Appendix

BT

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1. Equipment List

Conducted Emission					
Test Equipment	Manufacturer	Model No.	Inventory No.	Cal. date (yyyy-mm-dd)	Cal.Duedate (yyyy-mm-dd)
Shielding Room	ZhongYu Electron	GB-88	SEM001-06	2017/5/10	2020/5/9
LISN	Rohde & Schwarz	ENV216	SEM007-01	2019/7/14	2020/7/14
LISN	ETS-LINDGREN	Feb-16	SEM007-02	2019/4/1	2020/3/31
Measurement Software	AUDIX	e3 V5.4.1221d	N/A	N/A	N/A
Coaxial Cable	SGS	N/A	SEM024-01	2019/6/12	2020/6/11
2 Line ISN	Fischer Custom Communications Inc.	FCC-TLISN-T2-02	EMC0122	2019/2/11	2020/2/10
EMI Test Receiver	Rohde & Schwarz	ESCI	SEM004-02	2019/3/2	2020/3/1

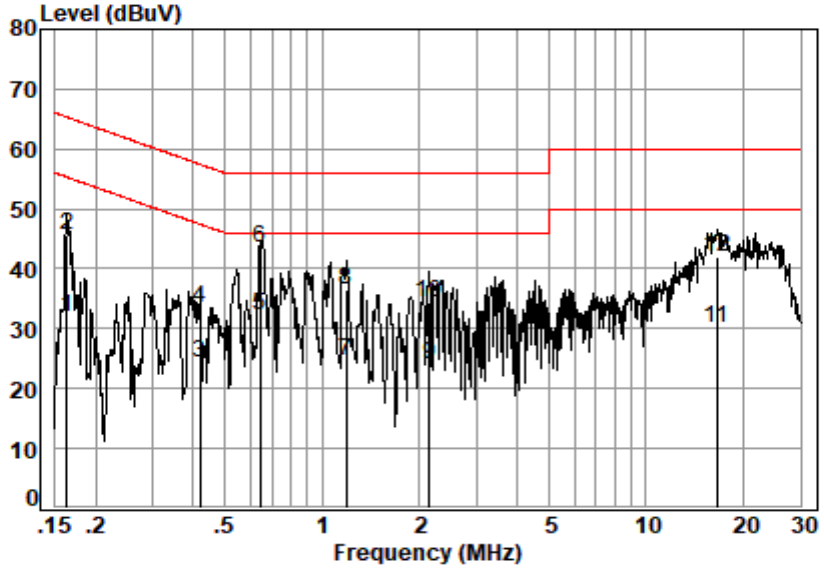
RF conducted test					
Test Equipment	Manufacturer	Model No.	Inventory No.	Cal. date (yyyy-mm-dd)	Cal.Duedate (yyyy-mm-dd)
DC Power Supply	Agilent Technologies Inc	66311B	W009-09	2019/7/15	2020/7/15
Signal Analyzer	Rohde & Schwarz	FSV	W025-05	2019/1/13	2020/1/12
Coaxial Cable	SGS	N/A	SEM031-01	2019/6/12	2020/6/11
Attenuator	Weinschel Associates	WA41	SEM021-09	N/A	N/A
Signal Generator	KEYSIGHT	N5173B	SEM006-05	2019/7/14	2020/7/14
Temperature Chamber	GIANT FORCE	ICT-150-40-CP-AR	W027-03	2018/11/27	2019/11/27
Power Meter	Rohde & Schwarz	NRVS	SEM014-02	2019/7/14	2020/7/14

2. Measurement Uncertainty (95% confidence levels, k=2)

No.	Item	Measurement Uncertainty
1	Total RF power, conducted	±0.75dB
2	RF power density, conducted	±2.84dB
3	Spurious emissions, conducted	±0.75dB
4	Conduct emission test	±3.12 dB (9KHz- 30MHz)

3. AC Power Line Conducted Emissions

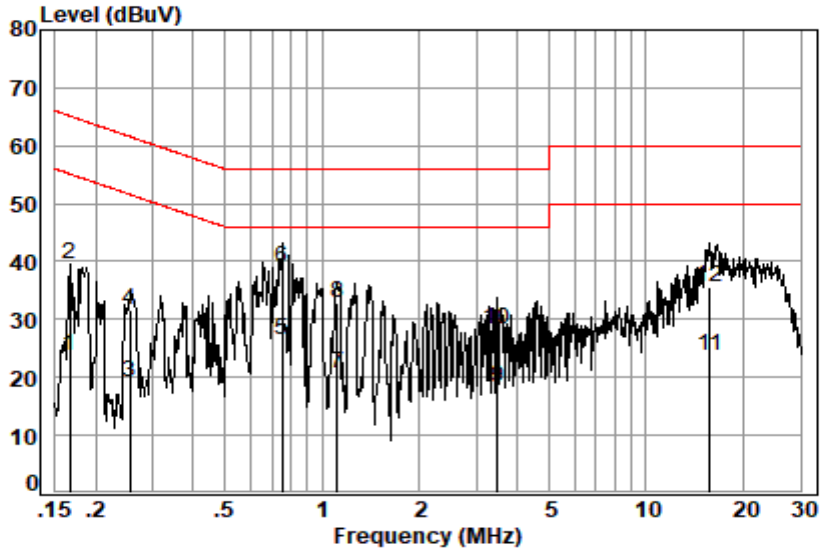
Live line:



Site : Shielding Room
Condition: Line
Job No. : 19419CR
Test mode: b

	Freq	Cable Loss	LISN Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dB	dBuV	dBuV	dBuV	dB	
1	0.16	0.01	9.49	22.45	31.95	55.30	-23.35	Average
2	0.16	0.01	9.49	36.10	45.60	65.30	-19.70	QP
3	0.42	0.05	9.58	14.85	24.48	47.46	-22.98	Average
4	0.42	0.05	9.58	23.69	33.32	57.46	-24.14	QP
5	0.64	0.07	9.62	22.65	32.34	46.00	-13.66	Average
6	0.64	0.07	9.62	33.73	43.42	56.00	-12.58	QP
7	1.19	0.11	9.64	15.00	24.75	46.00	-21.25	Average
8	1.19	0.11	9.64	26.71	36.46	56.00	-19.54	QP
9	2.14	0.16	9.64	14.25	24.05	46.00	-21.95	Average
10	2.14	0.16	9.64	24.49	34.29	56.00	-21.71	QP
11	16.57	0.22	10.02	19.79	30.03	50.00	-19.97	Average
12	16.57	0.22	10.02	31.80	42.04	60.00	-17.96	QP

Neutral line:



Site : Shielding Room
Condition: Neutral
Job No. : 19419CR
Test mode: b

	Freq	Cable Loss	LISN Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dB	dBuV	dBuV	dBuV	dB	
1	0.17	0.01	9.43	14.43	23.87	55.12	-31.25	Average
2	0.17	0.01	9.43	30.23	39.67	65.12	-25.45	QP
3	0.25	0.03	9.47	9.54	19.04	51.60	-32.56	Average
4	0.25	0.03	9.47	22.23	31.73	61.60	-29.87	QP
5	0.75	0.08	9.63	16.64	26.35	46.00	-19.65	Average
6	0.75	0.08	9.63	29.31	39.02	56.00	-16.98	QP
7	1.12	0.10	9.67	10.88	20.65	46.00	-25.35	Average
8	1.12	0.10	9.67	23.01	32.78	56.00	-23.22	QP
9	3.47	0.16	9.73	8.48	18.37	46.00	-27.63	Average
10	3.47	0.16	9.73	18.37	28.26	56.00	-27.74	QP
11	15.72	0.21	10.08	13.29	23.58	50.00	-26.42	Average
12	15.72	0.21	10.08	25.38	35.67	60.00	-24.33	QP

Remarks:

1. The following Quasi-Peak and Average measurements were performed on the EUT:

2. Final Test Level =Receiver Reading + LISN Factor + Cable Loss.

4. Conducted Peak Output Power

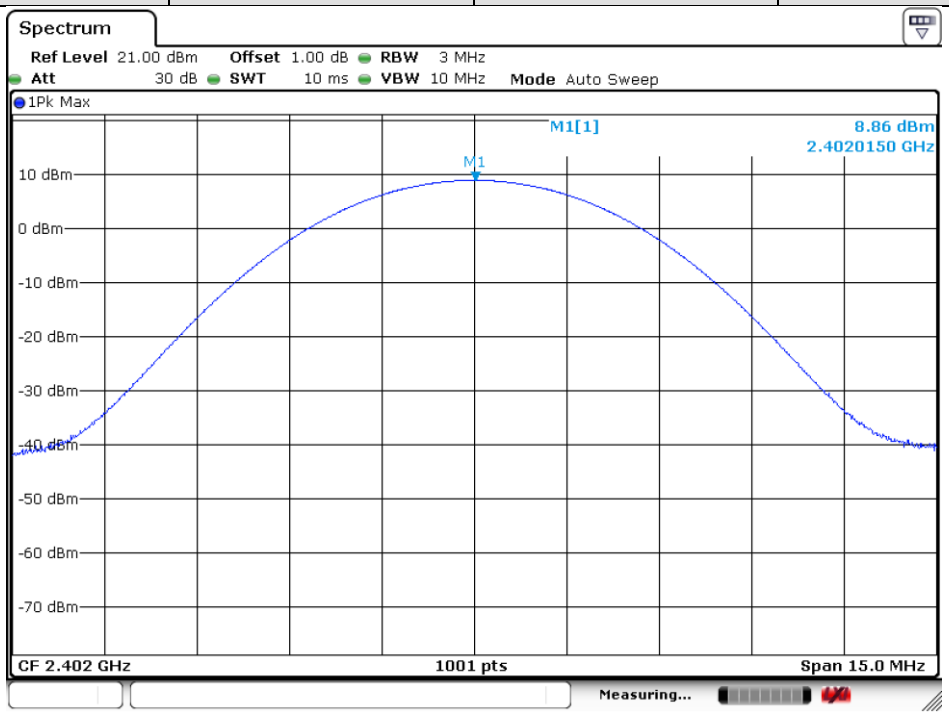
4.1. Test Results

Measurement Data of Peak power:

GFSK mode			
Test channel	**Peak Output Power (dBm)**	**Limit (dBm)**	**Result**
Lowest	8.86	20.97	Pass
Middle	9.27	20.97	Pass
Highest	9.01	20.97	Pass
π/4DQPSK mode			
Test channel	**Peak Output Power (dBm)**	**Limit (dBm)**	**Result**
Lowest	8.22	20.97	Pass
Middle	8.59	20.97	Pass
Highest	8.35	20.97	Pass
8DPSK mode			
Test channel	**Peak Output Power (dBm)**	**Limit (dBm)**	**Result**
Lowest	8.22	20.97	Pass
Middle	8.59	20.97	Pass
Highest	8.33	20.97	Pass

