RF TEST REPORT

Applicant	Quectel Wireless Solutions Co., Ltd
FCC ID	XMR201808BC66
Product	NB-IoT Module
Brand	Quectel
Model	BC66
Report No.	R2105A0419-R2V4
Issue Date	August 10, 2021

TA Technology (Shanghai) Co., Ltd. tested the above equipment in accordance with the requirements in **FCC CFR47 Part 2 (2020)/ FCC CFR 47 Part 24E (2020)**. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

Performed by: Peng Tao

Approved by: Kai Xu

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Version	Revision description	Issue Date
Rev.0	Initial issue of report.	July 15, 2021
Rev.1	Update description in Page 4.	July 30, 2021
Rev.2	Update description in Page 4. Update data in Page 38/40.	August 5, 2021
Rev.3	Add data in Page 12~13.	August 6, 2021
Rev.4	Update description in Page 11. Add data in Page 15.	August 10, 2021
Note: This revised report (Report No. R2105A0419-R2V4) supersedes and replaces the previously issued report (Report No. R2105A0419-R2V3). Please discard or destroy the previously issued report and dispose of it accordingly.		

Summary of measurement results

No.	Test Case	Clause in FCC rules	Verdict
1	RF Power Output and Effective Isotropic Radiated Power	2.1046 24.232(c)	PASS
2	Occupied Bandwidth	2.1049	PASS
3	Band Edge Compliance	2.1051 /24.238(a)	PASS
4	Peak-to-Average Power Ratio	24.232/KDB 971168 D01(5.7)	PASS
5	Frequency Stability	2.1055 / 24.235	PASS
6	Spurious Emissions at Antenna Terminals	2.1051 / 24.238(a)	PASS
7	Radiates Spurious Emission	2.1053 / 24.238(a)	PASS
Date of Testing: (Original) October 29, 2018 ~ November 12, 2018 (Variant) May 18, 2021~ June 11, 2021 and August 5, 2021			
Date of Sample Received: (Variant) May 14, 2021			
Note: PASS: The EUT complies with the essential requirements in the standard. FAIL: The EUT does not comply with the essential requirements in the standard.			

BC66 (Report No.: R2105A0419-R2V4) is a variant model of BC66 (Report No.: R1809A0442-R2V3).Test values partial duplicated from Original for variant. There is only tested RF power output and Effective Radiated Power, Frequency Stability, Occupied Bandwidth, Band Edge Compliance, Receiver Spurious Emissions with worst Channel for variant in this report. The detailed product change description please refers to Statement letter.

1. Test Laboratory

1.1. Notes of the test report

This report shall not be reproduced in full or partial, without the written approval of **TA technology (shanghai) co., Ltd.** The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein .Measurement Uncertainties were not taken into account and are published for informational purposes only. This report is written to support regulatory compliance of the applicable standards stated above.

1.2. Test facility

FCC (Designation number: CN1179, Test Firm Registration Number: 446626)

TA Technology (Shanghai) Co., Ltd. has been listed on the US Federal Communications Commission list of test facilities recognized to perform electromagnetic emissions measurements.

A2LA (Certificate Number: 3857.01)

TA Technology (Shanghai) Co., Ltd. has been listed by American Association for Laboratory Accreditation to perform electromagnetic emission measurement.

1.3. Testing Location

Company:	TA Technology (Shanghai) Co., Ltd.
Address:	No.145, Jintang Rd, Tangzhen Industry Park, Pudong
City:	Shanghai
Post code:	201201
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E-mail:	xukai@ta-shanghai.com

2. General Description of Equipment under Test

Client Information

Applicant	Quectel Wireless Solutions Co., Ltd
Applicant address	Building 5, Shanghai Business Park Phase III (Area B), No.1016 Tianlin Road, Minhang District, Shanghai 200233, China
Manufacturer	Quectel Wireless Solutions Co., Ltd
Manufacturer address	Building 5, Shanghai Business Park Phase III (Area B), No.1016 Tianlin Road, Minhang District, Shanghai 200233, China

General information

<table>
<tr><th colspan="5">EUT Description</th></tr>
<tr><td>Model</td><td colspan="4">BC66</td></tr>
<tr><td>IMEI</td><td colspan="4">Original: 867997030054273
Variant: 867997030002819</td></tr>
<tr><td>Hardware Version</td><td colspan="4">R2.5</td></tr>
<tr><td>Software Version</td><td colspan="4">BC66NBR01A11</td></tr>
<tr><td>Power Supply</td><td colspan="4">External Power Supply</td></tr>
<tr><td>Antenna Type</td><td colspan="4">External Antenna</td></tr>
<tr><td rowspan="6">Antenna Gain</td><td>Band</td><td colspan="2">Frequency (MHz)</td><td>Gain (dBi)</td></tr>
<tr><td rowspan="5">NB-IoT Band 2
NB-IoT Band 25</td><td colspan="2">1840</td><td>1.36</td></tr>
<tr><td colspan="2">1860</td><td>1.25</td></tr>
<tr><td colspan="2">1880</td><td>1.38</td></tr>
<tr><td colspan="2">1900</td><td>1.59</td></tr>
<tr><td colspan="2">1920</td><td>1.36</td></tr>
<tr><td>Test Mode(s)</td><td colspan="4">NB-IoT Band 2/ NB-IoT Band 25;</td></tr>
<tr><td>Test Modulation:</td><td colspan="4">BPSK, QPSK</td></tr>
<tr><td>Category</td><td colspan="4">NB1</td></tr>
<tr><td>Deployment:</td><td colspan="4">stand-alone</td></tr>
<tr><td>Sub-carrier spacing:</td><td colspan="4">3.75KHz, 15KHz</td></tr>
<tr><td>Ntones:</td><td colspan="4">single-tone, multi-tone</td></tr>
<tr><td rowspan="2">Maximum E.I.R.P</td><td colspan="2">NB-IoT Band 2:</td><td colspan="2">25.84dBm</td></tr>
<tr><td colspan="2">NB-IoT Band 25:</td><td colspan="2">25.60dBm</td></tr>
<tr><td>Rated Power Supply Voltage</td><td colspan="4">3.3V</td></tr>
<tr><td>Extreme Voltage</td><td colspan="4">Minimum: 2.1V Maximum: 3.63V</td></tr>
<tr><td>Extreme Temperature</td><td colspan="4">Lowest:-40°C Highest: +85°C</td></tr>
<tr><td rowspan="3">Operating Frequency Range(s)</td><td>Band</td><td colspan="2">Tx (MHz)</td><td>Rx (MHz)</td></tr>
<tr><td>NB-IoT Band 2</td><td colspan="2">1850 ~ 1910</td><td>1930 ~ 1990</td></tr>
<tr><td>NB-IoT Band 25</td><td colspan="2">1850 ~ 1915</td><td>1930 ~ 1995</td></tr>
<tr><td colspan="5">Note: The information of the EUT is declared by the manufacturer.</td></tr>
</table>

Accessory equipment	
Evaluation Board	RF Cable
RS232-to-USB Cable	Antenna: Dipole Antenna
DC 5V Adaptor	/

3. Applied Standards

According to the specifications of the manufacturer, it must comply with the requirements of the following standards:

Test standards:

FCC CFR47 Part 27C (2020)

ANSI C63.26 (2015)

Reference standard:

FCC CFR47 Part 2 (2020)

KDB 971168 D01 Power Meas License Digital Systems v03r01

4. Test Configuration

Radiated measurements are performed by rotating the EUT in three different orthogonal test planes. EUT stand-up position (Z axis), lie-down position (X, Y axis). Receiver antenna polarization (horizontal and vertical), the worst emission was found in position (Z axis, horizontal polarization) and the worst case was recorded.

All mode and data rates and positions and RB size and modulations were investigated.
Subsequently, only the worst case emissions are reported.
The following testing in NB-IoT is set based on the maximum RF Output Power.

All modes as Subcarrier Spacing, modulations, Channel were investigated.
Subsequently, only the worst case emissions are reported.
The following testing in NB-IoT is set based on the maximum RF Output Power.

Test modes are chosen to be reported as the worst case configuration below for NB-IoT Band 2/25

Test items	Mode	Deployment mode	Subcarrier Spacing (kHz)		Modulation		Test Channel		
		Stand-alone	3.75	15	BPSK	QPSK	L	M	H
RF Power Output and Effective Isotropic Radiated Power	NB-IoT B2	O	O	O	O	O	O	O	O
	NB-IoT B25	O	O	O	O	O	O	O	O
Occupied Bandwidth	NB-IoT B2	O	O	O	O	O	O	O	O
	NB-IoT B25	O	O	O	O	O	O	O	O
Band Edge Compliance	NB-IoT B2	O	O	O	O	O	O	-	O
	NB-IoT B25	O	O	O	O	O	O	-	O
Peak-to-Average Power Ratio	NB-IoT B2	O	O	O	O	O	-	O	-
	NB-IoT B25	O	O	O	O	O	-	O	-
Frequency Stability	NB-IoT B2	O	O	O	O	O	-	O	-
	NB-IoT B25	O	O	O	O	O	-	O	-
Conducted Spurious Emissions	NB-IoT B2	O	-	O	-	O	O	O	O
	NB-IoT B25	O	-	O	-	O	O	O	O
Radiates Spurious Emission	NB-IoT B2	O	-	O	-	O	O	O	O
	NB-IoT B25	O	-	O	-	O	O	O	O

Note1. The mark “O” means that this configuration is chosen for testing.
2. The mark “-” means that this configuration is not testing.

5. Test Case Results

5.1. RF Power Output and Effective Isotropic Radiated Power

Ambient condition

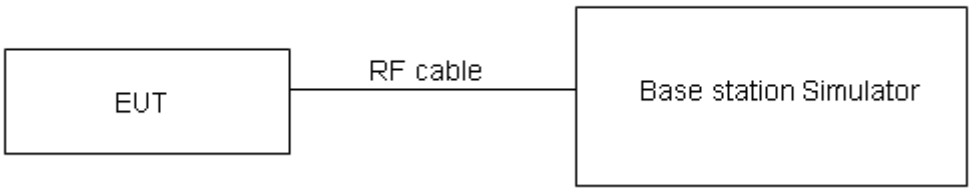
Temperature	Relative humidity	Pressure
23°C ~25°C	45%~50%	101.5kPa

Methods of Measurement

During the process of the testing, The EUT was connected to the Base Station Simulator with a known loss. The EUT is controlled by the Base Station Simulator test set to ensure max power transmission with proper modulation.

ERP can then be calculated as follows:
EIRP (dBm) = Output Power (dBm) - Losses (dB) + Antenna Gain (dBi)
where:dBd refers to gain relative to an ideal dipole.
EIRP (dBm) = ERP (dBm) + 2.15 (dB).

Test Setup



The loss between RF output port of the EUT and the input port of the tester has been taken into consideration.

Limits

No specific RF power output requirements in part 2.1046.

Rule Part 22.913(a)(5) specifies that "Mobile/portable stations are limited to 7 watts ERP".

Limit	≤ 7 W (38.45 dBm)

Measurement Uncertainty

The assessed measurement uncertainty to ensure 95% confidence level for the normal distribution is with the coverage factor k = 2, U= 0.4 dB for RF power output, k = 2, U= 1.19 dB for ERP.

Test Results

Power of new variant are varied due to measurement uncertainty, and sample tolerance of the acceptance range.

Variant

Mode	Modulation	Sub-carrier spacing (KHz)	Ntones	Conducted Power (dBm) for low/mid/high channel			EIRP (dBm)		
				18602/ 1850.2	18900/ 1880.0	19198/ 1909.8	18602/ 1850.2	18900/ 1880.0	19198/ 1909.8
NB-IoT Band 2 Standalone	BPSK	3.75	1@0	24.14	24.02	24.18	25.39	25.40	25.77
			1@47	24.01	23.96	24.11	25.26	25.34	25.70
		15	1@0	24.00	24.00	24.15	25.25	25.38	25.74
			1@11	24.03	24.02	24.16	25.28	25.40	25.75
	QPSK	3.75	1@0	24.04	24.05	24.15	25.29	25.43	25.74
			1@47	24.01	23.98	24.13	25.26	25.36	25.72
		15	1@0	23.89	23.82	24.03	25.14	25.20	25.62
			1@11	24.10	24.08	24.25	25.35	25.46	25.84
		15	12@0	21.97	21.96	22.22	23.22	23.34	23.81

Mode	Modulation	Sub-carrier spacing (KHz)	Ntones	Conducted Power (dBm) for low/mid/high channel			EIRP (dBm)		
				26042/ 1850.2	26365/ 1882.5	26688/ 1914.8	26042/ 1850.2	26365/ 1882.5	26688/ 1914.8
NB-IoT Band 25 Standalone	BPSK	3.75	1@0	24.15	24.13	24.15	25.40	25.51	25.51
			1@47	24.11	24.22	24.13	25.36	25.60	25.49
		15	1@0	23.84	23.93	23.94	25.09	25.31	25.30
			1@11	23.88	23.99	24.12	25.13	25.37	25.48
	QPSK	3.75	1@0	24.14	24.10	24.19	25.39	25.48	25.55
			1@47	24.06	24.16	24.20	25.31	25.54	25.56
		15	1@0	23.83	23.88	23.81	25.08	25.26	25.17
			1@11	24.00	23.91	23.95	25.25	25.29	25.31
		15	12@0	21.92	21.86	21.93	23.17	23.24	23.29

Original

Mode	Modulation	Sub-carrier spacing (KHz)	Ntones	Output Power (dBm) for low/mid/high channel		
				18601/1850.1	18900/1880.0	19199/1909.9
Band 2 Standalone	BPSK	3.75	1@0	23.38	23.26	23.34
			1@47	23.36	23.21	23.33
		15	1@0	23.26	23.18	23.26
			1@11	23.23	23.12	23.21
	QPSK	3.75	1@0	23.35	23.29	23.31
			1@47	23.40	23.25	23.32
		15	1@0	23.25	23.11	23.19
			1@11	23.14	23.01	23.13
		15	12@0	21.02	21.97	21.13

