

RF Power Output and Effective Radiated Power

Mode	Modulation	Sub-carrier spacing (KHz)	Ntones	Conducted Power (dBm) for low/mid/high channel		
				18602/1850.2	18900/1880.0	19198/1909.8
NB-IoT Band 2 Standalone	BPSK	3.75	1@0	23.18	23.03	23.35
			1@47	23.02	23.02	23.39
		15	1@0	23.1	23.18	23.21
			1@11	23.07	23.13	23.12
	QPSK	3.75	1@0	23.08	23.04	23.44
			1@47	23.12	23.08	23.34
		15	1@0	23.06	23.14	23.17
			1@11	23.17	23.08	23.24
		15	12@0	21.1	21.02	21.07

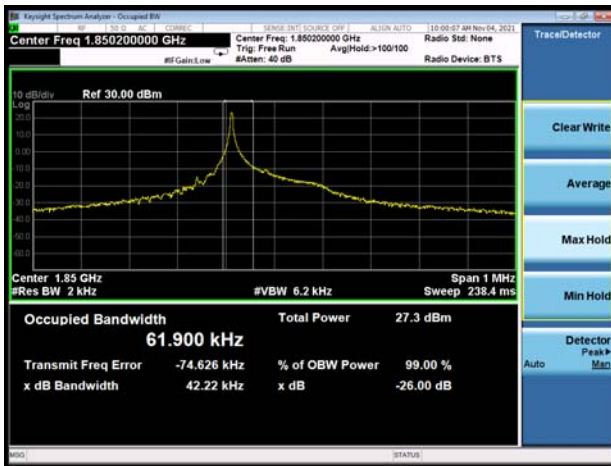
Mode	Modulation	Sub-carrier spacing (KHz)	Ntones	Conducted Power (dBm) for low/mid/high channel		
				26042/1850.2	26365/1882.5	26688/1914.8
NB-IoT Band 25 Standalone	BPSK	3.75	1@0	23.16	23.02	23.22
			1@47	23.04	22.93	23.18
		15	1@0	23.01	23.04	23.20
			1@11	23.02	22.96	23.14
	QPSK	3.75	1@0	23.07	22.99	23.22
			1@47	23.01	22.95	23.23
		15	1@0	23.05	22.97	23.28
			1@11	23.04	22.91	23.27
		15	12@0	20.97	20.86	20.97

Occupied Bandwidth

Mode	Modulation	Sub-carrier spacing (KHz)	Ntones	Bandwidth(KHz) for low/mid/high channel					
				18602/1850.2		18900/1880.0		19198/1909.8	
				99% Power	-26dBc	99% Power	-26dBc	99% Power	-26dBc
NB-IoT Band 2 Standalone	QPSK	3.75	1@0	61.90	42.22	60.47	39.39	61.70	39.76

Mode	Modulation	Sub-carrier spacing (KHz)	Ntones	Bandwidth(KHz) for low/mid/high channel					
				26042/1850.2		26365/1882.5		26688/1914.8	
				99% Power	-26dBc	99% Power	-26dBc	99% Power	-26dBc
NB-IoT Band 25 Standalone	QPSK	15	1@0	115.73	117.00	121.37	118.20	120.92	114.70

