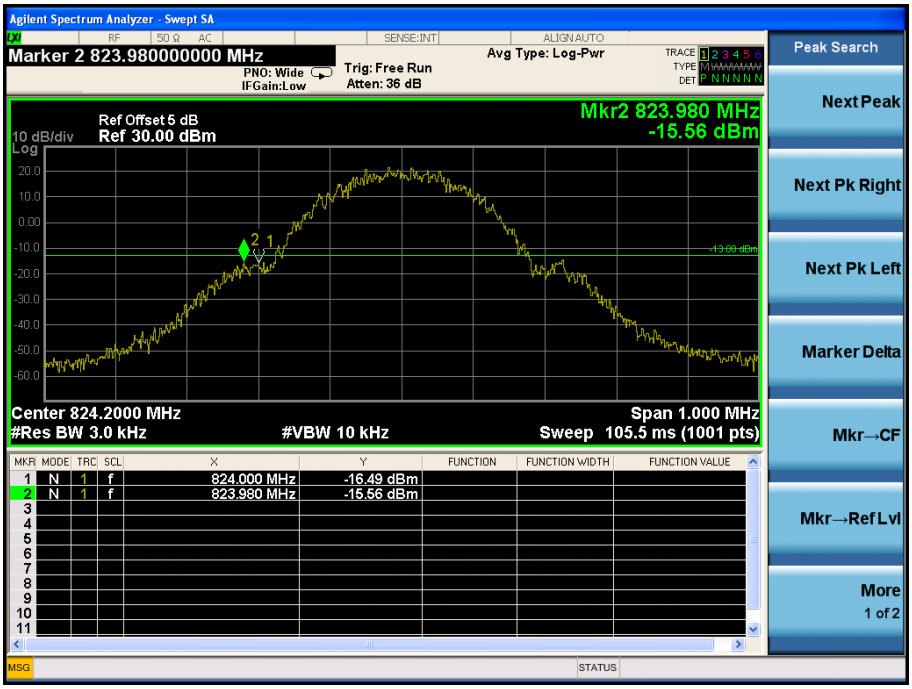
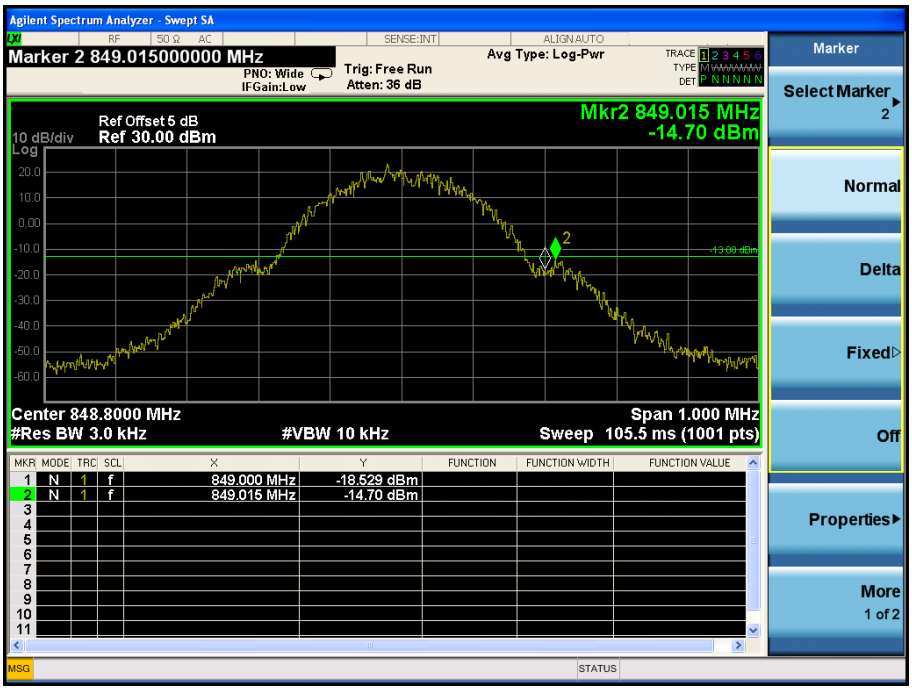
GPRS Low Band Emission