Mode	Modulation	Sub-carrier spacing (KHz)	Ntones	Output Power (dBm) for low/mid/high channel		
				26041/1850.1	26341/1880.1	26689/1914.9
Band 25 Standalone	BPSK	3.75	1@0	24.17	24.21	23.95
			1@47	24.06	24.17	23.90
		15	1@0	23.95	24.09	23.79
			1@11	23.97	24.05	23.92
	QPSK	3.75	1@0	24.12	24.08	23.93
			1@47	24.13	24.19	23.84
		15	1@0	23.99	24.10	23.80
			1@11	23.94	24.01	23.77
		15	12@0	21.82	22.08	21.62

Mode	Channel	Frequency (MHz)	Modulation	Polarization	Sub-carrier spacing (KHz)	Ntones	EIRP (dBm)	Limit (dBm)	Conclusion
Band2 Standalone	18601	1850.1	BPSK	H	3.75	1@0	24.54	33	Pass
			QPSK	H	3.75	1@0	24.34	33	Pass
			BPSK	H	15	1@0	24.47	33	Pass
			QPSK	H	15	1@0	24.27	33	Pass
	18900	1880	BPSK	H	3.75	1@0	24.98	33	Pass
			QPSK	H	3.75	1@0	24.54	33	Pass
			BPSK	H	15	1@0	24.67	33	Pass
			QPSK	H	15	1@0	24.13	33	Pass
	19199	1909.9	BPSK	H	3.75	1@0	24.62	33	Pass
			QPSK	H	3.75	1@0	24.37	33	Pass

			BPSK	H	15	1@0	24.31	33	Pass
			QPSK	H	15	1@0	24.39	33	Pass

Mode	Channel	Frequency (MHz)	Modulation	Polarization	Sub-carrier spacing (KHz)	Ntones	EIRP (dBm)	Limit (dBm)	Conclusion
Band25 Standalone	26041	1850.1	BPSK	H	3.75	1@0	25.13	33	Pass
			QPSK	H	3.75	1@0	25.01	33	Pass
			BPSK	H	15	1@0	24.84	33	Pass
			QPSK	H	15	1@0	24.61	33	Pass
	26341	1880.1	BPSK	H	3.75	1@0	24.89	33	Pass
			QPSK	H	3.75	1@0	24.37	33	Pass
			BPSK	H	15	1@0	24.69	33	Pass
			QPSK	H	15	1@0	24.51	33	Pass
	26689	1914.9	BPSK	H	3.75	1@0	24.96	33	Pass
			QPSK	H	3.75	1@0	24.76	33	Pass
			BPSK	H	15	1@0	24.36	33	Pass
			QPSK	H	15	1@0	24.66	33	Pass

5.2. Occupied Bandwidth

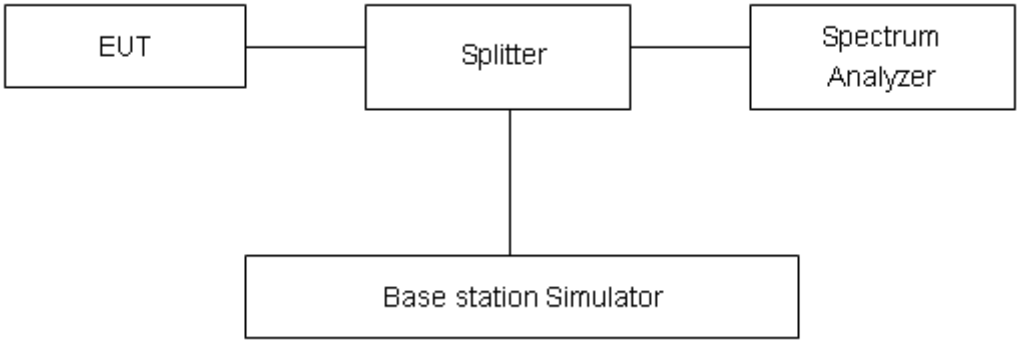
Ambient condition

Temperature	Relative humidity	Pressure
23°C ~25°C	45%~50%	101.5kPa

Method of Measurement

The EUT was connected to Spectrum Analyzer and Base Station Simulator via power Splitter. The occupied bandwidth is measured using spectrum analyzer.
RBW is set to 2kHz, VBW is set to 6.2kHz for NB-IOT Band 2/25.
99% power and -26dBc occupied bandwidths are recorded. Spectrum analyzer plots are included on the following pages.

Test Setup



Limits

No specific occupied bandwidth requirements in part 2.1049.

Measurement Uncertainty

The assessed measurement uncertainty to ensure 95% confidence level for the normal distribution is with the coverage factor k = 2, U= 624Hz.

Test Result

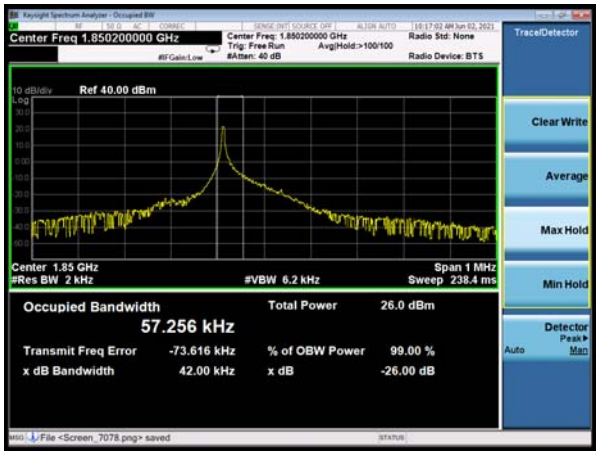
Variant

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	BPSK	3.75	1@0	57.26	42.00	57.77	41.87	58.82	42.51
	QPSK	3.75	1@0	65.55	43.18	64.20	42.23	67.72	45.09
	BPSK	15	1@0	103.70	120.20	103.33	113.40	108.52	118.00
	QPSK	15	1@0	105.78	129.50	105.36	130.50	104.69	128.90
	QPSK	15	12@0	181.93	239.90	181.02	236.80	180.20	236.80
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	BPSK	3.75	1@0	57.41	42.68	57.31	41.52	58.23	38.22
	QPSK	3.75	1@0	65.32	45.64	64.14	44.74	66.57	42.00
	BPSK	15	1@0	107.87	117.90	105.28	111.50	107.13	117.60
	QPSK	15	1@0	103.23	130.10	104.95	129.50	107.30	116.20
	QPSK	15	12@0	180.90	235.60	180.75	231.60	179.08	222.00

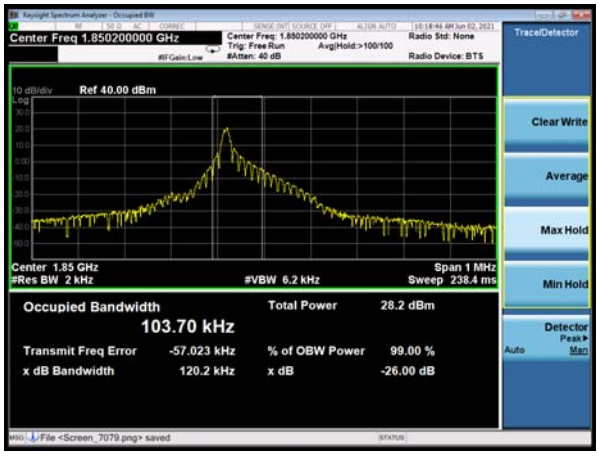
Original

Mode	Modulation	Sub-carrier spacing (KHz)	Ntones	Bandwidth(KHz) for low/mid/high channel					
				18601/1850.1		18900/1880.0		19199/1909.9	
				99% Power	-26dBc	99% Power	-26dBc	99% Power	-26dBc
Band 2 Standalone	BPSK	3.75	1@0	57.79	42.48	58.70	42.29	59.36	42.81
	QPSK	3.75	1@0	65.16	45.08	64.48	44.88	66.56	46.15
	BPSK	15	1@0	107.74	118.10	107.38	116.50	103.10	114.80
	QPSK	15	1@0	104.93	128.60	109.79	130.60	105.41	129.80
	QPSK	15	12@0	179.79	234.70	181.08	238.20	180.34	235.00
Mode	Modulation	Sub-carrier spacing (KHz)	Ntones	Bandwidth(KHz) for low/mid/high channel					
				26041/1850.1		26341/1880.1		26689/1914.9	
				99% Power	-26dBc	99% Power	-26dBc	99% Power	-26dBc
Band 25 Standalone	BPSK	3.75	1@0	58.24	42.18	58.29	42.71	58.13	41.89
	QPSK	3.75	1@0	65.13	45.05	65.07	46.24	63.60	45.27
	BPSK	15	1@0	107.66	116.30	102.83	113.40	105.00	112.80
	QPSK	15	1@0	104.40	129.30	104.27	130.00	107.25	131.00
	QPSK	15	12@0	179.55	238.10	180.39	238.00	181.20	239.50

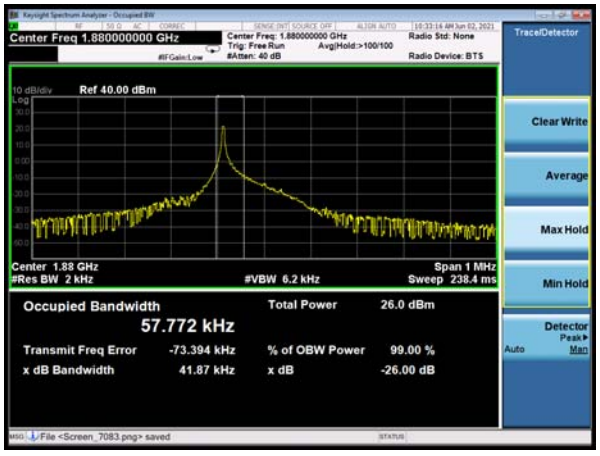
NB-IoT Band 2 BPSK 3.75kHz 1@0 CH-Low



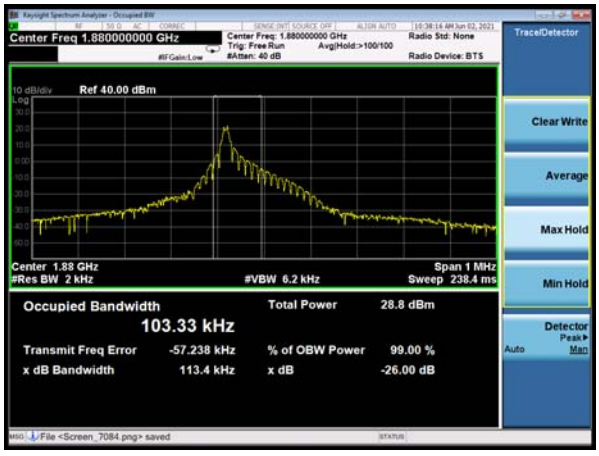
NB-IoT Band 2 BPSK 15kHz 1@0 CH-Low



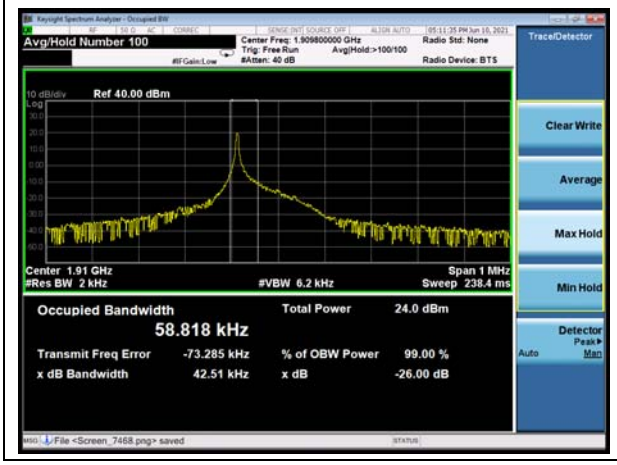
NB-IoT Band 2 BPSK 3.75kHz 1@0 CH-Middle



