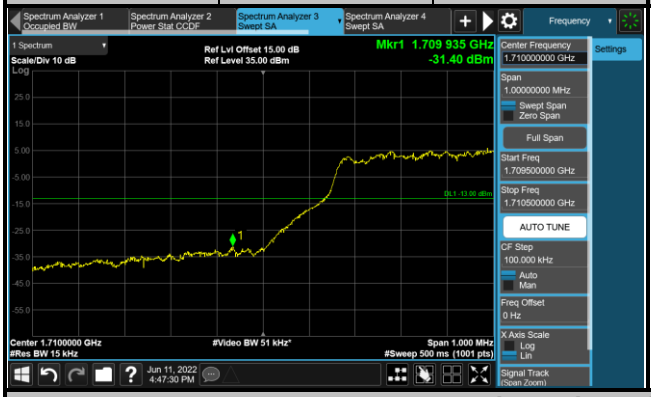
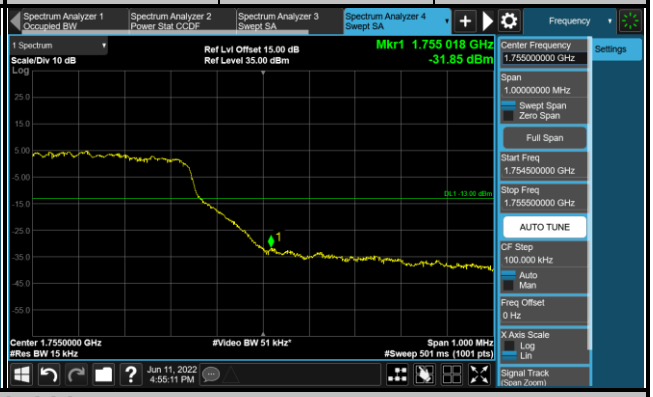
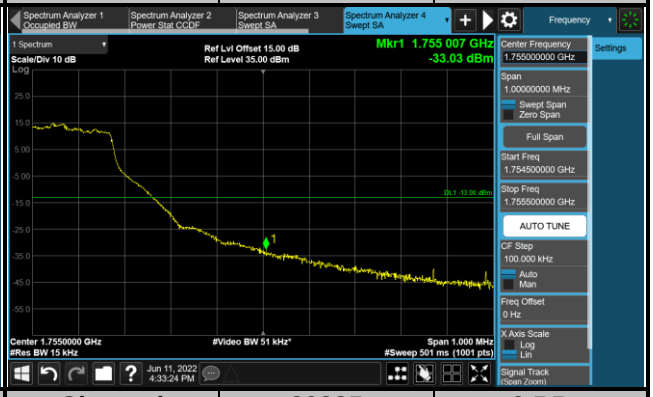
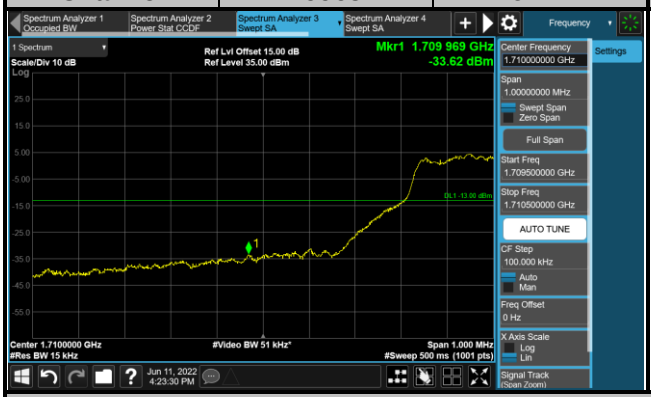
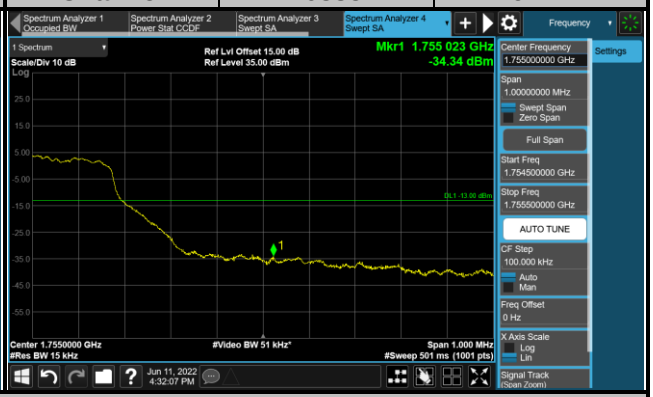
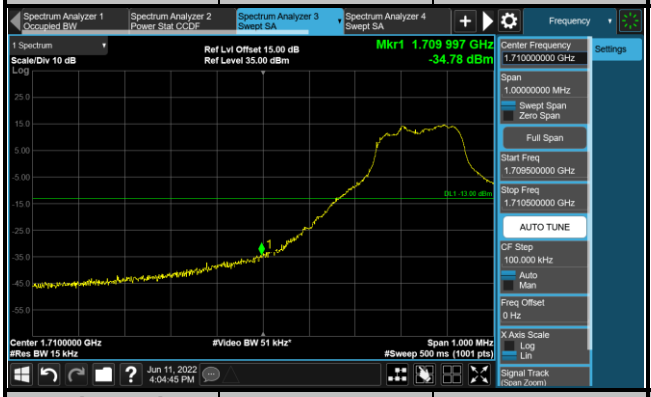
4.5.4 Test Results

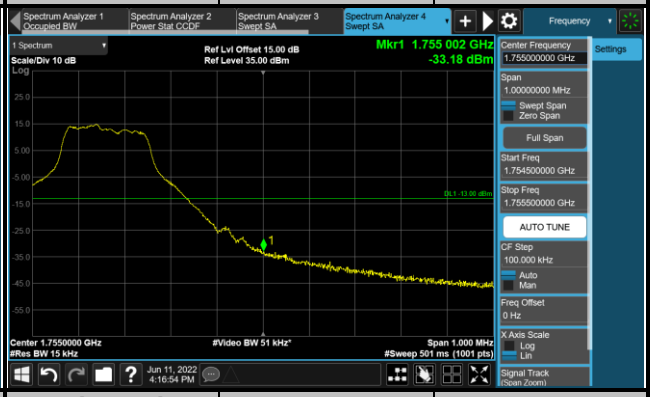
Cat-M1 Band 4					
Channel Bandwidth: 1.4 MHz					
Channel	19957	1 RB	Channel	20393	1 RB
Channel	19957	6 RB	Channel	20393	6 RB
					
