

Appendix

Main Test Instruments

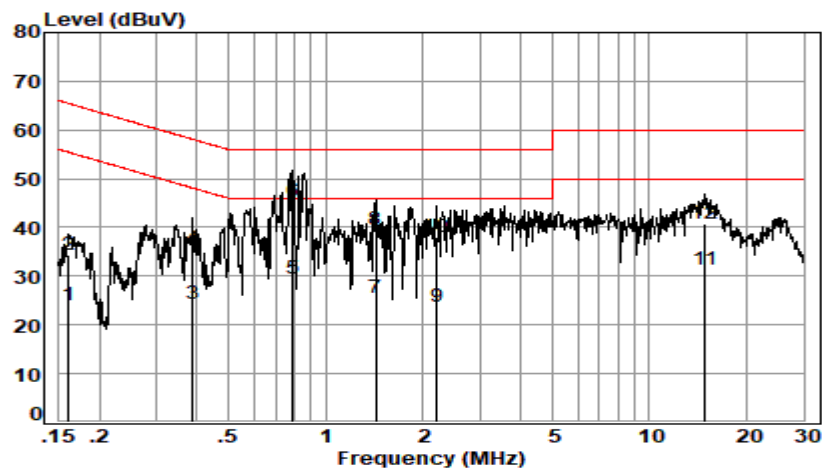
Conducted Emission					
Test Equipment	Manufacturer	Model No.	Inventory No.	Cal. date	Cal.Duedate
				(yyyy-mm-dd)	(yyyy-mm-dd)
Shielding Room	ZhongYu Electron	GB-88	SEM001-06	2017/5/10	2020/5/9
LISN	Rohde & Schwarz	ENV216	SEM007-01	2018/9/2	2019/9/2
LISN	ETS-LINDGREN	Feb-16	SEM007-02	2019/3/2	2020/3/1
Measurement Software	AUDIX	e3 V5.4.1221d	N/A	N/A	N/A
Coaxial Cable	SGS	N/A	SEM024-01	2018/7/12	2019/7/11
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	Cal.Duedate
				(yyyy-mm-dd)	(yyyy-mm-dd)
DC Power Supply	Agilent Technologies Inc	66311B	W009-09	2018/9/15	2019/9/15
Signal Analyzer	Rohde & Schwarz	FSV	W025-05	2019/1/13	2020/1/12
Coaxial Cable	SGS	N/A	SEM031-01	2018/7/13	2019/7/12
Attenuator	Weinschel Associates	WA41	SEM021-09	N/A	N/A
Signal Generator	KEYSIGHT	N5173B	SEM006-05	2018/9/2	2019/9/2
Temperature Chamber	GIANT FORCE	ICT-150-40-CP-AR	W027-03	2018/11/27	2019/11/27
Power Meter	Rohde & Schwarz	NRVS	SEM014-02	2018/9/2	2019/9/2

Measurement Uncertainty

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)
5	Temperature test	±1°C
6	Humidity test	±3%
7	DC and low frequency voltages	±0.5%

AC Power Line Conducted Emissions

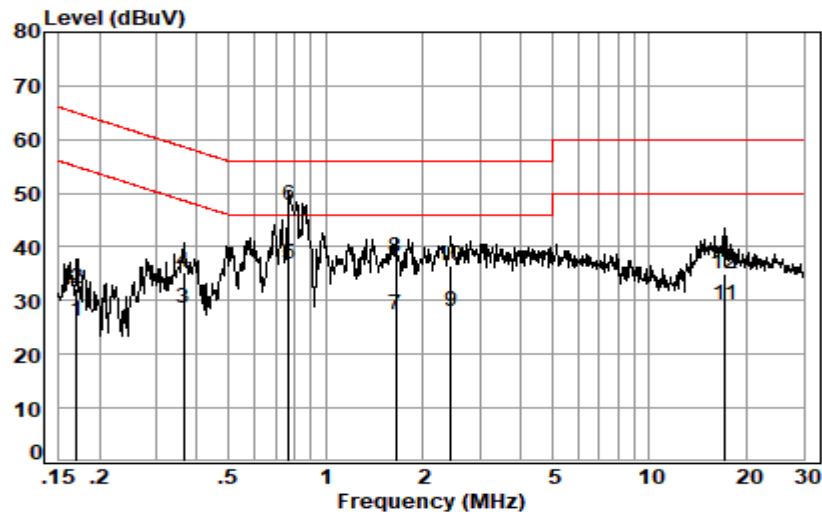
Live line:



Site : Shielding Room
Condition: Line
Job No. : 16053CR
Test mode: c

	Freq	Cable Loss	LISN Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dB	dBuV	dBuV	dBuV	dB	
1	0.1607	0.01	9.66	14.48	24.15	55.43	-31.28	Average
2	0.1607	0.01	9.66	24.67	34.34	65.43	-31.09	QP
3	0.3893	0.05	9.67	14.51	24.23	48.08	-23.85	Average
4	0.3893	0.05	9.67	25.80	35.52	58.08	-22.56	QP
5	0.7918	0.08	9.74	19.57	29.39	46.00	-16.61	Average
6	0.7918	0.08	9.74	35.49	45.31	56.00	-10.69	QP
7	1.4257	0.13	9.73	15.57	25.43	46.00	-20.57	Average
8	1.4257	0.13	9.73	29.77	39.63	56.00	-16.37	QP
9	2.2015	0.16	9.72	13.98	23.86	46.00	-22.14	Average
10	2.2015	0.16	9.72	28.06	37.94	56.00	-18.06	QP
11	14.9068	0.21	10.34	20.69	31.24	50.00	-18.76	Average
12	14.9068	0.21	10.34	30.09	40.64	60.00	-19.36	QP

Neutral line:



Site : Shielding Room
 Condition: Neutral
 Job No. : 16053CR
 Test mode: c

	Freq	Cable Loss	LISN Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dB	dBuV	dBuV	dBuV	dB	
1	0.1703	0.02	9.64	16.43	26.09	54.94	-28.85	Average
2	0.1703	0.02	9.64	22.60	32.26	64.94	-32.68	QP
3	0.3634	0.05	9.64	18.96	28.65	48.65	-20.00	Average
4	0.3634	0.05	9.64	25.46	35.15	58.65	-23.50	QP
5	0.7711	0.08	9.69	26.99	36.76	46.00	-9.24	Average
6	0.7711	0.08	9.69	38.07	47.84	56.00	-8.16	QP
7	1.6450	0.14	9.70	17.57	27.41	46.00	-18.59	Average
8	1.6450	0.14	9.70	28.15	37.99	56.00	-18.01	QP
9	2.4346	0.16	9.68	18.10	27.94	46.00	-18.06	Average
10	2.4346	0.16	9.68	26.61	36.45	56.00	-19.55	QP
11	17.1085	0.22	10.25	18.84	29.31	50.00	-20.69	Average
12	17.1085	0.22	10.25	24.53	35.00	60.00	-25.00	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.

