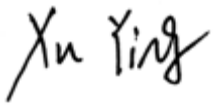
RF TEST REPORT

Applicant	Quectel Wireless Solutions Co., Ltd.
FCC ID	XMR2022BG955AGL
Product	LTE Cat M1/NB1/GPRS/GNSS Module
Brand	Quectel
Model	BG955A-GL
Report No.	R2208A0765-R3V1
Issue Date	November 18, 2022

TA Technology (Shanghai) Co., Ltd. tested the above equipment in accordance with the requirements in **FCC CFR47 Part 2 (2021)/ FCC CFR47 Part 27C (2021)**. 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

TA Technology (Shanghai) Co., Ltd.

Building 3, No.145, Jintang Rd, Tangzhen Industry Park, Pudong Shanghai, China

TEL: +86-021-50791141/2/3

FAX: +86-021-50791141/2/3-8000

TABLE OF CONTENT

This report shall not be reproduced except in full, without the written approval of TA Technology (Shanghai) Co., Ltd.

Version	Revision description	Issue Date
Rev.0	Initial issue of report.	October 21, 2022
Rev.1	Update information.	November 18, 2022
Note: This revised report (Report No. R2208A0765-R3V1) supersedes and replaces the previously issued report (Report No. R2208A0765-R3). Please discard or destroy the previously issued report and dispose of it accordingly.		

This report shall not be reproduced except in full, without the written approval of TA Technology (Shanghai) Co., Ltd.

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 8, 2022 ~ September 29, 2022 and October 21, 2022 Date of Sample Received: September 6, 2022			
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 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.			

This report shall not be reproduced except in full, without the written approval of TA Technology (Shanghai) Co., Ltd.

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 measurements.

A2LA (Certificate Number: 3857.01)

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

1.3 Testing Location

Company:	TA Technology (Shanghai) Co., Ltd.
Address:	Building 3, No.145, Jintang Rd, Tangzhen Industry Park, Pudong Shanghai, 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:	http://www.ta-shanghai.com
E-mail:	xukai@ta-shanghai.com

This report shall not be reproduced except in full, without the written approval of TA Technology (Shanghai) Co., Ltd.

2 General Description of Equipment under Test

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

2.2 General information

EUT Description			
Model	BG955A-GL		
IMEI	868348060003740		
Hardware Version	R1.2		
Software Version	BG955AGLAAR02A01		
Power Supply	External power supply		
Antenna Type	External Antenna		
Antenna Gain	Mode	Frequency (MHz)	Gain (dBi)
	NB-IoT Band 4	1700	1.67
		1720	1.94
		1740	2.00
		1760	1.57
	NB-IoT Band 12/17	700	1.66
		710	3.26
		720	3.95
	NB-IoT Band 13	770	3.98
		780	4.45
		790	3.63
	NB-IoT Band 66	1700	1.67
		1720	1.94
		1740	2.00
		1760	1.57
		1780	0.97
Test Mode(s)	NB-IoT Band 4/12/13/17/66;		
Test Modulation	BPSK, QPSK		
Category	NB 2		
Deployment	Stand-alone ;In-Band; Guard-Band		

This report shall not be reproduced except in full, without the written approval of TA Technology (Shanghai) Co., Ltd.

Sub-carrier spacing	3.75KHz, 15KHz		
Ntones	single-tone, multi-tone		
Maximum E.I.R.P./ E.R.P.	NB-IoT Band 4:	25.30 dBm	
	NB-IoT Band 12:	25.16 dBm	
	NB-IoT Band 13:	25.46 dBm	
	NB-IoT Band 17:	25.21 dBm	
	NB-IoT Band 66:	25.47 dBm	
Rated Power Supply Voltage	DC 3.8V		
Operating Voltage	Minimum: 3.3V Maximum: 4.3V		
Operating Temperature	Lowest: -35°C Highest: +75°C		
Testing Temperature	Lowest: -30°C Highest: +50°C		
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
	NB-IoT Band 17	704~716	734~746
	NB-IoT Band 66	1710 ~ 1780	2110 ~ 2180
Note: 1. The EUT is sent from the applicant to TA and the information of the EUT is declared by the applicant.			

This report shall not be reproduced except in full, without the written approval of TA Technology (Shanghai) Co., Ltd.

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 (2021)

FCC CFR47 Part 2 (2021)

Reference standard:

ANSI C63.26-2015

KDB 971168 D01 Power Meas License Digital Systems v03r01

This report shall not be reproduced except in full, without the written approval of TA Technology (Shanghai) Co., Ltd.

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, vertical 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.
The following testing in different mode is set to detail in the following table:

Test modes are chosen to be reported as the worst case configuration below for NB-IoT Band 4/12/13/17/66:

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
	NB-IoT B17	O	O	O	O	O	O	O	O
	NB-IoT B66	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
	NB-IoT B17	O	O	O	O	O	O	O	O
	NB-IoT B66	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
	NB-IoT B17	O	O	O	O	O	O	-	O
	NB-IoT B66	O	O	O	O	O	O	-	O
Peak-to-Average Power Ratio	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
	NB-IoT B17	O	O	O	O	O	O	O	O
	NB-IoT B66	O	O	O	O	O	O	O	O
Frequency Stability	NB-IoT B4	O	O	O	O	O	-	O	-

This report shall not be reproduced except in full, without the written approval of TA Technology (Shanghai) Co., Ltd.

	NB-IoT B12	O	O	O	O	O	-	O	-
	NB-IoT B13	O	O	O	O	O	-	O	-
	NB-IoT B17	O	O	O	O	O	-	O	-
	NB-IoT B66	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
	NB-IoT B17	O	-	O	-	O	O	O	O
	NB-IoT B66	O	-	O	-	O	O	O	O
Radiates 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
	NB-IoT B17	O	-	O	-	O	-	O	-
	NB-IoT B66	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.

This report shall not be reproduced except in full, without the written approval of TA Technology (Shanghai) Co., Ltd.

5 Test Case

5.1 RF Power Output and Effective Isotropic Radiated Power

Ambient condition

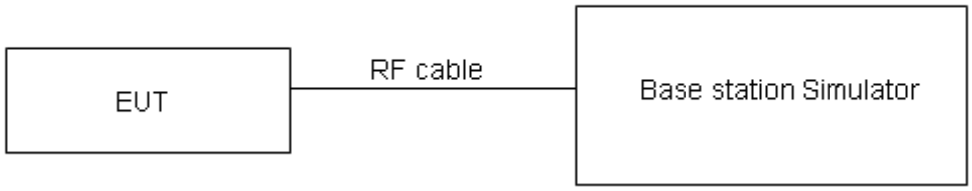
Temperature	Relative humidity	Pressure
23°C ~25°C	45%~50%	101.5kPa

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) + Antenna Gain (dBi)
where:dBd refers to gain relative to an ideal dipole.
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”

This report shall not be reproduced except in full, without the written approval of TA Technology (Shanghai) Co., Ltd.

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.

This report shall not be reproduced except in full, without the written approval of TA Technology (Shanghai) Co., Ltd.

5.2 Occupied Bandwidth

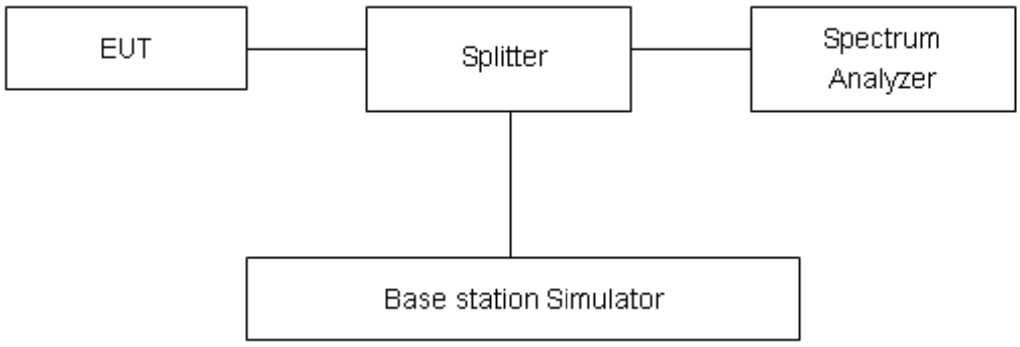
Ambient condition

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 ⩾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.

This report shall not be reproduced except in full, without the written approval of TA Technology (Shanghai) Co., Ltd.

5.3 Band Edge Compliance

Ambient condition

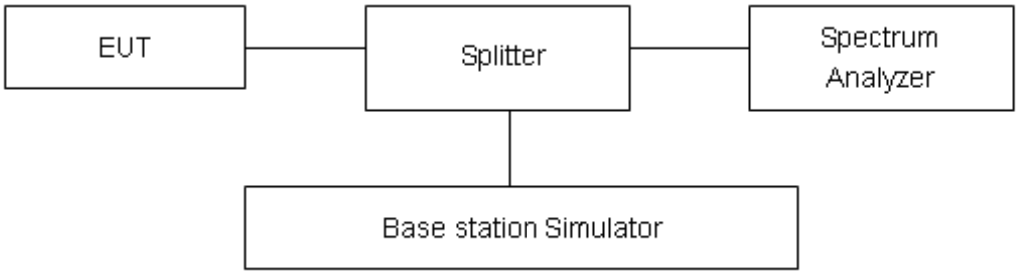
Temperature	Relative humidity	Pressure
23°C ~25°C	45%~50%	101.5kPa

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 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(i) By a factor of not less than 43 + 10 log (P) dB on all frequencies between 2305 and 2320 MHz.
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

This report shall not be reproduced except in full, without the written approval of TA Technology (Shanghai) Co., Ltd.

30 kHz may be employed.

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;

This report shall not be reproduced except in full, without the written approval of TA Technology (Shanghai) Co., Ltd.

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.

This report shall not be reproduced except in full, without the written approval of TA Technology (Shanghai) Co., Ltd.

5.4 Peak-to-Average Power Ratio (PAPR)

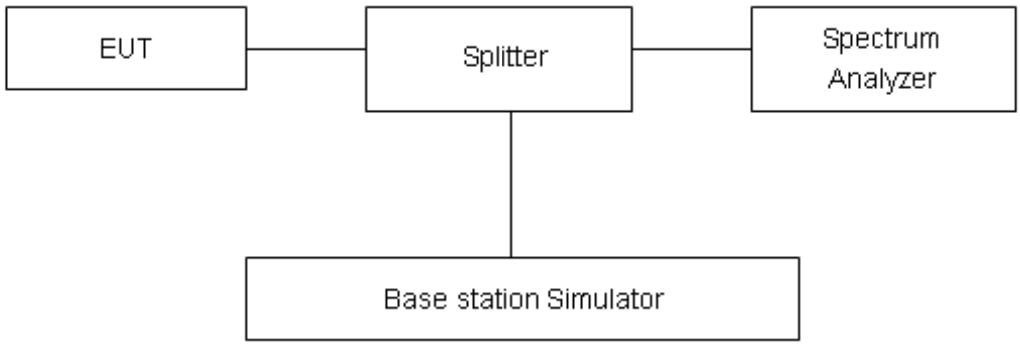
Ambient condition

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

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.

This report shall not be reproduced except in full, without the written approval of TA Technology (Shanghai) Co., Ltd.

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 -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.

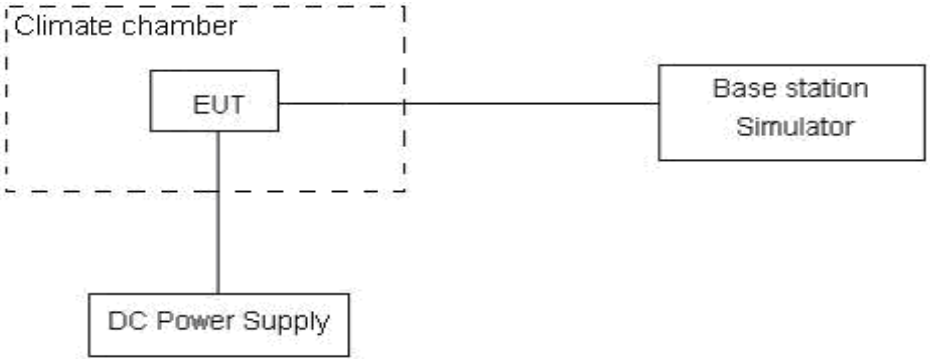
Frequency Stability (Voltage Variation)

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 3.3 V and 4.3 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.

This report shall not be reproduced except in full, without the written approval of TA Technology (Shanghai) Co., Ltd.

5.6 Spurious Emissions at Antenna Terminals

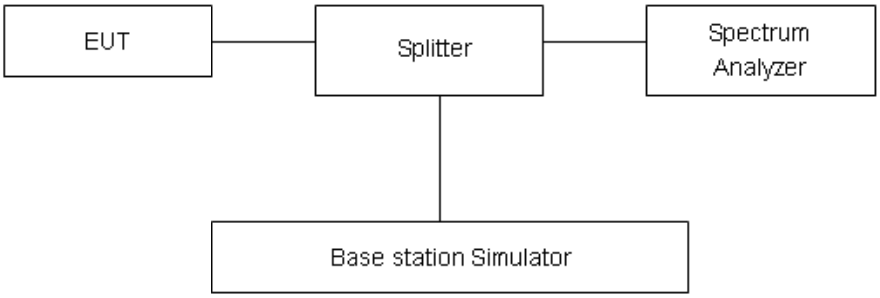
Ambient condition

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 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 ATUO.
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.

This report shall not be reproduced except in full, without the written approval of TA Technology (Shanghai) Co., Ltd.

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
9kHz~20GHz	1.407 dB

Test Results

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

This report shall not be reproduced except in full, without the written approval of TA Technology (Shanghai) Co., Ltd.

5.7 Radiated Spurious Emission

Ambient condition

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

Method of Measurement

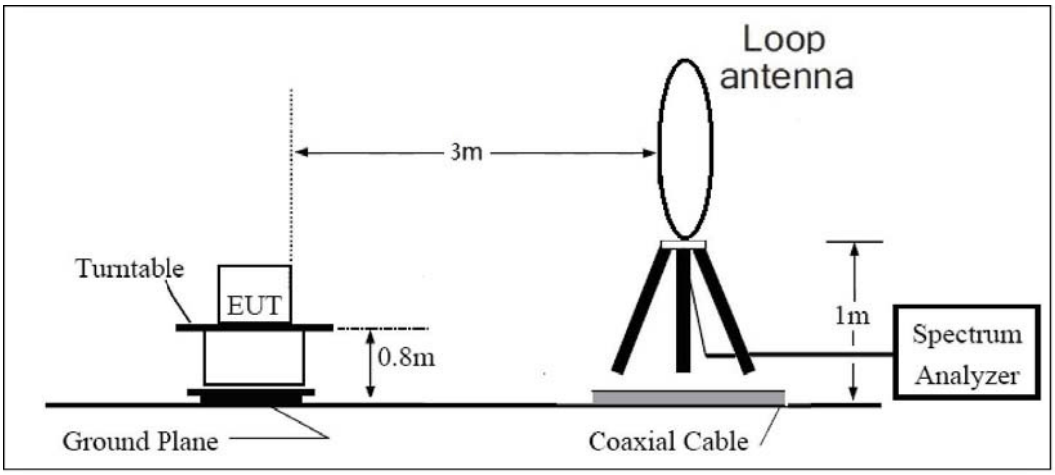
1. The testing follows FCC KDB 971168 D01 v03r01 Section 5.8 and ANSI C63.26-2015.
2. Below 1GHz: The EUT is placed on a turntable 0.8 meters above the ground in the chamber, 3 meter away from the antenna. The maximal emission value is acquired by adjusting the antenna height, polarisation and turntable 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.

This report shall not be reproduced except in full, without the written approval of TA Technology (Shanghai) Co., Ltd.

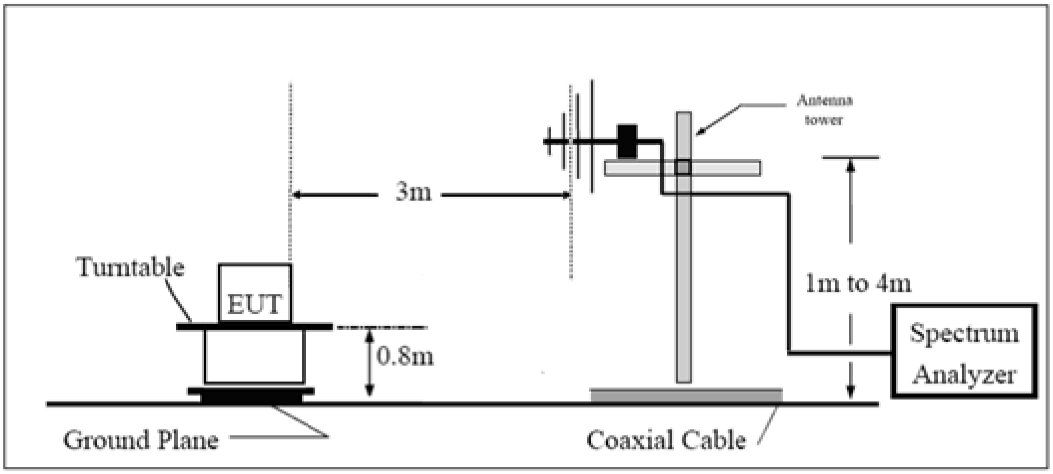
The modulation mode and RB allocation refer to section 5.1, using the maximum output power configuration.

Test setup

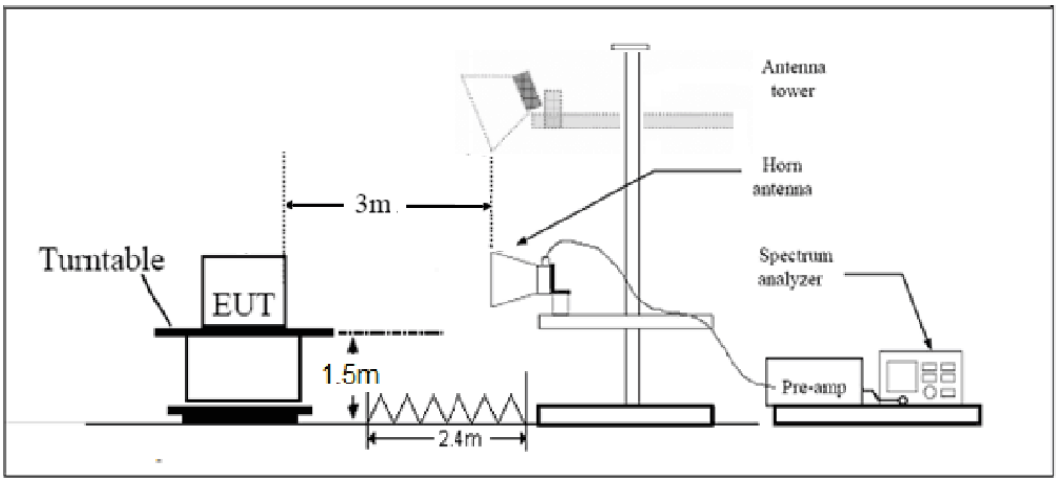
9KHz~ 30MHz



30MHz~ 1GHz



Above 1GHz



Note: Area side:2.4mX3.6m

This report shall not be reproduced except in full, without the written approval of TA Technology (Shanghai) Co., Ltd.

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;

This report shall not be reproduced except in full, without the written approval of TA Technology (Shanghai) Co., Ltd.

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.

This report shall not be reproduced except in full, without the written approval of TA Technology (Shanghai) Co., Ltd.

6 Test Results

6.1 RF Power Output and Effective Isotropic Radiated Power

Mode	Modulation	Sub-carrier spacing (KHz)	Ntones	Conducted Power (dBm) for low/mid/high channel			EIRP (dBm)		
				19952/ 1710.2	20175/ 1732.5	20398/ 1754.8	19952/ 1710.2	20175/ 1732.5	20398/ 1754.8
NB-IoT Band 4	BPSK	3.75	1@0	23.34	23.20	23.12	25.28	25.20	24.69
			1@47	23.31	23.21	23.02	25.25	25.21	24.59
		15	1@0	23.03	23.19	23.28	24.97	25.19	24.85
			1@11	23.05	23.25	23.24	24.99	25.25	24.81
	QPSK	3.75	1@0	23.36	23.23	23.14	25.30	25.23	24.71
			1@47	23.33	23.15	23.07	25.27	25.15	24.64
		15	1@0	23.08	23.05	23.20	25.02	25.05	24.77
			1@11	22.99	23.24	23.29	24.93	25.24	24.86
		15	12@0	20.78	20.95	21.01	22.72	22.95	22.58

Mode	Modulation	Sub-carrier spacing (KHz)	Ntones	Conducted Power (dBm) for low/mid/high channel			ERP (dBm)		
				23012/ 699.2	23095/ 707.5	23178/ 715.8	23012/ 699.2	23095/ 707.5	23178/ 715.8
NB-IoT Band 12	BPSK	3.75	1@0	23.30	23.25	23.23	22.81	24.36	25.03
			1@47	23.25	23.26	23.26	22.76	24.37	25.06
		15	1@0	23.01	23.14	23.36	22.52	24.25	25.16
			1@11	23.03	23.07	23.30	22.54	24.18	25.10
	QPSK	3.75	1@0	23.30	23.25	23.24	22.81	24.36	25.04
			1@47	23.31	23.25	23.26	22.82	24.36	25.06
		15	1@0	23.04	23.06	23.28	22.55	24.17	25.08
			1@11	23.00	23.16	23.19	22.51	24.27	24.99
		15	12@0	20.96	21.04	21.19	20.47	22.15	22.99

This report shall not be reproduced except in full, without the written approval of TA Technology (Shanghai) Co., Ltd.

