RF TEST REPORT

Applicant	Quectel Wireless Solutions Co., Ltd.
FCC ID	XMR202011EC200TAU
Product	LTE Module
Brand	Quectel
Model	EC200T-AU, EC200T-AU MINIPCIE
Report No.	R2009A0613-R2V2
Issue Date	December 11, 2020

TA Technology (Shanghai) Co., Ltd. tested the above equipment in accordance with the requirements in **FCC CFR47 Part 2 (2019)/ FCC CFR 47 Part 24E (2019)**. 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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Version	Revision description	Issue Date
Rev.0	/	November 17, 2020
Rev.1	Update the Band Edge test results of GSM1900.	December 9, 2020
Rev.2	Update the Occupied Bandwidth test results of GSM1900.	December 11, 2020
Note: This revised report (Report No. R2009A0613-R2V2) supersedes and replaces the previously issued report (Report No. R2009A0613-R2V1). Please discard or destroy the previously issued report and dispose of it accordingly.		

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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	Radiates Spurious Emission	2.1053 / 24.238(a)	PASS
Date of Testing: September 21, 2020~December 11, 2020			
Date of Sample Received: September 21, 2020			

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.

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1. Test Laboratory

1.1. Notes of the test report

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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 electromagnetic emissions measurements.

A2LA (Certificate Number: 3857.01)

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

1.3. Testing Location

Company:	TA Technology (Shanghai) Co., Ltd.
Address:	No.145, Jintang Rd, Tangzhen Industry Park, Pudong
City:	Shanghai
Post code:	201201
Country:	P. R. China
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2. General Description of Equipment under Test

2.3. 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

2.4. General information

EUT Description		
Model	EC200T-AU, EC200T-AU MINIPCIE	
IMEI	EC200T-AU: 861157040008266 EC200T-AU MINIPCIE: 861157040006484	
Hardware Version	R1.0	
Software Version	EC200TAUAAR05A01M16	
Power Supply	External power supply	
Antenna Type	External Antenna	
Antenna Gain	Frequency(MHz)	Gain (dBi)
	1860	1.25
	1880	1.38
	1900	1.59
	1920	1.36
Test Mode(s)	GSM1900; WCDMA Band II; LTE Band 2;	
Test Modulation	(GSM/GPRS)GMSK, (EGPRS) GMSK/ 8PSK; (WCDMA) BPSK,QPSK; (LTE)QPSK,16QAM	
GPRS Multislot Class	33	
EGPRS Multislot Class	33	
HSDPA UE Category	14	
HSUPA UE Category	6	
LTE Category	4	
Maximum E.I.R.P	GSM 1900:	31.64dBm
	WCDMA Band II:	24.82dBm
	LTE Band 2:	25.86dBm
Rated Power Supply Voltage	3.8V	
Extreme Voltage	Minimum: 3.4V Maximum: 4.5V	
Extreme Temperature	Lowest: -30°C Highest: +50°C	
Operating Voltage	Minimum: 3.4V Maximum: 4.5V	
Operating Temperature	Lowest: -40°C Highest: +85°C	

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	Band	Tx (MHz)	Rx (MHz)
Operating Frequency Range(s)	GSM1900	1850 ~ 1910	1930 ~ 1990
	WCDMA Band II	1850 ~ 1910	1930 ~ 1990
	LTE Band 2	1850 ~ 1910	1930 ~ 1990
Note: 1. The EUT is sent from the applicant to TA and the information of the EUT is declared by the applicant.			

The detailed product difference between EC200T-AU and EC200T-AU MINIPCIE please refers to the Difference Statements letter. For conducted test items, this report only record the test results of EC200T-AU.

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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 (2019)

ANSI C63.26 (2015)

Reference standard:

FCC CFR47 Part 2 (2019)

KDB 971168 D01 Power Meas License Digital Systems v03r01

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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 (X axis, horizontal polarization) 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	GSM GPRS EGPRS	RMC HSDPA/HSUPA
Occupied Bandwidth	GSM GPRS(1Tx slot) EGPRS(1Tx slot)	RMC
Band Edge Compliance	GSM GPRS(1Tx slot) EGPRS(1Tx slot)	RMC
Peak-to-Average Power Ratio	GSM GPRS(1Tx slot) EGPRS(1Tx slot)	RMC
Frequency Stability	GSM GPRS(1Tx slot) EGPRS(1Tx slot)	RMC
Spurious Emissions at Antenna Terminals	GSM	RMC
Radiates Spurious Emission	GSM	RMC

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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	O	O	O	O
Conducted Spurious Emissions	O	O	O	O	O	O	O	-	O	-	-	O	O	O
Radiates 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.													

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5. Test Case Results

5.1. RF Power Output and Effective Isotropic Radiated Power

Ambient condition

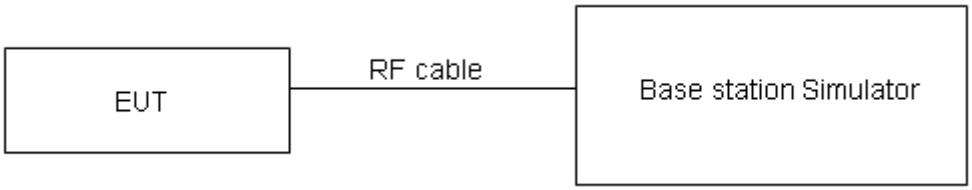
Temperature	Relative humidity	Pressure
23°C ~25°C	45%~50%	101.5kPa

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) - Losses (dB) + 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 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	⩽ 2 W (33 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 EIRP.

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Test Results

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)
GSM(GMSK)	Results	30.00	30.05	30.05	31.25	31.43	31.64
GPRS (GMSK)	1TXslot	29.99	30.01	29.99	31.24	31.39	31.58
	2TXslots	29.97	30.00	30.01	31.22	31.38	31.60
	3TXslots	28.48	28.52	28.55	29.73	29.90	30.14
	4TXslots	26.52	26.58	26.60	27.77	27.96	28.19
EGPRS	1TXslot	26.35	26.24	26.46	27.60	27.62	28.05
	2TXslots	26.23	26.18	26.43	27.48	27.56	28.02
	3TXslots	24.85	24.86	24.94	26.10	26.24	26.53
	4TXslots	22.64	22.63	22.78	23.89	24.01	24.37

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		23.00	23.38	23.23	24.25	24.76	24.82
HSDPA	Sub - Test 1	22.46	22.80	22.67	23.71	24.18	24.26
	Sub - Test 2	22.45	22.82	22.64	23.70	24.20	24.23
	Sub - Test 3	21.92	22.32	22.16	23.17	23.70	23.75
	Sub - Test 4	21.93	22.33	22.14	23.18	23.71	23.73
HSUPA	Sub - Test 1	22.42	22.79	22.62	23.67	24.17	24.21
	Sub - Test 2	21.41	21.77	21.61	22.66	23.15	23.20
	Sub - Test 3	21.88	22.25	22.10	23.13	23.63	23.69
	Sub - Test 4	21.64	22.04	21.88	22.89	23.42	23.47
	Sub - Test 5	22.35	22.72	22.56	23.60	24.10	24.15

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Band	Bandwidth (MHz)	UL Channel	RB Size	RB Position	Modulation	Power (dBm)	EIRP (dBm)	Verdict
LTE Band2	1.4	18607	1	#0	QPSK	24.22	25.47	PASS
LTE Band2	1.4	18607	1	#Mid	QPSK	24.33	25.58	PASS
LTE Band2	1.4	18607	1	#Max	QPSK	24.41	25.66	PASS
LTE Band2	1.4	18607	3	#0	QPSK	24.13	25.38	PASS
LTE Band2	1.4	18607	3	#Mid	QPSK	24.11	25.36	PASS
LTE Band2	1.4	18607	3	#Max	QPSK	24.24	25.49	PASS
LTE Band2	1.4	18607	6	#0	QPSK	23.08	24.33	PASS
LTE Band2	1.4	18607	1	#0	QAM16	23.07	24.32	PASS
LTE Band2	1.4	18607	1	#Mid	QAM16	23.22	24.47	PASS
LTE Band2	1.4	18607	1	#Max	QAM16	23.25	24.50	PASS
LTE Band2	1.4	18607	3	#0	QAM16	23.21	24.46	PASS
LTE Band2	1.4	18607	3	#Mid	QAM16	23.20	24.45	PASS
LTE Band2	1.4	18607	3	#Max	QAM16	23.35	24.60	PASS
LTE Band2	1.4	18607	6	#0	QAM16	22.20	23.45	PASS
LTE Band2	1.4	18900	1	#0	QPSK	24.36	25.74	PASS
LTE Band2	1.4	18900	1	#Mid	QPSK	24.43	25.81	PASS
LTE Band2	1.4	18900	1	#Max	QPSK	24.48	25.86	PASS
LTE Band2	1.4	18900	3	#0	QPSK	24.35	25.73	PASS
LTE Band2	1.4	18900	3	#Mid	QPSK	24.34	25.72	PASS
LTE Band2	1.4	18900	3	#Max	QPSK	24.43	25.81	PASS
LTE Band2	1.4	18900	6	#0	QPSK	23.42	24.80	PASS
LTE Band2	1.4	18900	1	#0	QAM16	23.23	24.61	PASS
LTE Band2	1.4	18900	1	#Mid	QAM16	23.46	24.84	PASS
LTE Band2	1.4	18900	1	#Max	QAM16	22.70	24.08	PASS
LTE Band2	1.4	18900	3	#0	QAM16	23.31	24.69	PASS
LTE Band2	1.4	18900	3	#Mid	QAM16	23.35	24.73	PASS
LTE Band2	1.4	18900	3	#Max	QAM16	22.01	23.39	PASS
LTE Band2	1.4	18900	6	#0	QAM16	21.06	22.44	PASS
LTE Band2	1.4	19193	1	#0	QPSK	24.07	25.66	PASS
LTE Band2	1.4	19193	1	#Mid	QPSK	24.07	25.66	PASS
LTE Band2	1.4	19193	1	#Max	QPSK	24.22	25.81	PASS
LTE Band2	1.4	19193	3	#0	QPSK	23.98	25.57	PASS
LTE Band2	1.4	19193	3	#Mid	QPSK	23.97	25.56	PASS
LTE Band2	1.4	19193	3	#Max	QPSK	24.06	25.65	PASS
LTE Band2	1.4	19193	6	#0	QPSK	22.92	24.51	PASS
LTE Band2	1.4	19193	1	#0	QAM16	22.74	24.33	PASS
LTE Band2	1.4	19193	1	#Mid	QAM16	22.84	24.43	PASS
LTE Band2	1.4	19193	1	#Max	QAM16	22.99	24.58	PASS
LTE Band2	1.4	19193	3	#0	QAM16	22.81	24.40	PASS
LTE Band2	1.4	19193	3	#Mid	QAM16	22.79	24.38	PASS

