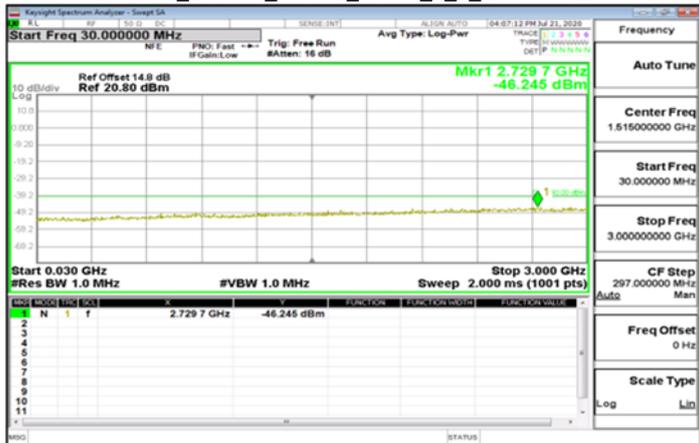


30MHz~3GHz\_Band48\_10MHz\_QPSK\_1\_0\_LowCH55290-3555



3GHz~10GHz\_Band48\_10MHz\_QPSK\_1\_0\_MidCH55990-3625



3GHz~10GHz\_Band48\_10MHz\_QPSK\_1\_0\_LowCH55290-3555



30MHz~3GHz\_Band48\_10MHz\_QPSK\_1\_0\_HighCH56690-3695



30MHz~3GHz\_Band48\_10MHz\_QPSK\_1\_0\_MidCH55990-3625



3GHz~10GHz\_Band48\_10MHz\_QPSK\_1\_0\_HighCH56690-3695



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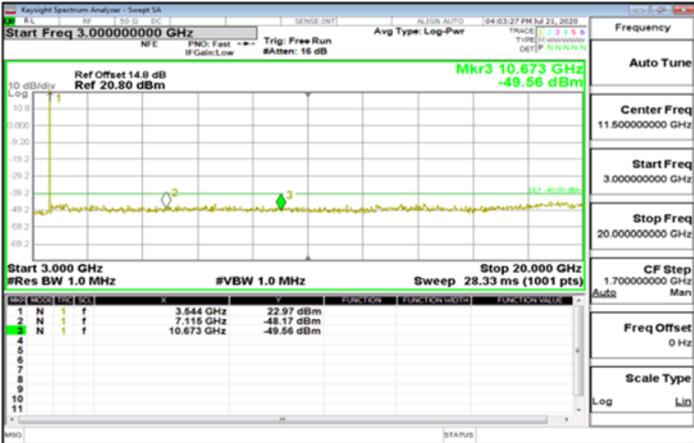
30MHz~3GHz\_Band48\_15MHz\_QPSK\_1\_0\_LowCH55315-3557.5



3GHz~10GHz\_Band48\_15MHz\_QPSK\_1\_0\_MidCH55990-3625



3GHz~10GHz\_Band48\_15MHz\_QPSK\_1\_0\_LowCH55315-3557.5



30MHz~3GHz\_Band48\_15MHz\_QPSK\_1\_0\_HighCH56665-3692.5



30MHz~3GHz\_Band48\_15MHz\_QPSK\_1\_0\_MidCH55990-3625



3GHz~10GHz\_Band48\_15MHz\_QPSK\_1\_0\_HighCH56665-3692.5

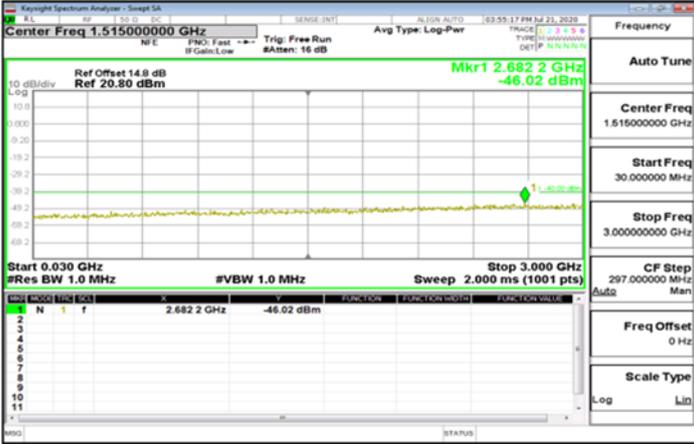


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30MHz~3GHz\_Band48\_20MHz\_QPSK\_1\_0\_LowCH55340-3560



3GHz~10GHz\_Band48\_20MHz\_QPSK\_1\_0\_MidCH55990-3625



3GHz~10GHz\_Band48\_20MHz\_QPSK\_1\_0\_LowCH55340-3560



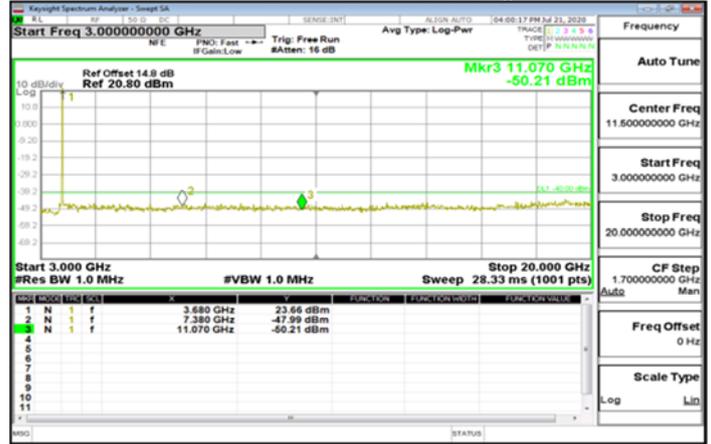
30MHz~3GHz\_Band48\_20MHz\_QPSK\_1\_0\_HighCH56640-3690



30MHz~3GHz\_Band48\_20MHz\_QPSK\_1\_0\_MidCH55990-3625



3GHz~10GHz\_Band48\_20MHz\_QPSK\_1\_0\_HighCH56640-3690

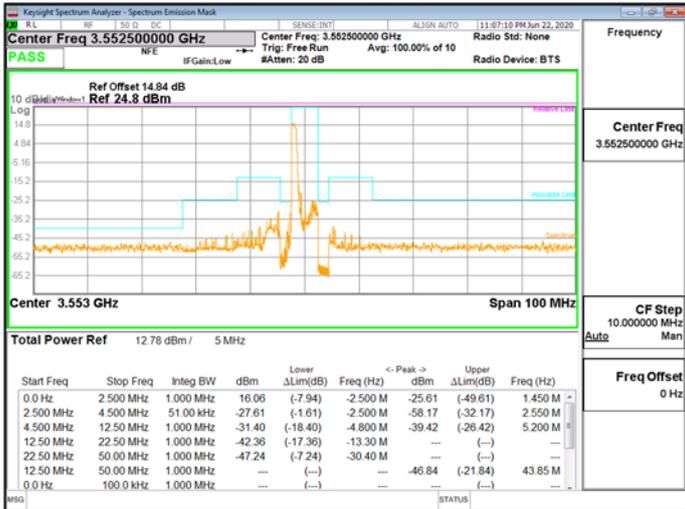


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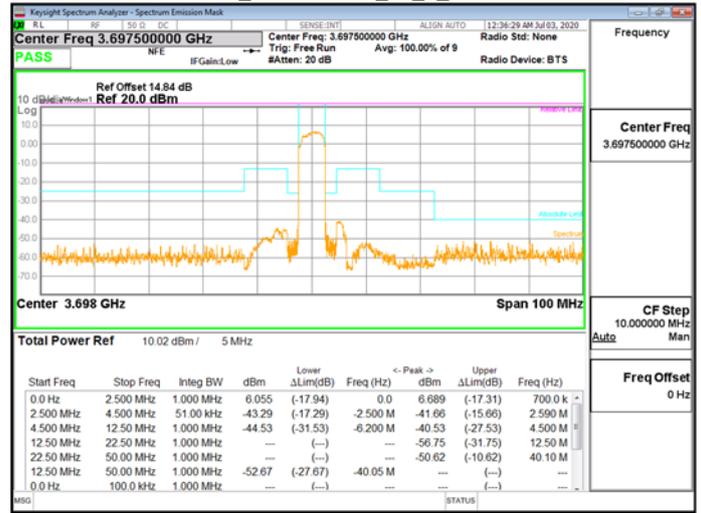
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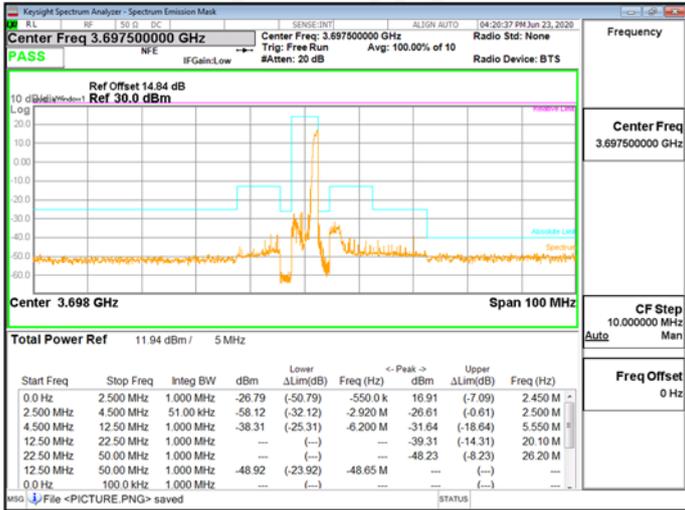
Band Edge or Emission Mask  
Band48\_5MHzQPSK\_1\_0\_CH55265



