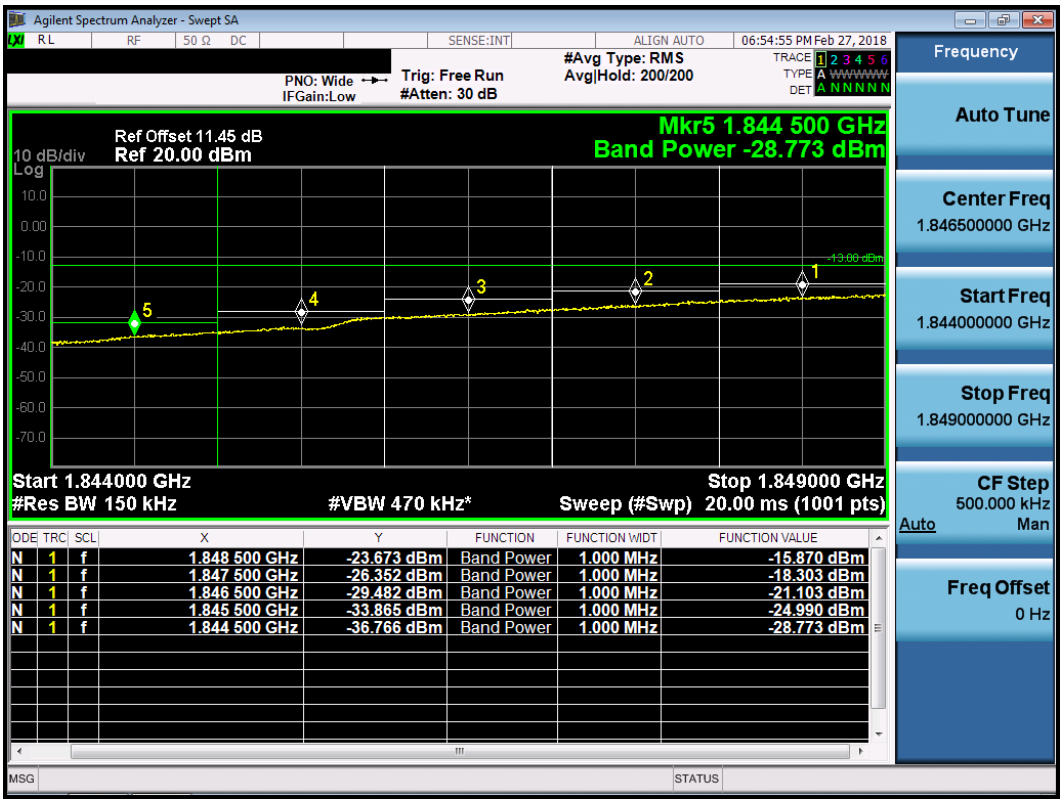
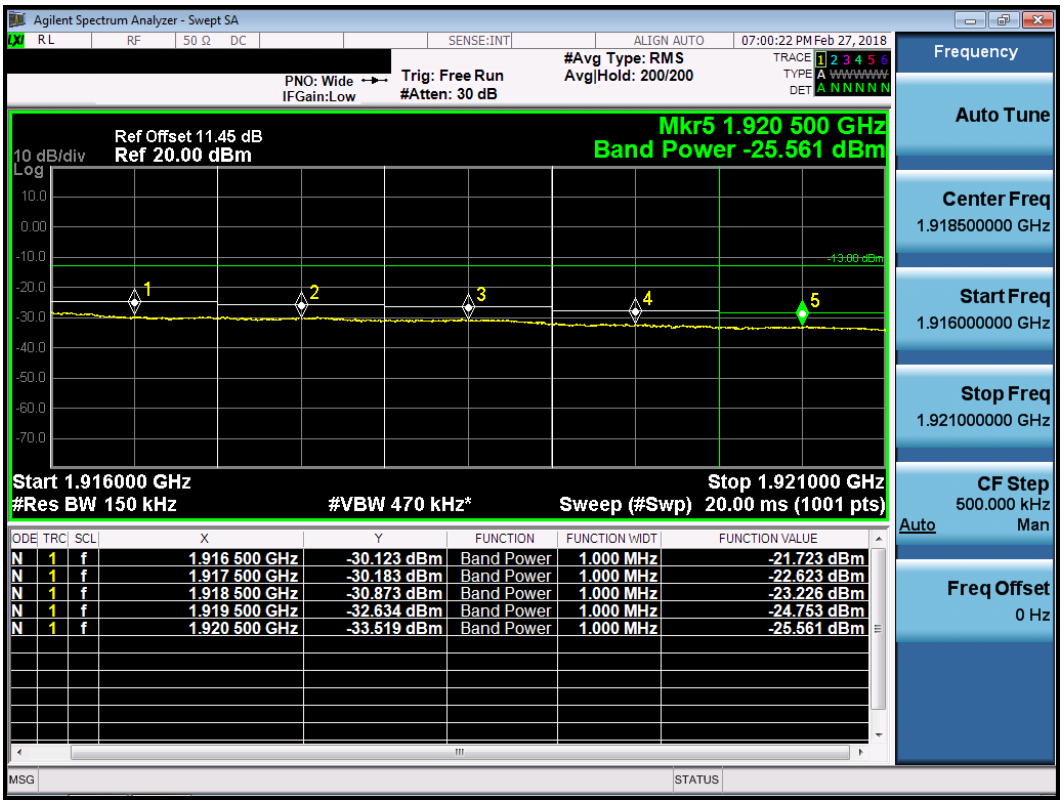
Worst Plot of 16QAM, Low Channel

