TEST REPORT

CERTIFICATE OF CONFORMITY

Standard:	**47 CFR FCC Part 96** **47 CFR FCC Part 2**
Report No.:	RFBBQJ-WTW-P24040202-2
FCC ID:	ACJ9TGWW23C
Product:	Radio Module
Brand:	Panasonic
Model No.:	WW23C
Received Date:	2024/4/10
Test Date:	2024/4/17 ~ 2024/5/2
Issued Date:	2024/7/31
Applicant:	Panasonic Corporation of North America
Address:	Two Riverforont Plaza,Newark, NJ 07102-5490, USA
Issued By:	Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch Lin Kou Laboratories
Lab Address:	No. 47-2, 14th Ling, Chia Pau Vil., Lin Kou Dist., New Taipei City, Taiwan
Test Location (1):	No. 19, Hwa Ya 2nd Rd., Wen Hwa Vil., Kewi Shan Dist., Taoyuan City 33383, Taiwan
Test Location (2):	No. 70, Wenming Rd., Guishan Dist., Taoyuan City 333, Taiwan (R.O.C.)
FCC Registration / Designation Number (1):	788550 / TW0003
FCC Registration / Designation Number (2):	281270 / TW0032

Approved by: Jeremy Lin , **Date:** **2024/7/31**

Jeremy Lin / Project Engineer

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Prepared by : Gina Liu / Specialist

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Release Control Record

Issue No.	Description	Date Issued
RFBBQJ-WTW-P24040202-2	Original release.	2024/7/31

1 Certificate

Product:	Radio Module
Brand:	Panasonic
Test Model:	WW23C
Sample Status:	Engineering sample
Applicant:	Panasonic Corporation of North America
Test Date:	2024/4/17 ~ 2024/5/2
Standard:	47 CFR FCC Part 96 47 CFR FCC Part 2
Measurement procedure:	ANSI/TIA/EIA-603-E 2016 ANSI C63.26-2015 KDB 971168 D01 Power Meas License Digital Systems v03r01 KDB 940660 D01 Part 96 CBRS Eqpt v03

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.

2 Summary of Test Results

47 CFR FCC Part 96 & Part 2			
Standard / Clause	Test Item	Result	Remark
FCC 47 CFR Part 2.1046 FCC 47 CFR Part 96.41(b)	Equivalent Isotropically Radiated Power	Pass	Meet the requirement of limit.
FCC 47 CFR Part 2.1047	Modulation Characteristics	Pass	Meet the requirement of limit.
FCC 47 CFR Part 96.41(g)	Peak to Average Ratio	Pass	Meet the requirement of limit.
FCC 47 CFR Part 2.1049	Bandwidth	Pass	Meet the requirement of limit.
FCC 47 CFR Part 2.1051 FCC 47 CFR Part 96.41(e)	Conducted Spurious Emissions	Pass	Meet the requirement of limit.
FCC 47 CFR Part 2.1053 FCC 47 CFR Part 96.41(e)	Radiated Spurious Emissions below 1GHz	Pass	Minimum passing margin is -28.26 dB at 520.24 MHz
FCC 47 CFR Part 2.1053 FCC 47 CFR Part 96.41(e)	Radiated Spurious Emissions above 1GHz	Pass	Minimum passing margin is -21.81 dB at 7150.00 MHz
FCC 47 CFR Part 2.1055	Frequency Stability	Pass	Meet the requirement of limit.

Note:

1. This report is prepared for FCC class II permissive change. The difference compared with original report are adding End-product disable LTE Band 41、Band 71 & adding LTE Band 42, LTE Band 48 Antenna gain is greater than original module certification. Therefore, LTE Band 42 full test, LTE Band 48 only test item of Equivalent Isotropically Radiated Power and Radiated Spurious Emissions were performed for this report. Other testing data please refer to SPORTON LAB report no.: FG242018F for module (Brand: AirPrime, Model: EM7595).
2. 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	Specification	Expanded Uncertainty (k=2) (±)
Maximum Output Power / Peak to Average Ratio	-	1.371 dB
26dB Bandwidth / Occupied Bandwidth	-	453.93 Hz / 72 Hz
Conducted emission / Spectrum Emission Mask	-	2.120 dB / 1.899 dB
Frequency Stability	-	0.176 ppm
Radiated Spurious Emissions below 1GHz	9 kHz ~ 30 MHz	3.00 dB
	30 MHz ~ 1 GHz	2.93 dB
Radiated Spurious Emissions above 1GHz	1 GHz ~ 18 GHz	1.76 dB
	18 GHz ~ 40 GHz	1.77 dB

The other instruments specified are routine verified to remain within the calibrated levels, no measurement uncertainty is required to be calculated.

2.2 Supplementary Information

There is not any deviation from the test standards for the test method, and no modifications required for compliance.

3 General Information

3.1 General Description of EUT

Product	Radio Module
Brand	Panasonic
Test Model	WW23C
Status of EUT	Engineering sample
Power Supply Rating	15.6 Vdc (Adapter) 10.8 Vdc (Battery)

Note:

1. The EUT is authorized for use in specific End-product. Please refer to below for more details.

Product	Brand	Model
Personal Computer	Panasonic	FZ-55

2. The End-product contains following accessory devices.

Product	Brand	Model	Description
Adapter	Panasonic	CF-AA5713A	I/P: 100-240 Vac, 50/60 Hz, 1.5 A O/P: 15.6 Vdc, 7.05 A 1.46m DC power cable with one core attached on adapter
Battery	Panasonic	FZ-VZSU1HU / FZ-VZSU1HAU	10.8 Vdc; 68 Wh; 6300mAh
Touch Pen	Panasonic	FZ-VNP551U	-

3. EUT Overview

Full Maximum EIRP (dBm/channel bandwidth)

Band / Bandwidth	TX Frequency Range (MHz)	Max. EIRP Power		
		QPSK	16QAM	64QAM
LTE Band 42 (Channel Bandwidth 20MHz)	3560.0-3590.0	103.039 mW (20.13dBm/channel bandwidth)	85.310 mW (19.31dBm/channel bandwidth)	65.917 mW (18.19dBm/channel bandwidth)
LTE Band 42 (Channel Bandwidth 15MHz)	3557.5-3592.5	102.802 mW (20.12dBm/channel bandwidth)	84.333 mW (19.26dBm/channel bandwidth)	64.269 mW (18.08dBm/channel bandwidth)
LTE Band 42 (Channel Bandwidth 10MHz)	3555.0-3595.0	101.158 mW (20.05dBm/channel bandwidth)	82.985 mW (19.19dBm/channel bandwidth)	65.163 mW (18.14dBm/channel bandwidth)
LTE Band 42 (Channel Bandwidth 5MHz)	3552.5-3597.5	102.329 mW (20.10dBm/channel bandwidth)	83.753 mW (19.23dBm/channel bandwidth)	64.417 mW (18.09dBm/channel bandwidth)
LTE Band 48 (Channel Bandwidth 20MHz)	3560.0-3690.0	126.474 mW (21.02dBm/channel bandwidth)	102.329 mW (20.10dBm/channel bandwidth)	78.886mW (18.97dBm/channel bandwidth)

Maximum EIRP (dBm/10MHz)

Band / Bandwidth	TX Frequency Range (MHz)	Max. EIRP Power		
		QPSK	16QAM	64QAM
LTE Band 42 (Channel Bandwidth 20MHz)	3460.0-3540.0	101.625 mW (20.07dBm/10MHz)	184.333 mW (19.26dBm/10MHz)	64.714 mW (18.11dBm/10MHz)
LTE Band 42 (Channel Bandwidth 15MHz)	3457.5-3542.5	101.158 mW (20.05dBm/10MHz)	83.368 mW (19.21dBm/10MHz)	63.096 mW (18.00dBm/10MHz)
LTE Band 48 (Channel Bandwidth 20MHz)	3560.0-3690.0	125.314 mW (20.98dBm/10MHz)	102.094 mW (20.09dBm/10MHz)	77.804 mW (18.91dBm/10MHz)

Band / Bandwidth	TX Frequency Range (MHz)	Emission Designator		
		QPSK	16QAM	64QAM
LTE Band 42 (Channel Bandwidth 5MHz)	3552.5-3697.5	4M50G7D	4M49D7W	4M49D7W
LTE Band 42 (Channel Bandwidth 10MHz)	3555.0-3695.0	8M97G7D	8M97D7W	8M97D7W
LTE Band 42 (Channel Bandwidth 15MHz)	3557.5-3692.5	13M4G7D	13M4D7W	13M4D7W
LTE Band 42 (Channel Bandwidth 20MHz)	3560.0-3690.0	17M9G7D	17M9D7W	17M9D7W

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

3.2 Antenna Description of EUT

1. The antenna information is listed as below.

Antenna Type	Monopole
Antenna Connector	ipex(MHF)
Band	Gain (dBi)
WCDMA Band 2	0.1
WCDMA Band 4	1.16
WCDMA Band 5	-0.65
LTE Band 2	0.1
LTE Band 4	1.16
LTE Band 5	-0.65
LTE Band 7	-0.24
LTE Band 12	0.36
LTE Band 13	-0.26
LTE Band 14	-0.26
LTE Band 25	0.1
LTE Band 26	-0.65
LTE Band 42	2.82
LTE Band 48	3.65
LTE Band 66	1.16

*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.

3.3 Test Mode Applicability and Tested Channel Detail

The EUT is designed to be positioned on the NB Mode only.

For LTE Band 42

Test Item	Tested Channel	Channel Bandwidth	Modulation	Mode
EIRP	43115 (3552.50 MHz) 43340 (3575.00 MHz) 43565 (3597.50 MHz)	5 MHz	QPSK / 16QAM / 64QAM	Full RB
	43140 (3555.00 MHz) 43340 (3575.00 MHz) 43540 (3595.00 MHz)	10 MHz	QPSK / 16QAM / 64QAM	Full RB
	43165 (3557.50 MHz) 43340 (3575.00 MHz) 43515 (3592.50 MHz)	15 MHz	QPSK / 16QAM / 64QAM	Full RB
	43190 (3560.00 MHz) 43340 (3575.00 MHz) 43490 (3590.00 MHz)	20 MHz	QPSK / 16QAM / 64QAM	Full RB
Modulation Characteristics	43340 (3575.00 MHz)	20 MHz	QPSK / 16QAM / 64QAM	Full RB
Frequency Stability	43115 (3552.50 MHz) 43565 (3597.50 MHz)	5 MHz	QPSK	Full RB
	43140 (3555.00 MHz) 43540 (3595.00 MHz)	10 MHz	QPSK	Full RB
	43165 (3557.50 MHz) 43515 (3592.50 MHz)	15 MHz	QPSK	Full RB
	43190 (3560.00 MHz) 43490 (3590.00 MHz)	20 MHz	QPSK	Full RB
Occupied Bandwidth	43115 (3552.50 MHz) 43340 (3575.00 MHz) 43565 (3597.50 MHz)	5 MHz	QPSK / 16QAM / 64QAM	Full RB
	43140 (3555.00 MHz) 43340 (3575.00 MHz) 43540 (3595.00 MHz)	10 MHz	QPSK / 16QAM / 64QAM	Full RB
	43165 (3557.50 MHz) 43340 (3575.00 MHz) 43515 (3592.50 MHz)	15 MHz	QPSK / 16QAM / 64QAM	Full RB
	43190 (3560.00 MHz) 43340 (3575.00 MHz) 43490 (3590.00 MHz)	20 MHz	QPSK / 16QAM / 64QAM	Full RB
Peak to Average Ratio	43115 (3552.50 MHz) 43340 (3575.00 MHz) 43565 (3597.50 MHz)	5 MHz	QPSK / 16QAM / 64QAM	1 RB
	43140 (3555.00 MHz) 43340 (3575.00 MHz) 43540 (3595.00 MHz)	10 MHz	QPSK / 16QAM / 64QAM	1 RB
	43165 (3557.50 MHz) 43340 (3575.00 MHz) 43515 (3592.50 MHz)	15 MHz	QPSK / 16QAM / 64QAM	1 RB
	43190 (3560.00 MHz) 43340 (3575.00 MHz) 43490 (3590.00 MHz)	20 MHz	QPSK / 16QAM / 64QAM	1 RB

Test Item	Tested Channel	Channel Bandwidth	Modulation	Mode
Conducted Emission	43115 (3552.50 MHz) 43340 (3575.00 MHz) 43565 (3597.50 MHz)	5 MHz	QPSK	1 RB Full RB
	43140 (3555.00 MHz) 43340 (3575.00 MHz) 43540 (3595.00 MHz)	10 MHz	QPSK	1 RB Full RB
	43165 (3557.50 MHz) 43340 (3575.00 MHz) 43515 (3592.50 MHz)	15 MHz	QPSK	1 RB Full RB
	43190 (3560.00 MHz) 43340 (3575.00 MHz) 43490 (3590.00 MHz)	20 MHz	QPSK	1 RB Full RB
RE Below 1GHz	43340 (3575.00 MHz)	20 MHz	QPSK	1 RB
RE Above 1GHz	43115 (3552.50 MHz) 43340 (3575.00 MHz) 43565 (3597.50 MHz)	5 MHz	QPSK	1 RB
	43190 (3560.00 MHz) 43340 (3575.00 MHz) 43490 (3590.00 MHz)	20 MHz	QPSK	1 RB

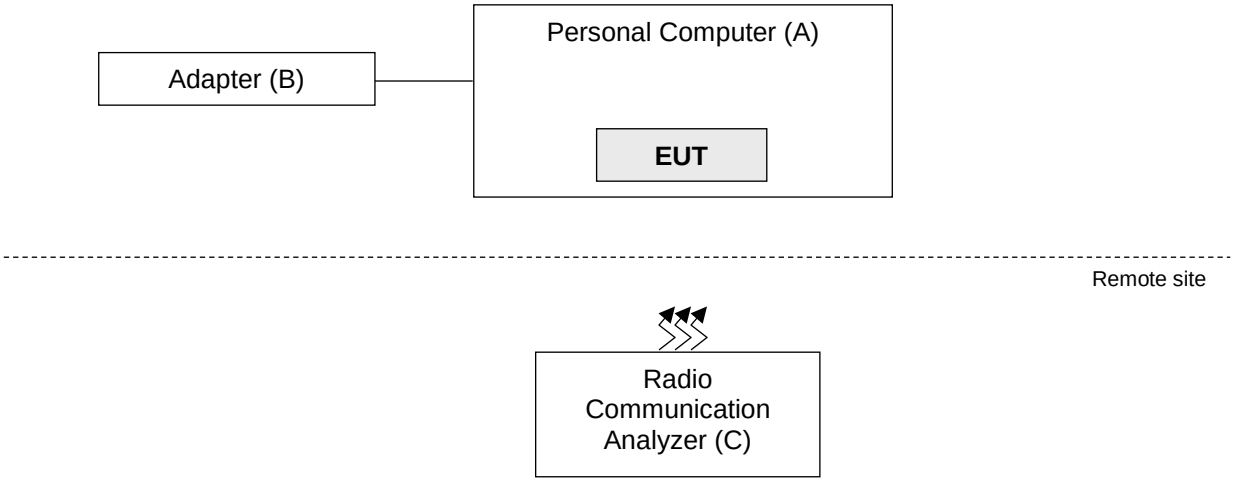
For LTE Band 48

Test Item	Tested Channel	Channel Bandwidth	Modulation	Mode
EIRP	55265 (3552.50 MHz) 55990 (3625.00 MHz) 56715 (3697.50 MHz)	5 MHz	QPSK / 16QAM / 64QAM / 256QAM	Full RB
	55290 (3555.00 MHz) 55990 (3625.00 MHz) 56690 (3695.00 MHz)	10 MHz	QPSK / 16QAM / 64QAM / 256QAM	Full RB
	55315 (3557.50 MHz) 55990 (3625.00 MHz) 56665 (3692.50 MHz)	15 MHz	QPSK / 16QAM / 64QAM / 256QAM	Full RB
	55340 (3560.00 MHz) 55990 (3625.00 MHz) 56640 (3690.00 MHz)	20 MHz	QPSK / 16QAM / 64QAM / 256QAM	Full RB
RE Below 1GHz	55990 (3625.00 MHz)	20 MHz	QPSK	1 RB
RE Above 1GHz	55265 (3552.50 MHz) 55990 (3625.00 MHz) 56715 (3697.50 MHz)	5 MHz	QPSK	1 RB
	55340 (3560.00 MHz) 55990 (3625.00 MHz) 56640 (3690.00 MHz)	20 MHz	QPSK	1 RB

3.4 Test Program Used and Operation Descriptions

There is no need to controlling software during the test, and the EUT can be paired with the Radio Communication Analyzer to test the connection when it is powered on.