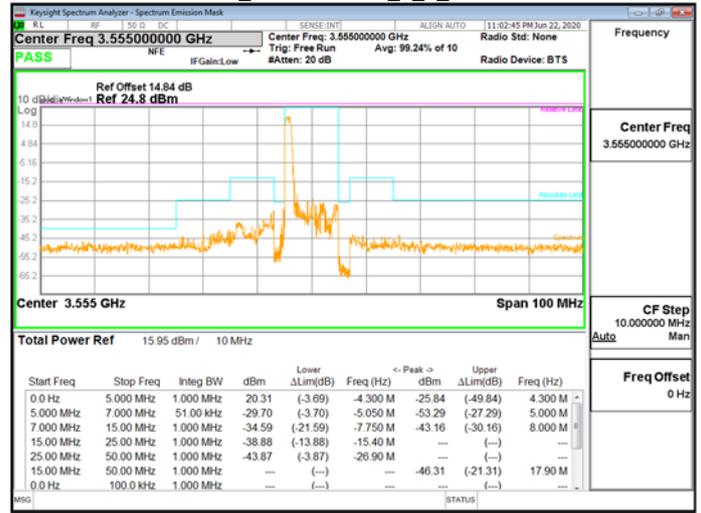
Band48\_5MHzQPSK\_25\_0\_CH56715



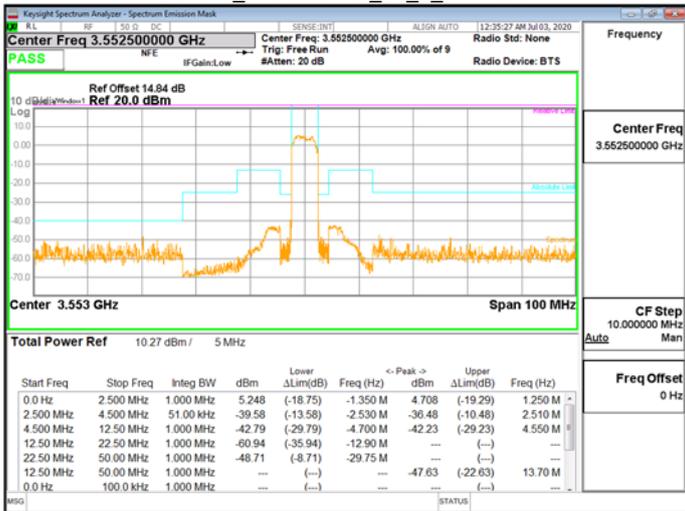
Band48\_5MHzQPSK\_1\_24\_CH56715



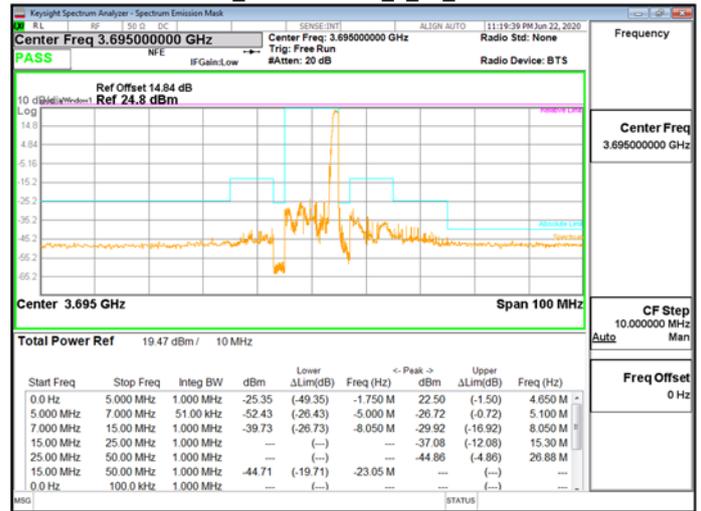
Band48\_10MHzQPSK\_1\_0\_CH55290



Band48\_5MHzQPSK\_25\_0\_CH55265



Band48\_10MHzQPSK\_1\_49\_CH56690

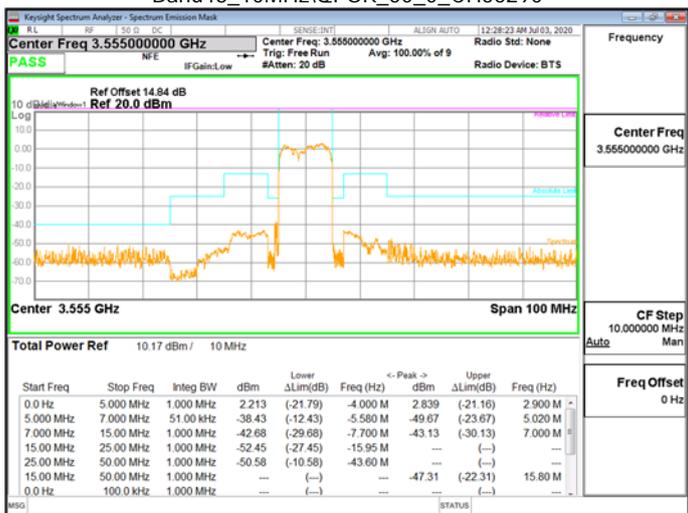


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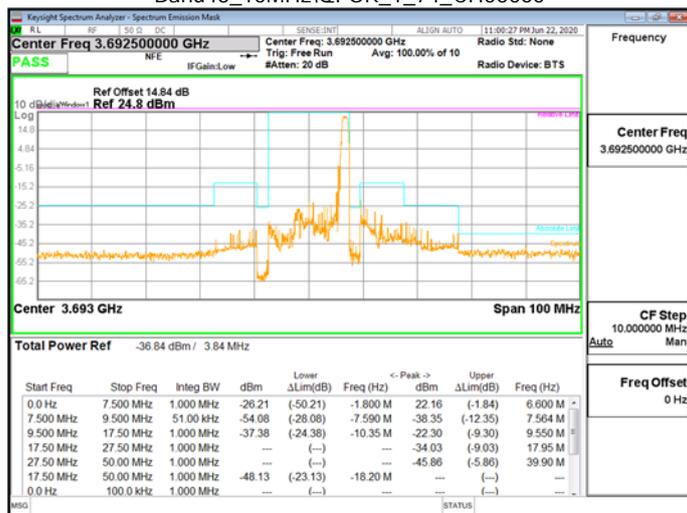
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Band48\_10MHzQPSK\_50\_0\_CH55290