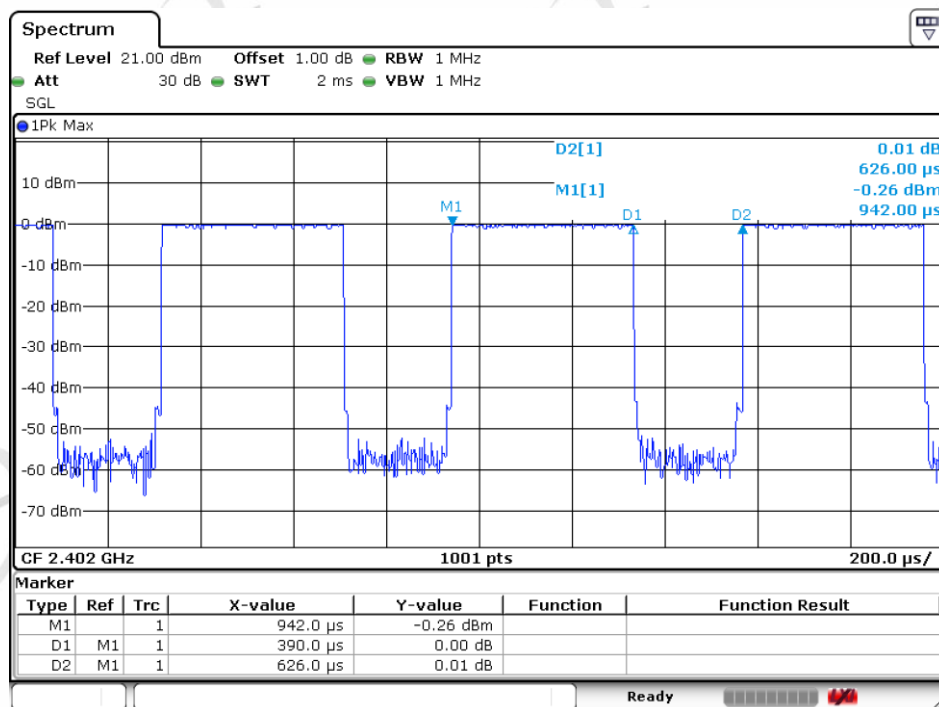
Duty Cycle

Test Results

Test Mode	TX Freq. [MHz]	Duty cycle [%]
BLE	CH0	62.30

Test Plots

BLE



Date: 6.AUG.2019 21:03:15

Conducted Output Power

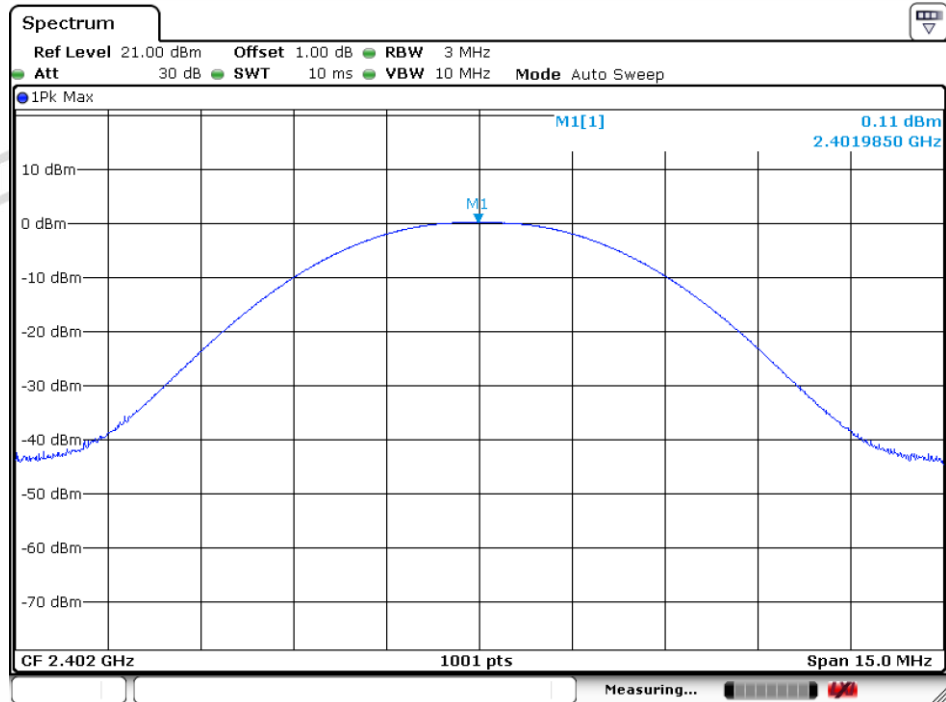
Test Results

Measurement Data of Peak Power :

GFSK mode			
Test channel	Peak Output Power (dBm)	Limit (dBm)	Result
Lowest	0.11	30.00	Pass
Middle	-0.09	30.00	Pass
Highest	-0.53	30.00	Pass