3.5 Connection Diagram of EUT and Peripheral Devices



3.6 Configuration of Peripheral Devices and Cable Connections

ID	Product	Brand	Model No.	Serial No.	FCC ID	Remarks
A	Personal Computer	Panasonic	FZ-55	N/A	N/A	Supplied by applicant
B	Adapter	Panasonic	CF-AA5713A	N/A	N/A	Supplied by applicant
C	Radio Communication Analyzer	Anritsu	MT8821C	6201462755	N/A	Provided by Lab

4 Test Instruments

The calibration interval of the all test instruments are 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

4.1 Equivalent Isotropically Radiated Power

Description Manufacturer	Model No.	Serial No.	Calibrated Date	Calibrated Until
PXA Signal Analyzer Keysight	N9030B	MY57140488	2024/3/6	2025/3/5
Radio Communication Analyzer Anritsu	MT8821C	6201462755	2024/3/13	2025/3/12
		6272278312	2023/7/6	2024/7/5
Software BV	ADT_RF Test Software V6.6.5.4	N/A	N/A	N/A

Notes:

1. The test was performed in Oven room.
2. Tested Date: 2024/4/29

4.2 Modulation Characteristics

Refer to section 4.1 to get information of the instruments.

4.3 Peak to Average Ratio

Refer to section 4.1 to get information of the instruments.

4.4 Bandwidth

Refer to section 4.1 to get information of the instruments.

4.5 Conducted Spurious Emissions

Refer to section 4.1 to get information of the instruments.

4.6 Radiated Spurious Emissions below 1GHz

Description Manufacturer	Model No.	Serial No.	Calibrated Date	Calibrated Until
Antenna Tower Max-Full	MFT-151SS-0.5T	N/A	N/A	N/A
Bi_Log Antenna Schwarzbeck	VULB 9168	9168-1213	2023/10/13	2024/10/12
EMI Test Receiver R&S	ESR3	102782	2023/12/7	2024/12/6
Loop Antenna Electro-Metrics	EM-6879	269	2023/9/23	2024/9/22
Loop Antenna TESEQ	HLA 6121	45745	2023/8/8	2024/8/7
MXA Signal Analyzer Keysight	N9020B	MY60110513	2023/12/22	2024/12/21
Preamplifier EMCI	EMC330N	980782	2024/1/15	2025/1/14
	EMC001340	980201	2023/9/27	2024/9/26
RF Coaxial Cable EMCI	EMCCFD400-NM-NM-500	201233	2024/1/15	2025/1/14
	EMCCFD400-NM-NM-3000	201235	2024/1/15	2025/1/14
	EMCCFD400-NM-NM-9000	201236(with PAD)	2024/1/15	2025/1/14
Software BV ADT	ADT_Radiated_ V7.6.15.9.5	N/A	N/A	N/A
Turn Table Max-Full	MF-7802BS	N/A	N/A	N/A
Turn Table Controller Max-Full	MF-7802BS	MF780208674	N/A	N/A

Notes:

1. The test was performed in WM - 966 chamber 8.
2. Tested Date: 2024/4/18

4.7 Radiated Spurious Emissions above 1GHz

Description Manufacturer	Model No.	Serial No.	Calibrated Date	Calibrated Until
Antenna Tower Max-Full	MFT-151SS-0.5T	N/A	N/A	N/A
EMI Test Receiver R&S	ESR3	102782	2023/12/7	2024/12/6
Horn Antenna RFSPIN	DRH18-E	210103A18E	2023/11/12	2024/11/11
Horn Antenna Schwarzbeck	BBHA 9170	9170-1049	2023/11/12	2024/11/11
MXA Signal Analyzer Keysight	N9020B	MY60110513	2023/12/22	2024/12/21
Preamplifier EMCI	EMC118A45SE	980808	2023/12/28	2024/12/27
	EMC184045SE	980788	2024/1/15	2025/1/14
RF Coaxial Cable EMCI	EMC101G-KM-KM-2000	201254	2024/1/15	2025/1/14
	EMC101G-KM-KM-3000	201258	2024/1/15	2025/1/14
	EMC101G-KM-KM-5000	201261	2024/1/15	2025/1/14
	EMC104-SM-SM-1000	210102	2024/1/15	2025/1/14
	EMC104-SM-SM-3000	201231	2024/1/15	2025/1/14
	EMC104-SM-SM-9000	201243	2024/1/15	2025/1/14
Software BV ADT	ADT_Radiated_ V7.6.15.9.5	N/A	N/A	N/A
Turn Table Max-Full	MF-7802BS	N/A	N/A	N/A
Turn Table Controller Max-Full	MF-7802BS	MF780208674	N/A	N/A

Notes:

1. The test was performed in WM - 966 chamber 8.
2. Tested Date: 2024/4/17

4.8 Frequency Stability

Description Manufacturer	Model No.	Serial No.	Calibrated Date	Calibrated Until
3-channel DC power supply JIN YIH Technology	ODP3033	ODP30332128138	N/A	N/A
Digital Multimeter Fluke	87-III	70360742	2023/7/6	2024/7/5
Signal and spectrum analyzer R&S	FSV3044	101105	2024/2/27	2025/2/26
Software BV	ADT_RF Test Software V6.6.5.4	N/A	N/A	N/A
Temperature & Humidity Chamber TERCHY	HRM-120RF	931022	2023/12/19	2024/12/18
Radio Communication Analyzer Anritsu	MT8821C	6201462755	2024/3/13	2025/3/12

Notes:

1. The test was performed in Oven room.
2. Tested Date: 2024/4/23

5 Limits of Test Items

5.1 Equivalent Isotropically Radiated Power

For Band 42:

Mobile devices are limited to 1Watt (30 dBm) EIRP. Mobile devices operating in these bands must employ a means for limiting power to the minimum necessary for successful communications.

For Band 48:

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

5.2 Modulation Characteristics

A curve or equivalent data which shows that the equipment will meet the modulation requirements of the rules under which the equipment is to be licensed.

5.3 Peak to Average Ratio

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.

5.4 Bandwidth

According to FCC 47 CFR part 2.1049, the occupied bandwidth, that is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5% of the total mean power radiated by a given emission.

5.5 Conducted Spurious Emissions

Power of any emissions outside the Fundamental	Limit
Within 0-10MHz above the Assigned Channel	-13 dBm/MHz
Within 0-10MHz below the Assigned Channel	
Greater than 10MHz above the Assigned Channel	-25 dBm/MHz
Greater than 10MHz below the Assigned Channel	
Power of any emission below 3530MHz	-40 dBm/MHz
Power of any emission above 3720MHz	

5.6 Radiated Spurious Emissions below 1GHz

Power of any emissions outside the Fundamental	Limit
Within 0-10MHz above the Assigned Channel	-13 dBm/MHz
Within 0-10MHz below the Assigned Channel	
Greater than 10MHz above the Assigned Channel	-25 dBm/MHz
Greater than 10MHz below the Assigned Channel	
Power of any emission below 3530MHz	-40 dBm/MHz
Power of any emission above 3720MHz	

5.7 Radiated Spurious Emissions above 1GHz

Power of any emissions outside the Fundamental	Limit
Within 0-10MHz above the Assigned Channel	-13 dBm/MHz
Within 0-10MHz below the Assigned Channel	
Greater than 10MHz above the Assigned Channel	-25 dBm/MHz
Greater than 10MHz below the Assigned Channel	
Power of any emission below 3530MHz	-40 dBm/MHz
Power of any emission above 3720MHz	

5.8 Frequency Stability

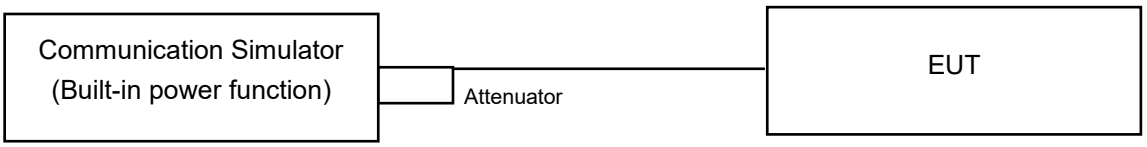
The frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized bands of operation (authorized frequency block).

6 Test Arrangements

6.1 Equivalent Isotropically Radiated Power

6.1.1 Test Setup

Conducted Power Measurement:



6.1.2 Test Procedure

Conducted Power Measurement:

The EUT is configured by emulator to set data modulation and maximum power using WWAN technology. The power measurement was performed on emulator and power value was measured from power function on emulator. Set the EUT to transmit under low, middle and high channel and record the power level shown on simulator.

Maximum EIRP / ERP

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

$EIRP = P_{Meas} + G_T$

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

where

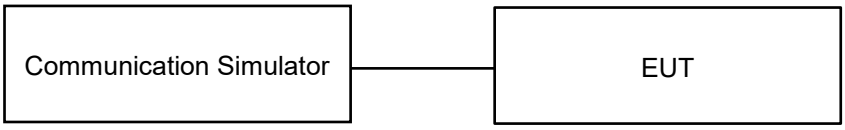
ERP or EIRP effective radiated power or equivalent isotropically radiated power, respectively (expressed in the same units as P_{Meas}, e.g., dBm or dBW)

P_{Meas} measured transmitter output power or PSD, in dBm or dBW

G_T gain of the transmitting antenna, in dBd (ERP) or dBi (EIRP)

6.2 Modulation Characteristics

6.2.1 Test Setup

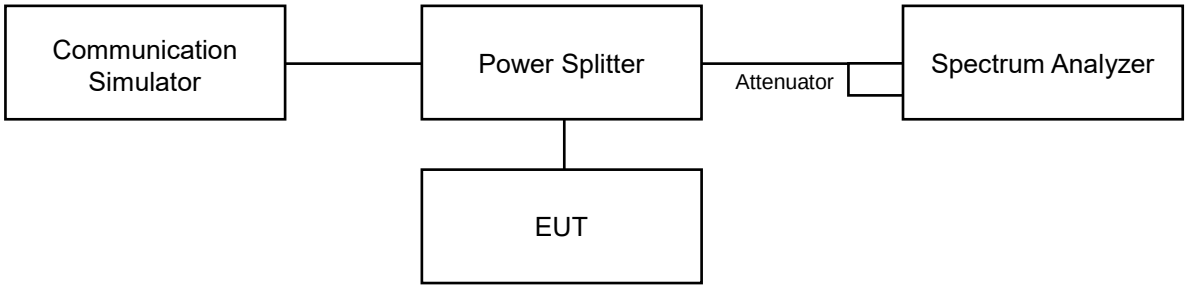


6.2.2 Test Procedure

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

6.3 Peak to Average Ratio

6.3.1 Test Setup

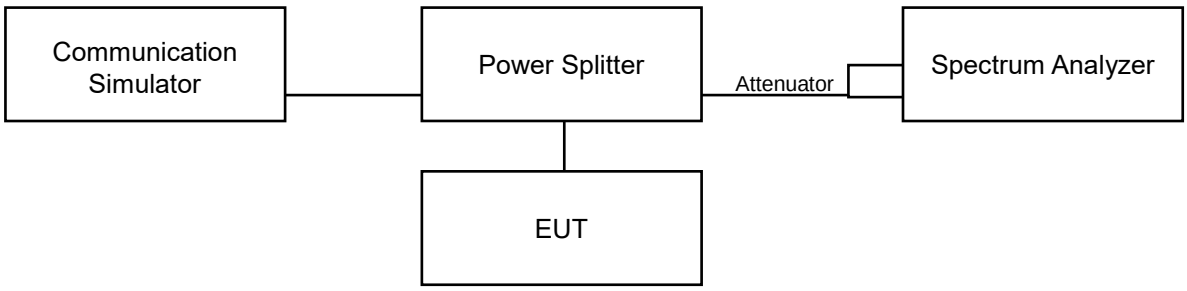


6.3.2 Test Procedure

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%.

6.4 Bandwidth

6.4.1 Test Setup



6.4.2 Test Procedure

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

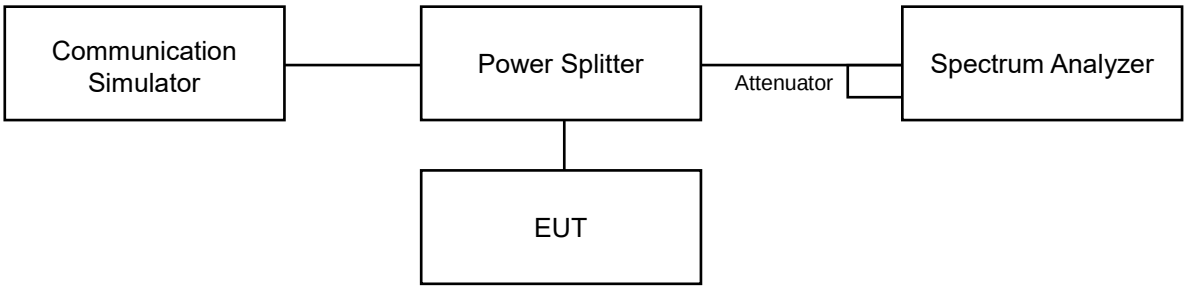
a. The spectrum analyzer center frequency is set to the nominal EUT channel center frequency. The span range for the spectrum analyzer shall be wide enough to see sufficient roll off of the signal to make the measurement.
b. The nominal RBW shall be in the range of 1% to 5% of the anticipated OBW, and the VBW shall be set ≥ 3 × RBW.
c. Set the reference level of the instrument as required to prevent the signal amplitude from exceeding the maximum spectrum analyzer input mixer level for linear operation. See guidance provided in 4.2.3.
d. The dynamic range of the spectrum analyzer at the selected RBW shall be more than 10 dB below the target "−X dB" requirement, i.e., if the requirement calls for measuring the −26 dB OBW, the spectrum analyzer noise floor at the selected RBW shall be at least 36 dB below the reference level.
e. Set spectrum analyzer detection mode to peak, and the trace mode to max hold.
f. Determine the following reference values: Set the EUT to transmit a modulated signal. Allow the trace to stabilize. Set the spectrum analyzer marker to the highest level of the displayed trace (this is the reference value).
g. Determine the "−X dB amplitude" as equal to (Reference Value − X). Alternatively, this calculation can be performed on the spectrum analyzer using the delta-marker measurement function.
h. Place two markers, one at the lowest and the other at the highest frequency of the envelope of the spectral display such that each marker is at or slightly below the "−X dB amplitude" determined in step f). If a marker is below this "−X dB amplitude" value it should be as close as possible to this value. The OBW is the positive frequency difference between the two markers.
i. The OBW shall be reported by providing plot(s) of the measuring instrument display, to include markers depicting the relevant frequency and amplitude information (e.g., marker table). The frequency and amplitude axis and scale shall be clearly labeled. Tabular data may be reported in addition to the plot(s).

