FCC Test Report
(Part 22 – GSM, WCDMA Band 5, LTE Band 5)

Report No.: RFBFJZ-WTW-P21050403-8

FCC ID: V65C6930

Test Model: C6930

Received Date: May 18, 2021

Test Date: Jun. 15 ~ Aug. 09, 2021

Issued Date: Aug. 09, 2021

Applicant: Kyocera Corporation c/o Kyocera International, Inc.

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Issued By: Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch Lin Kou Laboratories

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FCC Registration / Designation Number: 788550 / TW0003

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Release Control Record

Issue No.	Description	Date Issued
RFBFJZ-WTW-P21050403-8	Original release	Aug. 09, 2021

1 Certificate of Conformity

Product: SmartPhone

Brand: Kyocera

Test Model: C6930

Sample Status: Engineering sample

Applicant: Kyocera Corporation c/o Kyocera International, Inc.

Test Date: Jun. 15 ~ Aug. 09, 2021

Standards: FCC Part 22, Subpart H

The above equipment has been tested by **Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's RF characteristics under the conditions specified in this report.

Prepared by : Pettie Chen , **Date:** Aug. 09, 2021

Pettie Chen / Senior Specialist

Approved by : Bruce Chen , **Date:** Aug. 09, 2021

Bruce Chen / Senior Engineer

2 Summary of Test Results

Applied Standard: FCC Part 22 & Part 2			
FCC Clause	Test Item	Result	Remarks
2.1046 22.913 (a)	Effective radiated power	Pass	Meet the requirement of limit.
2.1047	Modulation Characteristics	Pass	Meet the requirement
22.913 (d)	Peak To Average Ratio	Pass	Meet the requirement of limit.
2.1055 22.355	Frequency Stability	Pass	Meet the requirement of limit.
2.1049	Occupied Bandwidth	Pass	Meet the requirement of limit.
22.917	Band Edge Measurements	Pass	Meet the requirement of limit.
2.1051 22.917	Conducted Spurious Emissions	Pass	Meet the requirement of limit.
2.1053 22.917	Radiated Spurious Emissions	Pass	Meet the requirement of limit. Minimum passing margin is -35.16dB at 950.53MHz.

Note: Determining compliance based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.

2.1 Measurement Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

Measurement	Frequency	Expanded Uncertainty (k=2) (±)
Radiated Emissions up to 1 GHz	9kHz ~ 30MHz	3.04 dB
	30MHz ~ 200MHz	3.59 dB
	200MHz ~1000MHz	3.60 dB
Radiated Emissions above 1 GHz	1GHz ~ 18GHz	2.29 dB
	18GHz ~ 40GHz	2.29 dB

2.2 Test Site and Instruments

Description & Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due
Test Receiver KEYSIGHT	N9038A	MY55420137	Apr. 09, 2021	Apr. 08, 2022
Spectrum Analyzer ROHDE & SCHWARZ	FSP40	100039	Jun. 10, 2021	Jun. 09, 2022
Spectrum Analyzer ROHDE & SCHWARZ	FSW43	101866	Dec. 14, 2020	Dec. 13, 2021
MXG Vector signal generator Agilent	N5182B	MY53050430	Nov. 25, 2020	Nov. 24, 2021
Radio Communication Analyzer Anritsu	MT8821C	6261806803	Jan. 22, 2021	Jan. 21, 2022
Universal Radio Communication Tester R&S	CMU200	101095	Nov. 18, 2020	Nov. 17, 2021
HORN Antenna SCHWARZBECK	BBHA 9120D	9120D-969	Nov. 22, 2020	Nov. 21, 2021
BILOG Antenna SCHWARZBECK	VULB9168	9168-160	Nov. 06, 2020	Nov. 05, 2021
HORN Antenna SCHWARZBECK	BBHA 9120 D	9120D-1169	Nov. 22, 2020	Nov. 21, 2021
HORN Antenna SCHWARZBECK	BBHA 9170	BBHA9170241	Nov. 22, 2020	Nov. 21, 2021
Preamplifier Agilent (Below 1GHz)	8447D	2944A10638	Jun. 05, 2021	Jun. 04, 2022
Preamplifier Agilent (Above 1GHz)	8449B	3008A02367	Feb. 17, 2021	Feb. 16, 2022
RF signal cable HUBER+SUHNER&EMCI	SUCOFLEX 104 & EMC104-SM-SM8000	CABLE-CH9-02 (248780+171006)	Jan. 16, 2021	Jan. 15, 2022
RF signal cable HUBER+SUHNER	SUCOFLEX 104	CABLE-CH9-(250795/4)	Jan. 16, 2021	Jan. 15, 2022
RF signal cable Woken	8D-FB	Cable-CH9-01	Jun. 05, 2021	Jun. 04, 2022
Software BV ADT	ADT_Radiated_V7.6.15.9.5	NA	NA	NA
Antenna Tower EMCO	2070/2080	512.835.4684	NA	NA
Turn Table EMCO	2087-2.03	NA	NA	NA
Antenna Tower &Turn BV ADT	AT100	AT93021705	NA	NA
Turn Table BV ADT	TT100	TT93021705	NA	NA
Turn Table Controller BV ADT	SC100	SC93021705	NA	NA
Boresight Antenna Fixture	FBA-01	FBA-SIP01	NA	NA
Standard Temperature And Humidity Chamber GIANT FORCE	GTH-120-40-CP-AR	MAA1306-019	Sep. 10, 2020	Sep. 09, 2021

Description & Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due
JFW 20dB attenuation	50HF-020-SMA	NA	NA	NA
True RMS Clamp Meter Fluke	325	31130711WS	Jun. 02, 2021	Jun. 01, 2022
DC power supply Keysight	U8002A	MY56330015	NA	NA

Note: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in HwaYa Chamber 9.

3 General Information

3.1 General Description of EUT

Product	SmartPhone				
Brand	Kyocera				
Test Model	C6930				
Sample Status	Engineering sample				
Power Supply Rating	3.87Vdc from battery 5Vdc / 9Vdc / 12Vdc from adapter				
Modulation Type	GSM, GPRS: GMSK EDGE: 8PSK WCDMA: BPSK, QPSK HSDPA: BPSK HSUPA: QPSK LTE: QPSK, 16QAM, 64QAM, 256QAM				
Operating Frequency	GSM/GPRS/EDGE	824.2MHz ~ 848.8MHz			
	WCDMA Band 5	826.4MHz ~ 846.6MHz			
	LTE Band 5 (Channel Bandwidth 1.4MHz)	824.7MHz ~ 848.3MHz			
	LTE Band 5 (Channel Bandwidth 3MHz)	825.5MHz ~ 847.5MHz			
	LTE Band 5 (Channel Bandwidth 5MHz)	826.5MHz ~ 846.5MHz			
	LTE Band 5 (Channel Bandwidth 10MHz)	829.0MHz ~ 844.0MHz			
Max. ERP Power	GSM	429.536mW (26.33dBm)			
	EDGE	135.831mW (21.33dBm)			
	WCDMA Band 5	71.450mW (18.54dBm)			
		QPSK	16QAM	64QAM	256QAM
	LTE Band 5 (Channel Bandwidth 1.4MHz)	66.988mW (18.26dBm)	53.088mW (17.25dBm)	41.115mW (16.14dBm)	21.038mW (13.23dBm)
	LTE Band 5 (Channel Bandwidth 3MHz)	66.834mW (18.25dBm)	52.360mW (17.19dBm)	40.179mW (16.04dBm)	20.989mW (13.22dBm)
	LTE Band 5 (Channel Bandwidth 5MHz)	65.464mW (18.16dBm)	52.845mW (17.23dBm)	39.446mW (15.96dBm)	21.429mW (13.31dBm)
	LTE Band 5 (Channel Bandwidth 10MHz)	67.764mW (18.31dBm)	54.075mW (17.33dBm)	40.644mW (16.09dBm)	21.528mW (13.33dBm)
Emission Designator	GSM/GPRS	248KGXW			
	EDGE	244KG7W			
	WCDMA Band 5	4M16F9W			
		QPSK	16QAM	64QAM	256QAM
	LTE Band 5 (Channel Bandwidth 1.4MHz)	1M09G7D	1M09D7W	1M09D7W	1M09D7W
	LTE Band 5 (Channel Bandwidth 3MHz)	2M70G7D	2M70D7W	2M70D7W	2M70D7W
	LTE Band 5 (Channel Bandwidth 5MHz)	4M49G7D	4M49D7W	4M49D7W	4M49D7W
	LTE Band 5 (Channel Bandwidth 10MHz)	8M98G7D	8M98D7W	8M98D7W	8M97D7W
Antenna Type	Refer to Note as below				
Antenna Connector	Refer to Note as below				
Accessory Device	Refer to Note as below				
Cable Supplied	Refer to Note as below				

Note:

1. The EUT contains following accessory devices.

Battery	
Brand	KYOCERA
Model	SCP-75LBPS
Rating	3.87 V typ / 4500 mAh/17.5 Wh typ

Adapter	
Brand	KYOCERA Corporation
Model	SCP-49ADT
Input Power	AC 100-240V, 50/60Hz 0.4A
Output Power	DC 5.0V, 1.8A / 9.0V, 1.8A / 12.0V, 1.2A

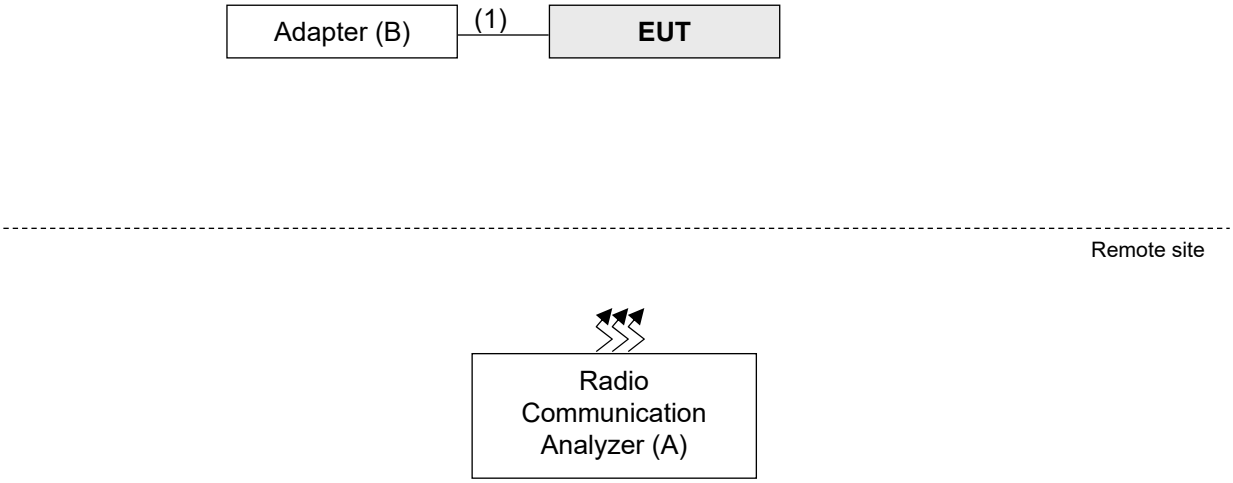
USB Cable	
Brand	KYOCERA Corporation
Model	SCP-24SDC
Signal Line	1m shielded Type A to Type C USB cable

2. The following antennas were provided to the EUT.

Band	Freq. Range (MHz)	Gain (dBi)
GSM-850	824 ~ 849	-3.5
WCDMA Band 5	824 ~ 849	-3.5
LTE Band 5	824.7 ~ 848.3	-3.5(Tx1)

* The above Antenna information is declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications, the laboratory shall not be held responsible.

3.2 Configuration of System under Test



3.2.1 Description of Support Units

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

ID	Product	Brand	Model No.	Serial No.	FCC ID	Remarks
A.	Radio Communication Analyzer	Anritsu	MT8821C	6261806803	NA	-
B.	Adapter	KYOCERA	SCP-49ADT	NA	NA	Accessory

Note:

1. All power cords of the above support units are non-shielded (1.8m).
2. Item A acted as a communication partner to transfer data.

ID	Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1.	Type A to Type C USB cable	1	1	Y	0	Accessory

3.3 Test Mode Applicability and Tested Channel Detail

Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates, XYZ axis and antenna ports. The worst case was found when positioned as the table below. Following channel(s) was (were) selected for the final test as listed below:

Band	Radiated Emission
GSM	Y-plane
WCDMA Band 5	X-plane
LTE Band 5	Y-plane

GSM Mode

EUT Configure Mode	Test Item	Available Channel	Tested Channel	Mode
-	ERP	128 to 251	128 (824.2MHz), 189 (836.4MHz), 251 (848.8MHz)	GSM, GPRS, EDGE
-	Modulation Characteristics	128 to 251	189 (836.4MHz)	GSM, GPRS, EDGE
-	Frequency Stability	128 to 251	128 (824.2MHz), 251 (848.8MHz)	GSM, EDGE
-	Occupied Bandwidth	128 to 251	128 (824.2MHz), 189 (836.4MHz), 251 (848.8MHz)	GSM, GPRS, EDGE
-	Band Edge	128 to 251	128(824.2MHz), 251(848.8MHz)	GSM, GPRS, EDGE
-	Peak To Average Ratio	128 to 251	128 (824.2MHz), 189 (836.4MHz), 251 (848.8MHz)	GSM, GPRS, EDGE
-	Conducted Emission	128 to 251	128 (824.2MHz), 189 (836.4MHz), 251 (848.8MHz)	GSM, GPRS, EDGE
-	Radiated Emission Below 1GHz	128 to 251	189 (836.4MHz)	GSM
-	Radiated Emission Above 1GHz	128 to 251	128 (824.2MHz), 189 (836.4MHz), 251 (848.8MHz)	GSM, EDGE

Note: For radiated emission below 1GHz, select the worst radiated emission channel (above 1GHz) for final testing.

WCDMA Band 5

EUT Configure Mode	Test Item	Available Channel	Tested Channel	Mode
-	ERP	4132 to 4233	4132 (826.4MHz), 4182 (836.4MHz), 4233 (846.6MHz)	WCDMA, HSDPA, HSUPA
-	Modulation Characteristics	4132 to 4233	4182 (836.4MHz)	WCDMA, HSDPA, HSUPA
-	Frequency Stability	4132 to 4233	4132 (826.4MHz), 4233 (846.6MHz)	WCDMA
-	Occupied Bandwidth	4132 to 4233	4132 (826.4MHz), 4182 (836.4MHz), 4233 (846.6MHz)	WCDMA, HSDPA, HSUPA
-	Band Edge	4132 to 4233	4132 (826.4MHz), 4233 (846.6MHz)	WCDMA, HSDPA, HSUPA
-	Peak To Average Ratio	4132 to 4233	4132 (826.4MHz), 4182 (836.4MHz), 4233 (846.6MHz)	WCDMA, HSDPA, HSUPA
-	Conducted Emission	4132 to 4233	4132 (826.4MHz), 4182 (836.4MHz), 4233 (846.6MHz)	WCDMA, HSDPA, HSUPA
-	Radiated Emission Below 1GHz	4132 to 4233	4182 (836.4MHz)	WCDMA
-	Radiated Emission Above 1GHz	4132 to 4233	4132 (826.4MHz), 4182 (836.4MHz), 4233 (846.6MHz)	WCDMA

Note: For radiated emission below 1GHz, select the worst radiated emission channel (above 1GHz) for final testing.

