

FCC Test Report

Product Name : M2M DATA MODULE
Brand Name : WNC
Model No. : IMA2, IMA2G
FCC ID : NKRIMA2

Applicant : Wistron NeWeb Corporation
Address : 20 Park Avenue II, Hsinchu Science Park,
Hsinchu 308, Taiwan, R.O.C

Date of Receipt : Jul. 27, 2022
Issued Date : Sep. 01, 2022
Report No. : 2270799R-RFUSWWAV04-A
Report Version : V1.0



The test results relate only to the samples tested.

The test results shown in the test report are traceable to the national/international standard through the calibration of the equipment and evaluated measurement uncertainty herein.

This report must not be used to claim product endorsement by TAF or any agency of the government.

Measurement uncertainties evaluated for each testing system and associated connections are given here to provide the system information for reference. Compliance determinations do not take into account measurement uncertainties for each testing system, but are based on the results of the compliance measurement.

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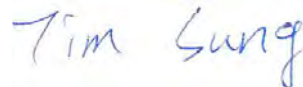
Product Name : M2M DATA MODULE
Applicant : Wistron NeWeb Corporation
Address : 20 Park Avenue II, Hsinchu Science Park, Hsinchu 308,
Taiwan, R.O.C
Manufacturer : Wistron NeWeb Corporation
Address : 20 Park Avenue II, Hsinchu Science Park, Hsinchu 308,
Taiwan, R.O.C
Brand Name : WNC
Model No. : IMA2, IMA2G
FCC ID : NKRIMA2
EUT Voltage : DC 3.3V ~ 4.2V
Testing Voltage : DC 3.8V
Applicable Standard : FCC CFR Title 47 Part 27
Measurement Reference : FCC CFR Title 47 Part 2
TIA/EIA 603-E 2016
KDB 971168 D01V03R01
ANSI C63.26 2015
Test Result : Complied

Documented By :



(Senior Project Specialist / Joanne Lin)

Approved By :



(Manager / Tim Sung)

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Revision History

Report No.	Version	Description	Issued Date
2270799R-RFUSWWAV04-A	V1.0	Initial issue of report	Sep. 01, 2022

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1. General Information

1.1. EUT Description

Product Name	M2M DATA MODULE	
Brand Name	WNC	
Model No.	IMA2, IMA2G	
Frequency Range	Cat-M1 Band 13	777 ~ 787 MHz (Uplink) 746 ~ 756 MHz (Downlink)
Bandwidth	Cat-M1 Band 13	5MHz / 10MHz
Type of Modulation	Cat-M1 Band 13	QPSK / 16QAM
Hardware Version	1.0	
Software Version	RK3.2	
IMEI No.	015776000037802	

Note:

This is to request a Class II permissive change for FCC ID: NKRIMA2.

The major change filed under this application is to enable Cat-M1 Band 13 by software. And all hardware designs are identical to the original application.

The difference for each model is shown as below:

Model No.	Description
IMA2	Unavailable GPS function
IMA2G	Available GPS function

Antenna Information				
Ant.	Brand Name	Model No.	Type	Gain (dBi)
0	WNC	RF21.S00940A (08.22100.018)	Dipole	3.14

1.2. Mode of Operation

DEKRA has verified the construction and function in typical operation. All the test modes were carried out with the EUT in normal operation, which was shown in this test report and defined as:

Test Mode	Mode 1: Cat-M1 Band 13
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Note:

1. Determining compliance shall be based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.
2. Regarding frequency band operation, the lowest, middle and highest frequency of channel were selected to perform the test, and the details were shown on this report.

1.3. Comments and Remarks

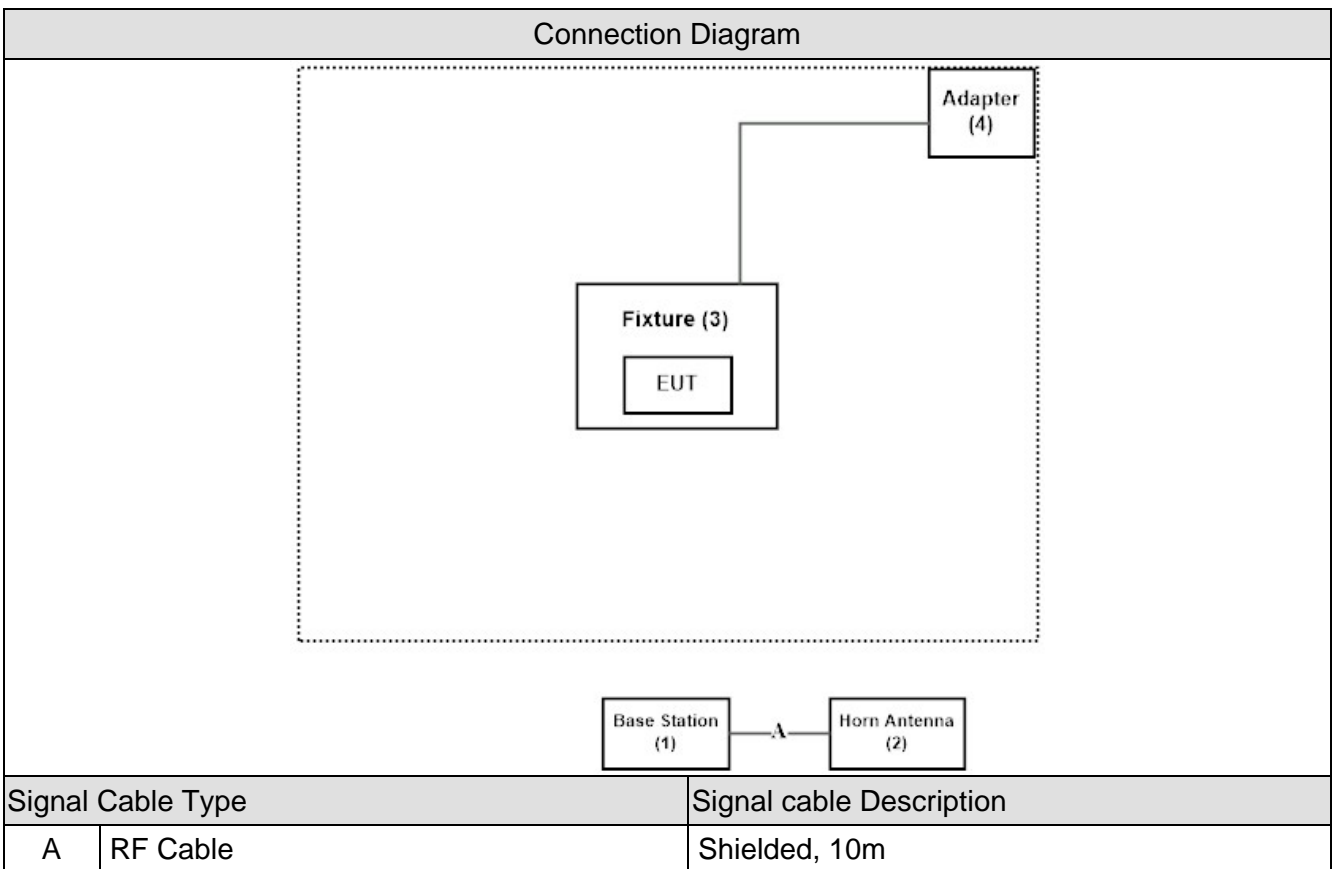
The product specification and testing instructions for the EUT declared in the report are provided by the manufacturer who will take all responsibilities for the accuracy.

1.4. Tested System Details

The types for all equipment, plus descriptions of all cables used in the tested system.

No.	Product	Manufacturer	Model No.	Serial No.
1	Base Station	R&S	CMW500	157304
2	Horn Antenna	Schwarzbeck	BBHA 9120D	1640
3	Fixture	WNC	IMA2, IMA2G	N/A
4	Adapter	APD	WB-12G12R	N/A

1.5. Configuration of Tested System



1.6. EUT Operation of during Test

1	Setup the EUT and simulators as shown on.
2	Turn on the power of all equipment.
3	The EUT will continue receive the signal from Cat-M1 function.
4	Repeat the above procedure (3)

1.7. Test Environment

Ambient conditions in the laboratory:

Performed Item	Items	Required	Actual
Radiated Emission	Temperature (°C)	10~40°C	23.5°C
	Humidity (%RH)	10~90%	55.1%
Conductive	Temperature (°C)	10~40°C	25°C
	Humidity (%RH)	10~90%	59%

USA : FCC Registration Number: TW0033

Canada : CAB Identifier Number: TW3023 / Company Number: 26930

Site Description : Accredited by TAF
Accredited Number: 3023

Test Laboratory : DEKRA Testing and Certification Co., Ltd
Address : No. 5-22, Ruishukeng Linkou District, New Taipei City, 24451, Taiwan
Performed Location : No. 26, Huaya 1st Rd., Guishan Dist., Taoyuan City 333411, Taiwan, R.O.C.

Phone number : +886-3-275-7255
Fax number : +866-3-327-8031
Email address : info.tw@dekra.com
Website : <http://www.dekra.com.tw>

1.8. List of Test Equipment

Instrument	Manufacturer	Model No.	Serial No.	Cal. Date	Next Cal. Date
Bi-Log Antenna	SCHWARZBECK	VULB9168	9168-675	2021/08/11	2022/08/10
Horn Antenna	RF SPIN	DRH18-E	210508A18ES	2022/06/08	2023/06/07
Pre-Amplifier	SGH	0301	20211007-10	2022/02/22	2023/02/21
Pre-Amplifier	SGH	PRAMP118	20200201	2021/10/27	2022/10/26
EMI Test Receiver	R&S	ESR3	102793	2021/12/15	2022/12/14
Spectrum Analyzer	R&S	FSV3044	101114	2022/02/11	2023/02/10
Coaxial Cable	SGH	SGH18	2021005-1	2022/03/18	2023/03/17
Coaxial Cable	SGH	SGH18	202108-4		
Coaxial Cable	SGH	SGH18	GD20110223-1		
Coaxial Cable	SGH	HA800	GD20110222-3		
Spectrum Analyzer	KEYSIGHT	N9010A	MY54510357	2022/05/18	2023/05/17
Universal Radio Communication Tester	R&S	CMW500	157304	2021/11/29	2022/11/28
Temperature Chamber	KSON	THS-D4T-100	A0606	2021/08/24	2022/08/23
DC Power Supply	KEYSIGHT	E36234A	MY59001234	2021/11/04	2022/11/03
Radiated Software	AUDIX	e3 V9	N/A	N/A	N/A

Note: All equipment upon which need to calibrated are with calibration period of 1 year.

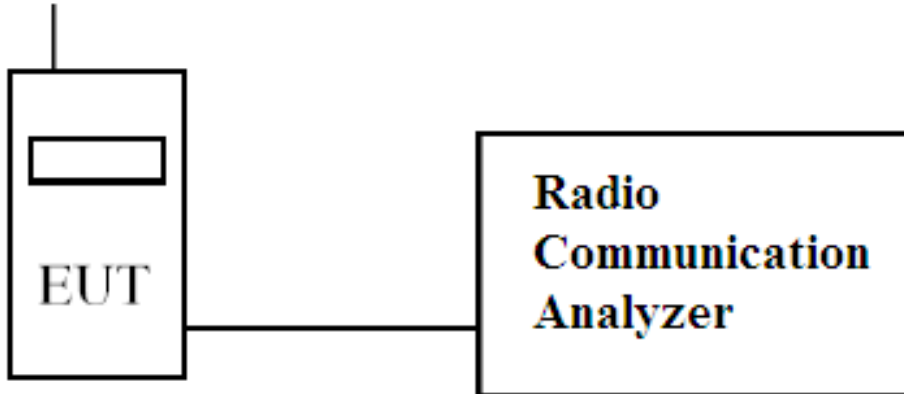
1.9. Measurement Uncertainty

Uncertainties have been calculated according to the DEKRA internal document 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 ($k=2$)).

Test Item	Uncertainty
RF Output Power	± 1.126 dB
Occupied Bandwidth	± 682.83 Hz
Peak to Average Ratio	± 1.126 dB
Conducted Band Edge	± 1.126 dB
Conducted Spurious Emissions	± 1.126 dB
Radiated Spurious Emissions	± 4.06 dB below 1 GHz ± 3.73 dB above 1 GHz
Frequency Stability	± 103.92 Hz

2. RF Output Power

2.1. Test Setup



2.2. Test Limit

Band	Limit
Band 13	ERP < 3W

2.3. Test Procedure

The EUT is tested with maximum rated TX power via the Base Station simulator, and the output power was measured at the antenna terminals of the EUT.

