

Appendix A

RF Test Data for BT V5.0(BDR/EDR) (Conducted Measurement)

Product Name: HyperGear Active True Wireless Earbuds

Trade Mark: N/A

Test Model: 14316

Environmental Conditions

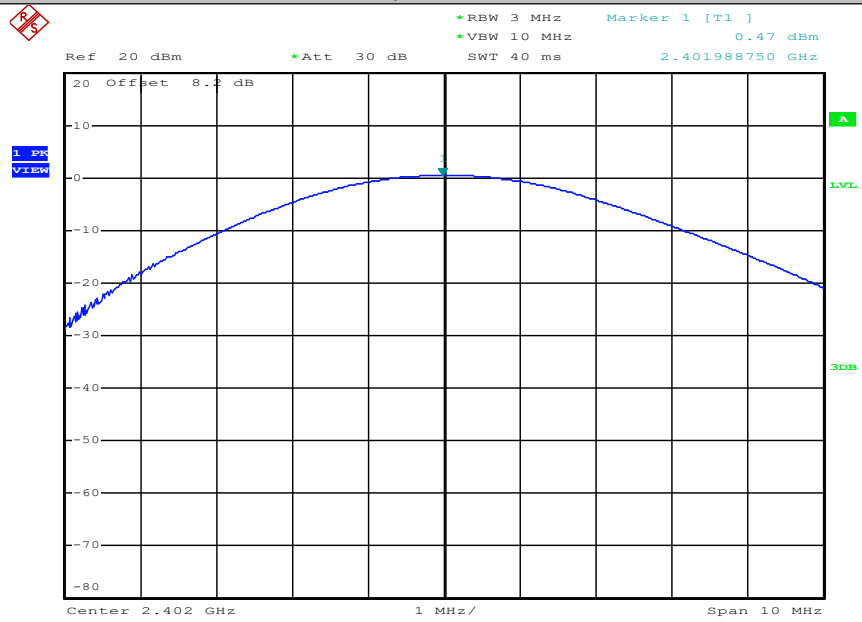
Temperature:	23.5 ° C
Relative Humidity:	52.7%
ATM Pressure:	100.0 kPa
Test Engineer:	SCOUT WU
Supervised by:	Wang.Chuang

A.1 Maximum Conducted Peak Output Power

Mode	Channel.	Maximum Peak Output Power [dBm]	Limit [dBm]	Verdict
GFSK	LCH	0.470	30	PASS
	MCH	-0.750	30	PASS
	HCH	-1.790	30	PASS
$\pi/4$ DQPSK	LCH	3.180	21	PASS
	MCH	1.900	21	PASS
	HCH	0.770	21	PASS