LTE Band 5

EUT Configure Mode	Test item	Available channel	Tested channel	Channel Bandwidth	Modulation	Mode
-	ERP	20407 to 20643	20407 (824.7MHz), 20525 (836.5MHz), 20643 (848.3MHz)	1.4MHz	QPSK / 16QAM / 64QAM / 256QAM	1 RB / 0 RB Offset 1 RB / 2 RB Offset 1 RB / 5 RB Offset 3 RB / 0 RB Offset 3 RB / 1 RB Offset 3 RB / 3 RB Offset 6 RB / 0 RB Offset
		20415 to 20635	20415 (825.5MHz), 20525 (836.5MHz), 20635 (847.5MHz)	3MHz	QPSK / 16QAM / 64QAM / 256QAM	1 RB / 0 RB Offset 1 RB / 7 RB Offset 1 RB / 14 RB Offset 8 RB / 0 RB Offset 8 RB / 3 RB Offset 8 RB / 7 RB Offset 15 RB / 0 RB Offset
		20425 to 20625	20425 (826.5MHz), 20525 (836.5MHz), 20625 (846.5MHz)	5MHz	QPSK / 16QAM / 64QAM / 256QAM	1 RB / 0 RB Offset 1 RB / 12 RB Offset 1 RB / 24 RB Offset 12 RB / 0 RB Offset 12 RB / 6 RB Offset 12 RB / 13 RB Offset 25 RB / 0 RB Offset
		20450 to 20600	20450 (829.0MHz), 20525 (836.5MHz), 20600 (844.0MHz)	10MHz	QPSK / 16QAM / 64QAM / 256QAM	1 RB / 0 RB Offset 1 RB / 24 RB Offset 1 RB / 49 RB Offset 25 RB / 0 RB Offset 25 RB / 12 RB Offset 25 RB / 25 RB Offset 50 RB / 0 RB Offset
-	Modulation Characteristics	20450 to 20600	20525 (836.5MHz)	10MHz	QPSK / 16QAM / 64QAM / 256QAM	50 RB / 0 RB Offset
-	Frequency Stability	20407 to 20643	20407 (824.7MHz), 20643 (848.3MHz)	1.4MHz	QPSK	6 RB / 0 RB Offset
		20415 to 20635	20415 (825.5MHz), 20635 (847.5MHz)	3MHz	QPSK	15 RB / 0 RB Offset
		20425 to 20625	20425 (826.5MHz), 20625 (846.5MHz)	5MHz	QPSK	25 RB / 0 RB Offset
		20450 to 20600	20450 (829.0MHz), 20600 (844.0MHz)	10MHz	QPSK	50 RB / 0 RB Offset
-	Occupied Bandwidth	20407 to 20643	20407 (824.7MHz), 20525 (836.5MHz), 20643 (848.3MHz)	1.4MHz	QPSK / 16QAM / 64QAM / 256QAM	6 RB / 0RB Offset
		20415 to 20635	20415 (825.5MHz), 20525 (836.5MHz), 20635 (847.5MHz)	3MHz	QPSK / 16QAM / 64QAM / 256QAM	15 RB / 0RB Offset
		20425 to 20625	20425 (826.5MHz), 20525 (836.5MHz), 20625 (846.5MHz)	5MHz	QPSK / 16QAM / 64QAM / 256QAM	25RB / 0RB Offset
		20450 to 20600	20450 (829.0MHz), 20525 (836.5MHz), 20600 (844.0MHz)	10MHz	QPSK / 16QAM / 64QAM / 256QAM	50RB / 0RB Offset

EUT Configure Mode	Test item	Available channel	Tested channel	Channel Bandwidth	Modulation	Mode
-	Band Edge	20407 to 20643	20407 (824.7MHz), 20643 (848.3MHz)	1.4MHz	QPSK	1 RB / 0 RB Offset 1 RB / 5 RB Offset 6 RB / 0 RB Offset
		20415 to 20635	20415 (825.5MHz), 20635 (847.5MHz)	3MHz	QPSK	1 RB / 0 RB Offset 1 RB / 14 RB Offset 15 RB / 0 RB Offset
		20425 to 20625	20425 (826.5MHz), 20625 (846.5MHz)	5MHz	QPSK	1 RB / 0 RB Offset 1 RB / 24 RB Offset 25 RB / 0 RB Offset
		20450 to 20600	20450 (829.0MHz), 20600 (844.0MHz)	10MHz	QPSK	1 RB / 0 RB Offset 1 RB / 49 RB Offset 50 RB / 0 RB Offset
-	Peak to Average Ratio	20407 to 20643	20407 (824.7MHz), 20525 (836.5MHz), 20643 (848.3MHz)	1.4MHz	QPSK / 16QAM / 64QAM / 256QAM	1 RB / 0 RB Offset
		20415 to 20635	20415 (825.5MHz), 20525 (836.5MHz), 20635 (847.5MHz)	3MHz	QPSK / 16QAM / 64QAM / 256QAM	1 RB / 0 RB Offset
		20425 to 20625	20425 (826.5MHz), 20525 (836.5MHz), 20625 (846.5MHz)	5MHz	QPSK / 16QAM / 64QAM / 256QAM	1 RB / 0 RB Offset
		20450 to 20600	20450 (829.0MHz), 20525 (836.5MHz), 20600 (844.0MHz)	10MHz	QPSK / 16QAM / 64QAM / 256QAM	1 RB / 0 RB Offset
-	Conducted Emission	20407 to 20643	20407 (824.7MHz), 20525 (836.5MHz), 20643 (848.3MHz)	1.4MHz	QPSK	1 RB / 0 RB Offset
		20415 to 20635	20415 (825.5MHz), 20525 (836.5MHz), 20635 (847.5MHz)	3MHz	QPSK	1 RB / 0 RB Offset
		20425 to 20625	20425 (826.5MHz), 20525 (836.5MHz), 20625 (846.5MHz)	5MHz	QPSK	1 RB / 0 RB Offset
		20450 to 20600	20450 (829.0MHz), 20525 (836.5MHz), 20600 (844.0MHz)	10MHz	QPSK	1 RB / 0 RB Offset

EUT Configure Mode	Test item	Available channel	Tested channel	Channel Bandwidth	Modulation	Mode
-	Radiated Emission Below 1GHz	20450 to 20600	20525 (836.5MHz)	10MHz	QPSK	1 RB / 0 RB Offset
-	Radiated Emission Above 1GHz	20407 to 20643	20407 (824.7MHz), 20525 (836.5MHz), 20643 (848.3MHz)	1.4MHz	QPSK	1 RB / 0 RB Offset
		20425 to 20625	20425 (826.5MHz), 20525 (836.5MHz), 20625 (846.5MHz)	5MHz	QPSK	1 RB / 0 RB Offset
		20450 to 20600	20450 (829.0MHz), 20525 (836.5MHz), 20600 (844.0MHz)	10MHz	QPSK	1 RB / 0 RB Offset

Note:

1. For radiated emission below 1GHz, select the worst radiated emission channel (above 1GHz) for final testing.
2. For radiated emission above 1GHz, according to 3GPP 36.521 Section 6.6.3.1.4, choose the lowest, 5MHz & highest channel bandwidth for final test.
3. The measured output power for QPSK mode is higher than the measured output power for 16QAM, 64QAM and 256QAM modes. Therefore, only Modulation characteristics, occupied bandwidth and Peak to average ratio items had been tested under QPSK, 16QAM, 64QAM and 256QAM modes, the other test items were performed under QPSK mode only.

Test Condition:

Test Item	Environmental Conditions	Input Power	Tested By
ERP	25deg. C, 60%RH	120Vac, 60Hz	James Yang
Modulation Characteristics	25deg. C, 60%RH	120Vac, 60Hz	James Yang
Frequency Stability	25deg. C, 60%RH	3.87Vdc	James Yang
Occupied Bandwidth	25deg. C, 60%RH	120Vac, 60Hz	James Yang
Band Edge	25deg. C, 60%RH	120Vac, 60Hz	James Yang
Peak To Average Ratio	25deg. C, 60%RH	120Vac, 60Hz	James Yang
Conducted Emission	25deg. C, 60%RH	120Vac, 60Hz	James Yang
Radiated Emission	22deg. C, 66%RH	120Vac, 60Hz	Hans Wu

3.4 EUT Operating Conditions

The EUT makes a call to the communication simulator. The communication simulator station system controlled a EUT to export maximum output power under transmission mode and specific channel frequency

3.5 General Description of Applied Standards and References

The EUT is a RF Product. According to the specifications of the manufacturer, it must comply with the requirements of the following standards:

Test Standard:

FCC 47 CFR Part 2

FCC 47 CFR Part 22

ANSI/TIA/EIA-603-E 2016

ANSI 63.26-2015

References Test Guidance:

KDB 971168 D01 Power Meas License Digital Systems v03r01

All test items have been performed and recorded as per the above standards.

4 Test Types and Results

4.1 Output Power Measurement

4.1.1 Limits of Output Power Measurement

Mobile / Portable station are limited to 7 watts e.r.p.

4.1.2 Test Procedures

Conducted Power Measurement:

The EUT was set up for the maximum power with GSM, WCDMA, LTE link data modulation and link up with simulator. Set the EUT to transmit under low, middle and high channel and record the power level shown on simulator.

Maximum EIRP / ERP

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

$EIRP = P_{Meas} + G_T$

$ERP = P_{Meas} + G_T - 2.15$

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)

4.1.3 Test Setup

Conducted Power Measurement:

4.1.4 Test Results

Conducted Output Power (dBm)

Band	GSM850		
Channel	128	189	251
Frequency	824.2	836.4	848.8
GSM	31.59	31.98	31.53
GPRS 1Tx Slot	31.43	31.82	31.41
GPRS 2Tx Slot	28.93	29.32	28.87
GPRS 3Tx Slot	27.31	27.72	27.26
GPRS 4Tx Slot	25.81	26.21	25.75
EDGE 1Tx Slot (MCS9)	26.59	26.98	26.53
EDGE 2Tx Slot (MCS9)	23.82	24.21	23.78
EDGE 3Tx Slot (MCS9)	21.77	22.16	21.71
EDGE 4Tx Slot (MCS9)	20.65	21.05	20.59

Band	WCDMA V		
TX Channel	4132	4182	4233
Rx Channel	4357	4407	4458
Frequency	826.4	836.4	846.6
RMC 12.2K	24.19	24.17	24.15
HSDPA Subtest-1	23.19	23.20	23.16
HSDPA Subtest-2	23.14	22.98	23.14
HSDPA Subtest-3	22.68	22.67	22.64
HSDPA Subtest-4	22.64	22.63	22.65
HSUPA Subtest-1	23.19	23.17	23.13
HSUPA Subtest-2	21.19	21.19	21.18
HSUPA Subtest-3	22.14	22.16	22.19
HSUPA Subtest-4	21.15	21.20	21.13
HSUPA Subtest-5	23.20	23.20	23.20

LTE Band 5						
BW	MCS Index	RB Size	RB Offset	Low	Mid	High
		Channel		20450	20525	20600
		Frequency (MHz)		829	836.5	844
10M	QPSK	1	0	23.93	23.96	23.89
		1	24	23.83	23.86	23.79
		1	49	23.77	23.80	23.73
		25	0	22.92	22.95	22.88
		25	12	22.90	22.93	22.86
		25	25	22.87	22.90	22.83
		50	0	22.89	22.92	22.85
10M	16QAM	1	0	22.95	22.98	22.91
		1	24	22.93	22.96	22.89
		1	49	22.89	22.92	22.85
		25	0	21.95	21.98	21.91
		25	12	21.93	21.96	21.89
		25	25	21.90	21.93	21.86
		50	0	21.94	21.97	21.90
10M	64QAM	1	0	21.71	21.74	21.67
		1	24	21.69	21.72	21.65
		1	49	21.68	21.71	21.64
		25	0	20.81	20.84	20.77
		25	12	20.77	20.80	20.73
		25	25	20.86	20.89	20.82
		50	0	20.82	20.85	20.78
10M	256QAM	1	0	18.95	18.98	18.91
		1	24	18.81	18.84	18.77
		1	49	18.87	18.90	18.83
		25	0	18.83	18.86	18.79
		25	12	18.80	18.83	18.76
		25	25	18.77	18.80	18.73
		50	0	18.88	18.91	18.84

LTE Band 5						
BW	MCS Index	RB Size	RB Offset	Low	Mid	High
		Channel		20425	20525	20625
		Frequency (MHz)		826.5	836.5	846.5
5M	QPSK	1	0	23.74	23.81	23.65
		1	12	23.78	23.77	23.64
		1	24	23.63	23.70	23.44
		12	0	22.71	22.80	22.72
		12	6	22.73	22.75	22.53
		12	13	22.67	22.74	22.64
		25	0	22.80	22.85	22.55
5M	16QAM	1	0	22.82	22.88	22.73
		1	12	22.83	22.85	22.78
		1	24	22.74	22.77	22.70
		12	0	21.78	21.95	21.74
		12	6	21.72	21.75	21.82
		12	13	21.83	21.86	21.72
		25	0	21.72	21.83	21.67
5M	64QAM	1	0	21.57	21.51	21.53
		1	12	21.53	21.54	21.58
		1	24	21.60	21.61	21.59
		12	0	20.74	20.69	20.73
		12	6	20.61	20.64	20.61
		12	13	20.78	20.70	20.72
		25	0	20.67	20.77	20.66
5M	256QAM	1	0	18.88	18.96	18.90
		1	12	18.80	18.81	18.75
		1	24	18.84	18.84	18.80
		12	0	18.75	18.76	18.75
		12	6	18.72	18.80	18.74
		12	13	18.71	18.77	18.68
		25	0	18.84	18.90	18.77

LTE Band 5						
BW	MCS Index	RB Size	RB Offset	Low	Mid	High
		Channel		20415	20525	20635
		Frequency (MHz)		825.5	836.5	847.5
3M	QPSK	1	0	23.90	23.86	23.77
		1	7	23.61	23.68	23.58
		1	14	23.61	23.70	23.59
		8	0	22.79	22.90	22.72
		8	3	22.78	22.87	22.74
		8	7	22.76	22.77	22.63
		15	0	22.72	22.74	22.69
3M	16QAM	1	0	22.83	22.84	22.75
		1	7	22.82	22.82	22.71
		1	14	22.69	22.69	22.71
		8	0	21.78	21.83	21.71
		8	3	21.80	21.93	21.77
		8	7	21.77	21.72	21.74
		15	0	21.86	21.75	21.80
3M	64QAM	1	0	21.65	21.69	21.54
		1	7	21.48	21.58	21.45
		1	14	21.57	21.51	21.55
		8	0	20.71	20.77	20.64
		8	3	20.57	20.68	20.60
		8	7	20.71	20.72	20.75
		15	0	20.62	20.74	20.63
3M	256QAM	1	0	18.83	18.85	18.75
		1	7	18.70	18.78	18.66
		1	14	18.66	18.83	18.68
		8	0	18.70	18.76	18.69
		8	3	18.64	18.82	18.66
		8	7	18.70	18.65	18.61
		15	0	18.87	18.78	18.70

LTE Band 5						
BW	MCS Index	RB Size	RB Offset	Low	Mid	High
		Channel		20407	20525	20643
		Frequency (MHz)		824.7	836.5	848.3
1.4M	QPSK	1	0	23.84	23.91	23.80
		1	2	23.80	23.71	23.67
		1	5	23.59	23.59	23.59
		3	0	23.80	23.82	23.86
		3	1	23.76	23.76	23.76
		3	3	23.80	23.84	23.73
		6	0	22.68	22.86	22.73
1.4M	16QAM	1	0	22.77	22.84	22.72
		1	2	22.89	22.90	22.76
		1	5	22.69	22.73	22.68
		3	0	22.77	22.84	22.73
		3	1	22.70	22.78	22.74
		3	3	22.80	22.85	22.64
		6	0	21.71	21.86	21.77
1.4M	64QAM	1	0	21.57	21.53	21.60
		1	2	21.52	21.56	21.46
		1	5	21.54	21.61	21.55
		3	0	21.71	21.64	21.73
		3	1	21.63	21.77	21.62
		3	3	21.68	21.75	21.79
		6	0	20.65	20.68	20.70
1.4M	256QAM	1	0	18.78	18.85	18.79
		1	2	18.71	18.68	18.63
		1	5	18.80	18.81	18.73
		3	0	18.70	18.62	18.68
		3	1	18.69	18.65	18.71
		3	3	18.60	18.73	18.57
		6	0	18.65	18.88	18.84

ERP Power (dBm)

Band	GSM850		
Channel	128	189	251
Frequency	824.2	836.4	848.8
GSM	25.94	**26.33**	25.88
GPRS 1Tx Slot	25.78	26.17	25.76
GPRS 2Tx Slot	23.28	23.67	23.22
GPRS 3Tx Slot	21.66	22.07	21.61
GPRS 4Tx Slot	20.16	20.56	20.10
EDGE 1Tx Slot (MCS9)	20.94	**21.33**	20.88
EDGE 2Tx Slot (MCS9)	18.17	18.56	18.13
EDGE 3Tx Slot (MCS9)	16.12	16.51	16.06
EDGE 4Tx Slot (MCS9)	15.00	15.40	14.94

Band	WCDMA V		
TX Channel	4132	4182	4233
Rx Channel	4357	4407	4458
Frequency	826.4	836.4	846.6
RMC 12.2K	**18.54**	18.52	18.50
HSDPA Subtest-1	17.54	17.55	17.51
HSDPA Subtest-2	17.49	17.33	17.49
HSDPA Subtest-3	17.03	17.02	16.99
HSDPA Subtest-4	16.99	16.98	17.00
HSUPA Subtest-1	17.54	17.52	17.48
HSUPA Subtest-2	15.54	15.54	15.53
HSUPA Subtest-3	16.49	16.51	16.54
HSUPA Subtest-4	15.50	15.55	15.48
HSUPA Subtest-5	17.55	17.55	17.55

