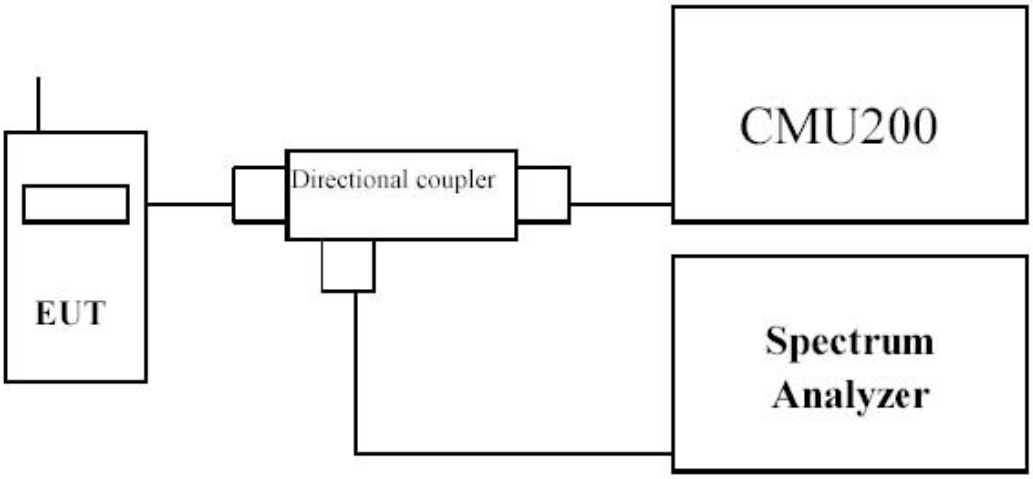
3.4 Spurious Emission

LIMIT

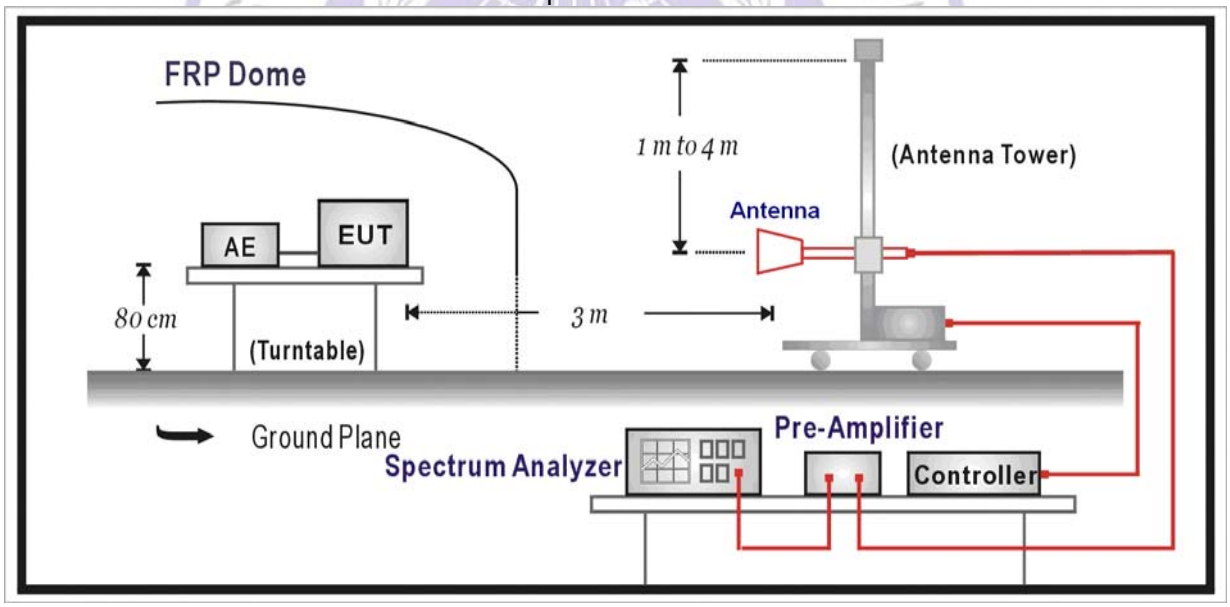
The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10log (P) dB.

TEST CONFIGURATION

Conducted Spurious Measurement:



Radiated Spurious Measurement:



TEST PROCEDURE

The EUT was setup according to EIA/TIA 603C

Conducted Spurious Measurement:

a) Place the EUT on a bench and set it in transmitting mode.

b) Connect a low loss RF cable from the antenna port to a spectrum analyzer and CMU200 by a Directional Couple.

c) EUT Communicate with CMU200 then selects a channel for testing.

d) Add a correction factor to the display of spectrum, and then test.

e) The resolution bandwidth of the spectrum analyzer was set at 1MHz for Part 22 and 1MHz for Part 24, sufficient scans were taken to show the out of band Emission if any up to10th harmonic.

Radiated Spurious Measurement:

a) The EUT shall be placed at the specified height on a support, and in the position closest to normal use as declared by provider.

b) The test antenna shall be oriented initially for vertical polarization and shall be chosen to correspond to the frequency of the transmitter

c) The output of the test antenna shall be connected to the measuring receiver.

d) The transmitter shall be switched on and the measuring receiver shall be tuned to the frequency of the transmitter under test.

e) The test antenna shall be raised and lowered through the specified range of height until a maximum signal level is detected by the measuring receiver.

f) The transmitter shall then be rotated through 360°in the horizontal plane, until the maximum signal level is detected by the measuring receiver.

g) The test antenna shall be raised and lowered again through the specified range of height until a maximum signal level is detected by the measuring receiver.

h) The maximum signal level detected by the measuring receiver shall be noted.

i) The transmitter shall be replaced by a substitution antenna.

j) The substitution antenna shall be orientated for vertical polarization and the length of the substitution antenna shall be adjusted to correspond to the frequency of the transmitter.

k) The substitution antenna shall be connected to a calibrated signal generator.

l) If necessary, the input attenuator setting of the measuring receiver shall be adjusted in order to increase the sensitivity of the measuring receiver.

m) The test antenna shall be raised and lowered through the specified range of height to ensure that the maximum signal is received.

n) The input signal to the substitution antenna shall be adjusted to the level that produces a level detected by the measuring receiver, that is equal to the level noted while the transmitter radiated power was measured, corrected for the change of input attenuator setting of the measuring receiver.

o) The measurement shall be repeated with the test antenna and the substitution antenna orientated for horizontal polarization.

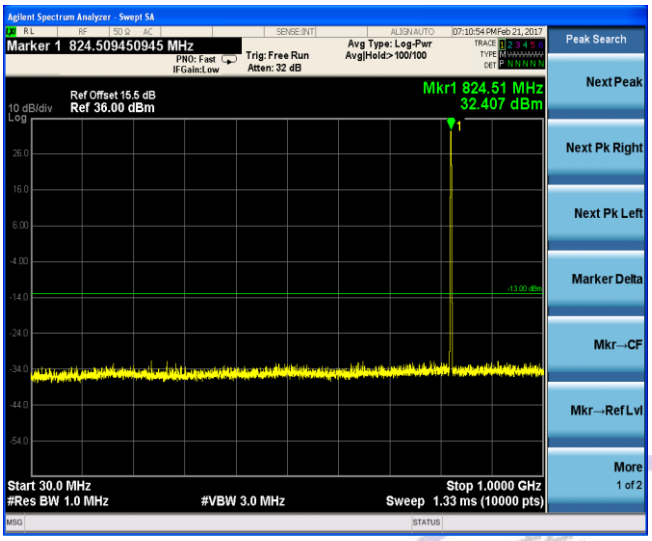
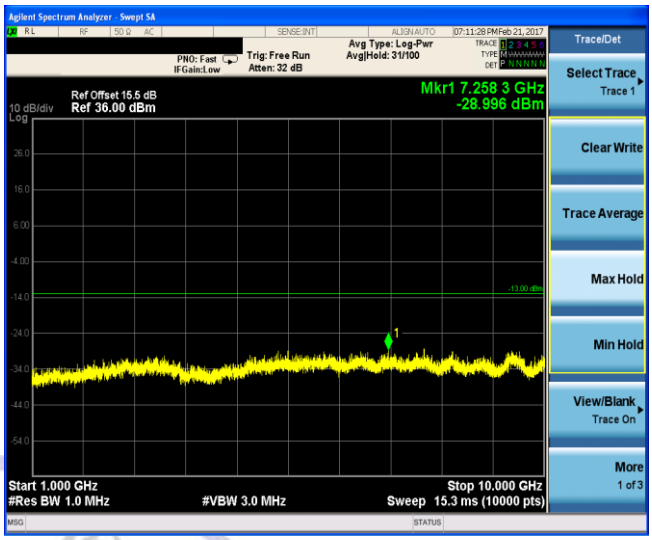
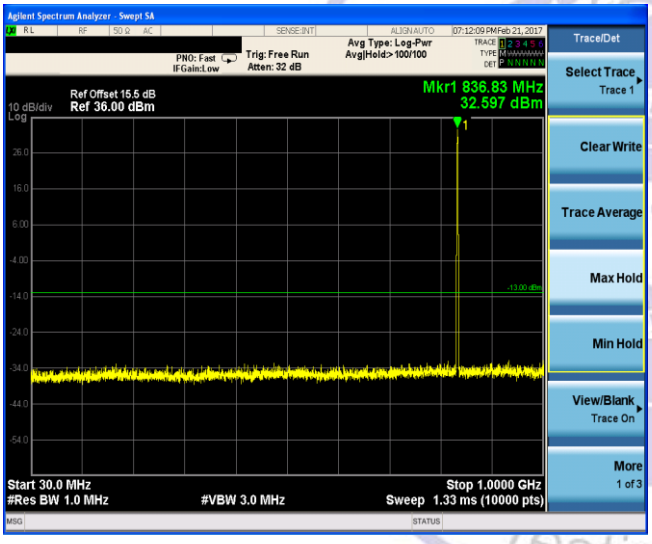
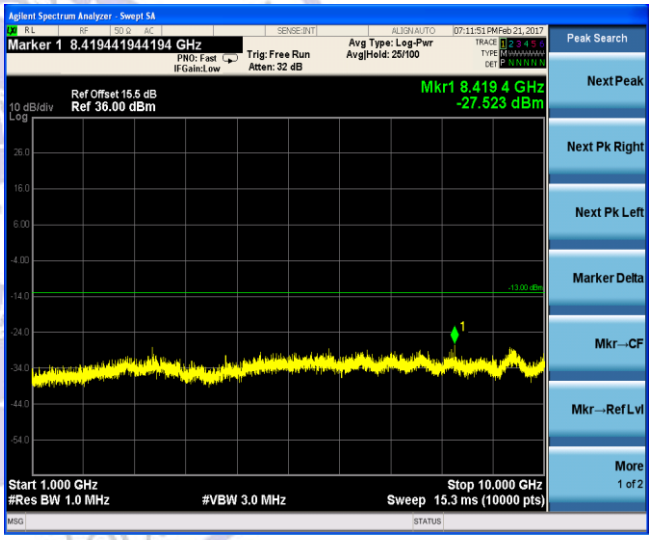
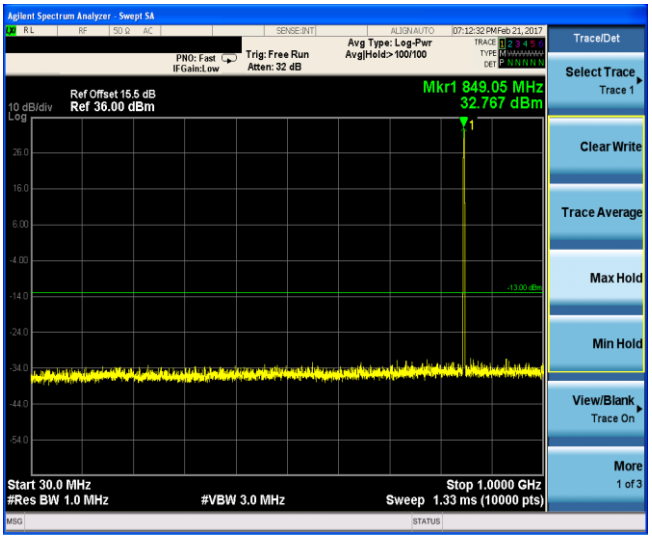
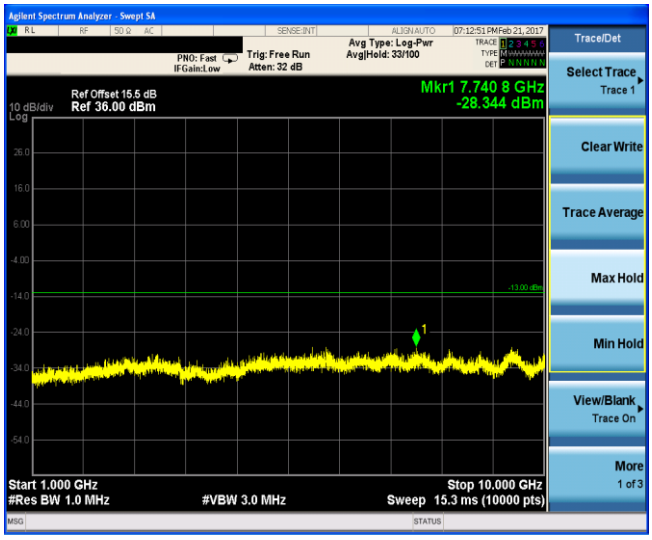
p) The measure of the effective radiated power is the larger of the two levels recorded at the input to the substitution antenna, corrected for gain of the substitution antenna if necessary.