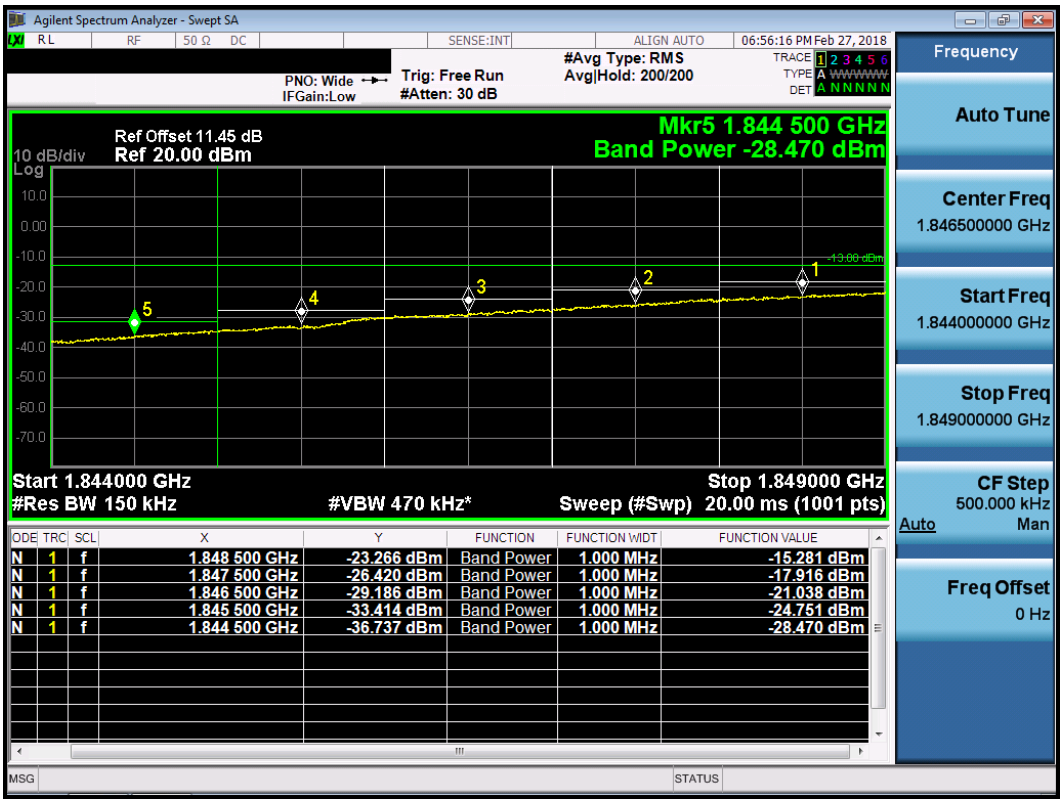


Worst Plot of 16QAM, High Channel

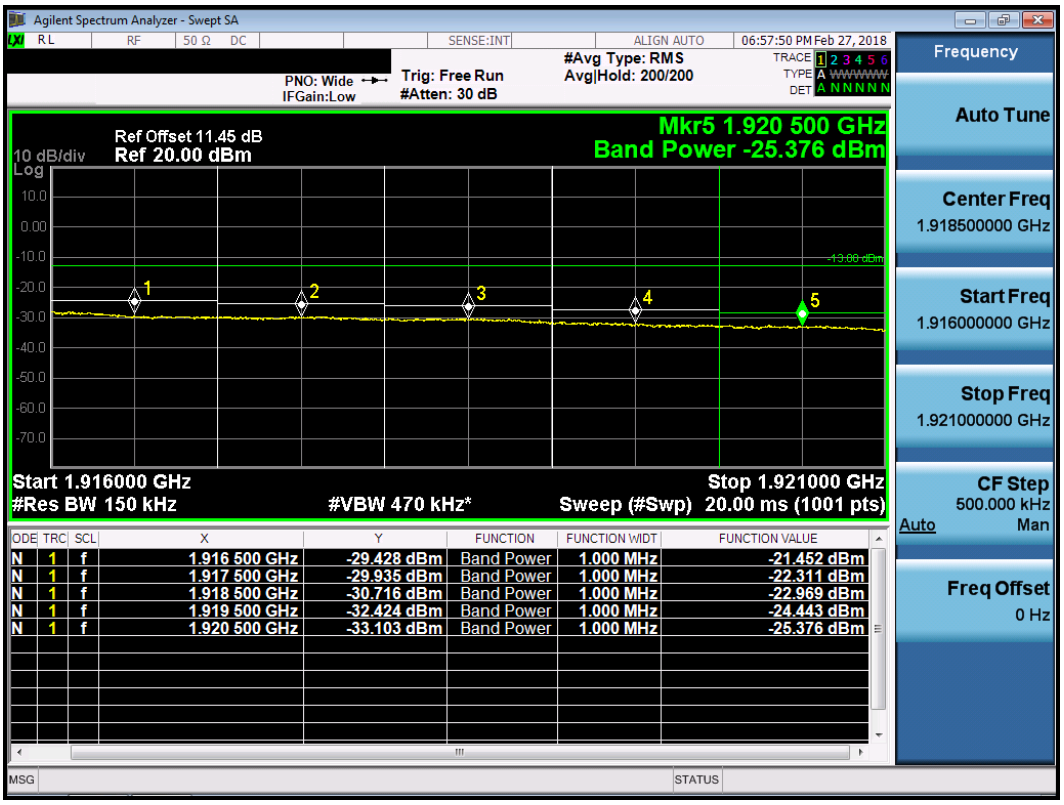


Measured Band Edge Result												
Channel Bandwidth (MHz)	Modulation	PCC Freq. (MHz)	SCC Freq. (MHz)	PCC RB		SCC RB		Range (MHz)	ANT 0 (dBm)	ANT 2 (dBm)	Total (dBm)	Limit (dBm)
				size	offset	size	offset					
5+10	64QAM	1852.5	1910.0	1	0	1	0	1849~1848	-35.647	-47.323	-35.36	-13
								1848~1847	-42.873	-48.837	-41.89	-13
								1847~1846	-44.290	-49.143	-43.06	-13
								1846~1845	-45.589	-49.297	-44.05	-13
								1845~1844	-48.299	-49.775	-45.96	-13
				25	0	50	0	1849~1848	-15.281	-28.431	-15.08	-13
								1848~1847	-17.916	-29.302	-17.61	-13
								1847~1846	-21.038	-30.646	-20.59	-13
								1846~1845	-24.751	-31.592	-23.93	-13
								1845~1844	-28.470	-33.081	-27.18	-13
				1	24	1	49	1916~1917	-50.130	-35.548	-35.40	-13
								1917~1918	-50.551	-40.950	-40.50	-13
								1918~1919	-50.679	-41.809	-41.28	-13
								1919~1920	-50.771	-45.351	-44.25	-13
								1920~1921	-50.795	-47.357	-45.73	-13
				25	0	50	0	1916~1917	-37.563	-21.452	-21.35	-13
								1917~1918	-40.696	-22.311	-22.25	-13
								1918~1919	-44.342	-22.969	-22.94	-13
								1919~1920	-46.650	-24.443	-24.42	-13
								1920~1921	-47.970	-25.376	-25.35	-13

