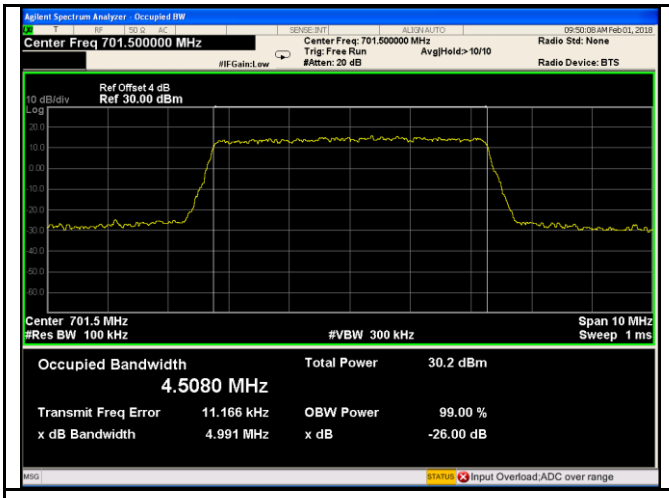
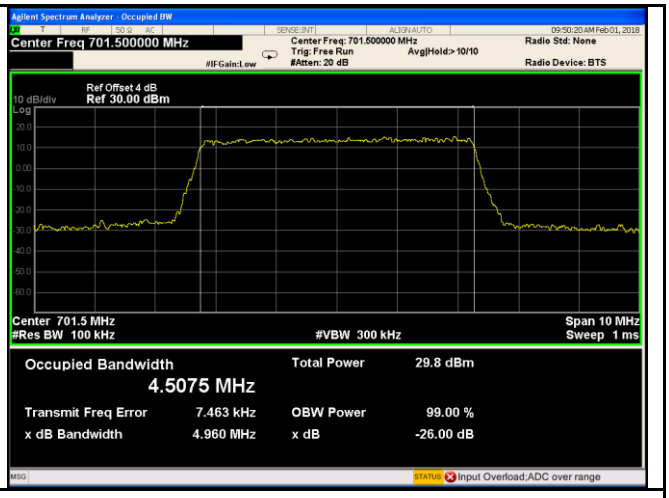
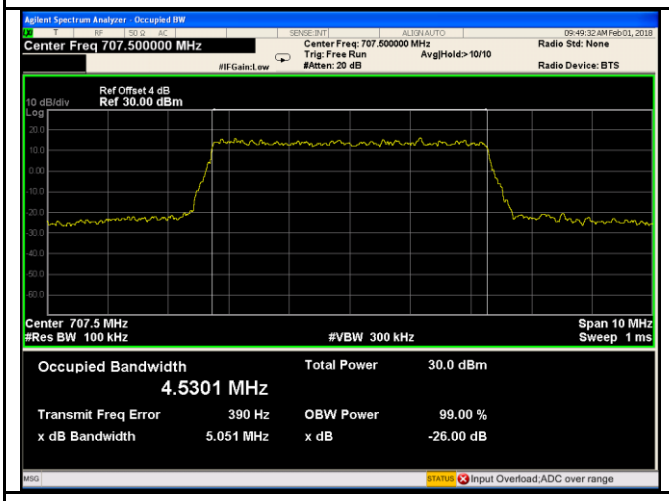


