

FCC Radio Test Report

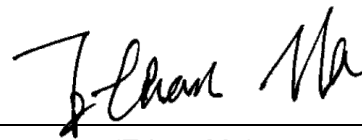
FCC ID: 2ATKG-RAD78235

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)

B T L I N C .

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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.

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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 27 Subpart L
47 CFR FCC Part 27 Subpart H
47 CFR FCC Part 2
ANSI / TIA / EIA-603-E-2016
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-2-1906C019) 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 4, 12 parts.

2. SUMMARY OF TEST RESULTS

Test procedures according to the technical standard(s):

FCC Part 27 Subpart L,H & Part 2			
Standard(s) Section	Test Item	Verdict	Tested By
2.1046 27.50(d)(4) 27.50(c)(10)	Effective Radiated Power & Equivalent Isotropic Radiated Power	PASS	Paul Li
2.1049	Occupied Bandwidth	PASS	Paul Li
2.1051 27.53(c)(2)(4) 27.53(g) 27.53(h)	Conducted Spurious Emissions	PASS	Paul Li
2.1051 27.53(c)(2)(4) 27.53(g) 27.53(h)	Radiated Spurious Emissions	PASS	Paul Li
2.1051 27.53(c)(2)(4) 27.53(g) 27.53(h)	Band Edge Measurements	PASS	Paul Li
-	Peak To Average Ratio	PASS	Paul Li
2.1055 27.54	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	eMTC Band 4	3.18 dBi			
	eMTC Band 12	3.09 dBi			
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 4 (Channel Bandwidth: 1.4MHz)		1710MHz ~ 1755MHz		
	eMTC Band 12 (Channel Bandwidth: 1.4MHz)		699MHz ~ 716MHz		
Max. EIRP Power	eMTC Band 4 (Channel Bandwidth: 1.4MHz)		QPSK	25.47	dBm
			16QAM	24.92	dBm
Max. ERP Power	eMTC Band 12 (Channel Bandwidth: 1.4MHz)		QPSK	23.97	dBm
			16QAM	23.80	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:

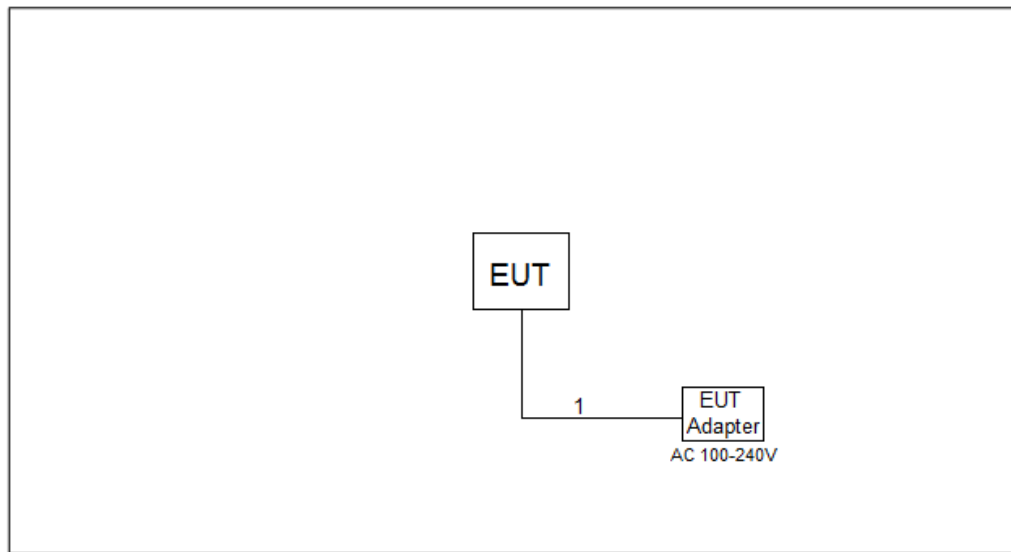
Test item	Modes	Modulation		Test Channel		
		QPSK	16QAM	L	M	H
Equivalent Isotropic Radiated Power	CAT-M1 B4	✓	✓	✓	✓	✓
Conducted Output Power	CAT-M1 B4	✓	✓	✓	✓	✓
Occupied Bandwidth	CAT-M1 B4	✓	✓		✓	
Conducted Spurious Emissions	CAT-M1 B4	✓			✓	
Radiated Spurious Emissions	CAT-M1 B4	✓			✓	
Band Edge Measurements	CAT-M1 B4	✓		✓		✓
Peak To Average Ratio	CAT-M1 B4	✓	✓	✓	✓	✓
Frequency Stability	CAT-M1 B4	✓			✓	

Test item	Modes	Modulation		Test Channel		
		QPSK	16QAM	L	M	H
Effective Radiated Power	CAT-M1 B12	✓	✓	✓	✓	✓
Conducted Output Power	CAT-M1 B12	✓	✓	✓	✓	✓
Occupied Bandwidth	CAT-M1 B12	✓	✓		✓	
Conducted Spurious Emissions	CAT-M1 B12	✓				✓
Radiated Spurious Emissions	CAT-M1 B12	✓				✓
Band Edge Measurements	CAT-M1 B12	✓		✓		✓
Peak To Average Ratio	CAT-M1 B12	✓	✓	✓	✓	✓
Frequency Stability	CAT-M1 B12	✓			✓	

EUT TEST CONDITIONS:

Test Item	Environmental Conditions	Test Voltage
Equivalent Isotropic Radiated Power / Effective 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 THECONFIGURATIONOFSYSTEMTESTED



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 1 watts / 1 watts e.i.r.p. (eMTC Band 4)

Mobile / Portable station are limited to 30 watts / 3 watts e.r.p. (eMTC Band 12)

4.1.2 TEST PROCEDURE

The testing follows FCC KDB 971168 v03r01 Section 5.0.

EIRP/ERP:

$EIRP = \text{Conducted Power} + \text{Antenna gain}$

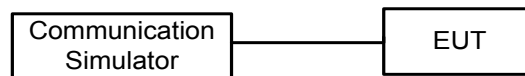
$ERP \text{ power} = EIRP \text{ power} - 2.15 \text{ dBi}$

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

Conducted Power Measurement



4.1.4 TEST DEVIATION

No deviation

4.1.5 TEST RESULTS

Please refer to the Appendix A.

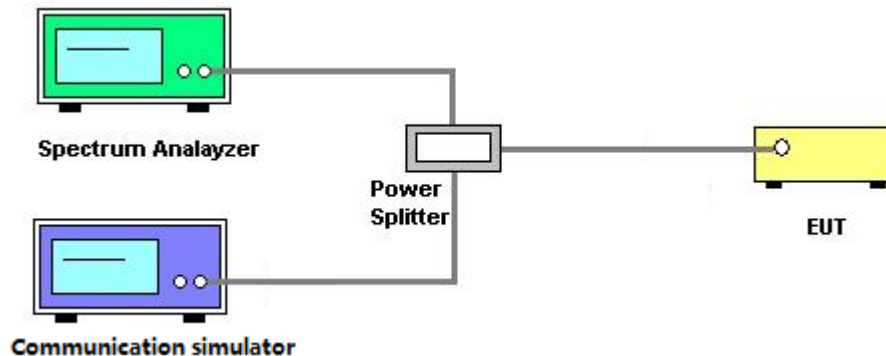
4.2 OCCUPIED BANDWIDTH MEASUREMENT

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. $RBW = (1\% \sim 5\%) \times EBW$
 $VBW \geq 3 \times RBW$
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

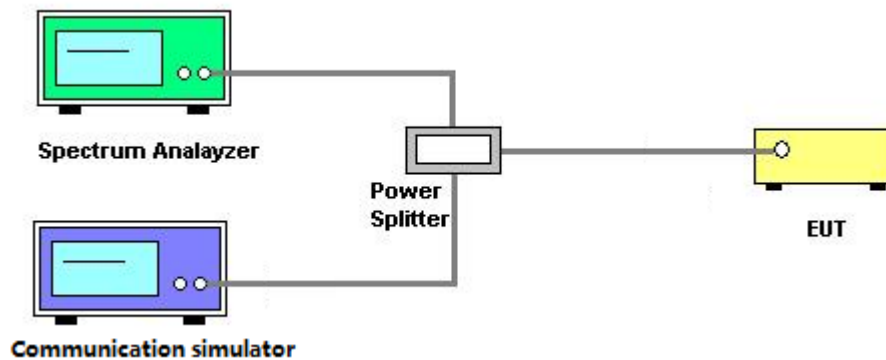
The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log(P)$ dB. The emission limit equal to -13dBm.

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.

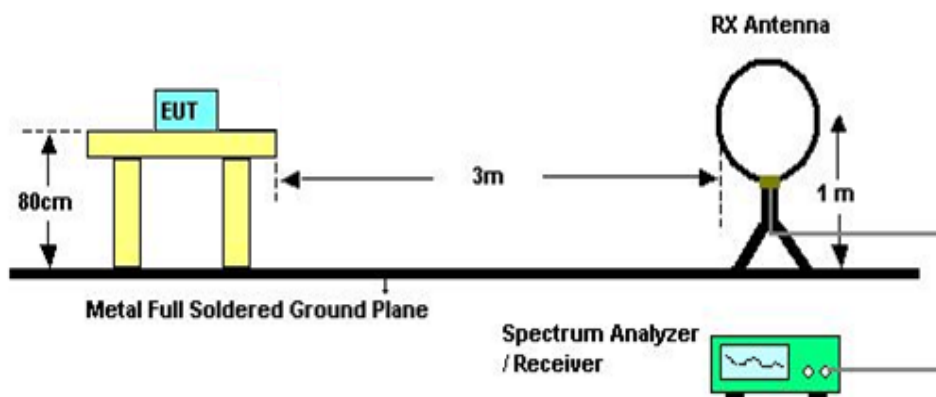
4.4.2 TEST PROCEDURES

The testing follows FCC KDB 971168 v03r01 Section 5.8.

