MEASUREMENT REPORT

FCC PART 90

FCC ID:	XMR2021BC660KGL
Application:	Quectel Wireless Solutions Company Limited
Application Type:	Certification
Product:	NB-IoT Module
Model No.:	BC660K-GL
Brand Name:	Quectel
FCC Rule Part(s):	Part 90 Subpart R
Test Procedure(s):	ANSI C63.26-2015
Test Date:	December 08, 2020 ~ January 10, 2021

Reviewed By: Sunny Sun

Approved By: Robin Wu

ACCREDITED
TESTING LABORATORY
CERTIFICATE #3628.01

The test results relate only to the samples tested.

This equipment has been shown to be capable of compliance with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in ANSI C63.26-2015. Test results reported herein relate only to the item(s) tested.

Revision History

Report No.	Version	Description	Issue Date	Note
2012RSU022-U2	Rev. 01	Initial Report	01-15-2021	Invalid
2012RSU022-U2	Rev. 02	Updated with TCB's comment	01-26-2021	Valid

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Description Page

1. GENERAL INFORMATION

1.1. Applicant

Quectel Wireless Solutions Company Limited
Building 5, Shanghai Business Park Phase III (Area B), No.1016 Tianlin Road, Minhang District, Shanghai, China 200233

1.2. Manufacturer

Quectel Wireless Solutions Company Limited
Building 5, Shanghai Business Park Phase III (Area B), No.1016 Tianlin Road, Minhang District, Shanghai, China 200233

1.3. Testing Facility

☒	**Test Site - MRT Suzhou Laboratory**	
	Laboratory Location (Suzhou - Wuzhong)	
	D8 Building, No.2 Tian'edang Rd., Wuzhong Economic Development Zone, Suzhou, China	
	Laboratory Location (Suzhou - SIP)	
	4b Building, Liando U Valley, No.200 Xingpu Rd., Shengpu Town, Suzhou Industrial Park, China	
	Laboratory Accreditations	
	A2LA: 3628.01	CNAS: L10551
	FCC: CN1166	ISED: CN0001
	VCCI: R-20025, G-20034, C-20020, T-20020	
☐	**Test Site - MRT Shenzhen Laboratory**	
	Laboratory Location (Shenzhen)	
	1G, Building A, Junxiangda Building, Zhongshanyuan Road West, Nanshan District, Shenzhen, China	
	Laboratory Accreditations	
	A2LA: 3628.02	CNAS: L10551
	FCC: CN1284	ISED: CN0105
☐	**Test Site - MRT Taiwan Laboratory**	
	Laboratory Location (Taiwan)	
	No. 38, Fuxing 2nd Rd., Guishan Dist., Taoyuan City 333, Taiwan (R.O.C.)	
	Laboratory Accreditations	
	TAF: L3261-190725	
	FCC: 291082, TW3261	ISED: TW3261

2. PRODUCT INFORMATION

2.1. Equipment Description

Product Name:	NB-IoT Module
Model No.:	BC660K-GL
Brand Name:	Quectel
Hardware Version:	R1.0
Software Version:	BC660KGLAAR01A02
IMEI.:	866207050001894; 866207050001886
Operating Temp.:	-35 ~ 75 °C
Supply Voltage:	2.2 ~ 4.3Vdc, typical 3.3Vdc
NB-IoT Specification	
Single Band:	NB-IoT Band 2, 4, 5, 12, 13, 14, 17, 25, 66, 85
Modulation:	BPSK, QPSK
Category:	Release 14 (Cat NB2)
Deployment:	Stand-alone
Sub-carrier Spacing:	3.75kHz, 15kHz

2.2. Product Specification Subjective to this Report

FDD T_X Frequency Range:	Band 14: 788 ~ 798 MHz
FDD R_X Frequency Range:	Band 14: 758 ~ 768 MHz
Type of Modulation:	BPSK, QPSK

Note 1: For other features of this EUT, test report will be issued separately.

Note 2: The declared of product specification for EUT presented in the report are provided by the manufacturer, and the manufacturer takes all the responsibilities for the accuracy of product specification.

2.3. Description of Available Antennas

Technology	Frequency Range (MHz)	Antenna Type	Max Peak Gain (dBi)
NB-IoT Band 2	1850 ~ 1910	Dipole	1.59
NB-IoT Band 4	1710 ~ 1755		2.00
NB-IoT Band 5	824 ~ 849		2.53
NB-IoT Band 12	699 ~ 716		3.95
NB-IoT Band 13	777 ~ 787		4.45
NB-IoT Band 14	788 ~ 798		4.45
NB-IoT Band 17	704 ~ 716		3.95
NB-IoT Band 25	1850 ~ 1915		1.59
NB-IoT Band 66	1710 ~ 1780		2.00
NB-IoT Band 85	698 ~ 716		3.95

Note: All the information is provided by the manufacturer.

2.4. Test Methodology

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

- ANSI C63.26:2015
- FCC KDB 971168 D01 v03r01: Power Meas License Digital Systems
- FCC KDB 971168 D02 v02r01: Misc Rev Approv License Devices
- FCC KDB 412172 D01 v01r01: Determining ERP and EIRP

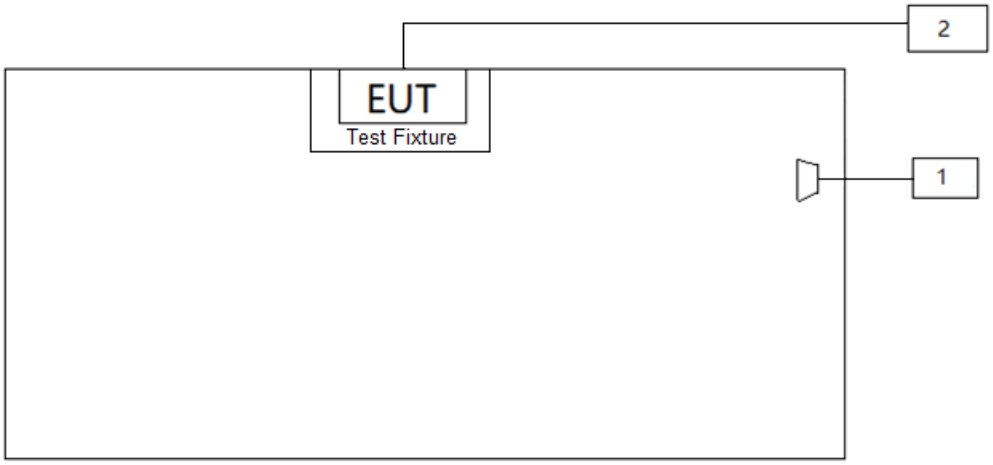
2.5. EMI Suppression Device(s)/Modifications

No EMI suppression device(s) were added and/or no modifications were made during testing.

2.6. Maximum Power, Frequency Tolerance, and Emission Designator

NB-IoT Band 14		BPSK			QPSK		
BW (kHz)	Feq. (MHz)	Designator	Tolerance (ppm)	Max Power (W)	Designator	Tolerance (ppm)	Max Power (W)
200	788 ~ 798	--	--	0.2333	178KG7D	0.0029	0.2328

2.7. Configuration of Tested System



Product		Manufacturer	Model No.
1	Wideband Radio Communication Tester	R&S	CMW 500
2	PC	ThinkPad	T460

2.8. Test Environment Condition

Ambient Temperature	15 ~ 35°C
Relative Humidity	20 ~ 75%RH

3. TEST EQUIPMENT CALIBRATION DATE

Radiated Emission (WZ- AC1)

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cali. Due Date
EMI Test Receiver	R&S	ESR7	MRTSUE06001	1 year	2021/08/01
Wideband Radio Communication Tester	R&S	CMW 500	MRTSUE06243	1 year	2021/11/07
PXA Signal Analyzer	Keysight	9030B	MRTSUE06395	1 year	2021/09/03
Loop Antenna	Schwarzbeck	FMZB 1519	MRTSUE06025	1 year	2021/11/10
Bilog Period Antenna	Schwarzbeck	VULB 9168	MRTSUE06172	1 year	2021/03/31
Broad Band Horn Antenna	Schwarzbeck	BBHA 9120D	MRTSUE06023	1 year	2021/10/13
Broad Band Horn Antenna	Schwarzbeck	BBHA 9170	MRTSUE06597	1 year	2021/02/23
Microwave System Amplifier	Agilent	83017A	MRTSUE06076	1 year	2021/11/15
Preamplifier	Schwarzbeck	BBV 9721	MRTSUE06121	1 year	2021/06/11
Thermohygrometer	Testo	608-H1	MRTSUE06403	1 year	2021/08/08
Anechoic Chamber	TDK	Chamber-AC1	MRTSUE06212	1 year	2021/04/30

Radiated Emission (WZ-AC2)

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cali. Due Date
Spectrum Analyzer	Keysight	N9038A	MRTSUE06125	1 year	2021/08/01
Wideband Radio Communication Tester	R&S	CMW 500	MRTSUE06243	1 year	2021/11/07
Loop Antenna	Schwarzbeck	FMZB 1519	MRTSUE06025	1 year	2021/11/10
Bilog Period Antenna	Schwarzbeck	VULB 9162	MRTSUE06022	1 year	2021/10/13
Horn Antenna	Schwarzbeck	BBHA9120D	MRTSUE06171	1 year	2021/10/27
Broad Band Horn Antenna	Schwarzbeck	BBHA 9170	MRTSUE06597	1 year	2021/02/23
Broad Band Coaxial Preamplifier	Schwarzbeck	BBV 9718	MRTSUE06176	1 year	2021/11/15
Preamplifier	Schwarzbeck	BBV 9721	MRTSUE06121	1 year	2021/06/11
Temperature/Humidity Meter	Minggao	ETH529	MRTSUE06170	1 year	2021/12/15
Anechoic Chamber	RIKEN	Chamber-AC2	MRTSUE06213	1 year	2021/04/30

