FCC Radio Test Report

FCC ID: 2ATKG-RAD78235

This report concerns: Original Grant

Project No.	: 1906C019
Equipment	: Sutro Hub + Charger
Test Model	: SHC-1
Series Model	: N/A
Applicant	: Sutro Connect Inc.
Address	: 181 2nd St. San Francisco, CA 94105, US

Date of Receipt	: Jun. 11, 2019
Date of Test	: Jun. 11, 2019 ~ Jul. 18, 2019
Issued Date	: Aug. 29, 2019
Tested by	: BTL Inc.

Technical Engineer : _____
(Ethan Ma)

Authorized Signatory : _____
(Steven Lu)

BTL INC.

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Certificate #5123.02

Declaration

BTL represents to the client that testing is done in accordance with standard procedures as applicable and that test instruments used has been calibrated with standards traceable to international standard(s) and/or national standard(s).

BTL's reports apply only to the specific samples tested under conditions. It is manufacture's responsibility to ensure that additional production units of this model are manufactured with the identical electrical and mechanical components. **BTL** shall have no liability for any declarations, inferences or generalizations drawn by the client or others from **BTL** issued reports.

The report must not be used by the client to claim product certification, approval, or endorsement by NIST, A2LA, or any agency of the U.S. Government.

This report is the confidential property of the client. As a mutual protection to the clients, the public and ourselves, the test report shall not be reproduced, except in full, without our written approval.

BTL's laboratory quality assurance procedures are in compliance with the **ISO/IEC 17025** requirements, and accredited by the conformity assessment authorities listed in this test report.

BTL is not responsible for the sampling stage, so the results only apply to the sample as received.

The information, data and test plan are provided by manufacturer which may affect the validity of results, so it is manufacturer's responsibility to ensure that the apparatus meets the essential requirements of applied standards and in all the possible configurations as representative of its intended use.

Limitation

For the use of the authority's logo is limited unless the Test Standard(s)/Scope(s)/Item(s) mentioned in this test report is (are) included in the conformity assessment authorities acceptance respective.
Please note that the measurement uncertainty is provided for informational purpose only and are not use in determining the Pass/Fail results.

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REPORT ISSUED HISTORY

Report Version	Description	Issued Date
R00	Original Issue.	Aug. 02, 2019
R01	Modified the comments of TCB.	Aug. 29, 2019

1. GENERAL SUMMARY

Equipment	:	Sutro Hub + Charger
Brand Name	:	N/A
Test Model	:	SHC-1
Series Model	:	N/A
Applicant	:	Sutro Connect Inc.
Manufacturer	:	Sutro Connect Inc.
Address	:	181 2nd St. San Francisco, CA 94105, US
Date of Test	:	Jun. 11, 2019 ~ Jul. 18, 2019
Test Sample	:	Engineering Sample No.: DG19060630
Standard(s)	:	47 CFR FCC Part 24 Subpart E 47 CFR FCC Part 2 ANSI / TIA / EIA-603-E-2016 FCC KDB 971168 D01 Power Meas. License Digital Systems v03r01

The above equipment has been tested and found compliance with the requirement of the relative standards by BTL Inc.
The test data, data evaluation, and equipment configuration contained in our test report (Ref No. BTL-FCCP-1-1906C019) were obtained utilizing the test procedures, test instruments, test sites that has been accredited by the Authority of A2LA according to the ISO/IEC 17025 quality assessment standard and technical standard(s).

Test results included in this report are only for the eMTC Band 2 part.

2. SUMMARY OF TEST RESULTS

Test procedures according to the technical standard(s):

FCC Part 24 Subpart E & Part 2			
Standard(s) Section	Test Item	Verdict	Tested By
2.1046 & 24.232(c)	Equivalent Isotropic Radiated Power	PASS	Paul Li
2.1049	Occupied Bandwidth	PASS	Paul Li
2.1051 & 24.238(a)	Conducted Spurious Emissions	PASS	Paul Li
2.1053 & 24.238(a)	Radiated Spurious Emissions	PASS	Paul Li
24.238(a)	Band Edge Measurements	PASS	Paul Li
24.232(d)	Peak To Average Ratio	PASS	Paul Li
2.1055 & 24.235	Frequency Stability	PASS	Paul Li

NOTE:

(1)" N/A" denotes test is not applicable to this device.

2.1 TEST FACILITY

The test facilities used to collect the test data in this report is at the location of No.3, Jinshagang 1st Road, Shixia, Dalang Town, Dongguan, Guangdong, China.
BTL's test firm number for FCC: 357015
BTL's designation number for FCC: CN1240

2.2 MEASUREMENT UNCERTAINTY

ISO/IEC 17025 requires that an estimate of the measurement uncertainties associated with the emissions test results be included in the report. The measurement uncertainties given below are based on a 95% confidence level (based on a coverage factor (k=2))
The BTL measurement uncertainty as below table:

A. Radiated Measurement :

Test Site	Method	Measurement Frequency Range	Ant. H / V	U,(dB)
DG-CB03 (3m)	CISPR	9KHz ~ 30MHz	V	3.79
		9KHz ~ 30MHz	H	3.57
		30MHz ~ 200MHz	V	4.88
		30MHz ~ 200MHz	H	4.14
		200MHz ~ 1,000MHz	V	4.62
		200MHz ~ 1,000MHz	H	4.80

Test Site	Method	Measurement Frequency Range	U,(dB)
DG-CB03 (3m)	CISPR	1GHz ~ 6GHz	4.58
		6GHz ~ 18GHz	5.18

Test Site	Method	Measurement Frequency Range	U,(dB)
DG-CB03 (1m)	CISPR	18 ~ 26.5 GHz	3.80
		26.5 ~ 40 GHz	4.30

Note: Unless specifically mentioned, the uncertainty of measurement has not been taken into account to declare the compliance or non-compliance to the specification.

3. GENERAL INFORMATION

3.1 GENERAL DESCRIPTION OF EUT

Equipment	Sutro Hub + Charger				
Brand Name	N/A				
Test Model	SHC-1				
Series Model	N/A				
Model Difference(s)	N/A				
Antenna Type	Internal Antenna				
Antenna Gain	3.68dBi				
Hardware Version	1.3A				
Software Version	1.0.0				
IMEI No.	Radiated	356726101144095			
	Conducted	356726101144095			
Power Source	DC voltage supplied from AC/DC adapter. Model: NT-120300D1				
Power Rating	I/P: 100-240V ~50/60Hz 1.0A Max O/P: 12V ⎓ 3A				
eMTC Category	CAT-M1				
Modulation Type	QPSK, 16QAM				
Operation Frequency	eMTC Band 2 (Channel Bandwidth: 1.4MHz)		1850MHz ~ 1910MHz		
Max. EIRP Power	eMTC Band 2 (Channel Bandwidth: 1.4MHz)		QPSK	26.32	dBm
			16QAM	25.84	dBm

Note:
1. For a more detailed features description, please refer to the manufacturer's specifications or the user's manual.

3.2 DESCRIPTION OF TEST MODES AND TEST CONDITION

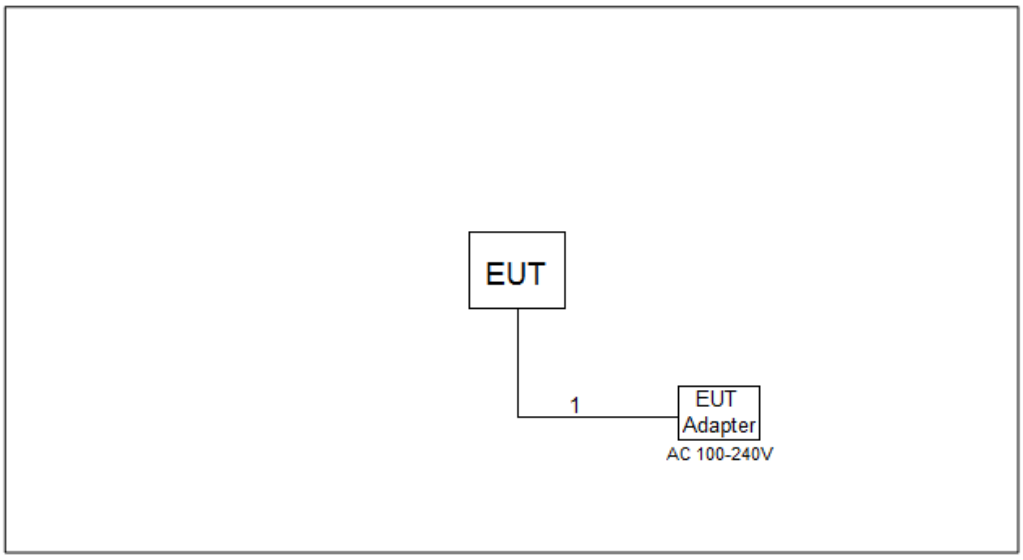
The EUT system operated these modes were found to be the worst case during the pre-scanning test sa following:

Test Item	Modes	Modulation		Test Channel		
		QPSK	16QAM	L	M	H
Equivalent Isotropic Radiated Power	CAT-M1 B2	√	√	√	√	√
Conducted Output Power	CAT-M1 B2	√	√	√	√	√
Occupied Bandwidth	CAT-M1 B2	√	√		√	
Conducted Spurious Emissions	CAT-M1 B2	√			√	
Radiated Spurious Emissions	CAT-M1 B2	√			√	
Band Edge Measurements	CAT-M1 B2	√		√		√
Peak To Average Ratio	CAT-M1 B2	√	√	√	√	√
Frequency Stability	CAT-M1 B2	√			√	

EUT TEST CONDITIONS:

Test Item	Environmental Conditions	Test Voltage
Equivalent Isotropic Radiated Power	23.2°C, 51.3%RH	DC 12V
Conducted Output Power	23.2°C, 51.3%RH	DC 12V
Occupied Bandwidth	23.2°C, 51.3%RH	DC 12V
Conducted Spurious Emissions	23.2°C, 51.3%RH	DC 12V
Radiated Spurious Emissions	24°C, 68%RH	AC 120V/60Hz
Band Edge	23.2°C, 51.3%RH	DC 12V
Peak to Average Ratio	23.2°C, 51.3%RH	DC 12V
Frequency Stability	Normal and Extreme	Normal and Extreme

3.3 BLOCK DIGRAM SHOWING THE CONFIGURATION OF SYSTEMTESTED



3.4 DESCRIPTION OF SUPPORT UNITS

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

Item	Equipment	Brand	Model No.	Series No.
-	-	-	-	-

Item	Cable Type	Shielded Type	Ferrite Core	Length
1	DC Cable	NO	NO	1.5m

4. TEST RESULT

4.1 OUTPUT POWER MEASUREMENT

4.1.1 LIMIT

Mobile / Portable station are limited to 2 watts e.i.r.p.

4.1.2 TEST PROCEDURE

The testing follows FCC KDB 971168 v03r01 Section 5.0.

EIRP:

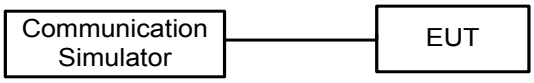
EIRP= Conducted Power +Antenan gain

Conducted Power:

The EUT was set up for the maximum power with CAT-M1 link data modulation and link up with simulator. Set the EUT to transmit under low, middle and high channel and record the power level shown on simulator.

4.1.3 TESTSETUP LAYOUT

Output Power Measurement



4.1.4 TEST DEVIATION

No deviation

4.1.5 TEST RESULTS

Please refer to the Appendix A.

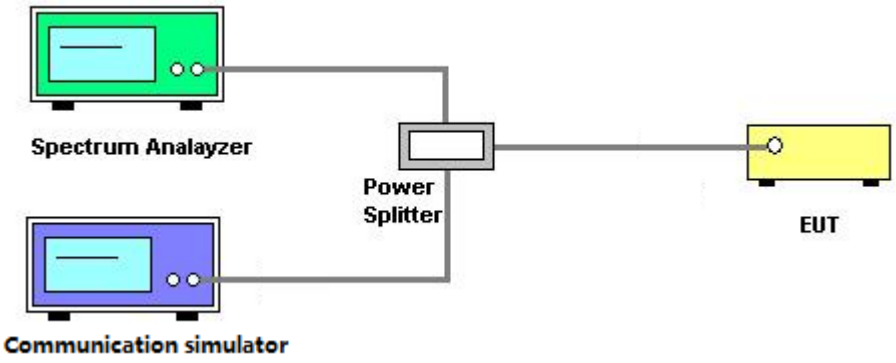
4.2 OCCUPIED BANDWIDTH MEASUREMENT

4.2.1 TEST PROCEDURE

The testing follows FCC KDB 971168 v03r01 Section 4.0.

1. The EUT makes a call to the communication simulator. All measurements were done at low, middle and high operational frequency range. The communication simulator station system controlled a EUT to export maximum output power under transmission mode and specific channel frequency. Use OBW measurement function of Spectrum analyzer to measure 99 % occupied bandwidth and 26dB bandwidth.
2. The EUT was connected to spectrum analyzer and system simulator via a power divider.
3. RBW=(1% ~ 5%)*EBW
   VBW≥3* RBW
4. Set spectrum analyzer with RMS detector.

4.2.2 TEST SETUP LAYOUT



4.2.3 TEST DEVIATION

No deviation

4.2.4 TEST RESULTS

Please refer to the Appendix B.

4.3 CONDUCTED EMISSIONS MEASUREMENT

4.3.1 LIMIT

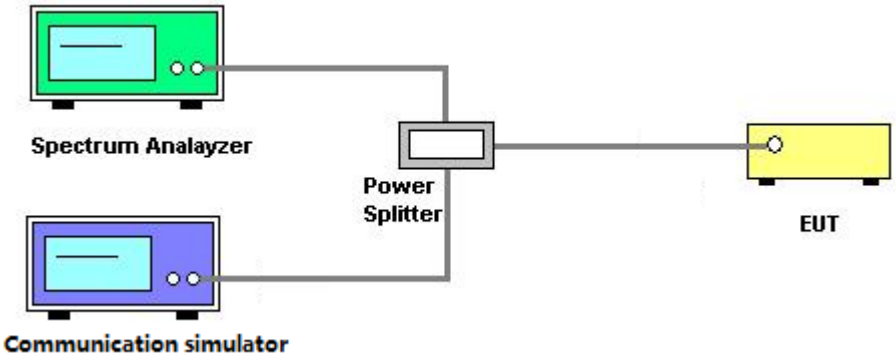
The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB. The emission limit equal to -13dBm.

4.3.2 TEST PROCEDURES

The testing follows FCC KDB 971168 v03r01 Section 6.0.

1. The EUT was connected to spectrum analyzer and system simulator via a power divider.
2. The band edges of low, middle and high channels for the highest RF powers were measured. Set RBW>=1% EBW in the 1MHz band immediately outside and adjacent to the band edge.
3. Set spectrum analyzer with RMS detector.
4. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.

4.3.3 TESTSETUP LAYOUT



4.3.4 TESTDEVIATION

No deviation

4.3.5 TEST RESULTS

Please refer to the Appendix C.

4.4 RADIATED EMISSIONS MEASUREMENT

4.4.1 LIMIT

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

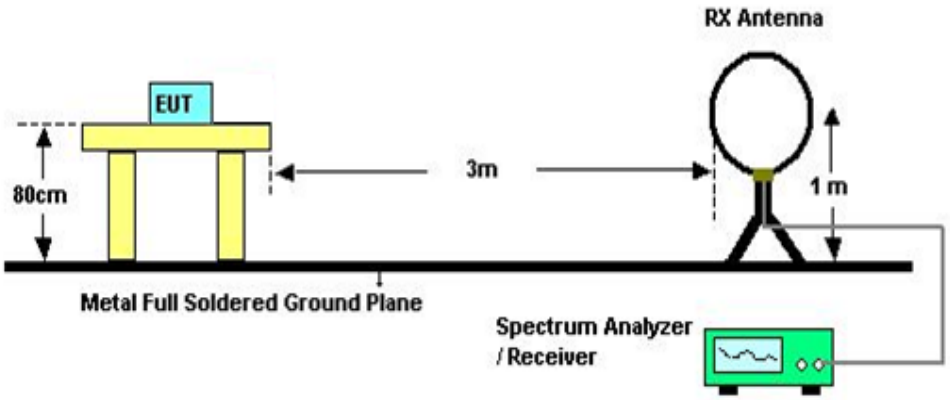
4.4.2 TEST PROCEDURES

The testing follows FCC KDB 971168 v03r01 Section 5.8.

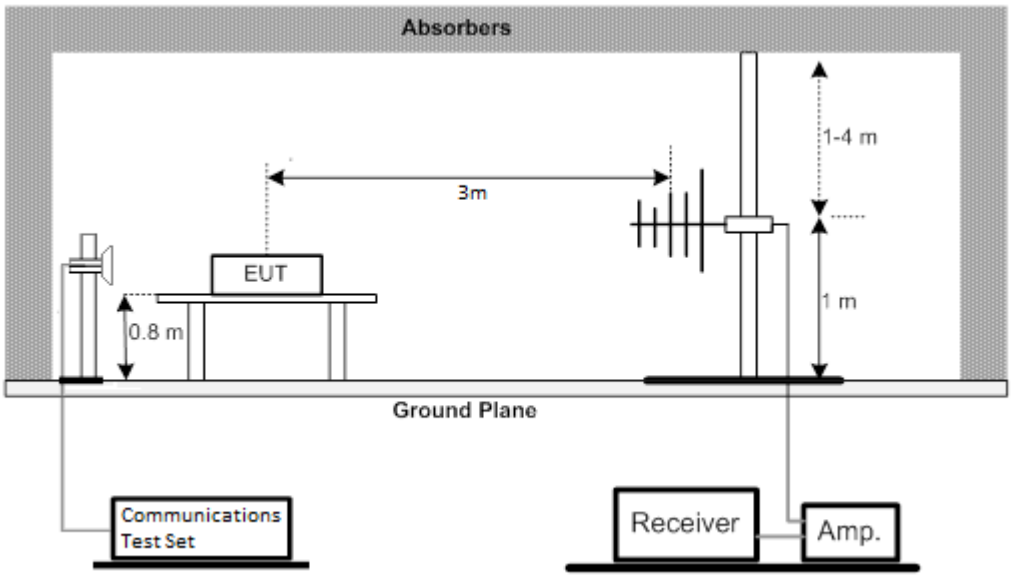
1. In the semi-anechoic chamber, EUT placed on the 0.8m height of Turn Table, rotated the table around 360 degrees to search the maximum radiation power and receiver antenna shall be rotated vertical and horizontal polarization and moved height from 1m to 4m to find the maximum polar radiated power. The “Read Value” is the spectrum reading the maximum power value.
2. The substitution horn antenna is substituted for EUT at the same position and signals generator export the CW signal to the substitution antenna via a TX cable. Rotated the Turn Table and moved receiving antenna to find the maximum radiation power. Adjust output power level of S.G to get a Value of spectrum reading equal to “Read Value “ of step a. Record the power level of S.G
3. EIRP = Output power level of S.G – TX cable loss + Antenna gain of substitution horn.
4. E.R.P power can be calculated form E.I.R.P power by subtracting the gain of dipole, E.R.P power = E.I.P.R power - 2.15dBi.
5. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 1MHz/3MHz.

