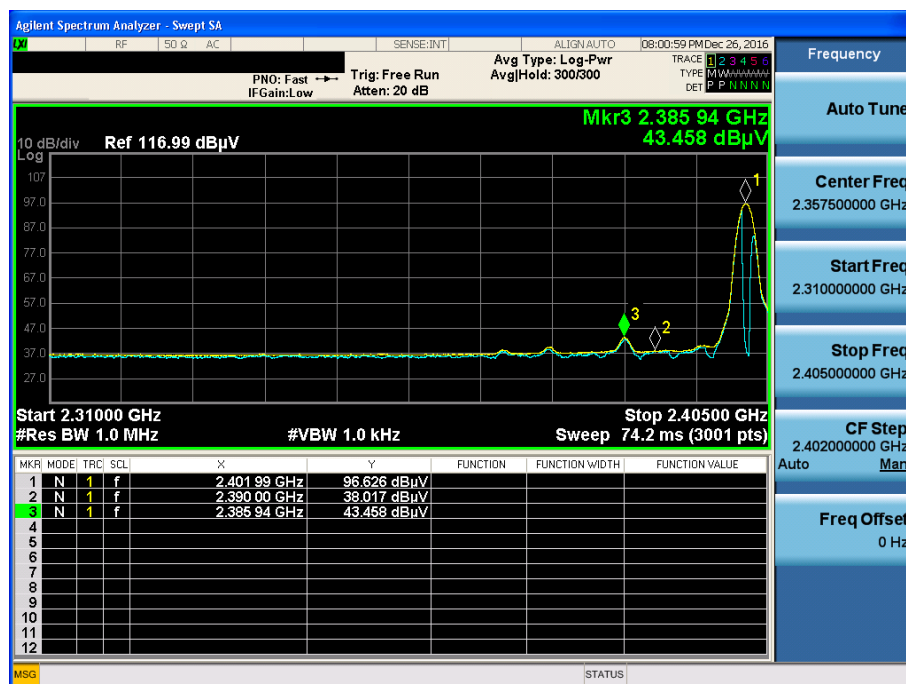
8DPSK & Lowest & X & Hor

Detector Mode : PK



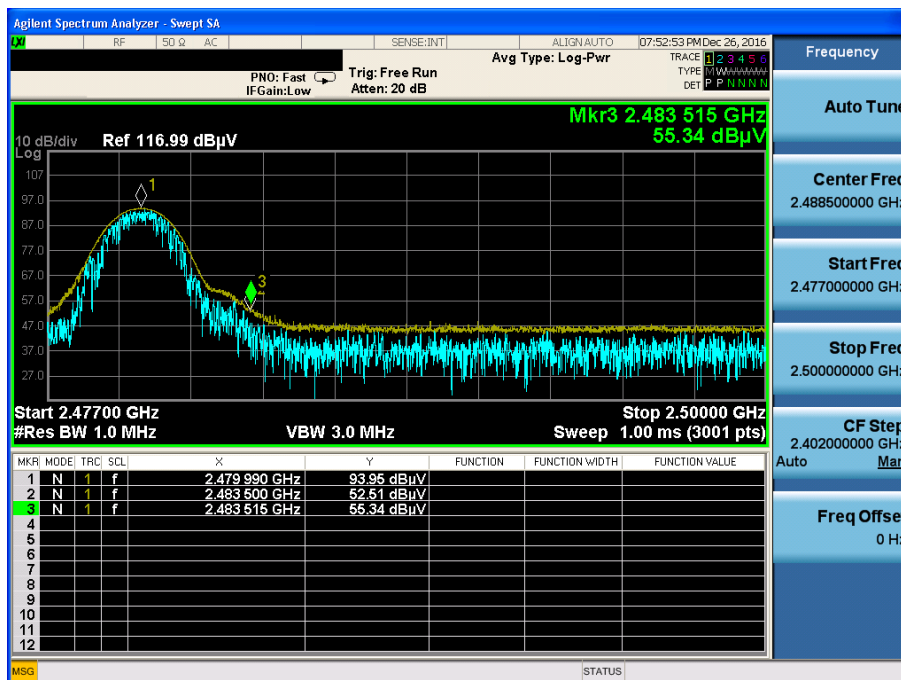
8DPSK & Lowest & X & Hor

Detector Mode : AV



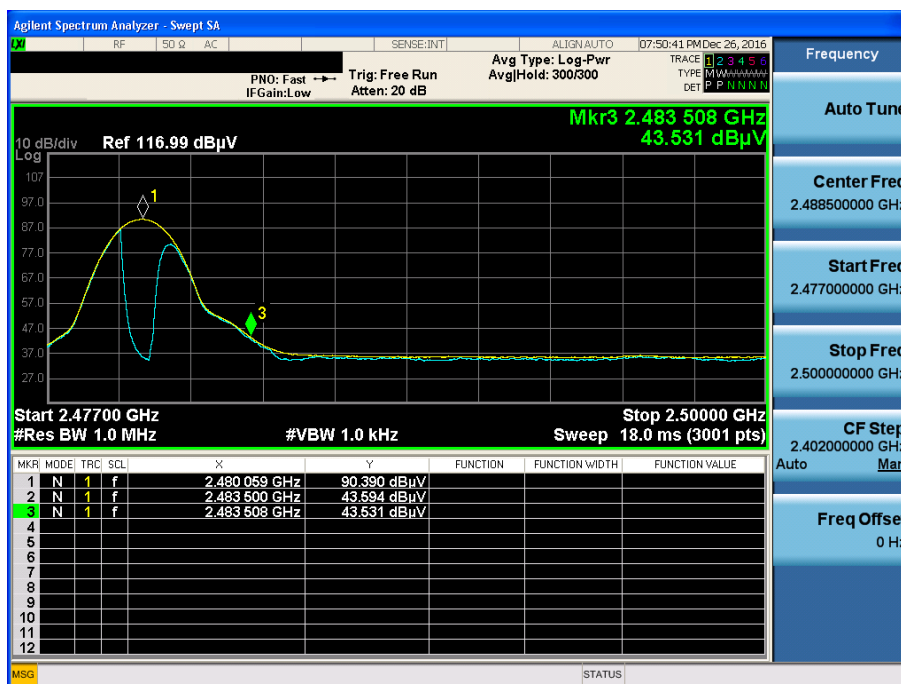
8DPSK & Highest & X & Hor

Detector Mode : PK



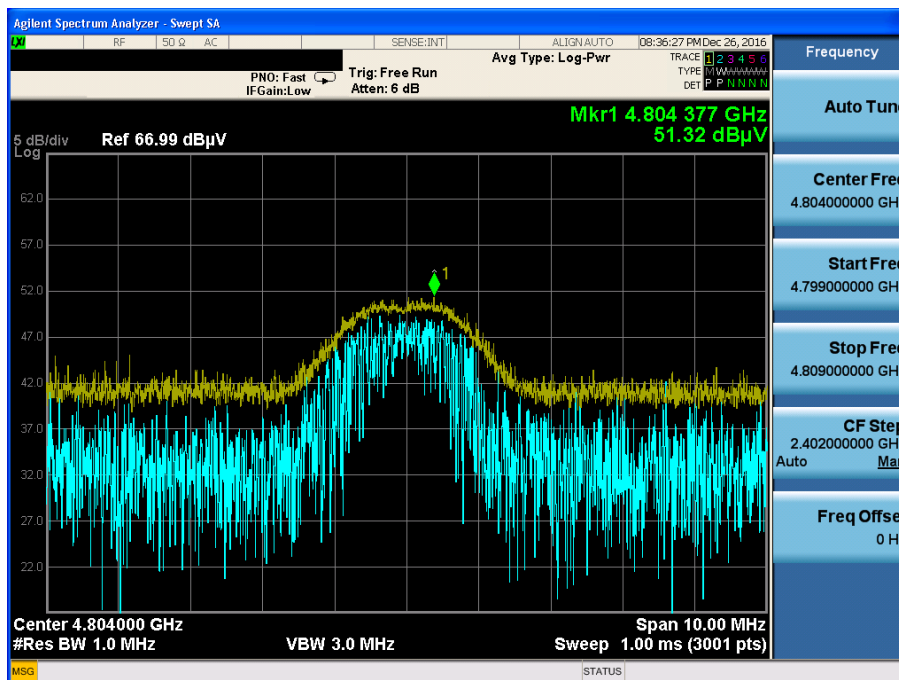
8DPSK & Highest & X & Hor

Detector Mode : AV



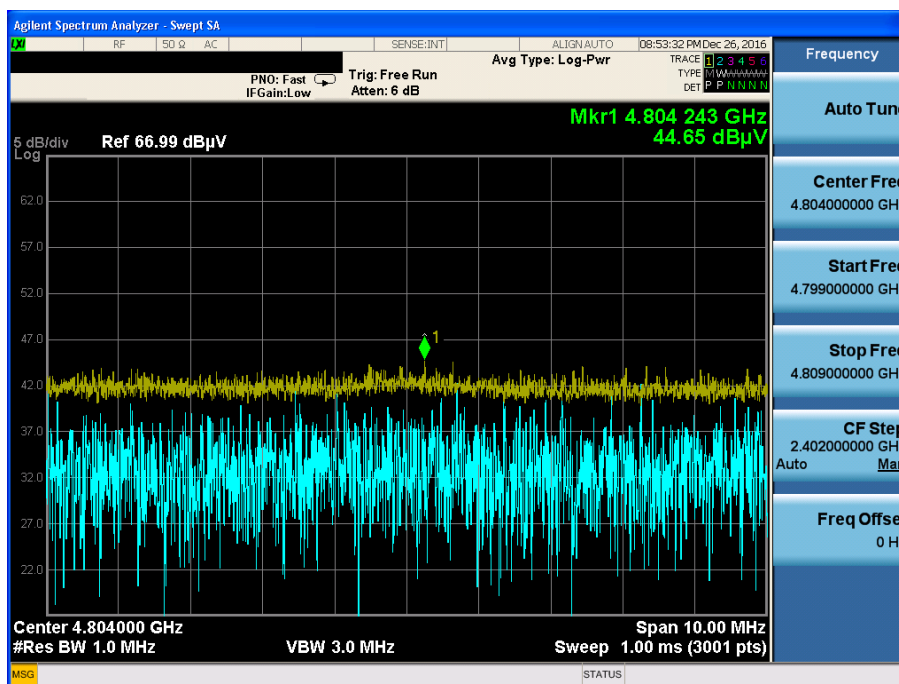
GFSK & Lowest & Y & Hor

Detector Mode : PK



