

## RF Power Output and Effective Radiated Power

Mode	Modulation	Sub-carrier spacing (KHz)	Ntones	Conducted Power (dBm) for low/mid/high channel		
				20402/824.2	20525/836.5	20648/848.8
NB-IoT Band 5 Standalone	BPSK	3.75	1@0	23.05	23.03	23.13
			1@47	22.93	22.73	22.97
		15	1@0	23.08	23.09	23.08
			1@11	23.06	22.98	23.05
	QPSK	3.75	1@0	23.02	22.94	23.06
			1@47	23.11	22.83	23.02
		15	1@0	23.17	23.00	23.11
			1@11	23.10	23.04	23.11
		15	12@0	21.34	21.19	21.25

## Occupied Bandwidth

Mode	Modulation	Sub-carrier spacing (KHz)	Ntones	Bandwidth(KHz) for low/mid/high channel					
				20402/824.2		20525/836.5		20648/848.8	
				99% Power	-26dBc	99% Power	-26dBc	99% Power	-26dBc
NB-IoT Band 5 Standalone	QPSK	15	1@0	119.38	131.30	117.17	117.80	115.47	103.10

### NB-IoT Band 5 QPSK 15kHz 1@0 CH-Low



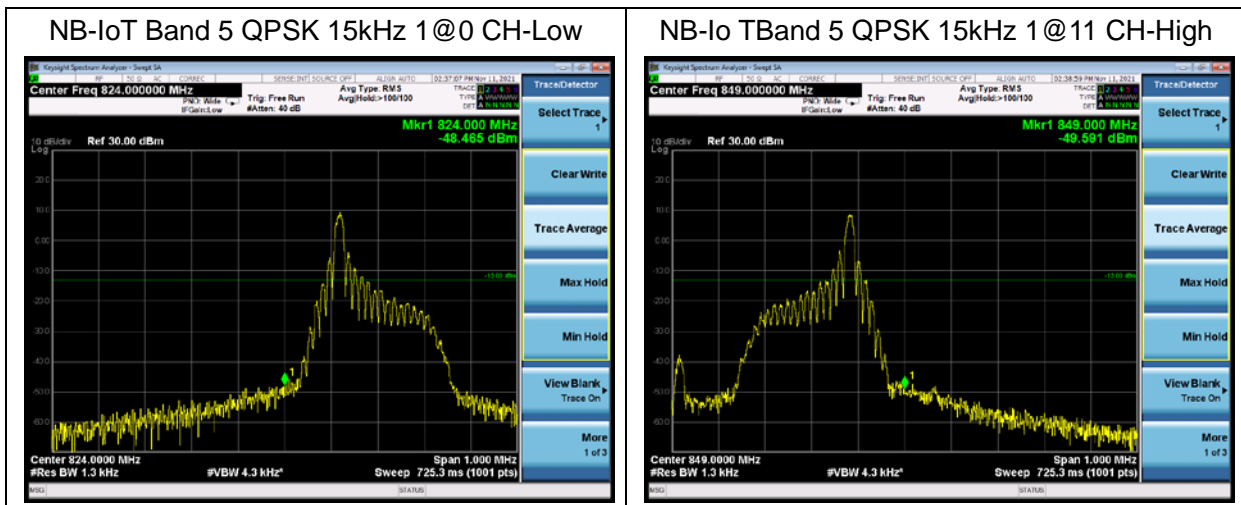
### NB-IoT Band 5 QPSK 15kHz 1@0 CH-Middle



### NB-IoT Band 5 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 5 Standalone	BPSK	3.75	20525/836.5	26.47	21.58	4.89
	QPSK	3.75	20525/836.5	25.67	21.57	4.10
	BPSK	15	20525/836.5	25.82	18.60	7.22
	QPSK	15	20525/836.5	25.59	18.61	6.98