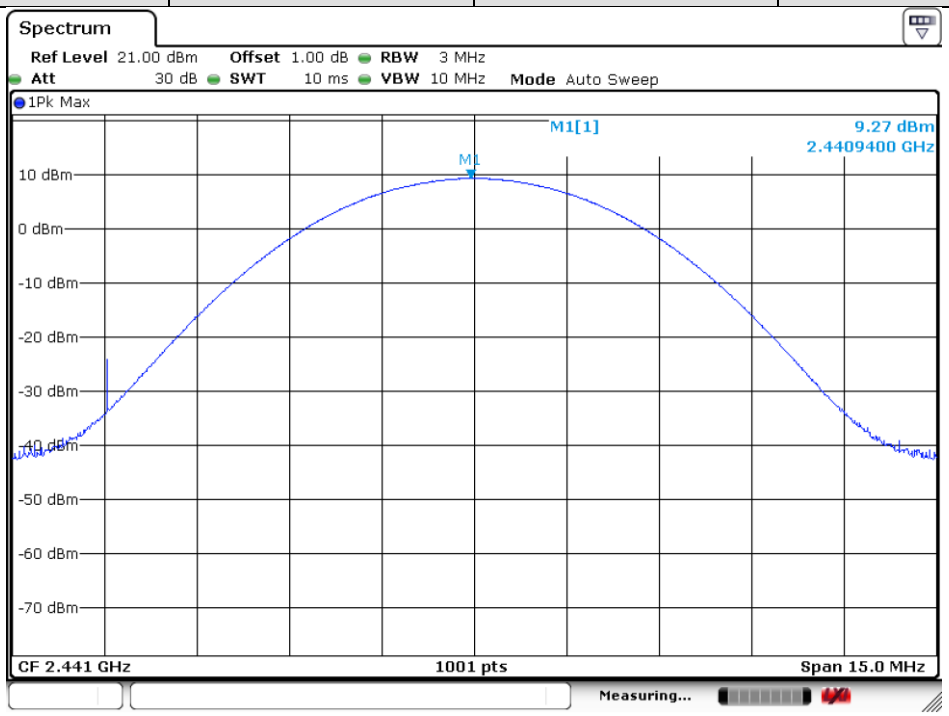
4.2. **Test plots**

Test mode:	GFSK	Test channel:	Lowest



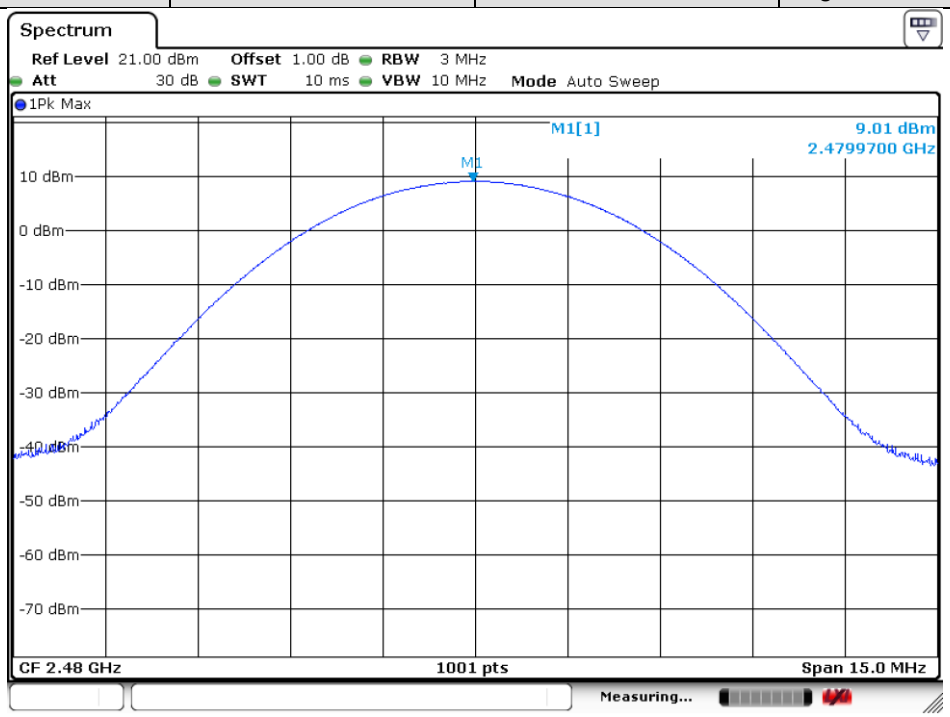
Date: 23.OCT.2019 21:02:43

Test mode:	GFSK	Test channel:	Middle



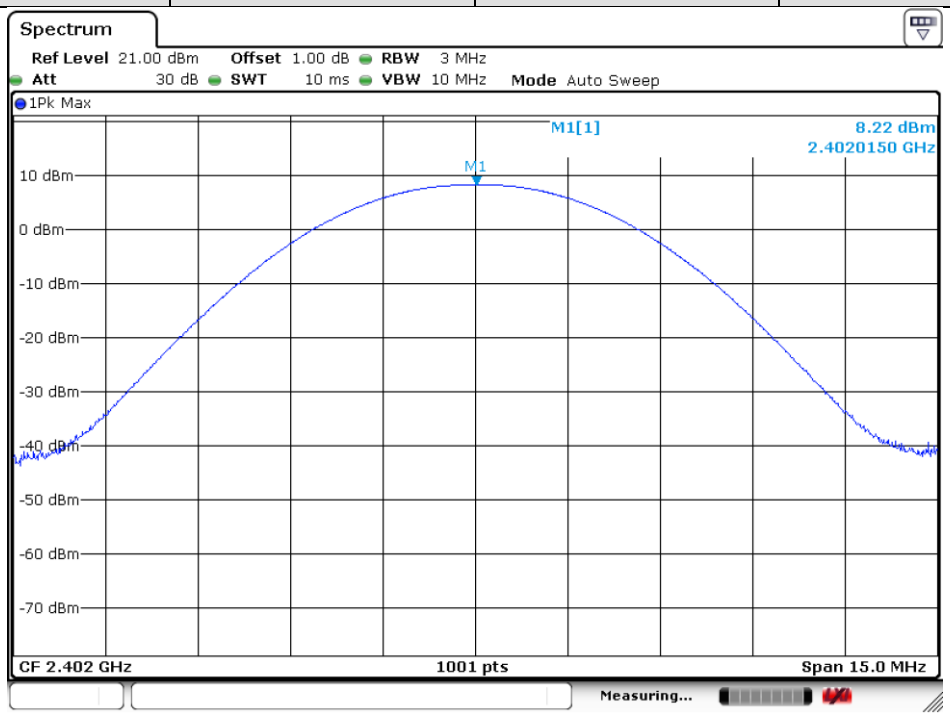
Date: 23.OCT.2019 21:03:07

Test mode:	GFSK	Test channel:	Highest



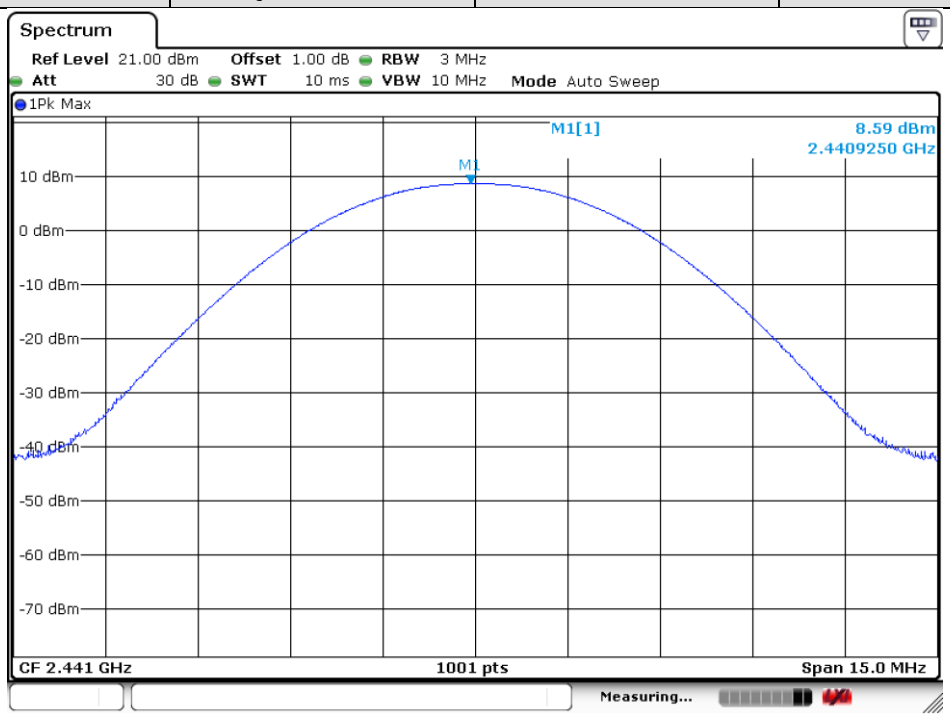
Date: 23.OCT.2019 21:03:34

Test mode:	π/4DQPSK	Test channel:	Lowest



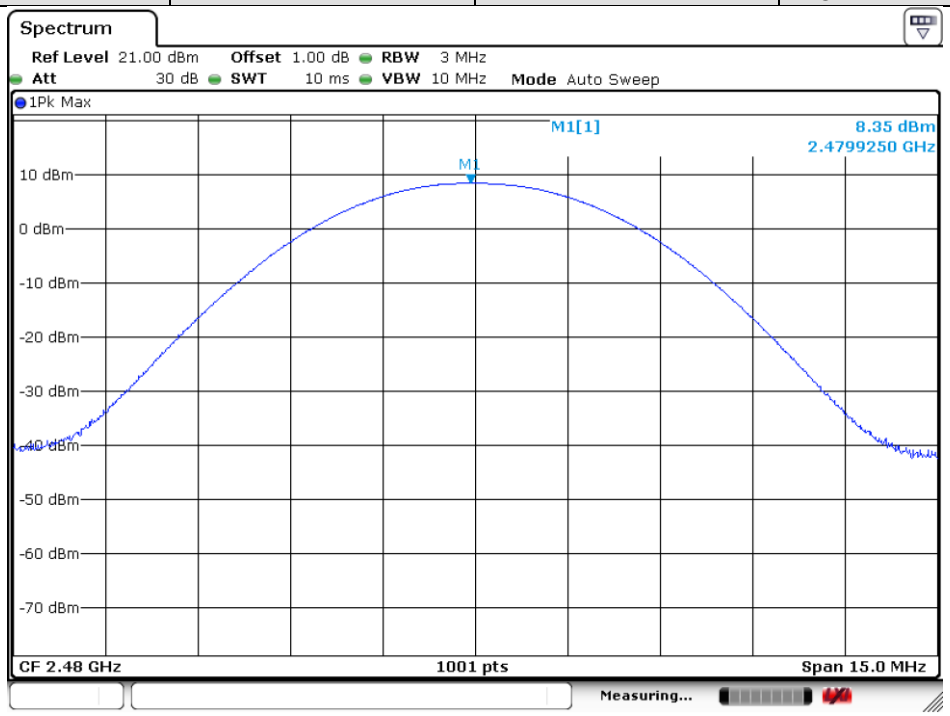
Date: 23.OCT.2019 21:04:51

Test mode:	π/4DQPSK	Test channel:	Middle



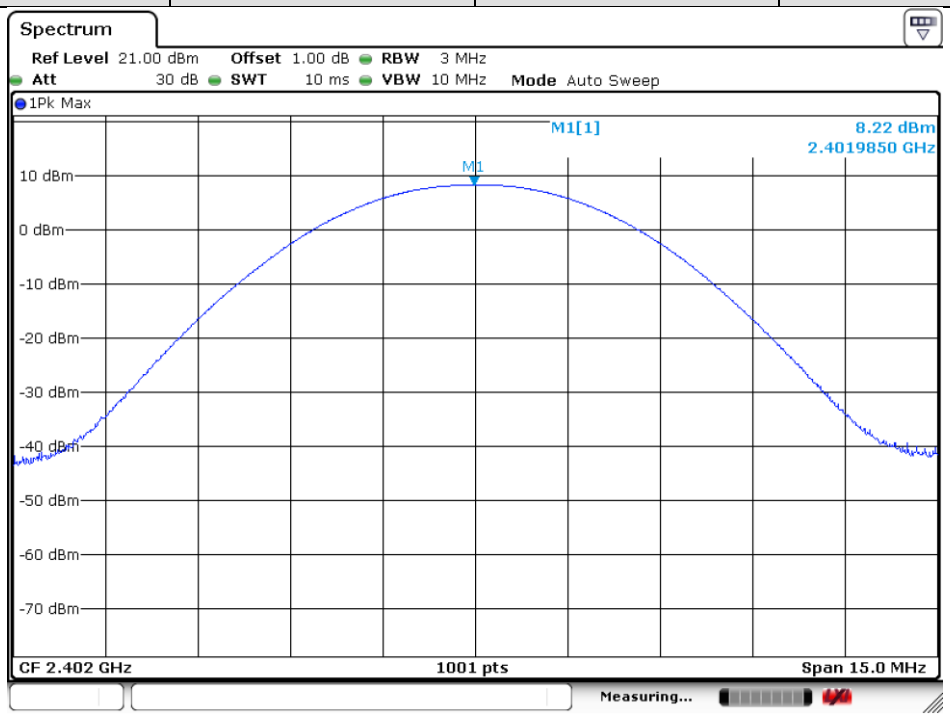
Date: 23.OCT.2019 21:04:31

Test mode:	π/4DQPSK	Test channel:	Highest



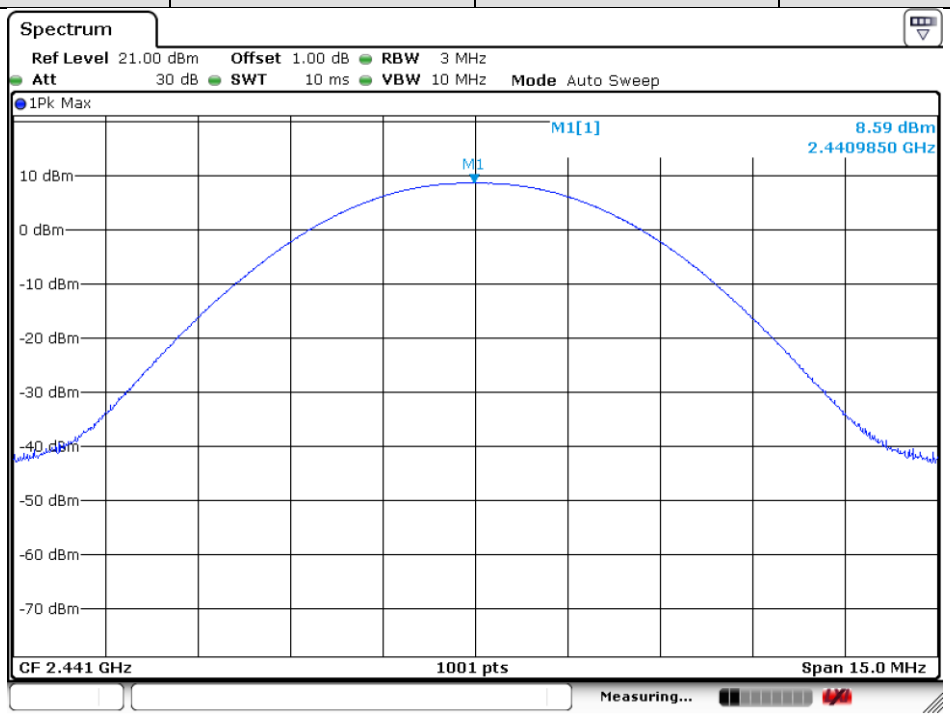
Date: 23.OCT.2019 21:04:08

Test mode:	8DPSK	Test channel:	Lowest



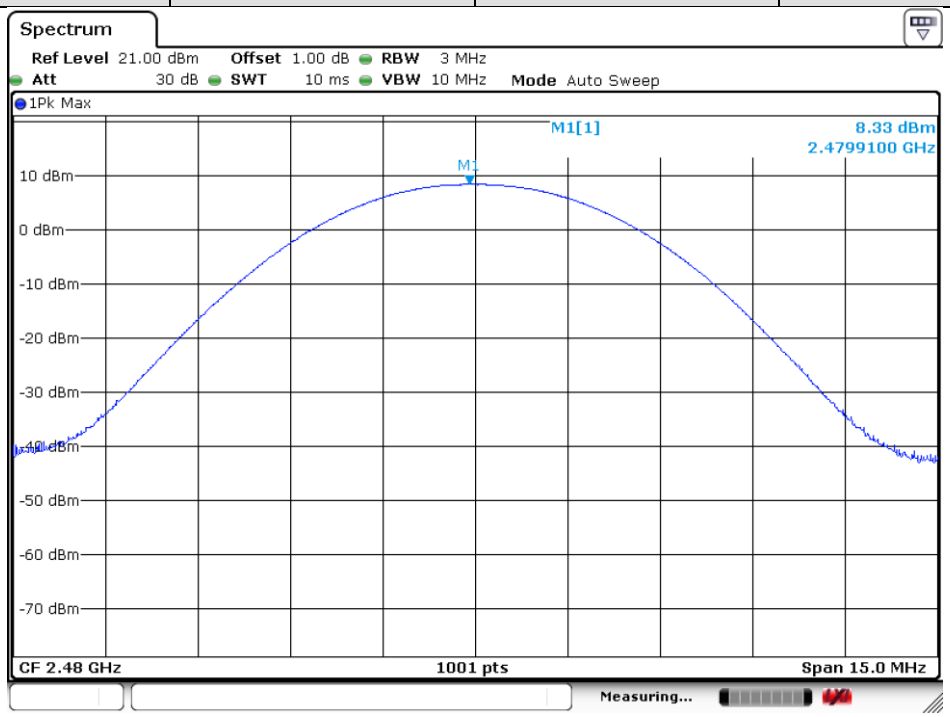
Date: 23.OCT.2019 21:06:50

Test mode:	8DPSK	Test channel:	Middle



Date: 23.OCT.2019 21:07:11

Test mode:	8DPSK	Test channel:	Highest



Date: 23.OCT.2019 21:07:37

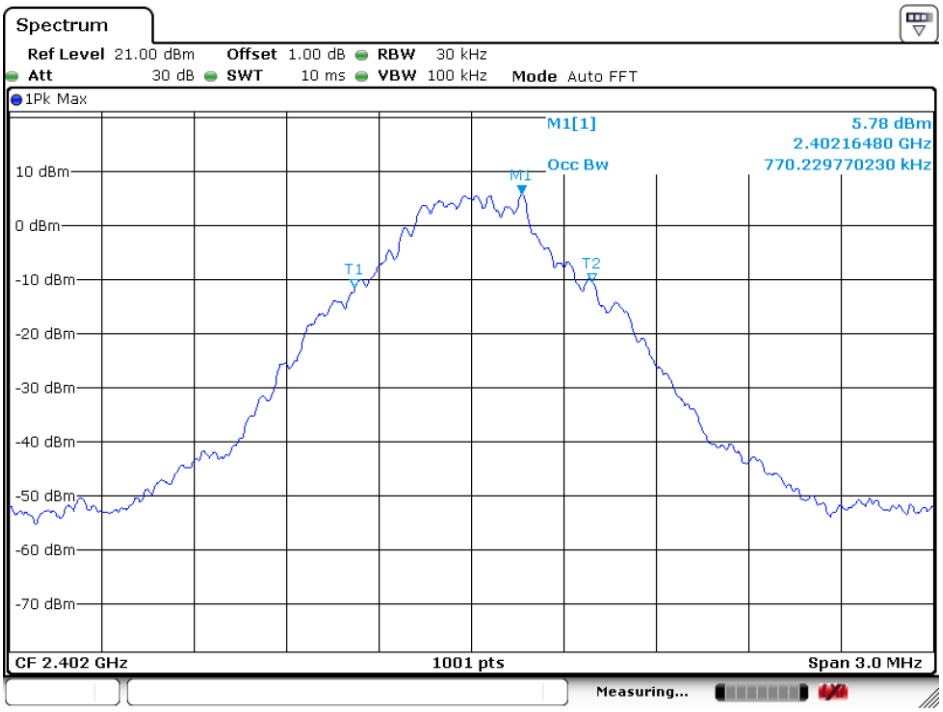
5. 20dB Emission Bandwidth & 99% Occupied Bandwidth

5.1. Test Results

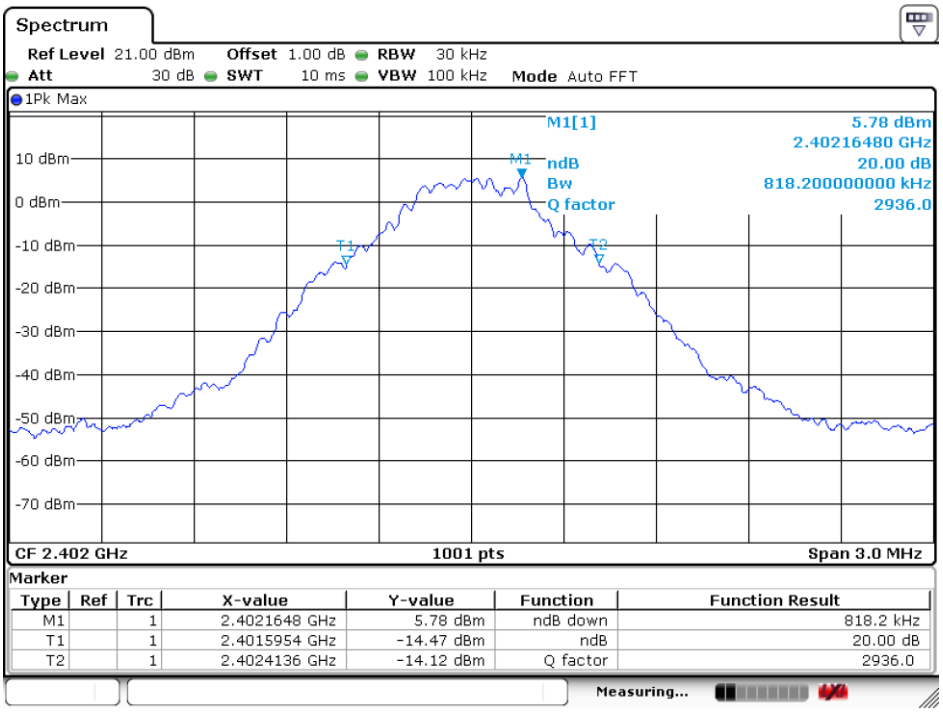
Mode	Test Channel	99% Occupied Bandwidth (KHz)	20dB Emission Bandwidth (KHz)	Result
GFSK	Lowest	770.2	818.2	Pass
	Middle	767.2	818.2	Pass
	Highest	764.2	818.2	Pass
π/4DQPSK	Lowest	1153.8	1270.7	Pass
	Middle	1150.8	1267.7	Pass
	Highest	1144.9	1258.7	Pass
8DPSK	Lowest	1153.8	1258.7	Pass
	Middle	1150.8	1255.7	Pass
	Highest	1144.9	1252.7	Pass

