

RF TEST REPORT

Applicant	Asiatelco Technologies Co.
FCC ID	XYO-AMA01R
Product	LTE Cellular Module
Brand	ATEL
Model	AMA-01R
Report No.	R2401A0042-R2
Issue Date	February 26, 2024

TA Technology (Shanghai) Co., Ltd. tested the above equipment in accordance with the requirements in **FCC CFR47 Part 2 (2023)/ FCC CFR 47 Part 24E (2023)**. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

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Summary of measurement results

No.	Test Case	Clause in FCC rules	Verdict
1	RF Power Output and Effective Isotropic Radiated Power	2.1046 24.232(c)	PASS
2	Occupied Bandwidth	2.1049	PASS
3	Band Edge Compliance	2.1051 / 24.238(a)	PASS
4	Peak-to-Average Power Ratio	24.232/KDB 971168 D01(5.7)	PASS
5	Frequency Stability	2.1055 / 24.235	PASS
6	Spurious Emissions at Antenna Terminals	2.1051 / 24.238(a)	PASS
7	Radiated Spurious Emission	2.1053 / 24.238(a)	PASS
Date of Testing: January 16, 2024 ~ January 23, 2024 Date of Sample Received: January 11, 2024			
Note: PASS: The EUT complies with the essential requirements in the standard. FAIL: The EUT does not comply with the essential requirements in the standard. All indications of Pass/Fail in this report are opinions expressed by TA Technology (Shanghai) Co., Ltd. based on interpretations and/or observations of test results. Measurement Uncertainties were not taken into account and are published for informational purposes only.			

1. Test Laboratory

1.1. Notes of the test report

This report shall not be reproduced in full or partial, without the written approval of **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, Pudong Shanghai, P.R.China
City:	Shanghai
Post code:	201201
Country:	P. R. China
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Website:	https://www.eurofins.com/electrical-and-electronics
E-mail:	Kain.Xu@cpt.eurofinscn.com

2. General Description of Equipment under Test

2.1. Applicant and Manufacturer Information

Applicant	Asiatelco Technologies Co.
Applicant address	#68 HuaTuo Road, Building-8, Zhangjiang Hi-Tech Park, Pudong, Shanghai 201204, China
Manufacturer	Asiatelco Technologies Co.
Manufacturer address	#68 HuaTuo Road, Building-8, Zhangjiang Hi-Tech Park, Pudong, Shanghai 201204, China

2.2. General information

EUT Description			
Model	AMA-01R		
Lab internal SN	R2404A0042/S01		
Hardware Version	p2		
Software Version	v1.002.015		
Power Supply	External power supply		
Antenna Type	External Antenna		
Test Mode(s)	GSM1900; WCDMA Band II; LTE Band 2;		
Test Modulation	(GPRS)GMSK, (EGPRS) GMSK/ 8PSK; (WCDMA) BPSK, QPSK; (LTE) QPSK, 16QAM;		
GPRS Multislot Class	12		
EGPRS Multislot Class	12		
HSDPA UE Category	14		
HSUPA UE Category	6		
LTE Category	1		
Maximum E.I.R.P	GSM 1900:	32.74 dBm	
	WCDMA Band II:	25.71 dBm	
	LTE Band 2:	26.90 dBm	
Rated Power Supply Voltage	3.8V		
Operating Voltage	Minimum: 3.4V Maximum: 4.2V		
Operating Temperature	Lowest: -20°C Highest: +55°C		
Testing Temperature	Lowest: -30°C Highest: +50°C		
Operating Frequency Range(s)	Band	Tx (MHz)	Rx (MHz)
	GSM1900	1850 ~ 1910	1930 ~ 1990
	WCDMA Band II	1850 ~ 1910	1930 ~ 1990
	LTE Band 2	1850 ~ 1910	1930 ~ 1990
Auxiliary Test Equipment			
Antenna	Manufacturer:	Asiatelco Technologies Co.	
	Model:	N12-7088-ROA	

	Gain:	GSM1900: 3.65 dBi WCDMA Band II: 3.65 dBi LTE Band 2: 3.65 dBi
Note: 1. The EUT is sent from the applicant to TA and the information of the EUT is declared by the applicant.		

3. Applied Standards

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

Test standards:

FCC CFR 47 Part 24E (2023)

FCC CFR47 Part 2 (2023)

Reference standard:

ANSI C63.26-2015

KDB 971168 D01 Power Meas License Digital Systems v03r01

4. Test Configuration

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

All mode and data rates and positions and RB size and modulations were investigated.

Subsequently, only the worst case emissions are reported.

The following testing in GSM/WCDMA/LTE is set based on the maximum RF Output Power.

Test modes are chosen to be reported as the worst case configuration below:

Test items	Modes/Modulation	
	GSM 1900	WCDMA Band II
RF Power Output and Effective Isotropic Radiated Power	GPRS EGPRS	RMC HSDPA/HSUPA
Occupied Bandwidth	GPRS(1Tx slot) EGPRS(1Tx slot)	RMC
Band Edge Compliance	GPRS(1Tx slot) EGPRS(1Tx slot)	RMC
Peak-to-Average Power Ratio	GPRS(1Tx slot) EGPRS(1Tx slot)	RMC
Frequency Stability	GPRS(1Tx slot) EGPRS(1Tx slot)	RMC
Spurious Emissions at Antenna Terminals	GPRS	RMC
Radiated Spurious Emission	GPRS	RMC

Test modes are chosen to be reported as the worst case configuration below for LTE Band 2:

Test items	Bandwidth (MHz)						Modulation		RB			Test Channel		
	1.4	3	5	10	15	20	QPSK	16QAM	1	50%	100%	L	M	H
RF Power Output and Effective Isotropic Radiated Power	O	O	O	O	O	O	O	O	O	O	O	O	O	O
Occupied Bandwidth	O	O	O	O	O	O	O	O	-	-	O	O	O	O
Band Edge Compliance	O	O	O	O	O	O	O	O	O	-	O	O	-	O
Peak-to-Average Power Ratio	O	O	O	O	O	O	O	O	-	-	O	O	O	O
Frequency Stability	O	O	O	O	O	O	O	O	O	-	-	-	O	-
Spurious Emissions at Antenna Terminals	O	O	O	O	O	O	O	-	O	-	-	O	O	O
Radiated Spurious Emission	O	-	O	-	-	O	O	-	O	-	-	-	O	-
Note	1. The mark "O" means that this configuration is chosen for testing. 2. The mark "-" means that this configuration is not testing.													

5. Test Case

5.1. RF Power Output and Effective Isotropic Radiated Power

Ambient condition

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

Methods of Measurement

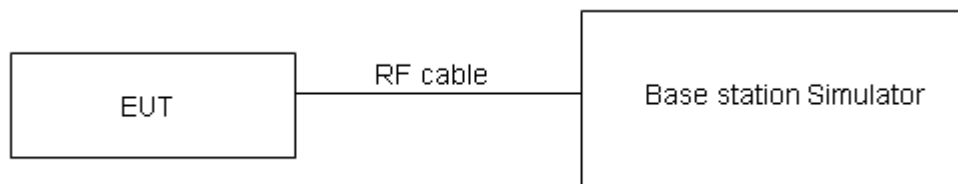
During the process of the testing, The EUT was connected to the Base Station Simulator with a known loss. The EUT is controlled by the Base Station Simulator test set to ensure max power transmission with proper modulation.

ERP can then be calculated as follows:

$EIRP \text{ (dBm)} = \text{Output Power (dBm)} + \text{Antenna Gain (dBi)}$

$EIRP \text{ (dBm)} = ERP \text{ (dBm)} + 2.15 \text{ (dB.)}$

Test Setup



Limits

No specific RF power output requirements in part 2.1046.

Rule Part 24.232(c) Mobile and portable stations are limited to 2 watts EIRP.

Rule Part 24.232(e) Peak transmit power must be measured over any interval of continuous transmission using instrumentation calibrated in terms of an rms-equivalent voltage.

Limit	$\leq 2 \text{ W}$ (33 dBm)
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Measurement Uncertainty

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

Test Results

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

5.2.Occupied Bandwidth

Ambient condition

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

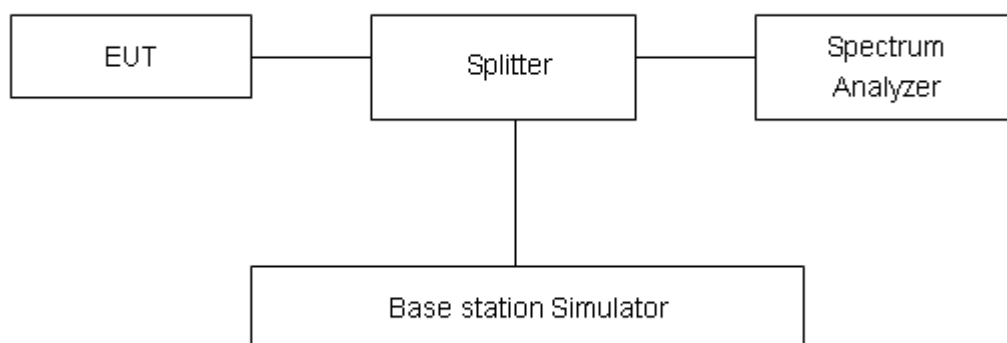
Method of Measurement

The EUT was connected to Spectrum Analyzer and Base Station Simulator via power Splitter. The occupied bandwidth is measured using spectrum analyzer.

RBW is set to $\geq 1\%EBW$, 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 $k = 2$, $U = 624\text{Hz}$.