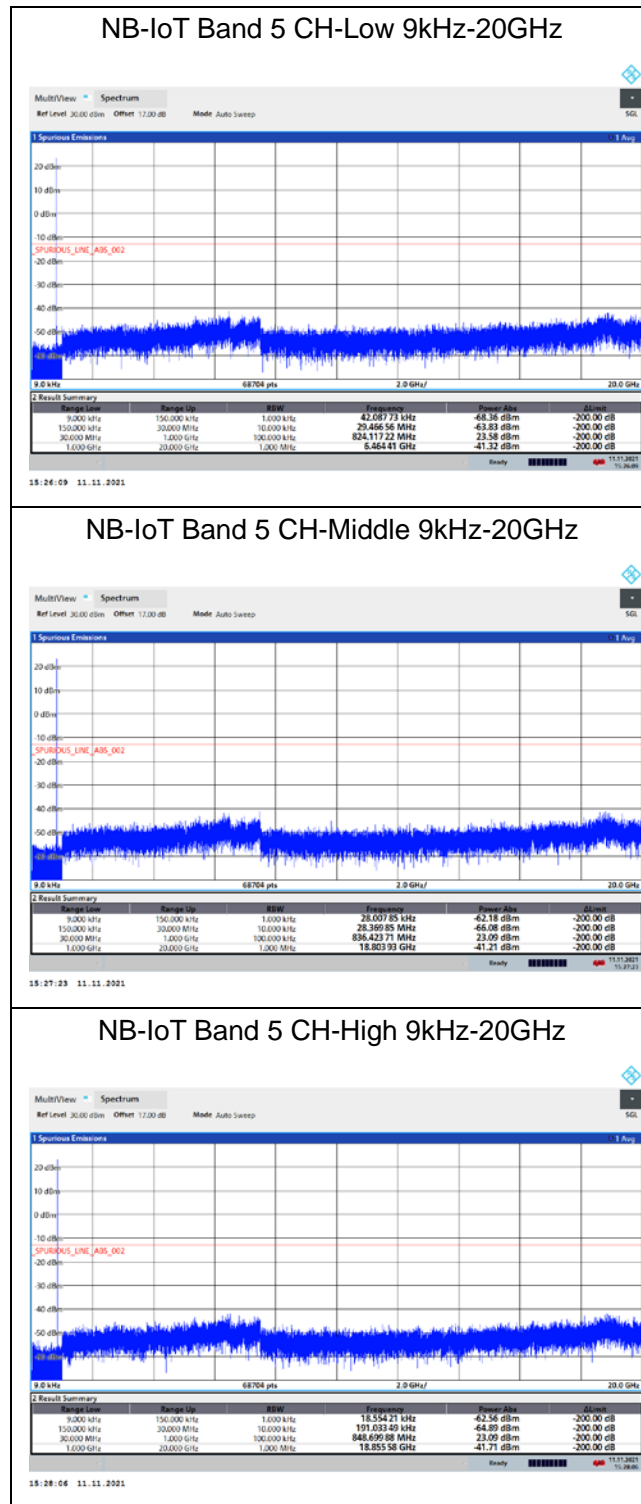
# Frequency Stability

NB-IoT Band 5						
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	3.85	17.19	0.00544	0.02430	PASS
Extreme(85°C)		9.79	13.25	0.01384	0.01873	PASS
Extreme(80°C)		2.74	11.35	0.00388	0.01605	PASS
Extreme(70°C)		2.83	14.75	0.00400	0.02085	PASS
Extreme(60°C)		10.80	13.18	0.01526	0.01863	PASS
Extreme(50°C)		10.00	8.00	0.01413	0.01131	PASS
Extreme(40°C)		14.00	10.00	0.01979	0.01413	PASS
Extreme(30°C)		4.00	8.00	0.00565	0.01131	PASS
Extreme(20°C)		16.00	15.00	0.02261	0.02120	PASS
Extreme(10°C)		13.00	13.00	0.01837	0.01837	PASS
Extreme(0°C)		8.08	8.51	0.01143	0.01203	PASS
Extreme(-10°C)		3.33	8.75	0.00470	0.01237	PASS
Extreme(-20°C)		2.29	15.00	0.00324	0.02120	PASS
Extreme(-30°C)		5.05	2.58	0.00714	0.00365	PASS
Extreme(-40°C)		16.16	2.14	0.02284	0.00302	PASS
25°C		LV	4.67	15.15	0.00660	0.02142
	HV	10.85	3.68	0.01534	0.00520	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	5.31	9.69	0.00751	0.01370	PASS
Extreme(85°C)		14.09	2.88	0.01992	0.00407	PASS
Extreme(80°C)		16.68	1.71	0.02358	0.00241	PASS
Extreme(70°C)		7.68	11.05	0.01085	0.01561	PASS
Extreme(60°C)		5.89	12.57	0.00833	0.01777	PASS
Extreme(50°C)		12.00	10.00	0.01696	0.01413	PASS
Extreme(40°C)		5.00	11.00	0.00707	0.01555	PASS
Extreme(30°C)		9.00	13.00	0.01272	0.01837	PASS
Extreme(20°C)		3.00	9.00	0.00424	0.01272	PASS
Extreme(10°C)		12.00	1.00	0.01696	0.00141	PASS
Extreme(0°C)		16.62	16.80	0.02349	0.02375	PASS