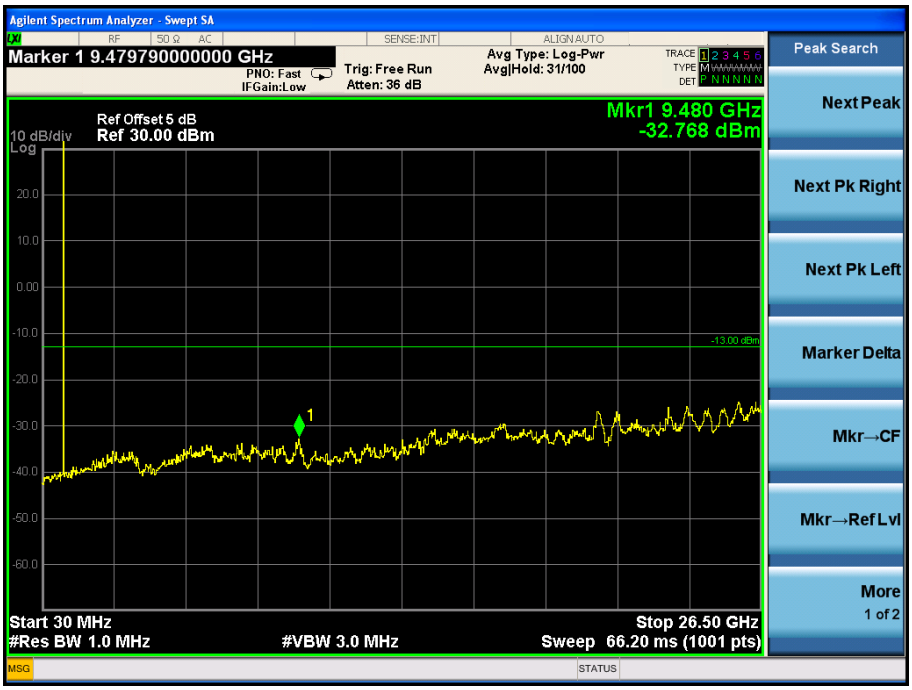


GPRS High Band Emission

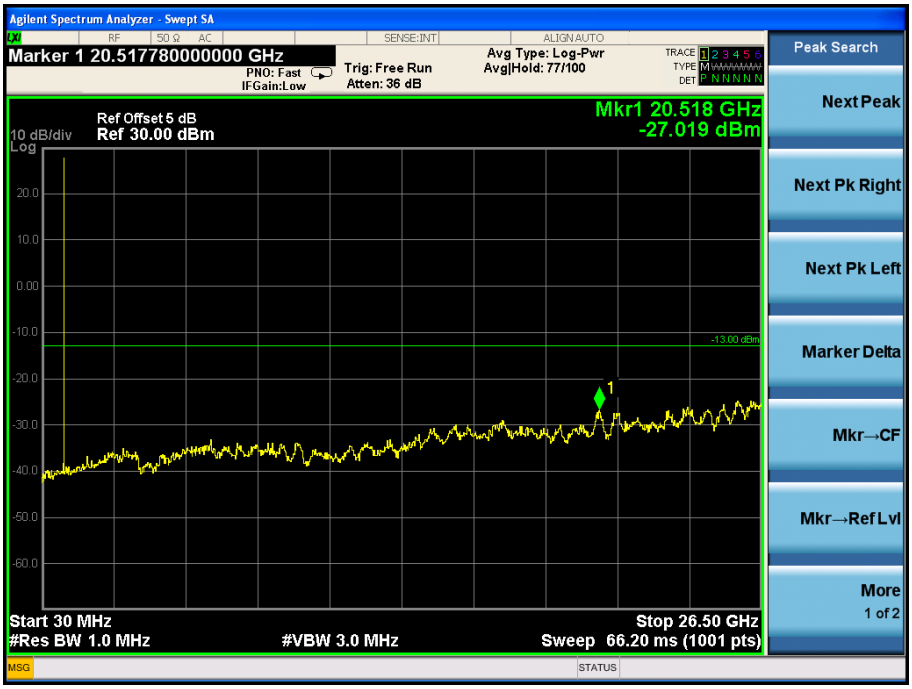


EDGE Low Channel

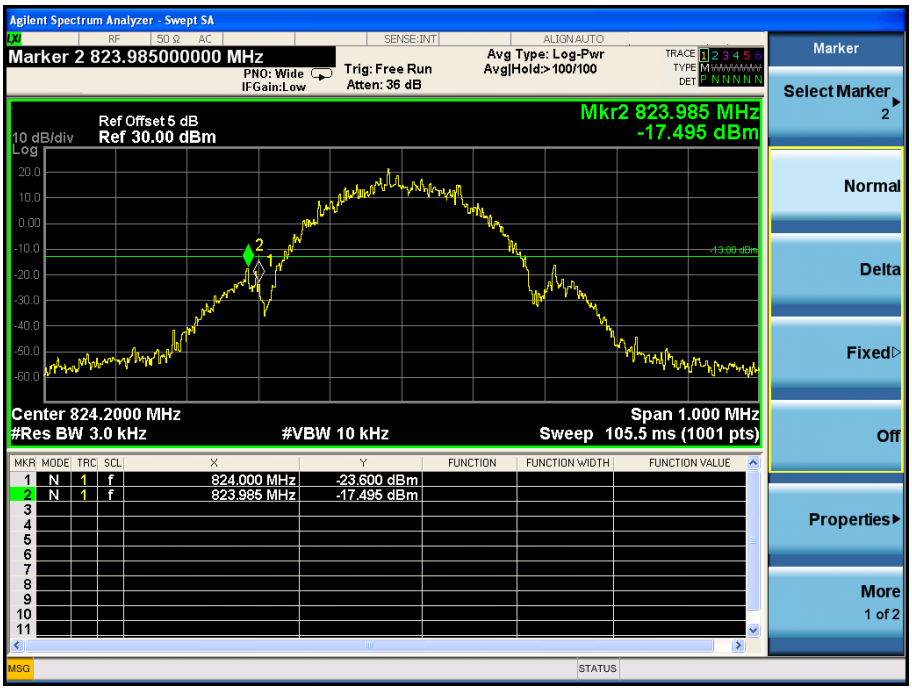
EDGE Middle Channel



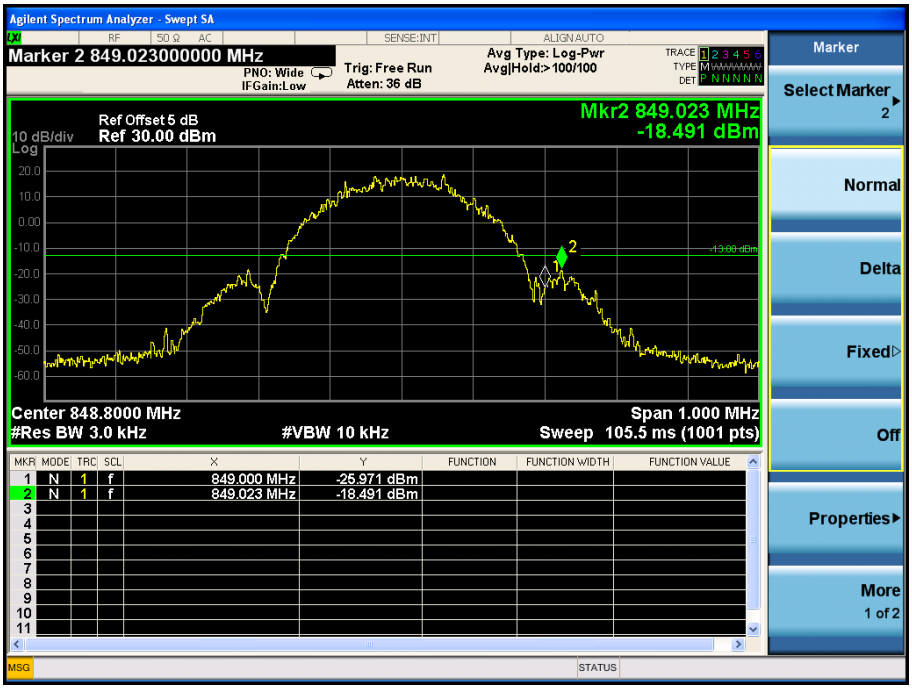
EDGE High Channel



EDGE Low Band Emission

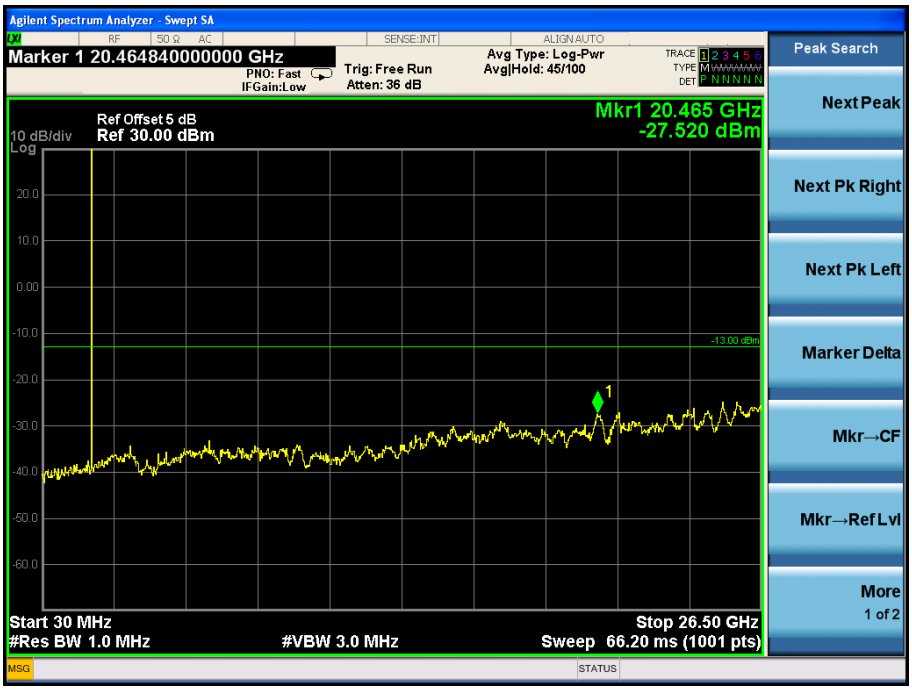


EDGE High Band Emission

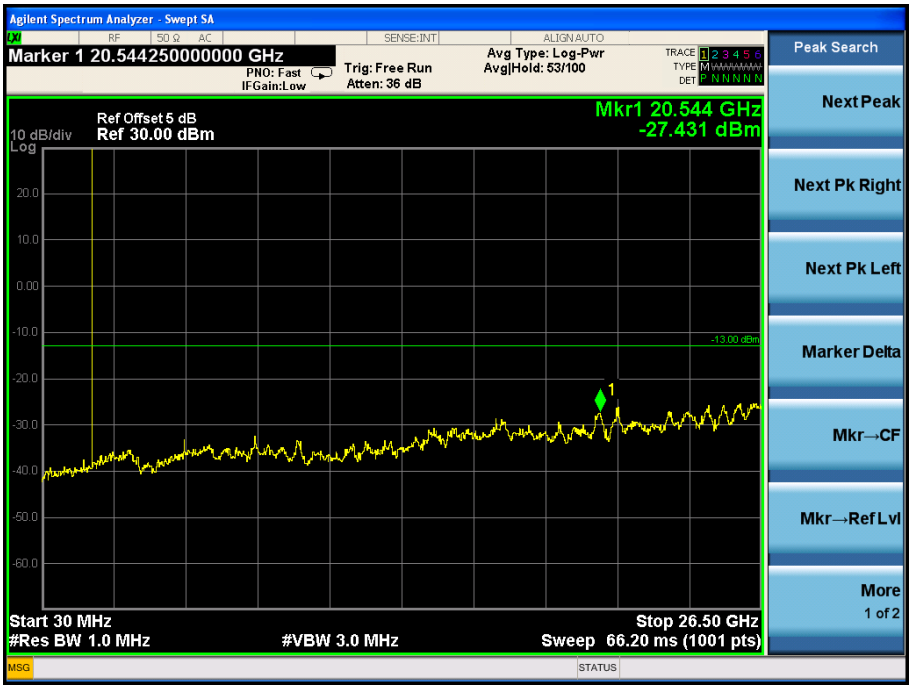


For PCS Band

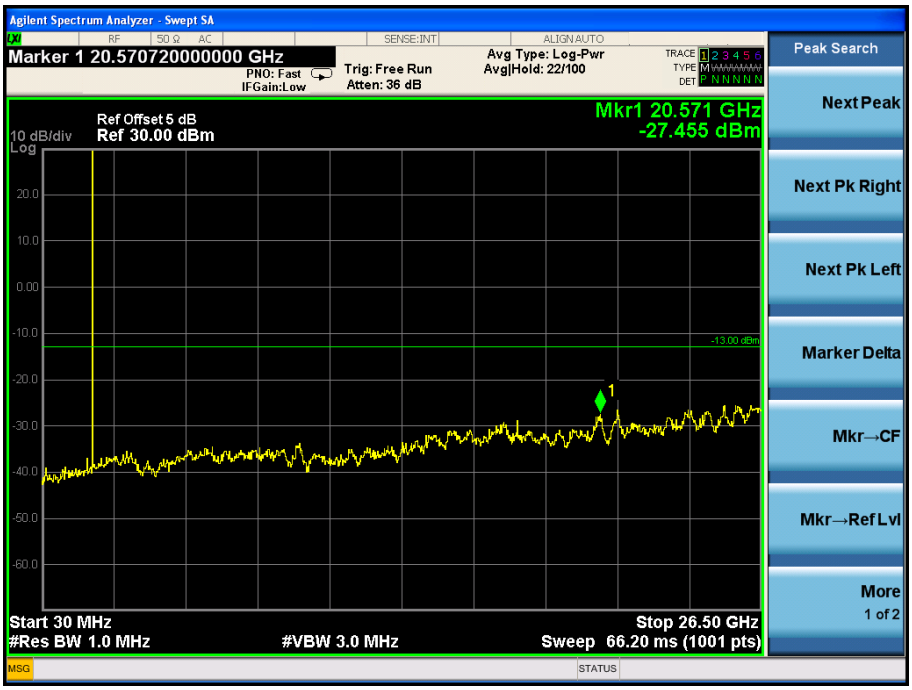
GSM Low Channel



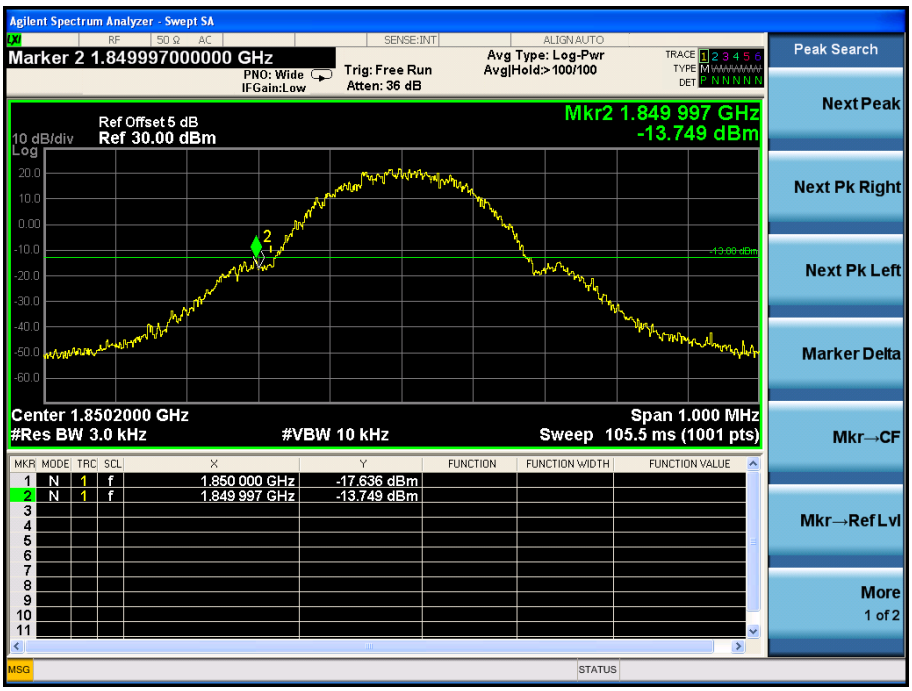
GSM Middle Channel



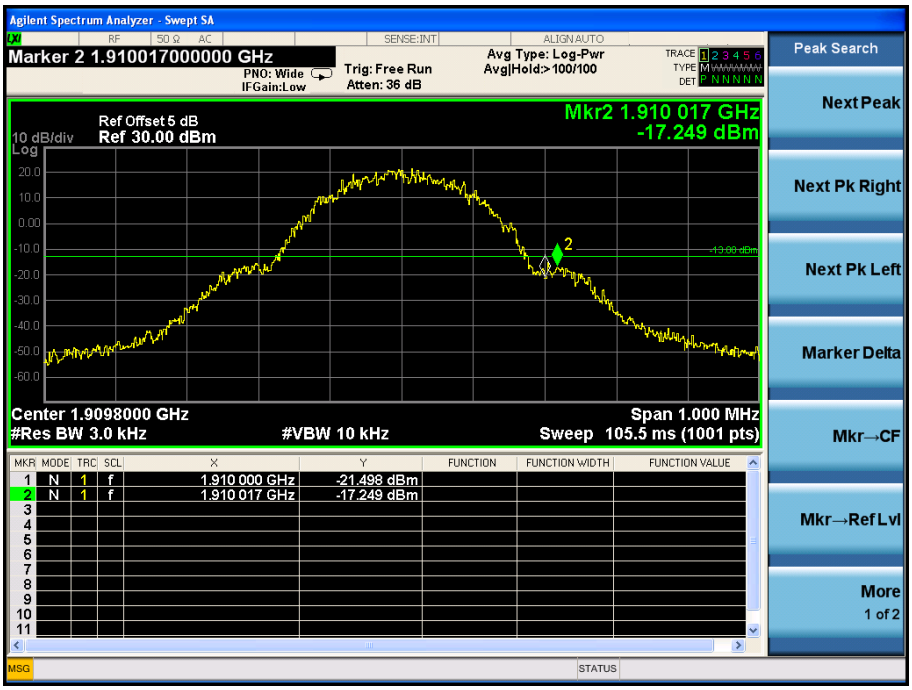
GSM High Channel



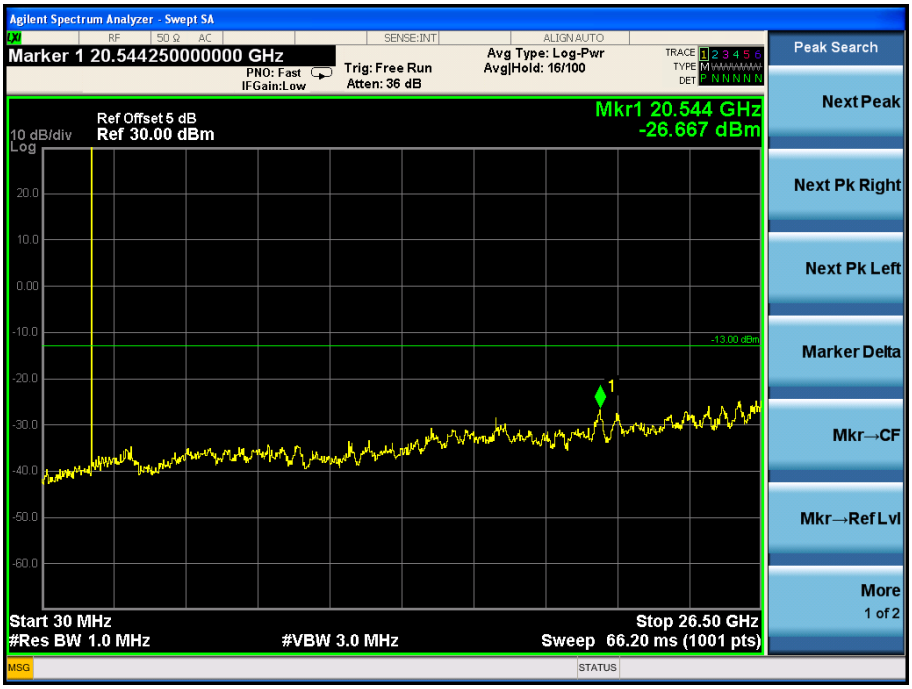
GSM Low Band Emission



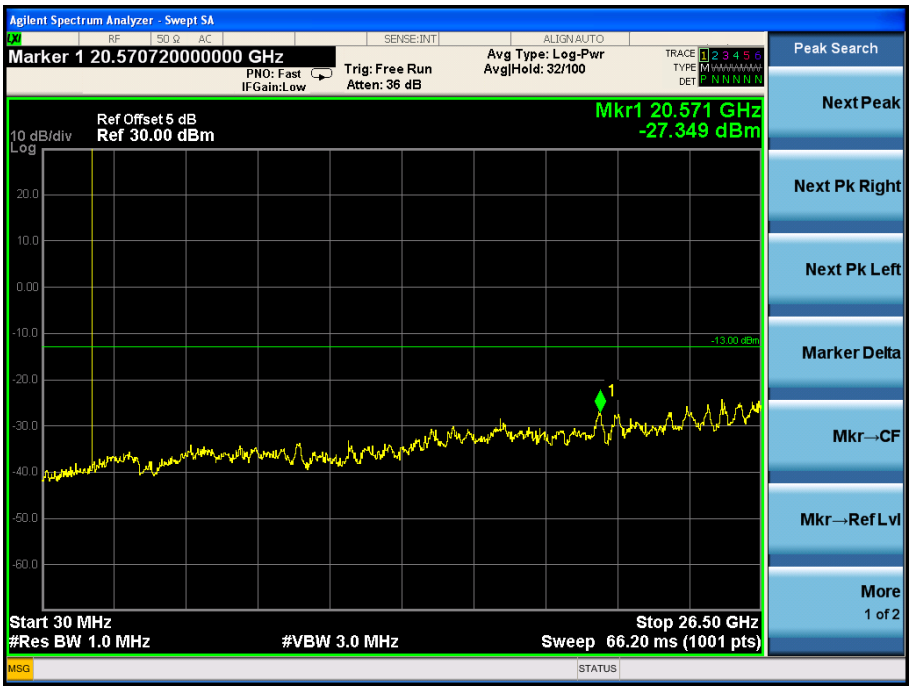
GSM High Band Emission



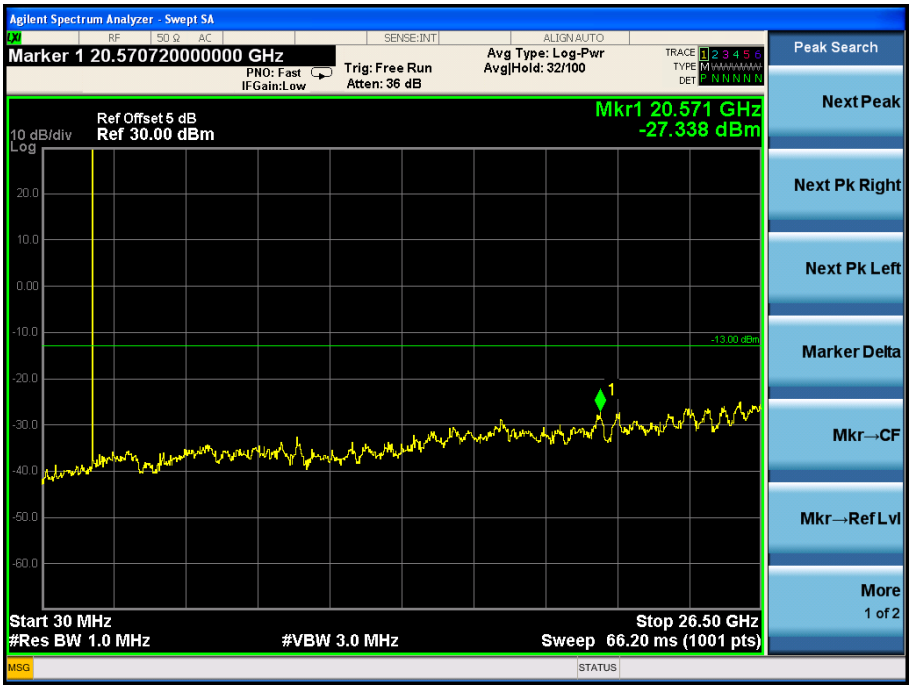
GPRS Low Channel



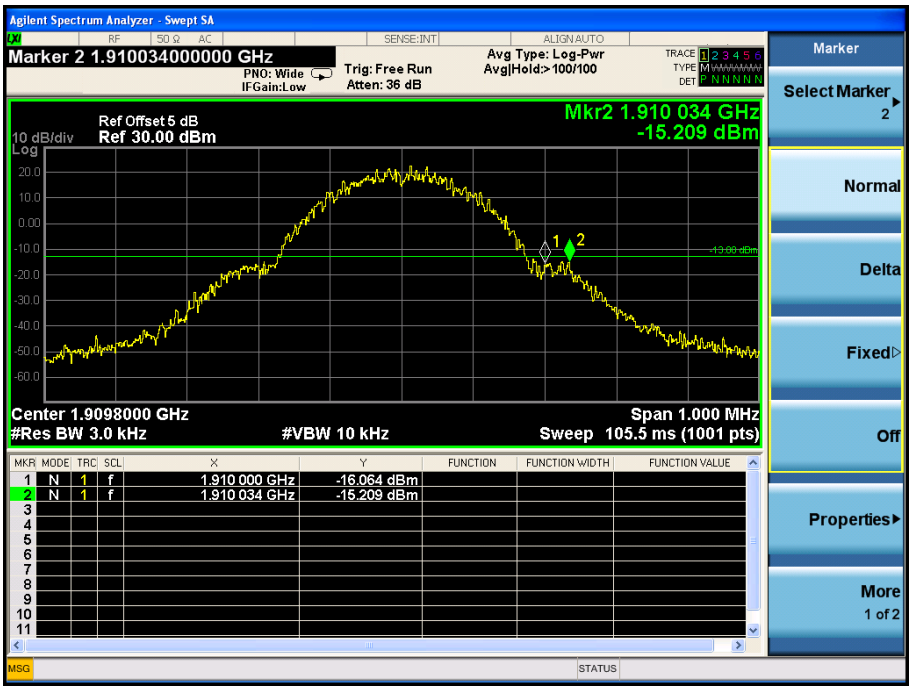
GPRS Middle Channel



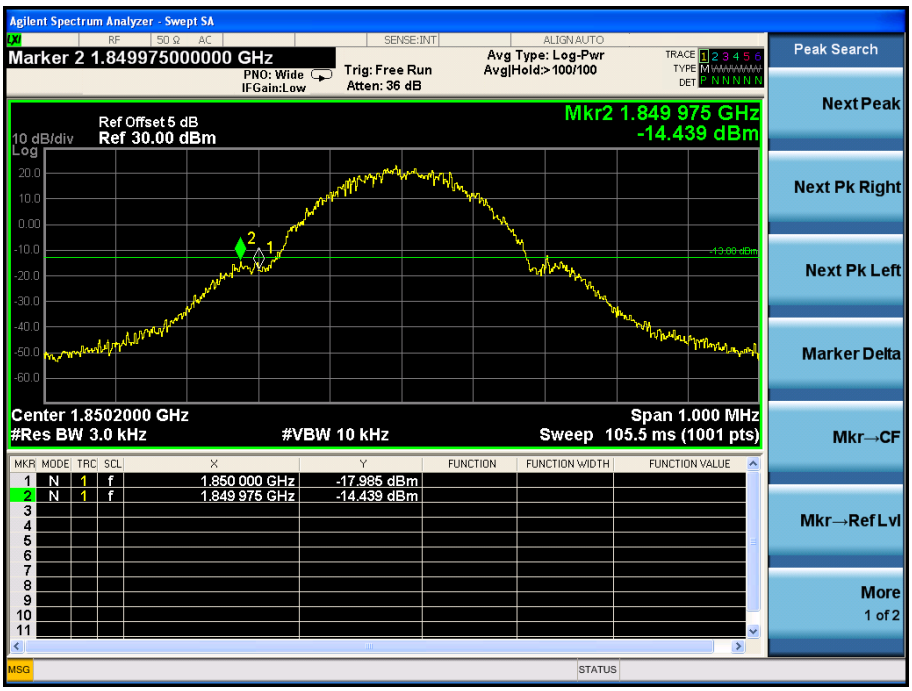
GPRS High Channel



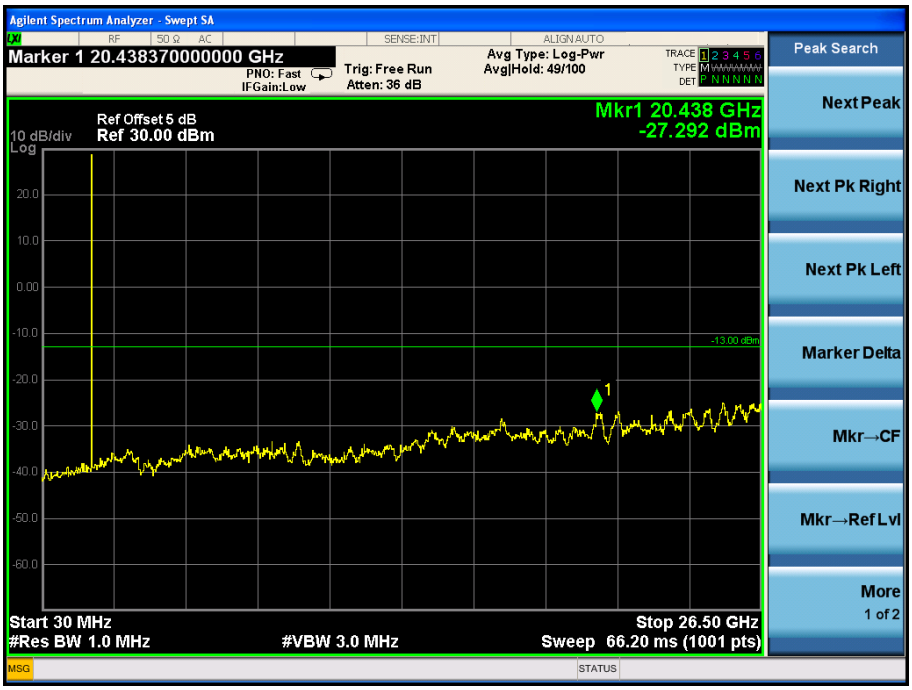
GPRS Low Band Emission



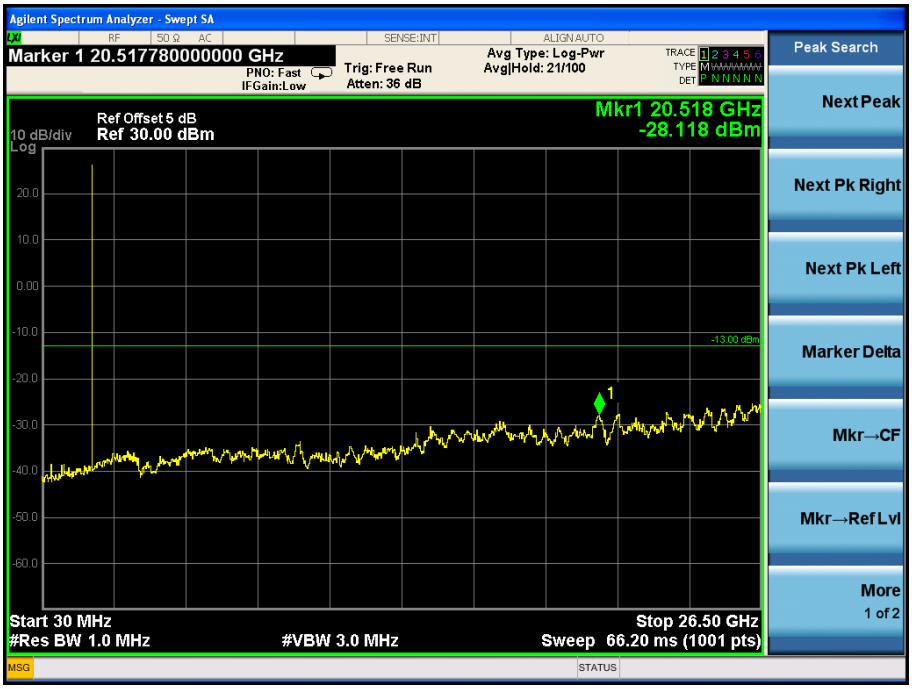
GPRS High Band Emission



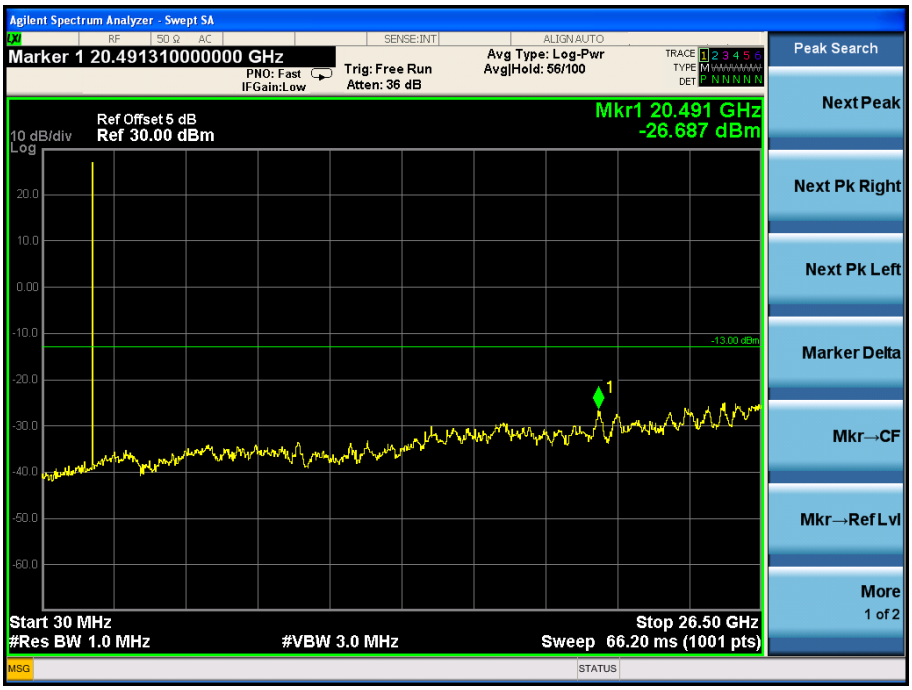
EDGE Low Channel



EDGE Middle Channel

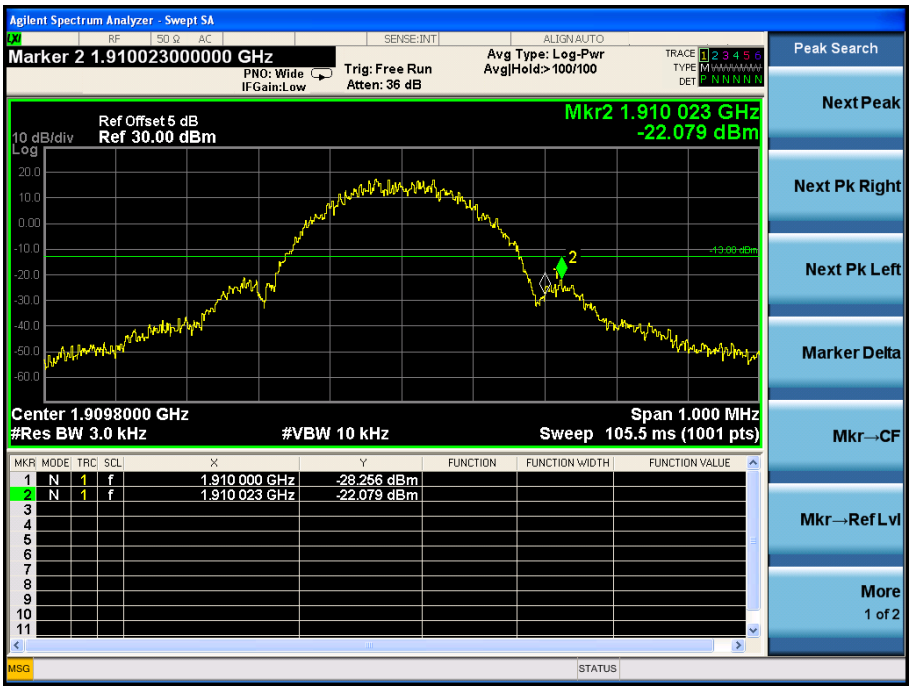


EDGE High Channel



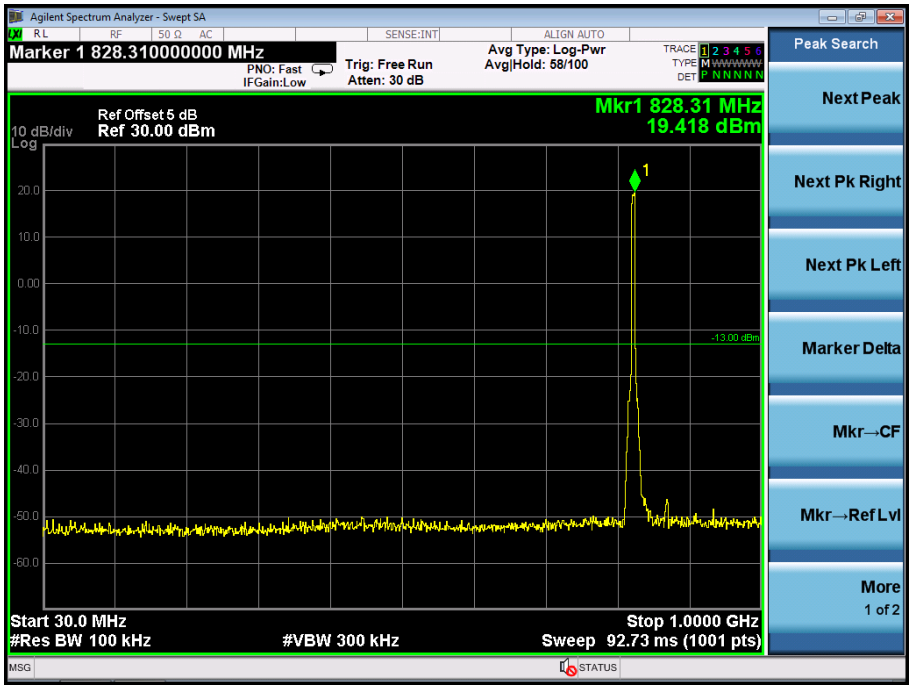
EDGE Low Band Emission

EDGE High Band Emission

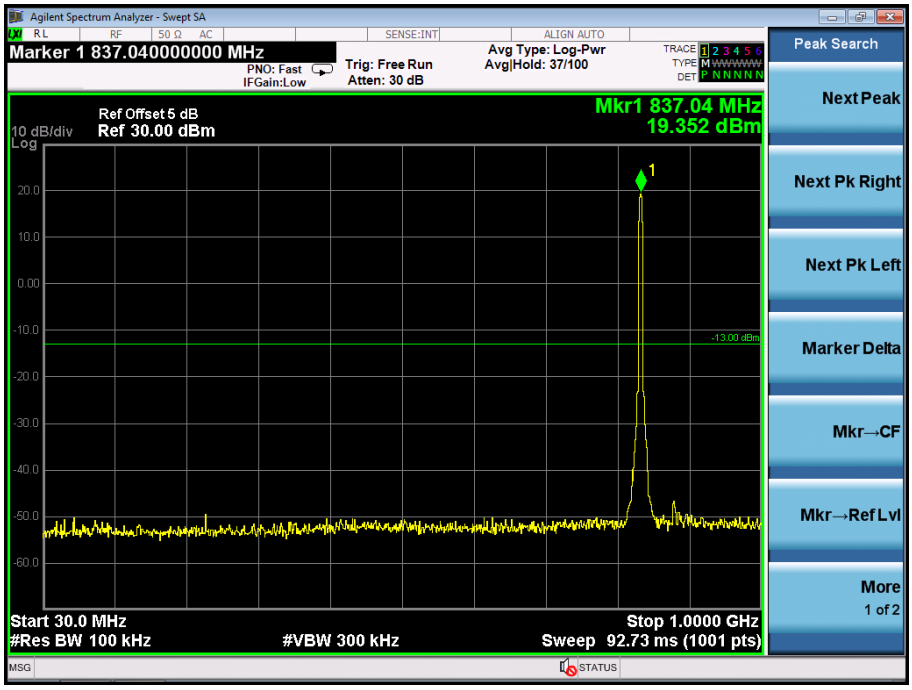


For Band V

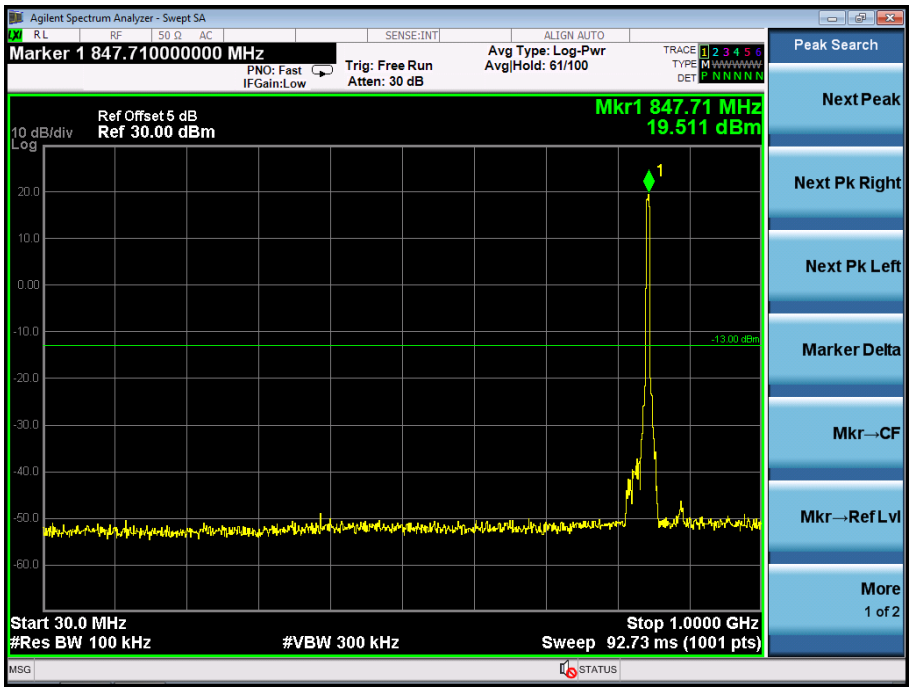
WCDMA Low Channel



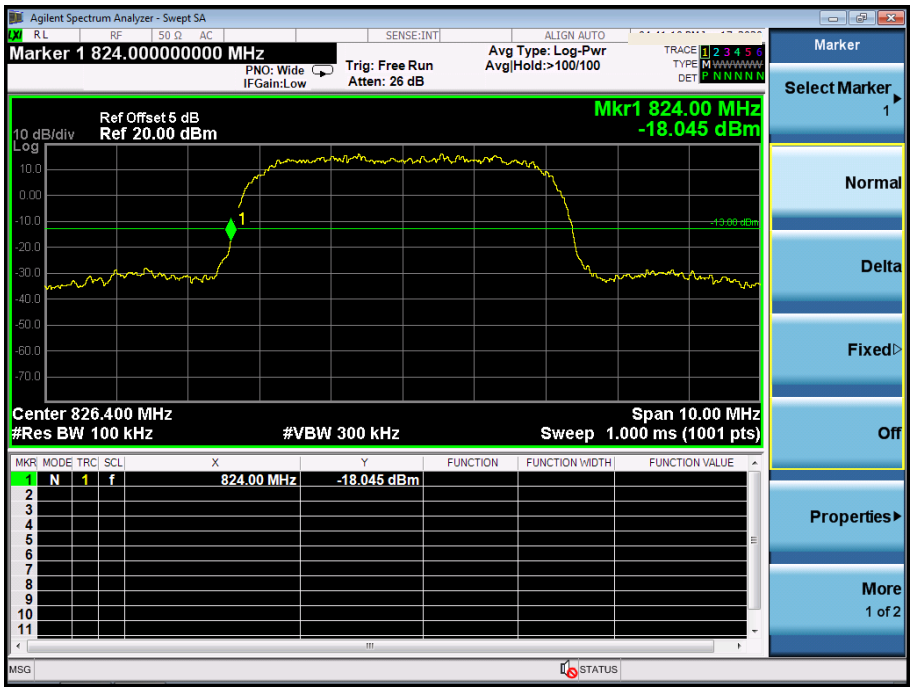
WCDMA Middle Channel



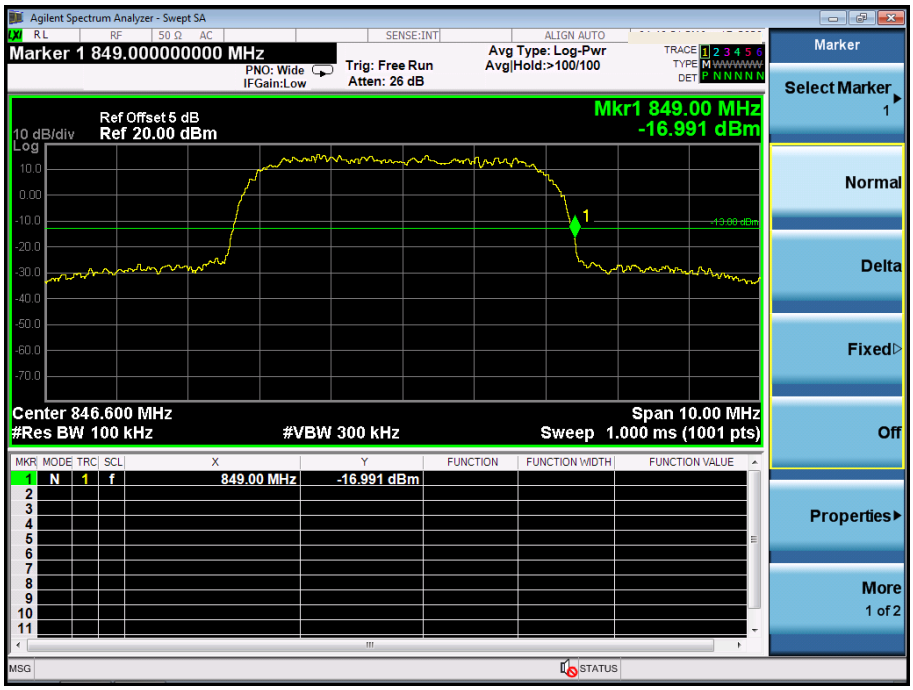
WCDMA High Channel



