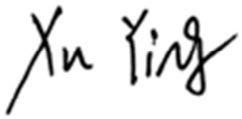
RF TEST REPORT

Applicant	MeiG Smart Technology Co., Ltd
FCC ID	2APJ4-SLM130-NA
Product	LTE NB-IOT Module
Brand	MEIGLink
Model	SLM130-NA
Report No.	R2409A1238-R3
Issue Date	October 21, 2024

Eurofins TA Technology (Shanghai) Co., Ltd. tested the above equipment in accordance with the requirements in **FCC CFR47 Part 2 (2023)/ FCC CFR47 Part 27C (2023)**. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.



Prepared by: Xu Ying

Approved by: Xu Kai

Eurofins TA Technology (Shanghai) Co., Ltd.

Building 3, No.145, Jintang Rd, Pudong Shanghai, P.R.China
TEL: +86-021-50791141/2/3
FAX: +86-021-50791141/2/3-8000

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Summary of Measurement Results

Number	Test Case	Clause in FCC rules	Verdict
1	RF Power Output and Effective Isotropic Radiated Power	2.1046 /27.50(d)(4) /27.50(b)(10) /27.50(c)(10)	PASS
2	Occupied Bandwidth	2.1049	PASS
3	Band Edge Compliance	27.53(h) /27.53(g) /27.53(f) /27.53(c)	PASS
4	Peak-to-Average Power Ratio	27.50(d)/KDB971168 D01(5.7)	PASS
5	Frequency Stability	2.1055 / 27.54	PASS
6	Spurious Emissions at Antenna Terminals	2.1051 /27.53(h) /27.53(g) /27.53(f) /27.53(c)	PASS
7	Radiated Spurious Emission	2.1053 /27.53(h) /27.53(g) /27.53(f) /27.53(c)	PASS
Date of Testing: September 3, 2024 ~ September 13, 2024 Date of Sample Received: September 2, 2024			
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. All indications of Pass/Fail in this report are opinions expressed by Eurofins TA Technology (Shanghai) Co., Ltd. based on interpretations and/or observations of test results. Measurement Uncertainties were not taken into account and are published for informational purposes only.			

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 **Eurofins 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)

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

A2LA (Certificate Number: 3857.01)

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

1.3 Testing Location

Company:	Eurofins TA Technology (Shanghai) Co., Ltd.
Address:	Building 3, No.145, Jintang Rd, Pudong Shanghai, P.R.China
City:	Shanghai
Post code:	201201
Country:	P. R. China
Contact:	Xu Kai
Telephone:	+86-021-50791141/2/3
Fax:	+86-021-50791141/2/3-8000
Website:	https://www.eurofins.com/electrical-and-electronics
E-mail:	Kain.Xu@cpt.eurofinscn.com

2 General Description of Equipment under Test

2.1 Applicant and Manufacturer Information

Applicant	MeiG Smart Technology Co., Ltd
Applicant address	2nd Floor, Office Building, No.5 Lingxia Road, Fenghuang, Fuyong Street, Bao'an District, Shenzhen, China.
Manufacturer	MeiG Smart Technology Co., Ltd
Manufacturer address	2nd Floor, Office Building, No.5 Lingxia Road, Fenghuang, Fuyong Street, Bao'an District, Shenzhen, China.

2.2 General information

EUT Description		
Model	SLM130-NA	
SN	Conducted: M130CN6AHE062600015 Radiated: M130CN6AHE062600033	
Hardware Version	SLM130-NA_V1.01_PCB	
Software Version	M018	
Power Supply	External power supply	
Antenna Type	External Antenna	
Antenna Gain	NB-IoT Band 4:	2.77 dBi
	NB-IoT Band 12:	1.35 dBi
	NB-IoT Band 13:	1.35 dBi
Test Mode(s)	NB-IoT Band 4/12/13	
Test Modulation	BPSK, QPSK	
Category	NB1	
Deployment	stand-alone	
Sub-carrier spacing	3.75KHz, 15KHz	
Ntones	single-tone, multi-tone	
Maximum E.I.R.P./ E.R.P.	NB-IoT Band 4:	24.99 dBm
	NB-IoT Band 12:	21.62 dBm
	NB-IoT Band 13:	21.99 dBm
Rated Power Supply Voltage	3.8V	
Operating Voltage	Minimum: 3.5V Maximum: 4.2V	
Operating Temperature	Lowest: -35°C Highest: +75°C	
Testing Temperature	Lowest: -30°C Highest: +50°C	

Operating Frequency Range(s)	Mode	Tx (MHz)	Rx (MHz)
	NB-IoT Band 4	1710 ~ 1755	2110 ~ 2155
	NB-IoT Band 12	699 ~ 716	729 ~ 746
	NB-IoT Band 13	777 ~ 787	746 ~ 756
Auxiliary Test Equipment			
Antenna	Manufacturer: Shenzhen Be-Comfortable Technology Co. Ltd Model: N19-0740-R0A Gain: NB-IoT Band 4: 2.77 dBi NB-IoT Band 12: 1.35 dBi NB-IoT Band 13: 1.35 dBi		
Mother board	Manufacturer: MeiG Smart Technology Co., Ltd Model: /		
Note: 1. The EUT is sent from the applicant to Eurofins TA and the information of the EUT is declared by the applicant.			

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 (2023)

FCC CFR47 Part 2 (2023)

Reference standard:

ANSI C63.26-2015

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 (vertical), lie-down position (horizontal). Receiver antenna polarization (horizontal and vertical), the worst emission was found in position (horizontal, horizontal polarization) and the worst case was recorded.

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 4/12/13:

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 B4	O	O	O	O	O	O	O	O
	NB-IoT B12	O	O	O	O	O	O	O	O
	NB-IoT B13	O	O	O	O	O	O	O	O
Occupied Bandwidth	NB-IoT B4	O	O	O	O	O	O	O	O
	NB-IoT B12	O	O	O	O	O	O	O	O
	NB-IoT B13	O	O	O	O	O	O	O	O
Band Edge Compliance	NB-IoT B4	O	O	O	O	O	O	-	O
	NB-IoT B12	O	O	O	O	O	O	-	O
	NB-IoT B13	O	O	O	O	O	O	-	O
Peak-to-Average Power Ratio	NB-IoT B4	O	O	O	O	O	-	O	-
	NB-IoT B12	O	O	O	O	O	-	O	-
	NB-IoT B13	O	O	O	O	O	-	O	-
Frequency Stability	NB-IoT B4	O	O	O	O	O	-	O	-
	NB-IoT B12	O	O	O	O	O	-	O	-
	NB-IoT B13	O	O	O	O	O	-	O	-
Conducted Spurious Emissions	NB-IoT B4	O	O	-	-	O	O	O	O
	NB-IoT B12	O	O	-	-	O	O	O	O
	NB-IoT B13	O	O	-	-	O	O	O	O
Radiated Spurious Emission	NB-IoT B4	O	O	-	-	O	O	O	O
	NB-IoT B12	O	O	-	-	O	O	O	O
	NB-IoT B13	O	O	-	-	O	O	O	O

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

5 Test Case

5.1 RF Power Output and Effective Isotropic Radiated Power

Ambient condition

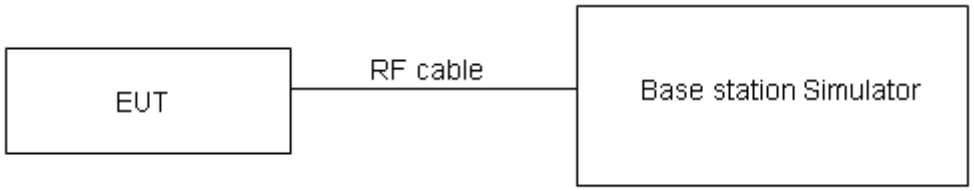
Temperature	Relative humidity	Pressure
15°C ~ 35°C	20% ~ 80%	86 kPa ~ 106 kPa

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) + Antenna Gain (dBi)
EIRP (dBm) = ERP (dBm) + 2.15 (dB.)

Test Setup



Limits

No specific RF power output requirements in part 2.1046.

Rule Part 27.50(b) (10) specifies that “Portable stations (hand-held devices) transmitting in the 746-757 MHz, 776-788 MHz, and 805-806 MHz bands are limited to 3 watts ERP”
Rule Part 27.50(c) (10) specifies that “Portable stations (hand-held devices) in the 600 MHz uplink band and the 698-746 MHz band, and fixed and mobile stations in the 600 MHz uplink band are limited to 3 watts ERP”
Rule Part 27.50(d) (4) specifies that “Fixed, mobile and portable (hand-held) stations operating in the 1710–1755 MHz band are limited to 1 watt EIRP”

Part 27.50(b)(10)Limit	≤ 3 W (34.77 dBm)
Part 27.50(c)(10)Limit	≤ 3 W (34.77 dBm)
Part 27.50(d)(4)Limit	≤ 1 W (30 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/EIRP.

Test Results

Refer to the section 6.1 of this report for test data.

5.2 Occupied Bandwidth

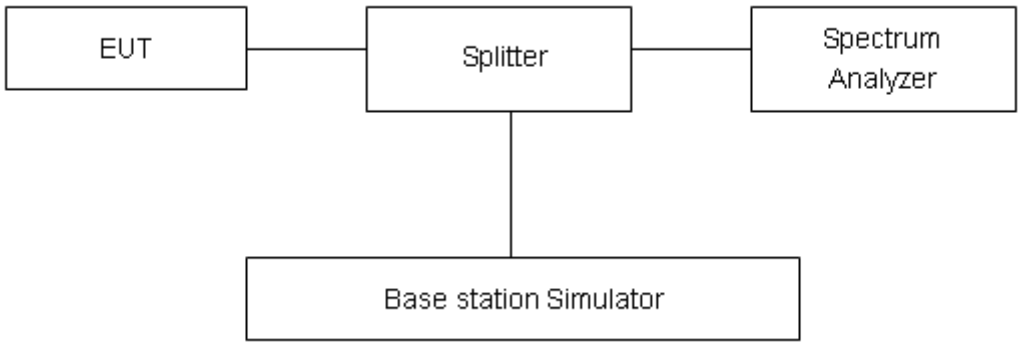
Ambient condition

Temperature	Relative humidity	Pressure
15°C ~ 35°C	20% ~ 80%	86 kPa ~ 106 kPa

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 ≥1%EBW, VBW is set to 3x RBW.
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 Results

Refer to the section 6.2 of this report for test data.

5.3 Band Edge Compliance

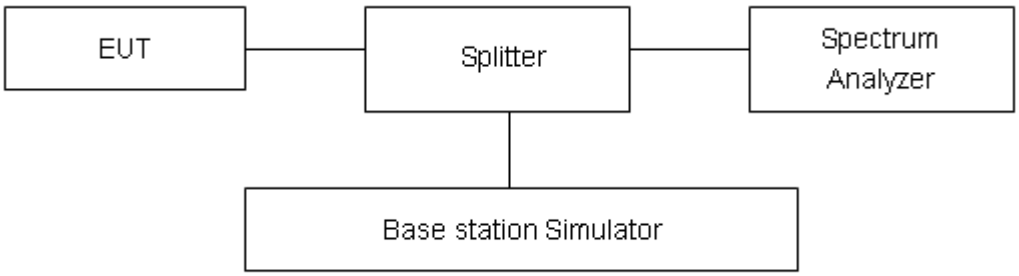
Ambient condition

Temperature	Relative humidity	Pressure
15°C ~ 35°C	20% ~ 80%	86 kPa ~ 106 kPa

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 testing follows KDB 971168 D01 v03r01 Section 6.0
The EUT was connected to spectrum analyzer and system simulator via a power divider.
The band edges of low and high channels for the highest RF powers were measured.
RBW is set to ≥1%EBW, VBW is set to 3x RBW on spectrum analyzer.
Set spectrum analyzer with RMS detector.
The RF fundamental frequency should be excluded against the limit line in the operating frequency band.
Checked that all the results comply with the emission limit line.

Test Setup



Limits

Rule Part 27.53(h) specifies that " for operations in the 1695-1710 MHz, 1710-1755 MHz, 1755-1780 MHz, 1915-1920 MHz, 1995-2000 MHz, 2000-2020 MHz, 2110-2155 MHz, 2155-2180 MHz, and 2180-2200 bands, the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) in watts by at least 43 + 10 $\log_{10}$ (P) dB"

Rule Part 27.53(g) For operations in the 600 MHz band and the 698-746 MHz band, the power of any emission outside a 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, by at least 43 + 10 log (P) dB. Compliance with this provision is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kilohertz or greater. However, in the 100 kilohertz bands immediately outside and adjacent to a licensee's frequency block, a resolution bandwidth of at least 30 kHz may be employed.