Channel Bandwidth: 3 MHz					
Channel	19965	1 RB	Channel	20385	1 RB
					
Channel	19965	6 RB	Channel	20385	6 RB
					
Cat-M1 Band 4					

Channel Bandwidth: 5 MHz

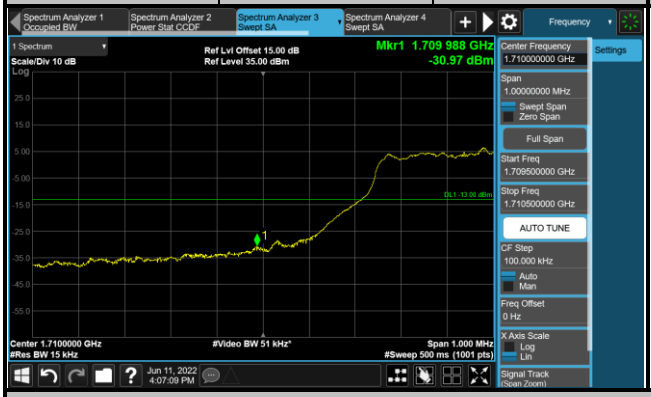
Channel	19975	1 RB



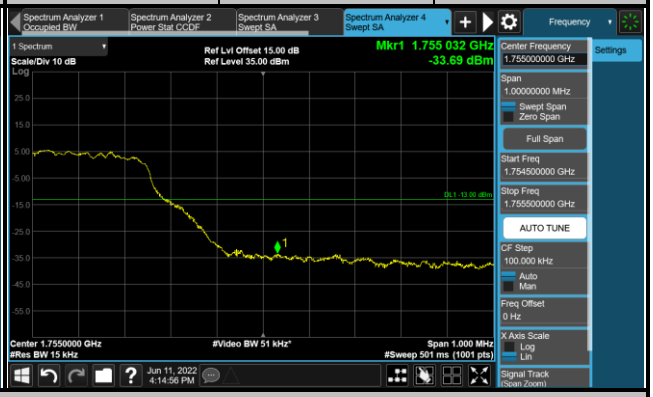
Channel	20375	1 RB



Channel	19975	6 RB



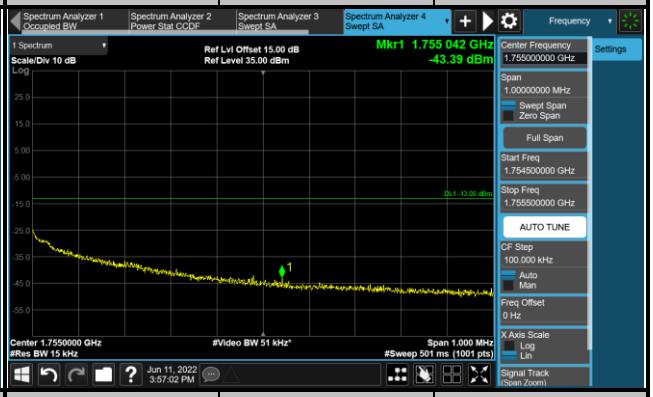
Channel	20375	6 RB



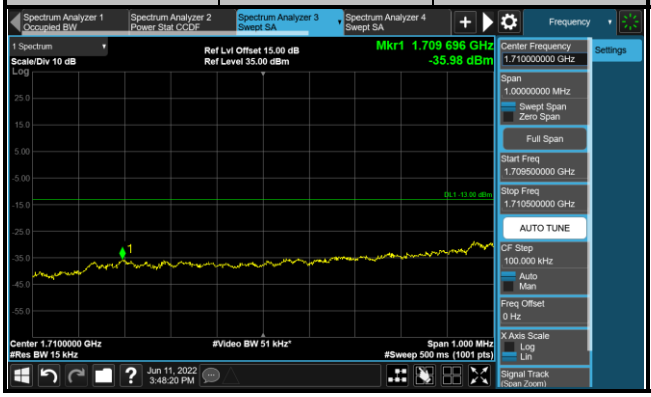
Channel Bandwidth: 10 MHz

Channel	20000	1 RB

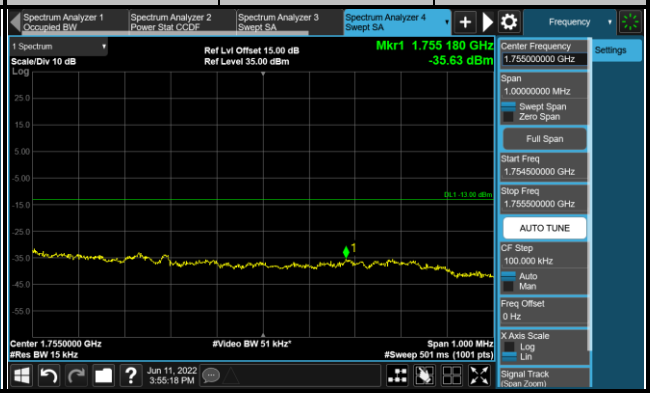
Channel	20350	1 RB

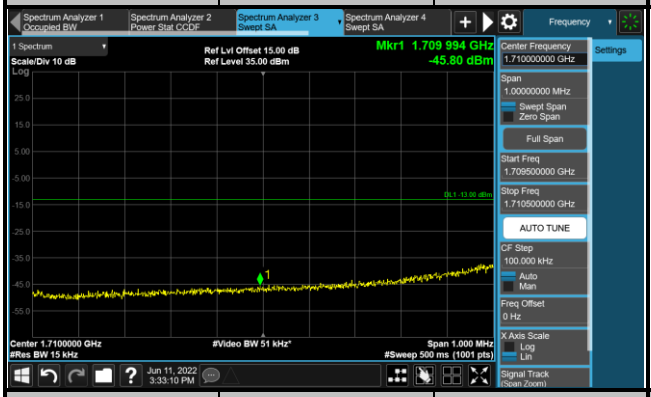
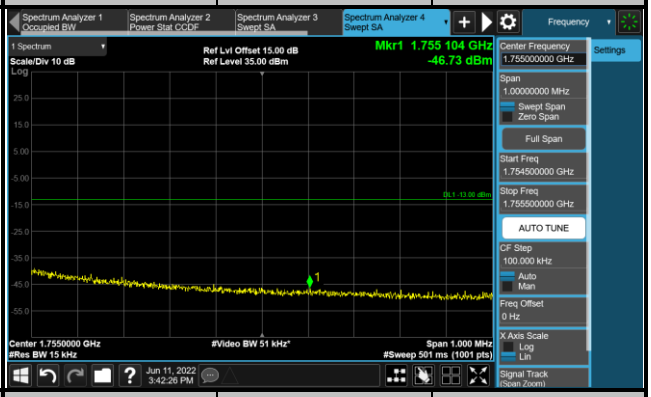
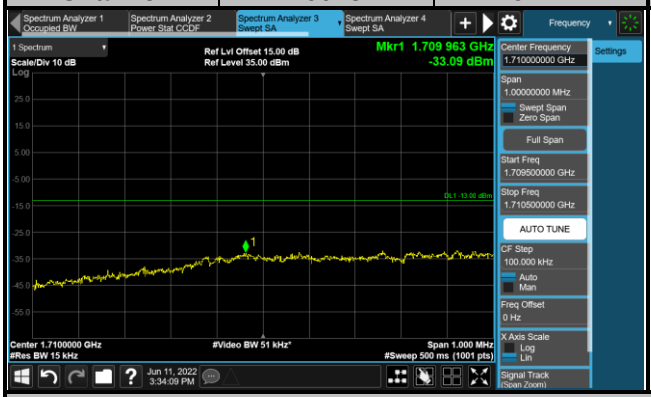
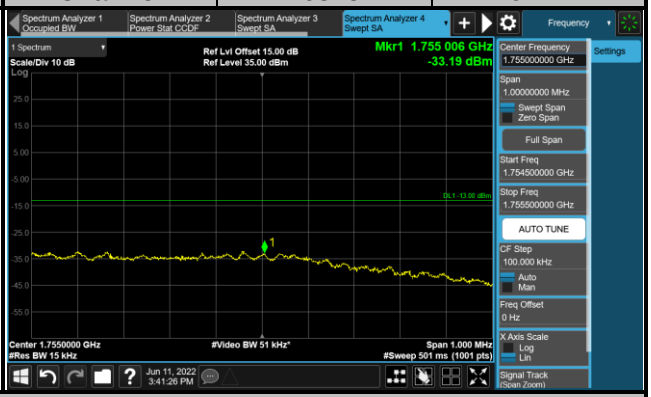
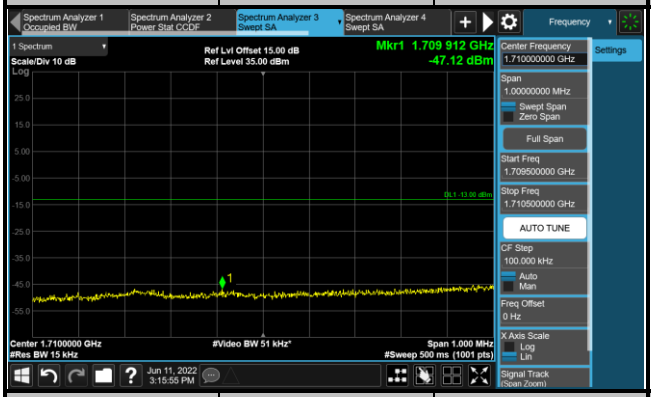
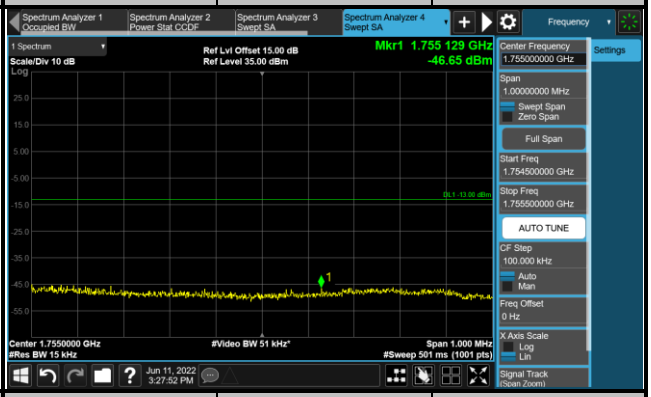
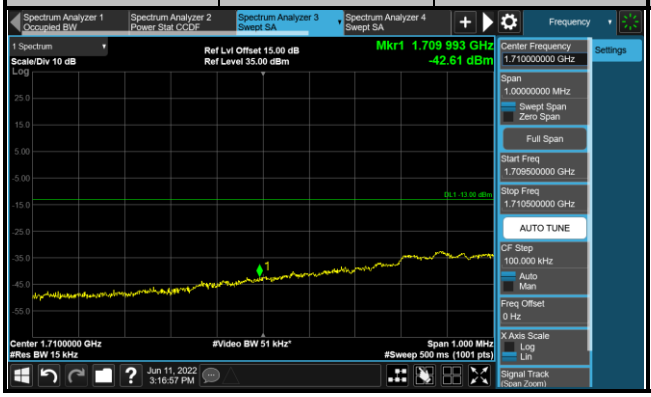
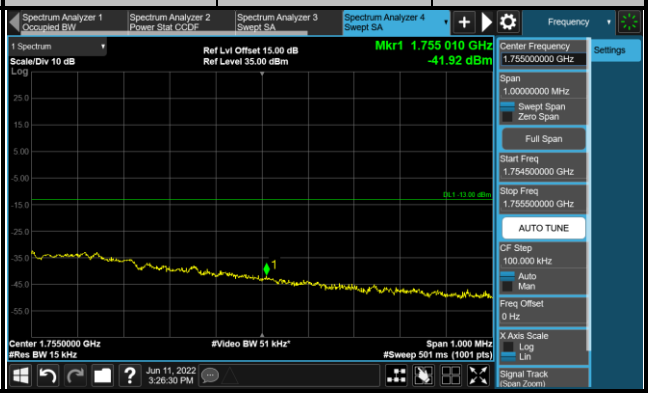