2.4. Test Specification

According to FCC Part 2.1046, 27.50

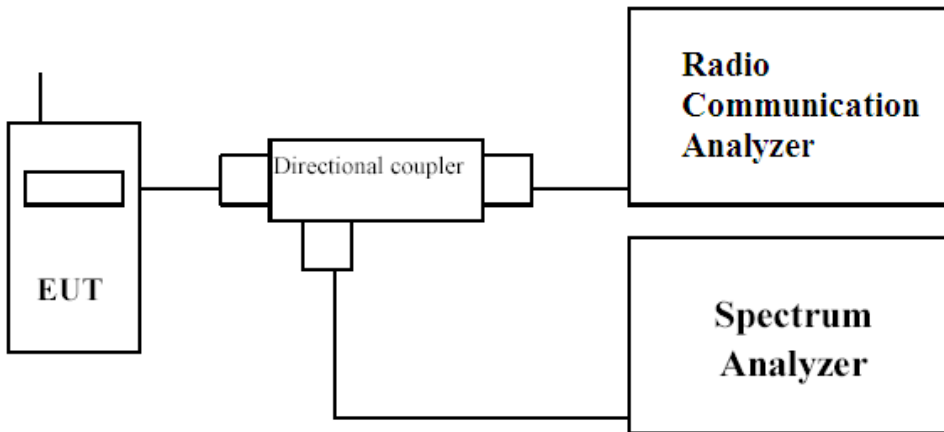
2.5. Test Result of RF Output Power

Band	Channel Freq. (MHz)	Modulation	RB No.	RB offset	NB Position	Conducted Output Power (dBm)	RF Output Power (W) ERP	Limit (W) ERP
Band 13 5MHz	23205 779.5	QPSK	1	0	Low	22.79	0.239	3
			6	0		21.92	0.195	3
		16-QAM	1	0		23.20	0.262	3
			5	0		20.87	0.153	3
	23230 782	QPSK	1	0		22.83	0.241	3
			6	0		21.91	0.195	3
		16-QAM	1	0		23.28	0.267	3
			5	0		20.90	0.155	3
	23255 784.5	QPSK	1	5	High	22.89	0.244	3
			6	0		22.08	0.203	3
		16-QAM	1	5		23.23	0.264	3
			5	1		20.77	0.150	3

Band	Channel Freq. (MHz)	Modulation	RB No.	RB offset	NB Position	Conducted Output Power (dBm)	RF Output Power (W) ERP	Limit (W) ERP
Band 13 10MHz	23230 782	QPSK	1	0	Low	22.77	0.238	3
			6	0		21.95	0.197	3
		16-QAM	1	0		23.12	0.258	3
			5	0		21.88	0.194	3
		QPSK	1	5	High	22.87	0.243	3
			6	0		22.04	0.201	3
		16-QAM	1	5		23.24	0.265	3
			5	1		22.01	0.200	3

3. Occupied Bandwidth

3.1. Test Setup



3.2. Test Limit

N/A

3.3. Test Procedure

The EUT is tested with maximum rated TX power via the Base Station simulator, and the occupied bandwidth was measured at the antenna terminals of the EUT.

The Resolution BW of the analyzer is set to 1 %~5% of the emission bandwidth. The EUT's occupied bandwidth is measured as the width of the signal between two points, one below the carrier center frequency and one above the carrier frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

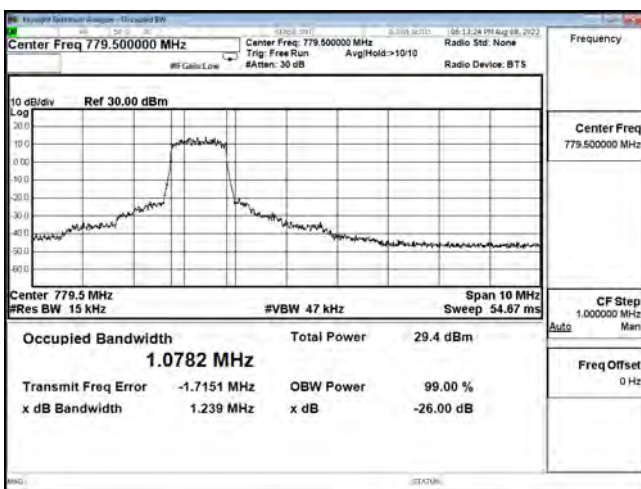
The plots below show the resultant display from the Spectrum Analyzer.

3.4. Test Specification

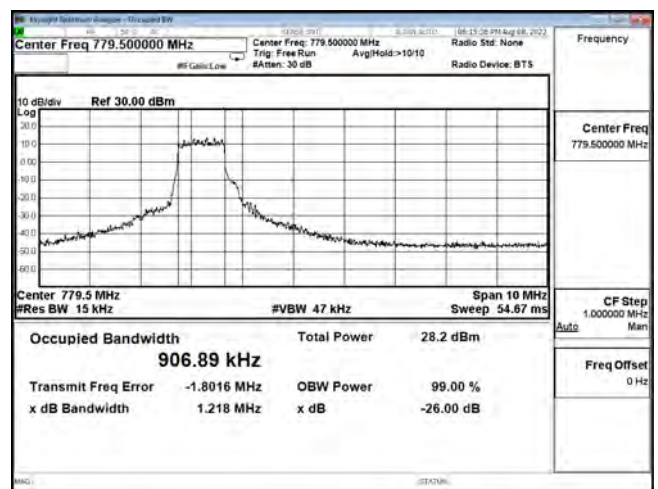
According to FCC Part 2.1049, 27.53

3.5. Test Result of Occupied Bandwidth

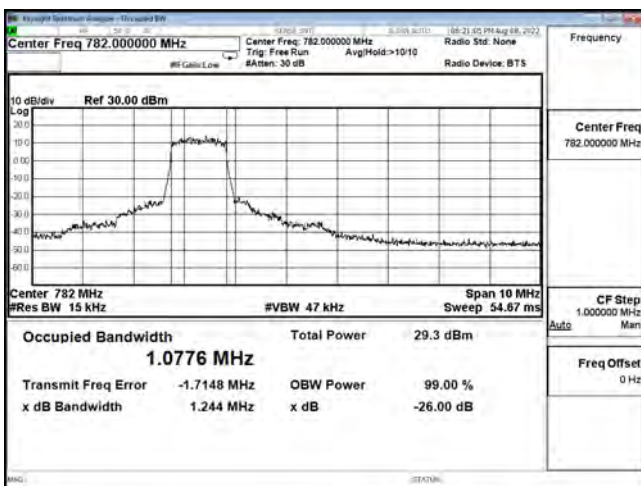
Band 13						
BW	Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)		26 dB bandwidth (MHz)	
			QPSK	16QAM	QPSK	16QAM
5M	23205	779.5	1.0782	0.9069	1.239	1.218
5M	23230	782	1.0776	0.9090	1.244	1.224
5M	23255	784.5	1.0742	0.9196	1.286	1.204
10M	23230	782 (Low)	1.0792	0.9155	1.262	1.238
10M	23230	782 (High)	1.0819	0.9078	1.271	1.206



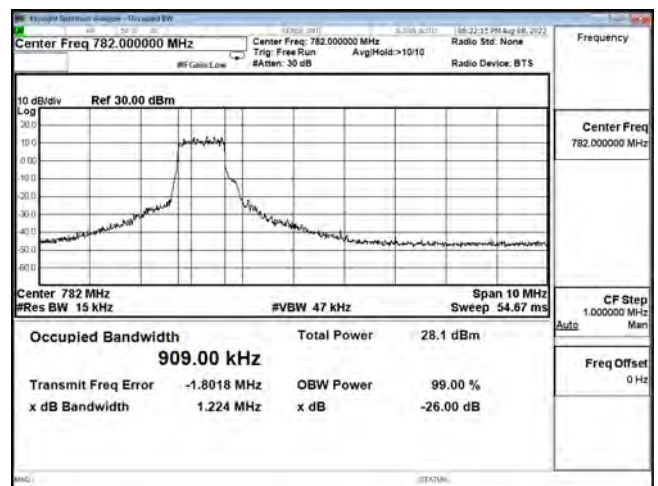
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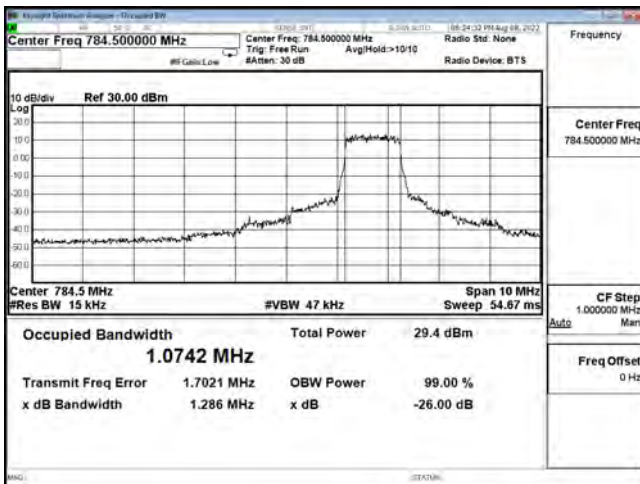
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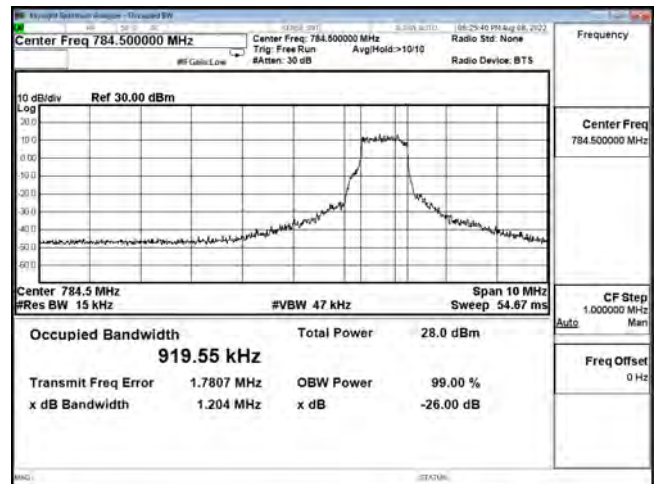
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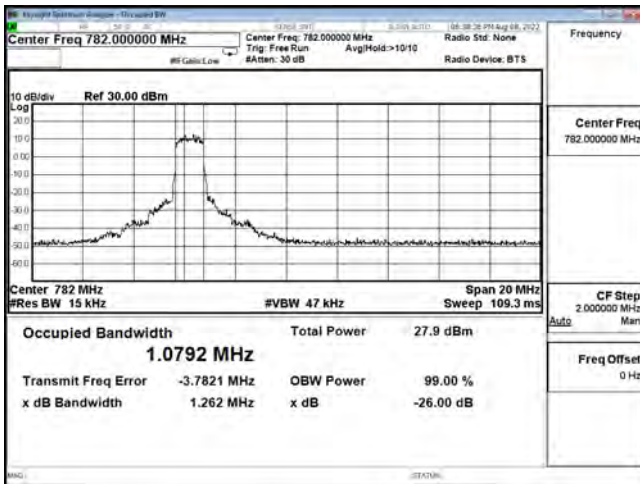
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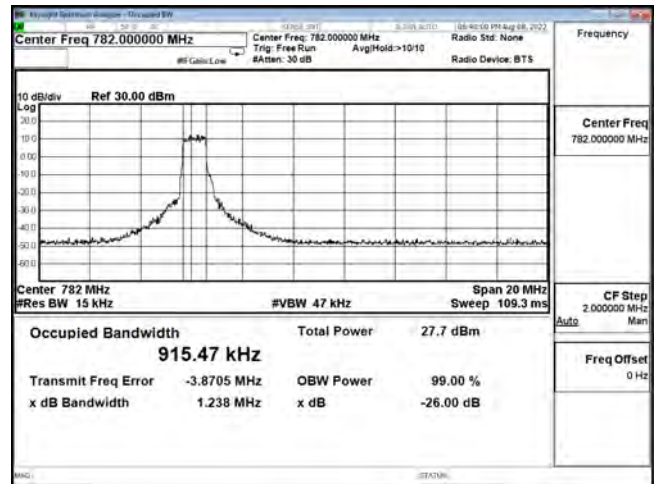
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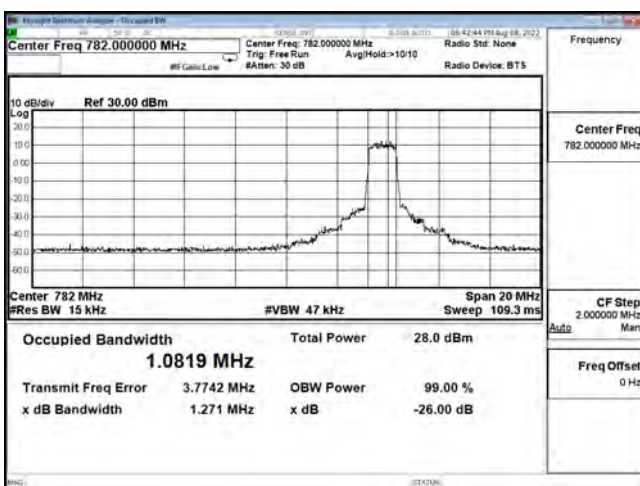
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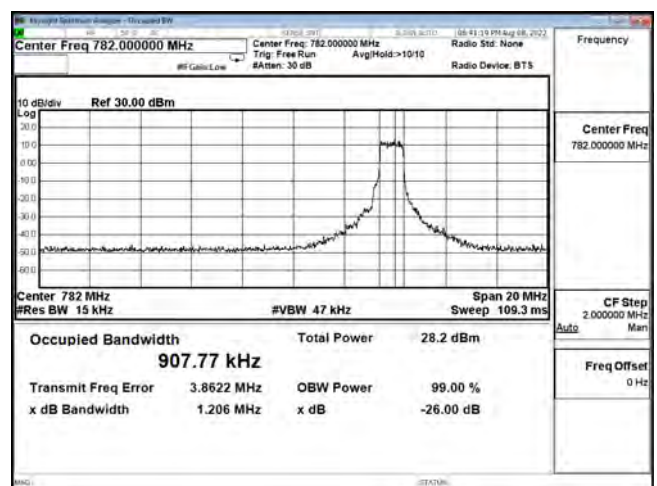
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OCC_CaT-M1_B13_10M_16QAM_CH23230_Low(5,0)