Worst Plot of 64QAM, Low Channel

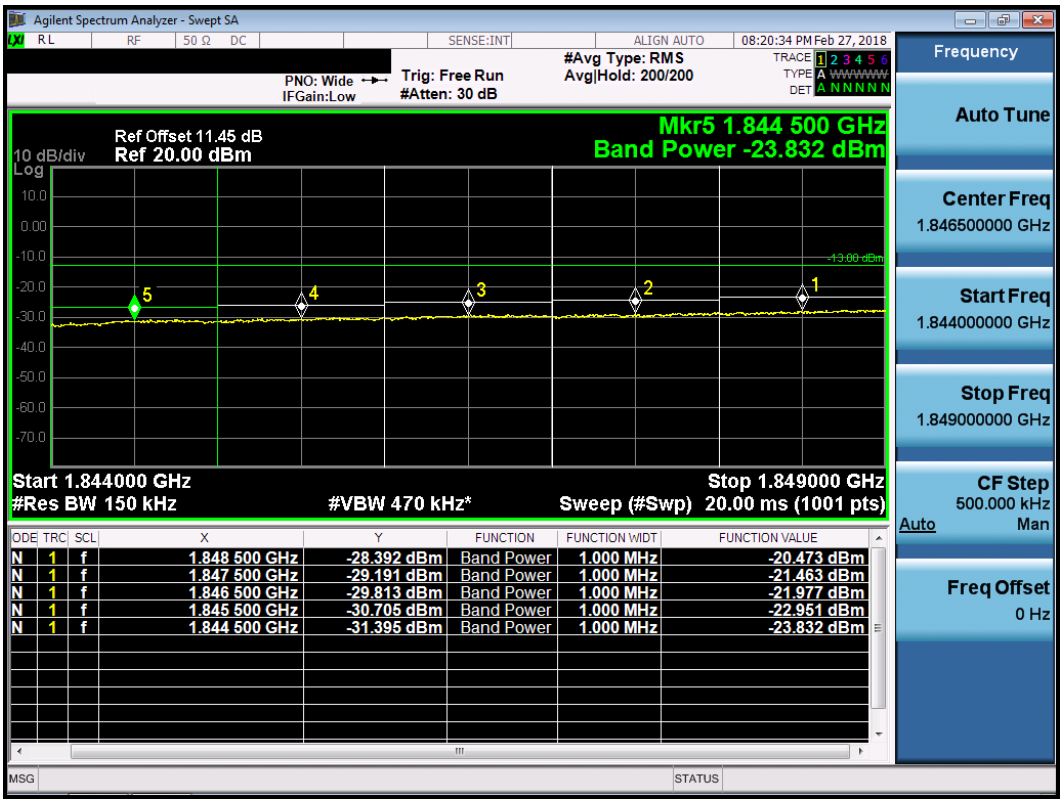


Worst Plot of 64QAM, High Channel

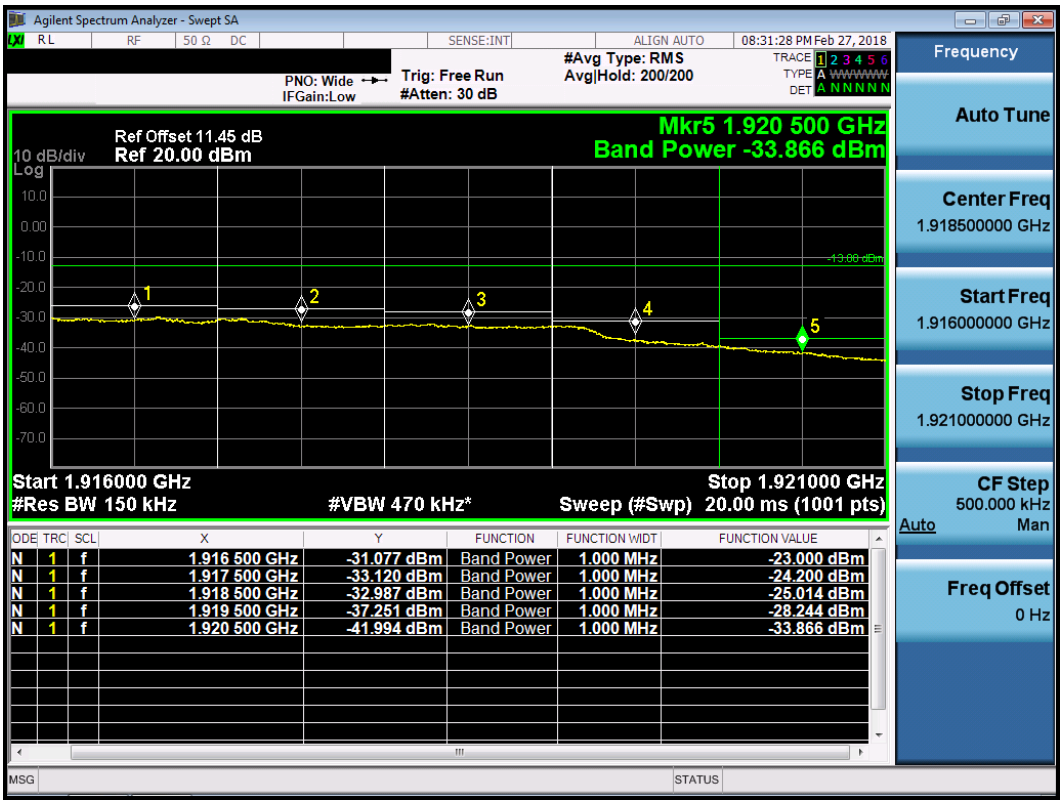


Measured Band Edge Result												
Channel Bandwidth (MHz)	Modulation	PCC Freq. (MHz)	SCC Freq. (MHz)	PCC RB		SCC RB		Range (MHz)	ANT 0 (dBm)	ANT 2 (dBm)	Total (dBm)	Limit (dBm)
				size	offset	size	offset					
10+5	QPSK	1855.0	1912.5	1	0	1	0	1849~1848	-34.056	-47.966	-33.88	-13
								1848~1847	-40.190	-49.004	-39.65	-13
								1847~1846	-39.584	-48.878	-39.10	-13
								1846~1845	-43.917	-49.594	-42.88	-13
								1845~1844	-45.940	-49.841	-44.46	-13
				50	0	25	0	1849~1848	-20.473	-33.543	-20.26	-13
								1848~1847	-21.463	-36.274	-21.32	-13
								1847~1846	-21.977	-39.184	-21.90	-13
								1846~1845	-22.951	-43.821	-22.92	-13
								1845~1844	-23.832	-46.374	-23.81	-13
				1	49	1	24	1916~1917	-49.337	-38.332	-38.00	-13
								1917~1918	-49.920	-43.930	-42.95	-13
								1918~1919	-50.072	-43.645	-42.75	-13
								1919~1920	-50.175	-44.764	-43.67	-13
								1920~1921	-50.305	-48.661	-46.40	-13
				50	0	25	0	1916~1917	-33.731	-23.000	-22.65	-13
								1917~1918	-34.195	-24.200	-23.79	-13
								1918~1919	-34.922	-25.014	-24.59	-13
								1919~1920	-35.448	-28.244	-27.49	-13
								1920~1921	-36.790	-33.866	-32.08	-13

Worst Plot of QPSK, Low Channel

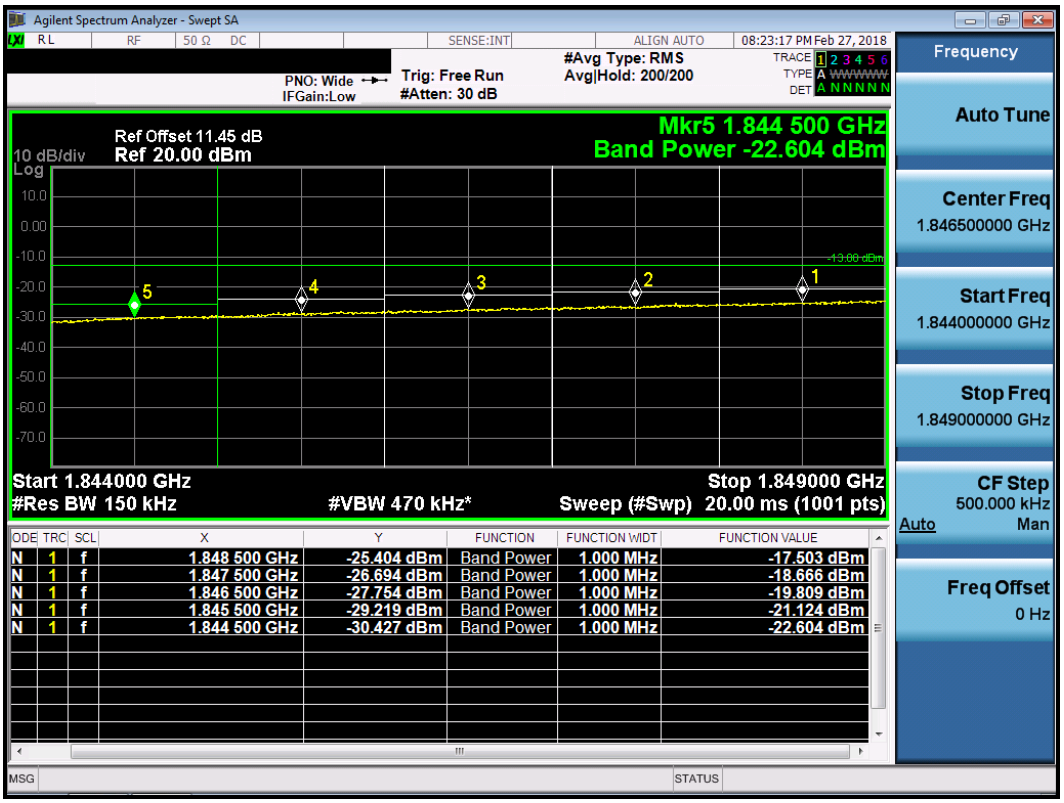


Worst Plot of QPSK, High Channel

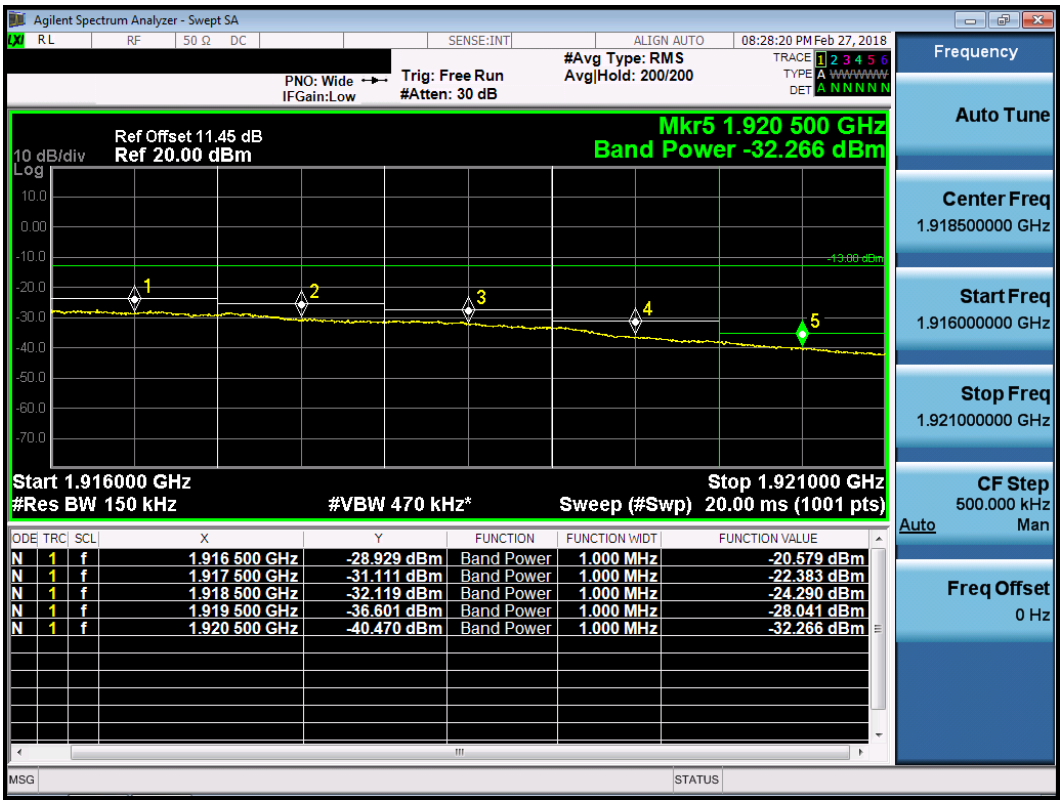


Measured Band Edge Result												
Channel Bandwidth (MHz)	Modulation	PCC Freq. (MHz)	SCC Freq. (MHz)	PCC RB		SCC RB		Range (MHz)	ANT 0 (dBm)	ANT 2 (dBm)	Total (dBm)	Limit (dBm)
				size	offset	size	offset					
10+5	16QAM	1855.0	1912.5	1	0	1	0	1849~1848	-33.853	-47.853	-33.68	-13
								1848~1847	-39.965	-48.945	-39.45	-13
								1847~1846	-38.724	-48.769	-38.31	-13
								1846~1845	-43.354	-49.548	-42.42	-13
								1845~1844	-45.493	-49.794	-44.12	-13
				50	0	25	0	1849~1848	-17.503	-33.161	-17.39	-13
								1848~1847	-18.666	-35.991	-18.59	-13
								1847~1846	-19.809	-39.215	-19.76	-13
								1846~1845	-21.124	-42.891	-21.10	-13
								1845~1844	-22.604	-45.736	-22.58	-13
				1	49	1	24	1916~1917	-49.326	-37.886	-37.58	-13
								1917~1918	-49.927	-43.834	-42.88	-13
								1918~1919	-50.162	-42.546	-41.85	-13
								1919~1920	-50.170	-43.821	-42.92	-13
								1920~1921	-50.353	-48.625	-46.39	-13
				50	0	25	0	1916~1917	-32.066	-20.579	-20.28	-13
								1917~1918	-32.834	-22.383	-22.01	-13
								1918~1919	-33.868	-24.290	-23.84	-13
								1919~1920	-35.062	-28.041	-27.25	-13
								1920~1921	-36.709	-32.266	-30.93	-13