For the occupied bandwidth measurement method, please refer to section 5.4.4 of ANSI C63.26.

a. The spectrum analyzer center frequency is set to the nominal EUT channel center frequency. The span range for the spectrum analyzer shall be wide enough to see sufficient roll off of the signal to make the measurement.
b. The nominal RBW shall be in the range of 1% to 5% of the anticipated OBW, and the VBW shall be set ≥ 3 × RBW.
c. Set the reference level of the instrument as required to prevent the signal amplitude from exceeding the maximum spectrum analyzer input mixer level for linear operation. See guidance provided in 4.2.3.
d. The dynamic range of the spectrum analyzer at the selected RBW shall be more than 10 dB below the target "−X dB" requirement, i.e., if the requirement calls for measuring the −26 dB OBW, the spectrum analyzer noise floor at the selected RBW shall be at least 36 dB below the reference level.
e. Set spectrum analyzer detection mode to peak, and the trace mode to max hold.
f. Determine the reference value by either of the following:
g. 1) Set the EUT to transmit a modulated signal. Allow the trace to stabilize. Set the spectrum analyzer marker to the highest level of the displayed trace (this is the reference value).
h. 2) Set the EUT to transmit an unmodulated carrier. Set the spectrum analyzer marker to the level of the carrier.
i. Determine the "−X dB amplitude" as equal to (Reference Value − X). Alternatively, this calculation can be performed on the spectrum analyzer using the delta-marker measurement function.
j. If the reference value was determined using an unmodulated carrier, turn the EUT modulation on, then either clear the existing trace or start a new trace on the spectrum analyzer and allow the new trace to stabilize. Otherwise the trace from step f) shall be used for step i).
k. Place two markers, one at the lowest and the other at the highest frequency of the envelope of the spectral display such that each marker is at or slightly below the "−X dB amplitude" determined in step f). If a marker is below this "−X dB amplitude" value it should be as close as possible to this value. The OBW is the positive frequency difference between the two markers. The spectral envelope can cross the "−X dB amplitude" at multiple points. The lowest or highest frequency shall be selected as the frequencies that are the farthest away from the center frequency at which the spectral envelope crosses the "−X dB amplitude."
l. The OBW shall be reported by providing plot(s) of the measuring instrument display, to include markers depicting the relevant frequency and amplitude information (e.g., marker table). The frequency and amplitude axis and scale shall be clearly labeled. Tabular data may be reported in addition to the plot(s).

6.5 Conducted Spurious Emissions

6.5.1 Test Setup



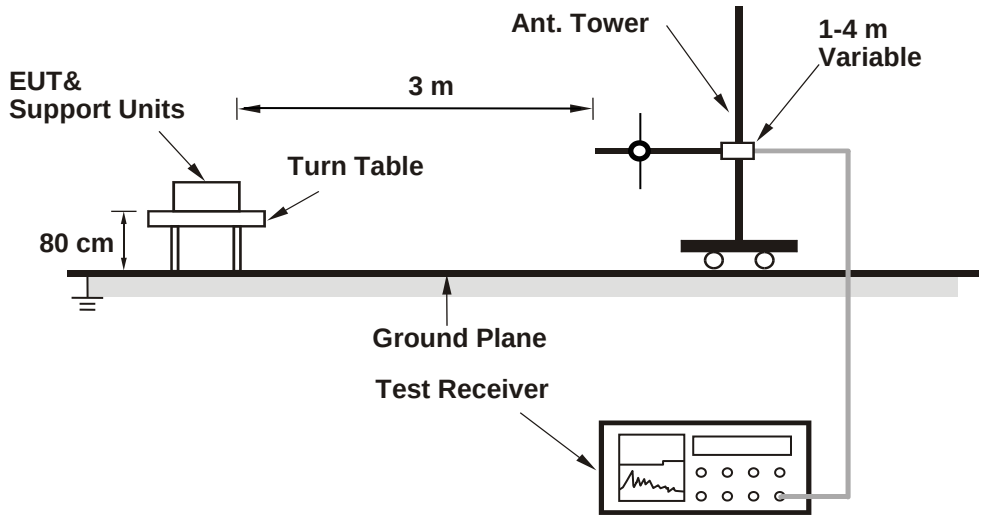
6.5.2 Test Procedure

a. Measurement refer to ANSI C63.26 section 5.7.
b. All measurements were done at 3 channels: low, middle and high operational frequency range.
c. Measuring frequency range is from 9 kHz up to the tenth harmonic of the hightest fundamental frequency or to 40 GHz, whichever is lower. 20 dB attenuation pad is connected with spectrum.
d. The fundamental frequency above 1 GHz, the spectrum set RBW = 1 MHz, VBW = 3 MHz, Detector = Average.
e. The fundamental frequency below 1 GHz, the spectrum set RBW ≥ 100 kHz, VBW ≥ 3 x RBW, Detector = Average.
f. Measuring frequency band edge, narrow RBW (no less than 1% of the OBW) is used for conducted emission measurement.

6.6 Radiated Spurious Emissions below 1GHz

6.6.1 Test Setup

For radiated emission 30 MHz to 1 GHz



For the actual test configuration, please refer to the attached file (Test Setup Photo).

6.6.2 Test Procedure

The EUT is configured by emulator to set data modulation and maximum power using WWAN technology.

a. In the semi-anechoic chamber, EUT placed on the 0.8 m (below or equal 1 GHz) height of turn table, rotated the table around 360 degrees to search the maximum radiation power and receiver antenna shall be rotated vertical and horizontal polarization and moved height from 1 m to 4 m to find the maximum polar radiated power. The “Read Value” is the spectrum reading the maximum power value.

b. The height of antenna is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.

c. Perform a field strength measurement and record the worse read value, is the field strength value via a spectrum reading obtained corrected for antenna factor, cable loss and pre-amplifier factor and then mathematically convert the measured field strength level to EIRP/ERP level.

d. Following C63.26 section 5.5 and 5.2.7

e. EIRP (dBm) = E (dBμV/m) + 20log(D) - 104.8; where D is the measurement distance (in the far field region) in m.

f. ERP (dBm) = E (dBμV/m) + 20log(D) - 104.8 - 2.15; where D is the measurement distance (in the far field region) in m.

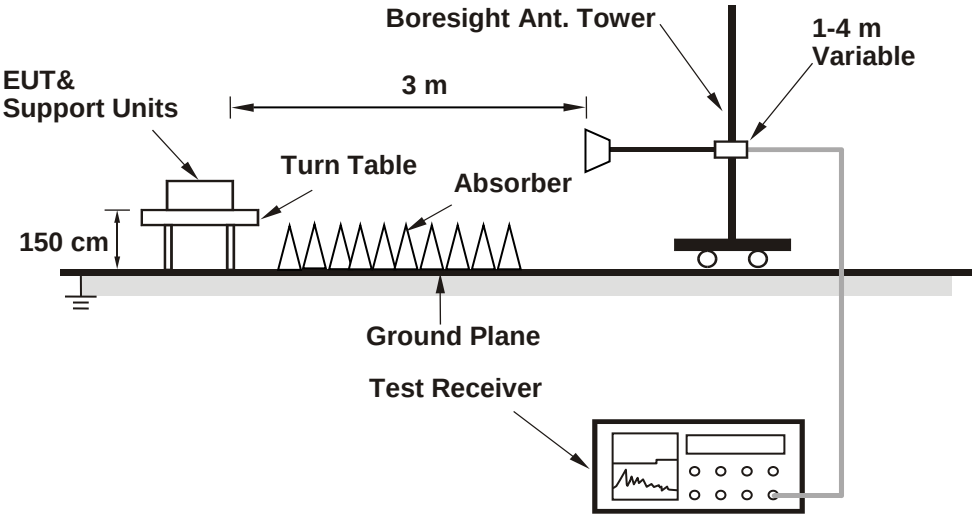
Note:

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 1 MHz/3 MHz.
2. The emission levels were against the limit of frequency range 9 kHz ~ 30 MHz:
   The amplitude of spurious emissions attenuated more than 20 dB below the permissible value is not required to be report.

6.7 Radiated Spurious Emissions above 1GHz

6.7.1 Test Setup

For radiated emission above 1 GHz



For the actual test configuration, please refer to the attached file (Test Setup Photo).

6.7.2 Test Procedure

The EUT is configured by emulator to set data modulation and maximum power using WWAN technology.

a. In the semi-anechoic chamber, EUT placed on the 1.5 m height of turn table, rotated the table around 360 degrees to search the maximum radiation power and receiver antenna shall be rotated vertical and horizontal polarization and moved height from 1 m to 4 m to find the maximum polar radiated power. The “Read Value” is the spectrum reading the maximum power value.

b. The height of antenna is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.

c. Perform a field strength measurement and record the worse read value, is the field strength value via a spectrum reading obtained corrected for antenna factor, cable loss and pre-amplifier factor and then mathematically convert the measured field strength level to EIRP/ERP level.

d. Following C63.26 section 5.5 and 5.2.7

e. EIRP (dBm) = E (dBμV/m) + 20log(D) - 104.8; where D is the measurement distance (in the far field region) in m.

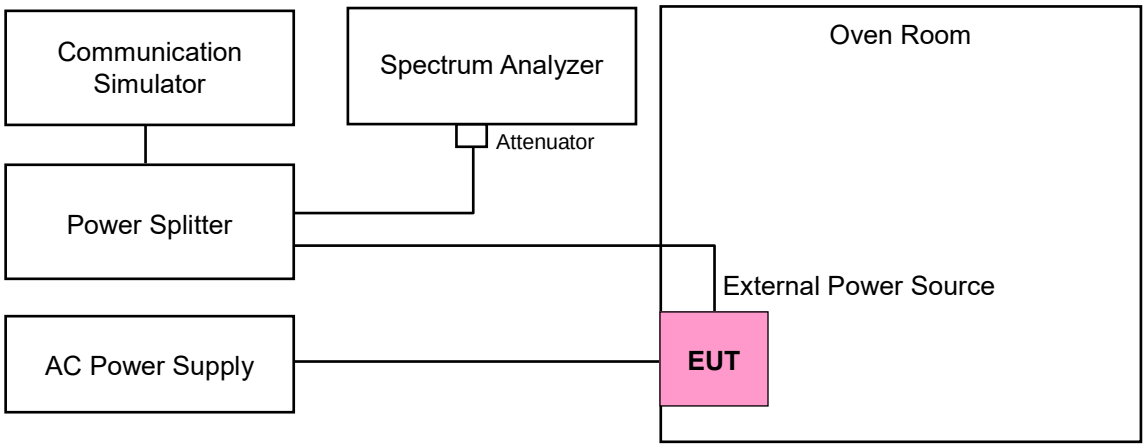
f. ERP (dBm) = E (dBμV/m) + 20log(D) - 104.8 - 2.15; where D is the measurement distance (in the far field region) in m.

Note:

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 1 MHz/3 MHz.

6.8 Frequency Stability

6.8.1 Test Setup



6.8.2 Test Procedure

The EUT is configured by emulator to set data modulation and maximum power using WWAN technology.

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.

7 Test Results of Test Item

7.1 Equivalent Isotropically Radiated Power

Input Power:	10.8 Vdc	Environmental Conditions:	22°C, 73% RH	Tested By:	Willy Cheng

7.1.1 LTE Band 42

Conducted Output Power (dBm) (dBm/channel bandwidth)

BW	MCS Index	RB Size	RB Offset	Low	Mid	High
		Channel		43190	43340	43490
		Frequence (MHz)		3560	3575	3590
20M	QPSK	1	0	17.11	17.31	17.08
		1	50	17.08	17.30	17.07
		1	99	17.04	17.23	17.06
		50	0	16.17	16.36	16.15
		50	25	16.12	16.35	16.11
		50	50	16.04	16.37	16.09
		100	0	16.25	16.40	16.14
20M	16QAM	1	0	16.23	16.49	16.24
		1	50	16.10	16.31	16.05
		1	99	16.25	16.45	16.18
		50	0	15.27	15.47	15.17
		50	25	15.20	15.39	15.15
		50	50	15.20	15.41	15.17
		100	0	15.28	15.37	15.18
20M	64QAM	1	0	15.17	15.37	15.14
		1	50	15.11	15.09	15.14
		1	99	15.14	15.09	15.06
		50	0	14.12	14.36	14.07
		50	25	14.11	14.31	14.07
		50	50	14.12	14.35	14.06
		100	0	14.14	14.38	14.18

BW	MCS Index	Channel		43165	43340	43515
		Frequence (MHz)		3557.5	3575	3592.5
15M	QPSK	1	0	17.08	17.25	17.04
		1	37	17.15	17.30	17.08
		1	74	17.13	17.16	17.06
		36	0	16.13	16.37	16.12
		36	19	16.02	16.23	16.13
		36	39	16.09	16.26	16.08
		75	0	16.16	16.31	16.17
15M	16QAM	1	0	16.14	16.44	16.25
		1	37	16.03	16.26	16.04
		1	74	16.17	16.41	16.16
		36	0	15.15	15.38	15.14
		36	19	15.25	15.28	15.10
		36	39	15.14	15.41	15.16
		75	0	15.24	15.34	15.16
15M	64QAM	1	0	15.09	15.26	15.11
		1	37	15.14	15.07	15.10
		1	74	15.04	15.05	15.04
		36	0	14.11	14.25	14.03
		36	19	14.05	14.24	14.07
		36	39	14.08	14.28	14.11
		75	0	14.10	14.36	14.03

BW	MCSIndex	Channel		43140	43340	43540
		Frequence (MHz)		3555	3575	3595
10M	QPSK	1	0	17.09	17.23	17.11
		1	24	17.08	17.23	17.04
		1	49	17.07	17.23	17.08
		25	0	16.14	16.27	16.18
		25	12	16.14	16.26	16.04
		25	25	16.12	16.33	16.13
		50	0	16.15	16.34	16.15
10M	16QAM	1	0	16.15	16.37	16.15
		1	24	16.09	16.24	16.13
		1	49	16.12	16.37	16.15
		25	0	15.19	15.42	15.12
		25	12	15.18	15.31	15.06
		25	25	15.24	15.34	15.16
		50	0	15.19	15.35	15.09
10M	64QAM	1	0	15.18	15.32	15.09
		1	24	15.08	15.05	15.08
		1	49	15.03	15.06	15.14
		25	0	14.03	14.35	14.14
		25	12	14.04	14.33	14.11
		25	25	14.10	14.21	14.06
		50	0	14.08	14.33	14.02

BW	MCS Index	Channel		43115	43340	43565
		Frequence (MHz)		3552.5	3575	3597.5
5M	QPSK	1	0	17.05	17.28	17.03
		1	12	17.02	17.23	17.06
		1	24	17.09	17.20	17.06
		12	0	16.13	16.36	16.07
		12	6	16.05	16.26	16.10
		12	13	16.11	16.33	16.08
		25	0	16.22	16.35	16.12
5M	16QAM	1	0	16.24	16.41	16.13
		1	12	16.10	16.27	16.01
		1	24	16.19	16.40	16.16
		12	0	15.23	15.42	15.08
		12	6	15.15	15.38	15.08
		12	13	15.16	15.40	15.17
		25	0	15.28	15.27	15.17
5M	64QAM	1	0	15.08	15.27	15.02
		1	12	15.06	15.09	15.11
		1	24	15.10	15.09	15.10
		12	0	14.12	14.29	14.08
		12	6	14.16	14.33	14.11
		12	13	14.13	14.20	14.08
		25	0	14.08	14.29	14.13

EIRP Power (dBm)

