

RF Power Output and Effective Radiated Power

Mode	Modulation	Sub-carrier spacing (KHz)	Ntones	Conducted Power (dBm) for low/middle/high channel		
				19952 /1710.2	20175 /1732.5	20398 /1754.8
NB-IoT Band 4 Standalone	BPSK	3.75	1@0	23.15	23.03	23.19
			1@47	23.11	22.94	23.06
		15	1@0	23.11	22.98	23.21
			1@11	23.05	22.86	23.17
	QPSK	3.75	1@0	23.16	23.06	23.15
			1@47	23.06	23.02	23.2
		15	1@0	23.04	22.94	23.13
			1@11	23.01	22.97	23.14
15	12@0	21.19	20.95	21.24		
Mode	Modulation	Sub-carrier spacing (KHz)	Ntones	Conducted Power (dBm) for low/middle/high channel		
				23012 /699.2	23095 /707.5	23178 /715.8
NB-IoT Band 12 Standalone	BPSK	3.75	1@0	22.70	22.75	22.61
			1@47	22.69	22.62	22.60
		15	1@0	22.84	22.66	22.77
			1@11	22.81	22.55	22.67
	QPSK	3.75	1@0	22.76	22.69	22.67
			1@47	22.71	22.62	22.54
		15	1@0	22.74	22.63	22.76
			1@11	22.75	22.66	22.72
15	12@0	21.16	21.00	21.14		
Mode	Modulation	Sub-carrier spacing (KHz)	Ntones	Conducted Power (dBm) for low/middle/high channel		
				23182 /777.2	23230 /782	23278 /786.8
NB-IoT Band 13 Standalone	BPSK	3.75	1@0	22.71	22.41	22.54
			1@47	22.56	22.24	22.41
		15	1@0	22.76	22.37	22.58
			1@11	22.69	22.36	22.45
	QPSK	3.75	1@0	22.62	22.34	22.50
			1@47	22.57	22.31	22.48
		15	1@0	22.80	22.43	22.52
			1@11	22.79	22.32	22.60
15	12@0	20.94	20.28	20.49		



Mode	Modulation	Sub-carrier spacing (KHz)	Ntones	Conducted Power (dBm) for low/middle/high channel		
				131974 /1710.2	132322 /1745	132670 /1779.8
NB-IoT Band 66 Standalone	BPSK	3.75	1@0	22.93	22.92	23.02
			1@47	22.92	22.86	22.92
		15	1@0	23.02	22.83	23.16
			1@11	22.84	22.73	23.06
	QPSK	3.75	1@0	22.98	22.9	22.99
			1@47	22.94	22.84	22.91
		15	1@0	22.93	22.81	23.07
			1@11	22.92	22.8	23.05
		15	12@0	20.97	20.97	21.12
		15	12@0	20.97	20.97	21.12
12@0	20.97		20.97	21.12		
Mode	Modulation	Sub-carrier spacing (KHz)	Ntones	Conducted Power (dBm) for low/middle/high channel		
				133124 /663.2	133297 /680.5	133470 /697.8
NB-IoT Band 71 Standalone	BPSK	3.75	1@0	23.12	23.11	23.15
			1@47	23.03	23.02	23.11
		15	1@0	23.05	23.32	23.10
			1@11	23.04	23.19	23.03
	QPSK	3.75	1@0	23.07	23.08	23.24
			1@47	23.01	23.04	23.19
		15	1@0	23.01	23.28	23.14
			1@11	23.14	23.23	23.06
		15	12@0	21.46	21.63	21.45
		15	12@0	21.46	21.63	21.45
Mode	Modulation	Sub-carrier spacing (KHz)	Ntones	Conducted Power (dBm) for low/middle/high channel		
				134004 /698.2	134092 /707	134180 /715.8
NB-IoT Band 85 Standalone	BPSK	3.75	1@0	22.56	22.52	22.32
			1@47	22.47	22.42	22.31
		15	1@0	22.72	22.43	22.62
			1@11	22.61	22.35	22.51
	QPSK	3.75	1@0	22.64	22.38	22.39
			1@47	22.51	22.41	22.37
		15	1@0	22.65	22.49	22.51
			1@11	22.64	22.37	22.56
		15	12@0	20.94	20.66	20.82
		15	12@0	20.94	20.66	20.82

Occupied Bandwidth

Mode	Modulation	Sub-carrier spacing (KHz)	Ntones	Bandwidth(KHz) for low/mid/high channel					
				19952/1710.2		20175/1732.5		20398/1754.8	
				99% Power	-26dBc	99% Power	-26dBc	99% Power	-26dBc
NB-IoT Band 4 Standalone	BPSK	15	1@0	131.94	132.20	122.28	114.80	128.15	116.50

Mode	Modulation	Sub-carrier spacing (KHz)	Ntones	Bandwidth(KHz) for low/mid/high channel					
				23012/699.2		23095/707.5		23178/715.8	
				99% Power	-26dBc	99% Power	-26dBc	99% Power	-26dBc
NB-IoT Band 12 Standalone	BPSK	15	1@0	130.23	118.50	128.61	105.20	127.27	115.90

Mode	Modulation	Sub-carrier spacing (KHz)	Ntones	Bandwidth(KHz) for low/mid/high channel					
				23182/777.2		23230/782		23278/786.8	
				99% Power	-26dBc	99% Power	-26dBc	99% Power	-26dBc
NB-IoT Band 13 Standalone	QPSK	15	1@0	118.15	126.80	118.81	115.30	117.46	116.30

Mode	Modulation	Sub-carrier spacing (KHz)	Ntones	Bandwidth(KHz) for low/mid/high channel					
				131974/1710.2		132322/1745		132670/1779.8	
				99% Power	-26dBc	99% Power	-26dBc	99% Power	-26dBc
NB-IoT Band 66 Standalone	BPSK	15	1@0	122.80	101.60	126.49	104.40	127.74	118.00



Mode	Modulation	Sub-carrier spacing (KHz)	Ntones	Bandwidth(KHz) for low/mid/high channel					
				133124/663.2		133297/680.5		133470/697.8	
				99% Power	-26dBc	99% Power	-26dBc	99% Power	-26dBc
NB-IoT Band 71 Standalone	BPSK	15	1@0	128.11	110.20	129.19	128.20	133.78	116.60

Mode	Modulation	Sub-carrier spacing (KHz)	Ntones	Bandwidth(KHz) for low/mid/high channel					
				134004/698.2		134092/707		134180/715.8	
				99% Power	-26dBc	99% Power	-26dBc	99% Power	-26dBc
NB-IoT Band 85 Standalone	BPSK	15	1@0	126.93	101.50	126.77	101.50	126.66	104.40