Conducted Test Equipment (WZ-SR6, WZ-TR3)

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cali. Due Date
EXA Signal Analyzer	Agilent	N9020A	MRTSUE06106	1 year	2021/04/15
EXA Signal Analyzer	Keysight	N9010B	MRTSUE06452	1 year	2021/07/11
Signal Analyzer	R&S	FSV40	MRTSUE06218	1 year	2021/04/15
Wideband Radio Communication Tester	R&S	CMW 500	MRTSUE06243	1 year	2021/11/07
Power Meter	Agilent	U2021XA	MRTSUE06030	1 year	2021/11/18
DC Power Supply	GWINSTEK	DPS-3303C	MRTSUE06064	N/A	N/A
True RMS Clamp Meter	Fluke	319	MRTSUE06080	1 year	2021/05/06
Directional Coupler	Agilent	87301D	MRTSUE06082	1 year	2021/03/25
Dual Directional Coupler	Agilent	7778D	MRTSUE06083	1 year	2021/03/25
Attenuator	MVE	6dB	MRTSUE06534	1 year	2021/12/12
Attenuator	MVE	10dB	MRTSUE06543	1 year	2021/12/12
Temperature & Humidity Chamber	BAOYT	BYH-150CL	MRTSUE06051	1 year	2021/11/07
Thermohygrometer	testo	608-H1	MRTSUE06401	1 year	2021/08/08

Software	Version	Function
EMI Software	V3	EMI Test Software

4. MEASUREMENT UNCERTAINTY

Where relevant, the following test uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k = 2.

Radiated Emission Measurement
Measurement Uncertainty for a Level of Confidence of 95% (U=2Uc(y)): Horizontal: 9kHz~300MHz: 5.04dB 300MHz~1GHz: 4.95dB 1GHz~40GHz: 6.40dB Vertical: 9kHz~300MHz: 5.24dB 300MHz~1GHz: 6.03dB 1GHz~40GHz: 6.40dB
Spurious Emissions, Conducted
Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)): 0.78dB
Output Power
Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)): 1.13dB
Power Spectrum Density
Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)): 1.15dB
Occupied Bandwidth
Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)): 0.28%

5. TEST RESULT

5.1. Summary

FCC Part Section(s)	Test Description	Test Limit	Test Condition	Test Result	Reference
2.1049	Occupied Bandwidth	N/A	Conducted	Pass	Section 5.2
2.1055, 90.539(e)	Frequency Stability	< 1.25 ppm		Pass	Section 5.3
90.542(a)(7)	Equivalent Radiated Power	< 30 Watts Max ERP		Pass	Section 5.4
2.1051, 90.543(e)(2)(3)	Band Edge	Refer to section 5.5		Pass	Section 5.5, 5.6, 5.7, 5.8
2.1051, 90.210(n)	Emission Mask	Mask B			
2.1051, 90.543(e)(3)	Spurious Emission	< 43 + 10log10 (P[Watts])			
2.1053, 90.543(e)(3) 90.543(f)	Spurious Emissions	< 43 + 10log10 (P[Watts])	Radiated	Pass	Section 5.9

Notes:

1) The analyzer plots shown in this section were all taken with a correction table loaded into the analyzer. The correction table was used to account for the losses of the cables and attenuators used as part of the system to connect the EUT to the analyzer at all frequencies of interest.
2) All supported modulation types were evaluated. The worst-case emission of modulation was selected. Therefore, the Frequency Stability, Channel Band Edge, Radiated & Conducted Spurious Emission were presented in the test report.

5.2. Occupied Bandwidth

5.2.1.Test Limit

The occupied bandwidth, that is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power radiated by a given emission shall be measured.

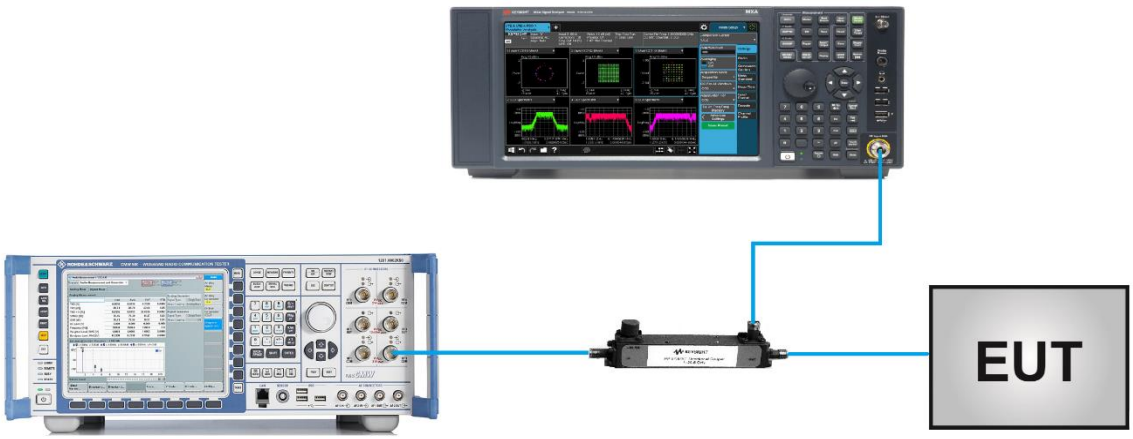
5.2.2.Test Procedure

ANSI C63.26-2015 - Section 5.4

5.2.3.Test Setting

1. Set center frequency to the nominal EUT channel center frequency
2. RBW = The nominal RBW shall be in the range of 1% to 5% of the anticipated OBW
3. VBW ≥ 3 × RBW
4. Detector = Peak
5. Trace mode = max hold
6. Sweep = auto couple
7. Allow the trace to stabilize
8. Use the 99% power bandwidth function of the instrument and report the measured bandwidth.

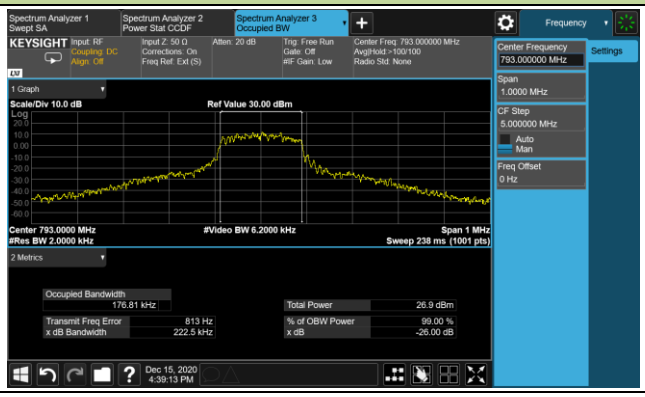
5.2.4.Test Setup



5.2.5.Test Result

Product	NB-IoT Module	Test Site	WZ-SR6
Test Engineer	Caitlin Chen	Test Date	2020/12/15 ~ 2021/01/05
Test Band	Band 14		

Channel	Frequency (MHz)	Modulation	Sub-carrier spacing (kHz)	N_{tones}	99% Bandwidth (kHz)
23282	788.2	QPSK	15	12@0	177.77
23330	793.0				176.81
23378	797.8				176.92

99% Bandwidth - QPSK	
15kHz 12@0 CH-Low	15kHz 12@0 CH-Middle
	
15kHz 12@0 CH-High	
	

5.3. Frequency Stability Measurement

5.3.1.Test Limit

The frequency stability of mobile, portable and control transmitters operating in the wideband segment must be 1.25 parts per million or better when AFC is locked to a base station, and 5 parts per million or better when AFC is not locked

5.3.2.Test Procedures Used

ANSI C63.26-2015 - Section 5.6

5.3.3.Test Setting

Frequency Stability Under Temperature Variations:

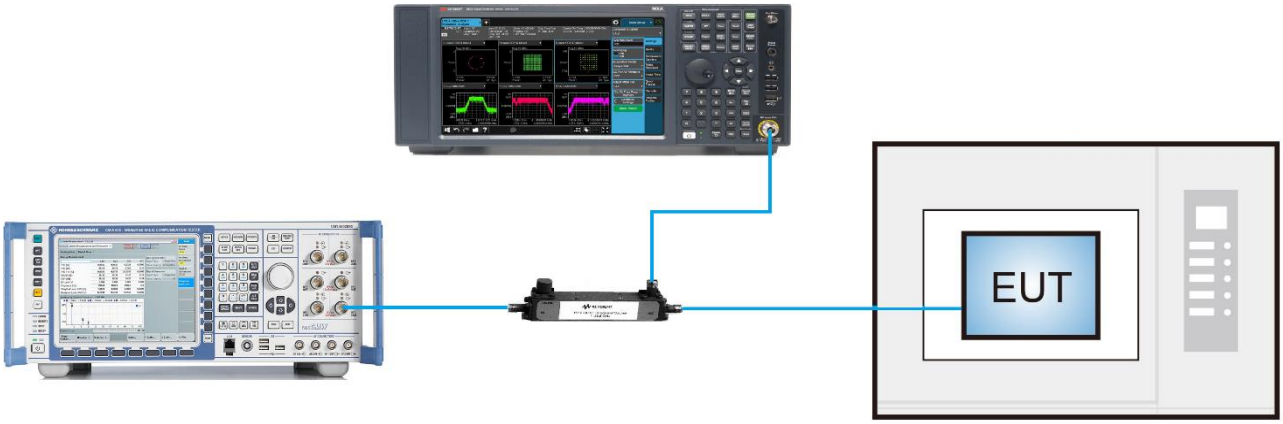
The equipment under test was connected to an external AC or DC power supply and input rated voltage. RF output was connected to a frequency counter or spectrum analyzer via feed through attenuators. The EUT was placed inside the temperature chamber. Set the spectrum analyzer RBW low enough to obtain the desired frequency resolution and measure EUT 20°C operating frequency as reference frequency. Turn EUT off and set the chamber temperature to highest. After the temperature stabilized for approximately 30 minutes recorded the frequency. Repeat step measure with 10°C decreased per stage until the lowest temperature reached.

