

# TEST REPORT

Reference No..... : WTX21X04036754W-1  
FCC ID ..... : 2AZP5-FST9301  
Applicant ..... : DUO AMERICA, LLC  
Address ..... : 8925 NW 26TH ST, DORAL,MIAMI, FL 33172 UNITED STATES OF AMERICA  
Product Name ..... : Smart Phone  
Test Model. .... : L285  
Standards ..... : FCC Part 22H, FCC Part 24E  
Date of Receipt sample .... : Apr.21, 2021  
Date of Test..... : Apr.21, 2021 to May.10, 2021  
Date of Issue ..... : May.11, 2021  
Test Result..... : **Pass**

Remarks:

The results shown in this test report refer only to the sample(s) tested, this test report cannot be reproduced, except in full, without prior written permission of the company. The report would be invalid without specific stamp of test institute and the signatures of compiler and approver.

**Prepared By:**

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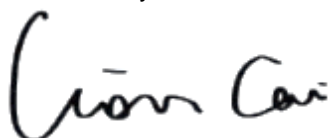
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**Report version**

Version No.	Date of issue	Description
Rev.00	May.11, 2021	Original
/	/	/

## 1. GENERAL INFORMATION

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### 1.1 Product Description for Equipment Under Test (EUT)

#### Client Information

Applicant: DUO AMERICA, LLC  
 Address of applicant: 8925 NW 26TH ST, DORAL,MIAMI, FL 33172 UNITED STATES OF AMERICA

Manufacturer: Shenzhen Water World Co., Ltd.  
 Address of manufacturer: No. 602, Block B, Digital Building, Garden City, No. 1079, Nanhai Road, Shekou Subdistrict, Nanshan District, Shenzhen

General Description of EUT:	
Product Name:	Smart Phone
Trade Name:	HYUNDAI
Model No.:	L285
Adding Model(s):	/
Rated Voltage:	DC3.7V
Battery:	/
Adapter Model:	HY-C500C INPUT: AC100-240V, 50/60Hz; Output: DC5V, 0.5A
Software Version:	A570_03B_COMMON_BT_128X160_V05_20210419.zip
Hardware Version:	A570-M.BOM-B-V0.3
<i>Note: The test data is gathered from a production sample provided by the manufacturer.</i>	

<b>Technical Characteristics of EUT:</b>	
<b>2G</b>	
Support Networks:	GSM, GPRS, EDGE
Support Band:	GSM850/PCS1900
Uplink Frequency:	GSM/GPRS/EDGE 850: 824~849MHz GSM/GPRS/EDGE 1900: 1850~1910MHz
Downlink Frequency:	GSM/GPRS/EDGE 850: 869~894MHz GSM/GPRS/EDGE 1900: 1930~1990MHz
Max RF Output Power:	GSM850: 33.50dBm, GSM1900: 30.15dBm EDGE850: 26.43dBm, EDGE1900: 25.14dBm
Type of Emission:	GSM850: 250KGXW, GSM1900: 244KGXW EDGE850: 251KG7W, EDGE1900: 252KG7W
Type of Modulation:	GMSK, 8PSK
Type of Antenna:	Integral Antenna
Antenna Gain:	GSM850: -1.2dBi; GSM1900: -1.1dBi
GPRS/EDGE Class:	Class 12
<b>3G</b>	
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: 22.65dBm, WCDMA Band 5: 22.89dBm
Type of Emission:	WCDMA Band 2: 4M17F9W WCDMA Band 5: 4M17F9W
Type of Modulation:	BPSK
Antenna Type:	Integral Antenna
Antenna Gain:	WCDMA Band 2: -1.1dBi, WCDMA Band 5: -1.2dBi

## 1.2 Test Standards

The tests were performed according to following standards:

**FCC Rules Part 2:** FREQUENCY ALLOCATIONS AND RADIO TREATY MATTERS; GENERAL RULES AND REGULATIONS.

**FCC Rules Part 22:** PRIVATE LAND MOBILE RADIO SERVICES.

**FCC Rules Part 24:** PUBLIC MOBILE SERVICES.

**TIA/EIA 603 E March 2016:** Land Mobile FM or PM Communications Equipment Measurement and Performance Standards.

**ANSI C63.26-2015:** American National Standard for Compliance Testing of Transmitters Used in Licensed Radio Services

**KDB 971168 D01 Power Meas License Digital Systems v03r01:** MEASUREMENT GUIDANCE FOR CERTIFICATION OF LICENSED DIGITAL TRANSMITTERS.

**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 TIA/EIA 603 E/ KDB 971168/ ANSI C63.26. The equipment under test (EUT) was configured to measure its highest possible emission level. The test modes were adapted accordingly in reference to the Operating Instructions.

## 1.4 Test Facility

### Address of the test laboratory

Laboratory: Waltek Testing Group (Shenzhen) Co., Ltd.

Address: 1/F., Room 101, Building 1, Hongwei Industrial Park, Liuxian 2nd Road, Block 70 Bao'an District, Shenzhen, Guangdong, China

### FCC – Registration No.: 125990

Waltek Testing Group (Shenzhen) Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the FCC (Federal Communications Commission). The acceptance letter from the FCC is maintained in our files. The Designation Number is CN5010, and Test Firm Registration Number is 125990.

### Industry Canada (IC) Registration No.: 11464A

The 3m Semi-anechoic chamber of Waltek Testing Group (Shenzhen) 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	GSM 850	Low, Middle, High Channels
TM2	GPRS 850	Low, Middle, High Channels
TM3	EDGE 850	Low, Middle, High Channels
TM4	GSM 1900	Low, Middle, High Channels
TM5	GPRS 1900	Low, Middle, High Channels
TM6	EDGE 1900	Low, Middle, High Channels
TM7	WCDMA Band 5	Low, Middle, High Channels
TM8	HSDPA Band 5	Low, Middle, High Channels
TM9	HSUPA Band 5	Low, Middle, High Channels
TM10	WCDMA Band 2	Low, Middle, High Channels
TM11	HSDPA Band 2	Low, Middle, High Channels
TM12	HSUPA Band 2	Low, Middle, High Channels

Testing Configure			
Support Band	Support Standard	Channel Frequency(MHz)	Channel Number
GSM 850	GSM/GPRS/EDGE	824.2	128
		836.6	190
		848.8	251
PCS 1900	GSM/GPRS/EDGE	1850.2	512
		1880.0	661
		1909.8	810
WCDMA Band 5	WCDMA/HSDPA/HSUPA	826.4	4132
		836.6	4183
		846.6	4233
WCDMA Band 2	WCDMA/HSDPA/HSUPA	1852.4	9262
		1880.0	9400
		1907.6	9538

Note: the transmitter has been tested on the communications mode of GSM, GPRS, EDGE, WCDMA, HSDPA, HSUPA compliance test and record the worst case.

<b>Test Conditions</b>	
Temperature:	22~25 °C
Relative Humidity:	50~55 %.
ATM Pressure:	1019 mbar

<b>EUT Cable List and Details</b>			
Cable Description	Length (m)	Shielded/Unshielded	With / Without Ferrite
DC Cable	1.0	Unshielded	Without Ferrite
Earphone Cable	1.17	Unshielded	Without Ferrite

<b>Special Cable List and Details</b>			
Cable Description	Length (m)	Shielded/Unshielded	With / Without Ferrite
USB Cable	1.0	Shielded	Without Ferrite

<b>Auxiliary Equipment List and Details</b>			
Description	Manufacturer	Model	Serial Number
/	/	/	/

## 1.6 Measurement Uncertainty

<b>Measurement uncertainty</b>		
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	2021-03-27	2022-03-26
SEMT-1063	GSM Tester	Rohde & Schwarz	CMU200	114403	2021-03-27	2022-03-26
SEMT-1072	Spectrum Analyzer	Agilent	E4407B	MY41440400	2021-03-27	2022-03-26
SEMT-1079	Spectrum Analyzer	Agilent	N9020A	US47140102	2021-03-27	2022-03-26
SEMT-1080	Signal Generator	Agilent	83752A	3610A01453	2021-03-27	2022-03-26
SEMT-1081	Vector Signal Generator	Agilent	N5182A	MY47070202	2021-03-27	2022-03-26
SEMT-1028	Power Divider	Weinschel	1506A	PM204	2021-03-27	2022-03-26
SEMT-1082	Power Divider	RF-Lambda	RFLT4W5M18G	14110400027	2021-03-27	2022-03-26
SEMT-1031	Spectrum Analyzer	Rohde & Schwarz	FSP30	836079/035	2021-03-27	2022-03-26
SEMT-1007	EMI Test Receiver	Rohde & Schwarz	ESVB	825471/005	2021-03-27	2022-03-26
SEMT-1008	Amplifier	Agilent	8447F	3113A06717	2021-04-12	2022-04-11
SEMT-1043	Amplifier	C&D	PAP-1G18	2002	2021-04-12	2022-04-11
SEMT-1069	Loop Antenna	Schwarz beck	FMZB 1516	9773	2021-03-19	2023-03-18
SEMT-1068	Broadband Antenna	Schwarz beck	VULB9163	9163-333	2021-03-19	2023-03-18
SEMT-1042	Horn Antenna	ETS	3117	00086197	2021-03-19	2023-03-18
SEMT-1121	Horn Antenna	Schwarzbeck	BBHA 9170	BBHA9170582	2021-04-27	2023-04-26
SEMT-1169	Pre-amplifier	Direction Systems Inc.	PAP-2640	14145-14153	2021-04-27	2022-04-26
SEMT-1163	Spectrum Analyzer	Rohde & Schwarz	FSP40	100612	2021-03-27	2022-03-26
SEMT-1166	Power Limiter	Agilent	N9356B	MY45450376	2021-03-27	2022-03-26
SEMT-1076	RF Switcher	Top Precision	RCS03-A2	/	2021-03-19	2023-03-18
SEMT-C001	Cable	Zheng DI	LL142-07-07-10M(A)	/	/	/
SEMT-C002	Cable	Zheng DI	ZT40-2.92J-2.92J-6M	/	/	/
SEMT-C003	Cable	Zheng DI	ZT40-2.92J-2.92J-2.5M	/	/	/
SEMT-C004	Cable	Zheng DI	2M0RFC	/	/	/
SEMT-C005	Cable	Zheng DI	1M0RFC	/	/	/
SEMT-C006	Cable	Zheng DI	1M0RFC	/	/	/

<b>Software List</b>			
<b>Description</b>	<b>Manufacturer</b>	<b>Model</b>	<b>Version</b>
EMI Test Software (Radiated Emission)*	Farad	EZ-EMC	RA-03A1

\*Remark: indicates software version used in the compliance certification testing

## 2. SUMMARY OF TEST RESULTS

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<b>FCC Rules</b>	<b>Description of Test Item</b>	<b>Result</b>
§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
§2.1047	Modulation characteristics	Compliant

### 3. RF Output Power

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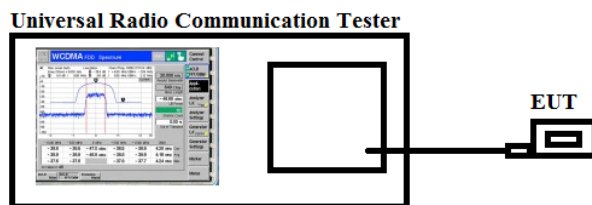
#### 3.1 Standard Applicable

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.

#### 3.2 Test Procedure

- Conducted output power test method:



- Radiated power test method:

1. The setup of EUT is according with per ANSI/TIA Standard 603E and ANSI C63.26 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.

#### 3.3 Summary of Test Results/Plots

➤ **Max. Radiated Power**

Mode	Channel	Antenna Polar	ERP (dBm)	Limit (dBm)	Result
GSM850	128	V	30.54	<38.45	Pass
		H	25.02		
	190	V	30.47		
		H	25.13		
	251	V	29.49		
		H	24.68		
GPRS850	128	V	29.69	<38.45	Pass
		H	24.25		
	190	V	29.41		
		H	24.36		
	251	V	29.07		
		H	24.65		
EGPRS850	128	V	22.31	<38.45	Pass
		H	17.02		
	190	V	22.43		
		H	17.12		
	251	V	21.47		
		H	16.97		

Mode	Channel	Antenna Polar	EIRP (dBm)	Limit (dBm)	Result
PCS1900	512	V	27.69	<33.00	Pass
		H	22.47		
	661	V	27.32		
		H	22.46		
	810	V	27.49		
		H	22.02		
GPRS1900	512	V	27.69	<33.00	Pass
		H	22.16		
	661	V	26.97		
		H	21.42		
	810	V	27.93		
		H	22.05		
EGPRS1900	512	V	22.14	<33.00	Pass
		H	16.25		
	661	V	22.43		
		H	16.87		
	810	V	22.16		
		H	16.92		

Mode	Channel	Antenna Polar	ERP	Limit (dBm)	Result
WCDMA Band V	4132	V	20.41	<38.45	Pass
		H	16.32		
	4183	V	20.08		
		H	16.17		
	4233	V	20.39		
		H	14.36		

Mode	Channel	Antenna Polar	EIRP	Limit (dBm)	Result
WCDMA Band II	9262	V	20.10	<33.00	Pass
		H	14.65		
	9400	V	20.42		
		H	14.65		
	9538	V	20.01		
		H	14.69		

Note: Pre-scan mode WCDMA/HSDPA/HSUPA find the worst case at WCDMA mode and recorded in the test report.

➤ **Max. Conducted Power (Average power)**

**Please refer to Appendix A**

## 4. Peak-to-average Ratio (PAR) of Transmitter

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### 4.1 Standard Applicable

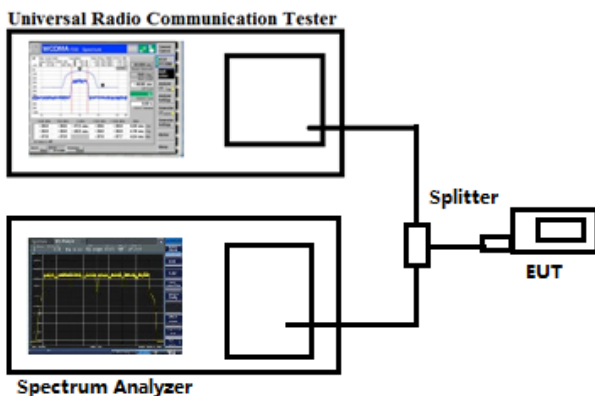
According to §24.232(d), power measurements for transmissions by stations authorized under this section may be made either in accordance with a Commission-approved average power technique or in compliance with paragraph (e) of this section. In both instances, equipment employed must be authorized in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

### 4.2 Test Procedure

According with KDB 971168

1. The signal analyzer's CCDF measurement profile is enabled
2. Frequency = carrier center frequency
3. Measurement BW > Emission bandwidth of signal
4. The signal analyzer was set to collect one million samples to generate the CCDF curve
5. The measurement interval was set depending on the type of signal analyzed. For continuous signals (>98% duty cycle), the measurement interval was set to 1ms. For burst transmissions, the spectrum analyzer is set to use an internal "RF Burst" trigger that is synced with an incoming pulse and the measurement interval is set to less than the duration of the "on time" of one burst to ensure that energy is only captured during a time in which the transmitter is operating at maximum power

Test Configuration for the emission bandwidth testing:



### 4.3 Summary of Test Results

Please refer to Appendix B.



## 5. Emission Bandwidth

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### 5.1 Standard Applicable

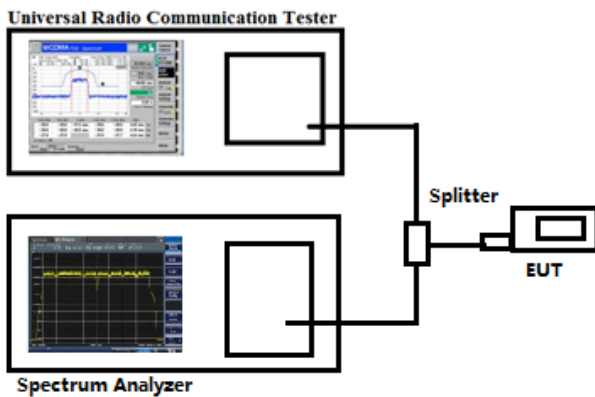
According to §22.917(b), the emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

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.

### 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 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:



### 5.3 Summary of Test Results/Plots

Please refer to Appendix C

## 6. Out of Band Emissions at Antenna Terminal

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### 6.1 Standard Applicable

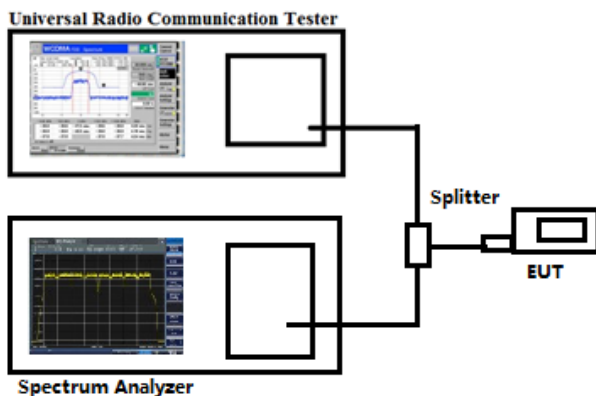
According to §22.917(a), the power of any emissions outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least  $43 + 10 \log(P)$  dB.

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.

### 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 100kHz and 1MHz for the scan frequency from 30MHz to 1GHz and the scan frequency from 1GHz to up to 10<sup>th</sup> harmonic.

Test Configuration for the out of band emissions testing:



### 6.3 Summary of Test Results/Plots

Note: Pre-scan mode WCDMA/HSDPA/HSUPA find the worst case at WCDMA mode and recorded in the test report.

Please refer to Appendix D

## 7. Spurious Radiated Emissions

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### 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

1. The setup of EUT is according with per ANSI/TIA Standard 603E and ANSI C63.26 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.

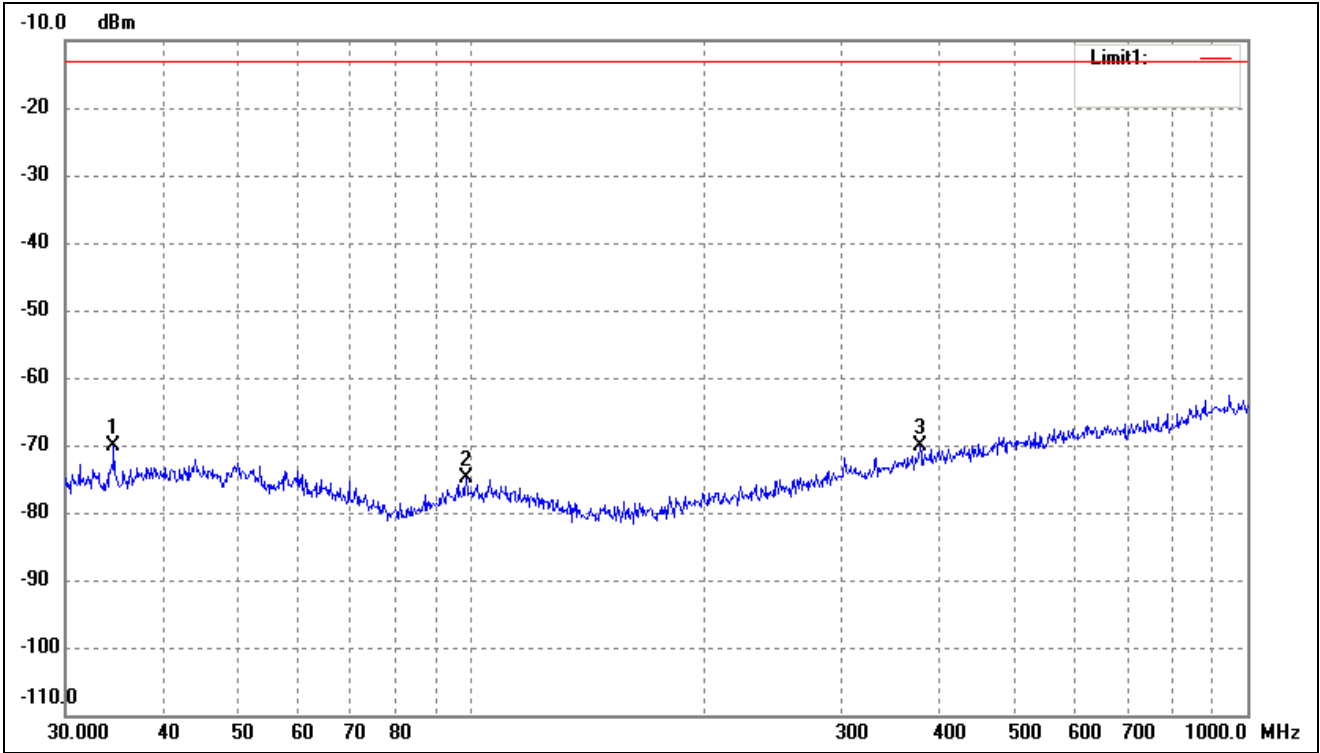
Spurious attenuation limit in dB =  $43 + 10 \log_{10}$  (power out in Watts)

### 7.3 Summary of Test Results/Plots

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

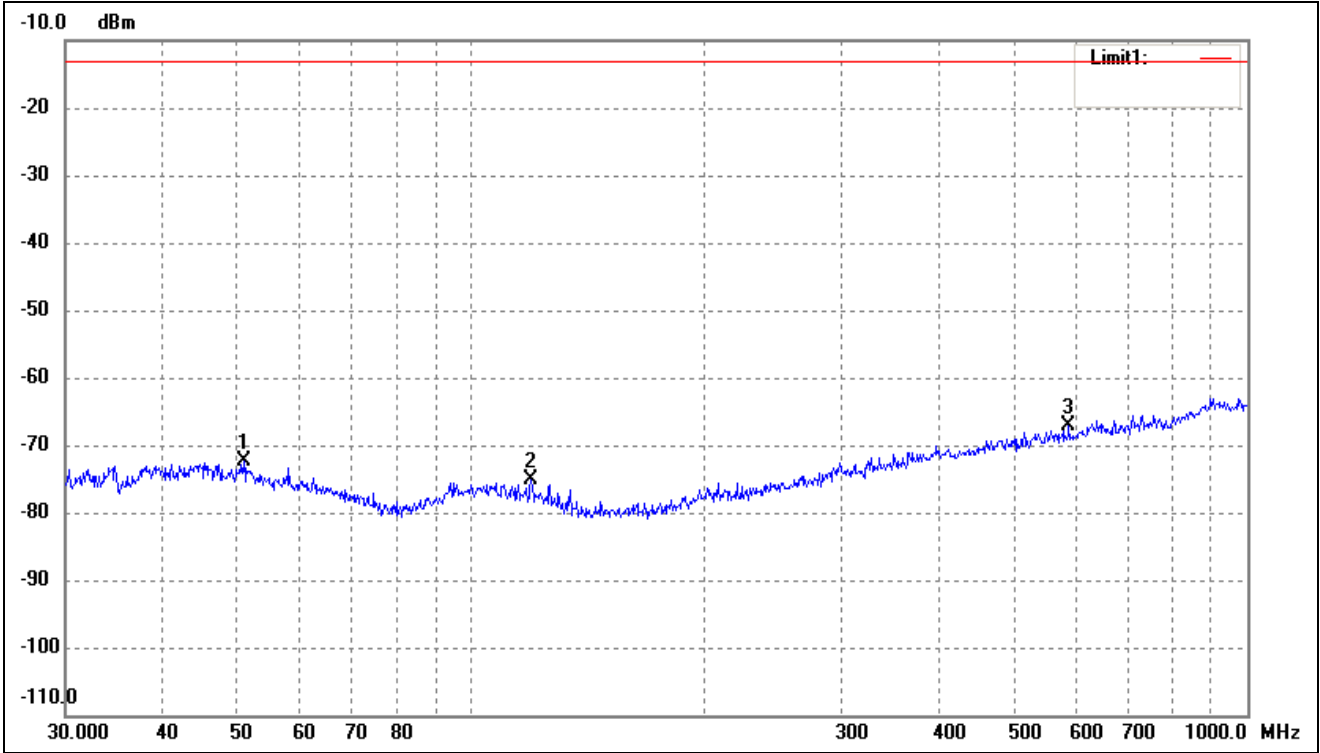
➤ Spurious Emissions Below 1GHz

For Cellular Band			
Test Channel	GSM850	Polarity:	Horizontal



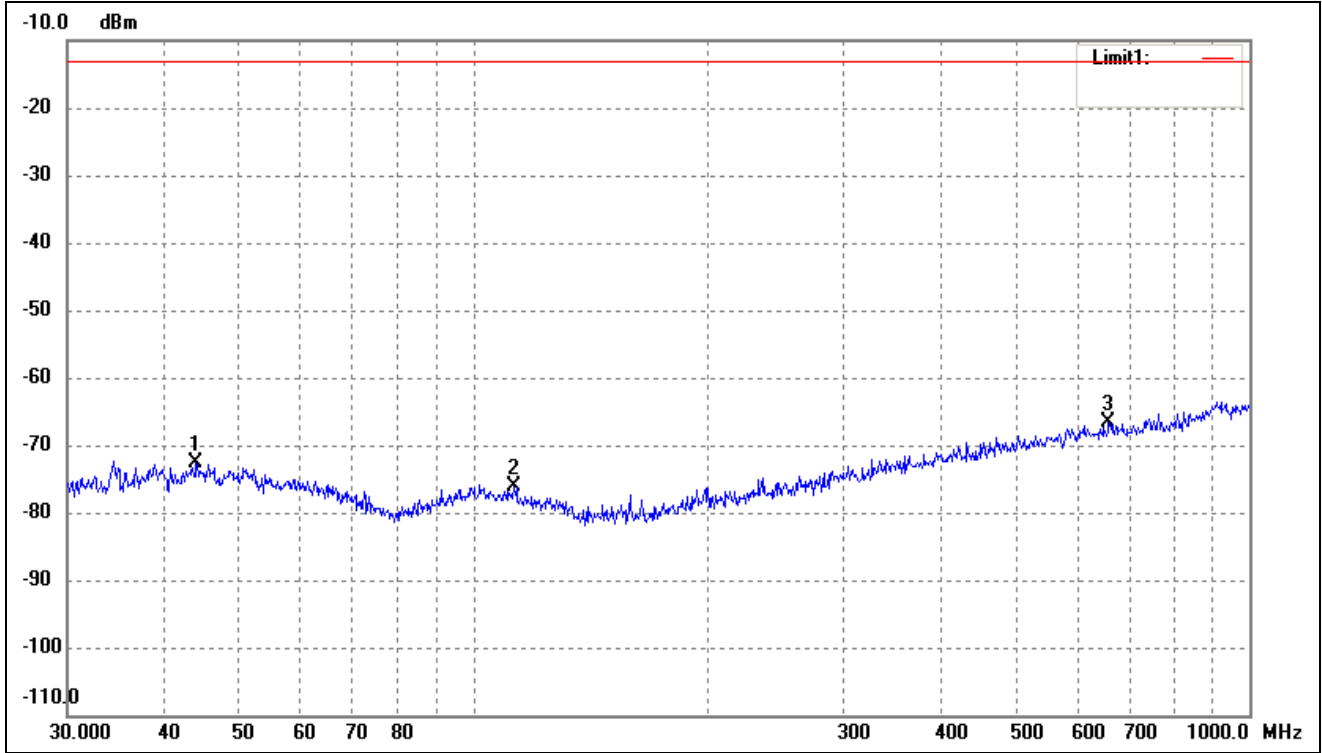
No.	Frequency (MHz)	Reading (dBm)	Correct (dB)	Result (dBm)	Limit (dBm)	Margin (dB)	Degree ( )	Height (cm)	Remark
1	34.6385	-67.96	-2.09	-70.05	-13.00	-57.05	-	-	peak
2	98.4866	-73.20	-1.77	-74.97	-13.00	-61.97	-	-	peak
3	378.5843	-74.76	4.71	-70.05	-13.00	-57.05	-	-	peak

For Cellular Band			
Test Channel	GSM850	Polarity:	Vertical



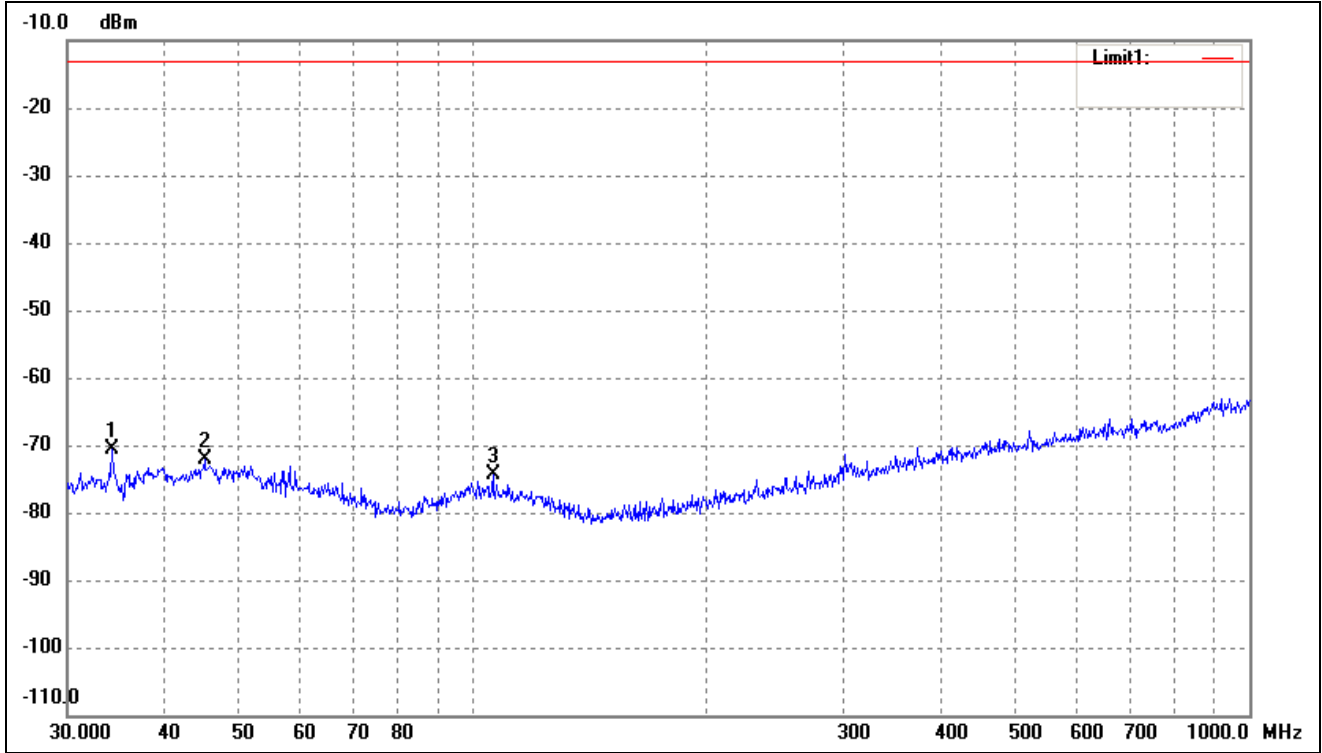
No.	Frequency (MHz)	Reading (dBm)	Correct (dB)	Result (dBm)	Limit (dBm)	Margin (dB)	Degree ( )	Height (cm)	Remark
1	50.9420	-72.44	0.00	-72.44	-13.00	-59.44	-	-	peak
2	119.4361	-72.63	-2.44	-75.07	-13.00	-62.07	-	-	peak
3	588.9051	-76.60	9.58	-67.02	-13.00	-54.02	-	-	peak

For Cellular Band			
Test Channel	GSM1900	Polarity:	Horizontal



No.	Frequency (MHz)	Reading (dBm)	Correct (dB)	Result (dBm)	Limit (dBm)	Margin (dB)	Degree ( )	Height (cm)	Remark
1	43.9658	-72.66	-0.03	-72.69	-13.00	-59.69	-	-	peak
2	112.9196	-74.29	-1.80	-76.09	-13.00	-63.09	-	-	peak
3	658.8362	-76.30	9.61	-66.69	-13.00	-53.69	-	-	peak