NB-IoT Band 4 BPSK 15KHz 1@0 CH-Low



NB-IoT Band 12 BPSK 15KHz 1@0 CH-Low



NB-IoT Band 4 BPSK 15KHz 1@0 CH-Middle



NB-IoT Band 12 BPSK 15KHz 1@0 CH-Middle



NB-IoT Band 4 BPSK 15KHz 1@0 CH-High



NB-IoT Band 12 BPSK 15KHz 1@0 CH-High





NB-IoT Band 13 QPSK 15KHz 1@0 CH-Low



NB-IoT Band 66 BPSK 15KHz 1@0 CH-Low



NB-IoT Band 13 QPSK 15KHz 1@0 CH-Middle



NB-IoT Band 66 BPSK 15KHz 1@0 CH-Middle



NB-IoT Band 13 QPSK 15KHz 1@0 CH-High



NB-IoT Band 66 BPSK 15KHz 1@0 CH-High





NB-IoT Band 71 BPSK 15KHz 1@0 CH-Low



NB-IoT Band 85 BPSK 15KHz 1@0 CH-Low



NB-IoT Band 71 BPSK 15KHz 1@0 CH-Middle



NB-IoT Band 85 BPSK 15KHz 1@0 CH-Middle



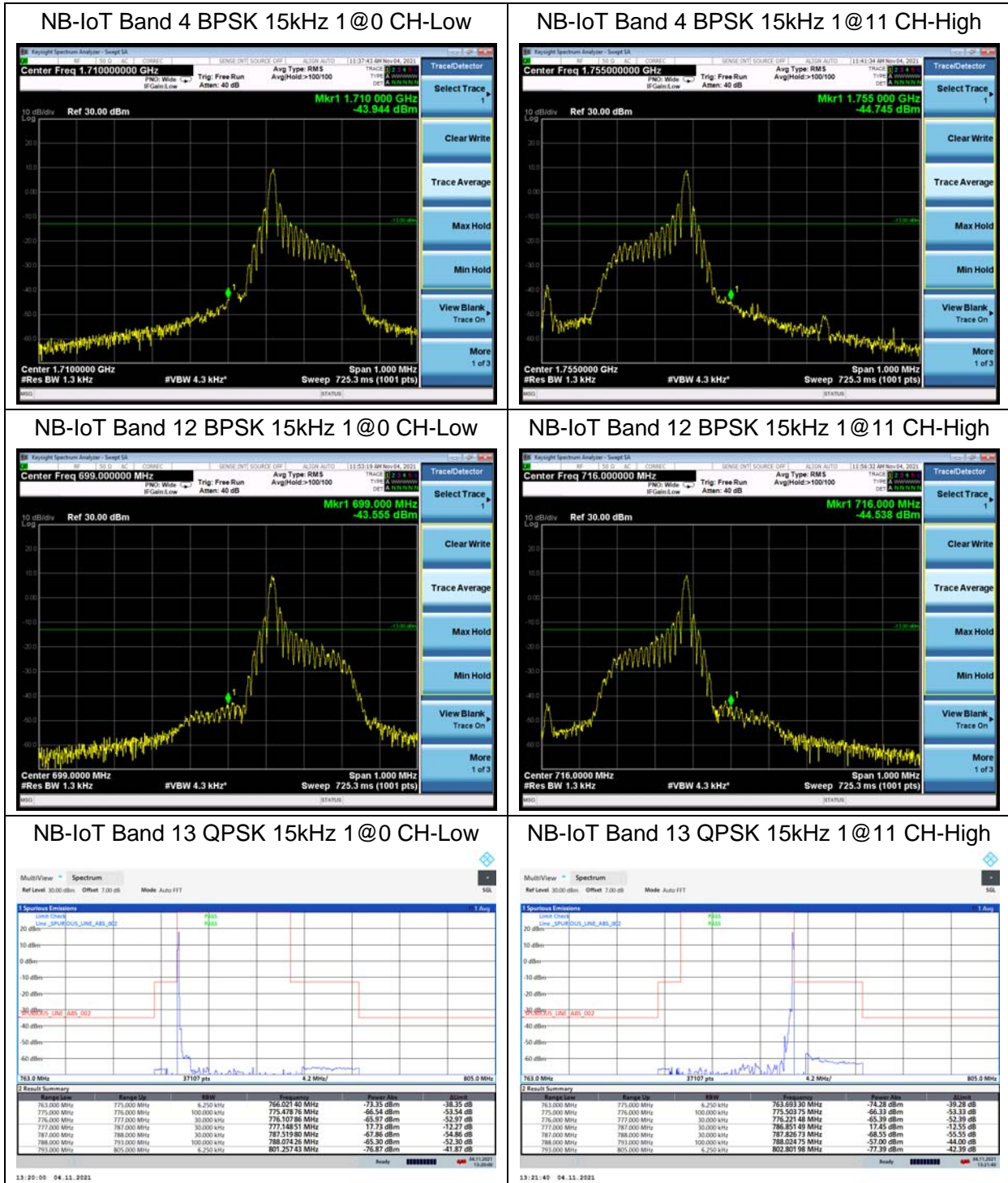
NB-IoT Band 71 BPSK 15KHz 1@0 CH-High



NB-IoT Band 85 BPSK 15KHz 1@0 CH-High

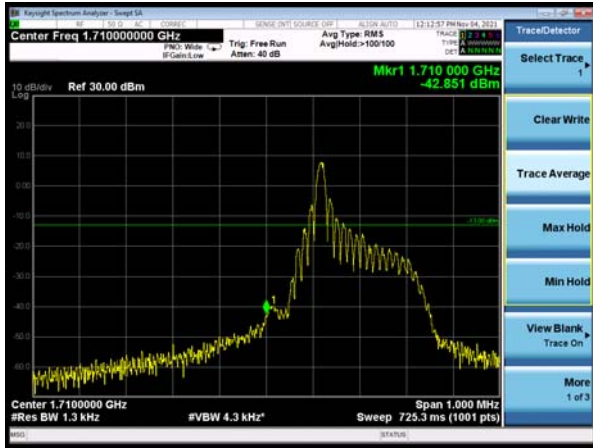


Band Edge Compliance

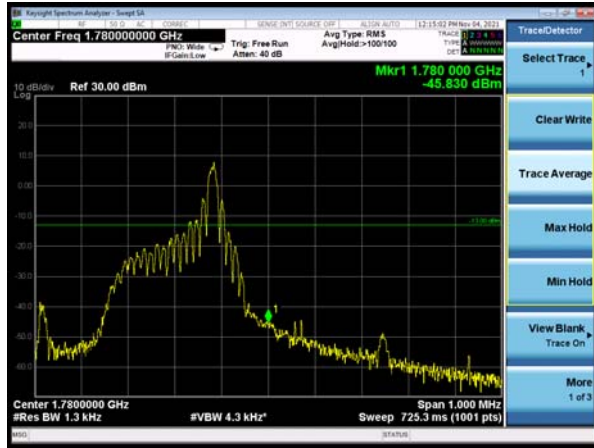




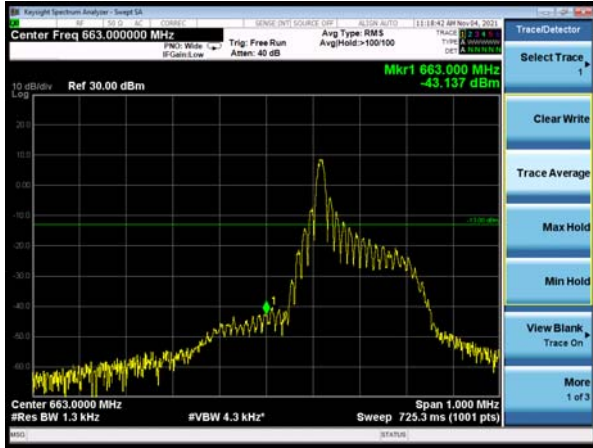
NB-IoT Band 66 BPSK 15kHz 1@0 CH-Low



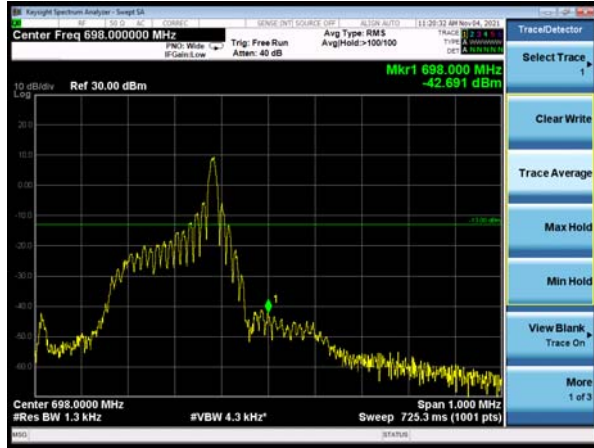
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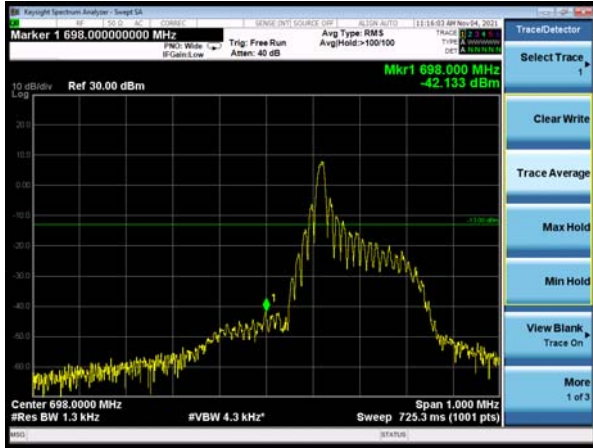
NB-IoT Band 71 BPSK 15kHz 1@0 CH-Low