*ERP = Conducted + antenna gain (-3.5dBi)-2.15

LTE Band 5						
BW	MCS Index	RB Size	RB Offset	Low	Mid	High
		Channel		20450	20525	20600
		Frequency (MHz)		829	836.5	844
10M	QPSK	1	0	18.28	**18.31**	18.24
		1	24	18.18	18.21	18.14
		1	49	18.12	18.15	18.08
		25	0	17.27	17.30	17.23
		25	12	17.25	17.28	17.21
		25	25	17.22	17.25	17.18
		50	0	17.24	17.27	17.20
10M	16QAM	1	0	17.30	17.33	17.26
		1	24	17.28	17.31	17.24
		1	49	17.24	17.27	17.20
		25	0	16.30	16.33	16.26
		25	12	16.28	16.31	16.24
		25	25	16.25	16.28	16.21
		50	0	16.29	16.32	16.25
10M	64QAM	1	0	16.06	16.09	16.02
		1	24	16.04	16.07	16.00
		1	49	16.03	16.06	15.99
		25	0	15.16	15.19	15.12
		25	12	15.12	15.15	15.08
		25	25	15.21	15.24	15.17
		50	0	15.17	15.20	15.13
10M	256QAM	1	0	13.30	13.33	13.26
		1	24	13.16	13.19	13.12
		1	49	13.22	13.25	13.18
		25	0	13.18	13.21	13.14
		25	12	13.15	13.18	13.11
		25	25	13.12	13.15	13.08
		50	0	13.23	13.26	13.19

*ERP = Conducted + antenna gain (-3.5dBi)-2.15

LTE Band 5						
BW	MCS Index	RB Size	RB Offset	Low	Mid	High
		Channel		20425	20525	20625
		Frequency (MHz)		826.5	836.5	846.5
5M	QPSK	1	0	18.09	**18.16**	18.00
		1	12	18.13	18.12	17.99
		1	24	17.98	18.05	17.79
		12	0	17.06	17.15	17.07
		12	6	17.08	17.10	16.88
		12	13	17.02	17.09	16.99
		25	0	17.15	17.20	16.90
5M	16QAM	1	0	17.17	17.23	17.08
		1	12	17.18	17.20	17.13
		1	24	17.09	17.12	17.05
		12	0	16.13	16.30	16.09
		12	6	16.07	16.10	16.17
		12	13	16.18	16.21	16.07
		25	0	16.07	16.18	16.02
5M	64QAM	1	0	15.92	15.86	15.88
		1	12	15.88	15.89	15.93
		1	24	15.95	15.96	15.94
		12	0	15.09	15.04	15.08
		12	6	14.96	14.99	14.96
		12	13	15.13	15.05	15.07
		25	0	15.02	15.12	15.01
5M	256QAM	1	0	13.23	13.31	13.25
		1	12	13.15	13.16	13.10
		1	24	13.19	13.19	13.15
		12	0	13.10	13.11	13.10
		12	6	13.07	13.15	13.09
		12	13	13.06	13.12	13.03
		25	0	13.19	13.25	13.12

*ERP = Conducted + antenna gain (-3.5dBi)-2.15

LTE Band 5						
BW	MCS Index	RB Size	RB Offset	Low	Mid	High
		Channel		20415	20525	20635
		Frequency (MHz)		825.5	836.5	847.5
3M	QPSK	1	0	**18.25**	18.21	18.12
		1	7	17.96	18.03	17.93
		1	14	17.96	18.05	17.94
		8	0	17.14	17.25	17.07
		8	3	17.13	17.22	17.09
		8	7	17.11	17.12	16.98
		15	0	17.07	17.09	17.04
3M	16QAM	1	0	17.18	17.19	17.10
		1	7	17.17	17.17	17.06
		1	14	17.04	17.04	17.06
		8	0	16.13	16.18	16.06
		8	3	16.15	16.28	16.12
		8	7	16.12	16.07	16.09
		15	0	16.21	16.10	16.15
3M	64QAM	1	0	16.00	16.04	15.89
		1	7	15.83	15.93	15.80
		1	14	15.92	15.86	15.90
		8	0	15.06	15.12	14.99
		8	3	14.92	15.03	14.95
		8	7	15.06	15.07	15.10
		15	0	14.97	15.09	14.98
3M	256QAM	1	0	13.18	13.20	13.10
		1	7	13.05	13.13	13.01
		1	14	13.01	13.18	13.03
		8	0	13.05	13.11	13.04
		8	3	12.99	13.17	13.01
		8	7	13.05	13.00	12.96
		15	0	13.22	13.13	13.05

*ERP = Conducted + antenna gain (-3.5dBi)-2.15

LTE Band 5						
BW	MCS Index	RB Size	RB Offset	Low	Mid	High
		Channel		20407	20525	20643
		Frequency (MHz)		824.7	836.5	848.3
1.4M	QPSK	1	0	18.19	**18.26**	18.15
		1	2	18.15	18.06	18.02
		1	5	17.94	17.94	17.94
		3	0	18.15	18.17	18.21
		3	1	18.11	18.11	18.11
		3	3	18.15	18.19	18.08
		6	0	17.03	17.21	17.08
1.4M	16QAM	1	0	17.12	17.19	17.07
		1	2	17.24	17.25	17.11
		1	5	17.04	17.08	17.03
		3	0	17.12	17.19	17.08
		3	1	17.05	17.13	17.09
		3	3	17.15	17.20	16.99
		6	0	16.06	16.21	16.12
1.4M	64QAM	1	0	15.92	15.88	15.95
		1	2	15.87	15.91	15.81
		1	5	15.89	15.96	15.90
		3	0	16.06	15.99	16.08
		3	1	15.98	16.12	15.97
		3	3	16.03	16.10	16.14
		6	0	15.00	15.03	15.05
1.4M	256QAM	1	0	13.13	13.20	13.14
		1	2	13.06	13.03	12.98
		1	5	13.15	13.16	13.08
		3	0	13.05	12.97	13.03
		3	1	13.04	13.00	13.06
		3	3	12.95	13.08	12.92
		6	0	13.00	13.23	13.19

*ERP = Conducted + antenna gain (-3.5dBi)-2.15

4.2 Modulation Characteristics Measurement

4.2.1 Limits of Modulation Characteristics

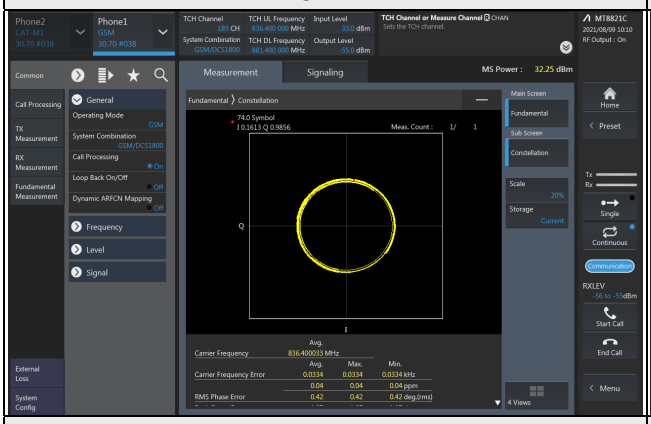
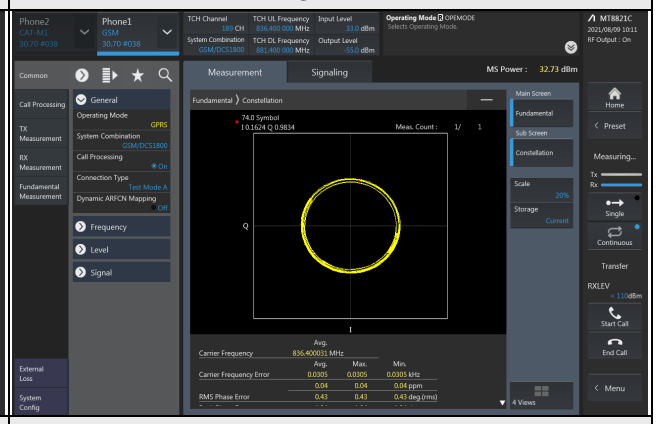
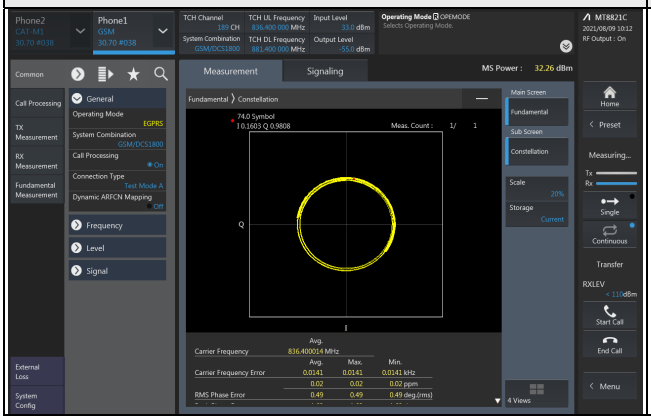
N/A

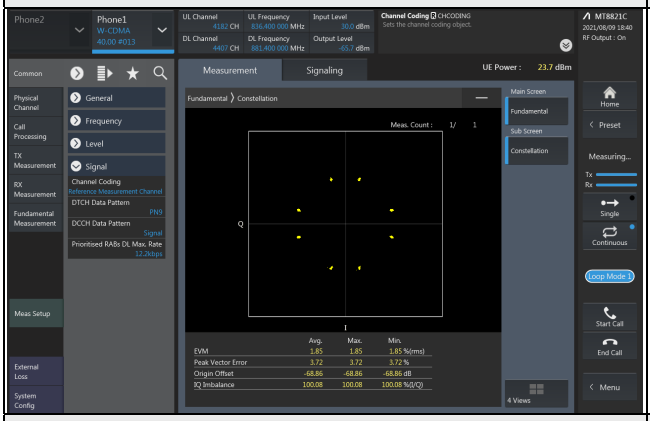
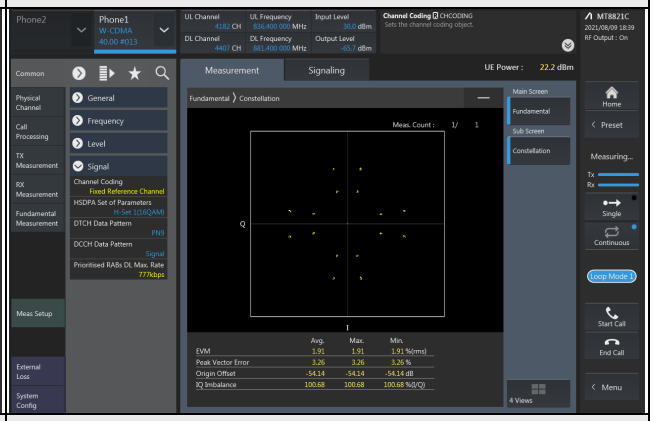
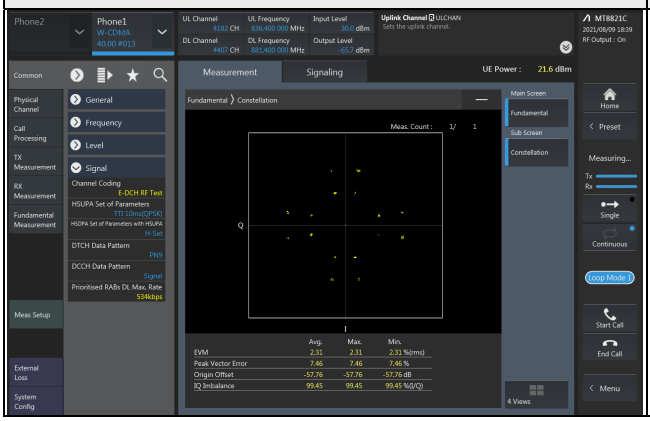
4.2.2 Test Procedure

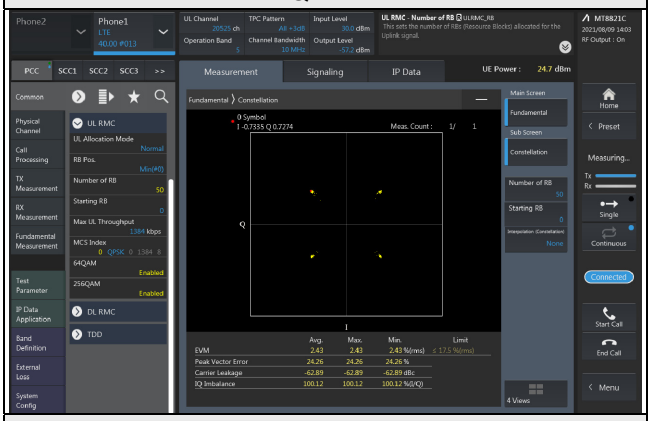
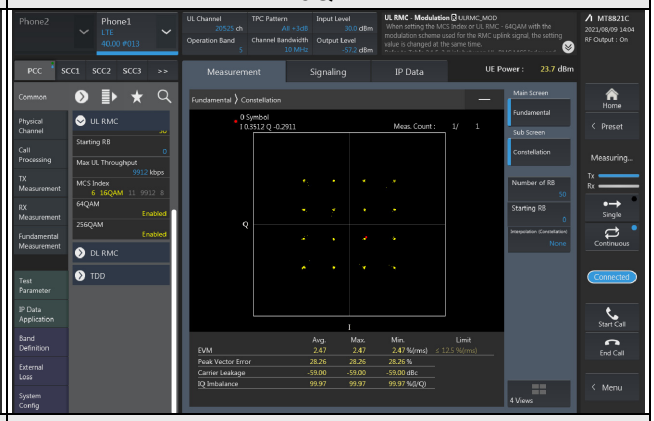
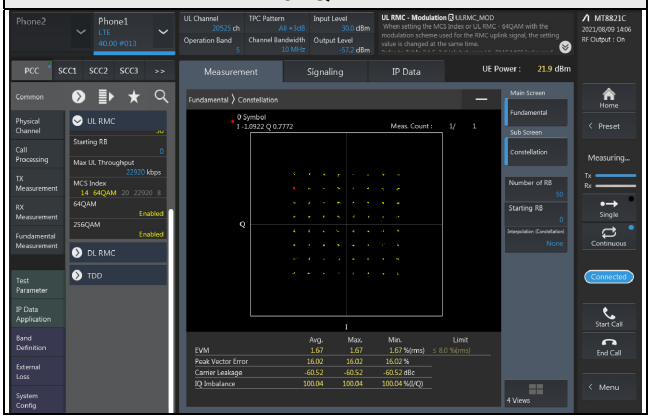
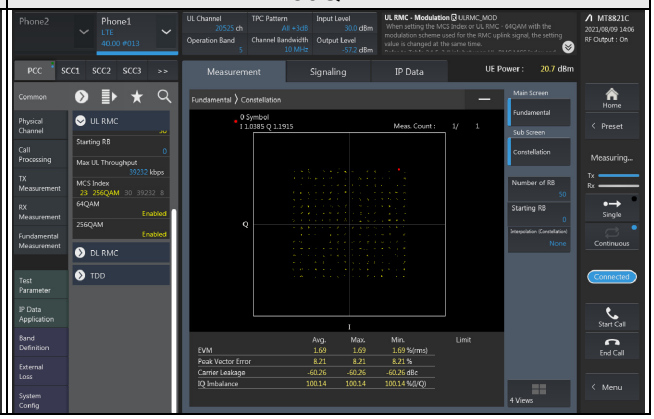
Connect the EUT to Communication Simulator via the antenna connector, The frequency band is set as EUT supported Modulation and Channels, the EUT output is matched with 50 ohm load, the waveform quality and constellation of the EUT was tested.

4.2.3 Test Setup

4.2.4 Test Results

GSM	
Spectrum Plot of Measurement Value	
Channel: 189 / Frequency (MHz): 836.4MHz	
GSM	GPRS
	
EDGE	
	

WCDMA Band 5	
Spectrum Plot of Measurement Value	
Channel: 4182 / Frequency (MHz): 836.4MHz	
WCDMA	HSDPA
	
HSUPA	
	

LTE Band 5	
Spectrum Plot of Measurement Value	
Channel: 20525 / Frequency (MHz): 836.5MHz	
QPSK	16QAM
	
64QAM	256QAM
	

4.3 Frequency Stability Measurement

4.3.1 Limits of Frequency Stability Measurement

1.5 ppm is for base and fixed station. 2.5 ppm is for mobile station.

4.3.2 Test Procedure

a. Device is placed at the oven room. The oven room could control the temperatures and humidity. Power warm up is at least 15 min and power applied should perform before recording frequency error.
b. EUT is connected the external power supply to control the DC input power. The test voltage range is from minimum to maximum working voltage. Each step shall be record the frequency error rate.
c. The temperature range step is 10 degrees in this test items. All temperature levels shall be hold the ±0.5 ℃ during the measurement testing. The each temperature step shall be at least 0.5 hours, consider the EUT could be test under the stability condition.