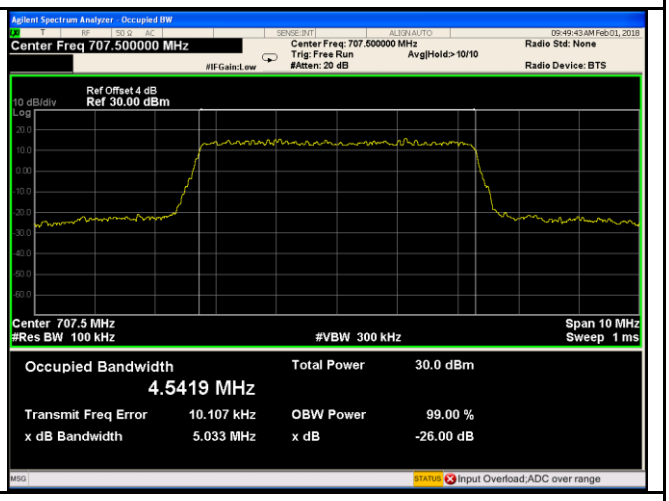
LTE Band XII - Low CH QPSK-5



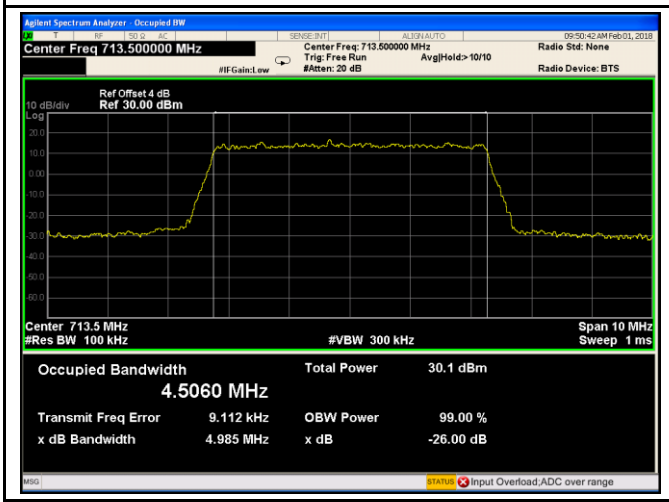
LTE Band XII - Low CH 16QAM-5



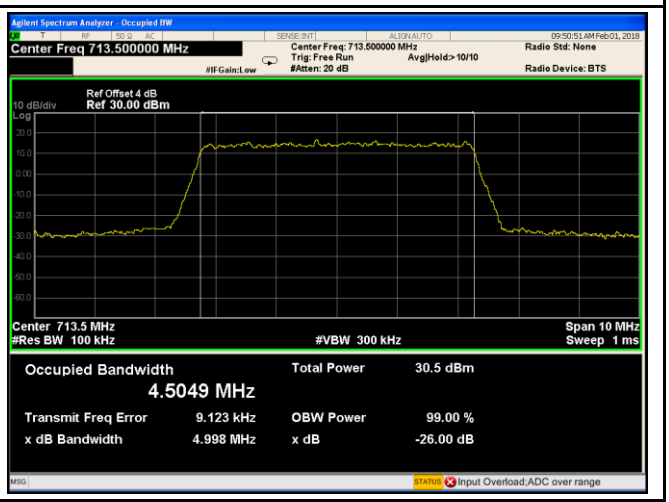
LTE Band XII - Middle CH QPSK-5



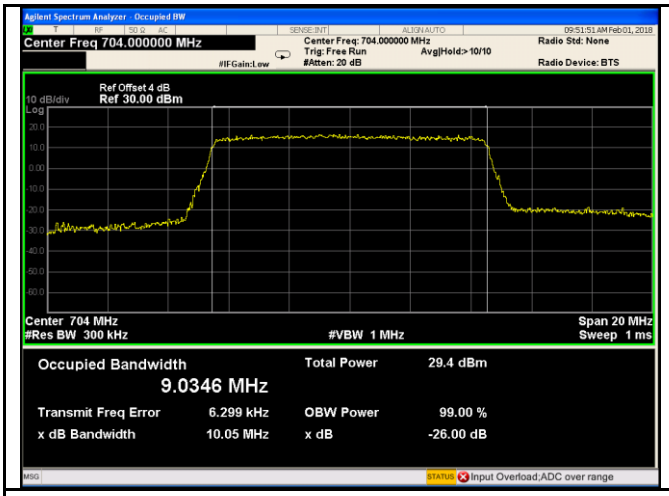
LTE Band XII - Middle CH 16QAM-5



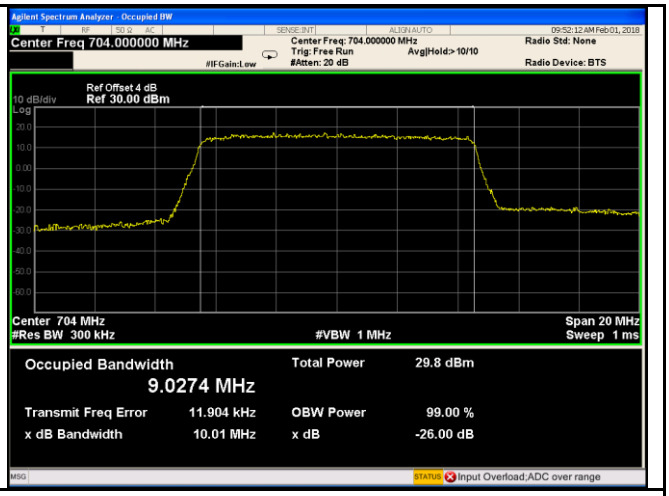
LTE Band XII - High CH QPSK-5



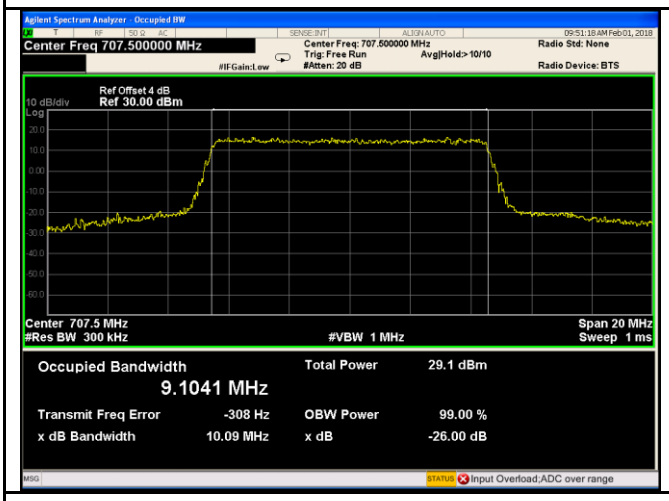
LTE Band XII - High CH 16QAM-5



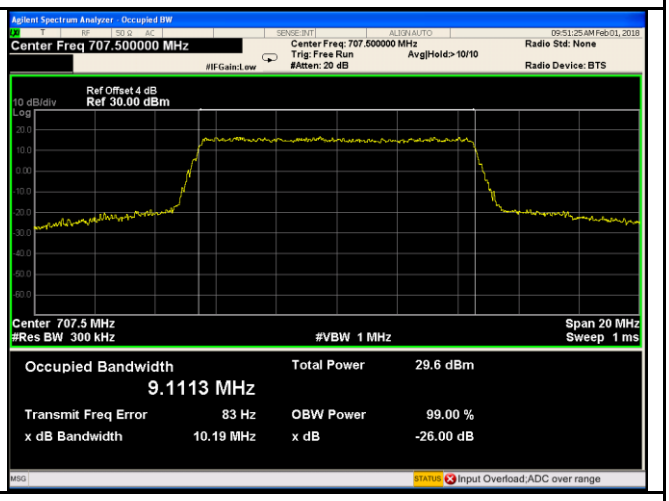
LTE Band XII - Low CH QPSK-10



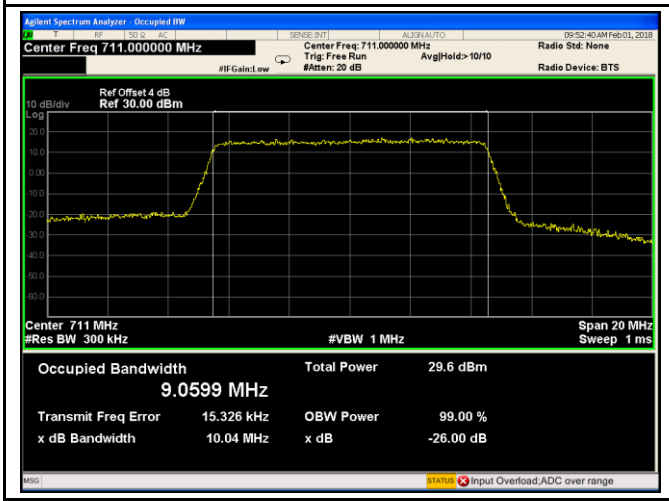
LTE Band XII - Low CH 16QAM-10



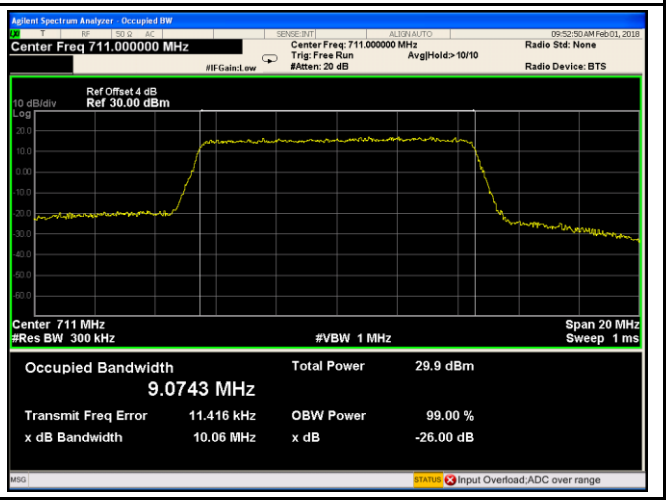
LTE Band XII - Middle CH QPSK-10



LTE Band XII - Middle CH 16QAM-10

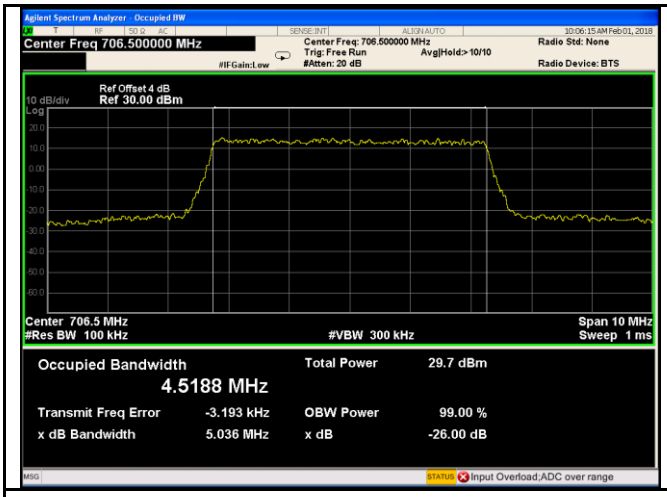


LTE Band XII - High CH QPSK-10

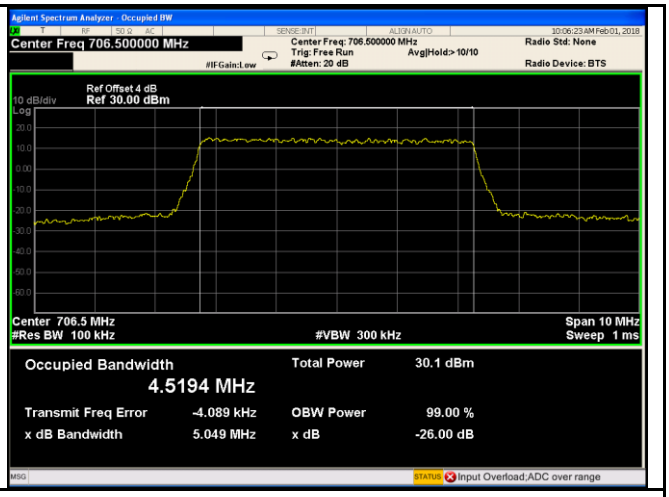


LTE Band XII - High CH 16QAM-10

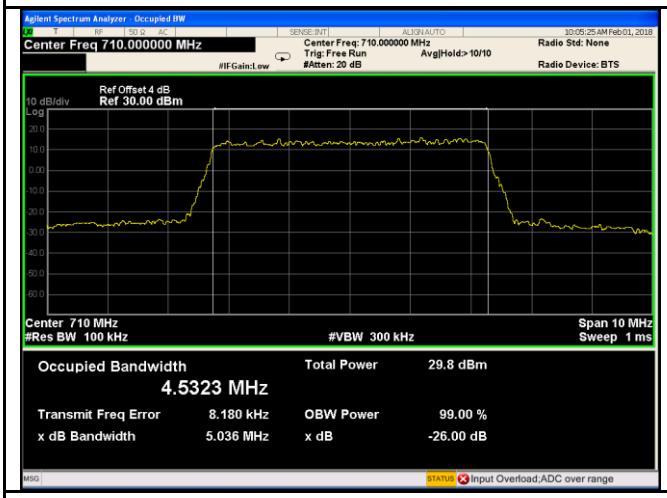
LTE Band XVII (Part 27)



