MEASUREMENT REPORT

FCC PART 22 & 24

FCC ID:	XMR202009UG89
Application:	Quectel Wireless Solutions Company Limited
Application Type:	Certification
Product:	UMTS/HSPA+Module
Model No.:	UG89
Brand Name:	Quectel
FCC Rule Part(s):	Part 22 Subpart H, Part 24 Subpart E,
Test Procedure(s):	ANSI C63.26-2015, KDB 971168 D01v03r01
Test Date:	August 04 ~ August 13, 2020

Reviewed By: (Sunny Sun)

Approved By: (Robin Wu)

ACCREDITED
TESTING LABORATORY
CERTIFICATE #3628.01

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

The test report shall not be reproduced except in full without the written approval of MRT Technology (Suzhou) Co., Ltd.

Revision History

Report No.	Version	Description	Issue Date	Note
2008RSU006-U1	Rev. 01	Initial Report	08-22-2020	Valid

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General Information

Applicant:	Quectel Wireless Solutions Company Limited
Applicant Address:	Building 5, Shanghai Business Park Phase III (Area B), No.1016 Tianlin Road, Minhang District, Shanghai, China 200233
Manufacturer:	Quectel Wireless Solutions Company Limited
Manufacturer Address:	Building 5, Shanghai Business Park Phase III (Area B), No.1016 Tianlin Road, Minhang District, Shanghai, China 200233
Test Site:	MRT Technology (Suzhou) Co., Ltd
Test Site Address:	D8 Building, No.2 Tian'edang Rd., Wuzhong Economic Development Zone, Suzhou, China

Test Facility / Accreditations

Measurements were performed at MRT Laboratory located in Tian'edang Rd., Suzhou, China.

- **MRT facility is an FCC registered (MRT Designation No. CN1166) test facility with the site description report on file and has met all the requirements specified in ANSI C63.4-2014.**
- **MRT facility is an IC registered (MRT Reg. No. 11384A-1) test laboratory with the site description on file at Industry Canada.**
- **MRT facility is a VCCI registered (R-20025, G-20034, C-20020, T-20020) test laboratory with the site description on file at VCCI Council.**
- **MRT Lab is accredited to ISO 17025 by the American Association for Laboratory Accreditation (A2LA) under the American Association for Laboratory Accreditation Program (A2LA Cert. No. 3628.01) in EMC, Telecommunications, Radio and SAR testing.**

ilac-MRA A2LA

Accredited Laboratory

A2LA has accredited

MRT TECHNOLOGY (SUZHOU) CO., LTD.

Suzhou, Jiangsu, People's Republic of China

for technical competence in the field of

Electrical Testing

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2017 General requirements for the competence of testing and calibration laboratories. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (refer to joint ISO-ILAC-IAF Communiqué dated April 2017).

Presented this 24th day of July 2018.

President and CEO
For the Accreditation Council
Certificate Number 3628.01
Valid to August 31, 2020

For the tests to which this accreditation applies, please refer to the laboratory's Electrical Scope of Accreditation.

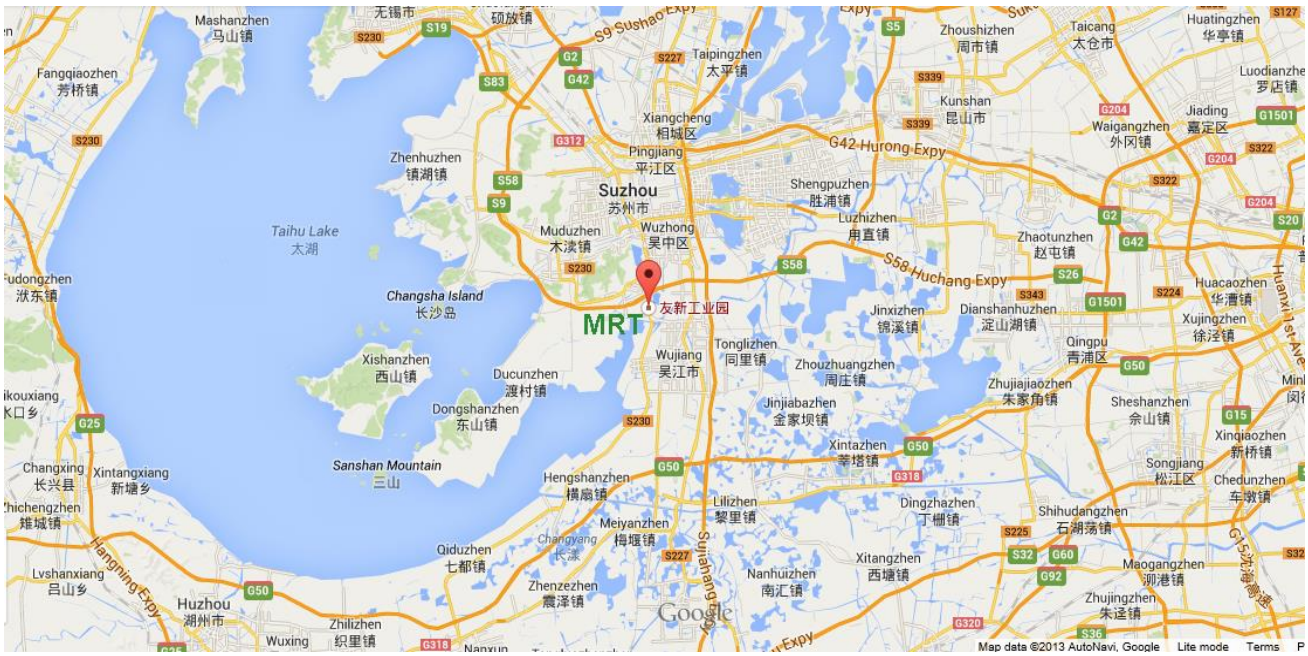
1. INTRODUCTION

1.1. Scope

Measurement and determination of electromagnetic emissions (EMC) of radio frequency devices includingintentional and/or unintentional radiators for compliance with the technical rules and regulations of the FederalCommunications Commission and the Innovation, Science and Economic Development Canada and Certification and Engineering Bureau.

1.2. MRT Test Location

The map below shows the location of the MRT LABORATORY, its proximity to the Taihu Lake. These measurement tests were conducted at the MRT Technology (Suzhou) Co., Ltd. Facility located at D8 Building, No.2 Tian'edang Rd., Wuzhong Economic Development Zone, Suzhou, China. The detailed description of the measurement facility was found to be in compliance with the requirements of § 2.948 according to ANSI C63.4-2009 on September 30, 2013.



2. PRODUCT INFORMATION

2.1. Equipment Description

Product Name:	UMTS/HSPA+ Module
Model No.:	UG89
SW:	UG89TAR02A01M16
Brand Name:	Quectel
IMEI.:	Conducted Measurement 868817040187401; 868817040187419 Radiated Measurement 868817040186833; 868817040187468
GSM Features	
Band (s):	GSM850, PCS1900
Tx Frequency Range:	GSM850: 824.2 ~ 848.8MHz, PCS1900: 1850.2 ~ 1909.8MHz
Rx Frequency Range:	GSM850: 869.2 ~ 893.8MHz, PCS1900: 1930.2 ~ 1989.8MHz
Support Slot	Support GPRS & EDGE multi-slot class 12
Modulation:	GMSK, 8-PSK
UMTS Features	
Band (s):	Band II, V
Tx Frequency Range:	WCDMA Band II: 1852.4 ~ 1907.6MHz WCDMA Band V: 826.4 ~ 846.6MHz
Rx Frequency Range:	WCDMA Band II: 1932.4 ~ 1987.6MHz WCDMA Band V: 871.4 ~ 891.6MHz
Modulation:	QPSK, 16QAM (DL only)
Operating Temperature:	-35 ~ 75 °C
Supply Voltage:	3.3 ~ 4.5Vdc, typical 3.8Vdc

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

2.2. Description of Available Antennas

Technology	Frequency Range (MHz)	Antenna Type	Max Peak Gain (dBi)
GSM850	824.2 ~ 848.8	Dipole	2.29
PCS1900	1850.2 ~ 1909.8		1.59
WCDMA Band II	1852.4 ~ 1907.6		1.59
WCDMA Band V	826.4 ~ 846.6		2.29

Note: All antenna information (Antenna type and Peak Gain) is provided by the manufacturer.