q) The resolution bandwidth of the spectrum analyzer was set at 100 kHz for Part 22 and 1MHz for Part 24. The frequency range was checked up to 10th harmonic.

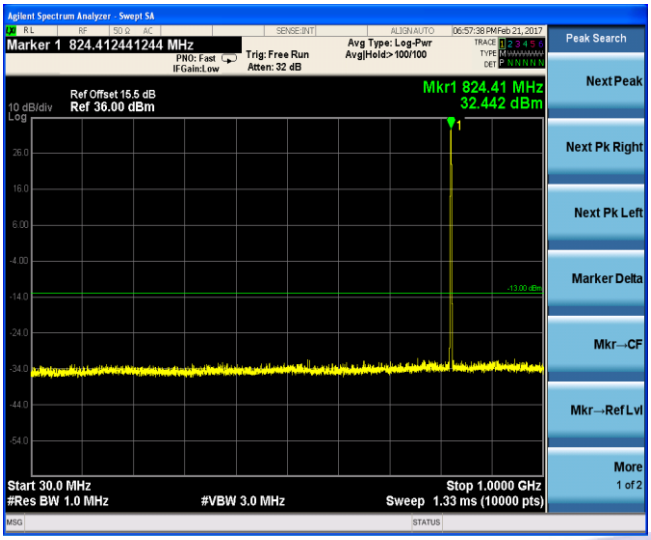
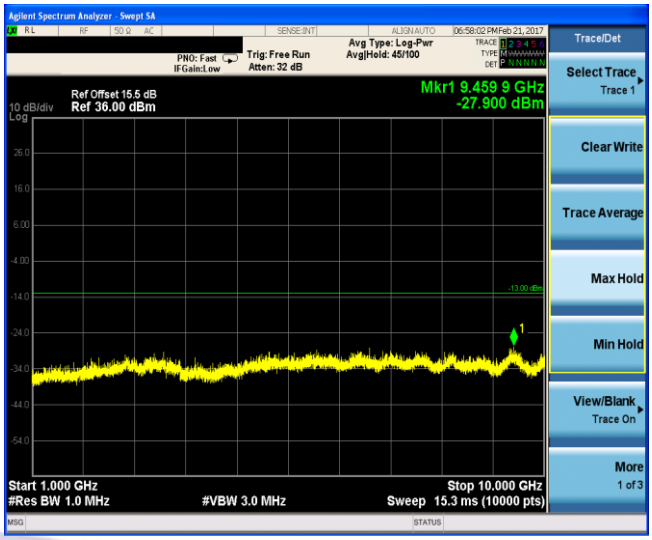
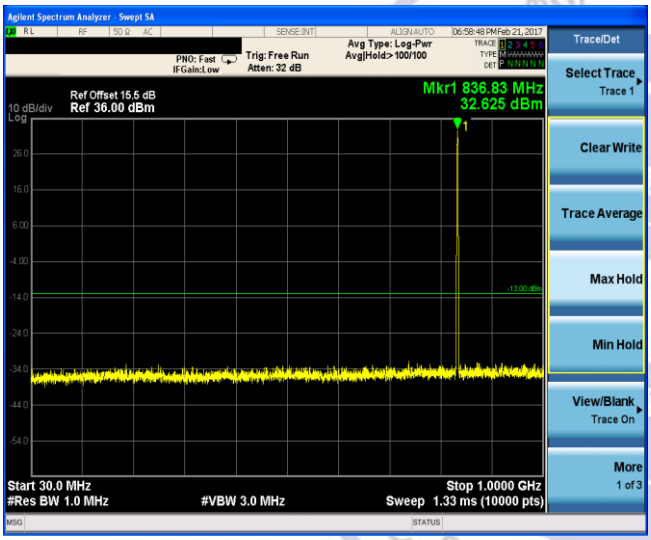
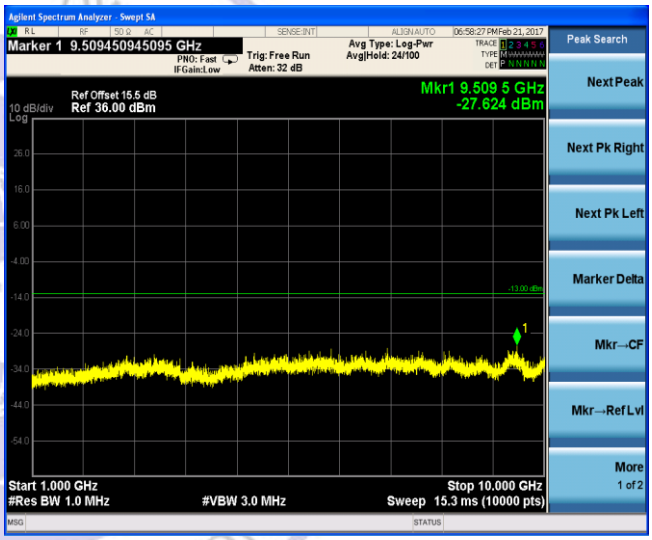
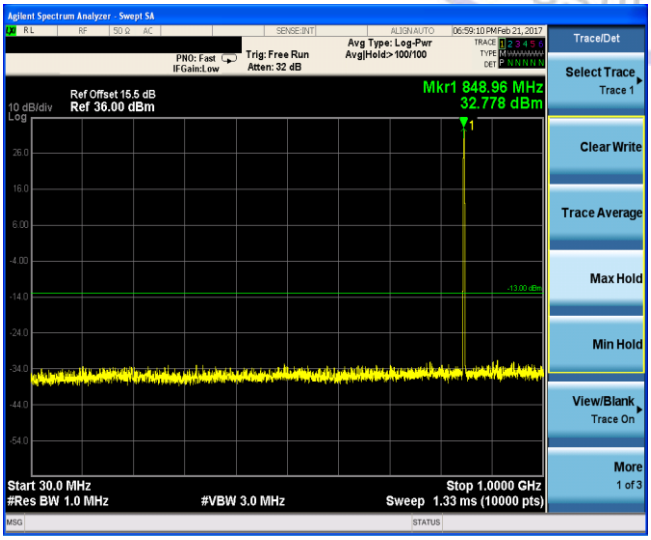
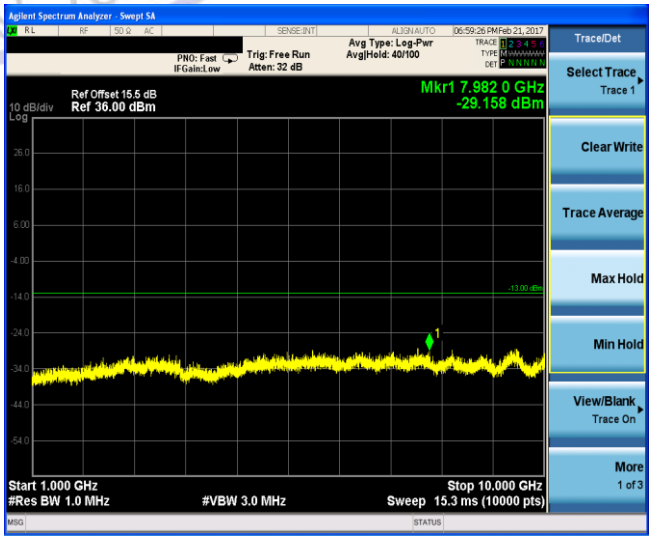
TEST RESULTS

Conducted Measurement:

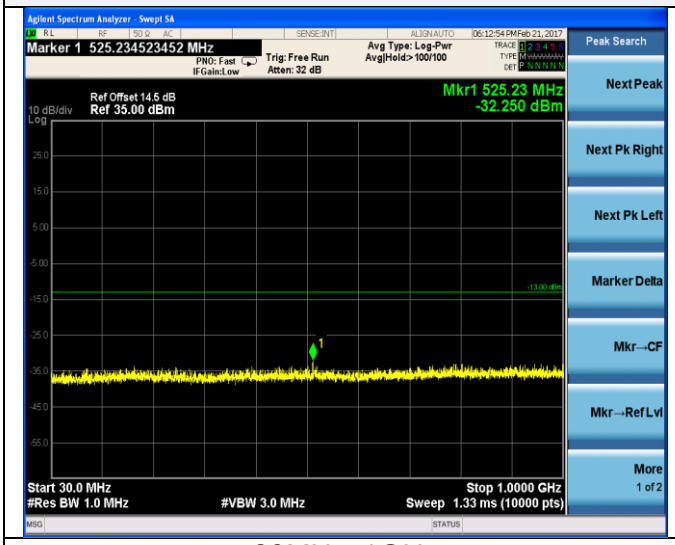
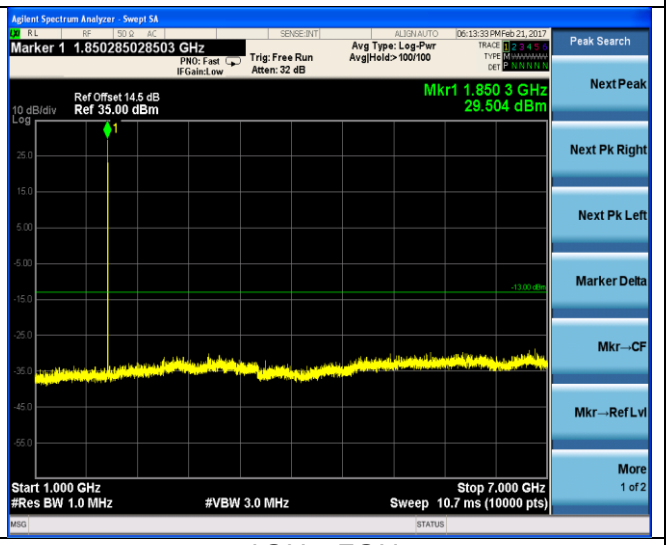
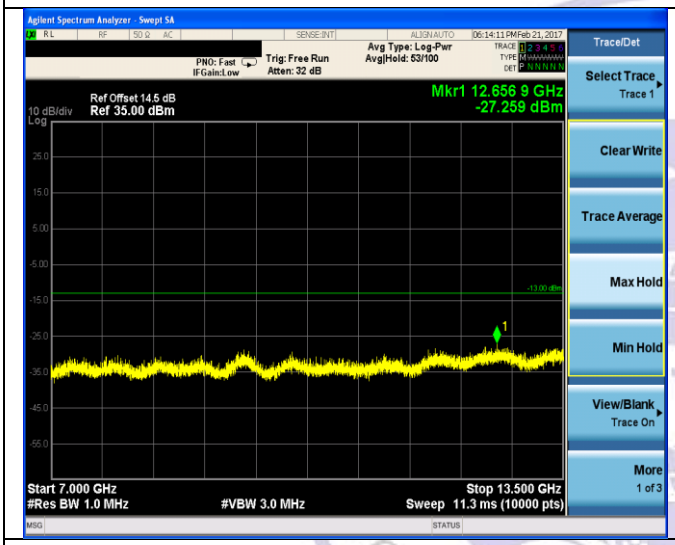
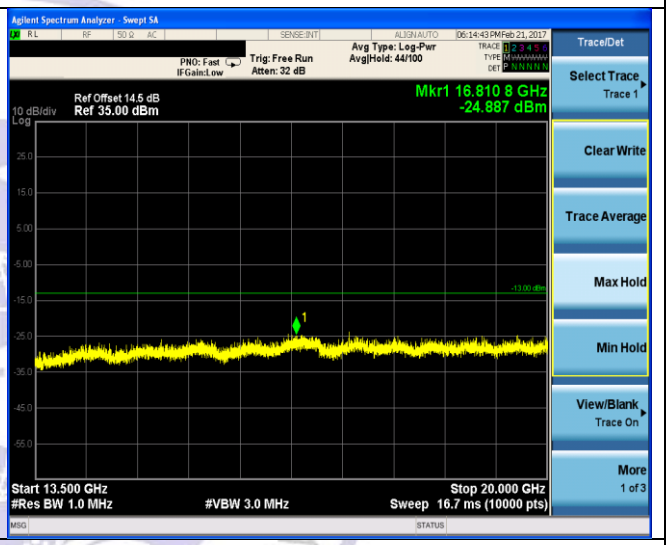
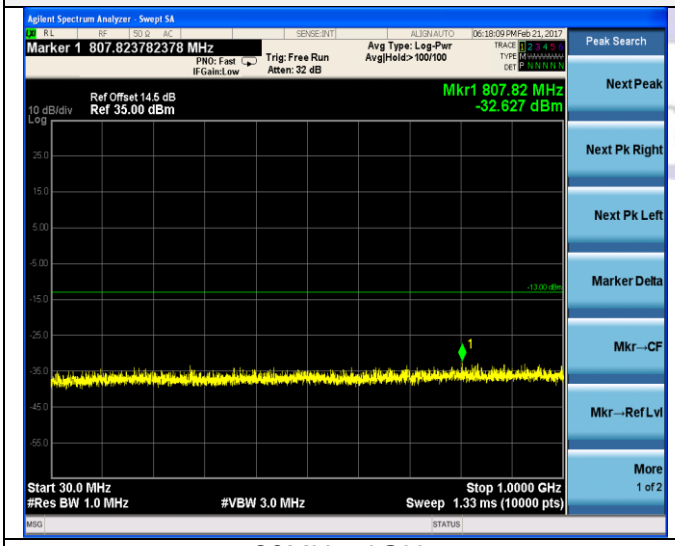
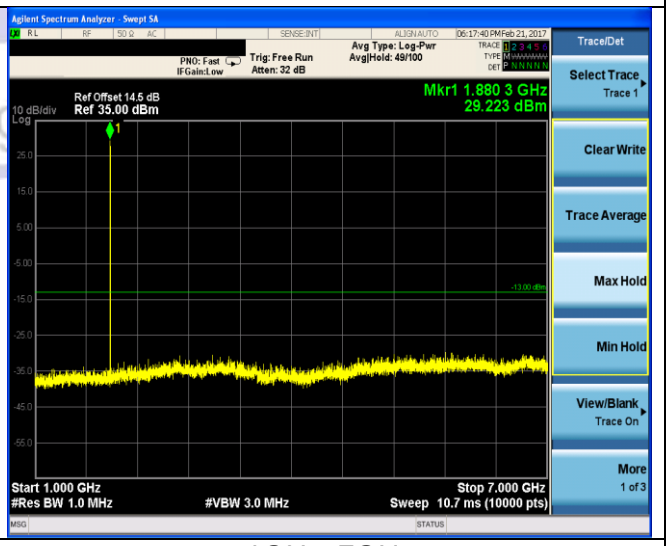
GSM850