Test Results

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

5.3. Band Edge Compliance

Ambient condition

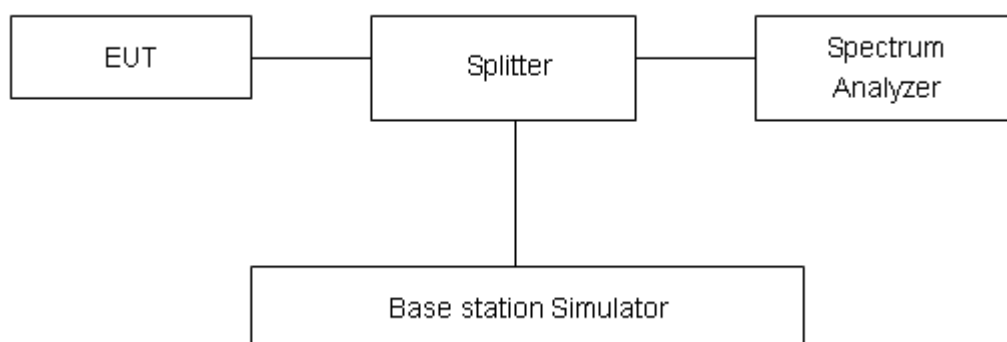
Temperature	Relative humidity	Pressure
15°C ~ 35°C	20% ~ 80%	86 kPa ~ 106 kPa

Method of Measurement

The EUT was connected to Spectrum Analyzer and Base Station Simulator via power Splitter. The band edge of the lowest and highest channels were measured. The Average detector is used and RBW is set to $\geq 1\%EBW$, VBW is set to 3x RBW.

Spectrum analyzer plots are included on the following pages.

Test Setup



Limits

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

Limit	-13 dBm
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Measurement Uncertainty

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

Test Results

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

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

Ambient condition

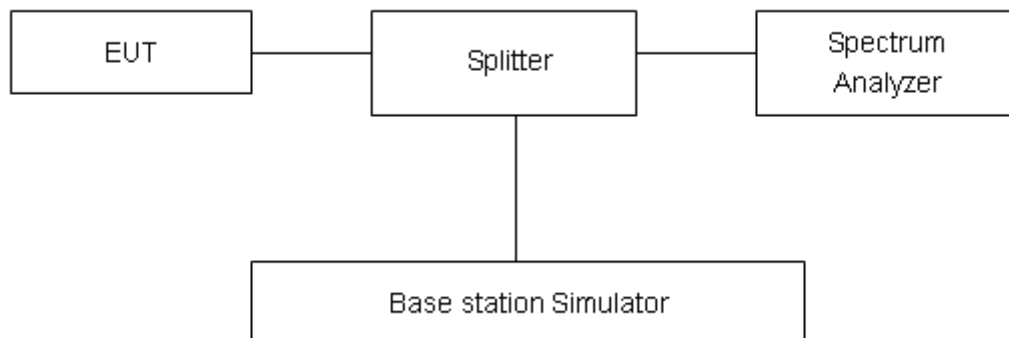
Temperature	Relative humidity	Pressure
15°C ~ 35°C	20% ~ 80%	86 kPa ~ 106 kPa

Methods of Measurement

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

$$\text{PAPR (dB)} = \text{PPk (dBm)} - \text{PAvg (dBm)}.$$

Test Setup



Limits

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 in 24.232(d).

Measurement Uncertainty

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

Test Results

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

5.5.Frequency Stability

Ambient condition

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

Method of Measurement

Frequency Stability (Temperature Variation)

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

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

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

(3) Repeat the above measurements at 10°C increments from -30°C to +50°C. Allow at least 1.5 hours at each temperature, un-powered, before making measurements.

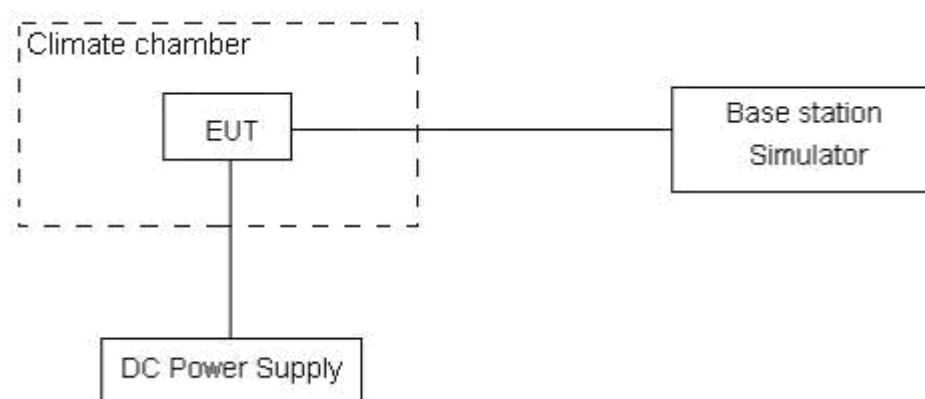
Frequency Stability (Voltage Variation)

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 3.4 V and 4.2 V, with a nominal voltage of 3.8V.

Test setup



Limits

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

Measurement Uncertainty

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

Test Results

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

5.6. Spurious Emissions at Antenna Terminals

Ambient condition

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

Method of Measurement

The EUT was connected to Spectrum Analyzer and Base Station Simulator via power Splitter. The measurement is carried out using a spectrum analyzer. The spectrum analyzer scans from 9kHz to the 10th harmonic of the carrier. The peak detector is used.

RBW is set to 1 kHz (0.009MHz~ 0.15 MHz),

RBW is set to 10 kHz (0.15 MHz~ 30 MHz)

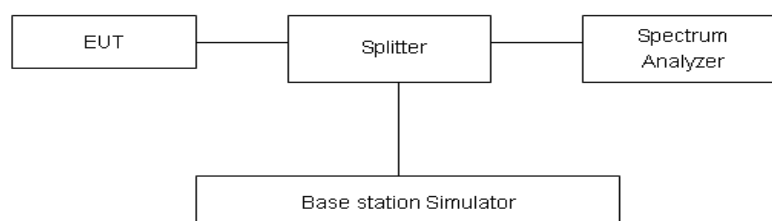
RBW is set to 100 kHz (30MHz~1000 MHz)

RBW is set to 1000 kHz (above 1000MHz)

Sweep is set to AUTO.

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

Test setup



Limits

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

Limit	-13 dBm
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Measurement Uncertainty

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

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

Test Results

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

5.7. Radiated Spurious Emission

Ambient condition

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

Method of Measurement

1. The testing follows FCC KDB 971168 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=1MHz, VBW=3MHz, 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:

$$\text{Power(EIRP)} = \text{PMea} - \text{PAg} - \text{Pcl} + \text{Ga}$$
 The measurement results are amend as described below:

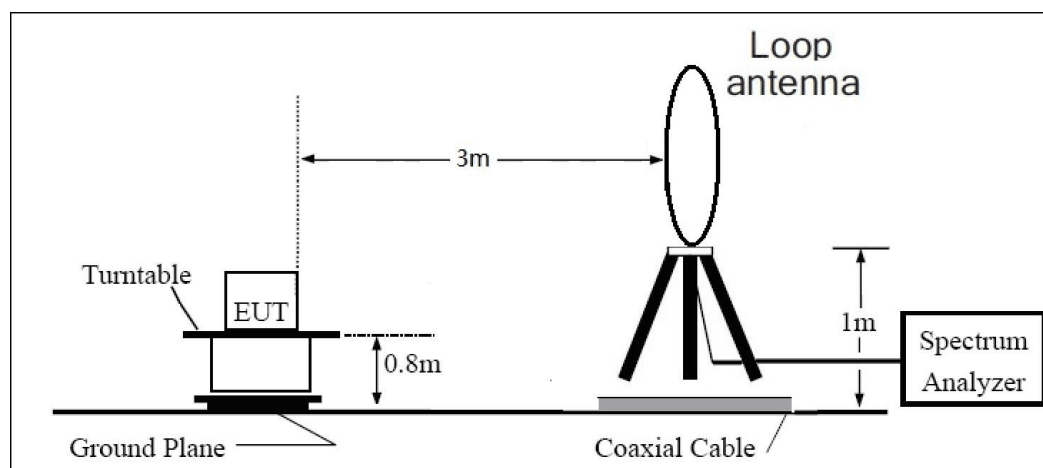
$$\text{Power(EIRP)} = \text{PMea} - \text{Pcl} + \text{Ga}$$
8. This value is EIRP since the measurement is calibrated using an antenna of known gain (2.15 dB) and known input power. ERP can be calculated from EIRP by subtracting the gain of the dipole, ERP

= EIRP-2.15dB.

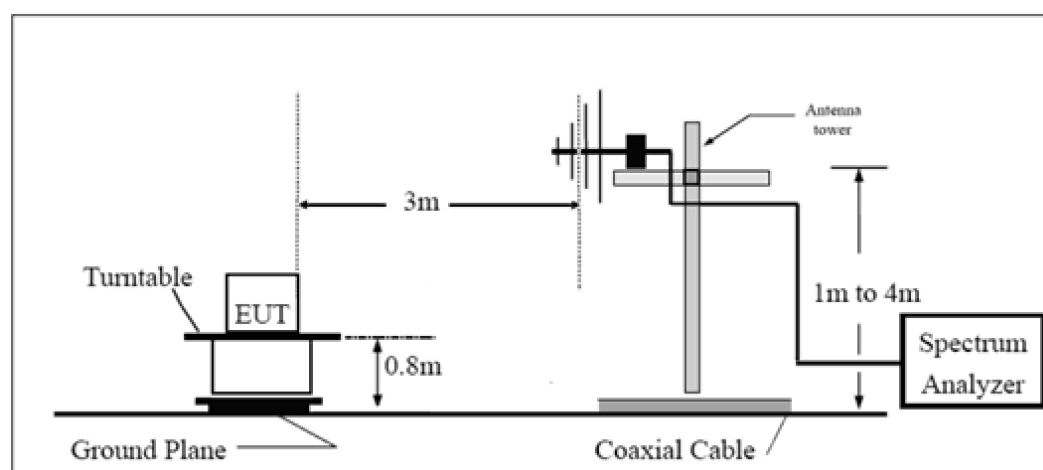
The modulation mode and RB allocation refer to section 5.1, using the maximum output power configuration.