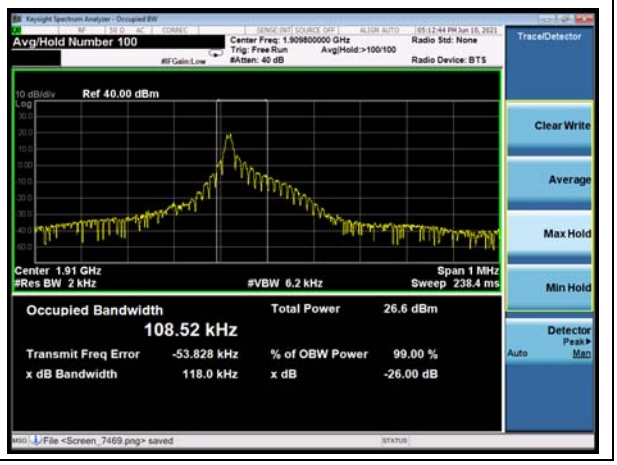
NB-IoT Band 2 BPSK 15kHz 1@0 CH-Middle



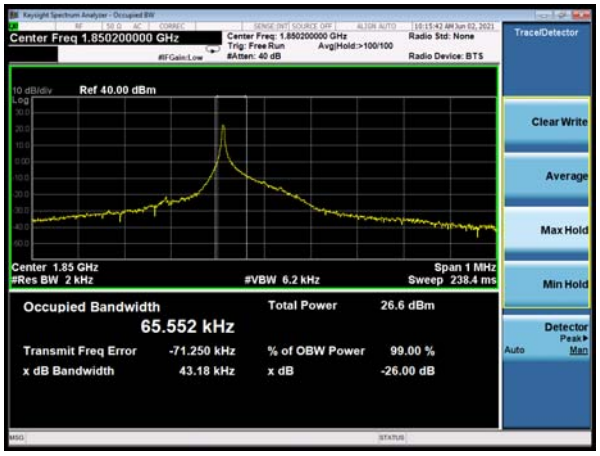
NB-IoT Band 2 BPSK 3.75kHz 1@0 CH-High



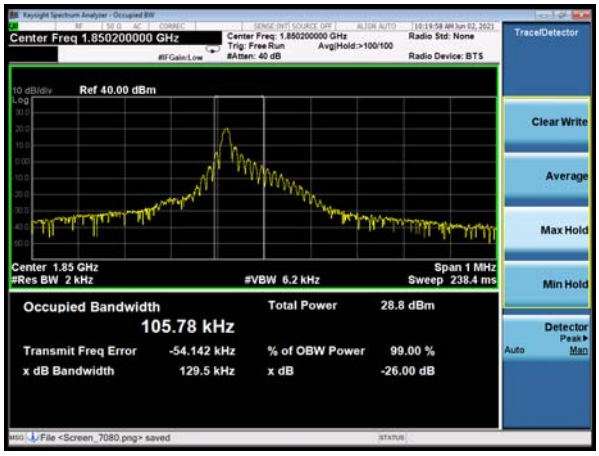
NB-IoT Band 2 BPSK 15kHz 1@0 CH-High



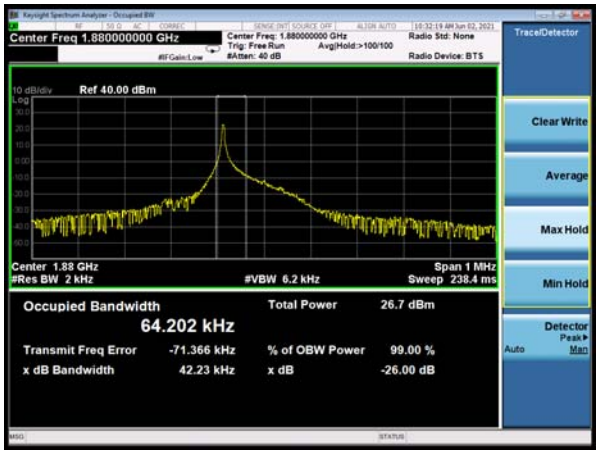
NB-IoT Band 2 QPSK 3.75kHz 1@0 CH-Low



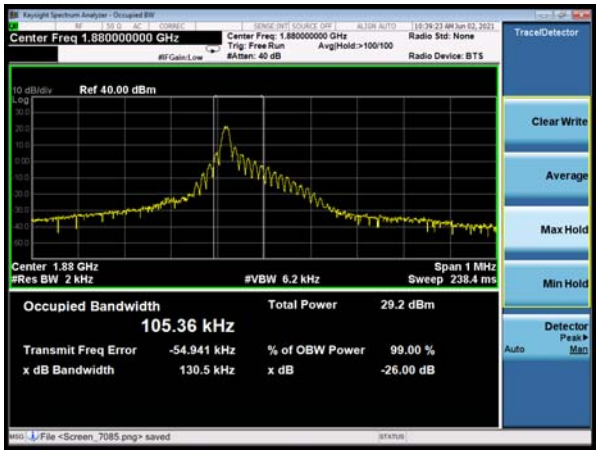
NB-IoT Band 2 QPSK 15kHz 1@0 CH-Low



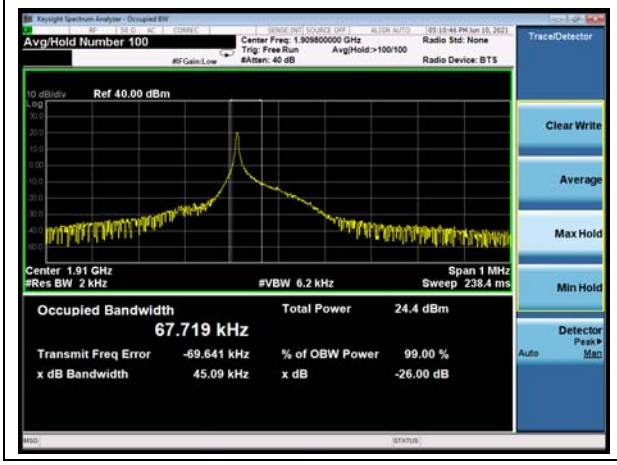
NB-IoT Band 2 QPSK 3.75kHz 1@0 CH-Middle