Rule Part 27.53(f) For operations in the 746-758 MHz, 775-788 MHz, and 805-806 MHz bands,

emissions in the band 1559-1610 MHz shall be limited to −70 dBW/MHz equivalent isotropically radiated power (EIRP) for wideband signals, and −80 dBW 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.

Rule Part 27.53 (c) For operations in the 746-758 MHz band and the 776-788 MHz band, 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 any frequency outside the 746-758 MHz band, the power of any emission shall be attenuated outside the band below the transmitter power (P) by at least 43 + 10 log (P) dB;
(2) On any frequency outside the 776-788 MHz band, the power of any emission shall be attenuated outside the band below the transmitter power (P) by at least 43 + 10 log (P) dB;
(3) On all frequencies between 763-775 MHz and 793-805 MHz, by a factor not less than 76 + 10 log (P) dB in a 6.25 kHz band segment, for base and fixed stations;
(4) On all frequencies between 763-775 MHz and 793-805 MHz, by a factor not less than 65 + 10 log (P) dB in a 6.25 kHz band segment, for mobile and portable stations;
(5) Compliance with the provisions of paragraphs (c)(1) and (c)(2) of this section is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater. However, in the 100 kHz bands immediately outside and adjacent to the frequency block, a resolution bandwidth of at least 30 kHz may be employed;

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 Results

Refer to the section 6.3 of this report for test data.

5.4 Peak-to-Average Power Ratio (PAPR)

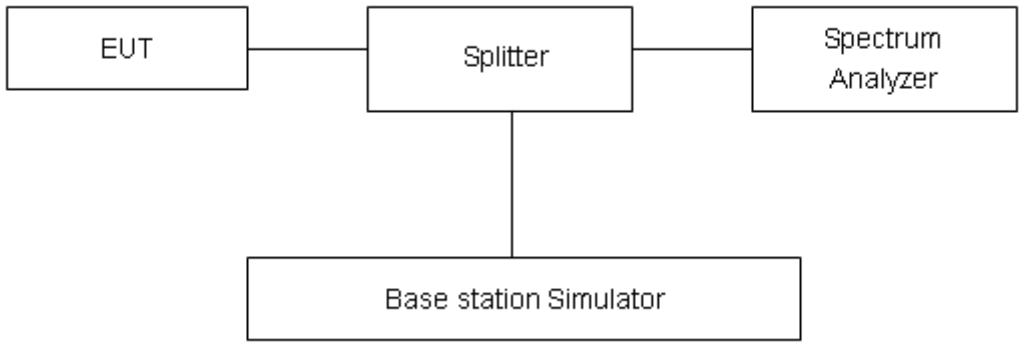
Ambient condition

Temperature	Relative humidity	Pressure
15°C ~ 35°C	20% ~ 80%	86 kPa ~ 106 kPa

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

Rule Part 27.50(d)(5) Equipment employed must be authorized in accordance with the provisions of 24.51. Power measurements for transmissions by stations authorized under this section may be made either in accordance with a Commission-approved average power technique or in compliance with paragraph (d)(6) of this section. In measuring transmissions in this band using an average power technique, the peak-to-average ratio (PAR) of the transmission may not exceed 13 dB.

Measurement Uncertainty

The assessed measurement uncertainty to ensure 95% confidence level for thenormal distribution is with the coverage factor k = 2, U= 0.4 dB.

Test Results

Refer to the section 6.4 of this report for test data.

5.5 Frequency Stability

Ambient condition

Temperature	Relative humidity	Pressure
15°C ~ 35°C	20% ~ 80%	86 kPa ~ 106 kPa

Method of Measurement

Frequency Stability (Temperature Variation)

The temperature inside the climate chamber is varied from -30°C to +50°C in 10°C step size.

(1)With all power removed, the temperature was decreased to -10°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 -30°C to +50°C. Allow at least 1.5 hours at each temperature, un-powered, before making measurements.

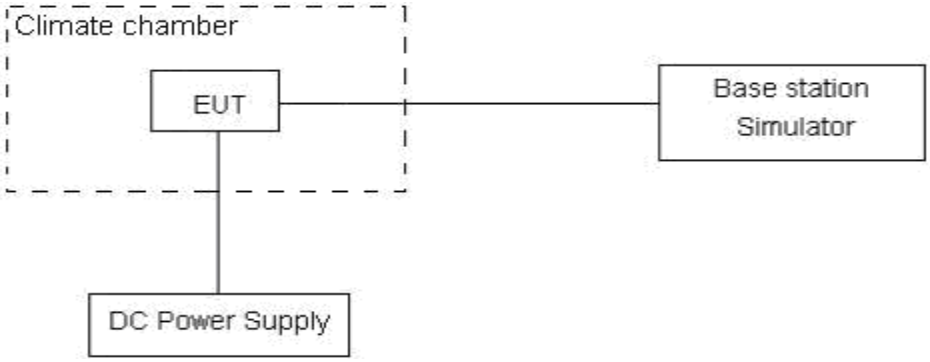
Frequency Stability (Voltage Variation)

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

Primary Supply Voltage: The primary supply voltage is varied from 85% to 115% of the nominal value for non hand-carried battery and AC powered equipment. For hand-carried, battery-powered equipment, primary supply voltage is reduced 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 3.6 V and 4.2 V, with a nominal voltage of 3.8V.

Test setup



Limits

The frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized bands of operation.

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 Results

Refer to the section 6.5 of this report for test data.

5.6 Spurious Emissions at Antenna Terminals

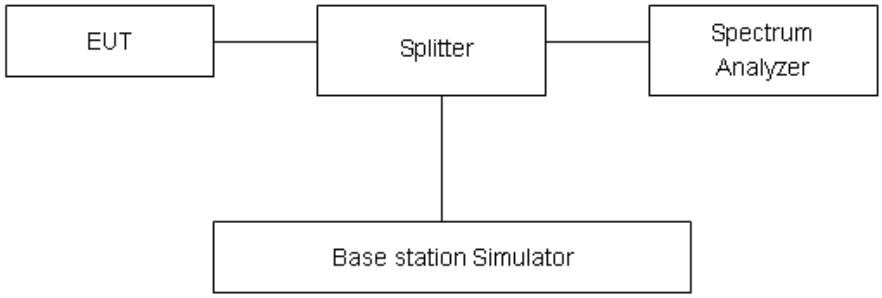
Ambient condition

Temperature	Relative humidity	Pressure
15°C ~ 35°C	20% ~ 80%	86 kPa ~ 106 kPa

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 1 kHz (0.009MHz~ 0.15 MHz),
RBW is set to 10 kHz (0.15 MHz~ 30 MHz)
RBW is set to 100 kHz (30MHz~1000 MHz)
RBW is set to 1000 kHz (above 1000MHz)
Sweep is set to AUTO.
Of those disturbances below (limit – 20 dB), the mark is not required for the EUT.
The modulation mode and RB allocation refer to section 5.1, using the maximum output power configuration.

Test setup



Limits

Rule Part 27.53(h) specifies that “for operations in the 1695-1710 MHz, 1710-1755 MHz, 1755-1780 MHz, 1915-1920 MHz, 1995-2000 MHz, 2000-2020 MHz, 2110-2155 MHz, 2155-2180 MHz, and 2180-2200 bands, the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) in watts by at least 43 + 10 log10 (P) dB..”
Rule Part 27.53 (g) For operations in the 600 MHz band and the 698-746 MHz band, the power of any emission outside a 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, by at least 43 + 10 log (P) dB. Compliance with this provision is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kilohertz or greater. However, in the 100 kilohertz bands immediately outside and adjacent to a licensee's frequency block, a resolution bandwidth of at least 30 kHz may be employed.
Rule Part 27.53(f) For operations in the 746-758 MHz, 775-788 MHz, and 805-806 MHz bands,

emissions in the band 1559-1610 MHz shall be limited to −70 dBW/MHz equivalent isotropically radiated power (EIRP) for wideband signals, and −80 dBW 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.
Part 27.53 (c) For operations in the 746-758 MHz band and the 776-788 MHz band, 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 any frequency outside the 746-758 MHz band, the power of any emission shall be attenuated outside the band below the transmitter power (P) by at least 43 + 10 log (P) dB;
(2) On any frequency outside the 776-788 MHz band, the power of any emission shall be attenuated outside the band below the transmitter power (P) by at least 43 + 10 log (P) dB;
(3) On all frequencies between 763-775 MHz and 793-805 MHz, by a factor not less than 76 + 10 log (P) dB in a 6.25 kHz band segment, for base and fixed stations;
(4) On all frequencies between 763-775 MHz and 793-805 MHz, by a factor not less than 65 + 10 log (P) dB in a 6.25 kHz band segment, for mobile and portable stations;
(5) Compliance with the provisions of paragraphs (c)(1) and (c)(2) of this section is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater. However, in the 100 kHz bands immediately outside and adjacent to the frequency block, a resolution bandwidth of at least 30 kHz may be employed;

Part 27.53(h)/(g) Limit		-13 dBm
Part 27.53(f) Limit	Limit out of the band 1559-1610 MHz	-13 dBm
	Limit in the band 1559-1610 MHz	-40 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 Results

Refer to the section 6.6 of this report for test data.

5.7 Radiated Spurious Emission

Ambient condition

Temperature	Relative humidity	Pressure
15°C ~ 35°C	20% ~ 80%	86 kPa ~ 106 kPa

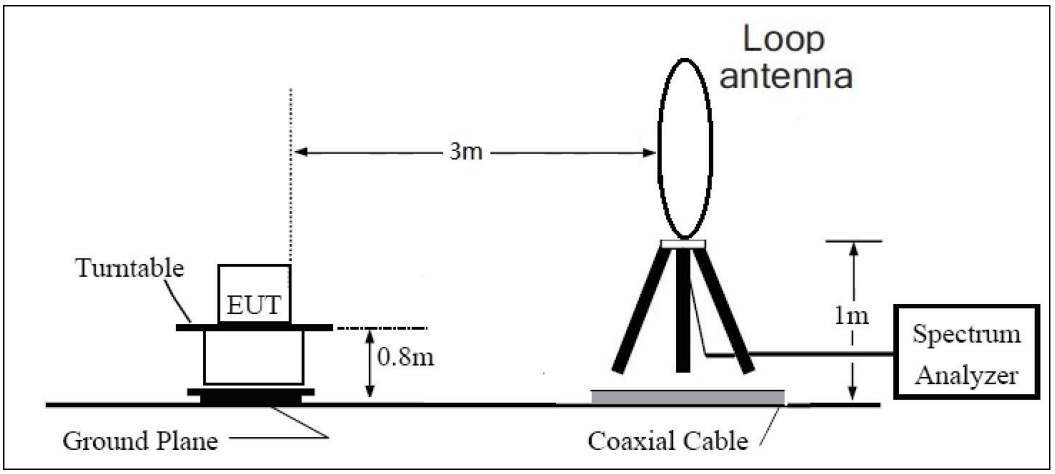
Method of Measurement

1. The testing follows FCC KDB 971168 D01 v03r01 Section 5.8 and ANSI C63.26-2015.
2. Below 1GHz: 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 loop antenna, 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=100kHz, VBW=300kHz for 30MHz to 1GHz and RBW=1MHz, VBW=3MHz for above 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 dB) and known input power. ERP can be calculated from EIRP by subtracting the gain of the dipole, ERP = EIRP-2.15dB.

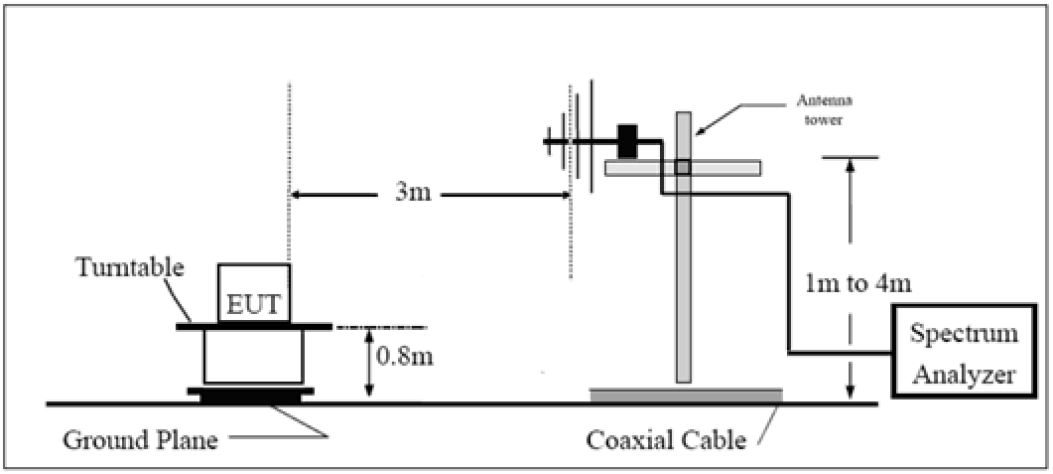
The modulation mode and RB allocation refer to section 5.1, using the maximum output power configuration.