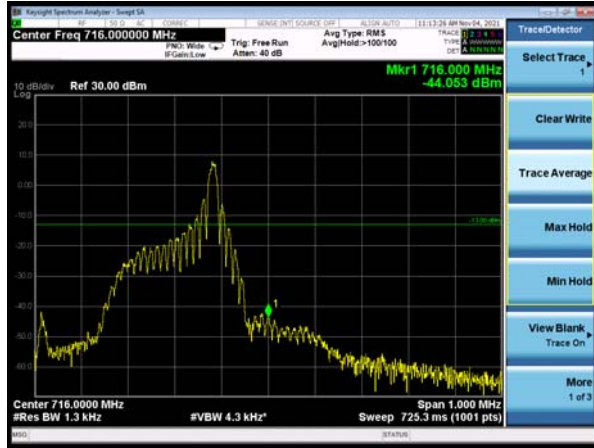
NB-IoT Band 71 BPSK 15kHz 1@11 CH-High



NB-IoT Band 85 BPSK 15kHz 1@0 CH-Low



NB-IoT Band 85 BPSK 15kHz 1@11 CH-High



Peak-to-Average Power Ratio (PAPR)

Mode	Modulation	Sub-carrier spacing (KHz)	Channel/ Frequency (MHz)	Peak-to-Average Power Ratio (PAPR)		
				Peak(dBm)	Avg(dBm)	PAPR(dB)
NB-IoT Band 4 Standalone	BPSK	3.75	20175/1732.5	26.34	21.45	4.89
	QPSK	3.75	20175/1732.5	25.73	21.41	4.32
	BPSK	15	20175/1732.5	25.79	18.47	7.32
	QPSK	15	20175/1732.5	25.45	18.39	7.06
Mode	Modulation	Sub-carrier spacing (KHz)	Channel/ Frequency (MHz)	Peak-to-Average Power Ratio (PAPR)		
				Peak(dBm)	Avg(dBm)	PAPR(dB)
NB-IoT Band 12 Standalone	BPSK	3.75	23095/707.5	25.73	20.81	4.92
	QPSK	3.75	23095/707.5	25.18	20.84	4.34
	BPSK	15	23095/707.5	25.36	18.06	7.30
	QPSK	15	23095/707.5	25.01	18.07	6.94
Mode	Modulation	Sub-carrier spacing (KHz)	Channel/ Frequency (MHz)	Peak-to-Average Power Ratio (PAPR)		
				Peak(dBm)	Avg(dBm)	PAPR(dB)
NB-IoT Band 13 Standalone	BPSK	3.75	23230/782	25.74	20.89	4.85
	QPSK	3.75	23230/782	24.99	20.78	4.21
	BPSK	15	23230/782	25.22	18.06	7.16
	QPSK	15	23230/782	24.90	17.91	6.99
Mode	Modulation	Sub-carrier spacing (KHz)	Channel/ Frequency (MHz)	Peak-to-Average Power Ratio (PAPR)		
				Peak(dBm)	Avg(dBm)	PAPR(dB)
NB-IoT Band 66 Standalone	BPSK	3.75	132322/1745	26.41	21.43	4.98
	QPSK	3.75	132322/1745	25.71	21.49	4.22
	BPSK	15	132322/1745	25.76	18.42	7.34
	QPSK	15	132322/1745	25.33	18.41	6.92
Mode	Modulation	Sub-carrier spacing (KHz)	Channel/ Frequency (MHz)	Peak-to-Average Power Ratio (PAPR)		
				Peak(dBm)	Avg(dBm)	PAPR(dB)
NB-IoT Band 71 Standalone	BPSK	3.75	133297/680.5	26.18	21.24	4.94
	QPSK	3.75	133297/680.5	25.45	21.20	4.25
	BPSK	15	133297/680.5	25.78	18.50	7.28
	QPSK	15	133297/680.5	25.51	18.43	7.08
Mode	Modulation	Sub-carrier spacing (KHz)	Channel/ Frequency (MHz)	Peak-to-Average Power Ratio (PAPR)		
				Peak(dBm)	Avg(dBm)	PAPR(dB)
NB-IoT Band 85 Standalone	BPSK	3.75	134092/707	25.62	20.73	4.89
	QPSK	3.75	134092/707	25.05	20.69	4.36
	BPSK	15	134092/707	25.22	17.85	7.37



	QPSK	15	134092/707	24.91	17.74	7.17
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Frequency Stability

NB-IoT Band 4						
Condition		Freq.Error (Hz)	Freq.Error (Hz)	Frequency Stability(ppm)	Frequency Stability(ppm)	Verdict
Sub-carrier spacing (KHz)	3.75					
Temperature	Voltage	BPSK	QPSK	BPSK	QPSK	
Normal(25°C)	Normal	8.10	16.75	0.00431	0.00891	PASS
Extreme(85°C)		8.84	7.85	0.00470	0.00417	PASS
Extreme(80°C)		13.54	7.93	0.00720	0.00422	PASS
Extreme(70°C)		8.91	5.38	0.00474	0.00286	PASS
Extreme(60°C)		15.27	6.86	0.00812	0.00365	PASS
Extreme(50°C)		15.67	5.26	0.00834	0.00280	PASS
Extreme(40°C)		5.13	4.11	0.00273	0.00218	PASS
Extreme(30°C)		10.52	11.87	0.00560	0.00631	PASS
Extreme(20°C)		9.30	13.68	0.00495	0.00728	PASS
Extreme(10°C)		7.49	7.06	0.00399	0.00376	PASS
Extreme(0°C)		10.59	9.95	0.00563	0.00529	PASS
Extreme(-10°C)		3.25	3.85	0.00173	0.00205	PASS
Extreme(-20°C)		14.79	7.79	0.00787	0.00414	PASS
Extreme(-30°C)		3.38	9.25	0.00180	0.00492	PASS
Extreme(-40°C)		3.74	2.80	0.00199	0.00149	PASS
25°C	LV	14.89	5.07	0.00792	0.00269	PASS
	HV	10.60	6.22	0.00564	0.00331	PASS
Condition		Freq.Error (Hz)	Freq.Error (Hz)	Frequency Stability(ppm)	Frequency Stability(ppm)	Verdict
Sub-carrier spacing (KHz)	15					
Temperature	Voltage	BPSK	QPSK	BPSK	QPSK	
Normal(25°C)	Normal	2.59	8.23	0.00138	0.00438	PASS
Extreme(85°C)		5.30	13.29	0.00282	0.00707	PASS
Extreme(80°C)		15.85	13.67	0.00843	0.00727	PASS
Extreme(70°C)		16.08	10.52	0.00855	0.00559	PASS
Extreme(60°C)		10.12	6.60	0.00538	0.00351	PASS
Extreme(50°C)		3.61	10.33	0.00192	0.00549	PASS
Extreme(40°C)		1.40	15.84	0.00075	0.00842	PASS
Extreme(30°C)		15.40	8.71	0.00819	0.00463	PASS
Extreme(20°C)		2.99	15.29	0.00159	0.00813	PASS
Extreme(10°C)		16.07	9.32	0.00855	0.00496	PASS
Extreme(0°C)		16.53	9.68	0.00879	0.00515	PASS