Frequency Stability Under Voltage Variations:

Set chamber temperature to 20°C. Use a variable AC power supply / DC power source to power the EUT and set the voltage to rated voltage. Set the spectrum analyzer RBW low enough to obtain the desired frequency resolution and recorded the frequency.

Reduce the input voltage to specify extreme voltage variation (±15%) and endpoint, recordthe maximum frequency change.

5.3.4.Test Setup



5.3.5.Test Result

Product	NB-IoT Module	Test Site	WZ-TR3
Test Engineer	Caitlin Chen	Test Date	2020/12/17
Test Band	Band 14		

Power (VDC)	Temp. (°C)	Freq. Error (Hz)	Frequency Tolerance (ppm)
3.3	- 30	1.98	0.00250
	- 20	1.54	0.00194
	- 10	1.67	0.00211
	0	1.91	0.00241
	+ 10	1.77	0.00223
	+ 20 (Ref)	2.24	0.00282
	+ 30	2.32	0.00293
	+ 40	2.17	0.00274
	+ 50	2.09	0.00264
4.3	+ 20	1.74	0.00219
2.2	+ 20	1.51	0.00190

5.4. Equivalent Isotropically Radiated Power Measurement

5.4.1.Test Limit

Control stations and mobile stations transmitting in the 758-768 MHz band and the 788-798 MHz band are limited to 30 watts ERP.

5.4.2.Test Procedures Used

ANSI C63.26-2015 - Section 5.2

5.4.3.Test Setting

Average power measurements were performed only when the EUT was transmitting at its maximum power control level using a broadband power meter with a pulse sensor. The power meter implemented triggering and gating capabilities which were set up such that power measurements were recorded only during the ON time of the transmitter.

The relevant equation for determining the maximum ERP or EIRP from the measured RF output power is given in Equation (1) as follows:

ERP or EIRP = P_{Meas} + G_T

where

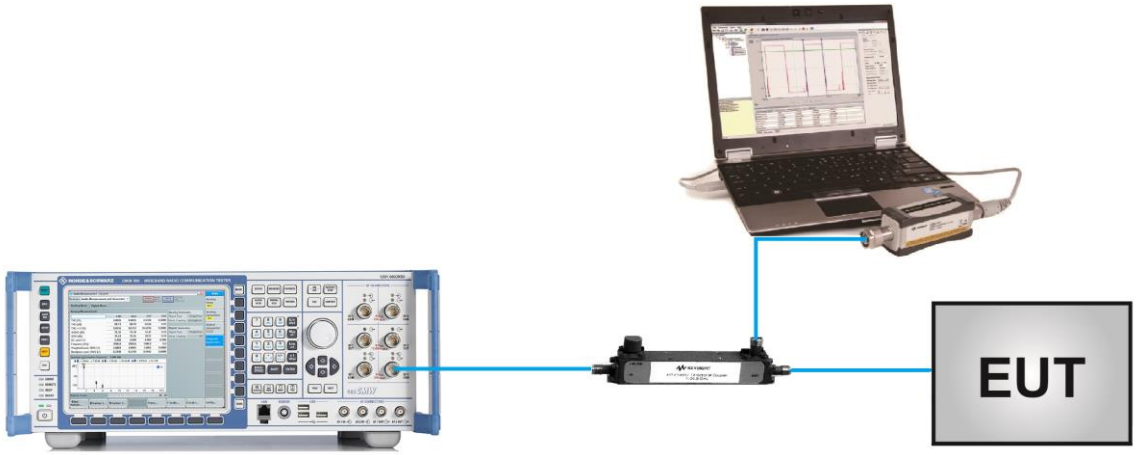
ERP or EIRP effective radiated power or equivalent isotropically radiated power, respectively (expressed in the same units as P_{Meas}, e.g., dBm or dBW)

P_{Meas} measured transmitter output power or PSD, in dBm or dBW

G_T gain of the transmitting antenna, in dBd (ERP) or dBi (EIRP)

ERP = EIRP -2.15

5.4.4.Test Setup



5.4.5.Test Result

Product	NB-IoT Module	Test Site	WZ-SR6
Test Engineer	Caitlin Chen	Test Date	2021/01/10
Test Band	Band 14		

Channel No.	Frequency (MHz)	Sub-carrier spacing (kHz)	N_{tones}	Output Power (dBm)	ERP (dBm)	Limit (dBm)
BPSK						
23282	788.2	3.75	1@0	23.13	25.43	< 44.77
23330	793.0			23.68	25.98	< 44.77
23378	797.8			23.60	25.90	< 44.77
23282	788.2		1@47	23.55	25.85	< 44.77
23330	793.0			23.63	25.93	< 44.77
23378	797.8			23.61	25.91	< 44.77
23282	788.2	15	1@0	23.52	25.82	< 44.77
23330	793.0			23.28	25.58	< 44.77
23378	797.8			23.21	25.51	< 44.77
23282	788.2		1@11	23.21	25.51	< 44.77
23330	793.0			23.41	25.71	< 44.77
23378	797.8			23.27	25.57	< 44.77
QPSK						
23282	788.2	3.75	1@0	23.25	25.55	< 44.77
23330	793.0			23.45	26.05	< 44.77
23378	797.8			23.46	26.06	< 44.77
23282	788.2		1@47	23.63	25.93	< 44.77
23330	793.0			23.67	25.97	< 44.77
23378	797.8			23.63	25.93	< 44.77
23282	788.2	15	1@0	23.45	25.75	< 44.77
23330	793.0			23.39	25.69	< 44.77
23378	797.8			23.25	25.55	< 44.77
23282	788.2		1@11	23.24	25.54	< 44.77
23330	793.0			23.57	25.87	< 44.77
23378	797.8			23.35	25.65	< 44.77
23282	788.2		12@0	21.69	23.99	< 44.77
23330	793.0			21.78	24.08	< 44.77
23378	797.8			21.87	24.17	< 44.77

5.5. Band Edge Measurement

5.5.1.Test Limit

For operations in the 758-768 MHz and the 788-798 MHz bands, the power of any emission outside the licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, in accordance with the following:
(1) On all frequencies between 769-775 MHz and 799-805 MHz, by a factor not less than 65 + 10 log (P) dB in a 6.25 kHz band segment, for mobile and portable stations;
(2) On any frequency between 775-788 MHz, above 805 MHz, and below 758 MHz, by at least 43 + 10 log (P) dB.