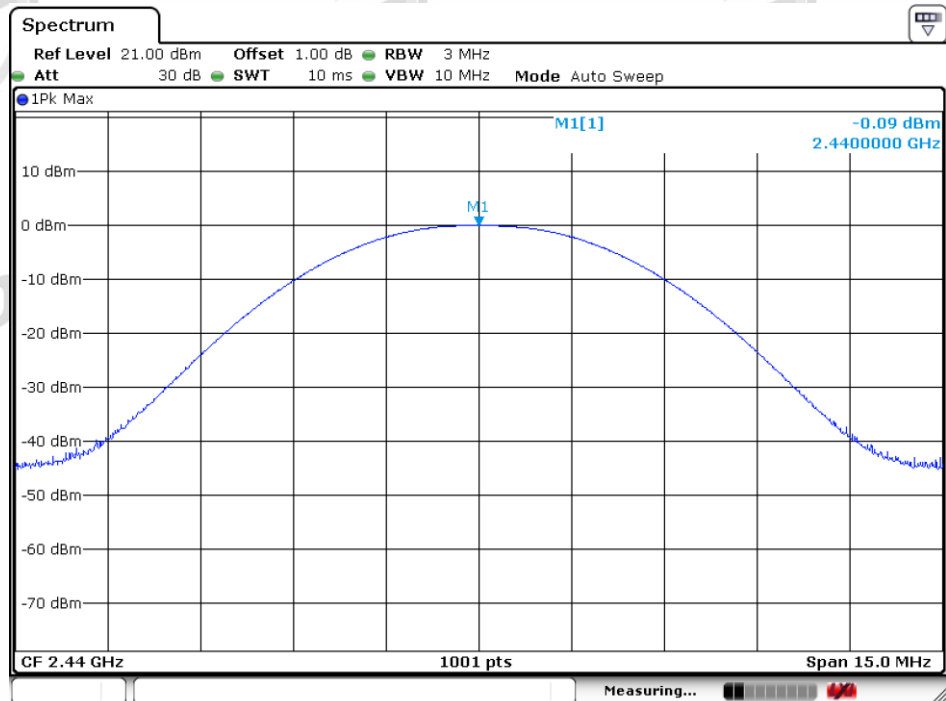
Test plots:

GFSK _Lowest Channel



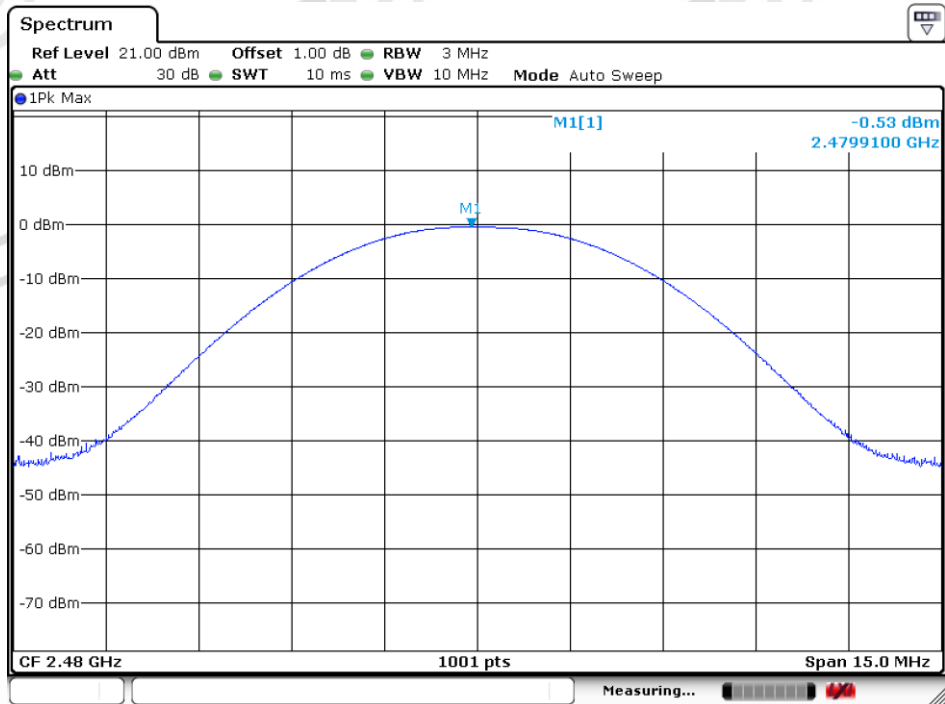
Date: 6.AUG.2019 20:35:01

GFSK _Middle Channel



Date: 6.AUG.2019 20:36:26

GFSK_Highest Channel



Date: 6.AUG.2019 20:36:51

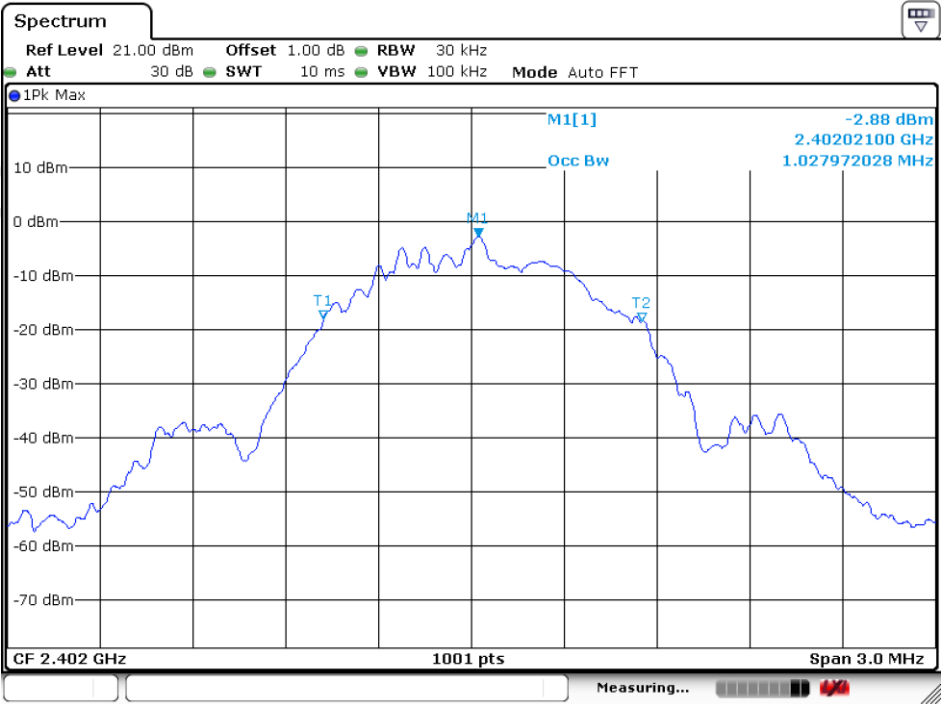
DTS (6 dB) Bandwidth & 99% Occupied Bandwidth