Maximum Output Power		
Modulation	Cond. Power (dBm)	Max. EIRP (dBm)
QPSK	17.31	20.13
16QAM	16.49	19.31
64QAM	15.37	18.19

Note: EIRP (dBm) = Cond. Power (dBm) + Antenna Gain (dBi) + Array Gain (if applicable)

Conducted Output Power (dBm) (dBm/10MHz)

BW	MCS Index	RB Size	RB Offset	Low	Mid	High
		Channel		43190	43340	43490
		Frequence (MHz)		3560	3575	3590
20M	QPSK	1	0	17.05	17.25	17.03
		1	50	17.03	17.02	17.22
		1	99	16.97	17.00	17.16
		50	0	16.11	16.07	16.29
		50	25	16.04	16.04	16.28
		50	50	15.99	16.02	16.30
		100	0	16.17	16.08	16.32
20M	16QAM	1	0	16.15	16.17	16.44
		1	50	16.04	15.97	16.23
		1	99	16.17	16.13	16.37
		50	0	15.19	15.12	15.40
		50	25	15.15	15.08	15.31
		50	50	15.15	15.11	15.34
		100	0	15.21	15.13	15.30
20M	64QAM	1	0	15.11	15.09	15.29
		1	50	15.03	15.06	15.03
		1	99	15.08	15.01	15.03
		50	0	14.05	14.02	14.30
		50	25	14.04	13.99	14.25
		50	50	14.06	13.99	14.29
		100	0	14.08	14.13	14.31

BW	MCS Index	Channel		43165	43340	43515
		Frequence (MHz)		3557.5	3575	3592.5
15M	QPSK	1	0	17.03	17.20	16.95
		1	37	17.08	17.00	17.23
		1	74	17.05	16.99	17.08
		36	0	16.08	16.07	16.31
		36	19	15.96	16.05	16.15
		36	39	16.02	16.01	16.18
		75	0	16.09	16.09	16.26
15M	16QAM	1	0	16.09	16.18	16.39
		1	37	15.96	15.98	16.19
		1	74	16.12	16.10	16.34
		36	0	15.08	15.07	15.33
		36	19	15.17	15.04	15.23
		36	39	15.06	15.10	15.33
		75	0	15.17	15.10	15.27
15M	64QAM	1	0	15.03	15.04	15.18
		1	37	15.07	15.02	15.00
		1	74	14.97	14.99	14.98
		36	0	14.06	13.96	14.20
		36	19	13.99	14.01	14.19
		36	39	14.01	14.02	14.21
		75	0	14.04	13.95	14.29

EIRP Power (dBm)

Maximum Output Power		
Modulation	Cond. Power (dBm)	Max. EIRP (dBm)
QPSK	17.25	20.07
16QAM	16.44	19.26
64QAM	15.29	18.11

Note: EIRP (dBm) = Cond. Power (dBm) + Antenna Gain (dBi) + Array Gain (if applicable)

7.1.2 LTE Band 48

Conducted Output Power (dBm) (dBm/channel bandwidth)

BW	MCS Index	RB Size	RB Offset	Low	Mid	High
		Channel		55340	55990	56640
		Frequence (MHz)		3560	3625	3690
20M	QPSK	1	0	17.25	17.37	17.29
		1	50	17.18	17.28	17.15
		1	99	17.15	17.24	17.13
		50	0	16.26	16.37	16.25
		50	25	16.21	16.32	16.21
		50	50	16.15	16.33	16.14
		100	0	16.32	16.35	16.23
20M	16QAM	1	0	16.30	16.45	16.30
		1	50	16.20	16.30	16.12
		1	99	16.30	16.42	16.29
		50	0	15.35	15.42	15.28
		50	25	15.31	15.36	15.21
		50	50	15.29	15.38	15.26
		100	0	15.36	15.37	15.26
20M	64QAM	1	0	15.26	15.32	15.19
		1	50	15.19	15.10	15.19
		1	99	15.19	15.07	15.17
		50	0	14.19	14.33	14.13
		50	25	14.22	14.31	14.16
		50	50	14.23	14.30	14.13
		100	0	14.23	14.34	14.23

BW	MCS Index	Channel		55315	55990	56665
		Frequence (MHz)		3557.5	3625	3692.5
15M	QPSK	1	0	17.15	17.30	17.26
		1	37	17.14	17.27	17.12
		1	74	17.12	17.21	17.07
		36	0	16.25	16.34	16.18
		36	19	16.21	16.31	16.16
		36	39	16.15	16.23	16.07
		75	0	16.32	16.31	16.17
15M	16QAM	1	0	16.27	16.40	16.29
		1	37	16.17	16.23	16.08
		1	74	16.29	16.34	16.21
		36	0	15.33	15.35	15.25
		36	19	15.23	15.33	15.11
		36	39	15.22	15.34	15.22
		75	0	15.26	15.27	15.24
15M	64QAM	1	0	15.20	15.29	15.18
		1	37	15.19	15.01	15.13
		1	74	15.17	15.04	15.17
		36	0	14.11	14.26	14.08
		36	19	14.20	14.30	14.12
		36	39	14.19	14.24	14.07
		75	0	14.17	14.34	14.18

BW	MCSIndex	Channel		55290	55990	56690
		Frequence (MHz)		3555	3625	3695
10M	QPSK	1	0	17.24	17.27	17.21
		1	24	17.18	17.25	17.07
		1	49	17.13	17.15	17.05
		25	0	16.19	16.34	16.24
		25	12	16.15	16.32	16.15
		25	25	16.13	16.27	16.05
		50	0	16.23	16.30	16.20
10M	16QAM	1	0	16.20	16.44	16.28
		1	24	16.18	16.27	16.06
		1	49	16.28	16.32	16.21
		25	0	15.35	15.34	15.24
		25	12	15.27	15.28	15.18
		25	25	15.25	15.29	15.24
		50	0	15.32	15.28	15.16
10M	64QAM	1	0	15.20	15.26	15.13
		1	24	15.12	15.09	15.12
		1	49	15.17	15.07	15.17
		25	0	14.10	14.26	14.06
		25	12	14.14	14.31	14.07
		25	25	14.14	14.30	14.08
		50	0	14.13	14.27	14.20

BW	MCS Index	Channel		55265	55990	56715
		Frequence (MHz)		3552.5	3625	3697.5
5M	QPSK	1	0	17.17	17.33	17.20
		1	12	17.12	17.23	17.11
		1	24	17.11	17.16	17.08
		12	0	16.20	16.30	16.15
		12	6	16.18	16.25	16.21
		12	13	16.05	16.24	16.14
		25	0	16.31	16.28	16.21
5M	16QAM	1	0	16.26	16.36	16.20
		1	12	16.14	16.30	16.12
		1	24	16.23	16.40	16.21
		12	0	15.29	15.37	15.22
		12	6	15.23	15.27	15.19
		12	13	15.25	15.32	15.21
		25	0	15.32	15.35	15.26
5M	64QAM	1	0	15.20	15.24	15.18
		1	12	15.14	15.01	15.14
		1	24	15.19	15.05	15.11
		12	0	14.16	14.23	14.10
		12	6	14.16	14.26	14.15
		12	13	14.16	14.22	14.04
		25	0	14.21	14.24	14.21

EIRP Power (dBm)

Maximum Output Power		
Modulation	Cond. Power (dBm)	Max. EIRP (dBm)
QPSK	17.37	21.02
16QAM	16.45	20.10
64QAM	15.32	18.97

Note: EIRP (dBm) = Cond. Power (dBm) + Antenna Gain (dBi) + Array Gain (if applicable)

Conducted Output Power (dBm) (dBm/10MHz)

BW	MCS Index	RB Size	RB Offset	Low	Mid	High
		Channel		55340	55990	56640
		Frequence (MHz)		3560	3625	3690
20M	QPSK	1	0	17.09	17.30	17.22
		1	50	16.95	17.09	17.08
		1	99	16.97	17.12	17.05
		50	0	16.13	16.13	16.22
		50	25	16.15	16.22	15.97
		50	50	16.10	16.26	16.08
		100	0	16.26	16.15	16.02
20M	16QAM	1	0	16.08	16.20	16.09
		1	50	15.95	16.12	16.06
		1	99	16.18	16.33	16.09
		50	0	15.11	15.32	15.12
		50	25	15.13	15.32	15.01
		50	50	15.22	15.23	15.18
		100	0	15.28	15.27	15.16
20M	64QAM	1	0	15.15	15.22	15.09
		1	50	15.06	14.91	14.96
		1	99	15.02	15.00	14.97
		50	0	14.16	14.14	13.97
		50	25	14.03	14.12	14.04
		50	50	14.15	14.19	13.91
		100	0	14.07	14.21	14.18

BW	MCS Index	Channel		55315	55990	56665
		Frequence (MHz)		3557.5	3625	3692.5
15M	QPSK	1	0	17.03	17.26	17.15
		1	37	16.92	17.24	16.91
		1	74	16.98	17.06	16.89
		36	0	16.13	16.32	16.08
		36	19	16.00	16.16	15.98
		36	39	16.01	16.01	16.03
		75	0	16.22	16.15	16.00
15M	16QAM	1	0	16.03	16.31	16.26
		1	37	15.94	16.21	15.97
		1	74	16.12	16.26	15.98
		36	0	15.15	15.31	15.16
		36	19	14.98	15.23	15.05
		36	39	14.98	15.18	15.19
		75	0	15.22	15.08	15.13
15M	64QAM	1	0	15.16	15.13	15.15
		1	37	14.98	14.90	15.08
		1	74	14.99	14.92	14.94
		36	0	13.94	14.06	13.91
		36	19	14.02	14.24	14.05
		36	39	14.00	14.20	13.84
		75	0	14.00	14.12	14.08

EIRP Power (dBm)

Maximum Output Power		
Modulation	Cond. Power (dBm)	Max. EIRP (dBm)
QPSK	17.33	20.98
16QAM	16.44	20.09
64QAM	15.26	18.91

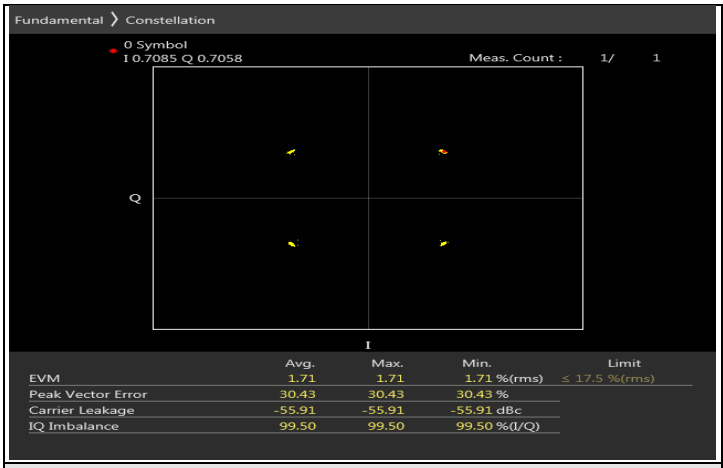
Note: EIRP (dBm) = Cond. Power (dBm) + Antenna Gain (dBi) + Array Gain (if applicable)

7.2 Modulation Characteristics

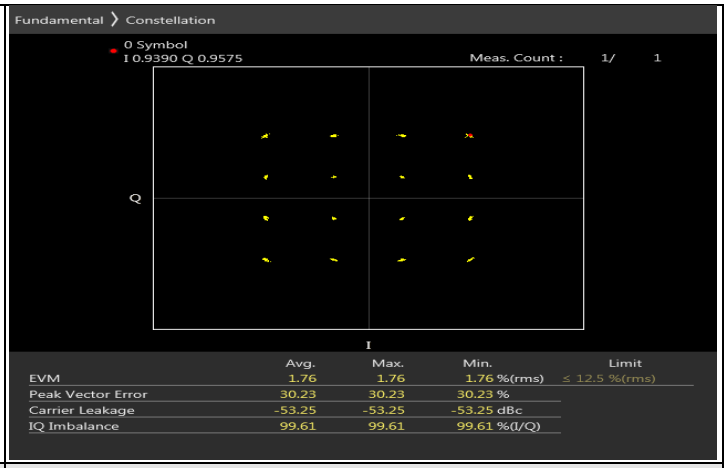
Input Power:	10.8 Vdc	Environmental Conditions:	25°C, 66% RH	Tested By:	Noah Chang

7.2.1 LTE Band 42

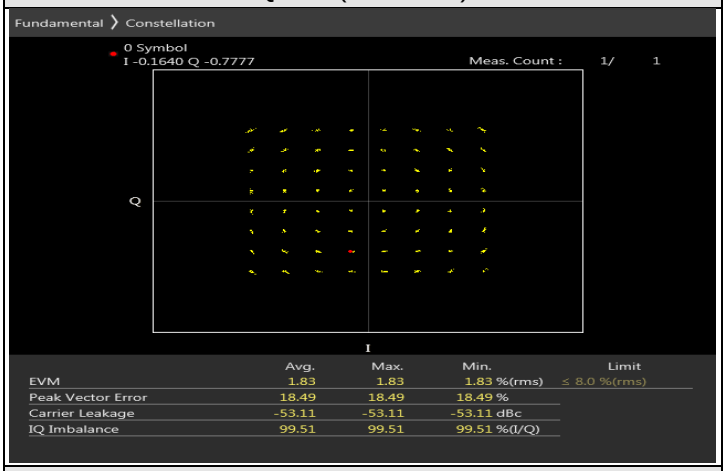
LTE Band 42, Channel Bandwidth: 20 MHz



QPSK (3575MHz)



16QAM (3575MHz)



64QAM (3575MHz)

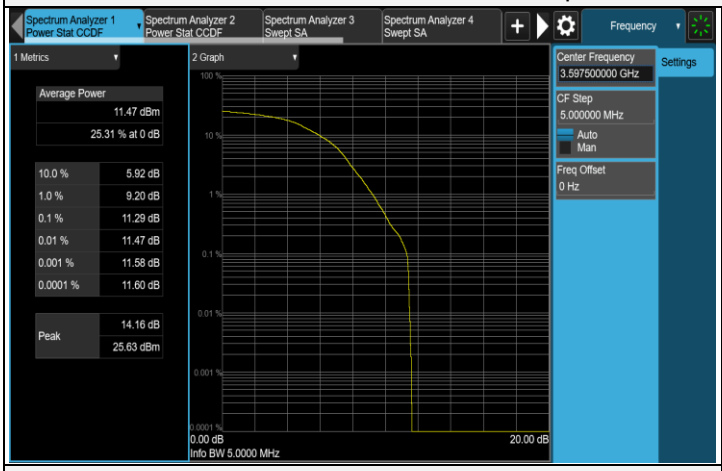
7.3 Peak to Average Ratio

Input Power:	10.8 Vdc	Environmental Conditions:	25°C, 66% RH	Tested By:	Noah Chang