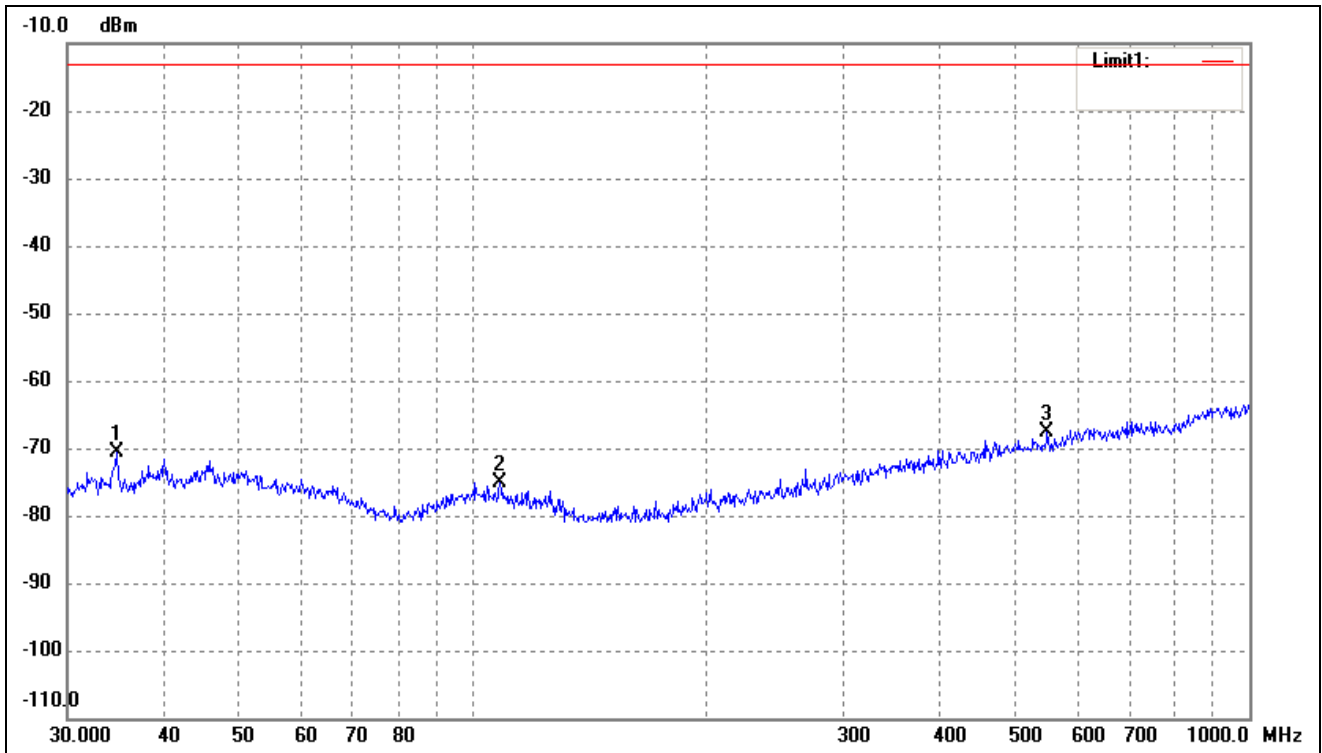
For Cellular Band			
Test Channel	GSM1900	Polarity:	Vertical



No.	Frequency (MHz)	Reading (dBm)	Correct (dB)	Result (dBm)	Limit (dBm)	Margin (dB)	Degree ( )	Height (cm)	Remark
1	34.2760	-68.40	-2.11	-70.51	-13.00	-57.51	-	-	peak
2	45.0583	-72.03	0.00	-72.03	-13.00	-59.03	-	-	peak
3	106.0126	-72.95	-1.51	-74.46	-13.00	-61.46	-	-	peak

Note: Margin= (Reading+ Correct)- Limit

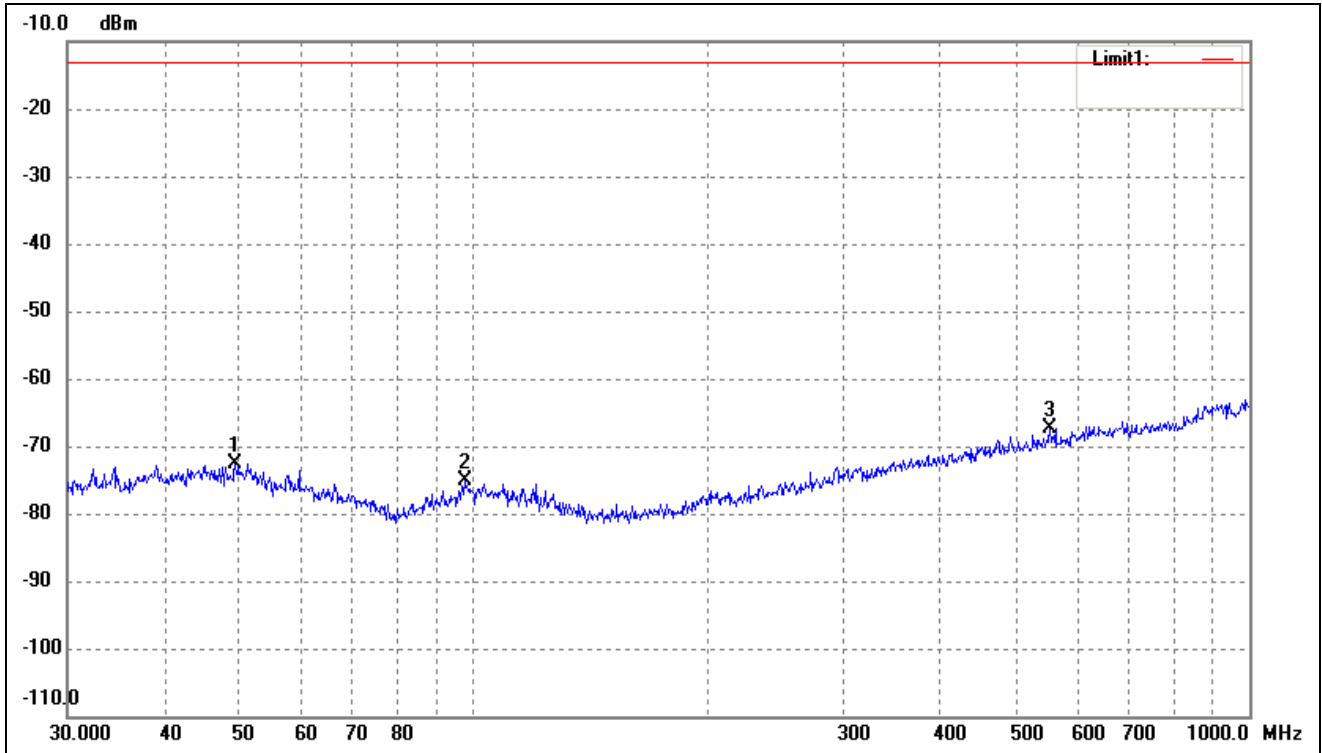
Test Channel	band 5	Polarity:	Horizontal
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No.	Frequency (MHz)	Reading (dBm)	Correct (dB)	Result (dBm)	Limit (dBm)	Margin (dB)	Degree ( )	Height (cm)	Remark
1	34.7602	-68.53	-2.08	-70.61	-13.00	-57.61	-	-	peak
2	108.2667	-73.49	-1.51	-75.00	-13.00	-62.00	-	-	peak
3	549.0195	-75.63	7.99	-67.64	-13.00	-54.64	-	-	peak

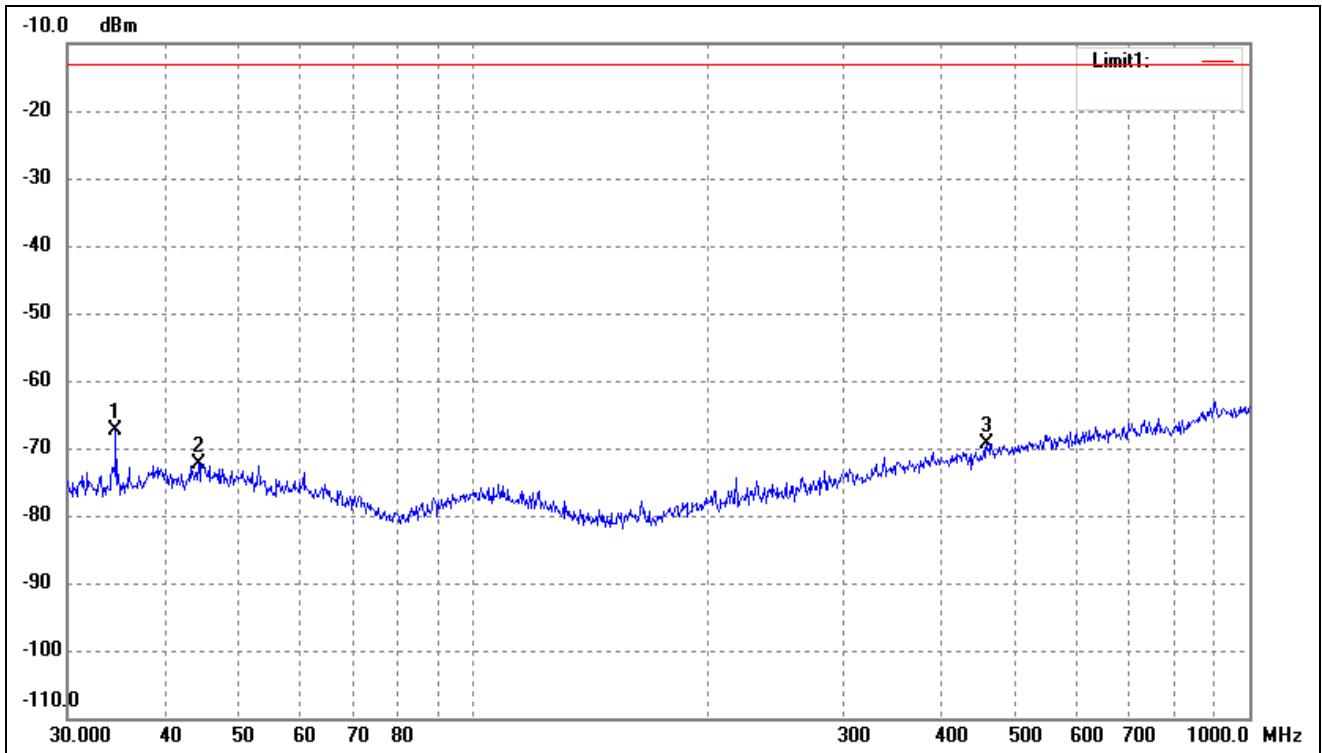


Test Channel	band 5	Polarity:	Vertical
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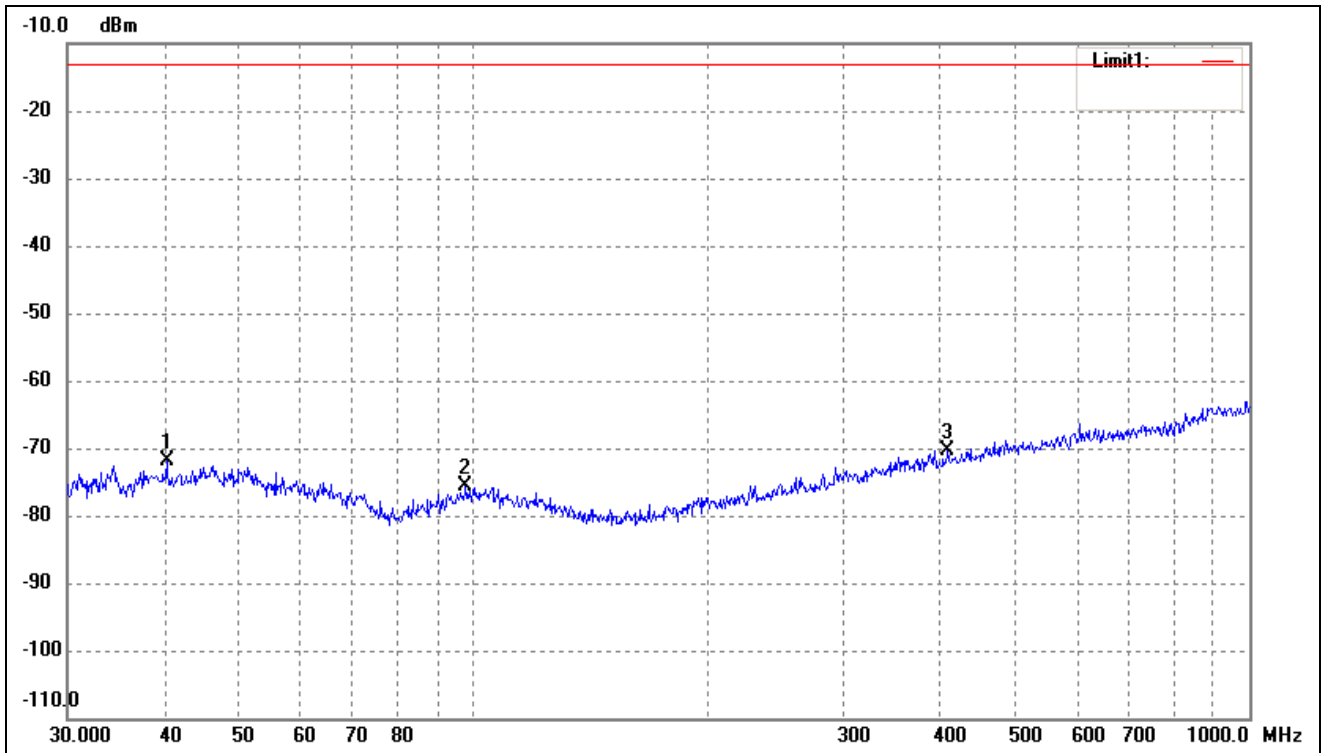
No.	Frequency (MHz)	Reading (dBm)	Correct (dB)	Result (dBm)	Limit (dBm)	Margin (dB)	Degree ( )	Height (cm)	Remark
1	49.3594	-72.78	0.23	-72.55	-13.00	-59.55	-	-	peak
2	97.4560	-73.18	-1.95	-75.13	-13.00	-62.13	-	-	peak
3	552.8833	-75.58	8.15	-67.43	-13.00	-54.43	-	-	peak

Test Channel	band 2	Polarity:	Horizontal
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No.	Frequency (MHz)	Reading (dBm)	Correct (dB)	Result (dBm)	Limit (dBm)	Margin (dB)	Degree ( )	Height (cm)	Remark
1	34.6385	-65.35	-2.09	-67.44	-13.00	-54.44	-	-	peak
2	44.2752	-72.38	-0.03	-72.41	-13.00	-59.41	-	-	peak
3	459.1144	-75.75	6.48	-69.27	-13.00	-56.27	-	-	peak

Test Channel	band 2	Polarity:	Vertical
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No.	Frequency (MHz)	Reading (dBm)	Correct (dB)	Result (dBm)	Limit (dBm)	Margin (dB)	Degree ( )	Height (cm)	Remark
1	40.2757	-71.66	-0.18	-71.84	-13.00	-58.84	-	-	peak
2	97.7983	-73.70	-1.89	-75.59	-13.00	-62.59	-	-	peak
3	408.9460	-75.86	5.54	-70.32	-13.00	-57.32	-	-	peak

Note:  $Margin = (Reading + Correct) - Limit$

Remark: ‘-’ Means the test Degree and Height are not recorded by the test software and only show the worst case in the test report.

- Spurious Emissions Above 1GHz
- For Cellular Band\_GSM850 Mode

Frequency	Reading	Correct	Result	Limit	Margin	Polar
(MHz)	(dBm)	dB	(dBm)	(dBm)	(dB)	H/V
Low Channel (824.2MHz)						
1648.4	-35.11	4.94	-30.17	-13	-17.17	H
2472.6	-41.86	8.46	-33.4	-13	-20.40	H
1648.4	-37.60	4.94	-32.66	-13	-19.66	V
2472.6	-44.87	8.46	-36.41	-13	-23.41	V
Middle Channel (836.6MHz)						
1673.2	-35.61	5.11	-30.5	-13	-17.5	H
2509.8	-41.05	8.54	-32.51	-13	-19.51	H
1673.2	-35.55	5.11	-30.44	-13	-17.44	V
2509.8	-43.17	8.54	-34.63	-13	-21.63	V
High Channel (848.8MHz)						
1697.6	-34.99	5.25	-29.74	-13	-16.74	H
2546.4	-41.55	8.57	-32.98	-13	-19.98	H
1697.6	-37.15	5.25	-31.9	-13	-18.90	V
2546.4	-44.02	8.57	-35.45	-13	-22.45	V

- For PCS Band\_GSM1900 Mode

Frequency	Reading	Correct	Result	Limit	Margin	Polar
(MHz)	(dBm)	dB	(dBm)	(dBm)	(dB)	H/V
Low Channel (1850.2MHz)						
3700.4	-40.86	10.54	-30.32	-13	-17.32	H
5550.6	-46.96	13.37	-33.59	-13	-20.59	H
3700.4	-42.22	10.54	-31.68	-13	-18.68	V
5550.6	-48	13.37	-34.63	-13	-21.63	V
Middle Channel (1880MHz)						
3760.0	-42.58	10.64	-31.94	-13	-18.94	H
5640.0	-49.77	13.54	-36.23	-13	-23.23	H
3760.0	-41.03	10.64	-30.39	-13	-17.39	V
5640.0	-46.00	13.54	-32.46	-13	-19.46	V
High Channel (1909.8MHz)						
3819.6	-39.79	10.74	-29.05	-13	-16.05	H
5729.4	-49.21	13.71	-35.5	-13	-22.5	H
3819.6	-39.58	10.74	-28.84	-13	-15.84	V
5729.4	-48.61	13.71	-34.9	-13	-21.90	V

## ➤ For WCDMA Band V Mode

Frequency	Reading	Correct	Result	Limit	Margin	Polar
(MHz)	(dBm)	dB	(dBm)	(dBm)	(dB)	H/V
Low Channel (826.4MHz)						
1652.8	-36.68	4.94	-31.74	-13	-18.74	H
2479.2	-43.55	8.46	-35.09	-13	-22.09	H
1652.8	-37.26	4.94	-32.32	-13	-19.32	V
2479.2	-41.01	8.46	-32.55	-13	-19.55	V
Middle Channel (836.6MHz)						
1672.8	-34.44	5.11	-29.33	-13	-16.33	H
2509.2	-43.18	8.54	-34.64	-13	-21.64	H
1672.8	-36.36	5.11	-31.25	-13	-18.25	V
2509.2	-44.14	8.54	-35.6	-13	-22.6	V
High Channel (846.6MHz)						
1693.2	-35.16	5.25	-29.91	-13	-16.91	H
2539.8	-44.7	8.57	-36.13	-13	-23.13	H
1693.2	-35.87	5.25	-30.62	-13	-17.62	V
2539.8	-44.95	8.57	-36.38	-13	-23.38	V

## ➤ For WCDMA Band II Mode

Frequency	Reading	Correct	Result	Limit	Margin	Polar
(MHz)	(dBm)	dB	(dBm)	(dBm)	(dB)	H/V
Low Channel (1852.4MHz)						
3704.8	-39.62	10.54	-29.08	-13	-16.08	H
5557.2	-46.08	13.37	-32.71	-13	-19.71	H
3704.8	-41.15	10.54	-30.61	-13	-17.61	V
5557.2	-48.02	13.37	-34.65	-13	-21.65	V
Middle Channel (1880MHz)						
3760.8	-41.89	10.64	-31.25	-13	-18.25	H
5640.0	-49.29	13.54	-35.75	-13	-22.75	H
3760.8	-41.49	10.64	-30.85	-13	-17.85	V
5640.0	-46.51	13.54	-32.97	-13	-19.97	V
High Channel (1907.6MHz)						
3815.2	-39.98	10.74	-29.24	-13	-16.24	H
5722.8	-46.39	13.71	-32.68	-13	-19.68	H
3815.2	-39.87	10.74	-29.13	-13	-16.13	V
5722.8	-46.11	13.71	-32.4	-13	-19.40	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.

## **8. Frequency Stability**

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### **8.1 Standard Applicable**

According to §22.355, §24.235 the limit is 2.5ppm.

### **8.2 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

### **8.3 Summary of Test Results/Plots**

**Please refer to Appendix E**

## 9. Modulation characteristics

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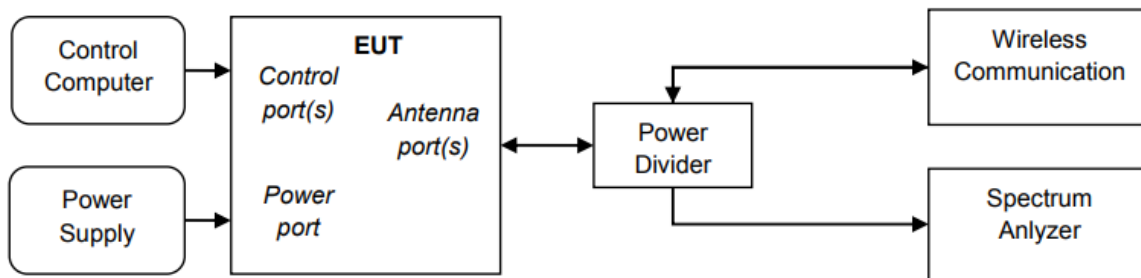
### 9.1 Standard Applicable

According to §2.1047, measurements required: Modulation characteristics is given below:

- (a) Voice modulated communication equipment. A curve or equivalent data showing the frequency response of the audio modulating circuit over a range of 100 to 5000 Hz shall be submitted. For equipment required to have an audio low-pass filter, a curve showing the frequency response of the filter, or of all circuitry installed between the modulation limiter and the modulated stage shall be submitted.
- (b) Equipment which employs modulation limiting. A curve or family of curves showing the percentage of modulation versus the modulation input voltage shall be supplied. The information submitted shall be sufficient to show modulation limiting capability throughout the range of modulating frequencies and input modulating signal levels employed.
- (c) Single sideband and independent sideband radiotelephone transmitters which employ a device or circuit to limit peak envelope power. A curve showing the peak envelope power output versus the modulation input voltage shall be supplied. The modulating signals shall be the same in frequency as specified in paragraph (c) of §2.1049 for the occupied bandwidth tests.
- (d) Other types of equipment. A curve or equivalent data which shows that the equipment will meet the modulation requirements of the rules under which the equipment is to be licensed.

### 9.2 Test Procedure

According to ANSI C63.26-2015 section 5.3.2, the following test setup was performed.



### 9.3 Summary of Test Results/Plots

Only the worst case was selected to record

**Please refer to Appendix F**

**APPENDIX SUMMARY**

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Project No.	WTX21X04036754W	Test Engineer	Combat
Start date	2021/4/29	Finish date	2021/4/30
Temperature	23°C	Humidity	52%
RF specifications	GSM/WCDMA		

<b>APPENDIX</b>	<b>Description of Test Item</b>	<b>Result</b>
A	RF Output Power	Compliant
B	Peak-to-average Ratio (PAR) of Transmitter	Compliant
C	Emission Bandwidth	Compliant
D	Out of Band Emissions at Antenna Terminal	Compliant
E	Frequency Stability	Compliant
F	Modulation characteristics	Compliant



**APPENDIX A****Conducted Average power**

Conducted Average power (dBm)						
Band	GSM850			PCS1900		
Channel	128	190	251	512	661	810
Frequency(MHz)	824.20	836.60	848.80	1850.20	1880.00	1909.80
GSM	33.41	33.47	33.48	29.80	29.71	29.78
GPRS(1Slot)	33.46	33.50	33.48	30.09	30.12	30.15
EGPRS(1Slot)	25.69	26.43	26.16	24.22	25.14	24.77

Conducted Average power (dBm)						
Band	WCDMA Band V			WCDMA Band II		
Channel	4132	4183	4233	9262	9400	9538
Frequency(MHz)	826.4	836.6	846.6	1852.4	1880.0	1907.6
RMC 12.2k	22.89	22.88	22.80	22.46	22.53	22.65
HSDPA Subtest-1	22.31	22.60	22.16	20.97	21.03	21.46
HSDPA Subtest-2	21.29	21.59	22.12	20.95	21.01	21.43
HSDPA Subtest-3	21.27	21.57	22.14	20.94	21.02	21.44
HSDPA Subtest-4	21.28	21.53	22.11	20.95	21.01	21.45
HSUPA Subtest-1	22.35	22.70	22.19	20.91	20.89	21.37
HSUPA Subtest-2	22.31	22.64	22.16	20.86	20.83	21.32
HSUPA Subtest-3	22.29	22.68	22.15	20.87	20.84	21.33
HSUPA Subtest-4	22.27	22.69	22.14	20.85	20.84	21.34
HSUPA Subtest-5	22.27	22.67	22.15	20.86	20.85	21.35

## APPENDIX B

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### Peak-to-average Ratio (PAR) of Transmitter

PCS1900				
Test Mode	Channel	Frequency (MHz)	PAR (dB)	Limit (dB)
GSM	661	1850.2	5.98	13
GPRS(1 Slot)	661	1850.2	5.02	13
EDGE(1 Slot)	661	1850.2	5.65	13

WCDMA Band II				
Test Mode	Channel	Frequency (MHz)	PAR (dB)	Limit (dB)
WCDMA	9262	1852.4	6.11	13
	9400	1880.0	6.56	13
	9538	1907.6	6.37	13

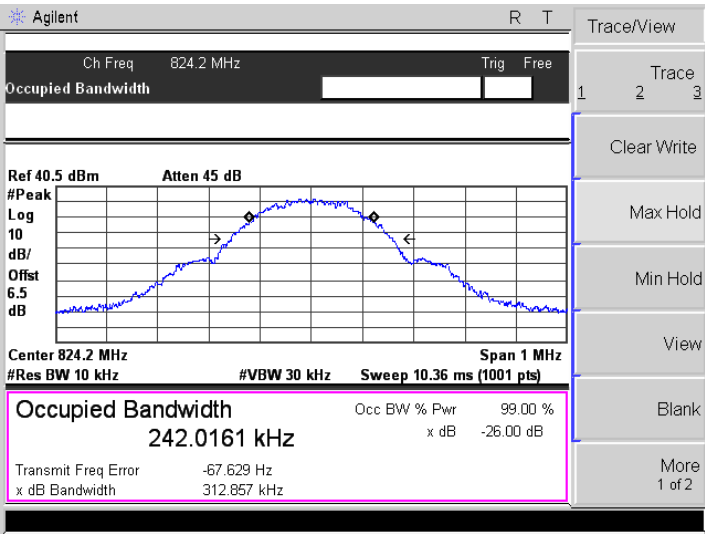
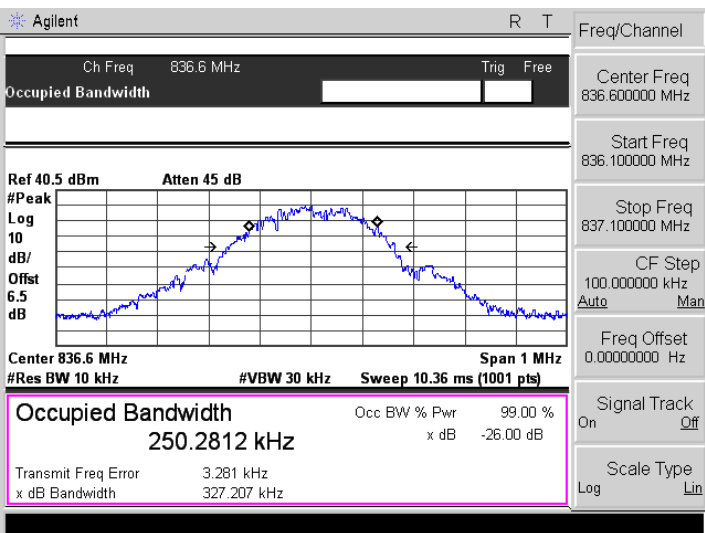
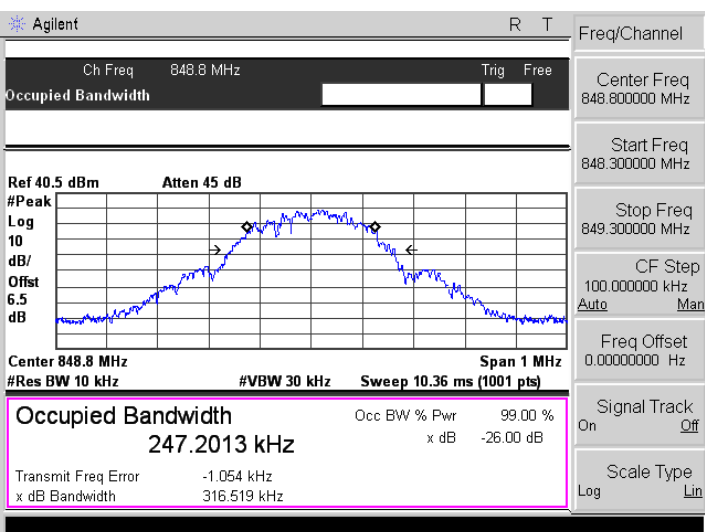
Note: Only the worst case was selected to record.