Test Results

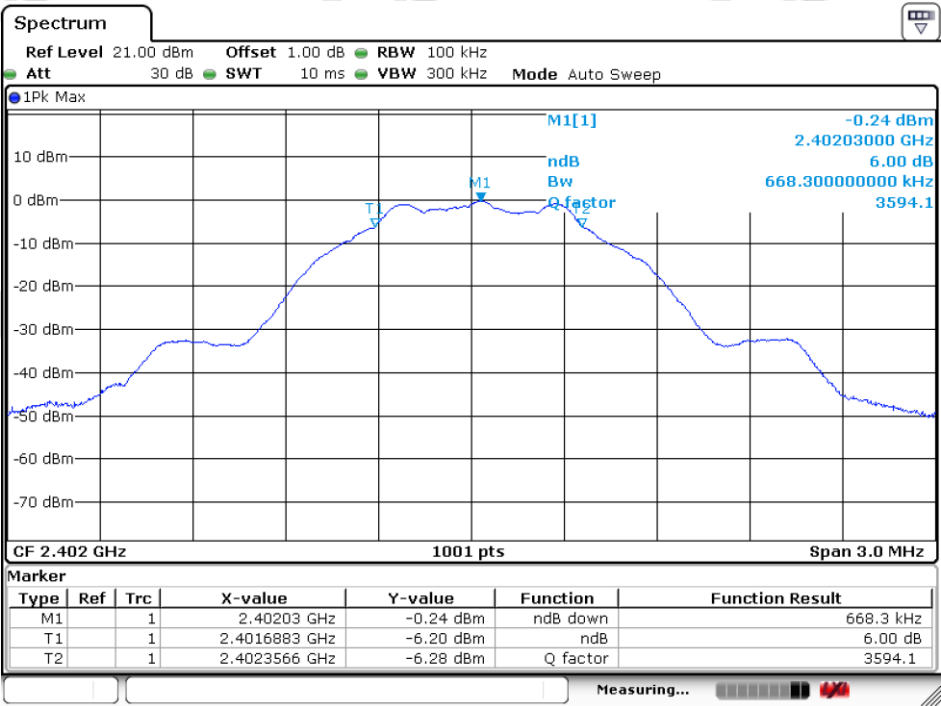
Mode	Test Channel	99% Occupied Bandwidth (MHz)	6dB Emission Bandwidth (MHz)	Limit (kHz)	Result
GFSK	Lowest	1.03	0.67	≥500	Pass
	Middle	1.03	0.67	≥500	Pass
	Highest	1.03	0.67	≥500	Pass

Test plots

GFSK_Lowest Channel

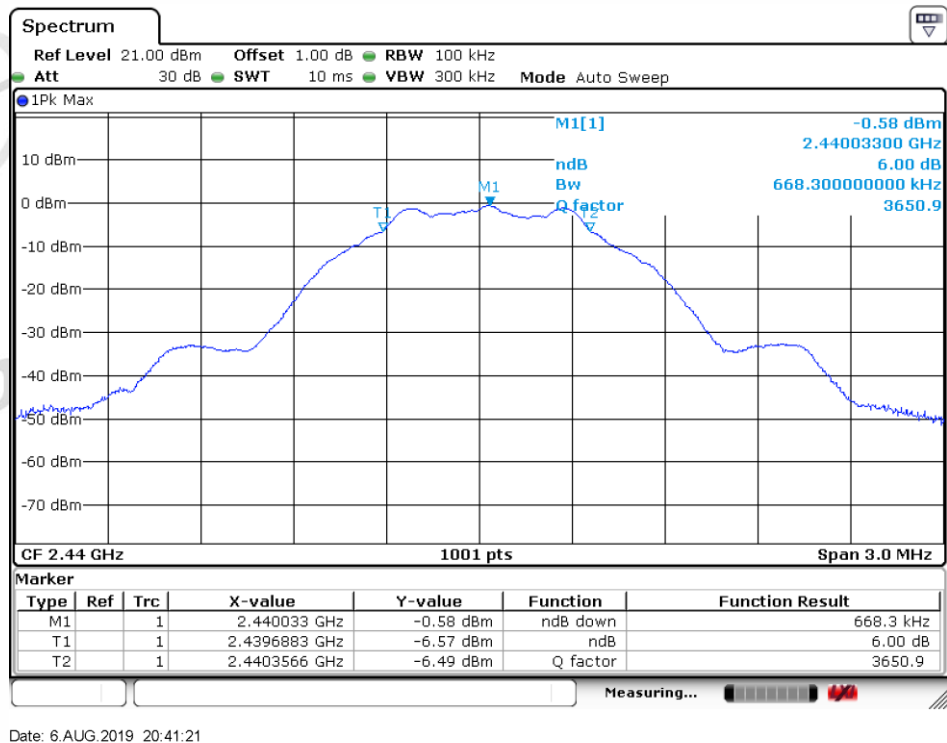
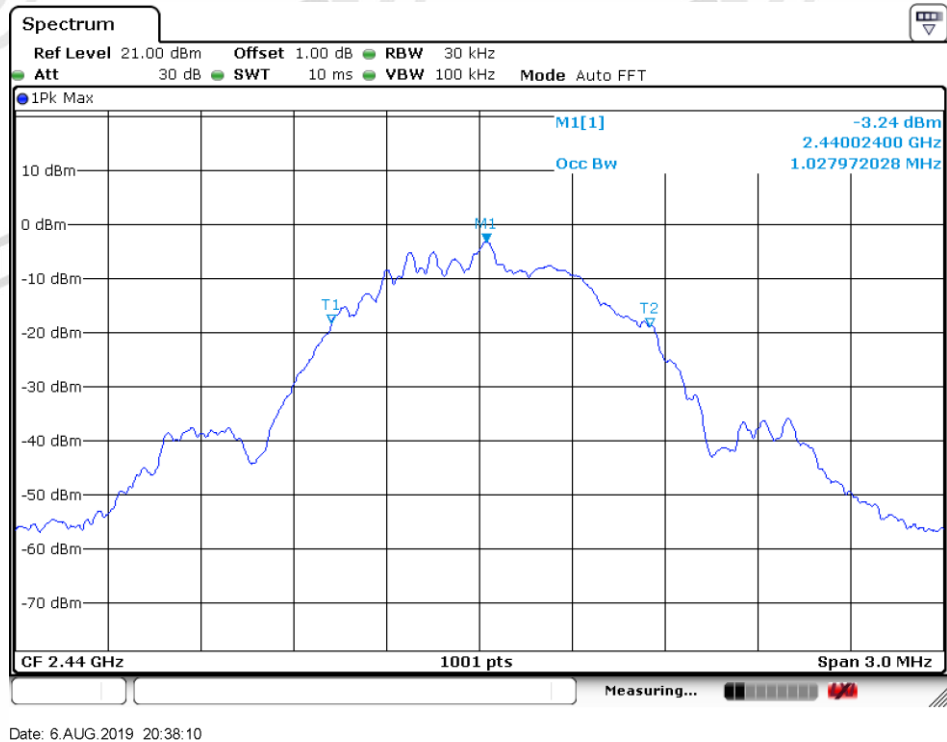


