

FCC Part 22H & 24E Measurement and Test Report

For

SHEN ZHEN TOMSTAR TECHNOLOGY CO., LTD

Room2110-2116, huafeng international building, No.4018 BaoAn

Blvd, Shenzhen, China

FCC ID: 2APD3AM-M701

FCC Rules: FCC Part 22H, FCC Part 24E

Product Description: AM-M701

Tested Model: AM-M701

Report No.: STR18048216I

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Note: This test report is limited to the above client company and the product model only. It may not be duplicated without prior permitted by Shenzhen SEM. Test Technology Co., Ltd.

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1. GENERAL INFORMATION

1.1 Product Description for Equipment Under Test (EUT)

Client Information

Applicant: SHEN ZHEN TOMSTAR TECHNOLOGY CO., LTD
Address of applicant: Room2110-2116, huafeng international building, No.4018
BaoAn Blvd, Shenzhen, China

Manufacturer: SHEN ZHEN TOMSTAR TECHNOLOGY CO., LTD
Address of manufacturer: Room2110-2116, huafeng international building, No.4018
BaoAn Blvd, Shenzhen, China

General Description of EUT:	
Product Name:	AM-M701
Brand Name:	/
Model No.:	AM-M701
Adding Model(s):	/
Rated Voltage:	Battery DC 3.8V
Battery:	2800mAh
Adapter Model:	/
Software Version:	/
Hardware Version:	BND_MT8321_MT706_V1.1
Device Category:	Portable Device
<i>The EUT Main board support GPRS850/ GPRS1900, WCDMA Band 2/5 function. It is intended for speech, Multimedia Message Service (MMS) transmission. It is equipped with GPRS class 12 for GPRS850/GPRS1900, For more information see the following datasheet</i>	
<i>Note: The test data is gathered from a production sample provided by the manufacturer.</i>	

Technical Characteristics of EUT:	
2G	
Support Networks:	GPRS
Support Band:	GPRS850/GPRS1900
Uplink Frequency:	GPRS 850: 824~849MHz GPRS 1900: 1850~1910MHz
Downlink Frequency:	GPRS 850: 869~894MHz GPRS 1900: 1930~1990MHz
Max RF Output Power:	GPRS850: 33.52dBm, GPRS1900: 29.60dBm
Type of Emission:	GPRS850: 249KGXW, GPRS1900: 246KGXW
Type of Modulation:	GMSK
Type of Antenna:	Integral Antenna
Antenna Gain:	GPRS850:0.35dBi; GPRS1900: 1.72dBi
GPRS Class:	Class 12
3G	
Support Networks:	WCDMA, HSDPA, HSUPA
Support Band:	WCDMA Band 2, WCDMA Band 5
Uplink Frequency:	WCDMA Band 2: 1850~1910MHz WCDMA Band 5: 824~849MHz
Downlink Frequency:	WCDMA Band 2: 1930~1990MHz WCDMA Band 5: 869~894MHz
RF Output Power:	WCDMA Band 2: 22.77dBm, WCDMA Band 5: 22.51dBm
Type of Emission:	WCDMA Band 2: 4M19F9W WCDMA Band 5: 4M17F9W
Type of Modulation:	BPSK
Antenna Type:	Integral Antenna
Antenna Gain:	WCDMA Band 2: 1.72dBi, WCDMA Band 5: 0.35dBi

1.2 Test Standards

The following report is prepared on behalf of the SHEN ZHEN TOMSTAR TECHNOLOGY CO., LTD in accordance with FCC Part 2 subpart J, FCC Part 22 subpart H and FCC Part 24 subpart E of the Federal Communication Commissions rules.

The objective is to determine compliance with FCC Part 2 subpart J, FCC Part 22 subpart H and FCC Part 24 subpart E of the Federal Communication Commissions rules.

Maintenance of compliance is the responsibility of the manufacturer. Any modification of the product, which result in lowering the emission, should be checked to ensure compliance has been maintained.

1.3 Test Methodology

All measurements contained in this report were conducted with ANSI/TIA-603-D: 2010 and ANSI C63.4-2014, American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the range of 9 kHz to 40 GHz. The measurement guide KDB 971168 D01 Power Meas License Digital Systems v03 shall be performed also.

1.4 Test Facility

FCC – Registration No.: 125990

Shenzhen SEM Test Technology Co., Ltd. Laboratory has been recognized to perform compliance testing on equipment subject to the Commissions Declaration Of Conformity (DOC). The Designation Number is CN5010, and Test Firm Registration Number is 125990.

Industry Canada (IC) Registration No.: 11464A

The 3m Semi-anechoic chamber of Shenzhen SEM.Test Technology Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 11464A.

1.5 EUT Setup and Test Mode

The EUT was operated in the engineering mode to fix the Tx frequency that was for the purpose of the measurements. All testing shall be performed under maximum output power condition, and to measure its highest possible emissions level, more detailed description as follows:

Test Mode List		
Test Mode	Description	Remark
TM1	GPRS 850	Low, Middle, High Channels
TM2	GPRS 1900	Low, Middle, High Channels
TM3	WCDMA Band 5	Low, Middle, High Channels
TM4	HSDPA Band 5	Low, Middle, High Channels
TM5	HSUPA Band 5	Low, Middle, High Channels
TM6	WCDMA Band 2	Low, Middle, High Channels
TM7	HSDPA Band 2	Low, Middle, High Channels
TM8	HSUPA Band 2	Low, Middle, High Channels

Testing Configure			
Support Band	Support Standard	Channel Frequency	Channel Number
GSM 850	GPRS	824.2 MHz	128
		836.6 MHz	190
		848.8 MHz	251
PCS 1900	GPRS	1850.2 MHz	512
		1880.0 MHz	661
		1909.8 MHz	810
WCDMA Band 5	WCDMA/HSDPA/HSUPA	826.4 MHz	4132
		836.6 MHz	4183
		846.6 MHz	4233
WCDMA Band 2	WCDMA/HSDPA/HSUPA	1852.4 MHz	9262
		1880.0 MHz	9400
		1907.6 MHz	9538
Note: the transmitter has been tested on the communications mode of GPRS, WCDMA, HSDPA, HSUPA compliance test and record the worst case.			

EUT Cable List and Details

Cable Description	Length (M)	Shielded/Unshielded	With Core/Without Core
/	/	/	/

Auxiliary Equipment List and Details

Description	Manufacturer	Model	Serial Number
/	/	/	/

Special Cable List and Details

Cable Description	Length (M)	Shielded/Unshielded	With Core/Without Core
/	/	/	/

1.6 Measurement Uncertainty

Measurement uncertainty		
Parameter	Conditions	Uncertainty
RF Output Power	Conducted	$\pm 0.42\text{dB}$
Occupied Bandwidth	Conducted	$\pm 1.5\%$
Frequency Stability	Conducted	2.3%
Transmitter Spurious Emissions	Conducted	$\pm 0.42\text{dB}$
Transmitter Spurious Emissions	Radiated	30-200MHz $\pm 4.52\text{dB}$
		0.2-1GHz $\pm 5.56\text{dB}$
		1-6GHz $\pm 3.84\text{dB}$
		6-18GHz $\pm 3.92\text{dB}$

1.7 Test Equipment List and Details

No.	Description	Manufacturer	Model	Serial No.	Cal Date	Due. Date
SEMT-1075	Communication Tester	Rohde & Schwarz	CMW500	148650	2017-06-12	2018-06-11
SEMT-1063	GSM Tester	Rohde & Schwarz	CMU200	114403	2017-06-12	2018-06-11
SEMT-1072	Spectrum Analyzer	Agilent	E4407B	MY41440400	2017-06-12	2018-06-11
SEMT-1079	Spectrum Analyzer	Agilent	N9020A	US47140102	2017-06-12	2018-06-11
SEMT-1080	Signal Generator	Agilent	83752A	3610A01453	2017-06-12	2018-06-11
SEMT-1081	Vector Signal Generator	Agilent	N5182A	MY47070202	2017-06-12	2018-06-11
SEMT-1028	Power Divider	Weinschel	1506A	PM204	2017-06-12	2018-06-11
SEMT-1082	Power Divider	RF-Lambda	RFLT4W5M18G	14110400027	2017-06-12	2018-06-11
SEMT-1031	Spectrum Analyzer	Rohde & Schwarz	FSP30	836079/035	2017-06-12	2018-06-11
SEMT-1007	EMI Test Receiver	Rohde & Schwarz	ESVB	825471/005	2017-06-12	2018-06-11
SEMT-1008	Amplifier	Agilent	8447F	3113A06717	2017-06-12	2018-06-11
SEMT-1043	Amplifier	C&D	PAP-1G18	2002	2017-06-12	2018-06-11
SEMT-1069	Loop Antenna	Schwarz beck	FMZB 1516	9773	2017-06-08	2020-06-07
SEMT-1068	Broadband Antenna	Schwarz beck	VULB9163	9163-333	2017-06-08	2020-06-07
SEMT-1042	Horn Antenna	ETS	3117	00086197	2017-06-08	2020-06-07
SEMT-1121	Horn Antenna	Schwarzbeck	BBHA 9170	BBHA9170582	2017-06-08	2020-06-07
SEMT-1168	Pre-amplifier	Direction Systems Inc.	PAP-0126	14141-12838	2017-08-15	2018-08-14
SEMT-1169	Pre-amplifier	Direction Systems Inc.	PAP-2640	14145-14153	2017-08-15	2018-08-14
SEMT-1163	Spectrum Analyzer	Rohde & Schwarz	FSP40	100612	2017-06-12	2018-06-11
SEMT-1170	DRG Horn Antenna	A.H. SYSTEMS	SAS-574	571	2018-03-19	2021-03-18

2. SUMMARY OF TEST RESULTS

FCC Rules	Description of Test Item	Result
§ 1.1307, § 2.1093	RF Exposure	Compliant
§ 22.913 (a), § 24.232 (c)	RF Output Power	Compliant
§ 24.51	Peak-to-average Ratio (PAR) of Transmitter	Compliant
§ 22.917 (b), § 24.238 (b)	Emission Bandwidth	Compliant
§ 22.917 (a), § 24.238 (a)	Spurious Emissions at Antenna Terminal	Compliant
§ 22.917 (a), § 24.238 (a)	Spurious Radiation Emissions	Compliant
§ 22.917 (a), § 24.238 (a)	Out of Band Emissions	Compliant
§ 22.355, § 24.235	Frequency Stability	Compliant

3. RF Exposure

3.1 Standard Applicable

According to § 1.1307 and § 2.1093, the portable transmitter must comply the RF exposure requirements.

3.2 Test Result

This product complied with the requirement of the RF exposure, please see the SAR report.

4. RF Output Power

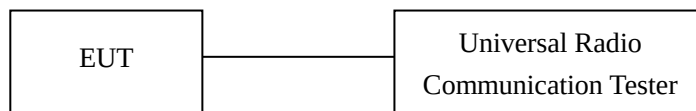
4.1 Standard Applicable

According to §22.913(a)(2), The ERP of mobile and portable stations transmitters and auxiliary test transmitters must not exceed 7 Watts.

According to §24.232 (c), Mobile and portable stations are limited to 2 watts EIRP and the equipment must employ a means for limiting power to the minimum necessary for successful communications.

4.2 Test Procedure

Conducted output power test method:



Radiated power test method:

- 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.

4.3 Environmental Conditions

Temperature:	24 °C
Relative Humidity:	54%
ATM Pressure:	1011 mbar

4.4 Summary of Test Results/Plots

Max. Radiated Power

ERP For GPRS Mode GPRS850

Frequency	Substitute SG	Height	Table	Polar	Cable loss	Antenna Gain	Result	FCC Part 22H Limit
MHz	dBm	Meter	Degree	H / V	dB	dB	dBm	dBm
Low Channel								
824.2	28.41	1.5	36	H	1.5	0	26.91	38.45
824.2	26.01	1.5	48	V	1.5	0	24.51	38.45
Middle Channel								
836.6	27.52	1.5	12	H	1.5	0	26.02	38.45
836.6	28.52	1.5	235	V	1.5	0	27.02	38.45
High Channel								
848.8	28.44	1.5	24	H	1.5	0	26.94	38.45
848.8	27.03	1.5	315	V	1.5	0	25.53	38.45

EIRP For GPRS Mode GPRS1900

Frequency	Substitute SG	Height	Table	Polar	Cable loss	Antenna Gain	Result	FCC Part 24E Limit
MHz	dBm	Meter	Degree	H / V	dB	dB	dBm	dBm
Low Channel								
1850.2	19.4	1.5	280	H	1.9	7.7	25.2	33.00
1850.2	19.08	1.5	325	V	1.9	7.7	24.88	33.00
Middle Channel								
1880.0	19.83	1.5	25	H	1.9	7.7	25.63	33.00
1880.0	19.96	1.5	36	V	1.9	7.7	25.76	33.00
High Channel								
1909.8	19.21	1.5	185	H	1.9	7.7	25.01	33.00
1909.8	19.99	1.5	187	V	1.9	7.7	25.79	33.00

ERP For WCDMA Mode Band 5

Frequency	Substitute SG	Height	Table	Polar	Cable loss	Antenna Gain	Result	FCC Part 22H Limit
MHz	dBm	Meter	Degree	H / V	dB	dBd	dBm	dBm
Low Channel								
826.4	22.18	1.5	25	H	1.5	0	20.68	38.45
826.4	23.21	1.5	48	V	1.5	0	21.71	38.45
Middle Channel								
836.6	23.33	1.5	252	H	1.5	0	21.83	38.45
836.6	23.32	1.5	184	V	1.5	0	21.82	38.45
High Channel								
846.6	23.39	1.5	185	H	1.5	0	21.89	38.45
846.6	24.90	1.5	165	V	1.5	0	23.40	38.45

ERP For HSDPA Mode Band 5

Frequency	Substitute SG	Height	Table	Polar	Cable loss	Antenna Gain	Result	FCC Part 22H Limit
MHz	dBm	Meter	Degree	H / V	dB	dBd	dBm	dBm
Low Channel								
826.4	20.29	1.5	247	H	1.5	0	18.79	38.45
826.4	20.88	1.5	212	V	1.5	0	19.38	38.45
Middle Channel								
836.6	20.94	1.5	34	H	1.5	0	19.44	38.45
836.6	21.53	1.5	25	V	1.5	0	20.03	38.45
High Channel								
846.6	21.29	1.5	36	H	1.5	0	19.79	38.45
846.6	21.43	1.5	48	V	1.5	0	19.93	38.45

ERP For HSUPA Mode Band 5

Frequency	Substitute SG	Height	Table	Polar	Cable loss	Antenna Gain	Result	FCC Part 22H Limit
MHz	dBm	Meter	Degree	H / V	dB	dBd	dBm	dBm
Low Channel								
826.4	21.01	1.5	221	H	1.5	0	19.51	38.45
826.4	21.2	1.5	187	V	1.5	0	19.7	38.45
Middle Channel								
836.6	20.79	1.5	28	H	1.5	0	19.29	38.45
836.6	20.67	1.5	192	V	1.5	0	19.17	38.45
High Channel								
846.6	21.68	1.5	312	H	1.5	0	20.18	38.45
846.6	21.47	1.5	285	V	1.5	0	19.97	38.45

EIRP For WCDMA Mode Band 2

Frequency	Substitute SG	Height	Table	Polar	Cable loss	Antenna Gain	Result	FCC Part 24E Limit
MHz	dBm	Meter	Degree	H / V	dB	dB	dBm	dBm
Low Channel								
1852.4	15.54	1.5	269	H	1.9	7.7	21.34	33
1852.4	14.91	1.5	247	V	1.9	7.7	20.71	33
Middle Channel								
1880.0	16.65	1.5	252	H	1.9	7.7	22.45	33
1880.0	17.06	1.5	186	V	1.9	7.7	22.86	33
High Channel								
1907.6	14.97	1.5	168	H	1.9	7.7	22.27	33
1907.6	17.15	1.5	247	V	1.9	7.7	22.95	33

EIRP For HSDPA Mode Band 2

Frequency	Substitute SG	Height	Table	Polar	Cable loss	Antenna Gain	Result	FCC Part 24E Limit
MHz	dBm	Meter	Degree	H / V	dB	dB	dBm	dBm
Low Channel								
1852.4	14.00	1.5	221	H	1.9	7.7	19.8	33
1852.4	12.82	1.5	284	V	1.9	7.7	18.62	33
Middle Channel								
1880.0	13.66	1.5	185	H	1.9	7.7	19.46	33
1880.0	15.15	1.5	166	V	1.9	7.7	20.95	33
High Channel								
1907.6	12.92	1.5	17	H	1.9	7.7	18.72	33
1907.6	14.15	1.5	39	V	1.9	7.7	19.95	33

EIRP For HSUPA Mode Band 2

Frequency	Substitute SG	Height	Table	Polar	Cable loss	Antenna Gain	Result	FCC Part 24E Limit
MHz	dBm	Meter	Degree	H / V	dB	dB	dBm	dBm
Low Channel								
1852.4	13.32	1.5	24	H	1.9	7.7	19.12	33
1852.4	13.21	1.5	88	V	1.9	7.7	19.01	33
Middle Channel								
1880.0	14.86	1.5	152	H	1.9	7.7	20.66	33
1880.0	13.94	1.5	194	V	1.9	7.7	19.74	33
High Channel								
1907.6	15.04	1.5	165	H	1.9	7.7	20.84	33
1907.6	13.41	1.5	147	V	1.9	7.7	19.21	33

Note: Result = Substitute - Cable loss + Antenna Gain

Max. Conducted Output Power

For Cellular Band (GPRS850)

Test Mode	Channel	Frequency (MHz)	Average Power (dBm)	FCC Part 22.913 Limit (dBm)
GPRS(1 Slot)	Low Channel	824.2	33.52	38.45
	Middle Channel	836.6	33.34	38.45
	High Channel	848.8	33.34	38.45

For PCS Band (GPRS1900)

Test Mode	Channel	Frequency (MHz)	Average Power (dBm)	FCC Part 24.232 Limit (dBm)
GPRS(1 Slot)	Low Channel	1850.2	29.53	33.0
	Middle Channel	1880.0	29.59	33.0
	High Channel	1909.8	29.60	33.0

For WCDMA Band 5

Test Mode	Channel	Frequency (MHz)	Average Power (dBm)	FCC Part 22.913 Limit (dBm)
WCDMA	Low Channel	826.4	22.51	38.45
	Middle Channel	836.6	22.49	38.45
	High Channel	846.6	22.51	38.45
HSDPA	Low Channel	826.4	21.61	38.45
	Middle Channel	836.6	21.53	38.45
	High Channel	846.6	21.63	38.45
HSUPA	Low Channel	826.4	21.67	38.45
	Middle Channel	836.6	21.57	38.45
	High Channel	846.6	21.64	38.45

For WCDMA Band 2

Test Mode	Channel	Frequency (MHz)	Average Power (dBm)	FCC Part 24.232 Limit (dBm)
WCDMA	Low Channel	1852.4	22.75	33.00
	Middle Channel	1880.0	22.77	33.00
	High Channel	1907.6	22.48	33.00
HSDPA	Low Channel	1852.4	21.80	33.00
	Middle Channel	1880.0	21.78	33.00
	High Channel	1907.6	21.68	33.00
HSUPA	Low Channel	1852.4	21.85	33.00
	Middle Channel	1880.0	21.72	33.00
	High Channel	1907.6	21.66	33.00

5. Peak-to-average Ratio (PAR) of Transmitter

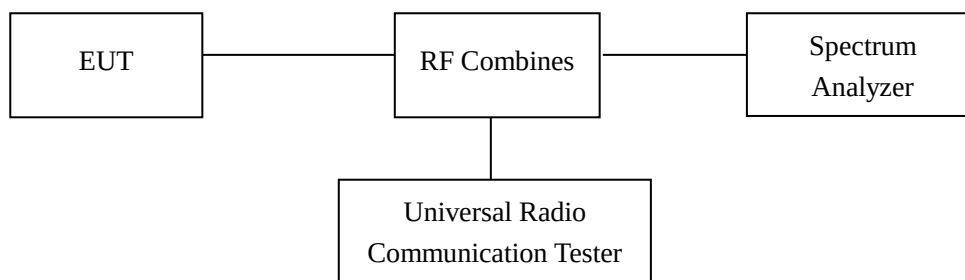
5.1 Standard Applicable

According to §24.232(d), Power measurements for transmissions by stations authorized under this section may be made either in accordance with a Commission-approved average power technique or in compliance with paragraph (e) of this section. In both instances, equipment employed must be authorized in accordance with the provisions of §24.51. 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.

5.2 Test Procedure

The RF output terminal of the transmitter was connected to the input of the spectrum analyzer via a suitable attenuation. The RBW of the spectrum analyzer was set to 30kHz and the peak-to-average ratio (PAR) of the transmission was recorded. Record the maximum PAPR level associated with a probability of 0.1%.

Test Configuration for the emission bandwidth testing:



5.3 Environmental Conditions

Temperature:	25 °C
Relative Humidity:	54%
ATM Pressure:	1011 mbar

5.4 Summary of Test Results

Only the worst case was selected to record

For PCS Band

Test Mode	Channel	Frequency (MHz)	PAR (dB)	Limit (dB)
GPRS(1 Slot)	512	1850.2	4.35	13

For WCDMA Band 2

Test Mode	Channel	Frequency (MHz)	PAR (dB)	Limit (dB)
WCDMA	9400	1880	5.65	13
HSDPA	9400	1880	6.08	13
HSUPA	9400	1880	4.32	13

6. Emission Bandwidth

6.1 Standard Applicable

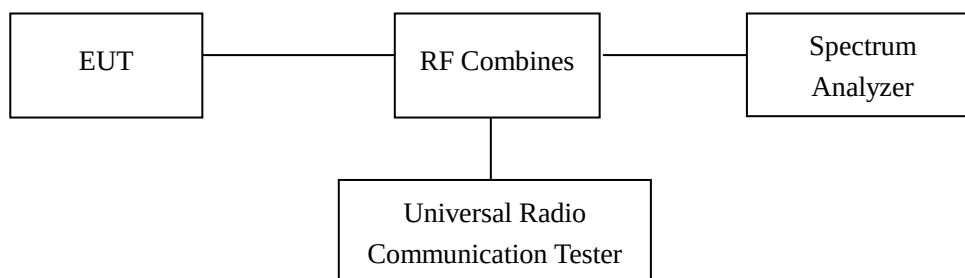
According to §22.917(b), The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

According to §24.238(b), The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

6.2 Test Procedure

The RF output terminal of the transmitter was connected to the input of the spectrum analyzer via a suitable attenuation. The RBW of the spectrum analyzer was set to 10kHz for GSM mode and 100kHz for WCDMA mode, VBW shall be at least 3 times the RBW, and the 26dB bandwidth was recorded.

Test Configuration for the emission bandwidth testing:



6.3 Environmental Conditions

Temperature:	25 °C
Relative Humidity:	54%
ATM Pressure:	1011 mbar

6.4 Summary of Test Results/Plots

For Cellular Band

Test Mode	Channel	Frequency (MHz)	99% Emission Bandwidth (kHz)	26 dB Emission Bandwidth (kHz)
GPRS	128	824.2	249.4119	326.851
	190	836.6	245.9046	320.519
	251	848.8	248.4705	319.803

For PCS Band

Test Mode	Channel	Frequency (MHz)	99% Emission Bandwidth (kHz)	26 dB Emission Bandwidth (kHz)
GPRS	512	1850.2	245.8252	325.242
	661	1880.0	243.0553	311.683
	810	1909.8	244.3559	320.825

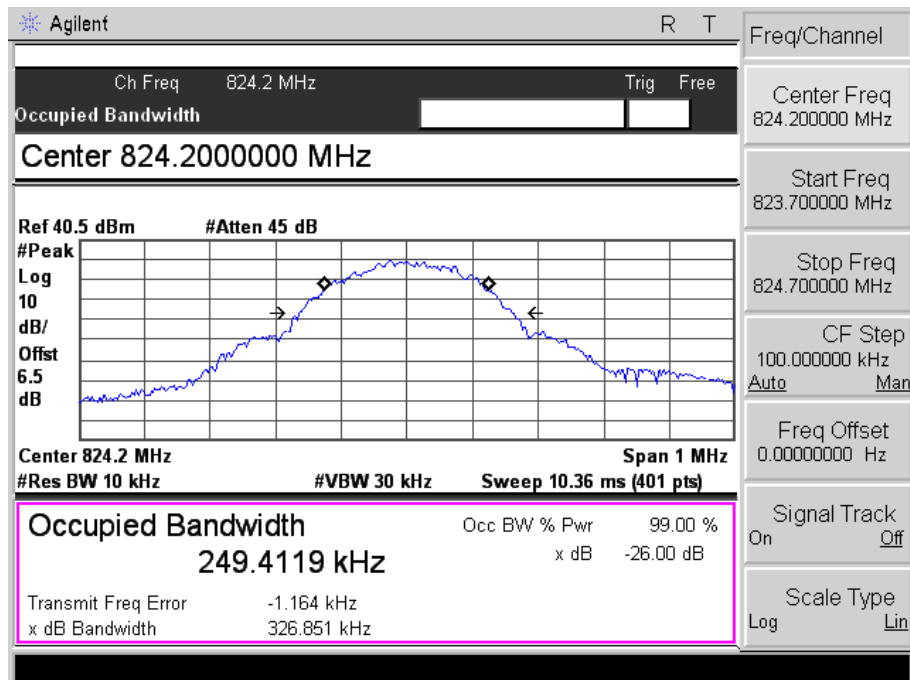
For Band 5

Test Mode	Channel	Frequency (MHz)	99% Emission Bandwidth (MHz)	26 dB Emission Bandwidth (MHz)
WCDMA	4132	826.4	4.1459	4.712
	4183	836.6	4.1376	4.698
	4233	846.6	4.1732	4.697
HSDPA	4132	826.4	4.1504	4.717
	4183	836.6	4.1637	4.675
	4233	846.6	4.1619	4.698
HSUPA	4132	826.4	4.1358	4.664
	4183	836.6	4.1572	4.696
	4233	846.6	4.1549	4.707

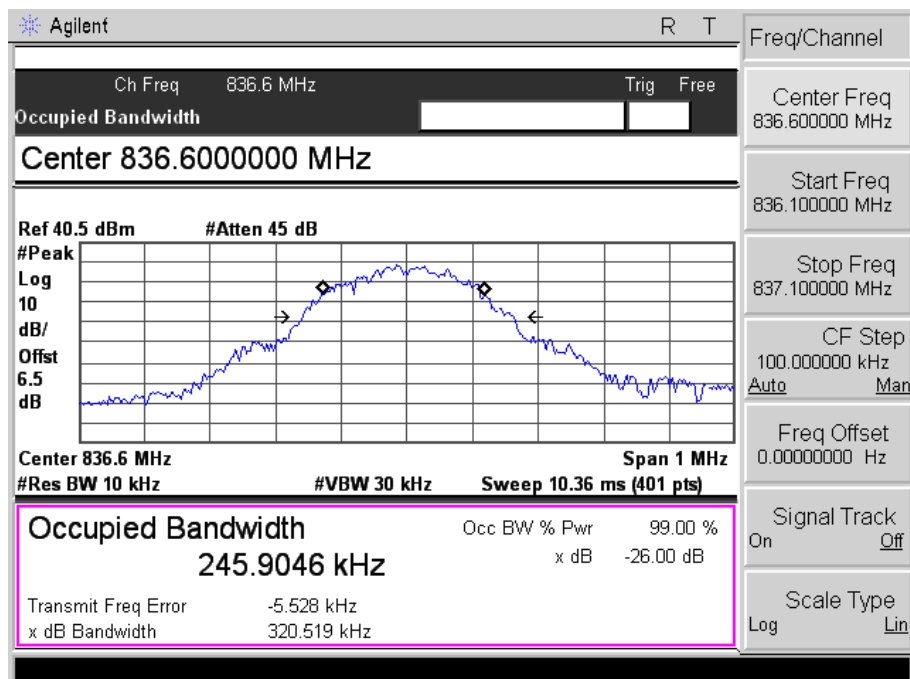
For Band 2

Test Mode	Channel	Frequency (MHz)	99% Emission Bandwidth (MHz)	26 dB Emission Bandwidth (MHz)
WCDMA	9262	1852.4	4.1760	4.726
	9400	1880.0	4.1739	4.706
	9538	1907.6	4.1910	4.737
HSDPA	9262	1852.4	4.1485	4.711
	9400	1880.0	4.1651	4.737
	9538	1907.6	4.1631	4.757
HSUPA	9262	1852.4	4.1628	4.722
	9400	1880.0	4.1842	4.710
	9538	1907.6	4.1561	4.716

