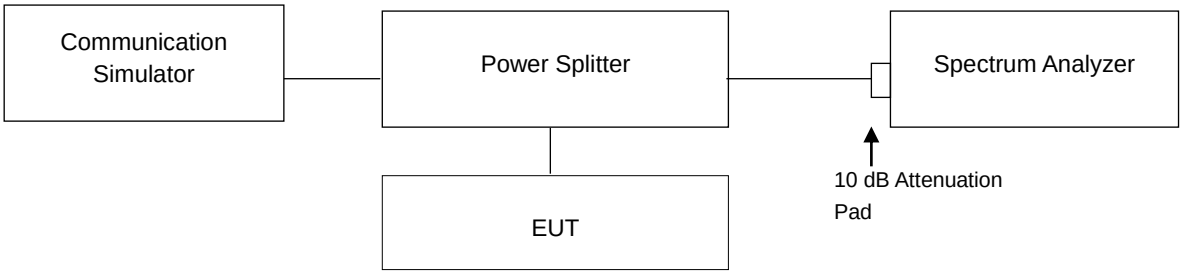
4.6 Peak to Average Ratio

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 %.

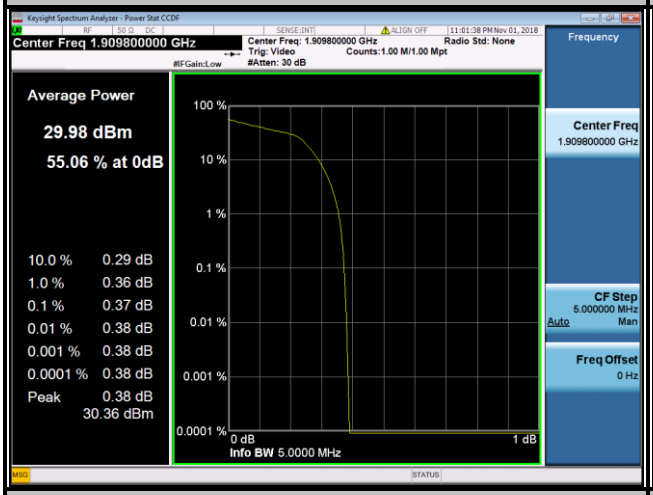
4.6.4 Test Results

Channel	Frequency (MHz)	Peak to Average Ratio (dB)		Channel	Frequency (MHz)	Peak to Average Ratio (dB)
		GSM	EDGE			WCDMA
512	1850.2	0.29	3.17	9262	1852.4	2.87
661	1880.0	0.33	3.22	9400	1880.0	3.00
810	1909.8	0.37	3.23	9538	1907.6	2.93

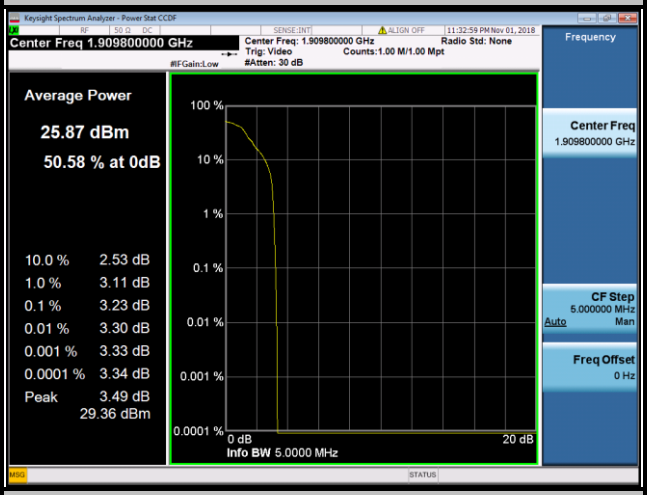
Channel	Frequency (MHz)	Peak to Average Ratio (dB)
		CDMA
25	1851.25	3.10
600	1880.00	3.98
1175	1908.75	3.38

Spectrum Plot of Worst Value

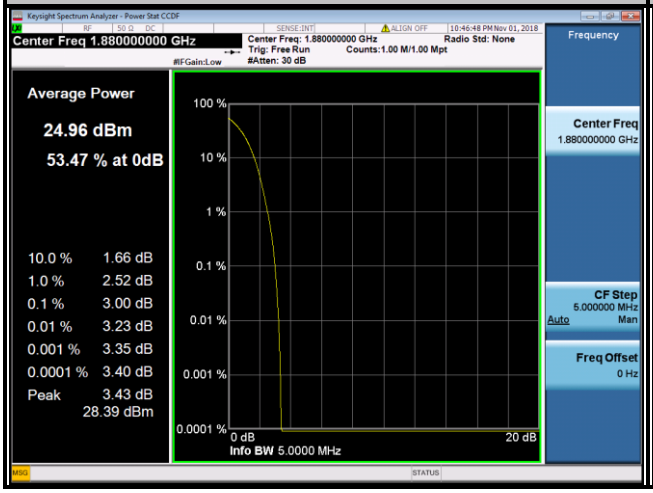
GSM



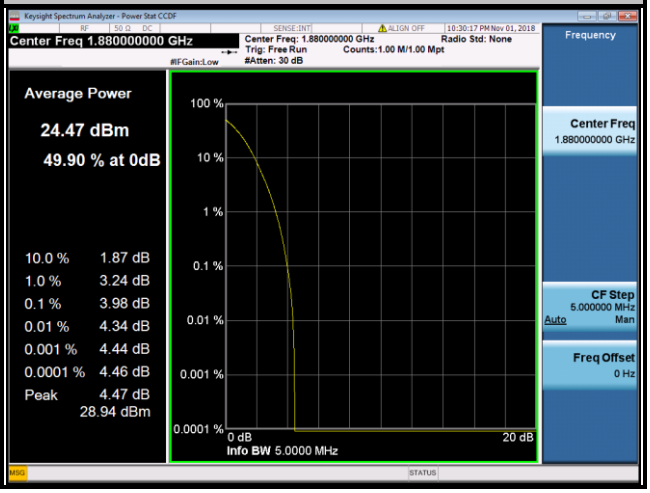
EDGE



WCDMA

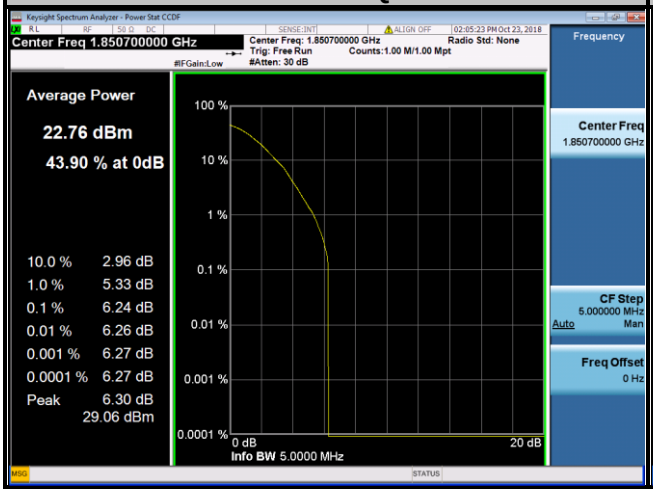


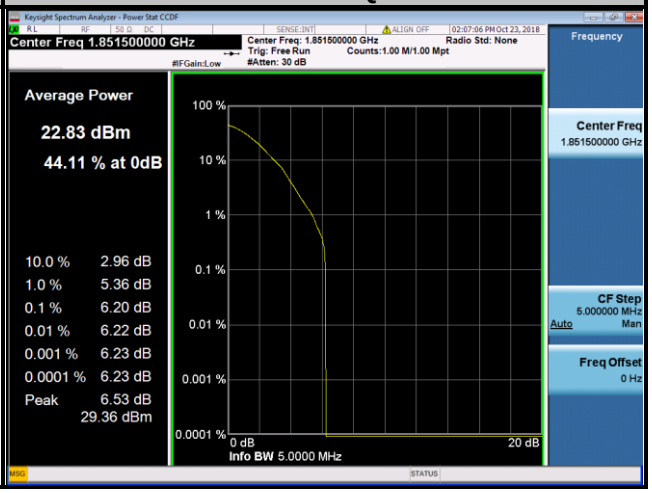
CDMA



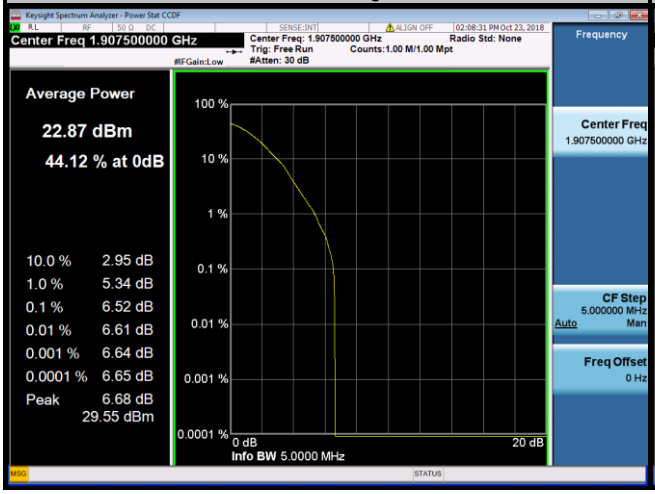
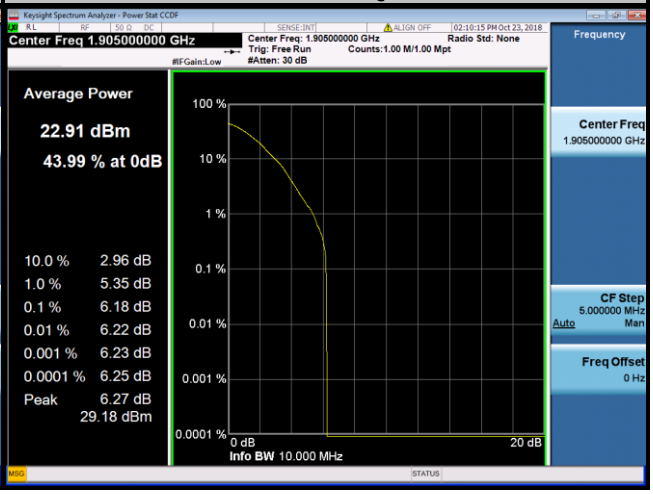
LTE Band 2									
Channel Bandwidth: 1.4 MHz					Channel Bandwidth: 3 MHz				
Channel	Frequency (MHz)	Peak to Average Ratio (dB)			Channel	Frequency (MHz)	Peak to Average Ratio (dB)		
		QPSK	16QAM	64QAM			QPSK	16QAM	64QAM
18607	1850.7	3.80	5.13	6.24	18615	1851.5	3.57	5.13	6.20
18900	1880.0	3.78	4.60	5.64	18900	1880.0	3.57	4.49	5.50
19193	1909.3	3.36	4.11	5.14	19185	1908.5	3.56	3.97	5.01

Spectrum Plot of Worst Value	
1.4 MHz / 64QAM	3 MHz / 64QAM

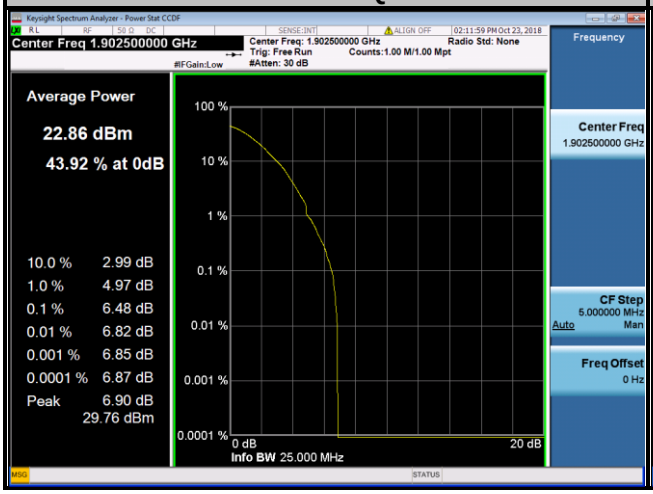
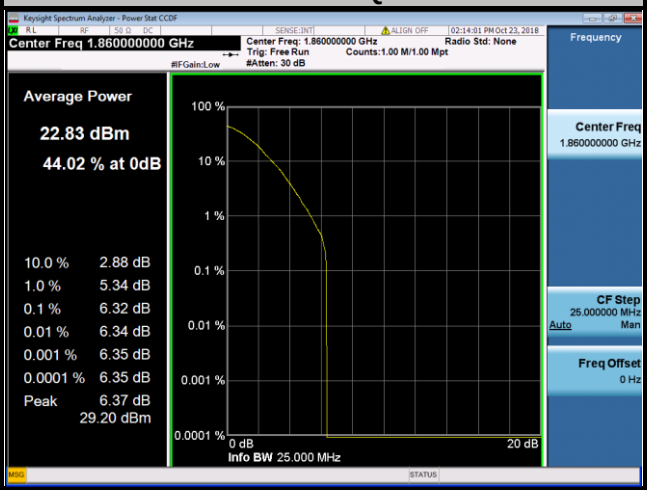




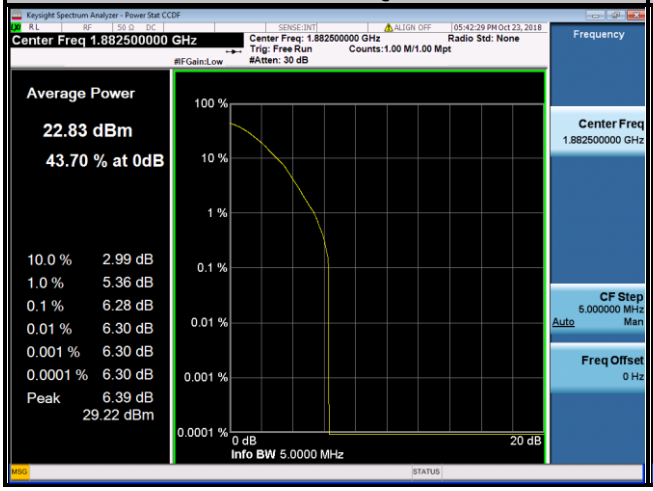
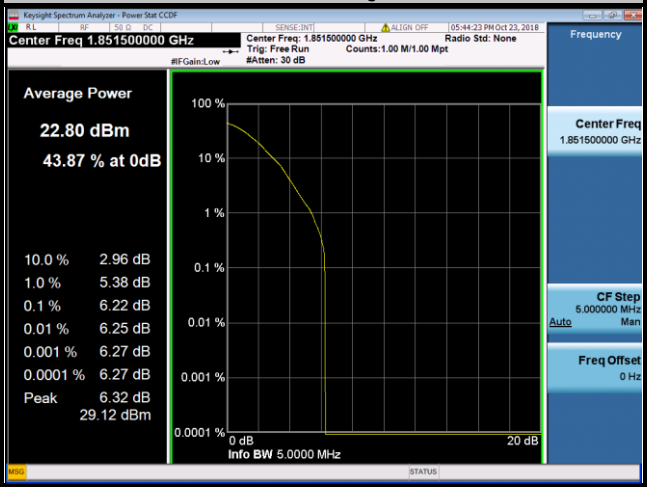
LTE Band 2									
Channel Bandwidth: 5 MHz					Channel Bandwidth: 10 MHz				
Channel	Frequency (MHz)	Peak to Average Ratio (dB)			Channel	Frequency (MHz)	Peak to Average Ratio (dB)		
		QPSK	16QAM	64QAM			QPSK	16QAM	64QAM
18625	1852.5	3.57	5.15	6.20	18650	1855.0	3.53	5.05	6.16
18900	1880.0	3.58	4.44	5.48	18900	1880.0	3.32	4.13	5.14
19175	1907.5	3.56	5.20	6.52	19150	1905.0	3.54	5.10	6.18

Spectrum Plot of Worst Value	
5 MHz / 64QAM	10 MHz / 64QAM
	

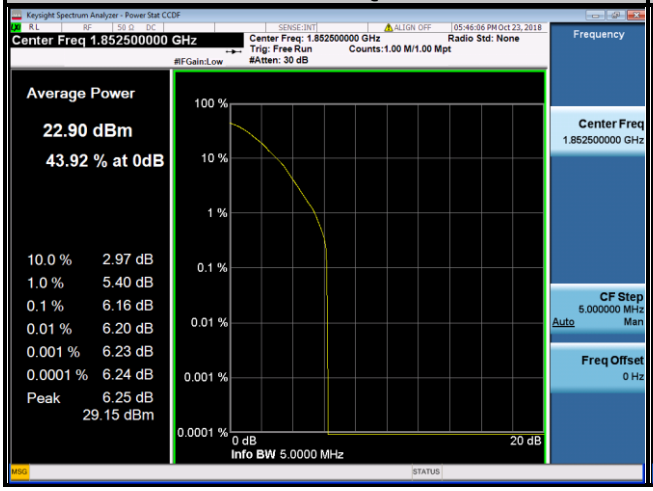
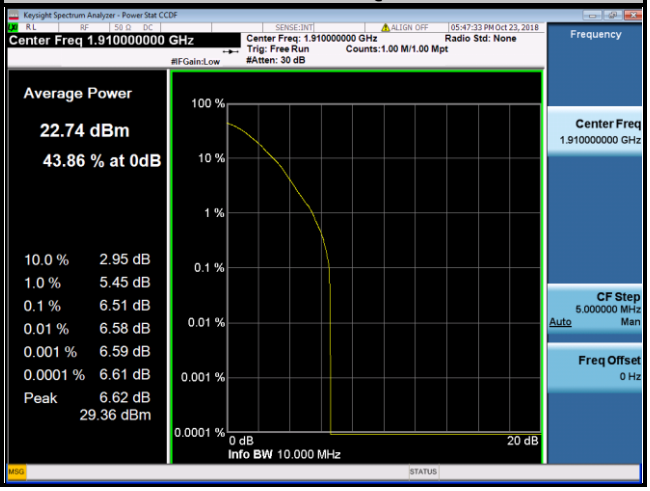
LTE Band 2									
Channel Bandwidth: 15 MHz					Channel Bandwidth: 20 MHz				
Channel	Frequency (MHz)	Peak to Average Ratio (dB)			Channel	Frequency (MHz)	Peak to Average Ratio (dB)		
		QPSK	16QAM	64QAM			QPSK	16QAM	64QAM
18675	1857.5	3.51	5.11	6.34	18700	1860.0	3.49	5.12	6.32
18900	1880.0	3.42	4.19	5.32	18900	1880.0	3.43	4.29	5.38
19125	1902.5	3.43	5.16	6.48	19100	1900.0	3.44	4.43	5.51

Spectrum Plot of Worst Value	
15 MHz / 64QAM	20 MHz / 64QAM
	

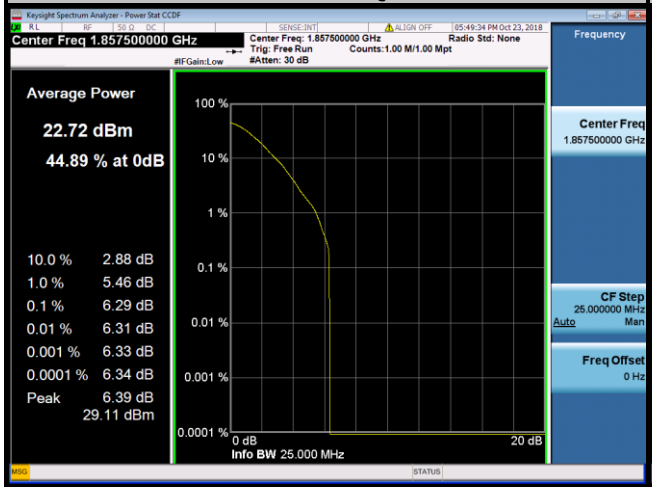
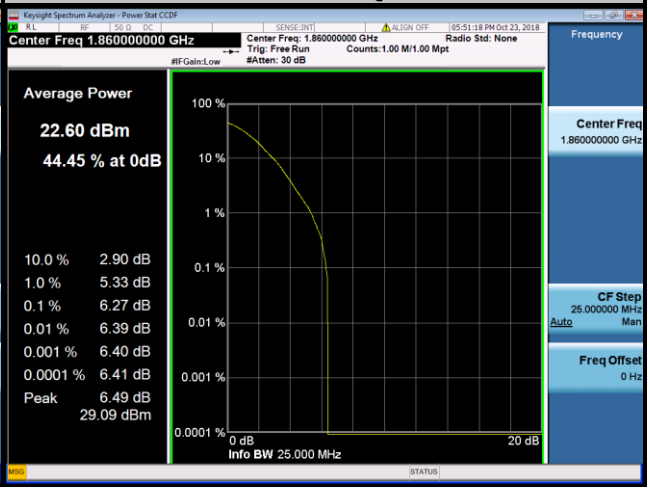
LTE Band 25									
Channel Bandwidth: 1.4 MHz					Channel Bandwidth: 3 MHz				
Channel	Frequency (MHz)	Peak to Average Ratio (dB)			Channel	Frequency (MHz)	Peak to Average Ratio (dB)		
		QPSK	16QAM	64QAM			QPSK	16QAM	64QAM
26047	1850.7	3.82	5.18	6.23	26055	1851.5	3.56	5.14	6.22
26365	1882.5	3.83	5.22	6.28	26365	1882.5	3.60	4.97	6.00
26683	1914.3	3.80	4.99	6.18	26675	1913.5	3.57	3.94	5.05

Spectrum Plot of Worst Value	
1.4 MHz / 64QAM	3 MHz / 64QAM
	

LTE Band 25									
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	64QAM			QPSK	16QAM	64QAM
26065	1852.5	3.57	5.11	6.16	26090	1855.0	3.53	5.12	6.15
26365	1882.5	3.61	4.76	5.79	26365	1882.5	3.48	4.31	5.32
26665	1912.5	3.50	4.36	5.43	26640	1910.0	3.49	5.23	6.51

Spectrum Plot of Worst Value	
5 MHz / 64QAM	10 MHz / 64QAM
	

LTE Band 25									
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	64QAM			QPSK	16QAM	64QAM
26115	1857.5	3.46	5.13	6.29	26140	1860.0	3.47	5.07	6.27
26365	1882.5	3.41	4.28	5.33	26365	1882.5	3.39	4.17	5.26
26615	1907.5	3.51	5.05	6.25	26590	1905.0	3.46	4.01	5.02

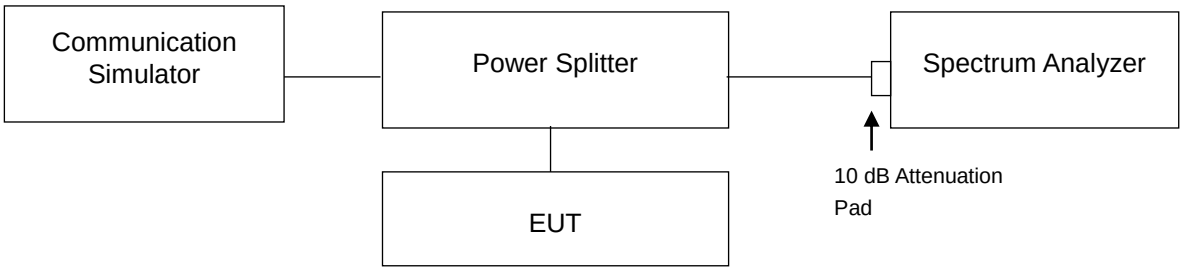
Spectrum Plot of Worst Value	
15 MHz / 64QAM	20 MHz / 64QAM
	

4.7 Conducted Spurious Emissions

4.7.1 Limits of Conducted Spurious Emissions Measurement

The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB. The emission limit equal to -13 dBm.