5.2. Test plots

GFSK _Lowest Channel

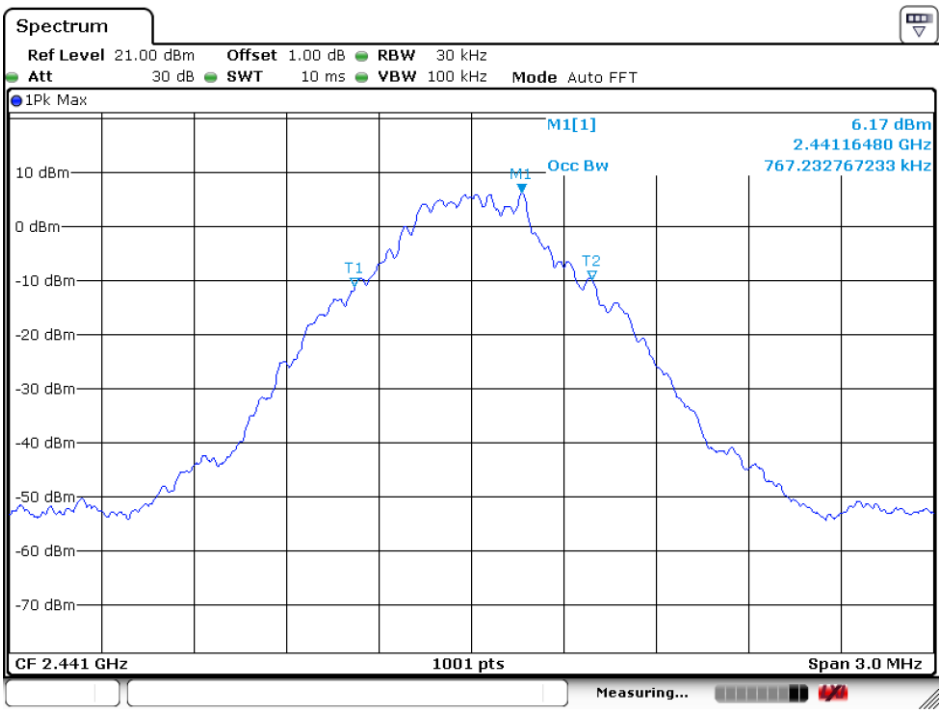


Date: 23.OCT.2019 21:22:32

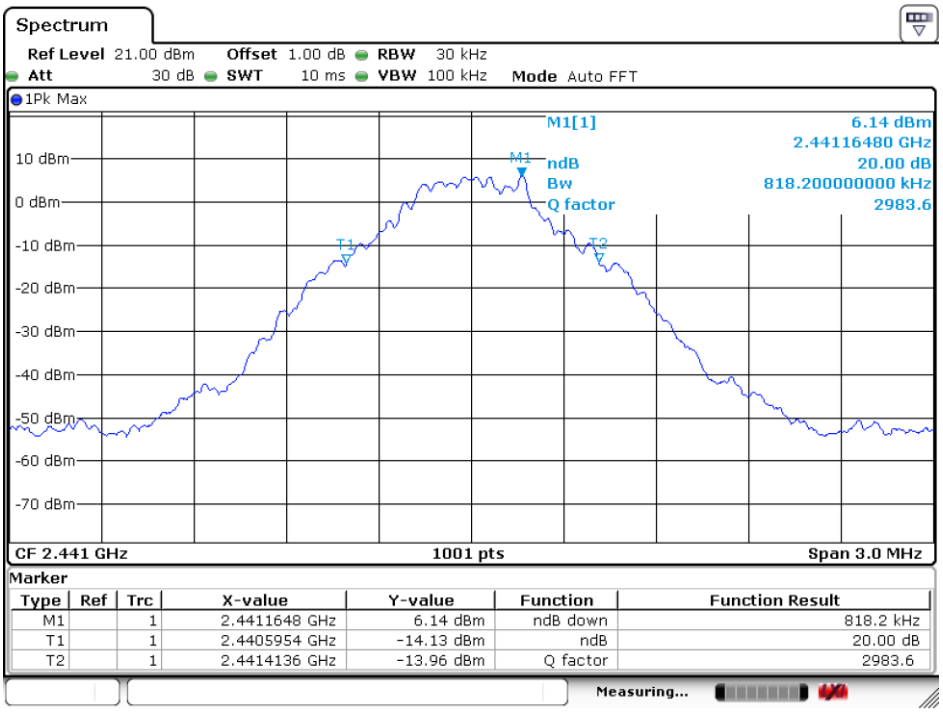


Date: 23.OCT.2019 21:23:08

GFSK _Middle Channel



Date: 23.OCT.2019 21:22:12

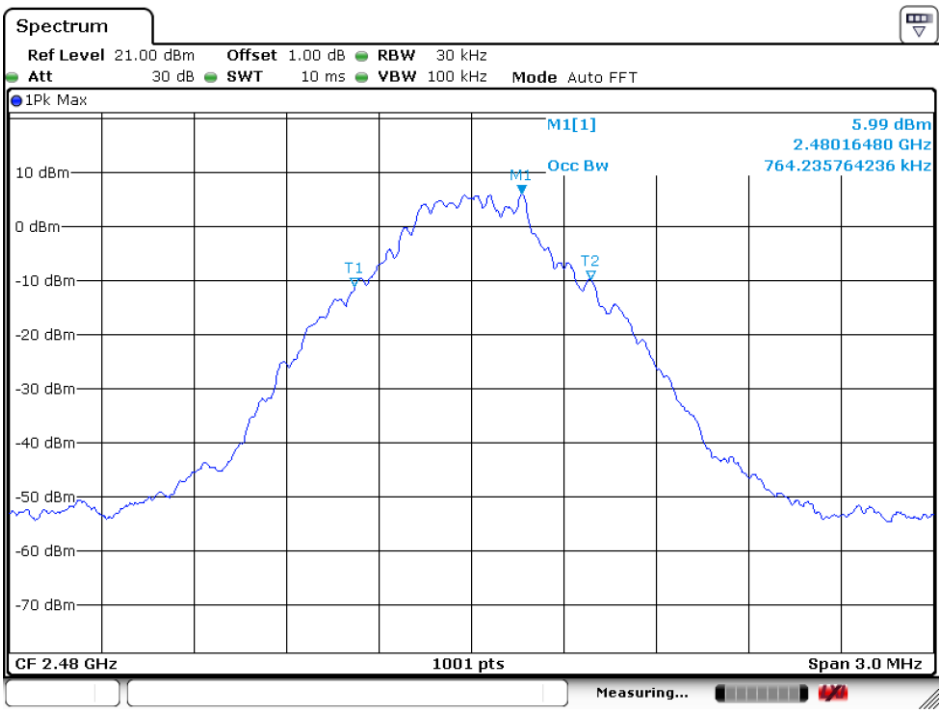


Marker

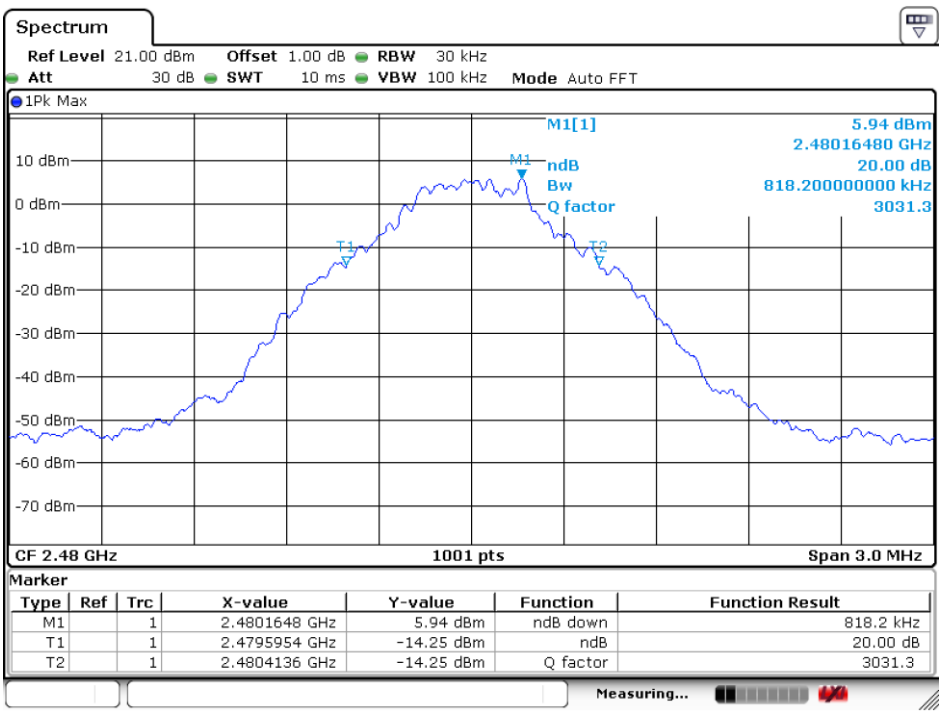
Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.4411648 GHz	6.14 dBm	ndB down	818.2 kHz
T1		1	2.4405954 GHz	-14.13 dBm	ndB	20.00 dB
T2		1	2.4414136 GHz	-13.96 dBm	Q factor	2983.6

Date: 23.OCT.2019 21:24:53

GFSK _Highest Channel

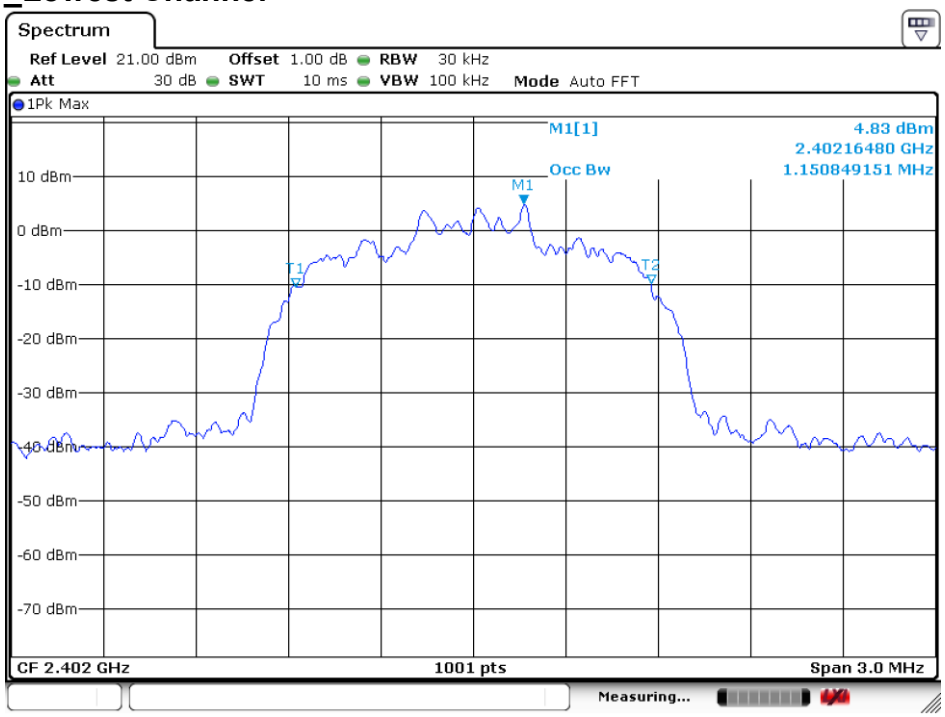


Date: 23.OCT.2019 21:21:56

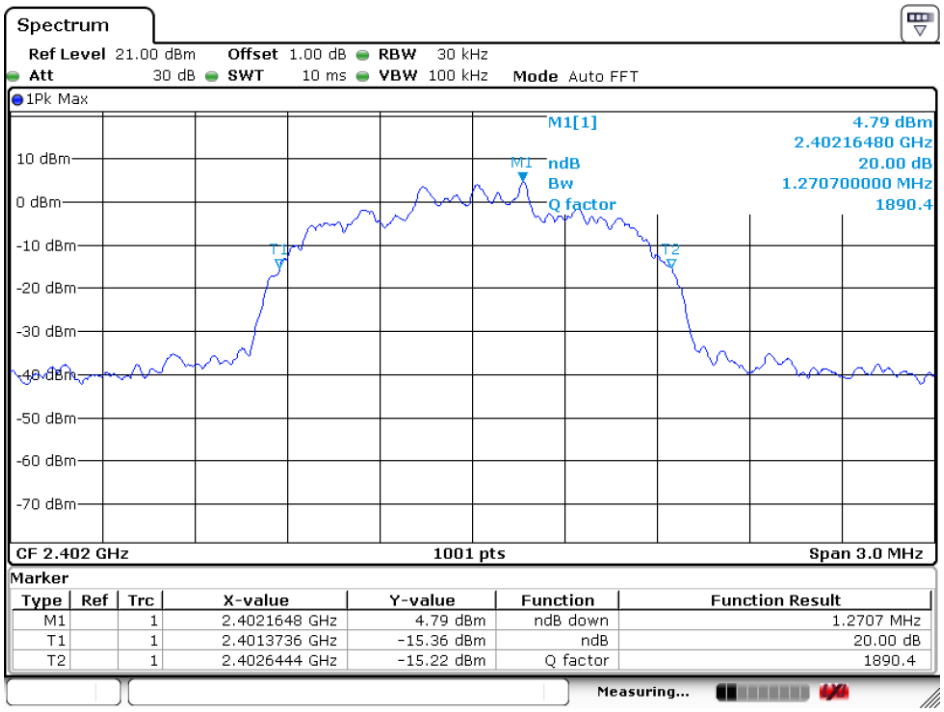


Date: 23.OCT.2019 21:25:10

π/4DQPSK _Lowest Channel

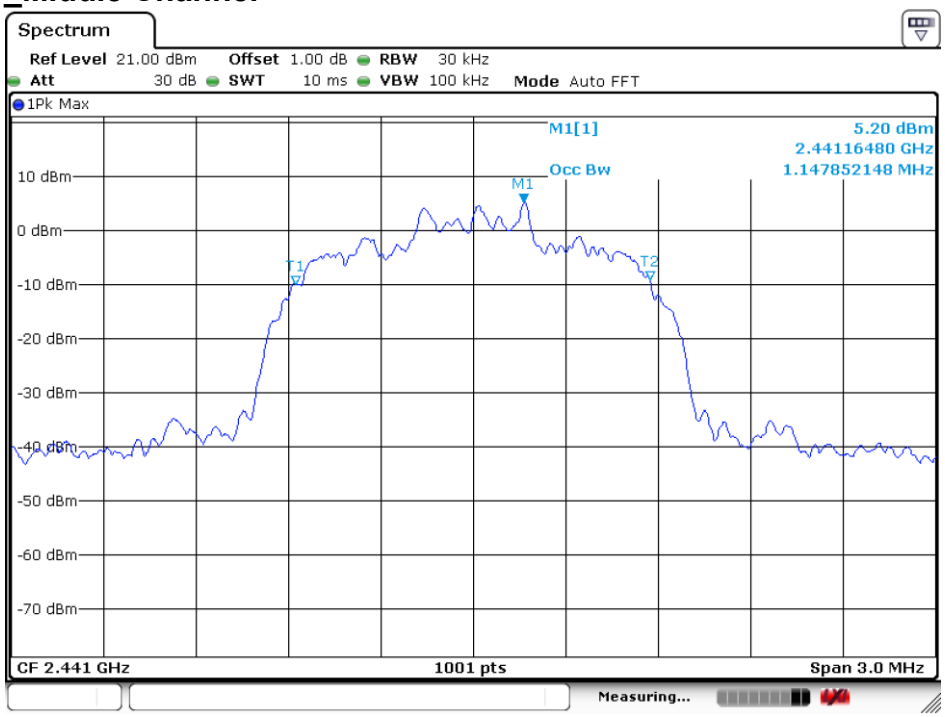


Date: 23.OCT.2019 21:19:05

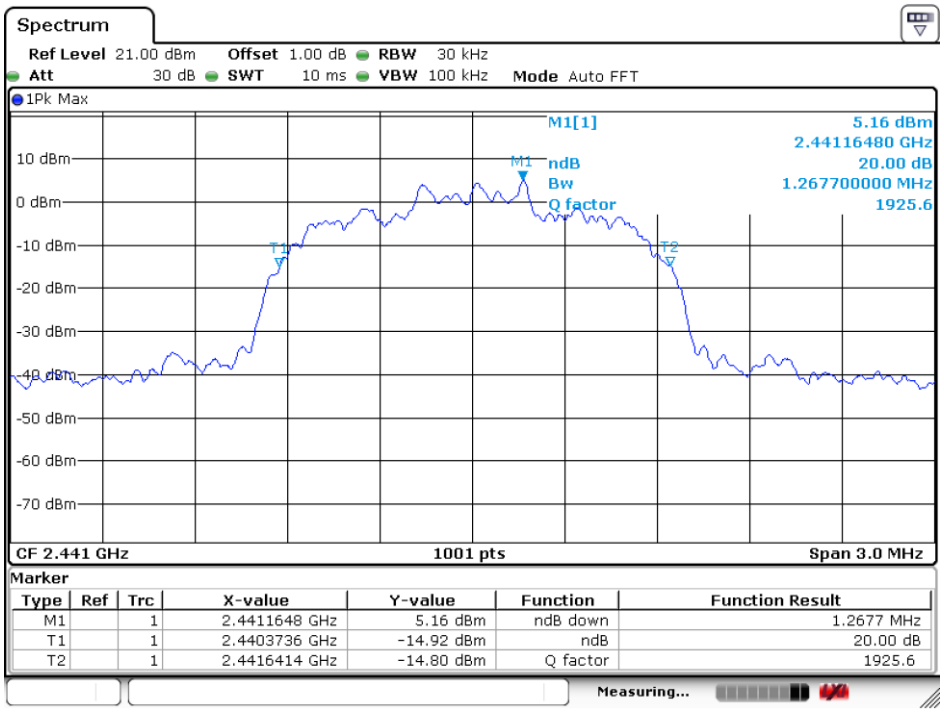


Date: 23.OCT.2019 21:33:45

π/4DQPSK _Middle Channel



Date: 23.OCT.2019 21:19:56

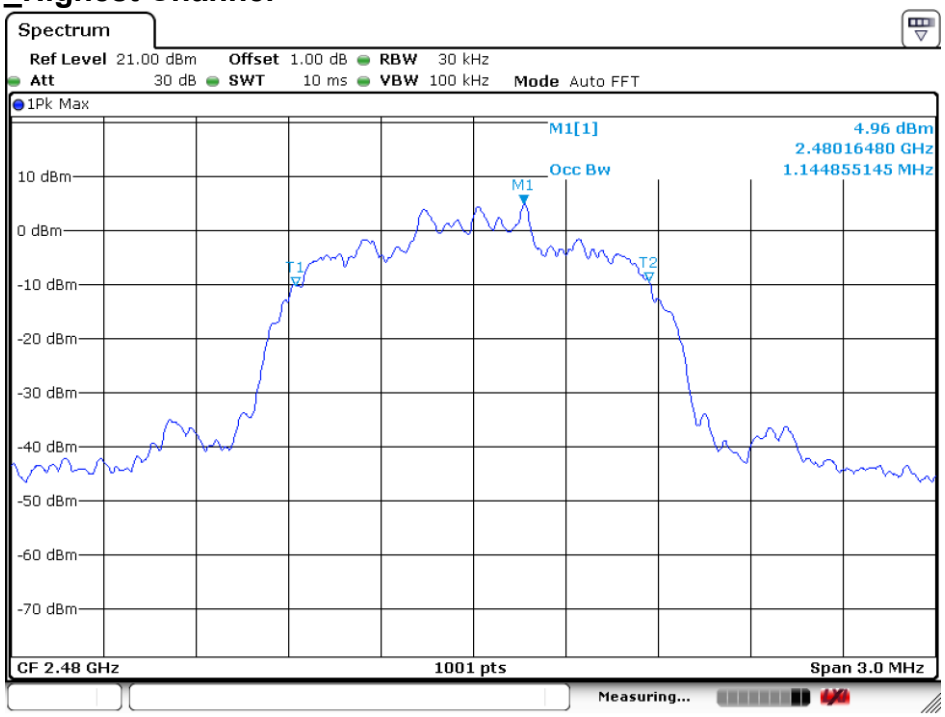


Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.4411648 GHz	5.16 dBm	ndB down	1.2677 MHz
T1		1	2.4403736 GHz	-14.92 dBm	ndB	20.00 dB
T2		1	2.4416414 GHz	-14.80 dBm	Q factor	1925.6