4.4.3 TESTSETUP LAYOUT

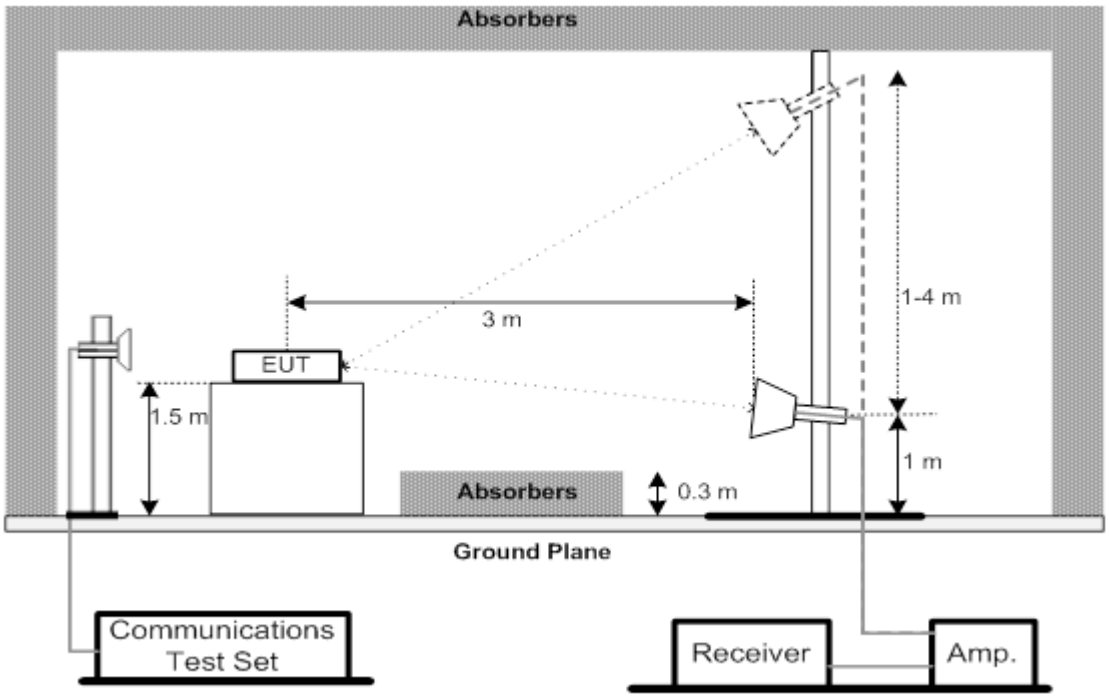
Below 30MHz



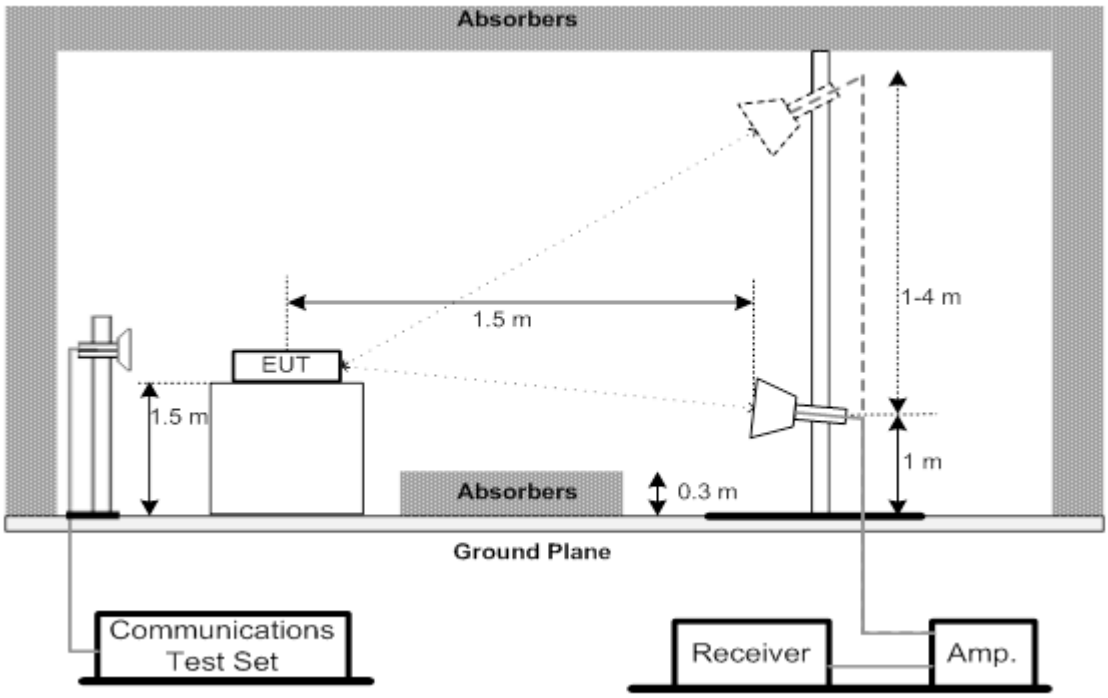
30MHz to 1GHz



1GHz to 18GHz



Above 18GHz



4.4.4 TESTDEVIATION

No deviation

4.4.5 TEST RESULTS

Please refer to the Appendix D.

4.5 BAND EDGE MEASUREMENT

4.5.1 LIMIT

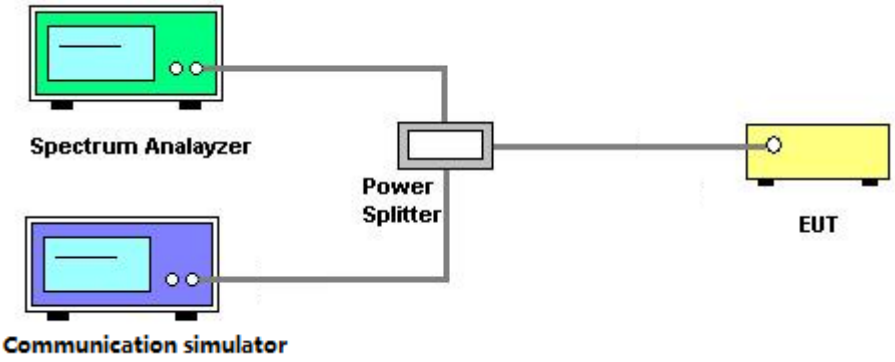
A Power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB. In the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the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

4.5.2 TEST PROCEDURES

The testing follows FCC KDB 971168 v03r01 Section 6.0.

1. All measurements were done at low and high operational frequency range.
2. RBW=99%OBW * (1% ~ 5%)
   VBW≥3* RBW
3. Set spectrum analyzer with RMS detector.
4. Record the max trace plot into the test report.

4.5.3 TESTSETUP LAYOUT



4.5.4 TESTDEVIATION

No deviation

4.5.5 TEST RESULTS

Please refer to the Appendix E.

4.6 PEAK TO AVERAGE RATIO MEASUREMENT

4.6.1 LIMIT

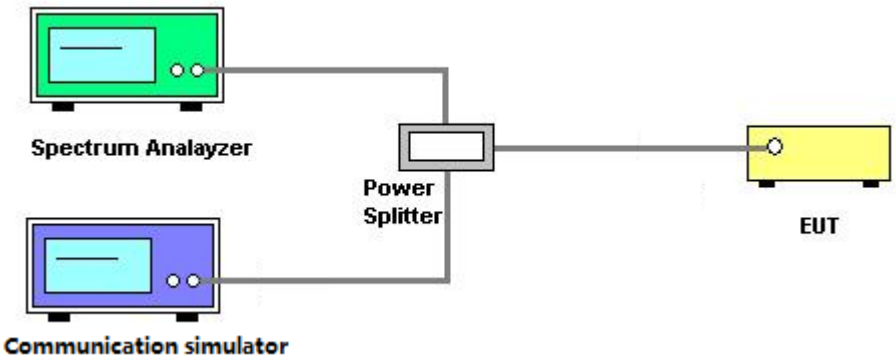
In measuring transmissions in this band using an average power technique, the peak to-average ratio (PAR) of the transmission may not exceed 13 dB.