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LTE Band2	1.4	19193	3	#Max	QAM16	22.87	24.46	PASS
LTE Band2	1.4	19193	6	#0	QAM16	21.78	23.37	PASS
LTE Band2	3	18615	1	#0	QPSK	23.07	24.32	PASS
LTE Band2	3	18615	1	#Mid	QPSK	22.98	24.23	PASS
LTE Band2	3	18615	1	#Max	QPSK	22.97	24.22	PASS
LTE Band2	3	18615	8	#0	QPSK	22.02	23.27	PASS
LTE Band2	3	18615	8	#Mid	QPSK	22.01	23.26	PASS
LTE Band2	3	18615	8	#Max	QPSK	21.98	23.23	PASS
LTE Band2	3	18615	15	#0	QPSK	21.96	23.21	PASS
LTE Band2	3	18615	1	#0	QAM16	22.31	23.56	PASS
LTE Band2	3	18615	1	#Mid	QAM16	22.23	23.48	PASS
LTE Band2	3	18615	1	#Max	QAM16	22.25	23.50	PASS
LTE Band2	3	18615	8	#0	QAM16	21.15	22.40	PASS
LTE Band2	3	18615	8	#Mid	QAM16	21.16	22.41	PASS
LTE Band2	3	18615	8	#Max	QAM16	21.10	22.35	PASS
LTE Band2	3	18615	15	#0	QAM16	21.05	22.30	PASS
LTE Band2	3	18900	1	#0	QPSK	23.07	24.45	PASS
LTE Band2	3	18900	1	#Mid	QPSK	22.91	24.29	PASS
LTE Band2	3	18900	1	#Max	QPSK	22.92	24.30	PASS
LTE Band2	3	18900	8	#0	QPSK	21.97	23.35	PASS
LTE Band2	3	18900	8	#Mid	QPSK	21.97	23.35	PASS
LTE Band2	3	18900	8	#Max	QPSK	22.02	23.40	PASS
LTE Band2	3	18900	15	#0	QPSK	21.97	23.35	PASS
LTE Band2	3	18900	1	#0	QAM16	22.16	23.54	PASS
LTE Band2	3	18900	1	#Mid	QAM16	22.16	23.54	PASS
LTE Band2	3	18900	1	#Max	QAM16	22.17	23.55	PASS
LTE Band2	3	18900	8	#0	QAM16	21.05	22.43	PASS
LTE Band2	3	18900	8	#Mid	QAM16	21.06	22.44	PASS
LTE Band2	3	18900	8	#Max	QAM16	21.02	22.40	PASS
LTE Band2	3	18900	15	#0	QAM16	20.91	22.29	PASS
LTE Band2	3	19185	1	#0	QPSK	23.99	25.58	PASS
LTE Band2	3	19185	1	#Mid	QPSK	23.94	25.53	PASS
LTE Band2	3	19185	1	#Max	QPSK	24.26	25.85	PASS
LTE Band2	3	19185	8	#0	QPSK	22.67	24.26	PASS
LTE Band2	3	19185	8	#Mid	QPSK	22.68	24.27	PASS
LTE Band2	3	19185	8	#Max	QPSK	22.86	24.45	PASS
LTE Band2	3	19185	15	#0	QPSK	22.82	24.41	PASS
LTE Band2	3	19185	1	#0	QAM16	22.55	24.14	PASS
LTE Band2	3	19185	1	#Mid	QAM16	22.63	24.22	PASS
LTE Band2	3	19185	1	#Max	QAM16	23.07	24.66	PASS
LTE Band2	3	19185	8	#0	QAM16	21.71	23.30	PASS
LTE Band2	3	19185	8	#Mid	QAM16	21.72	23.31	PASS

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LTE Band2	3	19185	8	#Max	QAM16	21.78	23.37	PASS
LTE Band2	3	19185	15	#0	QAM16	21.71	23.30	PASS
LTE Band2	5	18625	1	#0	QPSK	23.05	24.30	PASS
LTE Band2	5	18625	1	#Mid	QPSK	22.94	24.19	PASS
LTE Band2	5	18625	1	#Max	QPSK	22.97	24.22	PASS
LTE Band2	5	18625	12	#0	QPSK	21.94	23.19	PASS
LTE Band2	5	18625	12	#Mid	QPSK	21.94	23.19	PASS
LTE Band2	5	18625	12	#Max	QPSK	21.86	23.11	PASS
LTE Band2	5	18625	25	#0	QPSK	21.88	23.13	PASS
LTE Band2	5	18625	1	#0	QAM16	22.31	23.56	PASS
LTE Band2	5	18625	1	#Mid	QAM16	22.18	23.43	PASS
LTE Band2	5	18625	1	#Max	QAM16	22.20	23.45	PASS
LTE Band2	5	18625	12	#0	QAM16	21.02	22.27	PASS
LTE Band2	5	18625	12	#Mid	QAM16	21.03	22.28	PASS
LTE Band2	5	18625	12	#Max	QAM16	20.96	22.21	PASS
LTE Band2	5	18625	25	#0	QAM16	21.01	22.26	PASS
LTE Band2	5	18900	1	#0	QPSK	23.03	24.41	PASS
LTE Band2	5	18900	1	#Mid	QPSK	22.86	24.24	PASS
LTE Band2	5	18900	1	#Max	QPSK	22.82	24.20	PASS
LTE Band2	5	18900	12	#0	QPSK	21.97	23.35	PASS
LTE Band2	5	18900	12	#Mid	QPSK	21.98	23.36	PASS
LTE Band2	5	18900	12	#Max	QPSK	21.93	23.31	PASS
LTE Band2	5	18900	25	#0	QPSK	21.92	23.30	PASS
LTE Band2	5	18900	1	#0	QAM16	22.16	23.54	PASS
LTE Band2	5	18900	1	#Mid	QAM16	22.14	23.52	PASS
LTE Band2	5	18900	1	#Max	QAM16	22.11	23.49	PASS
LTE Band2	5	18900	12	#0	QAM16	21.00	22.38	PASS
LTE Band2	5	18900	12	#Mid	QAM16	21.01	22.39	PASS
LTE Band2	5	18900	12	#Max	QAM16	20.81	22.19	PASS
LTE Band2	5	18900	25	#0	QAM16	20.80	22.18	PASS
LTE Band2	5	19175	1	#0	QPSK	23.77	25.36	PASS
LTE Band2	5	19175	1	#Mid	QPSK	23.69	25.28	PASS
LTE Band2	5	19175	1	#Max	QPSK	24.13	25.72	PASS
LTE Band2	5	19175	12	#0	QPSK	22.61	24.20	PASS
LTE Band2	5	19175	12	#Mid	QPSK	22.63	24.22	PASS
LTE Band2	5	19175	12	#Max	QPSK	22.82	24.41	PASS
LTE Band2	5	19175	25	#0	QPSK	22.70	24.29	PASS
LTE Band2	5	19175	1	#0	QAM16	22.83	24.42	PASS
LTE Band2	5	19175	1	#Mid	QAM16	22.90	24.49	PASS
LTE Band2	5	19175	1	#Max	QAM16	23.37	24.96	PASS
LTE Band2	5	19175	12	#0	QAM16	21.66	23.25	PASS
LTE Band2	5	19175	12	#Mid	QAM16	21.66	23.25	PASS

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LTE Band2	5	19175	12	#Max	QAM16	21.78	23.37	PASS
LTE Band2	5	19175	25	#0	QAM16	21.68	23.27	PASS
LTE Band2	10	18650	1	#0	QPSK	22.91	24.16	PASS
LTE Band2	10	18650	1	#Mid	QPSK	22.92	24.17	PASS
LTE Band2	10	18650	1	#Max	QPSK	23.05	24.30	PASS
LTE Band2	10	18650	25	#0	QPSK	21.91	23.16	PASS
LTE Band2	10	18650	25	#Mid	QPSK	21.91	23.16	PASS
LTE Band2	10	18650	25	#Max	QPSK	21.89	23.14	PASS
LTE Band2	10	18650	50	#0	QPSK	21.88	23.13	PASS
LTE Band2	10	18650	1	#0	QAM16	22.25	23.50	PASS
LTE Band2	10	18650	1	#Mid	QAM16	22.21	23.46	PASS
LTE Band2	10	18650	1	#Max	QAM16	22.28	23.53	PASS
LTE Band2	10	18650	25	#0	QAM16	21.09	22.34	PASS
LTE Band2	10	18650	25	#Mid	QAM16	21.10	22.35	PASS
LTE Band2	10	18650	25	#Max	QAM16	21.08	22.33	PASS
LTE Band2	10	18650	50	#0	QAM16	21.00	22.25	PASS
LTE Band2	10	18900	1	#0	QPSK	23.13	24.51	PASS
LTE Band2	10	18900	1	#Mid	QPSK	22.92	24.30	PASS
LTE Band2	10	18900	1	#Max	QPSK	22.87	24.25	PASS
LTE Band2	10	18900	25	#0	QPSK	21.99	23.37	PASS
LTE Band2	10	18900	25	#Mid	QPSK	22.01	23.39	PASS
LTE Band2	10	18900	25	#Max	QPSK	21.89	23.27	PASS
LTE Band2	10	18900	50	#0	QPSK	22.01	23.39	PASS
LTE Band2	10	18900	1	#0	QAM16	22.22	23.60	PASS
LTE Band2	10	18900	1	#Mid	QAM16	22.19	23.57	PASS
LTE Band2	10	18900	1	#Max	QAM16	22.09	23.47	PASS
LTE Band2	10	18900	25	#0	QAM16	21.01	22.39	PASS
LTE Band2	10	18900	25	#Mid	QAM16	21.07	22.45	PASS
LTE Band2	10	18900	25	#Max	QAM16	20.83	22.21	PASS
LTE Band2	10	18900	50	#0	QAM16	20.87	22.25	PASS
LTE Band2	10	19150	1	#0	QPSK	22.98	24.57	PASS
LTE Band2	10	19150	1	#Mid	QPSK	23.79	25.38	PASS
LTE Band2	10	19150	1	#Max	QPSK	24.26	25.85	PASS
LTE Band2	10	19150	25	#0	QPSK	22.23	23.82	PASS
LTE Band2	10	19150	25	#Mid	QPSK	22.24	23.83	PASS
LTE Band2	10	19150	25	#Max	QPSK	22.65	24.24	PASS
LTE Band2	10	19150	50	#0	QPSK	22.47	24.06	PASS
LTE Band2	10	19150	1	#0	QAM16	21.88	23.47	PASS
LTE Band2	10	19150	1	#Mid	QAM16	22.45	24.04	PASS
LTE Band2	10	19150	1	#Max	QAM16	23.02	24.61	PASS
LTE Band2	10	19150	25	#0	QAM16	21.26	22.85	PASS
LTE Band2	10	19150	25	#Mid	QAM16	21.31	22.90	PASS

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LTE Band2	10	19150	25	#Max	QAM16	21.66	23.25	PASS
LTE Band2	10	19150	50	#0	QAM16	21.59	23.18	PASS
LTE Band2	15	18675	1	#0	QPSK	22.95	24.20	PASS
LTE Band2	15	18675	1	#Mid	QPSK	22.99	24.24	PASS
LTE Band2	15	18675	1	#Max	QPSK	23.14	24.39	PASS
LTE Band2	15	18675	36	#0	QPSK	22.00	23.25	PASS
LTE Band2	15	18675	36	#Mid	QPSK	21.98	23.23	PASS
LTE Band2	15	18675	36	#Max	QPSK	22.08	23.33	PASS
LTE Band2	15	18675	75	#0	QPSK	21.95	23.20	PASS
LTE Band2	15	18675	1	#0	QAM16	22.32	23.57	PASS
LTE Band2	15	18675	1	#Mid	QAM16	22.24	23.49	PASS
LTE Band2	15	18675	1	#Max	QAM16	22.36	23.61	PASS
LTE Band2	15	18675	36	#0	QAM16	21.06	22.31	PASS
LTE Band2	15	18675	36	#Mid	QAM16	21.05	22.30	PASS
LTE Band2	15	18675	36	#Max	QAM16	21.13	22.38	PASS
LTE Band2	15	18675	75	#0	QAM16	21.06	22.31	PASS
LTE Band2	15	18900	1	#0	QPSK	23.14	24.52	PASS
LTE Band2	15	18900	1	#Mid	QPSK	22.95	24.33	PASS
LTE Band2	15	18900	1	#Max	QPSK	22.79	24.17	PASS
LTE Band2	15	18900	36	#0	QPSK	22.04	23.42	PASS
LTE Band2	15	18900	36	#Mid	QPSK	22.05	23.43	PASS
LTE Band2	15	18900	36	#Max	QPSK	21.93	23.31	PASS
LTE Band2	15	18900	75	#0	QPSK	22.01	23.39	PASS
LTE Band2	15	18900	1	#0	QAM16	22.22	23.60	PASS
LTE Band2	15	18900	1	#Mid	QAM16	22.23	23.61	PASS
LTE Band2	15	18900	1	#Max	QAM16	22.10	23.48	PASS
LTE Band2	15	18900	36	#0	QAM16	20.96	22.34	PASS
LTE Band2	15	18900	36	#Mid	QAM16	20.97	22.35	PASS
LTE Band2	15	18900	36	#Max	QAM16	20.86	22.24	PASS
LTE Band2	15	18900	75	#0	QAM16	20.93	22.31	PASS
LTE Band2	15	19125	1	#0	QPSK	22.93	24.52	PASS
LTE Band2	15	19125	1	#Mid	QPSK	23.34	24.93	PASS
LTE Band2	15	19125	1	#Max	QPSK	24.16	25.75	PASS
LTE Band2	15	19125	36	#0	QPSK	21.87	23.46	PASS
LTE Band2	15	19125	36	#Mid	QPSK	21.87	23.46	PASS
LTE Band2	15	19125	36	#Max	QPSK	22.60	24.19	PASS
LTE Band2	15	19125	75	#0	QPSK	22.09	23.68	PASS
LTE Band2	15	19125	1	#0	QAM16	21.93	23.52	PASS
LTE Band2	15	19125	1	#Mid	QAM16	22.31	23.90	PASS
LTE Band2	15	19125	1	#Max	QAM16	23.08	24.67	PASS
LTE Band2	15	19125	36	#0	QAM16	20.71	22.30	PASS
LTE Band2	15	19125	36	#Mid	QAM16	20.78	22.37	PASS