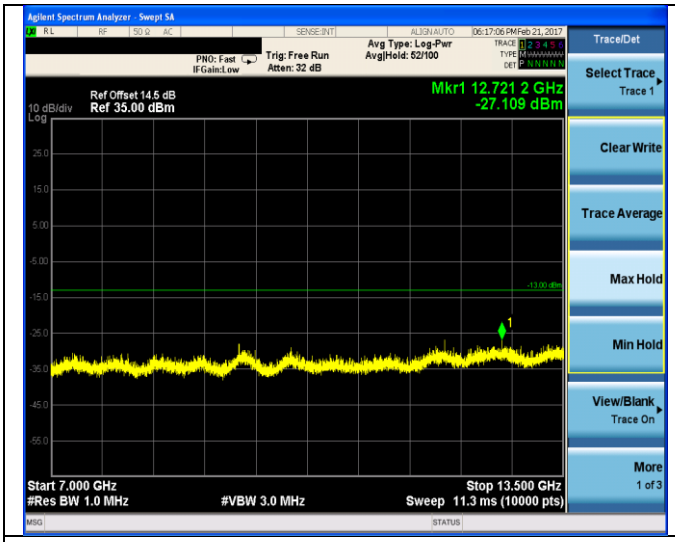
Channel:	*128*
	
30MHz~1GHz	*1GHz~10GHz*
Channel:	*190*
	
30MHz~1GHz	*1GHz~10GHz*
Channel:	*251*
	
30MHz~1GHz	*1GHz~10GHz*

GPRS850

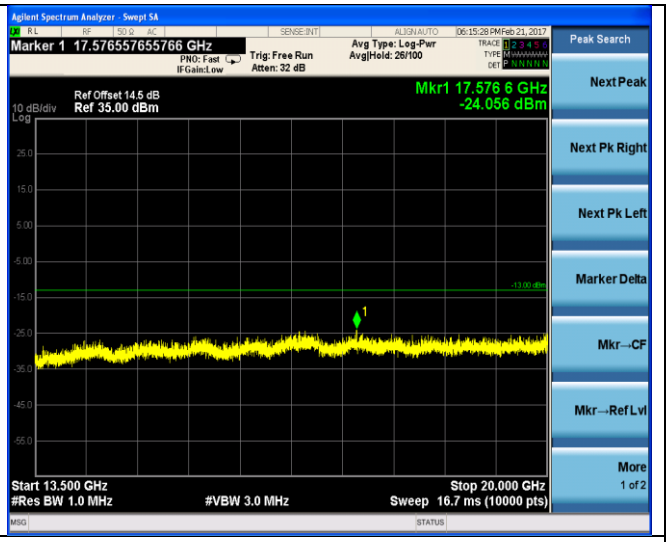
Channel:	128
	
30MHz~1GHz	*1GHz~10GHz*
Channel:	*190*
	
30MHz~1GHz	*1GHz~10GHz*
Channel:	*251*
	
30MHz~1GHz	*1GHz~10GHz*

GSM1900

Channel:	512
	
30MHz~1GHz	*1GHz~7GHz*
	
7GHz~13.5GHz	*13.5GHz~20GHz*
Channel:	*661*
	
30MHz~1GHz	*1GHz~7GHz*

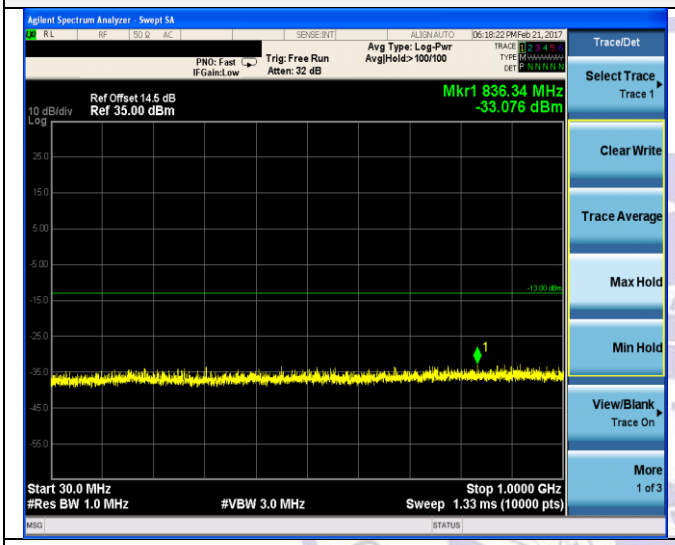


7GHz~13.5GHz

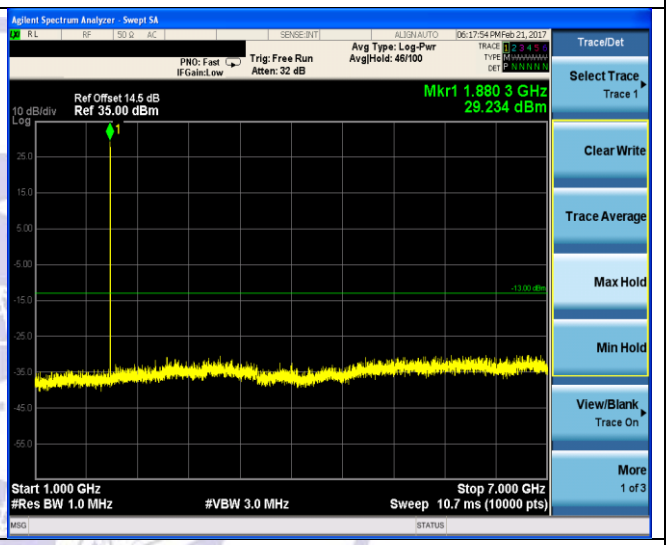


13.5GHz~20GHz

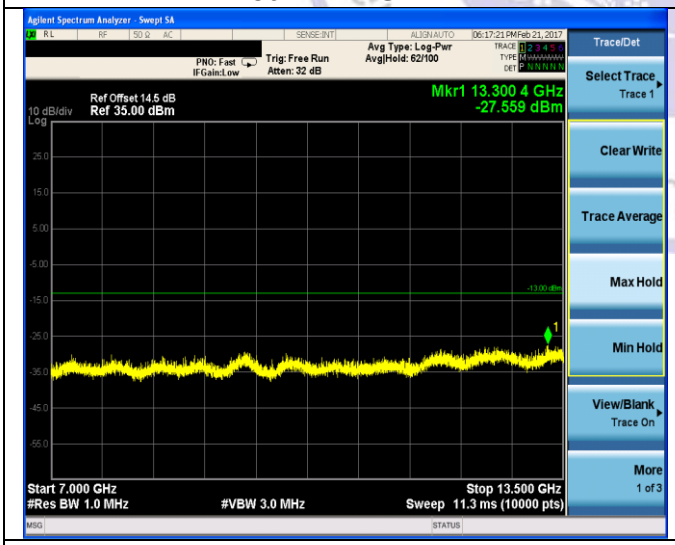
Channel: 810



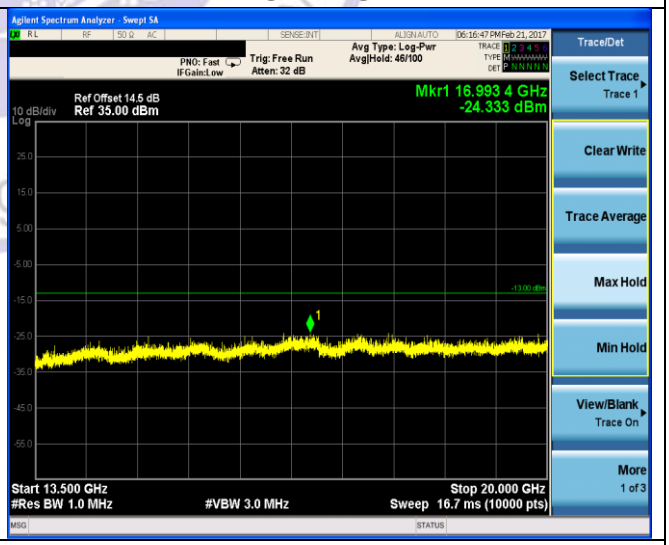
30MHz~1GHz



1GHz~7GHz

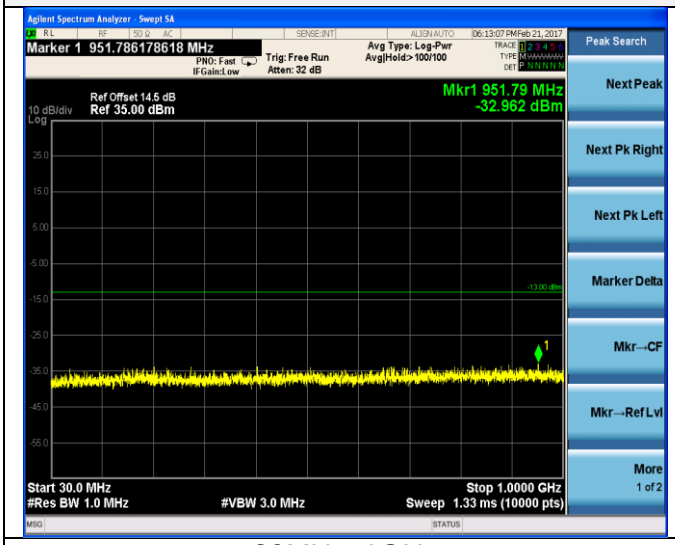
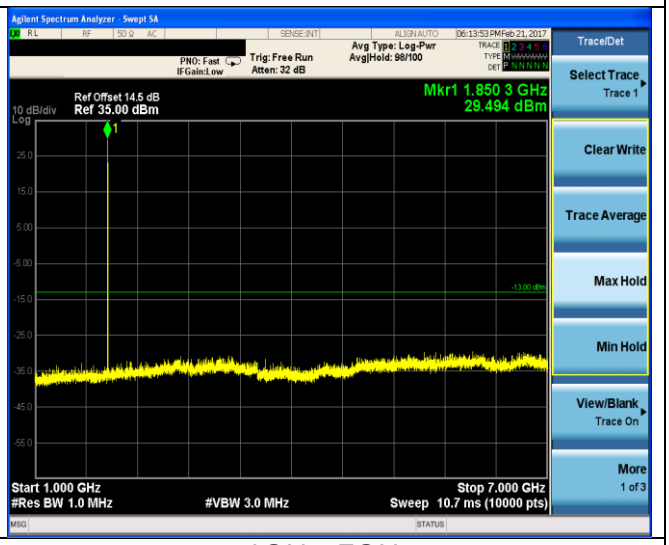
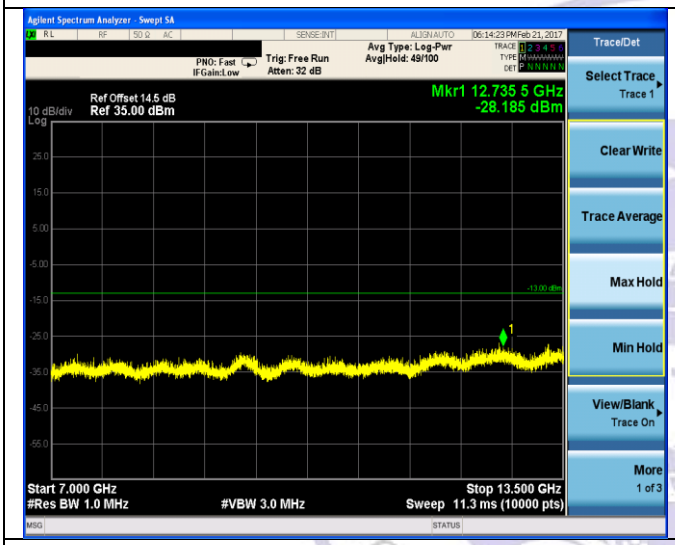
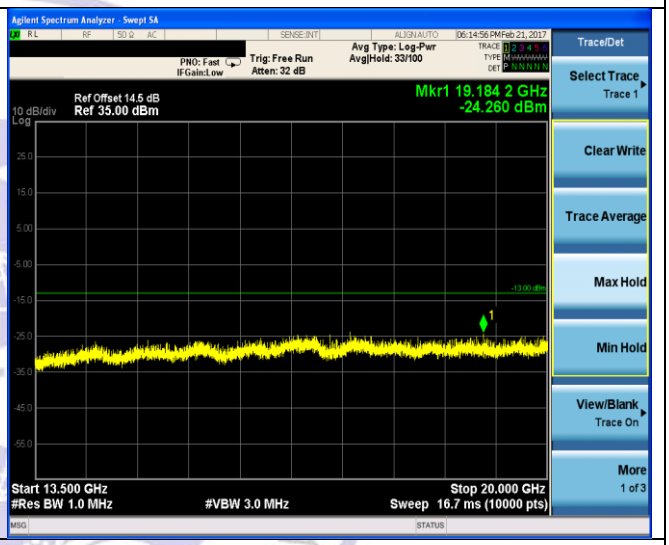
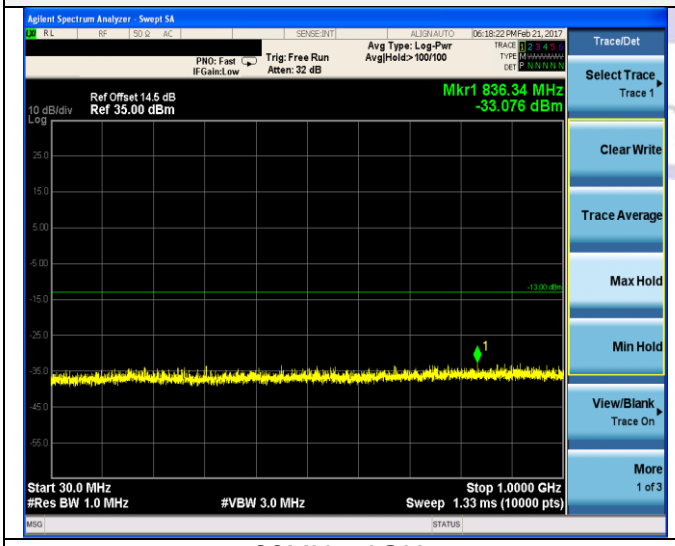
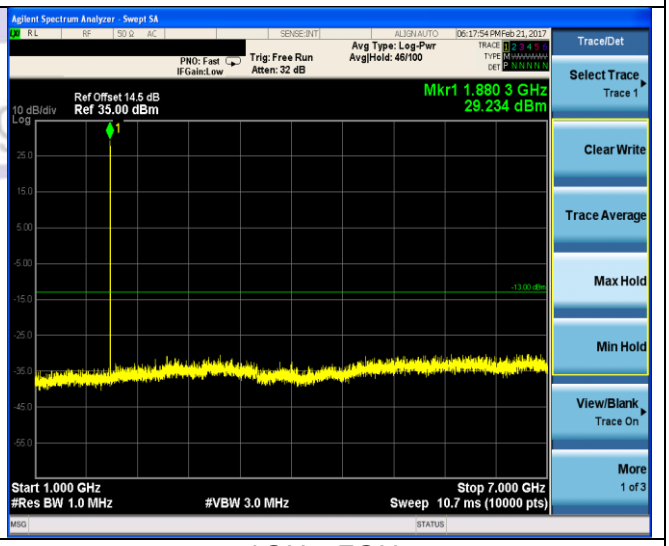