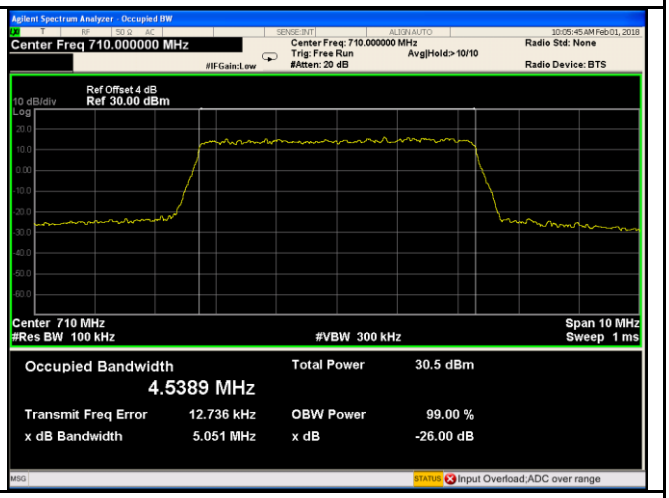
LTE Band XVII - Low CH QPSK-5



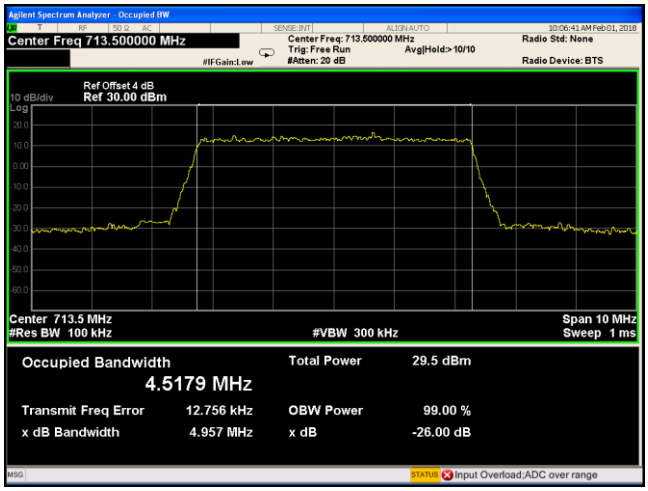
LTE Band XVII - Low CH 16QAM-5



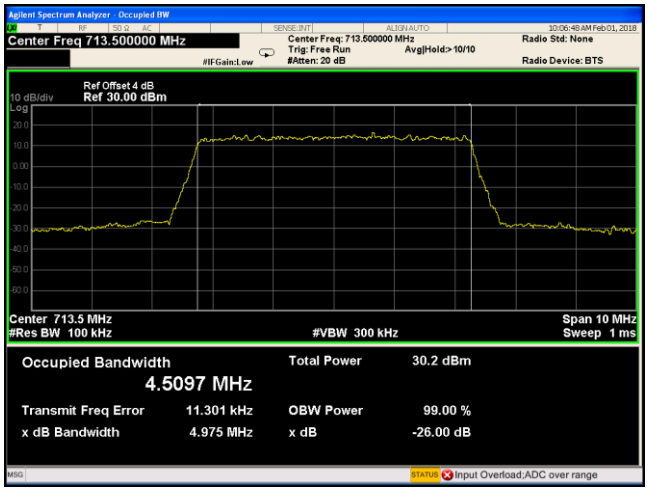
LTE Band XVII - Middle CH QPSK-5



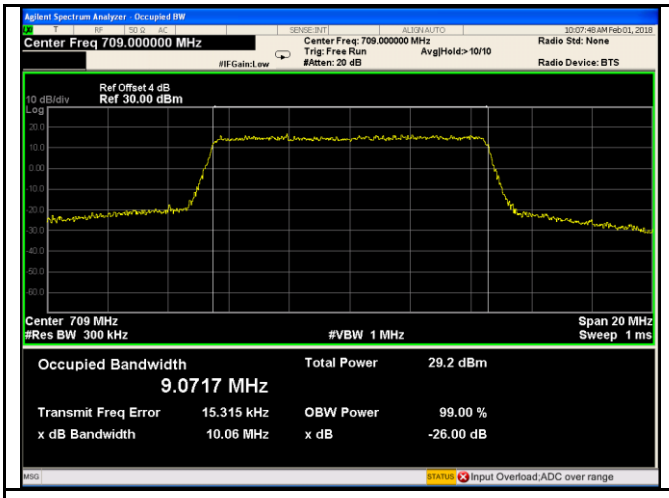
LTE Band XVII - Middle CH 16QAM-5



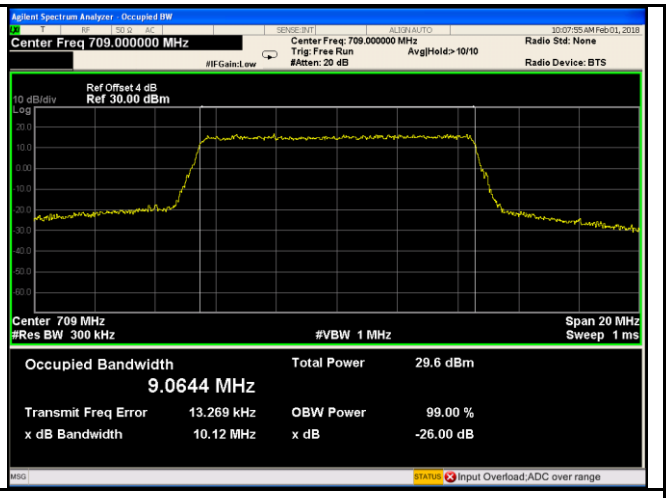
LTE Band XVII - High CH QPSK-5



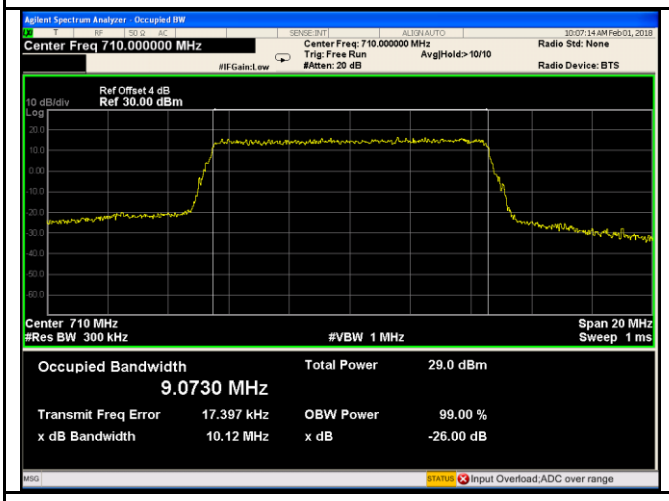
LTE Band XVII - High CH 16QAM-5



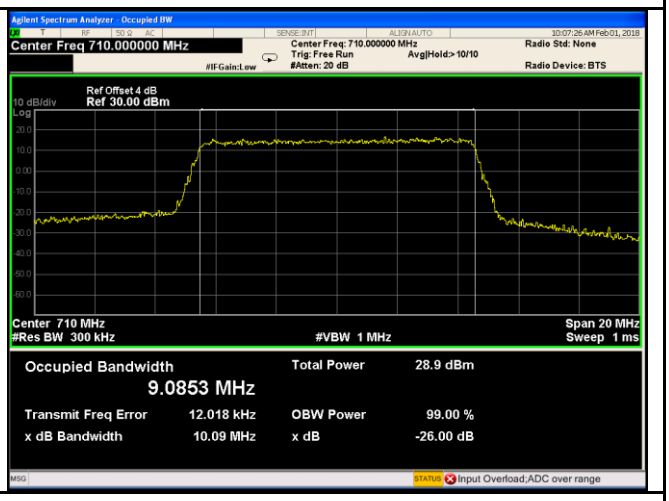
LTE Band XVII - Low CH QPSK-10



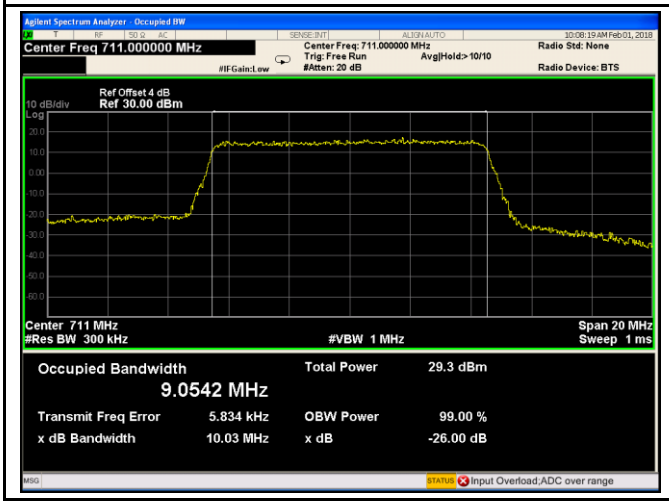
LTE Band XVII - Low CH 16QAM-10



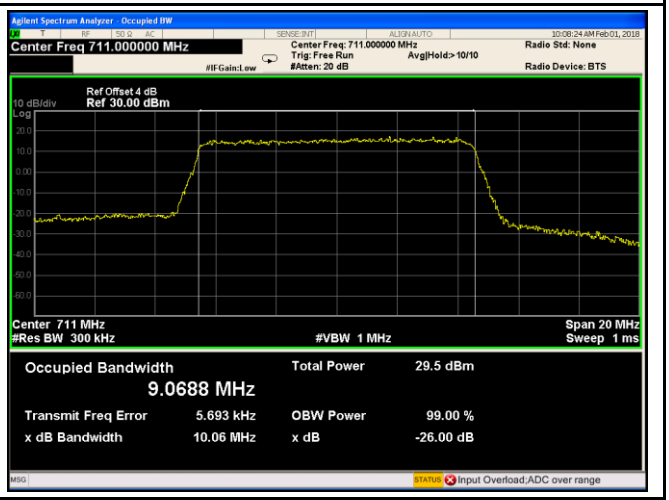
LTE Band XVII - Middle CH QPSK-10



LTE Band XVII - Middle CH 16QAM-10



LTE Band XVII - High CH QPSK-10

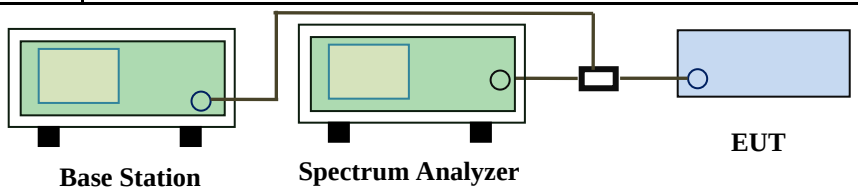


LTE Band XVII - High CH 16QAM-10

6.5 Spurious Emissions at Antenna Terminals

Temperature	23 °C
Relative Humidity	51%
Atmospheric Pressure	1020mbar
Test date :	January 30, 2018
Tested By :	Aaron Liang

Requirement(s):

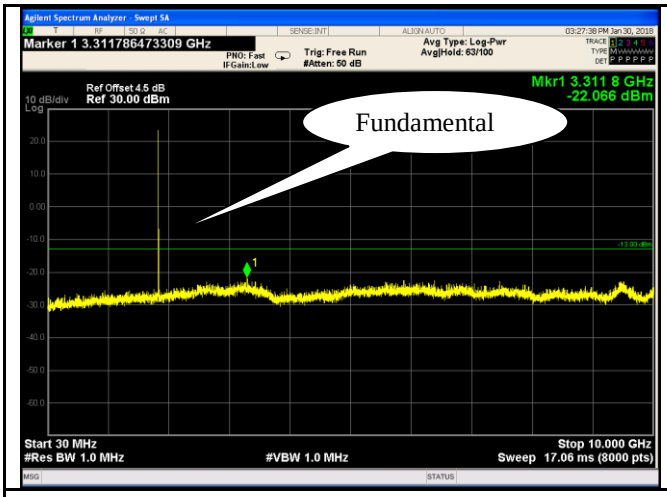
Spec	Item	Requirement	Applicable
§2.1051, §22.917(a)& §24.238(a) § 27.53(h)	a)	The power of any emission outside of the authorized operating frequency ranges must be lower than the transmitter power (P) by a factor of at least 43 + 10 log (P) dB	☑
Test Setup			
Test Procedure	- The EUT was connected to Spectrum Analyzer and Base Station via power divider. - The Band Edges of low and high channels for the highest RF powers were measured. - Setting RBW as roughly BW/100.		
Remark			
Result	☑ Pass ☐ Fail		

Test Data ☑ Yes ☐ N/A

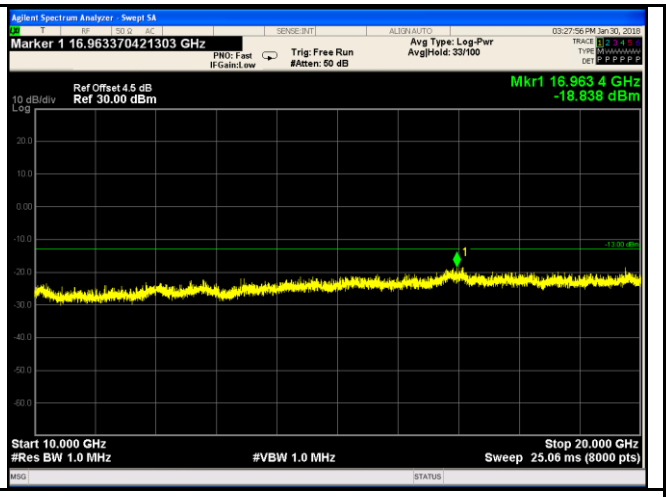
Test Plot ☑ Yes (See below) ☐ N/A

Test Plots 30MHz-5GHz

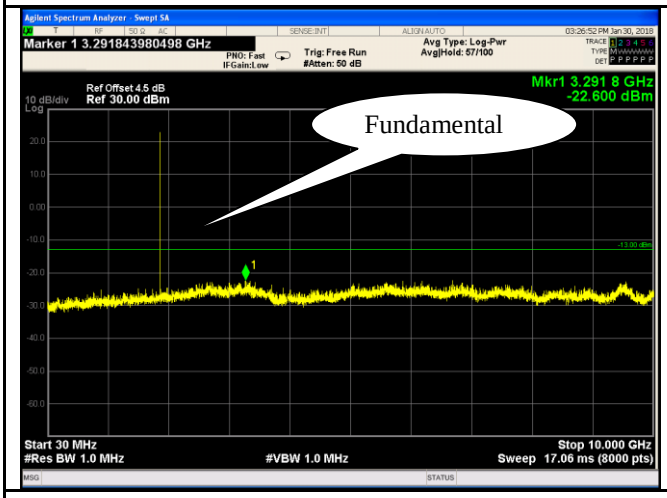
LTE Band II (Part 24E)