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LTE Band2	15	19125	36	#Max	QAM16	21.58	23.17	PASS
LTE Band2	15	19125	75	#0	QAM16	21.17	22.76	PASS
LTE Band2	20	18700	1	#0	QPSK	22.66	23.91	PASS
LTE Band2	20	18700	1	#Mid	QPSK	23.06	24.31	PASS
LTE Band2	20	18700	1	#Max	QPSK	22.82	24.07	PASS
LTE Band2	20	18700	50	#0	QPSK	21.92	23.17	PASS
LTE Band2	20	18700	50	#Mid	QPSK	21.87	23.12	PASS
LTE Band2	20	18700	50	#Max	QPSK	22.02	23.27	PASS
LTE Band2	20	18700	100	#0	QPSK	21.92	23.17	PASS
LTE Band2	20	18700	1	#0	QAM16	21.89	23.14	PASS
LTE Band2	20	18700	1	#Mid	QAM16	22.20	23.45	PASS
LTE Band2	20	18700	1	#Max	QAM16	21.95	23.20	PASS
LTE Band2	20	18700	50	#0	QAM16	20.99	22.24	PASS
LTE Band2	20	18700	50	#Mid	QAM16	20.99	22.24	PASS
LTE Band2	20	18700	50	#Max	QAM16	21.16	22.41	PASS
LTE Band2	20	18700	100	#0	QAM16	21.00	22.25	PASS
LTE Band2	20	18900	1	#0	QPSK	22.87	24.25	PASS
LTE Band2	20	18900	1	#Mid	QPSK	23.06	24.44	PASS
LTE Band2	20	18900	1	#Max	QPSK	22.61	23.99	PASS
LTE Band2	20	18900	50	#0	QPSK	22.01	23.39	PASS
LTE Band2	20	18900	50	#Mid	QPSK	22.02	23.40	PASS
LTE Band2	20	18900	50	#Max	QPSK	21.90	23.28	PASS
LTE Band2	20	18900	100	#0	QPSK	22.00	23.38	PASS
LTE Band2	20	18900	1	#0	QAM16	21.56	22.94	PASS
LTE Band2	20	18900	1	#Mid	QAM16	21.94	23.32	PASS
LTE Band2	20	18900	1	#Max	QAM16	21.48	22.86	PASS
LTE Band2	20	18900	50	#0	QAM16	20.97	22.35	PASS
LTE Band2	20	18900	50	#Mid	QAM16	20.93	22.31	PASS
LTE Band2	20	18900	50	#Max	QAM16	20.72	22.10	PASS
LTE Band2	20	18900	100	#0	QAM16	20.90	22.28	PASS
LTE Band2	20	19100	1	#0	QPSK	22.61	24.20	PASS
LTE Band2	20	19100	1	#Mid	QPSK	22.82	24.41	PASS
LTE Band2	20	19100	1	#Max	QPSK	23.88	25.47	PASS
LTE Band2	20	19100	50	#0	QPSK	21.82	23.41	PASS
LTE Band2	20	19100	50	#Mid	QPSK	21.84	23.43	PASS
LTE Band2	20	19100	50	#Max	QPSK	22.42	24.01	PASS
LTE Band2	20	19100	100	#0	QPSK	21.58	23.17	PASS
LTE Band2	20	19100	1	#0	QAM16	21.39	22.98	PASS
LTE Band2	20	19100	1	#Mid	QAM16	21.66	23.25	PASS
LTE Band2	20	19100	1	#Max	QAM16	22.53	24.12	PASS
LTE Band2	20	19100	50	#0	QAM16	20.77	22.36	PASS
LTE Band2	20	19100	50	#Mid	QAM16	20.79	22.38	PASS

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LTE Band2	20	19100	50	#Max	QAM16	21.54	23.13	PASS
LTE Band2	20	19100	100	#0	QAM16	20.49	22.08	PASS

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5.2. Occupied Bandwidth

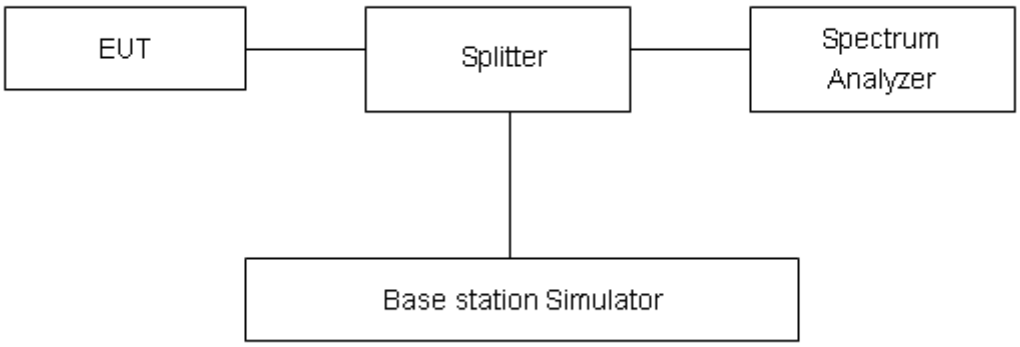
Ambient condition

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 3kHz, VBW is set to 10kHz for GSM 1900,
RBW is set to 10kHz, VBW is set to 30kHz for GPRS 1900/ EGPRS 1900,
RBW is set to 51 kHz, VBW is set to 160kHz for WCDMA Band II,
RBW is set to 30 kHz, VBW is set to 91kHz for LTE Band 2 (1.4MHz),
RBW is set to 62 kHz, VBW is set to 180 kHz for LTE Band 2 (3MHz),
RBW is set to 100 kHz, VBW is set to 300 kHz for LTE Band 2 (5MHz),
RBW is set to 200 kHz, VBW is set to 620kHz for LTE Band 2 (10MHz),
RBW is set to 300kHz,VBW is set to 910kHz for LTE Band 2 (15MHz).
RBW is set to 430kHz,VBW is set to 1.2MHz for LTE Band 2 (20MHz).
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.

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Test Result

Mode	Channel	Frequency (MHz)	99% Power Bandwidth (MHz)	-26dBc Bandwidth(MHz)
GSM 1900 (GMSK)	512	1850.2	0.2438	0.2997
	661	1880.0	0.2445	0.2958
	810	1909.8	0.2439	0.2997
GPRS 1900 (GMSK)	512	1850.2	0.2430	0.3134
	661	1880.0	0.2443	0.3154
	810	1909.8	0.2432	0.3208
EGPRS 1900 (8PSK)	512	1850.2	0.2481	0.3176
	661	1880.0	0.2429	0.3169
	810	1909.8	0.2423	0.3127
WCDMA Band II (RMC)	9262	1852.4	4.1204	4.6940
	9400	1880	4.1196	4.6990
	9538	1907.6	4.1336	4.7114

LTE Band 2					
Modulation	Bandwidth (MHz)	Channel	Frequency (MHz)	99% Power Bandwidth(MHz)	-26dBc Bandwidth(MHz)
QPSK	1.4	18607	1850.7	1.1059	1.5350
		18900	1880.0	1.1214	1.5740
		19193	1909.3	1.1304	1.7490
	3	18615	1851.5	2.7250	3.2290
		18900	1880	2.7186	3.2180
		19185	1908.5	2.7190	3.2910
	5	18625	1852.5	4.5126	5.1930
		18900	1880	4.5251	5.1350
		19175	1907.5	4.5300	5.1960
	10	18650	1855	9.0394	10.5900
		18900	1880	9.0212	10.2100
		19150	1905	9.0286	10.4300
	15	18675	1857.5	13.5680	15.4000
		18900	1880	13.5080	15.7100

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		19125	1902.5	13.5400	16.2700
	20	18700	1860	17.9740	20.8900
		18900	1880	18.0240	21.4200
		19100	1900	17.9740	20.9000
16QAM	1.4	18607	1850.7	1.1241	1.5850
		18900	1880.0	1.1101	1.4970
		19193	1909.3	1.1230	1.6690
	3	18615	1851.5	2.7025	3.1510
		18900	1880	2.7111	3.3360
		19185	1908.5	2.7271	3.3130
	5	18625	1852.5	4.5461	5.0860
		18900	1880	4.5436	5.1390
		19175	1907.5	4.5330	5.1990
	10	18650	1855	9.0364	10.5300
		18900	1880	9.0093	10.3100
		19150	1905	9.0401	10.4500
	15	18675	1857.5	13.4810	15.8800
		18900	1880	13.5010	16.3400
		19125	1902.5	13.4530	15.5900
	20	18700	1860	18.0260	21.1900
		18900	1880	18.0940	21.6900
		19100	1900	17.9530	21.2900

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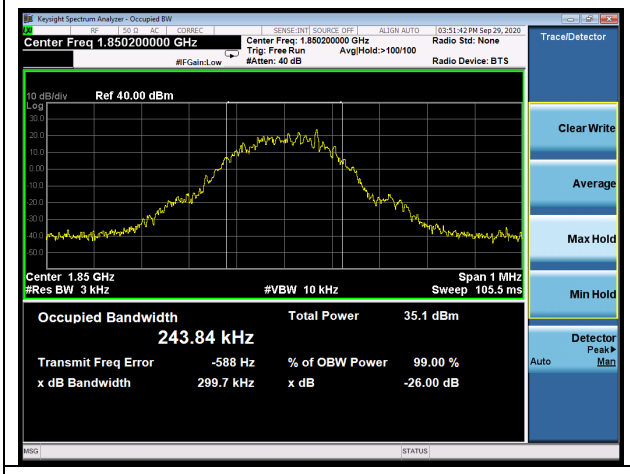
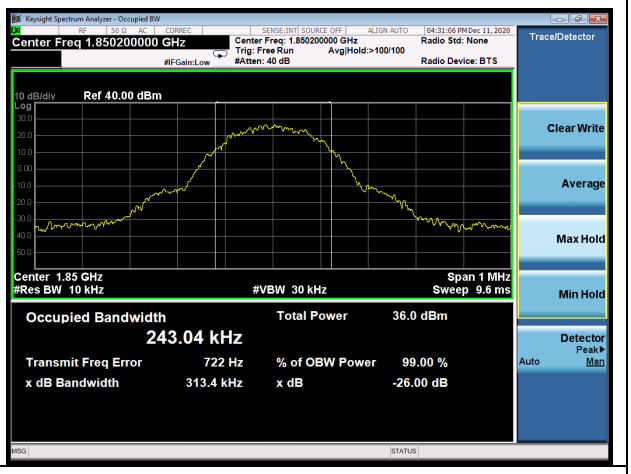
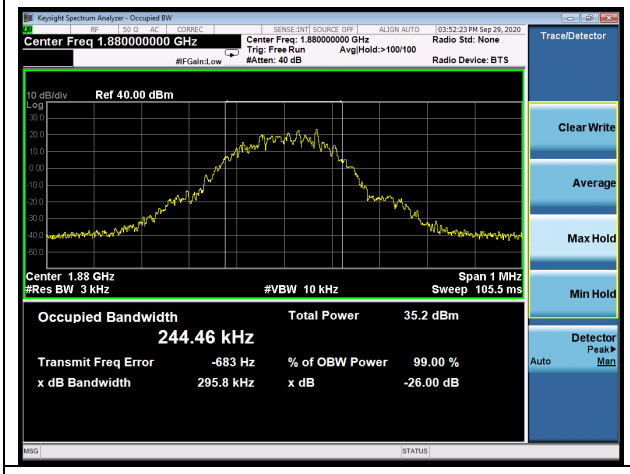
GSM1900 GSM CH-Low