4.6.2 TEST PROCEDURES

The testing follows FCC KDB 971168 v03r01 Section 5.7.

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

4.6.3 TESTSETUP LAYOUT



4.6.4 TESTDEVIATION

No deviation

4.6.5 TEST RESULTS

Please refer to the Appendix F.

4.7 FREQUENCY STABILITY MEASUREMENT

4.7.1 LIMIT

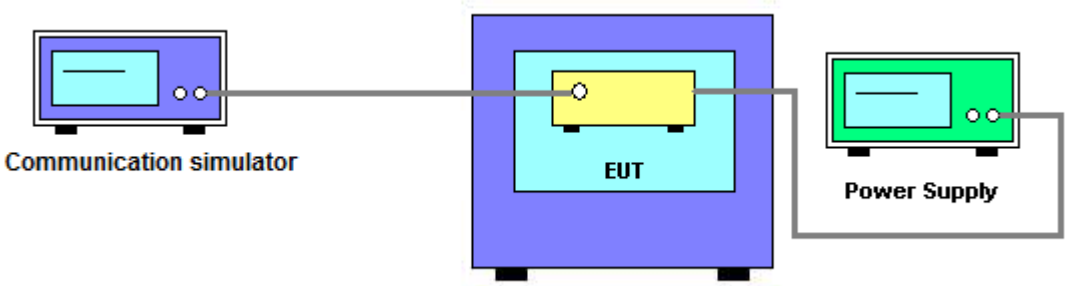
±1.5 ppm is for base and fixed station. ±2.5 ppm is for mobile station.

4.7.2 TEST PROCEDURES

The testing follows FCC KDB 971168 v03r01 Section 9.0.

1. 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.
2. EUT is connected the external power supply to control the DC input power. The test voltage range is from minimum to maximum working voltage. Each step shall be record the frequency error rate.
3. The temperature range step is 10 degrees in this test items. All temperature levels shall be hold the ±0.5°C 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.
4. The frequency error was recorded frequency error from the communication simulator.

4.7.3 TESTSETUP LAYOUT



4.7.4 TESTDEVIATION

No deviation

4.7.5 TEST RESULTS

Please refer to the Appendix G.

5. LIST OF MEASUREMENT EQUIPMENTS

Radiated Emission Measurement					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Antenna	Schwarzbeck	VULB9160	9160-3232	Mar. 09, 2020
2	Amplifier	Agilent	8449B	3008A02274	Mar. 10, 2020
3	Amplifier	HP	8447D	2944A09673	Aug. 11, 2019
4	HighPass Filter	Wairrwright Instruments Gmbh	WHK 1.5/15G-10ST	11	Mar. 10, 2020
5	Band Reject Filter	Wairrwright Instruments Gmbh	WRCG 1710/1785-1690/1805-60/12SS	38	Mar. 10, 2020
6	Band Reject Filter	Wairrwright Instruments Gmbh	WRCG 824/849-810/863-60/9SS	7	Mar. 10, 2020
7	Band Reject Filter	Wairrwright Instruments Gmbh	WRCG 880/915-860/935-60/9SS	14	Mar. 10, 2020
8	Band Reject Filter	Wairrwright Instruments Gmbh	WRCG 1850/1910-1830/1930-60/10SS	17	Mar. 10, 2020
9	HighPass Filter	Wairrwright Instruments Gmbh	WHK3.1/18G-10SS	24	Mar. 10, 2020
10	Wireless Communication Test SET	Agilent	E5515C	MY48364183	Mar. 10, 2020
11	Microwave Preamplifier With Adaptor	EMC INSTRUMENT	EMC2654045	980039 & HA01	Mar. 10, 2020
12	Receiver	Agilent	N9038A	MY52130039	Aug. 11, 2019
13	wideband radio communication tester	R&S	CMW500	152372	Mar. 10, 2020
14	High pass filter	KANGMAIWEI	ZHPF-M3-12.75G-3869	B2015073763	Feb. 12, 2020
15	High pass filter	KANGMAIWEI	ZHPF-M1000-4000-1	B2015073762	Feb. 12, 2020
16	High pass filter	KANGMAIWEI	ZHPF-M6-186-1727	B2015073764	Feb. 12, 2020
17	Cable	emci	LMR-400(30MHz-1GHz)(8m+5m)	N/A	May 24, 2020
18	Cable	mitron	B10-01-01-12M	18072744	Jul. 30, 2019
19	Controller	ETS-Lindgren	2090	N/A	N/A
20	Measurement Software	Farad	EZ-EMC Ver.NB-03A1-01	N/A	N/A
21	Loop Antenna	EM	EM-6876-1	230	Jan. 15, 2020
22	Double Ridged Guide Antenna	ETS	3115	75789	Mar. 09, 2020

Conducted Measurement					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	EXA Spectrum Analyzer	Agilent	N9010A	MY50520044	Mar. 10, 2020
2	POWER SPLITTER	Mini-Circuits	ZFRSC-123-S+	331000910-1	Mar. 10, 2020
3	wideband radio communication tester	R&S	CMW500	152372	Mar. 10, 2020
4	Spectrum Analyzer	R&S	FSP40	100185	Aug. 11, 2019

Frequency Stability Measurement					
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Multi-output DC Power Supply	GW Instek	GPC-3030DN	EK880675	Sep. 26, 2020
2	POWER SPLITTER	Mini-Circuits	ZFRSC-123-S+	331000910-1	Mar. 10, 2020
3	wideband radio communication tester	R&S	CMW500	152372	Mar. 10, 2020
4	Const Temp,& Humidity Chamber	Bell	BTH-50C	20170306001	Mar. 10, 2020

Remark: ”N/A” denotes no model name, serial no. or calibration specified.
All calibration period of equipment list is one year.

APPENDIX A - OUTPUT POWER

Test Mode:	eMTC Band 2 - QPSK

Bandwidth	Channel	Frequency (MHz)	Max. Conducted Power (dBm)	Max. EIRP Power (dBm)
1.4M	18607	1850.7	22.39	26.07
	18900	1880	22.64	26.32
	19193	1909.3	22.42	26.10

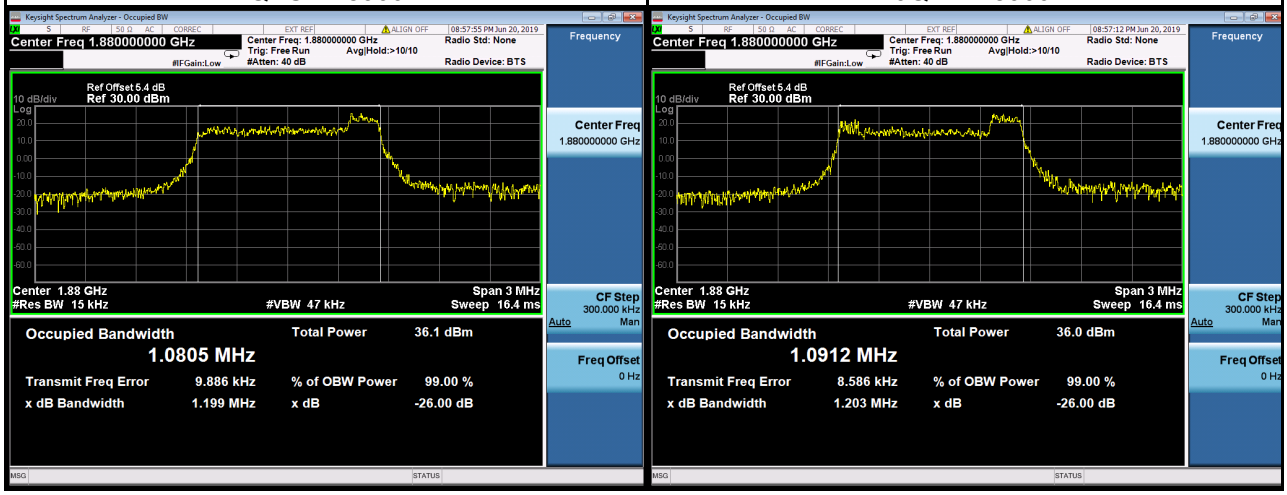
Test Mode:	eMTC Band 2 - 16QAM

Bandwidth	Channel	Frequency (MHz)	Max. Conducted Power (dBm)	Max. EIRP Power (dBm)
1.4M	18607	1850.7	21.86	25.54
	18900	1880	21.71	25.39
	19193	1909.3	22.16	25.84

