Appendix

Main Test Instruments

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	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

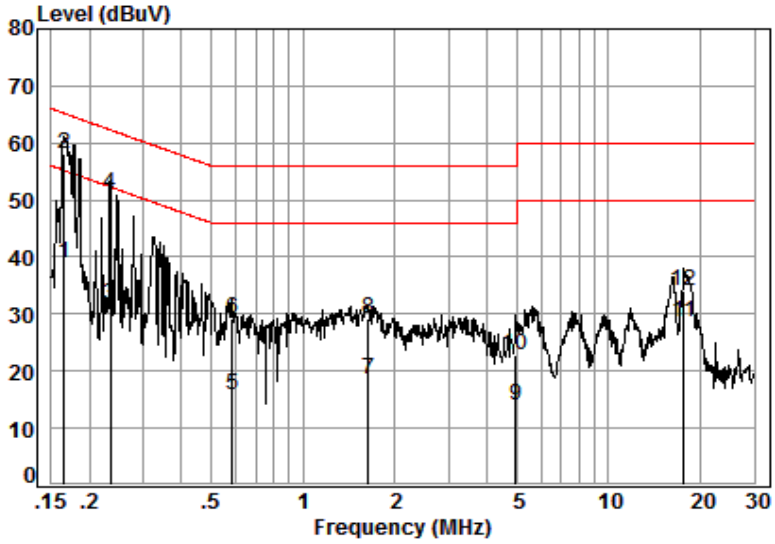
RF conducted test					
Test Equipment	Manufacturer	Model No.	Inventory No.	Cal. date (yyyy-mm-dd)	Cal.Duedate (yyyy-mm-dd)
DC Power Supply	Agilent Technologies Inc	66311B	W009-09	2018/9/15	2019/9/15
Signal Analyzer	Rohde & Schwarz	FSV	W025-05	2019/1/13	2020/1/12
Coaxial Cable	SGS	N/A	SEM031-01	2018/7/13	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 (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
5	Conduct emission test	±3.12 dB (9KHz- 30MHz)

AC Power Line Conducted Emissions

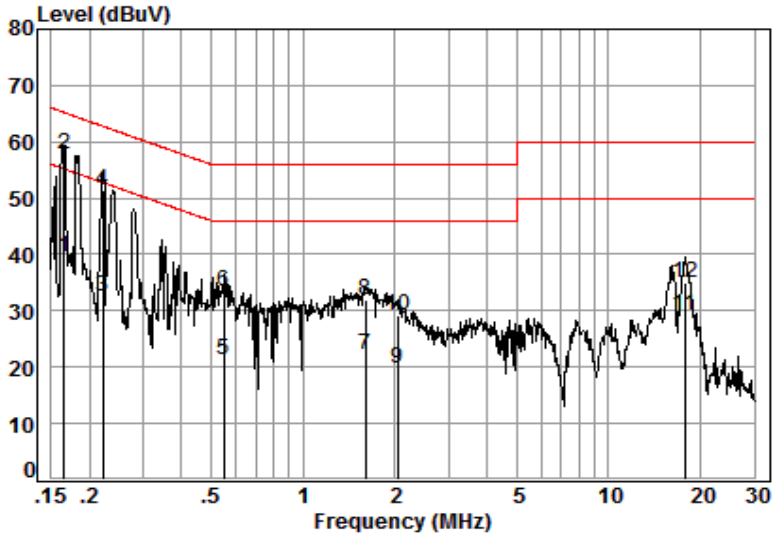
Live line:



Site : Shielding Room
Condition: Line
Job No. : 11305CR
Test mode: a

	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	9.66	29.13	38.80	55.21	-16.41	Average
2	0.17	0.01	9.66	48.43	58.10	65.21	-7.11	QP
3	0.23	0.03	9.67	22.09	31.79	52.30	-20.51	Average
4	0.23	0.03	9.67	41.27	50.97	62.30	-11.33	QP
5	0.59	0.07	9.67	6.12	15.86	46.00	-30.14	Average
6	0.59	0.07	9.67	19.42	29.16	56.00	-26.84	QP
7	1.64	0.14	9.73	8.74	18.61	46.00	-27.39	Average
8	1.64	0.14	9.73	19.25	29.12	56.00	-26.88	QP
9	4.95	0.17	9.74	4.14	14.05	46.00	-31.95	Average
10	4.95	0.17	9.74	12.88	22.79	56.00	-33.21	QP
11	17.66	0.23	10.19	18.13	28.55	50.00	-21.45	Average
12	17.66	0.23	10.19	23.65	34.07	60.00	-25.93	QP

Neutral line:



Site : Shielding Room
Condition: Neutral
Job No. : 11305CR
Test mode: a

	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	9.64	29.97	39.62	55.21	-15.59	Average
2	0.17	0.01	9.64	48.26	57.91	65.21	-7.30	QP
3	0.22	0.03	9.64	22.88	32.55	52.79	-20.24	Average
4	0.22	0.03	9.64	41.89	51.56	62.79	-11.23	QP
5	0.55	0.06	9.64	11.66	21.36	46.00	-24.64	Average
6	0.55	0.06	9.64	23.84	33.54	56.00	-22.46	QP
7	1.60	0.14	9.70	12.38	22.22	46.00	-23.78	Average
8	1.60	0.14	9.70	22.25	32.09	56.00	-23.91	QP
9	2.03	0.16	9.69	10.04	19.89	46.00	-26.11	Average
10	2.03	0.16	9.69	19.50	29.35	56.00	-26.65	QP
11	17.75	0.23	10.22	18.78	29.23	50.00	-20.77	Average
12	17.75	0.23	10.22	24.41	34.86	60.00	-25.14	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.