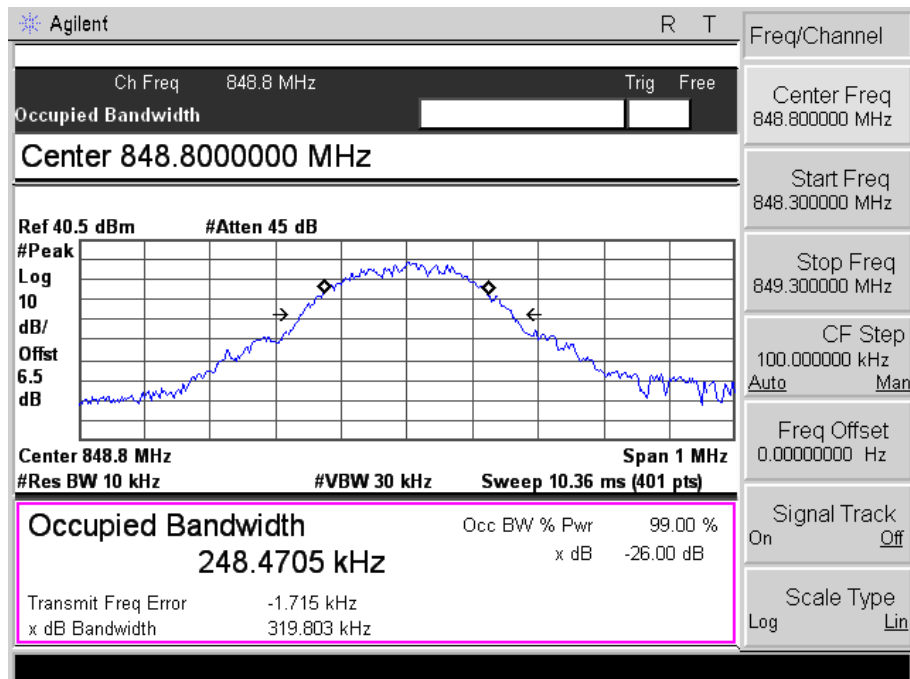
For Cellular Band
GPRS Low Channel



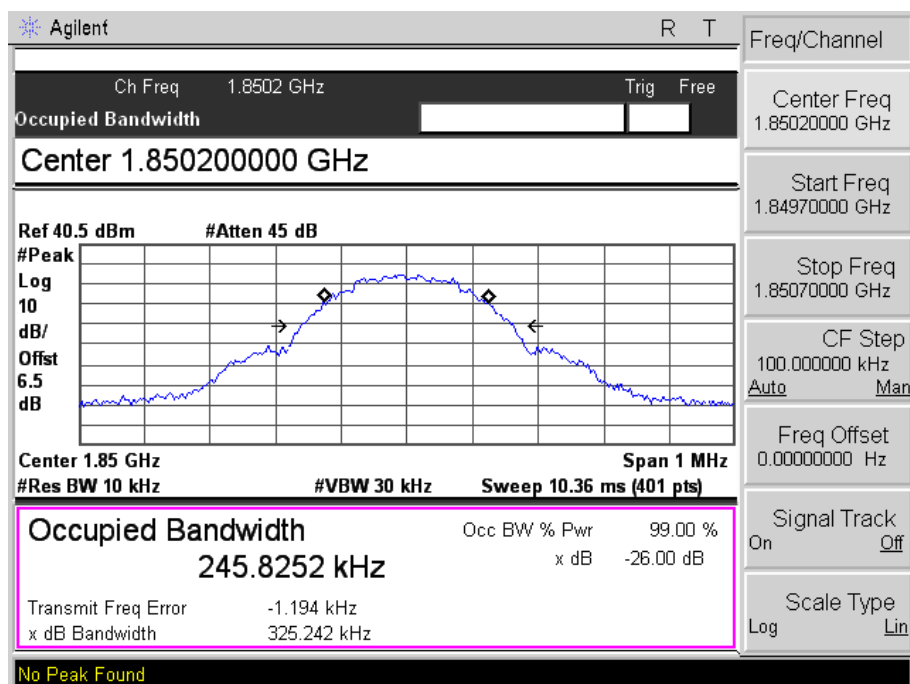
GPRS Middle Channel



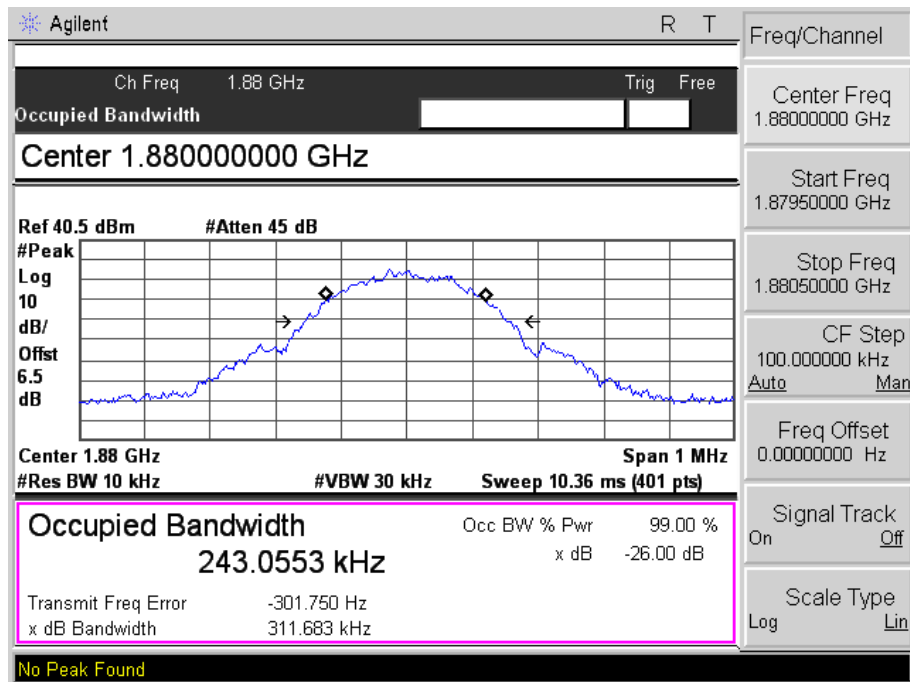
GPRS High Channel



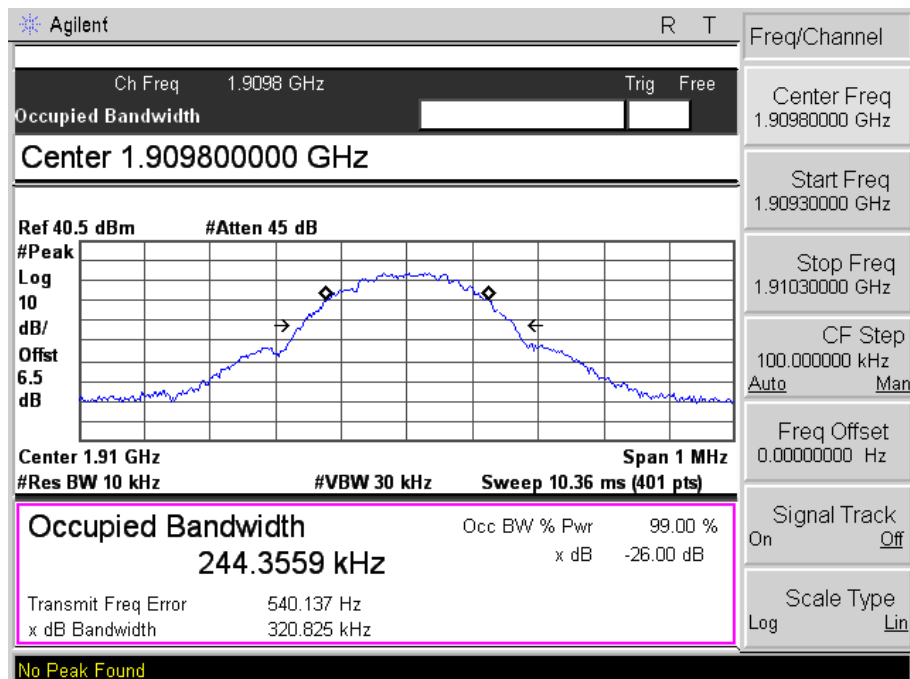
For PCS Band GPRS Low Channel



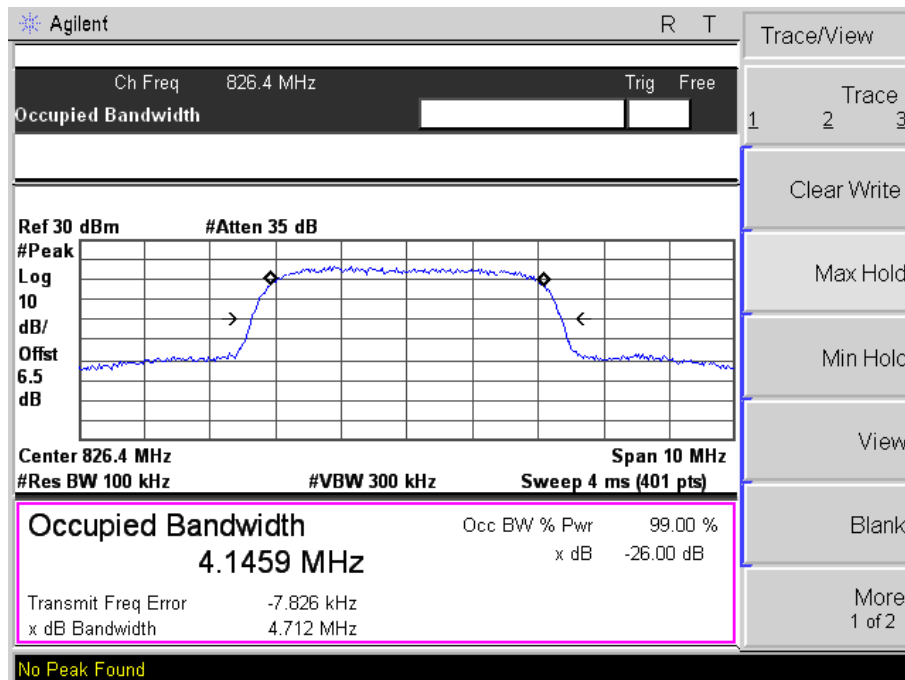
GPRS Middle Channel



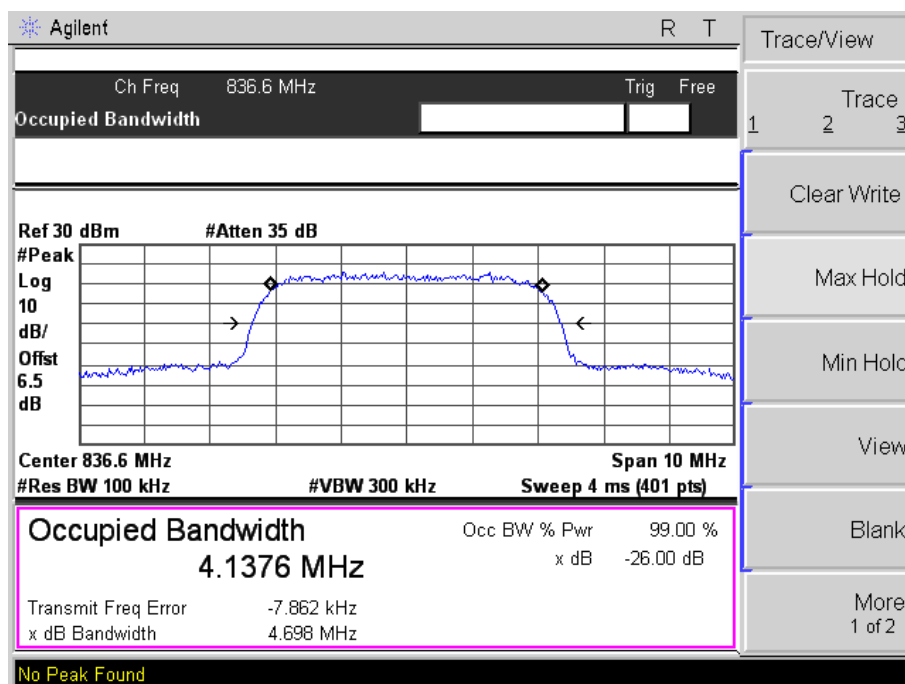
GPRS High Channel



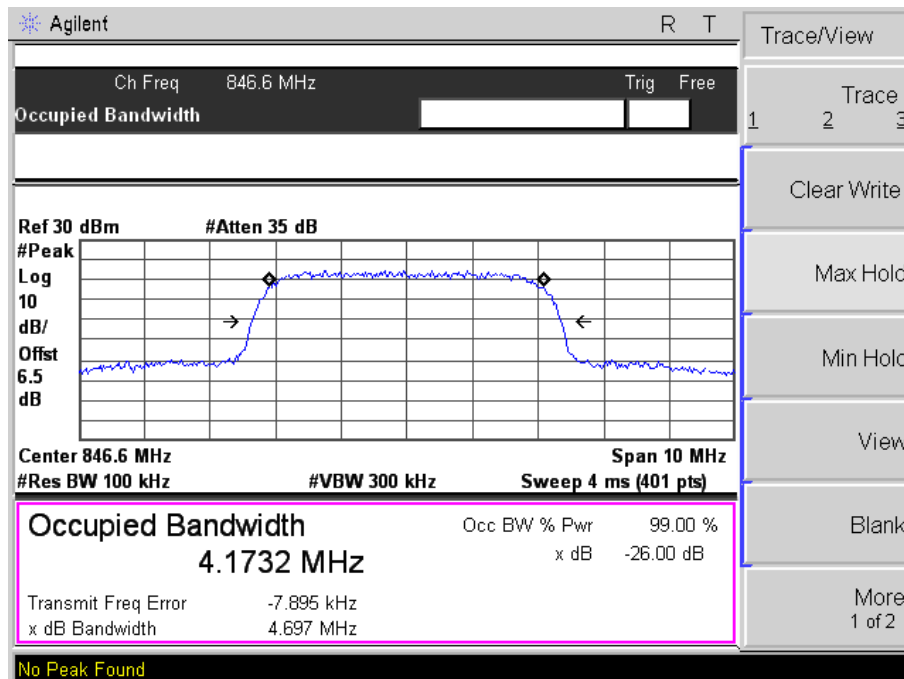
For Band V
WCDMA Low Channel



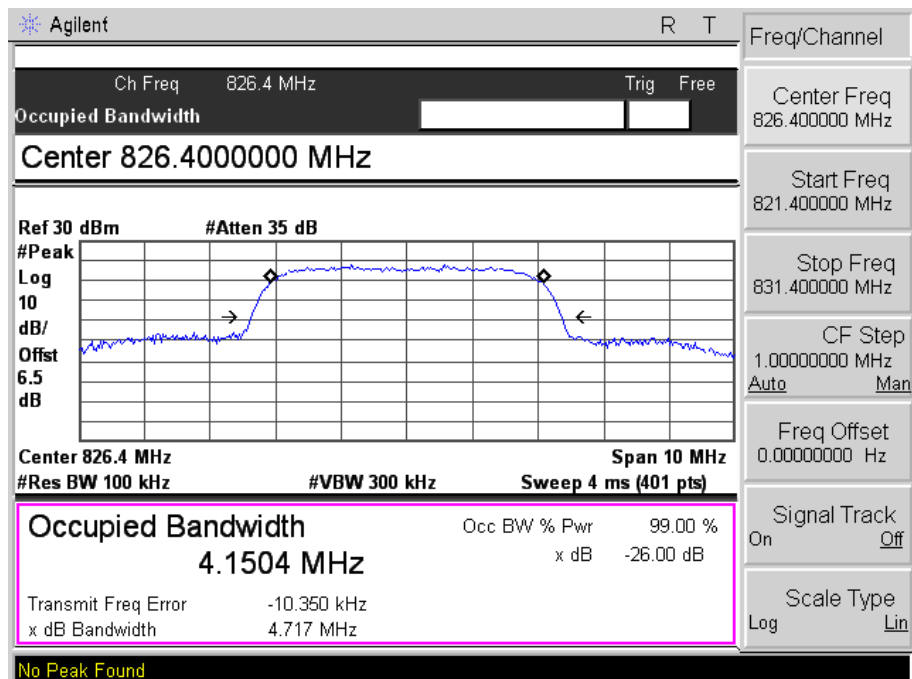
WCDMA Middle Channel



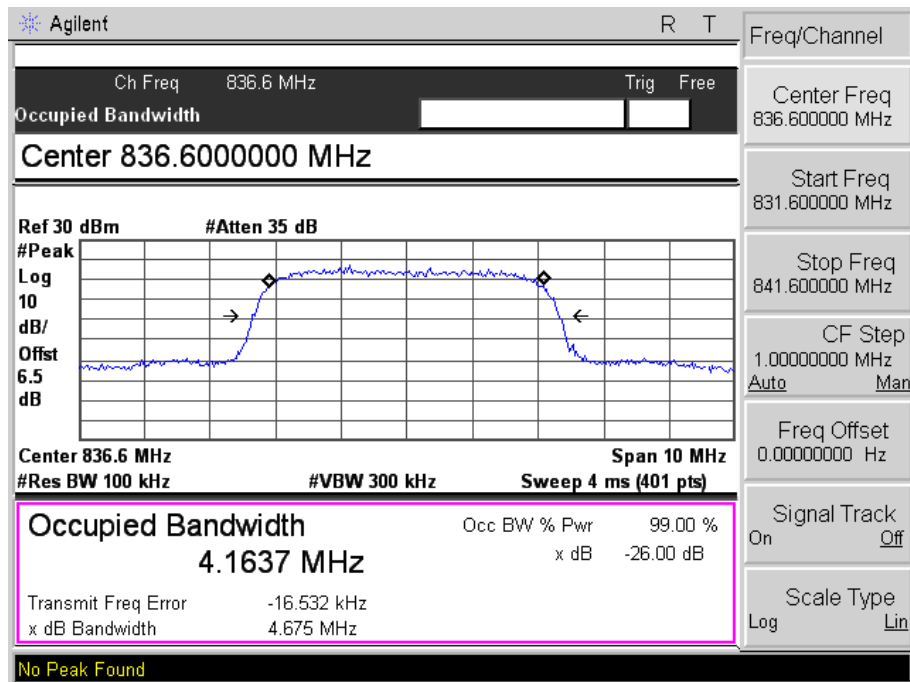
WCDMA High Channel



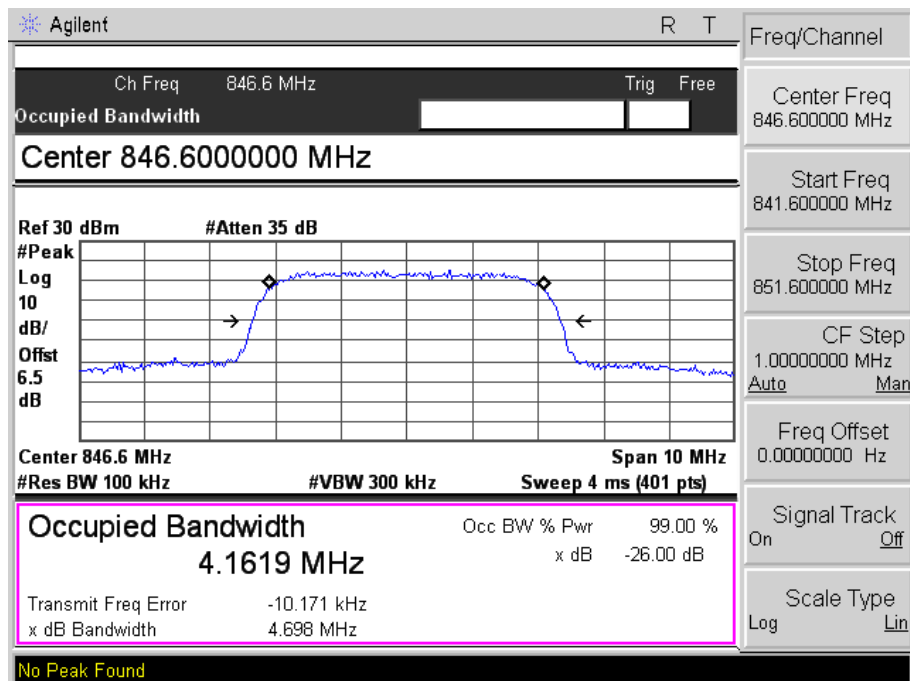
HSDPA Low Channel



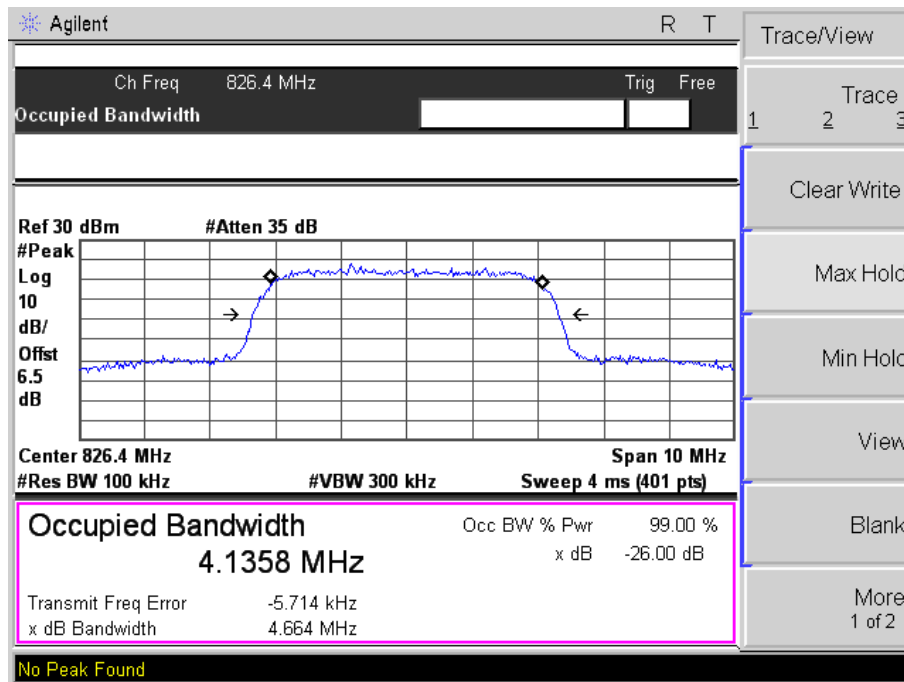
HSDPA Middle Channel



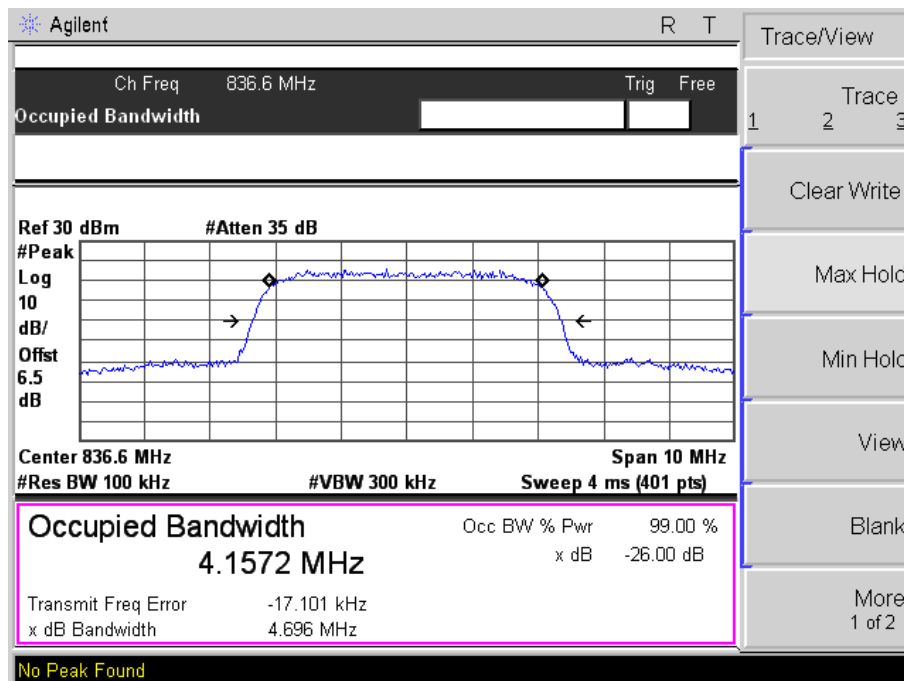
HSDPA High Channel



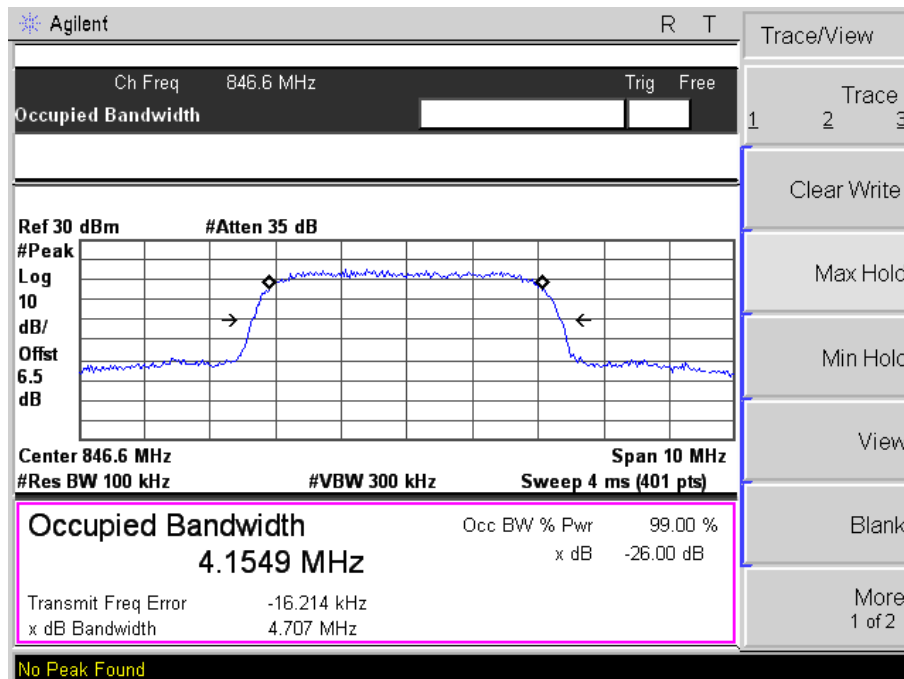
HSUPA Low Channel



HSUPA Middle Channel

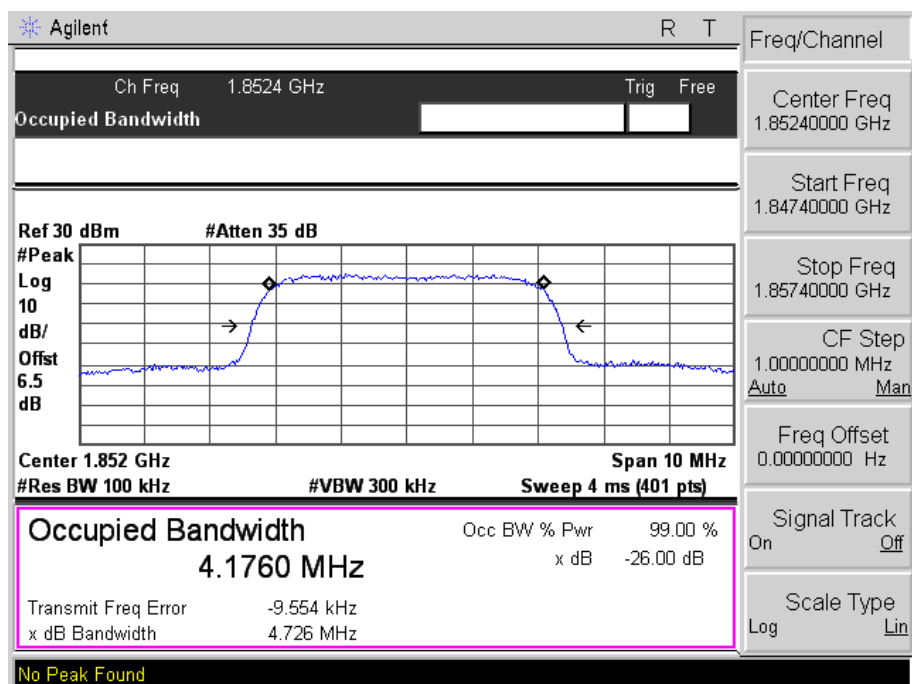


HSUPA High Channel

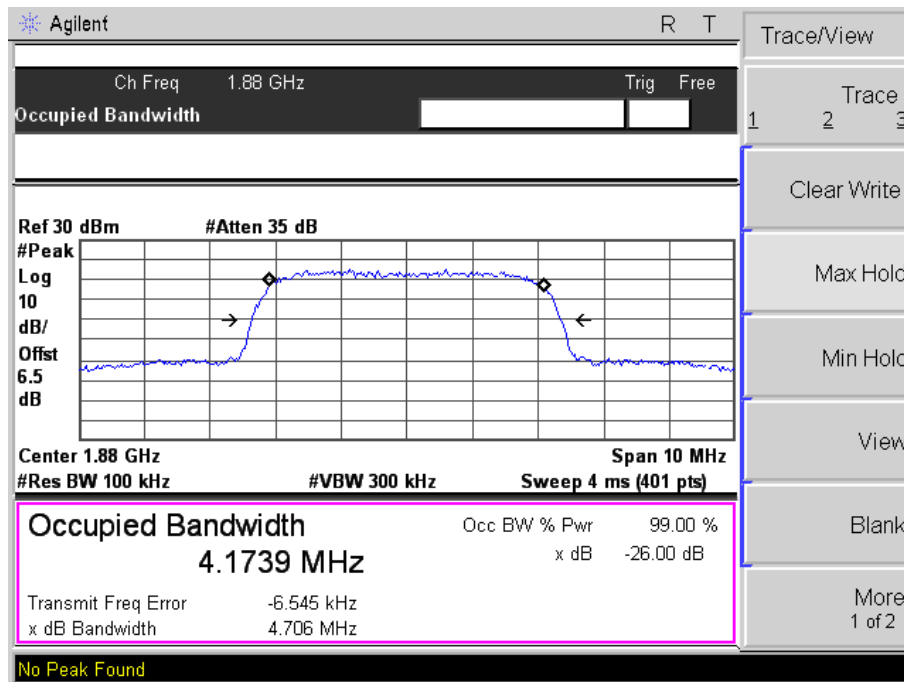


For Band II

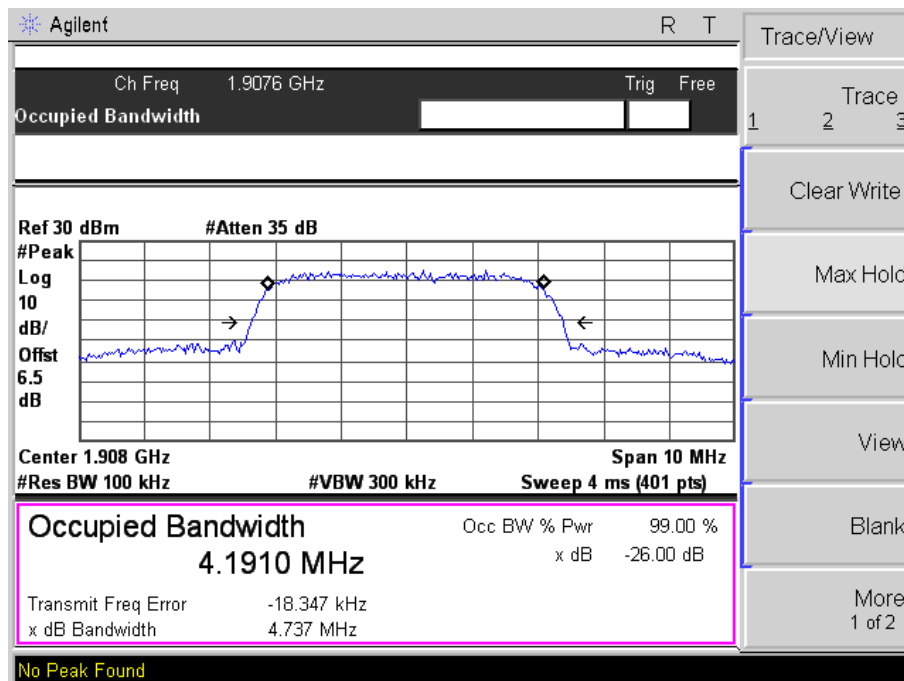
WCDMA Low Channel



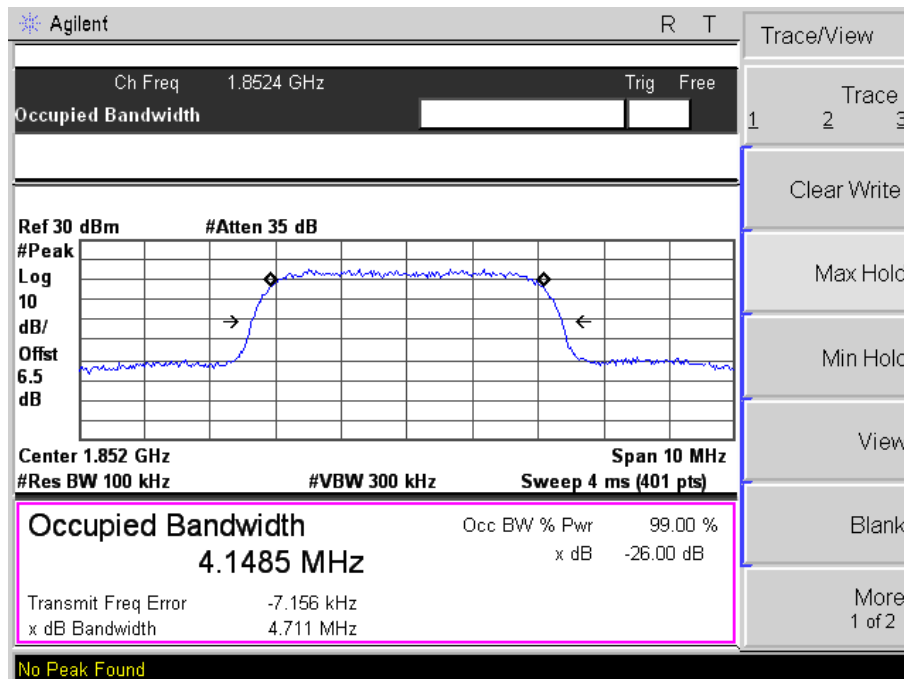
WCDMA Middle Channel



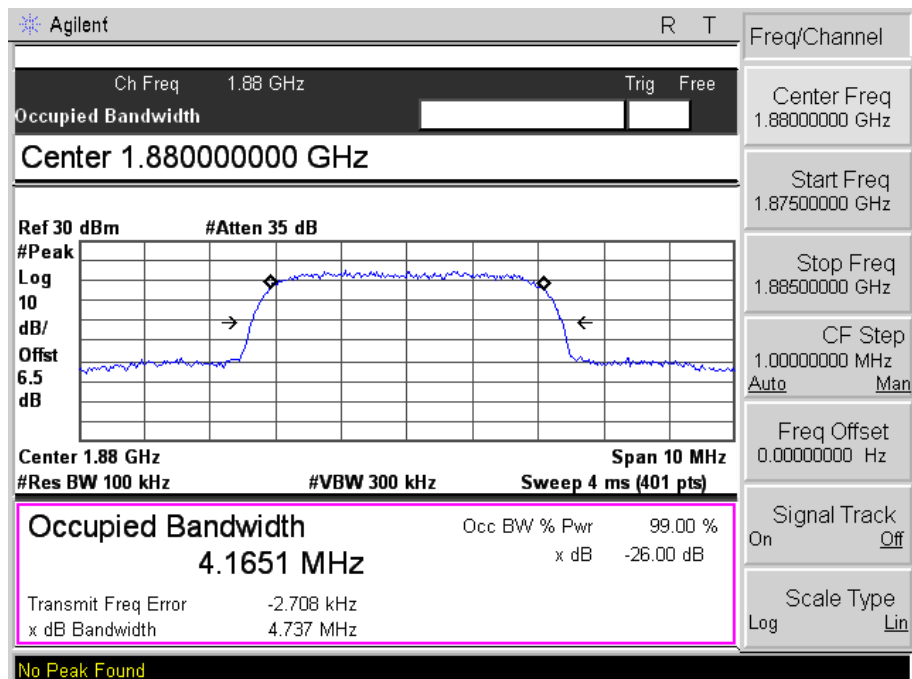
WCDMA High Channel



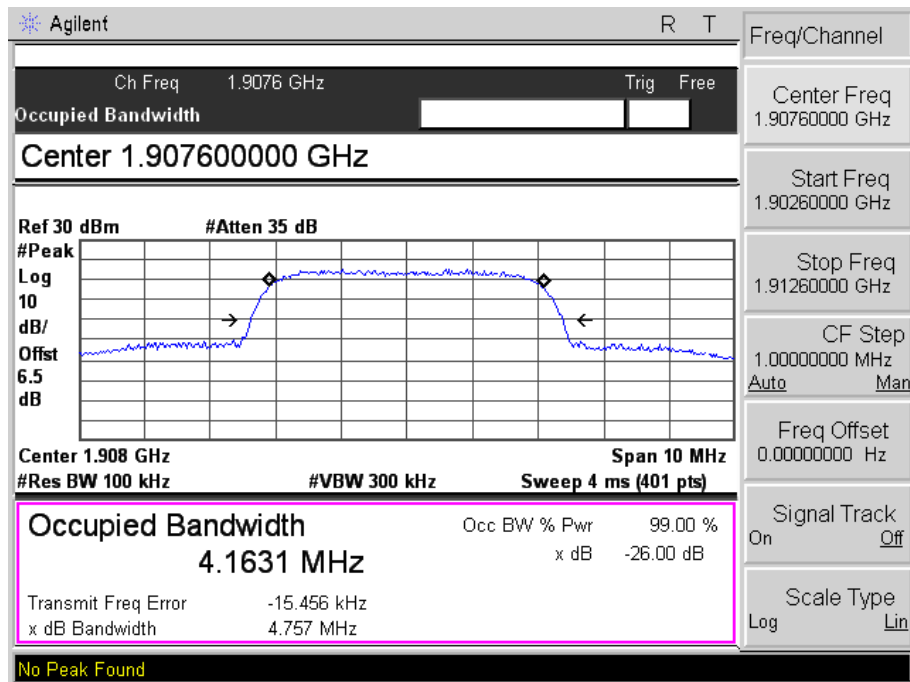
HSDPA Low Channel



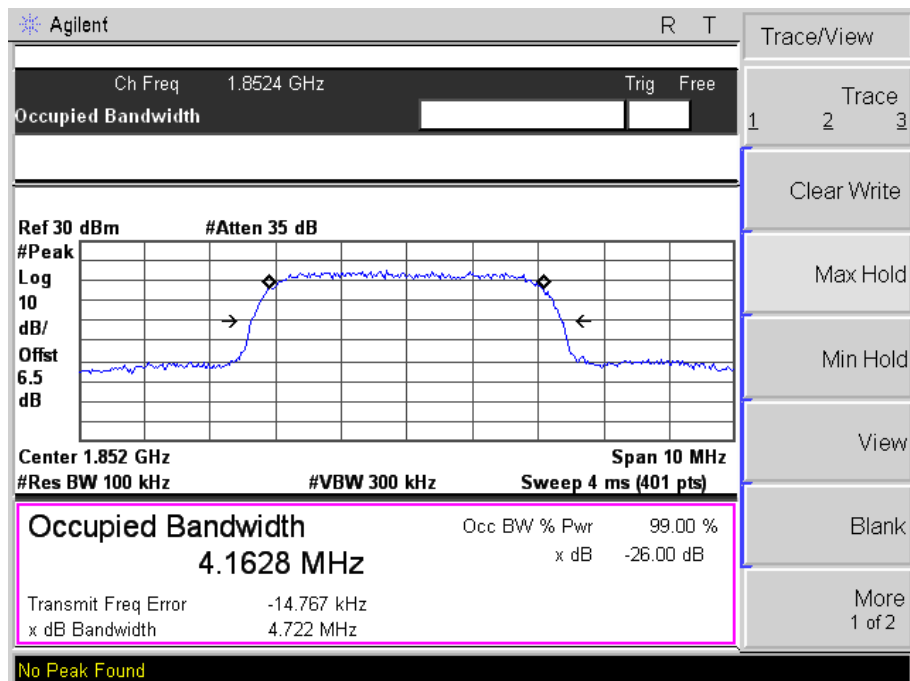
HSDPA Middle Channel



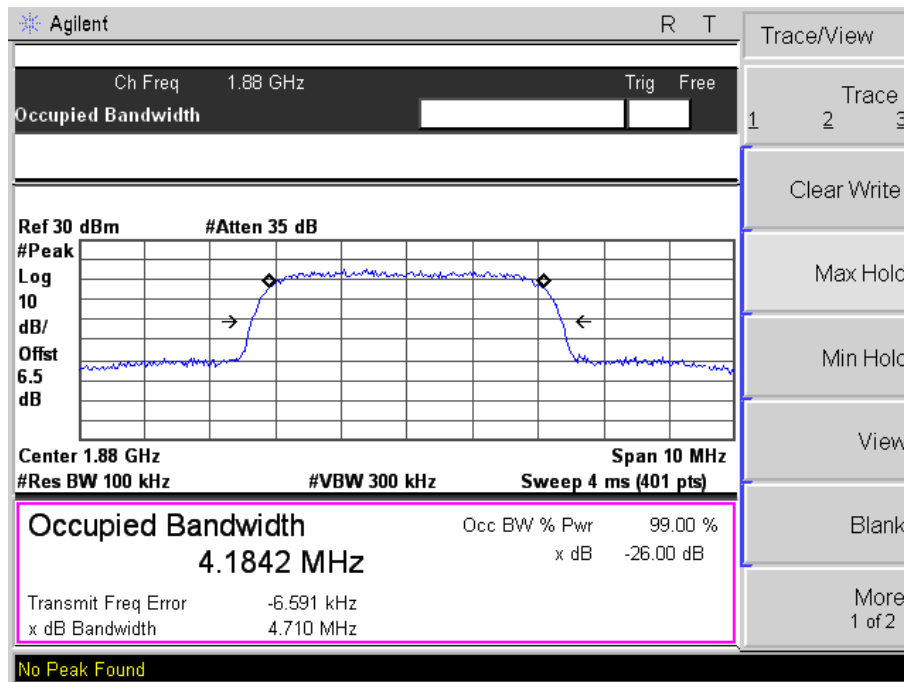
HSDPA High Channel



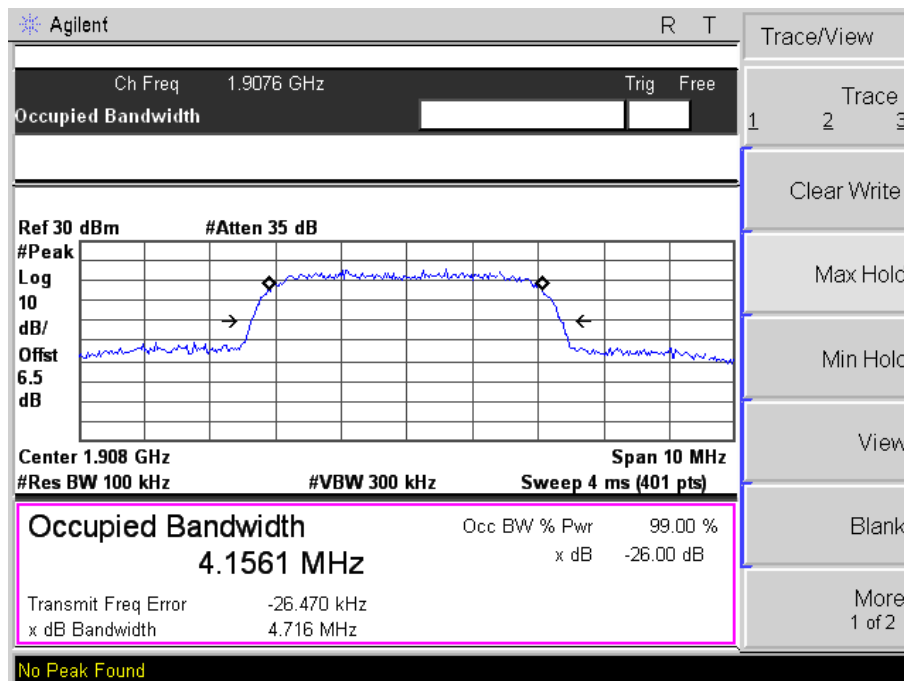
HSUPA Low Channel



HSUPA Middle Channel



HSUPA High Channel



7. Out of Band Emissions at Antenna Terminal