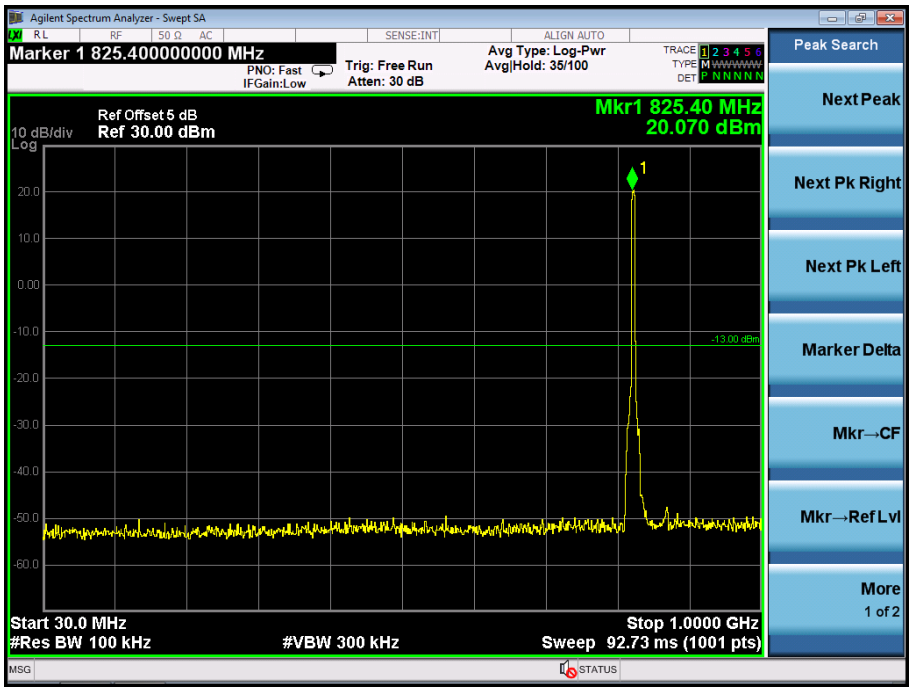
WCDMA Low Band Spurious Emission



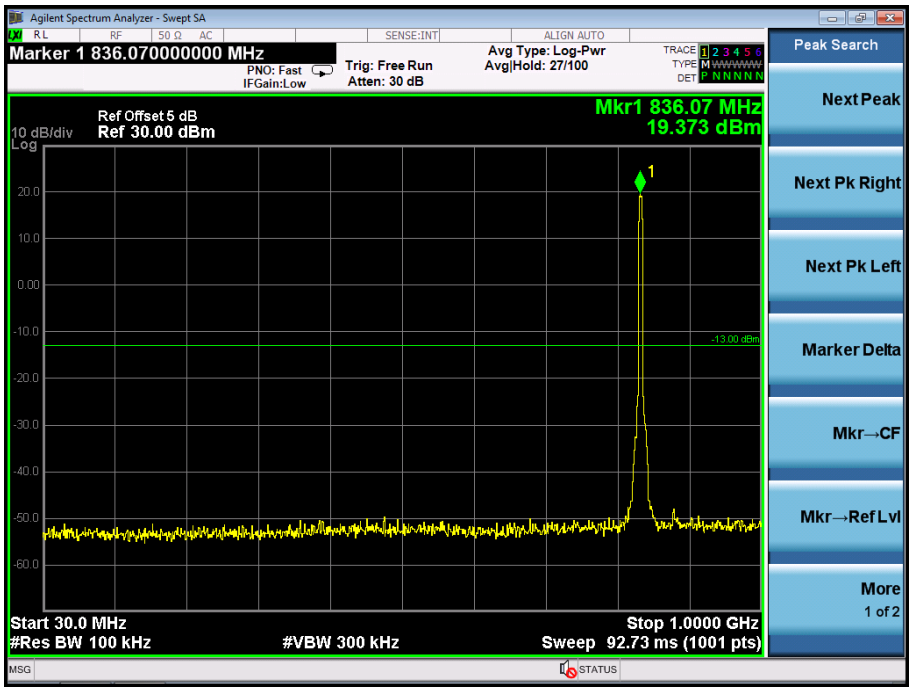
WCDMA High Band Spurious Emission



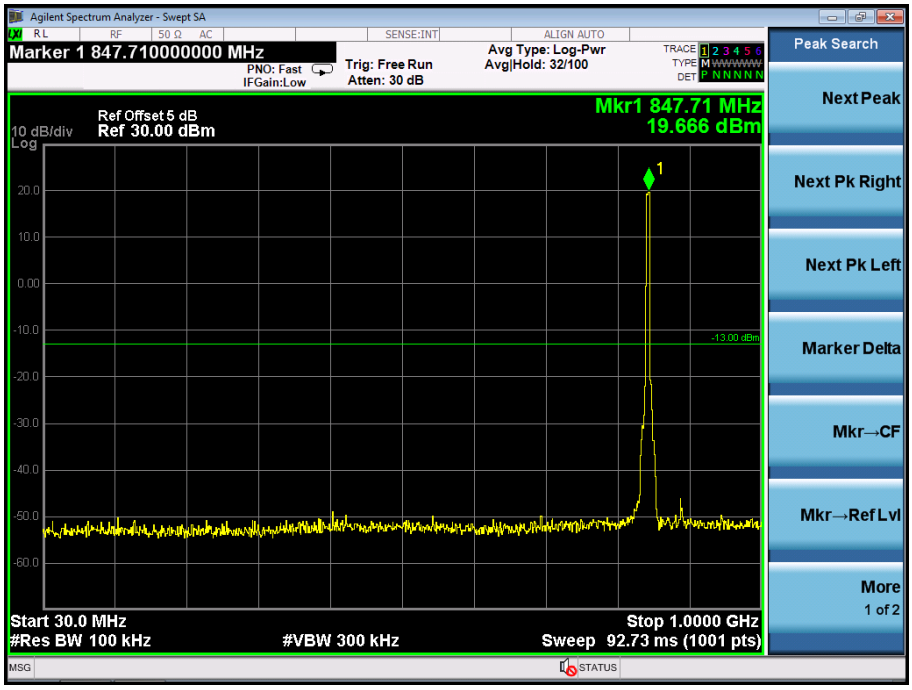
HSDPA Low Channel



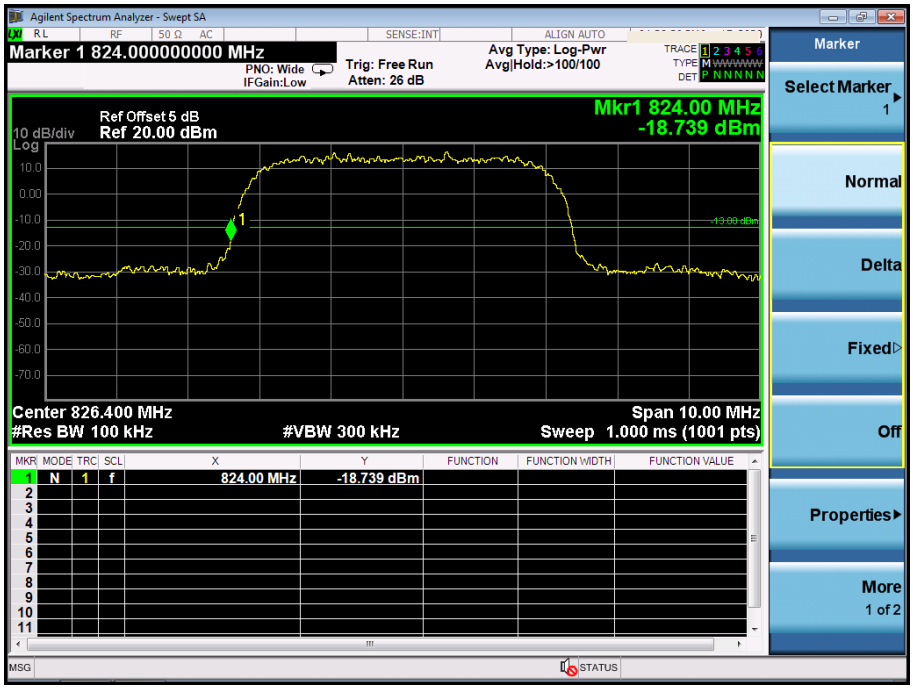
HSDPA Middle Channel



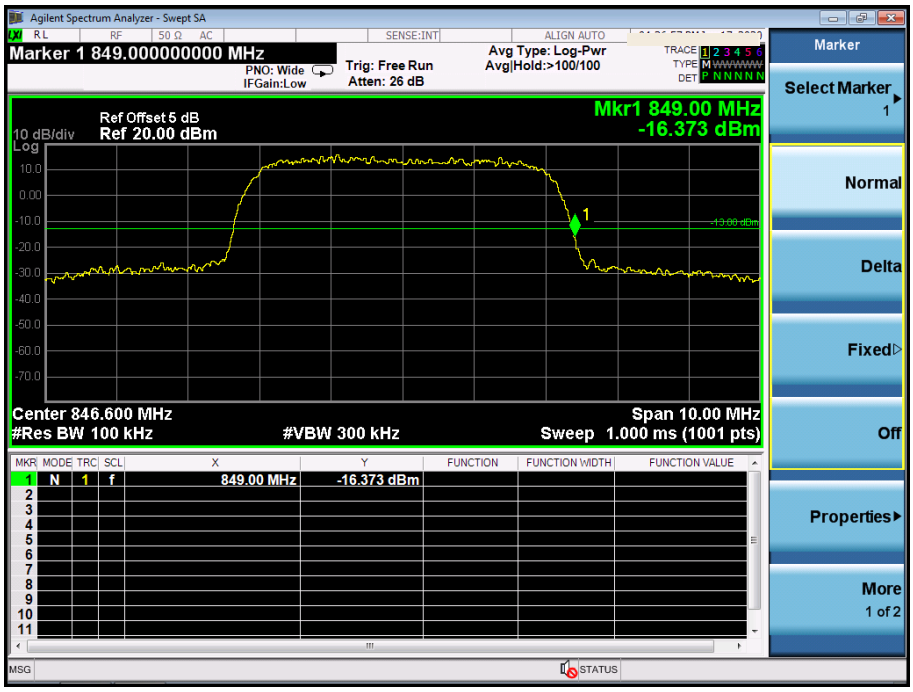
HSDPA High Channel



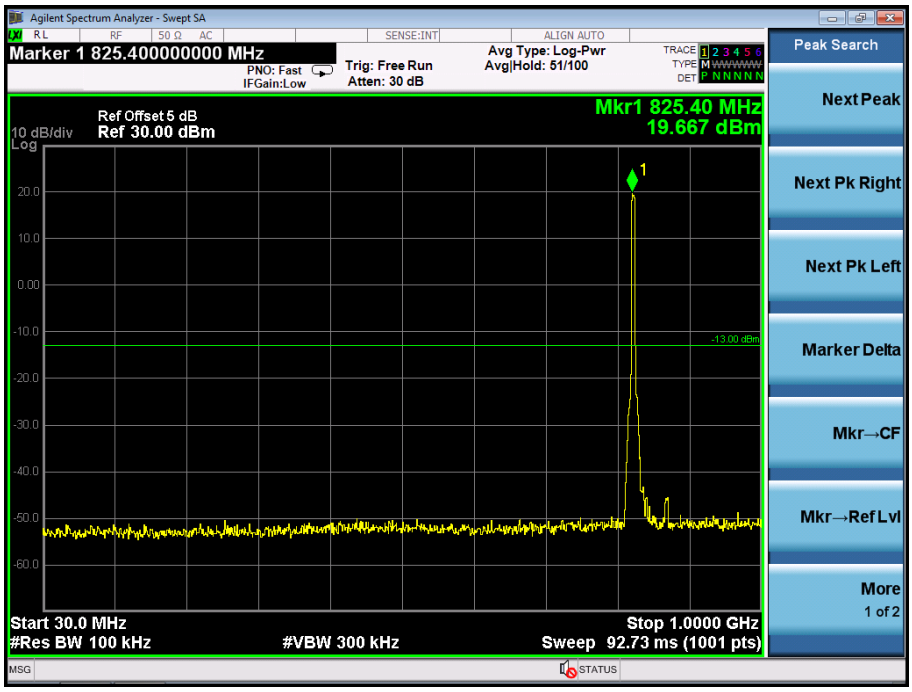
HSDPA Low Band Spurious Emission



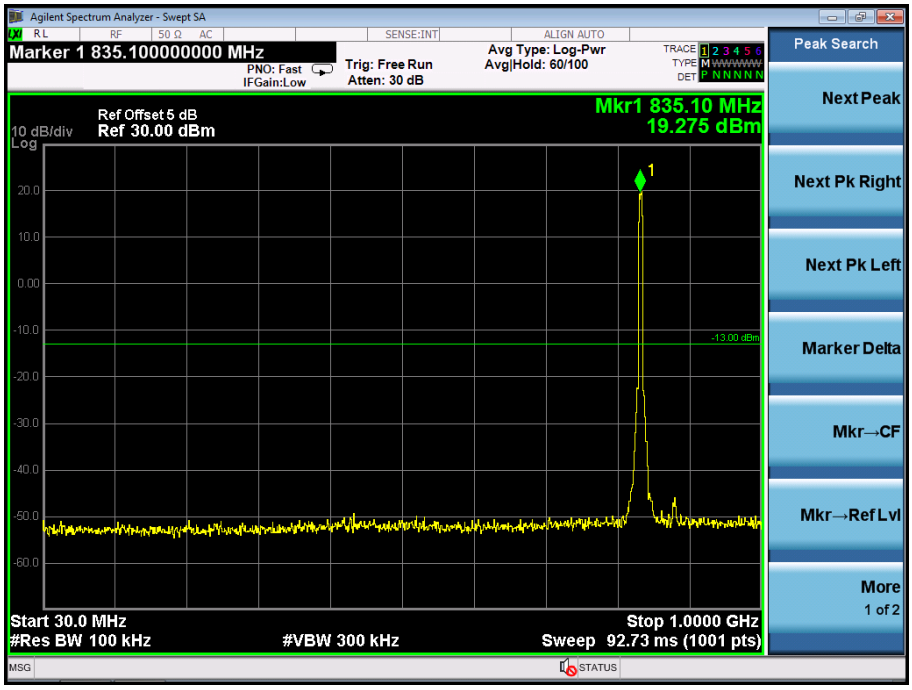
HSDPA High Band Spurious Emission



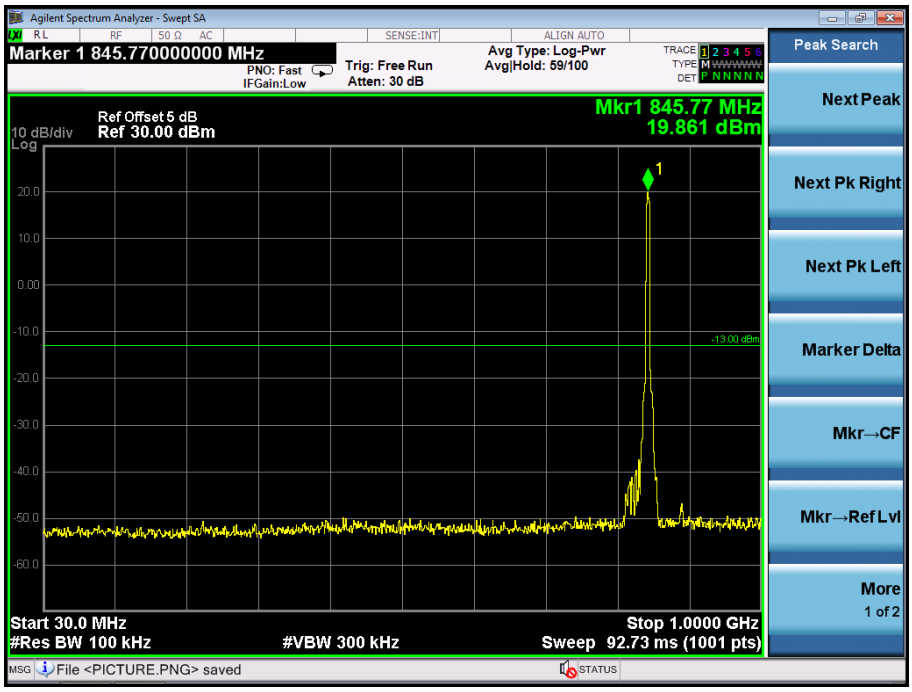
HSUPALow Channel



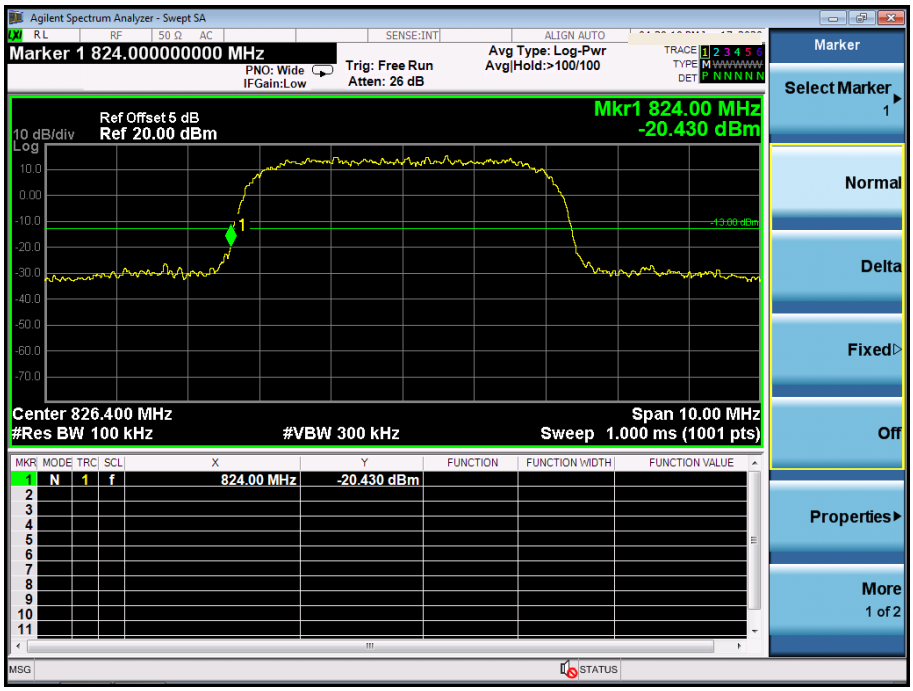
HSUPA Middle Channel



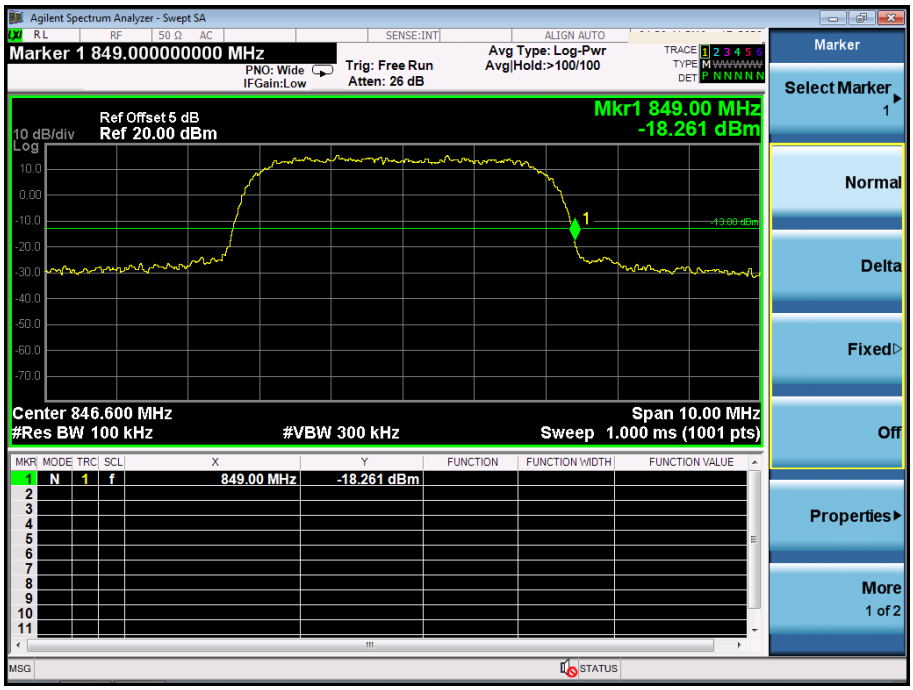
HSUPA High Channel



HSUPA Low Band Spurious Emission

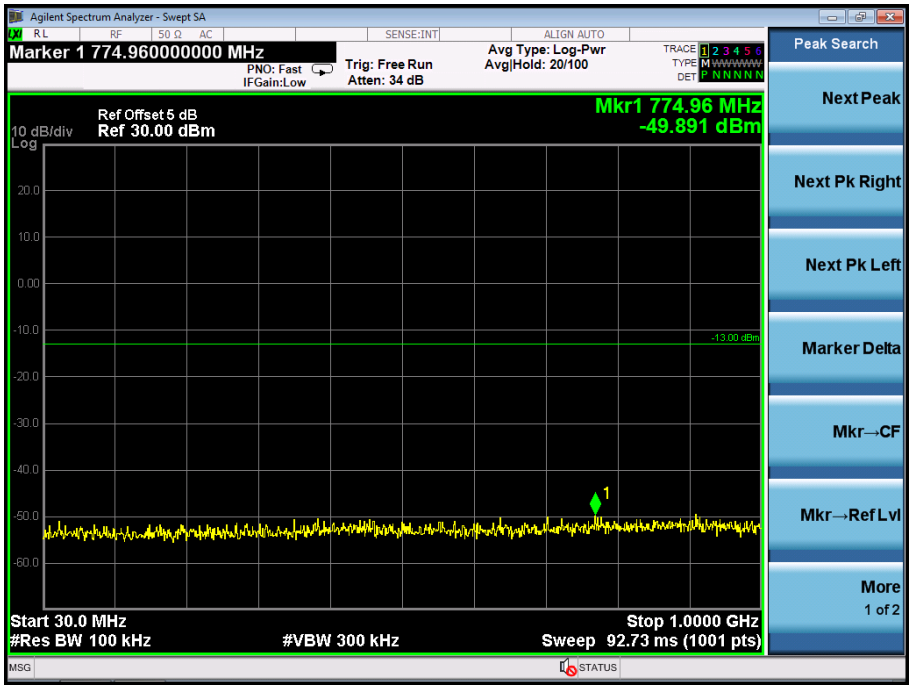


HSUPA High Band Spurious Emission

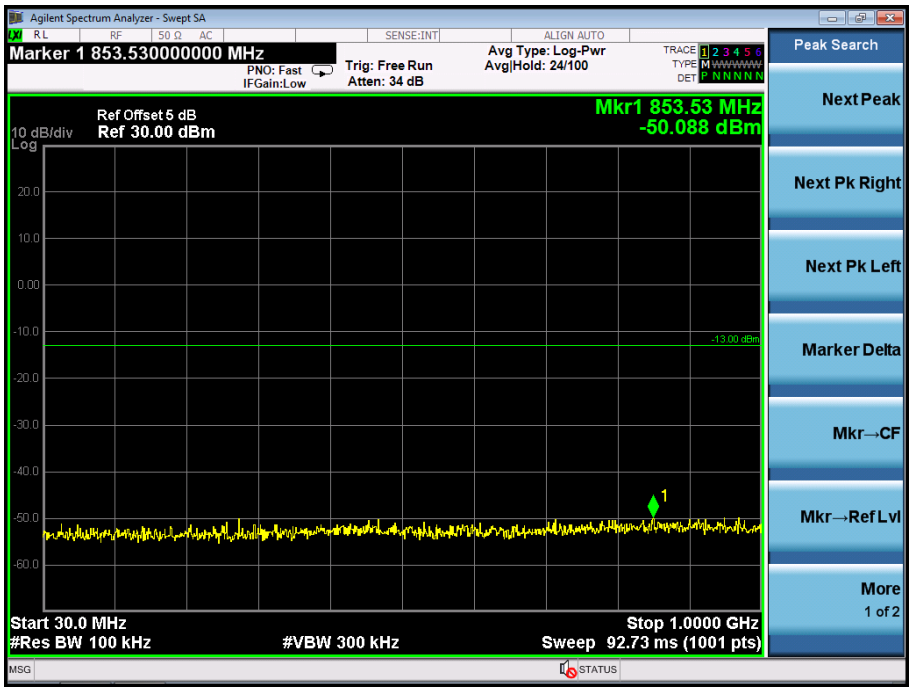


For Band II

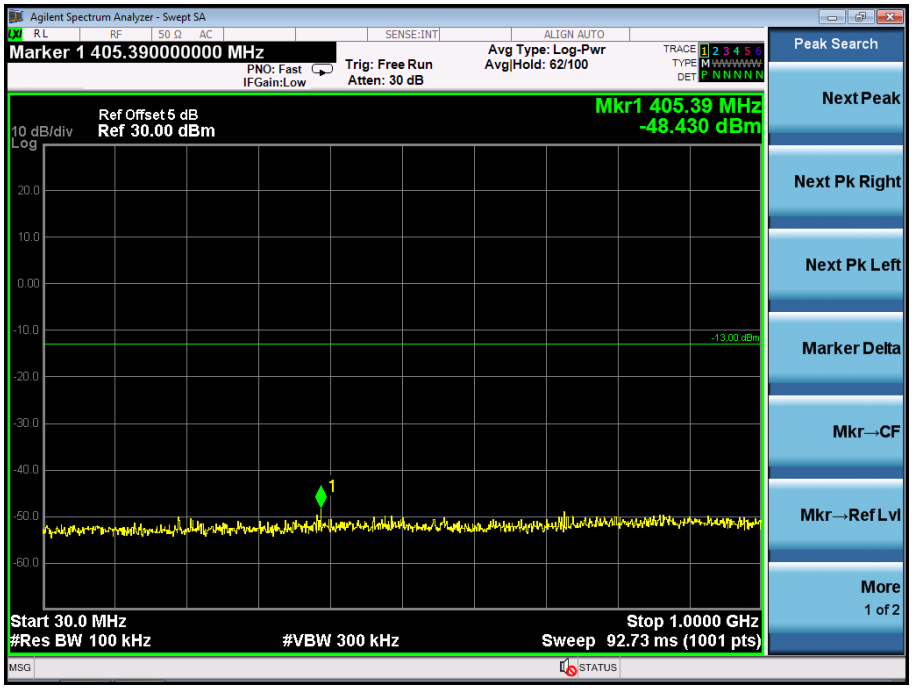
WCDMA Low Channel



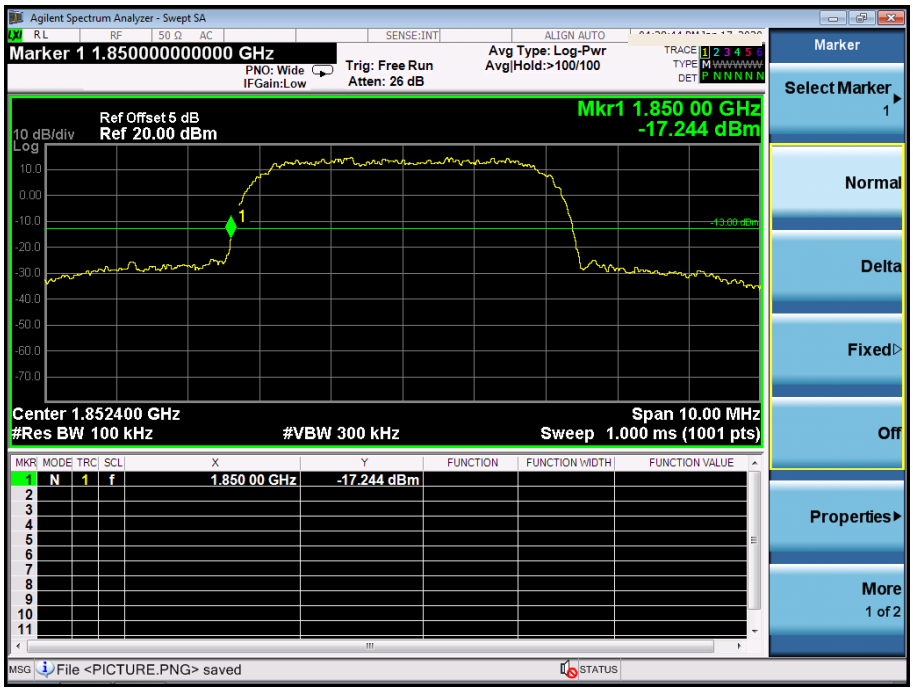
WCDMA Middle Channel



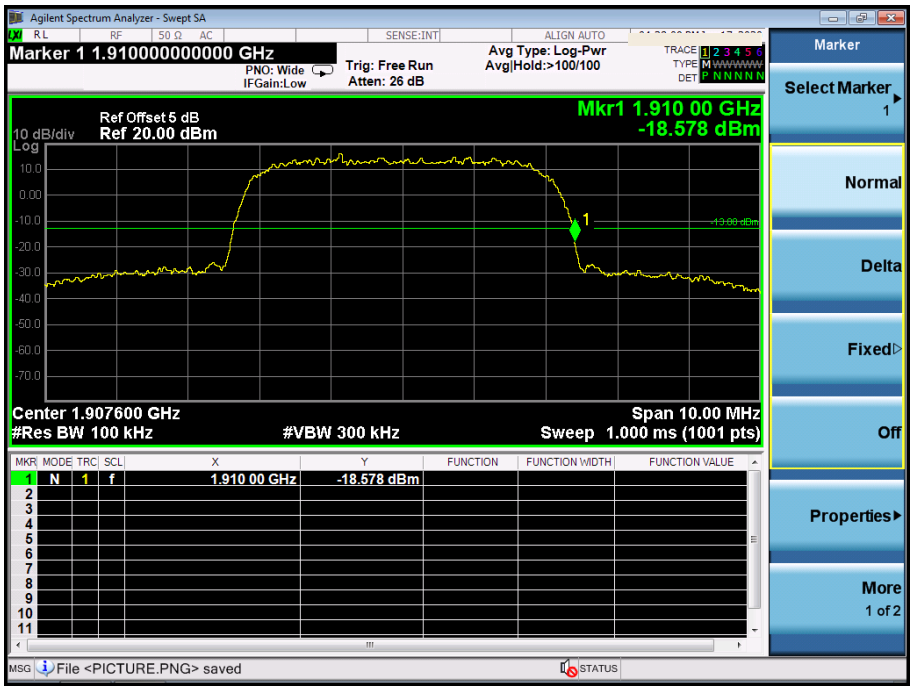
WCDMA High Channel



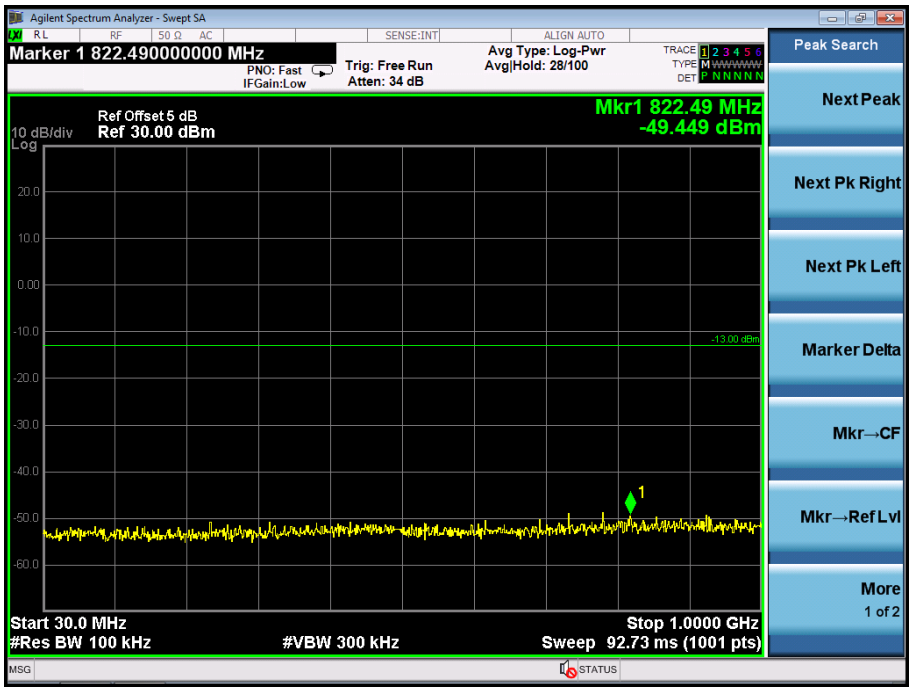
WCDMA Low Band Spurious Emission



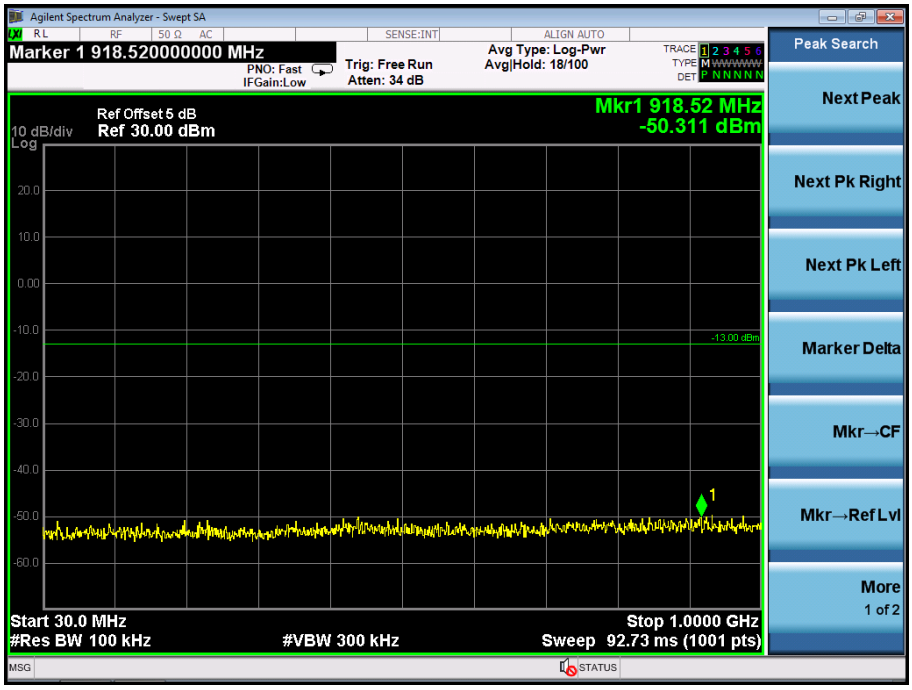
WCDMA High Band Spurious Emission



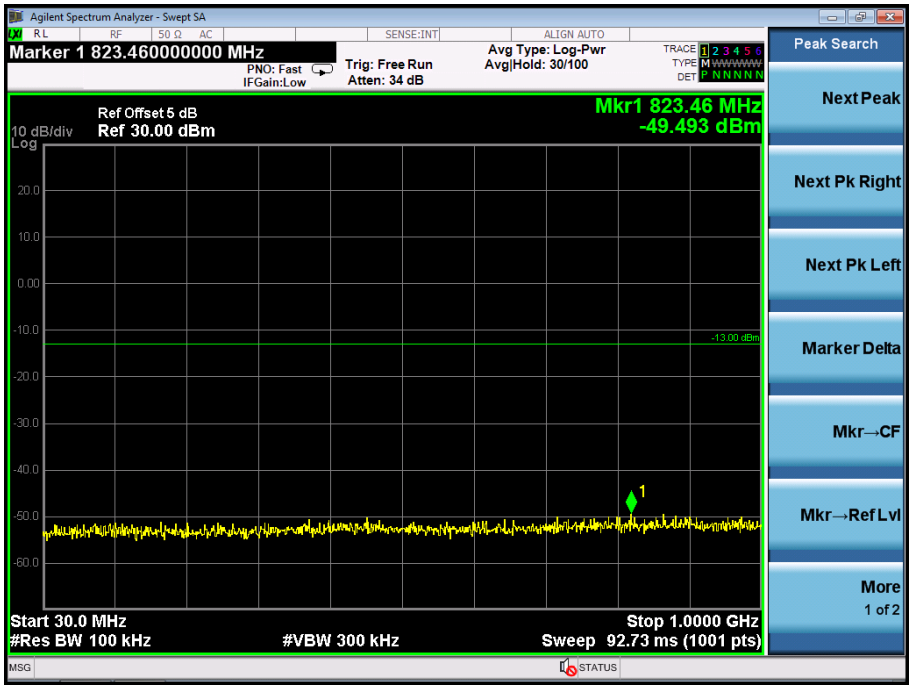
HSDPALow Channel



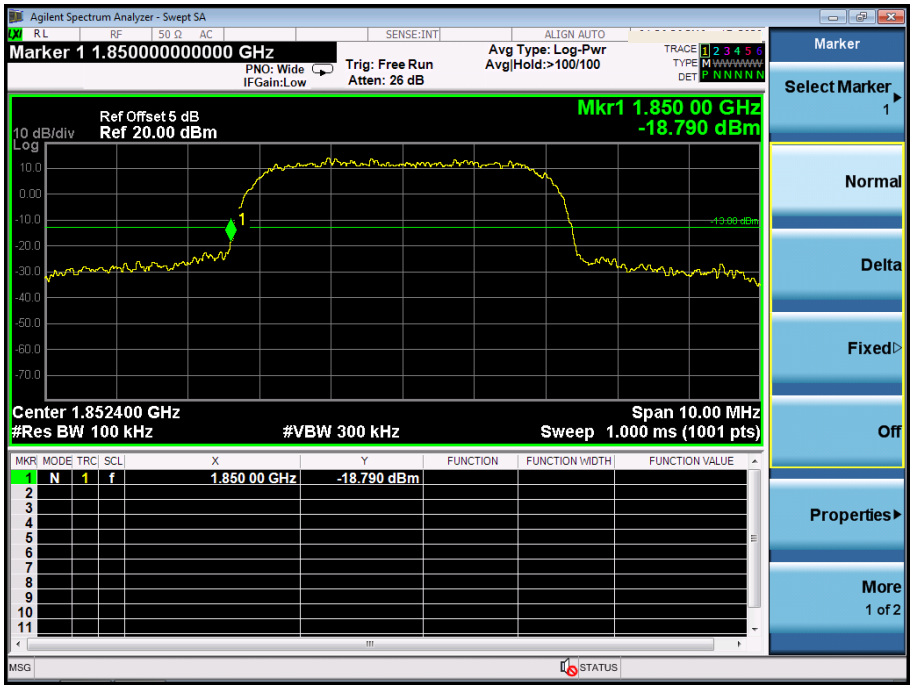
HSDPA Middle Channel



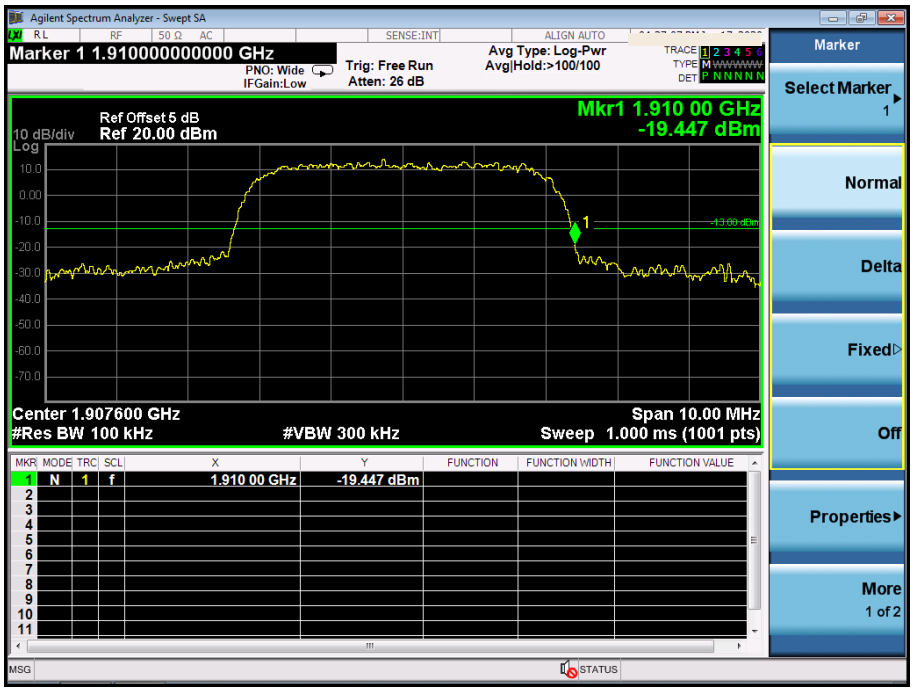
HSDPA High Channel



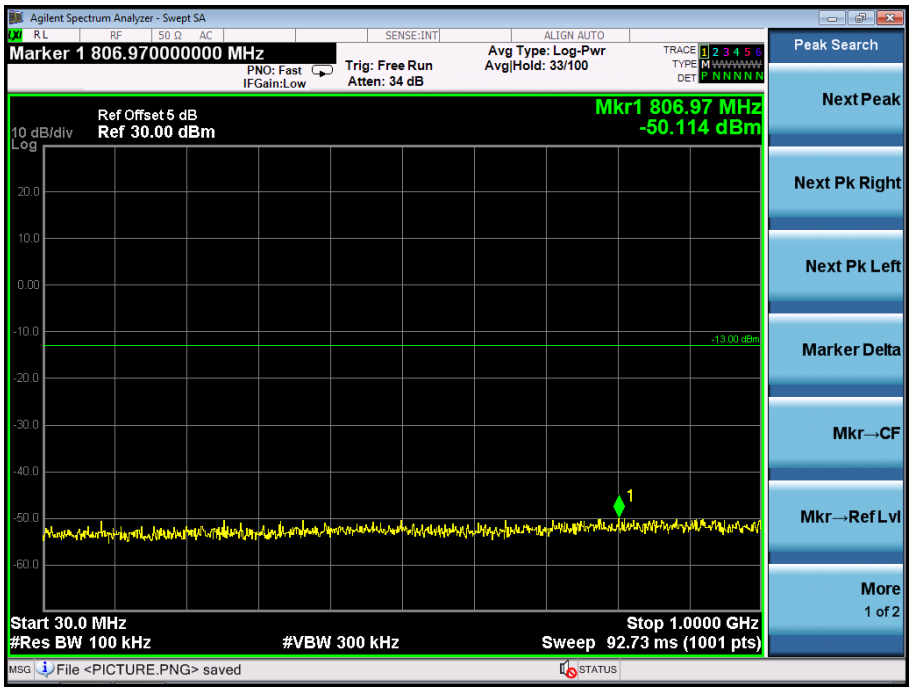
HSDPA Low Band Spurious Emission



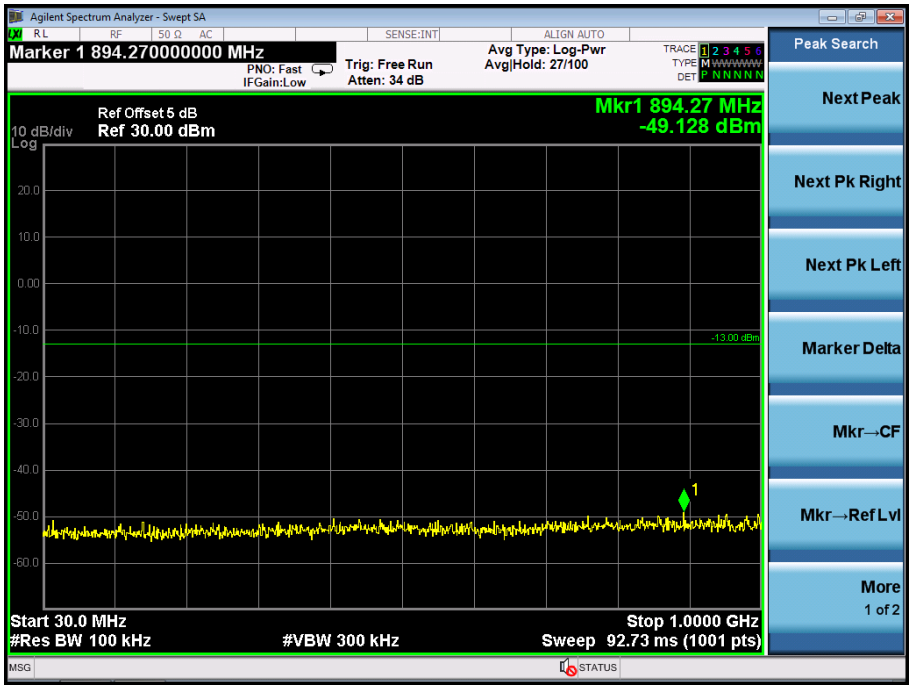
HSDPA High Band Spurious Emission