Date: 6.AUG.2019 20:37:52

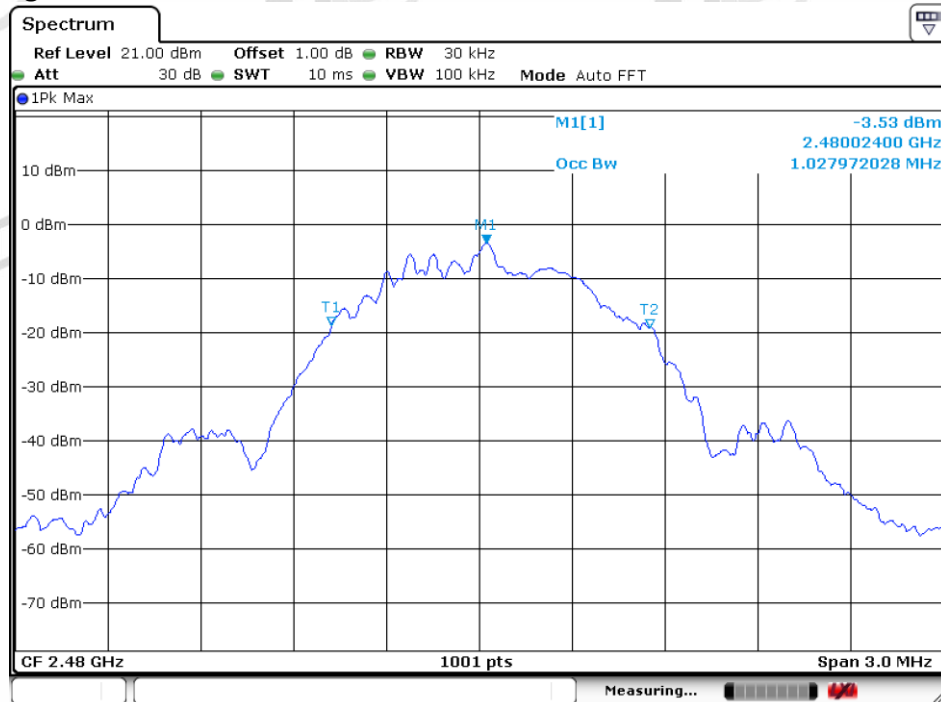


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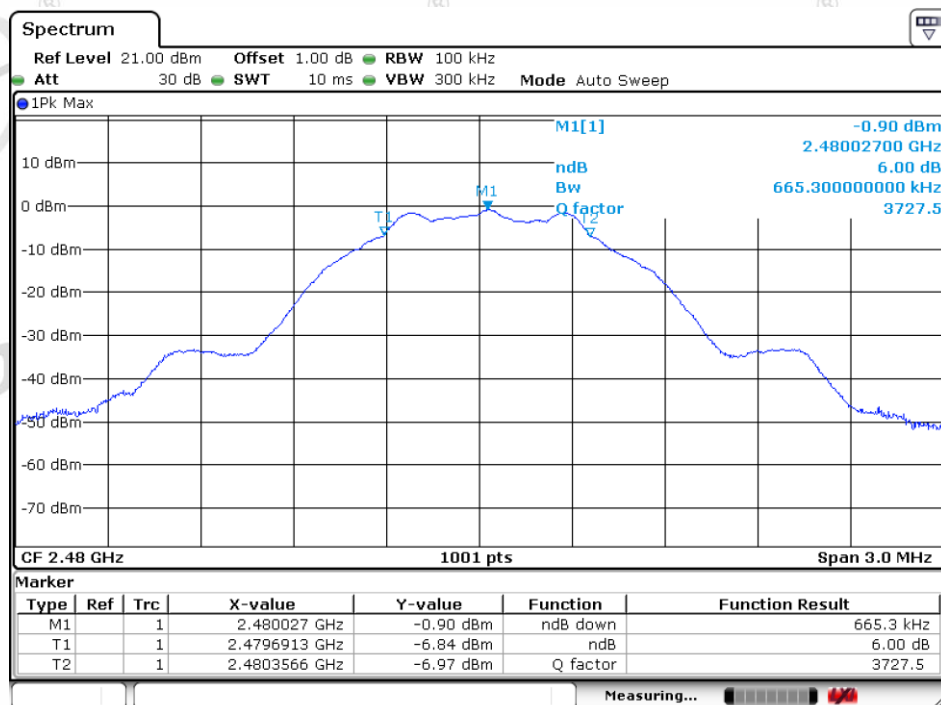
GFSK_Middle Channel