Mode	Modulation	Sub-carrier spacing (KHz)	Ntones	Conducted Power (dBm) for low/mid/high channel			ERP (dBm)		
				23182/ 777.2	23230/ 782	23278/ 786.8	23182/ 777.2	23230/ 782	23278/ 786.8
NB-IoT Band 13	BPSK	3.75	1@0	23.09	22.97	23.06	25.39	25.27	24.54
			1@47	23.03	22.94	23.07	25.33	25.24	24.55
		15	1@0	23.02	23.01	23.14	25.32	25.31	24.62
			1@11	23.01	23.06	23.12	25.31	25.36	24.60
	QPSK	3.75	1@0	23.04	23.03	23.09	25.34	25.33	24.57
			1@47	23.05	23.01	23.05	25.35	25.31	24.53
		15	1@0	22.96	23.04	23.14	25.26	25.34	24.62
			1@11	23.06	23.16	23.20	25.36	25.46	24.68
		15	12@0	20.95	21.09	21.15	23.25	23.39	22.63

Mode	Modulation	Sub-carrier spacing (KHz)	Ntones	Maximum Output Power (dBm) for low/mid/high channel			ERP (dBm)		
				23732/ 704.2	23790/ 710	23848/ 715.8	23732/704.2	23790/710	23848/715.8
NB-IoT Band 17	BPSK	3.75	1@0	23.99	23.37	23.41	23.50	22.88	25.21
			1@47	23.91	23.35	23.38	23.42	22.86	25.18
		15	1@0	23.06	23.19	23.26	22.57	22.70	25.06
			1@11	23.04	23.17	23.20	22.55	22.68	25.00
	QPSK	3.75	1@0	23.71	23.36	23.34	23.22	22.87	25.14
			1@47	23.89	23.36	23.35	23.40	22.87	25.15
		15	1@0	23.04	23.20	23.27	22.55	22.71	25.07
			1@11	23.07	23.22	23.24	22.58	22.73	25.04
		15	12@0	21.14	21.17	21.25	20.65	20.68	23.05

Mode	Modulation	Sub-carrier spacing (KHz)	Ntones	Conducted Power (dBm) for low/mid/high channel			EIRP (dBm)		
				131974/ 1710.2	132322/ 1745	132670/ 1779.8	131974/ 1710.2	132322/ 1745	132670/ 1779.8
NB-IoT Band 66	BPSK	3.75	1@0	23.45	23.10	23.25	25.39	25.10	24.22
			1@47	23.41	23.08	23.17	25.35	25.08	24.14
		15	1@0	23.08	23.38	23.43	25.02	25.38	24.40
			1@11	23.13	23.32	23.40	25.07	25.32	24.37
	QPSK	3.75	1@0	23.52	23.17	23.24	25.46	25.17	24.21
			1@47	23.44	23.14	23.20	25.38	25.14	24.17
		15	1@0	23.04	23.37	23.43	24.98	25.37	24.40
			1@11	23.17	23.47	23.45	25.11	25.47	24.42
		15	12@0	21.00	21.17	21.22	22.94	23.17	22.19

This report shall not be reproduced except in full, without the written approval of TA Technology (Shanghai) Co., Ltd.

6.2 Occupied Bandwidth

Mode	Modulation	Sub-carrier spacing (KHz)	Ntones	Bandwidth(KHz) for low/mid/high channel					
				19952/1710.2		20175/1732.5		20398/1754.8	
				99% Power	-26dBc	99% Power	-26dBc	99% Power	-26dBc
NB-IoT Band 4	BPSK	3.75	1@0	38.18	37.54	39.30	38.22	37.51	37.20
	QPSK	3.75	1@0	42.25	42.20	42.53	42.33	42.82	40.91
	BPSK	15	1@0	74.07	92.83	80.04	100.40	78.48	93.88
	QPSK	15	1@0	73.46	101.70	72.20	99.32	72.79	89.61
	QPSK	15	12@0	186.55	266.30	185.42	262.80	184.02	265.30

Mode	Modulation	Sub-carrier spacing (KHz)	Ntones	Bandwidth(KHz) for low/mid/high channel					
				23012/699.2		23095/707.5		23178/715.8	
				99% Power	-26dBc	99% Power	-26dBc	99% Power	-26dBc
NB-IoT Band 12	BPSK	3.75	1@0	37.52	37.89	37.98	37.26	37.37	37.81
	QPSK	3.75	1@0	40.99	41.30	40.87	41.65	41.58	41.93
	BPSK	15	1@0	73.79	92.98	73.90	99.35	73.72	90.98
	QPSK	15	1@0	75.60	104.30	72.51	100.30	72.50	91.01
	QPSK	15	12@0	187.61	265.90	185.49	263.40	183.83	254.70

Mode	Modulation	Sub-carrier spacing (KHz)	Ntones	Bandwidth(KHz) for low/mid/high channel					
				23182/777.2		23230/782		23278/786.8	
				99% Power	-26dBc	99% Power	-26dBc	99% Power	-26dBc
NB-IoT Band 13	BPSK	3.75	1@0	37.48	38.13	38.12	37.90	36.98	37.22
	QPSK	3.75	1@0	41.25	41.27	40.71	40.91	41.12	42.06
	BPSK	15	1@0	74.33	92.89	75.13	92.52	71.45	90.37
	QPSK	15	1@0	74.34	91.33	73.01	90.06	75.03	102.40
	QPSK	15	12@0	183.18	265.10	190.95	263.30	185.36	251.20

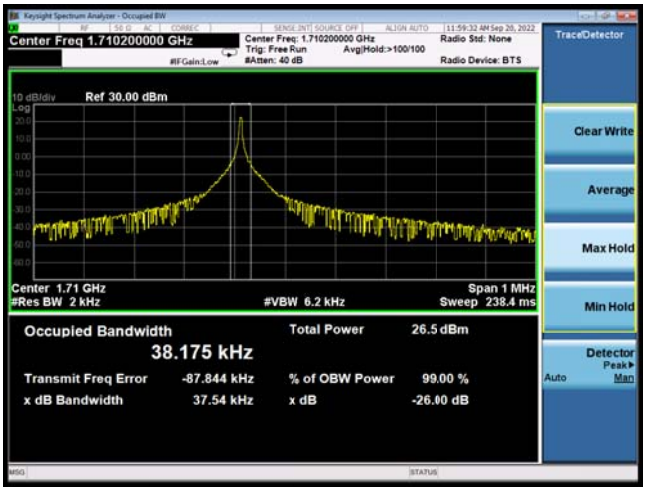
This report shall not be reproduced except in full, without the written approval of TA Technology (Shanghai) Co., Ltd.

Mode	Modulation	Sub-carrier spacing (KHz)	Ntones	Bandwidth(KHz) for low/mid/high channel					
				23732/704.2		23790/710		23848/715.8	
				99% Power	-26dBc	99% Power	-26dBc	99% Power	-26dBc
NB-IoT Band 17	BPSK	3.75	1@0	36.89	37.68	37.06	37.20	38.31	38.18
	QPSK	3.75	1@0	41.22	41.36	40.89	40.74	41.26	41.59
	BPSK	15	1@0	75.61	99.34	72.45	89.27	72.81	88.09
	QPSK	15	1@0	72.07	103.40	72.75	101.60	72.66	90.80
	QPSK	15	12@0	186.28	254.30	185.33	266.00	185.33	254.70

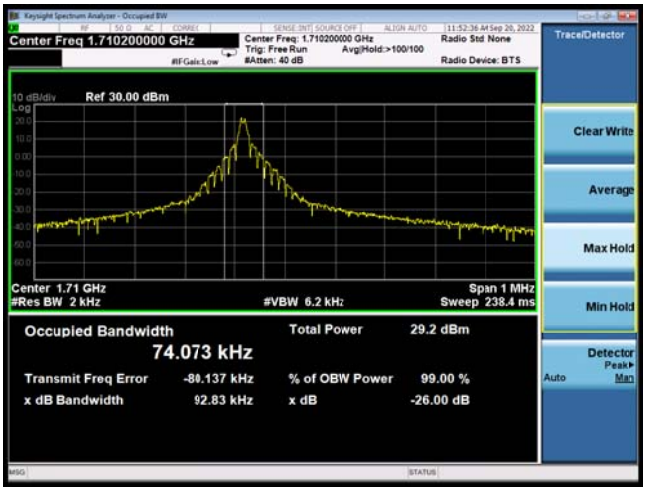
Mode	Modulation	Sub-carrier spacing (KHz)	Ntones	Bandwidth(KHz) for low/mid/high channel					
				131974/1710.2		132322/1745		132670/1779.8	
				99% Power	-26dBc	99% Power	-26dBc	99% Power	-26dBc
NB-IoT Band 66	BPSK	3.75	1@0	38.29	37.28	38.28	38.05	38.89	38.13
	QPSK	3.75	1@0	42.41	41.53	42.61	41.72	42.09	41.69
	BPSK	15	1@0	72.45	90.13	72.29	90.45	78.60	99.81
	QPSK	15	1@0	72.84	102.20	77.02	101.50	76.24	91.05
	QPSK	15	12@0	185.65	263.20	187.27	254.60	184.12	242.20

This report shall not be reproduced except in full, without the written approval of TA Technology (Shanghai) Co., Ltd.

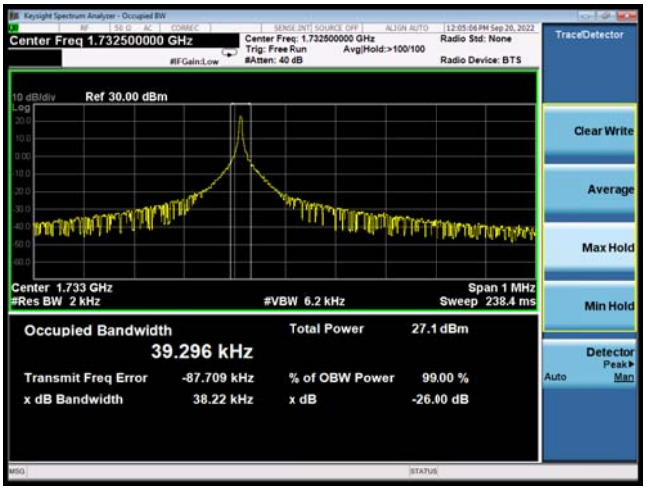
NB-IoT Band 4 BPSK 3.75KHz 1@0 CH-Low



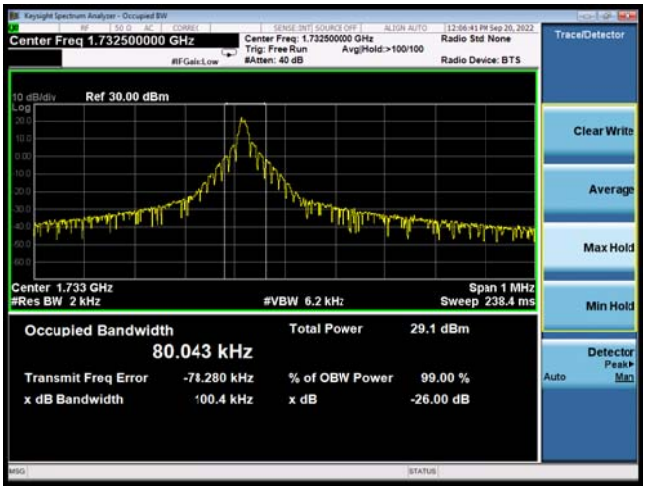
NB-IoT Band 4 BPSK 15KHz 1@0 CH-Low



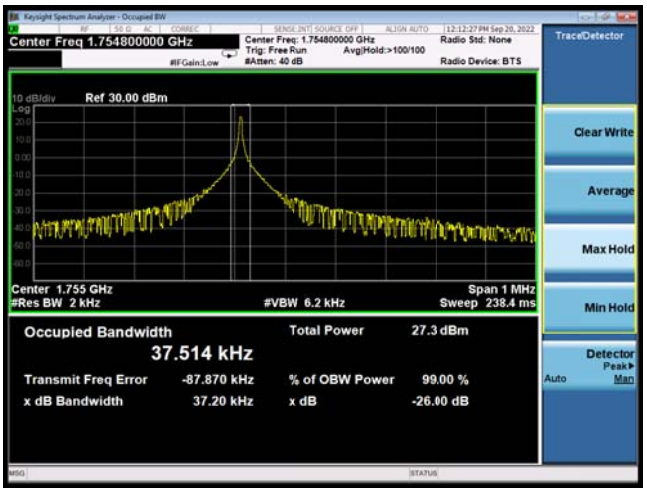
NB-IoT Band 4 BPSK 3.75KHz 1@0 CH-Middle



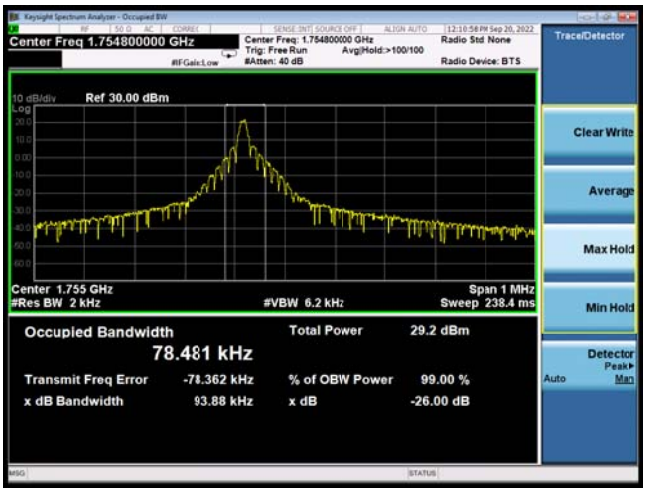
NB-IoT Band 4 BPSK 15KHz 1@0 CH-Middle



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

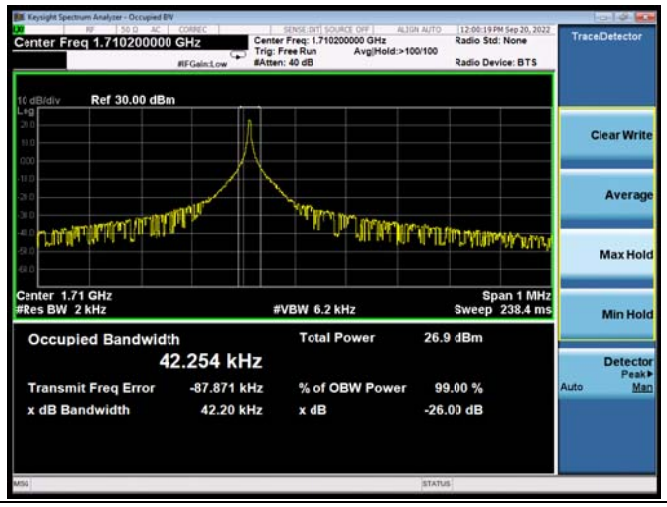


NB-IoT Band 4 BPSK 15KHz 1@0 CH-High

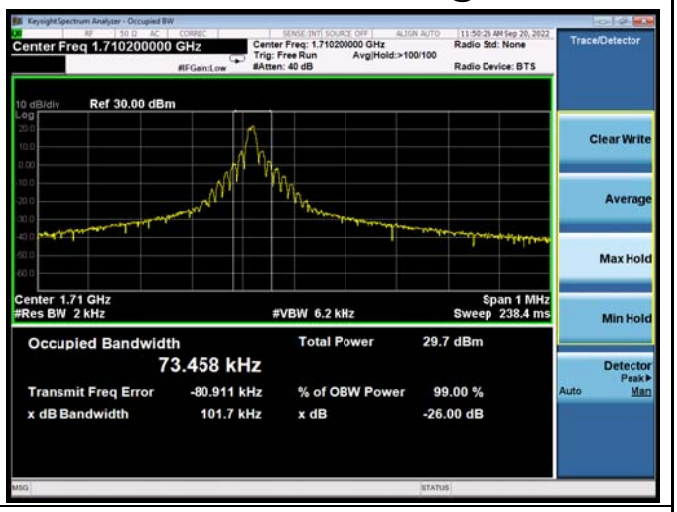


This report shall not be reproduced except in full, without the written approval of TA Technology (Shanghai) Co., Ltd.

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

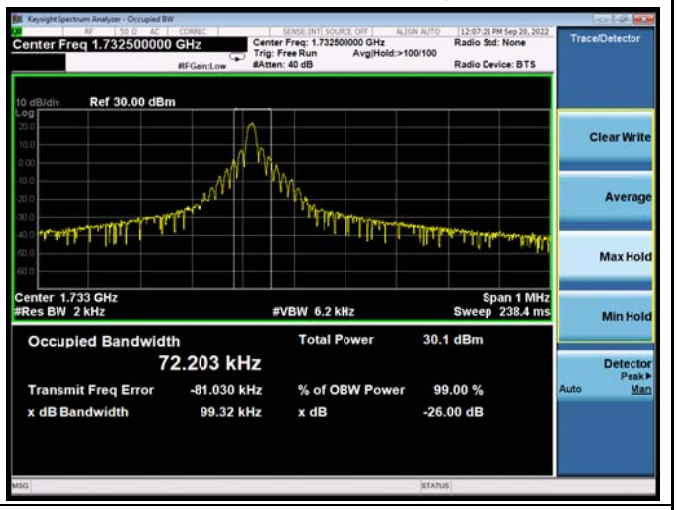


NB-IoT Band 4 QPSK 15KHz 1@0 CH-Low



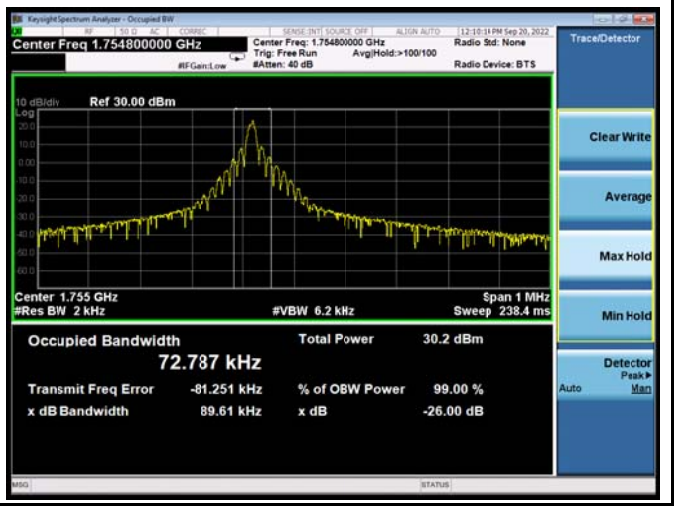
NB-IoT Band 4 QPSK 3.75KHz 1@0 CH-Middle

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

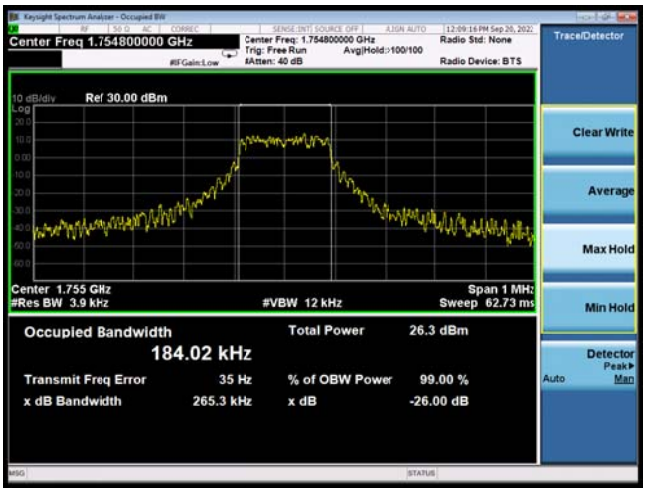


This report shall not be reproduced except in full, without the written approval of TA Technology (Shanghai) Co., Ltd.

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

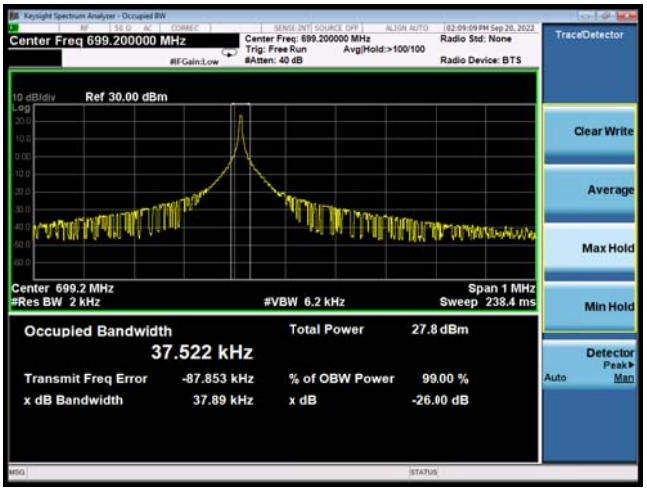
NB-IoT Band 4 QPSK 15KHz 12@0 CH-Middle

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

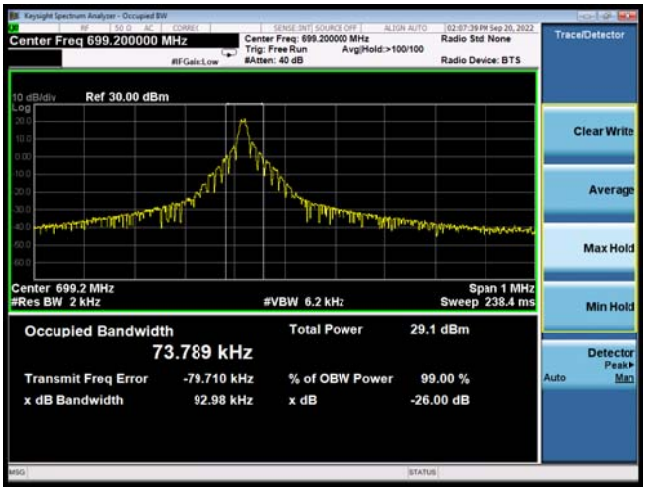


This report shall not be reproduced except in full, without the written approval of TA Technology (Shanghai) Co., Ltd.