Worst Plot of 16QAM, Low Channel

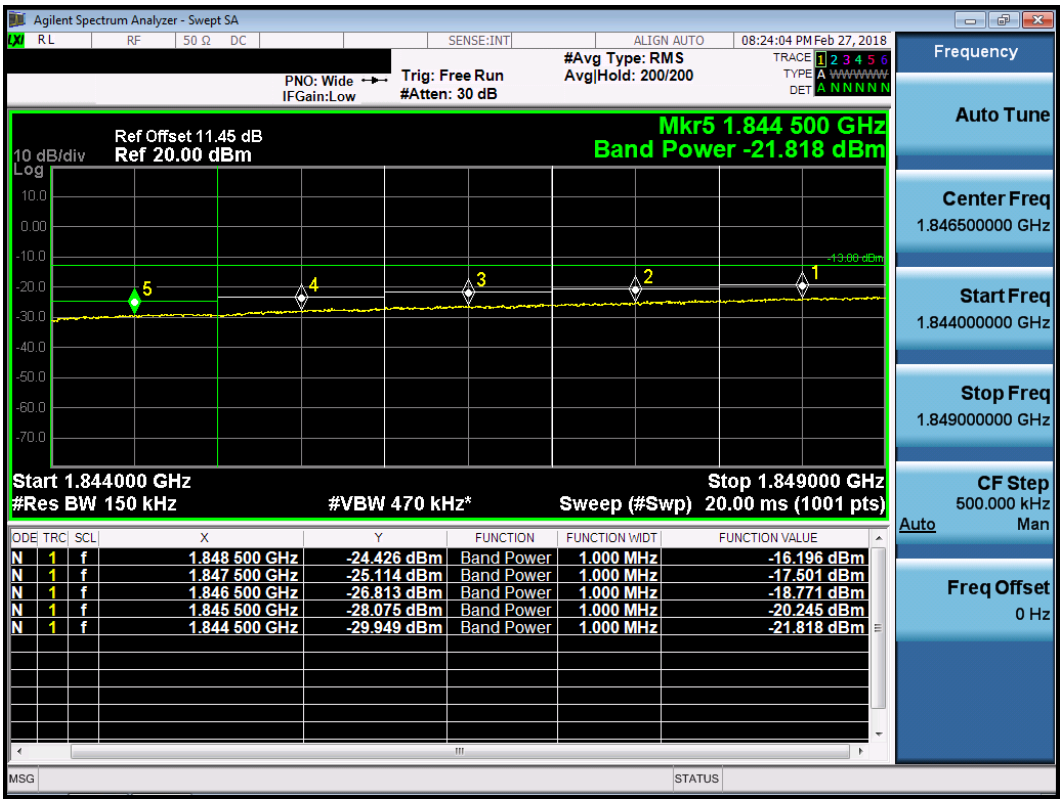


Worst Plot of 16QAM, High Channel

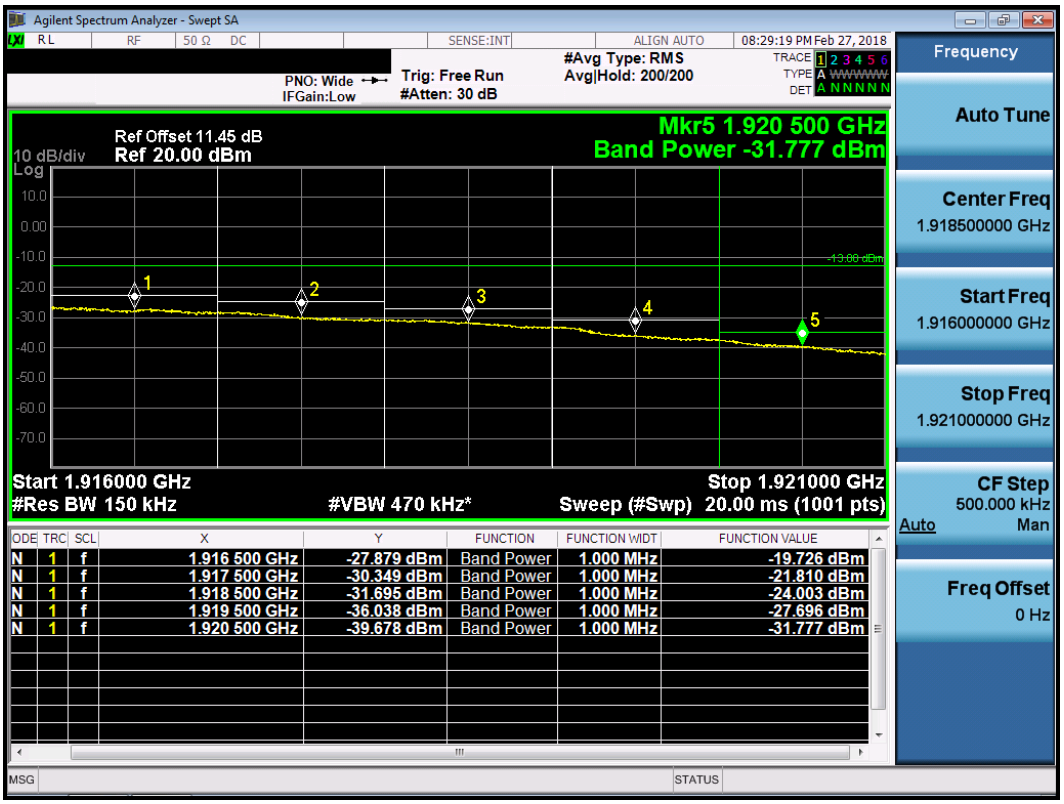


Measured Band Edge Result												
Channel Bandwidth (MHz)	Modulation	PCC Freq. (MHz)	SCC Freq. (MHz)	PCC RB		SCC RB		Range (MHz)	ANT 0 (dBm)	ANT 2 (dBm)	Total (dBm)	Limit (dBm)
				size	offset	size	offset					
10+5	64QAM	1855.0	1912.5	1	0	1	0	1849~1848	-33.988	-48.053	-33.82	-13
								1848~1847	-40.113	-48.919	-39.58	-13
								1847~1846	-38.489	-48.865	-38.11	-13
								1846~1845	-43.245	-49.520	-42.33	-13
								1845~1844	-45.460	-49.799	-44.10	-13
				50	0	25	0	1849~1848	-16.196	-32.866	-16.10	-13
								1848~1847	-17.501	-35.790	-17.44	-13
								1847~1846	-18.771	-38.927	-18.73	-13
								1846~1845	-20.245	-42.530	-20.22	-13
								1845~1844	-21.818	-45.464	-21.80	-13
				1	49	1	24	1916~1917	-49.345	-38.227	-37.90	-13
								1917~1918	-49.932	-43.929	-42.96	-13
								1918~1919	-50.158	-43.075	-42.30	-13
								1919~1920	-50.149	-44.191	-43.21	-13
								1920~1921	-50.314	-48.663	-46.40	-13
				50	0	25	0	1916~1917	-31.758	-19.726	-19.46	-13
								1917~1918	-32.638	-21.810	-21.47	-13
								1918~1919	-33.616	-24.003	-23.55	-13
								1919~1920	-34.883	-27.696	-26.94	-13
								1920~1921	-36.648	-31.777	-30.55	-13

Worst Plot of 64QAM, Low Channel



Worst Plot of 64QAM, High Channel



3.5 Occupied Bandwidth

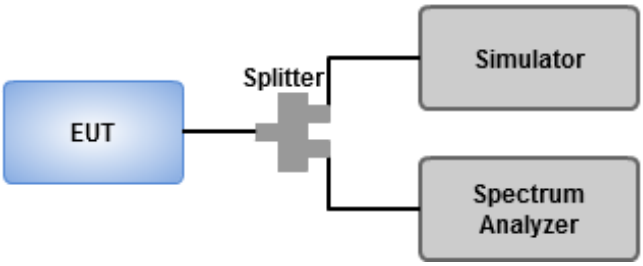
3.5.1 Test Procedures

1. Set as below setting for LTE mode

Bandwidth (MHz)	RBW (kHz)	VBW (KHz)	Detector	Sweep time
5	56	180	Peak	Auto
10	100	300	Peak	Auto
15	150	470	Peak	Auto
20	200	620	Peak	Auto

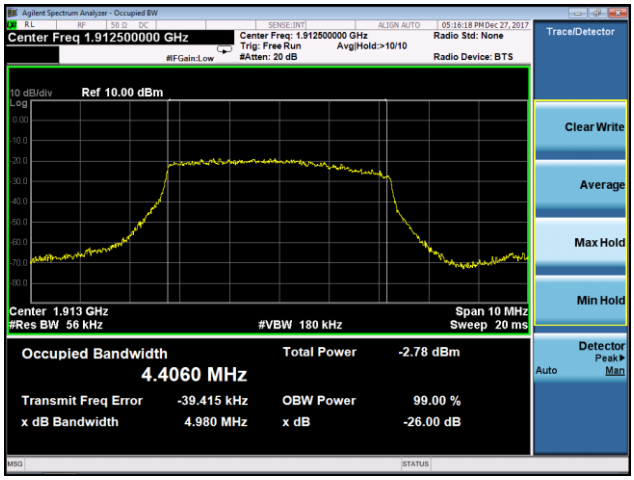
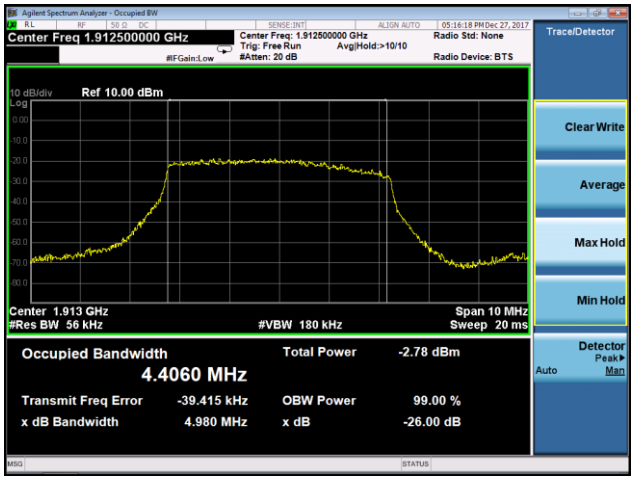
2. Using occupied bandwidth measurement function of spectrum analyzer to measure occupied bandwidth.