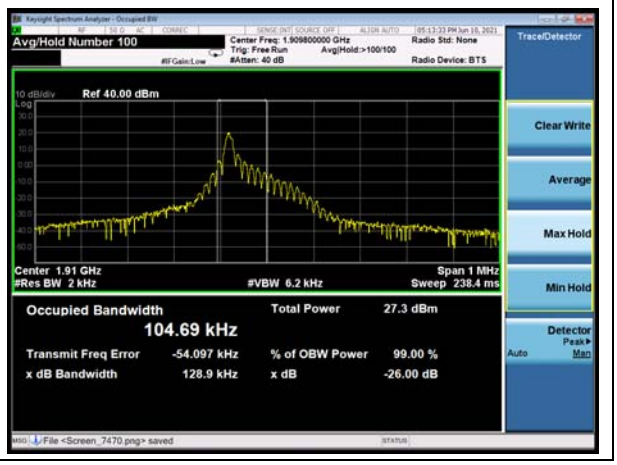
NB-IoT Band 2 QPSK 15kHz 1@0 CH-Middle



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

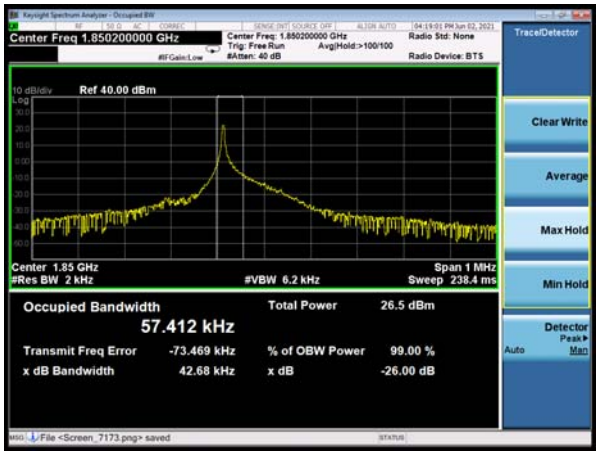


NB-IoT Band 2 QPSK 15kHz 1@0 CH-High

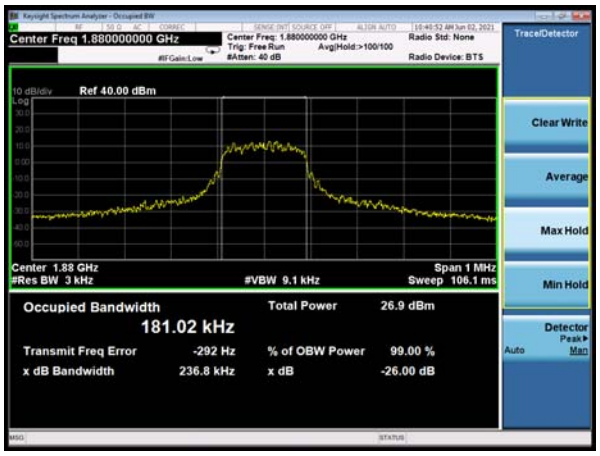


NB-IoT Band 2 QPSK 15kHz 12@0 CH-Low

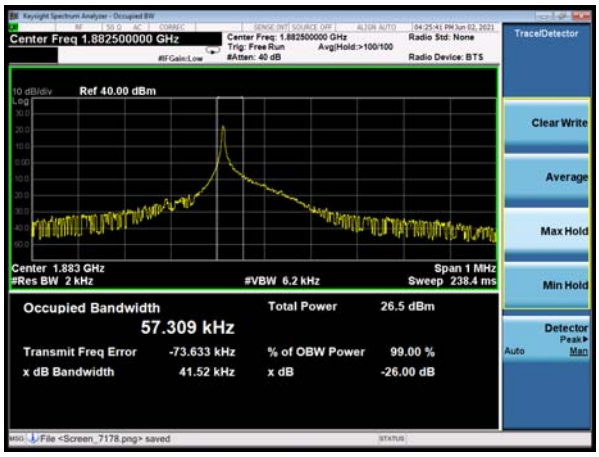
NB-IoT Band 25 BPSK 3.75kHz 1@0 CH-Low



NB-IoT Band 2 QPSK 15kHz 12@0 CH-Middle

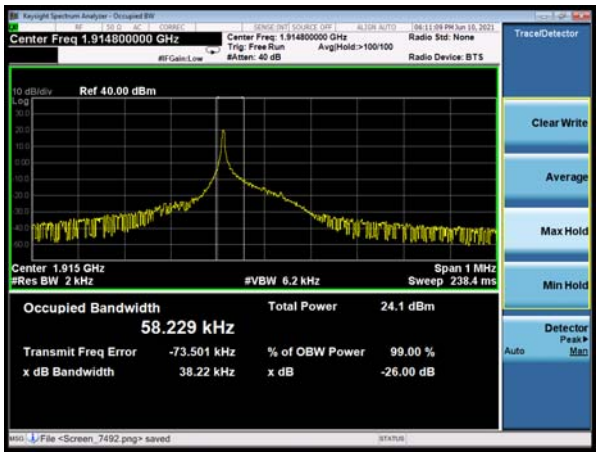


NB-IoT Band 25 BPSK 3.75kHz 1@0 CH-Middle

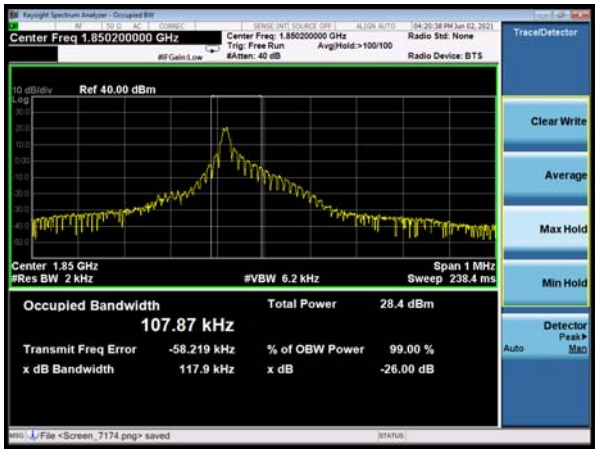


NB-IoT Band 2 QPSK 15kHz 12@0 CH-High

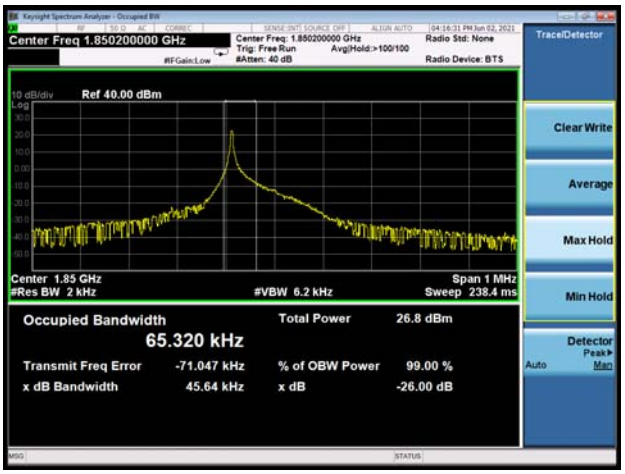
NB-IoT Band 25 BPSK 3.75kHz 1@0 CH-High



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

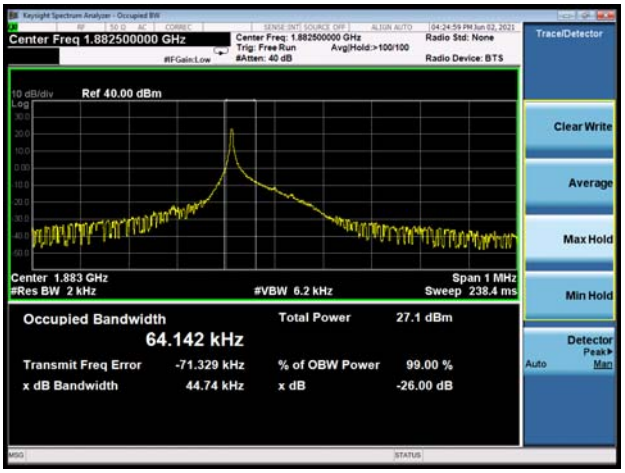


NB-IoT Band 25 QPSK 3.75kHz 1@0 CH-Low

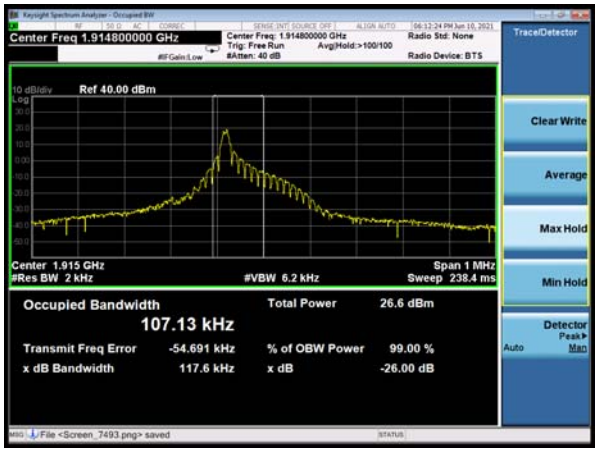


NB-IoT Band 25 BPSK 15kHz 1@0 CH-Middle

NB-IoT Band 25 QPSK 3.75kHz 1@0 CH-Middle

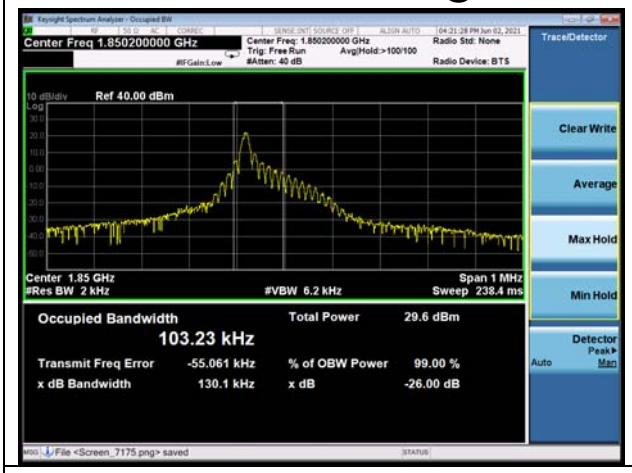


NB-IoT Band 25 BPSK 15kHz 1@0 CH-High



NB-IoT Band 25 QPSK 3.75kHz 1@0 CH-High

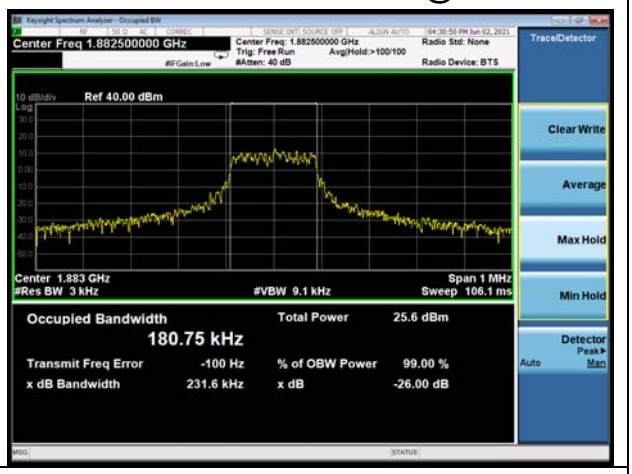
NB-IoT Band 25 QPSK 15kHz 1@0 CH-Low



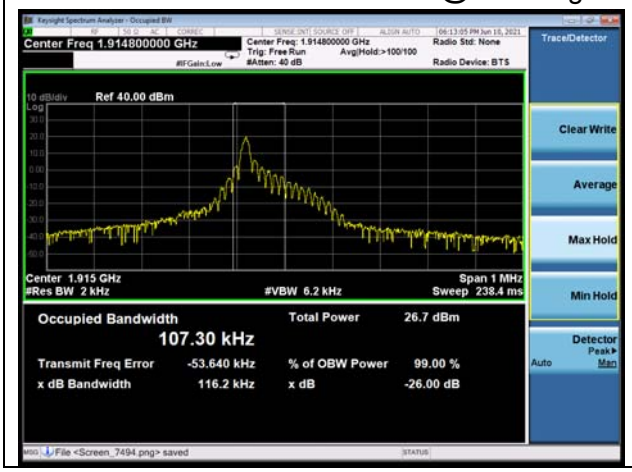
NB-IoT Band 25 QPSK 15kHz 12@0 CH-Low

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

NB-IoT Band 25 QPSK 15kHz 12@0 CH-Middle



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



NB-IoT Band 25 QPSK 15kHz 12@0 CH-High

5.3. Band Edge Compliance

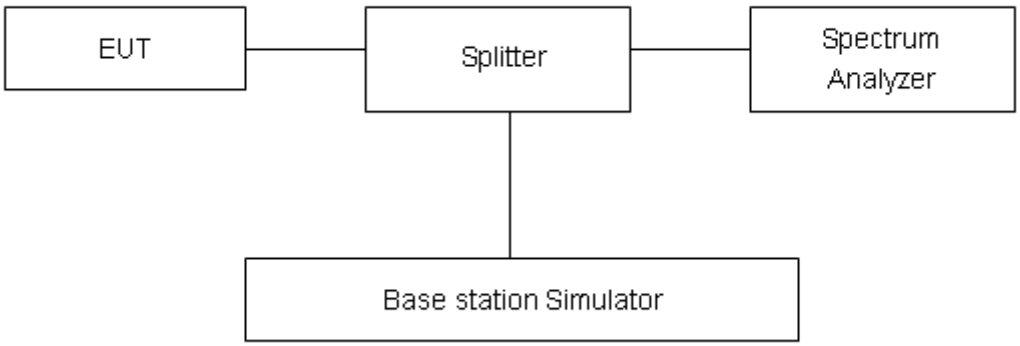
Ambient condition

Temperature	Relative humidity	Pressure
23°C ~25°C	45%~50%	101.5kPa

Method of Measurement

The EUT was connected to Spectrum Analyzer and Base Station Simulator via power Splitter. The band edge of the lowest and highest channels were measured. The Average detector is used and RBW is set to≥1%EBW, VBW is set to 3x RBW.
Spectrum analyzer plots are included on the following pages.

Test Setup



Limits

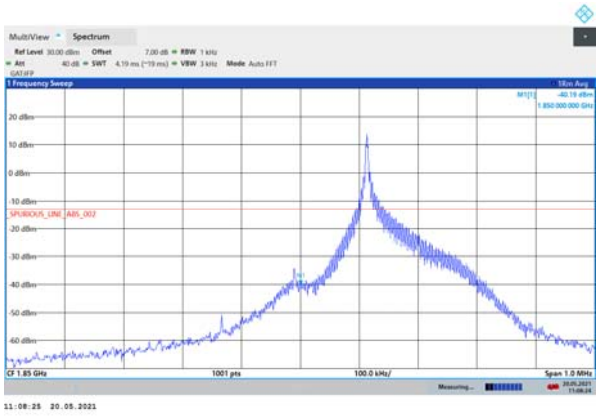
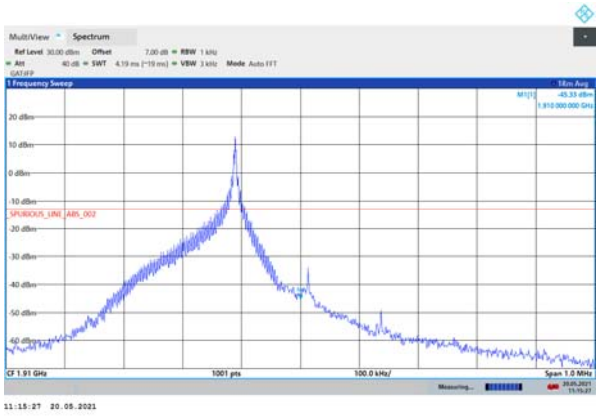
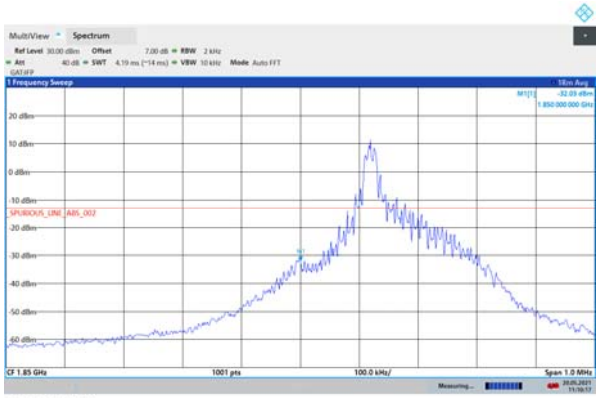
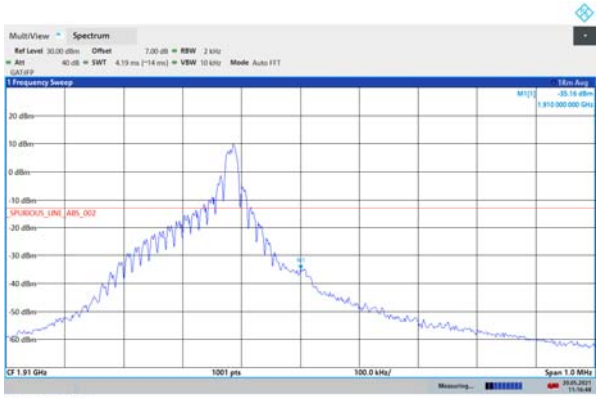
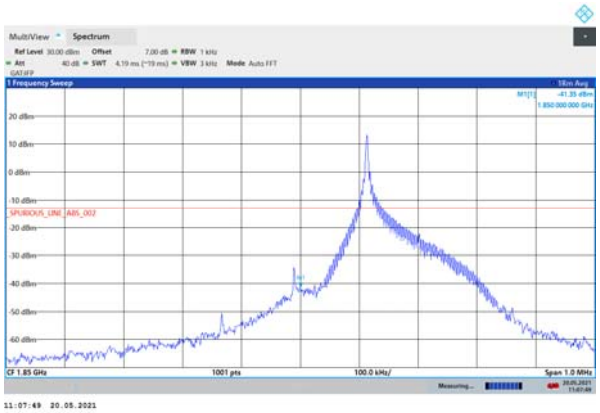
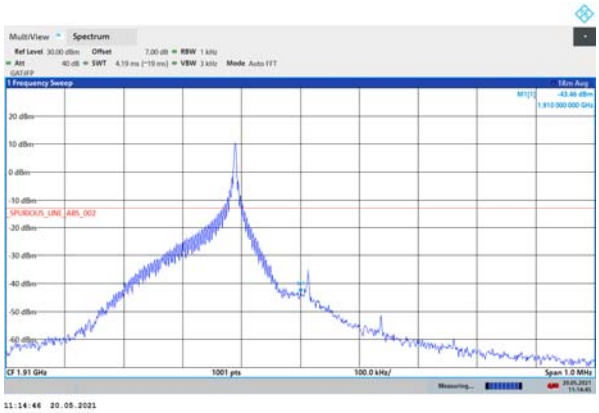
Rule Part 24.238(a) specifies that “on any frequency outside a licensee's frequency block, the power of any emission shall be attenuated below the transmitter power (P) by at least 43 + 10 log10 (P) dB.”

Limit	-13 dBm

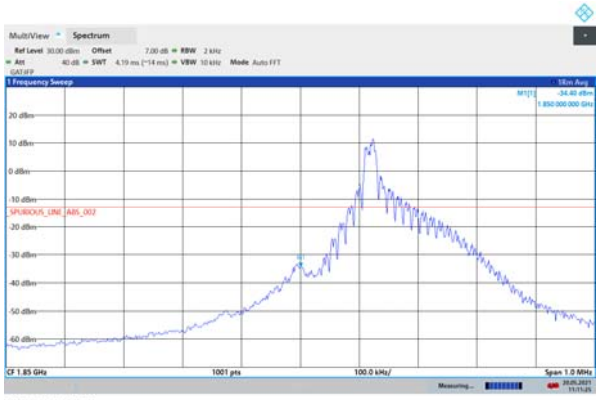
Measurement Uncertainty

The assessed measurement uncertainty to ensure 95% confidence level for the normal distribution is with the coverage factor k = 1.96, U=0.684dB.

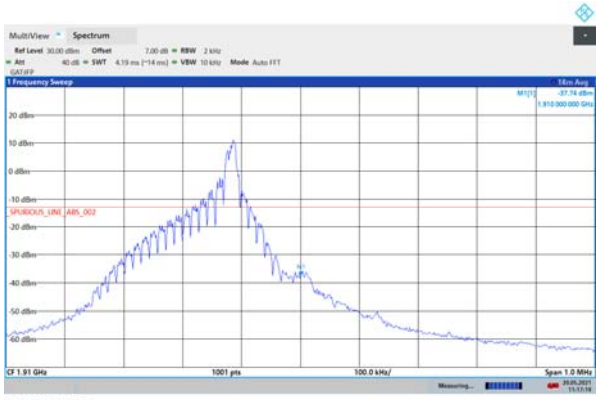
Test Result:

NB-IoT Band 2 BPSK 3.75kHz 1@0 CH-Low	NB-IoT Band 2 BPSK 3.75kHz 1@47 CH-High
	
NB-IoT Band 2 BPSK 15kHz 1@0 CH-Low	NB-IoT Band 2 BPSK 15kHz 1@11 CH-High
	
NB-IoT Band 2 QPSK 3.75kHz 1@0 CH-Low	NB-IoT Band 2 QPSK 3.75kHz 1@47 CH-High
	

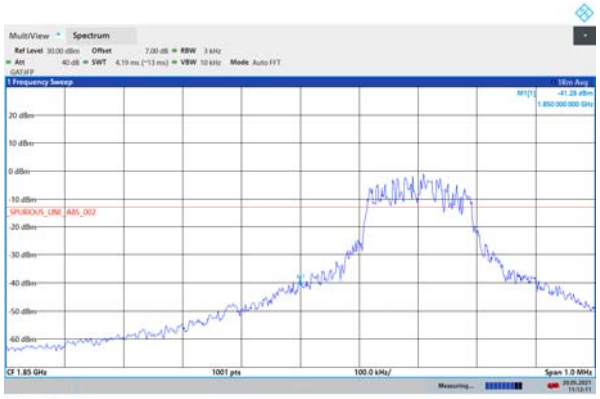
NB-IoT Band 2 QPSK 15kHz 1@0 CH-Low



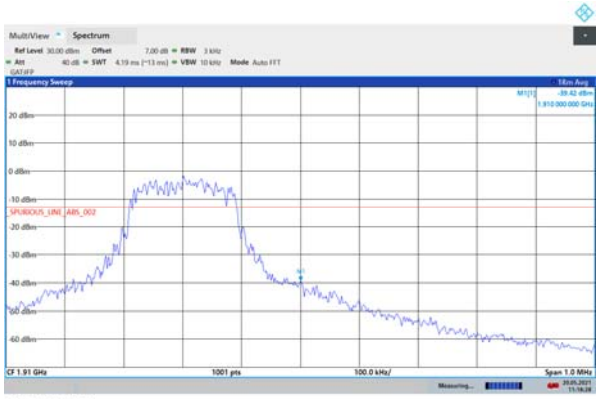
NB-IoT Band 2 QPSK 15kHz 1@11 CH-High



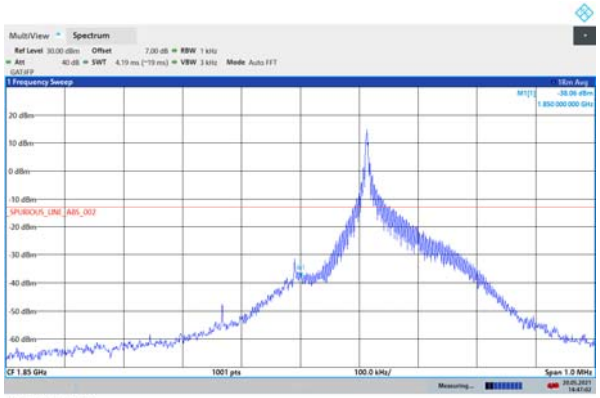
NB-IoT Band 2 QPSK 15kHz 12@0 CH-Low



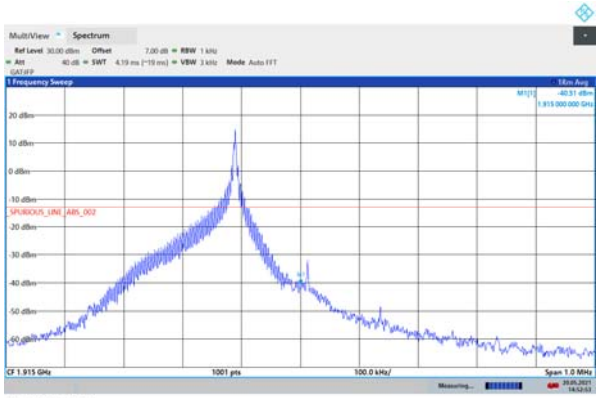
NB-IoT Band 2 QPSK 15kHz 12@0 CH-High



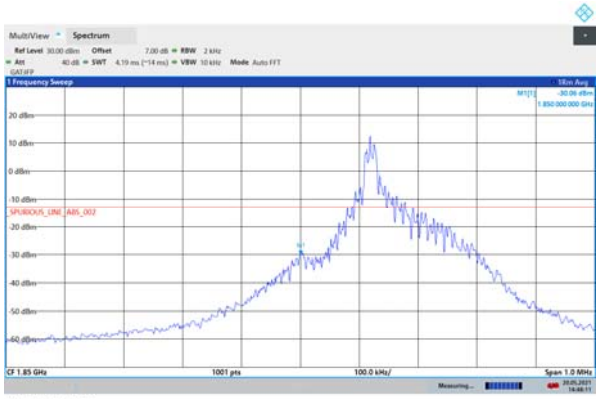
NB-IoT Band 25 BPSK 3.75kHz 1@0 CH-Low



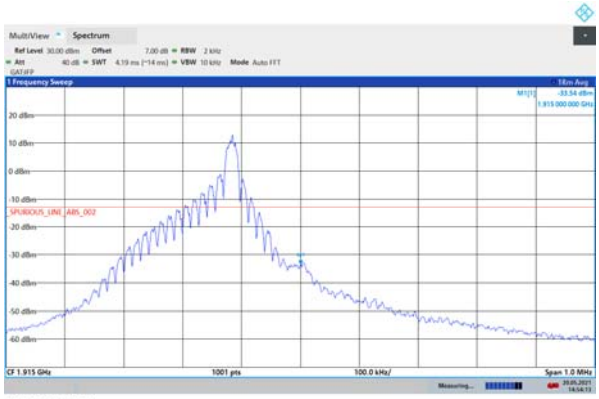
NB-IoT Band 25 BPSK 3.75kHz 1@47 CH-High



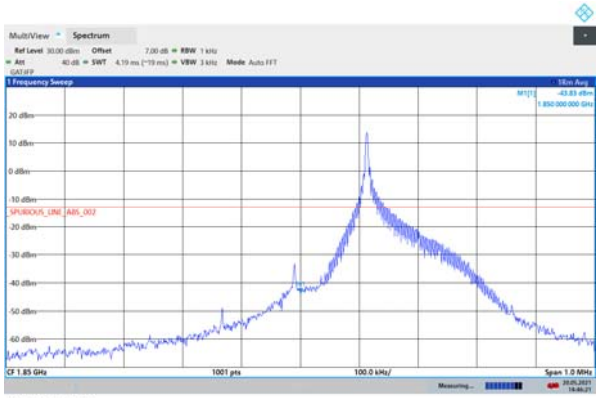
NB-IoT Band 25 BPSK 15kHz 1@0 CH-Low



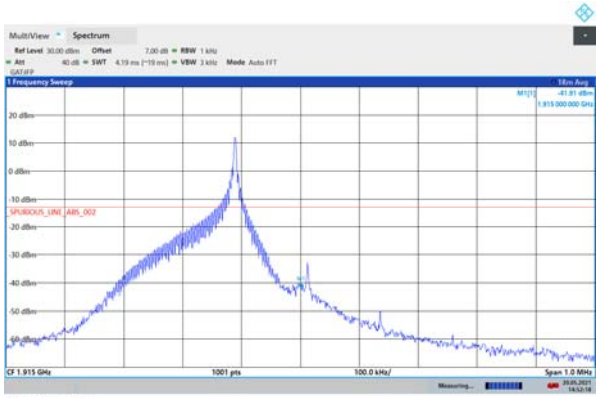
NB-IoT Band 25 BPSK 15kHz 1@11 CH-High



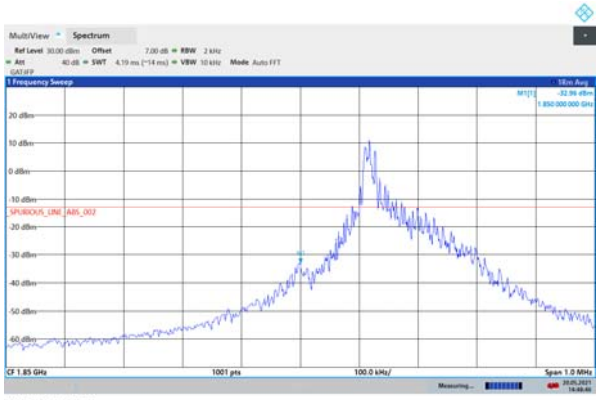
NB-IoT Band 25 QPSK 3.75kHz 1@0 CH-Low



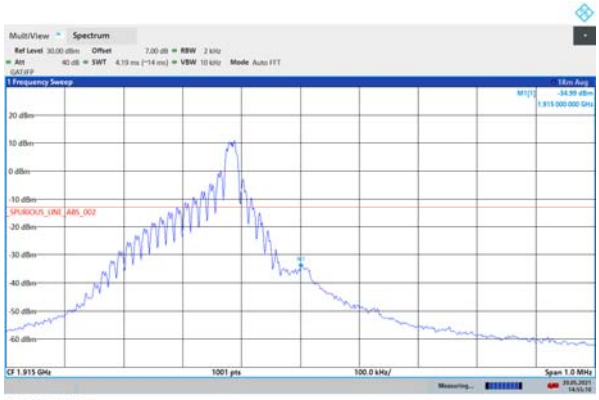
NB-IoT Band 25 QPSK 3.75kHz 1@47 CH-High



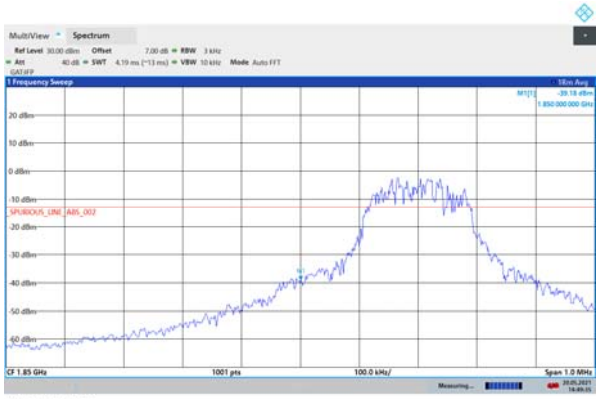
NB-IoT Band 25 QPSK 15kHz 1@0 CH-Low



NB-IoT Band 25 QPSK 15kHz 1@11 CH-High



NB-IoT Band 25 QPSK 15kHz 12@0 CH-Low



NB-IoT Band 25 QPSK 15kHz 12@0 CH-High

5.4. Peak-to-Average Power Ratio (PAPR)

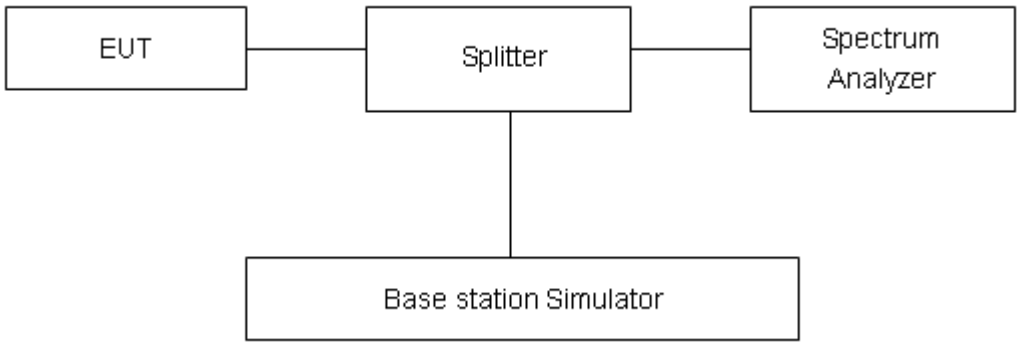
Ambient condition

Temperature	Relative humidity	Pressure
23°C ~25°C	45%~50%	101.5kPa

Methods of Measurement

Measure the total peak power and record as PPk. And measure the total average power and record as PAvg. Both the peak and average power levels must be expressed in the same logarithmic units (*e.g.*, dBm). Determine the PAPR from:
PAPR (dB) = PPk (dBm) - PAvg (dBm).

Test Setup



Limits

In measuring transmissions in this band using an average power technique, the peakto-average ratio (PAR) of the transmission may not exceed 13 dB in 24.232(d).

Measurement Uncertainty

The assessed measurement uncertainty to ensure 95% confidence level for the

normal distribution is with the coverage factor k = 2, U= 0.4 dB.

Test Results

Mode	Modulation	Sub-carrier spacing (KHz)	Channel/ Frequency(MHz)	Peak-to-Average Power Ratio (PAPR)		
				Peak(dBm)	Avg(dBm)	PAPR(dB)
Band 2 Standalone	BPSK	3.75	18900/1880.0	26.22	22.15	4.07
	QPSK	3.75	18900/1880.0	25.73	22.13	3.60
	BPSK	15	18900/1880.0	25.90	19.13	6.77
	QPSK	15	18900/1880.0	25.68	19.14	6.54

Mode	Modulation	Sub-carrier spacing (KHz)	Channel/ Frequency(MHz)	Peak-to-Average Power Ratio (PAPR)		
				Peak(dBm)	Avg(dBm)	PAPR(dB)
Band 25 Standalone	BPSK	3.75	26365/1882.5	26.25	22.16	4.09
	QPSK	3.75	26365/1882.5	25.75	22.18	3.57
	BPSK	15	26365/1882.5	25.93	19.25	6.68
	QPSK	15	26365/1882.5	25.66	19.06	6.60

5.5. Frequency Stability

Ambient condition

Temperature	Relative humidity	Pressure
23°C ~25°C	45%~50%	101.5kPa

Method of Measurement

Frequency Stability (Temperature Variation)

The temperature inside the climate chamber is varied from -40°C to +85°C in 10°C step size,

(1) With all power removed, the temperature was decreased to 0°C and permitted to stabilize for three hours.

(2) Measure the carrier frequency with the test equipment in a “call mode”. These measurements should be made within 1 minute of powering up the mobile station, to prevent significant self warming.

(3) Repeat the above measurements at 10°C increments from -40°C to +85°C. Allow at least 1.5 hours at each temperature, un-powered, before making measurements.

Frequency Stability (Voltage Variation)

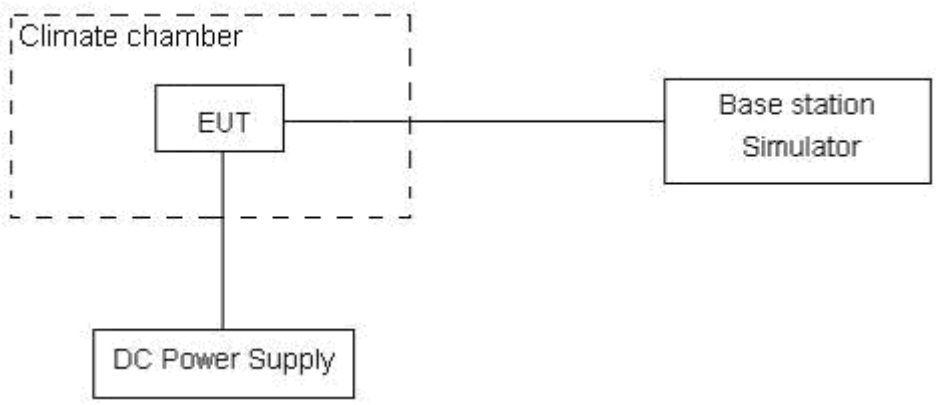
The frequency stability shall be measured with variation of primary supply voltage as follows:

(1) Vary primary supply voltage from 85 to 115 percent of the nominal value for other than hand carried battery equipment.

(2) For hand carried, battery powered equipment, reduce primary supply voltage to the battery-operating end point which shall be specified by the manufacturer.