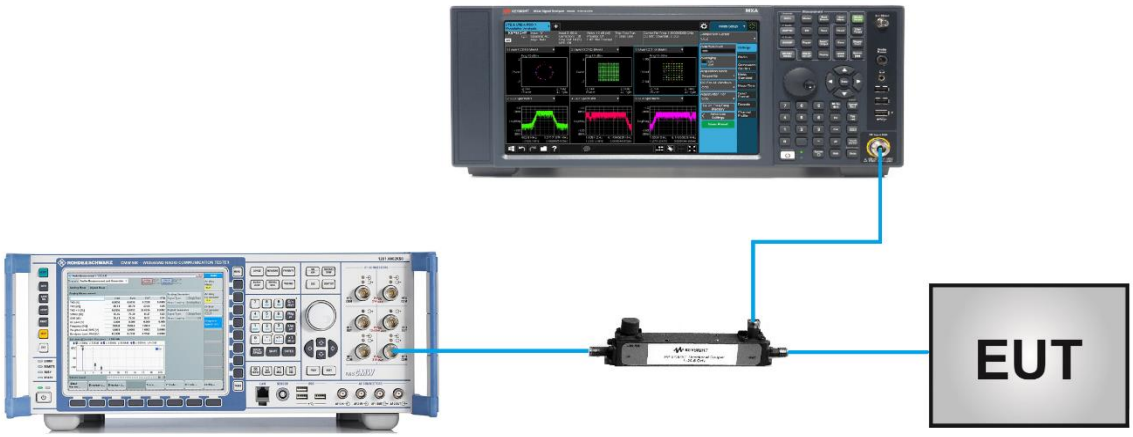
5.5.2.Test Procedure Used

ANSI C63.26-2015 - Section 5.7

5.5.3.Test Setting

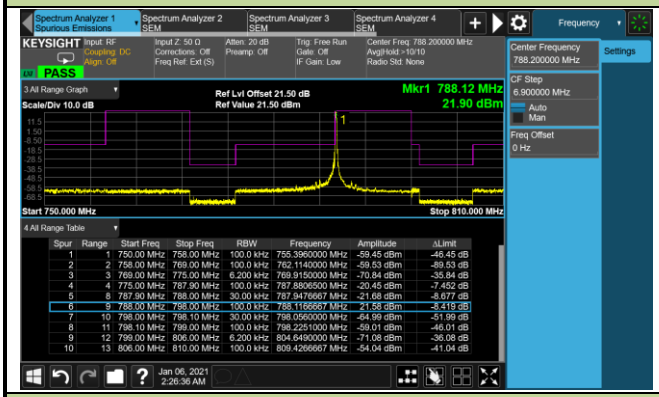
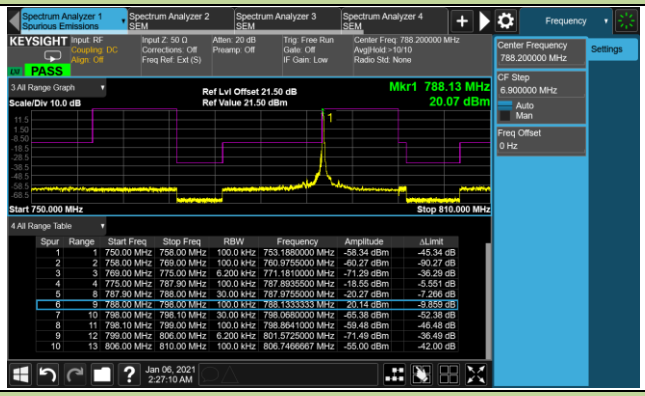
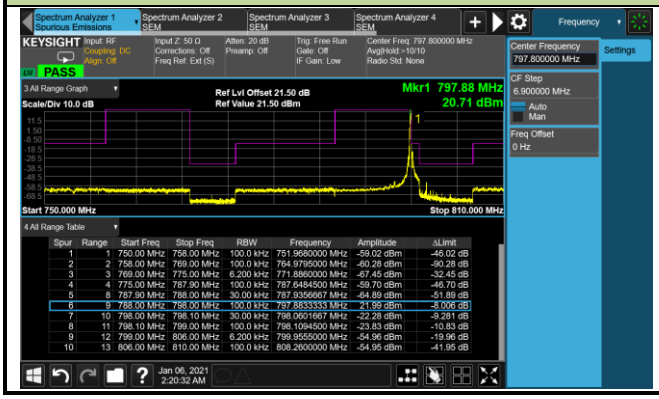
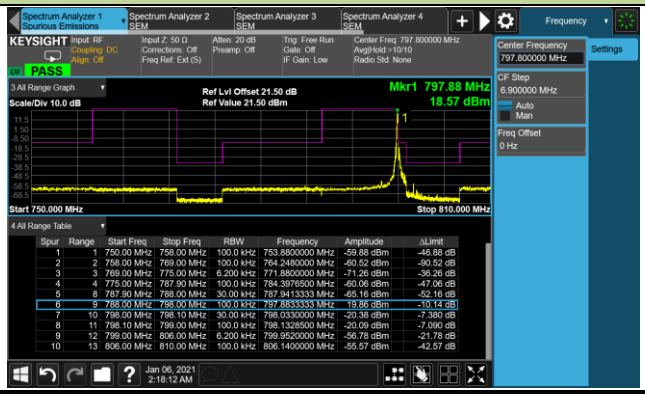
1. Set the analyzer frequency to low or high channel
2. RBW ≥ The nominal RBW shall be in the range of 1% of the anticipated OBW (in the 1MHz band immediately outside and adjacent to the band edge). For improvement of the accuracy in the measurement of the average power of a noise-like emission, a RBW narrower than the specified reference bandwidth can be used (generally limited to no less than 1% of the OBW), provided that a subsequent integration is performed over the full required measurement bandwidth. This integration should be performed using the spectrum analyzer’s band power functions.
3. VBW ≥ 3*RBW
4. Sweep time = auto
5. Detector = power averaging (rms)
6. Set sweep trigger to “free run.”
7. User gate triggered such that the analyzer only sweeps when the device is transmitting at full power
8. Trace average at least 100 traces in power averaging (rms) mode if sweep is set to auto-couple. To accurately determine the average power over the on and off time of the transmitter, it can be necessary to increase the number of traces to be averaged above 100, or if using a manually configured sweep time, increase the sweep time.

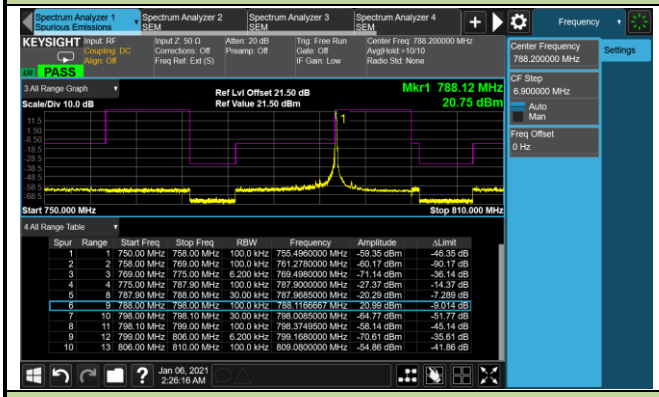
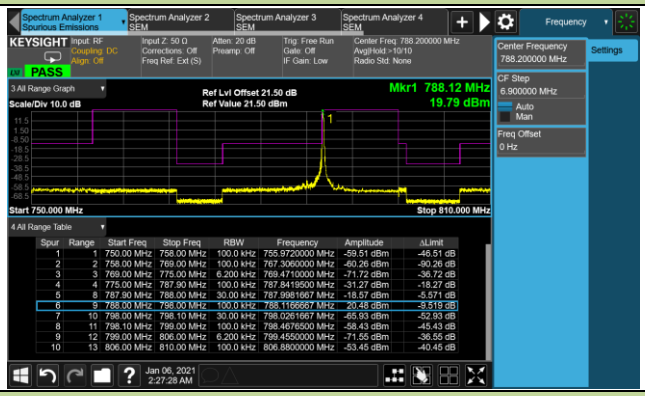
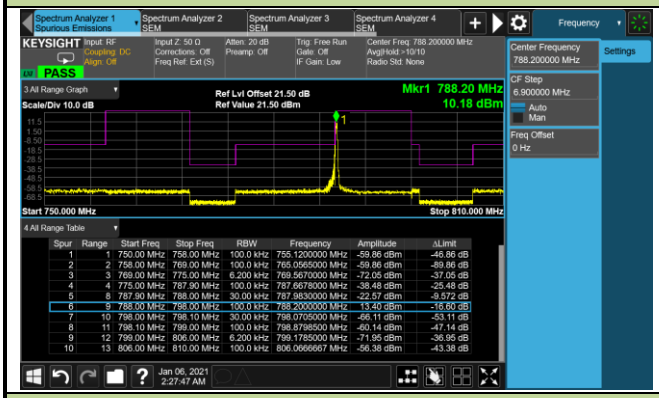
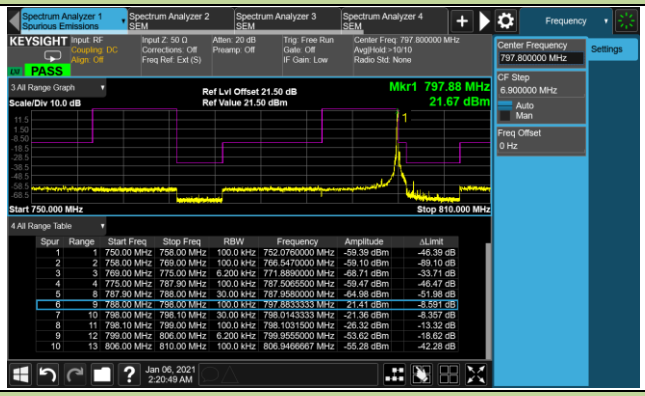
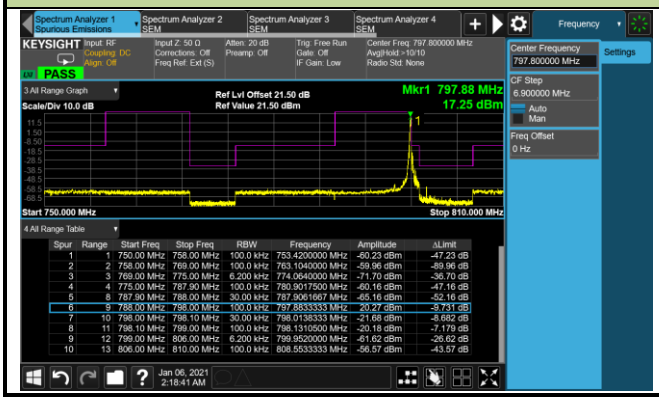
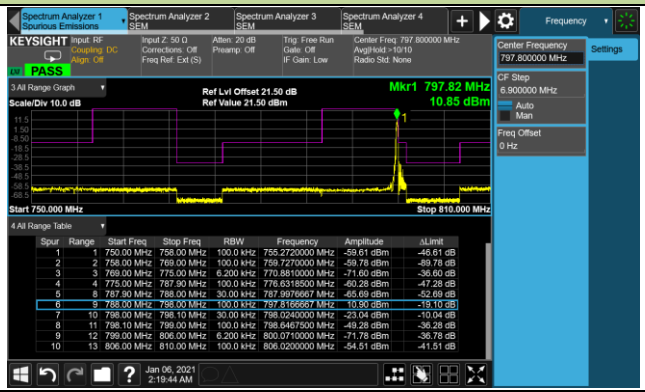
5.5.4.Test Setup



