MEASUREMENT REPORT

FCC PART 96

FCC ID:	2ADZR4G0812WA
Application:	Nokia Shanghai Bell Co., Ltd
Application Type:	Certification
Product:	FastMile 4G Gateway
Model No.:	4G08-12W-A
Brand Name:	NOKIA
FCC Rule Part(s):	Part 96
Test Procedure(s):	ANSI C63.26-2015, KDB 971168 D01v03r01, KDB 940660 D01v02, KDB 662911 D01v02r01
Test Date:	November 02, 2019 ~ April 12, 2020

Reviewed By: Sunny Sun
(Sunny Sun)

Approved By: Robin Wu
(Robin Wu)

Revision History

Report No.	Version	Description	Issue Date	Note
1911RSU040-U5	Rev. 01	Initial Report	04-27-2020	Valid

CONTENTS

Description Page

General Information

Applicant:	Nokia Shanghai Bell Co., Ltd
Applicant Address:	388#, Ningqiao Road, China (Shanghai) Pilot Free Trade Zone, Shanghai 201206, China
Manufacturer:	Nokia Shanghai Bell Co., Ltd
Manufacturer Address:	388#, Ningqiao Road, China (Shanghai) Pilot Free Trade Zone, Shanghai 201206, China
Test Site:	MRT Technology (Suzhou) Co., Ltd
Test Site Address:	D8 Building, No.2 Tian'edang Rd., Wuzhong Economic Development Zone, Suzhou, China
Test Device Serial No.:	N/A ☐ Production ☒ Pre-Production ☐ Engineering

Test Facility / Accreditations

Measurements were performed at MRT Laboratory located in Tian'edang Rd., Suzhou, China.

- **MRT facility is a FCC registered (MRT Designation No. CN1166) test facility with the site description report on file and has met all the requirements specified in ANSI C63.4-2014.**
- **MRT facility is an IC registered (MRT Reg. No. 11384A-1) test laboratory with the site description on file at Industry Canada.**
- **MRT facility is a VCCI registered (R-20025, G-20034, C-20020, T-20020) test laboratory with the site description on file at VCCI Council.**
- **MRT Lab is accredited to ISO 17025 by the American Association for Laboratory Accreditation (A2LA) under the American Association for Laboratory Accreditation Program (A2LA Cert. No. 3628.01) in EMC, Telecommunications, Radio and SAR testing.**

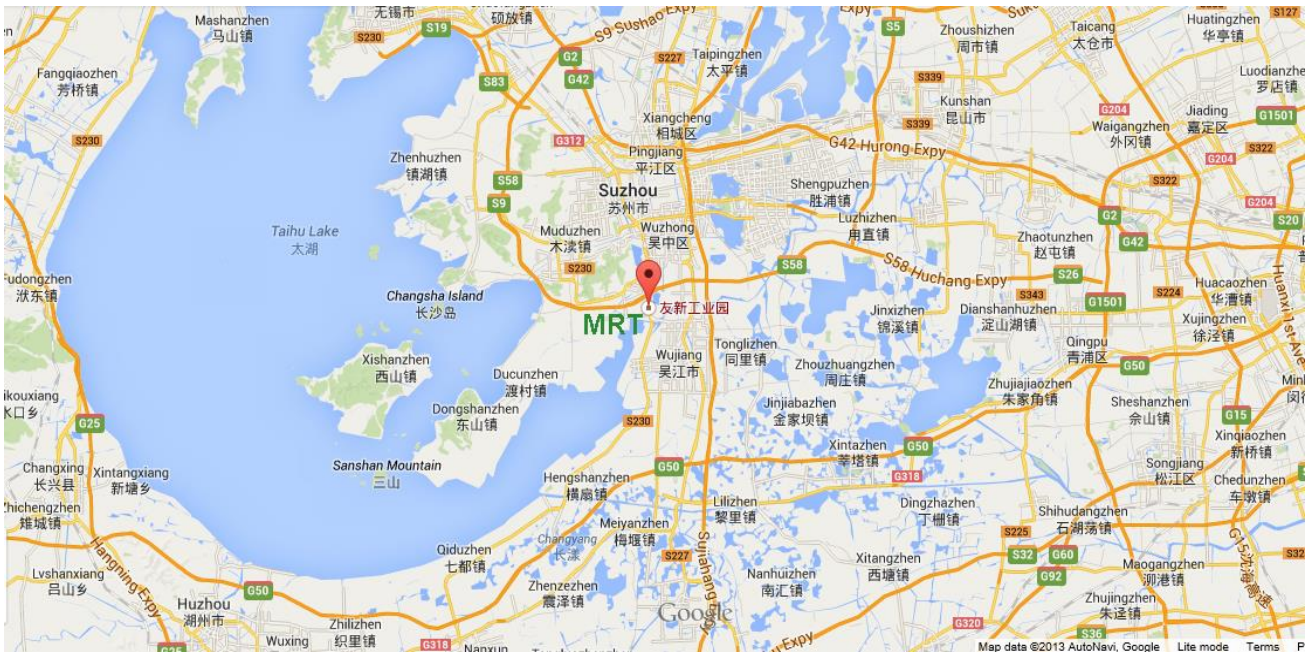
1. INTRODUCTION

1.1. Scope

Measurement and determination of electromagnetic emissions (EMC) of radio frequency devices includingintentional and/or unintentional radiators for compliance with the technical rules and regulations of the FederalCommunications Commission and the Innovation, Science and Economic Development Canada.

1.2. MRT Test Location

The map below shows the location of the MRT LABORATORY, its proximity to the Taihu Lake. These measurement tests were conducted at the MRT Technology (Suzhou) Co., Ltd. Facility located at D8 Building, No.2 Tian'edang Rd., Wuzhong Economic Development Zone, Suzhou, China. The detailed description of the measurement facility was found to be in compliance with the requirements of § 2.948 according to ANSI C63.4-2009 on September 30, 2013.



2. PRODUCT INFORMATION

2.1. Equipment Description

Product Name:	FastMile 4G Gateway
Model No.:	4G08-12W-A
Brand Name:	NOKIA
Wi-Fi Specification:	802.11a/b/g/n/ac
LTE Specification:	Band 2, 4, 5, 7, 25, 38, 48, 66
Operating Temperature:	0 ~ 45 °C
Power Type:	AC adapter input

2.2. Product Specification Subjective to this Report

TDD Tx & Rx Frequency Range:	Band 48: 3550 ~ 3700 MHz
UL-MIMO Band:	Band 48
Type of Modulation:	QPSK, 16QAM, 64QAM, 256QAM (DL)

Note: For other features of this EUT, test report will be issued separately.

2.3. Description of Available Antennas

Technology	Frequency Range (MHz)	Antenna Type	Max Peak Gain (dBi)		Directional Gain (dBi)			
					CDD Mode		Beam-Forming Mode	
			Ant 8	Ant 9	For Power	For PSD	For Power	For PSD
2.4GHz Wi-Fi	2400 ~ 2483.5	PCB	3.81	3.95	3.95	6.96	6.96	6.96
5GHz Wi-Fi	5150 ~ 5350	Dipole	4.13	3.99	4.13	7.14	7.14	7.14
	5470 ~ 5725		4.42	4.65	4.65	7.66	7.66	7.66
	5725 ~ 5850		4.56	4.67	4.67	7.68	7.68	7.68

Technology	Frequency Range (MHz)	Antenna Type	Max Peak Gain (dBi)
LTE Band 2	1850 ~ 1910	PCB	4.27
LTE Band 4	1710 ~ 1755		4.49
LTE Band 5	824 ~ 849		0.10
LTE Band 7	2500 ~ 2570		4.70
LTE Band 25	1850 ~ 1915		4.27
LTE Band 38	2570 ~ 2620		4.70
LTE Band 48	3550 ~ 3700		4.80
LTE Band 66	1710 ~ 1780		4.49

Note 1: The EUT supports Cyclic Delay Diversity (CDD) with 802.11a/g/n/ac, CDD signals are correlated.

If all antennas have the same gain, G_{ANT}, Directional gain = G_{ANT} + Array Gain, where Array Gain is as follows.

- For power spectral density (PSD) measurements on all devices,

Array Gain = 10 log (N_{ANT}/ N_{SS}) dB = 3.01;

- For power measurements on IEEE 802.11 devices,

Array Gain = 0 dB for $N_{ANT} \leq 4$;

If antenna gains are not equal, Directional gain may be calculated by using the formulas applicable to equal gain antennas with G_{ANT} set equal to the gain of the antenna having the highest gain.

Note 2: The EUT supports Beam Forming mode, Directional gain = G_{ANT} + 10 log(N_{ANT}/N_{SS}) dBi, Directional gain may be calculated by using the formulas applicable to equal gain antennas with G_{ANT} set equal to the gain of the antenna having the highest gain.

Note 3: For power measurements on all other devices: Array Gain = 10 log(N_{ANT}/N_{SS}) dB.

2.4. EMI Suppression Device(s)/Modifications

No EMI suppression device(s) were added and/or no modifications were made during testing.

2.5. Labeling Requirements

Per 2.1074 & 15.19; Docket 95-19

The label shall be permanently affixed at a conspicuous location on the device; instruction manual or pamphletsupplied to the user and be readily visible to the purchaser at the time of purchase. However, when the deviceis so small wherein placement of the label with specified statement is not practical, only the FCC ID must be displayed on the device per Section 15.19(a)(5). Please see attachment for FCC ID label andlabel location.

3. DESCRIPTION of TEST

3.1. Evaluation Procedure

The measurement procedure described in the document titled “American National Standard for Compliance Testing of Transmitters Used in Licensed Radio Services” (ANSI C63.26-2015) was used in the measurement.

3.2. Radiated Emissions

The radiated test facilities consisted of an indoor 3 meter semi-anechoic chamber used for final measurements and exploratory measurements, when necessary. The measurement area is contained within the semi-anechoic chamber which is shielded from any ambient interference. For measurements above 1GHz absorbers are arranged on the floor between the turn table and the antenna mast in such a way so as to maximize the reduction of reflections. For measurements below 1GHz, the absorbers are removed. A turntable is used for radiated measurement. It is a continuously rotatable, remote controlled, metallic turntable and 2 meters (6.56 ft.) in diameter. The turn table is flush with the raised floor of the chamber in order to maintain its function as a ground plane. An 80cm high PVC support structure is placed on top of the turntable.