7.1 Standard Applicable

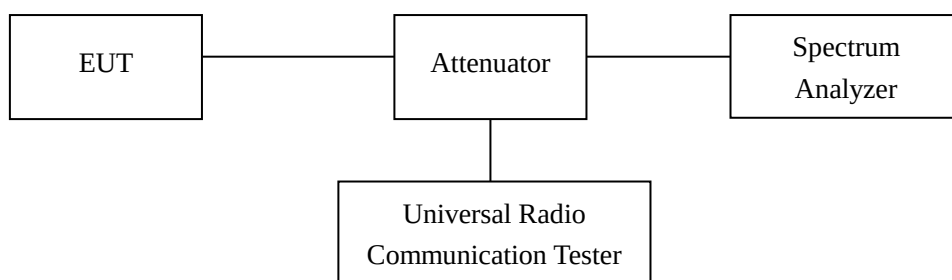
According to §22.917(a), the power of any emissions outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log(P)$ dB.

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.

7.2 Test Procedure

The RF output terminal of the transmitter was connected to the input of the spectrum analyzer via a suitable attenuation. The RBW of the spectrum analyzer was set to 100kHz and 1MHz for the scan frequency from 30MHz to 1GHz and the scan frequency from 1GHz to up to 10th harmonic.

Test Configuration for the out of band emissions testing:



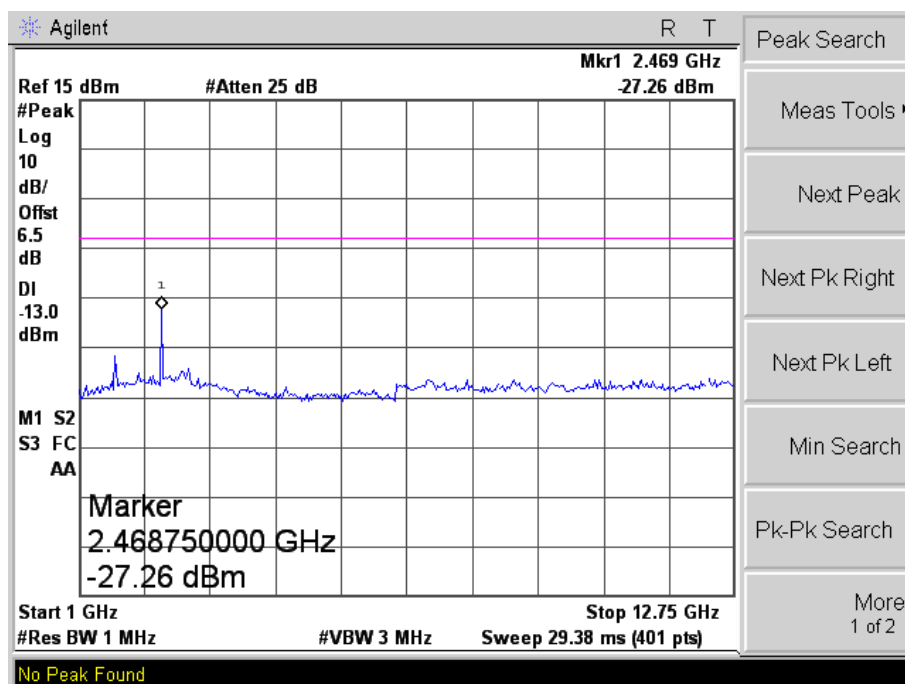
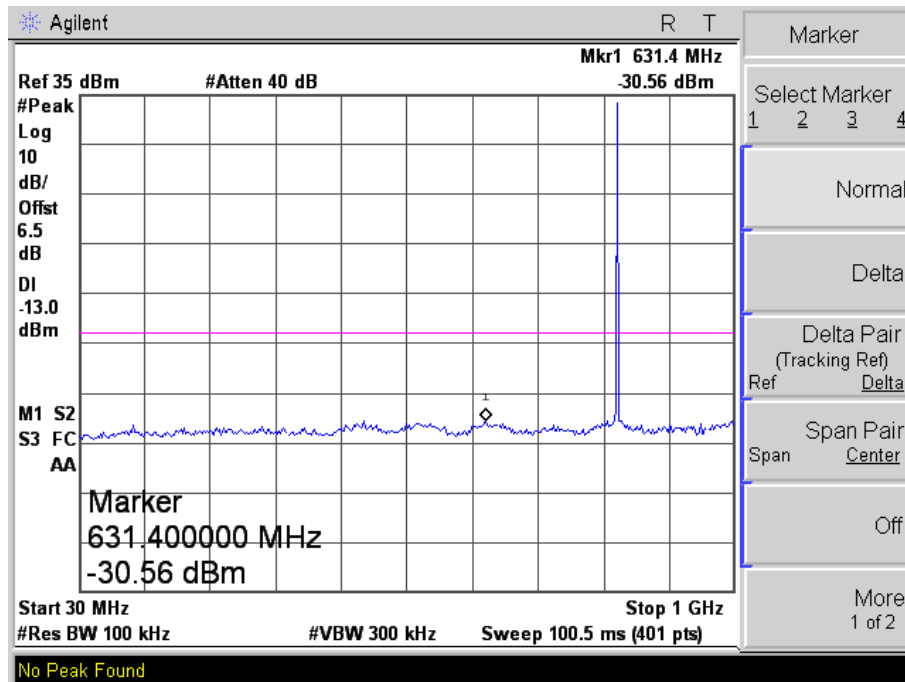
7.3 Environmental Conditions

Temperature:	25 °C
Relative Humidity:	53%
ATM Pressure:	1018 mbar

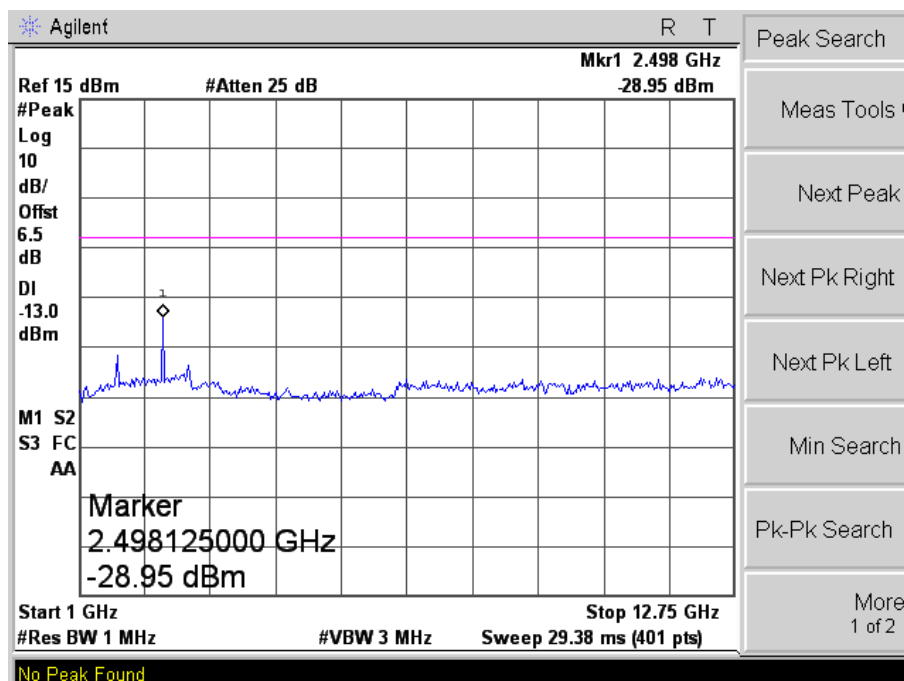
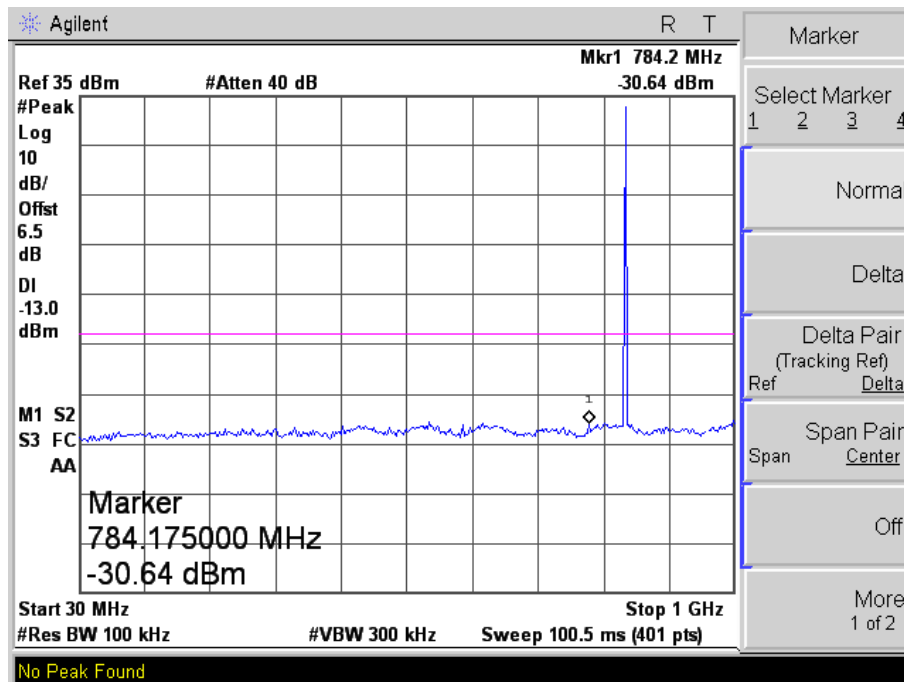
7.4 Summary of Test Results/Plots

Please refer to the following test plots For Cellular Band

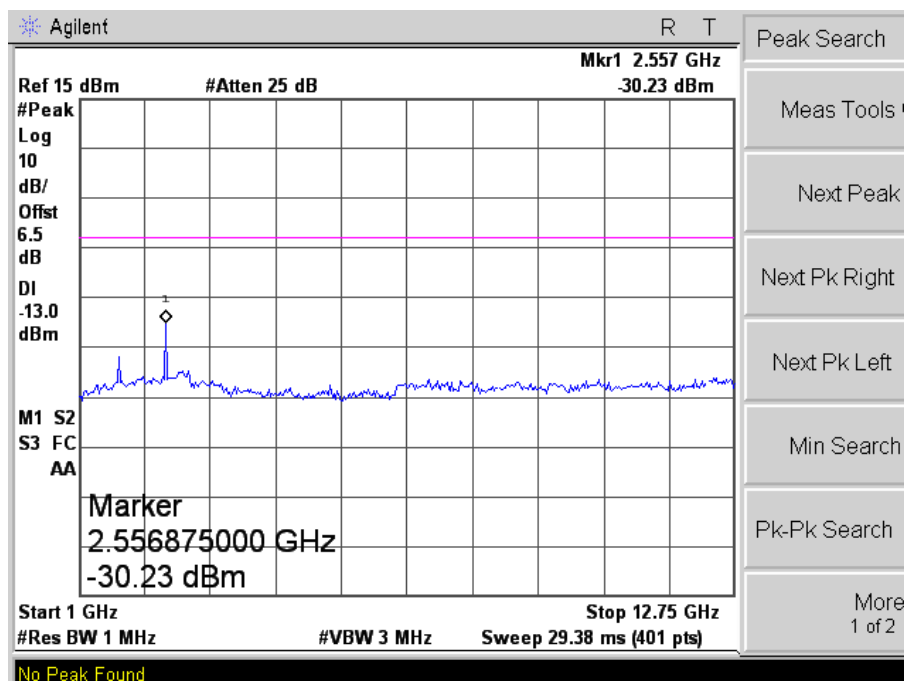
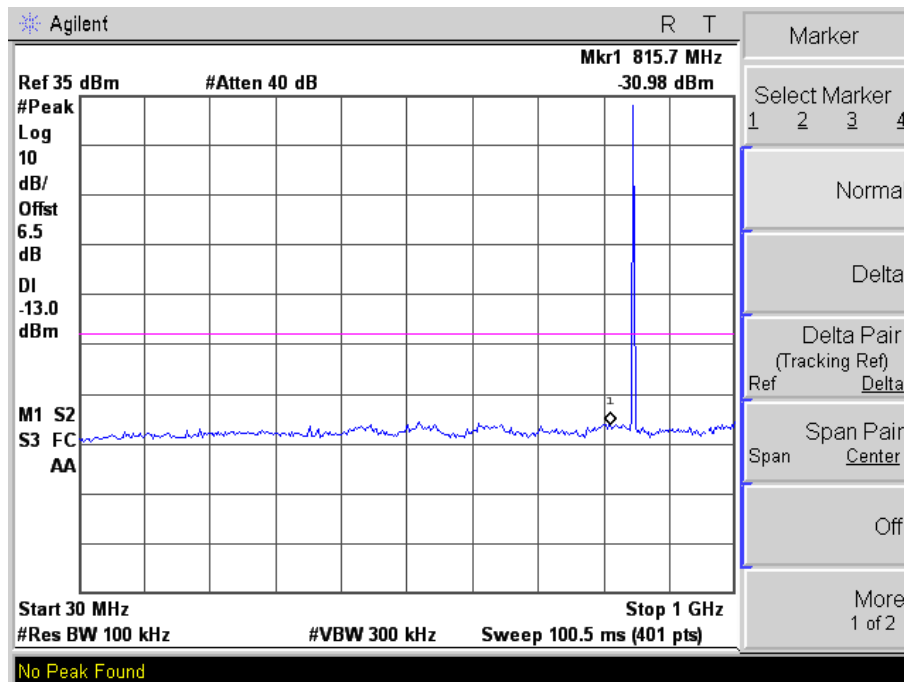
GPRS Low Channel



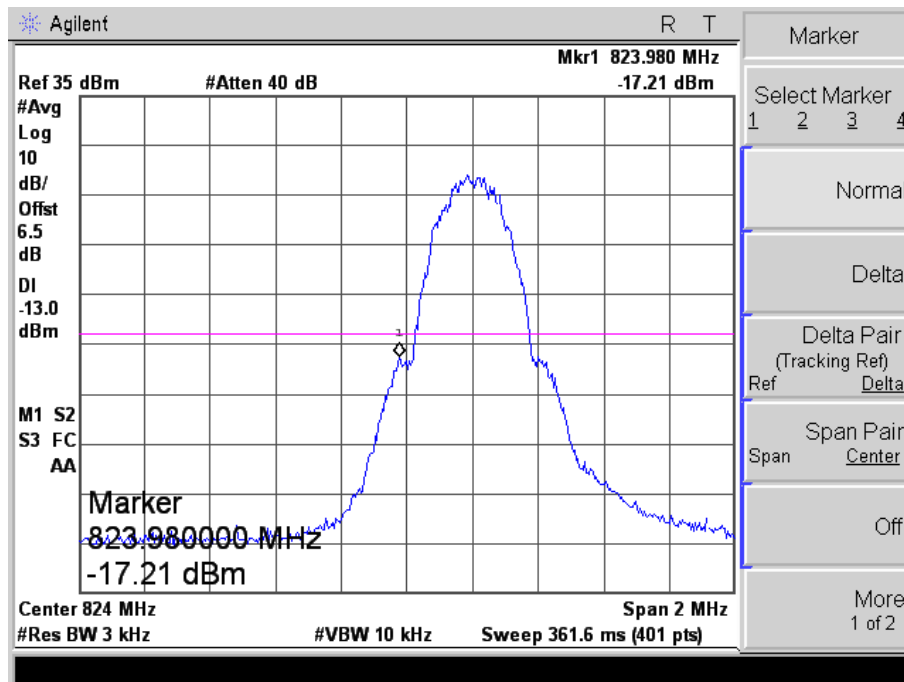
GPRS Middle Channel



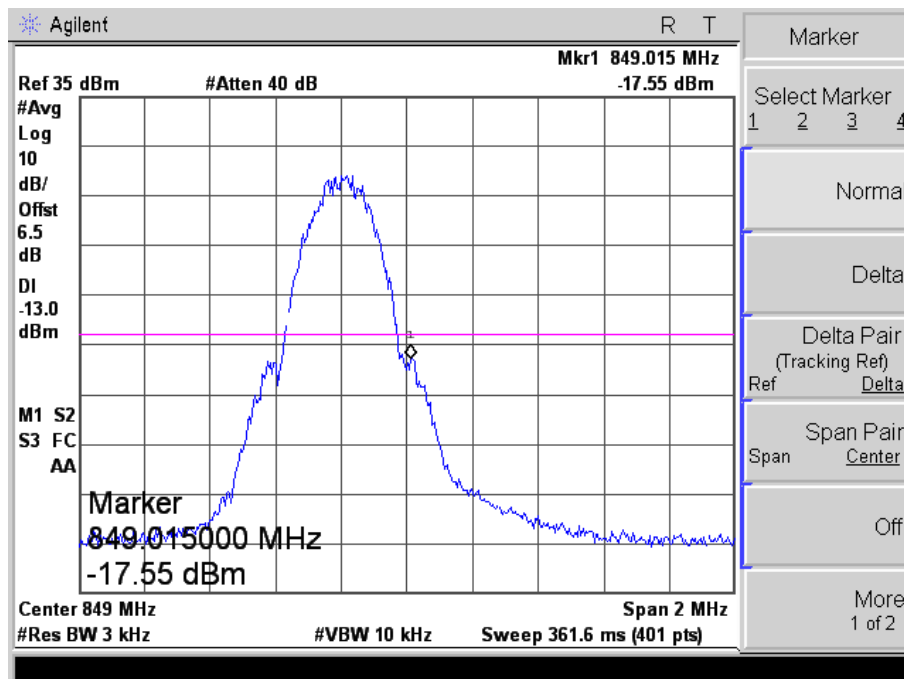
GPRS High Channel



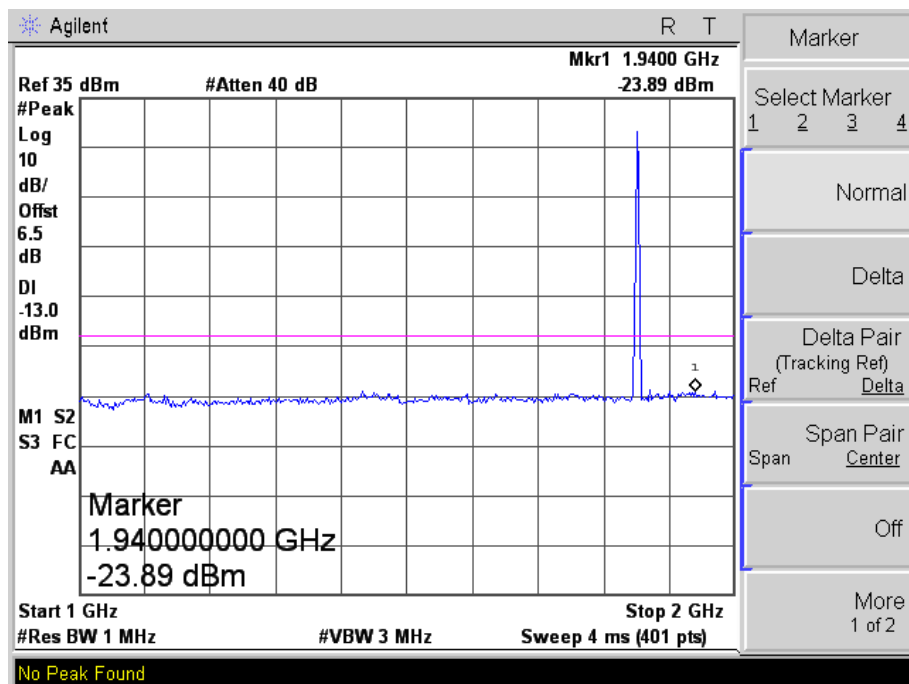
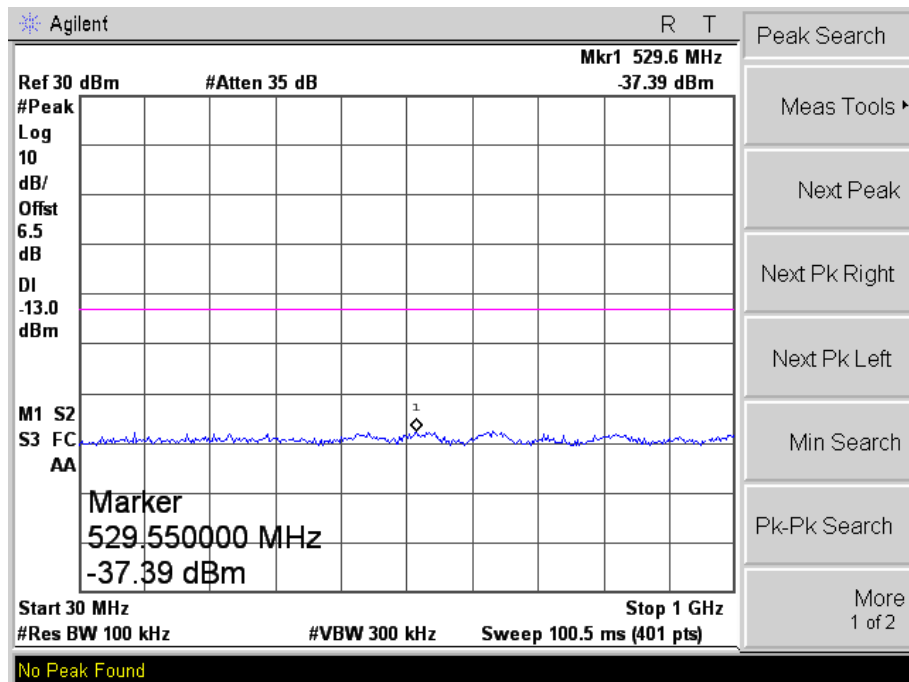
GPRS Low Band Emission

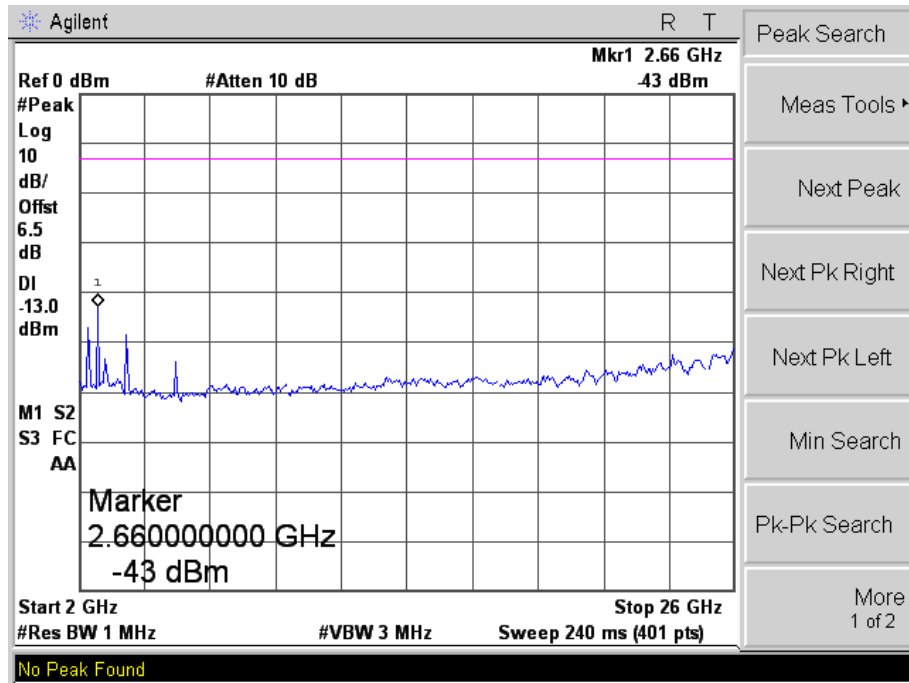


GPRS High Band Emission

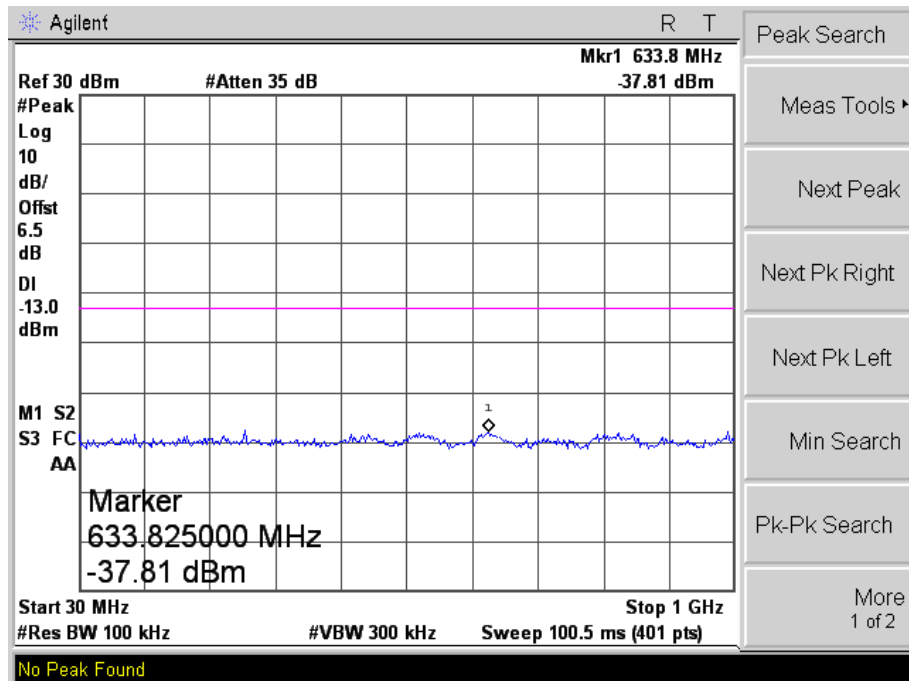


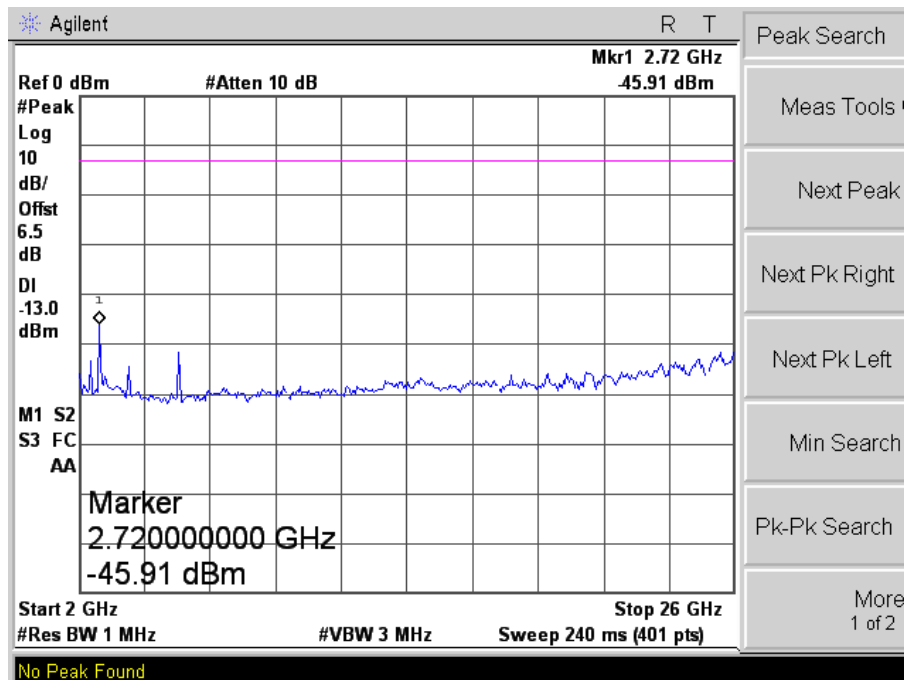
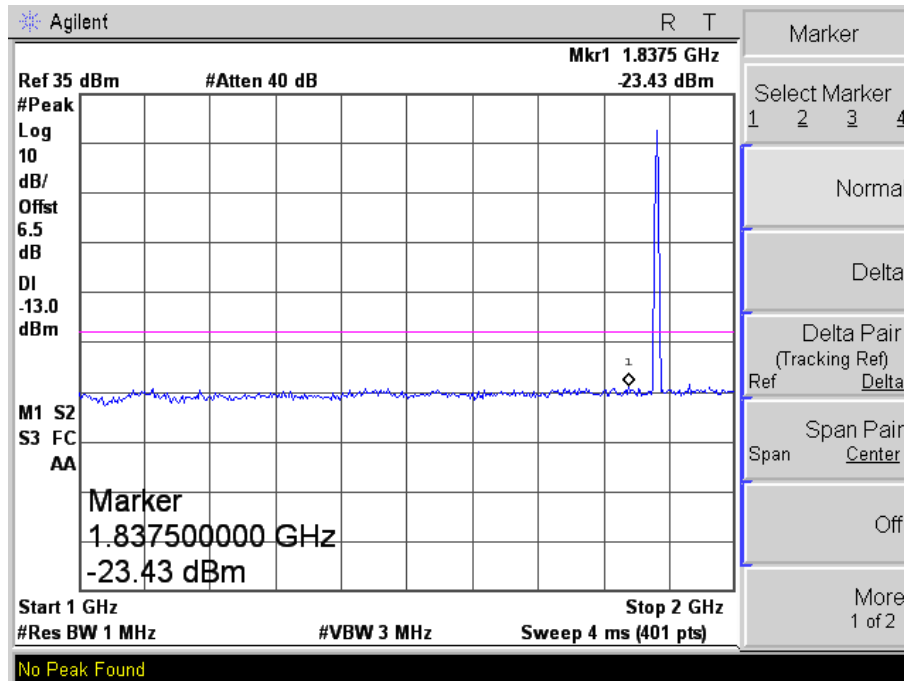
For PCS Band
GPRS Low Channel