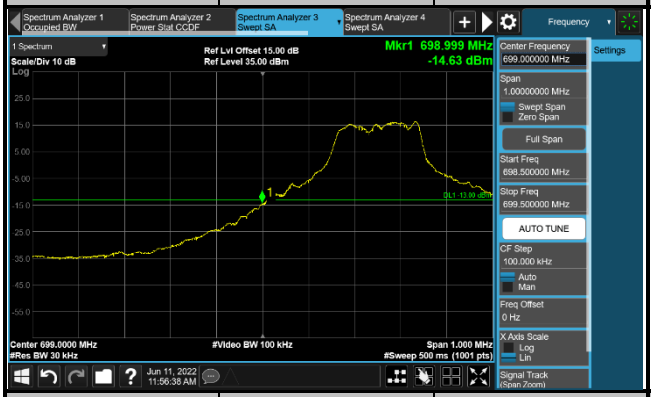
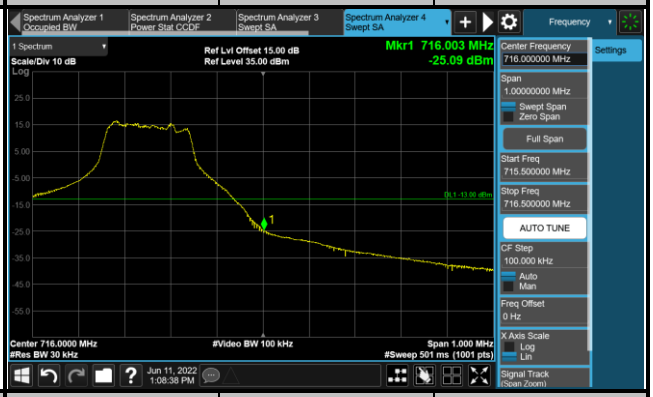
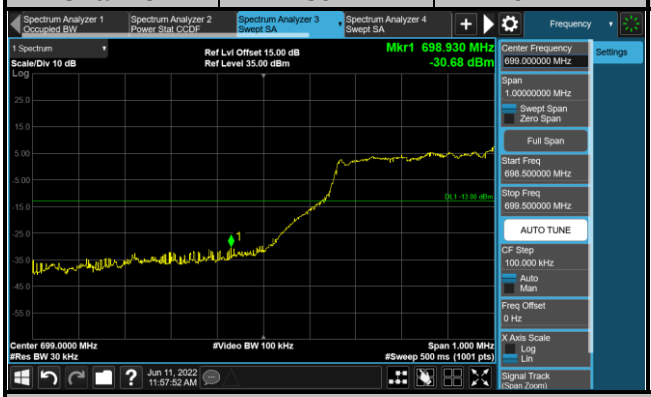
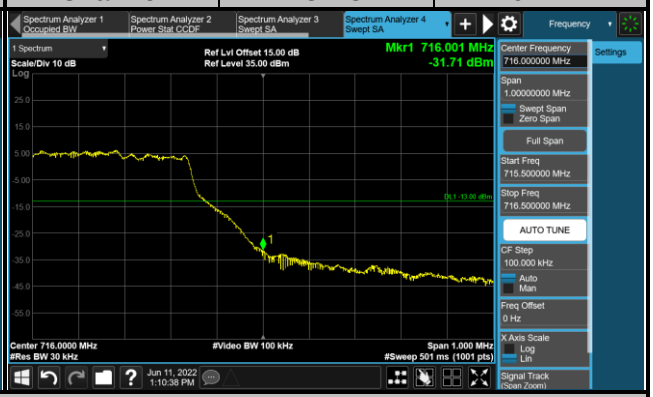
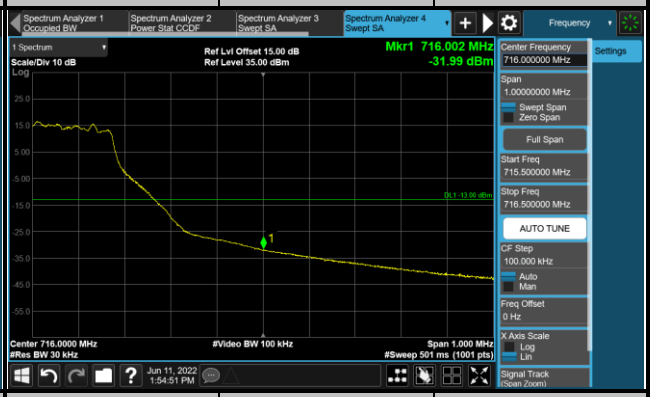
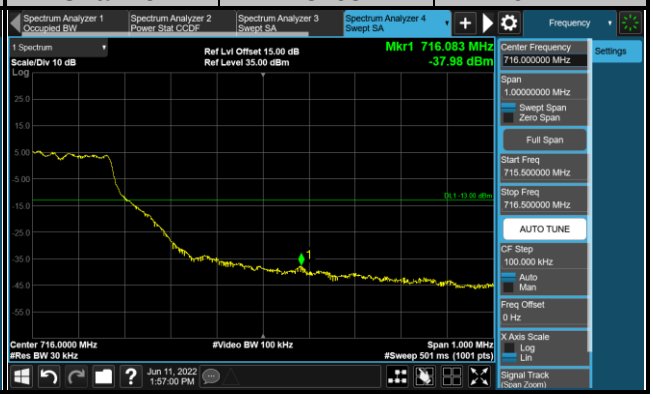
Channel	20000	6 RB