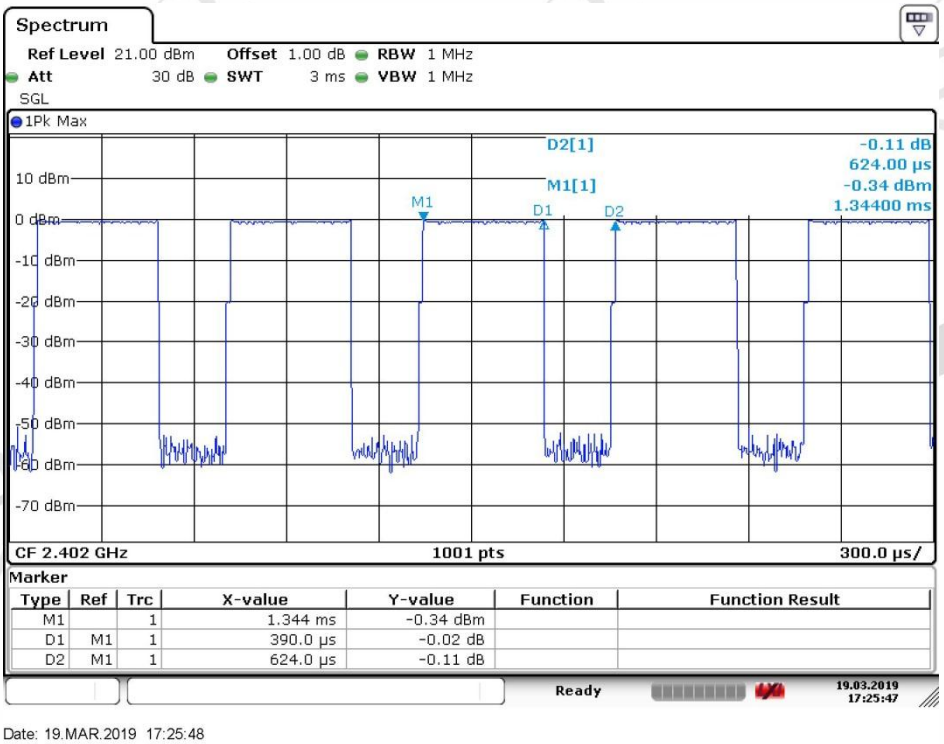
Duty Cycle

Test Results

Test Mode	TX Freq. [MHz]	Duty cycle [%]
BLE	CH0	62.50

Test Plots

BLE



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Conducted Output Power

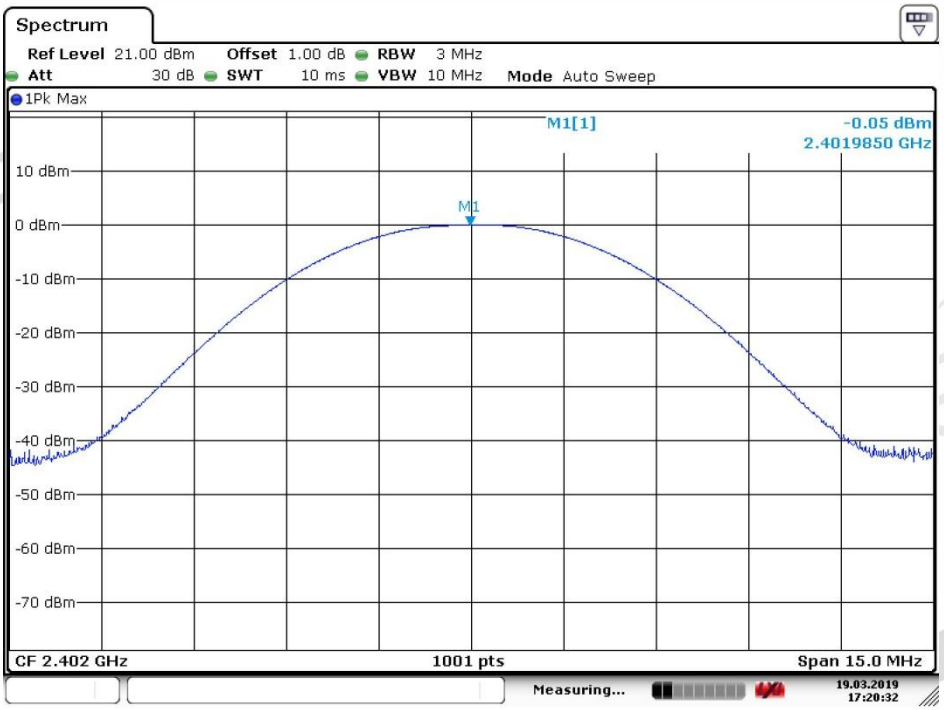
Test Results

Measurement Data of Peak Power :

GFSK mode			
Test channel	Peak Output Power (dBm)	Limit (dBm)	Result
Lowest	-0.05	30.00	Pass
Middle	0.73	30.00	Pass
Highest	-0.40	30.00	Pass

Test plots:

GFSK _Lowest Channel



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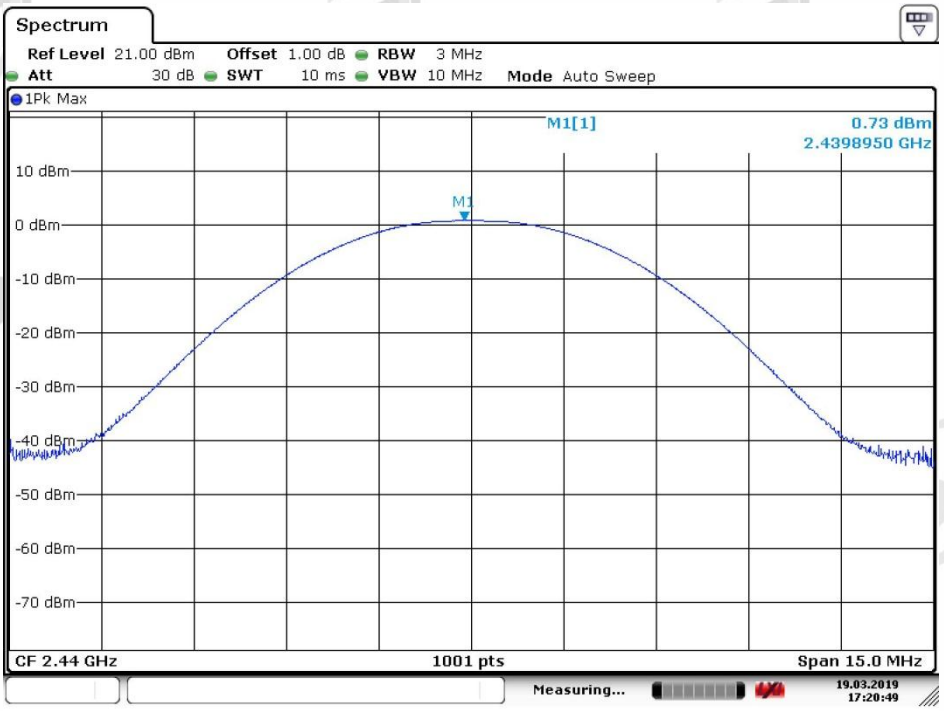
GFSK _Middle Channel



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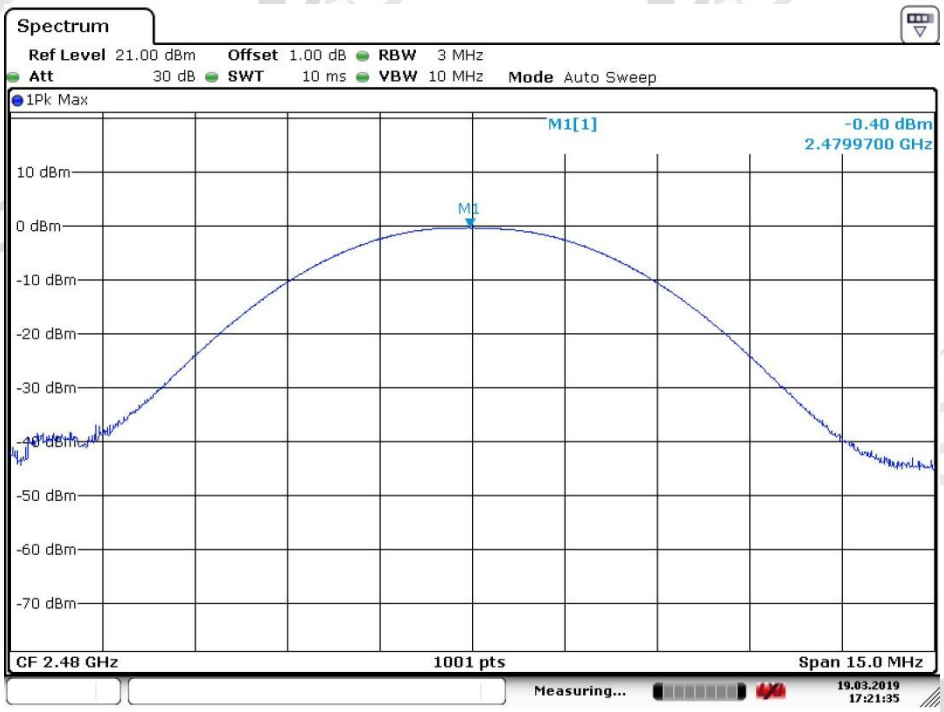
GFSK _Highest Channel



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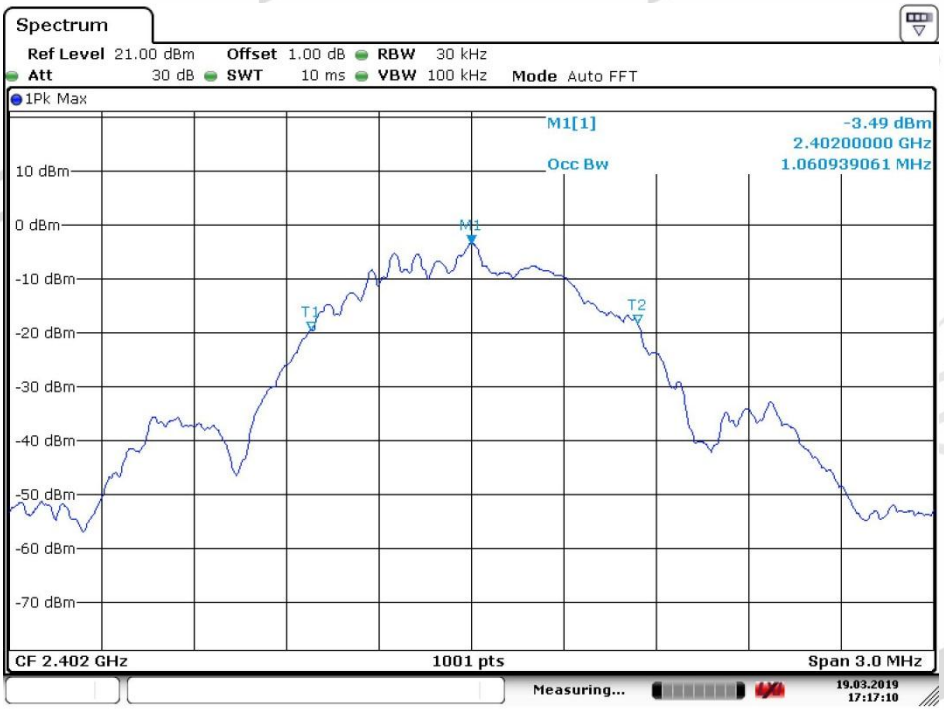
DTS (6 dB) Bandwidth & 99% Occupied Bandwidth

