

Report Number :E2/2021/70039

Test Site :SAC D

Operation Mode :LTE B66

Test Date :2021-08-05

Test Mode :TX CH HIGH

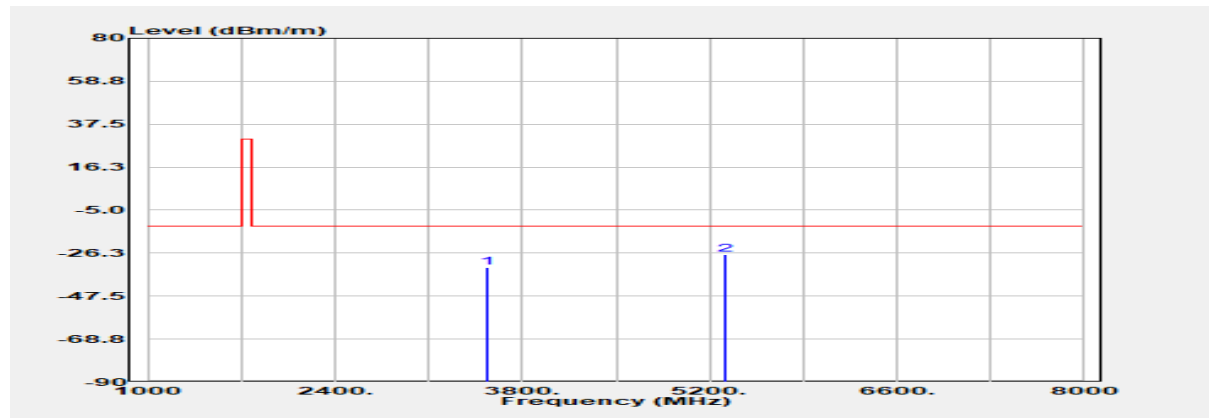
Temp./Humi. :21.3/65

EUT Pol :H Plane

Antenna Pol. :Vertical

Test Frequency :1772.5 MHz

Engineer :Jack Tseng



Freq. MHz	EIRP/ERP dBm	SG Output Level dBm	Antenna Gain dBi/dBd	Cable Loss dB	Limit dBm	Margin dB
3545.000	-33.23	-41.91	12.40	-3.72	-13.00	-20.23
5317.500	-27.10	-35.57	13.00	-4.54	-13.00	-14.10

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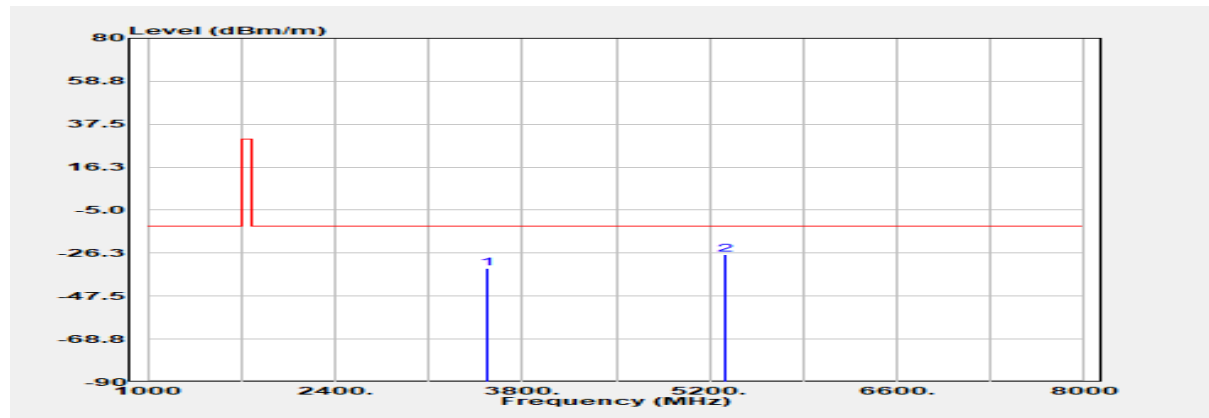
Temp./Humi. :21.3/65

EUT Pol :H Plane

Antenna Pol. :Horizontal

Test Frequency :1772.5 MHz

Engineer :Jack Tseng



Freq. MHz	EIRP/ERP dBm	SG Output Level dBm	Antenna Gain dBi/dBd	Cable Loss dB	Limit dBm	Margin dB
3545.000	-33.60	-42.28	12.40	-3.72	-13.00	-20.60
5317.500	-27.03	-35.50	13.00	-4.54	-13.00	-14.03

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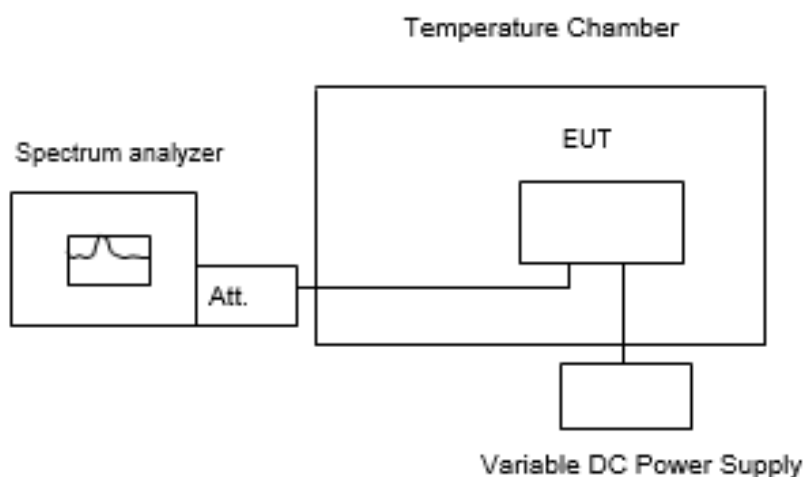
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## 10 FREQUENCY STABILITY MEASUREMENT

### 10.1 Standard Applicabl

The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

### 10.2 Test Set-up



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

### 10.3 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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## 10.4 Measurement Equipment Used

Conducted Emission Test Site: Conducted B					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Spectrum Analyzer	KEYSIGHT	N9010A	MY51440113	07/13/2021	07/12/2022
Radio Communication Analyzer	Anritsu	MT8820C	6201107337	07/28/2021	07/27/2022
Attenuator	Marvelous	MVE2213-10	RF05	11/19/2020	11/18/2021
DC Block	PASTER-NACK	PE8210	RF157	11/19/2020	11/18/2021
Splitter	Woken	DOM35LW1A2	RF255	11/19/2020	11/18/2021
Coaxial Cables	Woken	00100A1F1A185C	RF54	11/19/2020	11/18/2021
Coaxial Cables	Woken	00100A1F1A185C	RF55	11/19/2020	11/18/2021
Coaxial Cables	Woken	00100A1F1A185C	RF71	11/19/2020	11/18/2021
Coaxial Cables	Woken	00100A1F1A185C	RF72	11/19/2020	11/18/2021
DC Power Supply	Agilent	E3640A	MY53140006	05/28/2021	05/27/2022
Temperature Chamber	TERCHY	MHK-120LK	1020582	07/01/2021	06/30/2022
Test Software	SGS	Radio Test Software	Ver.21	N.C.R	N.C.R

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## 10.5 Measurement Result

**Note:** The battery is rated 24 Vdc.

Reference Freq.:		LTE B2 Mid Channel		1880	MHz 10M QPSK CH 18900
Power Supply Vdc	Temp. (°C)	Freq. (MHz)	Delta (Hz)	Limit = +/- 2.5 ppm (Hz)	
Freq. ERROR vs. VOLTAGE					
27.6	25	1880.000007	7	4700	
24	25	1879.999997	-3	4700	
20.4	25	1880.000008	8	4700	
19.1 (End Point)	25	1879.999996	-4	4700	
Freq. ERROR vs. Temp.					
24	-30	1879.999997	-3	4700	
24	-20	1880.000008	8	4700	
24	-10	1880.000007	7	4700	
24	0	1879.999998	-2	4700	
24	10	1880.000005	5	4700	
24	20	1880.000001	1	4700	
24	30	1880.000001	1	4700	
24	40	1880.000007	7	4700	
24	50	1880.000002	2	4700	

Reference Freq.:		LTE B4 Mid Channel		1732.5	MHz 10M QPSK CH 20175
Power Supply Vdc	Temp. (°C)	Freq. (MHz)	Delta (Hz)	Limit = +/- 2.5 ppm (Hz)	
Freq. ERROR vs. VOLTAGE					
27.6	25	1732.499995	-5	4331	
24	25	1732.500001	1	4331	
20.4	25	1732.499996	-4	4331	
19.1 (End Point)	25	1732.500007	7	4331	
Freq. ERROR vs. Temp.					
24	-30	1732.500000	0	4331	
24	-20	1732.499999	-1	4331	
24	-10	1732.500009	9	4331	
24	0	1732.500002	2	4331	
24	10	1732.500009	9	4331	
24	20	1732.500000	0	4331	
24	30	1732.499998	-2	4331	
24	40	1732.499996	-4	4331	
24	50	1732.500009	9	4331	

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Reference Freq.:		LTE B12 Mid Channel		707.5	MHz 10M QPSK CH 23095
Power Supply Vdc	Temp. (°C)	Freq. (MHz)	Delta (Hz)	Limit = +/- 2.5 ppm (Hz)	
Freq. ERROR vs. VOLTAGE					
27.6	25	707.500005	5	1769	
24	25	707.500004	4	1769	
20.4	25	707.500004	4	1769	
19.1 (End Point)	25	707.500005	5	1769	
Freq. ERROR vs. Temp.					
24	-30	707.500000	0	1769	
24	-20	707.499998	-2	1769	
24	-10	707.500000	0	1769	
24	0	707.499998	-2	1769	
24	10	707.499996	-4	1769	
24	20	707.500008	8	1769	
24	30	707.499995	-5	1769	
24	40	707.499995	-5	1769	
24	50	707.499995	-5	1769	

Reference Freq.:		LTE B17 Mid Channel		710	MHz 10M QPSK CH 23790
Power Supply Vdc	Temp. (°C)	Freq. (MHz)	Delta (Hz)	Limit = +/- 2.5 ppm (Hz)	
Freq. ERROR vs. VOLTAGE					
27.6	25	710.000000	0	1775	
24	25	709.999996	-4	1775	
20.4	25	710.000006	6	1775	
19.1 (End Point)	25	710.000003	3	1775	
Freq. ERROR vs. Temp.					
24	-30	709.999998	-2	1775	
24	-20	710.000006	6	1775	
24	-10	710.000008	8	1775	
24	0	710.000009	9	1775	
24	10	709.999995	-5	1775	
24	20	709.999999	-1	1775	
24	30	710.000005	5	1775	
24	40	710.000004	4	1775	
24	50	710.000004	4	1775	