5.5.5.Test Result

Product	NB-IoT Module	Test Site	WZ-SR6
Test Engineer	Caitlin Chen	Test Date	2021/01/06
Test Band	Band 14	Test Result	Pass

BPSK	
3.75kHz 1@0 CH-Low	15kHz 1@0 CH-Low
	
3.75kHz 1@47 CH-High	3.75kHz 1@11 CH-High
	

QPSK	
3.75kHz 1@0 CH-Low	15kHz 1@0 CH-Low
	
15 kHz 12@0 CH-Low	3.75kHz 1@47 CH-High
	
15kHz 1@11 CH-High	15kHz 12@0 CH-High
	

5.6. Emisson Mask

5.6.1.Test Limit

Emission Mask B. For transmitters that are equipped with an audio low-pass filter, the power of any emission must be attenuated below the unmodulated carrier power (P) as follows:

(1) On any frequency removed from the assigned frequency by more than 50 percent, but not more than 100 percent of the authorized bandwidth: At least 25 dB.

(2) On any frequency removed from the assigned frequency by more than 100 percent, but not more than 250 percent of the authorized bandwidth: At least 35 dB.

(3) On any frequency removed from the assigned frequency by more than 250 percent of the authorized bandwidth: At least 43 + 10 log (P) dB.

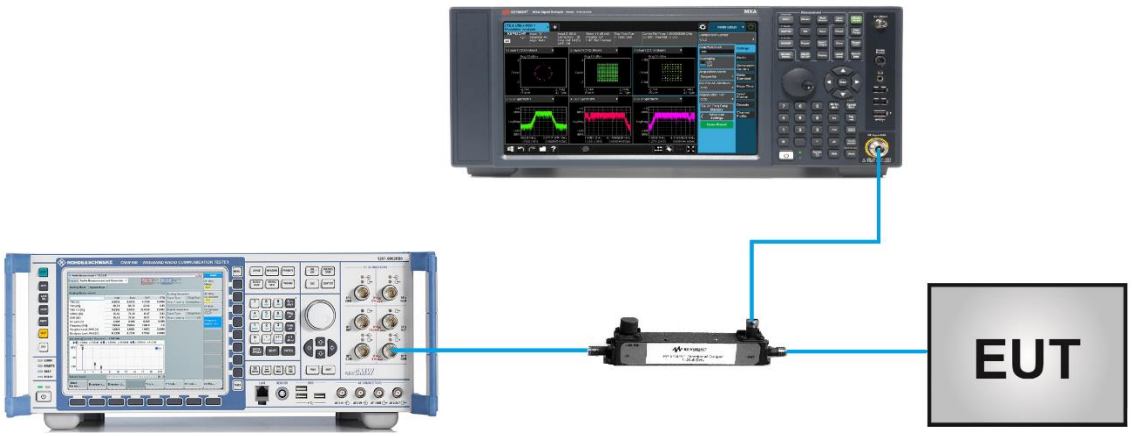
5.6.2.Test Procedure Used

ANSI C63.26-2015 - Section5.7

5.6.3.Test Setting

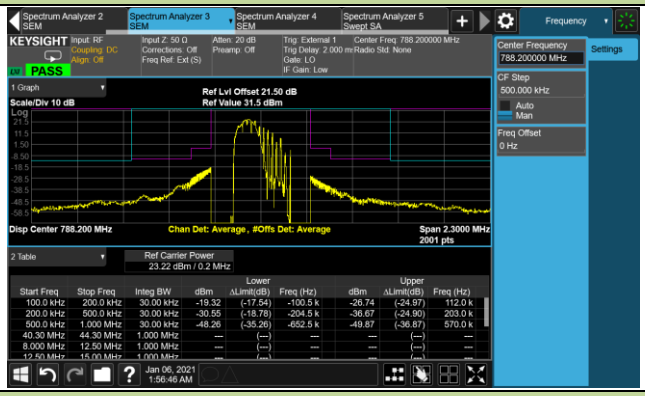
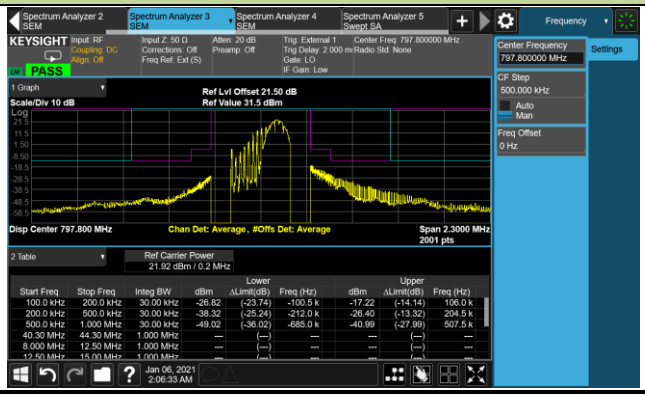
1. Set the analyzer frequency to low or high channel
2. RBW ≥ The nominal RBW shall be in the range of 1% of the anticipated OBW (in the 1MHz band immediately outside and adjacent to the band edge). For improvement of the accuracy in the measurement of the average power of a noise-like emission, a RBW narrower than the specified reference bandwidth can be used (generally limited to no less than 1% of the OBW), provided that a subsequent integration is performed over the full required measurement bandwidth. This integration should be performed using the spectrum analyzer’s band power functions.
3. VBW ≥ 3*RBW
4. Sweep time = auto
5. Detector = power averaging (rms)
6. Set sweep trigger to “free run.”
7. User gate triggered such that the analyzer only sweeps when the device is transmitting at full power
8. Trace average at least 100 traces in power averaging (rms) mode if sweep is set to auto-couple. To accurately determine the average power over the on and off time of the transmitter, it can be necessary to increase the number of traces to be averaged above 100, or if using a manually configured sweep time, increase the sweep time.

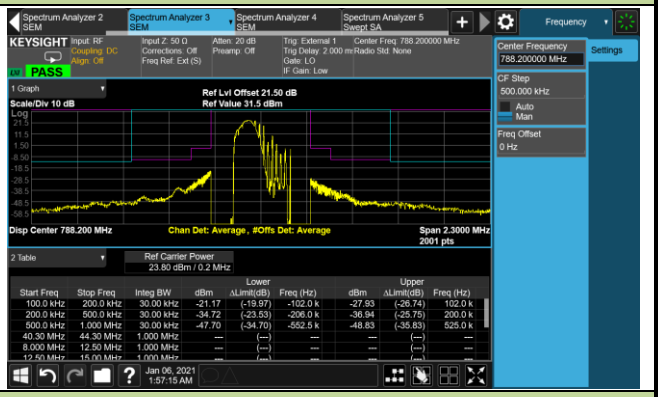
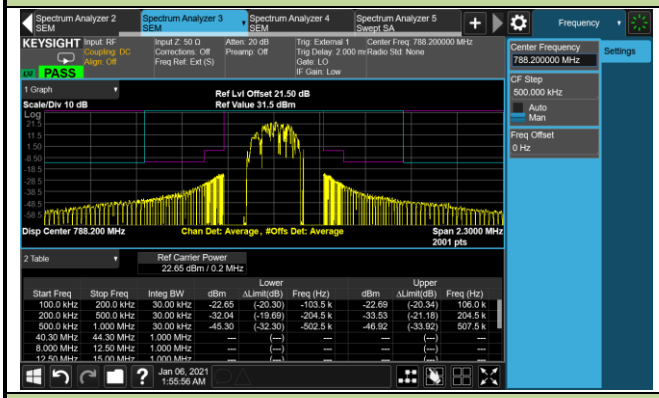
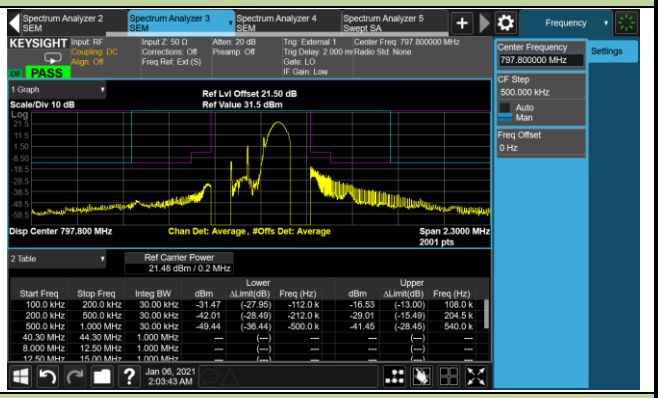
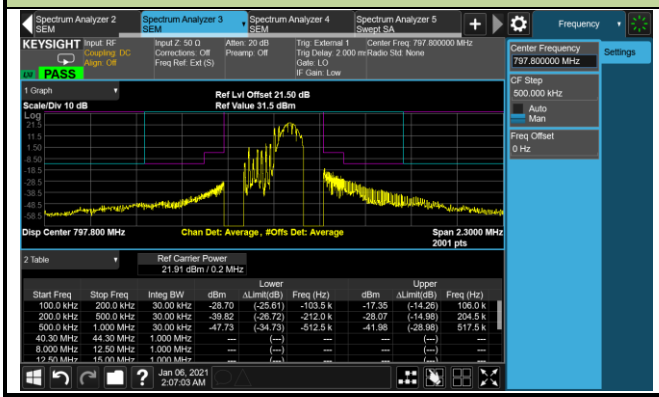
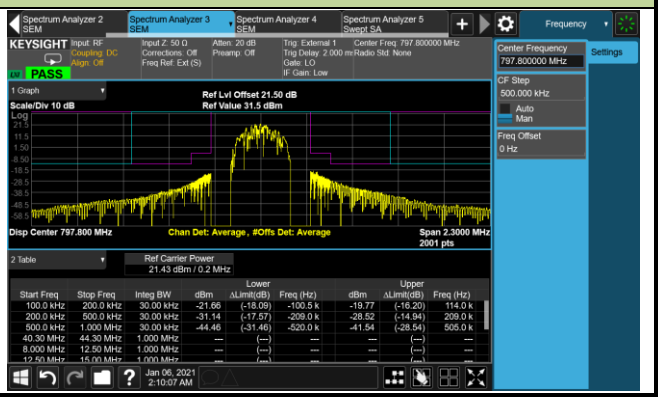
5.6.4.Test Setup