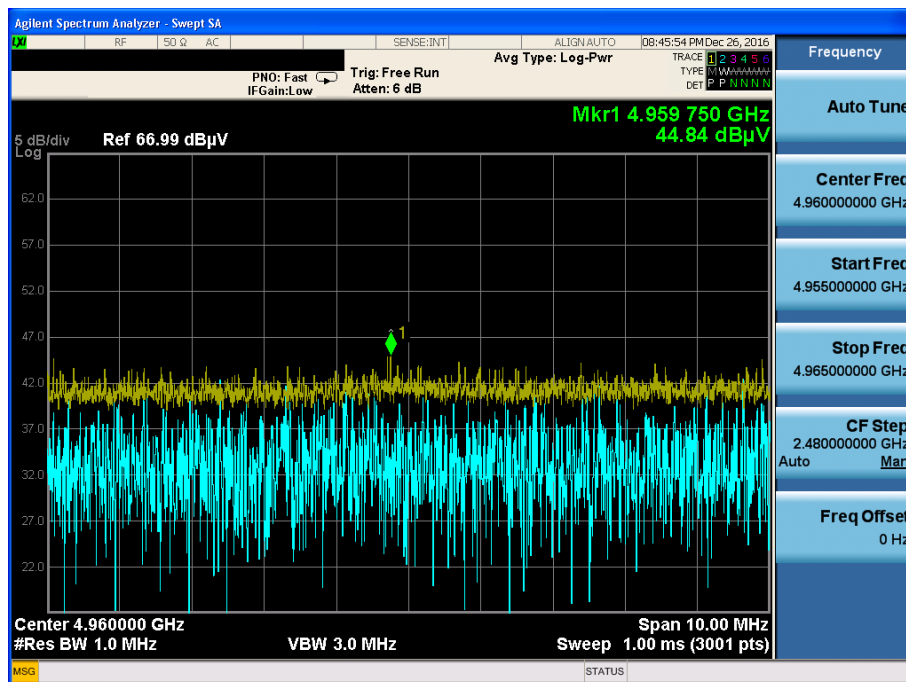
π /4DQPSK & Lowest & Y & Hor

Detector Mode : PK



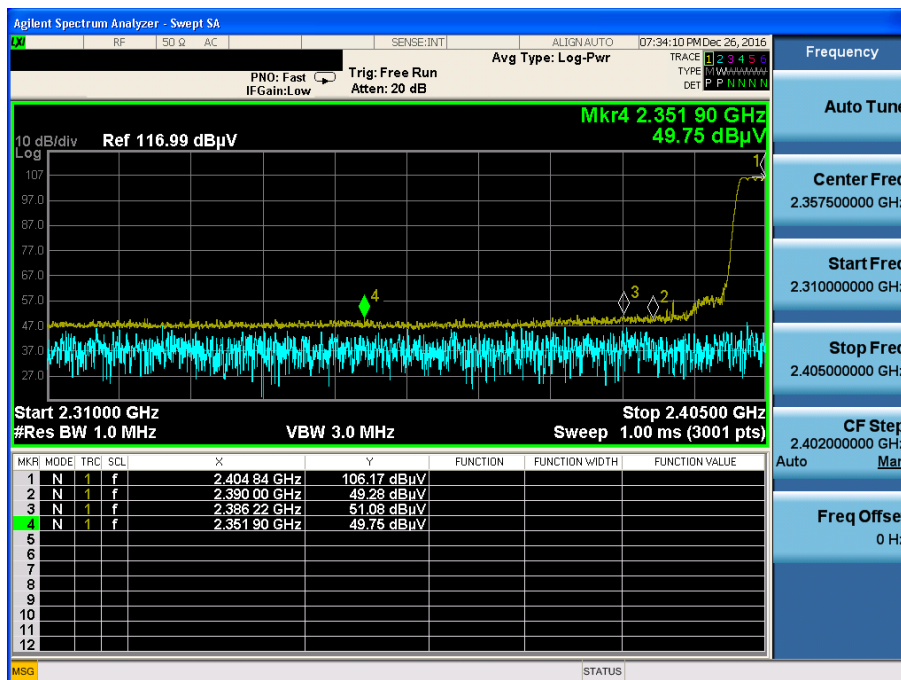
8DPSK & Highest & Y & Hor

Detector Mode : PK



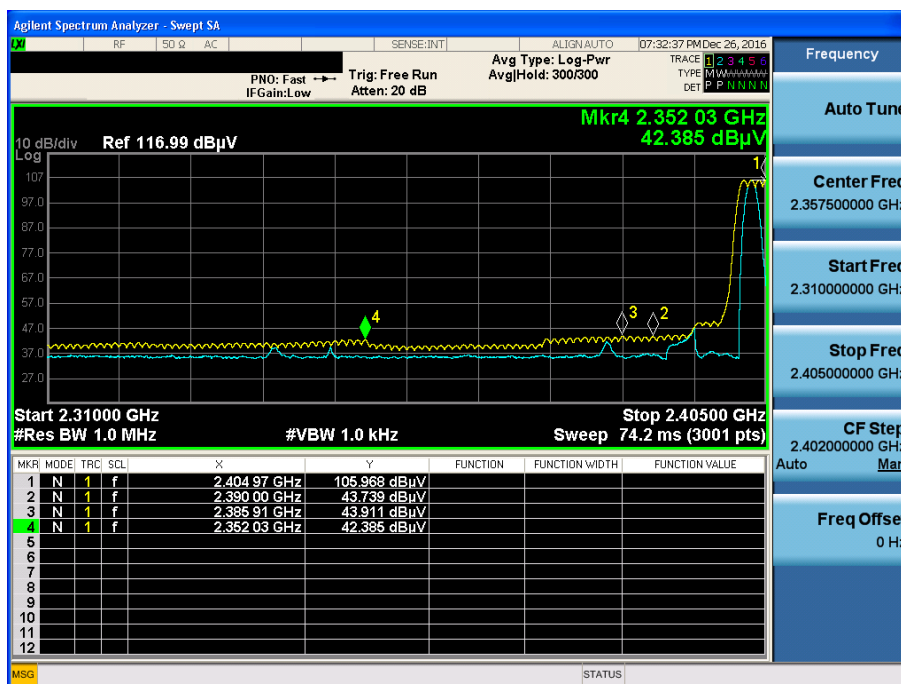
GFSK & Hopping mode & X & Hor

Detector Mode : PK



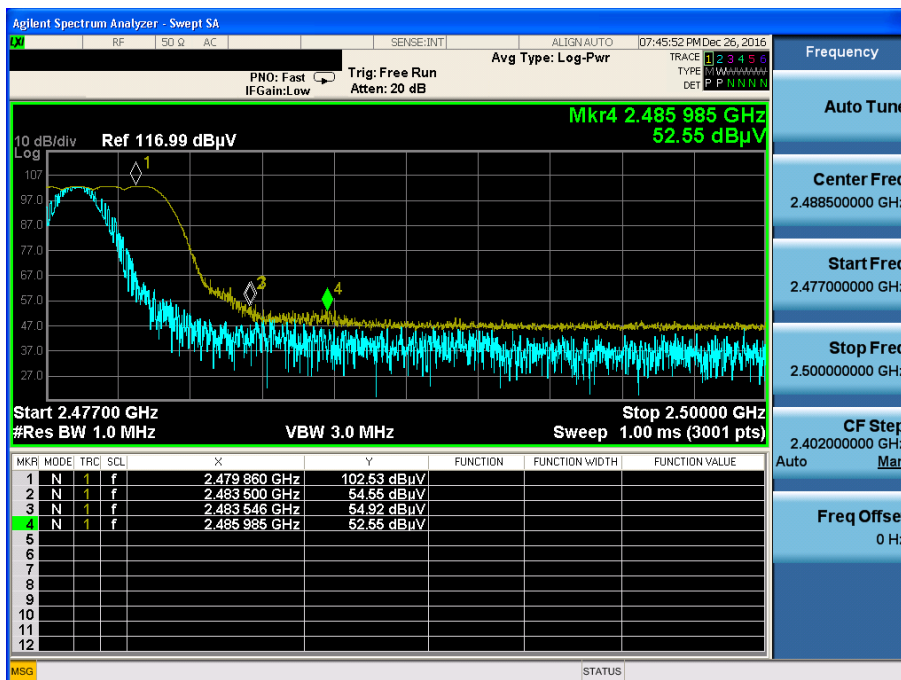
GFSK & Hopping mode & X & Hor

Detector Mode : AV



GFSK & Hopping mode & X & Hor

Detector Mode : PK



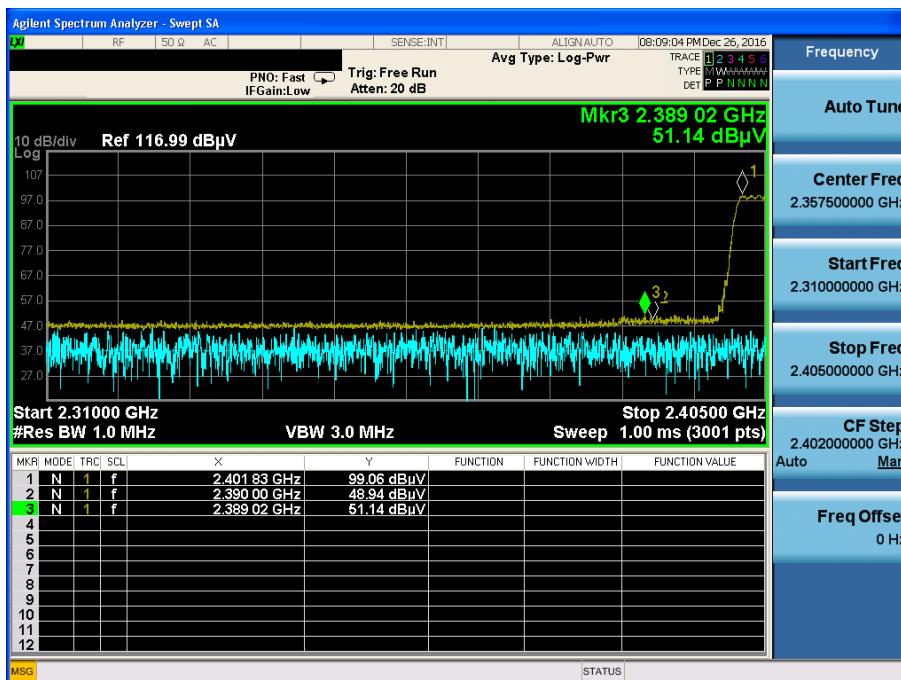
GFSK & Hopping mode & X & Hor