Extreme(-10°C)		15.92	14.70	0.02251	0.02078	PASS
Extreme(-20°C)		11.31	2.64	0.01599	0.00374	PASS
Extreme(-30°C)		1.24	15.74	0.00175	0.02224	PASS
Extreme(-40°C)		14.37	2.46	0.02031	0.00348	PASS
25°C	LV	6.66	16.28	0.00942	0.02301	PASS
	HV	6.24	7.12	0.00882	0.01006	PASS

# Spurious Emissions at Antenna Terminals





## Radiates Spurious Emission

NB-IoT Band 5 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	1648.2	-52.11	2.00	10.75	Horizontal	-45.51	-13.00	32.51	180
3	2472.3	-61.31	2.51	11.05	Horizontal	-54.92	-13.00	41.92	45
4	3296.4	-60.93	4.20	11.15	Horizontal	-56.13	-13.00	43.13	45
5	4120.5	-58.92	5.20	11.15	Horizontal	-55.12	-13.00	42.12	225
6	4944.6	-57.00	5.50	11.95	Horizontal	-52.70	-13.00	39.70	90
7	5768.7	-56.70	5.70	13.55	Horizontal	-51.00	-13.00	38.00	315
8	6592.8	-56.06	6.30	13.75	Horizontal	-50.76	-13.00	37.76	135
9	7416.9	-52.98	6.80	13.85	Horizontal	-48.08	-13.00	35.08	90
10	8241.0	-54.59	6.90	14.25	Horizontal	-49.39	-13.00	36.39	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 5 15kHz+QPSK CH-Middle

Harmonic	Frequency (MHz)	SG (dBm)	Cable Loss (dB)	Gain (dBi)	Antenna Polarization	ERP Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (deg)
2	1673.0	-50.20	2.00	10.75	Horizontal	-43.60	-13.00	30.60	45
3	2509.5	-63.18	2.51	11.05	Horizontal	-56.79	-13.00	43.79	135
4	3346.0	-61.02	4.20	11.15	Horizontal	-56.22	-13.00	43.22	225
5	4182.5	-58.50	5.20	11.15	Horizontal	-54.70	-13.00	41.70	45
6	5019.0	-55.36	5.50	11.95	Horizontal	-51.06	-13.00	38.06	90
7	5855.5	-56.17	5.70	13.55	Horizontal	-50.47	-13.00	37.47	45
8	6692.0	-57.22	6.30	13.75	Horizontal	-51.92	-13.00	38.92	45
9	7528.5	-53.37	6.80	13.85	Horizontal	-48.47	-13.00	35.47	135
10	8365.0	-53.35	6.90	14.25	Horizontal	-48.15	-13.00	35.15	90

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 5 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	1697.8	-49.28	2.00	10.75	Horizontal	-42.68	-13.00	29.68	135
3	2546.7	-62.25	2.51	11.05	Horizontal	-55.86	-13.00	42.86	90
4	3395.6	-62.11	4.20	11.15	Horizontal	-57.31	-13.00	44.31	0
5	4244.5	-55.87	5.20	11.15	Horizontal	-52.07	-13.00	39.07	0
6	5093.4	-54.07	5.50	11.95	Horizontal	-49.77	-13.00	36.77	180
7	5942.3	-56.13	5.70	13.55	Horizontal	-50.43	-13.00	37.43	0
8	6791.2	-57.94	6.30	13.75	Horizontal	-52.64	-13.00	39.64	270
9	7640.1	-53.61	6.80	13.85	Horizontal	-48.71	-13.00	35.71	270
10	8489.0	-52.21	6.90	14.25	Horizontal	-47.01	-13.00	34.01	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.

## Main Test Instruments

Date of Testing (Variant): August 24, 2021 ~ November 25, 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
Software	R&S	EMC32	10.35.10	/	/