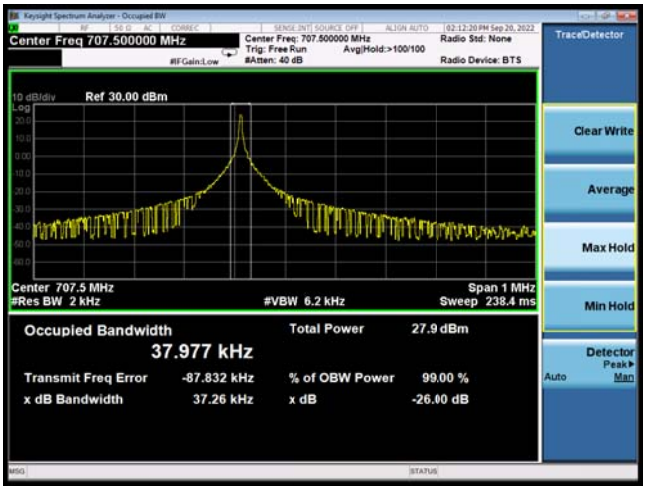
NB-IoT Band 12 BPSK 3.75KHz 1@0 CH-Low



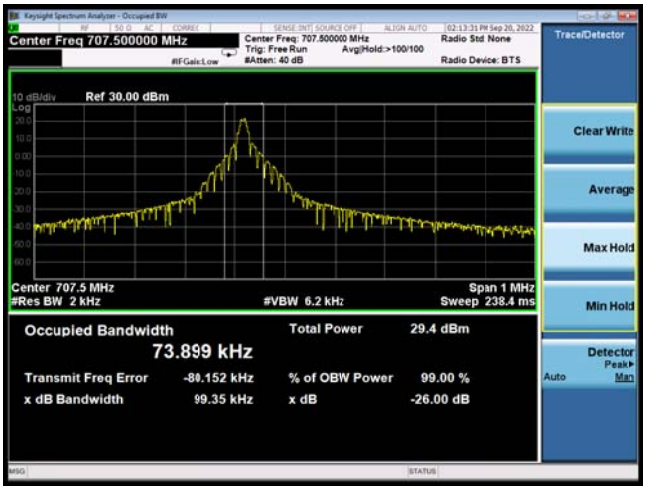
NB-IoT Band 12 BPSK15KHz 1@0 CH-Low



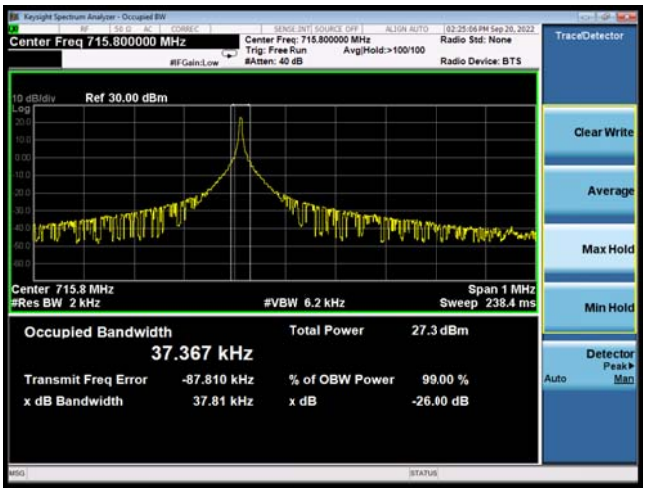
NB-IoT Band 12 BPSK 3.75KHz 1@0 CH-Middle



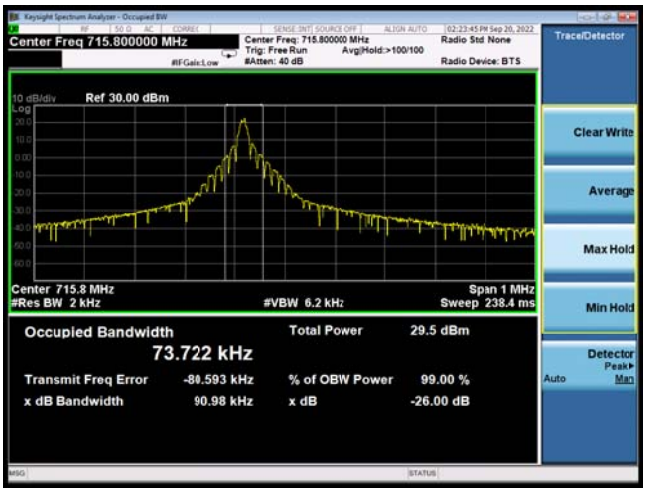
NB-IoT Band 12 BPSK 15KHz 1@0 CH-Middle



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

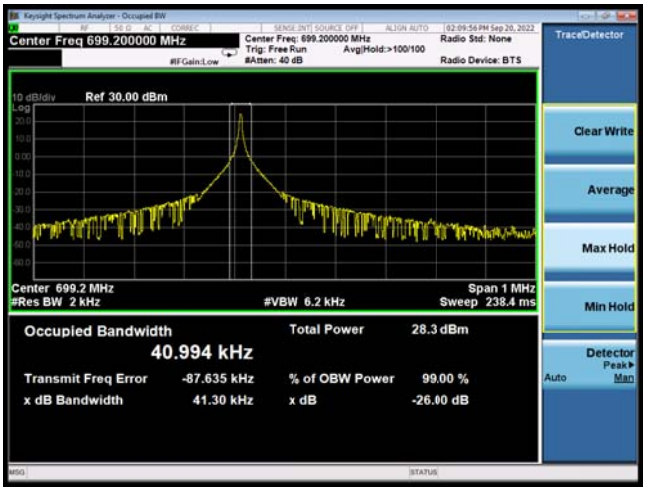


NB-IoT Band 12 BPSK 15KHz 1@0 CH-High



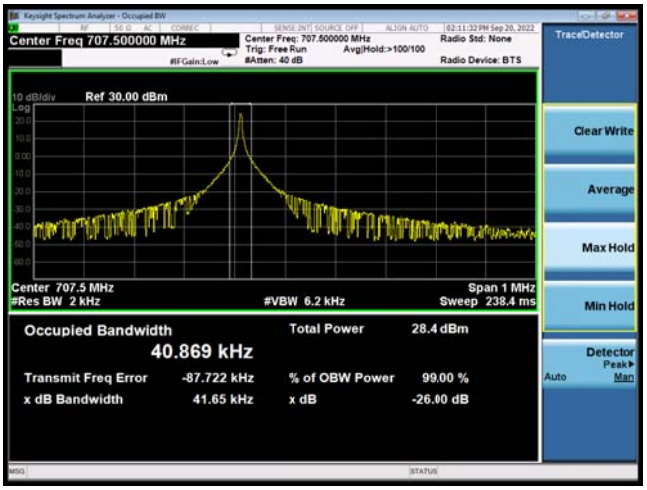
This report shall not be reproduced except in full, without the written approval of TA Technology (Shanghai) Co., Ltd.

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

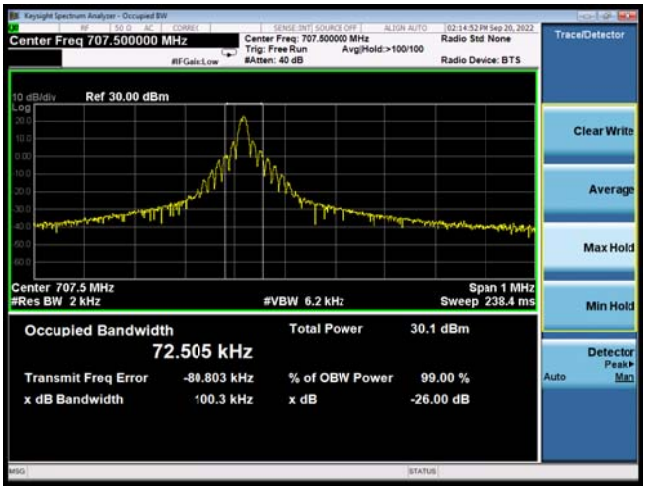


NB-IoT Band 12 QPSK 15KHz 1@0 CH-Low

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

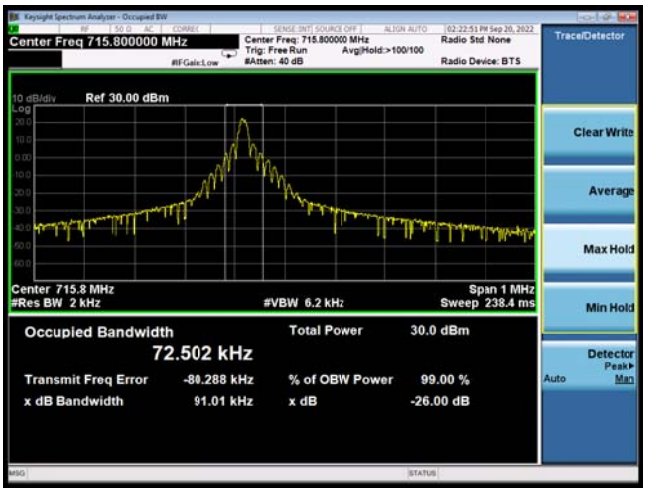


NB-IoT Band 12 QPSK 15KHz 1@0 CH-Middle



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

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



This report shall not be reproduced except in full, without the written approval of TA Technology (Shanghai) Co., Ltd.

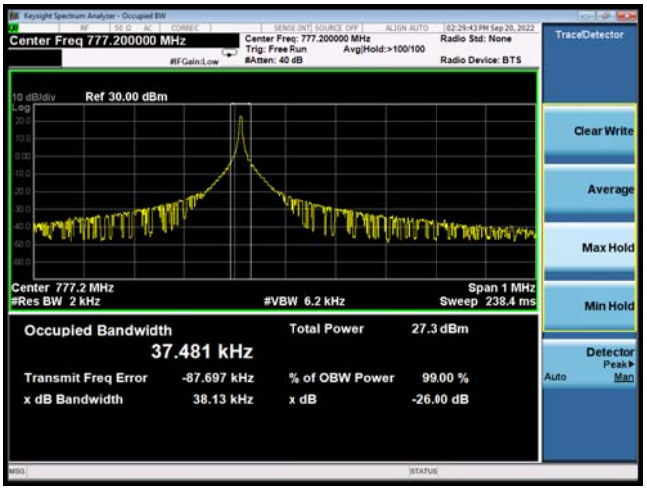
NB-IoT Band 12 QPSK 15KHz 12@0 CH-Low

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

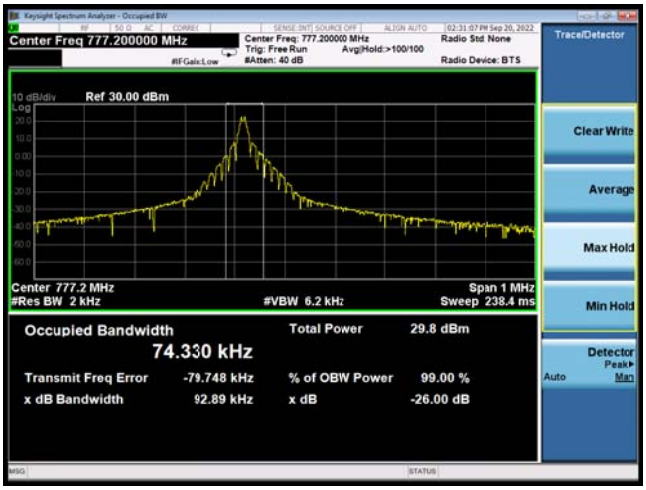
NB-IoT Band 12 QPSK 15KHz 12@0 CH-High

This report shall not be reproduced except in full, without the written approval of TA Technology (Shanghai) Co., Ltd.

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



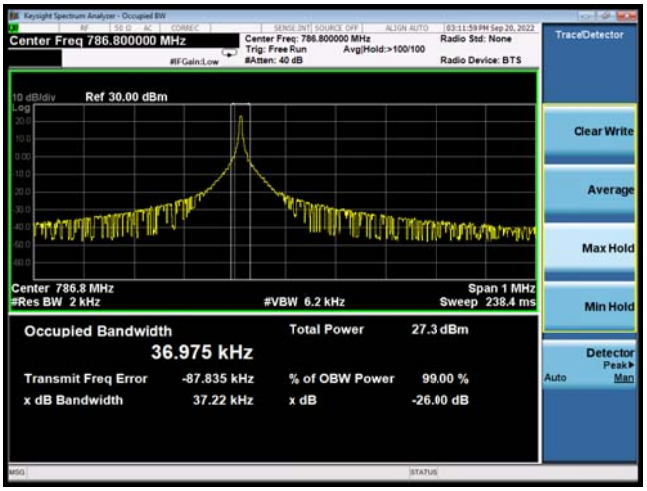
NB-IoT Band 13 BPSK15KHz 1@0 CH-Low



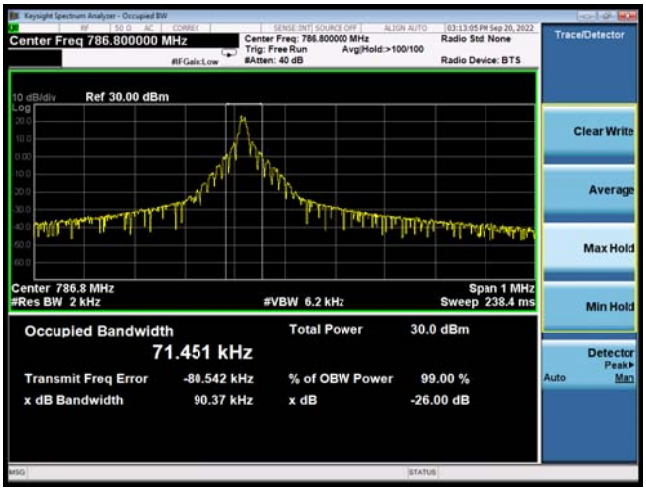
NB-IoT Band 13 BPSK 3.75KHz 1@0 CH-Middle

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

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

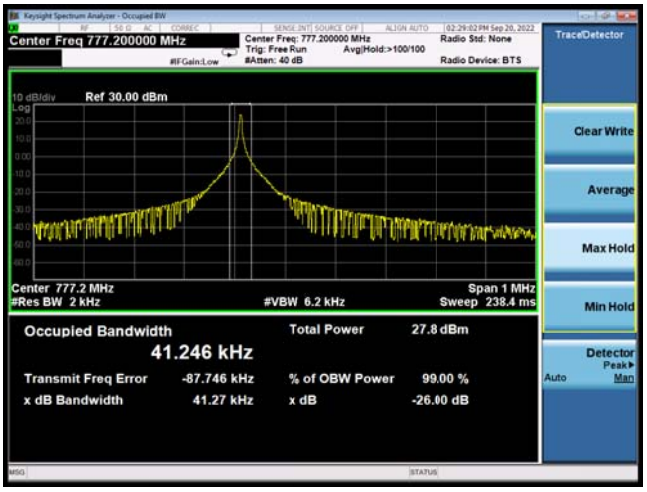


NB-IoT Band 13 BPSK 15KHz 1@0 CH-High



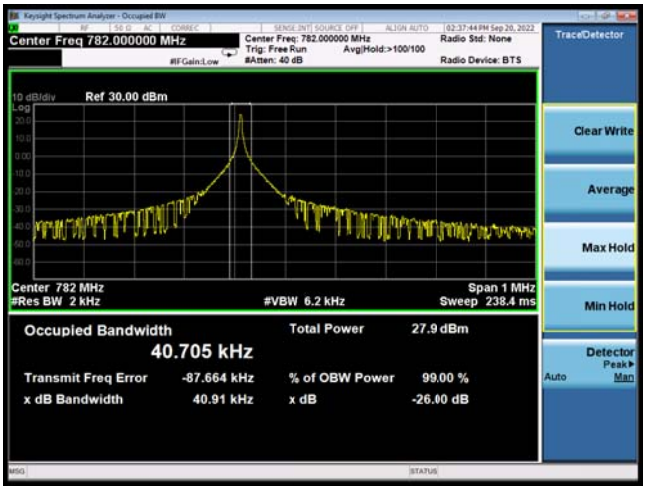
This report shall not be reproduced except in full, without the written approval of TA Technology (Shanghai) Co., Ltd.

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

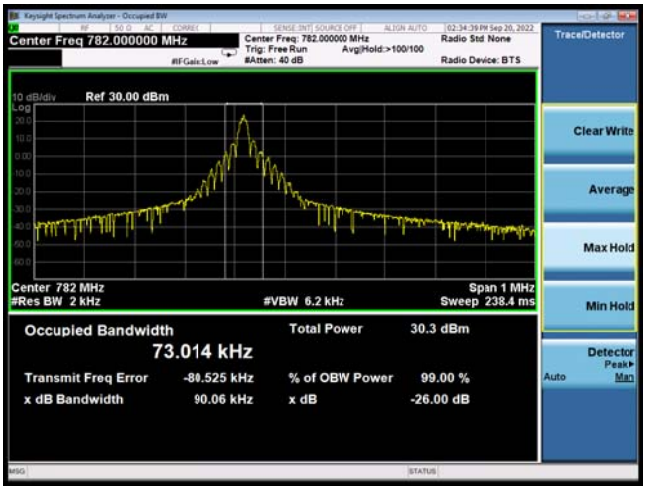


NB-IoT Band 13 QPSK 15KHz 1@0 CH-Low

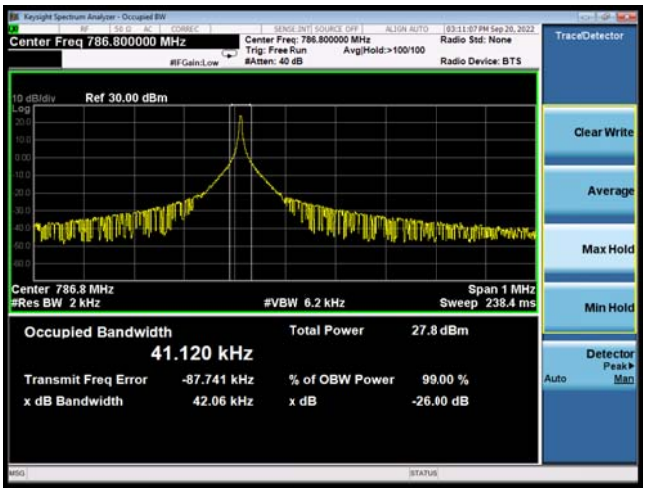
NB-IoT Band 13 QPSK 3.75KHz 1@0 CH-Middle



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

This report shall not be reproduced except in full, without the written approval of TA Technology (Shanghai) Co., Ltd.

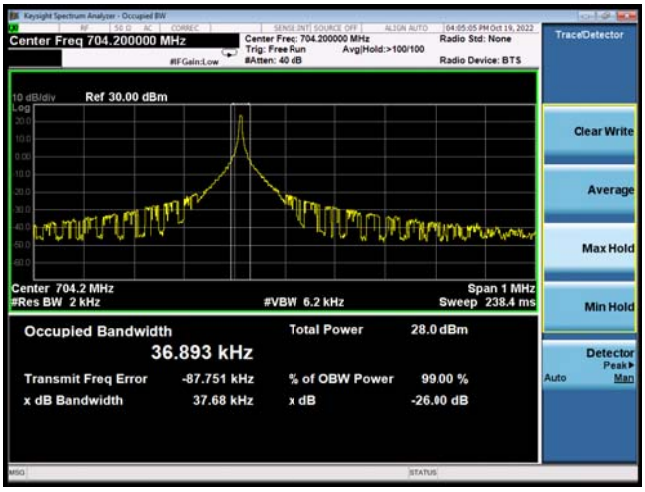
NB-IoT Band 13 QPSK 15KHz 12@0 CH-Low

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

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

This report shall not be reproduced except in full, without the written approval of TA Technology (Shanghai) Co., Ltd.

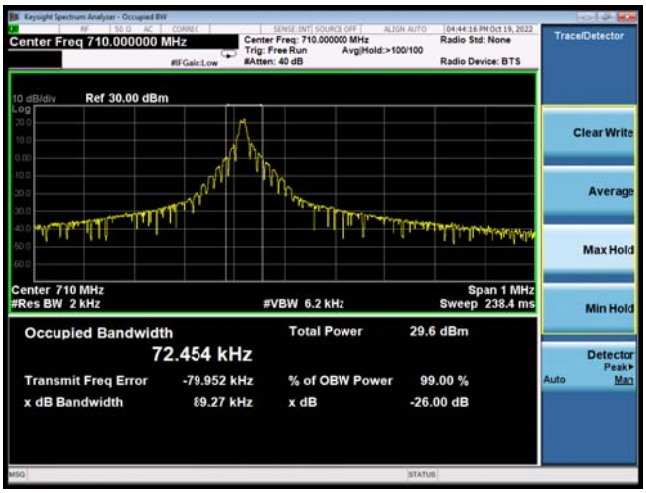
NB-IoT Band 17 BPSK 3.75KHz 1@0 CH-Low



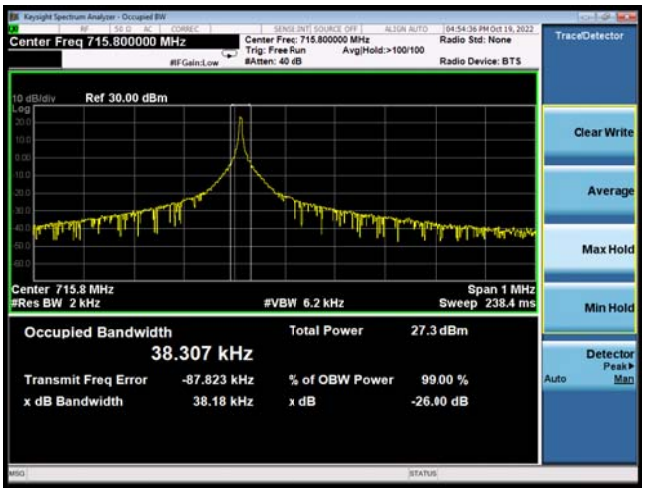
NB-IoT Band 17 BPSK15KHz 1@0 CH-Low

NB-IoT Band 17 BPSK 3.75KHz 1@0 CH-Middle

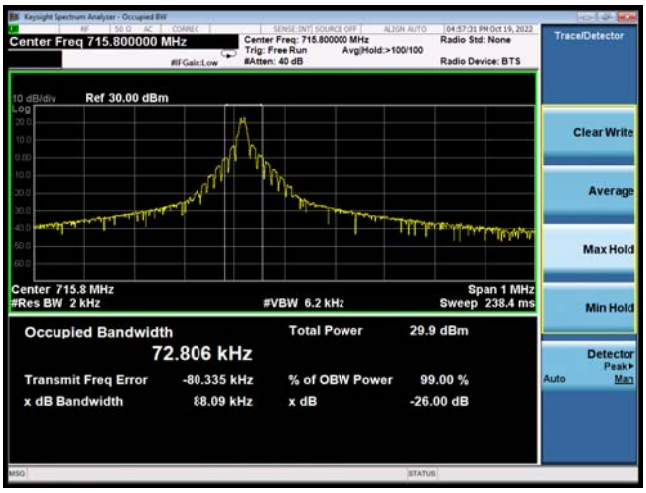
NB-IoT Band 17 BPSK 15KHz 1@0 CH-Middle



NB-IoT Band 17 BPSK 3.75KHz 1@0 CH-High



NB-IoT Band 17 BPSK 15KHz 1@0 CH-High

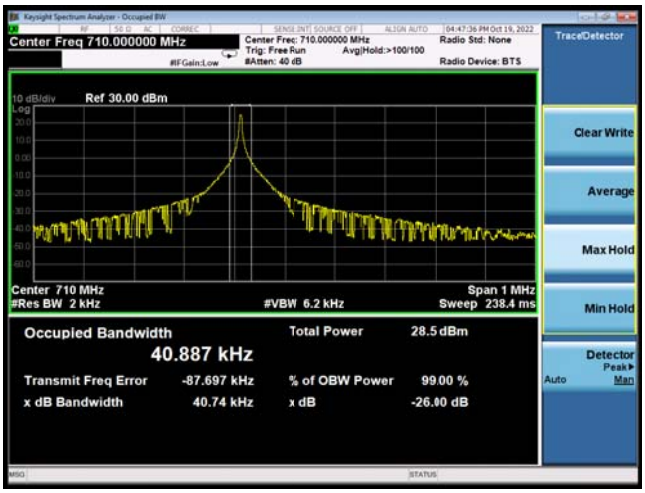


This report shall not be reproduced except in full, without the written approval of TA Technology (Shanghai) Co., Ltd.