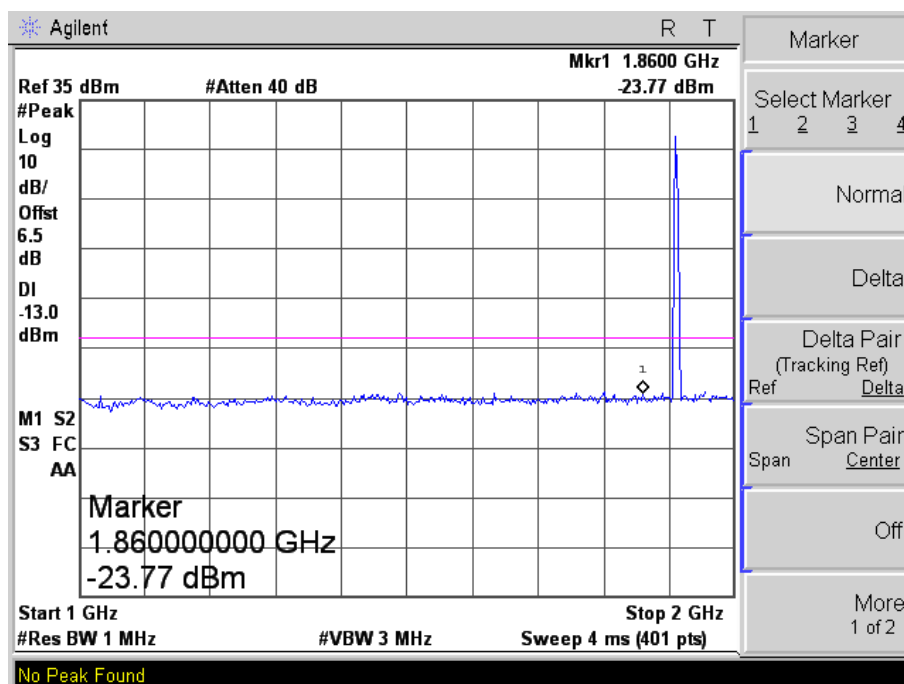
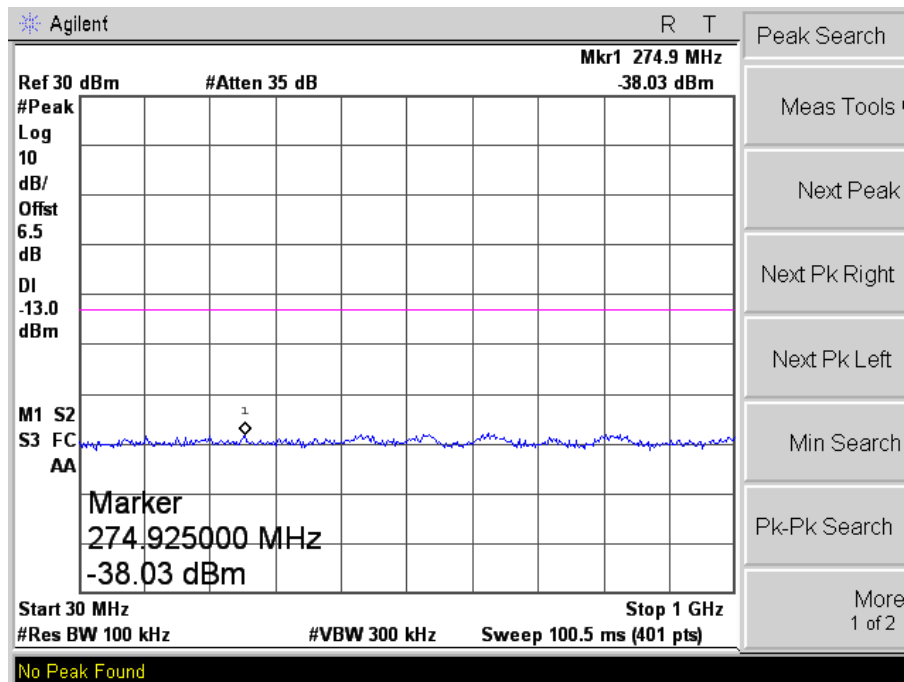


