





Report Reference ID:	400354TRFWL
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Test specification:	Title 47 – Telecommunication Chapter I – Federal Communications Commission Subchapter B – Common carrier services Part 96 – CITIZENS BROADBAND RADIO SERVICE
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Applicant:	TEKO Telecom Srl. Via Meucci, 24/a I-40024 Castel S. Pietro Terme (BO) (Italy)
Apparatus:	Cell Hub High-power Radio Remote Unit
Model:	XR35WH2/ACY
FCC ID:	XM2-X35H2B

Testing laboratory:	Nemko Italy Spa Via del Carroccio, 4 20853 Biassono (MB) – Italy Telephone: +39 039 2201201 Facsimile: +39 039 2201221
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	Name and title	Date
Tested by:	 _____ P. Barbieri, Wireless/EMC Specialist	10/09/2020
Reviewed by:	 _____ D. Guarnone, Wireless/EMC Specialist	10/09/2020

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Section 1: Report summary

1.1 Test specification

Specifications	Part 96 – CITIZENS BROADBAND RADIO SERVICE
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1.2 Statement of compliance

Compliance	<p>In the configuration tested the EUT was found compliant Yes <input checked="" type="checkbox"/> No <input type="checkbox"/></p> <p>Test method: ANSI C63.26-2015, 662911 D01 Multiple Transmitter Output v02r01, 662911 D02 MIMO with Cross-Polarized Antennas v01</p>
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1.3 Exclusions

Exclusions	None
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1.4 Registration number

Test site FCC ID number	682159
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1.5 Test report revision history

Revision #	Details of changes made to test report
TRF	Original report issued
R1TRF	----

1.6 Limits of responsibility

Note that the results contained in this report relate only to the items tested and were obtained in the period between the date of initial receipt of samples and the date of issue of the report.

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Section 2: Summary of test results

2.1 FCC Part 96, test results

Part	Methods	Test description	Verdict
§96.41(e)(3)	2.1049	Occupied bandwidth	Pass
§96.41(b)	2.1046	Peak output power at RF antenna connector EIRP	Pass
§96.41(b)	2.1046	Peak output power at RF antenna connector PSD	Pass
§96.41(g)	2.1046	Peak output power at RF antenna connector PAPR	Pass
§96.41(e)	2.1051	Spurious emissions at RF antenna connector	Pass
§96.41(e)	2.1053	Radiated spurious emissions	Pass
	2.1055	Frequency stability	Pass
Notes:			

Section 3: Equipment under test (EUT) and application details

3.1 Applicant details

Applicant complete business name	Name:	Teko Telecom Srl
	Federal Registration Number (FRN):	0018963462
	Grantee code	XM2
Mailing address	Address:	Via Meucci, 24/a
	City:	Castel S. Pietro Terme
	Province/State:	Bologna
	Post code:	40024
	Country:	Italy

3.2 Modular equipment

a) Single modular approval	Single modular approval Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
b) Limited single modular approval	Limited single modular approval Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>

3.3 Product details

FCC ID	Grantee code:	XM2
	Product code:	-X35H2B
Equipment class	CBD	
Description of product as it is marketed	Base Station	
	Model name/number:	XR35WH2/ACY
	Serial number:	1023038001

3.4 Application purpose

Type of application	<input checked="" type="checkbox"/> Original certification <input type="checkbox"/> Change in identification of presently authorized equipment Original FCC ID: _____ Grant date: _____ <input type="checkbox"/> Class II permissive change or modification of presently authorized equipment
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Section 3: Equipment under test

3.5 Composite/related equipment

a) Composite equipment	The EUT is a composite device subject to an additional equipment authorization Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
b) Related equipment	The EUT is part of a system that operates with, or is marketed with, another device that requires an equipment authorization Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
c) Related FCC ID	If either of the above is "yes": <input type="checkbox"/> has been granted under the FCC ID(s) listed below: <input type="checkbox"/> is in the process of being filled under the FCC ID(s) listed below: <input type="checkbox"/> is pending with the FCC ID(s) listed below: <input type="checkbox"/> has a mix of pending and granted statues under the FCC ID(s) listed below: i FCC ID: ii FCC ID:

3.6 Sample information

Receipt date:	09/28/2020
Nemko sample ID number:	-----

3.7 EUT technical specifications

Operating band:	Down Link: 3550–3700 MHz
Operating frequency:	Wideband
Modulation type:	LTE (16QAM, 64QAM, 256QAM, QPSK)
Occupied bandwidth:	LTE: 5 MHz, 10 MHz, 15 MHz, 20 MHz
Channel spacing:	standard
Emission designator:	LTE: D7W
RF Output	Down Link: 37dBm (5 W)
Category of CBSD	Category A and Category B
Antenna type:	External Antenna is not provided, equipment that has an external 50 Ω RF connector
Power source:	100-240 Vac

Section 3: Equipment under test

3.8 Accessories and support equipment
 The following information identifies accessories used to exercise the EUT during testing:

Item # 1	
Type of equipment:	Server
Brand name:	Dell
Model name or number:	E38S
Serial number:	408P2T2
Nemko sample number:	-----
Connection port:	-----
Cable length and type:	-----
Item # 2	
Type of equipment:	
Brand name:	
Model name or number:	
Serial number:	
Nemko sample number:	
Connection port:	
Cable length and type:	
Item # 3	
Type of equipment:	
Brand name:	
Model name or number:	
Serial number:	
Nemko sample number:	
Connection port:	
Cable length and type:	
Item # 4	
Type of equipment:	
Brand name:	
Model name or number:	
Serial number:	
Nemko sample number:	
Connection port:	
Cable length and type:	

3.9 Operation of the EUT during testing

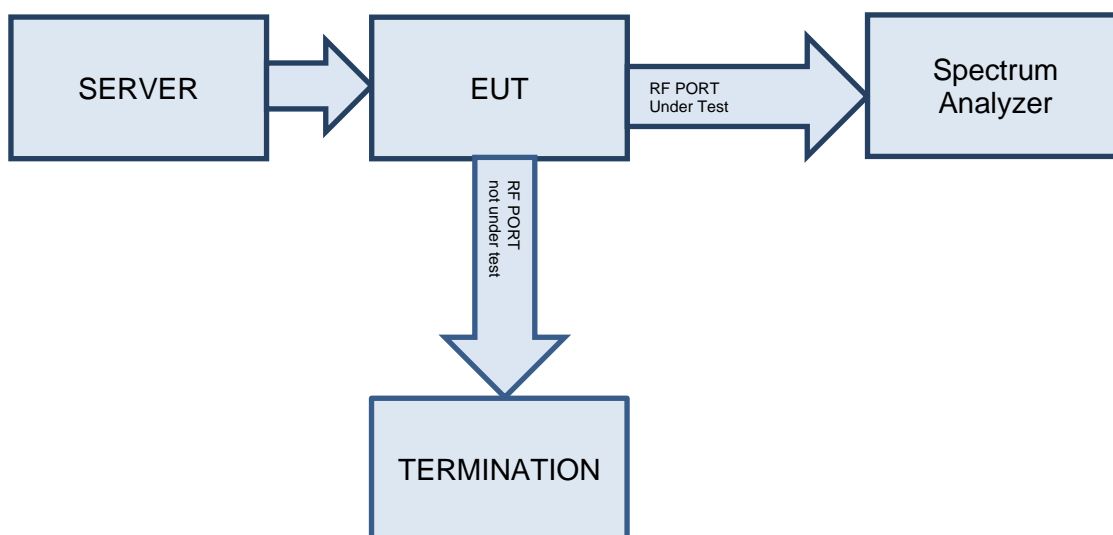
Details:

In down-link direction, normal working at max gain with max RF power output.
 This report refer to measurement both RF port 1 and RF port 2.
 When a RF port has been tested, the other one has been terminated on 50Ω load.

3.10 EUT setup diagram

In this system Cell Hub (Base Station) is the EUT.
 The server generates wanted signals in base band frequency and Cell Hub convert the signal to RF band.

Test setup :



Procedure

Connect the server to the input of EUT by means of optical fiber, so the EUT can works at the maximum power.
 Connect the spectrum analyzer to the RF output connector of the EUT.

Section 4: Engineering considerations

4.1 Modifications incorporated in the EUT

Modifications

Modifications performed to the EUT during this assessment
None Yes , performed by Client or Nemko
Details:

4.2 Deviations from laboratory tests procedures

Deviations

Deviations from laboratory test procedures
None Yes - details are listed below:

4.3 Technical judgment

Judgment

None

Section 5: Test conditions

5.1 Deviations from laboratory tests procedures

No deviations were made from laboratory test procedures.

5.2 Test conditions, power source and ambient temperatures

<p>Normal temperature, humidity and air pressure test conditions</p>	<p>Temperature: 15–30 °C Relative humidity: 20–75 % Air pressure: 86–106 kPa</p> <p>When it is impracticable to carry out tests under these conditions, a note to this effect stating the ambient temperature and relative humidity during the tests shall be recorded and stated.</p>
<p>Power supply range:</p>	<p>The normal test voltage for equipment to be connected to the mains shall be the nominal mains voltage. For the purpose of the present document, the nominal voltage shall be the declared voltage, or any of the declared voltages $\pm 5\%$, for which the equipment was designed.</p>

5.3 Measurement uncertainty

The measurement uncertainty was calculated for each test and quantity listed in this test report, according to CISPR 16-4-2 and other specific test standard and is documented in Nemko Spa working manual WML1002.

The assessment of conformity for each test performed on the equipment is performed not taking into account the measurement uncertainty. The two following possible verdicts are stated in the report:

P (Pass) - The measured values of the equipment respect the specification limit at the points tested. The specific risk of false accept is up to 50% when the measured result is close to the limit.

F (Fail) - One or more measured values of the equipment do not respect the specification limit at the points tested. The specific risk of false reject is up to 50% when the measured result is close to the limit.