GFSK_Highest Channel



Date: 6.AUG.2019 20:38:30



Date: 6.AUG.2019 20:41:38

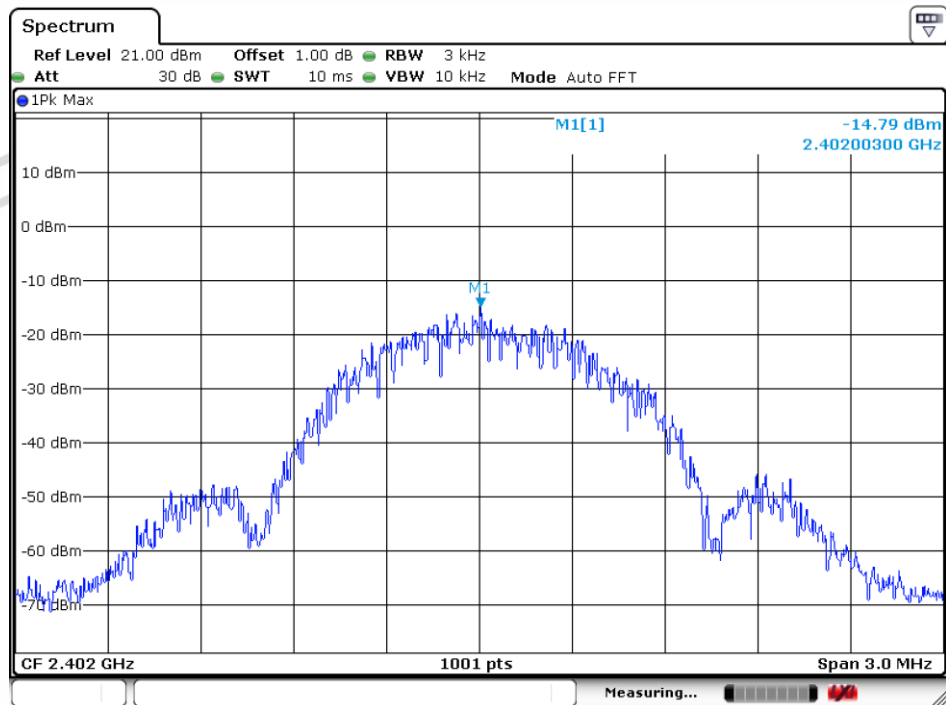
Power Spectral Density

Test Results

Mode	Test Channel	Power Spectral Density (dBm/3kHz)	Limit (dBm/3kHz)	Result
GFSK	Lowest	-14.79	≤8.00	Pass
	Middle	-15.14	≤8.00	Pass
	Highest	-15.49	≤8.00	Pass