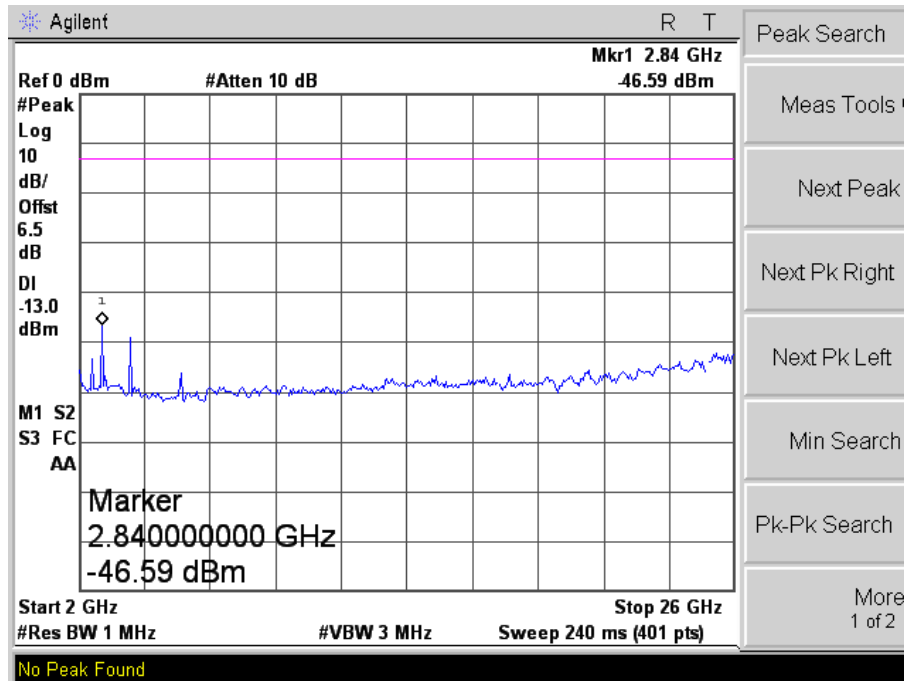
GPRS Middle Channel



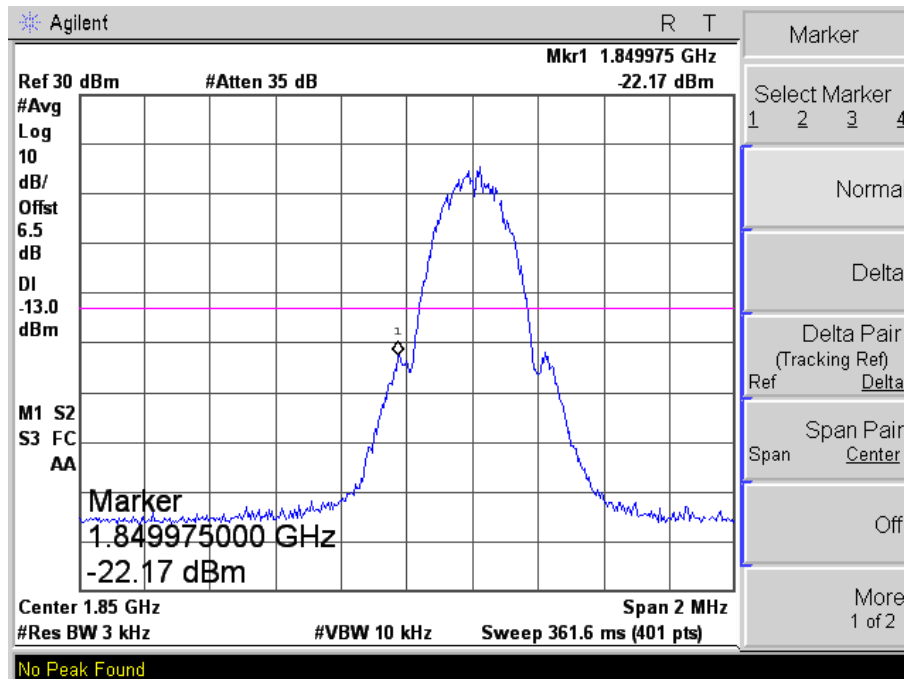


GPRS High Channel

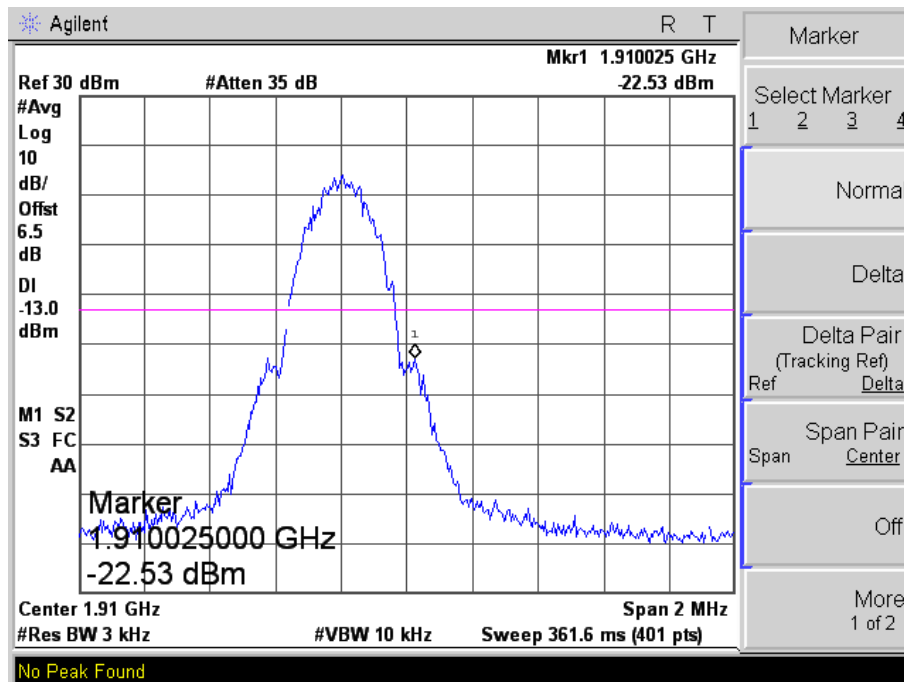




GPRS Low Band Emission

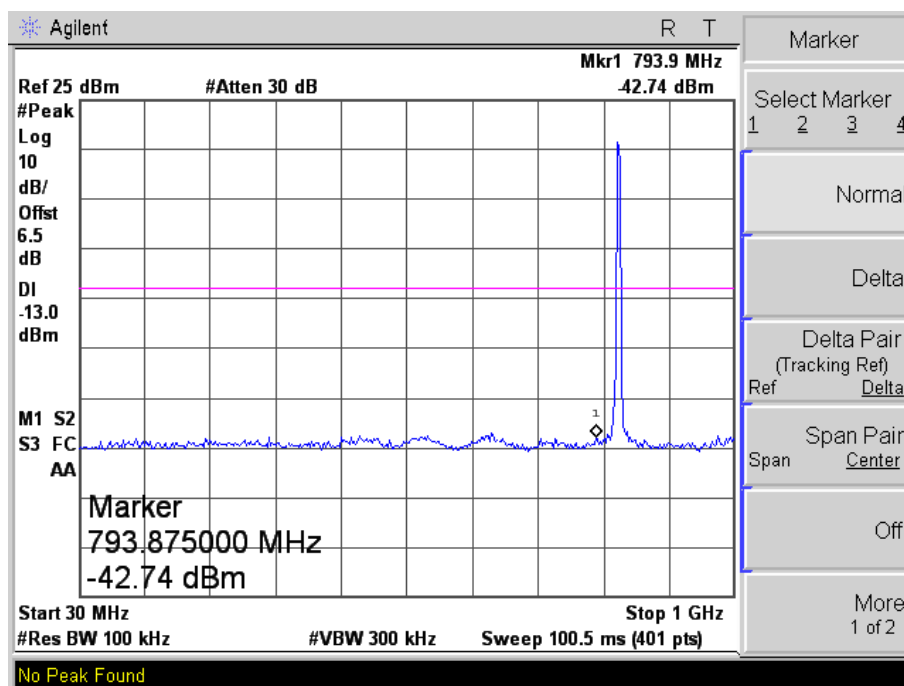


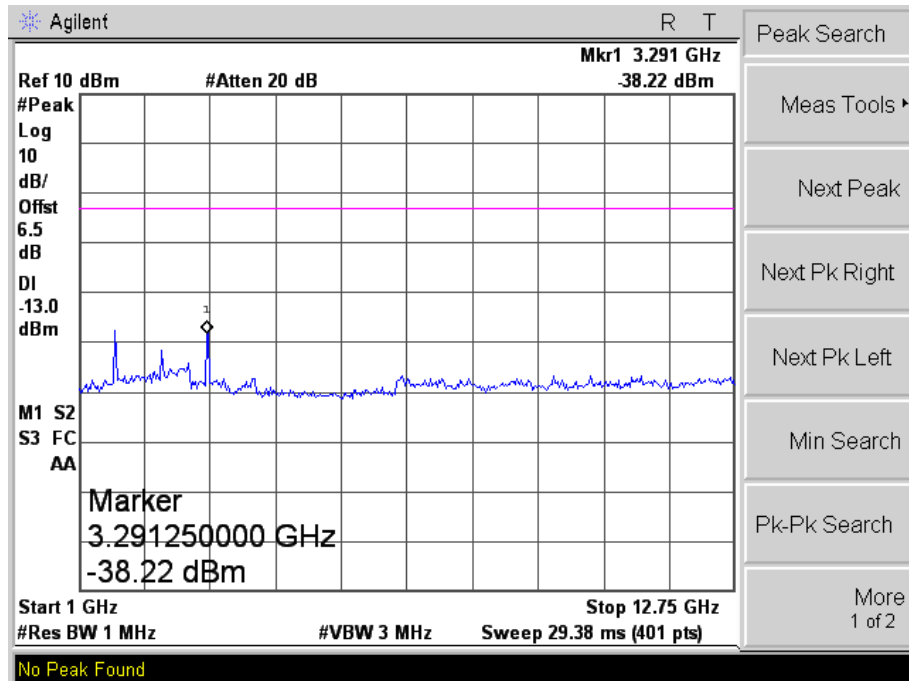
GPRS High Band Emission



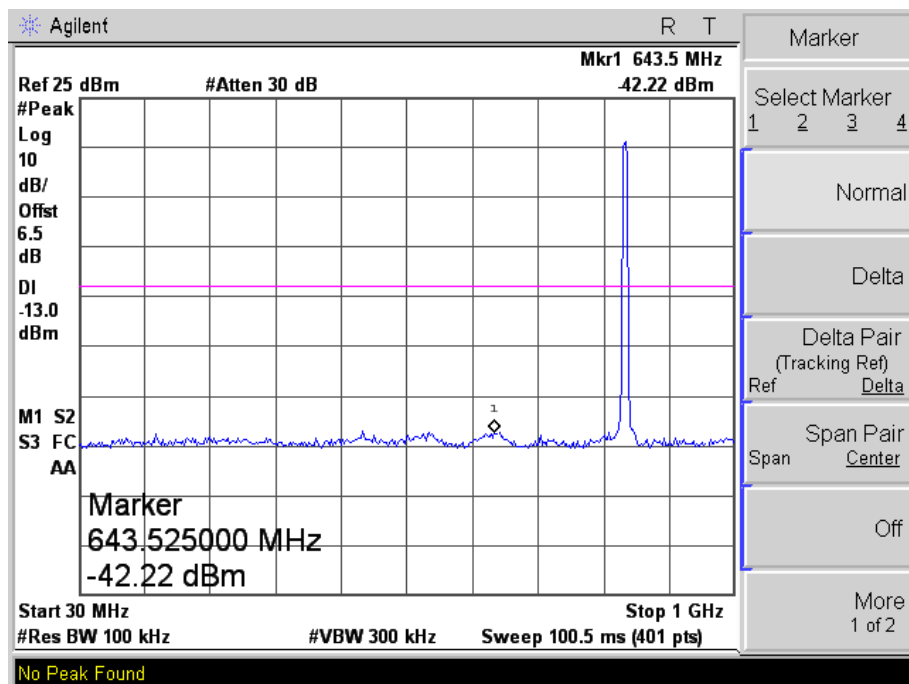
For Band V

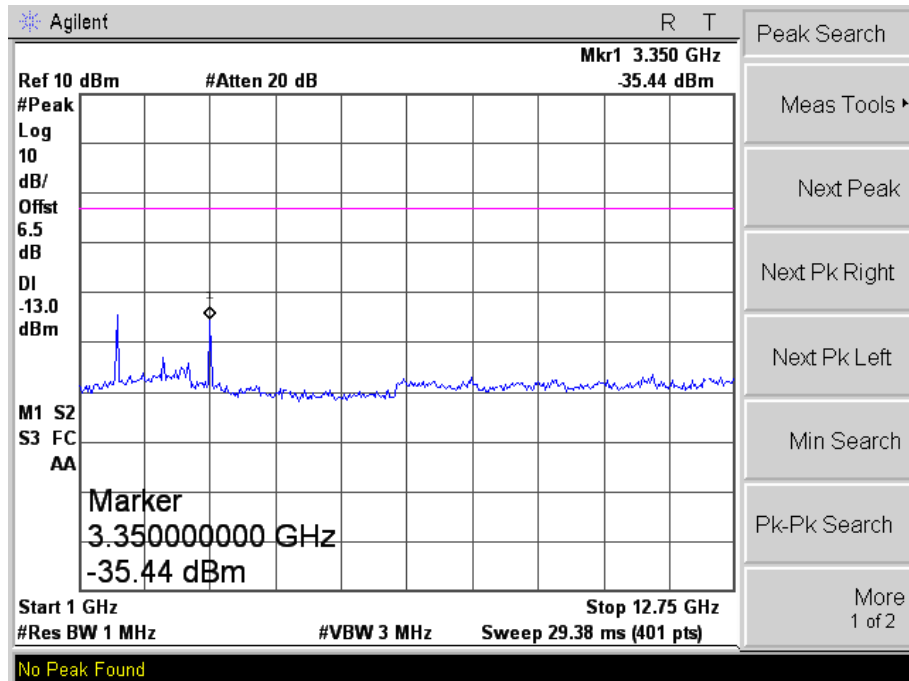
WCDMA Low Channel



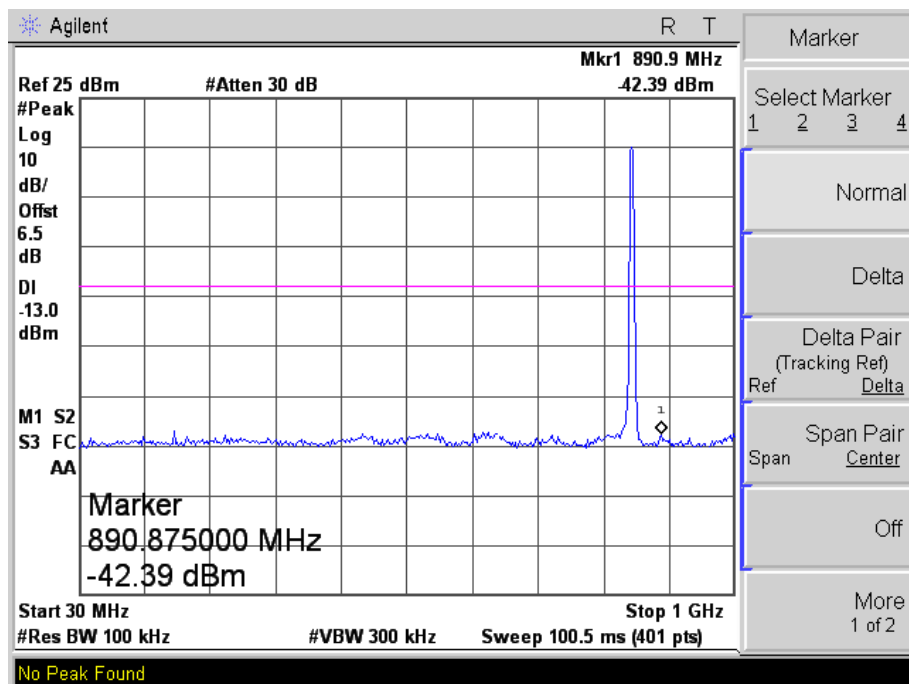


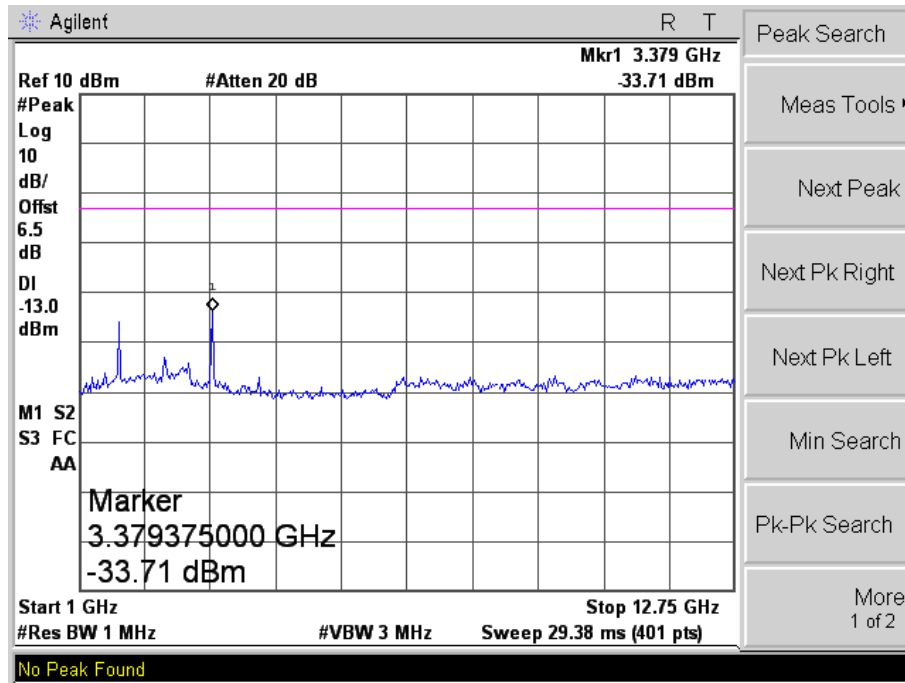
WCDMA Middle Channel



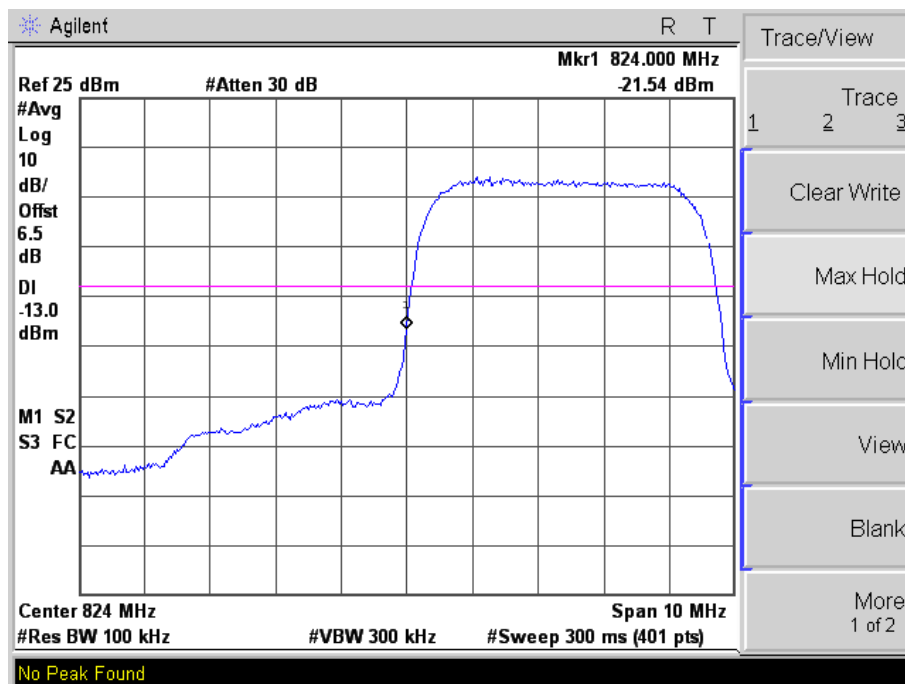


WCDMA High Channel

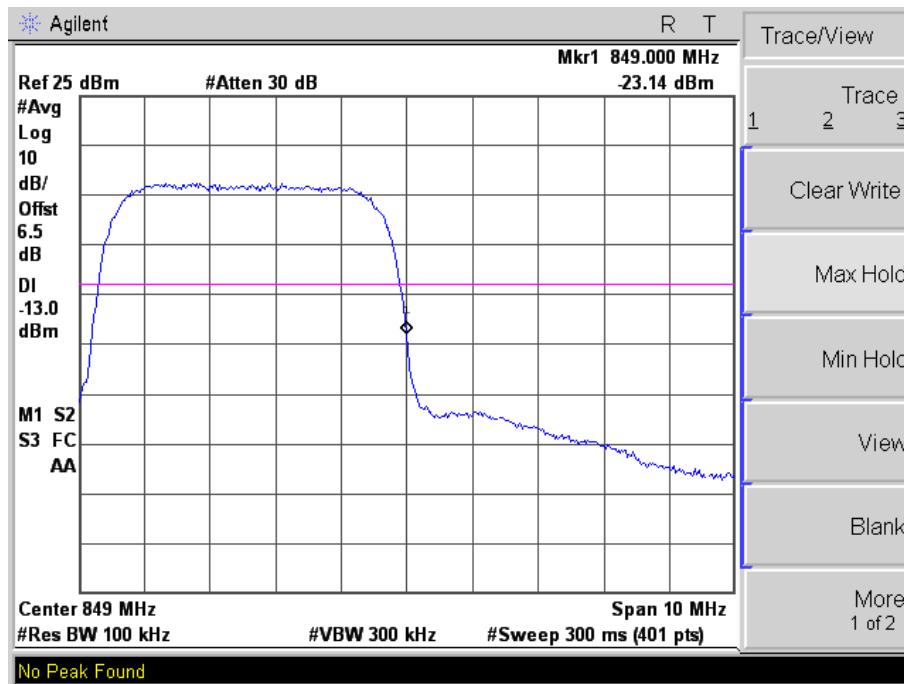




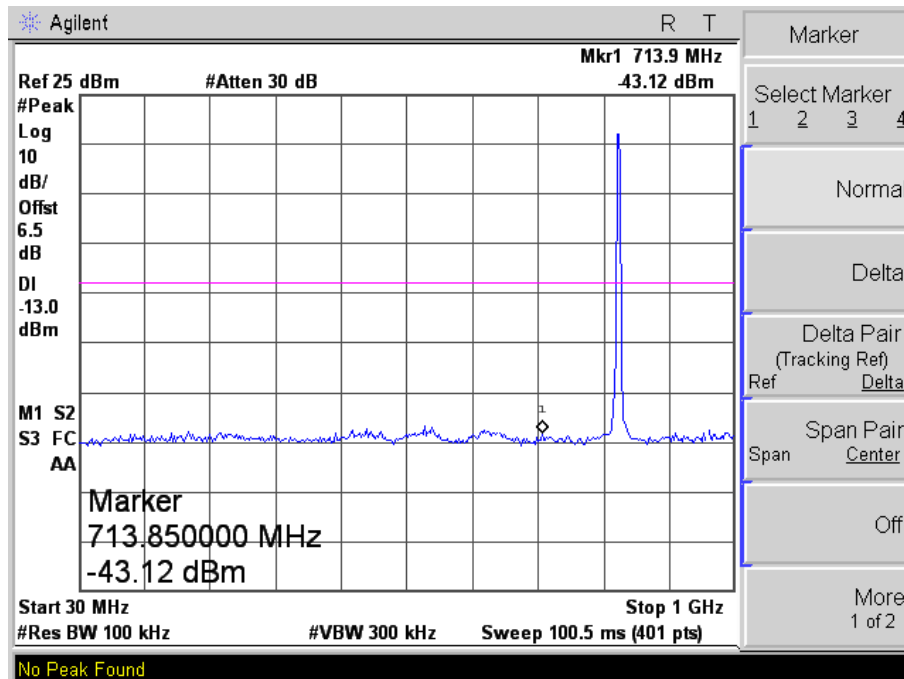
WCDMA Low Band Spurious Emission

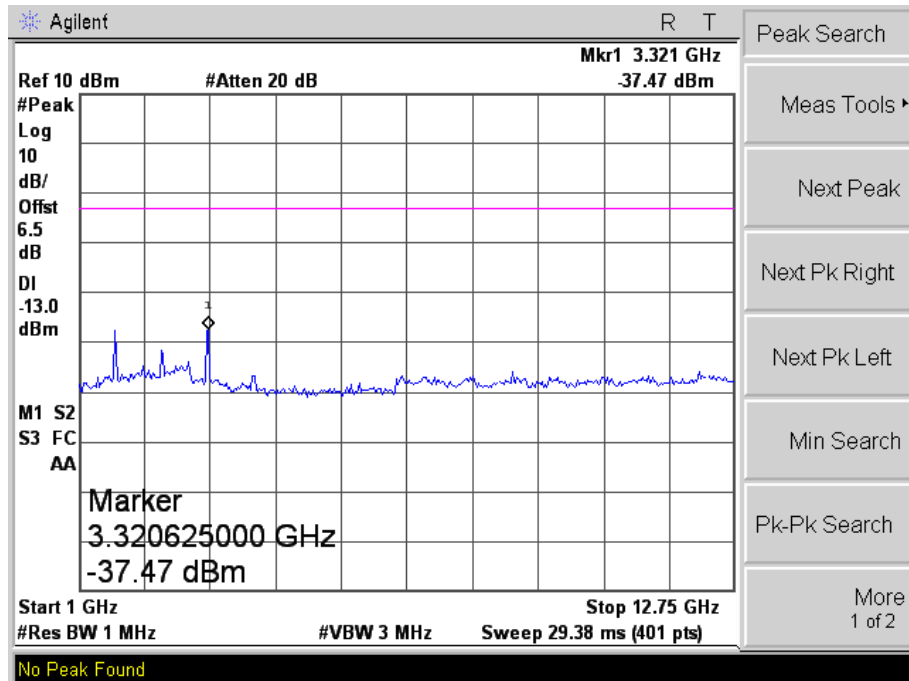


WCDMA High Band Spurious Emission

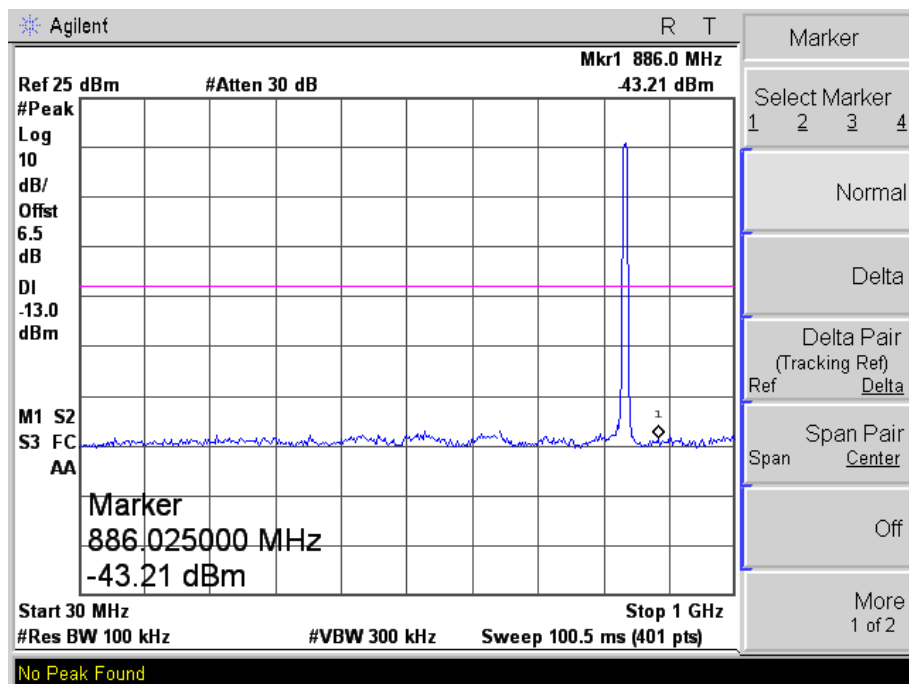


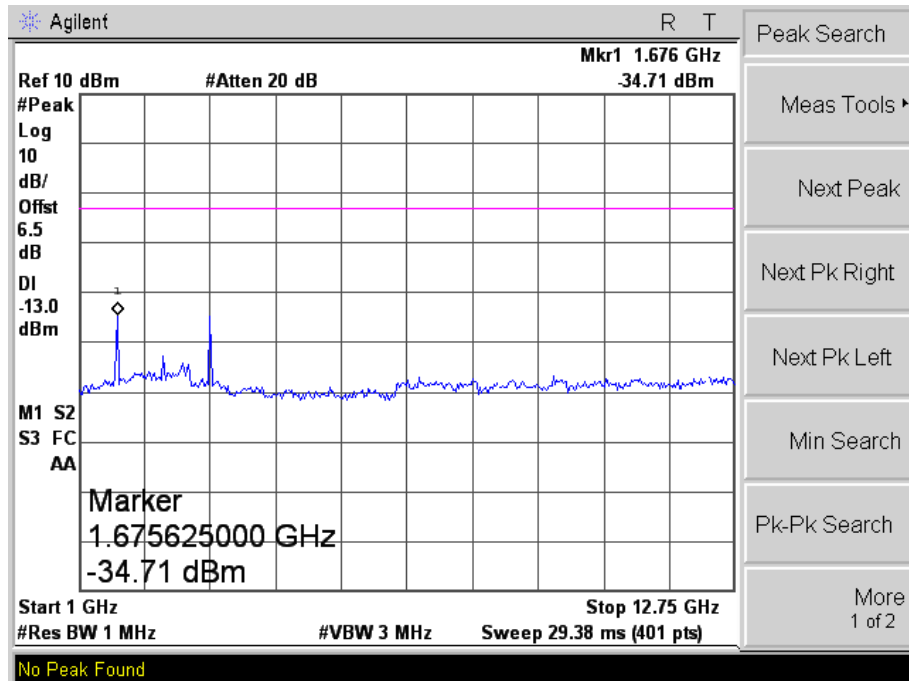
HSDPA Low Channel



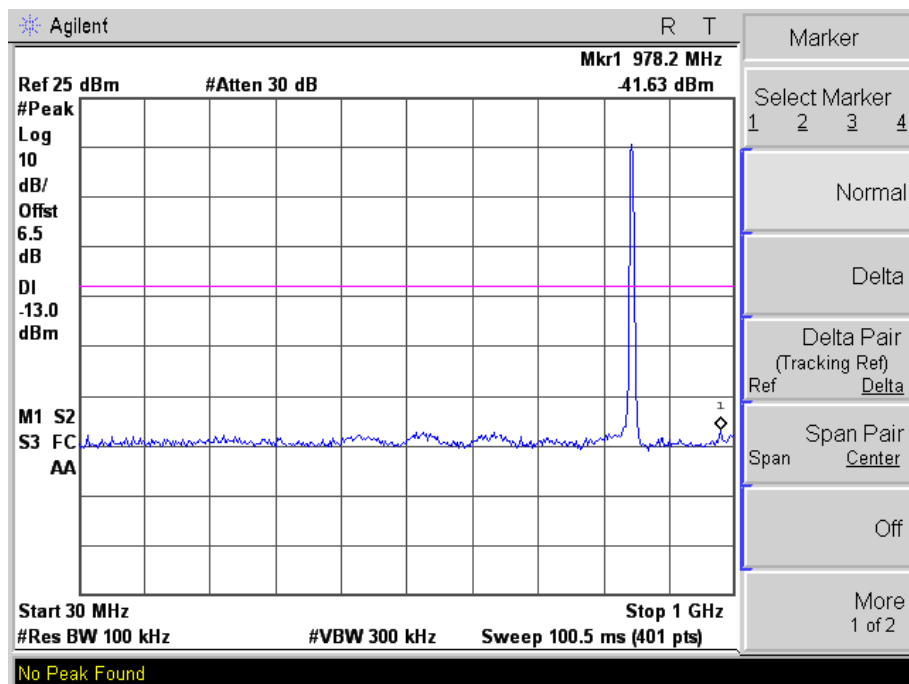


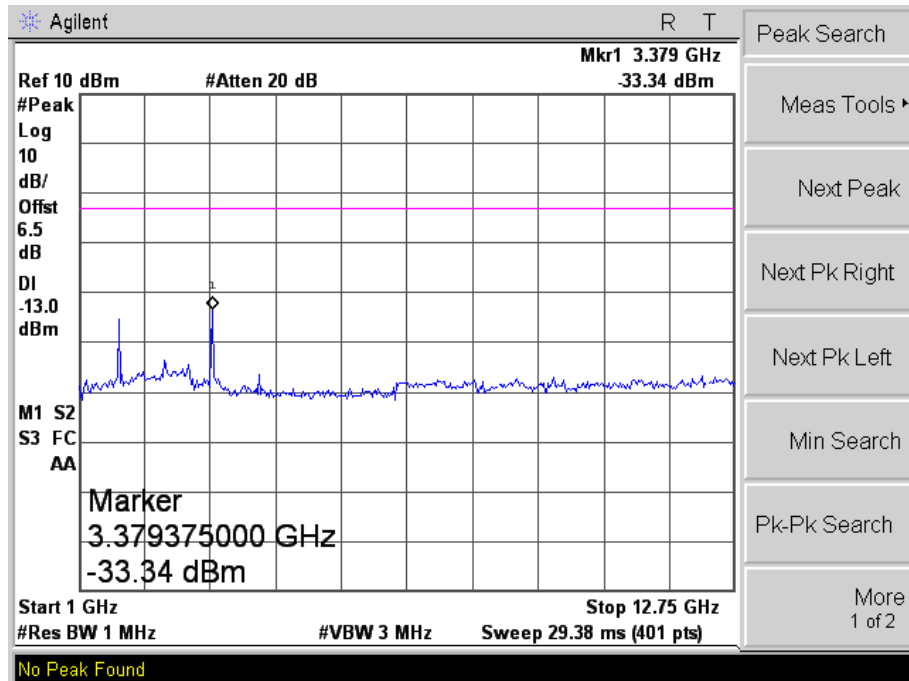
HSDPA Middle Channel



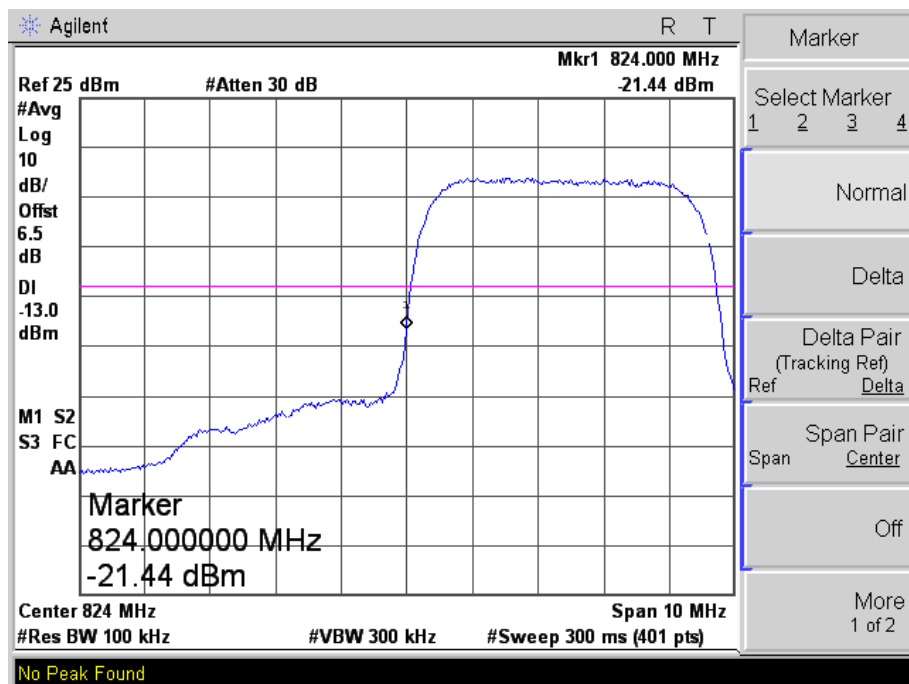


HSDPA High Channel

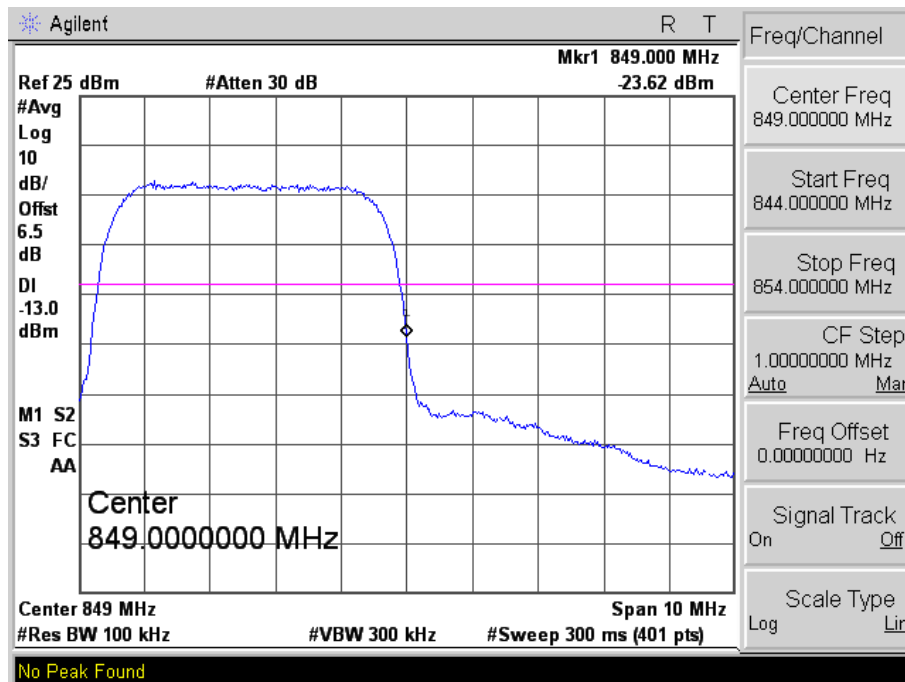




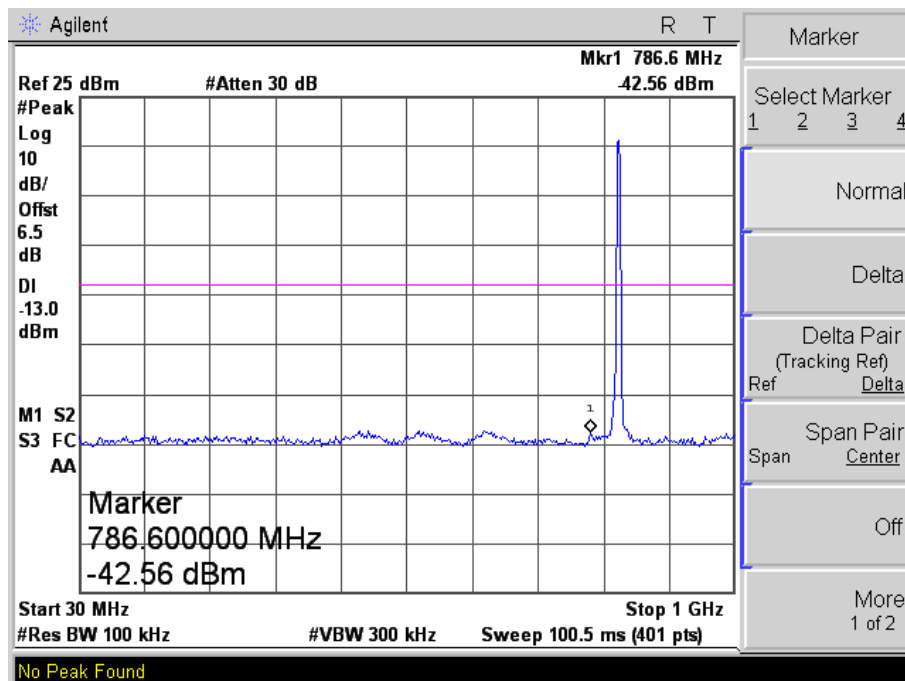
HSDPA Low Band Spurious Emission

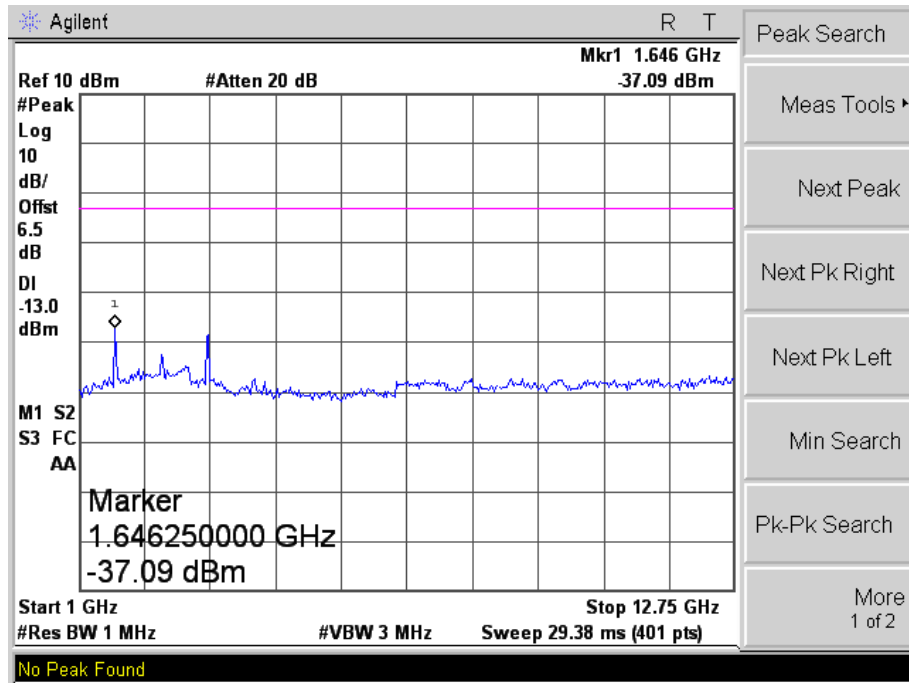


HSDPA High Band Spurious Emission

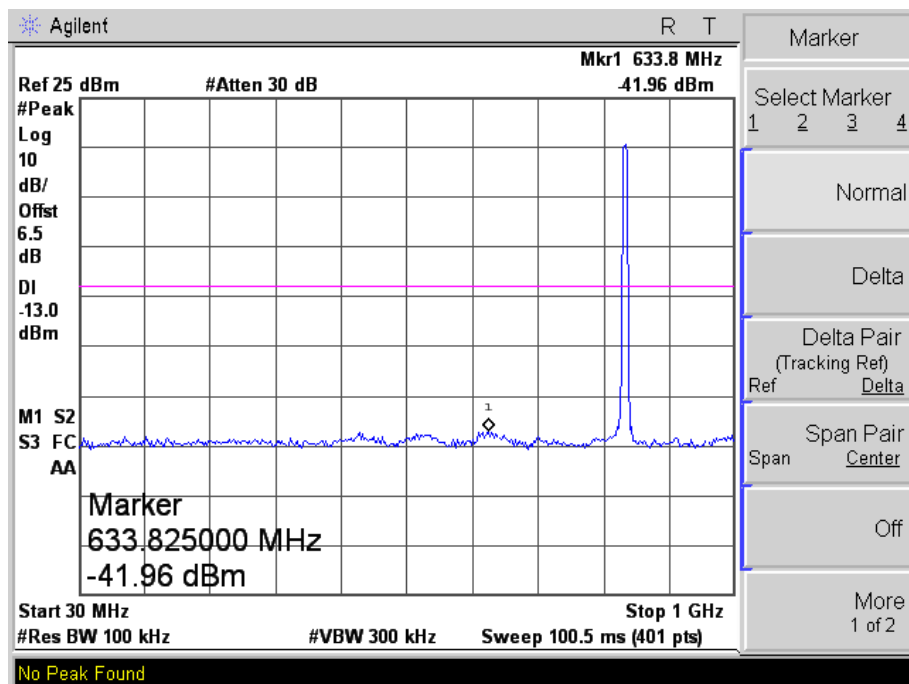


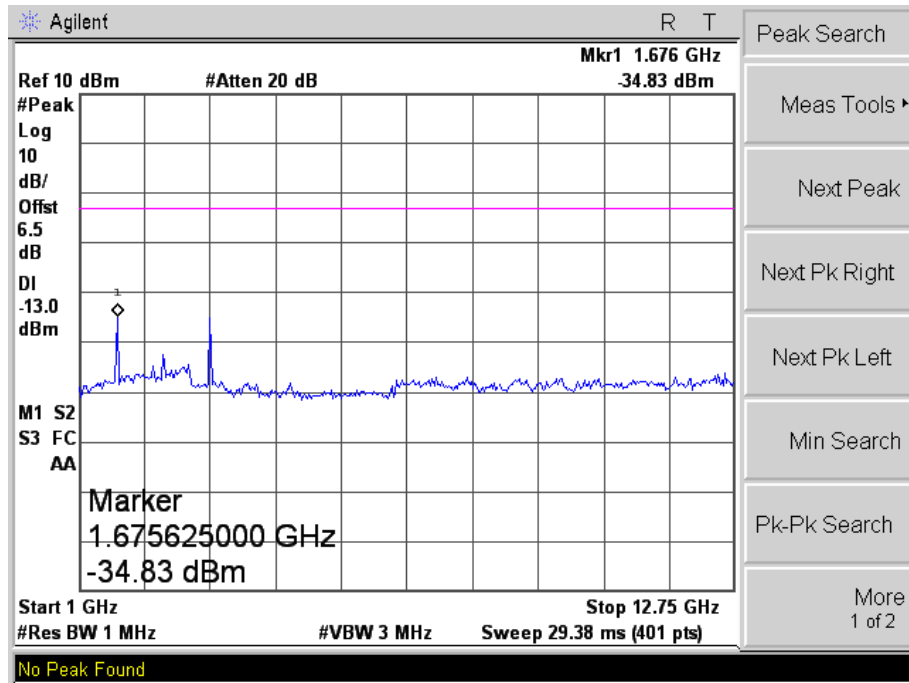
HSUPA Low Channel



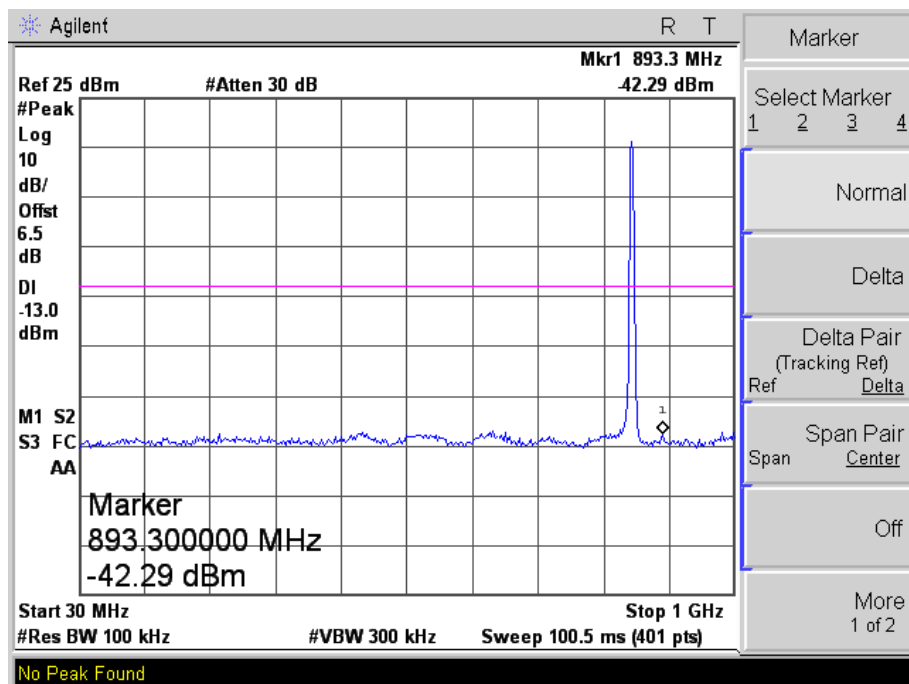


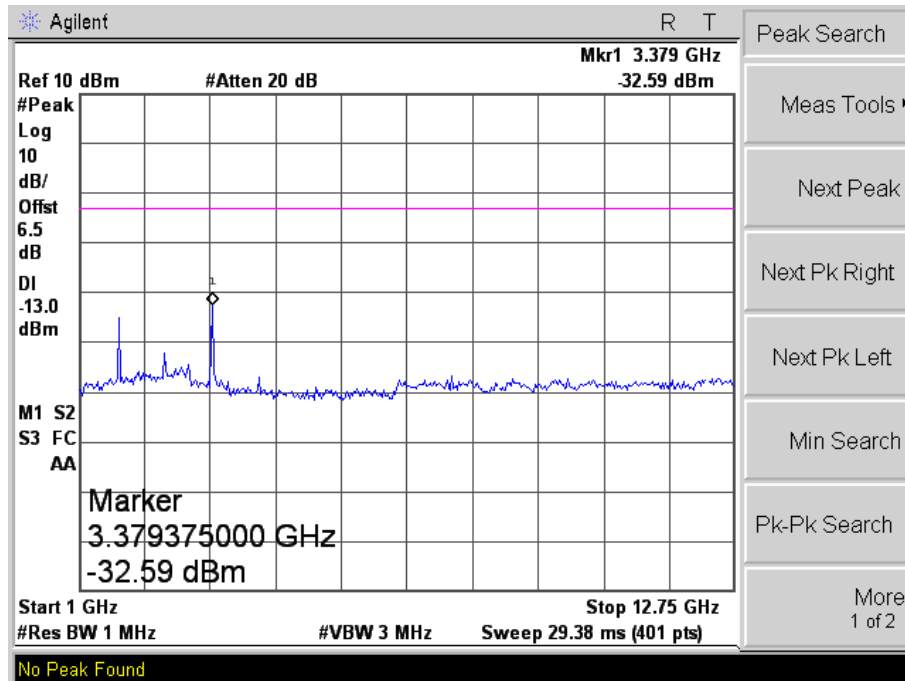
HSUPA Middle Channel



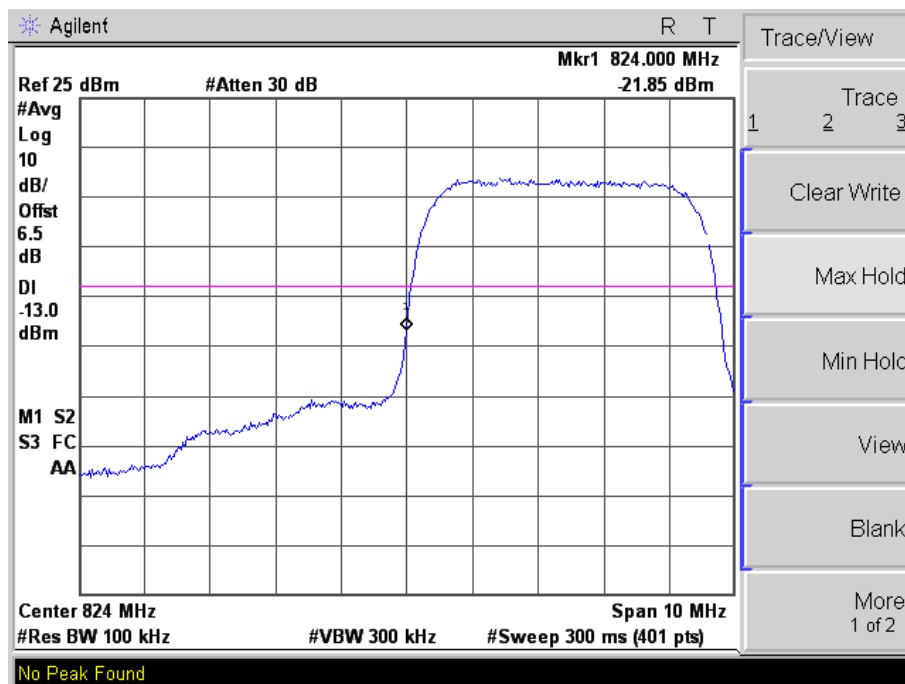


HSUPA High Channel

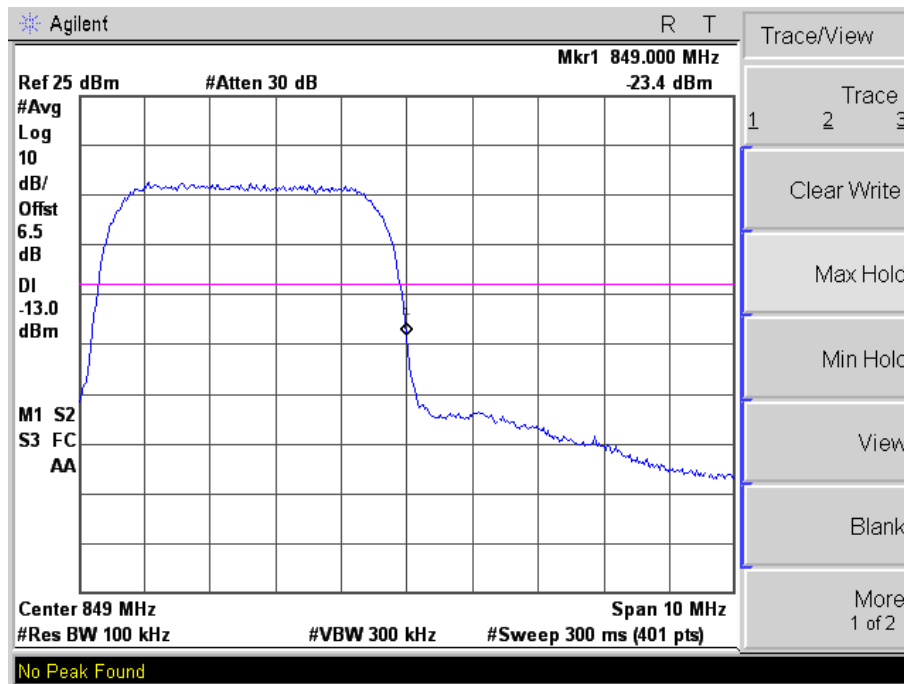




HSUPA Low Band Spurious Emission

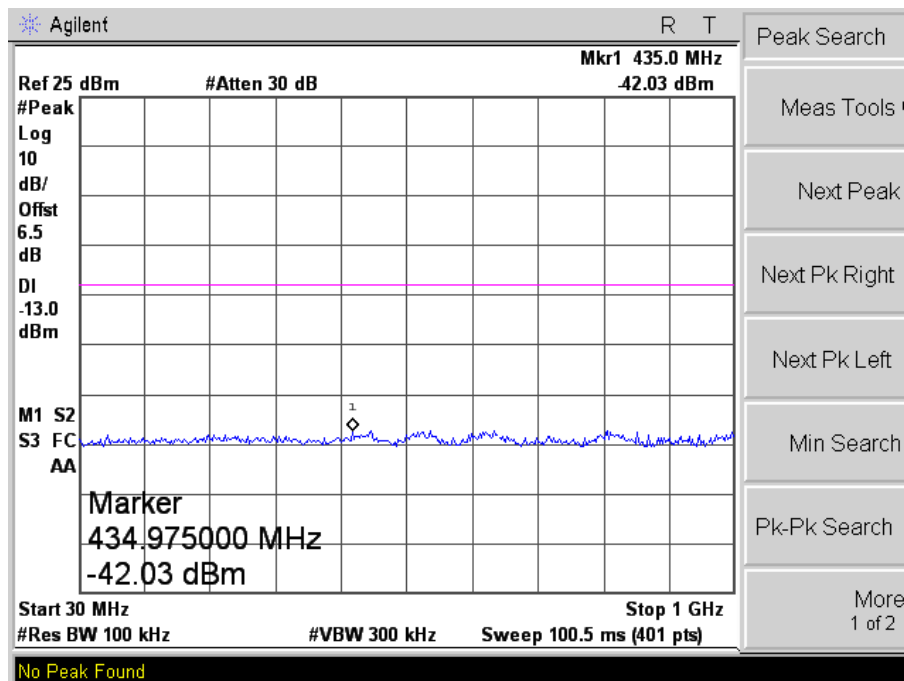


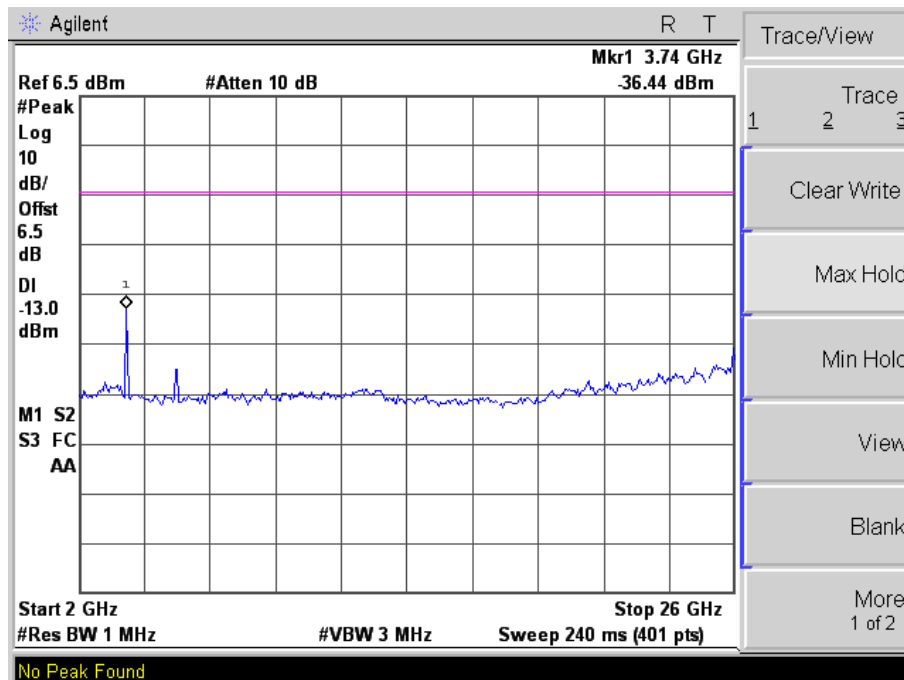
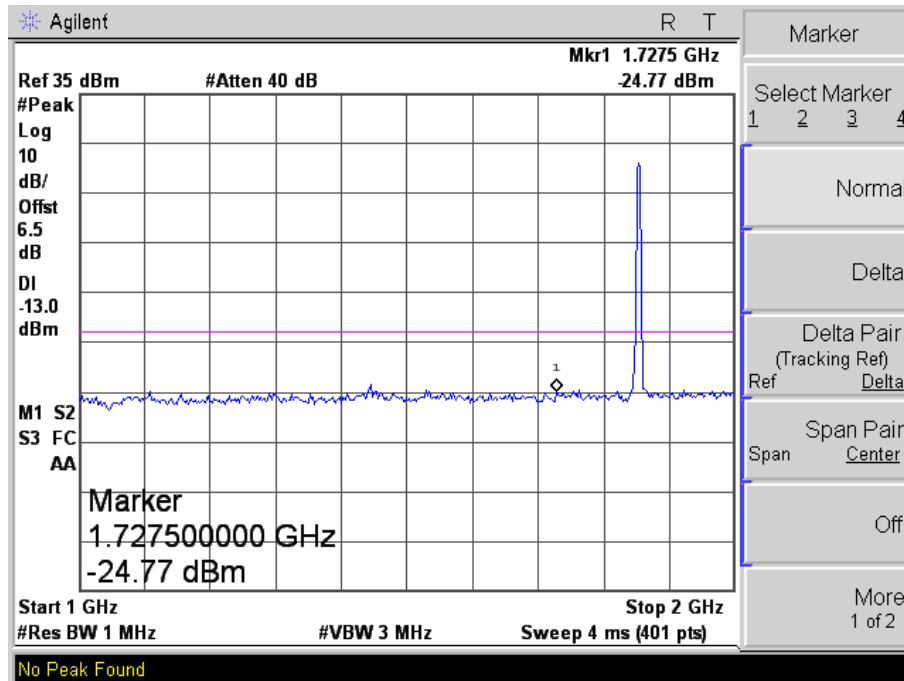
HSUPA High Band Spurious Emission