NB-IoT Band 2 QPSK 3.75kHz 1@0 CH-Low



NB-IoT Band 25 QPSK 15kHz 1@0 CH-Low



NB-IoT Band 2 QPSK 3.75kHz 1@0 CH-Middle



NB-IoT Band 25 QPSK 15kHz 1@0 CH-Middle



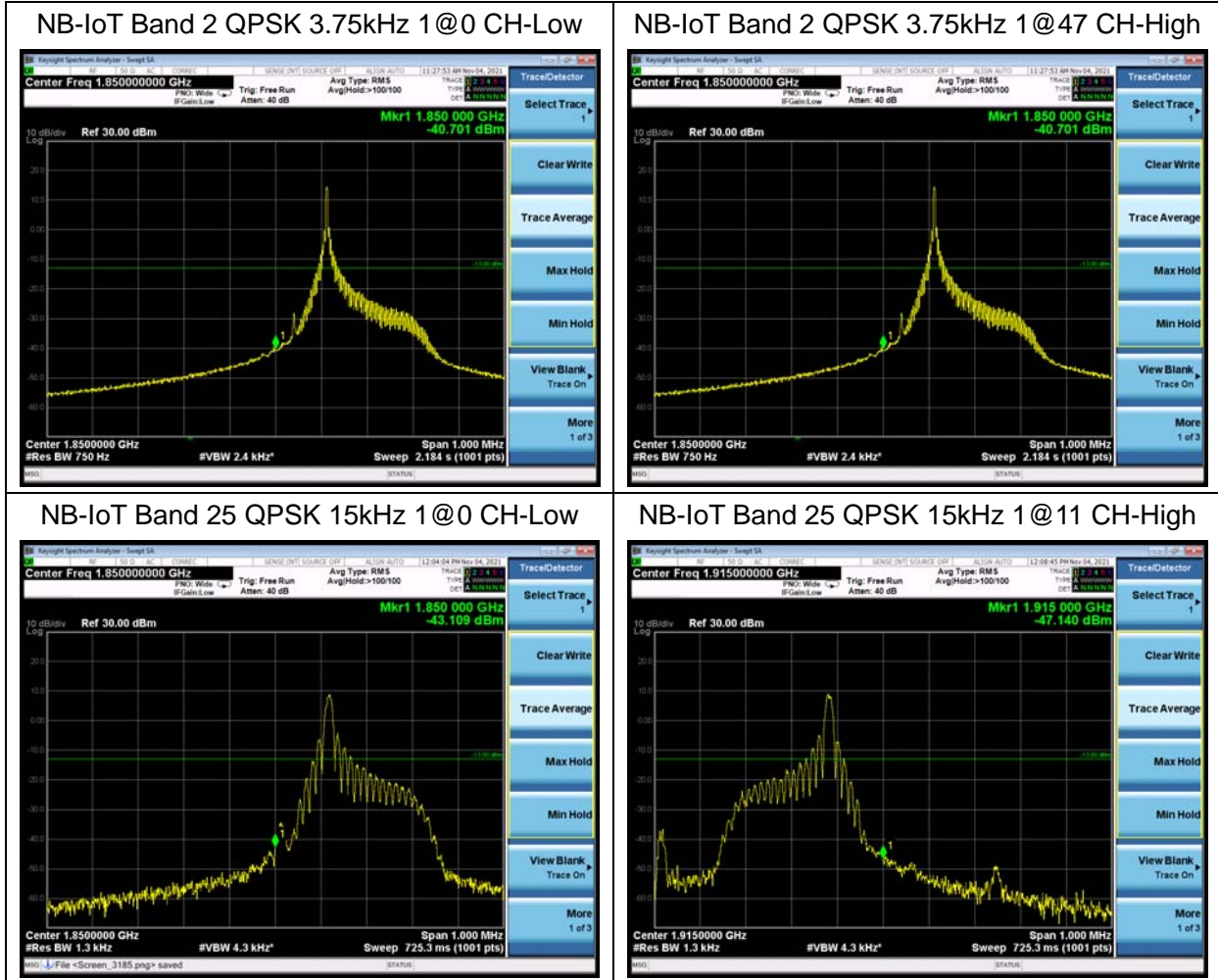
NB-IoT Band 2 QPSK 3.75kHz 1@0 CH-High



NB-IoT Band 25 QPSK 15kHz 1@0 CH-High



Band Edge Compliance



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 2 Standalone	BPSK	3.75	18900/1880.0	26.26	21.53	4.73
	QPSK	3.75	18900/1880.0	25.67	21.49	4.18
	BPSK	15	18900/1880.0	25.76	18.59	7.17
	QPSK	15	18900/1880.0	25.40	18.49	6.91