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Reference Freq.:		LTE B66 Mid Channel		1745 MHz 10M QPSK CH 132322
Power Supply Vdc	Temp. (°C)	Freq. (MHz)	Delta (Hz)	Limit = +/- 2.5 ppm (Hz)
Freq. ERROR vs. VOLTAGE				
27.6	25	1745.000006	6	4363
24	25	1744.999996	-4	4363
20.4	25	1745.000006	6	4363
19.1 (End Point)	25	1745.000004	4	4363
Freq. ERROR vs. Temp.				
24	-30	1744.999998	-2	4363
24	-20	1744.999998	-2	4363
24	-10	1745.000007	7	4363
24	0	1745.000003	3	4363
24	10	1745.000003	3	4363
24	20	1744.999995	-5	4363
24	30	1745.000008	8	4363
24	40	1745.000005	5	4363
24	50	1744.999996	-4	4363

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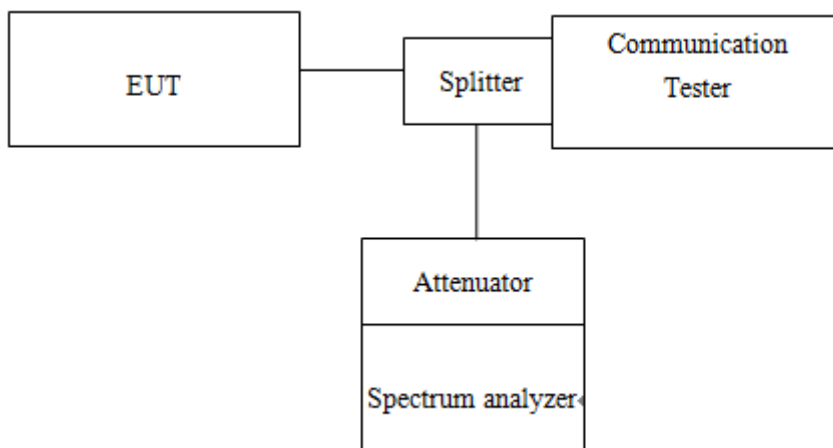
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## 11 PEAK TO AVERAGE RATIO

### 11.1 Standard Applicable

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

### 11.2 Test SET-UP



### 11.3 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.

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## 11.4 Measurement Equipment Used

Conducted Emission Test Site: Conducted B					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Spectrum Analyzer	KEYSIGHT	N9010A	MY51440113	07/13/2021	07/12/2022
Radio Communication Analyzer	Anritsu	MT8820C	6201107337	07/28/2021	07/27/2022
Attenuator	Marvelous	MVE2213-10	RF05	11/19/2020	11/18/2021
DC Block	PASTER-NACK	PE8210	RF157	11/19/2020	11/18/2021
Splitter	Woken	DOM35LW1A2	RF255	11/19/2020	11/18/2021
Coaxial Cables	Woken	00100A1F1A185C	RF54	11/19/2020	11/18/2021
Coaxial Cables	Woken	00100A1F1A185C	RF55	11/19/2020	11/18/2021
Coaxial Cables	Woken	00100A1F1A185C	RF71	11/19/2020	11/18/2021
Coaxial Cables	Woken	00100A1F1A185C	RF72	11/19/2020	11/18/2021
DC Power Supply	Agilent	E3640A	MY53140006	05/28/2021	05/27/2022
Temperature Chamber	TERCHY	MHK-120LK	1020582	07/01/2021	06/30/2022
Test Software	SGS	Radio Test Software	Ver.21	N.C.R	N.C.R

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## 11.5 Measurement Result

LTE BAND 2							
Channel bandwidth: 1.4MHz				Channel bandwidth: 3MHz			
Freq. (MHz)	CH	PAPR (dB)		Freq. (MHz)	CH	PAPR (dB)	
		16QAM	Limit			16QAM	Limit
1850.7	18607	5.08	13	1851.5	18615	5.37	13
1880.0	18900	5.18	13	1880.0	18900	5.33	13
1909.3	19193	5.20	13	1908.5	19185	5.38	13

LTE BAND 2							
Channel bandwidth: 5MHz				Channel bandwidth: 10MHz			
Freq. (MHz)	CH	PAPR (dB)		Freq. (MHz)	CH	PAPR (dB)	
		16QAM	Limit			16QAM	Limit
1852.5	18625	5.29	13	1855.0	18650	4.39	13
1880.0	18900	5.56	13	1880.0	18900	4.53	13
1907.5	19175	5.20	13	1905.0	19150	4.14	13

LTE BAND 2							
Channel bandwidth: 15MHz				Channel bandwidth: 20MHz			
Freq. (MHz)	CH	PAPR (dB)		Freq. (MHz)	CH	PAPR (dB)	
		16QAM	Limit			16QAM	Limit
1857.5	18675	4.31	13	1860.0	18700	4.42	13
1880.0	18900	4.50	13	1880.0	18900	4.48	13
1902.5	19125	3.86	13	1900.0	19100	4.25	13

LTE BAND 4							
Channel bandwidth: 1.4MHz				Channel bandwidth: 3MHz			
Freq. (MHz)	CH	PAPR (dB)		Freq. (MHz)	CH	PAPR (dB)	
		16QAM	Limit			16QAM	Limit
1710.7	19957	5.49	13	1711.5	19965	5.51	13
1732.5	20175	5.36	13	1732.5	20175	5.32	13
1754.3	20393	5.37	13	1753.5	20385	5.55	13

LTE BAND 4							
Channel bandwidth: 5MHz				Channel bandwidth: 10MHz			
Freq. (MHz)	CH	PAPR (dB)		Freq. (MHz)	CH	PAPR (dB)	
		16QAM	Limit			16QAM	Limit
1712.5	19957	5.34	13	1715.0	20000	4.61	13
1732.5	20175	5.24	13	1732.5	20175	4.44	13
1752.5	20375	5.37	13	1750.0	20350	4.71	13

LTE BAND 4							
Channel bandwidth: 15MHz				Channel bandwidth: 20MHz			
Freq. (MHz)	CH	PAPR (dB)		Freq. (MHz)	CH	PAPR (dB)	
		16QAM	Limit			16QAM	Limit
1717.5	20025	4.58	13	1720.0	20050	4.57	13
1732.5	20175	4.13	13	1732.5	20175	4.72	13
1747.5	20325	4.39	13	1745.0	20300	4.29	13

LTE BAND 12							
Channel bandwidth: 1.4MHz				Channel bandwidth: 3MHz			
Freq. (MHz)	CH	PAPR (dB)		Freq. (MHz)	CH	PAPR (dB)	
		16QAM	Limit			16QAM	Limit
699.7	23017	5.92	13	700.5	23025	6.04	13
707.5	23095	6.05	13	707.5	23095	6.21	13
715.3	23173	6.20	13	714.5	23165	6.19	13

LTE BAND 12							
Channel bandwidth: 5MHz				Channel bandwidth: 10MHz			
Freq. (MHz)	CH	PAPR (dB)		Freq. (MHz)	CH	PAPR (dB)	
		16QAM	Limit			16QAM	Limit
701.5	23035	5.96	13	704.0	23060	5.81	13
707.5	23095	6.02	13	707.5	23095	5.67	13
713.5	23155	5.98	13	711.0	23130	5.78	13

LTE BAND 17							
Channel bandwidth: 5MHz				Channel bandwidth: 10MHz			
Freq. (MHz)	CH	PAPR (dB)		Freq. (MHz)	CH	PAPR (dB)	
		16QAM	Limit			16QAM	Limit
706.5	23755	6.04	13	709.0	23780	5.74	13
710.0	23790	6.11	13	710.0	23790	5.82	13
713.5	23825	6.13	13	711.0	23800	5.74	13

LTE BAND 66							
Channel bandwidth: 1.4MHz				Channel bandwidth: 3MHz			
Freq. (MHz)	CH	PAPR (dB)		Freq. (MHz)	CH	PAPR (dB)	
		16QAM	Limit			16QAM	Limit
1710.7	131979	6.57	13	1711.5	131987	6.47	13
1745.0	132322	6.38	13	1745.0	132322	6.28	13
1779.3	132665	6.16	13	1778.5	132657	6.08	13

LTE BAND 66							
Channel bandwidth: 5MHz				Channel bandwidth: 10MHz			
Freq. (MHz)	CH	PAPR (dB)		Freq. (MHz)	CH	PAPR (dB)	
		16QAM	Limit			16QAM	Limit
1712.5	131997	6.57	13	1715.0	132022	6.20	13
1745.0	132322	6.04	13	1745.0	132322	5.95	13
1777.5	132647	6.05	13	1775.0	132622	5.79	13

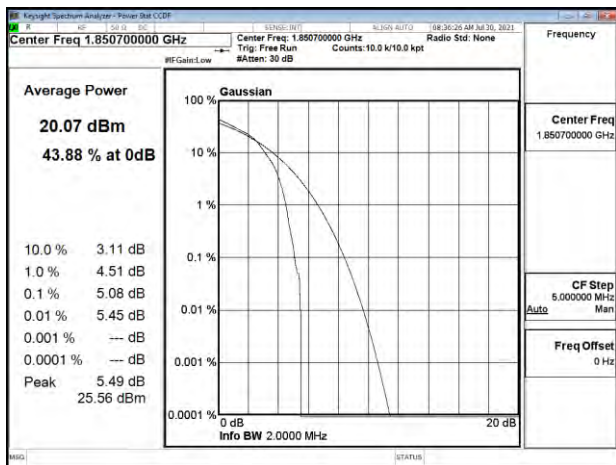
LTE BAND 66							
Channel bandwidth: 15MHz				Channel bandwidth: 20MHz			
Freq. (MHz)	CH	PAPR (dB)		Freq. (MHz)	CH	PAPR (dB)	
		16QAM	Limit			16QAM	Limit
1717.5	132047	6.07	13	1720.0	132072	5.85	13
1745.0	132322	5.19	13	1745.0	132322	4.97	13
1772.5	132597	5.77	13	1770.0	132572	6.02	13

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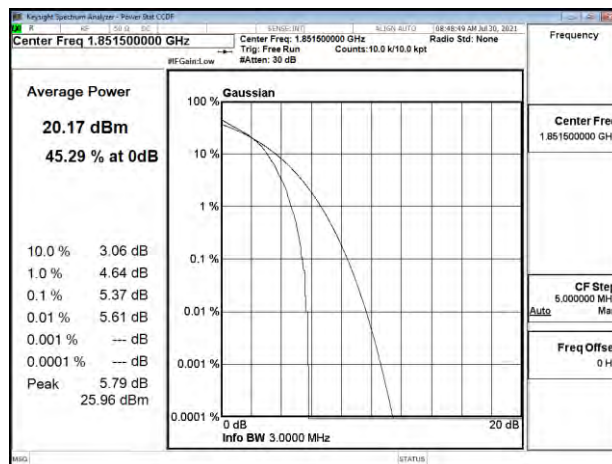
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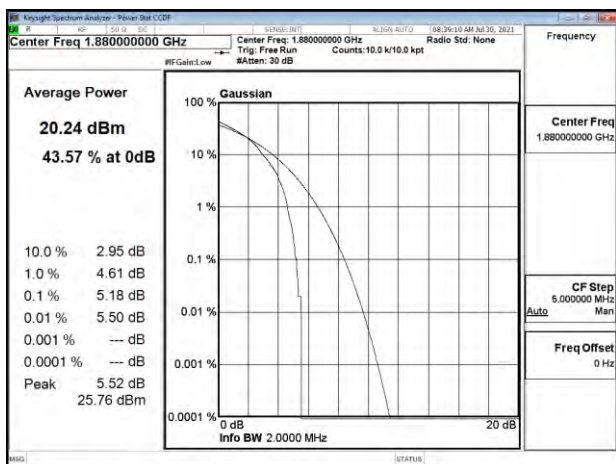
Band2\_1.4MHz\_16QAM\_RB6\_0\_CH18607