For all measurements, the spectrum was scanned through all EUT azimuths and from 1 to 4 meter receive antenna height using a broadband antenna from 30MHz up to the upper frequency shown in 15.33(b)(1) depending on the highest frequency generated or used in the device or on which the device operates or tunes. For frequencies above 1GHz, linearly polarized double ridge horn antennas were used. For frequencies below 30MHz, a calibrated loop antenna was used. When exploratory measurements were necessary, they were performed at 1 meter test distance inside the semi-anechoic chamber using broadband antennas, broadband amplifiers, and spectrum analyzers to determine the frequencies and modes producing the maximum emissions. Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition. The test set-up for frequencies below 1GHz was placed on top of the 0.8 meter high, 1 x 1.5 meter table; and test set-up for frequencies 1-40GHz was placed on top of the 1.5 meter high, 1 x 1.5 meter table. The EUT, support equipment, and interconnecting cables were arranged and manipulated to maximize each emission. Appropriate precaution was taken to ensure that all emissions from the EUT were maximized and investigated. The system configuration, clock speed, mode of operation or video resolution, if applicable, turntable azimuth, and receive antenna height was noted for each frequency found.

Final measurements were made in the semi-anechoic chamber using calibrated, linearly polarized broadband and horn antennas. The test setup was configured to the setup that produced the worst-case emissions. The spectrum analyzer was set to investigate all frequencies required for testing to compare the highest radiated disturbances with respect to the specified limits. The turntable containing the EUT was rotated through 360 degrees and the height of the receive antenna

was varied 1 to 4 meters and stopped at the azimuth and height producing the maximum emission. Each emission was maximized by changing the orientation of the EUT through three orthogonal planes and changing the polarity of the receive antenna, which produced the worst-case emissions. According to 3dB Beam-Width of horn antenna, the horn antenna should be always directed to the EUT when rising height.

4. TEST EQUIPMENT CALIBRATION DATE

Radiated Emissions - AC1

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cali. Due Date
EMI Test Receiver	R&S	ESR7	MRTSUE06001	1 year	2020/08/01
PXA Signal Analyzer	Keysight	9030B	MRTSUE06395	1 year	2020/09/03
Loop Antenna	Schwarzbeck	FMZB 1519	MRTSUE06025	1 year	2020/11/10
Bilog Period Antenna	Schwarzbeck	VULB 9168	MRTSUE06172	1 year	2021/03/31
Broad Band Horn Antenna	Schwarzbeck	BBHA 9120D	MRTSUE06023	1 year	2020/10/13
Broad Band Horn Antenna	Schwarzbeck	BBHA 9170	MRTSUE06597	1 year	2021/02/23
Microwave System Amplifier	Agilent	83017A	MRTSUE06076	1 year	2020/11/15
Preamplifier	Schwarzbeck	BBV 9721	MRTSUE06121	1 year	2020/06/11
Thermohygrometer	Testo	608-H1	MRTSUE06403	1 year	2020/08/08
Anechoic Chamber	TDK	Chamber-AC1	MRTSUE06212	1 year	2020/04/30

Radiated Emission - AC2

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cali. Due Date
Spectrum Analyzer	Keysight	N9038A	MRTSUE06125	1 year	2020/08/01
Loop Antenna	Schwarzbeck	FMZB 1519	MRTSUE06025	1 year	2020/11/10
Bilog Period Antenna	Schwarzbeck	VULB 9162	MRTSUE06022	1 year	2020/10/13
Horn Antenna	Schwarzbeck	BBHA9120D	MRTSUE06171	1 year	2020/10/27
Broad Band Horn Antenna	Schwarzbeck	BBHA 9170	MRTSUE06597	1 year	2021/02/23
Broadband Coaxial Preamplifier	Schwarzbeck	BBV 9718	MRTSUE06176	1 year	2020/11/15
Preamplifier	Schwarzbeck	BBV 9721	MRTSUE06121	1 year	2020/06/11
Temperature/Humidity Meter	Minggao	ETH529	MRTSUE06170	1 year	2020/12/15
Anechoic Chamber	RIKEN	Chamber-AC2	MRTSUE06213	1 year	2020/04/30

Conducted Test Equipment - TR3

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cali. Due Date
EXA Signal Analyzer	Agilent	N9020A	MRTSUE06106	1 year	2020/04/15
EXA Signal Analyzer	Keysight	N9010B	MRTSUE06452	1 year	2020/07/11
Signal Analyzer	R&S	FSV40	MRTSUE06218	1 year	2020/04/15
Power Meter	Agilent	U2021XA	MRTSUE06030	1 year	2020/11/18
USB wideband power sensor	Keysight	U2021XA	MRTSUE06446	1 year	2020/06/30
USB wideband power sensor	Keysight	U2021XA	MRTSUE06447	1 year	2020/06/30
Bluetooth Test Set	Anritsu	MT8852B-042	MRTSUE06389	1 year	2020/06/13
Audio Analyzer	Agilent	U8903B	MRTSUE06143	1 year	2020/06/13
Modulation Analyzer	HP	8901A	MRTSUE06098	1 year	2020/10/10
Wideband Radio Communication Tester	R&S	CMW 500	MRTSUE06243	1 year	2020/11/07
DC Power Supply	GWINSTEK	DPS-3303C	MRTSUE06064	N/A	N/A
Temperature & Humidity Chamber	BAOYT	BYH-150CL	MRTSUE06051	1 year	2020/11/07
Thermohygrometer	testo	608-H1	MRTSUE06401	1 year	2020/08/08

Software	Version	Function
e3	9.160520a	EMI Test Software

5. MEASUREMENT UNCERTAINTY

Where relevant, the following test uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k = 2.

AC Conducted Emission Measurement - SR2
The maximum measurement uncertainty is evaluated as: 9kHz~150kHz: 3.84dB 150kHz~30MHz: 3.46dB
Radiated Emission Measurement - AC1
The maximum measurement uncertainty is evaluated as: Horizontal: 30MHz~300MHz: 4.07dB 300MHz~1GHz: 3.63dB 1GHz~18GHz: 4.16dB Vertical: 30MHz~300MHz: 4.18dB 300MHz~1GHz: 3.60dB 1GHz~18GHz: 4.76dB
Radiated Emission Measurement - AC2
The maximum measurement uncertainty is evaluated as: Horizontal: 30MHz~300MHz: 3.75dB 300MHz~1GHz: 3.53dB 1GHz~18GHz: 4.28dB Vertical: 30MHz~300MHz: 3.86dB 300MHz~1GHz: 3.53dB 1GHz~18GHz: 4.33dB

6. TEST RESULT

6.1. Summary

FCC Part Section(s)	Test Description	Test Limit	Test Condition	Test Result	Reference
2.1049	Occupied Bandwidth	N/A	Conducted	Pass	Section 6.2
2.1055	Frequency Stability	Refer to section 6.3		Pass	Section 6.3
96.41(b)	Equivalent Isotropic Radiated Power	Refer to section 6.4		Pass	Section 6.4
2.1051 96.41(e)	Conducted Spurious Emissions; Band Edge Emissions at Antenna Terminal	Refer to section 6.5, 6.6		Pass	Section 6.5, 6.6
2.1053 96.41(e)	Radiated Spurious Emissions	Refer to section 6.7	Radiated	Pass	Section 6.7
96.47	End User Device Additional Requirements (CBSD Protocol)	Refer to section 6.8		Pass	Section 6.8

Notes:

1) The analyzer plots shown in this section were all taken with a correction table loaded into the analyzer. The correction table was used to account for the losses of the cables and attenuators used as part of the system to connect the EUT to the analyzer at all frequencies of interest.
2) Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations the worst-case was found.
3) All supported modulation types were evaluated. The worst-case emission of modulation was selected. Therefore, the Frequency Stability, Occupied Bandwidth, Channel Band Edge, Radiated & Conducted Spurious Emission were presented in the test report.

6.2. Occupied Bandwidth

6.2.1. Test Limit

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 percent of the total mean power radiated by a given emission shall be measured.

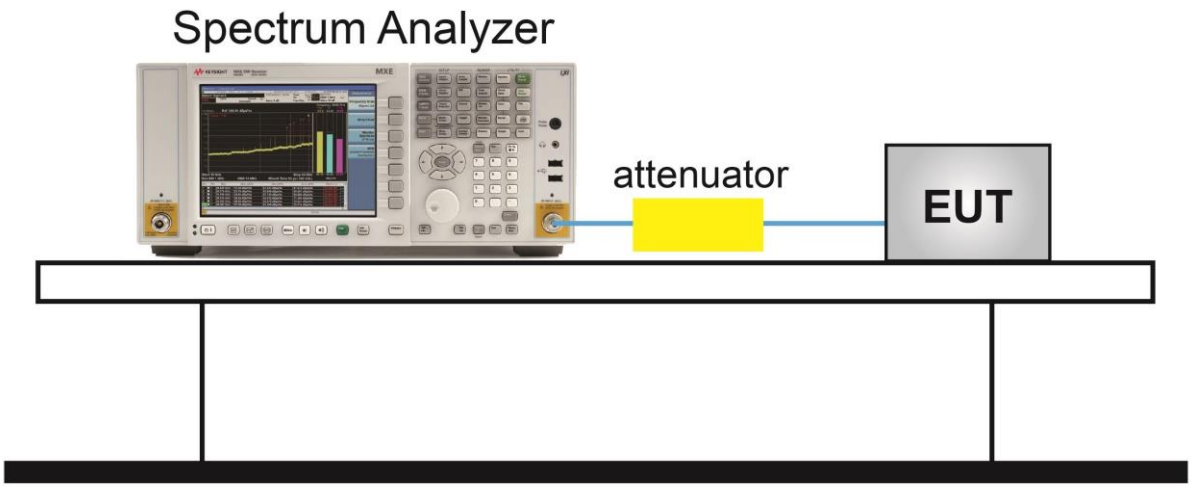
6.2.2. Test Procedure

ANSI C63.26-2015 - Section 5.4.4

6.2.3. Test Setting

1. Set center frequency to the nominal EUT channel center frequency
2. RBW = The nominal RBW shall be in the range of 1% to 5% of the anticipated OBW
3. VBW ≥ 3 × RBW
4. Detector = Peak
5. Trace mode = max hold
6. Sweep = auto couple
7. Allow the trace to stabilize
8. Use the 99% power bandwidth function of the instrument and report the measured bandwidth.

