Appendix D: Test Results of Band 12 for NB-IoT operation

Appendix D.1: RF Power Output and Effective (Isotropic) Radiated Power Output Data for NB

Test Result

Band	OpMode	Bandwidth	Modulation	Channel	Tones	SCS	Result	ERP		Limit (watts)	Verdict
							dBm	dBm	Watts		
Band12	Stand-Alone	NaN	QPSK	23011	3@3	15kHz	7.25	7.24	0.005	3	PASS
Band12	Stand-Alone	NaN	QPSK	23011	1@0	15kHz	7.53	7.52	0.006	3	PASS
Band12	Stand-Alone	NaN	QPSK	23011	1@0	3.75kHz	7.81	7.8	0.006	3	PASS
Band12	Stand-Alone	NaN	QPSK	23011	1@47	3.75kHz	7.82	7.81	0.006	3	PASS
Band12	Stand-Alone	NaN	QPSK	23011	1@11	15kHz	7.47	7.46	0.006	3	PASS
Band12	Stand-Alone	NaN	QPSK	23095	3@3	15kHz	21.04	21.03	0.127	3	PASS
Band12	Stand-Alone	NaN	QPSK	23095	1@11	15kHz	20.98	20.97	0.125	3	PASS
Band12	Stand-Alone	NaN	QPSK	23095	1@0	15kHz	21.04	21.03	0.127	3	PASS
Band12	Stand-Alone	NaN	QPSK	23095	1@0	3.75kHz	20.65	20.64	0.116	3	PASS
Band12	Stand-Alone	NaN	QPSK	23095	1@47	3.75kHz	20.59	20.58	0.114	3	PASS
Band12	Stand-Alone	NaN	QPSK	23179	1@0	15kHz	7.07	7.06	0.005	3	PASS
Band12	Stand-Alone	NaN	QPSK	23179	3@3	15kHz	7.35	7.34	0.005	3	PASS
Band12	Stand-Alone	NaN	QPSK	23179	1@11	15kHz	6.9	6.89	0.005	3	PASS
Band12	Stand-Alone	NaN	QPSK	23179	1@47	3.75kHz	7.61	7.6	0.006	3	PASS
Band12	Stand-Alone	NaN	QPSK	23179	1@0	3.75kHz	7.53	7.52	0.006	3	PASS
Band12	Stand-Alone	NaN	BPSK	23011	1@0	15kHz	7.4	7.39	0.005	3	PASS
Band12	Stand-Alone	NaN	BPSK	23011	1@11	15kHz	7.37	7.36	0.005	3	PASS
Band12	Stand-Alone	NaN	BPSK	23011	1@0	3.75kHz	7.78	7.77	0.006	3	PASS
Band12	Stand-Alone	NaN	BPSK	23011	1@47	3.75kHz	7.71	7.7	0.006	3	PASS
Band12	Stand-Alone	NaN	BPSK	23011	3@3	15kHz	7.53	7.52	0.006	3	PASS
Band12	Stand-Alone	NaN	BPSK	23095	1@47	3.75kHz	20.61	20.6	0.115	3	PASS
Band12	Stand-Alone	NaN	BPSK	23095	1@0	15kHz	20.96	20.95	0.124	3	PASS
Band12	Stand-Alone	NaN	BPSK	23095	1@11	15kHz	20.93	20.92	0.124	3	PASS
Band12	Stand-Alone	NaN	BPSK	23095	1@0	3.75kHz	20.58	20.57	0.114	3	PASS
Band12	Stand-Alone	NaN	BPSK	23095	3@3	15kHz	21.04	21.03	0.127	3	PASS
Band12	Stand-Alone	NaN	BPSK	23179	1@11	15kHz	6.89	6.88	0.005	3	PASS
Band12	Stand-Alone	NaN	BPSK	23179	1@0	15kHz	7.12	7.11	0.005	3	PASS
Band12	Stand-Alone	NaN	BPSK	23179	1@47	3.75kHz	7.51	7.5	0.006	3	PASS
Band12	Stand-Alone	NaN	BPSK	23179	1@0	3.75kHz	7.39	7.38	0.005	3	PASS
Band12	Stand-Alone	NaN	BPSK	23179	3@3	15kHz	7.05	7.04	0.005	3	PASS

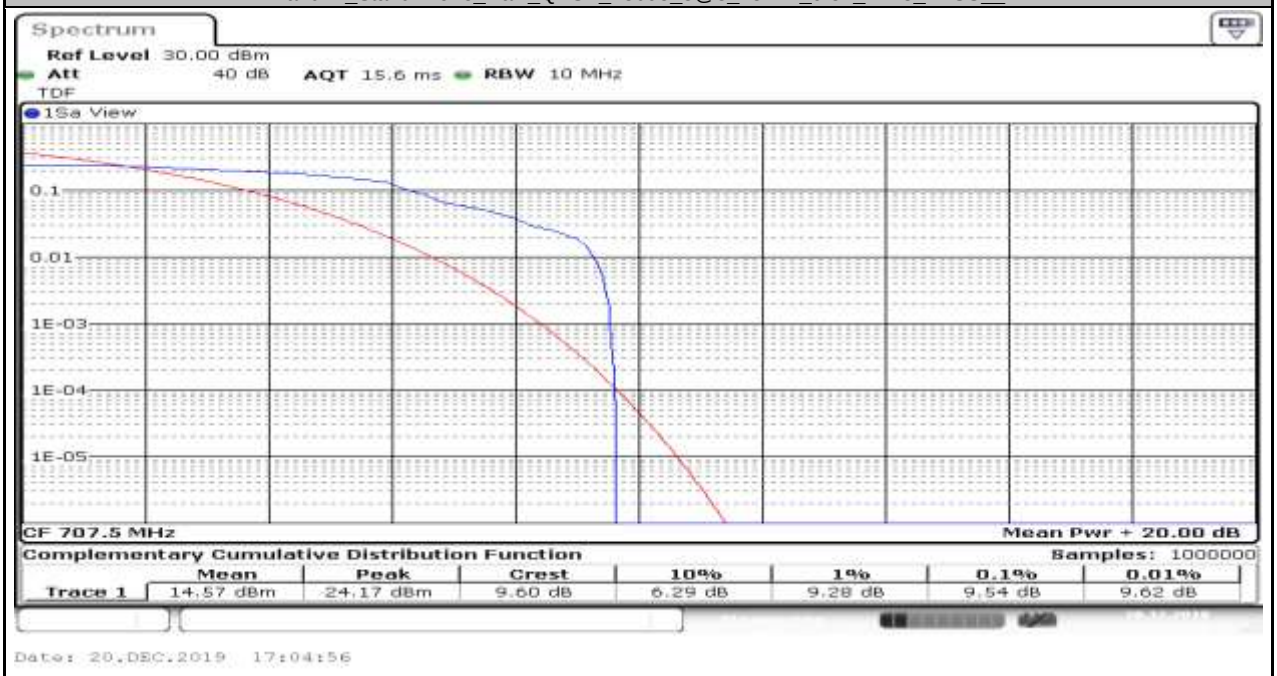
Appendix D.2: Peak-to-Average Ratio (CCDF) for NB

Test Result

Band	OpMode	Bandwidth	Modulation	Channel	Tones	SCS	Result (dB)	Limit (dB)	Verdict
Band12	Stand-Alone	NaN	QPSK	23095	3@3	15kHz	9.54	<=13	PASS
Band12	Stand-Alone	NaN	QPSK	23095	1@11	15kHz	8.46	<=13	PASS
Band12	Stand-Alone	NaN	QPSK	23095	1@0	15kHz	11.54	<=13	PASS
Band12	Stand-Alone	NaN	QPSK	23095	1@47	3.75kHz	4.96	<=13	PASS
Band12	Stand-Alone	NaN	QPSK	23095	1@0	3.75kHz	1.91	<=13	PASS
Band12	Stand-Alone	NaN	BPSK	23095	3@3	15kHz	9.97	<=13	PASS
Band12	Stand-Alone	NaN	BPSK	23095	1@11	15kHz	4.46	<=13	PASS
Band12	Stand-Alone	NaN	BPSK	23095	1@0	15kHz	8.55	<=13	PASS
Band12	Stand-Alone	NaN	BPSK	23095	1@47	3.75kHz	9.68	<=13	PASS
Band12	Stand-Alone	NaN	BPSK	23095	1@0	3.75kHz	8.43	<=13	PASS

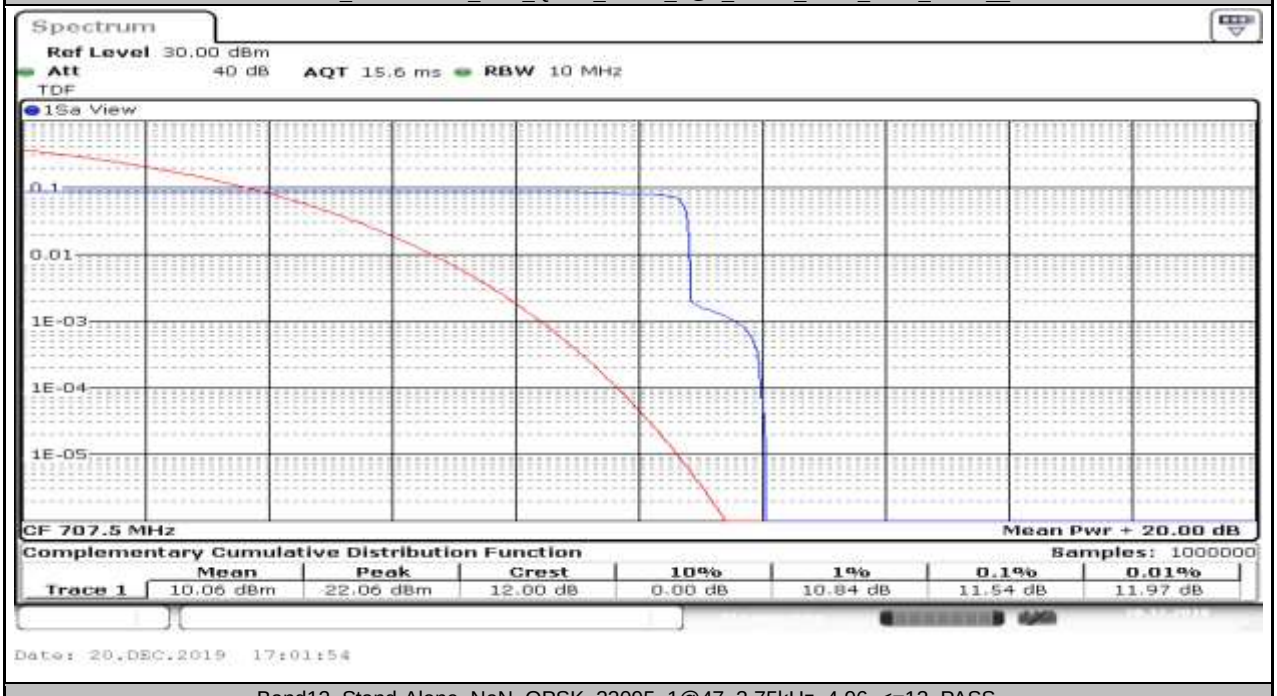
Test Graphs

Band12_Stand-Alone_NaN_QPSK_23095_3@3_15kHz_9.54_<=13_PASS__



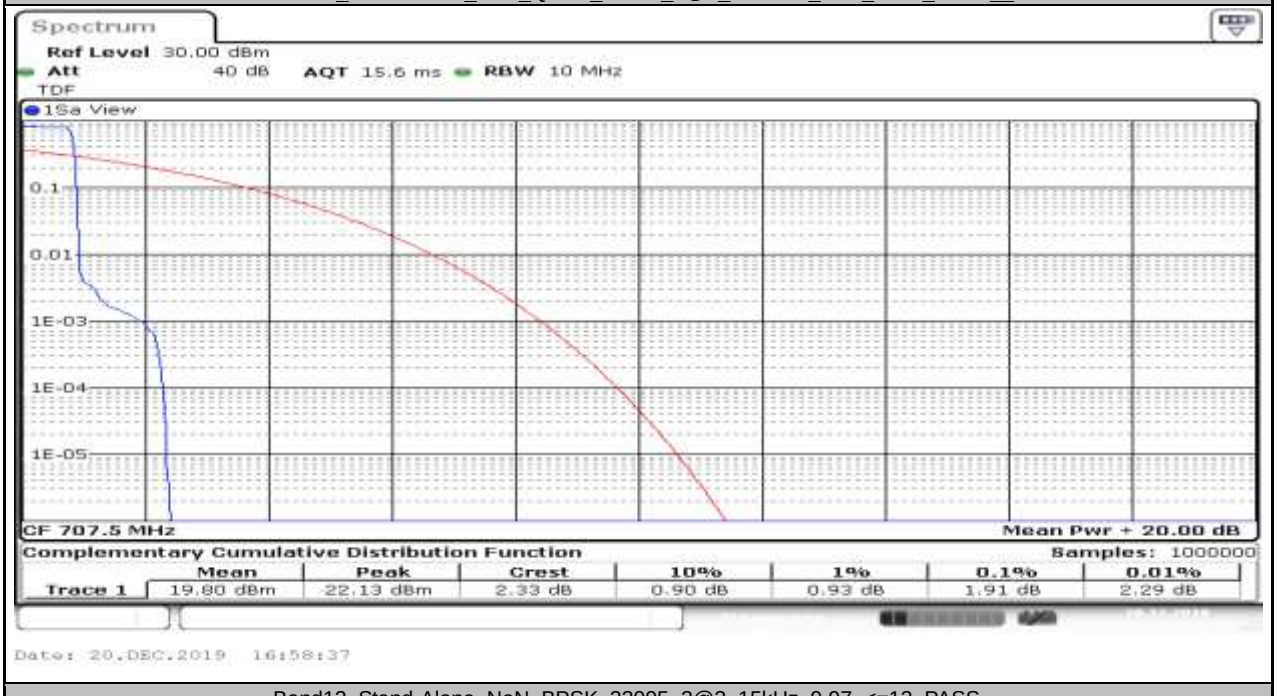
Band12_Stand-Alone_NaN_QPSK_23095_1@11_15kHz_8.46_<=13_PASS__

Band12_Stand-Alone_NaN_QPSK_23095_1@0_15kHz_11.54_<=13_PASS__

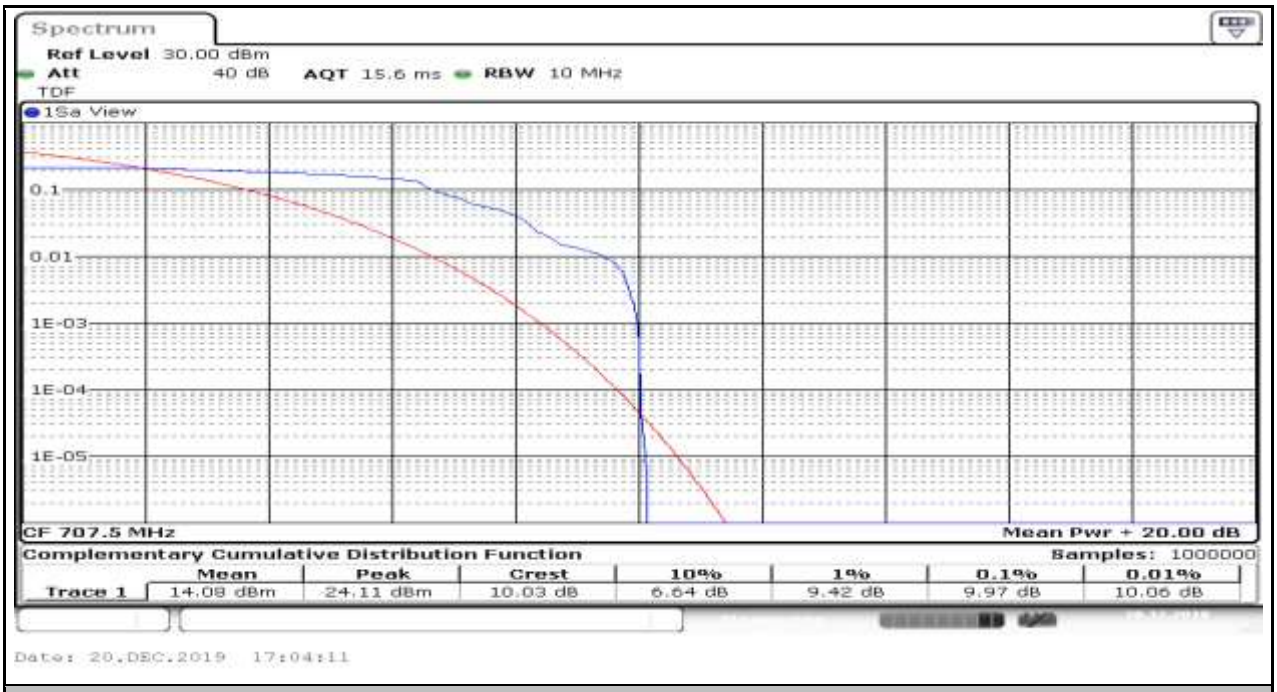


Band12_Stand-Alone_NaN_QPSK_23095_1@47_3.75kHz_4.96_<=13_PASS__

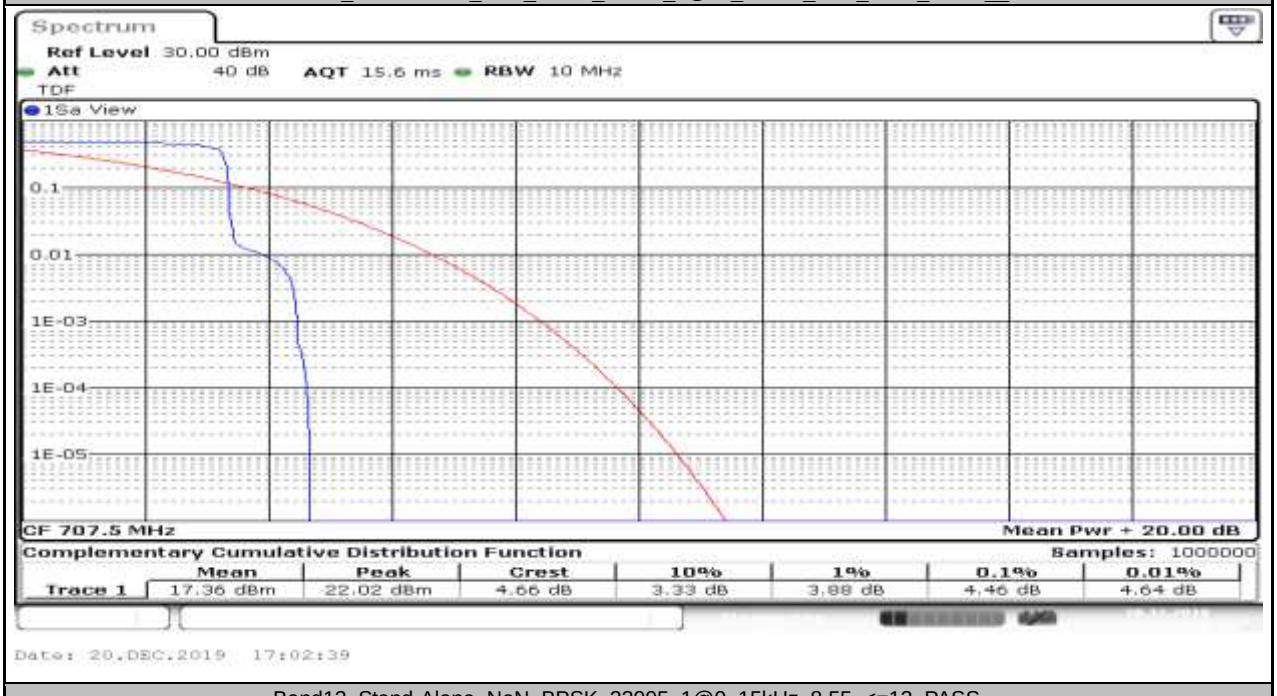
Band12_Stand-Alone_NaN_QPSK_23095_1@0_3.75kHz_1.91_<=13_PASS__



Band12_Stand-Alone_NaN_BPSK_23095_3@3_15kHz_9.97_<=13_PASS__

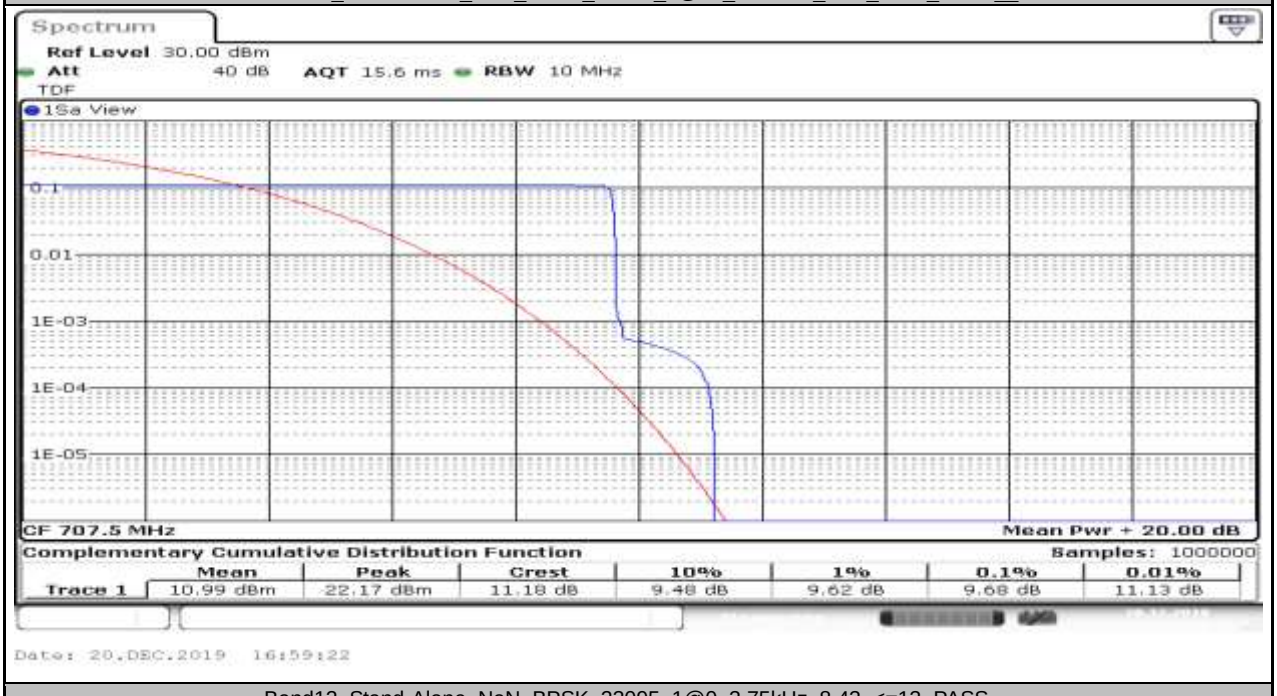


Band12_Stand-Alone_NaN_BPSK_23095_1@11_15kHz_4.46_<=13_PASS__



Band12_Stand-Alone_NaN_BPSK_23095_1@0_15kHz_8.55_<=13_PASS__

Band12_Stand-Alone_NaN_BPSK_23095_1@47_3.75kHz_9.68_<=13_PASS__



Band12_Stand-Alone_NaN_BPSK_23095_1@0_3.75kHz_8.43_<=13_PASS__


Spectrum
Ref Level 30.00 dBm
Att 40 dB
AQT 15.6 ms
RBW 10 MHz
TDF
1Sa View
0.1
0.01
1E-03
1E-04
1E-05
CF 707.5 MHz
Mean Pwr + 20.00 dB
Complementary Cumulative Distribution Function
Samples: 1000000
Mean
Peak
Crest
10%
1%
0.1%
0.01%
Trace 1
-34.67 dBm
-23.93 dBm
10.73 dB
3.68 dB
6.70 dB
8.43 dB
9.80 dB
Date: 20.DEC.2019 16:57:49

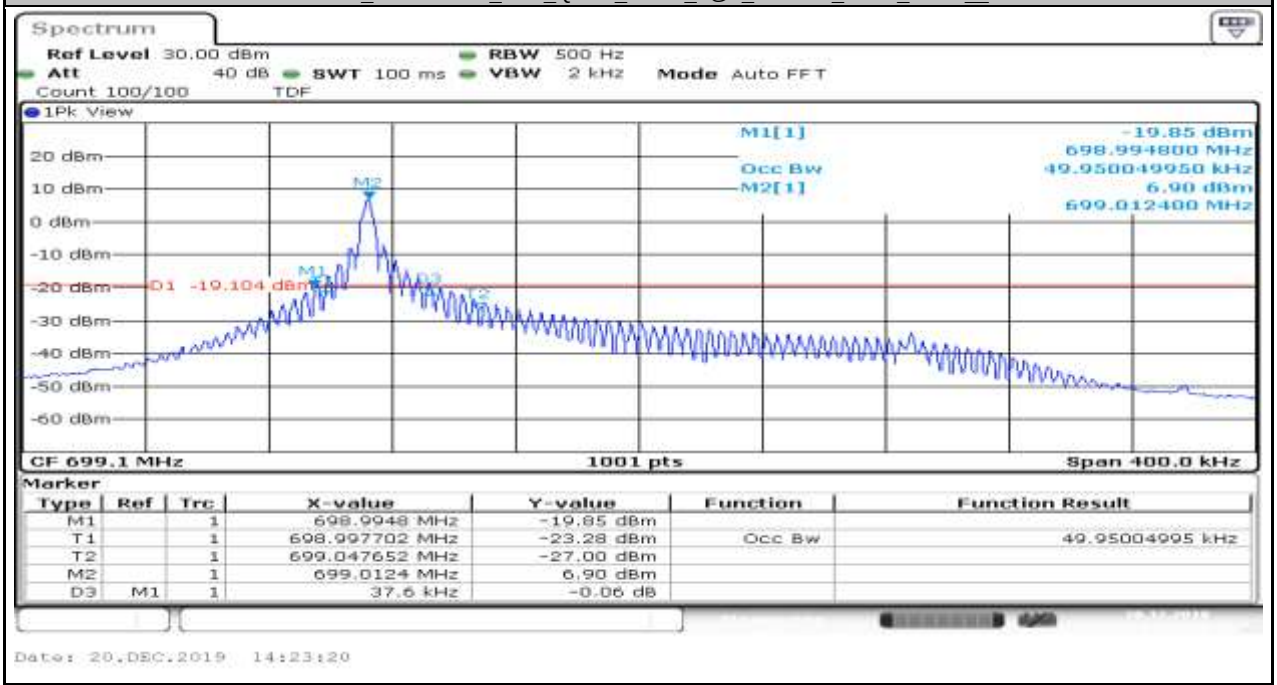
Appendix D.3: 26dB Emission Bandwidth and Occupied Bandwidth for NB

Test Result

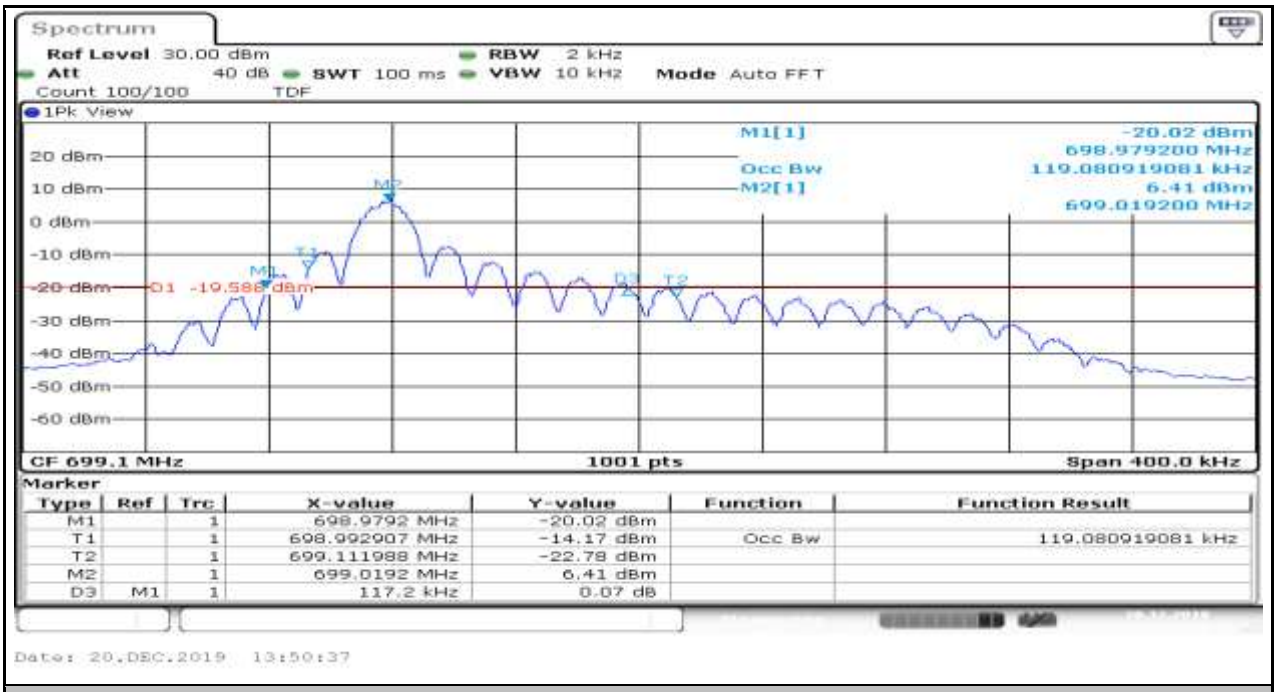
Band	OpMode	Bandwidth	Modulation	Channel	Tones	SCS	26dB Bandwidth (MHz)	Occupied Bandwidth (MHz)	Verdict
Band12	Stand-Alone	NaN	QPSK	23011	1@0	3.75kHz	0.038	0.050	PASS
Band12	Stand-Alone	NaN	QPSK	23011	1@0	15kHz	0.117	0.119	PASS
Band12	Stand-Alone	NaN	QPSK	23011	12@0	15kHz	0.251	0.184	PASS
Band12	Stand-Alone	NaN	QPSK	23095	1@0	3.75kHz	0.038	0.052	PASS
Band12	Stand-Alone	NaN	QPSK	23095	1@0	15kHz	0.117	0.120	PASS
Band12	Stand-Alone	NaN	QPSK	23095	12@0	15kHz	0.250	0.184	PASS
Band12	Stand-Alone	NaN	QPSK	23179	1@0	3.75kHz	0.038	0.050	PASS
Band12	Stand-Alone	NaN	QPSK	23179	1@0	15kHz	0.117	0.119	PASS
Band12	Stand-Alone	NaN	QPSK	23179	12@0	15kHz	0.251	0.184	PASS
Band12	Stand-Alone	NaN	BPSK	23011	1@0	3.75kHz	0.032	0.053	PASS
Band12	Stand-Alone	NaN	BPSK	23011	1@0	15kHz	0.104	0.127	PASS
Band12	Stand-Alone	NaN	BPSK	23095	1@0	3.75kHz	0.032	0.053	PASS
Band12	Stand-Alone	NaN	BPSK	23095	1@0	15kHz	0.106	0.126	PASS
Band12	Stand-Alone	NaN	BPSK	23179	1@0	3.75kHz	0.032	0.053	PASS
Band12	Stand-Alone	NaN	BPSK	23179	1@0	15kHz	0.104	0.127	PASS

Test Graphs

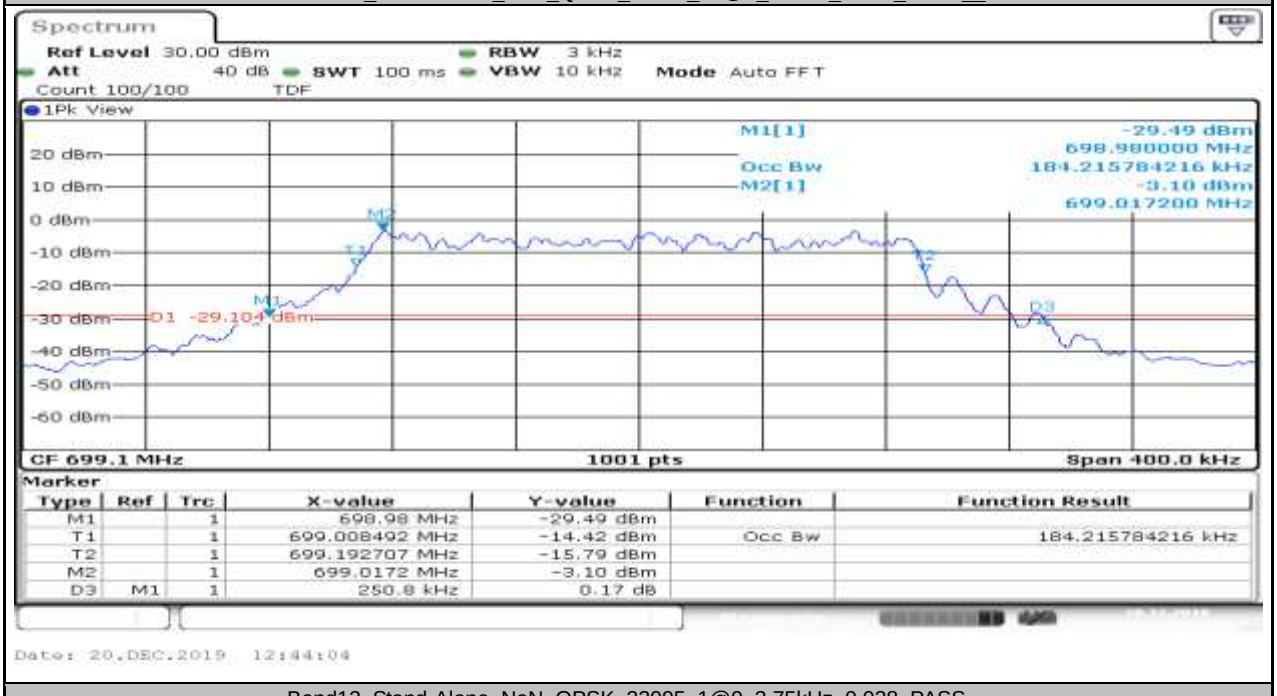
Band12_Stand-Alone_NaN_QPSK_23011_1@0_3.75kHz_0.038_PASS__



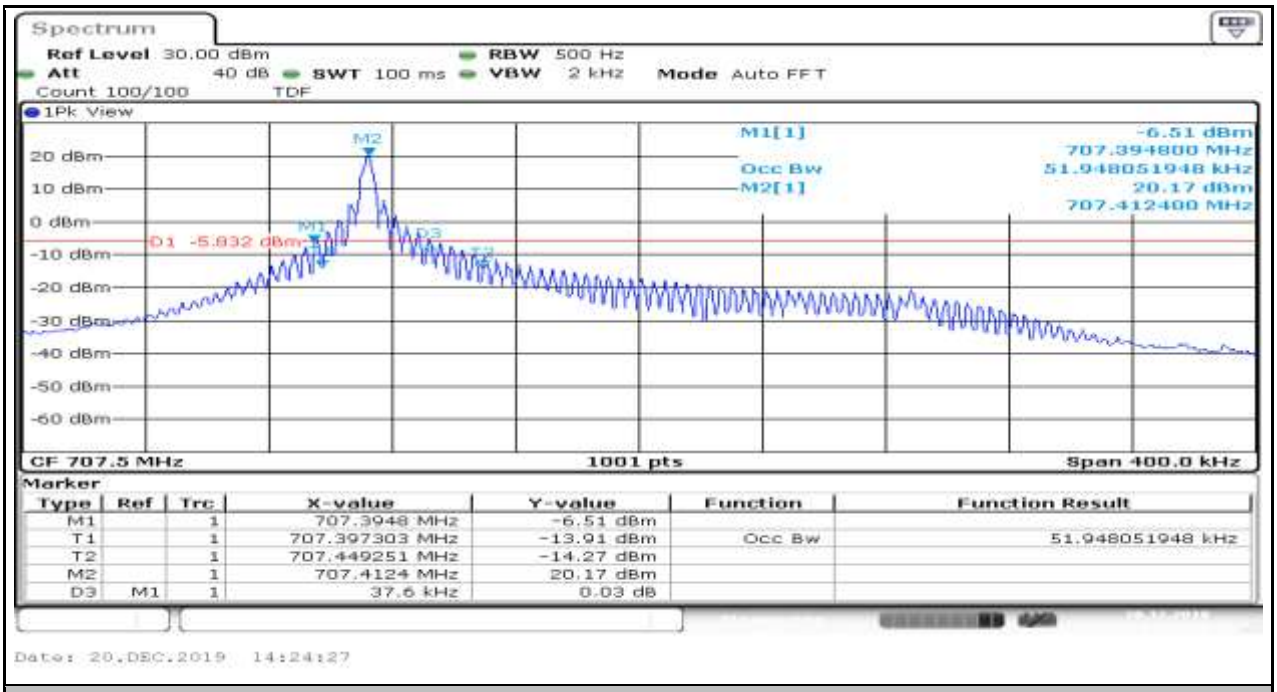
Band12_Stand-Alone_NaN_QPSK_23011_1@0_15kHz_0.117_PASS__



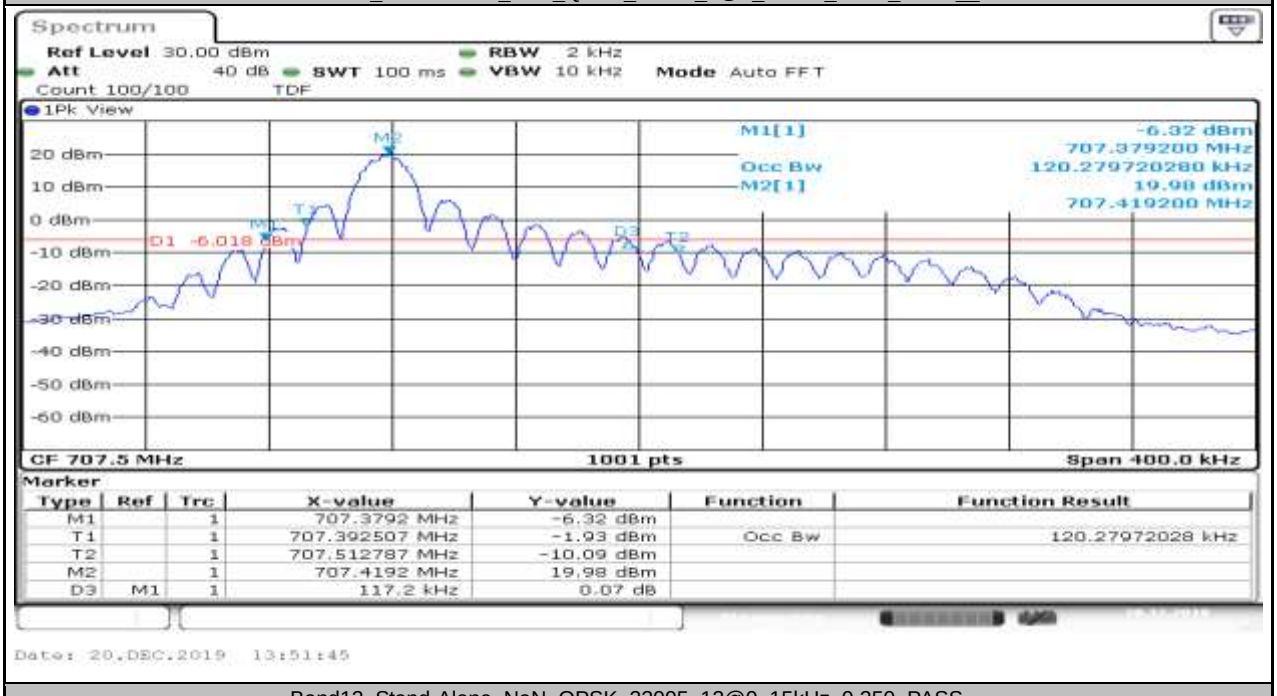
Band12_Stand-Alone_NaN_QPSK_23011_12@0_15kHz_0.251_PASS__



