



NB-IoT Band 71 / BPSK / 15KHz /1@0/ The Worst Test Results for Lowest							
Frequency(MHz)	S G.Lev (dBm)	Ant(dBi)	Loss	PMea (dBm)	Limit (dBm)	Margin (dBm)	Polarity
1326.10	-34.89	8.17	9.34	-36.06	-13.00	-23.06	H
1989.37	-34.91	9.53	10.42	-35.80	-13.00	-22.80	H
2652.63	-33.43	11.27	11.12	-33.28	-13.00	-20.28	H
1326.10	-35.54	8.17	9.34	-36.71	-13.00	-23.71	V
1989.37	-34.57	9.53	10.42	-35.46	-13.00	-22.46	V
2652.63	-32.71	11.27	11.12	-32.56	-13.00	-19.56	V
NB-IoT Band 71 / BPSK / 15KHz /1@0/ The Worst Test Results for Middle							
Frequency(MHz)	S G.Lev (dBm)	Ant(dBi)	Loss	PMea (dBm)	Limit (dBm)	Margin (dBm)	Polarity
1360.89	-34.68	8.17	9.34	-35.85	-13.00	-22.85	H
2041.24	-34.83	9.53	10.42	-35.72	-13.00	-22.72	H
2722.07	-33.01	11.27	11.12	-32.86	-13.00	-19.86	H
1360.89	-35.05	8.17	9.34	-36.22	-13.00	-23.22	V
2041.24	-34.83	9.53	10.42	-35.72	-13.00	-22.72	V
2722.07	-31.92	11.27	11.12	-31.77	-13.00	-18.77	V
NB-IoT Band 71 / BPSK / 15KHz /1@0/ The Worst Test Results for Highest							
Frequency(MHz)	S G.Lev (dBm)	Ant(dBi)	Loss	PMea (dBm)	Limit (dBm)	Margin (dBm)	Polarity
1395.51	-34.67	8.17	9.34	-35.84	-13.00	-22.84	H
2093.72	-34.22	9.53	10.42	-35.11	-13.00	-22.11	H
2791.61	-33.13	11.27	11.12	-32.98	-13.00	-19.98	H
1395.51	-34.98	8.17	9.34	-36.15	-13.00	-23.15	V
2093.72	-34.92	9.53	10.42	-35.81	-13.00	-22.81	V
2791.61	-32.99	11.27	11.12	-32.84	-13.00	-19.84	V

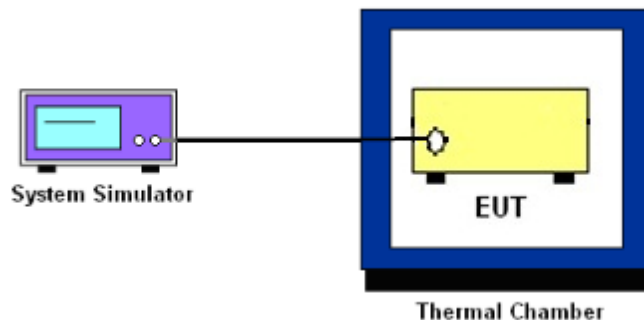
9. FREQUENCY STABILITY

9.1 DESCRIPTION OF FREQUENCY STABILITY MEASUREMENT

9.1.1 MEASUREMENT METHOD

The frequency stability shall be measured by variation of ambient temperature and variation of primary supply voltage to ensure that the fundamental emission stays within the authorized frequency block. The frequency stability of the transmitter shall be maintained within $\pm 0.00025\%$ ($\pm 2.5\text{ppm}$) of the center frequency.

9.1.2 TEST SETUP



9.1.3 TEST PROCEDURES FOR TEMPERATURE VARIATION

1. The EUT was set up in the thermal chamber and connected with the system simulator.
2. With power OFF, the temperature was decreased to -30°C and the EUT was stabilized before testing. Power was applied and the maximum change in frequency was recorded within one minute.
3. With power OFF, the temperature was raised in 10°C step up to 50°C . The EUT was stabilized at each step for at least half an hour. Power was applied and the maximum frequency change was recorded within one minute.