Hereafter Nemko's measurement uncertainties are reported:

Test	Range	Measurement Uncertainty	Notes
Radiated Disturbance 10m Chamber	Antenna distance 3 m, 10 m 0.009 ÷ 200 MHz	5.0 dB	(1)
	Antenna distance 1 m, 3 m, 10 m 200 ÷ 1000 MHz	5.2 dB	(1)
	Antenna distance 1 m, 3 m, 10 m 1 ÷ 6 GHz	5.2 dB	(1)
	Antenna distance 1 m, 3 m 6 ÷ 18 GHz	5.5 dB	(1)
	Antenna distance 1 m, 3 m 18 ÷ 40 GHz	7.2 dB	(1)
Radiated Disturbance with large loop antenna system (LLAS)	0.009 ÷ 30 MHz	3.3 dB	(1)
Conducted Disturbance	0.02 ÷ 150 kHz with AMN	3.8 dB	(1)
	150 kHz ÷ 30 MHz with AMN	3.4 dB	(1)
	150 kHz ÷ 30 MHz with AAN	4.6 dB	(1)
	9 kHz ÷ 30 MHz with voltage probe	2.9 dB	(1)
	150 kHz ÷ 30 MHz with current probe	2.9 dB	(1)
Clicks	9 ÷ 150 kHz	3.8 dB	(1)
	150 kHz ÷ 30 MHz	3.4 dB	(1)
Disturbance Power	30 MHz ÷ 300 MHz	4.5 dB	(1)
Frequency	10 Hz ÷ 1 kHz	0.2 %	(1)
	1 kHz ÷ 40 GHz	10 ⁻⁶	(1)
Harmonic Current Emission	50 Hz ÷ 2 kHz	3 %	(1)
Fluctuation and Flickers	Fluctuation	0.05 %	(1)
	Flickers	5 %	(1)
Radiated Immunity Anechoic Chambers	20 MHz ÷ 6 GHz	3.4 dB	(1) (3)
Radiated Immunity TEM Cell	0.01 ÷ 200 MHz	3.0 dB	(1) (3)
Bulk Current	1 ÷ 200 MHz	3.0 dB	(1)
Immunity to conducted disturbances	9 kHz ÷ 230 MHz	3.0 dB	(1)
ESD Immunity	Voltage, Current, Rise time, Duration	(2)	(1)
Burst Immunity	Voltage, frequency, burst period and duration, rise time and pulse width	(2)	(1)
Surge Immunity	Voltage, Current, Rise time, Duration	(2)	(1)
DIPS, Interruption and Voltage duration Immunity	Amplitude	5 %	(1)
	Duration	5 %	
Impulse Magnetic Field Immunity	Peak Current	10 %	(1) (3)
	Rise time, Duration	20 %	
Power Frequency Magnetic Field Immunity	16.7 Hz, 50 Hz, 60 Hz	2.0 dB	(1) (3)
Damped Oscillatory Wave Immunity Ring Wave Immunity	Voltage, front time, frequency 100 kHz, 1 MHz	(2)	(1)
Damped Magnetic Field	Amplitude: 100 kHz, 1 MHz	3 dB	(1)
	Frequency: 100 kHz, 1 MHz	10 %	
Low Frequency Immunity	15 Hz ÷ 150 kHz	2.2 dB	(1)
Automotive transients Immunity	Voltage, rise time, duration time Impulses 1, 2a, 2b, 3a, 3b and 4	(2)	(1)
Automotive transients Emission	Amplitude, Time	10 %	(1)
EMF for Lighting Equipment	-	25 %	(1)
Electromagnetic fields (EMF)	Magnetic, Electric and Electromagnetic fields: 0 Hz ÷ 40 GHz	25 %	(1)
Electrical quantities (voltage, current, resistance)	AC/DC Voltage 10 mV ÷ 1000 V 0÷100 kHz AC/DC Current 0.1 mA ÷ 400 A 0÷1 kHz Resistance 100 mΩ ÷ 10 MΩ	2.5 %	(1)

NOTES:

- (1) The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k = 2, which for a normal distribution corresponds to a coverage probability of approximately 95 %
- (2) The instruments used for this immunity test is according to the tolerances requested by the applicable standard
- (3) The reported expanded uncertainty of measurement is related to the stimulus quantity

5.4 Test equipment

Equipment	Manufacturer	Model No.	Asset/Serial No.	Next cal.
Spectrum Analyzer	Agilent	N9030A PXA	MY53120882	12/2020
Spectrum Analyzer	Keysight	N9040B UXA	NY57212657	10/2020
Climatic Chambre	Angelantoni	ACS-Hygnos 600	7237	11/2021
Trilog Broad Band Antenna	Schwarzbeck	VULB 9162	VULB 9162-25	07/2021
Bilog antenna (1 ÷ 18 GHz)	Schwarzbeck	STLP 9148	STPL 9148-123	07/2021
Double ridge horn antenna (4 ÷ 40 GHz)	RFSpin	DRH40	061106A40	04/2023
Broadband preamplifier (18 ÷ 40 GHz)	Sage	STB-1834034030-KFKF-L1	18490-01	03/2021
Broadband preamplifier (1 ÷ 18 GHz)	Schwarzbeck	BBV 9718	9718-137	07/2021
EMI receiver (2 Hz ÷ 44 GHz)	R&S	ESW44	101620	09/2021
Controller	Maturo	FCU3.0	10041	NCR
Tilt antenna mast	Maturo	TAM4.0-E	10042	NCR
Turntable	Maturo	TT4.0-5T	2.527	NCR
Semi-anechoic chamber	Nemko	10m semi-anechoic chamber	530	09/2021
Shielded room	Siemens	10m control room	1947	NCR
Controller	EMCO	2090	9511-1099	NCR
Antenna Tower	EMCO	2071-2	9601-1940	NCR
Turning table Controller	EMCO	1061-1.521	9012-1508	NCR
Semi-anechoic chamber	Nemko	3m semi-anechoic chamber	70	NCR
Shielded room	Siemens	3m control room	3	NCR

Note: N/A = Not Applicable, NCR = No Cal Required, COU = CAL On Use
 (*) Equipment supplied by manufacturer's

Appendix A: Test results

Clause 96.41(e)(3) Occupied bandwidth

(e) 3.5 GHz Emissions and Interference Limits

(3) *Measurement procedure.* (i) Compliance with this provision is based on the use of measurement instrumentation employing a resolution bandwidth of 1 megahertz or greater. However, in the 1 megahertz bands immediately outside and adjacent to the licensee's authorized frequency channel, a resolution bandwidth of no less than one percent of the fundamental emission bandwidth may be employed. A narrower resolution bandwidth is permitted in all cases to improve measurement accuracy provided the measured power is integrated over the full reference bandwidth (*i.e.*, 1 MHz or 1 percent of emission bandwidth, as specified).

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.

Test date: 09/28/2020 to 10/09/2020

Test results: Pass

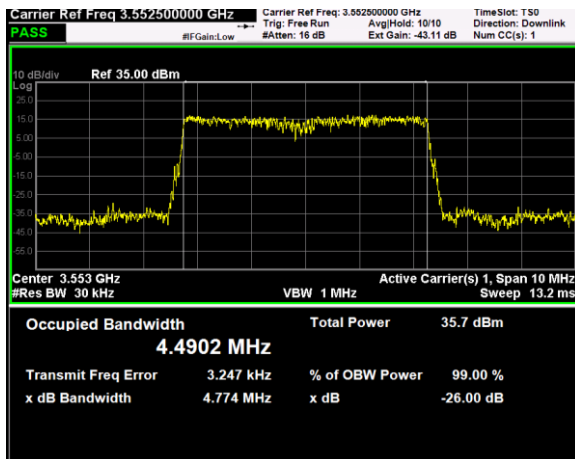
Special notes

-

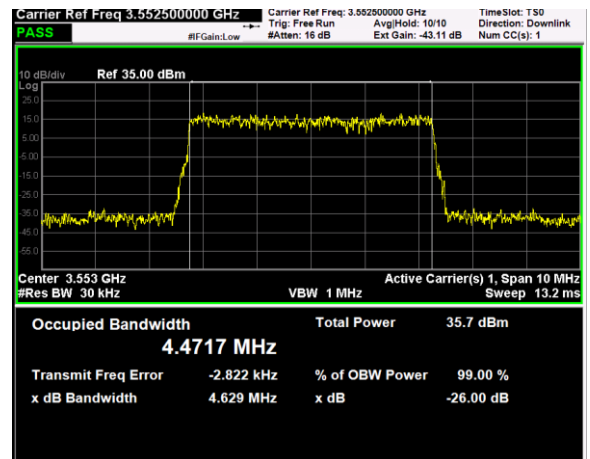
Clause 96.41(e)(3) Occupied bandwidth, continued