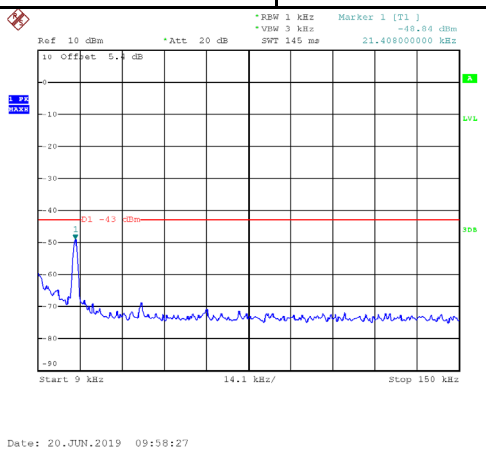
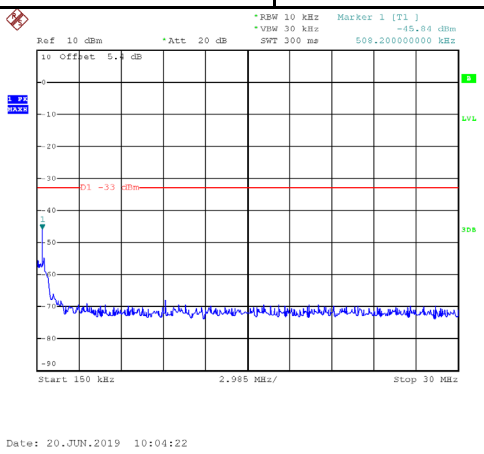
APPENDIX B - OCCUPIED BANDWIDTH

eMTC Band 2_1.4M					
QPSK			16QAM		
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)	Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)
18900	1880	1.0805	18900	1880	1.0912
Channel	Frequency (MHz)	26dB Bandwidth (MHz)	Channel	Frequency (MHz)	26dB Bandwidth (MHz)
18900	1880	1.199	18900	1880	1.203

Spectrum Plot	
QPSK-18900	16QAM-18900



APPENDIX C - CONDUCTED EMISSIONS

<table>
<tr><th colspan="4">eMTC Band 2_1.4M</th></tr>
<tr><td>Channel</td><td>Frequency(MHz)</td><td>Channel</td><td>Frequency(MHz)</td></tr>
<tr><td>18900</td><td>1880</td><td>18900</td><td>1880</td></tr>
<tr><td> 
</td><td colspan="2"> 
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<tr><td>Channel</td><td>Frequency(MHz)</td><td>-</td><td>-</td></tr>
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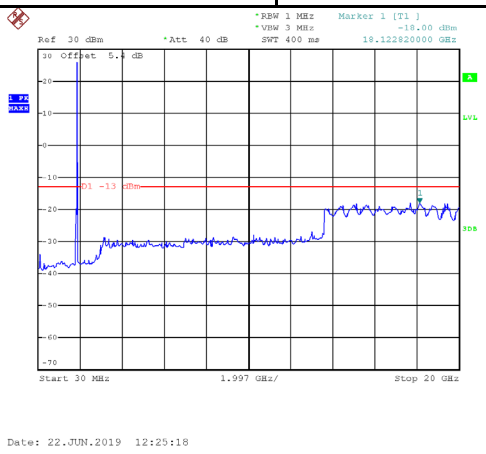
<tr><td> 

Note: The spike is no limit.</td><td colspan="2">-</td></tr>
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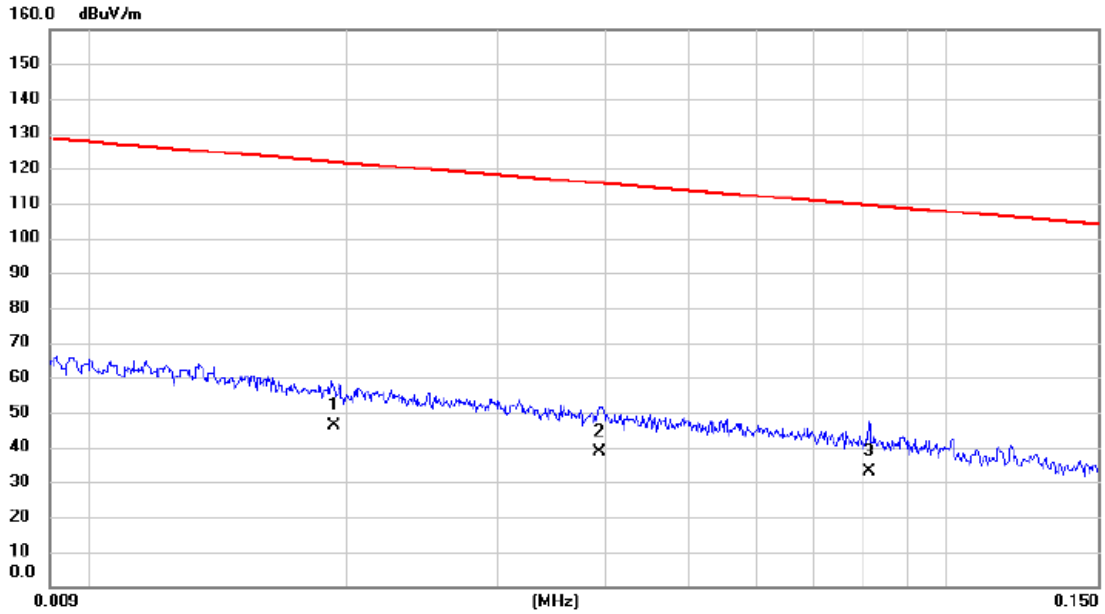
APPENDIX D - RADIATED EMISSION

Test Mode:	TX Mode

Ant 0°

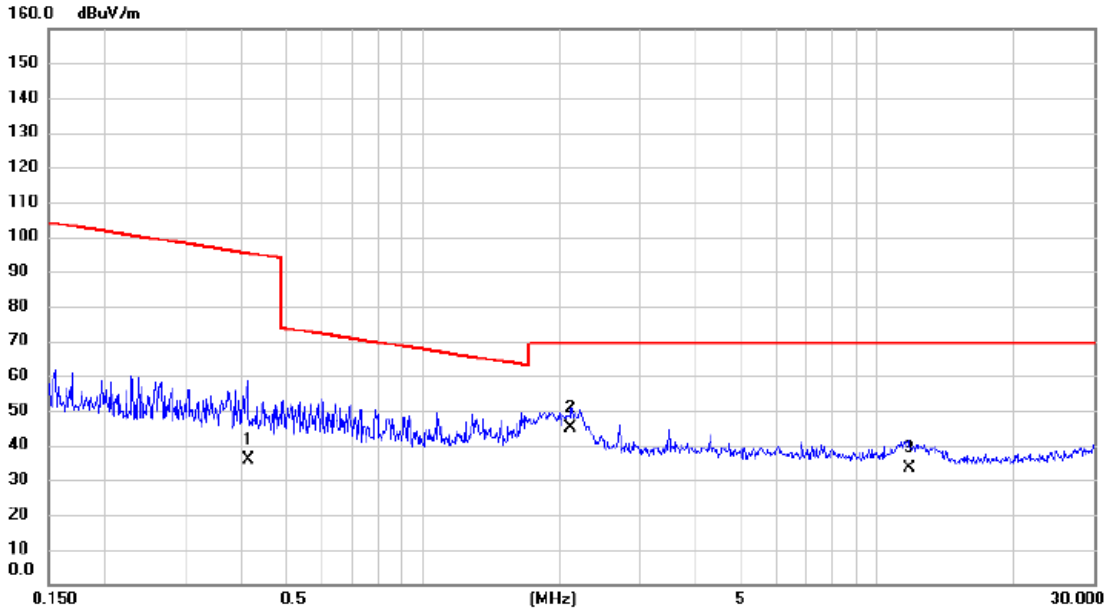


No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	*	0.0193	32.10	14.03	46.13	121.89	-75.76	AVG	
2		0.0394	24.80	13.89	38.69	115.69	-77.00	AVG	
3		0.0812	19.30	13.54	32.84	109.41	-76.57	AVG	

Note: * is maximum data.