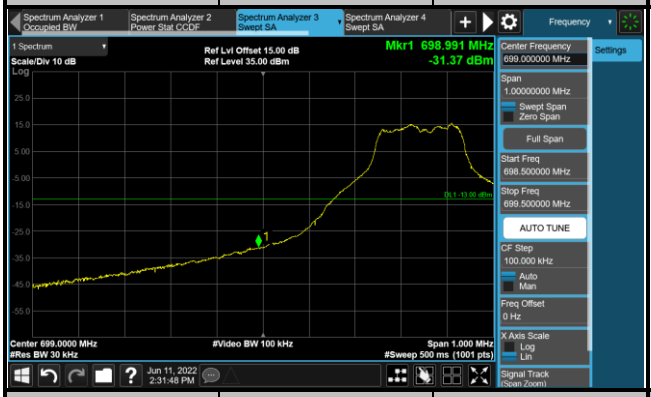
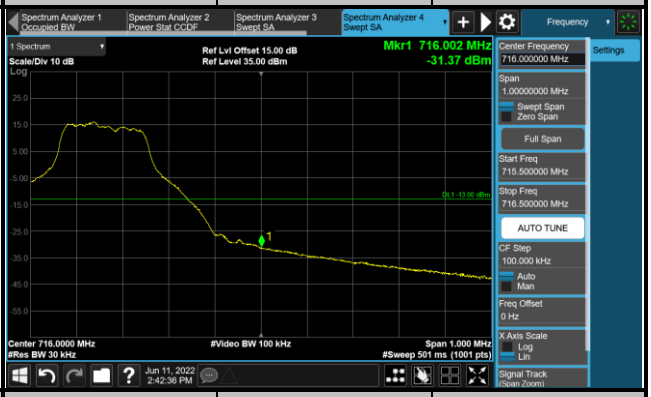
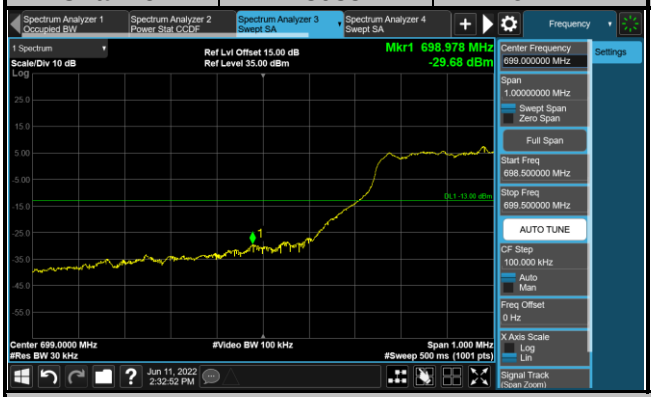
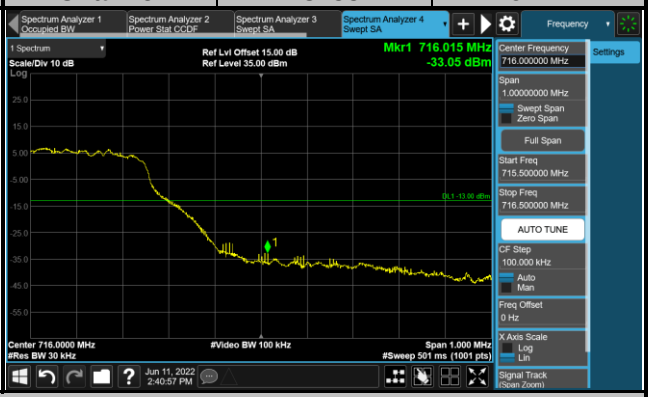
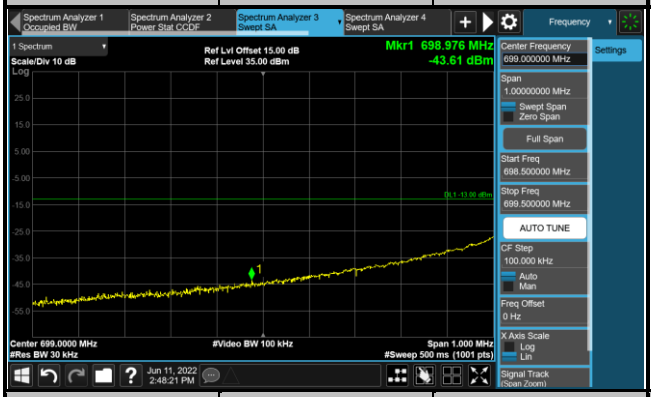
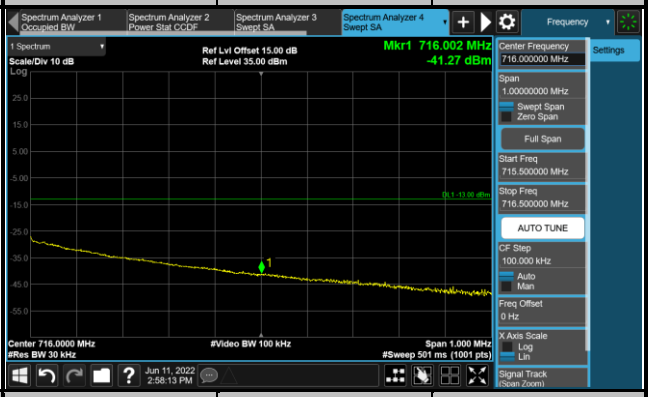
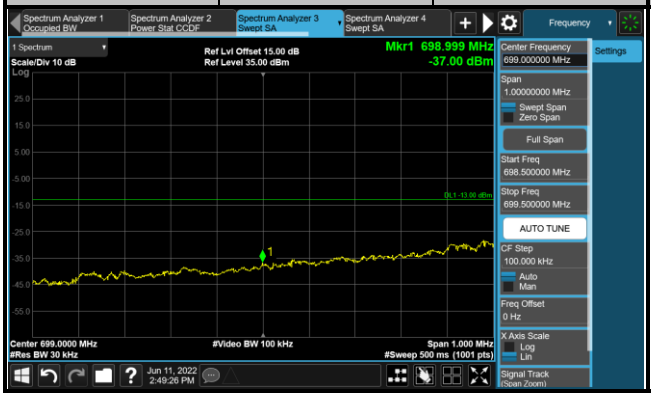
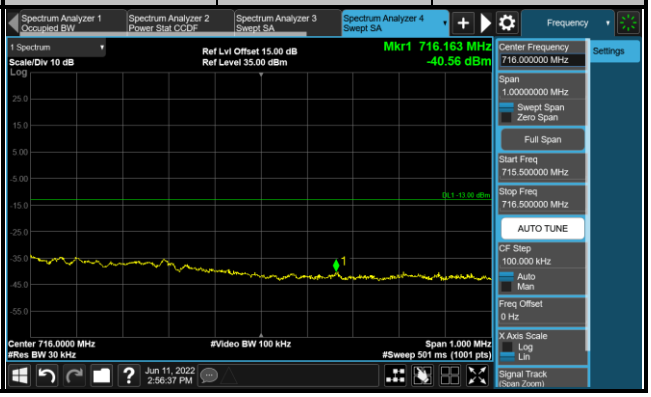


Channel	20350	6 RB



Cat-M1 Band 4					
Channel Bandwidth: 15 MHz					
Channel	**20025**	**1 RB**	**Channel**	**20325**	**1 RB**
					
Channel	**20025**	**6 RB**	**Channel**	**20325**	**6 RB**
					
Channel Bandwidth: 20 MHz					
Channel	**20050**	**1 RB**	**Channel**	**20300**	**1 RB**
					
Channel	**20050**	**6 RB**	**Channel**	**20300**	**6 RB**
					

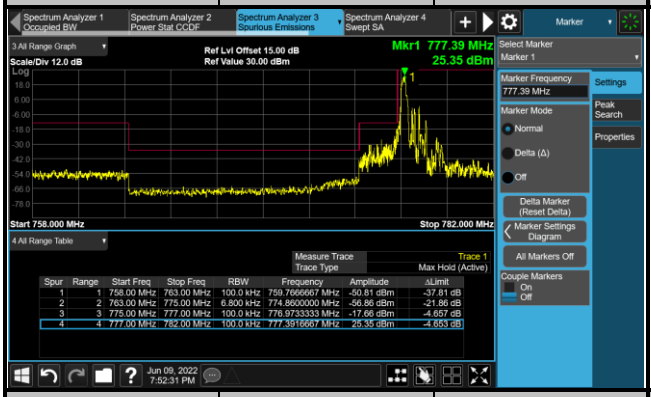
Cat-M1 Band 12					
Channel Bandwidth: 1.4 MHz					
Channel	**23017**	**1 RB**	**Channel**	**23173**	**1 RB**
					