Detector Mode : AV



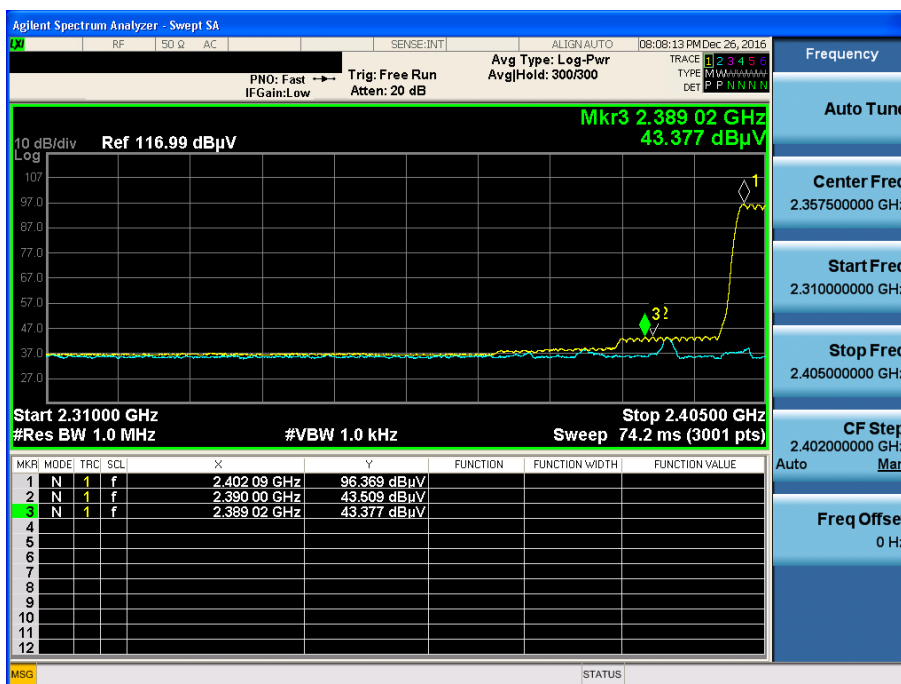
π /4DQPSK & Hopping mode & X & Hor

Detector Mode : PK



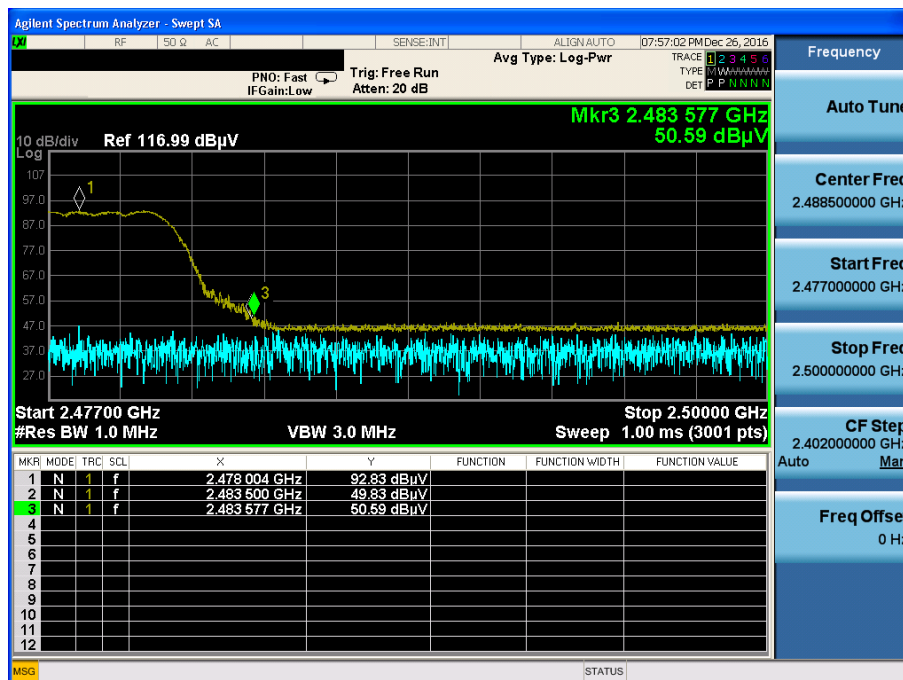
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Detector Mode : AV



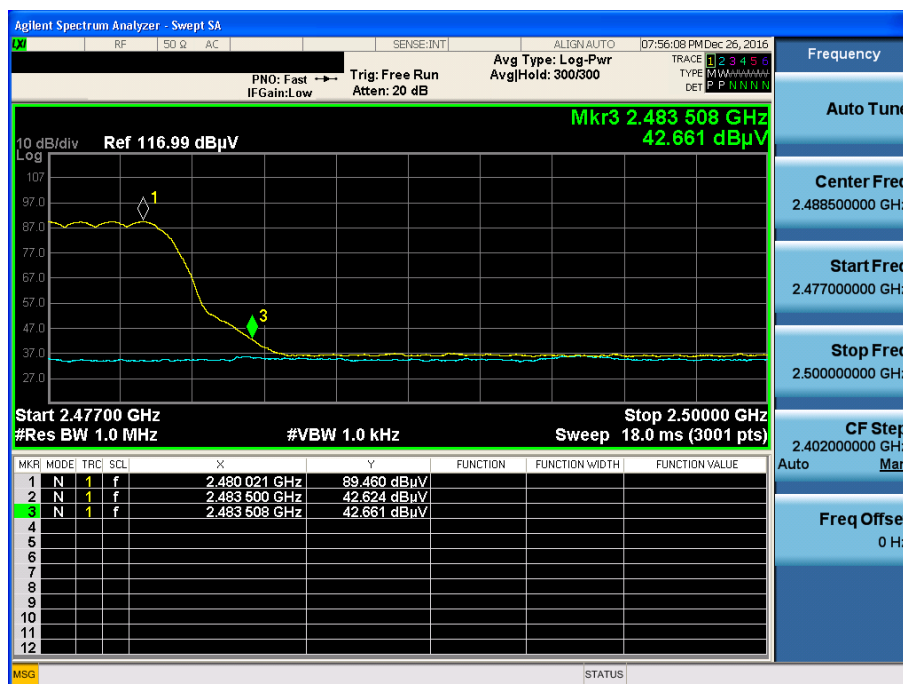
$\pi/4$ DQPSK & Hopping mode & X & Hor

Detector Mode : PK



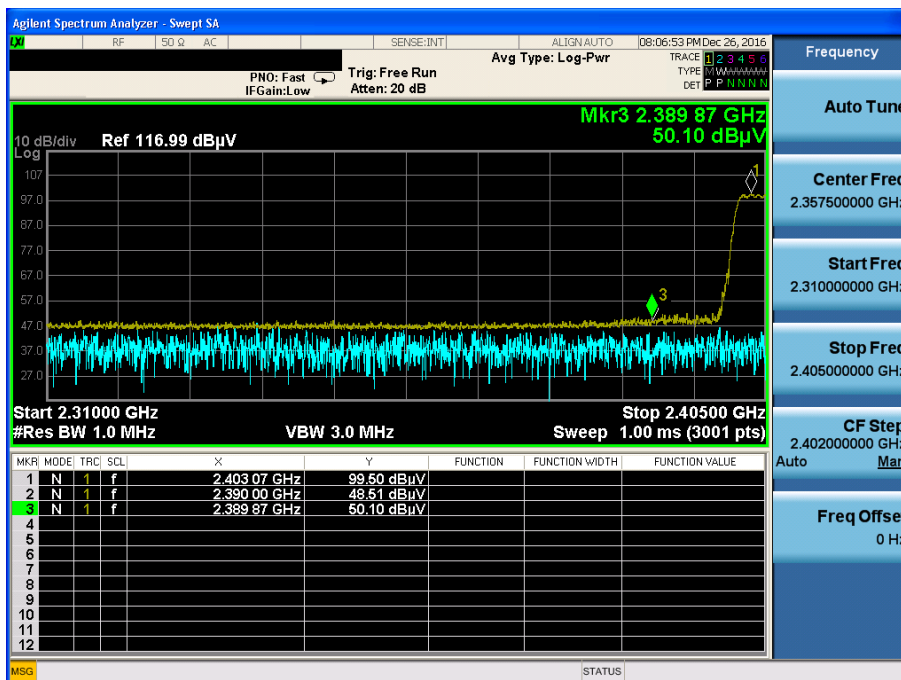
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Detector Mode : AV