6.2.4. Test Setup



6.2.5. Test Result

Product	FastMile 4G Gateway	Temperature	25°C
Test Engineer	Larry Yan	Relative Humidity	56%
Test Site	SR5	Test Date	2020/03/13
Test Band	Band 48	Test Mode	SISO Mode

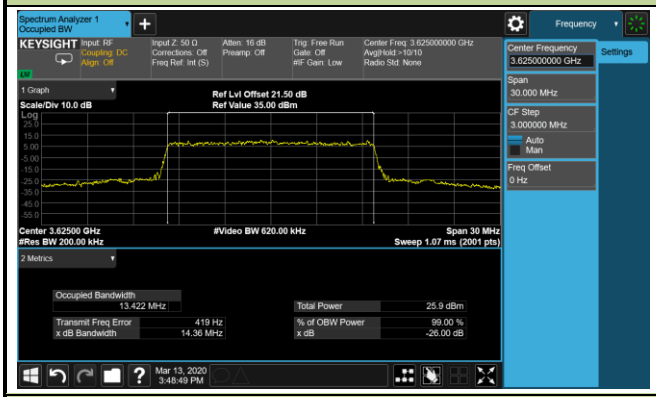
Modulation	Frequency (MHz)	Bandwidth (MHz)	99% Bandwidth (MHz)
QPSK	3625.0	5	4.51
		10	8.97
		15	13.42
		20	17.85
16QAM	3625.0	5	4.51
		10	8.95
		15	13.41
		20	17.85
64QAM	3625.0	5	4.53
		10	8.96
		15	13.40
		20	17.83

99% Bandwidth - QPSK

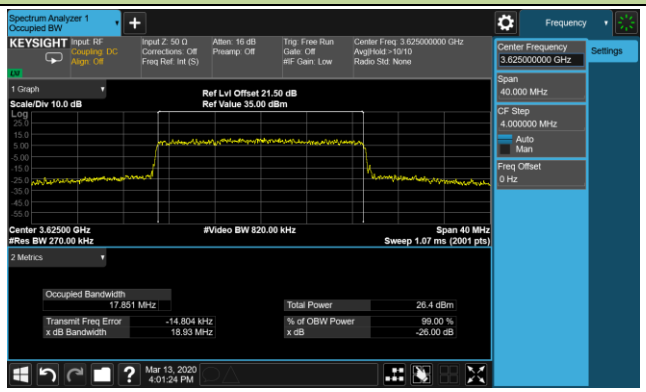
5MHz Channel Bandwidth

10MHz Channel Bandwidth

15MHz Channel Bandwidth



20MHz Channel Bandwidth

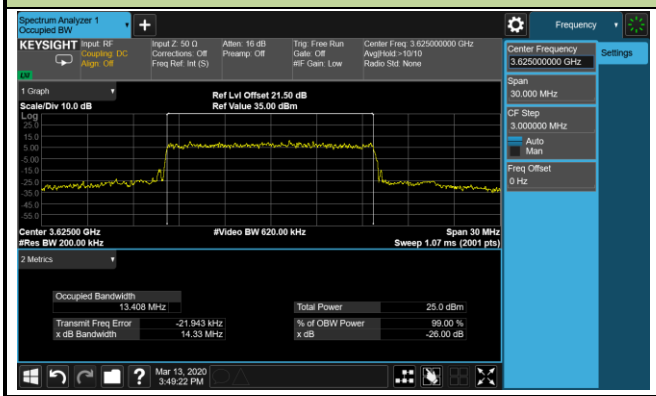


99% Bandwidth – 16QAM

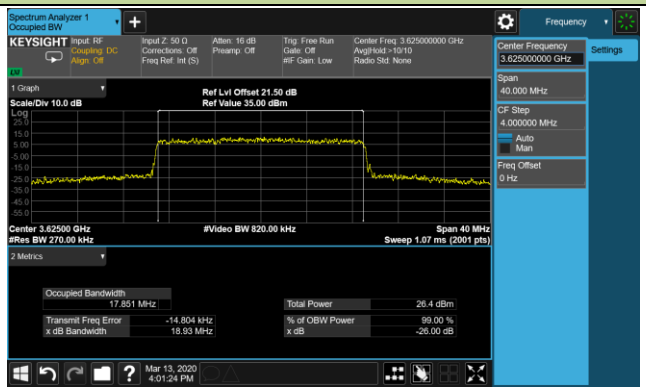
5MHz Channel Bandwidth

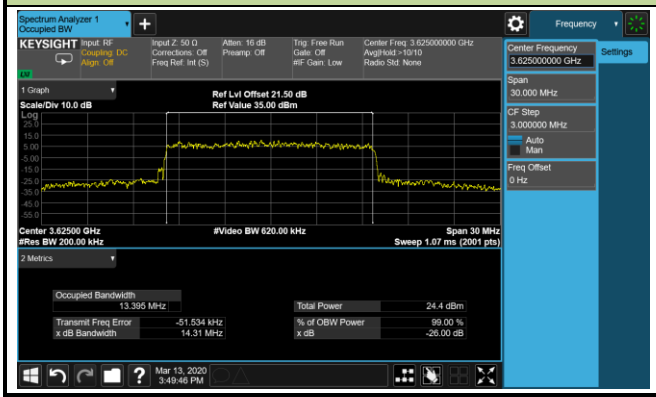
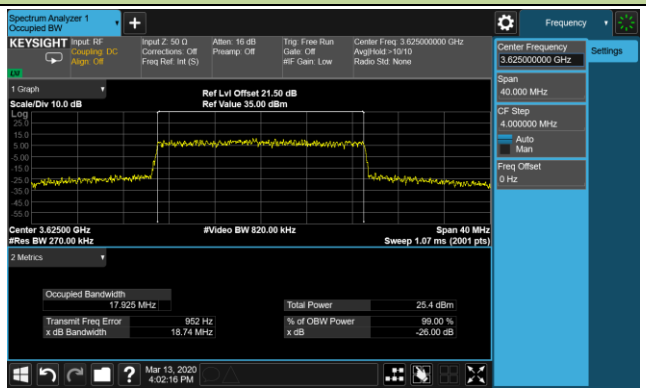
10MHz Channel Bandwidth

15MHz Channel Bandwidth



20MHz Channel Bandwidth



99% Bandwidth – 64QAM	
5MHz Channel Bandwidth	10MHz Channel Bandwidth
	
15MHz Channel Bandwidth	20MHz Channel Bandwidth
	

6.3. Frequency Stability Measurement

6.3.1. Test Limit

The applicant shall ensure compliance with frequency stability requirements by showing that f_L minus the frequency offset and f_H plus the frequency offset is within the frequency range in which the equipment is designed to operate.

6.3.2. Test Procedures Used

ANSI C63.26-2015 - Section 5.6

6.3.3. Test Setting

Frequency Stability Under Temperature Variations:

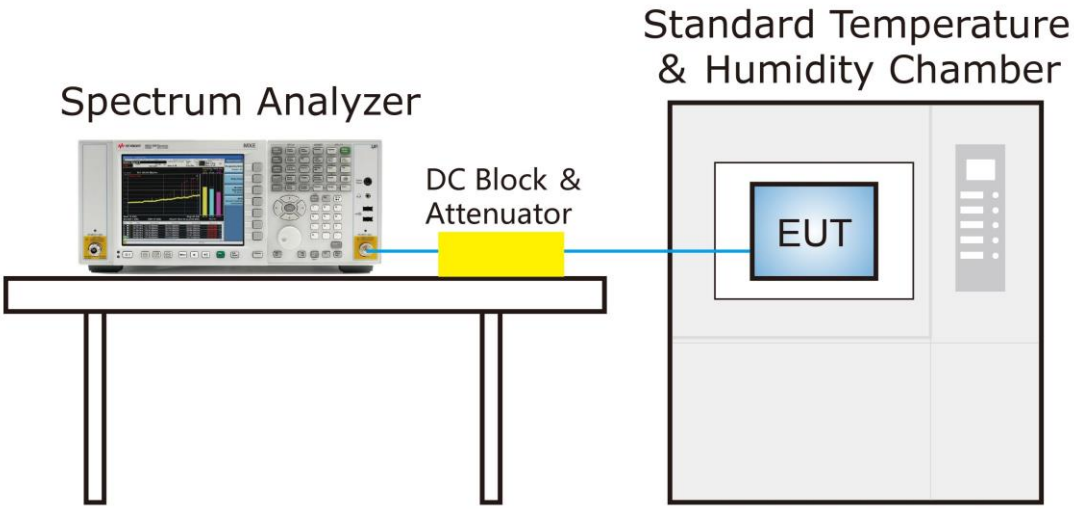
The equipment under test was connected to an external AC or DC power supply and input rated voltage. RF output was connected to a frequency counter or spectrum analyzer via feed through attenuators. The EUT was placed inside the temperature chamber. Set the spectrum analyzer RBW low enough to obtain the desired frequency resolution and measure EUT 20°C operating frequency as reference frequency. Turn EUT off and set the chamber temperature to highest. After the temperature stabilized for approximately 30 minutes recorded the frequency. Repeat step measure with 10°C decreased per stage until the lowest temperature reached.

Frequency Stability Under Voltage Variations:

Set chamber temperature to 20°C. Use a variable AC power supply / DC power source to power the EUT and set the voltage to rated voltage. Set the spectrum analyzer RBW low enough to obtain the desired frequency resolution and recorded the frequency.

Reduce the input voltage to specify extreme voltage variation (±15%) and endpoint, recordthe maximum frequency change.

6.3.4. Test Setup



6.3.5. Test Result

Product	FastMile 4G Gateway	Temperature	-30 ~ 50°C
Test Engineer	Larry Yan	Relative Humidity	46 ~ 58%
Test Site	TR3	Test Date	2020/01/15

Voltage (%)	Power (VAC)	Temp (°C)	Frequency Tolerance (ppm)
100%	120	- 30	-0.23
		- 20	-0.24
		- 10	-0.25
		0	-0.31
		+ 10	-0.22
		+ 20 (Ref)	-0.22
		+ 30	-0.24
		+ 40	-0.23
		+ 50	-0.24
115%	138	+ 20	-0.24
85%	102	+ 20	-0.31

6.4. Equivalent Isotropically Radiated Power Measurement

6.4.1. Test Limit

The maximum effective isotropic radiated power (EIRP) End User Device is 23dBm/10MHz

6.4.2. Test Procedures Used

ANSI C63.26-2015 - Section 5.2.4.2 & 5.2.5.5

6.4.3. Test Setting

Average Power Measurement

Average power measurements were performed only when the EUT was transmitting at its maximum power control level using a broadband power meter with a pulse sensor. The power meter implemented triggering and gating capabilities which were set up such that power measurements were recorded only during the ON time of the transmitter.