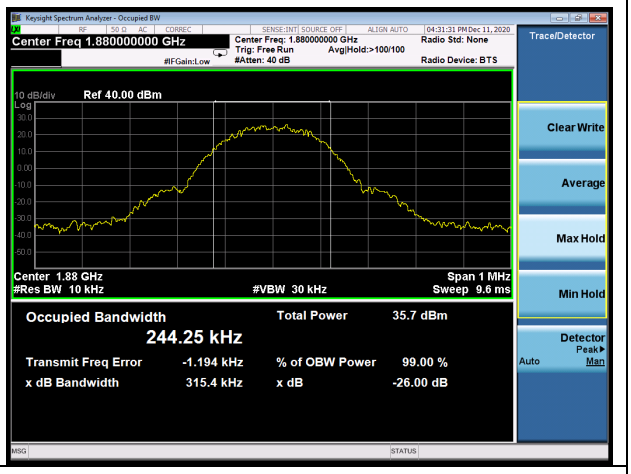
GSM1900 GPRS CH-Low



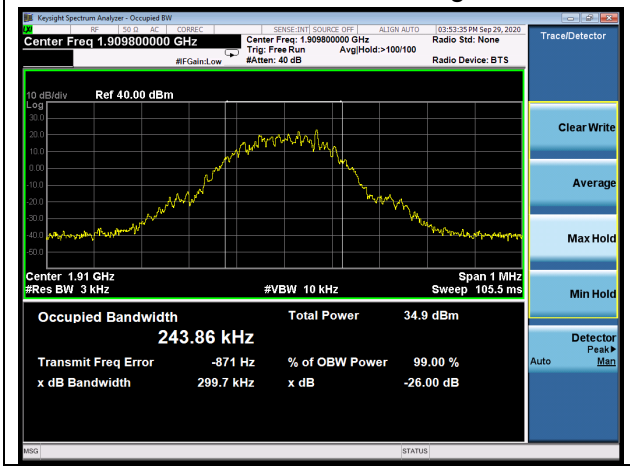
GSM 1900 GSM CH-Middle



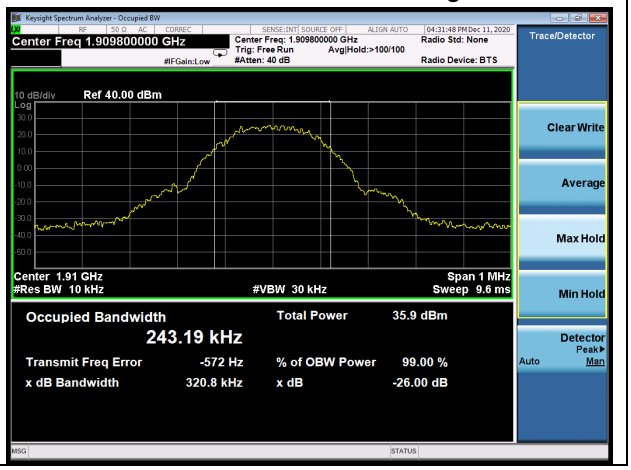
GSM 1900 GPRS CH-Middle



GSM 1900 GSM CH-High



GSM 1900 GPRS CH-High



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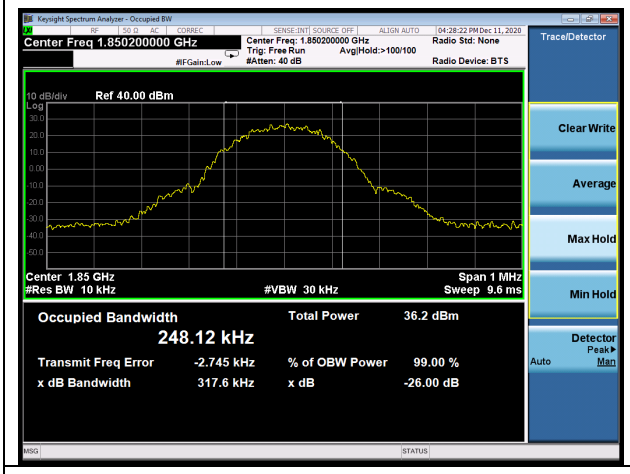
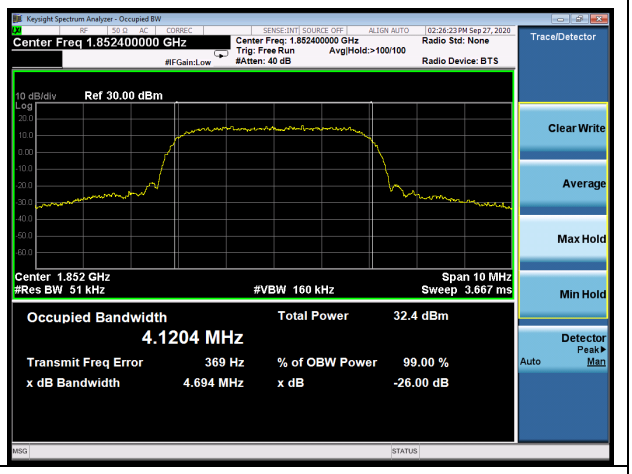
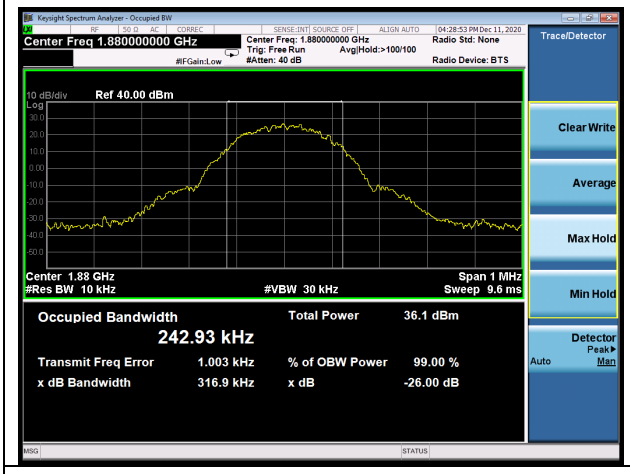
GSM1900 EGPRS CH-Low



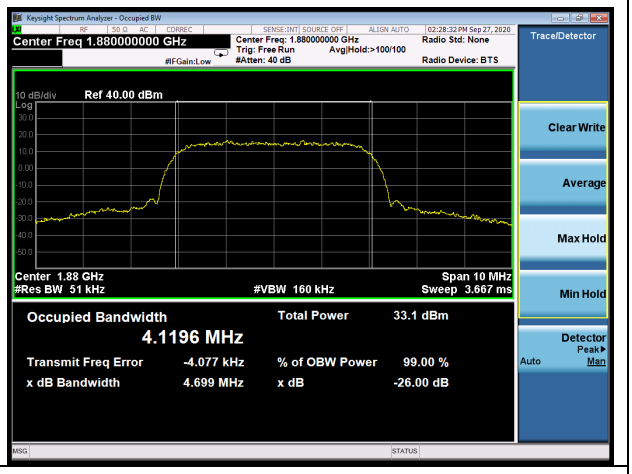
WCDMA Band II RMC CH-LOW



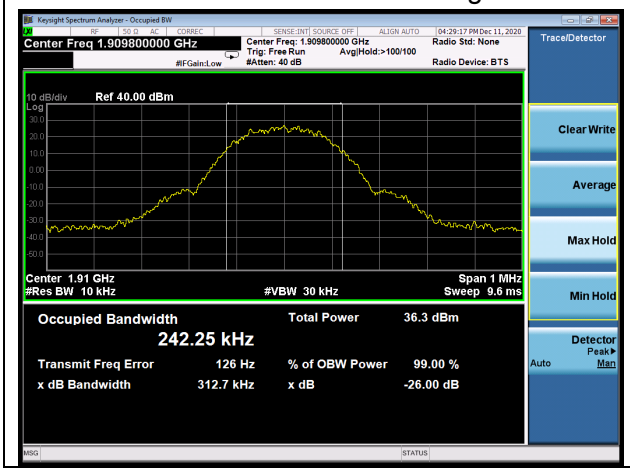
GSM 1900 EGPRS CH-Middle



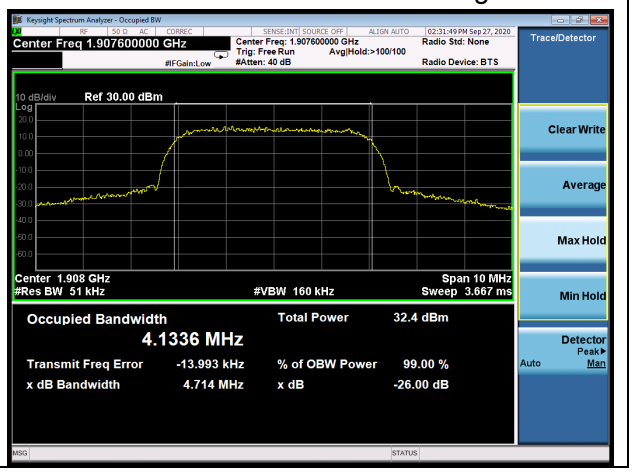
WCDMA Band II RMC CH-Middle



GSM 1900 EGPRS CH-High



WCDMA Band II RMC CH-High



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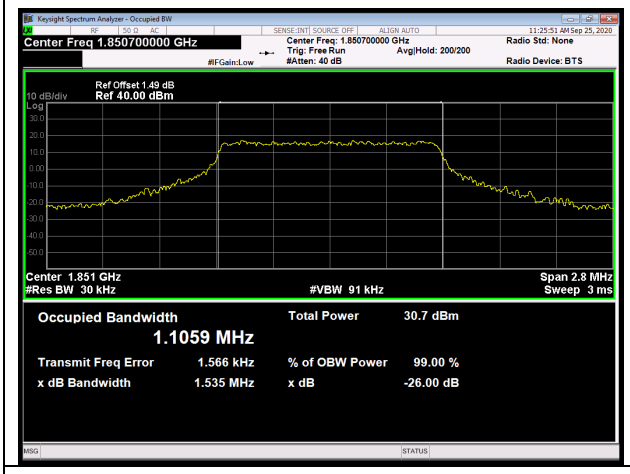
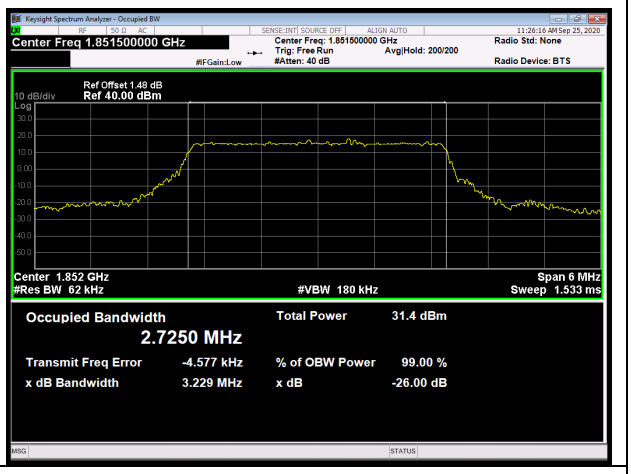
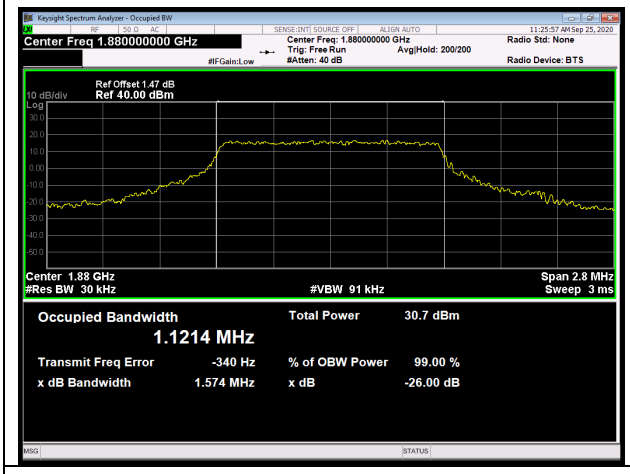
LTE Band 2 1.4MHz QPSK CH-Low