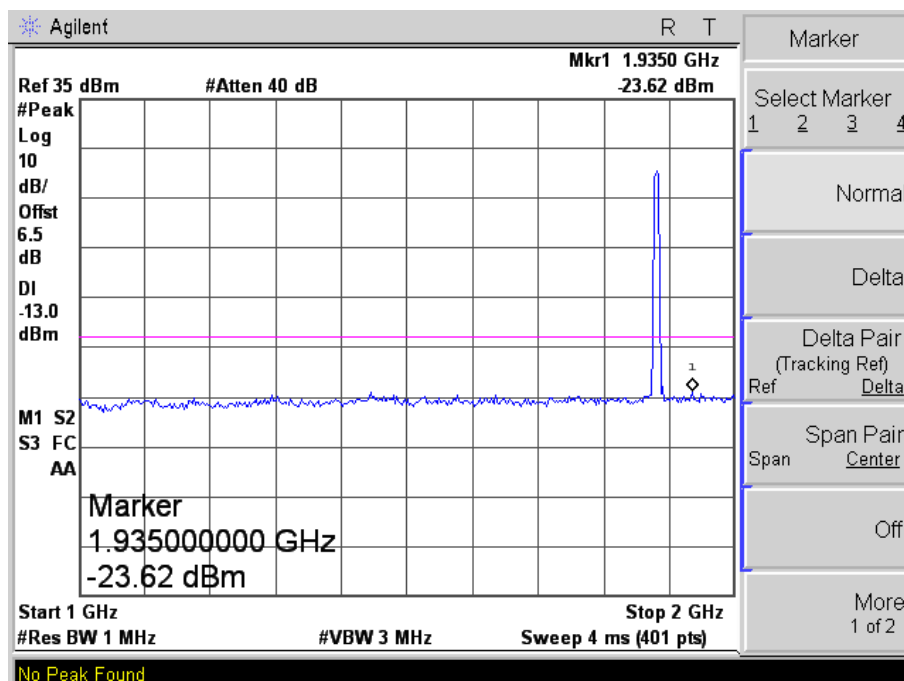
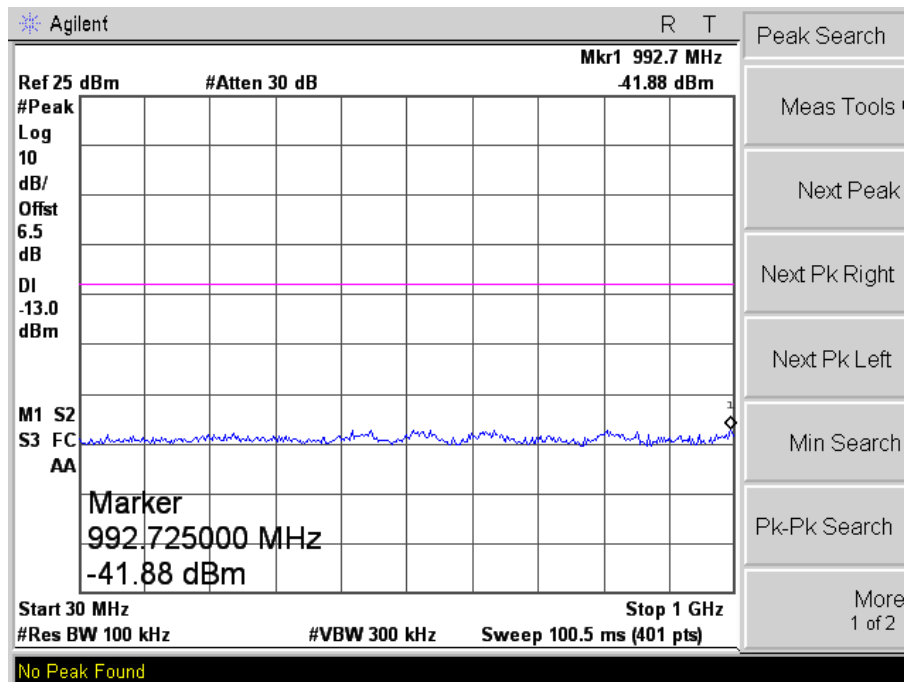
For Band II

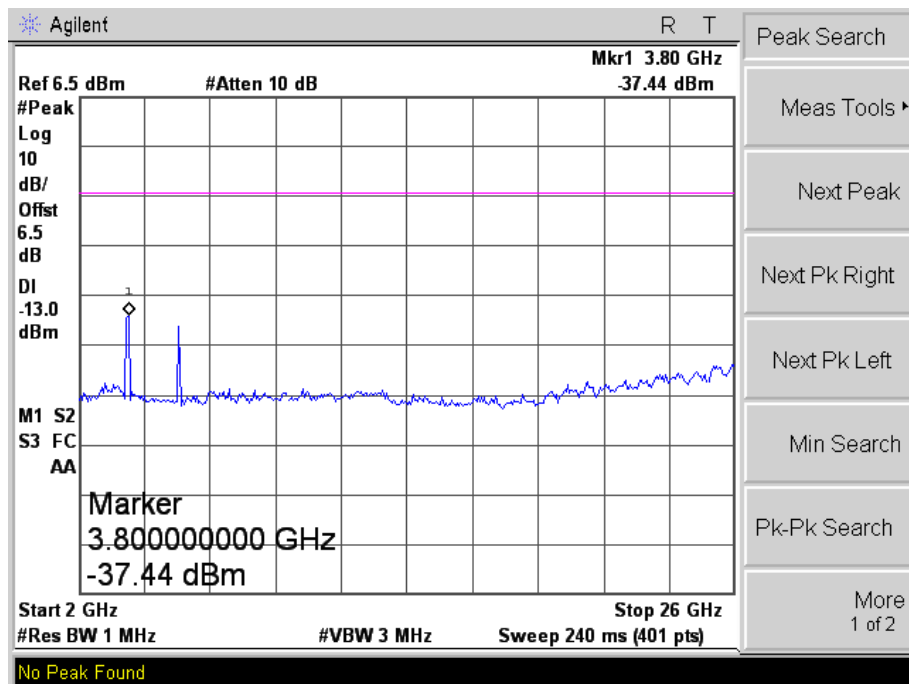
WCDMA Low Channel



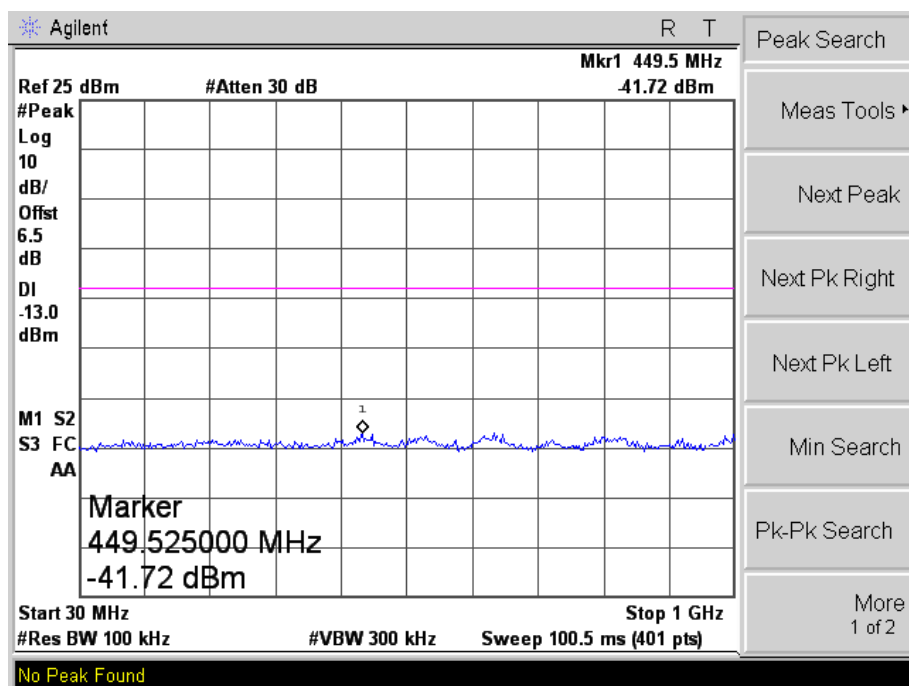


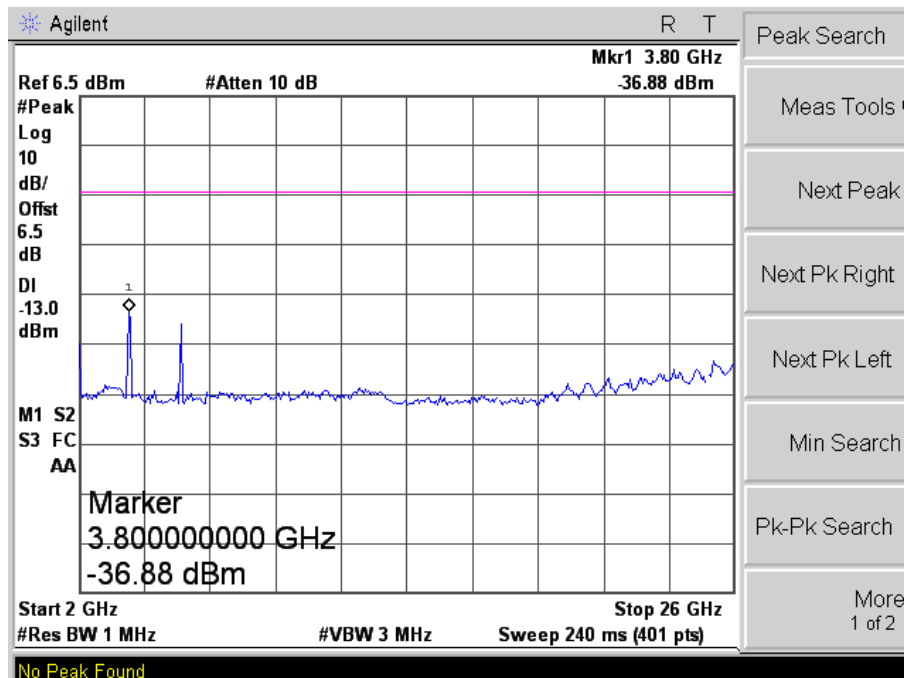
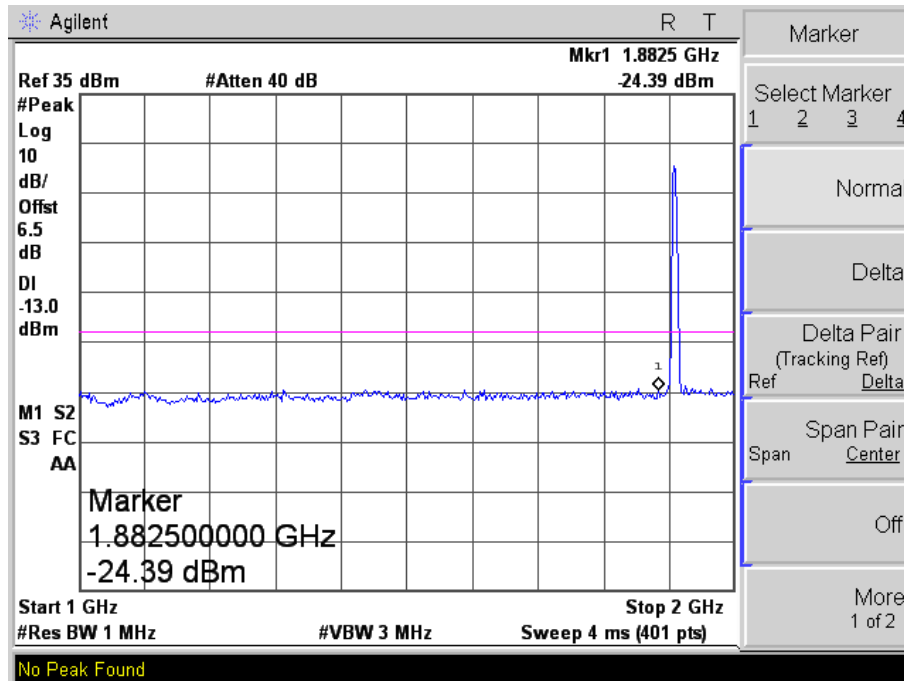
WCDMA Middle Channel



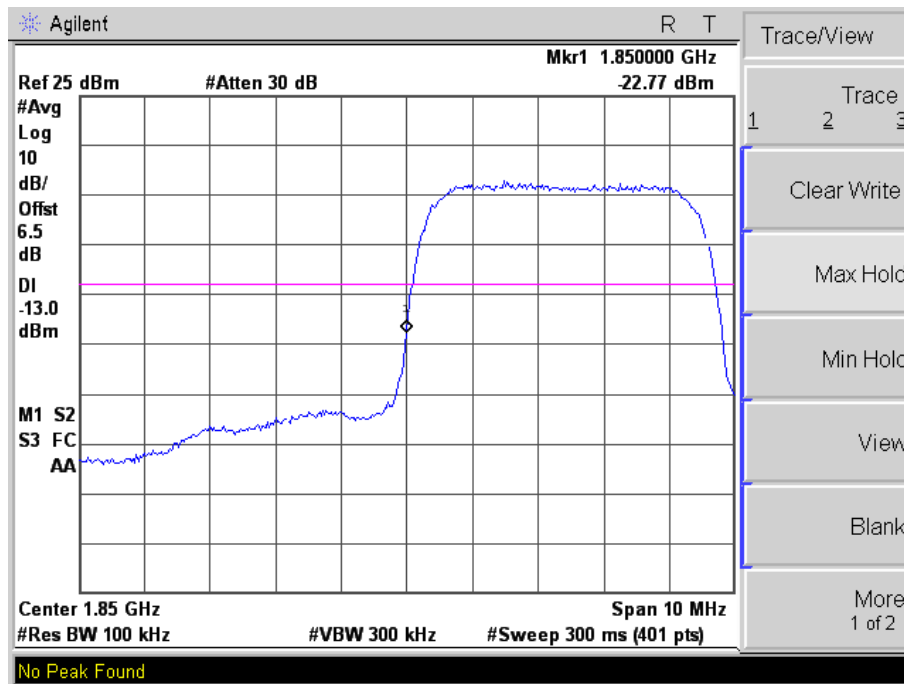


WCDMA High Channel

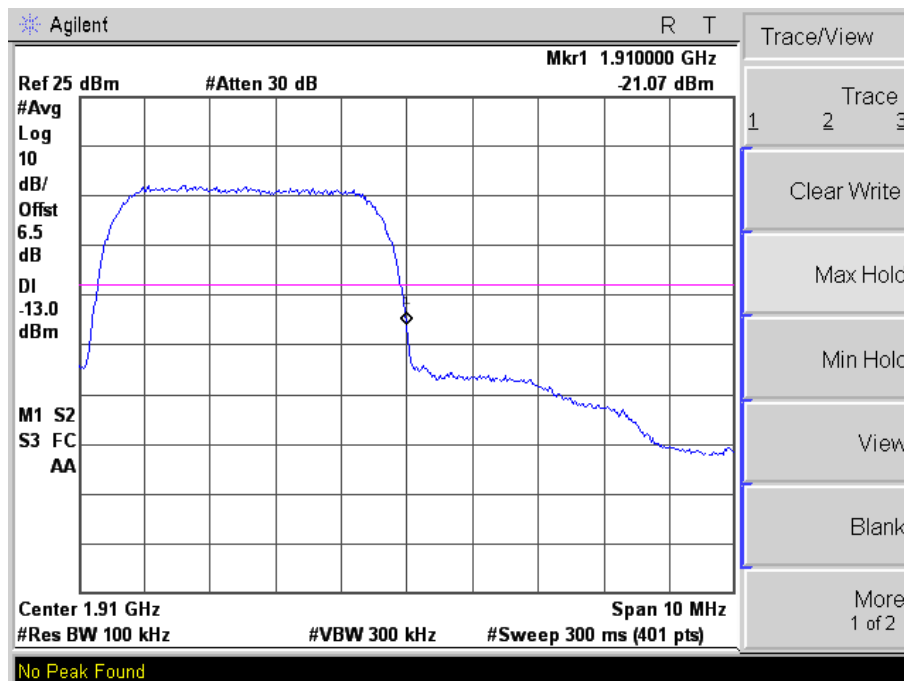




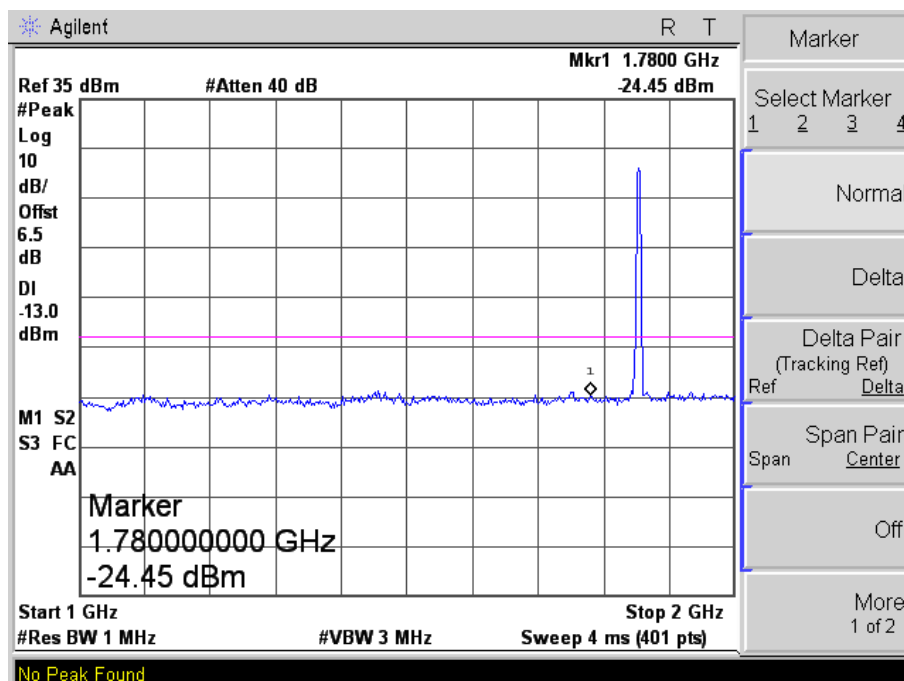
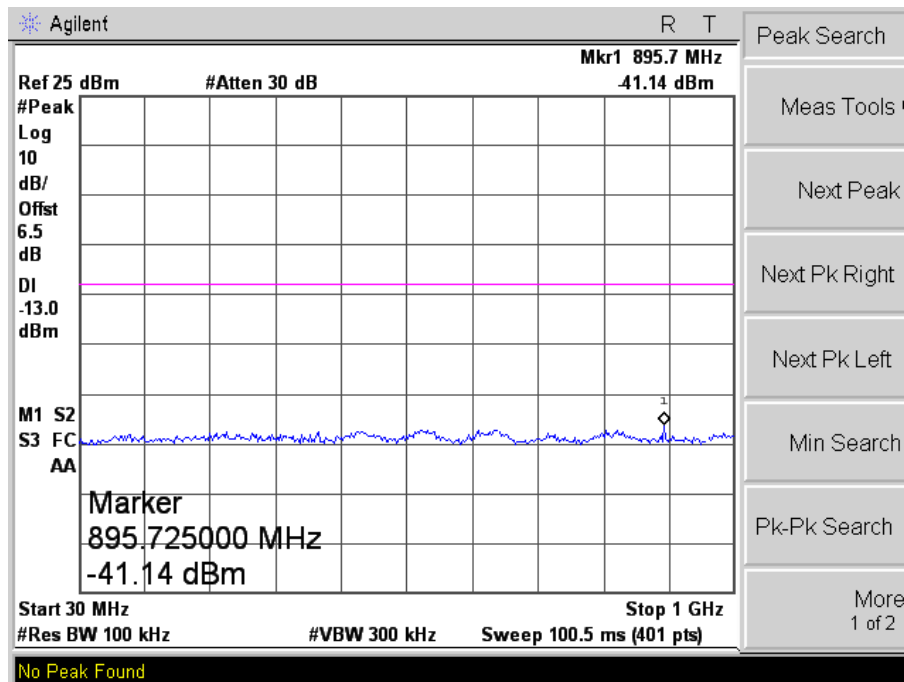
WCDMA Low Band Spurious Emission

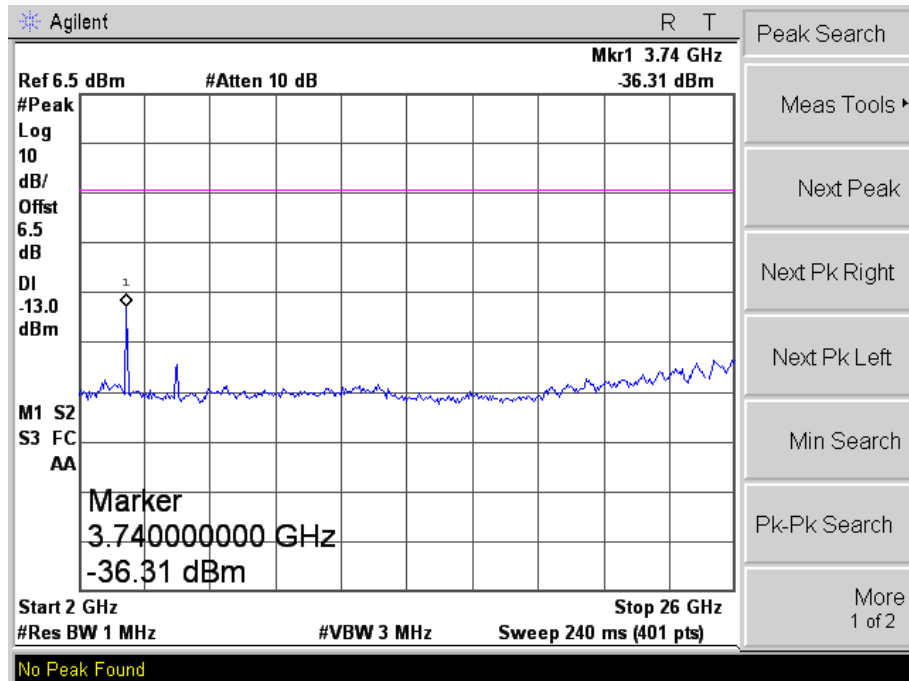


WCDMA High Band Spurious Emission

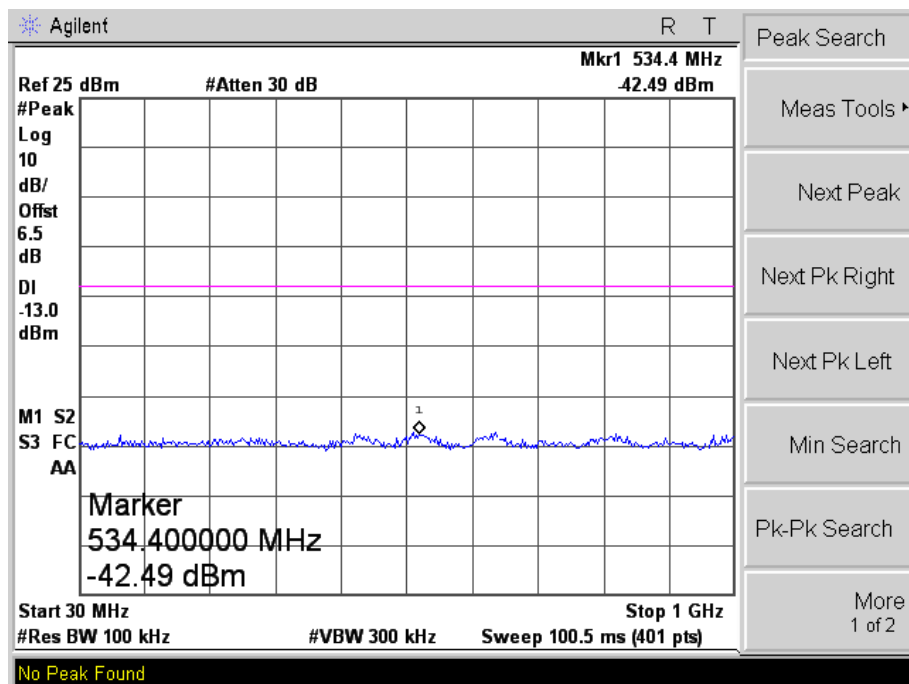


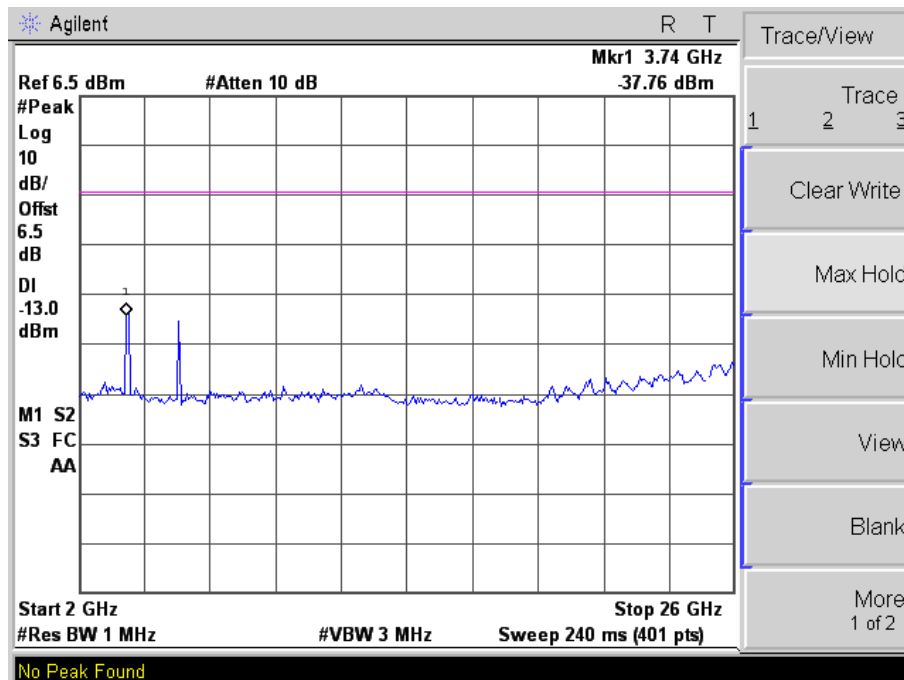
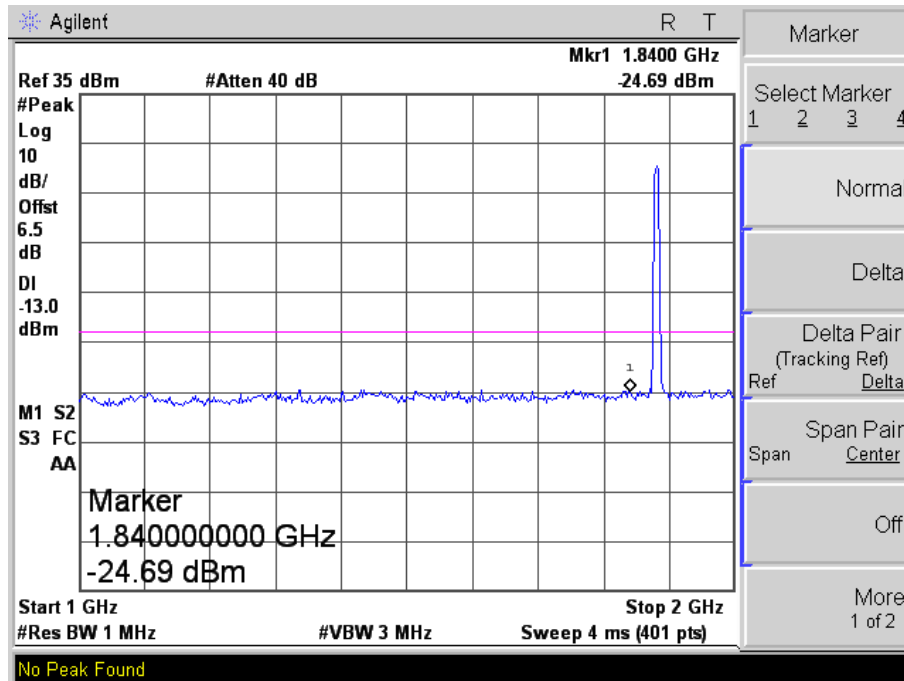
HSDPA Low Channel



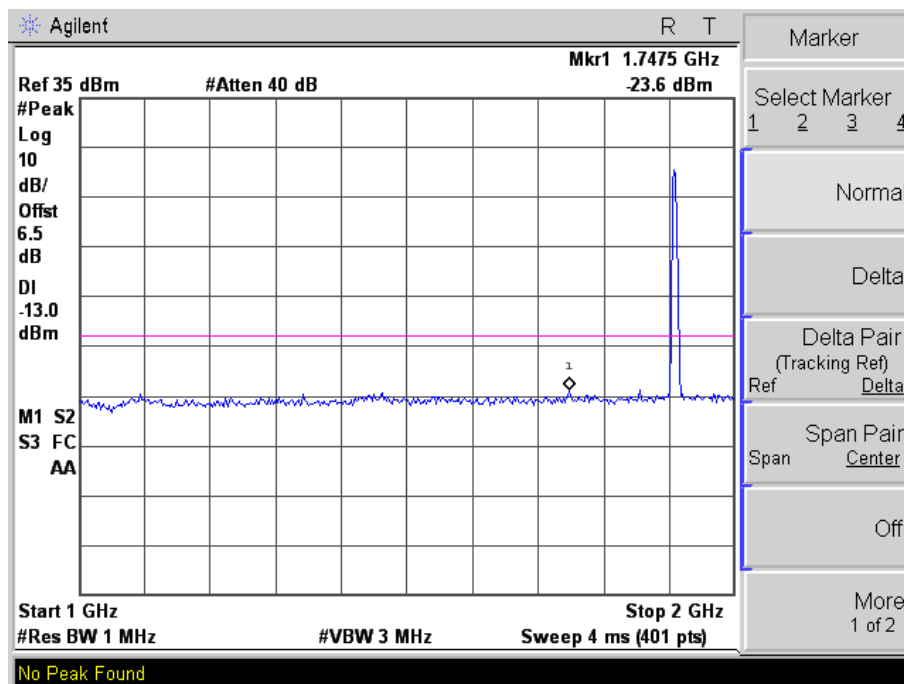
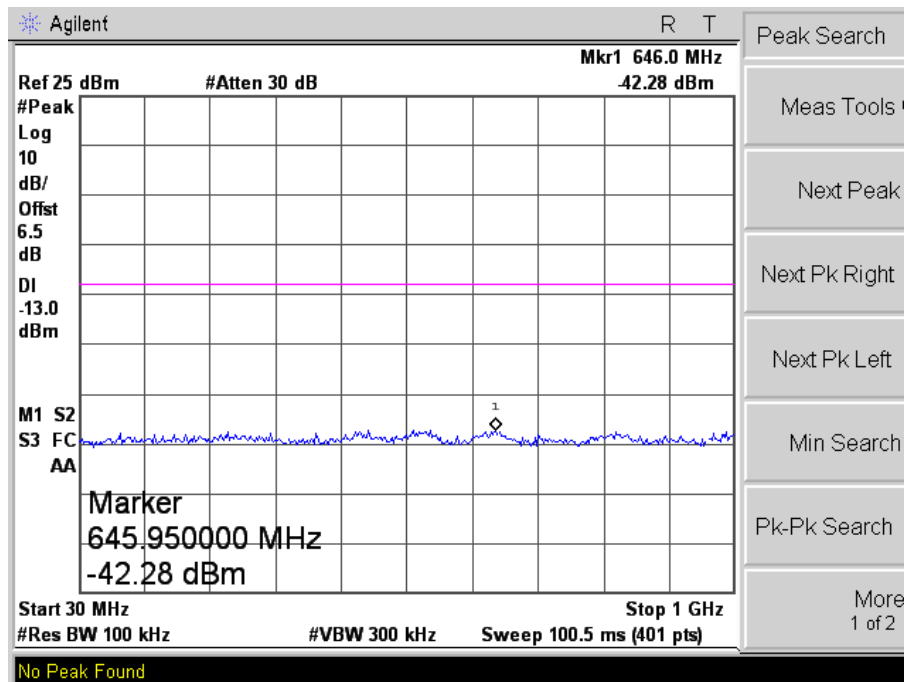