The relevant equation for determining the maximum ERP or EIRP from the measured RF output power is given in Equation (1) as follows:

ERP or EIRP = $P_{Meas} + G_T$

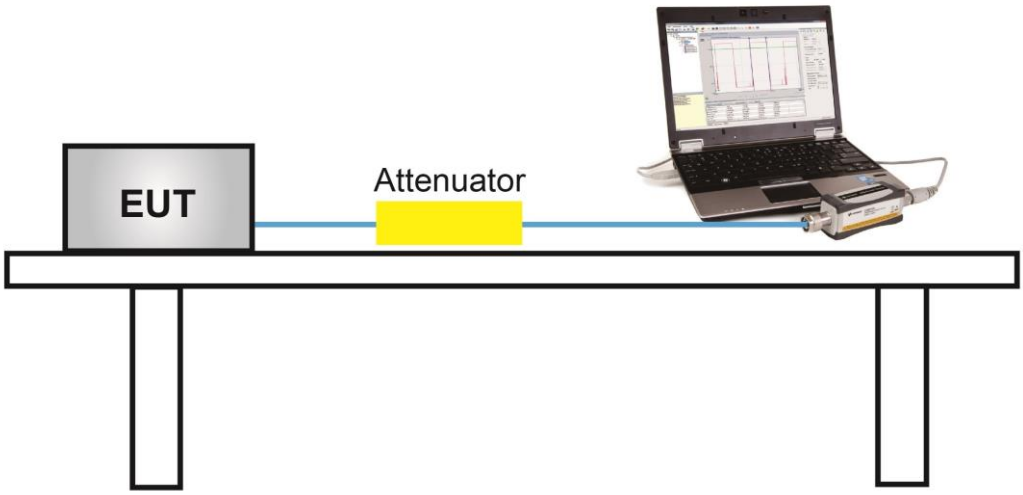
where

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)

6.4.4. Test Setup



6.4.5. Test Result

Product	FastMile 4G Gateway	Temperature	25°C
Test Engineer	Caitlin Chen	Relative Humidity	50%
Test Site	SR5	Test Date	2020/03/31
Test Band	Band 48	Test Mode	SISO Mode

Channel No.	Frequency (MHz)	Channel Bandwidth (MHz)	RB Size	RB Offset	Output Power (dBm/10MHz)	EIRP (dBm/ 10MHz)	Limit (dBm/ 10MHz)
QPSK							
55265	3552.50	5	25	0	16.44	21.29	< 23.00
55900	3625.00				17.51	22.36	< 23.00
56715	3697.50				17.42	22.27	< 23.00
55290	3555.00	10	50	0	16.87	21.72	< 23.00
55900	3625.00				17.81	22.66	< 23.00
56690	3695.00				17.80	22.65	< 23.00
55315	3557.50	15	75	0	15.41	20.26	< 23.00
55990	3625.00				17.24	22.09	< 23.00
56665	3692.50				17.25	22.10	< 23.00
55340	3550.00	20	100	0	15.64	20.49	< 23.00
55990	3625.00				17.56	22.41	< 23.00
56640	3690.00				17.73	22.58	< 23.00
16QAM							
55265	3552.50	5	25	0	16.33	21.18	< 23.00
55900	3625.00				17.27	22.12	< 23.00
56715	3697.50				17.28	22.13	< 23.00
55290	3555.00	10	50	0	16.82	21.67	< 23.00
55900	3625.00				17.58	22.43	< 23.00
56690	3695.00				17.64	22.49	< 23.00
55315	3557.50	15	75	0	15.63	20.48	< 23.00
55990	3625.00				17.19	22.04	< 23.00
56665	3692.50				17.30	22.15	< 23.00
55340	3550.00	20	100	0	15.10	19.95	< 23.00
55990	3625.00				17.54	22.39	< 23.00
56640	3690.00				17.54	22.39	< 23.00
Note: The EIRP (dBm/10MHz) = Output Power (dBm/10MHz) + Antenna Gain (dBi)							

Channel No.	Frequency (MHz)	Channel Bandwidth (MHz)	RB Size	RB Offset	Output Power (dBm/10MHz)	EIRP (dBm/ 10MHz)	Limit (dBm/ 10MHz)
64QAM							
55265	3552.50	5	25	0	16.78	21.63	< 23.00
55900	3625.00				17.54	22.39	< 23.00
56715	3697.50				17.42	22.27	< 23.00
55290	3555.00	10	50	0	16.29	21.14	< 23.00
55900	3625.00				17.44	22.29	< 23.00
56690	3695.00				18.03	22.88	< 23.00
55315	3557.50	15	75	0	15.28	20.13	< 23.00
55990	3625.00				17.20	22.05	< 23.00
56665	3692.50				17.46	22.31	< 23.00
55340	3550.00	20	100	0	15.49	20.34	< 23.00
55990	3625.00				16.33	21.18	< 23.00
56640	3690.00				16.52	21.37	< 23.00
Note: The EIRP (dBm/10MHz) = Output Power (dBm/10MHz) + Antenna Gain (dBi)							

Product	FastMile 4G Gateway	Temperature	25°C
Test Engineer	Caitlin Chen	Relative Humidity	50%
Test Site	SR5	Test Date	2020/03/31
Test Band	Band 48	Test Mode	MIMO Mode

Channel No.	Frequency (MHz)	Channel Bandwidth (MHz)	RB Size	RB Offset	Output Power (dBm/10MHz)		Toal EIRP (dBm/ 10MHz)	Limit (dBm/ 10MHz)
					Ant 4	Ant 5		
QPSK								
55265	3552.50	5	25	0	11.56	11.67	22.48	< 23.00
55900	3625.00				11.45	11.85	22.51	< 23.00
56715	3697.50				11.70	11.88	22.65	< 23.00
55290	3555.00	10	50	0	10.30	10.58	21.30	< 23.00
55900	3625.00				11.12	11.12	21.98	< 23.00
56690	3695.00				11.02	10.94	21.84	< 23.00
55315	3557.50	15	75	0	10.15	10.82	21.36	< 23.00
55990	3625.00				11.46	11.88	22.54	< 23.00
56665	3692.50				11.41	11.35	22.24	< 23.00
55340	3550.00	20	100	0	9.88	9.72	20.66	< 23.00
55990	3625.00				11.60	12.10	22.72	< 23.00
56640	3690.00				11.10	11.19	22.01	< 23.00
16QAM								
55265	3552.50	5	25	0	10.35	10.54	21.31	< 23.00
55900	3625.00				10.19	10.73	21.33	< 23.00
56715	3697.50				10.99	11.37	22.04	< 23.00
55290	3555.00	10	50	0	10.16	10.77	21.34	< 23.00
55900	3625.00				11.06	11.33	22.06	< 23.00
56690	3695.00				12.18	11.39	22.66	< 23.00
55315	3557.50	15	75	0	9.77	10.45	20.98	< 23.00
55990	3625.00				10.43	10.91	21.54	< 23.00
56665	3692.50				10.90	11.29	21.96	< 23.00
55340	3550.00	20	100	0	9.81	9.79	20.66	< 23.00
55990	3625.00				11.39	11.62	22.37	< 23.00
56640	3690.00				11.20	11.40	22.16	< 23.00
Note: The EIRP (dBm/10MHz) = 10*log($10^{\wedge(\text{Ant 4 Power}/10)} + 10^{\wedge(\text{Ant 5 Power}/10)}$) (dBm/10MHz) + Antenna Gain (dBi) + Array Gain								

Channel No.	Frequency (MHz)	Channel Bandwidth (MHz)	RB Size	RB Offset	Output Power (dBm/10MHz)		Toal EIRP (dBm/ 10MHz)	Limit (dBm/ 10MHz)
					Ant 4	Ant 5		
64QAM								
55265	3552.50	5	25	0	10.25	10.06	21.02	< 23.00
55900	3625.00				11.40	10.57	21.87	< 23.00
56715	3697.50				11.45	11.33	22.25	< 23.00
55290	3555.00	10	50	0	10.60	10.89	21.61	< 23.00
55900	3625.00				10.97	11.65	22.18	< 23.00
56690	3695.00				11.28	11.29	22.15	< 23.00
55315	3557.50	15	75	0	10.14	10.45	21.16	< 23.00
55990	3625.00				11.36	11.75	22.42	< 23.00
56665	3692.50				11.26	11.60	22.29	< 23.00
55340	3550.00	20	100	0	9.36	9.61	20.35	< 23.00
55990	3625.00				11.98	11.93	22.82	< 23.00
56640	3690.00				11.05	11.08	21.93	< 23.00
Note: The EIRP (dBm/10MHz) = 10*log(10^(Ant 4 Power/10) + 10^(Ant 5 Power/10)) (dBm/10MHz) + Antenna Gain (dBi) + Array Gain								

6.5. Band Edge Measurement

6.5.1. Test Limit

All out of band emissions are measured with a spectrum analyzer connected to the antenna terminal of the EUT while the EUT is operating at its maximum duty cycle, at maximum power, and at the appropriate frequencies. All data rates were investigated to determine the worst-case configuration. All modes of operation were investigated, and the worst-case configuration results are reported in this section.

The conducted power of any emission outside the fundamental emission (whether in or outside of the authorized band) shall not exceed −13 dBm/MHz within 0-10 megahertz above the upper SAS-assigned channel edge and within 0-10 megahertz below the lower SAS-assigned channel edge. At all frequencies greater than 10 megahertz above the upper SAS assigned channel edge and less than 10 MHz below the lower SAS assigned channel edge, the conducted power of any emission shall not exceed −25 dBm/MHz.

The conducted power of any emissions below 3530 MHz or above 3720 MHz shall not exceed -40 dBm/Mhz.

For MIMO Mode, the the minimum permissible attenuation levels should be reduced 3dB.

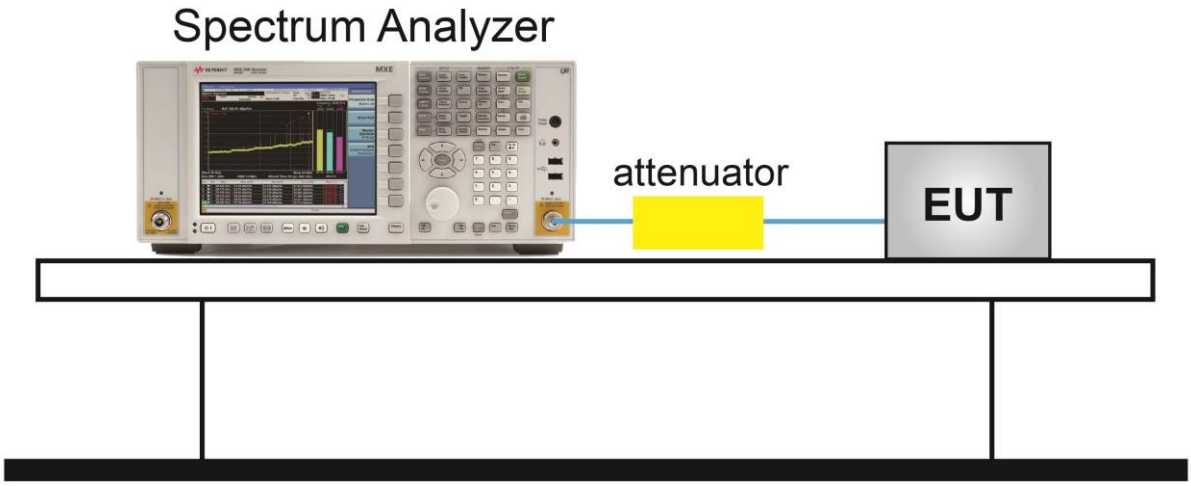
6.5.2. Test Procedure Used

ANSI C63.26-2015 - Section 5.7

6.5.3. Test Setting

1. Set the analyzer frequency to low or high channel
2. RBW ≥ The nominal RBW shall be in the range of 1% of the anticipated OBW
3. VBW ≥ 3*RBW
4. Sweep time = auto
5. Detector = power averaging (rms)
6. Set sweep trigger to “free run.”
7. The trace was allowed to stabilize.