Test data

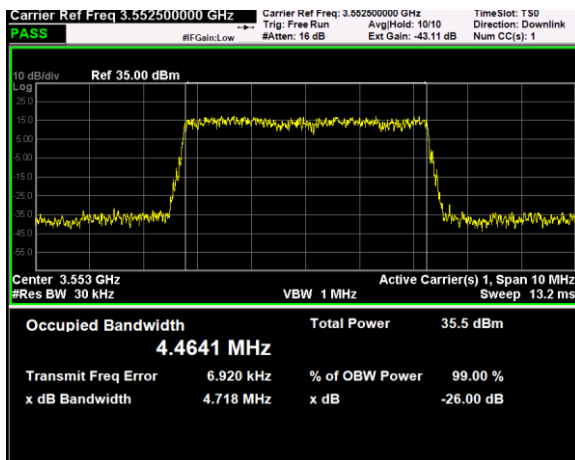
RF PORT 1



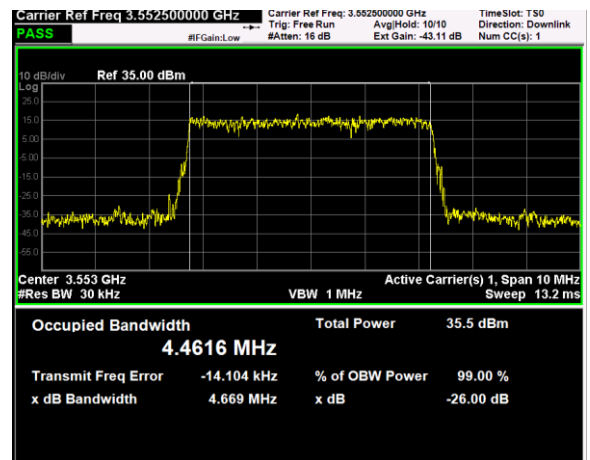
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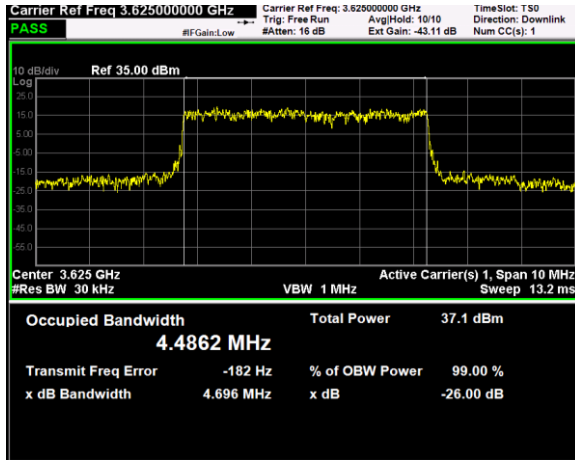
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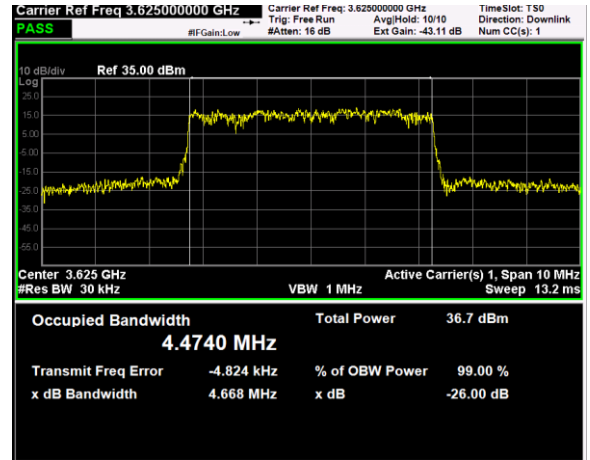
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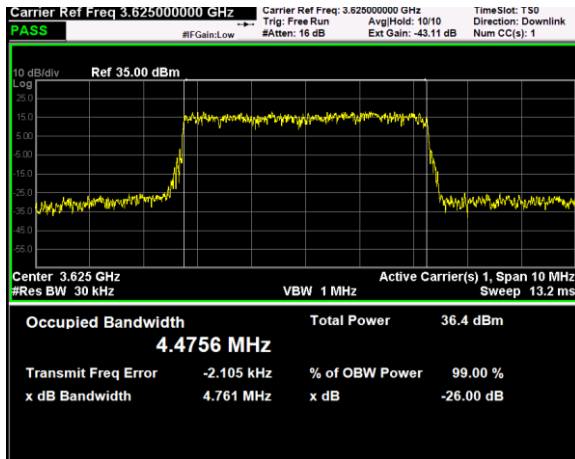
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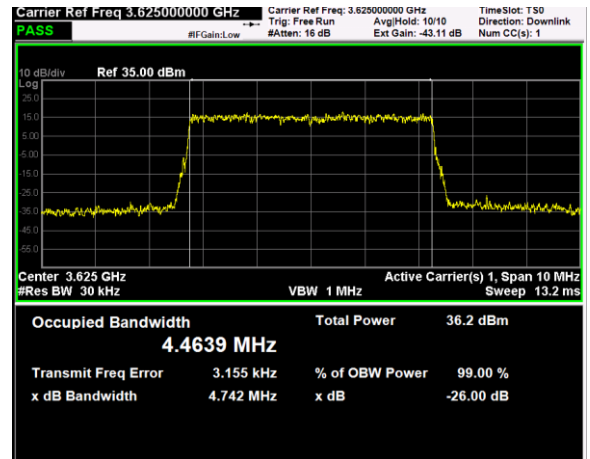
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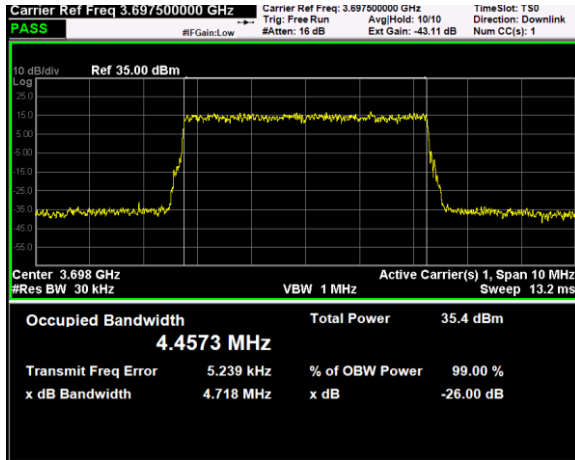
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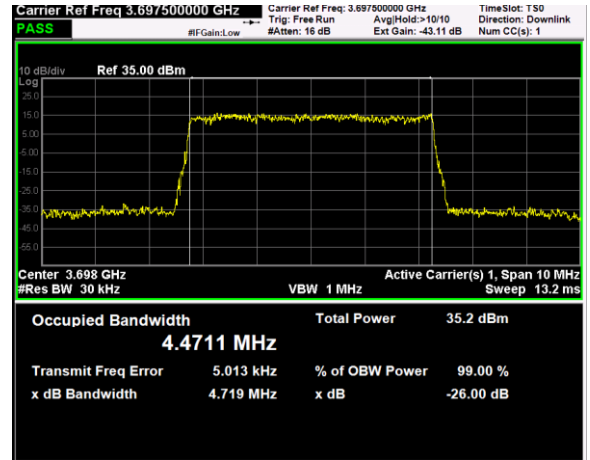
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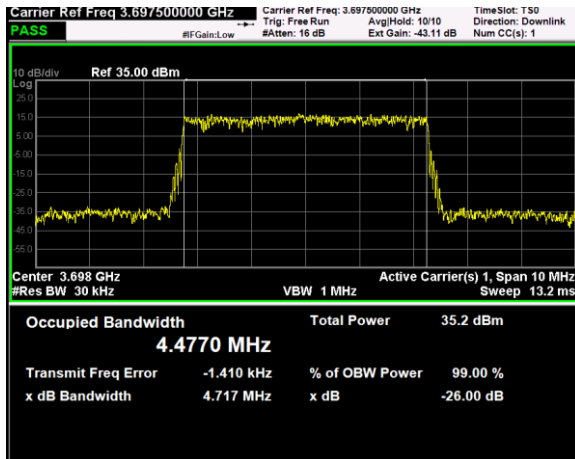
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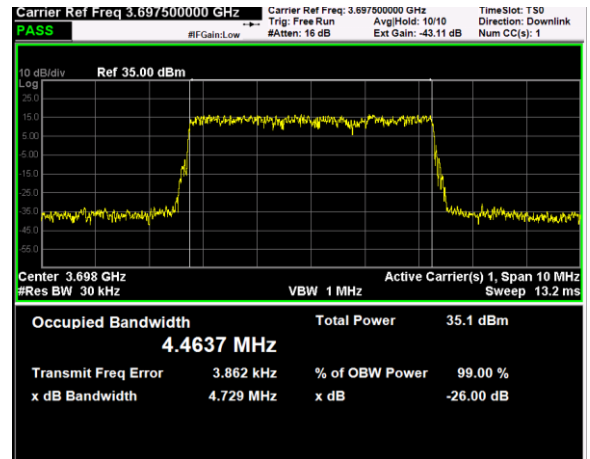
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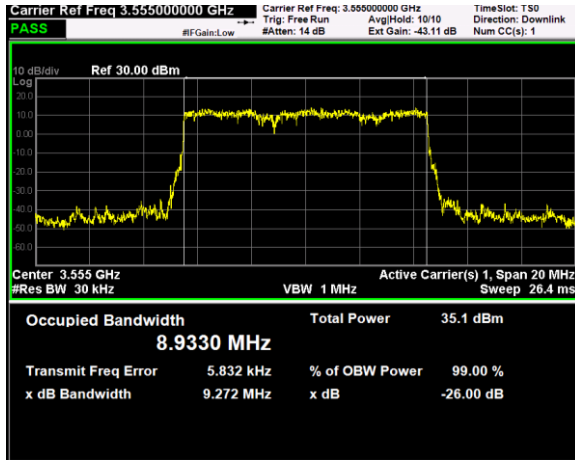
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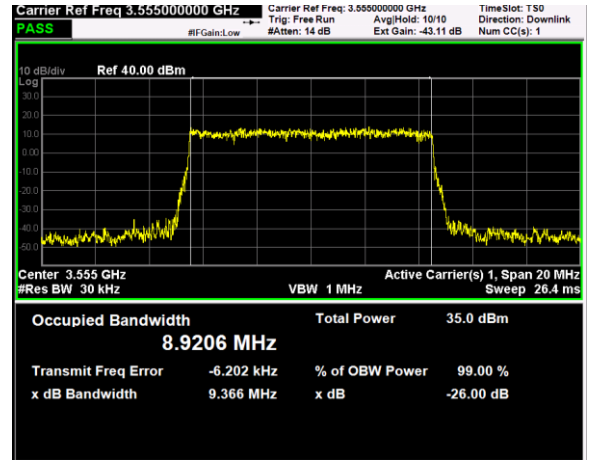
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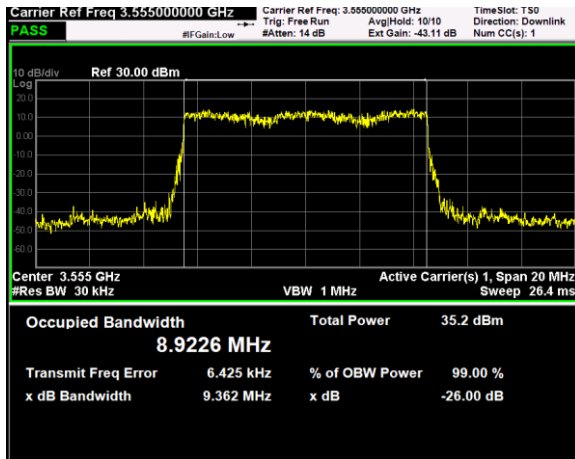
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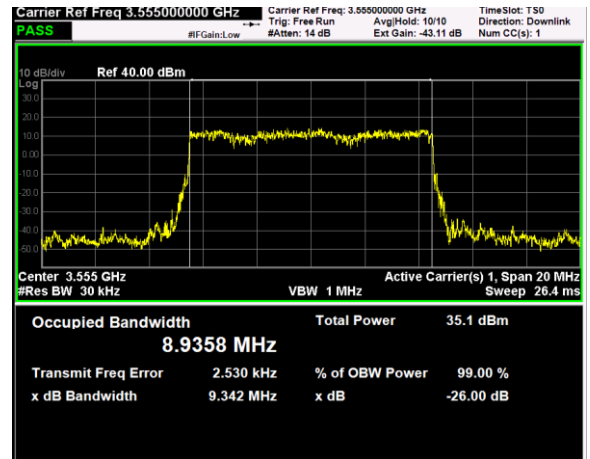
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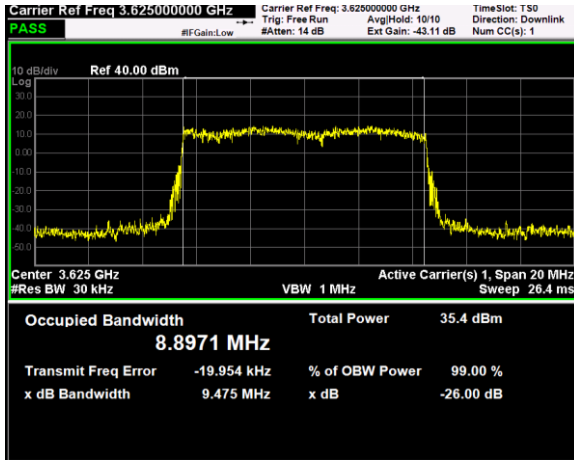