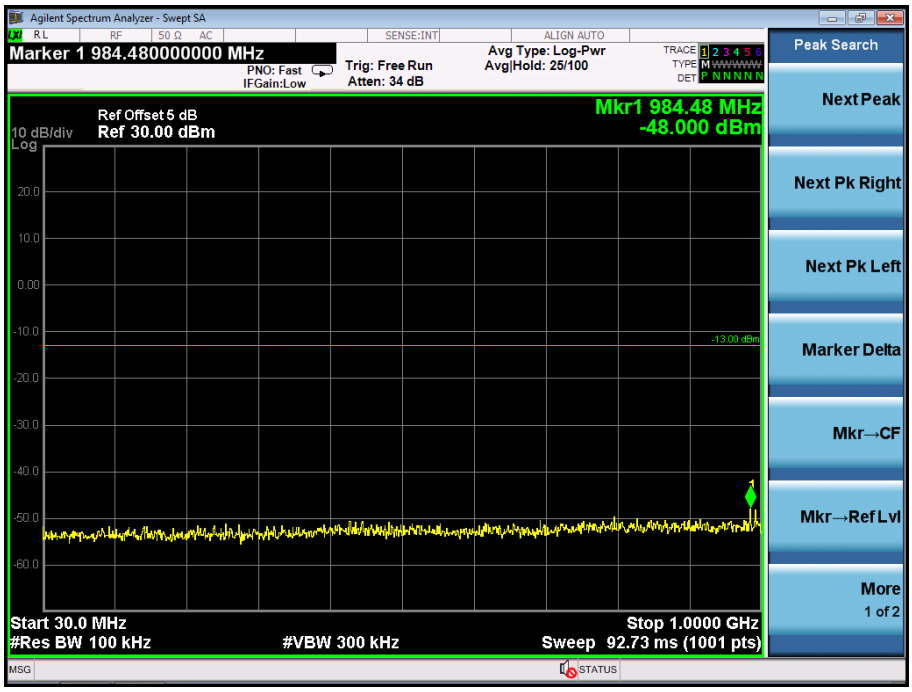
HSUPALow Channel



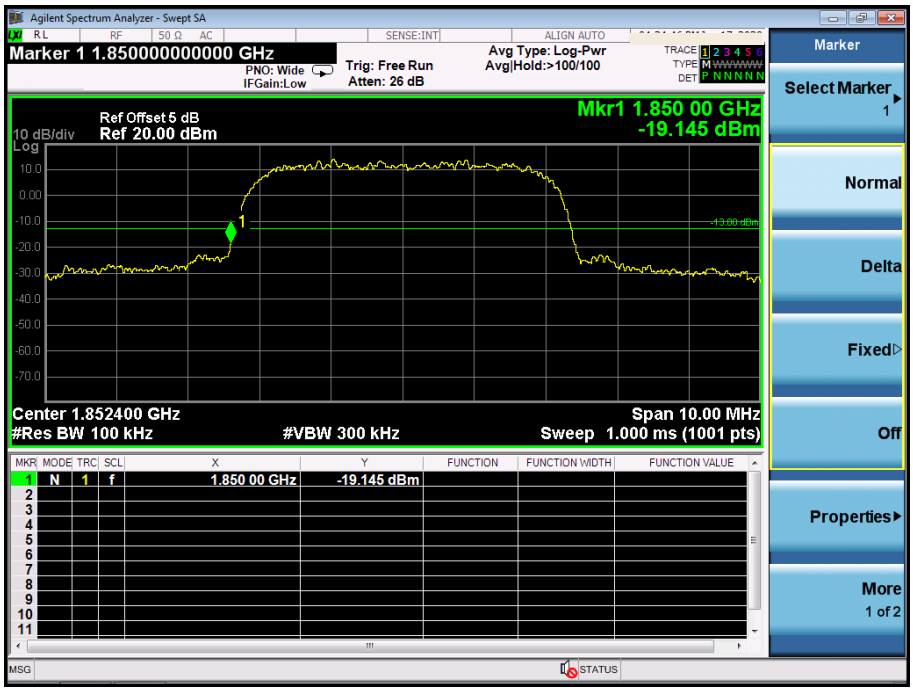
HSUPA Middle Channel



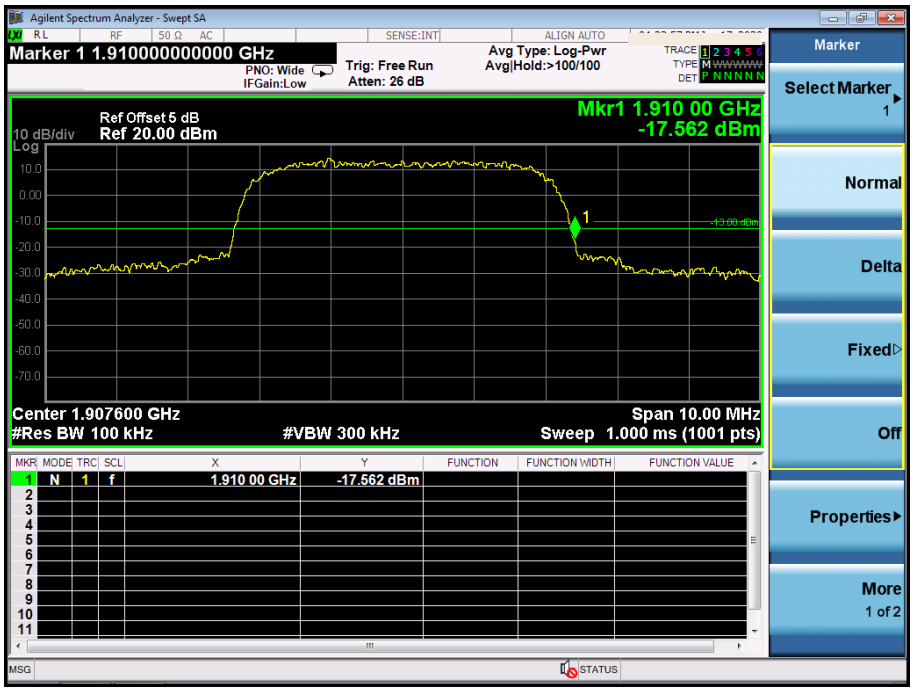
HSUPA High Channel



HSUPA Low Band Spurious Emission



HSUPA High Band Spurious Emission



7. Spurious Radiated Emissions

7.1Standard Applicable

According to §22.917(a), the power of any emissions 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.

According to §24.238(a), the power of any emissions 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.

7.2Test Procedure

1. The setup of EUT is according with per ANSI/TIA Standard 603D and ANSI C63.4-2014 measurement procedure.
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. The frequency range up to tenth harmonic of the fundamental frequency was investigated.
4. 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.

Spurious attenuation limit in dB =43+10 Log_{10} (power out in Watts)

7.3Environmental Conditions

Temperature:	26 °C
Relative Humidity:	54%
ATM Pressure:	101 kPa
Test Voltage	DC6.4V

7.4Summary of Test Results/Plots

According to the data below, the FCC Part22.917 and 24.238 standards, and had the worst margin of:

Note: this EUT was tested in 3 orthogonal positions and the worst case position data was reported.

All test modes are performed, but only the worst case is recorded in this report.

For Cellular Band_GSM850 Mode

Frequency (MHz)	Reading (dBm)	Correct dB	Result (dBm)	Limit (dBm)	Margin (dB)	Polar H/V
Low Channel (824.2MHz)						