Test setup

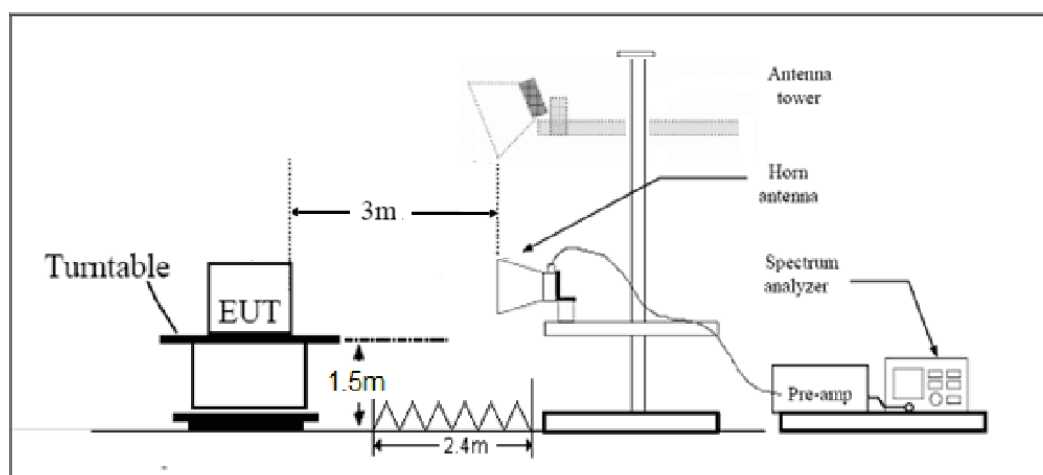
9KHz~ 30MHz



30MHz~ 1GHz



Above 1GHz



Note: Area side: 2.4mX3.6m

Limits

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

Limit	-13 dBm
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Measurement Uncertainty

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

Test Results

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

6. Test Results

6.1. RF Power Output and Effective Isotropic Radiated Power

GSM 1900		Maximum Output Power (dBm)			EIRP (dBm)		
		Channel 512	Channel 661	Channel 810	Channel 512	Channel 661	Channel 810
		1850.2 (MHz)	1880 (MHz)	1909.8 (MHz)	1850.2 (MHz)	1880 (MHz)	1909.8 (MHz)
GPRS (GMSK)	1TXslot	29.09	28.96	28.78	32.74	32.61	32.43
	2TXslots	29.08	28.93	28.75	32.73	32.58	32.40
	3TXslots	27.85	27.64	27.46	31.50	31.29	31.11
	4TXslots	25.87	25.61	25.49	29.52	29.26	29.14
EGPRS (8PSK)	1TXslot	24.62	24.50	24.23	28.27	28.15	27.88
	2TXslots	22.96	22.85	22.69	26.61	26.50	26.34
	3TXslots	20.75	20.73	20.17	24.40	24.38	23.82
	4TXslots	18.64	18.51	18.23	22.29	22.16	21.88

WCDMA Band II		Maximum Output Power (dBm)			EIRP (dBm)		
		Channel 9262	Channel 9400	Channel 9538	Channel 9262	Channel 9400	Channel 9538
		1852.4 (MHz)	1880 (MHz)	1907.6 (MHz)	1852.4 (MHz)	1880 (MHz)	1907.6 (MHz)
RMC	12.2k	22.06	21.94	21.65	25.71	25.59	25.30
HSDPA	Sub - Test 1	21.48	21.36	21.07	25.13	25.01	24.72
	Sub - Test 2	21.47	21.35	21.06	25.12	25.00	24.71
	Sub - Test 3	20.96	20.84	20.55	24.61	24.49	24.20
	Sub - Test 4	20.95	20.83	20.54	24.60	24.48	24.19
HSUPA	Sub - Test 1	20.44	20.32	20.03	24.09	23.97	23.68
	Sub - Test 2	18.43	18.31	18.02	22.08	21.96	21.67
	Sub - Test 3	19.41	19.30	19.01	23.06	22.95	22.66
	Sub - Test 4	18.40	18.29	18.00	22.05	21.94	21.65
	Sub - Test 5	21.89	21.78	21.49	25.54	25.43	25.14

LTE Band2						
Bandwidth (MHz)	UL Channel	RB Size	RB Position	Modulation	Power (dBm)	EIRP (dBm)
1.4	18607	1	#0	QPSK	23.25	26.90
1.4	18607	1	#Mid	QPSK	23.04	26.69
1.4	18607	1	#Max	QPSK	23.13	26.78
1.4	18607	3	#0	QPSK	22.98	26.63
1.4	18607	3	#Mid	QPSK	22.95	26.60
1.4	18607	3	#Max	QPSK	22.92	26.57
1.4	18607	6	#0	QPSK	21.88	25.53
1.4	18607	1	#0	16QAM	22.10	25.75
1.4	18607	1	#Mid	16QAM	21.97	25.62
1.4	18607	1	#Max	16QAM	22.03	25.68
1.4	18607	3	#0	16QAM	22.08	25.73
1.4	18607	3	#Mid	16QAM	22.07	25.72
1.4	18607	3	#Max	16QAM	22.09	25.74
1.4	18607	6	#0	16QAM	20.95	24.60
1.4	18900	1	#0	QPSK	22.40	26.05
1.4	18900	1	#Mid	QPSK	22.36	26.01
1.4	18900	1	#Max	QPSK	22.46	26.11
1.4	18900	3	#0	QPSK	22.37	26.02
1.4	18900	3	#Mid	QPSK	22.36	26.01
1.4	18900	3	#Max	QPSK	22.34	25.99
1.4	18900	6	#0	QPSK	21.46	25.11
1.4	18900	1	#0	16QAM	21.69	25.34
1.4	18900	1	#Mid	16QAM	21.68	25.33
1.4	18900	1	#Max	16QAM	21.69	25.34
1.4	18900	3	#0	16QAM	21.54	25.19
1.4	18900	3	#Mid	16QAM	21.53	25.18
1.4	18900	3	#Max	16QAM	21.53	25.18
1.4	18900	6	#0	16QAM	20.47	24.12
1.4	19193	1	#0	QPSK	22.34	25.99
1.4	19193	1	#Mid	QPSK	22.37	26.02
1.4	19193	1	#Max	QPSK	22.61	26.26
1.4	19193	3	#0	QPSK	22.16	25.81
1.4	19193	3	#Mid	QPSK	22.14	25.79
1.4	19193	3	#Max	QPSK	22.40	26.05
1.4	19193	6	#0	QPSK	21.32	24.97
1.4	19193	1	#0	16QAM	21.15	24.80
1.4	19193	1	#Mid	16QAM	21.30	24.95
1.4	19193	1	#Max	16QAM	21.55	25.20
1.4	19193	3	#0	16QAM	21.25	24.90
1.4	19193	3	#Mid	16QAM	21.24	24.89

1.4	19193	3	#Max	16QAM	21.41	25.06
1.4	19193	6	#0	16QAM	20.47	24.12
3	18615	1	#0	QPSK	22.86	26.51
3	18615	1	#Mid	QPSK	22.78	26.43
3	18615	1	#Max	QPSK	22.64	26.29
3	18615	8	#0	QPSK	21.80	25.45
3	18615	8	#Mid	QPSK	21.80	25.45
3	18615	8	#Max	QPSK	21.77	25.42
3	18615	15	#0	QPSK	21.82	25.47
3	18615	1	#0	16QAM	22.05	25.70
3	18615	1	#Mid	16QAM	22.12	25.77
3	18615	1	#Max	16QAM	22.00	25.65
3	18615	8	#0	16QAM	20.92	24.57
3	18615	8	#Mid	16QAM	20.93	24.58
3	18615	8	#Max	16QAM	20.91	24.56
3	18615	15	#0	16QAM	20.85	24.50
3	18900	1	#0	QPSK	22.22	25.87
3	18900	1	#Mid	QPSK	22.30	25.95
3	18900	1	#Max	QPSK	22.17	25.82
3	18900	8	#0	QPSK	21.36	25.01
3	18900	8	#Mid	QPSK	21.36	25.01
3	18900	8	#Max	QPSK	21.35	25.00
3	18900	15	#0	QPSK	21.33	24.98
3	18900	1	#0	16QAM	21.46	25.11
3	18900	1	#Mid	16QAM	21.55	25.20
3	18900	1	#Max	16QAM	21.43	25.08
3	18900	8	#0	16QAM	20.43	24.08
3	18900	8	#Mid	16QAM	20.44	24.09
3	18900	8	#Max	16QAM	20.42	24.07
3	18900	15	#0	16QAM	20.29	23.94
3	19185	1	#0	QPSK	21.78	25.43
3	19185	1	#Mid	QPSK	22.09	25.74
3	19185	1	#Max	QPSK	22.46	26.11
3	19185	8	#0	QPSK	20.97	24.62
3	19185	8	#Mid	QPSK	21.00	24.65
3	19185	8	#Max	QPSK	21.33	24.98
3	19185	15	#0	QPSK	21.09	24.74
3	19185	1	#0	16QAM	20.71	24.36
3	19185	1	#Mid	16QAM	21.05	24.70
3	19185	1	#Max	16QAM	21.37	25.02
3	19185	8	#0	16QAM	20.09	23.74
3	19185	8	#Mid	16QAM	20.10	23.75
3	19185	8	#Max	16QAM	20.42	24.07