Mode	Modulation	Sub-carrier spacing (KHz)	Channel/ Frequency(MHz)	Peak-to-Average Power Ratio (PAPR)		
				Peak(dBm)	Avg(dBm)	PAPR(dB)
NB-IoT Band 25 Standalone	BPSK	3.75	26365/1882.5	26.30	21.50	4.80
	QPSK	3.75	26365/1882.5	25.64	21.54	4.10
	BPSK	15	26365/1882.5	25.63	18.54	7.09
	QPSK	15	26365/1882.5	25.27	18.46	6.81

Frequency Stability

NB-IoT Band 2						
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	6.02	11.38	0.00320	0.00605	PASS
Extreme(85°C)		13.12	4.55	0.00698	0.00242	PASS
Extreme(80°C)		10.42	17.56	0.00554	0.00934	PASS
Extreme(70°C)		3.76	11.73	0.00200	0.00624	PASS
Extreme(60°C)		11.36	7.09	0.00604	0.00377	PASS
Extreme(50°C)		7.01	10.16	0.00373	0.00541	PASS
Extreme(40°C)		1.96	1.46	0.00104	0.00078	PASS
Extreme(30°C)		8.03	9.87	0.00427	0.00525	PASS
Extreme(20°C)		17.86	6.08	0.00950	0.00324	PASS
Extreme(10°C)		14.98	9.22	0.00797	0.00490	PASS
Extreme(0°C)		7.70	10.22	0.00409	0.00543	PASS
Extreme(-10°C)		15.29	2.86	0.00813	0.00152	PASS
Extreme(-20°C)		12.66	10.23	0.00673	0.00544	PASS
Extreme(-30°C)		1.10	3.27	0.00058	0.00174	PASS
Extreme(-40°C)		6.27	17.27	0.00334	0.00918	PASS
25°C	LV	13.86	14.14	0.00737	0.00752	PASS
	HV	12.42	14.34	0.00660	0.00763	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	9.11	13.17	0.00485	0.00701	PASS
Extreme(85°C)		9.28	6.32	0.00493	0.00336	PASS
Extreme(80°C)		13.77	1.10	0.00733	0.00058	PASS
Extreme(70°C)		6.82	8.32	0.00363	0.00442	PASS
Extreme(60°C)		8.61	17.92	0.00458	0.00953	PASS
Extreme(50°C)		5.81	2.94	0.00309	0.00157	PASS
Extreme(40°C)		14.75	13.57	0.00784	0.00722	PASS
Extreme(30°C)		15.46	1.44	0.00822	0.00077	PASS
Extreme(20°C)		13.13	11.84	0.00698	0.00630	PASS
Extreme(10°C)		16.99	9.92	0.00904	0.00528	PASS
Extreme(0°C)		15.45	14.11	0.00822	0.00750	PASS