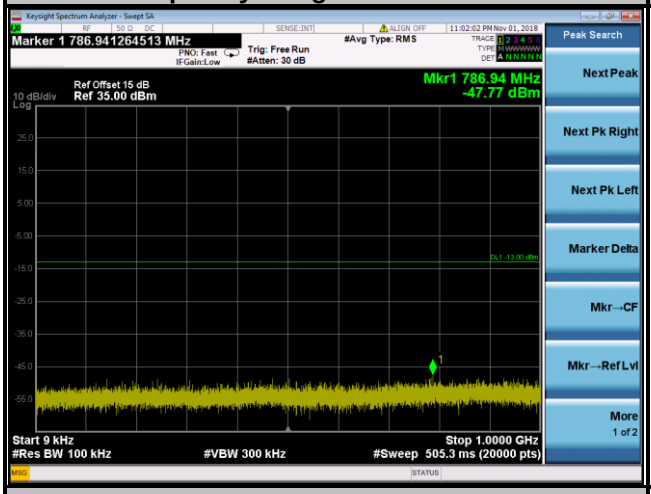
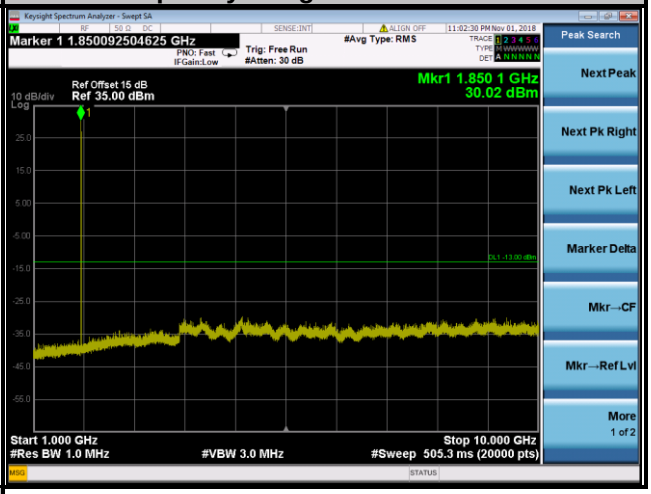
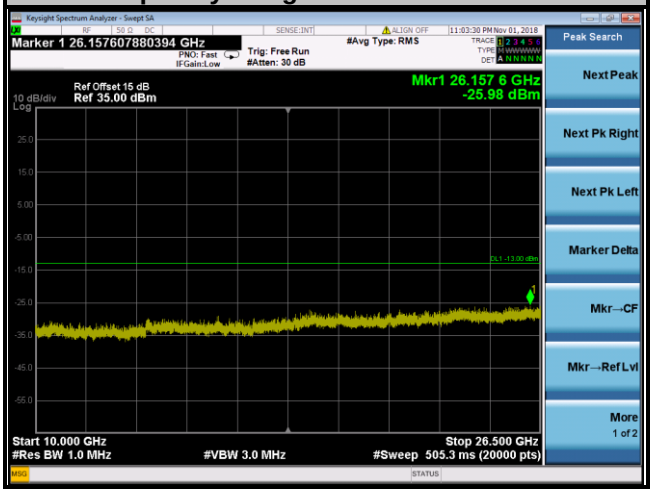
4.7.2 Test Setup



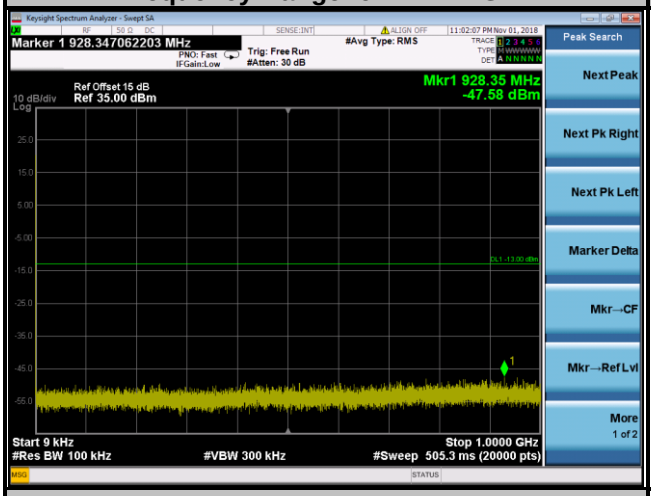
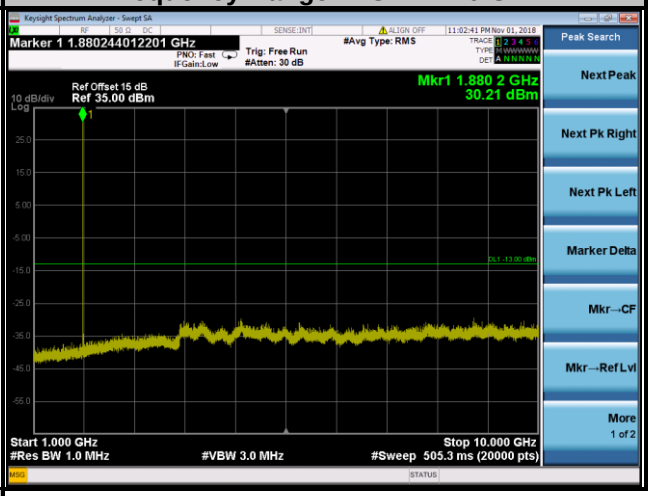
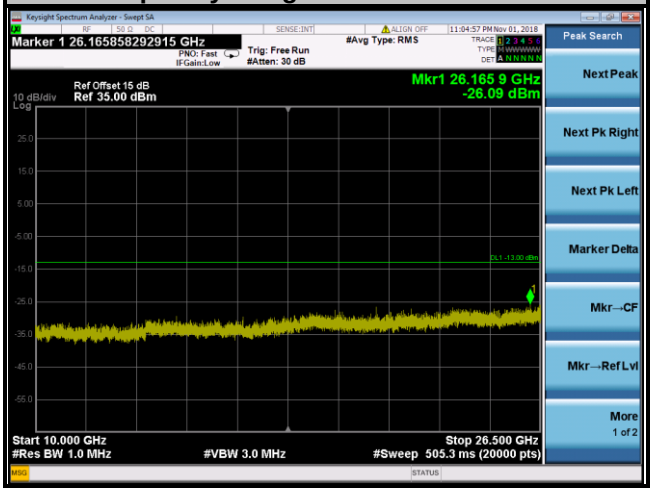
4.7.3 Test Procedure

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. 10 dB attenuation pad is connected with spectrum. RBW = 100 kHz and VBW = 300 kHz is used for conducted emission measurement.
c. Measuring frequency range is from 1 GHz to 26.5 GHz / 27 GHz. 10 dB attenuation pad is connected with spectrum. RBW = 1 MHz and VBW = 3 MHz is used for conducted emission measurement.

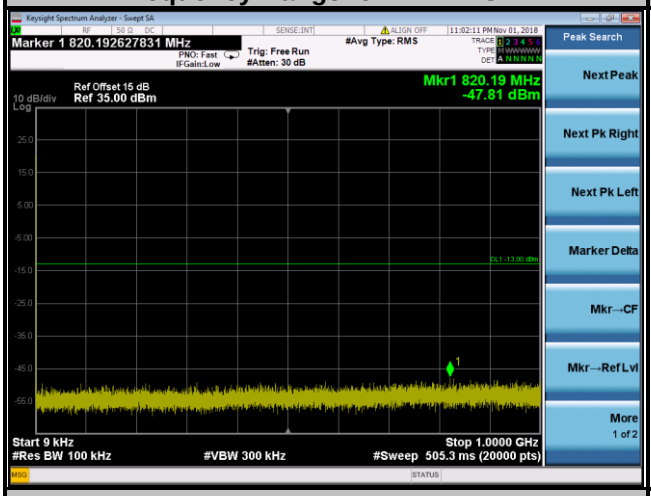
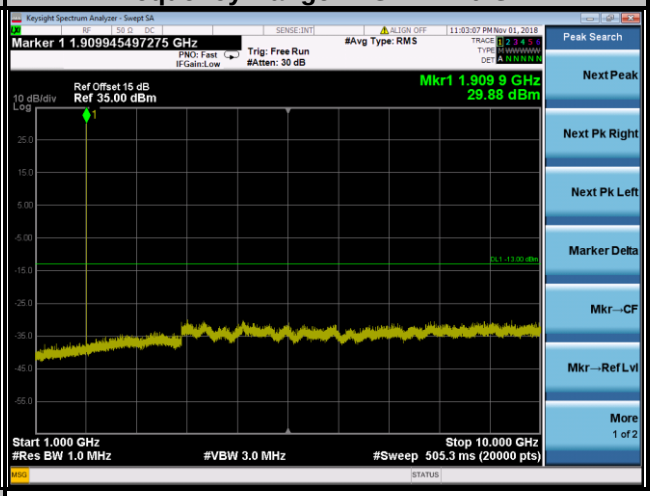
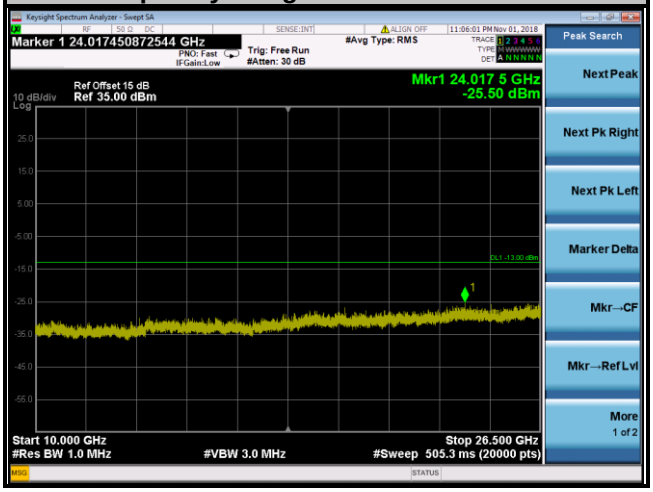
4.7.4 Test Results

GSM	
Channel 512	
Frequency Range: 9 kHz ~ 1 GHz	Frequency Range: 1 GHz ~ 10 GHz
	
Frequency Range: 10 GHz ~ 26.5 GHz	
	

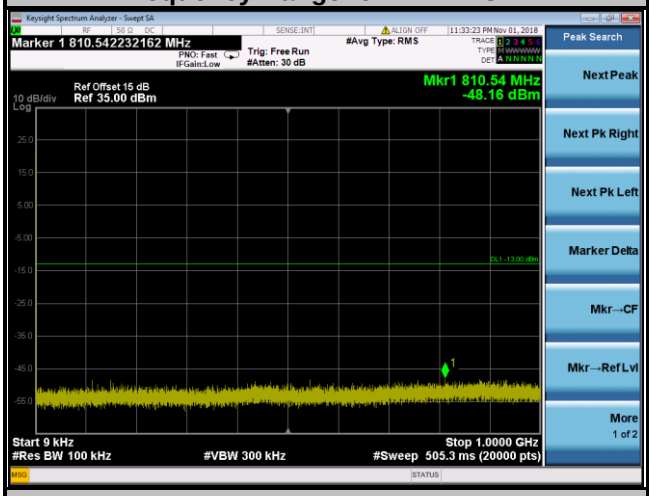
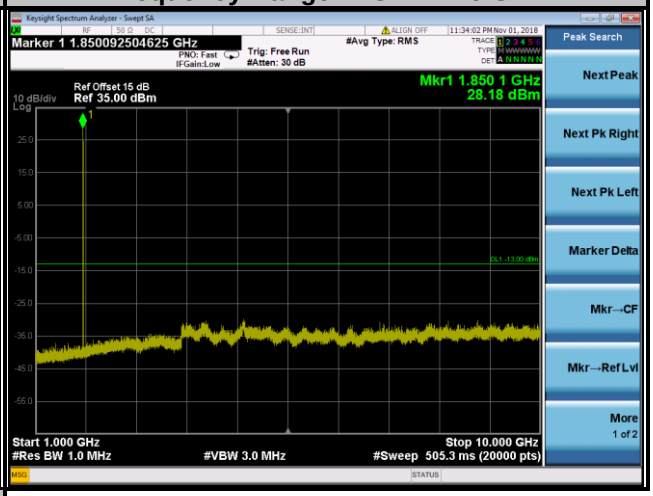
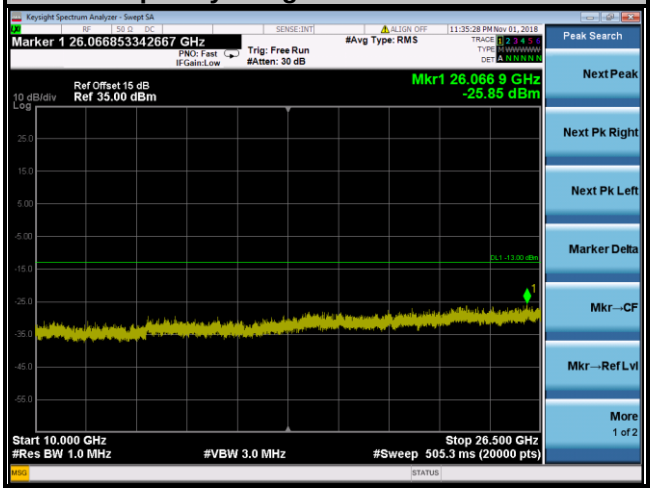
Note: The signal over the limit in 9 kHz is from spectrum analyzer.

GSM	
Channel 661	
Frequency Range: 9 kHz ~ 1 GHz	Frequency Range: 1 GHz ~ 10 GHz
	
Frequency Range: 10 GHz ~ 26.5 GHz	
	

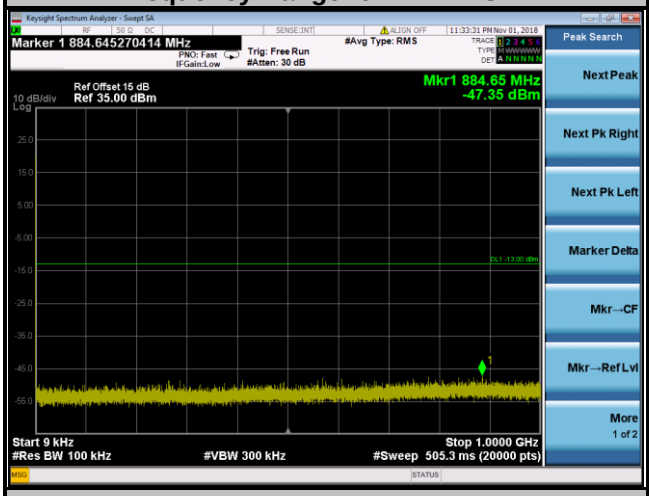
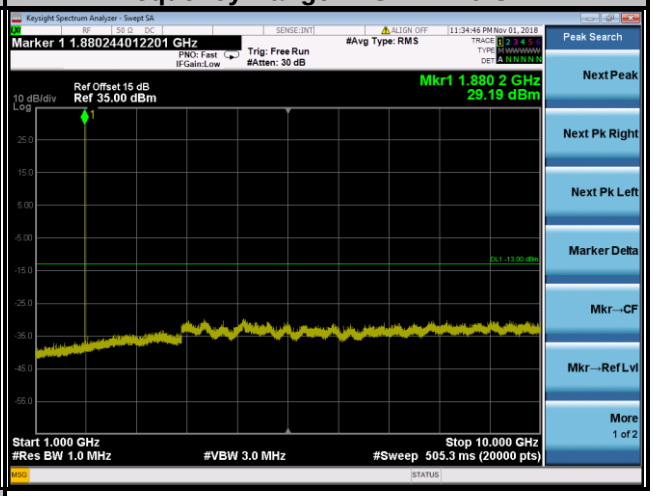
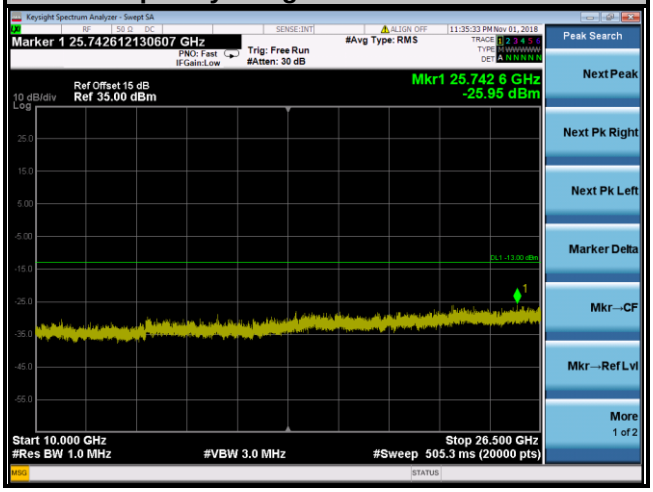
Note: The signal over the limit in 9 kHz is from spectrum analyzer.

GSM	
Channel 810	
Frequency Range: 9 kHz ~ 1 GHz	Frequency Range: 1 GHz ~ 10 GHz
	
Frequency Range: 10 GHz ~ 26.5 GHz	
	

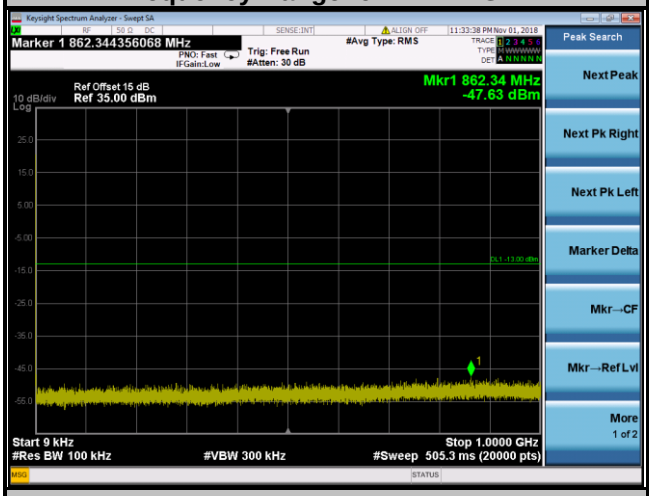
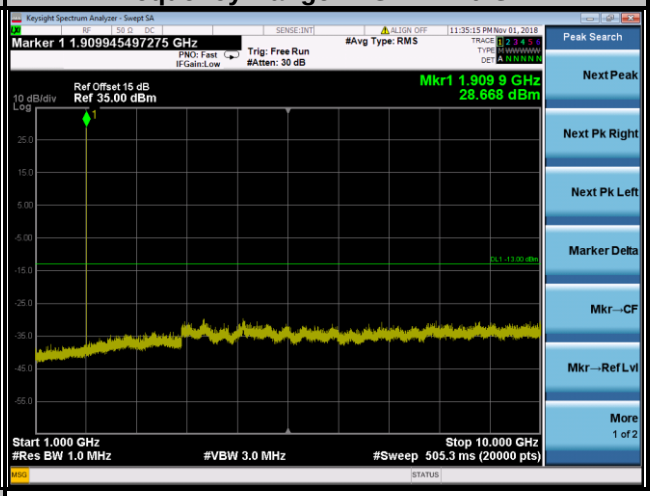
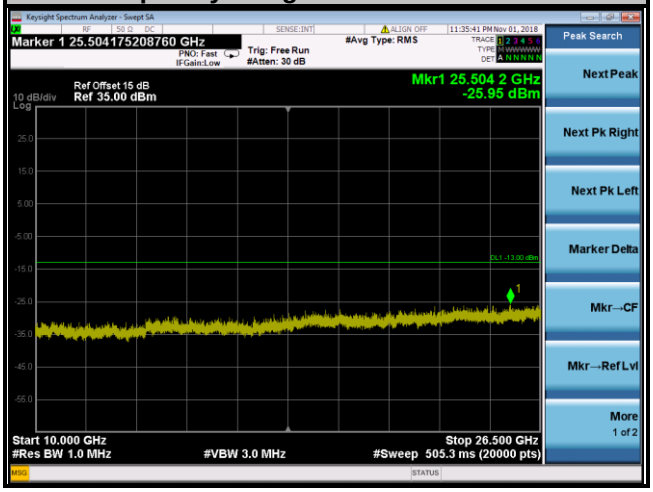
Note: The signal over the limit in 9 kHz is from spectrum analyzer.