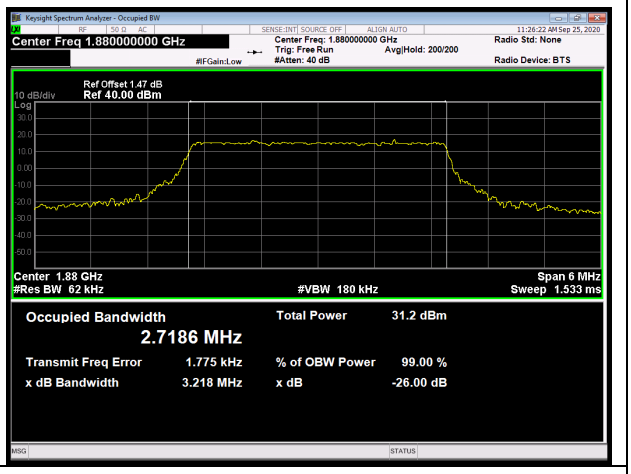
LTE Band 2 3MHz QPSK CH-Low



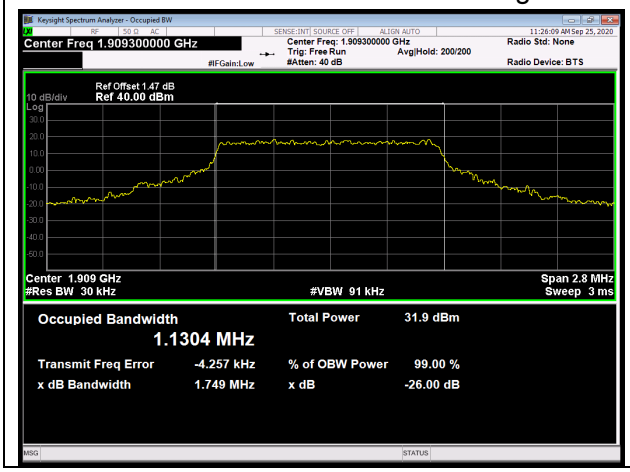
LTE Band 2 1.4MHz QPSK CH-Middle



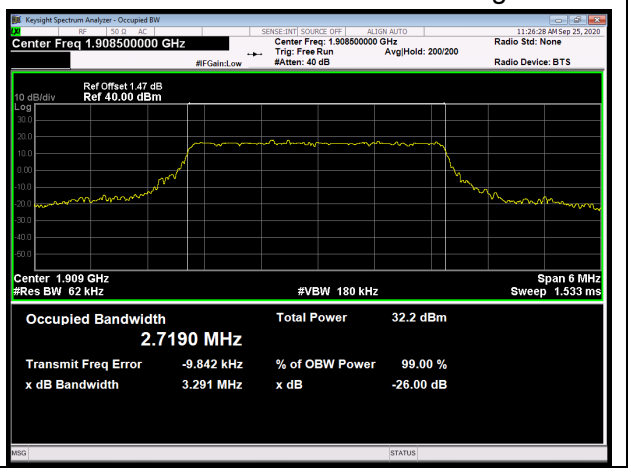
LTE Band 2 3MHz QPSK CH-Middle



LTE Band 2 1.4MHz QPSK CH-High



LTE Band 2 3MHz QPSK CH-High



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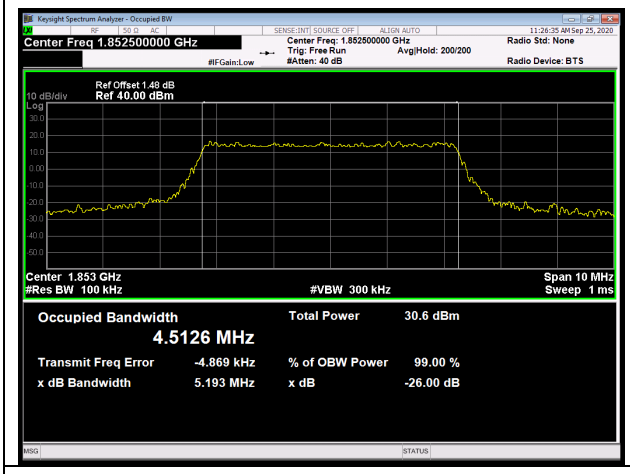
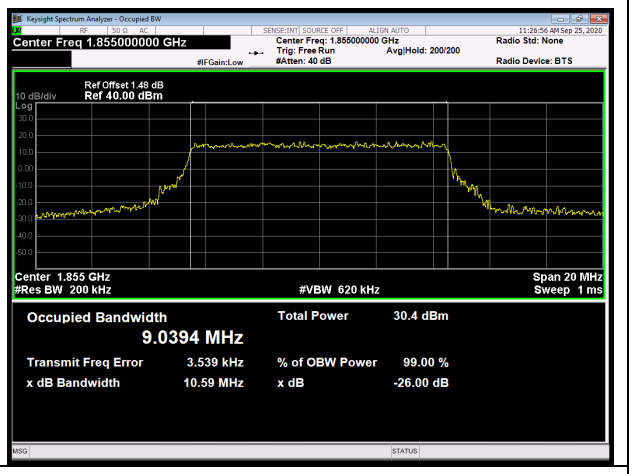
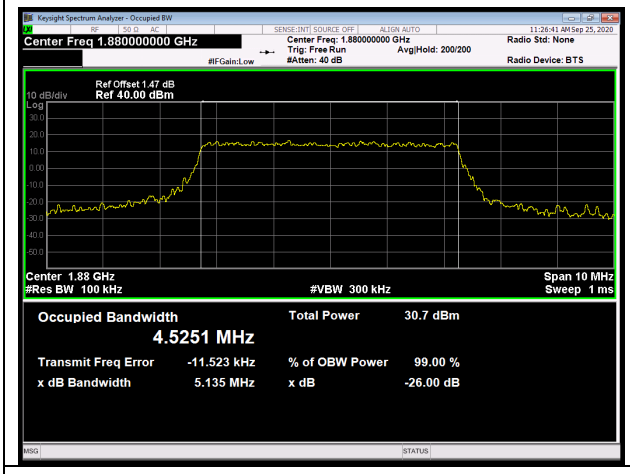
LTE Band 2 5MHz QPSK CH-Low



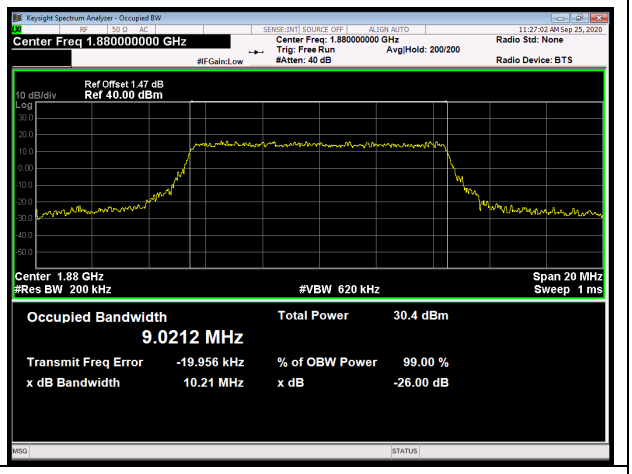
LTE Band 2 10MHz QPSK CH-Low



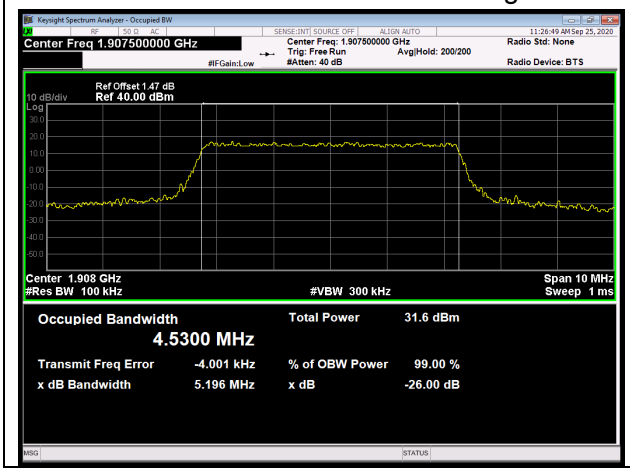
LTE Band 2 5MHz QPSK CH-Middle



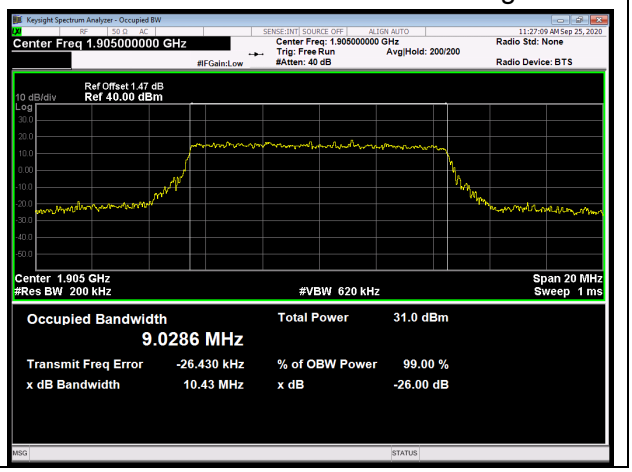
LTE Band 2 10MHz QPSK CH-Middle



LTE Band 2 5MHz QPSK CH-High



LTE Band 2 10MHz QPSK CH-High



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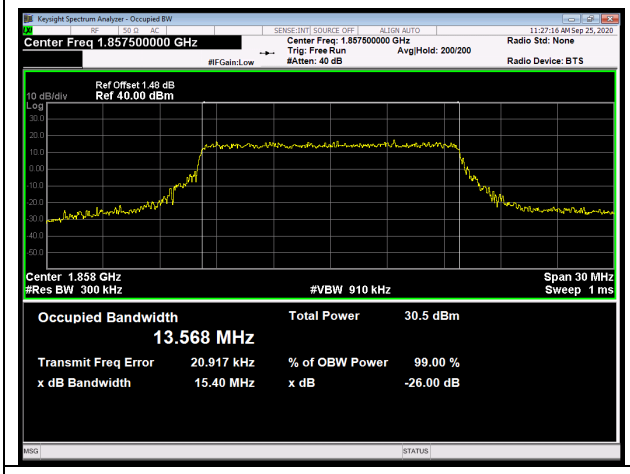
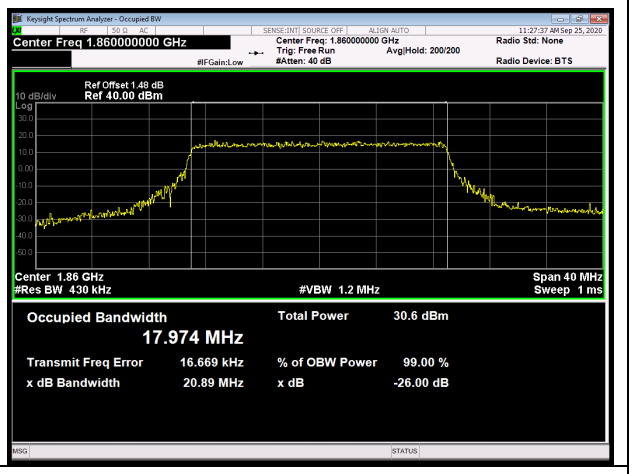
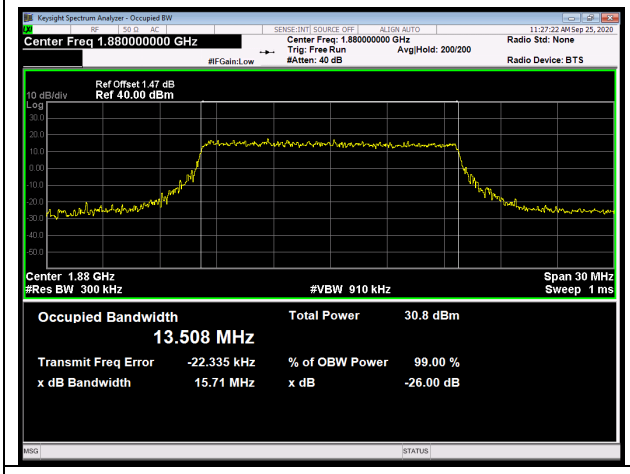
LTE Band 2 15MHz QPSK CH-Low