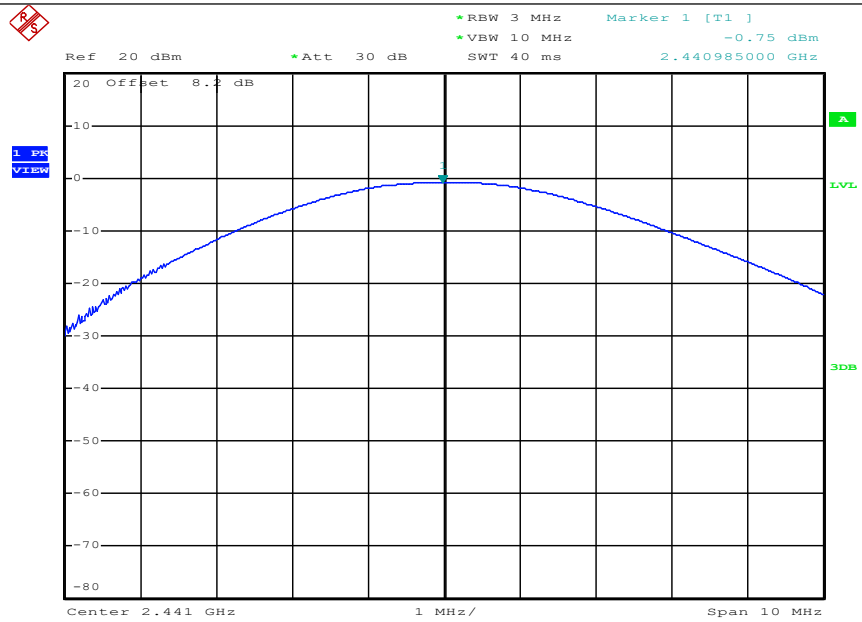
Test Graphs

GFSK/LCH



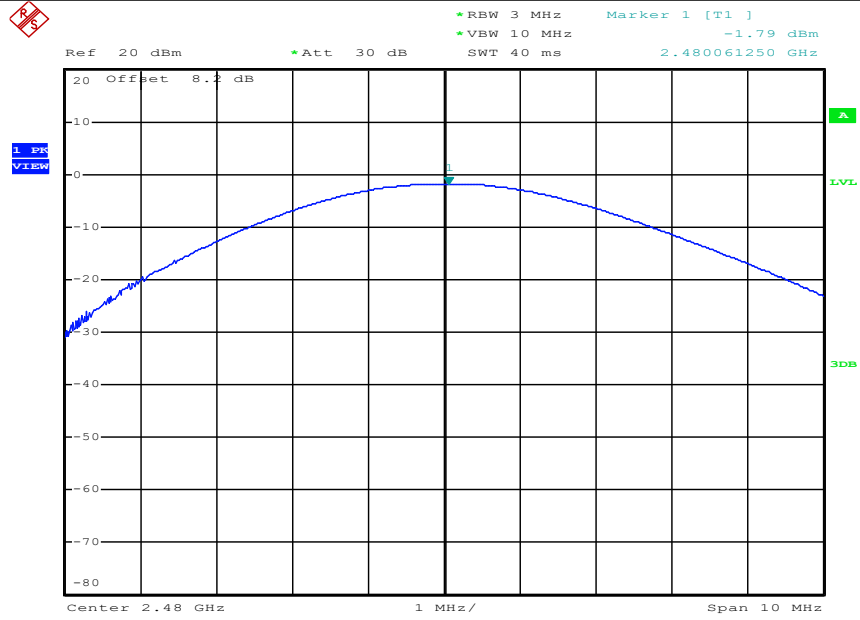
Date: 10.SEP.2019 19:12:16

GFSK/MCH



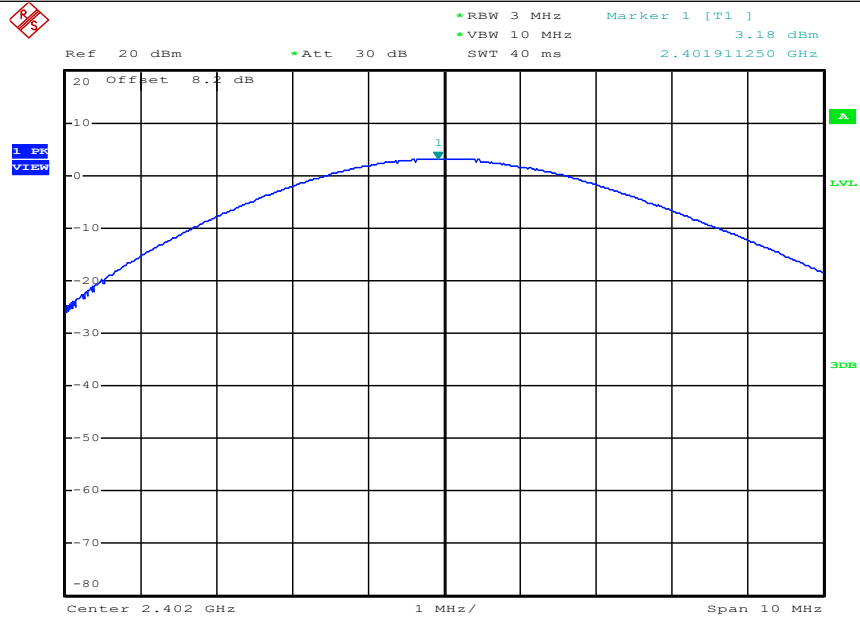
Date: 10.SEP.2019 19:15:09

GFSK/HCH



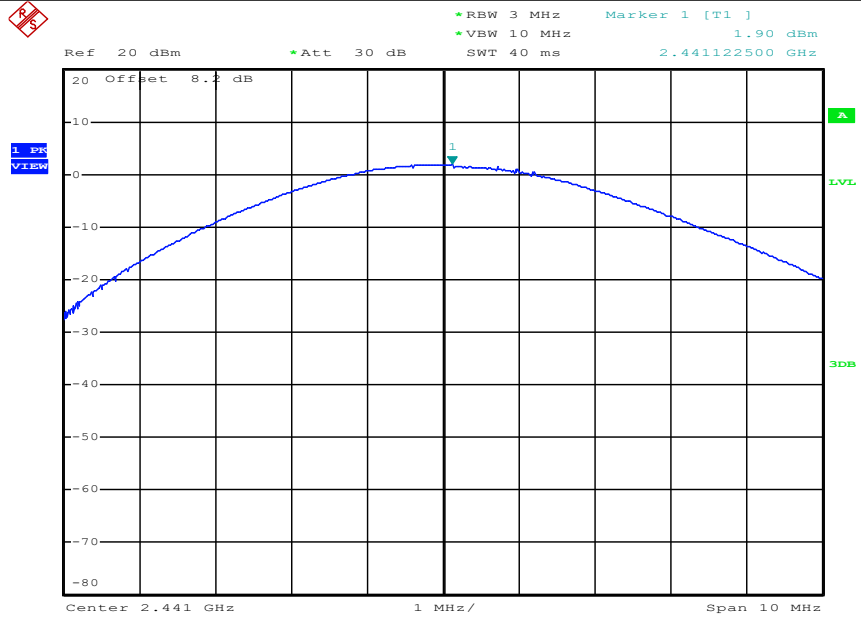
Date: 10.SEP.2019 19:17:06

$\pi/4$ DQPSK/LCH



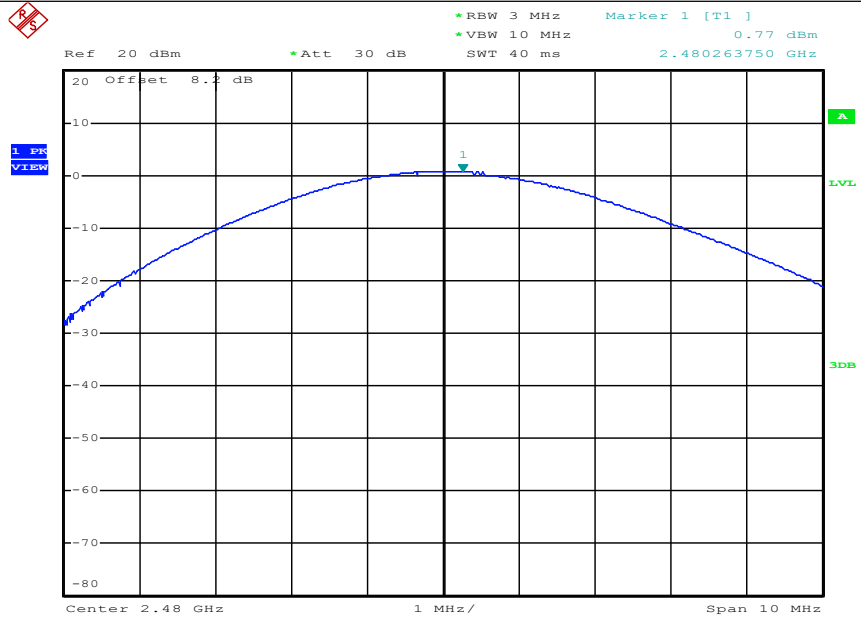
Date: 10.SEP.2019 19:20:09

$\pi/4$ DQPSK/MCH



Date: 10.SEP.2019 19:22:44

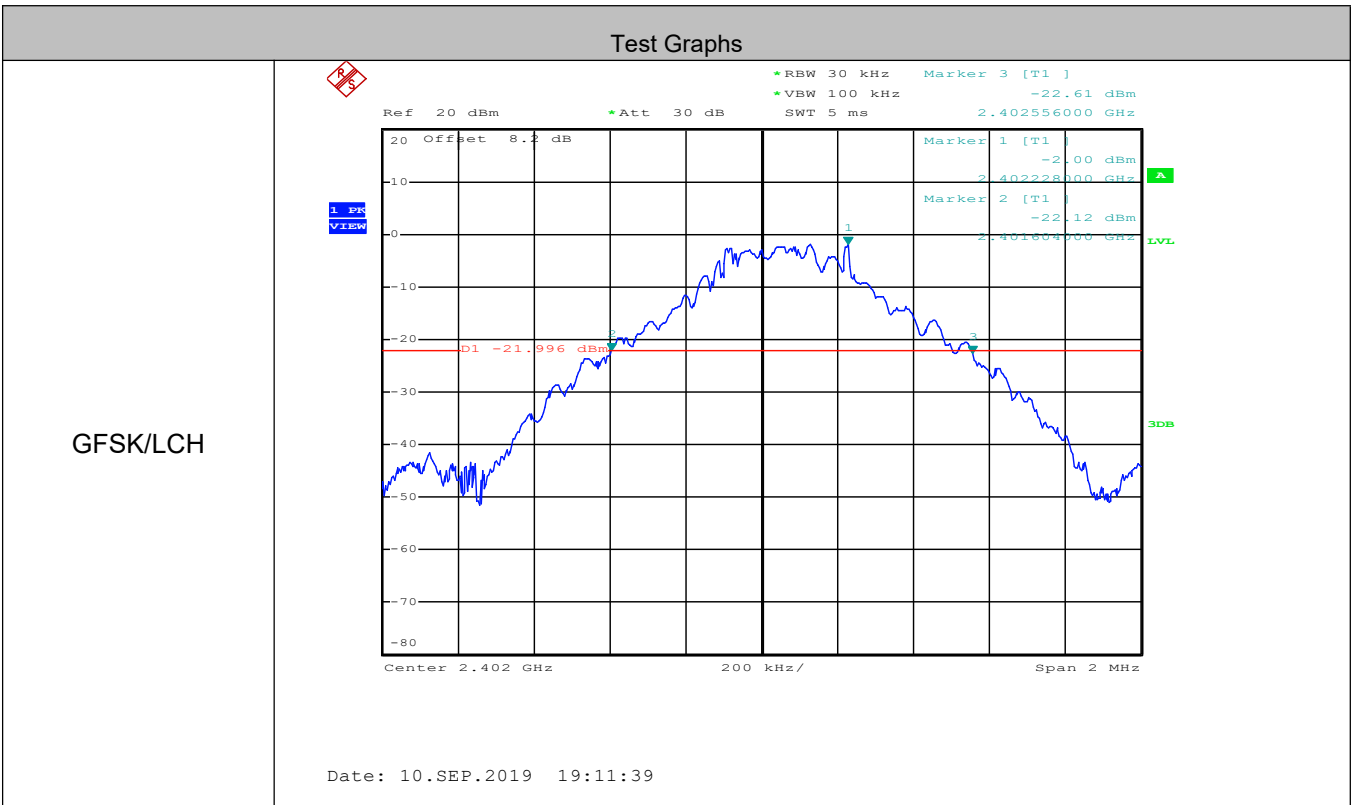
$\pi/4$ DQPSK/HCH



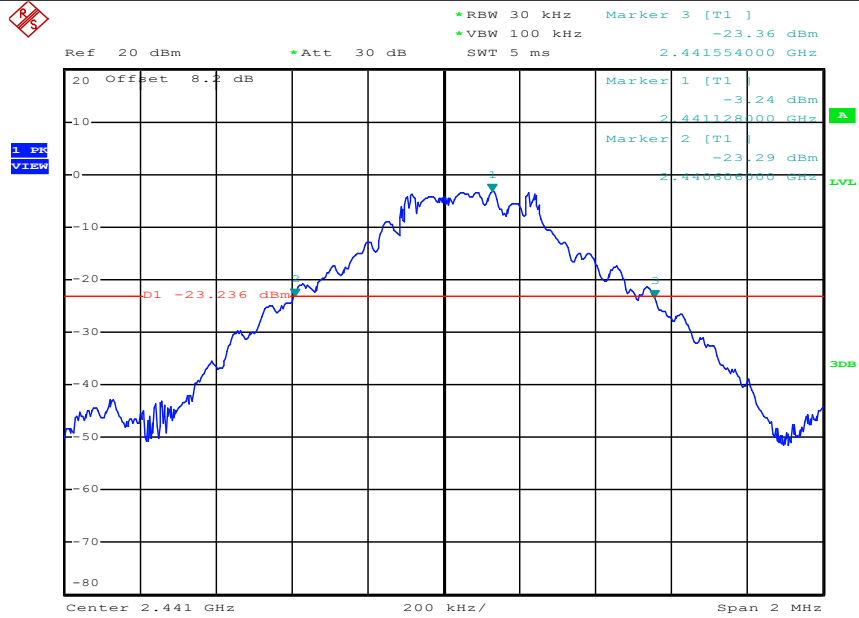
Date: 10.SEP.2019 19:26:35

A.2 20dB Bandwidth

Mode	Channel.	20dB Bandwidth [MHz]	Limit [MHz]	Verdict
GFSK	LCH	0.952	Not Specified	PASS
	MCH	0.948	Not Specified	PASS
	HCH	0.950	Not Specified	PASS
$\pi/4$ DQPSK	LCH	1.322	Not Specified	PASS
	MCH	1.324	Not Specified	PASS
	HCH	1.332	Not Specified	PASS