46.34	-69.29	4.34	-64.95	-13.00	-51.95	H
1648.4	-54.15	4.94	-49.21	-13.00	-36.21	H
2472.6	-52.93	8.46	-44.47	-13.00	-31.47	H
46.34	-69.17	4.34	-64.83	-13.00	-51.83	V
1648.4	-50.38	4.94	-45.44	-13.00	-32.44	V
2472.6	-50.94	8.46	-42.48	-13.00	-29.48	V
Middle Channel (836.6MHz)						
46.34	-68.61	4.34	-64.27	-13.00	-51.27	H
1673.2	-54.16	5.11	-49.05	-13.00	-36.05	H
2509.8	-52.93	8.54	-44.39	-13.00	-31.39	H
46.34	-68.72	4.34	-64.38	-13.00	-51.38	V
1673.2	-50.38	5.11	-45.27	-13.00	-32.27	V
2509.8	-50.99	8.54	-42.45	-13.00	-29.45	V
High Channel (848.8MHz)						
46.34	-69.15	4.34	-64.81	-13.00	-51.81	H
1697.6	-49.13	5.29	-43.84	-13.00	-30.84	H
2546.4	-51.42	8.59	-42.83	-13.00	-29.83	H
46.34	-69.20	4.34	-64.86	-13.00	-51.86	V
1697.6	-49.36	5.29	-44.07	-13.00	-31.07	V
2546.4	-51.73	8.59	-43.14	-13.00	-30.14	V

For PCS Band_GSM1900 Mode

Frequency (MHz)	Reading (dBm)	Correct dB	Result (dBm)	Limit (dBm)	Margin (dB)	Polar H/V
Low Channel (1850.2MHz)						
46.34	-69.22	4.34	-64.88	-13.00	-51.88	H
3700.4	-53.35	10.54	-42.81	-13.00	-29.81	H
5550.6	-56.25	13.37	-42.88	-13.00	-29.88	H
46.34	-68.54	4.34	-64.20	-13.00	-51.20	V
3700.4	-52.76	10.54	-42.22	-13.00	-29.22	V
5550.6	-56.32	13.37	-42.95	-13.00	-29.95	V
Middle Channel (1880MHz)						
46.34	-68.81	4.34	-64.47	-13.00	-51.47	H
3760.0	-51.45	10.64	-40.81	-13.00	-27.81	H
5640.0	-56.51	13.54	-42.97	-13.00	-29.97	H
46.34	-69.14	4.34	-64.80	-13.00	-51.80	V
3760.0	-51.32	10.64	-40.68	-13.00	-27.68	V
5640.0	-56.14	13.54	-42.6	-13.00	-29.60	V
High Channel (1909.8MHz)						