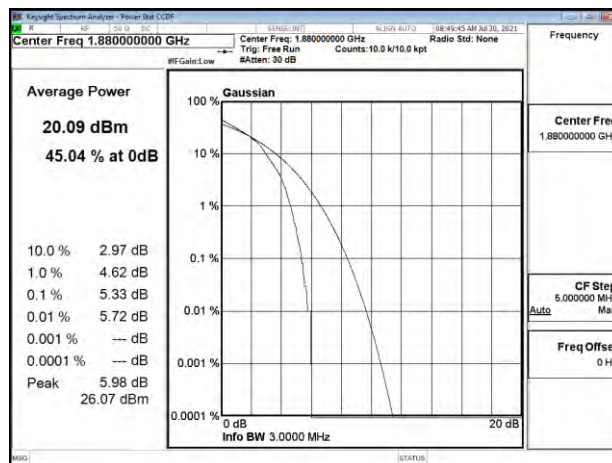
Band2\_3MHz\_16QAM\_RB15\_0\_CH18615



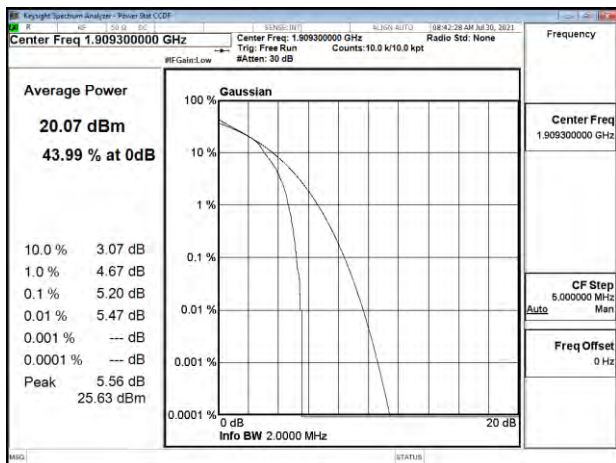
Band2\_1.4MHz\_16QAM\_RB6\_0\_CH18900



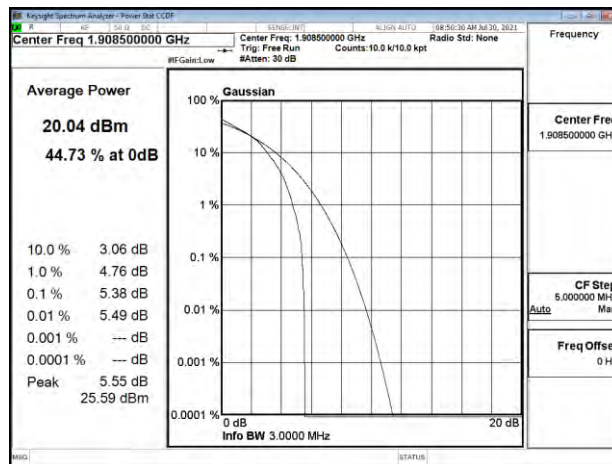
Band2\_3MHz\_16QAM\_RB15\_0\_CH18900



Band2\_1.4MHz\_16QAM\_RB6\_0\_CH19193



Band2\_3MHz\_16QAM\_RB15\_0\_CH19185

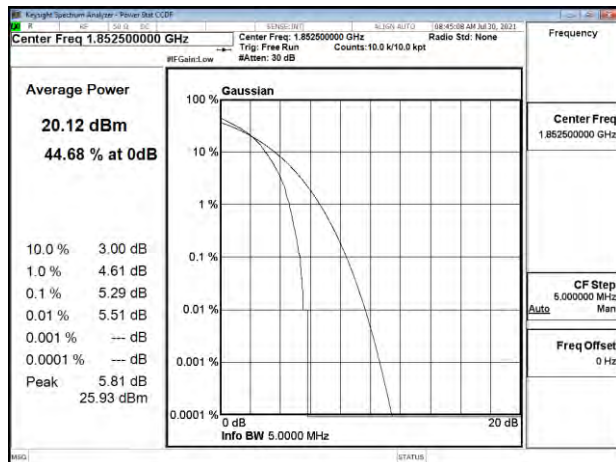


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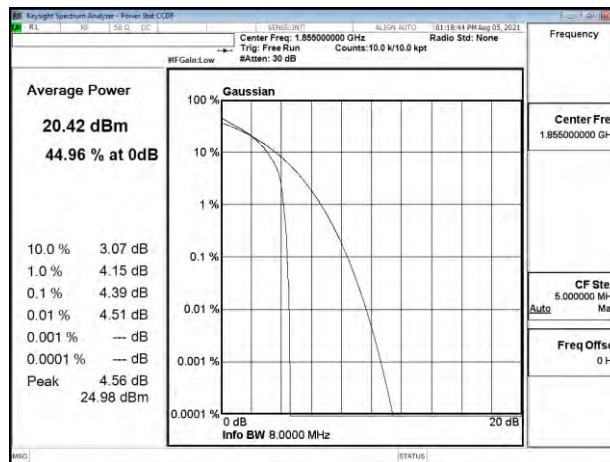
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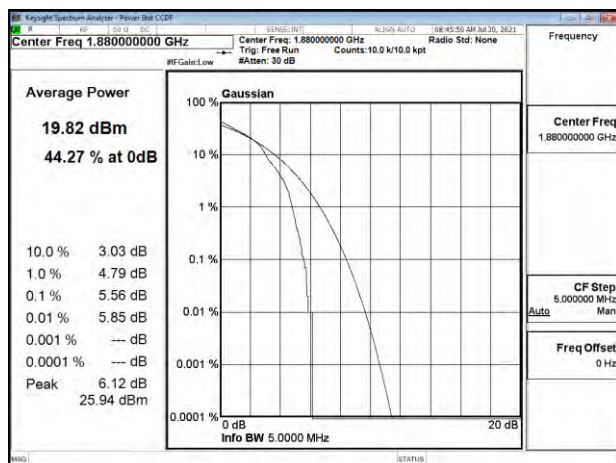
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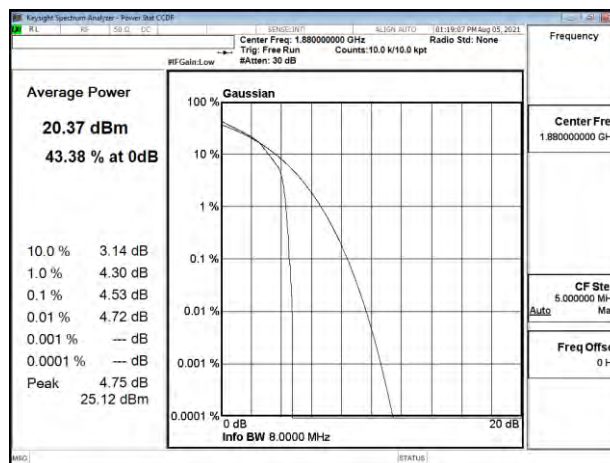
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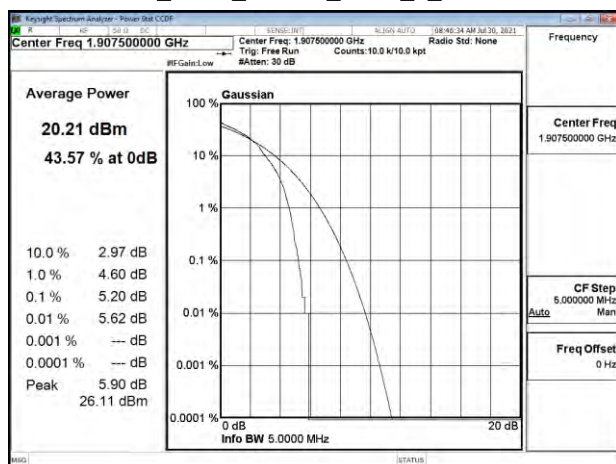
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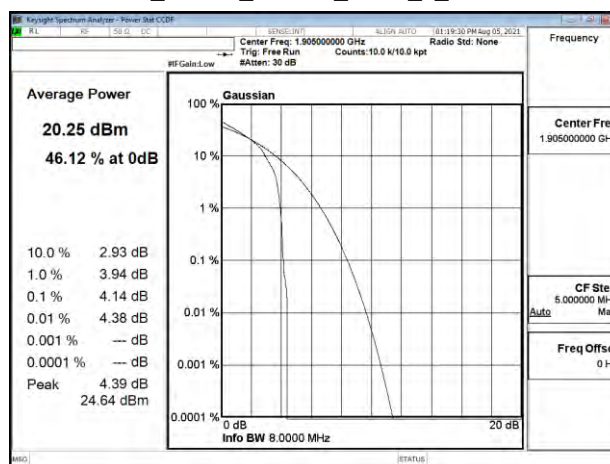
Band2\_10MHz\_16QAM\_RB16\_0\_CH18900