Test setup

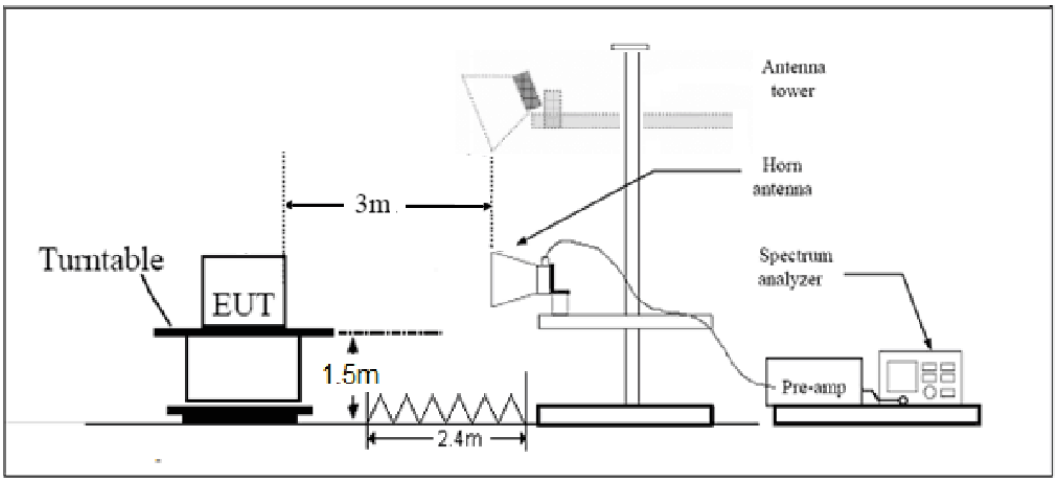
9KHz~ 30MHz



30MHz~ 1GHz



Above 1GHz



Note: Area side:2.4mX3.6m

Limits

Rule Part 27.53(h) specifies that “for operations in the 1695-1710 MHz, 1710-1755 MHz, 1755-1780 MHz, 1915-1920 MHz, 1995-2000 MHz, 2000-2020 MHz, 2110-2155 MHz, 2155-2180 MHz, and 2180-2200 bands, the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) in watts by at least 43 + 10 log10 (P) dB.”
Rule Part 27.53 (g) For operations in the 600 MHz band and the 698-746 MHz band, the power of any emission outside a 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, by at least 43 + 10 log (P) dB. Compliance with this provision is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kilohertz or greater. However, in the 100 kilohertz bands immediately outside and adjacent to a licensee's frequency block, a resolution bandwidth of at least 30 kHz may be employed.
Rule Part 27.53(f)For operations in the 746-758 MHz, 775-788 MHz, and 805-806 MHz bands, emissions in the band 1559-1610 MHz shall be limited to −70 dBW/MHz equivalent isotropically radiated power (EIRP) for wideband signals, and −80 dBW 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.
Part 27.53 (c) For operations in the 746-758 MHz band and the 776-788 MHz band, 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 any frequency outside the 746-758 MHz band, the power of any emission shall be attenuated outside the band below the transmitter power (P) by at least 43 + 10 log (P) dB;
(2) On any frequency outside the 776-788 MHz band, the power of any emission shall be attenuated outside the band below the transmitter power (P) by at least 43 + 10 log (P) dB;
(3) On all frequencies between 763-775 MHz and 793-805 MHz, by a factor not less than 76 + 10 log (P) dB in a 6.25 kHz band segment, for base and fixed stations;
(4) On all frequencies between 763-775 MHz and 793-805 MHz, by a factor not less than 65 + 10 log (P) dB in a 6.25 kHz band segment, for mobile and portable stations;
(5) Compliance with the provisions of paragraphs (c)(1) and (c)(2) of this section is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater. However, in the 100 kHz bands immediately outside and adjacent to the frequency block, a resolution bandwidth of at least 30 kHz may be employed;

Part 27.53 (h)/(g) Limit		-13 dBm
Part 27.53(f) Limit	Limit out of the band 1559-1610 MHz	-13 dBm
	Limit in the band 1559-1610 MHz	-40 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 Results

Refer to the section 6.7 of this report for test data.

6 Test Results

6.1 RF Power Output and Effective Isotropic Radiated Power

Mode	Modulation	Sub-carrier spacing (KHz)	Ntones	Conducted Power (dBm)			EIRP (dBm)		
				19952/ 1710.2	20175/ 1732.5	20398/ 1754.8	19952/ 1710.2	20175/ 1732.5	20398/ 1754.8
Band 4 Standalone	BPSK	3.75	1@0	21.49	21.42	22.00	24.26	24.19	24.77
			1@47	21.44	21.35	21.94	24.21	24.12	24.71
		15	1@0	21.61	21.66	22.09	24.38	24.43	24.86
			1@11	21.57	21.67	22.15	24.34	24.44	24.92
	QPSK	3.75	1@0	21.52	21.34	21.97	24.29	24.11	24.74
			1@47	21.43	21.39	21.98	24.20	24.16	24.75
		15	1@0	21.68	21.75	22.18	24.45	24.52	24.95
			1@11	21.76	21.72	22.22	24.53	24.49	24.99
		15	12@0	19.82	19.81	20.43	22.59	22.58	23.20

Mode	Modulation	Sub-carrier spacing (KHz)	Ntones	Conducted Power (dBm)			ERP (dBm)		
				23012/ 699.2	23095/ 707.5	23178/ 715.8	23012/ 699.2	23095/ 707.5	23178/ 715.8
Band 12 Standalone	BPSK	3.75	1@0	22.27	22.12	22.23	21.47	21.32	21.43
			1@47	22.34	22.18	22.26	21.54	21.38	21.46
		15	1@0	22.38	22.21	22.30	21.58	21.41	21.50
			1@11	22.37	22.19	22.28	21.57	21.39	21.48
	QPSK	3.75	1@0	22.36	22.16	22.30	21.56	21.36	21.50
			1@47	22.33	22.17	22.31	21.53	21.37	21.51
		15	1@0	22.40	22.23	22.33	21.60	21.43	21.53
			1@11	22.42	22.26	22.34	21.62	21.46	21.54
		15	12@0	19.36	19.10	19.24	18.56	18.30	18.44

Mode	Modulation	Sub-carrier spacing (KHz)	Ntones	Conducted Power (dBm)			ERP (dBm)		
				23182/ 777.2	23230/ 782	23278/ 786.8	23182/ 777.2	23230/ 782	23278/ 786.8
Band 13 Standalone	BPSK	3.75	1@0	20.50	22.58	22.67	19.70	21.78	21.87
			1@47	20.51	22.62	22.71	19.71	21.82	21.91
		15	1@0	20.58	22.69	22.73	19.78	21.89	21.93
			1@11	20.57	22.76	22.71	19.77	21.96	21.91
	QPSK	3.75	1@0	20.58	22.61	22.72	19.78	21.81	21.92
			1@47	20.57	22.64	22.73	19.77	21.84	21.93
		15	1@0	20.55	22.78	22.71	19.75	21.98	21.91
			1@11	20.57	22.79	22.75	19.77	21.99	21.95
		15	12@0	17.11	19.81	19.77	16.31	19.01	18.97

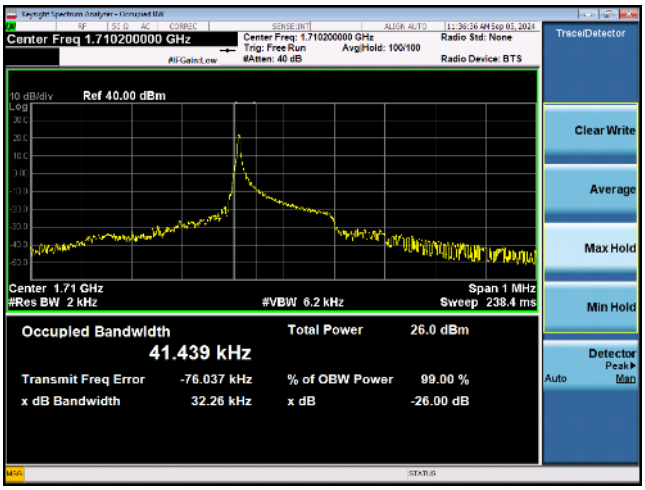
6.2 Occupied Bandwidth

Mode	Modulation	Sub-carrier spacing (KHz)	Ntones	Bandwidth (KHz)					
				19952/1710.2		20175/1732.5		20398/1754.8	
				99% Power	-26dBc	99% Power	-26dBc	99% Power	-26dBc
Band 4 Standalone	BPSK	3.75	1@0	41.44	32.26	40.86	32.33	41.94	32.47
	QPSK	3.75	1@0	48.84	36.20	48.54	33.54	47.26	33.42
	BPSK	15	1@0	95.97	89.88	95.45	88.84	93.97	86.83
	QPSK	15	1@0	92.18	98.94	94.19	99.02	101.55	88.34
	QPSK	15	12@0	182.73	230.10	181.49	205.30	183.08	219.30

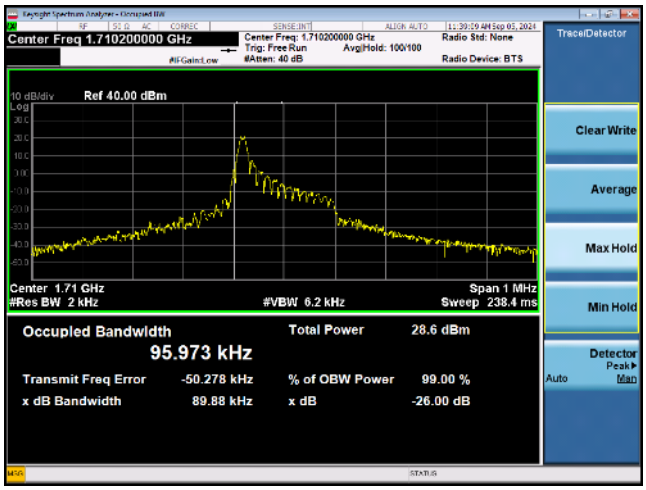
Mode	Modulation	Sub-carrier spacing (KHz)	Ntones	Bandwidth (KHz)					
				23012/699.2		23095/707.5		23178/715.8	
				99% Power	-26dBc	99% Power	-26dBc	99% Power	-26dBc
Band 12 Standalone	BPSK	3.75	1@0	46.33	33.61	46.15	33.32	57.15	33.43
	QPSK	3.75	1@0	57.17	38.68	58.53	41.73	57.15	41.52
	BPSK	15	1@0	99.33	89.59	98.41	89.94	98.39	90.41
	QPSK	15	1@0	108.99	129.90	106.64	102.00	107.72	130.10
	QPSK	15	12@0	181.24	232.00	182.85	213.10	182.30	234.40

Mode	Modulation	Sub-carrier spacing (KHz)	Ntones	Bandwidth (KHz)					
				23182/777.2		23230/782		23278/786.8	
				99% Power	-26dBc	99% Power	-26dBc	99% Power	-26dBc
Band 13 Standalone	BPSK	3.75	1@0	44.50	32.76	46.18	33.38	46.90	33.43
	QPSK	3.75	1@0	54.23	36.84	53.25	37.46	54.91	38.50
	BPSK	15	1@0	100.16	103.50	97.25	90.32	98.82	90.03
	QPSK	15	1@0	108.49	115.30	109.50	116.20	106.59	101.90
	QPSK	15	12@0	182.00	231.30	183.40	227.40	181.13	214.60