EDGE	
Channel 512	
Frequency Range: 9 kHz ~ 1 GHz	Frequency Range: 1 GHz ~ 10 GHz
	
Frequency Range: 10 GHz ~ 26.5 GHz	
	

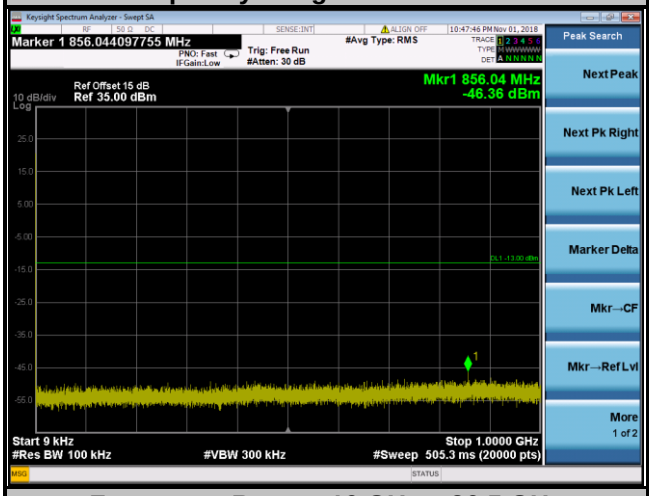
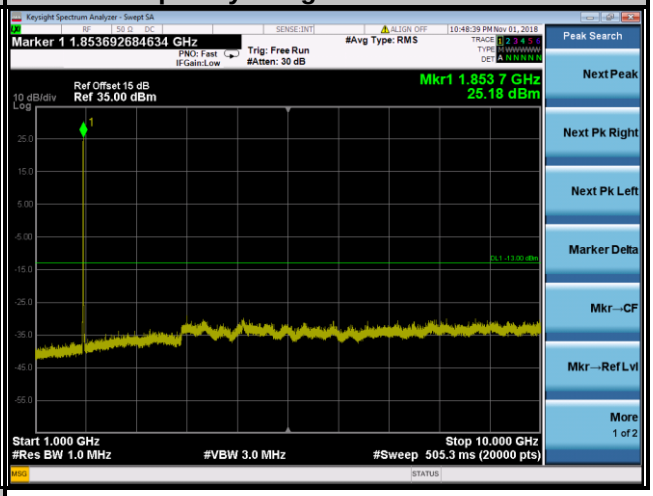
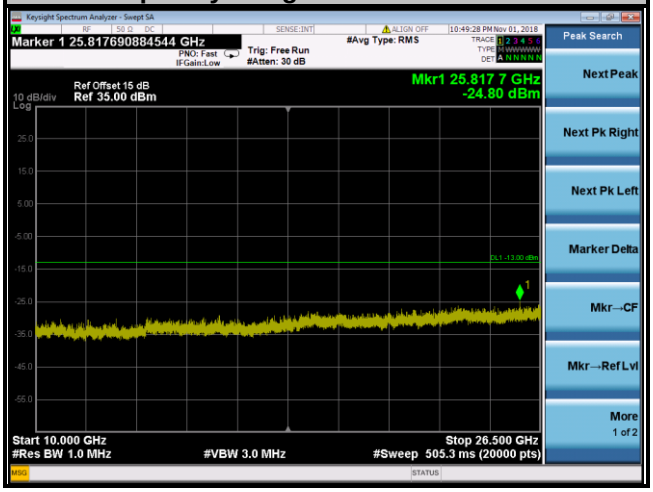
Note: The signal over the limit in 9 kHz is from spectrum analyzer.

EDGE	
Channel 661	
Frequency Range: 9 kHz ~ 1 GHz	Frequency Range: 1 GHz ~ 10 GHz
	
Frequency Range: 10 GHz ~ 26.5 GHz	
	

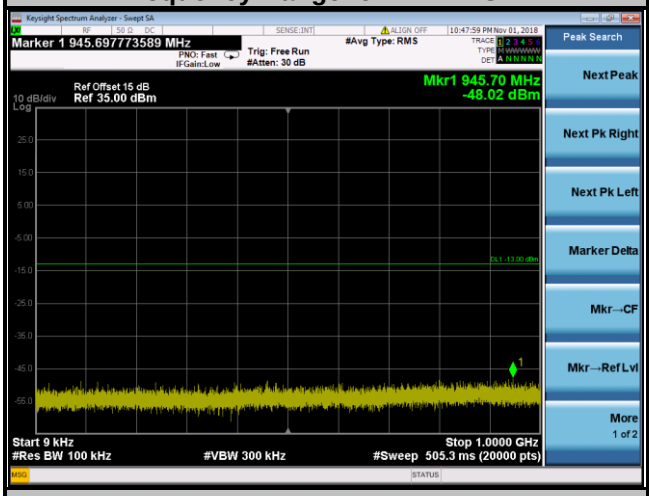
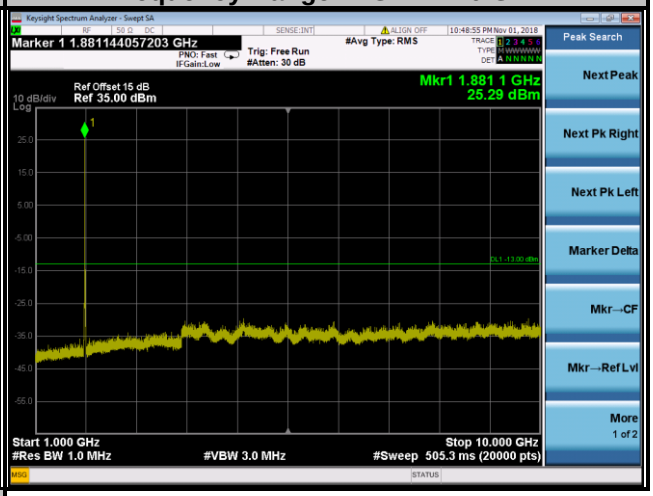
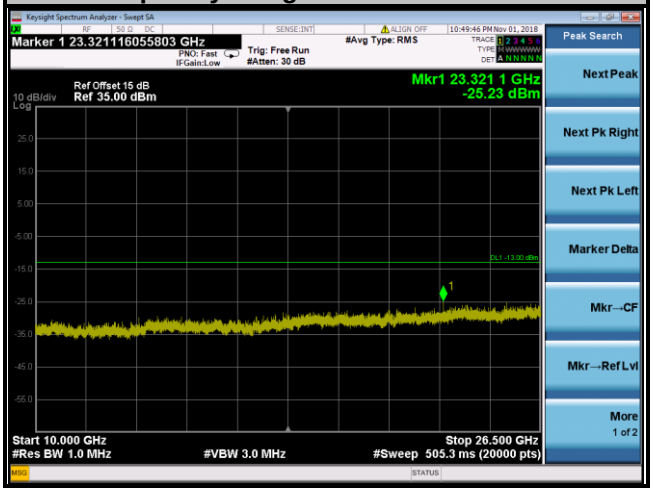
Note: The signal over the limit in 9 kHz is from spectrum analyzer.

EDGE	
Channel 810	
Frequency Range: 9 kHz ~ 1 GHz	Frequency Range: 1 GHz ~ 10 GHz
	
Frequency Range: 10 GHz ~ 26.5 GHz	
	

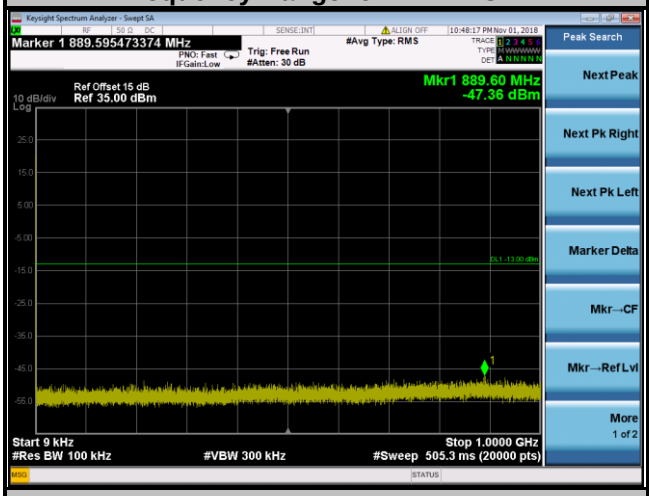
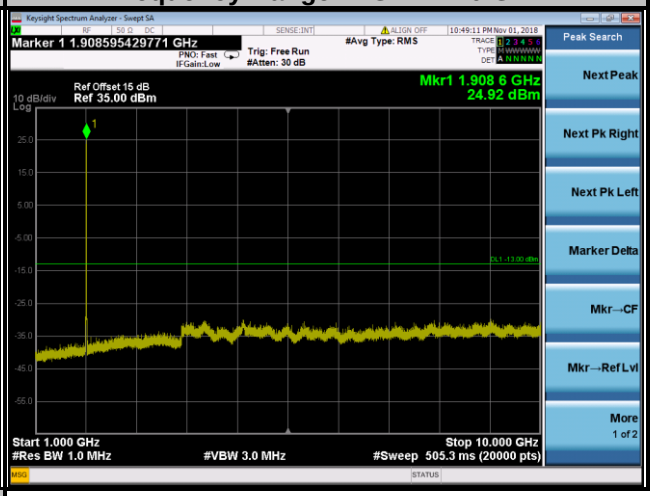
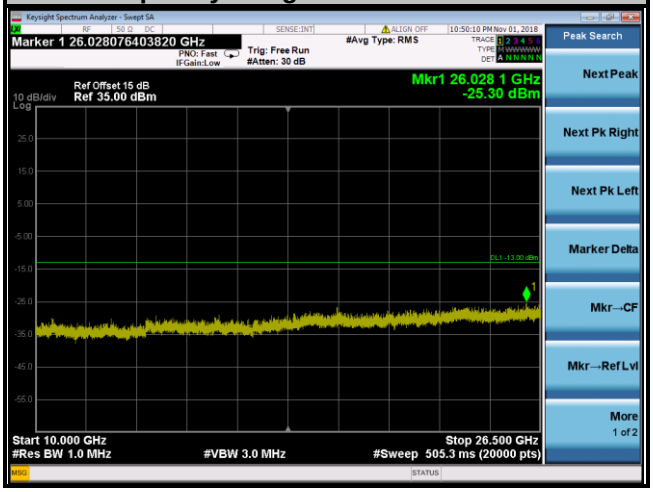
Note: The signal over the limit in 9 kHz is from spectrum analyzer.

WCDMA	
Channel 9262	
Frequency Range: 9 kHz ~ 1 GHz	Frequency Range: 1 GHz ~ 10 GHz
	
Frequency Range: 10 GHz ~ 26.5 GHz	
	

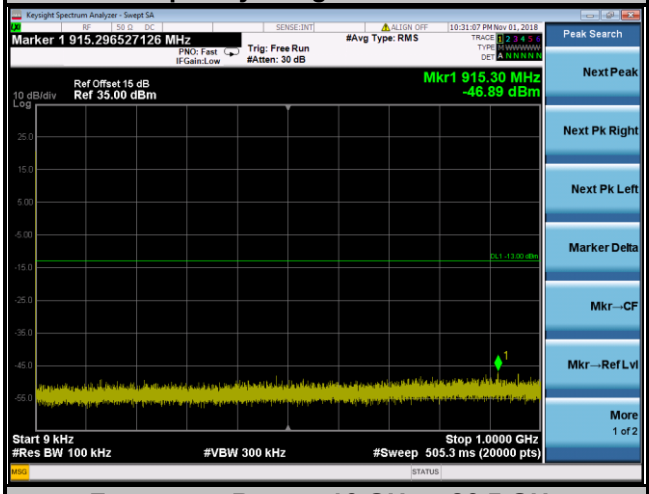
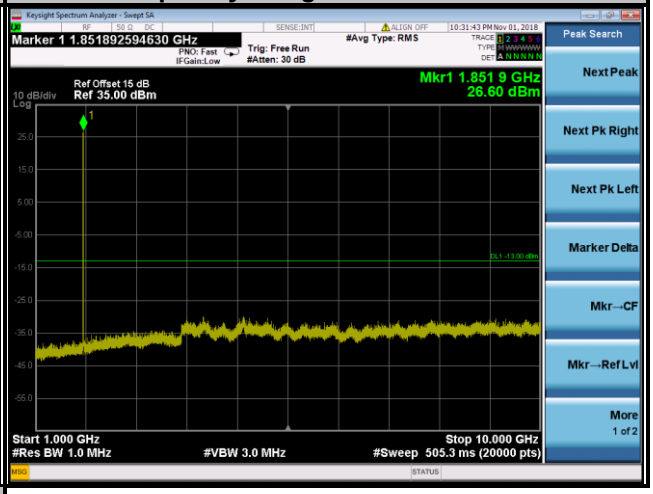
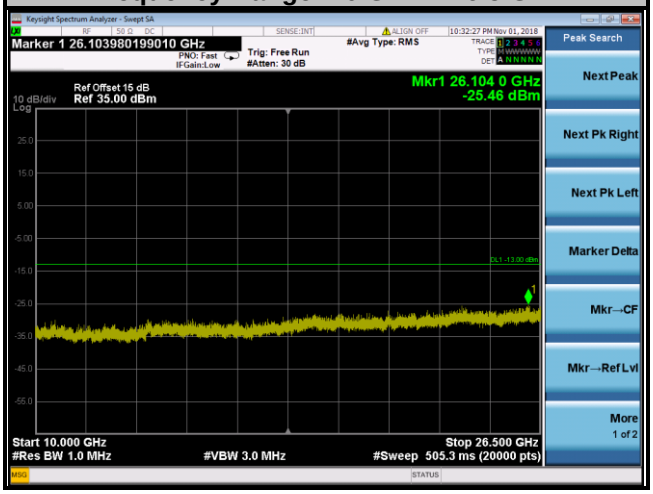
Note: The signal over the limit in 9 kHz is from spectrum analyzer.

WCDMA	
Channel 9400	
Frequency Range: 9 kHz ~ 1 GHz	Frequency Range: 1 GHz ~ 10 GHz
	
Frequency Range: 10 GHz ~ 26.5 GHz	
	

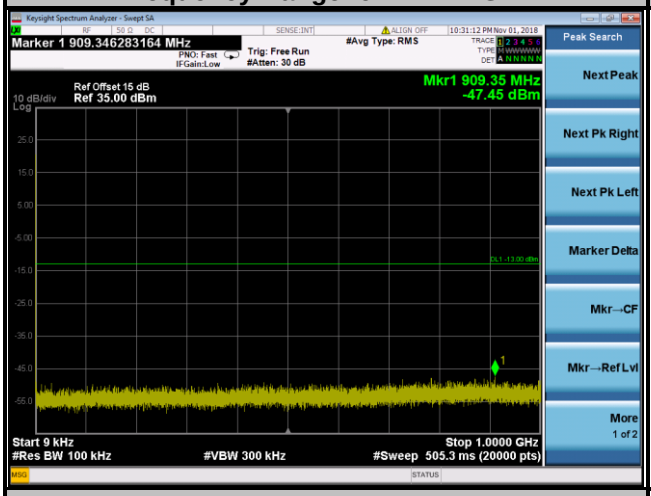
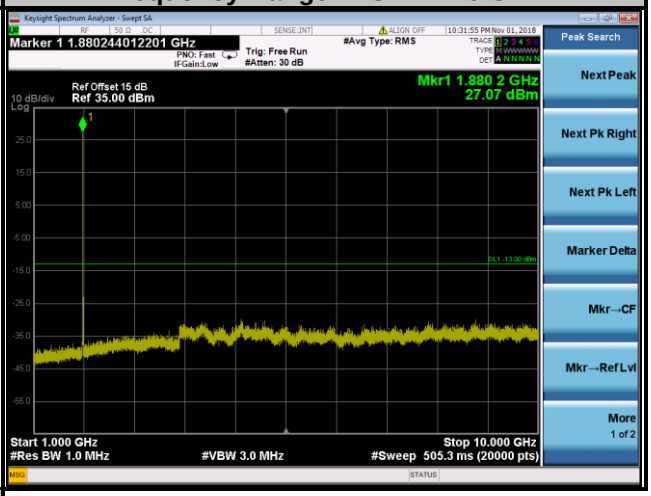
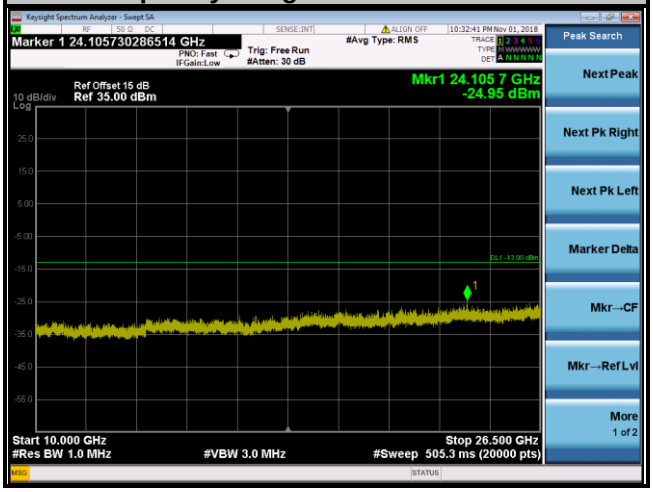
Note: The signal over the limit in 9 kHz is from spectrum analyzer.

WCDMA	
Channel 9538	
Frequency Range: 9 kHz ~ 1 GHz	Frequency Range: 1 GHz ~ 10 GHz
	
Frequency Range: 10 GHz ~ 26.5 GHz	
	

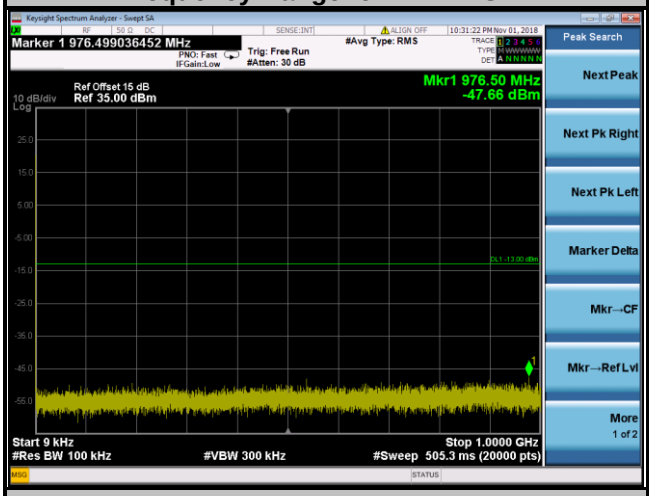
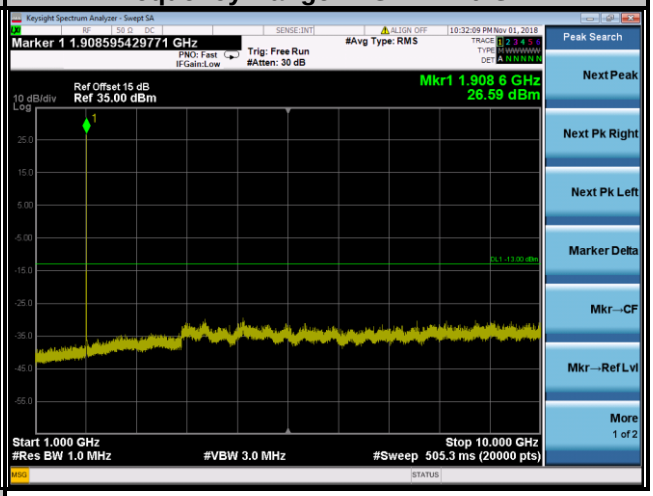
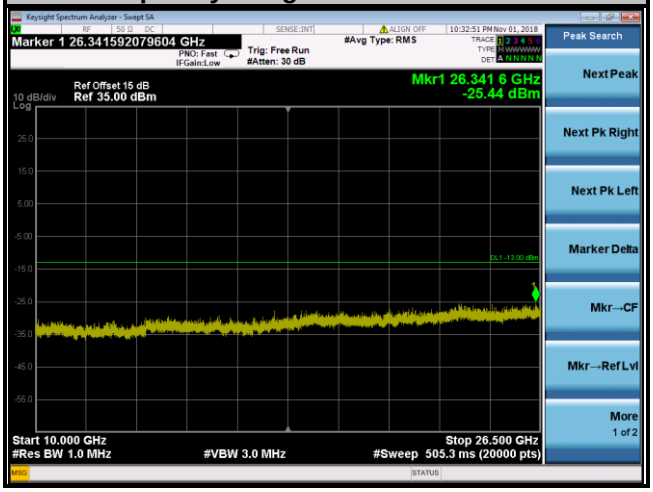
Note: The signal over the limit in 9 kHz is from spectrum analyzer.

CDMA	
Channel 25	
Frequency Range: 9 kHz ~ 1 GHz	Frequency Range: 1 GHz ~ 10 GHz
	
Frequency Range: 10 GHz ~ 26.5 GHz	
	

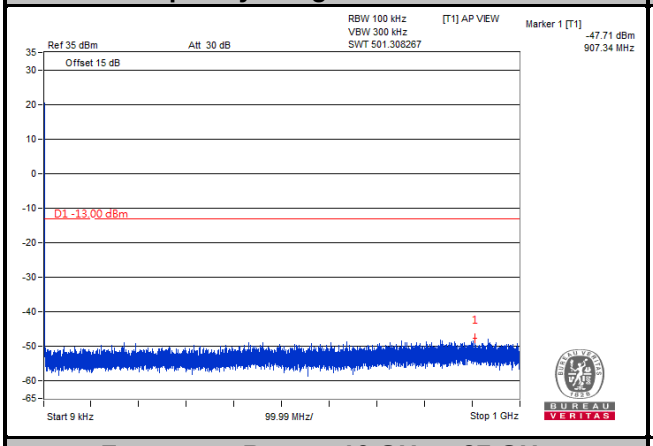
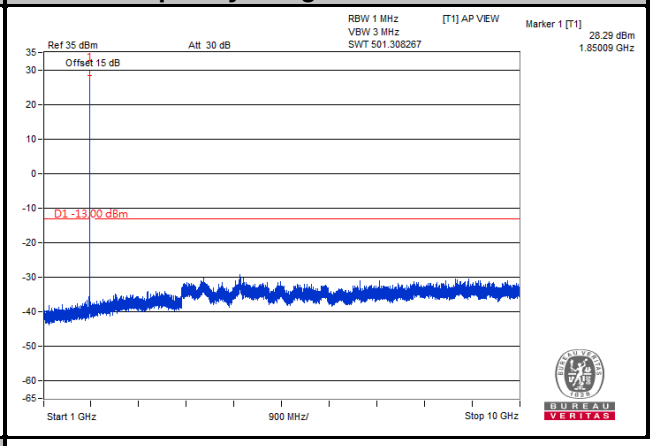
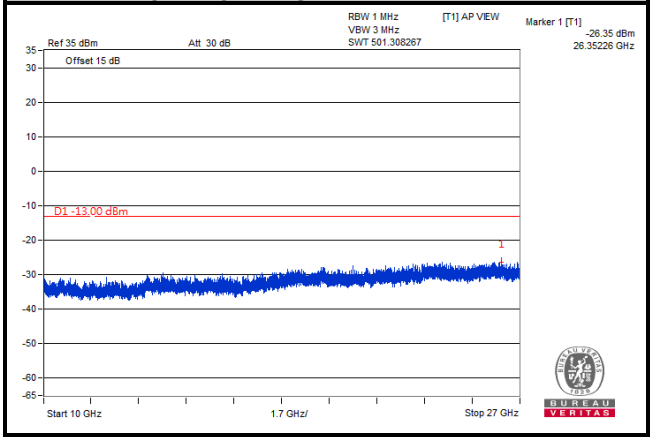
Note: The signal over the limit in 9 kHz is from spectrum analyzer.