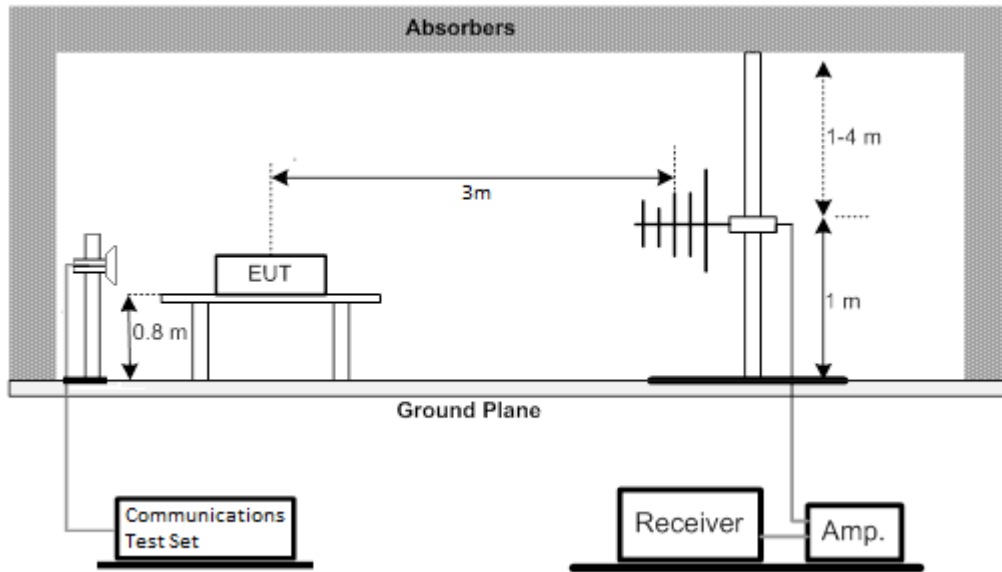
1. In the semi-anechoic chamber, EUT placed on the 0.8m height of Turn Table, rotated the table around 360 degrees to search the maximum radiation power and receiver antenna shall be rotated vertical and horizontal polarization and moved height from 1m to 4m to find the maximum polar radiated power. 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

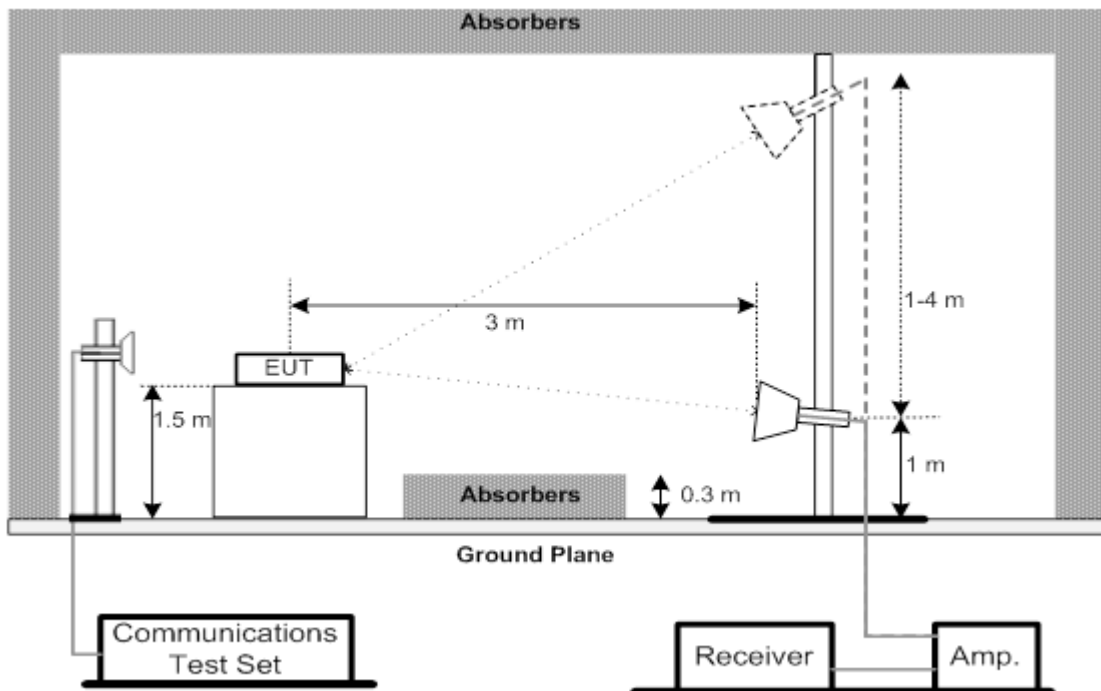
Below 30MHz

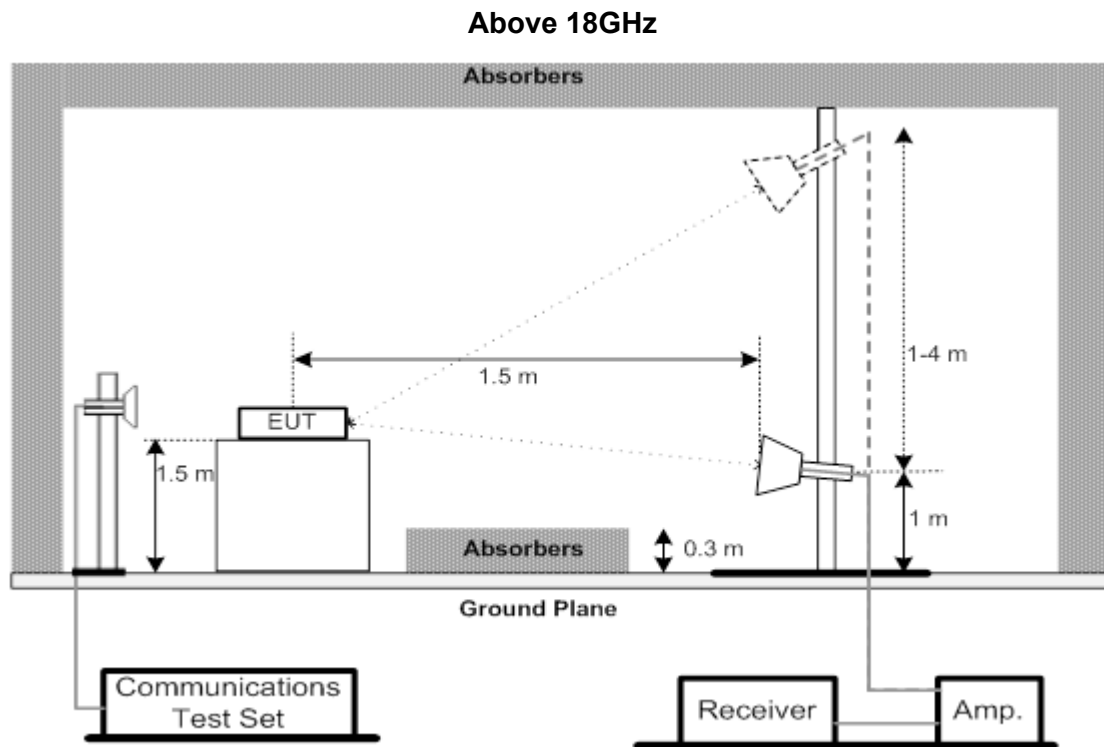


30MHz to 1GHz



1GHz to 18GHz





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

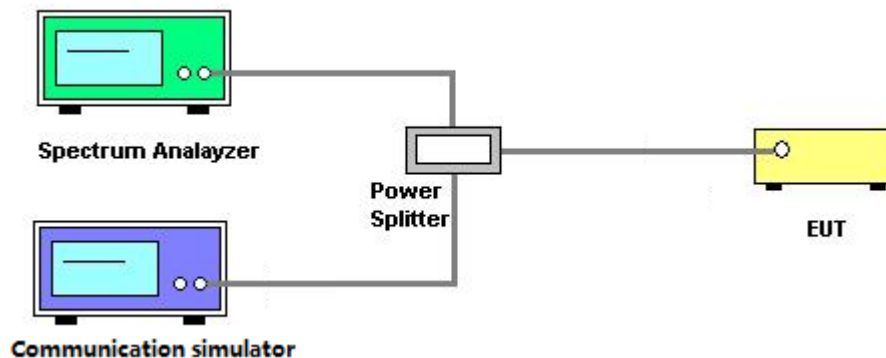
The power of any emission outside a licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, by at least $43 + 10 \log (P)$ dB. Compliance with this provision is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kilohertz or greater. However, in the 100 kilohertz bands immediately outside and adjacent to a licensee's frequency block, a resolution bandwidth of at least 30 kHz 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. $RBW = 99\%OBW * (1\% \sim 5\%)$
 $VBW \geq 3 * RBW$
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

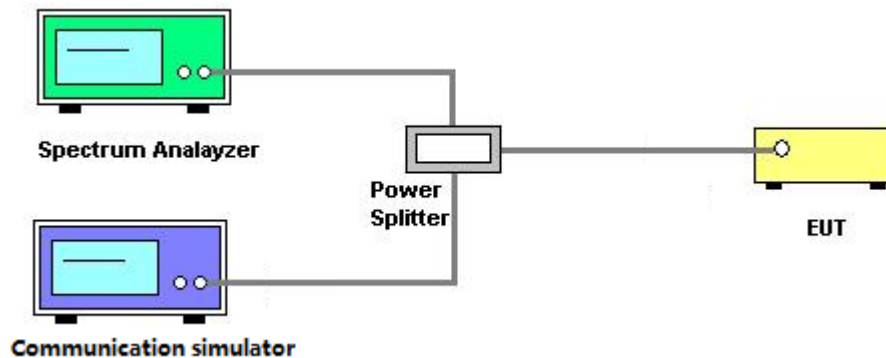
In measuring transmissions in this band using an average power technique, the peak to-average ratio (PAR) of the transmission may not exceed 13 dB.

4.6.2 TEST PROCEDURES

The testing follows FCC KDB 971168 v03r01 Section 5.7.

1. Set resolution/measurement bandwidth $\geq$ 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

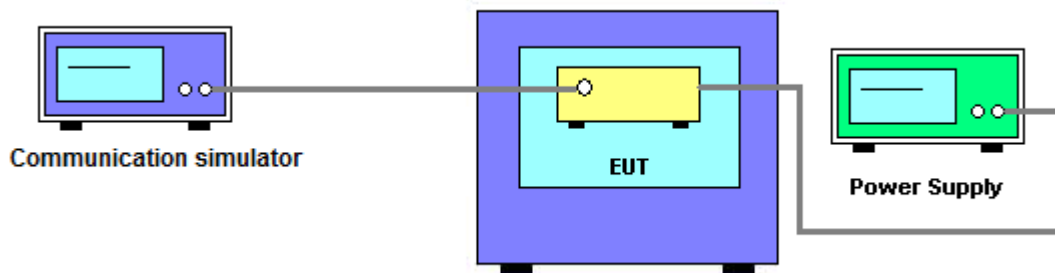
± 1.5 ppm is for base and fixed station. ± 2.5 ppm is for mobile station.