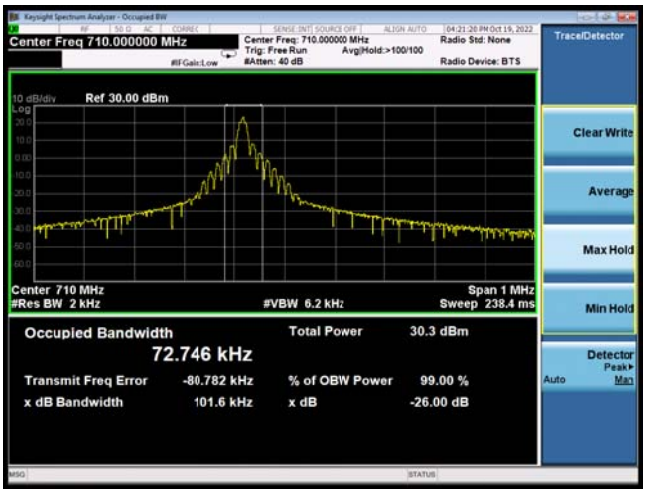
NB-IoT Band 17 QPSK 3.75KHz 1@0 CH-Low

NB-IoT Band 17 QPSK 15KHz 1@0 CH-Low

NB-IoT Band 17 QPSK 3.75KHz 1@0 CH-Middle

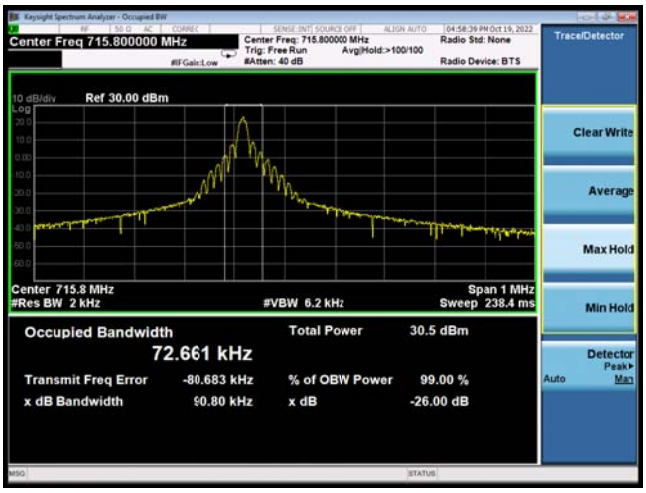


NB-IoT Band 17 QPSK 15KHz 1@0 CH-Middle



NB-IoT Band 17 QPSK 3.75KHz 1@0 CH-High

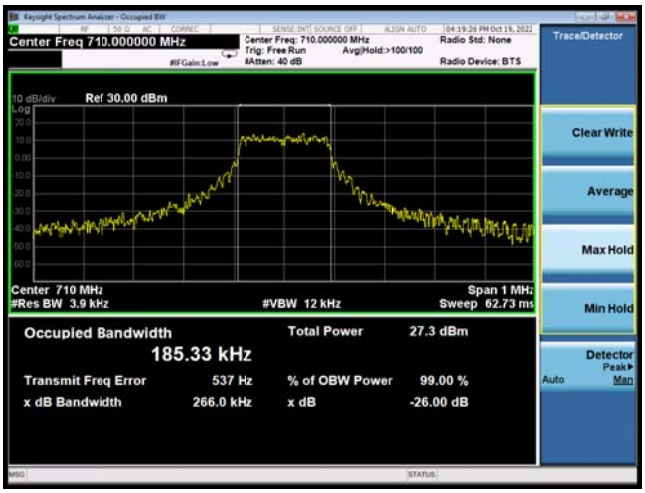
NB-IoT Band 17 QPSK 15KHz 1@0 CH-High



This report shall not be reproduced except in full, without the written approval of TA Technology (Shanghai) Co., Ltd.

NB-IoT Band 17 QPSK 15KHz 12@0 CH-Low

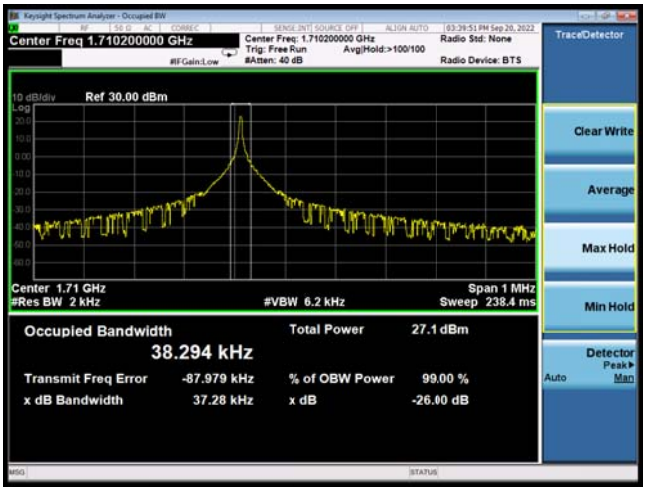
NB-IoT Band 17 QPSK 15KHz 12@0 CH-Middle



NB-IoT Band 17 QPSK 15KHz 12@0 CH-High

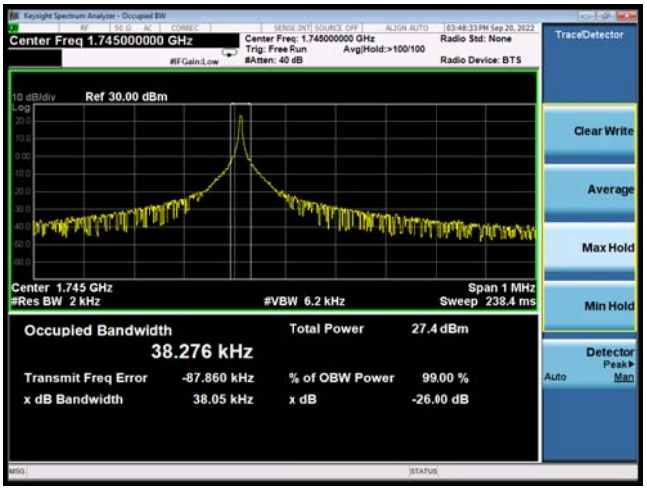
This report shall not be reproduced except in full, without the written approval of TA Technology (Shanghai) Co., Ltd.

NB-IoT Band 66 BPSK 3.75KHz 1@0 CH-Low

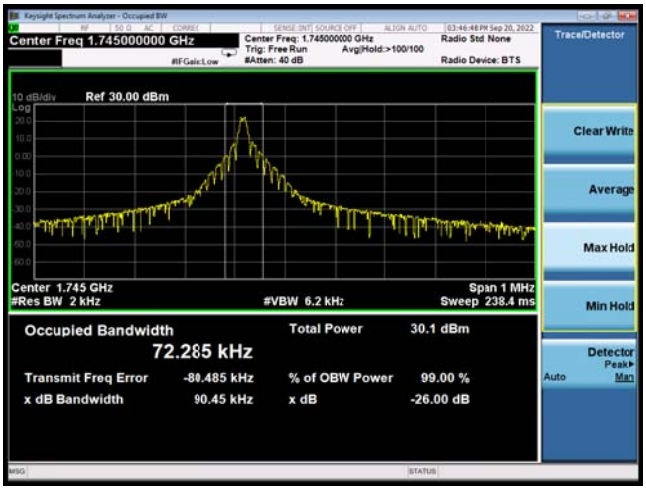


NB-IoT Band 66 BPSK 15KHz 1@0 CH-Low

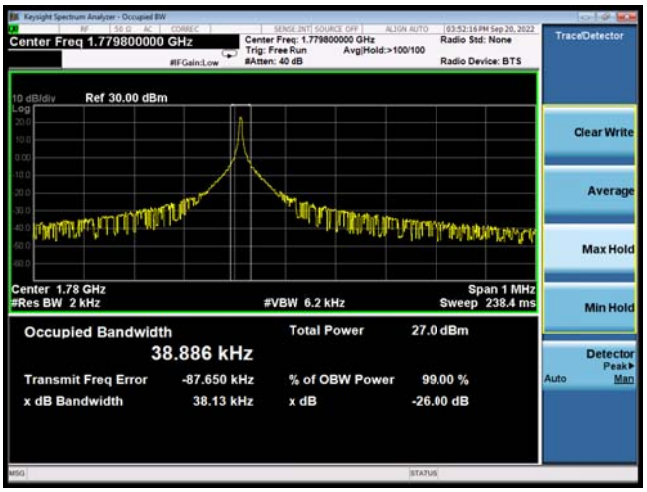
NB-IoT Band 66 BPSK 3.75KHz 1@0 CH-Middle



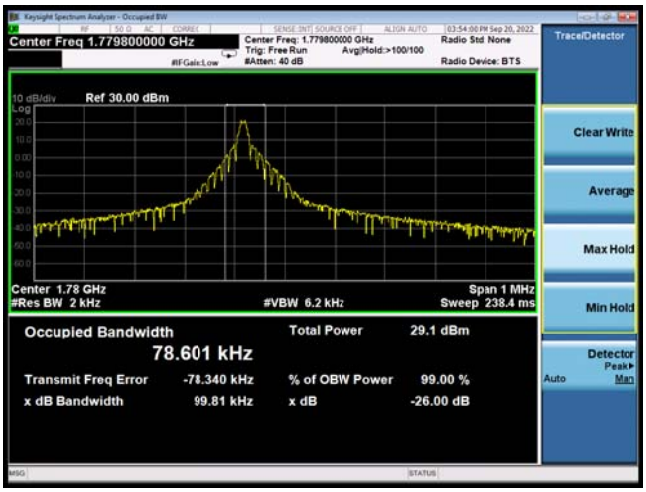
NB-IoT Band 66 BPSK 15KHz 1@0 CH-Middle



NB-IoT Band 66 BPSK 3.75KHz 1@0 CH-High

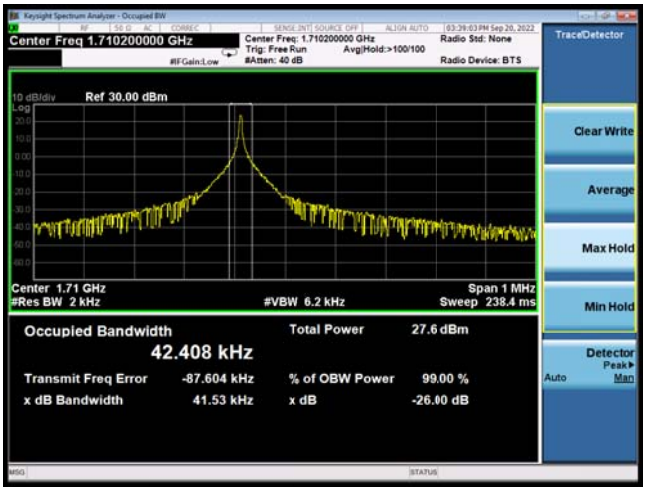


NB-IoT Band 66 BPSK 15KHz 1@0 CH-High

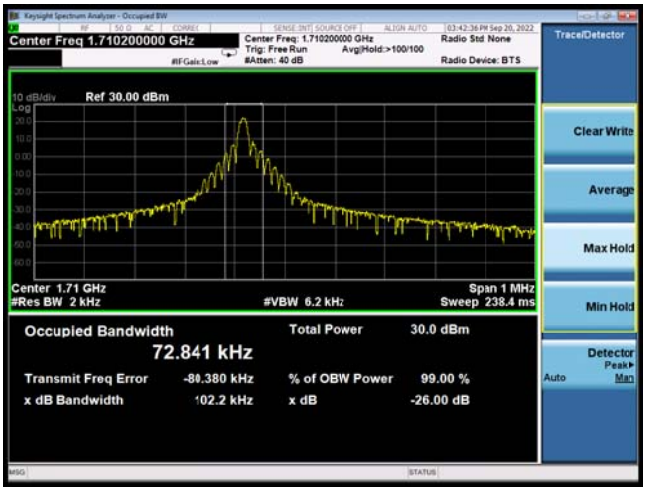


This report shall not be reproduced except in full, without the written approval of TA Technology (Shanghai) Co., Ltd.

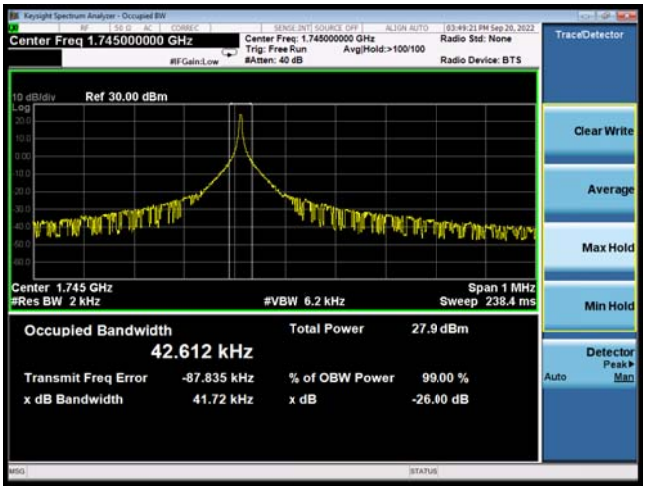
NB-IoT Band 66 QPSK 3.75KHz 1@0 CH-Low



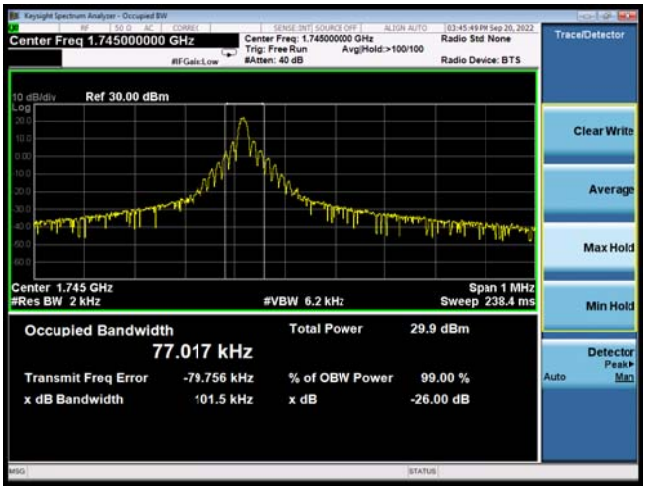
NB-IoT Band 66 QPSK 15KHz 1@0 CH-Low



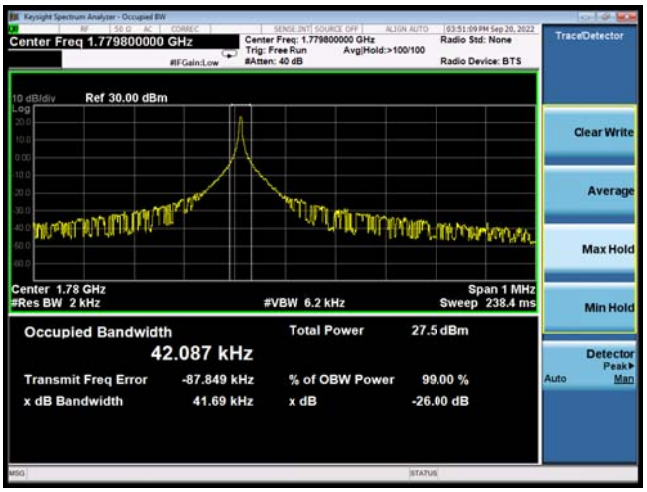
NB-IoT Band 66 QPSK 3.75KHz 1@0 CH-Middle



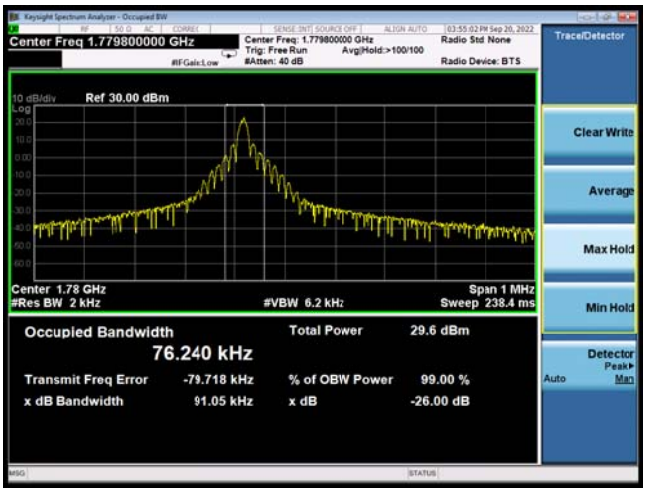
NB-IoT Band 66 QPSK 15KHz 1@0 CH-Middle



NB-IoT Band 66 QPSK 3.75KHz 1@0 CH-High



NB-IoT Band 66 QPSK 15KHz 1@0 CH-High

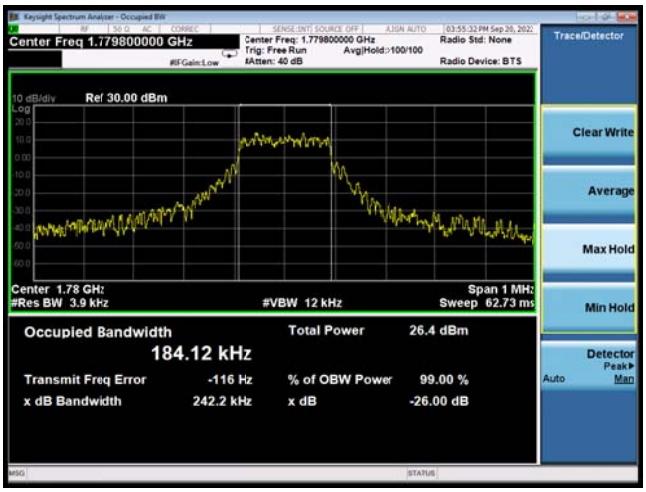


This report shall not be reproduced except in full, without the written approval of TA Technology (Shanghai) Co., Ltd.

NB-IoT Band 66 QPSK 15KHz 12@0 CH-Low

NB-IoT Band 66 QPSK 15KHz 12@0 CH-Middle

NB-IoT Band 66 QPSK 15KHz 12@0 CH-High

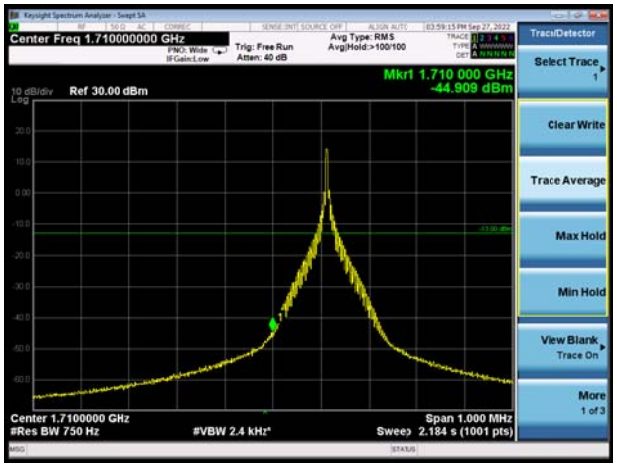


This report shall not be reproduced except in full, without the written approval of TA Technology (Shanghai) Co., Ltd.

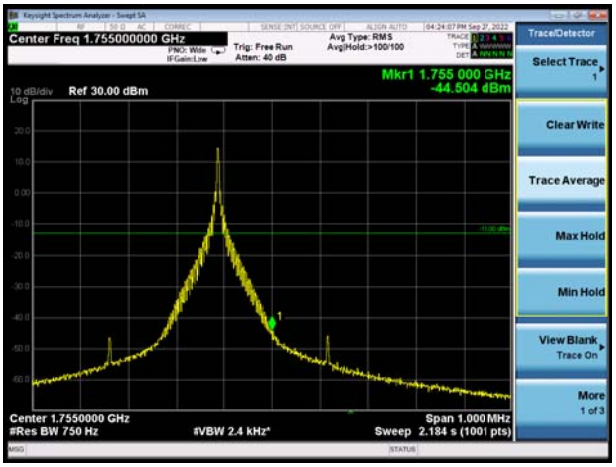
6.3 Band Edge Compliance

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

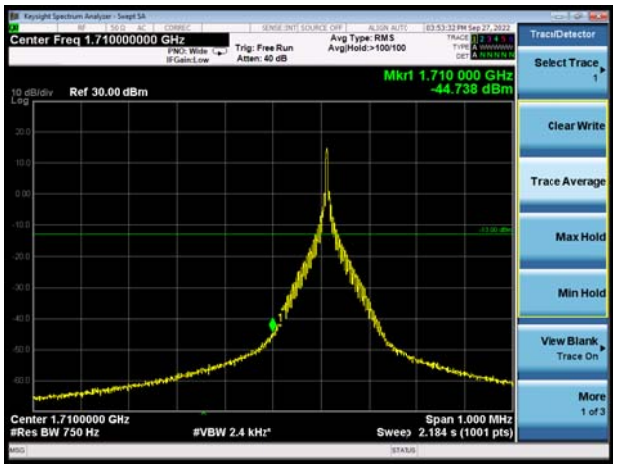
NB-IoT Band 4 BPSK 3.75KHz 1@0 CH-Low



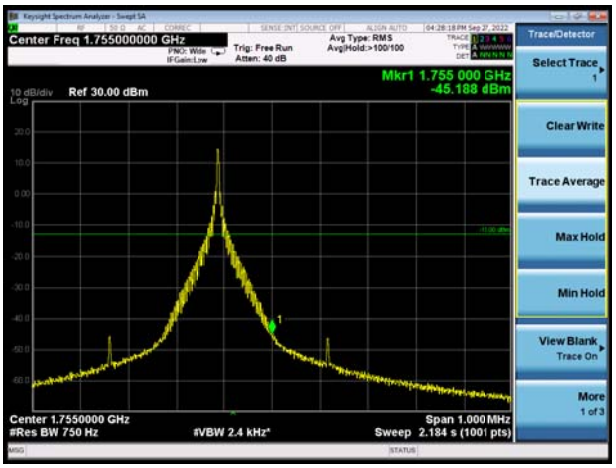
NB-IoT Band 4 BPSK 3.75KHz 1@0 CH-High



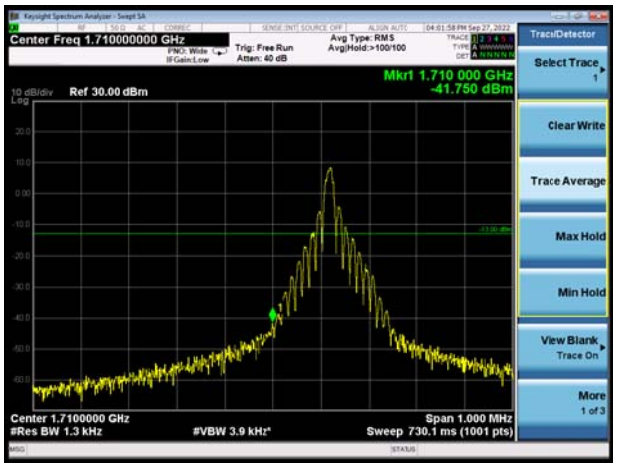
NB-IoT Band 4 QPSK 3.75KHz 1@0 CH-Low



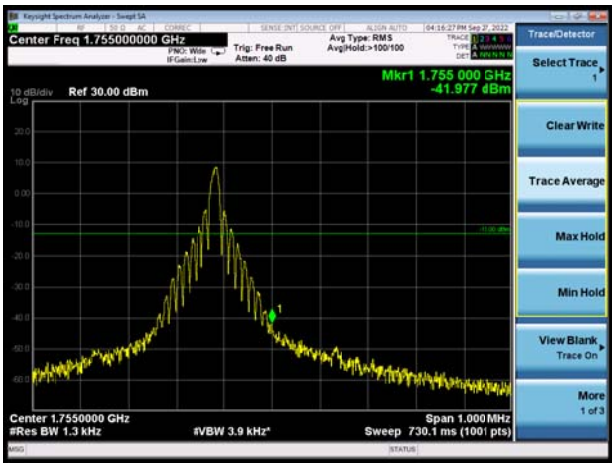
NB-IoT Band 4 QPSK 3.75KHz 1@0 CH-High



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

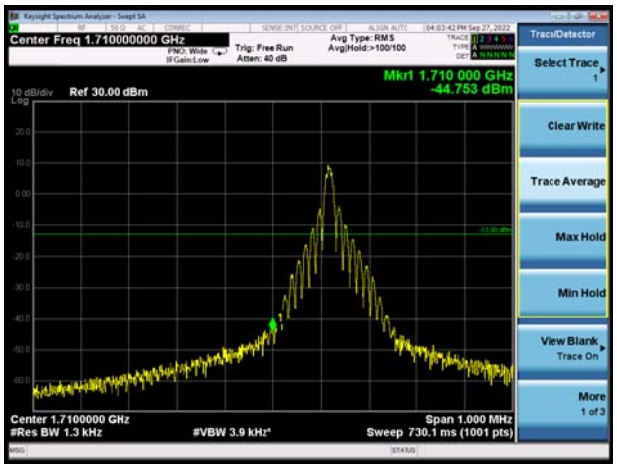


NB-IoT Band 4 BPSK 15KHz 1@0 CH- High

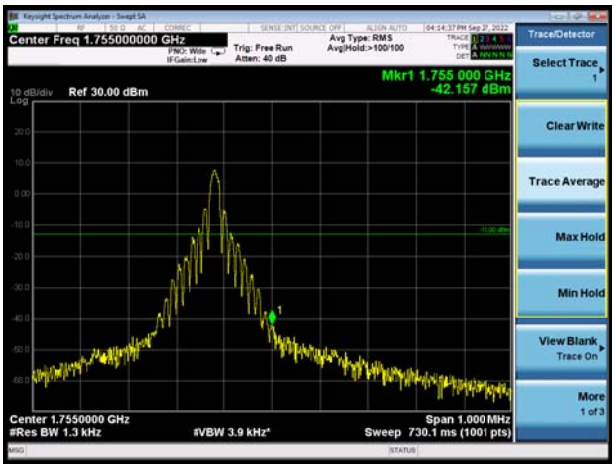


This report shall not be reproduced except in full, without the written approval of TA Technology (Shanghai) Co., Ltd.