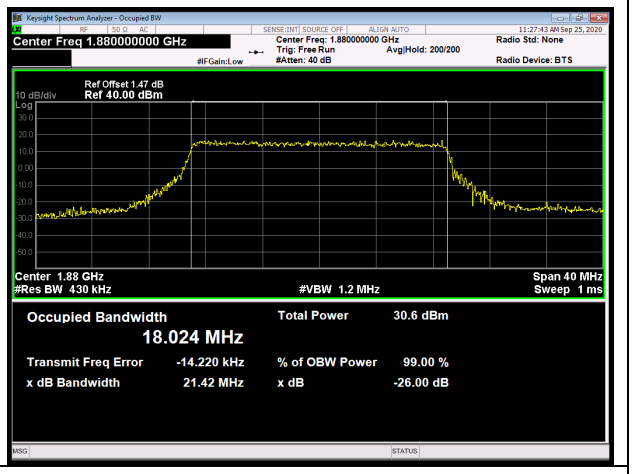
LTE Band 2 20MHz QPSK CH-Low



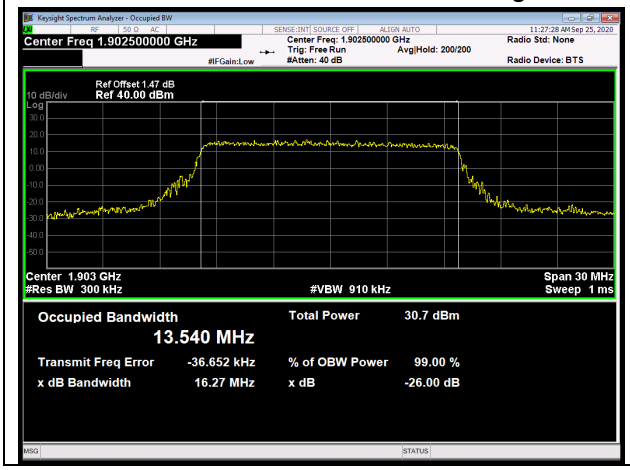
LTE Band 2 15MHz QPSK CH-Middle



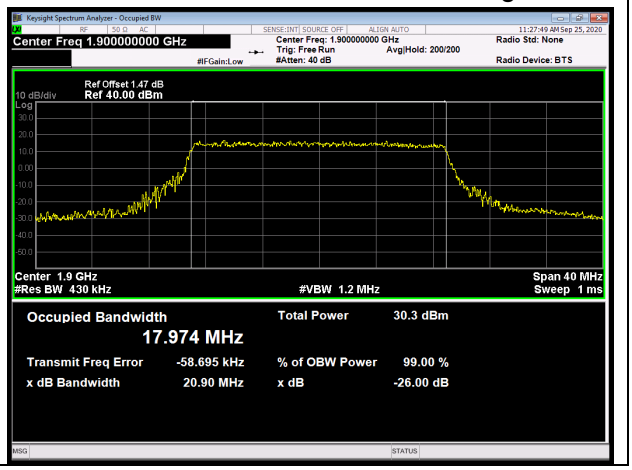
LTE Band 2 20MHz QPSK CH-Middle



LTE Band 2 15MHz QPSK CH-High



LTE Band 2 20MHz QPSK CH-High



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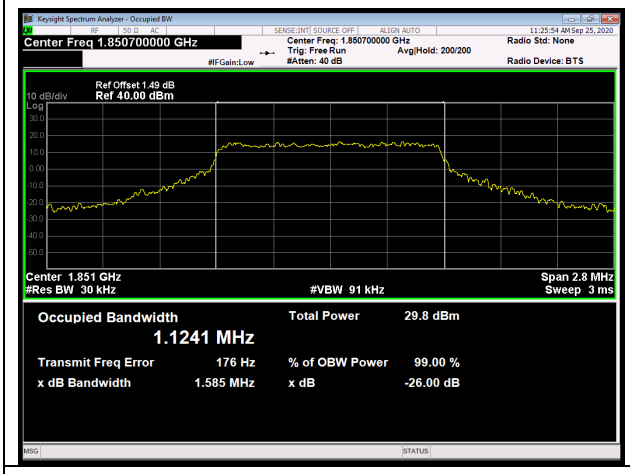
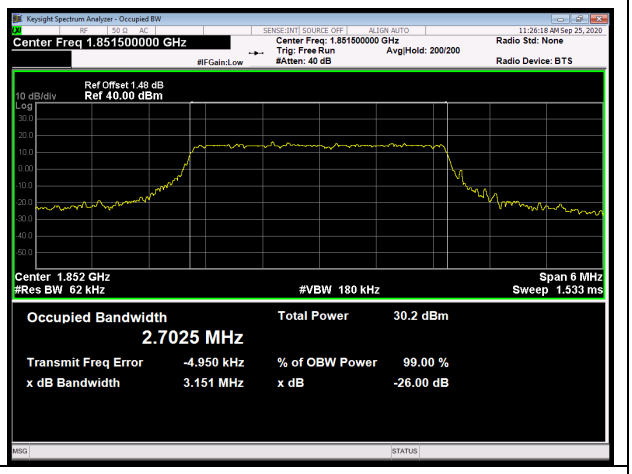
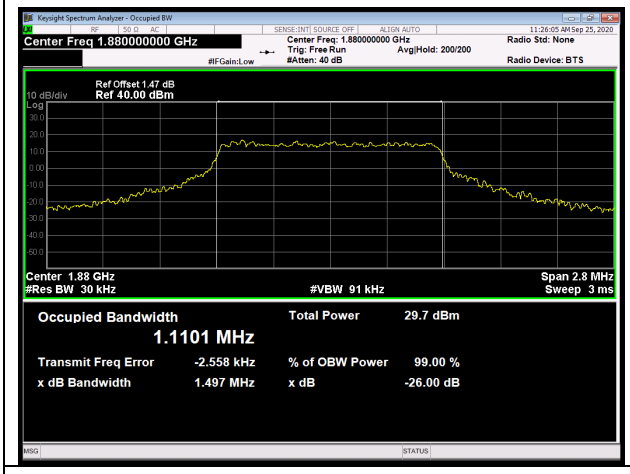
LTE Band 2 1.4MHz 16QAM CH-Low



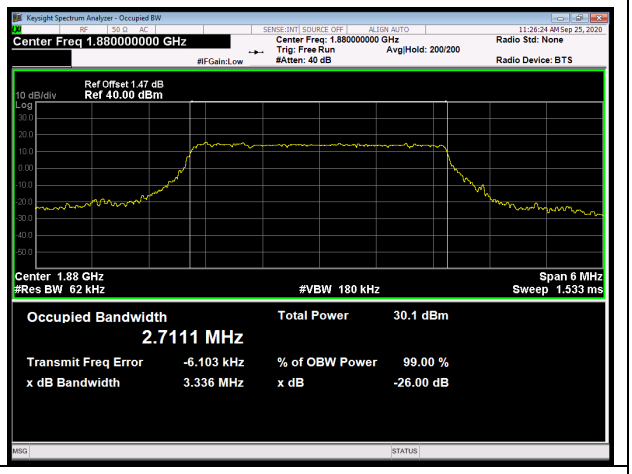
LTE Band 2 3MHz 16QAM CH-Low



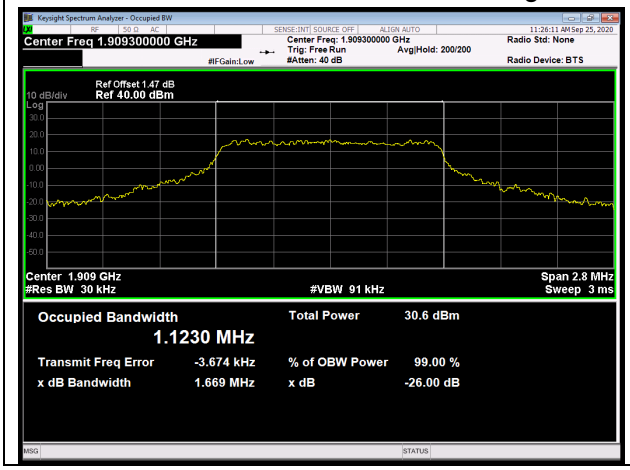
LTE Band 2 1.4MHz 16QAM CH-Middle



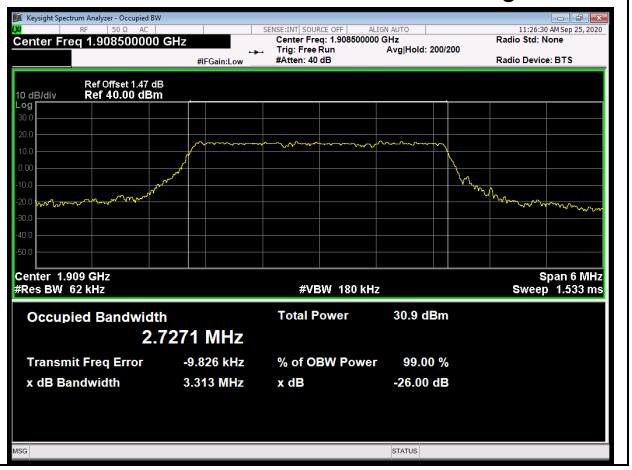
LTE Band 2 3MHz 16QAM CH-Middle



LTE Band 2 1.4MHz 16QAM CH-High



LTE Band 2 3MHz 16QAM CH-High



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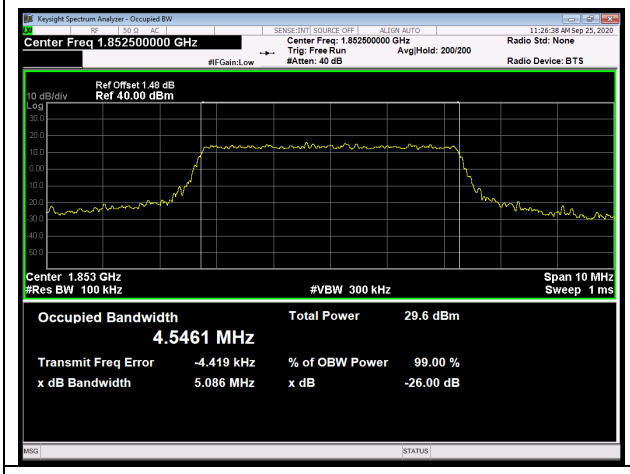
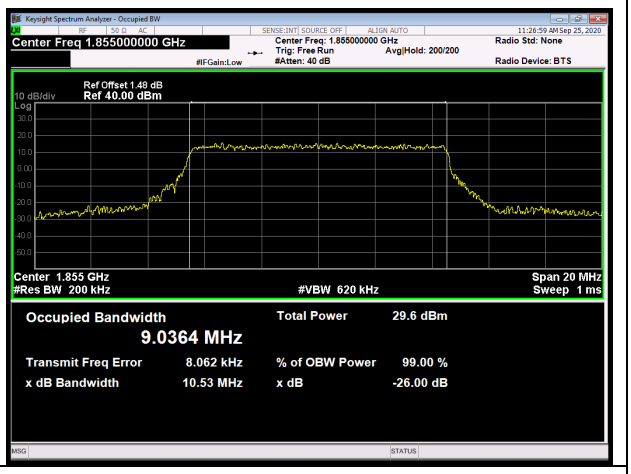
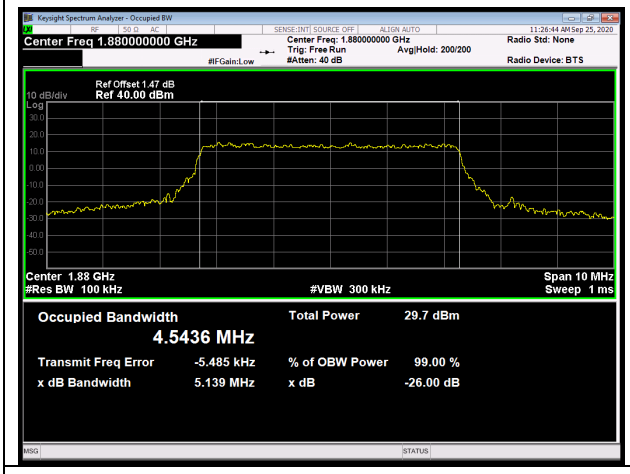
LTE Band 2 5MHz 16QAM CH-Low