9.1.4 TEST PROCEDURES FOR VOLTAGE VARIATION

1. The testing follows FCC KDB 971168 D01v01r03 Section 9.
2. The EUT was placed in a temperature chamber at $25 \pm 5^{\circ}\text{C}$ and connected with the system simulator.
3. The power supply voltage to the EUT was varied from 85% to 115% of the nominal value measured at the input to the EUT.
4. The variation in frequency was measured for the worst case.



9.1.5 TEST RESULTS

NB-IoT Band 2 (QPSK) / 1880MHz / 3.75KHz/1@0					
Temperature (°C)	Voltage	Freq. Dev.	Freq. Dev.	Limit	Result
	(Volt)	(Hz)	(ppm)		
50	Normal Voltage	24.33	0.013	2.5ppm	PASS
40		30.03	0.016		
30		33.07	0.018		
20		20.79	0.011		
10		20.16	0.011		
0		25.83	0.014		
-10		22.34	0.012		
-20		14.55	0.008		
-30		16.08	0.009		
20	Maximum Voltage	19.14	0.010		
20	BEP	18.09	0.010		

NB-IoT Band 2 (QPSK) / 1880MHz / 15KHz/1@0					
Temperature (°C)	Voltage	Freq. Dev.	Freq. Dev.	Limit	Result
	(Volt)	(Hz)	(ppm)		
50	Normal Voltage	36.16	0.019	2.5ppm	PASS
40		18.28	0.010		
30		20.96	0.011		
20		24.66	0.013		
10		24.60	0.013		
0		20.25	0.011		
-10		24.60	0.013		
-20		24.33	0.013		
-30		20.48	0.011		
20	Maximum Voltage	27.50	0.015		
20	BEP	27.00	0.014		



NB-IoT Band 4 (QPSK) / 1732.5MHz / 3.75KHz/1@0					
Temperature (°C)	Voltage	Freq. Dev.	Freq. Dev.	Limit	Result
	(Volt)	(Hz)	(ppm)		
50	Normal Voltage	19.76	0.011	2.5ppm	PASS
40		23.13	0.012		
30		12.03	0.006		
20		32.55	0.017		
10		12.87	0.007		
0		14.45	0.008		
-10		24.75	0.013		
-20		29.17	0.016		
-30		32.27	0.017		
20	Maximum Voltage	18.61	0.010		
20	BEP	23.29	0.012		

NB-IoT Band 4 (QPSK) / 1732.5MHz / 15KHz/1@0					
Temperature (°C)	Voltage	Freq. Dev.	Freq. Dev.	Limit	Result
	(Volt)	(Hz)	(ppm)		
50	Normal Voltage	13.56	0.007	2.5ppm	PASS
40		31.33	0.017		
30		20.98	0.011		
20		13.13	0.007		
10		22.53	0.012		
0		21.38	0.011		
-10		33.55	0.018		
-20		30.61	0.016		
-30		30.56	0.016		
20	Maximum Voltage	29.37	0.016		
20	BEP	18.00	0.010		



NB-IoT Band 5 (QPSK) / 836.5MHz / 3.75KHz/1@0					
Temperature (°C)	Voltage	Freq. Dev.	Freq. Dev.	Limit	Result
	(Volt)	(Hz)	(ppm)		
50	Normal Voltage	15.46	0.008	2.5ppm	PASS
40		18.80	0.010		
30		11.81	0.006		
20		15.44	0.008		
10		16.68	0.009		
0		25.56	0.014		
-10		13.33	0.007		
-20		19.02	0.010		
-30		22.54	0.012		
20	Maximum Voltage	31.68	0.017		
20	BEP	13.26	0.007		

NB-IoT Band 5 (QPSK) / 836.5MHz /15KHz/1@0					
Temperature (°C)	Voltage	Freq. Dev.	Freq. Dev.	Limit	Result
	(Volt)	(Hz)	(ppm)		
50	Normal Voltage	13.62	0.007	2.5ppm	PASS
40		31.26	0.017		
30		29.47	0.016		
20		19.87	0.011		
10		27.16	0.014		
0		15.77	0.008		
-10		29.66	0.016		
-20		20.78	0.011		
-30		19.22	0.010		
20	Maximum Voltage	23.96	0.013		
20	BEP	34.53	0.018		