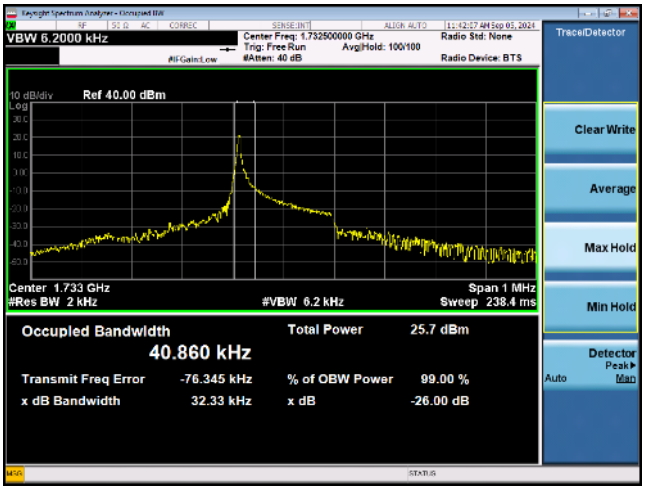
NB-IoT Band 4 BPSK 3.75KHz 1@0 CH-Low



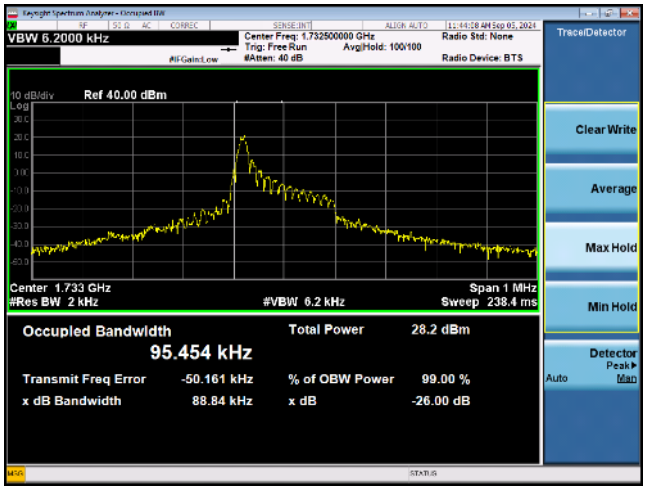
NB-IoT Band 4 BPSK 15KHz 1@0 CH-Low



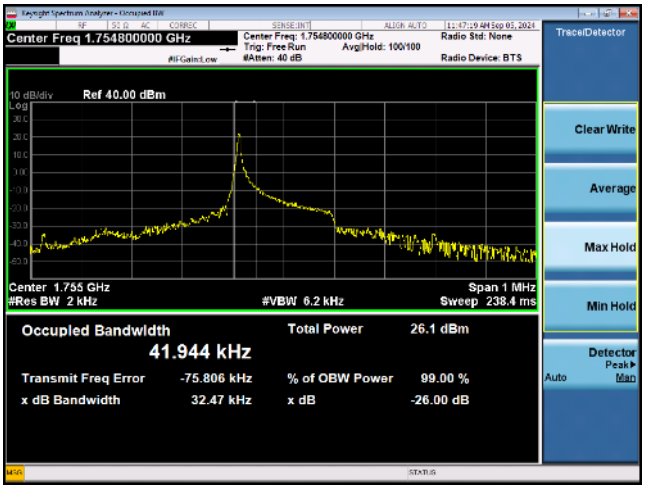
NB-IoT Band 4 BPSK 3.75KHz 1@0 CH-Middle



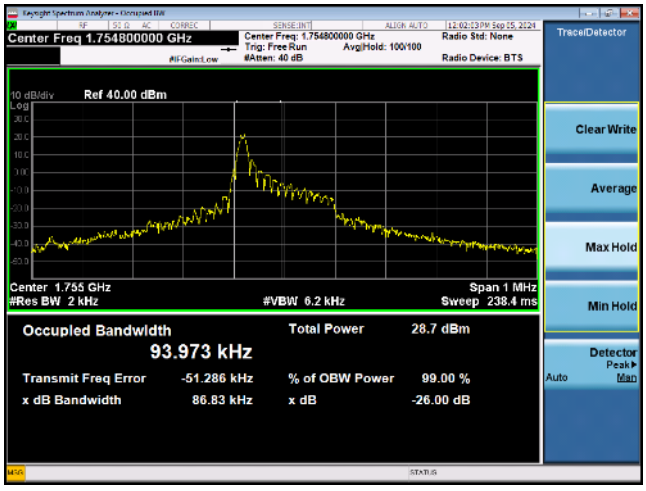
NB-IoT Band 4 BPSK 15KHz 1@0 CH-Middle



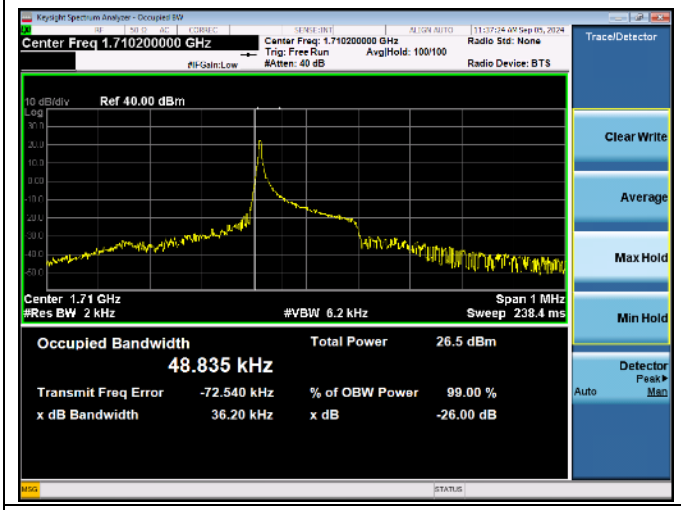
NB-IoT Band 4 BPSK 3.75KHz 1@0 CH-High



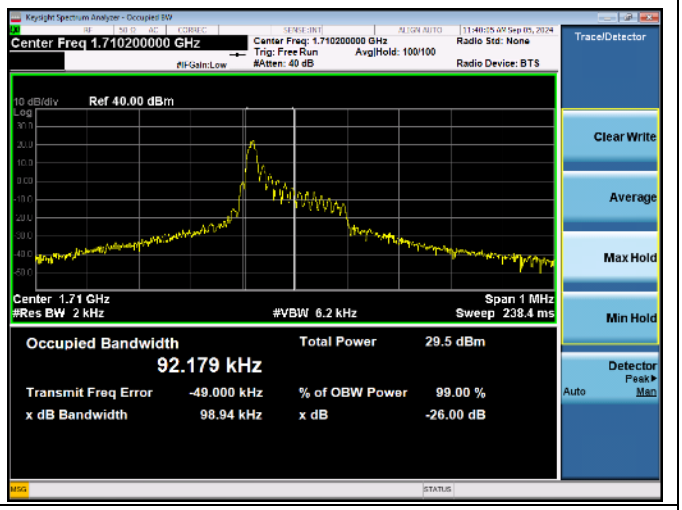
NB-IoT Band 4 BPSK 15KHz 1@0 CH-High



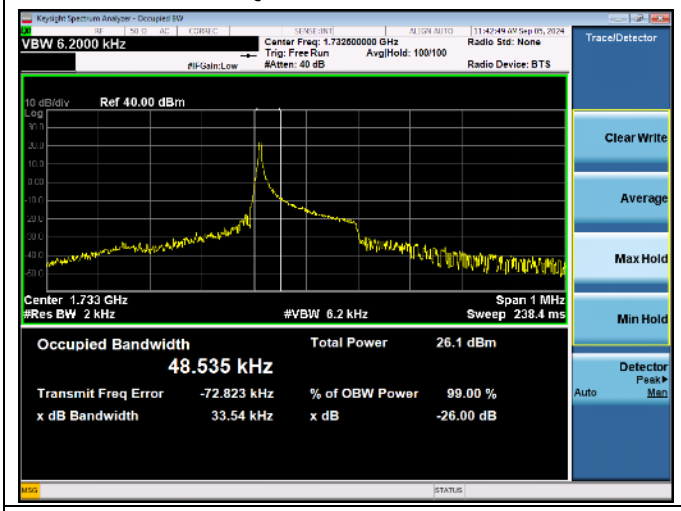
NB-IoT Band 4 QPSK 3.75KHz 1@0 CH-Low



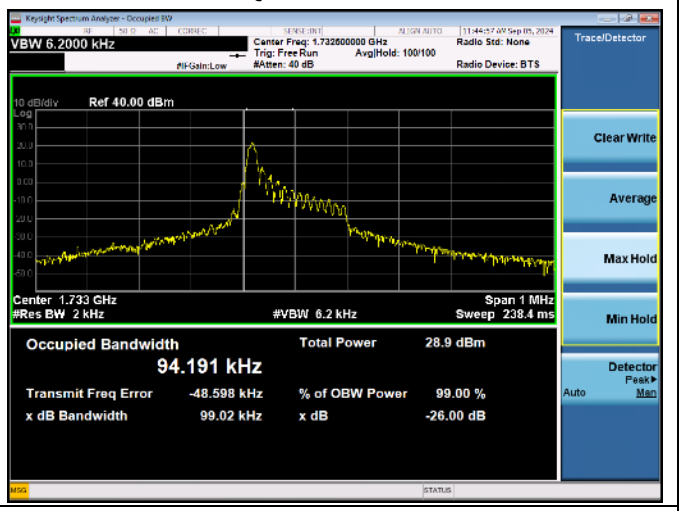
NB-IoT Band 4 QPSK 15KHz 1@0 CH-Low



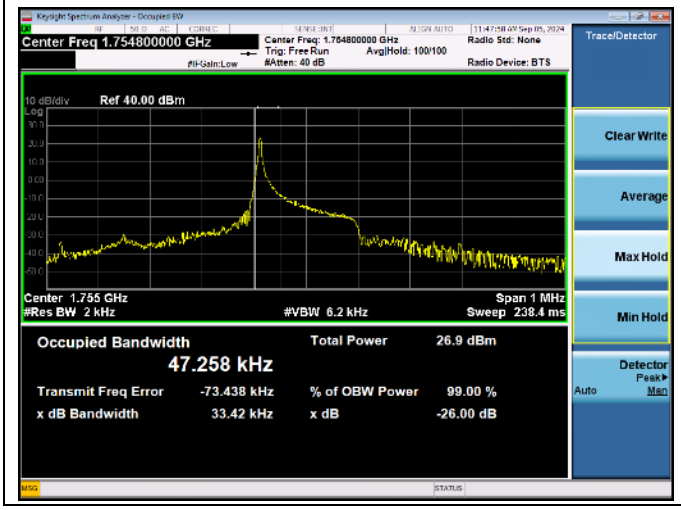
NB-IoT Band 4 QPSK 3.75KHz 1@0 CH-Middle