Band48\_15MHzQPSK\_1\_74\_CH56665



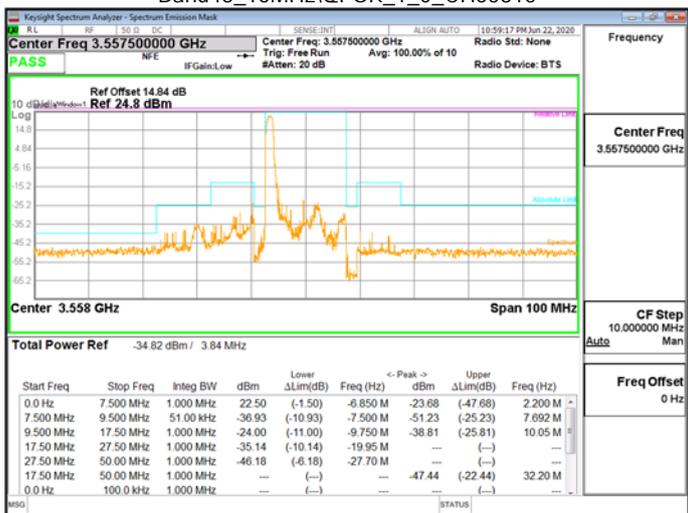
Band48\_10MHzQPSK\_50\_0\_CH56690



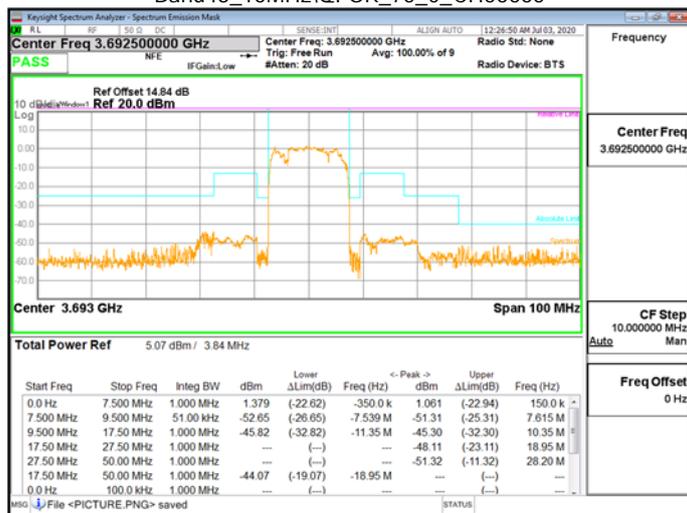
Band48\_15MHzQPSK\_75\_0\_CH55315



Band48\_15MHzQPSK\_1\_0\_CH55315



Band48\_15MHzQPSK\_75\_0\_CH56665

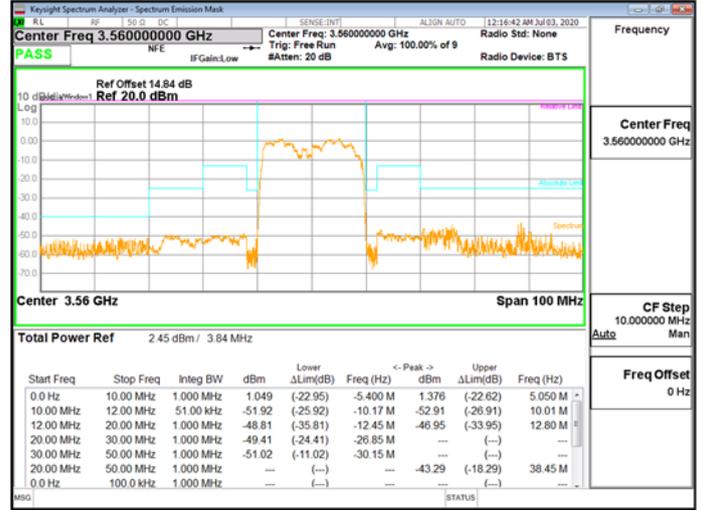
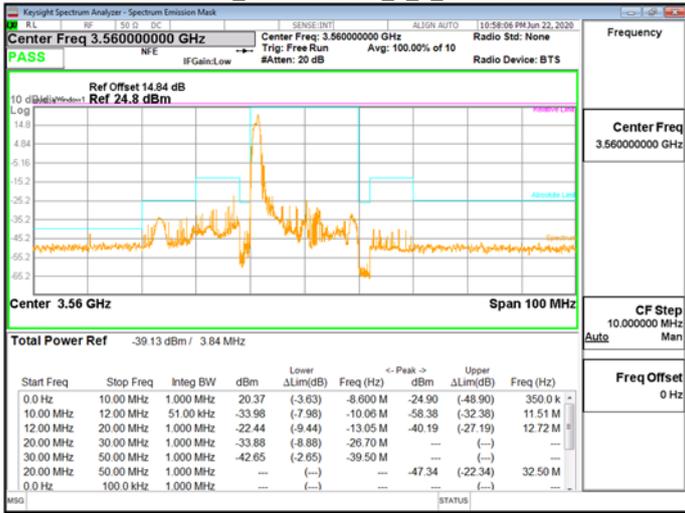


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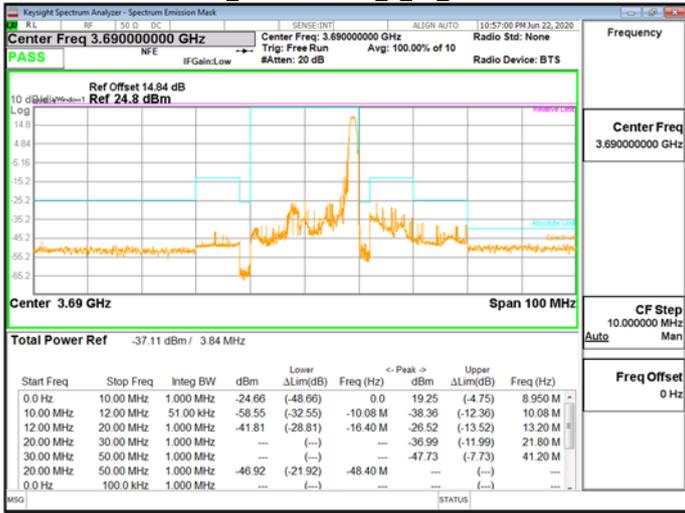
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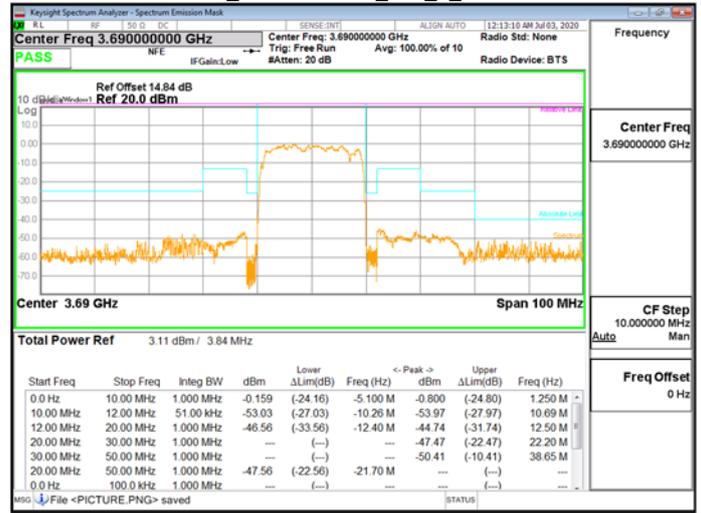
Band48\_20MHz\QPSK\_1\_0\_CH55340