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 $\pm 0.5^{\circ}\text{C}$ 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	Wairwright Instruments Gmbh	WHK 1.5/15G-10ST	11	Mar. 10, 2020
5	Band Reject Filter	Wairwright Instruments Gmbh	WRCG 1710/1785-1690/180 5-60/12SS	38	Mar. 10, 2020
6	Band Reject Filter	Wairwright Instruments Gmbh	WRCG 824/849-810/863-60/ 9SS	7	Mar. 10, 2020
7	Band Reject Filter	Wairwright Instruments Gmbh	WRCG 880/915-860/935-60/ 9SS	14	Mar. 10, 2020
8	Band Reject Filter	Wairwright Instruments Gmbh	WRCG 1850/1910-1830/193 0-60/10SS	17	Mar. 10, 2020
9	HighPass Filter	Wairwright Instruments Gmbh	WHK3.1/18G-10SS	24	Mar. 10, 2020
10	Microwave Preamplifier With Adaptor	EMC INSTRUMENT	EMC2654045	980039 & HA01	Mar. 10, 2020
11	Receiver	Agilent	N9038A	MY52130039	Aug. 11, 2019
12	wideband radio communication tester	R&S	CMW500	152372	Mar. 10, 2020
13	High pass filter	KANGMAIWEI	ZHPF-M3-12.75G-38 69	B2015073763	Feb. 12, 2020
14	High pass filter	KANGMAIWEI	ZHPF-M1000-4000-1	B2015073762	Feb. 12, 2020
15	High pass filter	KANGMAIWEI	ZHPF-M6-186-1727	B2015073764	Feb. 12, 2020
16	Cable	emci	LMR-400(30MHz-1G Hz)(8m+5m)	N/A	May 24, 2020
17	Cable	mitron	B10-01-01-12M	18072744	Jul. 30, 2019
18	Controller	ETS-Lindgren	2090	N/A	N/A
19	Measurement Software	Farad	EZ-EMC Ver.NB-03A1-01	N/A	N/A
20	Loop Antenna	EM	EM-6876-1	230	Jan. 15, 2020
21	Double Ridged Guide Antenna	ETS	3115	75789	Mar. 09, 2020
22	Broad-Band Horn Antenna	Schwarzbeck	BBHA 9170	9170319	Jun. 23, 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 4 - QPSK
------------	--------------------

Bandwidth	Channel	Frequency (MHz)	Max. Conducted Power (dBm)	Max. EIRP Power (dBm)
1.4M	19957	1710.7	22.29	25.47
	20175	1732.5	21.81	24.99
	20393	1754.3	22.03	25.21

Test Mode:	eMTC Band 4 - 16QAM
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Bandwidth	Channel	Frequency (MHz)	Max. Conducted Power (dBm)	Max. EIRP Power (dBm)
1.4M	19957	1710.7	21.74	24.92
	20175	1732.5	21.41	24.59
	20393	1754.3	21.55	24.73

Test Mode:	eMTC Band 12 - QPSK
------------	---------------------

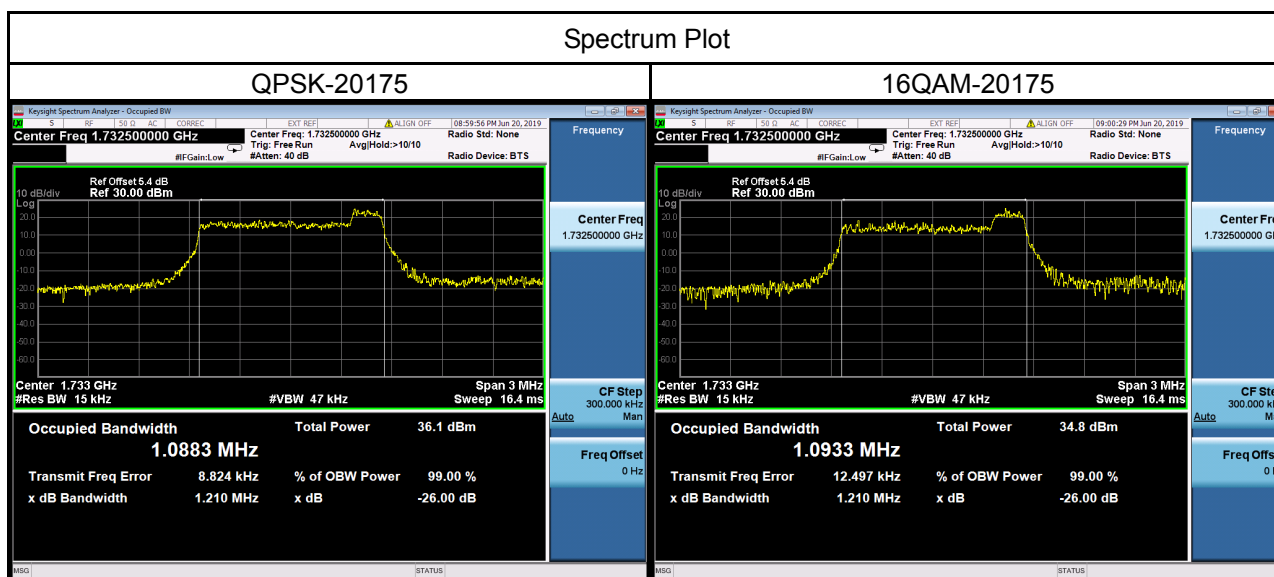
Bandwidth	Channel	Frequency (MHz)	Max. Conducted Power (dBm)	Max. ERP Power (dBm)
1.4M	23017	699.7	23.03	23.97
	23095	707.5	22.72	23.66
	23173	715.3	22.78	23.72

Test Mode:	eMTC Band 12 -16QAM
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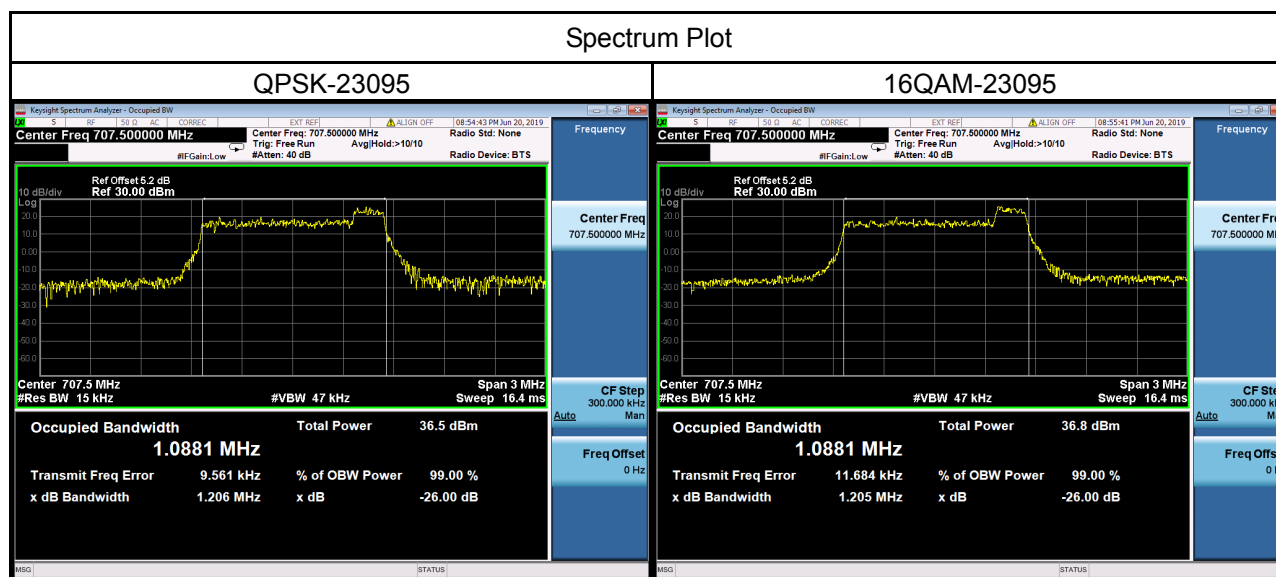
Bandwidth	Channel	Frequency (MHz)	Max. Conducted Power (dBm)	Max. ERP Power (dBm)
1.4M	23017	699.7	22.86	23.80
	23095	707.5	22.65	23.59
	23173	715.3	22.68	23.62

APPENDIX B - OCCUPIED BANDWIDTH

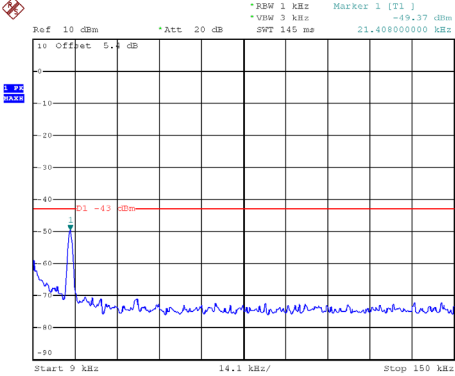
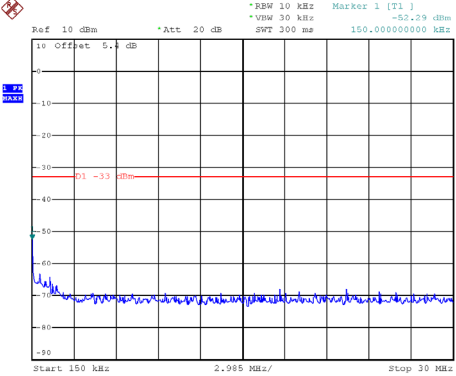
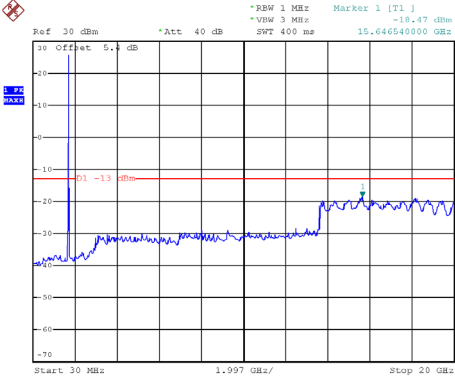
eMTC Band 4_1.4M					
QPSK			16QAM		
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)	Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)
20175	1732.5	1.0883	20175	1732.5	1.0933
Channel	Frequency (MHz)	26dB Bandwidth (MHz)	Channel	Frequency (MHz)	26dB Bandwidth (MHz)
20175	1732.5	1.210	20175	1732.5	1.210