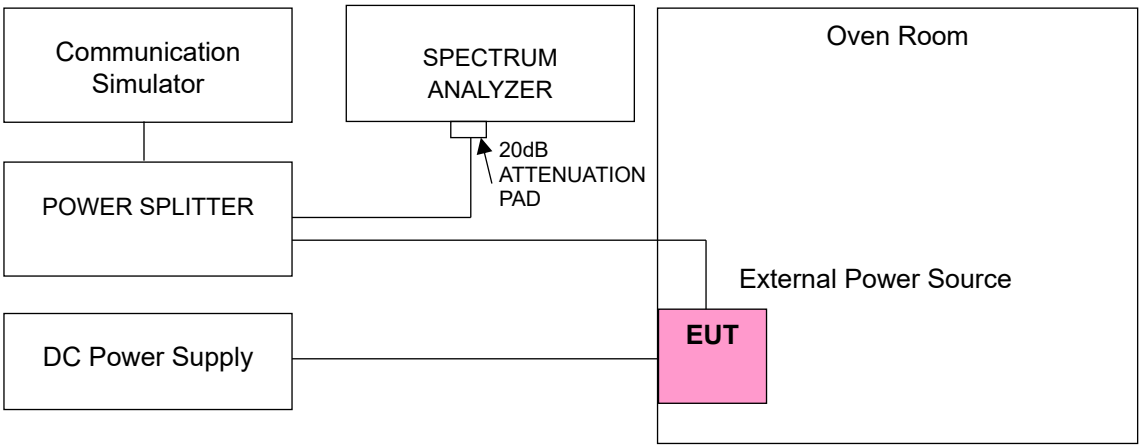
Note: The frequency error was recorded frequency error from the communication simulator.

4.3.3 Test Instruments

Description & Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due
Radio Communication Analyzer Anritsu	MT8821C	6261806803	Jan. 22, 2021	Jan. 21, 2022
Temperature & Humidity Chamber TERCHY	HRM-120RF	931022	Dec. 24, 2020	Dec. 23, 2021
Digital Multimeter Fluke	87-III	70360755	Jul. 10, 2020	Jul. 09, 2021
			Jul. 08, 2021	Jul. 07, 2022
DC Power Supply Topward	6306A	727263	NA	NA

Note: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

4.3.4 Test Setup



4.3.5 Test Results

Frequency Error vs. Voltage

Voltage (Vdc)	GSM			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
3.87	824.200039	0.047	848.800028	0.033
3.28	824.200017	0.021	848.800025	0.029
4.45	824.200040	0.049	848.800024	0.028

Note: The applicant defined the normal working voltage is from 3.28Vdc to 4.45Vdc.

Frequency Error vs. Temperature

Temp. (℃)	GSM			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-30	824.200027	0.033	848.800033	0.039
-20	824.200024	0.029	848.800037	0.044
-10	824.200035	0.042	848.800015	0.018
0	824.200013	0.016	848.800038	0.045
10	824.200020	0.024	848.800017	0.020
20	824.199986	-0.017	848.799978	-0.026
30	824.199965	-0.042	848.799972	-0.033
40	824.199970	-0.036	848.799960	-0.047
50	824.199985	-0.018	848.799977	-0.027
60	824.199978	-0.027	848.799961	-0.046

Frequency Error vs. Voltage

Voltage (Vdc)	EDGE			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
3.87	824.200010	0.012	848.800018	0.021
3.28	824.200035	0.042	848.800036	0.042
4.45	824.200019	0.023	848.800028	0.033

Note: The applicant defined the normal working voltage is from 3.28Vdc to 4.45Vdc.

Frequency Error vs. Temperature

Temp. (℃)	EDGE			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-30	824.200022	0.027	848.800024	0.028
-20	824.200017	0.021	848.800029	0.034
-10	824.200011	0.013	848.800029	0.034
0	824.200030	0.036	848.800011	0.013
10	824.200019	0.023	848.800040	0.047
20	824.199973	-0.033	848.799963	-0.044
30	824.199960	-0.049	848.799965	-0.041
40	824.199986	-0.017	848.799984	-0.019
50	824.199960	-0.049	848.799970	-0.035
60	824.199974	-0.032	848.799972	-0.033

Frequency Error vs. Voltage

Voltage (Vdc)	WCDMA Band 5			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
3.87	826.400021	0.025	846.600020	0.024
3.28	826.400034	0.041	846.600030	0.035
4.45	826.400036	0.044	846.600013	0.015

Note: The applicant defined the normal working voltage is from 3.28Vdc to 4.45Vdc.

Frequency Error vs. Temperature

Temp. (℃)	WCDMA Band 5			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-30	826.400028	0.034	846.600019	0.022
-20	826.400026	0.031	846.600014	0.017
-10	826.400016	0.019	846.600036	0.043
0	826.400030	0.036	846.600039	0.046
10	826.400038	0.046	846.600016	0.019
20	826.399973	-0.033	846.599961	-0.046
30	826.399986	-0.017	846.599966	-0.040
40	826.399970	-0.036	846.599989	-0.013
50	826.399987	-0.016	846.599963	-0.044
60	826.399983	-0.021	846.599982	-0.021

Frequency Error vs. Voltage

Voltage (Vdc)	LTE Band 5			
	Channel Bandwidth 1.4 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
3.87	824.700015	0.018	848.300018	0.021
3.28	824.700039	0.047	848.300030	0.035
4.45	824.700035	0.042	848.300018	0.021

Note: The applicant defined the normal working voltage is from 3.28Vdc to 4.45Vdc.

Frequency Error vs. Temperature

Temp. (℃)	LTE Band 5			
	Channel Bandwidth 1.4 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-30	824.700019	0.023	848.300014	0.017
-20	824.700013	0.016	848.300010	0.012
-10	824.700019	0.023	848.300011	0.013
0	824.700023	0.028	848.300011	0.013
10	824.700013	0.016	848.300011	0.013
20	824.699987	-0.016	848.299960	-0.047
30	824.699968	-0.039	848.299968	-0.038
40	824.699979	-0.025	848.299986	-0.017
50	824.699967	-0.040	848.299986	-0.017
60	824.699966	-0.041	848.299975	-0.029

Frequency Error vs. Voltage

Voltage (Vdc)	LTE Band 5			
	Channel Bandwidth 3 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
3.87	825.500030	0.036	847.500031	0.037
3.28	825.500023	0.028	847.500022	0.026
4.45	825.500028	0.034	847.500023	0.027

Note: The applicant defined the normal working voltage is from 3.28Vdc to 4.45Vdc.

Frequency Error vs. Temperature

Temp. (℃)	LTE Band 5			
	Channel Bandwidth 3 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-30	825.500029	0.035	847.500027	0.032
-20	825.500033	0.040	847.500030	0.035
-10	825.500026	0.031	847.500012	0.014
0	825.500016	0.019	847.500039	0.046
10	825.500037	0.045	847.500010	0.012
20	825.499985	-0.018	847.499968	-0.038
30	825.499960	-0.048	847.499962	-0.045
40	825.499990	-0.012	847.499971	-0.034
50	825.499976	-0.029	847.499961	-0.046
60	825.499978	-0.027	847.499966	-0.040

Frequency Error vs. Voltage

Voltage (Vdc)	LTE Band 5			
	Channel Bandwidth 5 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
3.87	826.500034	0.041	846.500016	0.019
3.28	826.500012	0.015	846.500027	0.032
4.45	826.500036	0.044	846.500012	0.014

Note: The applicant defined the normal working voltage is from 3.28Vdc to 4.45Vdc.

Frequency Error vs. Temperature

Temp. (℃)	LTE Band 5			
	Channel Bandwidth 5 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-30	826.500027	0.033	846.500020	0.024
-20	826.500025	0.030	846.500022	0.026
-10	826.500011	0.013	846.500024	0.028
0	826.500015	0.018	846.500023	0.027
10	826.500019	0.023	846.500018	0.021
20	826.499969	-0.038	846.499960	-0.047
30	826.499975	-0.030	846.499975	-0.030
40	826.499964	-0.044	846.499970	-0.035
50	826.499975	-0.030	846.499969	-0.037
60	826.499968	-0.039	846.499976	-0.028

Frequency Error vs. Voltage

Voltage (Vdc)	LTE Band 5			
	Channel Bandwidth 10 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
3.87	829.000014	0.017	844.000011	0.013
3.28	829.000037	0.045	844.000040	0.047
4.45	829.000023	0.028	844.000034	0.040

Note: The applicant defined the normal working voltage is from 3.28Vdc to 4.45Vdc.

Frequency Error vs. Temperature

Temp. (℃)	LTE Band 5			
	Channel Bandwidth 10 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-30	829.000026	0.031	844.000026	0.031
-20	829.000020	0.024	844.000036	0.043
-10	829.000017	0.021	844.000032	0.038
0	829.000033	0.040	844.000012	0.014
10	829.000011	0.013	844.000024	0.028
20	828.999963	-0.045	843.999972	-0.033
30	828.999989	-0.013	843.999981	-0.023
40	828.999984	-0.019	843.999961	-0.046
50	828.999985	-0.018	843.999961	-0.046
60	828.999961	-0.047	843.999973	-0.032

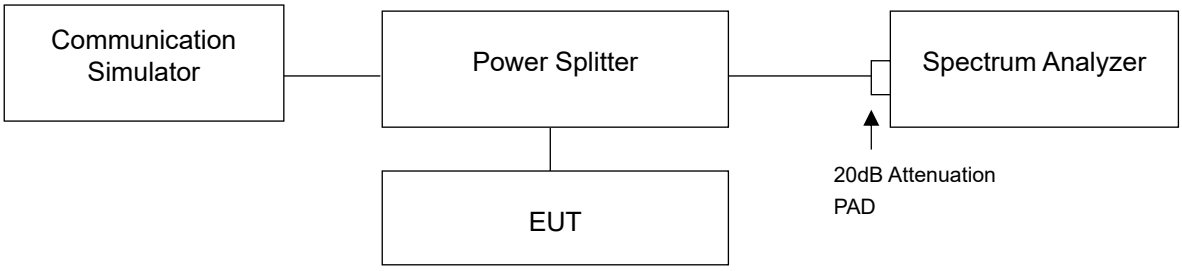
4.4 Occupied Bandwidth Measurement

4.4.1 Test Procedure

The EUT makes a call to the communication simulator. All measurements were done at low, middle and high operational frequency range. The communication simulator station system controlled a EUT to export maximum output power under transmission mode and specific channel frequency. Measurement method, please refer to section 5.4.4 of ANSI C63.26. Use OBW measurement function of Spectrum analyzer to measure 99 % occupied bandwidth.

For the 26dBc bandwidth measurement method, please refer to section 5.4.3 of ANSI C63.26.

4.4.2 Test Setup



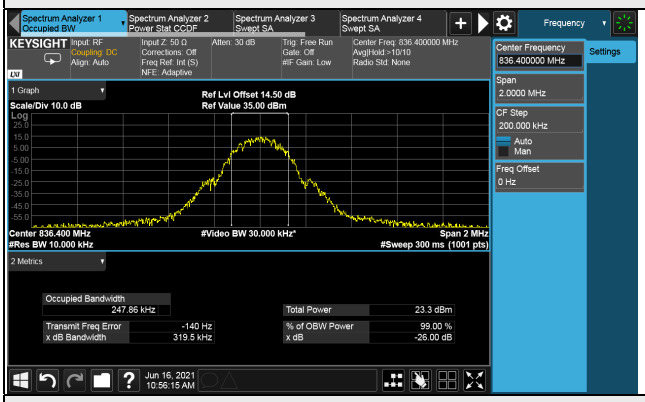
4.4.3 Test Result

Occupied Bandwidth

Channel	Frequency (MHz)	99% Occupied Bandwidth (kHz)		
		GSM	GPRS	EDGE
128	824.2	246.67	244.18	242.65
189	836.4	247.86	244.20	243.60
251	848.8	244.57	242.66	244.53

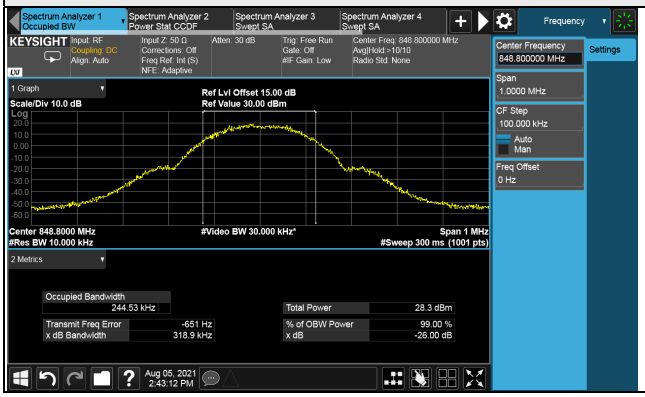
Spectrum Plot of Worst Value

GSM



GPRS

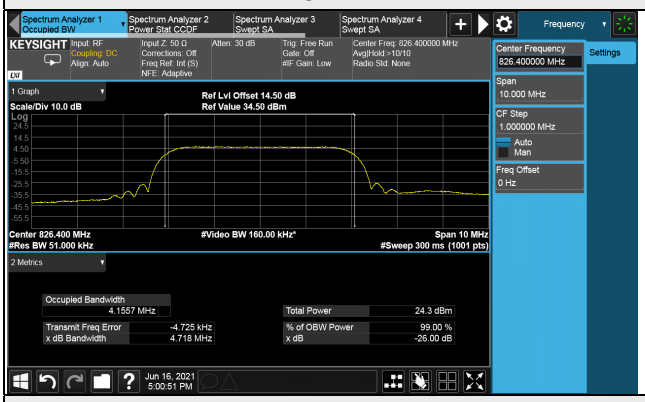
EDGE



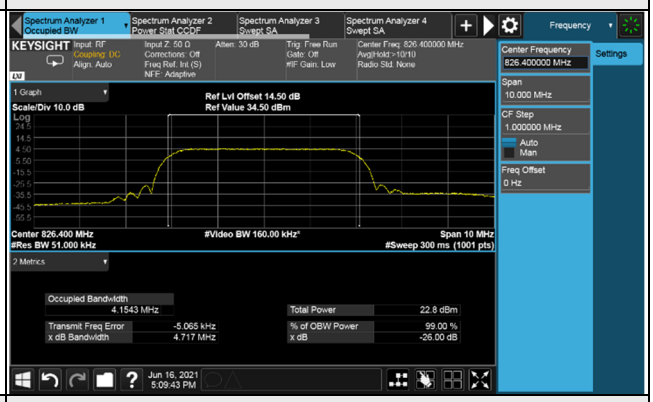
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)		
		WCDMA	HSDPA	HSUPA
4132	826.4	4.16	4.15	4.16
4182	836.4	4.15	4.15	4.15
4233	846.6	4.15	4.15	4.15

Spectrum Plot of Worst Value

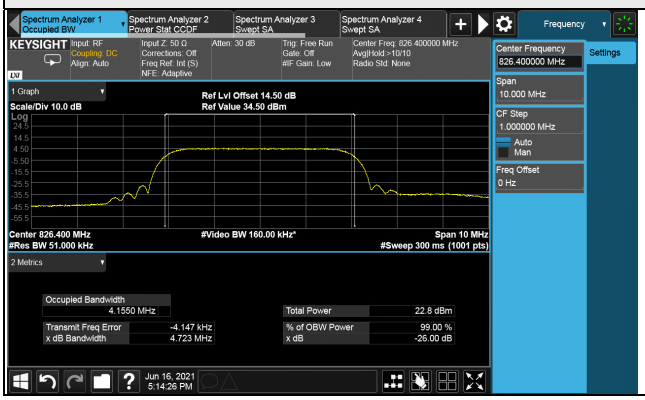
WCDMA



HSDPA



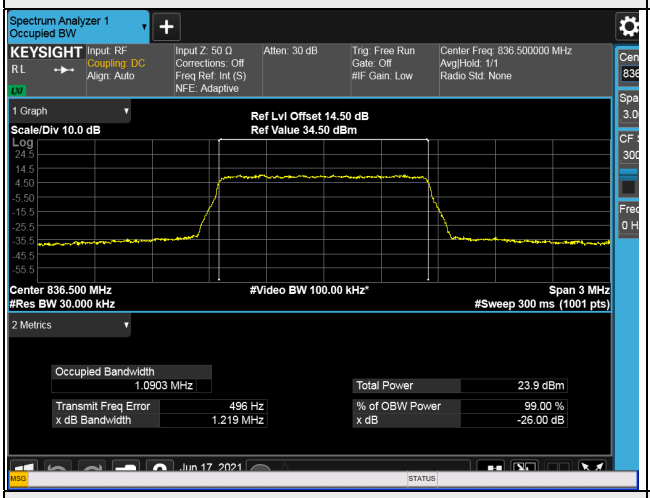
HSUPA



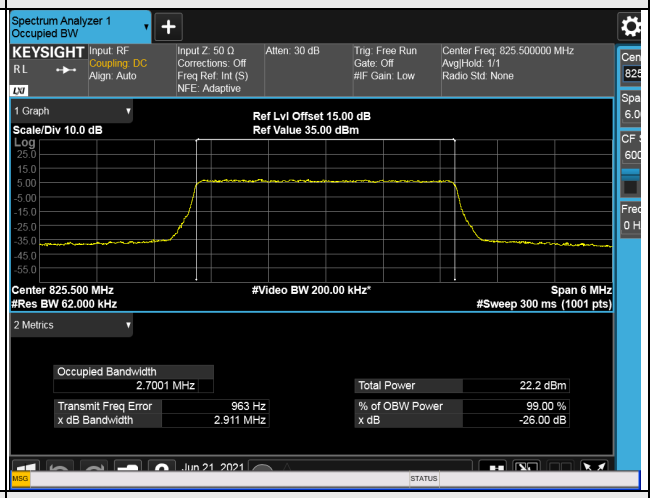
LTE Band 5, Channel Bandwidth 1.4MHz					
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)			
		QPSK	16QAM	64QAM	256QAM
20407	824.7	1.09	1.09	1.09	1.09
20525	836.5	1.09	1.09	1.09	1.09
20643	848.3	1.09	1.09	1.09	1.08
LTE Band 5, Channel Bandwidth 3MHz					
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)			
		QPSK	16QAM	64QAM	256QAM
20415	825.5	2.70	2.70	2.70	2.70
20525	836.5	2.70	2.70	2.70	2.69
20635	847.5	2.70	2.69	2.70	2.70
LTE Band 5, Channel Bandwidth 5MHz					
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)			
		QPSK	16QAM	64QAM	256QAM
20425	826.5	4.49	4.49	4.49	4.49
20525	836.5	4.49	4.49	4.49	4.48
20625	846.5	4.49	4.49	4.49	4.49
LTE Band 5, Channel Bandwidth 10MHz					
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)			
		QPSK	16QAM	64QAM	256QAM
20450	829.0	8.98	8.98	8.98	8.96
20525	836.5	8.96	8.96	8.96	8.95
20600	844.0	8.97	8.97	8.97	8.97