Band2\_5MHz\_16QAM\_RB25\_0\_CH19175



Band2\_10MHz\_16QAM\_RB16\_0\_CH19150



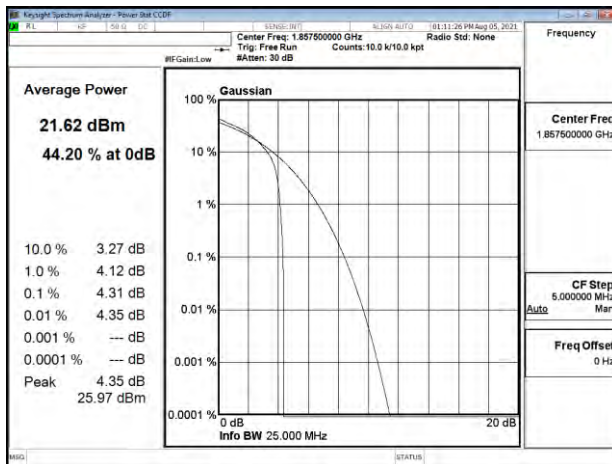
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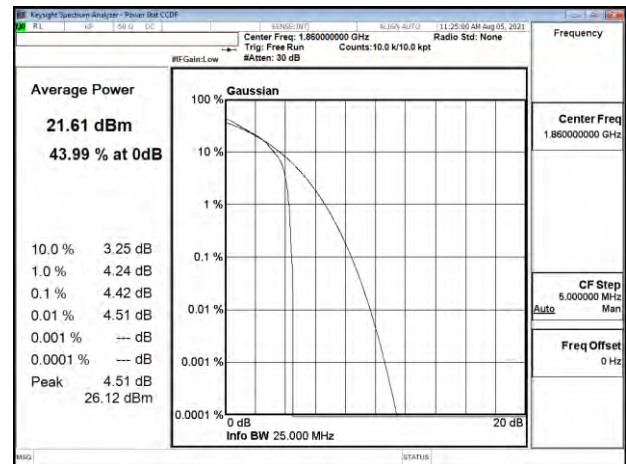
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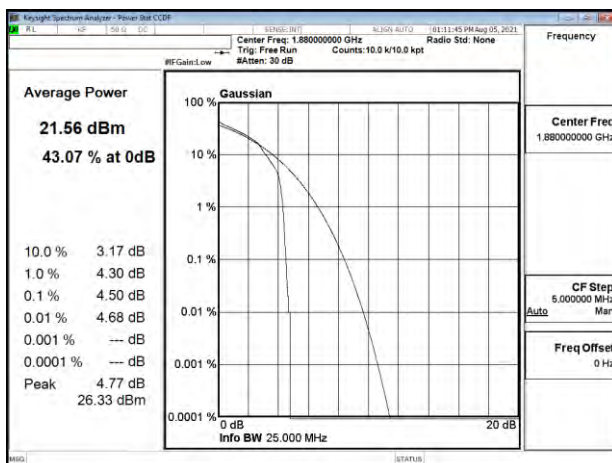
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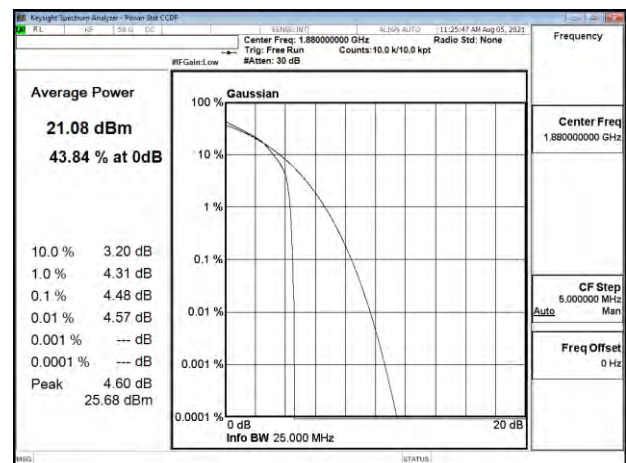
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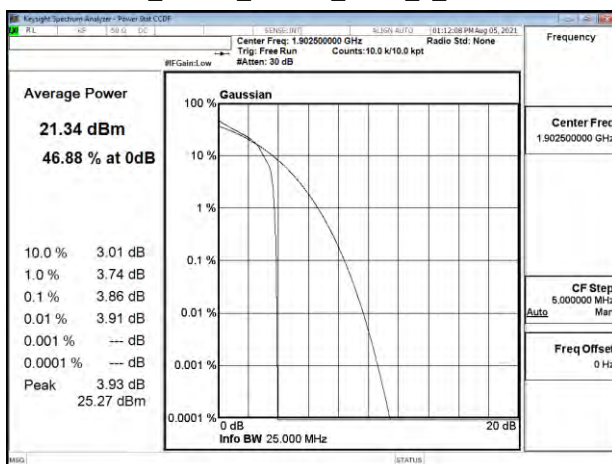
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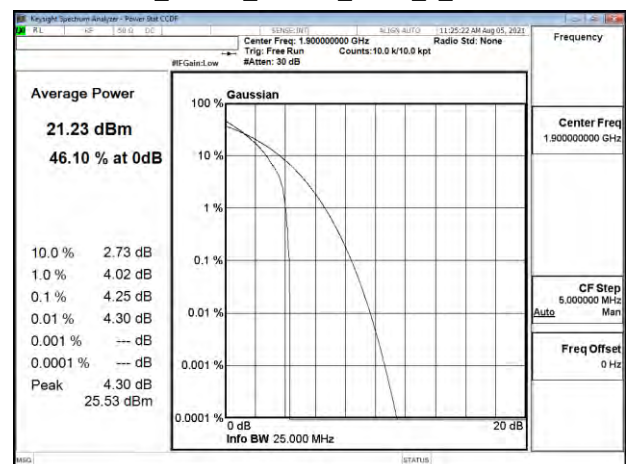
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Band2\_15MHz\_16QAM\_RB16\_0\_CH19125



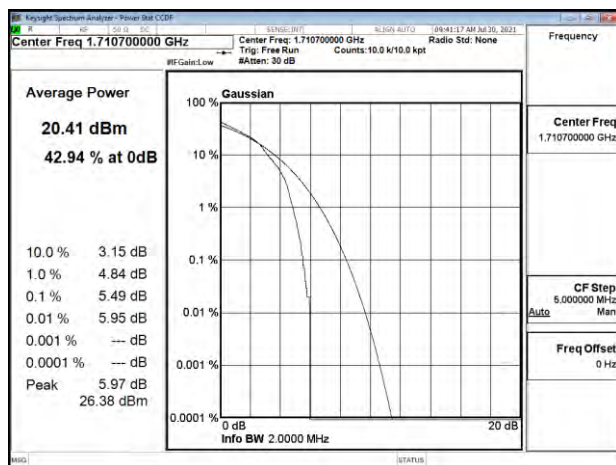
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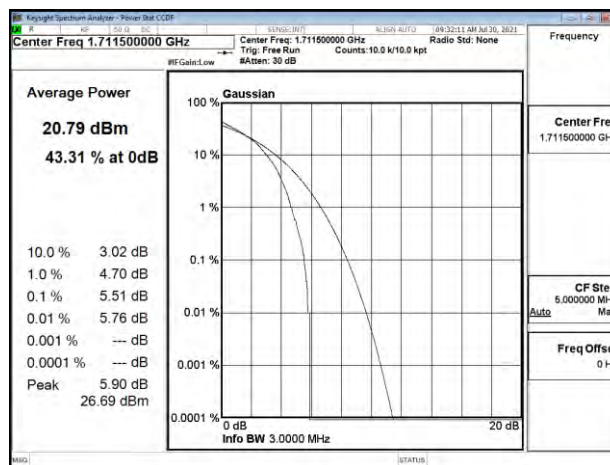
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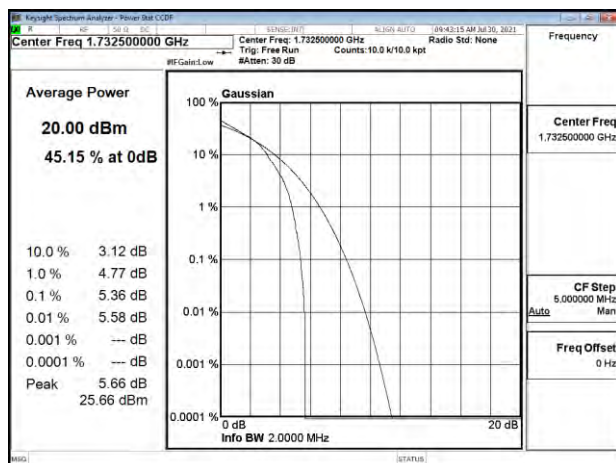
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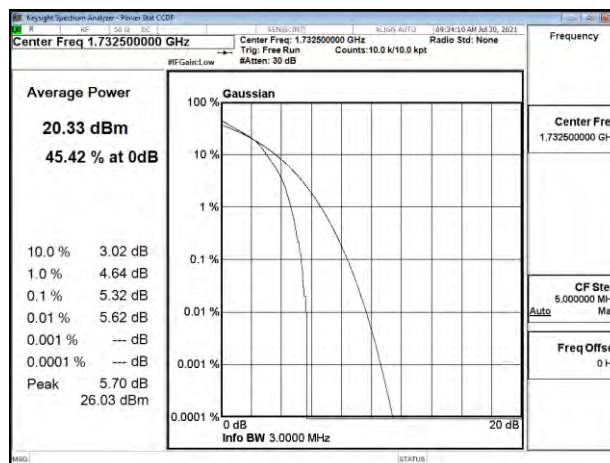
Band4\_3MHz\_16QAM\_RB15\_0\_CH19965



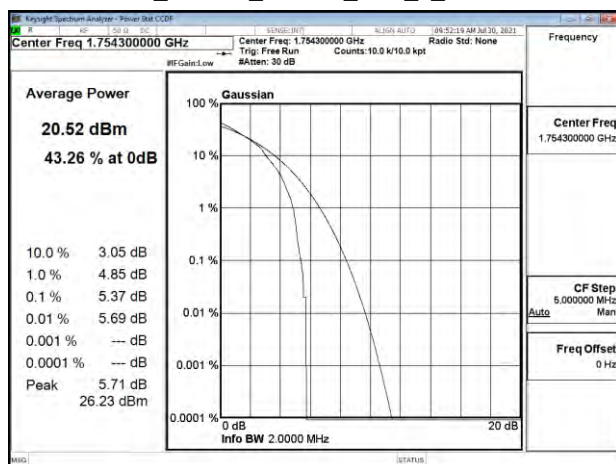
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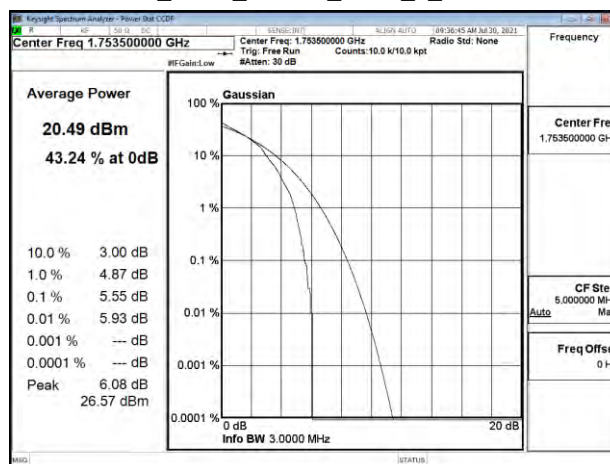
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Band4\_1.4MHz\_16QAM\_RB6\_0\_CH20393