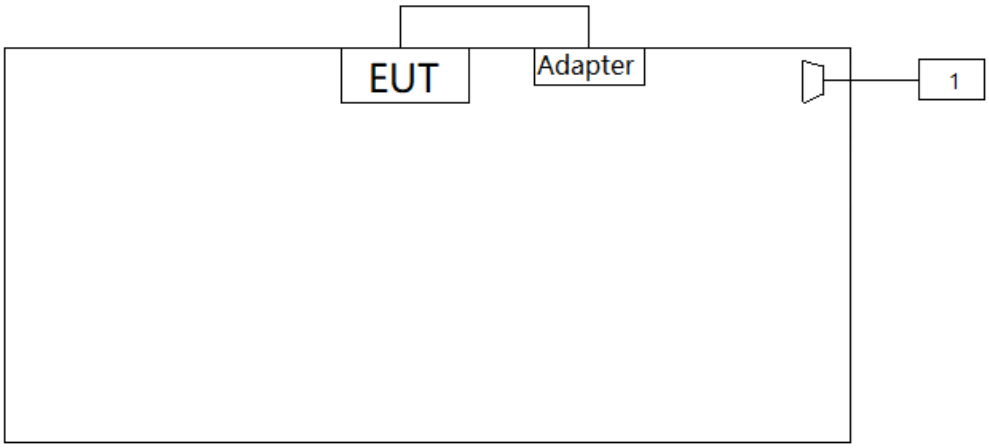
2.3. EMI Suppression Device(s)/Modifications

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

2.4. Maximum Power, Frequency Tolerance, and Emission Designator

FCC Rule	System	Modulation	Maximum Power (W)	Frequency Tolerance (ppm)	Emission Designator
Part 22	GSM850	GMSK	2.6303	0.0191	253KGXW
Part 22	GSM850 EDGE 1Tx slots	8PSK	0.6761	0.0218	248KG7W
Part 24	PCS1900	GMSK	1.2023	0.0124	256KGXW
Part 24	PCS1900 EDGE 1Tx slots	8PSK	0.4786	0.0117	249KG7W
Part 24	WCDMA Band II RMC 12.2Kbps	BPSK	0.3069	0.0103	4M15F9W
Part 22	WCDMA Band V RMC 12.2Kbps	BPSK	0.2698	0.0239	4M15F9W

2.5. Configuration of Tested System



Product		Manufacturer	Model No.
1	Wideband Radio Communication Tester	R&S	CMW 500

2.6. Test Environment Condition

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

3. TEST EQUIPMENT CALIBRATION DATE

Radiated Emission - AC1

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cali. Due Date
EMI Test Receiver	R&S	ESR7	MRTSUE06001	1 year	2021/08/01
Wideband Radio Communication Tester	R&S	CMW 500	MRTSUE06243	1 year	2020/11/07
PXA Signal Analyzer	Keysight	9030B	MRTSUE06395	1 year	2021/09/03
Loop Antenna	Schwarzbeck	FMZB 1519	MRTSUE06025	1 year	2020/11/10
Bilog Period Antenna	Schwarzbeck	VULB 9168	MRTSUE06172	1 year	2021/03/31
Broad Band Horn Antenna	Schwarzbeck	BBHA 9120D	MRTSUE06023	1 year	2020/10/13
Broad Band Horn Antenna	Schwarzbeck	BBHA 9170	MRTSUE06597	1 year	2021/02/23
Microwave System Amplifier	Agilent	83017A	MRTSUE06076	1 year	2020/11/15
Preamplifier	Schwarzbeck	BBV 9721	MRTSUE06121	1 year	2021/06/11
EMC Cable	HUBER+SUHNER	SF126-2M	MRTSUE06732	1 year	2021/04/11
Thermohygrometer	Testo	608-H1	MRTSUE06403	1 year	2021/08/08
Anechoic Chamber	TDK	Chamber-AC1	MRTSUE06212	1 year	2021/04/30

Radiated Emission - AC2

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cali. Due Date
Spectrum Analyzer	Keysight	N9038A	MRTSUE06125	1 year	2021/08/01
Wideband Radio Communication Tester	R&S	CMW 500	MRTSUE06243	1 year	2020/11/07
Loop Antenna	Schwarzbeck	FMZB 1519	MRTSUE06025	1 year	2020/11/10
Bilog Period Antenna	Schwarzbeck	VULB 9162	MRTSUE06022	1 year	2020/10/13
Horn Antenna	Schwarzbeck	BBHA9120D	MRTSUE06171	1 year	2020/10/27
Broad Band Horn Antenna	Schwarzbeck	BBHA 9170	MRTSUE06597	1 year	2021/02/23
Broadband Coaxial Preamplifier	Schwarzbeck	BBV 9718	MRTSUE06176	1 year	2020/11/15
Preamplifier	Schwarzbeck	BBV 9721	MRTSUE06121	1 year	2021/06/11
EMC Cable	HUBER+SUHNER	SF126-2M	MRTSUE06733	1 year	2021/04/10
Temperature/Humidity Meter	Minggao	ETH529	MRTSUE06170	1 year	2020/12/15
Anechoic Chamber	RIKEN	Chamber-AC2	MRTSUE06213	1 year	2021/04/30

Conducted Test Equipment

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cali. Due Date
EXA Signal Analyzer	Agilent	N9020A	MRTSUE06106	1 year	2021/04/15
EXA Signal Analyzer	Keysight	N9010B	MRTSUE06452	1 year	2021/07/11
Signal Analyzer	R&S	FSV40	MRTSUE06218	1 year	2021/04/15
Wideband Radio Communication Tester	R&S	CMW 500	MRTSUE06243	1 year	2020/11/07
Power Meter	Agilent	U2021XA	MRTSUE06030	1 year	2020/11/18
DC Power Supply	GWINSTEK	DPS-3303C	MRTSUE06064	N/A	N/A
True RMS Clamp Meter	Fluke	319	MRTSUE06080	1 year	2021/05/06
Directional Coupler	Agilent	87301D	MRTSUE06082	1 year	2021/03/25
Attenuator	MVE	6dB	MRTSUE06534	1 year	2020/12/12
Attenuator	MVE	10dB	MRTSUE06543	1 year	2020/12/12
Temperature & Humidity Chamber	BAOYT	BYH-150CL	MRTSUE06051	1 year	2020/11/07
Thermohygrometer	testo	608-H1	MRTSUE06401	1 year	2021/08/08

Software	Version	Function
EMI Software	V3	EMI Test Software

4. MEASUREMENT UNCERTAINTY

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

Radiated Emission Measurement
Measurement Uncertainty for a Level of Confidence of 95% (U=2Uc(y)): Horizontal: 30MHz~300MHz: 5.04dB 300MHz~1GHz: 4.95dB 1GHz~40GHz: 6.40dB Vertical: 30MHz~300MHz: 5.24dB 300MHz~1GHz: 6.03dB 1GHz~40GHz: 6.40dB
Spurious Emissions, Conducted
Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)): 0.78dB
Output Power
Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)): 1.13dB
Occupied Bandwidth
Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)): 0.28%

5. TEST RESULT

5.1. Summary

FCC Part Section(s)	Test Description	Test Limit	Test Condition	Test Result	Reference
2.1049	Occupied Bandwidth	N/A	Conducted	Pass	Section 5.2
2.1055, 22.355 24.235	Frequency Stability	< 2.5 ppm		Pass	Section 5.3
22.913(a)(5)	Equivalent Radiated Power	< 7 Watts Max ERP		Pass	Section 5.4
24.232(c)	Equivalent Isotropic Radiated Power	< 2 Watts Max EIRP			
2.1051, 22.917(a) 24.238(a)	Band Edge	< 43 + 10log10 (P[Watts])		Pass	Section 5.5, 5.7
2.1051, 22.917(a) 24.238(a)	Spurious Emission	< 43 + 10log10 (P[Watts])			
24.232(d)	Peak to Average Ratio	< 13dB		Pass	Section 5.6
2.1053, 22.917(a) 24.238(a)	Spurious Emissions	> 43 + 10log10 (P[Watts])	Radiated	Pass	Section 5.8

Notes:

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

5.2. Occupied Bandwidth

5.2.1. Test Limit

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

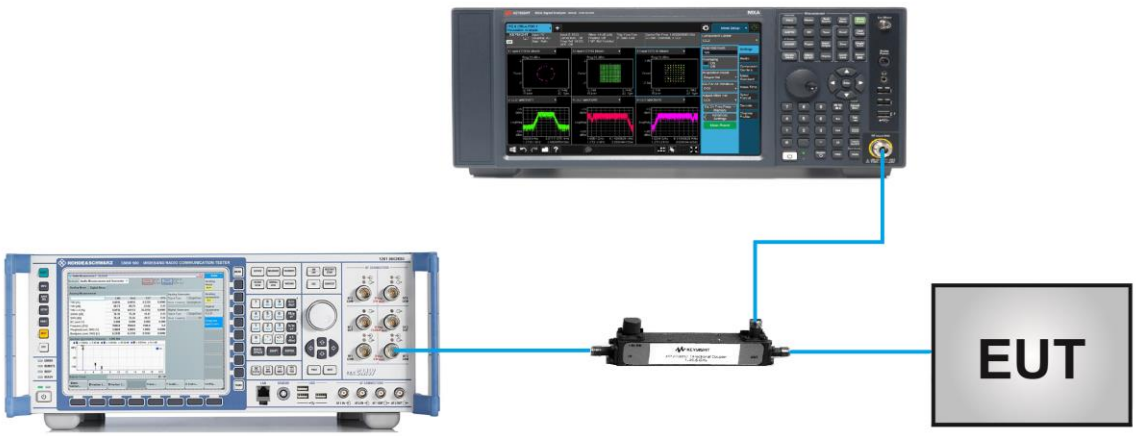
5.2.2. Test Procedure

ANSI C63.26-2015 - Section 5.4

5.2.3. Test Setting

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

5.2.4. Test Setup



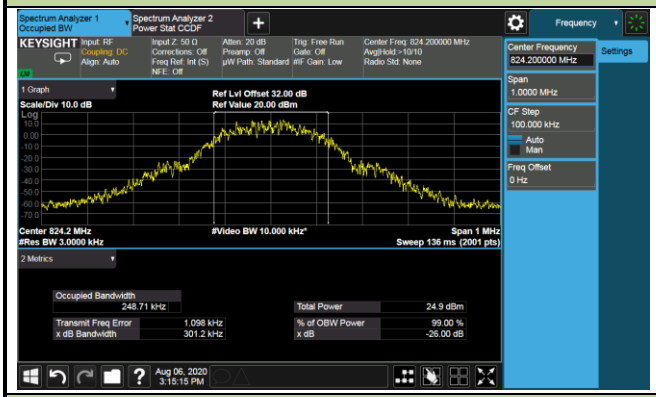
5.2.5. Test Result

Product	UMTS/HSPA+Module	Test Engineer	Candy Luo
Test Date	2020/08/06	Test Site	SR6
Test Band	GSM 850, PCS 1900		

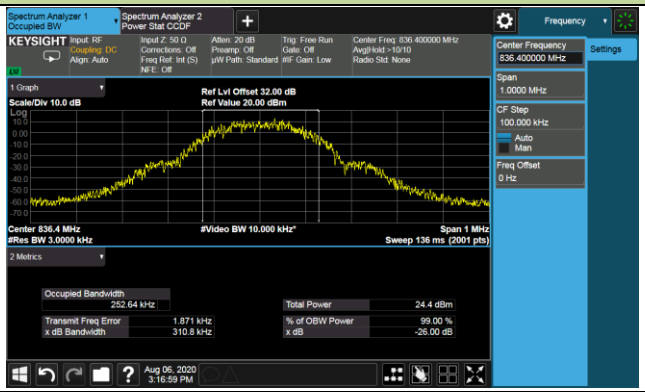
Channel	Frequency (MHz)	26dB Bandwidth (KHz)	99% Bandwidth (KHz)
GSM 850			
Lowest	824.2	301.2	248.7
Middle	836.4	310.8	252.6
Highest	848.8	308.8	252.2
PCS 1900			
Lowest	1850.2	307.7	256.4
Middle	1880.0	319.4	248.5
Highest	1909.8	310.8	249.6

Bandwidth – GSM 850

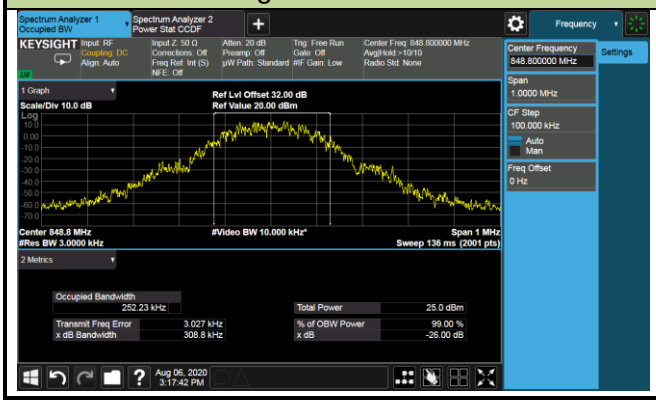
Lowest Channel

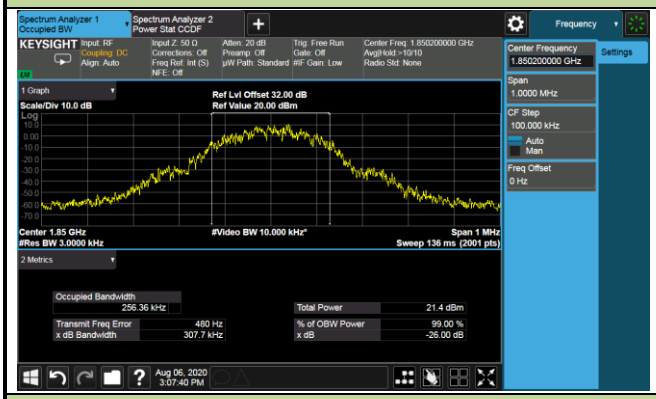
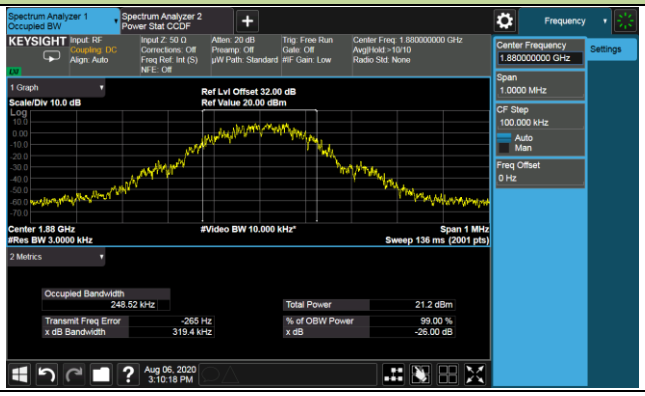
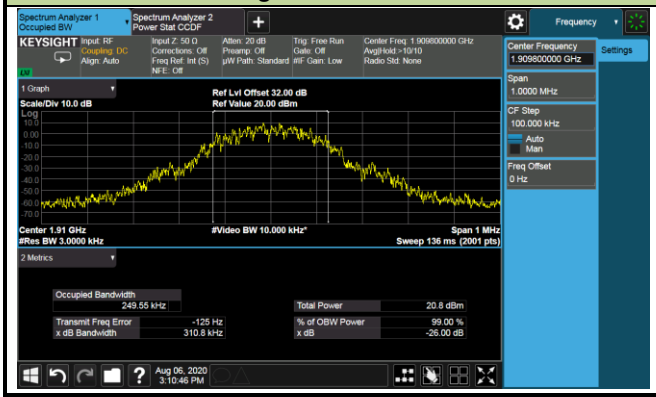


Middle Channel



Highest Channel



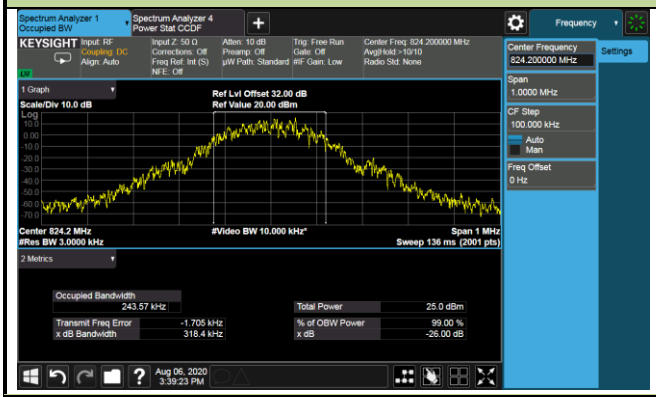
Bandwidth – PCS 1900	
Lowest Channel	Middle Channel
	
Highest Channel	
	

Product	UMTS/HSPA+Module	Test Engineer	Candy Luo
Test Date	2020/08/06	Test Site	SR6
Test Band	EDGE 850,1900		

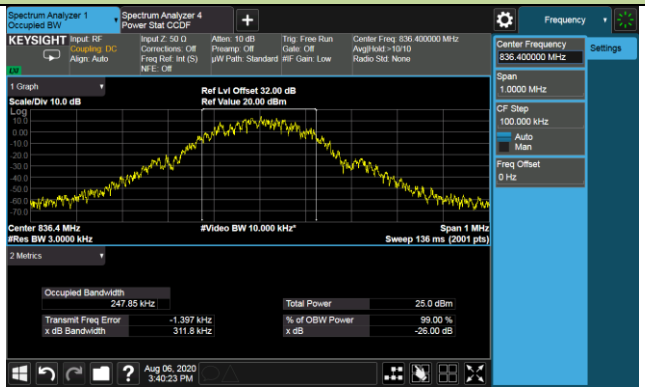
Channel	Frequency (MHz)	26dB Bandwidth (KHz)	99% Bandwidth (KHz)
EDGE 850			
Lowest	824.2	318.4	243.4
Middle	836.4	311.4	247.9
Highest	848.8	316.1	246.9
EDGE 1900			
Lowest	1850.2	318.3	248.9
Middle	1880.0	307.8	247.8
Highest	1909.8	312.2	247.6