Spectrum Plot of Worst Value

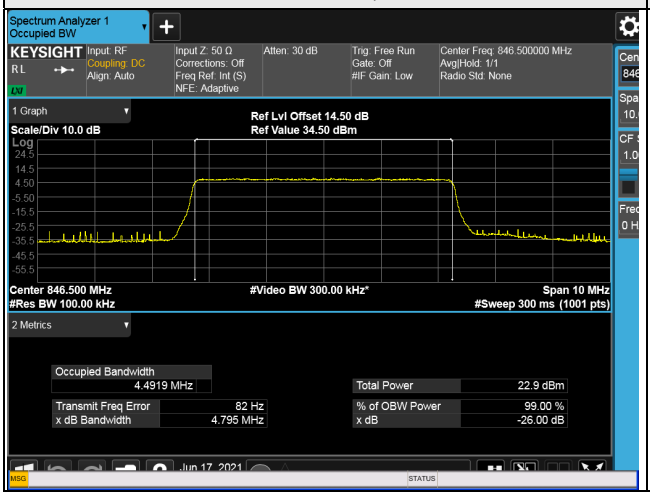
1.4MHz / 16QAM



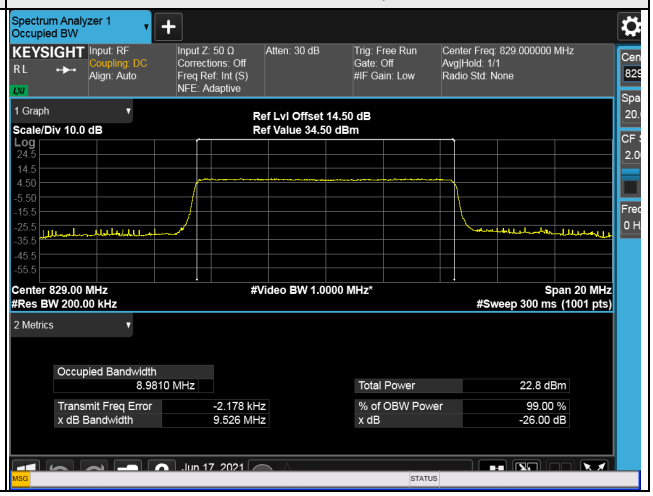
3MHz / 64QAM



5MHz / 16QAM



10MHz / 16QAM

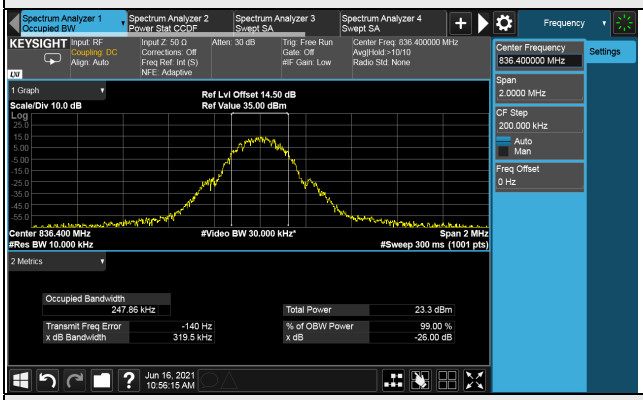


26dB Bandwidth

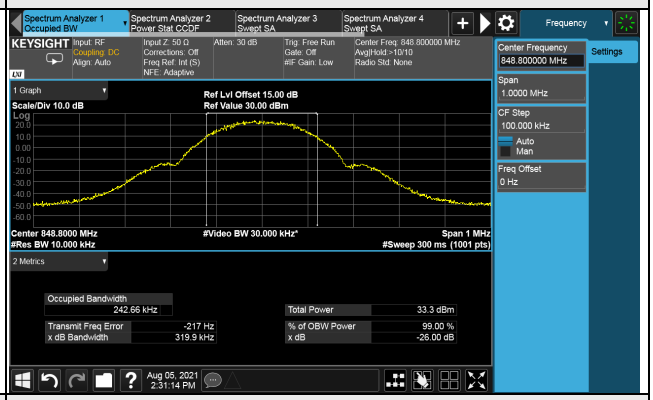
Channel	Frequency (MHz)	26dB Bandwidth (MHz)		
		GSM	GPRS	EDGE
128	824.2	309.30	318.90	318.40
189	836.4	319.50	316.70	312.20
251	848.8	313.60	319.90	318.90

Spectrum Plot of Worst Value

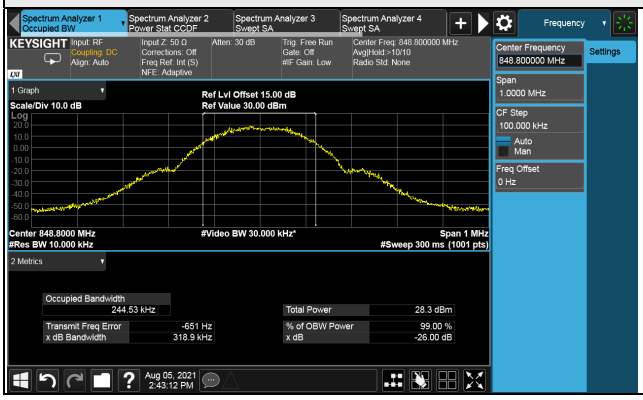
GSM



GPRS



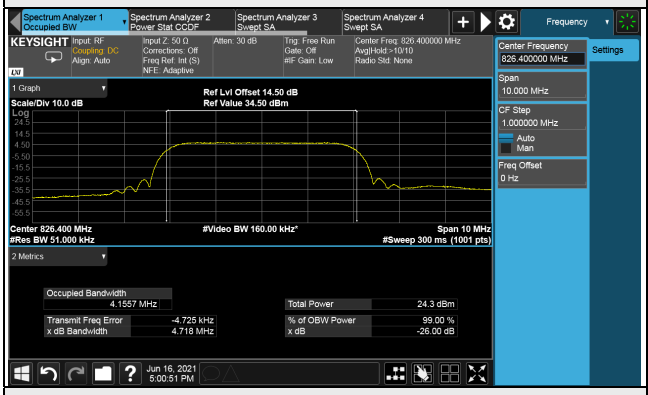
EDGE



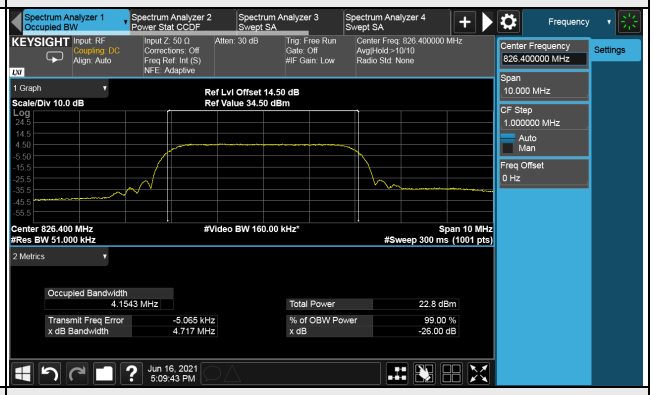
Channel	Frequency (MHz)	26dB Bandwidth (MHz)		
		WCDMA	HSDPA	HSUPA
4132	826.4	4.72	4.72	4.72
4182	836.4	4.71	4.71	4.72
4233	846.6	4.72	4.72	4.71

Spectrum Plot of Worst Value

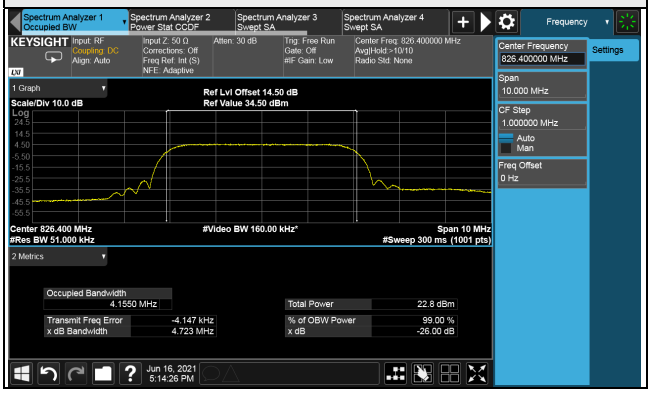
WCDMA



HSDPA



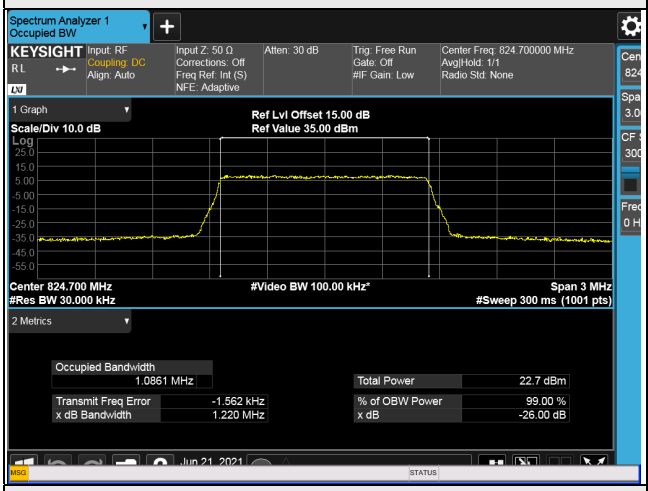
HSUPA



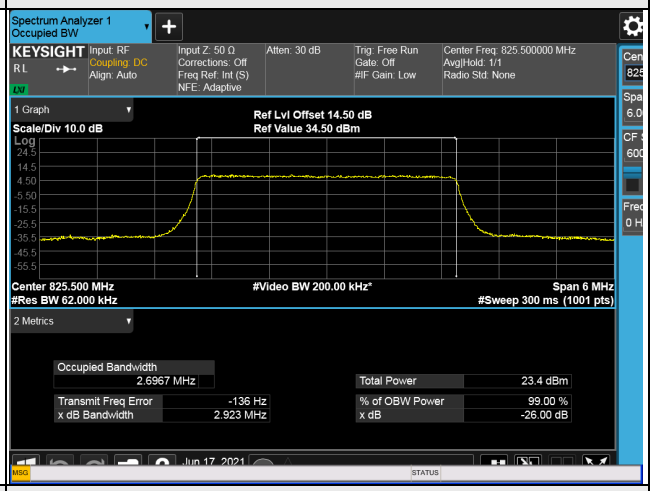
LTE Band 5, Channel Bandwidth 1.4MHz					
Channel	Frequency (MHz)	26dB Bandwidth (MHz)			
		QPSK	16QAM	64QAM	256QAM
20407	824.7	1.21	1.21	1.22	1.19
20525	836.5	1.22	1.22	1.22	1.19
20643	848.3	1.21	1.21	1.22	1.17
LTE Band 5, Channel Bandwidth 3MHz					
Channel	Frequency (MHz)	26dB Bandwidth (MHz)			
		QPSK	16QAM	64QAM	256QAM
20415	825.5	2.92	2.92	2.91	2.91
20525	836.5	2.91	2.92	2.91	2.82
20635	847.5	2.92	2.92	2.91	2.92
LTE Band 5, Channel Bandwidth 5MHz					
Channel	Frequency (MHz)	26dB Bandwidth (MHz)			
		QPSK	16QAM	64QAM	256QAM
20425	826.5	4.81	4.81	4.79	4.80
20525	836.5	4.79	4.79	4.80	4.68
20625	846.5	4.79	4.80	4.80	4.78
LTE Band 5, Channel Bandwidth 10MHz					
Channel	Frequency (MHz)	26dB Bandwidth (MHz)			
		QPSK	16QAM	64QAM	256QAM
20450	829.0	9.53	9.53	9.53	9.32
20525	836.5	9.50	9.51	9.51	9.51
20600	844.0	9.49	9.52	9.51	9.50

Spectrum Plot of Worst Value

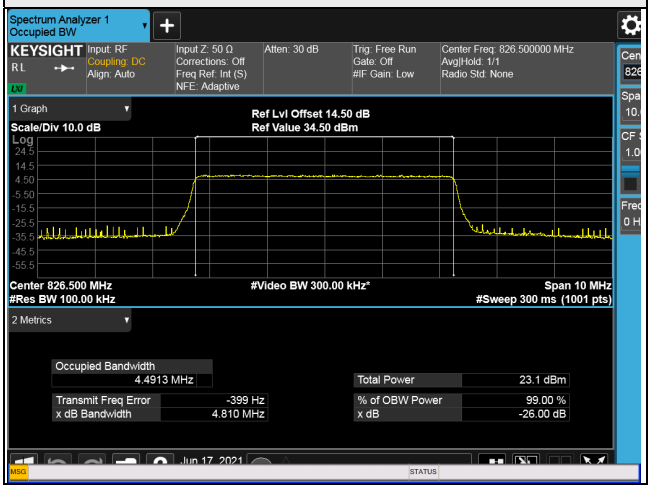
1.4MHz / 64QAM



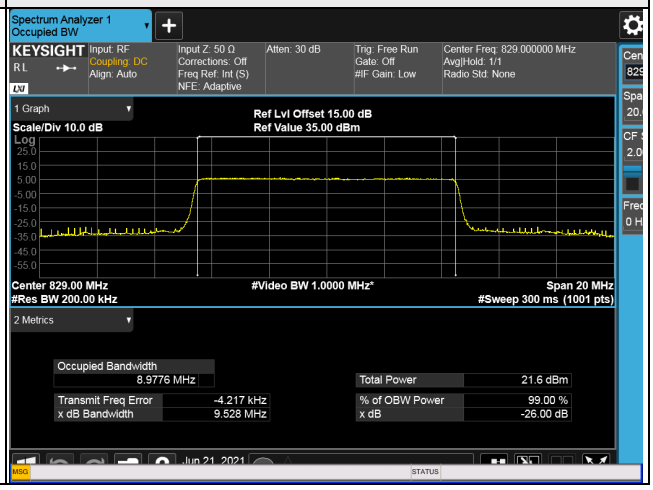
3MHz / 16QAM



5MHz / 16QAM



10MHz / 64QAM

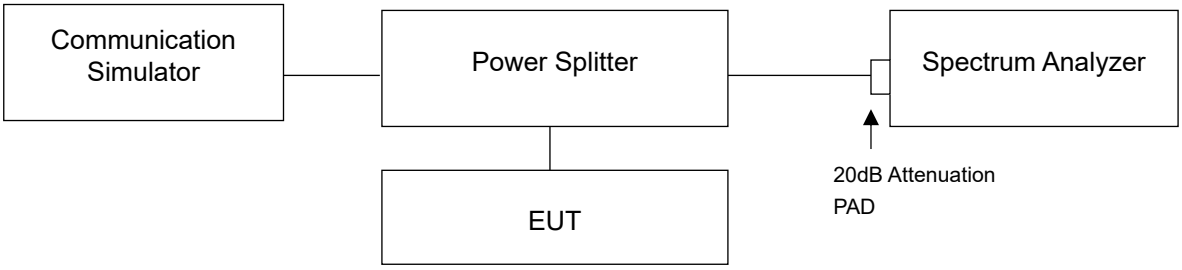


4.5 Band Edge Measurement

4.5.1 Limits of Band Edge Measurement

Power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB. In the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed.