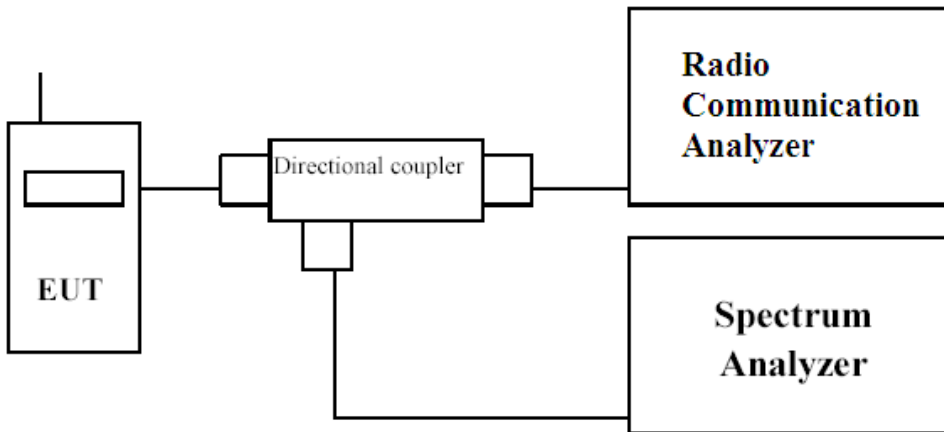
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OCC_CaT-M1_B13_10M_16QAM_CH23230_High(5,1)

4. Spurious Emission at Antenna Terminals

4.1. Test Setup



4.2. Test Limit

The spurious (unwanted) emission limits specified in the individual FCC rule parts applicable to licensed digital transmitters (typically referred to under the heading 'emission limits') normally apply to any and all emissions that are present outside of the authorized frequency band/block and apply to emissions in both the out-of-band and spurious domains. unwanted emissions are required by the licensed rule parts to be attenuated below the transmitter power by a factor of at least $43 + 10\log(P)$ dB, where P represents the transmitter power expressed in watts

For Band 13 27.53(c):

For operations in the 746-758 MHz band and the 776-788 MHz band, the power of any emission outside the 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, in accordance with the following:

- (1) On any frequency outside the 746-758 MHz band, the power of any emission shall be attenuated outside the band below the transmitter power (P) by at least $43 + 10 \log(P)$ dB;
- (2) On any frequency outside the 776-788 MHz band, the power of any emission shall be attenuated outside the band below the transmitter power (P) by at least $43 + 10 \log(P)$ dB;
- (3) On all frequencies between 763-775 MHz and 793-805 MHz, by a factor not less than $76 + 10 \log(P)$ dB in a 6.25 kHz band segment, for base and fixed stations;
- (4) On all frequencies between 763-775 MHz and 793-805 MHz, by a factor not less than $65 + 10 \log(P)$ dB in a 6.25 kHz band segment, for mobile and portable stations;

4.3. Test Procedure

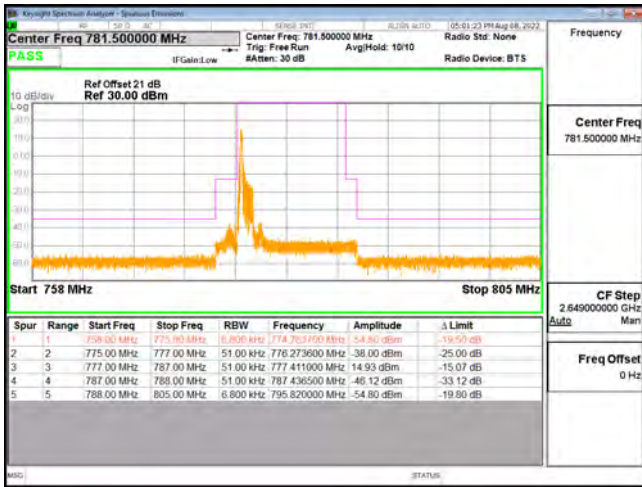
In accordance with Part 27.53 at least 1% of the emission bandwidth was used for the resolution and video bandwidths up to 1MHz away from the Block Edge. At greater than 1MHz, the resolution and video bandwidth were increased to 1MHz/3MHz.

The reference power and path losses of all channels used for testing in each frequency block were measured.

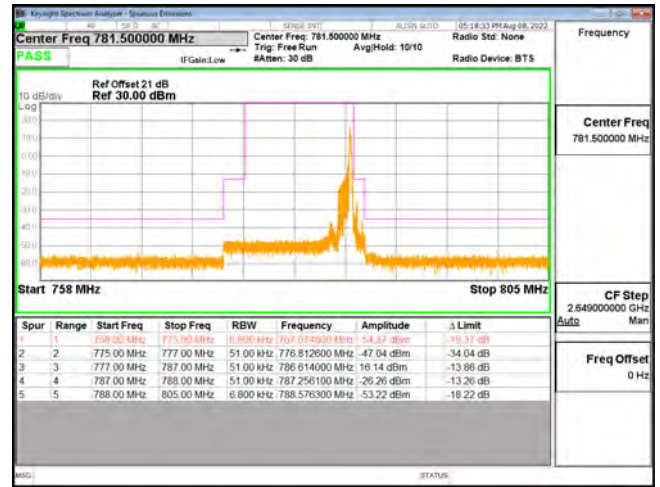
4.4. Test Specification

According to FCC Part 2.1051, 27.53

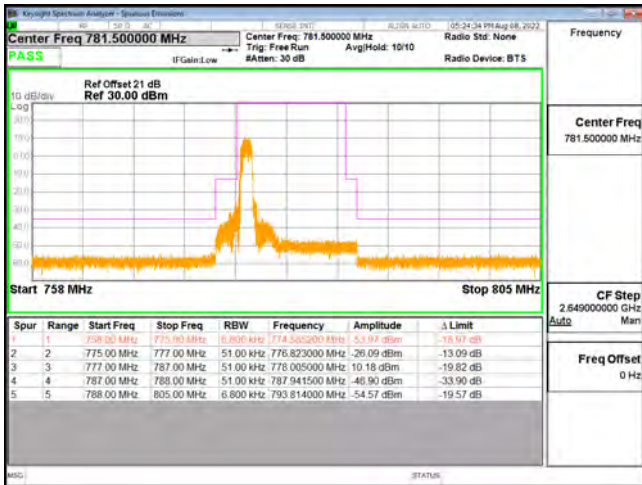
4.5. Test Result of Spurious Emission at Antenna Terminals