Test Mode:	TX Mode

Ant 0°

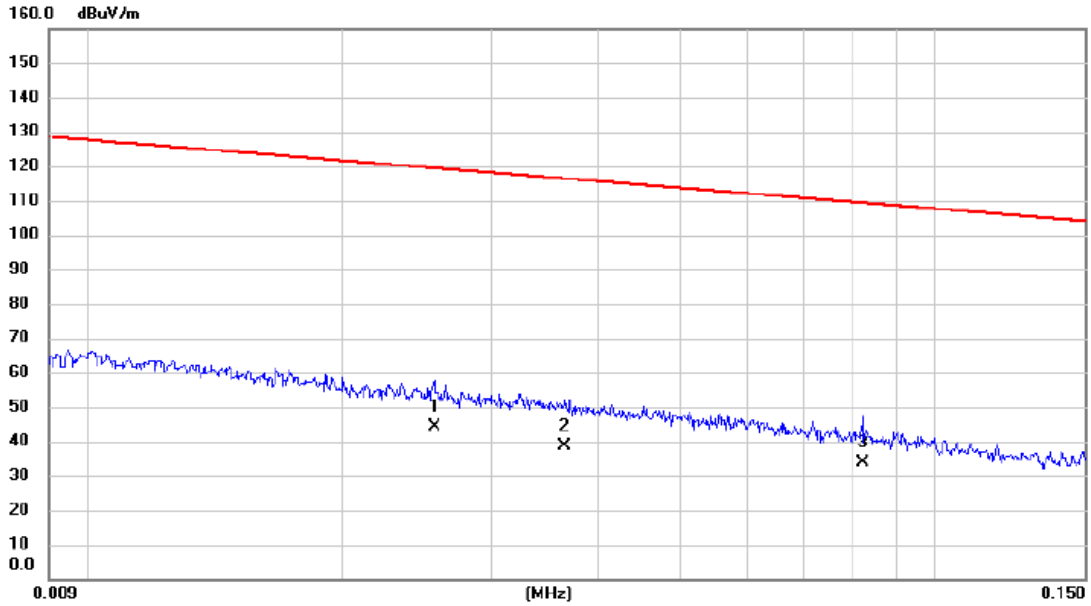


No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		0.4127	22.40	13.27	35.67	95.29	-59.62	AVG	
2	*	2.1213	33.10	11.75	44.85	69.54	-24.69	QP	
3		11.7446	21.90	11.62	33.52	69.54	-36.02	QP	

Note: * is maximum data.

Test Mode:	TX Mode

Ant 90°

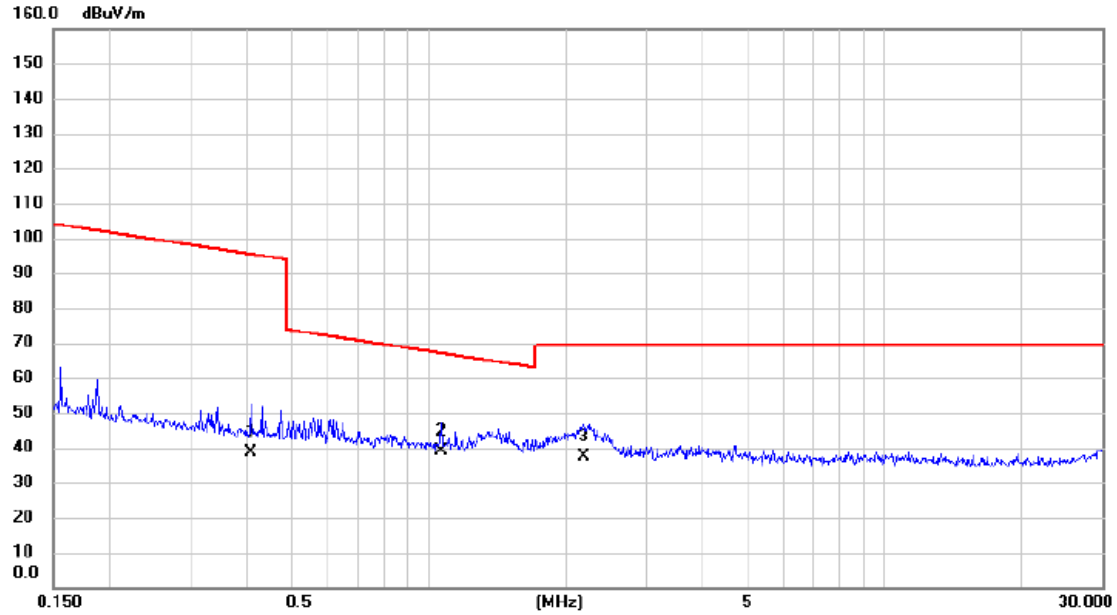


No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	*	0.0257	30.20	13.84	44.04	119.41	-75.37	AVG	
2		0.0366	24.80	13.89	38.69	116.34	-77.65	AVG	
3		0.0822	20.10	13.54	33.64	109.31	-75.67	AVG	

Note: * is maximum data.

Test Mode:	TX Mode

Ant 90°

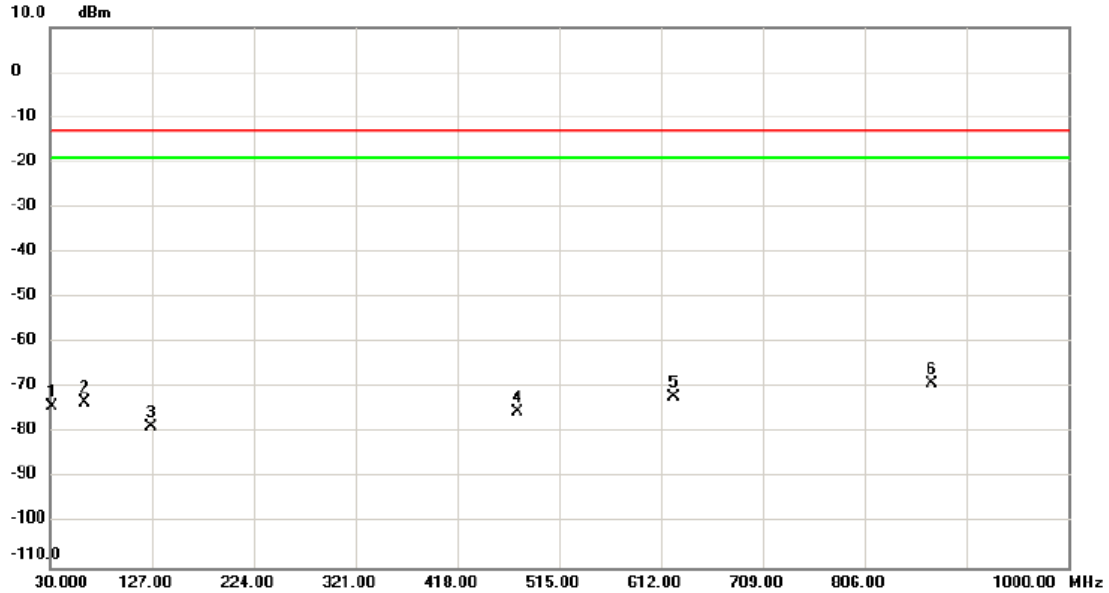


No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		0.4083	25.30	13.28	38.58	95.38	-56.80	AVG	
2	*	1.0653	26.70	12.45	39.15	67.05	-27.90	QP	
3		2.1898	25.80	11.71	37.51	69.54	-32.03	QP	

Note: * is maximum data.

Test Mode:	eMTC Band 2_TX CH18900_1.4M

Vertical

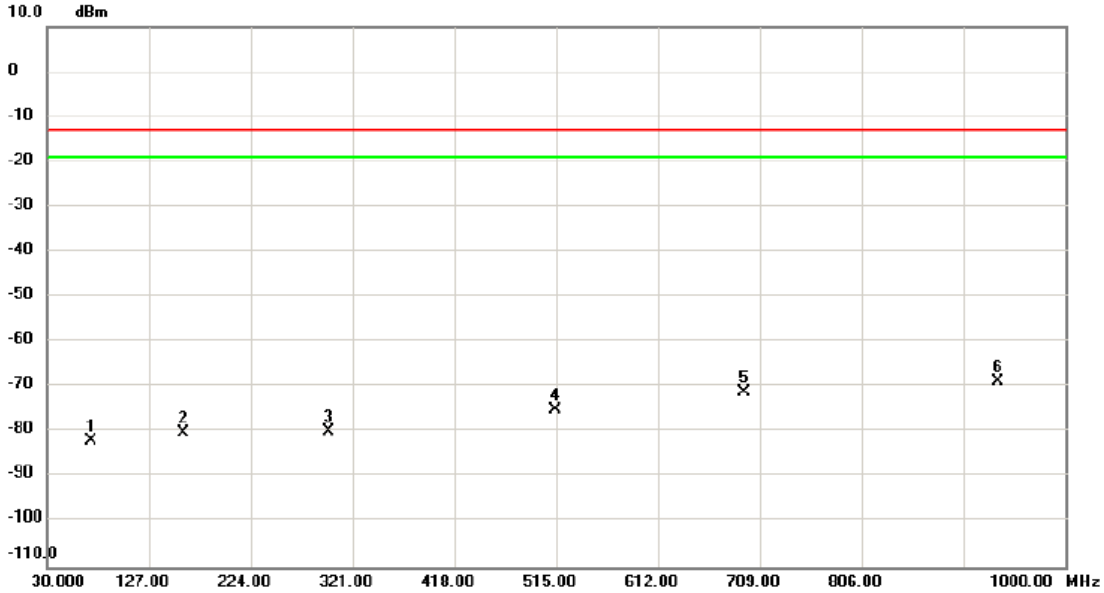


No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBm	dB	dBm	dBm	dB	Detector	Comment
1		31.455	-59.34	-14.84	-74.18	-13.00	-61.18	peak	
2		62.980	-58.33	-15.03	-73.36	-13.00	-60.36	peak	
3		126.515	-65.52	-13.05	-78.57	-13.00	-65.57	peak	
4		475.230	-67.39	-7.88	-75.27	-13.00	-62.27	peak	
5		623.640	-66.83	-5.23	-72.06	-13.00	-59.06	peak	
6	*	869.535	-66.77	-2.18	-68.95	-13.00	-55.95	peak	

Note: * is maximum data.