CDMA	
Channel 600	
Frequency Range: 9 kHz ~ 1 GHz	Frequency Range: 1 GHz ~ 10 GHz
	
Frequency Range: 10 GHz ~ 26.5 GHz	
	

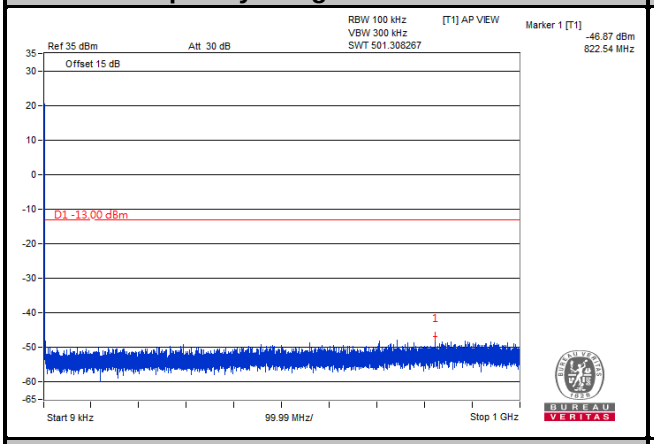
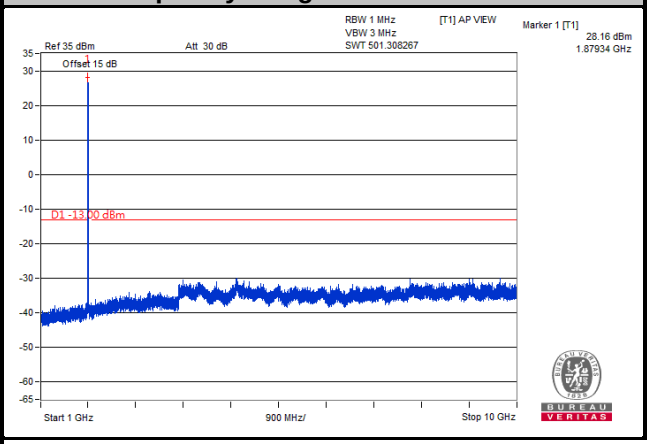
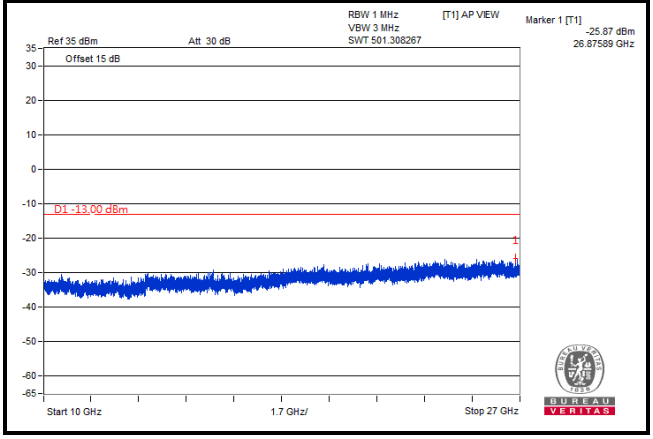
Note: The signal over the limit in 9 kHz is from spectrum analyzer.

CDMA	
Channel 1175	
Frequency Range: 9 kHz ~ 1 GHz	Frequency Range: 1 GHz ~ 10 GHz
	
Frequency Range: 10 GHz ~ 26.5 GHz	
	

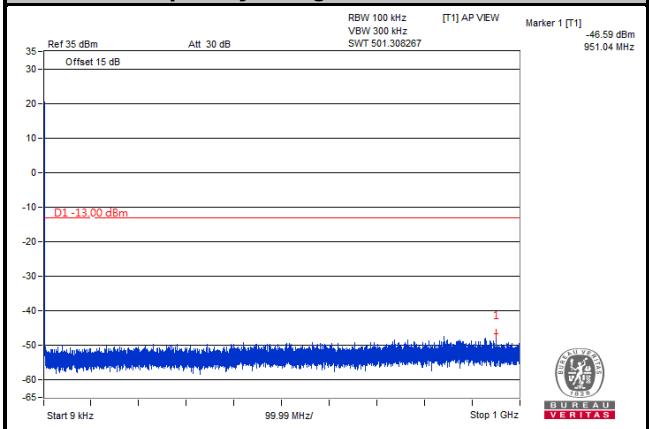
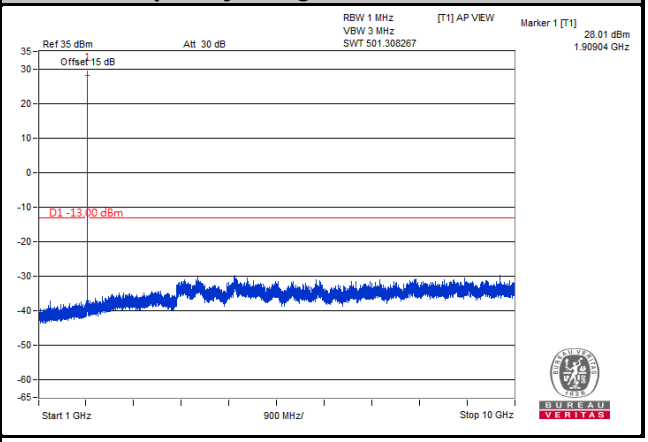
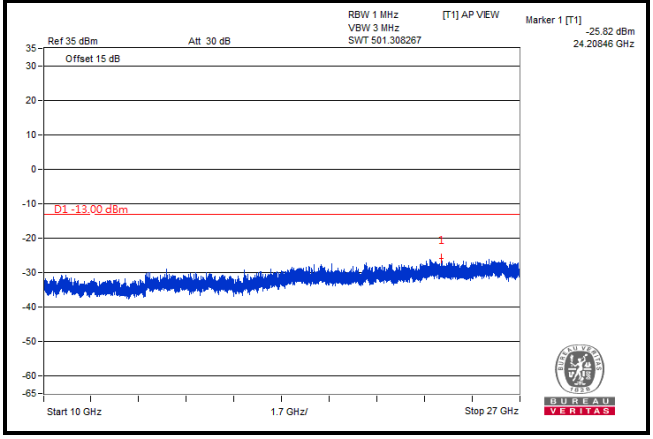
Note: The signal over the limit in 9 kHz is from spectrum analyzer.

LTE Band 2	
Channel Bandwidth: 1.4 MHz	
Channel 18607	
Frequency Range: 9 kHz ~ 1 GHz	Frequency Range: 1 GHz ~ 10 GHz
	
Frequency Range: 10 GHz ~ 27 GHz	
	

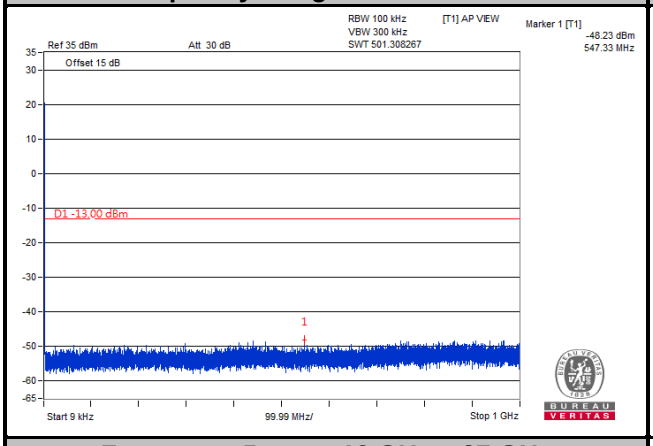
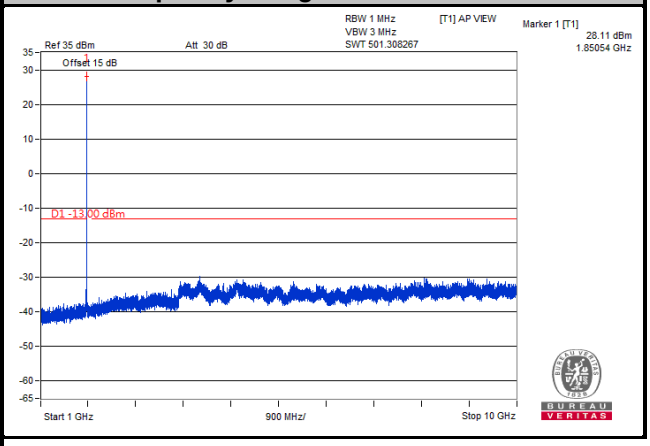
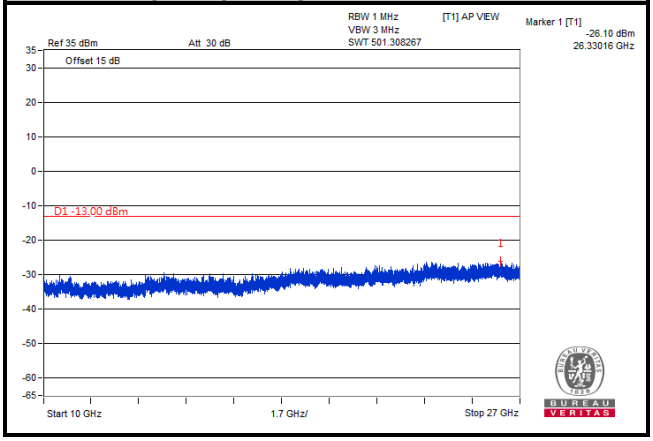
Note: The signal over the limit in 9 kHz is from spectrum analyzer.

LTE Band 2	
Channel Bandwidth: 1.4 MHz	
Channel 18900	
Frequency Range: 9 kHz ~ 1 GHz	Frequency Range: 1 GHz ~ 10 GHz
	
Frequency Range: 10 GHz ~ 27 GHz	
	

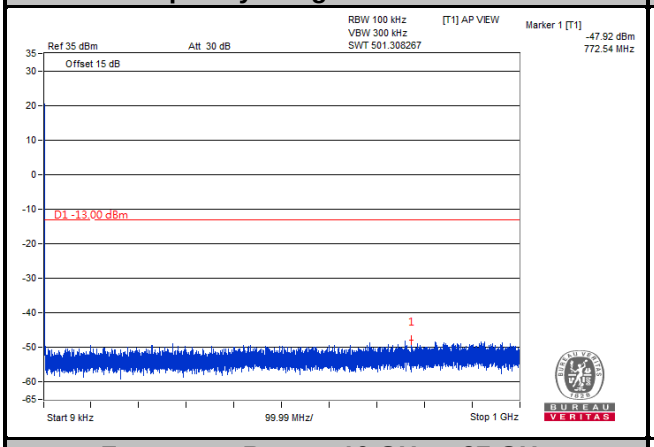
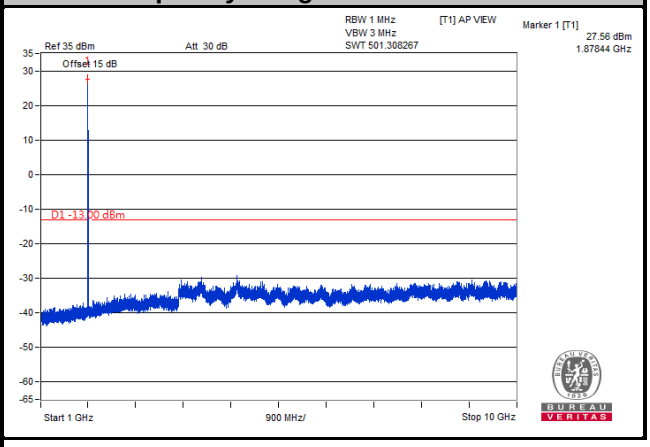
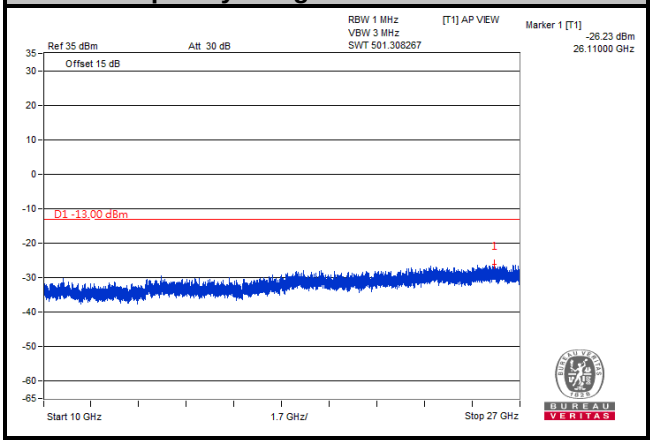
Note: The signal over the limit in 9 kHz is from spectrum analyzer.

LTE Band 2	
Channel Bandwidth: 1.4 MHz	
Channel 19193	
Frequency Range: 9 kHz ~ 1 GHz	Frequency Range: 1 GHz ~ 10 GHz
	
Frequency Range: 10 GHz ~ 27 GHz	
	

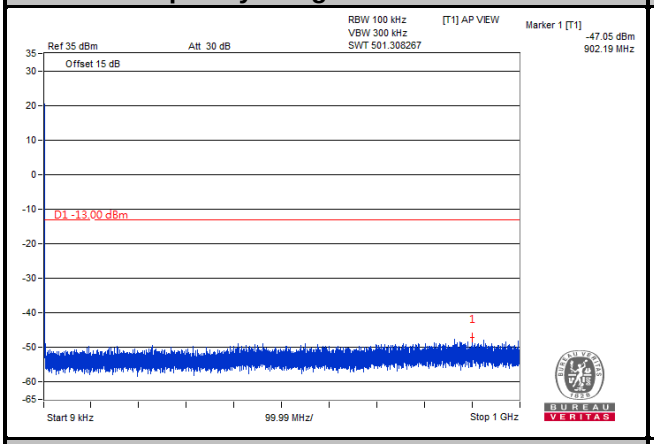
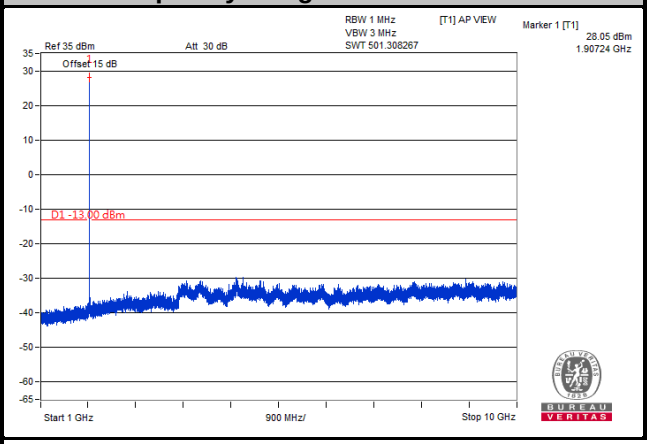
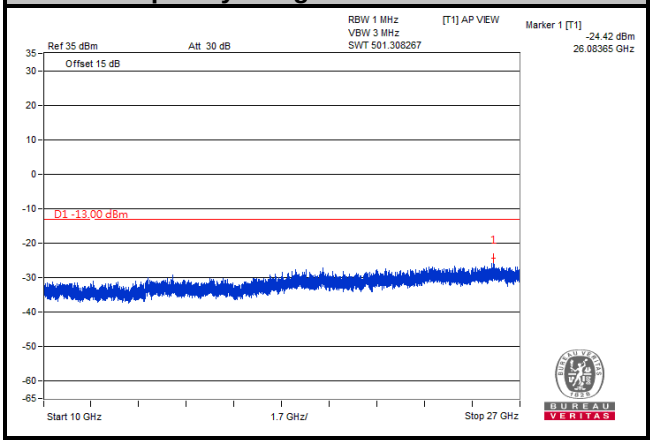
Note: The signal over the limit in 9 kHz is from spectrum analyzer.

LTE Band 2	
Channel Bandwidth: 3 MHz	
Channel 18615	
Frequency Range: 9 kHz ~ 1 GHz	Frequency Range: 1 GHz ~ 10 GHz
	
Frequency Range: 10 GHz ~ 27 GHz	
	

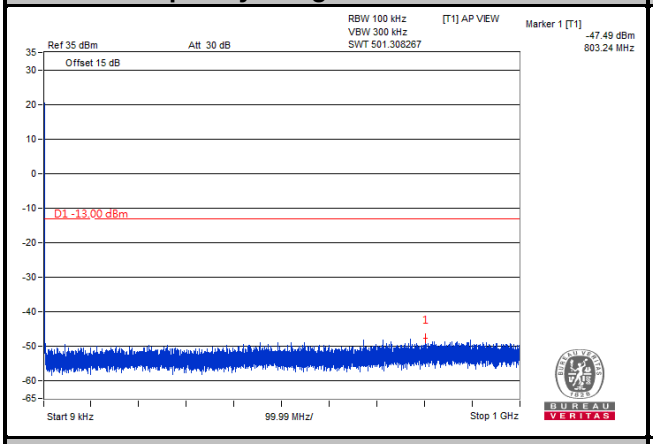
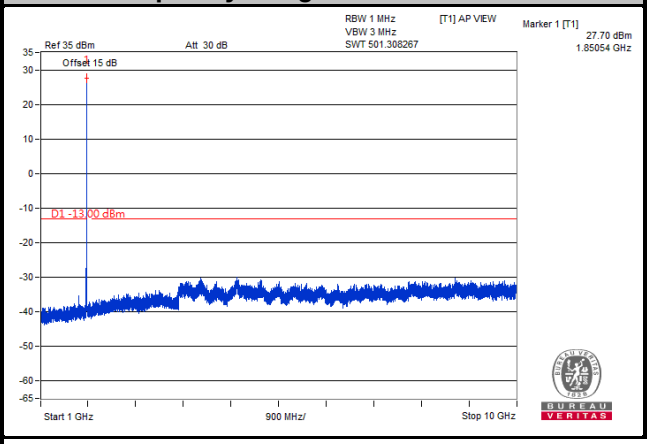
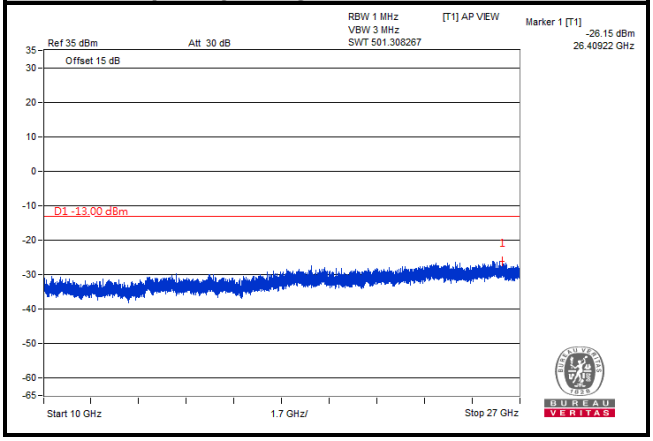
Note: The signal over the limit in 9 kHz is from spectrum analyzer.

LTE Band 2	
Channel Bandwidth: 3 MHz	
Channel 18900	
Frequency Range: 9 kHz ~ 1 GHz	Frequency Range: 1 GHz ~ 10 GHz
	
Frequency Range: 10 GHz ~ 27 GHz	
	

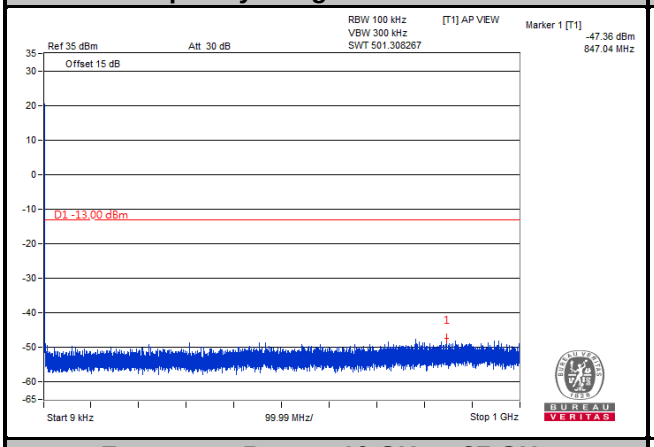
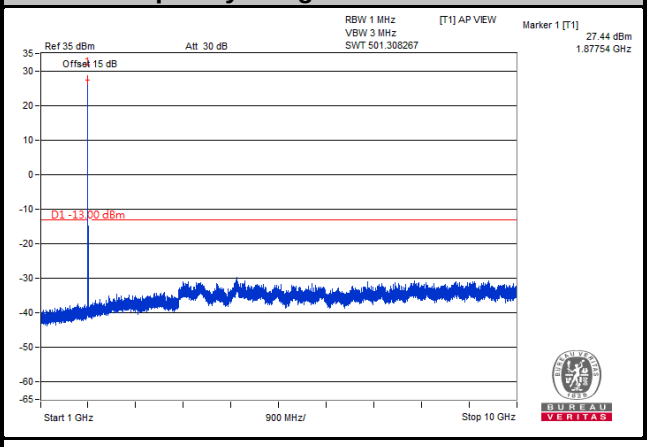
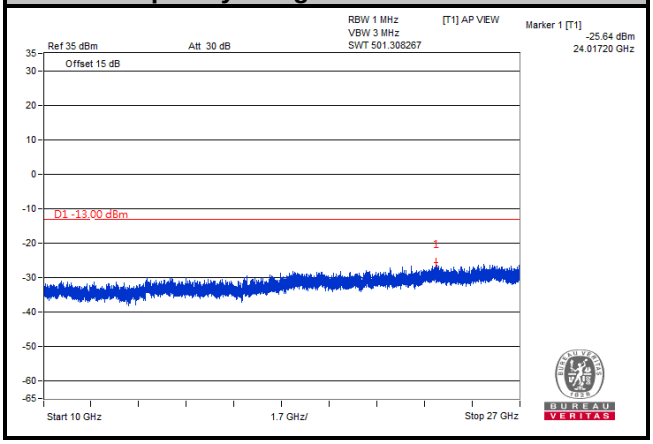
Note: The signal over the limit in 9 kHz is from spectrum analyzer.