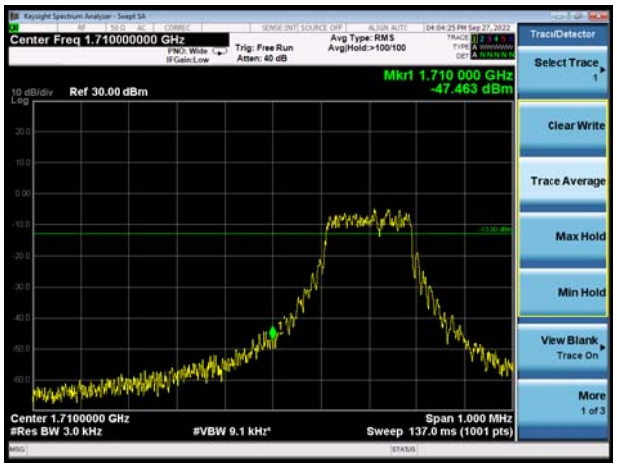
NB-IoT Band 4 QPSK 15KHz 1@0 CH-Low



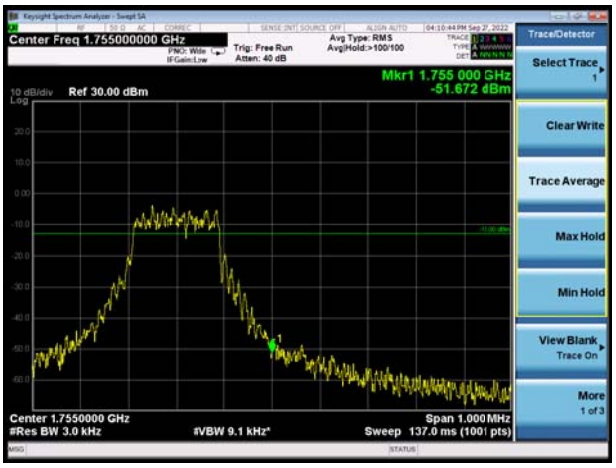
NB-IoT Band 4 QPSK 15KHz 1@0 CH- High



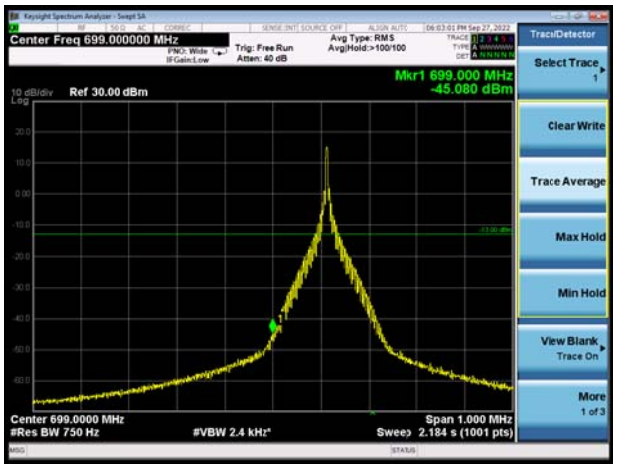
NB-IoT Band 4 QPSK 15KHz 12@0 CH-Low



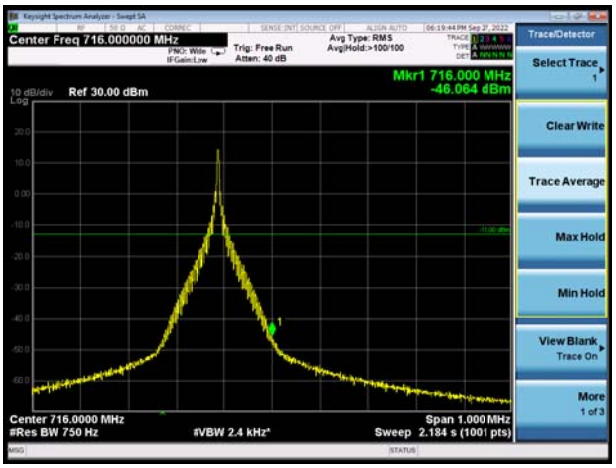
NB-IoT Band 4 QPSK 15KHz 12@0 CH- High



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

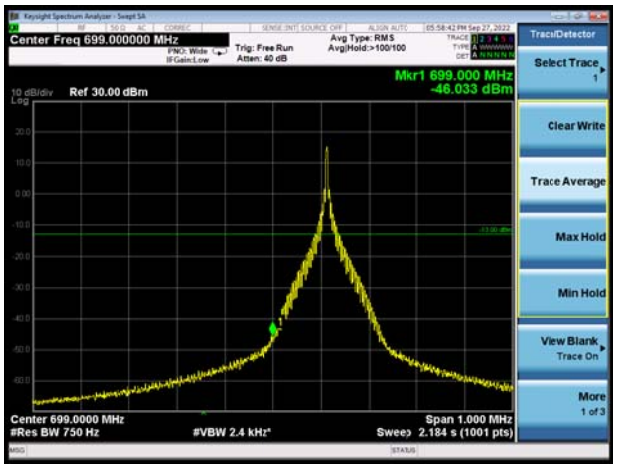


NB-IoT Band 12 BPSK 3.75KHz 1@0 CH- High

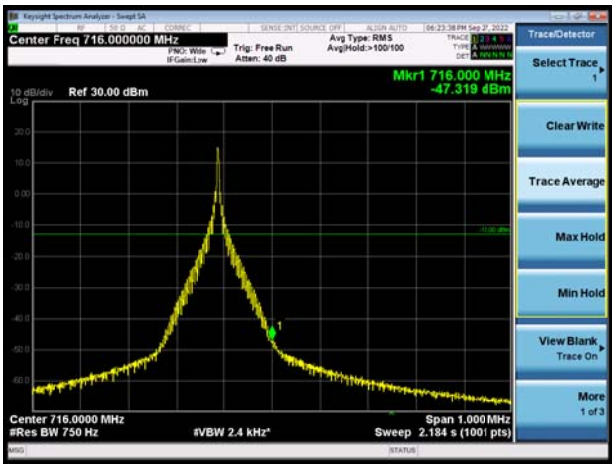


This report shall not be reproduced except in full, without the written approval of TA Technology (Shanghai) Co., Ltd.

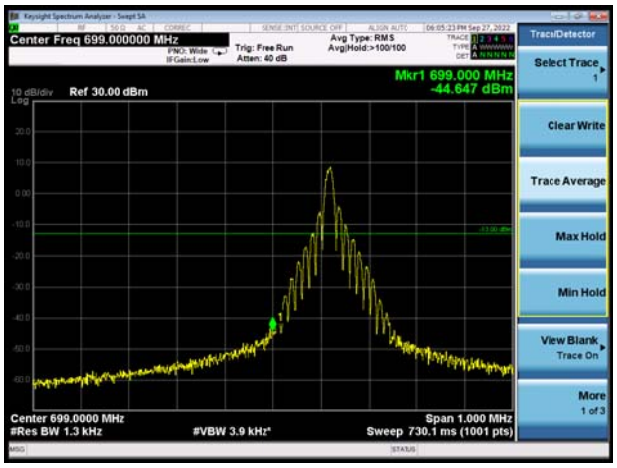
NB-IoT Band 12 QPSK 3.75KHz 1@0 CH-Low



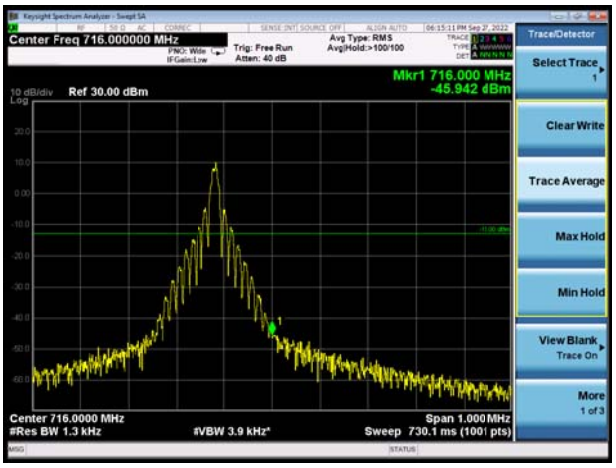
NB-IoT Band 12 QPSK 3.75KHz 1@0 CH- High



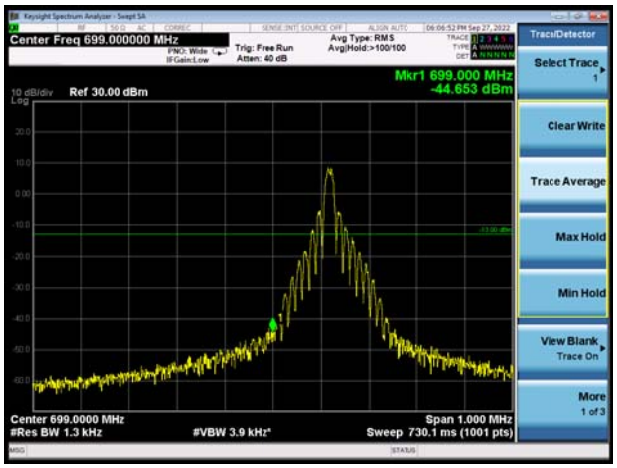
NB-IoT Band 12 BPSK 15KHz 1@0 CH-Low



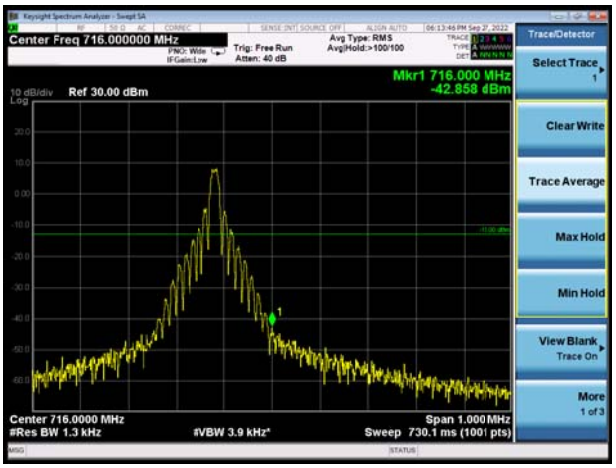
NB-IoT Band 12 BPSK 15KHz 1@0 CH- High



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

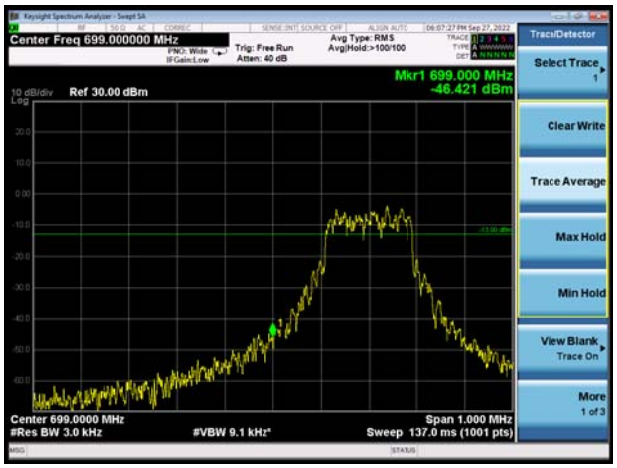


NB-IoT Band 12 QPSK 15KHz 1@0 CH- High

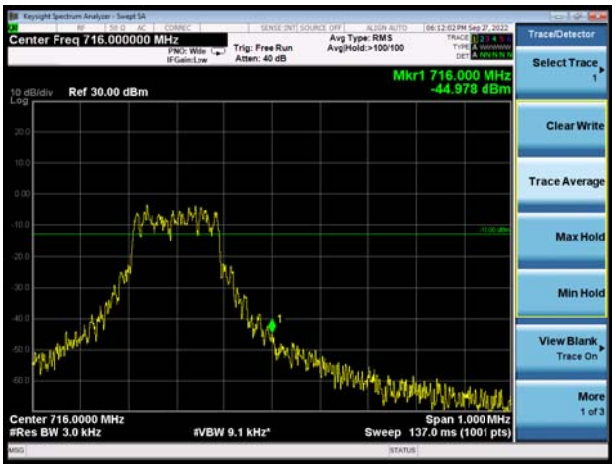


This report shall not be reproduced except in full, without the written approval of TA Technology (Shanghai) Co., Ltd.

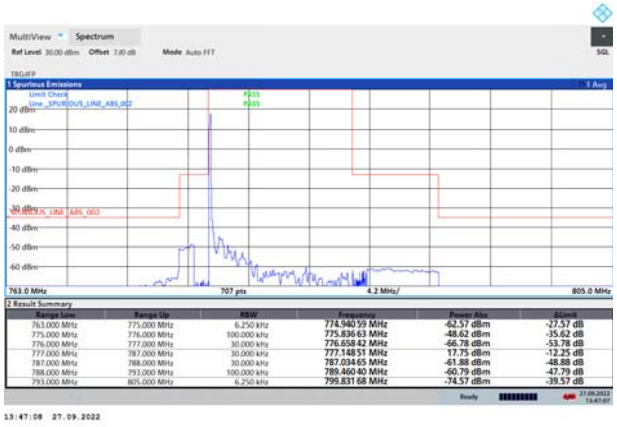
NB-IoT Band 12 QPSK 15KHz 12@0 CH-Low



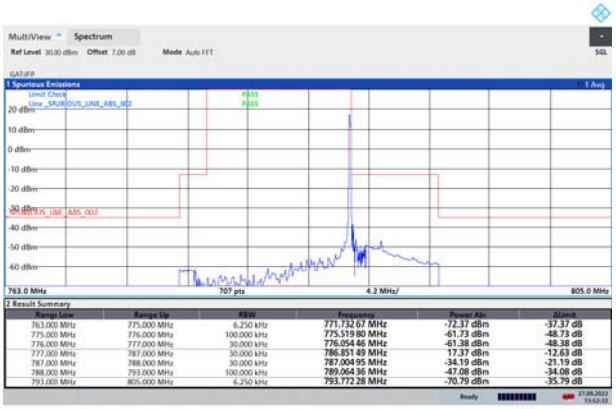
NB-IoT Band 12 QPSK 15KHz 12@0 CH- High



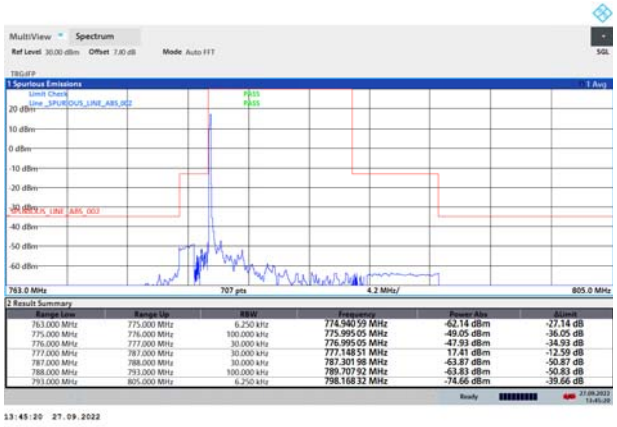
NB-IoT Band 13 BPSK 3.75KHz 1@0 CH-Low



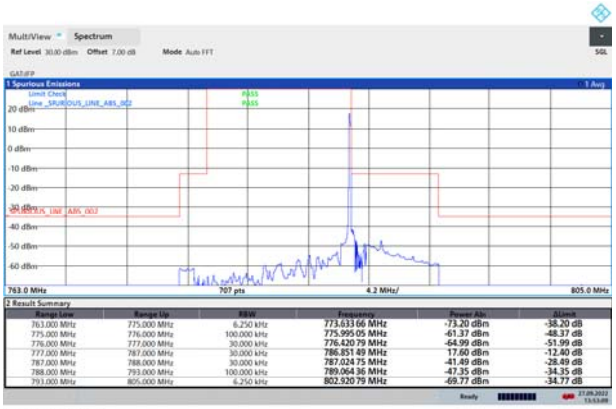
NB-IoT Band 13 BPSK 3.75KHz 1@0 CH- High



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

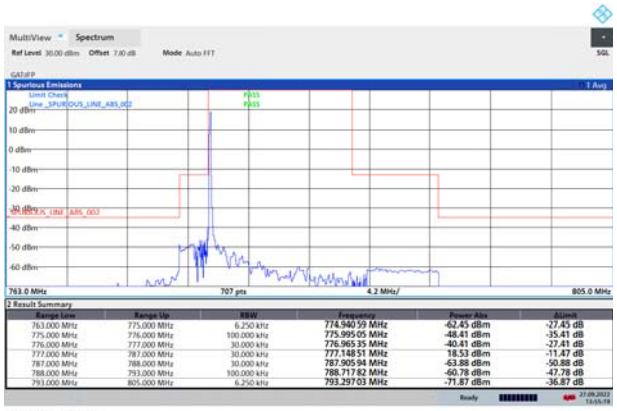


NB-IoT Band 13 QPSK 3.75KHz 1@0 CH- High



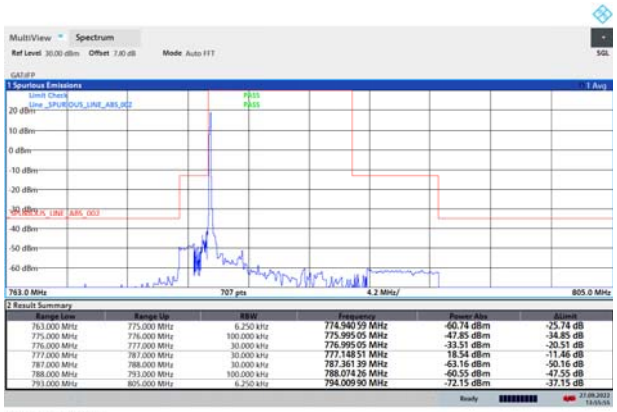
This report shall not be reproduced except in full, without the written approval of TA Technology (Shanghai) Co., Ltd.

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



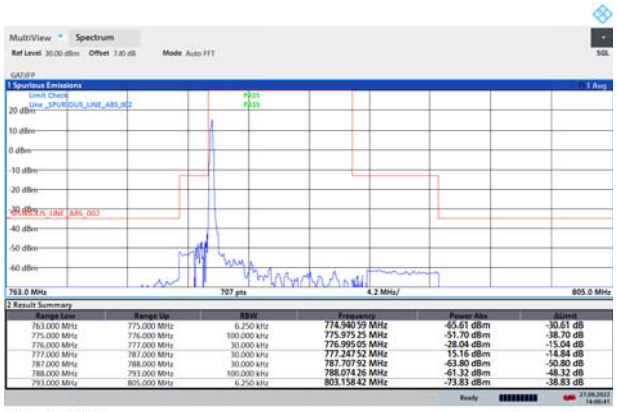
NB-IoT Band 13 BPSK 15KHz 1@0 CH- High

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



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

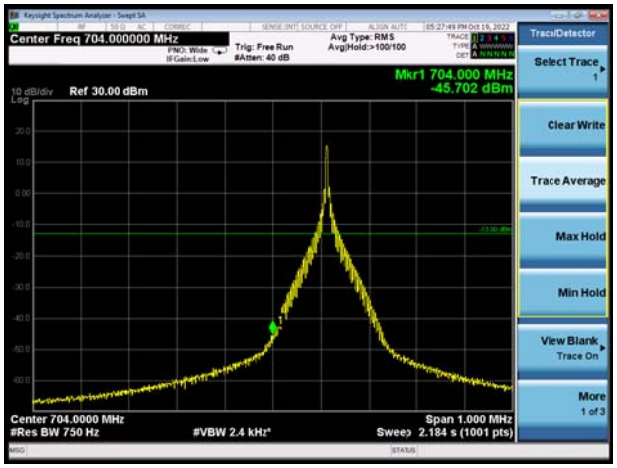
NB-IoT Band 13 QPSK 15KHz 12@0 CH-Low



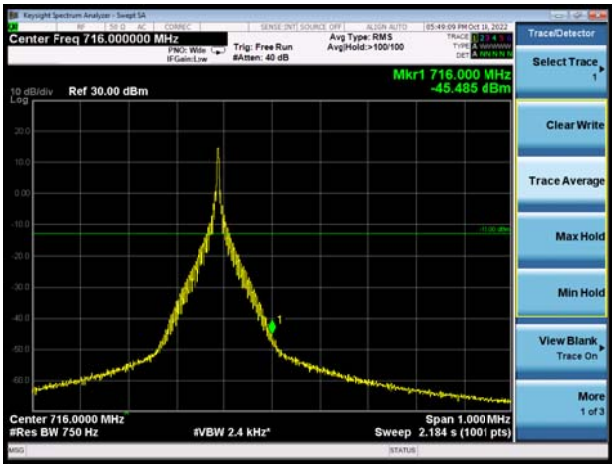
NB-IoT Band 13 QPSK 15KHz 12@0 CH- High

This report shall not be reproduced except in full, without the written approval of TA Technology (Shanghai) Co., Ltd.