Date: 23.OCT.2019 21:33:20

π/4DQPSK _Highest Channel



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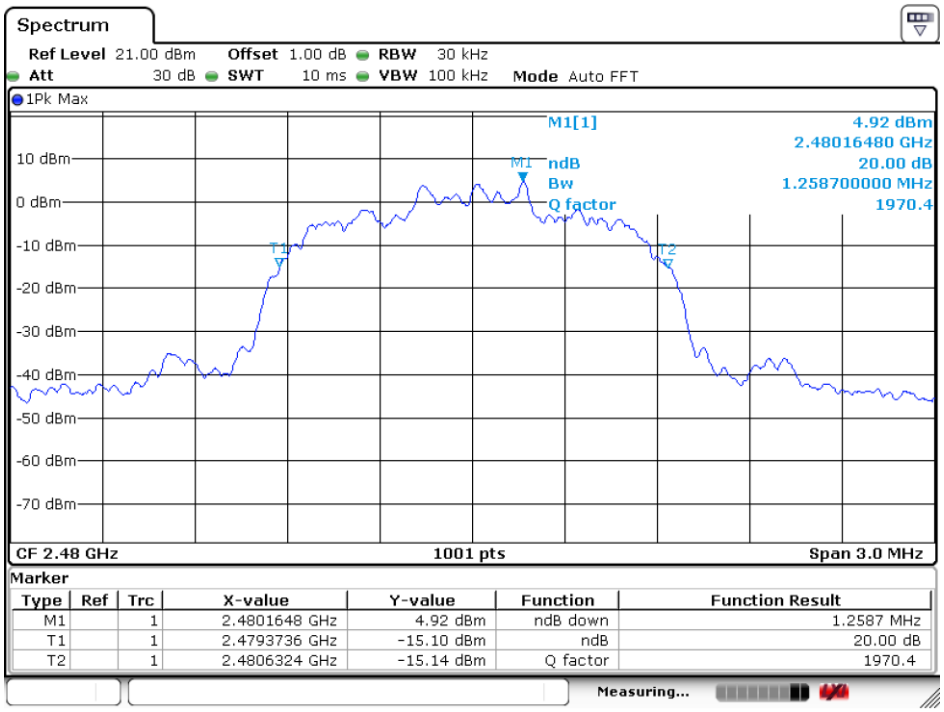
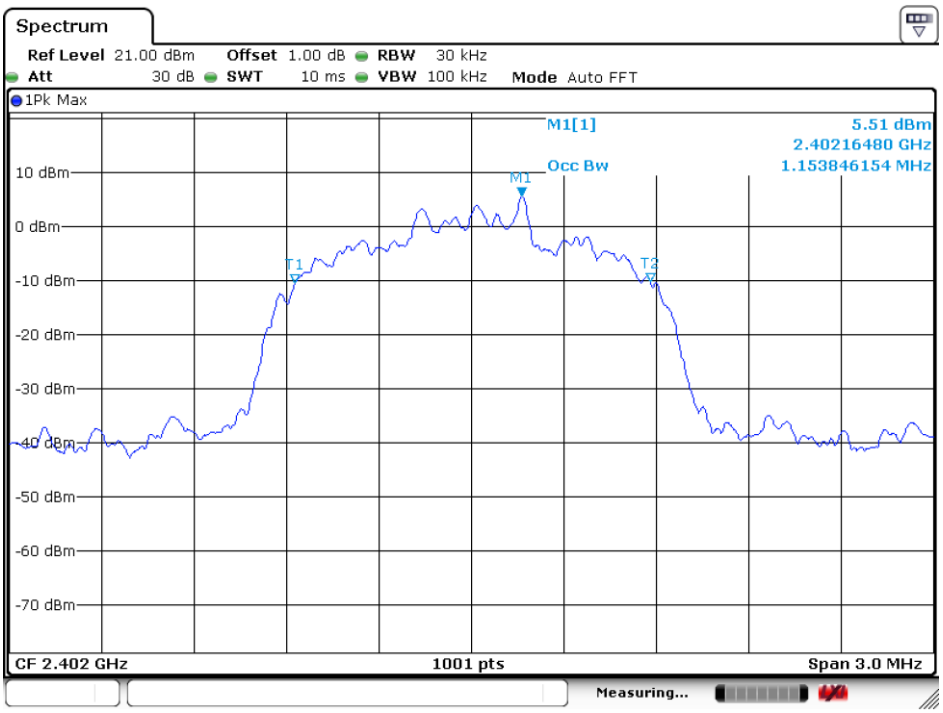


Date: 23.OCT.2019 21:31:42

8DPSK_Lowest Channel



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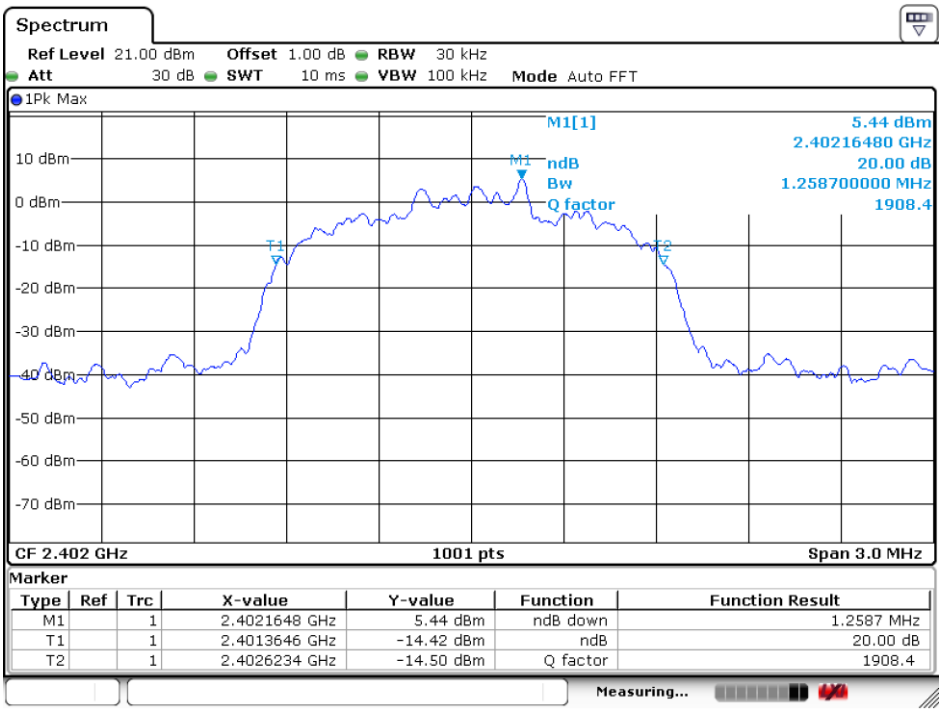

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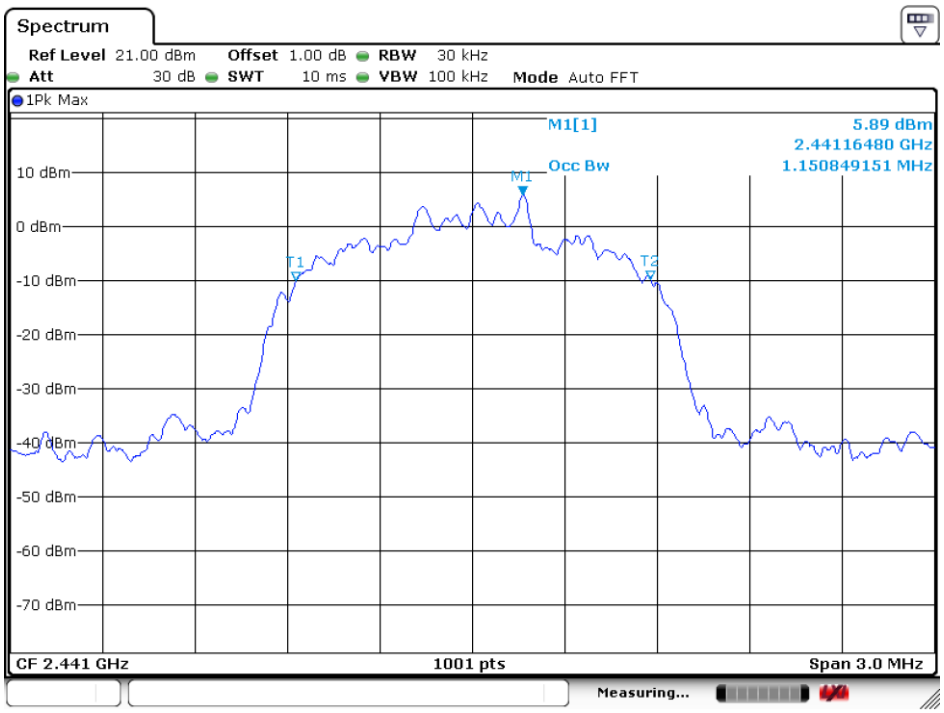
8DPSK _Middle Channel



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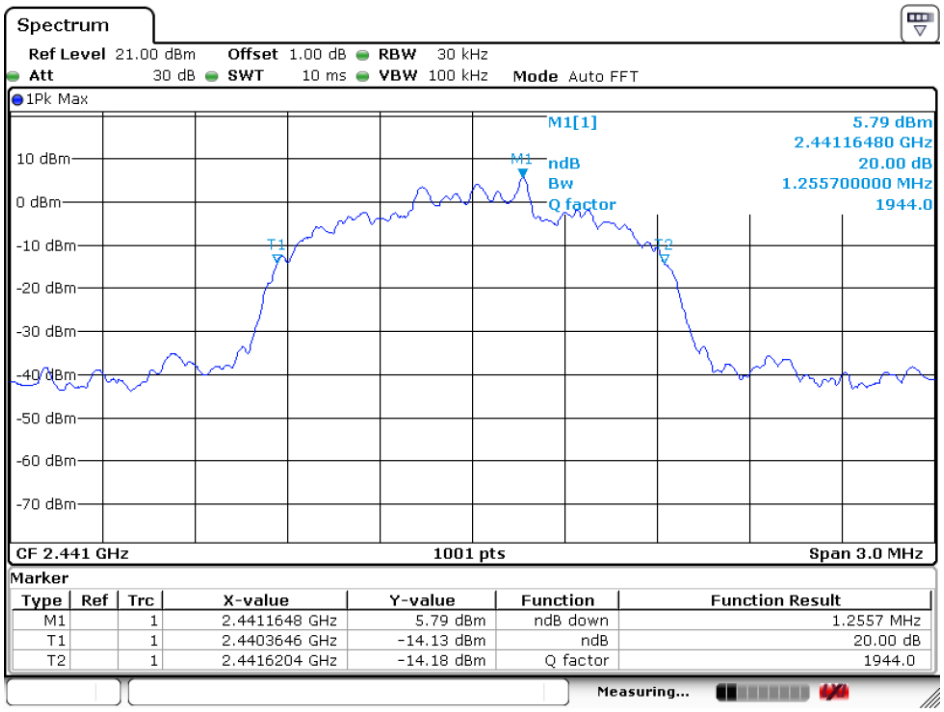

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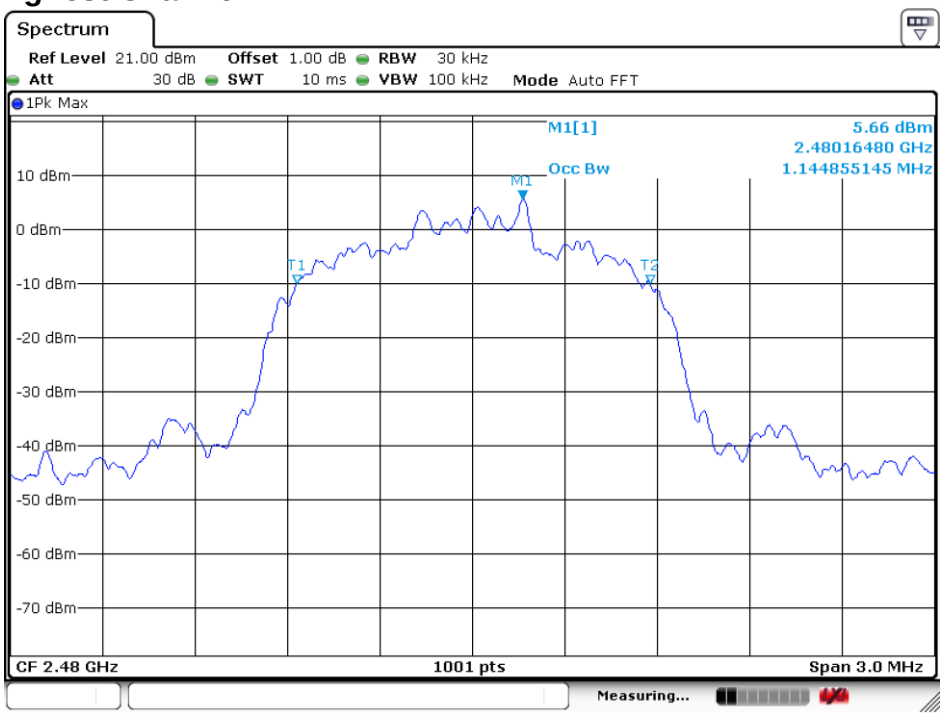
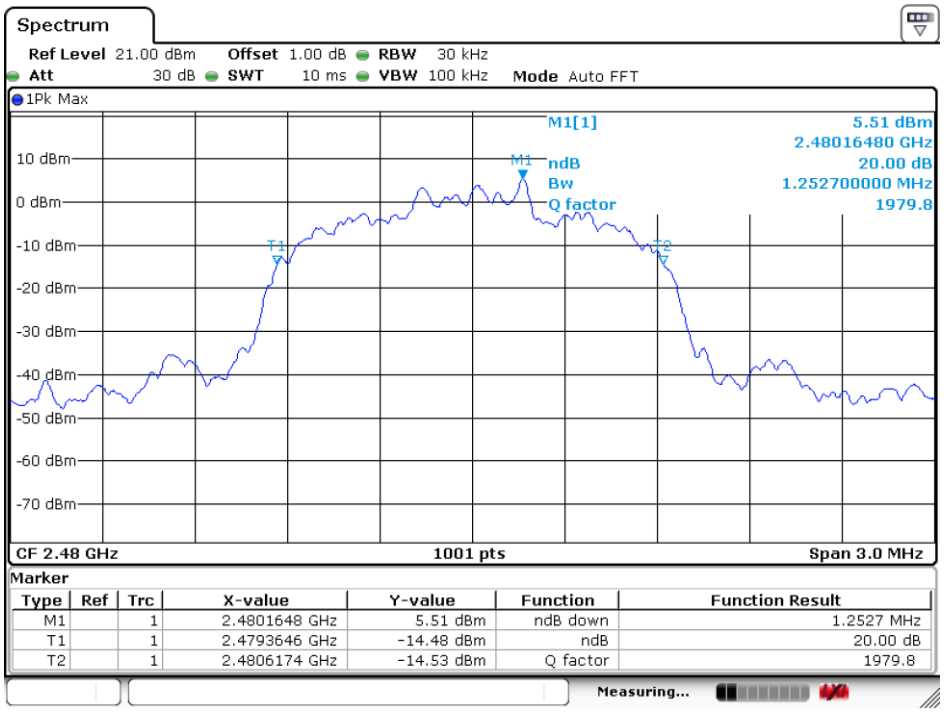
8DPSK_Highest Channel



Date: 23.OCT.2019 21:13:26



Date: 23.OCT.2019 21:37:20

6. Carrier Frequencies Separation

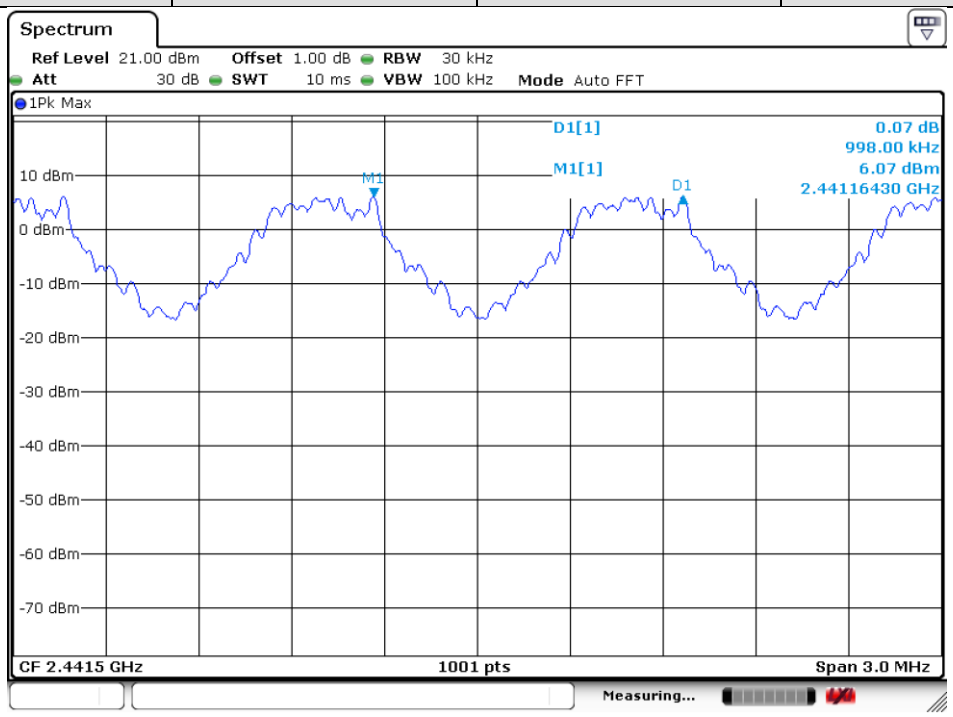
6.1. Test Results

GFSK mode			
Test channel	**Carrier Frequencies Separation (kHz)**	**Limit (kHz)**	**Result**
Middle	998	513.5	Pass
π/4DQPSK mode			
Test channel	**Carrier Frequencies Separation (kHz)**	**Limit (kHz)**	**Result**
Middle	1001	769.2	Pass
8DPSK mode			
Test channel	**Carrier Frequencies Separation (kHz)**	**Limit (kHz)**	**Result**
Middle	998	769.2	Pass

Mode	20dB bandwidth (kHz) (worse case)	Limit (kHz) (Carrier Frequencies Separation)
GFSK	770.2	513.5
π/4DQPSK	1153.8	769.2
8DPSK	1153.8	769.2

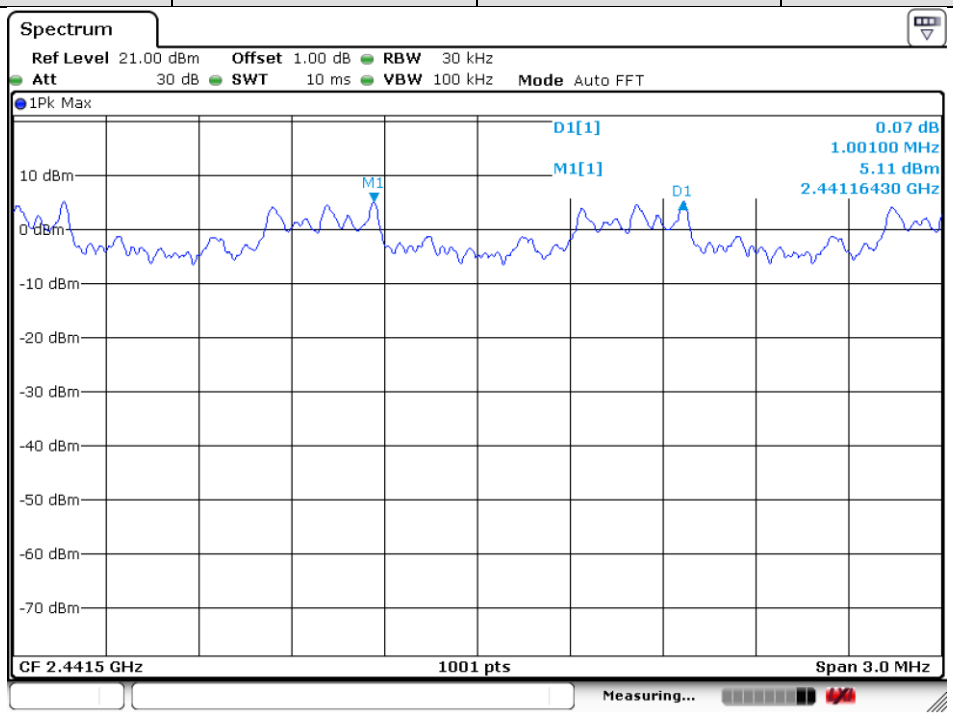
6.2. Test plots:

Test mode:	GFSK	Test channel:	Middle



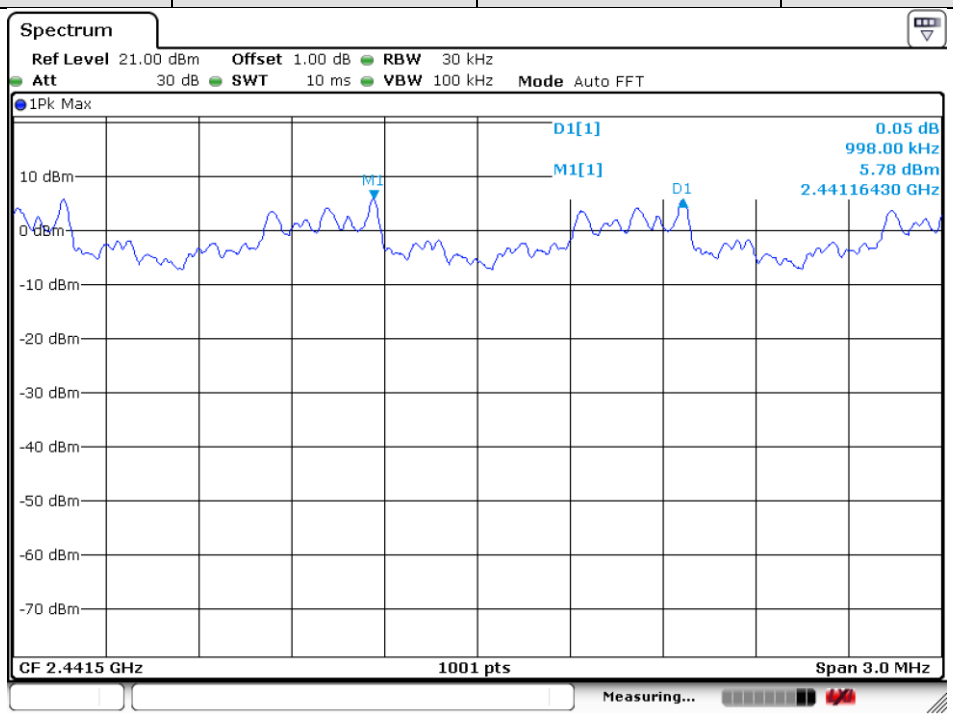
Date: 23.OCT.2019 21:41:11

Test mode:	π/4DQPSK	Test channel:	Middle



Date: 23.OCT.2019 21:38:54

Test mode:	8DPSK	Test channel:	Middle



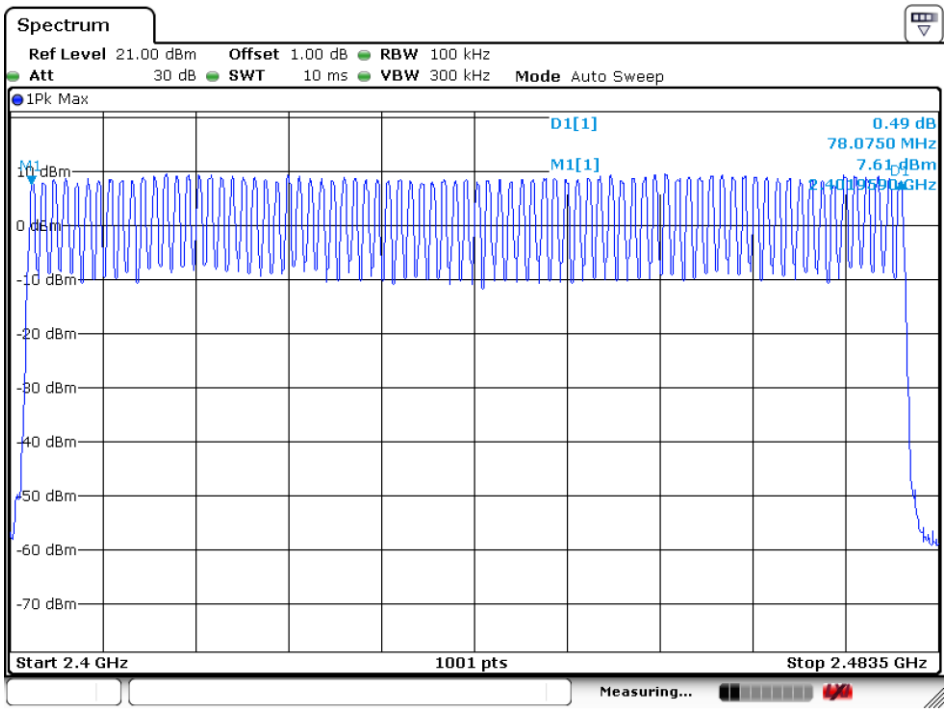
7. Hopping Channel Number

7.1. Test Results

Mode	Hopping channel numbers	Limit
GFSK	79	≥15
π/4DQPSK	79	≥15
8DPSK	79	≥15

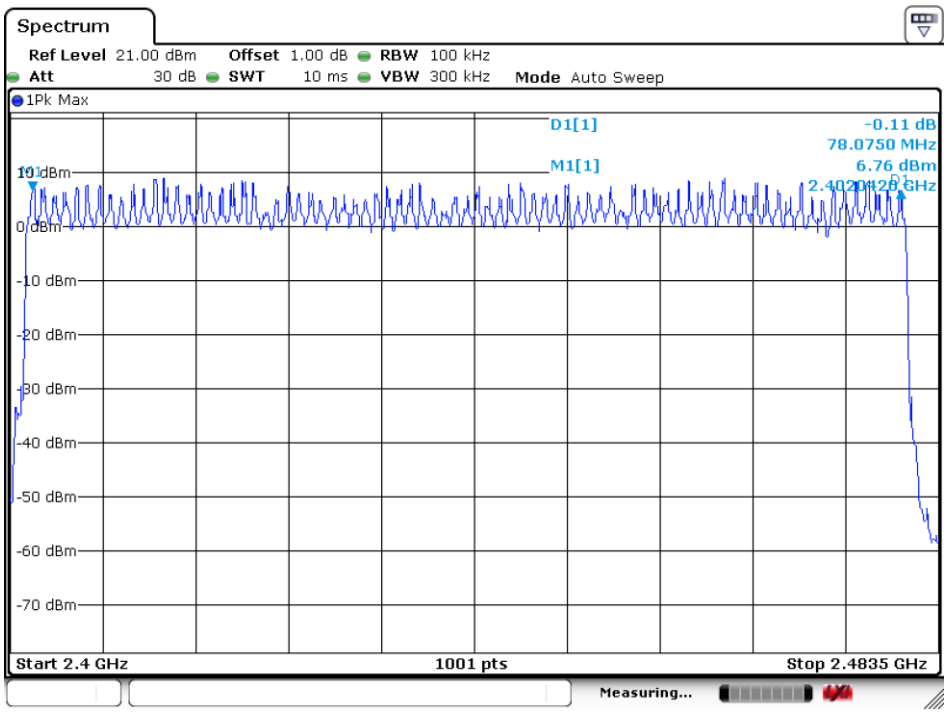
7.2. Test plots

GFSK



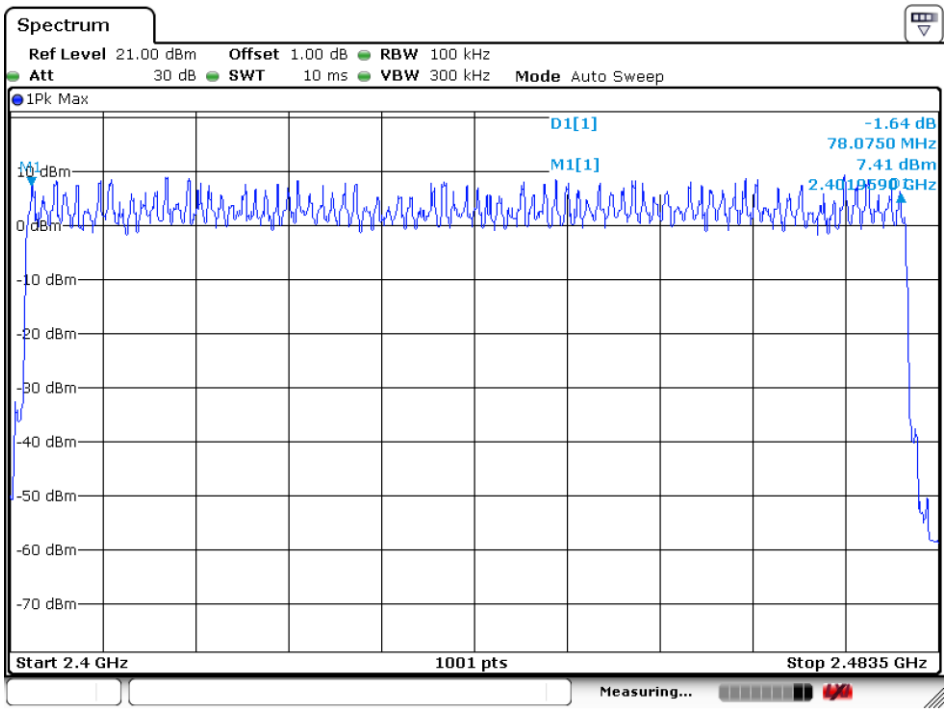
Date: 23.OCT.2019 21:42:54

π/4DQPSK



Date: 23.OCT.2019 21:44:19

8DPSK



Date: 23.OCT.2019 21:46:22

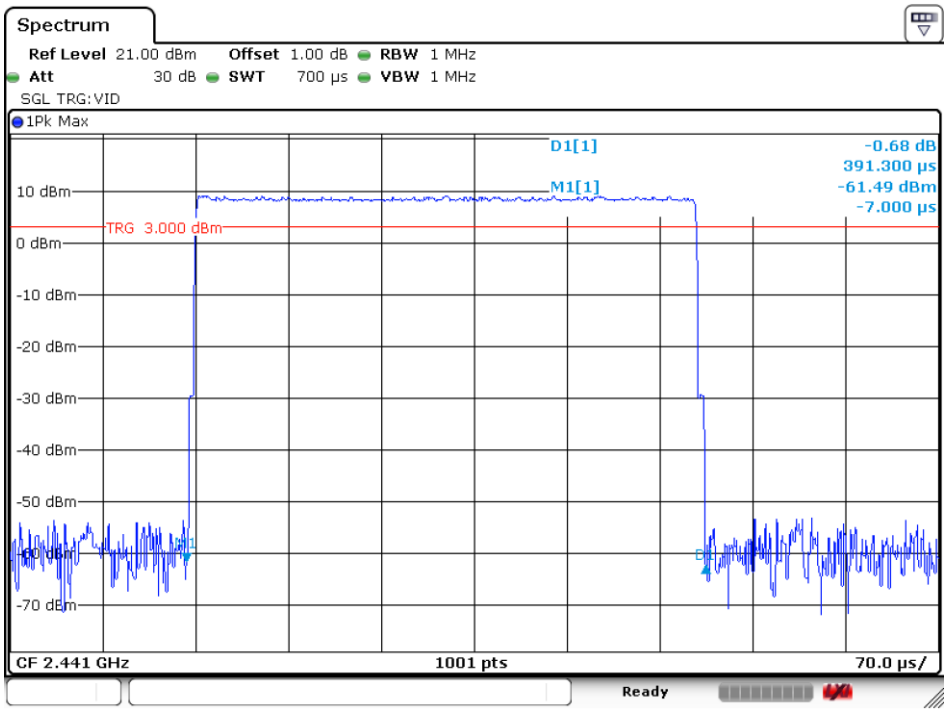
8. Dwell Time

8.1. Test Results

Operation Modes	On time（ms）on one channel
DH1	0.391
DH3	1.659
DH5	2.903
2-DH1	0.397
2-DH3	1.653
2-DH5	2.903
3-DH1	0.402
3-DH3	1.653
3-DH5	2.923