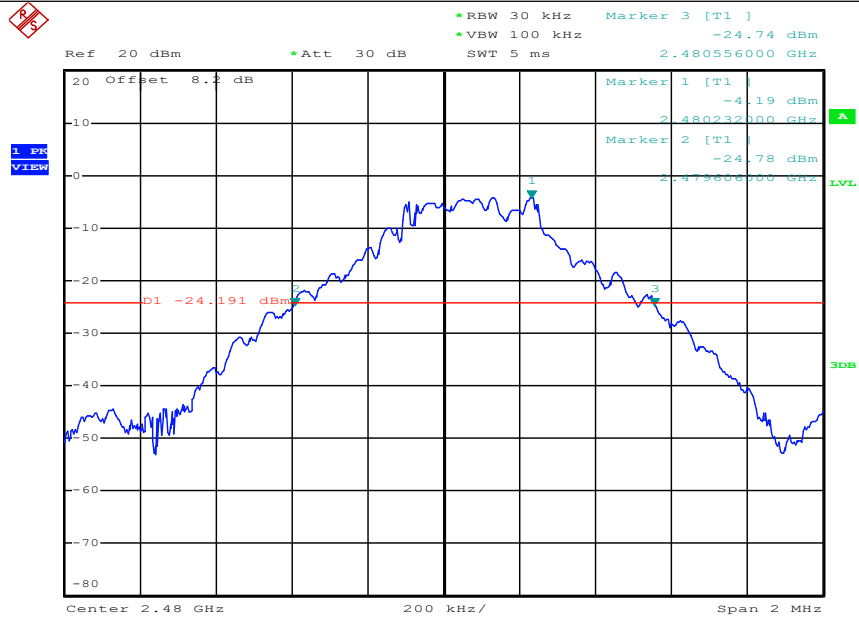


GFSK/MCH



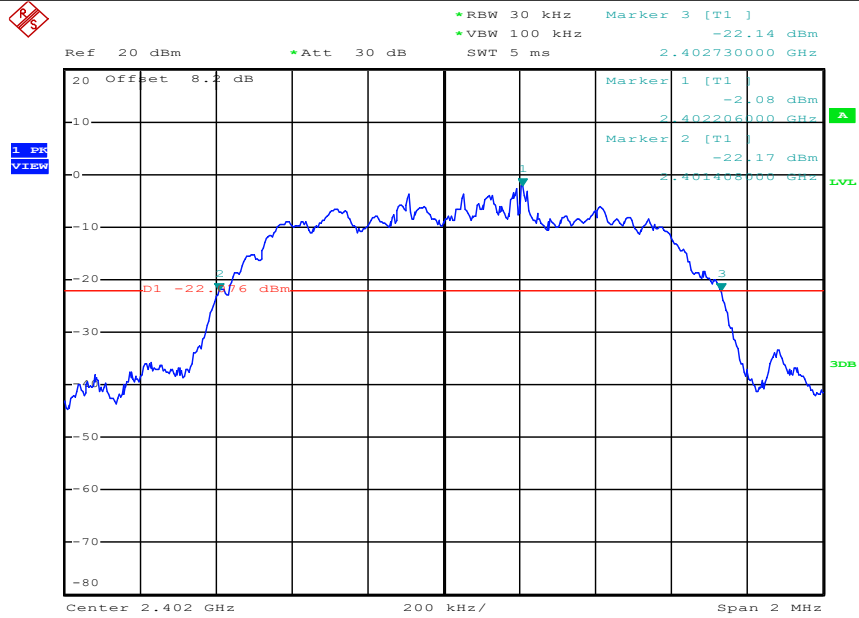
Date: 10.SEP.2019 19:14:32

GFSK/HCH



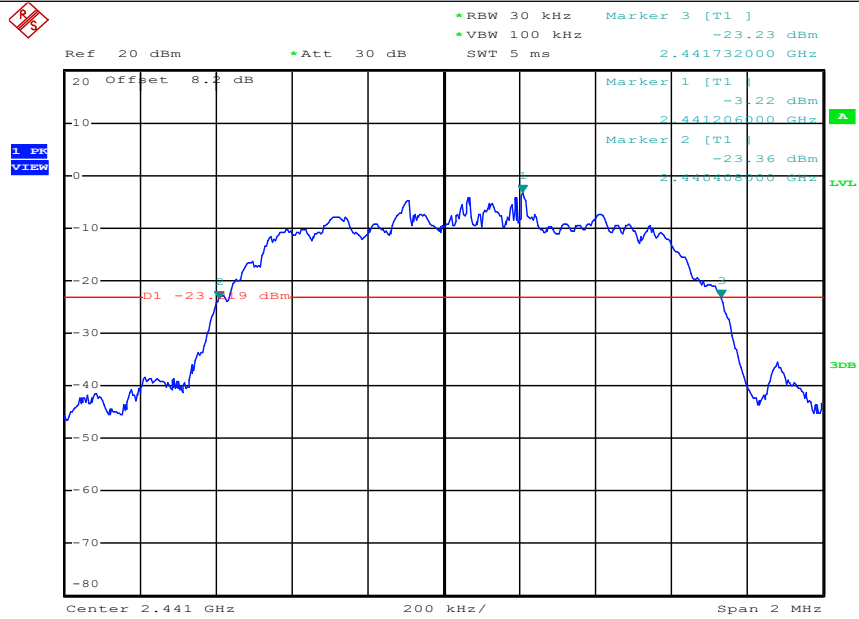
Date: 10.SEP.2019 19:16:30

$\pi/4$ DQPSK/LCH

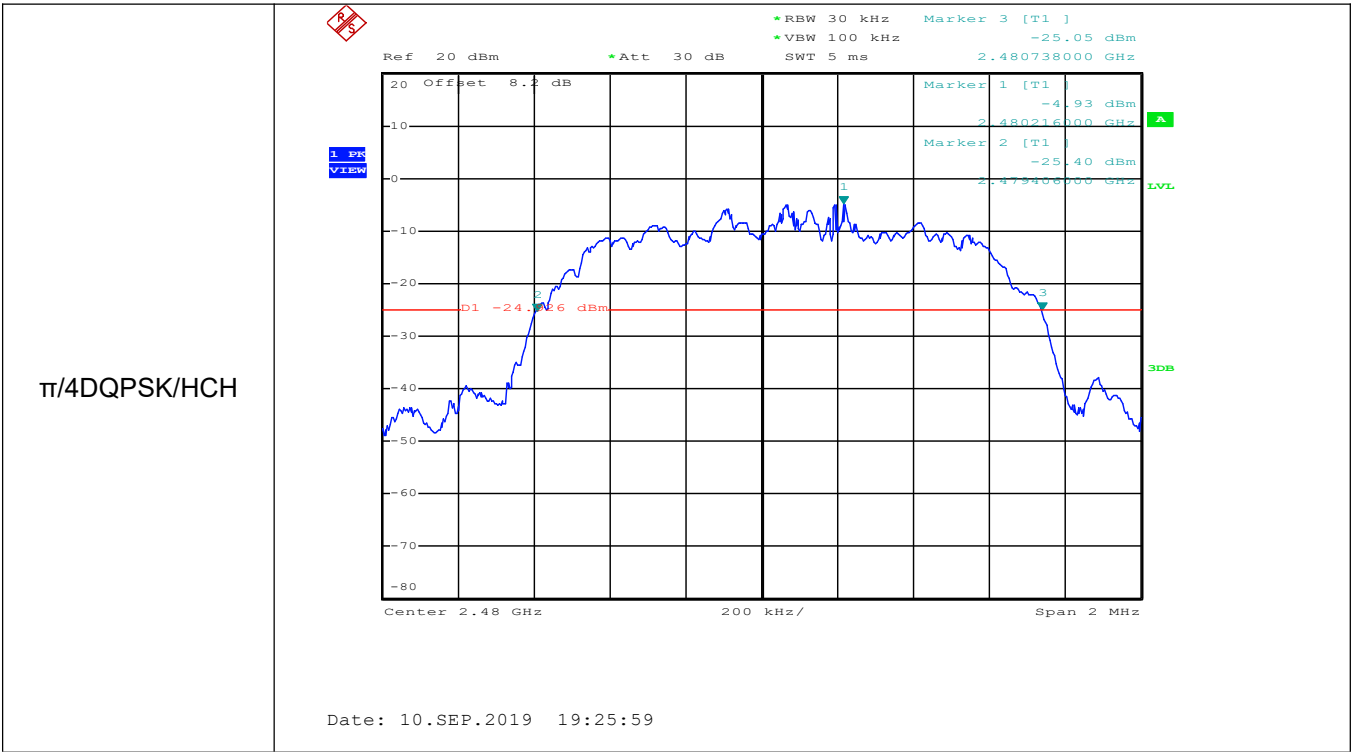


Date: 10.SEP.2019 19:19:33

$\pi/4$ DQPSK/MCH

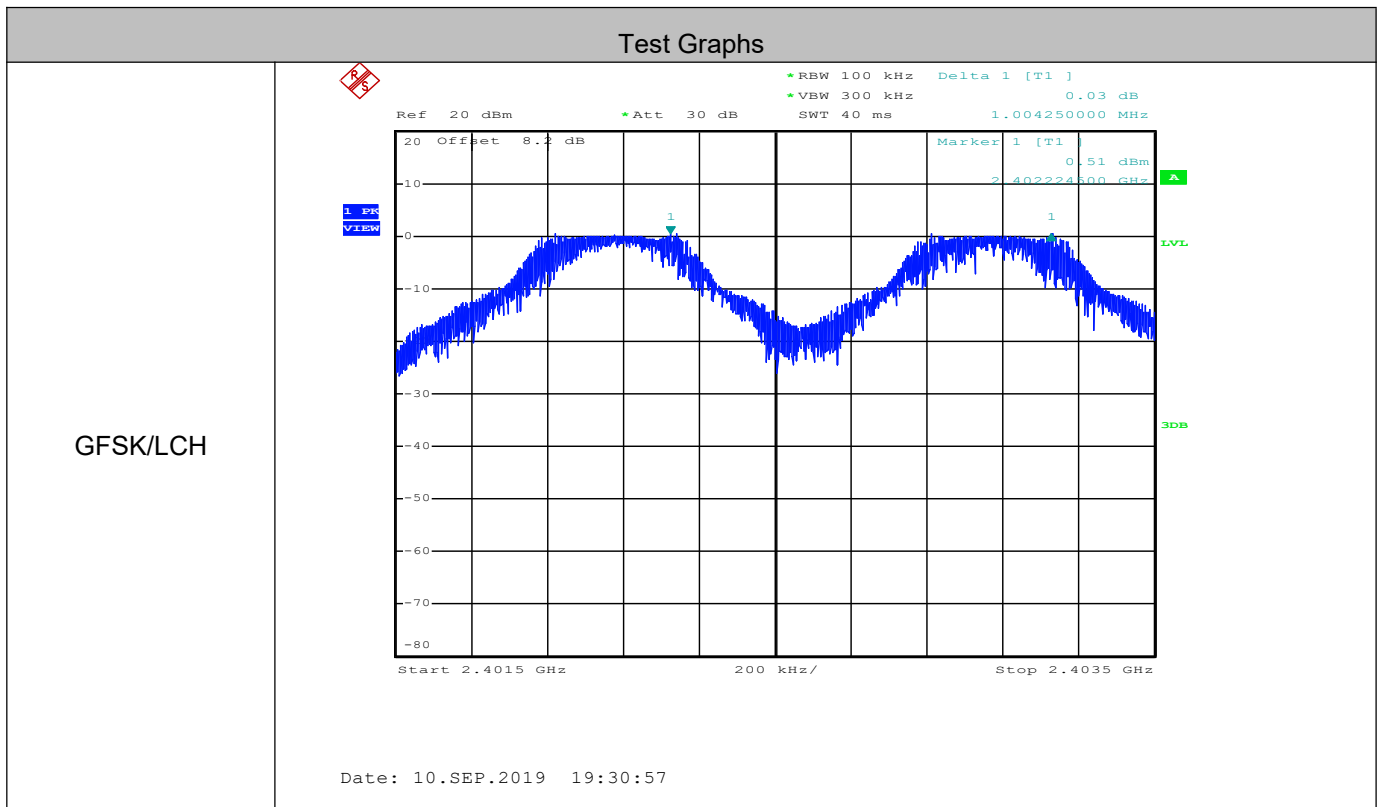


Date: 10.SEP.2019 19:22:07

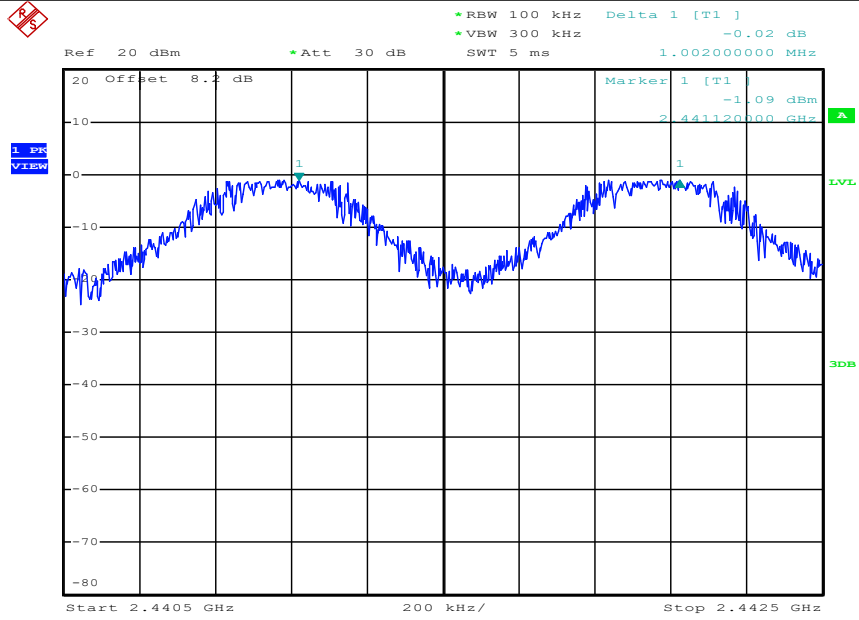


A.3 Carrier Frequency Separation

Mode	Channel.	Carrier Frequency Separation [MHz]	Limit [MHz]	Verdict
GFSK	LCH	1.004	0.952	PASS
	MCH	1.002	0.948	PASS
	HCH	1.146	0.950	PASS
π/4DQPSK	LCH	0.918	0.888	PASS
	MCH	0.896	0.888	PASS
	HCH	0.922	0.888	PASS