6.5.4. Test Setup

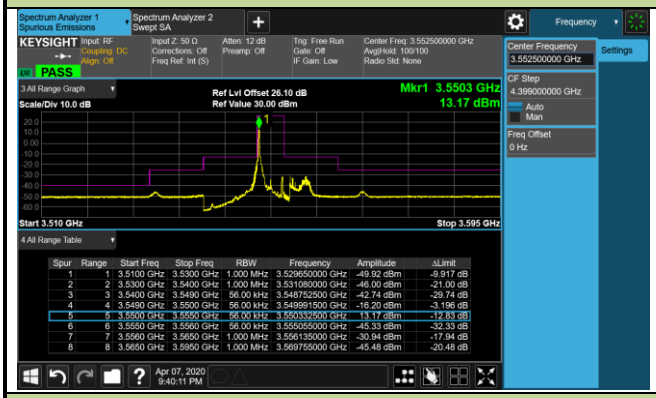


6.5.5. Test Result

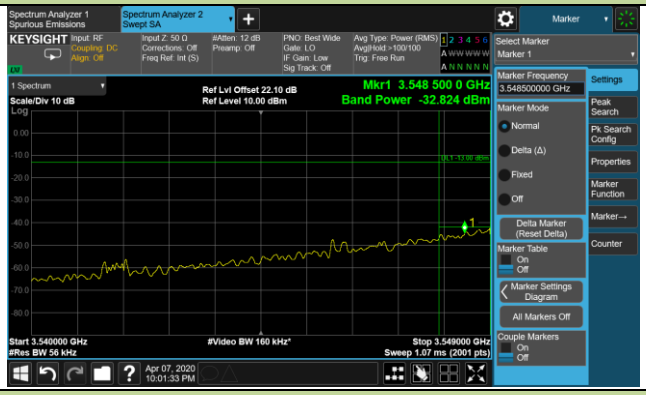
Product	FastMile 4G Gateway	Temperature	25°C
Test Engineer	Caitlin Chen	Relative Humidity	52%
Test Site	SR5	Test Date	2020/04/07
Test Band	Band 48	Test mode	SISO Mode
Test Result	Pass		

5MHz Channel Bandwidth – 1RB

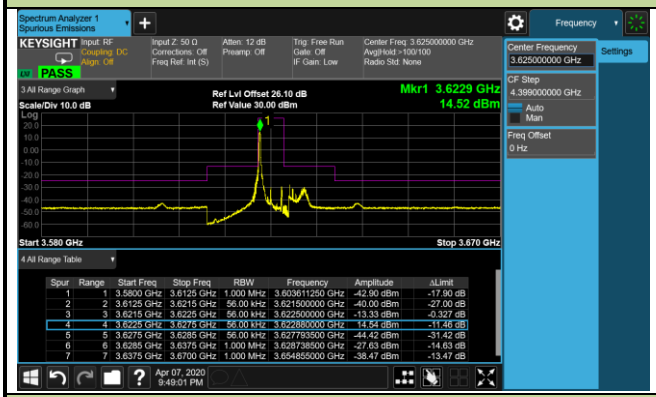
Low Channel ACP



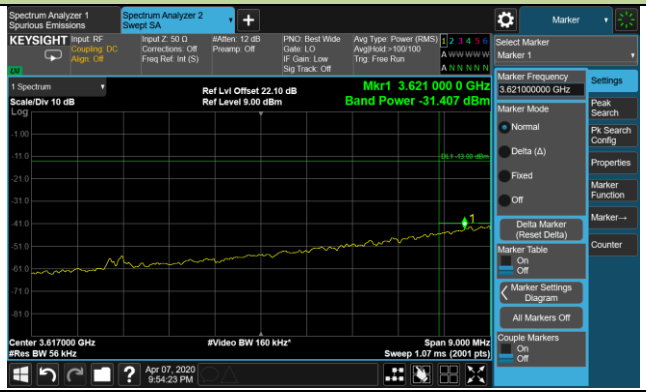
Extended Band Edge



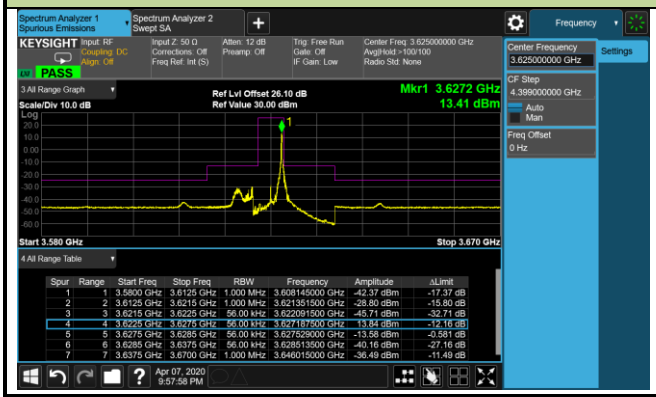
Middle Channel ACP – Low RB Position



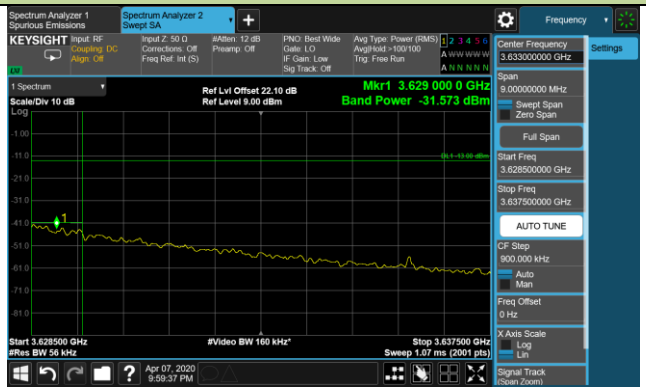
Extended Band Edge

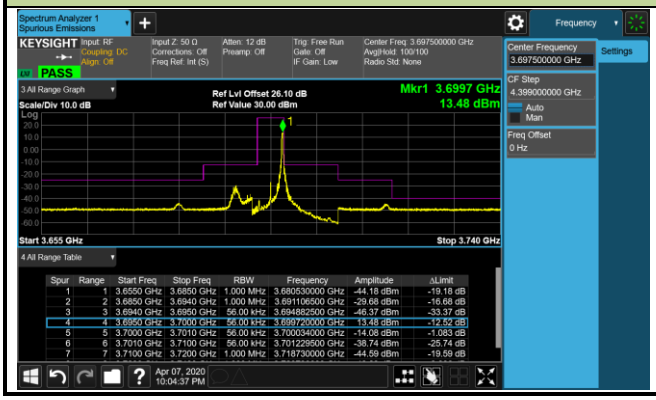
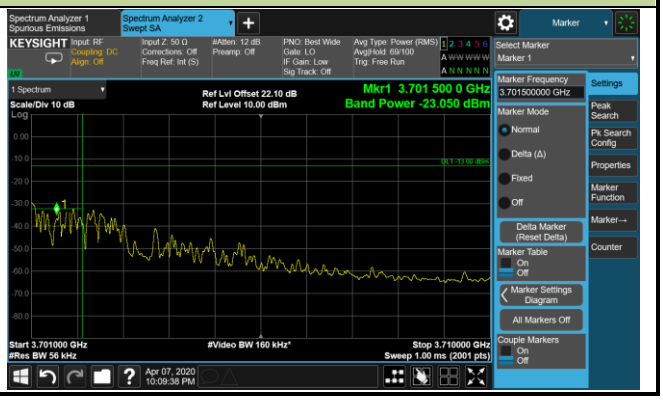