This transceiver is specified to operate with an input voltage of between 2.1 V and 3.63 V, with a nominal voltage of 3.3V.

Test setup



Limits

The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block

Measurement Uncertainty

The assessed measurement uncertainty to ensure 99.75％ confidence level for the normal distribution is with the coverage factor *k* = 3, U= 0.01ppm.

Test Result

NB-IoT Band 2(1880MHz)						
Condition		Freq.Error (Hz)	Freq.Error (Hz)	Frequency Stability （ppm）	Frequency Stability （ppm）	Verdict
Subcarrier Spacing	3.75					
Temperature	Voltage	BPSK	QPSK	BPSK	QPSK	
Normal（25℃）	Normal	9.88	1.21	0.00525	0.00064	PASS
Extreme（85℃）		13.44	8.87	0.00715	0.00472	PASS
Extreme（80℃）		10.30	3.22	0.00548	0.00171	PASS
Extreme（70℃）		8.28	2.61	0.00440	0.00139	PASS
Extreme（60℃）		15.69	11.69	0.00835	0.00622	PASS
Extreme（50℃）		14.01	14.16	0.00745	0.00753	PASS
Extreme（40℃）		16.00	5.51	0.00851	0.00293	PASS
Extreme（30℃）		10.14	13.94	0.00540	0.00741	PASS
Extreme（20℃）		17.01	8.93	0.00905	0.00475	PASS
Extreme（10℃）		10.19	15.78	0.00542	0.00840	PASS
Extreme（0℃）		7.82	16.88	0.00416	0.00898	PASS
Extreme（-10℃）		5.73	12.05	0.00305	0.00641	PASS
Extreme（-20℃）		1.60	3.63	0.00085	0.00193	PASS
Extreme（-30℃）		12.24	13.23	0.00651	0.00704	PASS
Extreme（-40℃）		14.48	15.36	0.00770	0.00817	PASS
25℃	LV	2.39	4.28	0.00127	0.00228	PASS
	HV	7.47	13.80	0.00397	0.00734	PASS

NB-IoT Band 2(1880MHz)						
Condition		Freq.Error (Hz)	Freq.Error (Hz)	Frequency Stability （ppm）	Frequency Stability （ppm）	Verdict
Subcarrier Spacing	15					
Temperature	Voltage	BPSK	QPSK	BPSK	QPSK	
Normal（25℃）	Normal	7.28	4.62	0.00387	0.00246	PASS
Extreme（85℃）		9.11	4.30	0.00485	0.00229	PASS
Extreme（80℃）		7.11	11.37	0.00378	0.00605	PASS
Extreme（70℃）		16.58	5.57	0.00882	0.00296	PASS
Extreme（60℃）		17.47	15.20	0.00929	0.00808	PASS
Extreme（50℃）		6.31	5.17	0.00336	0.00275	PASS
Extreme（40℃）		12.12	8.75	0.00645	0.00466	PASS
Extreme（30℃）		13.79	4.41	0.00734	0.00235	PASS
Extreme（20℃）		16.20	7.20	0.00861	0.00383	PASS
Extreme（10℃）		5.94	2.48	0.00316	0.00132	PASS
Extreme（0℃）		11.57	14.62	0.00615	0.00778	PASS
Extreme（-10℃）		7.83	3.85	0.00417	0.00205	PASS
Extreme（-20℃）		7.10	11.65	0.00378	0.00620	PASS
Extreme（-30℃）		10.11	1.49	0.00538	0.00079	PASS
Extreme（-40℃）		14.67	6.62	0.00781	0.00352	PASS
25℃	LV	2.85	10.01	0.00152	0.00532	PASS
	HV	9.20	4.78	0.00489	0.00254	PASS

NB-IoT Band 25(1882.5MHz)						
Condition		Freq.Error (Hz)	Freq.Error (Hz)	Frequency Stability （ppm）	Frequency Stability （ppm）	Verdict
Subcarrier Spacing	3.75					
Temperature	Voltage	BPSK	QPSK	BPSK	QPSK	
Normal（25℃）	Normal	8.47	10.44	0.00450	0.00555	PASS
Extreme（85℃）		13.05	16.10	0.00694	0.00856	PASS
Extreme（80℃）		12.29	12.99	0.00654	0.00691	PASS
Extreme（70℃）		8.35	14.65	0.00444	0.00779	PASS
Extreme（60℃）		2.51	6.29	0.00133	0.00335	PASS
Extreme（50℃）		17.35	15.35	0.00923	0.00816	PASS
Extreme（40℃）		14.68	3.08	0.00781	0.00164	PASS
Extreme（30℃）		15.33	3.70	0.00816	0.00197	PASS
Extreme（20℃）		7.34	3.87	0.00390	0.00206	PASS
Extreme（10℃）		12.09	14.91	0.00643	0.00793	PASS
Extreme（0℃）		8.09	14.40	0.00431	0.00766	PASS
Extreme（-10℃）		17.97	14.49	0.00956	0.00771	PASS
Extreme（-20℃）		9.88	11.44	0.00525	0.00609	PASS
Extreme（-30℃）		7.12	11.20	0.00379	0.00596	PASS
Extreme（-40℃）		4.64	6.08	0.00247	0.00323	PASS
25℃	LV	11.12	2.72	0.00592	0.00144	PASS
	HV	6.41	10.42	0.00341	0.00554	PASS

NB-IoT Band 25(1882.5MHz)						
Condition		Freq.Error (Hz)	Freq.Error (Hz)	Frequency Stability （ppm）	Frequency Stability （ppm）	Verdict
Subcarrier Spacing	15					
Temperature	Voltage	BPSK	QPSK	BPSK	QPSK	
Normal（25℃）	Normal	2.97	3.62	0.00158	0.00193	PASS
Extreme（85℃）		8.60	3.92	0.00457	0.00209	PASS
Extreme（80℃）		1.96	12.68	0.00104	0.00674	PASS
Extreme（70℃）		11.93	2.09	0.00634	0.00111	PASS
Extreme（60℃）		6.63	4.52	0.00353	0.00240	PASS
Extreme（50℃）		4.01	14.64	0.00213	0.00779	PASS
Extreme（40℃）		16.98	3.41	0.00903	0.00182	PASS
Extreme（30℃）		14.37	16.34	0.00764	0.00869	PASS
Extreme（20℃）		3.02	2.85	0.00160	0.00151	PASS
Extreme（10℃）		10.67	16.44	0.00567	0.00874	PASS
Extreme（0℃）		14.81	14.29	0.00788	0.00760	PASS
Extreme（-10℃）		12.95	4.33	0.00689	0.00230	PASS
Extreme（-20℃）		13.39	11.57	0.00712	0.00615	PASS
Extreme（-30℃）		4.65	7.32	0.00247	0.00389	PASS
Extreme（-40℃）		1.36	4.86	0.00072	0.00258	PASS
25℃	LV	4.45	2.42	0.00237	0.00128	PASS
	HV	7.35	11.42	0.00391	0.00607	PASS

5.6. Spurious Emissions at Antenna Terminals

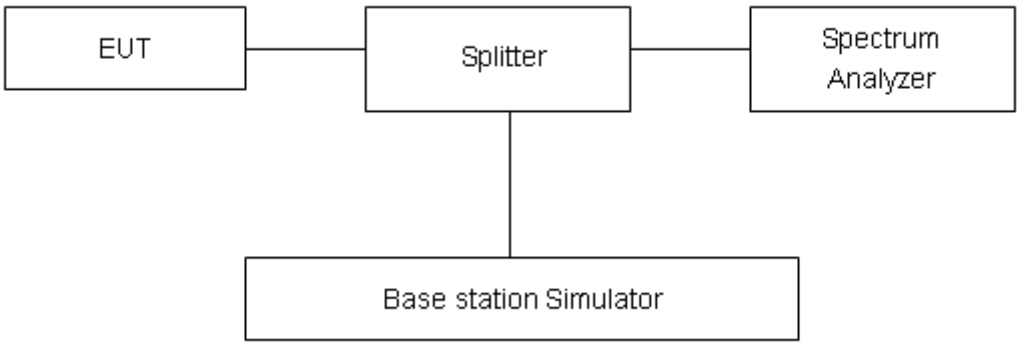
Ambient condition

Temperature	Relative humidity	Pressure
23°C ~25°C	45%~50%	101.5kPa

Method of Measurement

The EUT was connected to Spectrum Analyzer and Base Station Simulator via power Splitter. The measurement is carried out using a spectrum analyzer. The spectrum analyzer scans from 9kHz to the 10th harmonic of the carrier. The peak detector is used.
RBW is set to 100kHz, VBW is set to 300kHz for 30MHz~1GHz
RBW is set to 1MHz, VBW is set to 3MHz for above 1GHz, Sweep is set to ATUO.
The modulation mode and RB allocation refer to section 5.1, using the maximum output power configuration.

Test setup



Limits

Rule Part 24.238(a) specifies that “on any frequency outside a licensee's frequency block, the power of any emission shall be attenuated below the transmitter power (P) by at least 43 + 10 log10 (P) dB.”

Limit	-13 dBm

Measurement Uncertainty

The assessed measurement uncertainty to ensure 99.75% confidence level for the normal distribution is with the coverage factor *k* = 1.96.

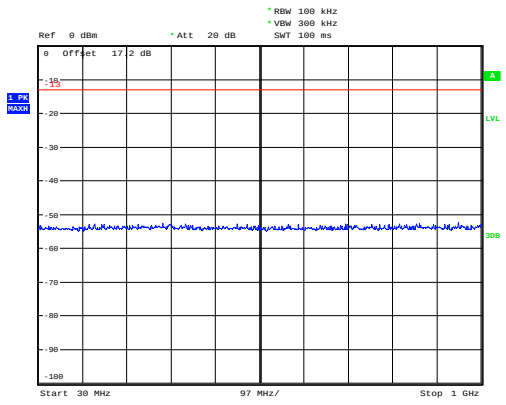
Frequency	Uncertainty
9kHz-1GHz	0.684 dB
1GHz-20GHz	1.407 dB

Test Result

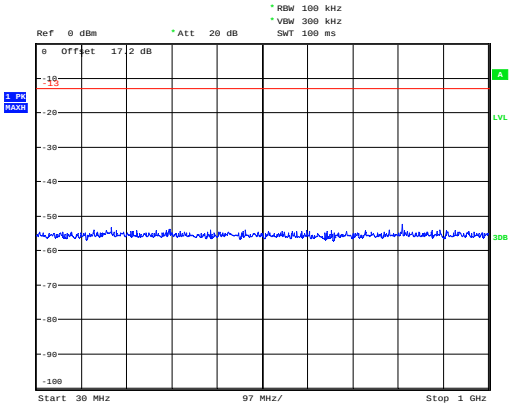
Sweep the whole frequency band through the range from 9kHz to the 10th harmonic of the carrier, the emissions more than 20 dB below the limit are not reported.

The signal beyond the limit is carrier.