7.3.1 LTE Band 42

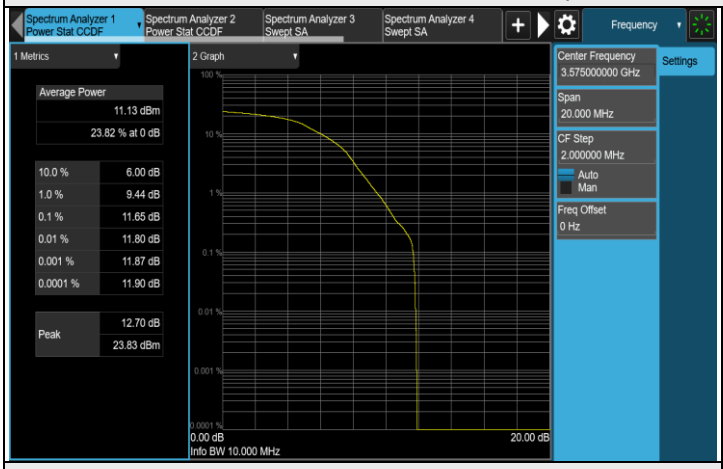
LTE Band 42, Channel Bandwidth: 5 MHz

Modulation	Channel	Frequency (MHz)	Measurement Value((dB))	Limit ((dB))	Result
QPSK	43115	3552.5	10.08	13	PASS
QPSK	43340	3575	9.28	13	PASS
QPSK	43565	3597.5	10.40	13	PASS
16QAM	43115	3552.5	10.36	13	PASS
16QAM	43340	3575	10.36	13	PASS
16QAM	43565	3597.5	11.29	13	PASS
64QAM	43115	3552.5	10.28	13	PASS
64QAM	43340	3575	10.11	13	PASS
64QAM	43565	3597.5	9.95	13	PASS

Spectrum Plot of Worst Value	
	
16QAM CH 43565 (3597.5MHz)	

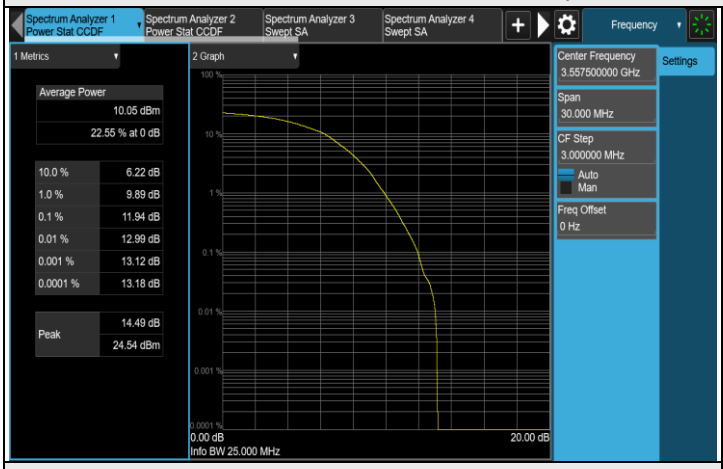
LTE Band 42, Channel Bandwidth: 10 MHz

Modulation	Channel	Frequency (MHz)	Measurement Value((dB))	Limit ((dB))	Result
QPSK	43140	3555	10.23	13	PASS
QPSK	43340	3575	9.48	13	PASS
QPSK	43540	3595	9.89	13	PASS
16QAM	43140	3555	11.48	13	PASS
16QAM	43340	3575	11.65	13	PASS
16QAM	43540	3595	10.57	13	PASS
64QAM	43140	3555	9.74	13	PASS
64QAM	43340	3575	9.79	13	PASS
64QAM	43540	3595	10.09	13	PASS

Spectrum Plot of Worst Value	
	
16QAM CH 43340 (3575MHz)	

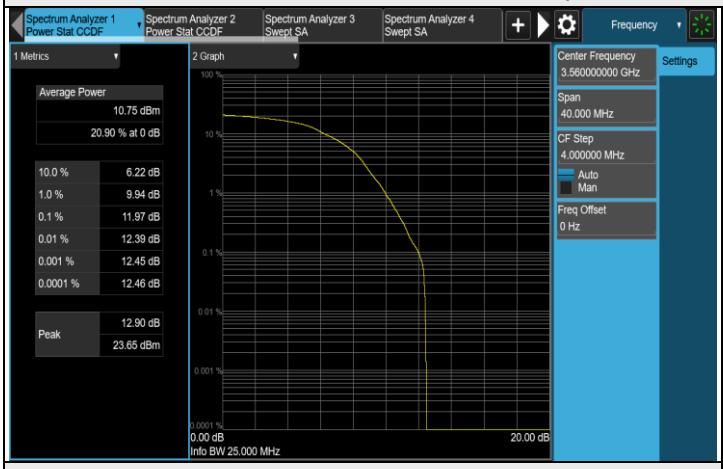
LTE Band 42, Channel Bandwidth: 15 MHz

Modulation	Channel	Frequency (MHz)	Measurement Value((dB))	Limit ((dB))	Result
QPSK	43165	3557.5	10.52	13	PASS
QPSK	43340	3575	8.41	13	PASS
QPSK	43515	3592.5	8.93	13	PASS
16QAM	43165	3557.5	10.13	13	PASS
16QAM	43340	3575	11.51	13	PASS
16QAM	43515	3592.5	9.78	13	PASS
64QAM	43165	3557.5	11.94	13	PASS
64QAM	43340	3575	9.25	13	PASS
64QAM	43515	3592.5	10.67	13	PASS

Spectrum Plot of Worst Value	
	
64QAM CH 43165 (3557.5MHz)	

LTE Band 42, Channel Bandwidth: 20 MHz

Modulation	Channel	Frequency (MHz)	Measurement Value((dB))	Limit ((dB))	Result
QPSK	43190	3560	9.59	13	PASS
QPSK	43340	3575	8.58	13	PASS
QPSK	43490	3590	9.68	13	PASS
16QAM	43190	3560	11.97	13	PASS
16QAM	43340	3575	9.54	13	PASS
16QAM	43490	3590	11.76	13	PASS
64QAM	55340	3560	10.65	13	PASS
64QAM	43340	3575	9.53	13	PASS
64QAM	43490	3590	9.02	13	PASS

Spectrum Plot of Worst Value	
	
16QAM CH 43190 (3560MHz)	

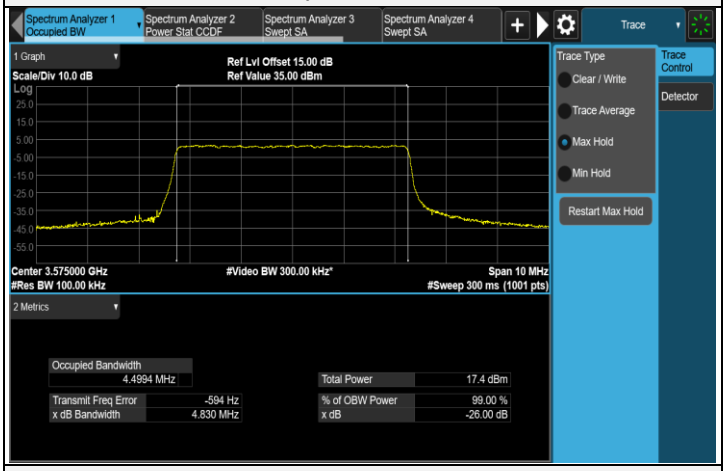
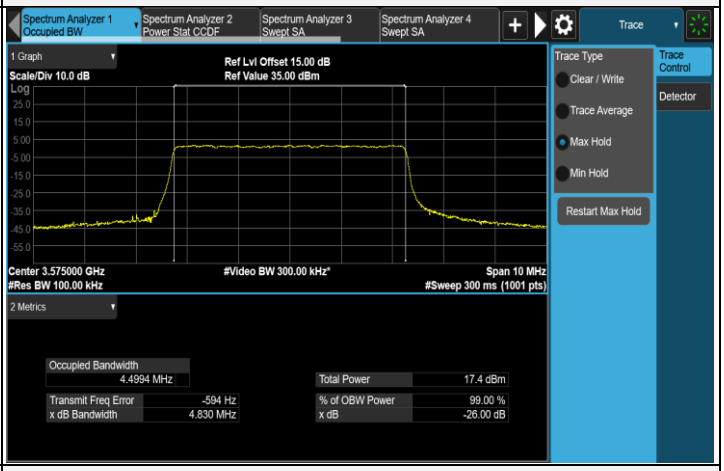
7.4 Bandwidth

Input Power:	10.8 Vdc	Environmental Conditions:	25°C, 66% RH	Tested By:	Noah Chang

7.4.1 LTE Band 42

LTE Band 42, Channel Bandwidth: 5 MHz

Modulation	Channel	Frequency (MHz)	Occupied Bandwidth ((MHz))	26 dB Bandwidth ((MHz))
QPSK	43115	3552.5	4.4933	4.804
QPSK	43340	3575	4.4994	4.830
QPSK	43565	3597.5	4.4955	4.812
16QAM	43115	3552.5	4.4896	4.806
16QAM	43340	3575	4.4927	4.790
16QAM	43565	3597.5	4.4895	4.800
64QAM	43115	3552.5	4.4893	4.814
64QAM	43340	3575	4.4925	4.822
64QAM	43565	3597.5	4.4918	4.800

Spectrum Plot of Worst Value	
Occupied bandwidth	26 dB Bandwidth
	
QPSK CH 43340 (3575MHz)	QPSK CH 43340 (3575MHz)

LTE Band 42, Channel Bandwidth: 10 MHz

Modulation	Channel	Frequency (MHz)	Occupied Bandwidth ((MHz))	26 dB Bandwidth ((MHz))
QPSK	43140	3555	8.9667	9.491
QPSK	43340	3575	8.9653	9.498
QPSK	43540	3595	8.9667	9.496
16QAM	43140	3555	8.9670	9.493
16QAM	43340	3575	8.9672	9.500
16QAM	43540	3595	8.9648	9.506
64QAM	43140	3555	8.9741	9.524
64QAM	43340	3575	8.9745	9.513
64QAM	43540	3595	8.9689	9.495

<table>
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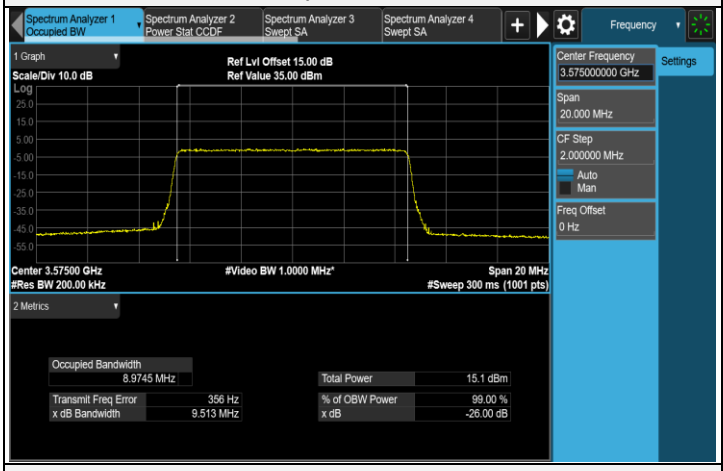
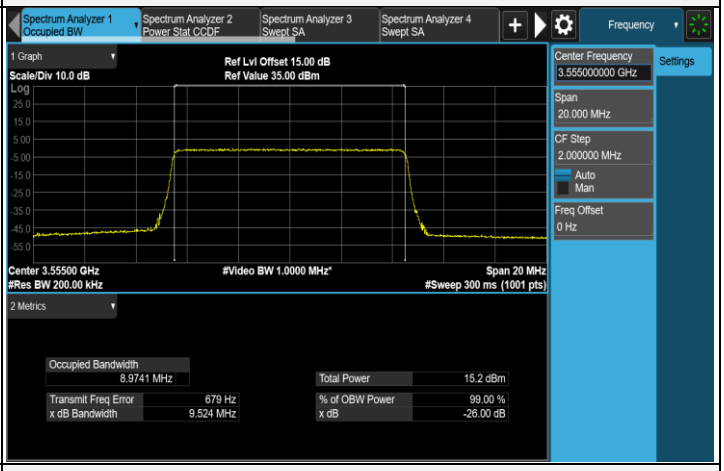
<tr><td> 
</td><td> 
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<tr><td>64QAM CH 43340 (3575MHz)</td><td>64QAM CH 43140 (3555MHz)</td></tr>
</table>

LTE Band 42, Channel Bandwidth: 15 MHz

Modulation	Channel	Frequency (MHz)	Occupied Bandwidth ((MHz))	26 dB Bandwidth ((MHz))
QPSK	43165	3557.5	13.4360	14.224
QPSK	43340	3575	13.4401	14.226
QPSK	43515	3592.5	13.4425	14.223
16QAM	43165	3557.5	13.4367	14.218
16QAM	43340	3575	13.4317	14.248
16QAM	43515	3592.5	13.4353	14.233
64QAM	43165	3557.5	13.4463	14.237
64QAM	43340	3575	13.4485	14.229
64QAM	43515	3592.5	13.4344	14.225

<table>
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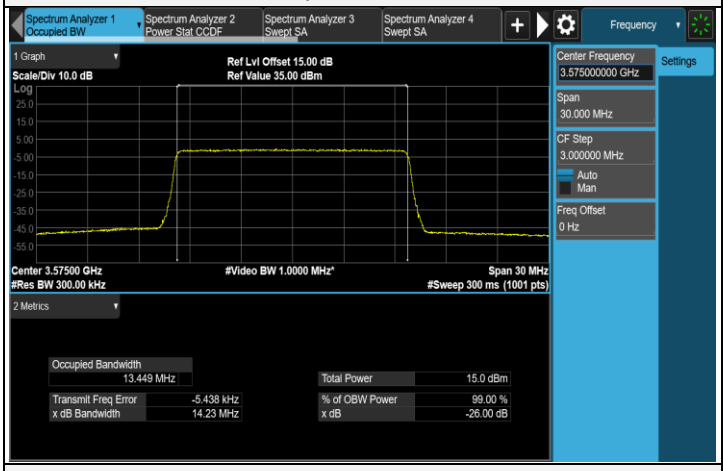
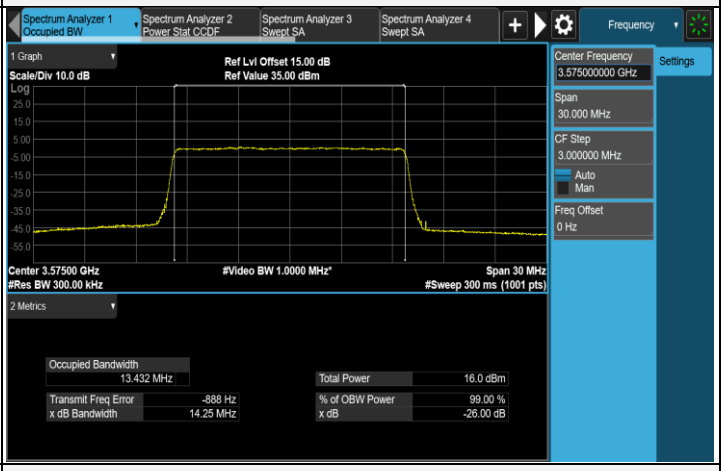
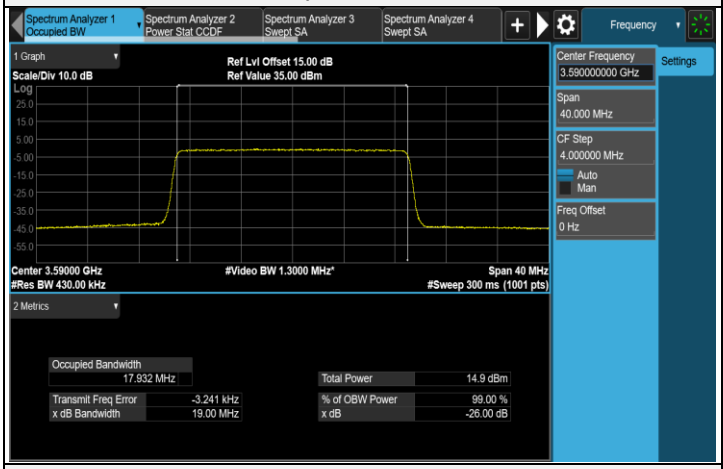
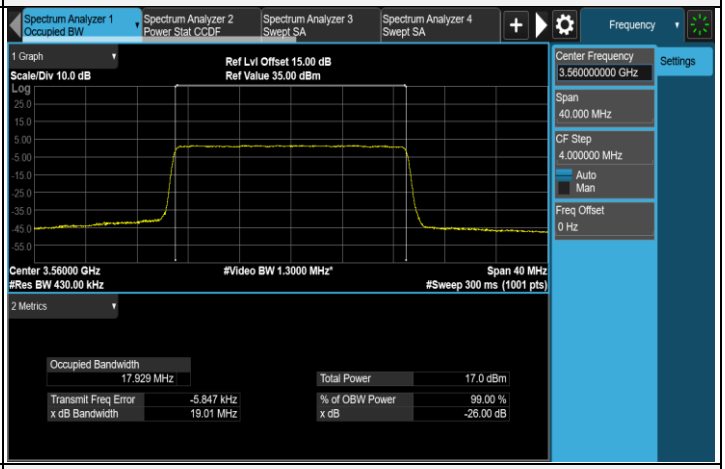
<tr><td> 
</td><td> 
</td></tr>
<tr><td>64QAM CH 43340 (3575MHz)</td><td>16QAM CH 43340 (3575MHz)</td></tr>
</table>