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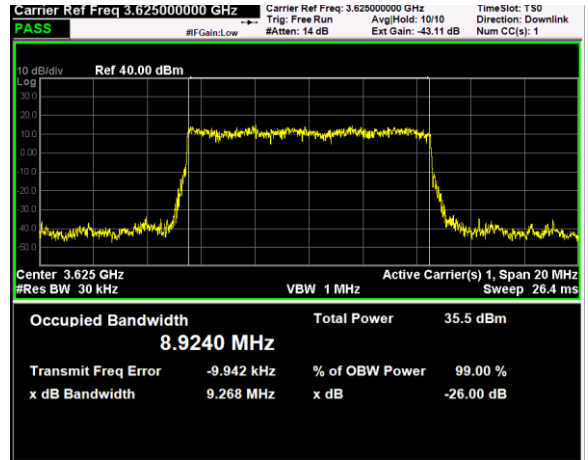
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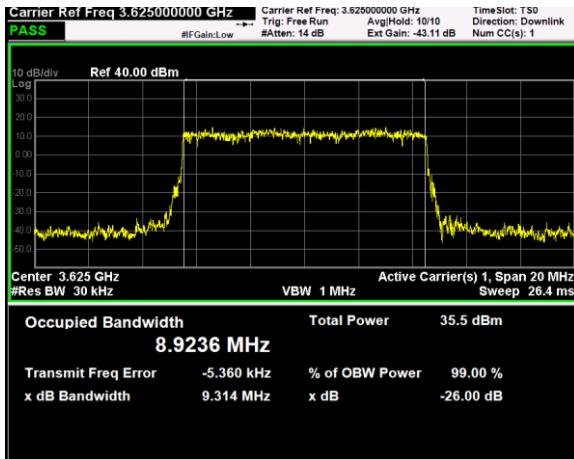
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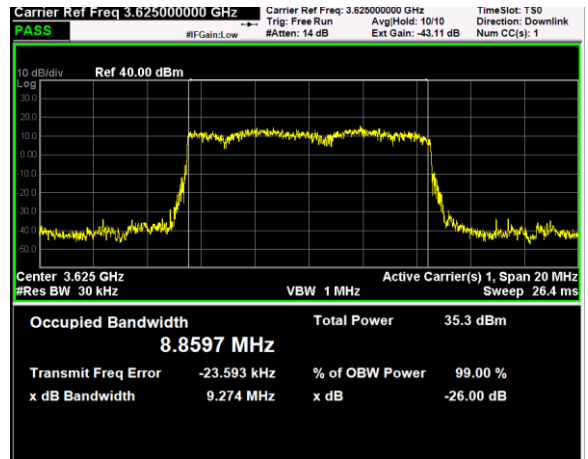
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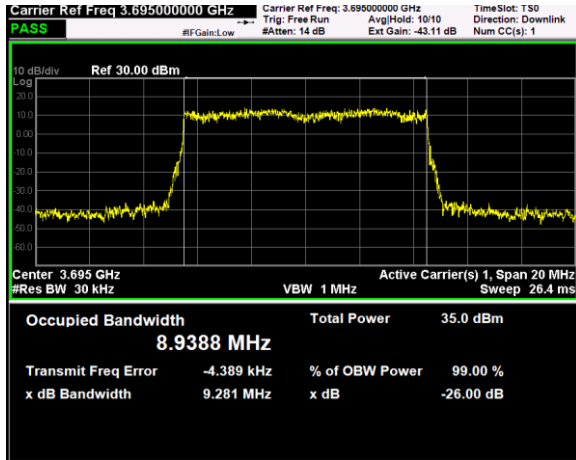
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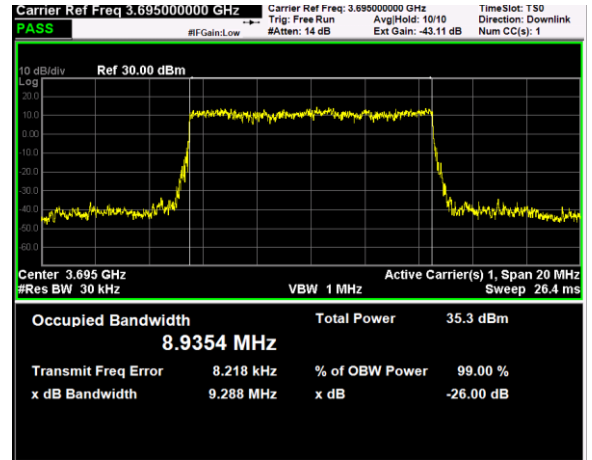
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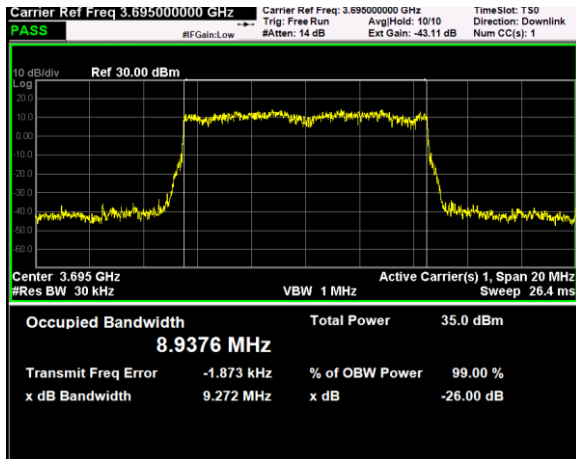
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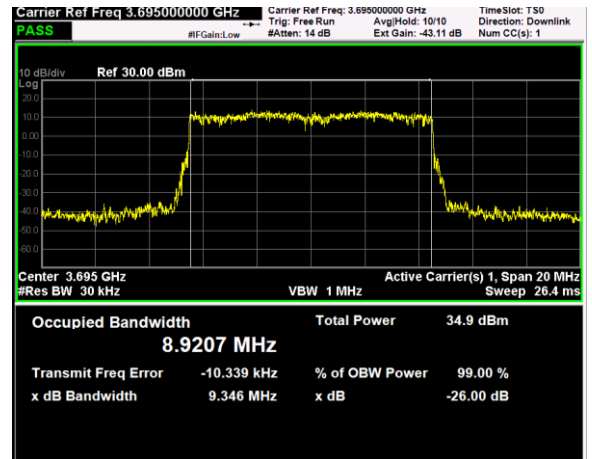
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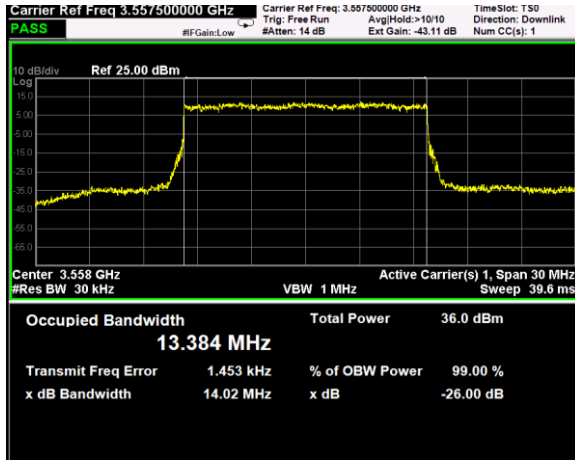
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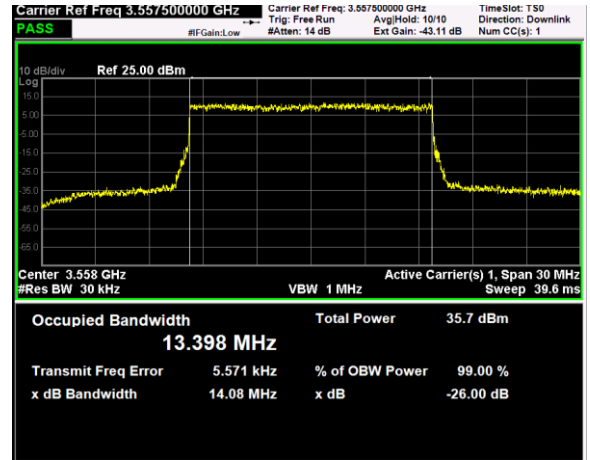
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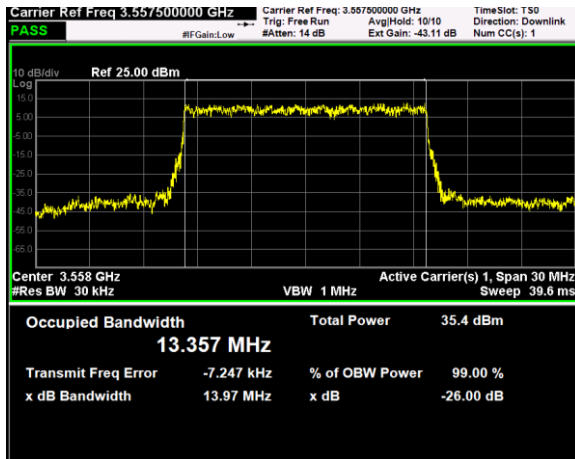
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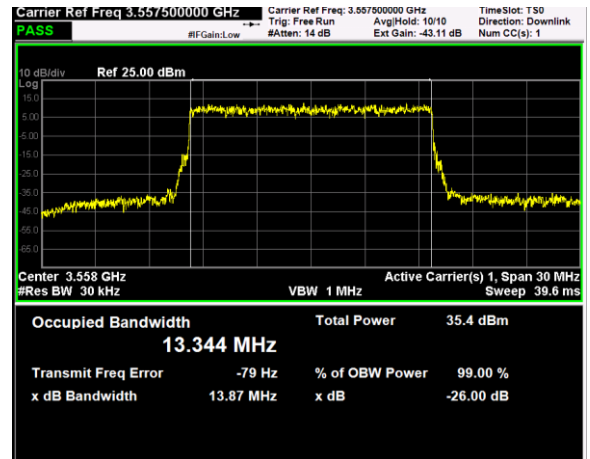
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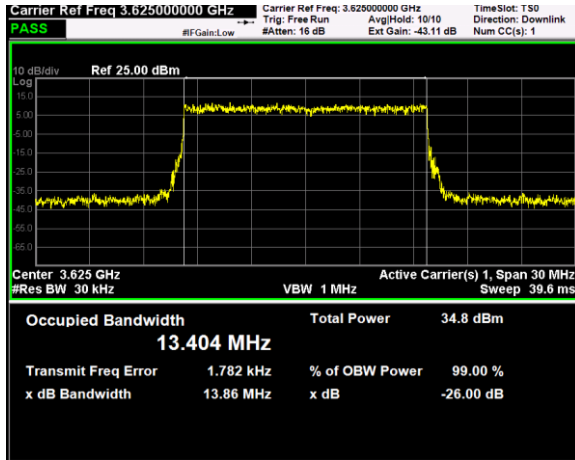
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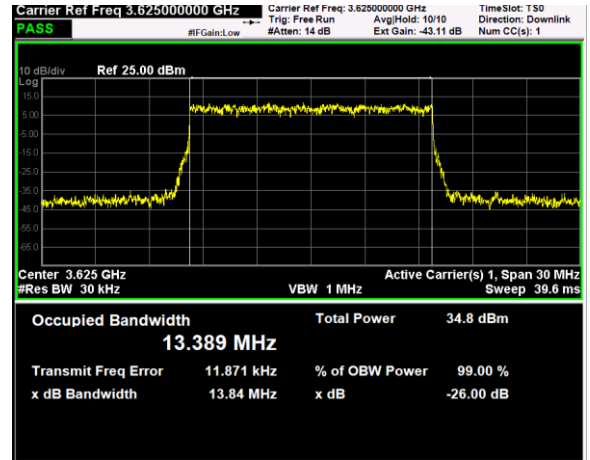
Channel: BOTTOM, Modulation: 64QAM, BW=15MHz