Band48\_20MHz\QPSK\_1\_99\_CH56640



Band48\_20MHz\QPSK\_100\_0\_CH56640



Band48\_20MHz\QPSK\_100\_0\_CH55340

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## 10. FIELD STRENGTH OF SPURIOUS RADIATION MEASUREMENT

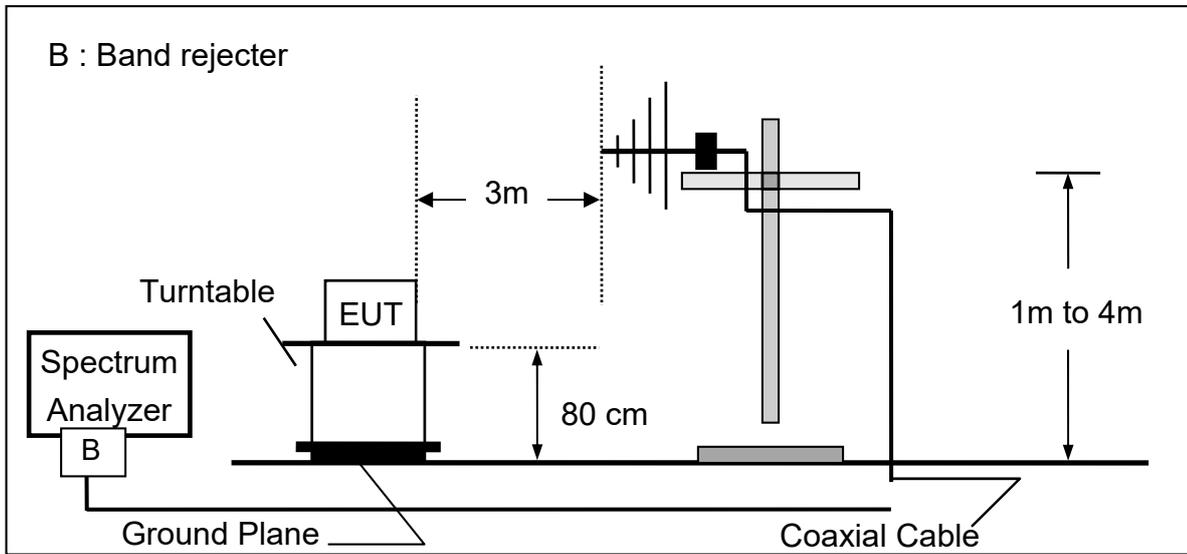
### 10.1. Standard Applicable

FCC Part 2.1053, Part 96.41 , C63.26 Clause 5.7

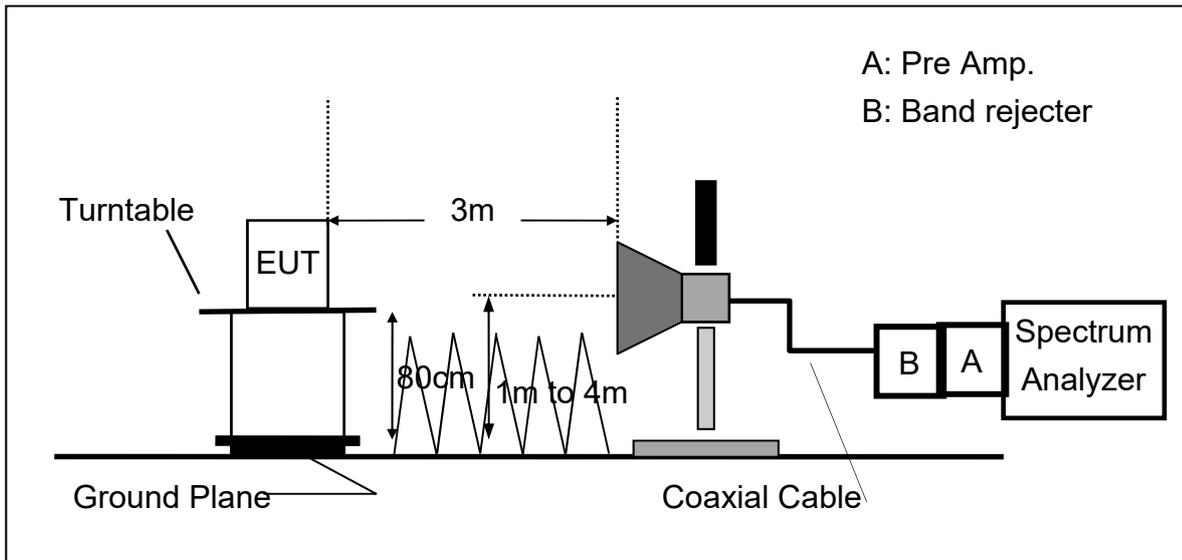
1. within 0 MHz to 10 MHz above and below the **assigned channel**  $\leq -13$  dBm/MHz
2. greater than 10 MHz above and below the **assigned channel**  $\leq -25$  dBm/MHz
3. any emission below 3530 MHz and above 3720 MHz  $\leq -40$  dBm/MHz

### 10.2. EUT Setup

Radiated Emission Test Set-Up, Frequency Below 1000MHz



Radiated Emission Test Set-UP Frequency Over 1 GHz



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**10.3. Measurement Procedure:**

The EUT was placed on a non-conductive; the measurement antenna was placed at a distance of 3 meters from the EUT. During the tests, the antenna height and the EUT azimuth were varied in order to identify the maximum level of emissions from the EUT. This maximization process was repeated with the EUT positioned in each of its three orthogonal orientations.

The frequency range up to tenth harmonic was investigated for each of three fundamental frequencies (low, middle and high channels). Once spurious emission was identified, the power of the emission was determined using the substitution method.

The spurious emissions attenuation was calculated as the difference between radiated power at the fundamental frequency and the spurious emissions frequency.

$$\text{ERP (dBm)} = \text{SG Level(dBm)} + \text{Antenna Gain(dBd)} + \text{Cable Loss(dB)}$$

$$\text{EIRP (dBm)} = \text{SG Level(dBm)} + \text{Antenna Gain(dBi)} + \text{Cable Loss(dB)}$$

**10.4. Measurement Equipment Used:**

ERP, EIRP MEASUREMENT EQUIPMENT List 966 Chamber					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Horn Antenna	Schwarzbeck	BBHA9170	184	12/25/2019	12/24/2020
Horn Antenna	Schwarzbeck	BBHA9120D	D803	12/20/2019	12/19/2020
Bi-log Antenna	TESEO	CBL 6112D	35242 & AT-N0555	01/13/2020	01/12/2021
Spectrum Analyzer	Agilent	E4446A	MY51100003	10/23/2019	10/22/2020
EMI Test Receiver	R&S	ESCI 7	100759	07/04/2019	07/03/2020
Radio Communication Analyzer	Anritsu	MT8821C	6261786084	01/18/2020	01/17/2021
Pre-Amplifier	EMC Instruments	EMC184045B	980135	01/02/2020	01/01/2021
Pre-Amplifier	EMC Instruments	EMC051825	980152	01/02/2020	01/01/2021
Pre-Amplifier	HP	8447D	2944A09469	01/02/2020	01/01/2021
Filter 3300-3800	Micro-Tronics	WI	1	01/02/2020	01/01/2021
High Pass Filter	WI	WHKX4.0/18G-10SS	22	01/02/2020	01/01/2021
1GHz High Pass Filter	Micro-Tronics	HPM50108	32	01/02/2020	01/01/2021
2GHz High Pass Filter	Micro-Tronics	HPM50110	36	01/02/2020	01/01/2021
Coaxial Cable	Huber Suhner	succoflex 102	MY2622/2	01/02/2020	01/01/2021
Coaxial Cable	Huber Suhner	succoflex 104A	800086/4a	01/02/2020	01/01/2021
Coaxial Cable	Huber Suhner	EMC 104-SM-SM-2000	160123	01/02/2020	01/01/2021

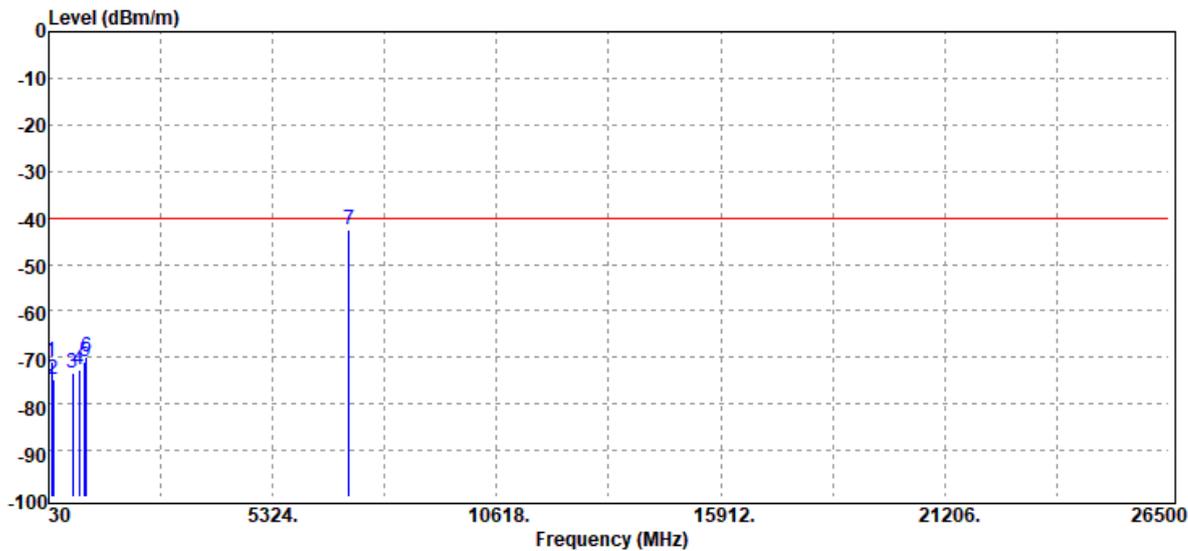
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### 10.5. Measurement Result:

Report Number	:ER/2020/30144	Test Date	:2020-06-19
Operation Mode	:LTE B48	Temp./Humi.	:26.1/64
Test Mode	:Tx CH Low	Antenna Pol.	:VERTICAL
EUT Pol	:E1 Plane	Engineer	:Neo
Test Frequency	:3560 MHz		



Freq. MHz	EIRP/ERP dBm	SG Output Level dBm	Antenna Gain dBi/dBd	Cable Loss dB	Limit dBm	Margin dB
99.84	-71.04	-64.08	-6.01	-0.95	-40.00	-31.04
139.61	-74.76	-65.74	-7.93	-1.09	-40.00	-34.76
604.24	-73.43	-69.40	-1.89	-2.14	-40.00	-33.43
747.80	-72.71	-68.07	-1.75	-2.89	-40.00	-32.71
891.36	-70.96	-66.52	-1.48	-2.96	-40.00	-30.96
915.61	-70.07	-65.34	-1.80	-2.93	-40.00	-30.07
7120.00	-42.41	-45.27	11.22	-8.36	-40.00	-2.41

