FCC Test Report (Part 96)

Report No.:	RF200428E03-1
FCC ID:	I88LTE5388-S905
Test Model:	LTE5388-S905
Received Date:	Apr. 28, 2020
Test Date:	July 07 to 08, 2020
Issued Date:	July 29, 2020
Applicant:	Zyxel Communications Corporation
Address:	No.2 Industry East RD. IX, Hsinchu Science Park, Hsinchu 30075, Taiwan
Issued By:	Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch Hsin Chu Laboratory
Lab Address:	E-2, No.1, Li Hsin 1st Road, Hsinchu Science Park, Hsinchu City 300, Taiwan
Test Location :	E-2, No.1, Li Hsin 1st Road, Hsinchu Science Park, Hsinchu City 300, Taiwan
FCC Registration / Designation Number:	723255 / TW2022

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Release Control Record

Issue No.	Description	Date Issued
RF200428E03-1	Original release.	July 29, 2020

1 Certificate of Conformity

Product:	4G LTE-A Indoor Router
Brand:	ZYXEL
Test Model:	LTE5388-S905
Sample Status:	ENGINEERING SAMPLE
Applicant:	Zyxel Communications Corporation
Test Date:	July 07 to 08, 2020
Standards:	47 CFR FCC Part 96, Subpart E

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 : Vivian Huang , **Date:** July 29, 2020

Vivian Huang / Specialist

Approved by : , **Date:** July 29, 2020

Clark Lin / Technical Manager

2 Summary of Test Results

47 CFR FCC Part 96			
FCC Clause	Test Item	Result	Remarks
2.1046 96.41(b)	Maximum Peak Output Power and Maximum EIRP	Pass	Meet the requirement of limit.
2.1046 96.41(b)	Maximum Power Spectral Density	NA	Not Applicable.
2.1047 96.41(a)	Modulation characteristics	Pass	Meet the requirement.
96.41(g)	Peak to Average Ration	Pass	Meet the requirement of limit.
2.1049	Emission Bandwidth	Pass	Meet the requirement of limit.
2.1055	Frequency Stability	Pass	Meet the requirement of limit.
2.1051 96.41(e)	Conducted Spurious Emissions	Pass	Meet the requirement of limit.
2.1053 96.41(e)	Radiated Spurious Emissions	Pass	Meet the requirement of limit. Minimum passing margin is -9.94dB at 18075.5MHz.

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	3.1 dB
	30MHz ~ 1GHz	5.5 dB
Radiated Emissions above 1 GHz	1GHz ~ 18GHz	5.1 dB
	18GHz ~ 40GHz	5.3 dB

2.2 Modification Record

There were no modifications required for compliance.

3 General Information

3.1 General Description of EUT

Product	4G LTE-A Indoor Router	
Brand	ZYXEL	
Test Model	LTE5388-S905	
CPU Model No.	MT7621AT	
RF Chip Model No.	MT7603EN	
FW version	V1.00(ABVI.0)C0	
Status of EUT	ENGINEERING SAMPLE	
Power Supply Rating	Refer to Note 3	
Modulation Type	QPSK, 16QAM, 64QAM	
Operating Frequency	LTE Band 48	TX: 3552.5 ~ 3697.5 MHz
		RX: 3552.5 ~ 3697.5 MHz
Channel Bandwidth	5MHz, 10MHz, 15MHz & 20MHz	
Max. EIRP Power (Full Power)	Channel Bandwidth 5MHz	22.58 dBm
	Channel Bandwidth 10MHz	22.45 dBm
	Channel Bandwidth 15MHz	22.72 dBm
	Channel Bandwidth 20MHz	22.79 dBm
	Channel Bandwidth 20MHz+20MHz	22.75 dBm
Emission Designator	Channel Bandwidth 5MHz	QPSK: 4M47G7D
		16QAM: 4M46D7W
		64QAM: 4M46D7W
	Channel Bandwidth 10MHz	QPSK: 8M96G7D
		16QAM: 8M92D7W
		64QAM: 8M94D7W
	Channel Bandwidth 15MHz	QPSK: 13M4G7D
		16QAM: 13M4D7W
		64QAM: 13M4D7W
	Channel Bandwidth 20MHz	QPSK: 17M9G7D
		16QAM: 17M8D7W
		64QAM: 17M8D7W
	Channel Bandwidth 20MHz+20MHz	QPSK: 37M5G7D
		16QAM: 37M5D7W
		64QAM: 37M5D7W
Antenna Type	Refer to note as below	
Antenna Connector	Refer to note as below	
Accessory Device	Adapter x 1	

Note:

1. The EUT has two radios as following table:

Radio 1	Radio 2
WLAN (2.4GHz)	WWAN (LTE)

2. Simultaneously transmission condition.

Condition	Technology	
1	WLAN (2.4GHz)	WWAN (LTE)
Note: The emission of the simultaneous operation has been evaluated and no non-compliance was found.		

3. The EUT power needs to be supplied from one power adapter, the information is as below table:

Brand	Model No.	Spec.
DVE	DSA-24PFS-12 FUS 120200	Input: 100-240Vac, 0.8A, 50/60Hz Output: 12Vdc, 2.0A DC Output cable: Unshielded, 1.5m

4. The antennas provided to the EUT, please refer to the following table:

Antenna No.	Antenna Net Gain (dBi)	Frequency range	Antenna Type	Connector Type
WLAN_2G-0	3.6	2.4~2.4835GHz	Dipole	i-pex(MHF)
WLAN_2G-1	3.6	2.4~2.4835GHz	Dipole	i-pex(MHF)
WWAN_Main(TX&RX)	3.6	3550 MHz to 3700 MHz	Dipole	i-pex(MHF)
WWAN_DIV1(RX only)	3.8	3550 MHz to 3700 MHz	Dipole	i-pex(MHF)
WWAN_DIV2(RX only)	3.9	3550 MHz to 3700 MHz	Dipole	i-pex(MHF)
WWAN_DIV3(RX only)	3	3550 MHz to 3700 MHz	Dipole	i-pex(MHF)

5. This device is UE LTE Router that can support carrier aggregation (two carrier) uplink Intra-Band contiguous, specification following as below:

Uplink CA Configurations	Component carriers in order of increasing carrier frequency		Maximum Aggregated Bandwidth [MHz]
	Channel bandwidths for carrier-1 [MHz]	Channel bandwidths for carrier-2 [MHz]	
CA_48C	20	20	40

6. The above EUT information is declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications or user's manual.
7. 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.

3.1.1 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, 0 degree, Vertical +30 degree, Vertical -30 degree, 0 degree clockwise 45 degree and 0 degree counterclockwise 45 degree antenna ports and RB configs
The worst case was found when positioned on 0 degree and RB configs wors case is 1RB. Following channel(s) was (were) selected for the final test as listed below:

Test Item	Available Frequency (MHz)	Tested Frequency (MHz)	Channel Bandwidth	Modulation
EIRP	3552.5 to 3697.5	3552.5, 3625, 3697.5	5MHz	QPSK, 16QAM, 64QAM
	3555 to 3695	3555, 3625, 3695	10MHz	QPSK, 16QAM, 64QAM
	3557.5 to 3692.5	3557.5, 3625, 3692.5	15MHz	QPSK, 16QAM, 64QAM
	3560 to 3690	3560, 3625, 3690	20MHz	QPSK, 16QAM, 64QAM
Modulation Characteristics	3552.5 to 3697.5	3625	5MHz	QPSK, 16QAM, 64QAM
Frequency Stability	3552.5 to 3697.5	3625	5MHz	QPSK
	3555 to 3695	3625	10MHz	QPSK
	3557.5 to 3692.5	3625	15MHz	QPSK
	3560 to 3690	3625	20MHz	QPSK
Occupied Bandwidth	3552.5 to 3697.5	3552.5, 3625, 3697.5	5MHz	QPSK, 16QAM, 64QAM
	3555 to 3695	3555, 3625, 3695	10MHz	QPSK, 16QAM, 64QAM
	3557.5 to 3692.5	3557.5, 3625, 3692.5	15MHz	QPSK, 16QAM, 64QAM
	3560 to 3690	3560, 3625, 3690	20MHz	QPSK, 16QAM, 64QAM
Peak to Average Ratio	3552.5 to 3697.5	3552.5, 3625, 3697.5	5MHz	QPSK
	3555 to 3695	3555, 3625, 3695	10MHz	QPSK
	3557.5 to 3692.5	3557.5, 3625, 3692.5	15MHz	QPSK
	3560 to 3690	3560, 3625, 3690	20MHz	QPSK
Conducted Emission	3552.5 to 3697.5	3552.5, 3625, 3697.5	5MHz	QPSK
	3555 to 3695	3555, 3625, 3695	10MHz	QPSK
	3557.5 to 3692.5	3557.5, 3625, 3692.5	15MHz	QPSK
	3560 to 3690	3560, 3625, 3690	20MHz	QPSK
Radiated Emission	3552.5 to 3697.5	3552.5, 3625, 3697.5	5MHz	QPSK
	3555 to 3695	3555, 3625, 3695	10MHz	QPSK
	3557.5 to 3692.5	3557.5, 3625, 3692.5	15MHz	QPSK
	3560 to 3690	3560, 3625, 3690	20MHz	QPSK

NOTE: All supported modulation types were evaluated. The Worst case of QPSK was selected. Therefore, the Frequency Stability, Peak to Average Ration, Conducted Emission and Radiated Emission were presented under QPSK mode only.

LTE CA_48C

Test Item	Modulation	PCC			SCC		
		Channel Bandwidth	Tested Freq. (MHz)	Mode	Channel Bandwidth	Tested Freq. (MHz)	Mode
EIRP	QPSK, 16QAM, 64QAM	20MHz	3560	0RB / 0 RB offset	20MHz	3579.8	0RB / 0 RB offset
			3615.1			3634.9	
			3670.2			3690	
Frequency Stability	QPSK	20MHz	3560	-	20MHz	3579.8	-
Occupied Bandwidth	QPSK, 16QAM, 64QAM	20MHz	3560	100RB / 0 RB offset	20MHz	3579.8	100RB / 0 RB offset
Peak to Average Ratio	QPSK, 16QAM, 64QAM	20MHz	3560	100RB / 0 RB offset	20MHz	3579.8	100RB / 0 RB offset
Band Edge	QPSK	20MHz	3560	1RB / 0 RB offset	20MHz	3579.8	0RB / 0 RB offset
				0RB / 0 RB offset			1RB / 99 RB offset
				100RB / 0 RB offset			100RB / 0 RB offset
Conducted Emission	QPSK	20MHz	3560	0RB / 0 RB offset	20MHz	3579.8	0RB / 0 RB offset
Radiated Emission	QPSK	20MHz	3560	0RB / 0 RB offset	20MHz	3579.8	0RB / 0 RB offset

Note: This product supports multiple carriers in intra-band contiguous spectrum operation, therefore worst case of test mode and test configurations was selected.

Test Condition:

Test Item	Environmental Conditions	Input Power	Tested By
EIRP	24deg. C, 58%RH	120Vac, 60Hz	Allen Chuang
Modulation Characteristics	20deg. C, 76%RH	120Vac, 60Hz	Allen Chuang
Frequency Stability	20deg. C, 76%RH	120Vac, 60Hz	Allen Chuang
Occupied Bandwidth	20deg. C, 76%RH	120Vac, 60Hz	Allen Chuang
Peak to Average Ratio	20deg. C, 76%RH	120Vac, 60Hz	Allen Chuang
Conducted Emission	20deg. C, 76%RH	120Vac, 60Hz	Allen Chuang
Radiated Emission	22deg. C, 64%RH	120Vac, 60Hz	Nelson Teng

3.2 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.

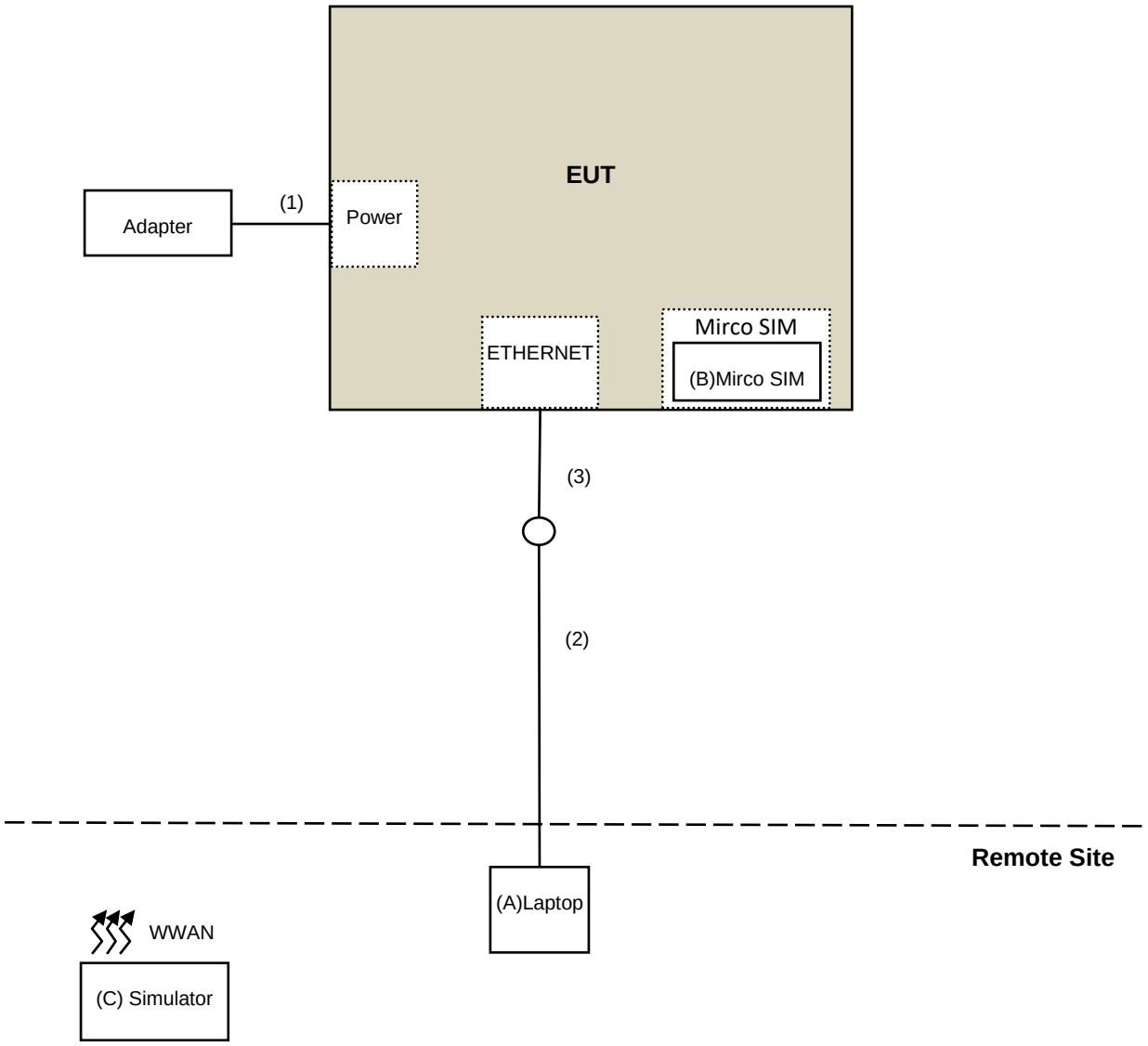
ID	Product	Brand	Model No.	Serial No.	FCC ID	Remarks
A.	Laptop	Lenovo	81A4	YD02YN76	NA	Provided by Lab
B.	Mirco SIM	KeysSight	E7515-10910	NA	NA	Provided by Lab
C.	Simulator	KeysSight	E7515A	MY55340229	NA	Provided by Lab

Note:

1. All power cords of the above support units are non-shielded (1.8m).

ID	Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1.	DC Cable	1	1.5	No	0	Supplied by client
2.	RJ-45 Cable	1	10	No	0	Provided by Lab
3.	RJ-45 Cable	1	1.8	No	0	Supplied by client

3.2.1 Configuration of System under Test



3.3 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 and references:

Test Standard:

47 CFR FCC Part 2

47 CFR FCC Part 96, Subpart E

ANSI/TIA/EIA-603-E 2016

ANSI 63.26-2015

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

References Test Guidance:

KDB 971168 D01 Power Meas License Digital Systems v03r01

KDB 940660 D01 Part 96 CBRS Eqpt v02

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

4 Test Types and Results

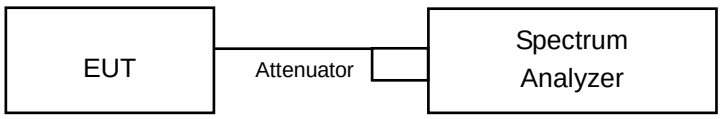
4.1 Maximum EIRP Measurement

4.1.1 Limits of Maximum EIRP Measurement

Device		Maximum EIRP (dBm/10 MHz)
☒	End User Device	23
☐	Category A CBSD	30
☐	Category B CBSD	47

4.1.2 Test Setup

Conducted / EIRP Power Measurement:



4.1.3 Test Instruments

For radiated emissions test:

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Test Receiver Agilent	N9038A	MY51210202	Dec. 13, 2019	Dec. 12, 2020
Pre-Amplifier EMCI	EMC001340	980142	May 25, 2020	May 24, 2021
Loop Antenna Electro-Metrics	EM-6879	264	Feb. 18, 2020	Feb. 17, 2021
RF Cable	NA	LOOPCAB-001	Jan. 08, 2020	Jan. 07, 2021
RF Cable	NA	LOOPCAB-002	Jan. 08, 2020	Jan. 07, 2021
Pre-Amplifier Mini-Circuits	ZFL-1000VH2B	AMP-ZFL-01	Oct. 23, 2019	Oct. 22, 2020
Trilog Broadband Antenna SCHWARZBECK	VULB 9168	9168-406	Nov. 11, 2019	Nov. 10, 2020
RF Cable	8D	966-4-1	Mar. 18, 2020	Mar. 17, 2021
RF Cable	8D	966-4-2	Mar. 18, 2020	Mar. 17, 2021
RF Cable	8D	966-4-3	Mar. 18, 2020	Mar. 17, 2021
Fixed attenuator Mini-Circuits	UNAT-5+	PAD-3m-4-01	Sep. 26, 2019	Sep. 25, 2020
Horn_Antenna SCHWARZBECK	BBHA 9120D	9120D-783	Nov. 24, 2019	Nov. 23, 2020
Pre-Amplifier EMCI	EMC12630SE	980385	Aug. 15, 2019	Aug. 14, 2020
RF Cable	EMC104-SM-SM-1200	160923	Jan. 15, 2020	Jan. 14, 2021
RF Cable	EMC104-SM-SM-2000	180502	Apr. 29, 2020	Apr. 28, 2021
RF Cable	EMC104-SM-SM-6000	180418	Apr. 29, 2020	Apr. 28, 2021
Pre-Amplifier EMCI	EMC184045SE	980387	Jan. 15, 2020	Jan. 14, 2021
Horn_Antenna SCHWARZBECK	BBHA 9170	BBHA9170519	Nov. 24, 2019	Nov. 23, 2020
RF Cable	EMC102-KM-KM-1200	160924	Jan. 15, 2020	Jan. 14, 2021
RF Cable	EMC-KM-KM-4000	200214	Mar. 11, 2020	Mar. 10, 2021
Software	ADT_Radiated_V8.7.08	NA	NA	NA
Boresight Antenna Tower & Turn Table Max-Full	MF-7802BS	MF780208530	NA	NA