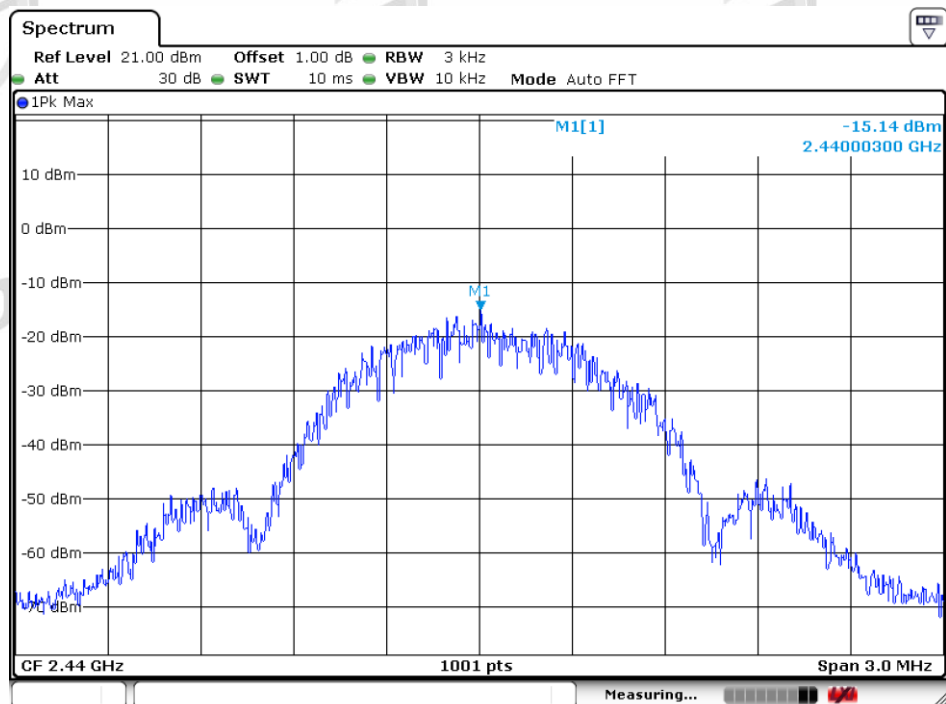
Test plots

GFSK _Lowest Channel



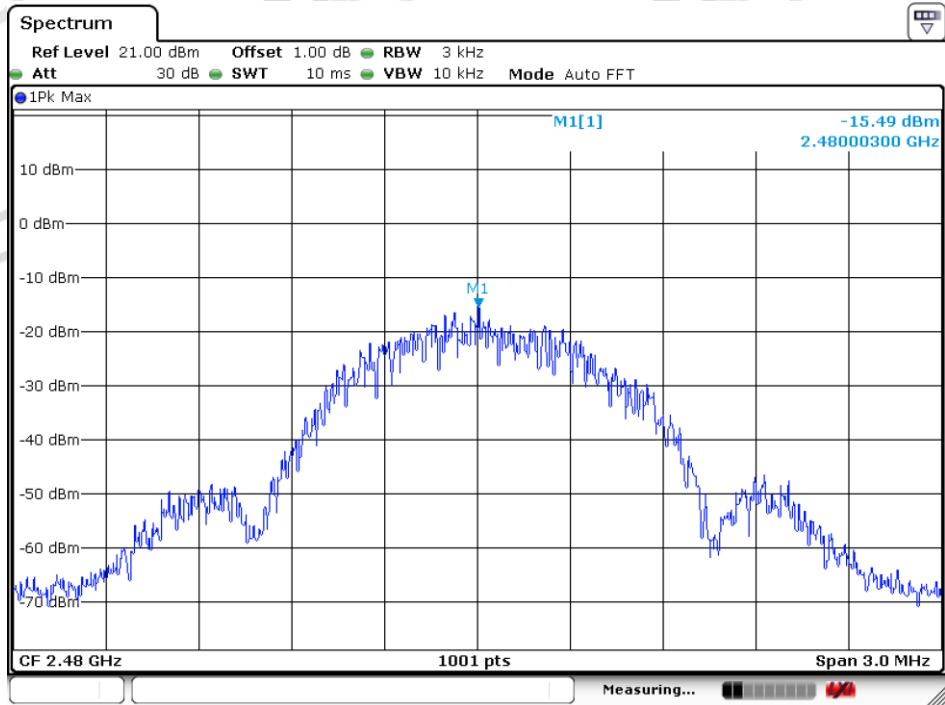
Date: 6.AUG.2019 20:55:59

GFSK _Middle Channel



Date: 6.AUG.2019 20:55:38

GFSK_Highest Channel

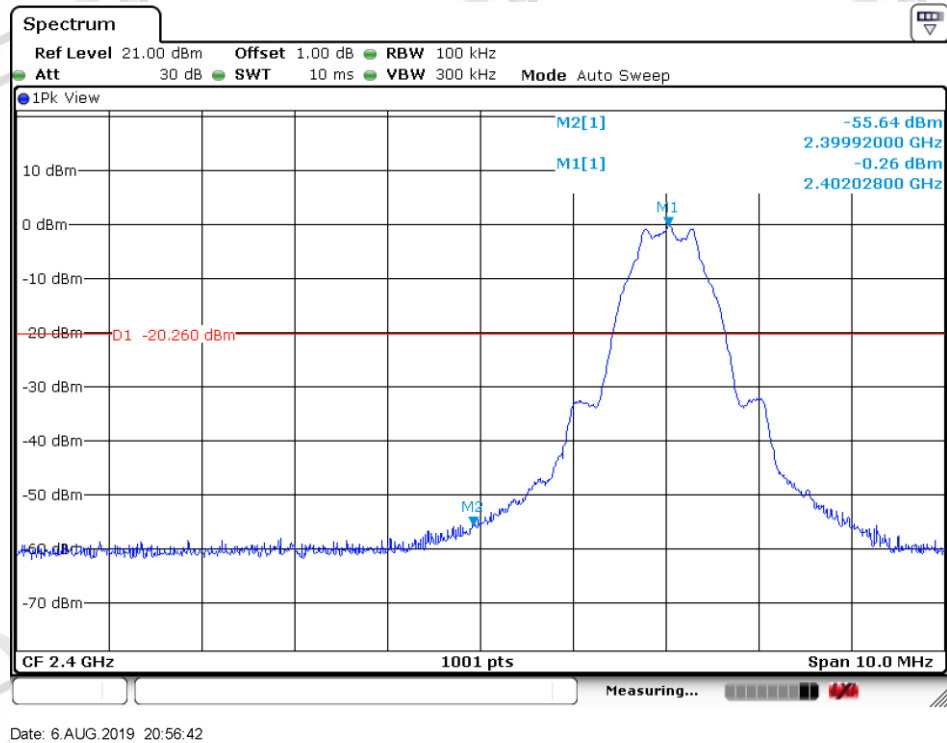


Date: 6.AUG.2019 20:55:19

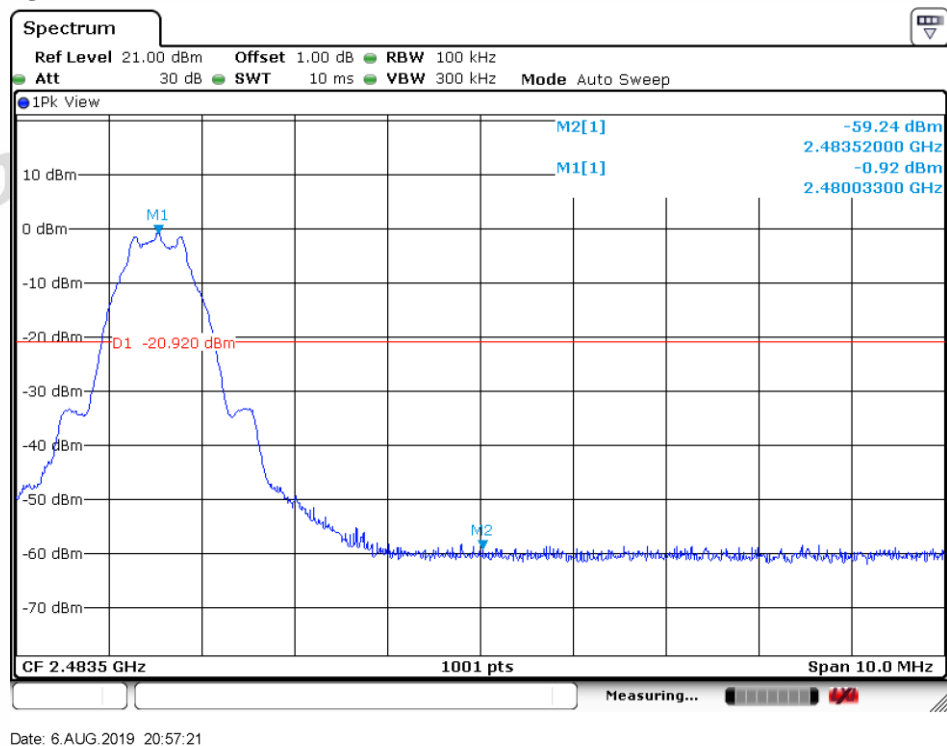
Band-edge for RF Conducted Emissions

Test plots

GFSK _Lowest Channel