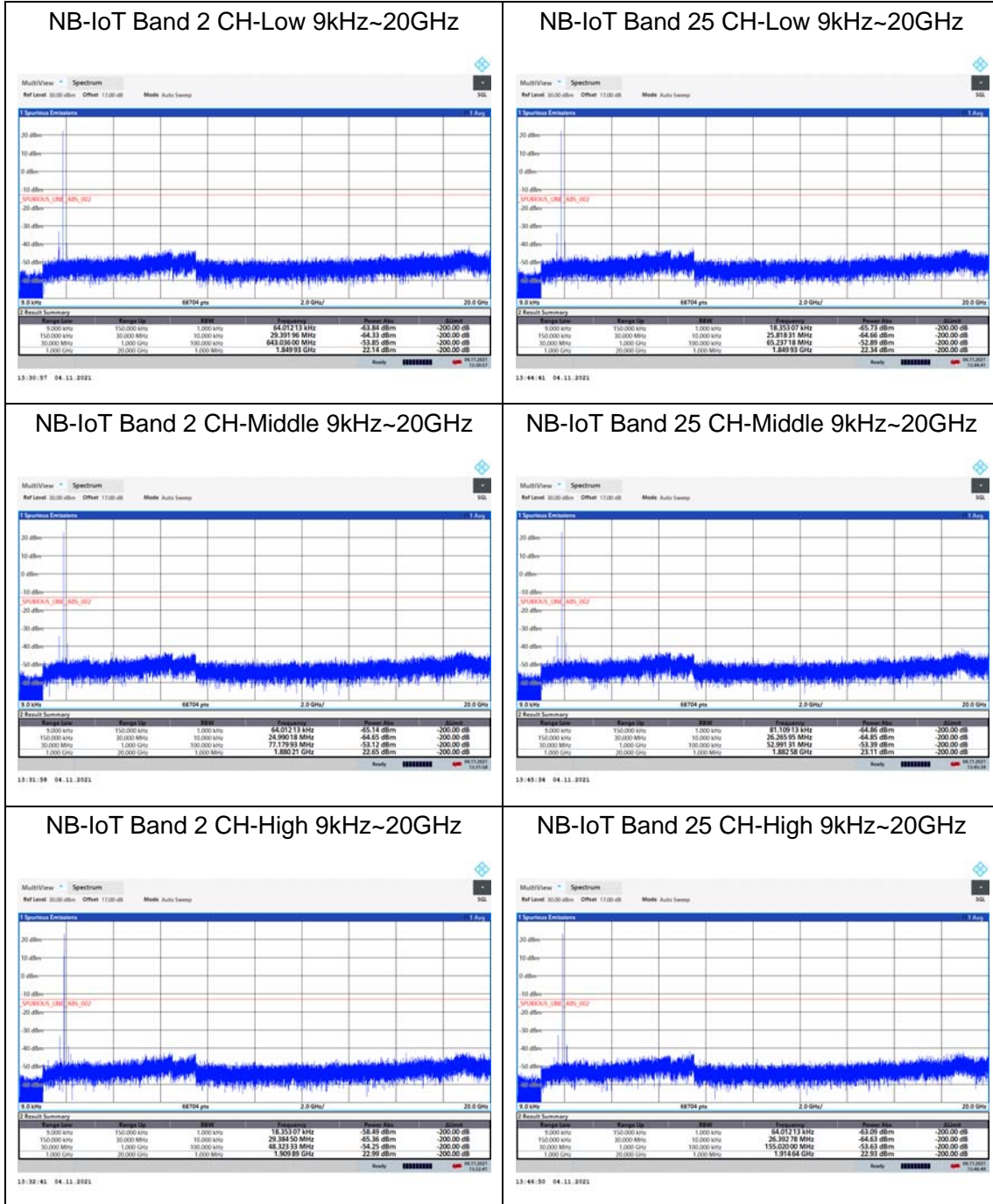
Extreme(-10°C)		11.14	3.12	0.00592	0.00166	PASS
Extreme(-20°C)		1.95	9.39	0.00104	0.00499	PASS
Extreme(-30°C)		11.43	3.07	0.00608	0.00163	PASS
Extreme(-40°C)		2.37	5.93	0.00126	0.00315	PASS
25°C	LV	4.39	1.74	0.00233	0.00092	PASS
	HV	5.43	16.91	0.00289	0.00900	PASS

NB-IoT Band 25						
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	5.57	10.84	0.00296	0.00577	PASS
Extreme(85°C)		17.72	17.17	0.00943	0.00913	PASS
Extreme(80°C)		7.13	5.28	0.00379	0.00281	PASS
Extreme(70°C)		4.33	8.54	0.00230	0.00454	PASS
Extreme(60°C)		17.94	16.32	0.00954	0.00868	PASS
Extreme(50°C)		11.71	3.18	0.00623	0.00169	PASS
Extreme(40°C)		2.39	16.29	0.00127	0.00867	PASS
Extreme(30°C)		7.88	13.13	0.00419	0.00698	PASS
Extreme(20°C)		11.00	1.96	0.00585	0.00104	PASS
Extreme(10°C)		12.27	15.37	0.00653	0.00818	PASS
Extreme(0°C)		3.22	10.33	0.00171	0.00549	PASS
Extreme(-10°C)		6.62	14.62	0.00352	0.00778	PASS
Extreme(-20°C)		14.92	7.41	0.00794	0.00394	PASS
Extreme(-30°C)		14.88	14.56	0.00792	0.00774	PASS
Extreme(-40°C)	10.90	16.35	0.00580	0.00869	PASS	
25°C	LV	15.07	16.96	0.00801	0.00902	PASS
	HV	11.84	8.68	0.00630	0.00462	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	17.70	10.96	0.00941	0.00583	PASS
Extreme(85°C)		10.00	13.13	0.00532	0.00699	PASS
Extreme(80°C)		13.63	9.84	0.00725	0.00523	PASS
Extreme(70°C)		15.18	6.89	0.00807	0.00367	PASS
Extreme(60°C)		2.21	3.58	0.00118	0.00190	PASS
Extreme(50°C)		1.68	9.15	0.00089	0.00487	PASS
Extreme(40°C)		17.26	8.70	0.00918	0.00463	PASS