Middle Channel ACP – High RB Position



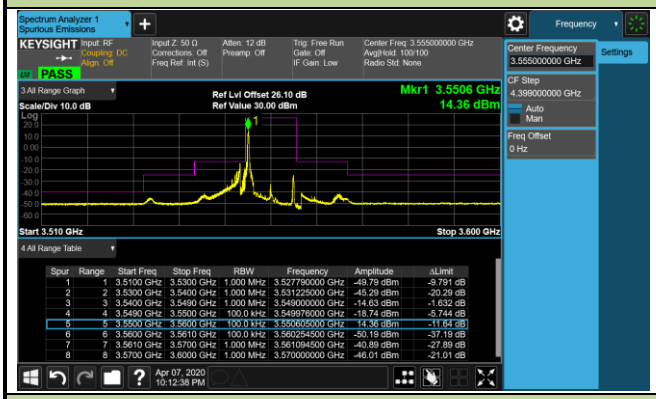
Extended Band Edge



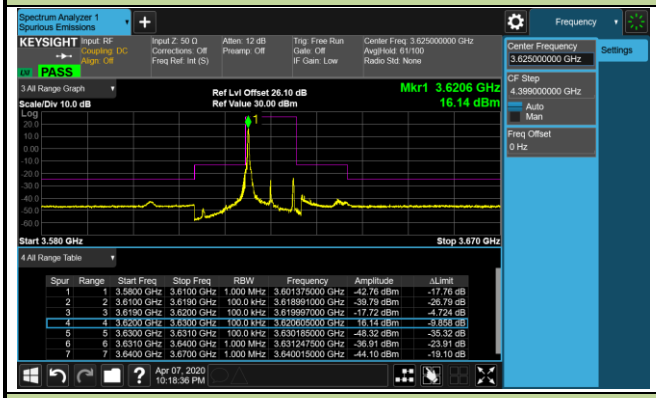
High Channel ACP	Extended Band Edge
	

10MHz Channel Bandwidth – 1RB

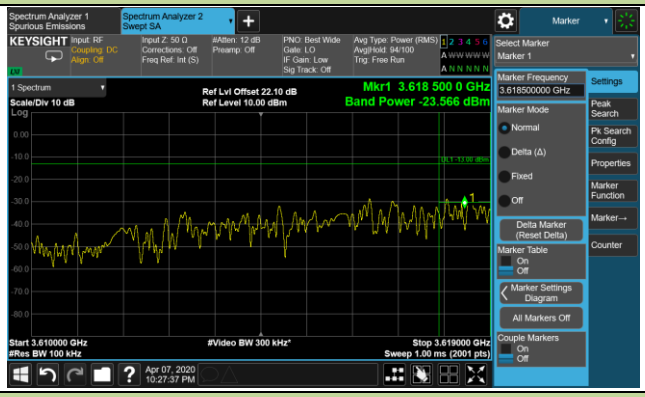
Low Channel ACP



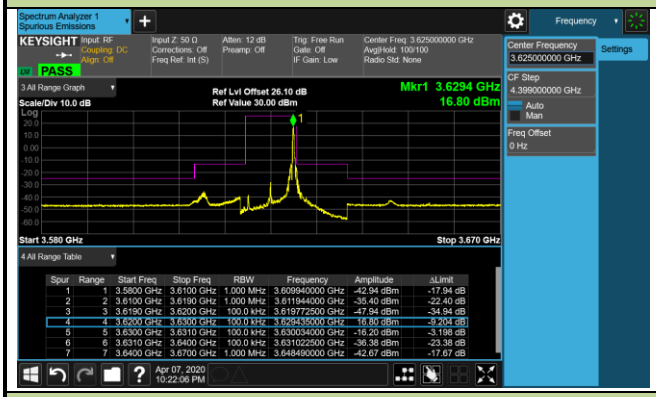
Middle Channel ACP – Low RB Position



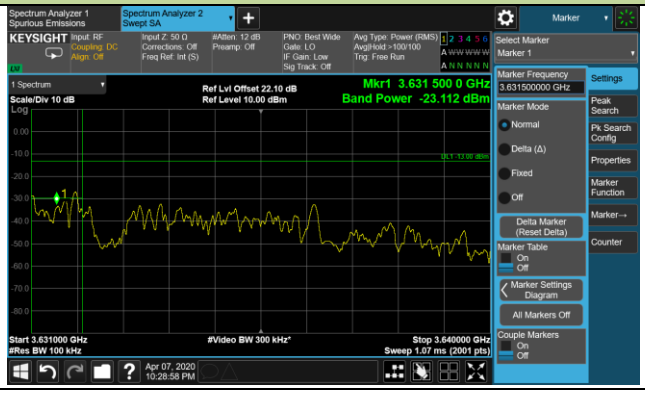
Extended Band Edge



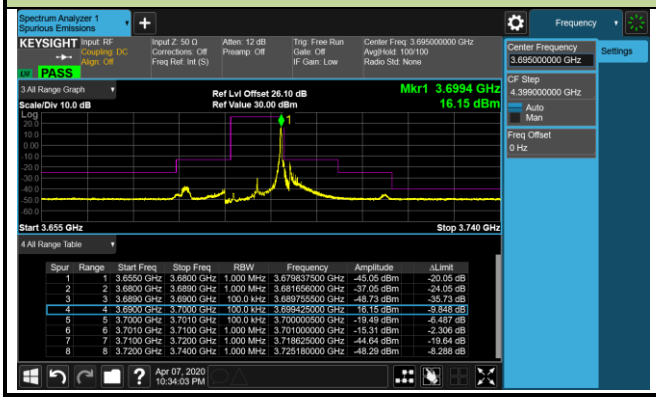
Middle Channel ACP – High RB Position

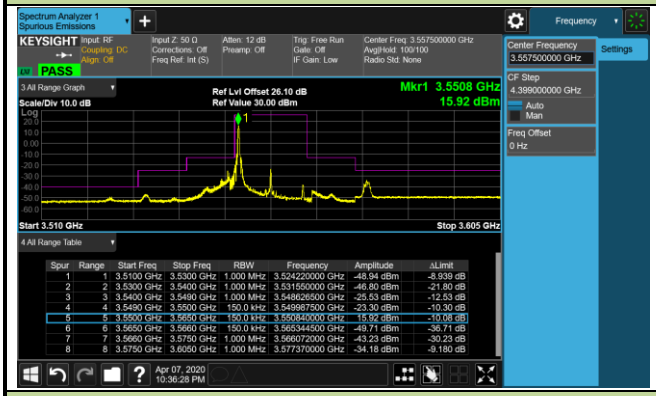
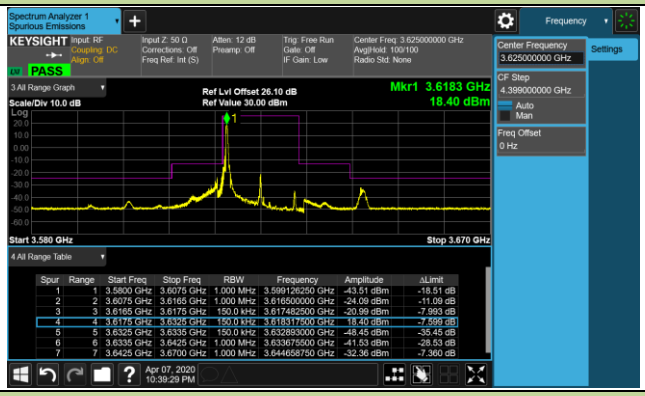
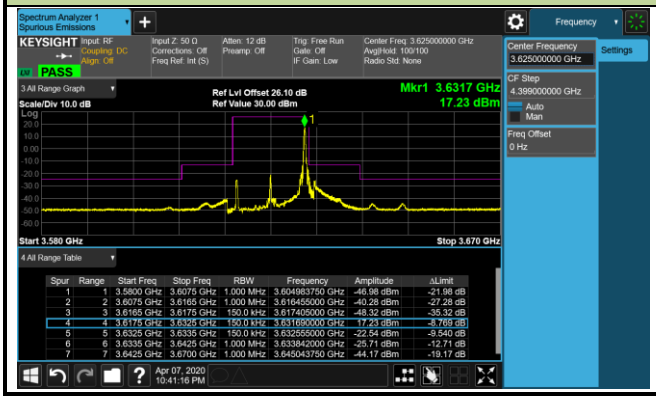
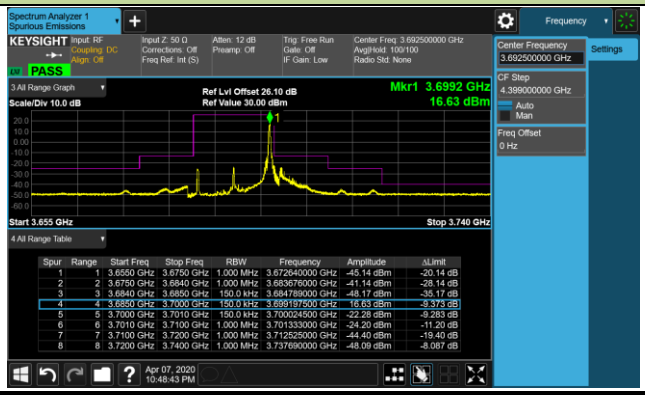


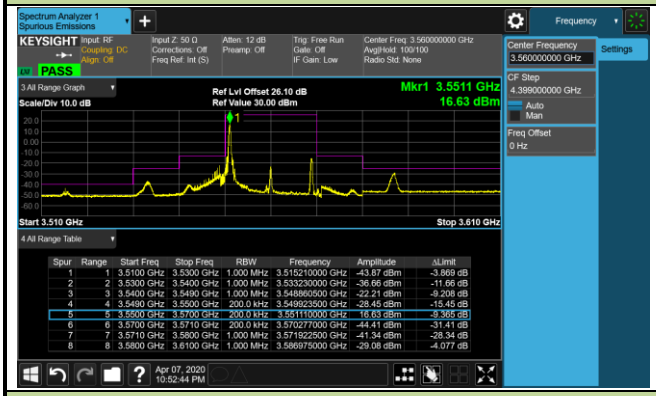
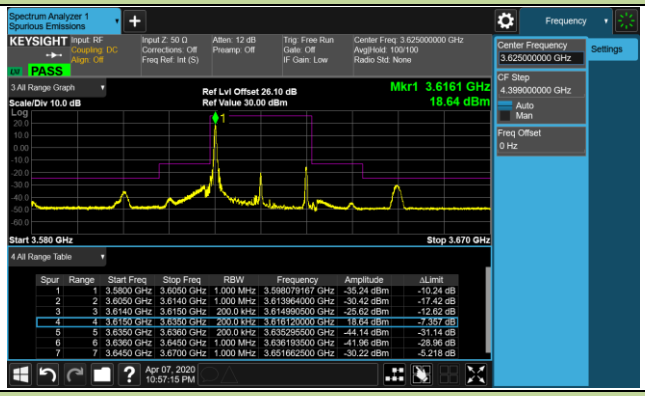
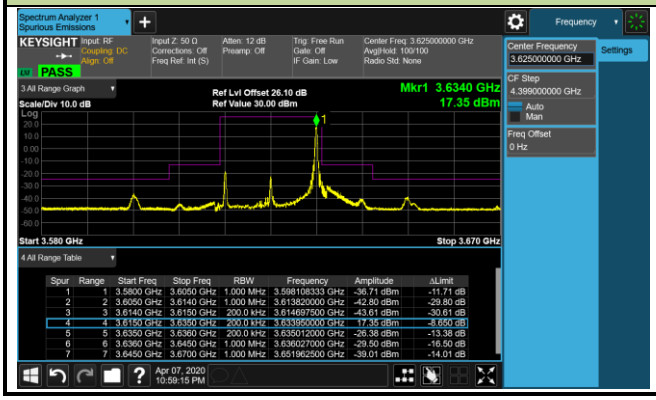
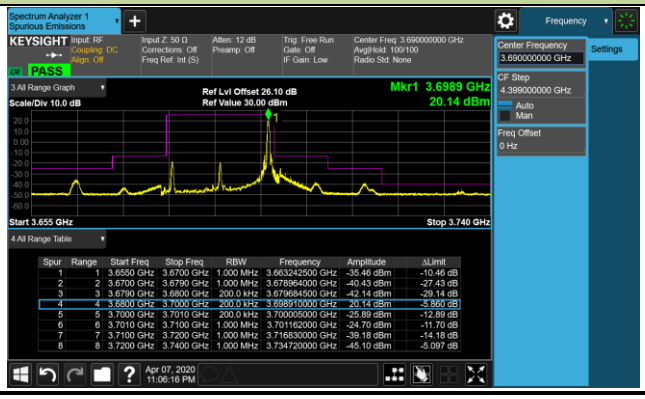
Extended Band Edge