NB-IoT Band 12 (QPSK) / 707.5MHz / 3.75KHz/1@0					
Temperature (°C)	Voltage	Freq. Dev.	Freq. Dev.	Limit	Result
	(Volt)	(Hz)	(ppm)		
50	Normal Voltage	30.98	0.016	2.5ppm	PASS
40		27.49	0.015		
30		28.67	0.015		
20		28.83	0.015		
10		26.43	0.014		
0		28.99	0.015		
-10		24.99	0.013		
-20		28.92	0.015		
-30		27.48	0.015		
20	Maximum Voltage	24.17	0.013		
20	BEP	24.90	0.013		

NB-IoT Band 12 (QPSK) / 707.5MHz / 15KHz/1@0					
Temperature (°C)	Voltage	Freq. Dev.	Freq. Dev.	Limit	Result
	(Volt)	(Hz)	(ppm)		
50	Normal Voltage	30.34	0.016	2.5ppm	PASS
40		30.60	0.016		
30		24.11	0.013		
20		26.39	0.014		
10		23.86	0.013		
0		27.59	0.015		
-10		18.55	0.010		
-20		34.59	0.018		
-30		27.15	0.014		
20	Maximum Voltage	28.97	0.015		
20	BEP	31.06	0.017		



NB-IoT Band 13 (QPSK) / 782MHz / 3.75KHz/1@0					
Temperature (°C)	Voltage	Freq. Dev.	Freq. Dev.	Limit	Result
	(Volt)	(Hz)	(ppm)		
50	Normal Voltage	18.41	0.010	2.5ppm	PASS
40		20.96	0.011		
30		36.49	0.019		
20		26.48	0.014		
10		12.97	0.007		
0		14.07	0.007		
-10		17.72	0.009		
-20		26.32	0.014		
-30		20.24	0.011		
20	Maximum Voltage	30.02	0.016	2.5ppm	PASS
20	BEP	30.95	0.016		

NB-IoT Band 13 (QPSK) / 782MHz /15KHz/1@0					
Temperature (°C)	Voltage	Freq. Dev.	Freq. Dev.	Limit	Result
	(Volt)	(Hz)	(ppm)		
50	Normal Voltage	16.27	0.009	2.5ppm	PASS
40		35.46	0.019		
30		18.03	0.010		
20		12.16	0.006		
10		22.41	0.012		
0		25.52	0.014		
-10		26.30	0.014		
-20		13.02	0.007		
-30		25.70	0.014		
20	Maximum Voltage	17.53	0.009	2.5ppm	PASS
20	BEP	14.00	0.007		



NB-IoT Band 25 (QPSK) / 1882.5MHz / 3.75KHz/1@0					
Temperature (°C)	Voltage	Freq. Dev.	Freq. Dev.	Limit	Result
	(Volt)	(Hz)	(ppm)		
50	Normal Voltage	17.67	0.009	2.5ppm	PASS
40		19.09	0.010		
30		31.46	0.017		
20		20.53	0.011		
10		34.08	0.018		
0		35.87	0.019		
-10		27.66	0.015		
-20		19.14	0.010		
-30		18.38	0.010		
20	Maximum Voltage	31.58	0.017		
20	BEP	17.05	0.009		

NB-IoT Band 25 (QPSK) / 1882.5MHz /15KHz/1@0					
Temperature (°C)	Voltage	Freq. Dev.	Freq. Dev.	Limit	Result
	(Volt)	(Hz)	(ppm)		
50	Normal Voltage	15.55	0.008	2.5ppm	PASS
40		23.23	0.012		
30		34.74	0.018		
20		19.03	0.010		
10		30.37	0.016		
0		28.35	0.015		
-10		18.38	0.010		
-20		18.59	0.010		
-30		12.33	0.007		
20	Maximum Voltage	25.58	0.014		
20	BEP	30.72	0.016		