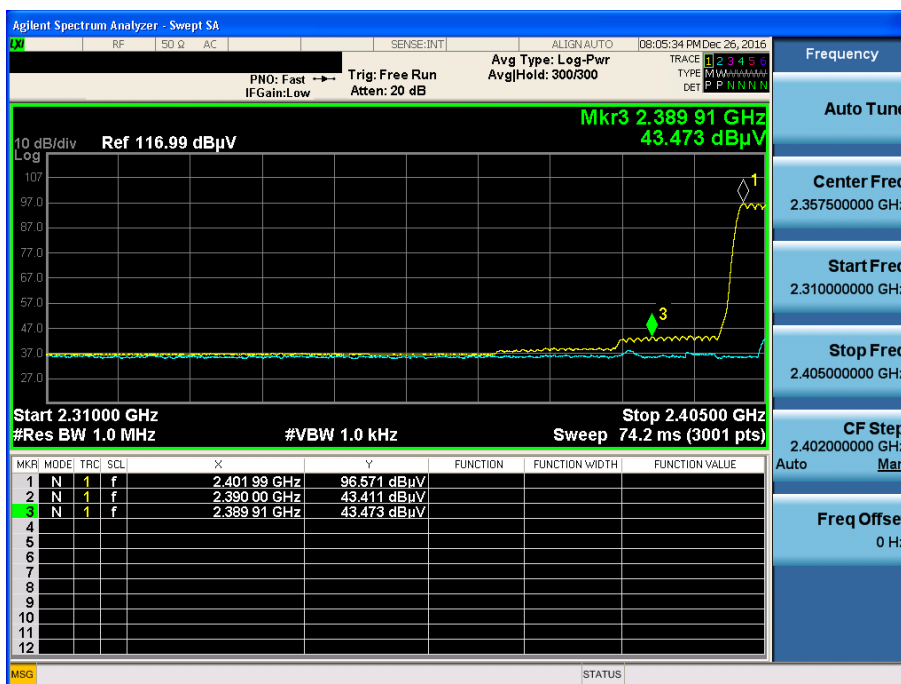
8DPSK & Hopping mode & X & Hor

Detector Mode : PK



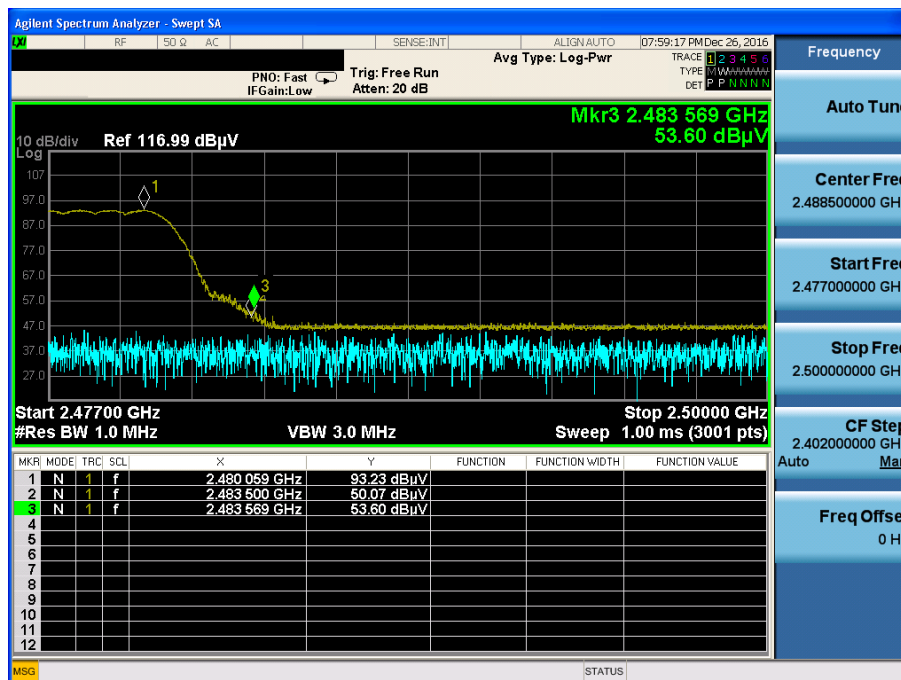
8DPSK & Hopping mode & X & Hor

Detector Mode : AV



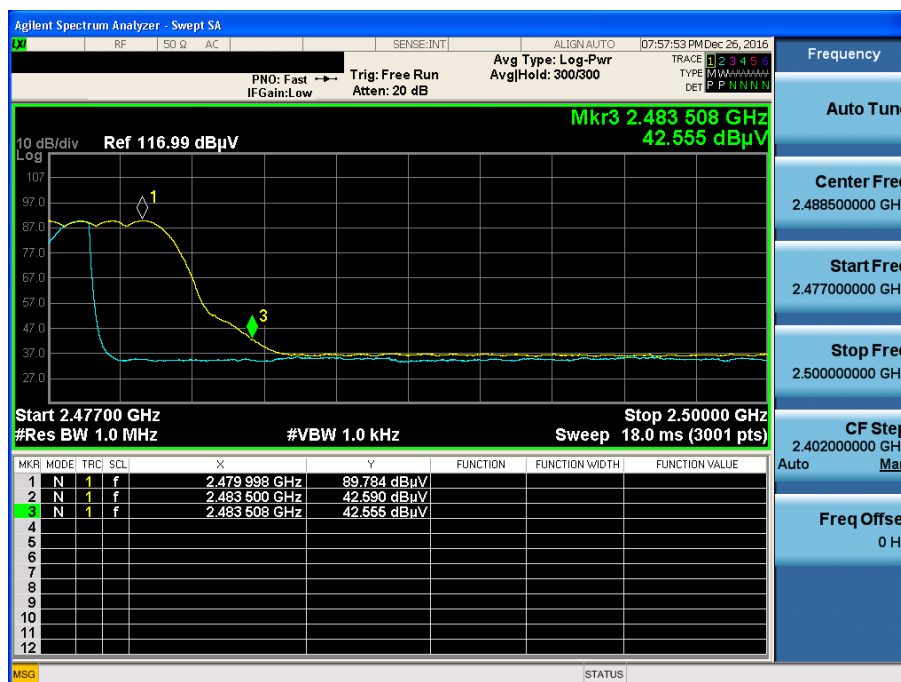
8DPSK & Hopping mode & X & Hor

Detector Mode : PK



8DPSK & Hopping mode & X & Hor

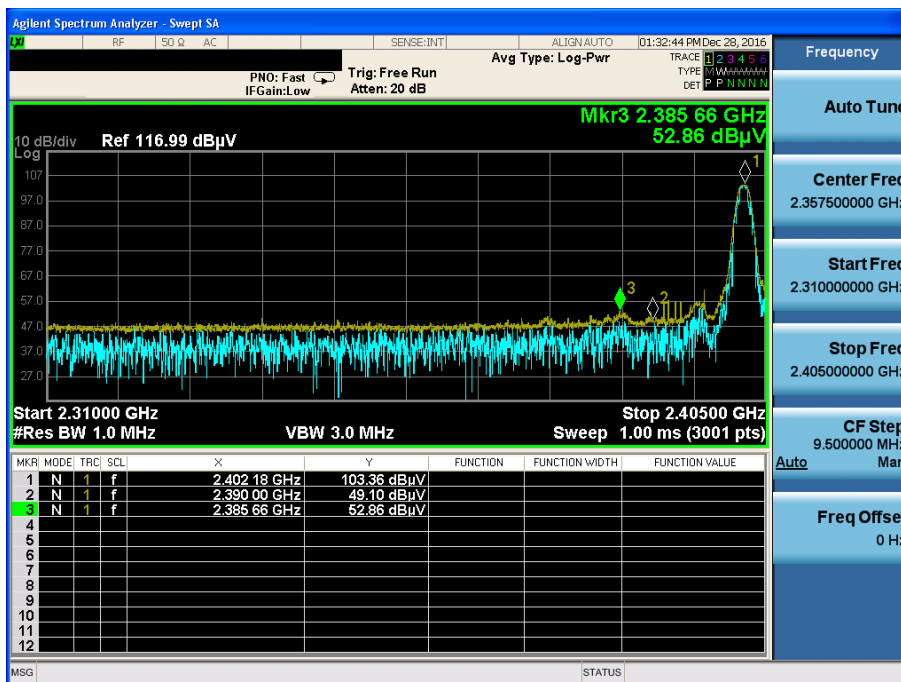
Detector Mode : AV



Antenna 2

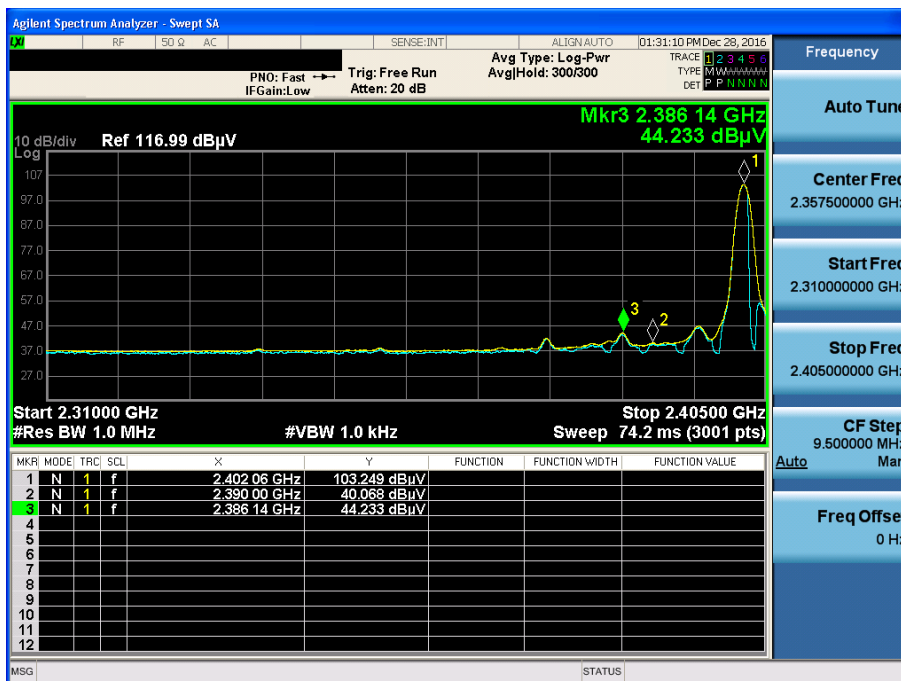