46.34	-69.50	4.34	-65.16	-13.00	-52.16	H
3819.6	-53.18	10.74	-42.44	-13.00	-29.44	H
5729.4	-56.65	13.71	-42.94	-13.00	-29.94	H
46.34	-68.88	4.34	-64.54	-13.00	-51.54	V
3819.6	-53.25	10.74	-42.51	-13.00	-29.51	V
5729.4	-56.11	13.71	-42.4	-13.00	-29.40	V

For Band 5 Mode

Frequency	Reading	Correct	Result	Limit	Margin	Polar
(MHz)	(dBm)	dB	(dBm)	(dBm)	(dB)	H/V
Low Channel (826.4MHz)						
46.34	-69.19	4.34	-64.85	-13.00	-51.85	H
1652.8	-58.43	4.94	-53.49	-13.00	-40.49	H
2479.2	-58.45	8.46	-49.99	-13.00	-36.99	H
46.34	-69.24	4.34	-64.90	-13.00	-51.90	V
1652.8	-57.12	4.94	-52.18	-13.00	-39.18	V
2479.2	-58.53	8.46	-50.07	-13.00	-37.07	V
Middle Channel (836.6MHz)						
46.34	-69.47	4.34	-65.13	-13.00	-52.13	H
1672.8	-57.47	5.11	-52.36	-13.00	-39.36	H
2509.2	-57.54	8.54	-49.00	-13.00	-36.00	H
46.34	-69.17	4.34	-64.83	-13.00	-51.83	V
1672.8	-58.32	5.11	-53.21	-13.00	-40.21	V
2509.2	-59.47	8.54	-50.93	-13.00	-37.93	V
High Channel (846.6MHz)						
46.34	-69.45	4.34	-65.11	-13.00	-52.11	H
1693.2	-56.43	5.29	-51.14	-13.00	-38.14	H
2539.8	-59.23	8.59	-50.64	-13.00	-37.64	H
46.34	-68.81	4.34	-64.47	-13.00	-51.47	V
1693.2	-57.11	5.29	-51.82	-13.00	-38.82	V
2539.8	-58.32	8.59	-49.73	-13.00	-36.73	V

For Band 2 Mode

Frequency (MHz)	Reading (dBm)	Correct dB	Result (dBm)	Limit (dBm)	Margin (dB)	Polar H/V
Low Channel (1852.4MHz)						
46.34	-69.29	4.34	-64.95	-13.00	-51.95	H
3704.8	-57.43	10.17	-47.26	-13.00	-34.26	H
5557.2	-58.17	14.69	-43.48	-13.00	-30.48	H
46.34	-68.83	4.34	-64.49	-13.00	-51.49	V
3704.8	-58.54	10.17	-48.37	-13.00	-35.37	V