3.5.2 Test Setup

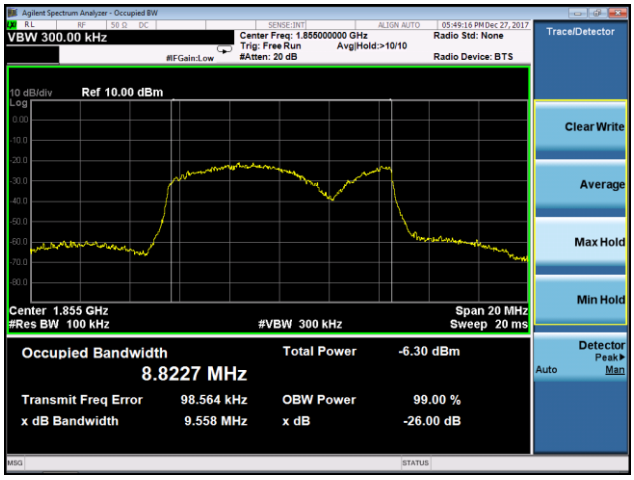


3.5.3 Test Result of Occupied Bandwidth_CDD mode

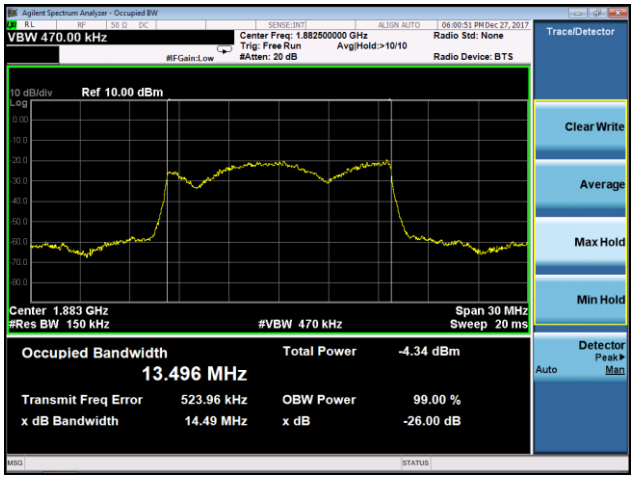
Channel Bandwidth (MHz)	Modulation	Frequency (MHz)	26dB BW (MHz)	99% OBW (MHz)
5	QPSK	1852.5	4.9340	4.1323
5	QPSK	1882.5	4.8800	4.3531
5	QPSK	1912.5	4.9800	4.4060
5	16QAM	1852.5	4.9150	4.1332
5	16QAM	1882.5	4.9360	4.3728
5	16QAM	1912.5	4.9500	4.3952
5	64QAM	1852.5	4.8670	4.0922
5	64QAM	1882.5	4.8740	4.3541
5	64QAM	1912.5	4.9310	4.4029

Worst plots	
26dB bandwidth	OBW
	

Channel Bandwidth (MHz)	Modulation	Frequency (MHz)	26dB BW (MHz)	99% OBW (MHz)
10	QPSK	1855.0	9.5390	8.8800
10	QPSK	1882.5	9.3080	8.6030
10	QPSK	1910.0	9.3700	8.7378
10	16QAM	1855.0	9.5580	8.8227
10	16QAM	1882.5	9.3440	8.7237
10	16QAM	1910.0	9.3620	8.7228
10	64QAM	1855.0	9.5560	8.8171
10	64QAM	1882.5	9.3160	8.5835
10	64QAM	1910.0	9.3010	8.6087

Worst plots	
26dB bandwidth	**OBW**
	

Channel Bandwidth (MHz)	Modulation	Frequency (MHz)	26dB BW (MHz)	99% OBW (MHz)
15	QPSK	1857.5	14.3500	13.4120
15	QPSK	1882.5	14.4900	13.4960
15	QPSK	1907.5	14.2800	13.4340
15	16QAM	1857.5	14.3100	13.4140
15	16QAM	1882.5	14.4900	13.4760
15	16QAM	1907.5	14.3900	13.4150
15	64QAM	1857.5	14.3700	13.3890
15	64QAM	1882.5	14.4600	13.4910
15	64QAM	1907.5	14.4000	13.4070

Worst plots	
26dB bandwidth	**OBW**
	

Channel Bandwidth (MHz)	Modulation	Frequency (MHz)	26dB BW (MHz)	99% OBW (MHz)
20	QPSK	1860.0	18.9100	17.8220
20	QPSK	1882.5	18.8100	17.7820
20	QPSK	1905.0	18.6200	17.4950
20	16QAM	1860.0	18.8700	17.8480
20	16QAM	1882.5	18.9200	17.8410
20	16QAM	1905.0	18.7100	17.5900
20	64QAM	1860.0	18.9400	17.8160
20	64QAM	1882.5	18.9400	17.8140
20	64QAM	1905.0	18.7700	17.5050

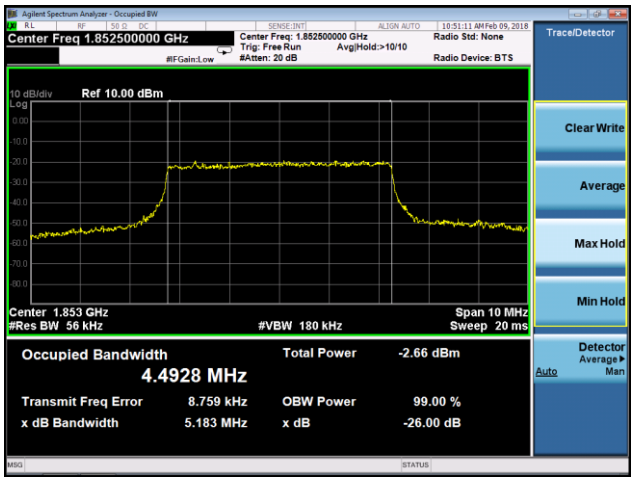
Worst plots	
26dB bandwidth	**OBW**

3.5.4 Test Result of Occupied Bandwidth_CA mode

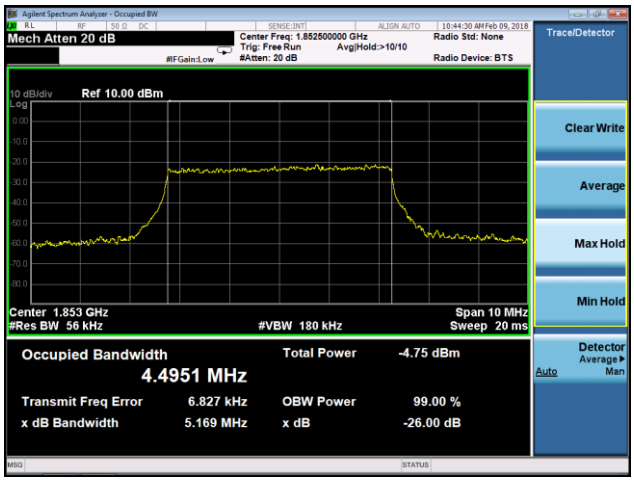
Channel Bandwidth (MHz)	Modulation	PCC Freq. (MHz)	26dB BW (MHz)	99% OBW (MHz)	SCC Freq. (MHz)	26dB BW (MHz)	99% OBW (MHz)	PCC+SCC 99% OBW (MHz)
5+5	QPSK	1852.5	5.1690	4.4951	1912.5	5.0540	4.4827	8.9778
5+5	16QAM	1852.5	5.0160	4.4945	1912.5	5.1150	4.4793	8.9738
5+5	64QAM	1852.5	5.1830	4.4928	1912.5	5.1510	4.4941	8.9869