Channel	**23017**	**6 RB**	**Channel**	**23173**	**6 RB**
					
Channel Bandwidth: 3 MHz					
Channel	**23025**	**1 RB**	**Channel**	**23165**	**1 RB**
					
Channel	**23025**	**6 RB**	**Channel**	**23165**	**6 RB**
					

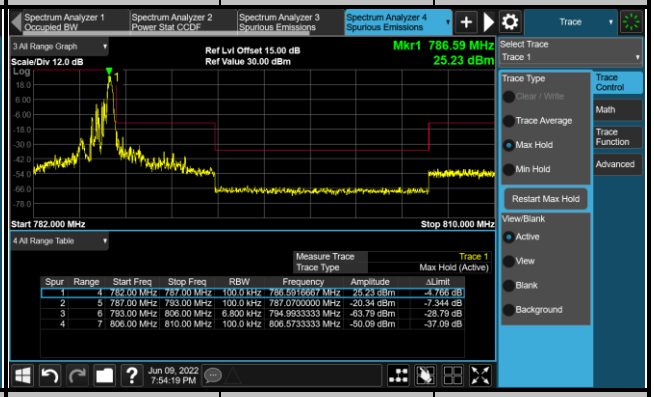
Cat-M1 Band 12					
Channel Bandwidth: 5 MHz					
Channel	**23035**	**1 RB**	**Channel**	**23155**	**1 RB**
					
Channel	**23035**	**6 RB**	**Channel**	**23155**	**6 RB**
					
Channel Bandwidth: 10 MHz					
Channel	**23060**	**1 RB**	**Channel**	**23130**	**1 RB**
					