GFSK & Lowest & X & Hor

Detector Mode : PK



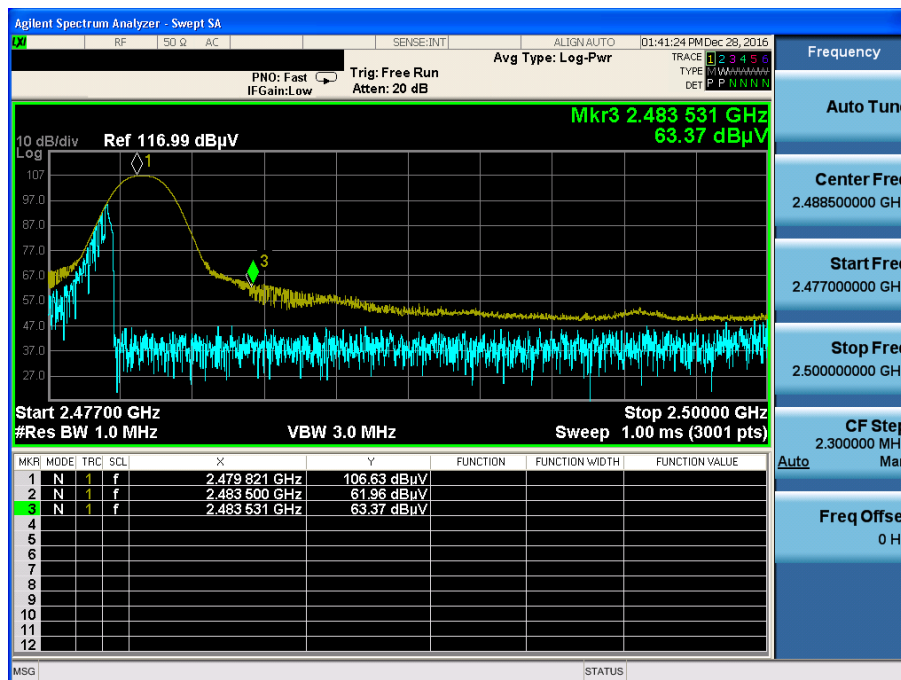
GFSK & Lowest & X & Hor

Detector Mode : AV



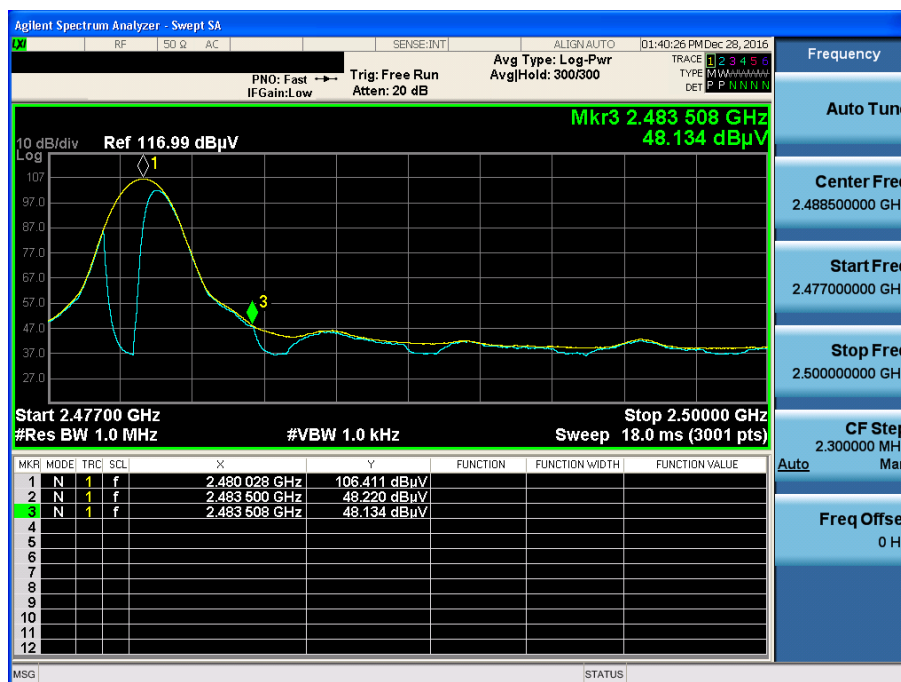
GFSK & Highest & X & Hor

Detector Mode : PK



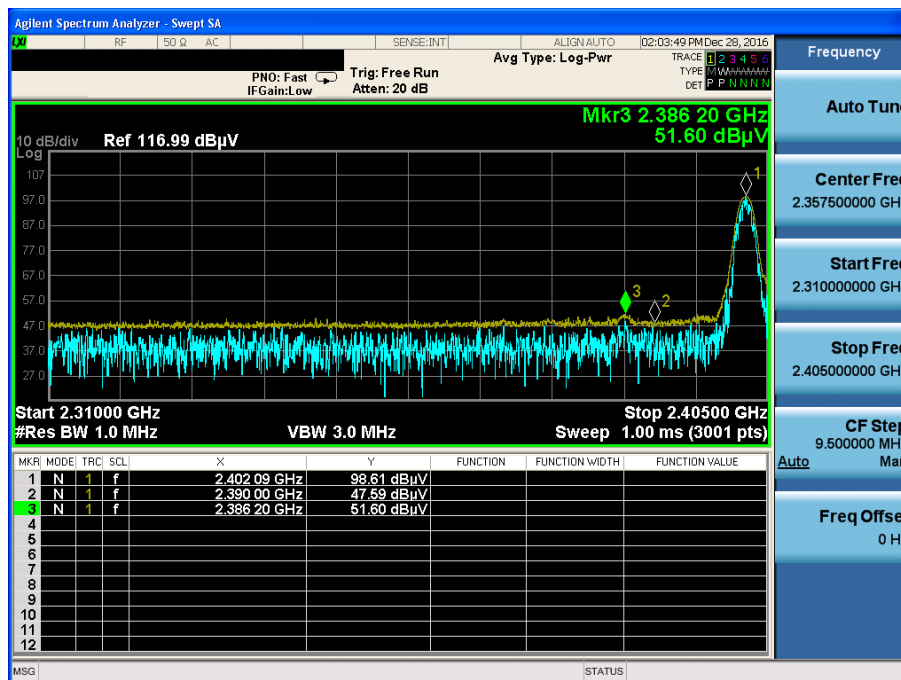
GFSK & Highest & X & Hor

Detector Mode : AV



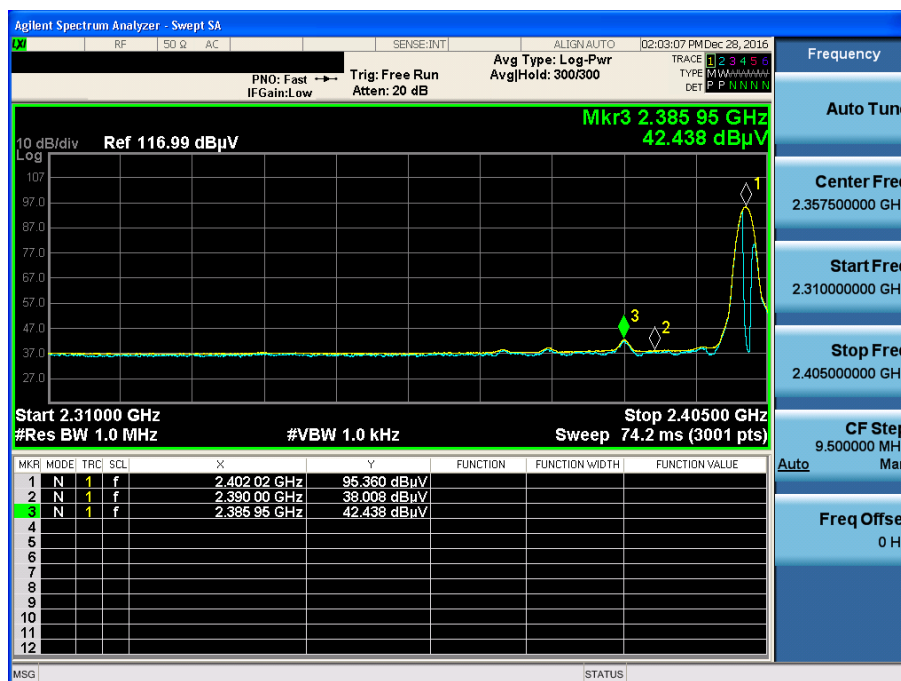
π /4DQPSK & Lowest & X & Hor

Detector Mode : PK