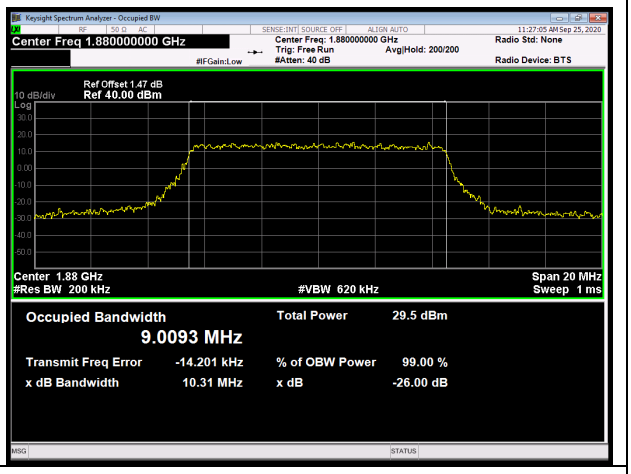
LTE Band 2 10MHz 16QAM CH-Low



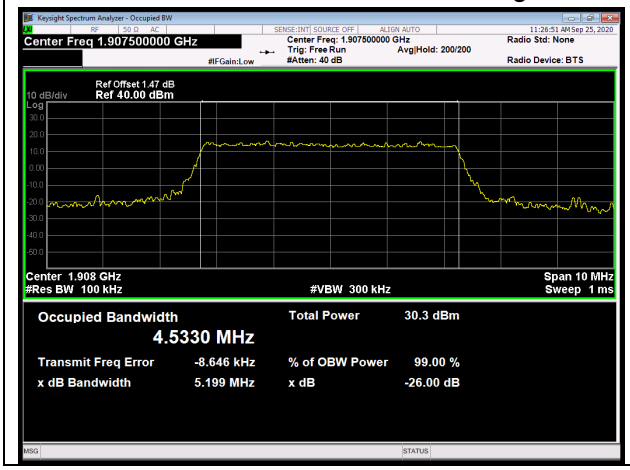
LTE Band 2 5MHz 16QAM CH-Middle



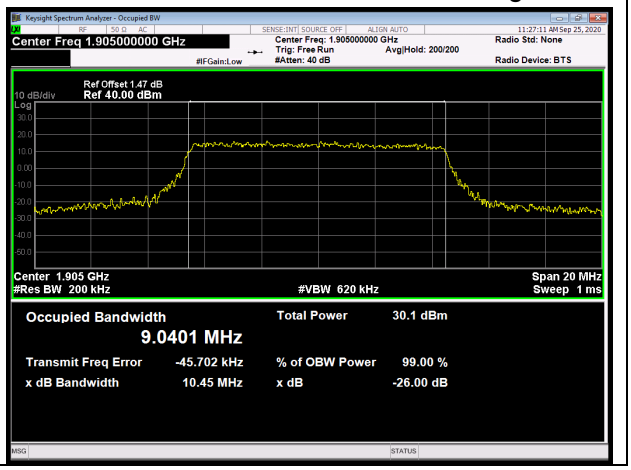
LTE Band 2 10MHz 16QAM CH-Middle



LTE Band 2 5MHz 16QAM CH-High



LTE Band 2 10MHz 16QAM CH-High



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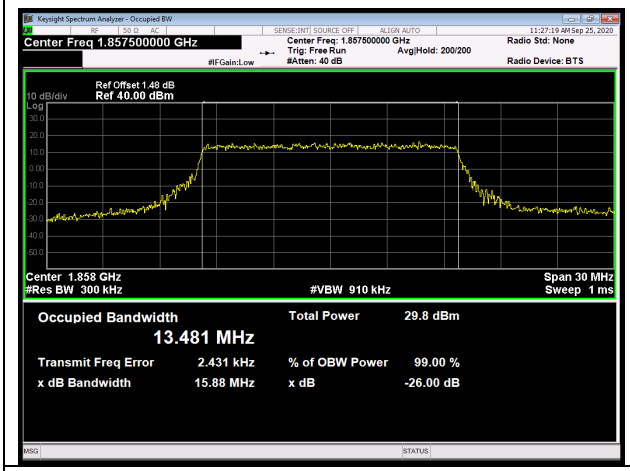
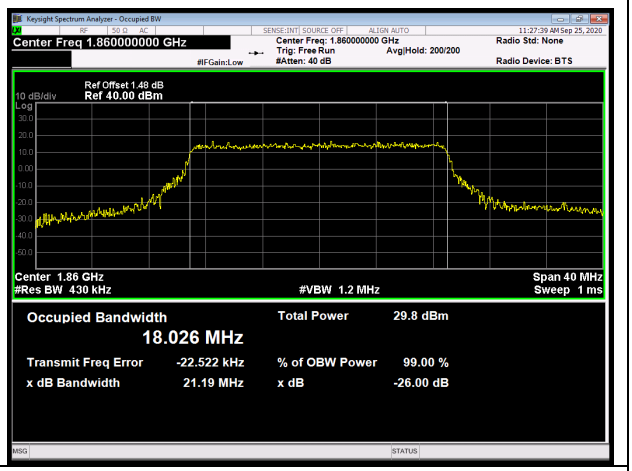
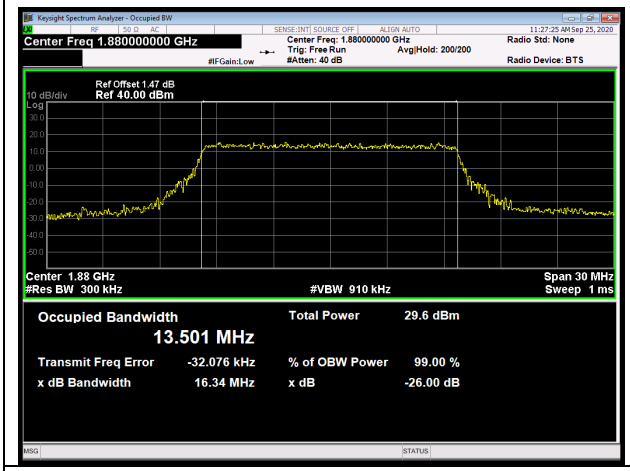
LTE Band 2 15MHz 16QAM CH-Low



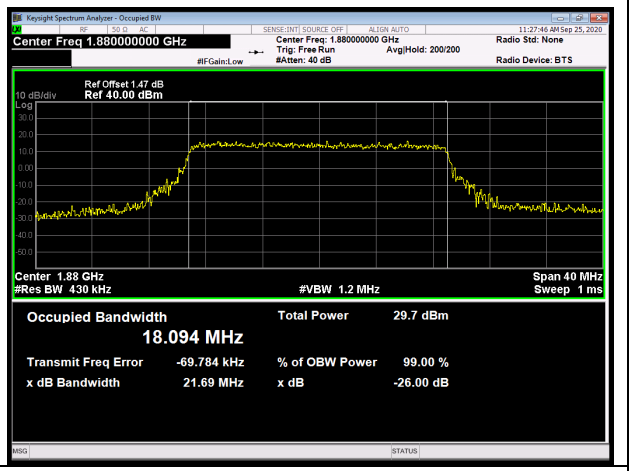
LTE Band 2 20MHz 16QAM CH-Low



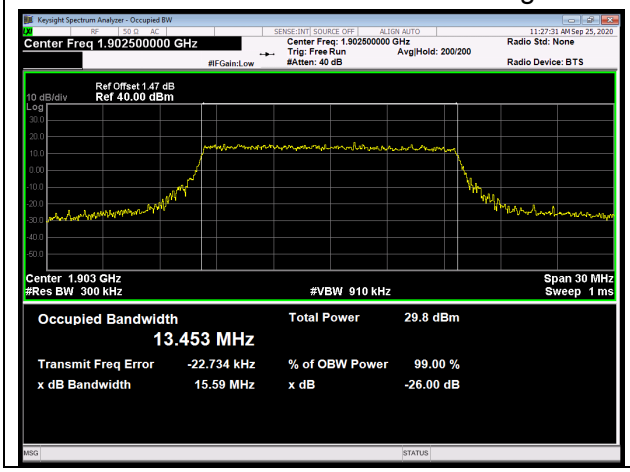
LTE Band 2 15MHz 16QAM CH-Middle



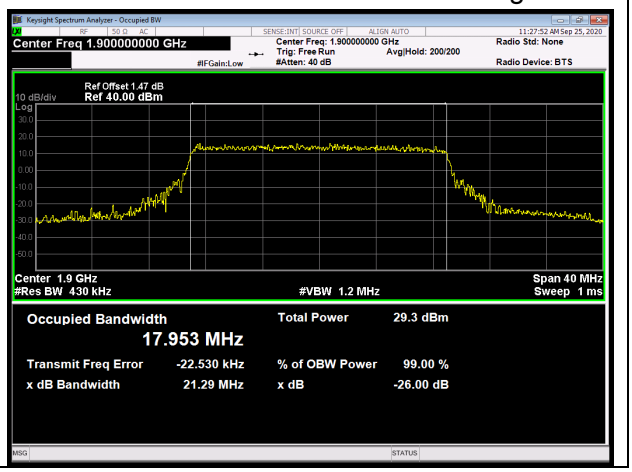
LTE Band 2 20MHz 16QAM CH-Middle



LTE Band 2 15MHz 16QAM CH-High



LTE Band 2 20MHz 16QAM CH-High



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5.3. Band Edge Compliance

Ambient condition

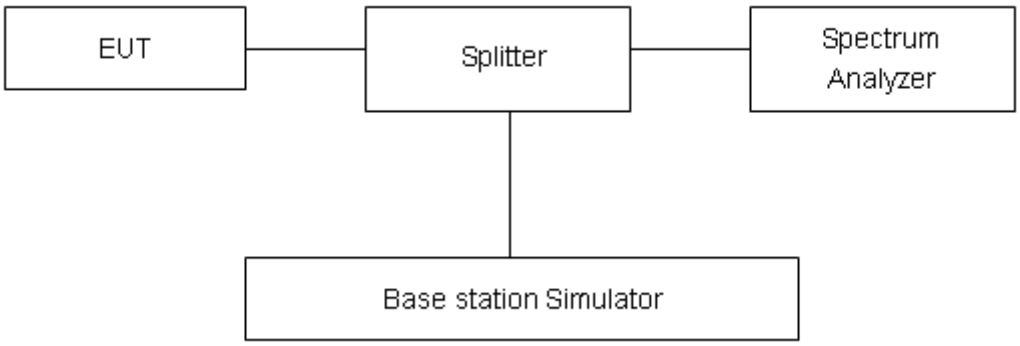
Temperature	Relative humidity	Pressure
23°C ~25°C	45%~50%	101.5kPa

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 Average detector is used and
RBW is set to 6.2kHz, VBW is set to 3x RBW for GSM 1900,
RBW is set to 51kHz, VBW is set to 160kHz for WCDMA Band II,
RBW is set to 20kHz, VBW is set to 100kHz for LTE Band 2 (1.4MHz),
RBW is set to 30kHz,VBW is set to 100kHz for LTE Band 2 (3MHz),
RBW is set to 50kHz,VBW is set to 200kHz for LTE Band 2 (5MHz),
RBW is set to 100kHz,VBW is set to 300kHz for LTE Band 2 (10MHz),
RBW is set to 200kHz,VBW is set to 1MHz for LTE Band 2 (15MHz/20MHz),

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 log10 (P) dB.”

Limit	-13 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=0.684dB.