Note:

The calibration interval of the above test instruments is 12 months and the calibrations are traceable to

1. NML/ROC and NIST/USA.
2. The test was performed in 966 Chamber No. 4.
3. Tested Date: July 08, 2020

For other test items:

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Spectrum Analyzer Keysight	N9030A	MY54490679	July 17, 2019	July 16, 2020
AC Power Source Extech Electronics	6205	1440452	NA	NA
Temperature & Humidity Chamber Giant Force	GTH-150-40-SP-AR	MAA0812-008	Jan. 16, 2020	Jan. 15, 2021
Voltage Meter FLUKE	179	89610322	Sep. 25, 2019	Sep. 24, 2020
Mech Switch Absorptive Mini-Circuits	MSP4TA-18+	0140	Feb. 10, 2020	Feb. 09, 2021
FXD ATTEN Mini-Circuits	BW-S3W2+	MN71981	Feb. 10, 2020	Feb. 09, 2021
Software	ADT_RF Test Software V6.6.5.4	NA	NA	NA

NOTE: 1. The test was performed in Oven room 2.
2. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
3. Tested Date: July 07, 2020

4.1.4 Test Procedures

1. Connect the DUT transmitter output to the spectrum analyzer via coaxial cable while ensuring proper impedance matching.
2. Set span to at least 2 times the OBW.
3. Set RBW = 1-5% of the OBW, not to exceed 1 MHz.
4. Set VBW ≥ 3 × RBW.
5. Set number of points in sweep ≥ 2 × span / RBW.
6. Sweep time = auto-couple.
7. Detector = RMS (power averaging).
8. If the EUT can be configured to transmit continuously (i.e., burst duty cycle ≥ 98%), then set the trigger to free run.
9. If the EUT cannot be configured to transmit continuously (i.e., burst duty cycle < 98 %), then use a sweep trigger with the level set to enable triggering only on full power bursts and configure the EUT to transmit at full power for the entire duration of each sweep. Ensure that the sweep time is less than or equal to the transmission burst duration.
10. Trace average at least 100 traces in power averaging (i.e., RMS) mode.
11. For conducted output power, compute the power by integrating the spectrum across the 10 MHz of the signal using the instrument's band power measurement function. If the instrument does not have a band power function, then sum the spectrum levels (in linear power units) at intervals equal to the RBW extending across the 10MHz of the spectrum.
12. For full power measurement, compute the power by integrating the spectrum across the EBW of the signal using the instrument's band power measurement function. If the instrument does not have a band power function, then sum the spectrum levels (in linear power units) at intervals equal to the RBW extending across the EBW of the spectrum.
13. EIRP = Conducted Power + Antenna Gain

4.1.5 Deviation from Test Standard

No deviation.

4.1.6 EUT Operating Conditions

The software provided by client to enable the EUT under transmission condition continuously at lowest, middle and highest channel frequencies individually.

4.1.7 Test Results

CONDUCTED OUTPUT POWER (dBm)

Single Carrier

Band / BW	RB Size	RB Offset	QPSK			3GPP MPR (dB)	16QAM			3GPP MPR (dB)	64QAM			3GPP MPR (dB)
			Low CH	Mid CH	High CH		Low CH	Mid CH	High CH		Low CH	Mid CH	High CH	
			55265	55990	56715		55265	55990	56715		55265	55990	56715	
			3552.5	3625	3697.5		3552.5	3625	3697.5		3552.5	3625	3697.5	
			MHz	MHz	MHz		MHz	MHz	MHz		MHz	MHz	MHz	
48 / 5M	1	0	18.84	18.98	18.76	0	18.78	18.79	18.65	1	18.58	18.66	18.54	2
	1	12	18.79	18.87	18.69	0	18.60	18.67	18.58	1	18.54	18.57	18.40	2
	1	24	18.71	18.80	18.72	0	18.59	18.68	18.56	1	18.46	18.56	18.44	2
	12	0	18.59	18.55	18.46	1	18.43	18.40	18.42	2	18.46	18.43	18.39	3
	12	6	18.49	18.51	18.51	1	18.35	18.42	18.44	2	18.34	18.39	18.36	3
	12	13	18.43	18.57	18.52	1	18.29	18.39	18.38	2	18.32	18.37	18.26	3
	25	0	18.58	18.60	18.55	1	18.47	18.49	18.45	2	18.45	18.50	18.41	3

Band / BW	RB Size	RB Offset	QPSK			3GPP MPR (dB)	16QAM			3GPP MPR (dB)	64QAM			3GPP MPR (dB)
			Low CH	Mid CH	High CH		Low CH	Mid CH	High CH		Low CH	Mid CH	High CH	
			55290	55990	56690		55290	55990	56690		55290	55990	56690	
			3555	3625	3695		3555	3625	3695		3555	3625	3695	
			MHz	MHz	MHz		MHz	MHz	MHz		MHz	MHz	MHz	
48 / 10M	1	0	18.74	18.85	18.69	0	18.52	18.67	18.59	1	18.50	18.58	18.53	2
	1	24	18.61	18.73	18.57	0	18.48	18.57	18.53	1	18.46	18.47	18.42	2
	1	49	18.58	18.75	18.51	0	18.49	18.59	18.50	1	18.43	18.54	18.39	2
	25	0	18.46	18.53	18.43	1	18.33	18.40	18.38	2	18.32	18.35	18.34	3
	25	12	18.37	18.46	18.39	1	18.35	18.37	18.34	2	18.30	18.31	18.36	3
	25	25	18.29	18.41	18.36	1	18.25	18.33	18.32	2	18.21	18.26	18.24	3
	50	0	18.51	18.60	18.50	1	18.47	18.43	18.40	2	18.35	18.40	18.38	3

Band / BW	RB Size	RB Offset	QPSK			3GPP MPR (dB)	16QAM			3GPP MPR (dB)	64QAM			3GPP MPR (dB)
			Low CH	Mid CH	High CH		Low CH	Mid CH	High CH		Low CH	Mid CH	High CH	
			55315	55990	56665		55315	55990	56665		55315	55990	56665	
			3557.5	3625	3692.5		3557.5	3625	3692.5		3557.5	3625	3692.5	
			MHz	MHz	MHz		MHz	MHz	MHz		MHz	MHz	MHz	
48 / 15M	1	0	19.07	19.12	19.01	0	18.78	18.84	18.75	1	18.71	18.80	18.73	2
	1	37	19.00	19.04	18.96	0	18.71	18.75	18.66	1	18.65	18.75	18.66	2
	1	74	18.92	18.94	18.88	0	18.61	18.66	18.60	1	18.55	18.67	18.60	2
	36	0	18.52	18.56	18.52	1	18.36	18.43	18.36	2	18.28	18.32	18.26	3
	36	19	18.53	18.53	18.43	1	18.35	18.40	18.33	2	18.30	18.32	18.33	3
	36	39	18.56	18.52	18.45	1	18.33	18.34	18.30	2	18.31	18.37	18.29	3
	75	0	18.60	18.63	18.64	1	18.40	18.43	18.46	2	18.38	18.40	18.35	3

Band / BW	RB Size	RB Offset	QPSK			3GPP MPR (dB)	16QAM			3GPP MPR (dB)	64QAM			3GPP MPR (dB)
			Low CH	Mid CH	High CH		Low CH	Mid CH	High CH		Low CH	Mid CH	High CH	
			55340	55990	56640		55340	55990	56640		55340	55990	56640	
			3560	3625	3690		3560	3625	3690		3560	3625	3690	
			MHz	MHz	MHz		MHz	MHz	MHz		MHz	MHz	MHz	
48 / 20M	1	0	19.00	19.19	19.09	0	18.86	18.90	18.84	1	18.82	18.92	18.83	2
	1	50	18.96	19.12	19.05	0	18.79	18.80	18.77	1	18.72	18.87	18.74	2
	1	99	18.95	19.06	19.03	0	18.74	18.72	18.72	1	18.64	18.81	18.65	2
	50	0	18.89	19.01	18.95	1	18.50	18.60	18.53	2	18.50	18.53	18.43	3
	50	25	18.55	18.53	18.55	1	18.43	18.56	18.43	2	18.43	18.54	18.38	3
	50	50	18.56	18.59	18.60	1	18.40	18.53	18.47	2	18.47	18.56	18.30	3
	100	0	18.68	18.67	18.60	1	18.53	18.62	18.53	2	18.52	18.60	18.49	3

CA Contiguous

LTE CA_48C (PCC/SCC: 20M+20M)

Intra Band-Contiguous CA															
PCC							SCC							MPR	
Band	BW (MHz)	Modulation	RB Size	RB Offset	UL Channel	UL Frequency (MHz)	Band	BW (MHz)	Modulation	RB Size	RB Offset	UL Channel	UL Frequency (MHz)	MPR Level (dB)	Tx Total Power Level (dB)
48	20	QPSK	0	0	55340	3560	48	20	QPSK	1	99	55538	3579.8	0	19.15
			1	0						0	0			0	19.1
			100	0						0	0			0-1	19.02
			100	0						100	0			0-2	18.98
			1	0						1	99			0-8.5	14.3
			1	0						1	0			0-4.5	18.92
			1	99						1	0			0	19.08
			100	0						1	99			0-3.5	19.03
48	20	QPSK	0	0	55891	3615.1	48	20	QPSK	1	99	56089	3634.9	0	19.1
			1	0						0	0			0	19.05
			100	0						0	0			0-1	19
			100	0						100	0			0-2	18.99
			1	0						1	99			0-8.5	14.56
			1	0						1	0			0-4.5	18.9
			1	99						1	0			0	18.98
			100	0						1	99			0-3.5	19.09
48	20	QPSK	0	0	56442	3670.2	48	20	QPSK	1	99	56640	3690	0	19.07
			1	0						0	0			0	18.98
			100	0						0	0			0-1	18.92
			100	0						100	0			0-2	19
			1	0						1	99			0-8.5	14.76
			1	0						1	0			0-4.5	19.02
			1	99						1	0			0	18.97
			100	0						1	99			0-3.5	19.04

Intra Band-Contiguous CA															
PCC							SCC							MPR	
Band	BW (MHz)	Modulation	RB Size	RB Offset	UL Channel	UL Frequency (MHz)	Band	BW (MHz)	Modulation	RB Size	RB Offset	UL Channel	UL Frequency (MHz)	MPR Level (dB)	Tx Total Power Level (dB)
48	20	16QAM	0	0	55340	3560	48	20	16QAM	1	99	55538	3579.8	0	18.94
			1	0						0	0			0	18.89
			100	0						0	0			0-1	18.8
			100	0						100	0			0-2	18.77
			1	0						1	99			0-8.5	14.22
			1	0						1	0			0-4.5	18.68
			1	99						1	0			0	18.89
			100	0						1	99			0-3.5	18.77
48	20	16QAM	0	0	55891	3615.1	48	20	16QAM	1	99	56089	3634.9	0	18.9
			1	0						0	0			0	18.76
			100	0						0	0			0-1	18.8
			100	0						100	0			0-2	18.77
			1	0						1	99			0-8.5	14.29
			1	0						1	0			0-4.5	18.6
			1	99						1	0			0	18.78
			100	0						1	99			0-3.5	18.83
48	20	16QAM	0	0	56442	3670.2	48	20	16QAM	1	99	56640	3690	0	18.88
			1	0						0	0			0	18.68
			100	0						0	0			0-1	18.68
			100	0						100	0			0-2	18.76
			1	0						1	99			0-8.5	14.48
			1	0						1	0			0-4.5	18.84
			1	99						1	0			0	18.7
			100	0						1	99			0-3.5	18.76

Intra Band-Contiguous CA															
PCC							SCC							MPR	
Band	BW (MHz)	Modulation	RB Size	RB Offset	UL Channel	UL Frequency (MHz)	Band	BW (MHz)	Modulation	RB Size	RB Offset	UL Channel	UL Frequency (MHz)	MPR Level (dB)	Tx Total Power Level (dB)
48	20	64QAM	0	0	55340	3560	48	20	64QAM	1	99	55538	3579.8	0	18.85
			1	0						0	0			0	18.79
			100	0						0	0			0-1	18.8
			100	0						100	0			0-2	18.77
			1	0						1	99			0-8.5	14.02
			1	0						1	0			0-4.5	18.68
			1	99						1	0			0	18.89
			100	0						1	99			0-3.5	18.77
48	20	64QAM	0	0	55891	3615.1	48	20	64QAM	1	99	56089	3634.9	0	18.82
			1	0						0	0			0	18.76
			100	0						0	0			0-1	18.8
			100	0						100	0			0-2	18.77
			1	0						1	99			0-8.5	14.29
			1	0						1	0			0-4.5	18.6
			1	99						1	0			0	18.78
			100	0						1	99			0-3.5	18.83
48	20	64QAM	0	0	56442	3670.2	48	20	64QAM	1	99	56640	3690	0	18.79
			1	0						0	0			0	18.68
			100	0						0	0			0-1	18.68
			100	0						100	0			0-2	18.76
			1	0						1	99			0-8.5	14.48
			1	0						1	0			0-4.5	18.84
			1	99						1	0			0	18.7
			100	0						1	99			0-3.5	18.76

Full Power (dBm)

Single Carrier

Channel	Freq. (MHz)	5MHz		
		QPSK		
		Conducted Total Average Power (dBm)	Gain(dBi)	3.6
			EIRP	
Low	3552.5	18.84	22.44	
Middle	3625	18.98	22.58	
High	3697.5	18.76	22.36	

Channel	Freq. (MHz)	5MHz		
		16QAM		
		Conducted Total Average Power (dBm)	Gain(dBi)	3.6
			EIRP	
Low	3552.5	18.78	22.38	
Middle	3625	18.79	22.39	
High	3697.5	18.65	22.25	

Channel	Freq. (MHz)	5MHz		
		64QAM		
		Conducted Total Average Power (dBm)	Gain(dBi)	3.6
			EIRP	
Low	3552.5	18.58	22.18	
Middle	3625	18.66	22.26	
High	3697.5	18.54	22.14	

Channel	Freq. (MHz)	10MHz		
		QPSK		
		Conducted Total Average Power (dBm)	Gain(dBi)	3.6
			EIRP	
Low	3555	18.74	22.34	
Middle	3625	18.85	22.45	
High	3695	18.69	22.29	

Channel	Freq. (MHz)	10MHz		
		16QAM		
		Conducted Total Average Power (dBm)	Gain(dBi)	3.6
			EIRP	
Low	3555	18.52	22.12	
Middle	3625	18.67	22.27	
High	3695	18.59	22.19	

Channel	Freq. (MHz)	10MHz		
		64QAM		
		Conducted Total Average Power (dBm)	Gain(dBi)	3.6
			EIRP	
Low	3555	18.50	22.10	
Middle	3625	18.58	22.18	
High	3695	18.53	22.13	

Channel	Freq. (MHz)	15MHz		
		QPSK		
		Conducted Total Average Power (dBm)	Gain(dBi)	3.6
			EIRP	
Low	3557.5	19.07	22.67	
Middle	3625	19.12	22.72	
High	3692.5	19.01	22.61	

Channel	Freq. (MHz)	15MHz		
		16QAM		
		Conducted Total Average Power (dBm)	Gain(dBi)	3.6
			EIRP	
Low	3557.5	18.78	22.38	
Middle	3625	18.84	22.44	
High	3692.5	18.75	22.35	

Channel	Freq. (MHz)	15MHz		
		64QAM		
		Conducted Total Average Power (dBm)	Gain(dBi)	3.6
			EIRP	
Low	3557.5	18.71	22.31	
Middle	3625	18.80	22.40	
High	3692.5	18.73	22.33	

Channel	Freq. (MHz)	20MHz		
		QPSK		
		Conducted Total Average Power (dBm)	Gain(dBi)	3.6
			EIRP	
Low	3560	19.00	22.60	
Middle	3625	19.19	22.79	
High	3690	19.09	22.69	

Channel	Freq. (MHz)	20MHz		
		16QAM		
		Conducted Total Average Power (dBm)	Gain(dBi)	3.6
			EIRP	
Low	3560	18.86	22.46	
Middle	3625	18.90	22.50	
High	3690	18.84	22.44	

Channel	Freq. (MHz)	20MHz		
		64QAM		
		Conducted Total Average Power (dBm)	Gain(dBi)	3.6
			EIRP	
Low	3560	18.82	22.42	
Middle	3625	18.92	22.52	
High	3690	18.83	22.43	

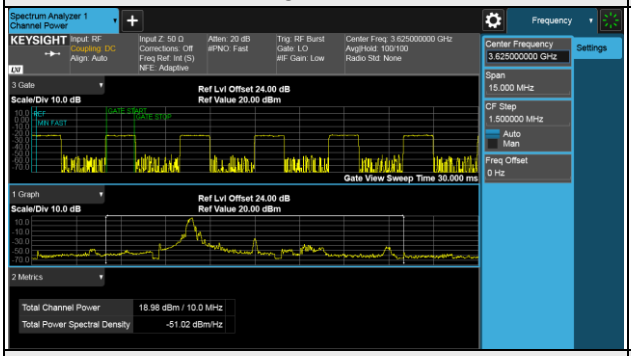
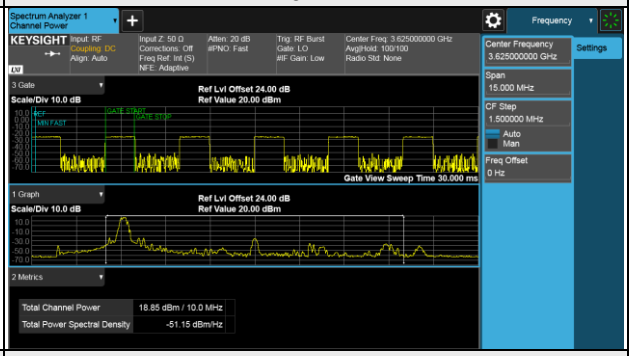
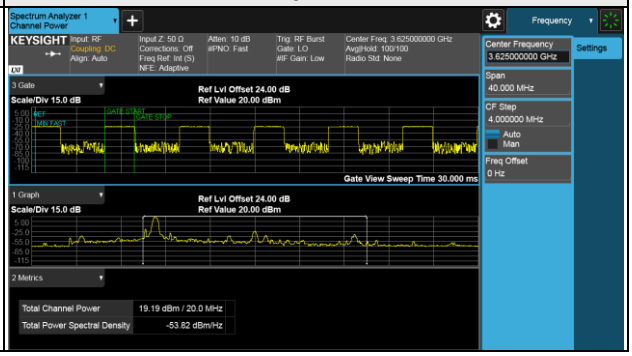
CA Contiguous