LTE Band 2	
Channel Bandwidth: 3 MHz	
Channel 19185	
Frequency Range: 9 kHz ~ 1 GHz	Frequency Range: 1 GHz ~ 10 GHz
	
Frequency Range: 10 GHz ~ 27 GHz	
	

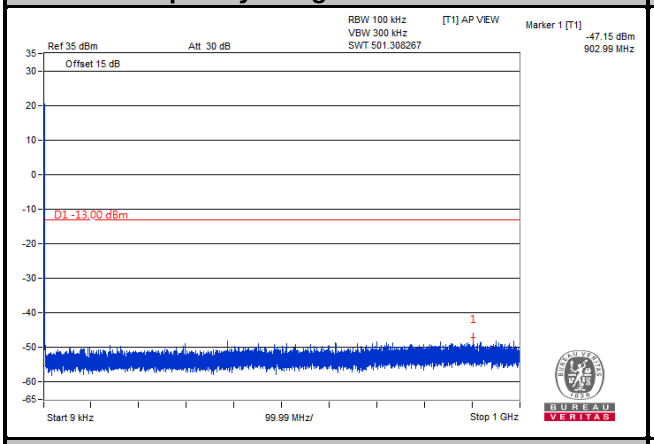
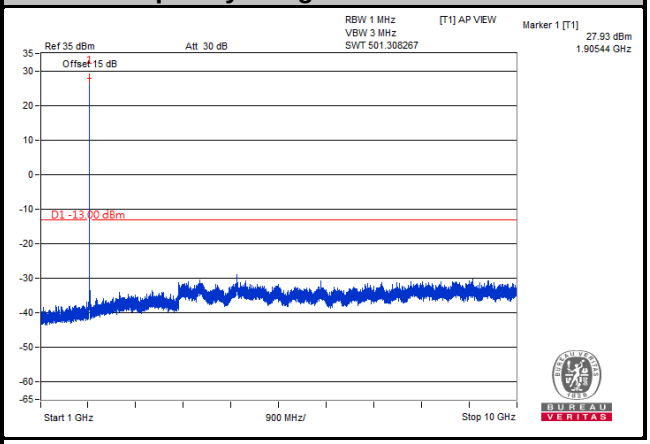
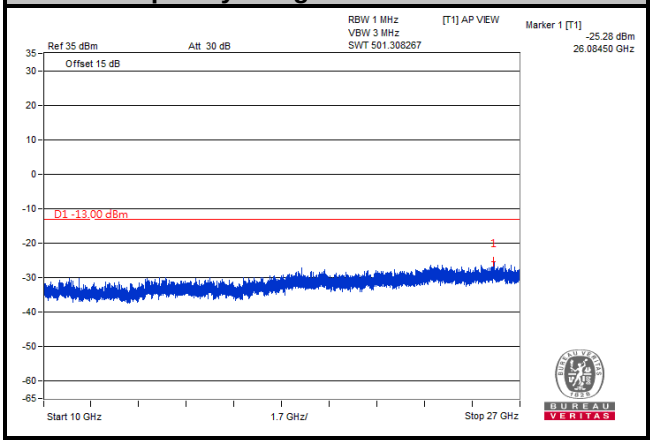
Note: The signal over the limit in 9 kHz is from spectrum analyzer.

LTE Band 2	
Channel Bandwidth: 5 MHz	
Channel 18625	
Frequency Range: 9 kHz ~ 1 GHz	Frequency Range: 1 GHz ~ 10 GHz
	
Frequency Range: 10 GHz ~ 27 GHz	
	

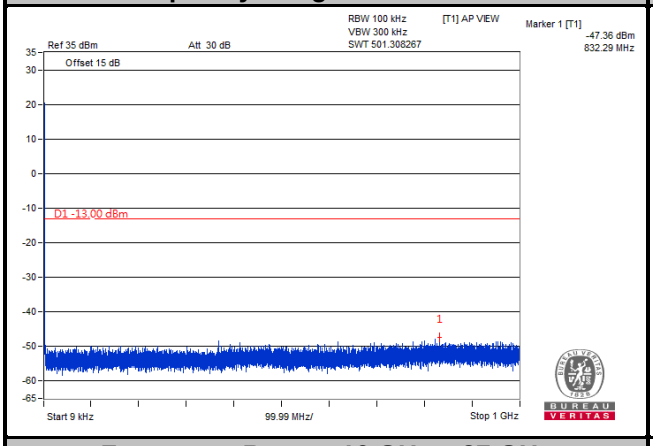
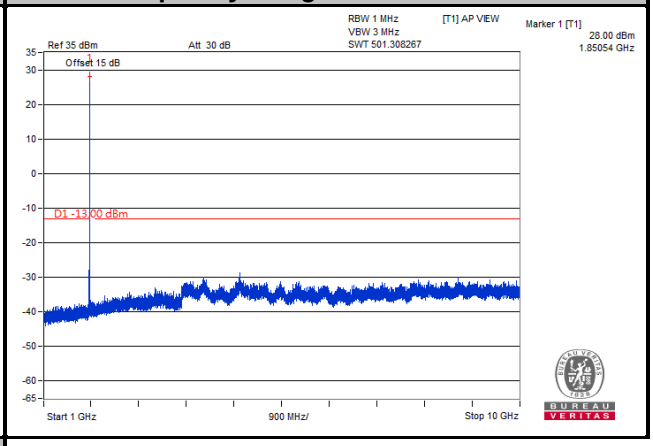
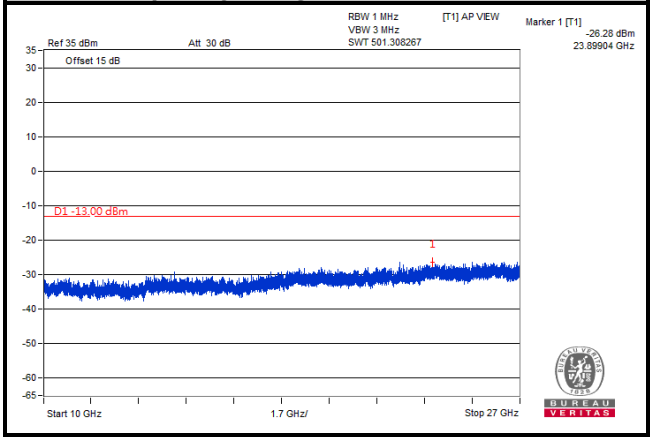
Note: The signal over the limit in 9 kHz is from spectrum analyzer.

LTE Band 2	
Channel Bandwidth: 5 MHz	
Channel 18900	
Frequency Range: 9 kHz ~ 1 GHz	Frequency Range: 1 GHz ~ 10 GHz
	
Frequency Range: 10 GHz ~ 27 GHz	
	

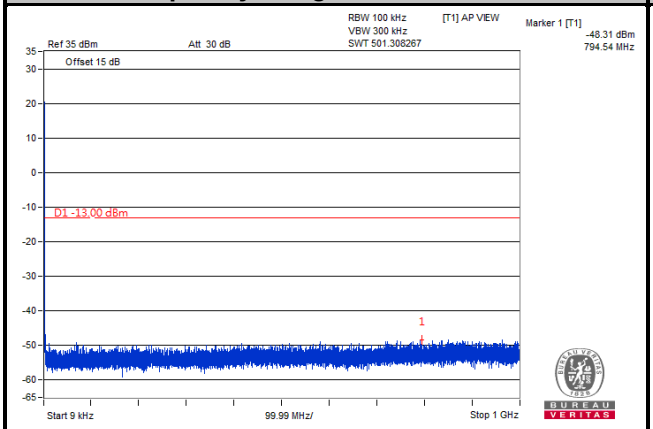
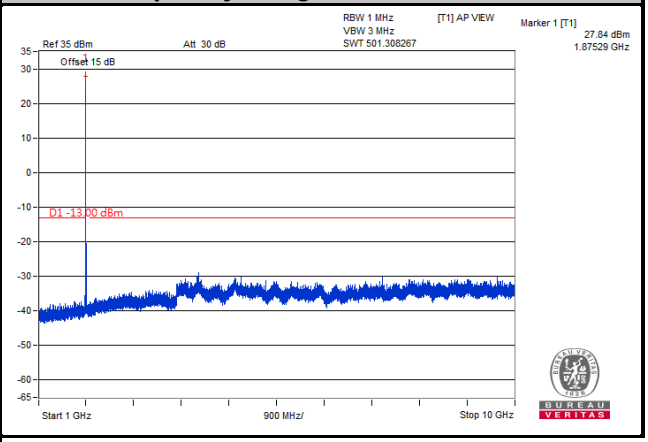
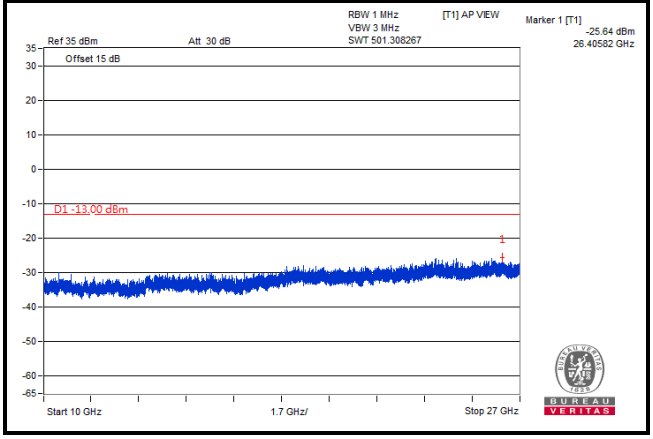
Note: The signal over the limit in 9 kHz is from spectrum analyzer.

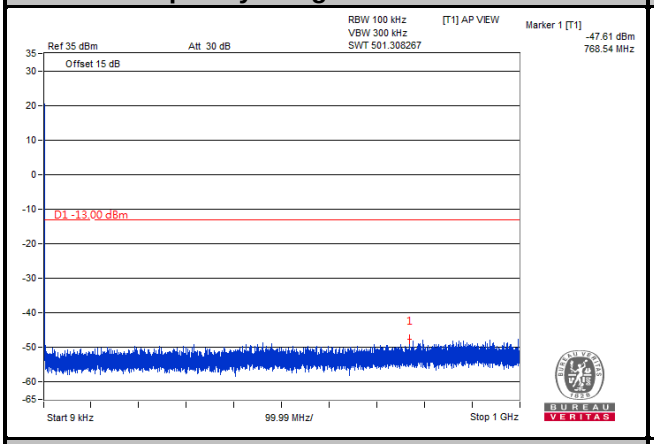
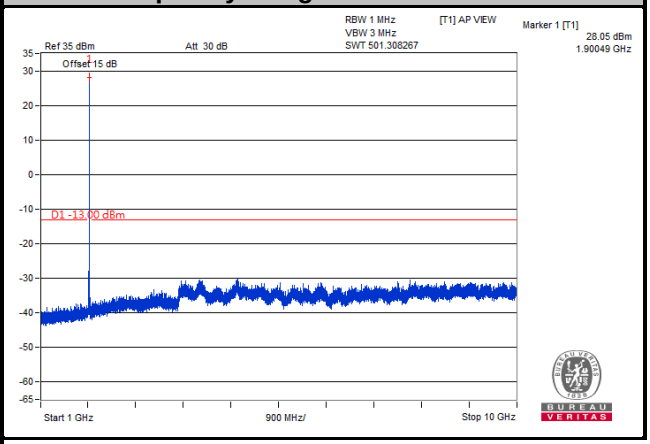
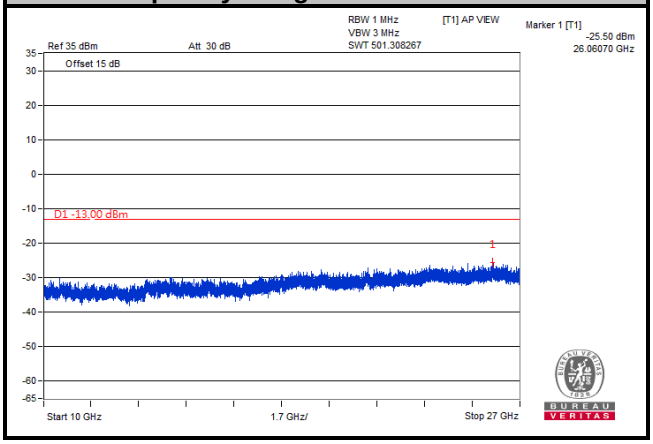
LTE Band 2	
Channel Bandwidth: 5 MHz	
Channel 19175	
Frequency Range: 9 kHz ~ 1 GHz	Frequency Range: 1 GHz ~ 10 GHz
	
Frequency Range: 10 GHz ~ 27 GHz	
	

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

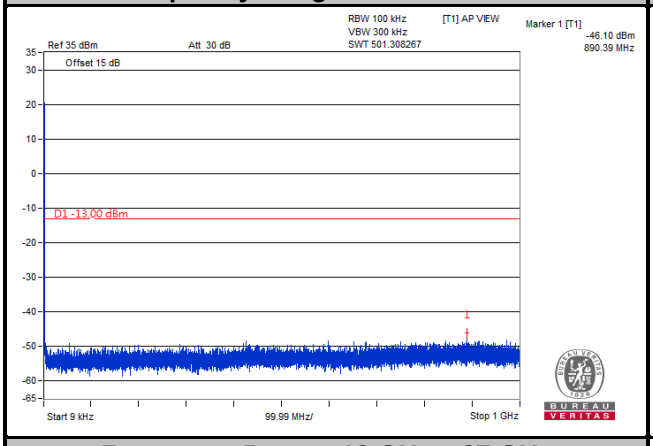
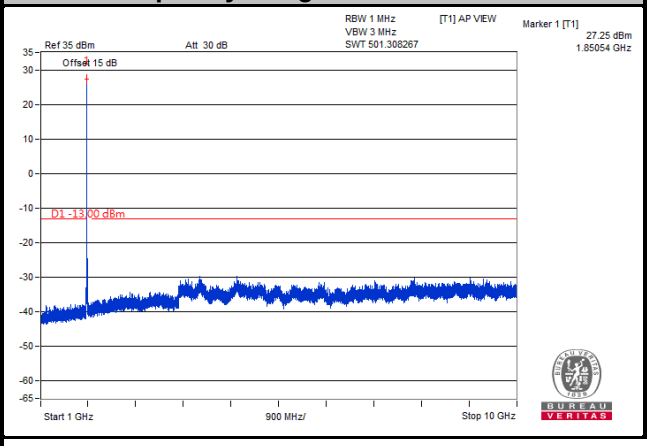
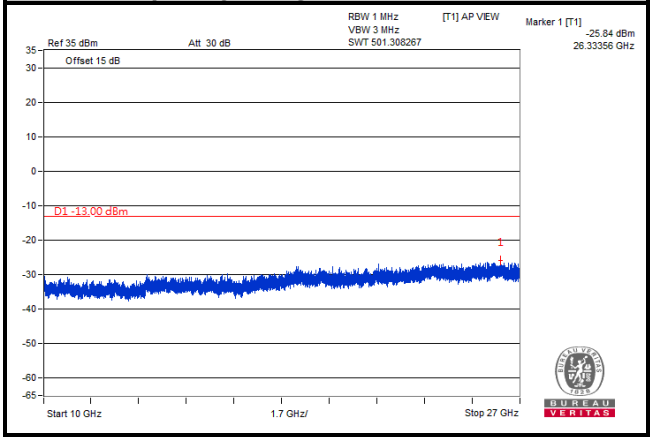
LTE Band 2	
Channel Bandwidth: 10 MHz	
Channel 18650	
Frequency Range: 9 kHz ~ 1 GHz	Frequency Range: 1 GHz ~ 10 GHz
	
Frequency Range: 10 GHz ~ 27 GHz	
	

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

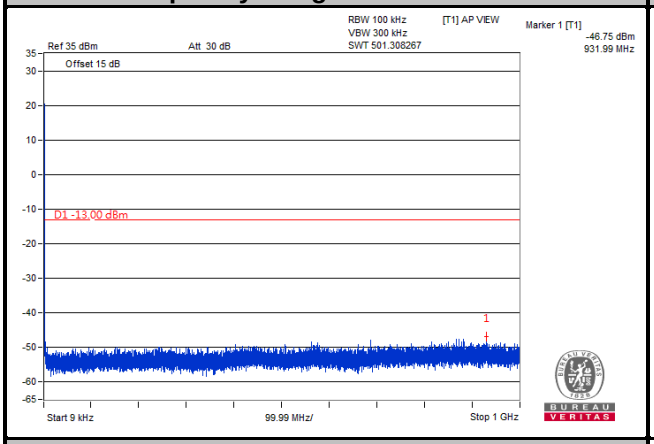
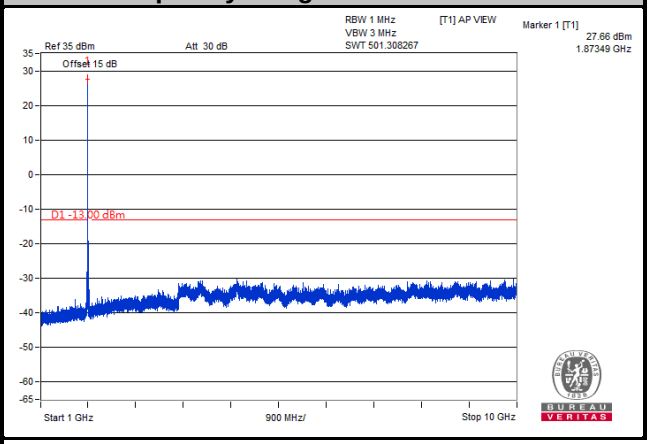
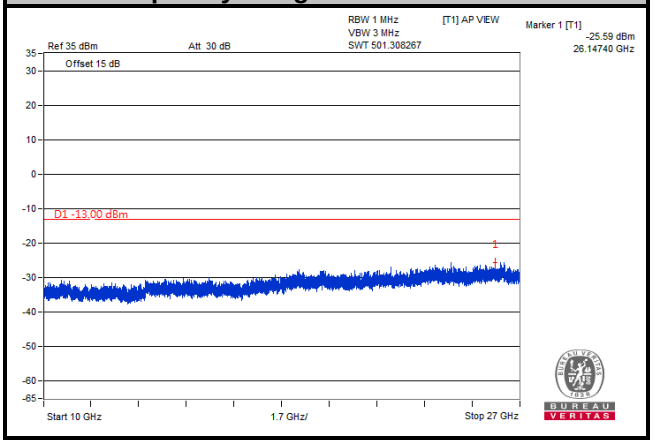
LTE Band 2	
Channel Bandwidth: 10 MHz	
Channel 18900	
Frequency Range: 9 kHz ~ 1 GHz	Frequency Range: 1 GHz ~ 10 GHz
	
Frequency Range: 10 GHz ~ 27 GHz	
	

LTE Band 2	
Channel Bandwidth: 10 MHz	
Channel 19150	
Frequency Range: 9 kHz ~ 1 GHz	Frequency Range: 1 GHz ~ 10 GHz
	
Frequency Range: 10 GHz ~ 27 GHz	
	

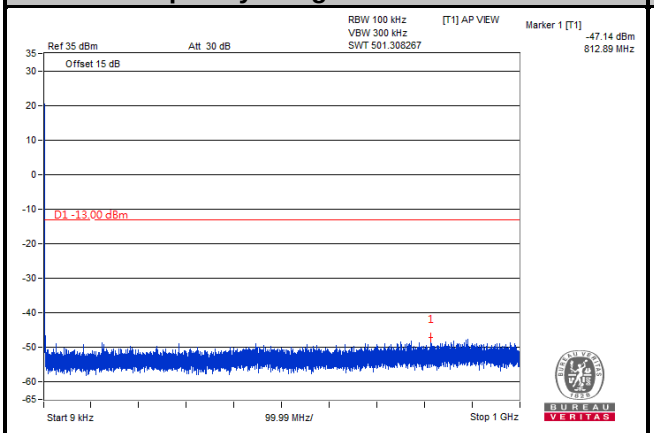
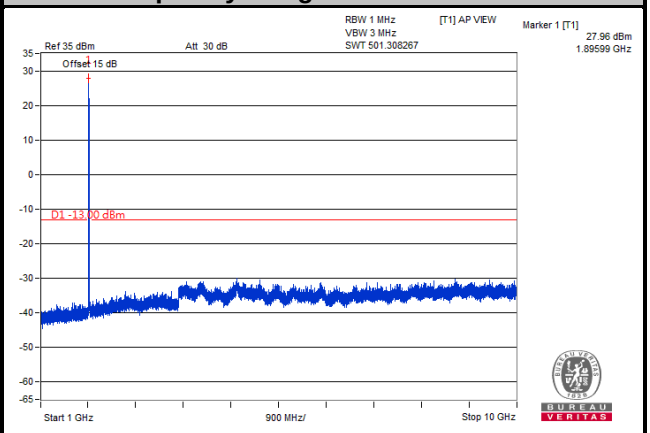
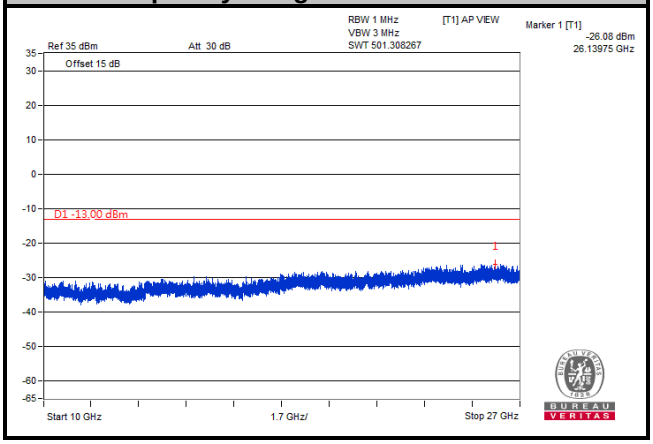
Note: The signal over the limit in 9 kHz is from spectrum analyzer.