Bandwidth - EDGE 850

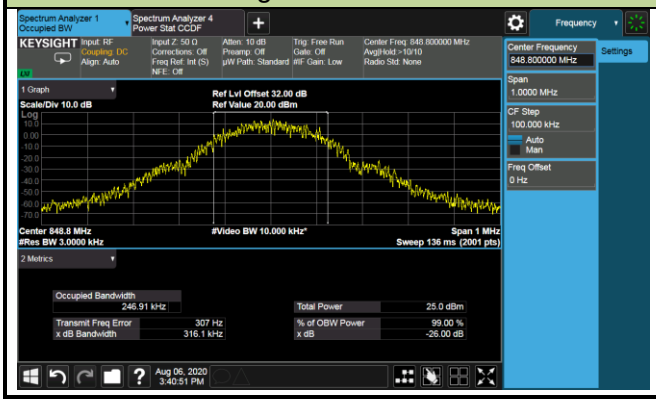
Lowest Channel

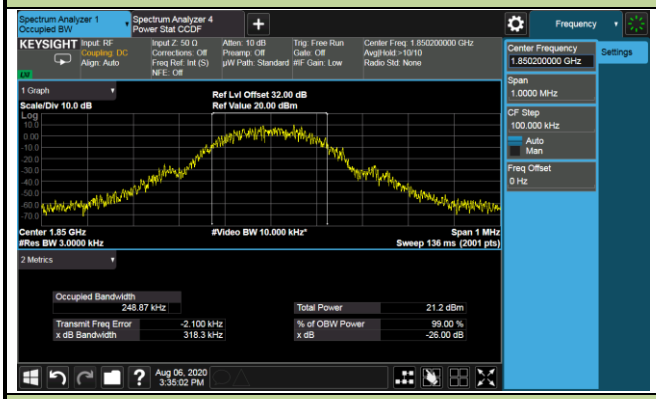
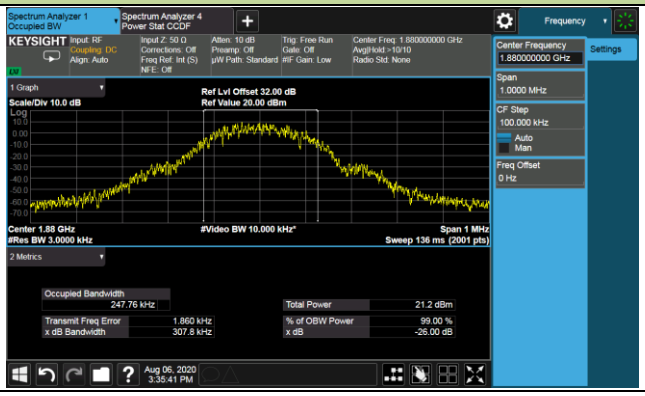
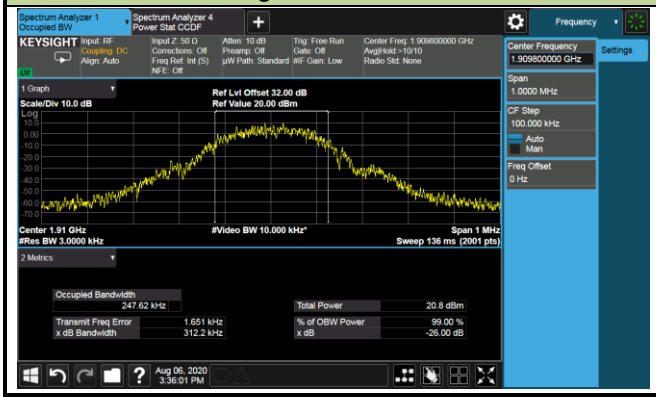


Middle Channel



Highest Channel



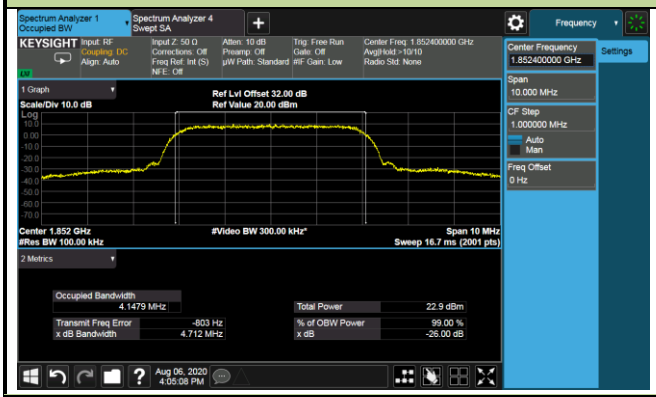
Bandwidth - EDGE 1900	
Lowest Channel	Middle Channel
	
Highest Channel	
	

Product	UMTS/HSPA+Module	Test Engineer	Candy Luo
Test Date	2020/08/06	Test Site	SR6
Test Band	WCDMA Band II, V		

Channel	Frequency (MHz)	26dB Bandwidth (MHz)	99% Bandwidth (MHz)
WCDMA Band II			
Lowest	1852.4	4.71	4.15
Middle	1880.0	4.72	4.15
Highest	1907.6	4.72	4.14
WCDMA Band V			
Lowest	826.4	4.70	4.13
Middle	836.4	4.71	4.15
Highest	846.6	4.69	4.14

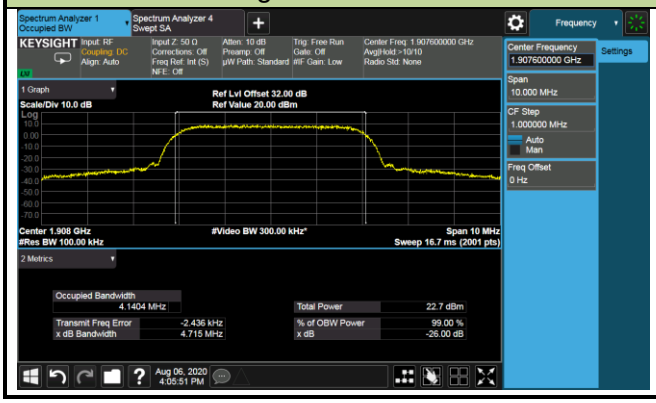
Bandwidth - WCDMA Band II

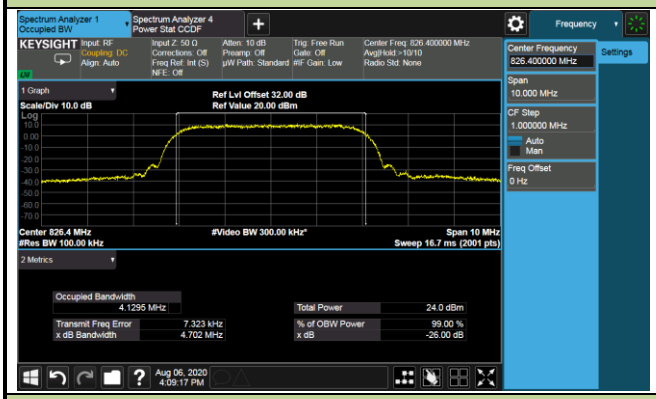
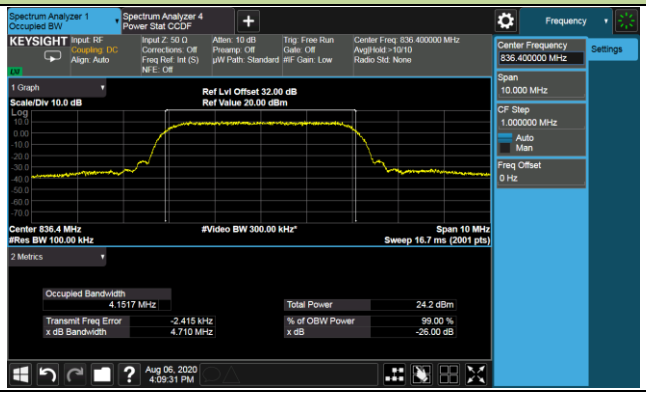
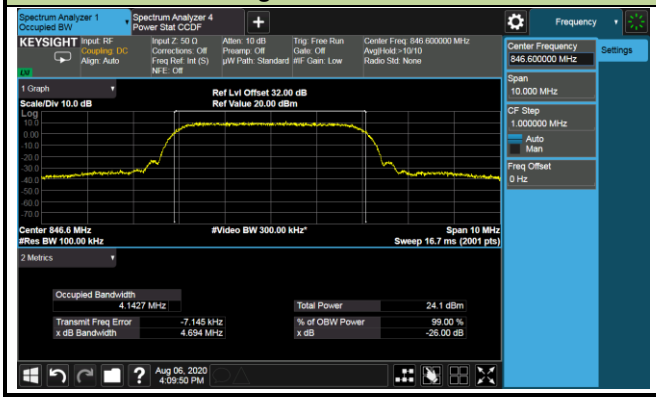
Lowest Channel



Middle Channel

Highest Channel



Bandwidth - WCDMA Band V	
Lowest Channel	Middle Channel
	
Highest Channel	
	

5.3. Frequency Stability Measurement

5.3.1. Test Limit

The frequency stability shall be measured by variation of ambient temperature and variation of primary supply voltage to ensure that the fundamental emission stays within the authorized frequency block. The frequency stability of the transmitter shall be maintained within ±0.00025% (±2.5ppm) of the center frequency.