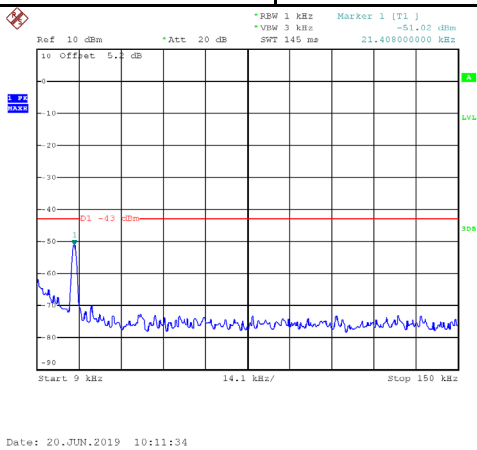
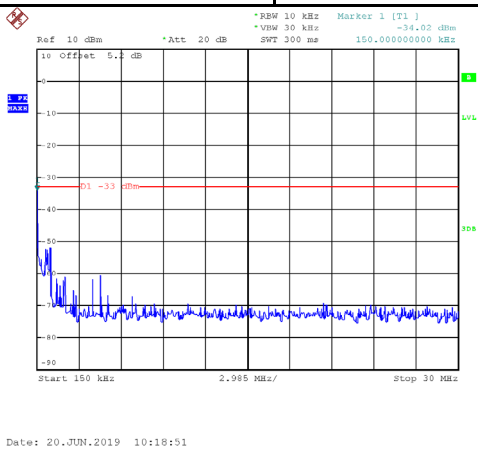
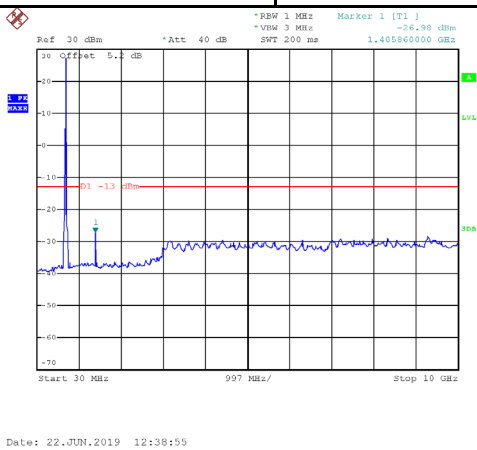
eMTC Band 12_1.4M					
QPSK			16QAM		
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)	Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)
23095	707.5	1.0881	23095	707.5	1.0881
Channel	Frequency (MHz)	26dB Bandwidth (MHz)	Channel	Frequency (MHz)	26dB Bandwidth (MHz)
23095	707.5	1.206	23095	707.5	1.205



APPENDIX C - CONDUCTED EMISSIONS

eMTC Band 4_1.4M			
Channel	Frequency(MHz)	Channel	Frequency(MHz)
20175	1732.5	20175	1732.5
 Date: 20.JUN.2019 10:06:22		 Date: 20.JUN.2019 10:07:54	
Channel	Frequency(MHz)	-	-
20175	1732.5	-	-
 Date: 22.JUN.2019 12:34:29		-	

Note: The spike is no limit.

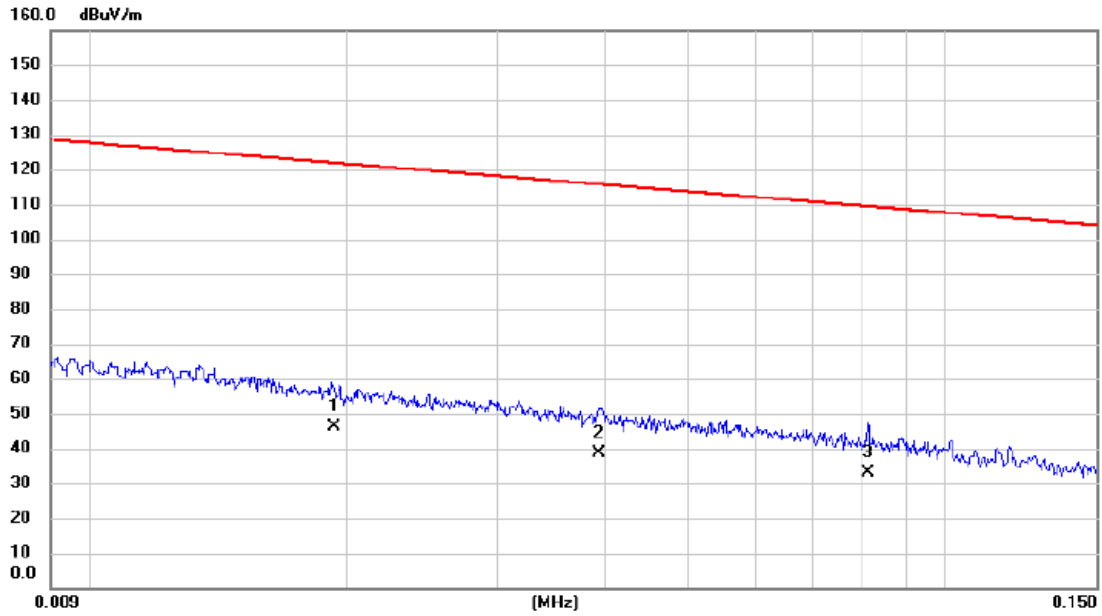
eMTC Band 12_1.4M			
Channel	Frequency(MHz)	Channel	Frequency(MHz)
23173	715.3	23173	715.3
			
Channel	Frequency(MHz)	-	-
23173	715.3	-	-
		-	

Note: The spike is no limit.

APPENDIX D - RADIATED EMISSION

Test Mode: TX Mode

Ant 0°

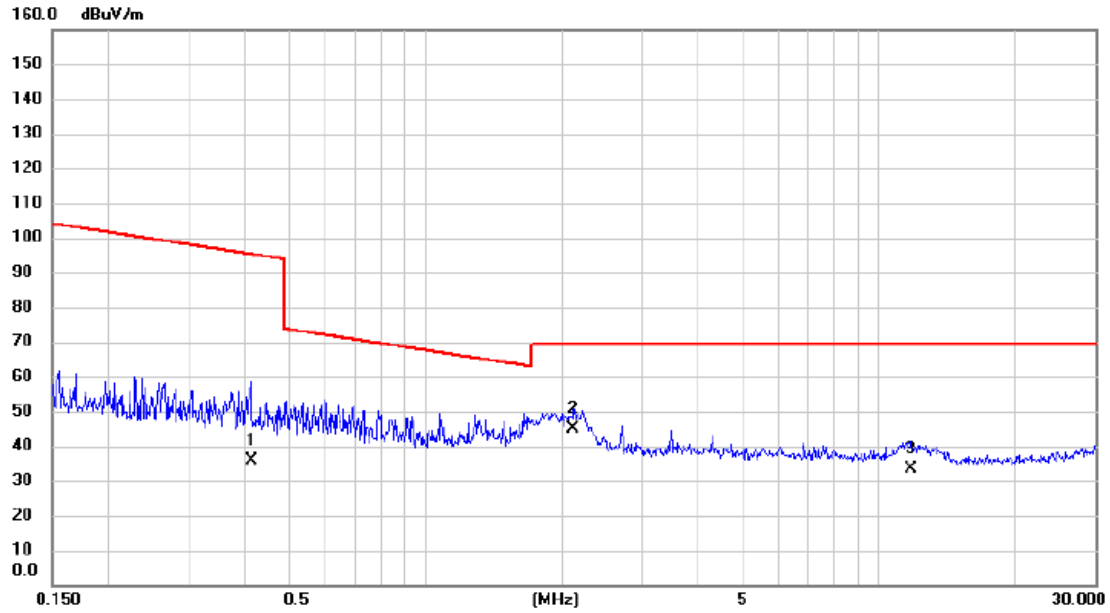


No.	Mk.	Freq.	Reading	Correct	Measure-	Limit	Margin		
		MHz	Level	Factor	ment				
			dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	*	0.0193	32.10	14.03	46.13	121.89	-75.76	AVG	
2		0.0394	24.80	13.89	38.69	115.69	-77.00	AVG	
3		0.0812	19.30	13.54	32.84	109.41	-76.57	AVG	

Note: * is maximum data.

Test Mode: TX Mode

Ant 0°

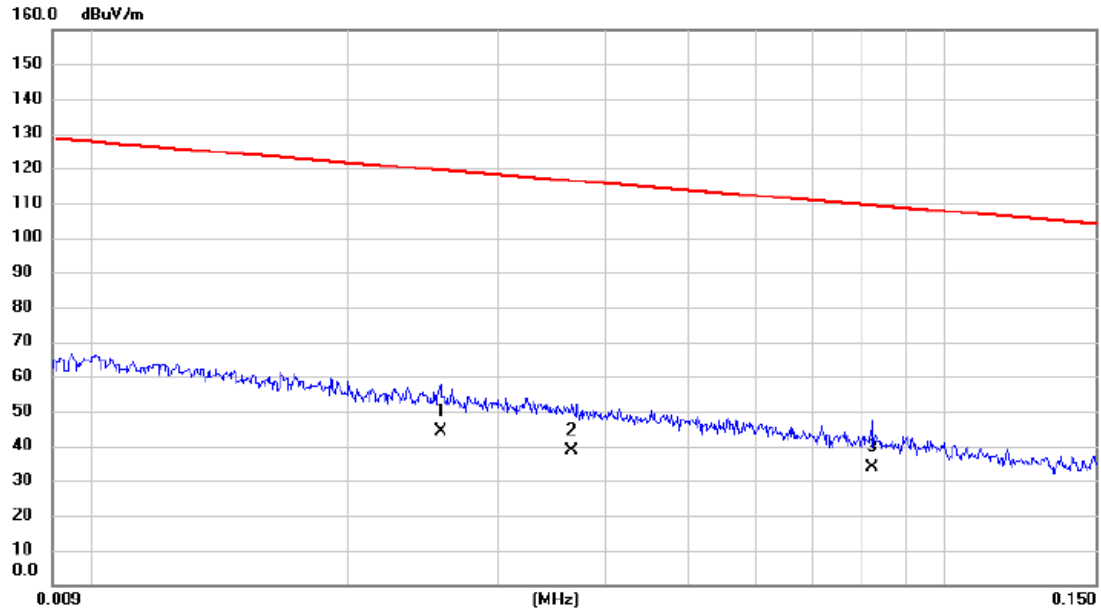


No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		0.4127	22.40	13.27	35.67	95.29	-59.62	AVG	
2	*	2.1213	33.10	11.75	44.85	69.54	-24.69	QP	
3		11.7446	21.90	11.62	33.52	69.54	-36.02	QP	

Note: * is maximum data.