LTE Band 42, Channel Bandwidth: 20 MHz

Modulation	Channel	Frequency (MHz)	Occupied Bandwidth ((MHz))	26 dB Bandwidth ((MHz))
QPSK	43190	3560	17.9291	19.010
QPSK	43340	3575	17.9100	18.995
QPSK	43490	3590	17.9052	18.989
16QAM	43190	3560	17.9100	19.003
16QAM	43340	3575	17.9090	19.005
16QAM	43490	3590	17.9048	18.988
64QAM	55340	3560	17.9293	19.007
64QAM	43340	3575	17.9303	19.003
64QAM	43490	3590	17.9317	19.003

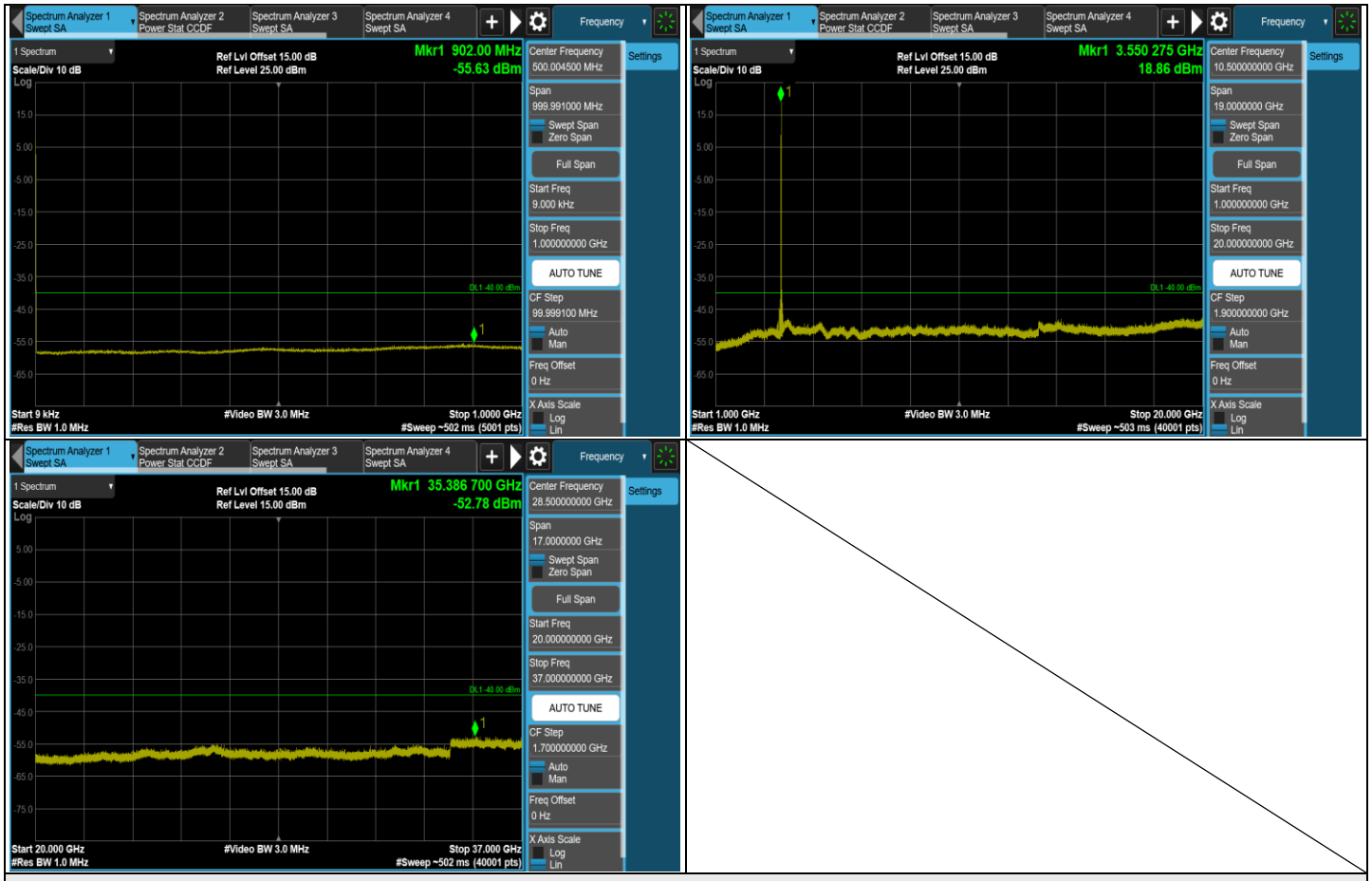
Spectrum Plot of Worst Value	
Occupied bandwidth	26 dB Bandwidth
	
64QAM CH 43490 (3590MHz)	QPSK CH 43190 (3560MHz)

7.5 Conducted Spurious Emissions

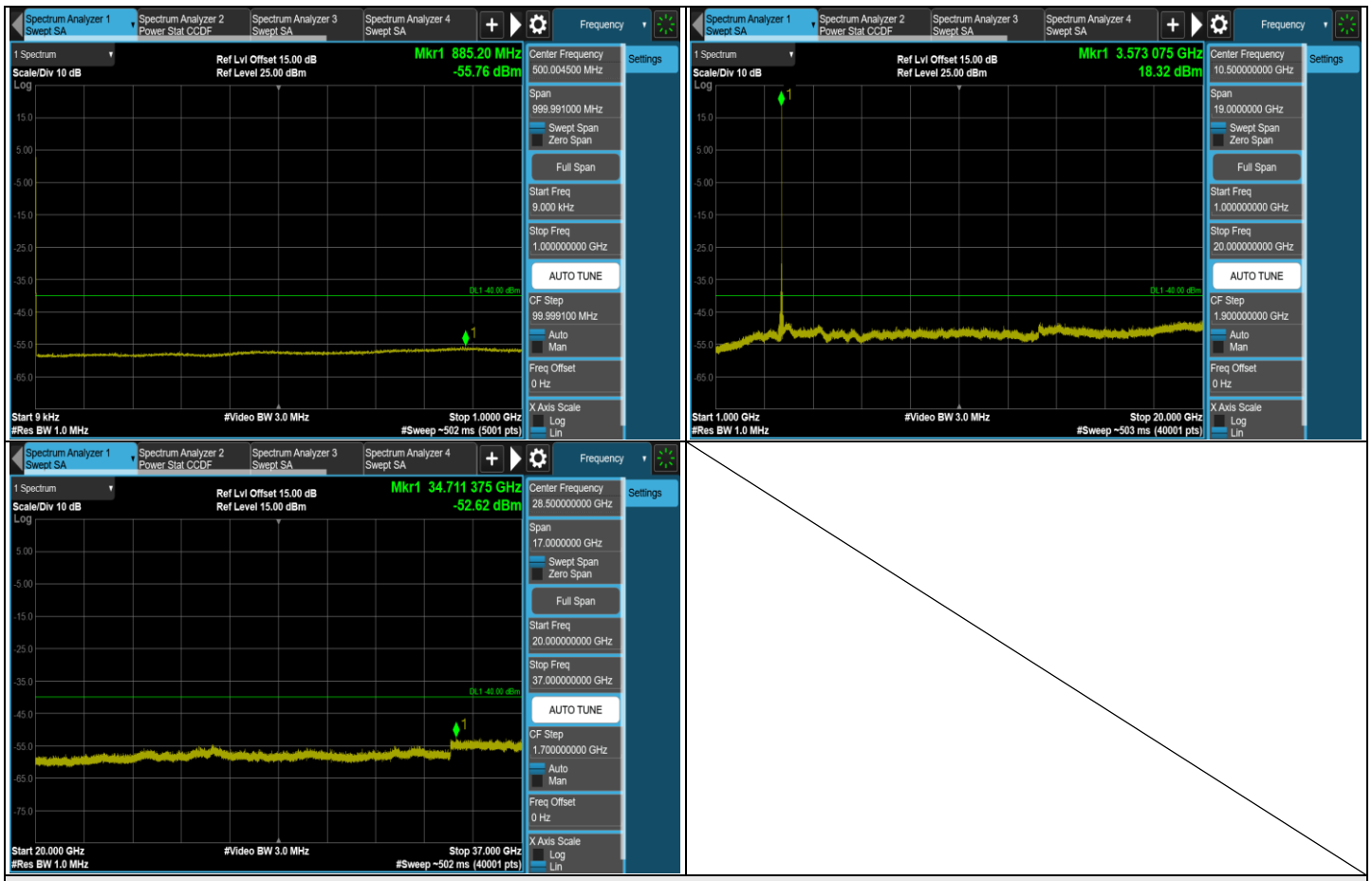
Input Power:	10.8 Vdc	Environmental Conditions:	25°C, 66% RH	Tested By:	Noah Chang

7.5.1 LTE Band 42

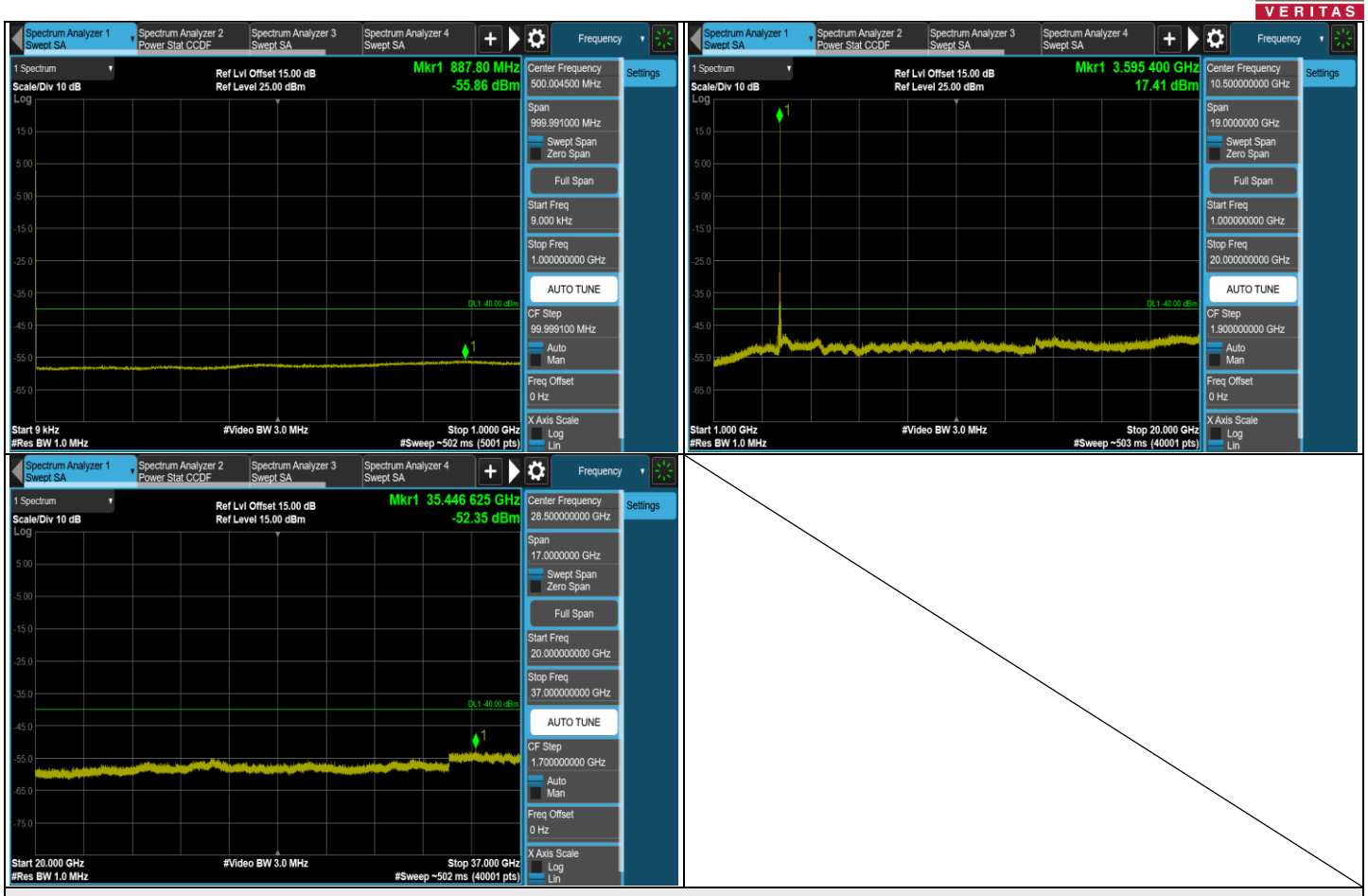
LTE Band 42, Channel Bandwidth: 5 MHz



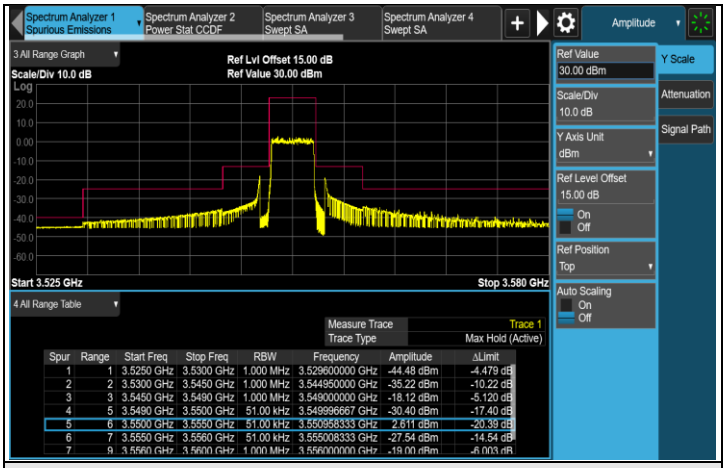
CH 43115 (3552.5 MHz)



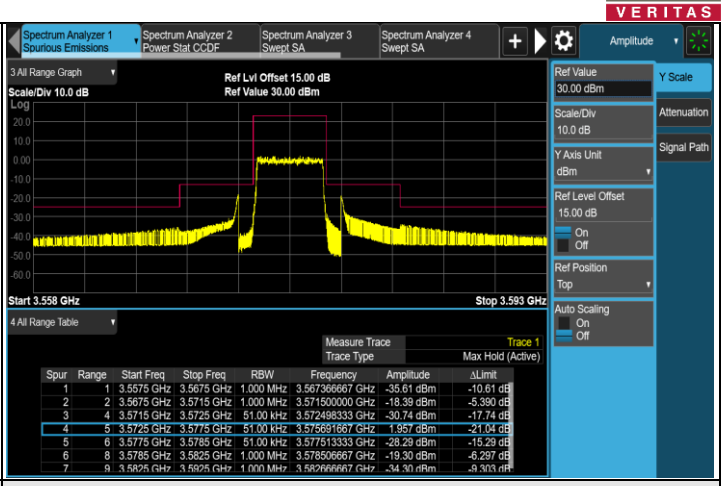
CH 43340 (3575 MHz)