Test Results

Mode	Test Channel	99% Occupied Bandwidth (MHz)	6dB Emission Bandwidth (MHz)	Limit (kHz)	Result
GFSK	Lowest	1.06	0.68	≥500	Pass
	Middle	1.06	0.68	≥500	Pass
	Highest	1.06	0.67	≥500	Pass

Test plots

GFSK _Lowest Channel



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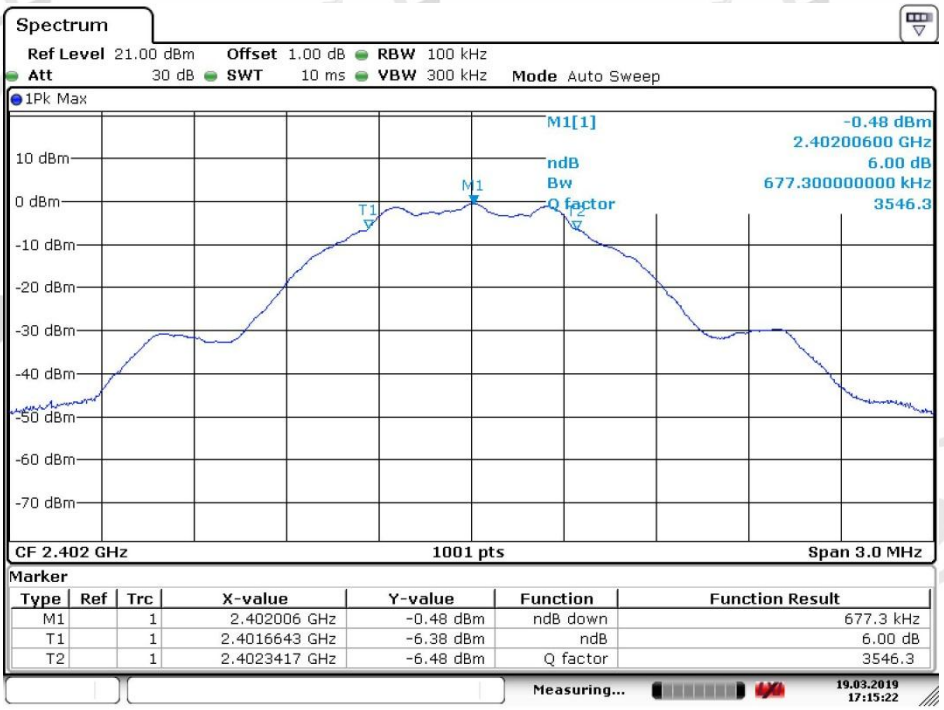

Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.402006 GHz	-0.48 dBm	ndB down	677.3 kHz
T1		1	2.4016643 GHz	-6.38 dBm	ndB	6.00 dB
T2		1	2.4023417 GHz	-6.48 dBm	Q factor	3546.3

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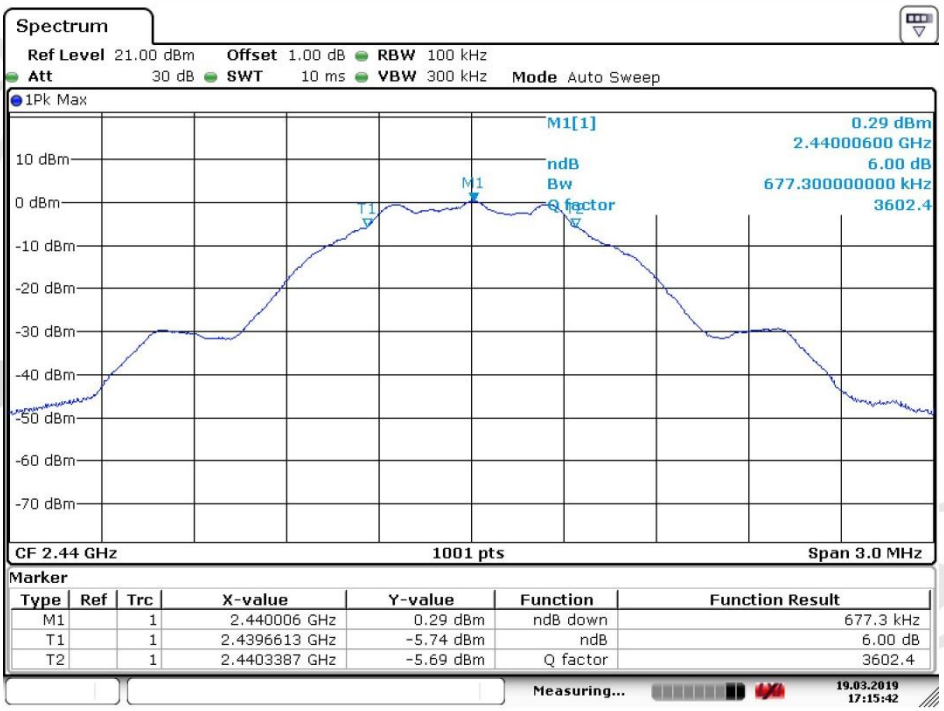
GFSK _Middle Channel