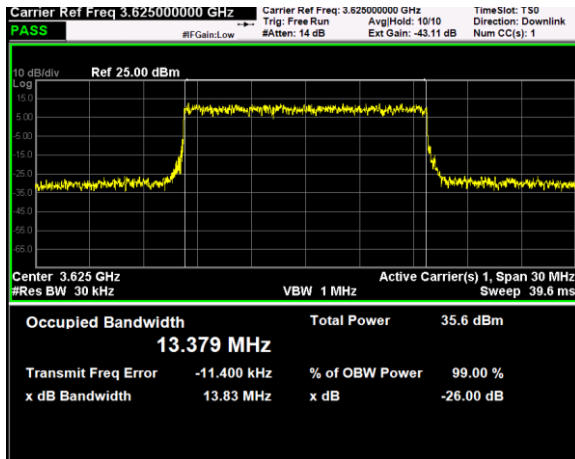
Channel: BOTTOM, Modulation: 256QAM, BW=15MHz



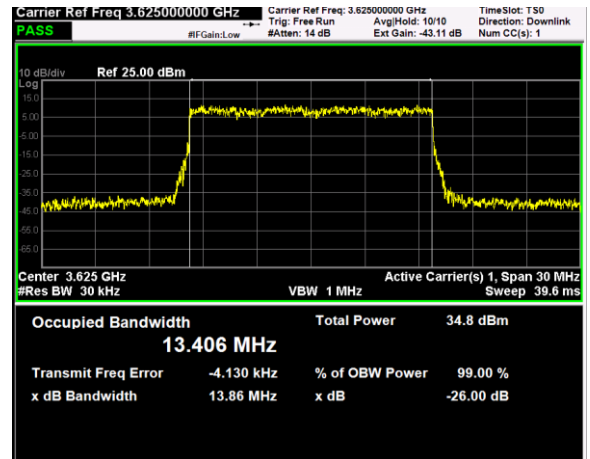
Channel: MIDDLE, Modulation: QPSK, BW=15MHz



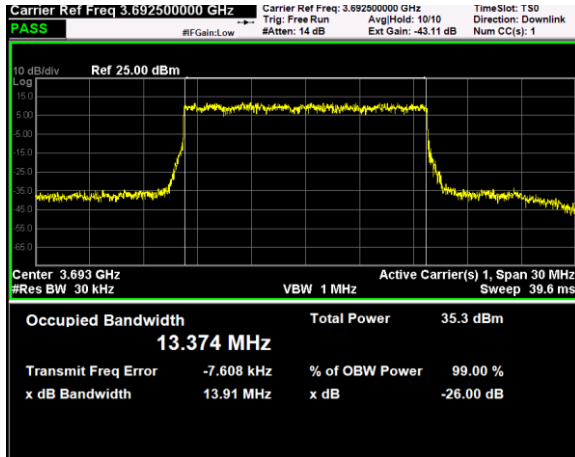
Channel: MIDDLE, Modulation: 16QAM, BW=15MHz



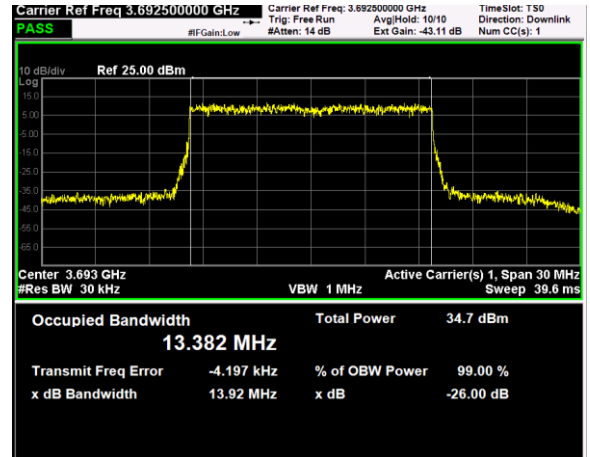
Channel: MIDDLE, Modulation: 64QAM, BW=15MHz



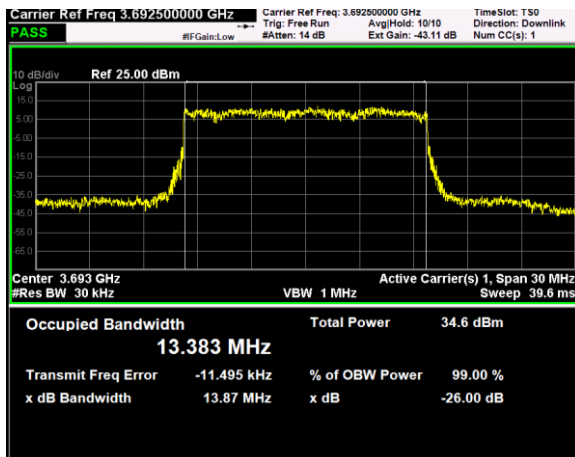
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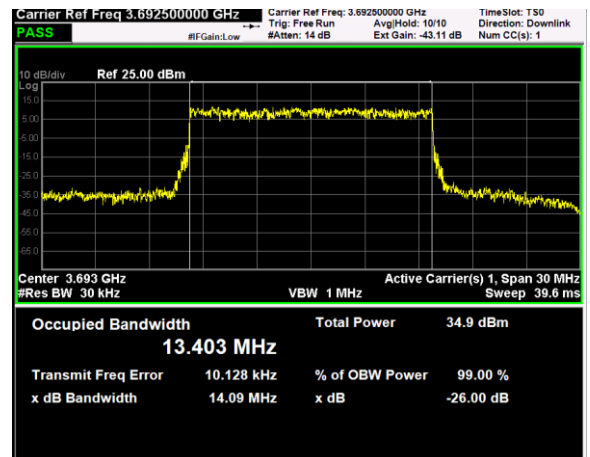
Channel: TOP, Modulation: QPSK,
BW=15MHz



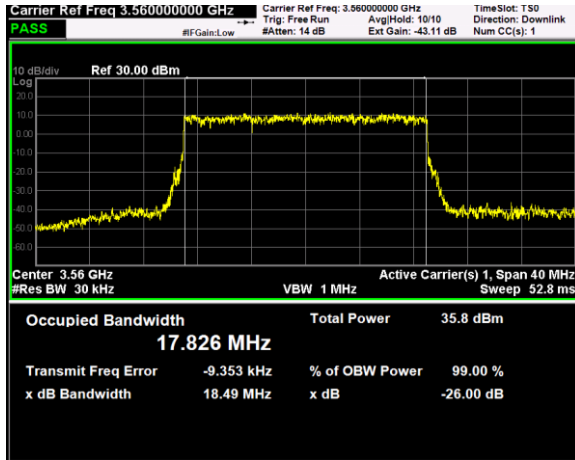
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BW=15MHz



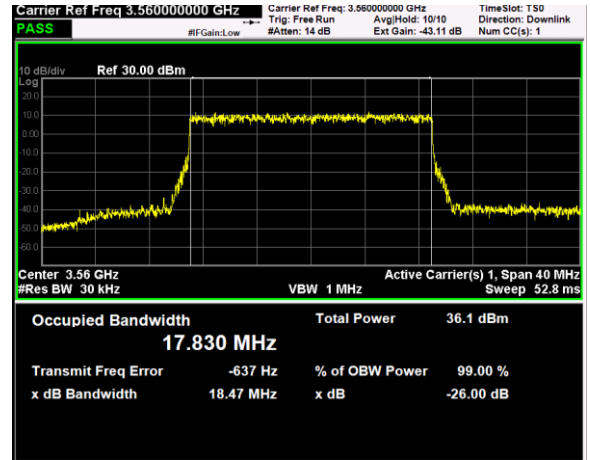
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BW=15MHz



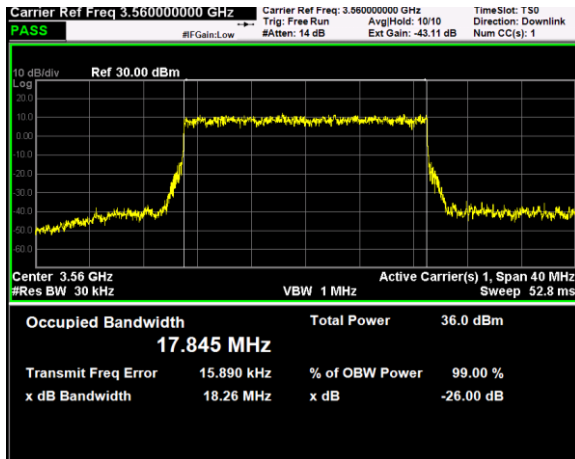
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BW=15MHz