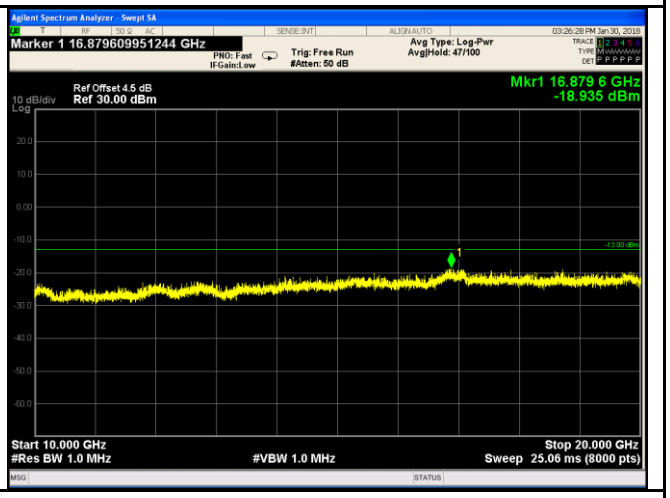
LTE Band II - Low Channel-1



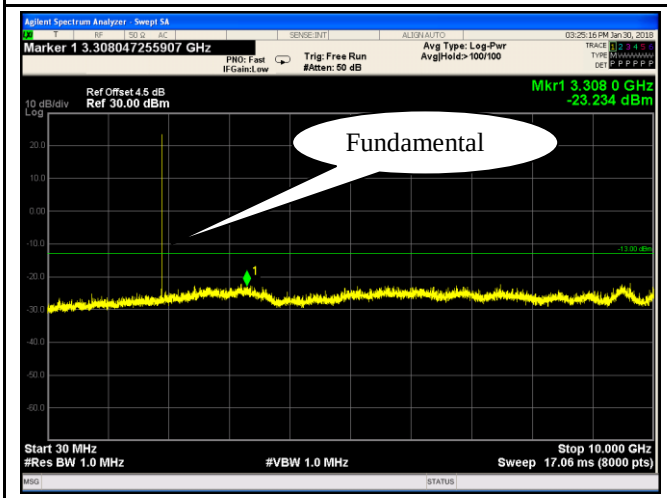
LTE Band II - Low Channel-2



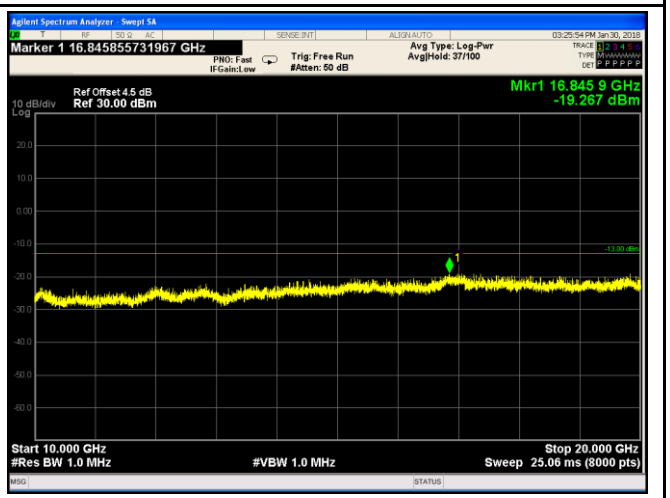
LTE Band II Middle Channel-1



LTE Band II Middle Channel-2

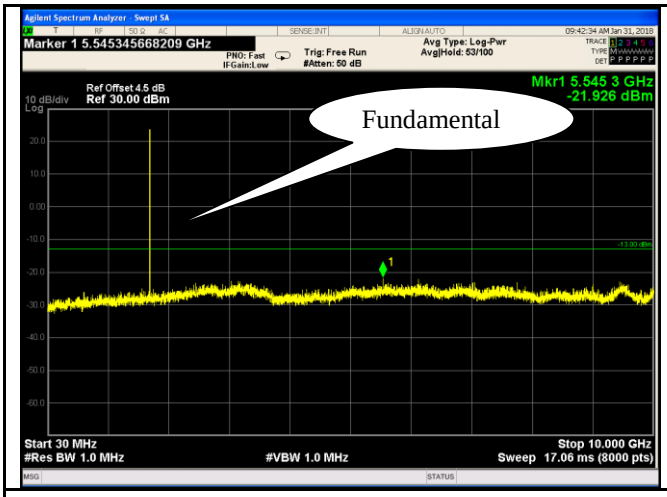


LTE Band II - High Channel-1

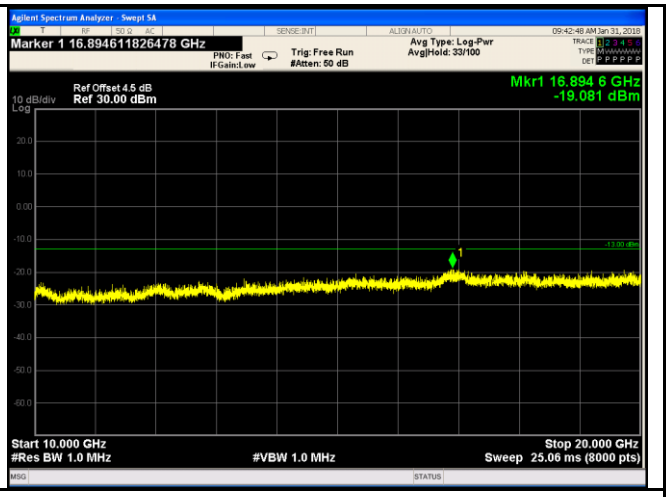


LTE Band II - High Channel-2

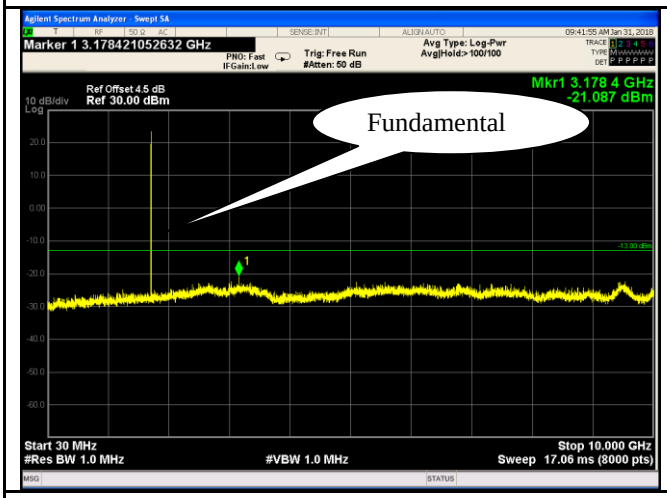
LTE Band IV (Part27) result



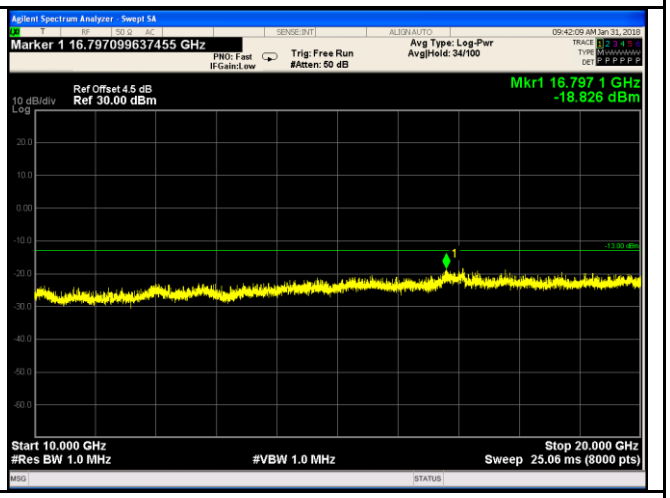
LTE Band IV - Low Channel-1



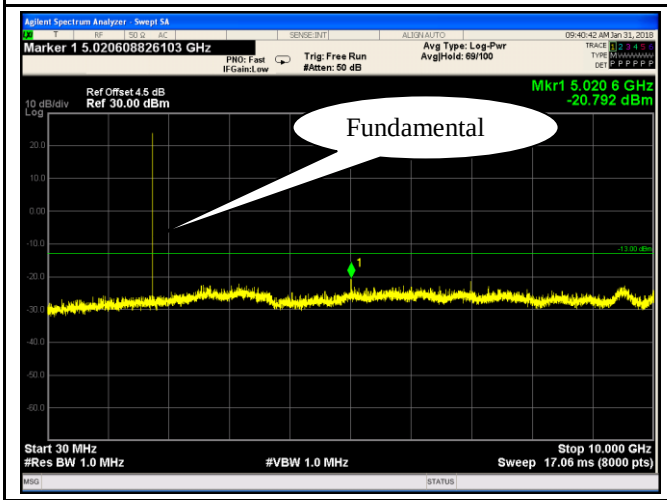
LTE Band IV - Low Channel-2



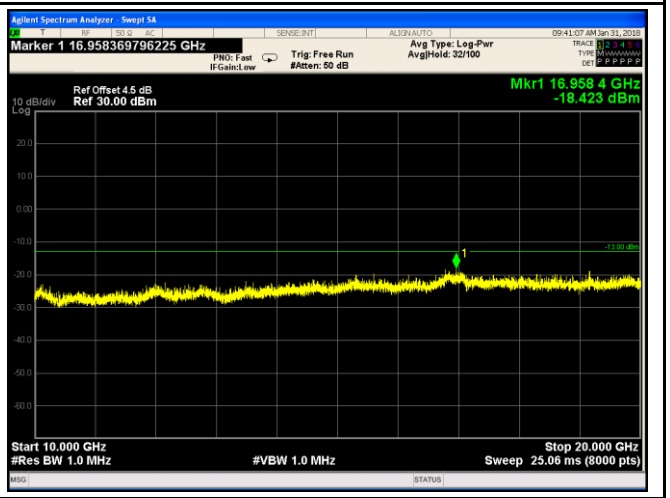
LTE Band IV - Middle Channel-1



LTE Band IV - Middle Channel-2

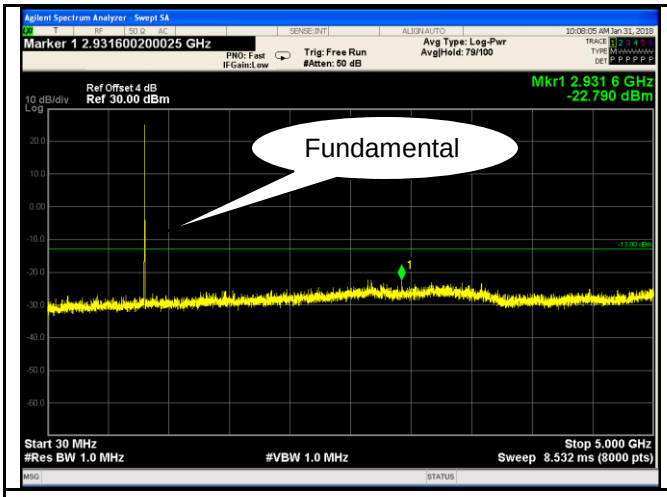


LTE Band IV - High Channel-1

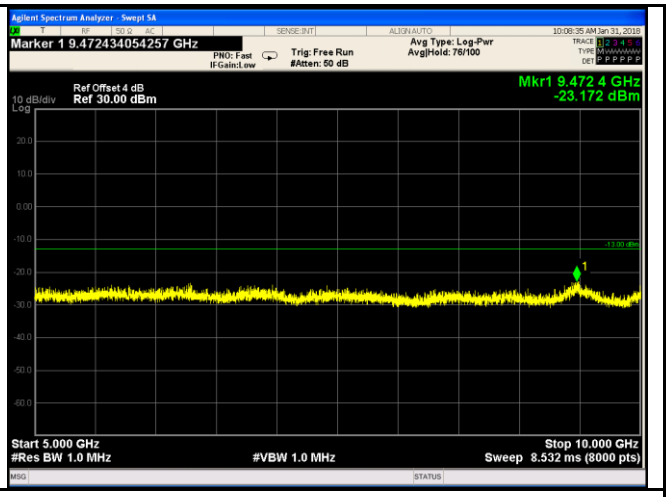


LTE Band IV - High Channel-2

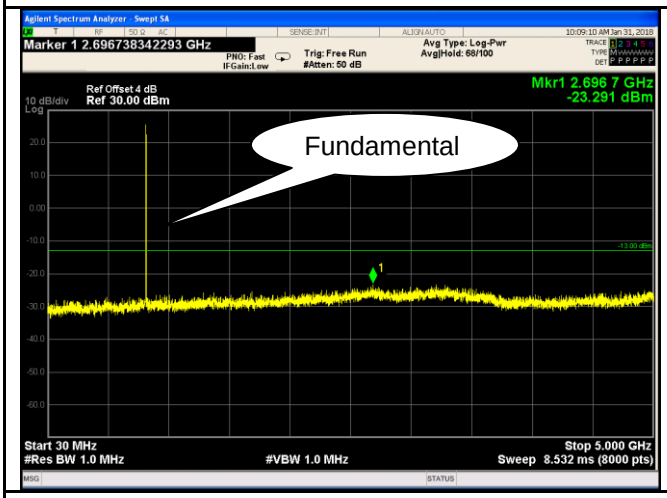
LTE Band V (Part 22H)