Channel	Freq. (MHz)	20MHz+20MHz		
		QPSK		
		Conducted Total Average Power (dBm)	Gain(dBi)	3.6
			EIRP	
Low	3560+3579.8	19.15	22.75	
Middle	3615.1+3634.9	19.10	22.70	
High	3670.2+3690	19.07	22.67	

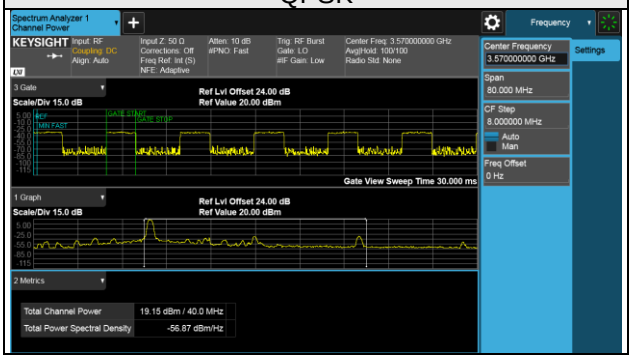
Channel	Freq. (MHz)	20MHz+20MHz		
		16QAM		
		Conducted Total Average Power (dBm)	Gain(dBi)	3.6
			EIRP	
Low	3560+3579.8	18.94	22.54	
Middle	3615.1+3634.9	18.90	22.50	
High	3670.2+3690	18.88	22.48	

Channel	Freq. (MHz)	20MHz+20MHz		
		64QAM		
		Conducted Total Average Power (dBm)	Gain(dBi)	3.6
			EIRP	
Low	3560+3579.8	18.89	22.49	
Middle	3615.1+3634.9	18.83	22.43	
High	3670.2+3690	18.84	22.44	

Single Carrier

Spectrum Plot of EIRP	
5MHz	10MHz
	
15MHz	20MHz
	

CA Contiguous

Spectrum Plot of EIRP
QPSK


EIRP POWER

Single Carrier

Channel	Freq. (MHz)	5MHz			Limit (dBm/10MHz)	Pass /Fail
		QPSK				
		Conducted Average Power (dBm/10MHz)	Gain(dBi)	3.6		
			EIRP		Maximum	
Low	3552.5	18.84	22.44		23.0	Pass
Middle	3625	18.98	22.58		23.0	Pass
High	3697.5	18.76	22.36		23.0	Pass

Channel	Freq. (MHz)	5MHz			Limit (dBm/10MHz)	Pass /Fail
		16QAM				
		Conducted Average Power (dBm/10MHz)	Gain(dBi)	3.6		
			EIRP		Maximum	
Low	3552.5	18.78	22.38		23.0	Pass
Middle	3625	18.79	22.39		23.0	Pass
High	3697.5	18.65	22.25		23.0	Pass

Channel	Freq. (MHz)	5MHz			Limit (dBm/10MHz)	Pass /Fail
		64QAM				
		Conducted Average Power (dBm/10MHz)	Gain(dBi)	3.6		
			EIRP		Maximum	
Low	3552.5	18.58	22.18		23.0	Pass
Middle	3625	18.66	22.26		23.0	Pass
High	3697.5	18.54	22.14		23.0	Pass

Channel	Freq. (MHz)	10MHz			Limit (dBm/10MHz)	Pass /Fail
		QPSK				
		Conducted Average Power (dBm/10MHz)	Gain(dBi)	3.6		
			EIRP		Maximum	
Low	3555	18.74	22.34		23.0	Pass
Middle	3625	18.85	22.45		23.0	Pass
High	3695	18.69	22.29		23.0	Pass

Channel	Freq. (MHz)	10MHz			Limit (dBm/10MHz)	Pass /Fail
		16QAM				
		Conducted Average Power (dBm/10MHz)	Gain(dBi)	3.6		
			EIRP		Maximum	
Low	3555	18.52	22.12		23.0	Pass
Middle	3625	18.67	22.27		23.0	Pass
High	3695	18.59	22.19		23.0	Pass

Channel	Freq. (MHz)	10MHz			Limit (dBm/10MHz)	Pass /Fail
		64QAM				
		Conducted Average Power (dBm/10MHz)	Gain(dBi)	3.6		
			EIRP		Maximum	
Low	3555	18.50	22.10		23.0	Pass
Middle	3625	18.58	22.18		23.0	Pass
High	3695	18.53	22.13		23.0	Pass

Channel	Freq. (MHz)	15MHz			Limit (dBm/10MHz)	Pass /Fail
		QPSK				
		Conducted Average Power (dBm/10MHz)	Gain(dBi)	3.6		
			EIRP		Maximum	
Low	3557.5	18.73	22.33		23.0	Pass
Middle	3625	18.91	22.51		23.0	Pass
High	3692.5	18.75	22.35		23.0	Pass

Channel	Freq. (MHz)	15MHz			Limit (dBm/10MHz)	Pass /Fail
		16QAM				
		Conducted Average Power (dBm/10MHz)	Gain(dBi)	3.6		
			EIRP		Maximum	
Low	3557.5	18.50	22.10		23.0	Pass
Middle	3625	18.63	22.23		23.0	Pass
High	3692.5	18.57	22.17		23.0	Pass

Channel	Freq. (MHz)	15MHz			Limit (dBm/10MHz)	Pass /Fail
		64QAM				
		Conducted Average Power (dBm/10MHz)	Gain(dBi)	3.6		
			EIRP		Maximum	
Low	3557.5	18.56	22.16		23.0	Pass
Middle	3625	18.56	22.16		23.0	Pass
High	3692.5	18.49	22.09		23.0	Pass

Channel	Freq. (MHz)	20MHz			Limit (dBm/10MHz)	Pass /Fail
		QPSK				
		Conducted Average Power (dBm/10MHz)	Gain(dBi)	3.6		
			EIRP		Maximum	
Low	3560	18.87	22.47		23.0	Pass
Middle	3625	18.96	22.56		23.0	Pass
High	3690	18.90	22.50		23.0	Pass

Channel	Freq. (MHz)	20MHz			Limit (dBm/10MHz)	Pass /Fail
		16QAM				
		Conducted Average Power (dBm/10MHz)	Gain(dBi)	3.6		
			EIRP		Maximum	
Low	3560	18.69	22.29		23.0	Pass
Middle	3625	18.80	22.40		23.0	Pass
High	3690	18.70	22.30		23.0	Pass

Channel	Freq. (MHz)	20MHz			Limit (dBm/10MHz)	Pass /Fail
		64QAM				
		Conducted Average Power (dBm/10MHz)	Gain(dBi)	3.6		
			EIRP		Maximum	
Low	3560	18.64	22.24		23.0	Pass
Middle	3625	18.79	22.39		23.0	Pass
High	3690	18.61	22.21		23.0	Pass

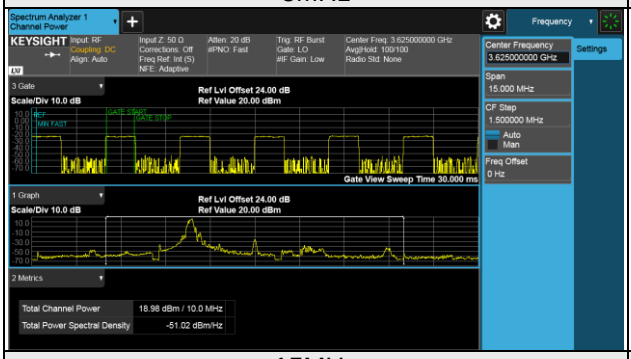
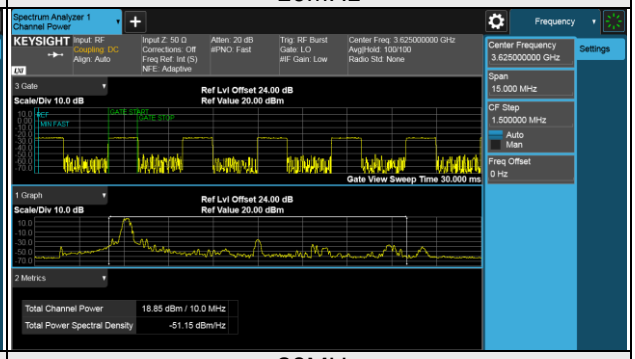
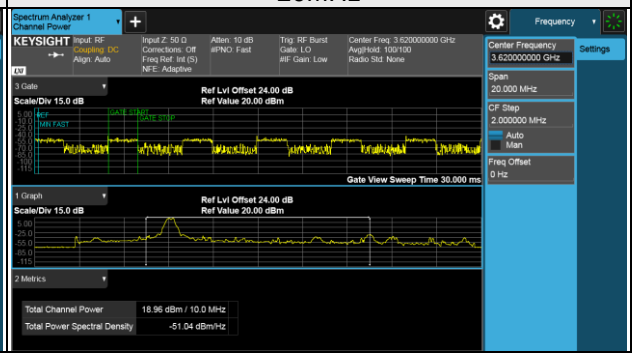
CA Contiguous

Channel	Freq. (MHz)	20MHz+20MHz			Limit (dBm/10MHz)	Pass /Fail
		QPSK				
		Conducted Average Power (dBm/10MHz)	Gain(dBi)	3.6		
			EIRP		Maximum	
Low	3560+3579.8	18.87	22.47		23.0	Pass
Middle	3615.1+3634.9	18.81	22.41		23.0	Pass
High	3670.2+3690	18.77	22.37		23.0	Pass

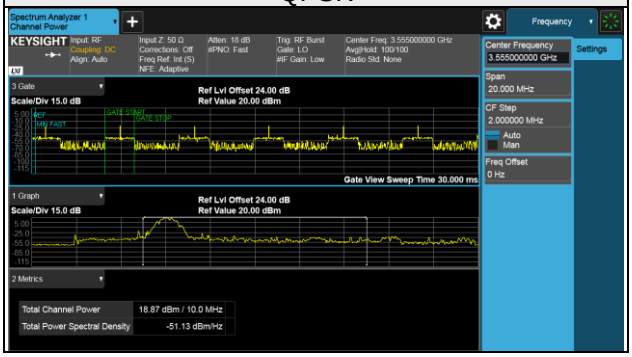
Channel	Freq. (MHz)	20MHz+20MHz			Limit (dBm/10MHz)	Pass /Fail
		16QAM				
		Conducted Average Power (dBm/10MHz)	Gain(dBi)	3.6		
			EIRP		Maximum	
Low	3560+3579.8	18.75	22.35		23.0	Pass
Middle	3615.1+3634.9	18.70	22.30		23.0	Pass
High	3670.2+3690	18.62	22.22		23.0	Pass

Channel	Freq. (MHz)	20MHz+20MHz			Limit (dBm/10MHz)	Pass /Fail
		64QAM				
		Conducted Average Power (dBm/10MHz)	Gain(dBi)	3.6		
			EIRP		Maximum	
Low	3560+3579.8	18.64	22.24		23.0	Pass
Middle	3615.1+3634.9	18.60	22.20		23.0	Pass
High	3670.2+3690	18.55	22.15		23.0	Pass

Single Carrier

Spectrum Plot of EIRP	
5MHz	10MHz
	
15MHz	20MHz
	

CA Contiguous

Spectrum Plot of EIRP
QPSK


Modulation Characteristics Measurement

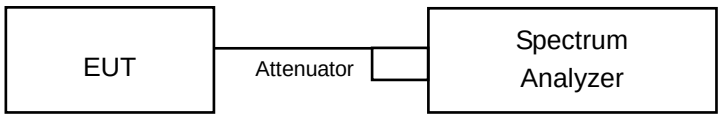
4.1.8 Limits of Modulation Characteristics

N/A

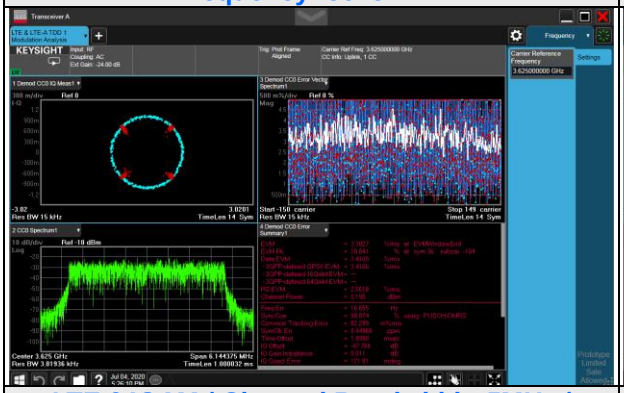
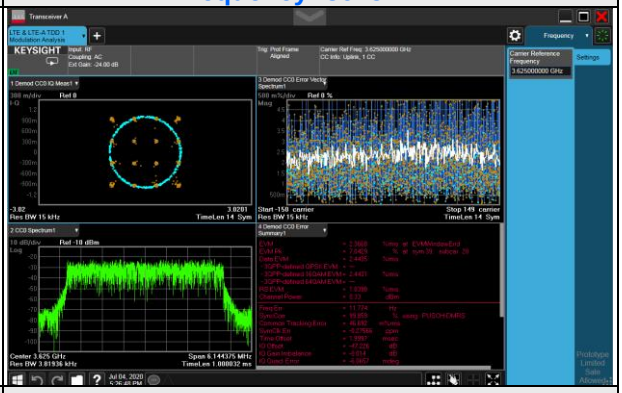
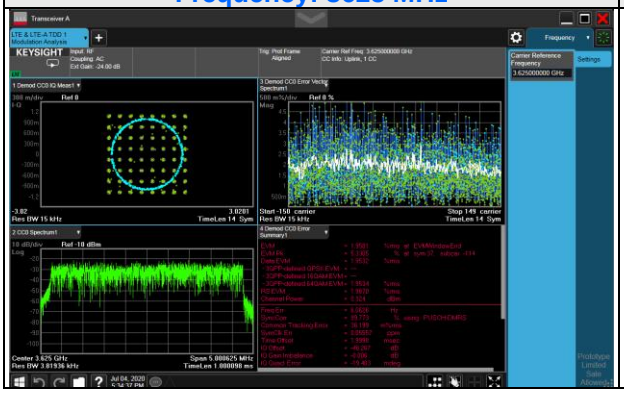
4.1.9 Test Procedure

Connect the EUT to spectrum analyzer 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.

4.1.10 Test Setup



4.1.11 Test Results

LTE QPSK / Channel Bandwidth: 5MHz / Frequency: 3625 MHz	LTE 16QAM / Channel Bandwidth: 5MHz / Frequency: 3625 MHz
	
LTE 64QAM / Channel Bandwidth: 5MHz / Frequency: 3625 MHz	
	

4.2 Frequency Stability Measurement

4.2.1 Limits of Frequency Stabiliity Measurement

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

4.2.2 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 AC input power. The test voltage range is from minimum to maximum working voltage. Each step shall be record the frequency error rate.

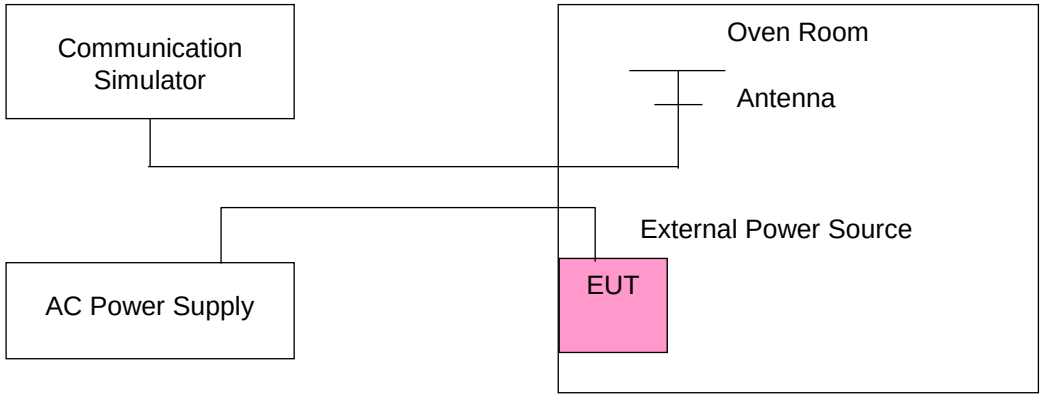
c. The temperature range step is 10 degrees in this test items. All temperature levels shall be hold the ±0.5℃ during the measurement testing. The each temperature step shall be at least 0.5 hours, consider the EUT could be test under the stability condition.

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

4.2.3 Test Instruments

Refer to section 4.1.3 to get information of above instrument.

4.2.4 Test Setup



4.2.5 Test Results

Single Carrier

Frequency Error vs. Voltage

Frequency Error vs. Voltage									PASS /FAIL
Voltage (Volts)	Test result								
	5MHz (MHz)	(ppm)	10MHz (MHz)	(ppm)	15MHz (MHz)	(ppm)	20MHz (MHz)	(ppm)	
102	3625.000000	0.0000	3624.999986	-0.0039	3624.999983	-0.0047	3625.000017	0.0047	PASS
138	3624.999980	-0.0055	3625.000018	0.0050	3625.000004	0.0011	3625.000006	0.0017	PASS

Frequency Error vs. Temperature

Frequency Error vs. Temperature									PASS /FAIL
TEMP. (℃)	Test result								
	5MHz (MHz)	(ppm)	10MHz (MHz)	(ppm)	15MHz (MHz)	(ppm)	20MHz (MHz)	(ppm)	
50	3624.999984	-0.0044	3625.000019	0.0052	3624.999991	-0.0025	3625.000007	0.0019	PASS
40	3624.999985	-0.0041	3624.999992	-0.0022	3624.999985	-0.0041	3625.000008	0.0022	PASS
30	3625.000018	0.0050	3625.000004	0.0011	3625.000007	0.0019	3625.000016	0.0044	PASS
20	3625.000009	0.0025	3624.999984	-0.0044	3624.999985	-0.0041	3625.000006	0.0017	PASS
10	3625.000009	0.0025	3625.000005	0.0014	3625.000016	0.0044	3625.000007	0.0019	PASS
0	3625.000018	0.0050	3625.000018	0.0050	3624.999982	-0.0050	3624.999982	-0.0050	PASS
-10	3624.999982	-0.0050	3624.999986	-0.0039	3625.000017	0.0047	3625.000013	0.0036	PASS
-20	3624.999984	-0.0044	3625.000007	0.0019	3624.999996	-0.0011	3625.000014	0.0039	PASS
-30	3625.000000	0.0000	3624.999994	-0.0017	3625.000010	0.0028	3625.000014	0.0039	PASS

CA Contiguous

Frequency Error vs. Voltage

Frequency Error vs. Voltage					PASS/FAIL
Voltage (Volts)	Test result (MHz)				
	CA_20+20 MHz Low Carrier (MHz)	(ppm)	CA_20+20 MHz High Carrier (MHz)	(ppm)	
102	3560.000023	0.0065	3579.800002	0.0006	PASS
138	3560.000039	0.0110	3579.800017	0.0047	PASS

Frequency Error vs. Temperature

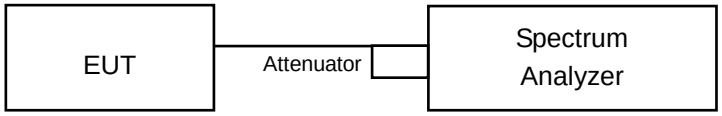
Frequency Error vs. Temperature					PASS/FAIL
Temp. (℃)	Test result (MHz)				
	CA_20+20 MHz Low Carrier (MHz)	(ppm)	CA_20+20 MHz High Carrier (MHz)	(ppm)	
50	3560.000030	0.0084	3579.800015	0.0042	PASS
40	3560.000003	0.0008	3579.800016	0.0045	PASS
30	3560.000057	0.0160	3579.799988	-0.0034	PASS
20	3560.000037	0.0104	3579.800011	0.0031	PASS
10	3560.000010	0.0028	3579.800011	0.0031	PASS
0	3560.000035	0.0098	3579.799981	-0.0053	PASS
-10	3560.000013	0.0037	3579.800004	0.0011	PASS
-20	3560.000045	0.0126	3579.800009	0.0025	PASS
-30	3560.000010	0.0028	3579.800010	0.0028	PASS

4.3 Emission Bandwidth Measurement

4.3.1 Limit of Emission Bandwidth Measurement

Reference only

4.3.2 Test Setup



4.3.3 Test Instruments

Refer to section 4.1.3 to get information of above instrument.