Channel	**23060**	**6 RB**	**Channel**	**23130**	**6 RB**
					

Cat-M1 Band 13

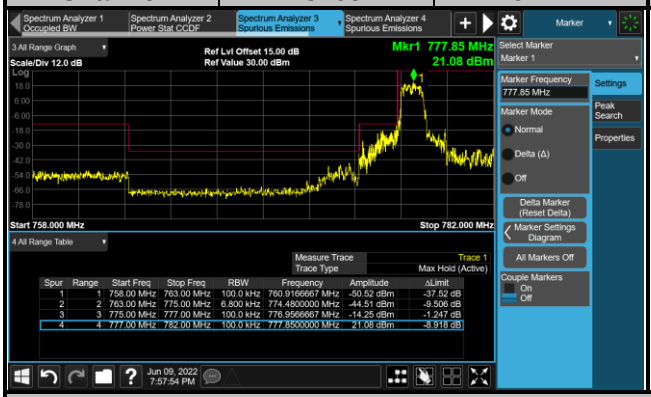
Channel Bandwidth: 5 MHz

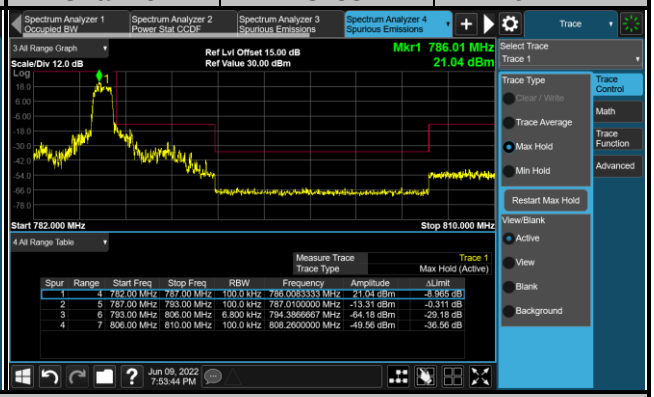
Channel	23205	1 RB	Channel	23255	1 RB





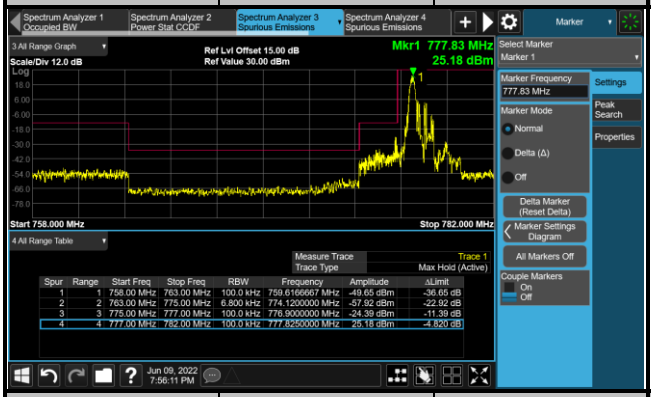
Channel	23205	6 RB	Channel	23255	6 RB

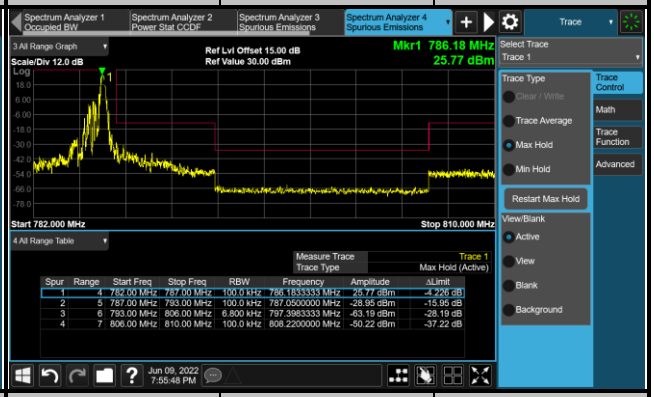




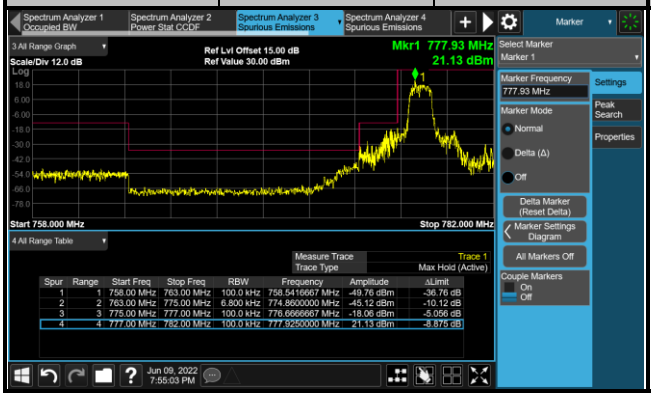
Channel Bandwidth: 10 MHz

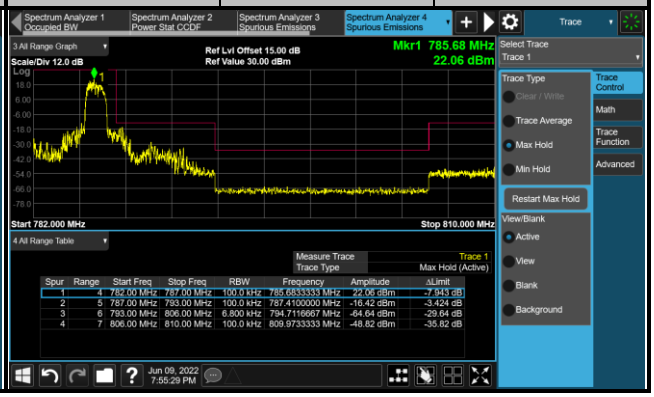
Channel	23230	1 RB	Channel	23230	1 RB





Channel	23230	6 RB	Channel	23230	6 RB



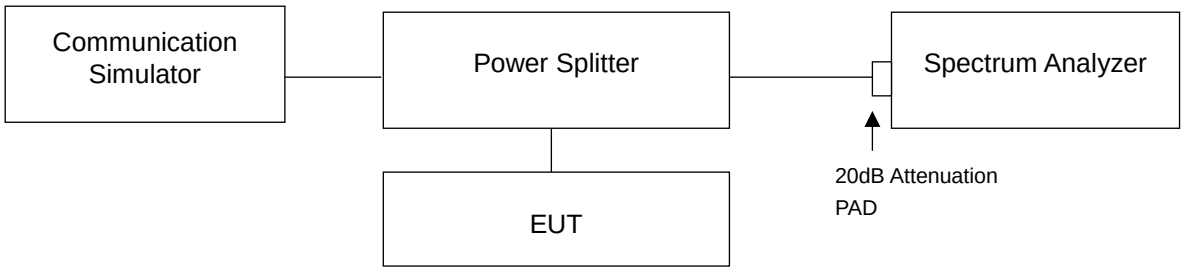


4.6 Peak to Average Ratio

4.6.1 Limits of Peak to Average Ratio Measurement

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

4.6.2 Test Setup

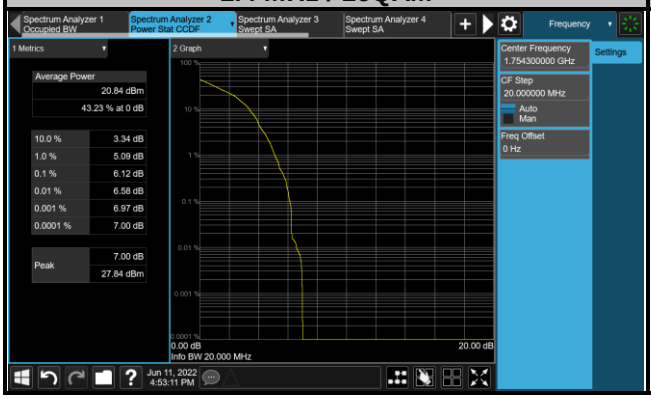
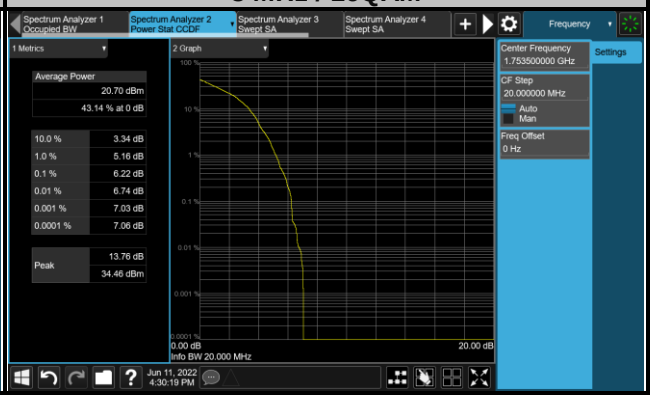


4.6.3 Test Procedures

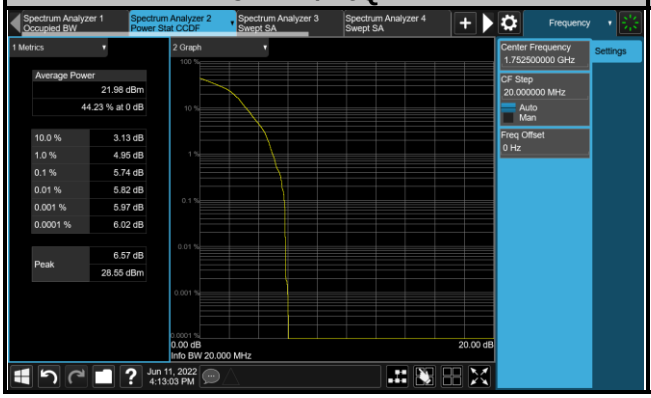
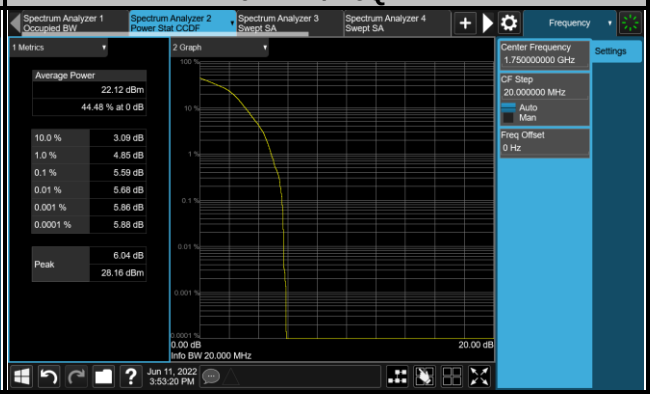
1. Set resolution/measurement bandwidth ≥ signal's occupied bandwidth;
2. Set the number of counts to a value that stabilizes the measured CCDF curve;
3. Record the maximum PAPR level associated with a probability of 0.1 %.

4.6.4 Test Results

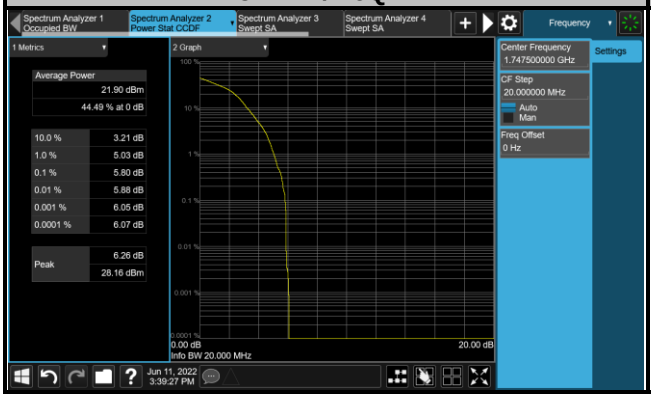
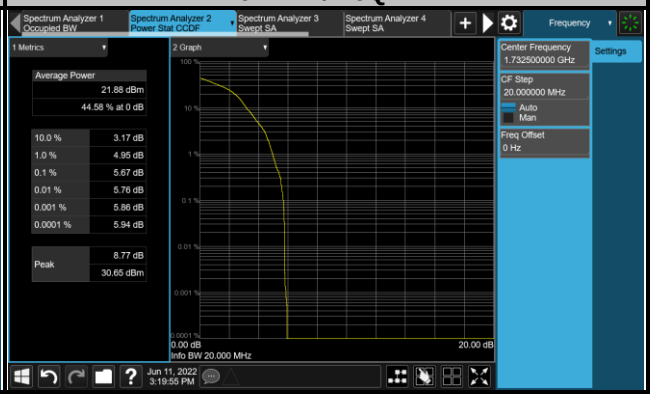
Cat-M1 Band 4							
Channel Bandwidth: 1.4 MHz				Channel Bandwidth: 3 MHz			
Channel	Frequency (MHz)	Peak to Average Ratio (dB)		Channel	Frequency (MHz)	Peak to Average Ratio (dB)	
		QPSK	16QAM			QPSK	16QAM
19957	1710.7	4.67	5.89	19965	1711.5	4.88	6.20
20175	1732.5	4.76	5.97	20175	1732.5	5.30	6.13
20393	1754.3	4.96	6.12	20385	1753.5	5.47	6.22