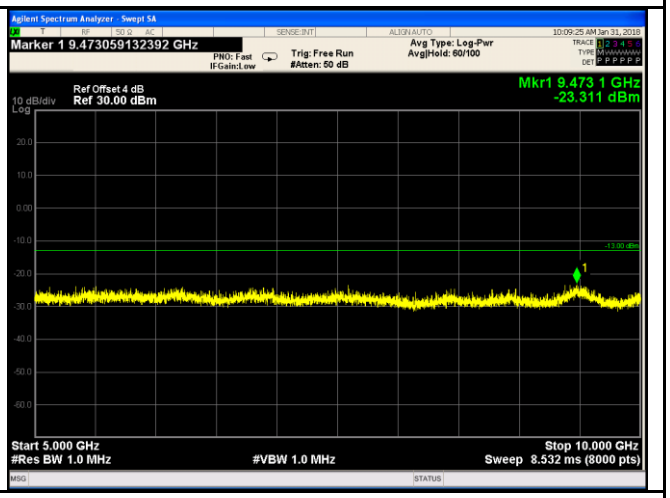
LTE Band V - Low Channel-1



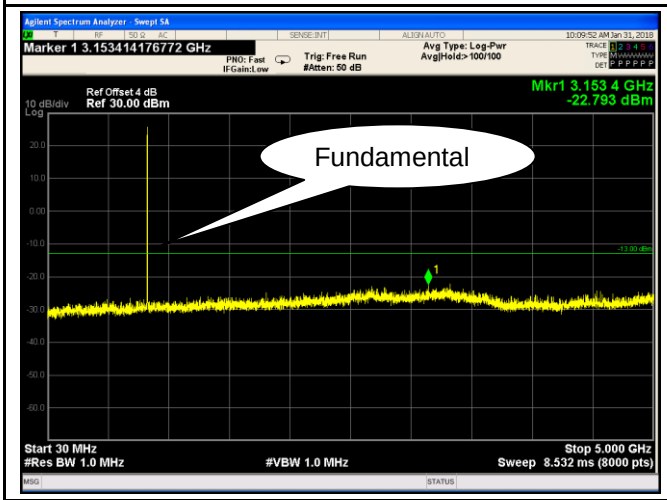
LTE Band V - Low Channel-2



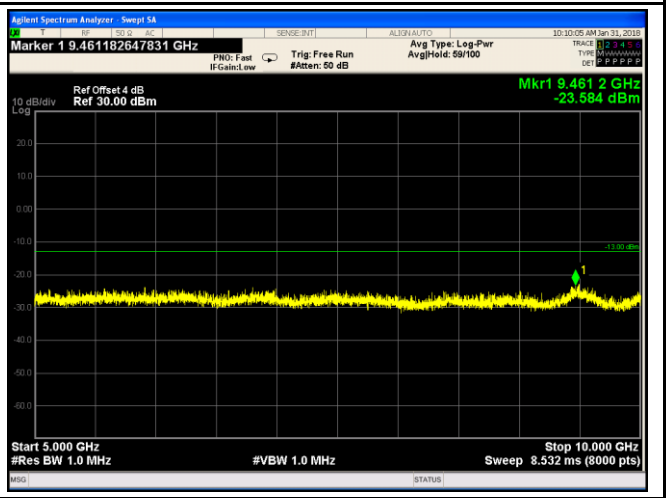
LTE Band V- Middle Channel-1



LTE Band V - Middle Channel-2

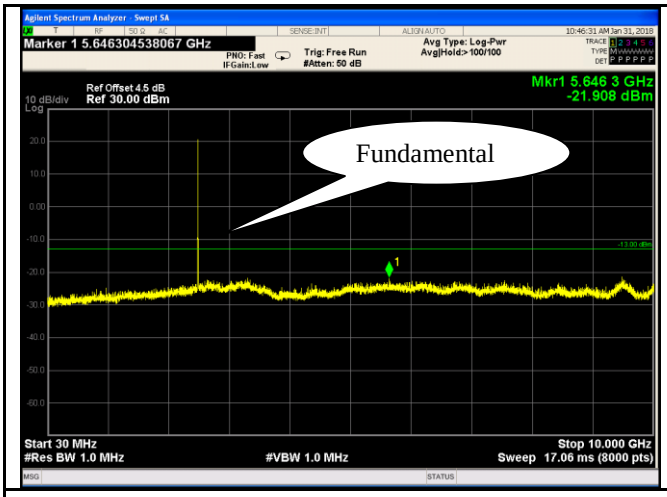


LTE Band V - High Channel-1

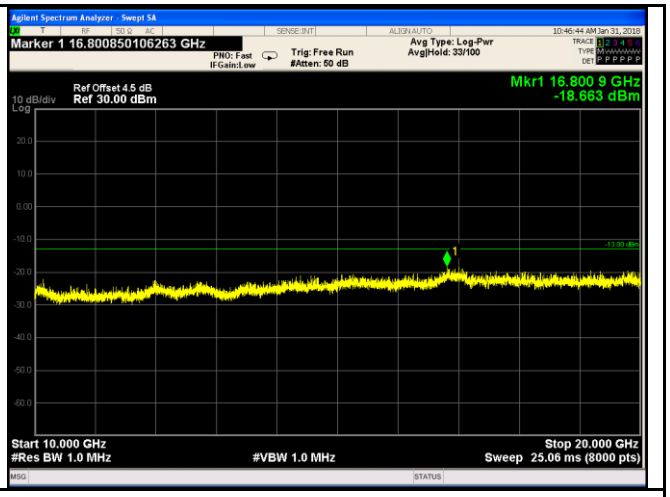


LTE Band V - High Channel-2

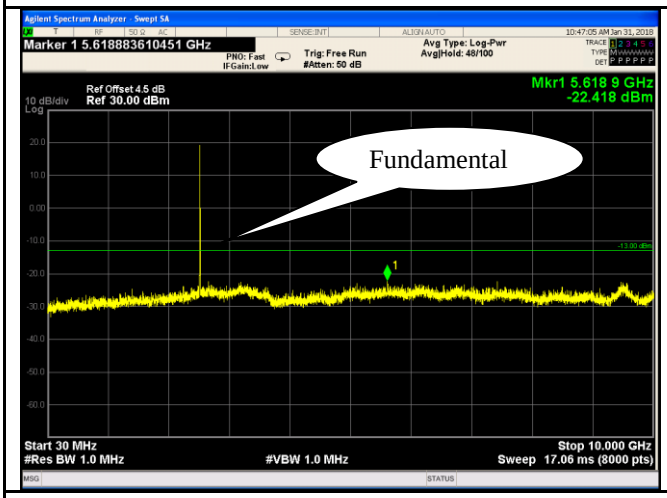
LTE Band VII (Part 27)