Extreme(-10°C)		13.98	9.46	0.00743	0.00503	PASS
Extreme(-20°C)		3.13	13.29	0.00166	0.00707	PASS
Extreme(-30°C)		1.53	4.80	0.00081	0.00256	PASS
Extreme(-40°C)		12.82	11.05	0.00682	0.00588	PASS
25°C	LV	10.56	1.62	0.00562	0.00086	PASS
	HV	14.22	8.95	0.00756	0.00476	PASS

NB-IoT Band 12						
Condition		Freq.Error (Hz)	Freq.Error (Hz)	Frequency Stability(ppm)	Frequency Stability(ppm)	Verdict
Sub-carrier spacing (KHz)	3.75					
Temperature	Voltage	BPSK	QPSK	BPSK	QPSK	
Normal(25°C)	Normal	15.34	7.79	0.00816	0.00414	PASS
Extreme(85°C)		6.24	1.24	0.00332	0.00066	PASS
Extreme(80°C)		1.82	13.03	0.00097	0.00693	PASS
Extreme(70°C)		4.39	11.74	0.00234	0.00624	PASS
Extreme(60°C)		6.13	13.06	0.00326	0.00695	PASS
Extreme(50°C)		17.57	4.46	0.00935	0.00237	PASS
Extreme(40°C)		8.18	16.14	0.00435	0.00859	PASS
Extreme(30°C)		5.48	14.12	0.00292	0.00751	PASS
Extreme(20°C)		12.16	6.98	0.00647	0.00371	PASS
Extreme(10°C)		1.51	2.78	0.00080	0.00148	PASS
Extreme(0°C)		4.25	3.88	0.00226	0.00206	PASS
Extreme(-10°C)		15.37	3.23	0.00818	0.00172	PASS
Extreme(-20°C)		5.67	7.28	0.00301	0.00387	PASS
Extreme(-30°C)		10.98	3.50	0.00584	0.00186	PASS
Extreme(-40°C)		17.39	4.37	0.00925	0.00232	PASS
25°C		LV	15.39	7.51	0.00819	0.00399
	HV	9.02	7.98	0.00480	0.00424	PASS
Condition		Freq.Error (Hz)	Freq.Error (Hz)	Frequency Stability(ppm)	Frequency Stability(ppm)	Verdict
Sub-carrier spacing (KHz)	15					
Temperature	Voltage	BPSK	QPSK	BPSK	QPSK	
Normal(25°C)	Normal	4.24	8.42	0.00226	0.00448	PASS
Extreme(85°C)		3.31	14.99	0.00176	0.00797	PASS
Extreme(80°C)		2.28	7.15	0.00121	0.00380	PASS
Extreme(70°C)		6.83	12.84	0.00363	0.00683	PASS
Extreme(60°C)		6.40	6.89	0.00340	0.00366	PASS
Extreme(50°C)		3.69	2.90	0.00196	0.00154	PASS



Extreme(40°C)		11.20	5.69	0.00596	0.00303	PASS
Extreme(30°C)		15.32	11.26	0.00815	0.00599	PASS
Extreme(20°C)		4.05	3.28	0.00216	0.00175	PASS
Extreme(10°C)		4.49	6.61	0.00239	0.00352	PASS
Extreme(0°C)		2.17	1.40	0.00115	0.00075	PASS
Extreme(-10°C)		14.87	12.01	0.00791	0.00639	PASS
Extreme(-20°C)		1.51	6.76	0.00080	0.00359	PASS
Extreme(-30°C)		11.14	12.06	0.00593	0.00642	PASS
Extreme(-40°C)		2.40	13.02	0.00128	0.00693	PASS
25°C	LV	4.79	3.88	0.00255	0.00206	PASS
	HV	17.67	14.23	0.00940	0.00757	PASS

NB-IoT Band 13						
Condition		Freq.Error (Hz)	Freq.Error (Hz)	Frequency Stability(ppm)	Frequency Stability(ppm)	Verdict
Sub-carrier spacing (KHz)	3.75					
Temperature	Voltage	BPSK	QPSK	BPSK	QPSK	
Normal(25°C)	Normal	17.02	8.94	0.00905	0.00476	PASS
Extreme(85°C)		9.06	3.51	0.00482	0.00187	PASS
Extreme(80°C)		14.84	6.91	0.00789	0.00368	PASS
Extreme(70°C)		10.49	9.10	0.00558	0.00484	PASS
Extreme(60°C)		13.35	5.34	0.00710	0.00284	PASS
Extreme(50°C)		3.21	2.09	0.00171	0.00111	PASS
Extreme(40°C)		14.39	8.91	0.00766	0.00474	PASS
Extreme(30°C)		14.45	10.12	0.00769	0.00539	PASS
Extreme(20°C)		10.19	1.75	0.00542	0.00093	PASS
Extreme(10°C)		2.48	14.12	0.00132	0.00751	PASS
Extreme(0°C)		6.52	10.22	0.00347	0.00544	PASS
Extreme(-10°C)		9.84	9.36	0.00524	0.00498	PASS
Extreme(-20°C)		17.51	11.94	0.00931	0.00635	PASS
Extreme(-30°C)		1.86	15.60	0.00099	0.00830	PASS
Extreme(-40°C)		10.49	6.50	0.00558	0.00346	PASS
25°C	LV	9.98	5.11	0.00531	0.00272	PASS
	HV	15.60	7.24	0.00830	0.00385	PASS
Condition		Freq.Error (Hz)	Freq.Error (Hz)	Frequency Stability(ppm)	Frequency Stability(ppm)	Verdict
Sub-carrier spacing (KHz)	15					
Temperature	Voltage	BPSK	QPSK	BPSK	QPSK	
Normal(25°C)	Normal	1.75	4.81	0.00093	0.00256	PASS



Extreme(85°C)		6.62	6.54	0.00352	0.00348	PASS
Extreme(80°C)		11.40	16.09	0.00606	0.00856	PASS
Extreme(70°C)		10.82	6.79	0.00575	0.00361	PASS
Extreme(60°C)		10.34	7.69	0.00550	0.00409	PASS
Extreme(50°C)		12.32	10.19	0.00655	0.00542	PASS
Extreme(40°C)		15.31	17.83	0.00814	0.00948	PASS
Extreme(30°C)		17.37	5.27	0.00924	0.00280	PASS
Extreme(20°C)		14.57	1.31	0.00775	0.00070	PASS
Extreme(10°C)		10.58	10.25	0.00563	0.00545	PASS
Extreme(0°C)		3.26	6.16	0.00173	0.00328	PASS
Extreme(-10°C)		4.33	3.48	0.00230	0.00185	PASS
Extreme(-20°C)		13.54	17.49	0.00720	0.00930	PASS
Extreme(-30°C)		3.88	5.41	0.00206	0.00288	PASS
Extreme(-40°C)		4.86	3.64	0.00259	0.00194	PASS
25°C	LV	10.81	9.90	0.00575	0.00526	PASS
	HV	13.72	5.77	0.00730	0.00307	PASS