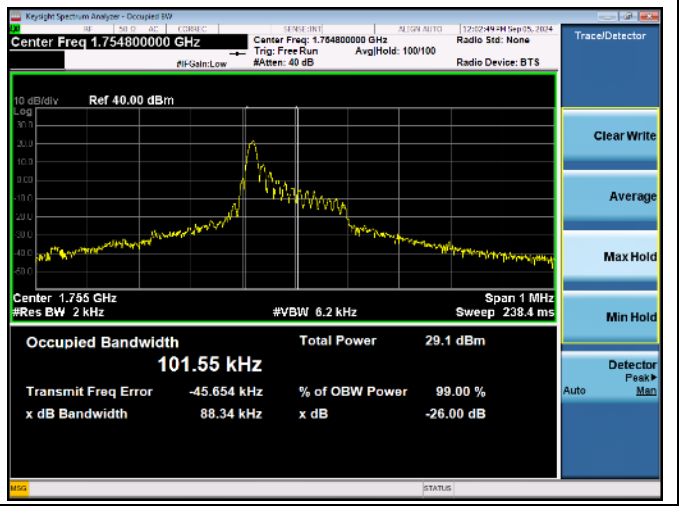
NB-IoT Band 4 QPSK 15KHz 1@0 CH-Middle



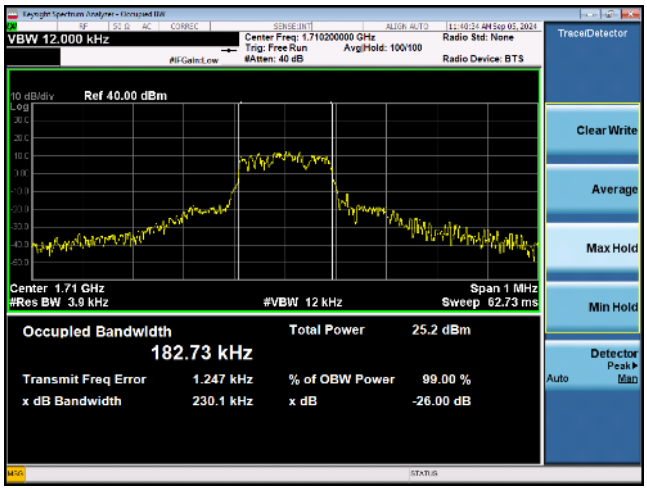
NB-IoT Band 4 QPSK 3.75KHz 1@0 CH-High



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

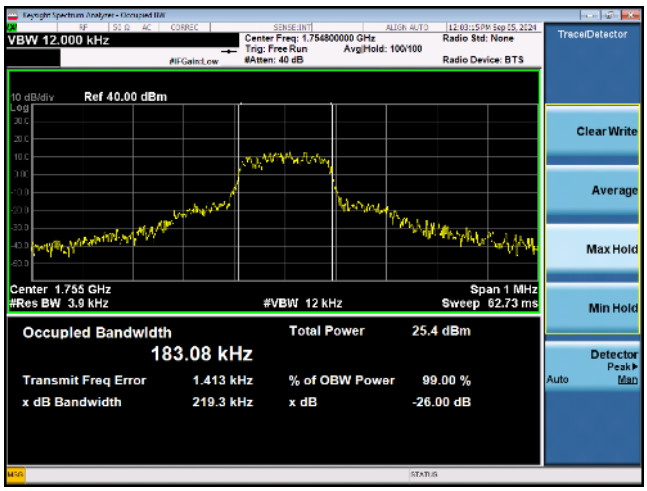


NB-IoT Band 4 QPSK 15KHz 12@0 CH-Low

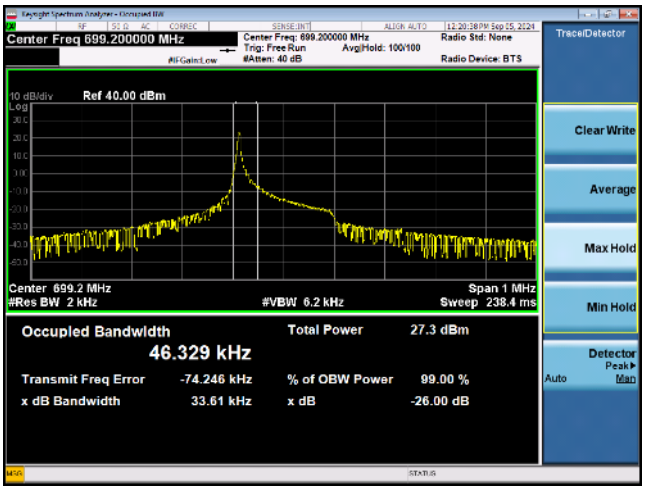


NB-IoT Band 4 QPSK 15KHz 12@0 CH-Middle

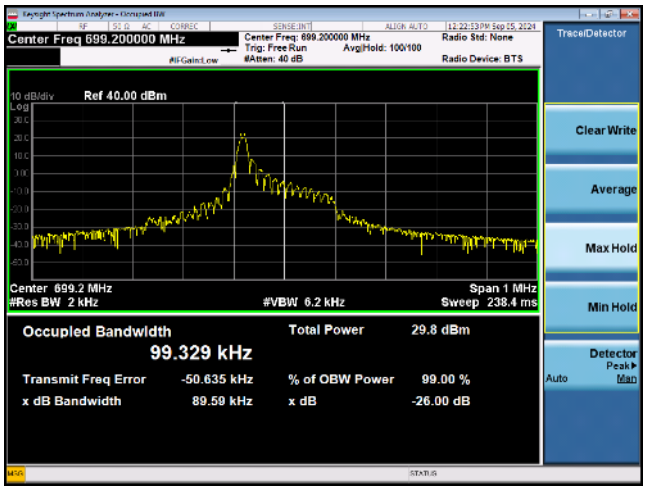
NB-IoT Band 4 QPSK 15KHz 12@0 CH-High



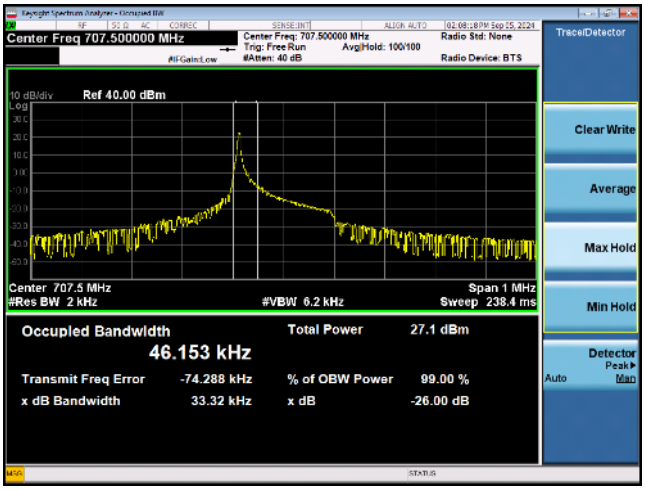
NB-IoT Band 12 BPSK 3.75KHz 1@0 CH-Low



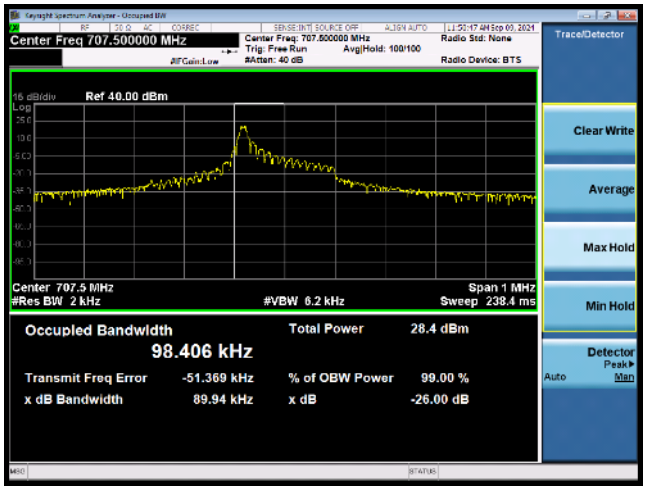
NB-IoT Band 12 BPSK15KHz 1@0 CH-Low



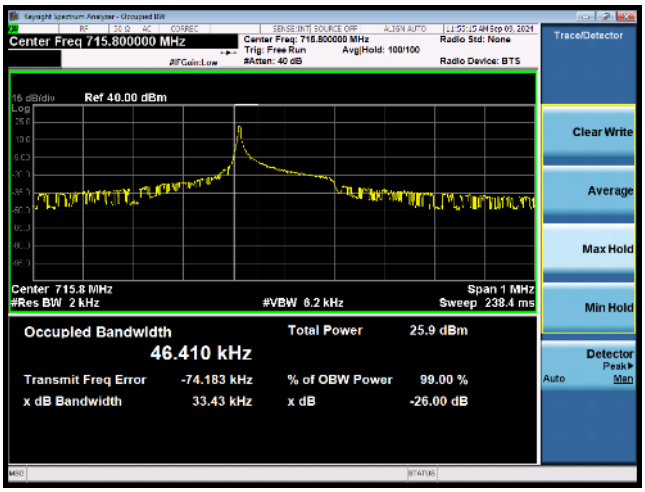
NB-IoT Band 12 BPSK 3.75KHz 1@0 CH-Middle



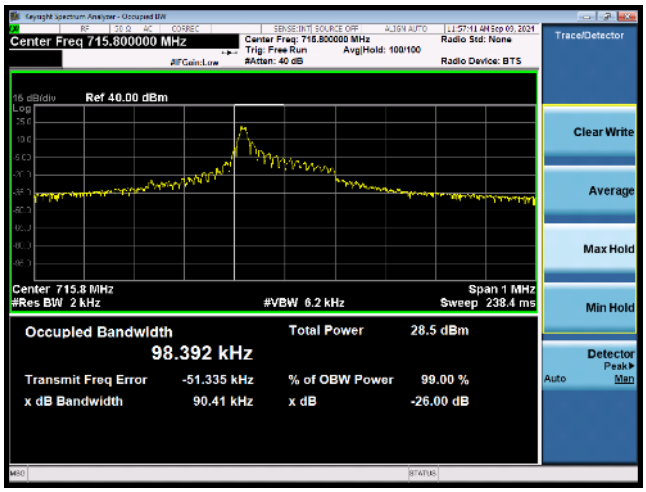
NB-IoT Band 12 BPSK 15KHz 1@0 CH-Middle



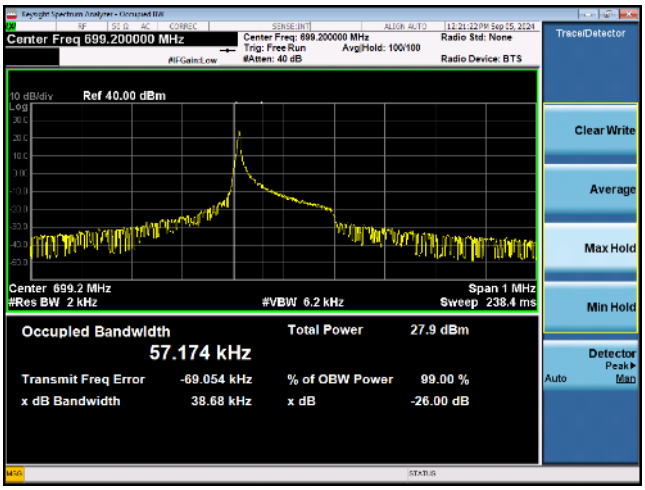
NB-IoT Band 12 BPSK 3.75KHz 1@0 CH-High



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

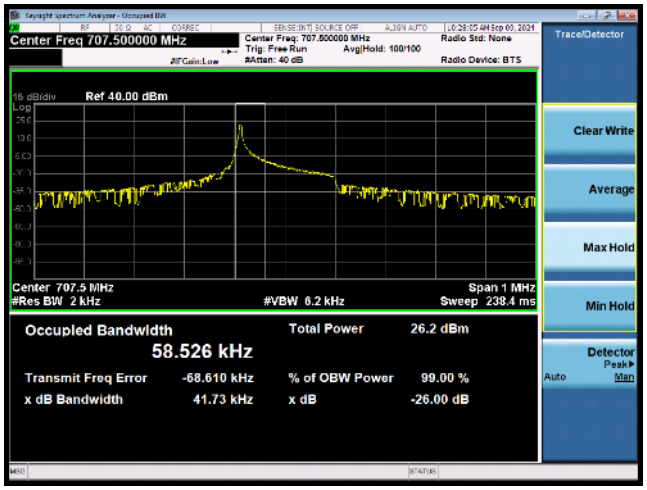


NB-IoT Band 12 QPSK 3.75KHz 1@0 CH-Low

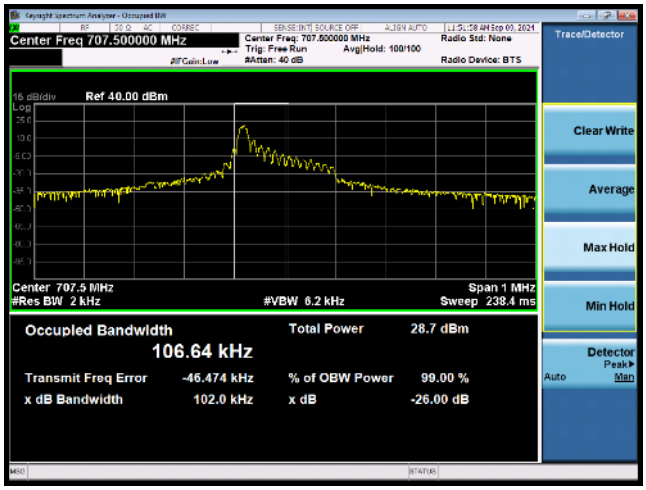


NB-IoT Band 12 QPSK 15KHz 1@0 CH-Low

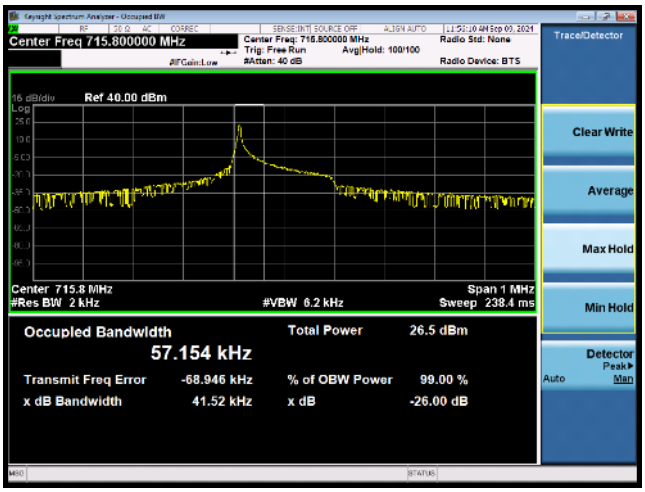
NB-IoT Band 12 QPSK 3.75KHz 1@0 CH-Middle