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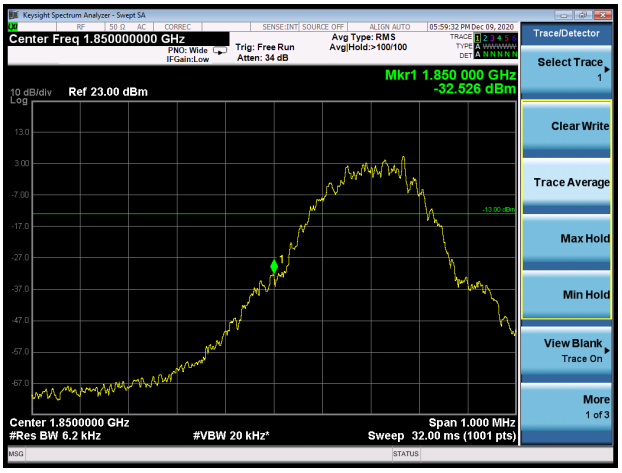
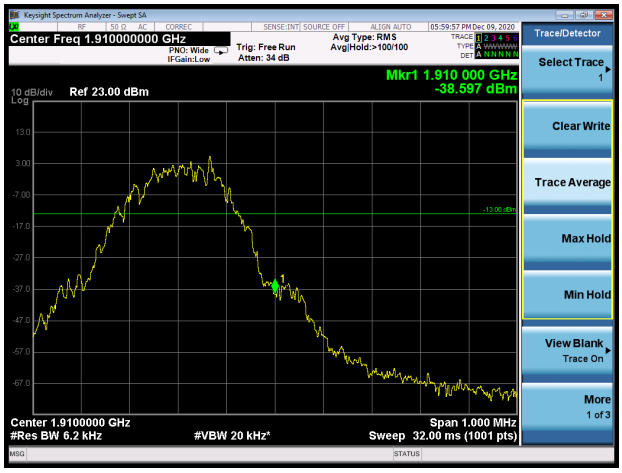
Test Result:

GSM1900 GSM CH-Low



GSM 1900 GSM CH-High



GSM1900 GPRS CH-Low

GSM 1900 GPRS CH-High

GSM1900 EGPRS CH-Low

GSM 1900 EGPRS CH-High

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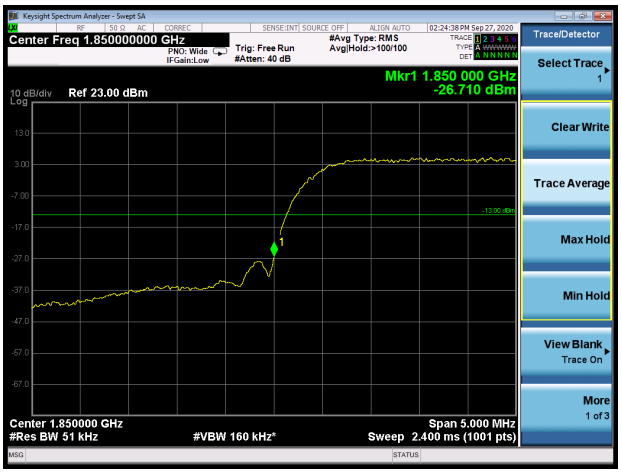
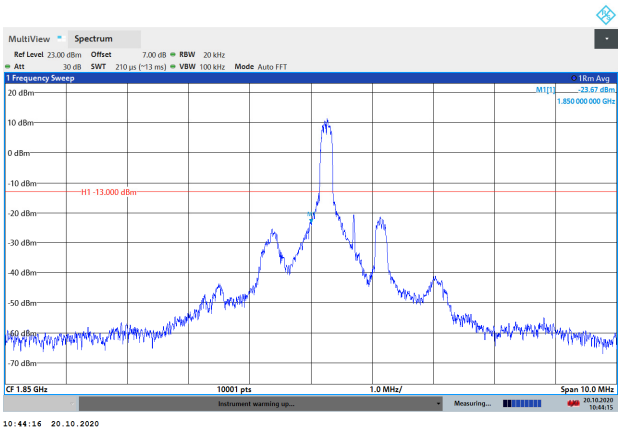
WCDMA Band II RMC CH-Low

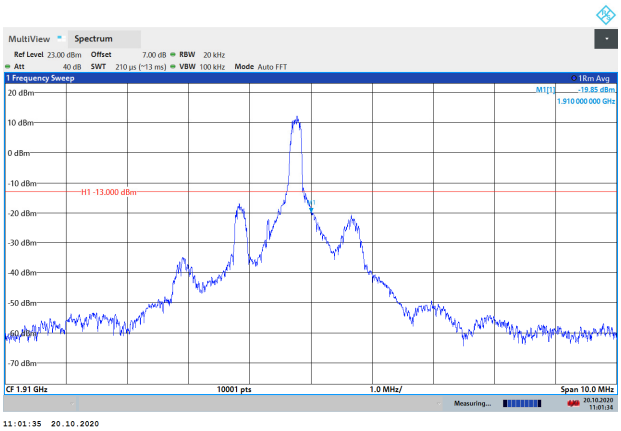


WCDMA Band II RMC CH-High

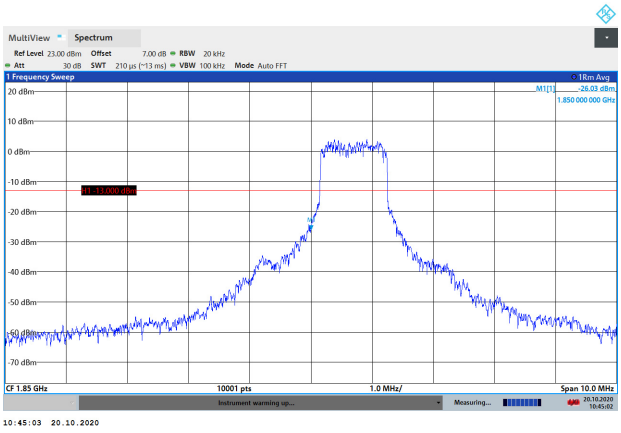
LTE Band 2 1.4MHz QPSK 1RB CH-Low



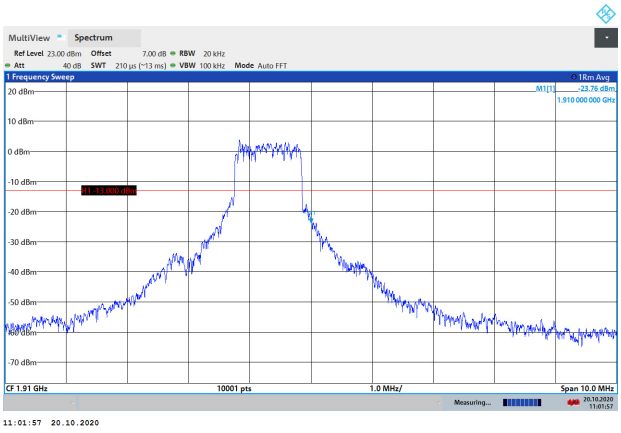
LTE Band 2 1.4MHz QPSK 1RB CH-High



LTE Band 2 1.4MHz QPSK 100%RB CH-Low



LTE Band 2 1.4MHz QPSK 100%RB CH-High



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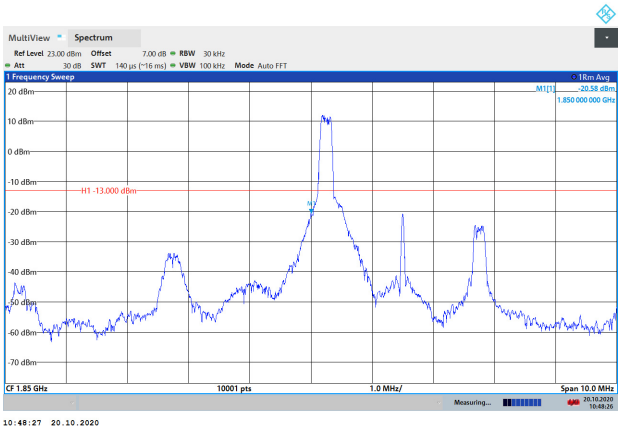
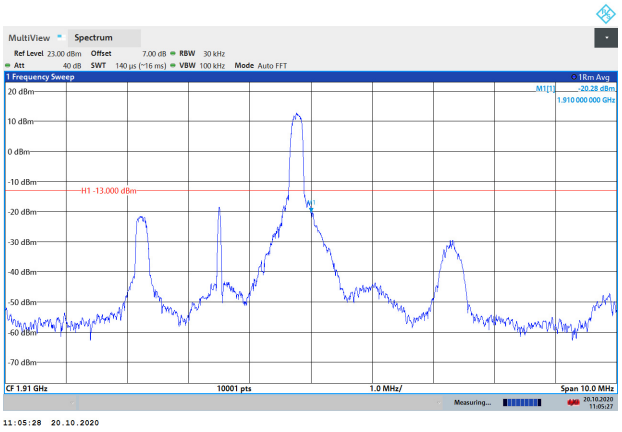
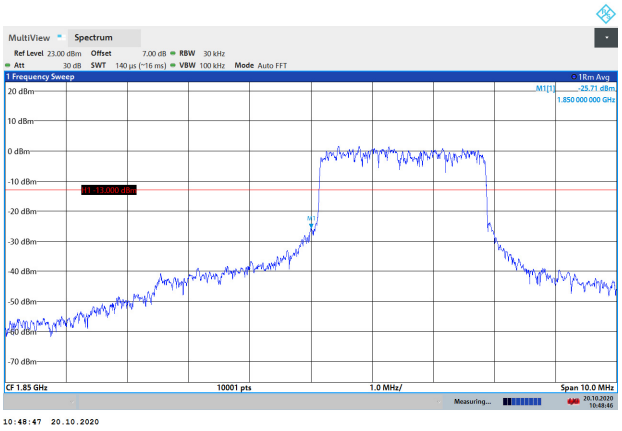
LTE Band 2 3MHz QPSK 1RB CH-Low



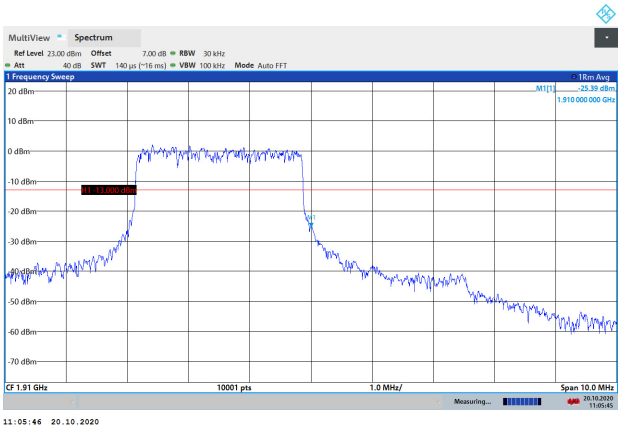
LTE Band 2 3MHz QPSK 1RB CH-High



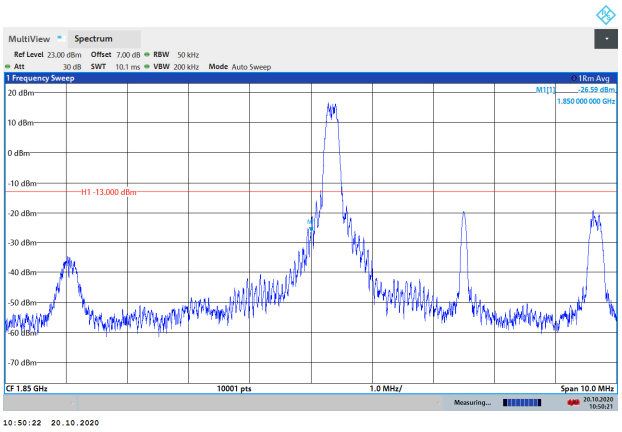
LTE Band 2 3MHz QPSK 100%RB CH-Low



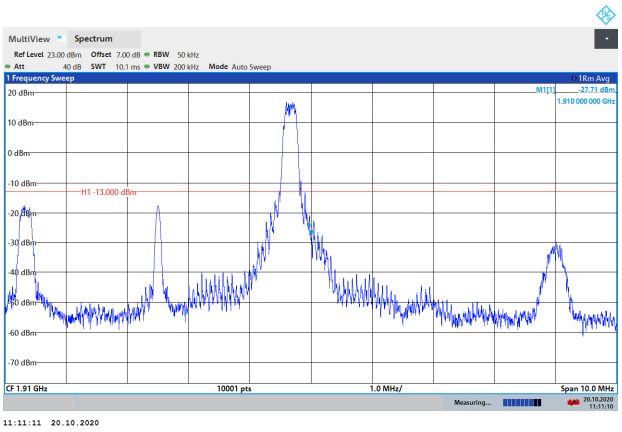
LTE Band 2 3MHz QPSK 100%RB CH-High



LTE Band 2 5MHz QPSK 1RB CH-Low



LTE Band 2 5MHz QPSK 1RB CH-High



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