**APPENDIX C**

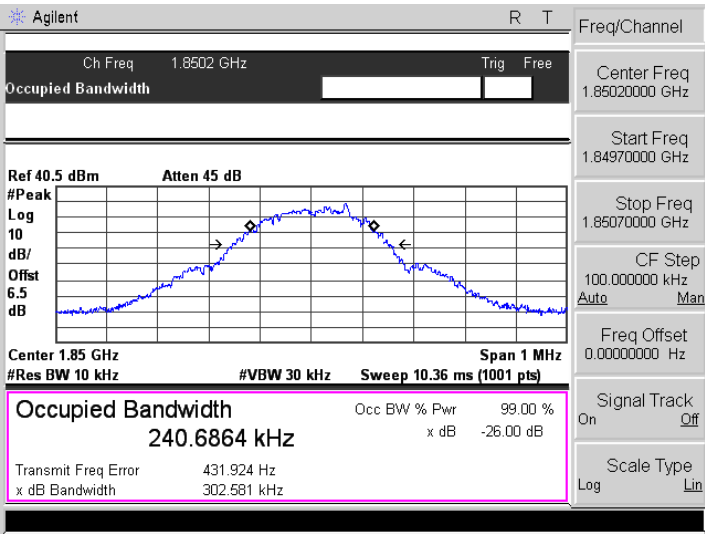
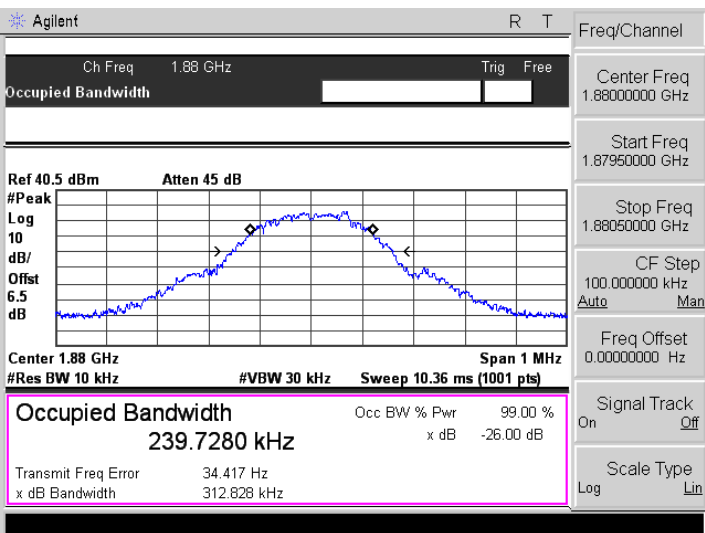
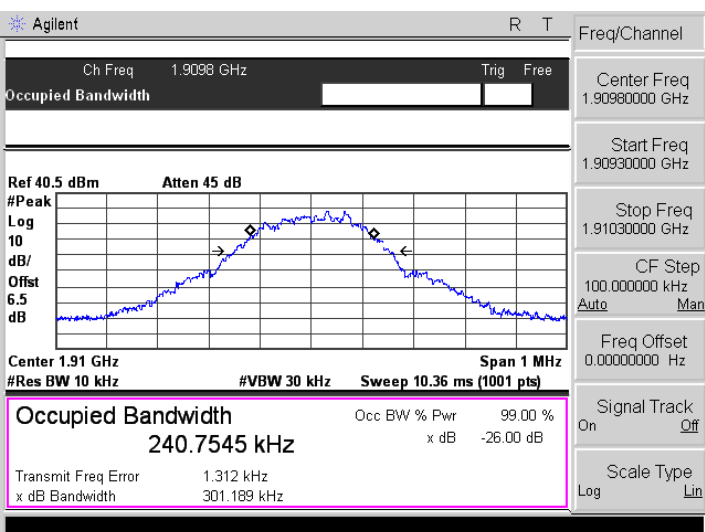
EUT Mode	Channel	Frequency (MHz)	99% Occupy bandwidth (kHz)	-26dB bandwidth (kHz)
GSM 850 (GMSK)	128	824.20	234.4346	304.844
	190	836.60	242.9729	310.812
	251	848.80	242.0229	317.763
GPRS850 (GMSK,1Slot)	128	824.20	242.0161	312.857
	190	836.60	250.2812	327.207
	251	848.80	247.2013	316.519
EGPRS850 (8PSK,1Slot)	128	824.20	240.8210	285.498
	190	836.60	250.5091	302.319
	251	848.80	243.1846	306.206
PCS1900 (GMSK)	512	1850.20	240.6864	302.581
	661	1880.00	239.7280	312.828
	810	1909.80	240.7545	301.189
GPRS1900 (GMSK,1Slot)	512	1850.20	244.1778	317.352
	661	1880.00	243.0030	300.002
	810	1909.80	242.6050	315.834
EGPRS1900 (8PSK,1Slot)	512	1850.20	251.7769	304.601
	661	1880.00	247.5299	322.858
	810	1909.80	231.9304	310.988

EUT Mode	Channel	Frequency (MHz)	99% Occupy bandwidth (kHz)	-26dB bandwidth (kHz)
WCDMA Band V	4132	826.40	4157.0	4680
	4183	836.60	4162.4	4688
	4233	846.60	4150.3	4696
HSDPA	4132	826.40	4146.4	4690
	4183	836.60	4164.5	4687
	4233	846.60	4162.0	4703
HSUPA	4132	826.40	4172.4	4690
	4183	836.60	4155.3	4696
	4233	846.60	4161.4	4673
WCDMA Band II	9262	1852.40	4164.6	4708
	9400	1880.00	4159.0	4696
	9538	1907.60	4158.4	4700
HSDPA	9262	1852.40	4166.7	4681
	9400	1880.00	4163.7	4705
	9538	1907.60	4159.6	4700
HSUPA	9262	1852.40	4147.9	4693
	9400	1880.00	4167.4	4693
	9538	1907.60	4161.0	4664

<p>GSM 850 (GMSK)-Low</p>	<p>Agilent R T</p> <p>Ch Freq 824.2 MHz Trig Free</p> <p>Occupied Bandwidth</p> <p>Ref 40.5 dBm Atten 45 dB</p> <p>#Peak Log 10 dB/Offset 6.5 dB</p> <p>Center 824.2 MHz Span 1 MHz</p> <p>#Res BW 10 kHz #VBW 30 kHz Sweep 10.36 ms (1001 pts)</p> <p><b>Occupied Bandwidth</b> 234.4346 kHz</p> <p>Occ BW % Pwr 99.00 % x dB -26.00 dB</p> <p>Transmit Freq Error -712.772 Hz x dB Bandwidth 304.844 kHz</p> <p>Freq/Channel</p> <p>Center Freq 824.200000 MHz</p> <p>Start Freq 823.700000 MHz</p> <p>Stop Freq 824.700000 MHz</p> <p>CF Step 100.000000 kHz Auto Man</p> <p>Freq Offset 0.00000000 Hz</p> <p>Signal Track On Off</p> <p>Scale Type Log Lin</p>
<p>GSM 850 (GMSK)-Middle</p>	<p>Agilent R T</p> <p>Ch Freq 836.6 MHz Trig Free</p> <p>Occupied Bandwidth</p> <p>Ref 40.5 dBm Atten 45 dB</p> <p>#Peak Log 10 dB/Offset 6.5 dB</p> <p>Center 836.6 MHz Span 1 MHz</p> <p>#Res BW 10 kHz #VBW 30 kHz Sweep 10.36 ms (1001 pts)</p> <p><b>Occupied Bandwidth</b> 242.9729 kHz</p> <p>Occ BW % Pwr 99.00 % x dB -26.00 dB</p> <p>Transmit Freq Error 392.591 Hz x dB Bandwidth 310.812 kHz</p> <p>Trace/View</p> <p>1 2 3</p> <p>Clear Write</p> <p>Max Hold</p> <p>Min Hold</p> <p>View</p> <p>Blank</p> <p>More 1 of 2</p>
<p>GSM 850 (GMSK)-High</p>	<p>Agilent R T</p> <p>Ch Freq 848.8 MHz Trig Free</p> <p>Occupied Bandwidth</p> <p>Ref 40.5 dBm Atten 45 dB</p> <p>#Peak Log 10 dB/Offset 6.5 dB</p> <p>Center 848.8 MHz Span 1 MHz</p> <p>#Res BW 10 kHz #VBW 30 kHz Sweep 10.36 ms (1001 pts)</p> <p><b>Occupied Bandwidth</b> 242.0229 kHz</p> <p>Occ BW % Pwr 99.00 % x dB -26.00 dB</p> <p>Transmit Freq Error -179.749 Hz x dB Bandwidth 317.763 kHz</p> <p>Freq/Channel</p> <p>Center Freq 848.800000 MHz</p> <p>Start Freq 848.300000 MHz</p> <p>Stop Freq 849.300000 MHz</p> <p>CF Step 100.000000 kHz Auto Man</p> <p>Freq Offset 0.00000000 Hz</p> <p>Signal Track On Off</p> <p>Scale Type Log Lin</p>

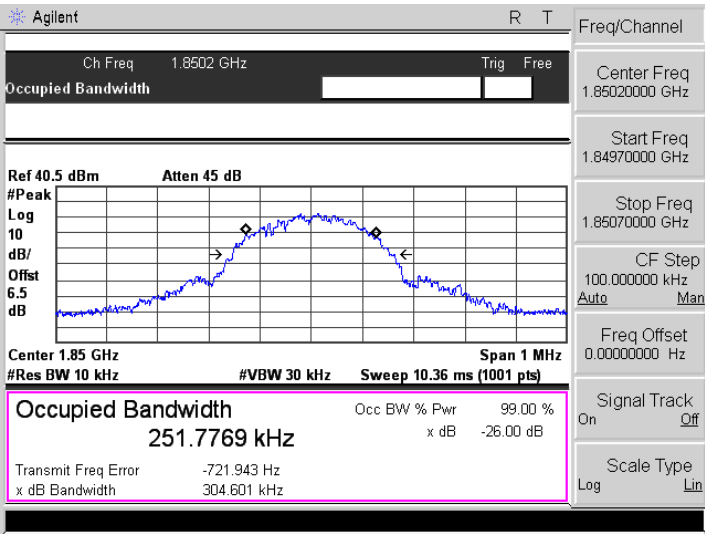
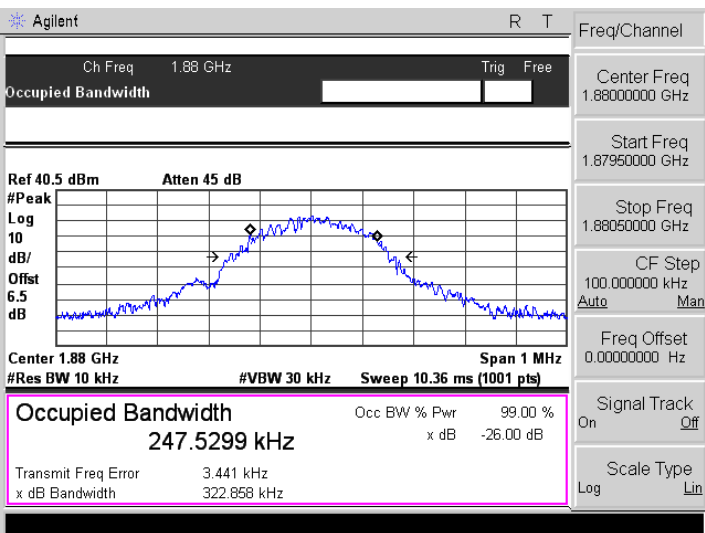
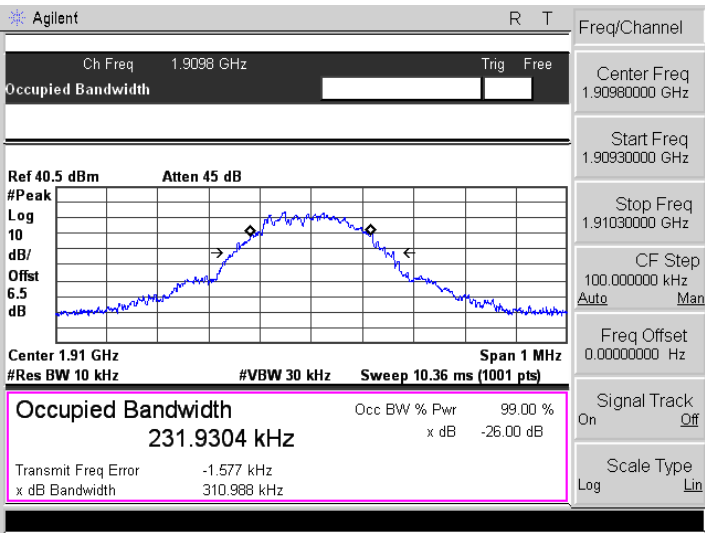
<p>GPRS850 (GMSK,1Slot)-Low</p>	 <p>Agilent R T</p> <p>Ch Freq 824.2 MHz Trig Free</p> <p>Occupied Bandwidth</p> <p>Ref 40.5 dBm Atten 45 dB</p> <p>#Peak Log 10 dB/ Offst 6.5 dB</p> <p>Center 824.2 MHz Span 1 MHz</p> <p>#Res BW 10 kHz #VBW 30 kHz Sweep 10.36 ms (1001 pts)</p> <p><b>Occupied Bandwidth</b> 242.0161 kHz Occ BW % Pwr 99.00 % x dB -26.00 dB</p> <p>Transmit Freq Error -67.629 Hz</p> <p>x dB Bandwidth 312.857 kHz</p> <p>Trace/View</p> <p>Trace 1 2 3</p> <p>Clear Write</p> <p>Max Hold</p> <p>Min Hold</p> <p>View</p> <p>Blank</p> <p>More 1 of 2</p>
<p>GPRS850 (GMSK,1Slot)-Middle</p>	 <p>Agilent R T</p> <p>Ch Freq 836.6 MHz Trig Free</p> <p>Occupied Bandwidth</p> <p>Ref 40.5 dBm Atten 45 dB</p> <p>#Peak Log 10 dB/ Offst 6.5 dB</p> <p>Center 836.6 MHz Span 1 MHz</p> <p>#Res BW 10 kHz #VBW 30 kHz Sweep 10.36 ms (1001 pts)</p> <p><b>Occupied Bandwidth</b> 250.2812 kHz Occ BW % Pwr 99.00 % x dB -26.00 dB</p> <p>Transmit Freq Error 3.281 kHz</p> <p>x dB Bandwidth 327.207 kHz</p> <p>Freq/Channel</p> <p>Center Freq 836.600000 MHz</p> <p>Start Freq 836.100000 MHz</p> <p>Stop Freq 837.100000 MHz</p> <p>CF Step 100.000000 kHz Auto Man</p> <p>Freq Offset 0.00000000 Hz</p> <p>Signal Track On Off</p> <p>Scale Type Log Lin</p>
<p>GPRS850 (GMSK,1Slot)-High</p>	 <p>Agilent R T</p> <p>Ch Freq 848.8 MHz Trig Free</p> <p>Occupied Bandwidth</p> <p>Ref 40.5 dBm Atten 45 dB</p> <p>#Peak Log 10 dB/ Offst 6.5 dB</p> <p>Center 848.8 MHz Span 1 MHz</p> <p>#Res BW 10 kHz #VBW 30 kHz Sweep 10.36 ms (1001 pts)</p> <p><b>Occupied Bandwidth</b> 247.2013 kHz Occ BW % Pwr 99.00 % x dB -26.00 dB</p> <p>Transmit Freq Error -1.054 kHz</p> <p>x dB Bandwidth 316.519 kHz</p> <p>Freq/Channel</p> <p>Center Freq 848.800000 MHz</p> <p>Start Freq 848.300000 MHz</p> <p>Stop Freq 849.300000 MHz</p> <p>CF Step 100.000000 kHz Auto Man</p> <p>Freq Offset 0.00000000 Hz</p> <p>Signal Track On Off</p> <p>Scale Type Log Lin</p>

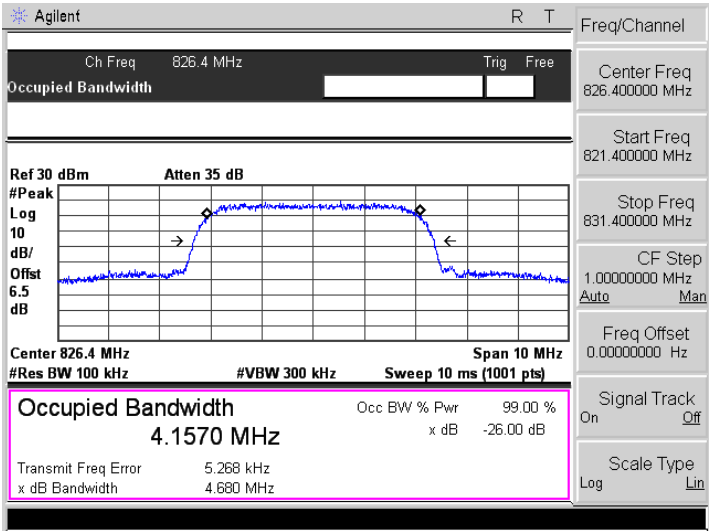
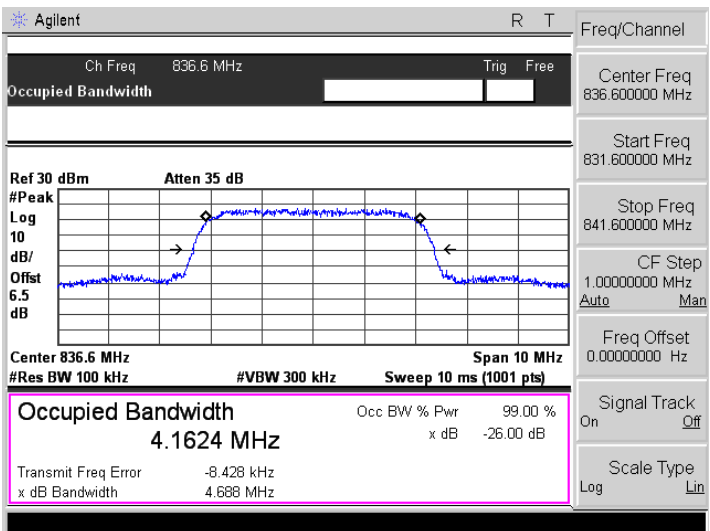
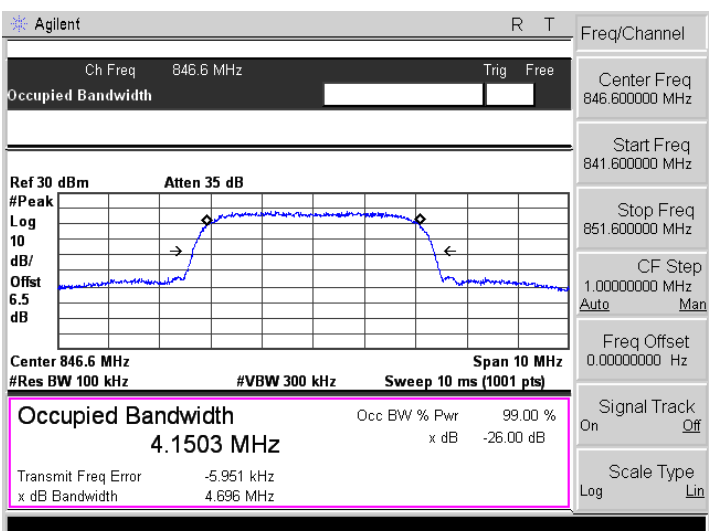
<p>EGPRS850 (8PSK,1Slot)-Low</p>	
<p>EGPRS850 (8PSK,1Slot)-Middle</p>	
<p>EGPRS850 (8PSK,1Slot)-High</p>	

<p>PCS1900 (GMSK)-Low</p>	 <p>Agilent R T</p> <p>Ch Freq 1.8502 GHz Trig Free</p> <p>Occupied Bandwidth</p> <p>Ref 40.5 dBm Atten 45 dB</p> <p>#Peak Log 10 dB/Offst 6.5 dB</p> <p>Center 1.85 GHz Span 1 MHz #Res BW 10 kHz #VBW 30 kHz Sweep 10.36 ms (1001 pts)</p> <p><b>Occupied Bandwidth</b> 240.6864 kHz Occ BW % Pwr 99.00 % x dB -26.00 dB</p> <p>Transmit Freq Error 431.924 Hz x dB Bandwidth 302.581 kHz</p> <p>Freq/Channel</p> <p>Center Freq 1.85020000 GHz</p> <p>Start Freq 1.84970000 GHz</p> <p>Stop Freq 1.85070000 GHz</p> <p>CF Step 100.000000 kHz Auto Man</p> <p>Freq Offset 0.00000000 Hz</p> <p>Signal Track On Off</p> <p>Scale Type Log Lin</p>
<p>PCS1900 (GMSK)-Middle</p>	 <p>Agilent R T</p> <p>Ch Freq 1.88 GHz Trig Free</p> <p>Occupied Bandwidth</p> <p>Ref 40.5 dBm Atten 45 dB</p> <p>#Peak Log 10 dB/Offst 6.5 dB</p> <p>Center 1.88 GHz Span 1 MHz #Res BW 10 kHz #VBW 30 kHz Sweep 10.36 ms (1001 pts)</p> <p><b>Occupied Bandwidth</b> 239.7280 kHz Occ BW % Pwr 99.00 % x dB -26.00 dB</p> <p>Transmit Freq Error 34.417 Hz x dB Bandwidth 312.828 kHz</p> <p>Freq/Channel</p> <p>Center Freq 1.88000000 GHz</p> <p>Start Freq 1.87950000 GHz</p> <p>Stop Freq 1.88050000 GHz</p> <p>CF Step 100.000000 kHz Auto Man</p> <p>Freq Offset 0.00000000 Hz</p> <p>Signal Track On Off</p> <p>Scale Type Log Lin</p>
<p>PCS1900 (GMSK)-High</p>	 <p>Agilent R T</p> <p>Ch Freq 1.9098 GHz Trig Free</p> <p>Occupied Bandwidth</p> <p>Ref 40.5 dBm Atten 45 dB</p> <p>#Peak Log 10 dB/Offst 6.5 dB</p> <p>Center 1.91 GHz Span 1 MHz #Res BW 10 kHz #VBW 30 kHz Sweep 10.36 ms (1001 pts)</p> <p><b>Occupied Bandwidth</b> 240.7545 kHz Occ BW % Pwr 99.00 % x dB -26.00 dB</p> <p>Transmit Freq Error 1.312 kHz x dB Bandwidth 301.189 kHz</p> <p>Freq/Channel</p> <p>Center Freq 1.90980000 GHz</p> <p>Start Freq 1.90930000 GHz</p> <p>Stop Freq 1.91030000 GHz</p> <p>CF Step 100.000000 kHz Auto Man</p> <p>Freq Offset 0.00000000 Hz</p> <p>Signal Track On Off</p> <p>Scale Type Log Lin</p>



<p>GPRS1900 (GMSK,1Slot)-Low</p>	
<p>GPRS1900 (GMSK,1Slot)-Middle</p>	
<p>GPRS1900 (GMSK,1Slot)-High</p>	

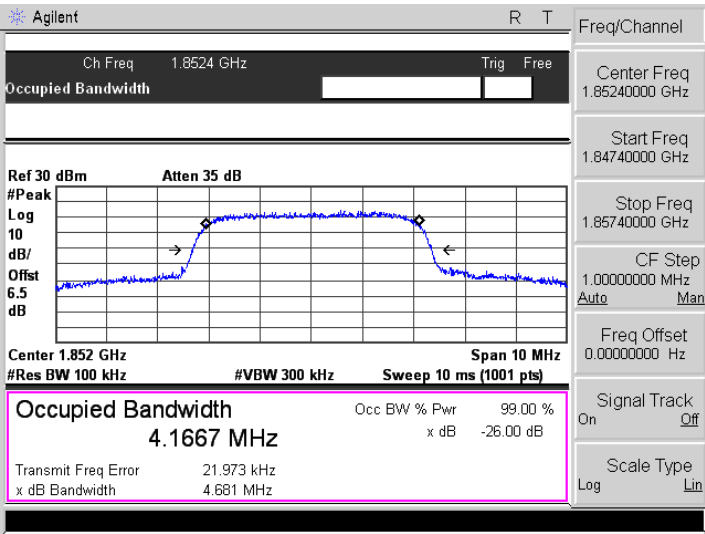
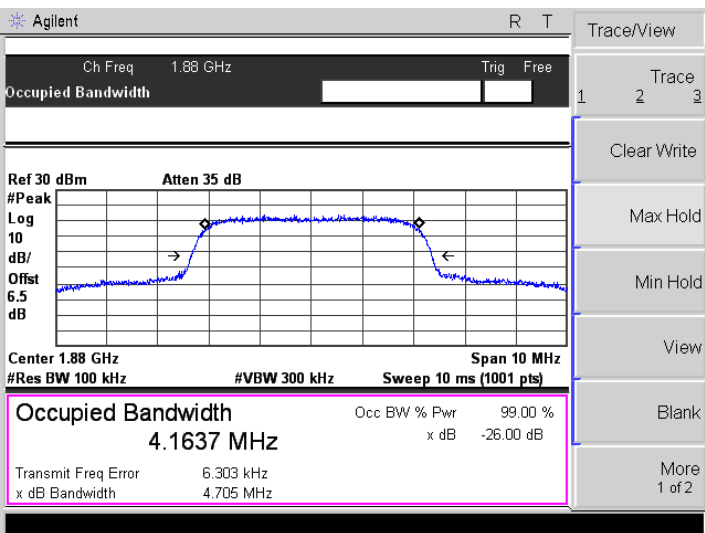
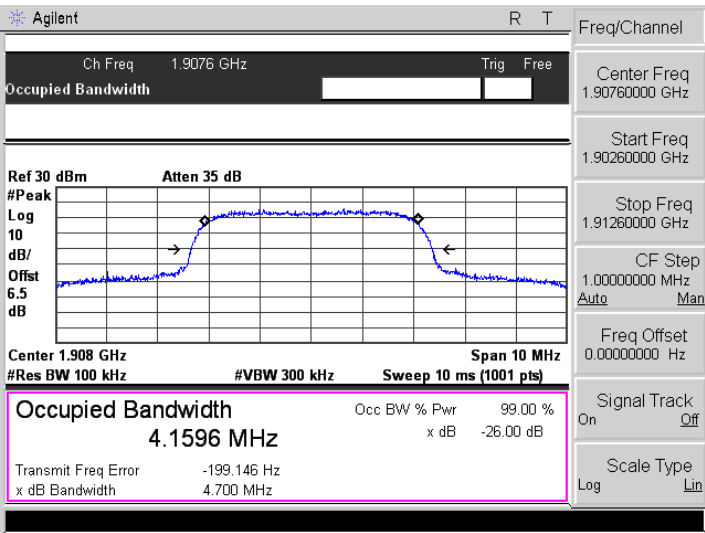
<p>EGPRS1900 (8PSK,1Slot)-Low</p>	 <p>Agilent R T</p> <p>Ch Freq 1.8502 GHz Trig Free</p> <p>Occupied Bandwidth</p> <p>Ref 40.5 dBm Atten 45 dB</p> <p>#Peak Log 10 dB/ Offst 6.5 dB</p> <p>Center 1.85 GHz Span 1 MHz #Res BW 10 kHz #VBW 30 kHz Sweep 10.36 ms (1001 pts)</p> <p><b>Occupied Bandwidth</b> 251.7769 kHz Occ BW % Pwr 99.00 % x dB -26.00 dB</p> <p>Transmit Freq Error -721.943 Hz x dB Bandwidth 304.601 kHz</p> <p>Freq/Channel</p> <p>Center Freq 1.85020000 GHz</p> <p>Start Freq 1.84970000 GHz</p> <p>Stop Freq 1.85070000 GHz</p> <p>CF Step 100.000000 kHz Auto Man</p> <p>Freq Offset 0.00000000 Hz</p> <p>Signal Track On Off</p> <p>Scale Type Log Lin</p>
<p>EGPRS1900 (8PSK,1Slot)-Middle</p>	 <p>Agilent R T</p> <p>Ch Freq 1.88 GHz Trig Free</p> <p>Occupied Bandwidth</p> <p>Ref 40.5 dBm Atten 45 dB</p> <p>#Peak Log 10 dB/ Offst 6.5 dB</p> <p>Center 1.88 GHz Span 1 MHz #Res BW 10 kHz #VBW 30 kHz Sweep 10.36 ms (1001 pts)</p> <p><b>Occupied Bandwidth</b> 247.5299 kHz Occ BW % Pwr 99.00 % x dB -26.00 dB</p> <p>Transmit Freq Error 3.441 kHz x dB Bandwidth 322.858 kHz</p> <p>Freq/Channel</p> <p>Center Freq 1.88000000 GHz</p> <p>Start Freq 1.87950000 GHz</p> <p>Stop Freq 1.88050000 GHz</p> <p>CF Step 100.000000 kHz Auto Man</p> <p>Freq Offset 0.00000000 Hz</p> <p>Signal Track On Off</p> <p>Scale Type Log Lin</p>
<p>EGPRS1900 (8PSK,1Slot)-High</p>	 <p>Agilent R T</p> <p>Ch Freq 1.9098 GHz Trig Free</p> <p>Occupied Bandwidth</p> <p>Ref 40.5 dBm Atten 45 dB</p> <p>#Peak Log 10 dB/ Offst 6.5 dB</p> <p>Center 1.91 GHz Span 1 MHz #Res BW 10 kHz #VBW 30 kHz Sweep 10.36 ms (1001 pts)</p> <p><b>Occupied Bandwidth</b> 231.9304 kHz Occ BW % Pwr 99.00 % x dB -26.00 dB</p> <p>Transmit Freq Error -1.577 kHz x dB Bandwidth 310.988 kHz</p> <p>Freq/Channel</p> <p>Center Freq 1.90980000 GHz</p> <p>Start Freq 1.90930000 GHz</p> <p>Stop Freq 1.91030000 GHz</p> <p>CF Step 100.000000 kHz Auto Man</p> <p>Freq Offset 0.00000000 Hz</p> <p>Signal Track On Off</p> <p>Scale Type Log Lin</p>

<p>WCDMA Band V-Low</p>	 <p>Agilent R T</p> <p>Ch Freq 826.4 MHz Trig Free</p> <p>Occupied Bandwidth</p> <p>Ref 30 dBm Atten 35 dB</p> <p>#Peak Log 10 dB/Offset 6.5 dB</p> <p>Center 826.4 MHz Span 10 MHz</p> <p>#Res BW 100 kHz #VBW 300 kHz Sweep 10 ms (1001 pts)</p> <p><b>Occupied Bandwidth 4.1570 MHz</b></p> <p>Occ BW % Pwr 99.00 % x dB -26.00 dB</p> <p>Transmit Freq Error 5.268 kHz x dB Bandwidth 4.680 MHz</p> <p>Freq/Channel</p> <p>Center Freq 826.400000 MHz</p> <p>Start Freq 821.400000 MHz</p> <p>Stop Freq 831.400000 MHz</p> <p>CF Step 1.00000000 MHz Auto Man</p> <p>Freq Offset 0.00000000 Hz</p> <p>Signal Track On Off</p> <p>Scale Type Log Lin</p>
<p>WCDMA Band V-Middle</p>	 <p>Agilent R T</p> <p>Ch Freq 836.6 MHz Trig Free</p> <p>Occupied Bandwidth</p> <p>Ref 30 dBm Atten 35 dB</p> <p>#Peak Log 10 dB/Offset 6.5 dB</p> <p>Center 836.6 MHz Span 10 MHz</p> <p>#Res BW 100 kHz #VBW 300 kHz Sweep 10 ms (1001 pts)</p> <p><b>Occupied Bandwidth 4.1624 MHz</b></p> <p>Occ BW % Pwr 99.00 % x dB -26.00 dB</p> <p>Transmit Freq Error -8.428 kHz x dB Bandwidth 4.688 MHz</p> <p>Freq/Channel</p> <p>Center Freq 836.600000 MHz</p> <p>Start Freq 831.600000 MHz</p> <p>Stop Freq 841.600000 MHz</p> <p>CF Step 1.00000000 MHz Auto Man</p> <p>Freq Offset 0.00000000 Hz</p> <p>Signal Track On Off</p> <p>Scale Type Log Lin</p>
<p>WCDMA Band V-High</p>	 <p>Agilent R T</p> <p>Ch Freq 846.6 MHz Trig Free</p> <p>Occupied Bandwidth</p> <p>Ref 30 dBm Atten 35 dB</p> <p>#Peak Log 10 dB/Offset 6.5 dB</p> <p>Center 846.6 MHz Span 10 MHz</p> <p>#Res BW 100 kHz #VBW 300 kHz Sweep 10 ms (1001 pts)</p> <p><b>Occupied Bandwidth 4.1503 MHz</b></p> <p>Occ BW % Pwr 99.00 % x dB -26.00 dB</p> <p>Transmit Freq Error -5.951 kHz x dB Bandwidth 4.696 MHz</p> <p>Freq/Channel</p> <p>Center Freq 846.600000 MHz</p> <p>Start Freq 841.600000 MHz</p> <p>Stop Freq 851.600000 MHz</p> <p>CF Step 1.00000000 MHz Auto Man</p> <p>Freq Offset 0.00000000 Hz</p> <p>Signal Track On Off</p> <p>Scale Type Log Lin</p>