Worst plots

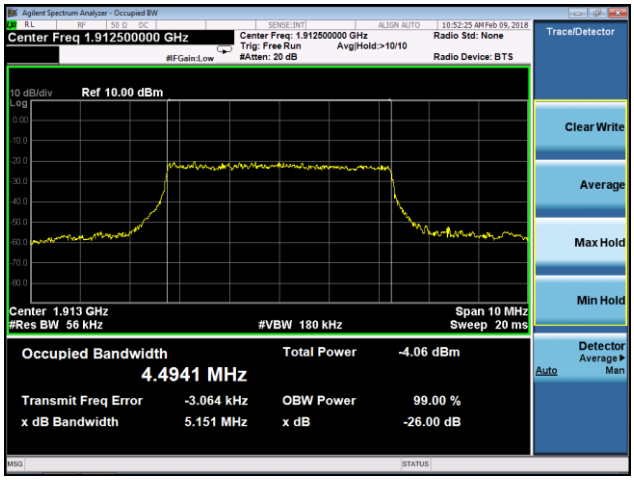
26dB bandwidth – Low



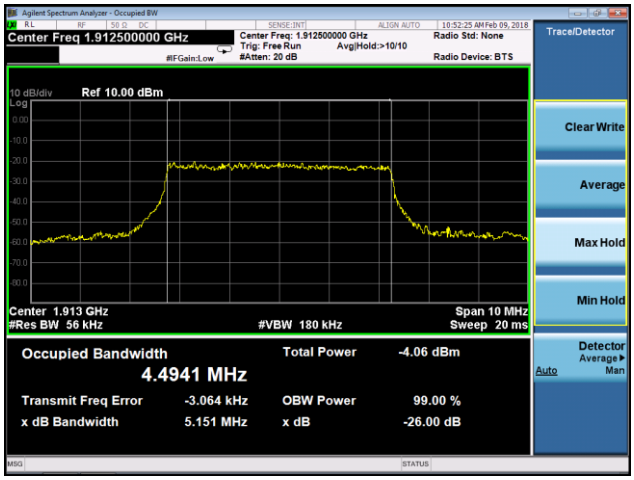
OBW – Low



26dB bandwidth – High



OBW – High

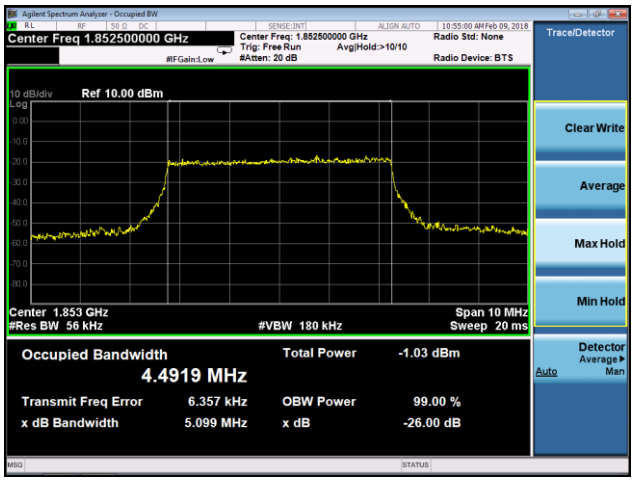


Channel Bandwidth (MHz)	Modulation	PCC Freq. (MHz)	26dB BW (MHz)	99% OBW (MHz)	SCC Freq. (MHz)	26dB BW (MHz)	99% OBW (MHz)	PCC+SCC 99% OBW (MHz)
5+10	QPSK	1852.5	5.0990	4.4919	1910.0	9.8330	8.9582	13.4501
5+10	16QAM	1852.5	5.0360	4.4904	1910.0	9.7970	8.9473	13.4377
5+10	64QAM	1852.5	5.1940	4.4910	1910.0	9.7860	8.9617	13.4527

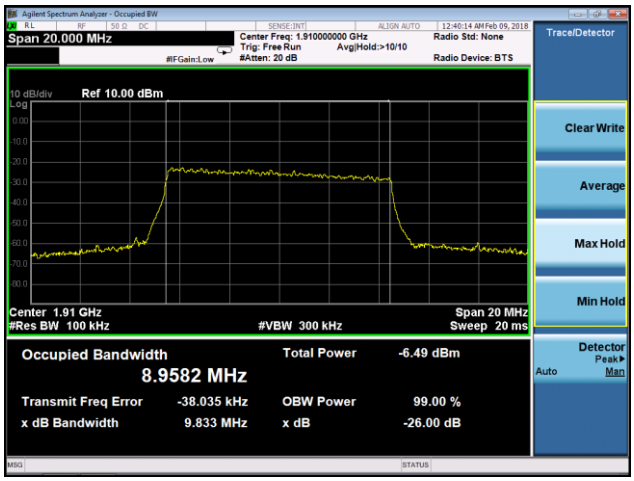
Worst plots

26dB bandwidth – Low

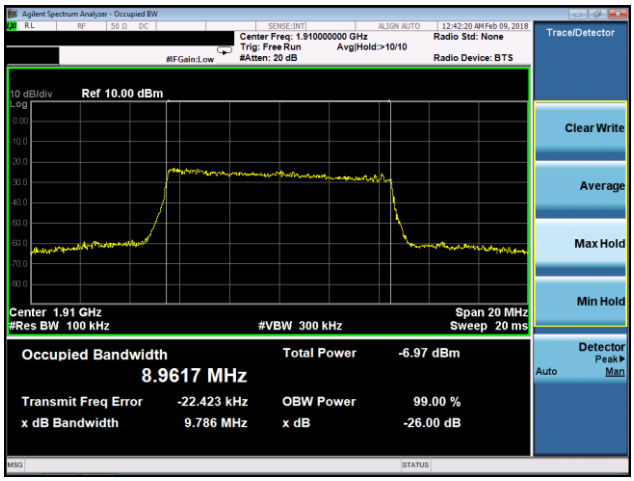
OBW – Low



26dB bandwidth – High



OBW – High

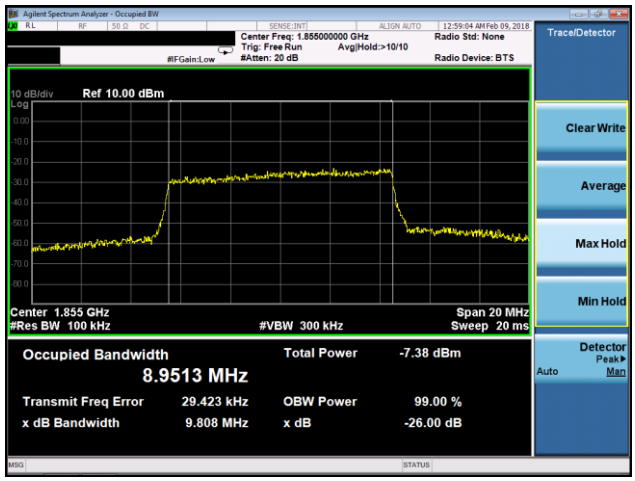


Channel Bandwidth (MHz)	Modulation	PCC Freq. (MHz)	26dB BW (MHz)	99% OBW (MHz)	SCC Freq. (MHz)	26dB BW (MHz)	99% OBW (MHz)	PCC+SCC 99% OBW (MHz)
10+5	QPSK	1855.0	9.7530	8.9425	1912.5	5.0470	4.4892	13.4317
10+5	16QAM	1855.0	9.8080	8.9513	1912.5	5.1930	4.4910	13.4423
10+5	64QAM	1855.0	9.7000	8.9319	1912.5	4.9810	4.4847	13.4166

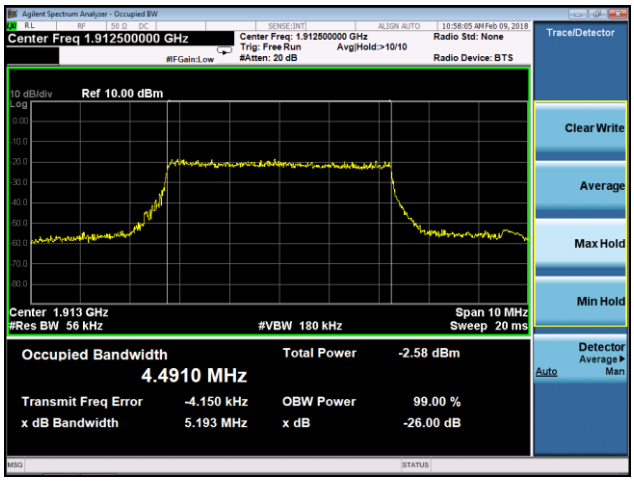
Worst plots

26dB bandwidth – Low

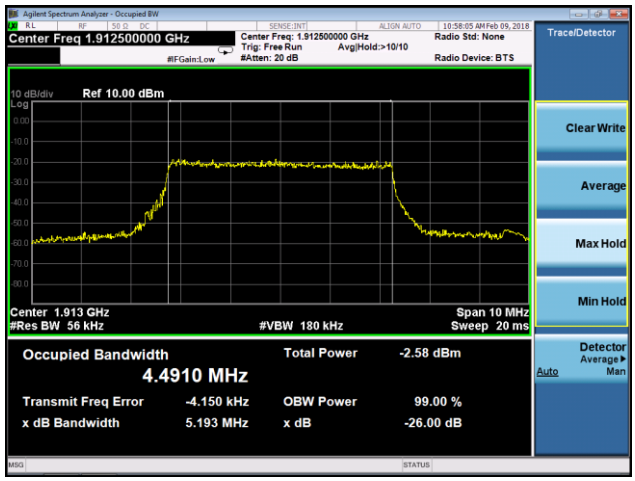
OBW – Low



26dB bandwidth – High



OBW – High



3.6 Peak to Average Ratio

3.6.1 Limit of Peak to Average Ratio

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

3.6.2 Test Procedures

CDD mode

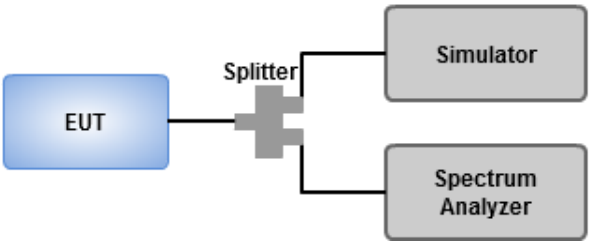
1. Enable CCDF function of spectrum analyzer and set as below setting for LTE mode
2. Set the number of counts to a value that stabilizes the measured CCDF curve.
3. Record the maximum PAPR level associated with a probability of 0.1%.