5.3.2. Test Procedures Used

ANSI C63.26-2015 - Section 5.6

5.3.3. Test Setting

Frequency Stability Under Temperature Variations:

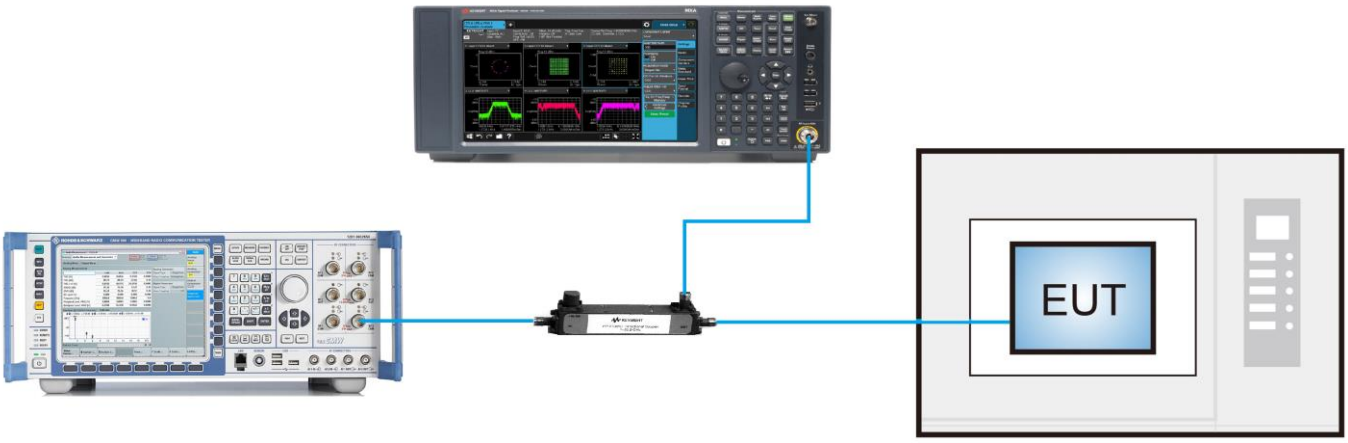
The equipment under test was connected to an external AC or DC power supply and input rated voltage. RF output was connected to a frequency counter or spectrum analyzer via feed through attenuators. The EUT was placed inside the temperature chamber. Set the spectrum analyzer RBW low enough to obtain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

Frequency Stability Under Voltage Variations:

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

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

5.3.4. Test Setup



5.3.5. Test Result

Product	UMTS/HSPA+Module	Temperature	-30 ~ 50°C
Test Engineer	Candy Luo	Relative Humidity	52%
Test Site	TR3	Test Date	2020/08/09
Test Band	GSM 850		

Voltage (%)	Power (VDC)	Temp (°C)	Frequency Tolerance (ppm)
100%	3.8	- 30	0.0141
		- 20	0.0160
		- 10	0.0176
		0	0.0138
		+ 10	0.0145
		+ 20 (Ref)	0.0174
		+ 30	-0.0191
		+ 40	0.0154
		+ 50	-0.0139
115%	4.3	+ 20	0.0173
85%	3.2	+ 20	0.0168

Product	UMTS/HSPA+Module	Temperature	-30 ~ 50°C
Test Engineer	Candy Luo	Relative Humidity	52%
Test Site	TR3	Test Date	2020/08/09
Test Band	PCS 1900		

Voltage (%)	Power (VDC)	Temp (°C)	Frequency Tolerance (ppm)
100%	3.8	- 30	0.0103
		- 20	0.0099
		- 10	0.0095
		0	0.0089
		+ 10	0.0094
		+ 20 (Ref)	0.0120
		+ 30	0.0105
		+ 40	0.0093
		+ 50	0.0068
115%	4.3	+ 20	0.0121
85%	3.2	+ 20	0.0124

Product	UMTS/HSPA+Module	Temperature	-30 ~ 50°C
Test Engineer	Candy Luo	Relative Humidity	52%
Test Site	TR3	Test Date	2020/08/09
Test Band	EDGE 850		

Voltage (%)	Power (VDC)	Temp (°C)	Frequency Tolerance (ppm)
100%	3.8	- 30	0.0147
		- 20	0.0206
		- 10	0.0150
		0	0.0157
		+ 10	0.0187
		+ 20 (Ref)	-0.0167
		+ 30	-0.0200
		+ 40	0.0198
		+ 50	0.0218
115%	4.3	+ 20	0.0139
85%	3.2	+ 20	-0.0186

Product	UMTS/HSPA+Module	Temperature	-30 ~ 50°C
Test Engineer	Candy Luo	Relative Humidity	52%
Test Site	TR3	Test Date	2020/08/09
Test Band	EDGE 1900		

Voltage (%)	Power (VDC)	Temp (°C)	Frequency Tolerance (ppm)
100%	3.8	- 30	0.0100
		- 20	0.0102
		- 10	0.0111
		0	0.0114
		+ 10	0.0117
		+ 20 (Ref)	0.0082
		+ 30	0.0099
		+ 40	0.0072
		+ 50	0.0099
115%	4.3	+ 20	0.0107
85%	3.2	+ 20	0.0095

Product	UMTS/HSPA+Module	Temperature	-30 ~ 50°C
Test Engineer	Candy Luo	Relative Humidity	52%
Test Site	TR3	Test Date	2020/08/09
Test Band	WCDMA Band II		

Voltage (%)	Power (VDC)	Temp (°C)	Frequency Tolerance (ppm)
100%	3.8	- 30	0.0086
		- 20	0.0102
		- 10	-0.0103
		0	0.0092
		+ 10	0.0075
		+ 20 (Ref)	0.0081
		+ 30	0.0092
		+ 40	-0.0081
		+ 50	0.0095
115%	4.3	+ 20	0.0099
85%	3.2	+ 20	0.0102

Product	UMTS/HSPA+Module	Temperature	-30 ~ 50°C
Test Engineer	Candy Luo	Relative Humidity	52%
Test Site	TR3	Test Date	2020/08/09
Test Band	WCDMA Band V		

Voltage (%)	Power (VDC)	Temp (°C)	Frequency Tolerance (ppm)
100%	3.8	- 30	0.0192
		- 20	0.0194
		- 10	0.0142
		0	-0.0140
		+ 10	-0.0172
		+ 20 (Ref)	0.0165
		+ 30	0.0181
		+ 40	-0.0227
		+ 50	0.0226
115%	4.3	+ 20	0.0239
85%	3.2	+ 20	0.0234

5.4. Equivalent Isotropically Radiated Power Measurement

5.4.1. Test Limit

FCC Part 24.232 (c):

Mobile and portable stations are limited to 2 watts EIRP and the equipment must employ a means for limiting power to the minimum necessary for successful communications.

FCC Part 22.913(a)(5):

The ERP of mobile transmitters and auxiliary test transmitters must not exceed 7 watts.

5.4.2. Test Procedures Used

ANSI C63.26-2015 - Section 5.2

5.4.3. Test Setting

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

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

ERP or EIRP = $P_{Meas} + G_T$

where

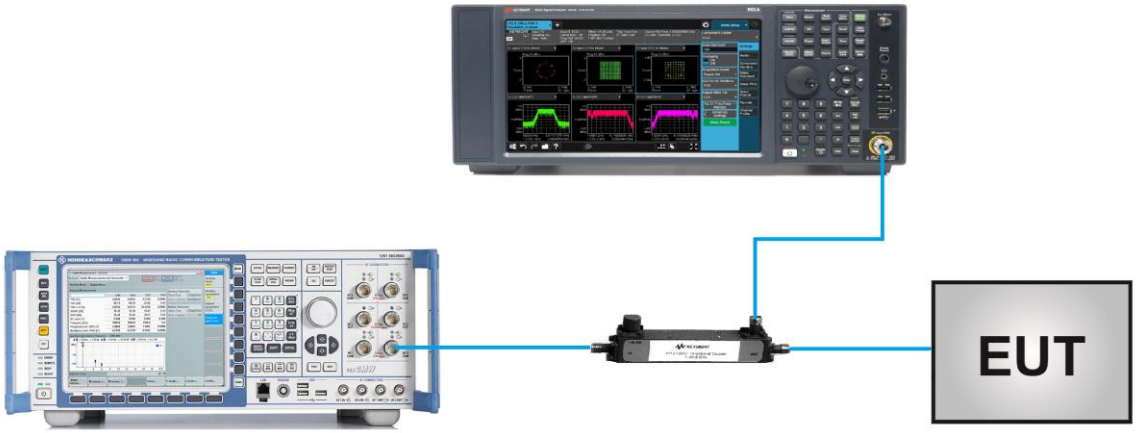
ERP or EIRP effective radiated power or equivalent isotropically radiated power, respectively (expressed in the same units as P_{Meas}, e.g., dBm or dBW)