NB-IoT Band 66						
Condition		Freq.Error (Hz)	Freq.Error (Hz)	Frequency Stability(ppm)	Frequency Stability(ppm)	Verdict
Sub-carrier spacing (KHz)	3.75					
Temperature	Voltage	BPSK	QPSK	BPSK	QPSK	
Normal(25°C)	Normal	2.82	6.23	0.00150	0.00331	PASS
Extreme(85°C)		12.19	6.03	0.00648	0.00321	PASS
Extreme(80°C)		16.70	10.06	0.00888	0.00535	PASS
Extreme(70°C)		16.74	14.55	0.00890	0.00774	PASS
Extreme(60°C)		1.61	12.32	0.00086	0.00655	PASS
Extreme(50°C)		11.43	2.29	0.00608	0.00122	PASS
Extreme(40°C)		1.39	3.89	0.00074	0.00207	PASS
Extreme(30°C)		14.77	17.95	0.00785	0.00955	PASS
Extreme(20°C)		16.27	10.05	0.00865	0.00534	PASS
Extreme(10°C)		8.26	4.79	0.00439	0.00255	PASS
Extreme(0°C)		12.59	3.39	0.00670	0.00180	PASS
Extreme(-10°C)		10.53	10.80	0.00560	0.00575	PASS
Extreme(-20°C)		11.87	14.79	0.00631	0.00787	PASS
Extreme(-30°C)		4.33	7.27	0.00231	0.00386	PASS
Extreme(-40°C)		11.77	7.02	0.00626	0.00373	PASS
25°C		LV	1.34	12.95	0.00071	0.00689
	HV	3.96	6.98	0.00211	0.00371	PASS
Condition		Freq.Error	Freq.Error	Frequency	Frequency	Verdict



Sub-carrier spacing (KHz)	15	(Hz)	(Hz)	Stability(ppm)	Stability(ppm)	
		BPSK	QPSK	BPSK	QPSK	
Temperature	Voltage	BPSK	QPSK	BPSK	QPSK	
Normal(25°C)	Normal	17.37	5.56	0.00924	0.00296	PASS
Extreme(85°C)		14.87	13.82	0.00791	0.00735	PASS
Extreme(80°C)		9.14	16.71	0.00486	0.00889	PASS
Extreme(70°C)		6.71	17.21	0.00357	0.00915	PASS
Extreme(60°C)		5.44	9.47	0.00289	0.00504	PASS
Extreme(50°C)		6.46	16.94	0.00344	0.00901	PASS
Extreme(40°C)		10.09	15.64	0.00537	0.00832	PASS
Extreme(30°C)		7.55	14.18	0.00402	0.00754	PASS
Extreme(20°C)		9.79	12.49	0.00521	0.00665	PASS
Extreme(10°C)		10.53	6.51	0.00560	0.00347	PASS
Extreme(0°C)		10.92	13.42	0.00581	0.00714	PASS
Extreme(-10°C)		5.98	7.83	0.00318	0.00416	PASS
Extreme(-20°C)		15.46	2.00	0.00822	0.00107	PASS
Extreme(-30°C)		15.40	1.42	0.00819	0.00076	PASS
Extreme(-40°C)		17.39	8.14	0.00925	0.00433	PASS
25°C	LV	9.12	4.61	0.00485	0.00245	PASS
	HV	6.72	17.26	0.00358	0.00918	PASS

NB-IoT Band 71						
Condition		Freq.Error (Hz)	Freq.Error (Hz)	Frequency Stability(ppm)	Frequency Stability(ppm)	Verdict
Sub-carrier spacing (KHz)	3.75	(Hz)	(Hz)	Stability(ppm)	Stability(ppm)	
Temperature	Voltage	BPSK	QPSK	BPSK	QPSK	
Normal(25°C)	Normal	11.24	8.66	0.00598	0.00461	PASS
Extreme(85°C)		14.85	5.46	0.00790	0.00290	PASS
Extreme(80°C)		3.05	12.57	0.00162	0.00668	PASS
Extreme(70°C)		12.18	8.81	0.00648	0.00469	PASS
Extreme(60°C)		15.47	2.29	0.00823	0.00122	PASS
Extreme(50°C)		2.38	8.50	0.00126	0.00452	PASS
Extreme(40°C)		8.89	4.73	0.00473	0.00251	PASS
Extreme(30°C)		17.90	12.91	0.00952	0.00687	PASS
Extreme(20°C)		13.74	15.84	0.00731	0.00842	PASS
Extreme(10°C)		7.39	9.90	0.00393	0.00527	PASS
Extreme(0°C)		13.31	6.27	0.00708	0.00334	PASS
Extreme(-10°C)		1.56	6.76	0.00083	0.00360	PASS
Extreme(-20°C)		10.86	14.24	0.00578	0.00757	PASS



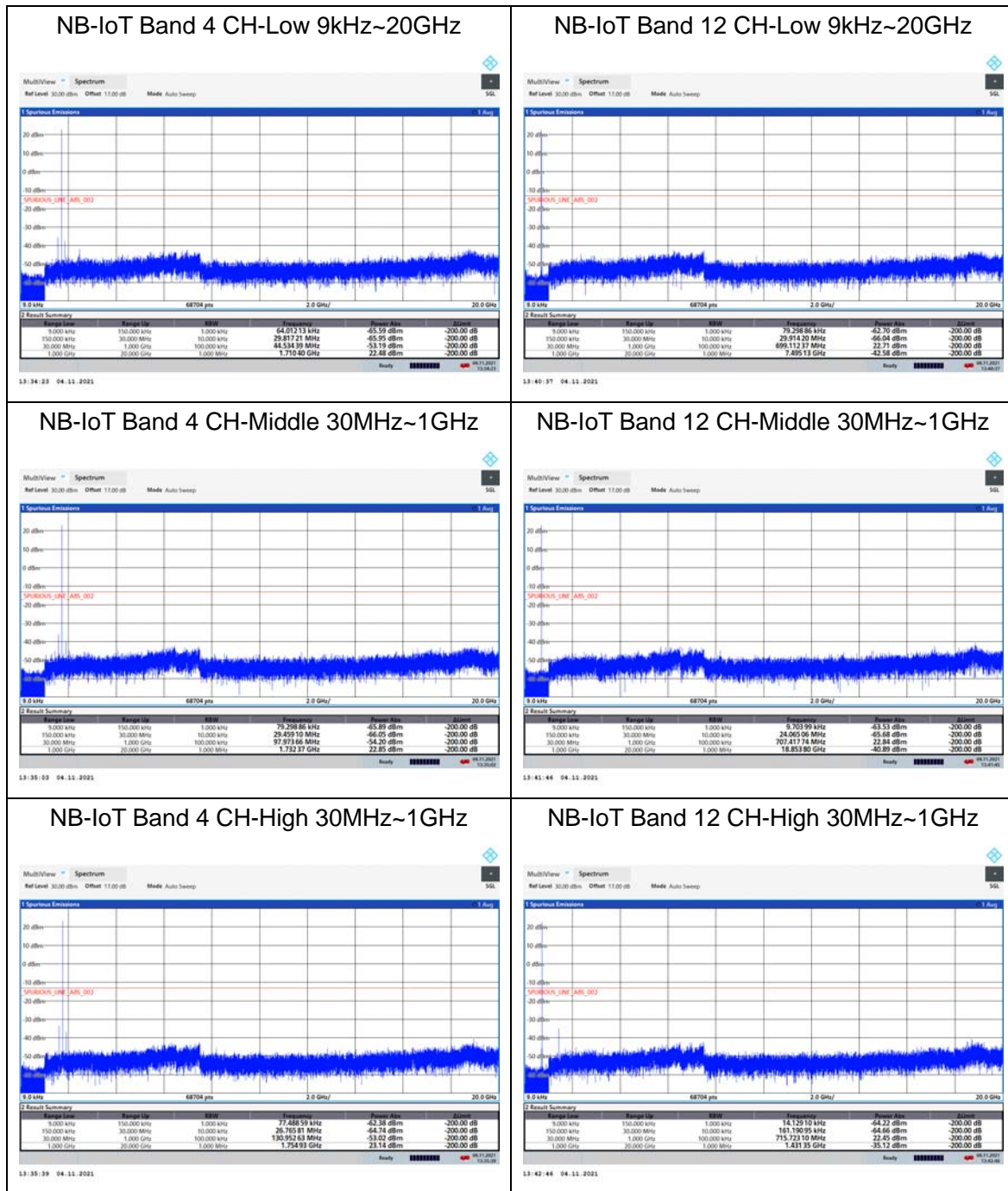
Condition		Freq.Error (Hz)	Freq.Error (Hz)	Frequency Stability(ppm)	Frequency Stability(ppm)	Verdict
Sub-carrier spacing (KHz)	15					
Temperature	Voltage	BPSK	QPSK	BPSK	QPSK	
Extreme(-30°C)		15.42	4.20	0.00820	0.00223	PASS
Extreme(-40°C)		9.76	3.57	0.00519	0.00190	PASS
25°C	LV	15.76	3.03	0.00838	0.00161	PASS
	HV	11.96	3.69	0.00636	0.00196	PASS
Normal(25°C)	Normal	10.43	11.48	0.00555	0.00611	PASS
Extreme(85°C)		6.89	6.15	0.00367	0.00327	PASS
Extreme(80°C)		15.21	13.42	0.00809	0.00714	PASS
Extreme(70°C)		16.26	4.18	0.00865	0.00222	PASS
Extreme(60°C)		11.22	2.32	0.00597	0.00123	PASS
Extreme(50°C)		12.75	5.87	0.00678	0.00312	PASS
Extreme(40°C)		1.71	12.41	0.00091	0.00660	PASS
Extreme(30°C)		14.54	14.50	0.00774	0.00772	PASS
Extreme(20°C)		4.38	4.76	0.00233	0.00253	PASS
Extreme(10°C)		10.68	9.77	0.00568	0.00520	PASS
Extreme(0°C)		7.33	11.49	0.00390	0.00611	PASS
Extreme(-10°C)		16.50	5.82	0.00878	0.00310	PASS
Extreme(-20°C)		5.61	7.04	0.00298	0.00374	PASS
Extreme(-30°C)		16.16	16.59	0.00860	0.00883	PASS
Extreme(-40°C)		12.30	5.65	0.00654	0.00300	PASS
25°C		LV	6.19	1.13	0.00329	0.00060
	HV	2.25	17.98	0.00120	0.00956	PASS