LTE Band 2	
Channel Bandwidth: 15 MHz	
Channel 18675	
Frequency Range: 9 kHz ~ 1 GHz	Frequency Range: 1 GHz ~ 10 GHz
	
Frequency Range: 10 GHz ~ 27 GHz	
	

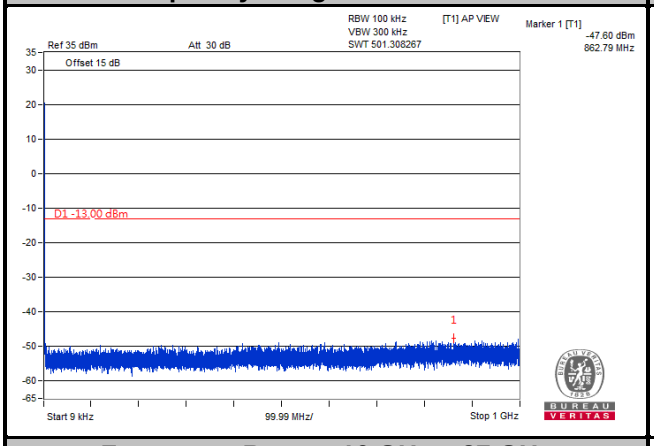
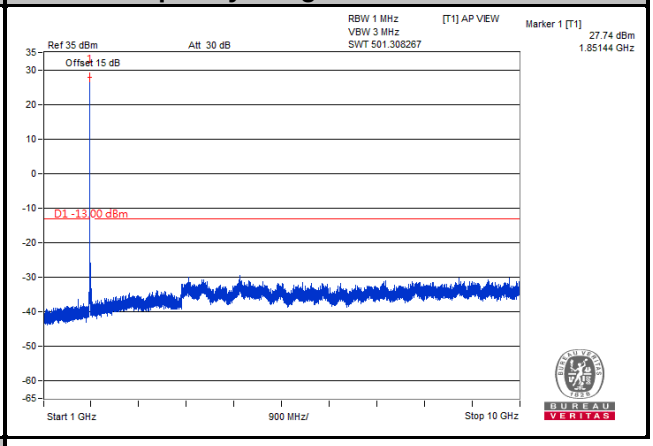
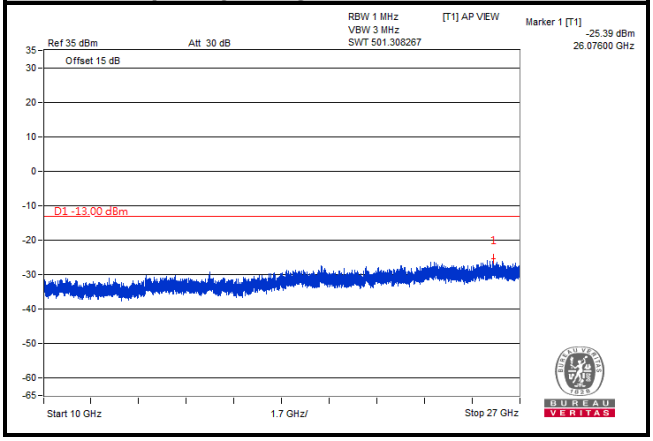
Note: The signal over the limit in 9 kHz is from spectrum analyzer.

LTE Band 2	
Channel Bandwidth: 15 MHz	
Channel 18900	
Frequency Range: 9 kHz ~ 1 GHz	Frequency Range: 1 GHz ~ 10 GHz
	
Frequency Range: 10 GHz ~ 27 GHz	
	

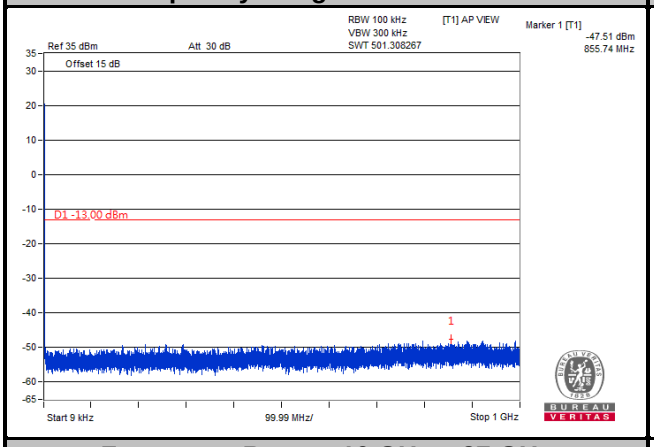
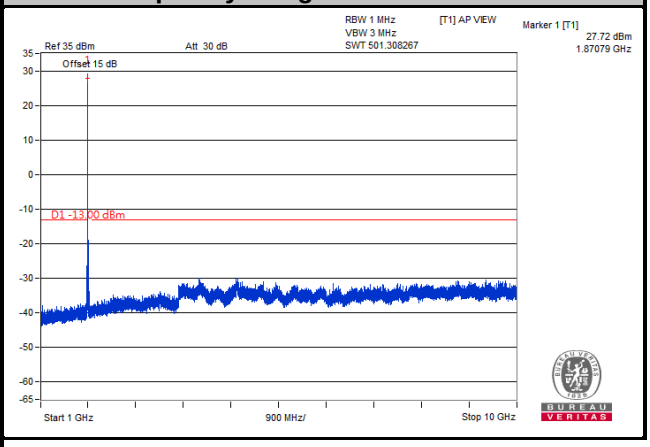
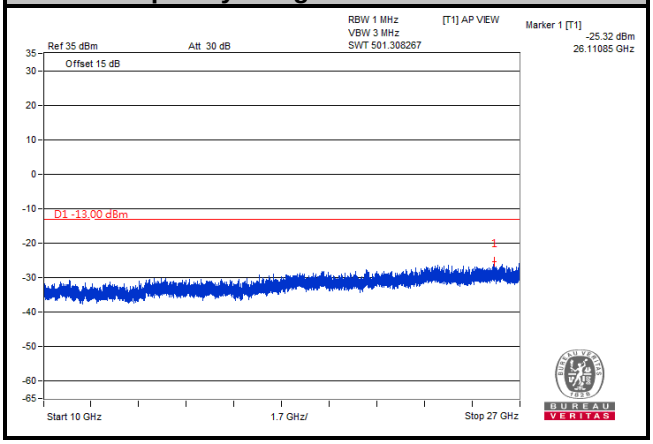
Note: The signal over the limit in 9 kHz is from spectrum analyzer.

LTE Band 2	
Channel Bandwidth: 15 MHz	
Channel 19125	
Frequency Range: 9 kHz ~ 1 GHz	Frequency Range: 1 GHz ~ 10 GHz
	
Frequency Range: 10 GHz ~ 27 GHz	
	

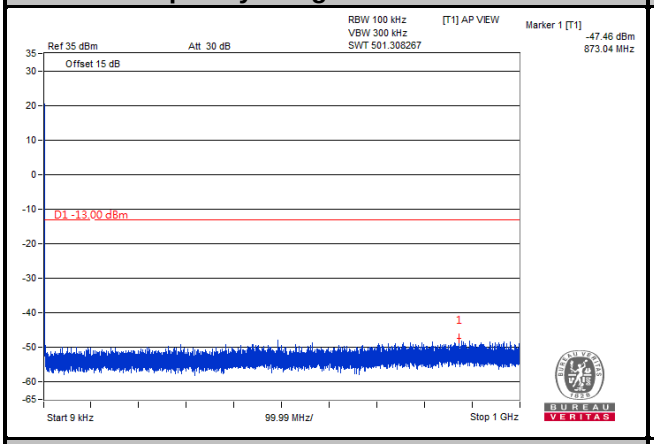
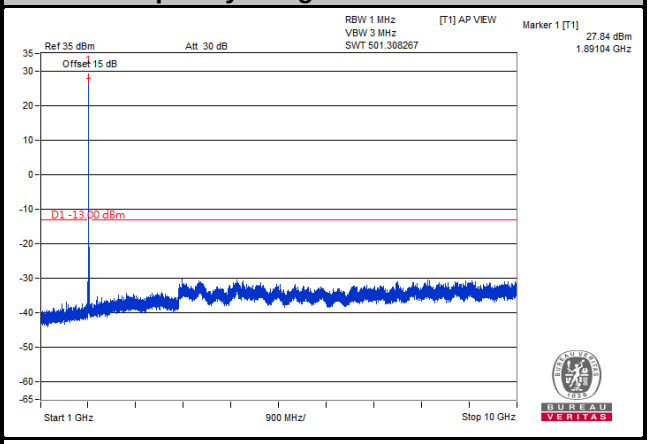
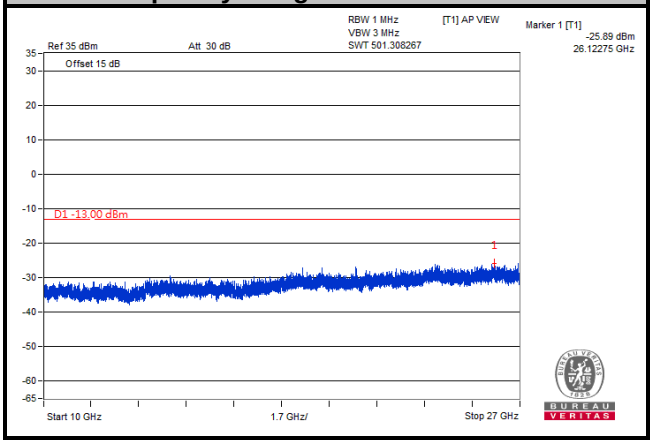
Note: The signal over the limit in 9 kHz is from spectrum analyzer.

LTE Band 2	
Channel Bandwidth: 20 MHz	
Channel 18700	
Frequency Range: 9 kHz ~ 1 GHz	Frequency Range: 1 GHz ~ 10 GHz
	
Frequency Range: 10 GHz ~ 27 GHz	
	

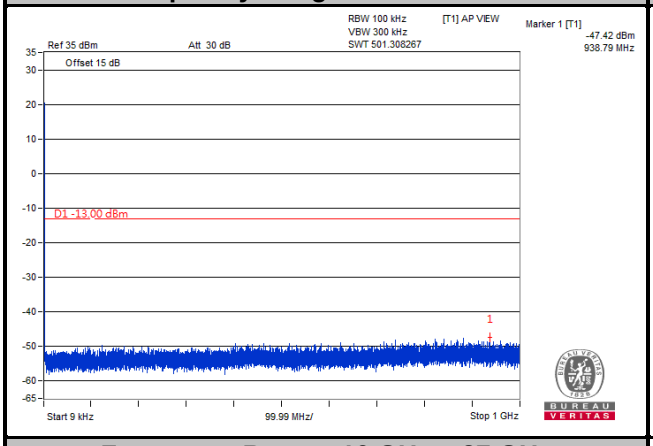
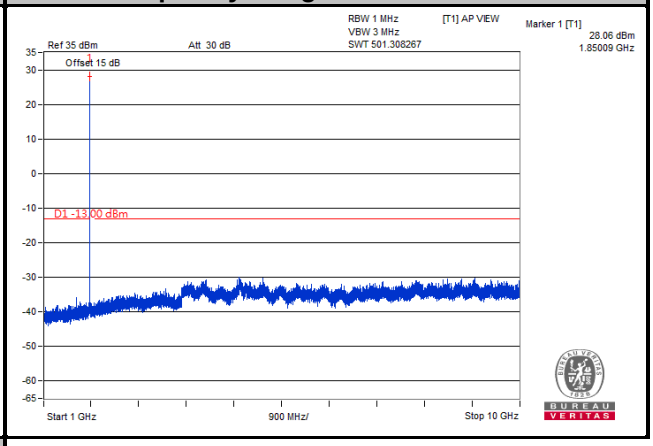
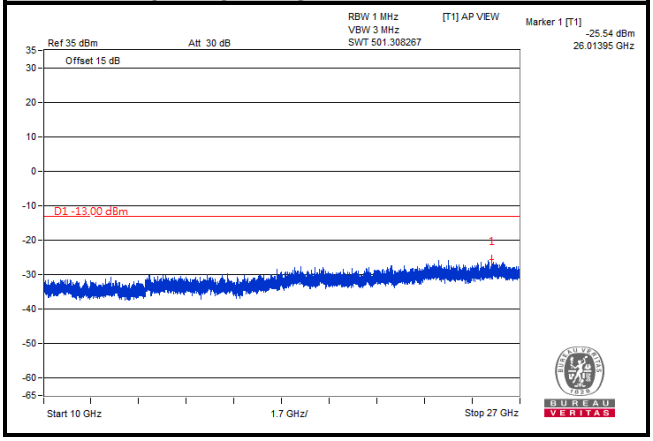
Note: The signal over the limit in 9 kHz is from spectrum analyzer.

LTE Band 2	
Channel Bandwidth: 20 MHz	
Channel 18900	
Frequency Range: 9 kHz ~ 1 GHz	Frequency Range: 1 GHz ~ 10 GHz
	
Frequency Range: 10 GHz ~ 27 GHz	
	

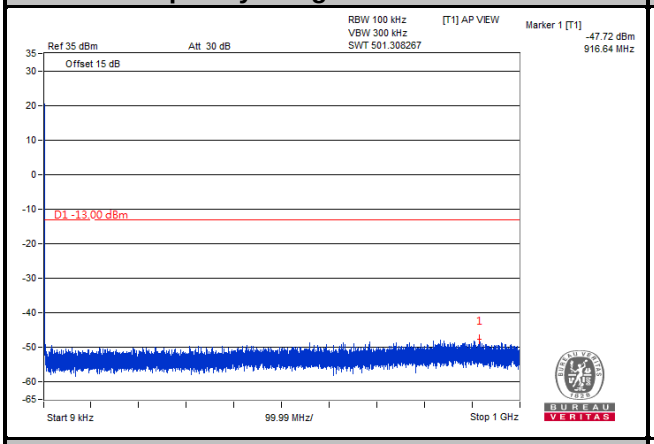
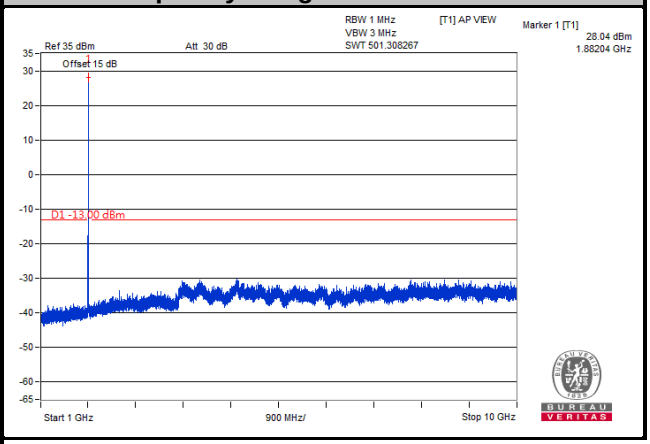
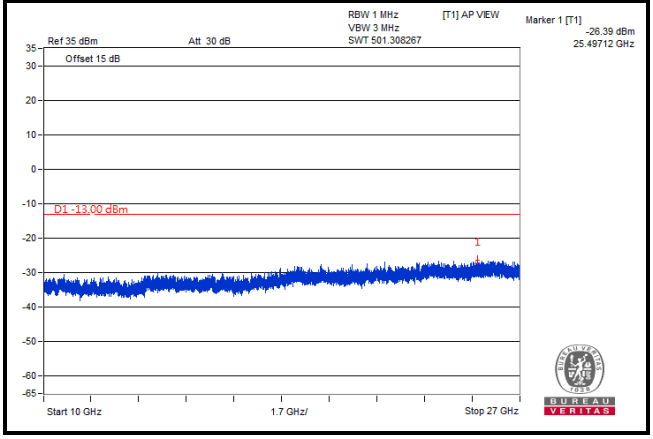
Note: The signal over the limit in 9 kHz is from spectrum analyzer.

LTE Band 2	
Channel Bandwidth: 20 MHz	
Channel 19100	
Frequency Range: 9 kHz ~ 1 GHz	Frequency Range: 1 GHz ~ 10 GHz
	
Frequency Range: 10 GHz ~ 27 GHz	
	

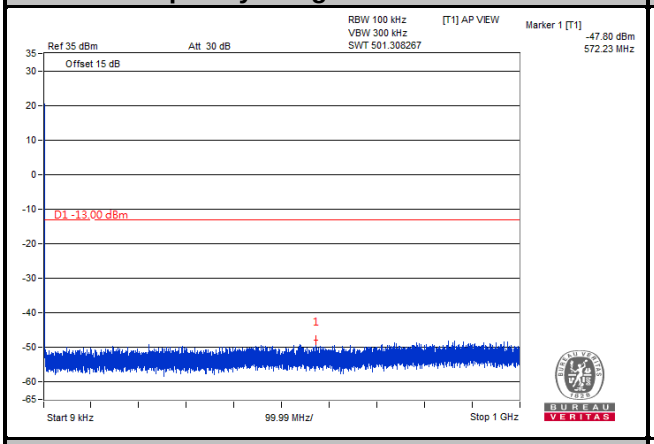
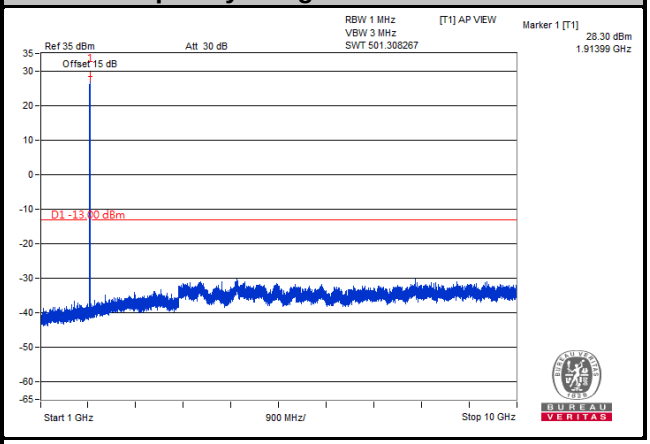
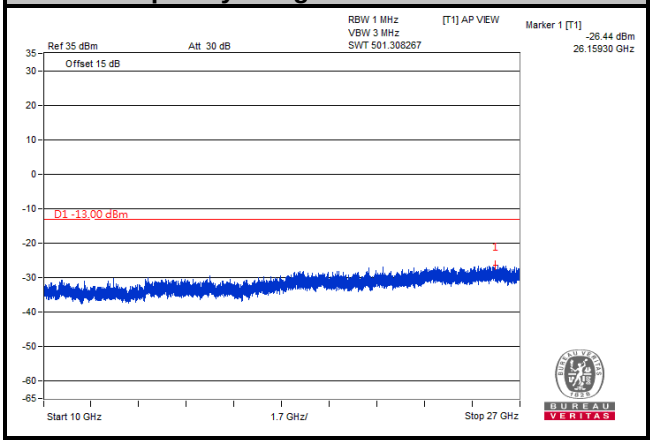
Note: The signal over the limit in 9 kHz is from spectrum analyzer.

LTE Band 25	
Channel Bandwidth: 1.4 MHz	
Channel 26047	
Frequency Range: 9 kHz ~ 1 GHz	Frequency Range: 1 GHz ~ 10 GHz
	
Frequency Range: 10 GHz ~ 27 GHz	
	

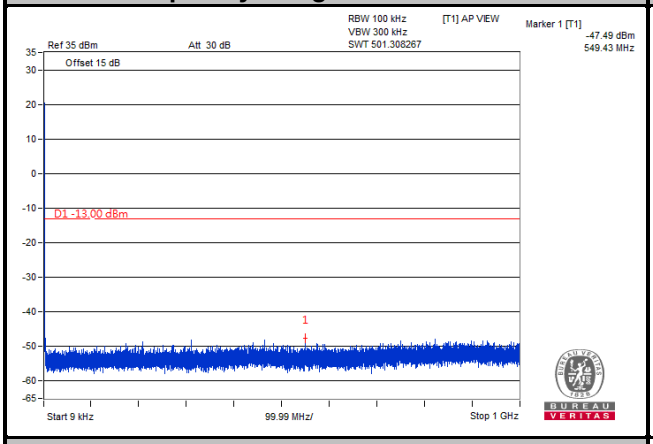
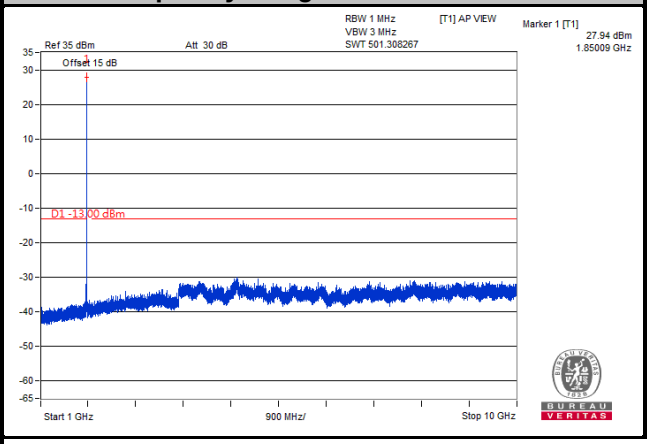
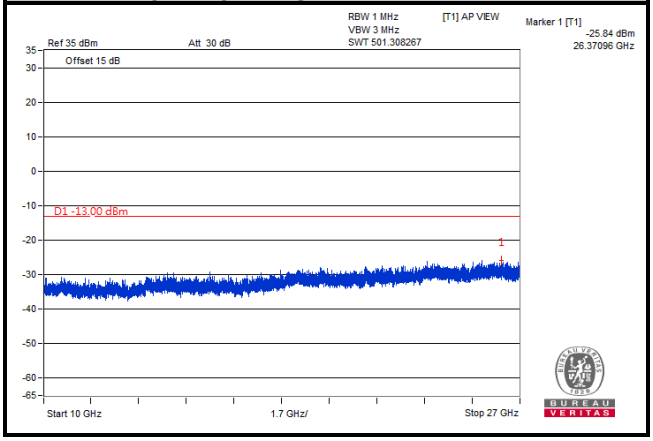
Note: The signal over the limit in 9 kHz is from spectrum analyzer.