<p>HSDPA-Low</p>	
<p>HSDPA-Middle</p>	
<p>HSDPA-High</p>	

<p>HSUPA-Low</p>	
<p>HSUPA-Middle</p>	
<p>HSUPA-High</p>	

<p>WCDMA Band II-Low</p>	<p>Agilent R T</p> <p>Ch Freq 1.8524 GHz Trig Free</p> <p>Occupied Bandwidth</p> <p>Ref 30 dBm Atten 35 dB</p> <p>#Peak Log 10 dB/Offset 6.5 dB</p> <p>Center 1.852 GHz Span 10 MHz</p> <p>#Res BW 100 kHz #VBW 300 kHz Sweep 10 ms (1001 pts)</p> <p><b>Occupied Bandwidth 4.1646 MHz</b></p> <p>Occ BW % Pwr 99.00 % x dB -26.00 dB</p> <p>Transmit Freq Error 14.246 kHz</p> <p>x dB Bandwidth 4.708 MHz</p> <p>Freq/Channel</p> <p>Center Freq 1.85240000 GHz</p> <p>Start Freq 1.84740000 GHz</p> <p>Stop Freq 1.85740000 GHz</p> <p>CF Step 1.00000000 MHz Auto Man</p> <p>Freq Offset 0.00000000 Hz</p> <p>Signal Track On Off</p> <p>Scale Type Log Lin</p>
<p>WCDMA Band II-Middle</p>	<p>Agilent R T</p> <p>Ch Freq 1.88 GHz Trig Free</p> <p>Occupied Bandwidth</p> <p>Ref 30 dBm Atten 35 dB</p> <p>#Peak Log 10 dB/Offset 6.5 dB</p> <p>Center 1.88 GHz Span 10 MHz</p> <p>#Res BW 100 kHz #VBW 300 kHz Sweep 10 ms (1001 pts)</p> <p><b>Occupied Bandwidth 4.1590 MHz</b></p> <p>Occ BW % Pwr 99.00 % x dB -26.00 dB</p> <p>Transmit Freq Error 3.410 kHz</p> <p>x dB Bandwidth 4.696 MHz</p> <p>Freq/Channel</p> <p>Center Freq 1.88000000 GHz</p> <p>Start Freq 1.87500000 GHz</p> <p>Stop Freq 1.88500000 GHz</p> <p>CF Step 1.00000000 MHz Auto Man</p> <p>Freq Offset 0.00000000 Hz</p> <p>Signal Track On Off</p> <p>Scale Type Log Lin</p>
<p>WCDMA Band II-High</p>	<p>Agilent R T</p> <p>Ch Freq 1.9076 GHz Trig Free</p> <p>Occupied Bandwidth</p> <p>Ref 30 dBm Atten 35 dB</p> <p>#Peak Log 10 dB/Offset 6.5 dB</p> <p>Center 1.908 GHz Span 10 MHz</p> <p>#Res BW 100 kHz #VBW 300 kHz Sweep 10 ms (1001 pts)</p> <p><b>Occupied Bandwidth 4.1584 MHz</b></p> <p>Occ BW % Pwr 99.00 % x dB -26.00 dB</p> <p>Transmit Freq Error -306.672 Hz</p> <p>x dB Bandwidth 4.700 MHz</p> <p>Freq/Channel</p> <p>Center Freq 1.90760000 GHz</p> <p>Start Freq 1.90260000 GHz</p> <p>Stop Freq 1.91260000 GHz</p> <p>CF Step 1.00000000 MHz Auto Man</p> <p>Freq Offset 0.00000000 Hz</p> <p>Signal Track On Off</p> <p>Scale Type Log Lin</p>

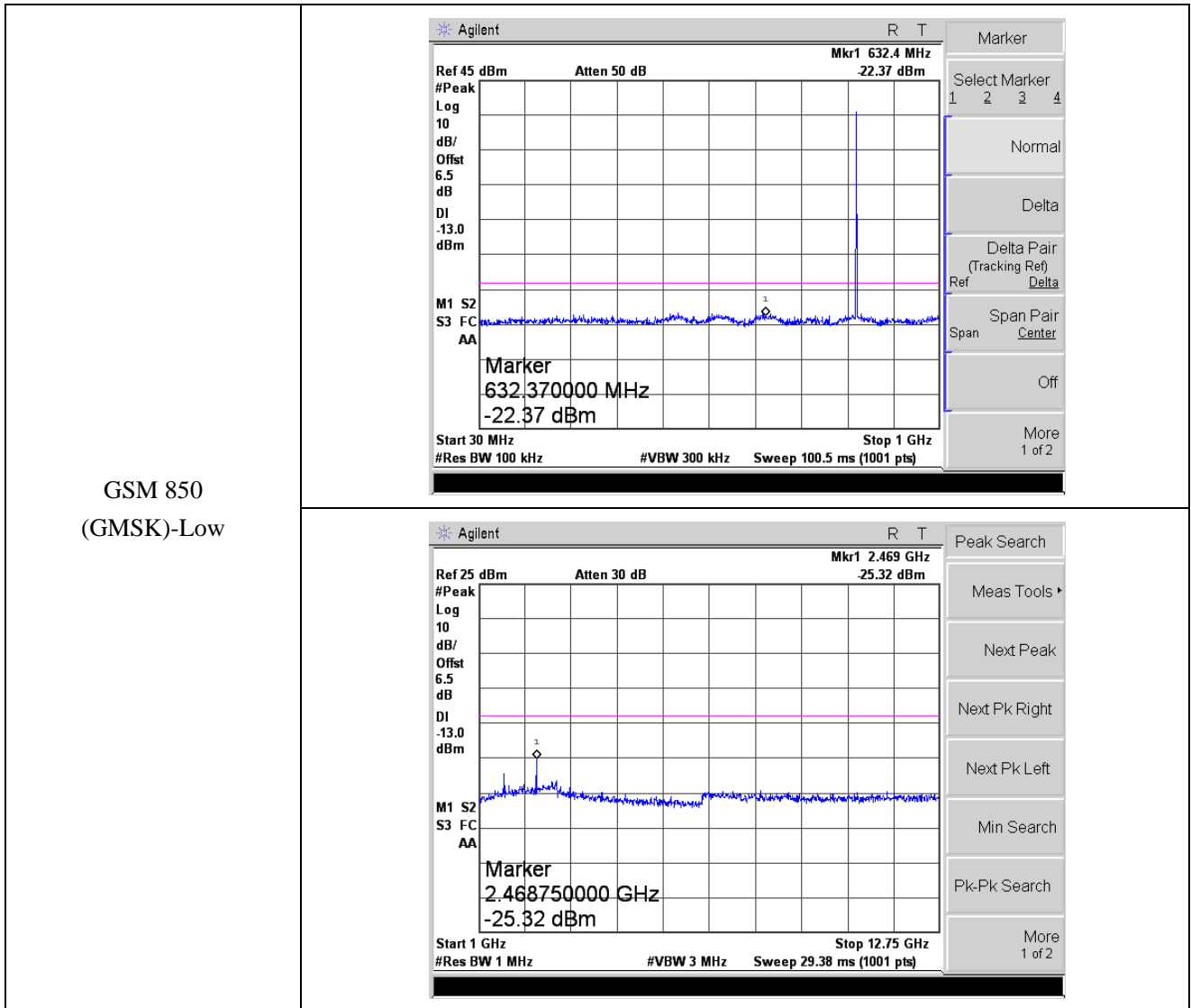
<p>HSDPA-Low</p>	 <p>Agilent R T</p> <p>Ch Freq 1.8524 GHz Trig Free</p> <p>Occupied Bandwidth</p> <p>Ref 30 dBm Atten 35 dB</p> <p>#Peak Log 10 dB/Offset 6.5 dB</p> <p>Center 1.852 GHz Span 10 MHz #Res BW 100 kHz #VBW 300 kHz Sweep 10 ms (1001 pts)</p> <p><b>Occupied Bandwidth</b> Occ BW % Pwr 99.00 % 4.1667 MHz x dB -26.00 dB</p> <p>Transmit Freq Error 21.973 kHz x dB Bandwidth 4.681 MHz</p> <p>Freq/Channel</p> <p>Center Freq 1.85240000 GHz</p> <p>Start Freq 1.84740000 GHz</p> <p>Stop Freq 1.85740000 GHz</p> <p>CF Step 1.00000000 MHz Auto Man</p> <p>Freq Offset 0.00000000 Hz</p> <p>Signal Track On Off</p> <p>Scale Type Log Lin</p>
<p>HSDPA-Middle</p>	 <p>Agilent R T</p> <p>Ch Freq 1.88 GHz Trig Free</p> <p>Occupied Bandwidth</p> <p>Ref 30 dBm Atten 35 dB</p> <p>#Peak Log 10 dB/Offset 6.5 dB</p> <p>Center 1.88 GHz Span 10 MHz #Res BW 100 kHz #VBW 300 kHz Sweep 10 ms (1001 pts)</p> <p><b>Occupied Bandwidth</b> Occ BW % Pwr 99.00 % 4.1637 MHz x dB -26.00 dB</p> <p>Transmit Freq Error 6.303 kHz x dB Bandwidth 4.705 MHz</p> <p>Trace/View</p> <p>Trace 1 2 3</p> <p>Clear Write</p> <p>Max Hold</p> <p>Min Hold</p> <p>View</p> <p>Blank</p> <p>More 1 of 2</p>
<p>HSDPA-High</p>	 <p>Agilent R T</p> <p>Ch Freq 1.9076 GHz Trig Free</p> <p>Occupied Bandwidth</p> <p>Ref 30 dBm Atten 35 dB</p> <p>#Peak Log 10 dB/Offset 6.5 dB</p> <p>Center 1.908 GHz Span 10 MHz #Res BW 100 kHz #VBW 300 kHz Sweep 10 ms (1001 pts)</p> <p><b>Occupied Bandwidth</b> Occ BW % Pwr 99.00 % 4.1596 MHz x dB -26.00 dB</p> <p>Transmit Freq Error -199.146 Hz x dB Bandwidth 4.700 MHz</p> <p>Freq/Channel</p> <p>Center Freq 1.90760000 GHz</p> <p>Start Freq 1.90260000 GHz</p> <p>Stop Freq 1.91260000 GHz</p> <p>CF Step 1.00000000 MHz Auto Man</p> <p>Freq Offset 0.00000000 Hz</p> <p>Signal Track On Off</p> <p>Scale Type Log Lin</p>

<p>HSUPA-Low</p>	
<p>HSUPA-Middle</p>	
<p>HSUPA-High</p>	

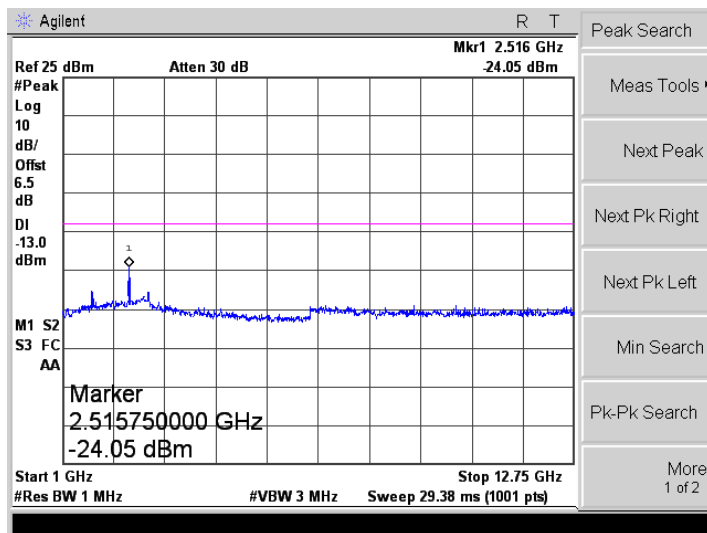
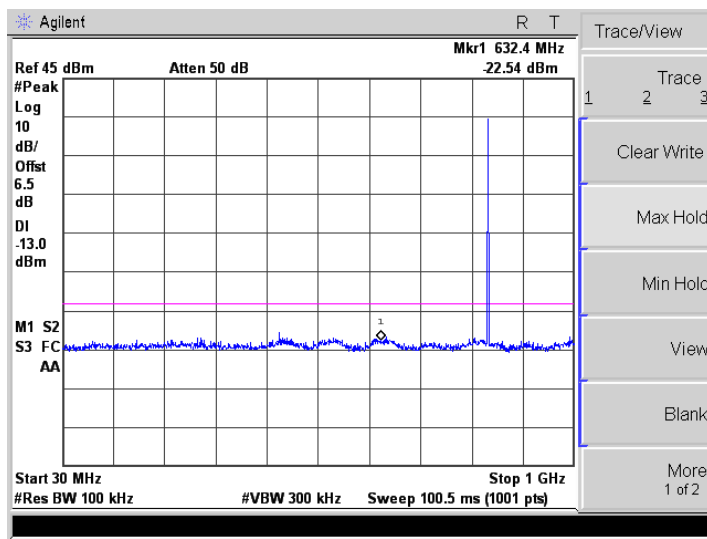


## APPENDIX D

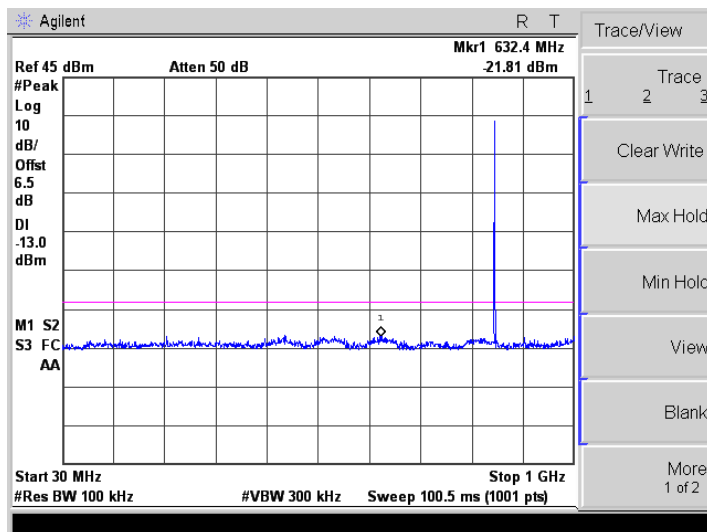
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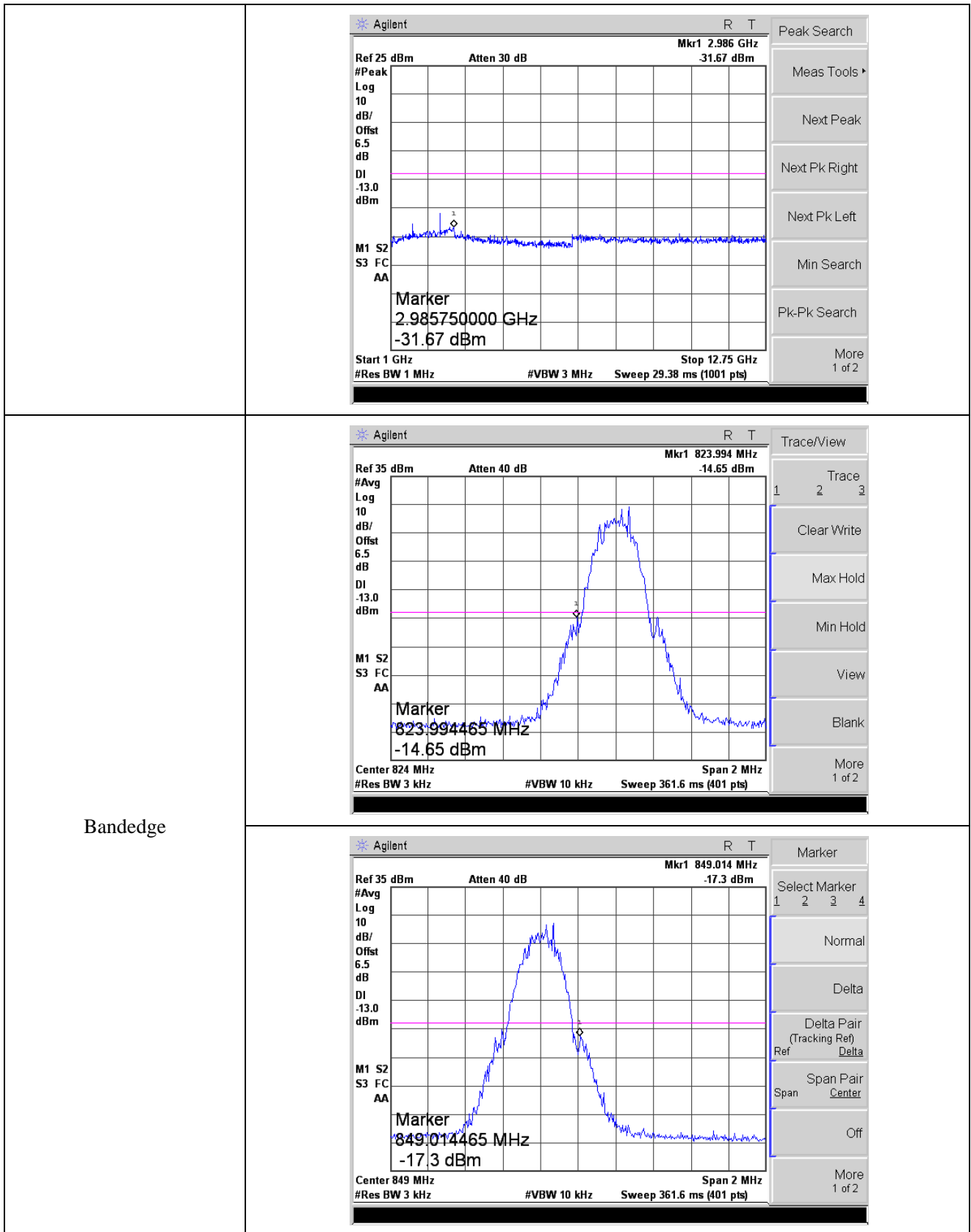


GSM 850  
(GMSK)-Middle

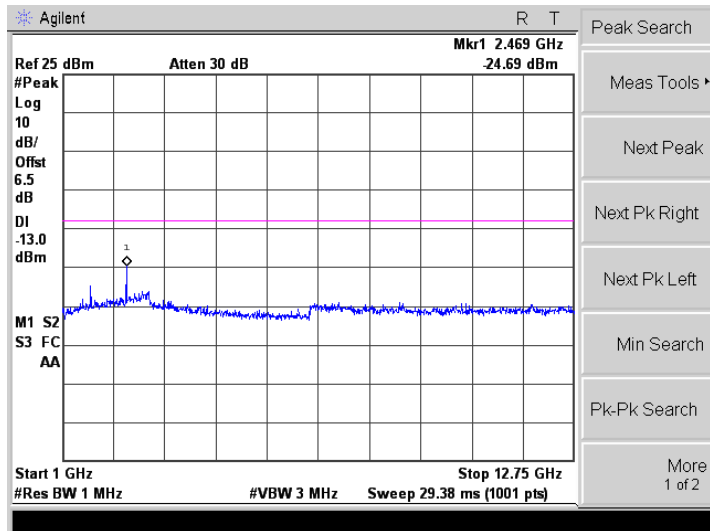
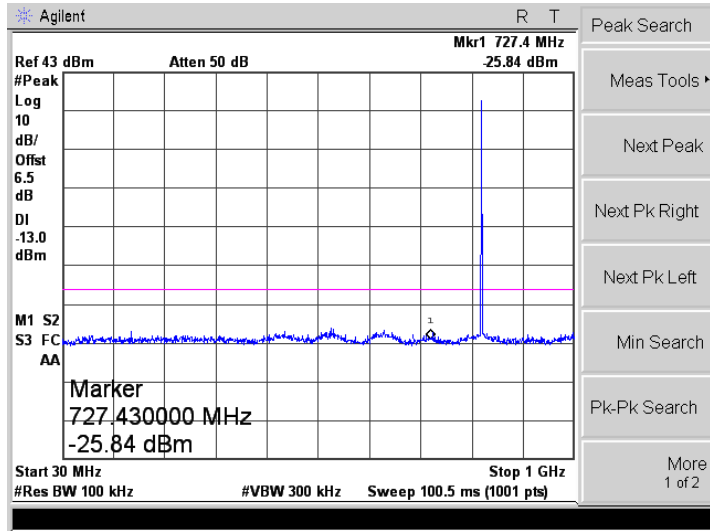


GSM 850  
(GMSK)-High

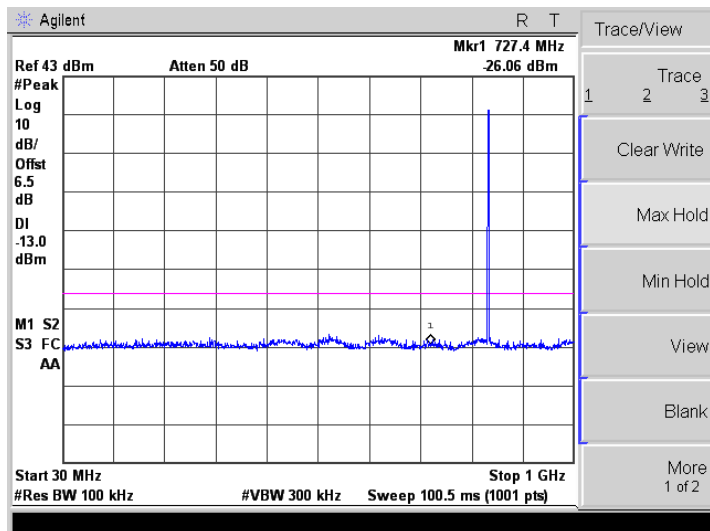


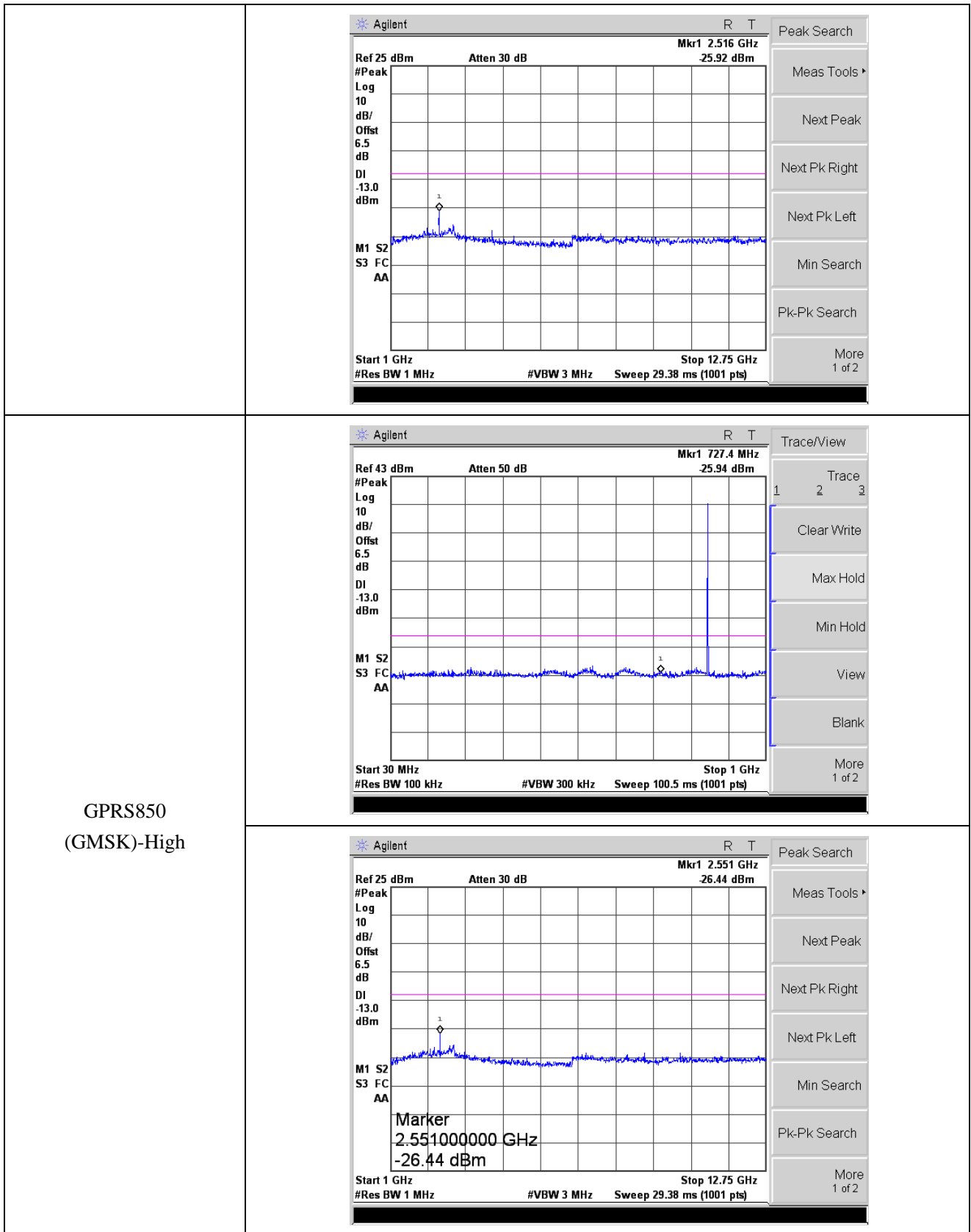


GPRS850  
(GMSK,1Slot)-Low

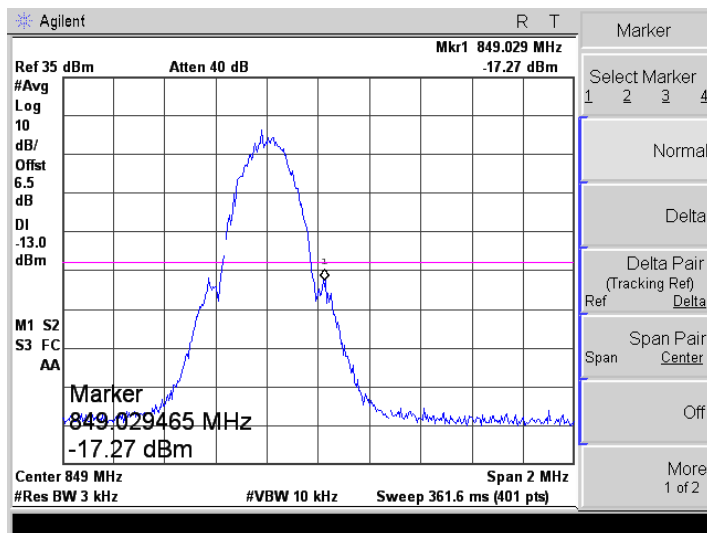
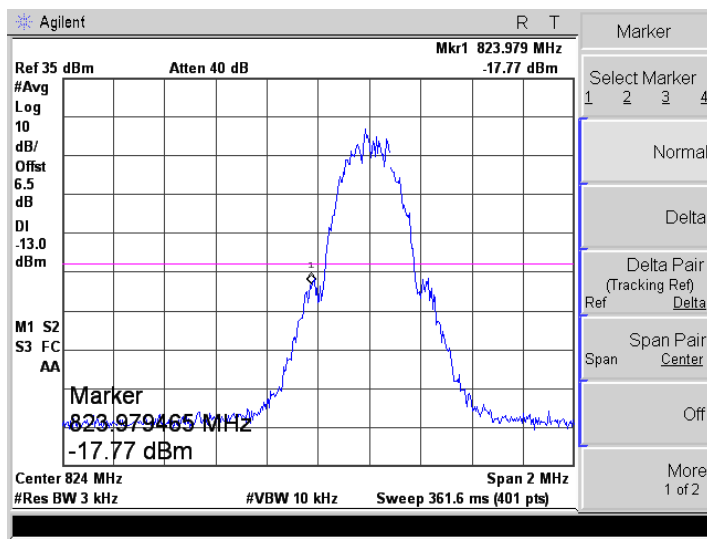


GPRS850  
(GMSK,1Slot)-Middle

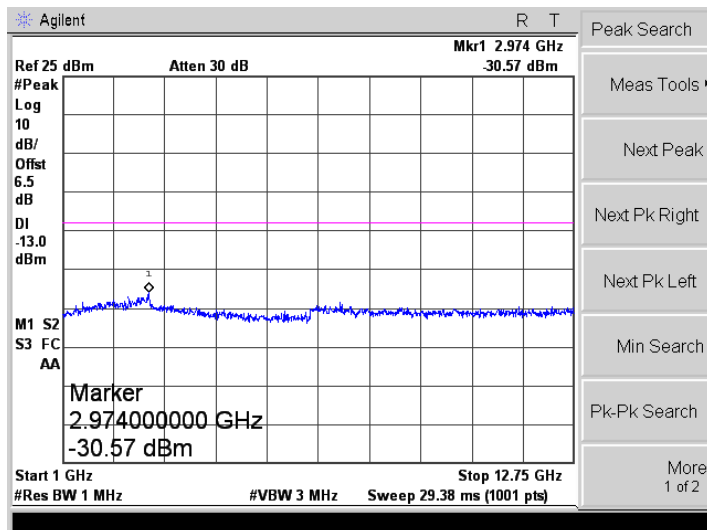
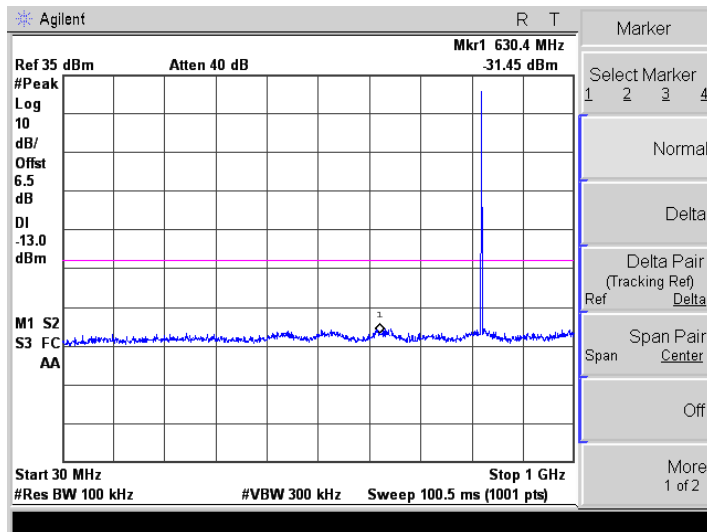




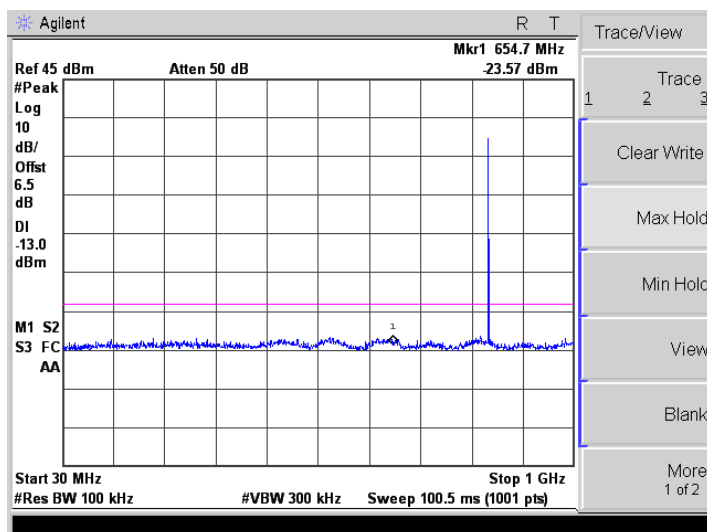
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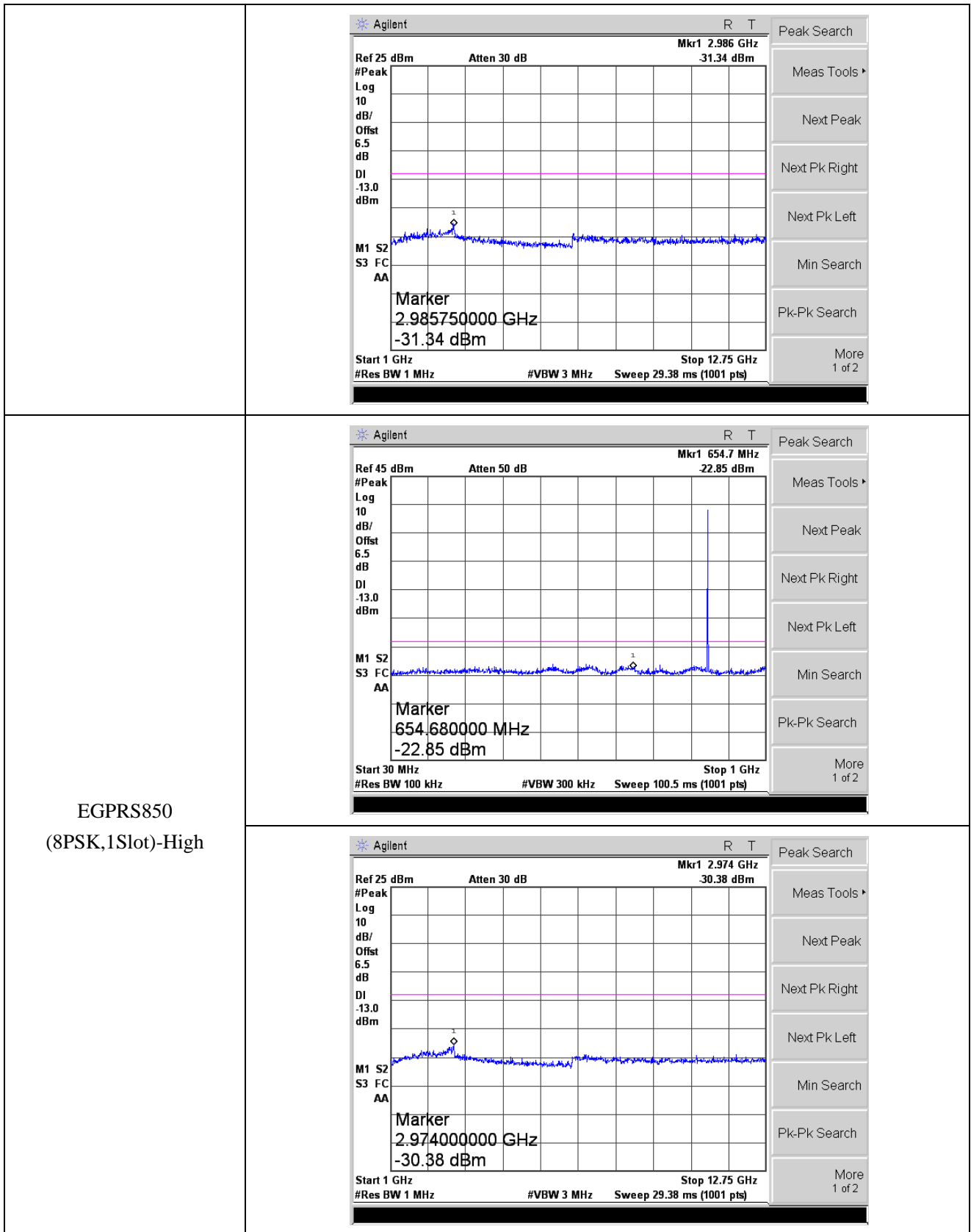