Test Mode: TX Mode

Ant 90°

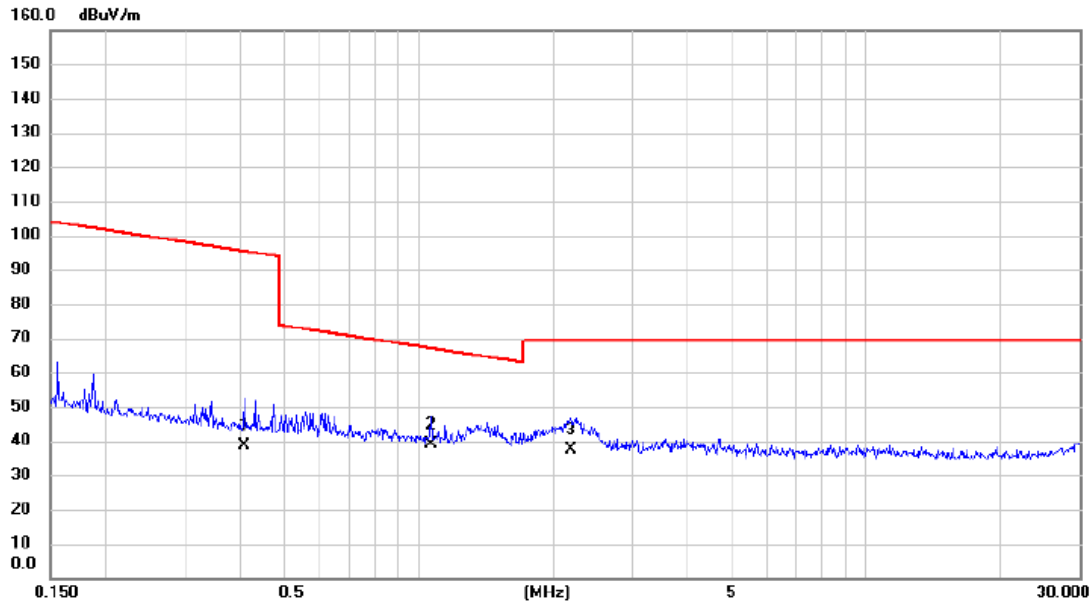


No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Margin		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1	*	0.0257	30.20	13.84	44.04	119.41	-75.37	AVG	
2		0.0366	24.80	13.89	38.69	116.34	-77.65	AVG	
3		0.0822	20.10	13.54	33.64	109.31	-75.67	AVG	

Note: * is maximum data.

Test Mode: TX Mode

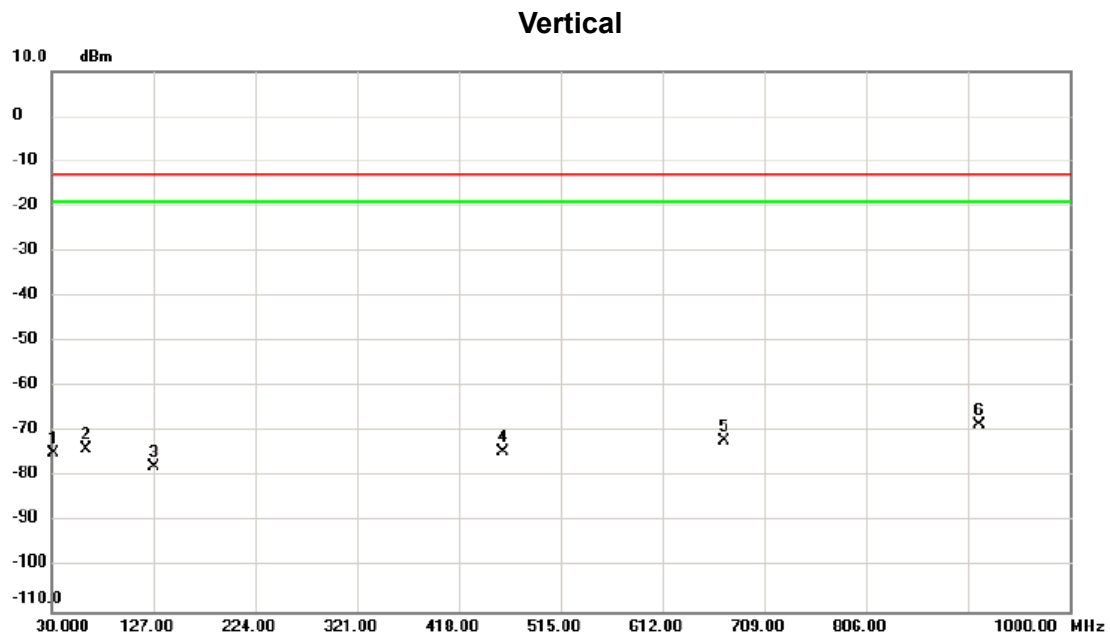
Ant 90°



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Margin 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 4_TX CH20175_1.4M

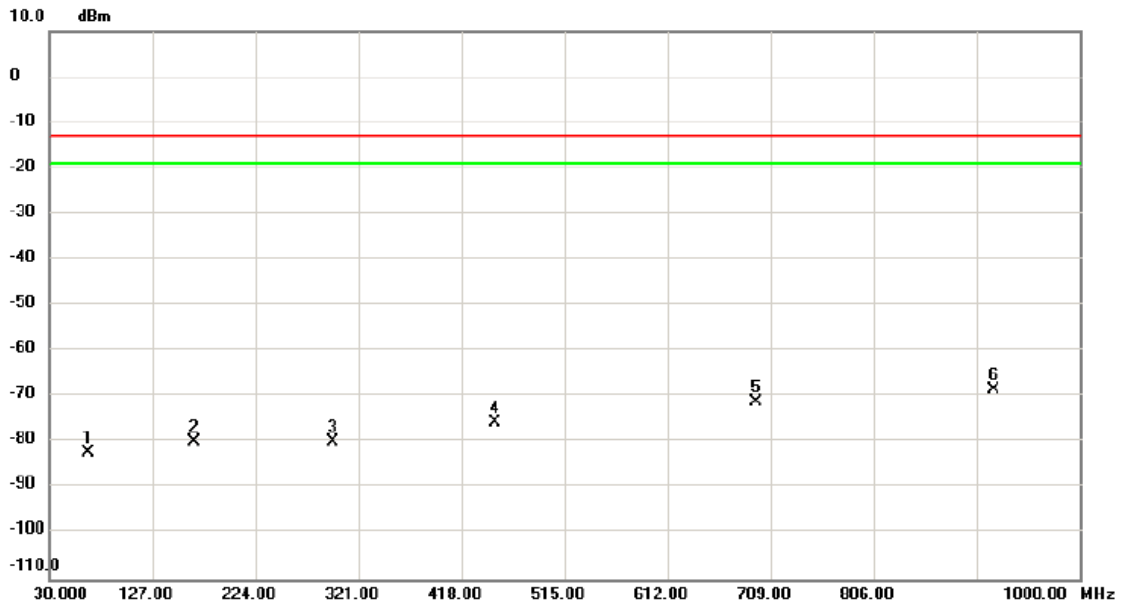


No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBm	dB	dBm	dBm	dB	Detector	Comment
1		31.455	-59.87	-14.84	-74.71	-13.00	-61.71	peak	
2		62.495	-58.80	-15.00	-73.80	-13.00	-60.80	peak	
3		127.485	-64.64	-13.04	-77.68	-13.00	-64.68	peak	
4		460.195	-66.55	-8.00	-74.55	-13.00	-61.55	peak	
5		671.170	-67.79	-4.40	-72.19	-13.00	-59.19	peak	
6	*	914.155	-66.89	-1.60	-68.49	-13.00	-55.49	peak	

Note: * is maximum data.

Test Mode: eMTC Band 4_TX CH20175_1.4M

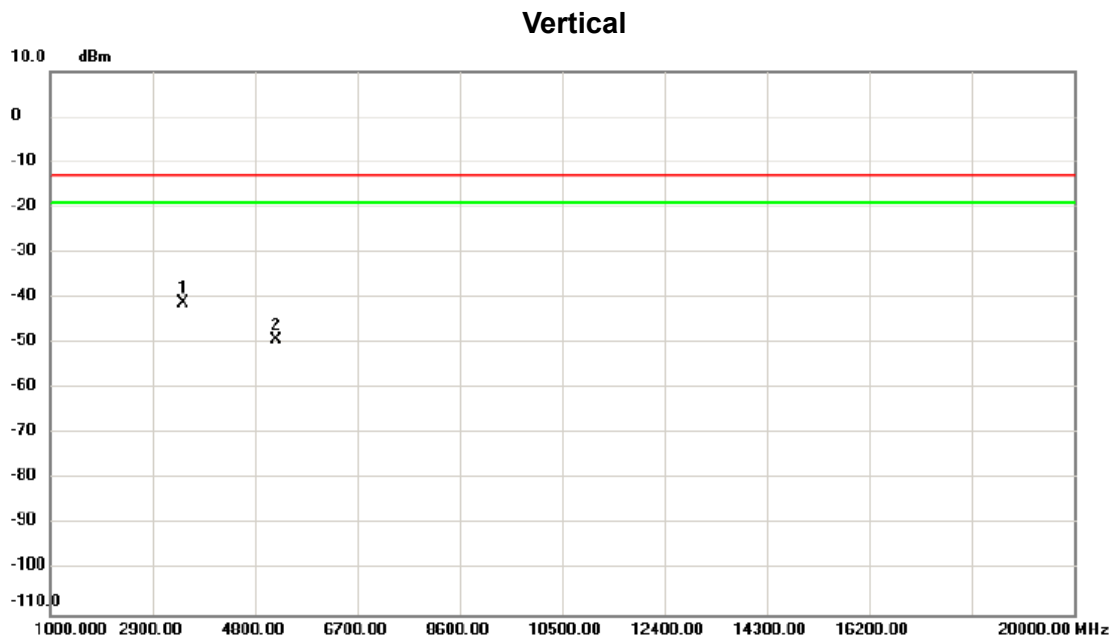
Horizontal



No.	Mk.	Freq. MHz	Reading Level dBm	Correct Factor dB	Measure- ment dBm	Limit dBm	Margin dB	Detector	Comment
1		66.375	-66.73	-15.46	-82.19	-13.00	-69.19	peak	
2		166.770	-67.79	-11.97	-79.76	-13.00	-66.76	peak	
3		296.750	-68.15	-11.63	-79.78	-13.00	-66.78	peak	
4		449.040	-67.45	-8.11	-75.56	-13.00	-62.56	peak	
5		695.905	-67.15	-4.07	-71.22	-13.00	-58.22	peak	
6	*	918.520	-66.83	-1.50	-68.33	-13.00	-55.33	peak	

Note: * is maximum data.