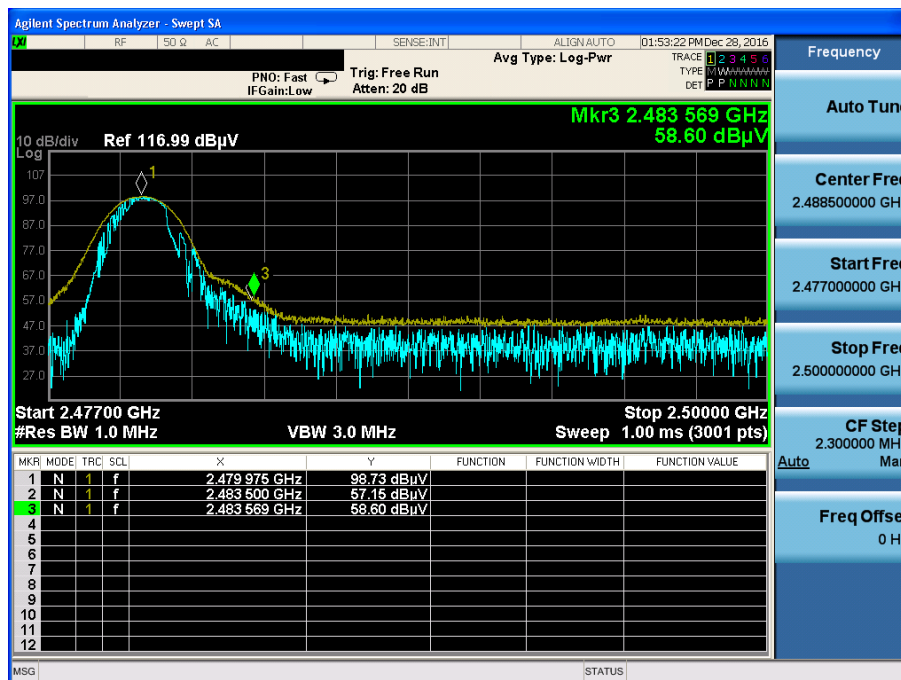
π /4DQPSK & Lowest & X & Hor

Detector Mode : AV



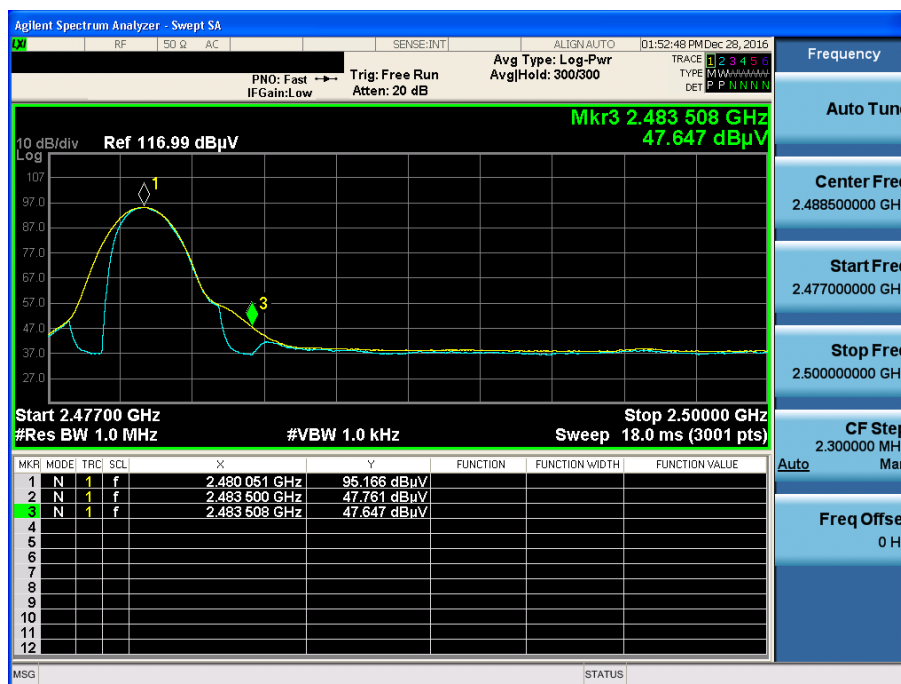
$\pi/4$ DQPSK & Highest & X & Hor

Detector Mode : PK



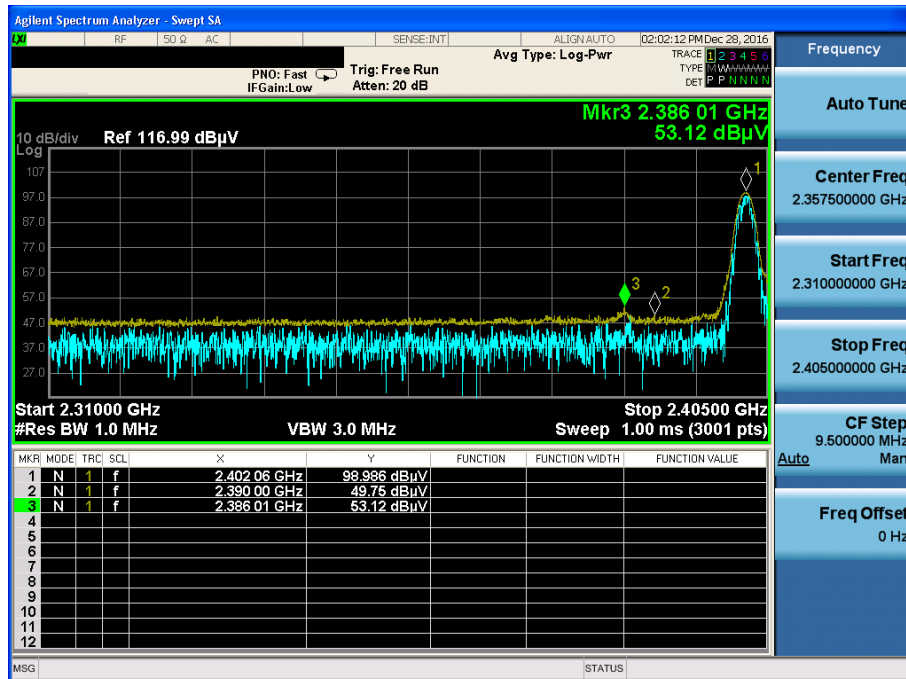
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Detector Mode : AV



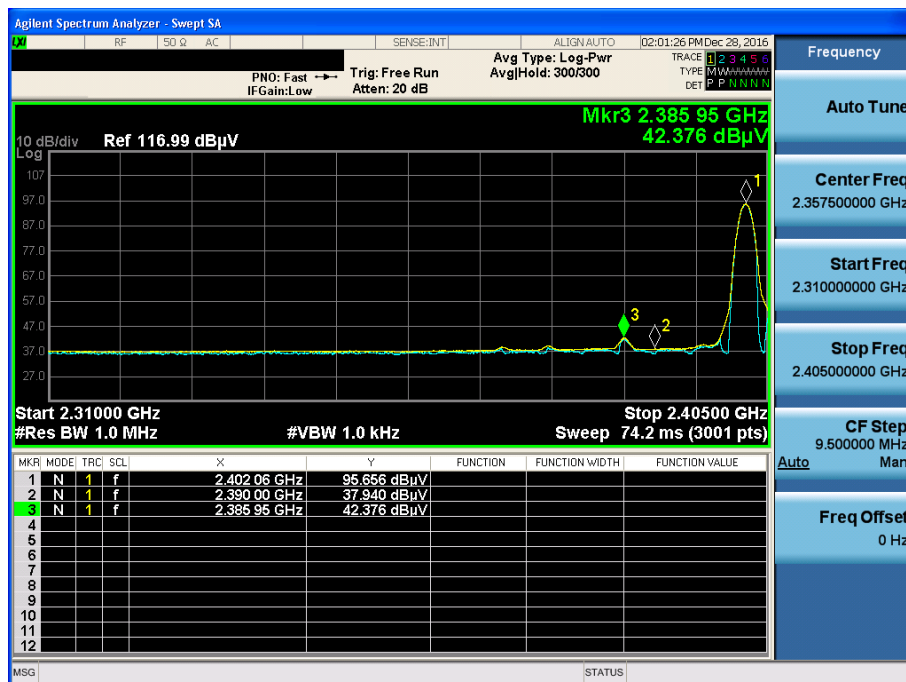
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Detector Mode : PK