Band12_Stand-Alone_NaN_QPSK_23095_1@0_3.75kHz_0.038_PASS__

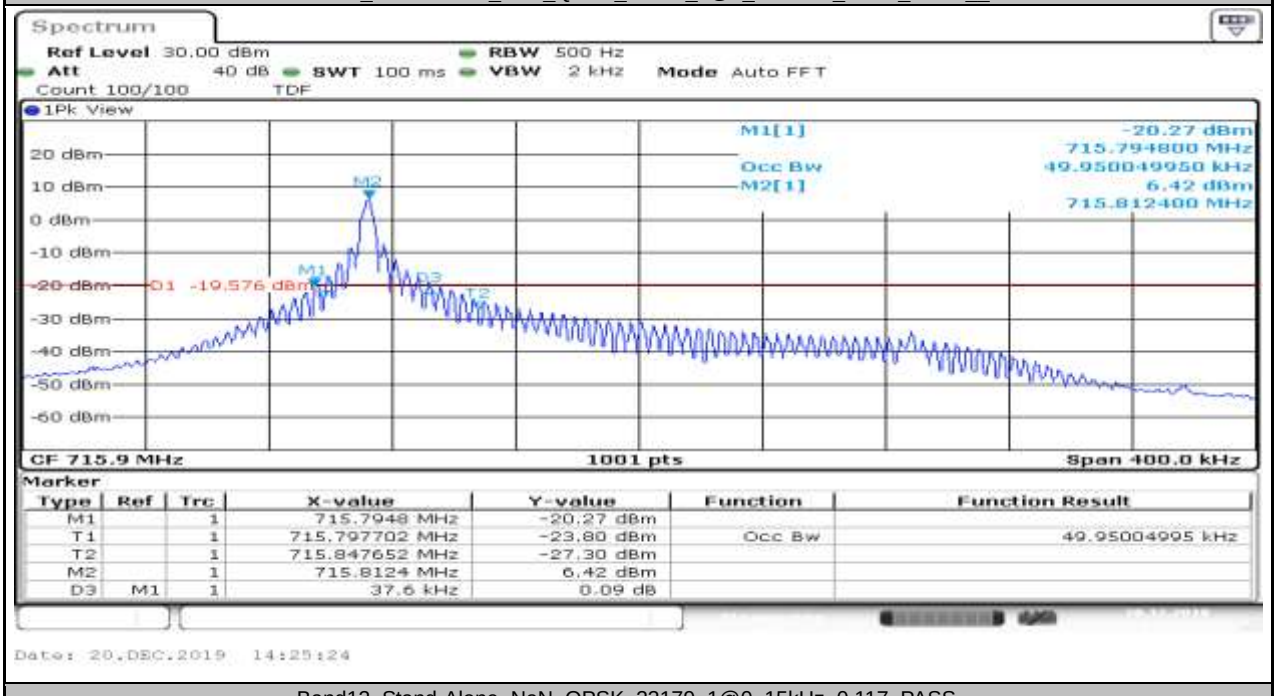


Band12_Stand-Alone_NaN_QPSK_23095_1@0_15kHz_0.117_PASS__

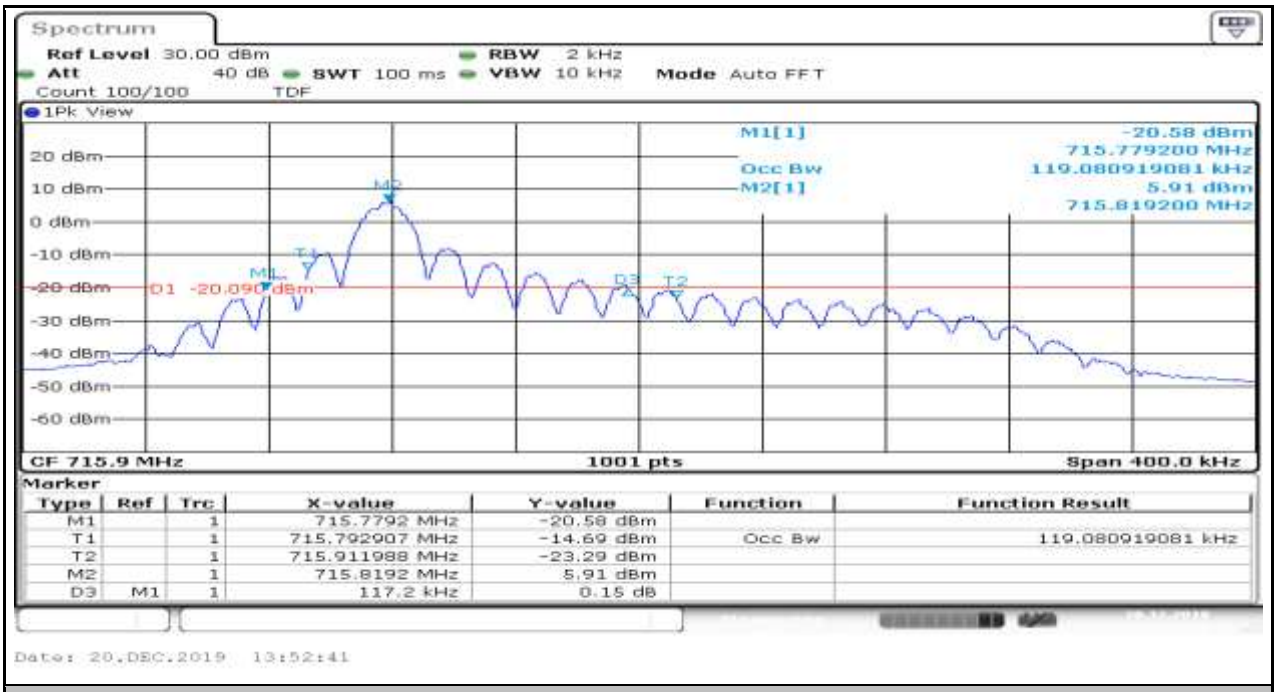


Band12_Stand-Alone_NaN_QPSK_23095_12@0_15kHz_0.250_PASS__

Band12_Stand-Alone_NaN_QPSK_23179_1@0_3.75kHz_0.038_PASS__

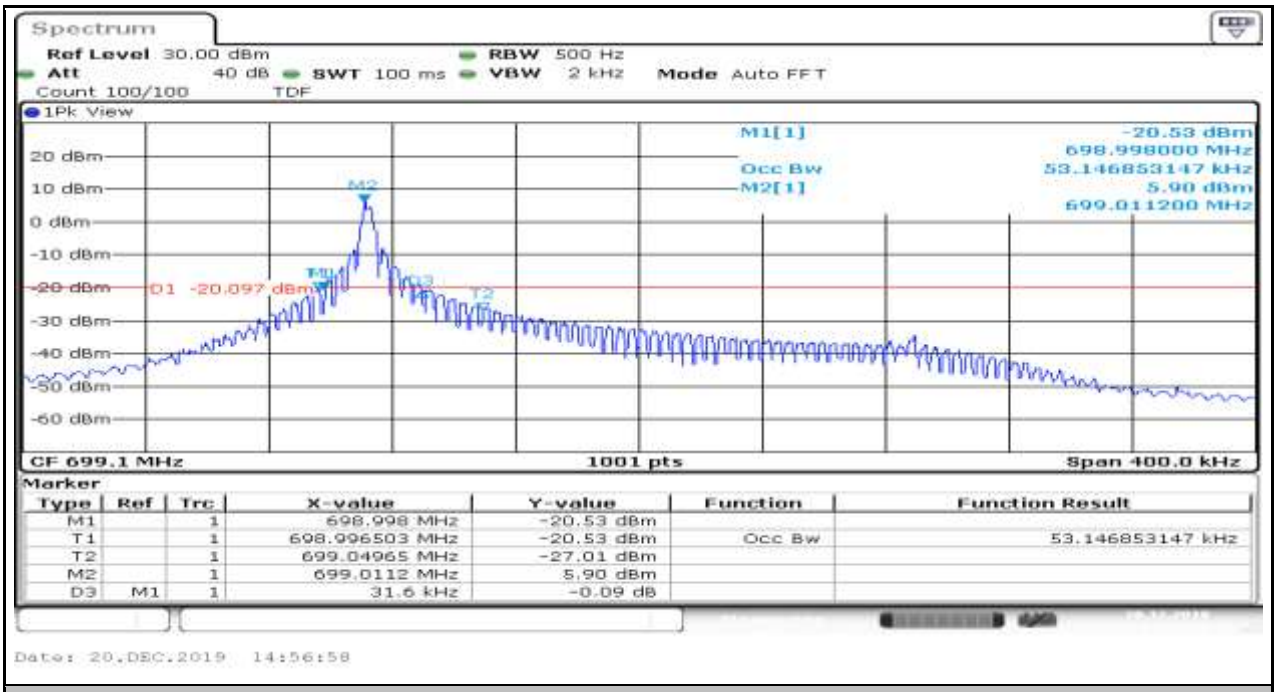


Band12_Stand-Alone_NaN_QPSK_23179_1@0_15kHz_0.117_PASS__

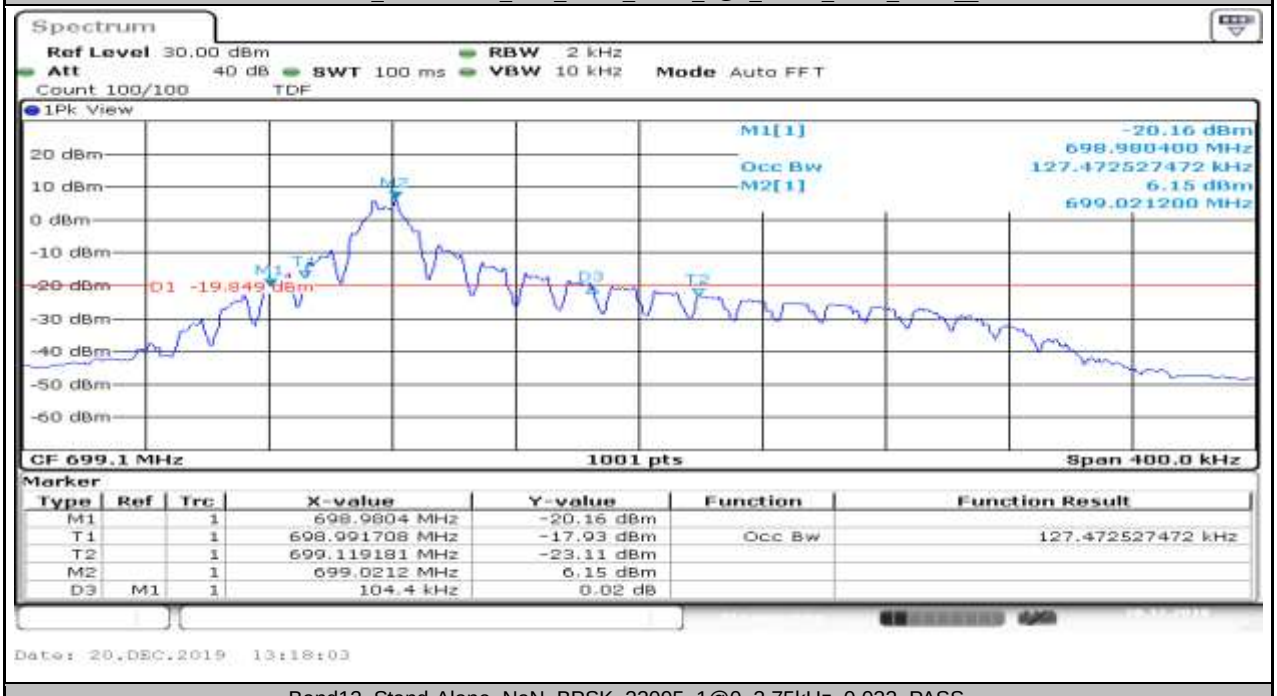


Band12_Stand-Alone_NaN_QPSK_23179_12@0_15kHz_0.251_PASS__

Band12_Stand-Alone_NaN_BPSK_23011_1@0_3.75kHz_0.032_PASS__

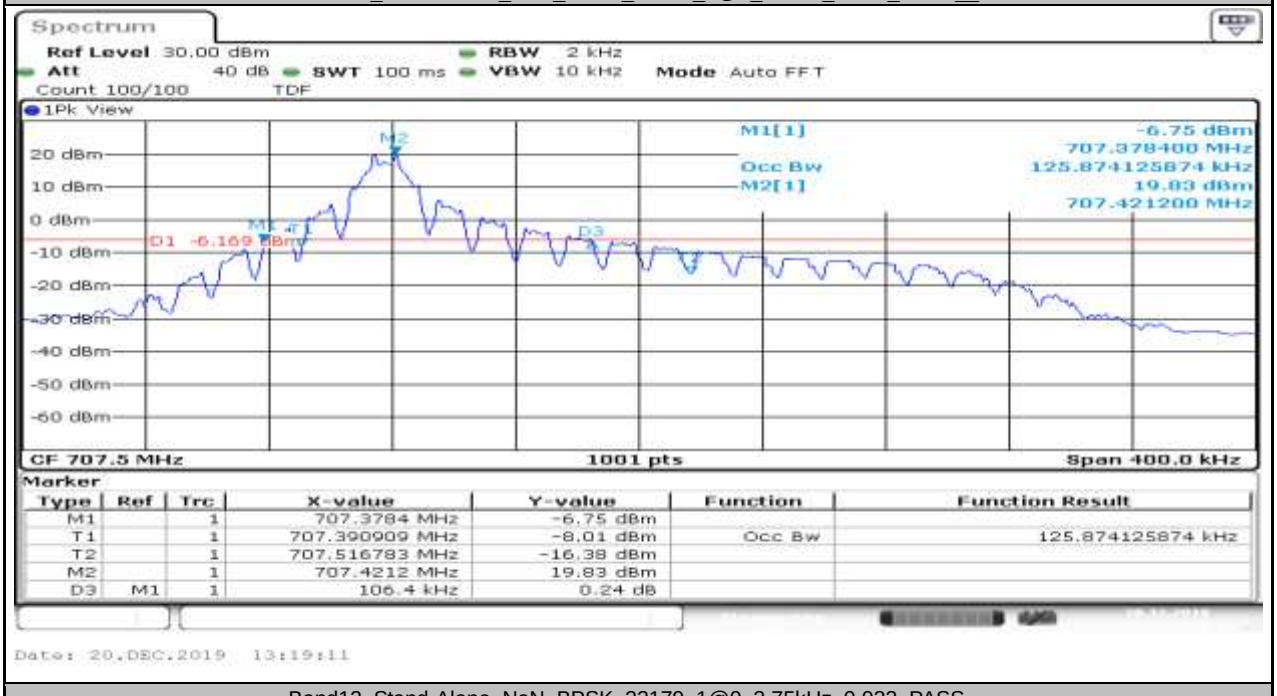


Band12_Stand-Alone_NaN_BPSK_23011_1@0_15kHz_0.104_PASS__

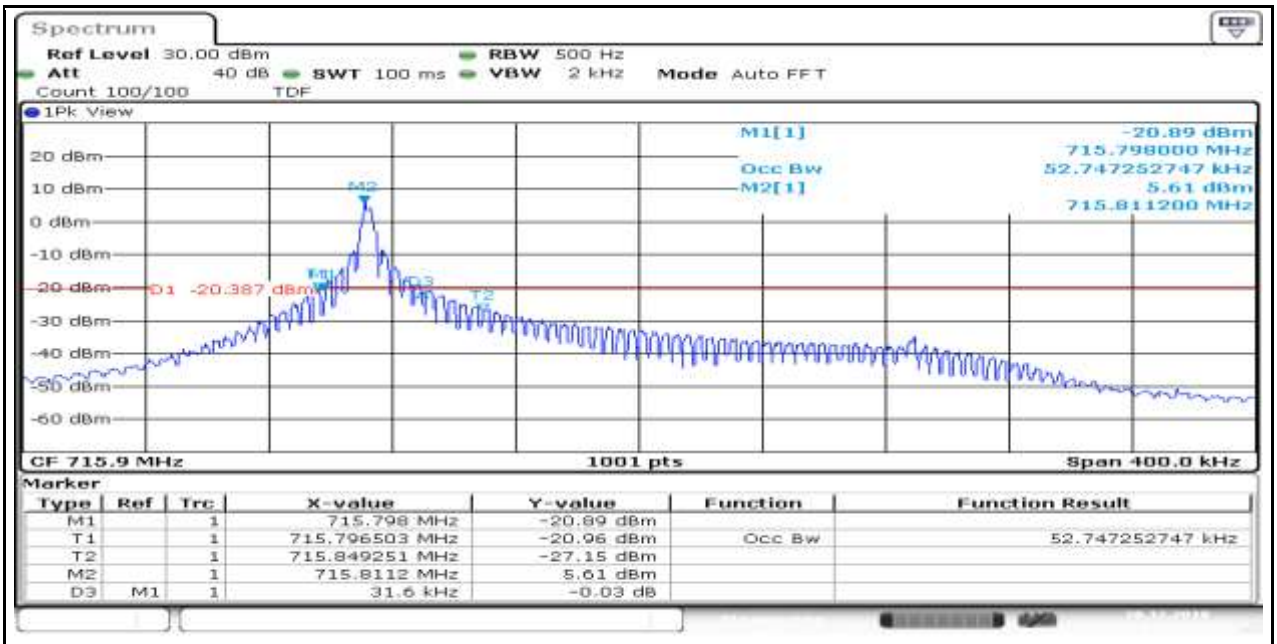


Band12_Stand-Alone_NaN_BPSK_23095_1@0_3.75kHz_0.032_PASS__

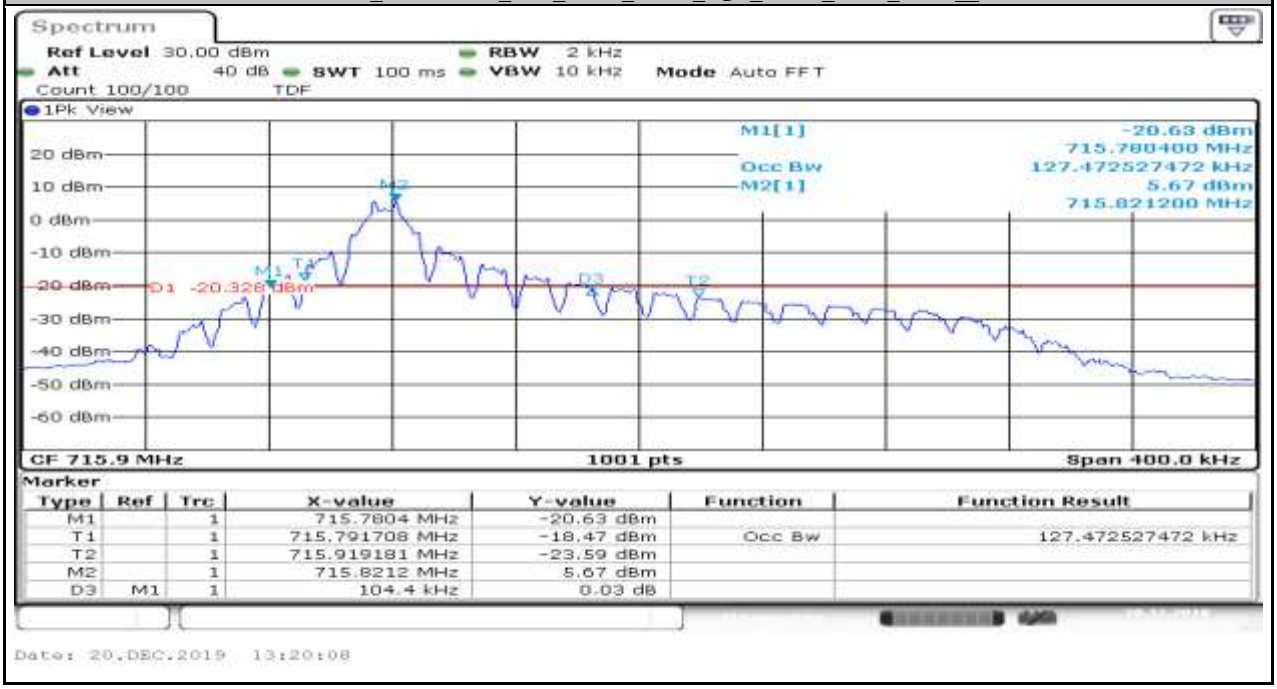
Band12_Stand-Alone_NaN_BPSK_23095_1@0_15kHz_0.106_PASS__



Band12_Stand-Alone_NaN_BPSK_23179_1@0_3.75kHz_0.032_PASS__



Band12_Stand-Alone_NaN_BPSK_23179_1@0_15kHz_0.104_PASS__



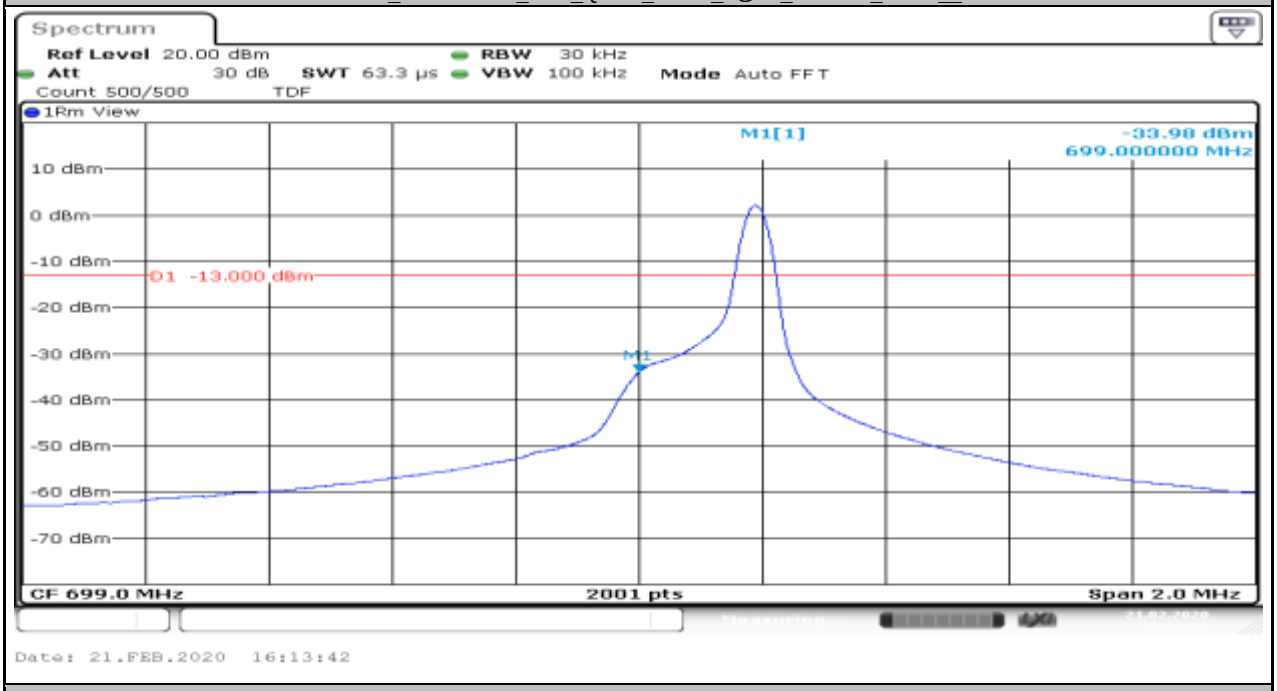
Appendix D.4: Band Edge for NB

Test Result

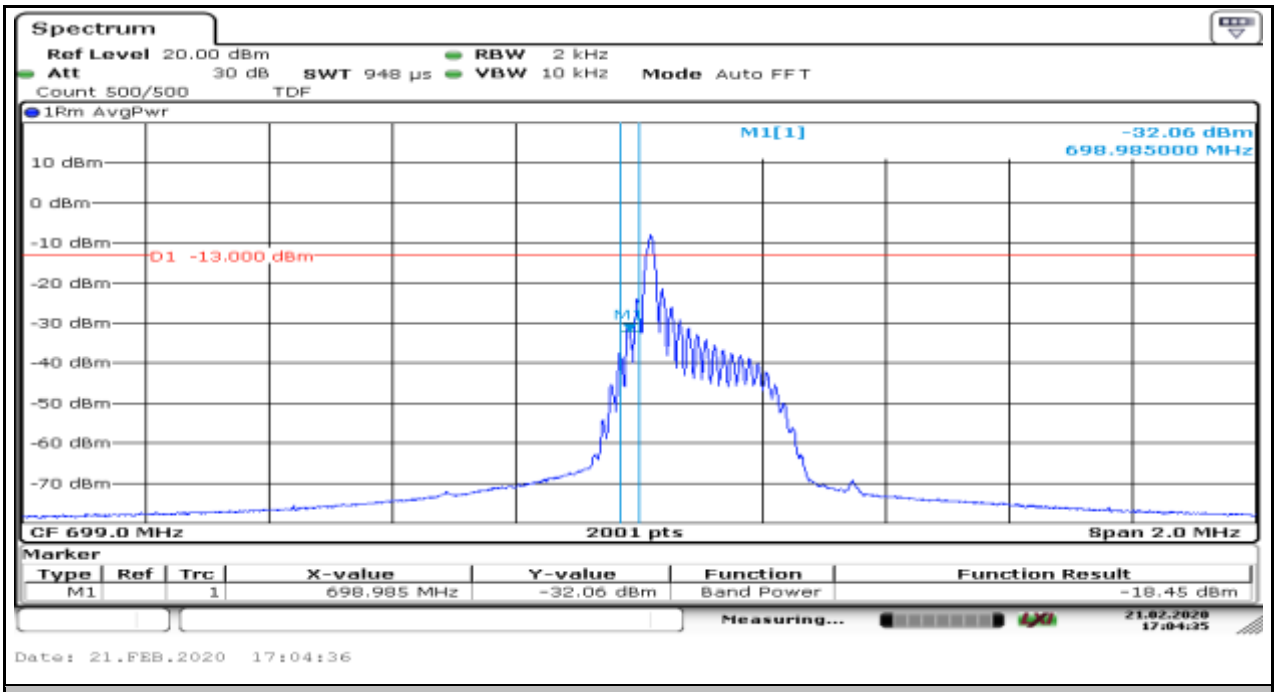
Band	OpMode	Bandwidth	Modulation	Channel	Tones	SCS	Result (dBm)	Verdict
Band12	Stand-Alone	NaN	QPSK	23011	1@47	3.75kHz	-33.98	PASS
Band12	Stand-Alone	NaN	QPSK	23011	1@0	15kHz	-18.45	PASS
Band12	Stand-Alone	NaN	QPSK	23011	1@11	15kHz	-31.20	PASS
Band12	Stand-Alone	NaN	QPSK	23011	12@0	15kHz	-23.85	PASS
Band12	Stand-Alone	NaN	QPSK	23011	1@0	3.75kHz	-19.36	PASS
Band12	Stand-Alone	NaN	QPSK	23179	12@0	15kHz	-20.19	PASS
Band12	Stand-Alone	NaN	QPSK	23179	1@0	3.75kHz	-31.61	PASS
Band12	Stand-Alone	NaN	QPSK	23179	1@47	3.75kHz	-20.05	PASS
Band12	Stand-Alone	NaN	QPSK	23179	1@11	15kHz	-19.28	PASS
Band12	Stand-Alone	NaN	QPSK	23179	1@0	15kHz	-28.52	PASS
Band12	Stand-Alone	NaN	BPSK	23011	1@0	3.75kHz	-18.04	PASS
Band12	Stand-Alone	NaN	BPSK	23011	1@47	3.75kHz	-32.98	PASS
Band12	Stand-Alone	NaN	BPSK	23011	1@0	15kHz	-16.65	PASS
Band12	Stand-Alone	NaN	BPSK	23011	1@11	15kHz	-29.73	PASS
Band12	Stand-Alone	NaN	BPSK	23179	1@11	15kHz	-17.55	PASS
Band12	Stand-Alone	NaN	BPSK	23179	1@0	3.75kHz	-30.94	PASS
Band12	Stand-Alone	NaN	BPSK	23179	1@47	3.75kHz	-18.81	PASS
Band12	Stand-Alone	NaN	BPSK	23179	1@0	15kHz	-26.71	PASS

Test Graphs

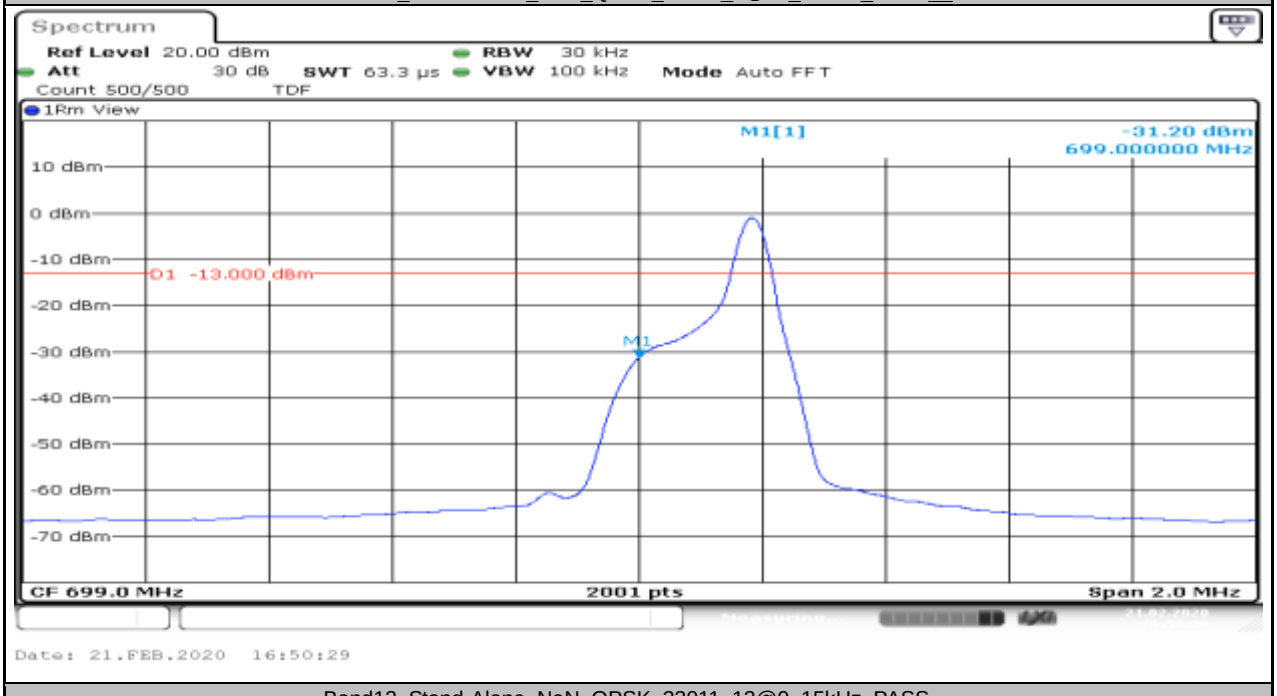
Band12_Stand-Alone_NaN_QPSK_23011_1@47_3.75kHz_PASS__



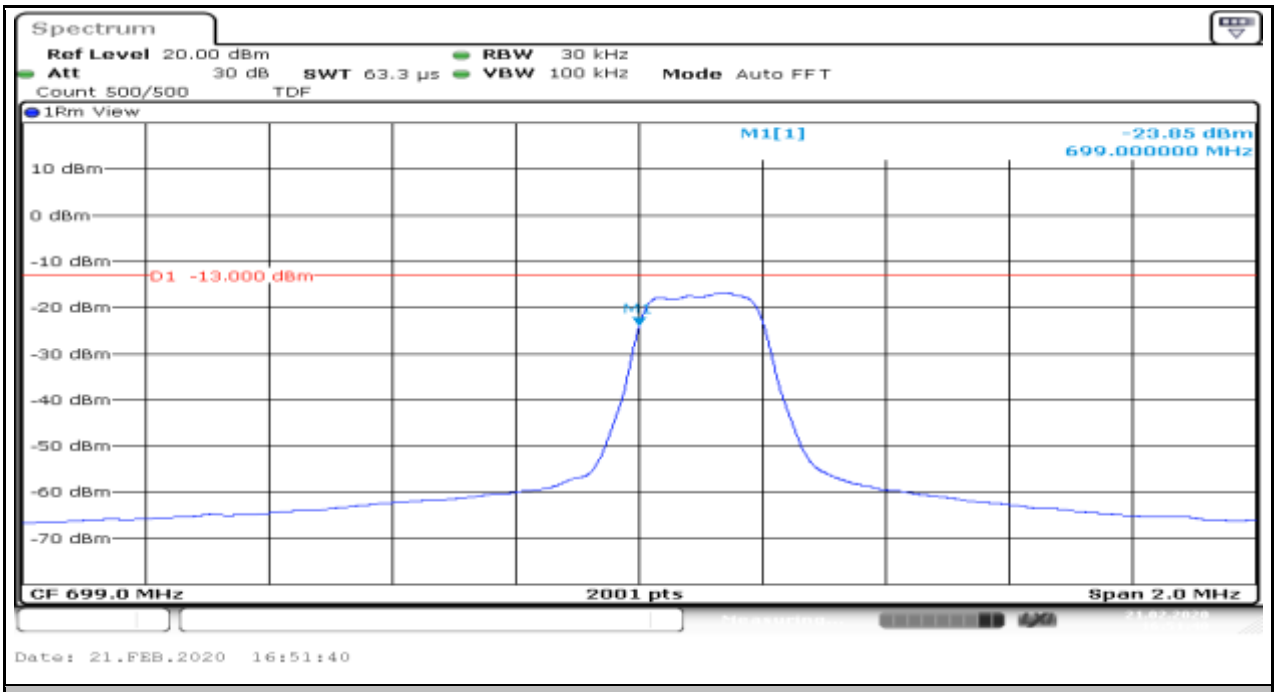
Band12_Stand-Alone_NaN_QPSK_23011_1@0_15kHz_PASS__



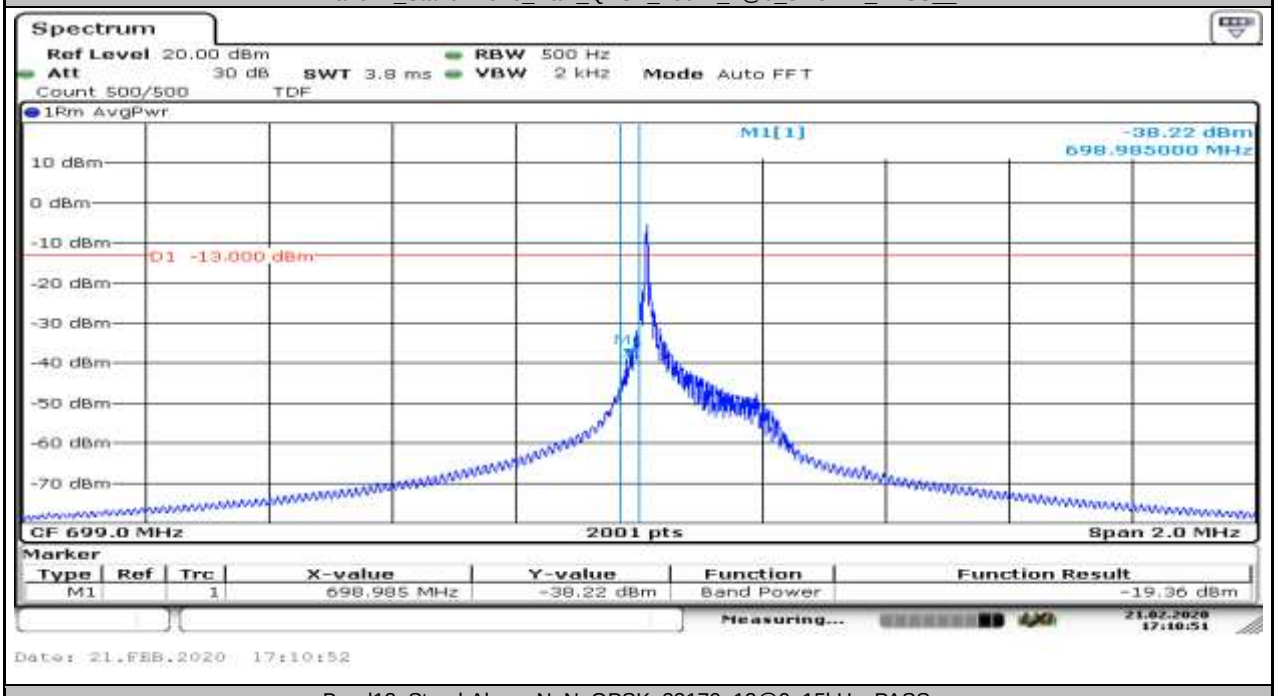
Band12_Stand-Alone_NaN_QPSK_23011_1@11_15kHz_PASS__