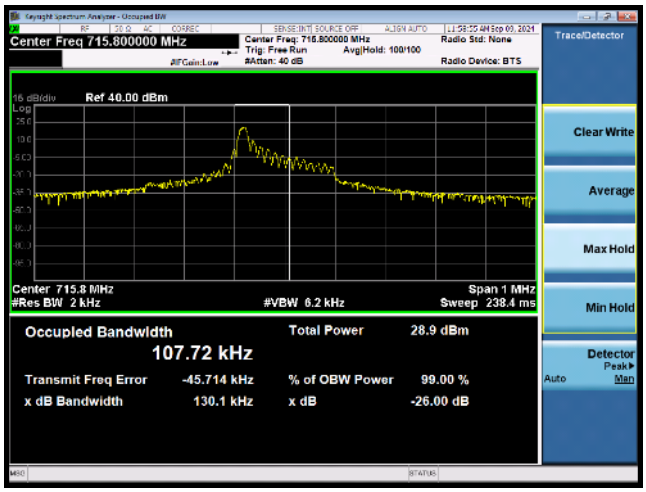
NB-IoT Band 12QPSK 15KHz 1@0 CH-Middle



NB-IoT Band 12 QPSK 3.75KHz 1@0 CH-High

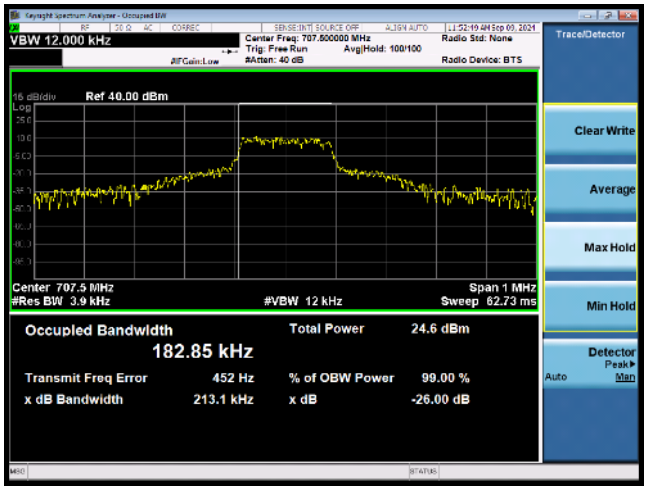


NB-IoT Band 12 QPSK 15KHz 1@0 CH-High

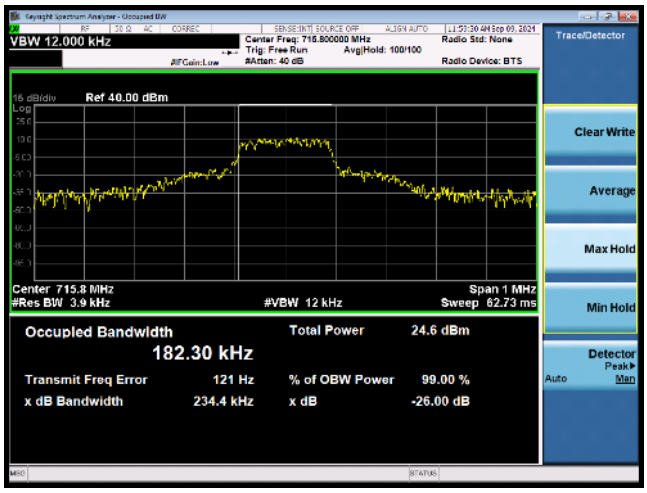


NB-IoT Band 12 QPSK 15KHz 12@0 CH-Low

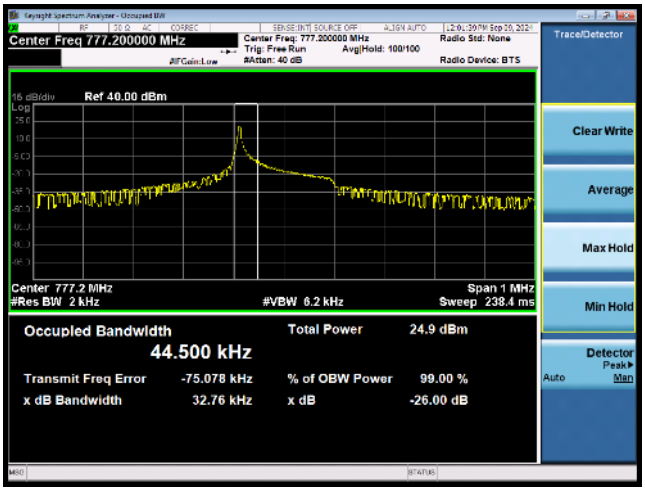
NB-IoT Band 12 QPSK 15KHz 12@0 CH-Middle



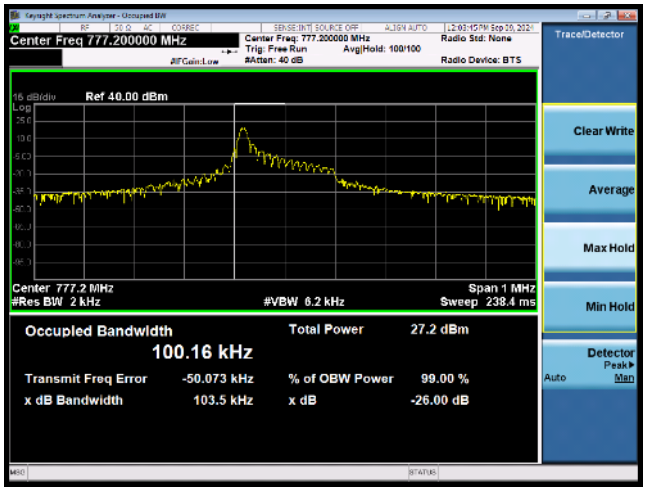
NB-IoT Band 12 QPSK 15KHz 12@0 CH-High



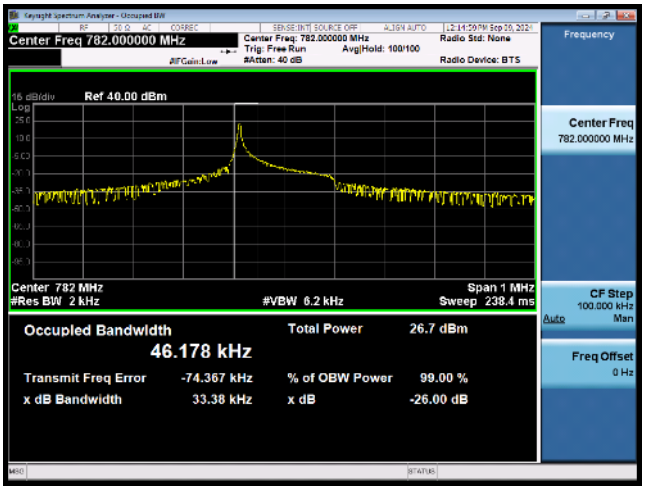
NB-IoT Band 13 BPSK 3.75KHz 1@0 CH-Low



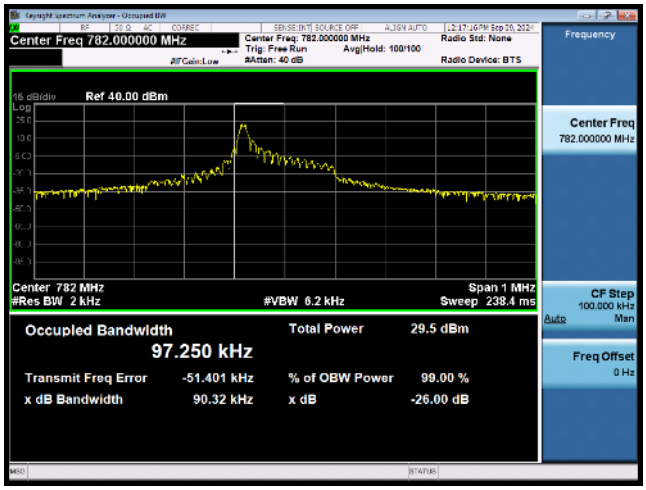
NB-IoT Band 13 BPSK 15KHz 1@0 CH-Low



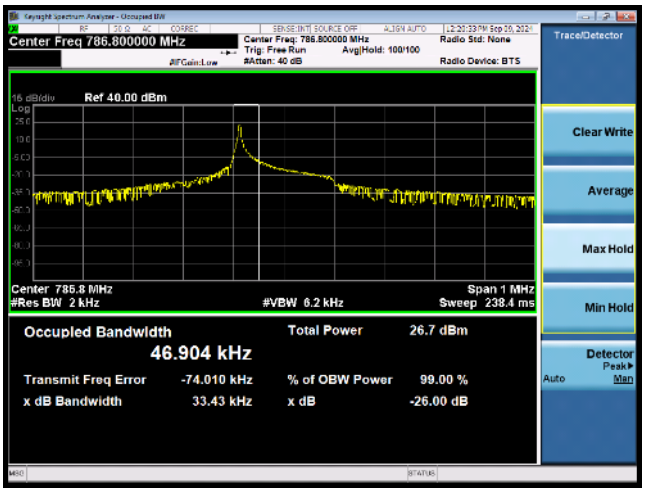
NB-IoT Band 13 BPSK 3.75KHz 1@0 CH-Middle