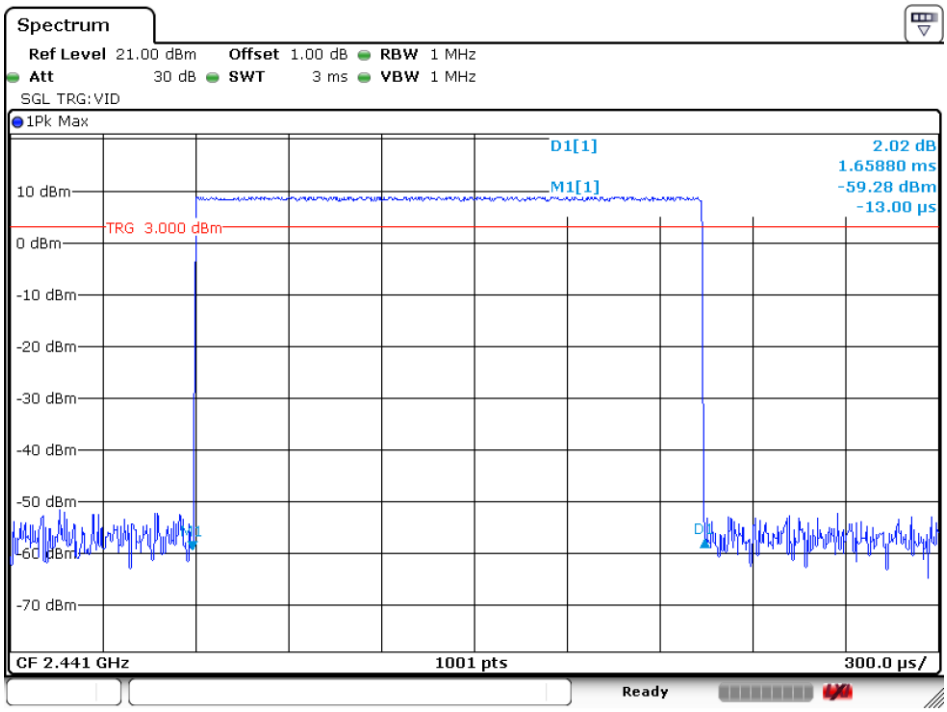
8.2. Test plots

DH1 _Middle Channel



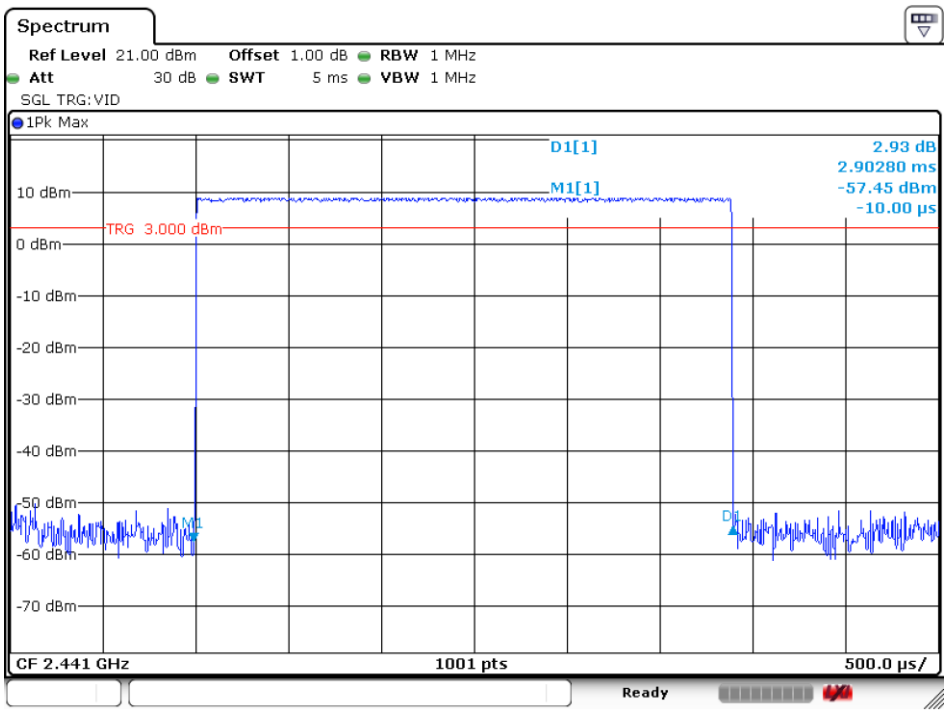
Date: 24.OCT.2019 01:03:03

DH3 _ Middle Channel



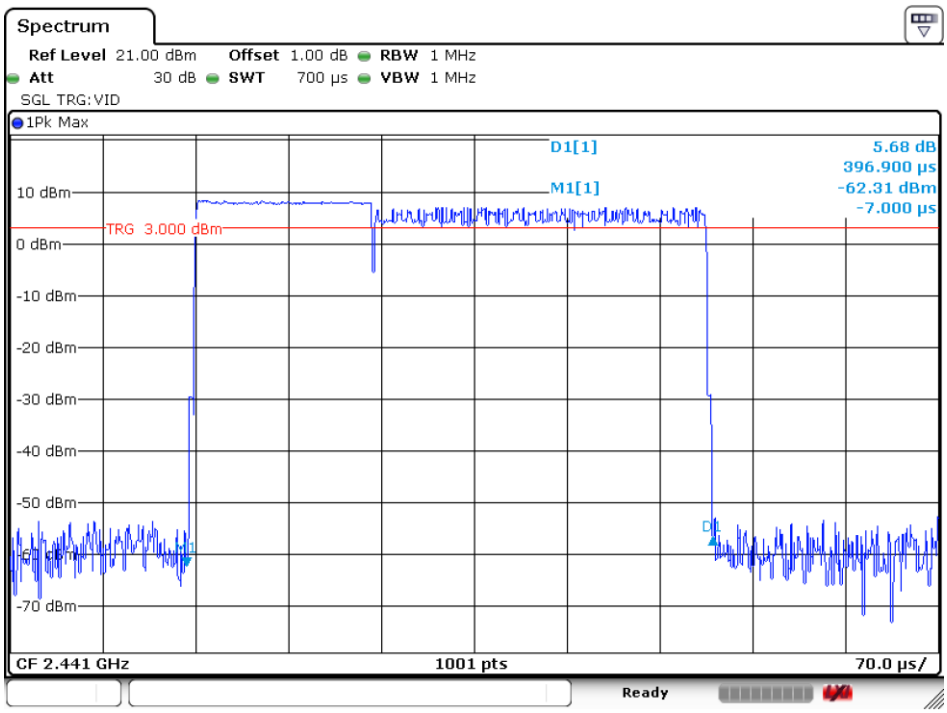
Date: 24.OCT.2019 01:05:09

DH5 _ Middle Channel



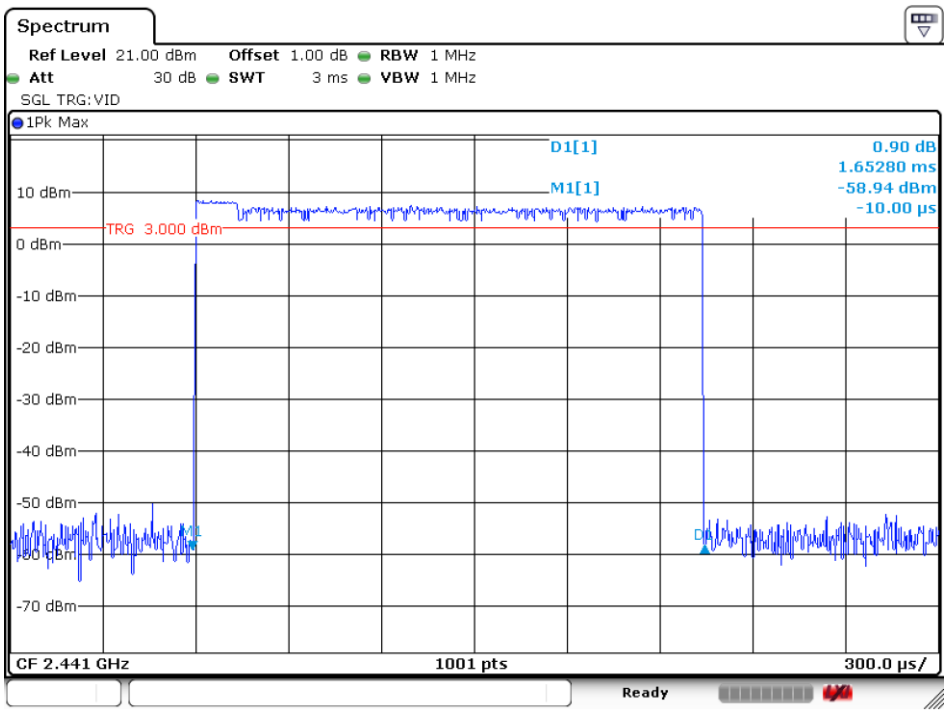
Date: 24.OCT.2019 01:06:34

2DH1 _Middle Channel



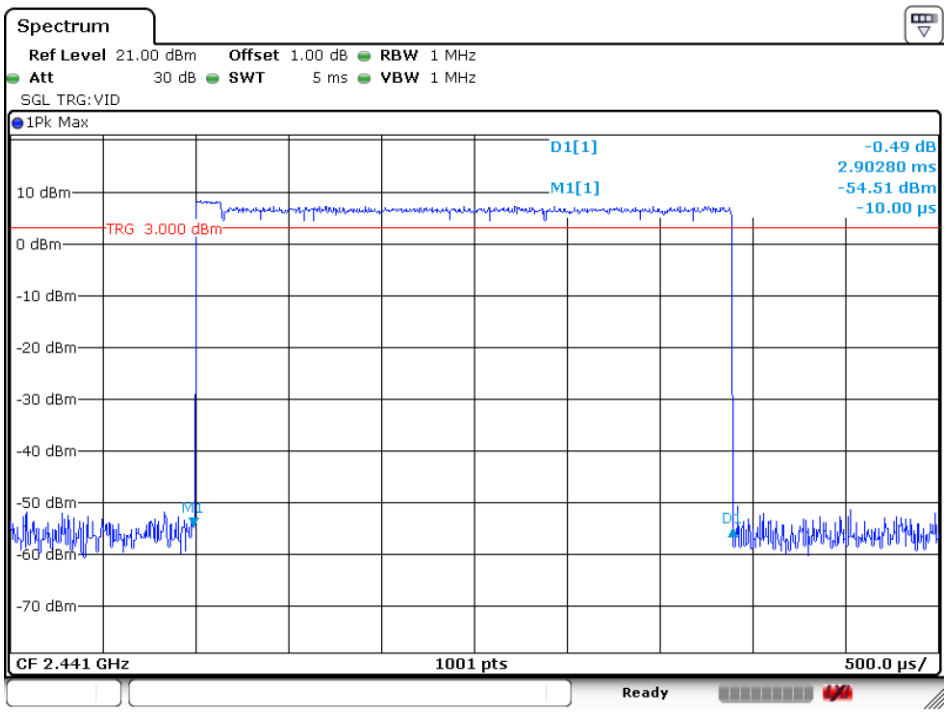
Date: 24.OCT.2019 01:03:38

2DH3 _ Middle Channel



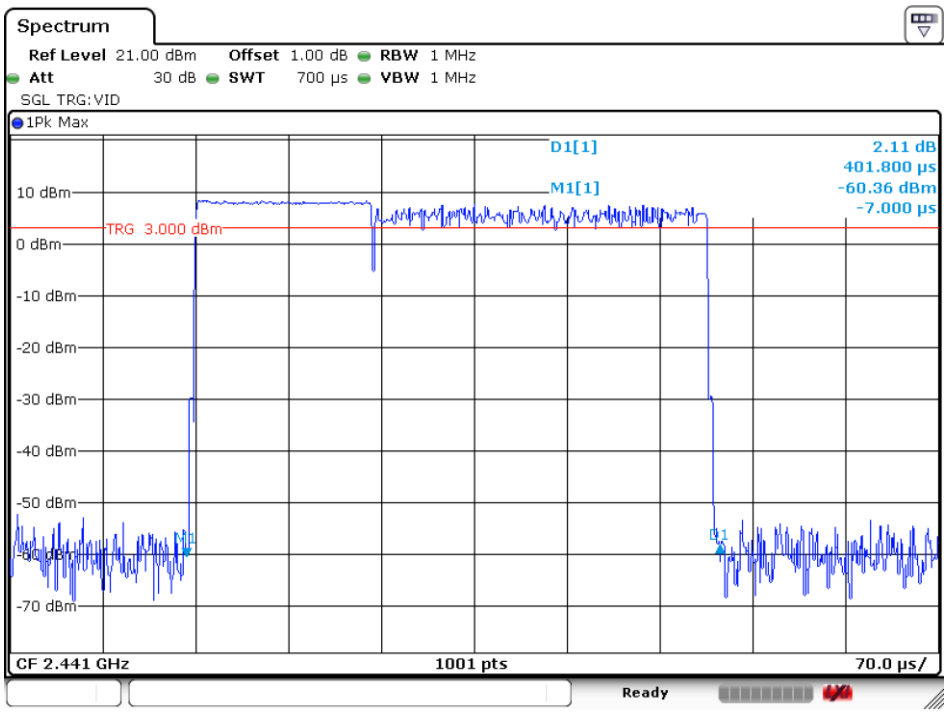
Date: 24.OCT.2019 01:05:34

2DH5 _ Middle Channel



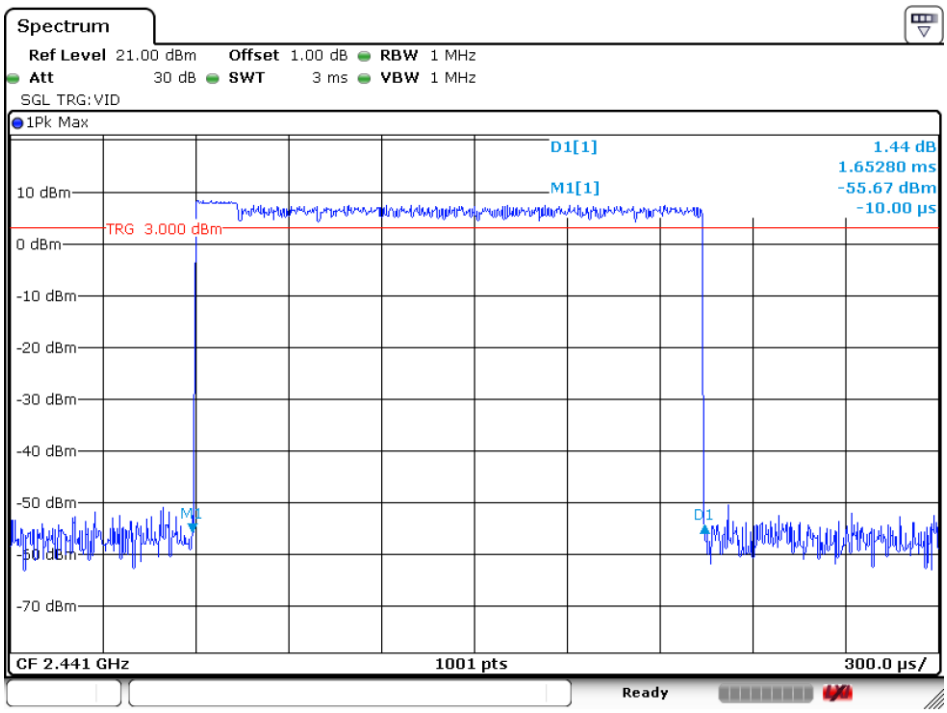
Date: 24.OCT.2019 01:06:58

3DH1 _Middle Channel



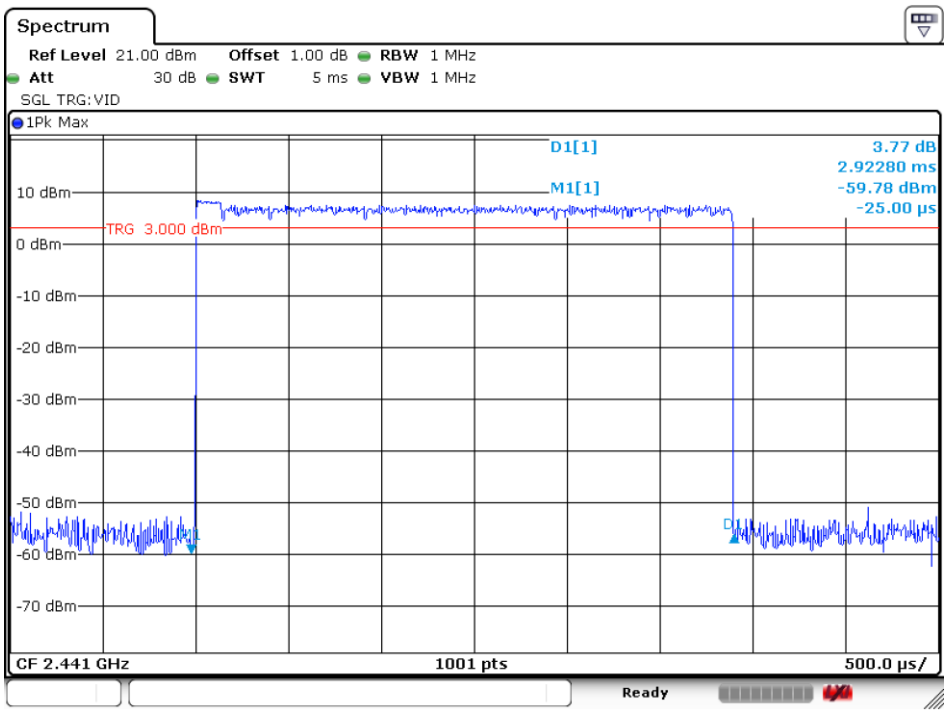
Date: 24.OCT.2019 01:04:24

3DH3 _ Middle Channel



Date: 24.OCT.2019 01:05:56

3DH5 _ Middle Channel

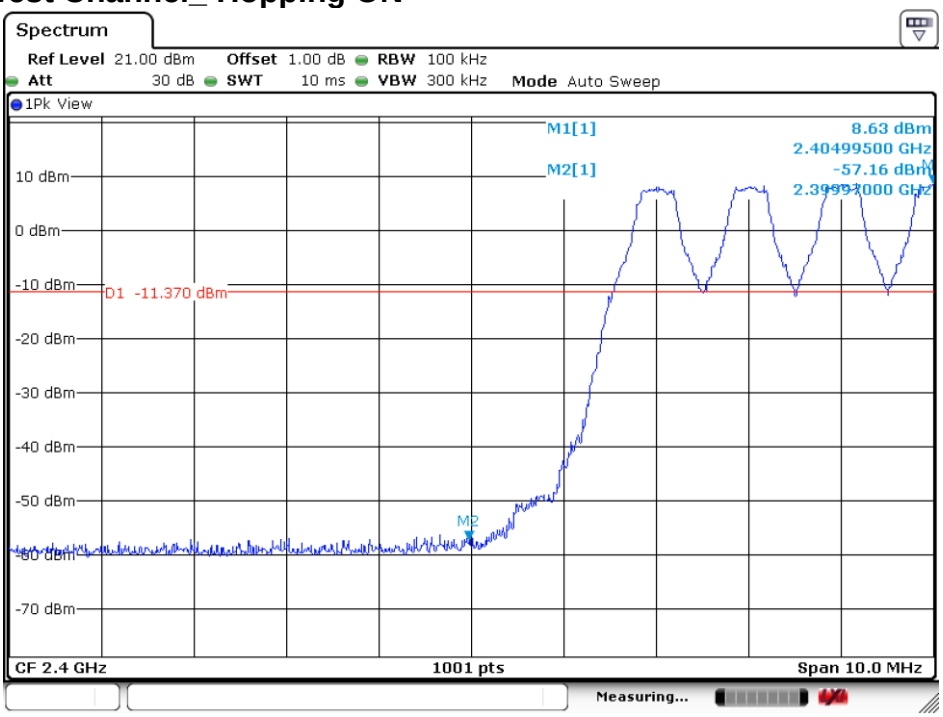


Date: 24.OCT.2019 01:07:26

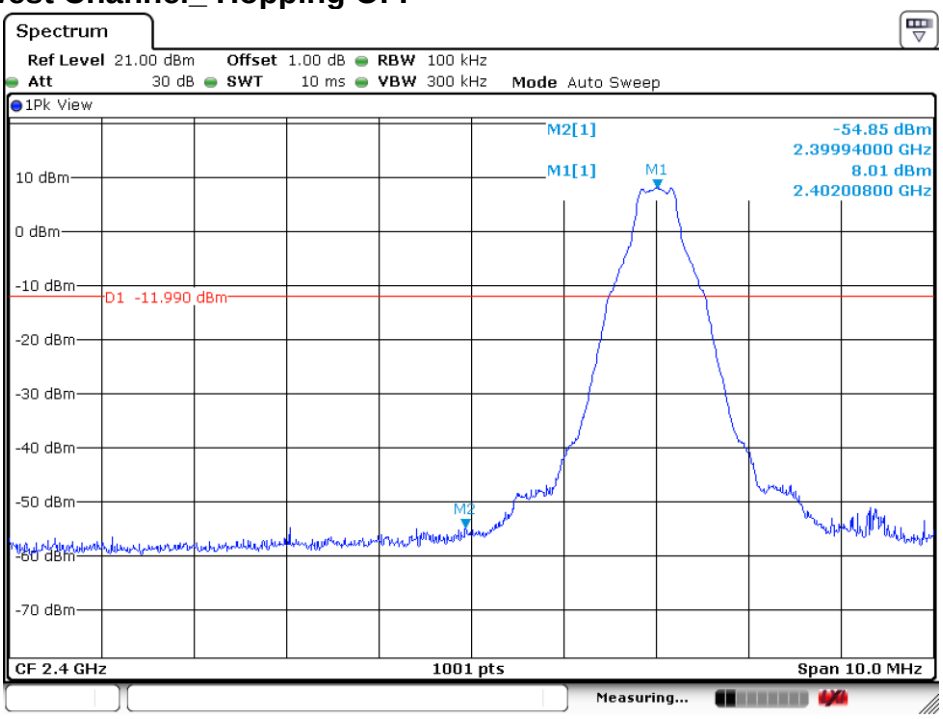
9. Band-edge for RF Conducted Emissions

9.1. Test plots

GFSK _Lowest Channel_ Hopping ON

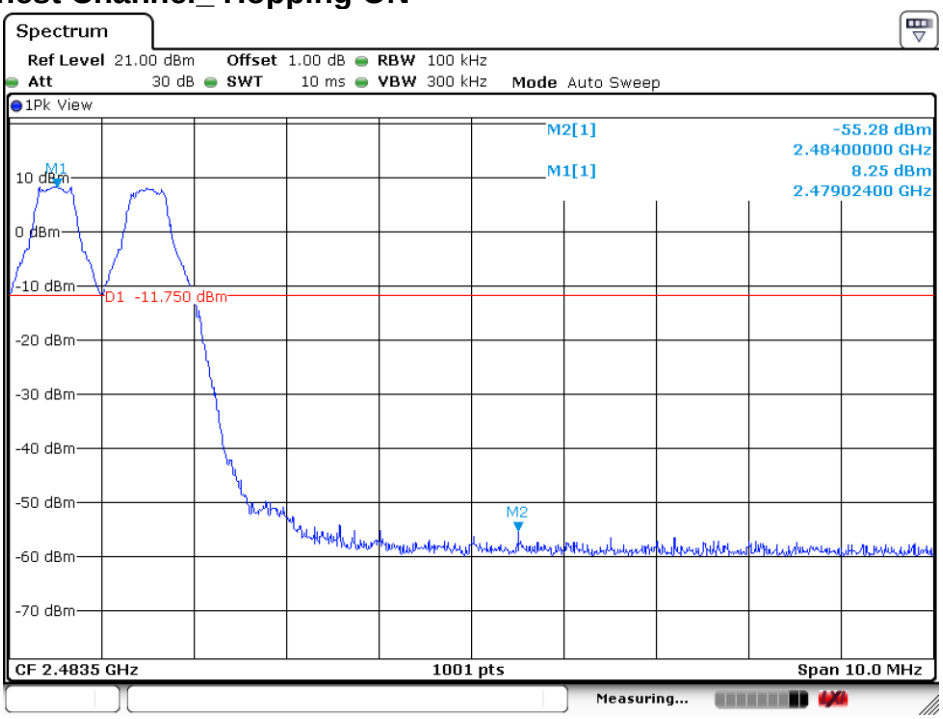


GFSK _Lowest Channel_ Hopping OFF