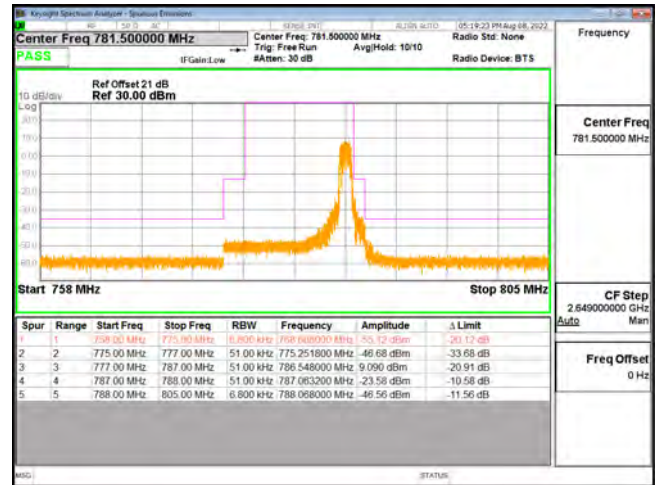
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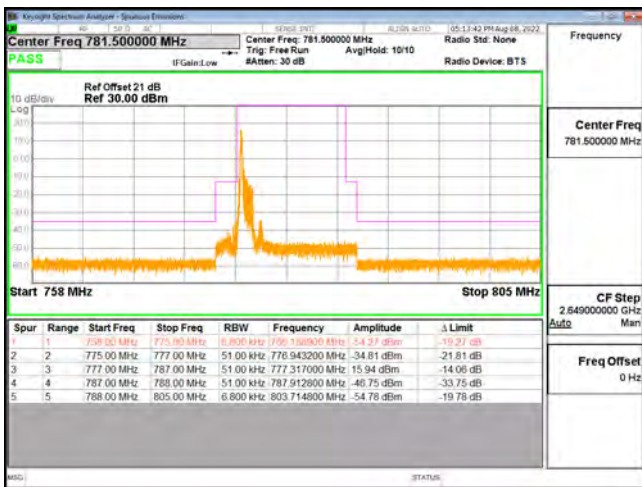
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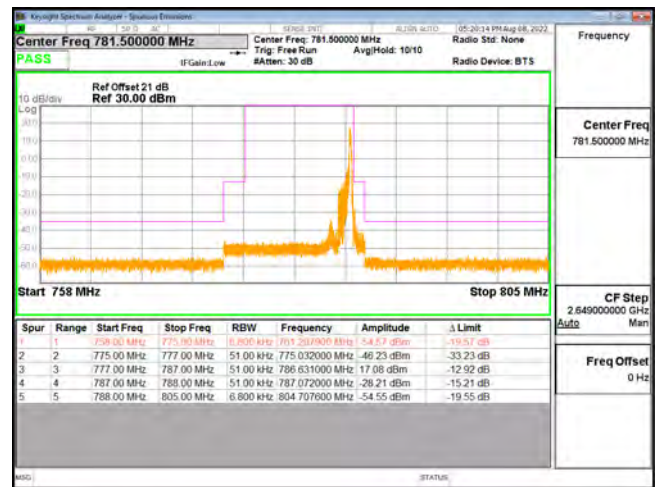
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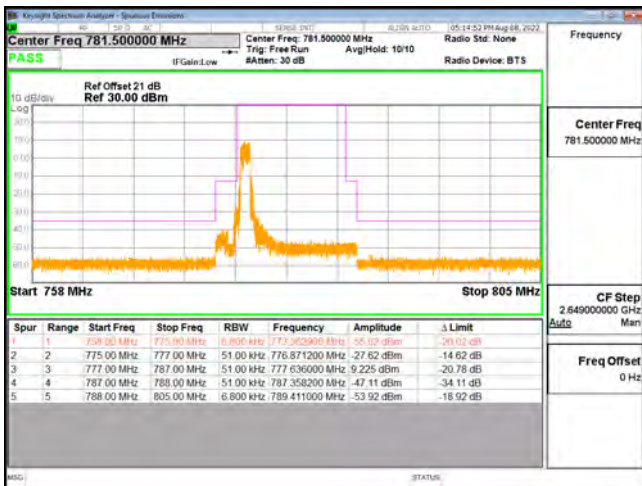
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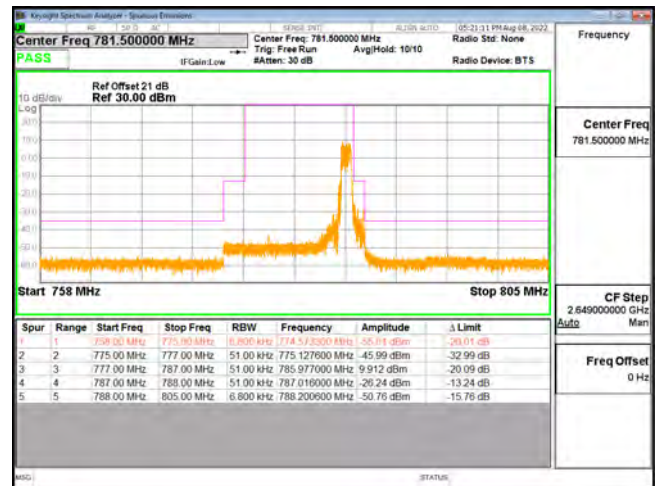
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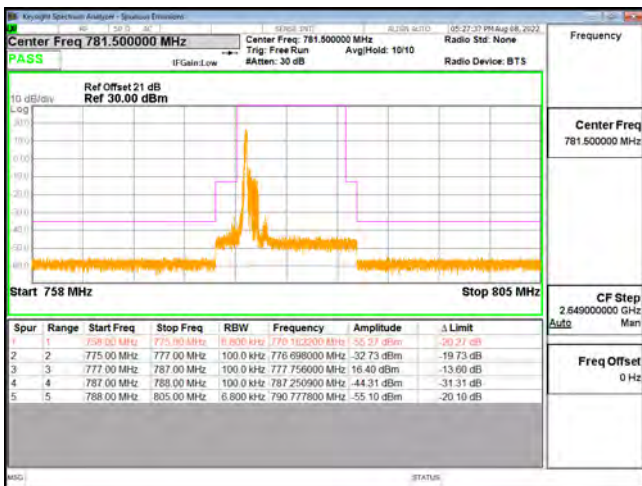
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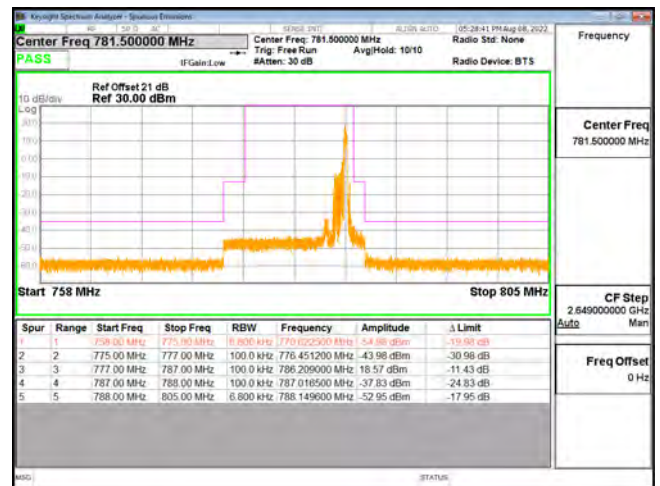
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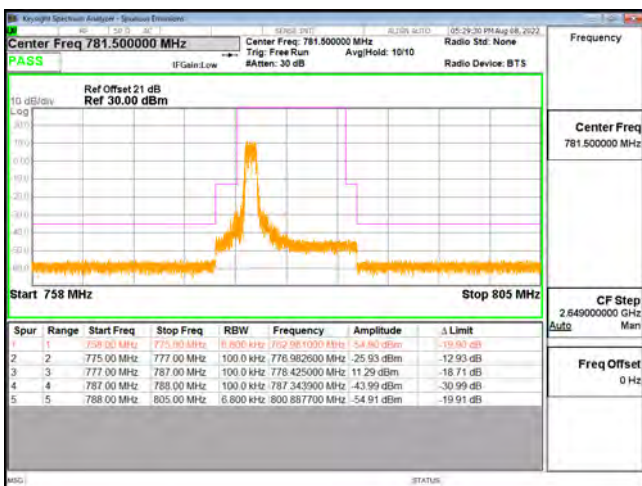
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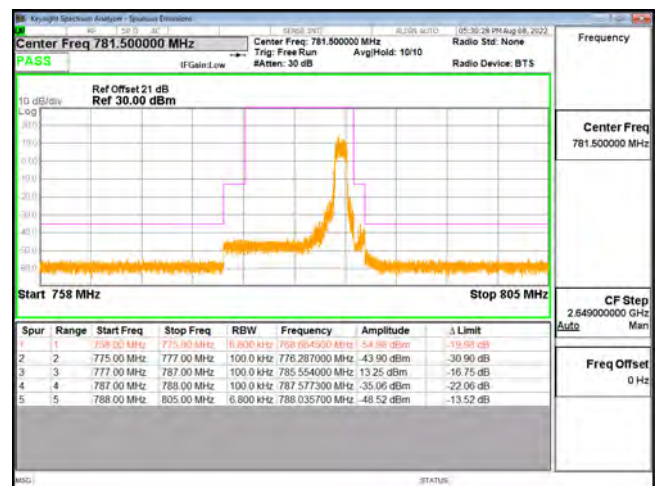
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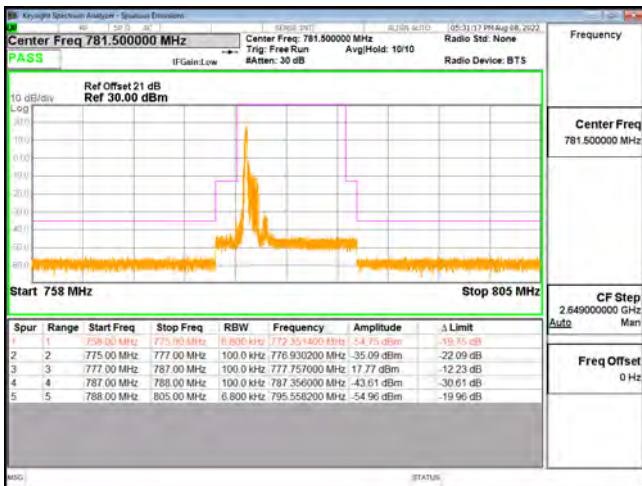
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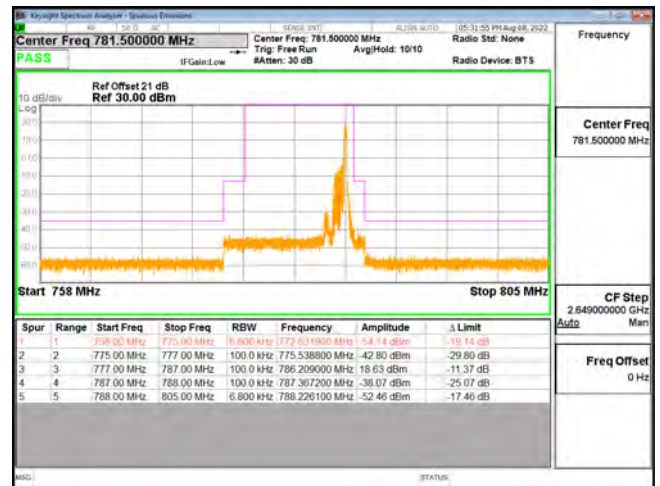
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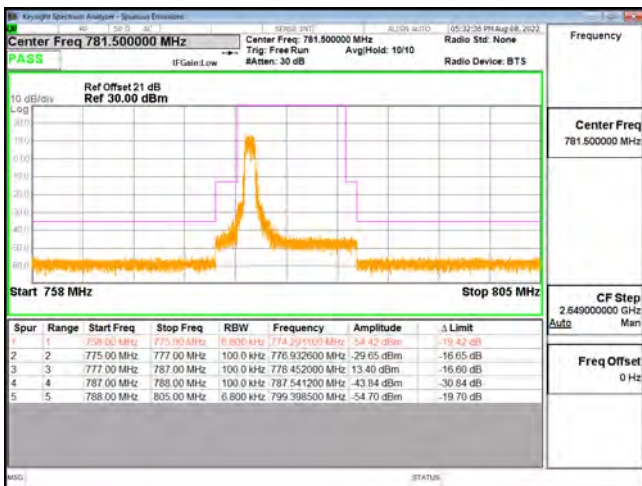
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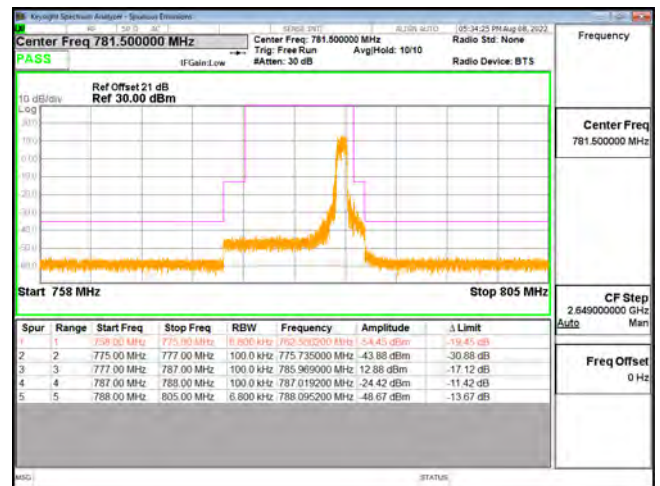
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EDGE_Cat-M1_B13_10M_16QAM_CH23230_High(1,5)



EDGE_Cat-M1_B13_10M_16QAM_CH23230_Low(5,0)

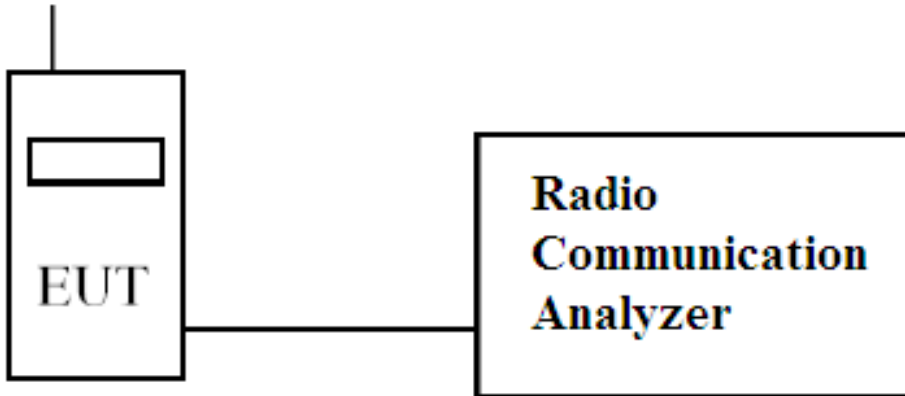


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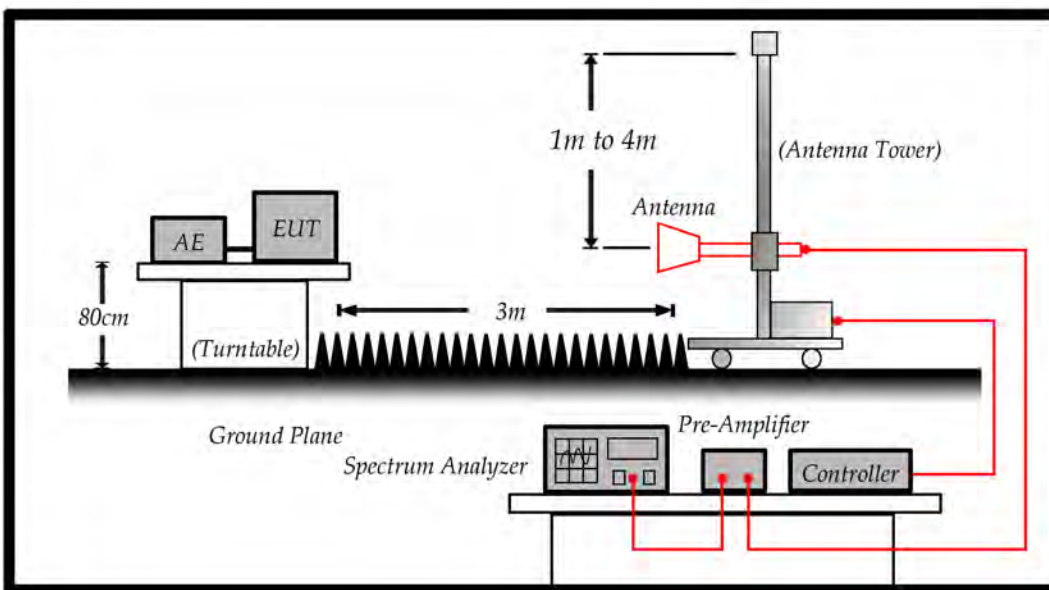
5. Spurious Emissions

5.1. Test Setup

Conducted Spurious Emission.



Radiated Spurious.



5.2. Test Limit

Limit: <-13 dBm

$43 + 10\text{Log}(P)$ down on the carrier where P is the power in Watts.

For operations in the 746-758 MHz, 775-788 MHz, and 805-806 MHz bands, emissions in the band 1559-1610 MHz shall be limited to -70 dBW/MHz equivalent isotropically radiated power (EIRP) for wideband signals.

5.3. Test Procedure

In accordance with Part 2.1051, 2.1053, 27.53, the spurious emissions from the antenna terminal were measured. The transmitter output power was attenuated using a combination of filters and attenuators and the frequency spectrum investigated from 30MHz to 20GHz. The EUT was set to transmit on full power. The EUT was tested on Low, middle and High channels for both power levels. The resolution and video bandwidth was set to 1MHz/3MHz in accordance with Part 2.1051, 2.1053, 27.53. The spectrum analyzer detector was set to Max Hold. In addition, measurements were made up to the 10th harmonic of the fundamental. The device was then replaced with a substitution antenna, which input signal was adjusted until the received level matched that of the previously detected emission.

- (1) The EUT is tested with maximum rated TX power via the Base Station simulator.
- (2) The EUT is tested in three orthogonal planes, The worst case was showing in this report.

The EUT is placed on a turn table which is 1.5 meter above ground. The turn table can rotate 360 degrees to determine the position of the maximum emission level. The EUT was positioned such that the distance from antenna to the EUT was 3 meters.

The antenna can move up and down between 1 meter and 4 meters to find out the maximum emission level.