Date: 19.MAR.2019 17:16:52

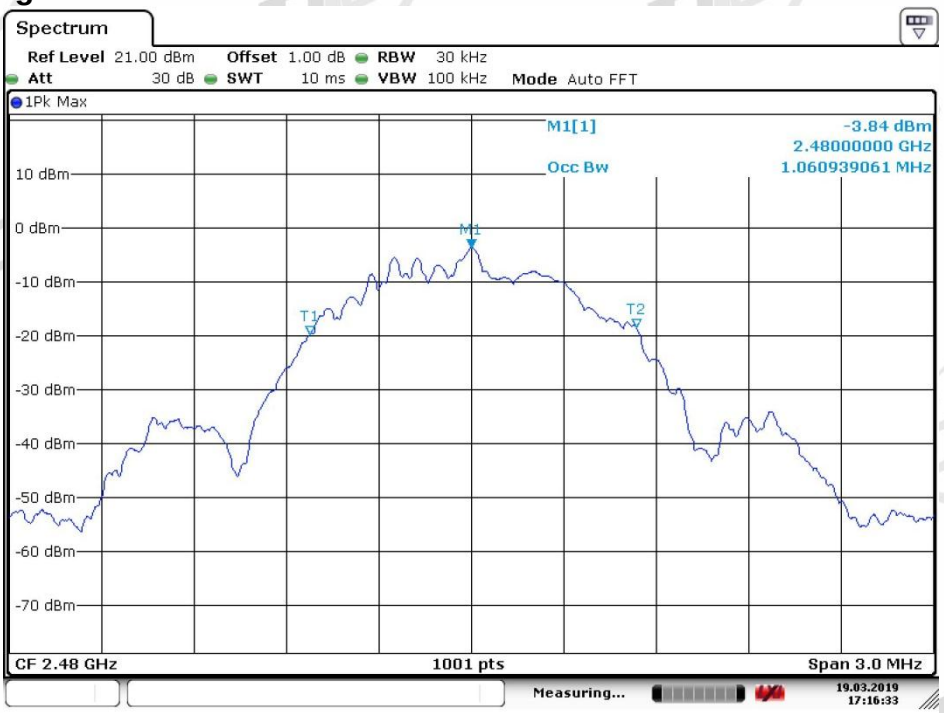


Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.440006 GHz	0.29 dBm	ndB down	677.3 kHz
T1		1	2.4396613 GHz	-5.74 dBm	ndB	6.00 dB
T2		1	2.4403387 GHz	-5.69 dBm	Q factor	3602.4

Date: 19.MAR.2019 17:15:42

GFSK _Highest Channel



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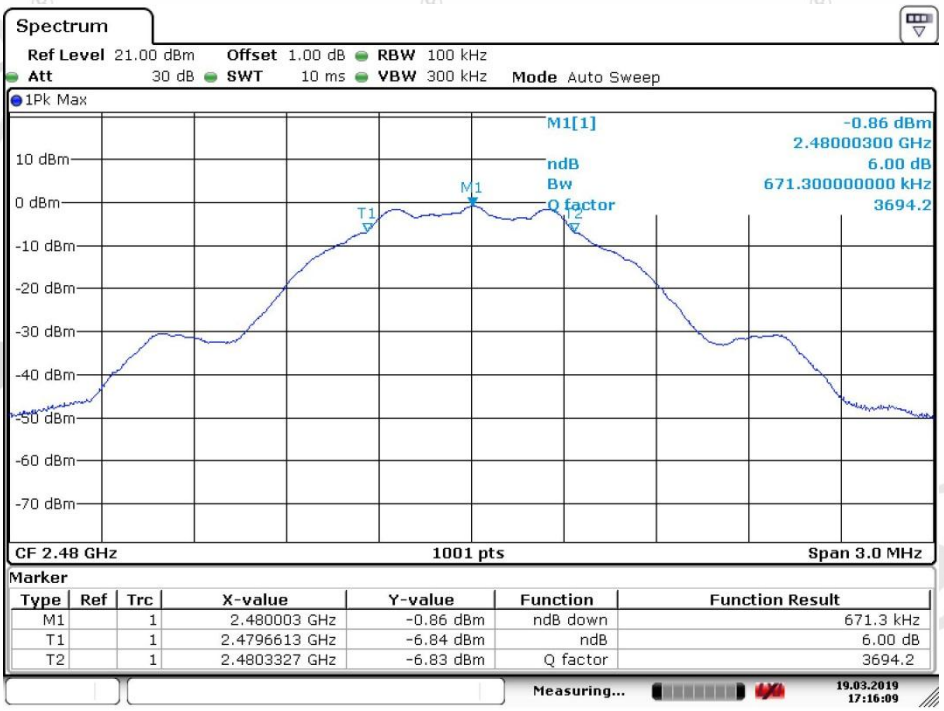


Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.480003 GHz	-0.86 dBm	ndB down	671.3 kHz
T1		1	2.4796613 GHz	-6.84 dBm	ndB	6.00 dB
T2		1	2.4803327 GHz	-6.83 dBm	Q factor	3694.2