5.6.5.Test Result

Product	NB-IoT Module	Test Site	WZ-SR6
Test Engineer	Caitlin Chen	Test Date	2021/01/06
Test Band	Band 14	Test Result	Pass

BPSK	
3.75kHz 1@0 CH-Low	15kHz 1@0 CH-Low
	
3.75kHz 1@47 CH-High	15kHz 1@11 CH-High
	

QPSK	
3.75kHz 1@0 CH-Low	15kHz 1@0 CH-Low
	
15 kHz 12@0 CH-Low	3.75kHz 1@47 CH-High
	
15kHz 1@11 CH-High	15kHz 12@0 CH-High
	

5.7. Peak to Average Ratio

5.7.1.Test Limit

A peak to average ratio measurement is performed at the conducted port of the EUT. The spectrum analyzers Complementary Cumulative Distribution Function (CCDF) measurement profile is used to determine the largest deviation between the average and the peak power of the EUT in a given bandwidth. The CCDF curve shows how much time the peak waveform spends at or above a given average power level. The percent of time the signal spends at or above the level defines the probability for that particular power level.

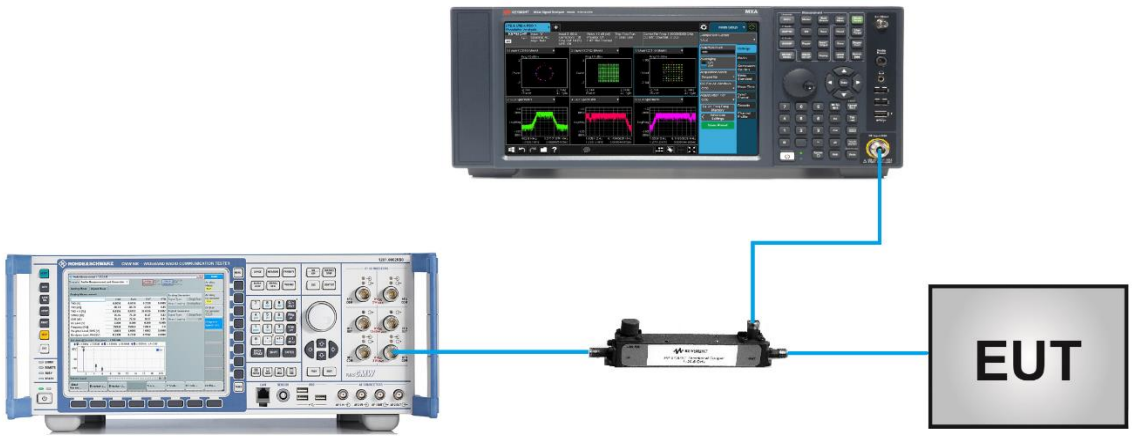
5.7.2.Test Procedure Used

ANSI C63.26-2015 - Section 5.2.3.4 (CCDF).

5.7.3.Test Setting

1. Set the resolution / measurement bandwidth ≥ signal's occupied bandwidth
2. Set the number of counts to a value that stabilizes the measured CCDF curve
3. Record the maximum PARR level associated with a probability of 0.1%

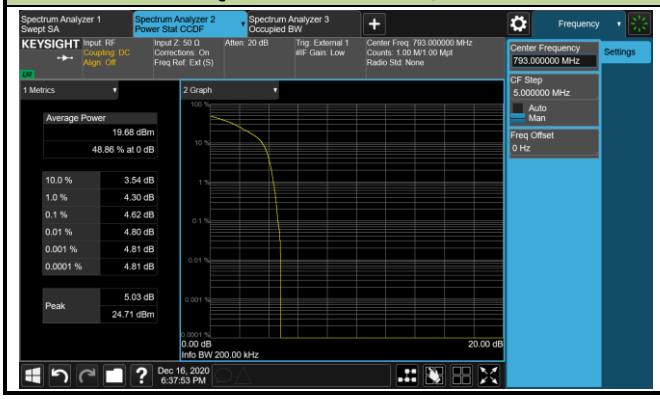
5.7.4.Test Setup



5.7.5.Test Result

Product	NB-IoT Module	Test Site	WZ-SR6
Test Engineer	Caitlin Chen	Test Date	2020/12/16
Test Band	Band 14		

Channel No.	Frequency (MHz)	Sub-carrier spacing (kHz)	N_{tones}	Peak to Average Ratio (dB)	Limit (dB)	Result
23330	793.0	15	12@0	4.62	≤ 13.00	Pass

QPSK 15kHz 12@0	
	

5.8. Conducted Spurious Emissions

5.8.1.Test Limit

The level of the carrier and the various conducted spurious and harmonic frequencies is measured by means of a calibrated spectrum analyzer. The spectrum is scanned from the lowest frequency generated in the equipment up to a frequency including its 10th harmonic. All out of band emissions are measured with a spectrum analyzer connected to the antenna terminal of the EUT while the EUT is operating at its maximum duty cycle, at maximum power, and at the appropriate frequencies. All data rates were investigated to determine the worst-case configuration. All modes of operation were investigated and the worst-case configuration results are reported in this section.
On any frequency between 775-788 MHz, above 805 MHz, and below 758 MHz, by at least 43 + 10 log (P) dB.

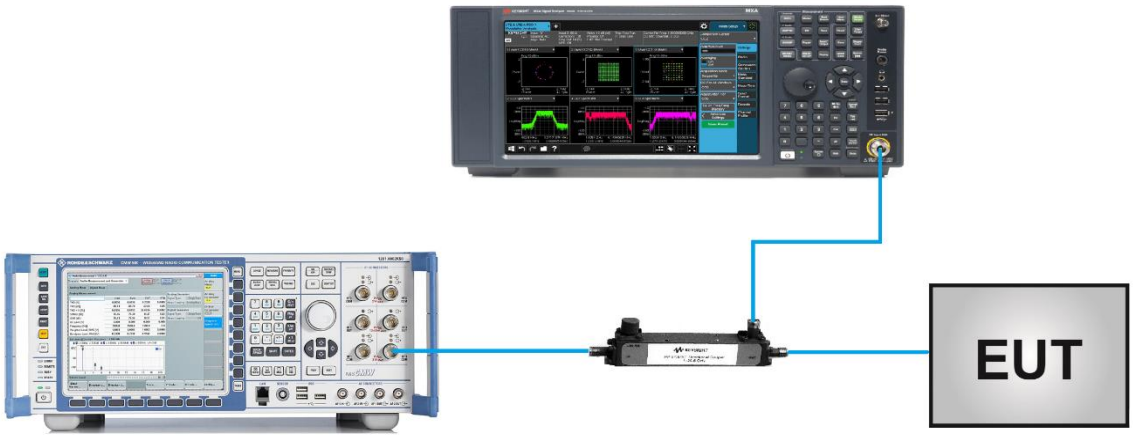
5.8.2.Test Procedure Used

ANSI C63.26-2015 - Section 5.7

5.8.3.Test Setting

1. Set the analyzer frequency to low, mid, high channel.
2. RBW = 1MHz
3. VBW ≥ 3*RBW
4. Sweep time = auto
5. Detector = power averaging (rms)
6. Set sweep trigger to “free run.”
7. User gate triggered such that the analyzer only sweeps when the device is transmitting at full power.
8. Trace average at least 100 traces in power averaging (rms) mode if sweep is set to auto-couple. To accurately determine the average power over the on and off time of the transmitter, it can be necessary to increase the number of traces to be averaged above 100, or if using a manually configured sweep time, increase the sweep time.