Extreme(30°C)		12.34	15.37	0.00656	0.00818	PASS
Extreme(20°C)		14.34	4.66	0.00763	0.00248	PASS
Extreme(10°C)		9.46	17.23	0.00503	0.00917	PASS
Extreme(0°C)		5.18	17.46	0.00276	0.00929	PASS
Extreme(-10°C)		4.92	14.09	0.00262	0.00750	PASS
Extreme(-20°C)		15.32	9.95	0.00815	0.00529	PASS
Extreme(-30°C)		8.49	3.18	0.00451	0.00169	PASS
Extreme(-40°C)		15.75	5.59	0.00838	0.00297	PASS
25°C	LV	2.17	13.73	0.00115	0.00730	PASS
	HV	3.87	14.71	0.00206	0.00782	PASS

Spurious Emissions at Antenna Terminals



Radiates Spurious Emission

NB-IoT Band 2 15kHz QPSK CH-Middle

Harmonic	Frequency (MHz)	SG (dBm)	Cable Loss (dB)	Gain (dBi)	Antenna Polarization	EIRP Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (deg)
2	3760.0	-56.51	5.10	11.05	Horizontal	-50.56	-13.0	37.56	225
3	5640.0	-60.42	5.42	12.65	Horizontal	-53.19	-13.0	40.19	135
4	7520.0	-56.75	6.70	13.85	Horizontal	-49.60	-13.0	36.60	135
5	9400.0	-55.06	7.01	14.75	Horizontal	-47.32	-13.0	34.32	270
6	11280.0	-52.26	7.48	15.95	Horizontal	-43.79	-13.0	30.79	315
7	13160.0	-54.27	7.51	16.55	Horizontal	-45.23	-13.0	32.23	0
8	15040.0	-53.55	8.24	15.35	Horizontal	-46.44	-13.0	33.44	180
9	16920.0	-50.06	8.41	14.95	Horizontal	-43.52	-13.0	30.52	90
10	18800.0	-	-	-	-	-	-	-	-

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 25 15kHz QPSK CH-Middle

Harmonic	Frequency (MHz)	SG (dBm)	Cable Loss (dB)	Gain (dBi)	Antenna Polarization	EIRP Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (deg)
2	3765.0	-56.02	5.10	11.05	Horizontal	-50.07	-13.0	37.07	270
3	5647.5	-60.41	5.42	12.65	Horizontal	-53.18	-13.0	40.18	0
4	7530.0	-54.29	6.70	13.85	Horizontal	-47.14	-13.0	34.14	270
5	9412.5	-55.40	7.01	14.75	Horizontal	-47.66	-13.0	34.66	225
6	11295.0	-53.45	7.48	15.95	Horizontal	-44.98	-13.0	31.98	315
7	13177.5	-55.60	7.51	16.55	Horizontal	-46.56	-13.0	33.56	270
8	15060.0	-53.83	8.24	15.35	Horizontal	-46.72	-13.0	33.72	0
9	16942.5	-49.91	8.41	14.95	Horizontal	-43.37	-13.0	30.37	270
10	18825.0	-	-	-	-	-	-	-	-

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	58226119450010	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