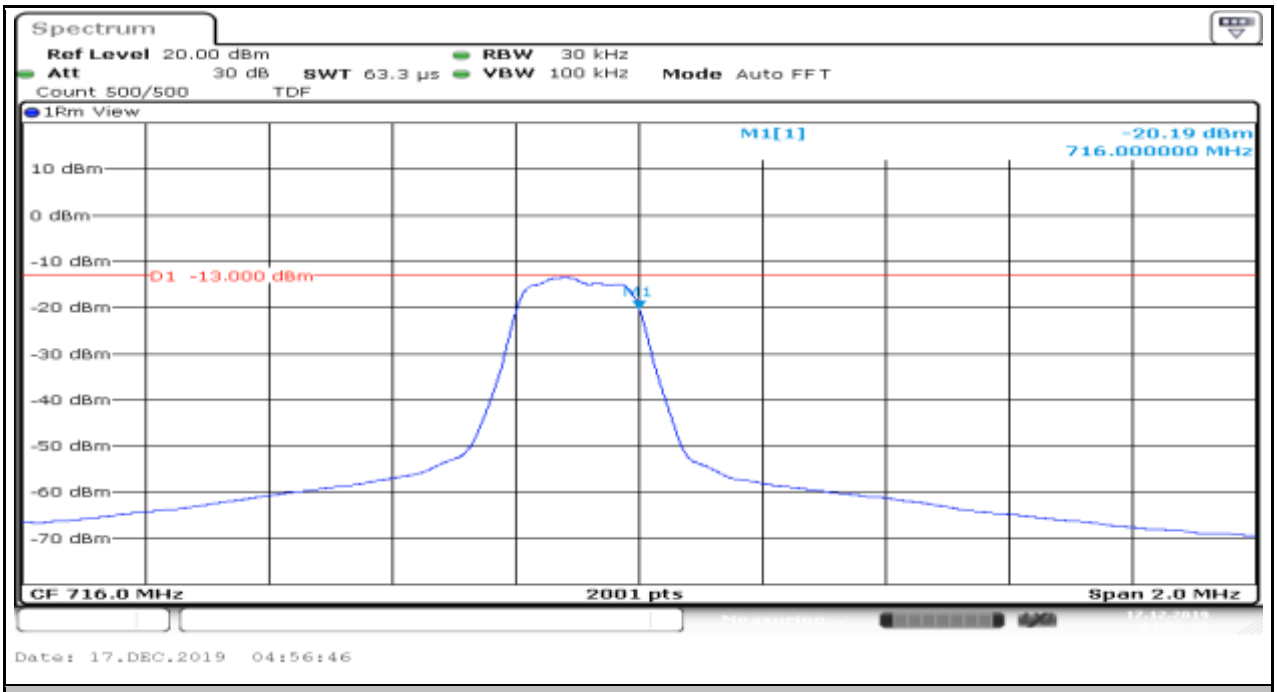
Band12_Stand-Alone_NaN_QPSK_23011_12@0_15kHz_PASS__



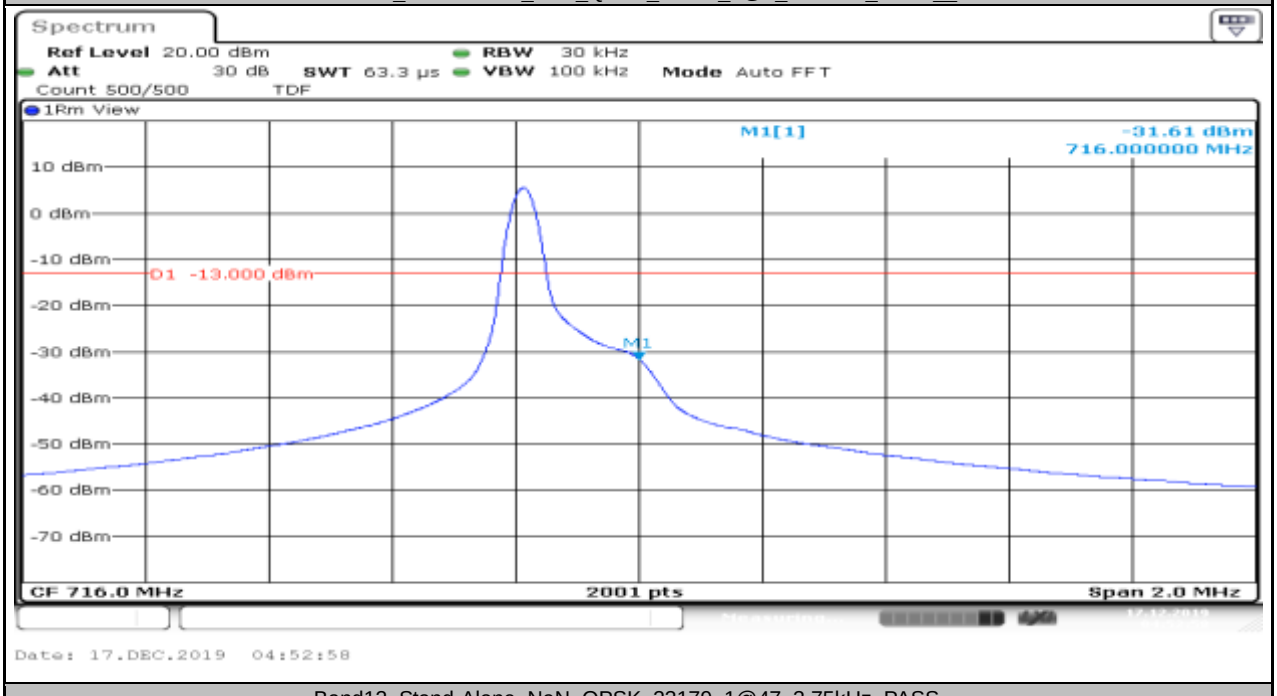
Band12_Stand-Alone_NaN_QPSK_23011_1@0_3.75kHz_PASS__



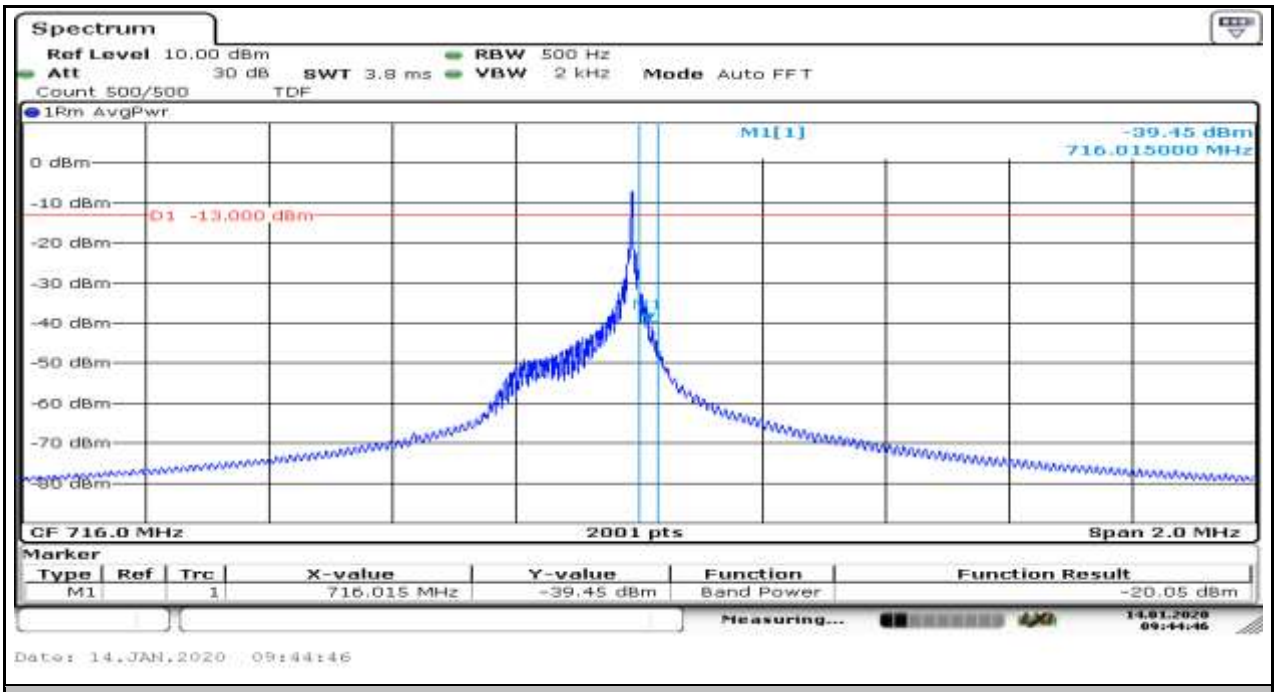
Band12_Stand-Alone_NaN_QPSK_23179_12@0_15kHz_PASS__



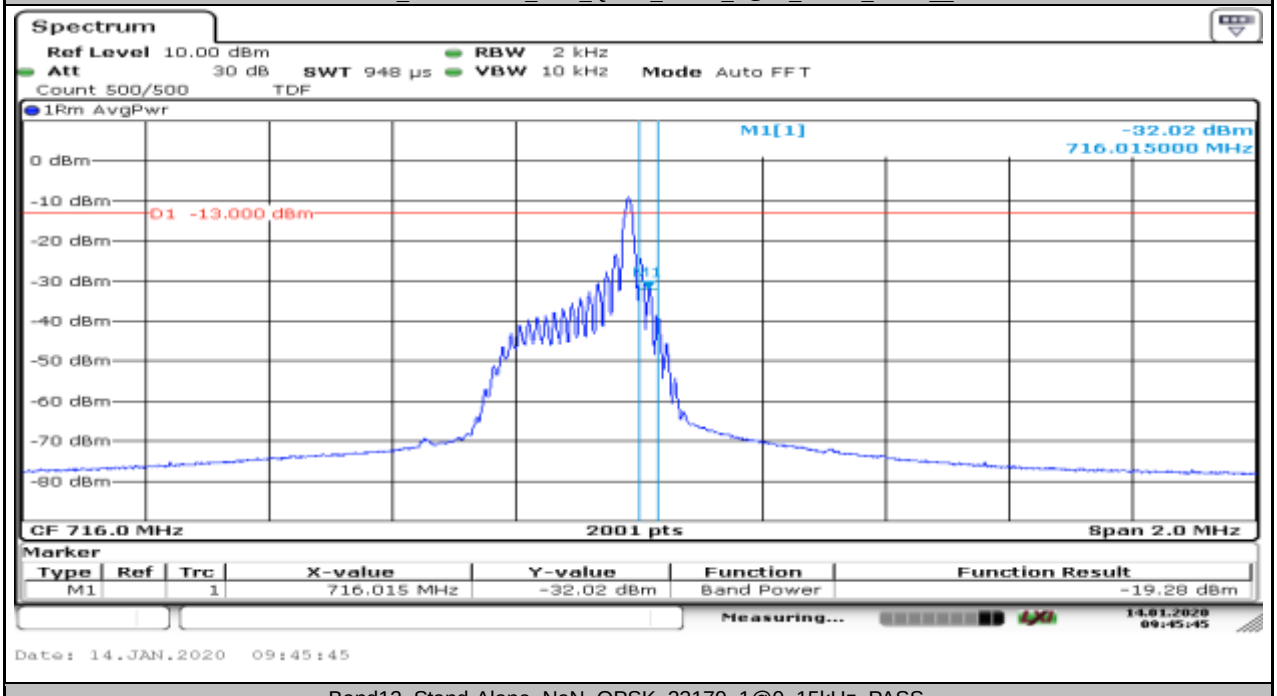
Band12_Stand-Alone_NaN_QPSK_23179_1@0_3.75kHz_PASS__



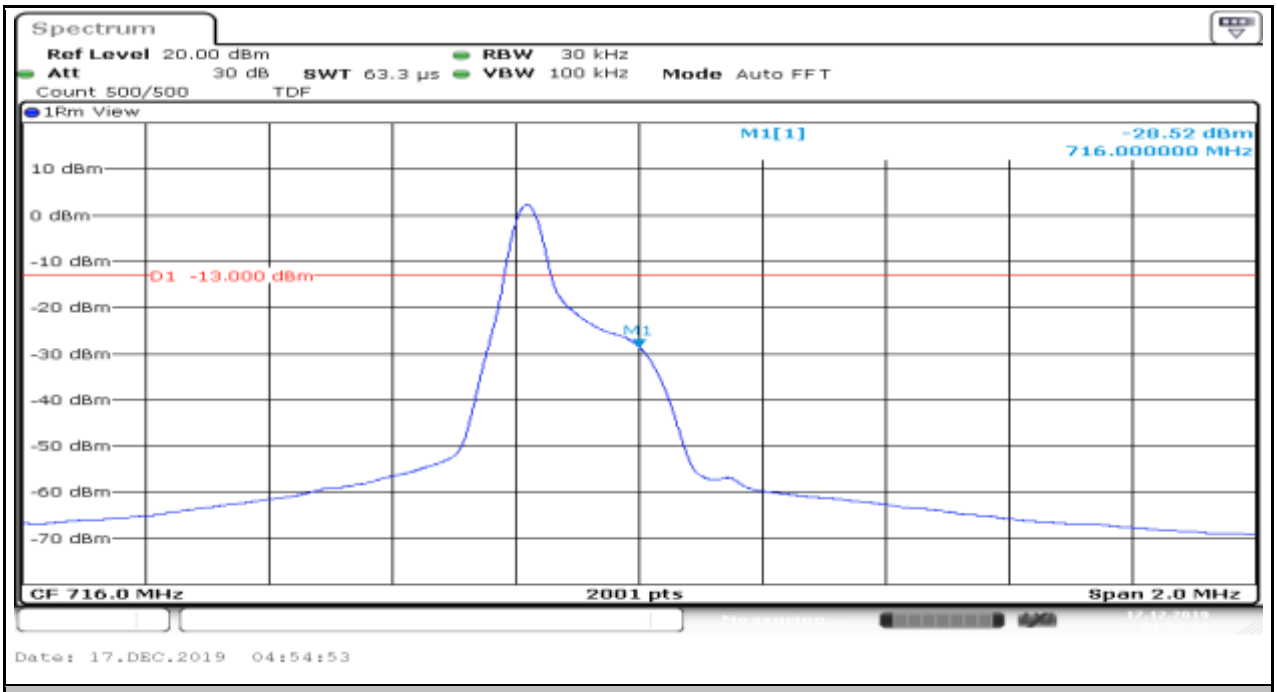
Band12_Stand-Alone_NaN_QPSK_23179_1@47_3.75kHz_PASS__



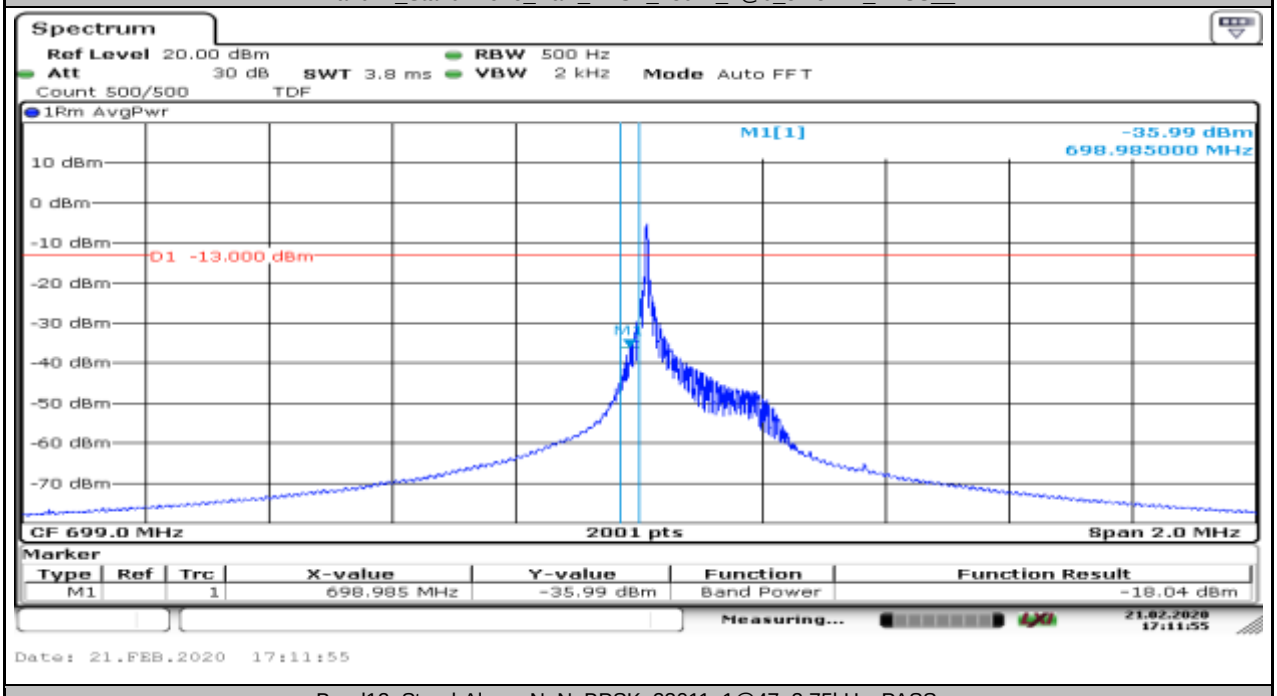
Band12_Stand-Alone_NaN_QPSK_23179_1@11_15kHz_PASS__



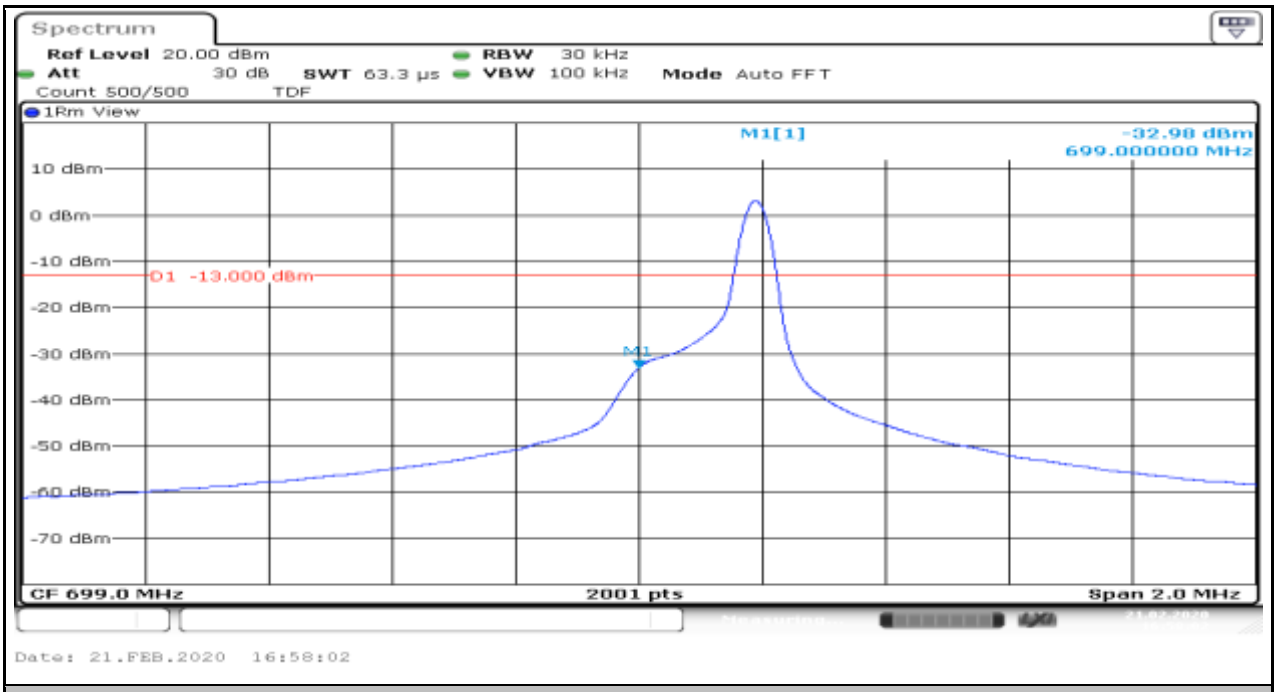
Band12_Stand-Alone_NaN_QPSK_23179_1@0_15kHz_PASS__



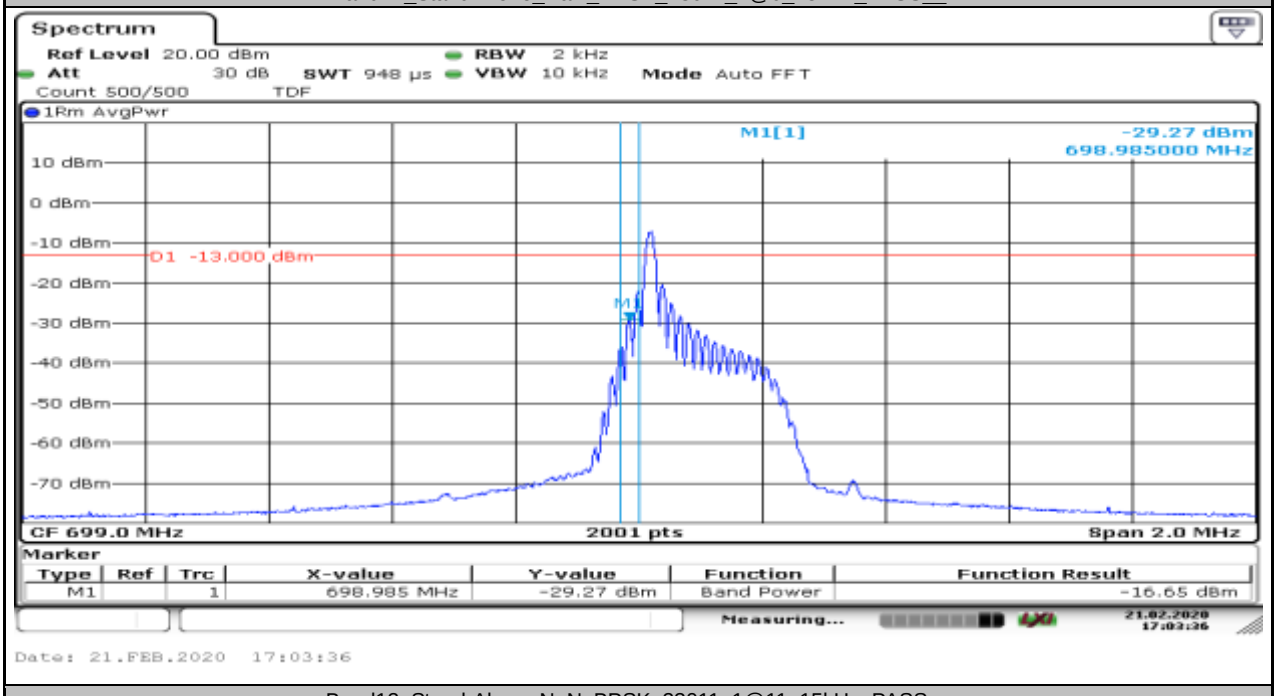
Band12_Stand-Alone_NaN_BPSK_23011_1@0_3.75kHz_PASS__



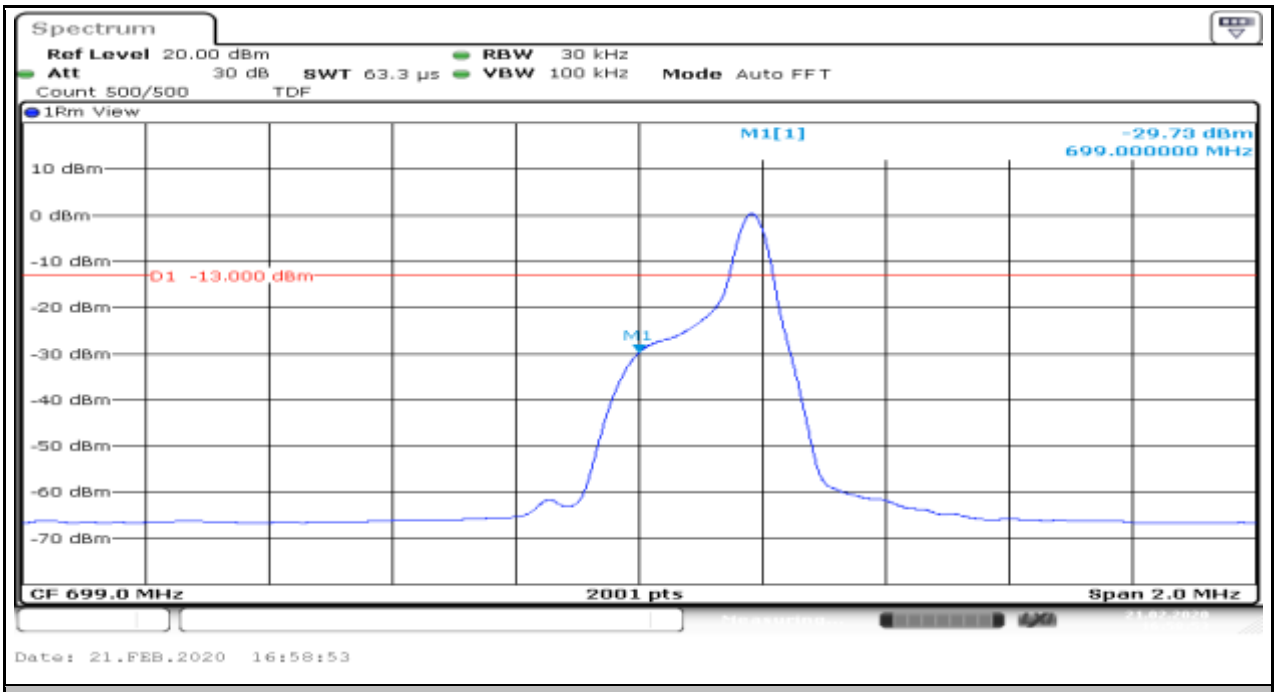
Band12_Stand-Alone_NaN_BPSK_23011_1@47_3.75kHz_PASS__



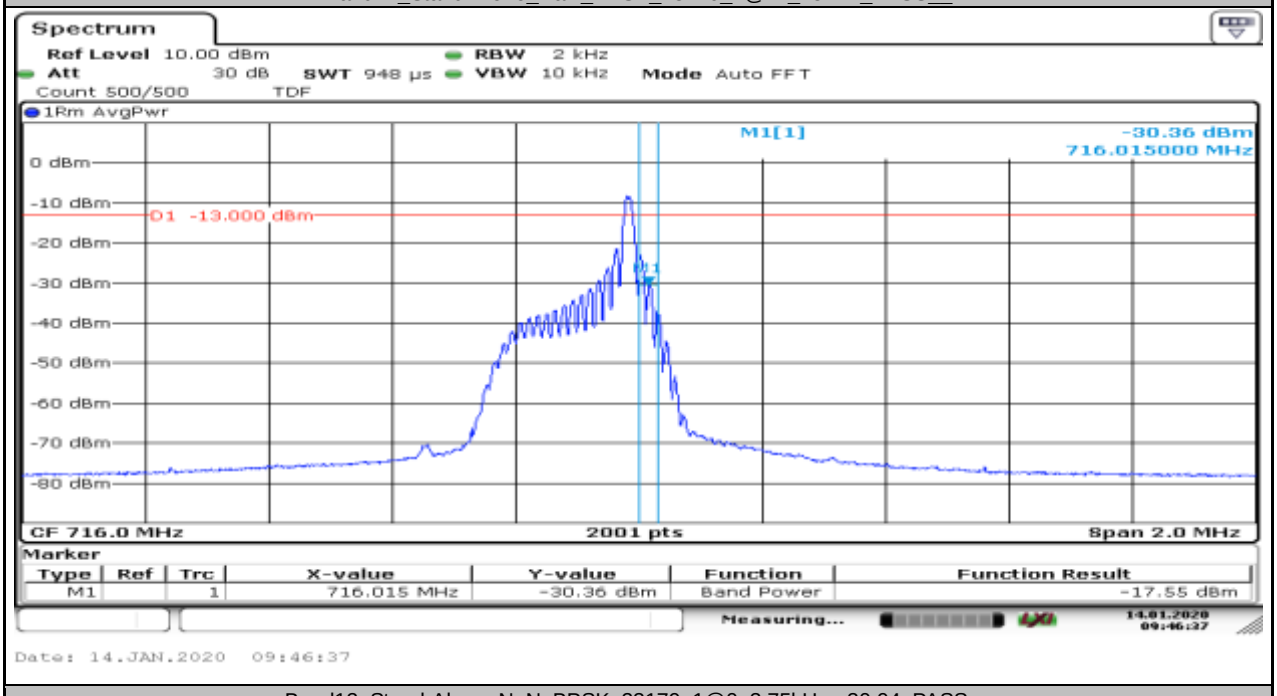
Band12_Stand-Alone_NaN_BPSK_23011_1@0_15kHz_PASS__



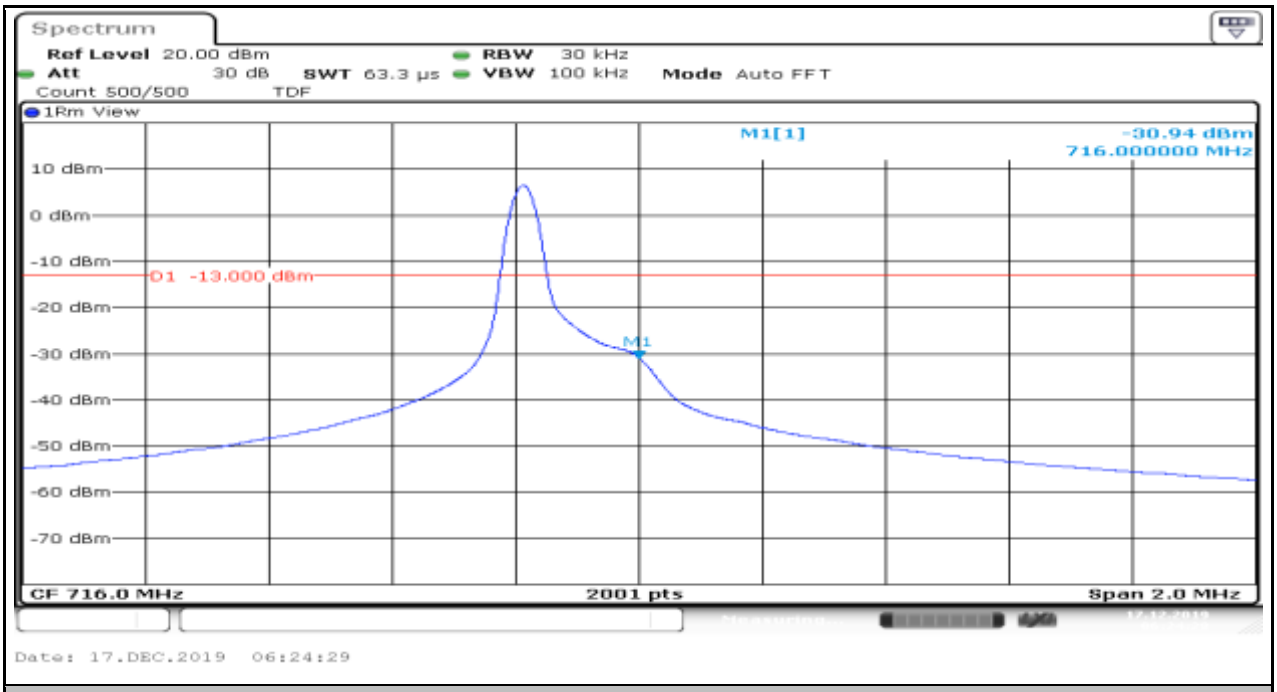
Band12_Stand-Alone_NaN_BPSK_23011_1@11_15kHz_PASS__



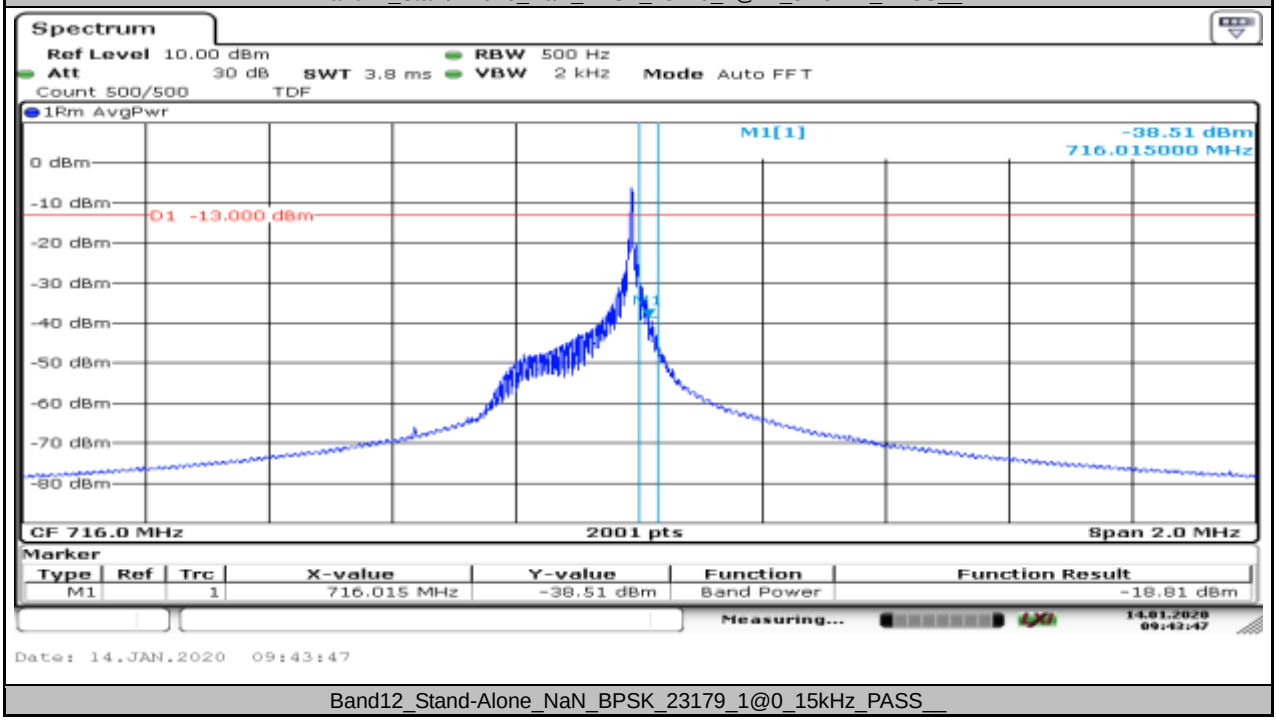
Band12_Stand-Alone_NaN_BPSK_23179_1@11_15kHz_PASS__



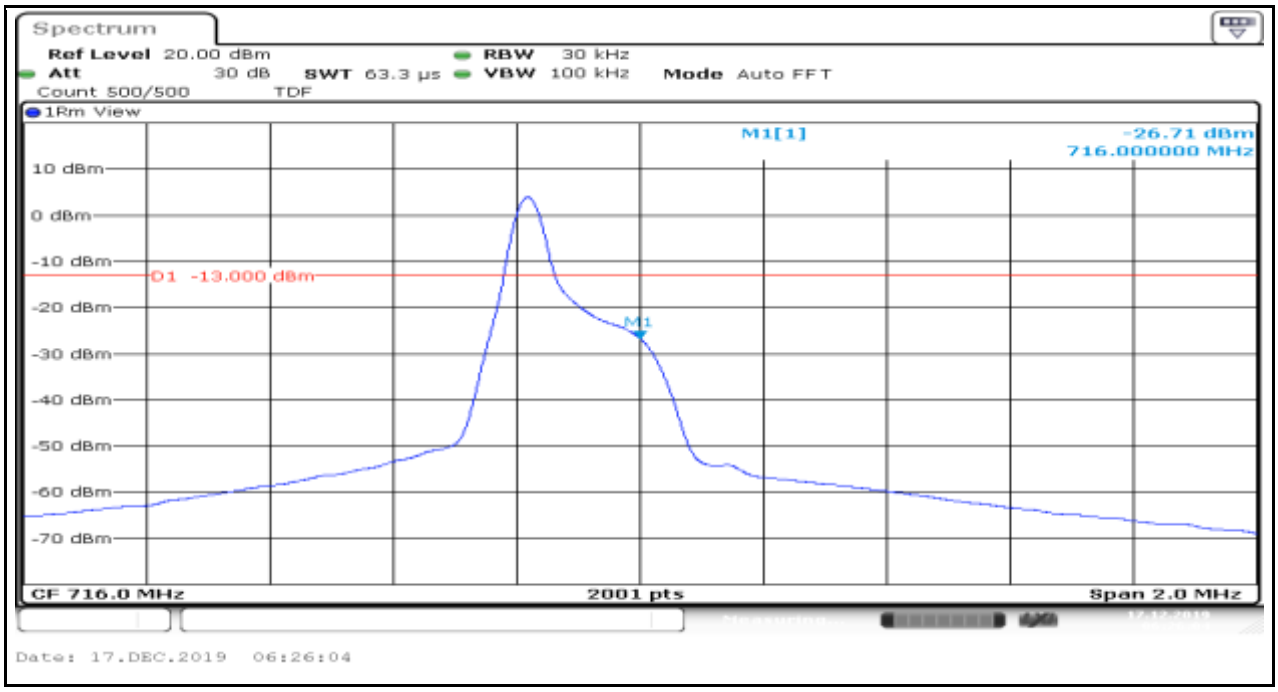
Band12_Stand-Alone_NaN_BPSK_23179_1@0_3.75kHz_-30.94_PASS__



Band12_Stand-Alone_NaN_BPSK_23179_1@47_3.75kHz_PASS__



Band12_Stand-Alone_NaN_BPSK_23179_1@0_15kHz_PASS__


Spectrum
Ref Level 20.00 dBm
RBW 30 kHz
Att 30 dB
SWT 63.3 µs
VBW 100 kHz
Mode Auto FFT
Count 500/500
TDF
1Rm View
M1[1]
-26.71 dBm
716.000000 MHz
10 dBm
0 dBm
-10 dBm
D1 -13.000 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
M1
CF 716.0 MHz
2001 pts
Span 2.0 MHz
Date: 17.DEC.2019 06:26:04