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

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

ERP = EIRP -2.15

5.4.4. Test Setup



5.4.5. Test Result

Product	UMTS/HSPA+Module	Temperature	25°C
Test Engineer	Candy Luo	Relative Humidity	54%
Test Site	SR5	Test Date	2020/08/08

Mode	Channel	Frequency (MHz)	Output Power (dBm)	ERP (dBm)	Limit (dBm)
GPRS850 (1 Slot)	128	824.2	33.9	34.0	38.45
	189	836.4	34.0	34.1	38.45
	251	848.8	34.2	34.3	38.45
GPRS850 (2 Slot)	128	824.2	33.8	33.9	38.45
	189	836.4	34.1	34.2	38.45
	251	848.8	34.0	34.1	38.45
GPRS850 (3 Slot)	128	824.2	32.2	32.3	38.45
	189	836.4	32.3	32.4	38.45
	251	848.8	32.5	32.6	38.45
GPRS850 (4 Slot)	128	824.2	29.7	29.8	38.45
	189	836.4	29.9	30.0	38.45
	251	848.8	29.9	30.0	38.45
EDGE850 (1 Slot)	128	824.2	28.3	28.4	38.45
	189	836.4	28.2	28.3	38.45
	251	848.8	28.1	28.2	38.45
EDGE850 (2 Slot)	128	824.2	27.8	27.9	38.45
	189	836.4	28.0	28.1	38.45
	251	848.8	28.1	28.2	38.45
EDGE850 (3 Slot)	128	824.2	26.2	26.3	38.45
	189	836.4	26.2	26.3	38.45
	251	848.8	26.6	26.7	38.45
EDGE850 (4 Slot)	128	824.2	23.7	23.8	38.45
	189	836.4	23.8	23.9	38.45
	251	848.8	23.8	23.9	38.45

Note: The ERP (dBm) = Output Power (dBm) + Antenna Gain (dBi) – 2.15

Mode	Channel	Frequency (MHz)	Output Power (dBm)	EIRP (dBm)	Limit (dBm)
GPRS1900 (1 Slot)	512	1850.2	30.7	32.3	33.00
	661	1880.0	30.6	32.2	33.00
	810	1909.8	30.8	32.4	33.00
GPRS1900 (2 Slot)	512	1850.2	30.7	32.3	33.00
	661	1880.0	30.8	32.4	33.00
	810	1909.8	30.7	32.3	33.00
GPRS1900 (3 Slot)	512	1850.2	29.2	30.8	33.00
	661	1880.0	29.2	30.8	33.00
	810	1909.8	29.5	31.1	33.00
GPRS1900 (4 Slot)	512	1850.2	26.9	28.5	33.00
	661	1880.0	26.9	28.5	33.00
	810	1909.8	26.9	28.5	33.00
EDGE1900 (1 Slot)	512	1850.2	26.7	28.3	33.00
	661	1880.0	26.6	28.2	33.00
	810	1909.8	26.8	28.4	33.00
EDGE1900 (2 Slot)	512	1850.2	26.6	28.2	33.00
	661	1880.0	26.6	28.2	33.00
	810	1909.8	26.7	28.3	33.00
EDGE1900 (3 Slot)	512	1850.2	25.0	26.6	33.00
	661	1880.0	25.0	26.6	33.00
	810	1909.8	25.1	26.7	33.00
EDGE1900 (4 Slot)	512	1850.2	22.9	24.5	33.00
	661	1880.0	22.9	24.5	33.00
	810	1909.8	22.9	24.5	33.00

Note: The EIRP (dBm) = Output Power (dBm) + Antenna Gain (dBi)

Product	UMTS/HSPA+Module	Test Engineer	Candy Luo
Test Date	2020/08/08	Test Site	SR6
Test Band	WCDMA Band II		

Mode	3GPP Subtest	Conducted Power (dBm)			Antenna Gain (dBi)	EIRP (dBm)		
		Band II Channel				Band II Channel		
		9262	9400	9538		9262	9400	9538
WCDMA R99	1	24.24	24.87	24.45	1.59	25.83	26.46	26.04
Rel5 HSDPA	1	24.22	24.64	24.47	1.59	25.81	26.23	26.06
	2	24.41	24.71	24.24	1.59	26.00	26.30	25.83
	3	24.05	24.21	23.82	1.59	25.64	25.80	25.41
	4	23.91	24.16	23.81	1.59	25.50	25.75	25.40
Rel6 HSUPA	1	22.47	22.24	22.27	1.59	24.06	23.83	23.86
	2	22.39	22.52	22.63	1.59	23.98	24.11	24.22
	3	22.62	23.19	22.85	1.59	24.21	24.78	24.44
	4	22.30	22.62	22.34	1.59	23.89	24.21	23.93
	5	24.44	24.64	24.53	1.59	26.03	26.23	26.12

Note: The EIRP (dBm) = Output Power (dBm) + Antenna Gain (dBi)

Product	UMTS/HSPA+Module	Test Engineer	Candy Luo
Test Date	2020/08/08	Test Site	SR6
Test Band	WCDMA Band V		

Mode	3GPP Subtest	Conducted Power (dBm)			Antenna Gain (dBi)	ERP (dBm)		
		Band V Channel				Band V Channel		
		1312	1412	1513		1312	1412	1513
WCDMA R99	1	24.11	24.23	24.31	2.29	24.25	24.37	24.45
Rel5 HSDPA	1	23.78	23.99	24.07	2.29	23.92	24.13	24.21
	2	23.62	24.12	24.15	2.29	23.76	24.26	24.29
	3	23.56	24.06	24.08	2.29	23.70	24.20	24.22
	4	23.48	23.91	23.96	2.29	23.62	24.05	24.10
Rel6 HSUPA	1	23.61	24.02	24.21	2.29	23.75	24.16	24.35
	2	23.46	23.80	24.06	2.29	23.60	23.94	24.20
	3	23.40	23.63	23.75	2.29	23.54	23.77	23.89
	4	23.91	23.96	24.18	2.29	24.05	24.10	24.32
	5	23.39	23.65	23.66	2.29	23.53	23.79	23.80

Note: The ERP (dBm) = Output Power (dBm) + Antenna Gain (dBi) – 2.15

5.5. Band Edge Measurement

5.5.1. Test Limit

22.917(a), 24.238 (a)

For operations in the 824 ~ 849 MHz, 1850 ~ 1910 MHz, the FCC limit is 43 + 10log10(P[Watts]) dB below the transmitter power P(Watts) in a 1 MHz bandwidth. However, in the 1MHz bands immediately outside and adjacent to the licensee's frequency block, a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed.