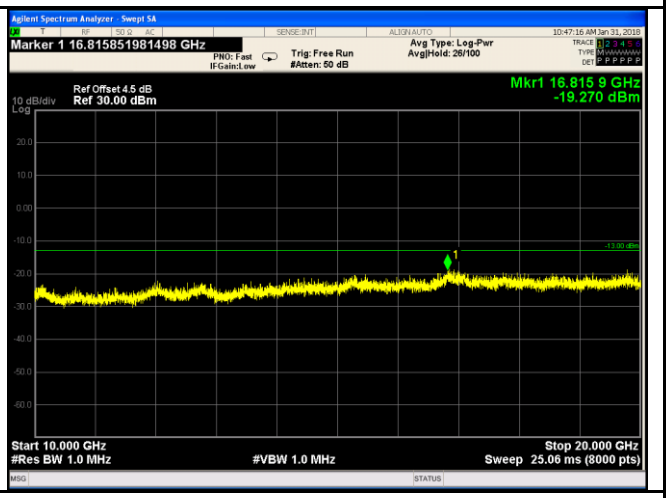
LTE Band VII - Low Channel-1



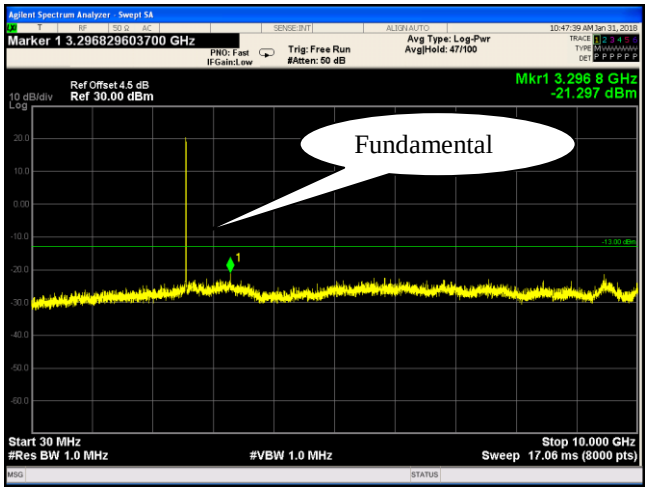
LTE Band VII - Low Channel-2



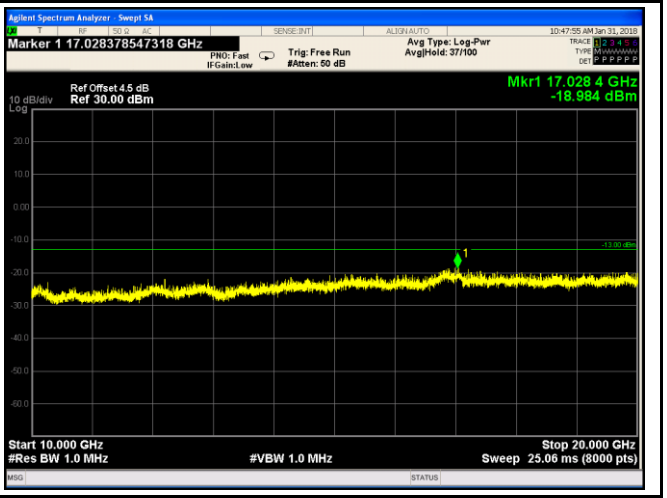
LTE Band VII- Middle Channel-1



LTE Band VII - Middle Channel-2

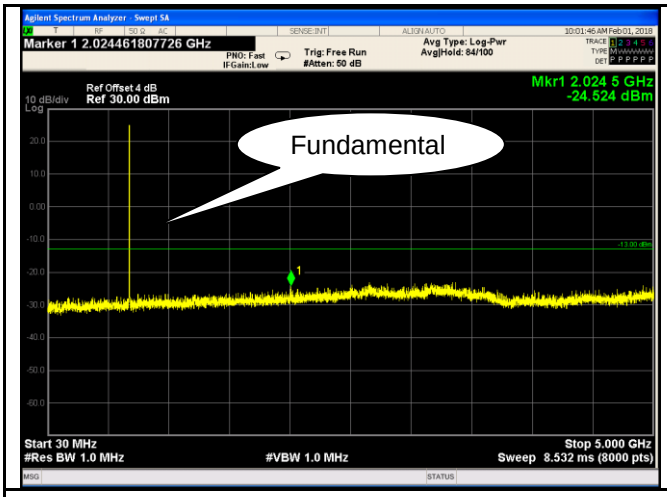


LTE Band VII - High Channel-1

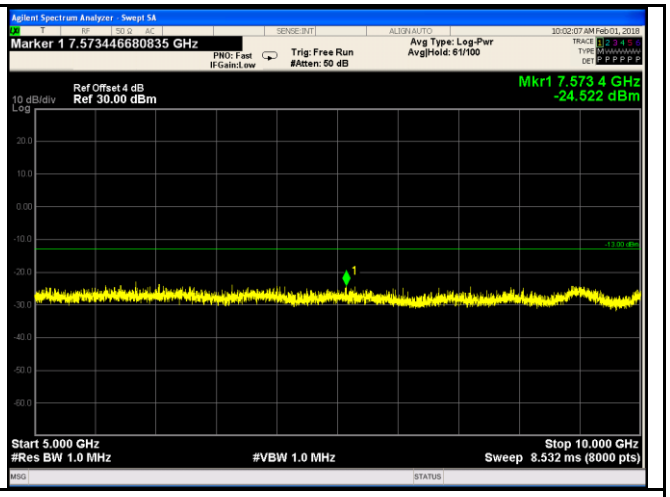


LTE Band VII - High Channel-2

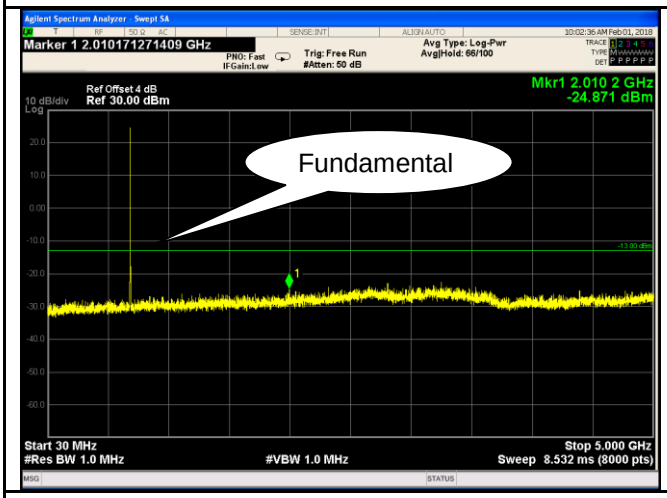
LTE Band XII (Part 27)



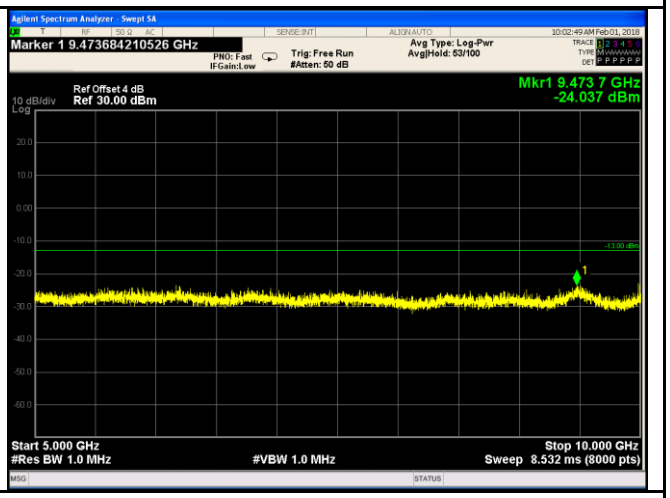
LTE Band XII - Low Channel-1



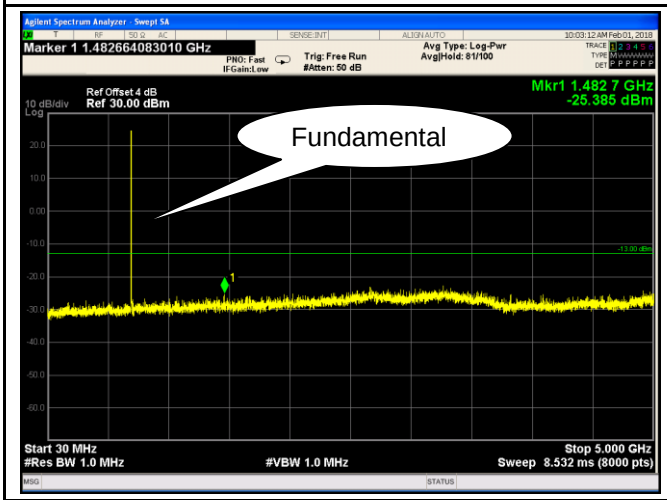
LTE Band XII - Low Channel-2



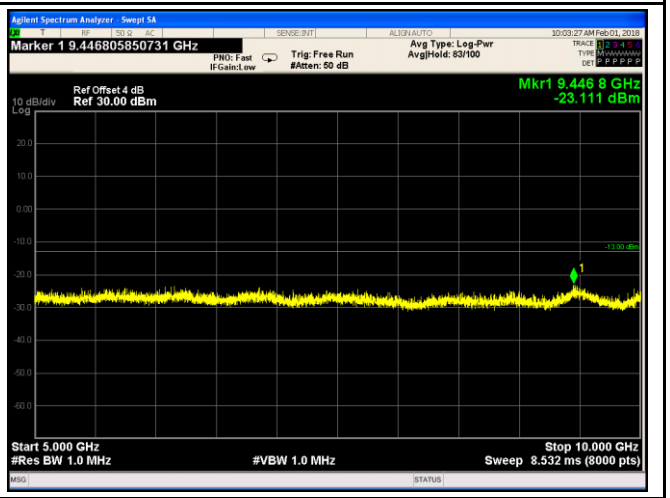
LTE Band XII- Middle Channel-1



LTE Band XII - Middle Channel-2

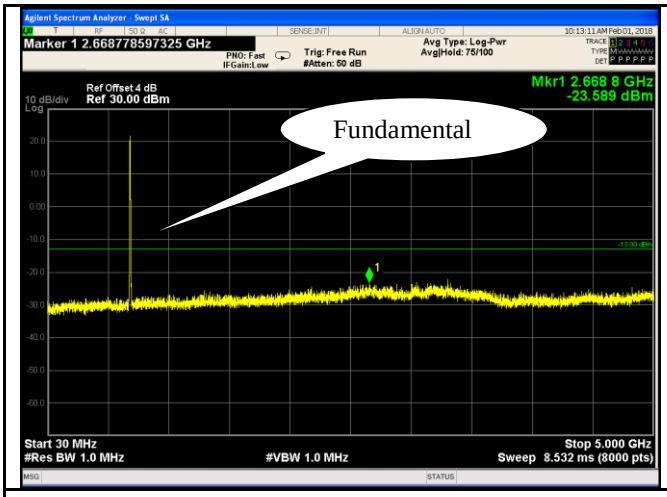


LTE Band XII - High Channel-1

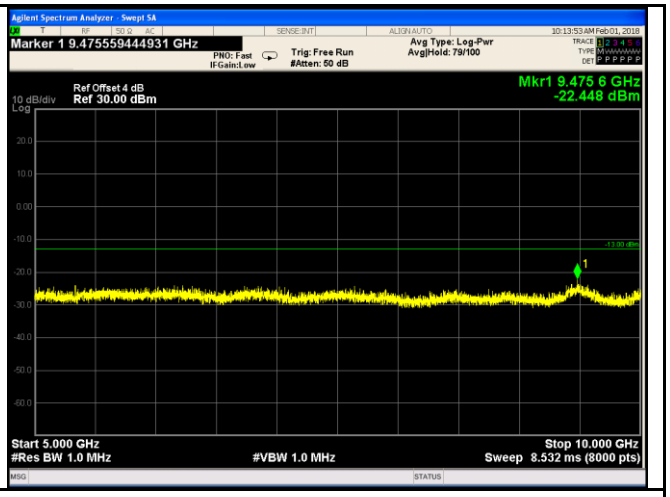


LTE Band XII - High Channel-2

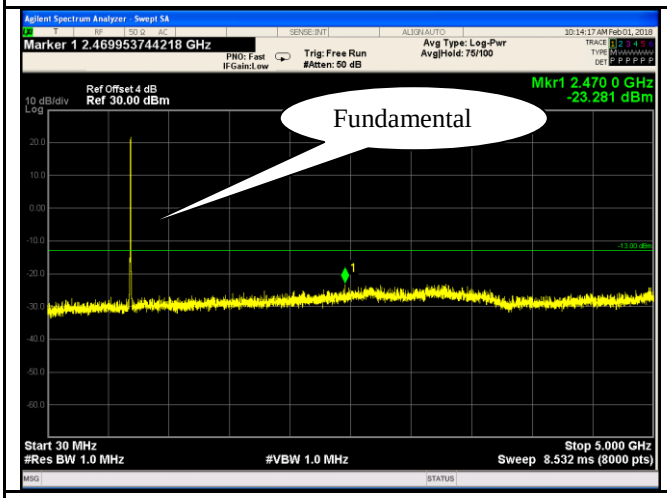
LTE Band XVII (Part 27)