Appendix D.5: Conducted Spurious Emission for NB

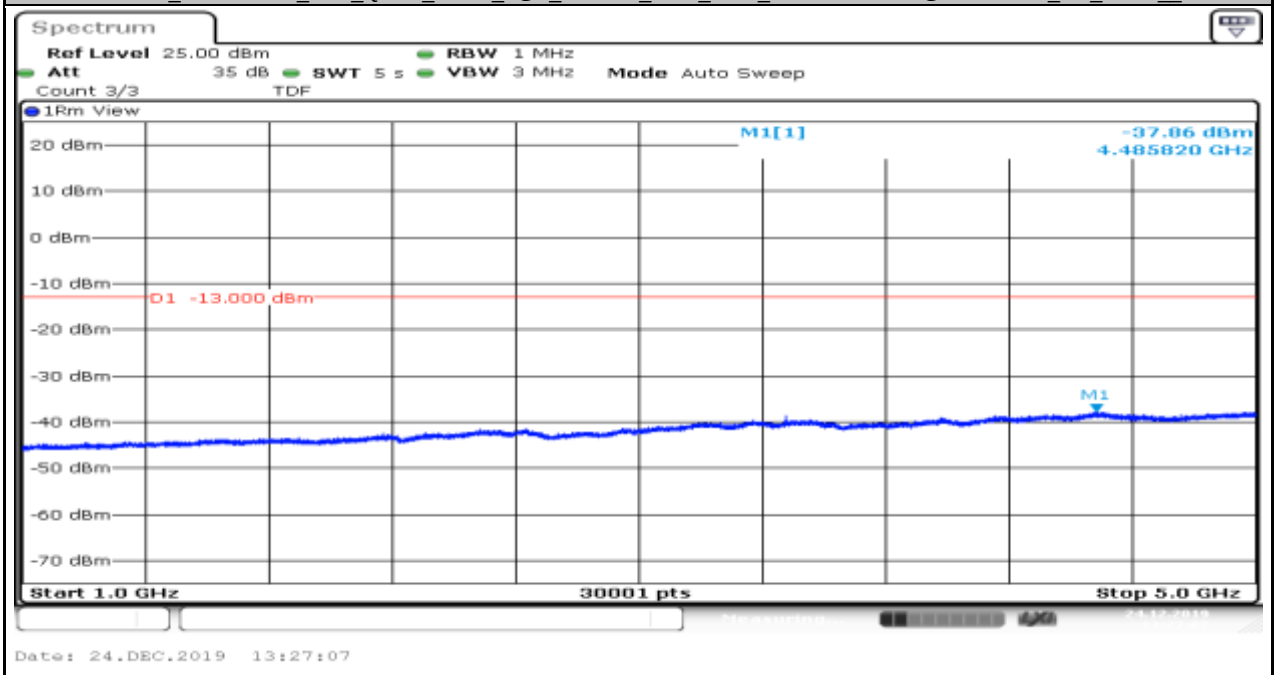
Test Result

Band	OpMode	Bandwidth	Modulation	Channel	Tones	SCS	StartFreq (MHz)	StopFreq (MHz)	Result (dBm)	Limit (dBm)	Verdict
Band12	Stand-Alone	NaN	QPSK	23011	1@0	3.75kHz	1000	5000	1000~5000MHz@-37.86dBm	-13	PASS
Band12	Stand-Alone	NaN	QPSK	23011	1@0	3.75kHz	5000	12000	5000~12000MHz@-47.56dBm	-13	PASS
Band12	Stand-Alone	NaN	QPSK	23011	1@0	3.75kHz	12000	26500	12000~26500MHz@-41.39dBm	-13	PASS
Band12	Stand-Alone	NaN	QPSK	23011	1@47	3.75kHz	30	1000	30~1000MHz@-35.92dBm	-13	PASS
Band12	Stand-Alone	NaN	QPSK	23011	1@47	3.75kHz	1000	5000	1000~5000MHz@-37.49dBm	-13	PASS
Band12	Stand-Alone	NaN	QPSK	23011	1@47	3.75kHz	5000	12000	5000~12000MHz@-47.29dBm	-13	PASS
Band12	Stand-Alone	NaN	QPSK	23011	1@47	3.75kHz	12000	26500	12000~26500MHz@-41.61dBm	-13	PASS
Band12	Stand-Alone	NaN	QPSK	23011	1@0	3.75kHz	30	1000	30~1000MHz@-36.23dBm	-13	PASS
Band12	Stand-Alone	NaN	QPSK	23011	12@0	15kHz	12000	26500	12000~26500MHz@-41.38dBm	-13	PASS
Band12	Stand-Alone	NaN	QPSK	23011	12@0	15kHz	5000	12000	5000~12000MHz@-47.54dBm	-13	PASS
Band12	Stand-Alone	NaN	QPSK	23011	12@0	15kHz	1000	5000	1000~5000MHz@-37.84dBm	-13	PASS
Band12	Stand-Alone	NaN	QPSK	23011	12@0	15kHz	30	1000	30~1000MHz@-35.85dBm	-13	PASS
Band12	Stand-Alone	NaN	QPSK	23095	1@0	3.75kHz	5000	12000	5000~12000MHz@-47.62dBm	-13	PASS
Band12	Stand-Alone	NaN	QPSK	23095	12@0	15kHz	1000	5000	1000~5000MHz@-37.72dBm	-13	PASS
Band12	Stand-Alone	NaN	QPSK	23095	1@47	3.75kHz	12000	26500	12000~26500MHz@-41.52dBm	-13	PASS
Band12	Stand-Alone	NaN	QPSK	23095	1@47	3.75kHz	5000	12000	5000~12000MHz@-47.39dBm	-13	PASS
Band12	Stand-Alone	NaN	QPSK	23095	1@47	3.75kHz	1000	5000	1000~5000MHz@-37.91dBm	-13	PASS
Band12	Stand-Alone	NaN	QPSK	23095	12@0	15kHz	12000	26500	12000~26500MHz@-41.53dBm	-13	PASS
Band12	Stand-Alone	NaN	QPSK	23095	1@0	3.75kHz	12000	26500	12000~26500MHz@-41.39dBm	-13	PASS
Band12	Stand-Alone	NaN	QPSK	23095	12@0	15kHz	5000	12000	5000~12000MHz@-47.5dBm	-13	PASS
Band12	Stand-Alone	NaN	QPSK	23095	1@0	3.75kHz	1000	5000	1000~5000MHz@-37.77dBm	-13	PASS
Band12	Stand-Alone	NaN	QPSK	23095	1@0	3.75kHz	30	1000	30~1000MHz@-35.48dBm	-13	PASS
Band12	Stand-Alone	NaN	QPSK	23095	1@47	3.75kHz	30	1000	30~1000MHz@-35.84dBm	-13	PASS
Band12	Stand-Alone	NaN	QPSK	23095	12@0	15kHz	30	1000	30~1000MHz@-35.67dBm	-13	PASS
Band12	Stand-Alone	NaN	QPSK	23179	1@0	3.75kHz	12000	26500	12000~26500MHz@-41.34dBm	-13	PASS
Band12	Stand-Alone	NaN	QPSK	23179	1@0	3.75kHz	30	1000	30~1000MHz@-35.09dBm	-13	PASS
Band12	Stand-Alone	NaN	QPSK	23179	1@0	3.75kHz	5000	12000	5000~12000MHz@-47.25dBm	-13	PASS
Band12	Stand-Alone	NaN	QPSK	23179	1@47	3.75kHz	30	1000	30~1000MHz@-34.66dBm	-13	PASS
Band12	Stand-Alone	NaN	QPSK	23179	1@47	3.75kHz	1000	5000	1000~5000MHz@-37.87dBm	-13	PASS
Band12	Stand-Alone	NaN	QPSK	23179	1@47	3.75kHz	5000	12000	5000~12000MHz@-47.46dBm	-13	PASS
Band12	Stand-Alone	NaN	QPSK	23179	1@47	3.75kHz	12000	26500	12000~26500MHz@-41.51dBm	-13	PASS
Band12	Stand-Alone	NaN	QPSK	23179	12@0	15kHz	30	1000	30~1000MHz@-35.69dBm	-13	PASS
Band12	Stand-Alone	NaN	QPSK	23179	1@0	3.75kHz	1000	5000	1000~5000MHz@-37.83dBm	-13	PASS
Band12	Stand-Alone	NaN	QPSK	23179	12@0	15kHz	12000	26500	12000~26500MHz@-41.35dBm	-13	PASS
Band12	Stand-Alone	NaN	QPSK	23179	12@0	15kHz	5000	12000	5000~12000MHz@-47.35dBm	-13	PASS
Band12	Stand-Alone	NaN	QPSK	23179	12@0	15kHz	1000	5000	1000~5000MHz@-37.87dBm	-13	PASS
Band12	Stand-Alone	NaN	BPSK	23011	1@0	15kHz	12000	26500	12000~26500MHz@-41.63dBm	-13	PASS
Band12	Stand-Alone	NaN	BPSK	23011	1@0	15kHz	1000	5000	1000~5000MHz@-37.8dBm	-13	PASS
Band12	Stand-Alone	NaN	BPSK	23011	1@0	15kHz	5000	12000	5000~12000MHz@-47.55dBm	-13	PASS
Band12	Stand-Alone	NaN	BPSK	23011	1@11	15kHz	12000	26500	12000~26500MHz@-41.64dBm	-13	PASS
Band12	Stand-Alone	NaN	BPSK	23011	1@11	15kHz	5000	12000	5000~12000MHz@-47.56dBm	-13	PASS
Band12	Stand-Alone	NaN	BPSK	23011	1@11	15kHz	1000	5000	1000~5000MHz@-37.9dBm	-13	PASS
Band12	Stand-Alone	NaN	BPSK	23011	1@11	15kHz	30	1000	30~1000MHz@-35.9dBm	-13	PASS
Band12	Stand-Alone	NaN	BPSK	23011	1@0	15kHz	30	1000	30~1000MHz@-34.7dBm	-13	PASS
Band12	Stand-Alone	NaN	BPSK	23095	1@0	15kHz	30	1000	30~1000MHz@-36dBm	-13	PASS
Band12	Stand-Alone	NaN	BPSK	23095	1@11	15kHz	12000	26500	12000~26500MHz@-41.56dBm	-13	PASS
Band12	Stand-Alone	NaN	BPSK	23095	1@11	15kHz	1000	5000	1000~5000MHz@-38.01dBm	-13	PASS
Band12	Stand-Alone	NaN	BPSK	23095	1@11	15kHz	5000	12000	5000~12000MHz@-47.63dBm	-13	PASS
Band12	Stand-Alone	NaN	BPSK	23095	1@11	15kHz	30	1000	30~1000MHz@-36.16dBm	-13	PASS
Band12	Stand-Alone	NaN	BPSK	23095	1@0	15kHz	12000	26500	12000~26500MHz@-41.59dBm	-13	PASS
Band12	Stand-Alone	NaN	BPSK	23095	1@0	15kHz	1000	5000	1000~5000MHz@-37.89dBm	-13	PASS
Band12	Stand-Alone	NaN	BPSK	23095	1@0	15kHz	5000	12000	5000~12000MHz@-47.57dBm	-13	PASS
Band12	Stand-Alone	NaN	BPSK	23179	1@11	15kHz	12000	26500	12000~26500MHz@-41.49dBm	-13	PASS
Band12	Stand-Alone	NaN	BPSK	23179	1@0	15kHz	30	1000	30~1000MHz@-35.63dBm	-13	PASS
Band12	Stand-Alone	NaN	BPSK	23179	1@0	15kHz	1000	5000	1000~5000MHz@-37.78dBm	-13	PASS
Band12	Stand-Alone	NaN	BPSK	23179	1@0	15kHz	5000	12000	5000~12000MHz@-47.59dBm	-13	PASS
Band12	Stand-Alone	NaN	BPSK	23179	1@0	15kHz	12000	26500	12000~26500MHz@-41.7dBm	-13	PASS
Band12	Stand-Alone	NaN	BPSK	23179	1@11	15kHz	30	1000	30~1000MHz@-36.41dBm	-13	PASS

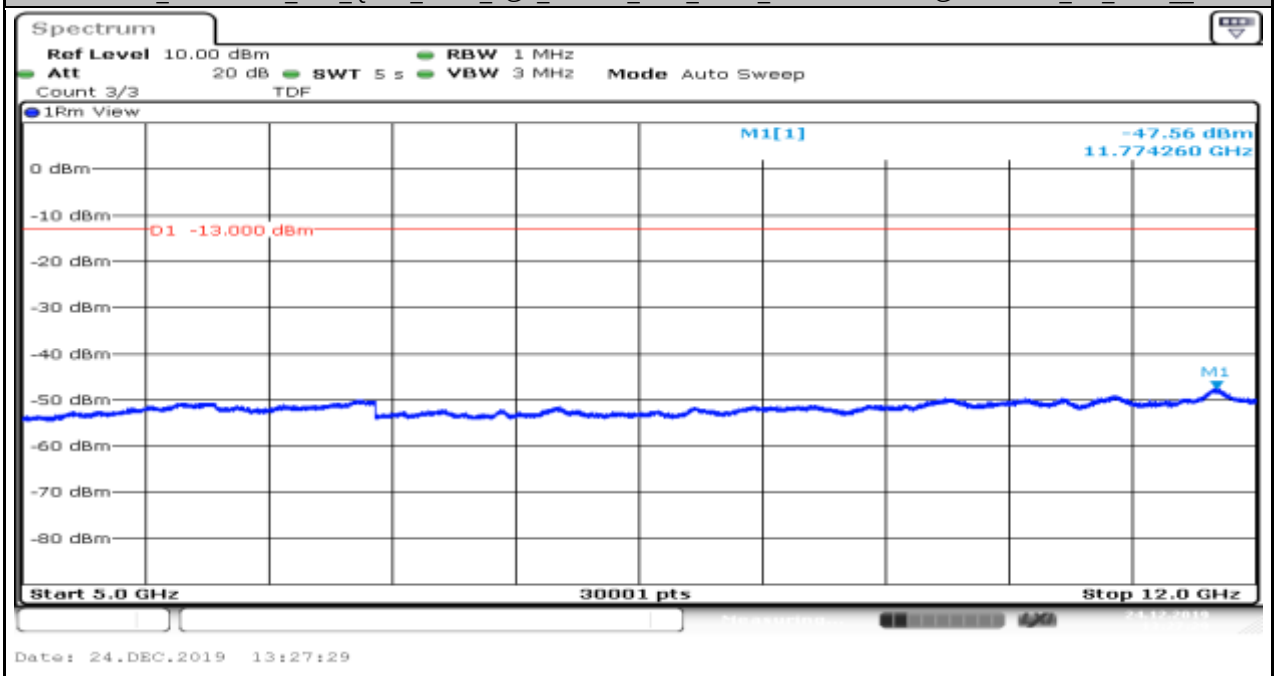
Band12	Stand-Alone	NaN	BPSK	23179	1@11	15kHz	1000	5000	1000~5000MHz@-37.8dBm	-13	PASS
Band12	Stand-Alone	NaN	BPSK	23179	1@11	15kHz	5000	12000	5000~12000MHz@-47.58dBm	-13	PASS

Test Graphs

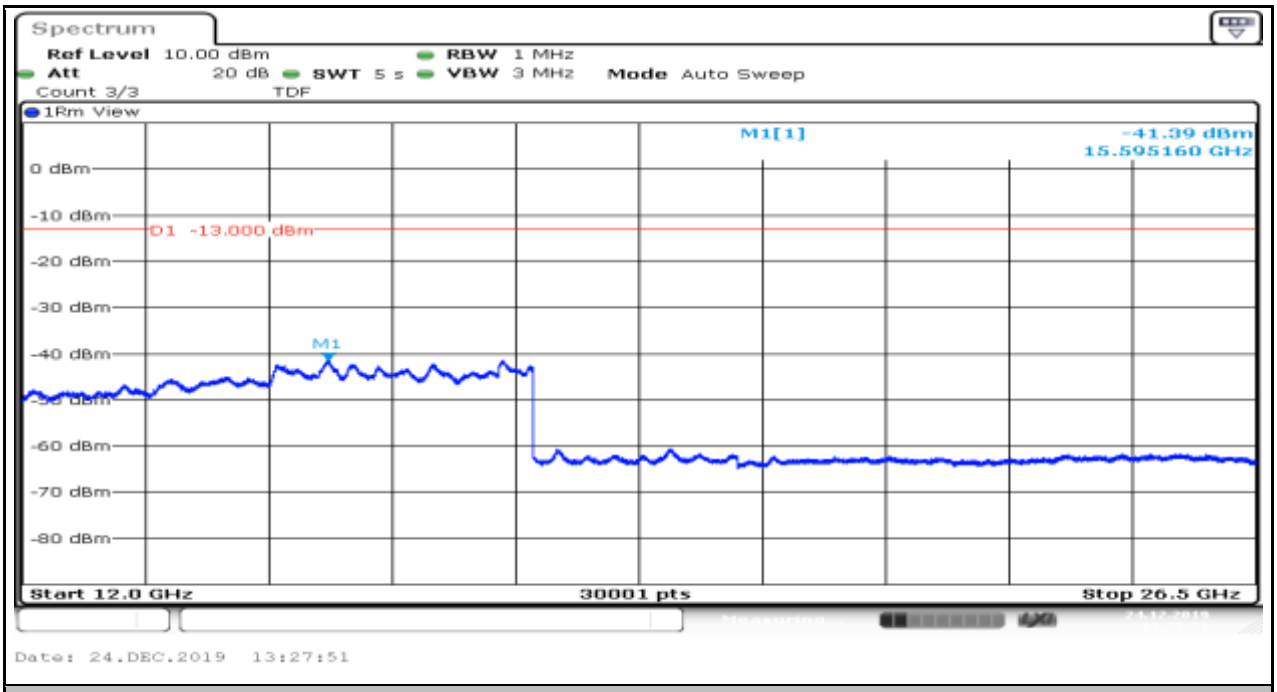
Band12_Stand-Alone_NaN_QPSK_23011_1@0_3.75kHz_1000_5000_1000~5000MHz@-37.86dBm_-13_PASS__



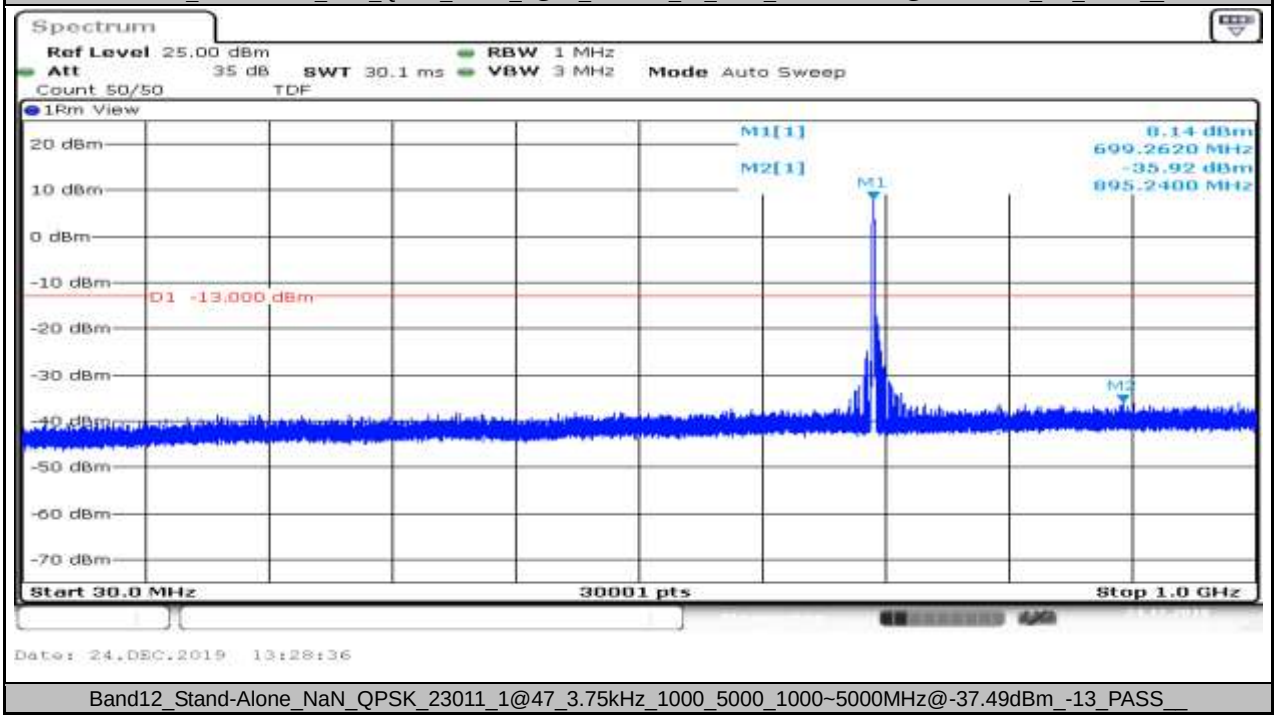
Band12_Stand-Alone_NaN_QPSK_23011_1@0_3.75kHz_5000_12000_5000~12000MHz@-47.56dBm_-13_PASS__



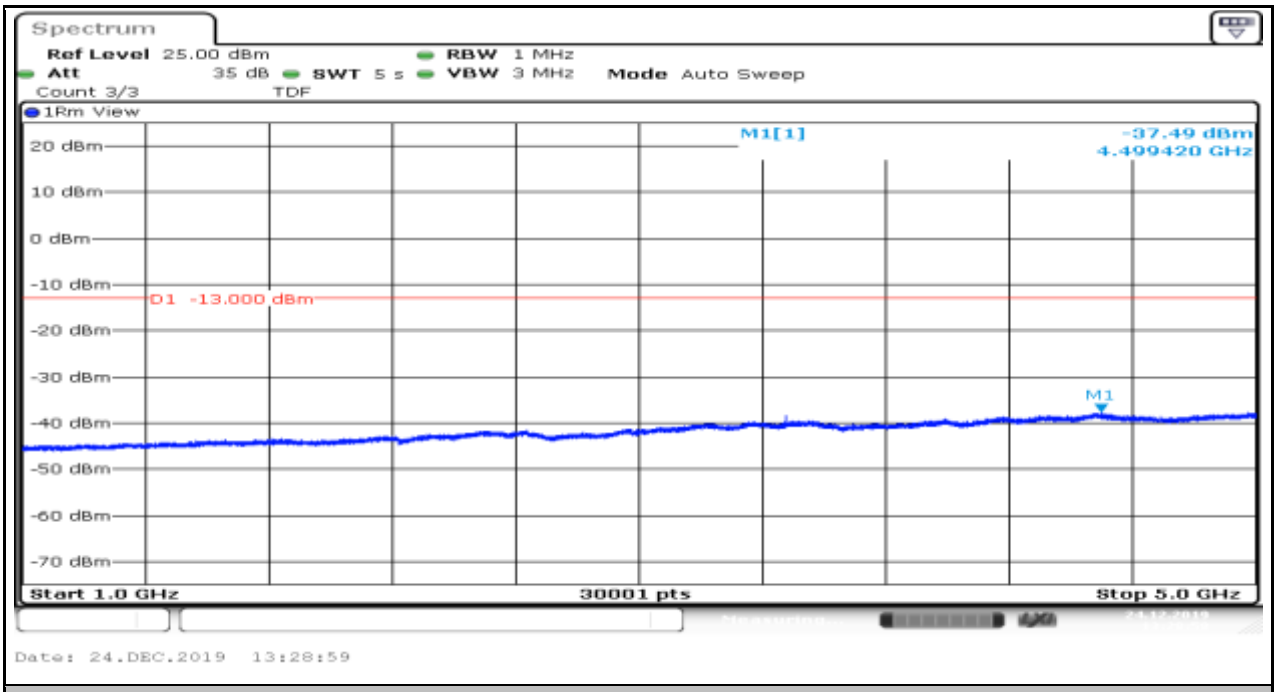
Band12_Stand-Alone_NaN_QPSK_23011_1@0_3.75kHz_12000_26500_12000~26500MHz@-41.39dBm_-13_PASS__



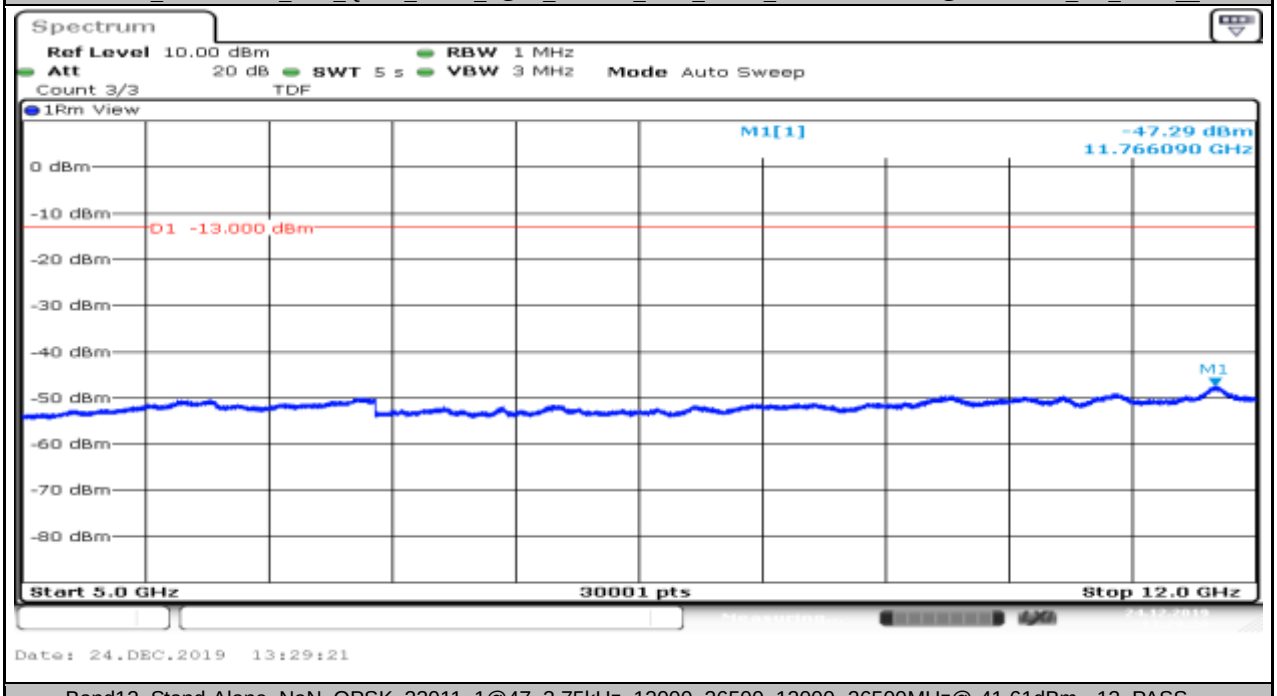
Band12_Stand-Alone_NaN_QPSK_23011_1@47_3.75kHz_30_1000_30~1000MHz@-35.92dBm_-13_PASS__



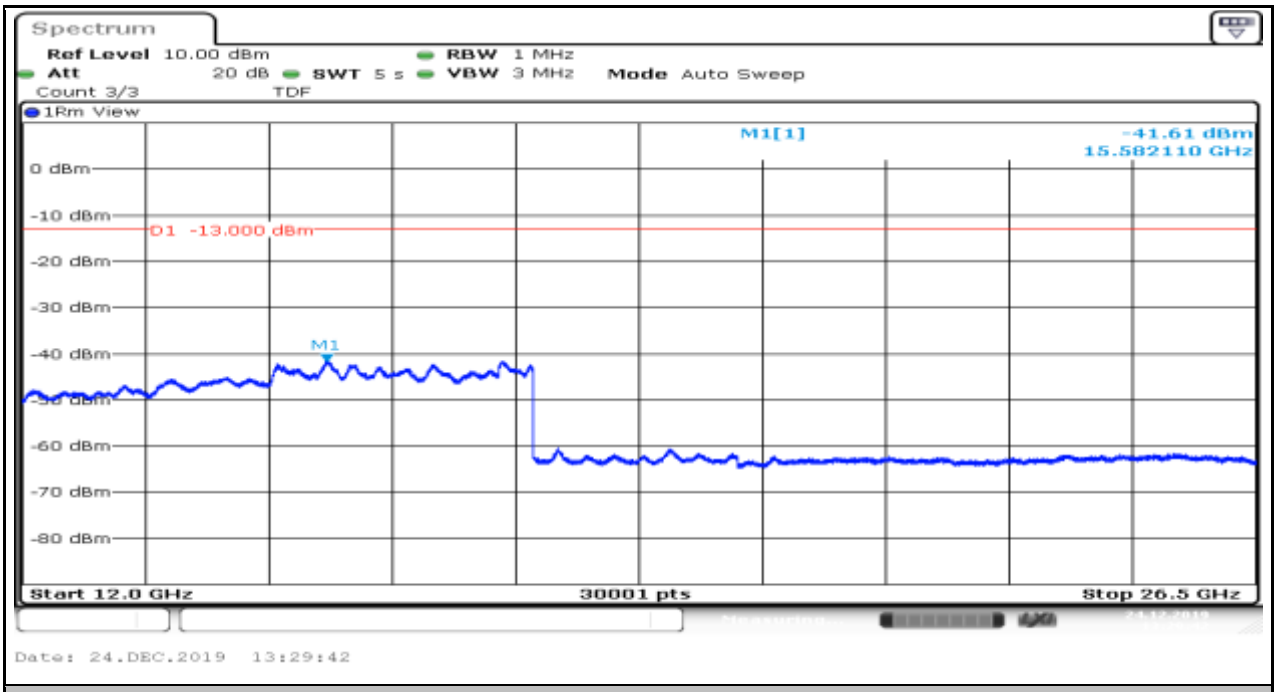
Band12_Stand-Alone_NaN_QPSK_23011_1@47_3.75kHz_1000_5000_1000~5000MHz@-37.49dBm_-13_PASS__



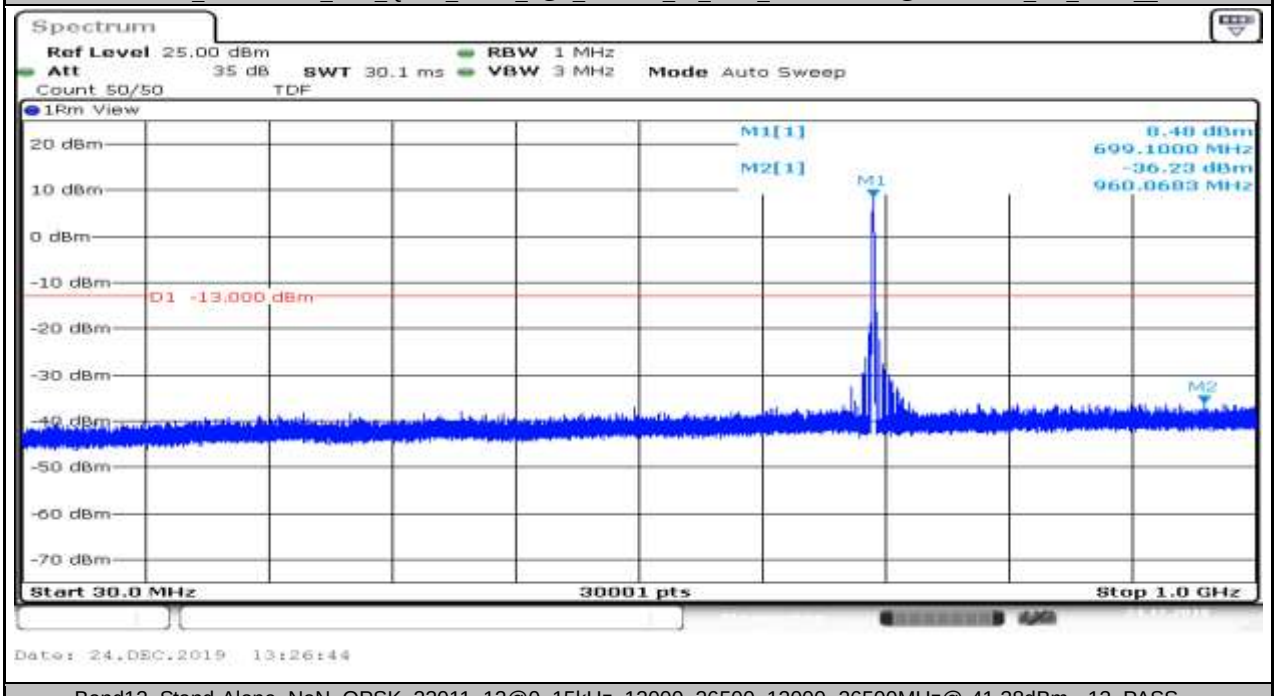
Band12_Stand-Alone_NaN_QPSK_23011_1@47_3.75kHz_5000_12000_5000~12000MHz@-47.29dBm_-13_PASS__



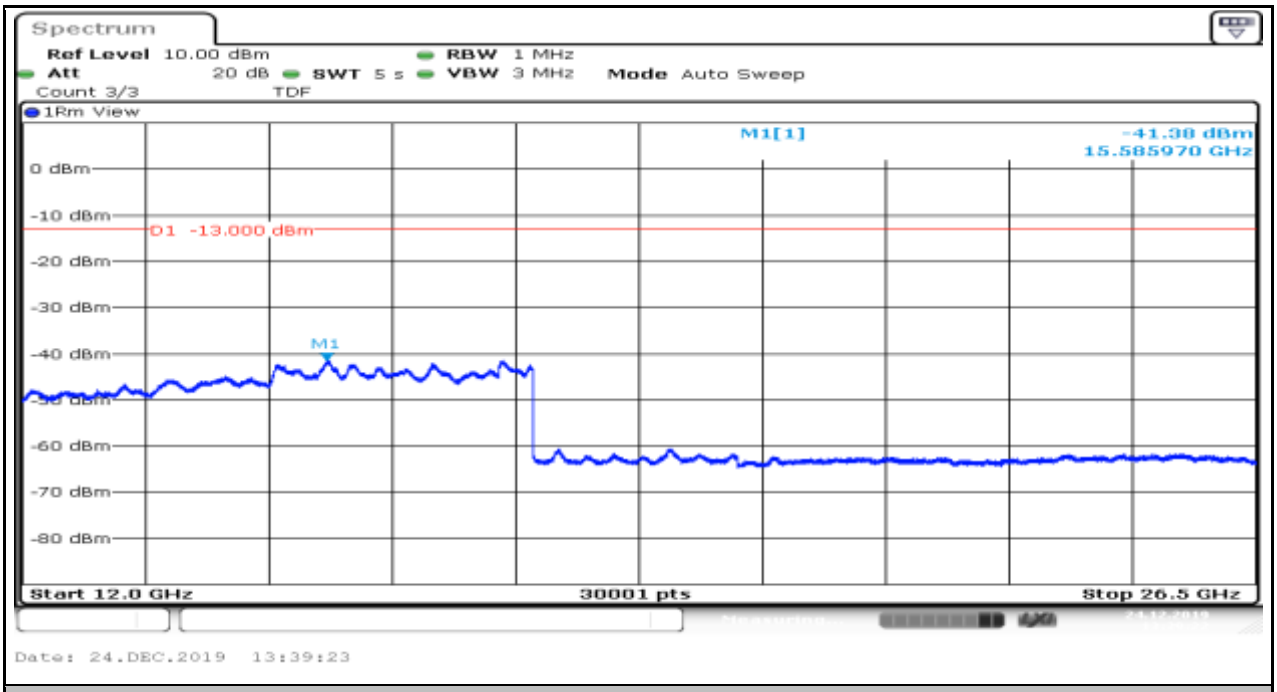
Band12_Stand-Alone_NaN_QPSK_23011_1@47_3.75kHz_12000_26500_12000~26500MHz@-41.61dBm_-13_PASS__



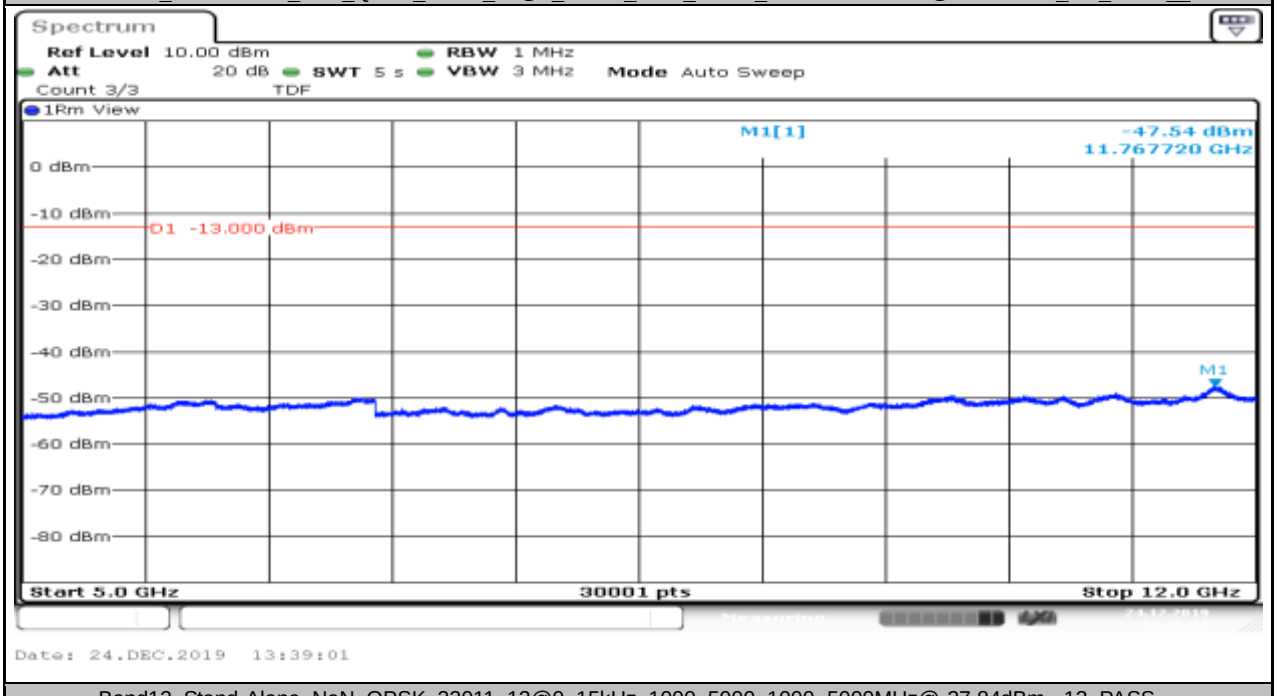
Band12_Stand-Alone_NaN_QPSK_23011_1@0_3.75kHz_30_1000_30~1000MHz@-36.23dBm_-13_PASS__