NB-IoT Band 85						
Condition		Freq.Error (Hz)	Freq.Error (Hz)	Frequency Stability(ppm)	Frequency Stability(ppm)	Verdict
Sub-carrier spacing (KHz)	3.75					
Temperature	Voltage	BPSK	QPSK	BPSK	QPSK	
Normal(25°C)	Normal	15.44	7.14	0.00821	0.00380	PASS
Extreme(85°C)		9.49	16.57	0.00505	0.00881	PASS
Extreme(80°C)		2.67	15.30	0.00142	0.00814	PASS
Extreme(70°C)		10.45	2.38	0.00556	0.00127	PASS
Extreme(60°C)		11.87	11.13	0.00632	0.00592	PASS
Extreme(50°C)		5.68	10.64	0.00302	0.00566	PASS
Extreme(40°C)		3.93	2.07	0.00209	0.00110	PASS
Extreme(30°C)		14.37	14.42	0.00764	0.00767	PASS



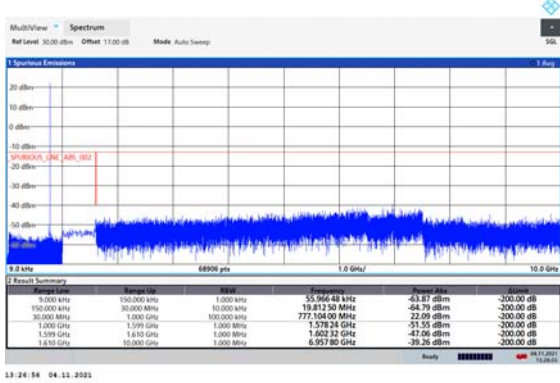
Extreme(20°C)		9.60	14.99	0.00511	0.00797	PASS
Extreme(10°C)		5.56	7.34	0.00296	0.00390	PASS
Extreme(0°C)		3.37	13.34	0.00179	0.00709	PASS
Extreme(-10°C)		17.85	13.46	0.00949	0.00716	PASS
Extreme(-20°C)		3.12	10.58	0.00166	0.00563	PASS
Extreme(-30°C)		8.06	14.96	0.00429	0.00796	PASS
Extreme(-40°C)		10.76	12.45	0.00572	0.00662	PASS
25°C	LV	5.54	16.85	0.00295	0.00896	PASS
	HV	9.66	16.17	0.00514	0.00860	PASS
Condition		Freq.Error (Hz)	Freq.Error (Hz)	Frequency Stability(ppm)	Frequency Stability(ppm)	Verdict
Sub-carrier spacing (KHz)	15					
Temperature	Voltage	BPSK	QPSK	BPSK	QPSK	
Normal(25°C)	Normal	12.48	7.10	0.00664	0.00378	PASS
Extreme(85°C)		7.54	9.36	0.00401	0.00498	PASS
Extreme(80°C)		1.19	6.08	0.00063	0.00324	PASS
Extreme(70°C)		3.22	3.95	0.00171	0.00210	PASS
Extreme(60°C)		3.97	7.64	0.00211	0.00406	PASS
Extreme(50°C)		1.60	17.76	0.00085	0.00945	PASS
Extreme(40°C)		17.74	1.20	0.00944	0.00064	PASS
Extreme(30°C)		7.54	8.14	0.00401	0.00433	PASS
Extreme(20°C)		15.06	16.32	0.00801	0.00868	PASS
Extreme(10°C)		4.50	13.56	0.00239	0.00722	PASS
Extreme(0°C)		17.13	6.67	0.00911	0.00355	PASS
Extreme(-10°C)		10.05	12.68	0.00535	0.00674	PASS
Extreme(-20°C)		16.11	2.00	0.00857	0.00106	PASS
Extreme(-30°C)		17.07	3.56	0.00908	0.00190	PASS
Extreme(-40°C)		16.67	9.87	0.00886	0.00525	PASS
25°C		LV	16.38	7.68	0.00871	0.00408
	HV	14.45	9.67	0.00768	0.00514	PASS