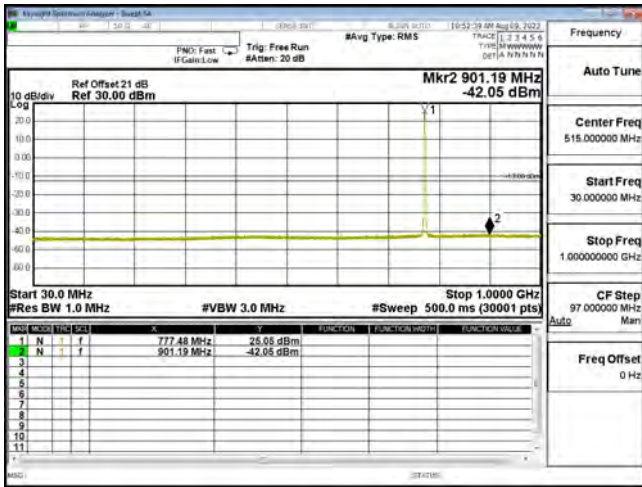
Both horizontal and vertical polarization of the antenna are set on measurement. In order to find the maximum emission, all of the interface cables must be manipulated according to TIA/EIA 603-E on radiated measurement.

27.53 (f) For operations in the 746-758 MHz, 775-788 MHz, and 805-806 MHz bands, emissions in the band 1559-1610 MHz shall be limited to -70 dBW/MHz equivalent isotropically radiated power (EIRP) for wideband signals, and -80 dBW EIRP for discrete emissions of less than 700 Hz bandwidth. For the purpose of equipment authorization, a transmitter shall be tested with an antenna that is representative of the type that will be used with the equipment in normal operation.

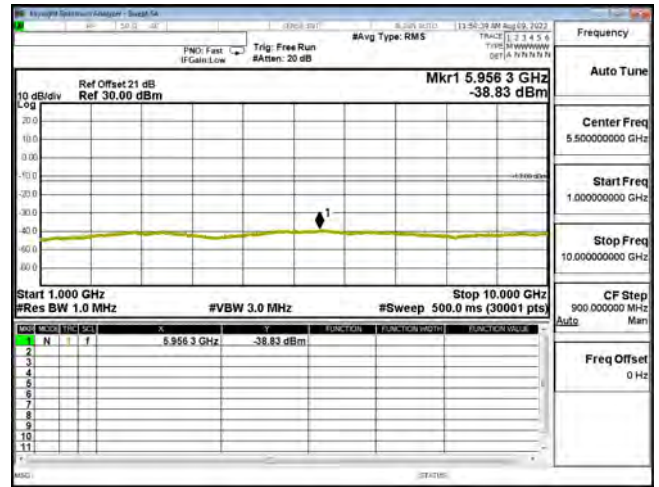
5.4. Test Specification

According to FCC Part 2.1051, 2.1053, 27.53

5.5. Test Result of Conducted Spurious Emission



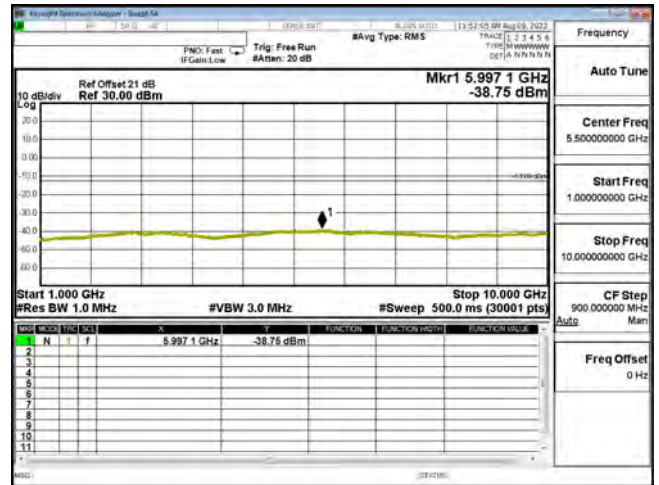
CSE_CaT-M1_B13_5M_QPSK_CH23205_Low(1,0) 30M-1G



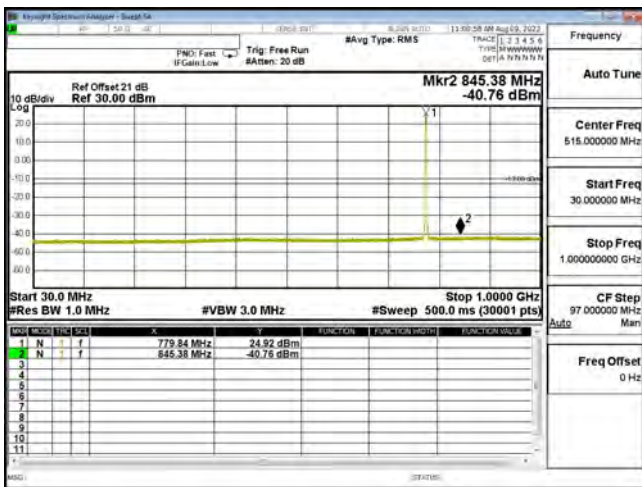
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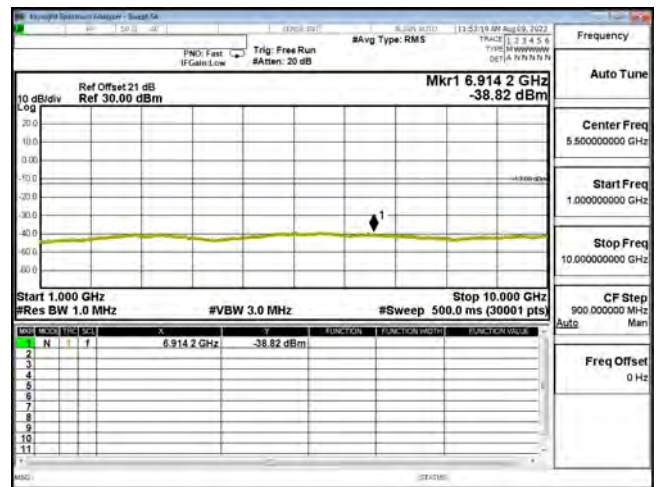
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CSE_CaT-M1_B13_5M_16QAM_CH23205_Low(1,0) 1G-10G



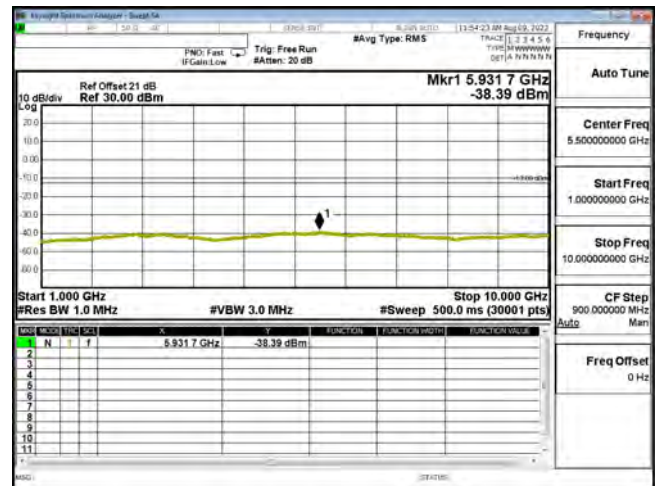
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CSE_CaT-M1_B13_5M_QPSK_CH23230_Low(1,0) 1G-10G



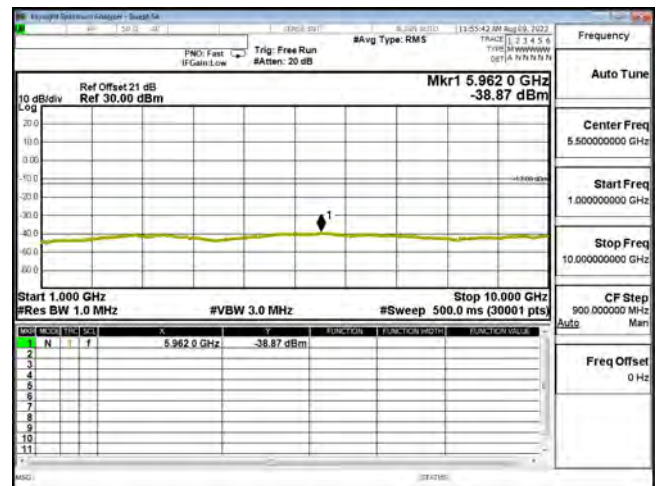
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CSE_Cat-M1_B13_5M_16QAM_CH23230_Low(1,0) 1G-10G



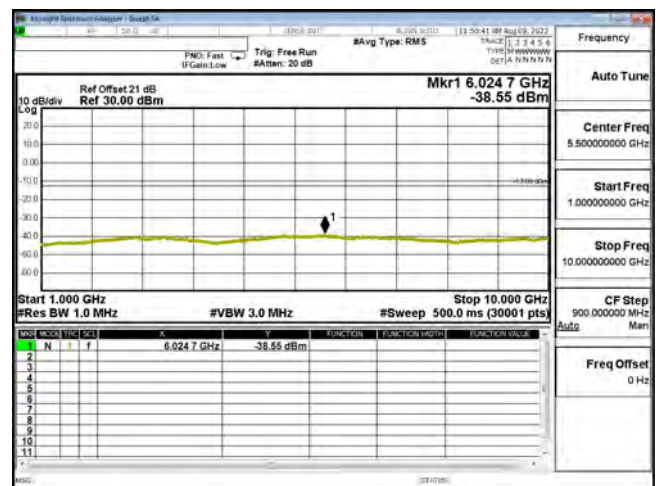
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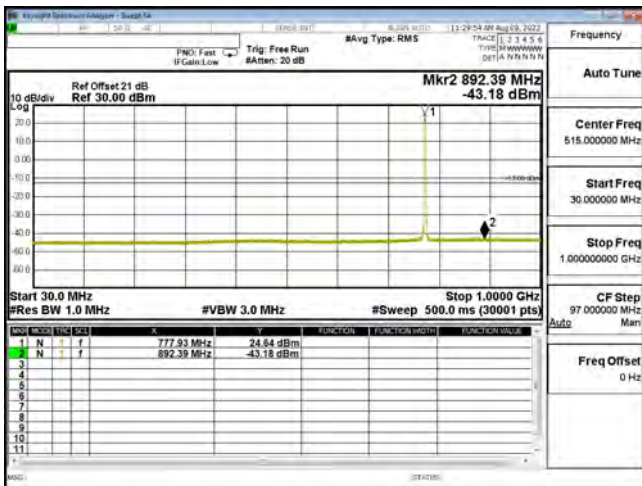
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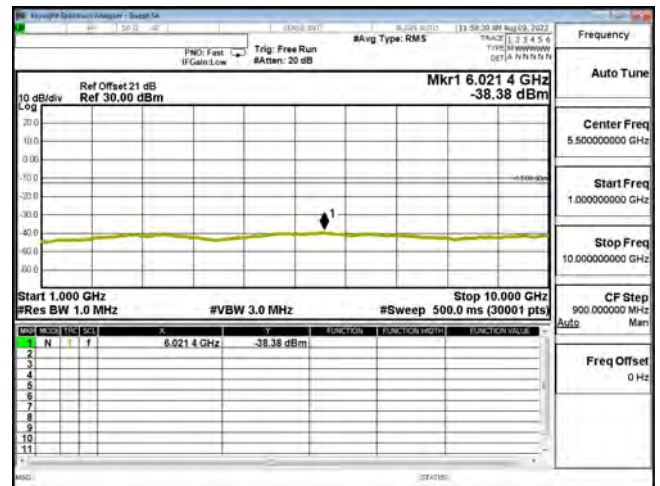
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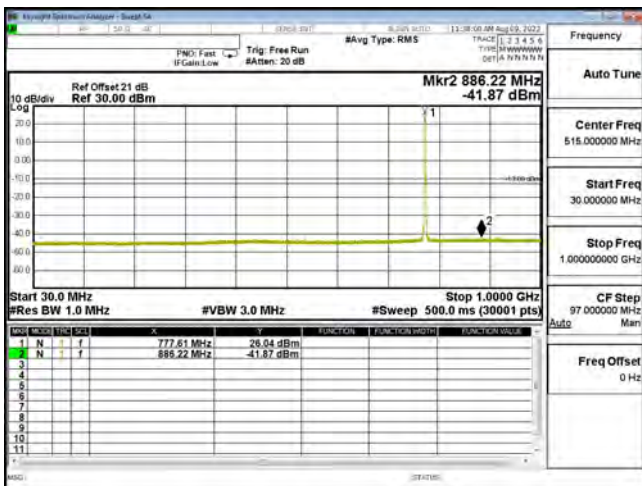
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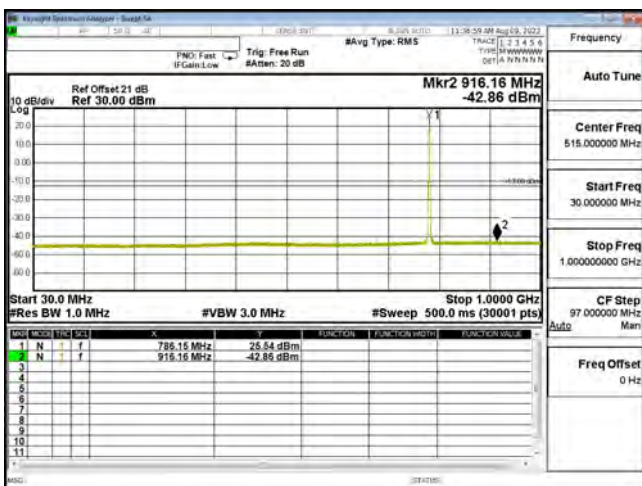
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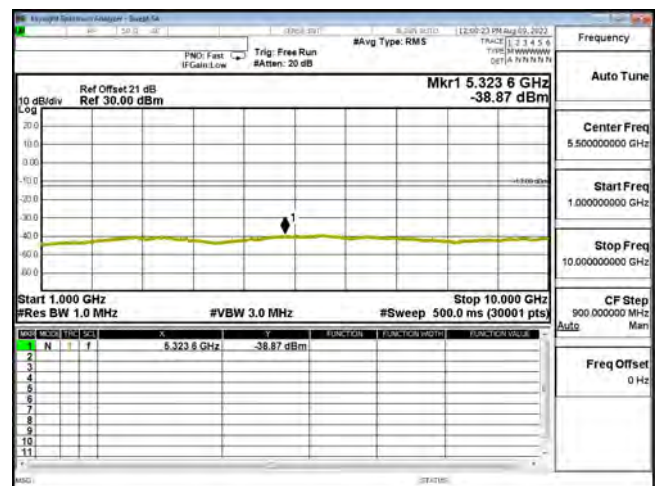
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CSE_Cat-M1_B13_10M_16QAM_CH23230_Low(1,0) 1G-10G