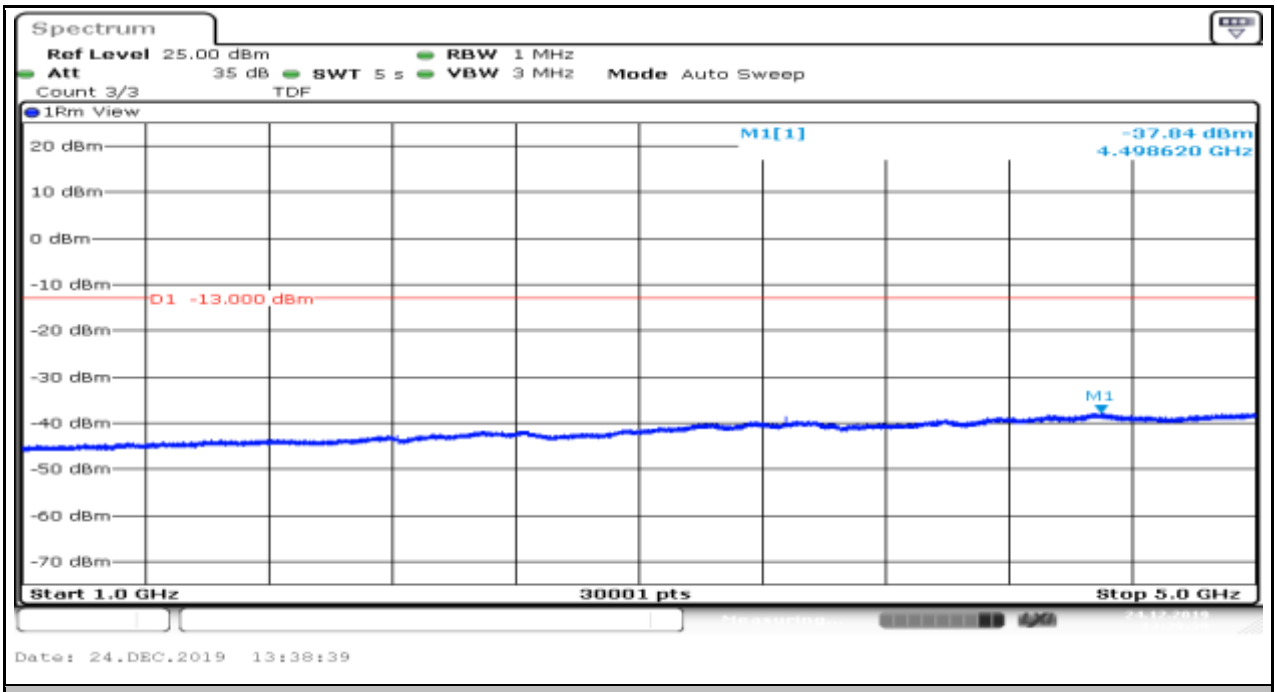
Band12_Stand-Alone_NaN_QPSK_23011_12@0_15kHz_12000_26500_12000~26500MHz@-41.38dBm_-13_PASS__



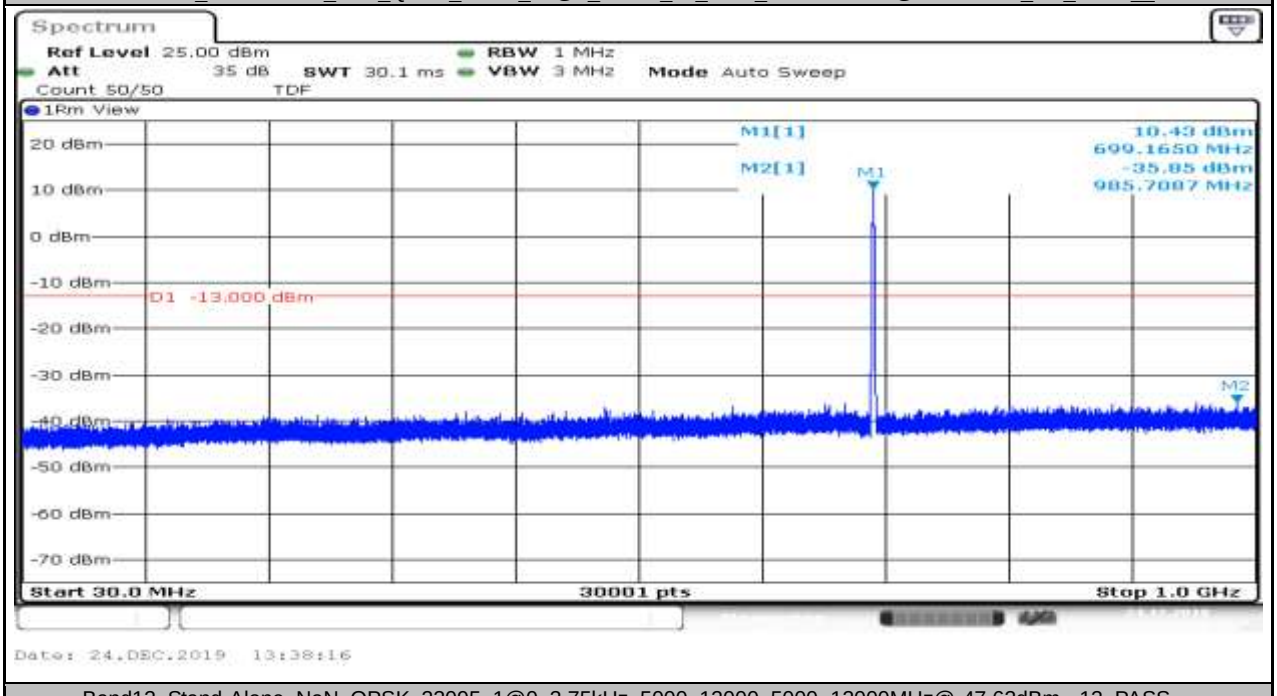
Band12_Stand-Alone_NaN_QPSK_23011_12@0_15kHz_5000_12000_5000~12000MHz@-47.54dBm_-13_PASS__



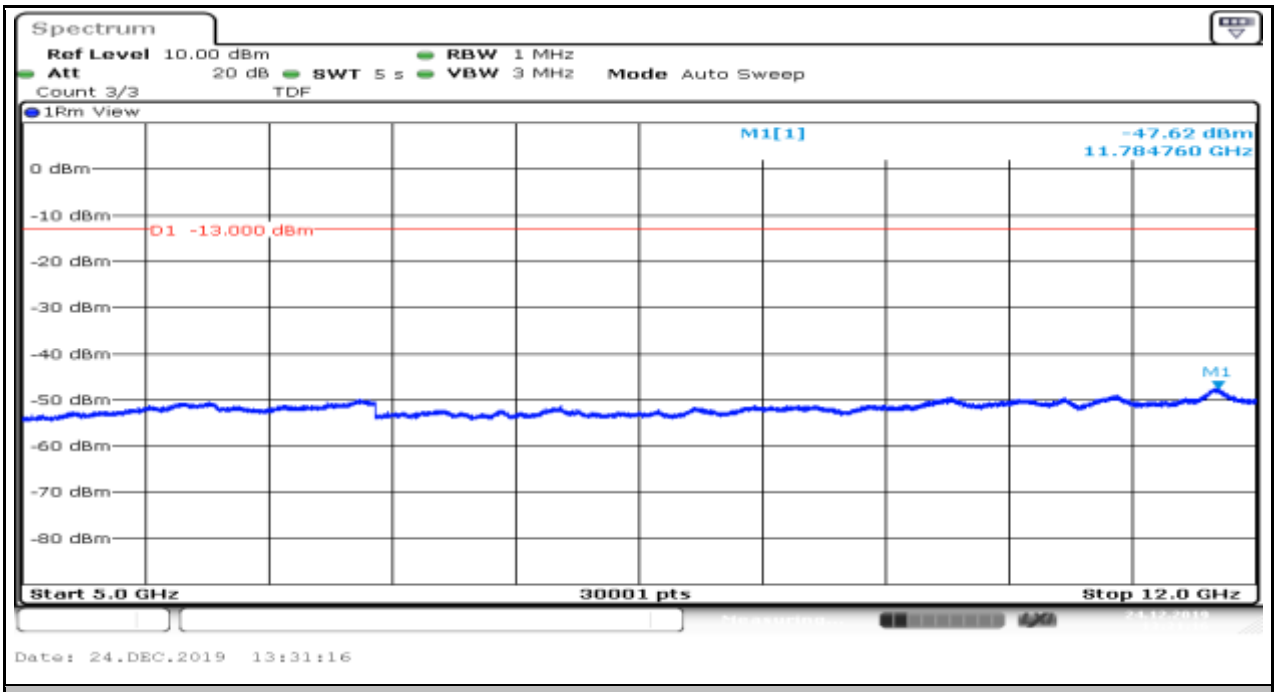
Band12_Stand-Alone_NaN_QPSK_23011_12@0_15kHz_1000_5000_1000~5000MHz@-37.84dBm_-13_PASS__



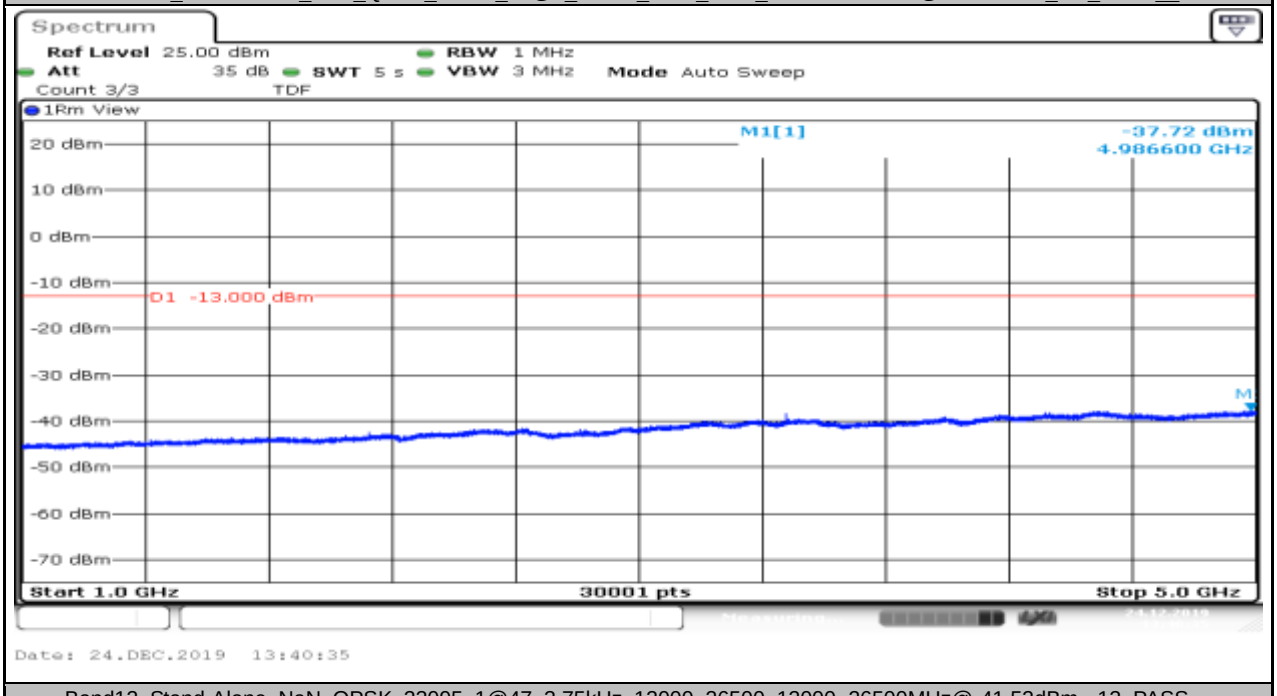
Band12_Stand-Alone_NaN_QPSK_23011_12@0_15kHz_30_1000_30~1000MHz@-35.85dBm_-13_PASS__



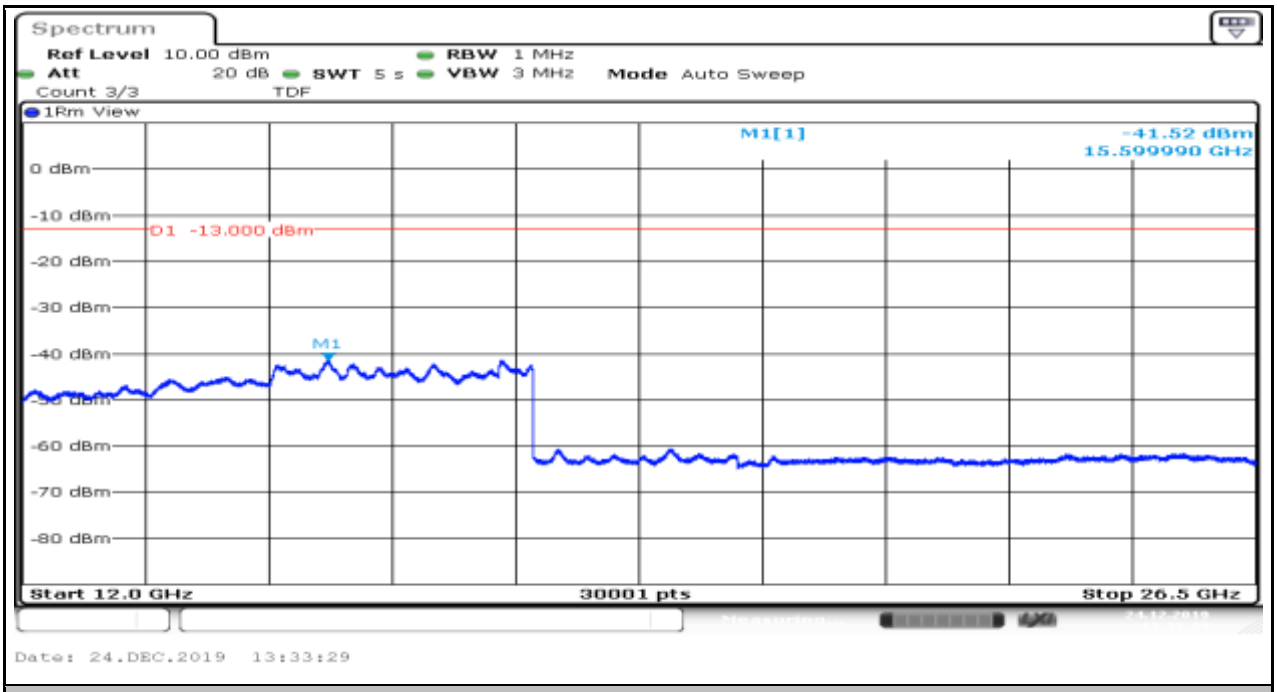
Band12_Stand-Alone_NaN_QPSK_23095_1@0_3.75kHz_5000_12000_5000~12000MHz@-47.62dBm_-13_PASS__



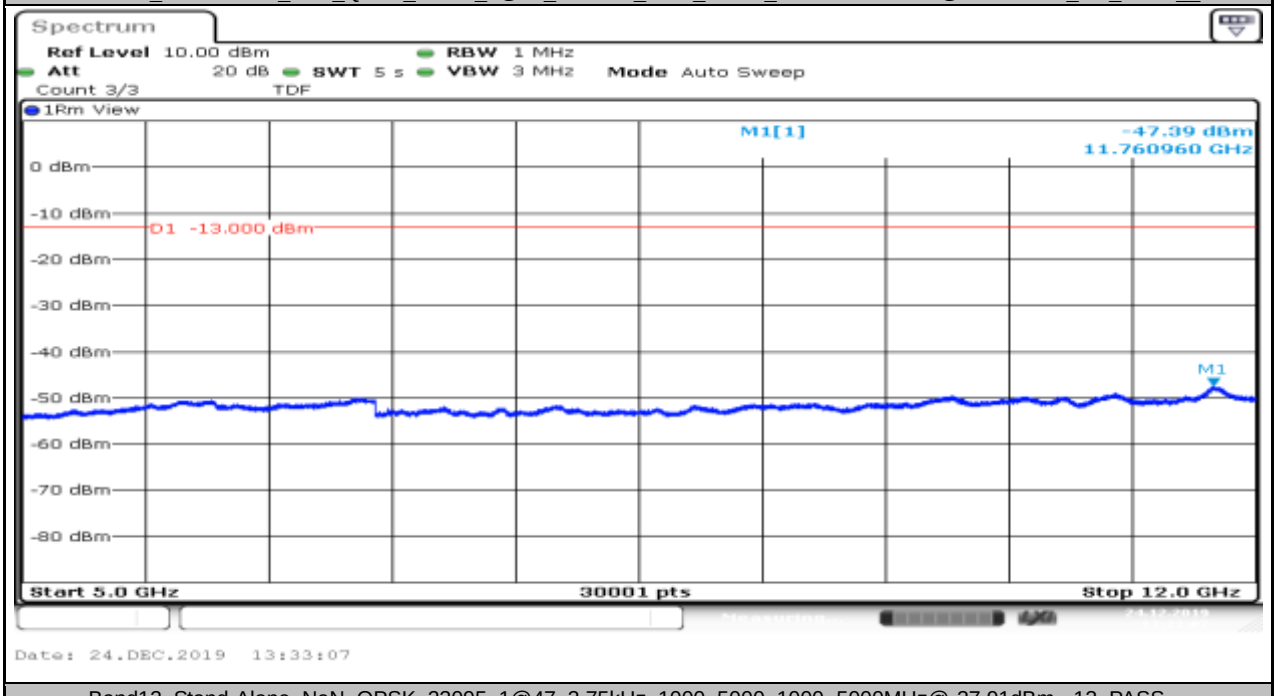
Band12_Stand-Alone_NaN_QPSK_23095_12@0_15kHz_1000_5000_1000~5000MHz@-37.72dBm_-13_PASS__



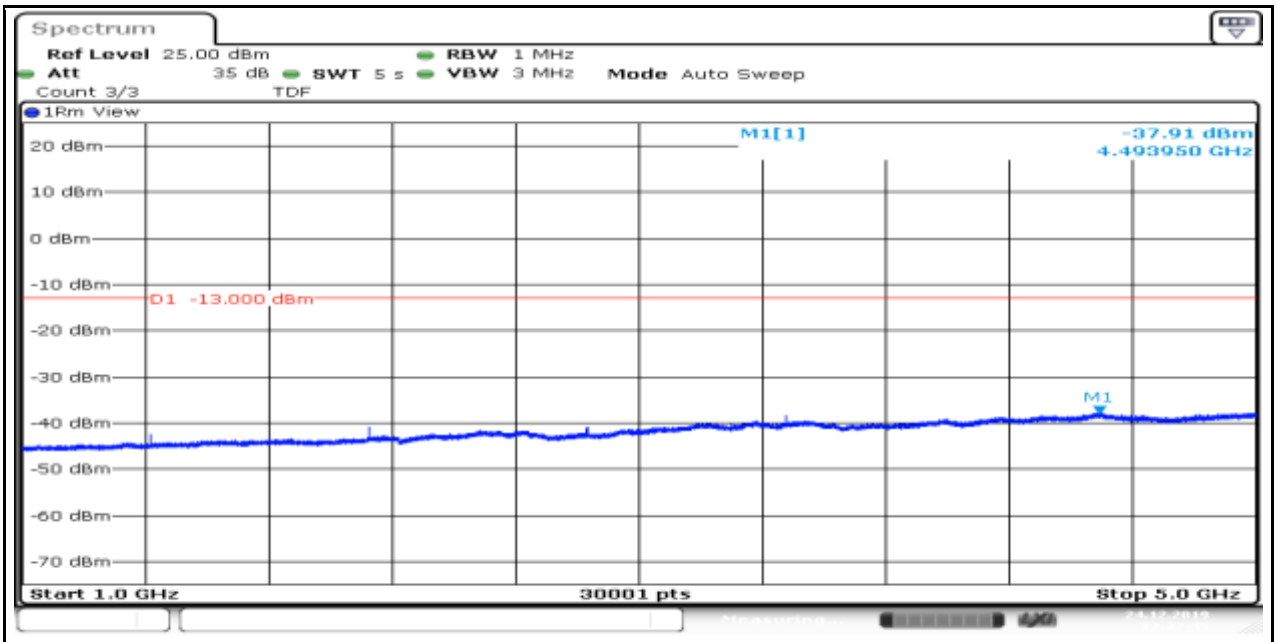
Band12_Stand-Alone_NaN_QPSK_23095_1@47_3.75kHz_12000_26500_12000~26500MHz@-41.52dBm_-13_PASS__



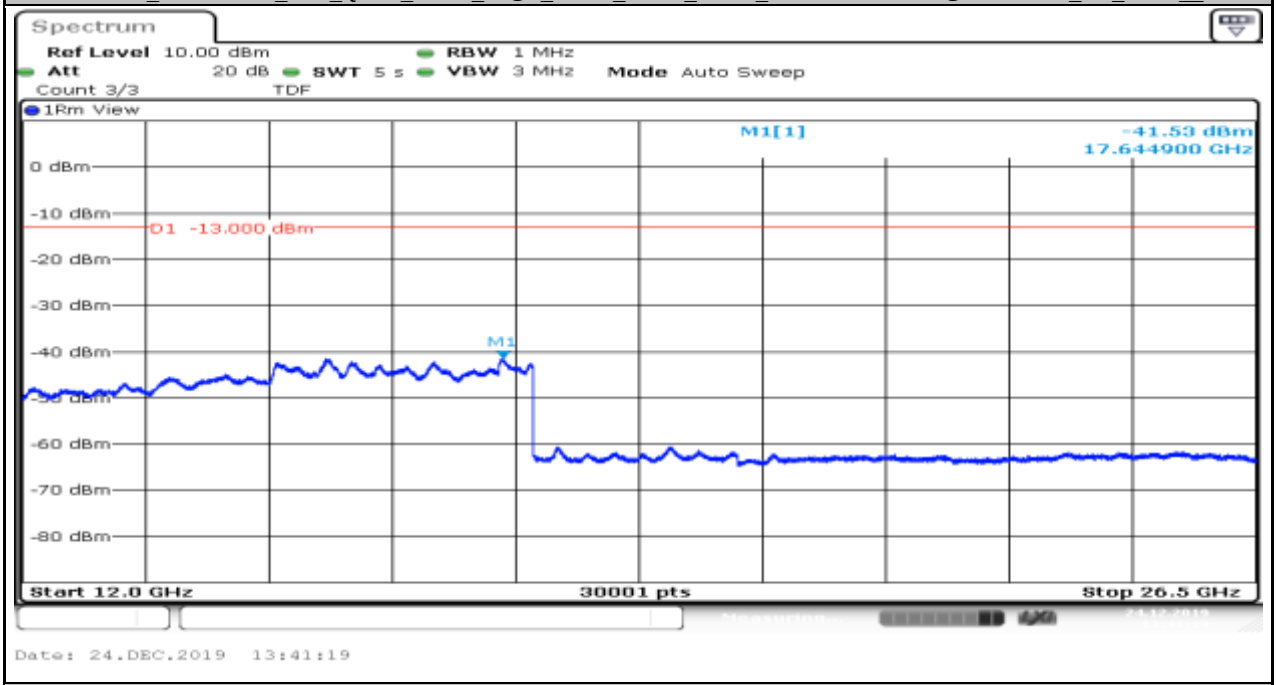
Band12_Stand-Alone_NaN_QPSK_23095_1@47_3.75kHz_5000_12000_5000~12000MHz@-47.39dBm_-13_PASS__



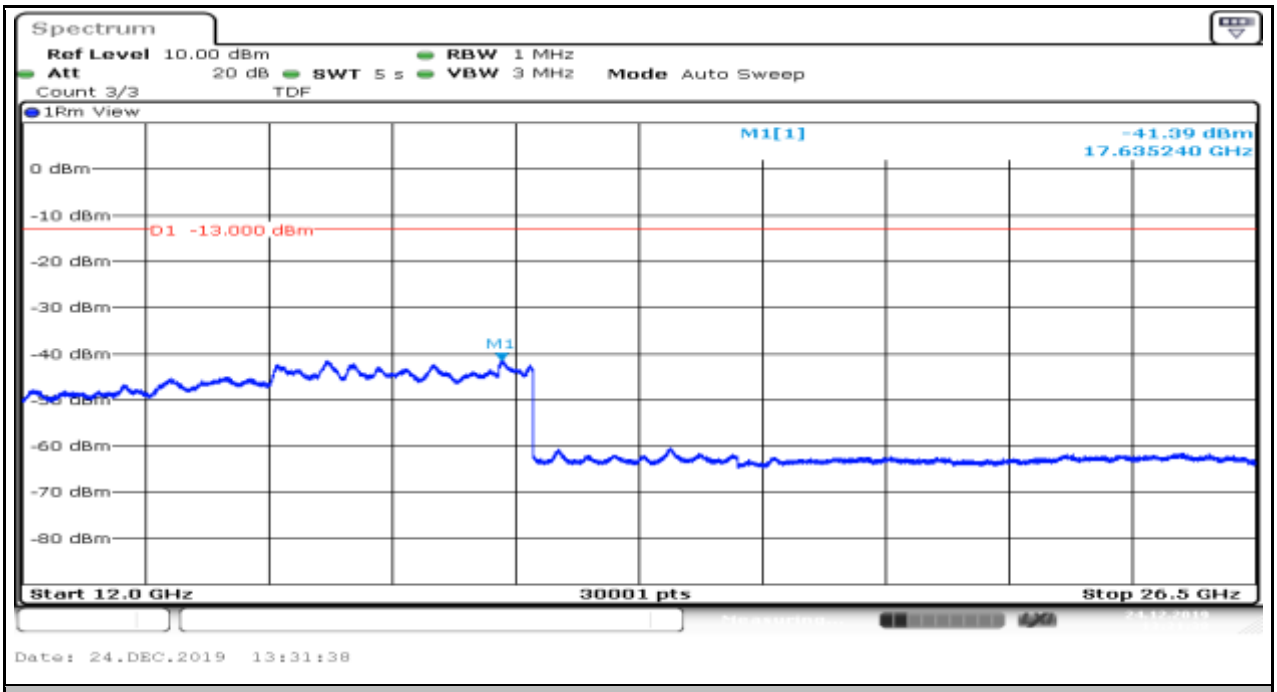
Band12_Stand-Alone_NaN_QPSK_23095_1@47_3.75kHz_1000_5000_1000~5000MHz@-37.91dBm_-13_PASS__



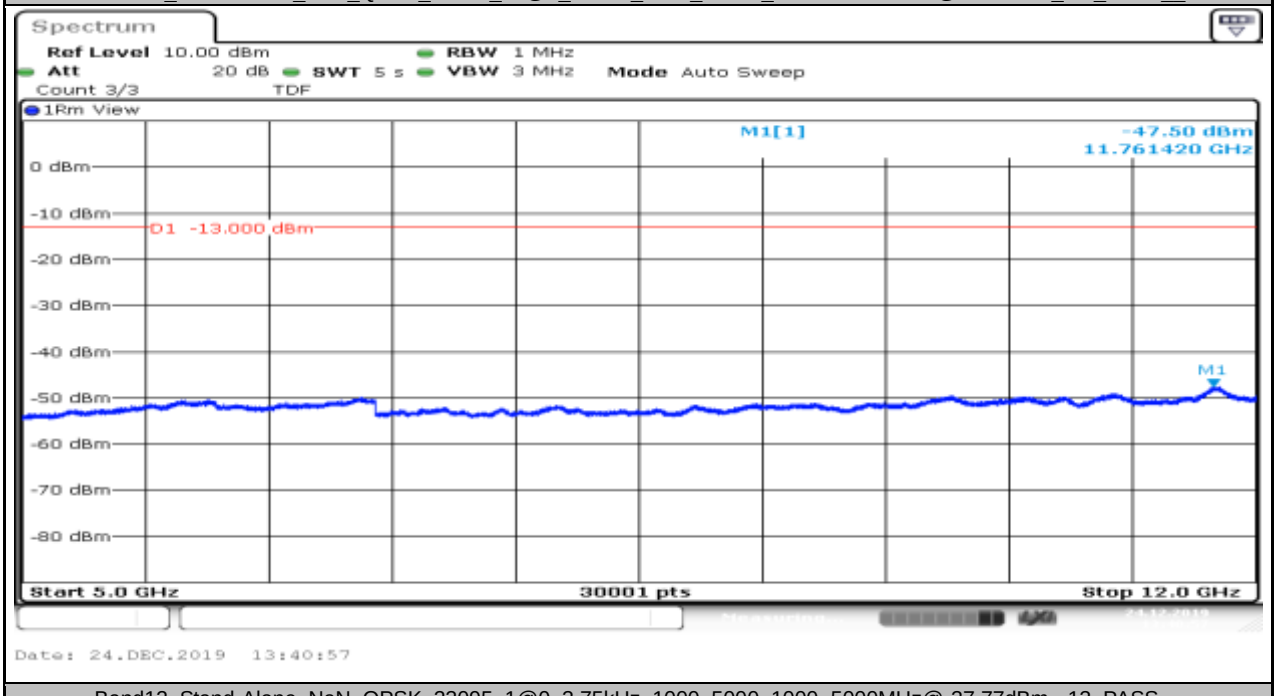
Band12_Stand-Alone_NaN_QPSK_23095_12@0_15kHz_12000_26500_12000~26500MHz@-41.53dBm_-13_PASS__



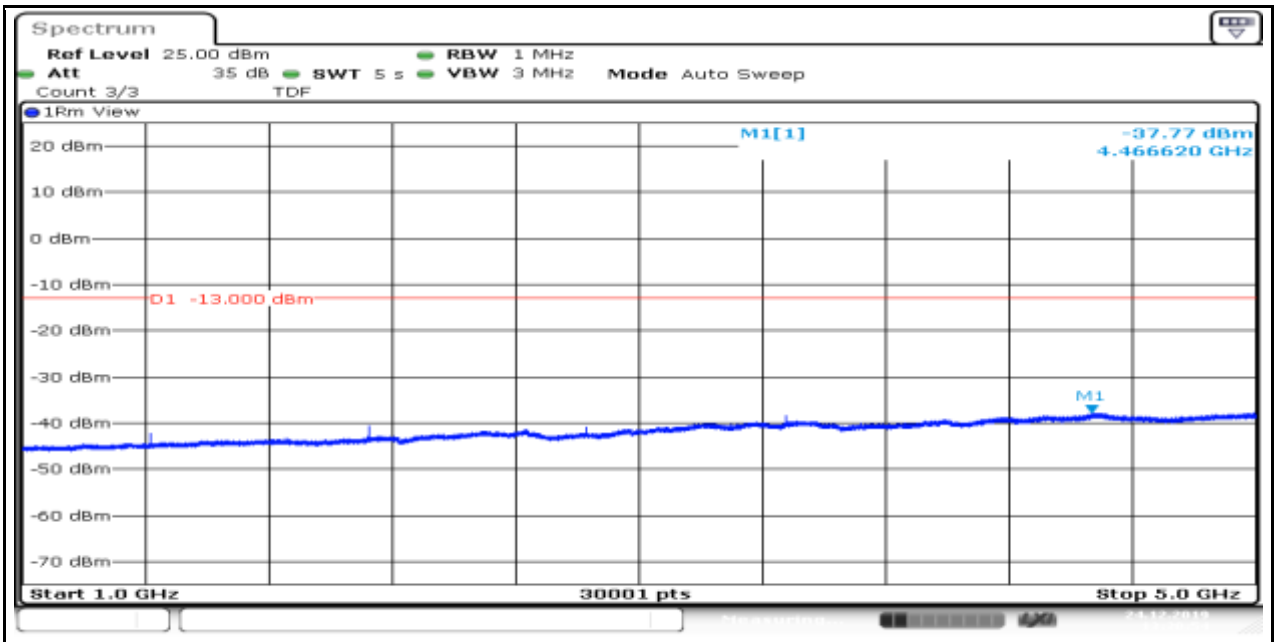
Band12_Stand-Alone_NaN_QPSK_23095_1@0_3.75kHz_12000_26500_12000~26500MHz@-41.39dBm_-13_PASS__



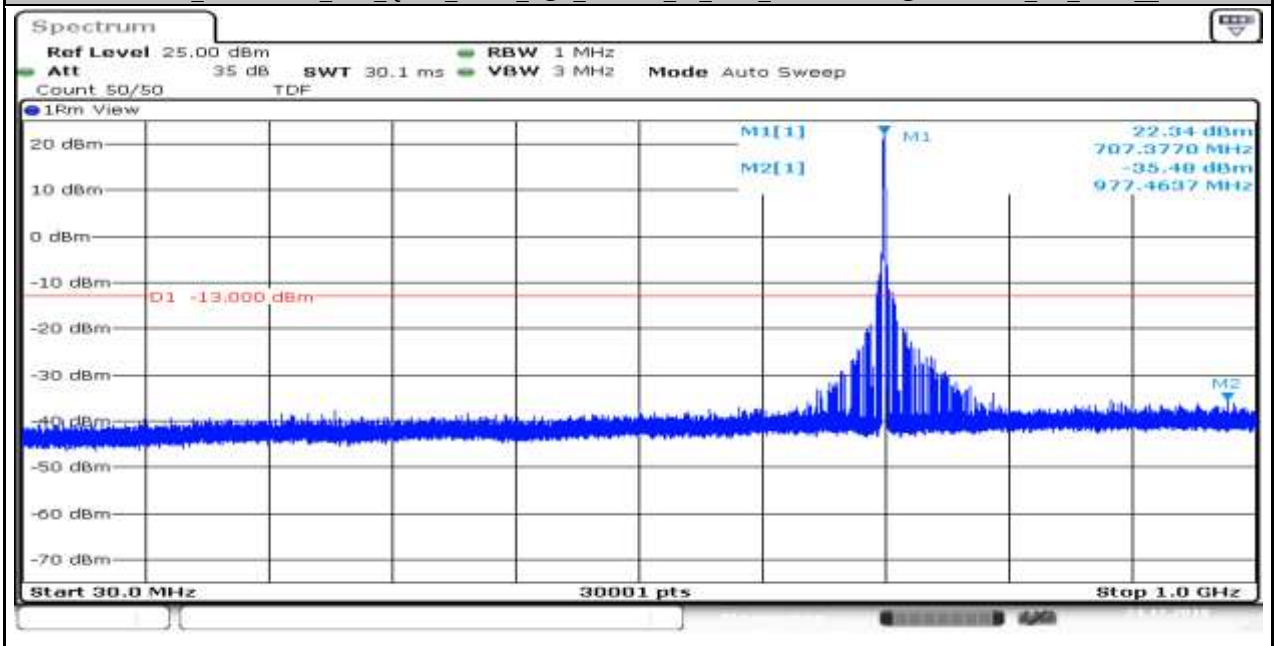
Band12_Stand-Alone_NaN_QPSK_23095_12@0_15kHz_5000_12000_5000~12000MHz@-47.5dBm_-13_PASS__



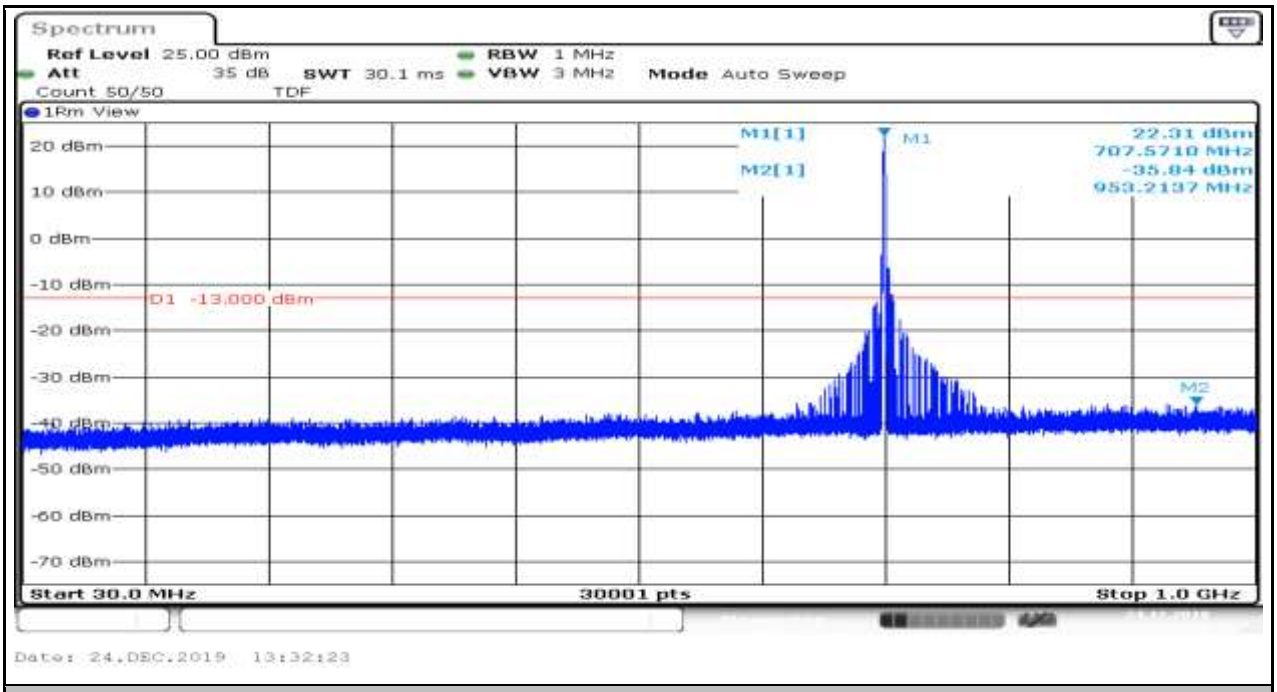
Band12_Stand-Alone_NaN_QPSK_23095_1@0_3.75kHz_1000_5000_1000~5000MHz@-37.77dBm_-13_PASS__



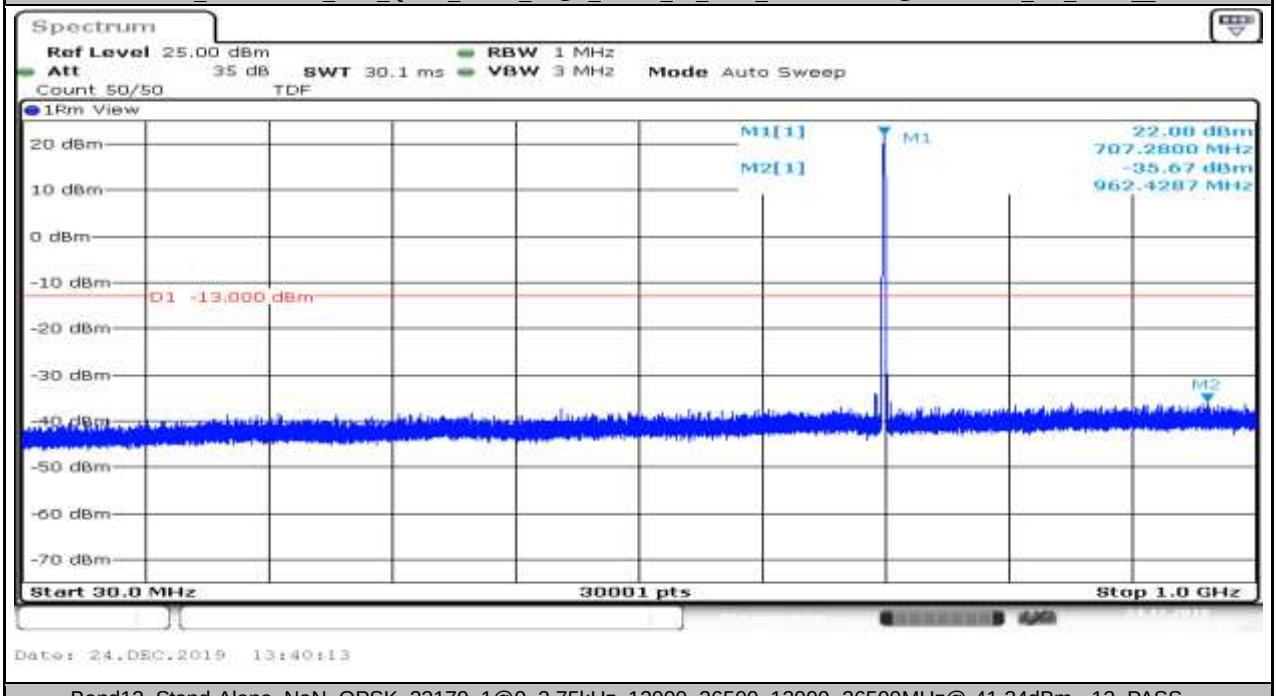
Band12_Stand-Alone_NaN_QPSK_23095_1@0_3.75kHz_30_1000_30~1000MHz@-35.48dBm_-13_PASS__