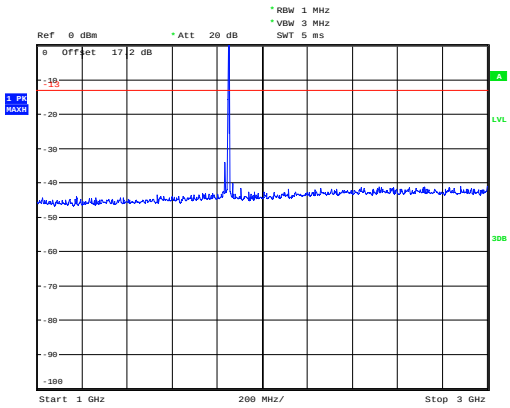
NB-IoT Band 2 CH-Low 30MHz~1GHz



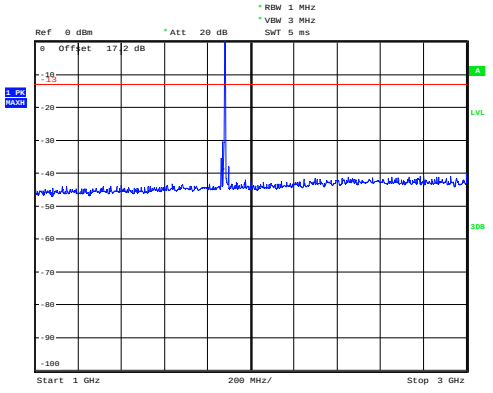
NB-IoT Band 2 CH-Middle 30MHz~1GHz



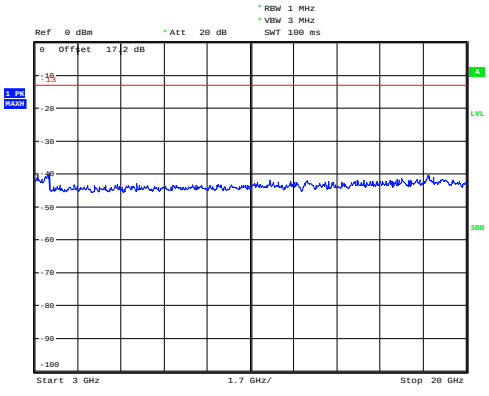
NB-IoT Band 2 CH-Low 1GHz~3GHz



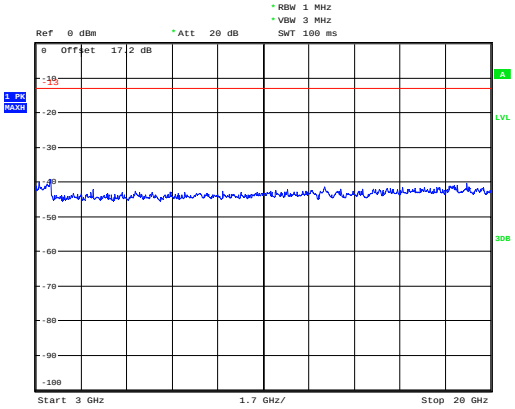
NB-IoT Band 2 CH-Middle 1GHz~3GHz



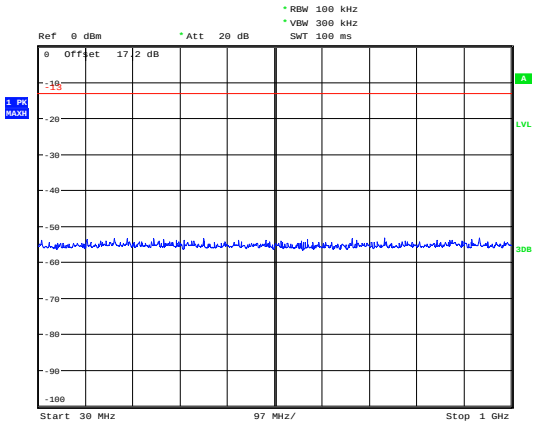
NB-IoT Band 2 CH-Low 3GHz~20GHz



NB-IoT Band 2 CH-Middle 3GHz~20GHz

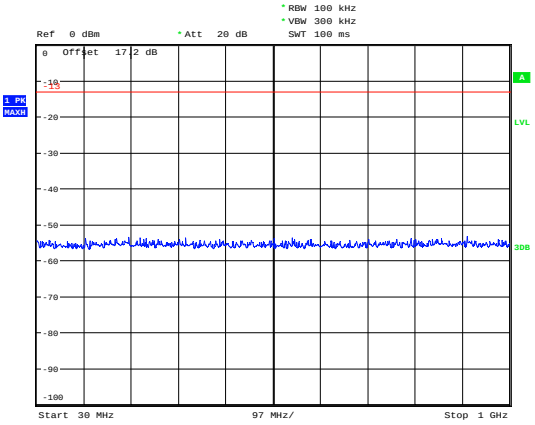


NB-IoT Band 2 CH-High 30MHz~1GHz



Date: 29.OCT.2018 11:00:31

NB-IoT Band 25 CH-Low 30MHz~1GHz



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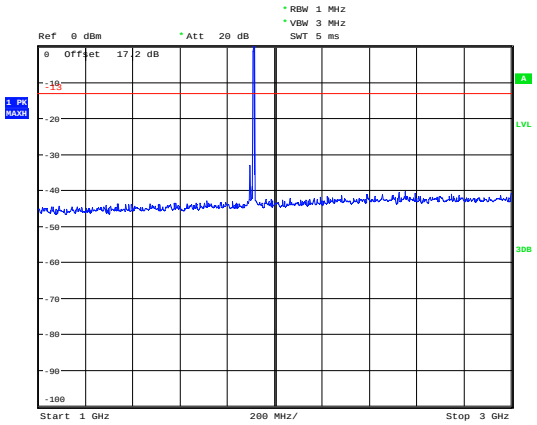
NB-IoT Band 2 CH-High 1GHz~3GHz



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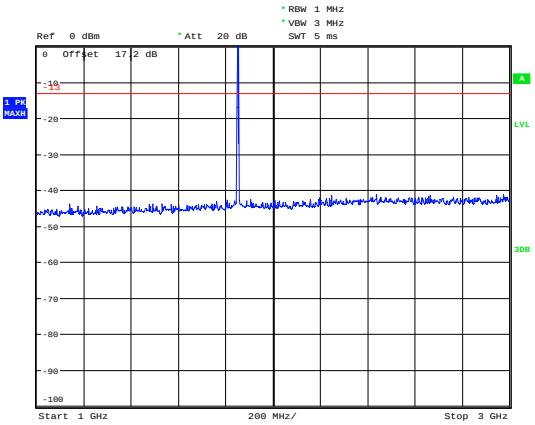
NB-IoT Band 25 CH-Low 1GHz~3GHz



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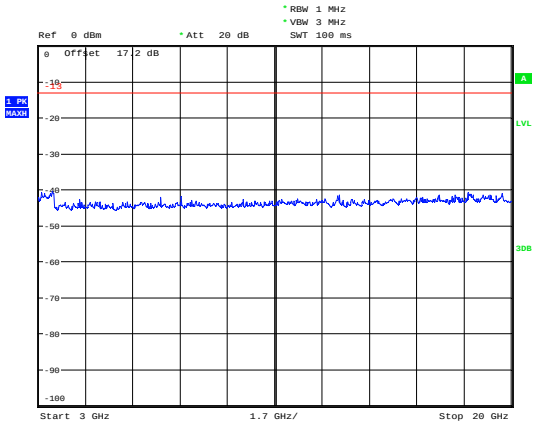
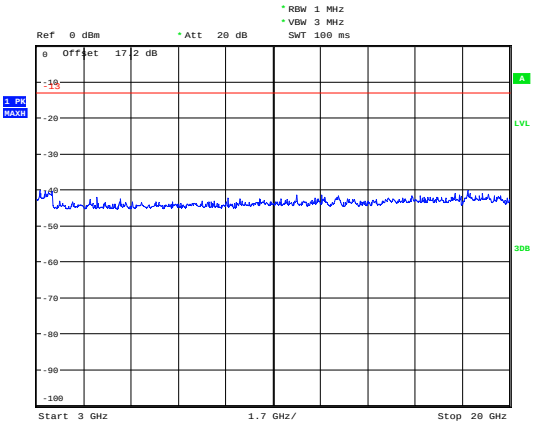
NB-IoT Band 2 CH-High 3GHz~20GHz



Date: 29.OCT.2018 11:02:13

NB-IoT Band 25 CH-Low 3GHz~20GHz



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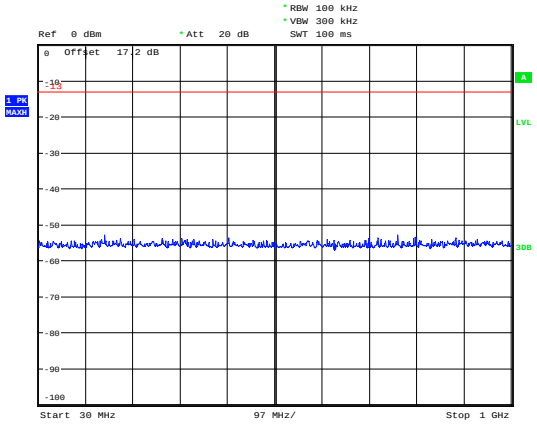
NB-IoT Band 25 CH- Middle 30MHz~1GHz



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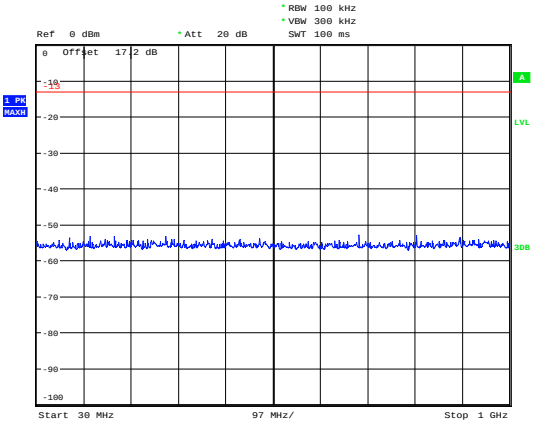
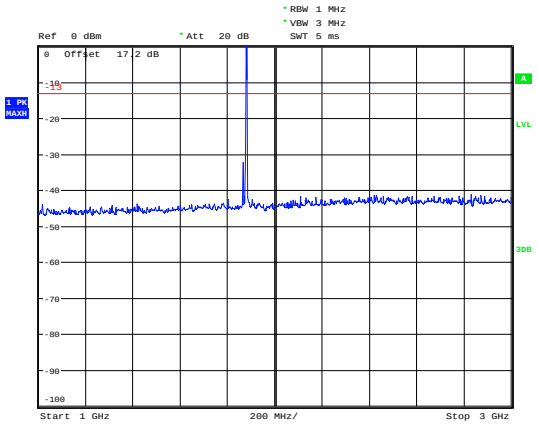
NB-IoT Band 25 CH- High 30MHz~1GHz



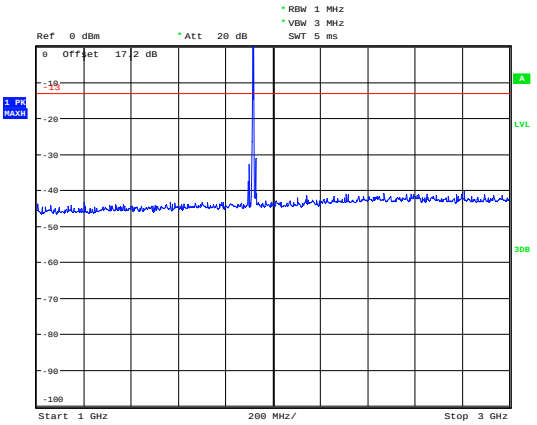
Date: 29.OCT.2018 13:28:02

NB-IoT Band 25 CH-Middle 1GHz~3GHz



Date: 29.OCT.2018 13:25:25

NB-IoT Band 25 CH-High 1GHz~3GHz



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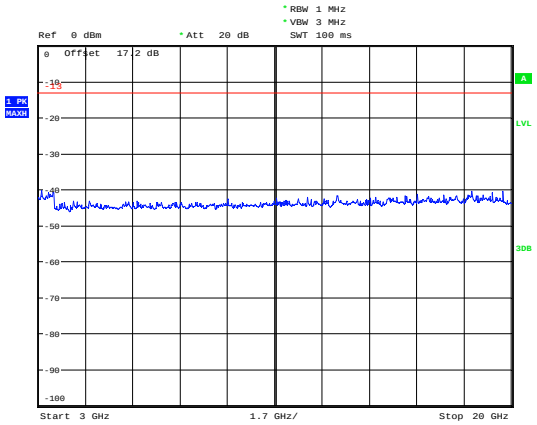
NB-IoT Band 25 CH-Middle 3GHz~20GHz



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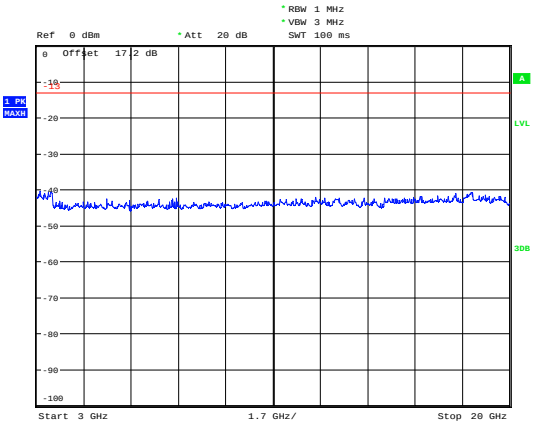
NB-IoT Band 25 CH-High 3GHz~20GHz



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5.7. Radiates Spurious Emission

Ambient condition

Temperature	Relative humidity	Pressure
23°C ~25°C	45%~50%	101.5kPa

Method of Measurement

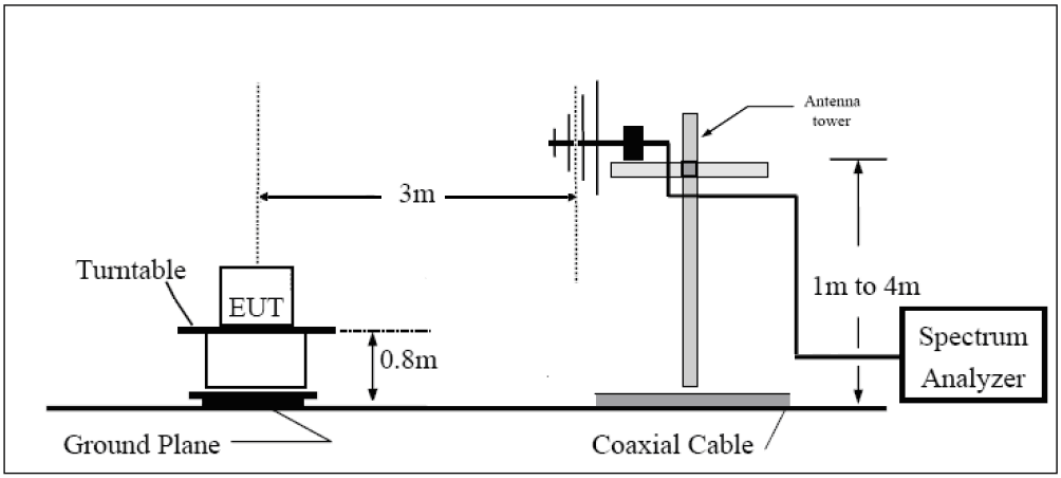
1. The testing follows FCC KDB 971168 v03r01 Section 5.8 and ANSI C63.26 (2015).
2. Above 30MHz: The EUT is placed on a turntable 0.8 meters above the ground in the chamber, 3 meter away from the antenna. The maximal emission value is acquired by adjusting the antenna height, polarisation and turntable azimuth. Normally, the height range of antenna is 1 m to 4 m, the azimuth range of turntable is 0° to 360°, and the receive antenna has two polarizations Vertical (V) and Horizontal (H). Above 1GHz: (Note: the FCC's permission to use 1.5m as an alternative per TCBC Conf call of Dec. 2, 2014.) The EUT is placed on a turntable 1.5 meters above the ground in the chamber, 3 meter away from the antenna. The maximal emission value is acquired by adjusting the antenna height, polarisation and turntable azimuth. Normally, the height range of antenna is 1 m to 4 m, the azimuth range of turntable is 0° to 360°, and the receive antenna has two polarizations Vertical (V) and Horizontal (H).
3. A log-periodic antenna or horn antenna shall be substituted in place of the EUT. The log-periodic antenna will be driven by a signal generator and the level will be adjusted till the same power value on the spectrum analyzer or receiver. The level of the spurious emissions can be calculated through the level of the signal generator, cable loss, the gain of the substitution antenna and the reading of the spectrum analyzer or receiver.
4. The EUT is then put into continuously transmitting mode at its maximum power level during the test.Set Test Receiver or Spectrum RBW=1MHz,VBW=3MHz for above 1GHz and RBW=100kHz,VBW=300kHz for 30MHz to 1GHz,, And the maximum value of the receiver should be recorded as (Pr).
5. The EUT shall be replaced by a substitution antenna. In the chamber, an substitution antenna for the frequency band of interest is placed at the reference point of the chamber. An RF Signal source for the frequency band of interest is connected to the substitution antenna with a cable that has been constructed to not interfere with the radiation pattern of the antenna. A power (PMea) is applied to the input of the substitution antenna, and adjust the level of the signal generator output until the value of the receiver reach the previously recorded (Pr). The power of signal source (PMea) is recorded. The test should be performed by rotating the test item and adjusting the receiving antenna polarization.
6. A amplifier should be connected to the Signal Source output port. And the cable should be connect between the Amplifier and the Substitution Antenna. The cable loss (Pcl) ,the Substitution Antenna Gain (Ga) and the Amplifier Gain (PAg) should be recorded after test.
7. The measurement results are obtained as described below:
Power(EIRP)=PMea- PAg - Pcl + Ga
The measurement results are amend as described below:
Power(EIRP)=PMea- Pcl + Ga
8. This value is EIRP since the measurement is calibrated using an antenna of known gain (2.15 dBi)

and known input power. ERP can be calculated from EIRP by subtracting the gain of the dipole, ERP = EIRP-2.15dBi.