Test Mode: eMTC Band 4_TX CH20175_1.4M

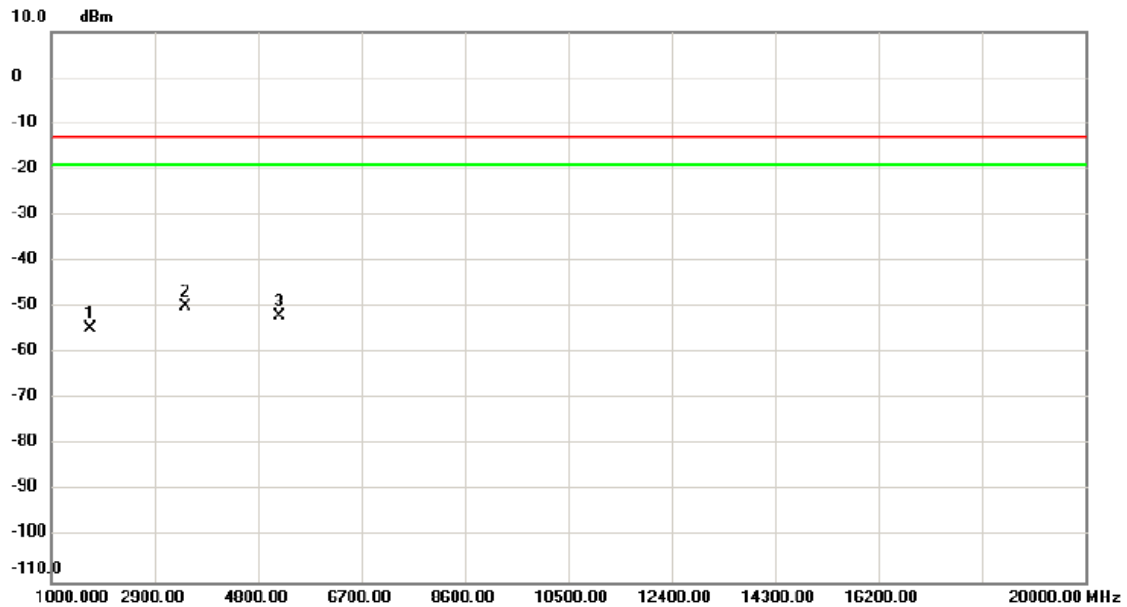


No.	Mk.	Freq. MHz	Reading Level dBm	Correct Factor dB	Measure- ment dBm	Limit dBm	Margin dB	Detector	Comment
1	*	3460.500	-42.12	0.94	-41.18	-13.00	-28.18	peak	
2		5199.000	-53.62	4.43	-49.19	-13.00	-36.19	peak	

Note: * is maximum data.

Test Mode: eMTC Band 4_TX CH20175_1.4M

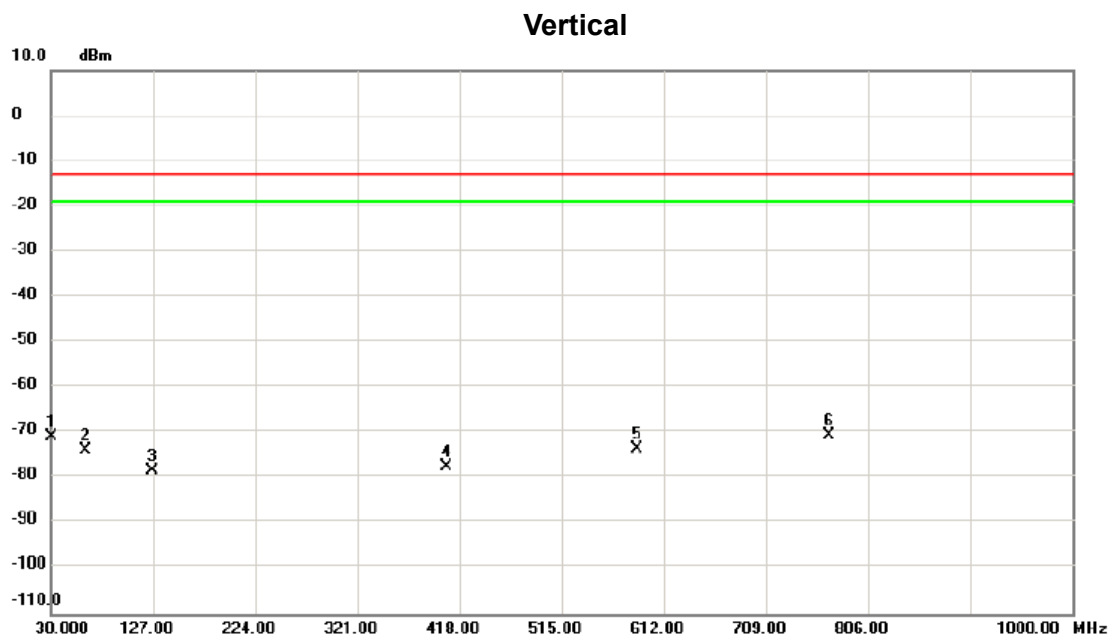
Horizontal



No.	Mk.	Freq. MHz	Reading Level dBm	Correct Factor dB	Measure- ment dBm	Limit dBm	Margin dB	Detector	Comment
1		1731.500	-49.95	-4.70	-54.65	-13.00	-41.65	peak	
2	*	3460.500	-50.70	0.94	-49.76	-13.00	-36.76	peak	
3		5199.000	-56.44	4.43	-52.01	-13.00	-39.01	peak	

Note: * is maximum data.

Test Mode: eMTC Band 12_TX CH23173_1.4M

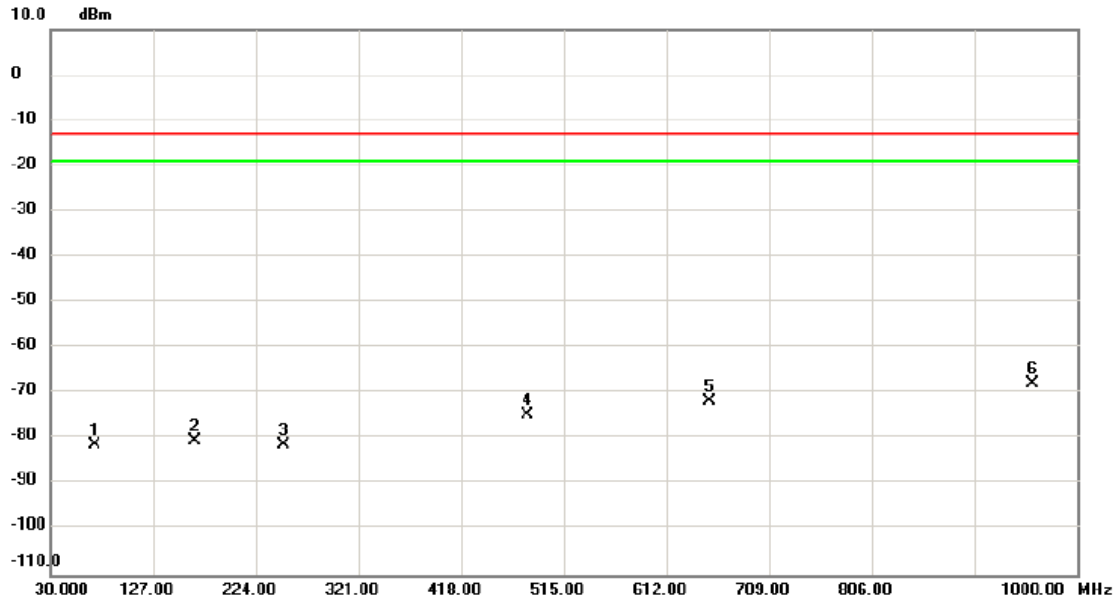


No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Margin		
		MHz	dBm	dB	dBm	dBm	dB	Detector	Comment
1		30.000	-55.80	-15.01	-70.81	-13.00	-57.81	peak	
2		62.980	-58.80	-15.03	-73.83	-13.00	-60.83	peak	
3		126.030	-65.22	-13.04	-78.26	-13.00	-65.26	peak	
4		405.875	-68.15	-9.30	-77.45	-13.00	-64.45	peak	
5		587.265	-67.41	-6.11	-73.52	-13.00	-60.52	peak	
6	*	769.625	-67.04	-3.39	-70.43	-13.00	-57.43	peak	

Note: * is maximum data.

Test Mode: eMTC Band 12_TX CH23173_1.4M

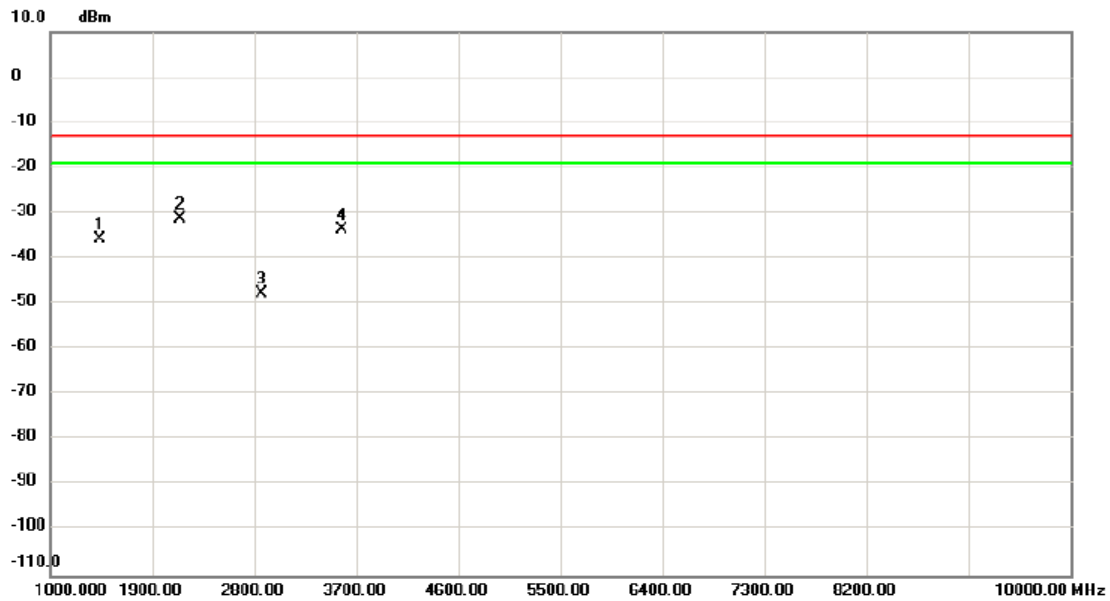
Horizontal



Note: * is maximum data.