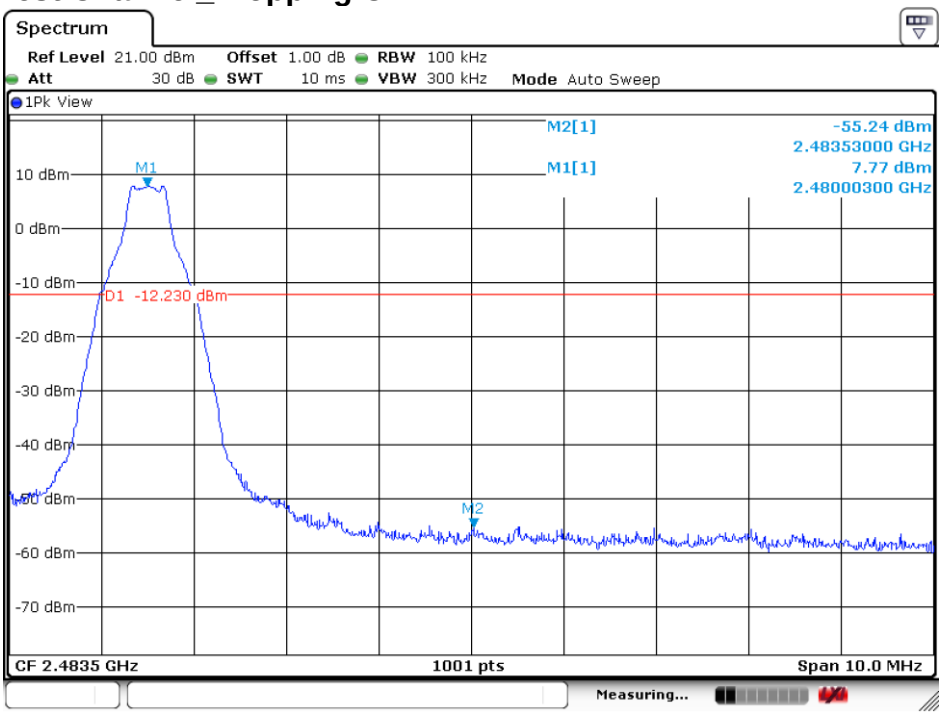
Date: 23.OCT.2019 22:22:30

GFSK _Highest Channel_ Hopping ON



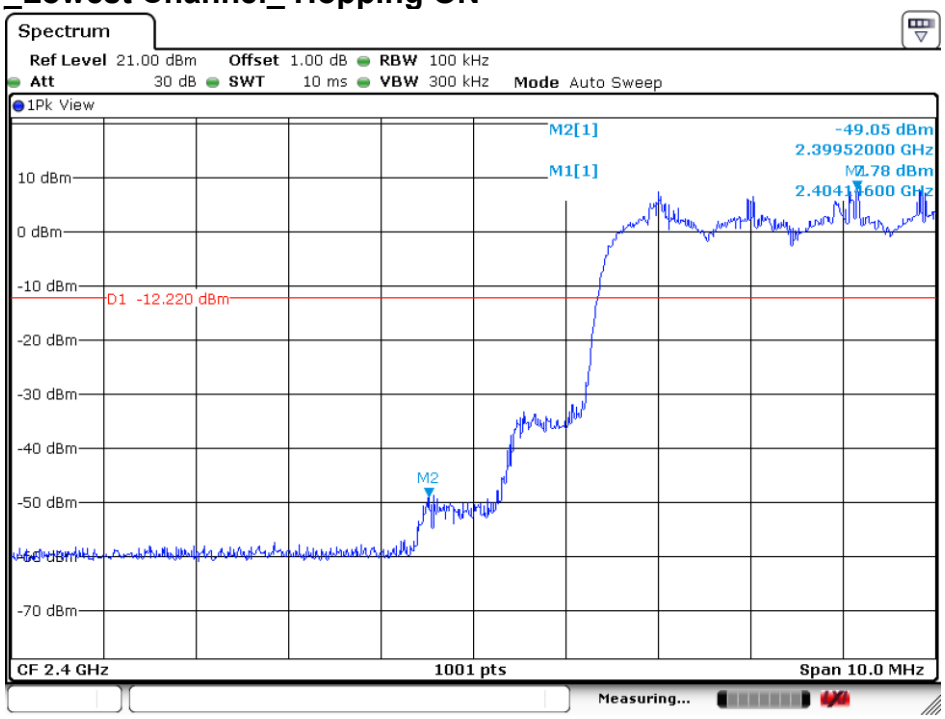
Date: 23.OCT.2019 22:30:04

GFSK _Highest Channel_ Hopping OFF



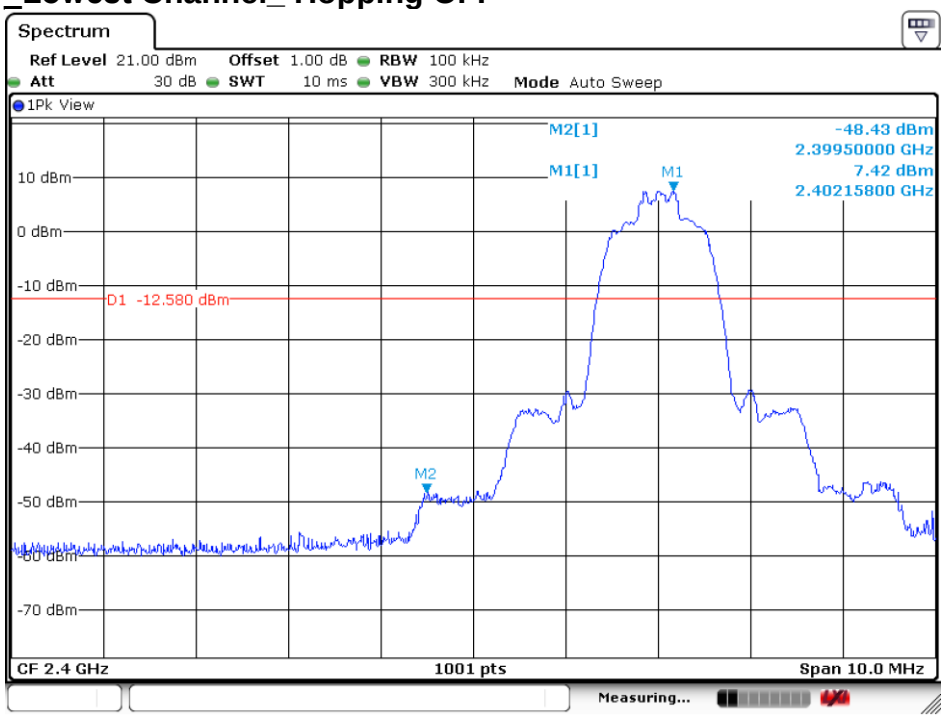
Date: 23.OCT.2019 22:27:03

π/4DQPSK _Lowest Channel_ Hopping ON



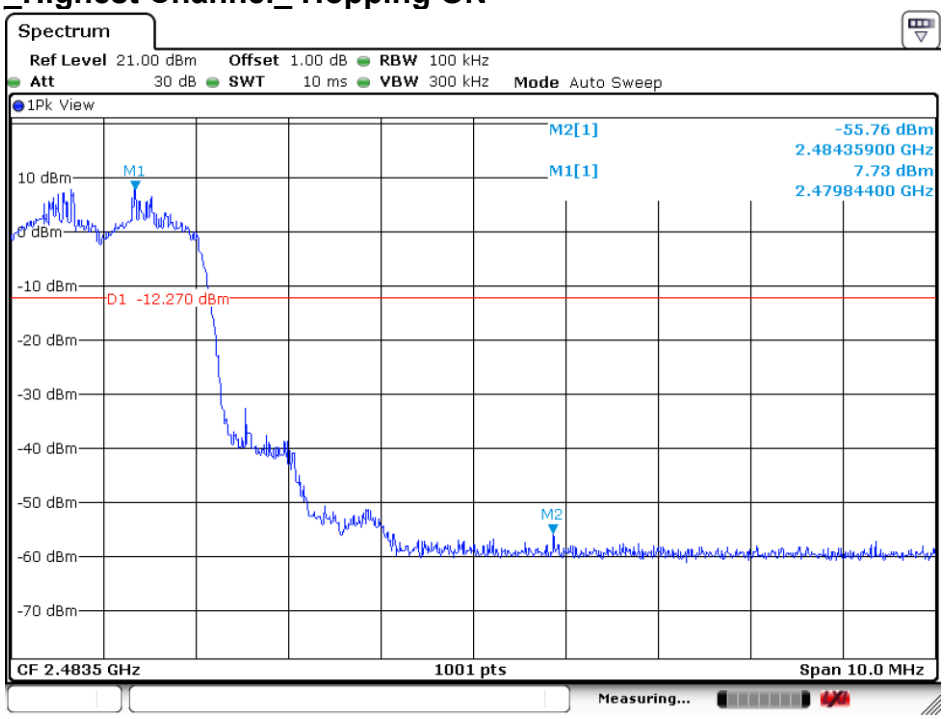
Date: 23.OCT.2019 22:18:46

π/4DQPSK _Lowest Channel_ Hopping OFF



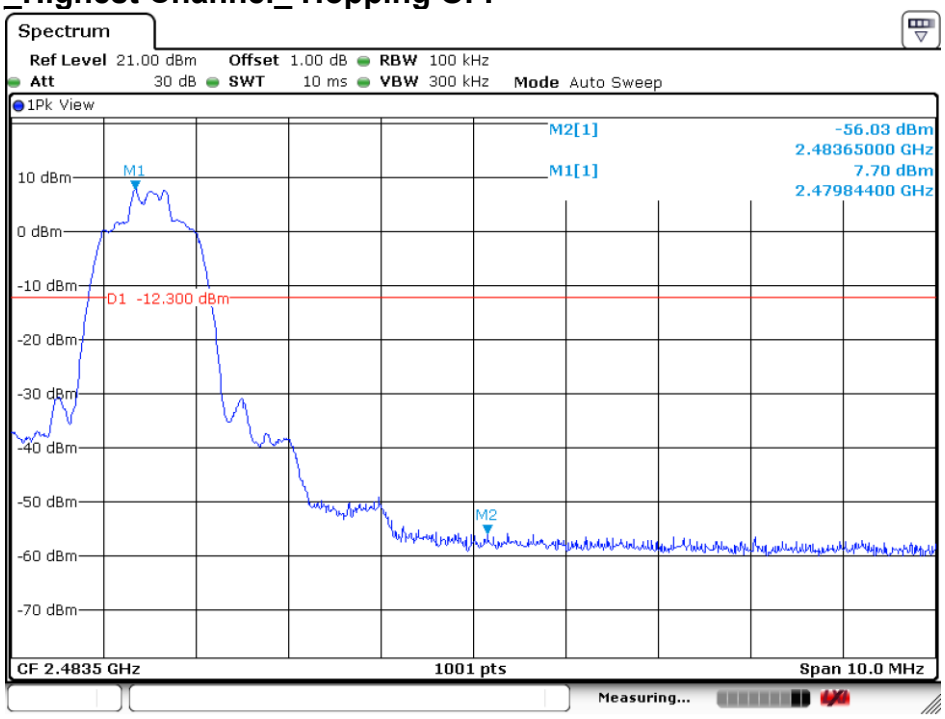
Date: 23.OCT.2019 22:17:25

π/4DQPSK _Highest Channel_ Hopping ON



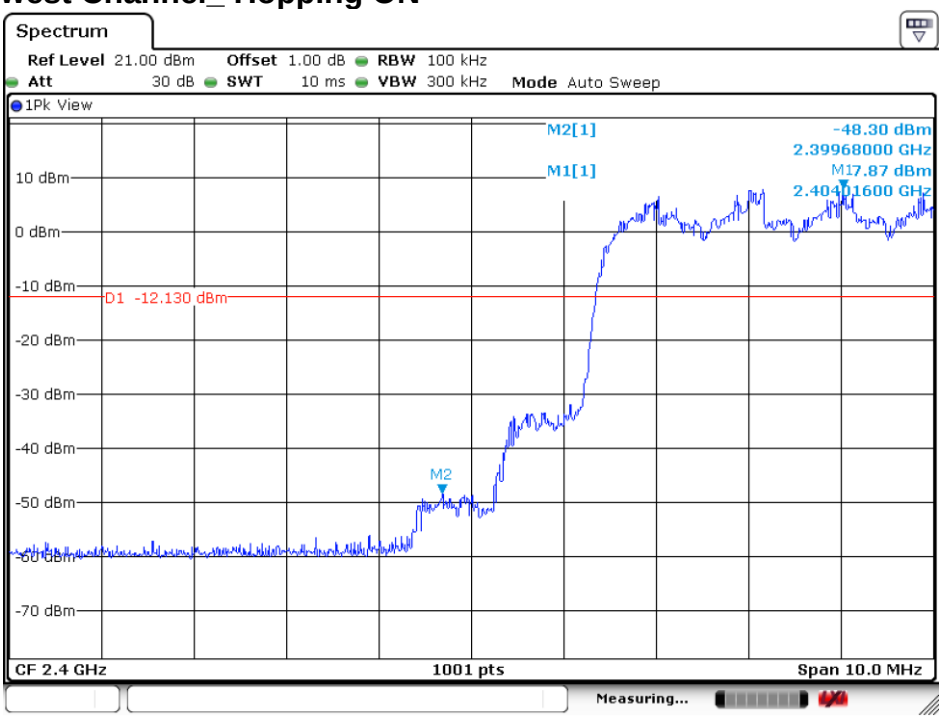
Date: 23.OCT.2019 22:31:16

π/4DQPSK _Highest Channel_ Hopping OFF



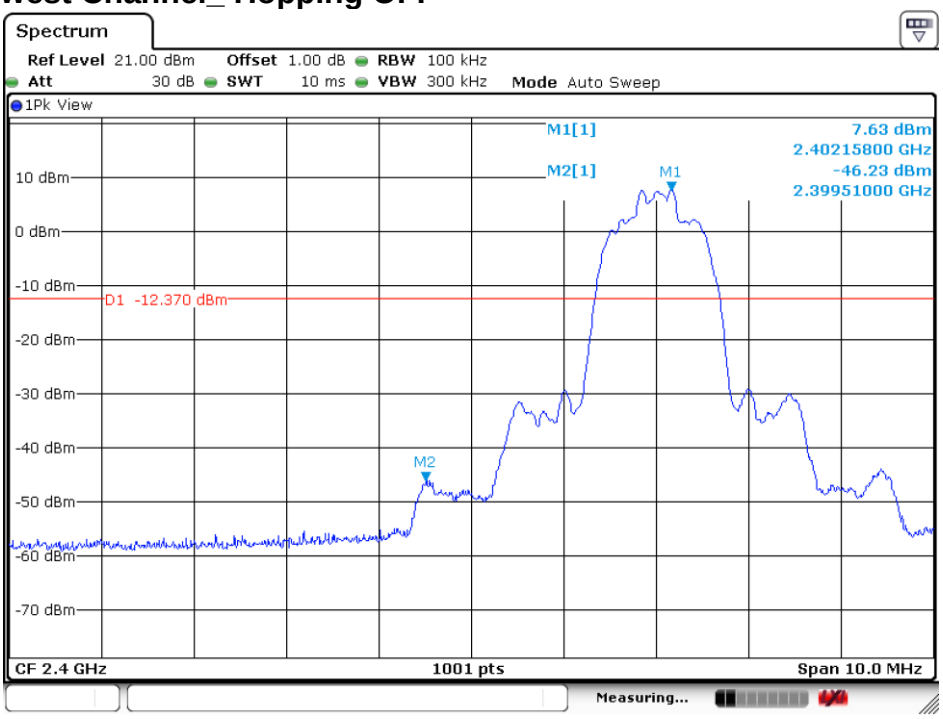
Date: 23.OCT.2019 22:33:15

8DPSK _Lowest Channel_ Hopping ON



Date: 23.OCT.2019 21:48:04

8DPSK _Lowest Channel_ Hopping OFF

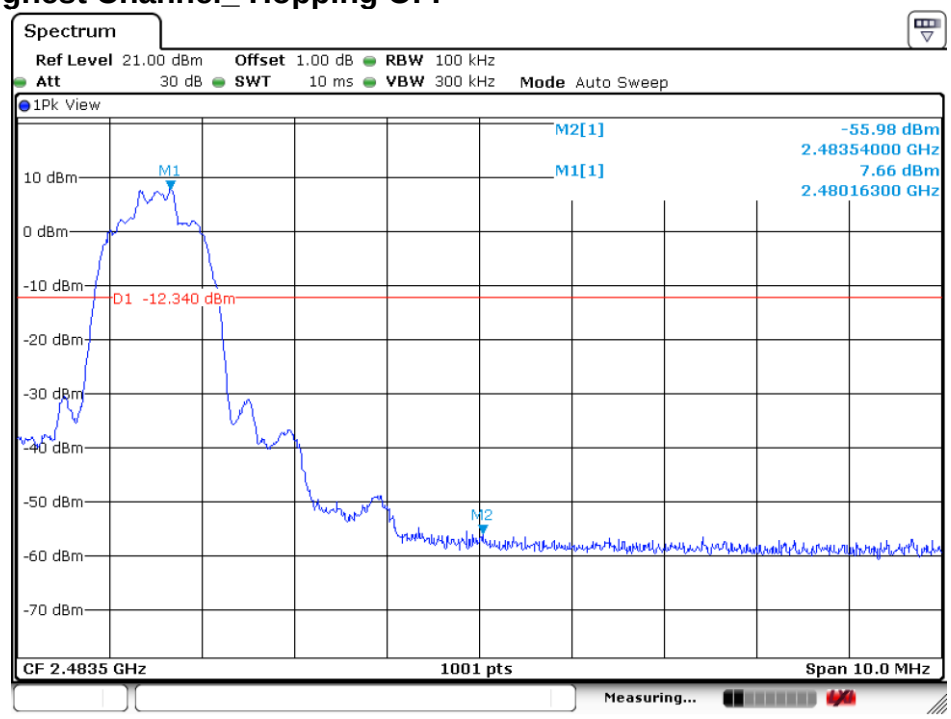


Date: 23.OCT.2019 21:50:04

8DPSK _Highest Channel_ Hopping ON

Date: 23.OCT.2019 22:35:40

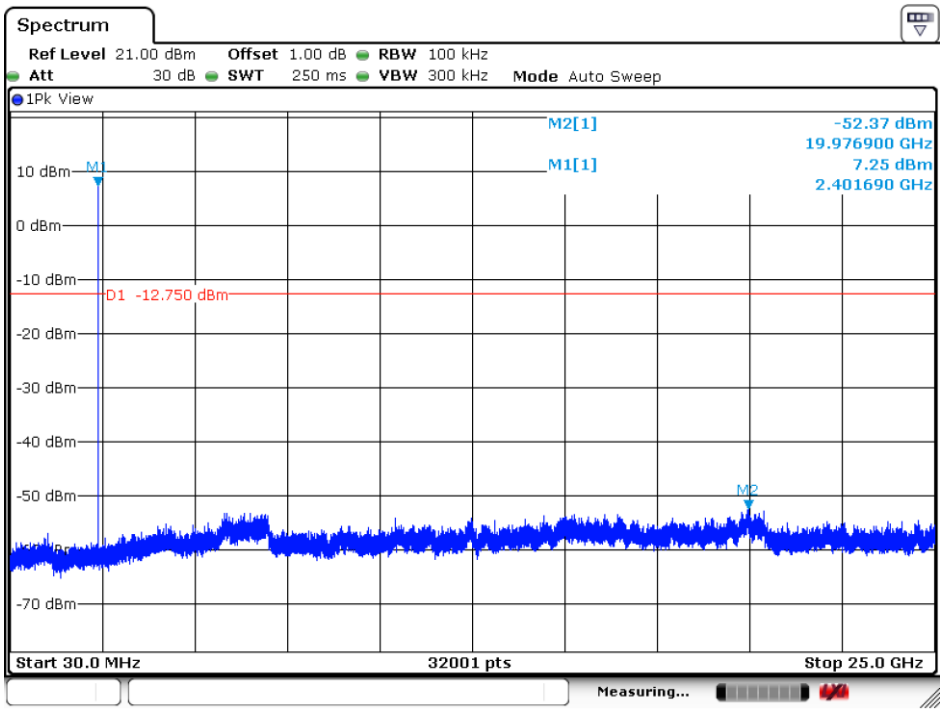
8DPSK _Highest Channel_ Hopping OFF



10. Spurious RF Conducted Emissions

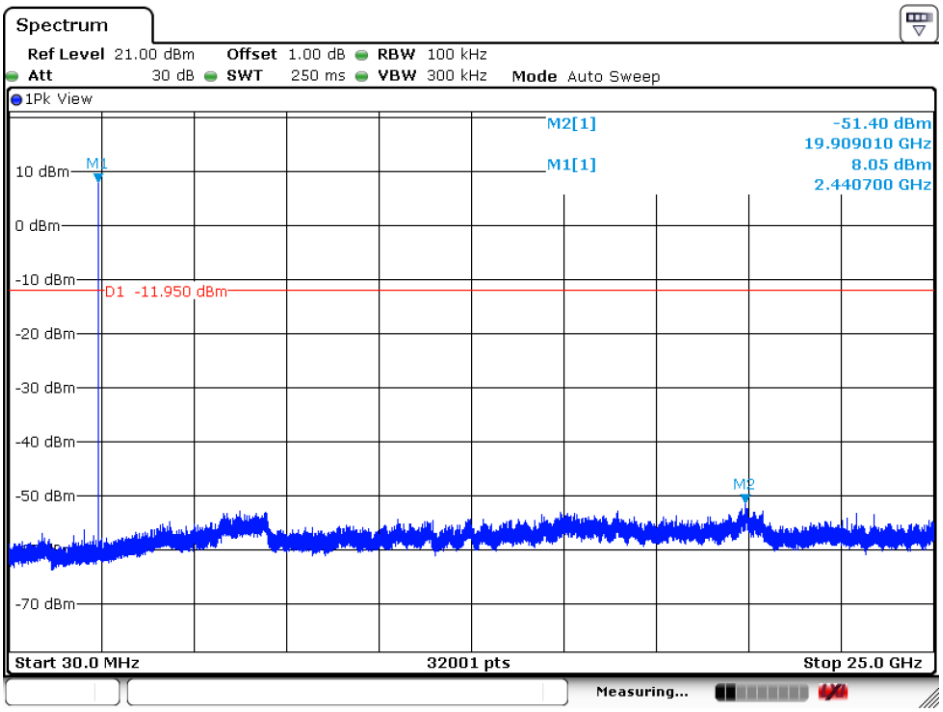