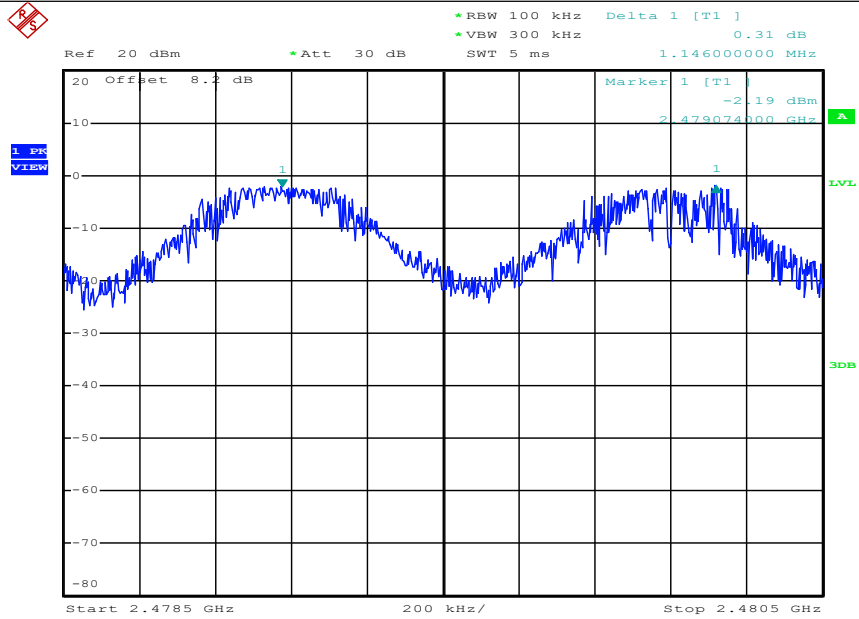


GFSK/MCH



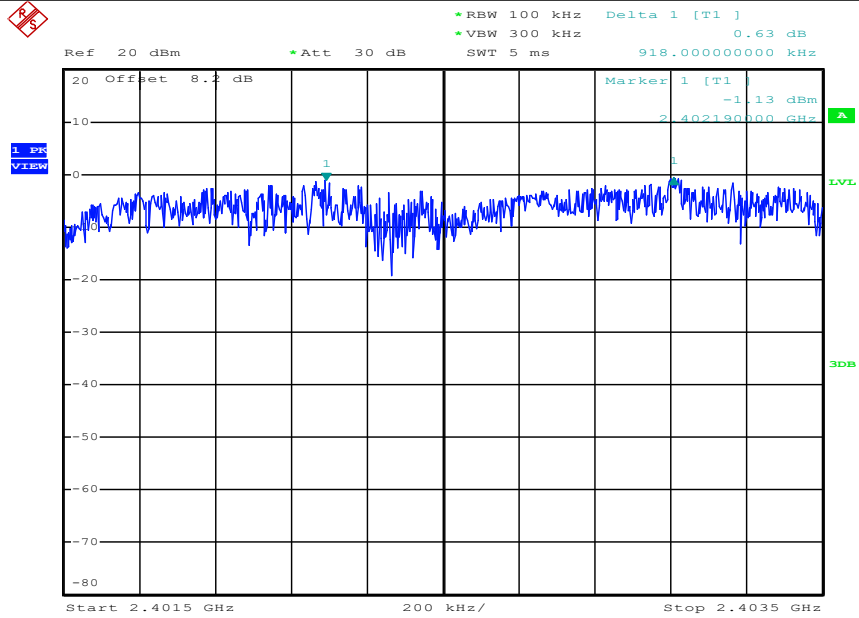
Date: 10.SEP.2019 19:34:13

GFSK/HCH



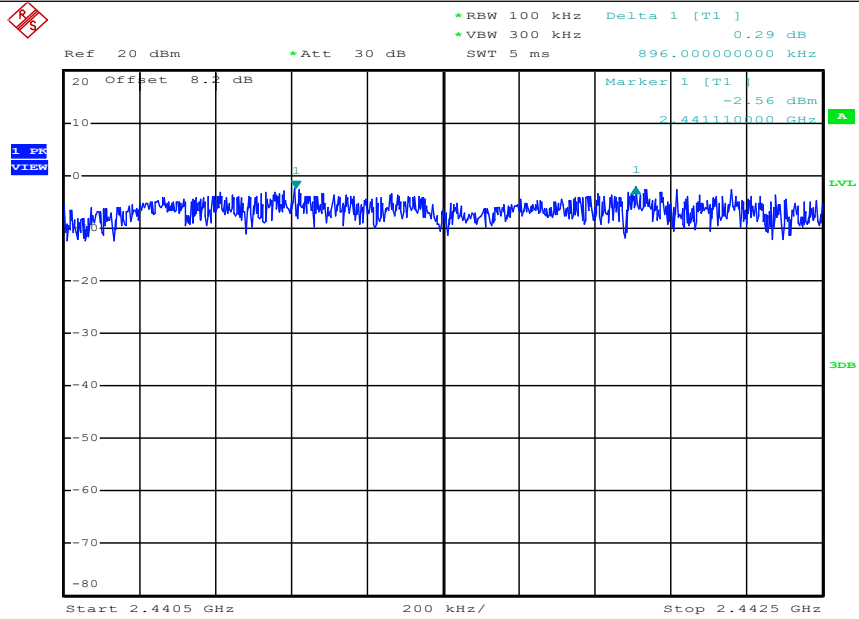
Date: 10.SEP.2019 19:34:32

$\pi/4$ DQPSK/LCH

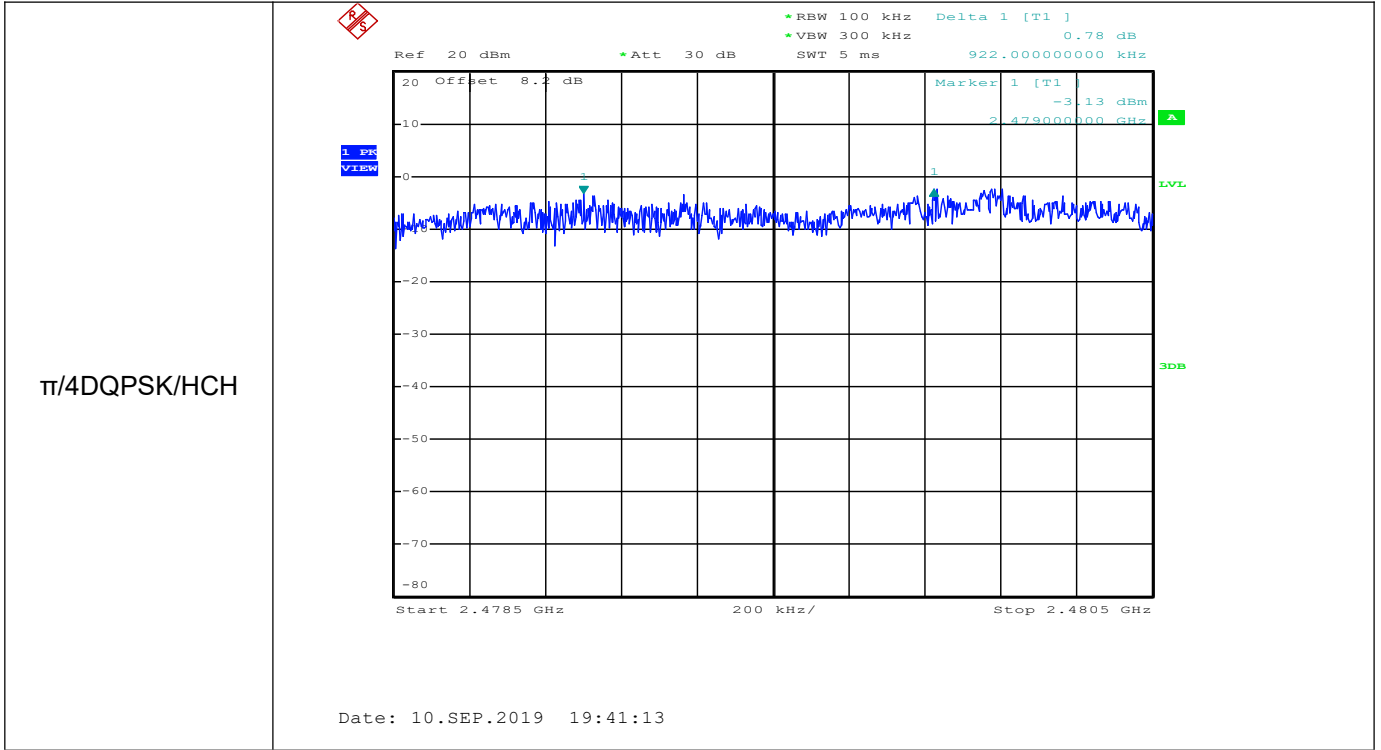


Date: 10.SEP.2019 19:38:51

$\pi/4$ DQPSK/MCH

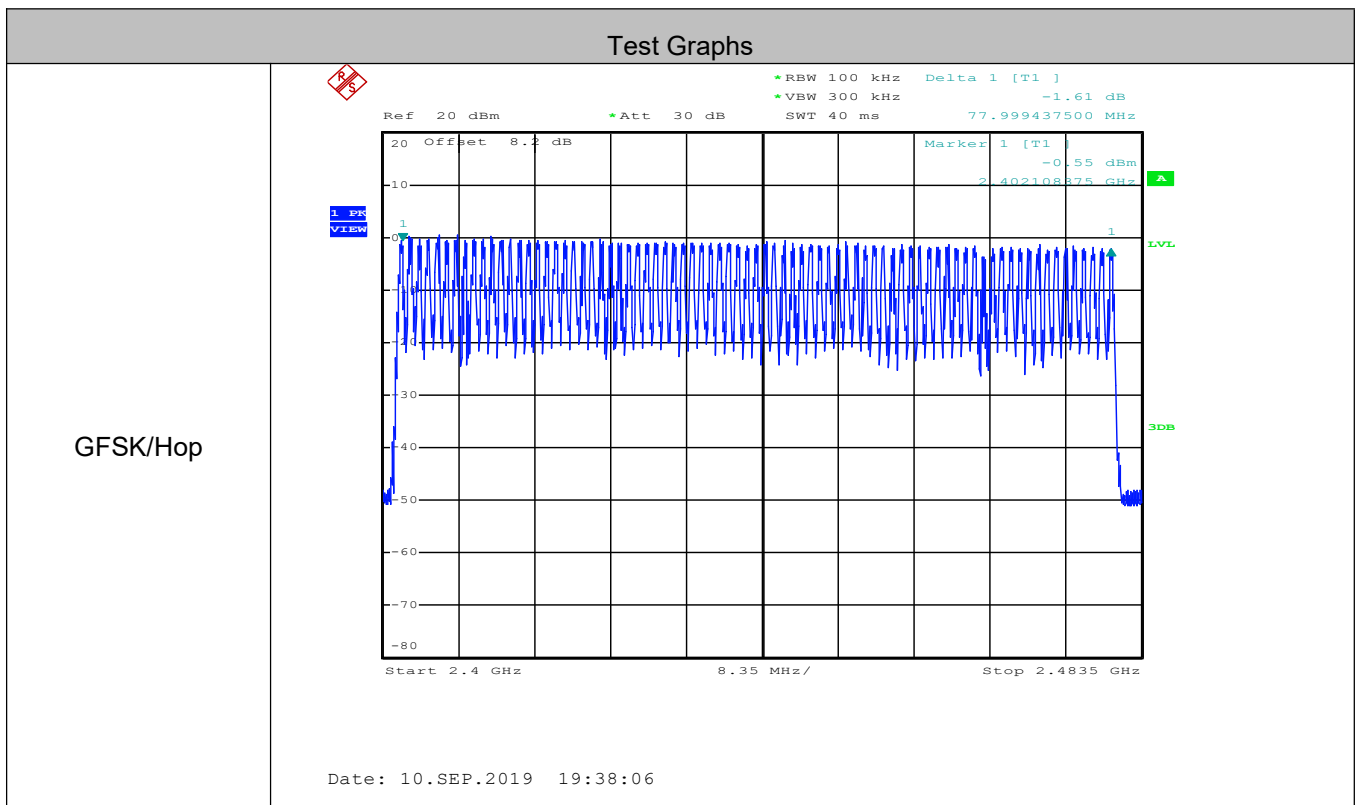


Date: 10.SEP.2019 19:40:48

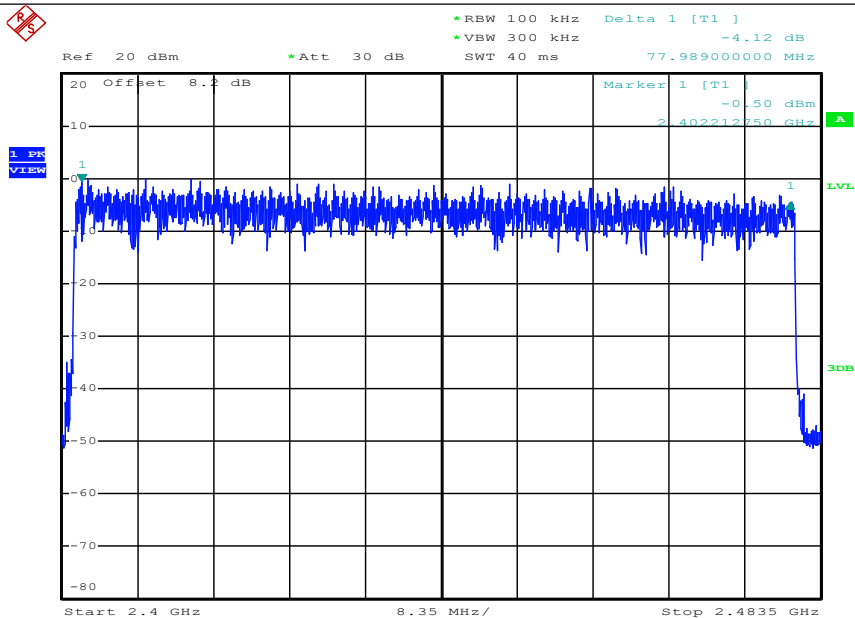


A.4 Hopping Channel Number

Mode	Channel.	Number of Hopping Channel [N]	Limit [N]	Verdict
GFSK	Hop	79	>=15	PASS
π/4DQPSK	Hop	79	>=15	PASS



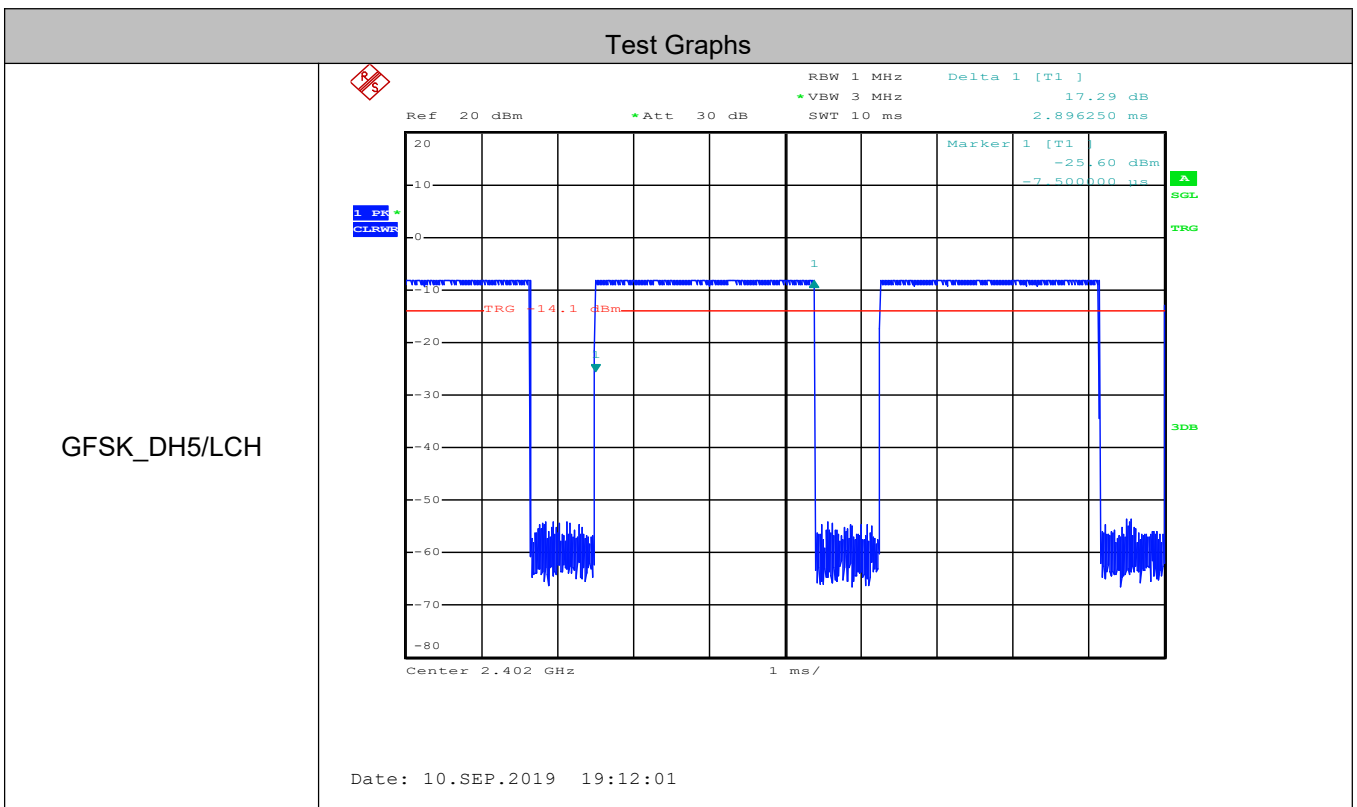
$\pi/4$ DQPSK/Hop



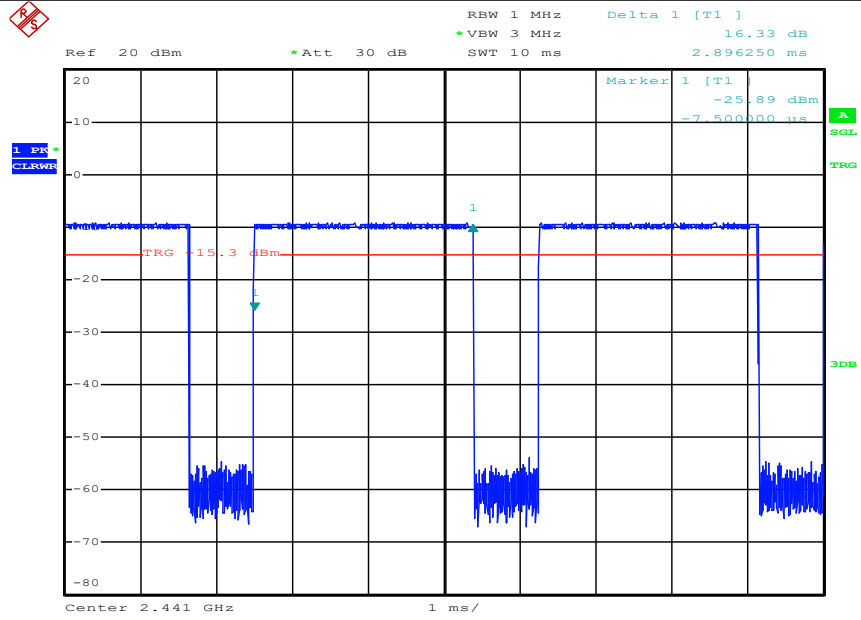
Date: 10.SEP.2019 19:44:31

A.5 Dwell Time

Mode	Packet	Channel	Burst Width [ms/hop/ch]	Total Hops[hop*ch]	Dwell Time[s]	Limit [s]	Verdict
GFSK	DH5	LCH	2.9	106.7	0.309	0.4	PASS
	DH5	MCH	2.9	106.7	0.309	0.4	PASS
	DH5	HCH	2.9	106.7	0.309	0.4	PASS
$\pi/4$ DQPSK	2DH5	LCH	2.9	106.7	0.309	0.4	PASS
	2DH5	MCH	2.9	106.7	0.309	0.4	PASS
	2DH5	HCH	2.9	106.7	0.309	0.4	PASS