3	19185	15	#0	16QAM	20.20	23.85
5	18625	1	#0	QPSK	22.79	26.44
5	18625	1	#Mid	QPSK	22.79	26.44
5	18625	1	#Max	QPSK	22.44	26.09
5	18625	12	#0	QPSK	21.72	25.37
5	18625	12	#Mid	QPSK	21.72	25.37
5	18625	12	#Max	QPSK	21.66	25.31
5	18625	25	#0	QPSK	21.66	25.31
5	18625	1	#0	16QAM	22.02	25.67
5	18625	1	#Mid	16QAM	22.04	25.69
5	18625	1	#Max	16QAM	21.82	25.47
5	18625	12	#0	16QAM	20.82	24.47
5	18625	12	#Mid	16QAM	20.82	24.47
5	18625	12	#Max	16QAM	20.75	24.40
5	18625	25	#0	16QAM	20.80	24.45
5	18900	1	#0	QPSK	22.16	25.81
5	18900	1	#Mid	QPSK	22.25	25.90
5	18900	1	#Max	QPSK	21.99	25.64
5	18900	12	#0	QPSK	21.38	25.03
5	18900	12	#Mid	QPSK	21.30	24.95
5	18900	12	#Max	QPSK	21.35	25.00
5	18900	25	#0	QPSK	21.35	25.00
5	18900	1	#0	16QAM	21.52	25.17
5	18900	1	#Mid	16QAM	21.65	25.30
5	18900	1	#Max	16QAM	21.37	25.02
5	18900	12	#0	16QAM	20.43	24.08
5	18900	12	#Mid	16QAM	20.43	24.08
5	18900	12	#Max	16QAM	20.39	24.04
5	18900	25	#0	16QAM	20.39	24.04
5	19175	1	#0	QPSK	21.62	25.27
5	19175	1	#Mid	QPSK	21.80	25.45
5	19175	1	#Max	QPSK	22.29	25.94
5	19175	12	#0	QPSK	20.71	24.36
5	19175	12	#Mid	QPSK	20.71	24.36
5	19175	12	#Max	QPSK	21.04	24.69
5	19175	25	#0	QPSK	20.91	24.56
5	19175	1	#0	16QAM	20.88	24.53
5	19175	1	#Mid	16QAM	21.15	24.80
5	19175	1	#Max	16QAM	21.60	25.25
5	19175	12	#0	16QAM	19.84	23.49
5	19175	12	#Mid	16QAM	19.85	23.50
5	19175	12	#Max	16QAM	20.24	23.89
5	19175	25	#0	16QAM	20.01	23.66

10	18650	1	#0	QPSK	22.50	26.15
10	18650	1	#Mid	QPSK	22.36	26.01
10	18650	1	#Max	QPSK	21.84	25.49
10	18650	25	#0	QPSK	21.44	25.09
10	18650	25	#Mid	QPSK	21.47	25.12
10	18650	25	#Max	QPSK	21.13	24.78
10	18650	50	#0	QPSK	21.28	24.93
10	18650	1	#0	16QAM	21.80	25.45
10	18650	1	#Mid	16QAM	21.73	25.38
10	18650	1	#Max	16QAM	21.28	24.93
10	18650	25	#0	16QAM	20.61	24.26
10	18650	25	#Mid	16QAM	20.61	24.26
10	18650	25	#Max	16QAM	20.35	24.00
10	18650	50	#0	16QAM	20.43	24.08
10	18900	1	#0	QPSK	21.96	25.61
10	18900	1	#Mid	QPSK	22.14	25.79
10	18900	1	#Max	QPSK	21.52	25.17
10	18900	25	#0	QPSK	21.05	24.70
10	18900	25	#Mid	QPSK	21.06	24.71
10	18900	25	#Max	QPSK	20.92	24.57
10	18900	50	#0	QPSK	21.03	24.68
10	18900	1	#0	16QAM	21.20	24.85
10	18900	1	#Mid	16QAM	21.41	25.06
10	18900	1	#Max	16QAM	20.81	24.46
10	18900	25	#0	16QAM	20.16	23.81
10	18900	25	#Mid	16QAM	20.17	23.82
10	18900	25	#Max	16QAM	20.03	23.68
10	18900	50	#0	16QAM	20.10	23.75
10	19150	1	#0	QPSK	21.57	25.22
10	19150	1	#Mid	QPSK	21.54	25.19
10	19150	1	#Max	QPSK	21.98	25.63
10	19150	25	#0	QPSK	20.40	24.05
10	19150	25	#Mid	QPSK	20.42	24.07
10	19150	25	#Max	QPSK	20.55	24.20
10	19150	50	#0	QPSK	20.45	24.10
10	19150	1	#0	16QAM	20.44	24.09
10	19150	1	#Mid	16QAM	20.43	24.08
10	19150	1	#Max	16QAM	20.88	24.53
10	19150	25	#0	16QAM	19.47	23.12
10	19150	25	#Mid	16QAM	19.49	23.14
10	19150	25	#Max	16QAM	19.66	23.31
10	19150	50	#0	16QAM	19.57	23.22
15	18675	1	#0	QPSK	22.60	26.25

15	18675	1	#Mid	QPSK	22.21	25.86
15	18675	1	#Max	QPSK	22.00	25.65
15	18675	36	#0	QPSK	21.50	25.15
15	18675	36	#Mid	QPSK	21.51	25.16
15	18675	36	#Max	QPSK	21.17	24.82
15	18675	75	#0	QPSK	21.26	24.91
15	18675	1	#0	16QAM	21.93	25.58
15	18675	1	#Mid	16QAM	21.61	25.26
15	18675	1	#Max	16QAM	21.49	25.14
15	18675	36	#0	16QAM	20.60	24.25
15	18675	36	#Mid	16QAM	20.60	24.25
15	18675	36	#Max	16QAM	20.29	23.94
15	18675	75	#0	16QAM	20.41	24.06
15	18900	1	#0	QPSK	22.19	25.84
15	18900	1	#Mid	QPSK	22.18	25.83
15	18900	1	#Max	QPSK	21.78	25.43
15	18900	36	#0	QPSK	21.27	24.92
15	18900	36	#Mid	QPSK	21.28	24.93
15	18900	36	#Max	QPSK	21.03	24.68
15	18900	75	#0	QPSK	21.19	24.84
15	18900	1	#0	16QAM	21.43	25.08
15	18900	1	#Mid	16QAM	21.43	25.08
15	18900	1	#Max	16QAM	21.05	24.70
15	18900	36	#0	16QAM	20.35	24.00
15	18900	36	#Mid	16QAM	20.36	24.01
15	18900	36	#Max	16QAM	20.12	23.77
15	18900	75	#0	16QAM	20.28	23.93
15	19125	1	#0	QPSK	22.38	26.03
15	19125	1	#Mid	QPSK	21.64	25.29
15	19125	1	#Max	QPSK	22.05	25.70
15	19125	36	#0	QPSK	21.00	24.65
15	19125	36	#Mid	QPSK	21.02	24.67
15	19125	36	#Max	QPSK	20.67	24.32
15	19125	75	#0	QPSK	20.76	24.41
15	19125	1	#0	16QAM	21.47	25.12
15	19125	1	#Mid	16QAM	20.74	24.39
15	19125	1	#Max	16QAM	21.15	24.80
15	19125	36	#0	16QAM	20.05	23.70
15	19125	36	#Mid	16QAM	20.09	23.74
15	19125	36	#Max	16QAM	19.81	23.46
15	19125	75	#0	16QAM	19.88	23.53
20	18700	1	#0	QPSK	22.57	26.22
20	18700	1	#Mid	QPSK	22.08	25.73

20	18700	1	#Max	QPSK	21.91	25.56
20	18700	50	#0	QPSK	21.34	24.99
20	18700	50	#Mid	QPSK	21.32	24.97
20	18700	50	#Max	QPSK	21.11	24.76
20	18700	100	#0	QPSK	20.99	24.64
20	18700	1	#0	16QAM	21.74	25.39
20	18700	1	#Mid	16QAM	21.35	25.00
20	18700	1	#Max	16QAM	21.26	24.91
20	18700	50	#0	16QAM	20.52	24.17
20	18700	50	#Mid	16QAM	20.51	24.16
20	18700	50	#Max	16QAM	20.23	23.88
20	18700	100	#0	16QAM	20.14	23.79
20	18900	1	#0	QPSK	22.01	25.66
20	18900	1	#Mid	QPSK	22.21	25.86
20	18900	1	#Max	QPSK	21.84	25.49
20	18900	50	#0	QPSK	21.14	24.79
20	18900	50	#Mid	QPSK	21.14	24.79
20	18900	50	#Max	QPSK	20.85	24.50
20	18900	100	#0	QPSK	21.13	24.78
20	18900	1	#0	16QAM	20.96	24.61
20	18900	1	#Mid	16QAM	21.14	24.79
20	18900	1	#Max	16QAM	20.76	24.41
20	18900	50	#0	16QAM	20.21	23.86
20	18900	50	#Mid	16QAM	20.21	23.86
20	18900	50	#Max	16QAM	19.92	23.57
20	18900	100	#0	16QAM	20.24	23.89
20	19100	1	#0	QPSK	22.05	25.70
20	19100	1	#Mid	QPSK	21.84	25.49
20	19100	1	#Max	QPSK	21.90	25.55
20	19100	50	#0	QPSK	21.21	24.86
20	19100	50	#Mid	QPSK	21.19	24.84
20	19100	50	#Max	QPSK	20.56	24.21
20	19100	100	#0	QPSK	20.75	24.40
20	19100	1	#0	16QAM	20.87	24.52
20	19100	1	#Mid	16QAM	20.80	24.45
20	19100	1	#Max	16QAM	20.76	24.41
20	19100	50	#0	16QAM	20.29	23.94
20	19100	50	#Mid	16QAM	20.31	23.96
20	19100	50	#Max	16QAM	19.73	23.38
20	19100	100	#0	16QAM	19.77	23.42