4.3.4 Test Procedure

Occupied Bandwdith:
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. Use OBW measurement function of Spectrum analyzer to measure 99 % occupied bandwidth.

26dBc Bandwidth:
The transmitter output was connected to the spectrum analyzer through an attenuator. The bandwidth of the fundamental frequency was measured by spectrum analyzer with RBW = 1-5% of the OBW. The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

4.3.5 Deviation from Test Standard

No deviation.

4.3.6 EUT Operating Conditions

The software provided by client to enable the EUT under transmission condition continuously at lowest, middle and highest channel frequencies individually.

4.3.7 Test Result (-26dB Bandwidth)

Single Carrier

Channel	Freq. (MHz)	26dB Down Bandwidth (MHz)		
		5MHz		
		QPSK	16QAM	64QAM
Low	3552.5	4.90	4.87	4.86
Middle	3625	4.87	4.79	4.78
High	3697.5	4.90	4.83	4.83

Channel	Freq. (MHz)	26dB Down Bandwidth (MHz)		
		10MHz		
		QPSK	16QAM	64QAM
Low	3555	9.73	9.67	9.70
Middle	3625	9.52	9.50	9.44
High	3695	9.67	9.53	9.37

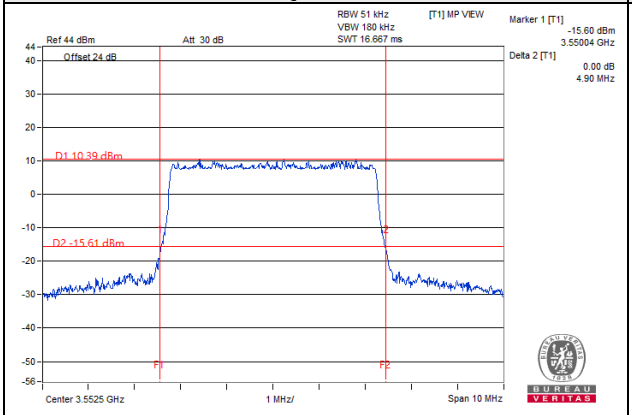
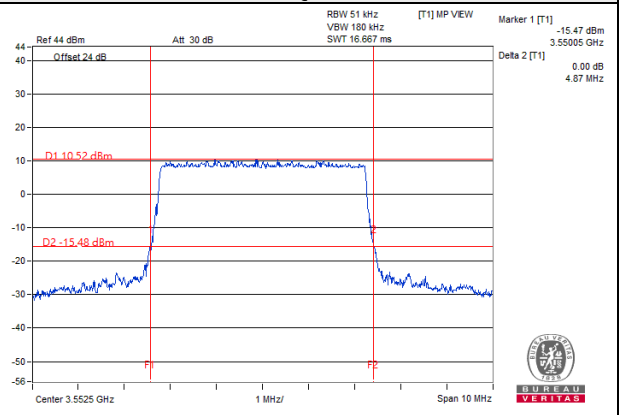
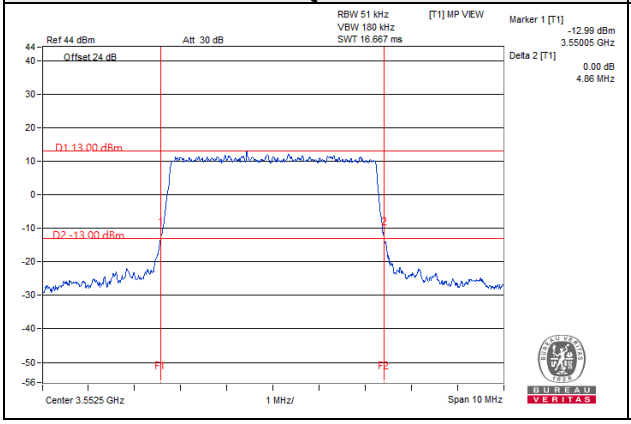
Channel	Freq. (MHz)	26dB Down Bandwidth (MHz)		
		15MHz		
		QPSK	16QAM	64QAM
Low	3557.5	14.45	14.41	14.44
Middle	3625	14.45	14.21	14.06
High	3692.5	14.35	14.21	14.33

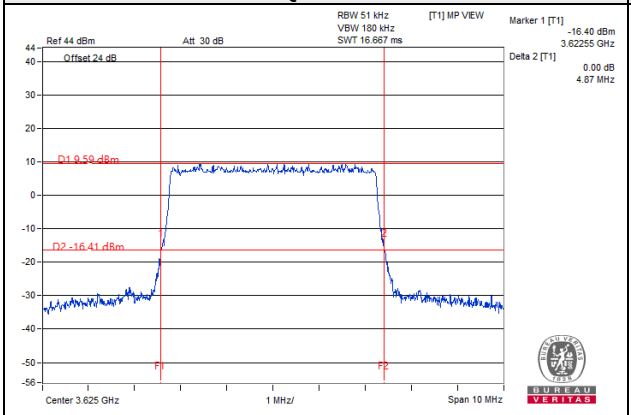
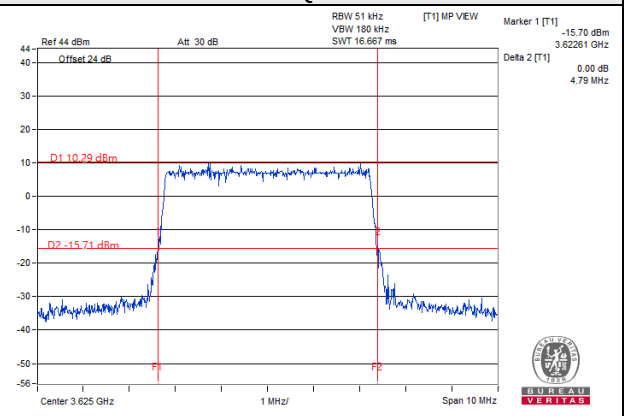
Channel	Freq. (MHz)	26dB Down Bandwidth (MHz)		
		20MHz		
		QPSK	16QAM	64QAM
Low	3560	19.31	19.15	19.15
Middle	3625	18.89	18.81	18.67
High	3690	18.78	18.74	18.72

CA Contiguous

Channel	Freq. (MHz)	26dB Down Bandwidth (MHz)		
		20MHz+20MHz		
		QPSK	16QAM	64QAM
Worst case	3560+3579.8	39.14	38.86	39.04

5MHz:

Spectrum Plot of Value	
Low	
QPSK	16QAM
	
64QAM	
	

Spectrum Plot of Value	
Middle	
QPSK	16QAM
	
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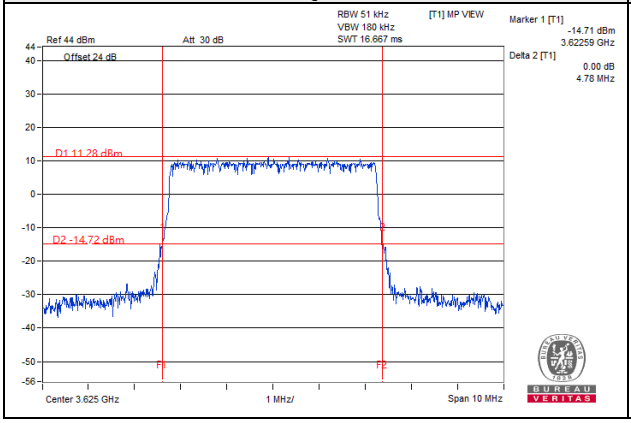
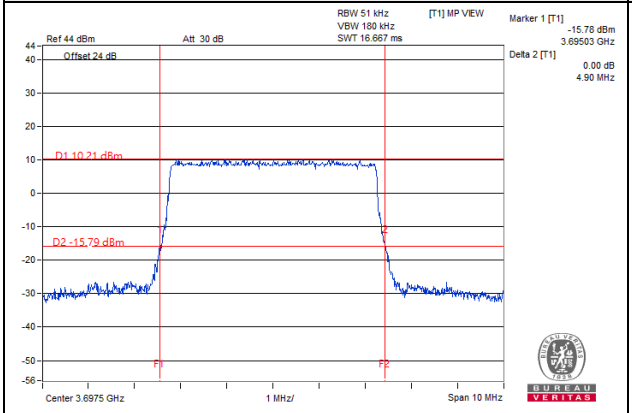
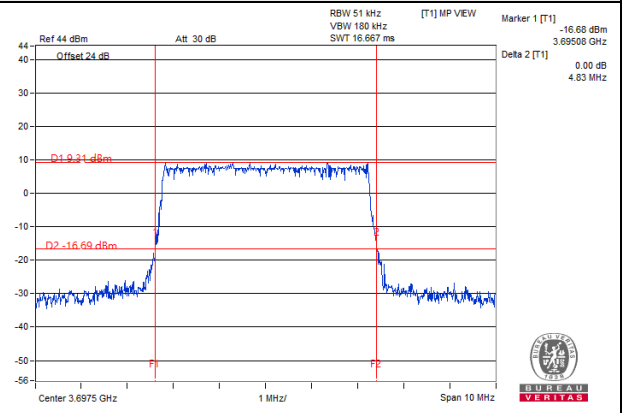
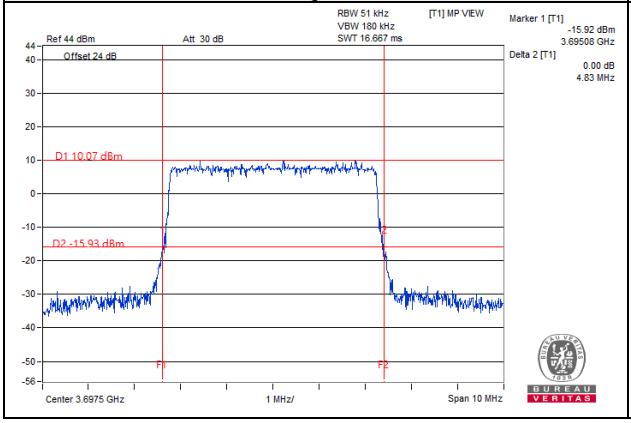
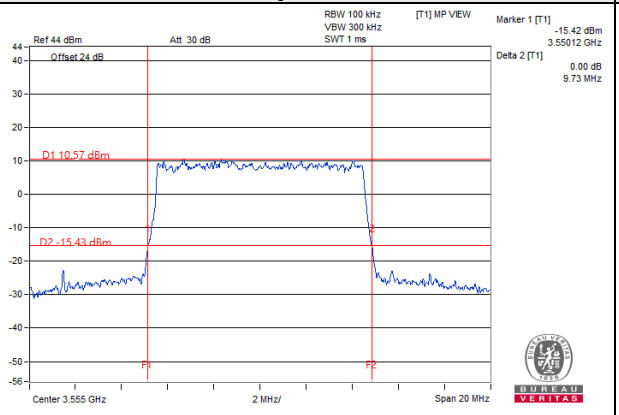
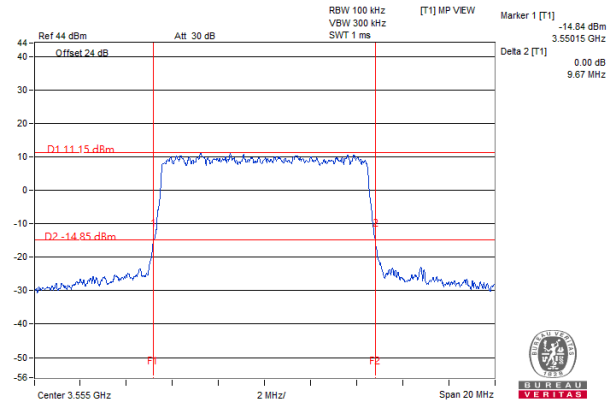
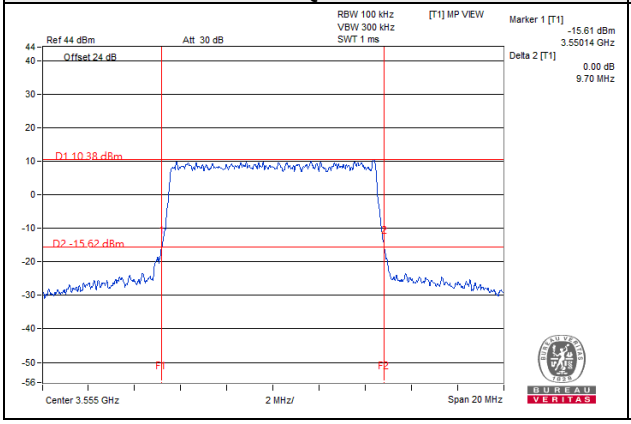
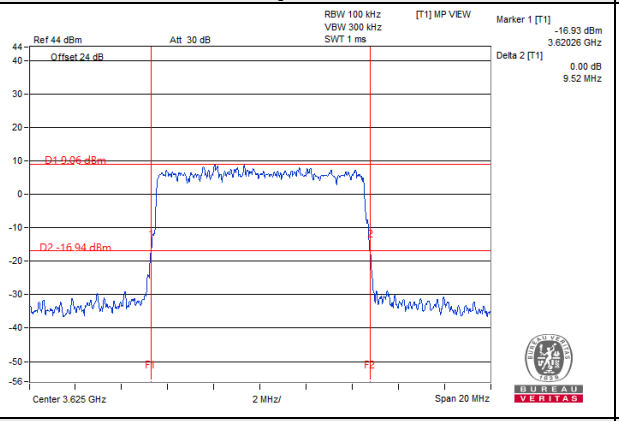
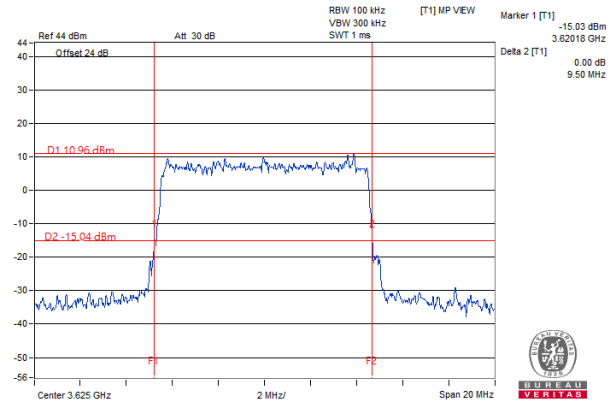
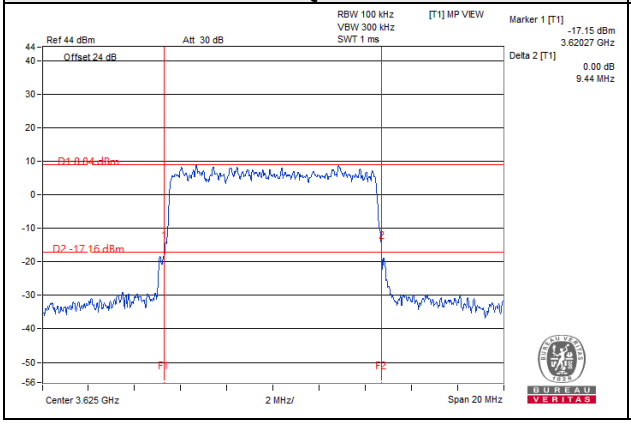
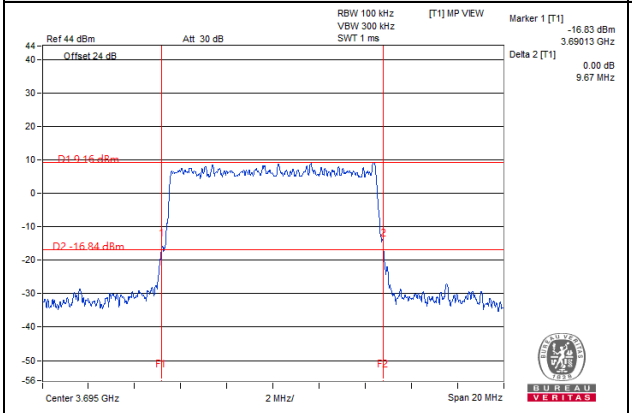
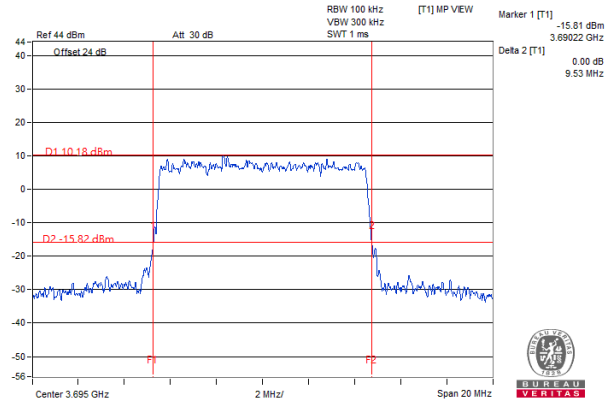
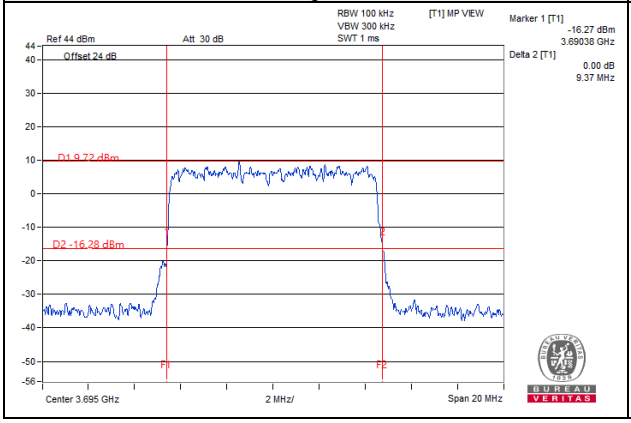
	