Test Mode:	eMTC Band 2_TX CH18900_1.4M

Horizontal

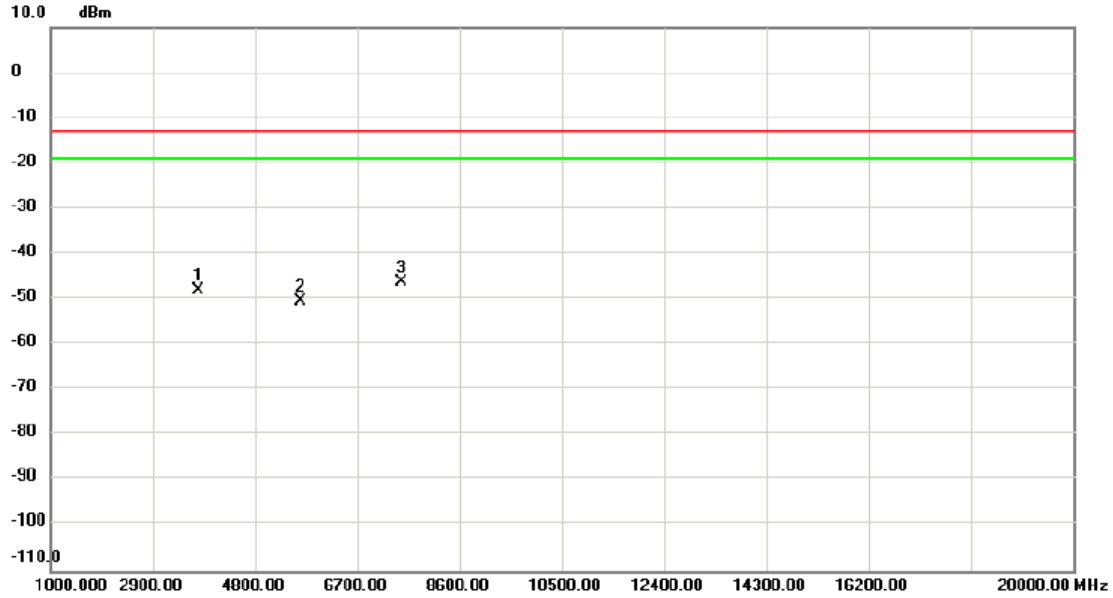


No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBm	dB	dBm	dBm	dB	Detector	Comment
1		71.710	-65.44	-16.54	-81.98	-13.00	-68.98	peak	
2		159.980	-69.06	-11.00	-80.06	-13.00	-67.06	peak	
3		298.205	-68.19	-11.56	-79.75	-13.00	-66.75	peak	
4		514.030	-67.52	-7.55	-75.07	-13.00	-62.07	peak	
5		693.965	-66.95	-4.09	-71.04	-13.00	-58.04	peak	
6	*	935.495	-67.62	-1.11	-68.73	-13.00	-55.73	peak	

Note: * is maximum data.

Test Mode:	eMTC Band 2_TX CH18900_1.4M

Vertical

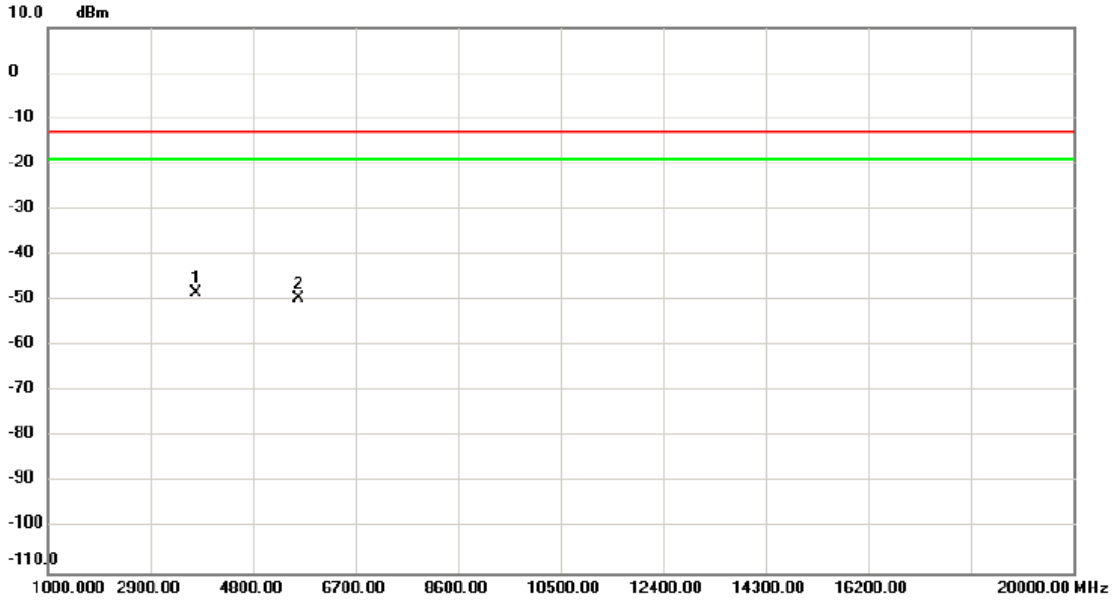


No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBm	dB	dBm	dBm	dB	Detector	Comment
1		3755.000	-49.77	1.71	-48.06	-13.00	-35.06	peak	
2		5645.500	-55.91	5.49	-50.42	-13.00	-37.42	peak	
3	*	7517.000	-55.70	9.50	-46.20	-13.00	-33.20	peak	

Note: * is maximum data.

Test Mode:	eMTC Band 2_TX CH18900_1.4M

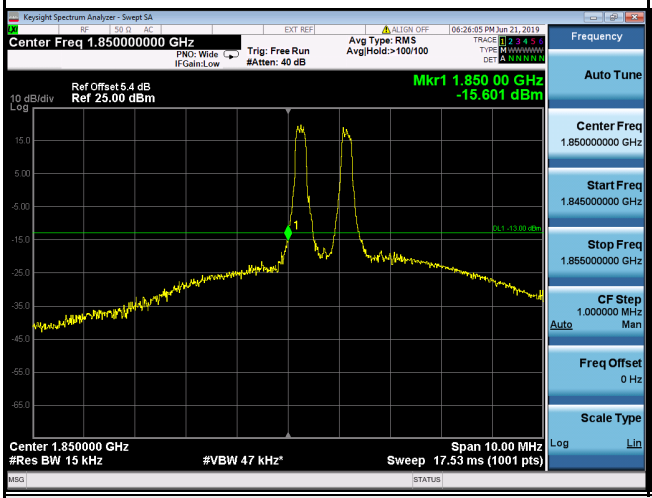
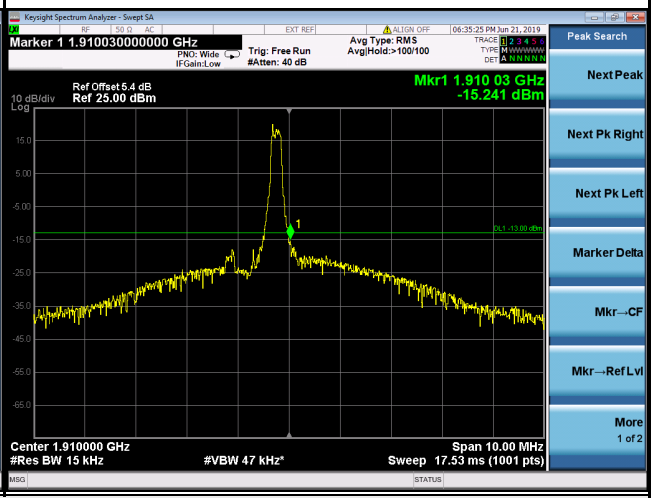
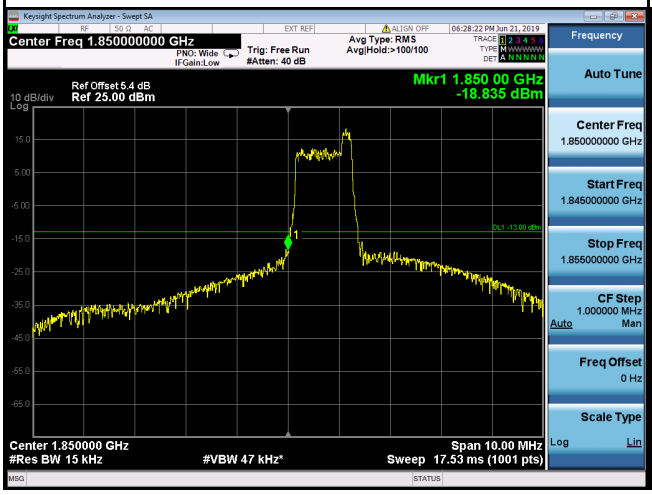
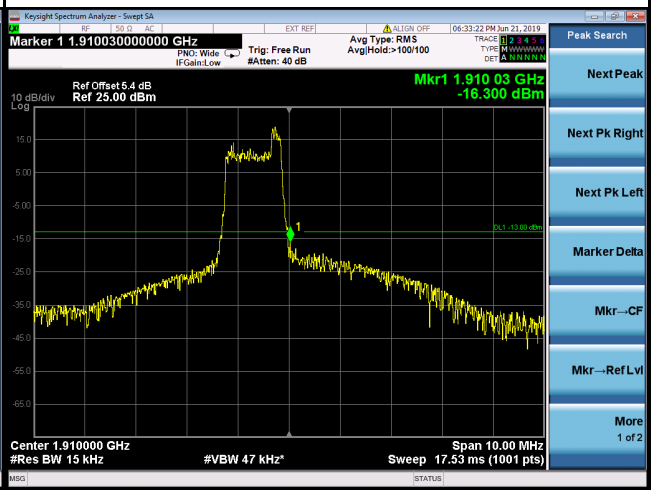
Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBm	dB	dBm	dBm	dB	Detector	Comment
1	*	3755.000	-50.02	1.71	-48.31	-13.00	-35.31	peak	
2		5636.000	-55.13	5.47	-49.66	-13.00	-36.66	peak	

Note: * is maximum data.