Band4\_3MHz\_16QAM\_RB15\_0\_CH20385

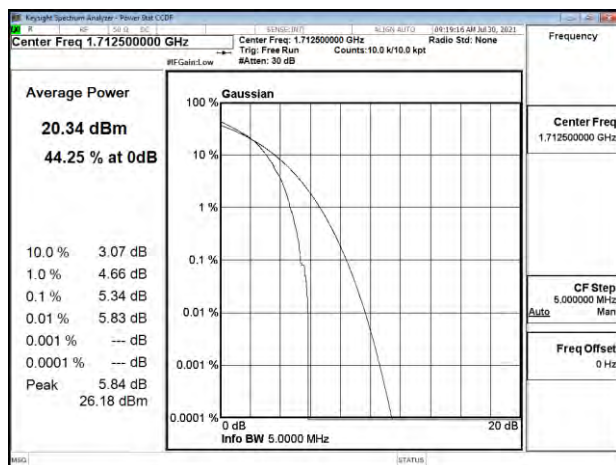


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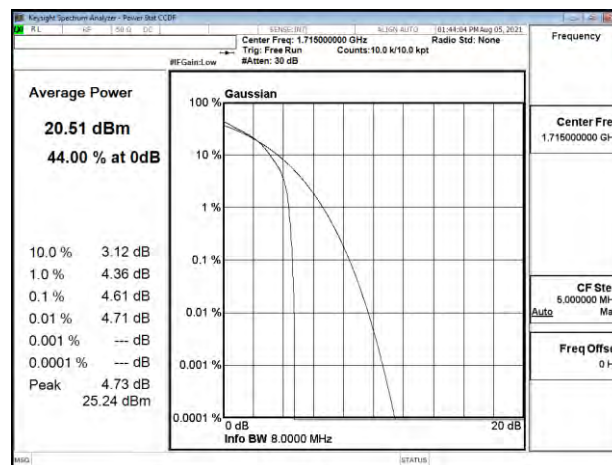
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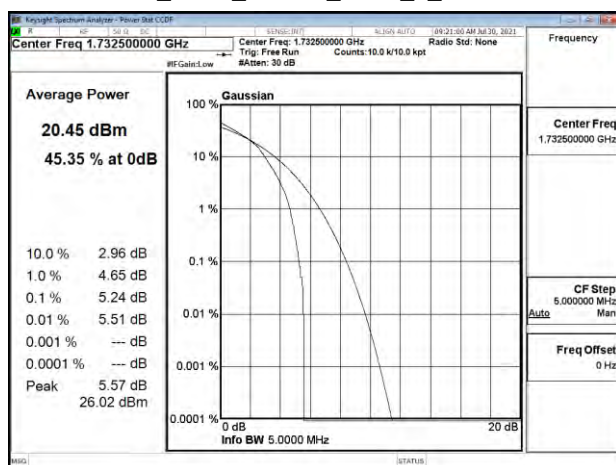
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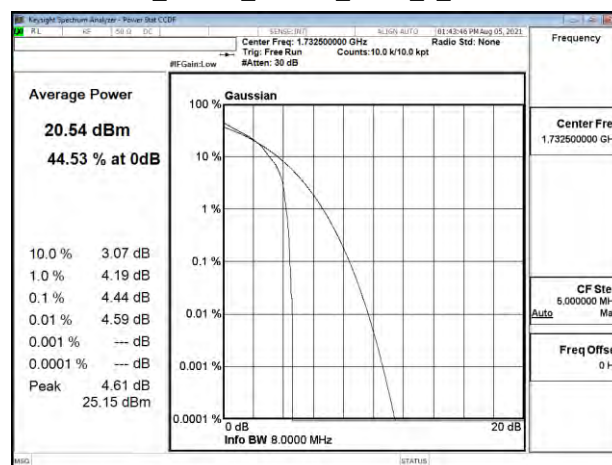
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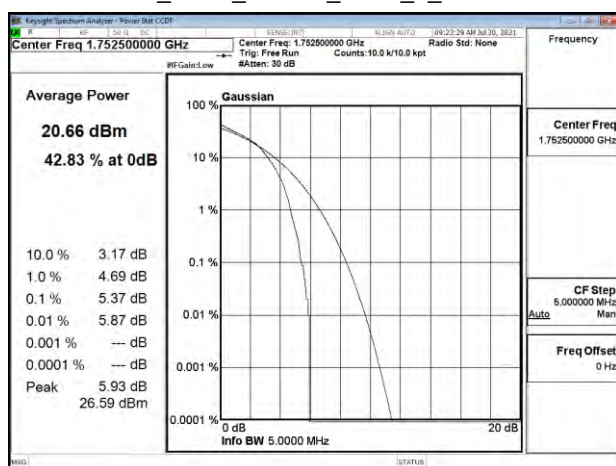
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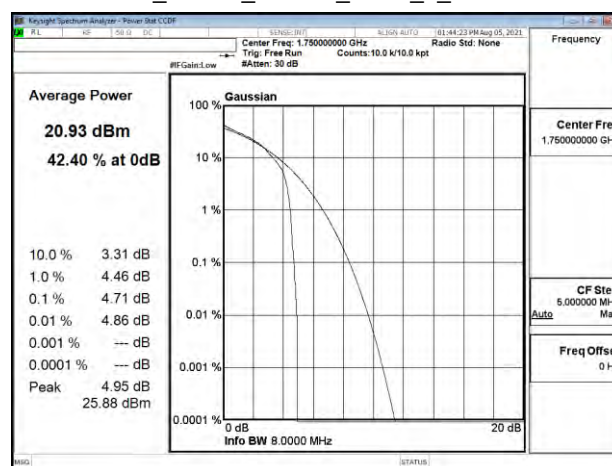
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Band4\_5MHz\_16QAM\_RB25\_0\_CH20375



Band4\_10MHz\_16QAM\_RB16\_0\_CH20350



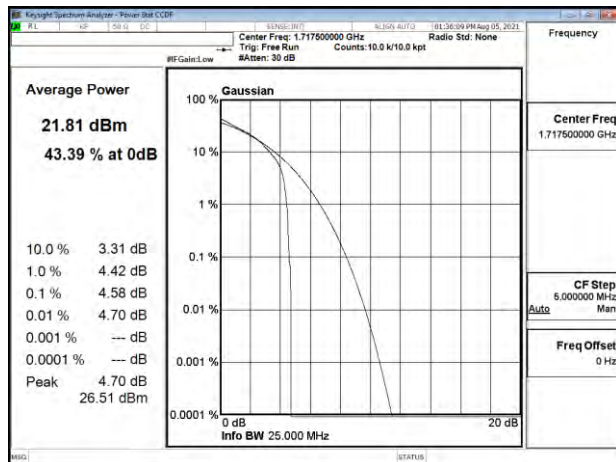
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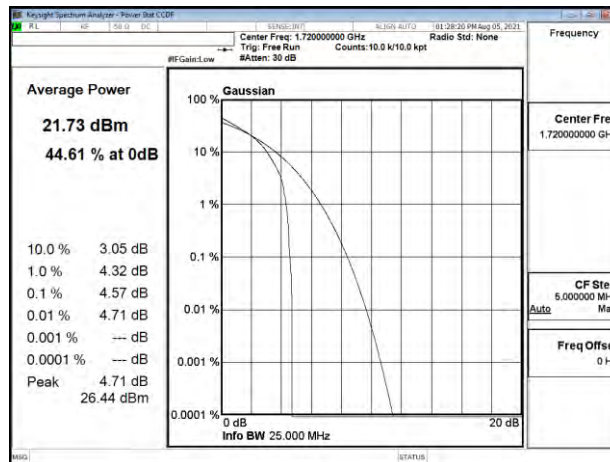
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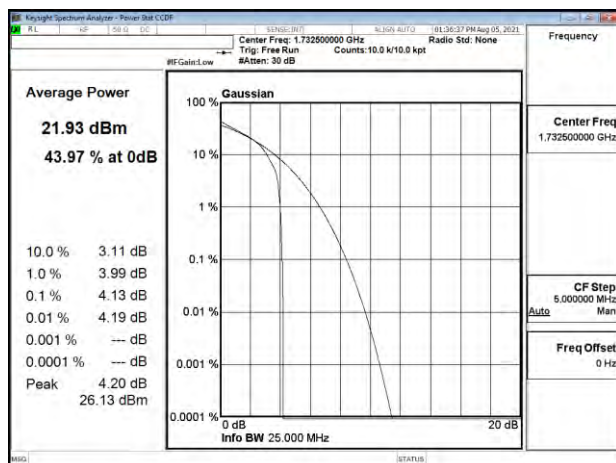
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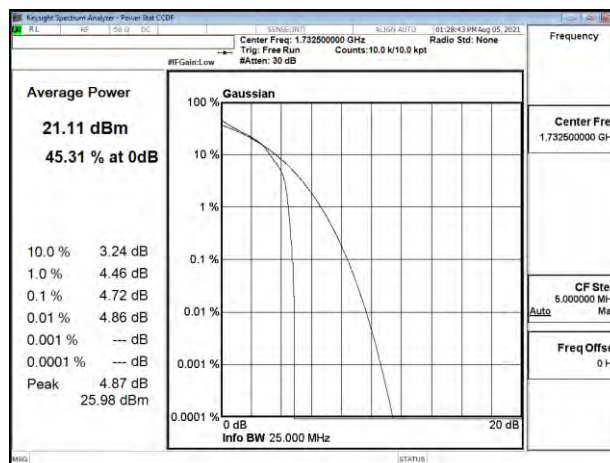
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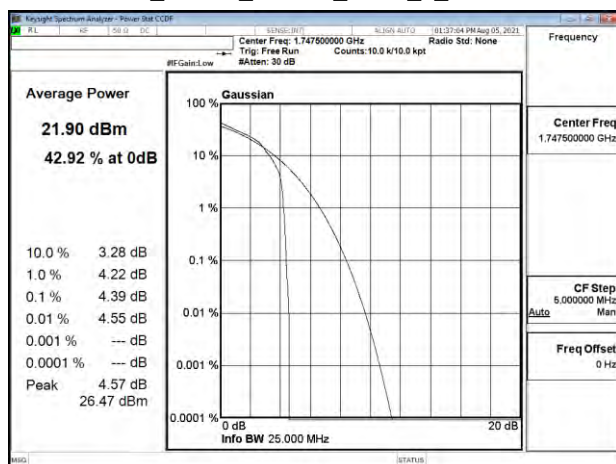
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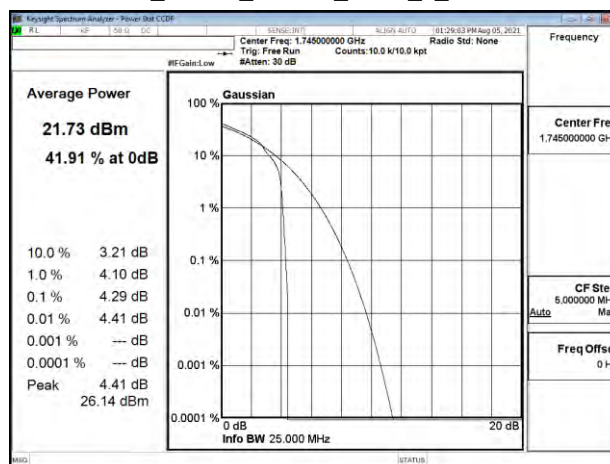
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Band4\_15MHz\_16QAM\_RB16\_0\_CH20325