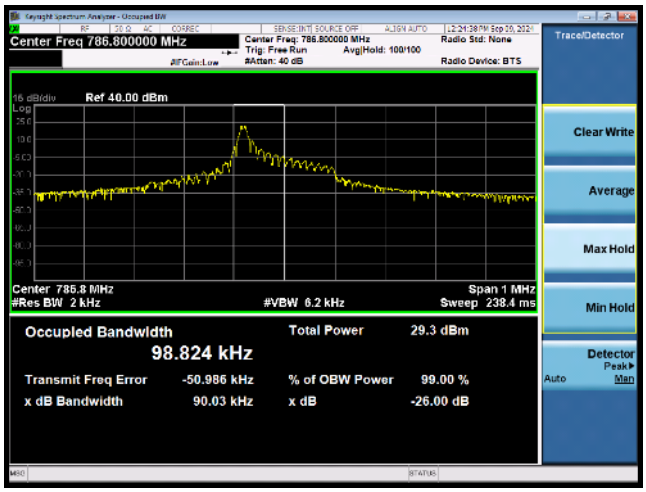
NB-IoT Band 13 BPSK 15KHz 1@0 CH-Middle



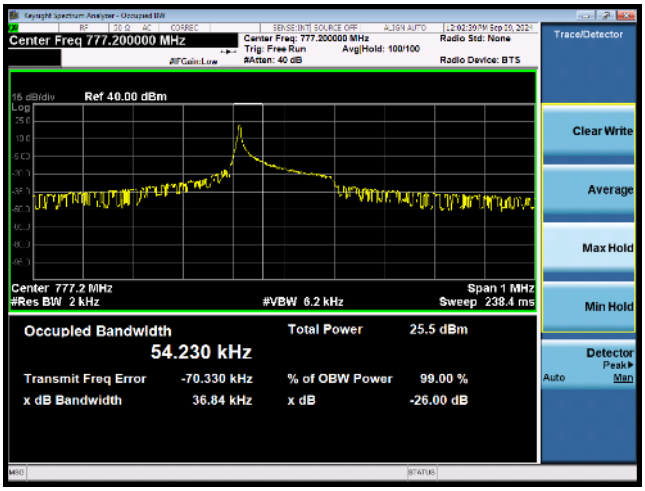
NB-IoT Band 13 BPSK 3.75KHz 1@0 CH-High



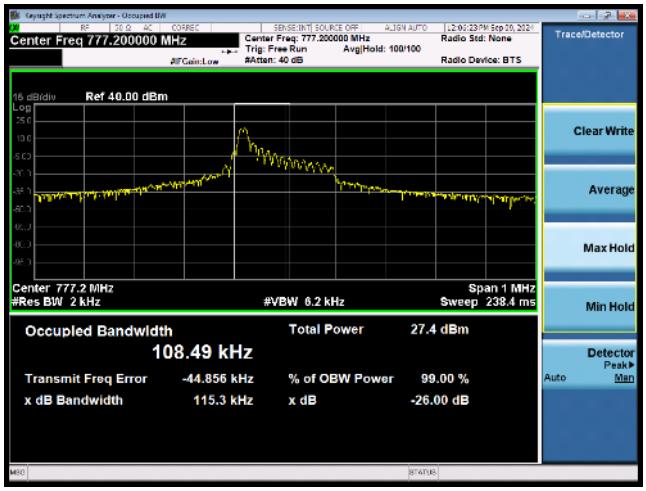
NB-IoT Band 13 BPSK 15KHz 1@0 CH-High



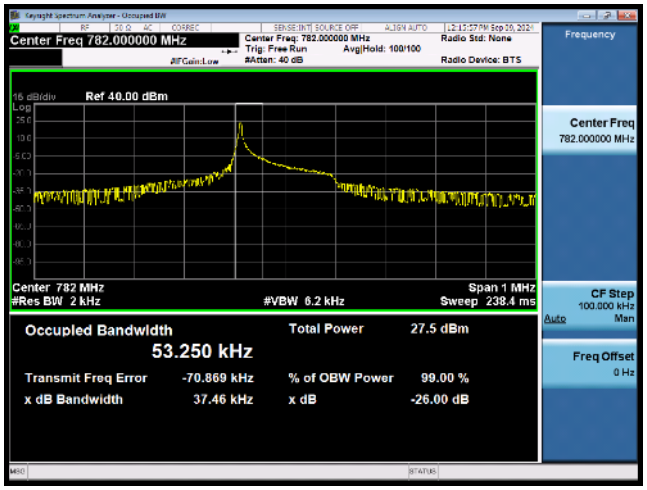
NB-IoT Band 13 QPSK 3.75KHz 1@0 CH-Low



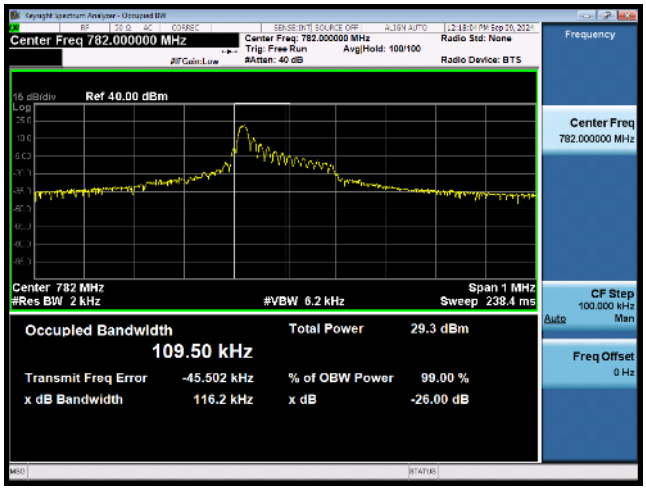
NB-IoT Band 13 QPSK 15KHz 1@0 CH-Low



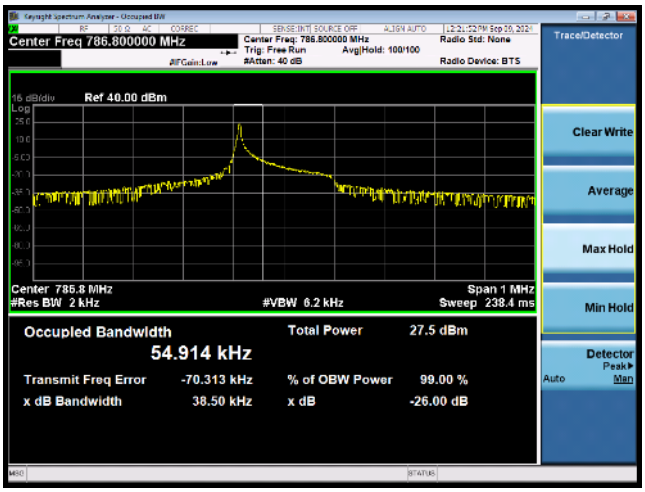
NB-IoT Band 13 QPSK 3.75KHz 1@0 CH-Middle



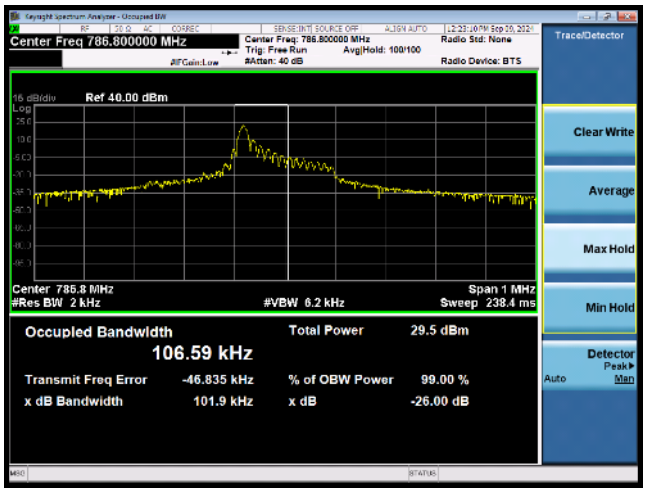
NB-IoT Band 13 QPSK 15KHz 1@0 CH-Middle



NB-IoT Band 13 QPSK 3.75KHz 1@0 CH-High

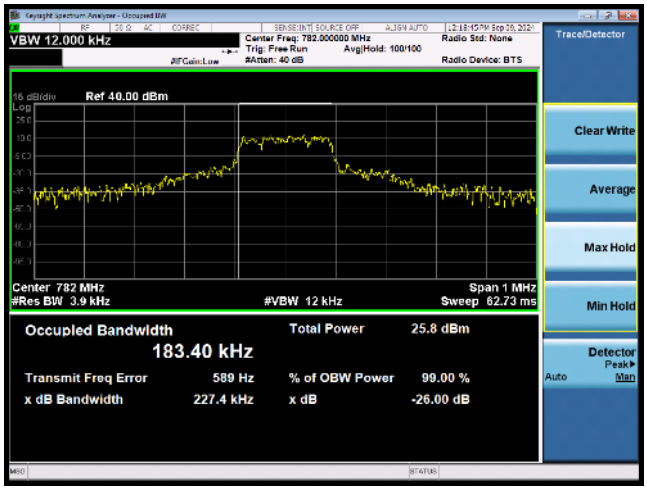


NB-IoT Band 13 QPSK 15KHz 1@0 CH-High



NB-IoT Band 13 QPSK 15KHz 12@0 CH-Low

NB-IoT Band 13 QPSK 15KHz 12@0 CH-Middle



NB-IoT Band 13 QPSK 15KHz 12@0 CH-High

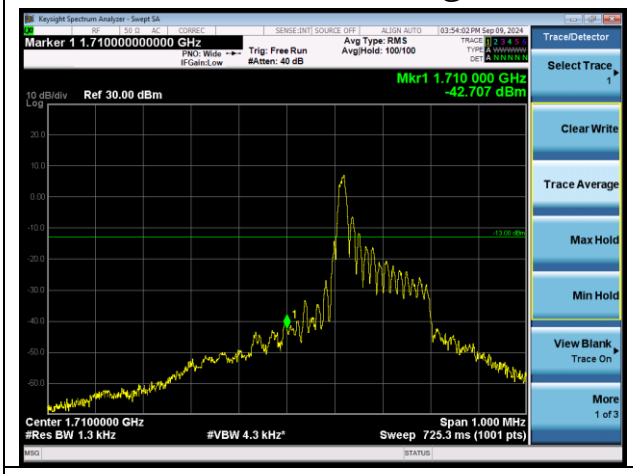
6.3 Band Edge Compliance

All the test traces in the plots shows the test results clearly.