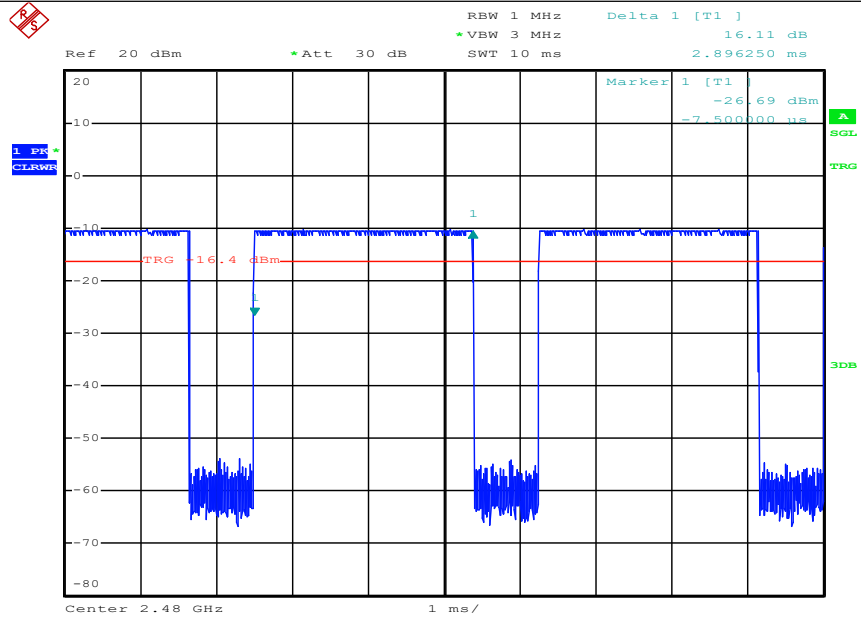


GFSK_DH5/MCH



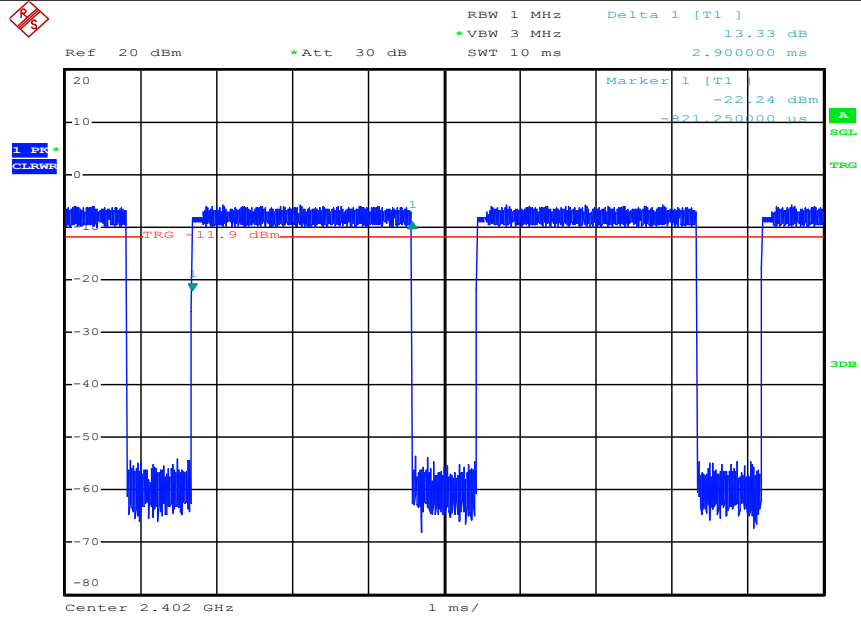
Date: 10.SEP.2019 19:14:54

GFSK_DH5/HCH



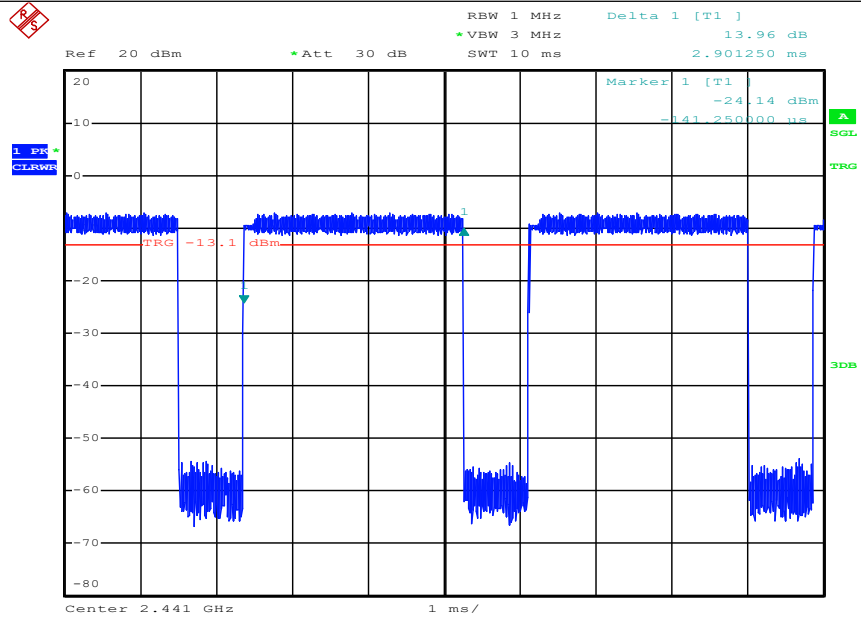
Date: 10.SEP.2019 19:16:51

$\pi/4$ DQPSK
_2DH5/LCH



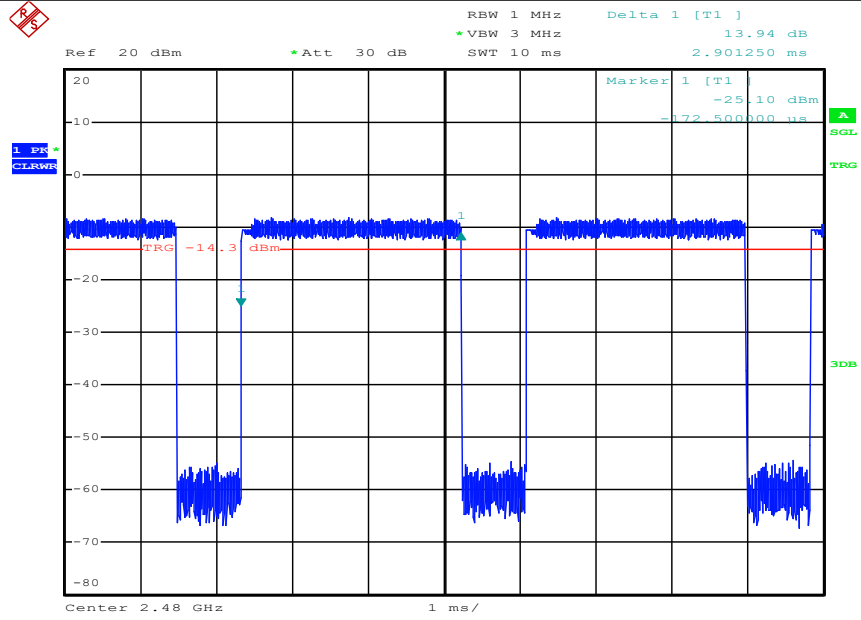
Date: 10.SEP.2019 19:19:54

$\pi/4$ DQPSK
_2DH5/MCH



Date: 10.SEP.2019 19:22:29

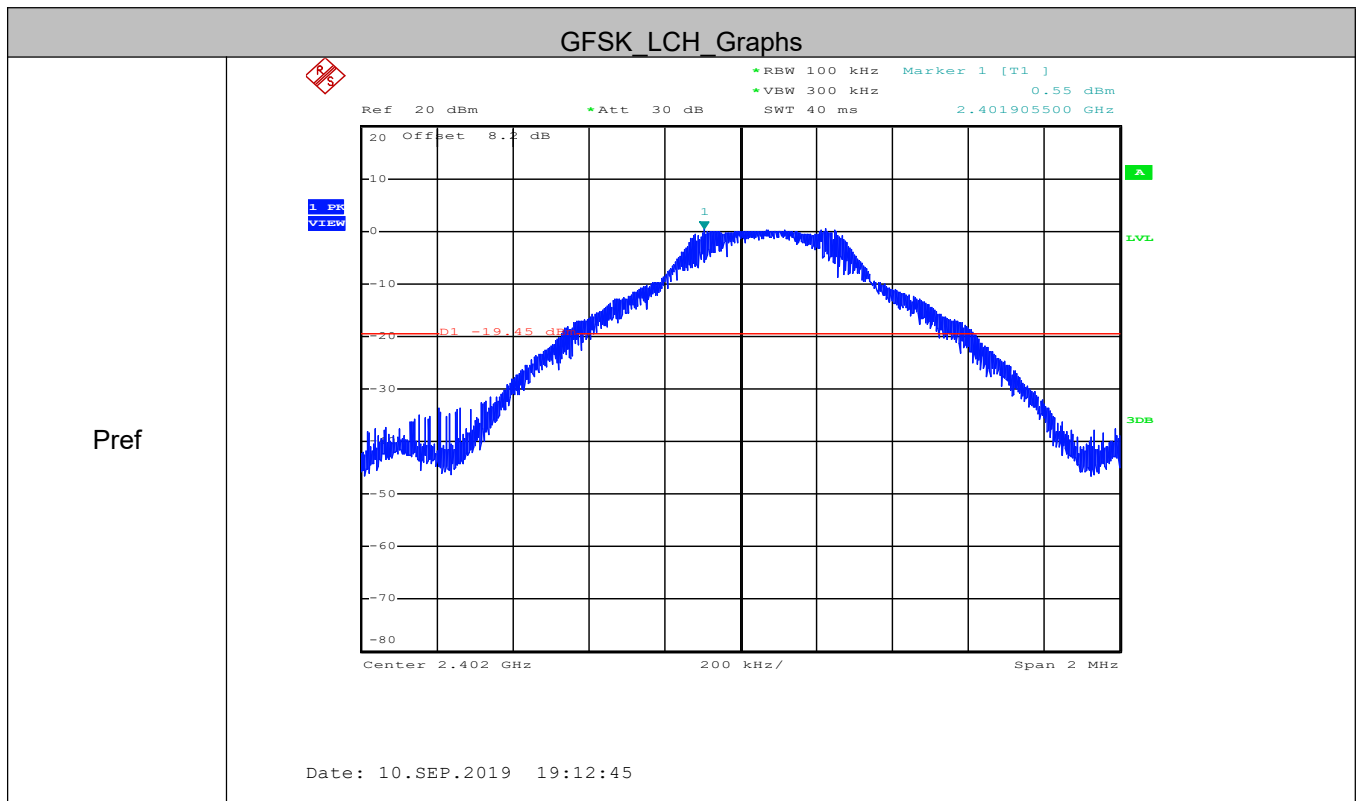
$\pi/4$ DQPSK
_2DH5/HCH



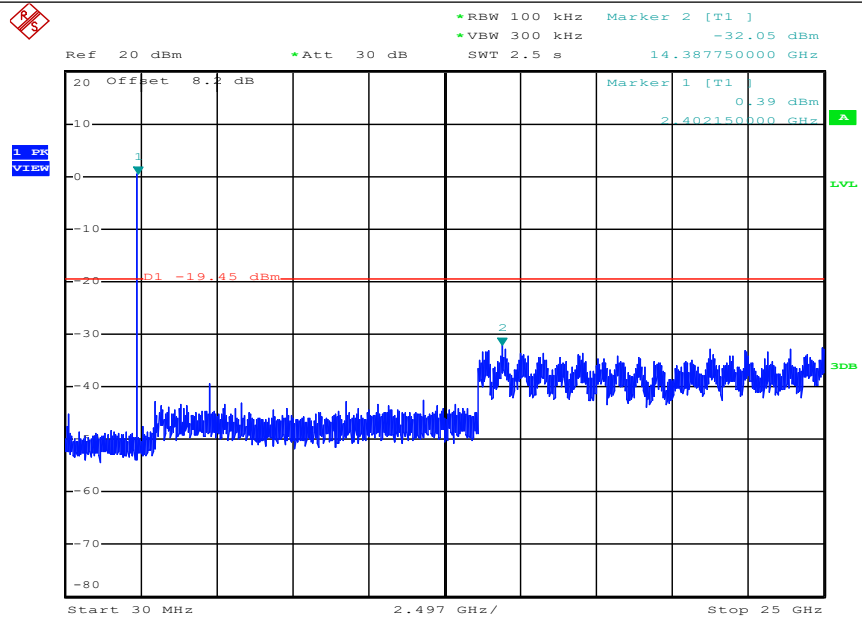
Date: 10.SEP.2019 19:26:20

A.6 RF Conducted Spurious Emissions

Mode	Channel	Pref [dBm]	Max. Level [dBm]	Limit [dBm]	Verdict
GFSK	LCH	0.55	-32.050	-19.450	PASS
	MCH	-0.59	-32.460	-20.590	PASS
	HCH	-1.66	-31.940	-21.660	PASS
π/4DQPSK	LCH	0.37	-33.060	-19.630	PASS
	MCH	-0.83	-32.620	-20.830	PASS
	HCH	-1.84	-31.250	-21.840	PASS