Spectrum Plot of Value	
High	
QPSK	16QAM
	
64QAM	
	

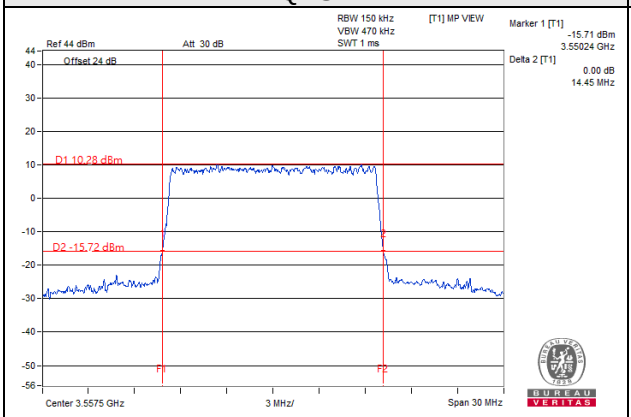
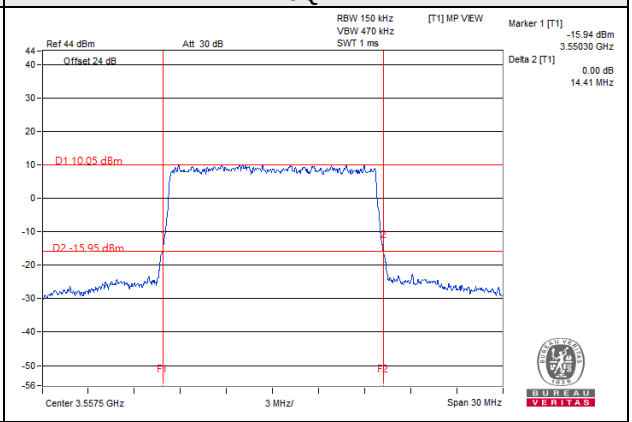
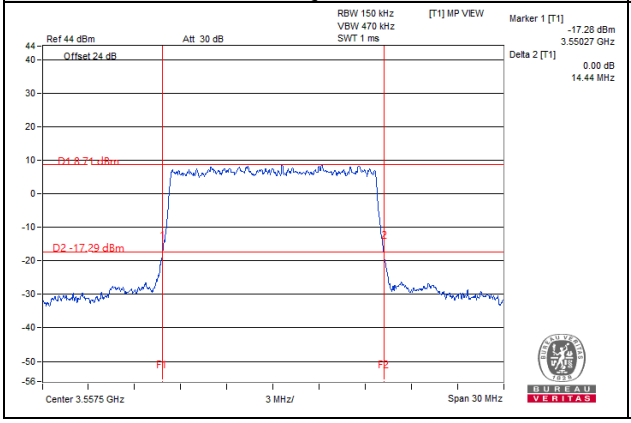
10MHz:

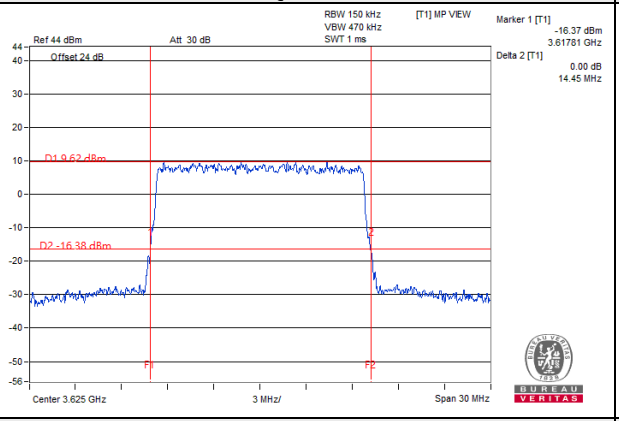
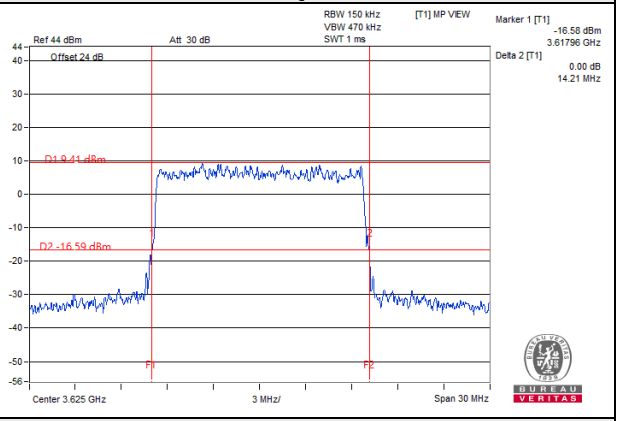
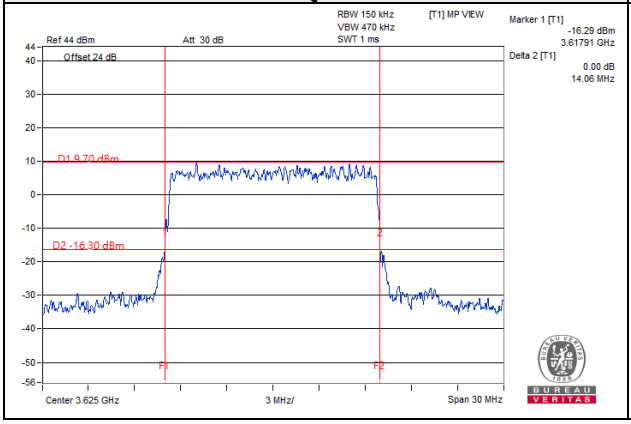
Spectrum Plot of Value	
Low	
QPSK	16QAM
	
64QAM	
	

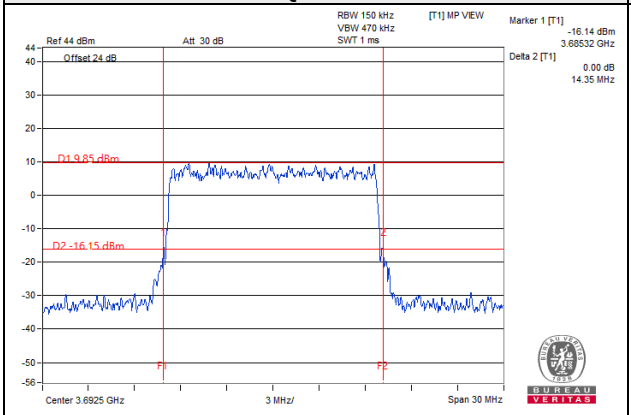
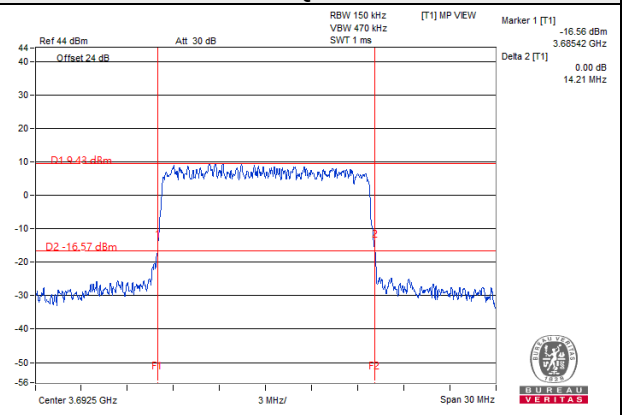
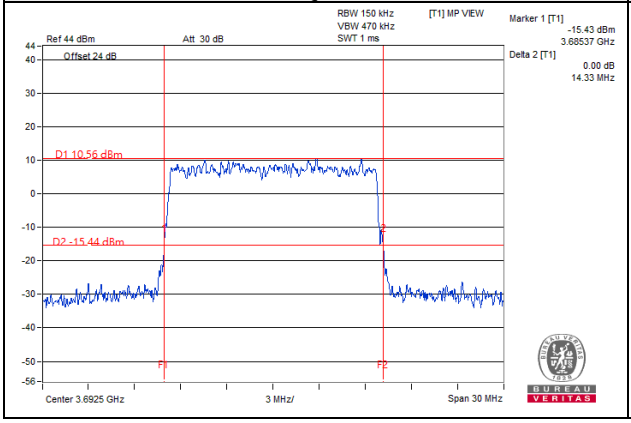
Spectrum Plot of Value	
Middle	
QPSK	16QAM
	
64QAM	
	

Spectrum Plot of Value	
High	
QPSK	16QAM
	
64QAM	
	

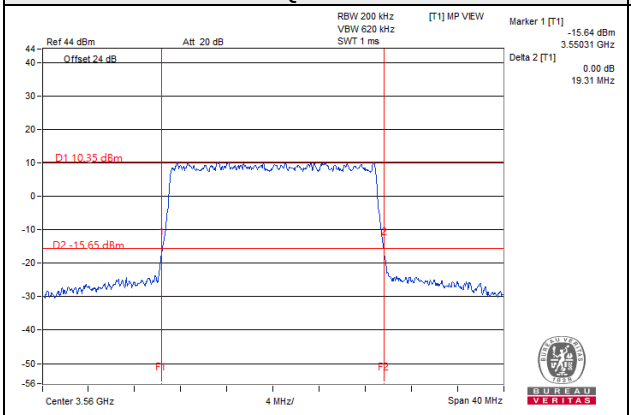
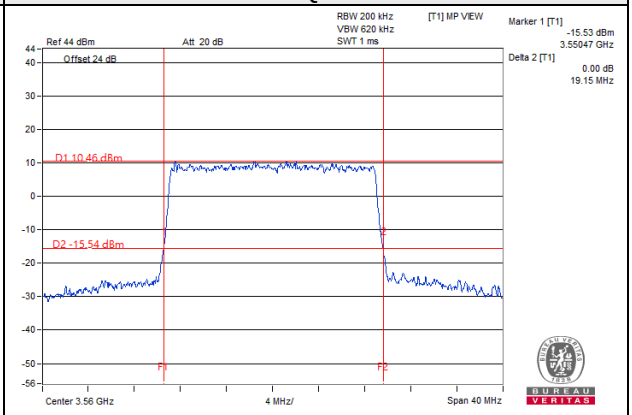
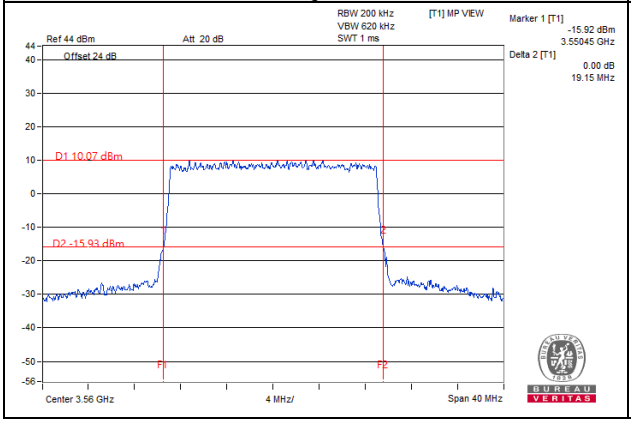
15MHz:

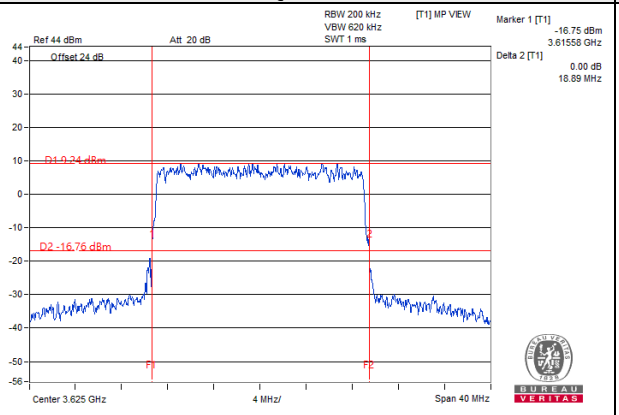
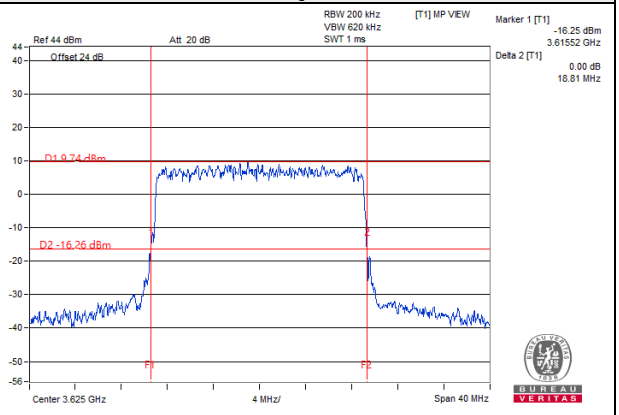
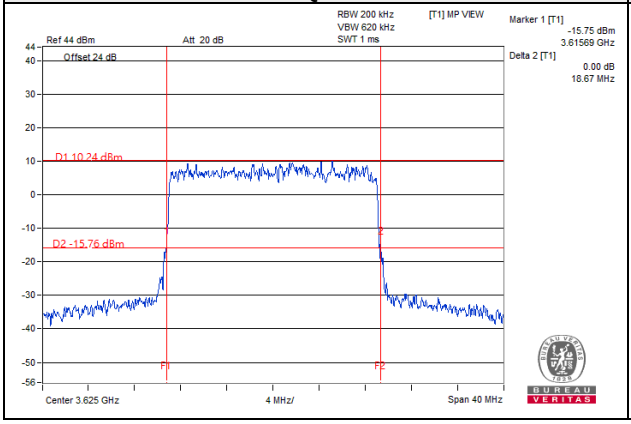
Spectrum Plot of Value	
Low	
QPSK	16QAM
	
64QAM	
	

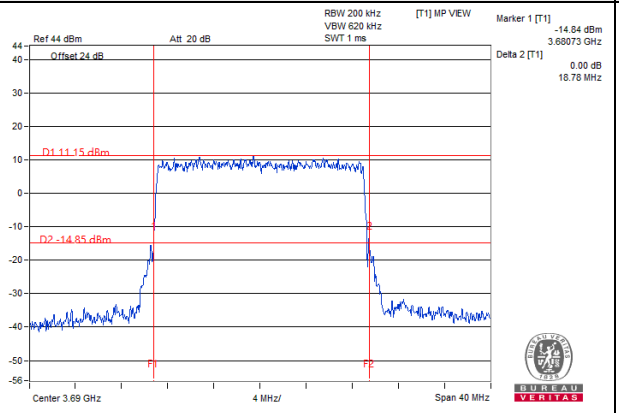
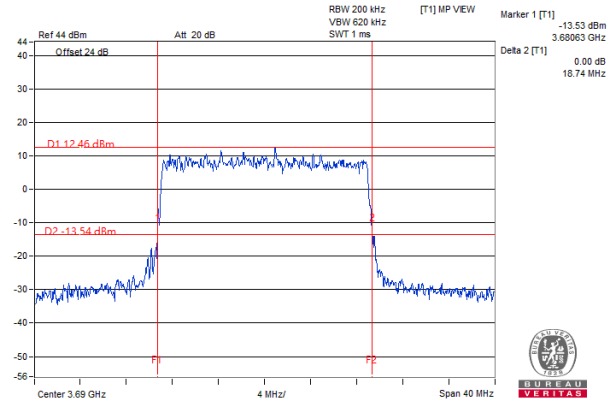
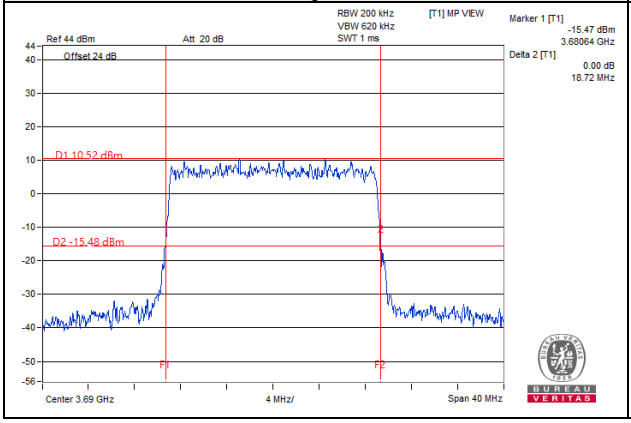
Spectrum Plot of Value	
Middle	
QPSK	16QAM
	
64QAM	
	

Spectrum Plot of Value	
High	
QPSK	16QAM
	
64QAM	
	

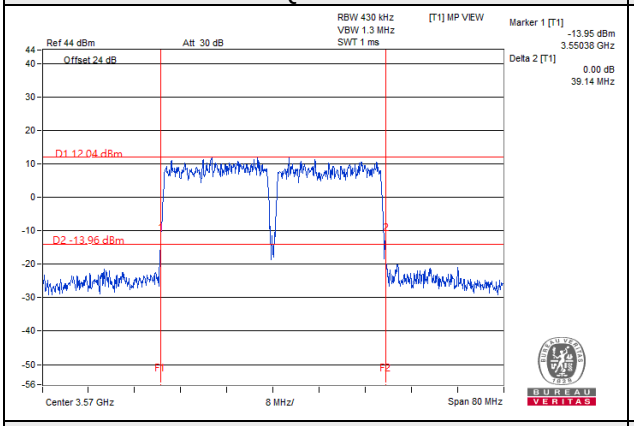
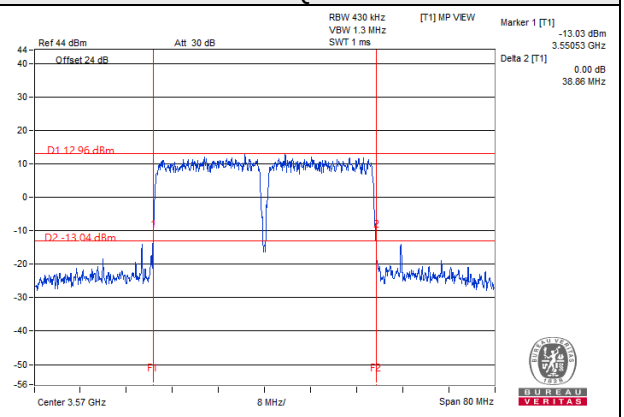
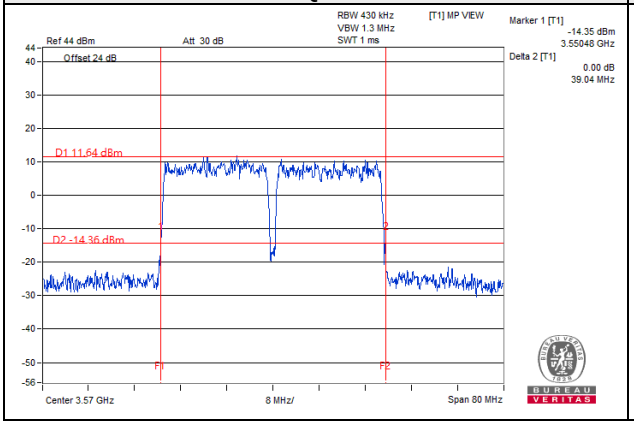
20MHz:

Spectrum Plot of Value	
Low	
QPSK	16QAM
	
64QAM	
	

Spectrum Plot of Value	
Middle	
QPSK	16QAM
	
64QAM	
	

Spectrum Plot of Value	
High	
QPSK	16QAM
	
64QAM	
	

20MHz+20MHz:

Spectrum Plot of Value	
Worst case	
QPSK	16QAM
	
64QAM	
	

4.3.8 Test Result (Occupied Bandwidth)

Single Carrier

Channel	Freq. (MHz)	OCP 99 Band Width (MHz)		
		5MHz		
		QPSK	16QAM	64QAM
Low	3552.5	4.47	4.46	4.46
Middle	3625	4.47	4.45	4.46
High	3697.5	4.47	4.46	4.46

Channel	Freq. (MHz)	OCP 99 Band Width (MHz)		
		10MHz		
		QPSK	16QAM	64QAM
Low	3555	8.96	8.92	8.92
Middle	3625	8.93	8.88	8.92
High	3695	8.96	8.92	8.94

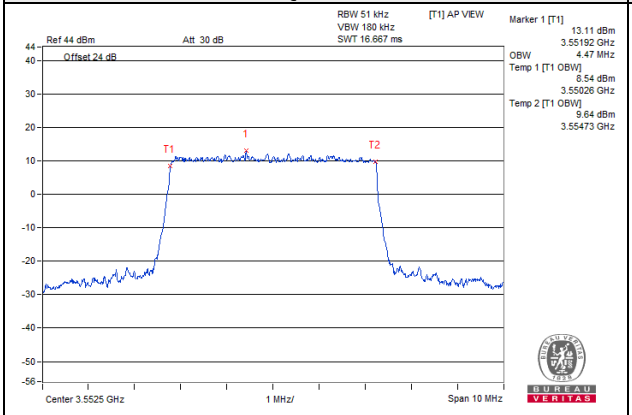
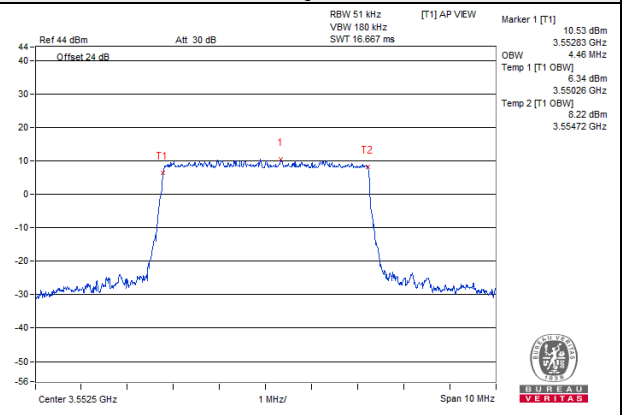
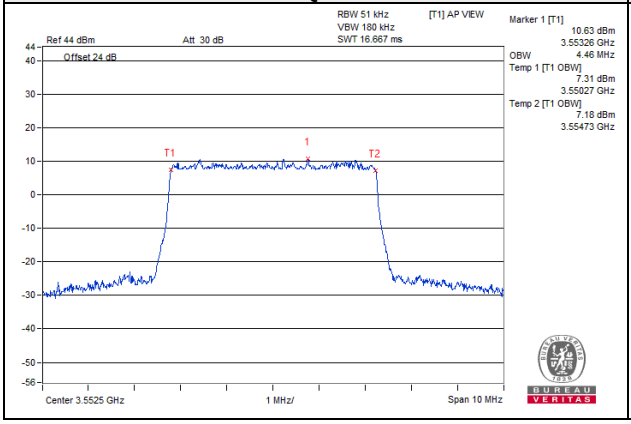
Channel	Freq. (MHz)	OCP 99 Band Width (MHz)		
		15MHz		
		QPSK	16QAM	64QAM
Low	3557.5	13.42	13.38	13.41
Middle	3625	13.43	13.41	13.38
High	3692.5	13.42	13.38	13.38

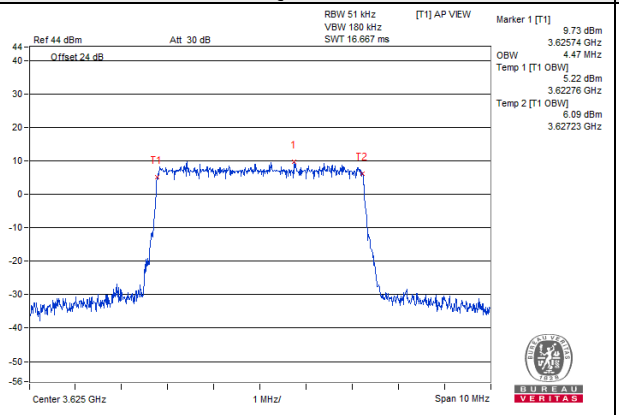
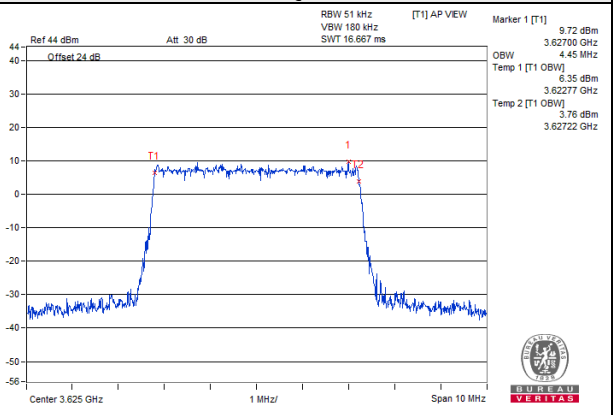
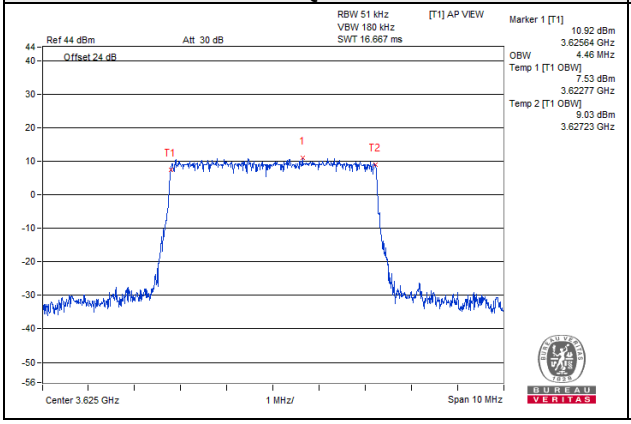
Channel	Freq. (MHz)	OCP 99 Band Width (MHz)		
		20MHz		
		QPSK	16QAM	64QAM
Low	3560	17.92	17.84	17.84
Middle	3625	17.85	17.84	17.84
High	3690	17.86	17.84	17.76

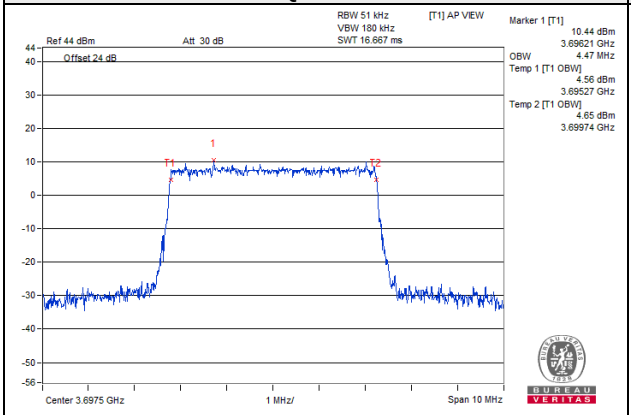
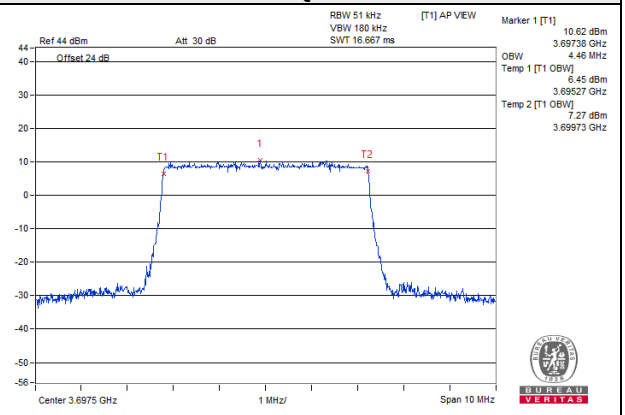
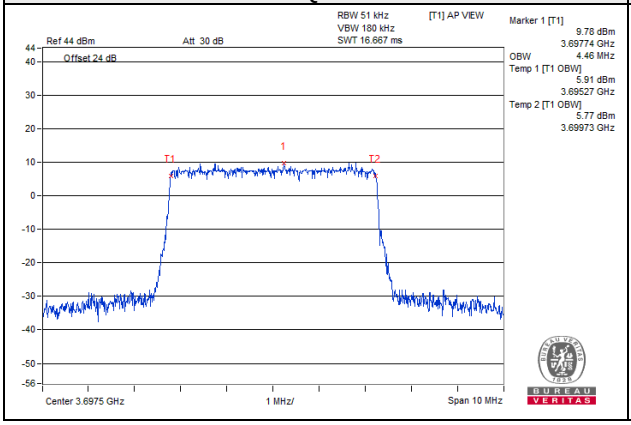
CA Contiguous

Channel	Freq. (MHz)	OCP 99 Band Width (MHz)		
		20MHz+20MHz		
		QPSK	16QAM	64QAM
Worst case	3600+3579.8	37.54	37.52	37.52

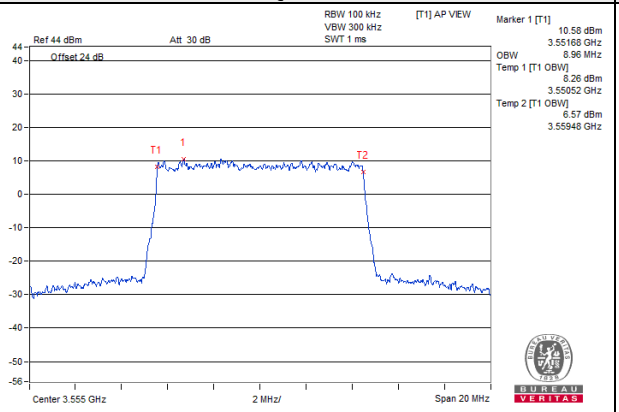
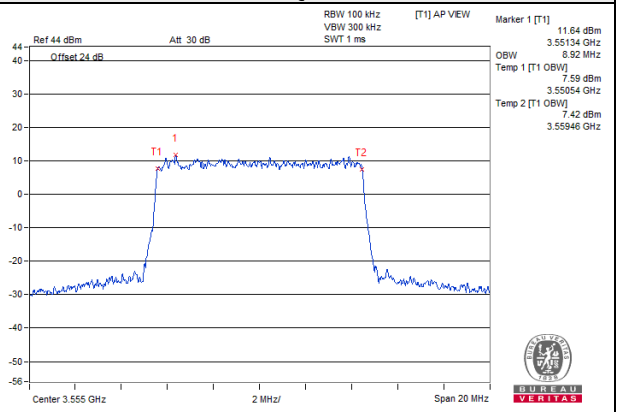
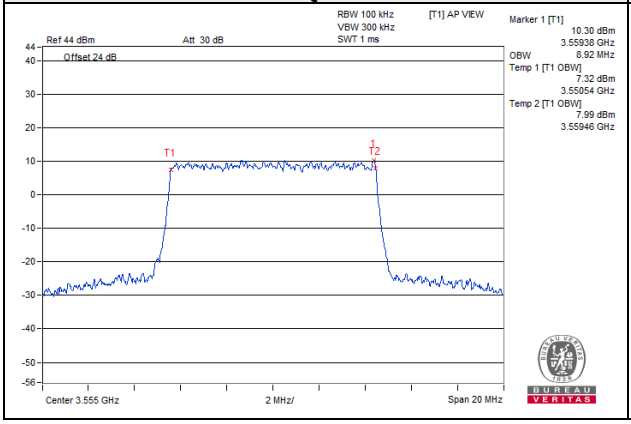
5MHz:

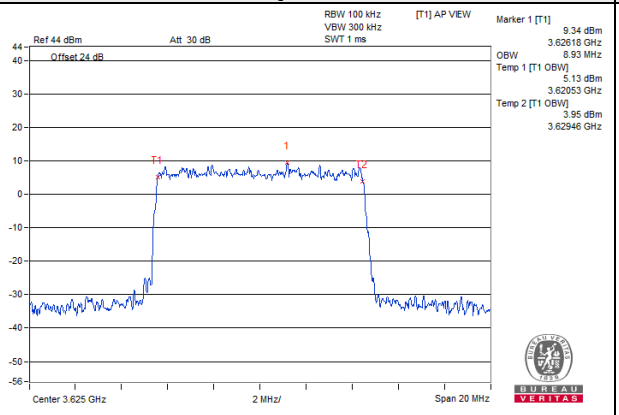
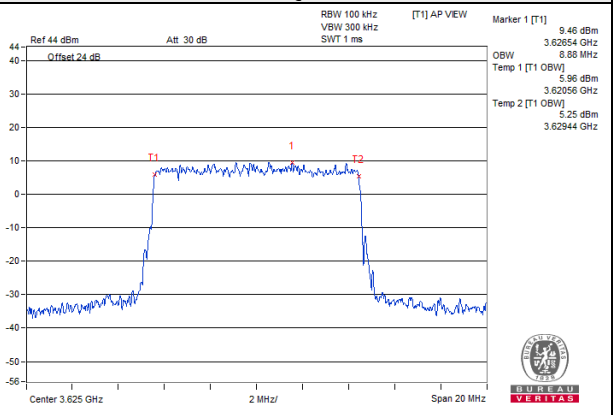
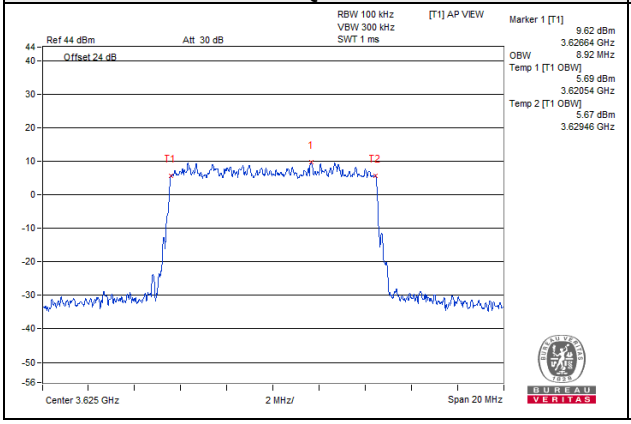
Spectrum Plot of Value	
Low	
QPSK	16QAM
	
64QAM	
	

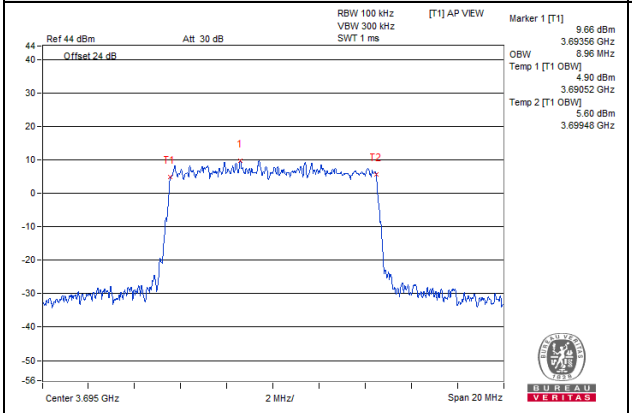
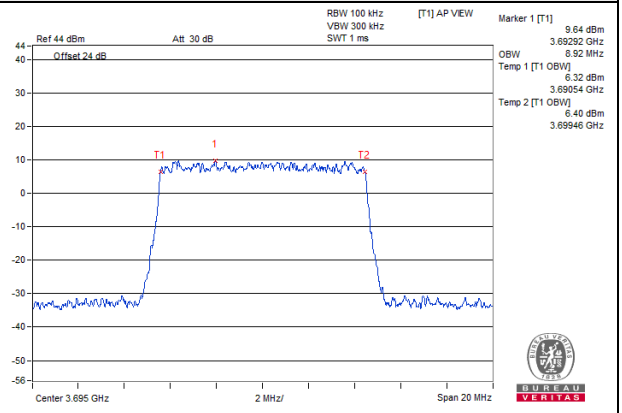
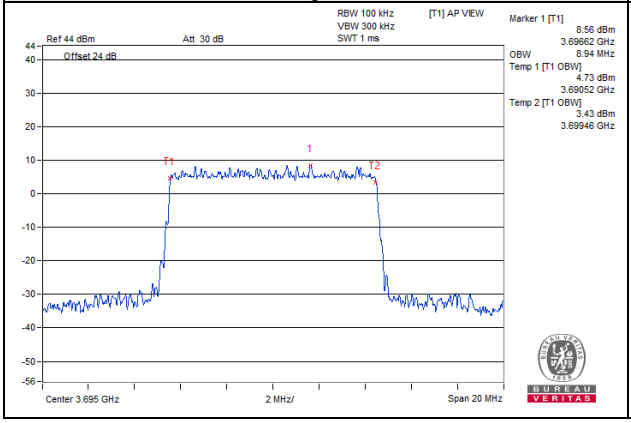
Spectrum Plot of Value	
Middle	
QPSK	16QAM
	