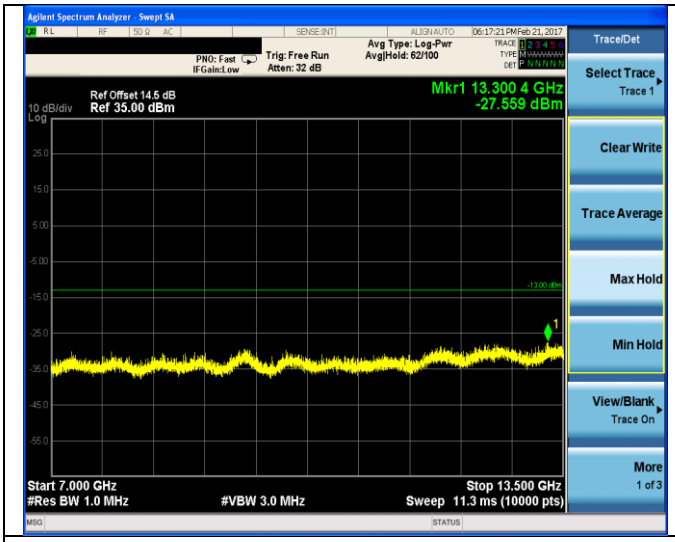
7GHz~13.5GHz



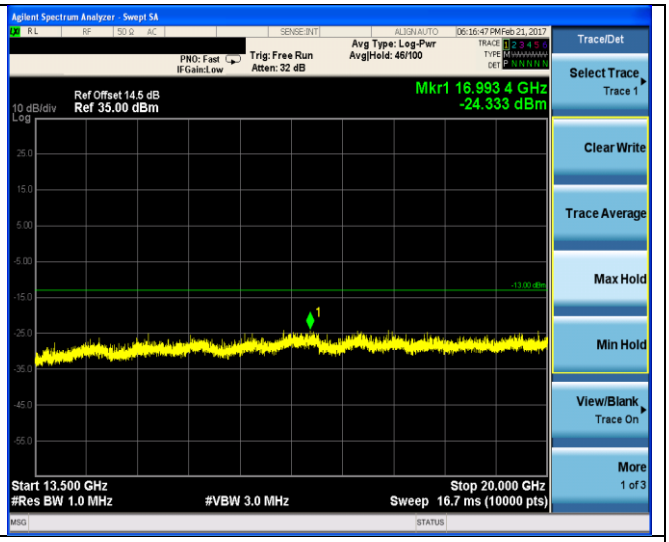
13.5GHz~20GHz

GPRS1900

Channel:	512
	
30MHz~1GHz	*1GHz~7GHz*
	
7GHz~13.5GHz	*13.5GHz~20GHz*
Channel:	*661*
	
30MHz~1GHz	*1GHz~7GHz*

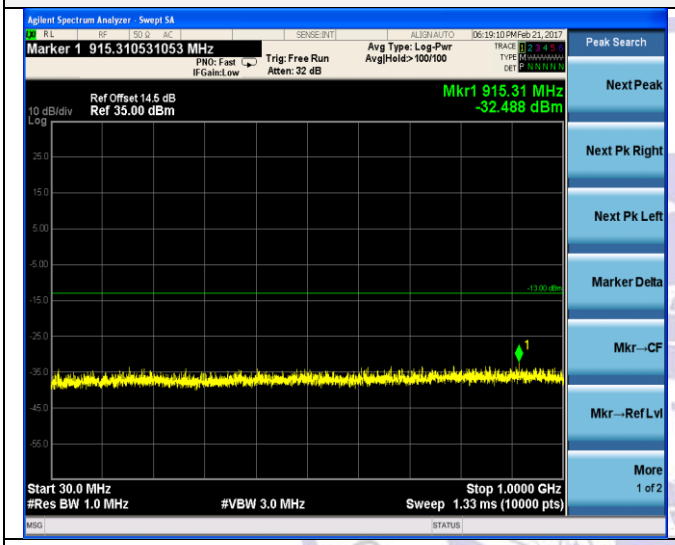


7GHz~13.5GHz

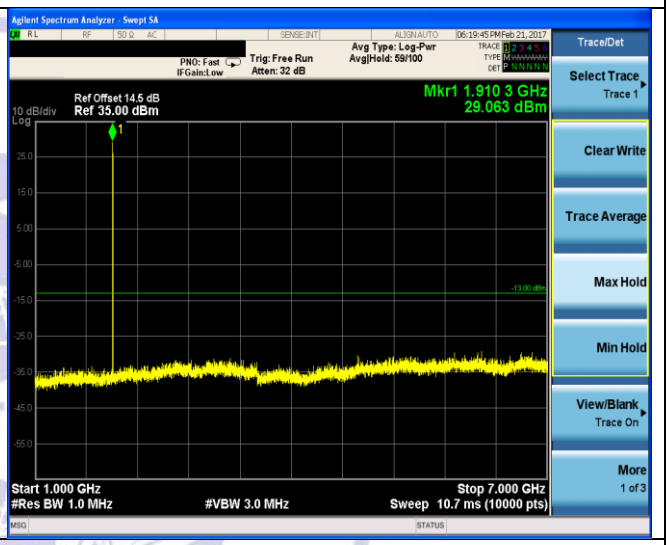


13.5GHz~20GHz

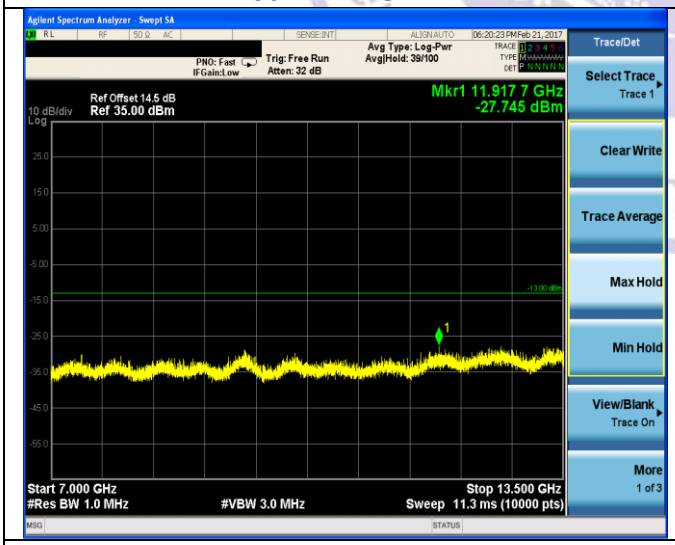
Channel: 810



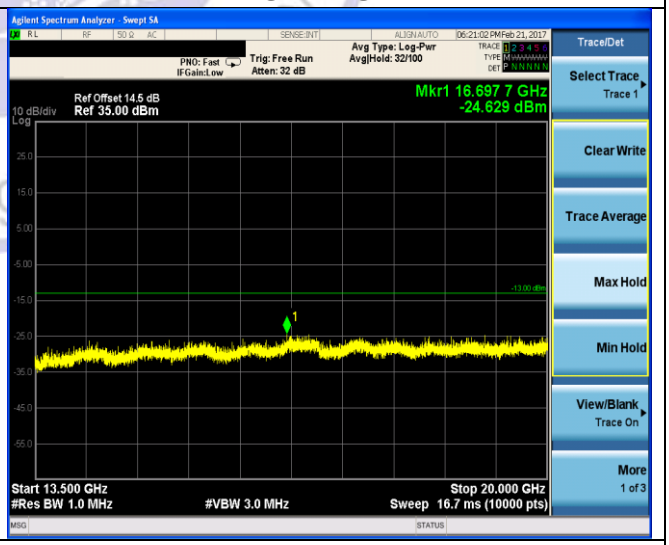
30MHz~1GHz



1GHz~7GHz

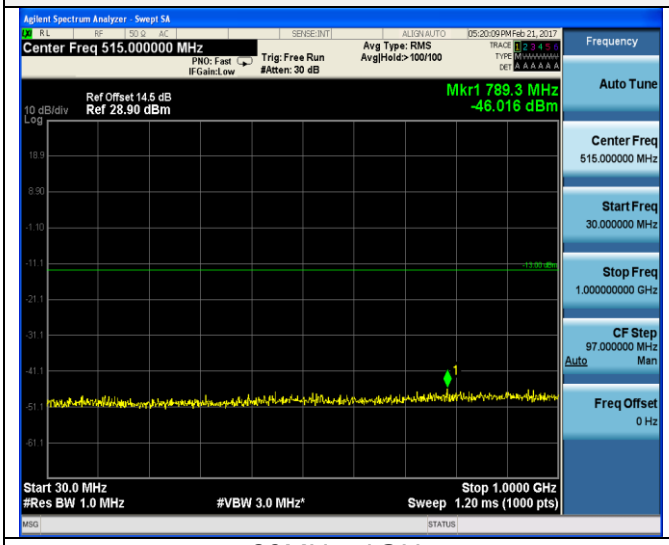
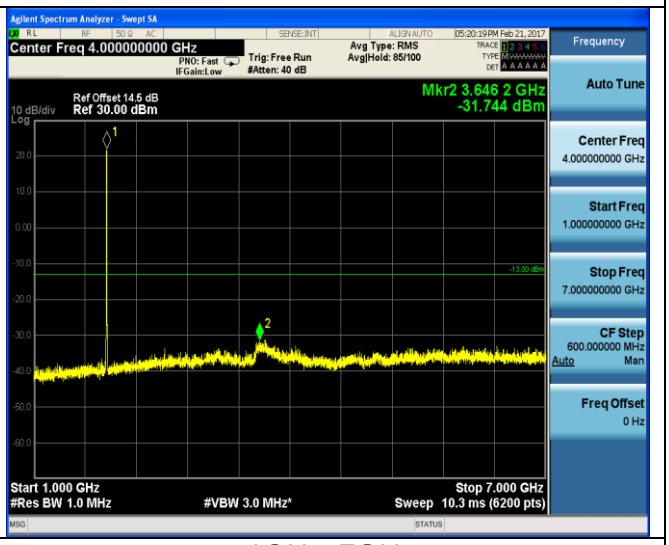
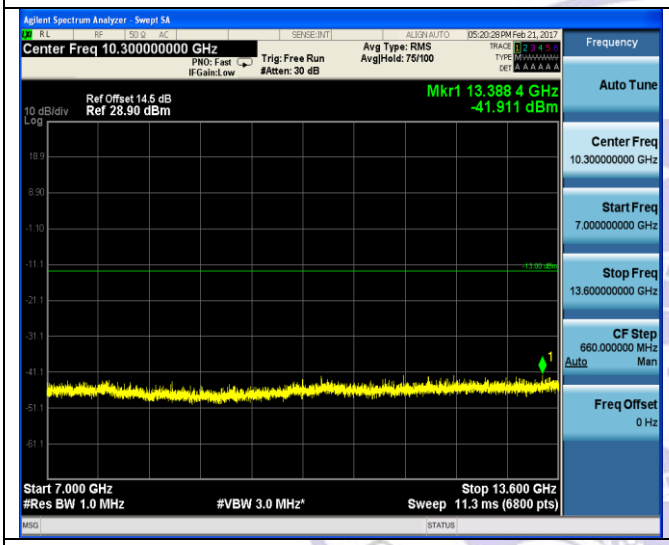
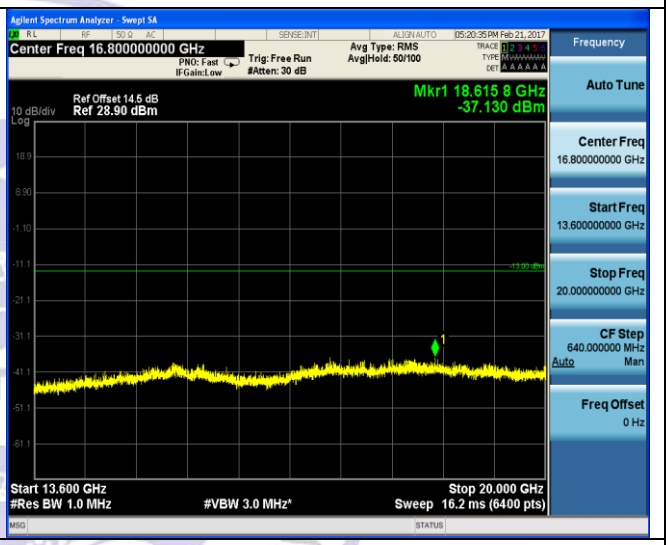