6.2.Occupied Bandwidth

Mode	Channel	Frequency (MHz)	99% Power Bandwidth (MHz)	-26dBc Bandwidth(MHz)
GPRS 1900 (GMSK)	512	1850.2	0.2450	0.3172
	661	1880.0	0.2403	0.3159
	810	1909.8	0.2435	0.3153
EGPRS 1900 (8PSK)	512	1850.2	0.2495	0.3186
	661	1880.0	0.2495	0.3060
	810	1909.8	0.2524	0.3211
WCDMA Band II (RMC)	9262	1852.4	4.1611	4.701
	9400	1880	4.1492	4.655
	9538	1907.6	4.1597	4.704

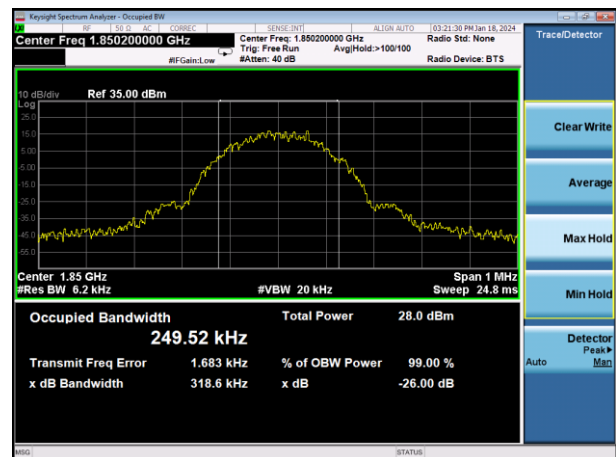
LTE Band2						
Bandwidth (MHz)	UL Channel	RB Size	RB Position	Modulation	99% OBW (MHz)	-26dB EBW (MHz)
1.4	18607	6	#0	QPSK	1.093	1.271
1.4	18607	6	#0	16QAM	1.109	1.274
1.4	18900	6	#0	QPSK	1.100	1.273
1.4	18900	6	#0	16QAM	1.097	1.271
1.4	19193	6	#0	QPSK	1.107	1.257
1.4	19193	6	#0	16QAM	1.105	1.262
3	18615	15	#0	QPSK	2.702	2.931
3	18615	15	#0	16QAM	2.694	2.924
3	18900	15	#0	QPSK	2.712	2.917
3	18900	15	#0	16QAM	2.707	2.951
3	19185	15	#0	QPSK	2.701	2.936
3	19185	15	#0	16QAM	2.689	2.933
5	18625	25	#0	QPSK	4.510	4.853
5	18625	25	#0	16QAM	4.506	4.833
5	18900	25	#0	QPSK	4.513	4.840
5	18900	25	#0	16QAM	4.506	4.871
5	19175	25	#0	QPSK	4.500	4.841
5	19175	25	#0	16QAM	4.504	4.869
10	18650	50	#0	QPSK	9.007	9.610
10	18650	50	#0	16QAM	8.959	9.672
10	18900	50	#0	QPSK	8.956	9.596
10	18900	50	#0	16QAM	8.940	9.631
10	19150	50	#0	QPSK	9.011	9.641

10	19150	50	#0	16QAM	8.980	9.610
15	18675	75	#0	QPSK	13.437	14.343
15	18675	75	#0	16QAM	13.472	14.520
15	18900	75	#0	QPSK	13.424	14.312
15	18900	75	#0	16QAM	13.471	14.445
15	19125	75	#0	QPSK	13.492	14.425
15	19125	75	#0	16QAM	13.490	14.336
20	18700	100	#0	QPSK	17.923	19.477
20	18700	100	#0	16QAM	17.955	19.521
20	18900	100	#0	QPSK	17.925	19.535
20	18900	100	#0	16QAM	17.916	19.490
20	19100	100	#0	QPSK	17.936	19.589
20	19100	100	#0	16QAM	17.941	19.272

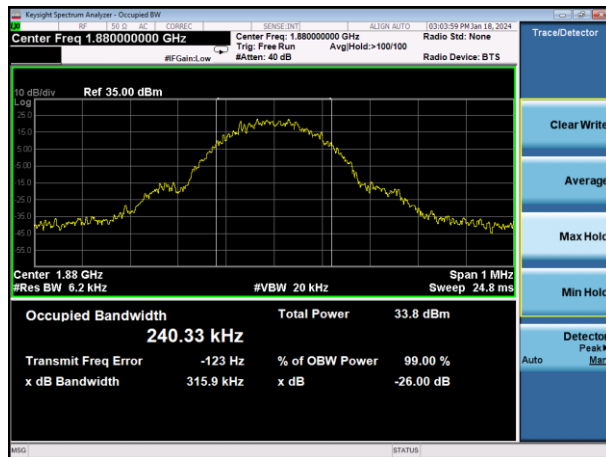
GSM1900 GPRS CH-Low



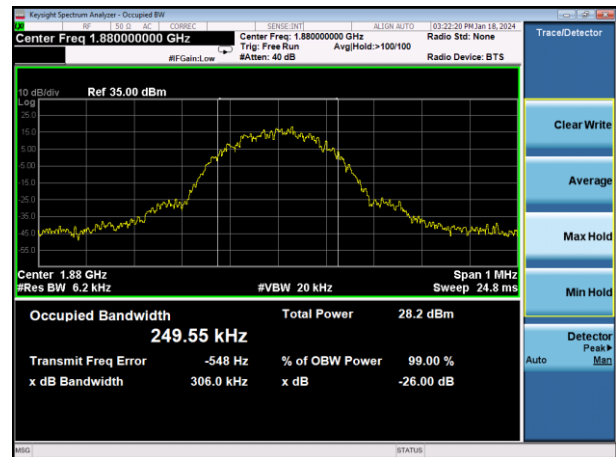
GSM1900 EGPRS CH-Low



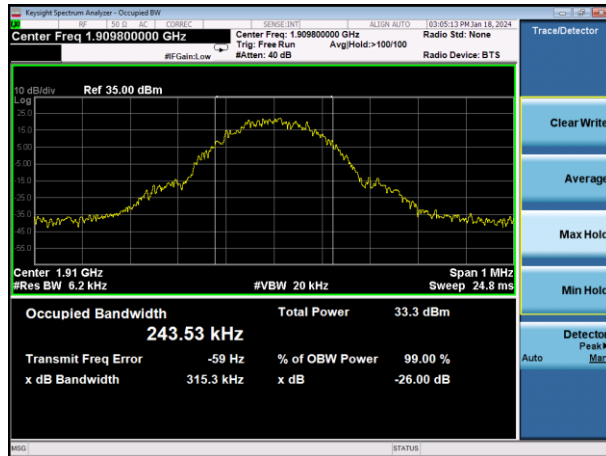
GSM 1900 GPRS CH-Middle



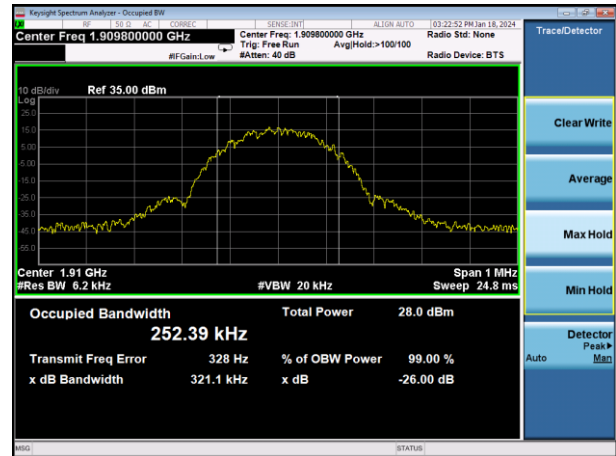
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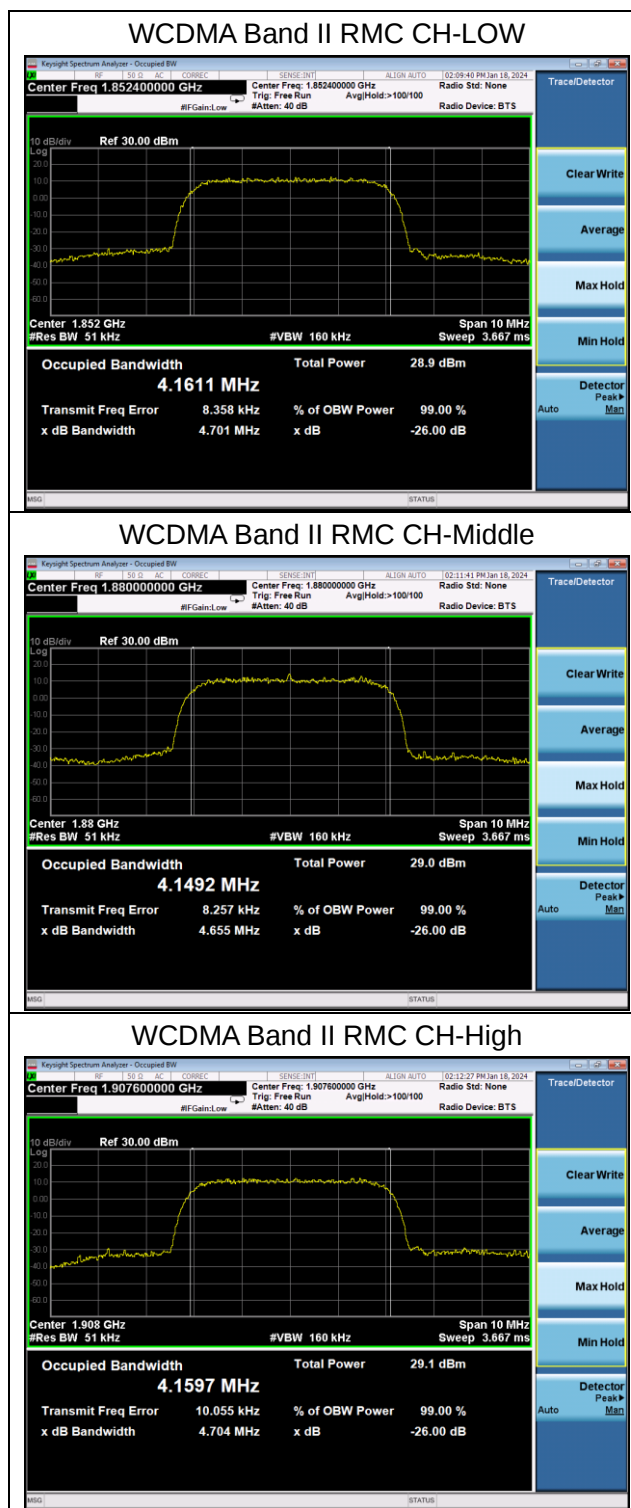