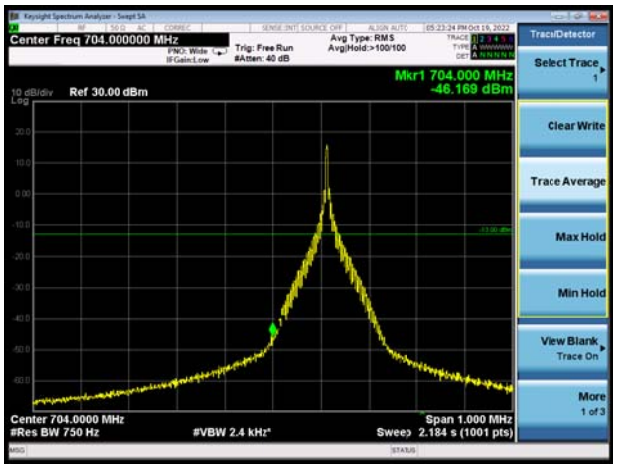
NB-IoT Band 17BPSK 3.75KHz 1@0 CH-Low



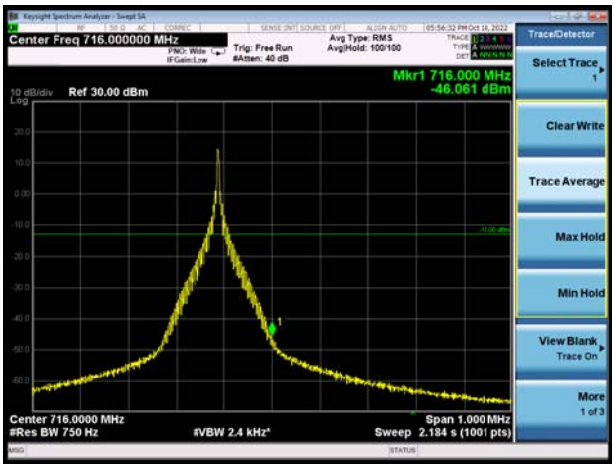
NB-IoT Band 17BPSK 3.75KHz 1@0 CH- High



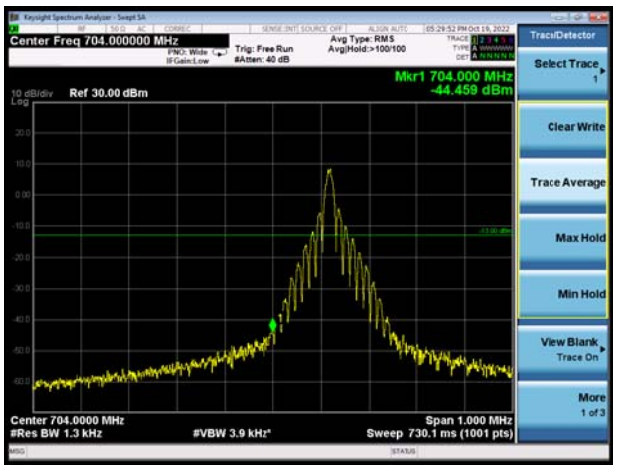
NB-IoT Band 17QPSK 3.75KHz 1@0 CH-Low



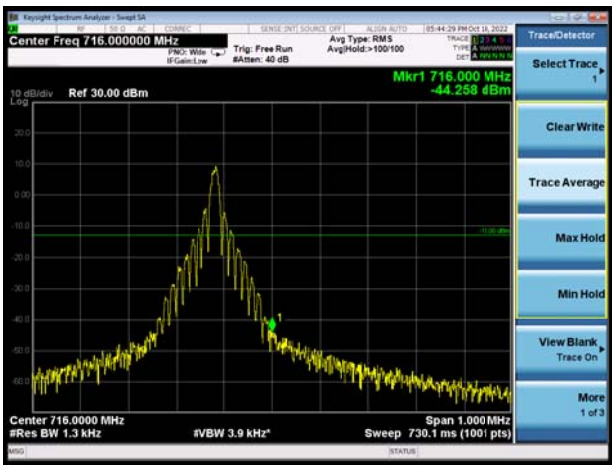
NB-IoT Band 17QPSK 3.75KHz 1@0 CH- High



NB-IoT Band 17BPSK 15KHz 1@0 CH-Low

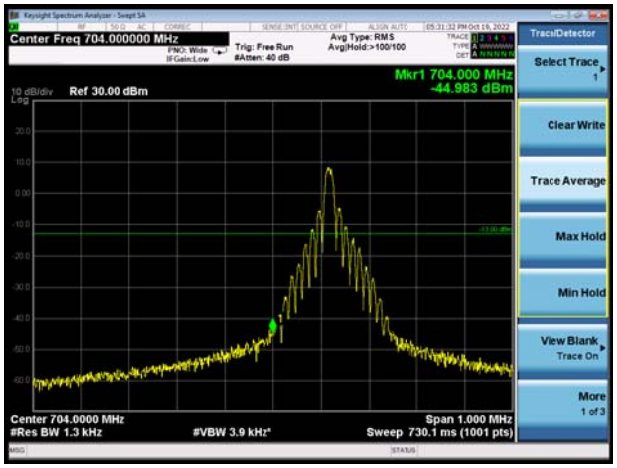


NB-IoT Band 17BPSK 15KHz 1@0 CH- High

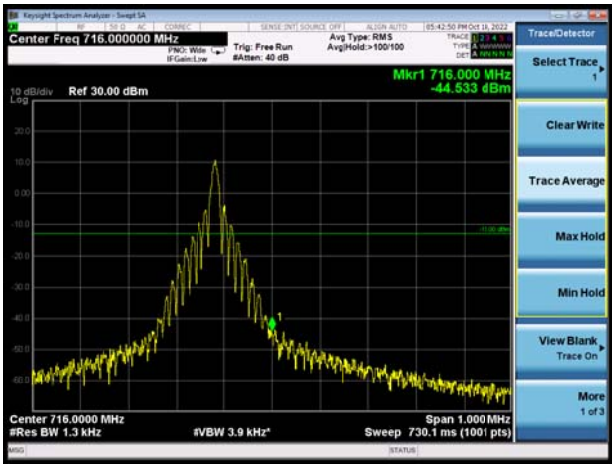


This report shall not be reproduced except in full, without the written approval of TA Technology (Shanghai) Co., Ltd.

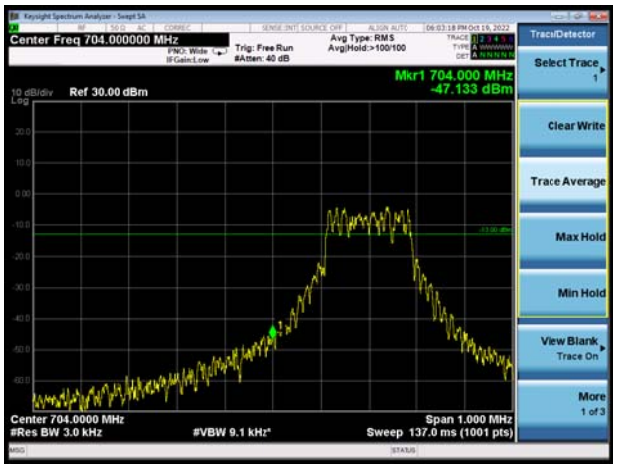
NB-IoT Band 17QPSK 15KHz 1@0 CH-Low



NB-IoT Band 17QPSK 15KHz 1@0 CH- High



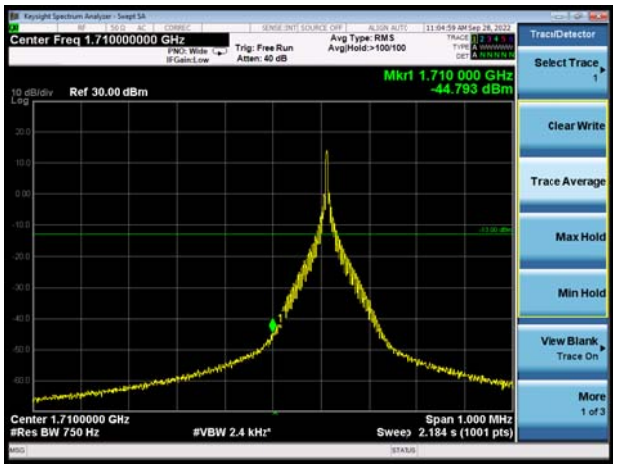
NB-IoT Band 17QPSK 15KHz 12@0 CH-Low



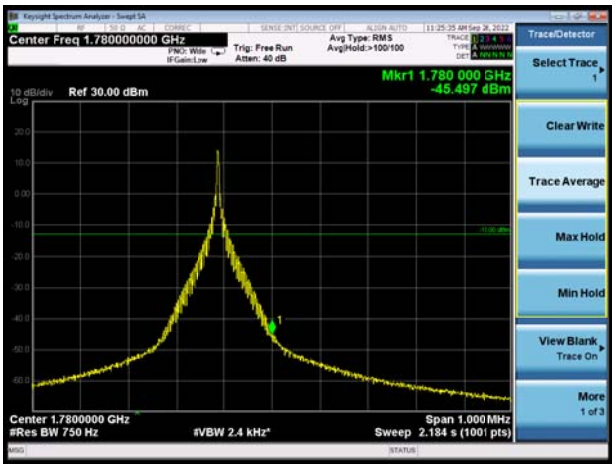
NB-IoT Band 17QPSK 15KHz 12@0 CH- High

This report shall not be reproduced except in full, without the written approval of TA Technology (Shanghai) Co., Ltd.

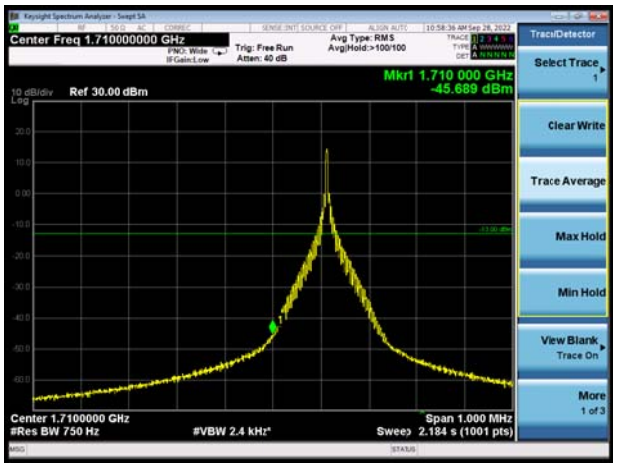
NB-IoT Band 66 BPSK 3.75KHz 1@0 CH-Low



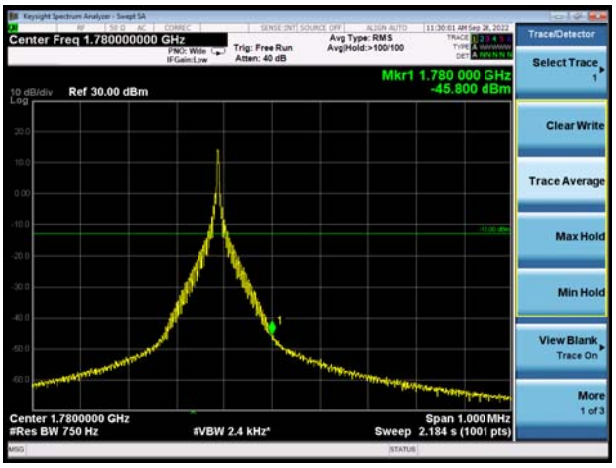
NB-IoT Band 66 BPSK 3.75KHz 1@0 CH- High



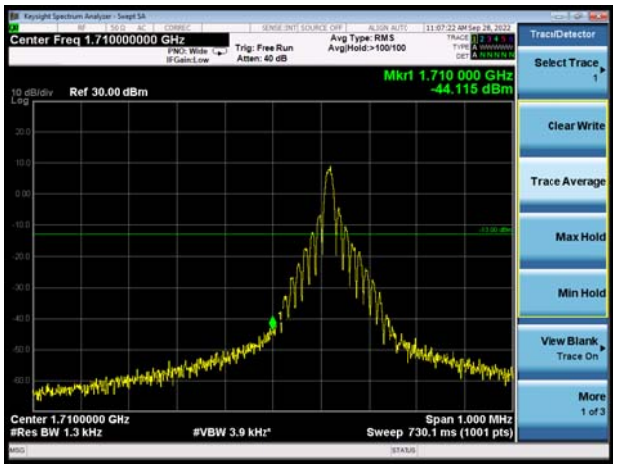
NB-IoT Band 66 QPSK 3.75KHz 1@0 CH-Low



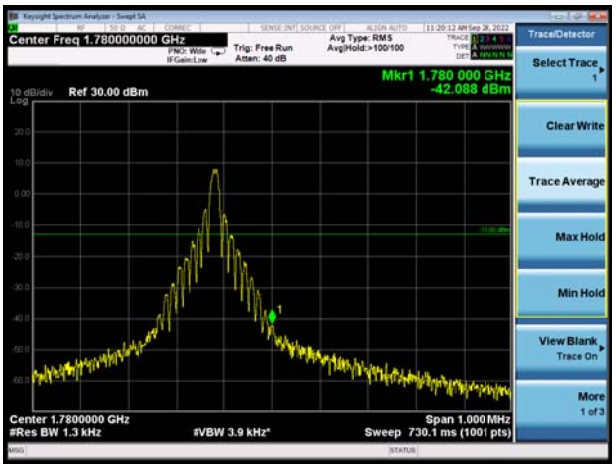
NB-IoT Band 66 QPSK 3.75KHz 1@0 CH- High



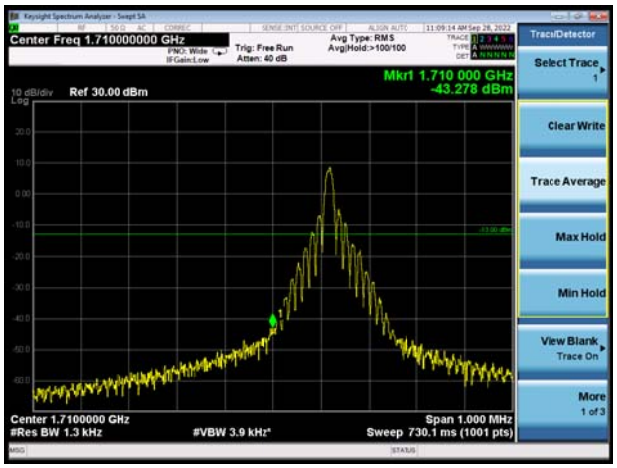
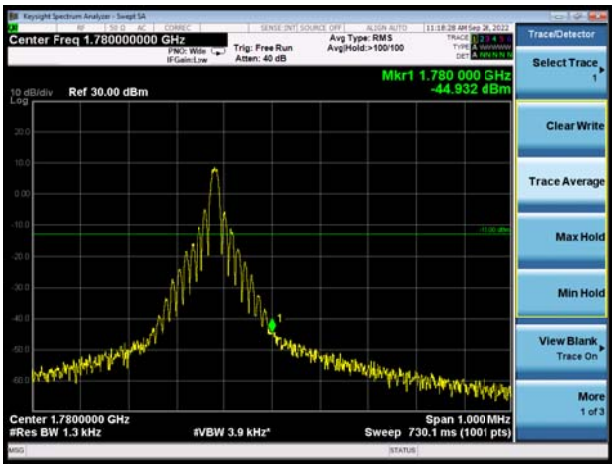
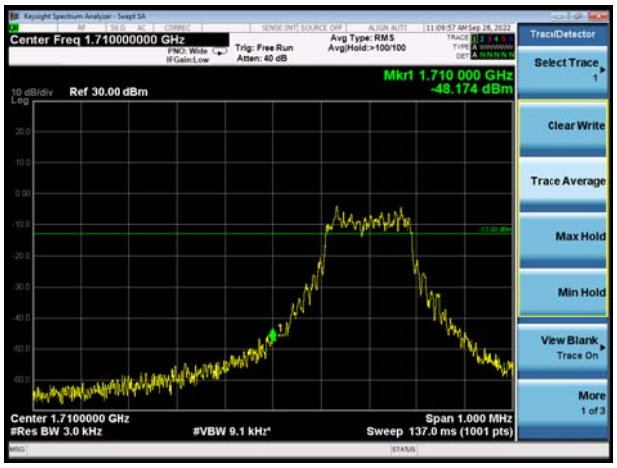
NB-IoT Band 66 BPSK 15KHz 1@0 CH-Low



NB-IoT Band 66 BPSK 15KHz 1@0 CH- High



This report shall not be reproduced except in full, without the written approval of TA Technology (Shanghai) Co., Ltd.

NB-IoT Band 66 QPSK 15KHz 1@0 CH-Low	NB-IoT Band 66 QPSK 15KHz 1@0 CH- High
	
NB-IoT Band 66 QPSK 15KHz 12@0 CH-Low	NB-IoT Band 66 QPSK 15KHz 12@0 CH- High
	

This report shall not be reproduced except in full, without the written approval of TA Technology (Shanghai) Co., Ltd.

6.4 Peak-to-Average Power Ratio (PAPR)

Mode	Modulation	Sub-carrier spacing (KHz)	Channel/ Frequency(MHz)	Peak-to-Average Power Ratio (PAPR)		
				Peak(dBm)	Avg(dBm)	PAPR(dB)
NB-IoT Band 4	BPSK	3.75	20175/1732.5	23.42	20.60	2.82
	QPSK	3.75	20175/1732.5	23.70	20.80	2.90
	BPSK	15	20175/1732.5	24.08	18.07	6.01
	QPSK	15	20175/1732.5	23.95	17.81	6.14

Mode	Modulation	Sub-carrier spacing (KHz)	Channel/ Frequency(MHz)	Peak-to-Average Power Ratio (PAPR)		
				Peak(dBm)	Avg(dBm)	PAPR(dB)
NB-IoT Band 12	BPSK	3.75	23095/707.5	25.59	22.99	2.60
	QPSK	3.75	23095/707.5	25.89	23.03	2.86
	BPSK	15	23095/707.5	25.63	19.27	6.36
	QPSK	15	23095/707.5	25.61	19.14	6.47

Mode	Modulation	Sub-carrier spacing (KHz)	Channel/ Frequency(MHz)	Peak-to-Average Power Ratio (PAPR)		
				Peak(dBm)	Avg(dBm)	PAPR(dB)
NB-IoT Band 13	BPSK	3.75	23095/707.5	24.87	22.30	2.57
	QPSK	3.75	23095/707.5	25.15	22.29	2.86
	BPSK	15	23095/707.5	25.29	19.44	5.85
	QPSK	15	23095/707.5	25.42	19.43	5.99

Mode	Modulation	Sub-carrier spacing (KHz)	Channel/ Frequency(MHz)	Peak-to-Average Power Ratio (PAPR)		
				Peak(dBm)	Avg(dBm)	PAPR(dB)
NB-IoT Band 17	BPSK	3.75	23790/710	24.74	22.11	2.63
	QPSK	3.75	23790/710	25.04	22.17	2.87
	BPSK	15	23790/710	24.21	18.30	5.91
	QPSK	15	23790/710	24.38	18.43	5.95

Mode	Modulation	Sub-carrier spacing (KHz)	Channel/ Frequency(MHz)	Peak-to-Average Power Ratio (PAPR)		
				Peak(dBm)	Avg(dBm)	PAPR(dB)
NB-IoT Band 66	BPSK	3.75	132322/1745	23.94	21.19	2.75
	QPSK	3.75	132322/1745	24.03	21.14	2.89
	BPSK	15	132322/1745	23.71	17.81	5.90
	QPSK	15	132322/1745	23.71	17.71	6.00

This report shall not be reproduced except in full, without the written approval of TA Technology (Shanghai) Co., Ltd.

6.5 Frequency Stability

	Condition		Freq.Error (Hz)	Freq.Error (Hz)	Frequency Stability （ppm）	Frequency Stability （ppm）	Verdict
	Sub-carrier spacing(KHz)	3.75					
	Temperature	Voltage	BPSK	QPSK	BPSK	QPSK	
NB-IoT Band 4	Normal（25℃）	Normal	15.61	17.81	0.00830	0.00947	PASS
	Extreme（50℃）		4.84	16.75	0.00257	0.00891	PASS
	Extreme（40℃）		1.63	10.39	0.00087	0.00553	PASS
	Extreme（30℃）		8.07	14.64	0.00429	0.00779	PASS
	Extreme（20℃）		6.15	16.45	0.00327	0.00875	PASS
	Extreme（10℃）		7.40	2.94	0.00393	0.00156	PASS
	Extreme（0℃）		12.31	2.46	0.00655	0.00131	PASS
	Extreme（-10℃）		12.15	8.28	0.00646	0.00440	PASS
	Extreme（-20℃）		1.63	14.13	0.00087	0.00752	PASS
	Extreme（-30℃）		16.29	5.58	0.00866	0.00297	PASS
	25℃	LV	10.86	12.42	0.00578	0.00661	PASS
		HV	6.84	6.62	0.00364	0.00352	PASS

	Condition		Freq.Error (Hz)	Freq.Error (Hz)	Frequency Stability （ppm）	Frequency Stability （ppm）	Verdict
	Sub-carrier spacing(KHz)	3.75					
	Temperature	Voltage	BPSK	QPSK	BPSK	QPSK	
NB-IoT Band 12	Normal（25℃）	Normal	15.62	3.80	0.00831	0.00202	PASS
	Extreme（50℃）		10.16	17.79	0.00540	0.00946	PASS
	Extreme（40℃）		8.09	4.60	0.00431	0.00245	PASS
	Extreme（30℃）		11.29	13.15	0.00600	0.00700	PASS
	Extreme（20℃）		16.90	17.73	0.00899	0.00943	PASS
	Extreme（10℃）		7.65	3.79	0.00407	0.00201	PASS
	Extreme（0℃）		7.58	14.11	0.00403	0.00751	PASS
	Extreme（-10℃）		15.22	1.77	0.00810	0.00094	PASS
	Extreme（-20℃）		16.04	12.86	0.00853	0.00684	PASS
	Extreme（-30℃）		7.27	10.95	0.00387	0.00583	PASS
	25℃	LV	4.05	4.28	0.00216	0.00228	PASS
		HV	4.18	11.85	0.00222	0.00630	PASS

This report shall not be reproduced except in full, without the written approval of TA Technology (Shanghai) Co., Ltd.