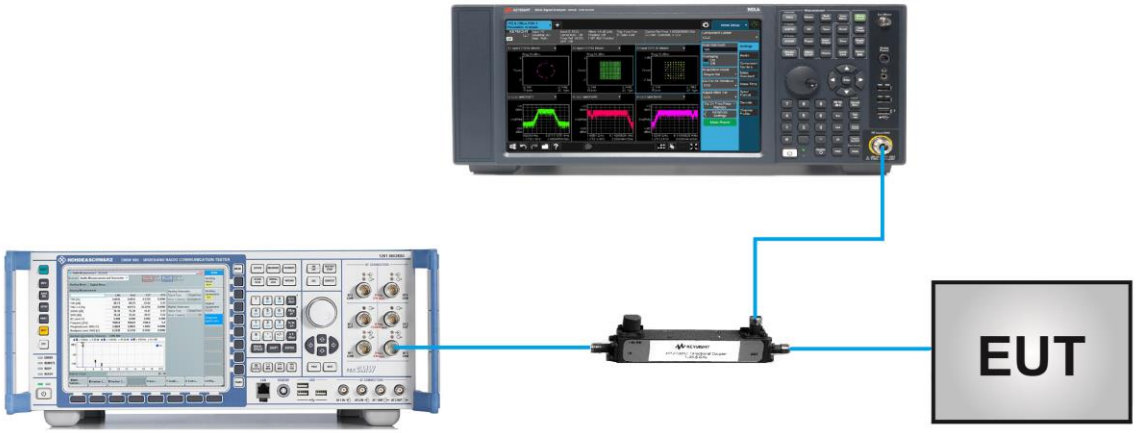
5.5.2. Test Procedure Used

ANSI C63.26-2015 - Section 5.7

5.5.3. Test Setting

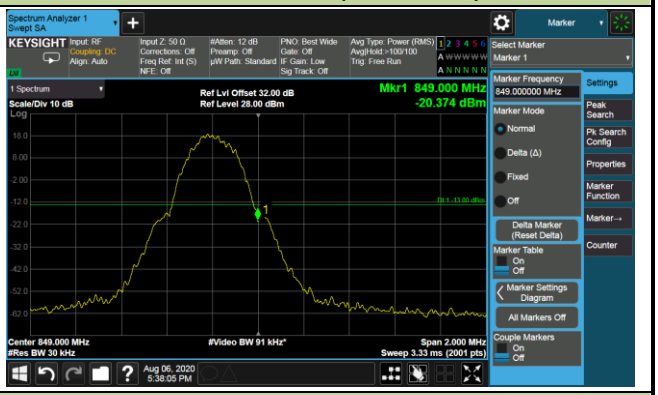
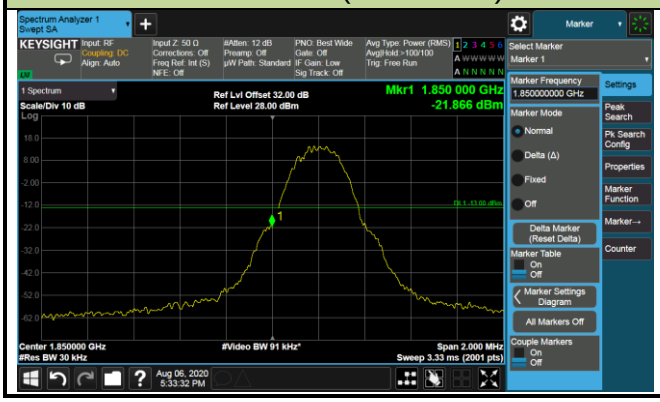
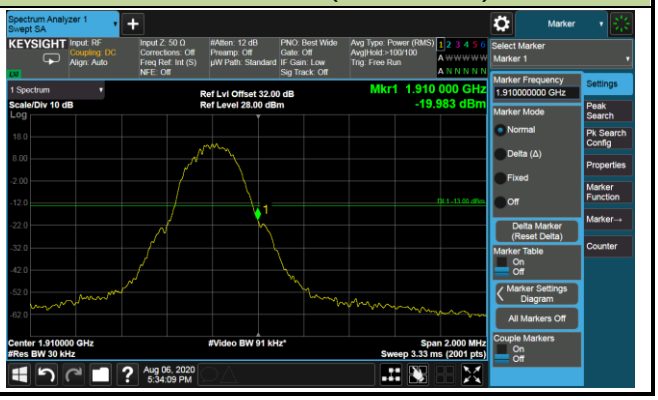
1. Set the analyzer frequency to low or high channel
2. RBW ≥ The nominal RBW shall be in the range of 1% of the anticipated OBW (in the 1MHz band immediately outside and adjacent to the band edge). For improvement of the accuracy in the measurement of the average power of a noise-like emission, a RBW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

5.5.4. Test Setup

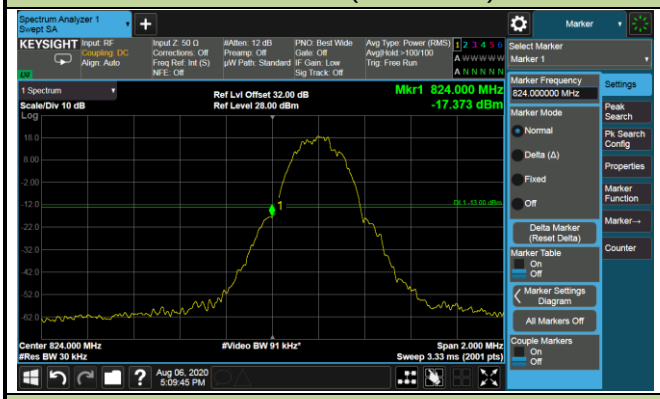
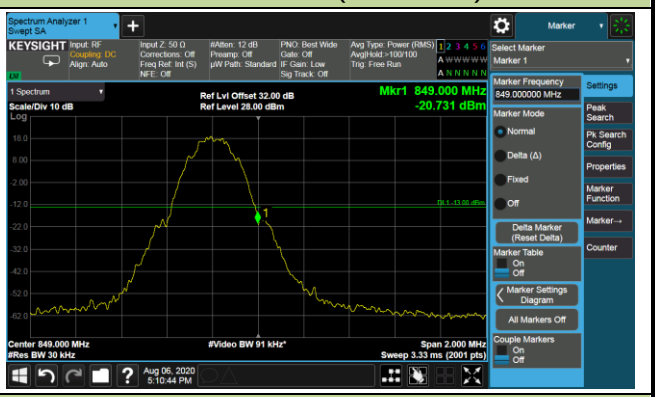
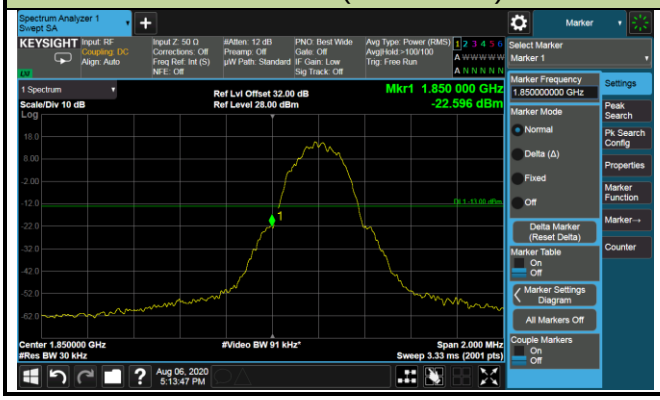
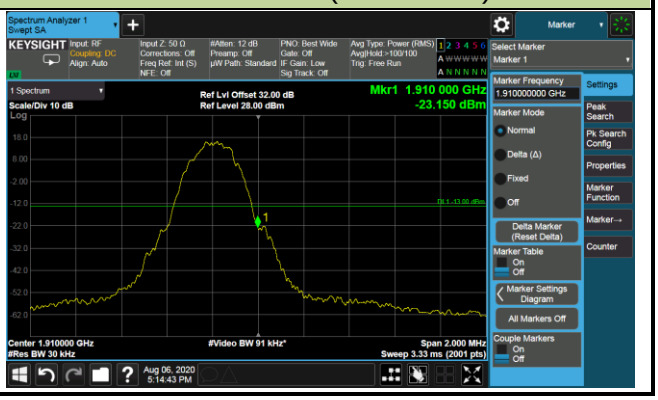


5.5.5. Test Result

Product	UMTS/HSPA+Module	Test Engineer	Candy Luo
Test Date	2020/08/06	Test Site	SR6
Test Band	GSM 850, PCS 1900	Test Result	Pass

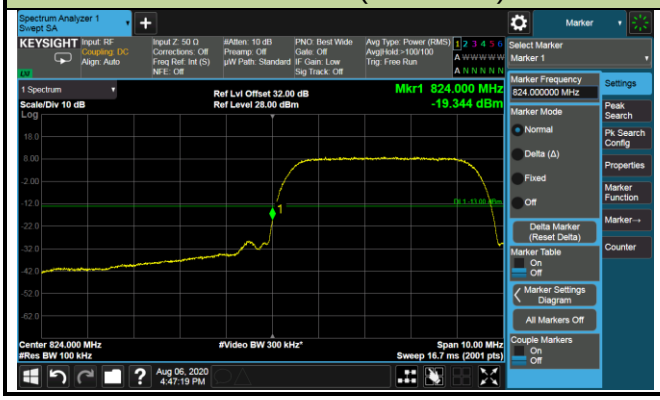
GSM 850 Band Edge	
Channel 128 (824.2MHz)	Channel 251 (848.8MHz)
	
PCS 1900 Band Edge	
Channel 512 (1850.2MHz)	Channel 810 (1909.8MHz)
	

Product	UMTS/HSPA+Module	Test Engineer	Candy Luo
Test Date	2020/08/06	Test Site	SR6
Test Band	EDGE 850, 1900	Test Result	Pass

EDGE 850 Band Edge	
Channel 128 (824.2MHz)	Channel 251 (848.8MHz)
	
EDGE 1900 Band Edge	
Channel 512 (1850.2MHz)	Channel 810 (1909.8MHz)
	

Product	UMTS/HSPA+Module	Test Engineer	Candy Luo
Test Date	2020/08/06	Test Site	SR6
Test Band	WCDMA II, V	Test Result	Pass

WCDMA Band II Band Edge	
Channel 9262 (1852.4MHz)	Channel 9538 (1907.6MHz)

WCDMA Band V Band Edge	
Channel 4132 (826.4MHz)	Channel 4233 (846.6MHz)
	

5.6. Peak to Average Ratio

5.6.1. Test Limit

The peak-to-average power ratio (PAPR) of the transmitter shall not exceed 13 dB for more than 0.1% of the time using a signal corresponding to the highest PAPR during periods of continuous transmission.