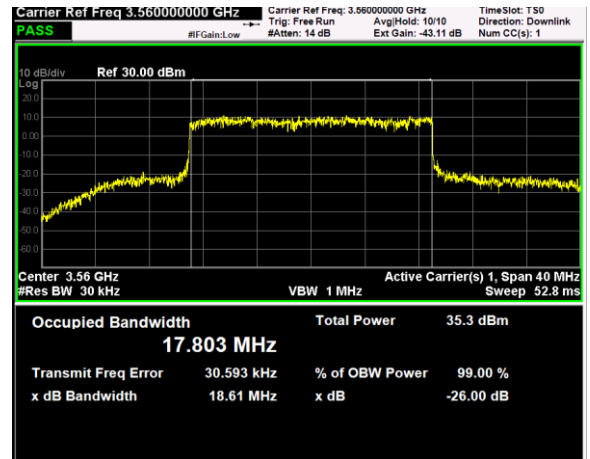
Channel: BOTTOM, Modulation: QPSK, BW=20MHz



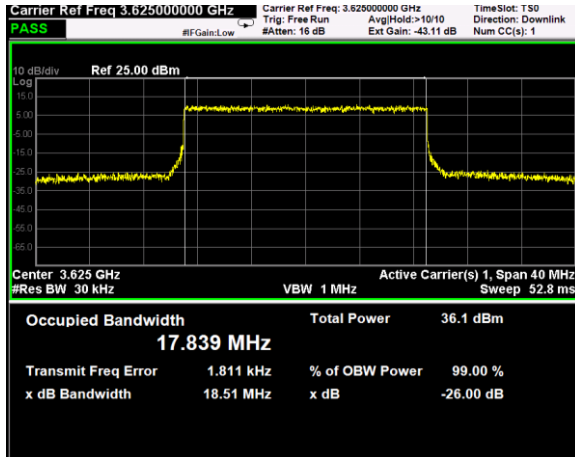
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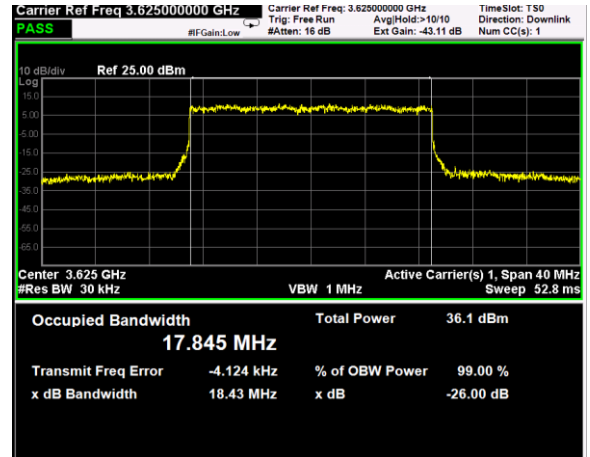
Channel: BOTTOM, Modulation: 64QAM, BW=20MHz



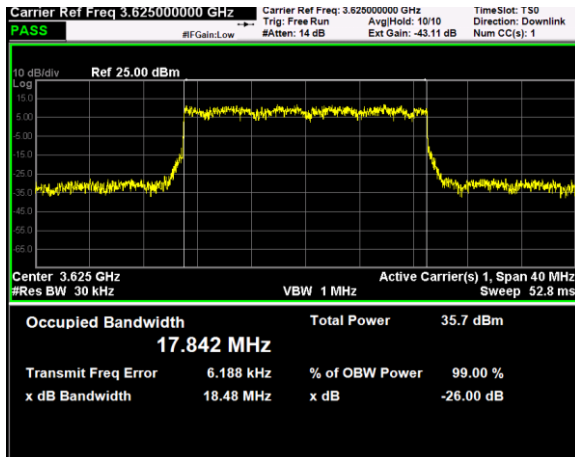
Channel: BOTTOM, Modulation: 256QAM, BW=20MHz



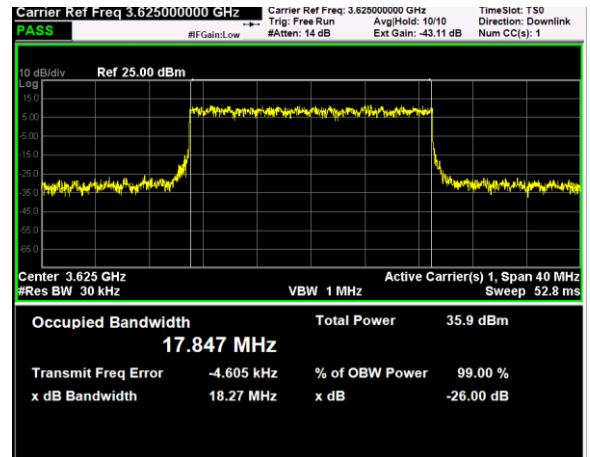
Channel: MIDDLE, Modulation: QPSK, BW=20MHz



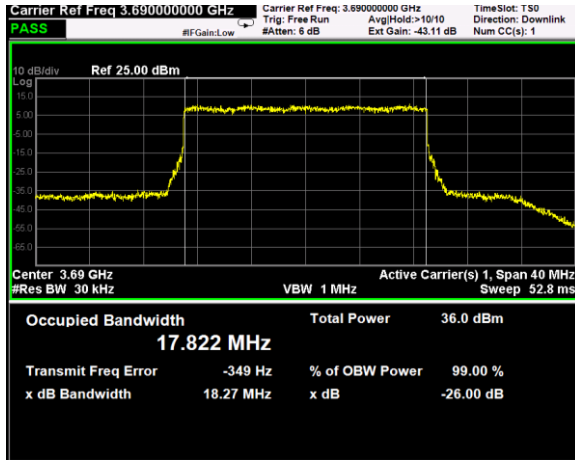
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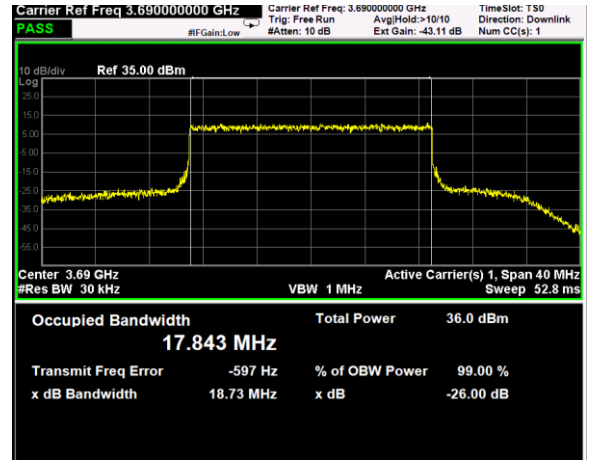
Channel: MIDDLE, Modulation: 64QAM, BW=20MHz



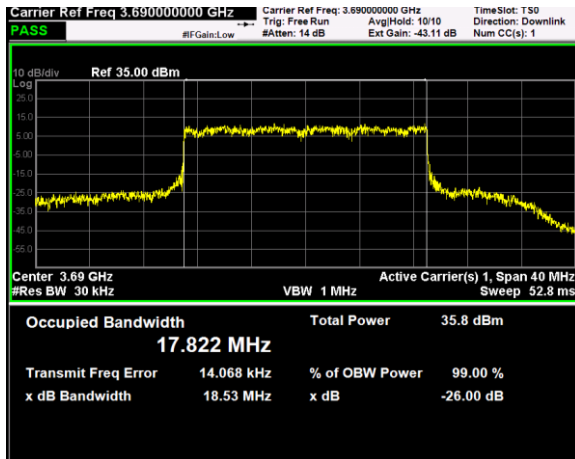
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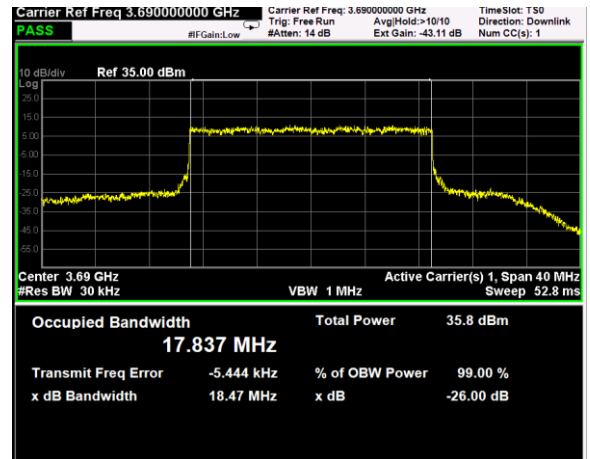
Channel: TOP, Modulation: QPSK, BW=20MHz