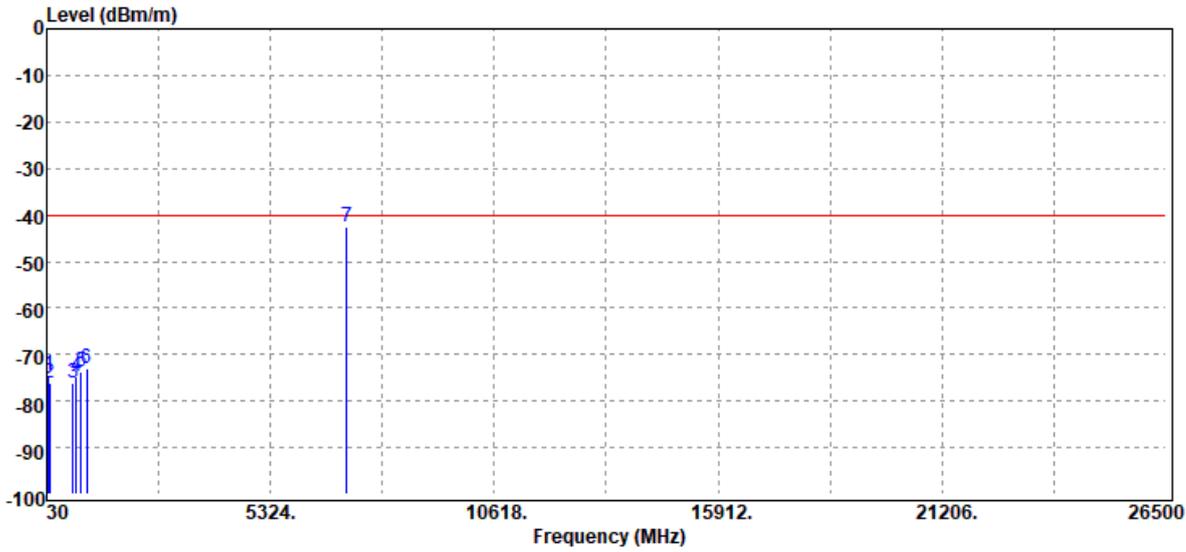
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Report Number :ER/2020/30144  
 Operation Mode :LTE B48  
 Test Mode :Tx CH Low  
 EUT Pol :E1 Plane  
 Test Frequency :3560 MHz

Test Date :2020-06-19  
 Temp./Humi. :26.1/64  
 Antenna Pol. :HORIZONTAL  
 Engineer :Neo



Freq. MHz	EIRP/ERP dBm	SG Output Level dBm	Antenna Gain dBi/dBd	Cable Loss dB	Limit dBm	Margin dB
78.50	-74.35	-64.08	-9.43	-0.84	-40.00	-34.35
97.90	-76.17	-69.44	-5.79	-0.94	-40.00	-36.17
643.04	-76.05	-72.09	-1.46	-2.50	-40.00	-36.05
733.25	-74.90	-70.66	-1.55	-2.69	-40.00	-34.90
849.65	-73.81	-69.88	-1.54	-2.39	-40.00	-33.81
973.81	-73.12	-68.15	-1.83	-3.14	-40.00	-33.12
7120.00	-42.71	-45.57	11.22	-8.36	-40.00	-2.71

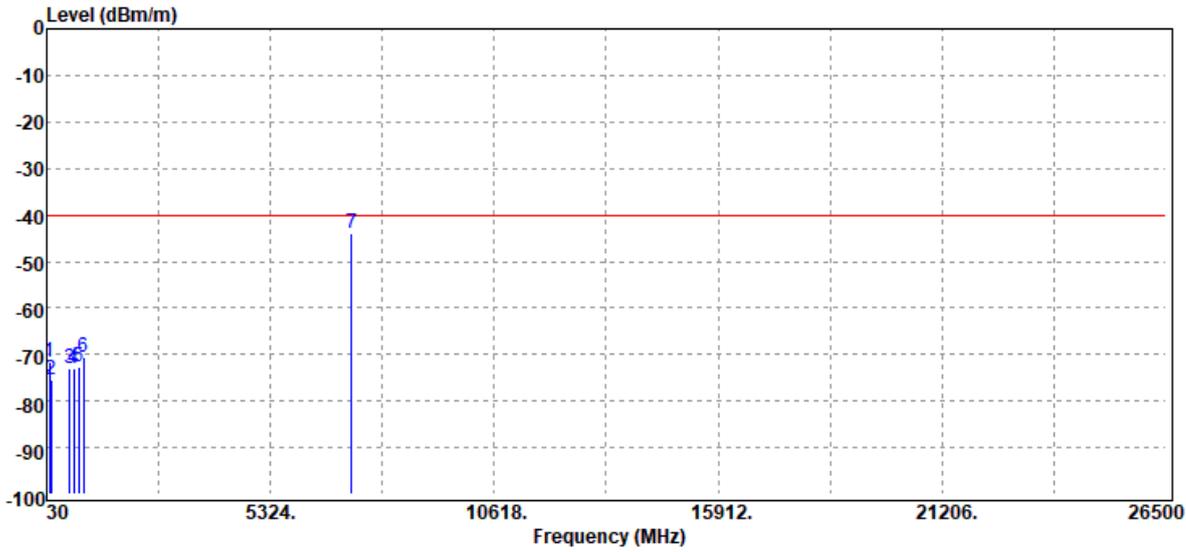
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Report Number :ER/2020/30144  
 Operation Mode :LTE B48  
 Test Mode :Tx CH Mid  
 EUT Pol :E1 Plane  
 Test Frequency :3625 MHz

Test Date :2020-06-19  
 Temp./Humi. :26.1/64  
 Antenna Pol. :VERTICAL  
 Engineer :Neo



Freq. MHz	EIRP/ERP dBm	SG Output Level dBm	Antenna Gain dBi/dBd	Cable Loss dB	Limit dBm	Margin dB
99.84	-71.67	-64.71	-6.01	-0.95	-40.00	-31.67
144.46	-75.56	-66.62	-7.79	-1.15	-40.00	-35.56
575.14	-73.02	-69.10	-1.54	-2.38	-40.00	-33.02
677.96	-73.05	-69.15	-1.46	-2.44	-40.00	-33.05
789.51	-72.67	-68.41	-1.59	-2.67	-40.00	-32.67
909.79	-70.55	-65.80	-1.74	-3.01	-40.00	-30.55
7250.00	-44.09	-46.64	11.10	-8.55	-40.00	-4.09

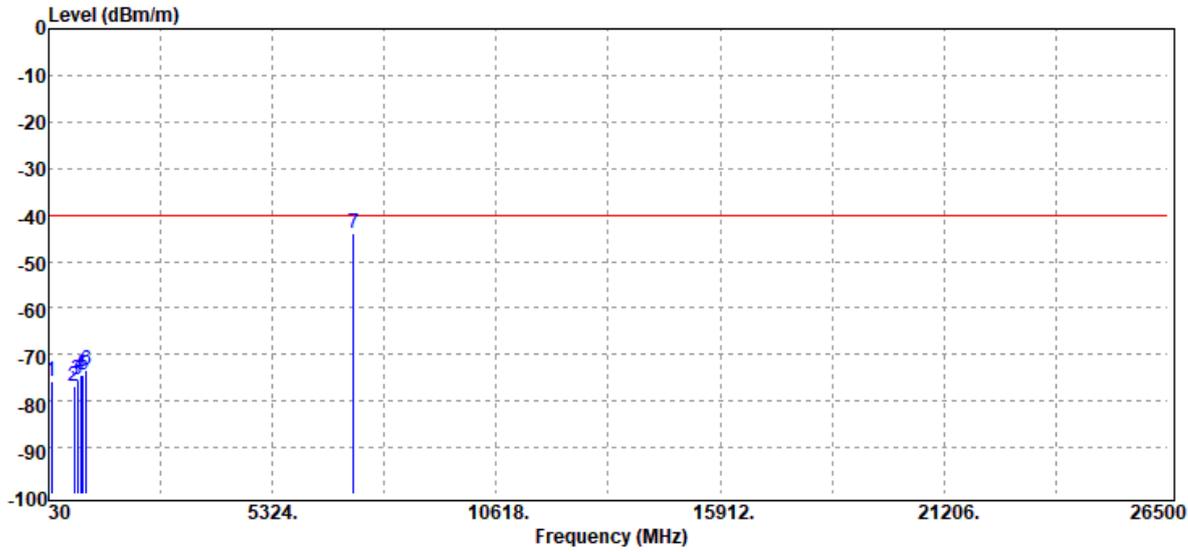
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Report Number :ER/2020/30144  
 Operation Mode :LTE B48  
 Test Mode :Tx CH Mid  
 EUT Pol :E1 Plane  
 Test Frequency :3625 MHz

Test Date :2020-06-19  
 Temp./Humi. :26.1/64  
 Antenna Pol. :HORIZONTAL  
 Engineer :Neo



Freq. MHz	EIRP/ERP dBm	SG Output Level dBm	Antenna Gain dBi/dBd	Cable Loss dB	Limit dBm	Margin dB
97.90	-75.64	-68.91	-5.79	-0.94	-40.00	-35.64
639.16	-76.84	-72.85	-1.50	-2.49	-40.00	-36.84
713.85	-75.48	-71.58	-1.35	-2.55	-40.00	-35.48
778.84	-74.54	-70.56	-1.72	-2.26	-40.00	-34.54
839.95	-74.37	-69.85	-1.64	-2.88	-40.00	-34.37
915.61	-73.22	-68.49	-1.80	-2.93	-40.00	-33.22
7250.00	-43.95	-46.50	11.10	-8.55	-40.00	-3.95