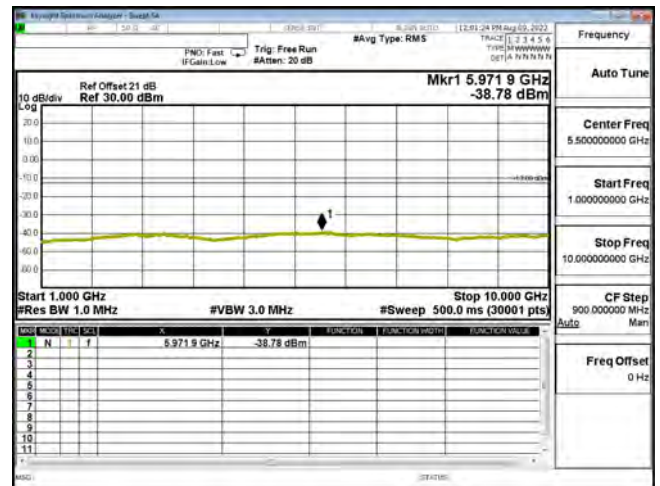
CSE_Cat-M1_B13_10M_QPSK_CH23230_High(1,5) 30M-1G



CSE_Cat-M1_B13_10M_QPSK_CH23230_High(1,5) 1G-10G



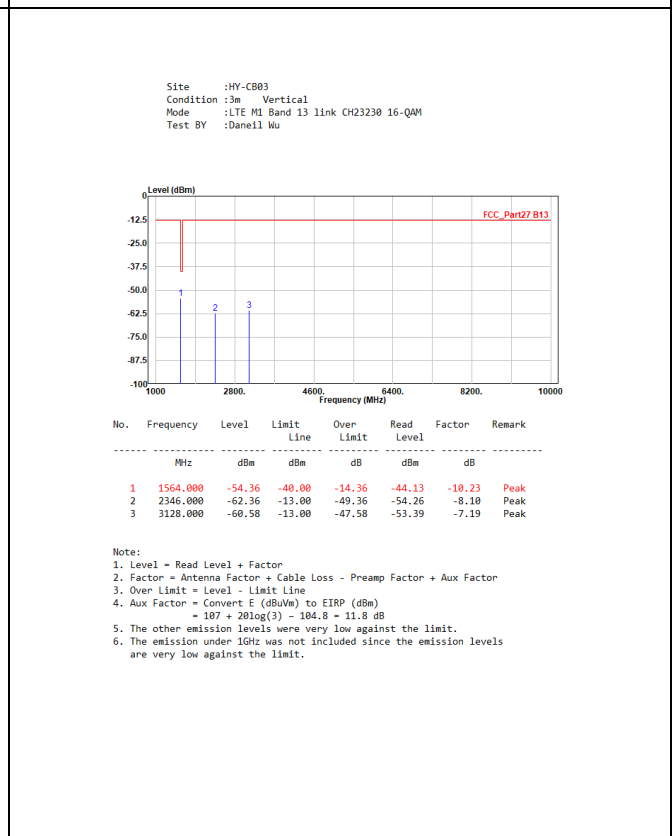
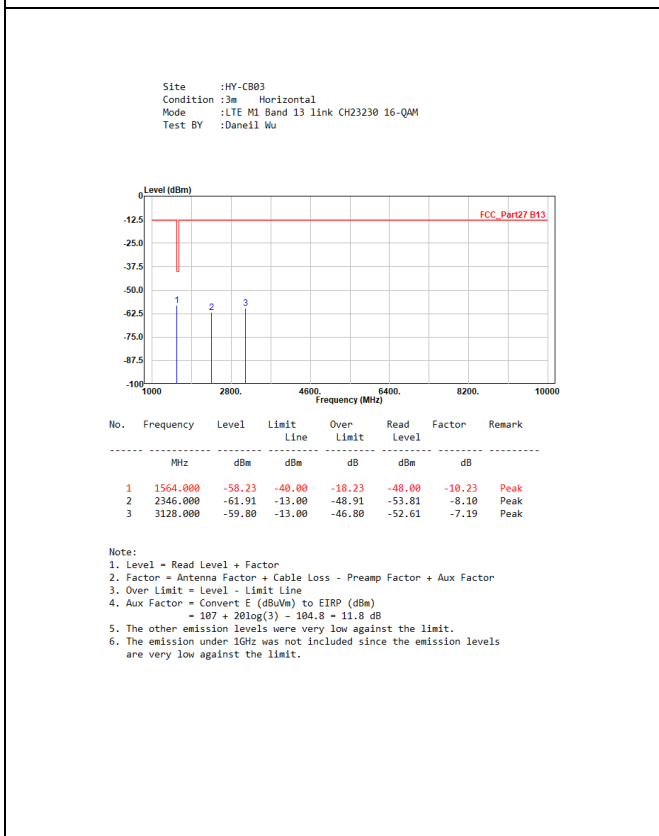
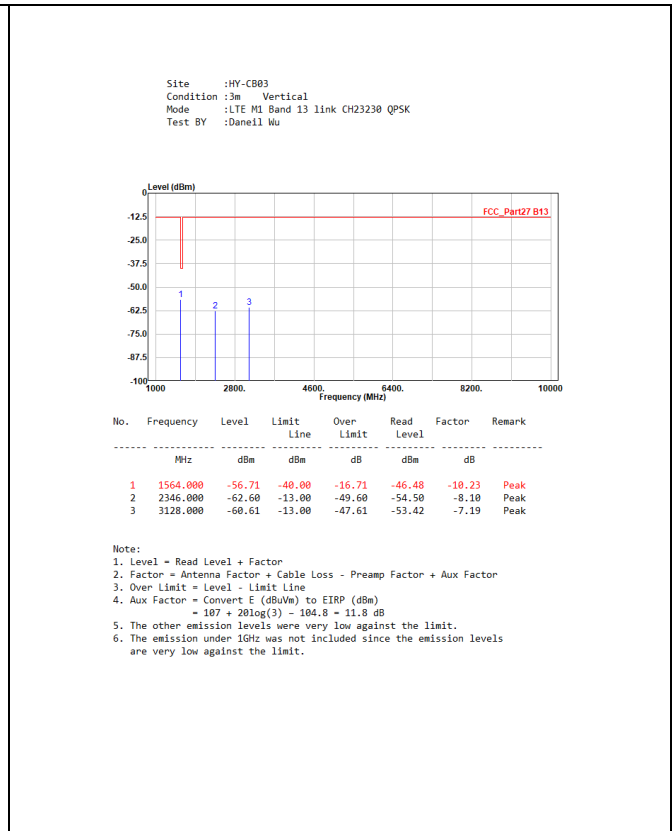
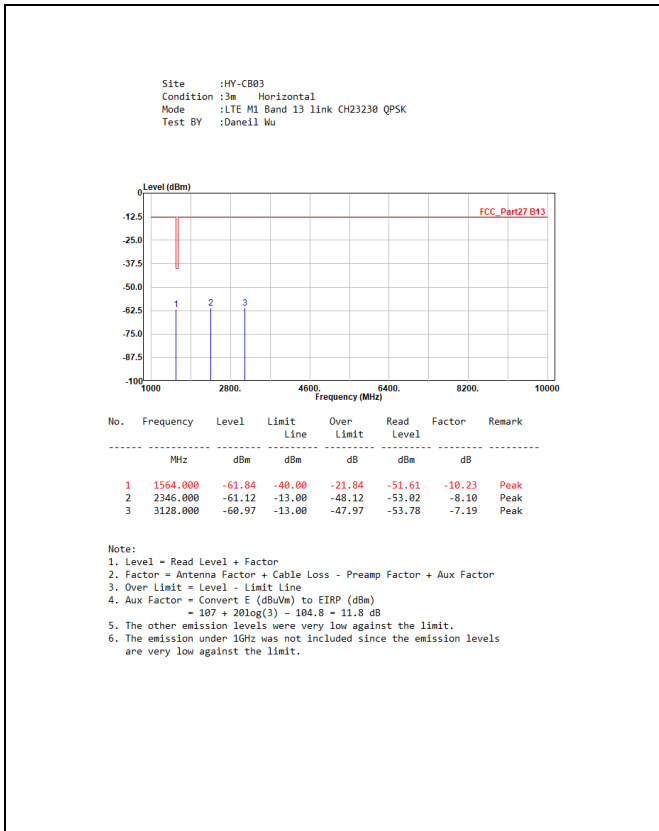
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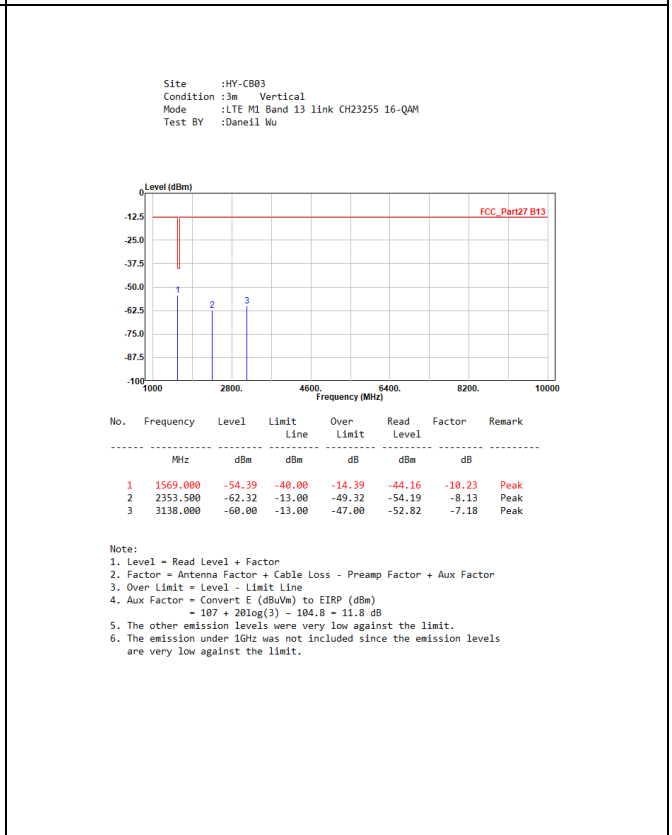
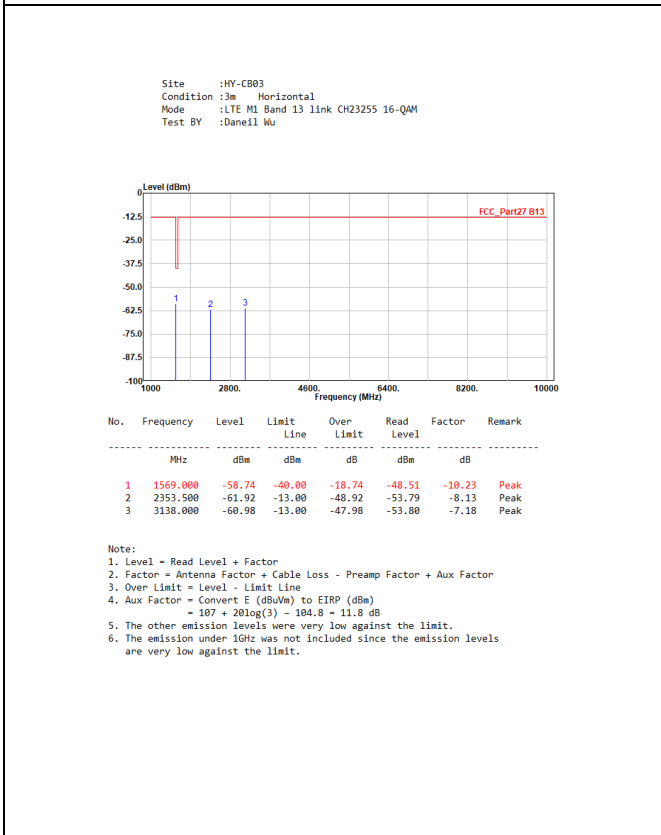
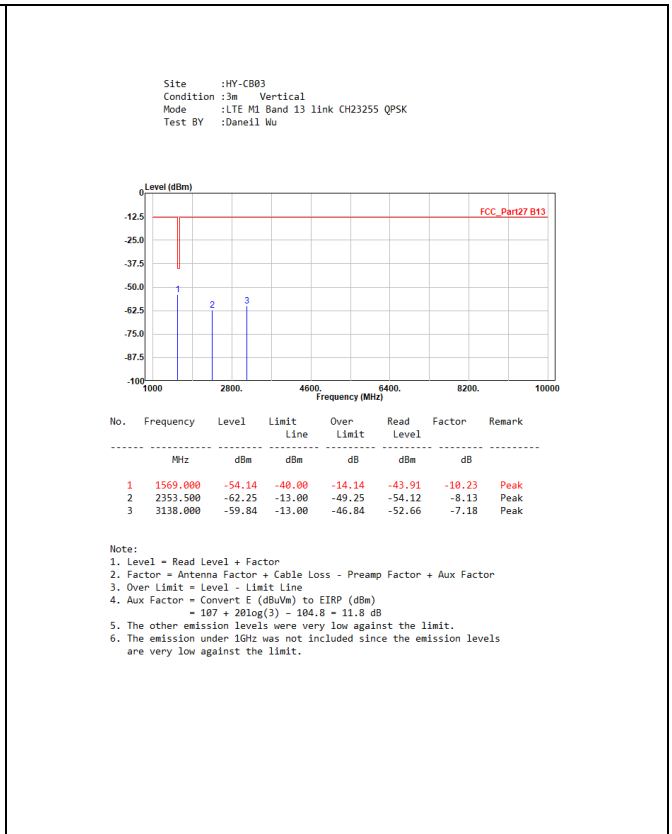
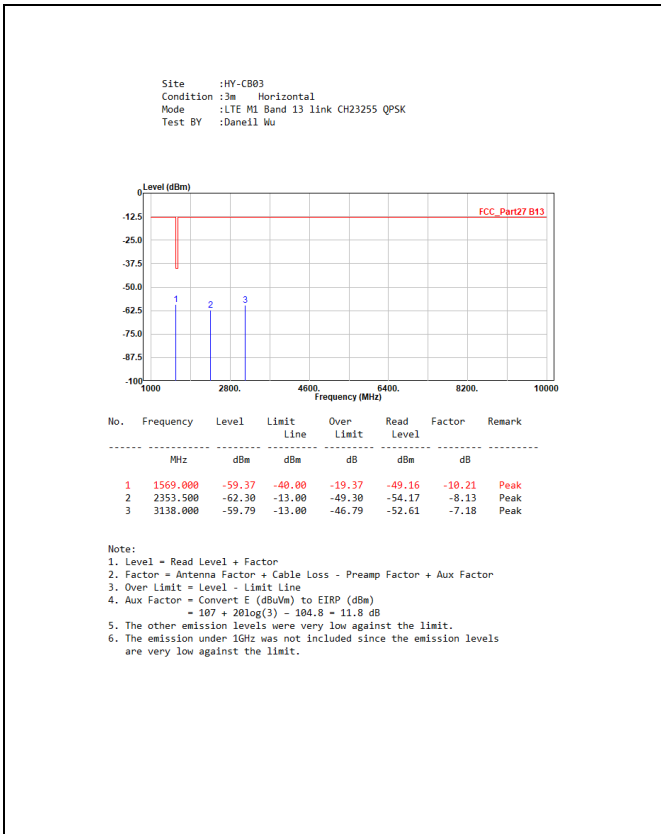