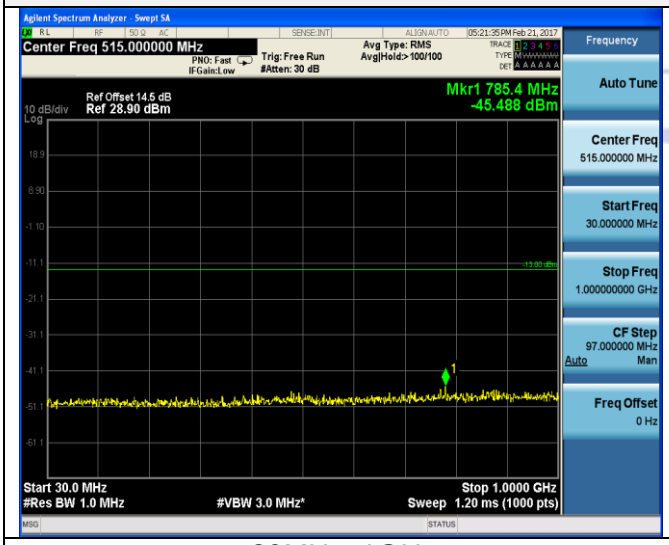
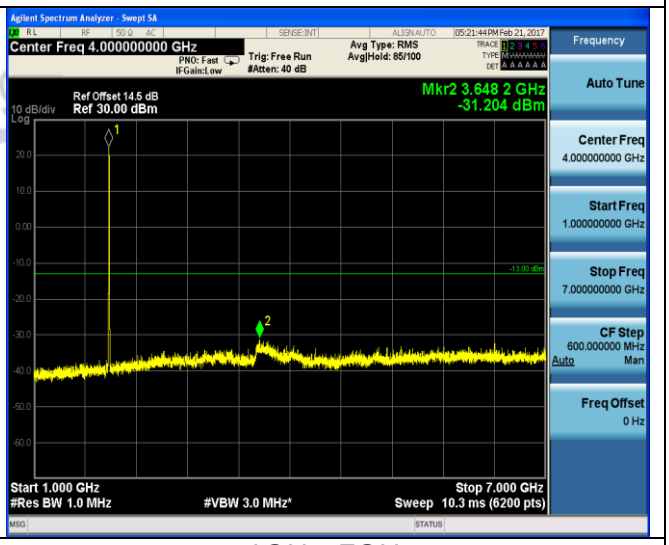
7GHz~13.5GHz