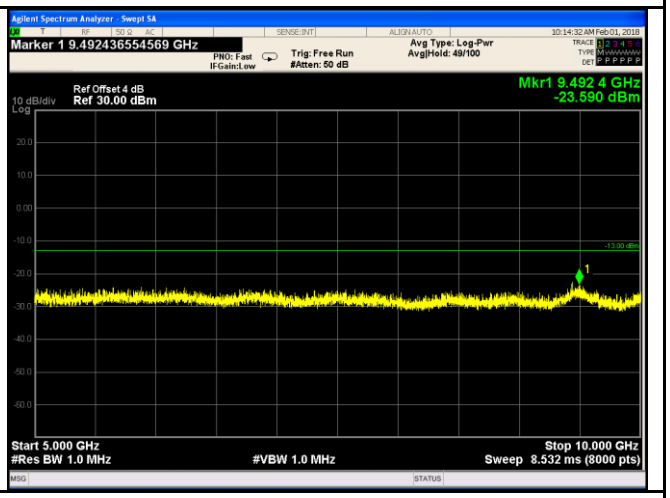
LTE Band XVII - Low Channel-1



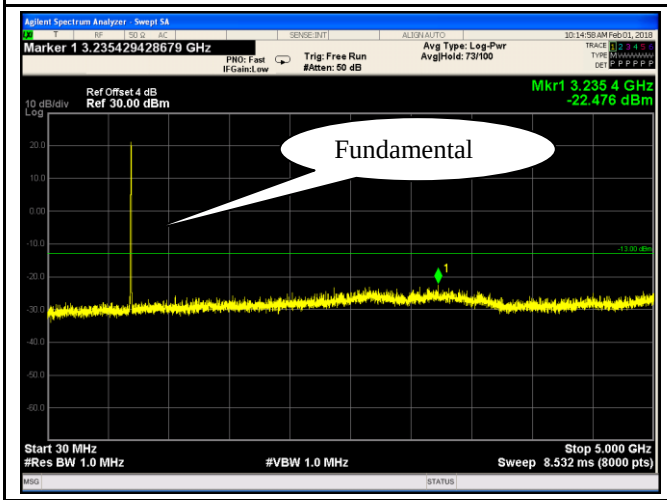
LTE Band XVII - Low Channel-2



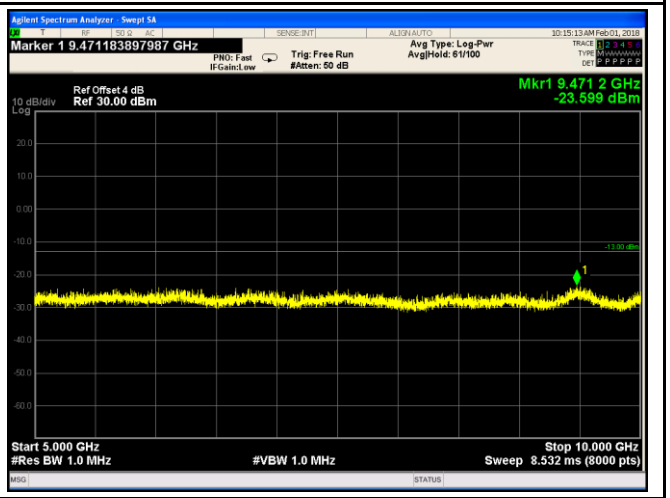
LTE Band XVII- Middle Channel-1



LTE Band XVII - Middle Channel-2



LTE Band XVII - High Channel-1

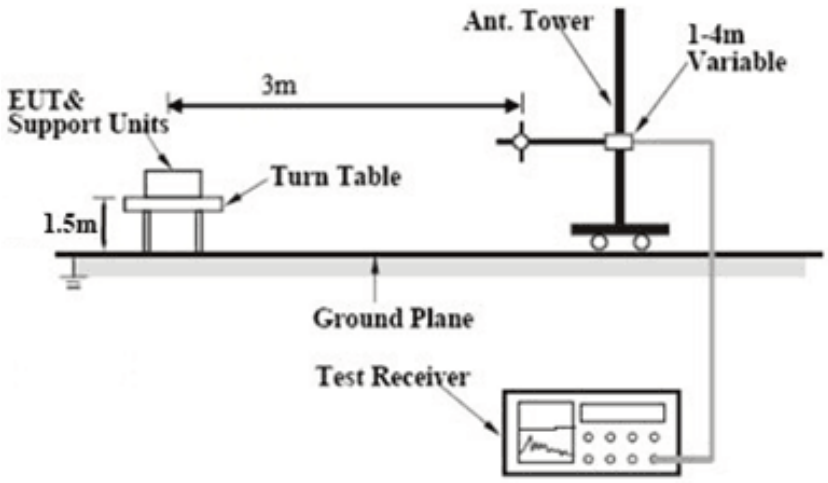


LTE Band XVII - High Channel-2

6.6 Spurious Radiated Emissions

Temperature	23 °C
Relative Humidity	51%
Atmospheric Pressure	1020mbar
Test date :	January 30, 2018
Tested By:	Aaron Liang

Requirement(s):

Spec	Item	Requirement	Applicable
§2.1053, §22.917 & §24.238 § 27.53(h)	a)	The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitter power (P) by a factor of at least 43 + 10 log (P) dB. The spectrum is scanned from 30 MHz up to a frequency including its 10th harmonic.	☑
Test setup			
Test Procedure	1. The transmitter was placed on a wooden turntable, and it was transmitting into a non-radiating load which was also placed on the turntable. 2. The measurement antenna was placed at a distance of 3 meters from the EUT. During the tests, the antenna height and polarization as well as EUT azimuth were varied in order to identify the maximum level of emissions from the EUT. The test was performed by placing the EUT on 3-orthogonal axis. 3. Remove the EUT and replace it with substitution antenna. A signal generator was connected to the substitution antenna by a non-radiating cable. The absolute levels of the spurious emissions were measured by the substitution. Sample Calculation: EUT Field Strength = Raw Amplitude (dBμV/m) – Amplifier Gain (dB) + Antenna Factor (dB) + Cable Loss (dB) + Filter Attenuation (dB, if used)		

Remark	
Result	☑ Pass ☐ Fail

Test Data ☑ Yes ☐ N/A

Test Plot ☐ Yes (See below) ☑ N/A

LTE Band II (Part 24E) result

Low channel

Frequency (MHz)	Antenna Polarization (H/V)	Corrected Reading (dBm)	Limit (dBm)	Margin (dB)
3720	V	-24.32	-13	-11.32
3720	H	-32.03	-13	-19.03
606.44	V	-33.77	-13	-20.77
777.24	H	-34.64	-13	-21.64

Middle channel

Frequency (MHz)	Antenna Polarization (H/V)	Corrected Reading (dBm)	Limit (dBm)	Margin (dB)
3760	V	-30.22	-13	-17.22
3760	H	-29.79	-13	-16.79
782.98	V	-37.7	-13	-24.7
606.74	H	-38.61	-13	-25.61

High channel

Frequency (MHz)	Antenna Polarization (H/V)	Corrected Reading (dBm)	Limit (dBm)	Margin (dB)
3800	V	-25.34	-13	-12.34
3800	H	-27.16	-13	-14.16
699.46	V	-35.36	-13	-22.36
356.9	H	-33.47	-13	-20.47

Note:

*1, The testing has been conformed to 10*1907.5MHz=19,075MHz*
2, All other emissions more than 30 dB below the limit
3, X-Axis, Y-Axis and Z–Axis were investigated. The results above show only the worst case.

LTE Band IV (Part27) result

Low channel

Frequency (MHz)	Antenna Polarization (H/V)	Corrected Reading (dBm)	Limit (dBm)	Margin (dB)
3440	V	-37.62	-13	-24.62
3440	H	-33.63	-13	-20.63
369.38	V	-39.66	-13	-26.66
446.33	H	-34.9	-13	-21.9

Middle channel

Frequency (MHz)	Antenna Polarization (H/V)	Corrected Reading (dBm)	Limit (dBm)	Margin (dB)
3465	V	-37.79	-13	-24.79
3465	H	-35.45	-13	-22.45
647.87	V	-41.99	-13	-28.99
700.78	H	-42	-13	-29

High channel

Frequency (MHz)	Antenna Polarization (H/V)	Corrected Reading (dBm)	Limit (dBm)	Margin (dB)
3490	V	-28.57	-13	-15.57
3490	H	-37.39	-13	-24.39
740.5	V	-39.65	-13	-26.65
645.62	H	-35.81	-13	-22.81

Note:

*1, The testing has been conformed to 10*1752.5MHz=17,525MHz*
2, All other emissions more than 30 dB below the limit
3, X-Axis, Y-Axis and Z–Axis were investigated. The results above show only the worst case.

LTE Band V (Part22H) result

Low channel

Frequency (MHz)	Antenna Polarization (H/V)	Corrected Reading (dBm)	Limit (dBm)	Margin (dB)
1658	V	-38.22	-13	-25.22
1658	H	-37.48	-13	-24.48
839.57	V	-35.53	-13	-22.53
310.83	H	-35.08	-13	-22.08

Middle channel

Frequency (MHz)	Antenna Polarization (H/V)	Corrected Reading (dBm)	Limit (dBm)	Margin (dB)
1673	V	-33.54	-13	-20.54
1673	H	-38.55	-13	-25.55
530.21	V	-42.6	-13	-29.6
519.68	H	-33.76	-13	-20.76

High channel

Frequency (MHz)	Antenna Polarization (H/V)	Corrected Reading (dBm)	Limit (dBm)	Margin (dB)
1688	V	-32.25	-13	-19.25
1688	H	-37.56	-13	-24.56
738.78	V	-36.28	-13	-23.28
339.62	H	-33.81	-13	-20.81

Note:

*1, The testing has been conformed to 10*846.5MHz=8,465MHz*
2, All other emissions more than 30 dB below the limit
3, X-Axis, Y-Axis and Z–Axis were investigated. The results above show only the worst case.

LTE Band VII (Part27) result

Low channel

Frequency (MHz)	Antenna Polarization (H/V)	Corrected Reading (dBm)	Limit (dBm)	Margin (dB)
5020	V	-29.21	-13	-16.21
5020	H	-29.04	-13	-16.04
345.71	V	-37.37	-13	-24.37
835.37	H	-38.12	-13	-25.12

Middle channel

Frequency (MHz)	Antenna Polarization (H/V)	Corrected Reading (dBm)	Limit (dBm)	Margin (dB)
5070	V	-31.44	-13	-18.44
5070	H	-27.83	-13	-14.83
618.37	V	-39.79	-13	-26.79
412.06	H	-35.7	-13	-22.7

High channel

Frequency (MHz)	Antenna Polarization (H/V)	Corrected Reading (dBm)	Limit (dBm)	Margin (dB)
5120	V	-35.64	-13	-22.64
5120	H	-28.89	-13	-15.89
549.08	V	-41.12	-13	-28.12
413.84	H	-35.79	-13	-22.79

Note:

*1, The testing has been conformed to 10*2567.5MHz=25,675MHz*
2, All other emissions more than 30 dB below the limit
3, X-Axis, Y-Axis and Z –Axis were investigated. The results above show only the worst case.

LTE Band XII (Part27) result

Low channel

Frequency (MHz)	Antenna Polarization (H/V)	Corrected Reading (dBm)	Limit (dBm)	Margin (dB)
1408	V	-35.27	-13	-22.27
1408	H	-37.18	-13	-24.18
420.1	V	-36.27	-13	-23.27
241.07	H	-40.45	-13	-27.45

Middle channel

Frequency (MHz)	Antenna Polarization (H/V)	Corrected Reading (dBm)	Limit (dBm)	Margin (dB)
1415	V	-34.35	-13	-21.35
1415	H	-38.76	-13	-25.76
809.28	V	-35.16	-13	-22.16
690.22	H	-36.96	-13	-23.96

High channel

Frequency (MHz)	Antenna Polarization (H/V)	Corrected Reading (dBm)	Limit (dBm)	Margin (dB)
1422	V	-32.93	-13	-19.93
1422	H	-38.93	-13	-25.93
582.84	V	-39.53	-13	-26.53
214.92	H	-33.06	-13	-20.06

Note:

*1, The testing has been conformed to 10*715.3MHz=7,153MHz*
2, All other emissions more than 30 dB below the limit
3, X-Axis, Y-Axis and Z–Axis were investigated. The results above show only the worst case.

LTE Band XVII (Part27) result

Low channel

Frequency (MHz)	Antenna Polarization (H/V)	Corrected Reading (dBm)	Limit (dBm)	Margin (dB)
1418	V	-33.01	-13	-20.01
1418	H	-34.78	-13	-21.78
263.23	V	-37.31	-13	-24.31
398.96	H	-37.72	-13	-24.72

Middle channel

Frequency (MHz)	Antenna Polarization (H/V)	Corrected Reading (dBm)	Limit (dBm)	Margin (dB)
1420	V	-37.59	-13	-24.59
1420	H	-31.3	-13	-18.3
768.84	V	-37.49	-13	-24.49
382.25	H	-41.5	-13	-28.5

High channel

Frequency (MHz)	Antenna Polarization (H/V)	Corrected Reading (dBm)	Limit (dBm)	Margin (dB)
1422	V	-30.71	-13	-17.71
1422	H	-34.53	-13	-21.53
261.3	V	-34.17	-13	-21.17
221.76	H	-37.1	-13	-24.1

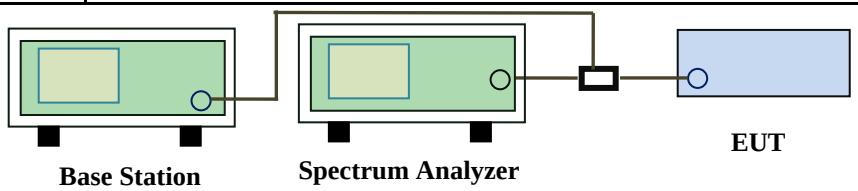
Note:

*1, The testing has been conformed to 10*713.5MHz=7,135MHz*
2, All other emissions more than 30 dB below the limit
3, X-Axis, Y-Axis and Z–Axis were investigated. The results above show only the worst case.