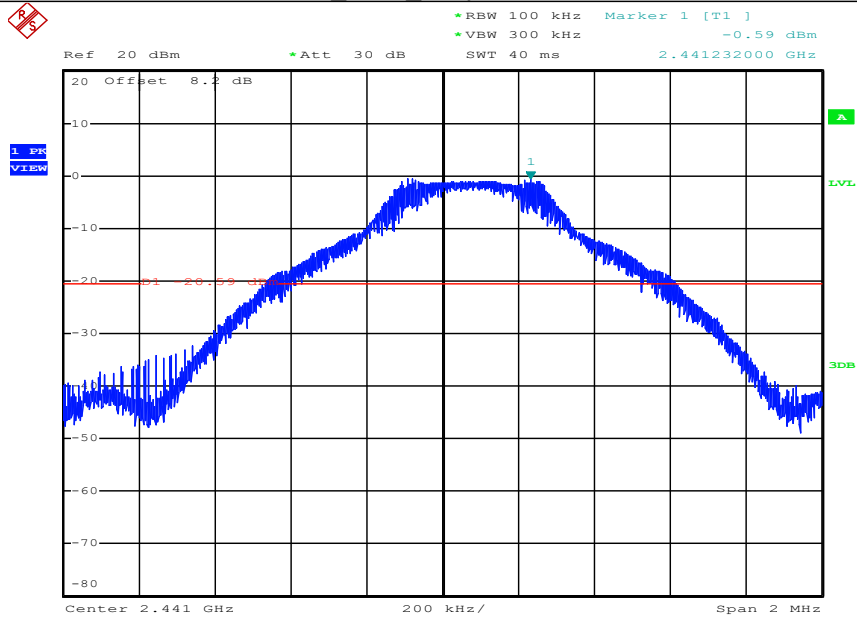
P_{uw}



Date: 10.SEP.2019 19:12:59

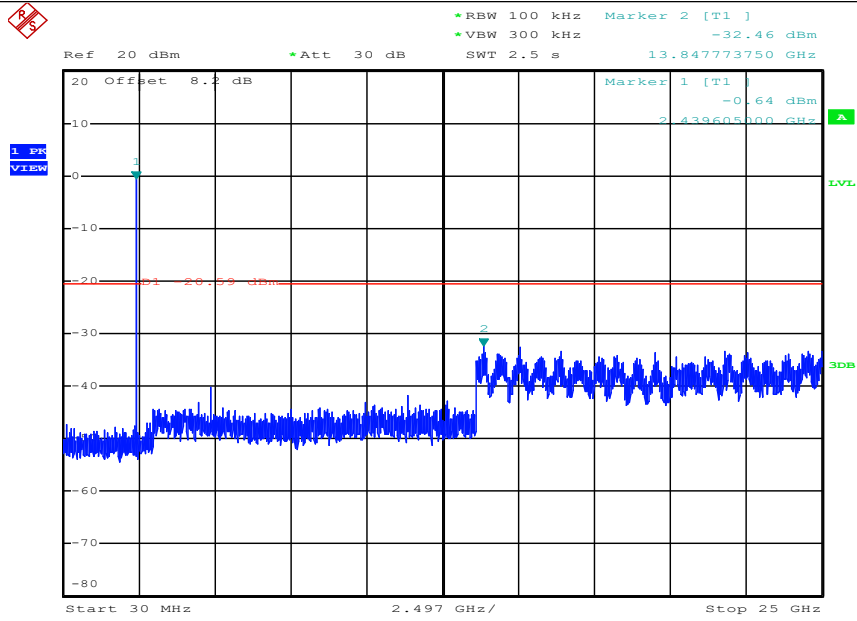
GFSK_MCH_Graphs

Pref



Date: 10.SEP.2019 19:15:21

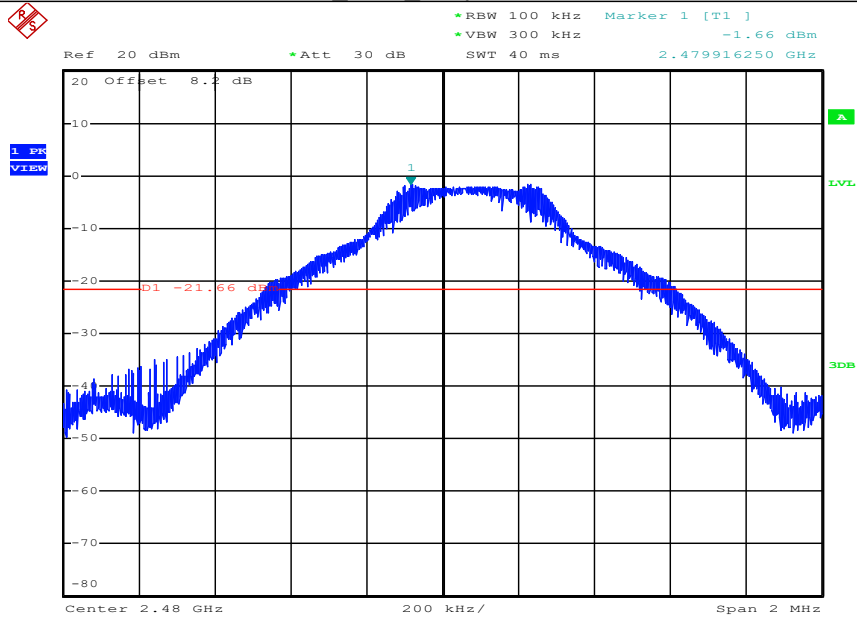
Puw



Date: 10.SEP.2019 19:15:36

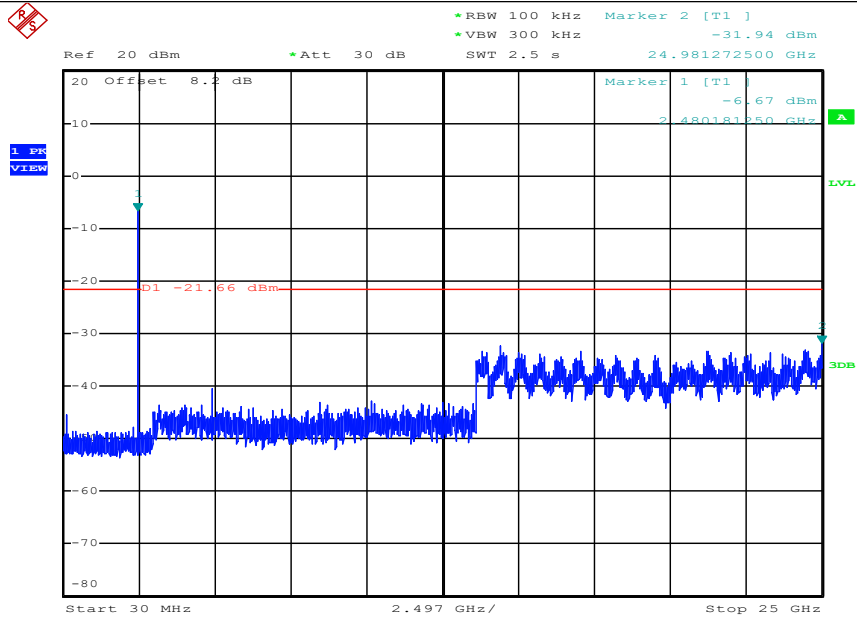
GFSK_HCH_Graphs

Pref



Date: 10.SEP.2019 19:17:35

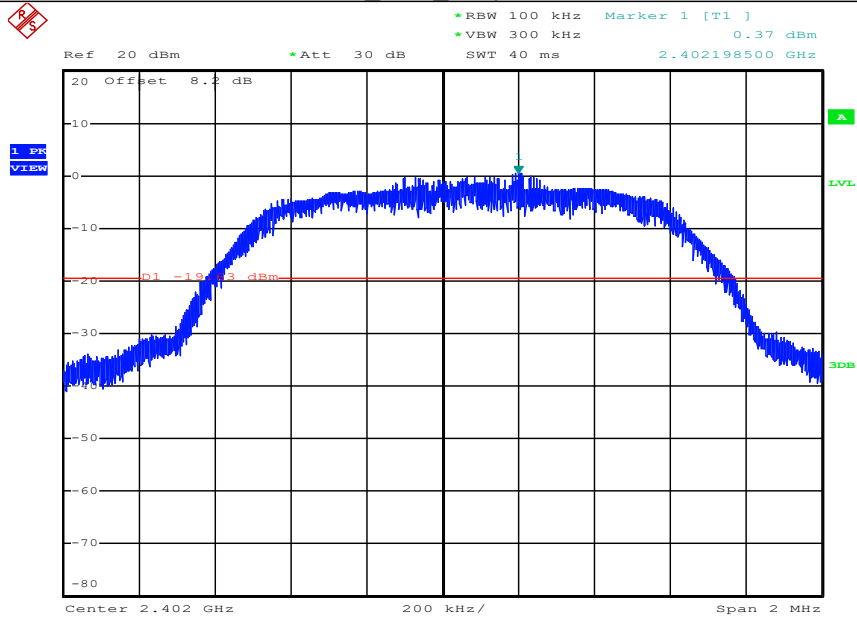
Puw



Date: 10.SEP.2019 19:17:50

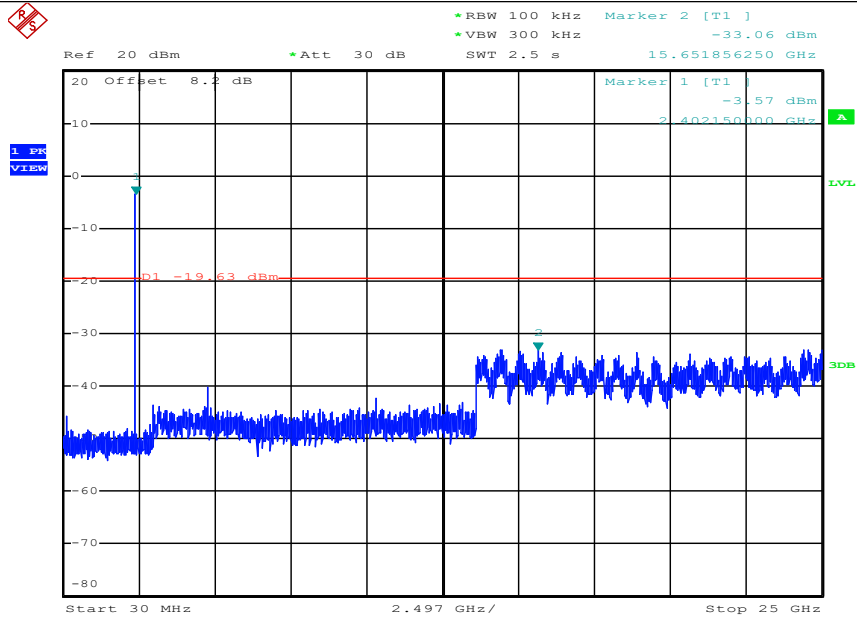
$\pi/4$ DQPSK_LCH_Graphs

Pref



Date: 10.SEP.2019 19:20:38

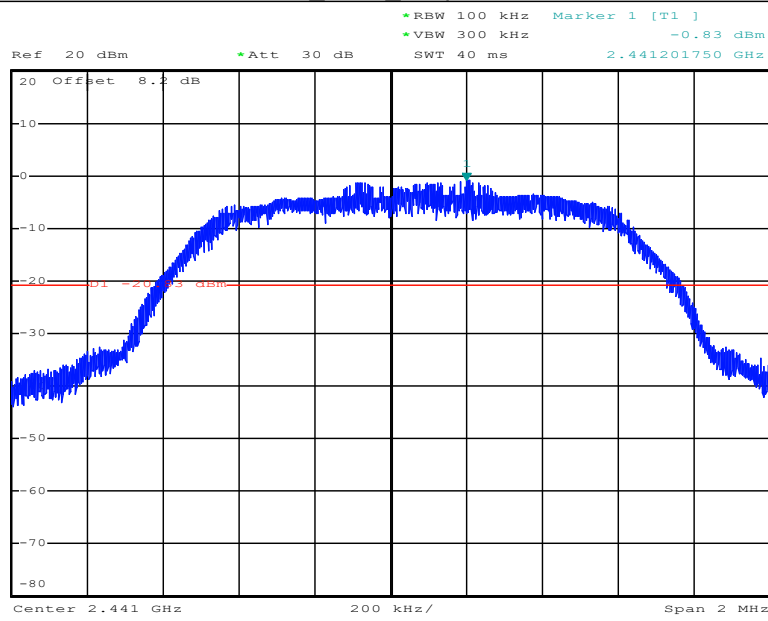
Puw



Date: 10.SEP.2019 19:20:53

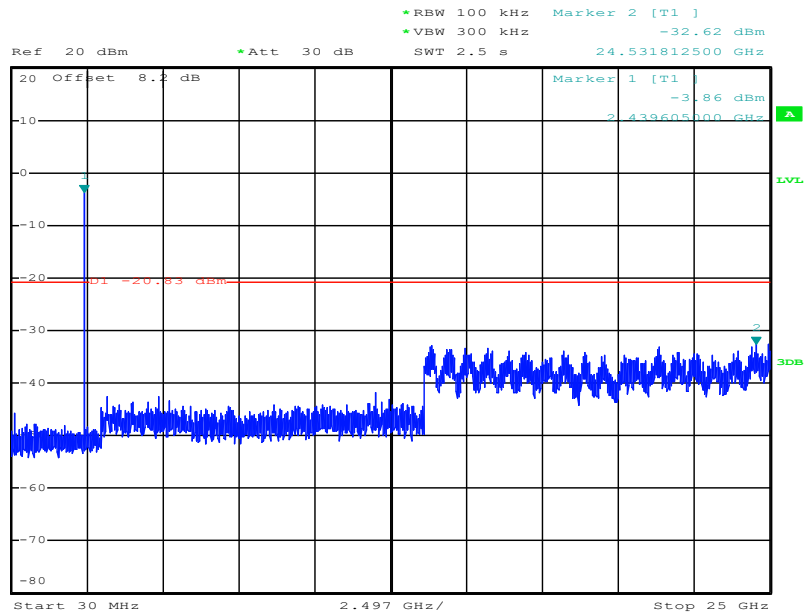
$\pi/4$ DQPSK_MCH_Graphs

Pref



Date: 10.SEP.2019 19:22:56

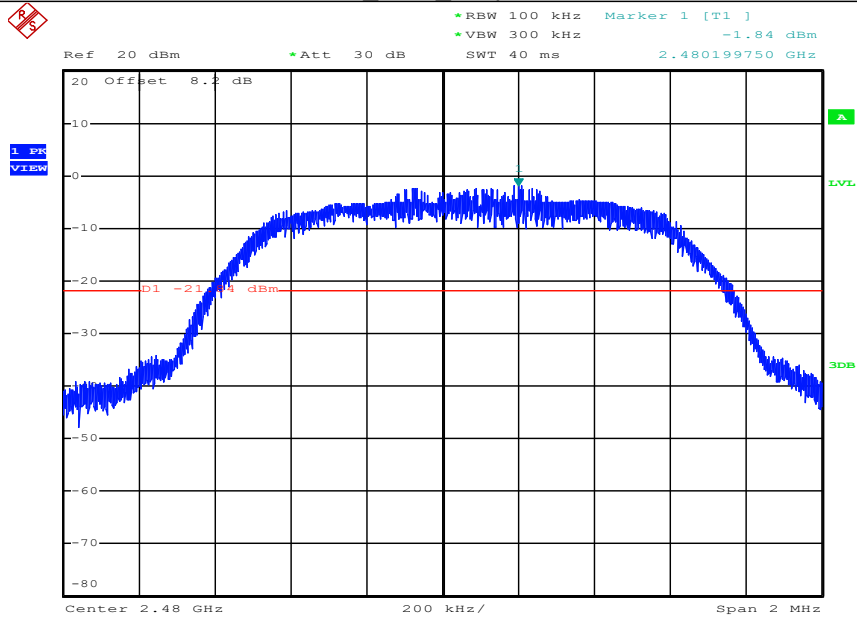
Puw



Date: 10.SEP.2019 19:23:11

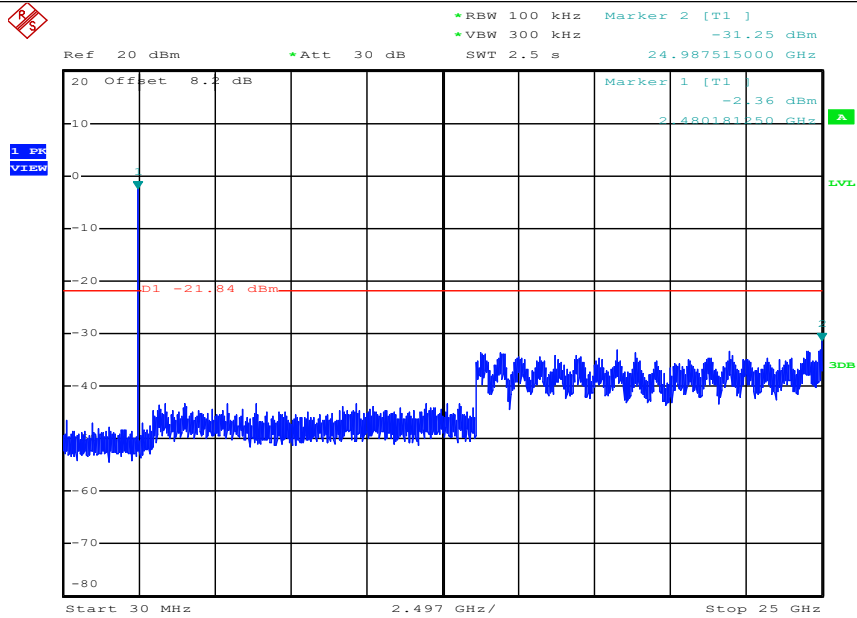
$\pi/4$ DQPSK_HCH_Graphs

Pref



Date: 10.SEP.2019 19:27:04

Puw



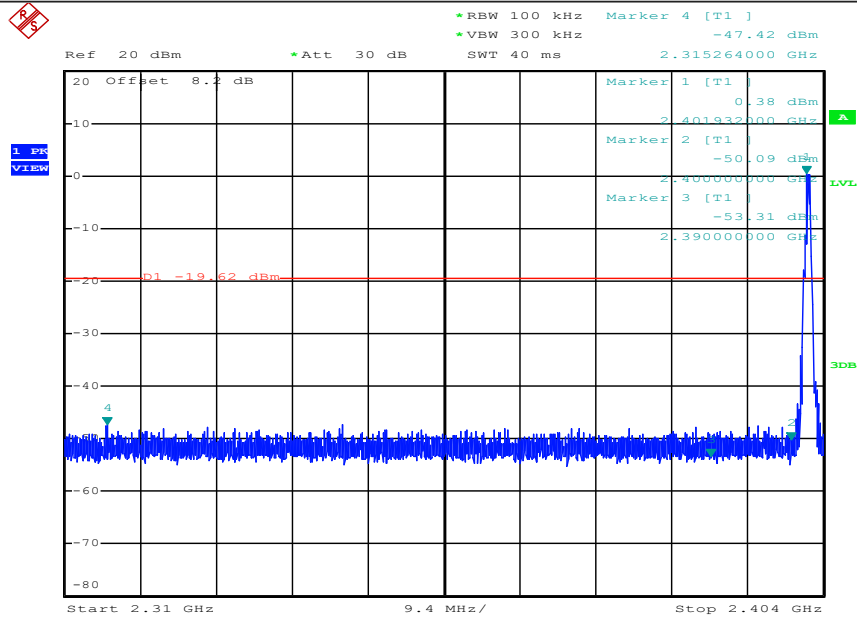
Date: 10.SEP.2019 19:27:19

A.7 Band-edge for RF Conducted Emissions

Mode	Channel	Carrier Frequency [MHz]	Carrier Power [dBm]	Frequency Hopping	Max Spurious Level [dBm]	Limit [dBm]	Verdict
GFSK	LCH	2402	0.380	Off	-47.420	-19.62	PASS
			0.430	On	-46.471	-19.57	PASS
	HCH	2480	-1.720	Off	-47.556	-21.72	PASS
			-1.220	On	-46.561	-21.22	PASS
$\pi/4$ DQPSK	LCH	2402	-0.310	Off	-47.653	-20.31	PASS
			0.080	On	-46.151	-19.92	PASS
	HCH	2480	-2.380	Off	-47.644	-22.38	PASS
			-2.210	On	-47.042	-22.21	PASS