4.5.2 Test Setup



4.5.3 Test Procedures

a. All measurements were done at low and high operational frequency range.

b. The center frequency of spectrum is the band edge frequency and span is 2MH/1MHz. RB of the spectrum is 10kHz and VB of the spectrum is 30kHz (GSM / GPRS / EDGE).

c. The center frequency of spectrum is the band edge frequency and span is 2MHz. RB of the spectrum is 51kHz and VB of the spectrum is 160kHz (WCDMA / HSDPA / HSUPA).

d. The center frequency of spectrum is the band edge frequency and span is 1MHz. RB of the spectrum is 15kHz and VB of the spectrum is 51kHz (LTE Channel Bandwidth 1.4MHz).

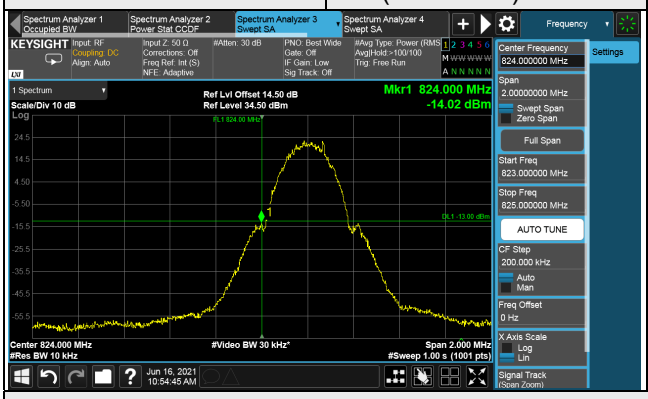
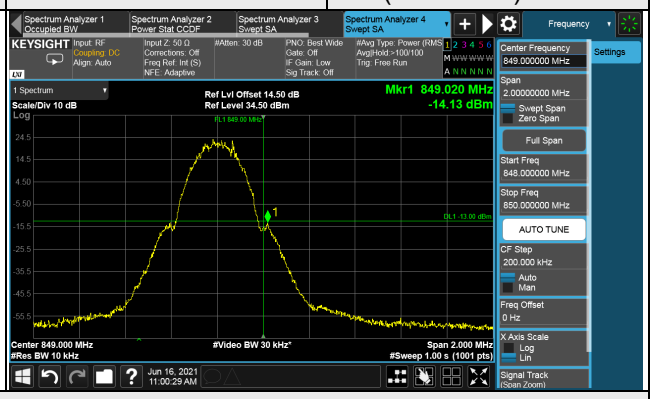
e. The center frequency of spectrum is the band edge frequency and span is 1MHz. RB of the spectrum is 30kHz and VB of the spectrum is 100kHz (LTE Channel Bandwidth 3MHz).

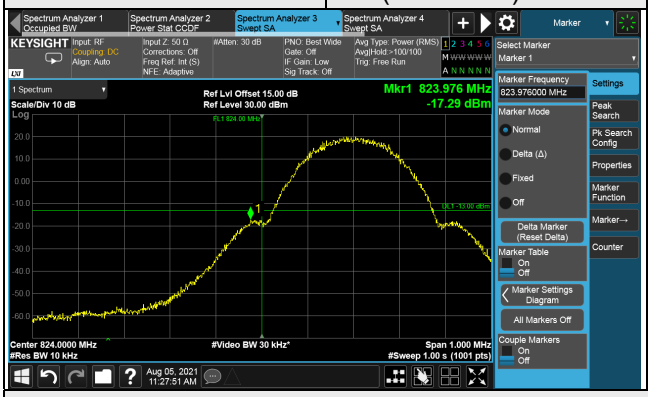
f. The center frequency of spectrum is the band edge frequency and span is 1MHz. RB of the spectrum is 51kHz and VB of the spectrum is 160kHz (LTE Channel Bandwidth 5MHz).

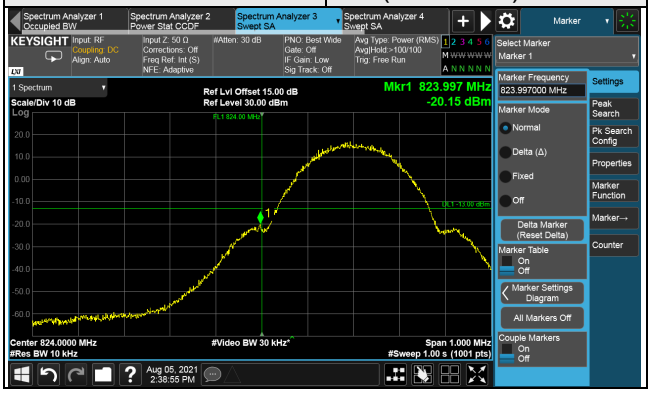
g. The center frequency of spectrum is the band edge frequency and span is 1MHz. RB of the spectrum is 100kHz and VB of the spectrum is 300kHz (LTE Channel Bandwidth 10MHz).

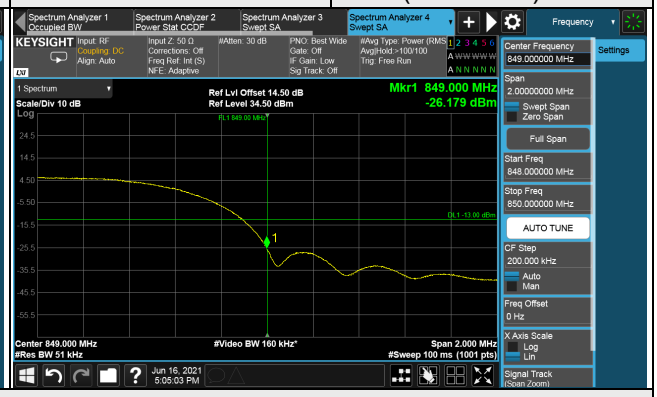
h. Record the max trace plot into the test report.

4.5.4 Test Results

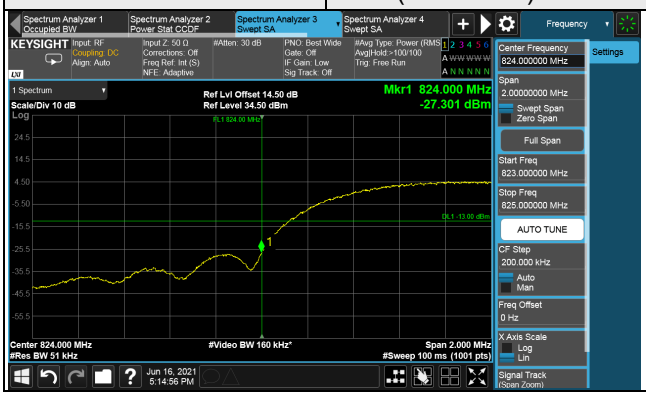
GSM			
Channel	128 (824.2MHz)	Channel	251 (848.8MHz)
			

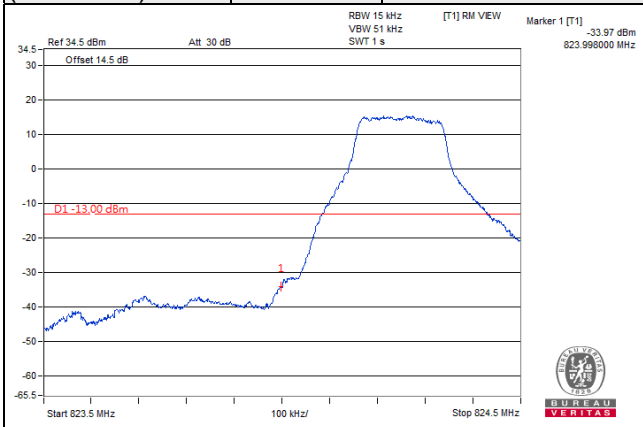
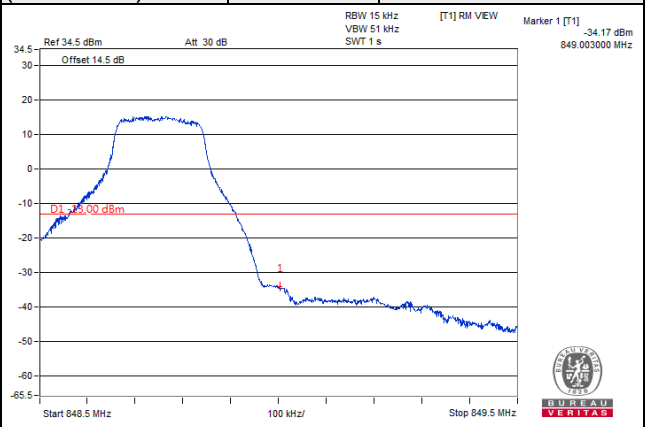
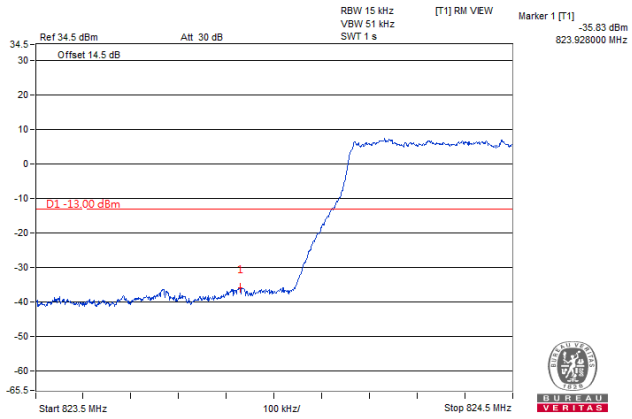
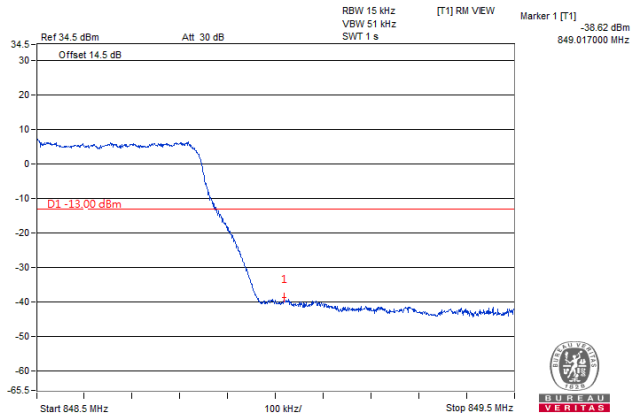
GPRS			
Channel	128 (824.2MHz)	Channel	251 (848.8MHz)
			

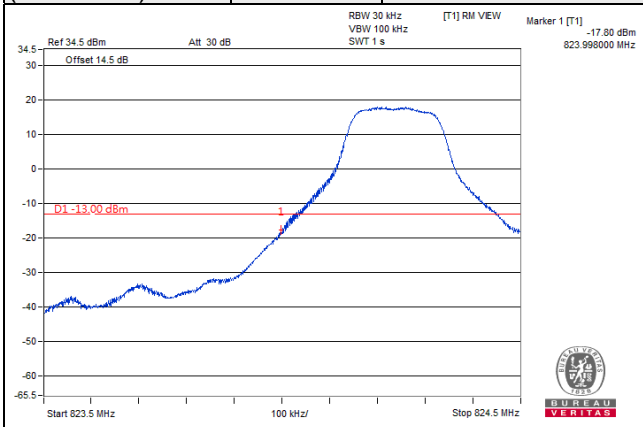
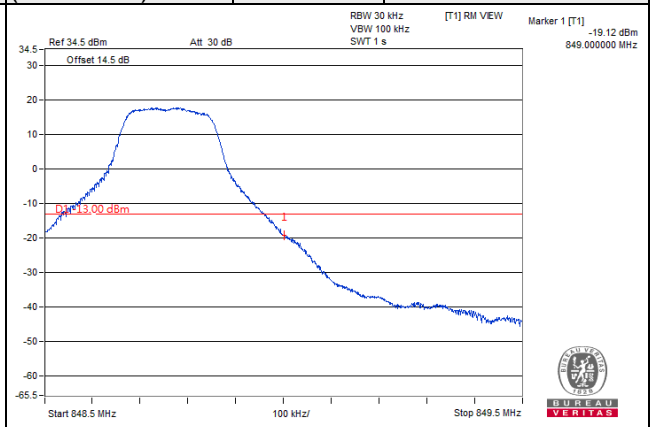
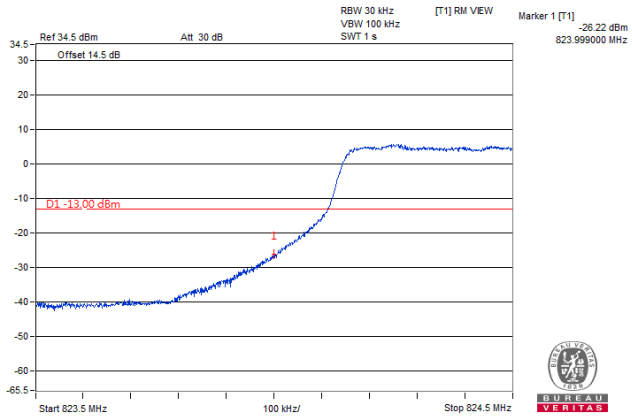
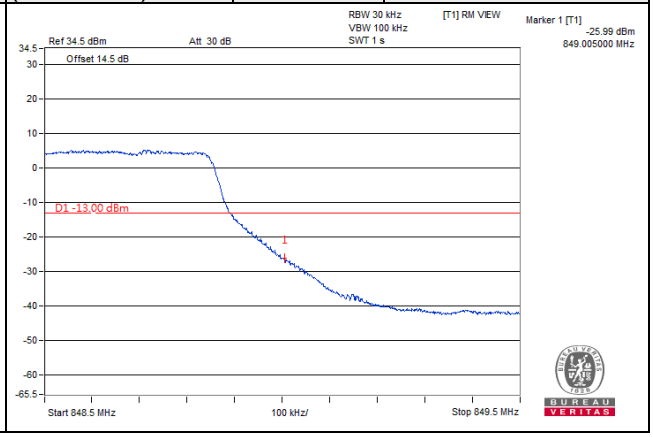
EDGE			
Channel	128 (824.2MHz)	Channel	251 (848.8MHz)
			

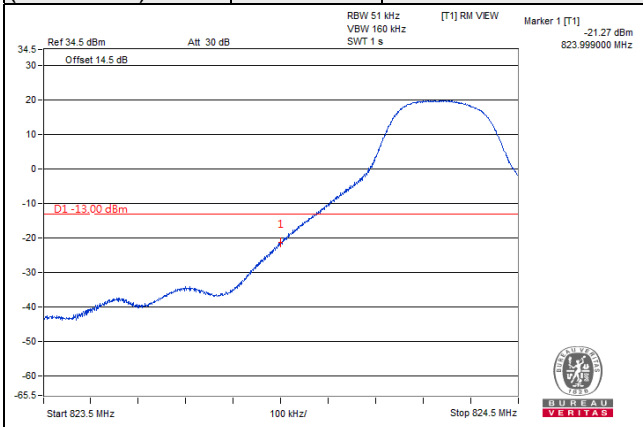
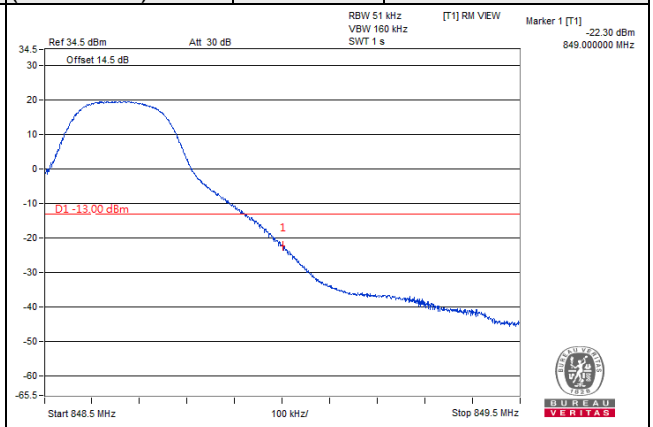
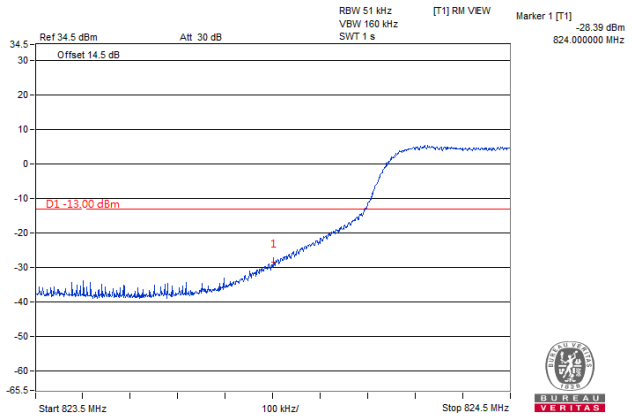
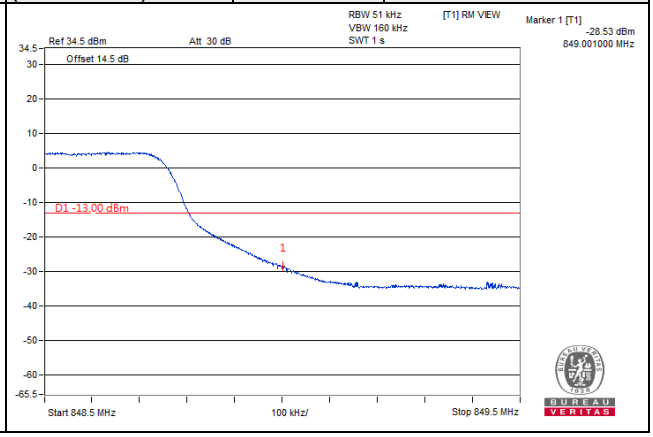
WCDMA			
Channel	4132 (826.4MHz)	Channel	4233 (846.6MHz)
			