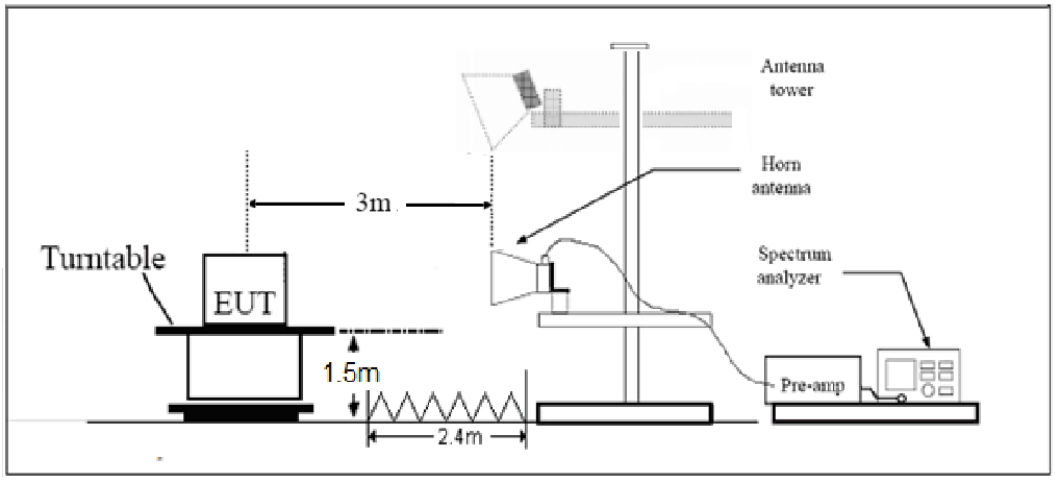
The modulation mode and RB allocation refer to section 5.1, using the maximum output power configuration.

Test setup

30MHz~~~ 1GHz



Above 1GHz



Note: Area side: 2.4mX3.6m

Limits

Rule Part 24.238(a) specifies that “on any frequency outside a licensee's frequency block, the power of any emission shall be attenuated below the transmitter power (P) by at least 43 + 10 log10 (P) dB.”

Limit	-13 dBm

Measurement Uncertainty

The assessed measurement uncertainty to ensure 95％ confidence level for the normal distribution is with the coverage factor *k* = 1.96, *U*= 3.55 dB.

Test Result

Sweep the whole frequency band through the range from 30MHz to the 10th harmonic of the carrier, the emissions below the noise floor will not be recorded in the report.

NB-IoT Band 2 CH-Low

Harmonic	Frequency (MHz)	SG (dBm)	Cable Loss (dB)	Gain (dBi)	Antenna Polarization	EIRP Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (deg)
2	3700.5	-60.07	2.60	12.50	Horizontal	-52.32	-13.00	39.32	225
3	5550.8	-58.07	3.30	12.50	Horizontal	-51.02	-13.00	38.02	180
4	7402.8	-54.88	4.20	12.20	Horizontal	-49.03	-13.00	36.03	180
5	9253.5	-51.17	4.30	11.10	Horizontal	-46.52	-13.00	33.52	90
6	11104.2	-48.48	5.90	11.90	Horizontal	-44.63	-13.00	31.63	45
7	12954.9	-50.27	5.70	14.00	Horizontal	-44.12	-13.00	31.12	90
8	14805.6	-50.47	5.80	13.10	Horizontal	-45.32	-13.00	32.32	135
9	16656.3	-49.97	6.10	14.60	Horizontal	-43.62	-13.00	30.62	180
10	18507.0	-	-	-	-	-	-	-	-
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 2 CH-Middle

Harmonic	Frequency (MHz)	SG (dBm)	Cable Loss (dB)	Gain (dBi)	Antenna Polarization	EIRP Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (deg)
2	3759.0	-65.10	2.60	12.50	Horizontal	-55.2	-13.0	42.16	135
3	5638.9	-60.50	3.30	12.50	Horizontal	-51.3	-13.0	38.30	90
4	7520.0	-51.10	4.20	12.20	Horizontal	-43.1	-13.0	30.09	180
5	9400.0	-57.20	4.30	11.10	Horizontal	-50.4	-13.0	37.38	180
6	11280.0	-50.40	5.90	11.90	Horizontal	-44.4	-13.0	31.45	0
7	13160.0	-54.70	5.70	14.00	Horizontal	-46.4	-13.0	33.41	45
8	15040.0	-52.60	5.80	13.10	Horizontal	-45.3	-13.0	32.26	315
9	16920.0	-54.80	6.10	14.60	Horizontal	-46.3	-13.0	33.32	0
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 2 CH-High

Harmonic	Frequency (MHz)	SG (dBm)	Cable Loss (dB)	Gain (dBi)	Antenna Polarization	EIRP Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (deg)
2	3817.5	-57.19	2.60	12.50	Horizontal	-49.44	-13.00	36.44	180
3	5726.6	-56.17	3.30	12.50	Horizontal	-49.12	-13.00	36.12	180
4	7637.2	-55.46	4.20	12.20	Horizontal	-49.61	-13.00	36.61	90
5	9546.5	-51.80	4.30	11.10	Horizontal	-47.15	-13.00	34.15	45
6	11455.8	-48.33	5.90	11.90	Horizontal	-44.48	-13.00	31.48	90
7	13365.1	-50.23	5.70	14.00	Horizontal	-44.08	-13.00	31.08	135
8	15274.4	-51.48	5.80	13.10	Horizontal	-46.33	-13.00	33.33	180
9	17183.7	-49.91	6.10	14.60	Horizontal	-43.56	-13.00	30.56	45
10	19093.0	-	-	-	-	-	-	-	-
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 CH-Low

Harmonic	Frequency (MHz)	SG (dBm)	Cable Loss (dB)	Gain (dBi)	Antenna Polarization	EIRP Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (deg)
2	3700.13	-63.21	2.60	12.50	Horizontal	-55.46	-13.00	42.46	180
3	5550.38	-61.45	3.30	12.50	Horizontal	-54.40	-13.00	41.40	90
4	7230.00	-55.89	4.20	12.20	Horizontal	-50.04	-13.00	37.04	45
5	9255.38	-54.48	4.30	11.10	Horizontal	-49.83	-13.00	36.83	90
6	11109.37	-50.48	5.90	11.90	Horizontal	-46.63	-13.00	33.63	135
7	12942.0	-51.48	5.70	14.00	Horizontal	-45.33	-13.00	32.21	180
8	14831.63	-50.36	5.80	13.10	Horizontal	-45.21	-13.00	32.29	90
9	16666.50	-51.64	6.10	14.60	Horizontal	-45.29	-13.00	32.29	45
10	18500.00	-	-	-	-	-	-	-	-
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 CH-Middle

Harmonic	Frequency (MHz)	SG (dBm)	Cable Loss (dB)	Gain (dBi)	Antenna Polarization	EIRP Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (deg)
2	3764.63	-70.49	2.60	12.50	Horizontal	-60.59	-13.00	47.59	90
3	5647.50	-66.87	3.30	12.50	Horizontal	-57.67	-13.00	44.67	135
4	7444.88	-57.55	4.20	12.20	Horizontal	-49.55	-13.00	36.55	45
5	9459.75	-56.01	4.30	11.10	Horizontal	-49.21	-13.00	36.21	45
6	11296.50	-51.99	5.90	11.90	Horizontal	-45.99	-13.00	32.99	0
7	13294.50	-55.08	5.70	14.00	Horizontal	-46.78	-13.00	33.78	90
8	14991.38	-52.08	5.80	13.10	Horizontal	-44.78	-13.00	31.78	135
9	16900.80	-56.36	6.10	14.60	Horizontal	-47.86	-13.00	34.86	90
10	18820.00	-	-	-	-	-	-	-	-
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 CH-High

Harmonic	Frequency (MHz)	SG (dBm)	Cable Loss (dB)	Gain (dBi)	Antenna Polarization	EIRP Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (deg)
2	3829.50	-62.87	2.60	12.50	Horizontal	-52.97	-13.00	39.97	180
3	5743.88	-63.03	3.30	12.50	Horizontal	-53.83	-13.00	40.83	315
4	7659.00	-61.34	4.20	12.20	Horizontal	-53.34	-13.00	40.34	315
5	9570.75	-55.53	4.30	11.10	Horizontal	-48.73	-13.00	35.73	135
6	11503.13	-52.42	5.90	11.90	Horizontal	-46.42	-13.00	33.42	225
7	13398.30	-54.17	5.70	14.00	Horizontal	-45.87	-13.00	32.87	90
8	15316.50	-54.80	5.80	13.10	Horizontal	-47.50	-13.00	34.50	135
9	17247.30	-53.74	6.10	14.60	Horizontal	-45.24	-13.00	32.24	45
10	19147.50	-	-	-	-	-	-	-	-
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.									

6. Main Test Instruments

Date of Testing: October 29, 2018 ~ November 12, 2018

Name	Manufacturer	Type	Serial Number	Calibration Date	Expiration Date
Base Station Simulator	R&S	CMU200	118133	2018-05-13	2019-05-12
Base Station Simulator	R&S	CMW500	113824	2018-05-20	2019-05-19
Power Splitter	Hua Xiang	SHX-GF2-2-13	10120101	/	/
Spectrum Analyzer	Agilent	N9010A	MY50210259	2018-05-20	2019-05-19
Universal Radio Communication Tester	Agilent	E5515C	MY48367192	2018-05-20	2019-05-19
Signal Analyzer	R&S	FSV30	100815	2017-12-17	2018-12-16
EMI Test Receiver	R&S	ESCI	100948	2018-05-20	2019-05-19
Loop Antenna	SCHWARZBECK	FMZB1519	1519-047	2017-09-26	2019-09-25
Trilog Antenna	SCHWARZBECK	VUBL 9163	9163-201	2017-11-18	2019-11-17
Horn Antenna	R&S	HF907	100126	2018-07-07	2020-07-06
Horn Antenna	ETS-Lindgren	3160-09	00102643	2018-06-20	2020-06-19
Signal generator	R&S	SMB 100A	102594	2018-05-20	2019-05-19
Climatic Chamber	ESPEC	SU-242	93000506	2017-12-17	2020-12-16
Preampflier	R&S	SCU18	102327	2018-05-20	2019-05-19
MOB COMMS DC SUPPLY	Keysight	66319D	MY43004105	2018-05-07	2019-05-06
RF Cable	Agilent	SMA 15cm	0001	/	/
Software	R&S	EMC32	9.26.0	/	/

Date of Testing: May 18, 2021~ June 11, 2021 and August 5, 2021

Name	Manufacturer	Type	Serial Number	Calibration Date	Expiration Date
Base Station Simulator	R&S	CMU200	118133	2021-05-15	2022-05-14
Base Station Simulator	R&S	CMW500	113645	2021-05-15	2022-05-14
Power Splitter	Hua Xiang	SHX-GF2-2-13	10120101	/	/
Spectrum Analyzer	Key sight	N9010A	MY50210259	2021-05-15	2022-05-14
Universal Radio Communication Tester	Key sight	E5515C	MY48367192	2021-5-15	2022-5-14
Spectrum Analyzer	R&S	FSV3030	101411	2020-12-13	2021-12-12
Loop Antenna	SCHWARZBECK	FMZB1519	1519-047	2020-04-02	2023-04-01
TRILOG Broadband Antenna	SCHWARZBECK	VULB 9163	391	2019-12-16	2022-12-15
Horn Antenna	R&S	HF907	102723	2018-08-11	2021-08-10
Horn Antenna	ETS-Lindgren	3160-09	00102643	2018-06-20	2021-06-19
Signal generator	R&S	SMB 100A	102594	2021-05-15	2022-05-14
Climatic Chamber	ESPEC	SU-242	93000506	2020-12-13	2021-12-12
Preampflier	R&S	SCU18	102327	2021-05-15	2022-05-14
MOB COMMS DC SUPPLY	Keysight	66319D	MY43004105	2021-06-09	2021-12-08
RF Cable	Agilent	SMA 15cm	0001	2020-12-09	2021-06-08
				2021-06-09	2021-12-08
Software	R&S	EMC32	9.26.0	/	/

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

ANNEX A: The EUT Appearance

The EUT Appearance are submitted separately.

ANNEX B: Test Setup Photos

The Test Setup Photos are submitted separately.