LTE Band 25	
Channel Bandwidth: 1.4 MHz	
Channel 26365	
Frequency Range: 9 kHz ~ 1 GHz	Frequency Range: 1 GHz ~ 10 GHz
	
Frequency Range: 10 GHz ~ 27 GHz	
	

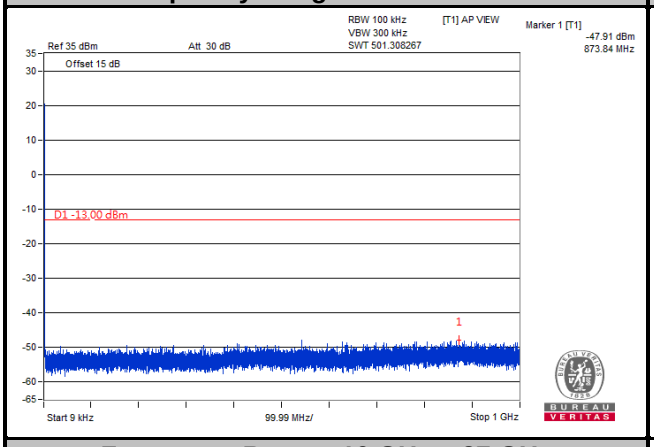
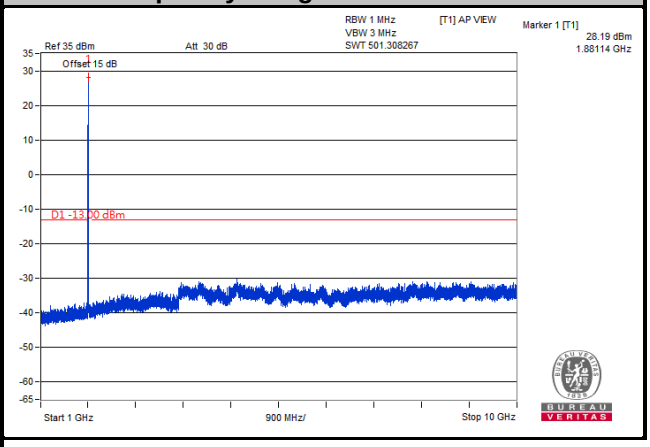
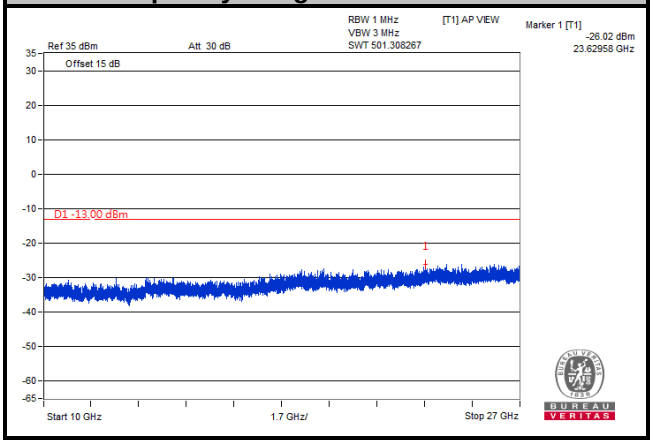
Note: The signal over the limit in 9 kHz is from spectrum analyzer.

LTE Band 25	
Channel Bandwidth: 1.4 MHz	
Channel 26683	
Frequency Range: 9 kHz ~ 1 GHz	Frequency Range: 1 GHz ~ 10 GHz
	
Frequency Range: 10 GHz ~ 27 GHz	
	

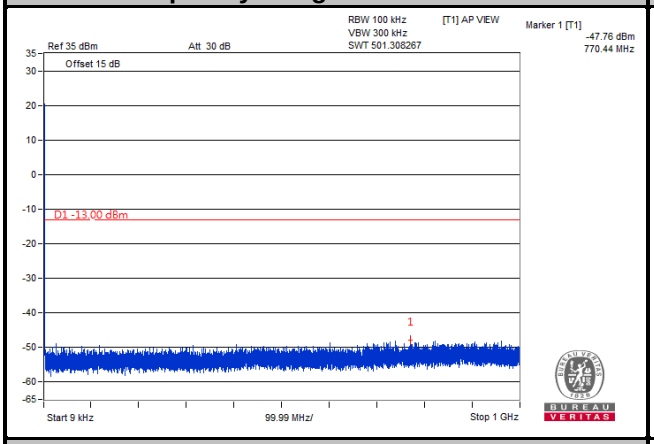
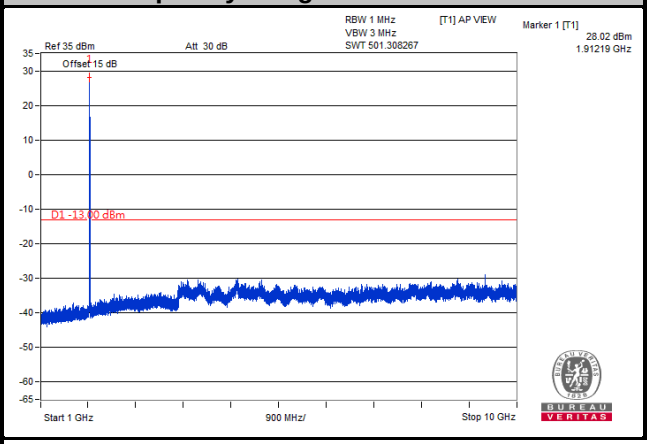
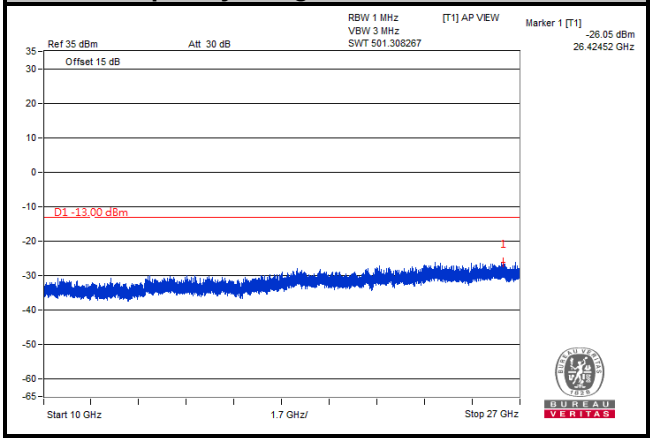
Note: The signal over the limit in 9 kHz is from spectrum analyzer.

LTE Band 25	
Channel Bandwidth: 3 MHz	
Channel 26055	
Frequency Range: 9 kHz ~ 1 GHz	Frequency Range: 1 GHz ~ 10 GHz
	
Frequency Range: 10 GHz ~ 27 GHz	
	

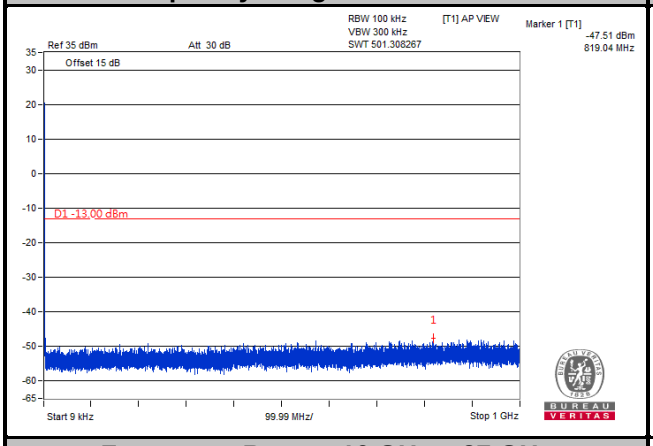
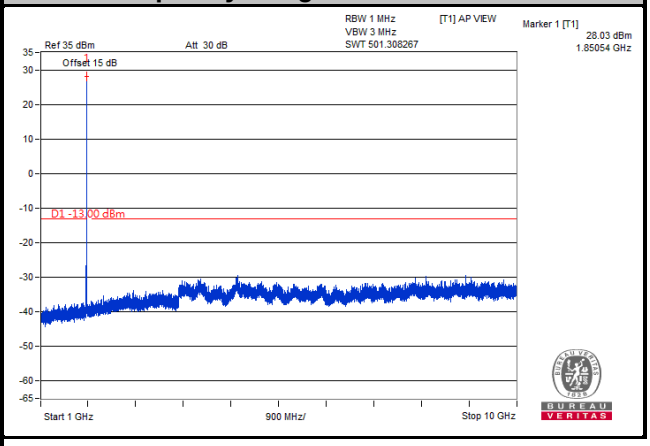
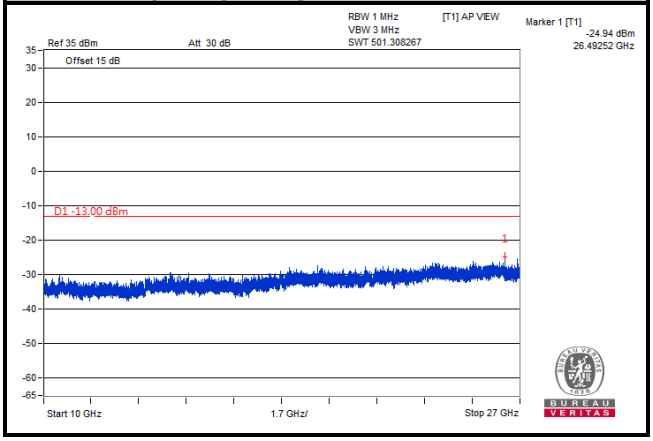
Note: The signal over the limit in 9 kHz is from spectrum analyzer.

LTE Band 25	
Channel Bandwidth: 3 MHz	
Channel 26365	
Frequency Range: 9 kHz ~ 1 GHz	Frequency Range: 1 GHz ~ 10 GHz
	
Frequency Range: 10 GHz ~ 27 GHz	
	

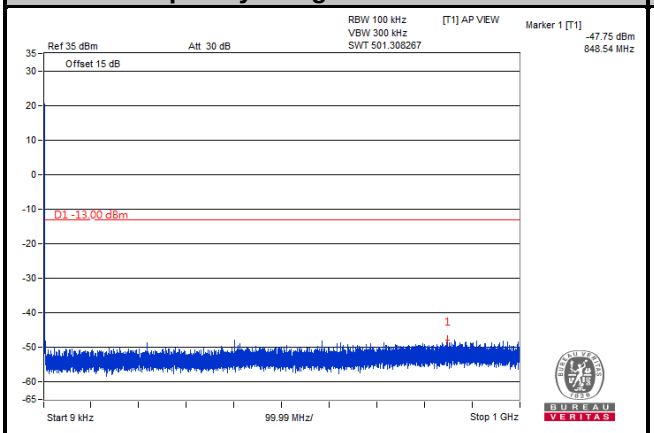
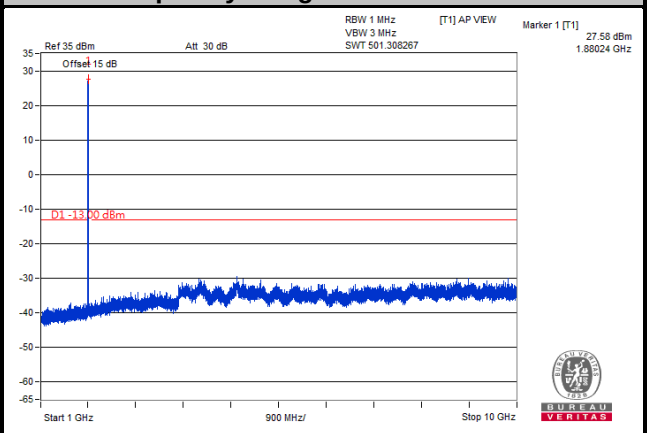
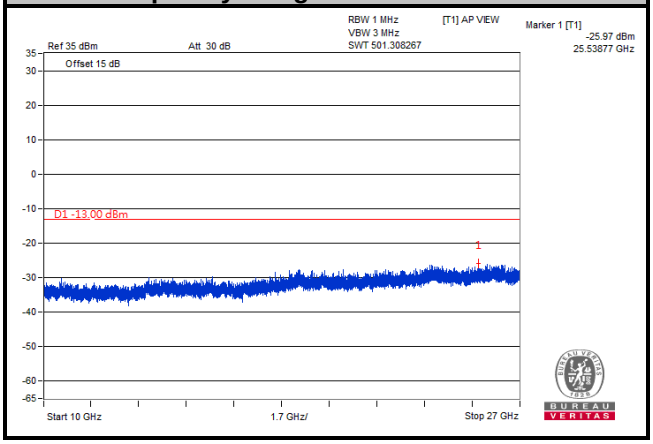
Note: The signal over the limit in 9 kHz is from spectrum analyzer.

LTE Band 25	
Channel Bandwidth: 3 MHz	
Channel 26675	
Frequency Range: 9 kHz ~ 1 GHz	Frequency Range: 1 GHz ~ 10 GHz
	
Frequency Range: 10 GHz ~ 27 GHz	
	

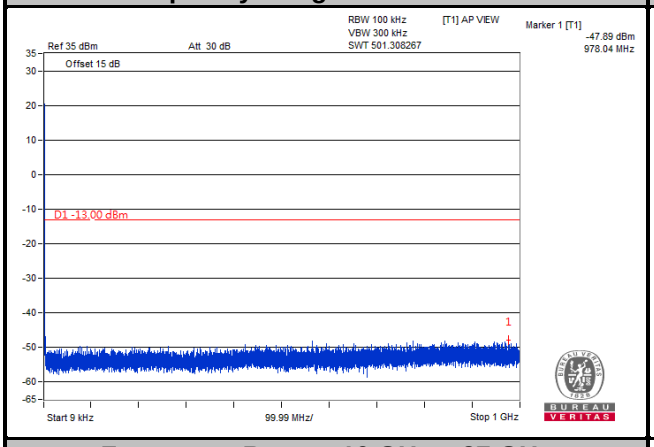
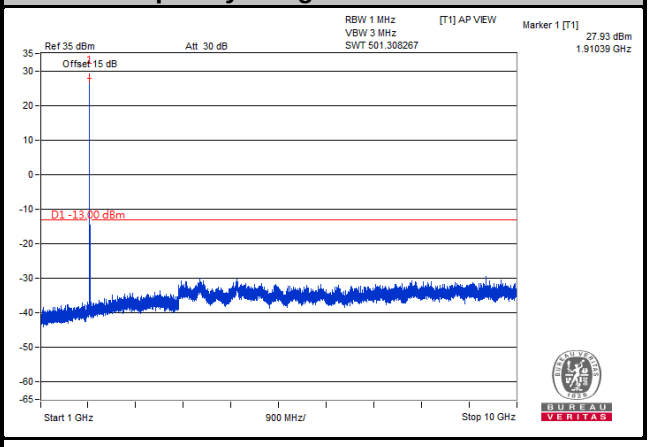
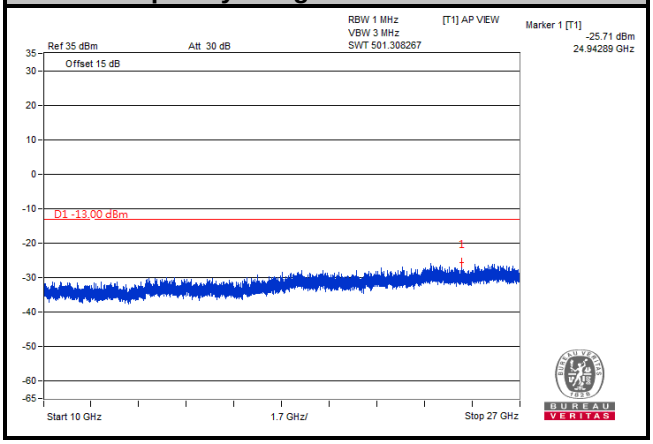
Note: The signal over the limit in 9 kHz is from spectrum analyzer.

LTE Band 25	
Channel Bandwidth: 5 MHz	
Channel 26065	
Frequency Range: 9 kHz ~ 1 GHz	Frequency Range: 1 GHz ~ 10 GHz
	
Frequency Range: 10 GHz ~ 27 GHz	
	

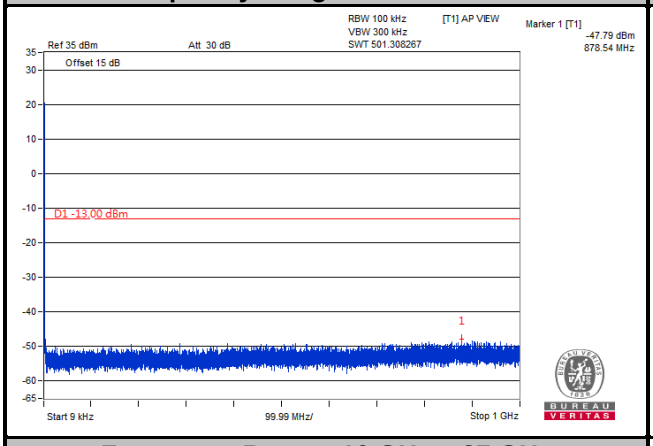
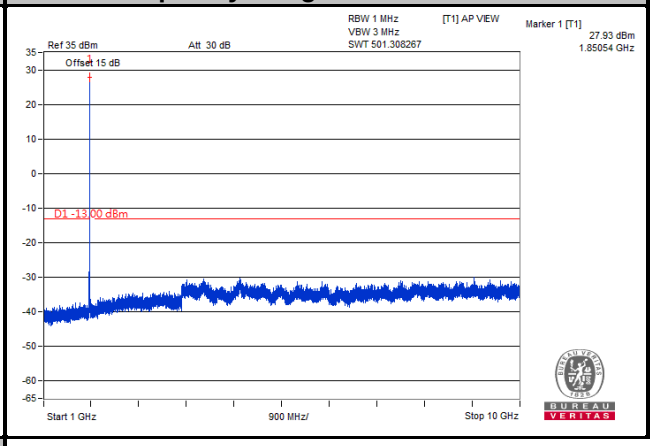
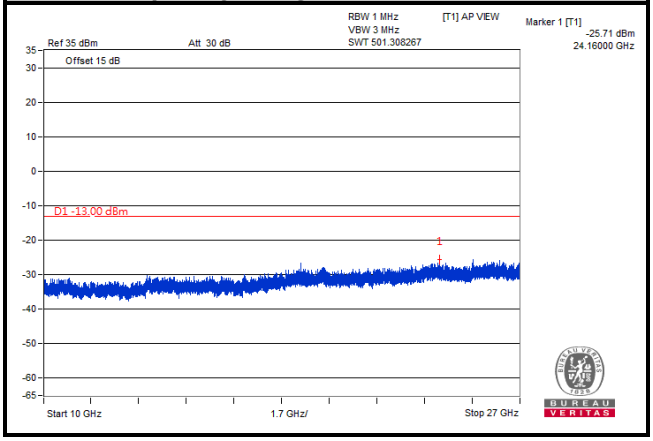
Note: The signal over the limit in 9 kHz is from spectrum analyzer.

LTE Band 25	
Channel Bandwidth: 5 MHz	
Channel 26365	
Frequency Range: 9 kHz ~ 1 GHz	Frequency Range: 1 GHz ~ 10 GHz
	
Frequency Range: 10 GHz ~ 27 GHz	
	

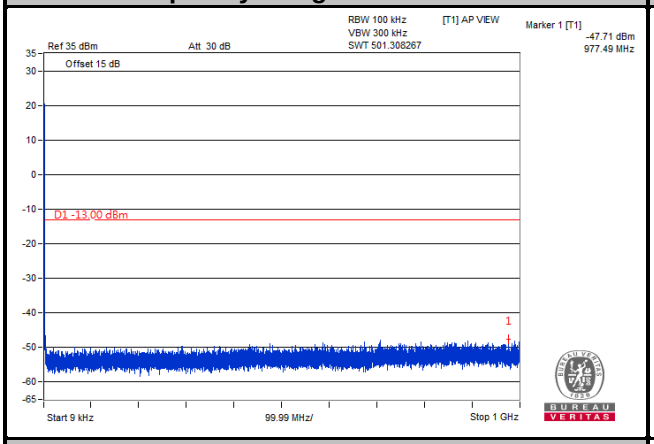
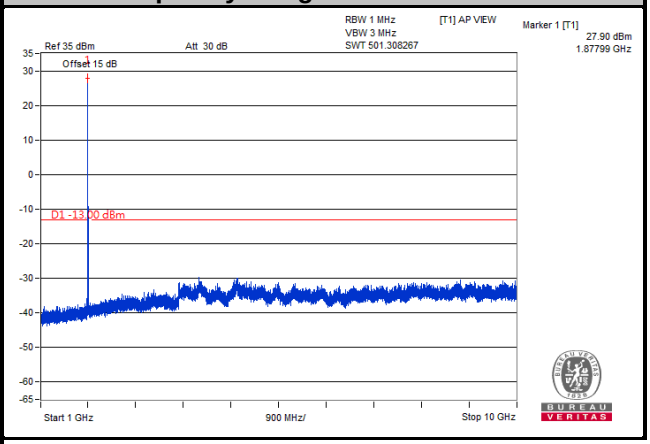
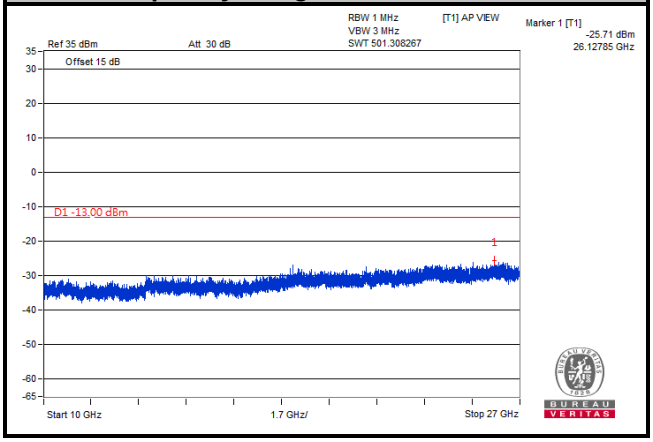
Note: The signal over the limit in 9 kHz is from spectrum analyzer.