5557.2	-58.56	14.69	-43.87	-13.00	-30.87	V
Middle Channel (1880MHz)						
46.34	-68.94	4.34	-64.60	-13.00	-51.60	H
3760.8	-58.46	10.26	-48.20	-13.00	-35.20	H
5640.0	-57.46	14.78	-42.68	-13.00	-29.68	H
46.34	-68.72	4.34	-64.38	-13.00	-51.38	V
3760.8	-57.87	10.26	-47.61	-13.00	-34.61	V
5640.0	-58.12	14.78	-43.34	-13.00	-30.34	V
High Channel (1907.6MHz)						
46.34	-69.42	4.34	-65.08	-13.00	-52.08	H
3815.2	-58.25	10.59	-47.66	-13.00	-34.66	H
5722.8	-58.14	15.03	-43.11	-13.00	-30.11	H
46.34	-69.15	4.34	-64.81	-13.00	-51.81	V
3815.2	-58.38	10.59	-47.79	-13.00	-34.79	V
5722.8	-57.62	15.03	-42.59	-13.00	-29.59	V

Note: Result=Reading+ Correct, Margin= Result- Limit

Note: Testing is carried out with frequency rang 9kHz to the tenth harmonics, other than listedin the table above are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

8. Frequency Stability

8.1 Standard Applicable

According to §22.355, the carrier frequency of each transmitter in the Public Mobile Services must be maintained within the tolerances given in Table below:

Frequency Tolerance for Cellular Band

Frequency range (MHz)	Base, fixed (ppm)	Mobile >3 watts (ppm)	Mobile ≤3 watts (ppm)
25 to 50	20.0	20.0	50.0
50 to 450	5.0	5.0	50.0
450 to 512	2.5	5.0	5.0
821 to 896	1.5	2.5	2.5
928 to 929	5.0	N/A	N/A
929 to 960	1.5	N/A	N/A
2110 to 2220	10.0	N/A	N/A

According to §24.235, the frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

According to §27.54 The frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized bands of operation.