CA mode

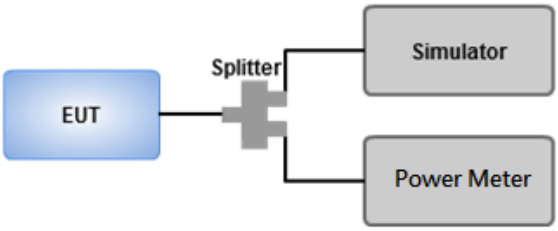
1. A broadband Peak RF power meter is used for output power measurement. The video bandwidth of power meter is greater than occupied bandwidth of EUT. If duty cycle of test signal is not 100 %, trigger and gating function of power meter will be enabled to capture transmission burst for measuring output power.
2. Measured and recored peak and average power
3. PAPR (dB) = P_{Pk} -P_{Avg}

3.6.3 Test Setup

For CDD mode



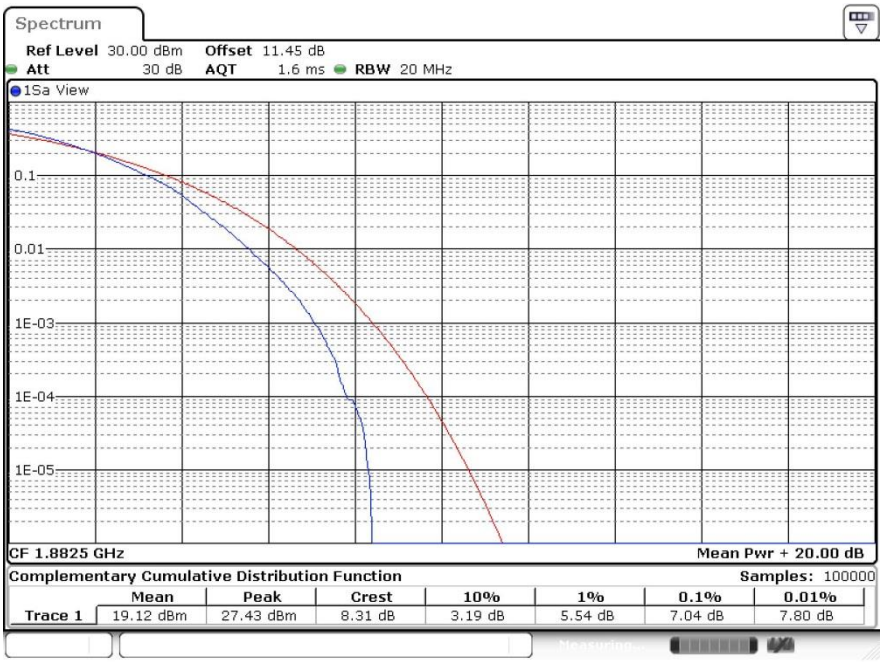
For CA mode



3.6.4 Test Result of Peak to Average Ratio_CDD mode

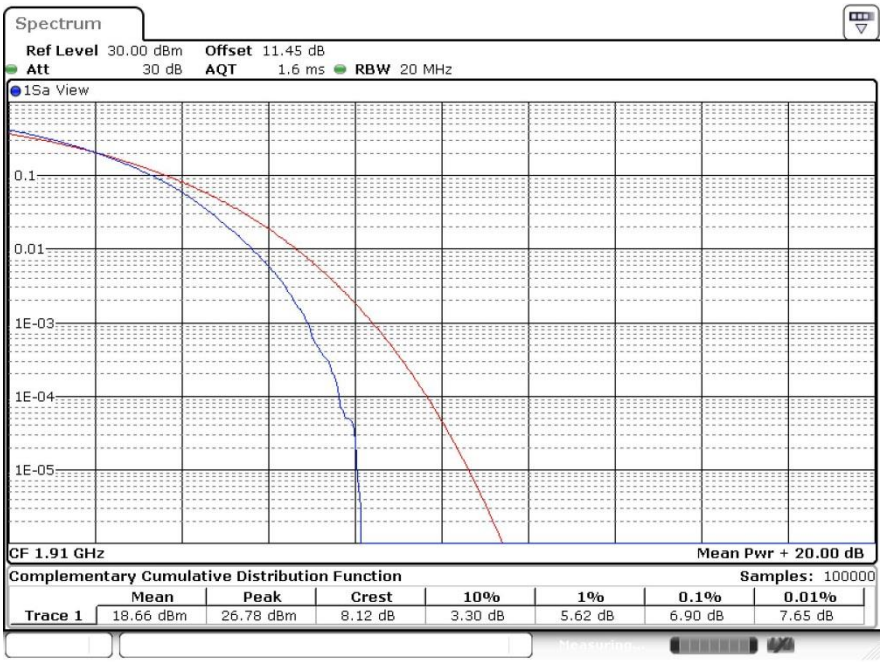
Channel Bandwidth (MHz)	Modulation	Frequency (MHz)	Antenna Port	Peak to Average Ratio (dB)
5	QPSK	1852.5	ANT 0	5.54
			ANT 2	5.39
5	QPSK	1882.5	ANT 0	6.09
			ANT 2	5.91
5	QPSK	1912.5	ANT 0	5.57
			ANT 2	5.83
5	16QAM	1852.5	ANT 0	6.23
			ANT 2	6.09
5	16QAM	1882.5	ANT 0	6.81
			ANT 2	6.78
5	16QAM	1912.5	ANT 0	6.12
			ANT 2	6.55
5	64QAM	1852.5	ANT 0	6.61
			ANT 2	6.55
5	64QAM	1882.5	ANT 0	7.04
			ANT 2	6.78
5	64QAM	1912.5	ANT 0	6.58
			ANT 2	6.78

Worst plot



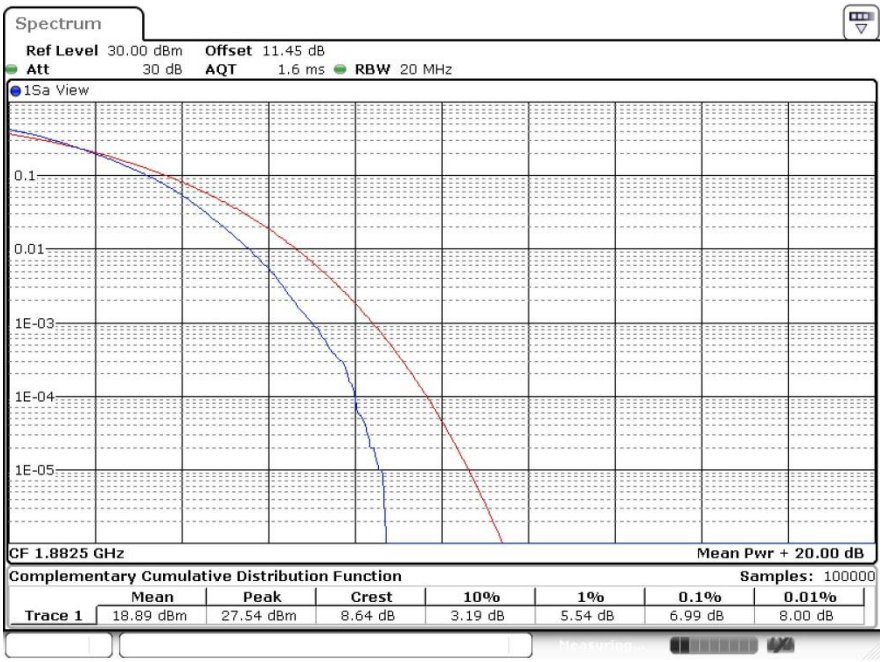
Channel Bandwidth (MHz)	Modulation	Frequency (MHz)	Antenna Port	Peak to Average Ratio (dB)
10	QPSK	1855.0	ANT 0	5.54
			ANT 2	5.33
10	QPSK	1882.5	ANT 0	6.09
			ANT 2	5.91
10	QPSK	1910.0	ANT 0	5.80
			ANT 2	5.97
10	16QAM	1855.0	ANT 0	6.23
			ANT 2	6.17
10	16QAM	1882.5	ANT 0	6.70
			ANT 2	6.41
10	16QAM	1910.0	ANT 0	6.41
			ANT 2	6.58
10	64QAM	1855.0	ANT 0	6.58
			ANT 2	6.43
10	64QAM	1882.5	ANT 0	6.81
			ANT 2	6.70
10	64QAM	1910.0	ANT 0	6.81
			ANT 2	6.90