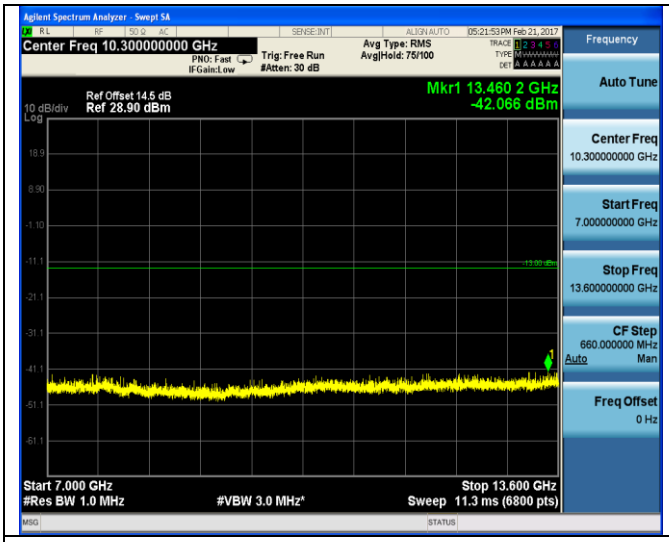


13.5GHz~20GHz

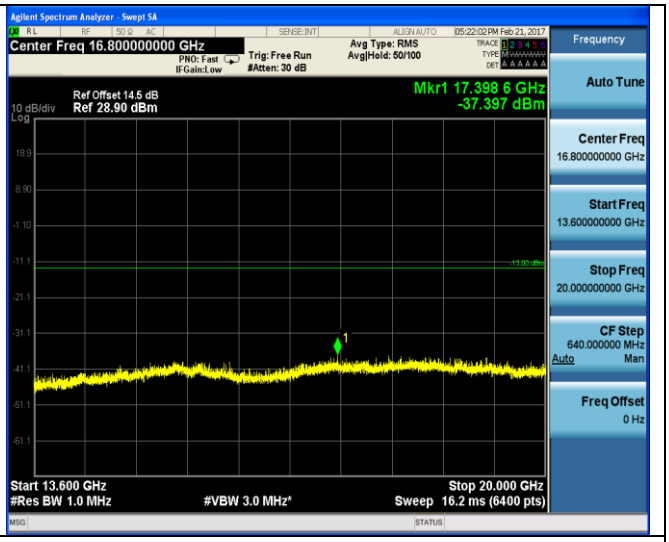
WCDMA Band II

Channel:	*9262*
	
30MHz~1GHz	*1GHz~7GHz*
	
7GHz~13.6GHz	*13.5GHz~20GHz*

Channel:	*9400*
	
30MHz~1GHz	*1GHz~7GHz*

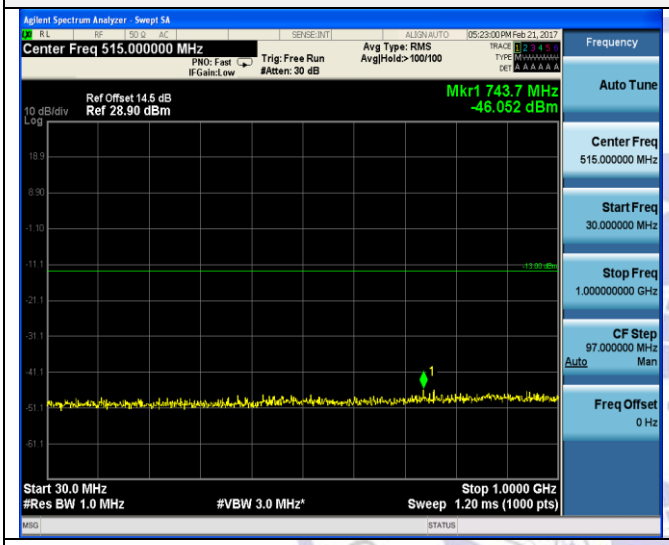


7GHz~13.6GHz

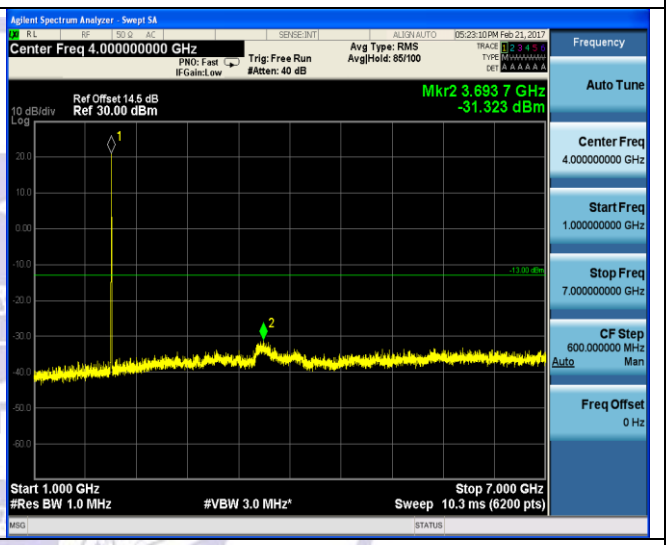


13.5GHz~20GHz

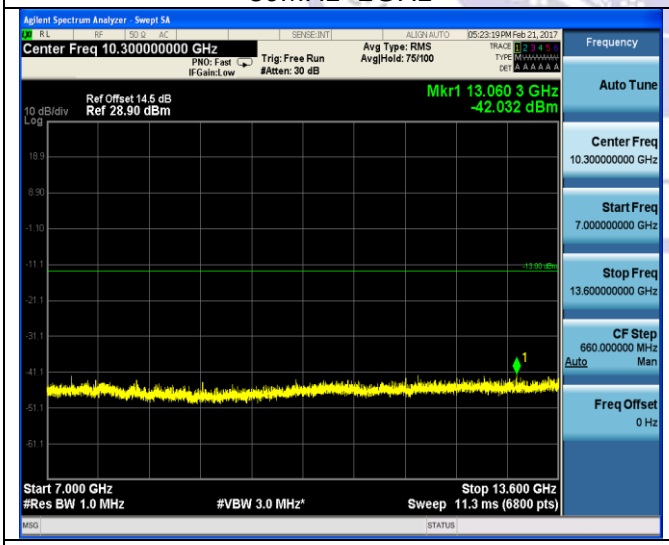
Channel: 9538



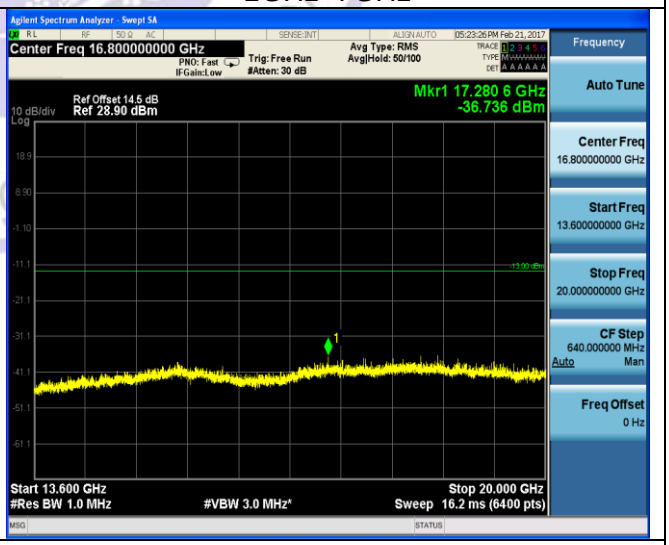
30MHz~1GHz



1GHz~7GHz

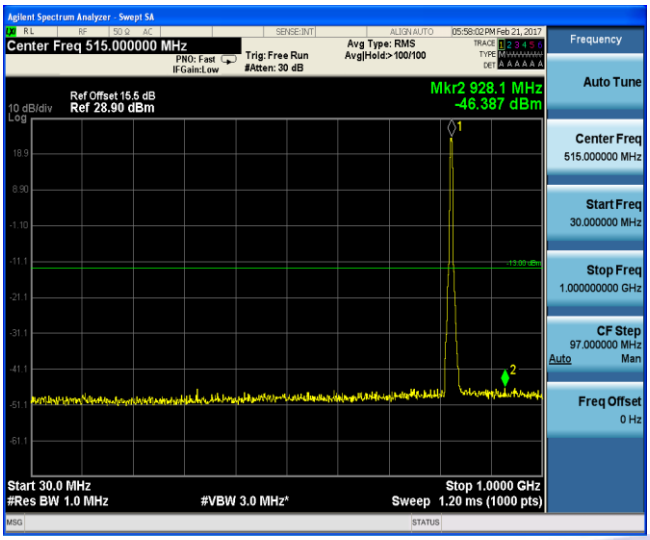
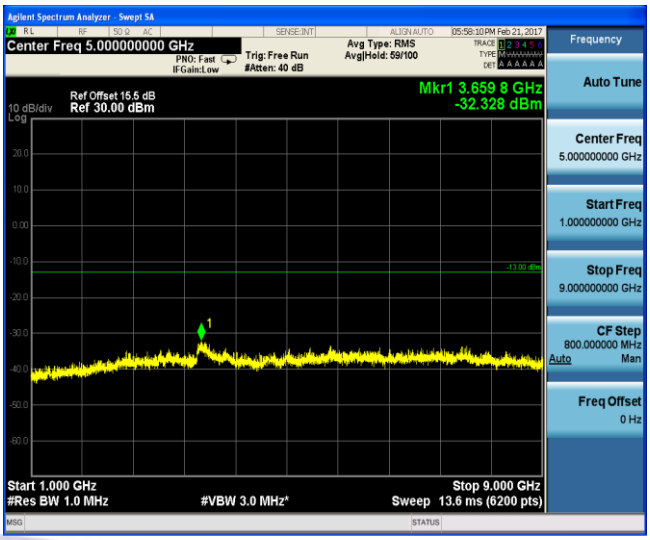
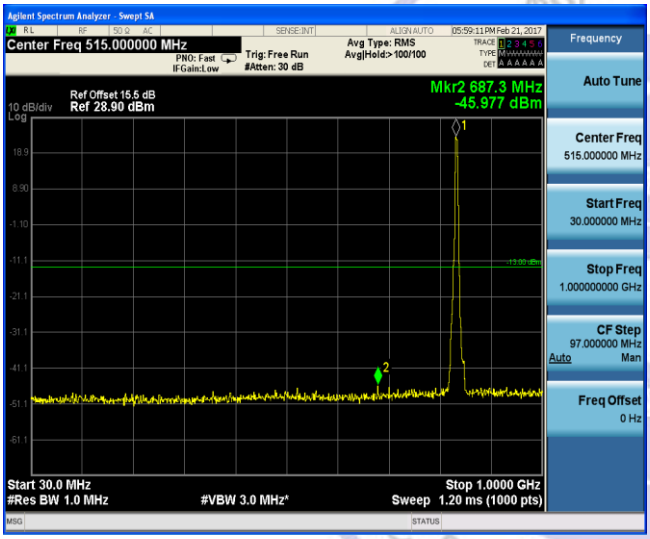
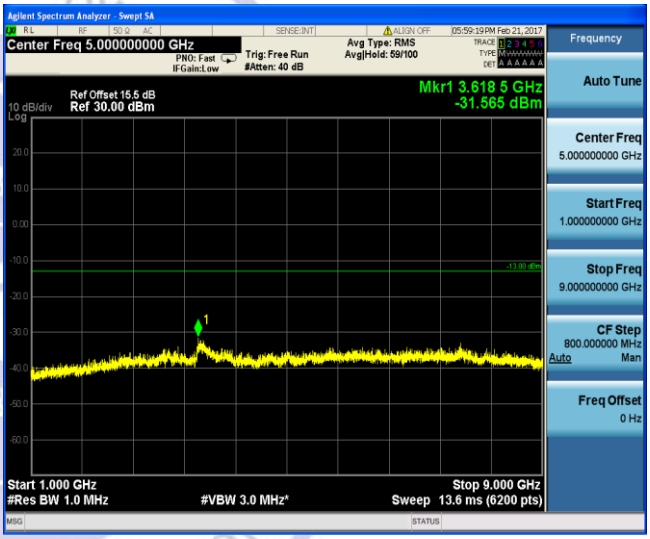
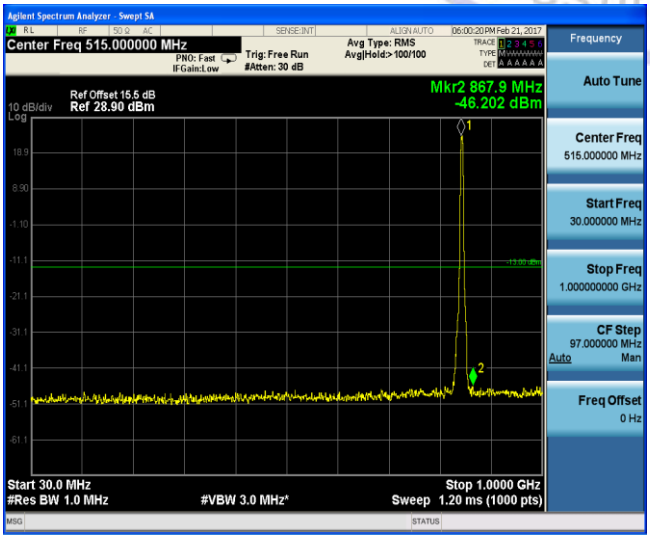
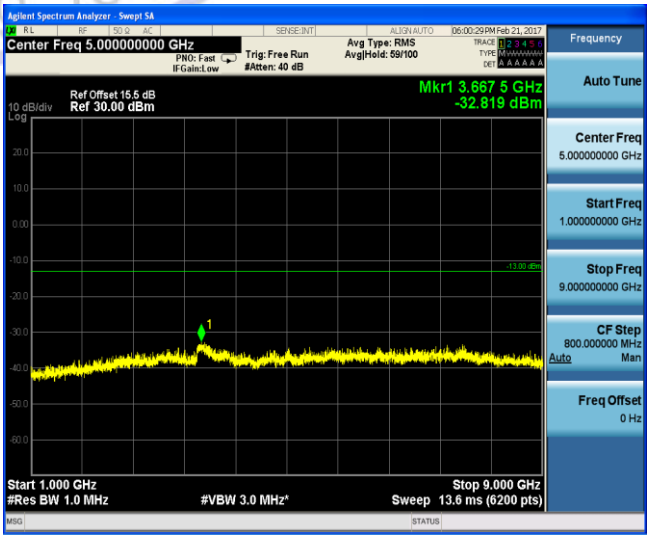


7GHz~13.6GHz



13.5GHz~20GHz

WCDMA Band V

Channel:	4132
	
30MHz~1GHz	*1GHz~9GHz*
Channel:	*4183*
	
30MHz~1GHz	*1GHz~9GHz*
Channel:	*4233*
	
30MHz~1GHz	*1GHz~9GHz*

Radiated Measurement:

GSM 850

Channel	Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	Diatance	G_a Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
128	1648.40	-32.42	3.00	3.00	9.58	-26.50	-13.00	13.50	H
	2472.60	-37.51	3.47	3.00	10.72	-31.55	-13.00	18.55	H
	1648.40	-30.94	3.00	3.00	9.68	-24.44	-13.00	11.44	V
	2472.60	-37.12	3.47	3.00	10.72	-30.01	-13.00	17.01	V
190	1673.20	-30.76	3.14	3.00	9.61	-25.54	-13.00	12.54	H
	2509.80	-40.72	3.59	3.00	10.77	-30.66	-13.00	17.66	H
	1673.20	-32.25	3.14	3.00	9.61	-24.50	-13.00	11.50	V
	2509.80	-37.42	3.59	3.00	10.77	-29.55	-13.00	16.55	V
251	1697.60	-30.25	3.26	3.00	9.77	-25.15	-13.00	12.15	H
	2546.40	-38.53	3.69	3.00	10.89	-31.47	-13.00	18.47	H
	1697.60	-28.98	3.26	3.00	9.77	-24.65	-13.00	11.65	V
	2546.40	-37.61	3.69	3.00	10.89	-30.50	-13.00	17.50	V

GPRS850

Channel	Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	Diatance	G_a Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
128	1648.40	-32.23	3.00	3.00	9.58	-25.65	-13.00	12.65	H
	2472.60	-36.75	3.47	3.00	10.72	-29.50	-13.00	16.50	H
	1648.40	-32.12	3.00	3.00	9.68	-25.44	-13.00	12.44	V
	2472.60	-35.73	3.47	3.00	10.72	-28.48	-13.00	15.48	V
190	1673.20	-33.97	3.14	3.00	9.61	-27.50	-13.00	14.50	H
	2509.80	-39.07	3.59	3.00	10.77	-31.89	-13.00	18.89	H
	1673.20	-30.99	3.14	3.00	9.61	-24.52	-13.00	11.52	V
	2509.80	-38.15	3.59	3.00	10.77	-30.97	-13.00	17.97	V
251	1697.60	-33.06	3.26	3.00	9.77	-26.55	-13.00	13.55	H
	2546.40	-36.77	3.69	3.00	10.89	-29.57	-13.00	16.57	H
	1697.60	-29.73	3.26	3.00	9.77	-23.22	-13.00	10.22	V
	2546.40	-35.59	3.69	3.00	10.89	-28.39	-13.00	15.39	V

GSM1900

Channel	Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	Diatance	G_a Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
512	3700.40	-36.30	4.25	3.00	12.34	-28.21	-13.00	15.21	H
	5550.60	-41.77	4.97	3.00	13.52	-33.22	-13.00	20.22	H
	3700.40	-35.45	4.25	3.00	12.34	-27.36	-13.00	14.36	V
	5550.60	-41.30	4.97	3.00	13.52	-32.75	-13.00	19.75	V
661	3760.00	-35.21	4.38	3.00	12.34	-27.25	-13.00	14.25	H
	5640.00	-41.25	5.01	3.00	13.58	-32.68	-13.00	19.68	H
	3760.00	-36.18	4.38	3.00	12.34	-28.22	-13.00	15.22	V
	5640.00	-42.02	5.01	3.00	13.58	-33.45	-13.00	20.45	V
810	3819.60	-36.58	4.49	3.00	12.45	-28.62	-13.00	15.62	H
	5729.40	-41.18	5.26	3.00	13.66	-32.78	-13.00	19.78	H
	3819.60	-34.61	4.49	3.00	12.45	-26.65	-13.00	13.65	V
	5729.40	-39.80	5.26	3.00	13.66	-31.40	-13.00	18.40	V