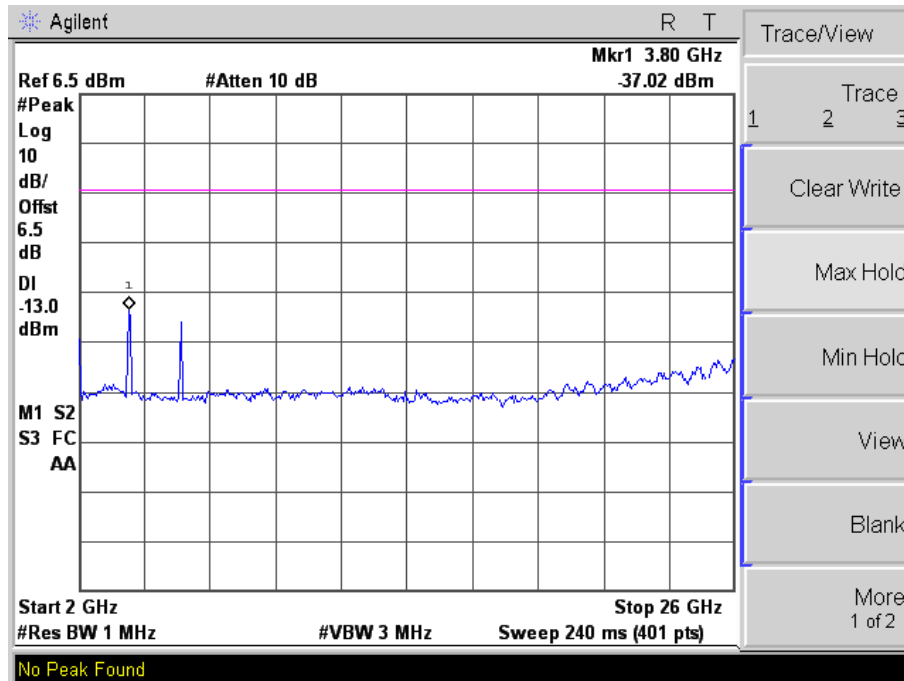
HSDPA Middle Channel



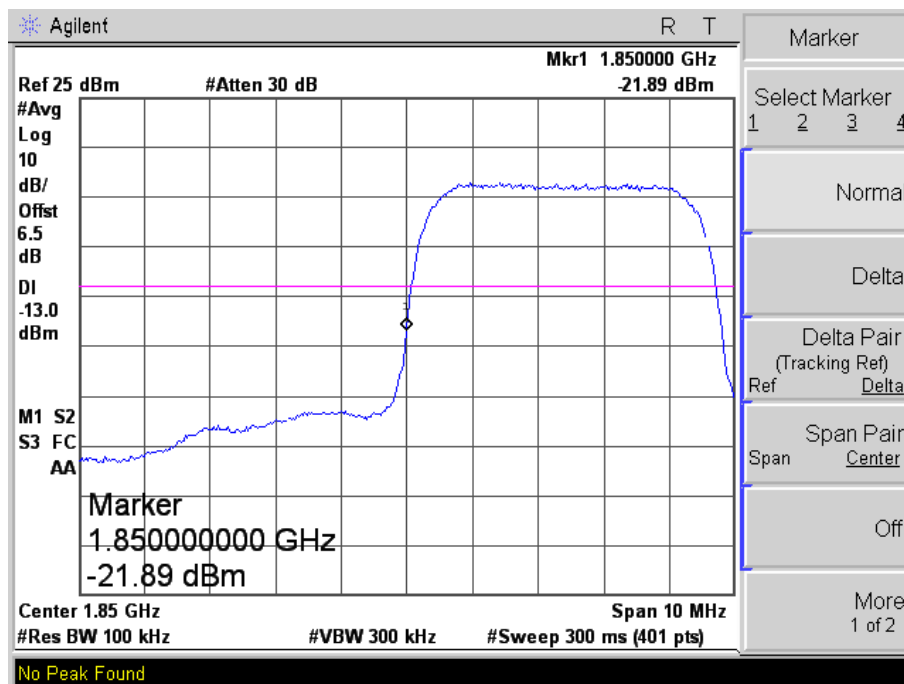


HSDPA High Channel

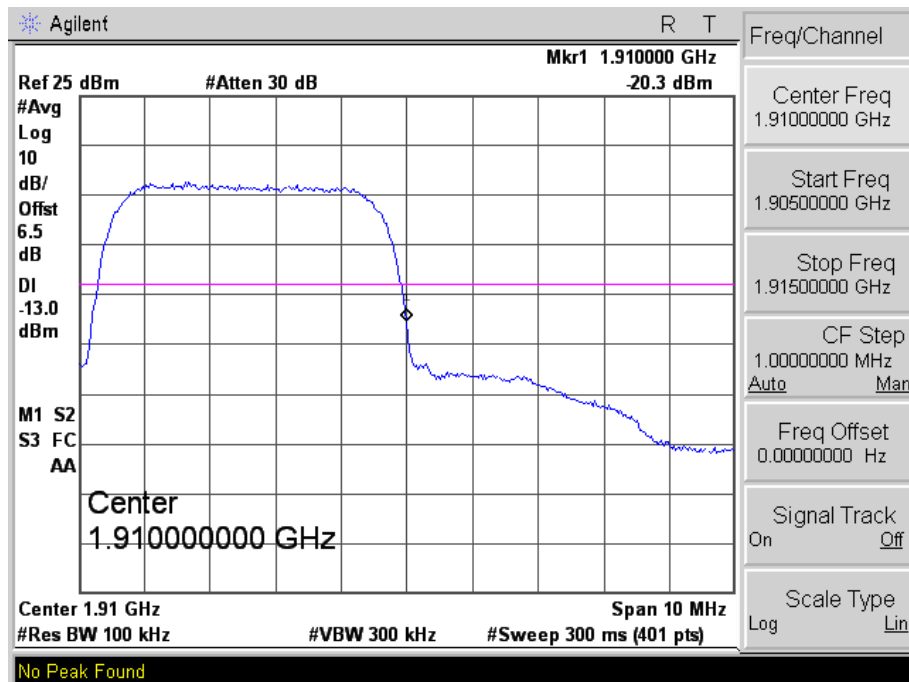




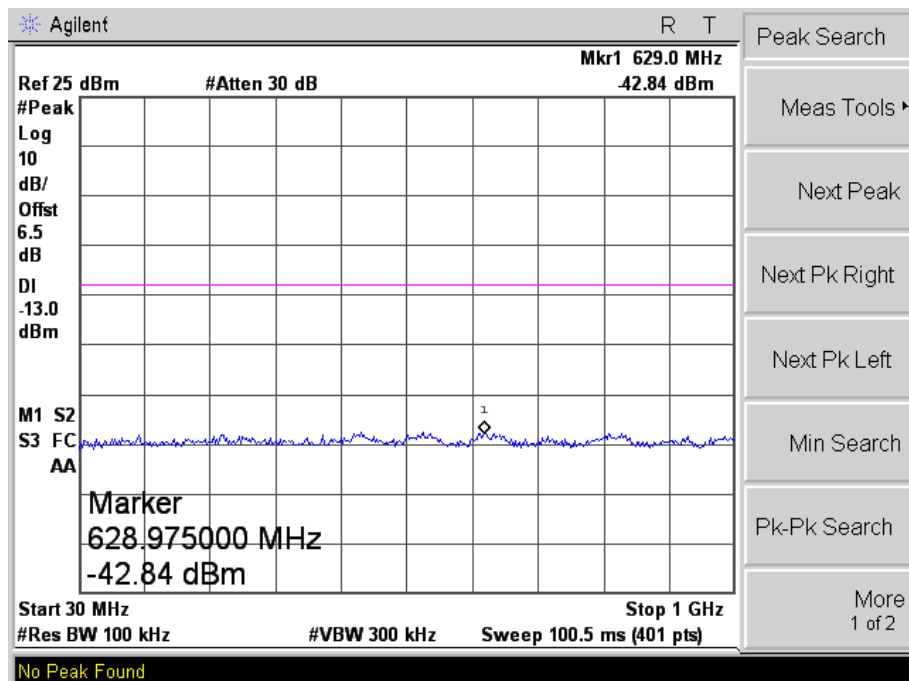
HSDPA Low Band Spurious Emission

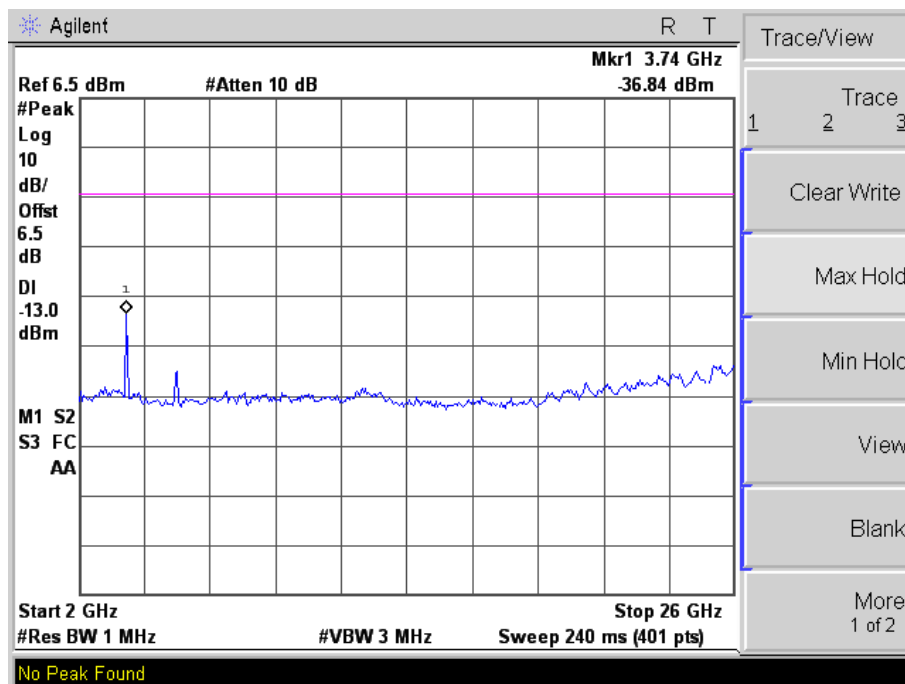
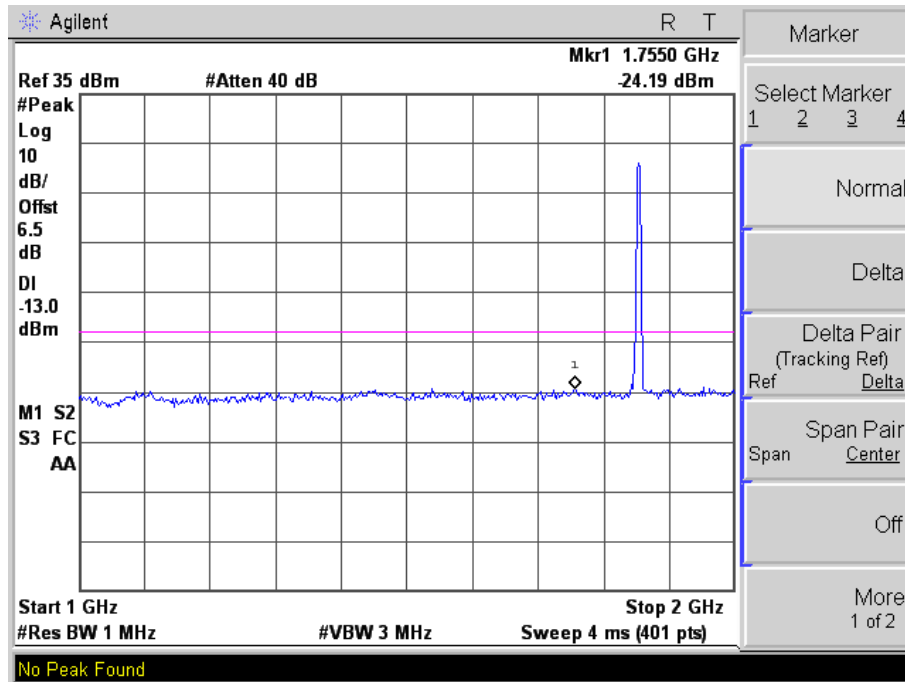


HSDPA High Band Spurious Emission

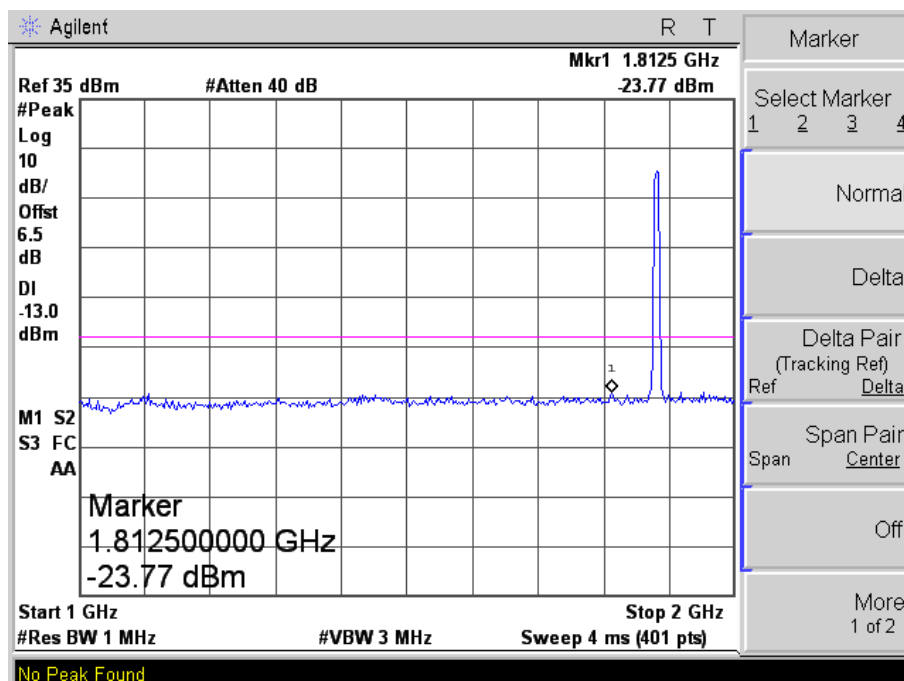
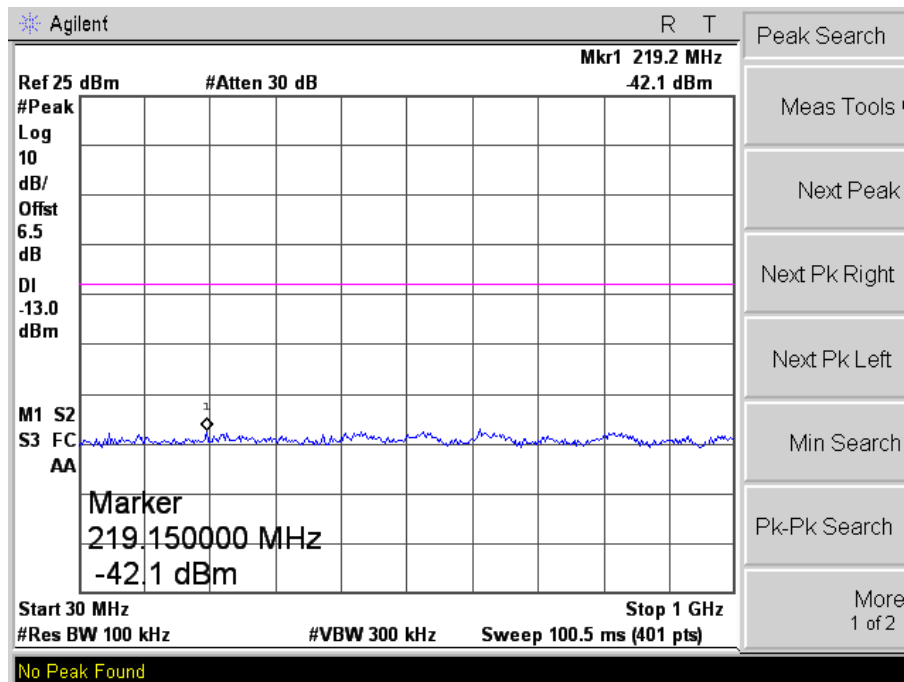


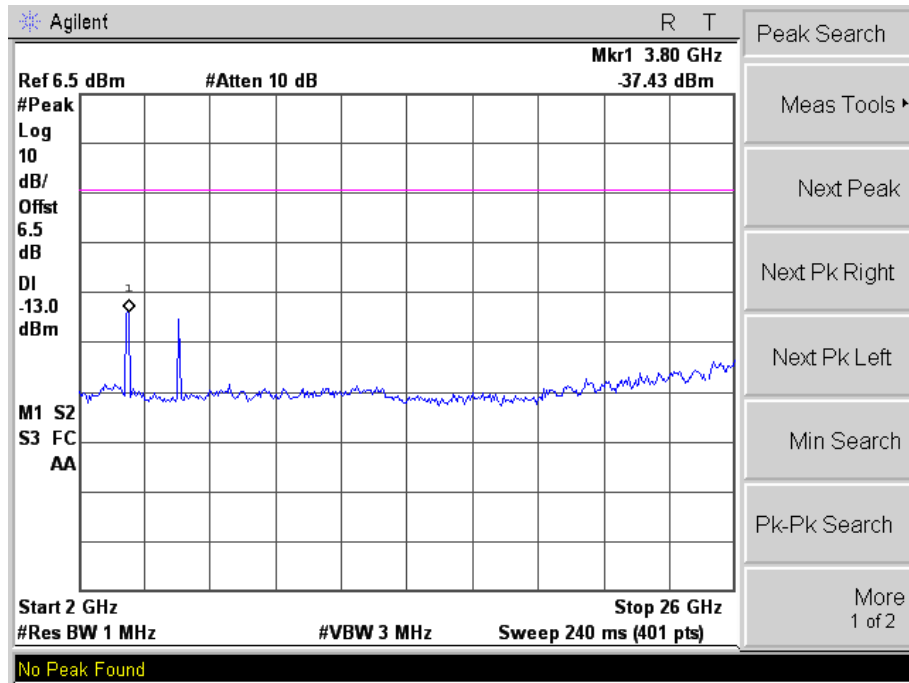
HSUPA Low Channel



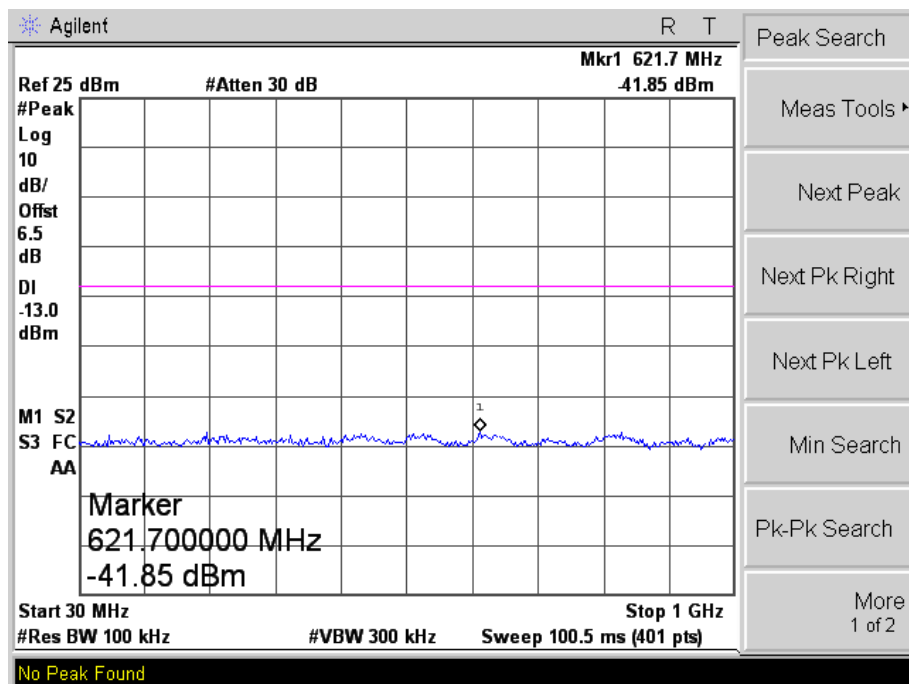


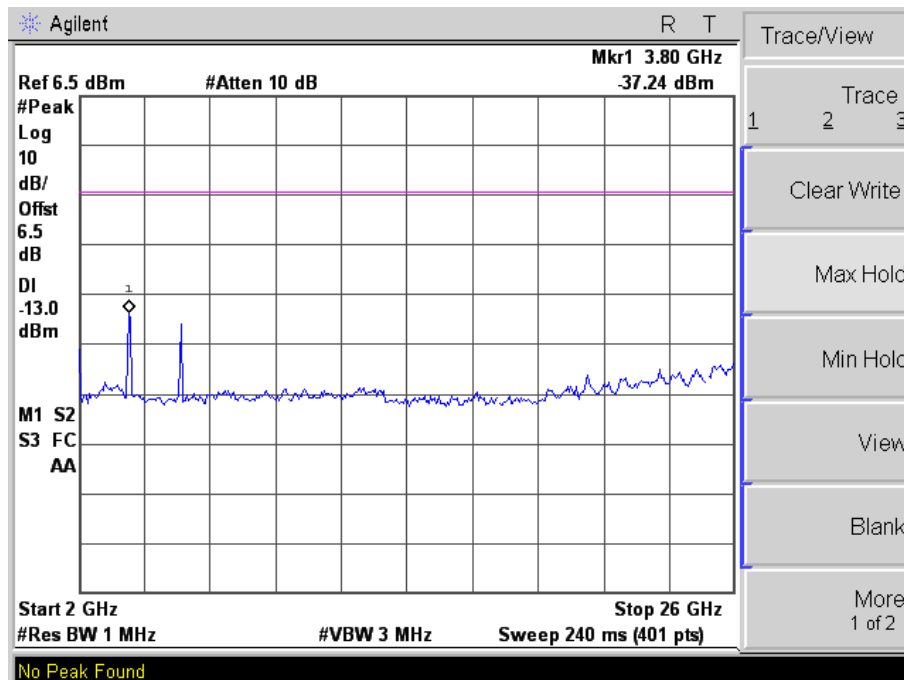
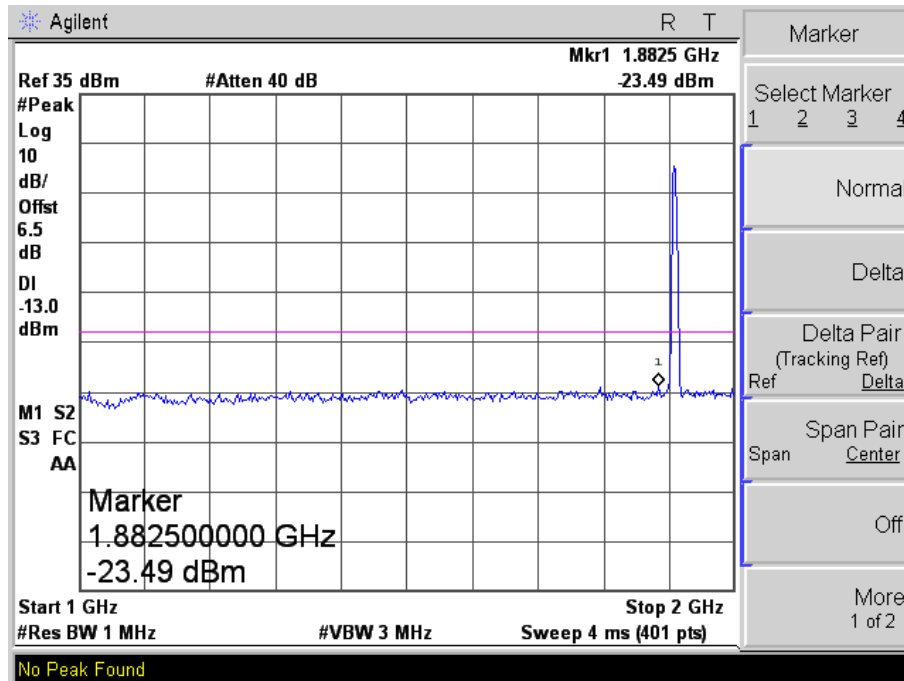
HSUPA Middle Channel



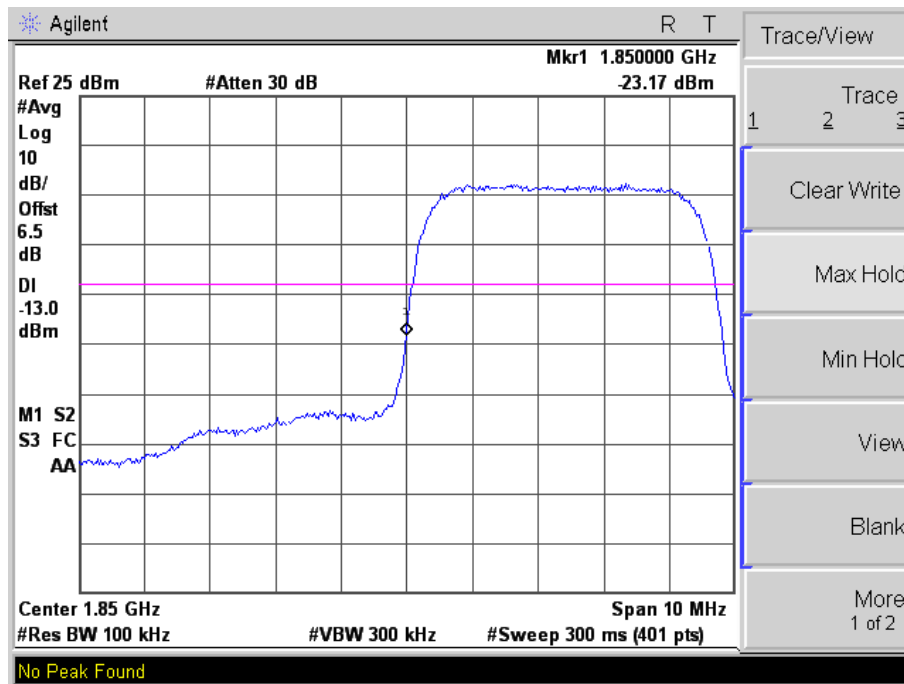


HSUPA High Channel

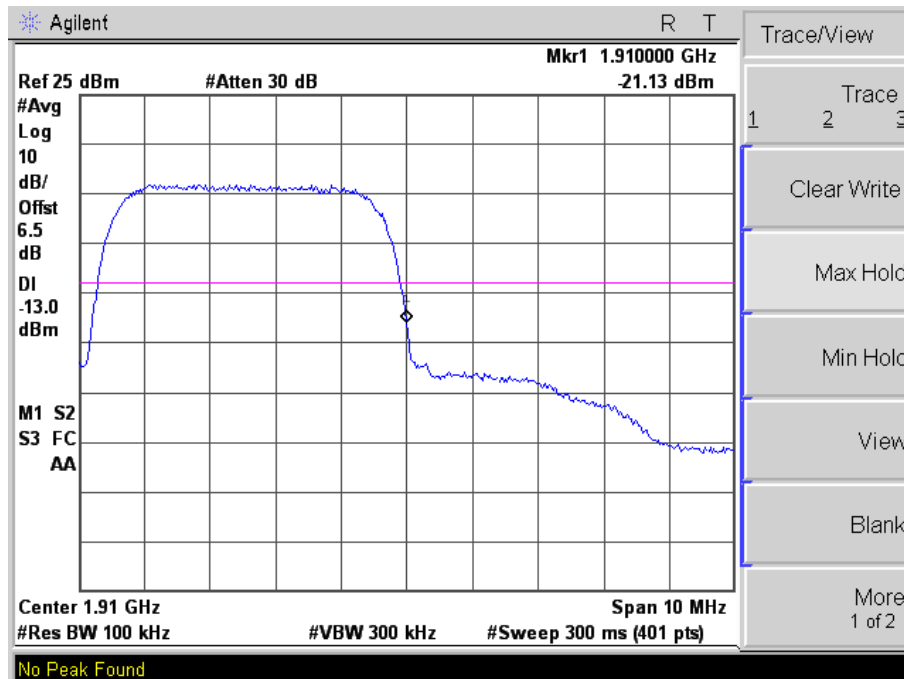




HSUPA Low Band Spurious Emission



HSUPA High Band Spurious Emission



8. Spurious Radiated Emissions

8.1 Standard 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.

8.2 Test 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)

8.3 Environmental Conditions

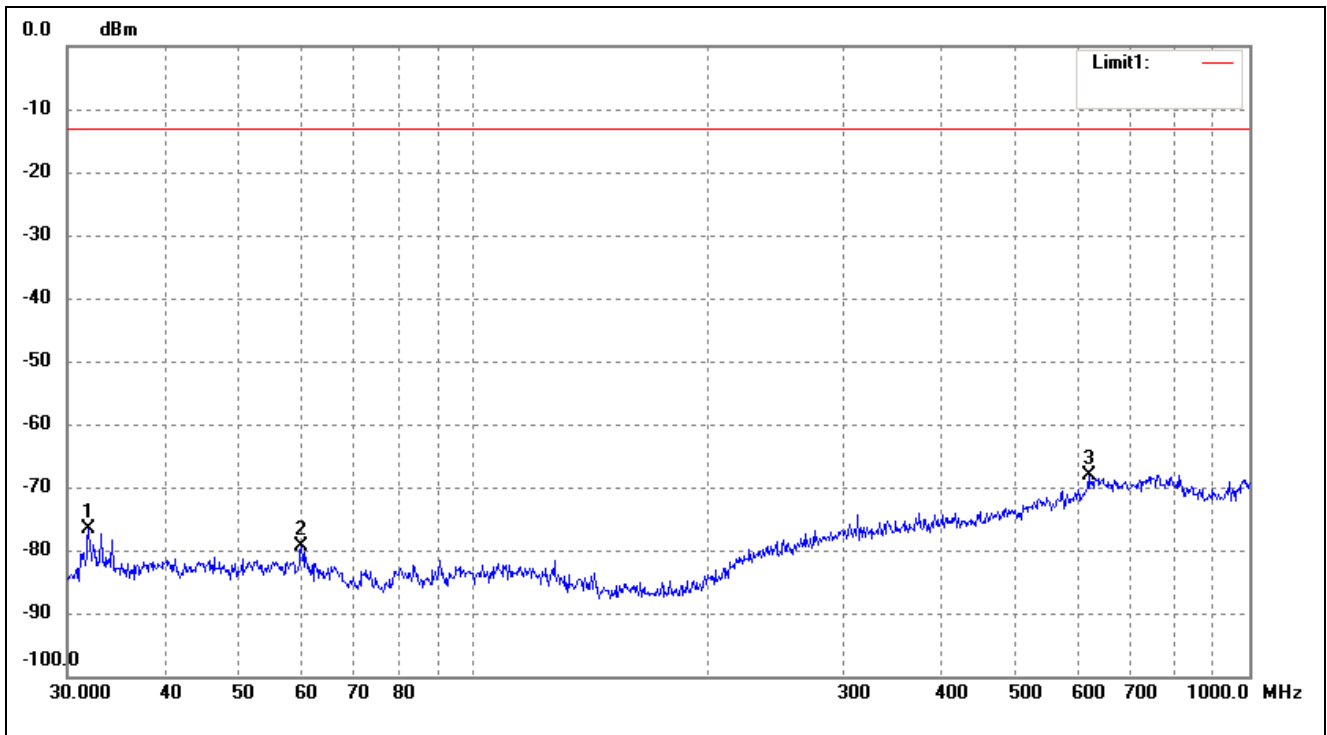
Temperature:	25 °C
Relative Humidity:	52%
ATM Pressure:	1012 mbar

8.4 Summary of Test Results/Plots

According to the data below, the FCC Part 22.917 and 24.238 standards, and had the worst margin of:

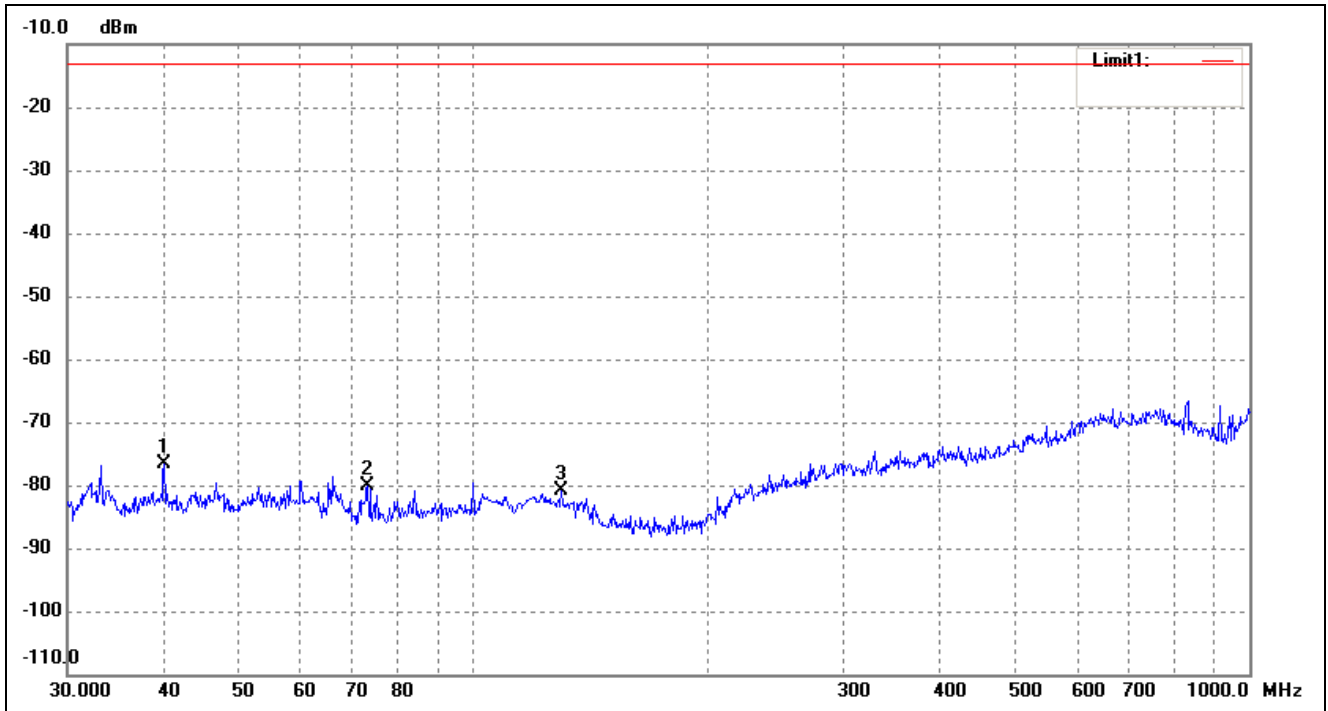
Note: this EUT was tested in 3 orthogonal positions and the worst case position data was reported.