Spectrum Plot of Worst Value	
1.4 MHz / 16QAM	3 MHz / 16QAM
	

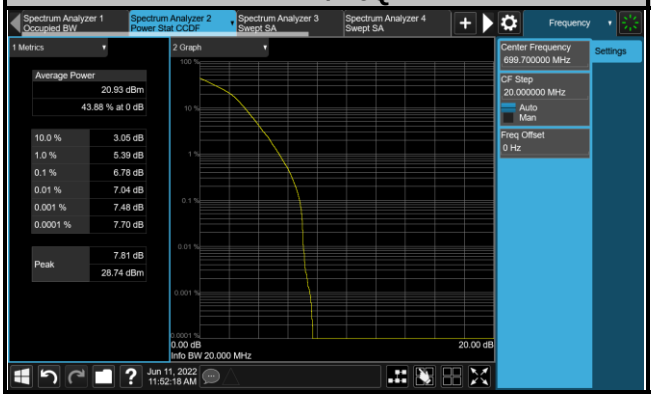
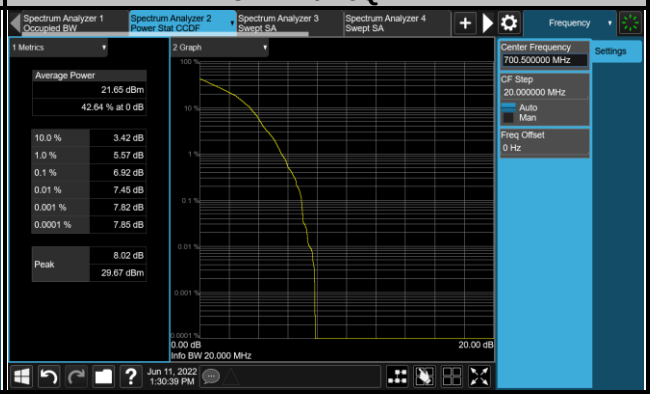
Cat-M1 Band 4							
Channel Bandwidth: 5 MHz				Channel Bandwidth: 10 MHz			
Channel	Frequency (MHz)	Peak to Average Ratio (dB)		Channel	Frequency (MHz)	Peak to Average Ratio (dB)	
		QPSK	16QAM			QPSK	16QAM
19975	1712.5	5.39	5.58	20000	1715.0	5.41	5.46
20175	1732.5	5.30	5.59	20175	1732.5	5.33	5.47
20375	1752.5	5.61	5.74	20350	1750.0	5.47	5.59

Spectrum Plot of Worst Value	
5 MHz / 16QAM	10 MHz / 16QAM
	

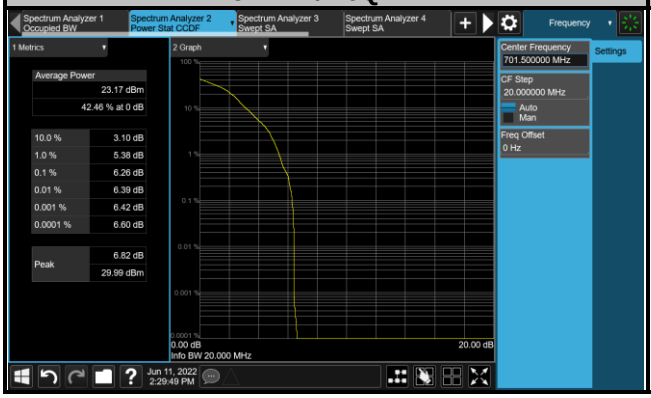
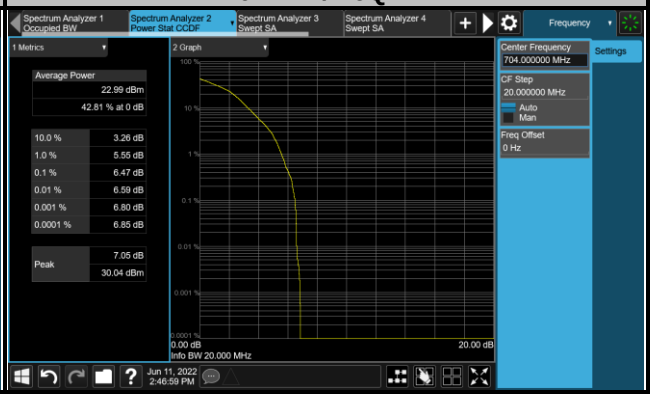
Cat-M1 Band 4							
Channel Bandwidth: 15 MHz				Channel Bandwidth: 20 MHz			
Channel	Frequency (MHz)	Peak to Average Ratio (dB)		Channel	Frequency (MHz)	Peak to Average Ratio (dB)	
		QPSK	16QAM			QPSK	16QAM
20025	1717.5	5.38	5.56	20050	1720.0	5.44	5.53
20175	1732.5	5.43	5.59	20175	1732.5	5.55	5.67
20325	1747.5	5.42	5.80	20300	1745.0	5.41	5.54

Spectrum Plot of Worst Value	
15 MHz / 16QAM	20 MHz / 16QAM
	

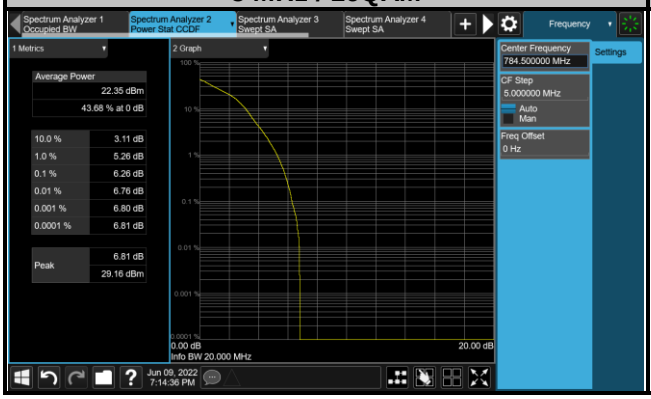
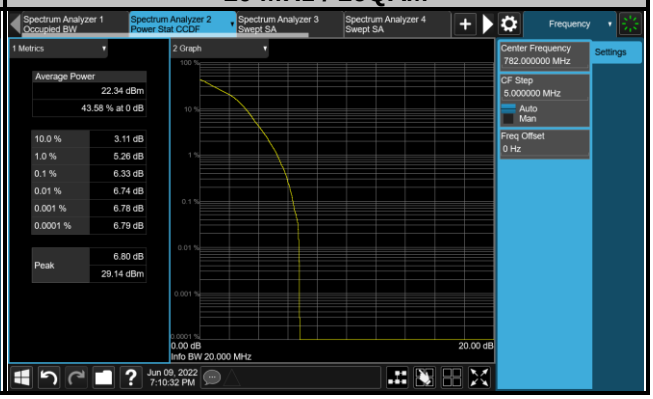
Cat-M1 Band 12							
Channel Bandwidth: 1.4 MHz				Channel Bandwidth: 3 MHz			
Channel	Frequency (MHz)	Peak to Average Ratio (dB)		Channel	Frequency (MHz)	Peak to Average Ratio (dB)	
		QPSK	16QAM			QPSK	16QAM
23017	699.7	5.95	6.78	23025	700.5	5.42	6.92
23095	707.5	5.91	6.60	23095	707.5	5.44	6.63
23173	715.3	6.62	6.62	23165	714.5	5.21	6.44

Spectrum Plot of Worst Value	
1.4 MHz / 16QAM	3 MHz / 16QAM
	

Cat-M1 Band 12							
Channel Bandwidth: 5 MHz				Channel Bandwidth: 10 MHz			
Channel	Frequency (MHz)	Peak to Average Ratio (dB)		Channel	Frequency (MHz)	Peak to Average Ratio (dB)	
		QPSK	16QAM			QPSK	16QAM
23035	701.5	6.15	6.26	23060	704.0	6.08	6.47
23095	707.5	5.91	6.06	23095	707.5	6.16	6.30
23155	713.5	5.77	5.91	23130	711.0	5.96	5.91

Spectrum Plot of Worst Value	
5 MHz / 16QAM	10 MHz / 16QAM
	

Cat-M1 Band 13							
Channel Bandwidth: 5 MHz				Channel Bandwidth: 10 MHz			
Channel	Frequency (MHz)	Peak to Average Ratio (dB)		Channel	Frequency (MHz)	Peak to Average Ratio (dB)	
		QPSK	16QAM			QPSK	16QAM
23205	779.5	5.44	6.18	23230	782.0	5.40	6.33
23230	782.0	5.44	6.18				
23255	784.5	5.35	6.26				

Spectrum Plot of Worst Value	
5 MHz / 16QAM	10 MHz / 16QAM
	

4.7 Conducted Spurious Emissions

4.7.1 Limits of Conducted Spurious Emissions Measurement

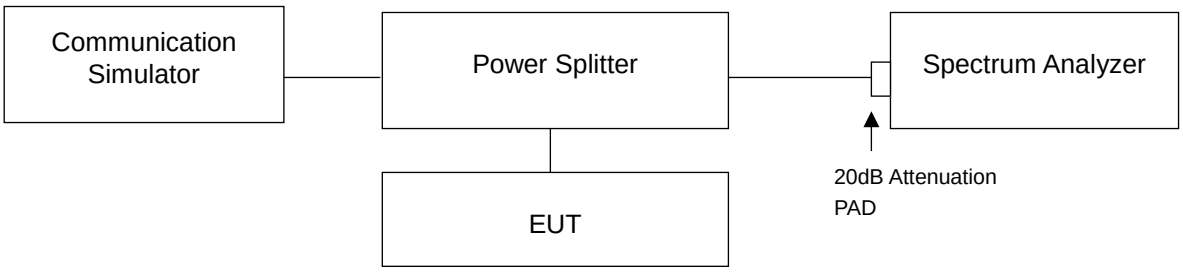
For Cat-M1 Band 4:
According to FCC 27.53(h), for operations in the 1695-1710MHz, 1710-1755MHz, 1755-1780 MHz bands, the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) in watts by at least 43 + 10 log (P) dB.