CSE_CaT-M1_B13_10M_16QAM_CH23230_High(1,5) 1G-10G

5.6. Test Result of Field Strength of Spurious Radiation

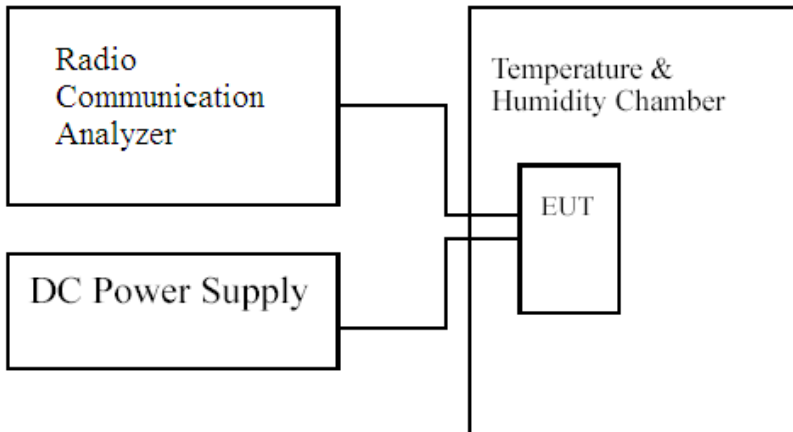
<p>Site :HY-CB03 Condition :3m Horizontal Mode :LTE M1 Band 13 link CH23205 QPSK Test BY :Daneil Wu</p> <table border="1"> <thead> <tr> <th>No.</th> <th>Frequency MHz</th> <th>Level dBm</th> <th>Limit Line dBm</th> <th>Over Limit dB</th> <th>Read Level dBm</th> <th>Factor dB</th> <th>Remark</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>1559.000</td> <td>-65.33</td> <td>-40.00</td> <td>-25.33</td> <td>-55.00</td> <td>-10.25</td> <td>Peak</td> </tr> <tr> <td>2</td> <td>2338.500</td> <td>-62.51</td> <td>-13.00</td> <td>-49.51</td> <td>-54.42</td> <td>-8.09</td> <td>Peak</td> </tr> <tr> <td>3</td> <td>3118.000</td> <td>-61.00</td> <td>-13.00</td> <td>-48.00</td> <td>-53.79</td> <td>-7.21</td> <td>Peak</td> </tr> </tbody> </table> <p>Note: 1. Level = Read Level + Factor 2. Factor = Antenna Factor + Cable Loss - Preamp Factor + Aux Factor 3. Over Limit = Level - Limit Line 4. Aux Factor = Convert E (dBuV/m) to EIRP (dBm) = 107 + 20log(3) = 104.8 = 11.8 dB 5. The other emission levels were very low against the limit. 6. The emission under 1GHz was not included since the emission levels are very low against the limit.</p>	No.	Frequency MHz	Level dBm	Limit Line dBm	Over Limit dB	Read Level dBm	Factor dB	Remark	1	1559.000	-65.33	-40.00	-25.33	-55.00	-10.25	Peak	2	2338.500	-62.51	-13.00	-49.51	-54.42	-8.09	Peak	3	3118.000	-61.00	-13.00	-48.00	-53.79	-7.21	Peak	<p>Site :HY-CB03 Condition :3m Vertical Mode :LTE M1 Band 13 link CH23205 QPSK Test BY :Daneil Wu</p> <table border="1"> <thead> <tr> <th>No.</th> <th>Frequency MHz</th> <th>Level dBm</th> <th>Limit Line dBm</th> <th>Over Limit dB</th> <th>Read Level dBm</th> <th>Factor dB</th> <th>Remark</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>1559.000</td> <td>-55.60</td> <td>-40.00</td> <td>-15.60</td> <td>-45.83</td> <td>-9.77</td> <td>Peak</td> </tr> <tr> <td>2</td> <td>2338.500</td> <td>-61.85</td> <td>-13.00</td> <td>-48.85</td> <td>-53.78</td> <td>-8.07</td> <td>Peak</td> </tr> <tr> <td>3</td> <td>3118.000</td> <td>-59.67</td> <td>-13.00</td> <td>-46.67</td> <td>-53.37</td> <td>-6.30</td> <td>Peak</td> </tr> </tbody> </table> <p>Note: 1. Level = Read Level + Factor 2. Factor = Antenna Factor + Cable Loss - Preamp Factor + Aux Factor 3. Over Limit = Level - Limit Line 4. Aux Factor = Convert E (dBuV/m) to EIRP (dBm) = 107 + 20log(3) = 104.8 = 11.8 dB 5. The other emission levels were very low against the limit. 6. The emission under 1GHz was not included since the emission levels are very low against the limit.</p>	No.	Frequency MHz	Level dBm	Limit Line dBm	Over Limit dB	Read Level dBm	Factor dB	Remark	1	1559.000	-55.60	-40.00	-15.60	-45.83	-9.77	Peak	2	2338.500	-61.85	-13.00	-48.85	-53.78	-8.07	Peak	3	3118.000	-59.67	-13.00	-46.67	-53.37	-6.30	Peak
No.	Frequency MHz	Level dBm	Limit Line dBm	Over Limit dB	Read Level dBm	Factor dB	Remark																																																										
1	1559.000	-65.33	-40.00	-25.33	-55.00	-10.25	Peak																																																										
2	2338.500	-62.51	-13.00	-49.51	-54.42	-8.09	Peak																																																										
3	3118.000	-61.00	-13.00	-48.00	-53.79	-7.21	Peak																																																										
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1	1559.000	-55.60	-40.00	-15.60	-45.83	-9.77	Peak																																																										
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<p>Site :HY-CB03 Condition :3m Horizontal Mode :LTE M1 Band 13 link CH23205 16-QAM Test BY :Daneil Wu</p> <table border="1"> <thead> <tr> <th>No.</th> <th>Frequency MHz</th> <th>Level dBm</th> <th>Limit Line dBm</th> <th>Over Limit dB</th> <th>Read Level dBm</th> <th>Factor dB</th> <th>Remark</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>1559.000</td> <td>-57.65</td> <td>-40.00</td> <td>-17.65</td> <td>-47.40</td> <td>-10.25</td> <td>Peak</td> </tr> <tr> <td>2</td> <td>2338.500</td> <td>-63.19</td> <td>-13.00</td> <td>-50.19</td> <td>-55.10</td> <td>-8.09</td> <td>Peak</td> </tr> <tr> <td>3</td> <td>3118.000</td> <td>-61.10</td> <td>-13.00</td> <td>-48.10</td> <td>-53.89</td> <td>-7.21</td> <td>Peak</td> </tr> </tbody> </table> <p>Note: 1. Level = Read Level + Factor 2. Factor = Antenna Factor + Cable Loss - Preamp Factor + Aux Factor 3. Over Limit = Level - Limit Line 4. Aux Factor = Convert E (dBuV/m) to EIRP (dBm) = 107 + 20log(3) = 104.8 = 11.8 dB 5. The other emission levels were very low against the limit. 6. The emission under 1GHz was not included since the emission levels are very low against the limit.</p>	No.	Frequency MHz	Level dBm	Limit Line dBm	Over Limit dB	Read Level dBm	Factor dB	Remark	1	1559.000	-57.65	-40.00	-17.65	-47.40	-10.25	Peak	2	2338.500	-63.19	-13.00	-50.19	-55.10	-8.09	Peak	3	3118.000	-61.10	-13.00	-48.10	-53.89	-7.21	Peak	<p>Site :HY-CB03 Condition :3m VERTICAL Mode :LTE M1 Band 13 link CH23205 16-QAM Test BY :Daneil Wu</p> <table border="1"> <thead> <tr> <th>No.</th> <th>Frequency MHz</th> <th>Level dBm</th> <th>Limit Line dBm</th> <th>Over Limit dB</th> <th>Read Level dBm</th> <th>Factor dB</th> <th>Remark</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>1559.000</td> <td>-53.46</td> <td>-40.00</td> <td>-13.46</td> <td>-43.21</td> <td>-10.25</td> <td>Peak</td> </tr> <tr> <td>2</td> <td>2338.500</td> <td>-61.74</td> <td>-13.00</td> <td>-48.74</td> <td>-53.65</td> <td>-8.09</td> <td>Peak</td> </tr> <tr> <td>3</td> <td>3118.000</td> <td>-60.63</td> <td>-13.00</td> <td>-47.63</td> <td>-53.42</td> <td>-7.21</td> <td>Peak</td> </tr> </tbody> </table> <p>Note: 1. Level = Read Level + Factor 2. Factor = Antenna Factor + Cable Loss - Preamp Factor + Aux Factor 3. Over Limit = Level - Limit Line 4. Aux Factor = Convert E (dBuV/m) to EIRP (dBm) = 107 + 20log(3) = 104.8 = 11.8 dB 5. The other emission levels were very low against the limit. 6. The emission under 1GHz was not included since the emission levels are very low against the limit.</p>	No.	Frequency MHz	Level dBm	Limit Line dBm	Over Limit dB	Read Level dBm	Factor dB	Remark	1	1559.000	-53.46	-40.00	-13.46	-43.21	-10.25	Peak	2	2338.500	-61.74	-13.00	-48.74	-53.65	-8.09	Peak	3	3118.000	-60.63	-13.00	-47.63	-53.42	-7.21	Peak
No.	Frequency MHz	Level dBm	Limit Line dBm	Over Limit dB	Read Level dBm	Factor dB	Remark																																																										
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3	3118.000	-61.10	-13.00	-48.10	-53.89	-7.21	Peak																																																										
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3	3118.000	-60.63	-13.00	-47.63	-53.42	-7.21	Peak																																																										





6. Frequency Stability

6.1. Test Setup



6.2. Test Limit

Limit: $<\pm 2.5$ ppm

6.3. Test Procedure

The frequency stability of transmitter is measured by:

- Temperature: The temperature is varied from -30°C to 50°C in 10°C increment using a standard temperature & Humidity chamber.
- Primary Supply Voltage: The primary supply voltage is varied 85% to 115% of the nominal value for non hand-carried equipment. For hand-carried, battery-powered equipment, primary supply voltage is reduced to the battery operating endpoint which shall be specified by the manufacturer.