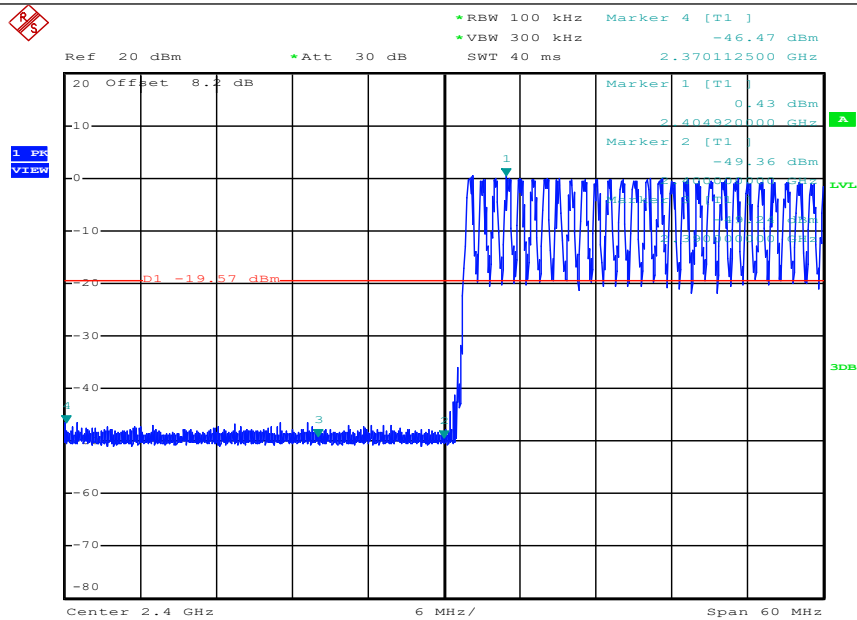
Test Graphs

GFSK/LCH/No Hop



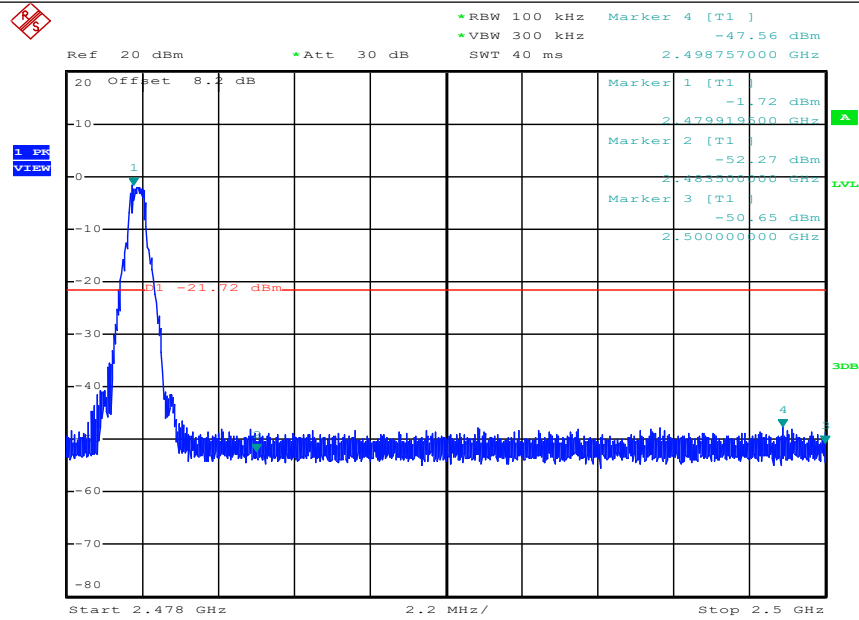
Date: 10.SEP.2019 19:12:32

GFSK/LCH/Hop



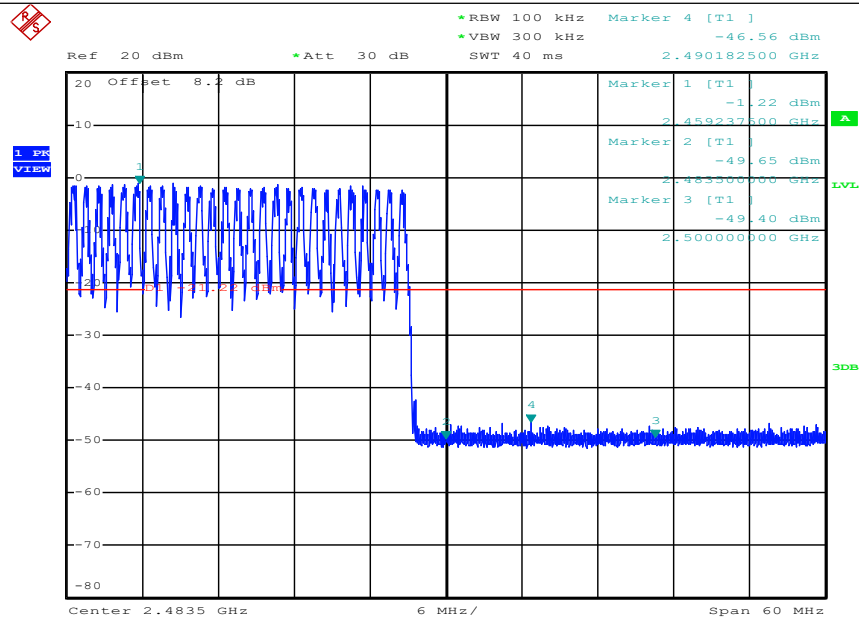
Date: 10.SEP.2019 19:33:53

GFSK/HCH/No Hop



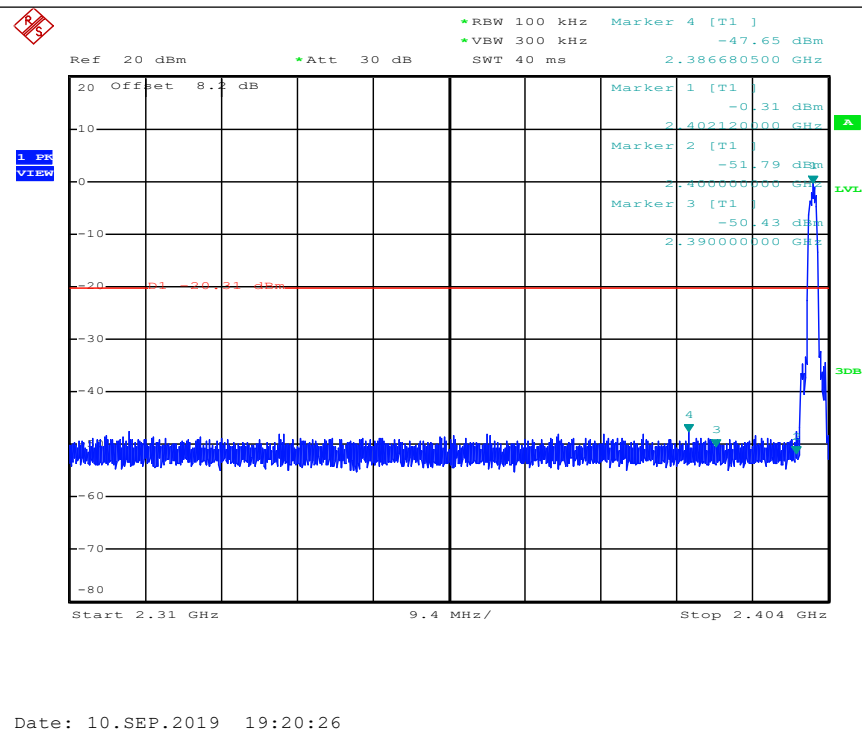
Date: 10.SEP.2019 19:17:23

GFSK/HCH/Hop

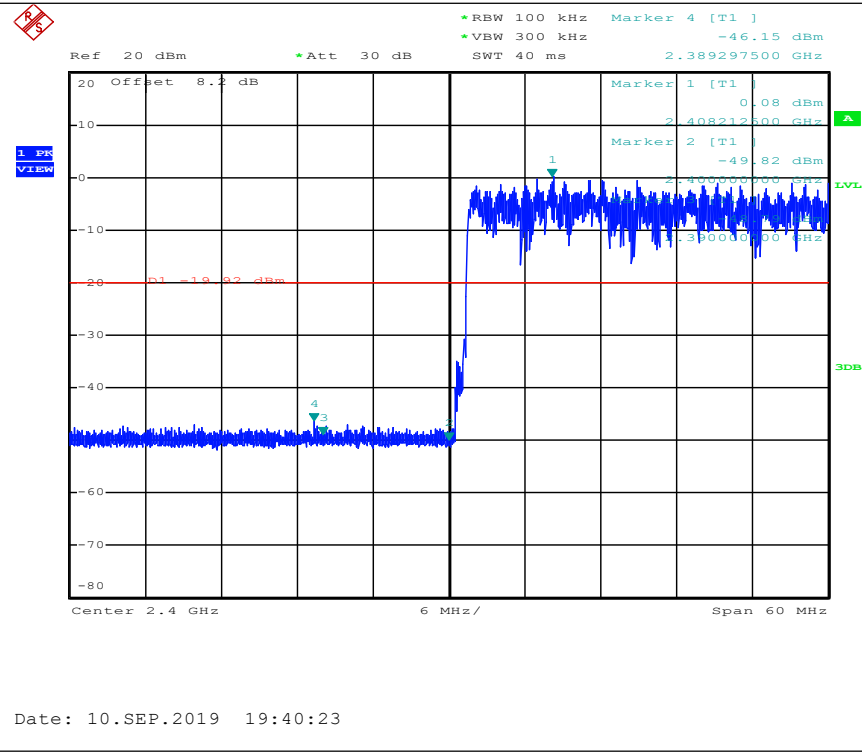


Date: 10.SEP.2019 19:36:15

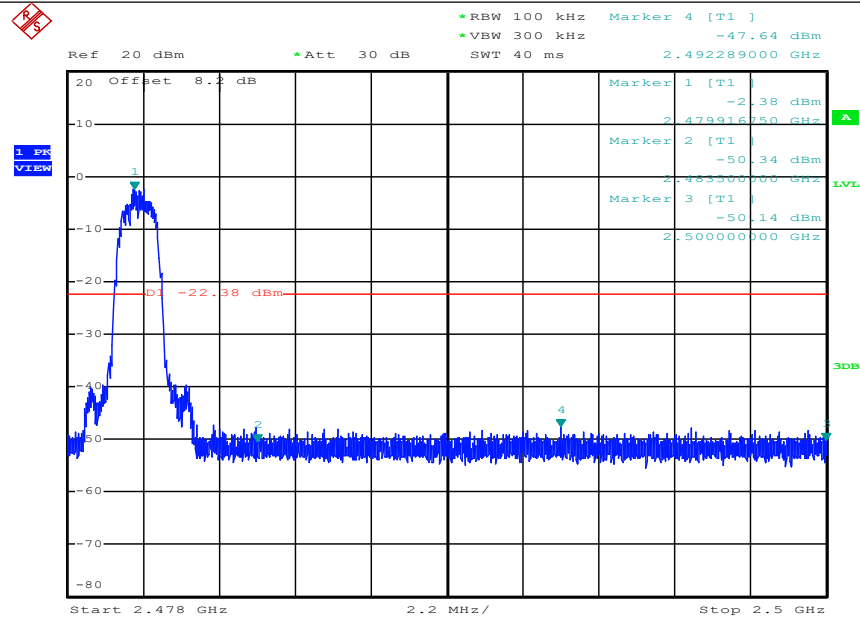
$\pi/4$ DQPSK/LCH/No
Hop



$\pi/4$ DQPSK/LCH/Hop

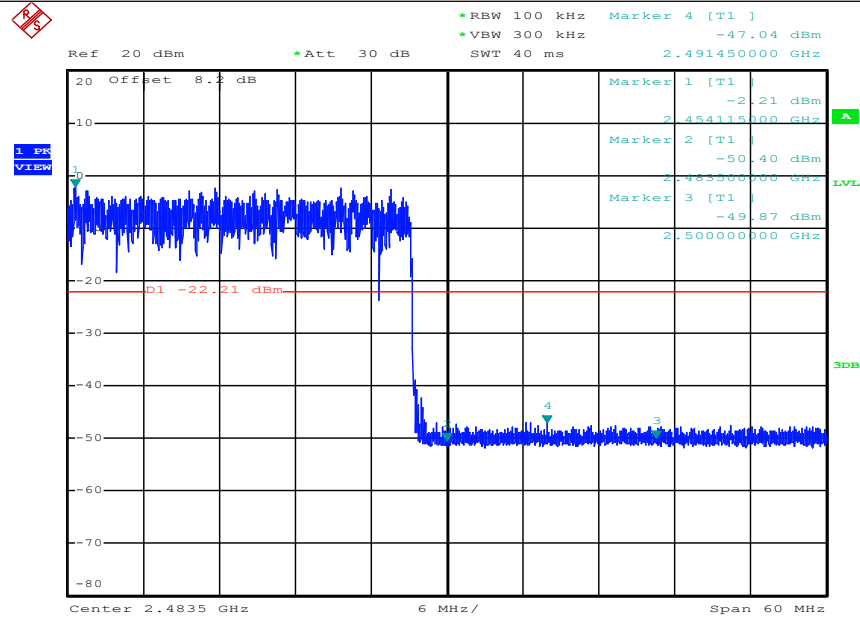


π /4DQPSK/HCH/No Hop



Date: 10.SEP.2019 19:26:51

π /4DQPSK/HCH/Hop

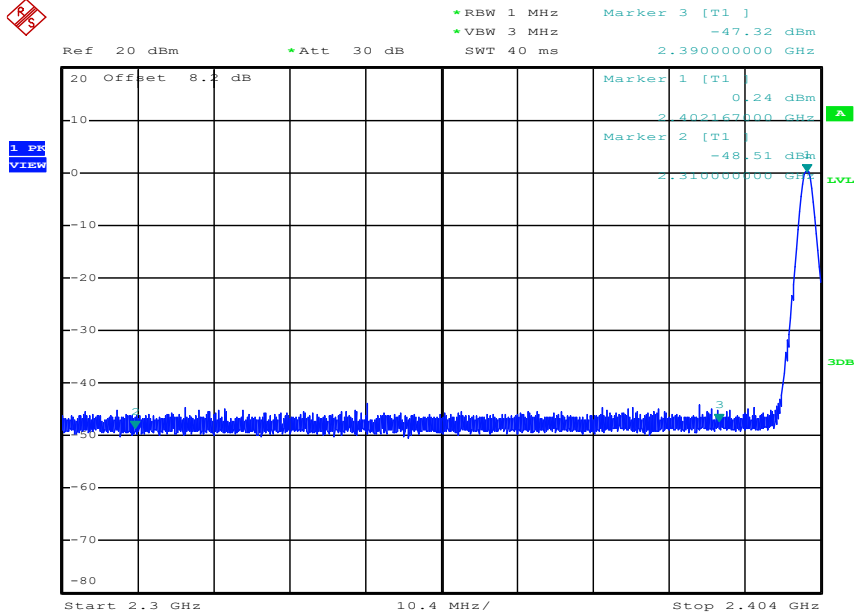


Date: 10.SEP.2019 19:42:28

A.8 Restrict-band band-edge measurements

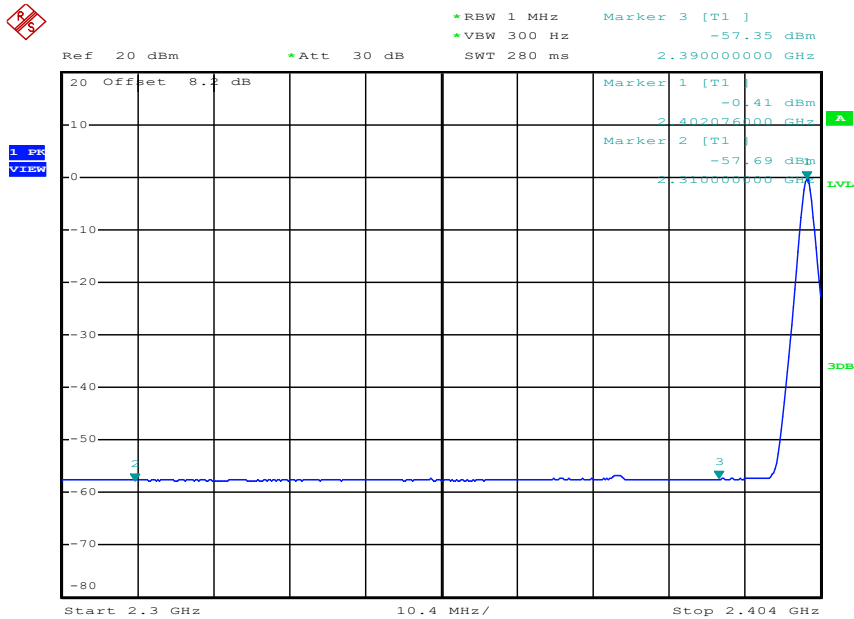
Test Mode	Hopping	Freq.	Power [dBm]	Gain	Ground Factor	E [dBuV/m]	Detector	Limit [dBuV/m]	Verdict
GFSK	Off	2310.0	-48.51	2.0	0	46.75	PEAK	74	PASS
	Off	2310.0	-57.69	2.0	0	37.57	AV	54	PASS
	Off	2390.0	-47.32	2.0	0	47.94	PEAK	74	PASS
	Off	2390.0	-57.35	2.0	0	37.91	AV	54	PASS
	Off	2483.5	-40.02	2.0	0	55.24	PEAK	74	PASS
	Off	2483.5	-44.03	2.0	0	51.23	AV	54	PASS
	Off	2500.0	-48.04	2.0	0	47.22	PEAK	74	PASS
	Off	2500.0	-58.11	2.0	0	37.15	AV	54	PASS
$\pi/4$ DQPSK	Off	2310.0	-47.98	2.0	0	47.28	PEAK	74	PASS
	Off	2310.0	-57.62	2.0	0	37.64	AV	54	PASS
	Off	2390.0	-48.11	2.0	0	47.15	PEAK	74	PASS