EGPRS850  
(8PSK,1Slot)-Low



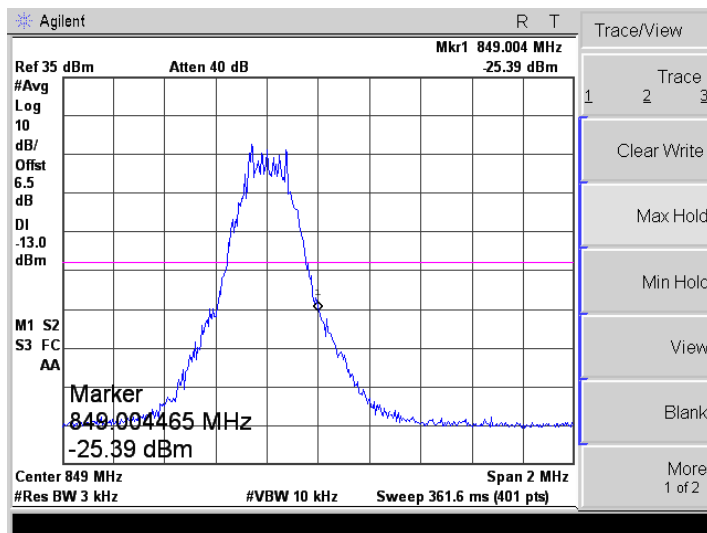
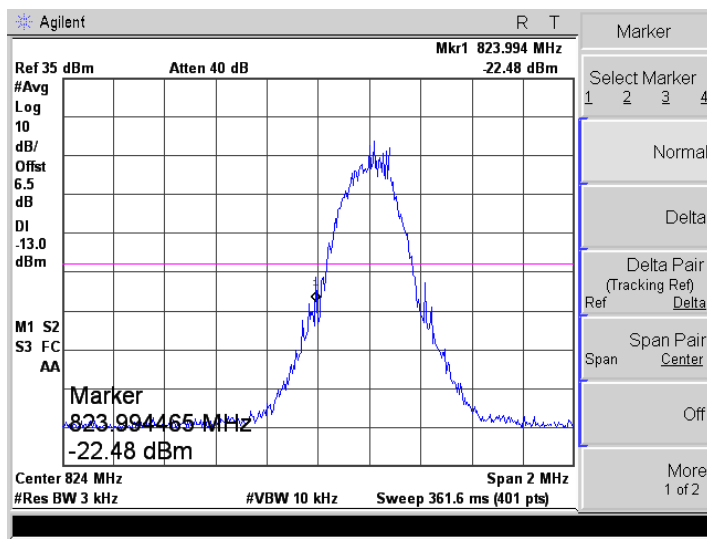
EGPRS850  
(8PSK,1Slot)-Middle



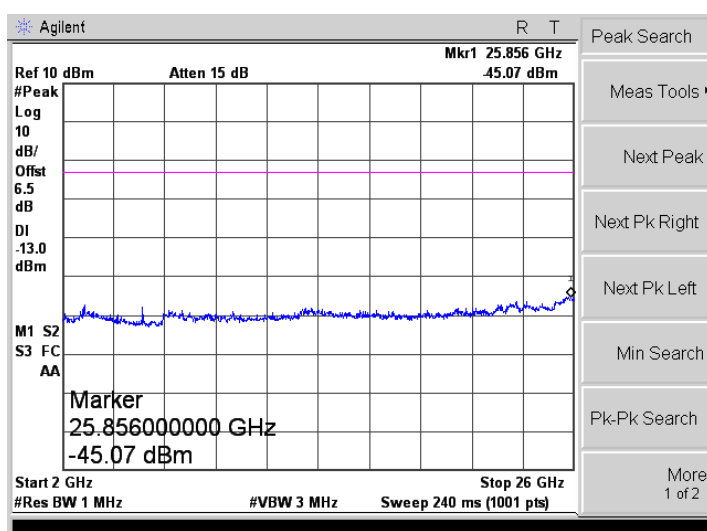
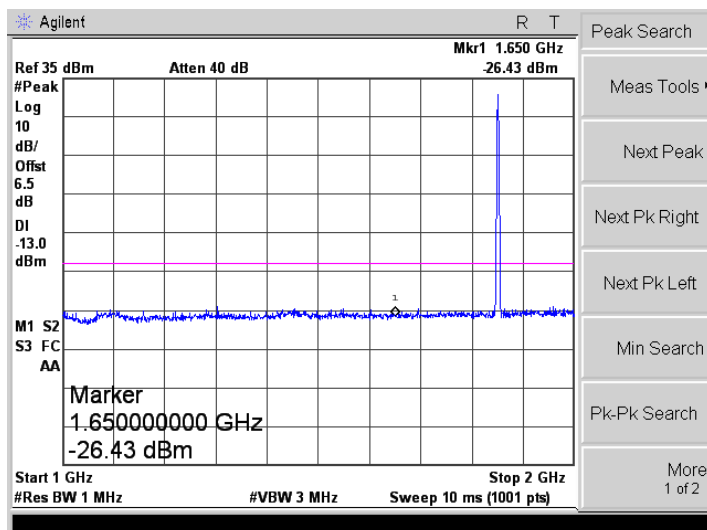
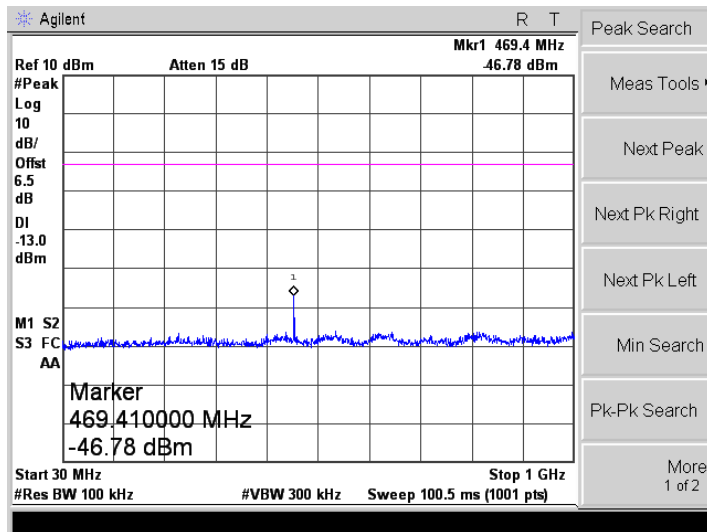




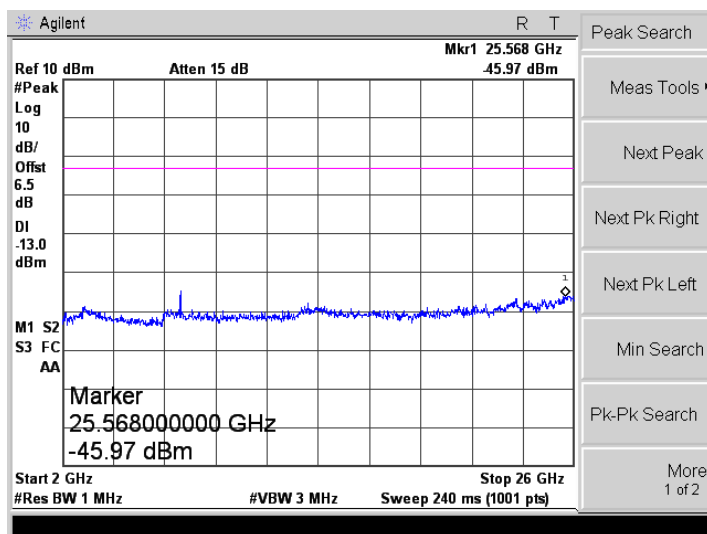
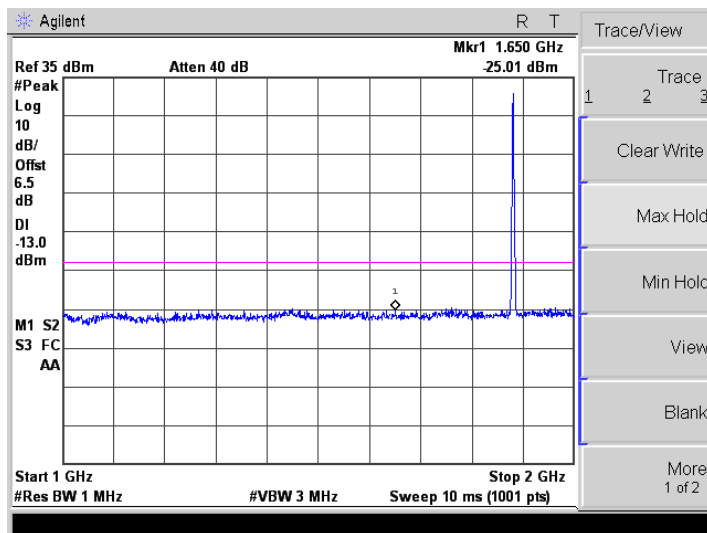
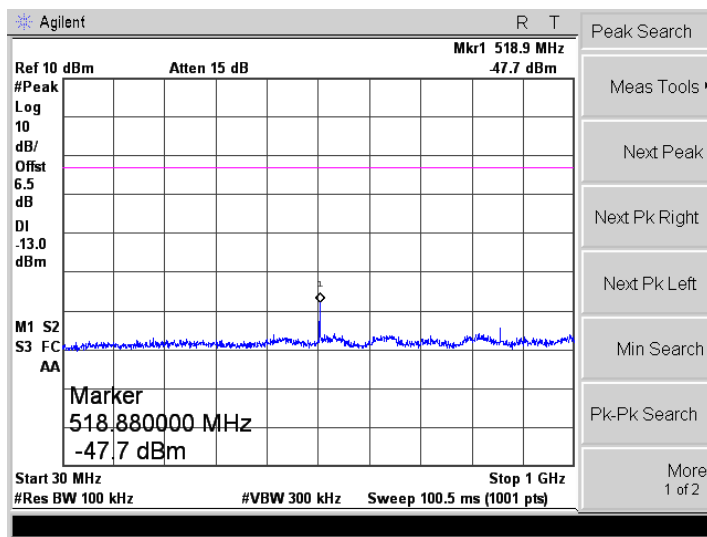
Bandedge



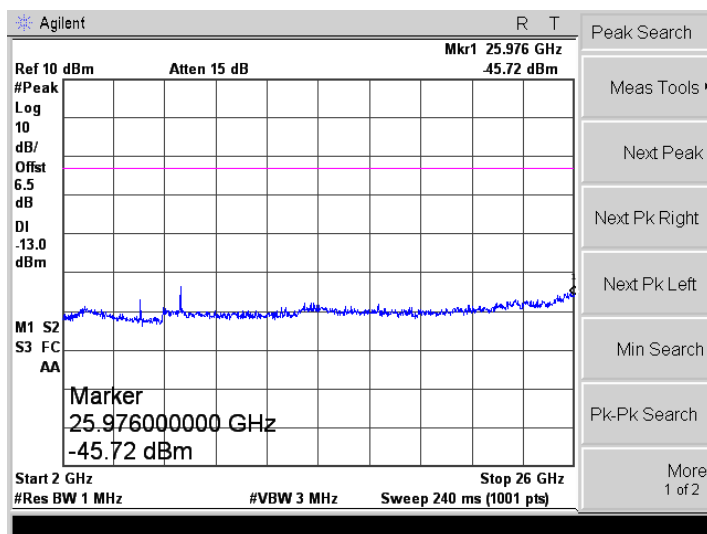
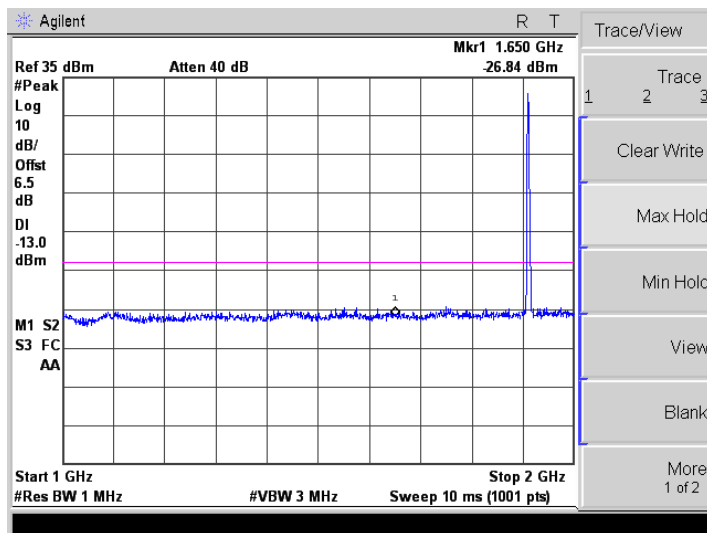
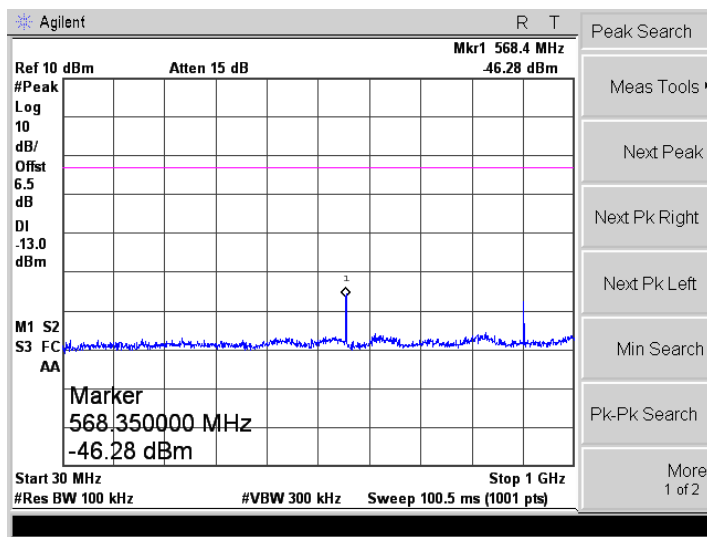
PCS1900  
(GMSK)-Low



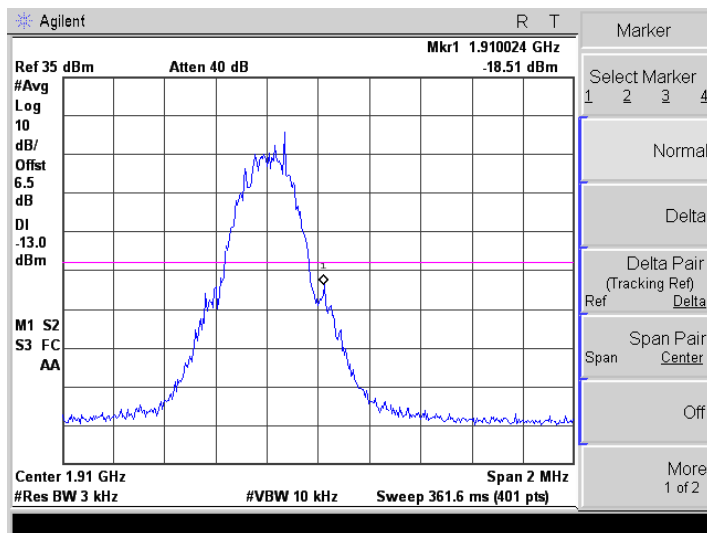
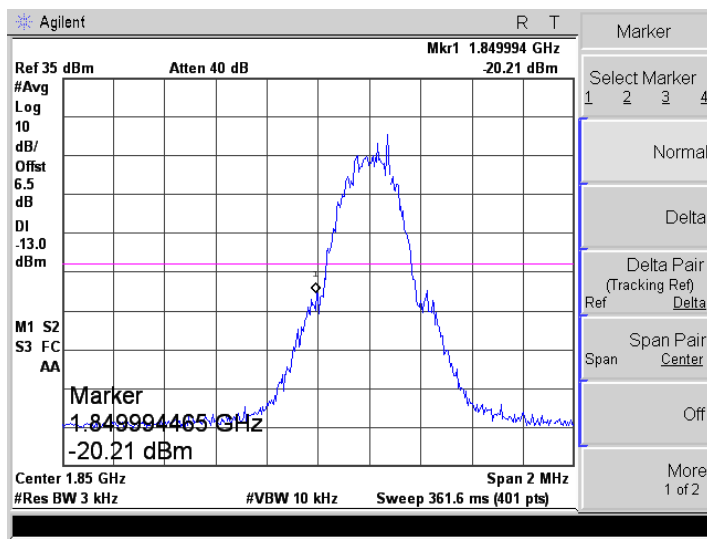
PCS1900  
(GMSK)-Middle



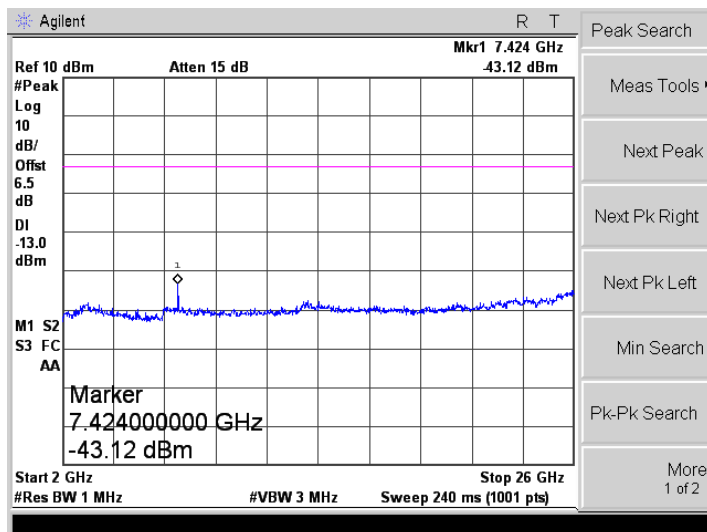
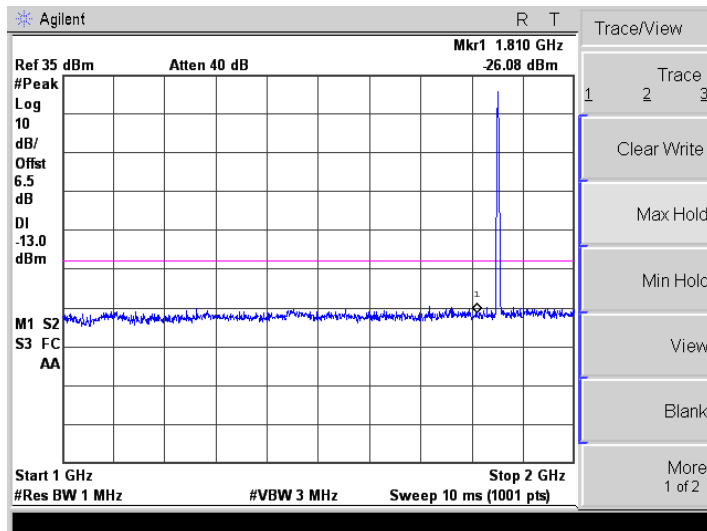
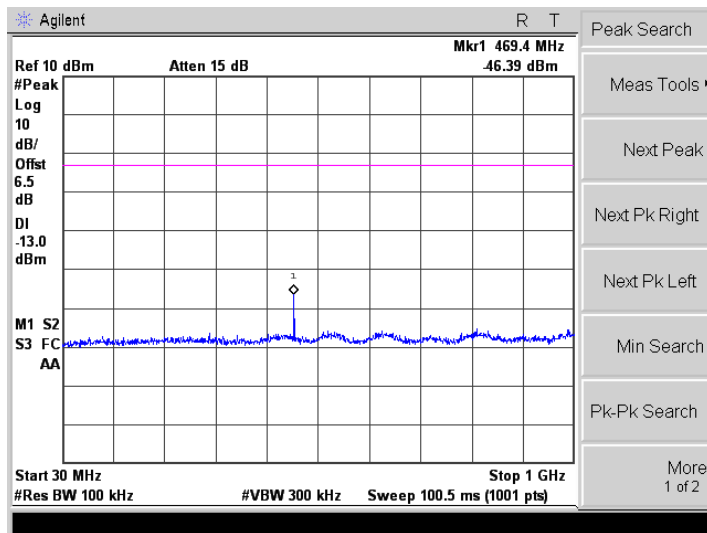
PCS1900  
(GMSK)-High



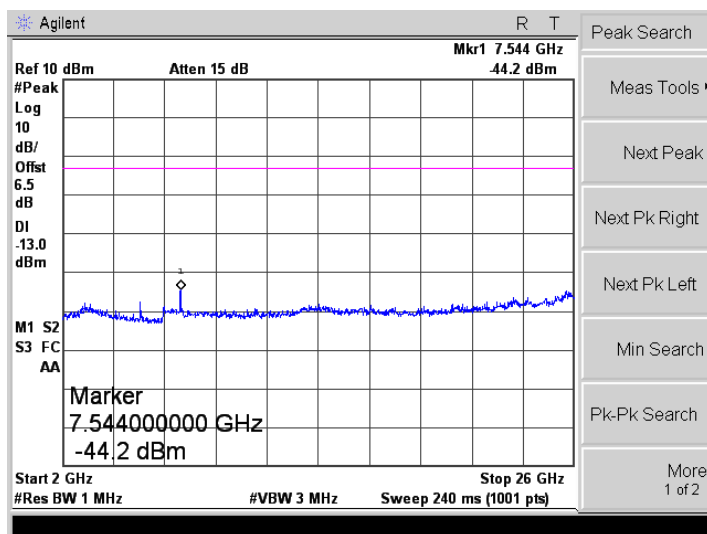
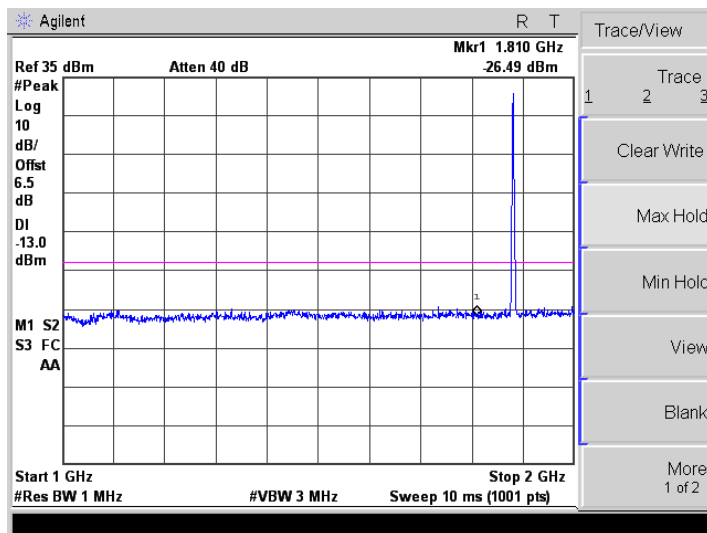
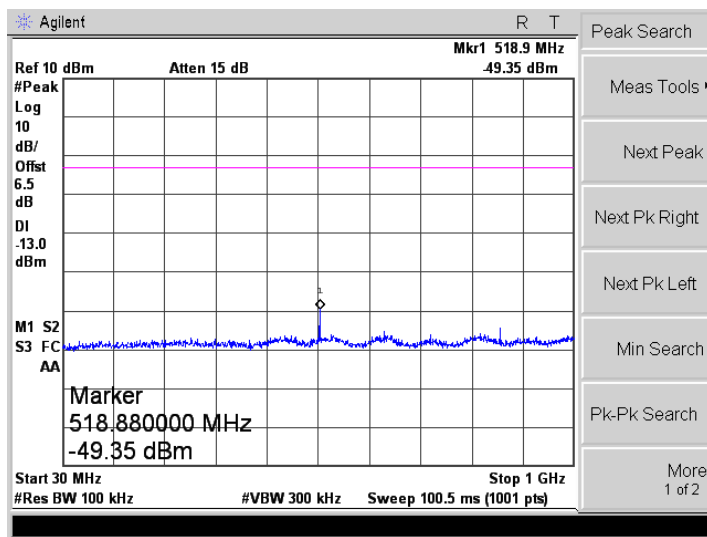
Bandedge



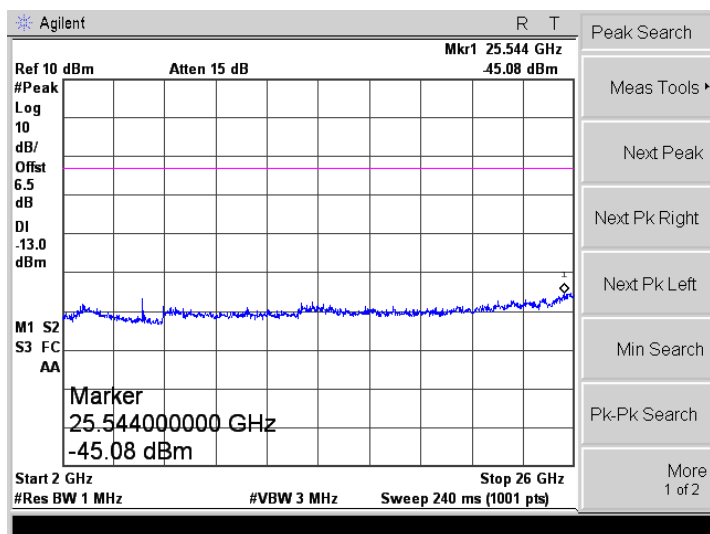
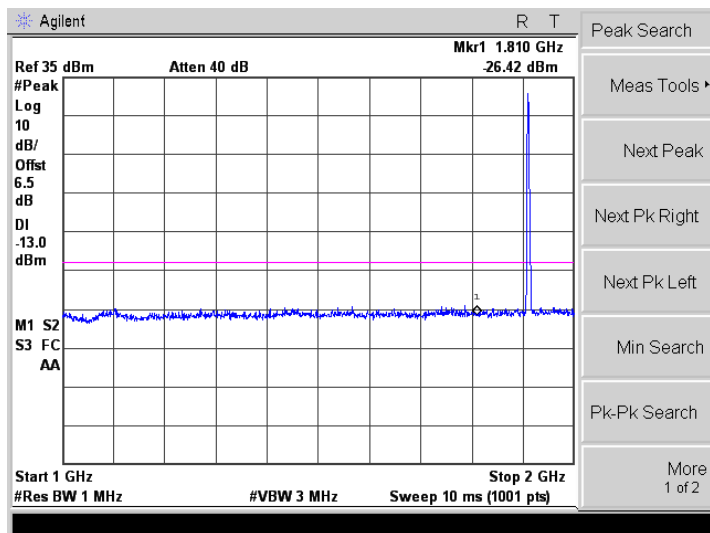
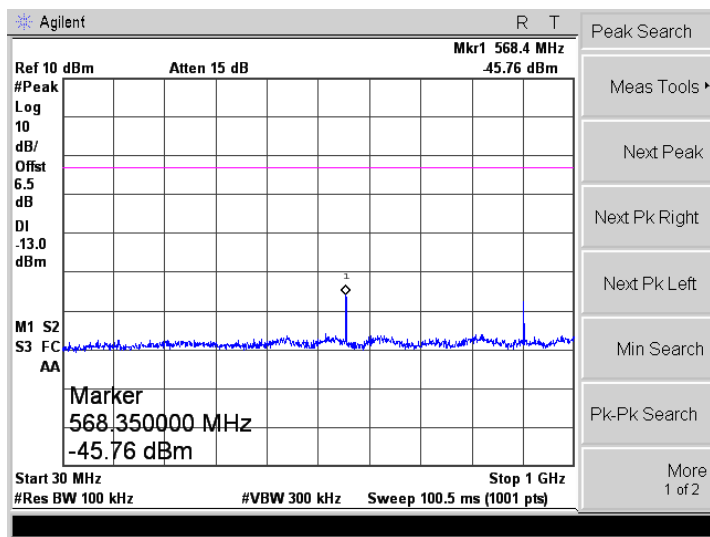
GPRS1900  
(GMSK,1Slot)-Low



GPRS1900  
(GMSK,1Slot)-Middle

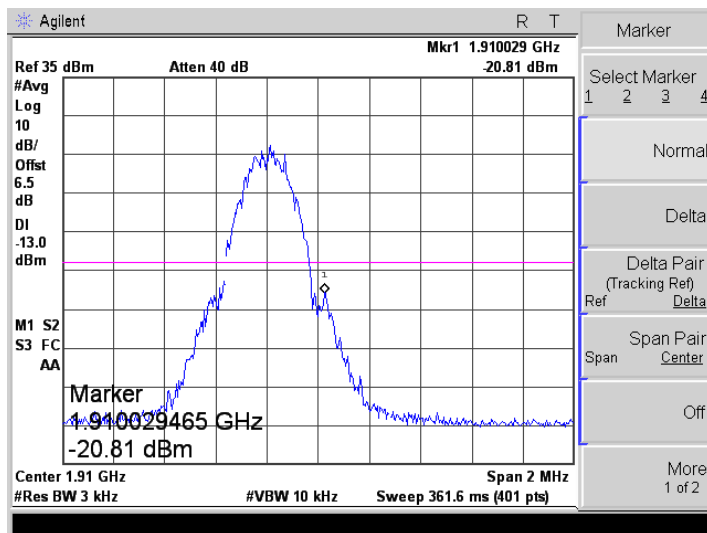
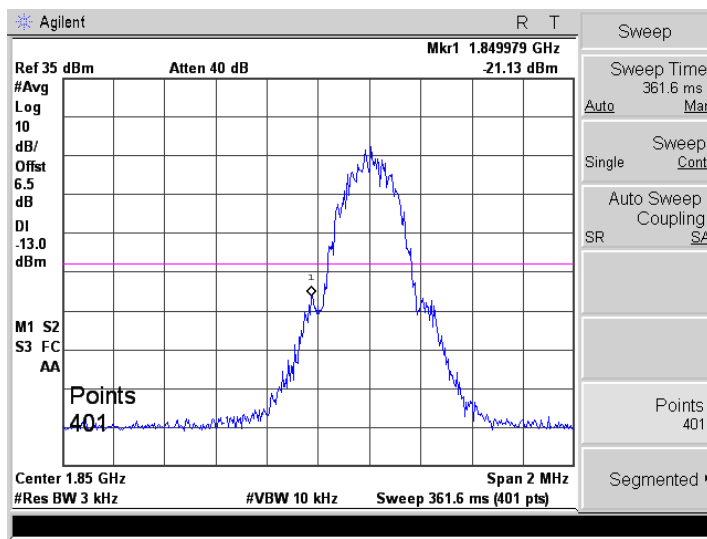