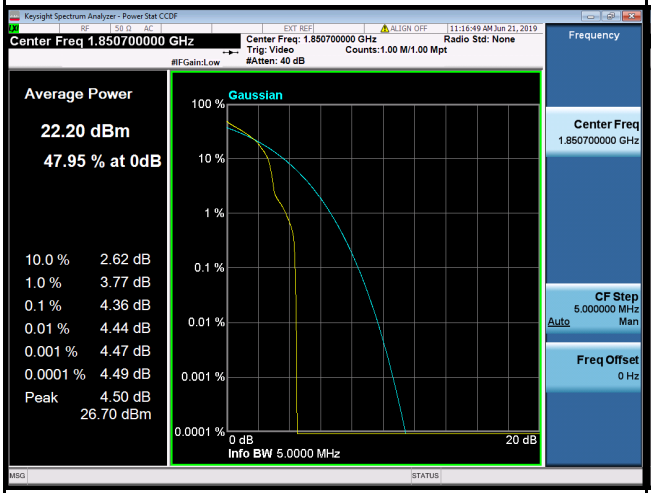
APPENDIX E - BAND EDGE

eMTC Band 2_1.4M - QPSK			
1RB0			
Channel	18607	Channel	19193
			
Full RB			
Channel	18607	Channel	19193
			

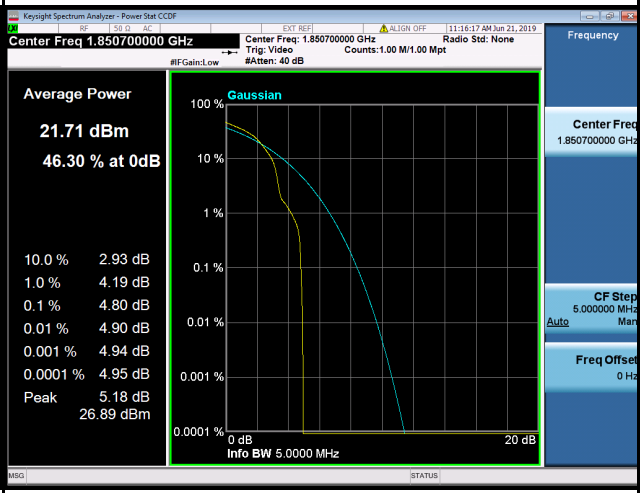
APPENDIX F - PEAK TO AVERAGE RATIO

eMTC Band 2 Spectrum Plot_1.4M

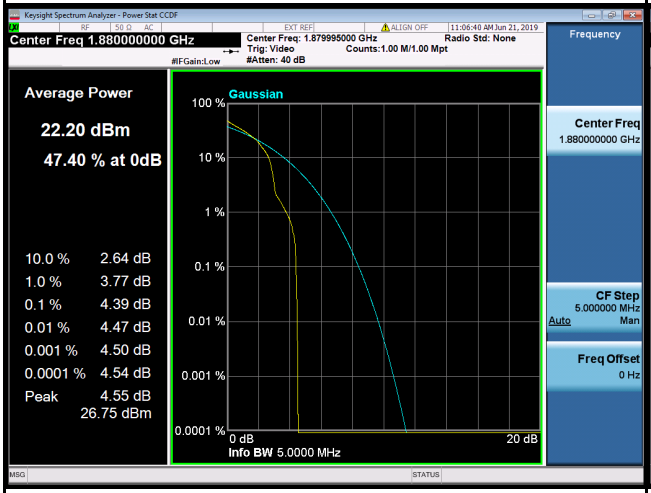
QPSK-18607



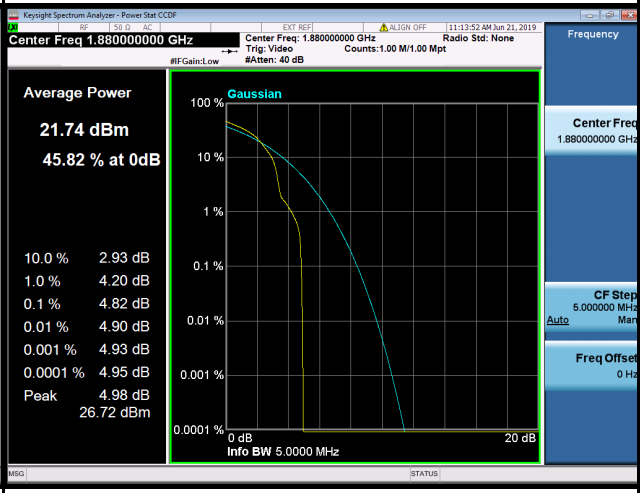
16QAM-18607



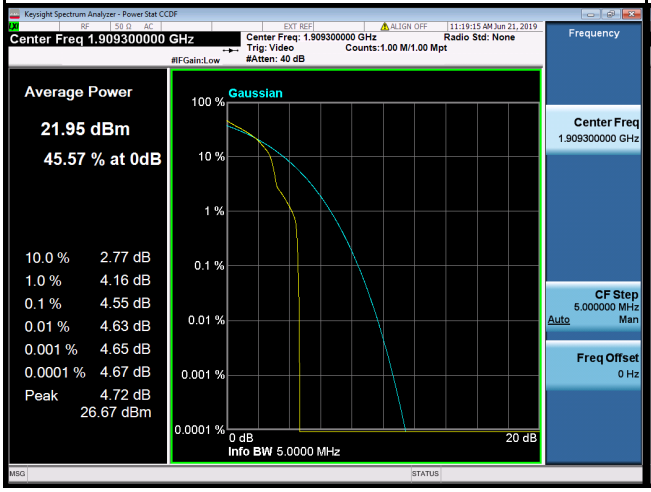
QPSK-18900



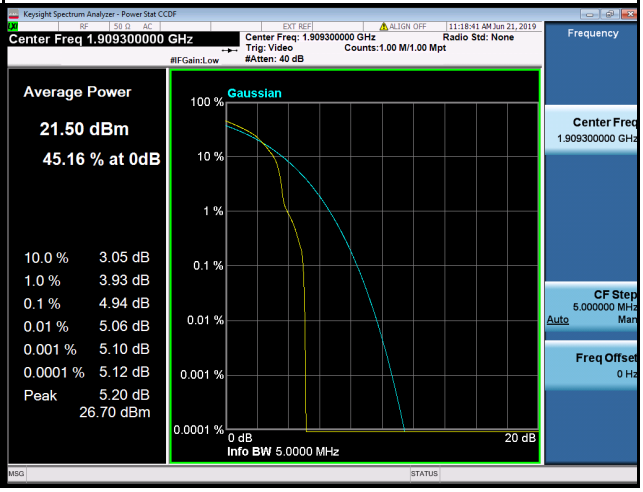
16QAM-18900



QPSK-19193



16QAM-19193



APPENDIX G - FREQUENCY STABILITY

Test Mode:	eMTC Band 2_CH18900_1.4M

Temperature vs. Frequency Stabiility

Temperature(°C)	Frequency Error (Hz)	Frequency Error (ppm)	Limit(ppm)
-30	6.58	0.0035	±2.5
-20	-5.15	-0.002739362	
-10	3.82	0.002031915	
0	-2.17	-0.001154255	
10	-5.84	-0.003106383	
20	6.15	0.003271277	
30	3.54	0.001882979	
40	4.84	0.002574468	
50	3.47	0.001845745	
Max. Deviation (ppm)	6.58	0.0035	

Voltage vs. Frequency Stability

Voltage(Volts)	Frequency Error (Hz)	Frequency Error (ppm)	Limit(ppm)
10.8	5.11	0.002718085	±2.5
12.0	-1.15	-0.000611702	
13.2	4.21	0.002239362	
Max. Deviation (ppm)	5.11	0.002718085	

End of Test Report