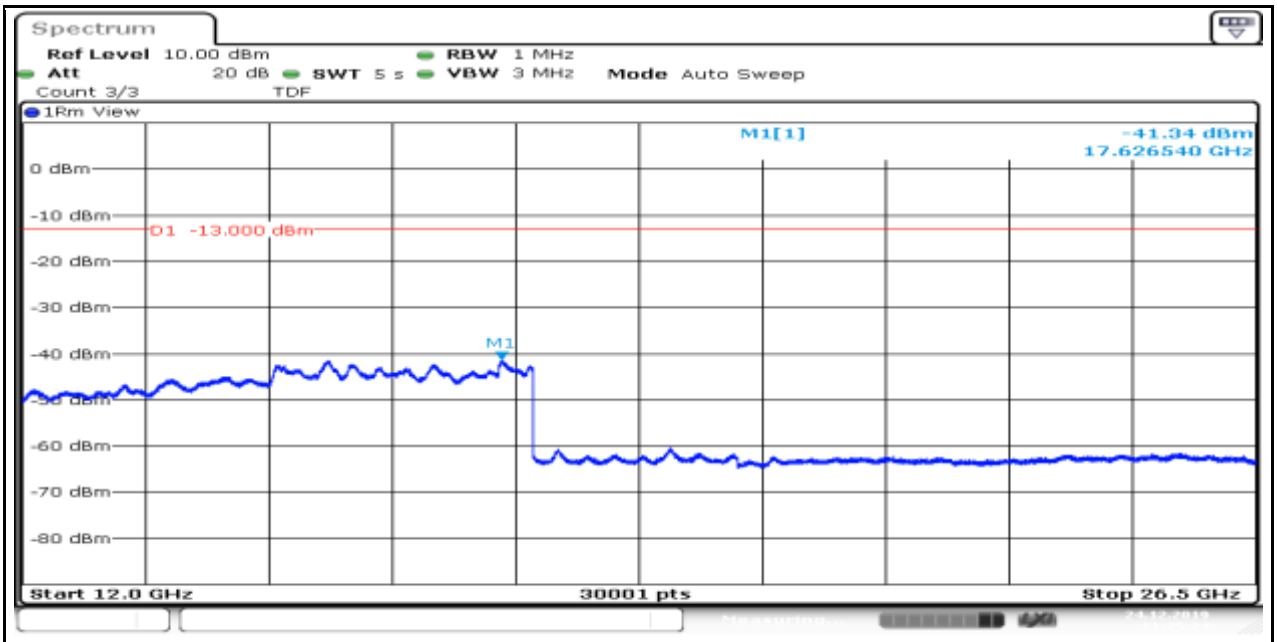
Band12_Stand-Alone_NaN_QPSK_23095_1@47_3.75kHz_30_1000_30~1000MHz@-35.84dBm_-13_PASS__



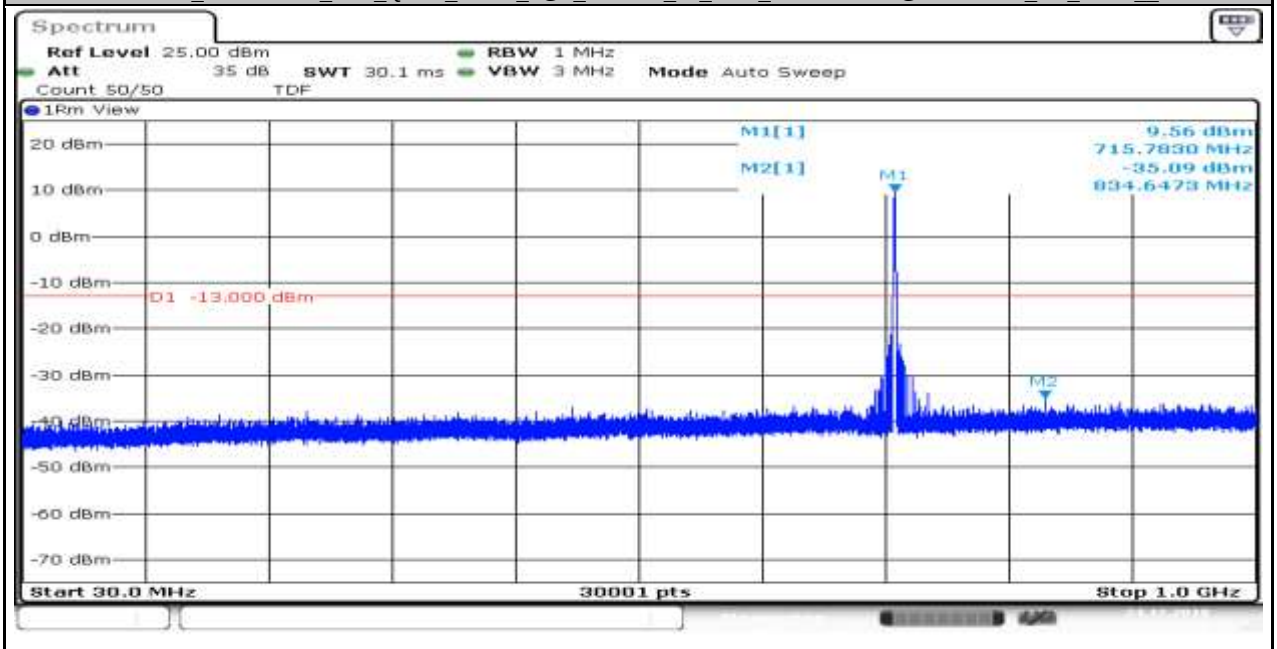
Band12_Stand-Alone_NaN_QPSK_23095_12@0_15kHz_30_1000_30~1000MHz@-35.67dBm_-13_PASS__



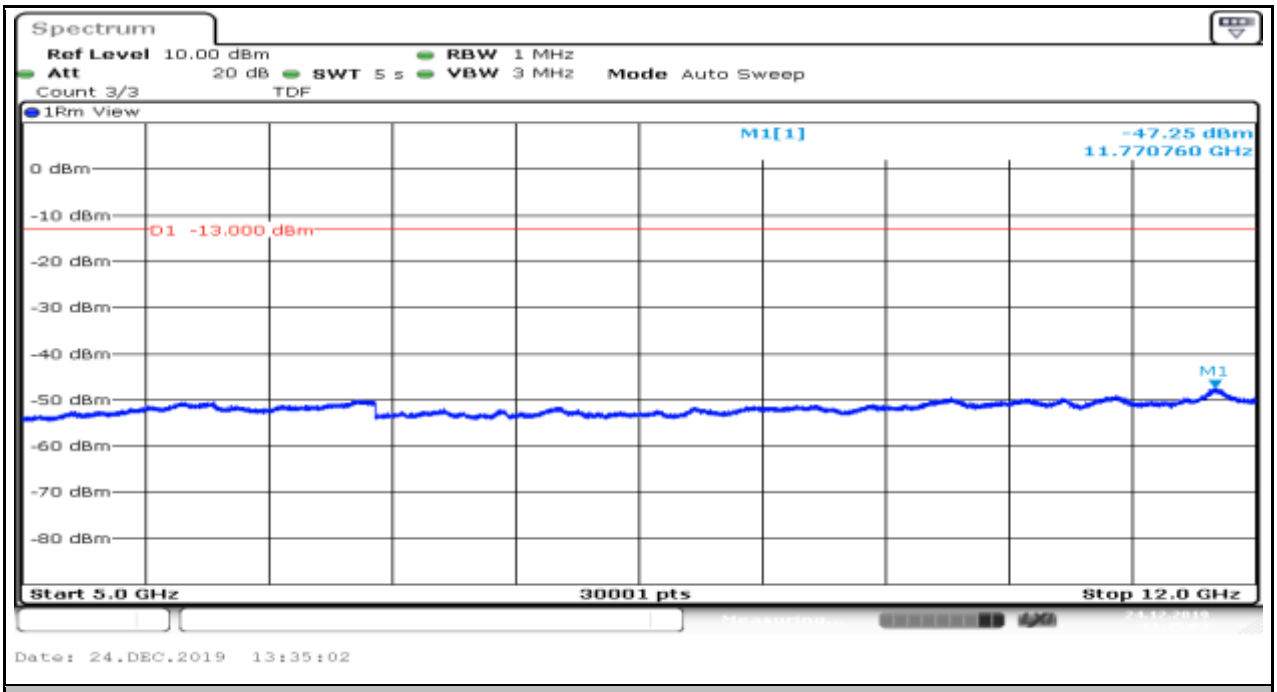
Band12_Stand-Alone_NaN_QPSK_23179_1@0_3.75kHz_12000_26500_12000~26500MHz@-41.34dBm_-13_PASS__



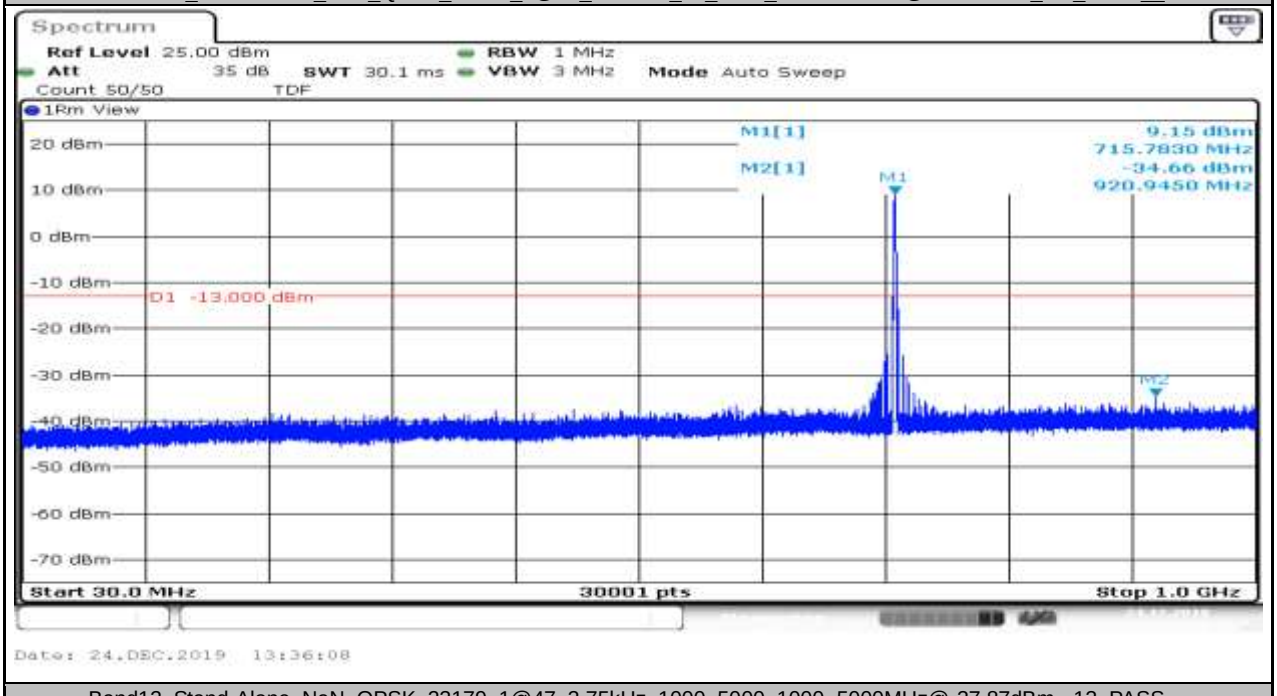
Band12_Stand-Alone_NaN_QPSK_23179_1@0_3.75kHz_30_1000_30~1000MHz@-35.09dBm_-13_PASS__



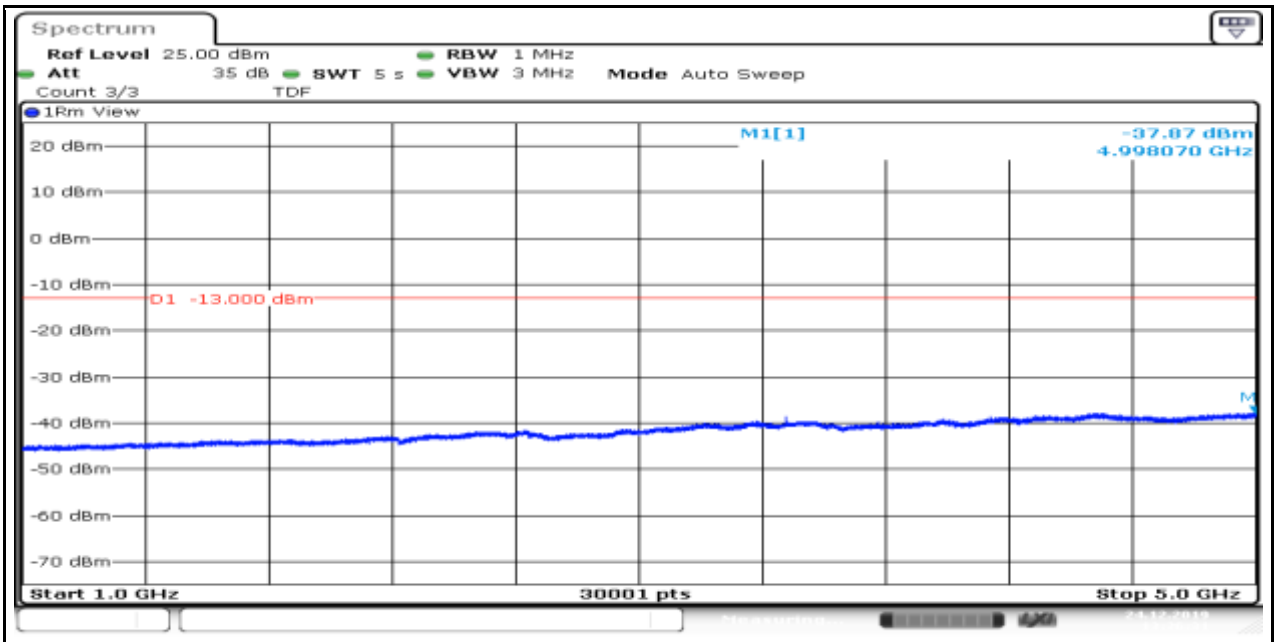
Band12_Stand-Alone_NaN_QPSK_23179_1@0_3.75kHz_5000_12000_5000~12000MHz@-47.25dBm_-13_PASS__



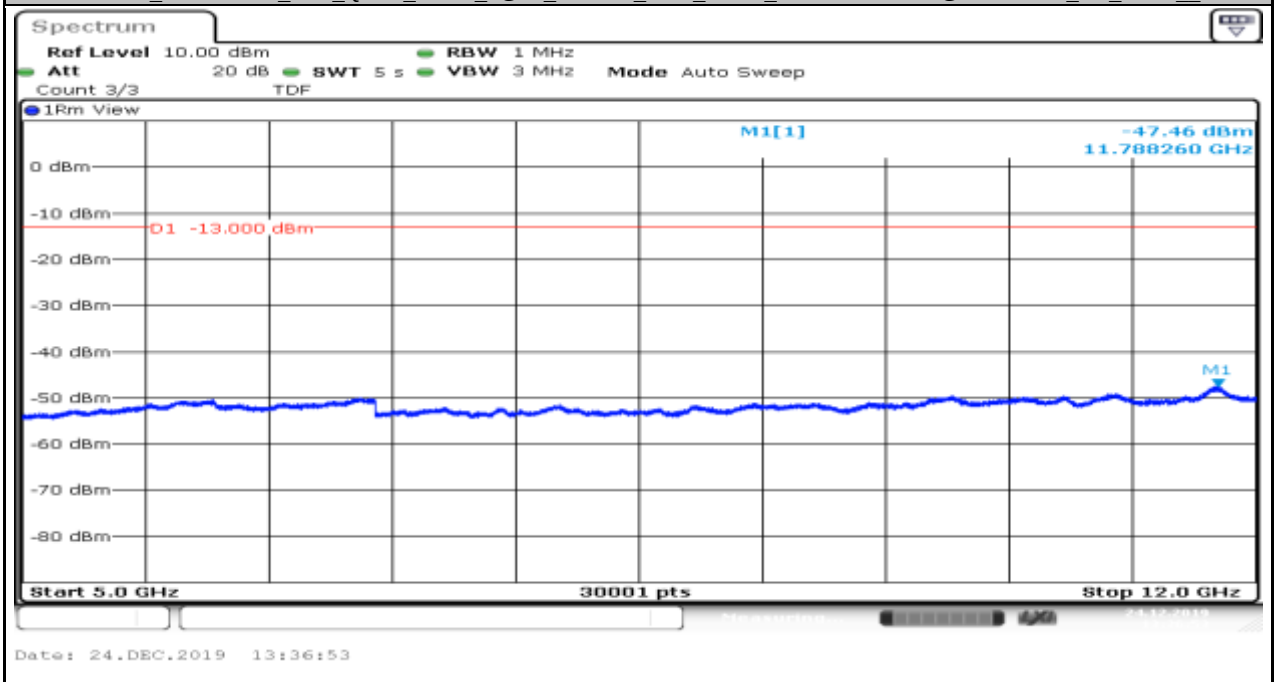
Band12_Stand-Alone_NaN_QPSK_23179_1@47_3.75kHz_30_1000_30~1000MHz@-34.66dBm_-13_PASS__



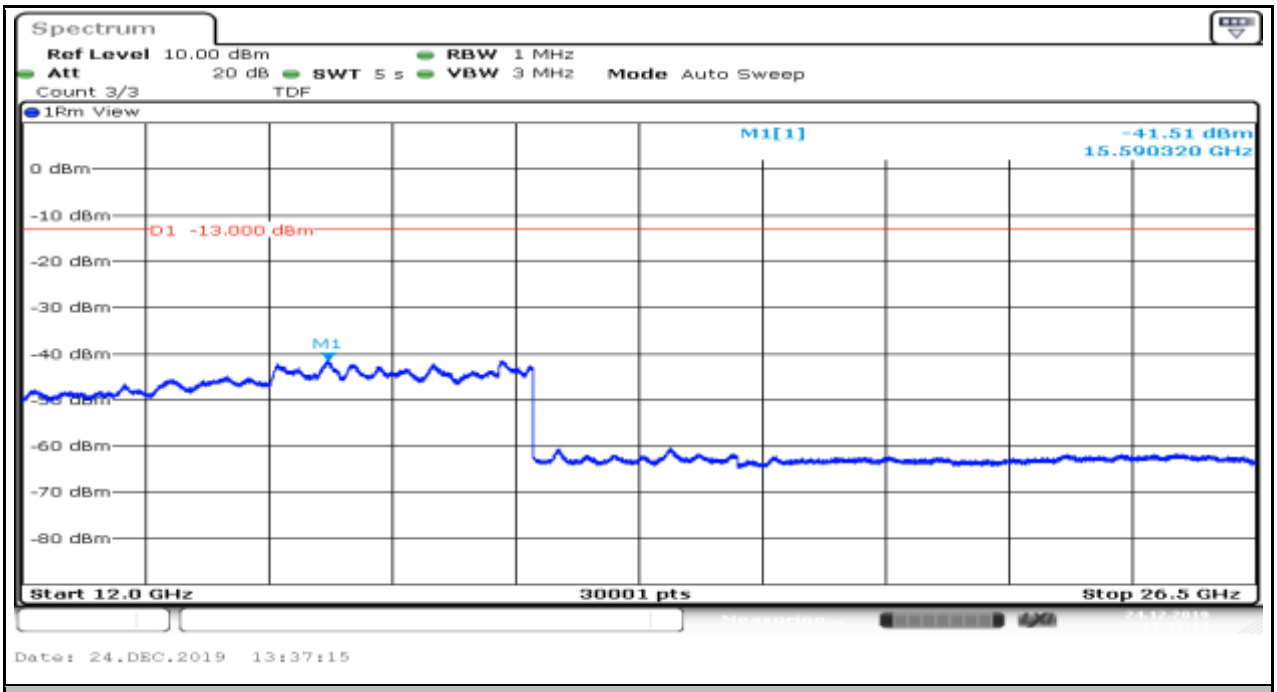
Band12_Stand-Alone_NaN_QPSK_23179_1@47_3.75kHz_1000_5000_1000~5000MHz@-37.87dBm_-13_PASS__



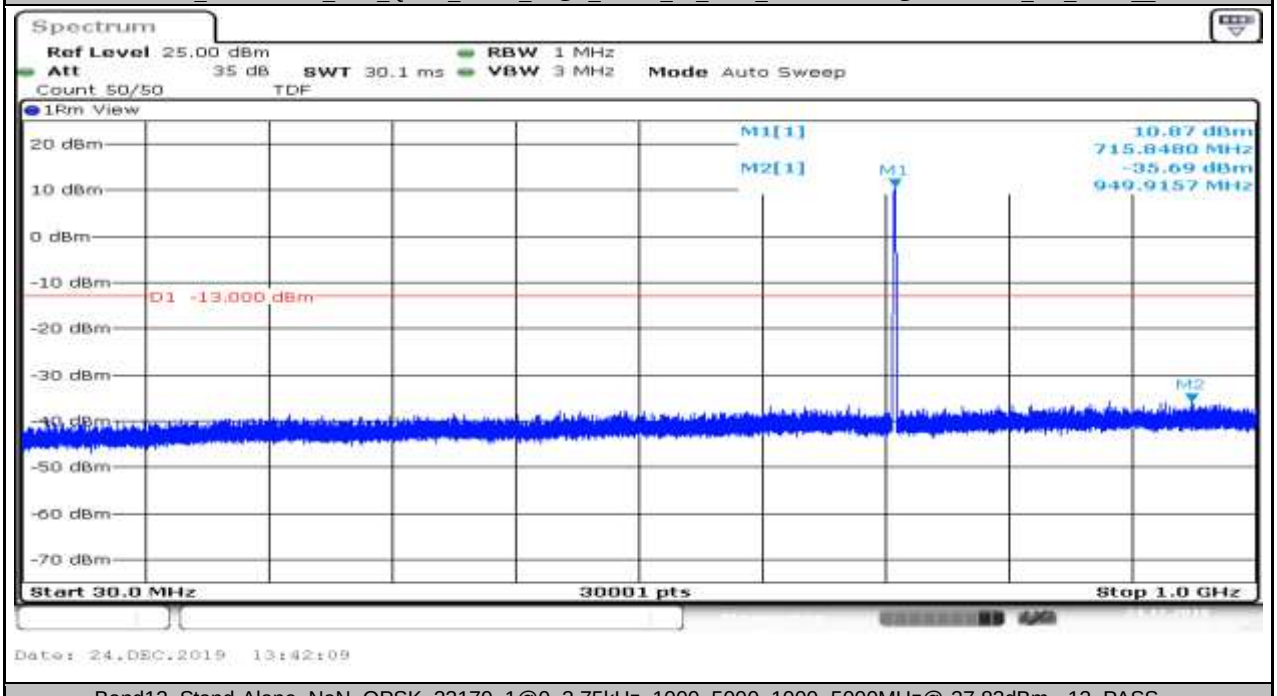
Band12_Stand-Alone_NaN_QPSK_23179_1@47_3.75kHz_5000_12000_5000~12000MHz@-47.46dBm_-13_PASS__



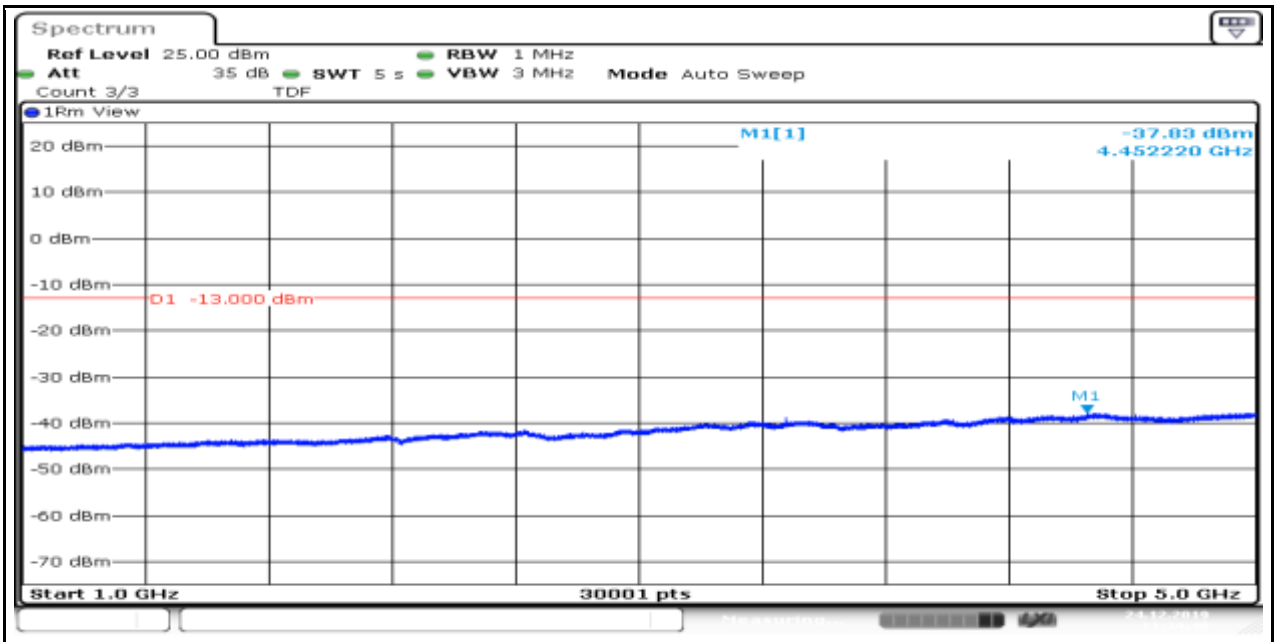
Band12_Stand-Alone_NaN_QPSK_23179_1@47_3.75kHz_12000_26500_12000~26500MHz@-41.51dBm_-13_PASS__



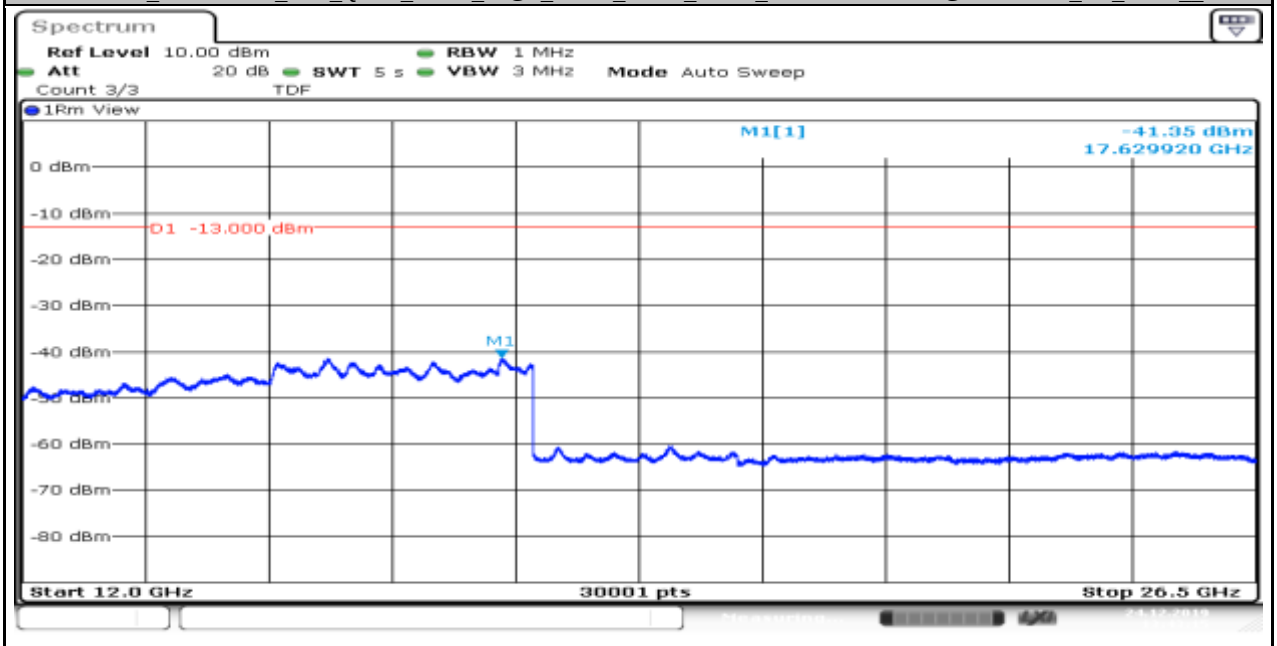
Band12_Stand-Alone_NaN_QPSK_23179_12@0_15kHz_30_1000_30~1000MHz@-35.69dBm_-13_PASS__



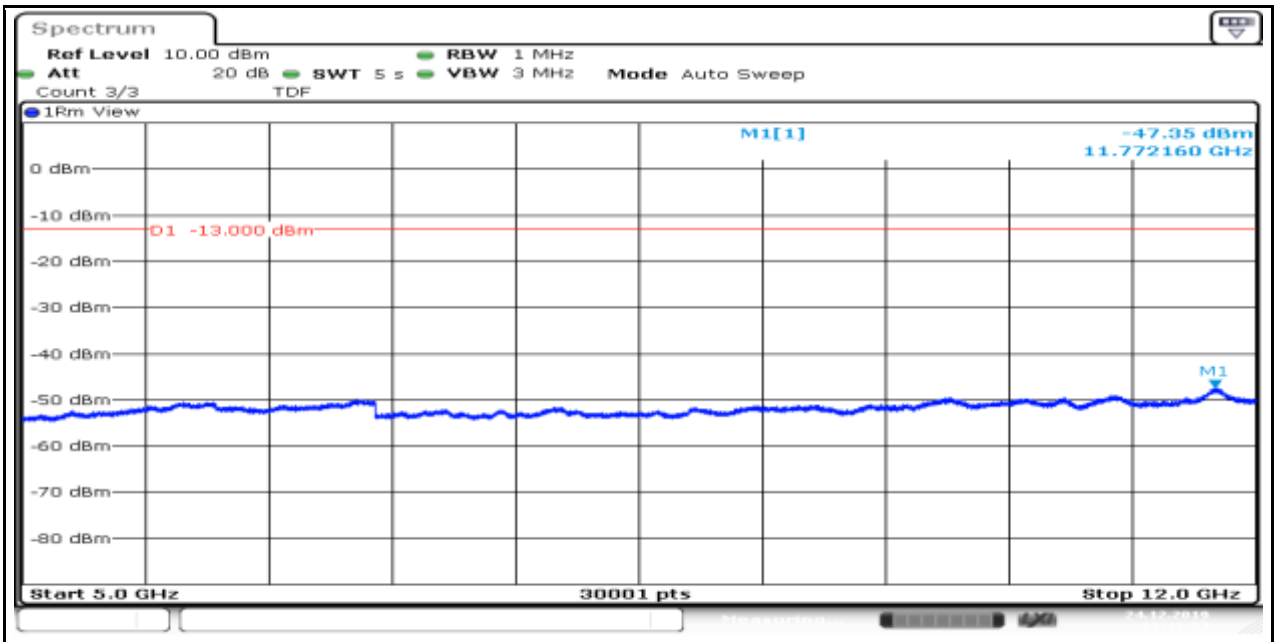
Band12_Stand-Alone_NaN_QPSK_23179_1@0_3.75kHz_1000_5000_1000~5000MHz@-37.83dBm_-13_PASS__



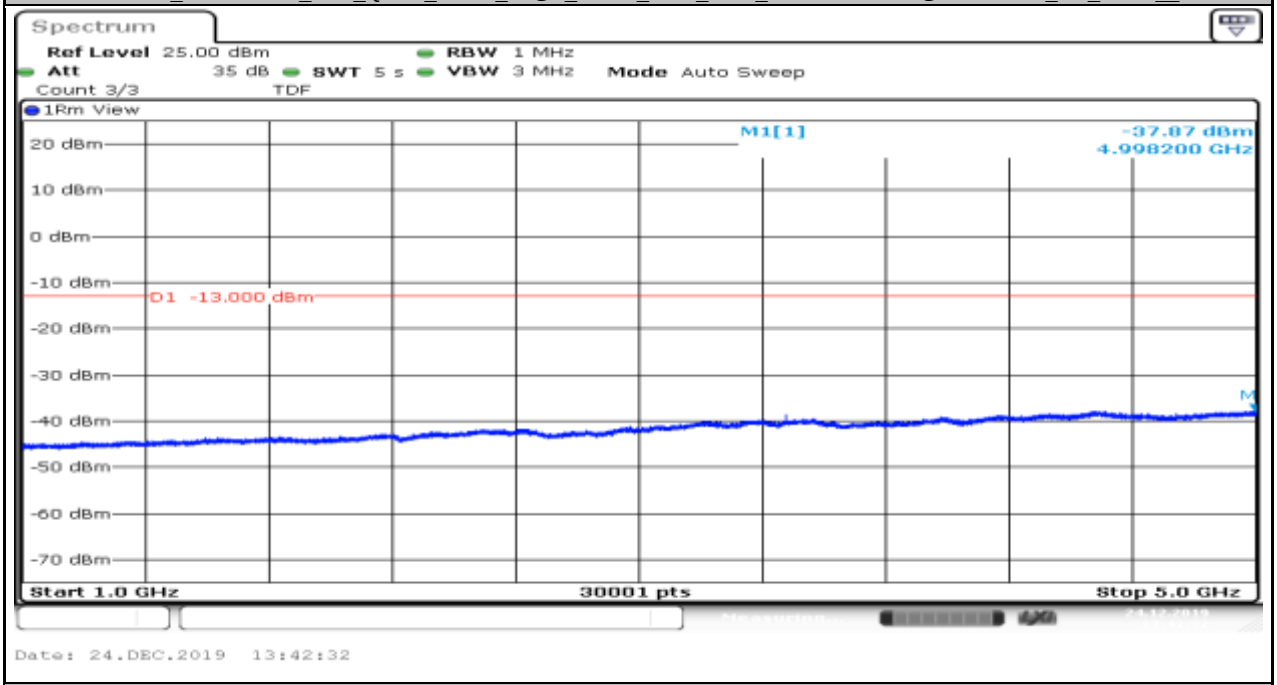
Band12_Stand-Alone_NaN_QPSK_23179_12@0_15kHz_12000_26500_12000~26500MHz@-41.35dBm_-13_PASS__



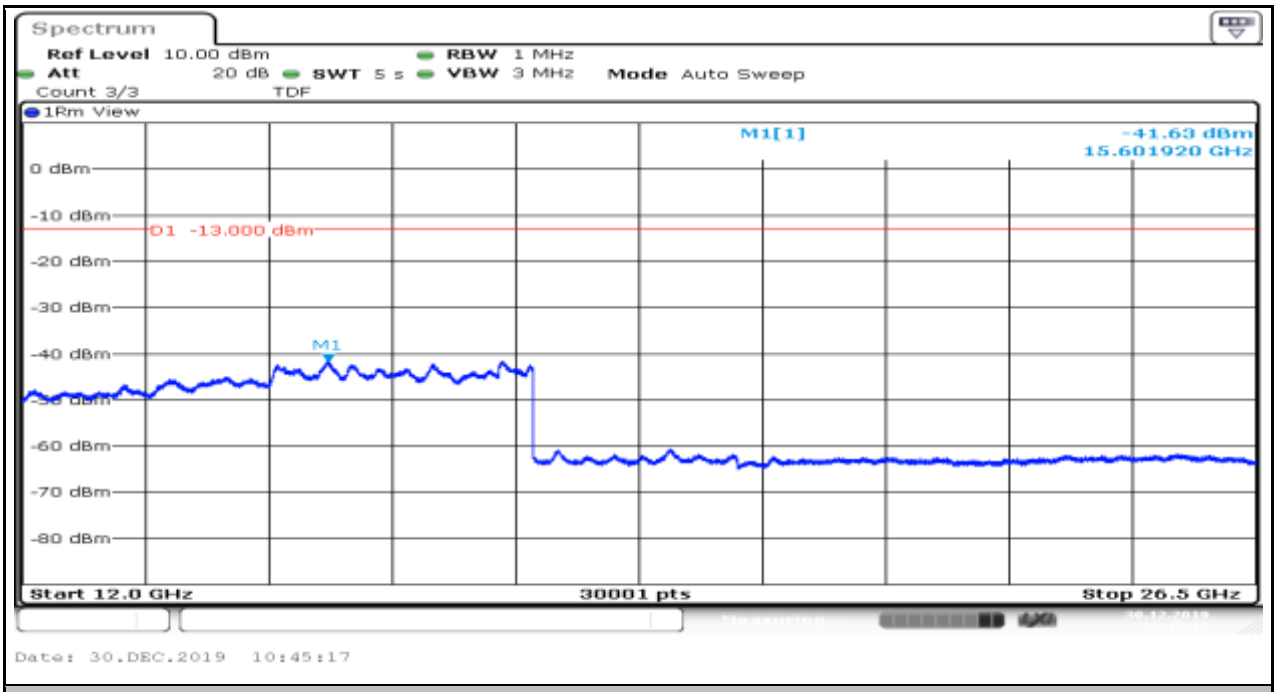
Band12_Stand-Alone_NaN_QPSK_23179_12@0_15kHz_5000_12000_5000~12000MHz@-47.35dBm_-13_PASS__