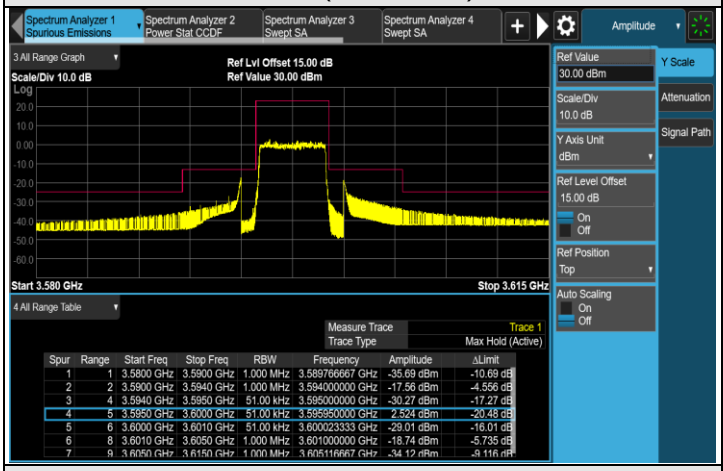
CH 43565 (3597.5 MHz)



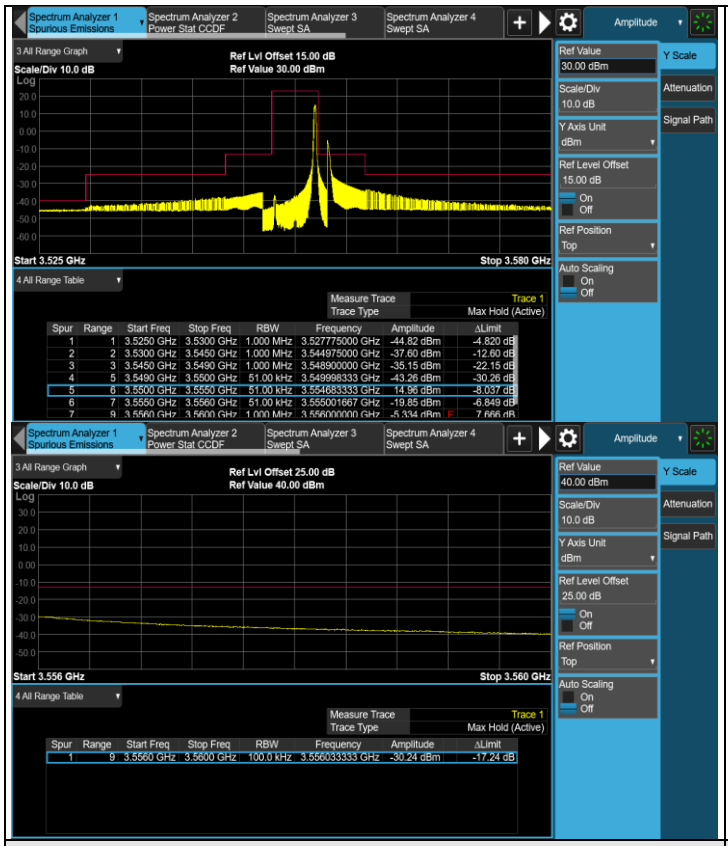
FULL (3552.5MHz)



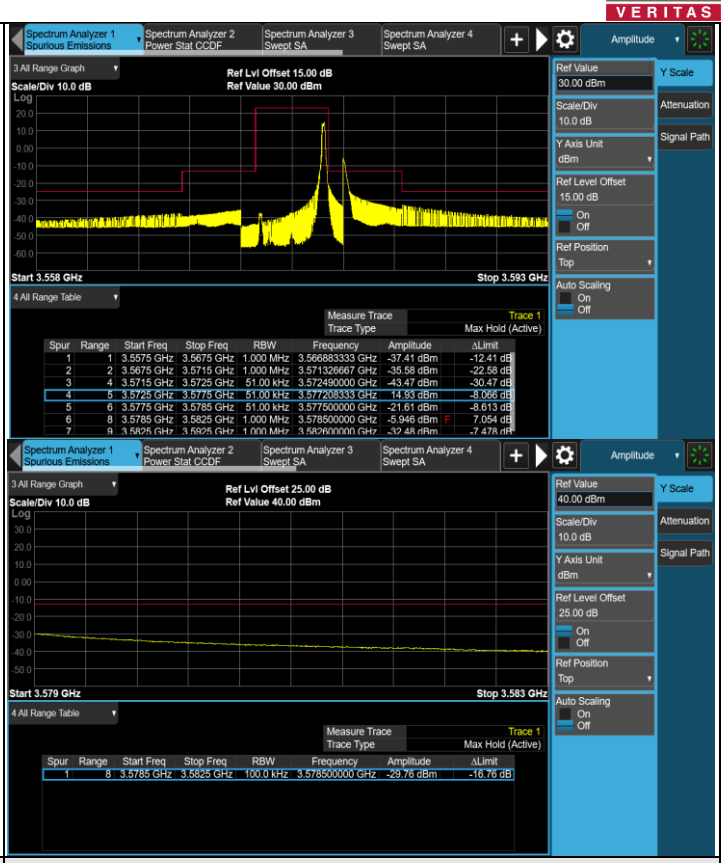
FULL (3575MHz)



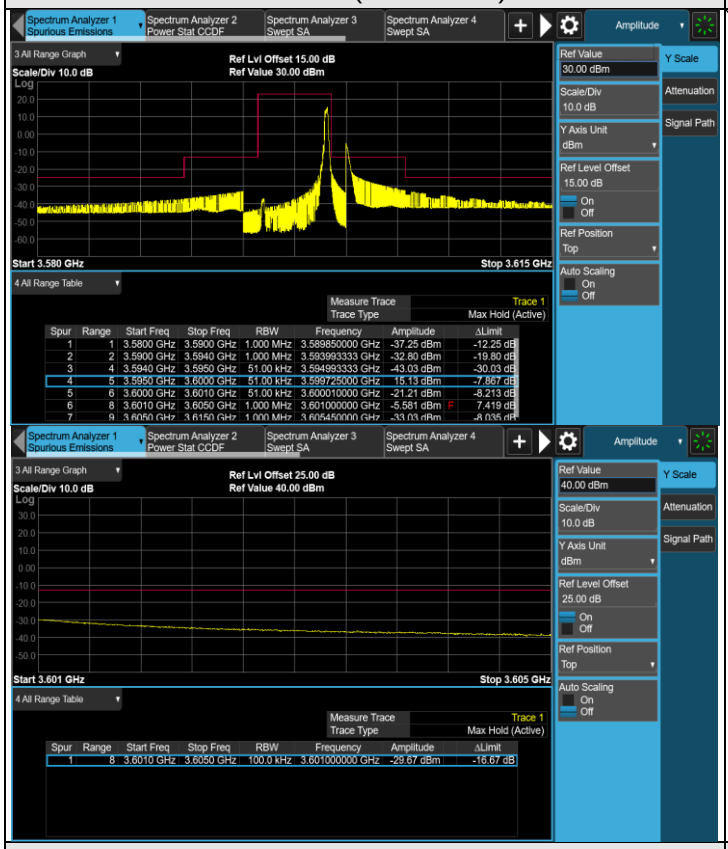
FULL (3597.5MHz)



1RB#MAX (3552.5MHz)

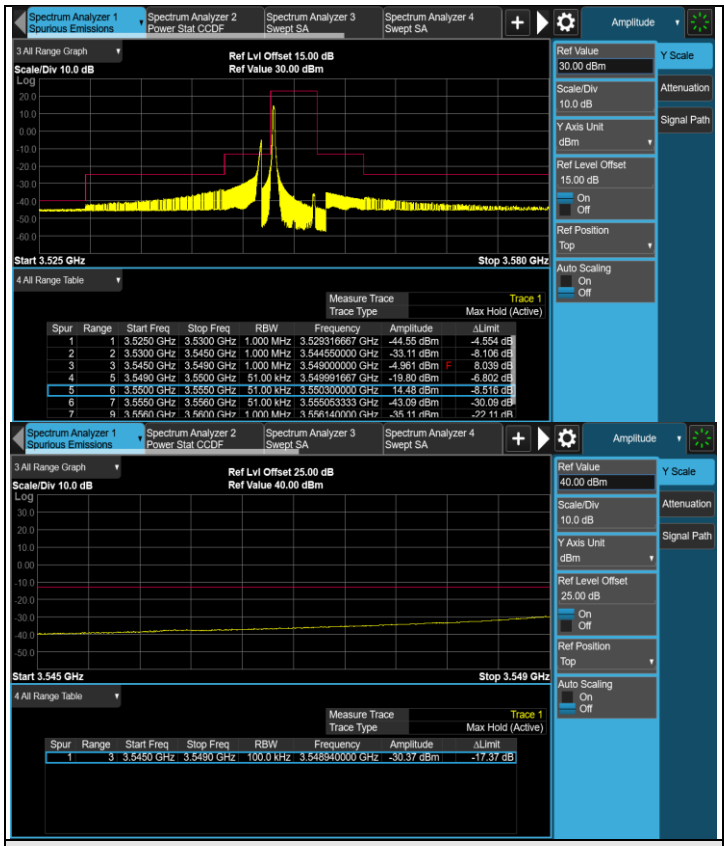


1RB#MAX (3575MHz)

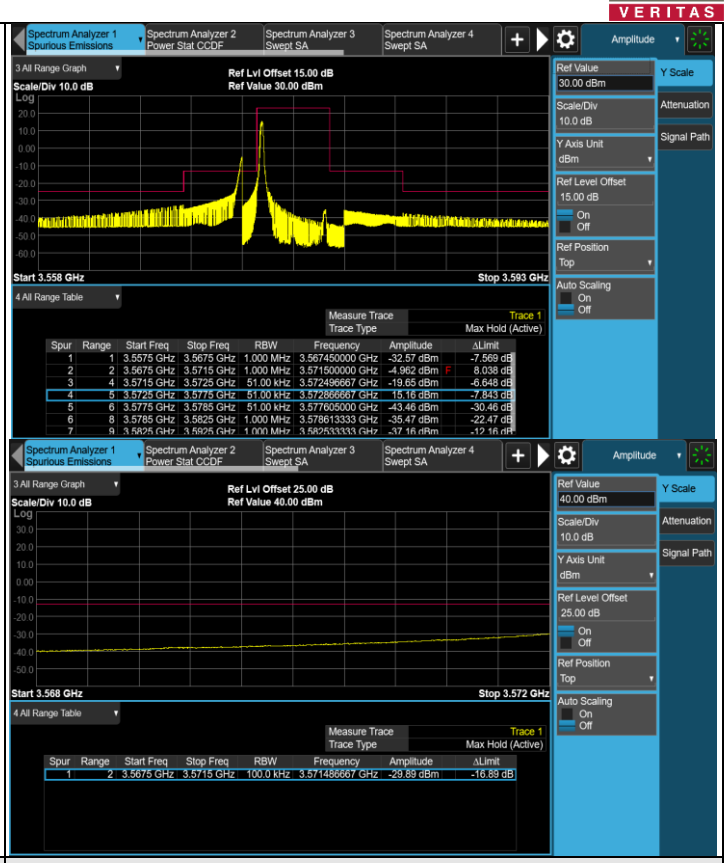


1RB#MAX (3597.5MHz)

NOTE: For 1MHz to 2MHz above/below the channel edge, compliance is demonstrated via integration with a smaller RBW as permitted by the rules. [RBW = 100 kHz / Reference RBW = 1 MHz]
Worst-case integrated BW power = [Max Measured Value (dBm) with RBW=100kHz] + 10log (1000/100)
To compensate for this integration before comparison to the limit, 10 dB was added to Ref Lvl Offset.
i.e. 15.00 dB CF + 10 dB integration compensation factor = 25.00 dB Ref Lvl Offset



1RB#0 (3552.5MHz)

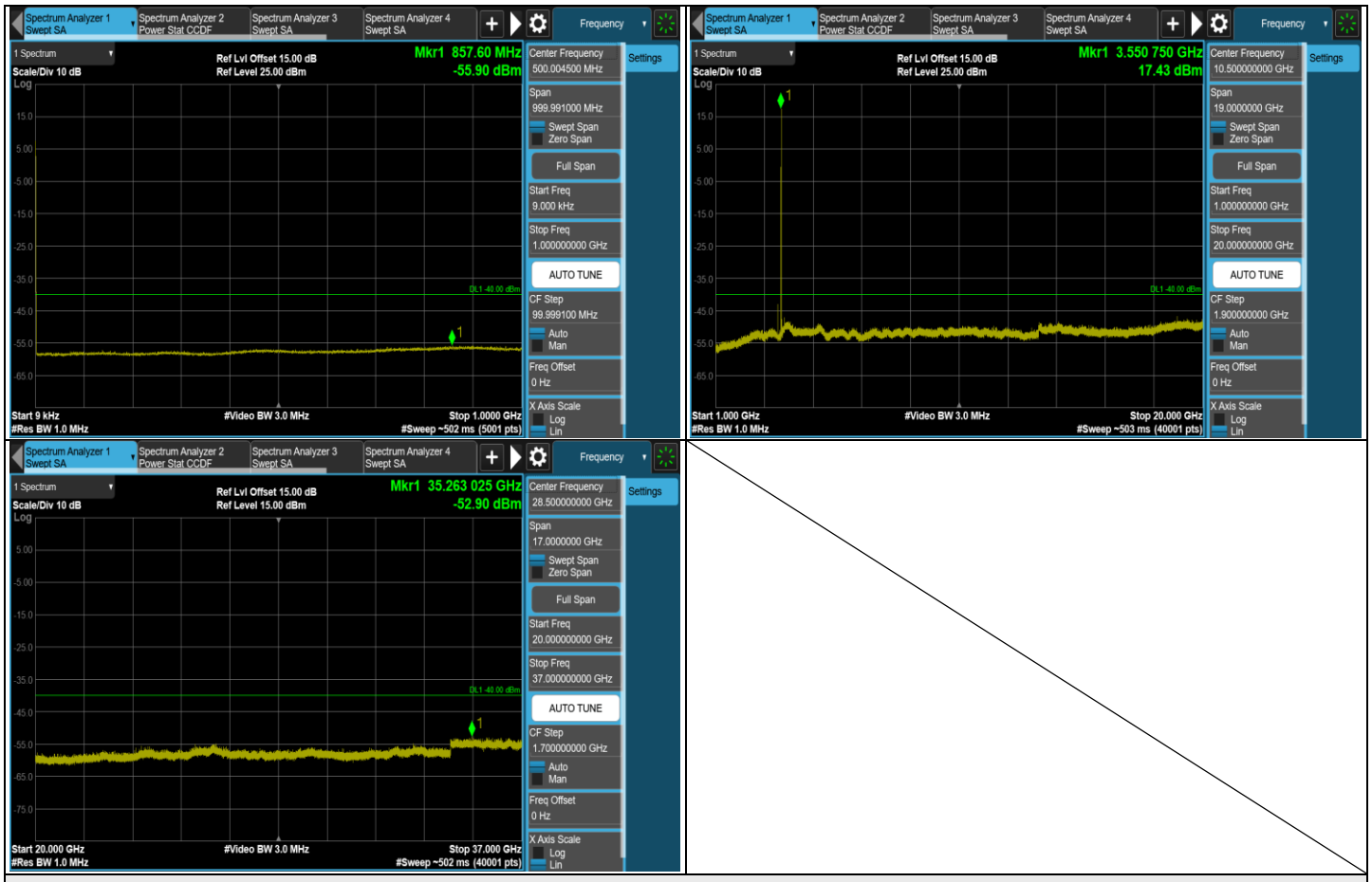


1RB#0 (3575MHz)