GPRS1900  
(GMSK,1Slot)-High

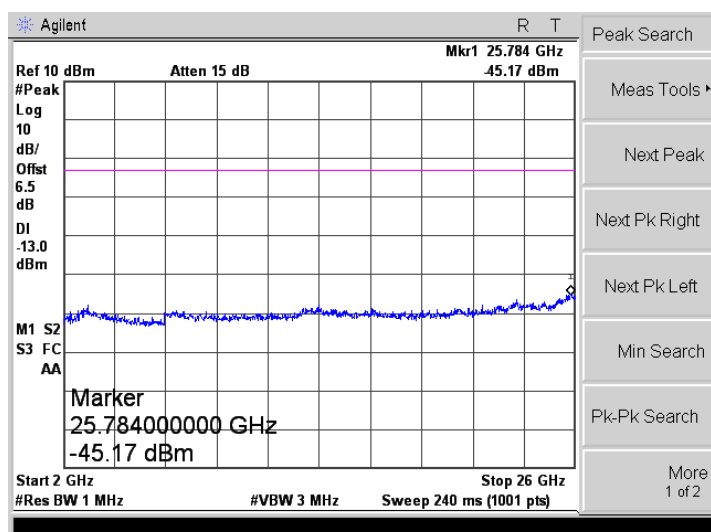
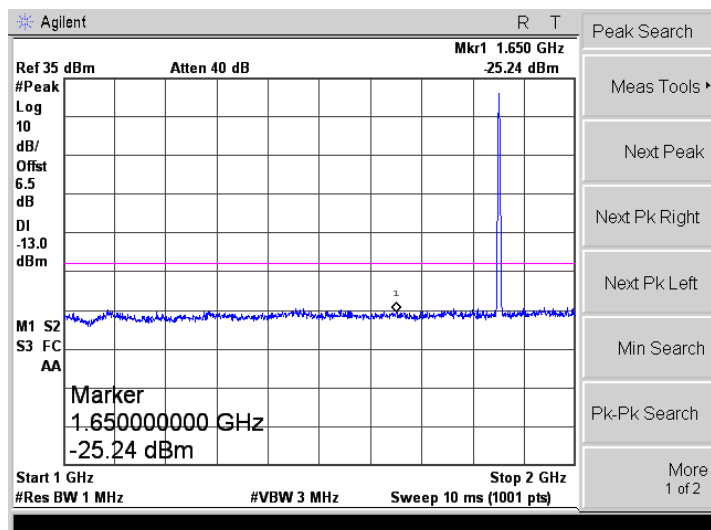
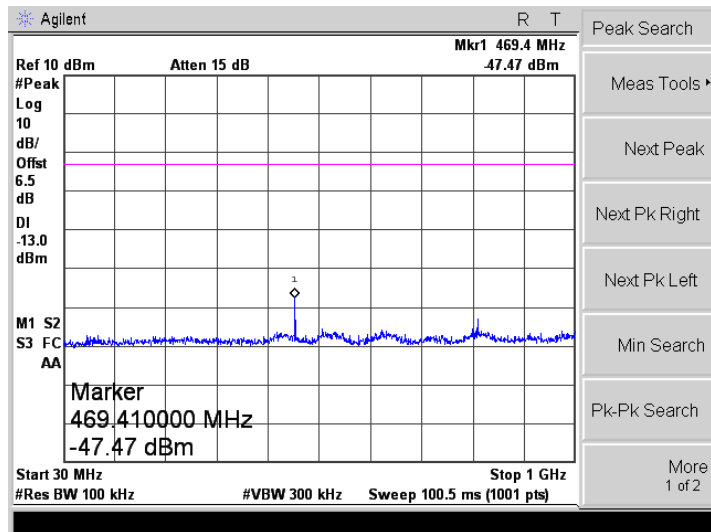




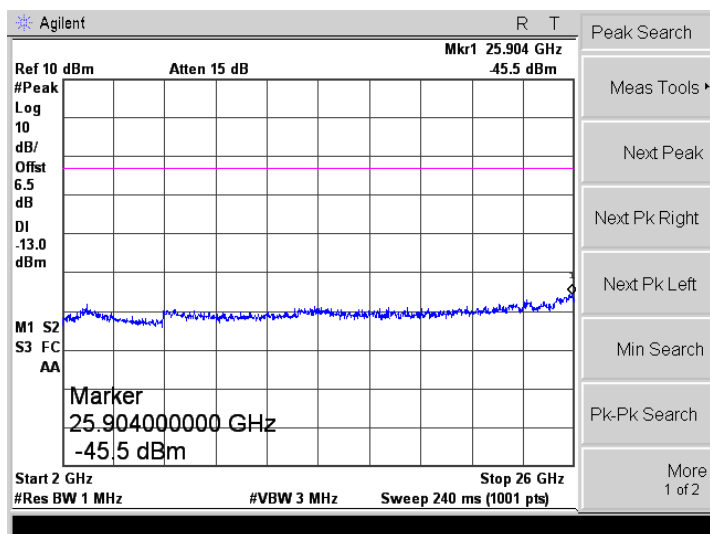
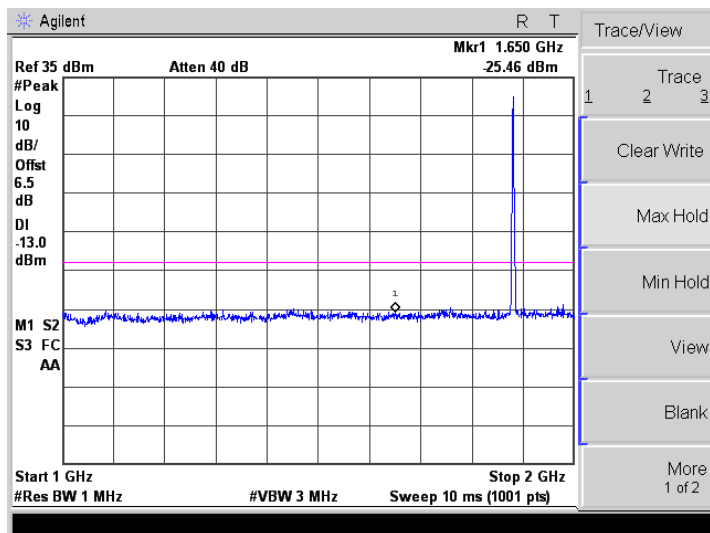
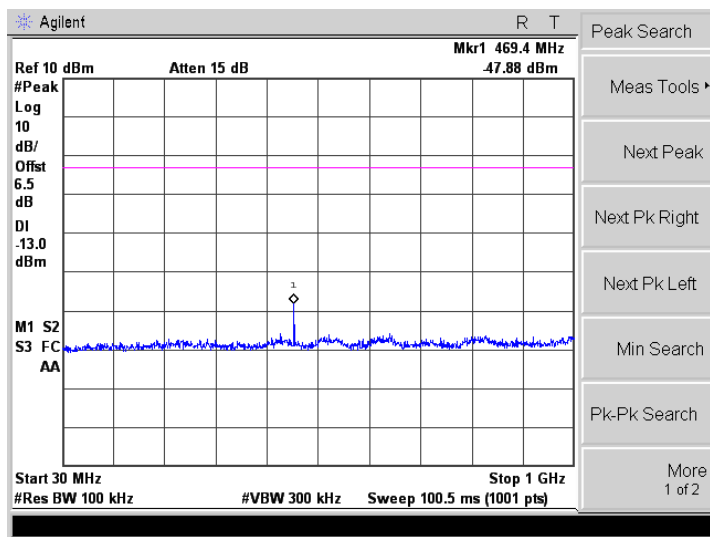
Bandedge



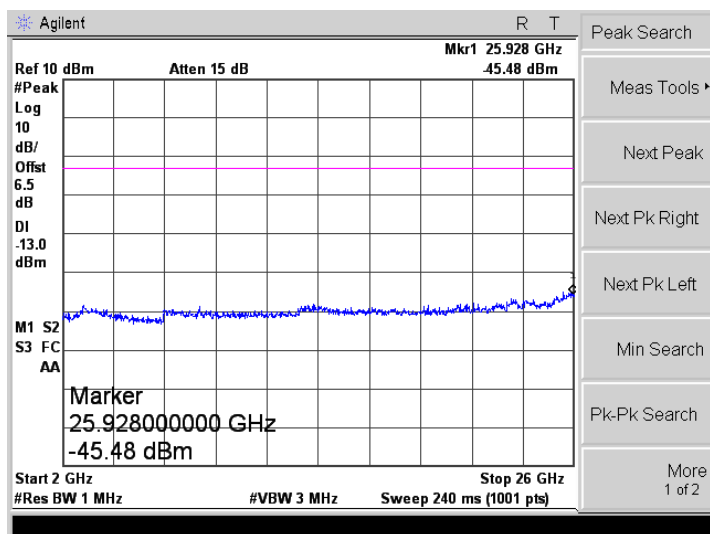
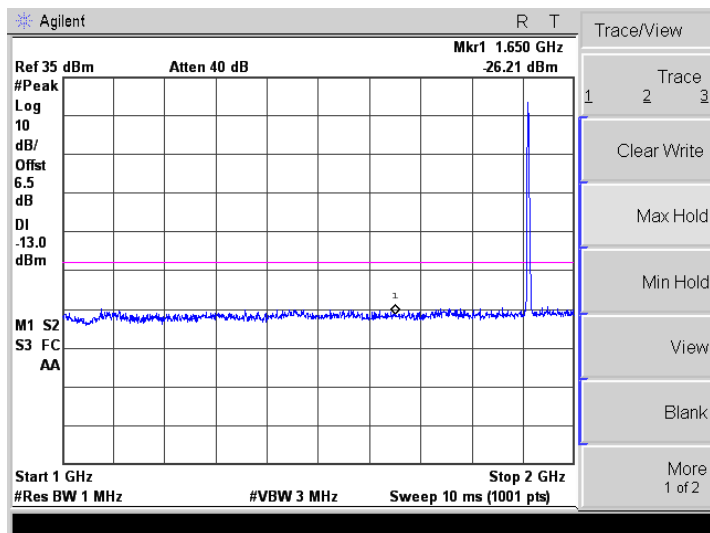
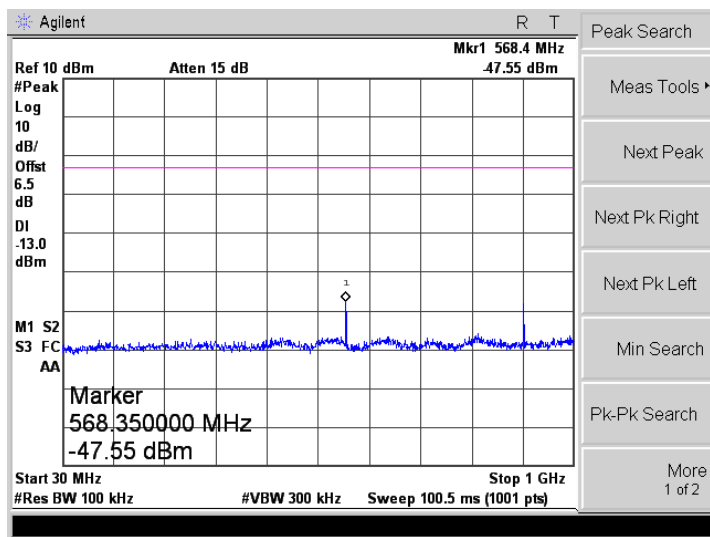
EGPRS1900  
(8PSK,1Slot)-Low



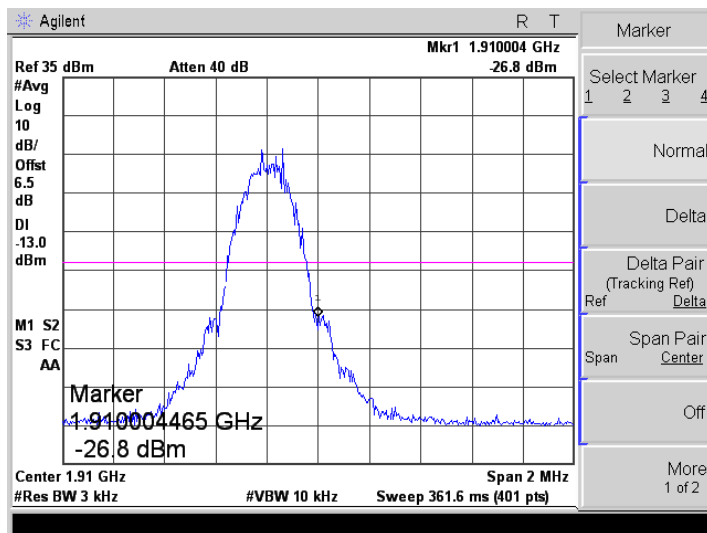
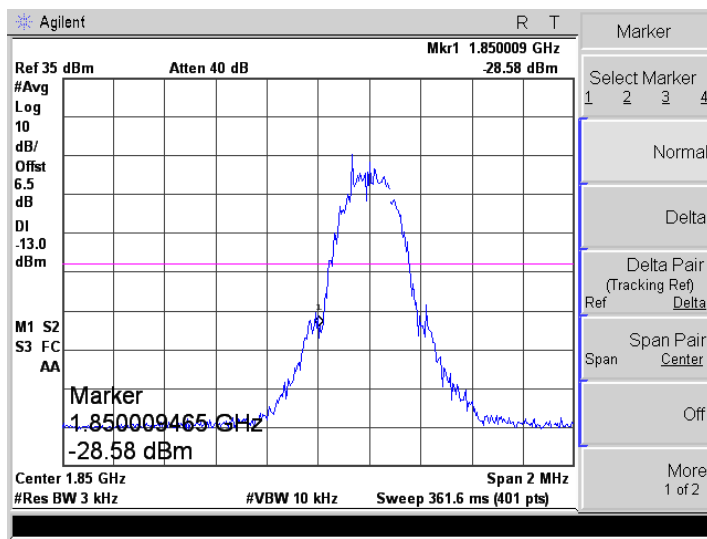
EGPRS1900  
(8PSK,1Slot)-Middle



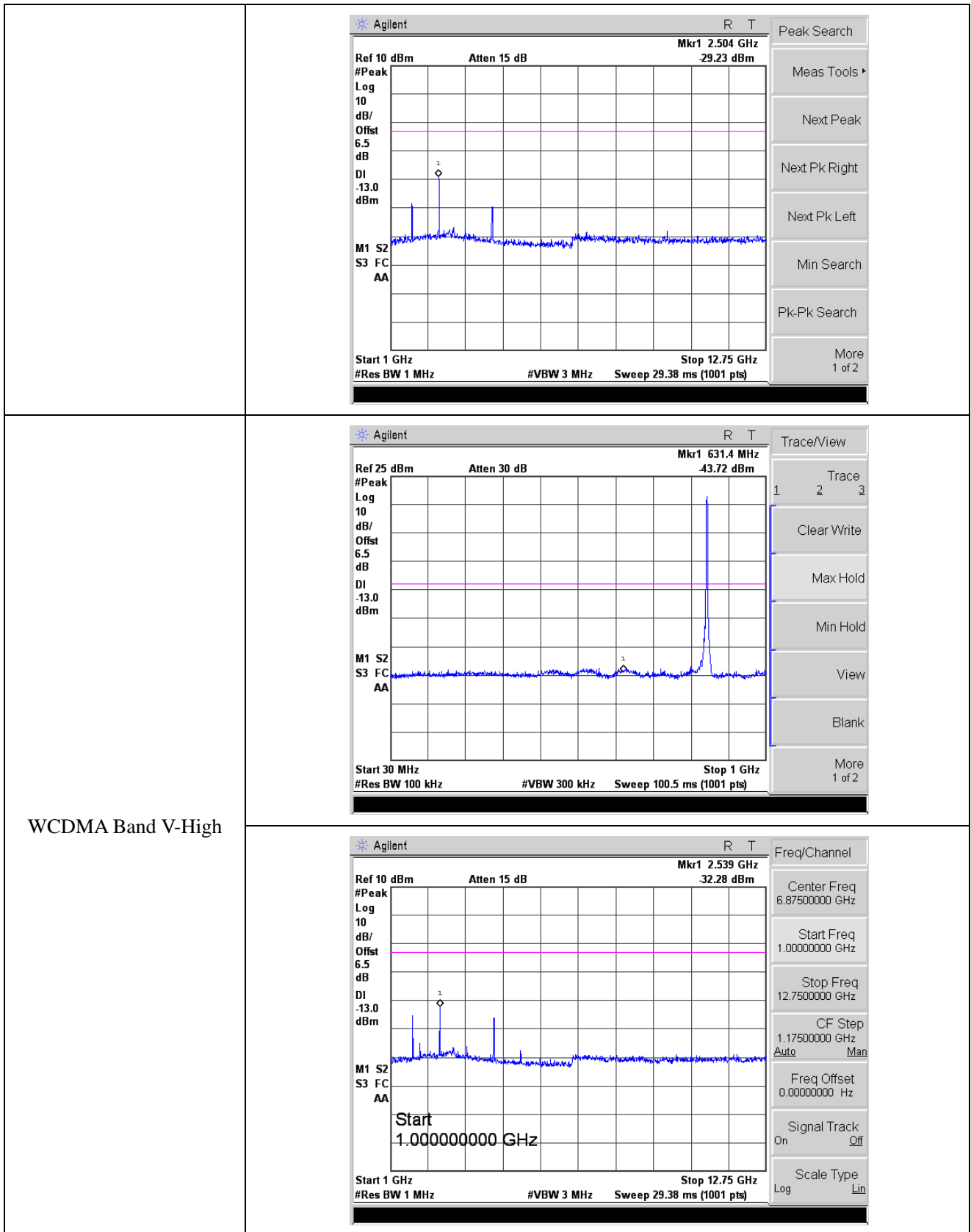
EGPRS1900  
(8PSK,1Slot)-High



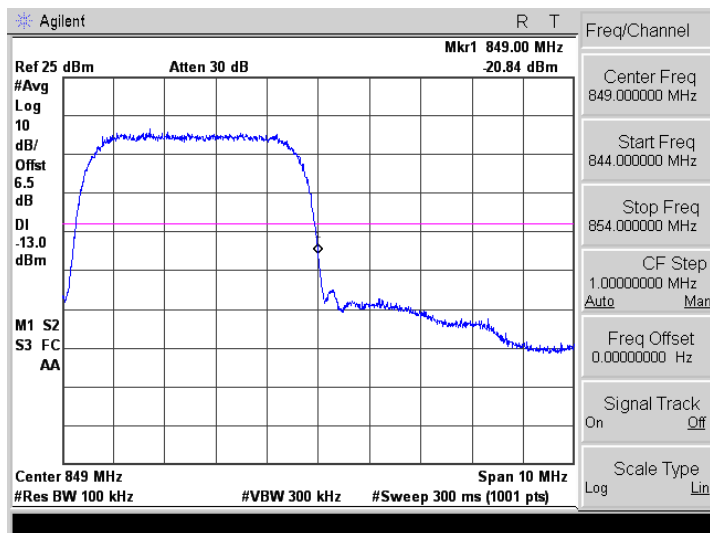
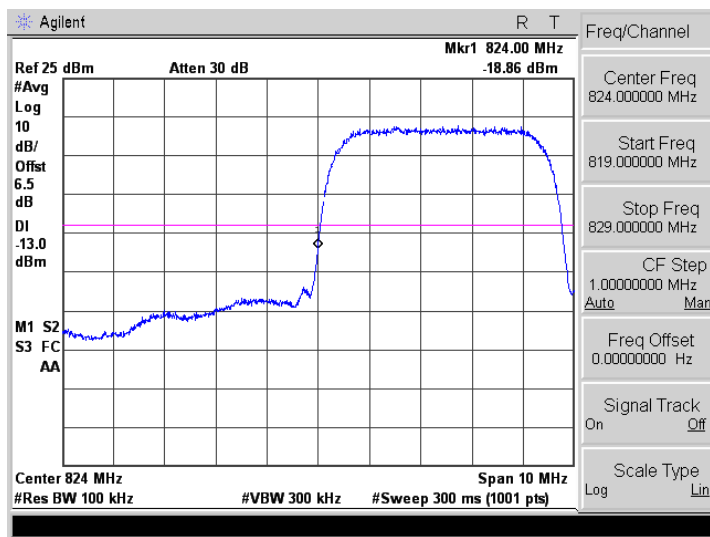
Bandedge



<p>WCDMA Band V-Low</p>	
<p>WCDMA Band V-Middle</p>	
<p>WCDMA Band V-Middle</p>	

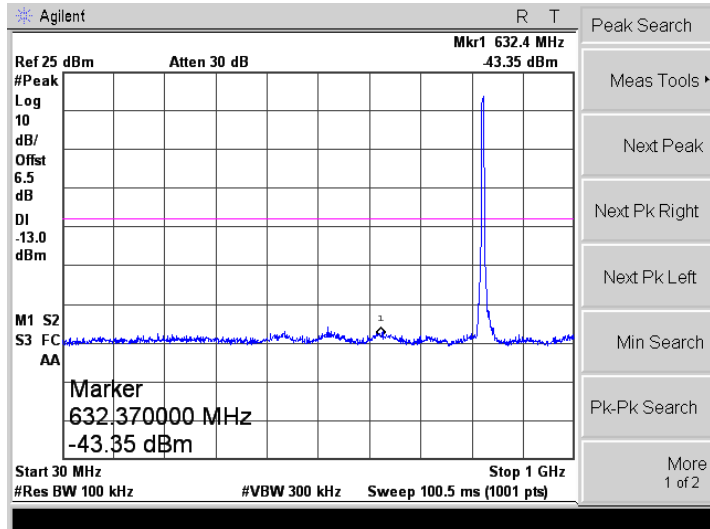


Bandedge

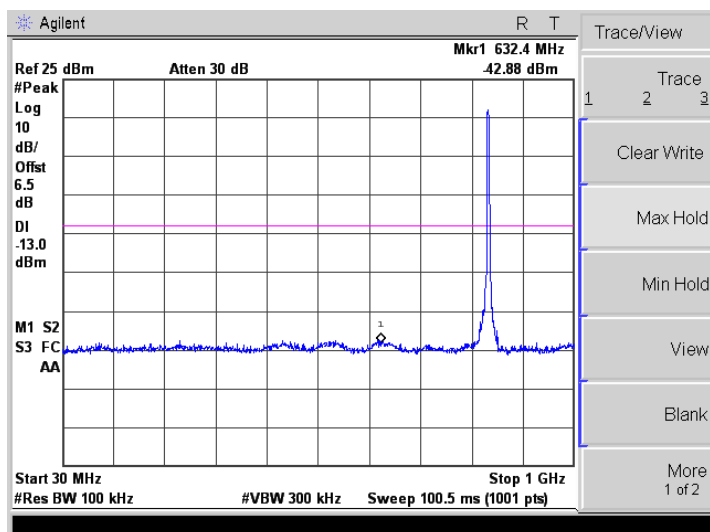
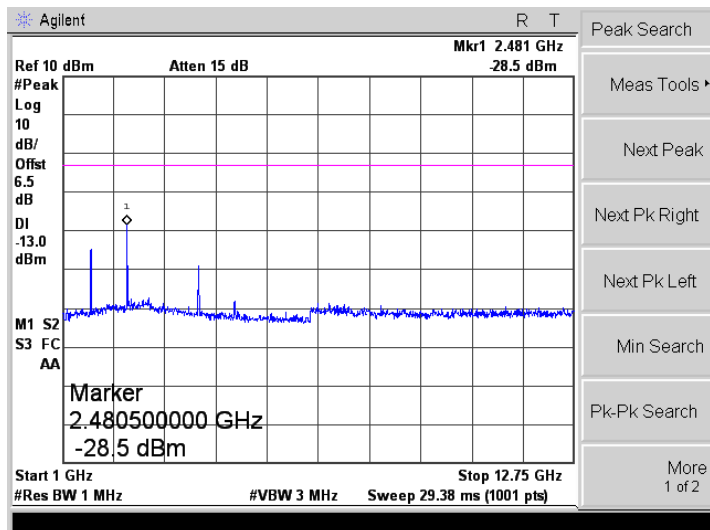


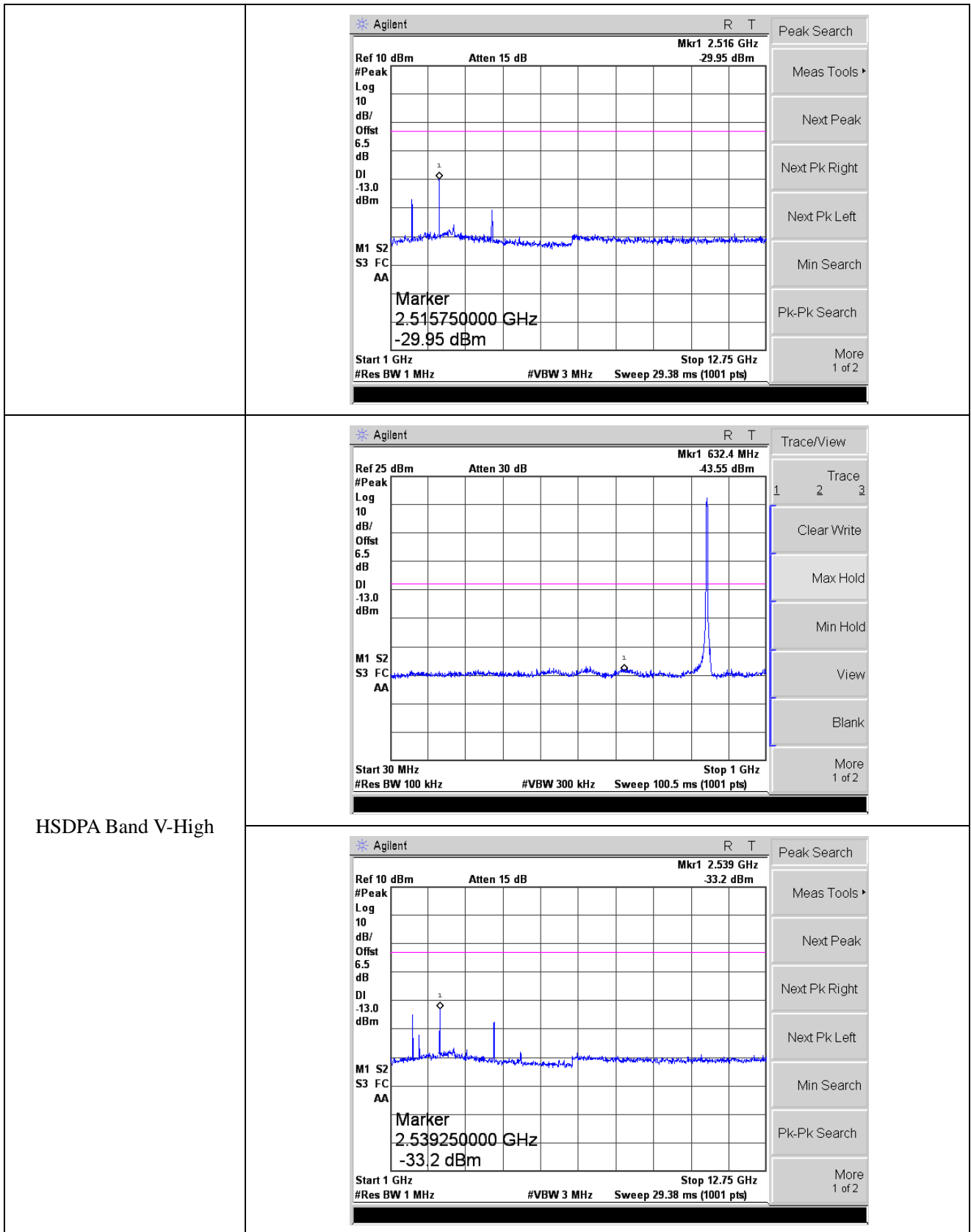


HSDPA Band V-Low

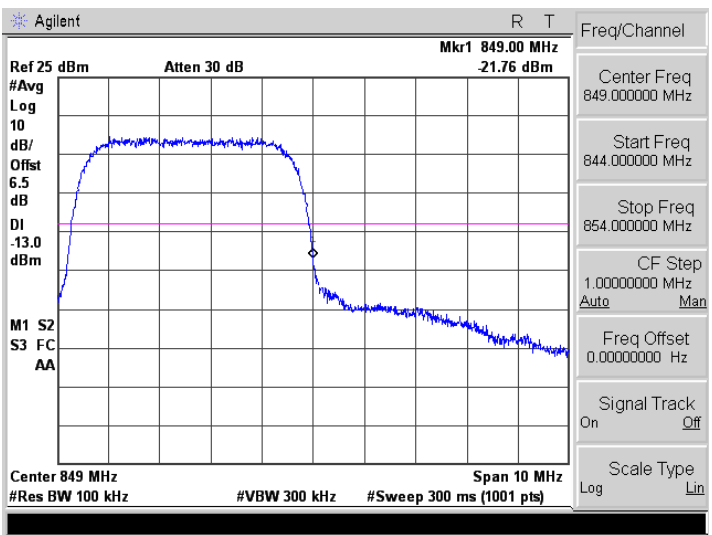
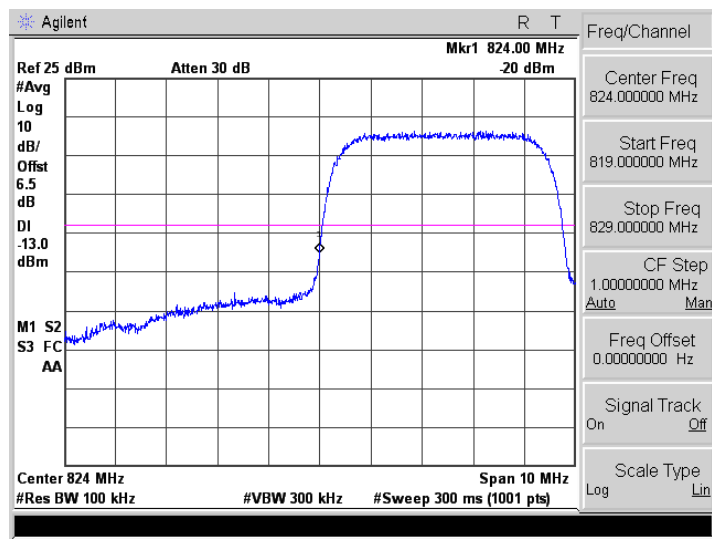


HSDPA Band V-Middle

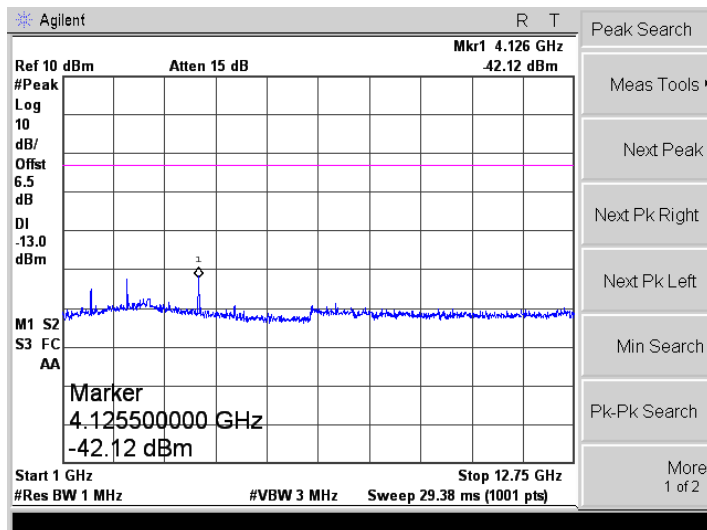
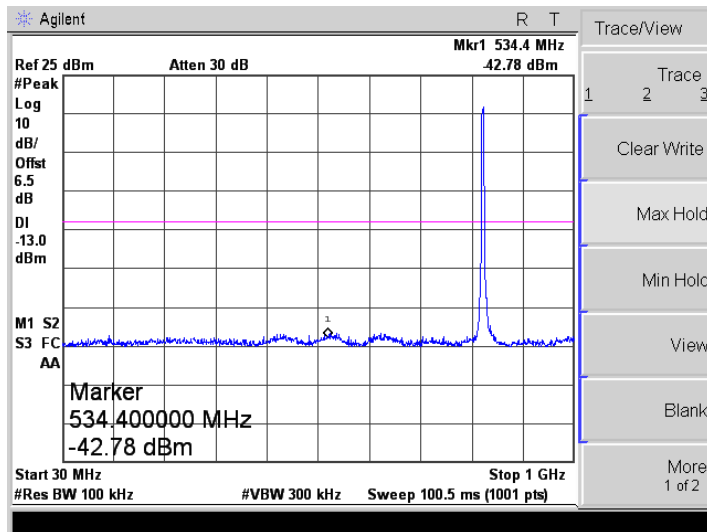