Test Mode: eMTC Band 12_TX CH23173_1.4M

Vertical

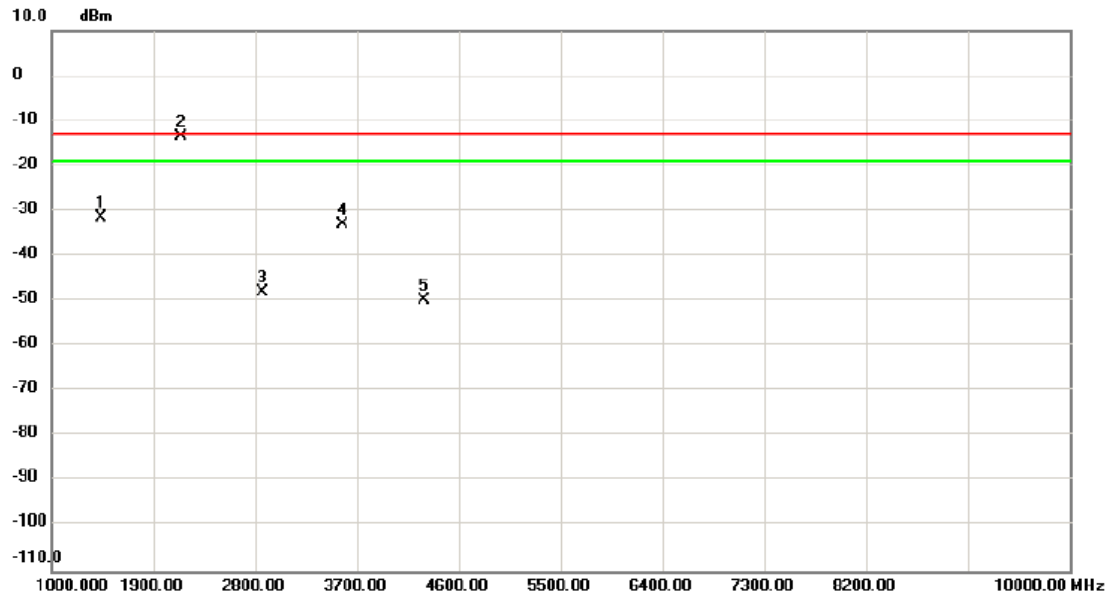


No.	Mk.	Freq. MHz	Reading Level dBm	Correct Factor dB	Measure- ment dBm	Limit dBm	Margin dB	Detector	Comment
1		1432.000	-29.29	-6.47	-35.76	-13.00	-22.76	peak	
2	*	2147.500	-28.07	-3.18	-31.25	-13.00	-18.25	peak	
3		2863.000	-45.96	-1.67	-47.63	-13.00	-34.63	peak	
4		3578.500	-34.97	1.28	-33.69	-13.00	-20.69	peak	

Note: * is maximum data.

Test Mode: eMTC Band 12_TX CH23173_1.4M

Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Margin		
		MHz	dBm	dB	dBm	dBm	dB	Detector	Comment
1		1432.000	-25.15	-6.47	-31.62	-13.00	-18.62	peak	
2	*	2147.260	-10.39	-3.18	-13.57	-13.00	-0.57	peak	
3		2863.000	-46.30	-1.67	-47.97	-13.00	-34.97	peak	
4		3578.500	-34.30	1.28	-33.02	-13.00	-20.02	peak	
5		4294.000	-52.12	2.39	-49.73	-13.00	-36.73	peak	

Note: * is maximum data.

APPENDIX E - BAND EDGE

eMTC Band 4_1.4M - QPSK

1RB0

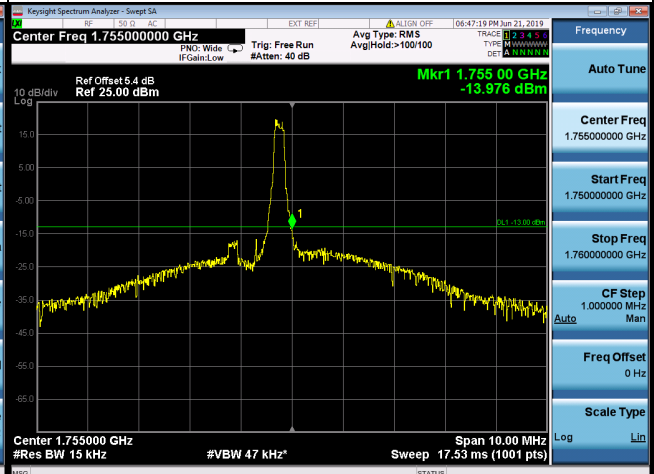
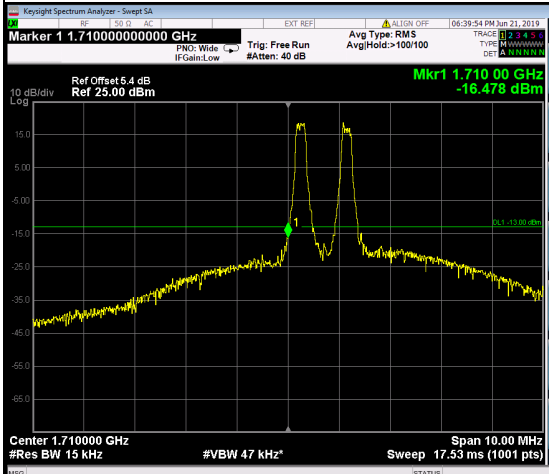
1RB5

Channel

19975

Channel

20393



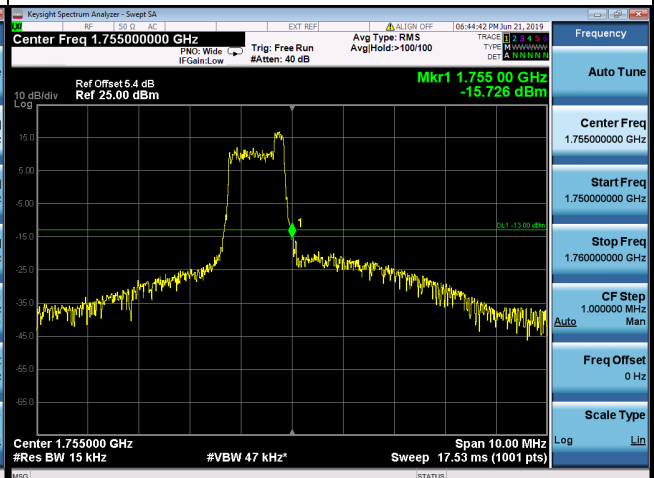
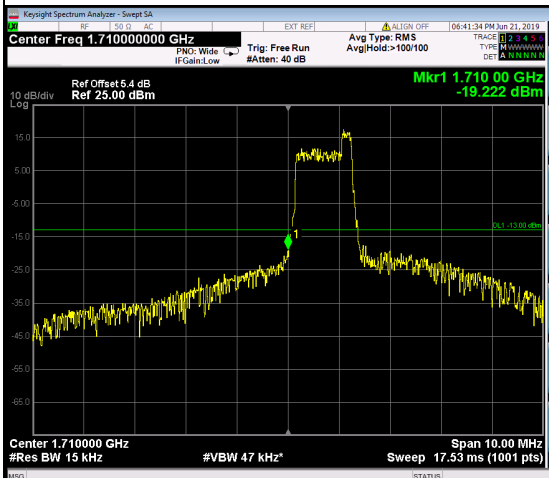
Full RB

Channel

19975

Channel

20393



eMTC Band 12_1.4M - QPSK

1RB0

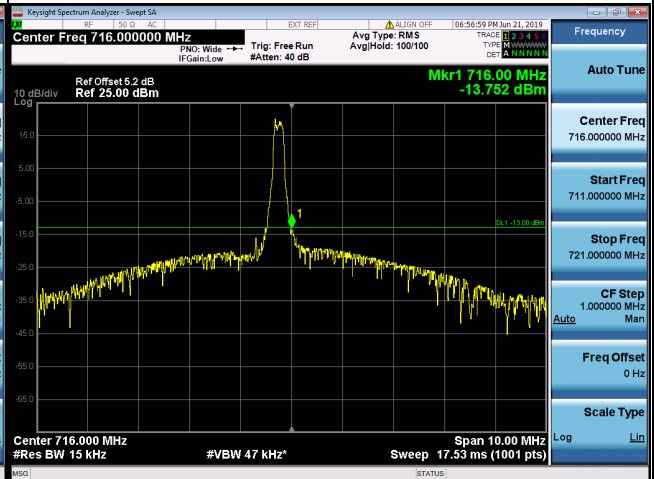
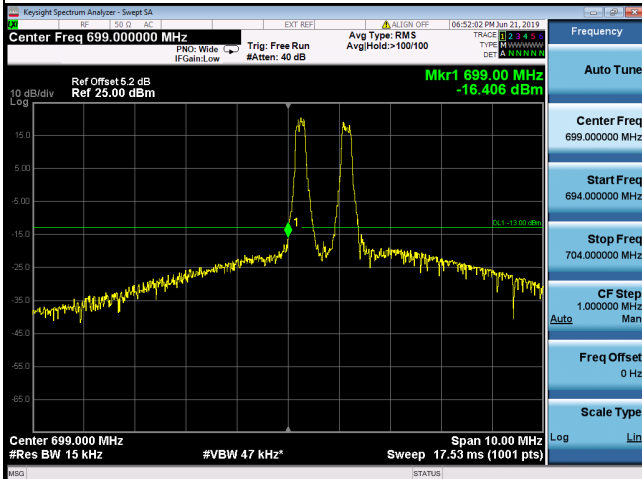
1RB5

Channel

23017

Channel

23173



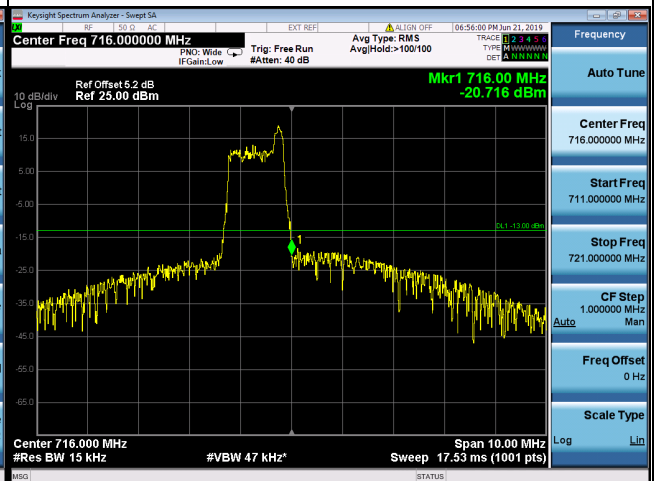
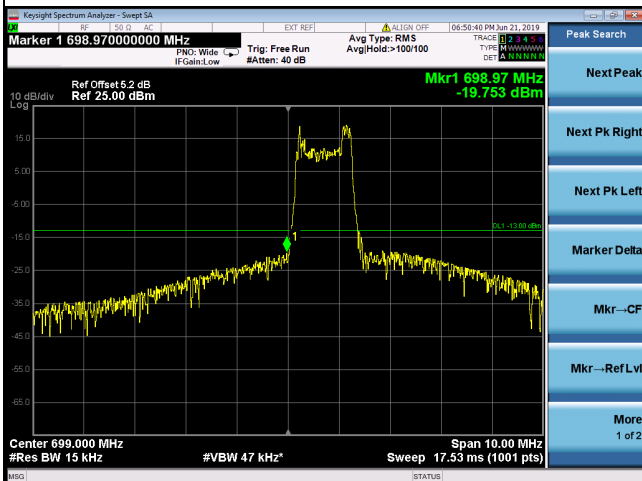
Full RB