Band4\_20MHz\_16QAM\_RB18\_0\_CH20300



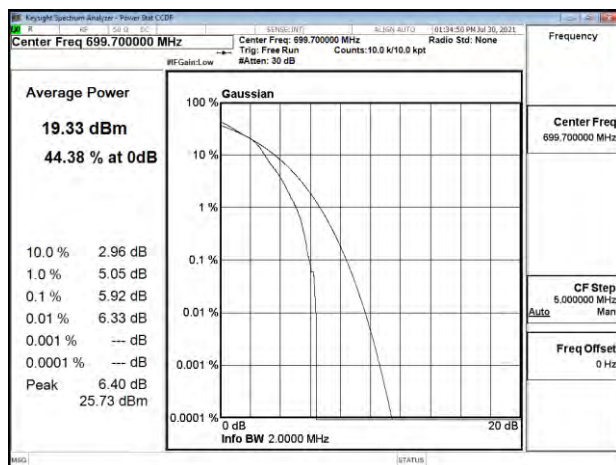
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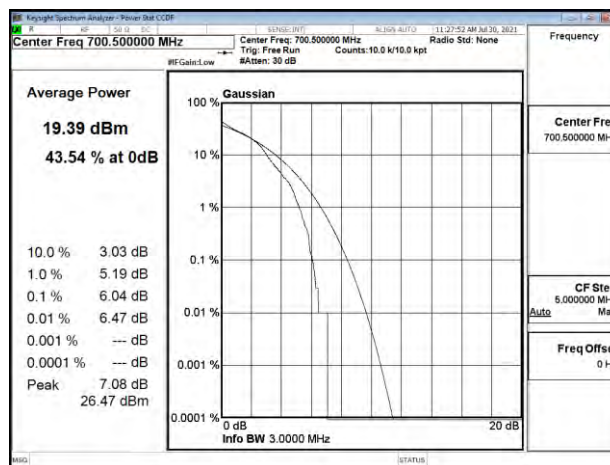
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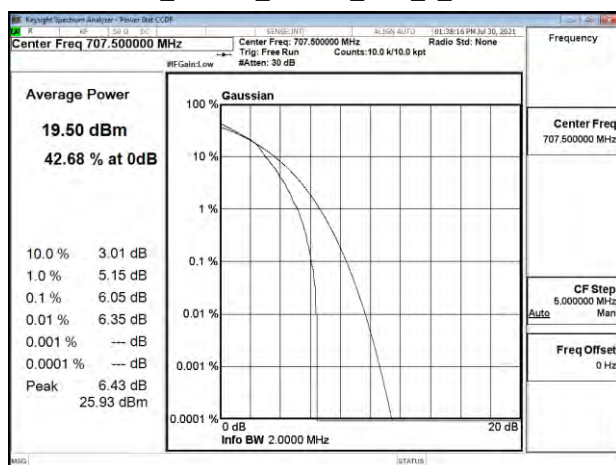
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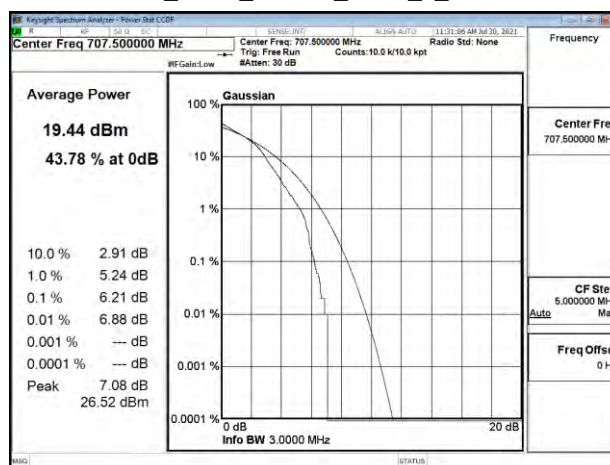
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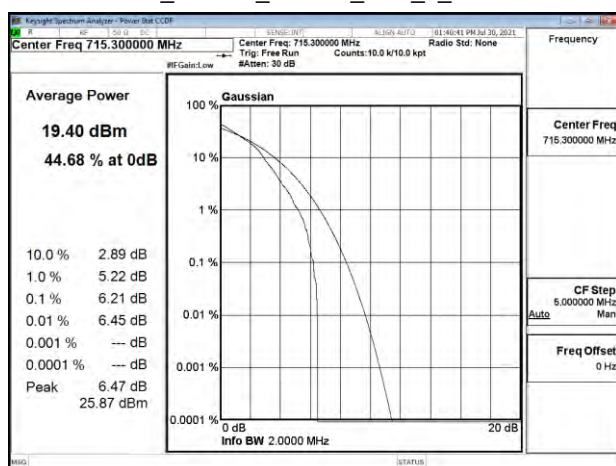
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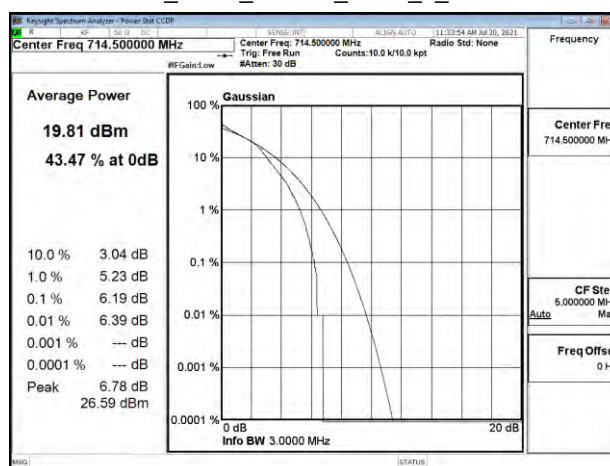
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Band12\_1.4MHz\_16QAM\_RB6\_0\_CH23173



Band12\_3MHz\_16QAM\_RB15\_0\_CH23165

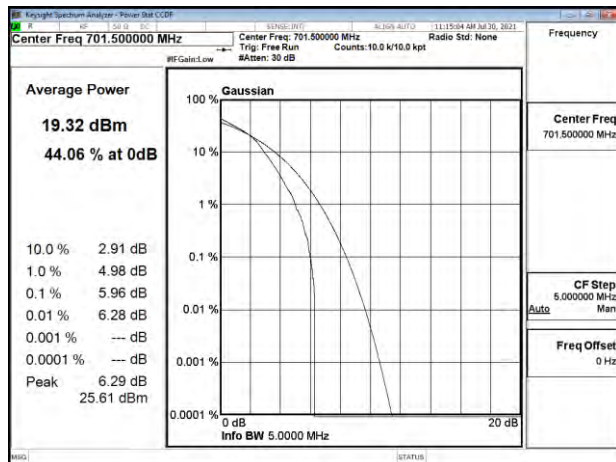


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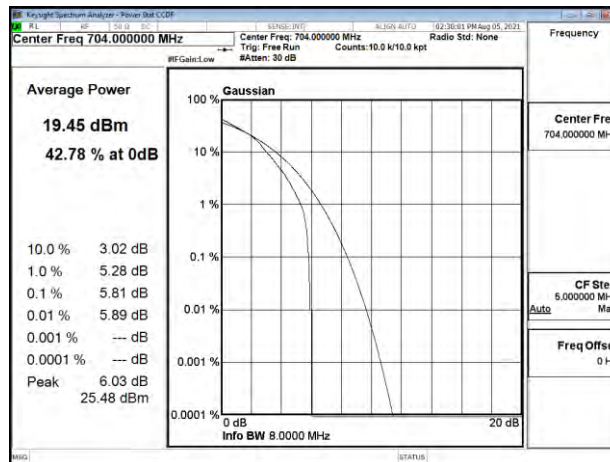
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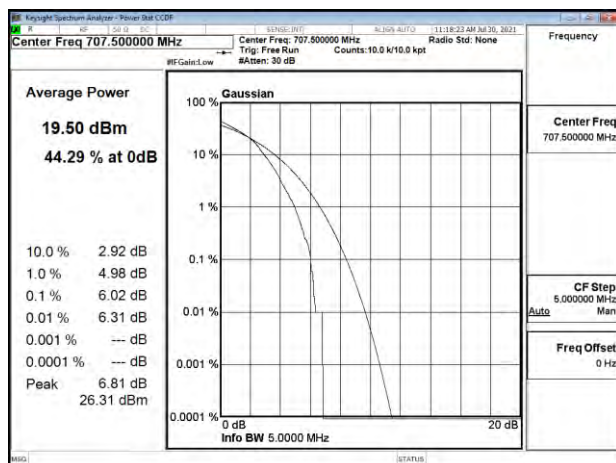
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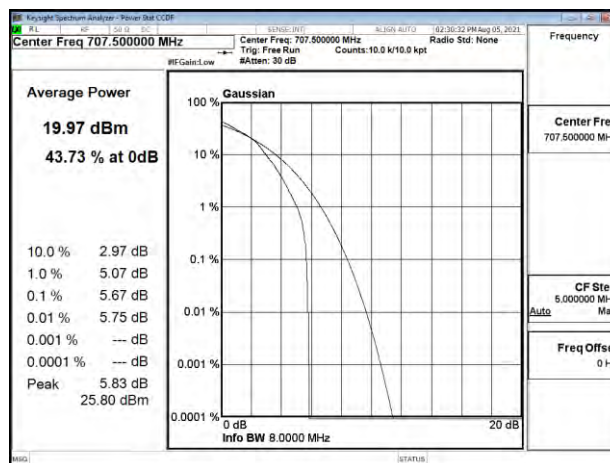
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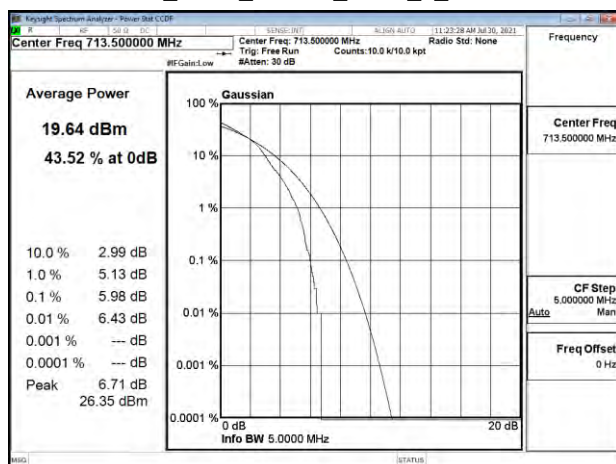
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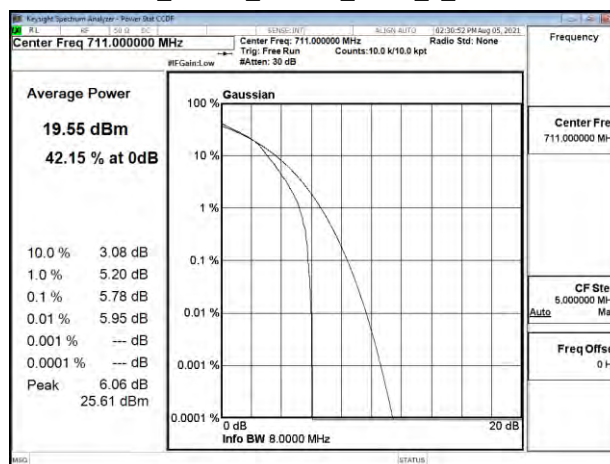
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Band12\_5MHz\_16QAM\_RB25\_0\_CH23155