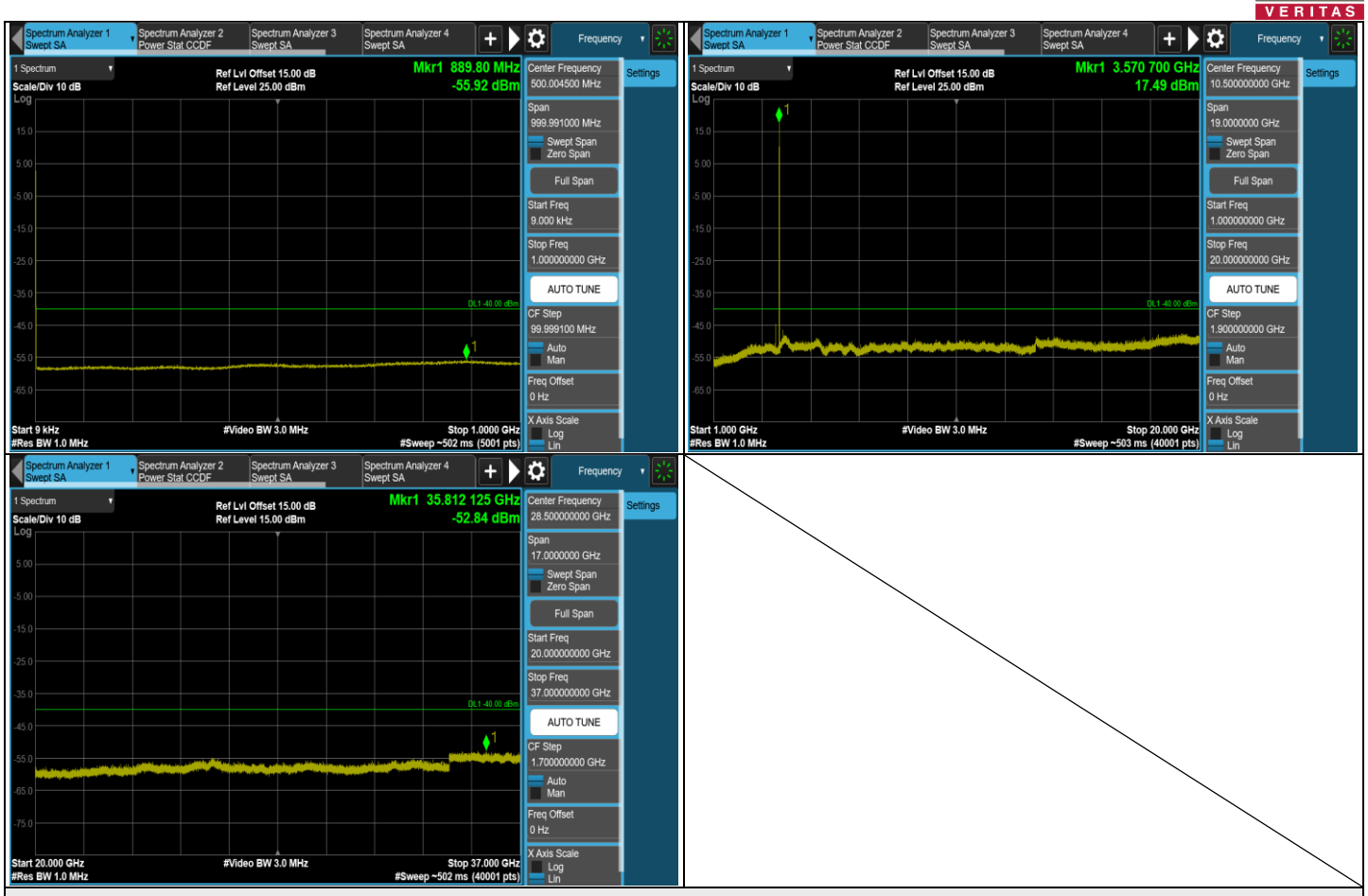
1RB#0 (3597.5MHz)

NOTE: For 1MHz to 2MHz above/below the channel edge, compliance is demonstrated via integration with a smaller RBW as permitted by the rules. [RBW = 100 kHz / Reference RBW = 1 MHz]
Worst-case integrated BW power = [Max Measured Value (dBm) with RBW=100kHz] + 10log (1000/100)
To compensate for this integration before comparison to the limit, 10 dB was added to Ref Lvl Offset.
i.e. 15.00 dB CF + 10 dB integration compensation factor = 25.00 dB Ref Lvl Offset

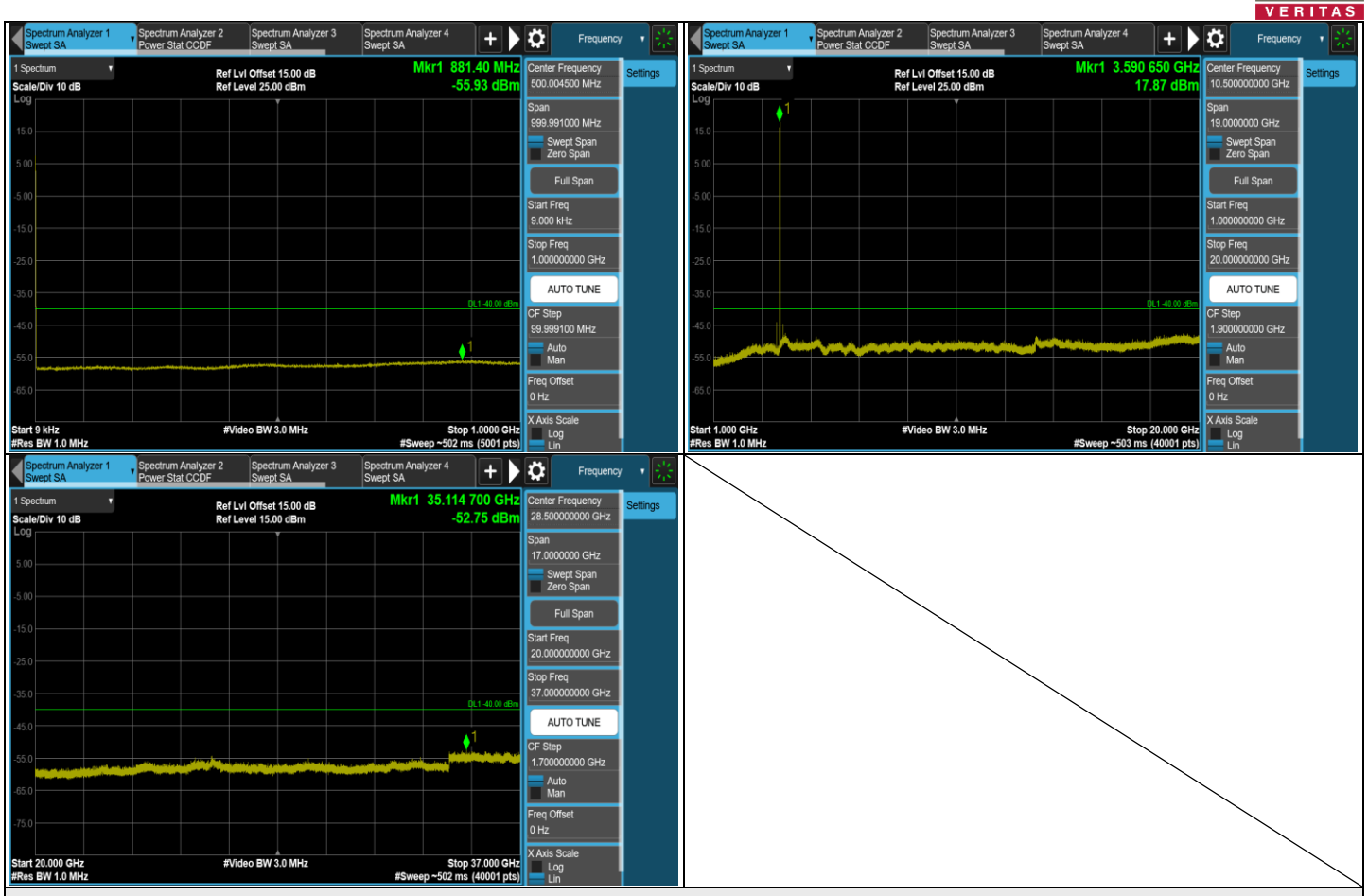
LTE Band 42, Channel Bandwidth: 10 MHz



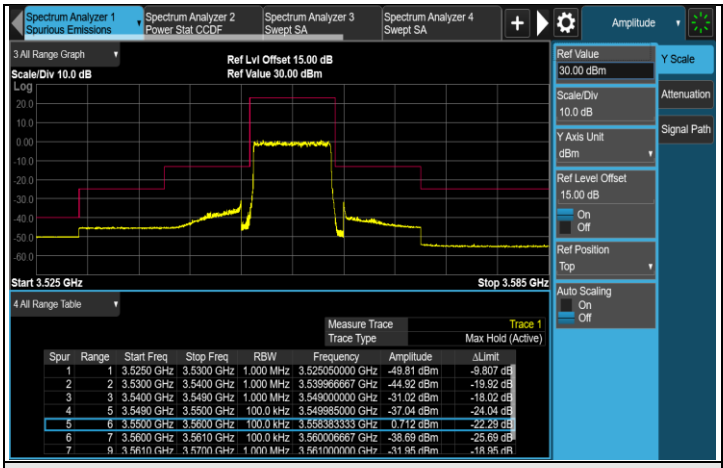
CH 43140 (3555 MHz)



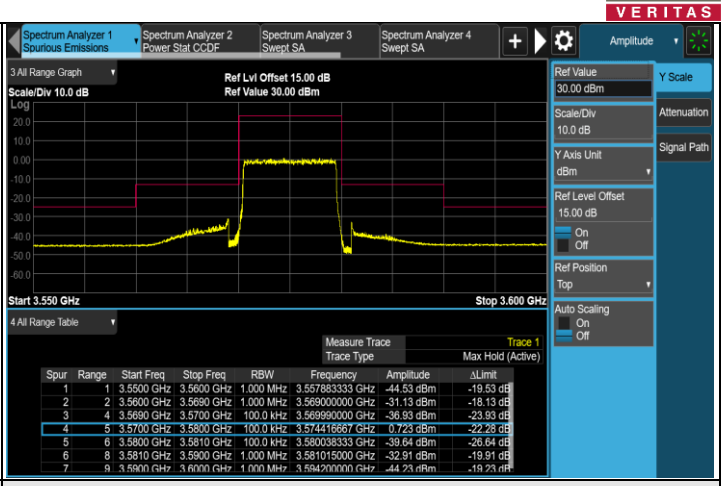
CH 43340 (3575 MHz)



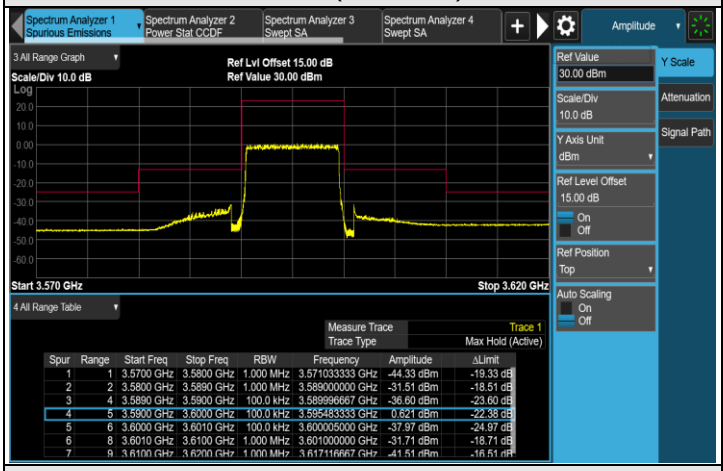
CH 43540 (3595 MHz)



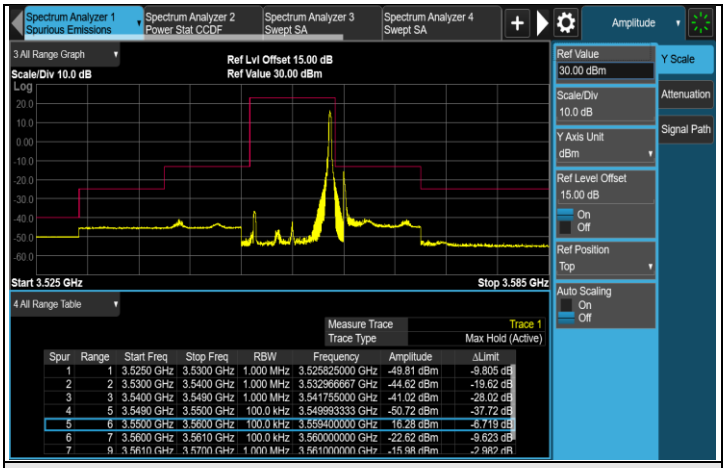
FULL (3555MHz)



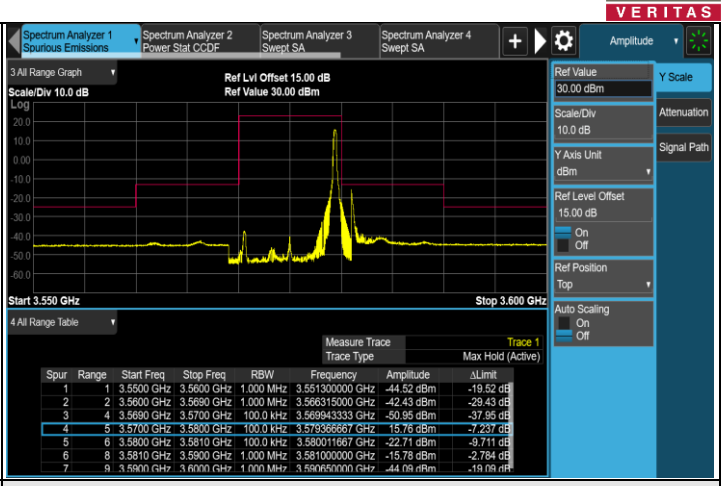
FULL (3575MHz)



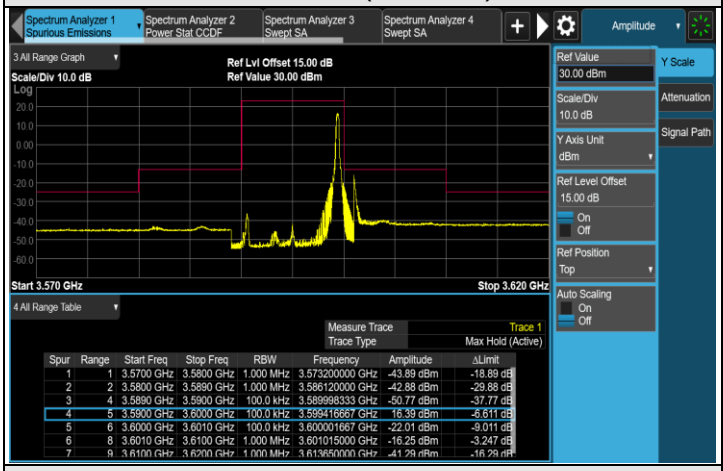
FULL (3595MHz)



1RB#MAX (3555MHz)



1RB#MAX (3575MHz)



1RB#MAX (3595MHz)