Channel: TOP, Modulation: 16QAM, BW=20MHz

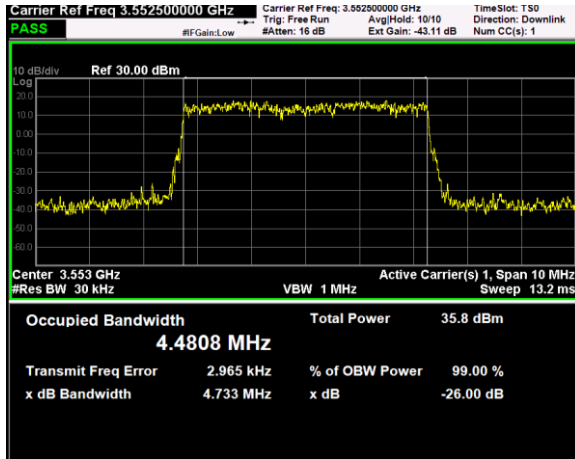


Channel: TOP, Modulation: 64QAM, BW=20MHz

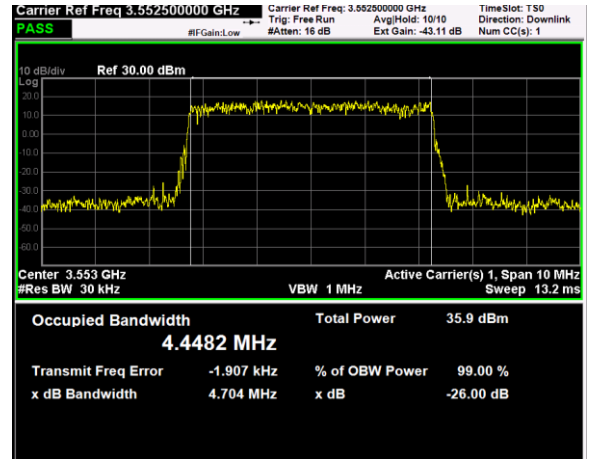


Channel: TOP, Modulation: 256QAM, BW=20MHz

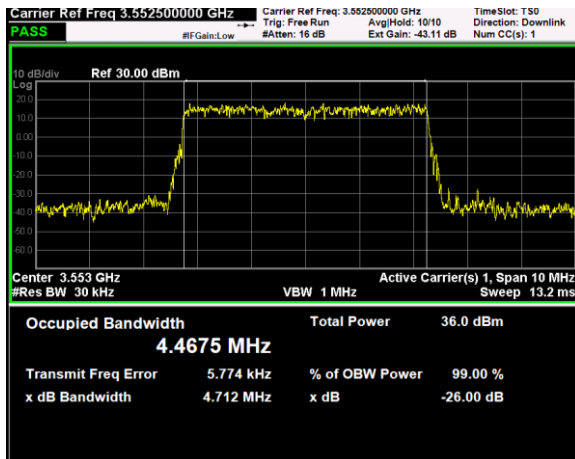
RF PORT 2



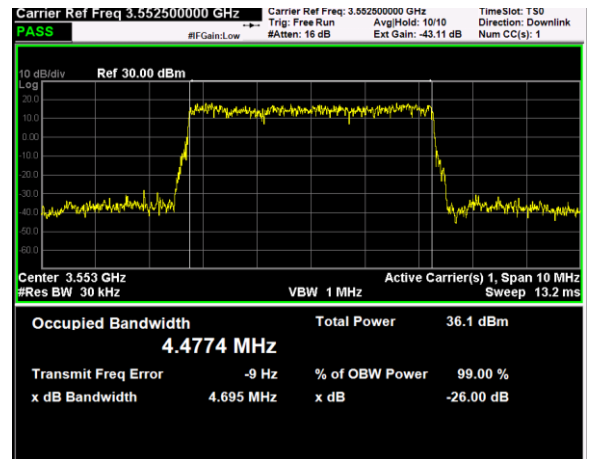
Channel: BOTTOM, Modulation: QPSK, BW=5MHz



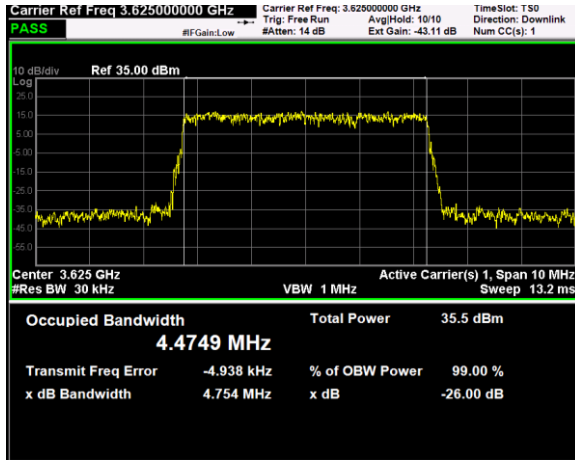
Channel: BOTTOM, Modulation: 16QAM, BW=5MHz



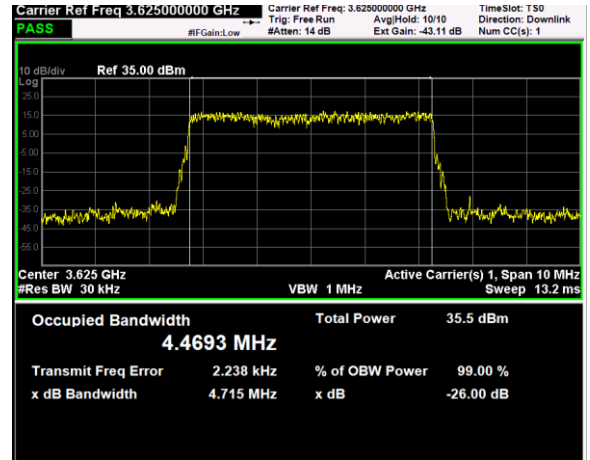
Channel: BOTTOM, Modulation: 64QAM, BW=5MHz



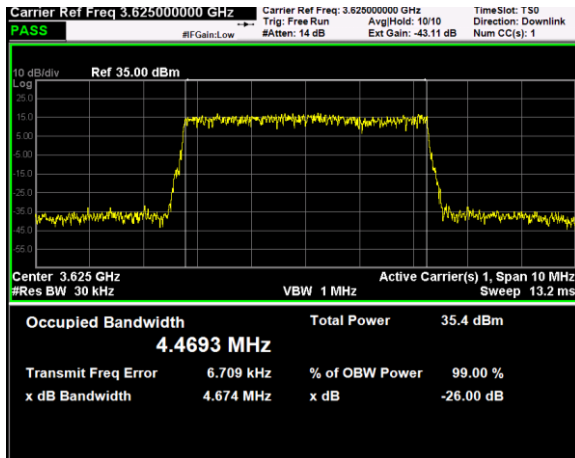
Channel: BOTTOM, Modulation: 256QAM, BW=5MHz



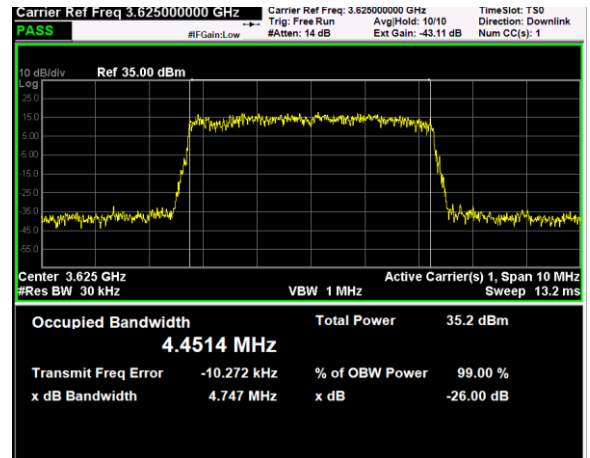
Channel: MIDDLE, Modulation: QPSK, BW=5MHz



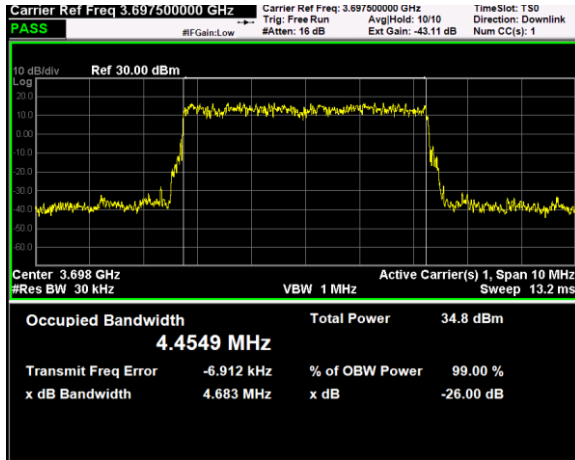
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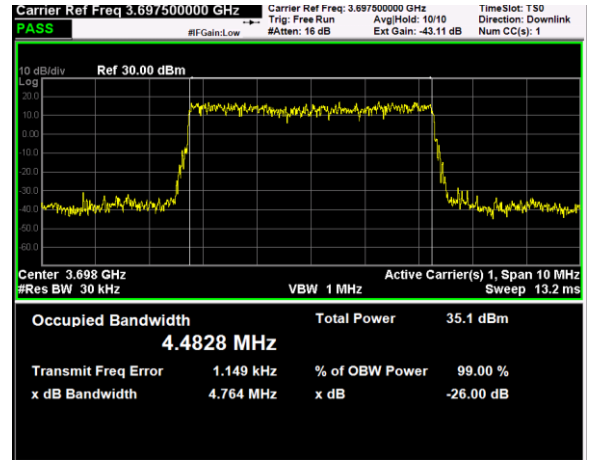
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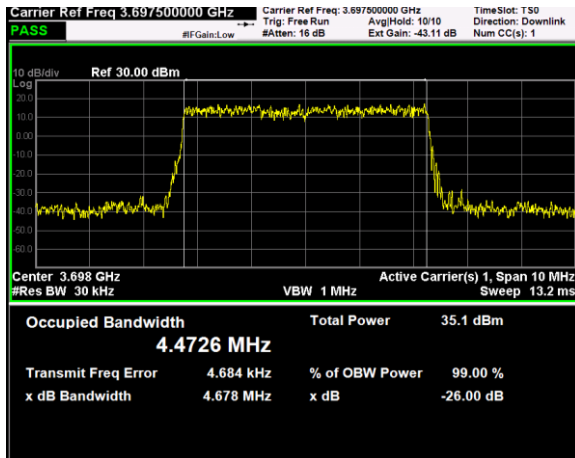
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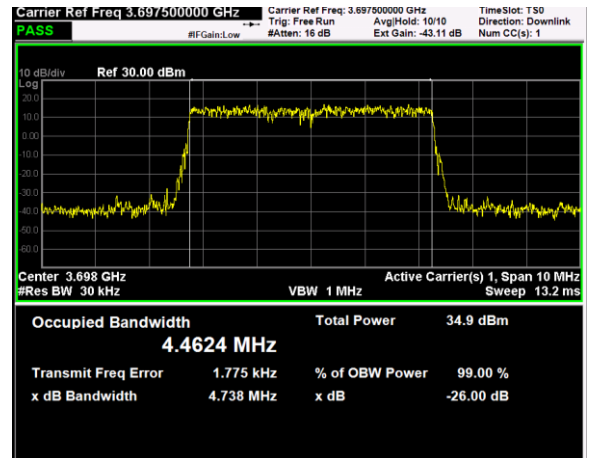
Channel: TOP, Modulation: QPSK, BW=5MHz



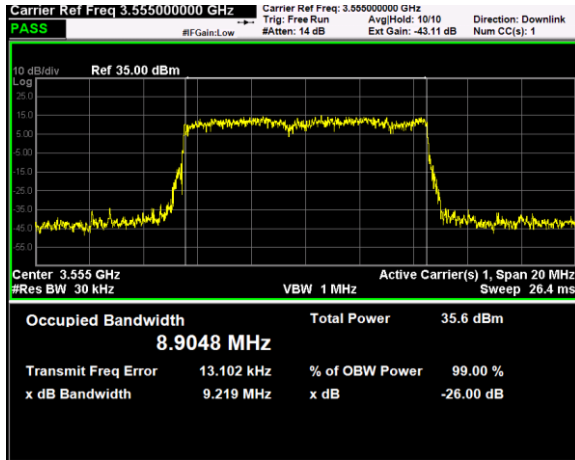
Channel: TOP, Modulation: 16QAM, BW=5MHz