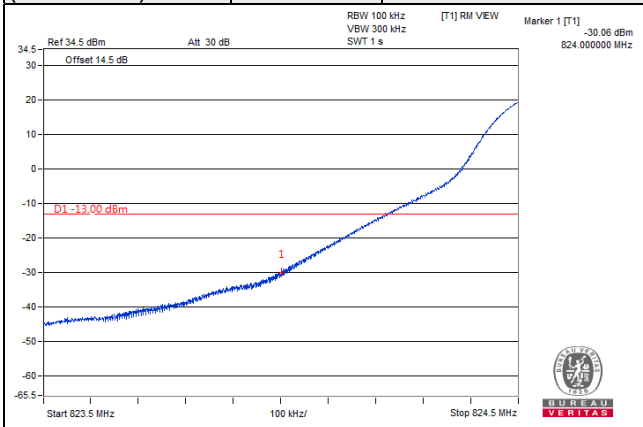
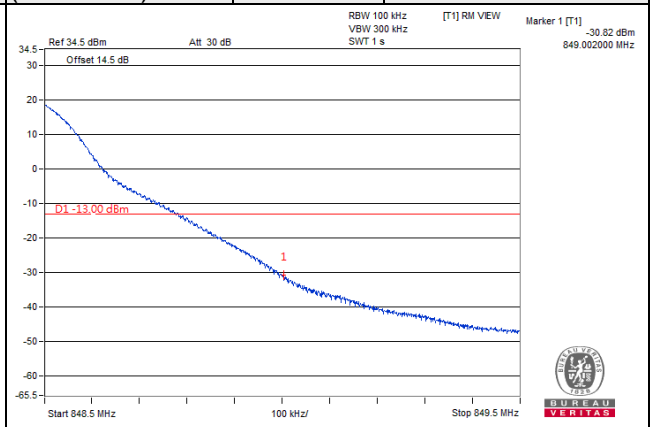
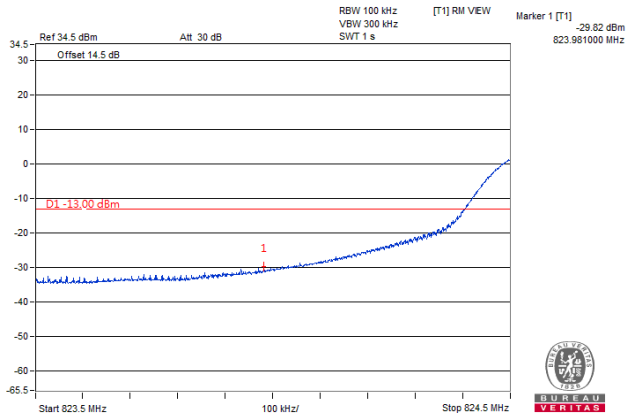
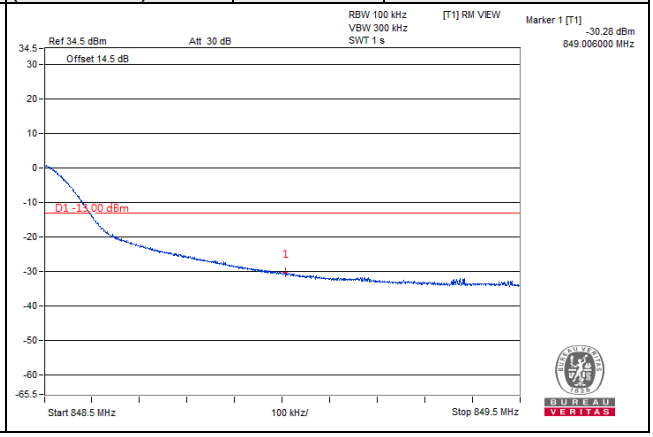
HSDPA			
Channel	4132 (826.4MHz)	Channel	4233 (846.6MHz)

HSUPA			
Channel	4132 (826.4MHz)	Channel	4233 (846.6MHz)
			

LTE Band 5, Channel Bandwidth 1.4MHz					
Channel 20407 (824.7MHz)	QPSK	1 RB / 0 RB Offset	Channel 20643 (848.3MHz)	QPSK	1 RB / 5 RB Offset
					
Channel 20407 (824.7MHz)	QPSK	6 RB / 0 RB Offset	Channel 20643 (848.3MHz)	QPSK	6 RB / 0 RB Offset
					

LTE Band 5, Channel Bandwidth 3MHz					
Channel 20415 (825.5MHz)	QPSK	1 RB / 0 RB Offset	Channel 20635 (847.5MHz)	QPSK	1 RB / 14 RB Offset
					
Channel 20415 (825.5MHz)	QPSK	15 RB / 0 RB Offset	Channel 20635 (847.5MHz)	QPSK	15 RB / 0 RB Offset
					

LTE Band 5, Channel Bandwidth 5MHz					
Channel 20425 (826.5MHz)	QPSK	1 RB / 0 RB Offset	Channel 20625 (846.5MHz)	QPSK	1 RB / 24 RB Offset
					
Channel 20425 (826.5MHz)	QPSK	25 RB / 0 RB Offset	Channel 20625 (846.5MHz)	QPSK	25 RB / 0 RB Offset
					

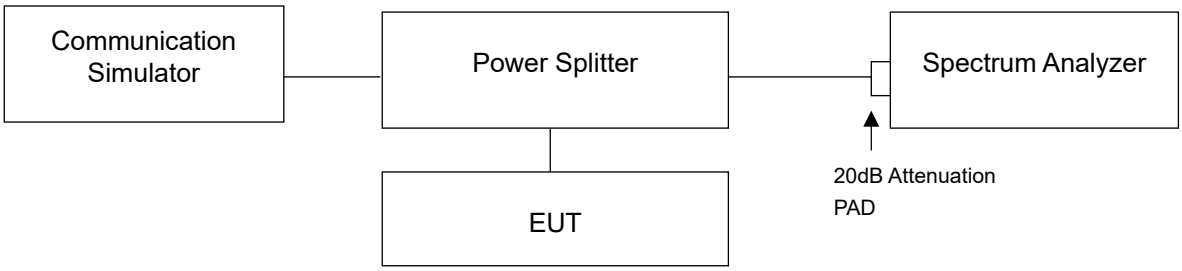
LTE Band 5, Channel Bandwidth 10MHz					
Channel 20450 (829.0MHz)	QPSK	1 RB / 0 RB Offset	Channel 20600 (844.0MHz)	QPSK	1 RB / 49 RB Offset
					
Channel 20450 (829.0MHz)	QPSK	50 RB / 0 RB Offset	Channel 20600 (844.0MHz)	QPSK	50 RB / 0 RB Offset
					

4.6 Peak to Average Ratio

4.6.1 Limits of Peak to Average Ratio Measurement

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

4.6.2 Test Setup



4.6.3 Test Procedures

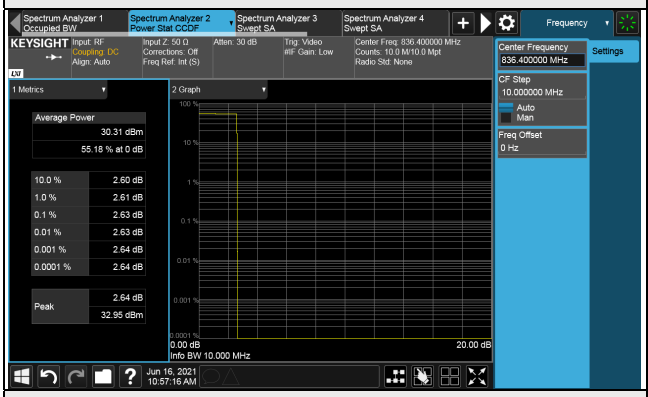
a. Set resolution/measurement bandwidth ≥ signal's occupied bandwidth;
b. Set the number of counts to a value that stabilizes the measured CCDF curve;
c. Record the maximum PAPR level associated with a probability of 0.1%.

4.6.4 Test Results

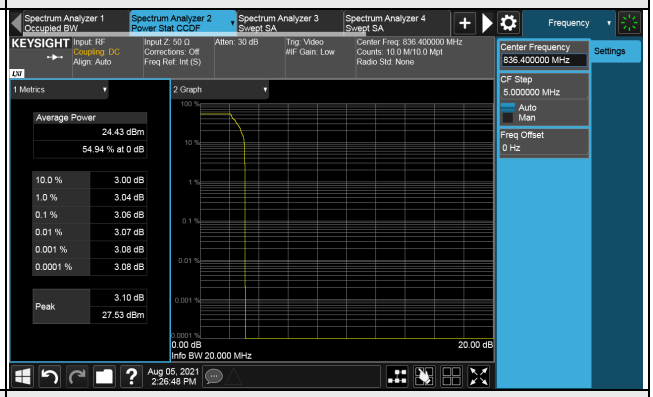
Channel	Frequency (MHz)	Peak To Average Ratio (dB)		
		GSM	GPRS	EDGE
128	824.2	2.62	2.64	2.67
189	836.4	2.63	3.06	2.66
251	848.8	2.63	2.64	2.66

Spectrum Plot of Worst Value

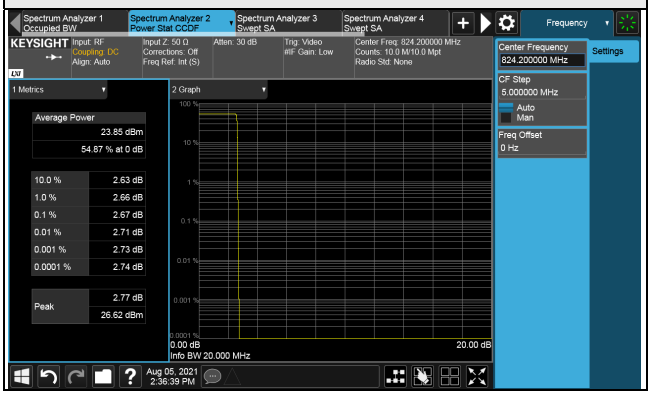
GSM



GPRS



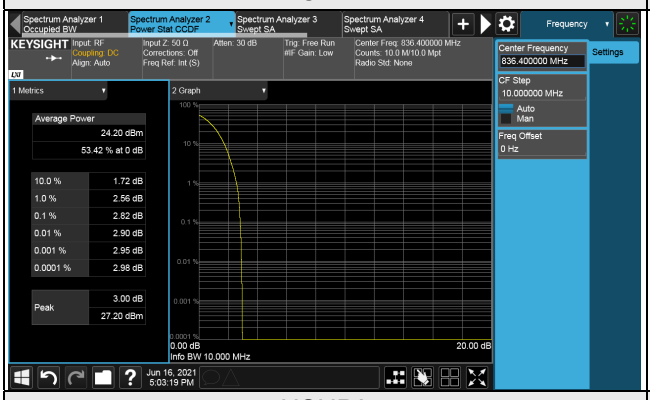
EDGE



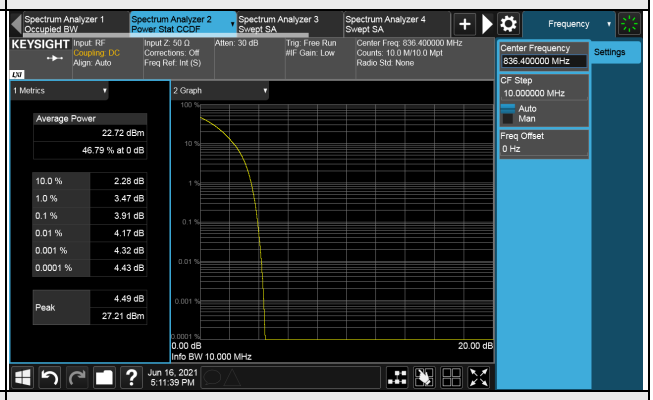
Channel	Frequency (MHz)	Peak To Average Ratio (dB)		
		WCDMA	HSDPA	HSUPA
4132	826.4	2.73	3.86	3.83
4182	836.4	2.82	3.91	3.94
4233	846.6	2.80	3.87	3.86

Spectrum Plot of Worst Value

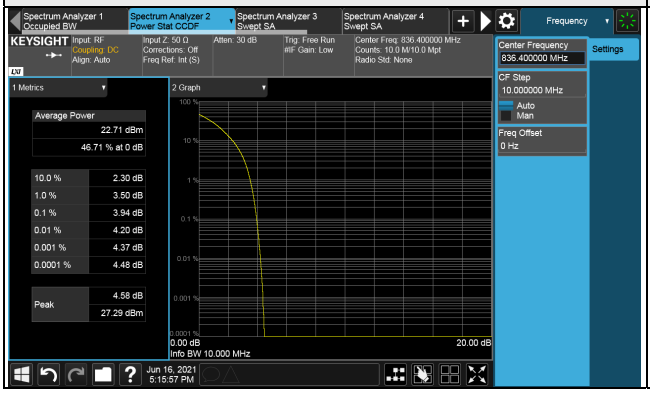
WCDMA



HSDPA



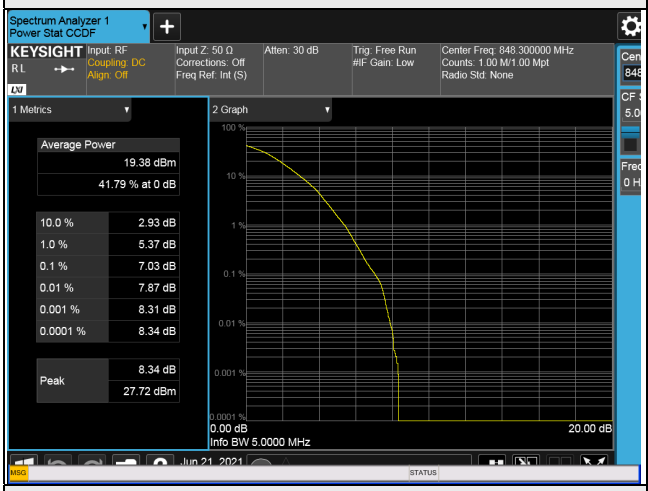
HSUPA



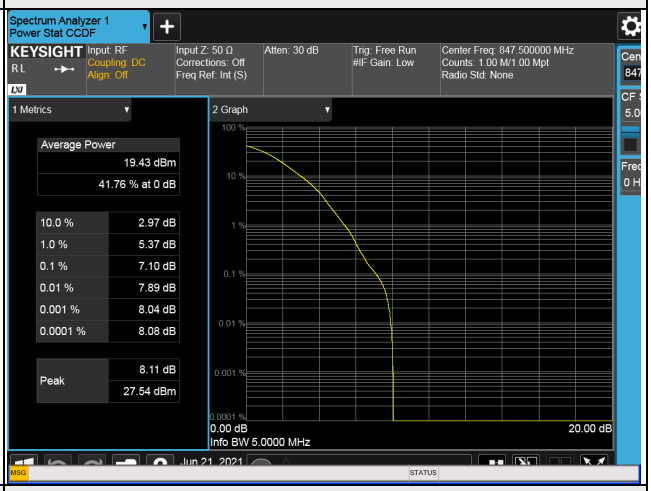
LTE Band 5, Channel Bandwidth 1.4MHz					
Channel	Frequency (MHz)	Peak To Average Ratio (dB)			
		QPSK	16QAM	64QAM	256QAM
20407	824.7	3.94	4.62	6.38	6.74
20525	836.5	3.87	5.59	6.76	6.81
20643	848.3	3.81	5.30	6.63	7.03
LTE Band 5, Channel Bandwidth 3MHz					
Channel	Frequency (MHz)	Peak To Average Ratio (dB)			
		QPSK	16QAM	64QAM	256QAM
20415	825.5	3.58	4.65	6.25	6.92
20525	836.5	3.59	5.37	6.74	6.61
20635	847.5	3.58	5.27	6.41	7.10
LTE Band 5, Channel Bandwidth 5MHz					
Channel	Frequency (MHz)	Peak To Average Ratio (dB)			
		QPSK	16QAM	64QAM	256QAM
20425	826.5	3.69	4.51	6.26	7.05
20525	836.5	3.62	5.34	6.58	6.91
20625	846.5	3.56	5.20	6.43	7.07
LTE Band 5, Channel Bandwidth 10MHz					
Channel	Frequency (MHz)	Peak To Average Ratio (dB)			
		QPSK	16QAM	64QAM	256QAM
20450	829.0	3.64	4.54	6.25	6.95
20525	836.5	3.56	4.81	6.14	6.92
20600	844.0	3.55	5.24	6.77	6.99