GPRS1900

Channel	Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	Diatance	G_a Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
512	3700.40	-35.31	4.25	3.00	12.34	-27.22	-13.00	14.22	H
	5550.60	-41.66	4.97	3.00	13.52	-33.11	-13.00	20.11	H
	3700.40	-34.59	4.25	3.00	12.34	-26.50	-13.00	13.50	V
	5550.60	-41.30	4.97	3.00	13.52	-32.75	-13.00	19.75	V
661	3760.00	-36.40	4.38	3.00	12.34	-28.44	-13.00	15.44	H
	5640.00	-42.16	5.01	3.00	13.58	-33.59	-13.00	20.59	H
	3760.00	-35.74	4.38	3.00	12.34	-27.78	-13.00	14.78	V
	5640.00	-41.08	5.01	3.00	13.58	-32.51	-13.00	19.51	V
810	3819.60	-36.65	4.49	3.00	12.45	-28.69	-13.00	15.69	H
	5729.40	-41.94	5.26	3.00	13.66	-33.54	-13.00	20.54	H
	3819.60	-35.21	4.49	3.00	12.45	-27.25	-13.00	14.25	V
	5729.40	-40.00	5.26	3.00	13.66	-31.60	-13.00	18.60	V

WCDMA Band II

Channel	Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	Diatance	G_a Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
9262	3704.80	-42.61	4.27	3.00	12.34	-34.54	-13.00	21.54	H
	5557.20	-46.93	4.99	3.00	13.52	-38.40	-13.00	25.40	H
	3704.80	-40.52	4.27	3.00	12.34	-32.45	-13.00	19.45	V
	5557.20	-44.95	4.99	3.00	13.52	-36.42	-13.00	23.42	V
9400	3760.00	-42.59	4.38	3.00	12.34	-34.63	-13.00	21.63	H
	5640.00	-47.09	5.01	3.00	13.58	-38.52	-13.00	25.52	H
	3760.00	-41.18	4.38	3.00	12.34	-33.22	-13.00	20.22	V
	5640.00	-46.11	5.01	3.00	13.58	-37.54	-13.00	24.54	V
9538	3815.20	-41.46	4.47	3.00	12.45	-33.48	-13.00	20.48	H
	5722.80	-47.21	5.23	3.00	13.66	-38.78	-13.00	25.78	H
	3815.20	-39.67	4.47	3.00	12.45	-31.69	-13.00	18.69	V
	5722.80	-44.13	5.23	3.00	13.66	-35.70	-13.00	22.70	V

WCDMA Band V

Channel	Frequency (MHz)	P_{Mea} (dBm)	P_{cl} (dB)	Diatance	G_a Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
9262	1652.80	-40.11	3.02	3.00	9.58	-33.55	-13.00	20.55	H
	2479.20	-43.68	3.51	3.00	10.72	-36.47	-13.00	23.47	H
	1652.80	-39.19	3.02	3.00	9.68	-32.53	-13.00	19.53	V
	2479.20	-41.66	3.51	3.00	10.72	-34.45	-13.00	21.45	V
9400	1673.20	-39.32	3.14	3.00	9.61	-32.85	-13.00	19.85	H
	2509.80	-42.68	3.59	3.00	10.77	-35.50	-13.00	22.50	H
	1673.20	-37.92	3.14	3.00	9.61	-31.45	-13.00	18.45	V
	2509.80	-40.42	3.59	3.00	10.77	-33.24	-13.00	20.24	V
9538	1693.20	-39.27	3.24	3.00	9.77	-32.74	-13.00	19.74	H
	2539.80	-42.89	3.65	3.00	10.89	-35.65	-13.00	22.65	H
	1693.20	-38.75	3.24	3.00	9.77	-32.22	-13.00	19.22	V
	2539.80	-41.64	3.65	3.00	10.89	-34.40	-13.00	21.40	V

Remark:

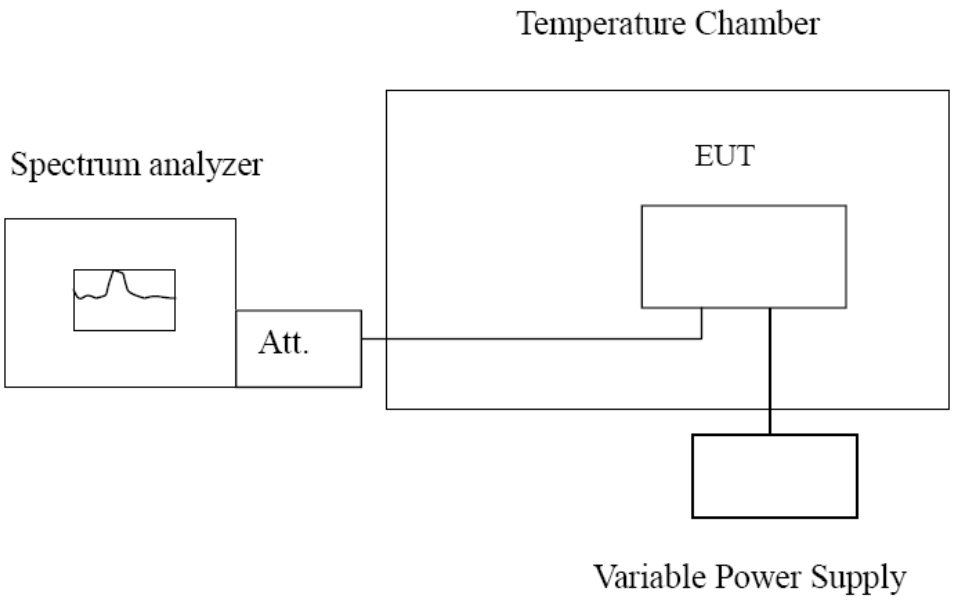
1. *EIRP=P_{Mea}(dBm)-P_{cl}(dB) +G_a(dBi)*
2. *We were not recorded other points as values lower than limits.*
3. *Margin = Limit - EIRP*

3.5 Frequency Stability under Temperature & Voltage Variations

LIMIT

Cellular Band: ±2.5ppm PCS Band: Within the authorized frequency block

TEST CONFIGURATION



TEST PROCEDURE

The EUT was setup according to EIA/TIA 603C

Frequency Stability under Temperature Variations:
The equipment under test was connected to an external AC or DC power supply and input rated voltage. RF output was connected to a frequency counter or spectrum analyzer via feed through attenuators. The EUT was placed inside the temperature chamber. Set the spectrum analyzer RBW low enough to obtain the desired frequency resolution and measure EUT 20℃ operating frequency as reference frequency. Turn EUT off and set the chamber temperature to -30℃. After the temperature stabilized for approximately 30 minutes recorded the frequency. Repeat step measure with 10℃ increased per stage until the highest temperature of +50℃ reached.

Frequency Stability under Voltage Variations:
Set chamber temperature to 20℃. Use a variable AC power supply / DC power source to power the EUT and set the voltage to rated voltage. Set the spectrum analyzer RBW low enough to obtain the desired frequency resolution and recorded the frequency.
Reduce the input voltage to specify extreme voltage variation (±15%) and endpoint, record the maximum frequency change.

TEST RESULTS

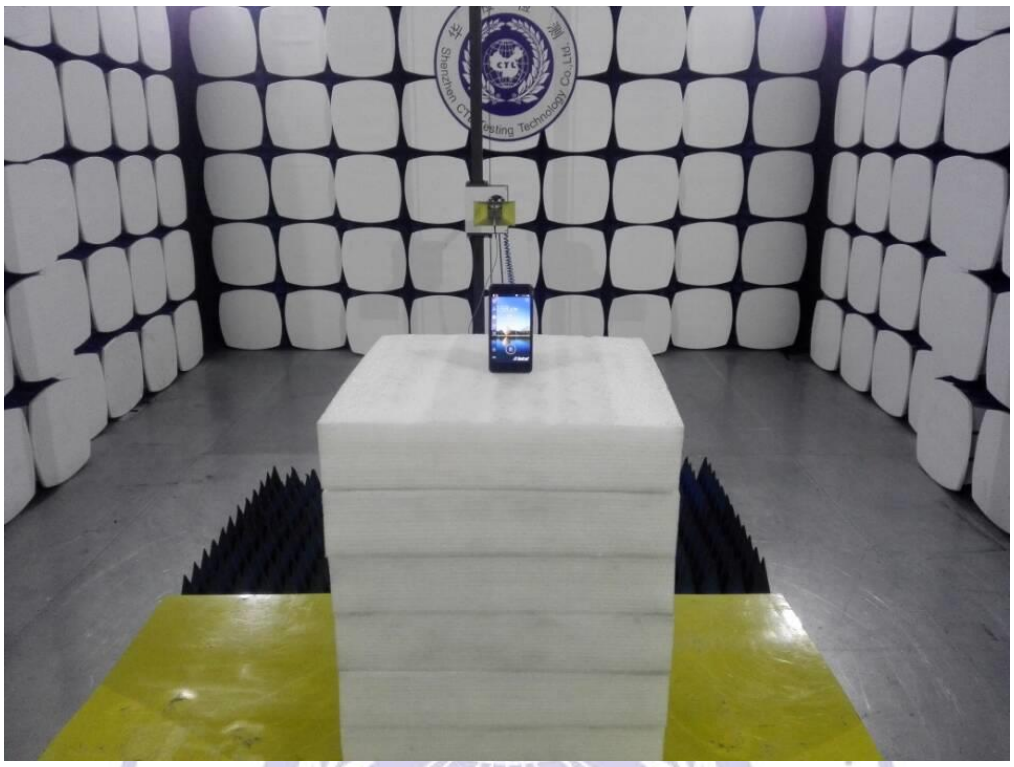
Reference Frequency: GSM850 Middle channel=190 channel=836.6MHz					
Voltage (V)	Temperature (℃)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
3.80	-30	99	0.118	2.5	Pass
	-20	86	0.103		
	-10	87	0.104		
	0	45	0.054		
	10	50	0.060		
	20	45	0.054		
	30	69	0.082		
	40	58	0.069		
	50	87	0.104		
4.37	25	67	0.080		
End point 3.23	25	105	0.126		

Reference Frequency: PCS1900 Middle channel=661 channel=1880MHz					
Voltage (V)	Temperature (℃)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
3.80	-30	68	0.036	Within the authorized frequency block	Pass
	-20	79	0.042		
	-10	54	0.029		
	0	85	0.045		
	10	53	0.028		
	20	75	0.040		
	30	55	0.029		
	40	69	0.037		
	50	58	0.031		
4.37	25	71	0.038		
End point 3.23	25	91	0.048		

Reference Frequency: WCDMA Band II Middle channel=9400 channel=1880MHz					
Voltage (V)	Temperature (℃)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
3.80	-30	79	0.042	Within the authorized frequency block	Pass
	-20	75	0.040		
	-10	69	0.037		
	0	65	0.035		
	10	74	0.039		
	20	69	0.037		
	30	70	0.037		
	40	66	0.035		
	50	51	0.027		
4.37	25	63	0.034		
End point 3.23	25	87	0.046		

Reference Frequency: WCDMA Band V Middle channel=4182 channel=836.6MHz					
Voltage (V)	Temperature (℃)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
3.80	-30	68	0.081	2.5	Pass
	-20	78	0.093		
	-10	59	0.071		
	0	66	0.079		
	10	73	0.087		
	20	64	0.077		
	30	66	0.079		
	40	54	0.065		
	50	50	0.060		
4.37	25	65	0.078		
End point 3.23	25	88	0.105		

4 Test Setup Photos of the EUT



5 Photos of the EUT

Reference to the test report No. CTL1612072101-WF01

********** End of Report **********