Date: 19.MAR.2019 17:16:10

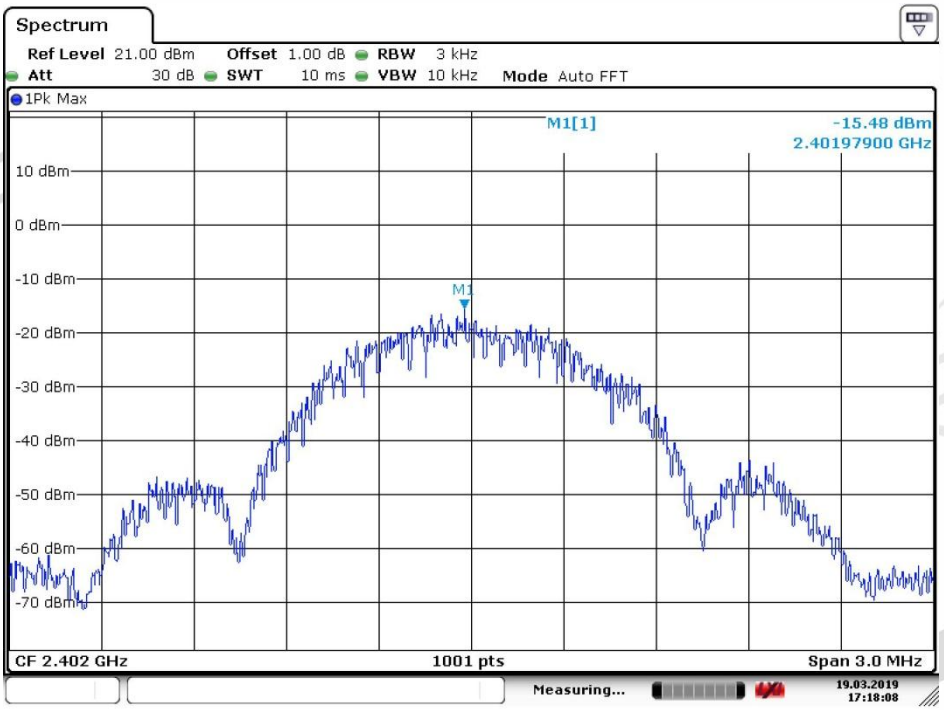
Power Spectral Density

Test Results

Mode	Test Channel	Power Spectral Density (dBm/3kHz)	Limit (dBm/3kHz)	Result
GFSK	Lowest	-15.49	≤8.00	Pass
	Middle	-14.65	≤8.00	Pass
	Highest	-15.78	≤8.00	Pass

Test plots

GFSK _Lowest Channel



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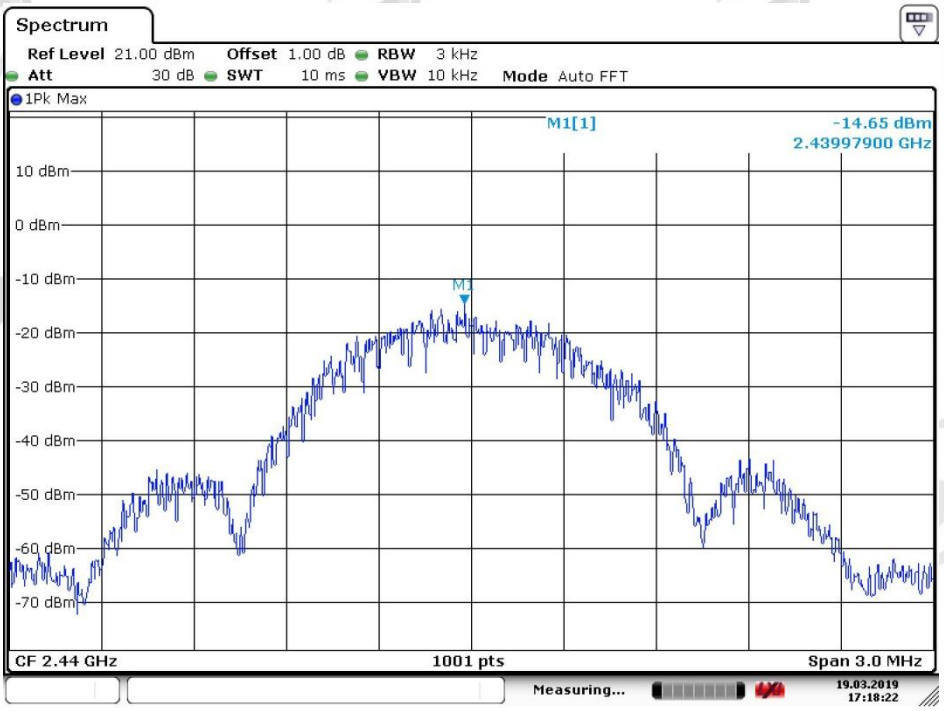
GFSK _Middle Channel