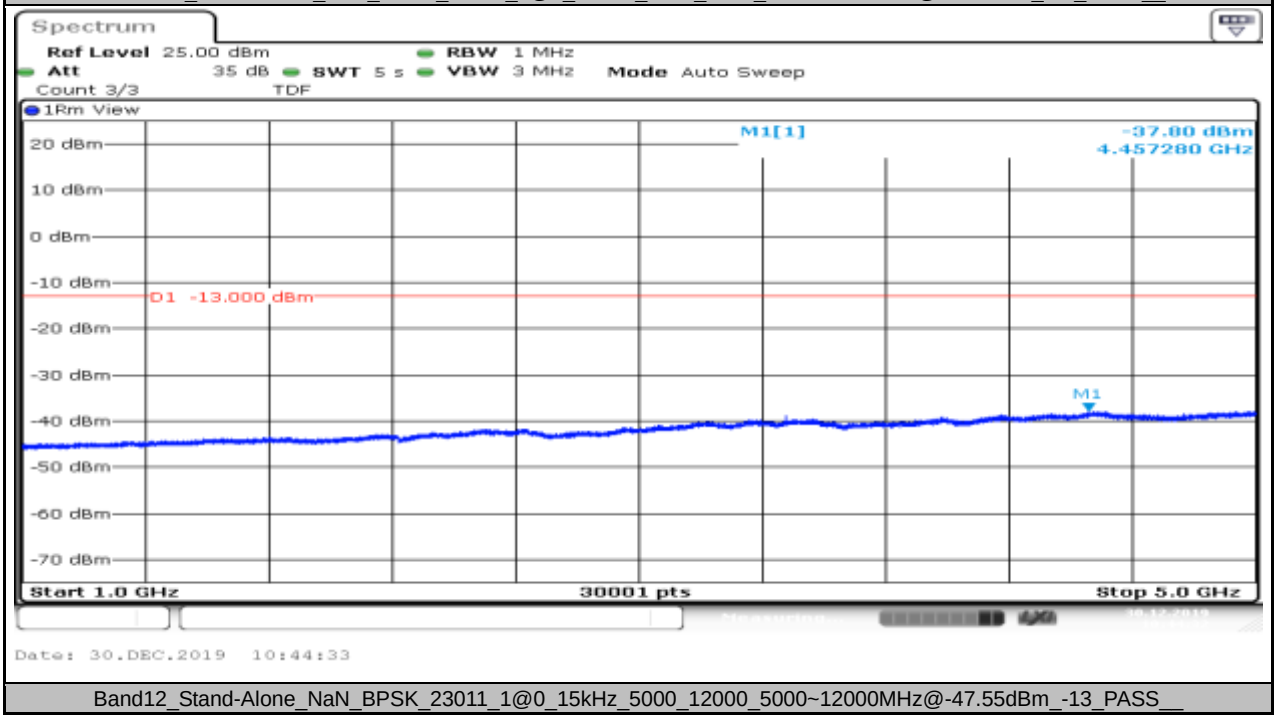
Band12_Stand-Alone_NaN_QPSK_23179_12@0_15kHz_1000_5000_1000~5000MHz@-37.87dBm_-13_PASS__



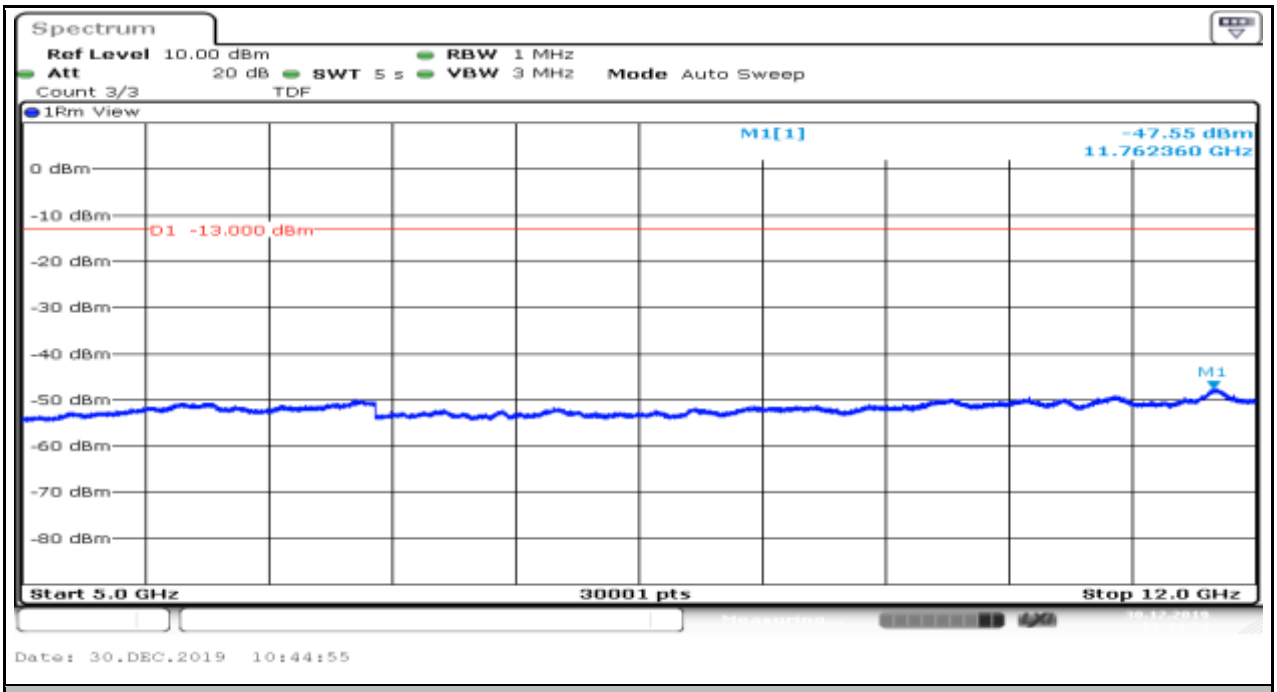
Band12_Stand-Alone_NaN_BPSK_23011_1@0_15kHz_12000_26500_12000~26500MHz@-41.63dBm_-13_PASS__



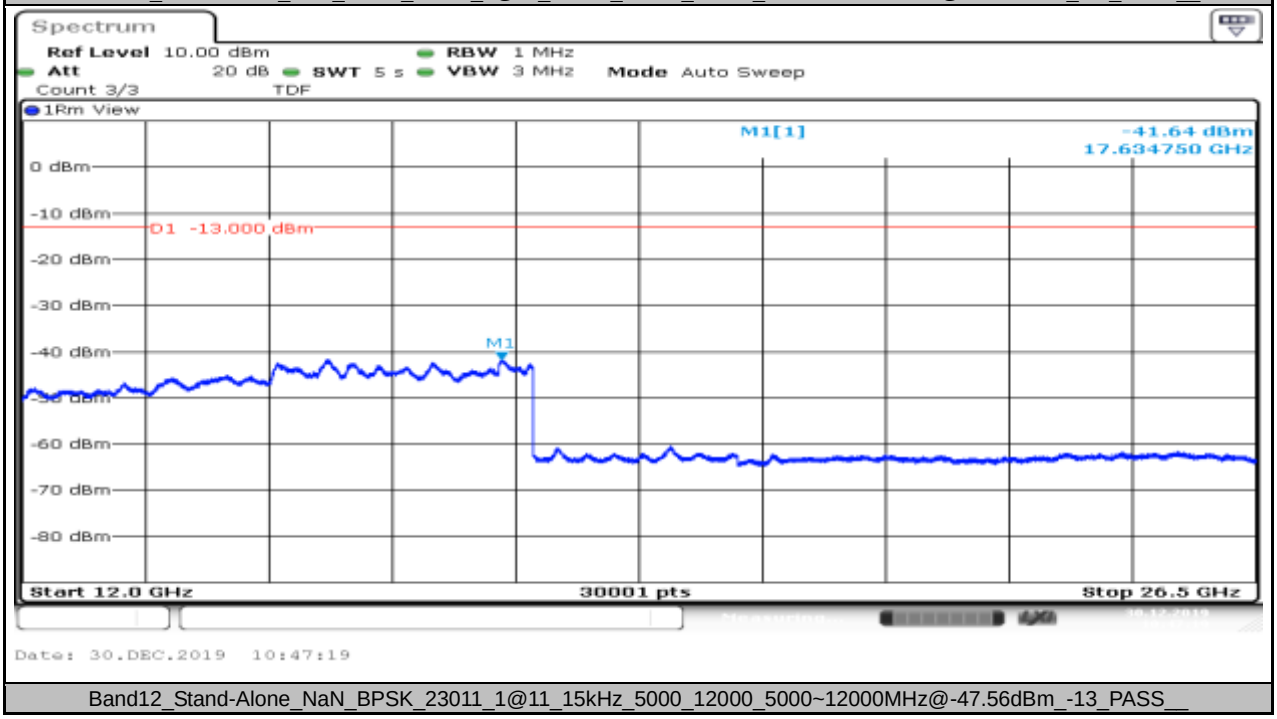
Band12_Stand-Alone_NaN_BPSK_23011_1@0_15kHz_1000_5000_1000~5000MHz@-37.8dBm_-13_PASS__



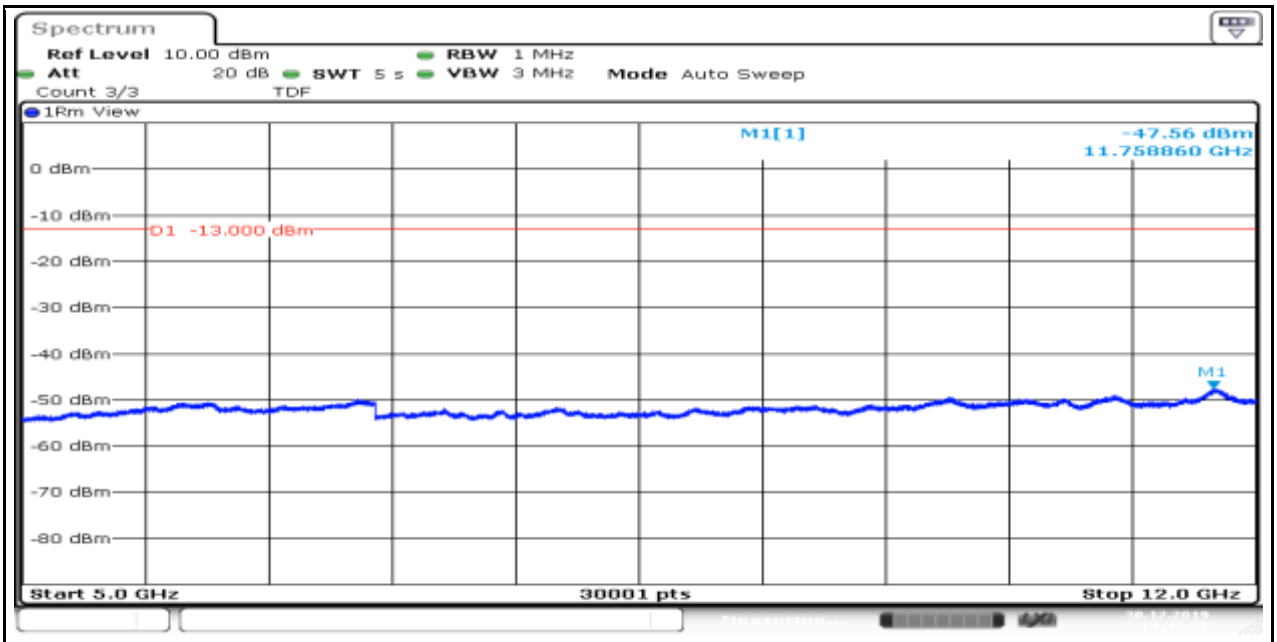
Band12_Stand-Alone_NaN_BPSK_23011_1@0_15kHz_5000_12000_5000~12000MHz@-47.55dBm_-13_PASS__



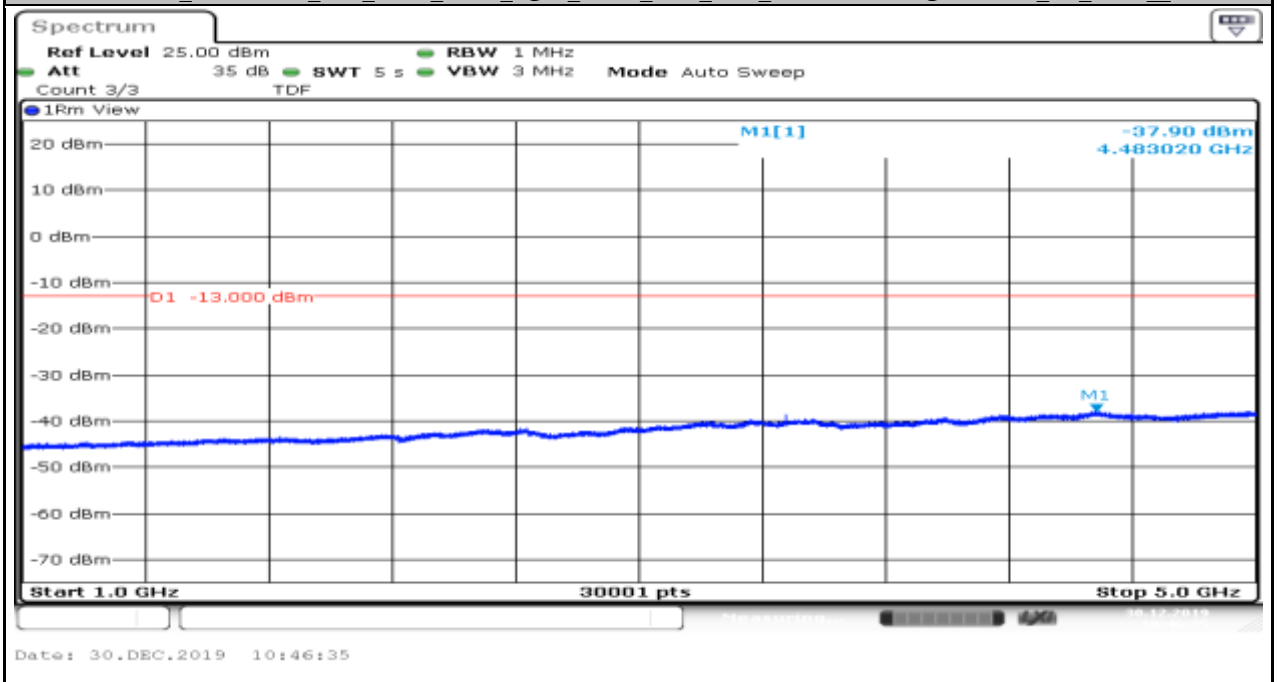
Band12_Stand-Alone_NaN_BPSK_23011_1@11_15kHz_12000_26500_12000~26500MHz@-41.64dBm_-13_PASS__



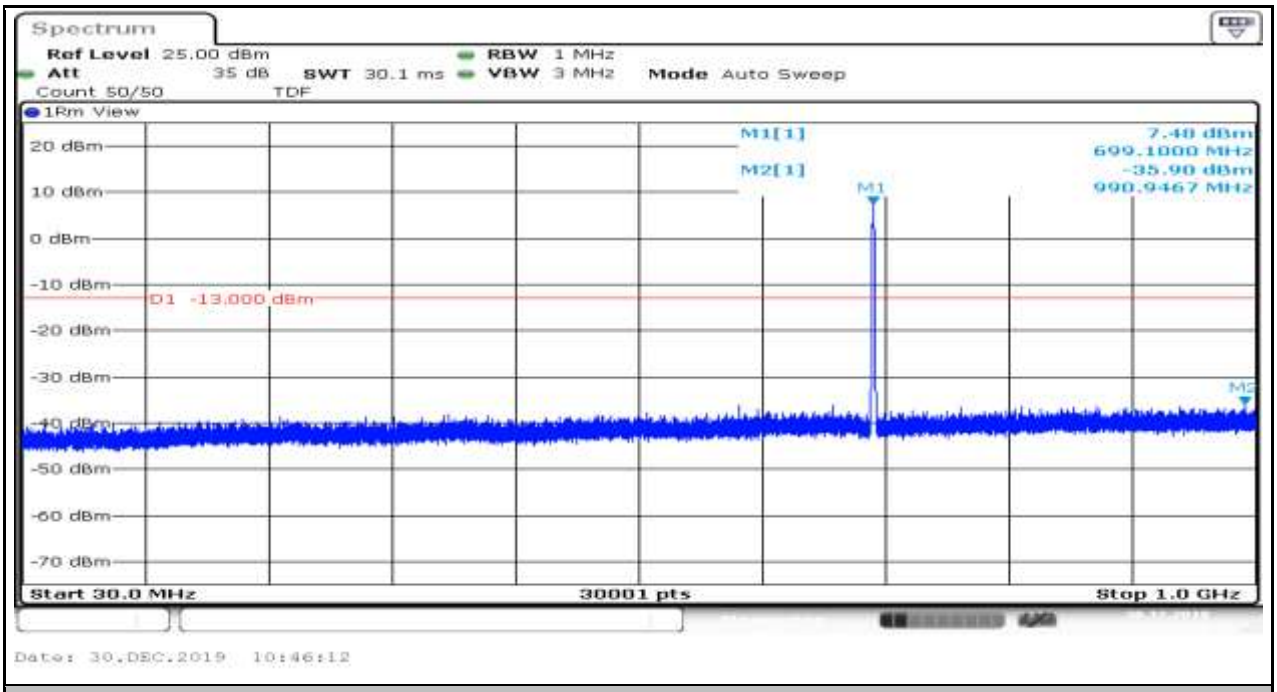
Band12_Stand-Alone_NaN_BPSK_23011_1@11_15kHz_5000_12000_5000~12000MHz@-47.56dBm_-13_PASS__



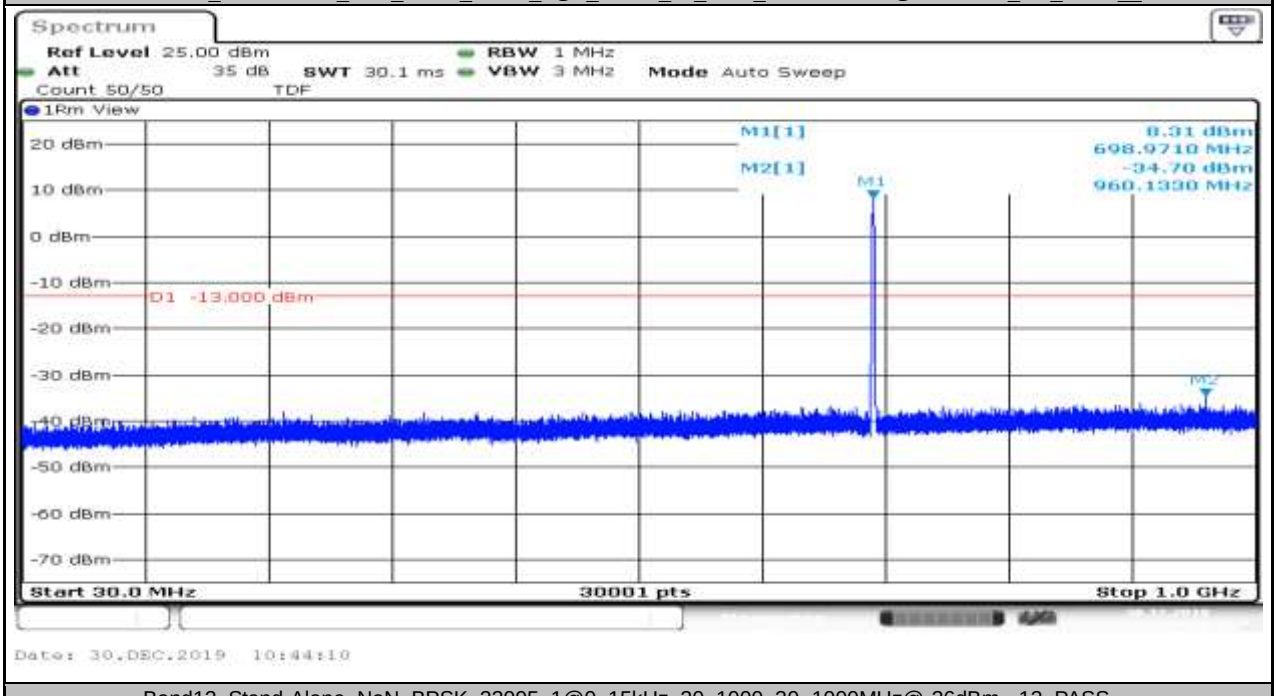
Band12_Stand-Alone_NaN_BPSK_23011_1@11_15kHz_1000_5000_1000~5000MHz@-37.9dBm_-13_PASS__



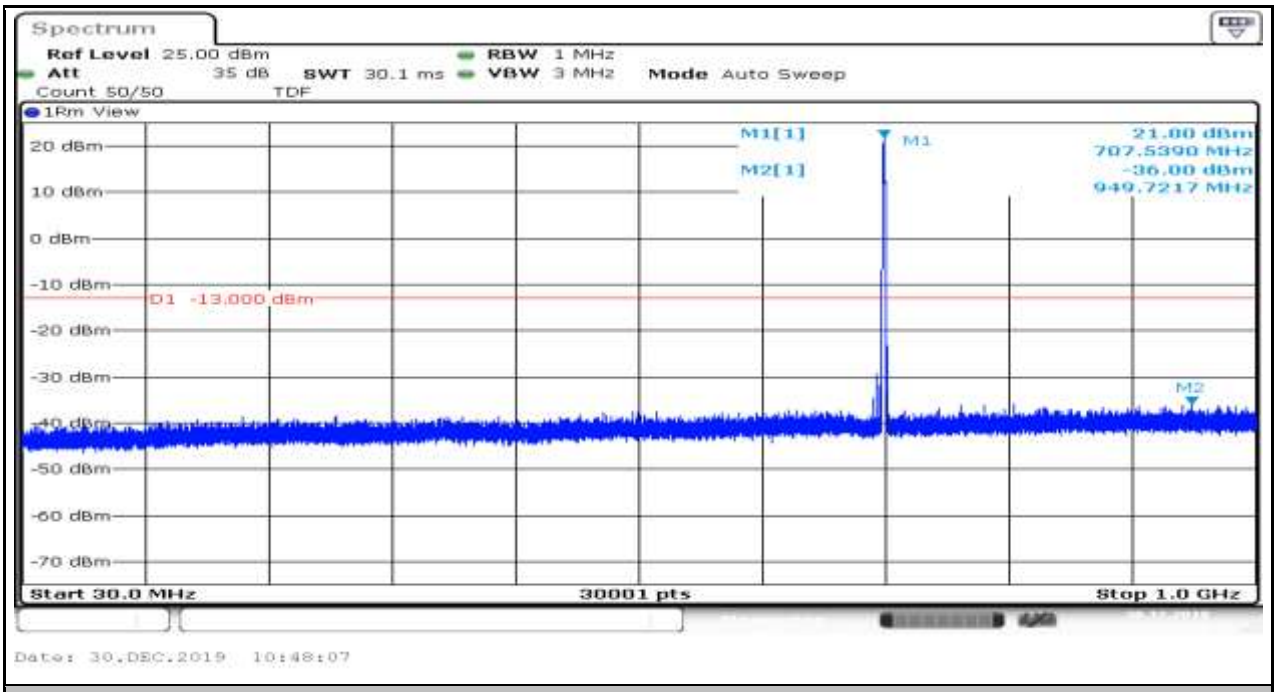
Band12_Stand-Alone_NaN_BPSK_23011_1@11_15kHz_30_1000_30~1000MHz@-35.9dBm_-13_PASS__



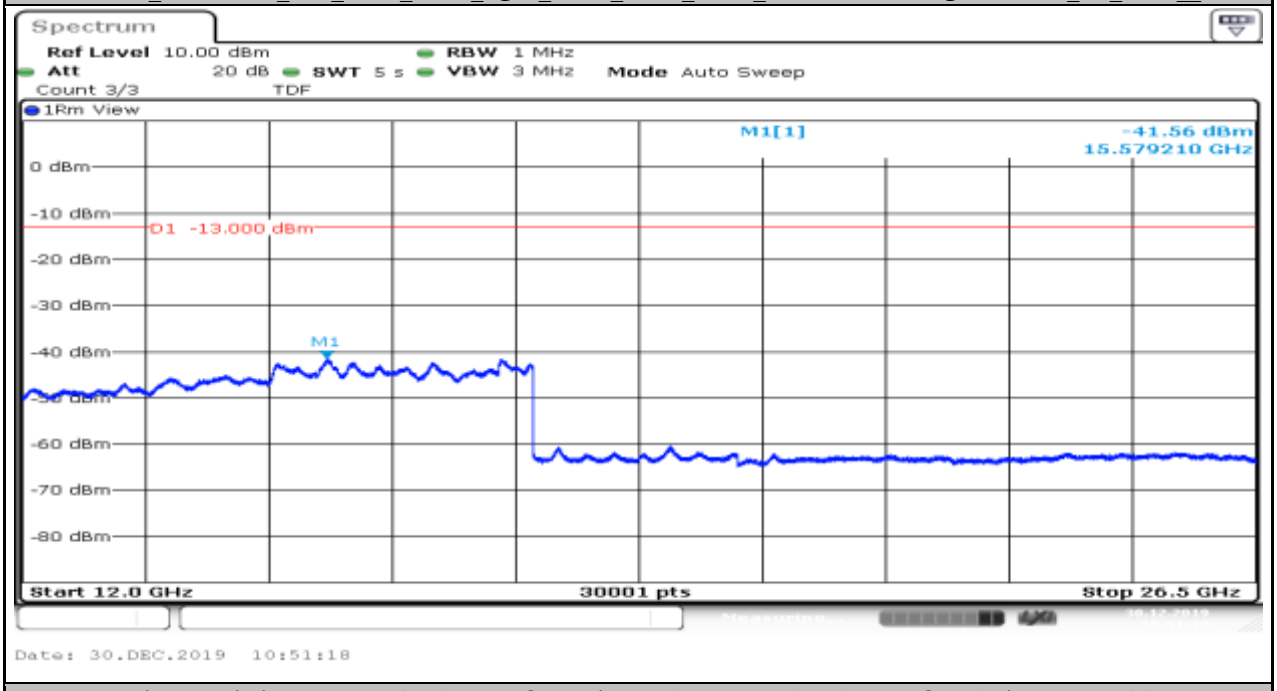
Band12_Stand-Alone_NaN_BPSK_23011_1@0_15kHz_30_1000_30~1000MHz@-34.7dBm_-13_PASS__



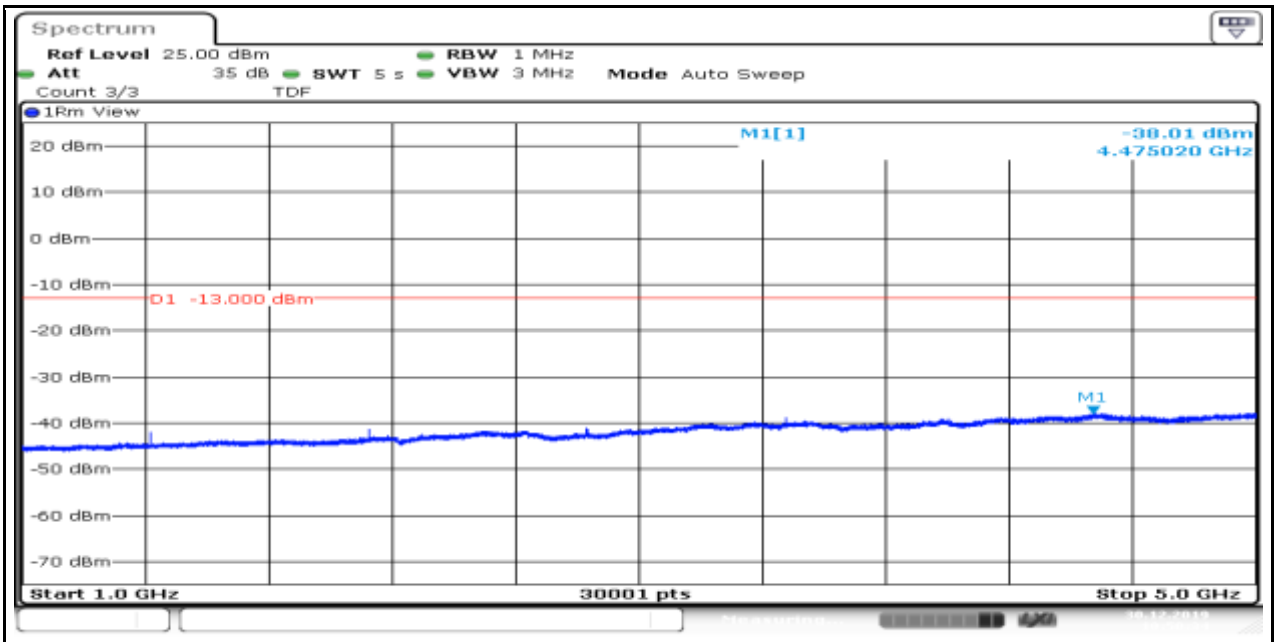
Band12_Stand-Alone_NaN_BPSK_23095_1@0_15kHz_30_1000_30~1000MHz@-36dBm_-13_PASS__



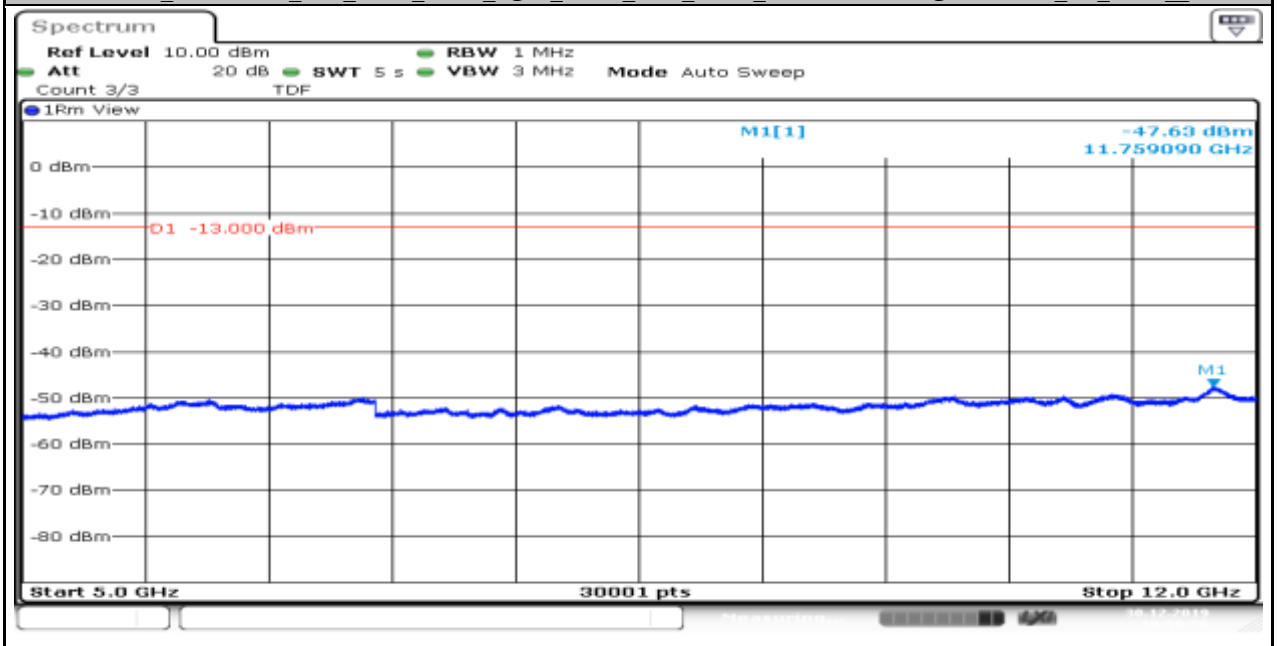
Band12_Stand-Alone_NaN_BPSK_23095_1@11_15kHz_12000_26500_12000~26500MHz@-41.56dBm_-13_PASS__



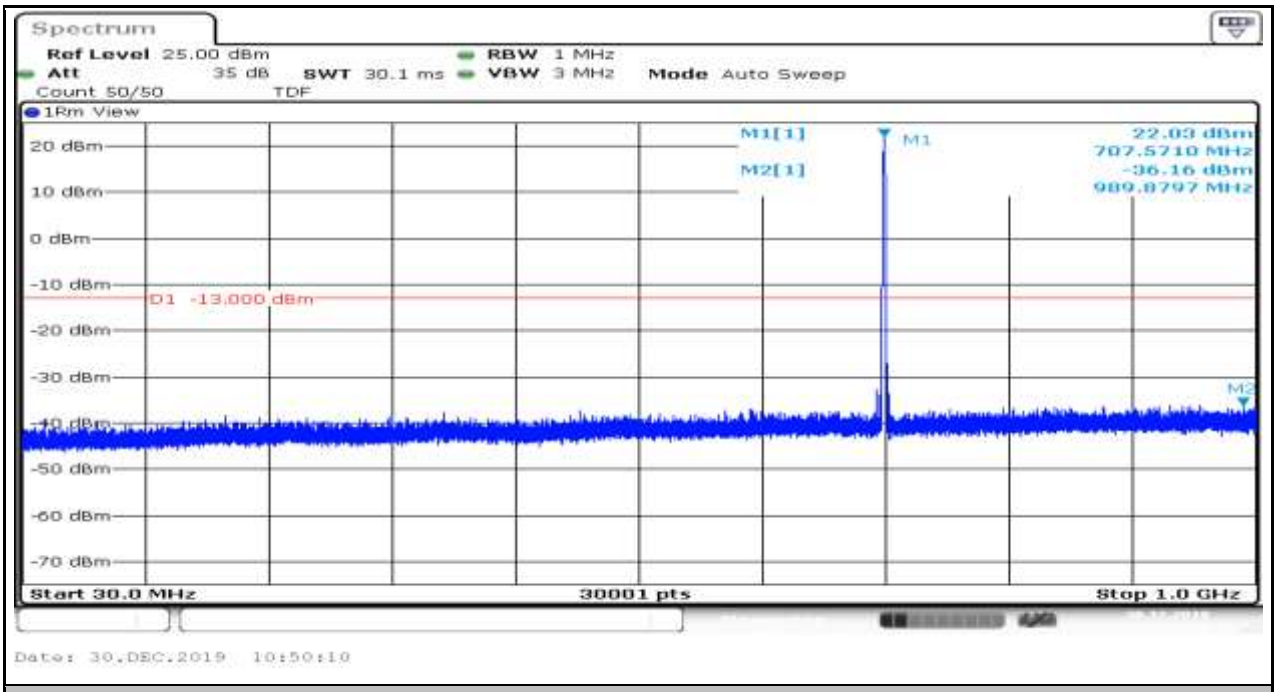
Band12_Stand-Alone_NaN_BPSK_23095_1@11_15kHz_1000_5000_1000~5000MHz@-38.01dBm_-13_PASS__



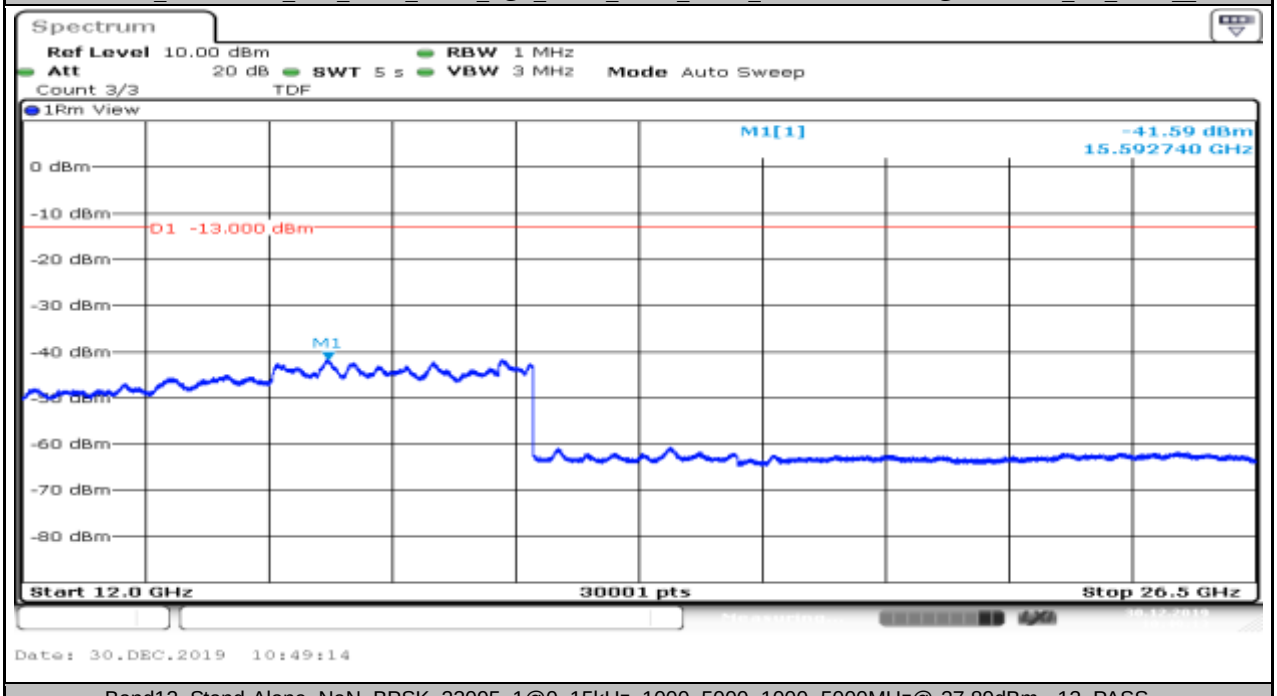
Band12_Stand-Alone_NaN_BPSK_23095_1@11_15kHz_5000_12000_5000~12000MHz@-47.63dBm_-13_PASS__