Spurious Emissions at Antenna Terminals

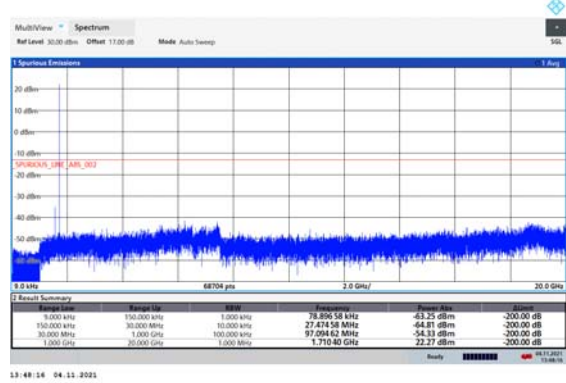




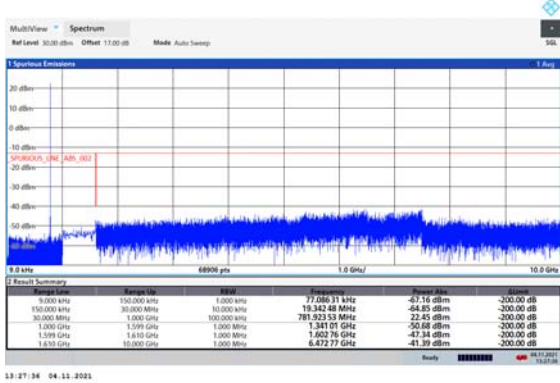
NB-IoT Band 13 CH-Low 9kHz~20GHz



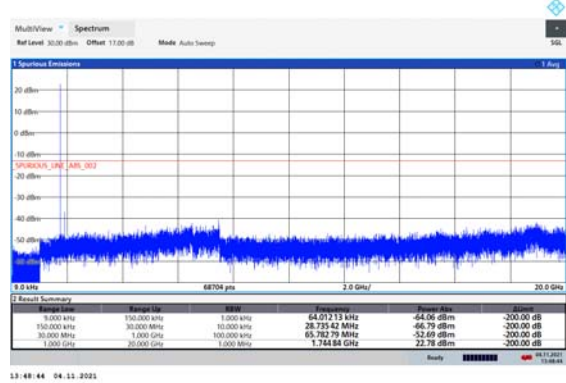
NB-IoT Band 66 CH-Low 9kHz~20GHz



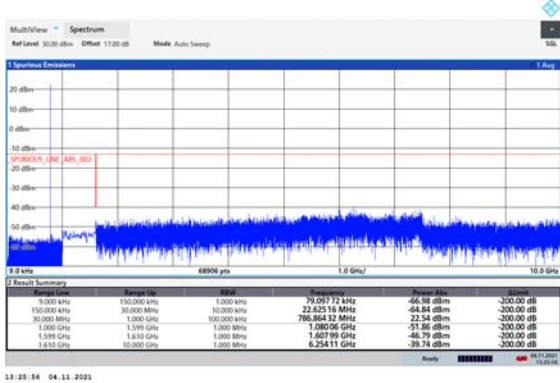
NB-IoT Band 13 CH-Middle 30MHz~1GHz



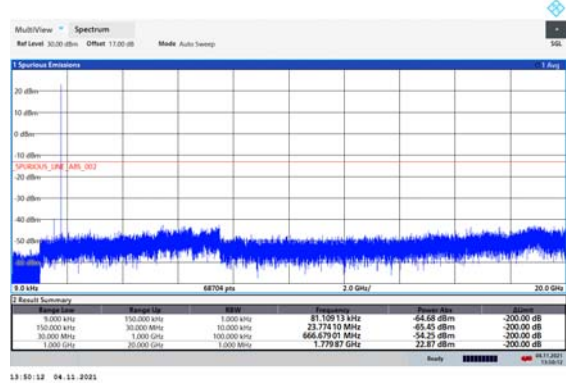
NB-IoT Band 66 CH-Middle 30MHz~1GHz



NB-IoT Band 13 CH-High 30MHz~1GHz

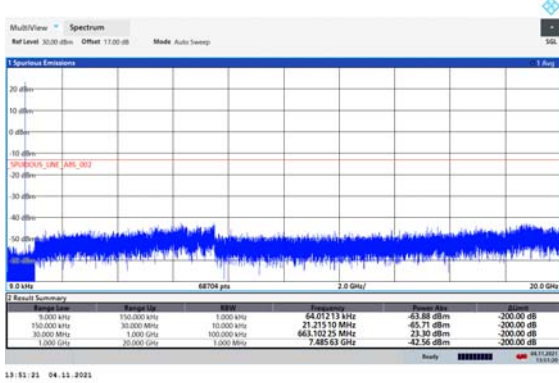


NB-IoT Band 66 CH-High 30MHz~1GHz

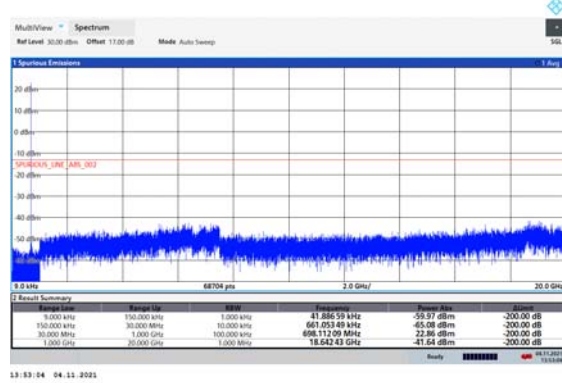




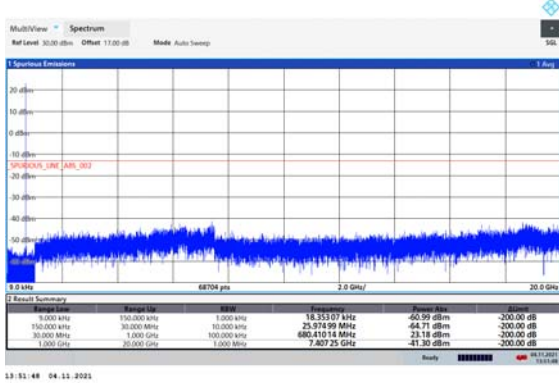
NB-IoT Band 71 CH-Low 9kHz~20GHz



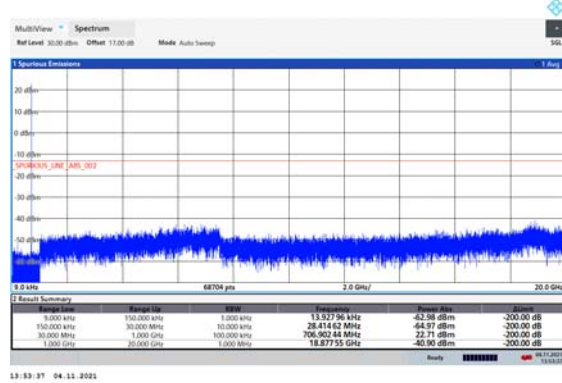
NB-IoT Band 85 CH-Low 9kHz~20GHz



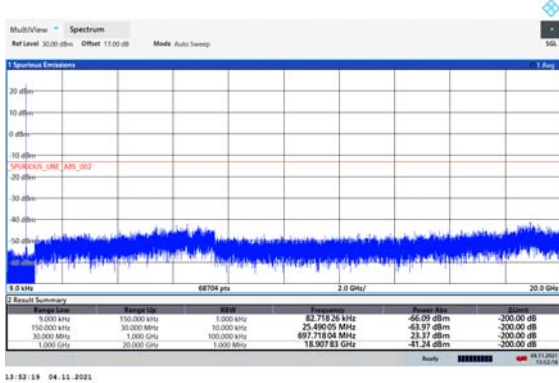
NB-IoT Band 71 CH-Middle 30MHz~1GHz



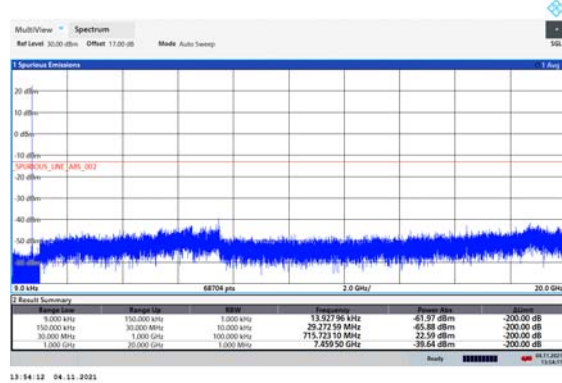
NB-IoT Band 85 CH-Middle 30MHz~1GHz



NB-IoT Band 71 CH-High 30MHz~1GHz



NB-IoT Band 85 CH-High 30MHz~1GHz



Radiates Spurious Emission

NB-IoT Band 4 15kHz QPSK CH-Low

Harmonic	Frequency (MHz)	SG (dBm)	Cable Loss (dB)	Gain (dBi)	Antenna Polarization	EIRP Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (deg)
2	3420.0	-54.99	2.6	10.15	Horizontal	-47.44	-13.0	34.44	180
3	5130.0	-57.73	2.4	11.35	Horizontal	-48.78	-13.0	35.78	270
4	6840.0	-58.44	4.5	10.85	Horizontal	-52.09	-13.0	39.09	180
5	8550.0	-55.17	5.1	11.35	Horizontal	-48.92	-13.0	35.92	270
6	10260.0	-53.06	5.3	11.95	Horizontal	-46.41	-13.0	33.41	135
7	11970.0	-53.26	5.5	13.55	Horizontal	-45.21	-13.0	32.21	90
8	13680.0	-51.34	6.3	13.75	Horizontal	-43.89	-13.0	30.89	270
9	15390.0	-54.47	6.7	13.85	Horizontal	-47.32	-13.0	34.32	180
10	17100.0	-51.07	6.8	14.25	Horizontal	-43.62	-13.0	30.62	135

Note: 1.The other Spurious RF Radiated emissions level is no more than noise floor.
2. The worst emission was found in the antenna is Horizontal position.