Spurious Emission From 30MHz to 1GHz
For Cellular Band_ GPRS Mode GPRS850 Mode
Horizontal:



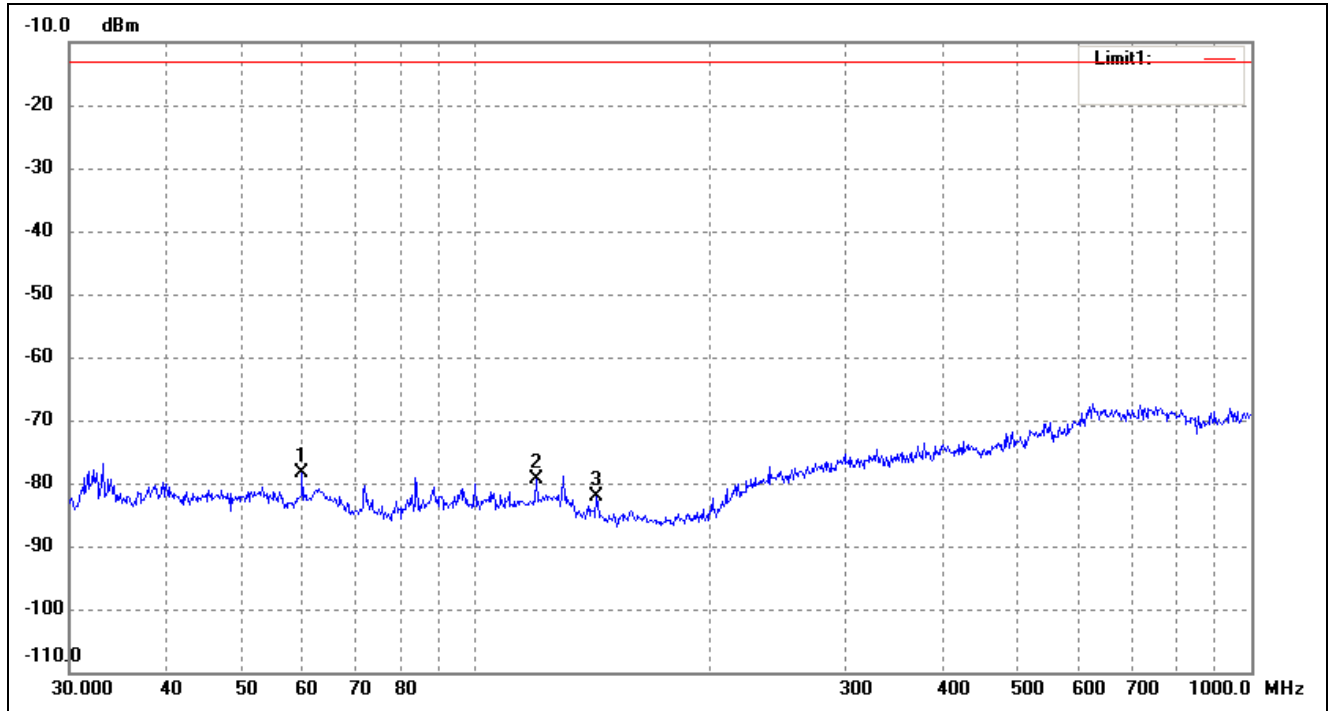
No.	Frequency (MHz)	Reading (dBm)	Correct Factor(dB)	Result (dBm)	Limit (dBm)	Margin (dB)	Remark
1	31.9546	-70.52	-6.05	-76.57	-13.00	-63.57	ERP
2	60.0691	-74.62	-4.72	-79.34	-13.00	-66.34	ERP
3	620.7096	-78.28	10.13	-68.15	-13.00	-55.15	ERP

Vertical:



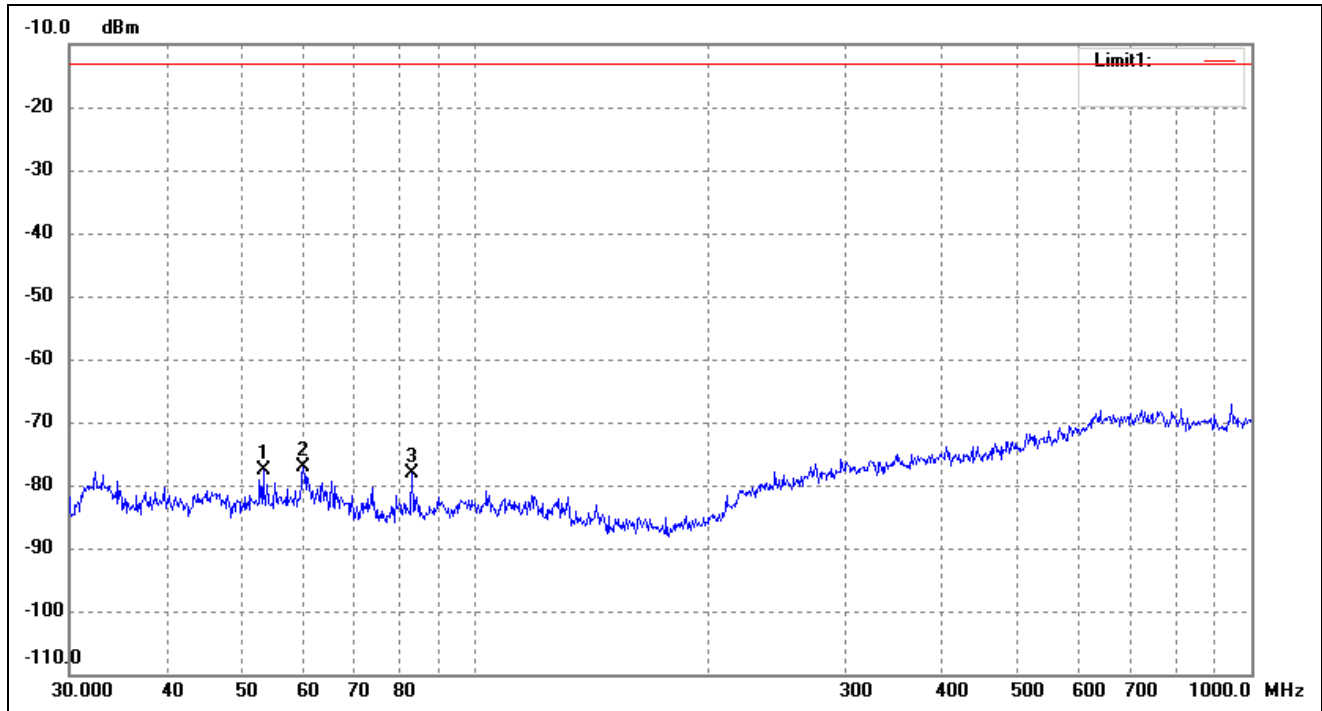
No.	Frequency (MHz)	Reading (dBm)	Correct Factor(dB)	Result (dBm)	Limit (dBm)	Margin (dB)	Remark
1	39.9942	-71.88	-4.73	-76.61	-13.00	-63.61	ERP
2	73.1025	-72.97	-7.27	-80.24	-13.00	-67.24	ERP
3	129.9226	-75.18	-5.69	-80.87	-13.00	-67.87	ERP

For Cellular Band_ GPRS Mode GPRS1900 Mode
Horizontal:



No.	Frequency (MHz)	Reading (dBm)	Correct Factor(dB)	Result (dBm)	Limit (dBm)	Margin (dB)	Remark
1	46.9948	-68.28	4.35	-63.93	-13.00	-50.93	ERP
2	520.8882	-68.29	10.57	-57.72	-13.00	-44.72	ERP
3	952.0937	-68.14	17.76	-50.38	-13.00	-37.38	ERP

Vertical:

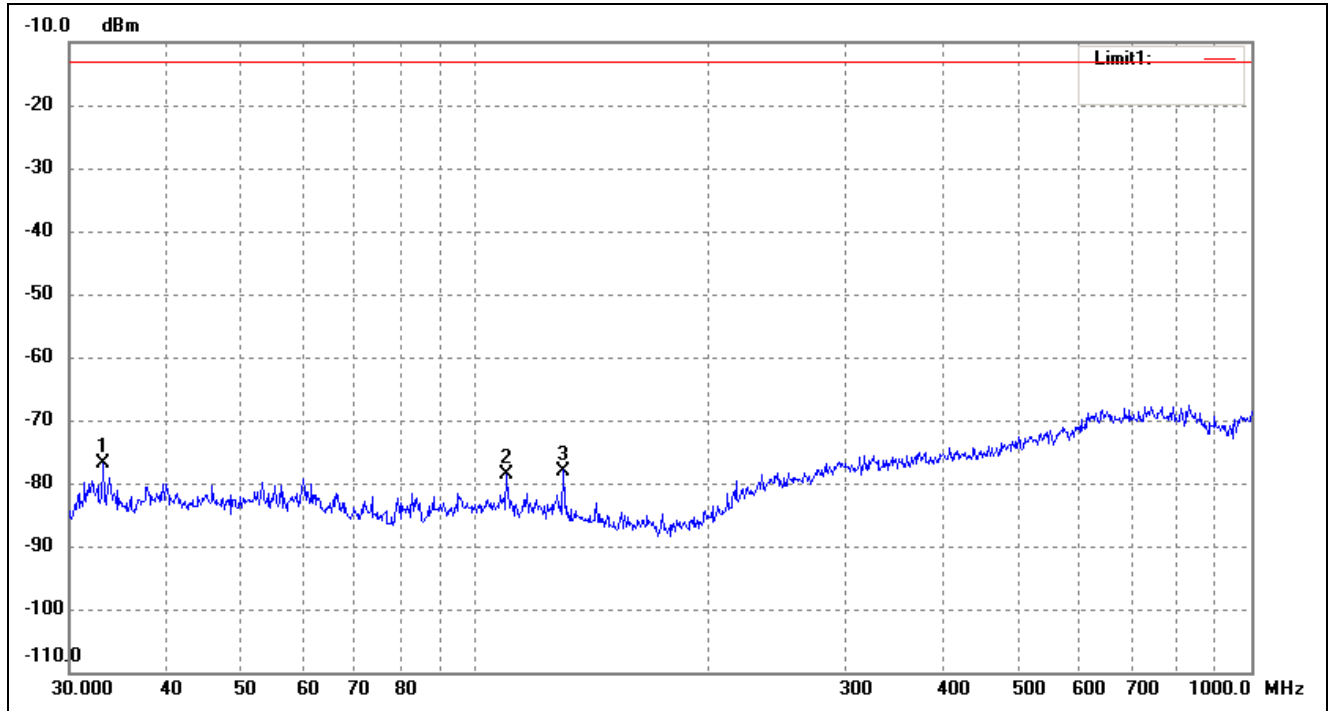


No.	Frequency (MHz)	Reading (dBm)	Correct Factor(dB)	Result (dBm)	Limit (dBm)	Margin (dB)	Remark
1	53.3179	-72.84	-4.69	-77.53	-13.00	-64.53	ERP
2	60.0691	-72.29	-4.72	-77.01	-13.00	-64.01	ERP
3	82.9385	-70.67	-7.51	-78.18	-13.00	-65.18	ERP

Note: Margin= (Reading+ Correct)- Limit

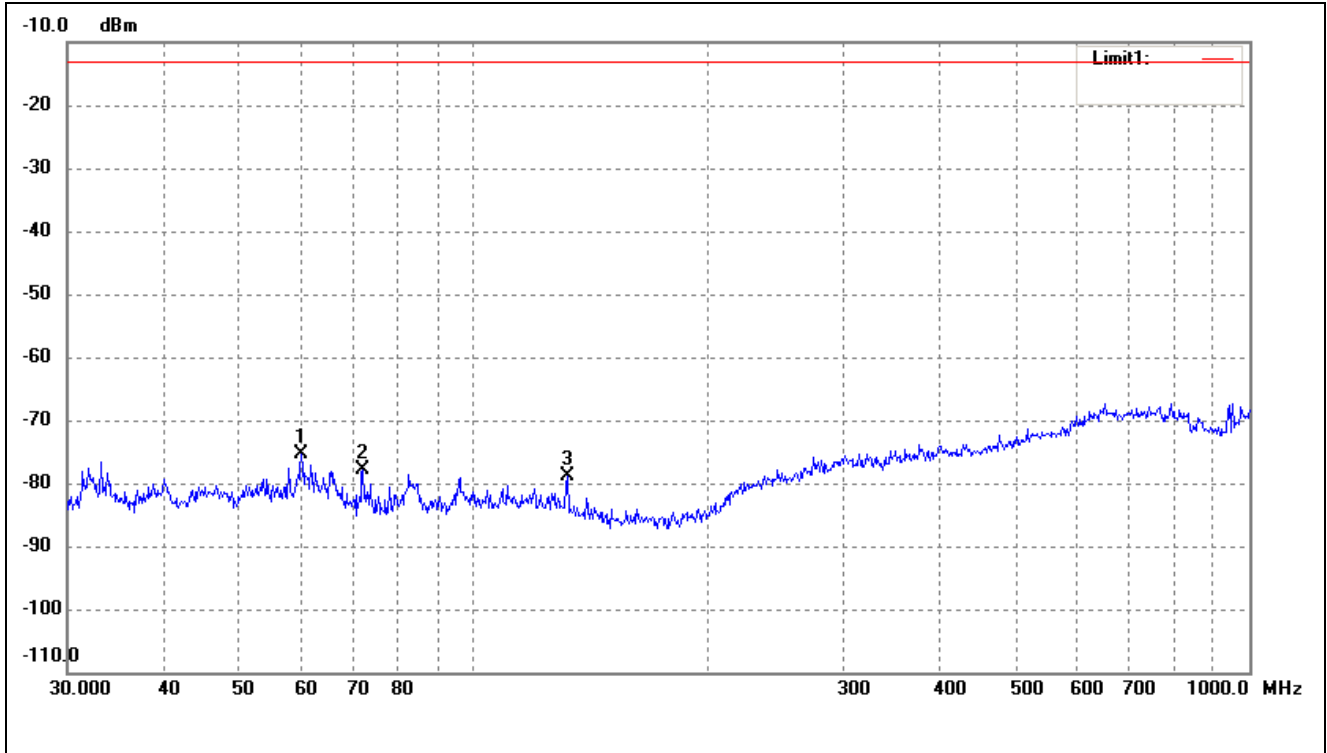
For band 5 Mode

Horizontal:



No.	Frequency (MHz)	Reading (dBm)	Correct Factor(dB)	Result (dBm)	Limit (dBm)	Margin (dB)	Remark
1	33.2112	-71.11	-5.82	-76.93	-13.00	-63.93	ERP
2	109.7960	-73.79	-4.82	-78.61	-13.00	-65.61	ERP
3	129.9226	-72.31	-5.69	-78.00	-13.00	-65.00	ERP

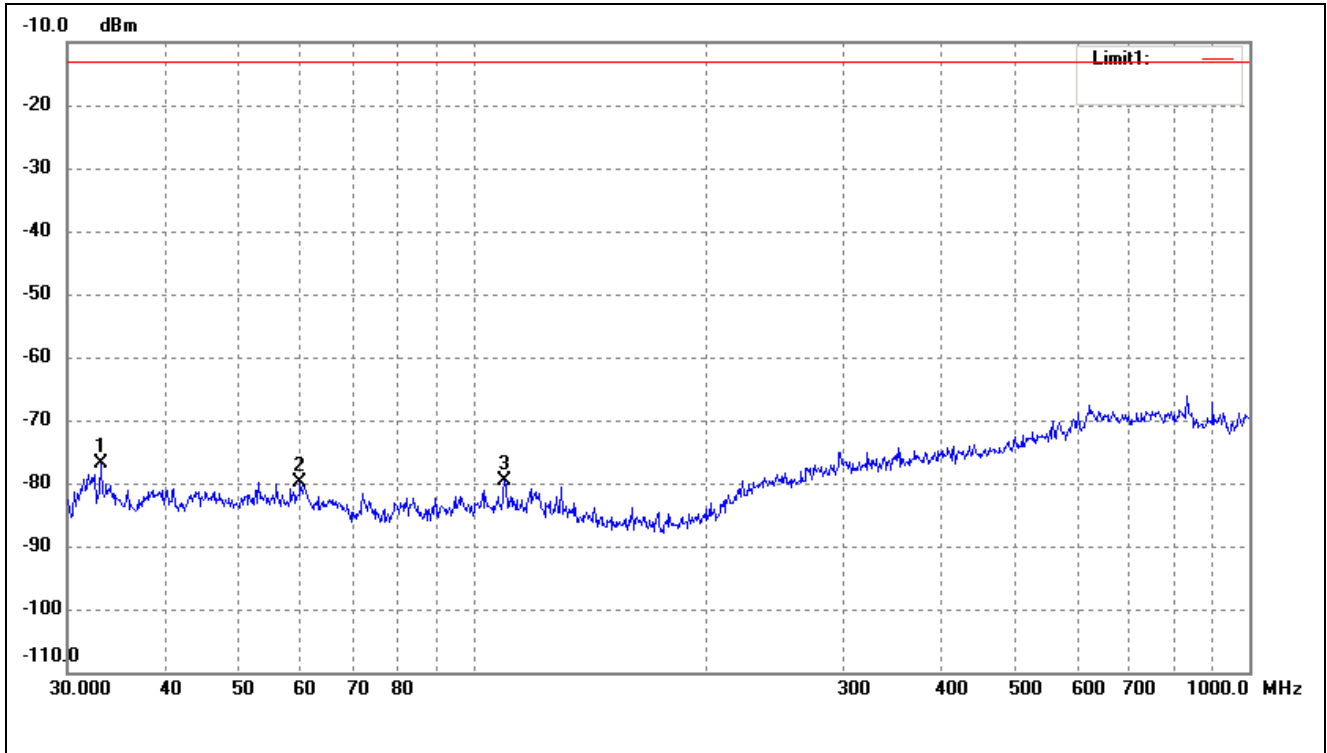
Vertical:



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBm)	dB	(dBm)	(dBm)	(dB)	
1	60.0691	-70.58	-4.72	-75.30	-13.00	-62.30	ERP
2	72.0843	-70.75	-7.17	-77.92	-13.00	-64.92	ERP
3	132.2206	-72.94	-5.89	-78.83	-13.00	-65.83	ERP

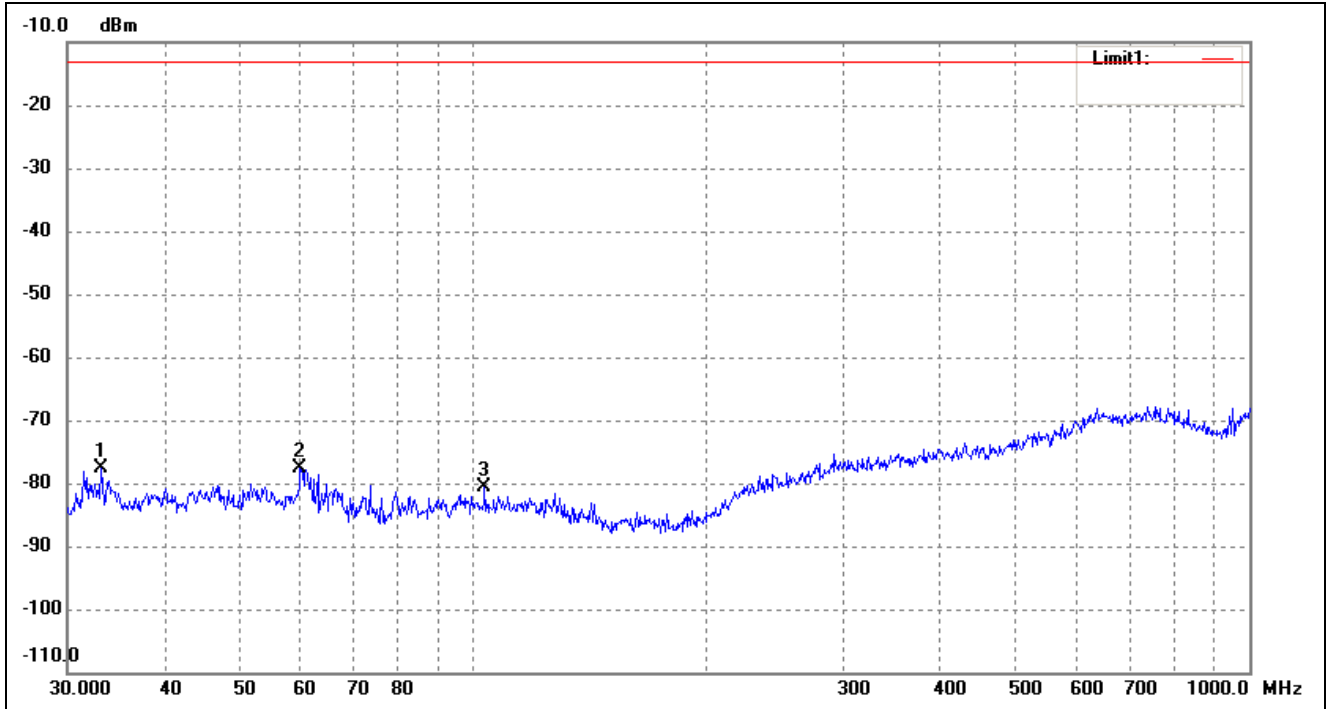
For band 2 Mode

Horizontal:



No.	Frequency (MHz)	Reading (dBm)	Correct dB	Result (dBm)	Limit (dBm)	Margin (dB)	Remark
1	33.0950	-71.09	-5.84	-76.93	-13.00	-63.93	ERP
2	59.8588	-75.24	-4.71	-79.95	-13.00	-66.95	ERP
3	109.7960	-74.68	-4.82	-79.50	-13.00	-66.50	ERP

Vertical:



No.	Frequency (MHz)	Reading (dBm)	Correct Factor(dB)	Result (dBm)	Limit (dBm)	Margin (dB)	Remark
1	33.0950	-71.87	-5.84	-77.71	-13.00	-64.71	ERP
2	59.8588	-72.96	-4.71	-77.67	-13.00	-64.67	ERP
3	103.4421	-75.80	-4.79	-80.59	-13.00	-67.59	ERP

Note: Margin= (Reading+ Correct)- Limit

Spurious Emissions Above 1GHz

For Cellular Band_ GPRS Mode GSM850 Mode

Frequency	Reading	Correct	Result	Limit	Margin	Polar
(MHz)	(dBm)	dB	(dBm)	(dBm)	(dB)	H/V
Low Channel (824.2MHz)						
1648.4	-32.94	4.94	-28	-13	-15	H
2472.6	-36.12	8.46	-27.66	-13	-14.66	H
1648.4	-30.22	4.94	-25.28	-13	-12.28	V
2472.6	-38.33	8.46	-29.87	-13	-16.87	V
Middle Channel (836.6MHz)						
1673.2	-34.38	5.11	-29.27	-13	-16.27	H
2509.8	-39.31	8.54	-30.77	-13	-17.77	H
1673.2	-31.62	5.11	-26.51	-13	-13.51	V
2509.8	-36.53	8.54	-27.99	-13	-14.99	V
High Channel (848.8MHz)						
1697.6	-34.89	5.29	-29.6	-13	-16.6	H
2546.4	-39.96	8.59	-31.37	-13	-18.37	H
1697.6	-33.24	5.29	-27.95	-13	-14.95	V
2546.4	-39	8.59	-30.41	-13	-17.41	V

For PCS Band_ GPRS Mode GSM1900 Mode

Frequency	Reading	Correct	Result	Limit	Margin	Polar
(MHz)	(dBm)	dB	(dBm)	(dBm)	(dB)	H/V
Low Channel (1850.2MHz)						
3700.4	-35.19	10.54	-24.65	-13	-11.65	H
5550.6	-38.97	13.37	-25.60	-13	-12.60	H
3700.4	-35.00	10.54	-24.46	-13	-11.46	V
5550.6	-39.71	13.37	-26.34	-13	-13.34	V
Middle Channel (1880MHz)						
3760.0	-37.58	10.64	-26.94	-13	-13.94	H
5640.0	-37.89	13.54	-24.35	-13	-11.35	H
3760.0	-33.96	10.64	-23.32	-13	-10.32	V
5640.0	-39.8	13.54	-26.26	-13	-13.26	V
High Channel (1909.8MHz)						
3819.6	-35.29	10.74	-24.55	-13	-11.55	H
5729.4	-40.00	13.71	-26.29	-13	-13.29	H
3819.6	-33.64	10.74	-22.90	-13	-9.90	V
5729.4	-36.18	13.71	-22.47	-13	-9.47	V

For Band 5 Mode

Frequency	Reading	Correct	Result	Limit	Margin	Polar
(MHz)	(dBm)	dB	(dBm)	(dBm)	(dB)	H/V
Low Channel (826.4MHz)						
1652.8	-32.4	4.94	-27.46	-13	-14.46	H
2479.2	-36.22	8.46	-27.76	-13	-14.76	H
1652.8	-30.1	4.94	-25.16	-13	-12.16	V
2479.2	-39.26	8.46	-30.8	-13	-17.8	V
Middle Channel (836.6MHz)						
1672.8	-31.68	5.11	-26.57	-13	-13.57	H
2509.2	-38.44	8.54	-29.9	-13	-16.9	H
1672.8	-32.64	5.11	-27.53	-13	-14.53	V
2509.2	-36.32	8.54	-27.78	-13	-14.78	V
High Channel (846.6MHz)						
1693.2	-31.26	5.29	-25.97	-13	-12.97	H
2539.8	-37.95	8.59	-29.36	-13	-16.36	H
1693.2	-30.99	5.29	-25.7	-13	-12.7	V
2539.8	-38.01	8.59	-29.42	-13	-16.42	V

For Band 2 Mode

Frequency	Reading	Correct	Result	Limit	Margin	Polar
(MHz)	(dBm)	dB	(dBm)	(dBm)	(dB)	H/V
Low Channel (1852.4MHz)						
3704.8	-37.12	10.17	-26.95	-13	-13.95	H
5557.2	-36.45	14.69	-21.76	-13	-8.76	H
3704.8	-34.96	10.17	-24.79	-13	-11.79	V
5557.2	-37.22	14.69	-22.53	-13	-9.53	V
Middle Channel (1880MHz)						
3760.8	-37.39	10.26	-27.13	-13	-14.13	H
5640.0	-39.05	14.78	-24.27	-13	-11.27	H
3760.8	-33.59	10.26	-23.33	-13	-10.33	V
5640.0	-37.03	14.78	-22.25	-13	-9.25	V
High Channel (1907.6MHz)						
3815.2	-35.45	10.59	-24.86	-13	-11.86	H
5722.8	-36.64	15.03	-21.61	-13	-8.61	H
3815.2	-35.11	10.59	-24.52	-13	-11.52	V
5722.8	-38.28	15.03	-23.25	-13	-10.25	H

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

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

9. Frequency Stability

9.1 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.

9.2 Test 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

Temperature:	Supply Voltage
20°C	DC 3.3-4.2V declared by manufacturer
-30°C to +50°C	Normal

9.3 Environmental Conditions

Temperature:	20°C
Relative Humidity:	54%
ATM Pressure:	1011 mbar

9.4 Summary of Test Results/Plots

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	3.8	72	0.0855
40	3.8	60	0.0717
30	3.8	52	0.0616
20	3.8	48	0.0570
10	3.8	41	0.0487
0	3.8	35	0.0414
-10	3.8	39	0.0469
-20	3.8	47	0.0561
-30	3.8	52	0.0616

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	3.8	57	0.0303
40	3.8	48	0.0254
30	3.8	40	0.0213
20	3.8	35	0.0184
10	3.8	28	0.0151
0	3.8	22	0.0119
-10	3.8	29	0.0155
-20	3.8	34	0.0180
-30	3.8	38	0.0205

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	3.8	56	0.0671
40	3.8	52	0.0625
30	3.8	48	0.0570
20	3.8	43	0.0515
10	3.8	39	0.0469
0	3.8	34	0.0405
-10	3.8	42	0.0497
-20	3.8	46	0.0552
-30	3.8	51	0.0607

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	3.8	65	0.0344
40	3.8	51	0.0270
30	3.8	46	0.0245
20	3.8	41	0.0217
10	3.8	36	0.0192
0	3.8	29	0.0155
-10	3.8	35	0.0184
-20	3.8	40	0.0213
-30	3.8	45	0.0237

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	3.8	76	0.0910
40	3.8	68	0.0809
30	3.8	57	0.0680
20	3.8	49	0.0588
10	3.8	44	0.0524
0	3.8	38	0.0451
-10	3.8	45	0.0533
-20	3.8	51	0.0607
-30	3.8	58	0.0690

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	3.8	75	0.0397
40	3.8	59	0.0315
30	3.8	53	0.0282
20	3.8	46	0.0245
10	3.8	38	0.0205
0	3.8	32	0.0172
-10	3.8	38	0.0200
-20	3.8	42	0.0221
-30	3.8	46	0.0245

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	3.8	52	0.0616
40	3.8	47	0.0561
30	3.8	42	0.0506
20	3.8	35	0.0423
10	3.8	30	0.0359
0	3.8	22	0.0267
-10	3.8	30	0.0359
-20	3.8	34	0.0405
-30	3.8	41	0.0487

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	3.8	52	0.0278
40	3.8	44	0.0233
30	3.8	34	0.0180
20	3.8	30	0.0160
10	3.8	25	0.0131
0	3.8	19	0.0102
-10	3.8	25	0.0135
-20	3.8	29	0.0155
-30	3.8	36	0.0192

So, Frequency Stability Versus Input Voltage is:

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	3.6	38	0.0451
	3.8	32	0.0377
	4.35	38	0.0451
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	3.6	41	0.0217
	3.8	37	0.0196
	4.35	44	0.0233

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	3.6	30	0.0359
	3.8	21	0.0248
	4.35	28	0.0331
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	3.6	37	0.0196
	3.8	32	0.0168
	4.35	38	0.0205

Reference Frequency(Middle Channel): HSDPA 836.6MHz, Limit: 2.5ppm			
Environment Temperature (℃)	Power Supplied (VDC)	Frequency Measure with Time Elapsed	
		Frequency (Hz)	Error (ppm)
20	3.6	27	0.0322
	3.8	22	0.0257
	4.35	35	0.0414
Reference Frequency(Middle Channel): HSDPA 1880 MHz, Limit: 2.5ppm			
Environment Temperature (℃)	Power Supplied (VDC)	Frequency Measure with Time Elapsed	
		Frequency (Hz)	Error (ppm)
20	3.6	42	0.0225
	3.8	37	0.0196
	4.35	51	0.0270

Reference Frequency(Middle Channel): HSUPA 836.6MHz, Limit: 2.5ppm			
Environment Temperature (℃)	Power Supplied (VDC)	Frequency Measure with Time Elapsed	
		Frequency (Hz)	Error (ppm)
20	3.6	36	0.0432
	3.8	32	0.0386
	4.35	42	0.0506
Reference Frequency(Middle Channel): HSUPA 1880 MHz, Limit: 2.5ppm			
Environment Temperature (℃)	Power Supplied (VDC)	Frequency Measure with Time Elapsed	
		Frequency (Hz)	Error (ppm)
20	3.6	22	0.0119
	3.8	18	0.0098
	4.35	33	0.0176

***** END OF REPORT *****