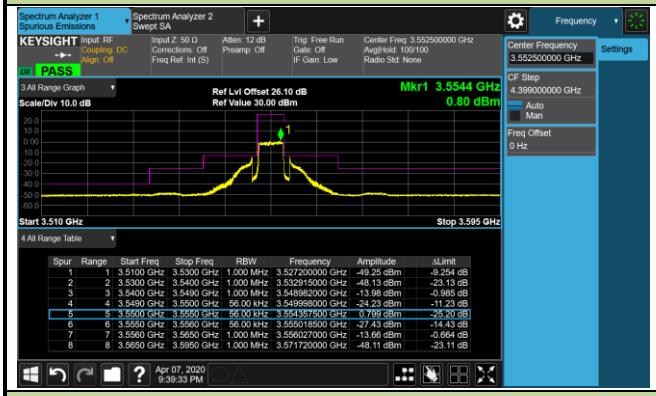
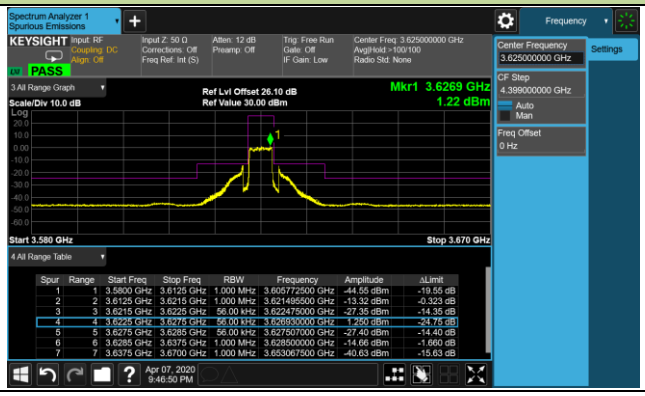
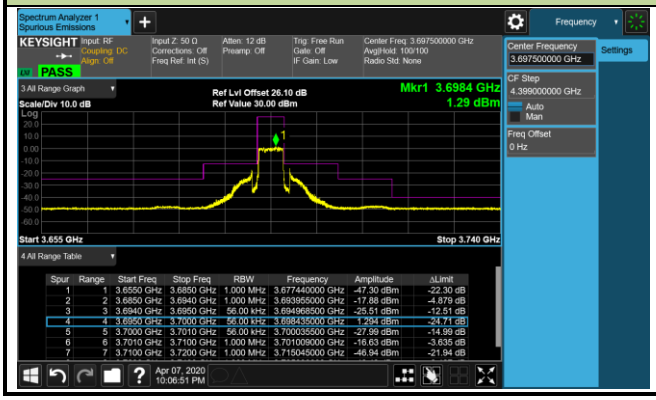


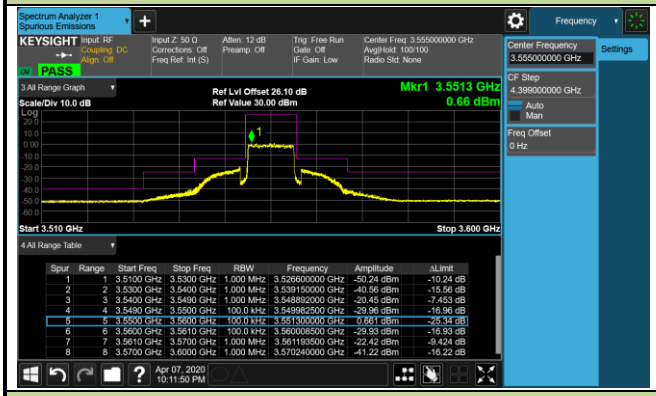
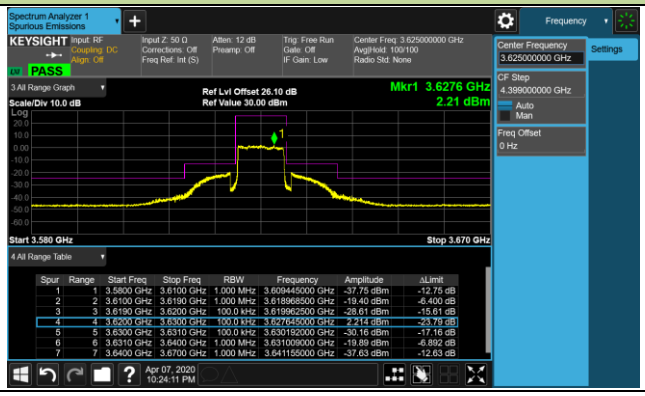
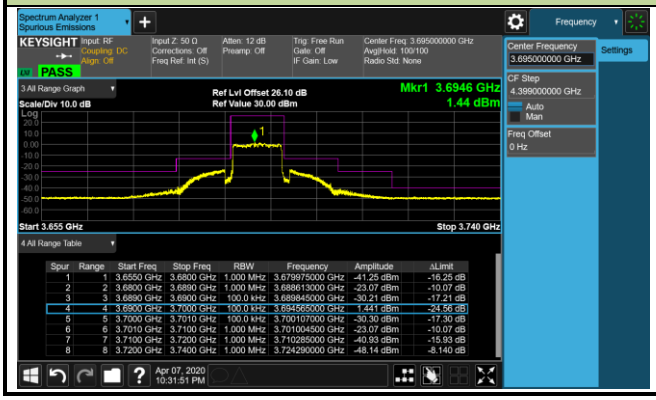
High Channel ACP

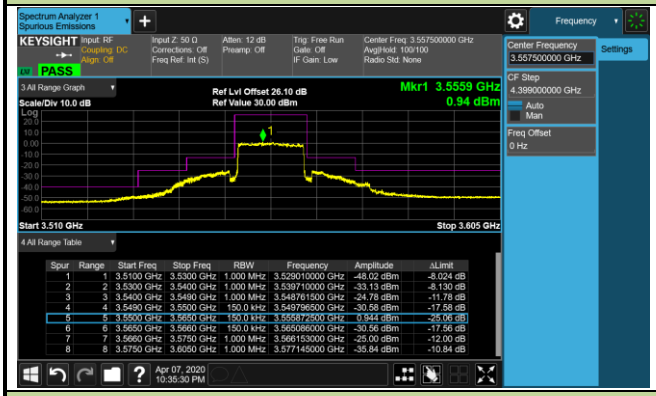
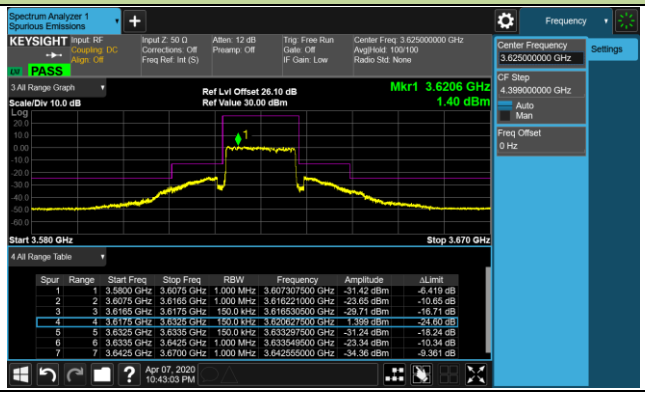
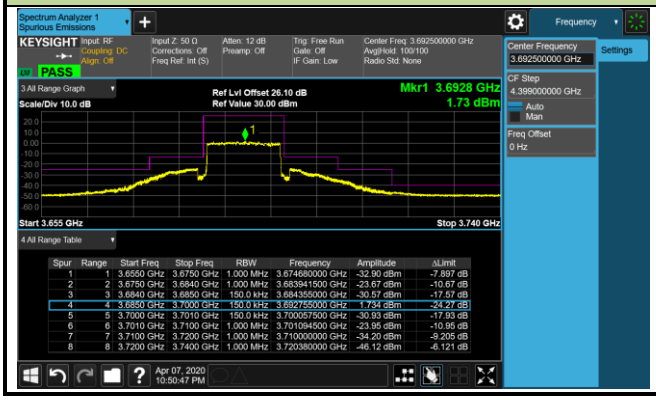


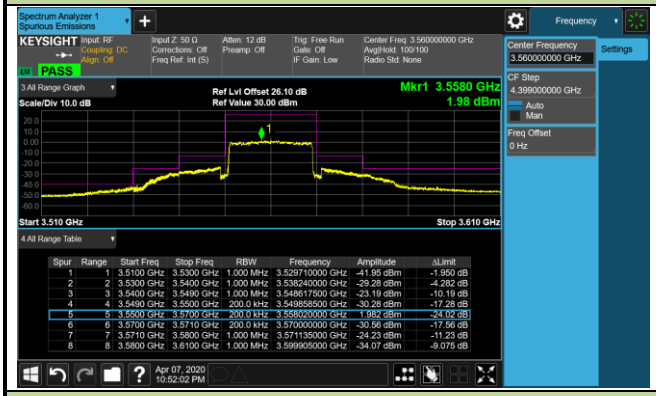
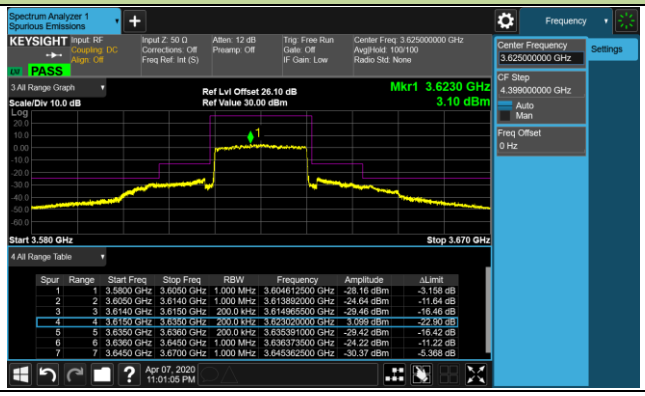
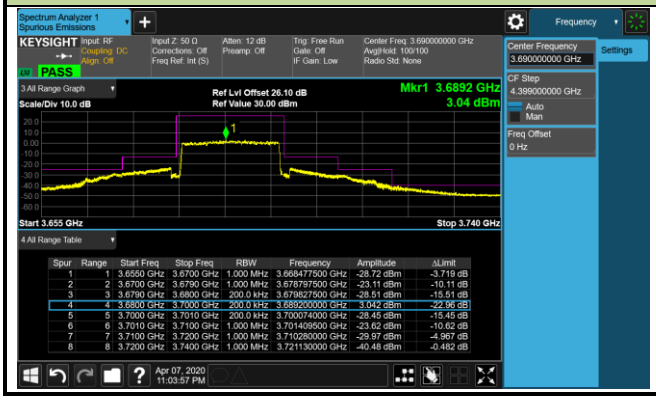
15MHz Channel Bandwidth – 1RB	
Low Channel ACP	Middle Channel ACP – Low RB Position
	