8.2Test Procedure

According to §2.1055, the following test procedure was performed.
The Frequency Stability is measured directly with a Frequency Domain Analyzer. Frequency Deviation in ppm is calculated from the measured peak to peak value.
The Carrier Frequency Stability over Power Supply Voltage and over Temperature is measured with a Frequency Domain Analyzer in histogram mode

8.3Environmental Conditions

Temperature:	26°C
Relative Humidity:	54%
ATM Pressure:	101kPa

8.4Summary of Test Results/Plots

For Cellular Band GSM Mode

Reference Frequency(Middle Channel): 836.6 MHz, Limit: 2.5ppm			
Environment Temperature (°C)	Power Supplied (VDC)	Frequency Measure with Time Elapsed	
		MCF (Hz)	Error (ppm)
50	6.4	77	0.0920
40	6.4	75	0.0070
30	6.4	62	0.0074
20	6.4	66	0.0789
10	6.4	71	0.0849
0	6.4	65	0.0777
-10	6.4	50	0.0598
-20	6.4	61	0.0729
-30	6.4	58	0.0693

For PCS Band GSM Mode

Reference Frequency(Middle Channel): 1880 MHz, Limit: 2.5ppm			
Environment Temperature (°C)	Power Supplied (VDC)	Frequency Measure with Time Elapsed	
		MCF (Hz)	Error (ppm)
50	6.4	48	0.0255
40	6.4	45	0.0239
30	6.4	41	0.0218
20	6.4	50	0.0266
10	6.4	46	0.0245
0	6.4	50	0.0266
-10	6.4	61	0.0324
-20	6.4	58	0.0309
-30	6.4	64	0.0340

For Cellular Band GPRS Mode

Reference Frequency(Middle Channel): 836.6MHz, Limit: 2.5ppm			
Environment Temperature (°C)	Power Supplied (VDC)	Frequency Measure with Time Elapsed	
		MCF (Hz)	Error (ppm)
50	6.4	63	0.0753
40	6.4	59	0.0705
30	6.4	54	0.0645
20	6.4	52	0.0622
10	6.4	57	0.0681
0	6.4	51	0.0610
-10	6.4	36	0.0430
-20	6.4	47	0.0562
-30	6.4	44	0.0526

For PCS Band GPRS Mode

Reference Frequency(Middle Channel): 1880 MHz, Limit: 2.5ppm			
Environment Temperature (°C)	Power Supplied (VDC)	Frequency Measure with Time Elapsed	
		MCF (Hz)	Error (ppm)
50	6.4	72	0.0383
40	6.4	69	0.0367
30	6.4	65	0.0346
20	6.4	74	0.0394
10	6.4	70	0.0372
0	6.4	74	0.0394
-10	6.4	75	0.0399
-20	6.4	61	0.0324
-30	6.4	64	0.0340

For Cellular Band EDGE Mode

Reference Frequency(Middle Channel): 836.6MHz, Limit: 2.5ppm			
Environment Temperature (°C)	Power Supplied (VDC)	Frequency Measure with Time Elapsed	
		MCF (Hz)	Error (ppm)
50	6.4	65	0.0777
40	6.4	61	0.0729
30	6.4	56	0.0669
20	6.4	54	0.0645
10	6.4	59	0.0705
0	6.4	53	0.0634
-10	6.4	38	0.0454
-20	6.4	51	0.0610
-30	6.4	46	0.0550

For PCS Band EDGE Mode

Reference Frequency(Middle Channel): 1880 MHz, Limit: 2.5ppm			
Environment Temperature (°C)	Power Supplied (VDC)	Frequency Measure with Time Elapsed	
		MCF (Hz)	Error (ppm)
50	6.4	67	0.0356
40	6.4	64	0.0340
30	6.4	60	0.0319
20	6.4	69	0.0367
10	6.4	65	0.0346
0	6.4	69	0.0367
-10	6.4	70	0.0372
-20	6.4	55	0.0293
-30	6.4	59	0.0314

For WCDMA Band 5 Mode

Reference Frequency(Middle Channel): 836.6 MHz, Limit: 2.5ppm			
Environment Temperature (°C)	Power Supplied (VDC)	Frequency Measure with Time Elapsed	
		MCF (Hz)	Error (ppm)
50	6.4	69	0.0825
40	6.4	65	0.0777
30	6.4	60	0.0717
20	6.4	58	0.0693
10	6.4	63	0.0753
0	6.4	57	0.0681
-10	6.4	42	0.0502
-20	6.4	53	0.0634
-30	6.4	50	0.0598

For WCDMA Band 2 Mode

Reference Frequency(Middle Channel): 1880 MHz, Limit: 2.5ppm			
Environment Temperature (°C)	Power Supplied (VDC)	Frequency Measure with Time Elapsed	
		MCF (Hz)	Error (ppm)
50	6.4	64	0.0340
40	6.4	51	0.0271
30	6.4	47	0.0250
20	6.4	56	0.0298
10	6.4	42	0.0223
0	6.4	31	0.0165
-10	6.4	77	0.0410
-20	6.4	60	0.0319
-30	6.4	50	0.0266

For HSDPA Band 5 Mode

Reference Frequency(Middle Channel): 836.6 MHz, Limit: 2.5ppm			
Environment Temperature (°C)	Power Supplied (VDC)	Frequency Measure with Time Elapsed	
		MCF (Hz)	Error (ppm)
50	6.4	67	0.0801
40	6.4	63	0.0753
30	6.4	58	0.0693
20	6.4	56	0.0669
10	6.4	61	0.0729
0	6.4	55	0.0657
-10	6.4	40	0.0478
-20	6.4	53	0.0634
-30	6.4	48	0.0574

For HSDPA Band 2 Mode

Reference Frequency(Middle Channel): 1880 MHz, Limit: 2.5ppm			
Environment Temperature (°C)	Power Supplied (VDC)	Frequency Measure with Time Elapsed	
		MCF (Hz)	Error (ppm)
50	6.4	59	0.0314
40	6.4	46	0.0245
30	6.4	42	0.0223
20	6.4	51	0.0271
10	6.4	37	0.0197
0	6.4	26	0.0138
-10	6.4	72	0.0383
-20	6.4	55	0.0293
-30	6.4	43	0.0228

For HSUPA Band 5 Mode

Reference Frequency(Middle Channel): 836.6 MHz, Limit: 2.5ppm			
Environment Temperature (°C)	Power Supplied (VDC)	Frequency Measure with Time Elapsed	
		MCF (Hz)	Error (ppm)
50	6.4	73	0.0873
40	6.4	71	0.0849
30	6.4	66	0.0789
20	6.4	64	0.0765
10	6.4	69	0.0825
0	6.4	63	0.0753
-10	6.4	48	0.0574
-20	6.4	59	0.0705
-30	6.4	54	0.0645

For HSUPA Band 2 Mode

Reference Frequency(Middle Channel): 1880 MHz, Limit: 2.5ppm			
Environment Temperature (°C)	Power Supplied (VDC)	Frequency Measure with Time Elapsed	
		MCF (Hz)	Error (ppm)
50	6.4	76	0.0404
40	6.4	58	0.0309
30	6.4	54	0.0287
20	6.4	63	0.0335
10	6.4	49	0.0261
0	6.4	38	0.0202
-10	6.4	84	0.0447
-20	6.4	67	0.0356
-30	6.4	53	0.0282

So, Frequency Stability Versus Input Voltage is:

Reference Frequency(Middle Channel): GSM 836.6MHz, Limit: 2.5ppm			
Environment Temperature (°C)	Power Supplied (VDC)	Frequency Measure with Time Elapsed	
		Frequency (Hz)	Error (ppm)
20	5.44	70	0.0837
	6.40	66	0.0789
	7.36	67	0.0800
Reference Frequency(Middle Channel): GSM 1880 MHz, Limit: 2.5ppm			
Environment Temperature (°C)	Power Supplied (VDC)	Frequency Measure with Time Elapsed	
		Frequency (Hz)	Error (ppm)
20	5.44	51	0.0271
	6.40	53	0.0282
	7.36	52	0.0277
Reference Frequency(Middle Channel): GPRS 836.6MHz, Limit: 2.5ppm			
Environment Temperature (°C)	Power Supplied (VDC)	Frequency Measure with Time Elapsed	
		Frequency (Hz)	Error (ppm)
20	5.44	47	0.0562
	6.40	52	0.0622
	7.36	51	0.0610
Reference Frequency(Middle Channel): GPRS 1880 MHz, Limit: 2.5ppm			
Environment Temperature (°C)	Power Supplied (VDC)	Frequency Measure with Time Elapsed	
		Frequency (Hz)	Error (ppm)
20	5.44	73	0.0388
	6.40	74	0.0394
	7.36	74	0.0394

Reference Frequency(Middle Channel): EDGE 836.6MHz, Limit: 2.5ppm			
Environment Temperature (°C)	Power Supplied (VDC)	Frequency Measure with Time Elapsed	
		Frequency (Hz)	Error (ppm)
20	5.44	52	0.0621
	6.40	54	0.0645
	7.36	53	0.0634

Reference Frequency(Middle Channel): EDGE 1880 MHz, Limit: 2.5ppm			
Environment Temperature (°C)	Power Supplied (VDC)	Frequency Measure with Time Elapsed	
		Frequency (Hz)	Error (ppm)
20	5.44	65	0.0346
	6.40	69	0.0367
	7.36	71	0.0378

Reference Frequency(Middle Channel): WCDMA 836.6MHz, Limit: 2.5ppm			
Environment Temperature (°C)	Power Supplied (VDC)	Frequency Measure with Time Elapsed	
		Frequency (Hz)	Error (ppm)
20	5.44	51	0.0610
	6.40	58	0.0693
	7.36	59	0.0705

Reference Frequency(Middle Channel): WCDMA 1732.4MHz, Limit: 2.5ppm			
Environment Temperature (°C)	Power Supplied (VDC)	Frequency Measure with Time Elapsed	
		Frequency (Hz)	Error (ppm)
20	5.44	61	0.0369
	6.40	64	0.0369
	7.36	66	0.0381

Reference Frequency(Middle Channel): WCDMA 1880 MHz, Limit: 2.5ppm			
Environment Temperature (°C)	Power Supplied (VDC)	Frequency Measure with Time Elapsed	
		Frequency (Hz)	Error (ppm)
20	5.44	54	0.0287
	6.40	57	0.0303
	7.36	58	0.0309

Reference Frequency(Middle Channel): HSDPA 836.6MHz, Limit: 2.5ppm			
Environment Temperature (°C)	Power Supplied (VDC)	Frequency Measure with Time Elapsed	
		Frequency (Hz)	Error (ppm)
20	5.44	54	0.0645
	6.40	55	0.0657
	7.36	57	0.0681

Reference Frequency(Middle Channel): HSDPA 1732.4MHz, Limit: 2.5ppm			
Environment Temperature (°C)	Power Supplied (VDC)	Frequency Measure with Time Elapsed	
		Frequency (Hz)	Error (ppm)
20	5.44	56	0.0323
	6.40	55	0.0317
	7.36	53	0.0306

Reference Frequency(Middle Channel): HSDPA 1880 MHz, Limit: 2.5ppm			
Environment Temperature (°C)	Power Supplied (VDC)	Frequency Measure with Time Elapsed	
		Frequency (Hz)	Error (ppm)
20	5.44	53	0.0282
	6.40	51	0.0271
	7.36	48	0.0255

Reference Frequency(Middle Channel): HSUPA 836.6MHz, Limit: 2.5ppm			
Environment Temperature (°C)	Power Supplied (VDC)	Frequency Measure with Time Elapsed	
		Frequency (Hz)	Error (ppm)
20	5.44	65	0.0777
	6.40	64	0.0765
	7.36	66	0.0789

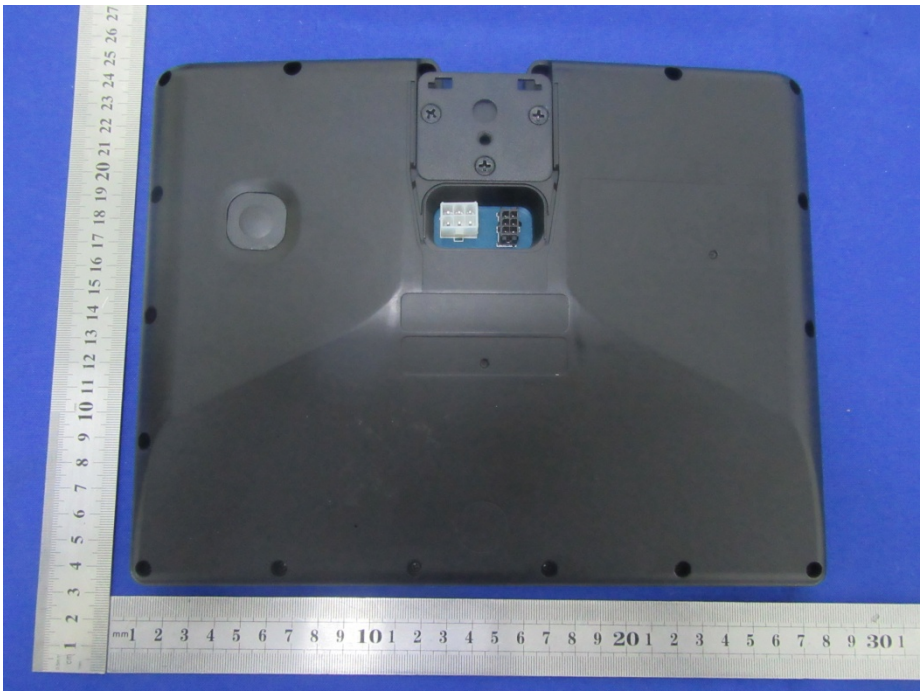
Reference Frequency(Middle Channel): HSUPA 1732.4MHz, Limit: 2.5ppm			
Environment Temperature (°C)	Power Supplied (VDC)	Frequency Measure with Time Elapsed	
		Frequency (Hz)	Error (ppm)
20	5.44	67	0.0387
	6.40	65	0.0375
	7.36	62	0.0358

Reference Frequency(Middle Channel): HSUPA 1880 MHz, Limit: 2.5ppm			
Environment Temperature (°C)	Power Supplied (VDC)	Frequency Measure with Time Elapsed	
		Frequency (Hz)	Error (ppm)
20	5.44	64	0.0340
	6.40	63	0.0335
	7.36	68	0.0362

9. EUT PHOTO

EUT Photo 1

EUT Photo 2



10. EUT TEST PHOTO

Radiated Measurement Photos

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