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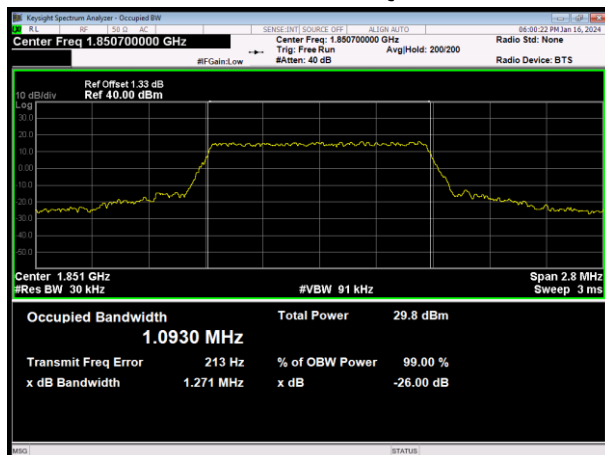


GSM 1900 EGPRS CH-High

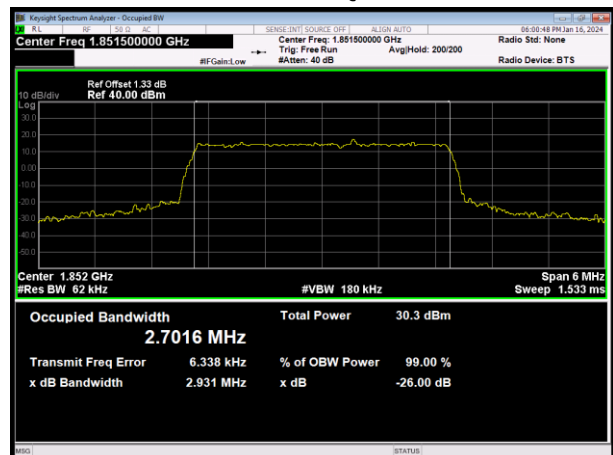




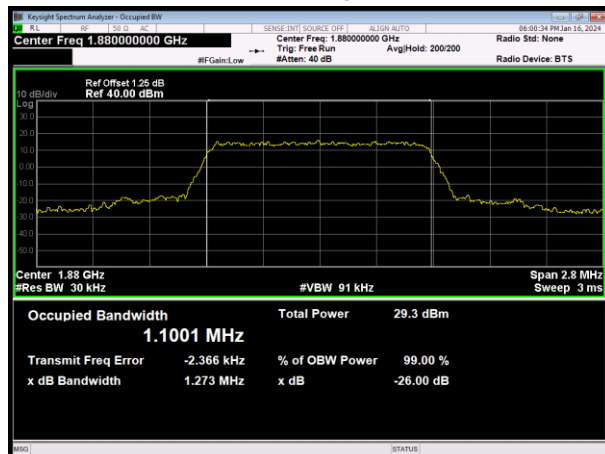
LTE Band 2 1.4MHz QPSK CH-Low



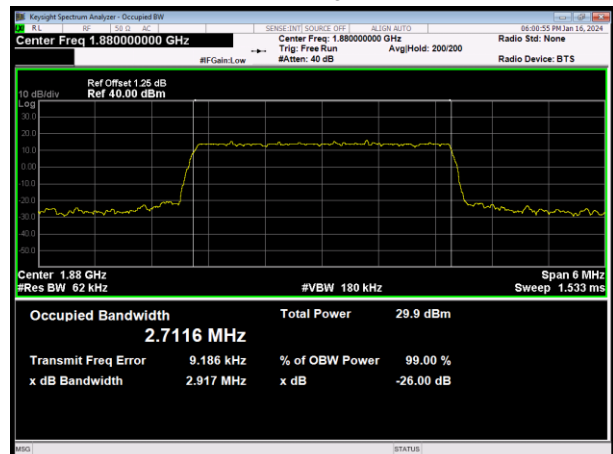
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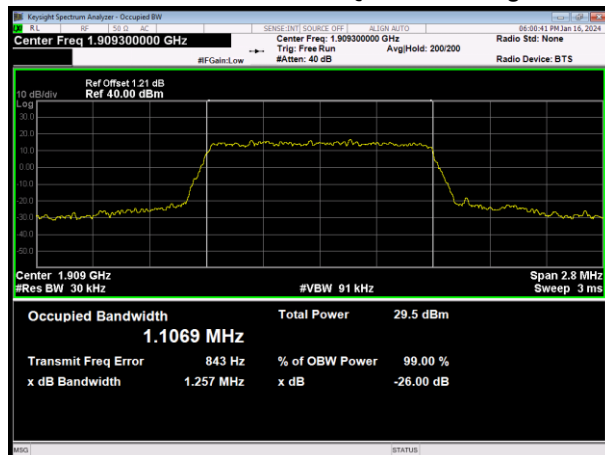
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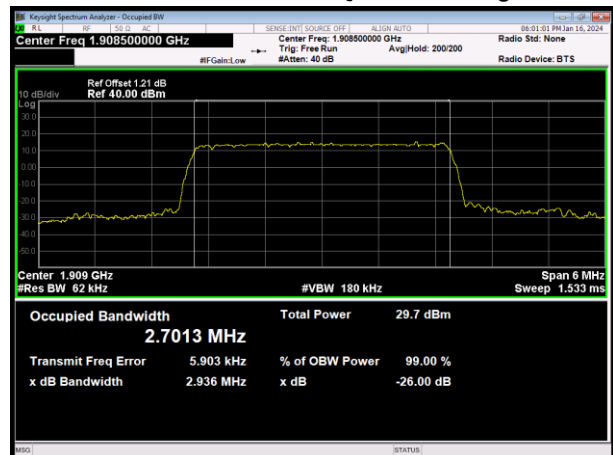
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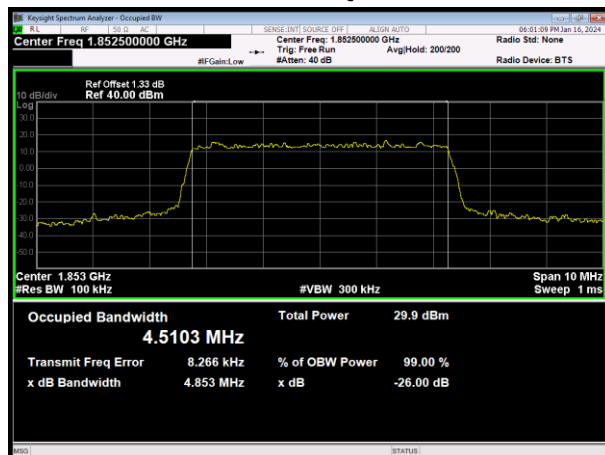
LTE Band 2 1.4MHz QPSK CH-High



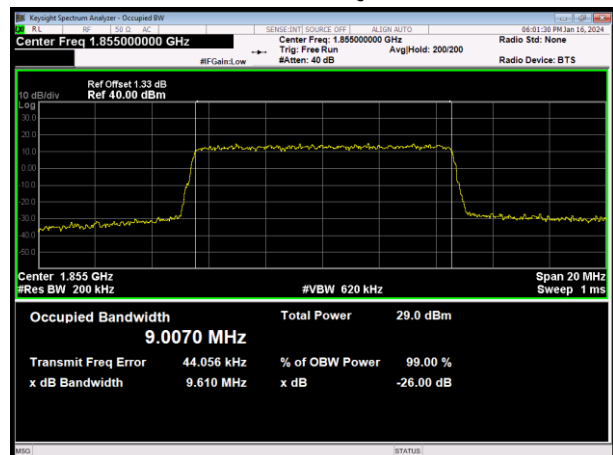
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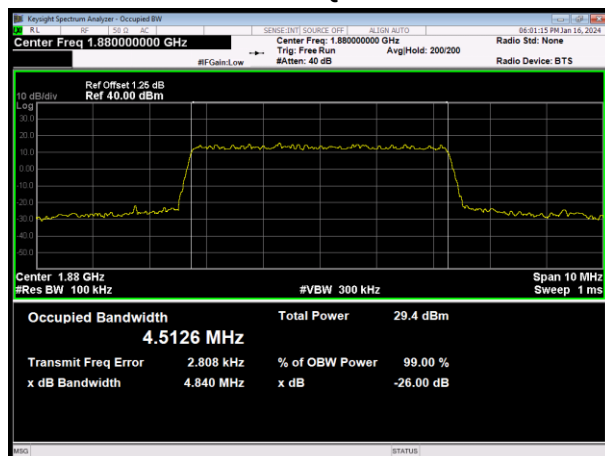
LTE Band 2 5MHz QPSK CH-Low