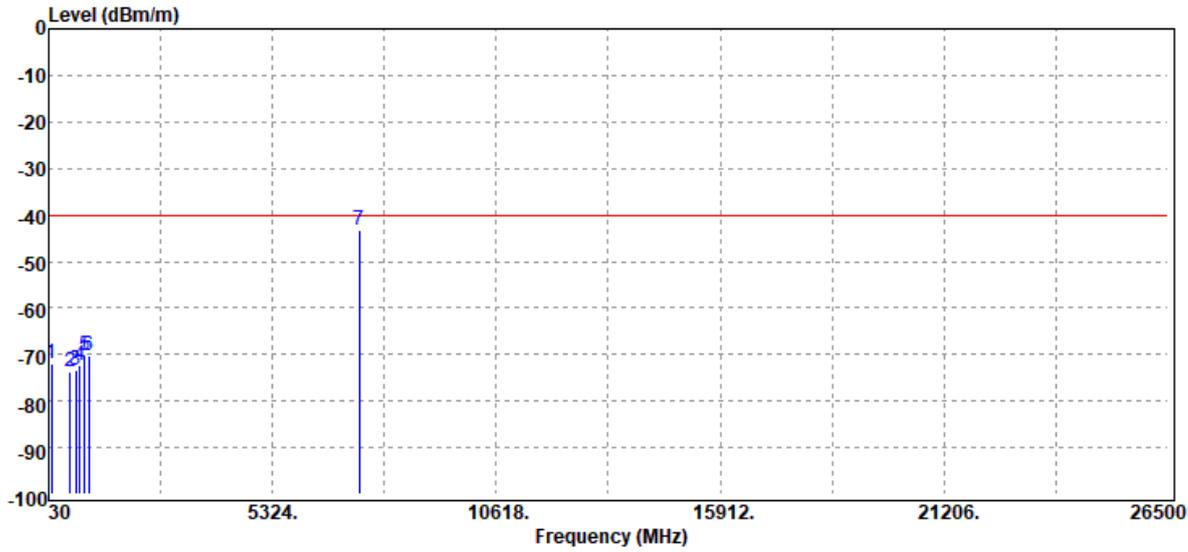
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Report Number :ER/2020/30144  
 Operation Mode :LTE B48  
 Test Mode :Tx CH High  
 EUT Pol :E1 Plane  
 Test Frequency :3690 MHz

Test Date :2020-06-19  
 Temp./Humi. :26.1/64  
 Antenna Pol. :VERTICAL  
 Engineer :Neo



Freq. MHz	EIRP/ERP dBm	SG Output Level dBm	Antenna Gain dBi/dBd	Cable Loss dB	Limit dBm	Margin dB
99.84	-71.89	-64.93	-6.01	-0.95	-40.00	-31.89
544.10	-73.61	-70.36	-1.21	-2.04	-40.00	-33.61
676.99	-73.34	-69.41	-1.45	-2.48	-40.00	-33.34
759.44	-72.30	-67.82	-1.81	-2.67	-40.00	-32.30
886.51	-70.16	-65.72	-1.47	-2.97	-40.00	-30.16
987.39	-70.22	-65.36	-1.74	-3.12	-40.00	-30.22
7380.00	-43.14	-45.66	11.02	-8.50	-40.00	-3.14

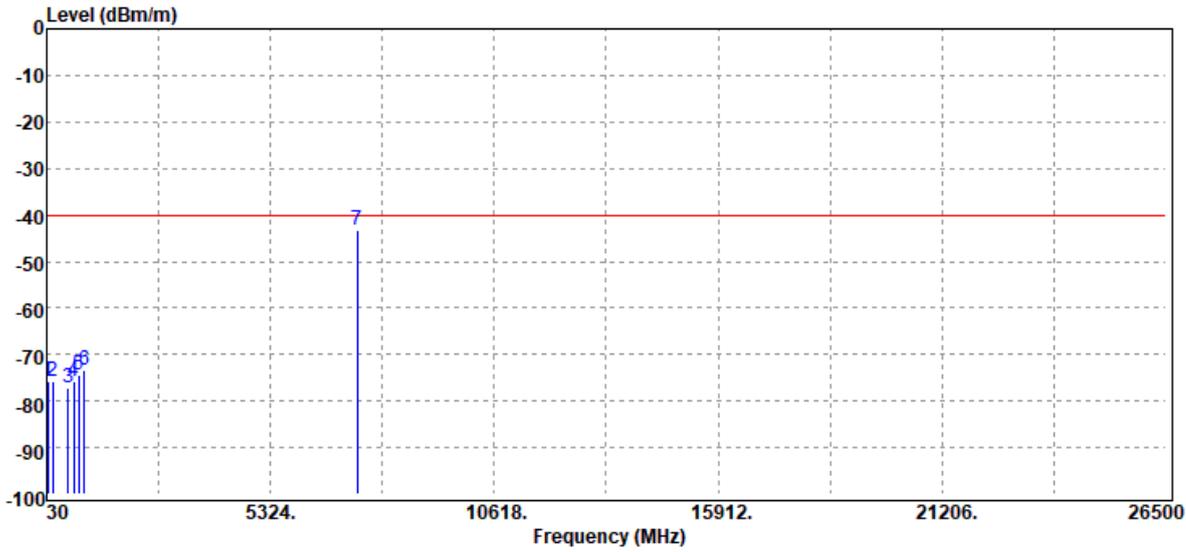
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Report Number :ER/2020/30144  
 Operation Mode :LTE B48  
 Test Mode :Tx CH High  
 EUT Pol :E1 Plane  
 Test Frequency :3690 MHz

Test Date :2020-06-19  
 Temp./Humi. :26.1/64  
 Antenna Pol. :HORIZONTAL  
 Engineer :Neo



Freq. MHz	EIRP/ERP dBm	SG Output Level dBm	Antenna Gain dBi/dBd	Cable Loss dB	Limit dBm	Margin dB
54.25	-75.91	-58.85	-16.39	-0.67	-40.00	-35.91
168.71	-75.93	-68.63	-6.04	-1.26	-40.00	-35.93
539.25	-77.16	-73.95	-1.29	-1.92	-40.00	-37.16
679.90	-75.71	-71.89	-1.48	-2.34	-40.00	-35.71
786.60	-74.23	-70.00	-1.68	-2.55	-40.00	-34.23
912.70	-73.36	-68.61	-1.77	-2.98	-40.00	-33.36
7380.00	-43.24	-45.76	11.02	-8.50	-40.00	-3.24

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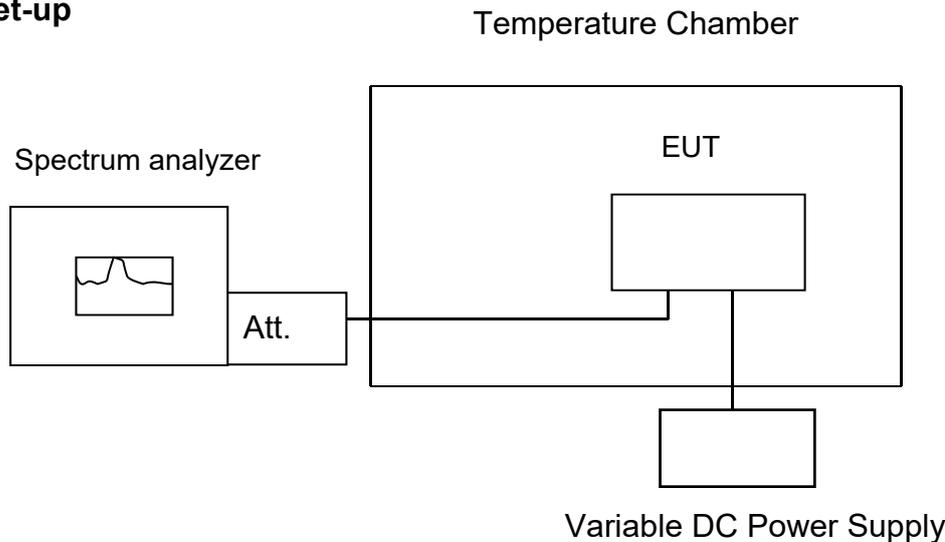
## 11. FREQUENCY STABILITY MEASUREMENT

### 11.1. Standard Applicabl

FCC §2.1055(a)

The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency band. The frequency stability of the transmitter shall be maintained within  $\pm 0.00025\%$  ( $\pm 2.5$  ppm ) of the center frequency.

### 11.2. Test Set-up



**Note:** Measurement setup for testing on Antenna connector

### 11.3. Measurement Procedure

The equipment under test was connected to an external AC or DC power supply and input rated voltage. RF output was connected to a frequency counter or spectrum analyzer via feed through attenuators. The EUT was placed inside the temperature chamber. Set the spectrum analyzer RBW low enough to obtain the desired frequency resolution and measure EUT 25°C operating frequency as reference frequency. Turn EUT off and set the chamber temperature to -30°C. After the temperature stabilized for approximately 30 minutes recorded the frequency. Repeat step measure with 10°C increased per stage until the highest temperature of +50°C reached.

Set chamber temperature to 25°C. Use a variable AC power supply / DC power source to power the EUT and set the voltage to rated voltage. Set the spectrum analyzer RBW low enough to obtain the desired frequency resolution and recorded the frequency.