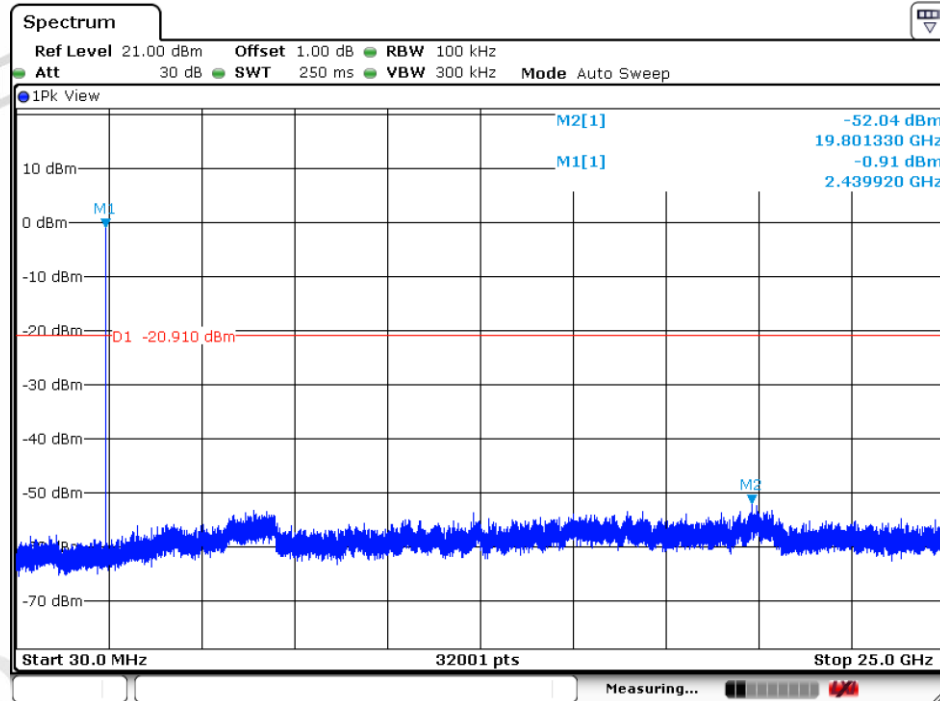
GFSK _Highest Channel



Spurious RF Conducted Emissions

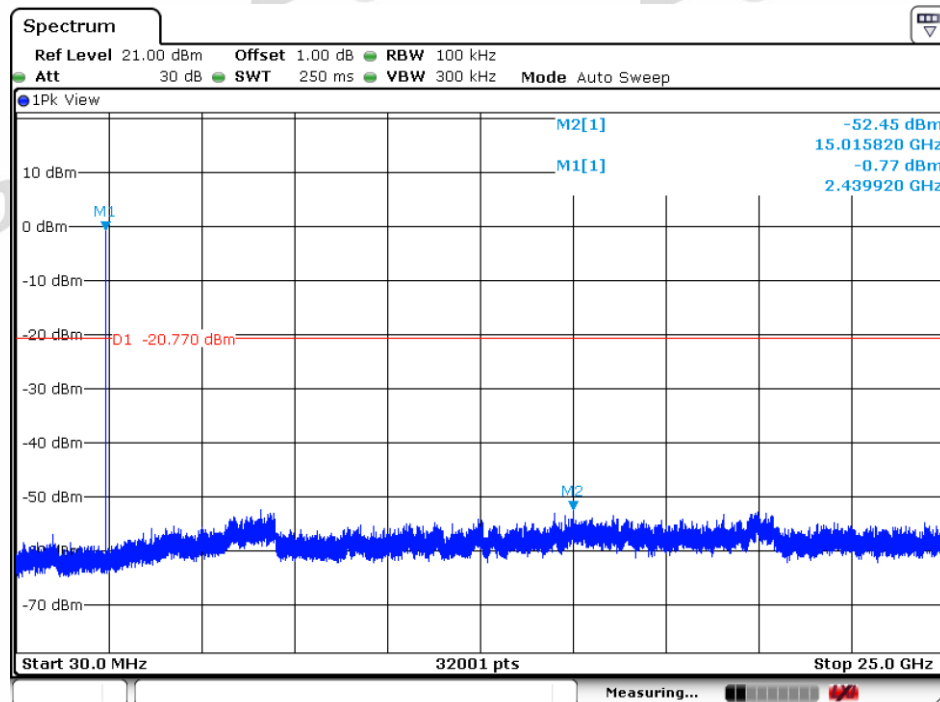
Test plots:

GFSK _Lowest Channel



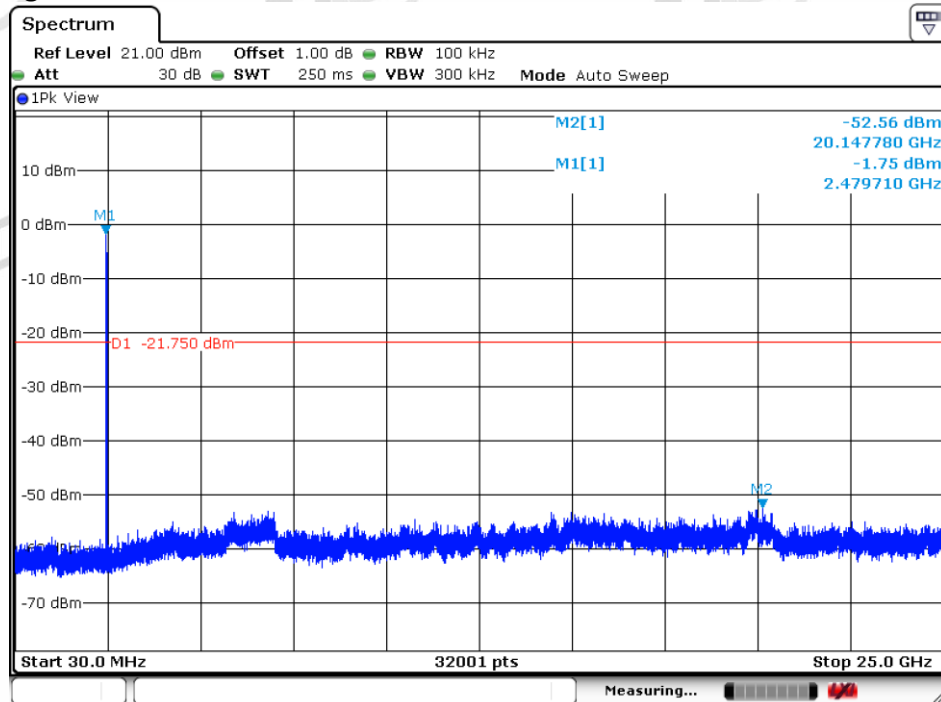
Date: 6.AUG.2019 21:01:59

GFSK _Middle Channel



Date: 6.AUG.2019 21:01:23

GFSK_Highest Channel



Date: 6.AUG.2019 21:00:45

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.