	Condition		Freq.Error (Hz)	Freq.Error (Hz)	Frequency Stability （ppm）	Frequency Stability （ppm）	Verdict
	Sub-carrier spacing(KHz)	3.75					
	Temperature	Voltage	BPSK	QPSK	BPSK	QPSK	
NB-IoT Band 13	Normal（25℃）	Normal	1.55	7.53	0.00083	0.00400	PASS
	Extreme（50℃）		4.99	16.05	0.00266	0.00854	PASS
	Extreme（40℃）		12.37	3.99	0.00658	0.00212	PASS
	Extreme（30℃）		11.86	8.78	0.00631	0.00467	PASS
	Extreme（20℃）		6.77	8.15	0.00360	0.00433	PASS
	Extreme（10℃）		5.17	12.28	0.00275	0.00653	PASS
	Extreme（0℃）		5.28	14.10	0.00281	0.00750	PASS
	Extreme（-10℃）		3.23	5.79	0.00172	0.00308	PASS
	Extreme（-20℃）		17.21	2.68	0.00915	0.00143	PASS
	Extreme（-30℃）		7.52	5.31	0.00400	0.00282	PASS
	25℃	LV	6.10	12.37	0.00325	0.00658	PASS
		HV	5.49	16.61	0.00292	0.00883	PASS

	Condition		Freq.Error (Hz)	Freq.Error (Hz)	Frequency Stability （ppm）	Frequency Stability （ppm）	Verdict
	Sub-carrier spacing(KHz)	3.75					
	Temperature	Voltage	BPSK	QPSK	BPSK	QPSK	
NB-IoT Band 17	Normal（25℃）	Normal	15.52	9.36	0.00826	0.00498	PASS
	Extreme（50℃）		4.04	11.92	0.00215	0.00634	PASS
	Extreme（40℃）		15.22	3.97	0.00810	0.00211	PASS
	Extreme（30℃）		3.70	8.67	0.00197	0.00461	PASS
	Extreme（20℃）		11.25	16.73	0.00598	0.00890	PASS
	Extreme（10℃）		3.59	1.31	0.00191	0.00070	PASS
	Extreme（0℃）		9.82	10.93	0.00522	0.00582	PASS
	Extreme（-10℃）		9.96	4.40	0.00530	0.00234	PASS
	Extreme（-20℃）		14.62	17.70	0.00778	0.00942	PASS
	Extreme（-30℃）		17.42	17.77	0.00926	0.00945	PASS
	25℃	LV	5.47	7.82	0.00291	0.00416	PASS
		HV	14.25	14.48	0.00758	0.00770	PASS

This report shall not be reproduced except in full, without the written approval of TA Technology (Shanghai) Co., Ltd.

	Condition		Freq.Error (Hz)	Freq.Error (Hz)	Frequency Stability （ppm）	Frequency Stability （ppm）	Verdict
	Sub-carrier spacing(KHz)	3.75					
	Temperature	Voltage	BPSK	QPSK	BPSK	QPSK	
NB-IoT Band 66	Normal（25℃）	Normal	7.12	1.23	0.00379	0.00065	PASS
	Extreme（50℃）		8.29	15.48	0.00441	0.00823	PASS
	Extreme（40℃）		4.44	14.54	0.00236	0.00773	PASS
	Extreme（30℃）		15.64	5.02	0.00832	0.00267	PASS
	Extreme（20℃）		14.95	17.05	0.00795	0.00907	PASS
	Extreme（10℃）		16.21	6.85	0.00862	0.00364	PASS
	Extreme（0℃）		6.24	7.29	0.00332	0.00388	PASS
	Extreme（-10℃）		6.01	16.21	0.00320	0.00862	PASS
	Extreme（-20℃）		7.65	12.83	0.00407	0.00683	PASS
	Extreme（-30℃）		3.95	13.91	0.00210	0.00740	PASS
	25℃	LV	15.03	8.82	0.00799	0.00469	PASS
		HV	1.68	5.30	0.00090	0.00282	PASS

This report shall not be reproduced except in full, without the written approval of TA Technology (Shanghai) Co., Ltd.

	Condition		Freq.Error (Hz)	Freq.Error (Hz)	Frequency Stability （ppm）	Frequency Stability （ppm）	Verdict
	Sub-carrier spacing(KHz)	15					
	Temperature	Voltage	BPSK	QPSK	BPSK	QPSK	
NB-IoT Band 4	Normal（25℃）	Normal	17.30	6.23	0.00920	0.00331	PASS
	Extreme（50℃）		2.22	3.29	0.00118	0.00175	PASS
	Extreme（40℃）		5.60	7.69	0.00298	0.00409	PASS
	Extreme（30℃）		13.41	16.43	0.00713	0.00874	PASS
	Extreme（20℃）		17.51	14.68	0.00931	0.00781	PASS
	Extreme（10℃）		1.44	2.66	0.00077	0.00142	PASS
	Extreme（0℃）		14.63	16.49	0.00778	0.00877	PASS
	Extreme（-10℃）		11.13	6.14	0.00592	0.00327	PASS
	Extreme（-20℃）		3.24	16.90	0.00173	0.00899	PASS
	Extreme（-30℃）		1.01	9.27	0.00054	0.00493	PASS
	25℃	LV	7.56	16.87	0.00402	0.00898	PASS
		HV	9.33	17.89	0.00496	0.00952	PASS

	Condition		Freq.Error (Hz)	Freq.Error (Hz)	Frequency Stability （ppm）	Frequency Stability （ppm）	Verdict
	Sub-carrier spacing(KHz)	15					
	Temperature	Voltage	BPSK	QPSK	BPSK	QPSK	
NB-IoT Band 12	Normal（25℃）	Normal	14.35	12.44	0.00763	0.00662	PASS
	Extreme（50℃）		11.39	2.11	0.00606	0.00112	PASS
	Extreme（40℃）		2.65	14.51	0.00141	0.00772	PASS
	Extreme（30℃）		10.87	2.79	0.00578	0.00149	PASS
	Extreme（20℃）		17.79	6.93	0.00946	0.00369	PASS
	Extreme（10℃）		10.85	9.81	0.00577	0.00522	PASS
	Extreme（0℃）		12.87	1.35	0.00685	0.00072	PASS
	Extreme（-10℃）		15.34	11.44	0.00816	0.00608	PASS
	Extreme（-20℃）		4.45	14.84	0.00237	0.00789	PASS
	Extreme（-30℃）		6.72	1.84	0.00357	0.00098	PASS
	25℃	LV	3.08	5.68	0.00164	0.00302	PASS
		HV	15.16	12.43	0.00806	0.00661	PASS

This report shall not be reproduced except in full, without the written approval of TA Technology (Shanghai) Co., Ltd.

	Condition		Freq.Error (Hz)	Freq.Error (Hz)	Frequency Stability （ppm）	Frequency Stability （ppm）	Verdict
	Sub-carrier spacing(KHz)	15					
	Temperature	Voltage	BPSK	QPSK	BPSK	QPSK	
NB-IoT Band 13	Normal（25℃）	Normal	9.44	1.70	0.00502	0.00090	PASS
	Extreme（50℃）		6.65	15.36	0.00354	0.00817	PASS
	Extreme（40℃）		14.76	16.98	0.00785	0.00903	PASS
	Extreme（30℃）		1.32	2.66	0.00070	0.00142	PASS
	Extreme（20℃）		7.37	13.07	0.00392	0.00695	PASS
	Extreme（10℃）		8.36	17.04	0.00445	0.00907	PASS
	Extreme（0℃）		8.37	2.98	0.00445	0.00159	PASS
	Extreme（-10℃）		14.17	2.53	0.00754	0.00135	PASS
	Extreme（-20℃）		1.59	9.90	0.00084	0.00527	PASS
	Extreme（-30℃）		1.95	11.59	0.00104	0.00617	PASS
	25℃	LV	7.34	13.22	0.00390	0.00703	PASS
		HV	11.99	10.15	0.00638	0.00540	PASS

	Condition		Freq.Error (Hz)	Freq.Error (Hz)	Frequency Stability （ppm）	Frequency Stability （ppm）	Verdict
	BANDWIDTH	15					
	Temperature	Voltage	BPSK	QPSK	BPSK	QPSK	
NB-IoT Band 17	Normal（25℃）	Normal	7.08	6.97	0.00377	0.00371	PASS
	Extreme（50℃）		9.10	10.48	0.00484	0.00558	PASS
	Extreme（40℃）		2.45	12.32	0.00130	0.00655	PASS
	Extreme（30℃）		2.32	12.07	0.00123	0.00642	PASS
	Extreme（20℃）		17.68	14.89	0.00941	0.00792	PASS
	Extreme（10℃）		6.56	16.65	0.00349	0.00885	PASS
	Extreme（0℃）		9.60	10.90	0.00511	0.00580	PASS
	Extreme（-10℃）		10.92	15.50	0.00581	0.00825	PASS
	Extreme（-20℃）		6.27	14.25	0.00334	0.00758	PASS
	Extreme（-30℃）		3.24	12.43	0.00172	0.00661	PASS
	25℃	LV	6.82	8.38	0.00363	0.00446	PASS
		HV	1.02	1.19	0.00054	0.00063	PASS

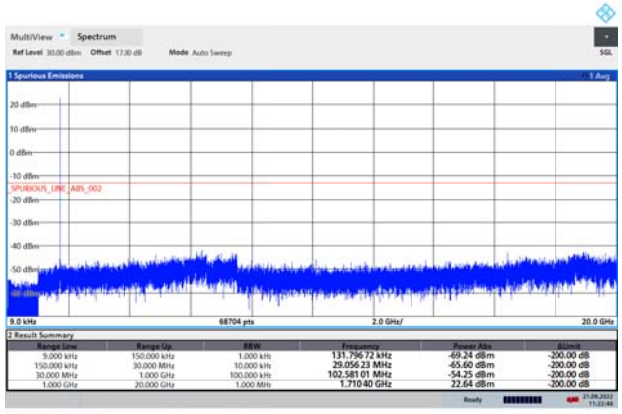
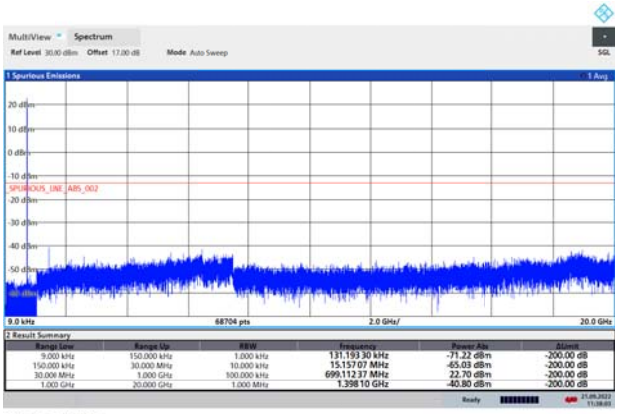
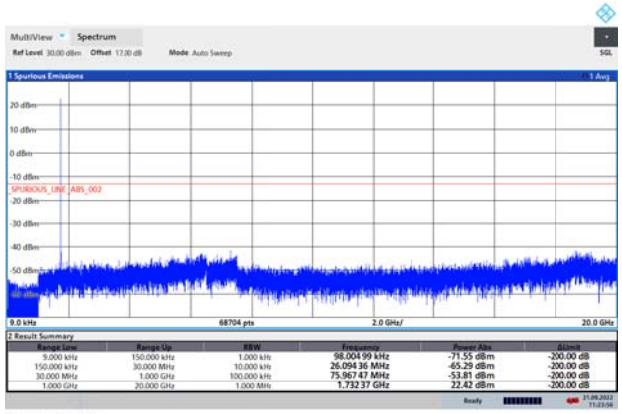
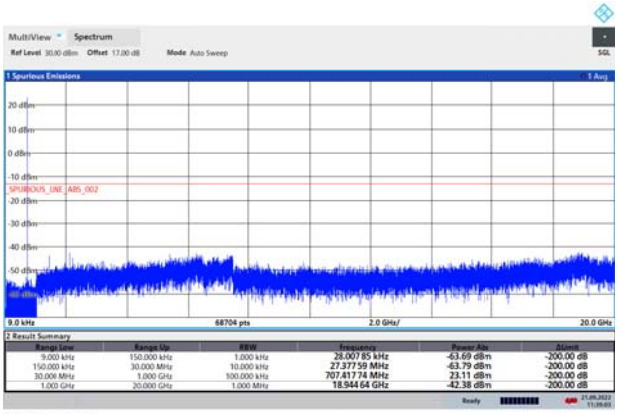
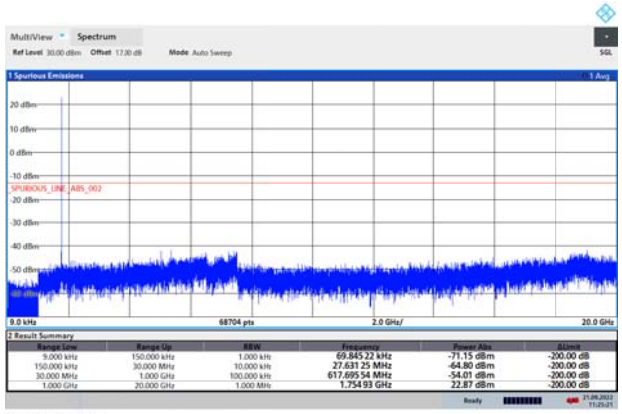
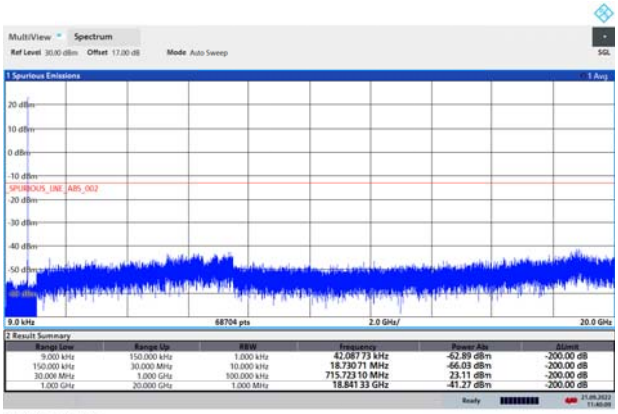
This report shall not be reproduced except in full, without the written approval of TA Technology (Shanghai) Co., Ltd.

	Condition		Freq.Error (Hz)	Freq.Error (Hz)	Frequency Stability （ppm）	Frequency Stability （ppm）	Verdict
	Sub-carrier spacing(KHz)	15					
	Temperature	Voltage	BPSK	QPSK	BPSK	QPSK	
NB-IoT Band 66	Normal（25℃）	Normal	14.80	10.74	0.00787	0.00572	PASS
	Extreme（50℃）		14.60	17.60	0.00777	0.00936	PASS
	Extreme（40℃）		4.70	12.92	0.00250	0.00687	PASS
	Extreme（30℃）		1.25	11.28	0.00067	0.00600	PASS
	Extreme（20℃）		4.28	7.58	0.00228	0.00403	PASS
	Extreme（10℃）		16.19	9.84	0.00861	0.00523	PASS
	Extreme（0℃）		2.86	1.08	0.00152	0.00058	PASS
	Extreme（-10℃）		17.75	16.46	0.00944	0.00876	PASS
	Extreme（-20℃）		4.94	13.84	0.00263	0.00736	PASS
	Extreme（-30℃）		4.91	13.29	0.00261	0.00707	PASS
	25℃	LV	14.46	14.29	0.00769	0.00760	PASS
		HV	4.80	8.59	0.00255	0.00457	PASS

This report shall not be reproduced except in full, without the written approval of TA Technology (Shanghai) Co., Ltd.

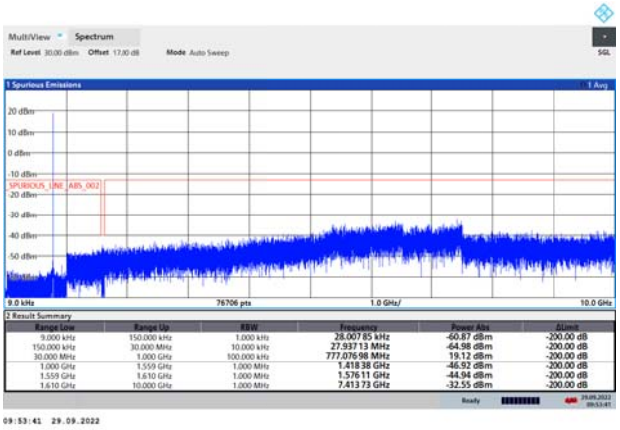
6.6 Spurious Emissions at Antenna Terminals

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.

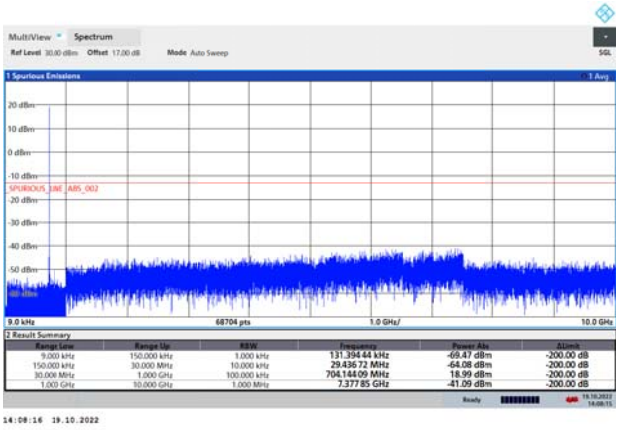
NB-IoT Band 4 CH-Low 9kHz~20GHz	NB-IoT Band 12 CH-Low 9kHz~20GHz
	
NB-IoT Band 4 CH-Middle 9kHz~20GHz	NB-IoT Band 12 CH-Middle 9kHz~20GHz
	
NB-IoT Band 4 CH-High 9kHz~20GHz	NB-IoT Band 12 CH-High 9kHz~20GHz
	

This report shall not be reproduced except in full, without the written approval of TA Technology (Shanghai) Co., Ltd.

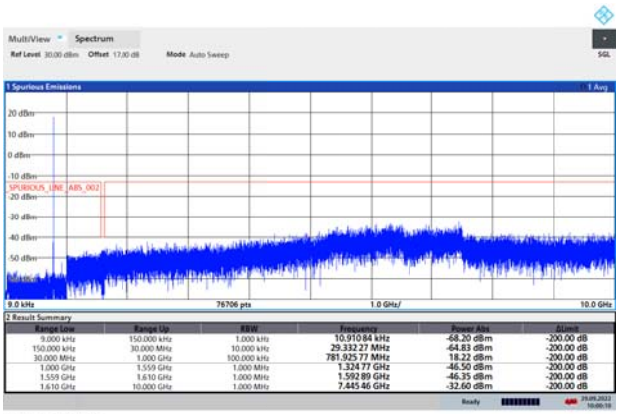
NB-IoT Band 13 CH-Low 9kHz~12.75GHz



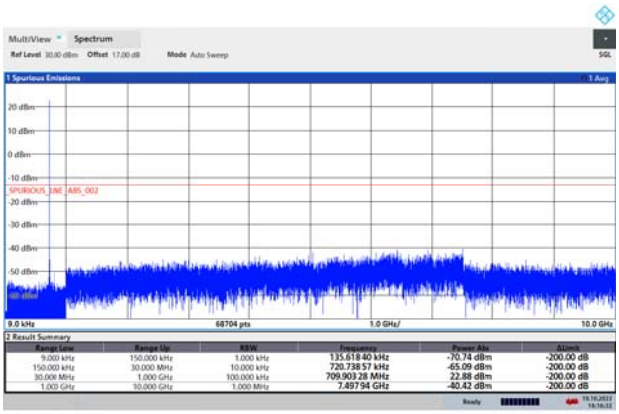
NB-IoT Band 17CH-Low 9kHz~12.75GHz



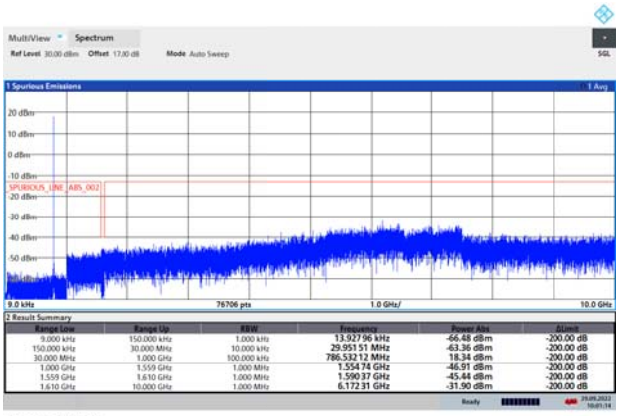
NB-IoT Band 13 CH-Middle 9kHz~12.75GHz



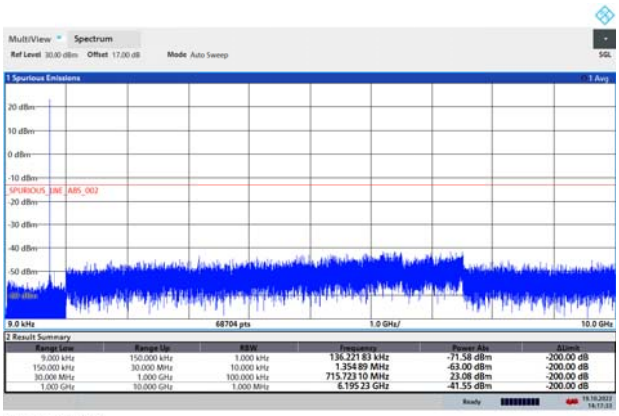
NB-IoT Band 17CH-Middle 9kHz~12.75GHz



NB-IoT Band 13 CH-High 9kHz~12.75GHz

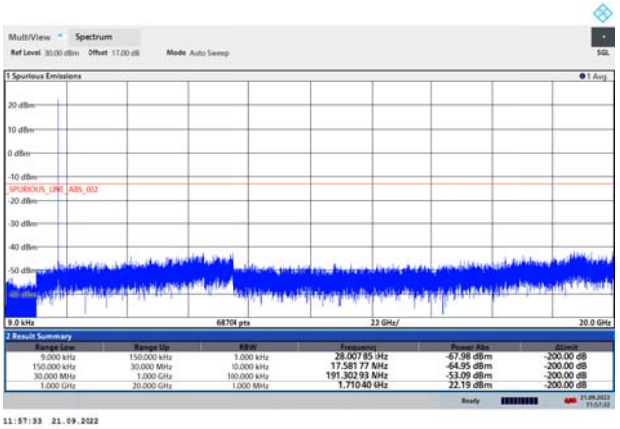


NB-IoT Band 17CH-High 9kHz~12.75GHz

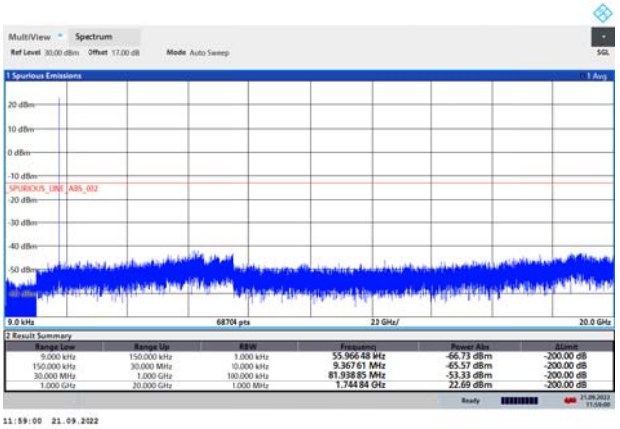


This report shall not be reproduced except in full, without the written approval of TA Technology (Shanghai) Co., Ltd.