Reduce the input voltage to specify extreme voltage variation (+/- 15%) and endpoint as declared by the manufacturer, record the maximum frequency change.

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#### 11.4. Measurement Equipment Used

Conducted Emission (measured at antenna port) Test Site					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
PXA Spectrum Analyzer	Agilent	N9030A	MY53120760	04/21/2020	04/20/2021
Temperature Chamber	TERCHY	MHG-120LF	911009	05/20/2020	05/19/2021
Radio Communication Analyzer	Anritsu	MT8821C	6261786084	01/18/2020	01/17/2021
Attenuator	Mini-Circuit	BW-S10W2+	2	01/02/2020	01/01/2021
DC Block	Mini-Circuits	BLK-18-S+	1	01/02/2020	01/01/2021
Splitter	RF-LAMBAD	RFLT2W1G18G	11-JSPF412-018	01/02/2020	01/01/2021

#### 11.5. Measurement Result

Reference Freq.:	LTE B48 Mid Channel		3625	MHz 10M QPSK CH 55990
Power Supply Vdc	Temp. (°C)	Freq. (MHz)	Delta (Hz)	Limit = +/- 2.5 ppm (Hz)
<b>Freq. ERROR vs. VOLTAGE</b>				
4.35	25	3625.000005	5	6488
3.85	25	3625.000001	1	6488
3.65	25	3624.999994	-6	6488
3.35 (End Point)	25	3624.999996	-4	6488
<b>Freq. ERROR vs. Temp.</b>				
3.85	-30	3624.999995	-5	6488
3.85	-20	3624.999997	-3	6488
3.85	-10	3625.000001	1	6488
3.85	0	3625.000007	7	6488
3.85	10	3624.999994	-6	6488
3.85	20	3624.999991	-9	6488
3.85	30	3625.000003	3	6488
3.85	40	3625.000008	8	6488
3.85	50	3625.000001	1	6488

**Note:** The battery is rated 3.85Vdc

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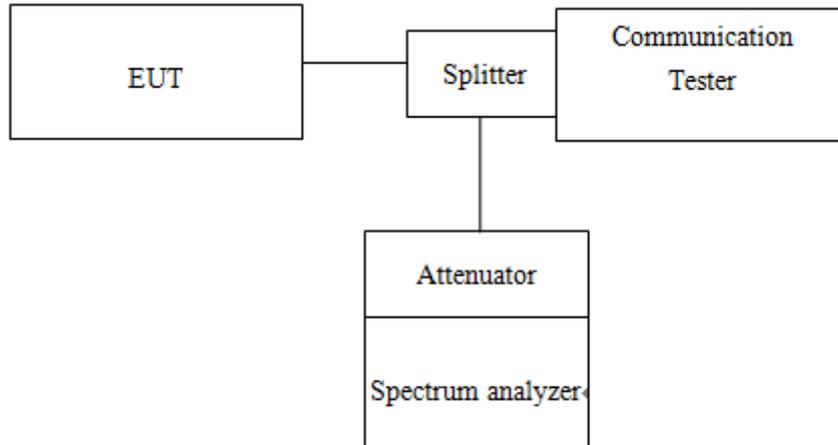
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## 12. PEAK TO AVERAGE RATIO

### 12.1. Standard Applicable

The peak-to-average ratio (PAR) of the transmission may not exceed 13dB.

### 12.2. Test SET-UP



### 12.3. Measurement Procedure

1. KDB 971168 D01 is employed as the following procedure is proper adjusted accordingly:
2. Set resolution/measurement bandwidth  $\geq$  signal's occupied bandwidth; & internal =1ms
3. Set the number of counts to a value that stabilizes the measured CCDF curve.

### 12.4. Measurement Equipment Used

Conducted Emission (measured at antenna port) Test Site					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
PXA Spectrum Analyzer	Agilent	N9030A	MY53120760	04/21/2020	04/20/2021
Radio Communication Analyzer	Anritsu	MT8821C	6261786084	01/18/2020	01/17/2021
Attenuator	Mini-Circuit	BW-S10W2+	2	01/02/2020	01/01/2021
DC Block	Mini-Circuits	BLK-18-S+	1	01/02/2020	01/01/2021
Splitter	RF-LAMBAD	RFLT2W1G18G	11-JSPF412-018	01/02/2020	01/01/2021

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## 12.5. Measurement Result

LTE BAND 48							
Channel bandwidth: 5MHz				Channel bandwidth: 10MHz			
Freq. (MHz)	CH	PAPR (dB)		Freq. (MHz)	CH	PAPR (dB)	
		256QAM	Limit			256QAM	Limit
3552.5	56765	9.98	13	3555.0	55290	10.25	13
3625.0	55990	10.10	13	3625.0	55990	9.54	13
3697.5	58215	10.36	13	3695.0	56690	11.04	13
LTE BAND 48							
Channel bandwidth: 15MHz				Channel bandwidth: 20MHz			
Freq. (MHz)	CH	PAPR (dB)		Freq. (MHz)	CH	PAPR (dB)	
		256QAM	Limit			256QAM	Limit
3557.5	55315	12.05	13	3650.0	55340	10.43	13
3625.0	55990	10.84	13	3625.0	55990	11.20	13
3692.5	56665	11.79	13	3690.0	56640	12.32	13

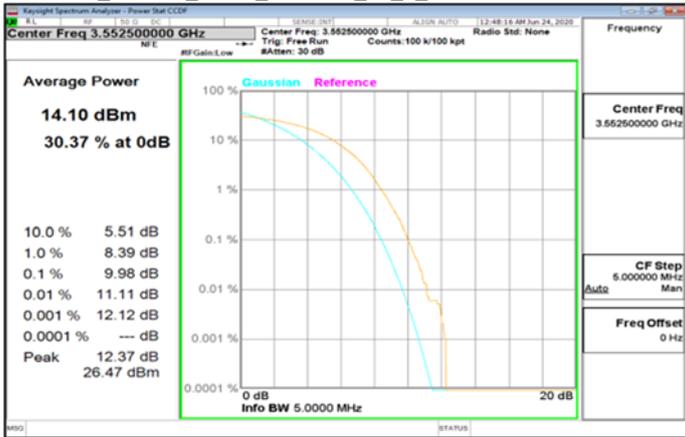
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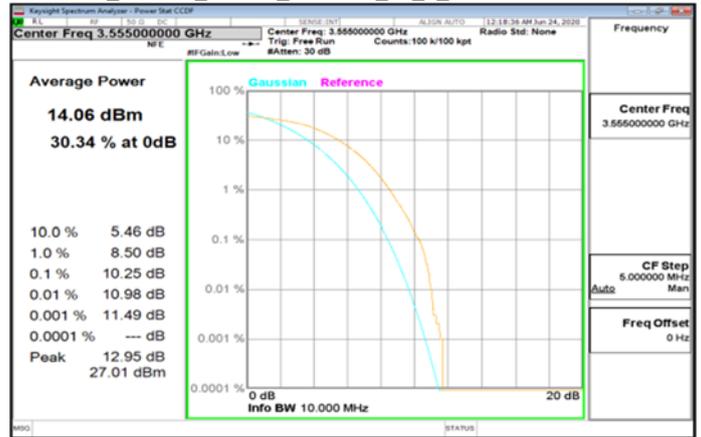
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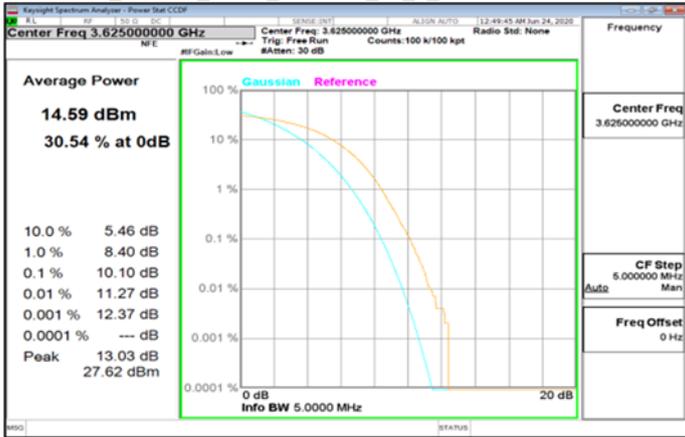
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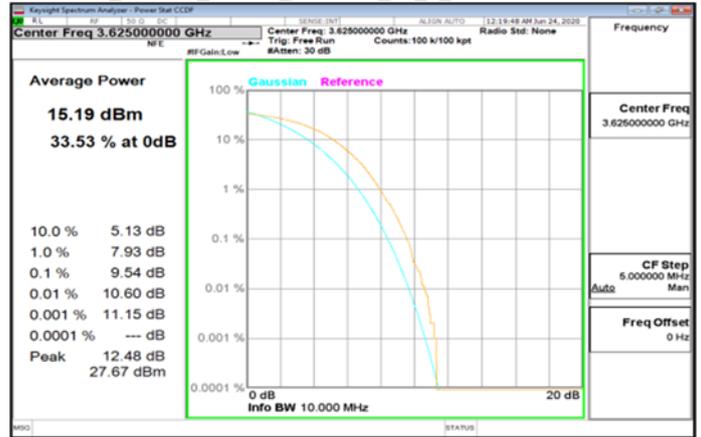
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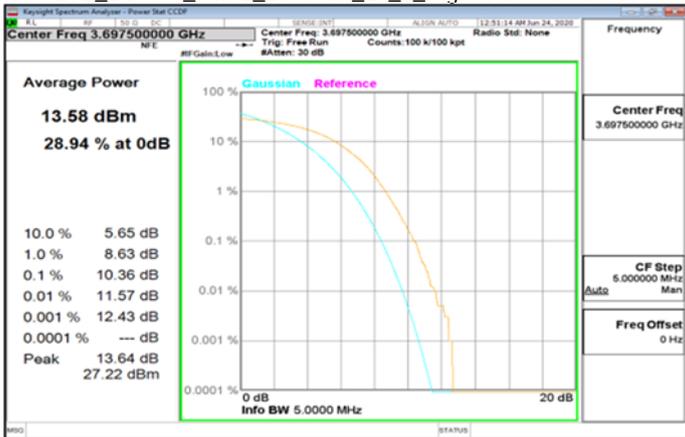
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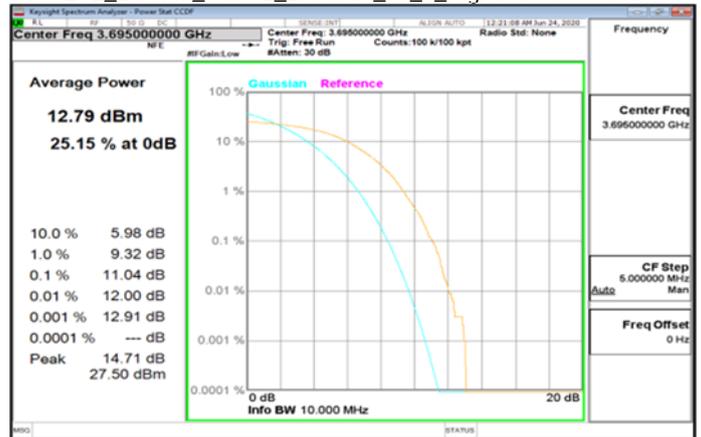
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LTE\_Band48\_10MHz\_256QAM\_50\_0\_HighCH56690-3695