LTE Band 25	
Channel Bandwidth: 5 MHz	
Channel 26665	
Frequency Range: 9 kHz ~ 1 GHz	Frequency Range: 1 GHz ~ 10 GHz
	
Frequency Range: 10 GHz ~ 27 GHz	
	

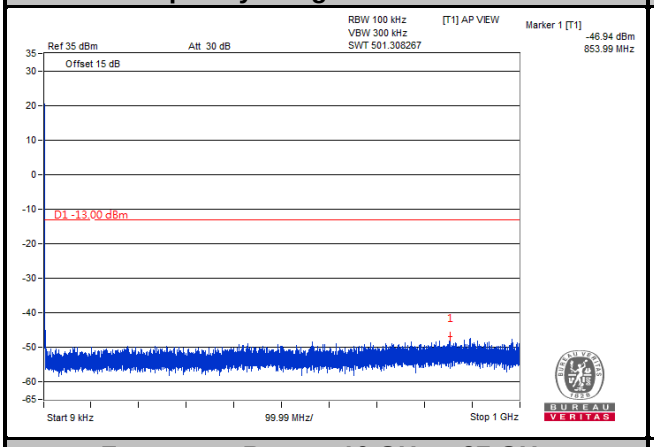
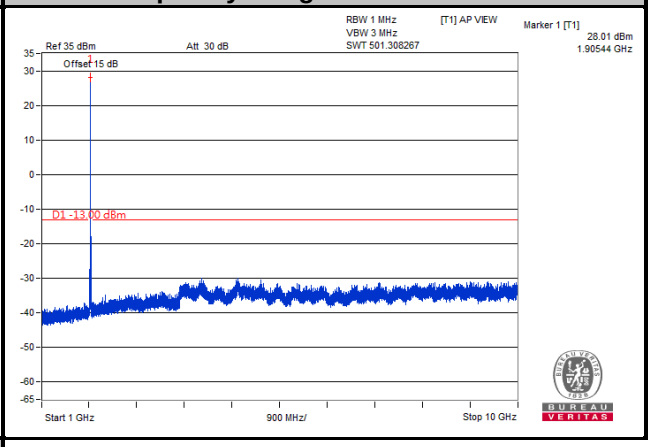
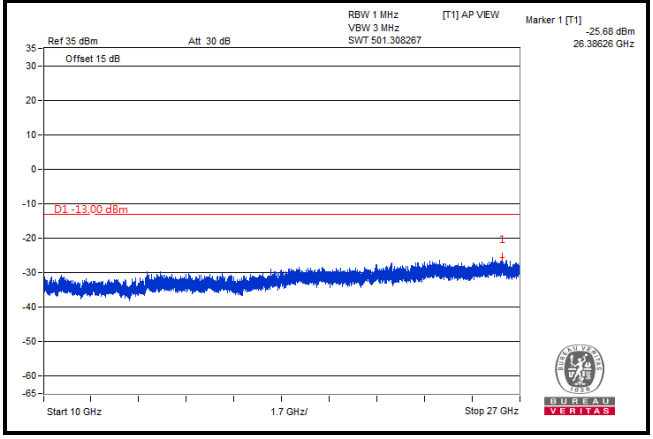
Note: The signal over the limit in 9 kHz is from spectrum analyzer.

LTE Band 25	
Channel Bandwidth: 10 MHz	
Channel 26090	
Frequency Range: 9 kHz ~ 1 GHz	Frequency Range: 1 GHz ~ 10 GHz
	
Frequency Range: 10 GHz ~ 27 GHz	
	

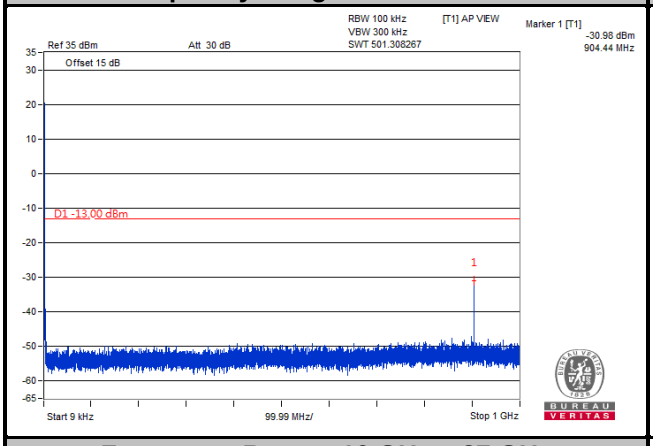
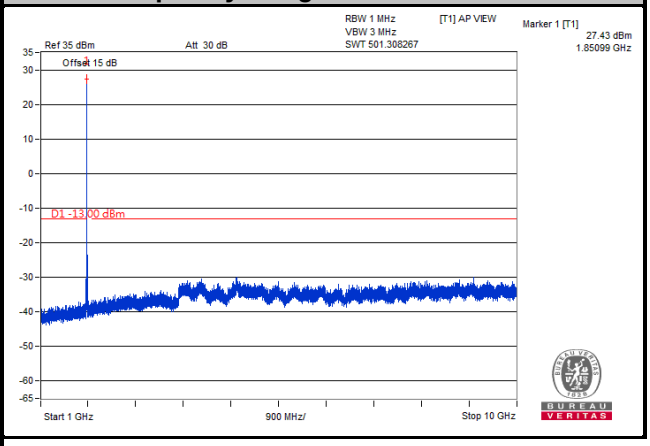
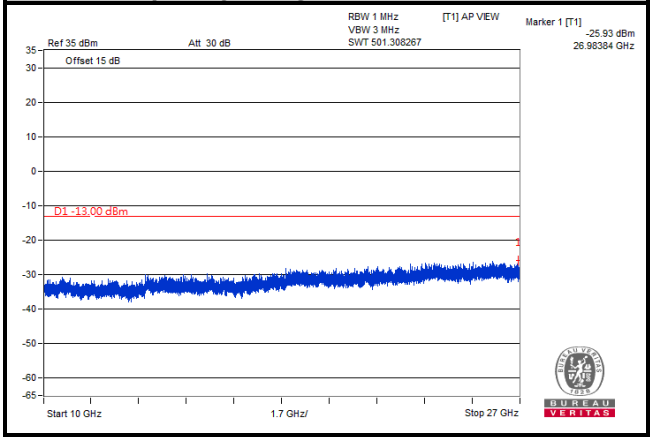
Note: The signal over the limit in 9 kHz is from spectrum analyzer.

LTE Band 25	
Channel Bandwidth: 10 MHz	
Channel 26365	
Frequency Range: 9 kHz ~ 1 GHz	Frequency Range: 1 GHz ~ 10 GHz
	
Frequency Range: 10 GHz ~ 27 GHz	
	

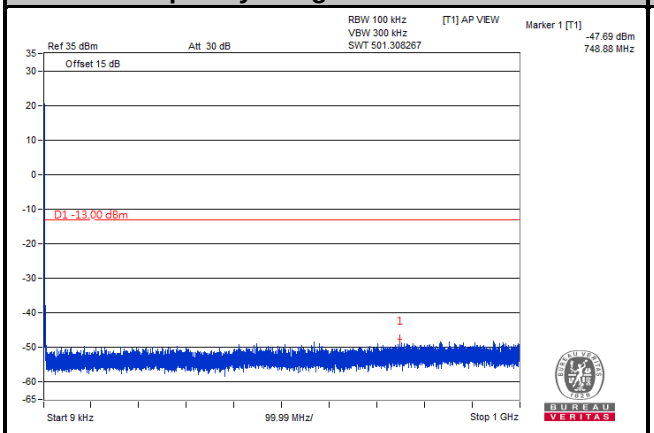
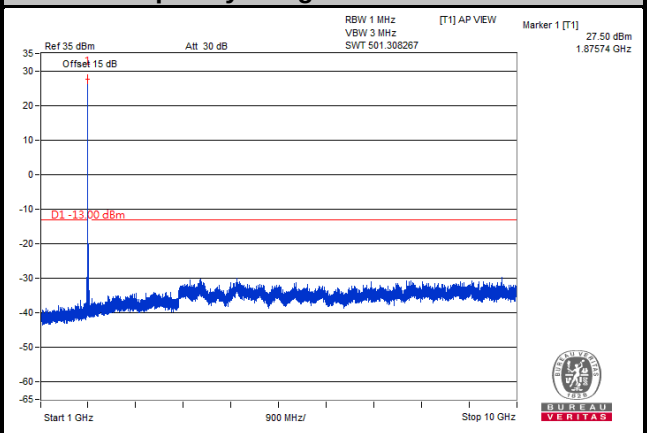
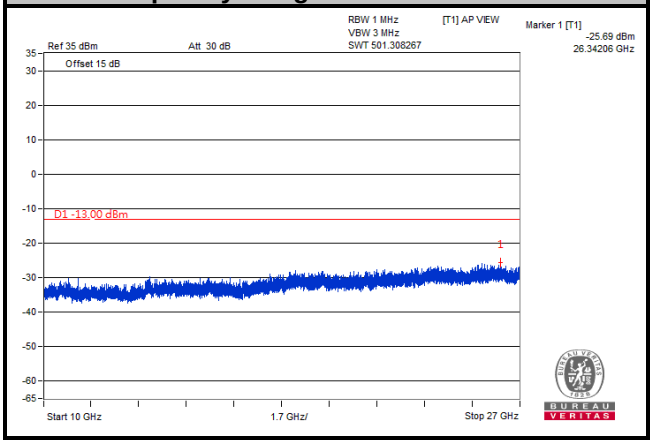
Note: The signal over the limit in 9 kHz is from spectrum analyzer.

LTE Band 25	
Channel Bandwidth: 10 MHz	
Channel 26640	
Frequency Range: 9 kHz ~ 1 GHz	Frequency Range: 1 GHz ~ 10 GHz
	
Frequency Range: 10 GHz ~ 27 GHz	
	

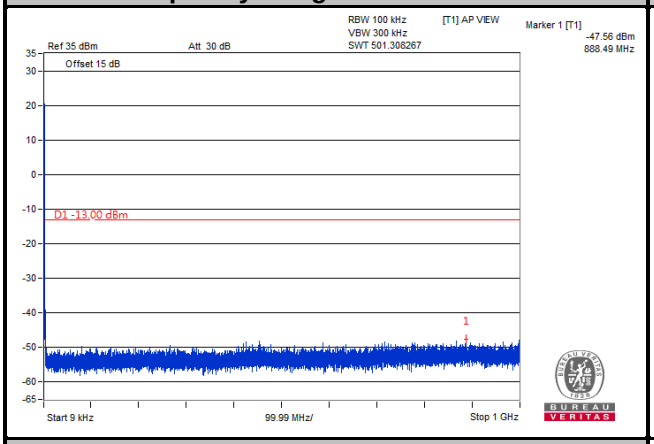
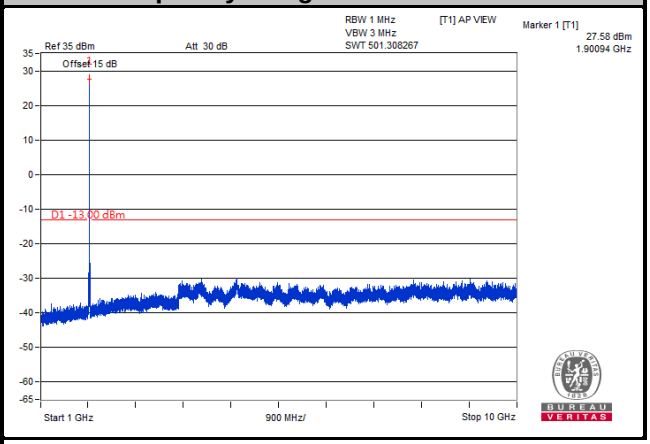
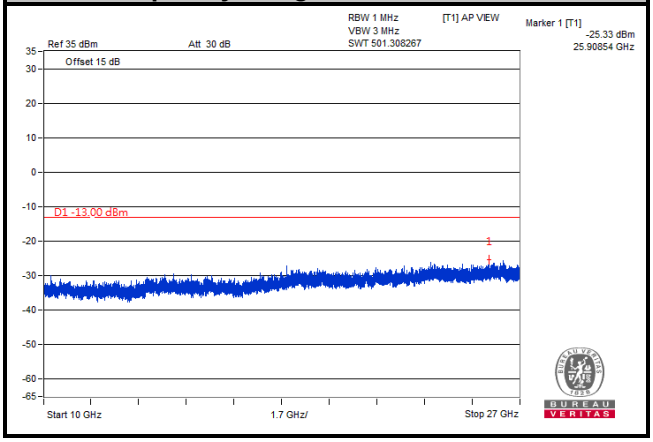
Note: The signal over the limit in 9 kHz is from spectrum analyzer.

LTE Band 25	
Channel Bandwidth: 15 MHz	
Channel 26115	
Frequency Range: 9 kHz ~ 1 GHz	Frequency Range: 1 GHz ~ 10 GHz
	
Frequency Range: 10 GHz ~ 27 GHz	
	

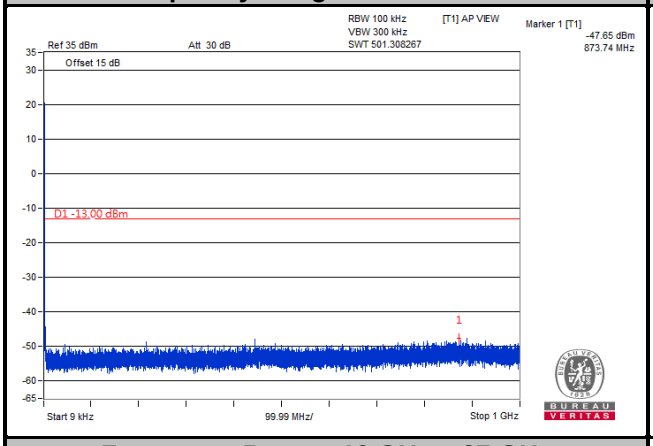
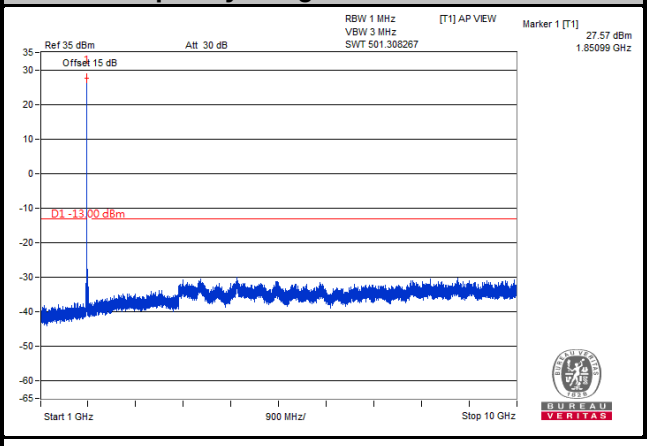
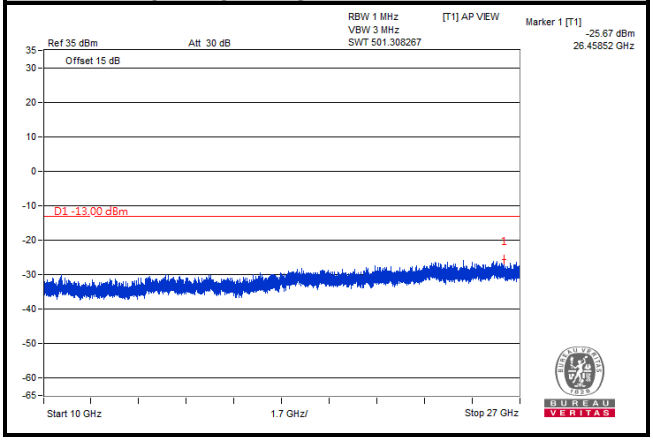
Note: The signal over the limit in 9 kHz is from spectrum analyzer.

LTE Band 25	
Channel Bandwidth: 15 MHz	
Channel 26365	
Frequency Range: 9 kHz ~ 1 GHz	Frequency Range: 1 GHz ~ 10 GHz
	
Frequency Range: 10 GHz ~ 27 GHz	
	

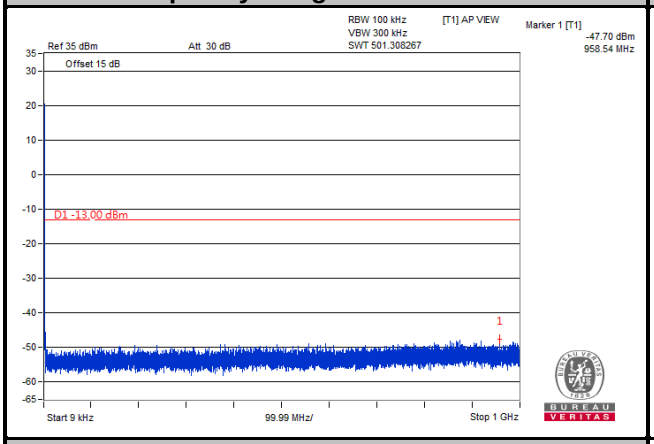
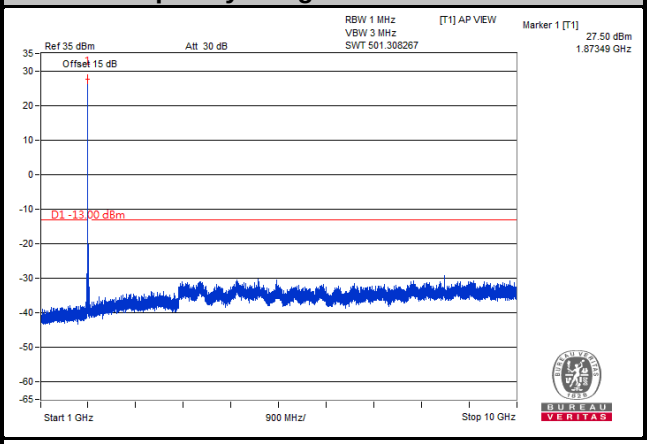
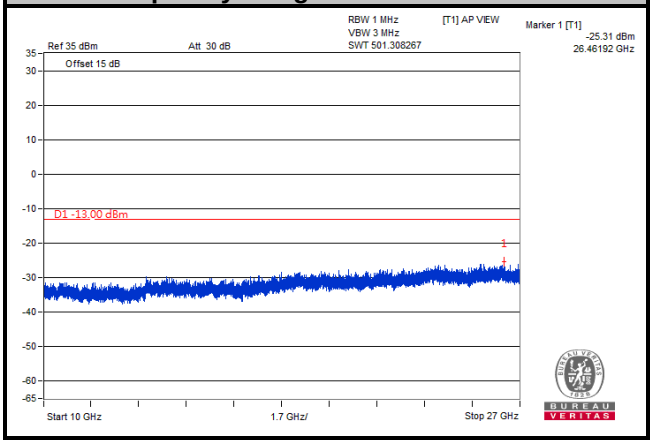
Note: The signal over the limit in 9 kHz is from spectrum analyzer.

LTE Band 25	
Channel Bandwidth: 15 MHz	
Channel 26615	
Frequency Range: 9 kHz ~ 1 GHz	Frequency Range: 1 GHz ~ 10 GHz
	
Frequency Range: 10 GHz ~ 27 GHz	
	

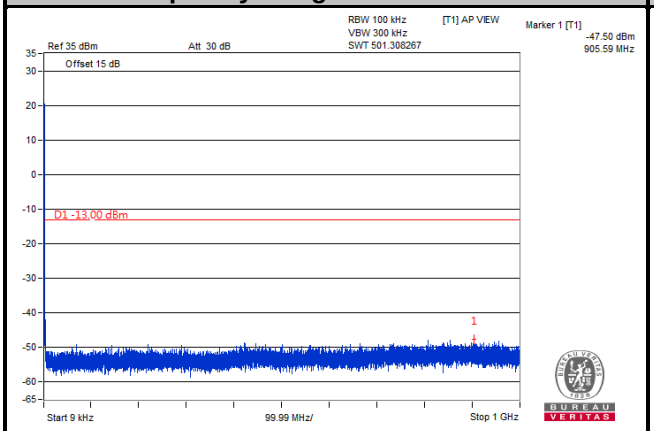
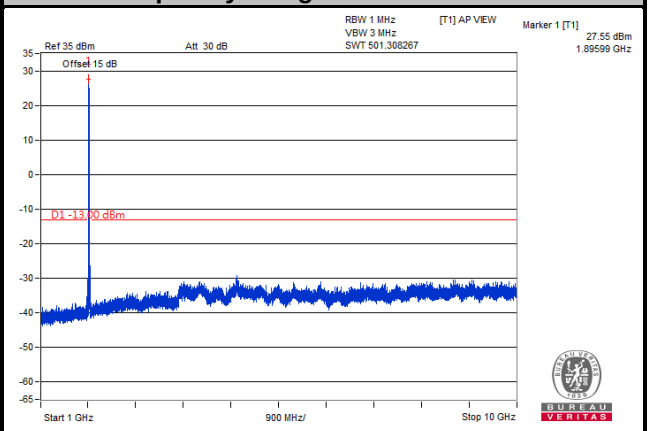
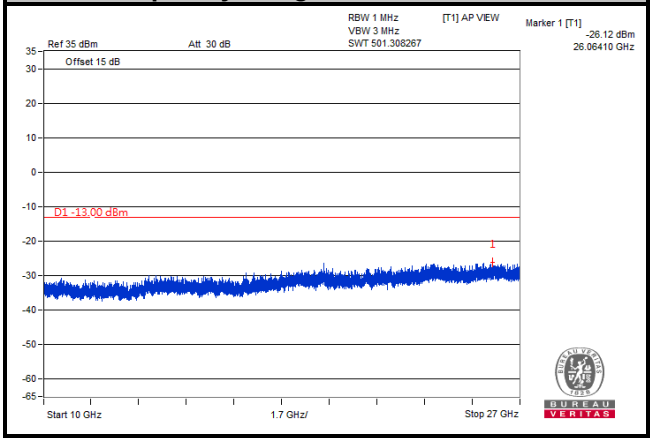
Note: The signal over the limit in 9 kHz is from spectrum analyzer.

LTE Band 25	
Channel Bandwidth: 20 MHz	
Channel 26140	
Frequency Range: 9 kHz ~ 1 GHz	Frequency Range: 1 GHz ~ 10 GHz
	
Frequency Range: 10 GHz ~ 27 GHz	
	

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

LTE Band 25	
Channel Bandwidth: 20 MHz	
Channel 26365	
Frequency Range: 9 kHz ~ 1 GHz	Frequency Range: 1 GHz ~ 10 GHz
	
Frequency Range: 10 GHz ~ 27 GHz	
	

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

LTE Band 25	
Channel Bandwidth: 20 MHz	
Channel 26590	
Frequency Range: 9 kHz ~ 1 GHz	Frequency Range: 1 GHz ~ 10 GHz
	
Frequency Range: 10 GHz ~ 27 GHz	
	

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