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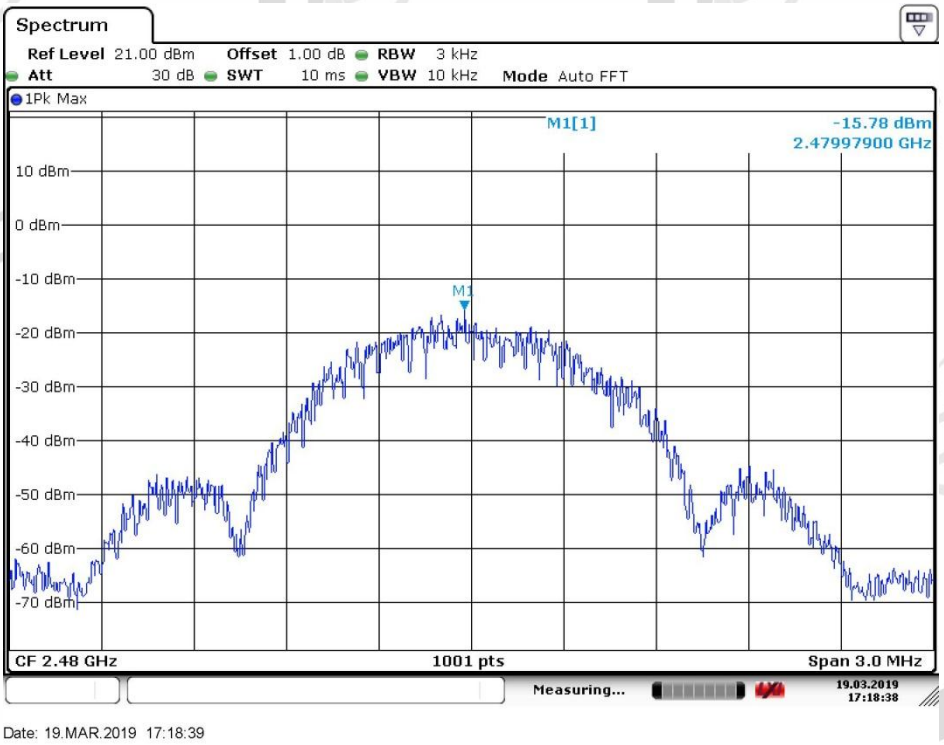
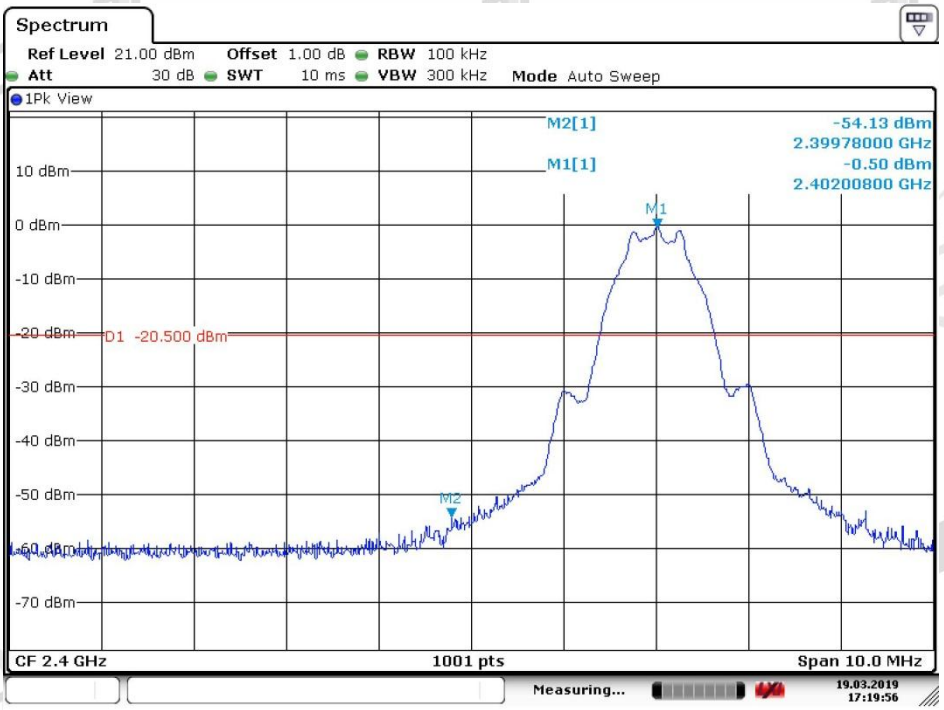
GFSK _Highest Channel



Band-edge for RF Conducted Emissions

Test plots

GFSK _Lowest Channel



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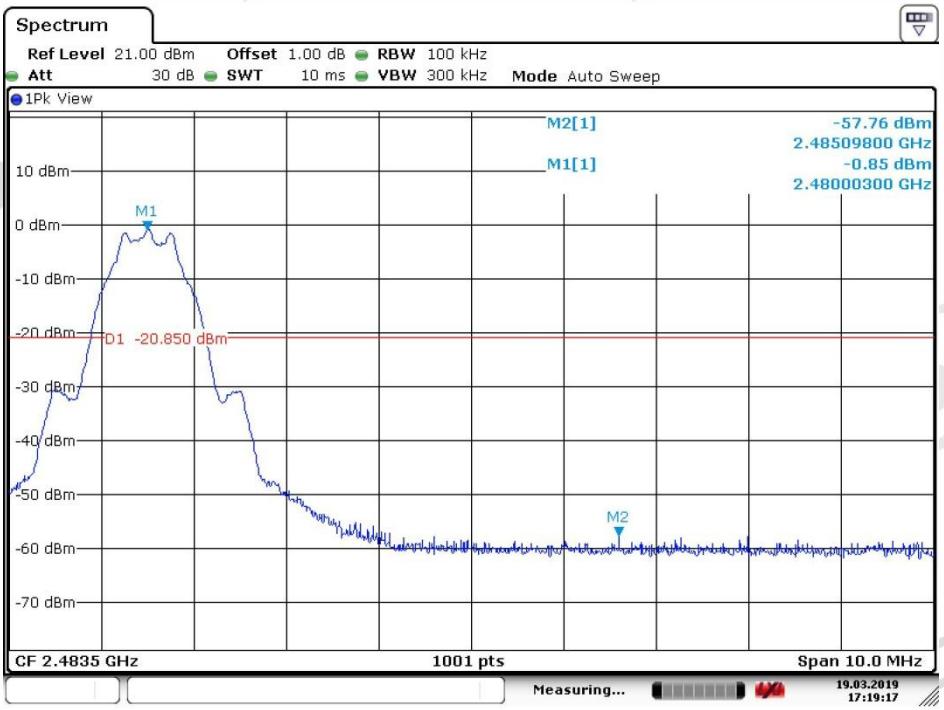
GFSK _Highest Channel