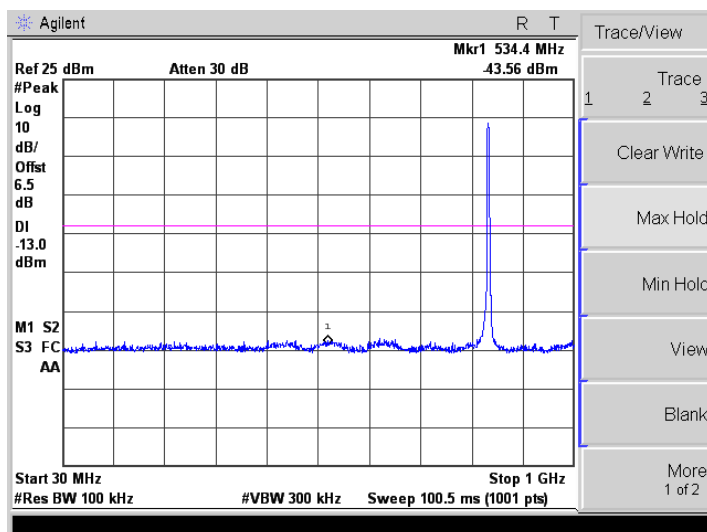
Bandedge

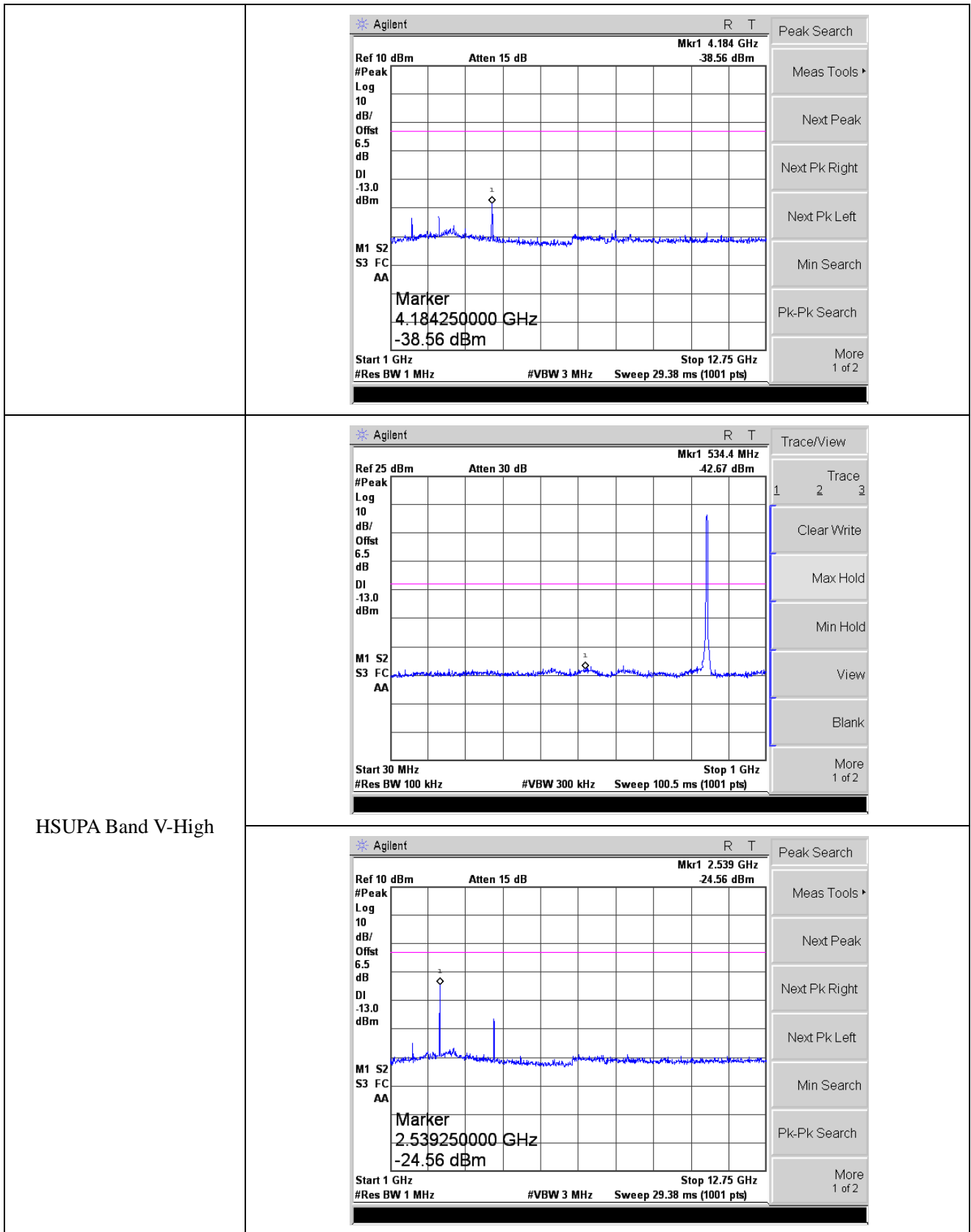


HSUPA Band V-Low

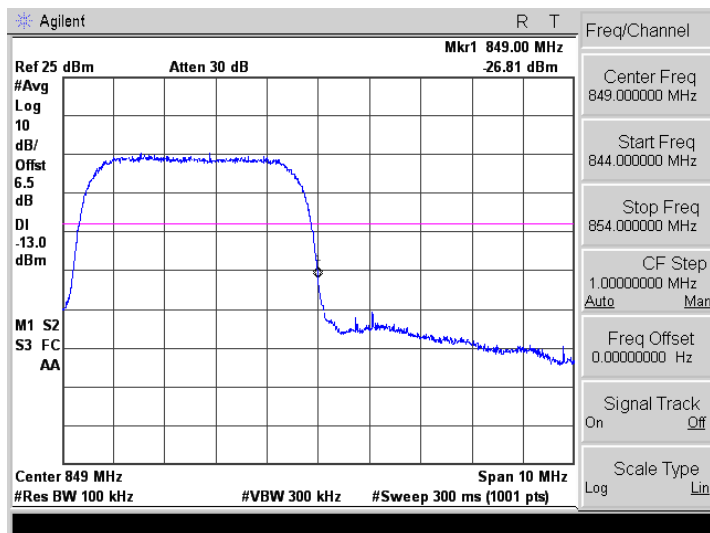
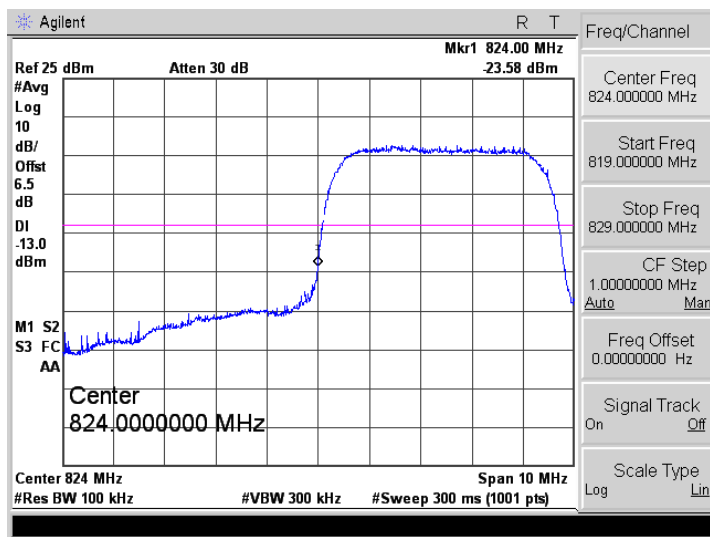


HSUPA Band V-Middle

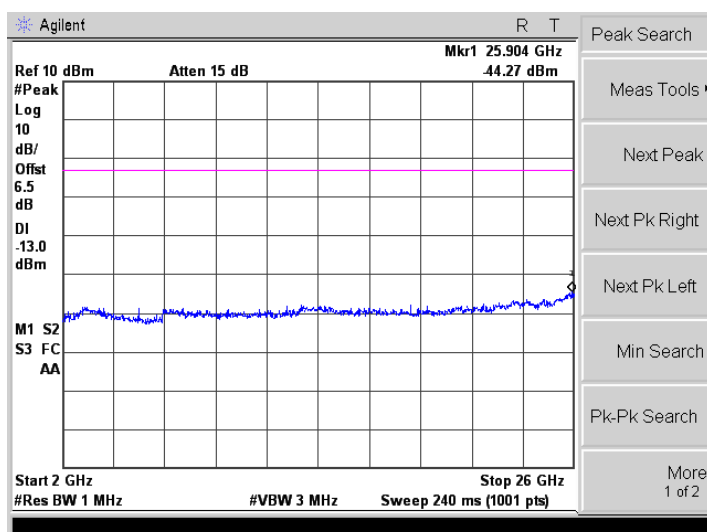
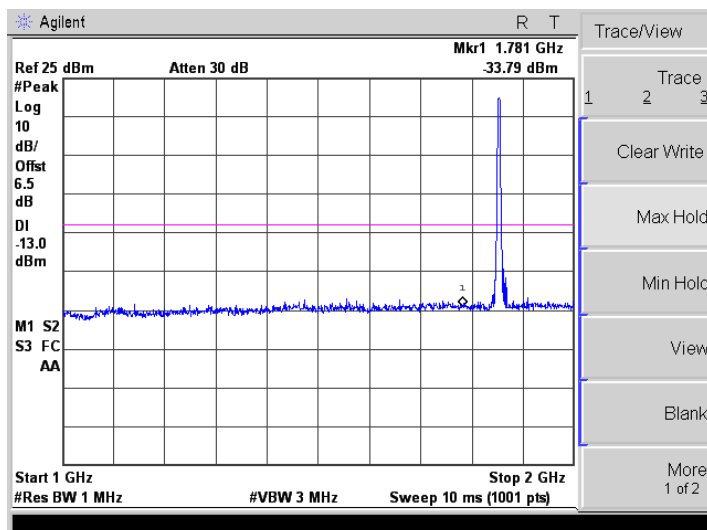
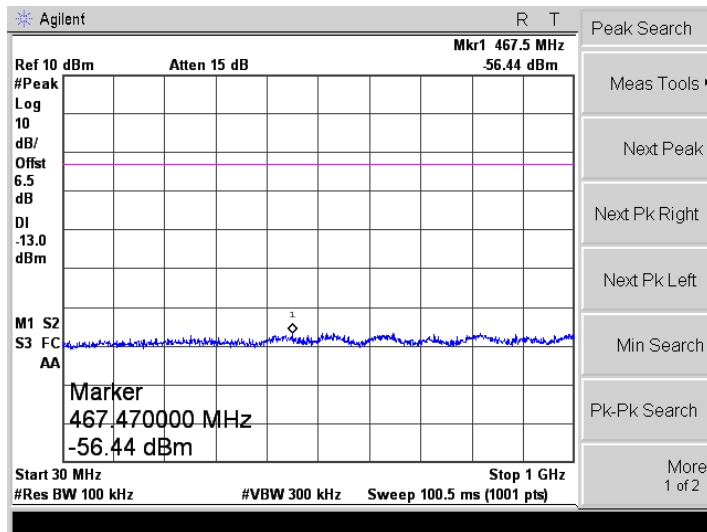




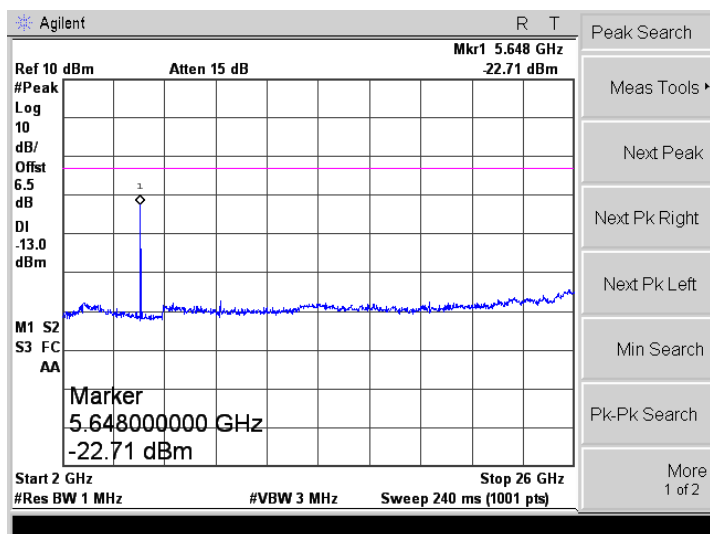
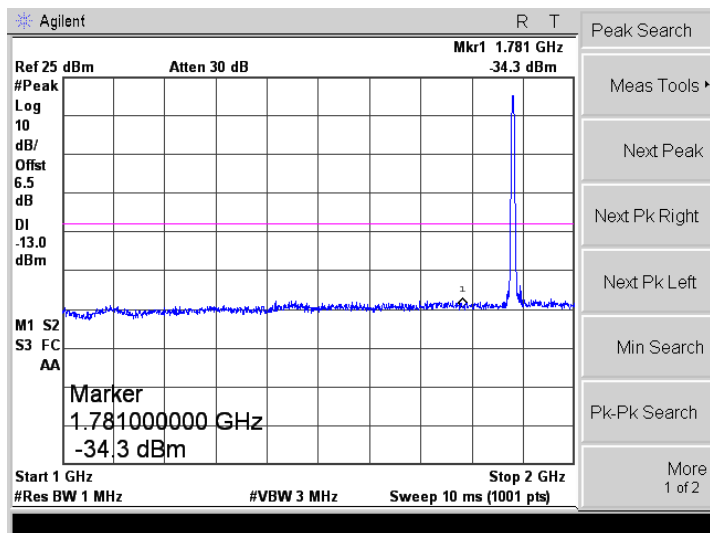
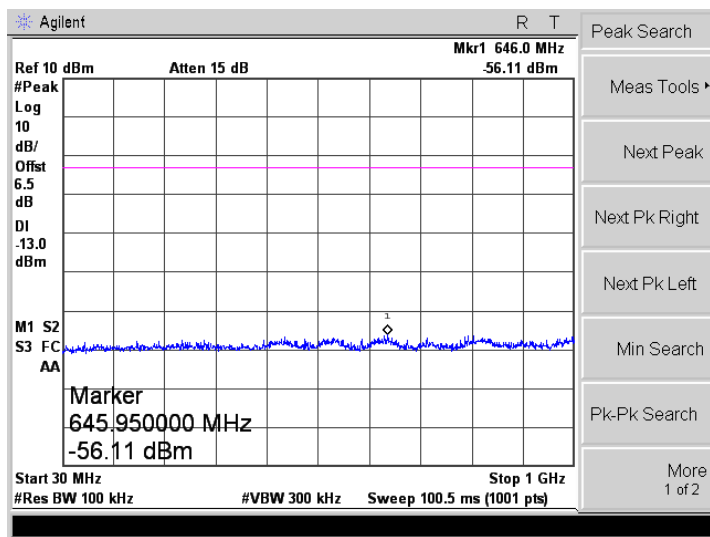
Bandedge



WCDMA Band II-Low

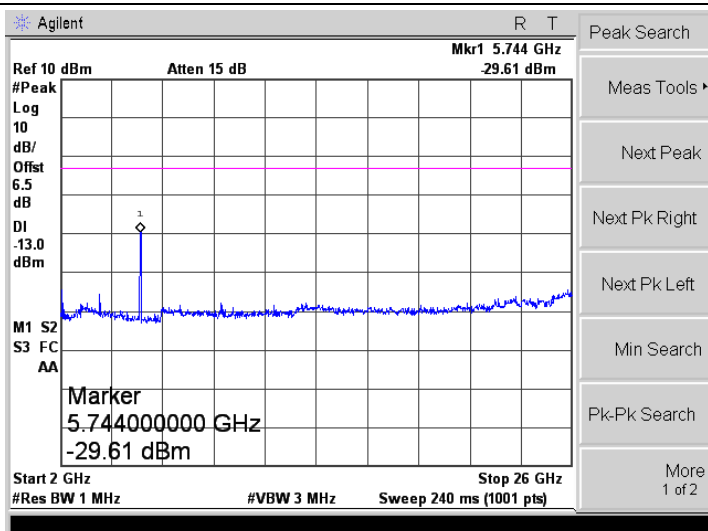
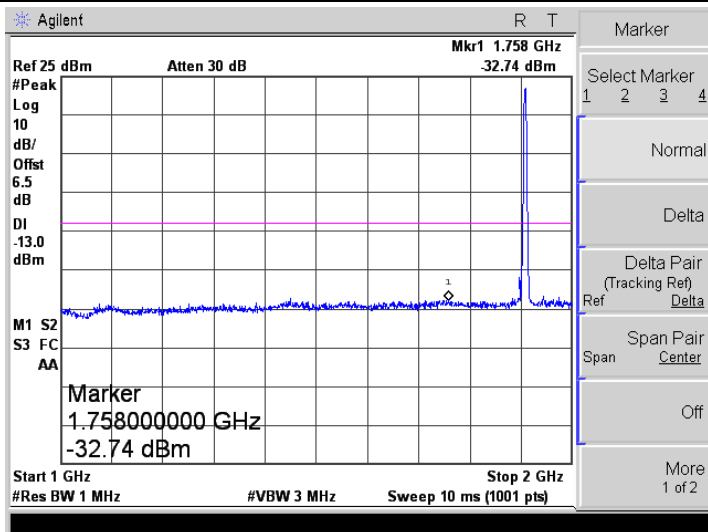
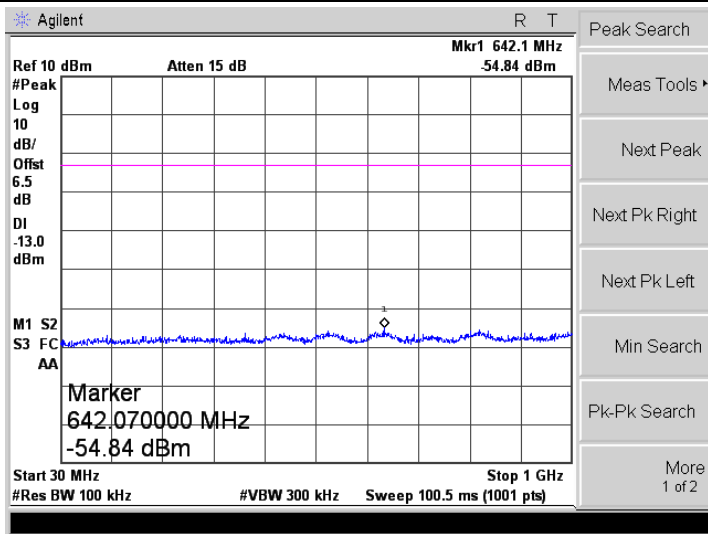


WCDMA Band II-Low

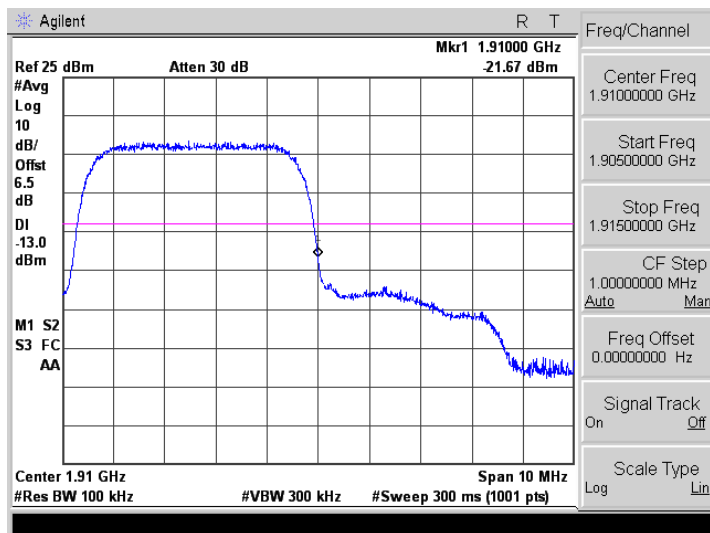
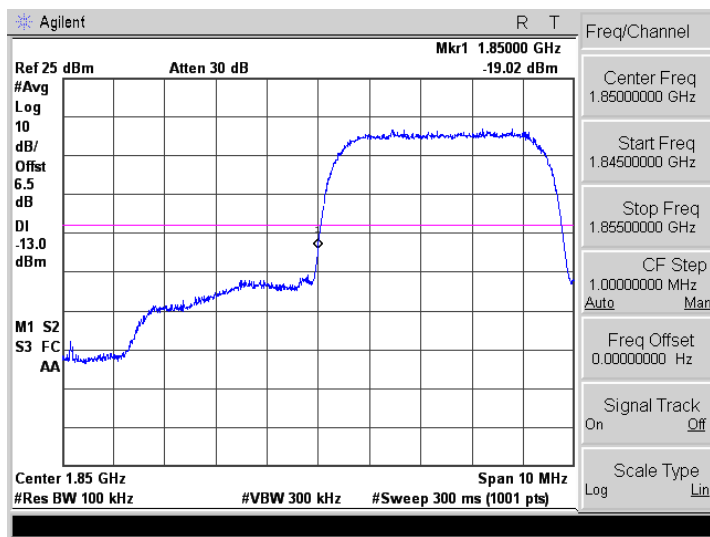




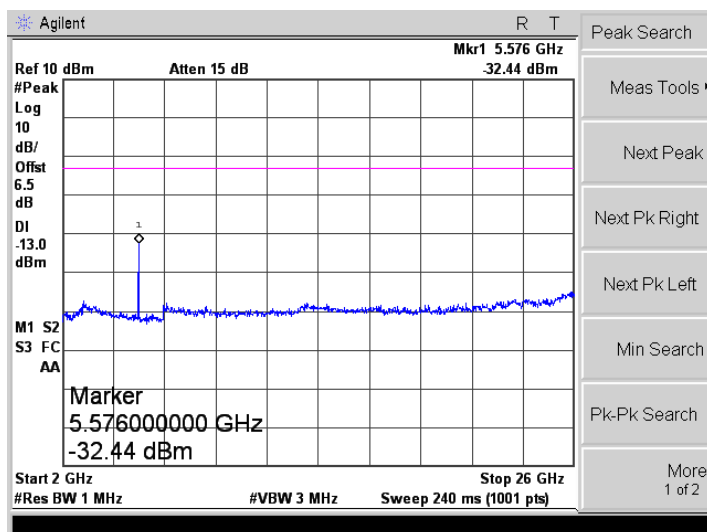
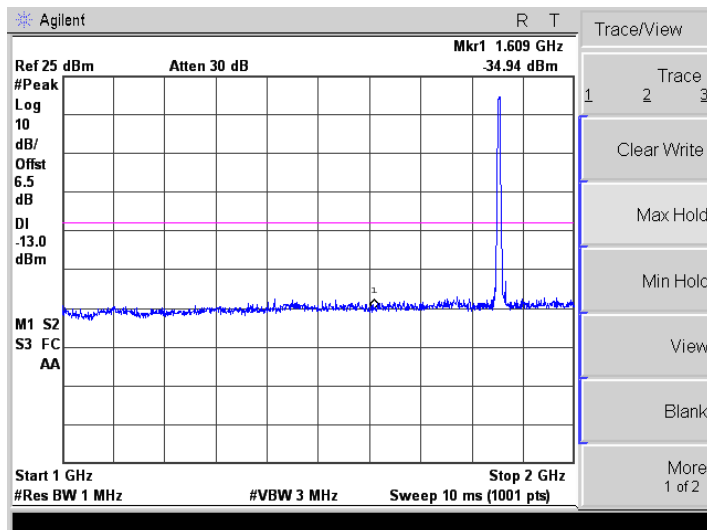
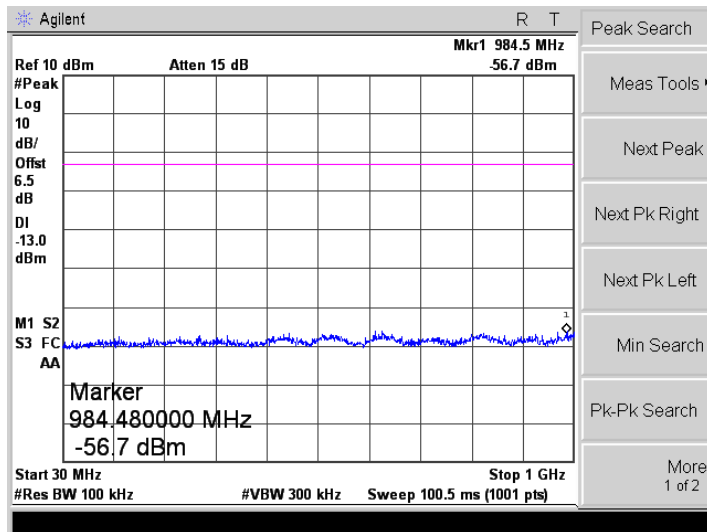
WCDMA Band II-Low



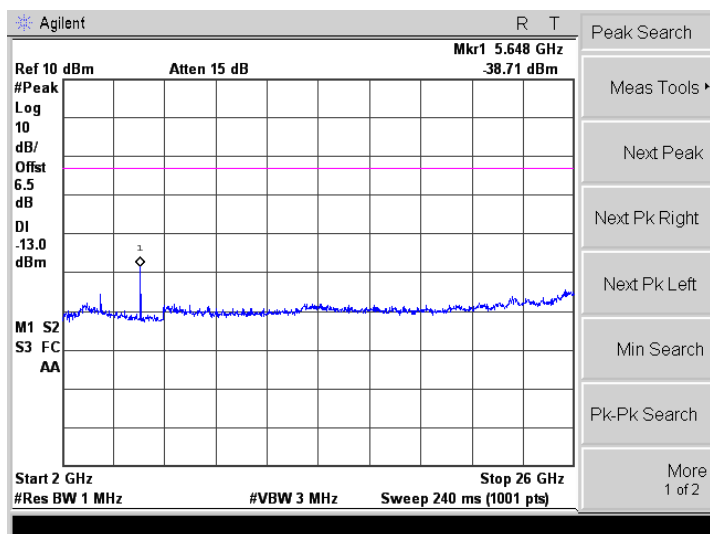
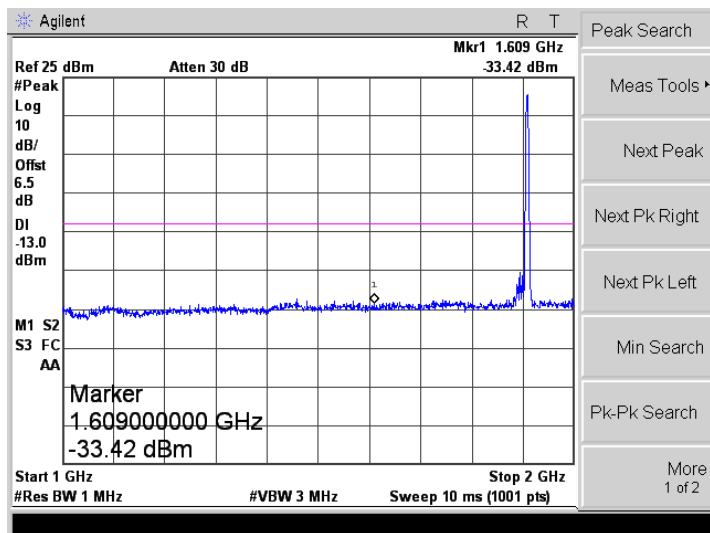
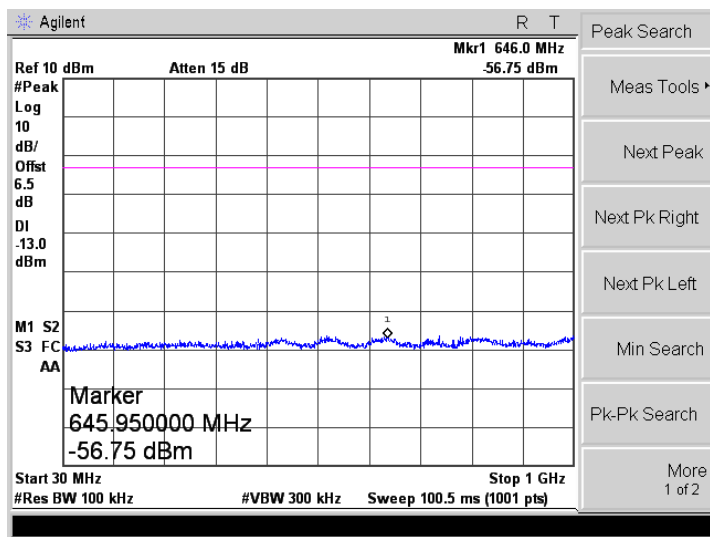
Bandedge



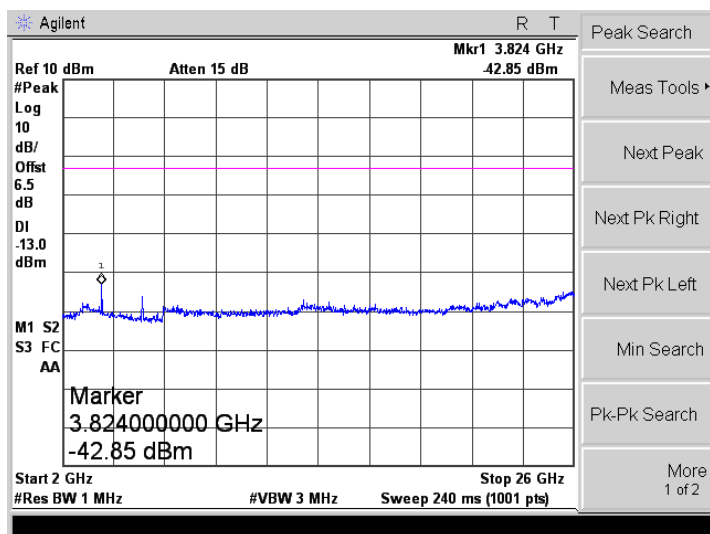
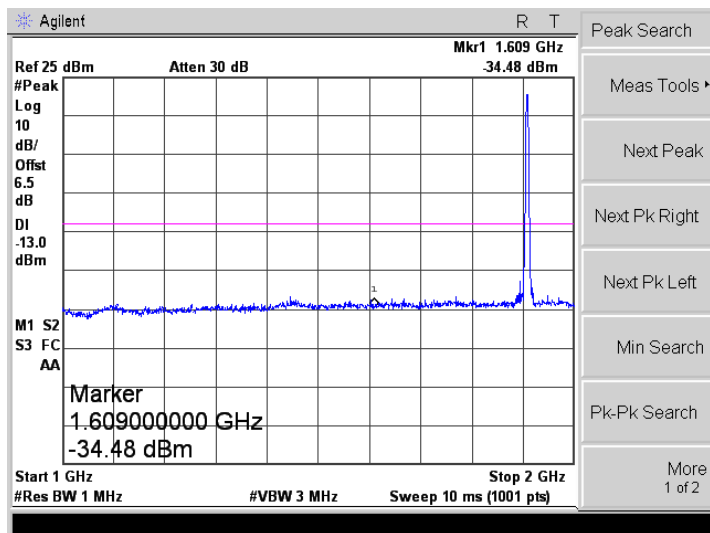
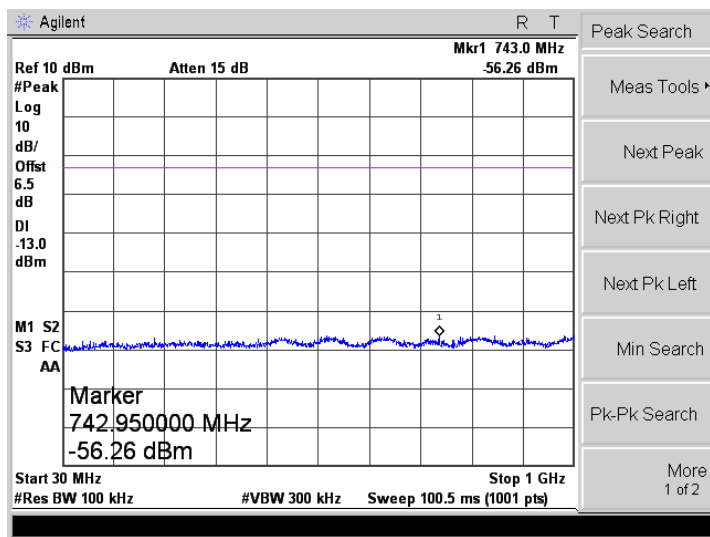
HSDPA Band II-Low