Worst plot



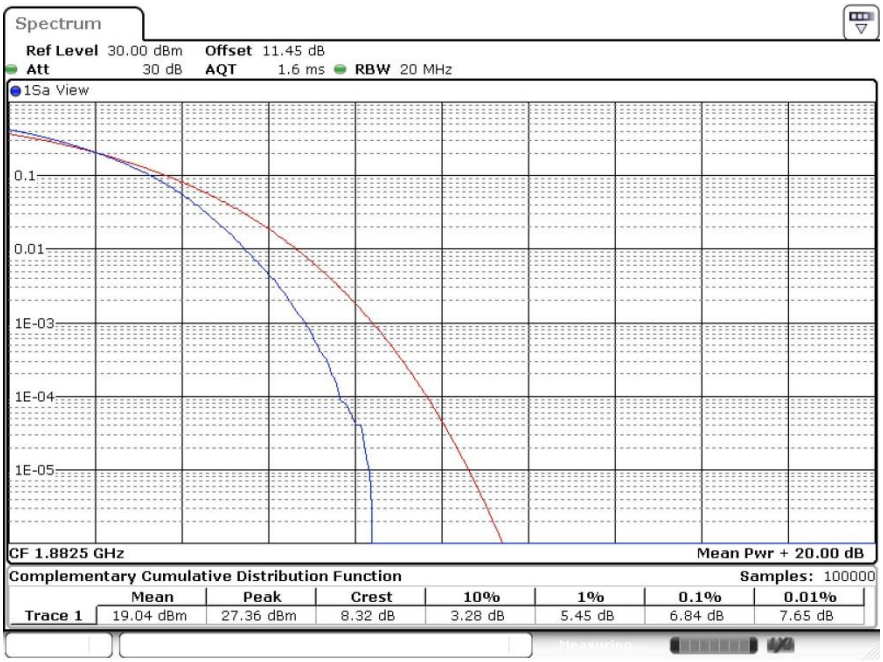
Channel Bandwidth (MHz)	Modulation	Frequency (MHz)	Antenna Port	Peak to Average Ratio (dB)
15	QPSK	1857.5	ANT 0	5.30
			ANT 2	5.28
15	QPSK	1882.5	ANT 0	6.03
			ANT 2	5.65
15	QPSK	1907.5	ANT 0	5.57
			ANT 2	5.30
15	16QAM	1857.5	ANT 0	6.29
			ANT 2	6.17
15	16QAM	1882.5	ANT 0	6.64
			ANT 2	6.38
15	16QAM	1907.5	ANT 0	6.38
			ANT 2	6.35
15	64QAM	1857.5	ANT 0	6.58
			ANT 2	6.49
15	64QAM	1882.5	ANT 0	6.99
			ANT 2	6.75
15	64QAM	1907.5	ANT 0	6.61
			ANT 2	6.55

Worst plot



Channel Bandwidth (MHz)	Modulation	Frequency (MHz)	Antenna Port	Peak to Average Ratio (dB)
20	QPSK	1860.0	ANT 0	4.90
			ANT 2	5.04
20	QPSK	1882.5	ANT 0	5.80
			ANT 2	5.45
20	QPSK	1905.0	ANT 0	5.33
			ANT 2	4.90
20	16QAM	1860.0	ANT 0	6.09
			ANT 2	6.17
20	16QAM	1882.5	ANT 0	6.75
			ANT 2	6.35
20	16QAM	1905.0	ANT 0	6.38
			ANT 2	6.20
20	64QAM	1860.0	ANT 0	6.43
			ANT 2	6.49
20	64QAM	1882.5	ANT 0	6.84
			ANT 2	6.61
20	64QAM	1905.0	ANT 0	6.46
			ANT 2	6.14

Worst plot



3.6.5 Test Result of Peak to Average Ratio_CA mode

Channel Bandwidth (MHz)	Modulation	PCC Freq. (MHz)	SCC Freq. (MHz)	Total Peak Power (dBm)	Total Average Power (dBm)	Peak to Average Ratio (dB)
5+5	QPSK	1852.5	1912.5	30.34	25.66	4.68
5+5	16QAM	1852.5	1912.5	30.37	25.60	4.77
5+5	64QAM	1852.5	1912.5	30.57	25.54	5.03

Channel Bandwidth (MHz)	Modulation	PCC Freq. (MHz)	SCC Freq. (MHz)	Total Peak Power (dBm)	Total Average Power (dBm)	Peak to Average Ratio (dB)
5+10	QPSK	1852.5	1910.0	30.66	25.81	4.85
5+10	16QAM	1852.5	1910.0	30.75	25.8	4.95
5+10	64QAM	1852.5	1910.0	30.71	25.76	4.95

Channel Bandwidth (MHz)	Modulation	PCC Freq. (MHz)	SCC Freq. (MHz)	Total Peak Power (dBm)	Total Average Power (dBm)	Peak to Average Ratio (dB)
10+5	QPSK	1855.0	1912.5	30.46	25.84	4.62
10+5	16QAM	1855.0	1912.5	30.69	25.73	4.96
10+5	64QAM	1855.0	1912.5	30.73	25.79	4.94

3.7 Frequency Stability

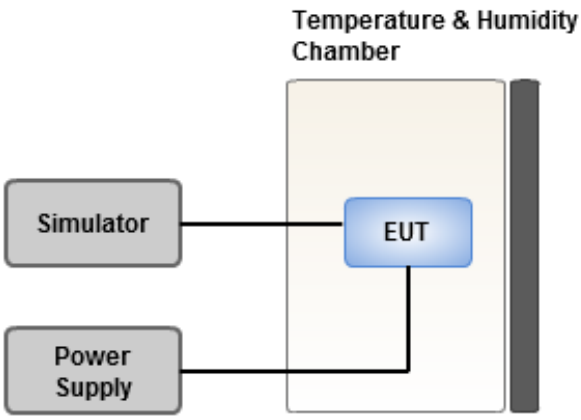
3.7.1 Limit of Frequency Stability

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

3.7.2 Test Procedures

1. EUT was placed at temperature chamber and connected to an external power supply.
2. Temperature and voltage condition shall be tested to confirm frequency stability.
3. Temperature range is from -40~60°C and voltage range is from lowest to highest working voltage.
4. Tem Link up EUT and simulator. Confirm frequency drift value of simulator and record it.

3.7.3 Test Setup



3.7.4 Test Result of Frequency Stability_CDD mode

Temperature (°C)	Voltage (ac)	Frequency Drift (ppm)			
		CB: 5MHz	CB: 10MHz	CB: 15MHz	CB: 20MHz
60	120	-0.021	-0.020	-0.018	-0.017
50	120	-0.018	-0.019	-0.019	-0.018
40	120	-0.017	-0.018	-0.017	-0.017
30	120	-0.019	-0.018	-0.019	-0.015
20	120	-0.020	-0.019	-0.018	-0.016
10	120	-0.021	-0.018	-0.017	-0.018
0	120	-0.016	-0.018	-0.019	-0.019
-10	120	-0.018	-0.019	-0.021	-0.018
-20	120	-0.019	-0.020	-0.019	-0.020
-30	120	-0.020	-0.021	-0.020	-0.019
-40	120	-0.021	-0.022	-0.021	-0.020
20	138	-0.023	-0.022	-0.020	-0.021
20	102	-0.024	-0.023	-0.021	-0.022

3.7.5 Test Result of Frequency Stability_CA mode

Temperature (°C)	Voltage (ac)	Frequency Drift (ppm)		
		CB: 5MHz+5MHz	CB: 5MHz+10MHz	CB: 10MHz+5MHz
60	120	-0.019	-0.017	-0.02
50	120	-0.018	-0.018	-0.19
40	120	-0.017	-0.017	-0.018
30	120	-0.018	-0.018	-0.019
20	120	-0.017	-0.015	-0.021
10	120	-0.018	-0.019	-0.019
0	120	-0.019	-0.017	-0.021
-10	120	-0.018	-0.019	-0.017
-20	120	-0.019	-0.018	-0.018
-30	120	-0.018	-0.02	-0.017
-40	120	-0.02	-0.021	-0.02
20	138	-0.021	-0.02	-0.018
20	102	-0.023	-0.022	-0.021

4 Test laboratory information

Established in 2012, ICC provides foremost EMC & RF Testing and advisory consultation services by our skilled engineers and technicians. Our services employ a wide variety of advanced edge test equipment and one of the widest certification extents in the business.

International Certification Corp (EMC and Wireless Communication Laboratory), it is our definitive objective is to institute long term, trust-based associations with our clients. The expectation we set up with our clients is based on outstanding service, practical expertise and devotion to a certified value structure. Our passion is to grant our clients with best EMC / RF services by oriented knowledgeable and accommodating staff.

Our Test sites are located at Linkou District and Kwei Shan District. Location map can be found on our website http://www.icertifi.com.tw.

Linkou	**Kwei Shan**	**Kwei Shan Site II**
Tel: 886-2-2601-1640	Tel: 886-3-271-8666	Tel: 886-3-271-8640
No. 30-2, Ding Fwu Tsuen, Lin Kou District, New Taipei City, Taiwan, R.O.C.	No. 3-1, Lane 6, Wen San 3rd St., Kwei Shan District, Tao Yuan City 333, Taiwan, R.O.C.	No. 14-1, Lane 19, Wen San 3rd St., Kwei Shan District, Tao Yuan City 333, Taiwan, R.O.C..

If you have any suggestion, please feel free to contact us as below information

Tel: 886-3-271-8666
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Email: ICC_Service@icertifi.com.tw

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