NB-IoT Band 12 15kHz QPSK CH-High

Harmonic	Frequency (MHz)	SG (dBm)	Cable Loss (dB)	Gain (dBi)	Antenna Polarization	ERP Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (deg)
2	1431.7	-39.49	2.00	10.15	Horizontal	-33.49	-13.0	20.49	225
3	2147.9	-36.18	2.51	11.05	Horizontal	-29.79	-13.0	16.79	180
4	2863.7	-61.44	4.20	11.15	Horizontal	-56.64	-13.0	43.64	45
5	3579.5	-59.67	5.20	11.15	Horizontal	-55.87	-13.0	42.87	90
6	4295.4	-60.50	5.50	11.95	Horizontal	-56.20	-13.0	43.20	225
7	5011.3	-60.73	5.70	13.55	Horizontal	-55.03	-13.0	42.03	270
8	5727.2	-60.21	6.30	13.75	Horizontal	-54.91	-13.0	41.91	225
9	6443.1	-58.15	6.80	13.85	Horizontal	-53.25	-13.0	40.25	135
10	7159.0	-54.23	6.90	14.25	Horizontal	-49.03	-13.0	36.03	225

Note: 1.The other Spurious RF Radiated emissions level is no more than noise floor.
2. The worst emission was found in the antenna is Horizontal position.

NB-IoT Band 13 15kHz QPSK CH-Low

Harmonic	Frequency (MHz)	SG (dBm)	Cable Loss (dB)	Gain (dBi)	Antenna Polarization	ERP Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (deg)
2	1554.1	-43.52	2.00	10.15	Horizontal	-37.52	-13.0	24.52	90
3	2331.1	-41.46	2.50	11.35	Horizontal	-34.76	-13.0	21.76	180
4	3108.4	-58.96	4.20	10.85	Horizontal	-54.46	-13.0	41.46	315
5	3885.5	-60.75	5.20	11.35	Horizontal	-56.75	-13.0	43.75	0
6	4662.6	-60.26	5.50	11.95	Horizontal	-55.96	-13.0	42.96	45
7	5439.7	-60.65	5.70	13.55	Horizontal	-54.95	-13.0	41.95	0
8	6216.8	-58.90	6.30	13.75	Horizontal	-53.60	-13.0	40.60	0
9	6993.9	-57.42	6.80	13.85	Horizontal	-52.52	-13.0	39.52	270
10	7771.0	-54.69	6.90	14.25	Horizontal	-49.49	-13.0	36.49	180

Note: 1.The other Spurious RF Radiated emissions level is no more than noise floor.
2. The worst emission was found in the antenna is Horizontal position.

NB-IoT Band 66 15kHz QPSK CH-Low

Harmonic	Frequency (MHz)	SG (dBm)	Cable Loss (dB)	Gain (dBi)	Antenna Polarization	EIRP Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (deg)
2	3420.2	-55.34	2.6	10.15	Horizontal	-47.79	-13.0	34.79	180
3	5130.3	-57.74	2.4	11.35	Horizontal	-48.79	-13.0	35.79	225
4	6840.4	-59.09	4.5	10.85	Horizontal	-52.74	-13.0	39.74	315
5	8550.5	-55.72	5.1	11.35	Horizontal	-49.47	-13.0	36.47	45
6	10260.6	-52.63	5.3	11.95	Horizontal	-45.98	-13.0	32.98	90
7	11970.7	-53.10	5.5	13.55	Horizontal	-45.05	-13.0	32.05	315
8	13680.8	-50.97	6.3	13.75	Horizontal	-43.52	-13.0	30.52	90
9	15390.9	-54.01	6.7	13.85	Horizontal	-46.86	-13.0	33.86	315
10	17101.0	-51.57	6.8	14.25	Horizontal	-44.12	-13.0	31.12	270

Note: 1.The other Spurious RF Radiated emissions level is no more than noise floor.
2. The worst emission was found in the antenna is Horizontal position.

NB-IoT Band 71 15kHz QPSK CH-High

Harmonic	Frequency (MHz)	SG (dBm)	Cable Loss (dB)	Gain (dBi)	Antenna Polarization	ERP Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (deg)
2	1395.7	-38.11	2.6	10.15	Horizontal	-32.71	-13.0	19.71	45
3	2093.7	-34.05	2.4	11.05	Horizontal	-27.55	-13.0	14.55	90
4	2791.2	-61.73	4.5	11.15	Horizontal	-57.23	-13.0	44.23	90
5	3489.5	-60.22	5.1	11.35	Horizontal	-56.12	-13.0	43.12	45
6	4187.4	-61.43	5.3	11.95	Horizontal	-56.93	-13.0	43.93	45
7	4885.3	-61.24	5.5	13.55	Horizontal	-55.34	-13.0	42.34	270
8	5583.2	-60.69	6.3	13.75	Horizontal	-55.39	-13.0	42.39	225
9	6281.1	-58.36	6.7	13.85	Horizontal	-53.36	-13.0	40.36	225
10	6979.0	-57.42	6.8	14.25	Horizontal	-52.12	-13.0	39.12	45

Note: 1.The other Spurious RF Radiated emissions level is no more than noise floor.

2. The worst emission was found in the antenna is Horizontal position.

NB-IoT Band 85 15kHz QPSK CH-High

Harmonic	Frequency (MHz)	SG (dBm)	Cable Loss (dB)	Gain (dBi)	Antenna Polarization	ERP Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (deg)
2	1431.6	-38.31	2.6	10.15	Horizontal	-32.91	-13.0	19.91	180
3	2147.5	-39.31	2.4	11.05	Horizontal	-32.81	-13.0	19.81	225
4	2863.5	-62.81	4.5	11.15	Horizontal	-58.31	-13.0	45.31	135
5	3579.5	-60.14	5.1	11.35	Horizontal	-56.04	-13.0	43.04	225
6	4295.4	-60.99	5.3	11.95	Horizontal	-56.49	-13.0	43.49	270
7	5011.3	-60.38	5.5	13.55	Horizontal	-54.48	-13.0	41.48	90
8	5727.2	-60.30	6.3	13.75	Horizontal	-55.00	-13.0	42.00	45
9	6443.1	-58.53	6.7	13.85	Horizontal	-53.53	-13.0	40.53	90
10	7159.0	-54.42	6.8	14.25	Horizontal	-49.12	-13.0	36.12	135

Note: 1.The other Spurious RF Radiated emissions level is no more than noise floor.

2. The worst emission was found in the antenna is Horizontal position.

Main Test Instruments

Date of Testing (variant): August 31, 2021 ~ November 5, 2021

Name	Manufacturer	Type	Serial Number	Calibration Date	Expiration Date
Base Station Simulator	R&S	CMW500	113824	2021-05-15	2022-05-14
Climate Chamber	Weiss	VT4002	582261194500 10	2021-05-15	2022-05-14
Spectrum Analyzer	Key sight	N9020	MY52330084	2021-05-15	2022-05-14
Signal Analyzer	R&S	FSV3030	101411	2020-12-13	2021-12-12
Signal Analyzer	R&S	FSV30	100815	2020-12-13	2021-12-12
TRILOG Broadband Antenna	Schwarzbeck	VULB 9163	01111	2019--9-12	2022-09-11
Horn Antenna	Schwarzbeck	BBHA 9120D	1594	2020-12-17	2021-12-16