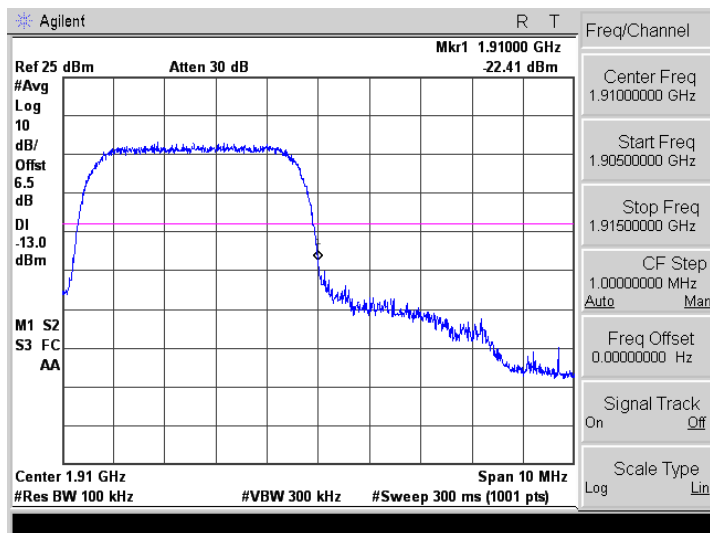
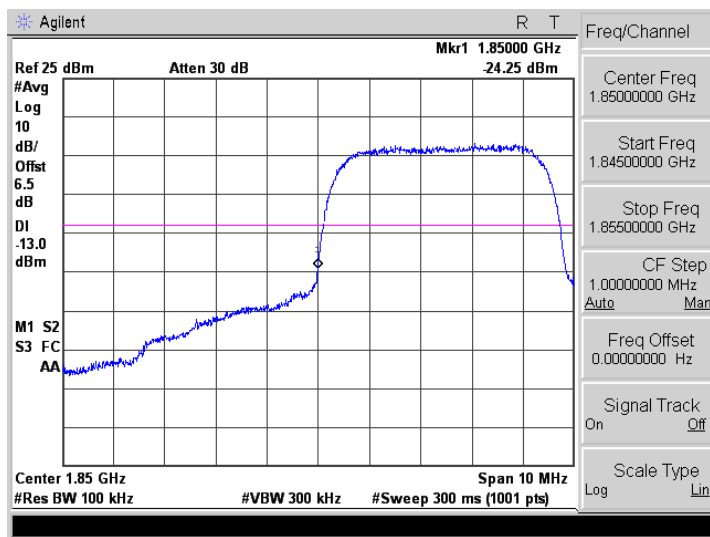
HSDPA Band II-Low



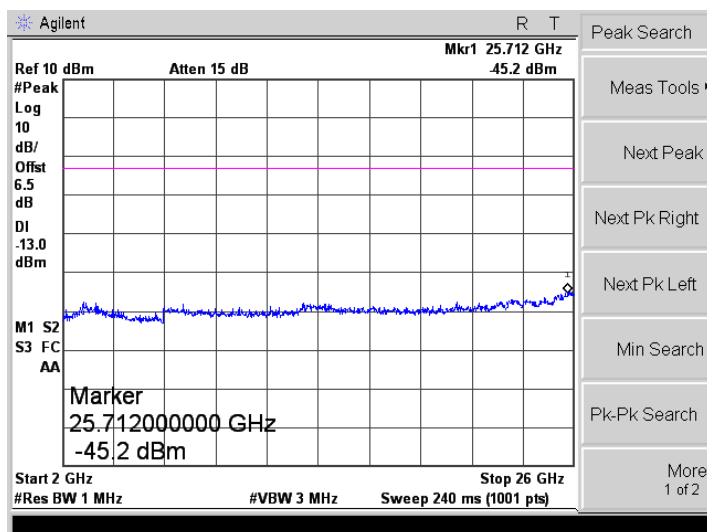
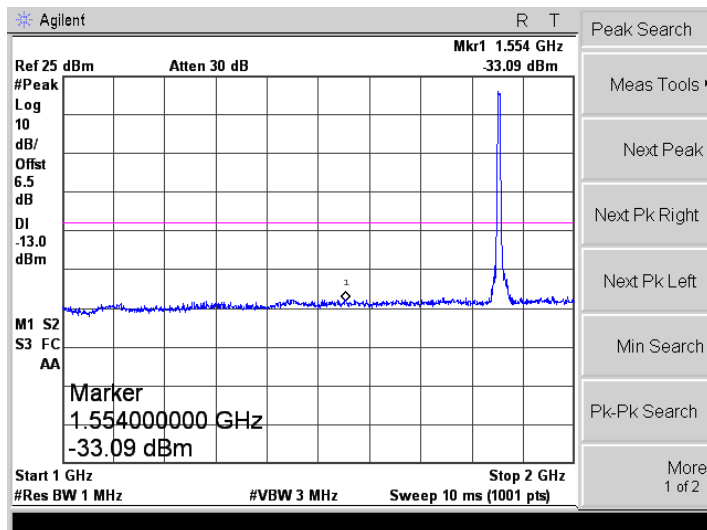
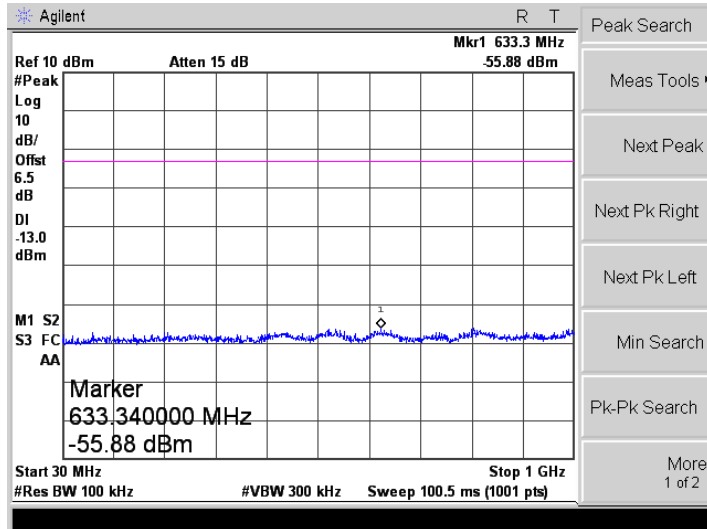
HSDPA Band II-Low



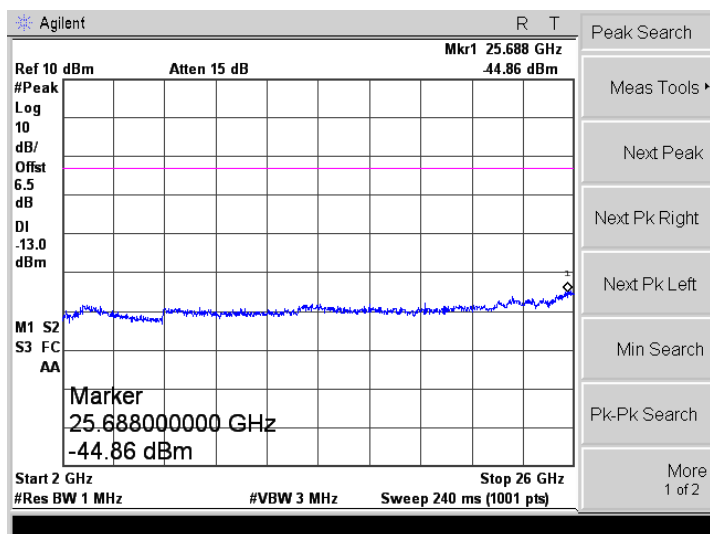
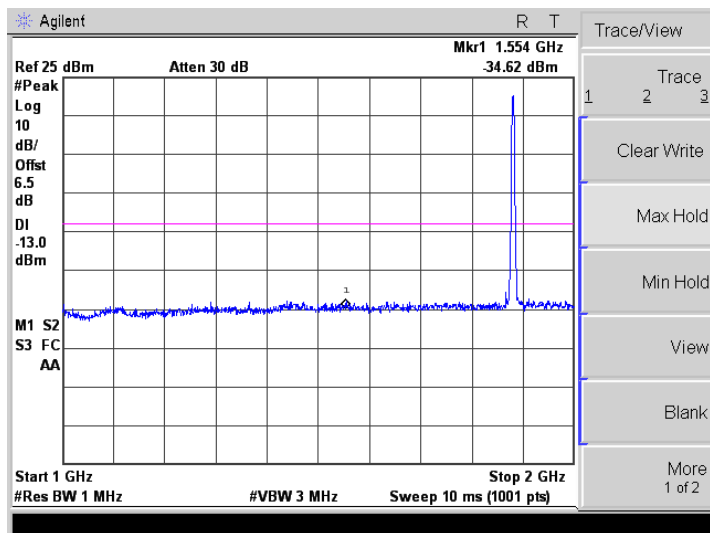
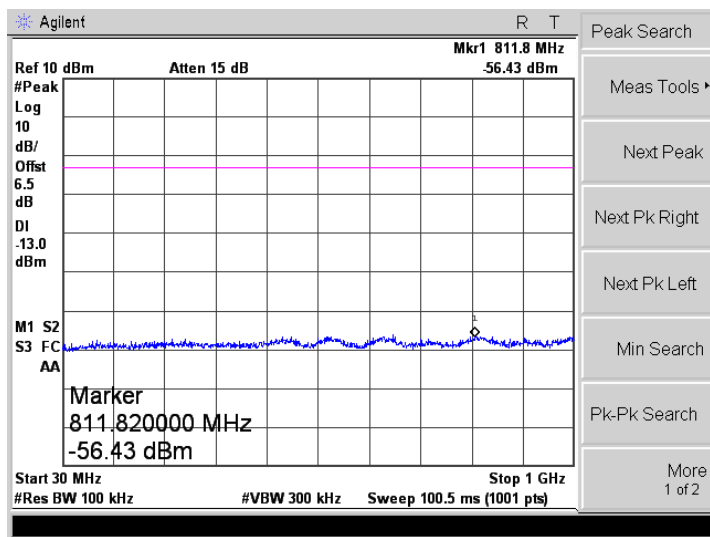
Bandedge



HSUPA Band II-Low

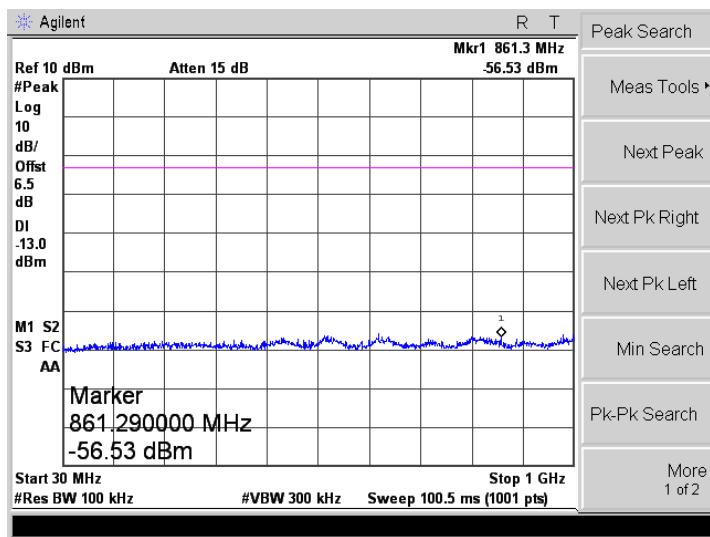


HSUPA Band II-Low

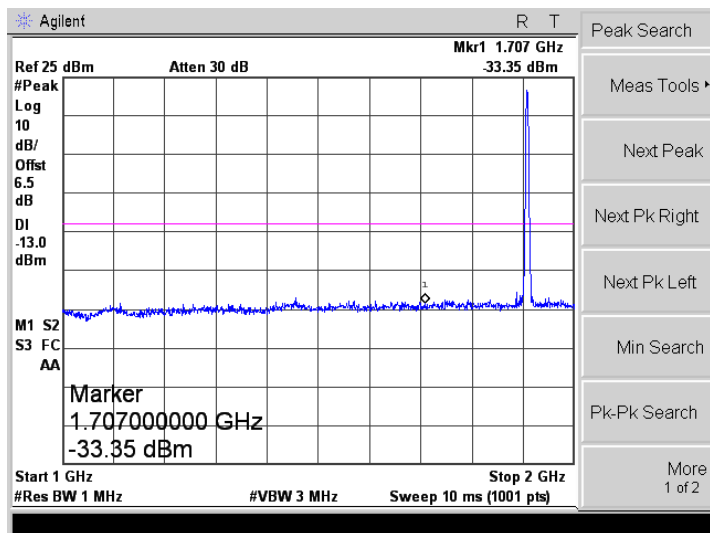




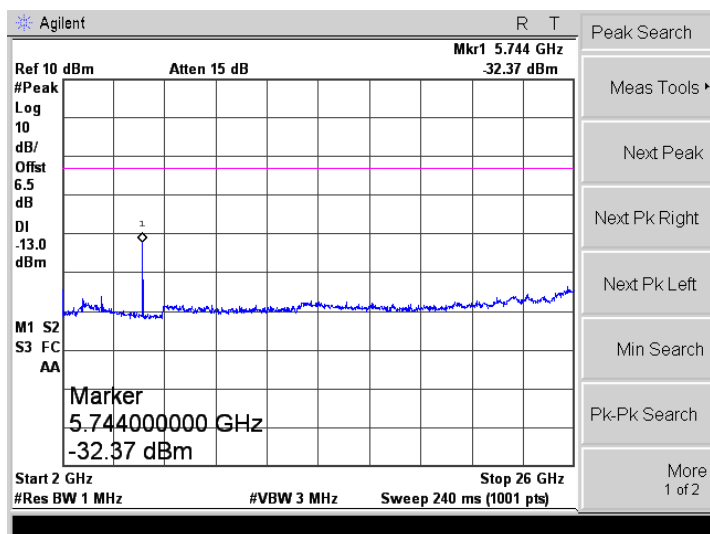
HSUPA Band II-Low



- Peak Search
- Meas Tools ▾
- Next Peak
- Next Pk Right
- Next Pk Left
- Min Search
- Pk-Pk Search
- More 1 of 2

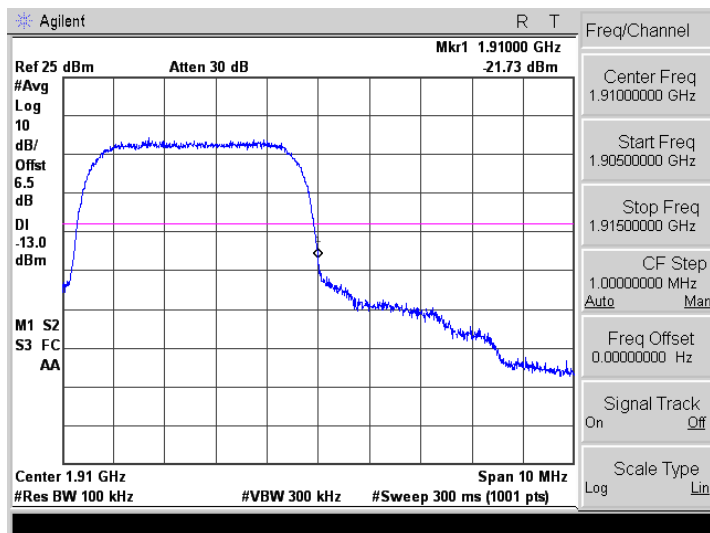
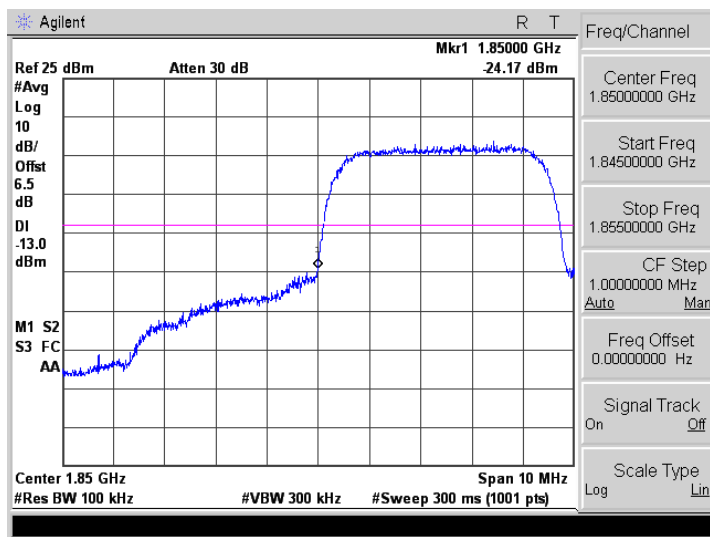


- Peak Search
- Meas Tools ▾
- Next Peak
- Next Pk Right
- Next Pk Left
- Min Search
- Pk-Pk Search
- More 1 of 2



- Peak Search
- Meas Tools ▾
- Next Peak
- Next Pk Right
- Next Pk Left
- Min Search
- Pk-Pk Search
- More 1 of 2

Bandedge



## APPENDIX E

### Frequency Stability

Note: 1. Worst case at GSM850/PCS1900/WCDMA B2/B5 middle channel

2. Normal Voltage NV=DC3.7V; Low Voltage LV=DC3.5V;High Voltage HV=DC4.2V

➤ Frequency stability V.S. Temperature measurement

Reference Frequency: GSM850 Middle channel=190 channel=836.6MHz					
Power supplied (Vdc)	Temperature ( °C)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
NV	-30	59	0.0708	2.50	Pass
	-20	45	0.0533		
	-10	37	0.0441		
	0	32	0.0386		
	10	28	0.0340		
	20	23	0.0276		
	30	29	0.0349		
	40	33	0.0395		
	50	41	0.0487		
Reference Frequency: PCS1900 Middle channel=661 channel=1880MHz					
Power supplied (Vdc)	Temperature ( °C)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
NV	-30	75	0.0397	2.50	Pass
	-20	67	0.0356		
	-10	57	0.0303		
	0	49	0.0262		
	10	42	0.0225		
	20	36	0.0192		
	30	44	0.0233		
	40	52	0.0274		
	50	58	0.0307		

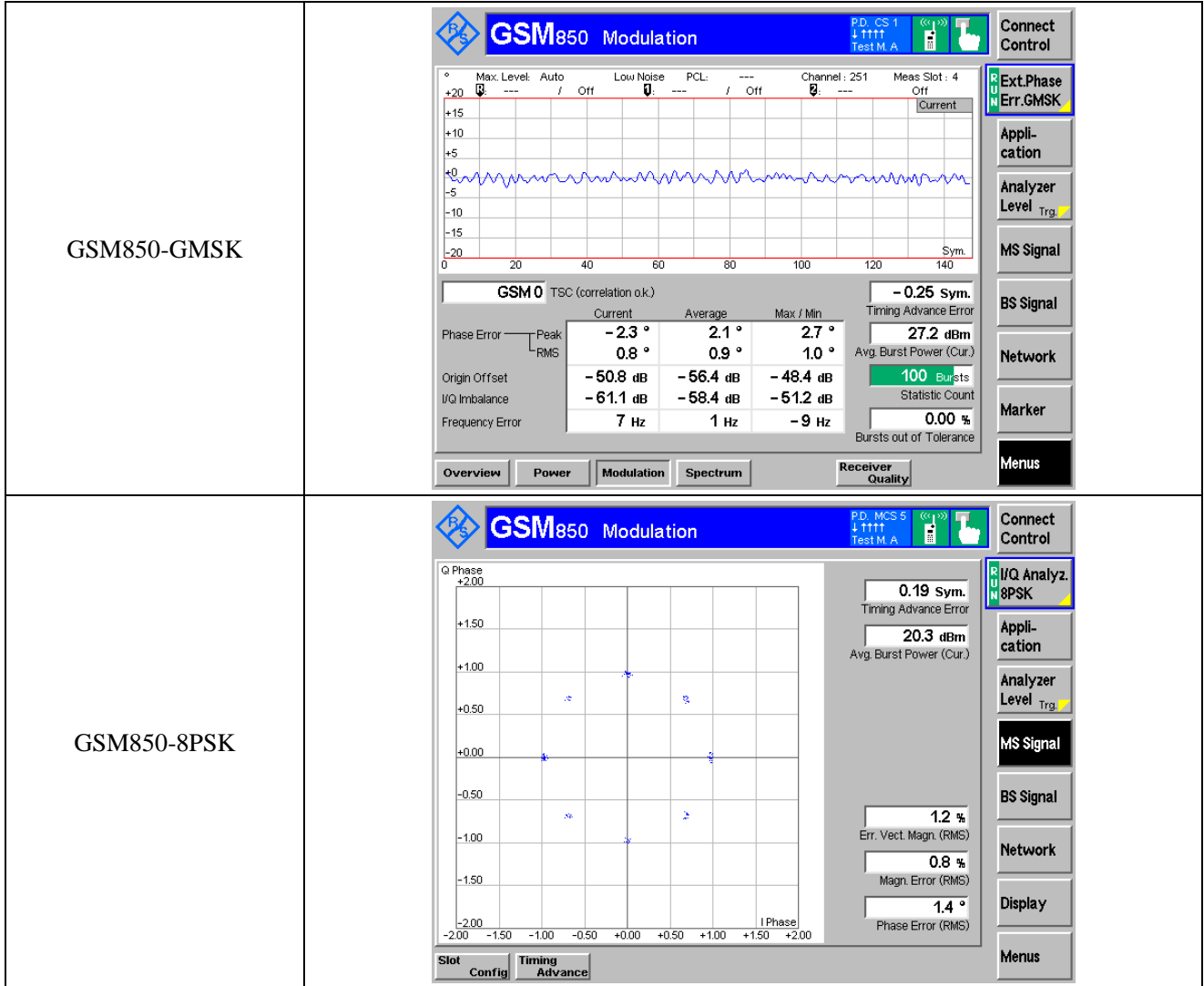
Reference Frequency: WCDMA Band V Middle channel=4183 channel=836.6MHz					
Power supplied (Vdc)	Temperature ( °C)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
NV	-30	78	0.0929	2.50	Pass
	-20	65	0.0782		
	-10	55	0.0662		
	0	49	0.0588		
	10	42	0.0497		
	20	37	0.0441		
	30	44	0.0524		
	40	48	0.0579		
	50	55	0.0662		
Reference Frequency: WCDMA Band II Middle channel=9400 channel=1880MHz					
Power supplied (Vdc)	Temperature ( °C)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
NV	-30	58	0.0311	2.50	Pass
	-20	46	0.0245		
	-10	38	0.0200		
	0	33	0.0176		
	10	27	0.0143		
	20	22	0.0115		
	30	29	0.0155		
	40	37	0.0196		
	50	42	0.0221		

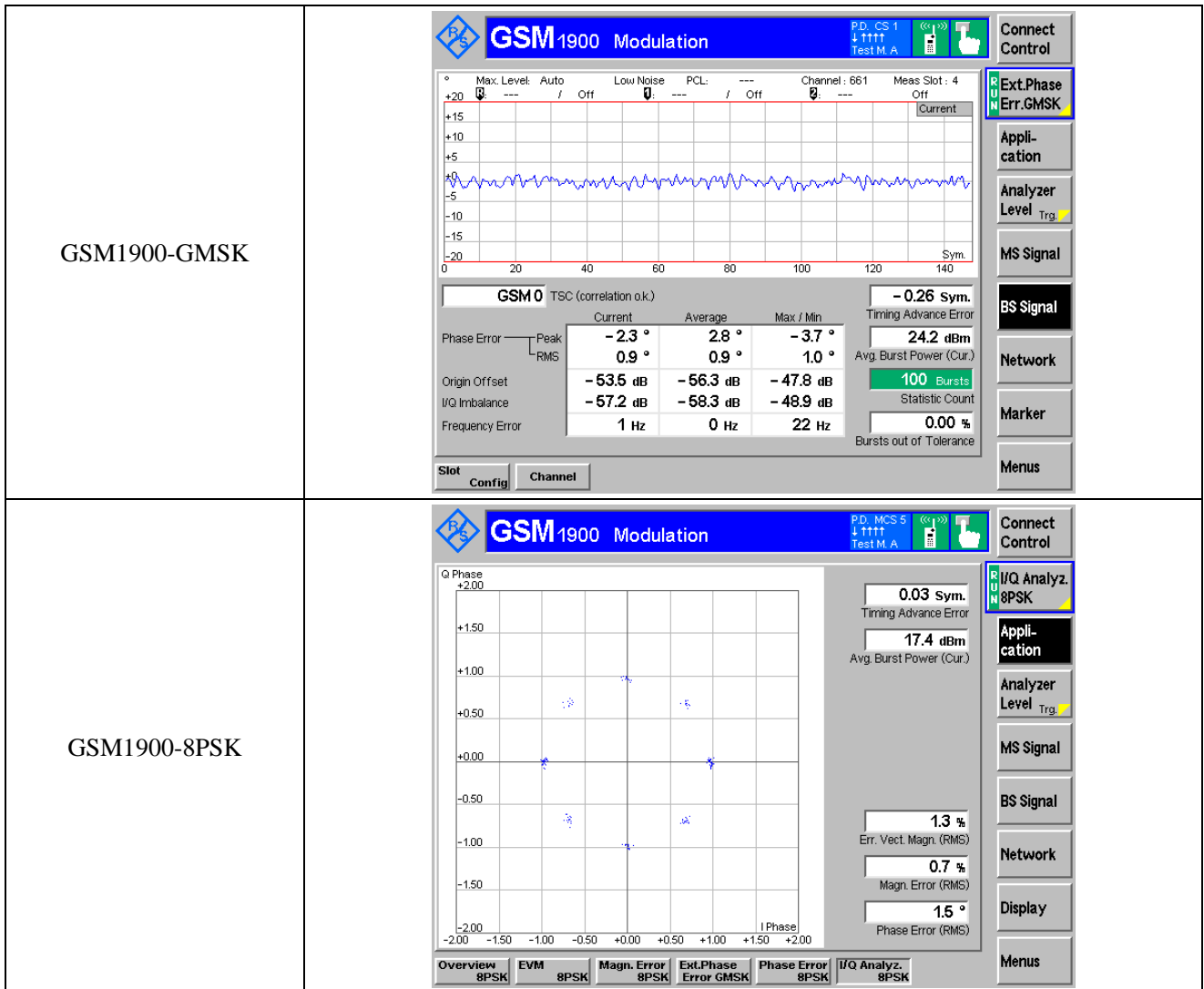
## ➤ Frequency stability V.S. Voltage measurement

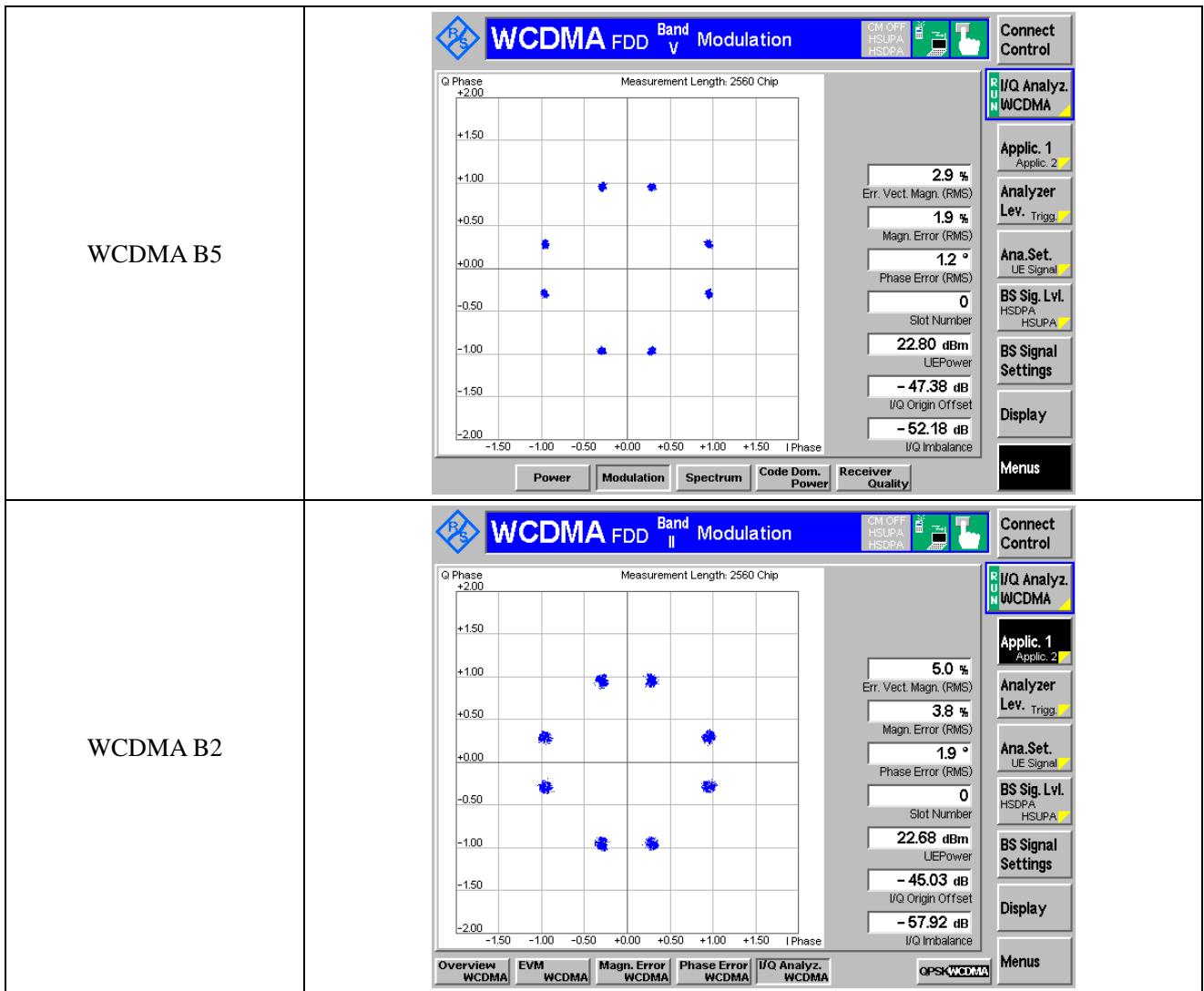
Reference Frequency: GSM850 (GSM link) Middle channel=190 channel=836.6MHz					
Temperature ( °C)	Power supplied (Vdc)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
25	HV	59	0.0708	2.50	Pass
	NV	53	0.0634		
	LV	47	0.0561		
Reference Frequency: PCS1900 (GSM link) Middle channel=661 channel=1880MHz					
Temperature ( °C)	Power supplied (Vdc)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
25	HV	72	0.0385	2.50	Pass
	NV	61	0.0323		
	LV	51	0.0270		
Reference Frequency: WCDMA Band V Middle channel=4183 channel=836.6MHz					
Temperature ( °C)	Power supplied (Vdc)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
25	HV	40	0.0478	2.50	Pass
	NV	36	0.0432		
	LV	32	0.0377		
Reference Frequency: WCDMA Band II Middle channel=9400 channel=1880MHz					
Temperature ( °C)	Power supplied (Vdc)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
25	HV	46	0.0245	2.50	Pass
	NV	38	0.0205		
	LV	35	0.0184		

## APPENDIX F

### Modulation characteristics









## **APPENDIX PHOTOGRAPHS**

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**Please refer to “ANNEX”**

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