The EUT was connected via the base station simulator. Universal Radio Communication Tester, was used to measure The Frequency Error. The maximum result of measurements was recorded.

6.4. Test Specification

According to FCC Part 2.1055, 27.54

6.5. Test Result of Frequency Stability

Temperature Variations

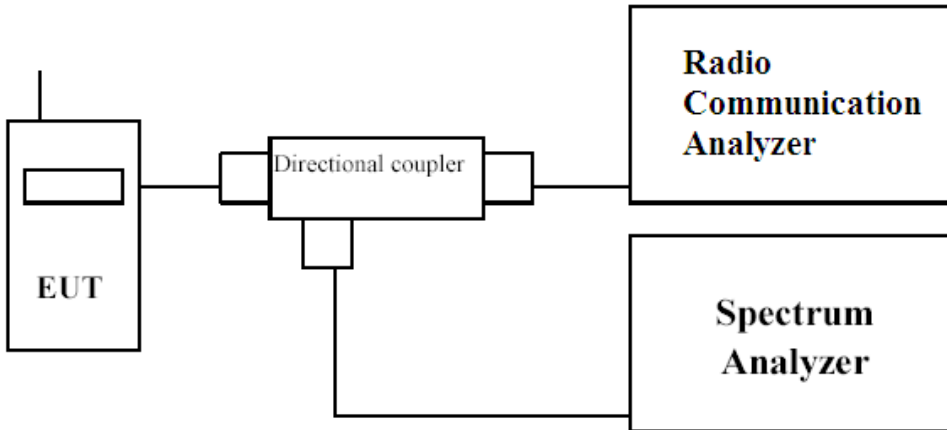
Temperature Interval (°C)	Test Channel	Deviation (kHz)		Limit (kHz)
		5M	10M	
-30	Mid	0.0316	0.0371	±1.96
-20	Mid	0.0214	0.0222	±1.96
-10	Mid	0.0147	-0.0245	±1.96
0	Mid	-0.0081	-0.0200	±1.96
10	Mid	-0.0104	-0.0172	±1.96
20	Mid	-0.0121	0.0170	±1.96
30	Mid	-0.0092	-0.0133	±1.96
40	Mid	-0.0093	-0.0144	±1.96
50	Mid	-0.0132	-0.0153	±1.96

Voltage Variations

DC Voltage (V)	Test Channel	Deviation (kHz)		Limit (kHz)
		5M	10M	
4.2	Mid	-0.0150	-0.0120	±1.96
3.8	Mid	-0.0121	-0.0170	±1.96
3.3	Mid	-0.0152	-0.0107	±1.96

7. Peak to Average Ratio

7.1. Test Setup



7.2. Test Limit

The peak-to-average power ratio (PAPR) of the transmitter output power must not exceed 13 dB. The PAPR measurements should be made using either an instrument with complementary cumulative distribution function (CCDF) capabilities to determine that PAPR will not exceed 13 dB for more than 0.1 percent of the time or other Commission approved procedure.

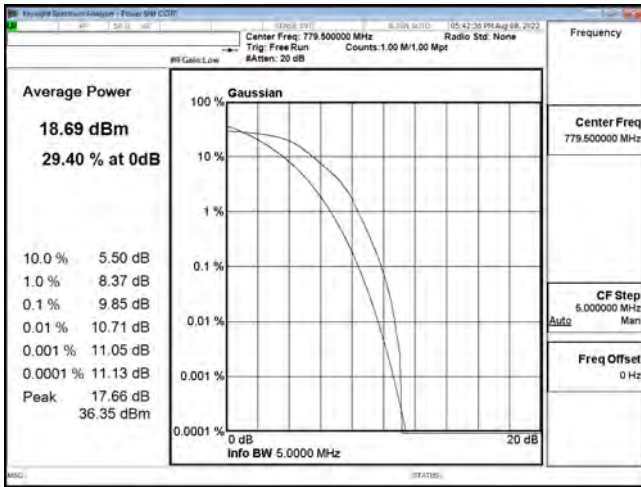
7.3. Test Procedure

- a) Refer to instrument's analyzer instruction manual for details on how to use the power statistics/CCDF function;
- b) Set resolution/measurement bandwidth \geq signal's occupied bandwidth;
- c) Set the number of counts to a value that stabilizes the measured CCDF curve;
- d) Set the measurement interval as follows:
 - 1) for continuous transmissions, set to 1 ms
 - 2) for burst transmissions, employ an external trigger that is synchronized with the EUT burst timing sequence, or use the internal burst trigger with a trigger level that allows the burst to stabilize and set the measurement interval to a time that is less than or equal to the burst duration.
- e) Record the maximum PAPR level associated with a probability of 0.1%.

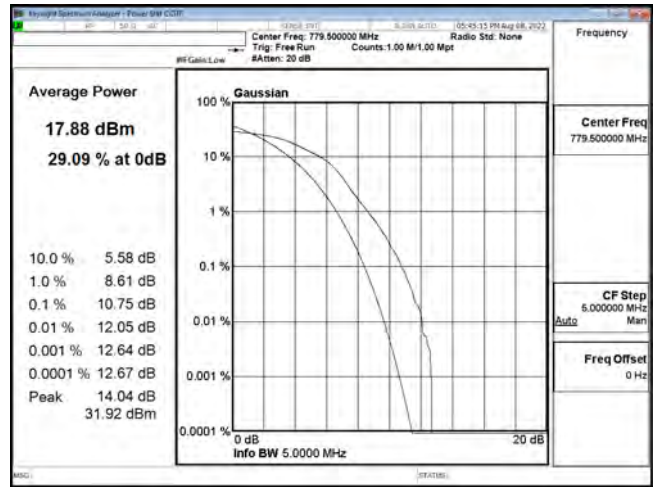
7.4. Test Specification

According to FCC Part 27.50

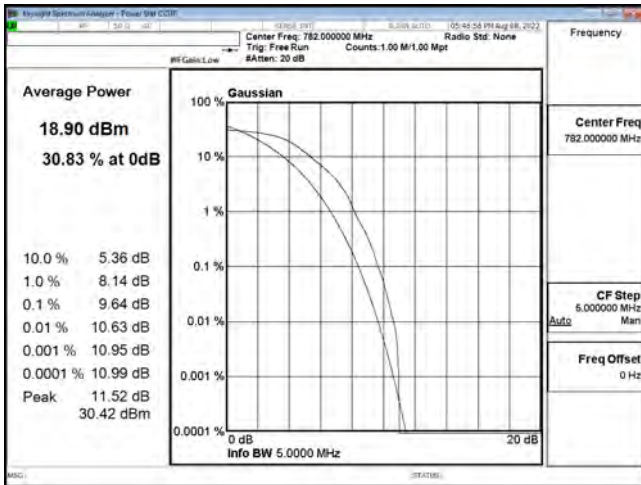
7.5. Test Result of Peak to Average Ratio



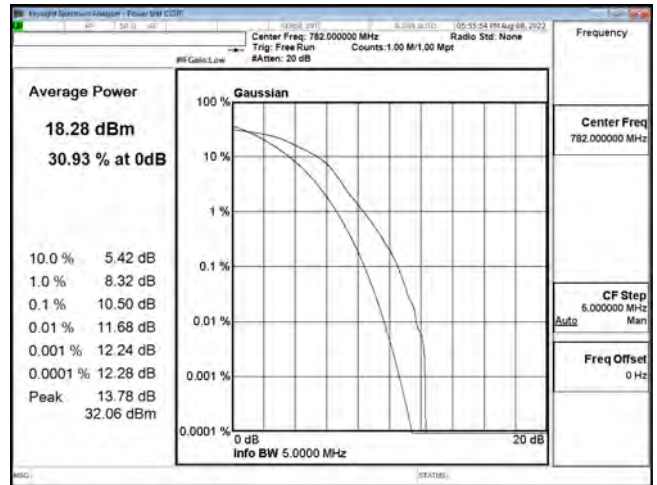
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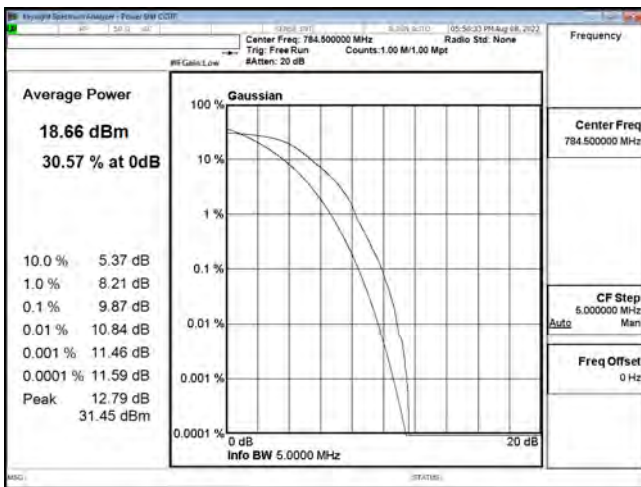
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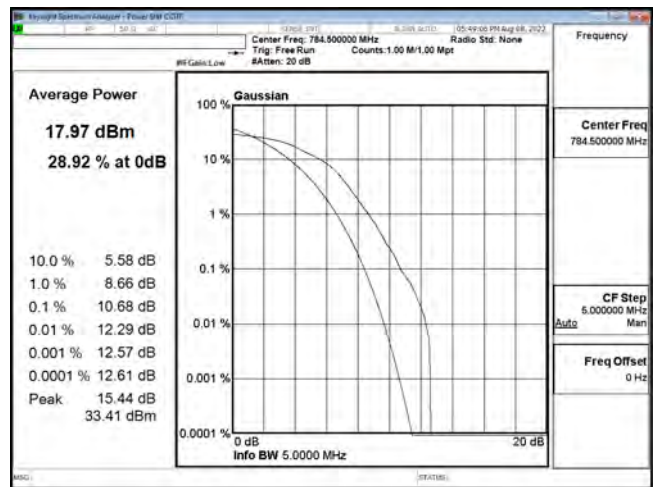
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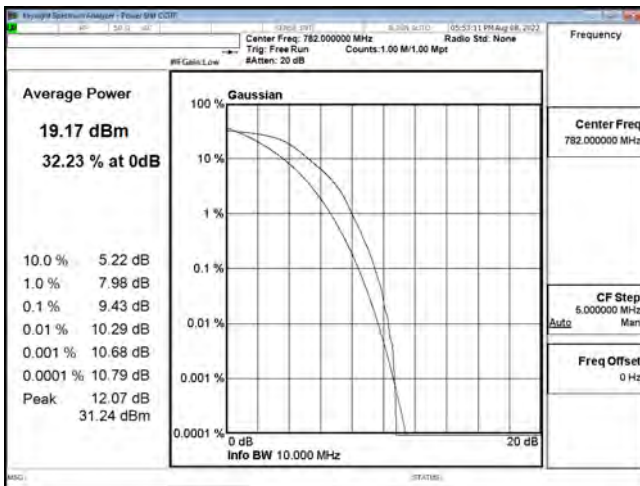
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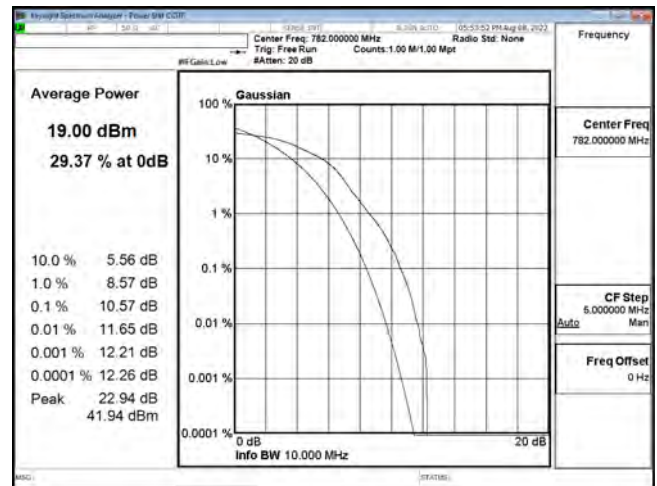
PTAR_CaT-M1_B13_5M_QPSK_CH23255



PTAR_CaT-M1_B13_5M_16QAM_CH23255



PTAR_CaT-M1_B13_10M_QPSK_CH23230



PTAR_CaT-M1_B13_10M_16QAM_CH23230