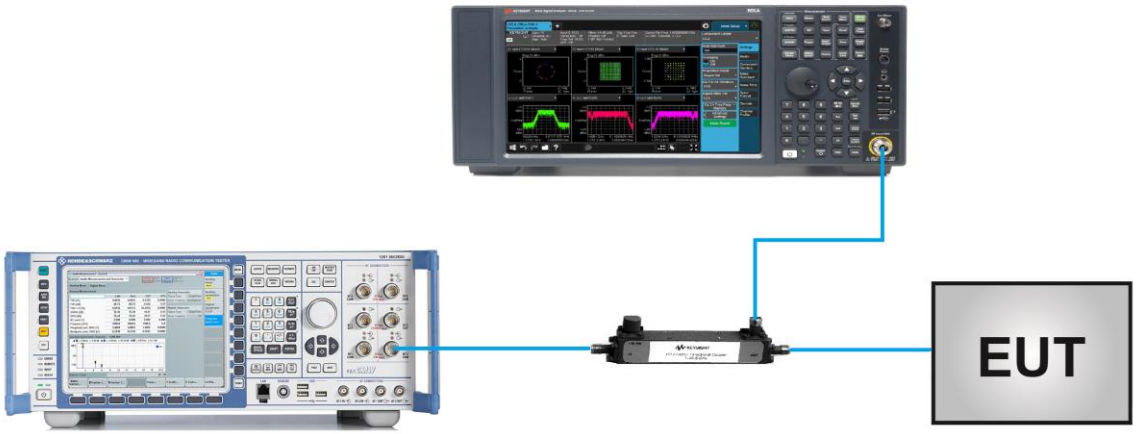
5.6.2. Test Procedure Used

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

5.6.3. Test Setting

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

5.6.4. Test Setup



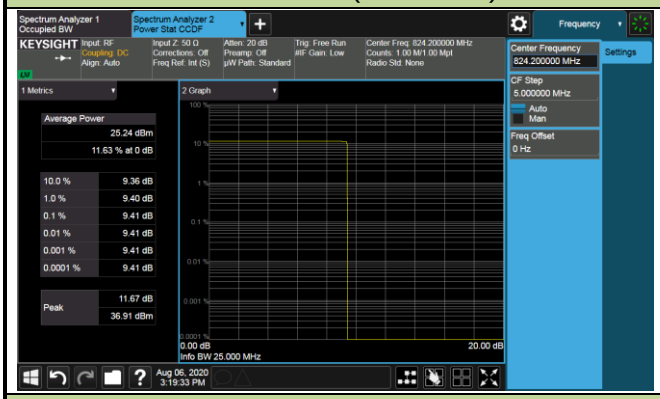
5.6.5. Test Result

Product	UMTS/HSPA+Module	Test Engineer	Candy Luo
Test Date	2020/08/06	Test Site	SR6
Test Band	GSM 850, PCS 1900	Test Result	Pass

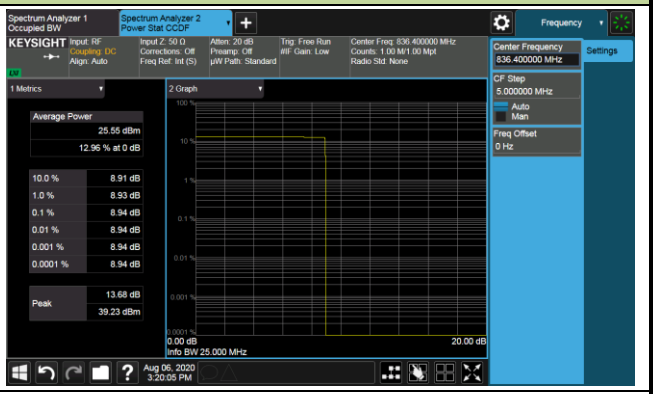
Channel No.	Frequency (MHz)	Channel Bandwidth (MHz)	Peak to Average Ratio (dB)	Limit (dB)	Result
GSM 850 (Report Only)					
128	824.2	0.2	9.41	≤ 13.00	Pass
189	836.4	0.2	8.94	≤ 13.00	Pass
251	848.8	0.2	8.68	≤ 13.00	Pass
PCS 1900					
512	1850.2	0.2	8.89	≤ 13.00	Pass
661	1880.0	0.2	9.37	≤ 13.00	Pass
810	1909.6	0.2	9.54	≤ 13.00	Pass

GSM 850

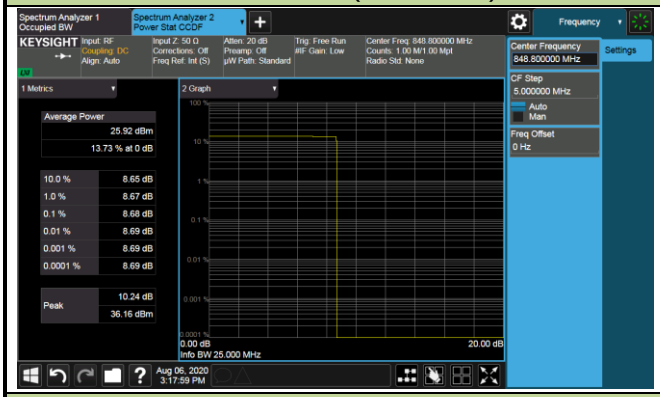
Channel 128 (824.2MHz)



Channel 189 (836.4MHz)

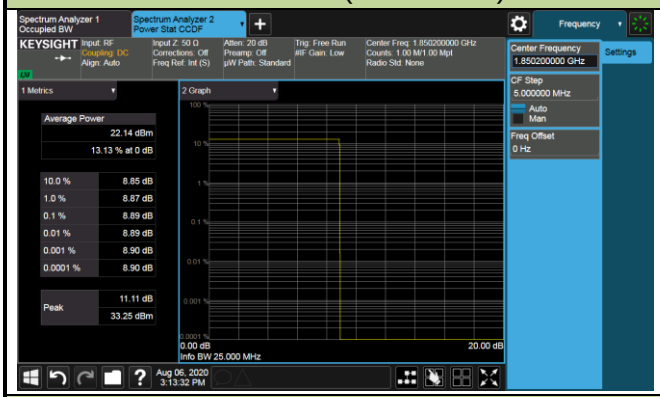


Channel 251 (848.8MHz)

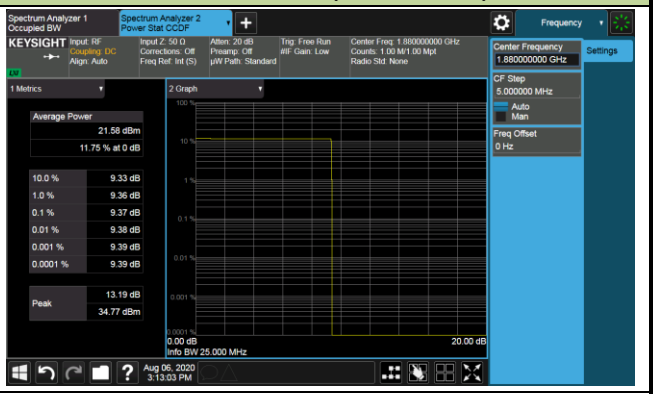


PCS 1900

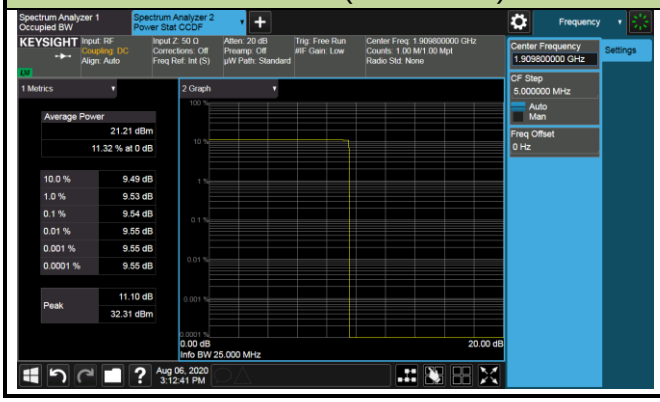
Channel 512 (1850.2MHz)



Channel 661 (1880.0MHz)



Channel 810 (1909.8MHz)



Product	UMTS/HSPA+Module	Test Engineer	Candy Luo
Test Date	2020/08/06	Test Site	SR6
Test Band	EDGE 850, 1900	Test Result	Pass

Channel No.	Frequency (MHz)	Channel Bandwidth (MHz)	Peak to Average Ratio (dB)	Limit (dB)	Result
EDGE 850 (Report Only)					
128	824.2	0.2	9.32	≤ 13.00	Pass
189	836.4	0.2	8.83	≤ 13.00	Pass
251	848.8	0.2	9.52	≤ 13.00	Pass
EDGE 1900					
512	1850.2	0.2	9.36	≤ 13.00	Pass
661	1880.0	0.2	9.48	≤ 13.00	Pass
810	1909.6	0.2	9.35	≤ 13.00	Pass