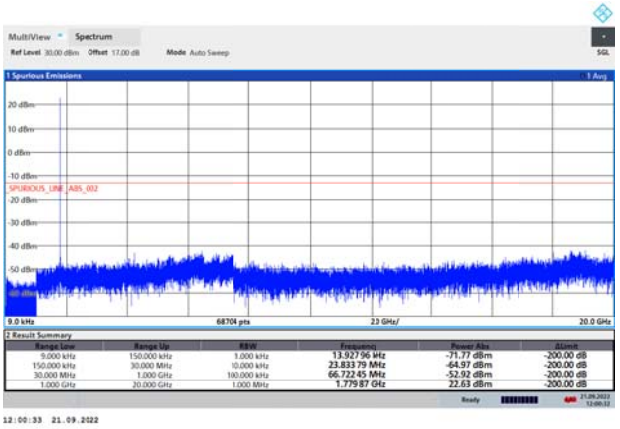
NB-IoT Band 66 CH-Low 9kHz~20GHz



NB-IoT Band 66 CH-Middle 9kHz~20GHz



NB-IoT Band 66 CH-High 9kHz~20GHz



This report shall not be reproduced except in full, without the written approval of TA Technology (Shanghai) Co., Ltd.

6.7 Radiated Spurious Emission

Sweep the whole frequency band through the range from 9kHz to the 10th harmonic of the carrier, the emissions below the noise floor will not be recorded in the report.

NB-IoT Band 4 3.75KHz+QPSK CH-Low

Harmonic	Frequency (MHz)	SG (dBm)	Cable Loss (dB)	Gain (dBi)	Antenna Polarization	EIRP Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (deg)
2	3420.00	-56.72	2.70	12.70	Vertical	-46.72	-13.00	33.72	0
3	5130.00	-58.10	3.20	12.50	Vertical	-48.80	-13.00	35.80	45
4	6840.00	-58.44	4.20	11.80	Vertical	-50.84	-13.00	37.84	270
5	8550.00	-56.15	4.40	12.50	Vertical	-48.05	-13.00	35.05	315
6	10260.00	-52.21	4.70	11.30	Vertical	-45.61	-13.00	32.61	135
7	11970.00	-54.23	5.20	13.80	Vertical	-45.63	-13.00	32.63	90
8	13680.00	-46.78	5.70	11.30	Vertical	-41.18	-13.00	28.18	0
9	15390.00	-56.16	6.10	16.80	Vertical	-45.46	-13.00	32.46	45
10	17100.00	-49.82	6.10	14.20	Vertical	-41.72	-13.00	28.72	135
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 Vertical position.									

NB-IoT Band 4 3.75KHz+QPSK CH- Middle

Harmonic	Frequency (MHz)	SG (dBm)	Cable Loss (dB)	Gain (dBi)	Antenna Polarization	EIRP Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (deg)
2	3465.00	-56.33	2.70	12.70	Vertical	-46.33	-13.00	33.33	0
3	5197.50	-61.68	3.20	12.50	Vertical	-52.38	-13.00	39.38	45
4	6930.00	-60.73	4.20	11.80	Vertical	-53.13	-13.00	40.13	225
5	8662.50	-54.90	4.40	12.50	Vertical	-46.80	-13.00	33.80	90
6	10395.00	-50.94	4.70	11.30	Vertical	-44.34	-13.00	31.34	0
7	12127.50	-52.95	5.20	13.80	Vertical	-44.35	-13.00	31.35	0
8	13860.00	-46.21	5.70	11.30	Vertical	-40.61	-13.00	27.61	45
9	15592.50	-56.59	6.10	16.80	Vertical	-45.89	-13.00	32.89	315
10	17325.00	-51.20	6.10	14.20	Vertical	-43.10	-13.00	30.10	180
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 Vertical position.									

This report shall not be reproduced except in full, without the written approval of TA Technology (Shanghai) Co., Ltd.

NB-IoT Band 4 3.75KHz+QPSK CH- High

Harmonic	Frequency (MHz)	SG (dBm)	Cable Loss (dB)	Gain (dBi)	Antenna Polarization	EIRP Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (deg)
2	3509.80	-56.09	2.70	12.70	Vertical	-46.09	-13.00	33.09	225
3	5264.70	-61.07	3.20	12.50	Vertical	-51.77	-13.00	38.77	90
4	7019.60	-58.43	4.20	11.80	Vertical	-50.83	-13.00	37.83	0
5	8774.50	-55.57	4.40	12.50	Vertical	-47.47	-13.00	34.47	45
6	10529.40	-50.84	4.70	11.30	Vertical	-44.24	-13.00	31.24	315
7	12284.30	-53.75	5.20	13.80	Vertical	-45.15	-13.00	32.15	90
8	14039.20	-46.58	5.70	11.30	Vertical	-40.98	-13.00	27.98	0
9	15794.10	-56.45	6.10	16.80	Vertical	-45.75	-13.00	32.75	45
10	17549.00	-51.56	6.10	14.20	Vertical	-43.46	-13.00	30.46	270
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 Vertical position.									

NB-IoT Band 12 3.75KHz+QPSK CH- Low

Harmonic	Frequency (MHz)	SG (dBm)	Cable Loss (dB)	Gain (dBi)	Antenna Polarization	ERP Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (deg)
2	1398.20	-56.16	1.70	8.70	Vertical	-51.31	-13.00	38.31	45
3	2097.30	-58.96	2.10	11.10	Vertical	-52.11	-13.00	39.11	180
4	2796.40	-66.99	2.30	13.10	Vertical	-58.34	-13.00	45.34	0
5	3495.50	-65.20	2.60	12.70	Vertical	-57.25	-13.00	44.25	90
6	4194.60	-63.62	3.30	12.50	Vertical	-56.57	-13.00	43.57	180
7	4893.70	-63.05	3.40	12.50	Vertical	-56.10	-13.00	43.10	45
8	5592.80	-61.89	3.30	12.50	Vertical	-54.84	-13.00	41.84	270
9	6291.90	-59.48	3.80	11.50	Vertical	-53.93	-13.00	40.93	135
10	6991.00	-61.01	4.20	11.80	Vertical	-55.56	-13.00	42.56	90
Note: 1.The other Spurious RF Radiated emissions level is no more than noise floor. 2. The worst emission was found in the antenna is Vertical position.									

This report shall not be reproduced except in full, without the written approval of TA Technology (Shanghai) Co., Ltd.

NB-IoT Band 12 3.75KHz+QPSK CH- Middle

Harmonic	Frequency (MHz)	SG (dBm)	Cable Loss (dB)	Gain (dBi)	Antenna Polarization	ERP Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (deg)
2	1415.00	-57.93	1.70	8.70	Vertical	-53.08	-13.00	40.08	180
3	2122.50	-58.71	2.10	11.10	Vertical	-51.86	-13.00	38.86	270
4	2830.00	-67.08	2.30	13.10	Vertical	-58.43	-13.00	45.43	90
5	3525.50	-65.89	2.60	12.70	Vertical	-57.94	-13.00	44.94	90
6	4230.60	-63.83	3.30	12.50	Vertical	-56.78	-13.00	43.78	270
7	4935.70	-61.68	3.40	12.50	Vertical	-54.73	-13.00	41.73	45
8	5640.80	-62.48	3.30	12.50	Vertical	-55.43	-13.00	42.43	135
9	6345.90	-59.62	3.80	11.50	Vertical	-54.07	-13.00	41.07	90
10	7051.00	-56.48	4.20	11.80	Vertical	-51.03	-13.00	38.03	180
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 Vertical position.									

NB-IoT Band 12 3.75KHz+QPSK CH- High

Harmonic	Frequency (MHz)	SG (dBm)	Cable Loss (dB)	Gain (dBi)	Antenna Polarization	ERP Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (deg)
2	1431.80	-60.13	1.70	8.70	Vertical	-55.28	-13.00	42.28	90
3	2147.70	-53.84	2.10	11.10	Vertical	-46.99	-13.00	33.99	0
4	2863.60	-67.21	2.30	13.10	Vertical	-58.56	-13.00	45.56	270
5	3579.50	-65.69	2.60	12.70	Vertical	-57.74	-13.00	44.74	90
6	4295.40	-64.26	3.30	12.50	Vertical	-57.21	-13.00	44.21	180
7	5011.30	-61.98	3.40	12.50	Vertical	-55.03	-13.00	42.03	90
8	5727.20	-61.31	3.30	12.50	Vertical	-54.26	-13.00	41.26	45
9	6443.10	-60.87	3.80	11.50	Vertical	-55.32	-13.00	42.32	270
10	7159.00	-55.87	4.20	11.80	Vertical	-50.42	-13.00	37.42	90
Note: 1.The other Spurious RF Radiated emissions level is no more than noise floor. 2. The worst emission was found in the antenna is Vertical position.									

This report shall not be reproduced except in full, without the written approval of TA Technology (Shanghai) Co., Ltd.

NB-IoT Band 13 3.75KHz+QPSK CH- Low

Harmonic	Frequency (MHz)	SG (dBm)	Cable Loss (dB)	Gain (dBi)	Antenna Polarization	ERP Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (deg)
2	1554.20	-59.29	1.70	8.70	Vertical	-54.44	-13.00	41.44	90
3	2331.30	-50.32	2.10	12.00	Vertical	-42.57	-13.00	29.57	315
4	3108.40	-66.37	2.30	13.10	Vertical	-57.72	-13.00	44.72	45
5	3885.50	-64.01	2.90	12.50	Vertical	-56.56	-13.00	43.56	270
6	4662.60	-62.96	3.10	12.50	Vertical	-55.71	-13.00	42.71	315
7	5439.70	-61.83	3.30	12.50	Vertical	-54.78	-13.00	41.78	90
8	6216.80	-60.95	3.50	12.80	Vertical	-53.80	-13.00	40.80	45
9	6993.90	-60.31	4.20	11.80	Vertical	-54.86	-13.00	41.86	180
10	7771.00	-56.60	4.40	12.30	Vertical	-50.85	-13.00	37.85	90
Note: 1.The other Spurious RF Radiated emissions level is no more than noise floor. 2. The worst emission was found in the antenna is Vertical position.									

NB-IoT Band 13 3.75KHz+QPSK CH- Middle

Harmonic	Frequency (MHz)	SG (dBm)	Cable Loss (dB)	Gain (dBi)	Antenna Polarization	EIRP Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (deg)
2	1564.00	-61.63	1.70	8.70	Vertical	-54.63	-40.00	14.63	45
Harmonic	**Frequency (MHz)**	**SG (dBm)**	**Cable Loss (dB)**	**Gain (dBi)**	**Antenna Polarization**	**ERP Level (dBm)**	**Limit (dBm)**	**Margin (dB)**	**Azimuth (deg)**
3	2346.00	-53.66	2.10	12.00	Vertical	-45.91	-13.00	32.91	180
4	3128.00	-66.61	2.30	13.10	Vertical	-57.96	-13.00	44.96	270
5	3910.00	-64.36	2.90	12.50	Vertical	-56.91	-13.00	43.91	45
6	4692.00	-60.28	3.10	12.50	Vertical	-53.03	-13.00	40.03	315
7	5474.00	-60.20	3.30	12.50	Vertical	-53.15	-13.00	40.15	180
8	6256.00	-58.66	3.50	12.80	Vertical	-51.51	-13.00	38.51	45
9	7038.00	-56.00	4.20	11.80	Vertical	-50.55	-13.00	37.55	270
10	7820.00	-55.43	4.40	12.30	Vertical	-49.68	-13.00	36.68	180
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 Vertical position.									

This report shall not be reproduced except in full, without the written approval of TA Technology (Shanghai) Co., Ltd.

NB-IoT Band 13 3.75KHz+QPSK CH- High

Harmonic	Frequency (MHz)	SG (dBm)	Cable Loss (dB)	Gain (dBi)	Antenna Polarization	EIRP Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (deg)
2	1573.80	-61.91	1.70	8.70	Vertical	-54.91	-40.00	14.91	0
Harmonic	**Frequency (MHz)**	**SG (dBm)**	**Cable Loss (dB)**	**Gain (dBi)**	**Antenna Polarization**	**ERP Level (dBm)**	**Limit (dBm)**	**Margin (dB)**	**Azimuth (deg)**
3	2360.70	-53.46	2.10	12.00	Vertical	-45.71	-13.00	32.71	270
4	3147.60	-67.28	2.30	13.10	Vertical	-58.63	-13.00	45.63	90
5	3934.50	-64.91	2.90	12.50	Vertical	-57.46	-13.00	44.46	180
6	4721.40	-59.51	3.10	12.50	Vertical	-52.26	-13.00	39.26	90
7	5508.30	-59.46	3.30	12.50	Vertical	-52.41	-13.00	39.41	180
8	6295.20	-60.86	3.50	12.80	Vertical	-53.71	-13.00	40.71	45
9	7082.10	-56.70	4.20	11.80	Vertical	-51.25	-13.00	38.25	315
10	7869.00	-55.50	4.40	12.30	Vertical	-49.75	-13.00	36.75	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 Vertical position.									

NB-IoT Band 17 3.75KHz+QPSK CH- Low

Harmonic	Frequency (MHz)	SG (dBm)	Cable Loss (dB)	Gain (dBi)	Antenna Polarization	ERP Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (deg)
2	1408.20	-56.17	1.70	8.70	Vertical	-51.32	-13.00	38.32	250
3	2112.30	-58.08	2.10	11.10	Vertical	-51.23	-13.00	38.23	35
4	2816.40	-67.66	2.30	13.10	Vertical	-59.01	-13.00	46.01	315
5	3520.50	-65.95	2.60	12.70	Vertical	-58.00	-13.00	45.00	3
6	4224.60	-63.80	3.30	12.50	Vertical	-56.75	-13.00	43.75	8
7	4928.70	-62.04	3.40	12.50	Vertical	-55.09	-13.00	42.09	283
8	5632.80	-60.92	3.30	12.50	Vertical	-53.87	-13.00	40.87	46
9	6336.90	-59.39	3.80	11.50	Vertical	-53.84	-13.00	40.84	90
10	7041.00	-57.24	4.20	11.80	Vertical	-51.79	-13.00	38.79	80
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 Vertical position.									

This report shall not be reproduced except in full, without the written approval of TA Technology (Shanghai) Co., Ltd.

NB-IoT Band 17 3.75KHz+QPSK CH- Middle

Harmonic	Frequency (MHz)	SG (dBm)	Cable Loss (dB)	Gain (dBi)	Antenna Polarization	ERP Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (deg)
2	1420.00	-57.77	1.70	8.70	Vertical	-52.92	-13.00	39.92	1
3	2130.00	-59.01	2.10	11.10	Vertical	-52.16	-13.00	39.16	114
4	2840.00	-68.12	2.30	13.10	Vertical	-59.47	-13.00	46.47	25
5	3550.00	-65.37	2.60	12.70	Vertical	-57.42	-13.00	44.42	56
6	4260.00	-63.98	3.30	12.50	Vertical	-56.93	-13.00	43.93	96
7	4970.00	-62.63	3.40	12.50	Vertical	-55.68	-13.00	42.68	175
8	5680.00	-61.87	3.30	12.50	Vertical	-54.82	-13.00	41.82	33
9	6390.00	-60.31	3.80	11.50	Vertical	-54.76	-13.00	41.76	45
10	7100.00	-56.34	4.20	11.80	Vertical	-50.89	-13.00	37.89	280
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 Vertical position.									

NB-IoT Band 17 3.75KHz+QPSK CH- High

Harmonic	Frequency (MHz)	SG (dBm)	Cable Loss (dB)	Gain (dBi)	Antenna Polarization	ERP Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (deg)
2	1431.80	-60.52	1.70	8.70	Vertical	-55.67	-13.00	42.67	210
3	2147.70	-55.48	2.10	11.10	Vertical	-48.63	-13.00	35.63	204
4	2863.60	-67.94	2.30	13.10	Vertical	-59.29	-13.00	46.29	48
5	3579.50	-65.44	2.60	12.70	Vertical	-57.49	-13.00	44.49	8
6	4295.40	-63.92	3.30	12.50	Vertical	-56.87	-13.00	43.87	309
7	5011.30	-61.74	3.40	12.50	Vertical	-54.79	-13.00	41.79	280
8	5727.20	-61.38	3.30	12.50	Vertical	-54.33	-13.00	41.33	47
9	6443.10	-60.14	3.80	11.50	Vertical	-54.59	-13.00	41.59	57
10	7159.00	-56.77	4.20	11.80	Vertical	-51.32	-13.00	38.32	13
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 Vertical position.									

This report shall not be reproduced except in full, without the written approval of TA Technology (Shanghai) Co., Ltd.

NB-IoT Band 66 3.75KHz+QPSK CH-Middle

Harmonic	Frequency (MHz)	SG (dBm)	Cable Loss (dB)	Gain (dBi)	Antenna Polarization	EIRP Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (deg)
2	3420.20	-56.60	2.70	12.70	Vertical	-46.60	-13.00	33.60	315
3	5130.30	-57.46	3.20	12.50	Vertical	-48.16	-13.00	35.16	180
4	6840.40	-58.61	4.20	11.80	Vertical	-51.01	-13.00	38.01	180
5	8550.50	-56.87	4.40	12.50	Vertical	-48.77	-13.00	35.77	90
6	10260.60	-54.04	4.70	11.80	Vertical	-46.94	-13.00	33.94	315
7	11970.70	-53.43	5.20	13.80	Vertical	-44.83	-13.00	31.83	270
8	13680.80	-49.14	5.70	13.20	Vertical	-41.64	-13.00	28.64	0
9	15390.90	-55.61	6.10	16.80	Vertical	-44.91	-13.00	31.91	180
10	17101.00	-50.65	6.10	14.20	Vertical	-42.55	-13.00	29.55	90
Note: 1.The other Spurious RF Radiated emissions level is no more than noise floor. 2. The worst emission was found in the antenna is Vertical position.									

NB-IoT Band 66 3.75KHz+QPSK CH-Middle

Harmonic	Frequency (MHz)	SG (dBm)	Cable Loss (dB)	Gain (dBi)	Antenna Polarization	EIRP Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (deg)
2	3510.00	-55.70	2.70	12.70	Vertical	-45.70	-13.00	32.70	180
3	5265.00	-61.28	3.20	12.50	Vertical	-51.98	-13.00	38.98	45
4	7020.00	-58.97	4.20	11.80	Vertical	-51.37	-13.00	38.37	270
5	8775.00	-56.67	4.40	12.50	Vertical	-48.57	-13.00	35.57	0
6	10530.00	-51.68	4.70	11.80	Vertical	-44.58	-13.00	31.58	315
7	12285.00	-54.26	5.20	13.80	Vertical	-45.66	-13.00	32.66	45
8	14040.00	-48.76	5.70	13.20	Vertical	-41.26	-13.00	28.26	90
9	15795.00	-56.22	6.10	16.80	Vertical	-45.52	-13.00	32.52	180
10	17550.00	-51.97	6.10	14.20	Vertical	-43.87	-13.00	30.87	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 Vertical position.									

This report shall not be reproduced except in full, without the written approval of TA Technology (Shanghai) Co., Ltd.

NB-IoT Band 66 3.75KHz+QPSK CH-Middle

Harmonic	Frequency (MHz)	SG (dBm)	Cable Loss (dB)	Gain (dBi)	Antenna Polarization	EIRP Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (deg)
2	3559.80	-56.64	2.70	12.70	Vertical	-46.64	-13.00	33.64	315
3	5339.70	-61.45	3.20	12.50	Vertical	-52.15	-13.00	39.15	90
4	7119.60	-56.14	4.20	11.80	Vertical	-48.54	-13.00	35.54	135
5	8899.50	-54.95	4.40	12.50	Vertical	-46.85	-13.00	33.85	45
6	10679.40	-52.29	4.70	11.80	Vertical	-45.19	-13.00	32.19	0
7	12459.30	-55.77	5.20	13.80	Vertical	-47.17	-13.00	34.17	90
8	14239.20	-48.36	5.70	13.20	Vertical	-40.86	-13.00	27.86	180
9	16019.10	-57.27	6.10	16.80	Vertical	-46.57	-13.00	33.57	270
10	17799.00	-51.24	6.10	14.20	Vertical	-43.14	-13.00	30.14	90
Note: 1.The other Spurious RF Radiated emissions level is no more than noise floor. 2. The worst emission was found in the antenna is Vertical position.									

This report shall not be reproduced except in full, without the written approval of TA Technology (Shanghai) Co., Ltd.

7 Main Test Instruments

Name	Manufacturer	Type	Serial Number	Calibration Date	Expiration Date
Climatic Chamber	ESPEC	SU-242	93000506	2021-12-12	2022-12-11
Comprehensive measuring instrument	R&S	CMW500	150415	2022-05-14	2023-05-13
Spectrum Analyzer	Keysight	N9020A	MY50510203	2021-12-12	2022-12-11
Universal Radio Communication Tester	Agilent	E5515C	GB44400275	2021-12-12	2022-12-11
Universal Radio Communication Tester	StarPoint	SP8315	SP8315-1225	2022-05-14	2023-05-13
Spectrum Analyzer	R&S	FSV3030	101411	2021-12-12	2022-12-11
Radiated Spurious Emissions					
Signal Analyzer	R&S	FSV30	100815	2021-12-12	2022-12-11
Loop antenna	SCHWARZBECK	FMZB1519	1519-047	2020-04-02	2023-04-01
TRILOG Broadband Antenna	Schwarzbeck	VULB 9163	01439	2021-06-30	2024-06-29
Horn Antenna	Schwarzbeck	BBHA 9120D	1594	2020-12-17	2023-12-16
Software	R&S	EMC32	10.35.10	/	/

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

This report shall not be reproduced except in full, without the written approval of TA Technology (Shanghai) Co., Ltd.

ANNEX A: The EUT Appearance

The EUT Appearance are submitted separately.

This report shall not be reproduced except in full, without the written approval of TA Technology (Shanghai) Co., Ltd.

ANNEX B: Test Setup Photos

The Test Setup Photos are submitted separately.

This report shall not be reproduced except in full, without the written approval of TA Technology (Shanghai) Co., Ltd.