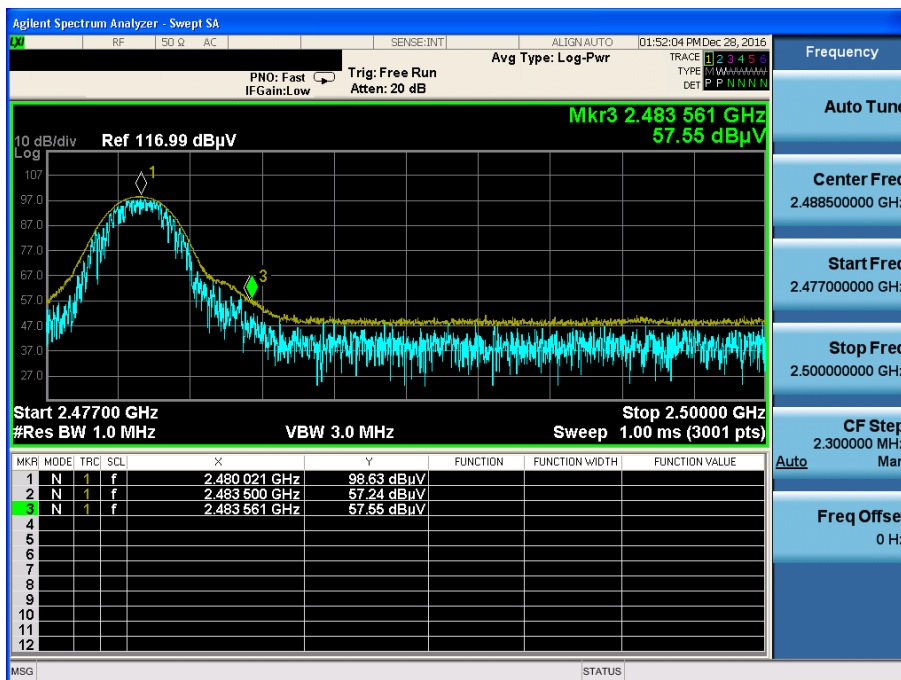
8DPSK & Lowest & X & Hor

Detector Mode : AV



8DPSK & Highest & X & Hor

Detector Mode : PK



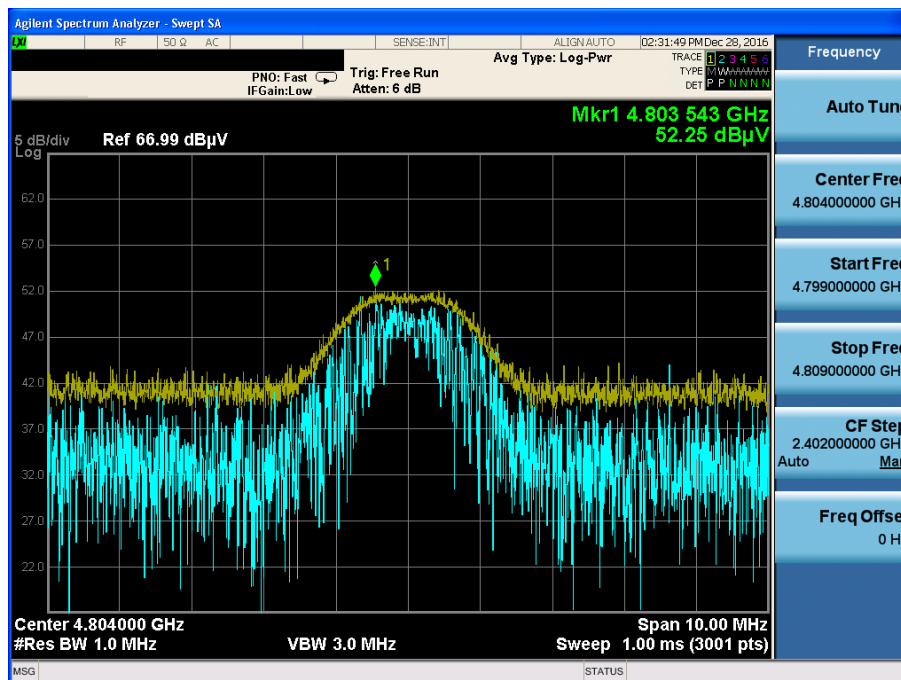
8DPSK & Highest & X & Hor

Detector Mode : AV

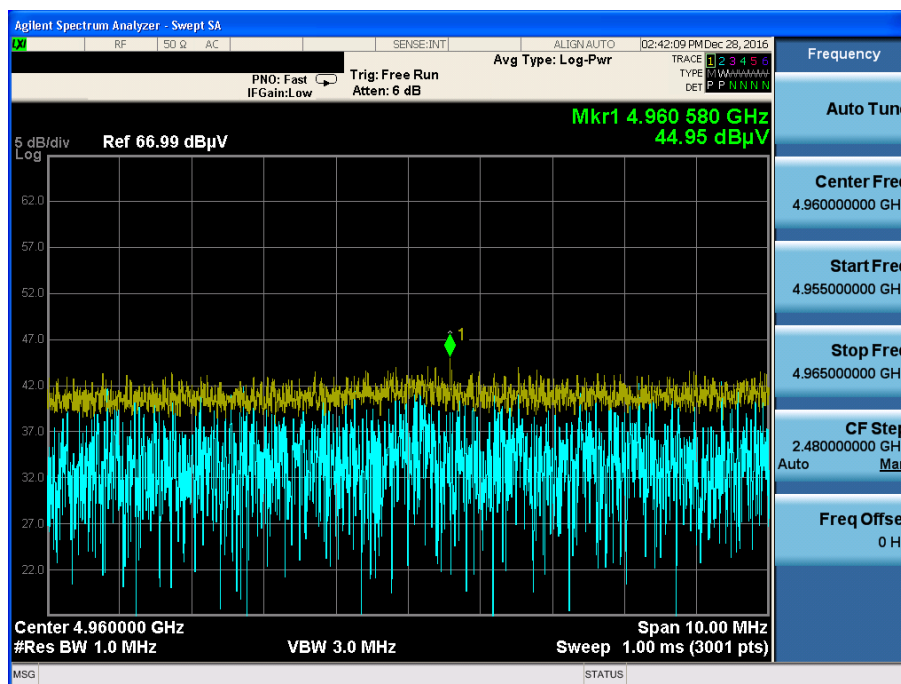


GFSK & Lowest & Y & Hor

Detector Mode : PK

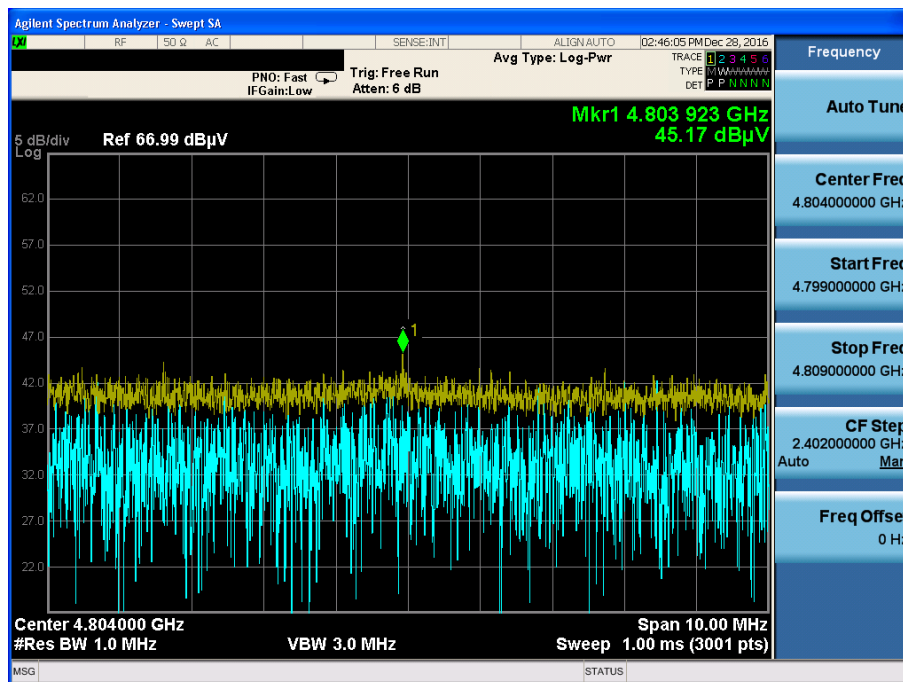
 π /4DQPSK & Highest & Y & Hor

Detector Mode : PK



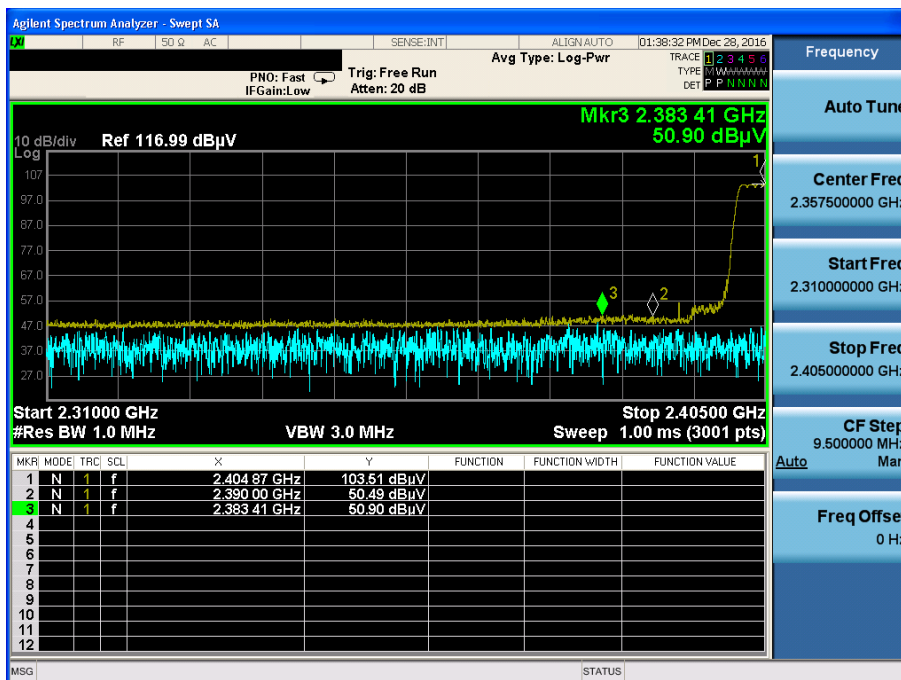
8DPSK & Lowest & Y & Hor

Detector Mode : PK



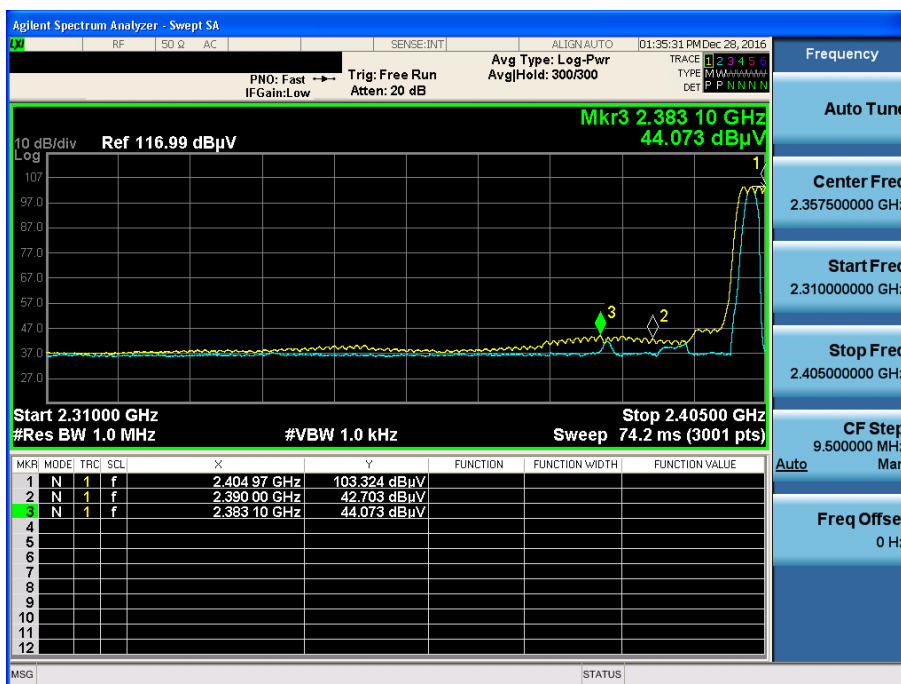
GFSK & Hopping mode & X & Hor