10.1. Test plots

GFSK _Lowest Channel



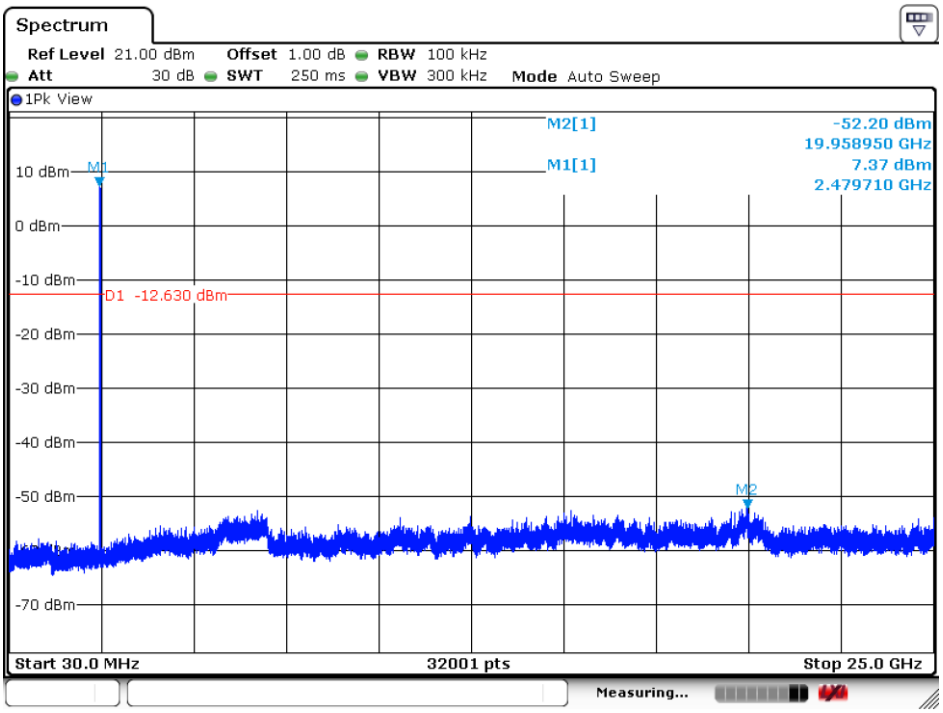
Date: 24.OCT.2019 01:01:09

GFSK _Middle Channel



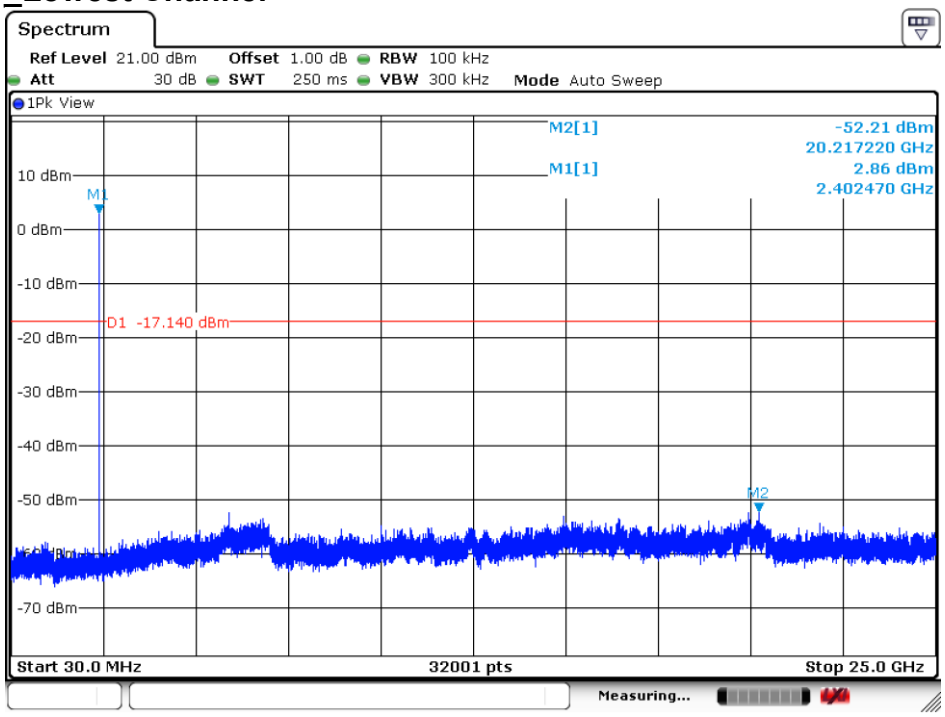
Date: 24.OCT.2019 00:59:48

GFSK _Highest Channel



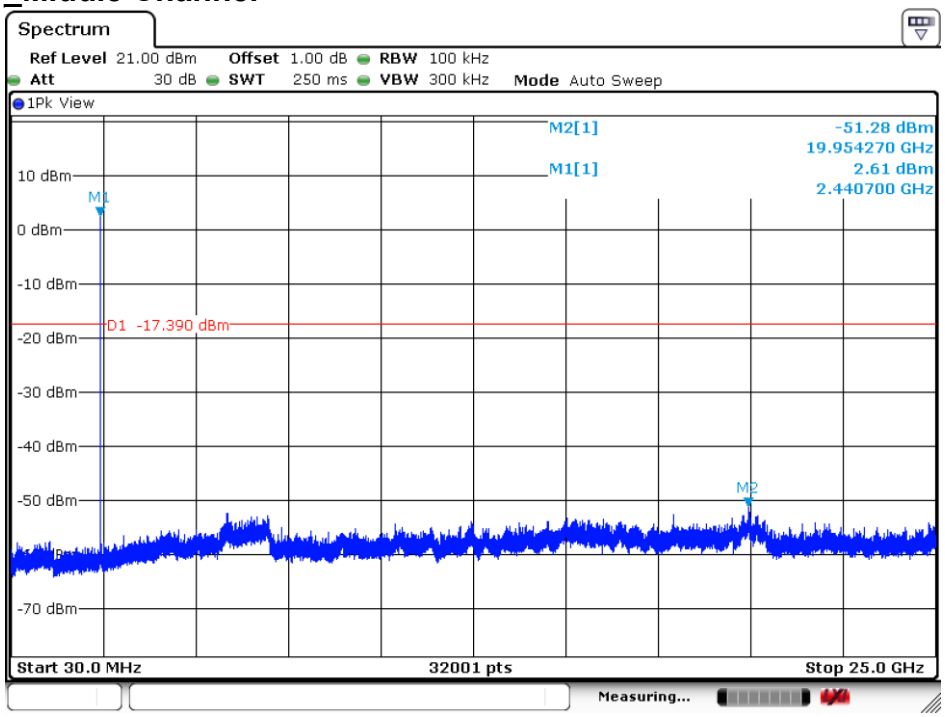
Date: 24.OCT.2019 00:58:24

π/4DQPSK _Lowest Channel



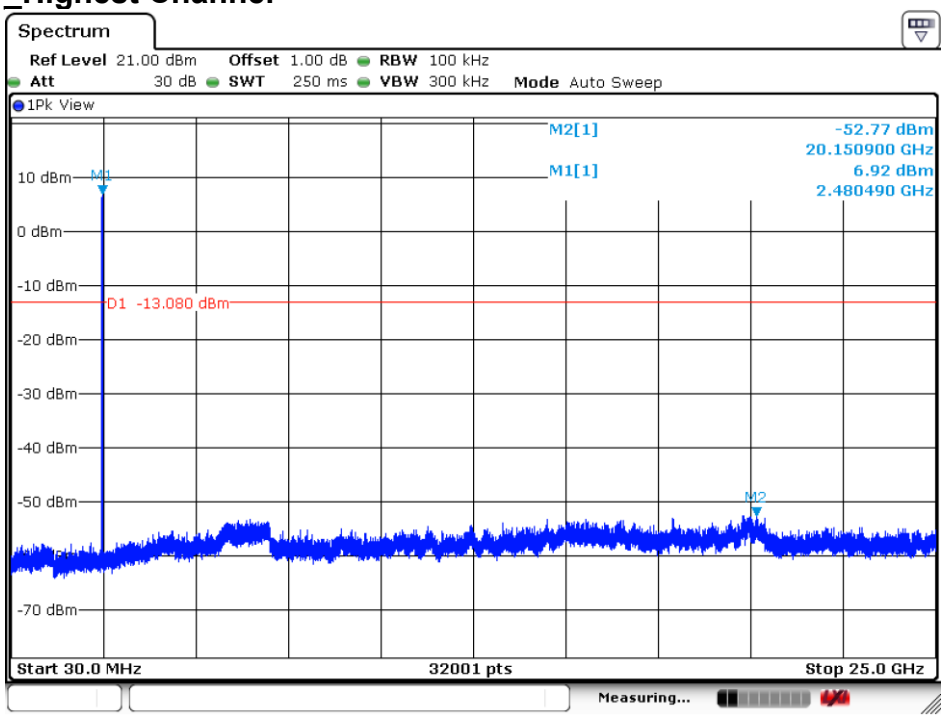
Date: 24.OCT.2019 00:53:14

π/4DQPSK _Middle Channel



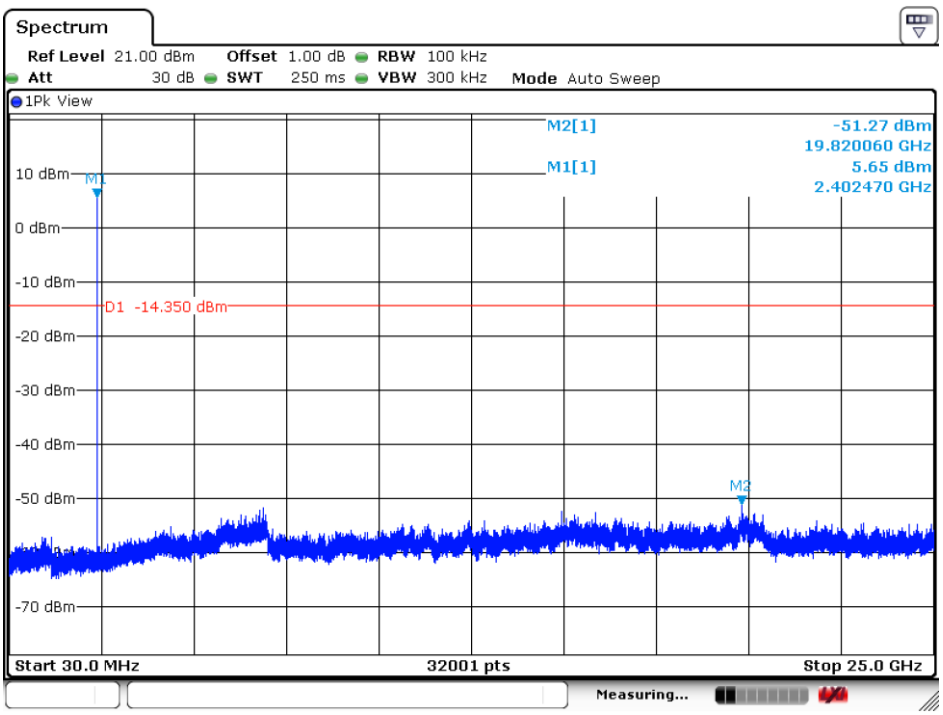
Date: 24.OCT.2019 00:56:18

π/4DQPSK _Highest Channel



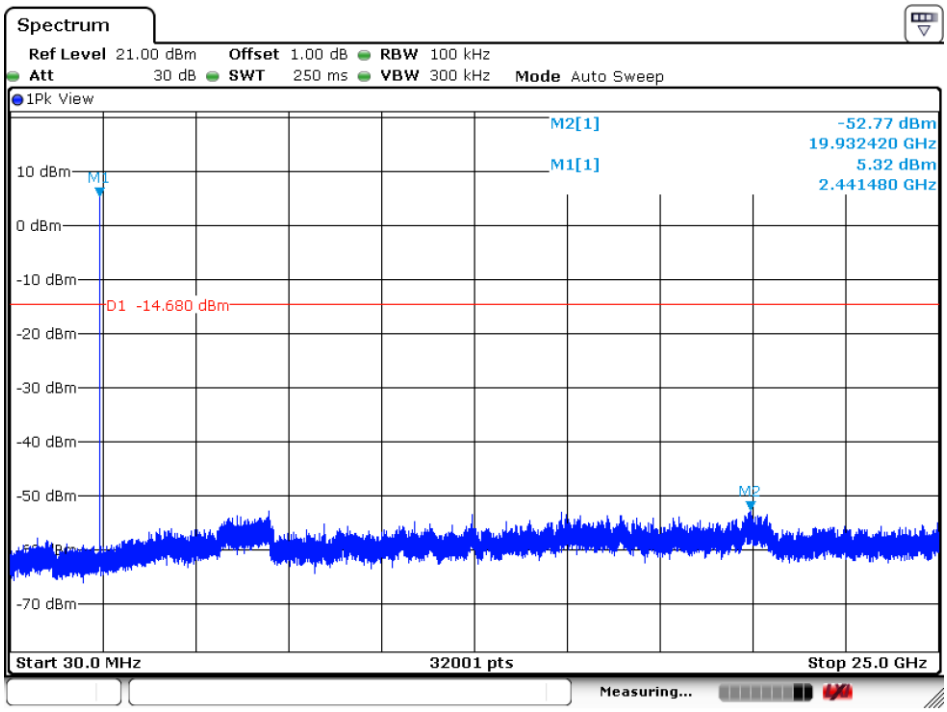
Date: 24.OCT.2019 00:57:26

8DPSK_Lowest Channel



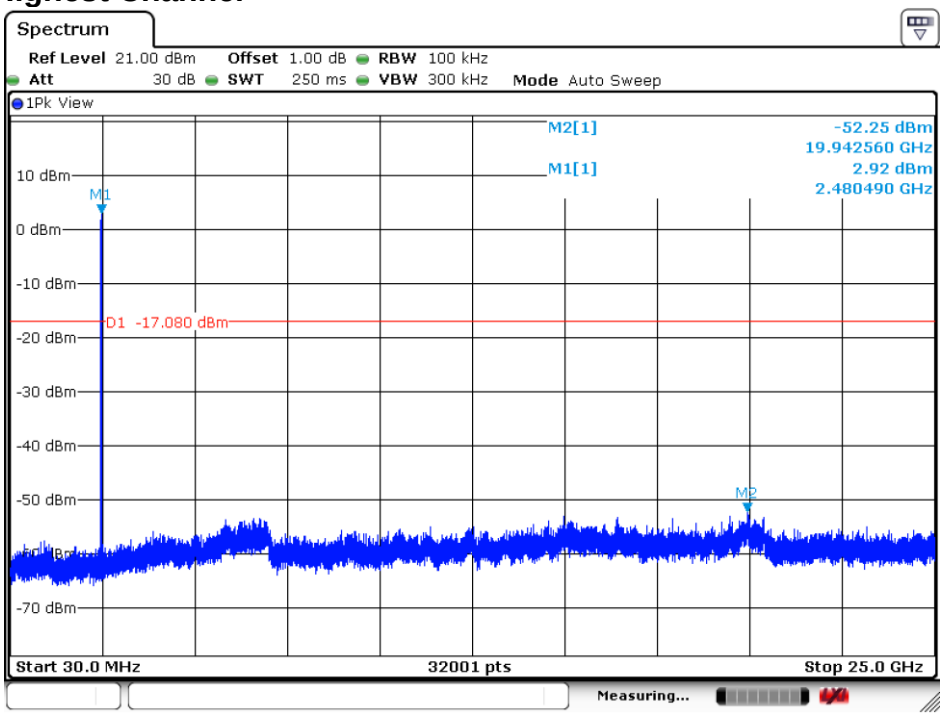
Date: 24.OCT.2019 00:54:07

8DPSK _Middle Channel



Date: 24.OCT.2019 00:51:43

8DPSK_Highest Channel



Date: 24.OCT.2019 00:50:36

Remark:

Scan from 9kHz to 25GHz, the disturbance between 9KHz to 30MHz was very low, and the above harmonics were the highest point could be found when testing, The amplitude of spurious emissions from the radiator which are attenuated more than 20dB below the limit need not be reported.