	Off	2390.0	-57.39	2.0	0	37.87	AV	54	PASS
	Off	2483.5	-37.85	2.0	0	57.41	PEAK	74	PASS
	Off	2483.5	-43.96	2.0	0	51.30	AV	54	PASS
	Off	2500.0	-48.20	2.0	0	47.06	PEAK	74	PASS
	Off	2500.0	-58.00	2.0	0	37.26	AV	54	PASS

Restrict-band band-edge measurements_Hopping Off_GFSK_PEAK (Low Channel)



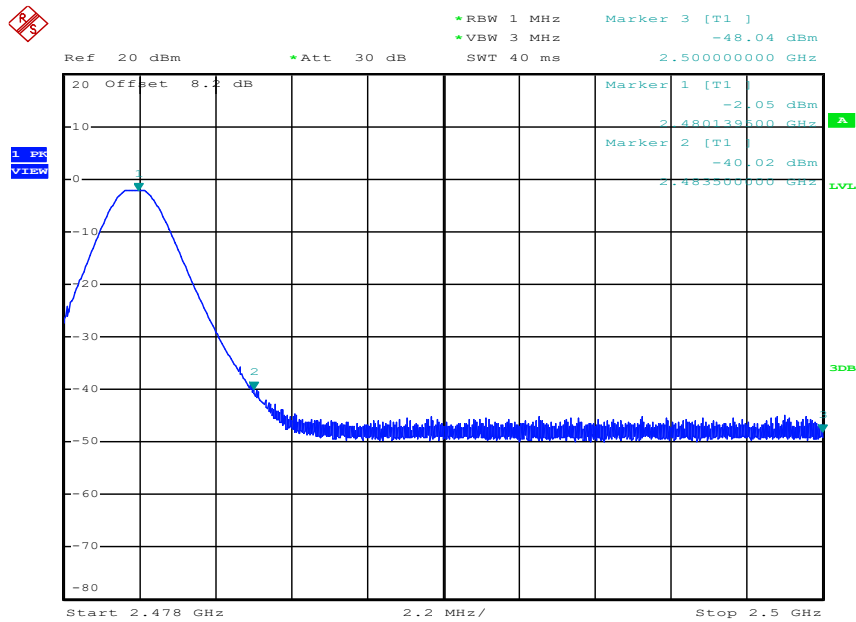
Date: 10.SEP.2019 19:13:18

Restrict-band band-edge measurements_Hopping Off_GFSK_Average (Low Channel)



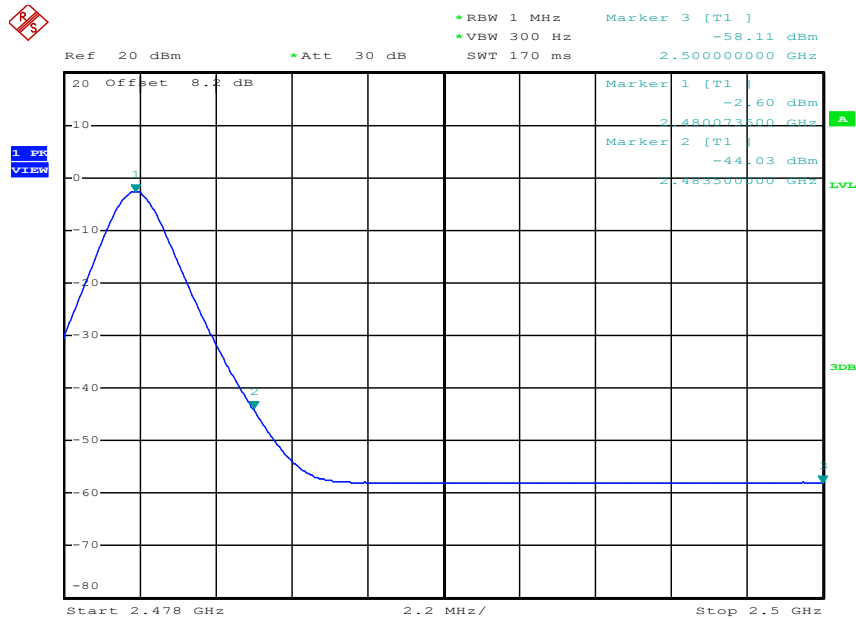
Date: 10.SEP.2019 19:13:31

Restrict-band band-edge measurements_Hopping Off_GFSK_PEAK (High Channel)



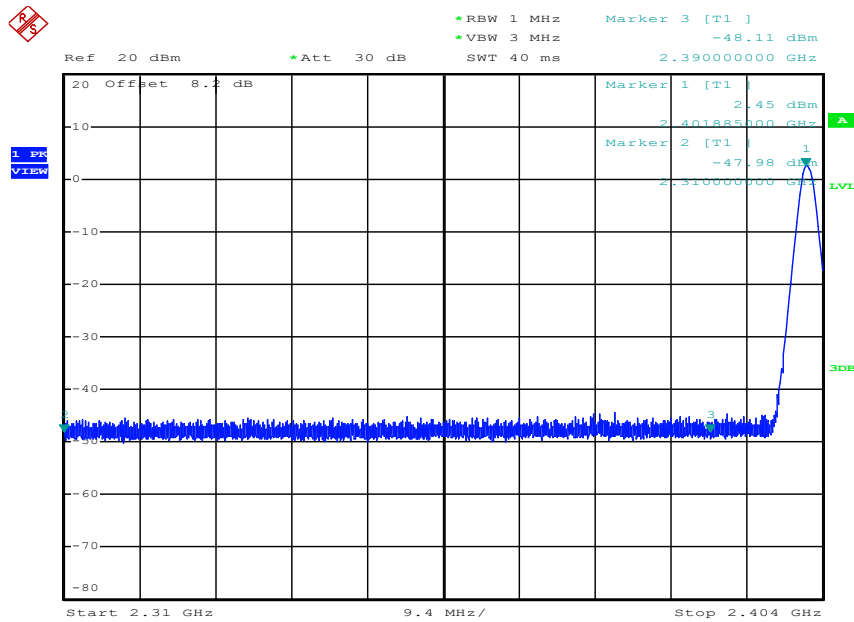
Date: 10.SEP.2019 19:18:09

Restrict-band band-edge measurements_Hopping Off_GFSK_Average (High Channel)



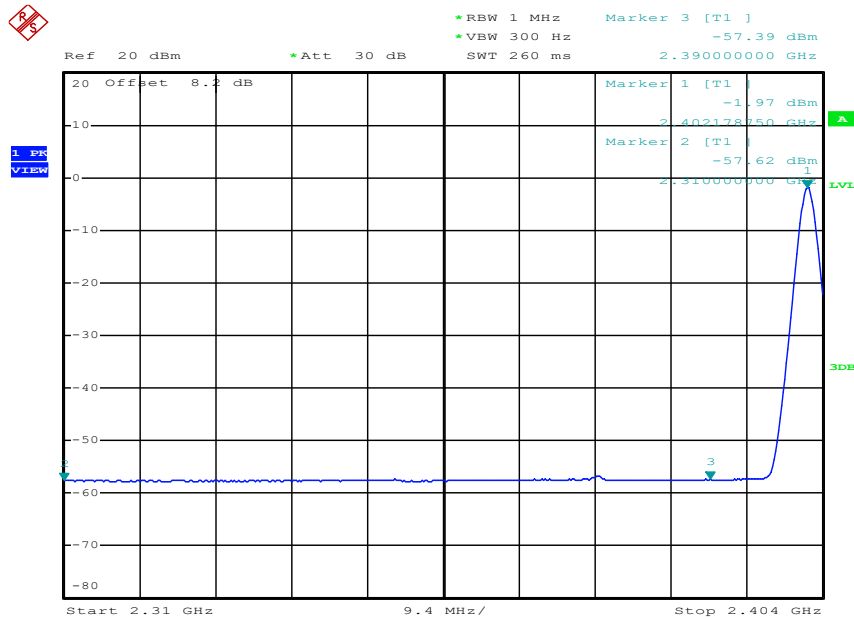
Date: 10.SEP.2019 19:18:22

Restrict-band band-edge measurements_Hopping Off $\pi/4$ -DQPSK_PEAK (Low Channel)



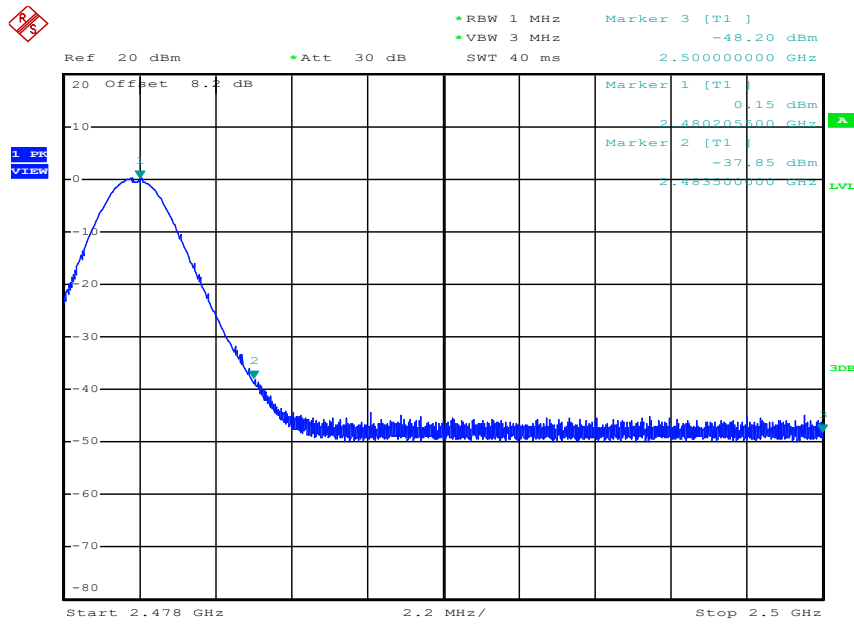
Date: 10.SEP.2019 19:21:11

Restrict-band band-edge measurements_Hopping Off $\pi/4$ -DQPSK_Average (Low Channel)



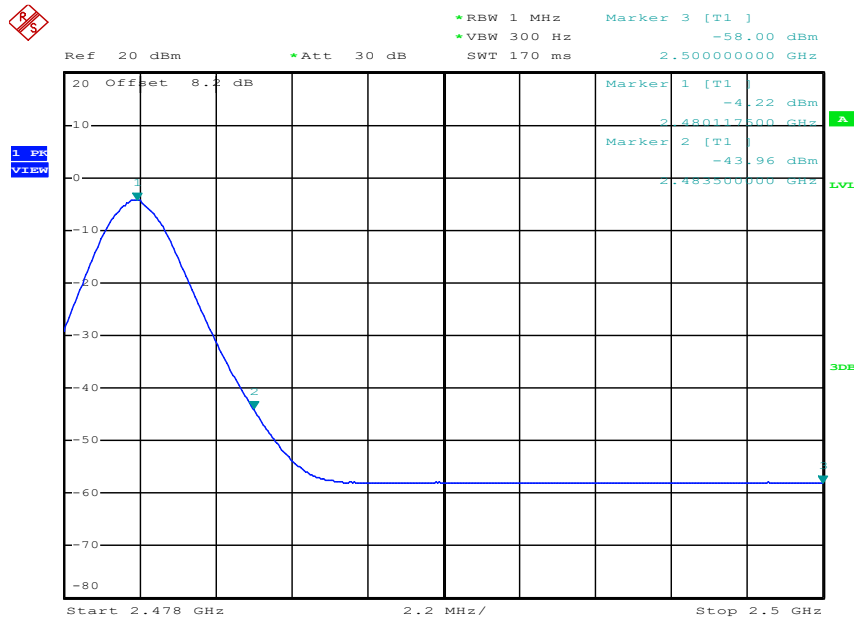
Date: 10.SEP.2019 19:21:24

Restrict-band band-edge measurements_Hopping Off $\pi/4$ -DQPSK_PEAK (High Channel)



Date: 10.SEP.2019 19:27:37

Restrict-band band-edge measurements_Hopping Off $\pi/4$ -DQPSK_Average (High Channel)



Date: 10.SEP.2019 19:27:50