NB-IoT Band 26 (QPSK) / 831.5MHz / 3.75KHz/1@0					
Temperature (°C)	Voltage	Freq. Dev.	Freq. Dev.	Limit	Result
	(Volt)	(Hz)	(ppm)		
50	Normal Voltage	33.41	0.018	2.5ppm	PASS
40		24.91	0.013		
30		28.59	0.015		
20		26.81	0.014		
10		26.02	0.014		
0		24.95	0.013		
-10		12.93	0.007		
-20		34.39	0.018		
-30		28.22	0.015		
20	Maximum Voltage	35.91	0.019		
20	BEP	17.47	0.009		

NB-IoT Band 26 (QPSK) / 831.5MHz / 15KHz/1@0					
Temperature (°C)	Voltage	Freq. Dev.	Freq. Dev.	Limit	Result
	(Volt)	(Hz)	(ppm)		
50	Normal Voltage	34.18	0.018	2.5ppm	PASS
40		15.07	0.008		
30		28.71	0.015		
20		34.56	0.018		
10		14.02	0.007		
0		19.99	0.011		
-10		16.14	0.009		
-20		15.78	0.008		
-30		34.09	0.018		
20	Maximum Voltage	26.35	0.014		
20	BEP	34.89	0.019		



NB-IoT Band 66 (QPSK) / 1745MHz / 3.75KHz/1@0					
Temperature (°C)	Voltage	Freq. Dev.	Freq. Dev.	Limit	Result
	(Volt)	(Hz)	(ppm)		
50	Normal Voltage	21.32	0.011	2.5ppm	PASS
40		27.55	0.015		
30		28.96	0.015		
20		31.82	0.017		
10		14.17	0.008		
0		19.04	0.010		
-10		21.65	0.012		
-20		26.76	0.014		
-30		14.17	0.008		
20	Maximum Voltage	29.80	0.016		
20	BEP	17.55	0.009		

NB-IoT Band 66 (QPSK) / 1745MHz /15KHz/1@0					
Temperature (°C)	Voltage	Freq. Dev.	Freq. Dev.	Limit	Result
	(Volt)	(Hz)	(ppm)		
50	Normal Voltage	18.80	0.010	2.5ppm	PASS
40		25.15	0.013		
30		21.49	0.011		
20		11.58	0.006		
10		32.12	0.017		
0		35.79	0.019		
-10		16.24	0.009		
-20		28.21	0.015		
-30		36.00	0.019		
20	Maximum Voltage	21.40	0.011		
20	BEP	34.89	0.019		



NB-IoT Band 71 (QPSK) / 680.5MHz / 3.75KHz/1@0					
Temperature (°C)	Voltage	Freq. Dev.	Freq. Dev.	Limit	Result
	(Volt)	(Hz)	(ppm)		
50	Normal Voltage	18.94	0.010	2.5ppm	PASS
40		12.09	0.006		
30		12.82	0.007		
20		26.33	0.014		
10		19.39	0.010		
0		25.99	0.014		
-10		15.63	0.008		
-20		35.76	0.019		
-30		31.87	0.017		
20	Maximum Voltage	26.40	0.014	2.5ppm	PASS
20	BEP	30.09	0.016		

NB-IoT Band 71 (QPSK) / 680.5MHz / 15KHz/1@0					
Temperature (°C)	Voltage	Freq. Dev.	Freq. Dev.	Limit	Result
	(Volt)	(Hz)	(ppm)		
50	Normal Voltage	20.58	0.011	2.5ppm	PASS
40		34.20	0.018		
30		20.04	0.011		
20		16.07	0.009		
10		17.05	0.009		
0		21.97	0.012		
-10		12.77	0.007		
-20		18.60	0.010		
-30		16.48	0.009		
20	Maximum Voltage	23.60	0.013	2.5ppm	PASS
20	BEP	18.72	0.010		



APPENDIX-PHOTOS OF TEST SETUP

Note: See test photos in setup photo document for the actual connections between Product and support equipment.

*****END OF THE REPORT*****