Band12\_10MHz\_16QAM\_RB16\_0\_CH23130

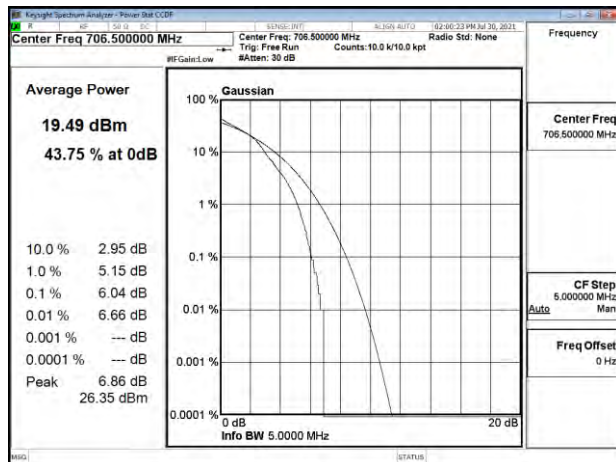


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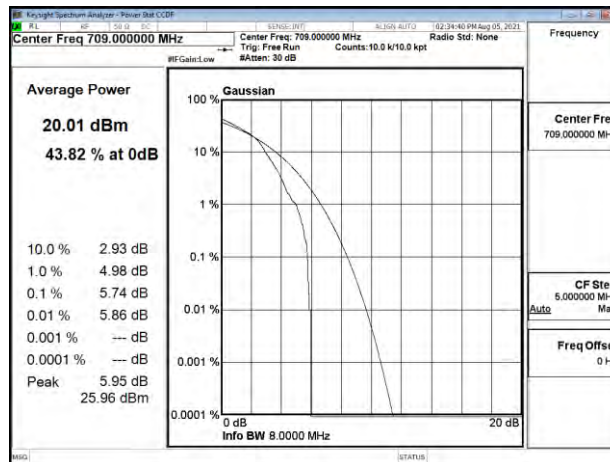
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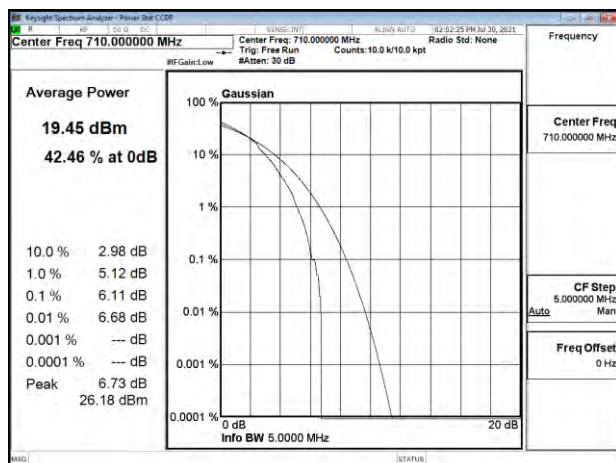
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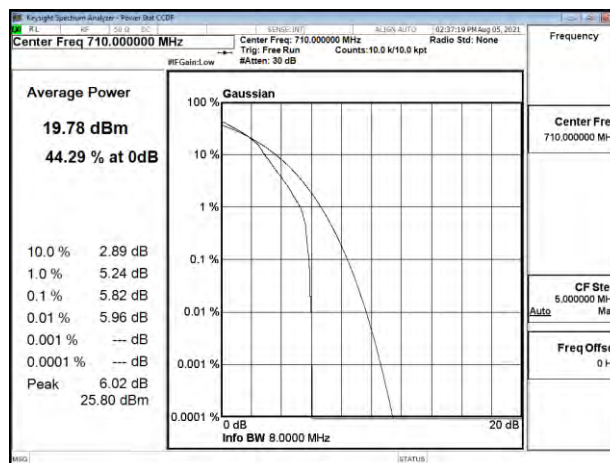
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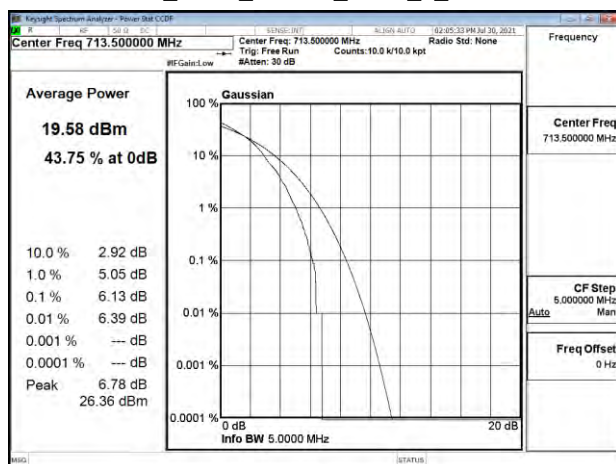
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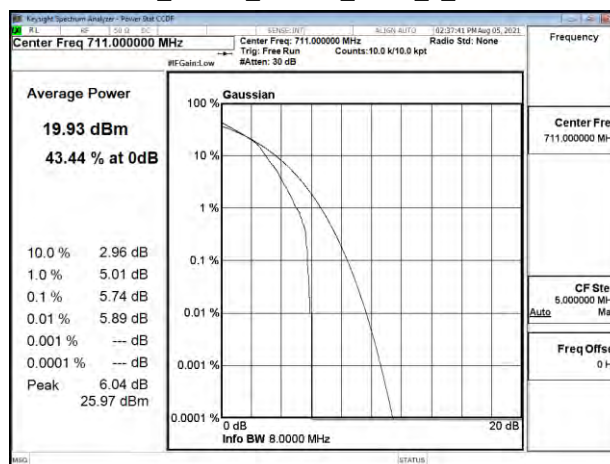
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Band17\_10MHz\_16QAM\_RB16\_0\_CH23800



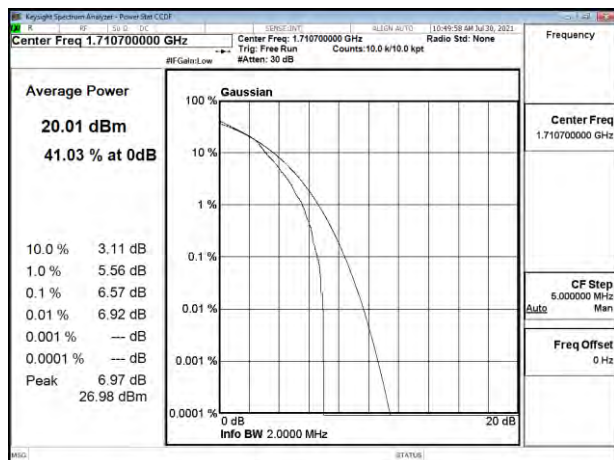
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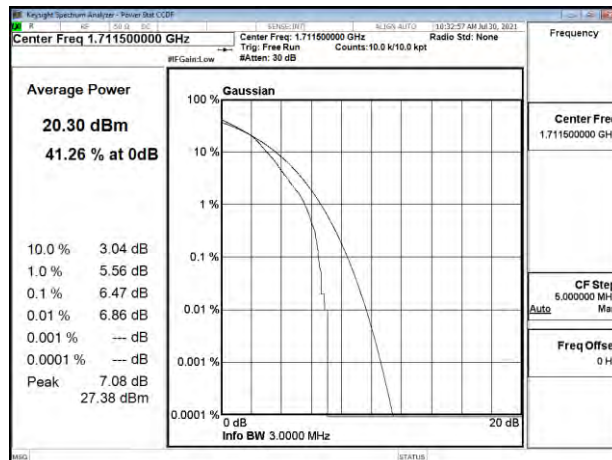
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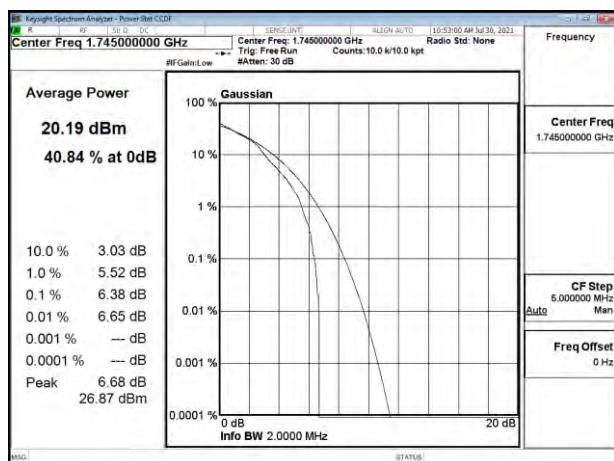
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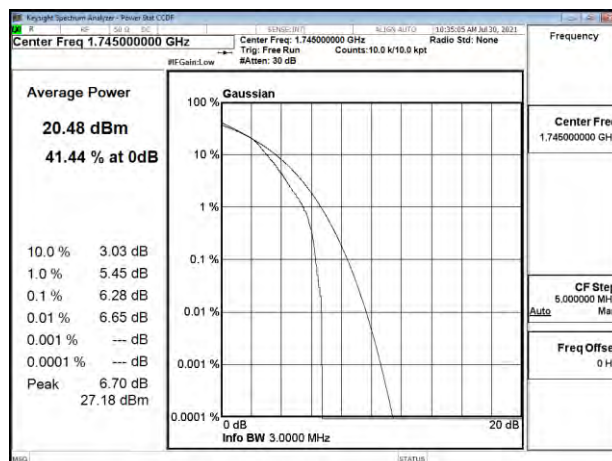
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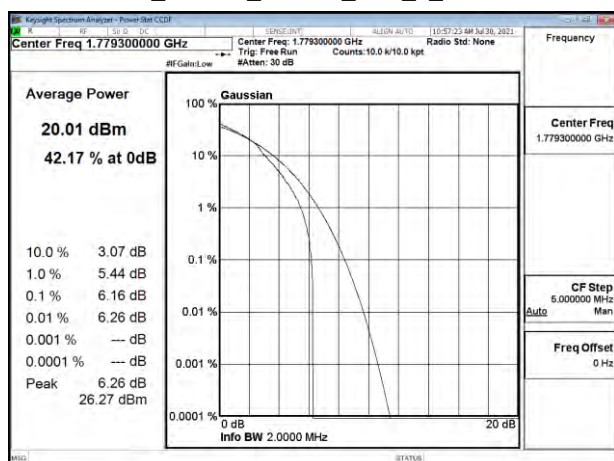
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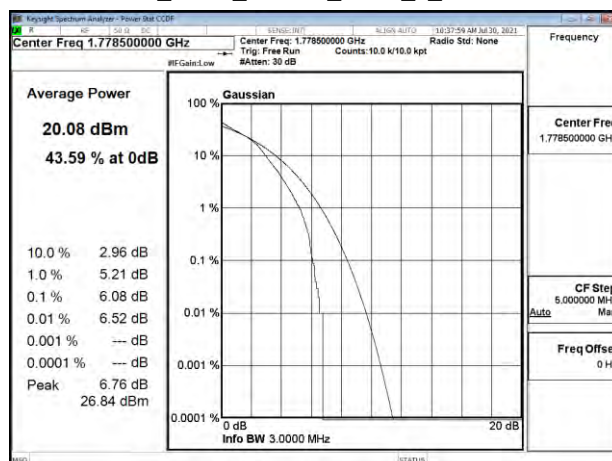
Band66\_3MHz\_16QAM\_RB15\_0\_CH132322