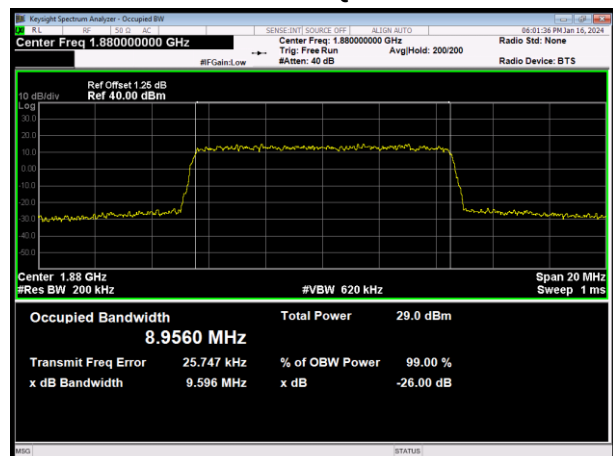
LTE Band 2 10MHz QPSK CH-Low



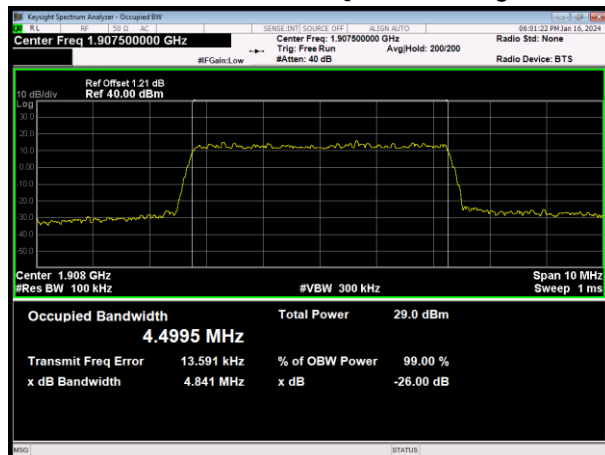
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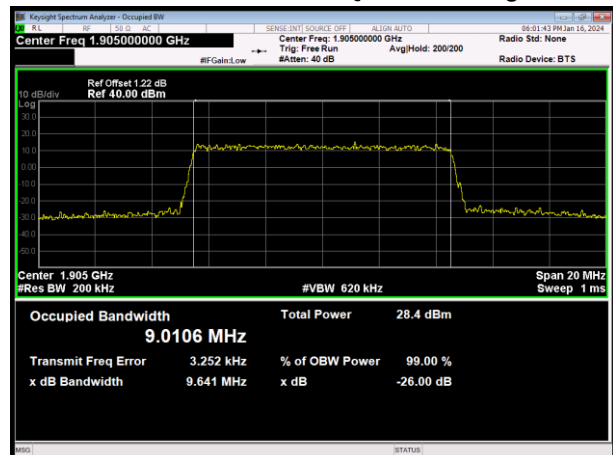
LTE Band 2 10MHz QPSK CH-Middle



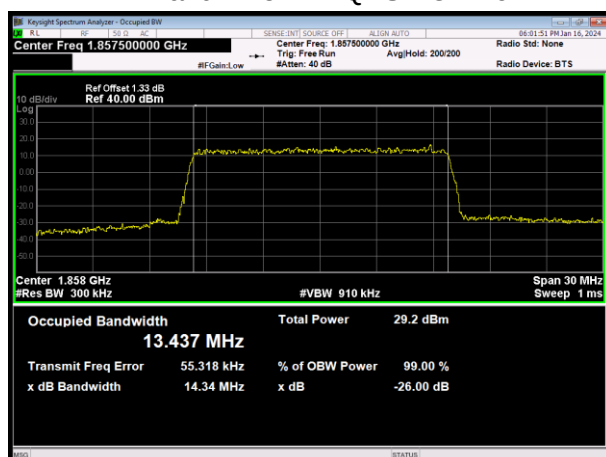
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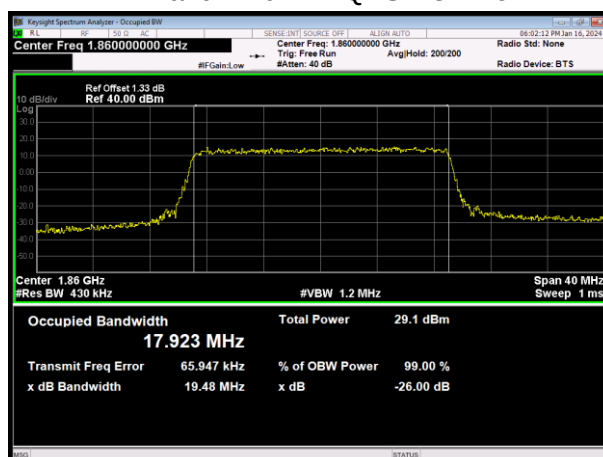
LTE Band 2 10MHz QPSK CH-High