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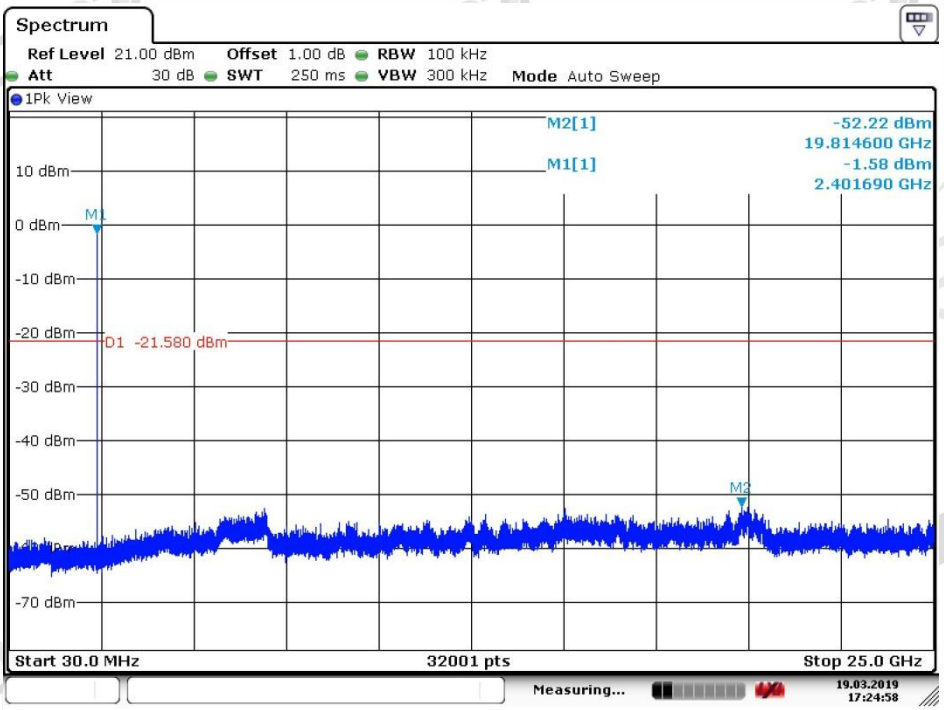
Spurious RF Conducted Emissions

Test plots:

GFSK _Lowest Channel



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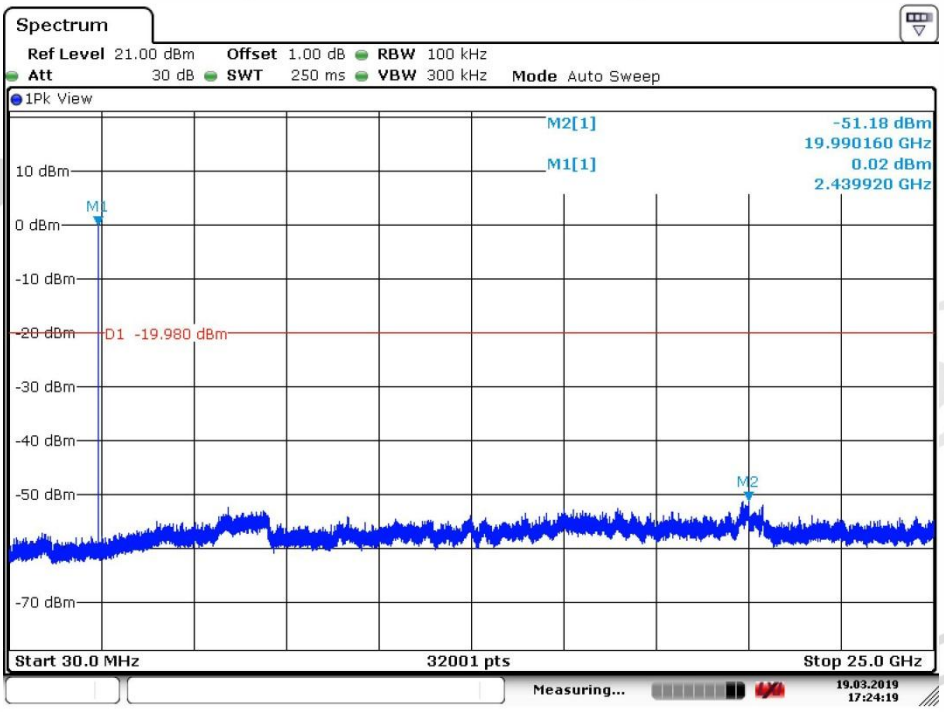
GFSK _Middle Channel



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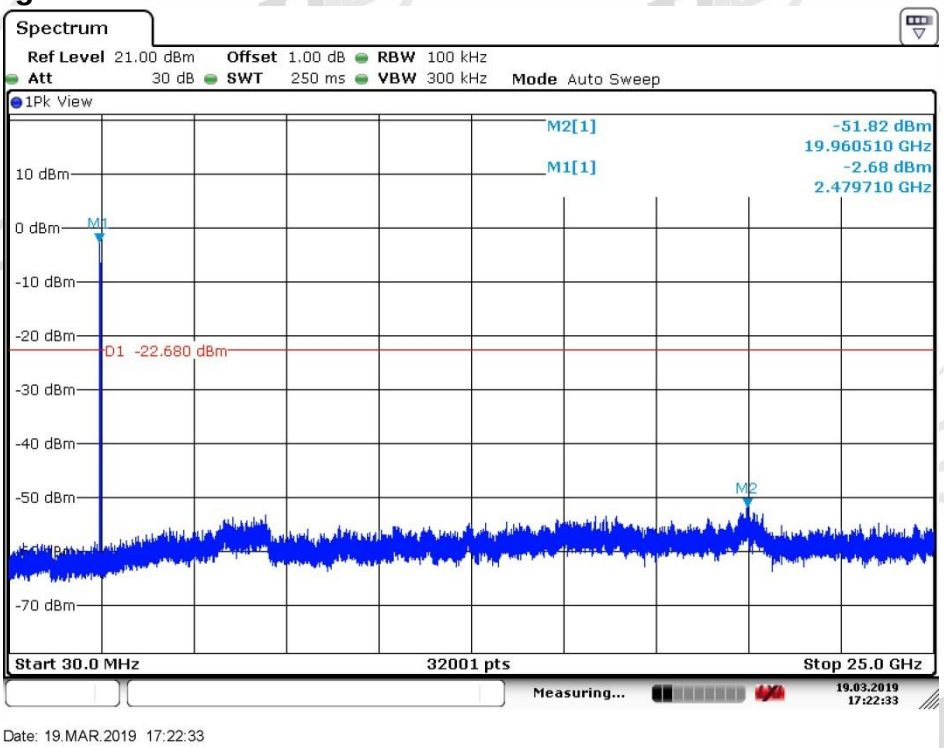
GFSK _Highest Channel



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.