Detector Mode : PK



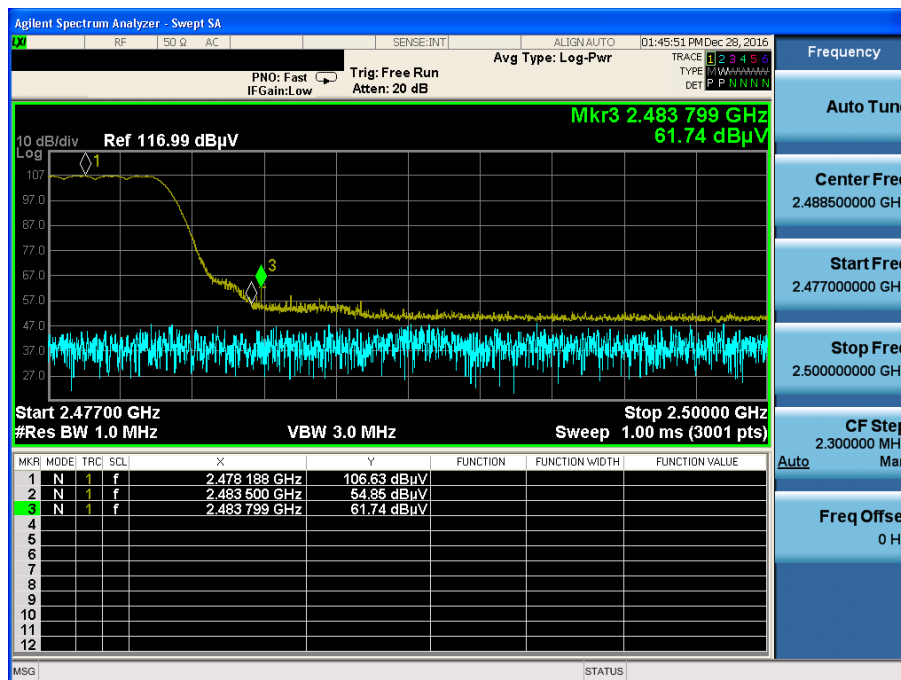
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Detector Mode : AV



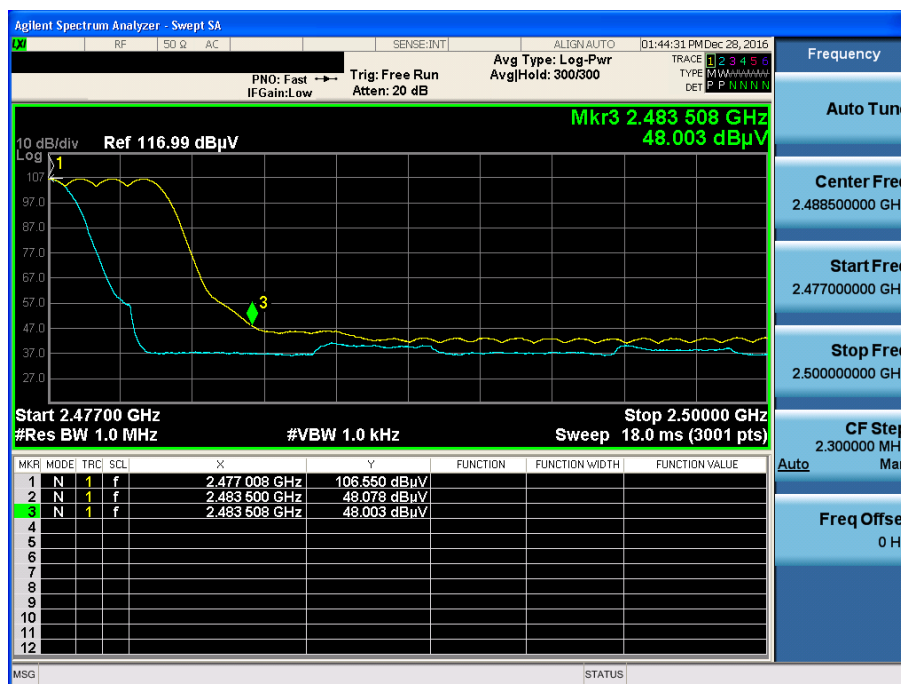
GFSK & Hopping mode & X & Hor

Detector Mode : PK



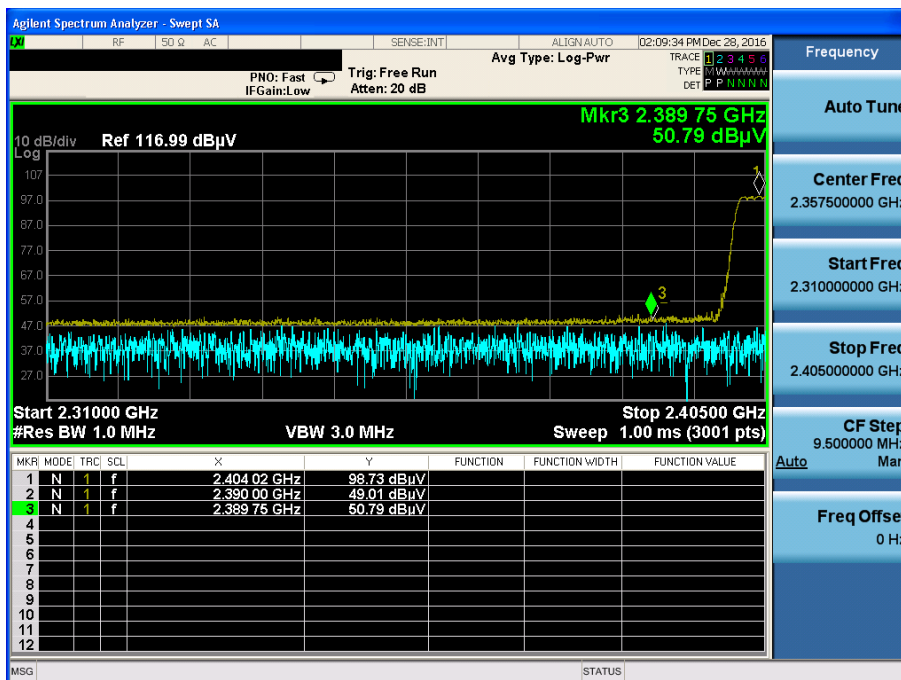
GFSK & Hopping mode & X & Hor

Detector Mode : AV



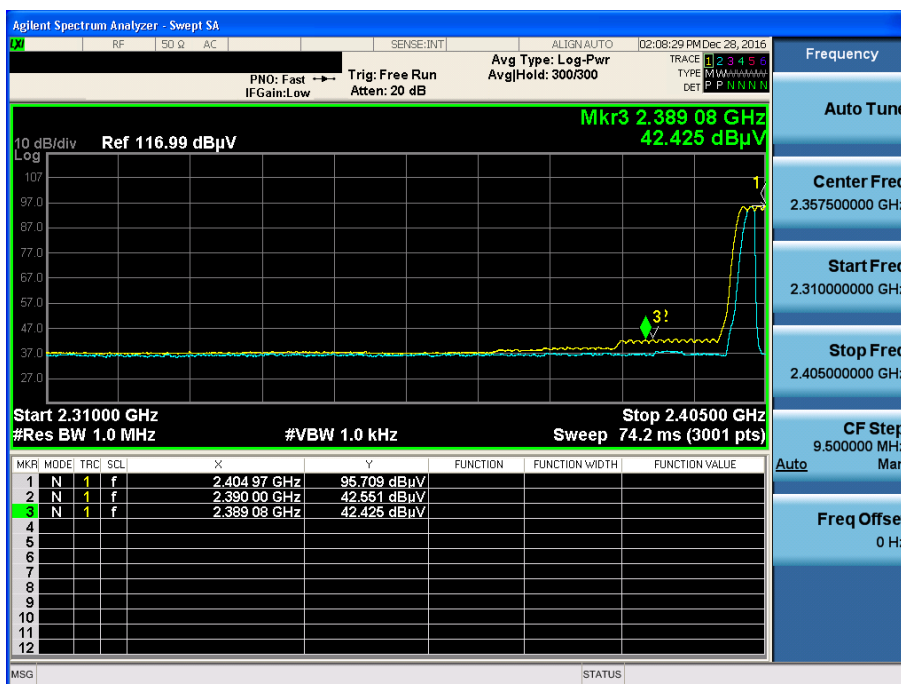
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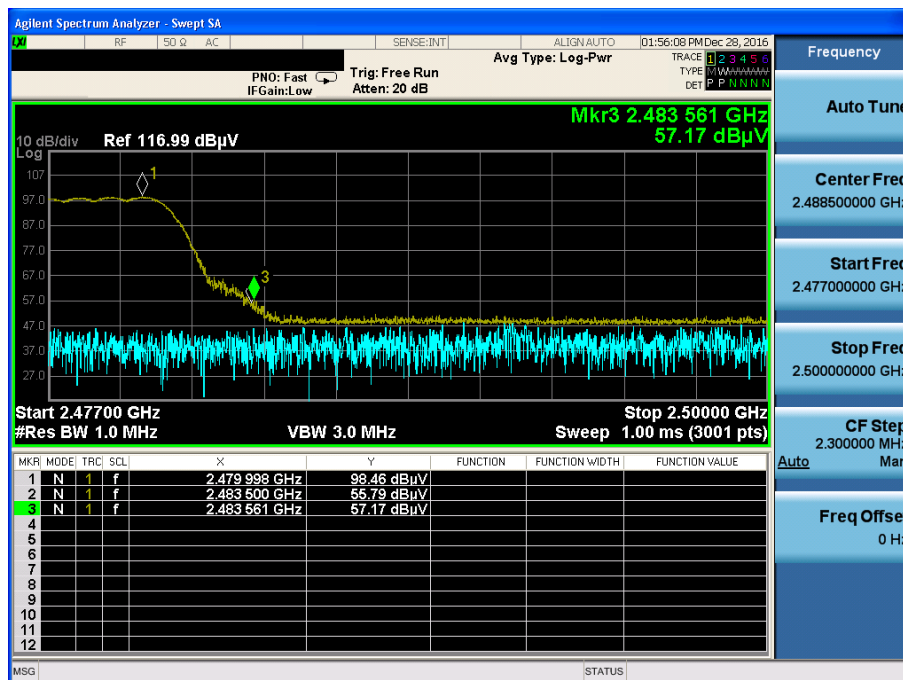


π /4DQPSK & Hopping mode & X & Hor

Detector Mode : AV



Detector Mode : PK



Detector Mode : AV