Band66\_1.4MHz\_16QAM\_RB6\_0\_CH132665



Band66\_3MHz\_16QAM\_RB15\_0\_CH132657

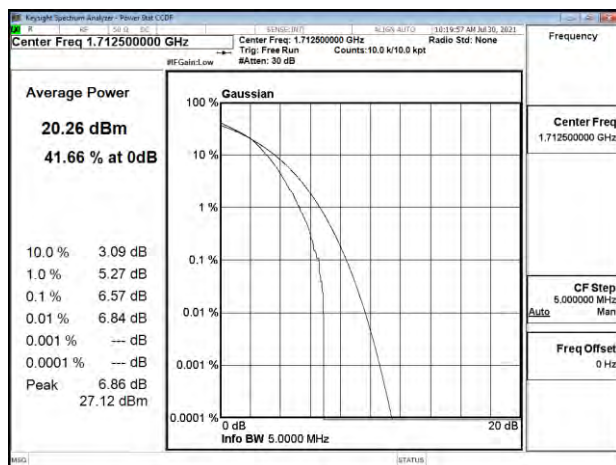


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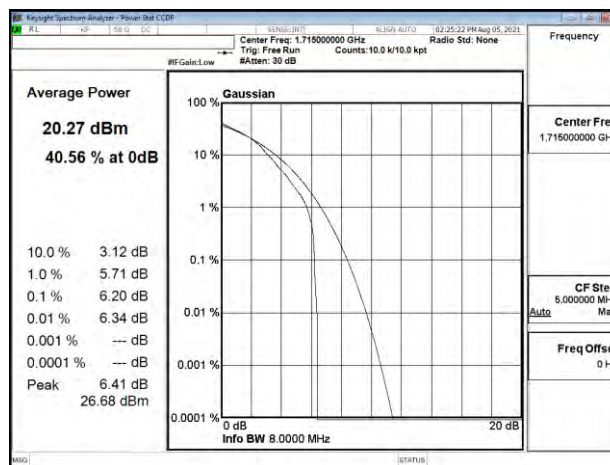
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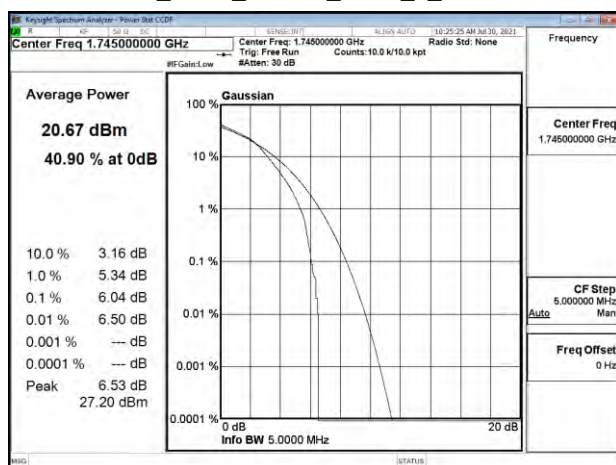
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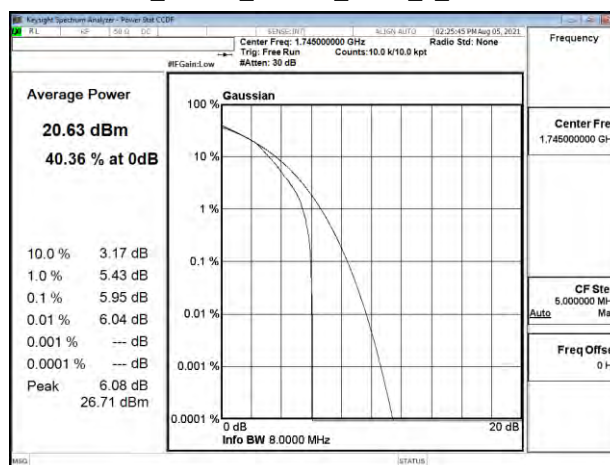
Band66\_10MHz\_16QAM\_RB16\_0\_CH132022



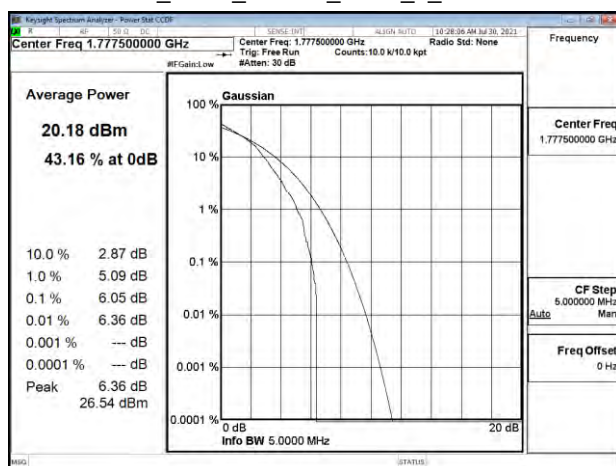
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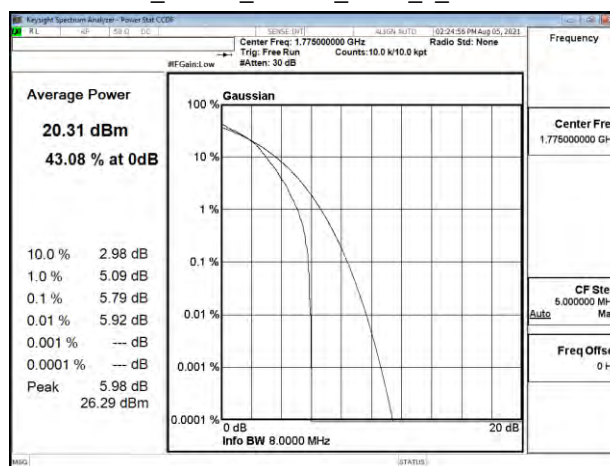
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Band66\_5MHz\_16QAM\_RB25\_0\_CH132647



Band66\_10MHz\_16QAM\_RB16\_0\_CH132622



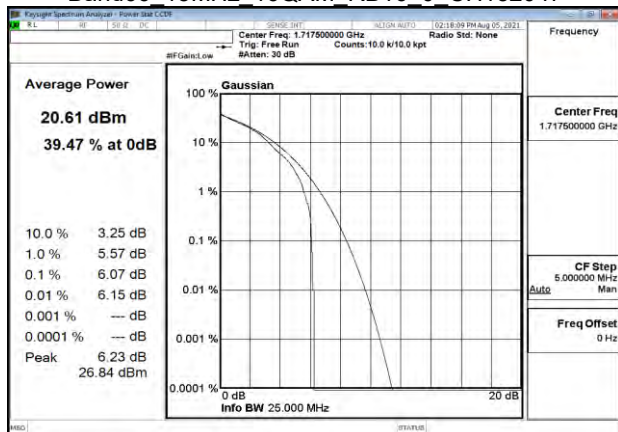
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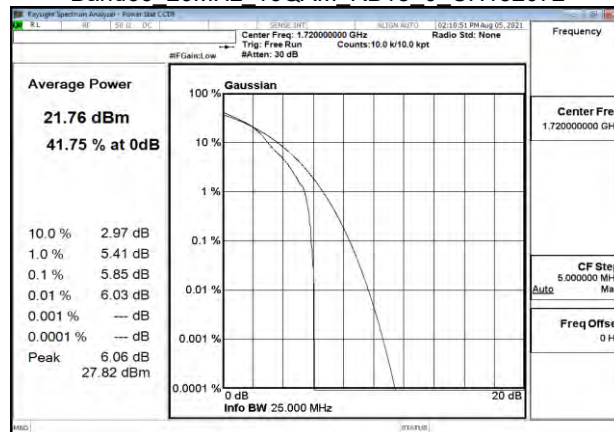
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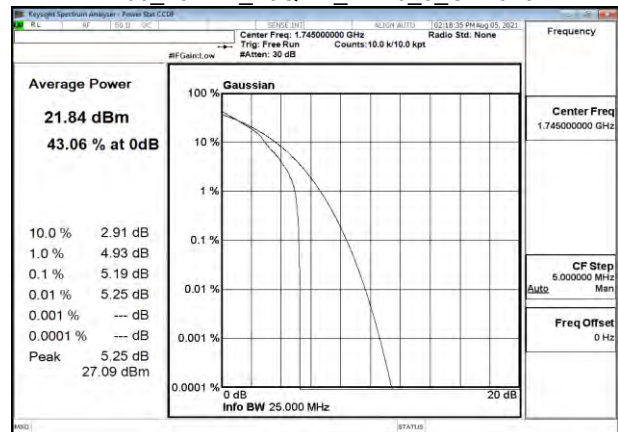
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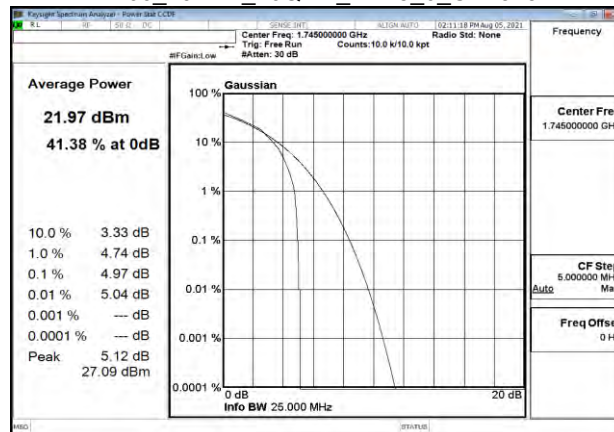
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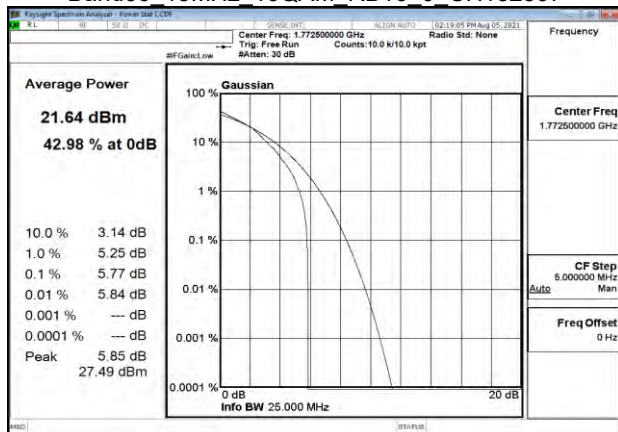
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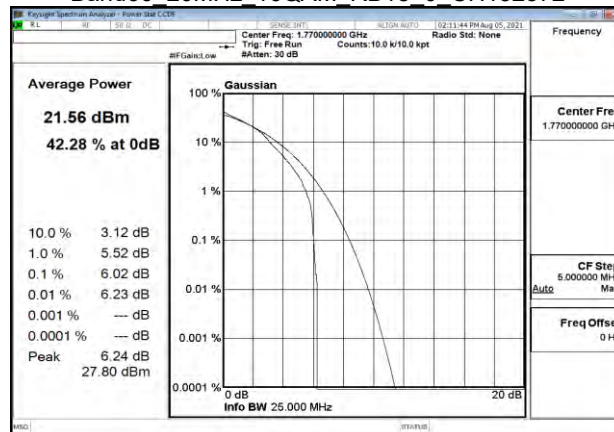
Band66\_20MHz\_16QAM\_RB18\_0\_CH132322



Band66\_15MHz\_16QAM\_RB16\_0\_CH132597



Band66\_20MHz\_16QAM\_RB18\_0\_CH132572



~ End of Report ~

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