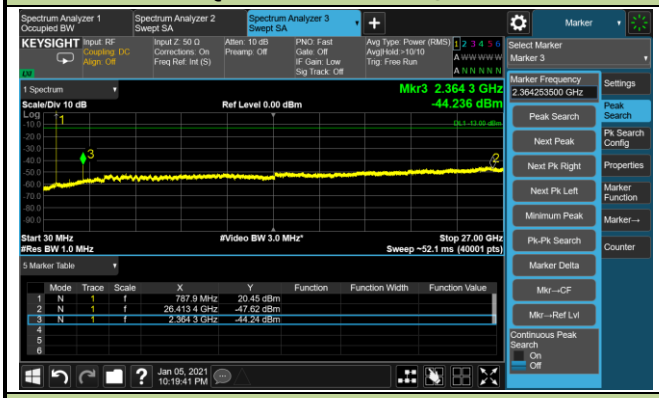
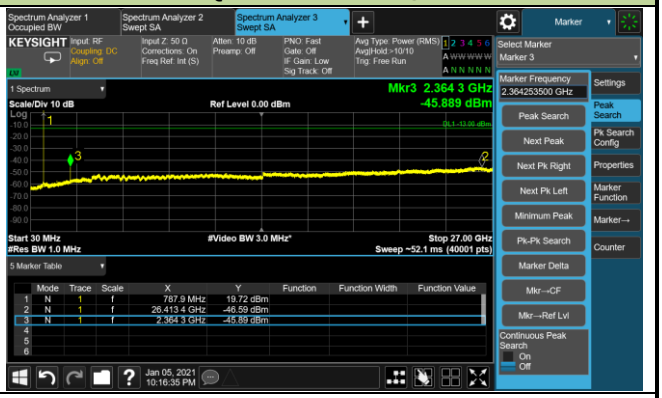
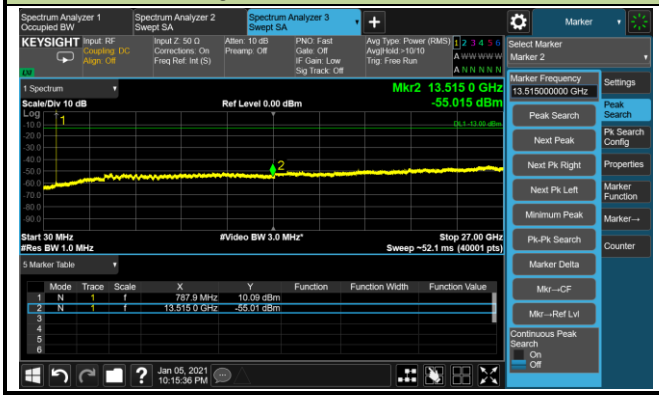
5.8.4.Test Setup

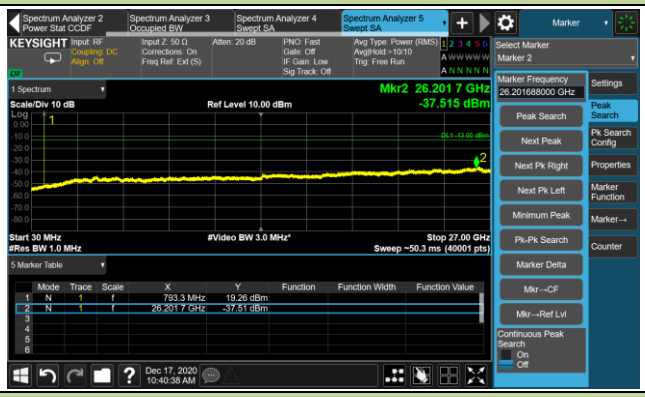
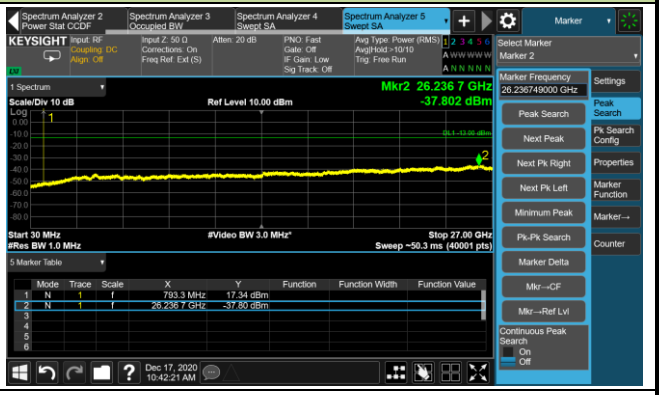
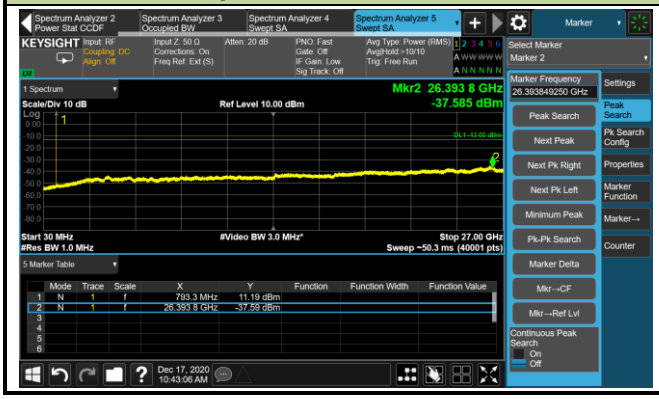


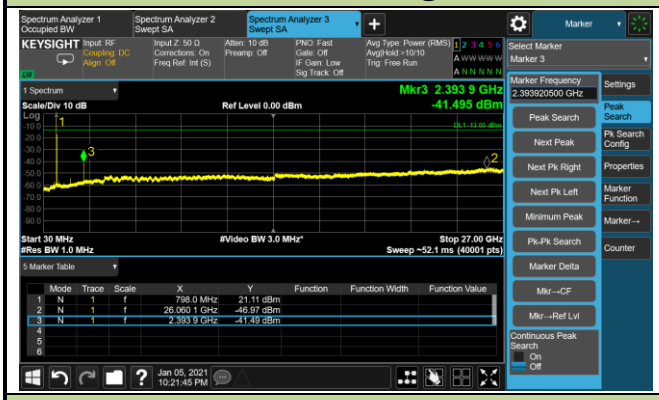
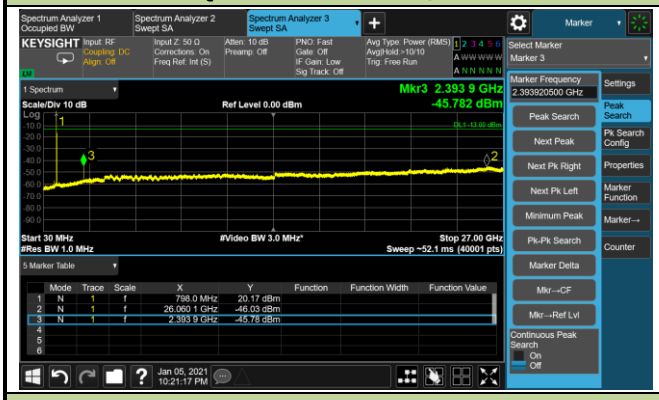
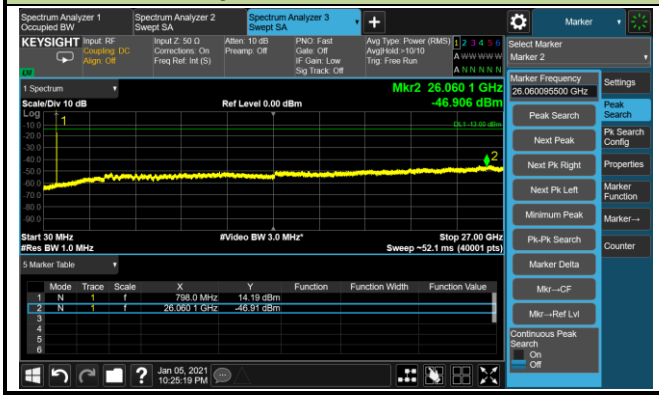
5.8.5.Test Result

Product	NB-IoT Module	Test Site	WZ-SR6
Test Engineer	Caitlin Chen	Test Date	2020/12/17
Test Band	Band 14		

Channel	Frequency (MHz)	Sub-carrier spacing (kHz)	N_{tones}	Frequency Range (MHz)	Max Spurious Emissions (dBm)	Limit (dBm)	Result
BPSK							
23282	788.2	3.75	1@0	30 ~ 27000	-36.43	≤ -13.00	Pass
23282	788.2	15	1@0	30 ~ 27000	-43.97	≤ -13.00	Pass
23330	793.0	3.75	1@23	30 ~ 27000	-36.82	≤ -13.00	Pass
23330	793.0	15	1@5	30 ~ 27000	-37.52	≤ -13.00	Pass
23378	797.8	3.75	1@47	30 ~ 27000	-41.49	≤ -13.00	Pass
23378	797.8	15	1@11	30 ~ 27000	-46.82	≤ -13.00	Pass
QPSK							
23282	788.2	3.75	1@0	30 ~ 27000	-44.24	≤ -13.00	Pass
23282	788.2	15	1@0	30 ~ 27000	-45.89	≤ -13.00	Pass
23282	788.2	15	12@0	30 ~ 27000	-55.02	≤ -13.00	Pass
23330	793.0	3.75	1@23	30 ~ 27000	-36.83	≤ -13.00	Pass
23330	793.0	15	1@5	30 ~ 27000	-37.80	≤ -13.00	Pass
23330	793.0	15	12@0	30 ~ 27000	-37.59	≤ -13.00	Pass
23378	797.8	3.75	1@47	30 ~ 27000	-45.78	≤ -13.00	Pass
23378	797.8	15	1@11	30 ~ 27000	-47.03	≤ -13.00	Pass
23378	797.8	15	12@0	30 ~ 27000	-46.91	≤ -13.00	Pass

Channel 23282 (788.2 MHz)	
BPSK 3.75kHz 1@0	BPSK 15kHz 1@0
	
QPSK 3.75kHz 1@0	QPSK 15kHz 1@0
	
QPSK 15kHz 12@0	
	

Channel 23330 (793 MHz)	
BPSK 3.75kHz 1@23	BPSK 15kHz 1@5
	
QPSK 3.75kHz 1@23	QPSK 15kHz 1@5
	
QPSK 15kHz 12@0	
	

Channel 23378 (797.8 MHz)	
BPSK 3.75kHz 1@47	BPSK 15kHz 1@11
	
QPSK 3.75kHz 1@47	QPSK 15kHz 1@11
	
QPSK 15kHz 12@0	
	

5.9. Radiated Spurious Emissions Measurements

5.9.1.Test Limit

Out of band emissions: The powerof any emission outside of theauthorized operating frequency ranges must be attenuated below the transmitting power (P) by a factorof at least 43 + 10 log(P) dB. The emission limit equal to -13dBm.