64QAM	
	

Spectrum Plot of Value	
High	
QPSK	16QAM
	
64QAM	
	

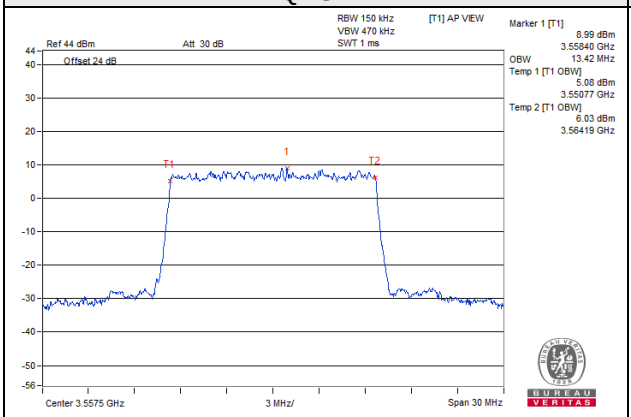
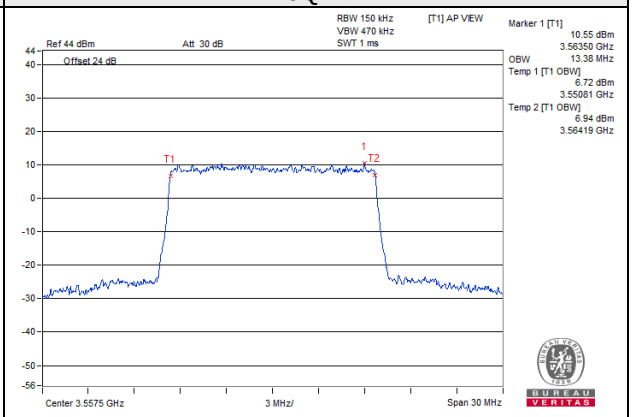
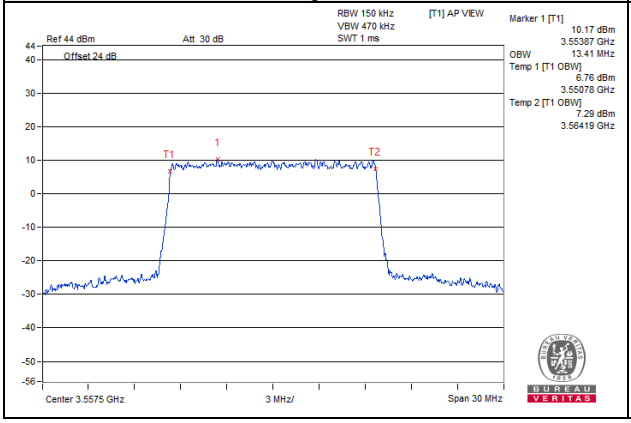
10MHz:

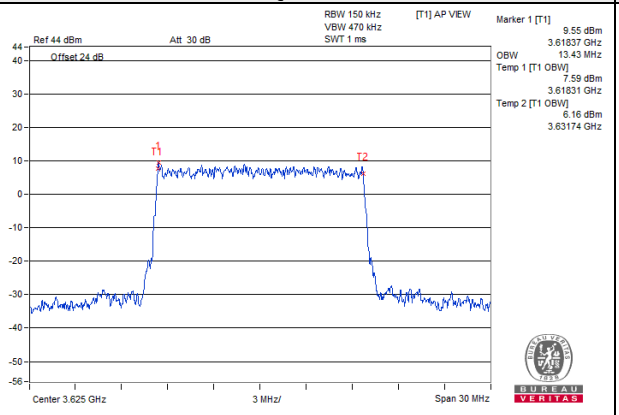
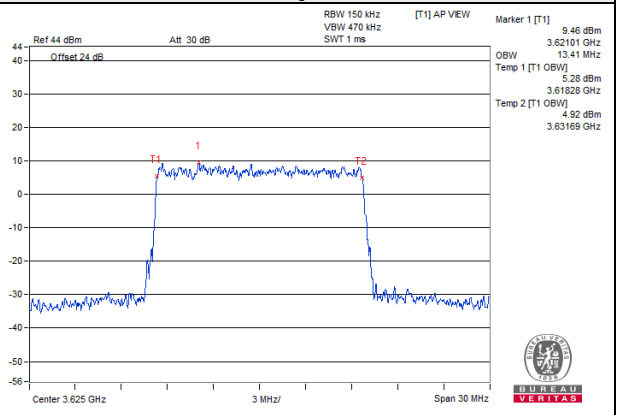
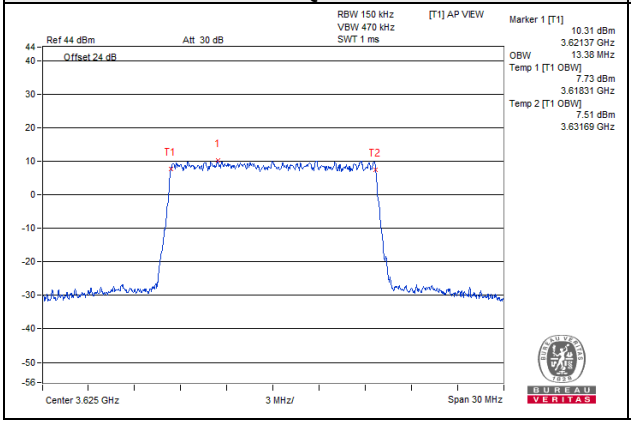
Spectrum Plot of Value	
Low	
QPSK	16QAM
	
64QAM	
	

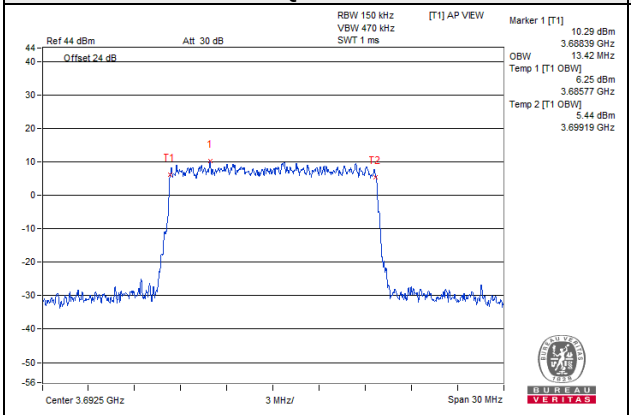
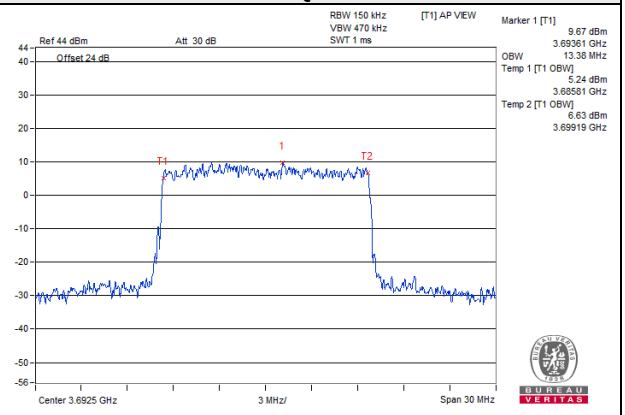
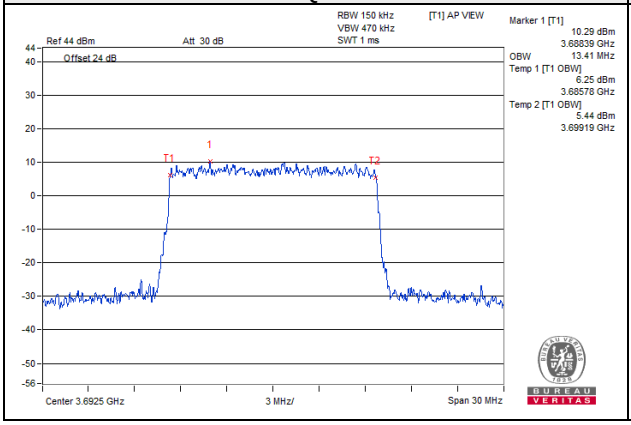
Spectrum Plot of Value	
Middle	
QPSK	16QAM
	
64QAM	
	

Spectrum Plot of Value	
High	
QPSK	16QAM
	
64QAM	
	

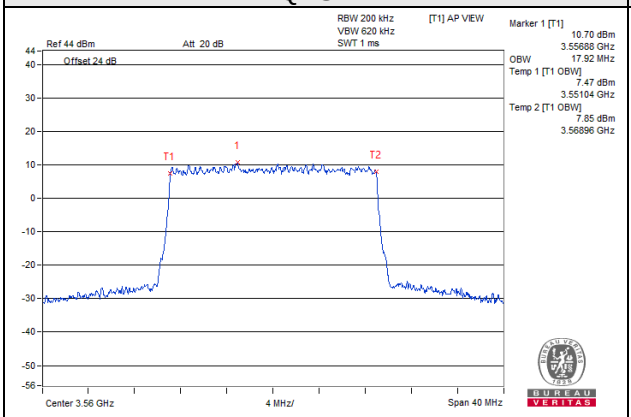
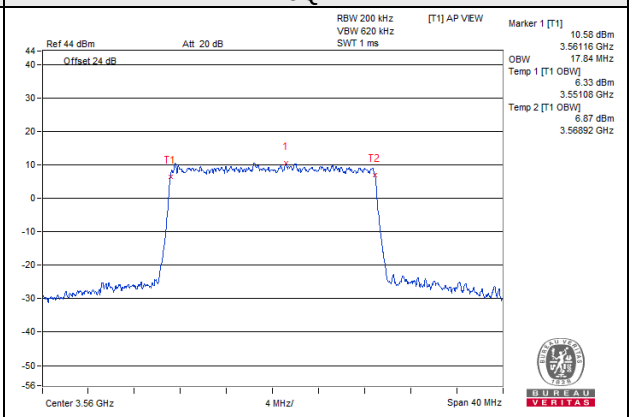
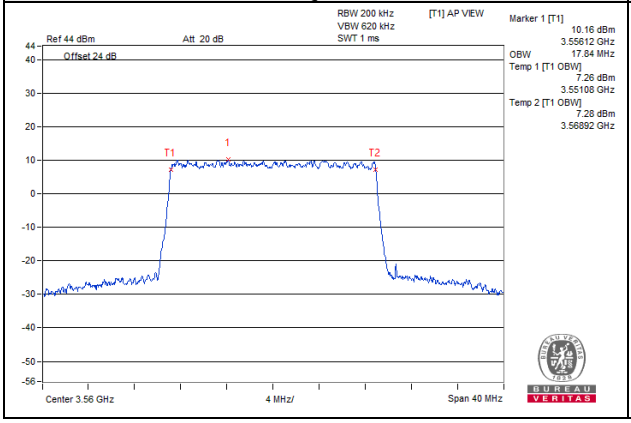
15MHz:

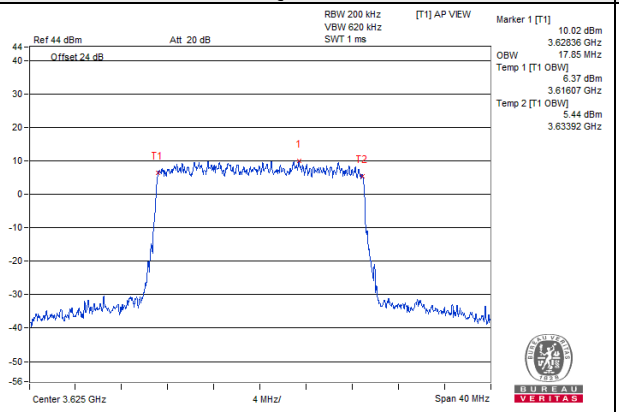
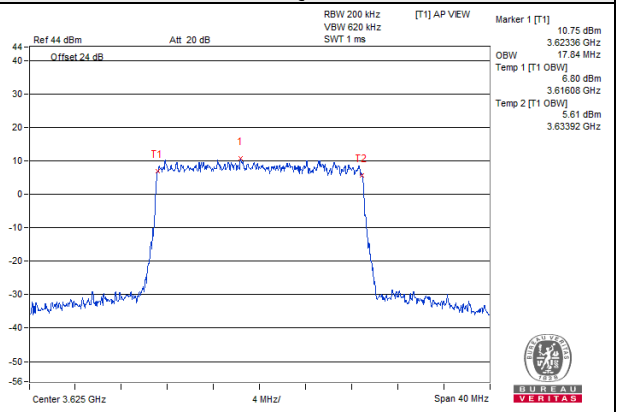
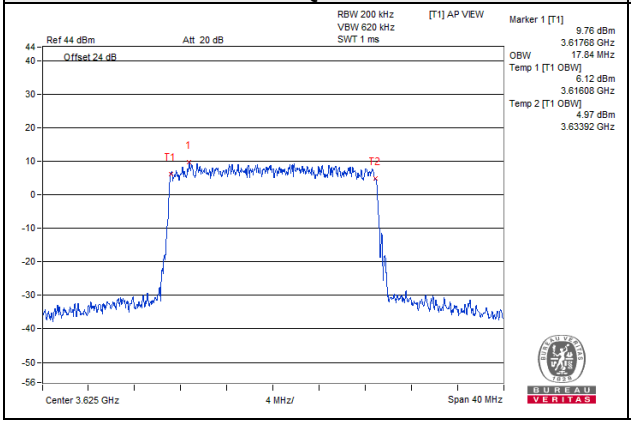
Spectrum Plot of Value	
Low	
QPSK	16QAM
	
64QAM	
	

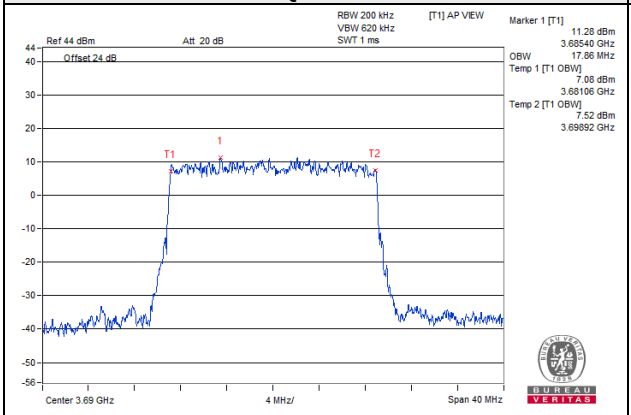
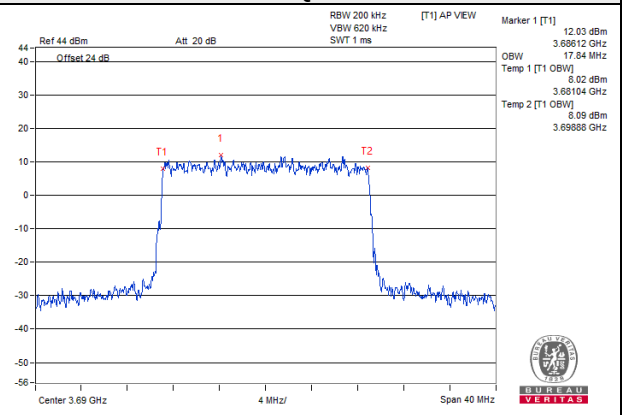
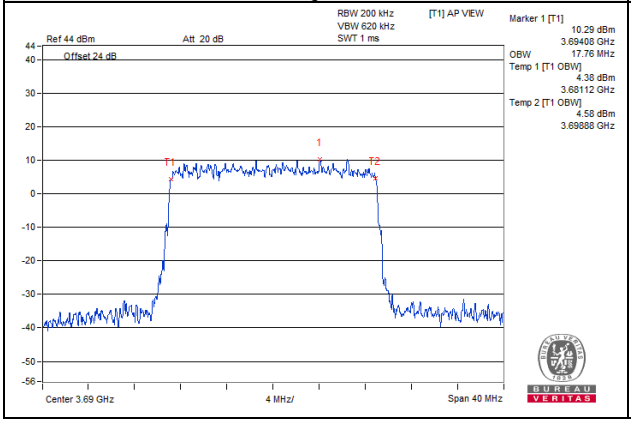
Spectrum Plot of Value	
Middle	
QPSK	16QAM
	
64QAM	
	

Spectrum Plot of Value	
High	
QPSK	16QAM
	
64QAM	
	

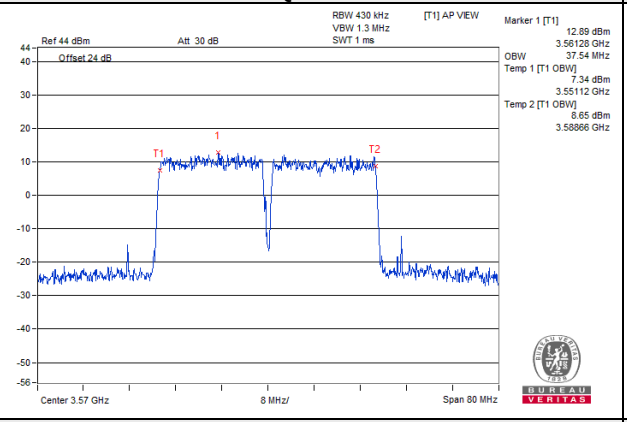
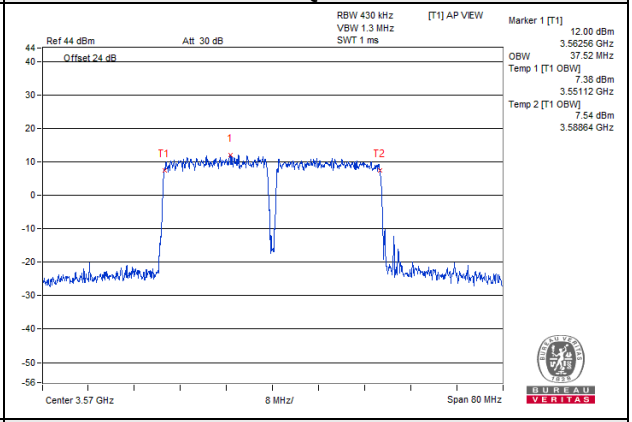
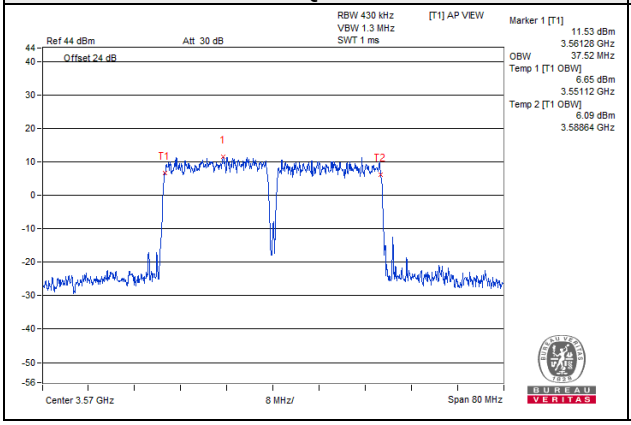
20MHz:

Spectrum Plot of Value	
Low	
QPSK	16QAM
	
64QAM	
	

Spectrum Plot of Value	
Middle	
QPSK	16QAM
	
64QAM	
	

Spectrum Plot of Value	
High	
QPSK	16QAM
	
64QAM	
	

20MHz+20MHz:

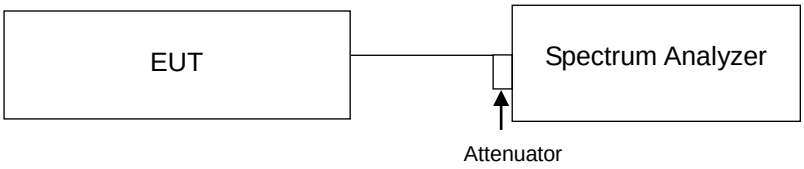
Spectrum Plot of Value	
Worst case	
QPSK	16QAM
	
64QAM	
	

4.4 Peak to Average Ratio

4.4.1 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

4.4.2 Test Setup



4.4.3 Test Procedures

For SC Configurations:

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%.

For CA Configurations:

PAPR (dB) = P_{Pk} (dBm) − P_{Avg} (dBm)

Where :

a. PAPR: peak-to-average power ratio, in dB.

b. P_{Pk}: measured peak power or peak PSD level, in dBm.

c. P_{Avg}: measured average power or average PSD level, in dBm.