Spectrum Plot of Worst Value

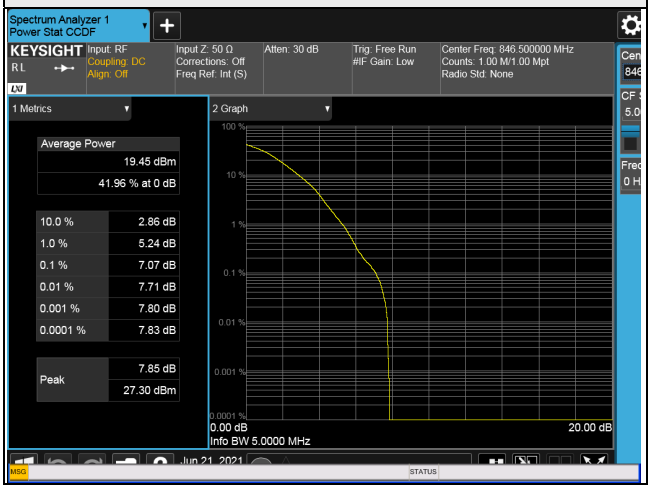
1.4MHz / 256QAM



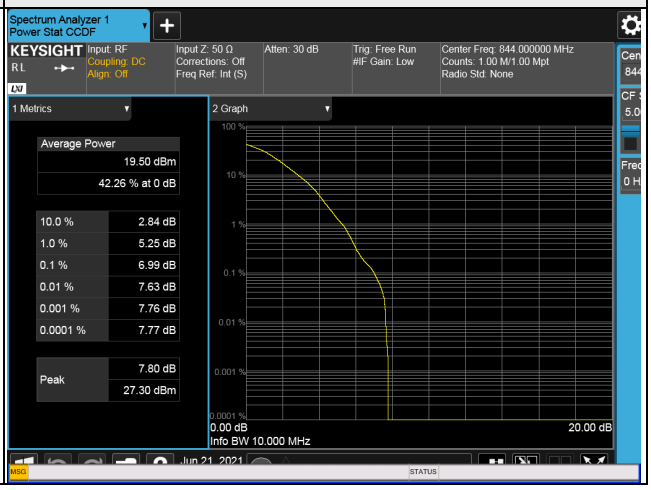
3MHz / 256QAM



5MHz / 256QAM



10MHz / 256QAM

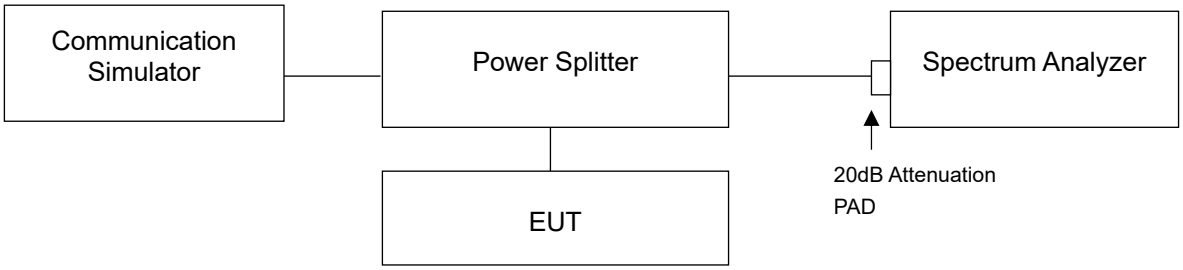


4.7 Conducted Spurious Emissions

4.7.1 Limits of Conducted Spurious Emissions Measurement

The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB. The emission limit equal to –13dBm.

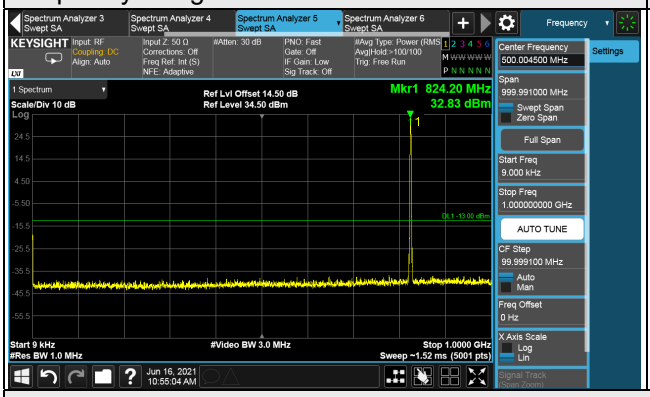
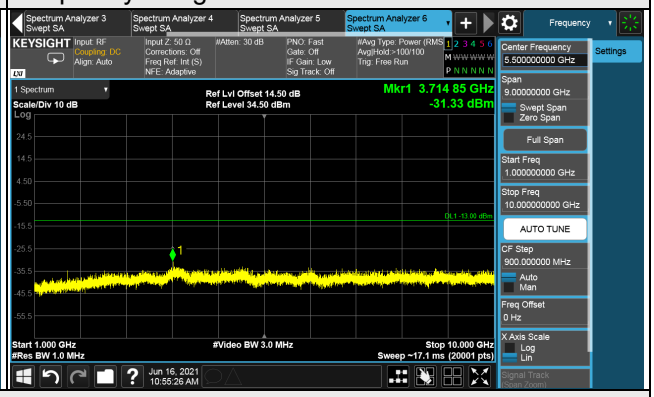
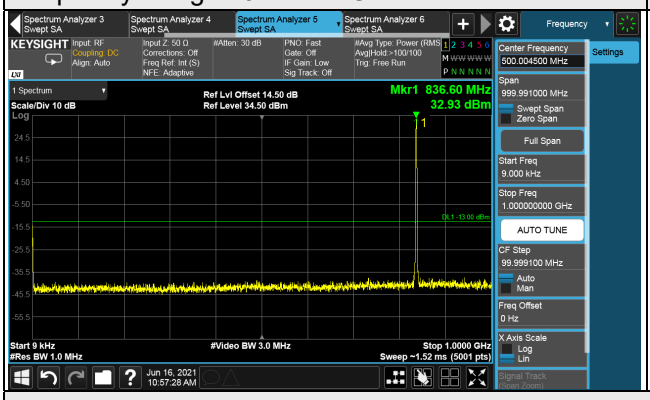
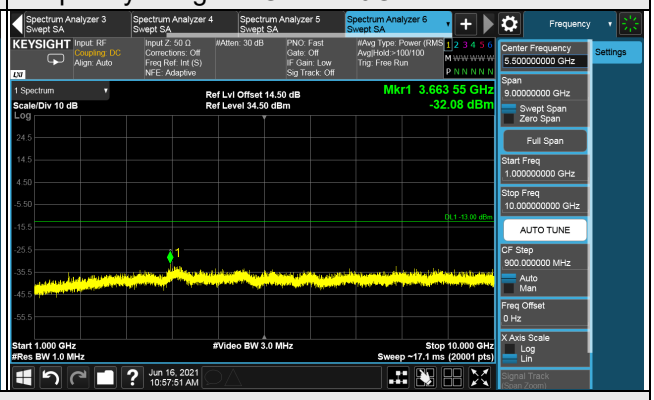
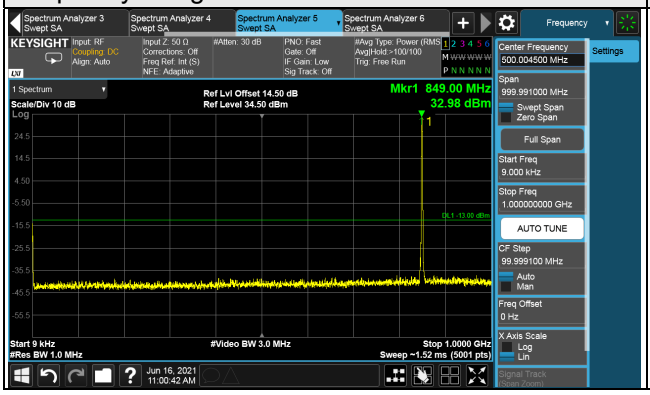
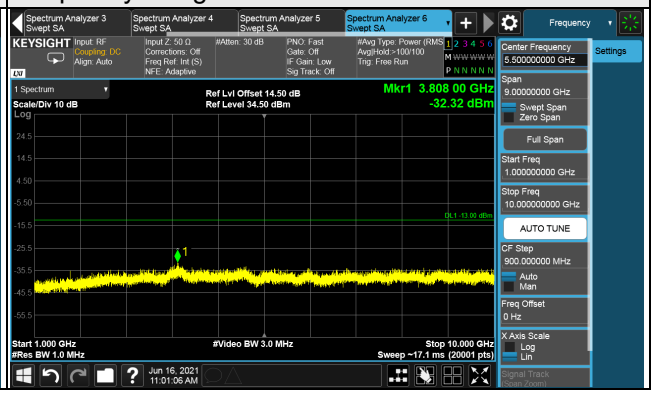
4.7.2 Test Setup



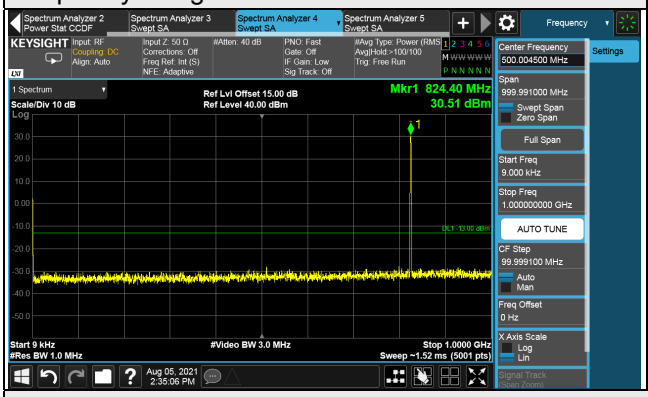
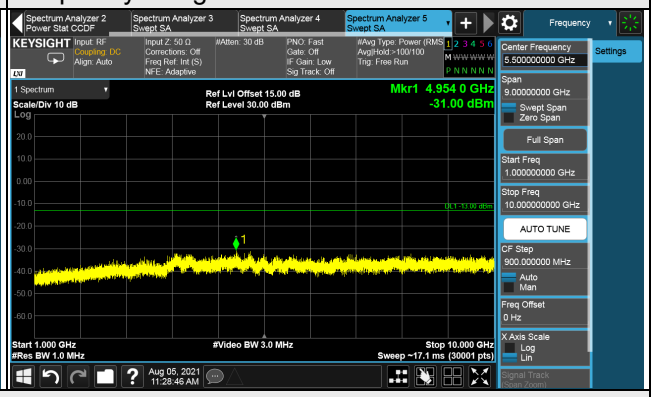
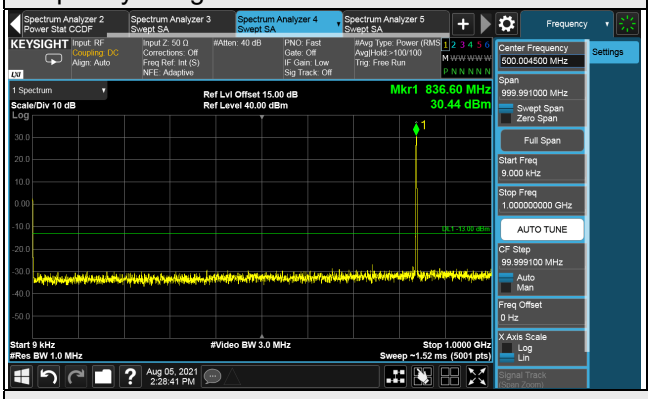
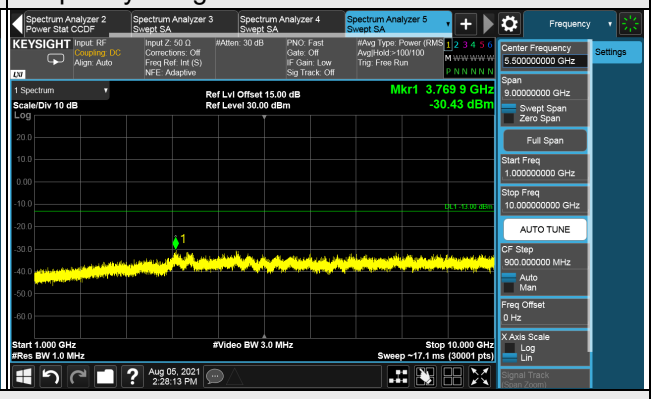
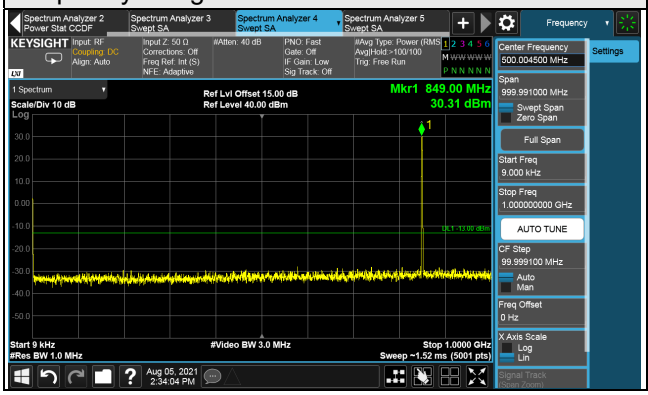
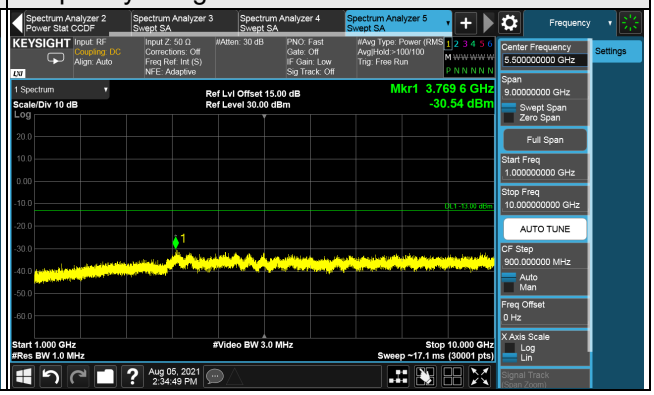
4.7.3 Test Procedure

a. The EUT makes a phone call to the communication simulator. All measurements were done at low, middle and high operational frequency range.
b. Measuring frequency range is from 9kHz to 10GHz. 20dB attenuation pad is connected with spectrum. RBW=1MHz and VBW=3MHz are used for GSM and WCDMA band conducted emission measurement.
c. Measuring frequency range is from 9kHz to 9GHz. 20dB attenuation pad is connected with spectrum. RBW=100kHz and VBW=300kHz for 9kHz to 1GHz and RBW=1MHz and VBW=3MHz for 1 GHz to 9GHz are used for LTE band conducted emission measurement.

4.7.4 Test Results

GSM	
Channel 128 (824.2MHz)	
Frequency Range : 9kHz ~ 1GHz	Frequency Range : 1GHz ~ 10GHz
	
Channel 189 (836.4MHz)	
Frequency Range : 9kHz ~ 1GHz	Frequency Range : 1GHz ~ 10GHz
	
Channel 251 (848.8MHz)	
Frequency Range : 9kHz ~ 1GHz	Frequency Range : 1GHz ~ 10GHz
	

*The 9 kHz tone is from the spectrum analyzer.

GPRS	
Channel 128 (824.2MHz)	
Frequency Range : 9kHz ~ 1GHz	Frequency Range : 1GHz ~ 10GHz
	
Channel 189 (836.4MHz)	
Frequency Range : 9kHz ~ 1GHz	Frequency Range : 1GHz ~ 10GHz
	
Channel 251 (848.8MHz)	
Frequency Range : 9kHz ~ 1GHz	Frequency Range : 1GHz ~ 10GHz
	

*The 9 kHz tone is from the spectrum analyzer.