NB-IoT Band 4 BPSK 3.75KHz 1@0 CH-Low

NB-IoT Band 4 BPSK 3.75KHz 1@47 CH-High

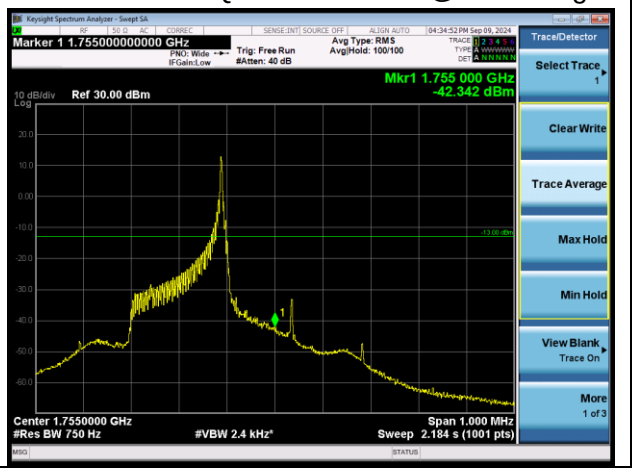
NB-IoT Band 4 BPSK 15KHz 1@0 CH-Low



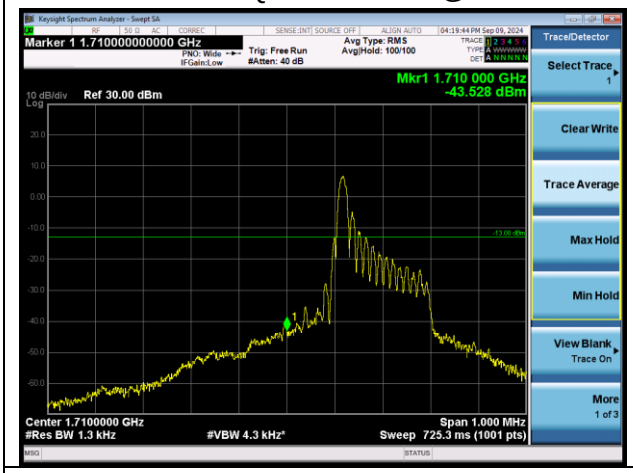
NB-IoT Band 4 BPSK 15KHz 1@11 CH-High

NB-IoT Band 4 QPSK 3.75KHz 1@0 CH-Low

NB-IoT Band 4 QPSK 3.75KHz 1@47 CH-High

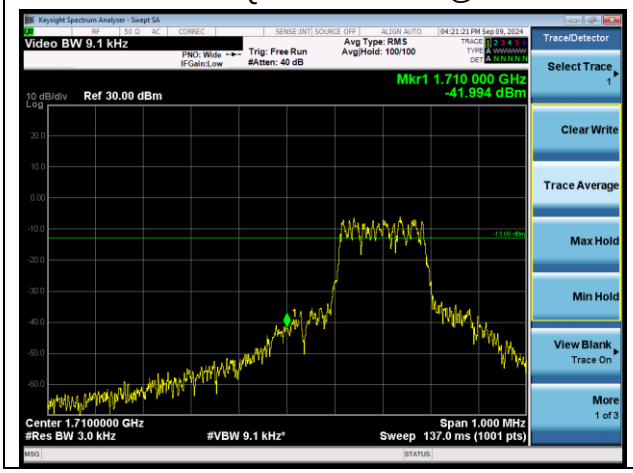


NB-IoT Band 4 QPSK 15KHz 1@0 CH-Low



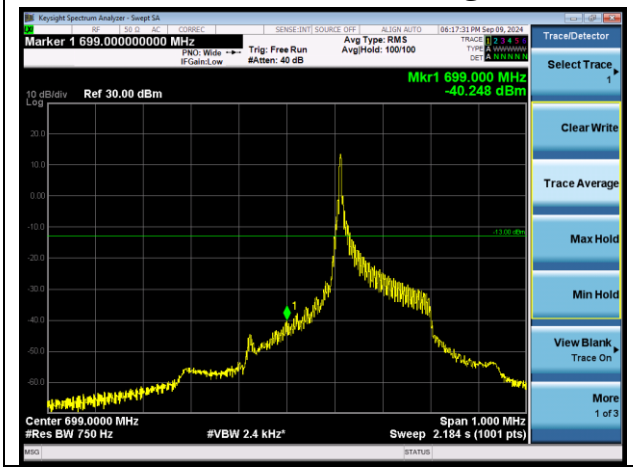
NB-IoT Band 4 QPSK 15KHz 1@11 CH-High

NB-IoT Band 4 QPSK 15KHz 12@0 CH-Low

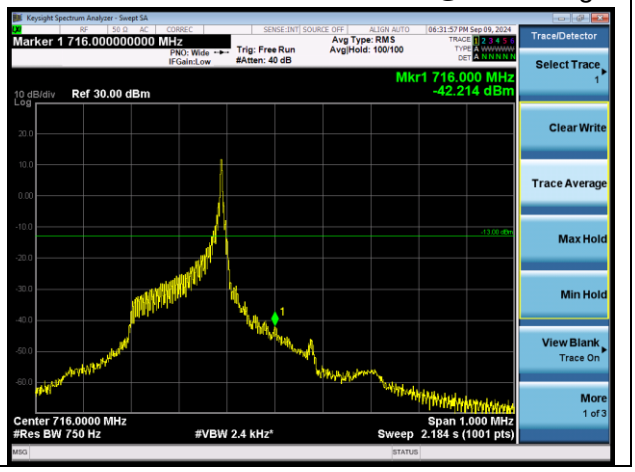


NB-IoT Band 4 QPSK 15KHz 12@0 CH-High

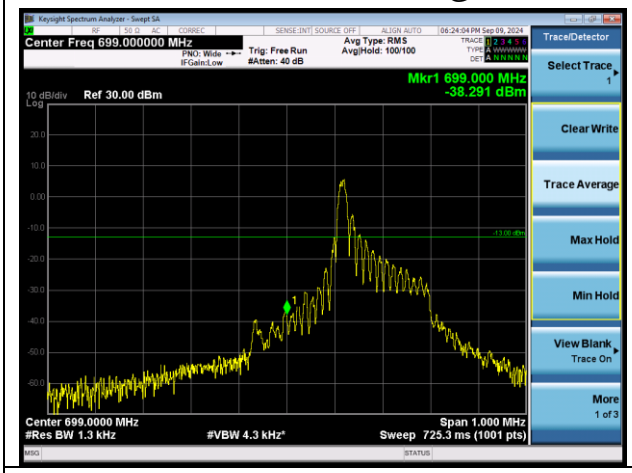
NB-IoT Band 12 BPSK 3.75KHz 1@0 CH-Low



NB-IoT Band 12 BPSK 3.75KHz 1@47 CH-High



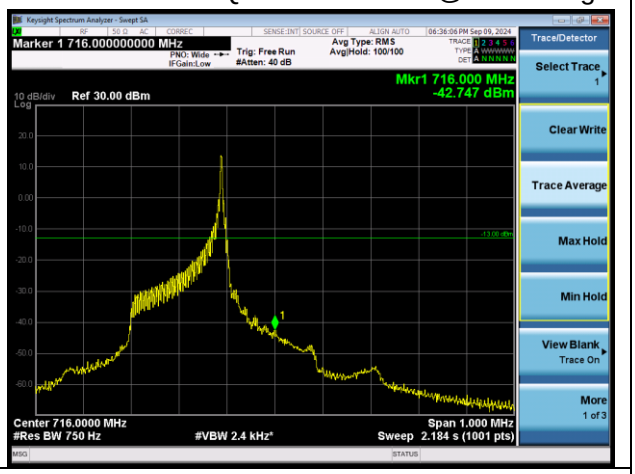
NB-IoT Band 12 BPSK 15KHz 1@0 CH-Low



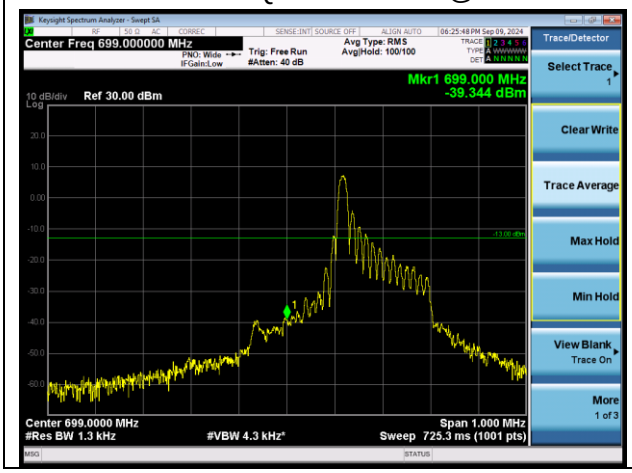
NB-IoT Band 12 BPSK 15KHz 1@11 CH-High

NB-IoT Band 12 QPSK 3.75KHz 1@0 CH-Low

NB-IoT Band 12 QPSK 3.75KHz 1@47 CH-High

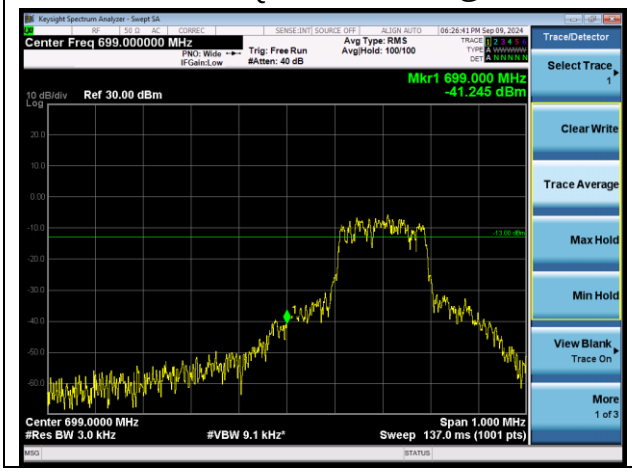


NB-IoT Band 12 QPSK 15KHz 1@0 CH-Low

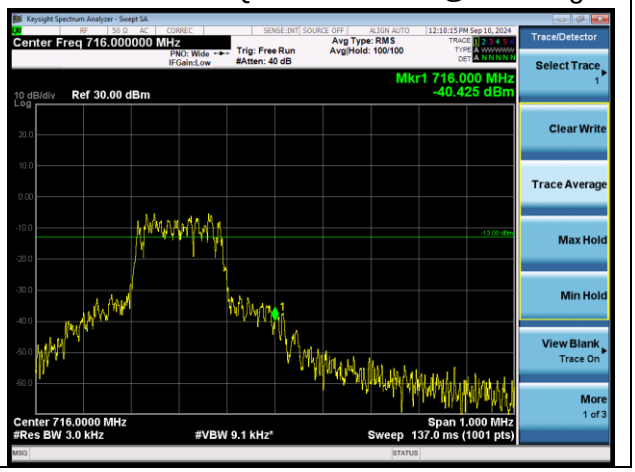


NB-IoT Band 12 QPSK 15KHz 1@11 CH-High

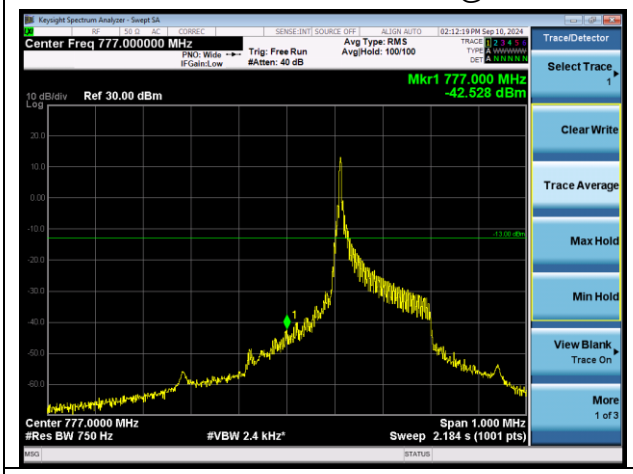
NB-IoT Band 12 QPSK 15KHz 12@0 CH-Low



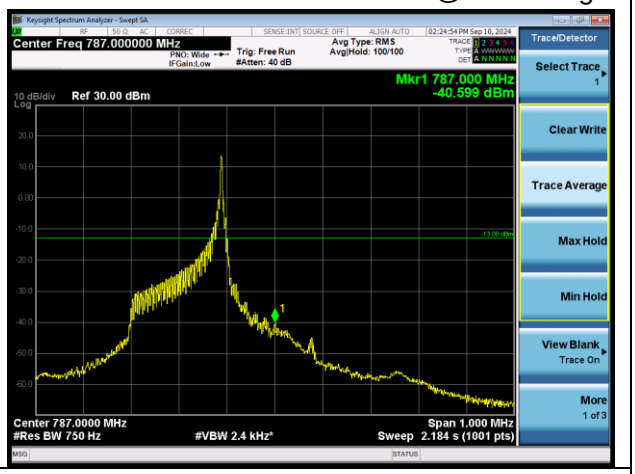
NB-IoT Band 12 QPSK 15KHz 12@0 CH-High



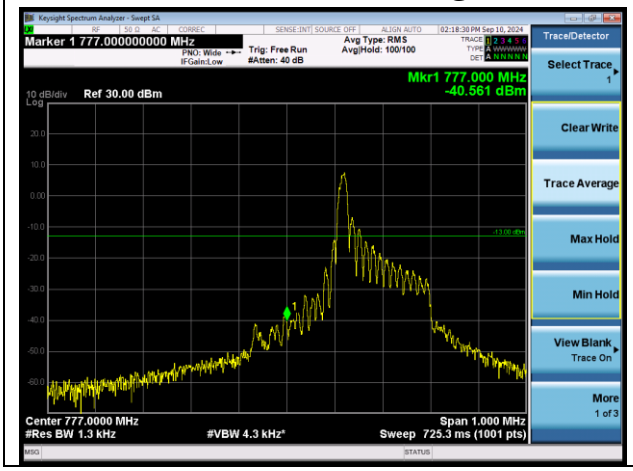
NB-IoT Band 13 BPSK 3.75KHz 1@0 CH-Low



NB-IoT Band 13 BPSK 3.75KHz 1@47 CH-High

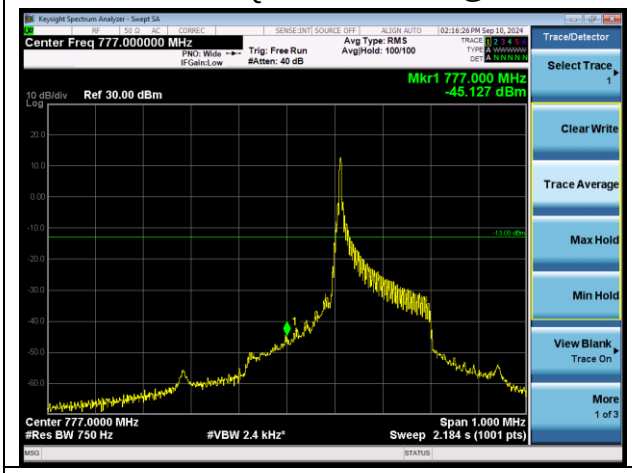


NB-IoT Band 13 BPSK 15KHz 1@0 CH-Low

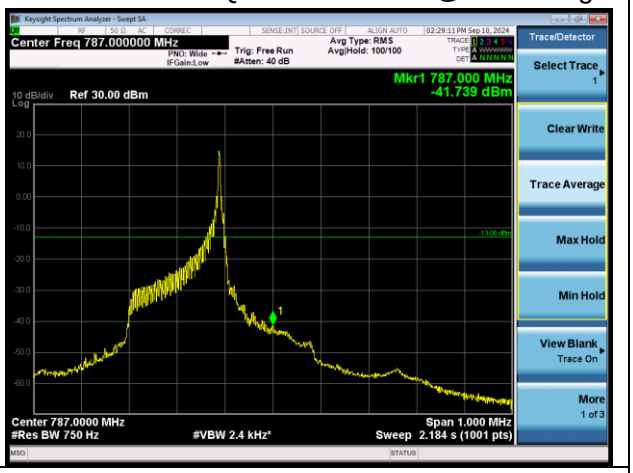


NB-IoT Band 13 BPSK 15KHz 1@11 CH-High

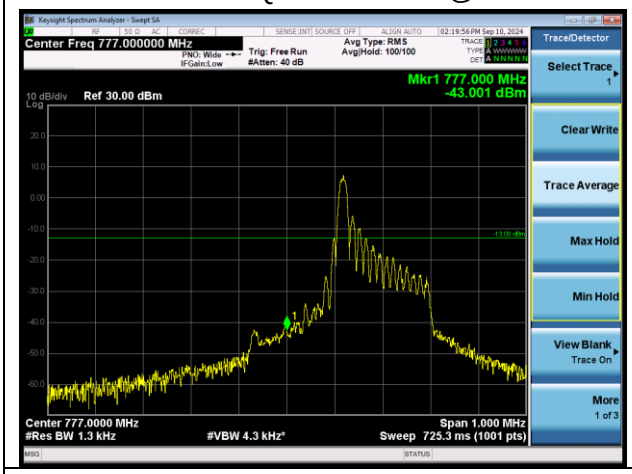
NB-IoT Band 13 QPSK 3.75KHz 1@0 CH-Low



NB-IoT Band 13 QPSK 3.75KHz 1@47 CH-High



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



NB-IoT Band 13 QPSK 15KHz 1@11 CH-High

NB-IoT Band 13 QPSK 15KHz 12@0 CH-Low

NB-IoT Band 13 QPSK 15KHz 12@0 CH-High