For operations in the 758-775 MHz and 788-805 MHz bands, all emissions including harmonics in the band 1559-1610 MHz shall be limited to −70 dBW/MHz (-40dBm/MHz) equivalent isotropically radiated power (EIRP) for wideband signals, and −80 dBW (-50dBm) EIRP for discrete emissions of less than 700 Hz bandwidth. For the purpose of equipment authorization, a transmitter shall be tested with an antenna that is representative of the type that will be used with the equipment in normal operation.

E (dBμV/m) = EIRP (dBm) - 20 log D + 104.8; where D is the measurement distance in meters. The emission limit equal to 82.3dBμV/m or 55.3dBμV/m.

5.9.2.Test Procedure Used

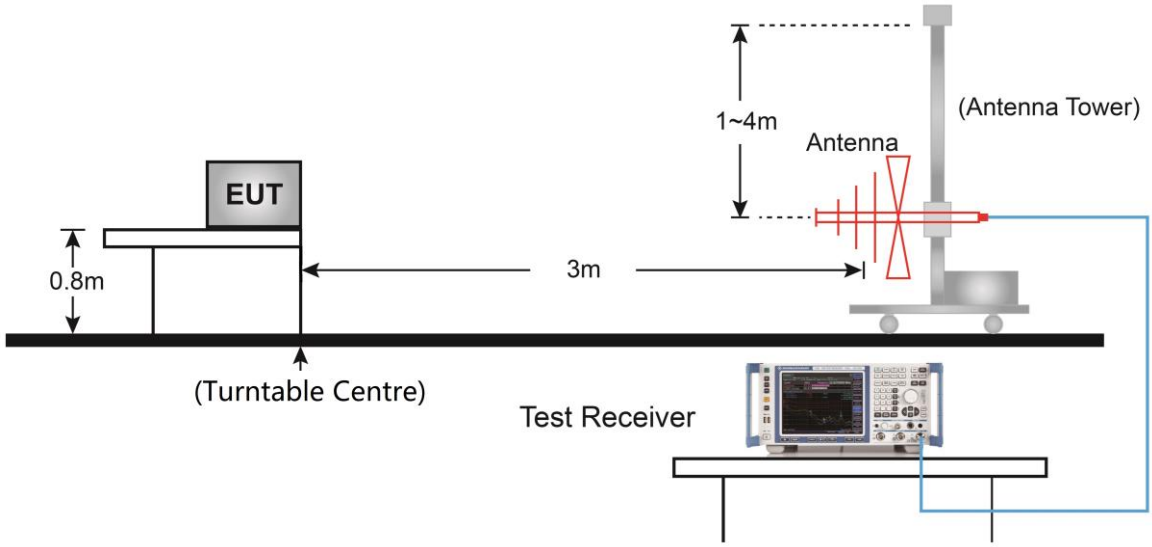
ANSI C63.26-2015 - Section 5.2.7 & 5.5

5.9.3.Test Setting

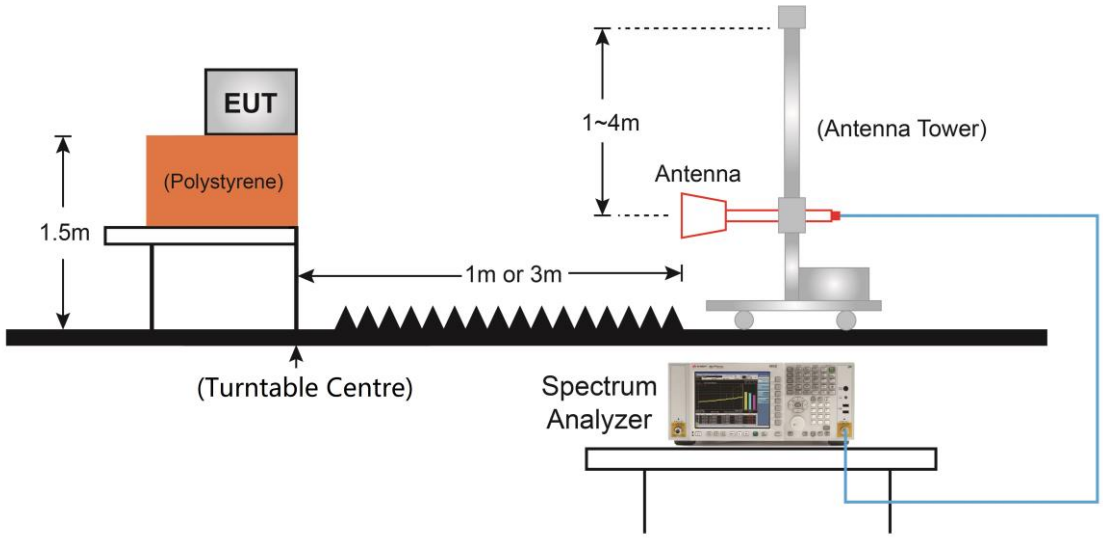
1. RBW = 1MHz
2. VBW≥ 3*RBW
3. Sweep time ≥ 10 × (number of points in sweep) × (transmission symbol period)
4. Detector = Peak
5. Trace mode = max hold
6. The trace was allowed to stabilize

5.9.4.Test Setup

Below 1GHz Test Setup:



Above 1GHz Test Setup:



5.9.5.Test Result

Product	NB-IoT Module	Test Site	WZ-AC2
Test Engineer	Hyde Yu	Test Date	2020/12/20
Test Configuration	NB-IoT Band 14, 3.75kHz, 1 Tone		

Frequency (MHz)	Reading Level (dBμV)	Factor (dB)	Measure Level(dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector	Polarization
Bottom CH 23282 (788.2MHz)							
46.5	4.8	20.6	25.4	82.3	-56.9	Peak	Horizontal
573.7	4.2	26.6	30.8	82.3	-51.5	Peak	Horizontal
45.5	16.6	20.5	37.1	82.3	-45.2	Peak	Vertical
54.7	17.1	20.2	37.3	82.3	-45.0	Peak	Vertical
1578.0	41.7	-4.4	37.3	55.3	-18.0	Peak	Horizontal
3116.5	38.8	-1.0	37.8	82.3	-44.5	Peak	Horizontal
1578.0	43.5	-4.4	39.1	55.3	-16.2	Peak	Vertical
3116.5	38.9	-1.0	37.9	82.3	-44.4	Peak	Vertical
Middle CH 23330 (793.0MHz)							
47.0	4.8	20.6	25.4	82.3	-56.9	Peak	Horizontal
915.6	9.7	31.7	41.4	82.3	-40.9	Peak	Horizontal
43.6	17.8	20.4	38.2	82.3	-44.1	Peak	Vertical
670.2	11.9	28.2	40.1	82.3	-42.2	Peak	Vertical
1586.5	46.2	-4.5	41.7	55.3	-13.6	Peak	Horizontal
2802.0	39.2	-1.1	38.1	82.3	-44.2	Peak	Horizontal
1586.5	46.1	-4.5	41.6	55.3	-13.7	Peak	Vertical
2198.5	39.2	-0.6	38.6	82.3	-43.7	Peak	Vertical
Top CH 23378 (797.8MHz)							
46.5	7.2	20.6	27.8	82.3	-54.5	Peak	Horizontal
915.6	8.6	31.7	40.3	82.3	-42.0	Peak	Horizontal
44.1	18.4	20.5	38.9	82.3	-43.4	Peak	Vertical
670.2	12.4	28.2	40.6	82.3	-41.7	Peak	Vertical
1595.0	47.2	-4.6	42.6	55.3	-12.7	Peak	Horizontal
3142.0	38.4	-0.6	37.8	82.3	-44.5	Peak	Horizontal
1595.0	47.4	-4.6	42.8	55.3	-12.5	Peak	Vertical
2606.5	39.4	-0.8	38.6	82.3	-43.7	Peak	Vertical
Note: Measure Level (dBm) = Reading Level (dBm) + Factor (dB).							

6. CONCLUSION

The data collected relate only the item(s) tested and show that unit is compliance with FCC Rules.

The End

Appendix A - Test Setup Photograph

Refer to “2012RSU022-UT” file.

Appendix B - EUT Photograph

Refer to “2012RSU022-UE” file.