4.4.4 Test Results

Single Carrier

Channel	Freq. (MHz)	Peak to Average Ratio (dB)			Limit(dB)	Pass /Fail
		5MHz				
		QPSK	16QAM	64QAM		
Low	3552.5	5.09	5.13	7.09	13	Pass
Middle	3625	5.00	6.08	6.87	13	Pass
High	3697.5	4.49	5.38	6.17	13	Pass

Channel	Freq. (MHz)	Peak to Average Ratio (dB)			Limit(dB)	Pass /Fail
		10MHz				
		QPSK	16QAM	64QAM		
Low	3555	5.03	6.36	6.89	13	Pass
Middle	3625	4.92	6.12	6.71	13	Pass
High	3695	4.55	5.72	6.08	13	Pass

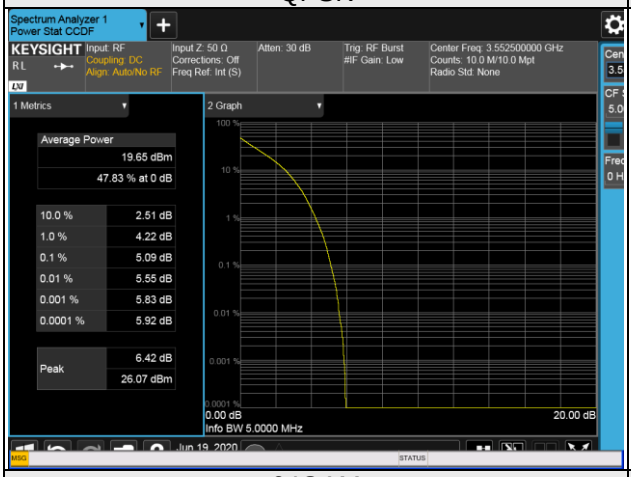
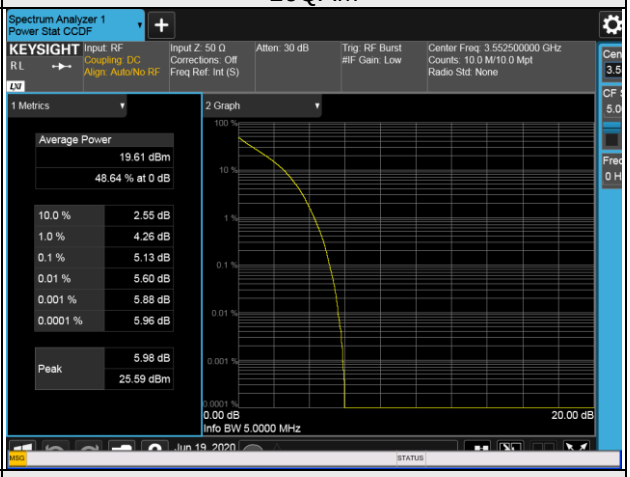
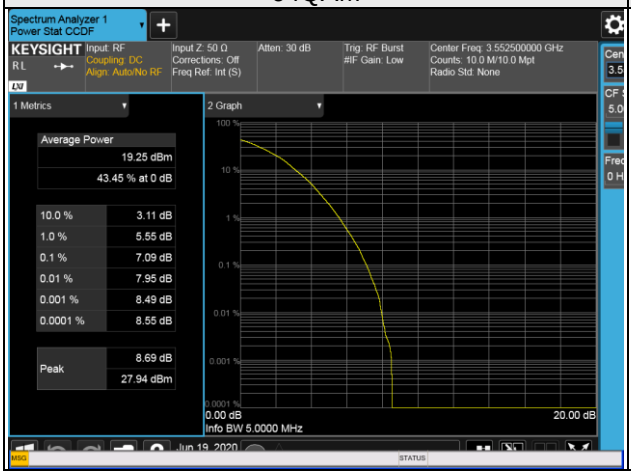
Channel	Freq. (MHz)	Peak to Average Ratio (dB)			Limit(dB)	Pass /Fail
		15MHz				
		QPSK	16QAM	64QAM		
Low	3557.5	5.15	6.34	6.85	13	Pass
Middle	3625	4.98	6.08	6.62	13	Pass
High	3692.5	4.57	5.35	6.05	13	Pass

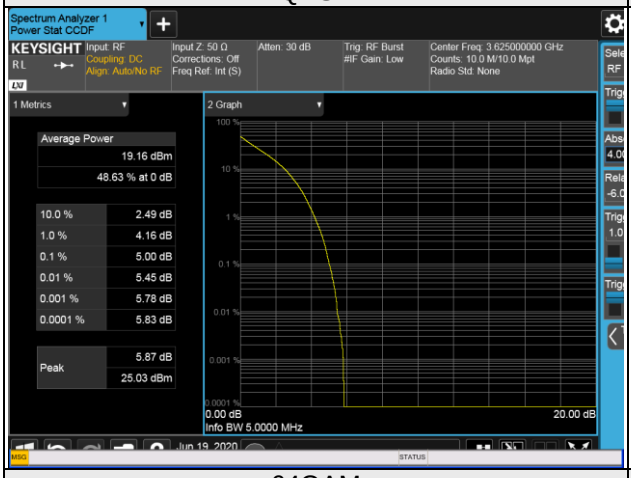
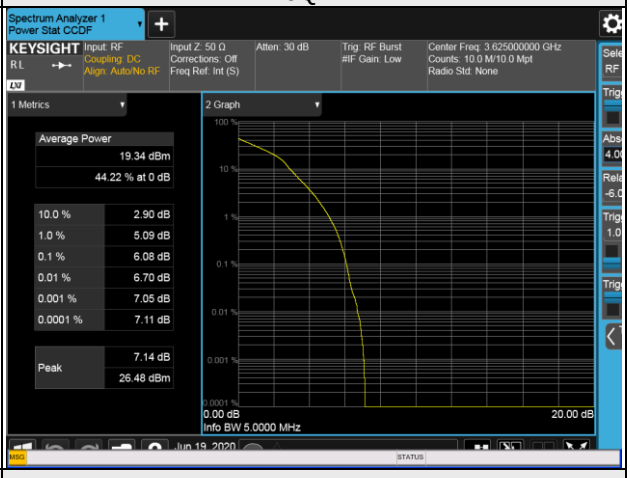
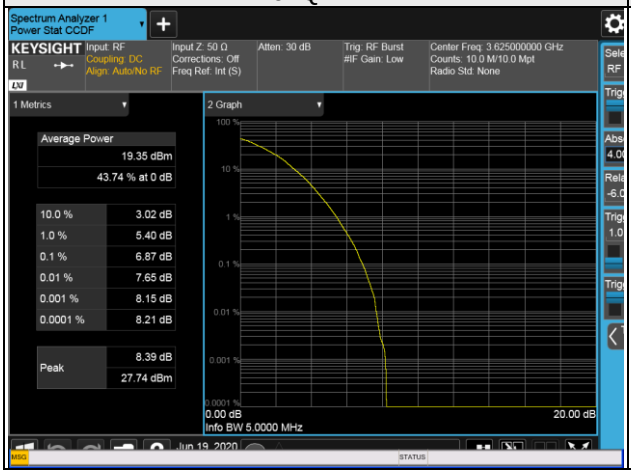
Channel	Freq. (MHz)	Peak to Average Ratio (dB)			Limit(dB)	Pass /Fail
		20MHz				
		QPSK	16QAM	64QAM		
Low	3560	5.01	6.24	6.88	13	Pass
Middle	3625	4.79	6.07	6.07	13	Pass
High	3690	4.50	5.71	5.70	13	Pass

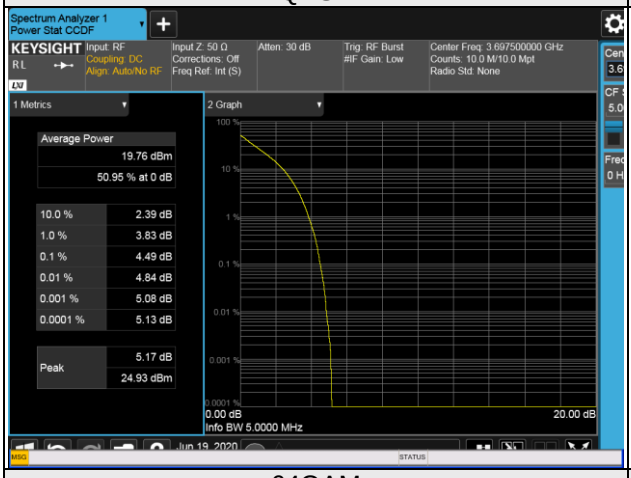
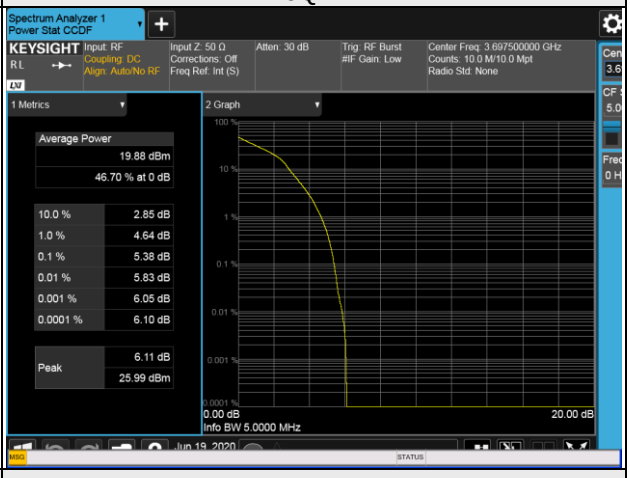
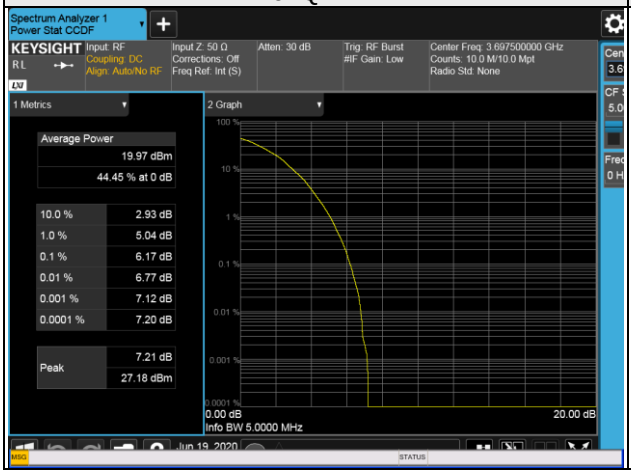
CA Contiguous

Channel	Freq. (MHz)	Peak to Average Ratio (dB)			Limit(dB)	Pass /Fail
		20MHz+20MHz				
		QPSK	16QAM	64QAM		
Worst case	3600+3579.8	5.39	4.69	4.82	13	Pass

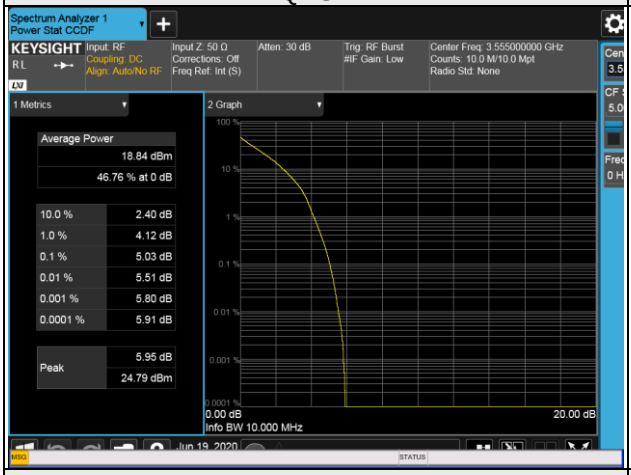
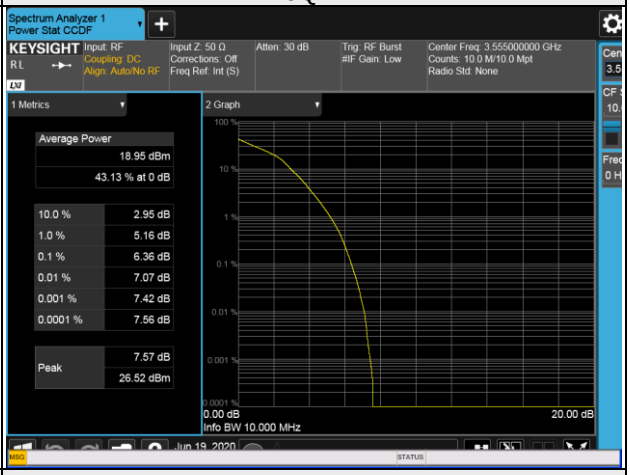
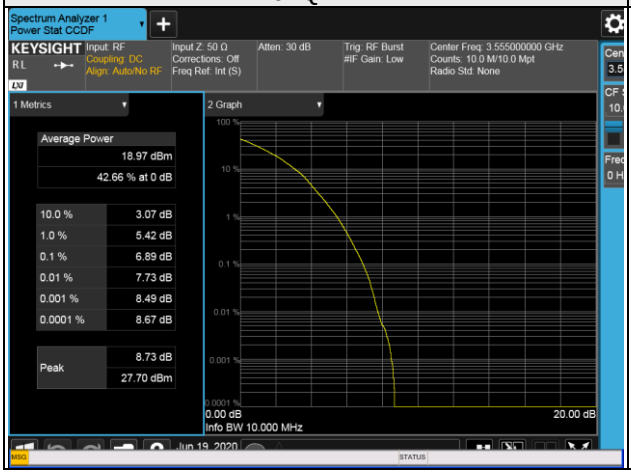
5MHz:

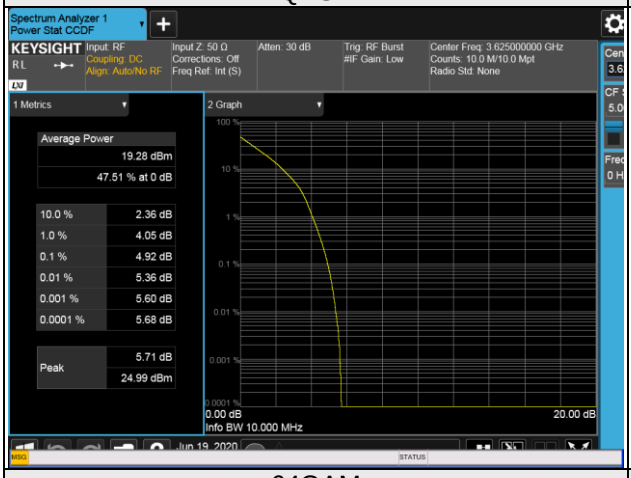
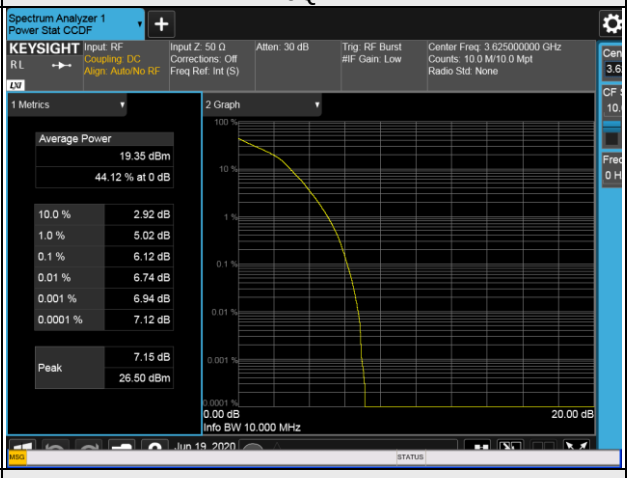
Spectrum Plot of Value	
Low	
QPSK	16QAM
	
64QAM	
	

Middle	
QPSK	16QAM
	
64QAM	
	

High	
QPSK	16QAM
	
64QAM	
	

10MHz:

Spectrum Plot of Value	
Low	
QPSK	16QAM
	
64QAM	
	

Middle	
QPSK	16QAM
	
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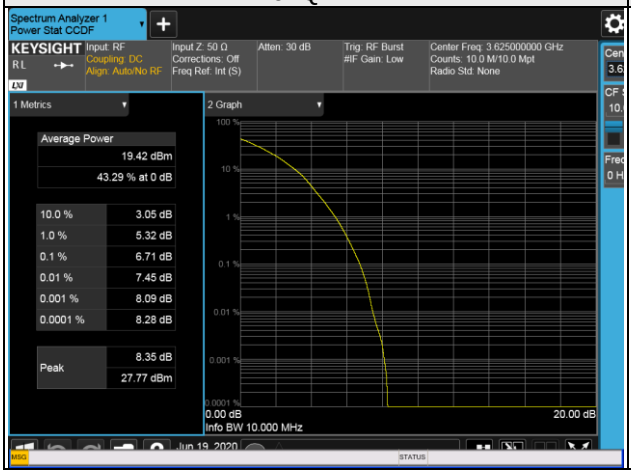
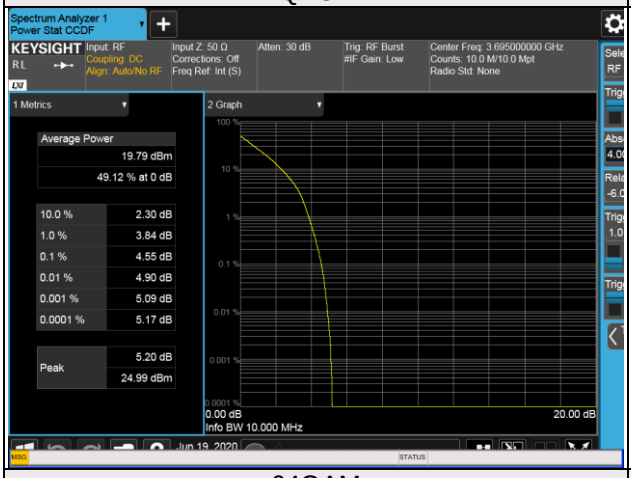
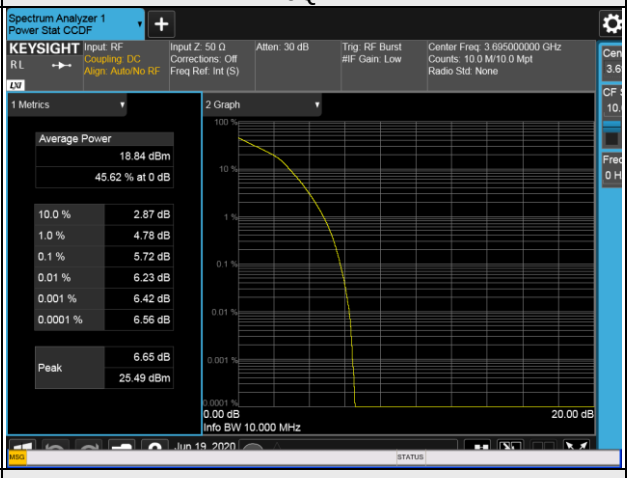
	

High	
QPSK	16QAM
	
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