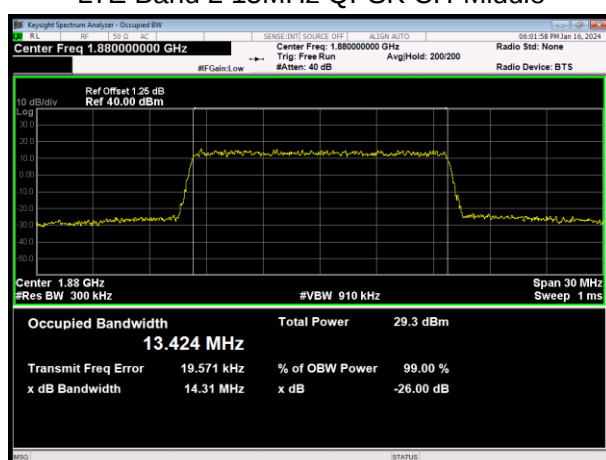
LTE Band 2 15MHz QPSK CH-Low



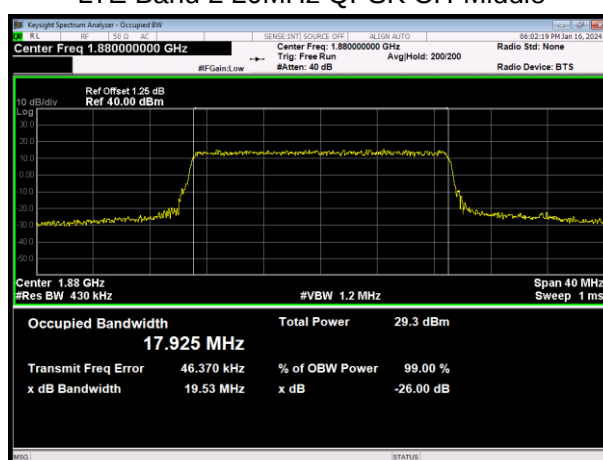
LTE Band 2 20MHz QPSK CH-Low



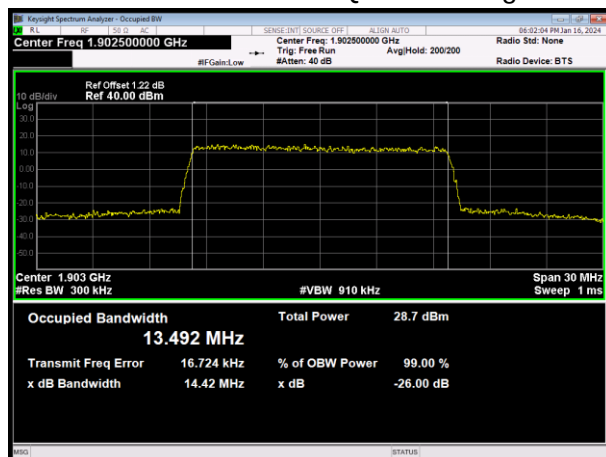
LTE Band 2 15MHz QPSK CH-Middle



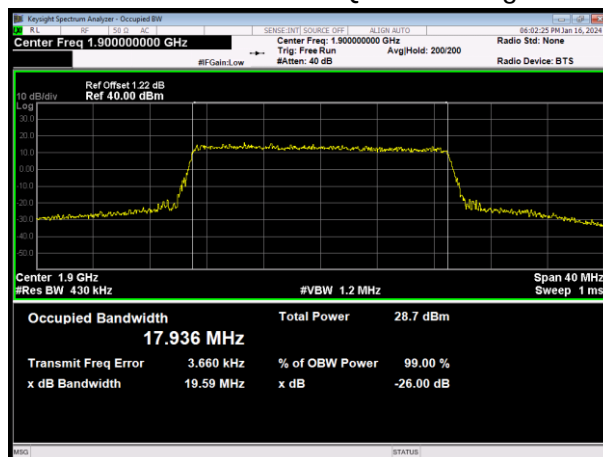
LTE Band 2 20MHz QPSK CH-Middle



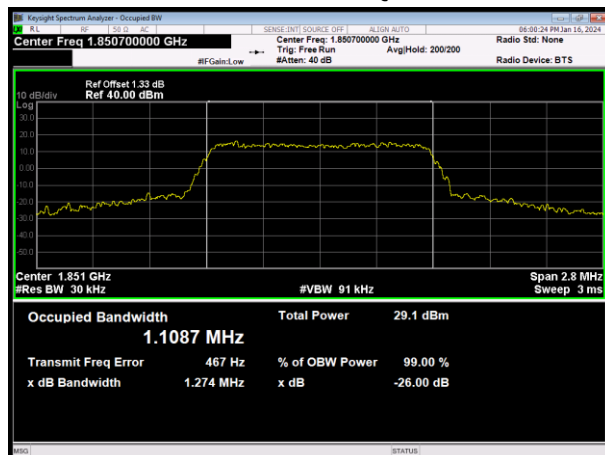
LTE Band 2 15MHz QPSK CH-High



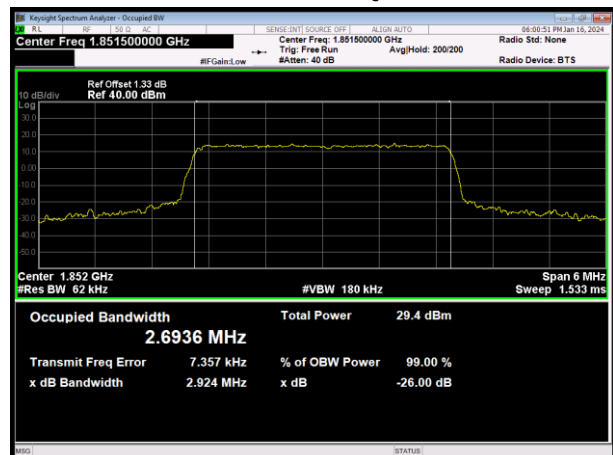
LTE Band 2 20MHz QPSK CH-High



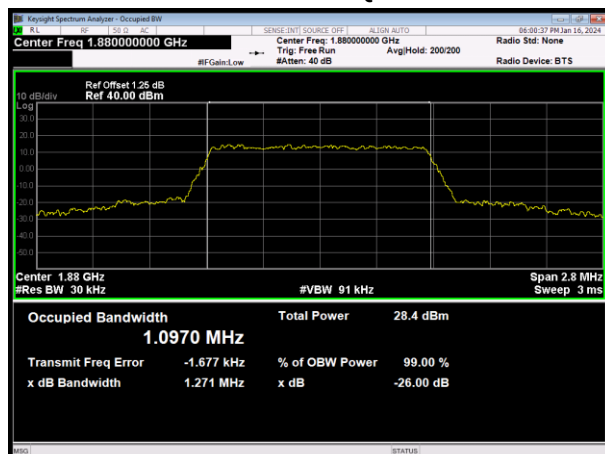
LTE Band 2 1.4MHz 16QAM CH-Low



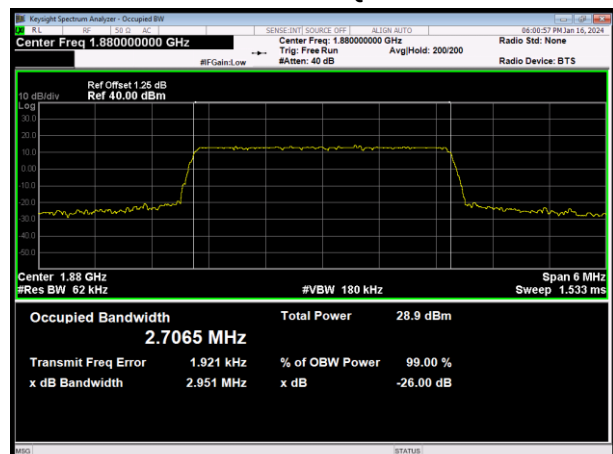
LTE Band 2 3MHz 16QAM CH-Low



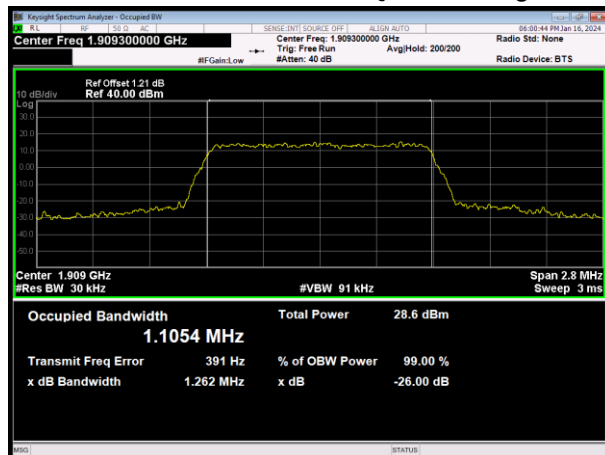
LTE Band 2 1.4MHz 16QAM CH-Middle



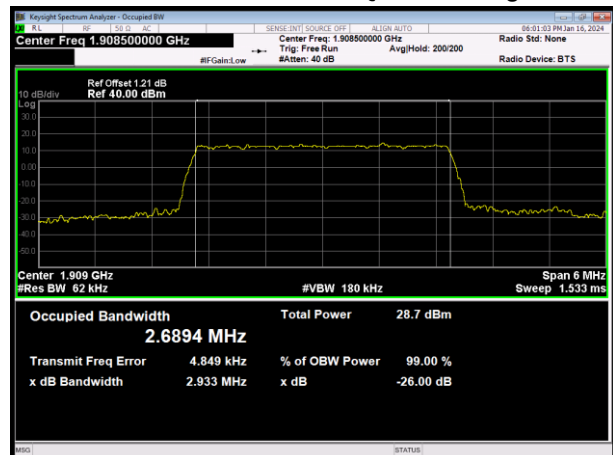
LTE Band 2 3MHz 16QAM CH-Middle



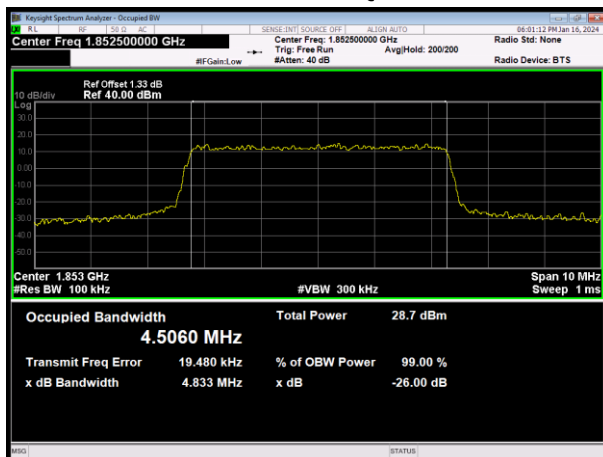
LTE Band 2 1.4MHz 16QAM CH-High



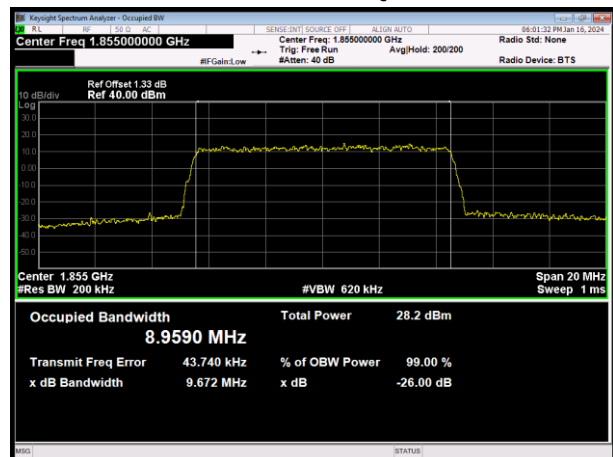
LTE Band 2 3MHz 16QAM CH-High



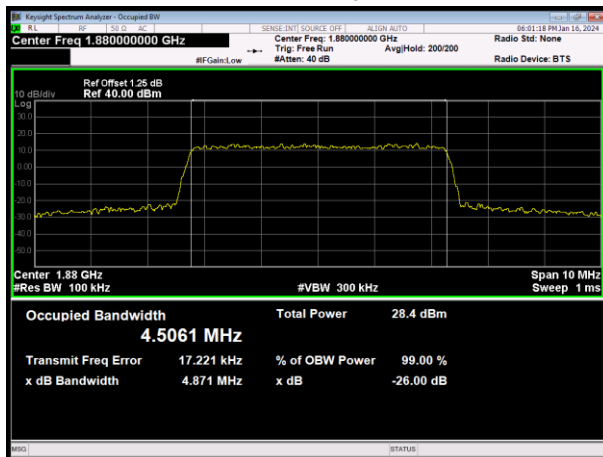
LTE Band 2 5MHz 16QAM CH-Low



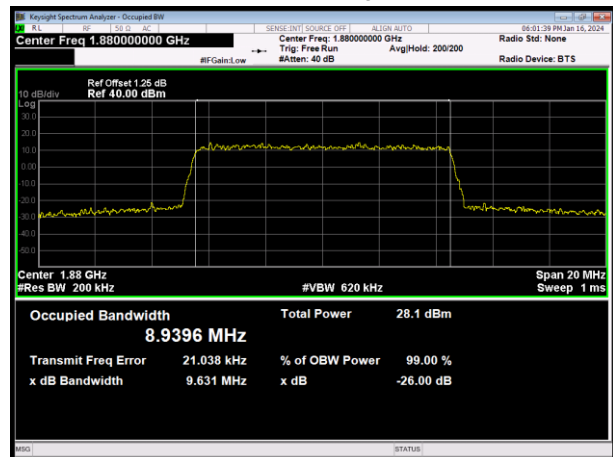
LTE Band 2 10MHz 16QAM CH-Low



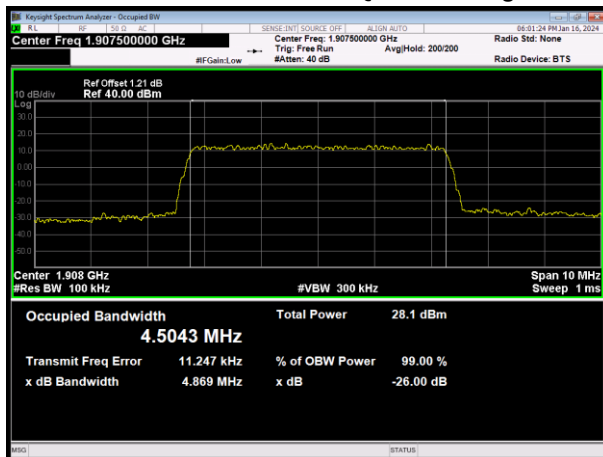
LTE Band 2 5MHz 16QAM CH-Middle



LTE Band 2 10MHz 16QAM CH-Middle



LTE Band 2 5MHz 16QAM CH-High



LTE Band 2 10MHz 16QAM CH-High