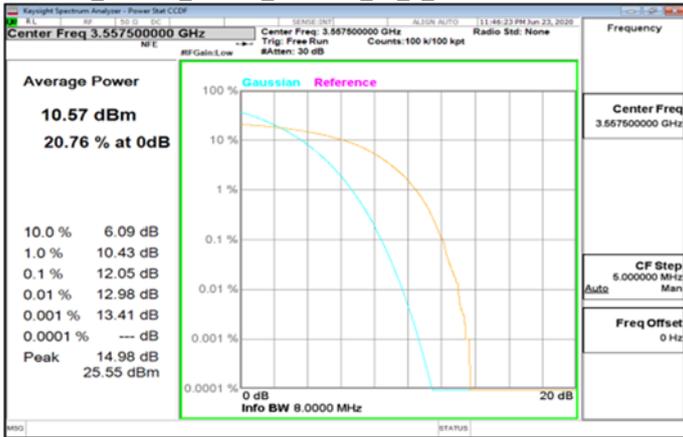


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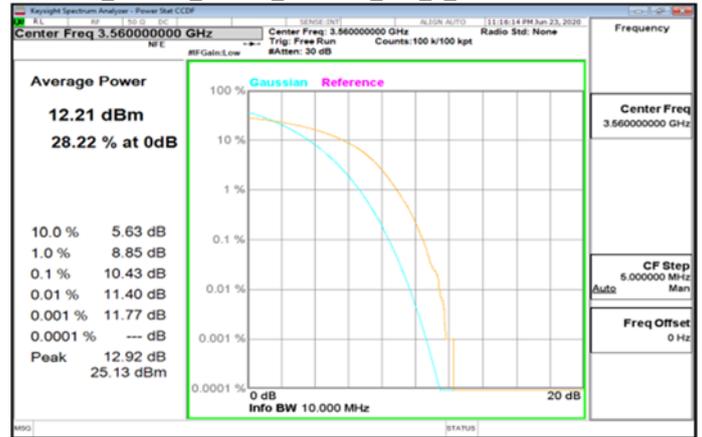
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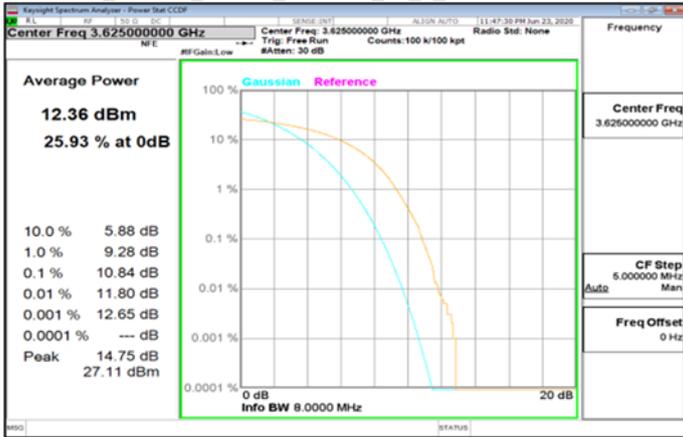
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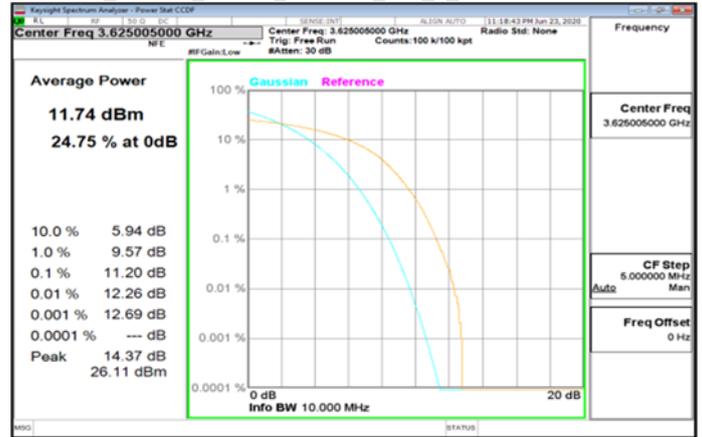
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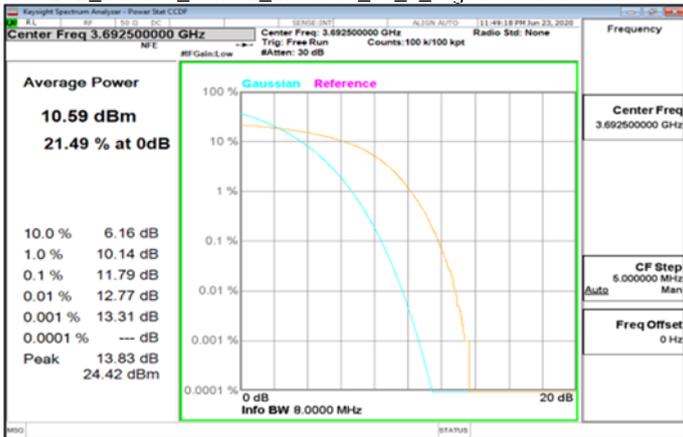
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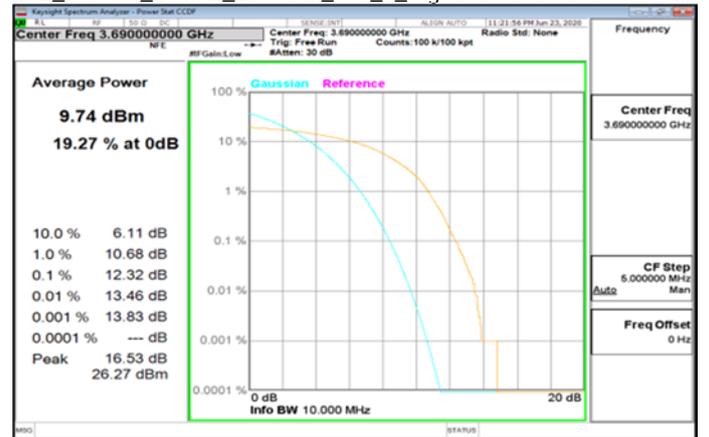
LTE\_Band48\_20MHz\_256QAM\_100\_0\_MidCH55990-3625



LTE\_Band48\_15MHz\_256QAM\_75\_0\_HighCH56665-3692.5



LTE\_Band48\_20MHz\_256QAM\_100\_0\_HighCH56640-3690



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