Channel

23017

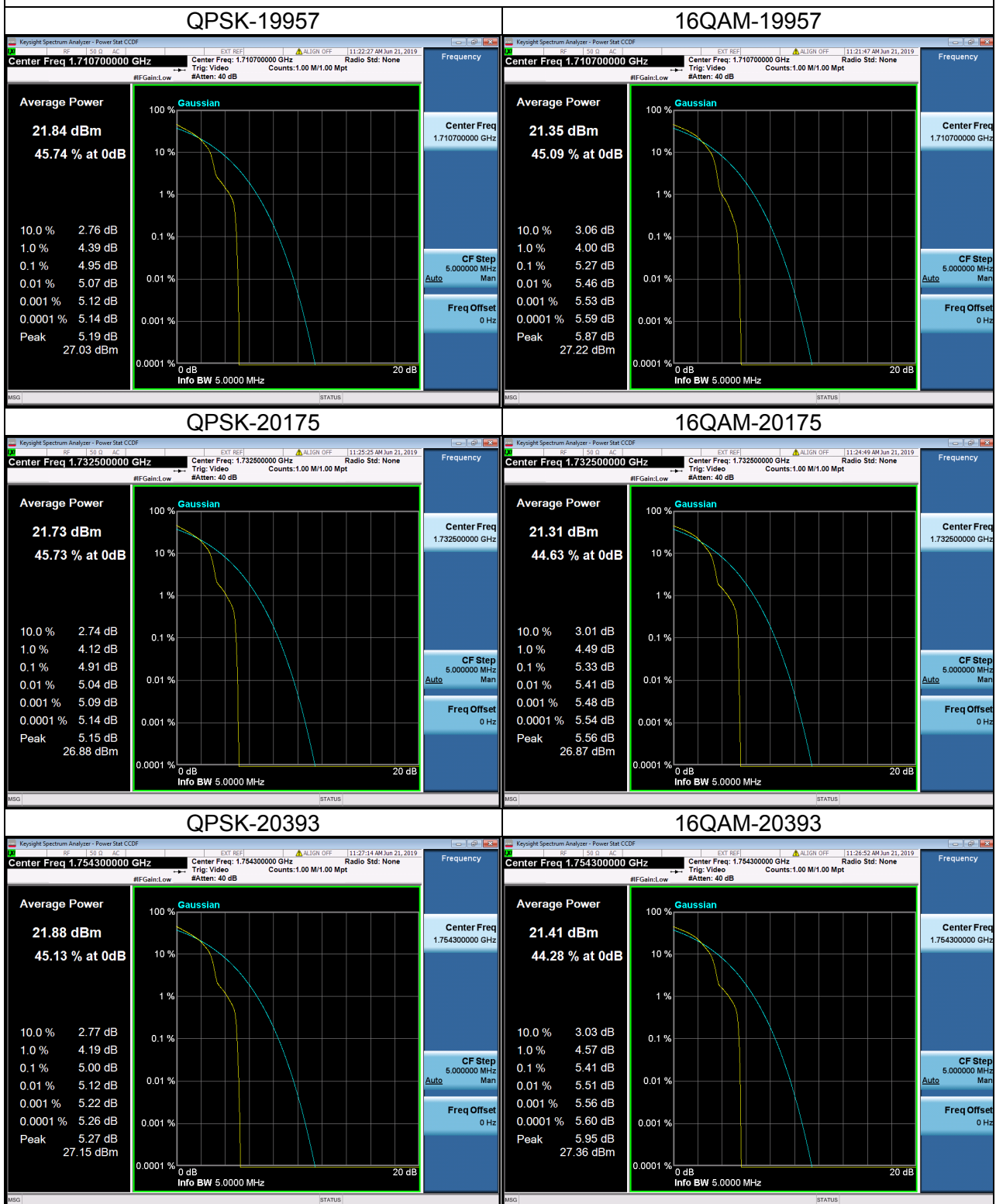
Channel

23173

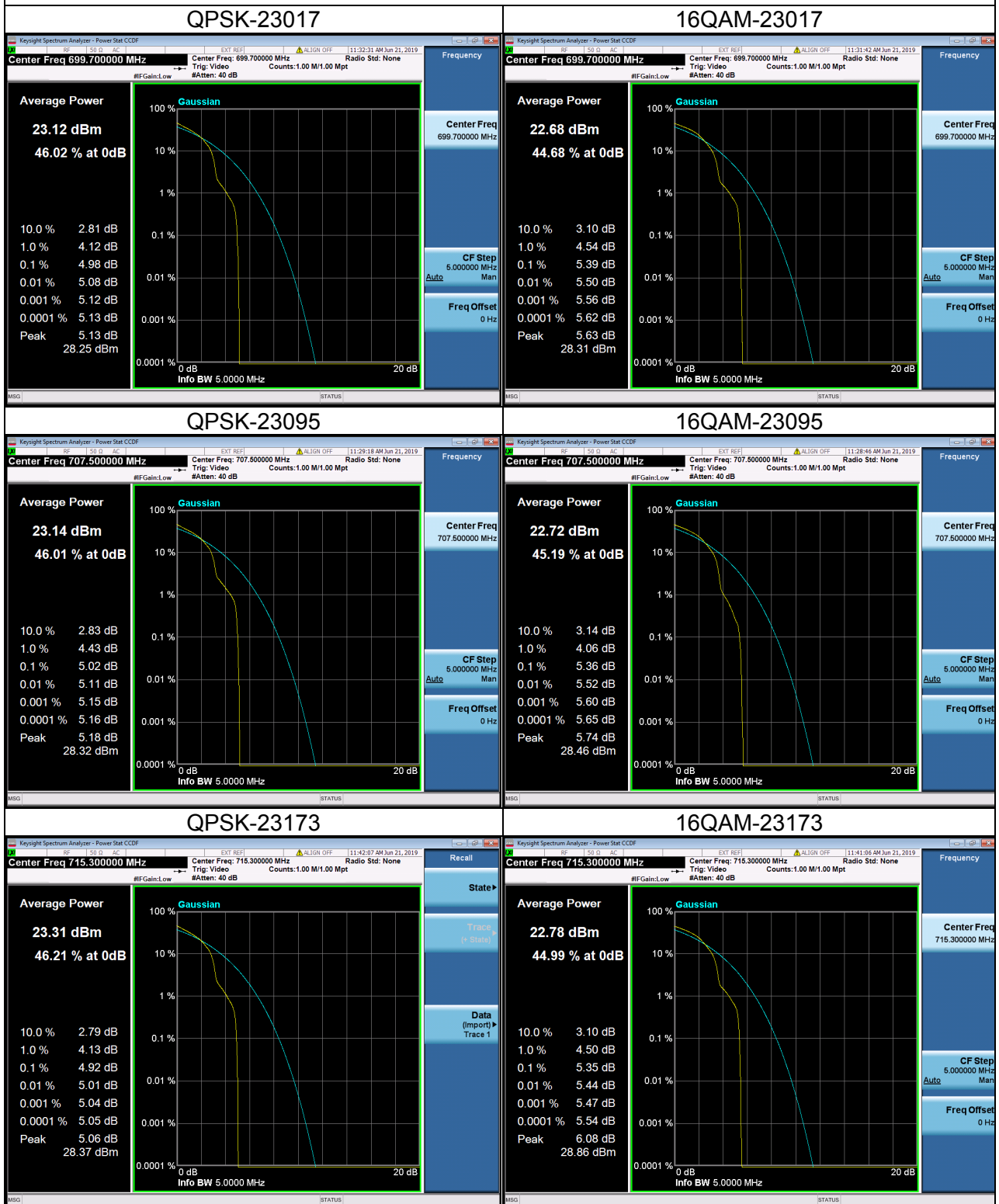


APPENDIX F - PEAK TO AVERAGE RATIO

eMTC Band 4 Spectrum Plot_1.4M



eMTC Band 12 Spectrum Plot_1.4M



APPENDIX G - FREQUENCY STABILITY

Test Mode:	eMTC Band 4_CH20175_1.4M
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Temperature vs. Frequency Stability

Temperature(°C)	Frequency Error (Hz)	Frequency Error (ppm)	Limit(ppm)
-30	3.14	0.00181241	±2.5
-20	-3.54	-0.00204329	
-10	-4.69	-0.002707071	
0	5.14	0.002966811	
10	-6.21	-0.003584416	
20	-4.15	-0.002395382	
30	5.48	0.003163059	
40	3.82	0.002204906	
50	-6.28	-0.00362482	
Max. Deviation (ppm)	-6.28	-0.00362482	

Voltage vs. Frequency Stability

Voltage(Volts)	Frequency Error (Hz)	Frequency Error (ppm)	Limit(ppm)
10.8	-7.81	-0.004507937	±2.5
12.0	-3.65	-0.002106782	
13.2	-4.21	-0.002430014	
Max. Deviation (ppm)	-7.81	-0.004507937	

Test Mode:	eMTC Band 12_CH23095_1.4M
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Temperature vs. Frequency Stability

Temperature(°C)	Frequency Error (Hz)	Frequency Error (ppm)	Limit(ppm)
-30	-6.32	0.008932862	±2.5
-20	-4.14	0.00585159	
-10	7.48	0.010572438	
0	4.21	0.00595053	
10	8.21	0.01160424	
20	-5.54	0.007830389	
30	6.28	0.008876325	
40	-3.14	0.004438163	
50	-2.95	0.004169611	
Max. Deviation (ppm)	8.21	0.01160424	

Voltage vs. Frequency Stability

Voltage(Volts)	Frequency Error (Hz)	Frequency Error (ppm)	Limit(ppm)
10.8	3.58	0.005060071	±2.5
12.0	-8.49	0.012	
13.2	3.18	0.0044947	
Max. Deviation (ppm)	-8.49	0.012	

End of Test Report