For Cat-M1 Band 12:
According to FCC 27.53(g), for operations in the 600 MHz band and the 698-746 MHz band, the power of any emission outside a licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, by at least 43 + 10 log (P) dB. The limit of emissions is equal to -13 dBm.

For Cat-M1 Band 13:
According to FCC 27.53(c)(2), for 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. The limit of emissions is equal to -13 dBm.

According to FCC 27.53(f), for operations in the 775-788 MHz, emissions in the band 1559-1610MHz shall be limited to -70 dBW/MHz (EIRP). The limit of emissions is equal to -40 dBm.

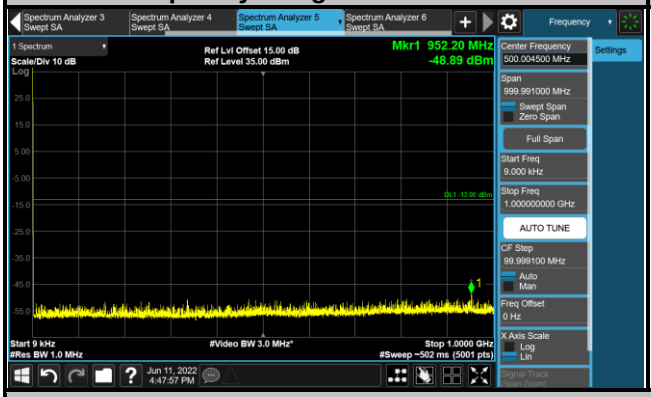
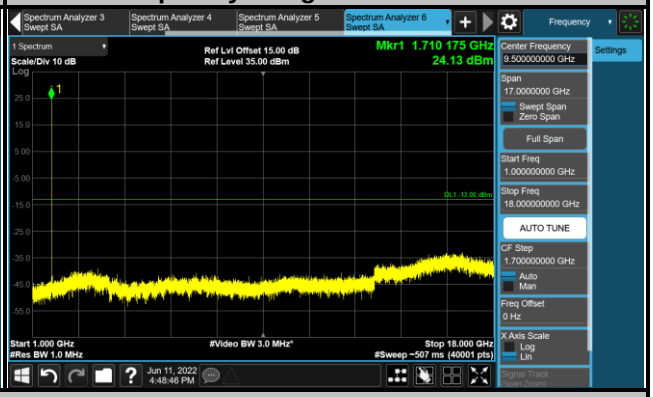
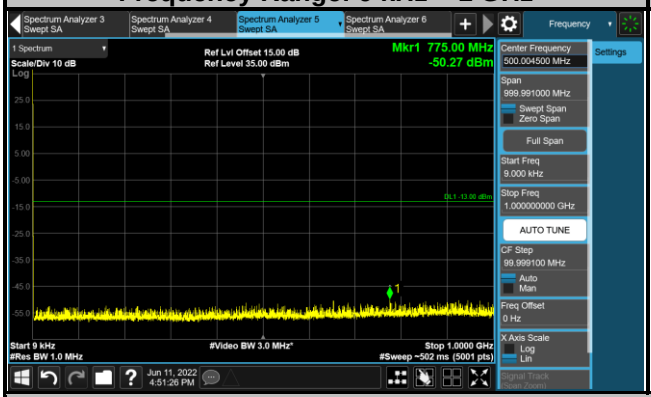
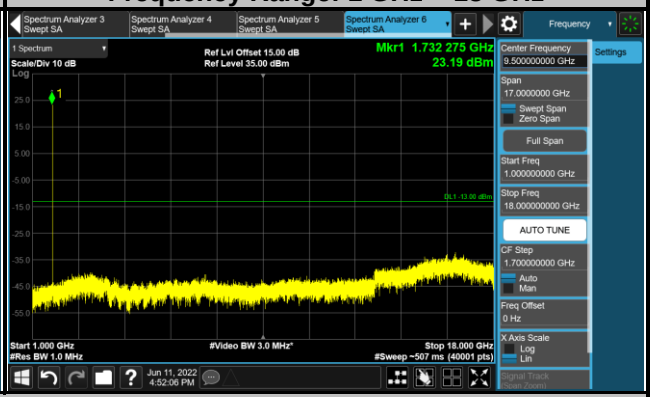
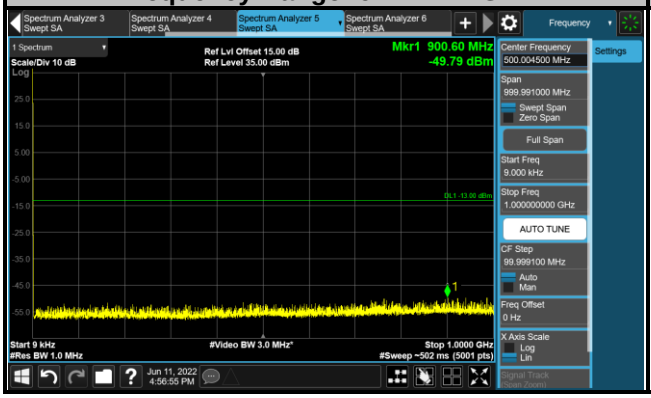
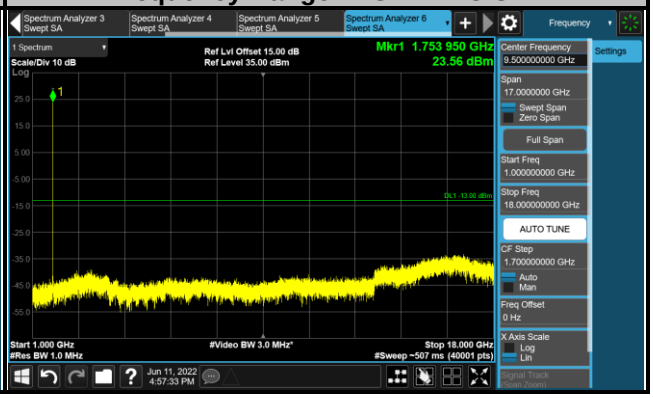
4.7.2 Test Setup



4.7.3 Test Procedure

a. The EUT makes a phone call to the communication simulator. All measurements were done at low, middle and high operational frequency range.
b. Measuring frequency range is from 9 kHz to 1 GHz. 20 dB attenuation pad is connected with spectrum. RBW = 1 MHz and VBW = 3 MHz is used for conducted emission measurement.
c. Measuring frequency range is from 1 GHz to 8 GHz / 9 GHz / 18 GHz. 10 dB attenuation pad is connected with spectrum. RBW = 1 MHz and VBW = 3 MHz is used for conducted emission measurement.

4.7.4 Test Results

Cat-M1 Band 4	
Channel Bandwidth: 1.4 MHz	
Channel 19957	
Frequency Range: 9 kHz ~ 1 GHz	Frequency Range: 1 GHz ~ 18 GHz
	
Channel 20175	
Frequency Range: 9 kHz ~ 1 GHz	Frequency Range: 1 GHz ~ 18 GHz
	
Channel 20393	
Frequency Range: 9 kHz ~ 1 GHz	Frequency Range: 1 GHz ~ 18 GHz
	

Note: The signal over the limit in 9 kHz is from spectrum analyzer.