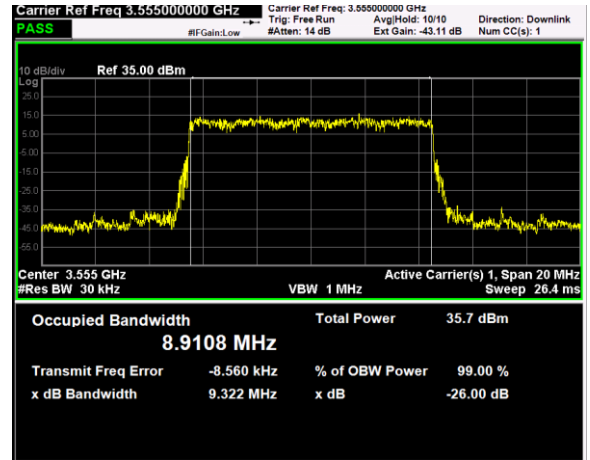
Channel: TOP, Modulation: 64QAM, BW=5MHz



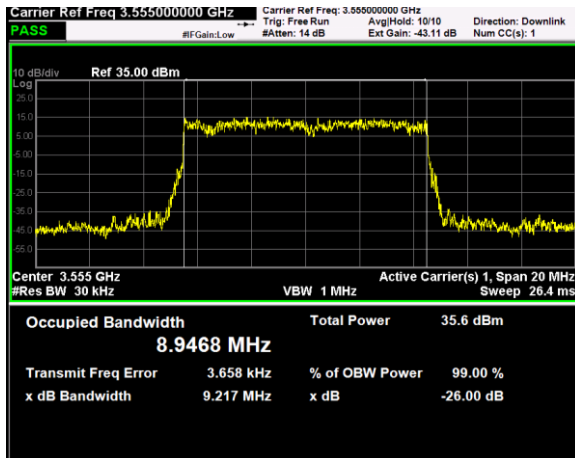
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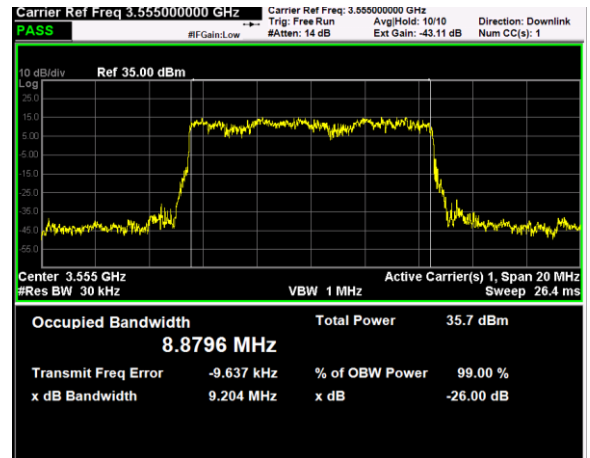
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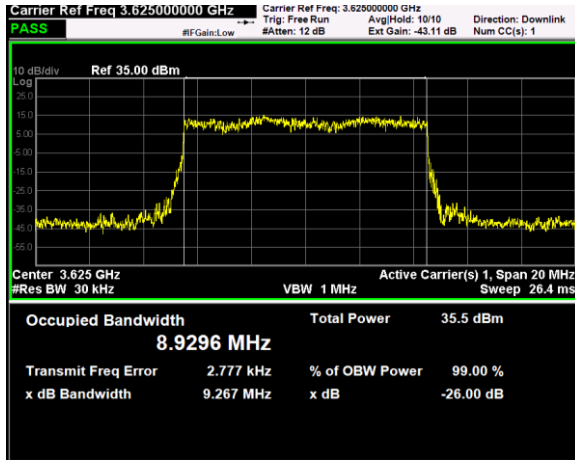
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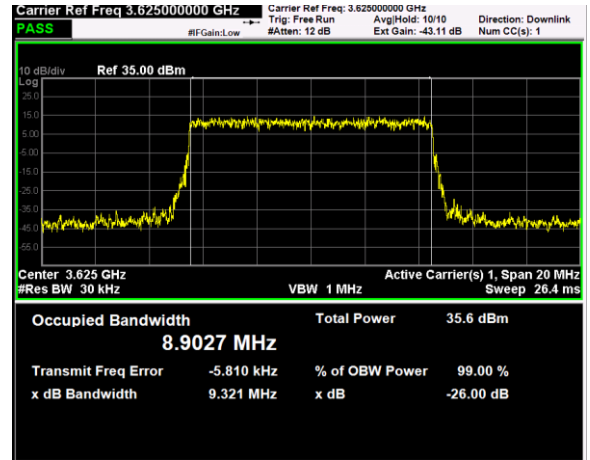
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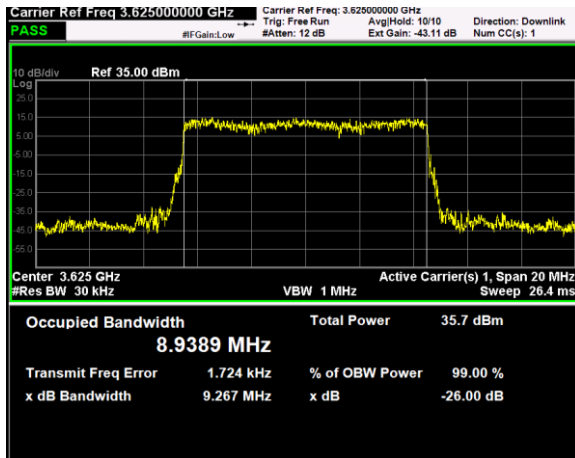
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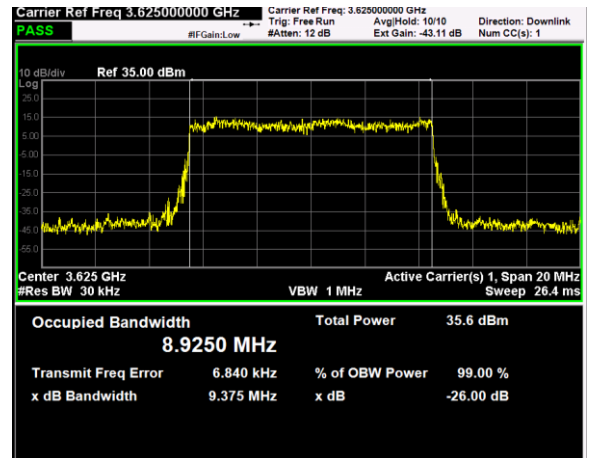
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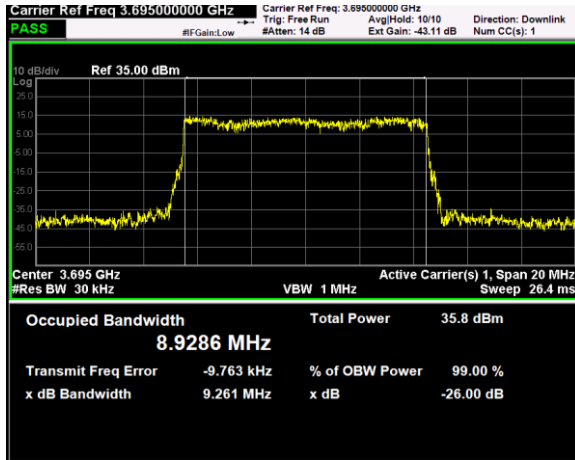
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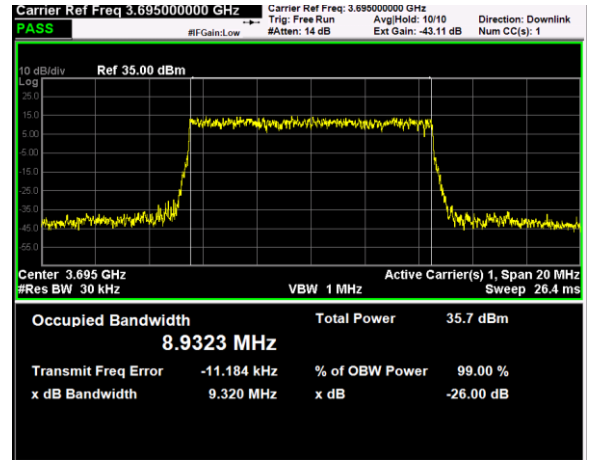
Channel: MIDDLE, Modulation: 64QAM, BW=10MHz



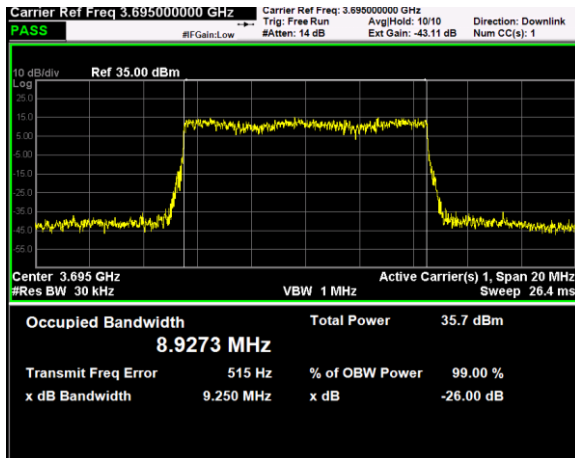
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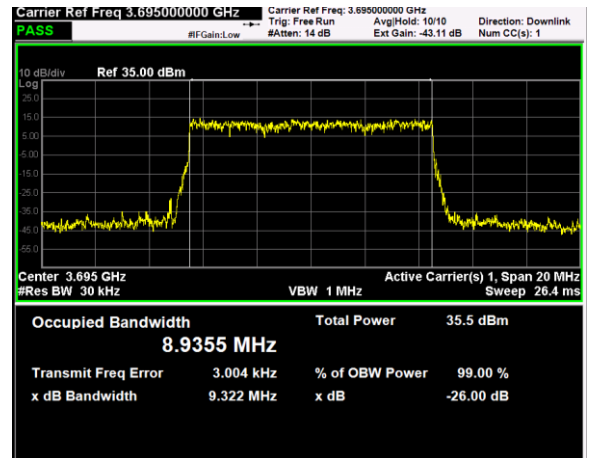
Channel: TOP, Modulation: QPSK, BW=10MHz



Channel: TOP, Modulation: 16QAM, BW=10MHz



Channel: TOP, Modulation: 64QAM, BW=10MHz



Channel: TOP, Modulation: 256QAM, BW=10MHz