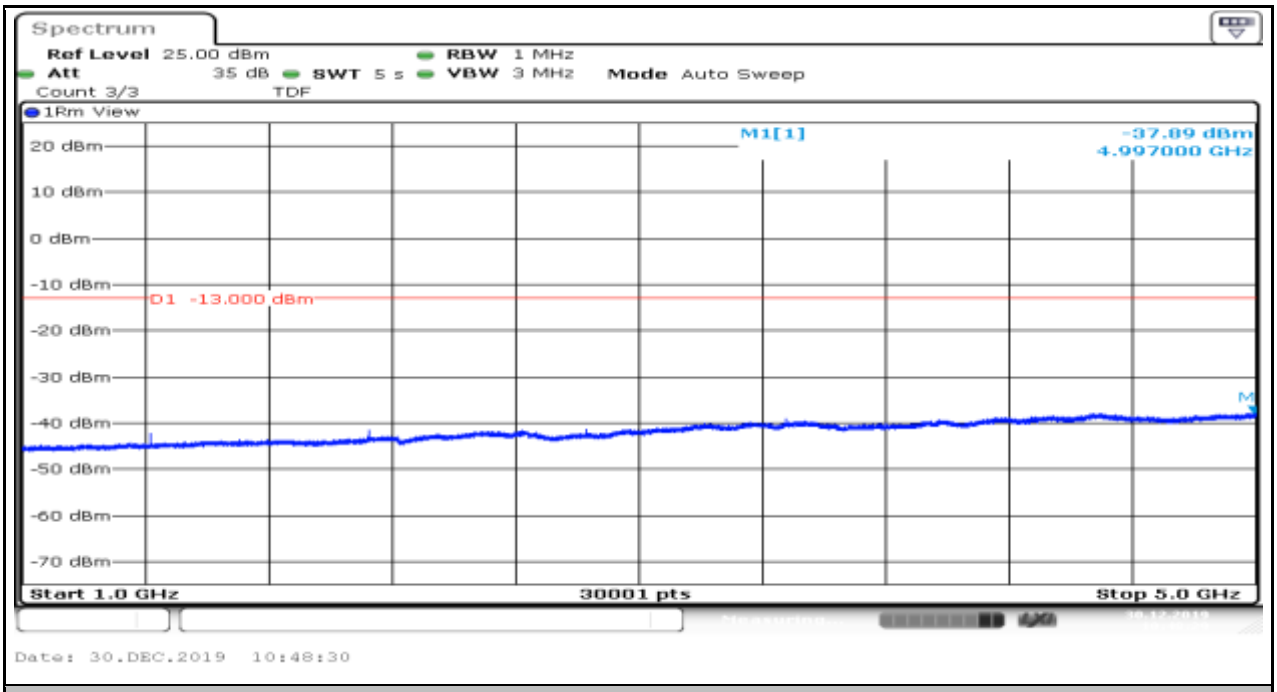
Band12_Stand-Alone_NaN_BPSK_23095_1@11_15kHz_30_1000_30~1000MHz@-36.16dBm_-13_PASS__



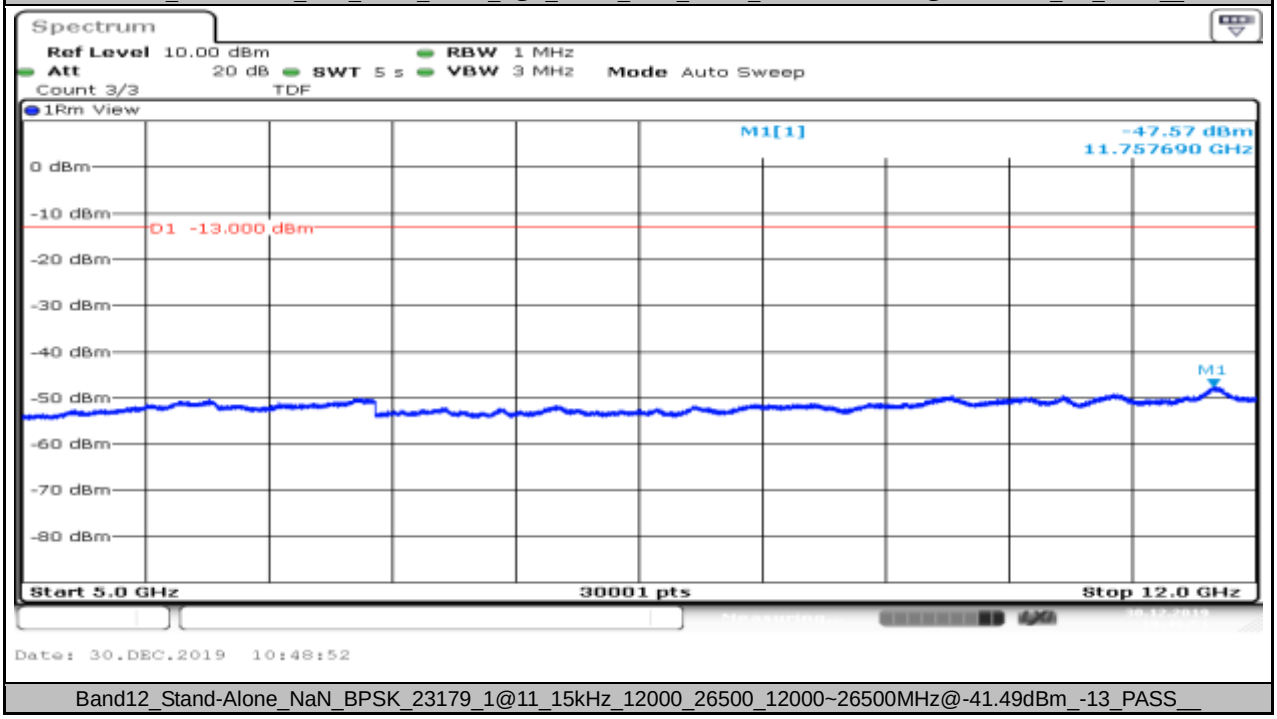
Band12_Stand-Alone_NaN_BPSK_23095_1@0_15kHz_12000_26500_12000~26500MHz@-41.59dBm_-13_PASS__



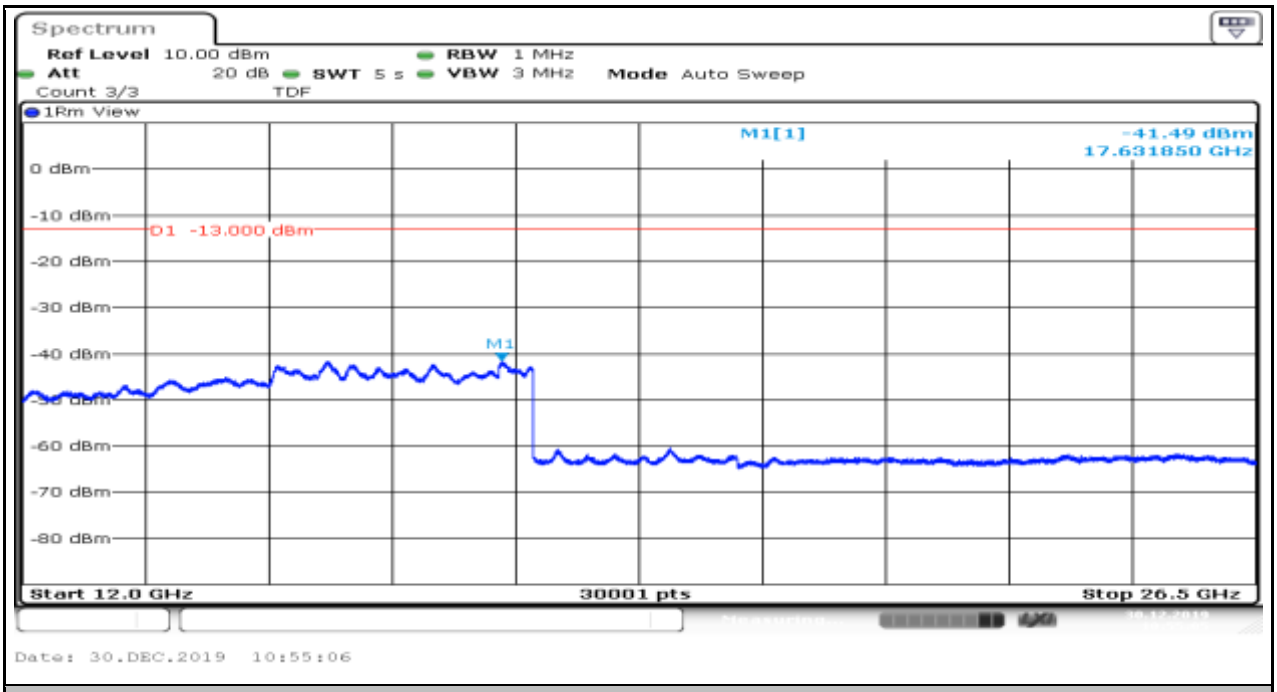
Band12_Stand-Alone_NaN_BPSK_23095_1@0_15kHz_1000_5000_1000~5000MHz@-37.89dBm_-13_PASS__



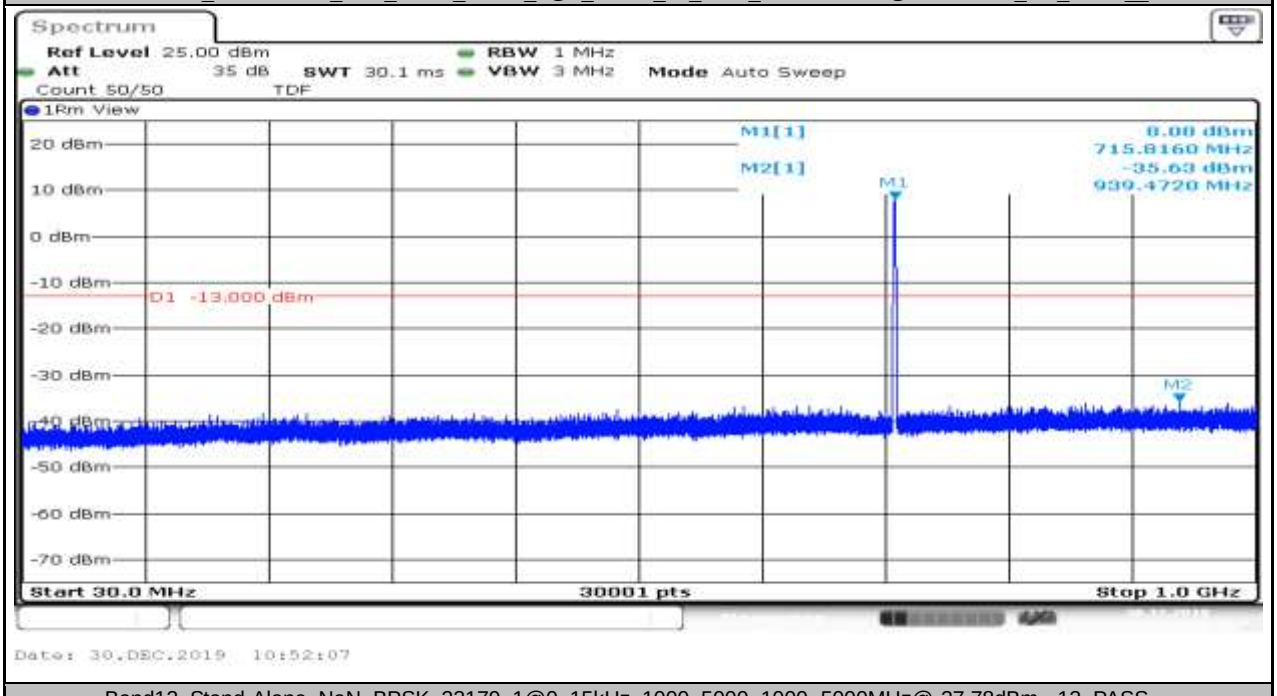
Band12_Stand-Alone_NaN_BPSK_23095_1@0_15kHz_5000_12000_5000~12000MHz@-47.57dBm_-13_PASS__



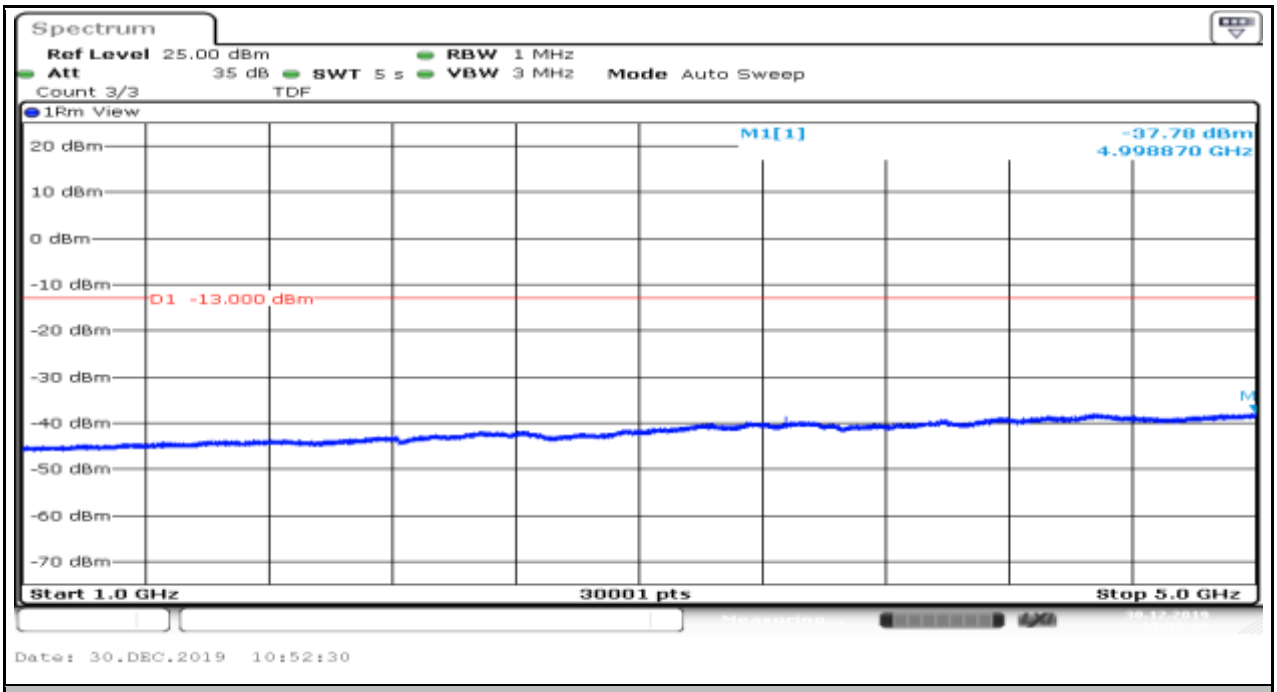
Band12_Stand-Alone_NaN_BPSK_23179_1@11_15kHz_12000_26500_12000~26500MHz@-41.49dBm_-13_PASS__



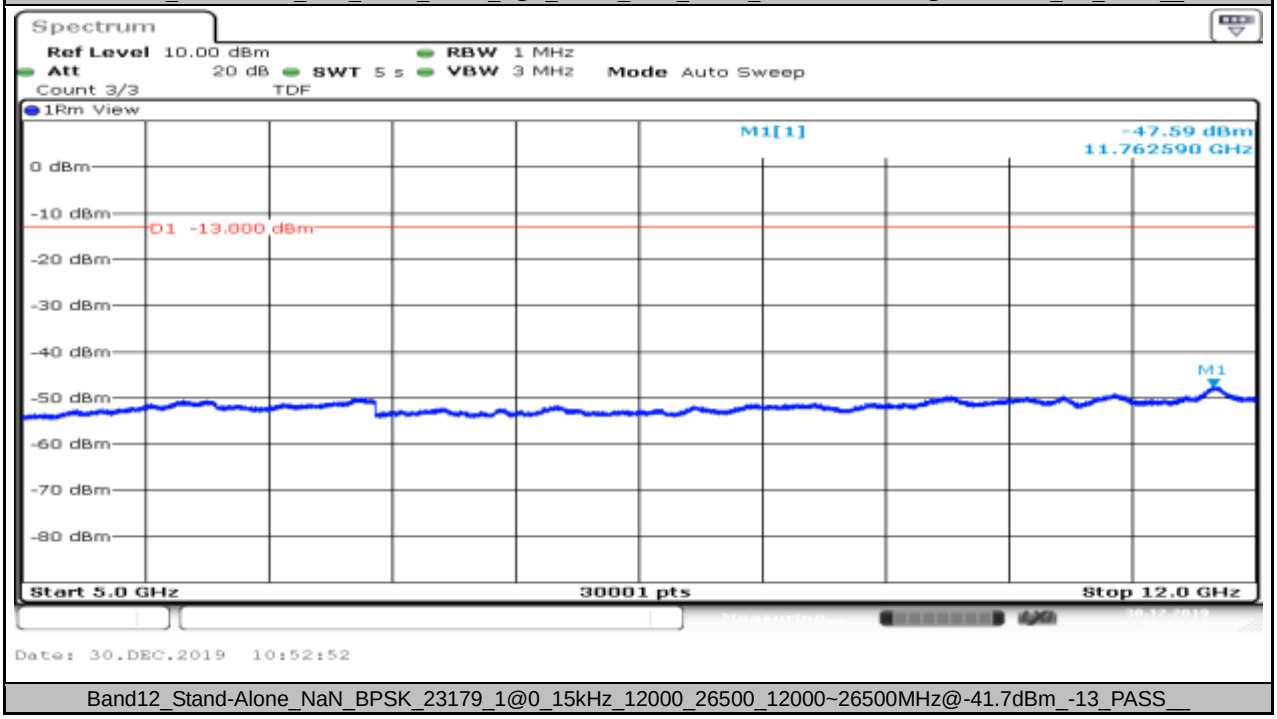
Band12_Stand-Alone_NaN_BPSK_23179_1@0_15kHz_30_1000_30~1000MHz@-35.63dBm_-13_PASS__



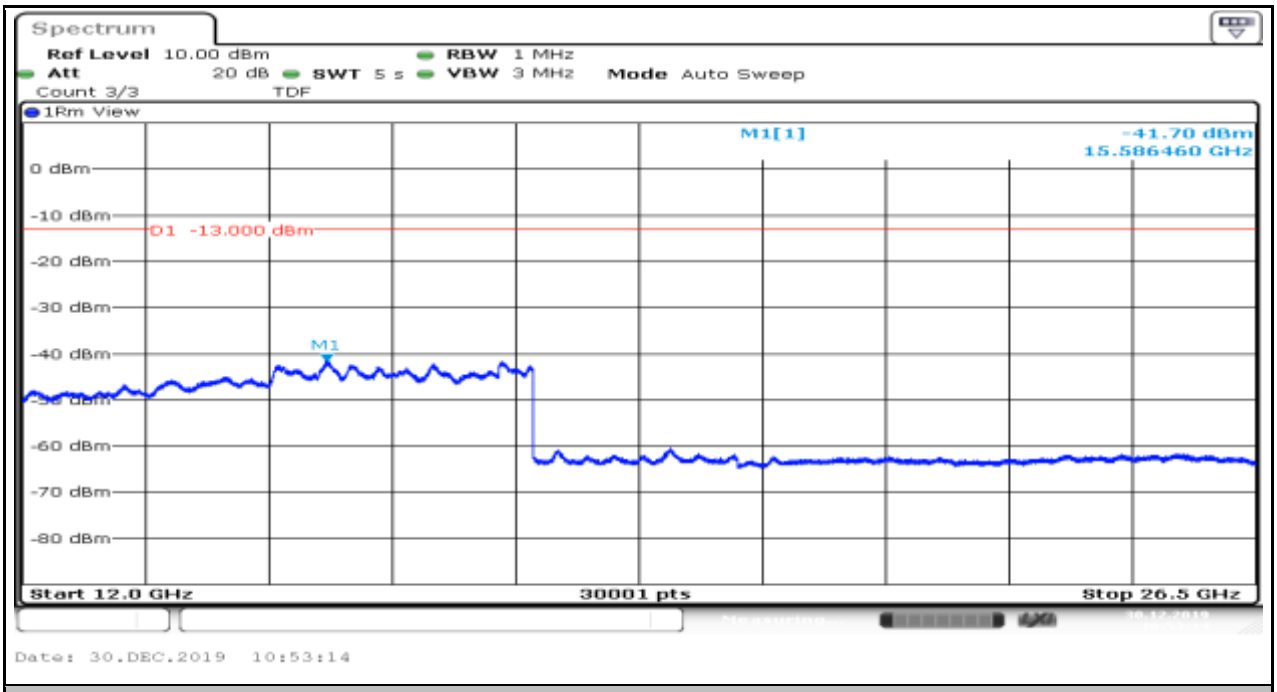
Band12_Stand-Alone_NaN_BPSK_23179_1@0_15kHz_1000_5000_1000~5000MHz@-37.78dBm_-13_PASS__



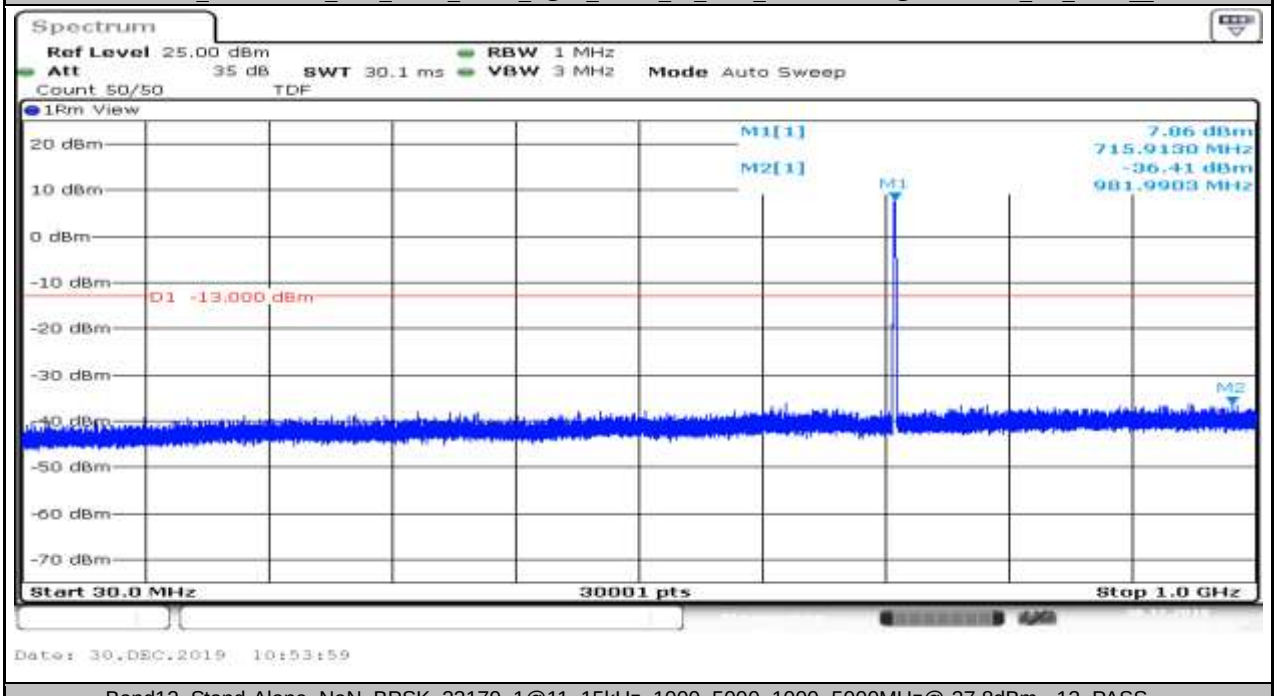
Band12_Stand-Alone_NaN_BPSK_23179_1@0_15kHz_5000_12000_5000~12000MHz@-47.59dBm_-13_PASS__



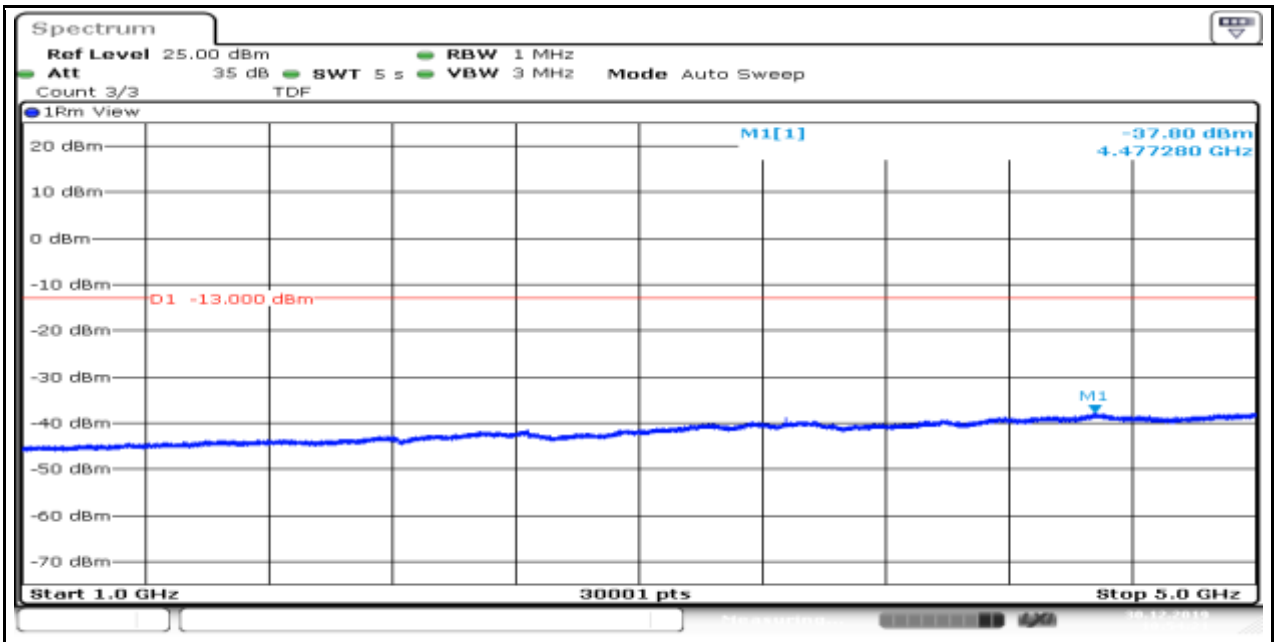
Band12_Stand-Alone_NaN_BPSK_23179_1@0_15kHz_12000_26500_12000~26500MHz@-41.7dBm_-13_PASS__



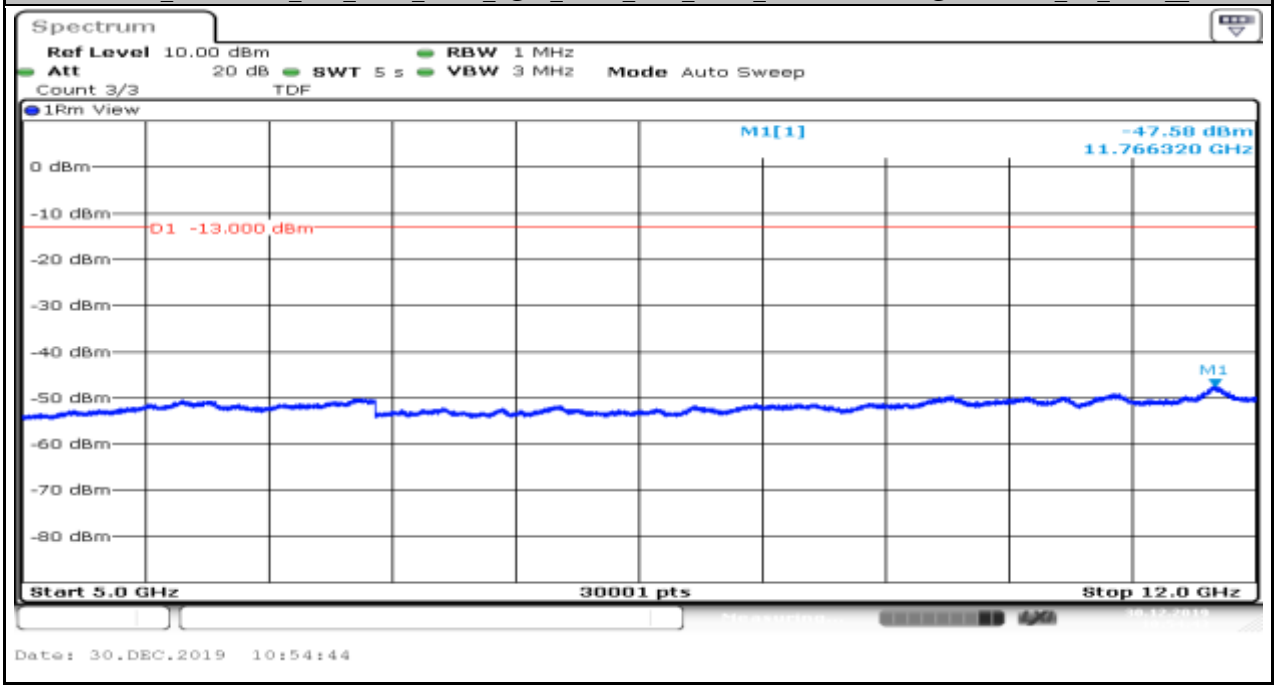
Band12_Stand-Alone_NaN_BPSK_23179_1@11_15kHz_30_1000_30~1000MHz@-36.41dBm_-13_PASS__



Band12_Stand-Alone_NaN_BPSK_23179_1@11_15kHz_1000_5000_1000~5000MHz@-37.8dBm_-13_PASS__



Band12_Stand-Alone_NaN_BPSK_23179_1@11_15kHz_5000_12000_5000~12000MHz@-47.58dBm_-13_PASS__



Appendix D.6: Frequency Stability for NB

Test Result

Voltage												
Band	OpMode	Bandwidth	Modulation	Channel	Tones	SCS	Voltage [Vdc]	Temperature (℃)	Deviation (Hz)	Deviation (ppm)	Limit (ppm)	Verdict
Band12	Stand-Alone	NaN	QPSK	23095	1@11	15kHz	LV	NT	-7.12	-0.010064	±2.5	PASS
Band12	Stand-Alone	NaN	QPSK	23095	1@11	15kHz	HV	NT	6.08	0.008594	±2.5	PASS
Band12	Stand-Alone	NaN	QPSK	23095	1@11	15kHz	NV	NT	6.65	0.009399	±2.5	PASS
Band12	Stand-Alone	NaN	QPSK	23095	1@0	15kHz	HV	NT	-6.62	-0.009357	±2.5	PASS
Band12	Stand-Alone	NaN	QPSK	23095	1@0	15kHz	LV	NT	7.04	0.009951	±2.5	PASS
Band12	Stand-Alone	NaN	QPSK	23095	1@0	15kHz	NV	NT	-7.91	-0.011180	±2.5	PASS
Band12	Stand-Alone	NaN	QPSK	23095	1@47	3.75kHz	LV	NT	-3.65	-0.005159	±2.5	PASS
Band12	Stand-Alone	NaN	QPSK	23095	1@47	3.75kHz	NV	NT	-4.72	-0.006671	±2.5	PASS
Band12	Stand-Alone	NaN	QPSK	23095	1@0	3.75kHz	HV	NT	3.35	0.004735	±2.5	PASS
Band12	Stand-Alone	NaN	QPSK	23095	1@0	3.75kHz	LV	NT	-4.56	-0.006445	±2.5	PASS
Band12	Stand-Alone	NaN	QPSK	23095	1@0	3.75kHz	NV	NT	-4.82	-0.006813	±2.5	PASS
Band12	Stand-Alone	NaN	QPSK	23095	1@47	3.75kHz	HV	NT	-3.50	-0.004947	±2.5	PASS

Temperature												
Band	OpMode	Bandwidth	Modulation	Channel	Tones	SCS	Voltage [Vdc]	Temperature (℃)	Deviation (Hz)	Deviation (ppm)	Limit (ppm)	Verdict
Band12	Stand-Alone	NaN	QPSK	23095	1@0	15kHz	NV	-10	7.21	0.010191	±2.5	PASS
Band12	Stand-Alone	NaN	QPSK	23095	1@0	15kHz	NV	80	7.81	0.011039	±2.5	PASS
Band12	Stand-Alone	NaN	QPSK	23095	1@0	15kHz	NV	70	-6.67	-0.009428	±2.5	PASS
Band12	Stand-Alone	NaN	QPSK	23095	1@0	15kHz	NV	60	-7.90	-0.011166	±2.5	PASS
Band12	Stand-Alone	NaN	QPSK	23095	1@0	15kHz	NV	50	-8.21	-0.011604	±2.5	PASS
Band12	Stand-Alone	NaN	QPSK	23095	1@0	15kHz	NV	40	-7.64	-0.010799	±2.5	PASS
Band12	Stand-Alone	NaN	QPSK	23095	1@0	15kHz	NV	30	6.88	0.009724	±2.5	PASS
Band12	Stand-Alone	NaN	QPSK	23095	1@0	15kHz	NV	20	-8.07	-0.011406	±2.5	PASS
Band12	Stand-Alone	NaN	QPSK	23095	1@0	15kHz	NV	-20	7.00	0.009894	±2.5	PASS
Band12	Stand-Alone	NaN	QPSK	23095	1@0	15kHz	NV	0	7.34	0.010375	±2.5	PASS
Band12	Stand-Alone	NaN	QPSK	23095	1@0	15kHz	NV	85	7.55	0.010671	±2.5	PASS
Band12	Stand-Alone	NaN	QPSK	23095	1@11	15kHz	NV	30	-6.39	-0.009032	±2.5	PASS
Band12	Stand-Alone	NaN	QPSK	23095	1@0	15kHz	NV	-30	6.42	0.009074	±2.5	PASS
Band12	Stand-Alone	NaN	QPSK	23095	1@0	15kHz	NV	10	6.65	0.009399	±2.5	PASS
Band12	Stand-Alone	NaN	QPSK	23095	1@11	15kHz	NV	-40	7.21	0.010191	±2.5	PASS
Band12	Stand-Alone	NaN	QPSK	23095	1@11	15kHz	NV	-30	-7.22	-0.010205	±2.5	PASS
Band12	Stand-Alone	NaN	QPSK	23095	1@11	15kHz	NV	-20	6.91	0.009767	±2.5	PASS
Band12	Stand-Alone	NaN	QPSK	23095	1@11	15kHz	NV	-10	6.55	0.009258	±2.5	PASS
Band12	Stand-Alone	NaN	QPSK	23095	1@11	15kHz	NV	0	-5.91	-0.008353	±2.5	PASS
Band12	Stand-Alone	NaN	QPSK	23095	1@11	15kHz	NV	85	-7.45	-0.010530	±2.5	PASS
Band12	Stand-Alone	NaN	QPSK	23095	1@11	15kHz	NV	20	-6.64	-0.009385	±2.5	PASS
Band12	Stand-Alone	NaN	QPSK	23095	1@11	15kHz	NV	40	6.24	0.008820	±2.5	PASS
Band12	Stand-Alone	NaN	QPSK	23095	1@11	15kHz	NV	50	5.78	0.008170	±2.5	PASS
Band12	Stand-Alone	NaN	QPSK	23095	1@11	15kHz	NV	60	6.14	0.008678	±2.5	PASS
Band12	Stand-Alone	NaN	QPSK	23095	1@11	15kHz	NV	70	7.10	0.010035	±2.5	PASS
Band12	Stand-Alone	NaN	QPSK	23095	1@0	15kHz	NV	-40	-6.88	-0.009724	±2.5	PASS
Band12	Stand-Alone	NaN	QPSK	23095	1@11	15kHz	NV	80	-5.88	-0.008311	±2.5	PASS
Band12	Stand-Alone	NaN	QPSK	23095	1@11	15kHz	NV	10	7.34	0.010375	±2.5	PASS
Band12	Stand-Alone	NaN	QPSK	23095	1@0	3.75kHz	NV	40	-2.03	-0.002869	±2.5	PASS
Band12	Stand-Alone	NaN	QPSK	23095	1@47	3.75kHz	NV	85	3.39	0.004792	±2.5	PASS
Band12	Stand-Alone	NaN	QPSK	23095	1@0	3.75kHz	NV	-30	-3.42	-0.004834	±2.5	PASS
Band12	Stand-Alone	NaN	QPSK	23095	1@0	3.75kHz	NV	-20	-3.15	-0.004452	±2.5	PASS
Band12	Stand-Alone	NaN	QPSK	23095	1@0	3.75kHz	NV	-10	3.71	0.005244	±2.5	PASS
Band12	Stand-Alone	NaN	QPSK	23095	1@0	3.75kHz	NV	0	-3.35	-0.004735	±2.5	PASS
Band12	Stand-Alone	NaN	QPSK	23095	1@0	3.75kHz	NV	10	-1.79	-0.002530	±2.5	PASS

Band12	Stand-Alone	NaN	QPSK	23095	1@0	3.75kHz	NV	30	4.18	0.005908	±2.5	PASS
Band12	Stand-Alone	NaN	QPSK	23095	1@0	3.75kHz	NV	-40	-3.92	-0.005541	±2.5	PASS
Band12	Stand-Alone	NaN	QPSK	23095	1@0	3.75kHz	NV	50	2.57	0.003633	±2.5	PASS
Band12	Stand-Alone	NaN	QPSK	23095	1@0	3.75kHz	NV	60	-2.43	-0.003435	±2.5	PASS
Band12	Stand-Alone	NaN	QPSK	23095	1@0	3.75kHz	NV	70	2.63	0.003717	±2.5	PASS
Band12	Stand-Alone	NaN	QPSK	23095	1@0	3.75kHz	NV	80	3.40	0.004806	±2.5	PASS
Band12	Stand-Alone	NaN	QPSK	23095	1@0	3.75kHz	NV	85	2.13	0.003011	±2.5	PASS
Band12	Stand-Alone	NaN	QPSK	23095	1@47	3.75kHz	NV	40	2.79	0.003943	±2.5	PASS
Band12	Stand-Alone	NaN	QPSK	23095	1@47	3.75kHz	NV	80	3.13	0.004424	±2.5	PASS
Band12	Stand-Alone	NaN	QPSK	23095	1@0	3.75kHz	NV	20	-2.82	-0.003986	±2.5	PASS
Band12	Stand-Alone	NaN	QPSK	23095	1@47	3.75kHz	NV	-40	-3.63	-0.005131	±2.5	PASS
Band12	Stand-Alone	NaN	QPSK	23095	1@47	3.75kHz	NV	50	1.96	0.002770	±2.5	PASS
Band12	Stand-Alone	NaN	QPSK	23095	1@47	3.75kHz	NV	70	-2.69	-0.003802	±2.5	PASS
Band12	Stand-Alone	NaN	QPSK	23095	1@47	3.75kHz	NV	30	-1.60	-0.002261	±2.5	PASS
Band12	Stand-Alone	NaN	QPSK	23095	1@47	3.75kHz	NV	20	-1.75	-0.002473	±2.5	PASS
Band12	Stand-Alone	NaN	QPSK	23095	1@47	3.75kHz	NV	10	1.93	0.002728	±2.5	PASS
Band12	Stand-Alone	NaN	QPSK	23095	1@47	3.75kHz	NV	0	-2.37	-0.003350	±2.5	PASS
Band12	Stand-Alone	NaN	QPSK	23095	1@47	3.75kHz	NV	-10	2.29	0.003237	±2.5	PASS
Band12	Stand-Alone	NaN	QPSK	23095	1@47	3.75kHz	NV	-20	2.93	0.004141	±2.5	PASS
Band12	Stand-Alone	NaN	QPSK	23095	1@47	3.75kHz	NV	-30	-3.45	-0.004876	±2.5	PASS
Band12	Stand-Alone	NaN	QPSK	23095	1@47	3.75kHz	NV	60	-2.76	-0.003901	±2.5	PASS