6.7 Band Edge

Temperature	23 °C
Relative Humidity	51%
Atmospheric Pressure	1020mbar
Test date :	January 30, 2018
Tested By :	Aaron Liang

Requirement(s):

Spec	Item	Requirement	Applicable
§22.917(a) §24.238(a) § 27.53(h)	a)	The power of any emission outside of the authorized operating frequency ranges must be lower than the transmitter power (P) by a factor of at least 43 + 10 log (P) dB.	☑
Test setup			
Procedure	- The EUT was connected to Spectrum Analyzer and Base Station via power divider. - The Band Edges of low and high channels for the highest RF powers were measured. Setting RBW as roughly BW/100.		
Remark			
Result	☑ Pass ☐ Fail		

Test Data ☑ Yes ☐ N/A

Test Plot ☑ Yes (See below) ☐ N/A

LTE Band II (Part 24E) result

BW(MHz)	Channel	Frequency (MHz)	Mode	Emission (dBm)	Limit (dBm)
1.4	18607	1850	16QAM	-22.425	-13
			QPSK	-22.942	-13
1.4	18900	1910	16QAM	-23.799	-13
			QPSK	-23.795	-13
3	18615	1850	16QAM	-18.676	-13
			QPSK	-19.176	-13
3	19185	1910	16QAM	-25.598	-13
			QPSK	-23.539	-13
5	18625	1850	16QAM	-20.074	-13
			QPSK	-18.871	-13
5	19175	1910	16QAM	-21.415	-13
			QPSK	-22.055	-13
10	18650	1850	16QAM	-20.842	-13
			QPSK	-20.171	-13
10	19150	1910	16QAM	-23.772	-13
			QPSK	-21.254	-13
15	18675	1850	16QAM	-22.677	-13
			QPSK	-21.491	-13
15	19125	1910	16QAM	-22.506	-13
			QPSK	-23.301	-13
20	18700	1850	16QAM	-27.545	-13
			QPSK	-28.804	-13
20	19100	1910	16QAM	-28.679	-13
			QPSK	-26.560	-13

LTE Band IV (Part 27) result

BW(MHz)	Channel	Frequency (MHz)	Mode	Emission (dBm)	Limit (dBm)
1.4	19957	1709.9	16QAM	-24.040	-13
			QPSK	-26.119	-13
1.4	20393	1755	16QAM	-25.700	-13
			QPSK	-27.215	-13
3	19965	1709.9	16QAM	-23.304	-13
			QPSK	-19.860	-13
3	20385	1755	16QAM	-21.563	-13
			QPSK	-21.303	-13
5	19975	1709.9	16QAM	-22.104	-13
			QPSK	-21.237	-13
5	20375	1755	16QAM	-21.947	-13
			QPSK	-21.395	-13
10	20000	1709.9	16QAM	-22.231	-13
			QPSK	-21.109	-13
10	20350	1755	16QAM	-20.223	-13
			QPSK	-20.872	-13
15	20025	1709.9	16QAM	-24.146	-13
			QPSK	-25.245	-13
15	20325	1755	16QAM	-25.400	-13
			QPSK	-25.496	-13
20	20050	1709.9	16QAM	-26.801	-13
			QPSK	-29.050	-13
20	20300	1755	16QAM	-28.216	-13
			QPSK	-24.040	-13

LTE Band V (Part 22H) result

BW(MHz)	Channel	Frequency (MHz)	Mode	Emission (dBm)	Limit (dBm)
1.4	20407	823.9	16QAM	-21.705	-13
			QPSK	-20.119	-13
1.4	20643	849	16QAM	-23.018	-13
			QPSK	-23.872	-13
3	20415	824	16QAM	-17.760	-13
			QPSK	-16.494	-13
3	20635	849	16QAM	-18.831	-13
			QPSK	-19.625	-13
5	20425	824	16QAM	-19.519	-13
			QPSK	-17.479	-13
5	20625	849	16QAM	-17.107	-13
			QPSK	-19.919	-13
10	20450	824	16QAM	-18.574	-13
			QPSK	-18.290	-13
10	20800	849	16QAM	-19.636	-13
			QPSK	-23.411	-13

LTE Band XII (Part 27) result

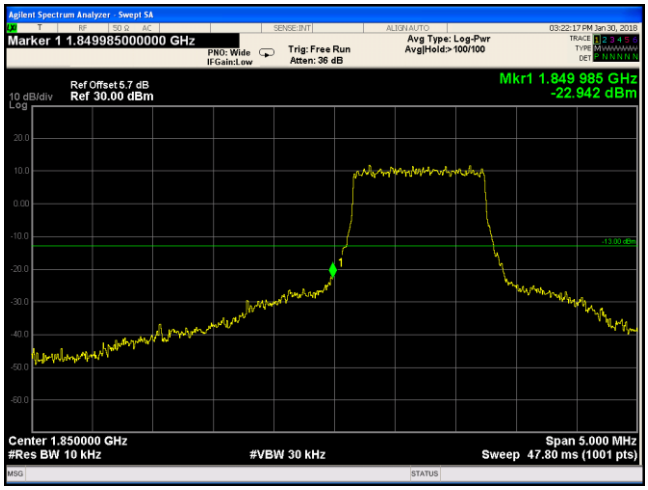
BW(MHz)	Channel	Frequency (MHz)	Mode	Emission (dBm)	Limit (dBm)
1.4	23017	699	16QAM	-22.491	-13
			QPSK	-21.435	-13
1.4	23173	716	16QAM	-21.763	-13
			QPSK	-21.113	-13
3	23025	699	16QAM	-18.758	-13
			QPSK	-18.020	-13
3	23165	716	16QAM	-19.604	-13
			QPSK	-22.508	-13
5	23035	699	16QAM	-18.289	-13
			QPSK	-20.874	-13
5	23155	716	16QAM	-17.316	-13
			QPSK	-18.811	-13
10	23060	698	16QAM	-17.806	-13
			QPSK	-17.929	-13
10	23130	716	16QAM	-17.909	-13
			QPSK	-18.931	-13

LTE Band XVII (Part 27) result

BW(MHz)	Channel	Frequency (MHz)	Mode	Emission (dBm)	Limit (dBm)
5	23755	704	16QAM	-19.041	-13
			QPSK	-16.001	-13
5	23825	716	16QAM	-26.231	-13
			QPSK	-25.848	-13
10	23780	704	16QAM	-20.672	-13
			QPSK	-16.505	-13
10	23800	716	16QAM	-19.310	-13
			QPSK	-21.661	-13

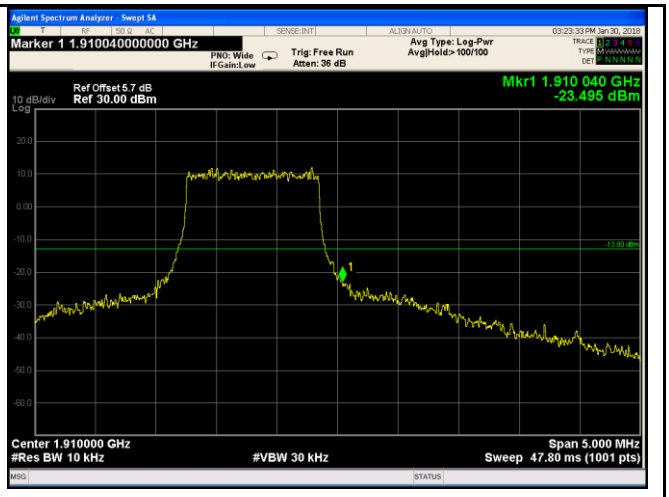
Test Plots

LTE Band II (Part 24E)



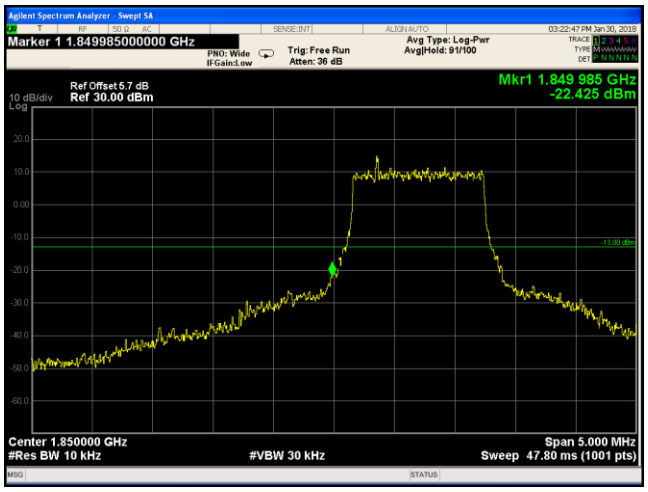
LTE Band II - Low Channel QPSK-1.4

Note: Offset=Cable loss (4.5) + 10log (13.18/10)=4.5+1.2=5.7dB



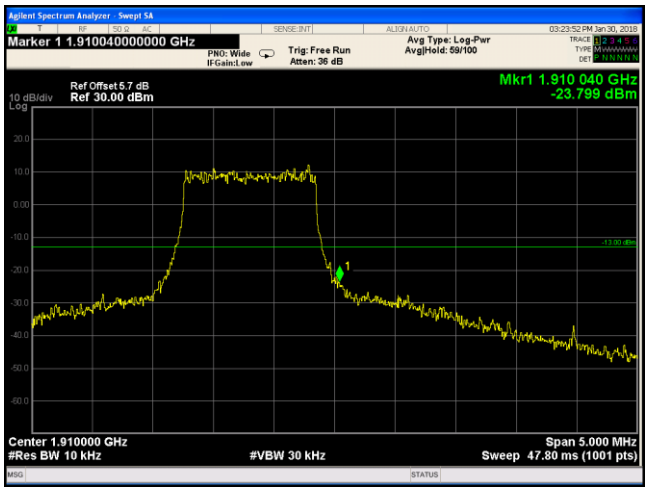
LTE Band II - High Channel QPSK-1.4

Note: Offset=Cable loss (4.5) + 10log (13.07/10)=4.5+1.2=5.7dB



LTE Band II - Low Channel 16QAM-1.4

Note: Offset=Cable loss (4.5) + 10log (13.18/10)=4.5+1.2=5.7 dB



LTE Band II - High Channel 16QAM-1.4

Note: Offset=Cable loss (4.5) + 10log (13.24/10)=4.5+1.2=5.7 dB