Middle Channel ACP – High RB Position	High Channel ACP
	

20MHz Channel Bandwidth – 1RB	
Low Channel ACP	Middle Channel ACP – Low RB Position
	
Middle Channel ACP – High RB Position	High Channel ACP
	

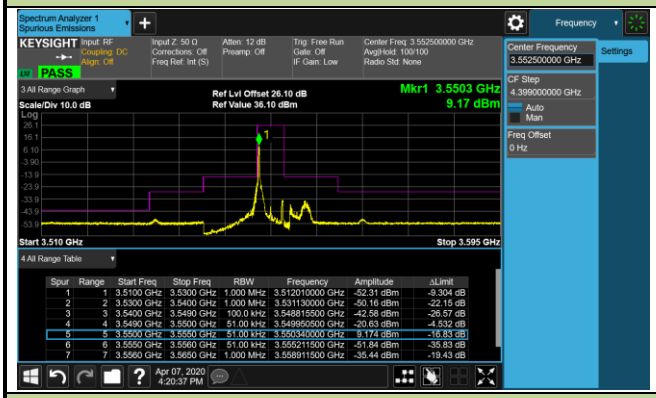
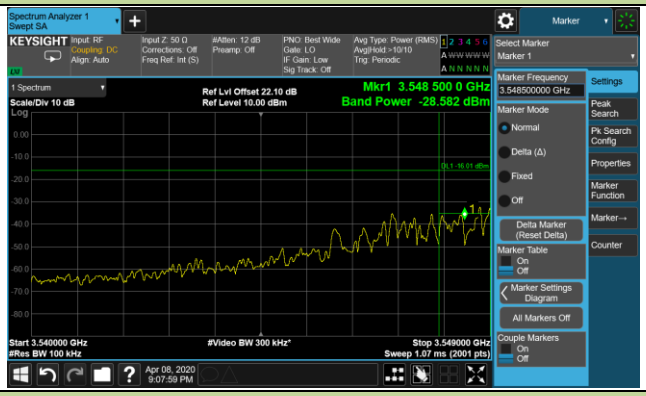
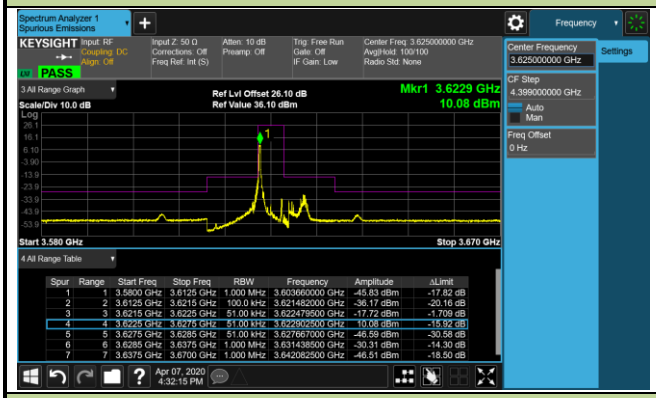
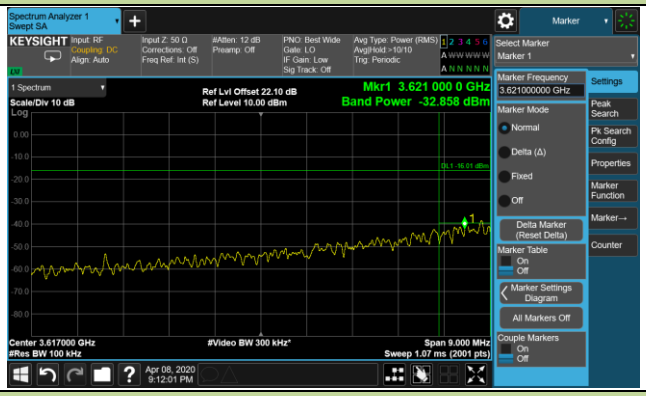
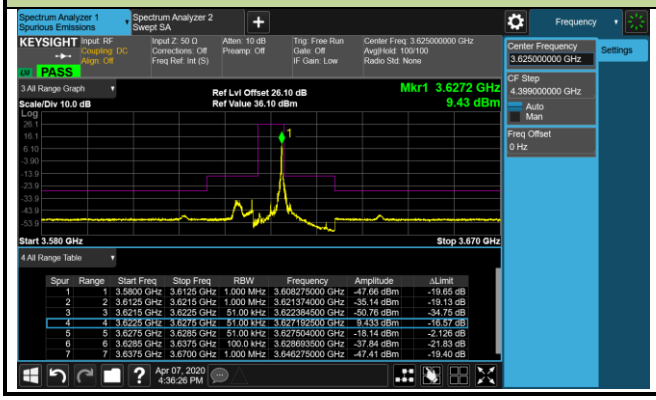
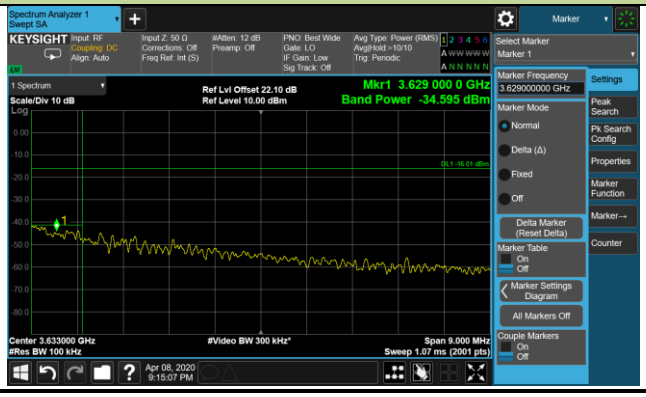
5MHz Channel Bandwidth – Full RB	
Low Channel ACP	Middle Channel ACP
	
High Channel ACP	
	

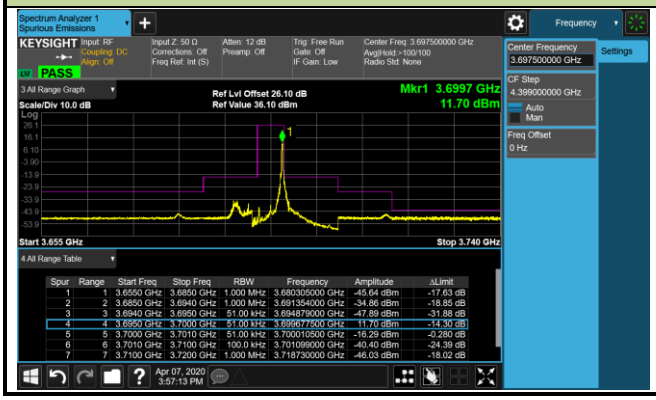
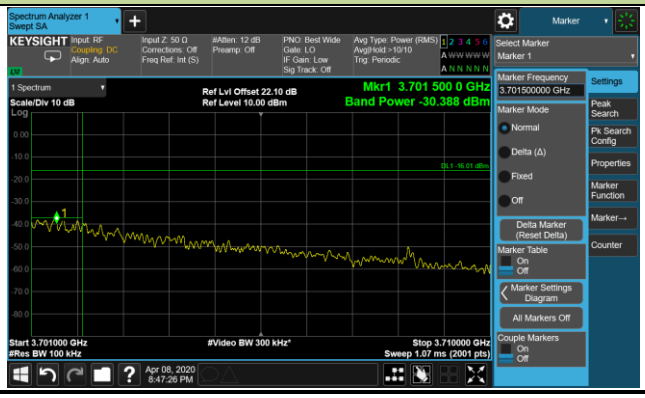
10MHz Channel Bandwidth – Full RB	
Low Channel ACP	Middle Channel ACP
	
High Channel ACP	
	

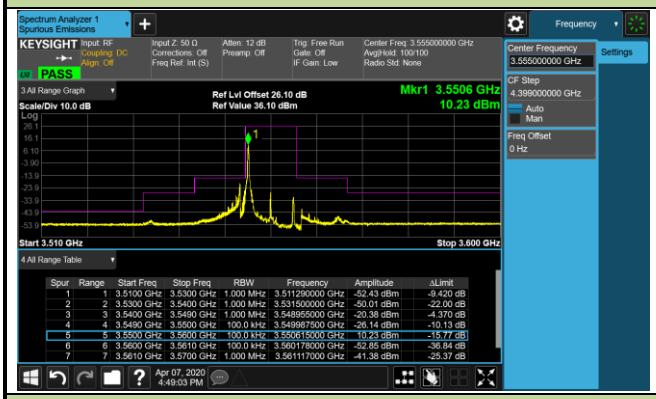
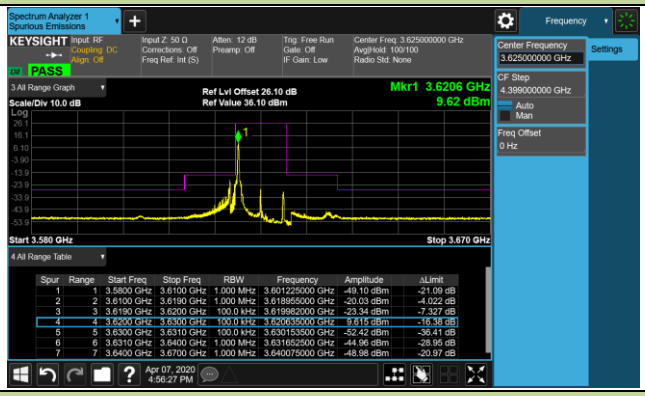
15MHz Channel Bandwidth – Full RB	
Low Channel ACP	Middle Channel ACP
	
High Channel ACP	
	

20MHz Channel Bandwidth – Full RB	
Low Channel ACP	Middle Channel ACP
	
High Channel ACP	
	

Product	FastMile 4G Gateway	Temperature	25°C
Test Engineer	Caitlin Chen	Relative Humidity	52%
Test Site	SR5	Test Date	2020/04/07
Test Band	Band 48	Test mode	MIMO Mode
Test Result	Pass		

5MHz Channel Bandwidth – 1RB	
Low Channel ACP	Extended Band Edge
	
Middle Channel ACP – Low RB Position	Extended Band Edge
	
Middle Channel ACP – High RB Position	Extended Band Edge
	

High Channel ACP	Extended Band Edge
	

10MHz Channel Bandwidth – 1RB	
Low Channel ACP	Middle Channel ACP – Low RB Position
	
Middle Channel ACP – High RB Position	High Channel ACP