FCC RADIO TEST REPORT
FCC ID: 2ACJ8E110

Product：	MorphoBT - Morpho Biometric Terminal
Trade Name：	Morpho
Model Number：	E110
Serial Model：	N/A
Report No.：	BZT140608F01

Prepared for

Morpho

11 boulevard Gallieni 92130 ISSY LES MOULINEAUX FRANCE

Prepared by

BZT Testing Technology Co., Ltd.

TEST RESULT CERTIFICATION

Applicant's name.....:	Morpho
Address .....:	11 boulevard Gallieni 92130 ISSY LES MOULINEAUX FRANCE
Manufacture's Name.....:	WIATEC INTERNATIONAL LTD.
Address .....:	Unit 601-605, TaoJinDi Electronic Commercial Plaza B, TengLong Road,LongHua, Shenzhen, China 518131
Product name.....:	MorphoBT - Morpho Biometric Terminal
Band name .....:	Morpho
Model and/or type reference ...:	E110
Standards.....:	FCC Part 22H and 24E
Test procedure ..... :	ANSI C63.4-2003

This device described above has been tested by BZT, and the test results show that the equipment under test (EUT) is in compliance with the FCC requirements. And it is applicable only to the tested sample identified in the report.

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Date of Test.....

Date (s) of performance of tests..... May 11, 2014 ~May 29, 2014

Date of Issue ..... June 05, 2014

Test Result..... **Pass**

Testing Engineer : Lynn Chen

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1. GENERAL INFORMATION

1.1 PRODUCT DESCRIPTION

A major technical description of EUT is described as following:

Product Designation:	MorphoBT - Morpho Biometric Terminal
Hardware version:	--
Software version:	--
FCC ID:	**2ACJ8E110**
Frequency Bands:	☒GSM 850 ☒PCS 1900 (U.S. Bands) ☒GSM 900 ☒DCS 1800 (Non-U.S. Bands) U.S. Bands: ☒UMTS FDD Band II ☐UMTS FDD Band V Non-U.S. Bands: ☒UMTS FDD Band I ☐UMTS FDD Band VIII
Bluetooth	Frequency:2402 – 2480 MHz Modulation: GFSK+π/4DQPSK+8DPSK
Wifi	Frequency:2412 – 2462 MHz Modulation: CCK/OFDM/DBPSK/DAPSK
Antenna:	FIFA Antenna
Antenna gain:	1.0dBi
Power Supply:	DC 3.7V by battery or DC 5.0V supplied by adapter
Battery parameter:	DC 3.7V/5400mAh
Adapter Input:	AC100-240V, 50-60Hz
Adapter Output:	DC 5.0V, 2A
GPRS/EDGE Class	Multi-Class12
Extreme Vol. Limits:	DC3.4 V to 4.2 V (Nominal DC3.7 V)
Extreme Temp. Tolerance	-10℃ to +50℃
** Note: The High Voltage 4.2V and Low Voltage 3.4V was declared by manufacturer, The EUT couldn't be operate normally with higher or lower voltage.	

Mode	Max. Conducted Power (dBm)
GSM850	32.01
GPRS 850	31.56
EDGE 850	27.78
GSM1900	29.10
GPRS 1900	28.90
EDGE1900	26.12
UMTS BAND II	23.01

1.2 RELATED SUBMITTAL(S) / GRANT (S)

This submittal(s) (test report) is intended for **FCC ID: 2ACJ8E110** filing to comply with the FCC Part 22H&24E.

1.3 TEST METHODOLOGY

The radiated emission testing was performed according to the procedures of ANSI C 63.4: 2003; TIA/EIA 603 and FCC CFR 47 Rules of 2.1046, 2.1047, 2.1049, 2.1051, 2.1053, 2.1055, 2.1057.

1.4 TEST FACILITY

The test site used to collect the radiated data is located at:
BZT Testing Technology Co.,Ltd.
1/F, Building E, Fenda Science Park, Sanwei Community, Xixiang Street, Bao'an District, Shenzhen P.R. China.

The test site is constructed and calibrated to meet the FCC requirements in documents ANSI C63.4: 2003.

FCC Registration No.: 701733

1.5 MEASUREMENT INSTRUMENTS

NAME OF EQUIPMENT	MANUFACTURER	MODEL	SERIAL NUMBER	NEXT CAL. DATE
SPECTRUM ANALYZER	AGILENT	E4440A	US44300399	2014.6.26
TEST RECEIVER	R&S	ESCI	A0304218	2014.6.26
COMMUNICATION TESTER	AGILENT	8960	3104A03367	2014.7.21
COMMUNICATION TESTER	R&S	CMU200	A0304247	2014.7.21
TEST RECEIVER	R&S	FCKL1528	A0304230	2014.6.26
LISN	SCHWARZBECK	NSLK8127	A0309538	2014.6.26
CLIMATE CHAMBER	ALBATROSS	--	--	2014.6.26
Loop Antenna	Daze	ZN30900N	SEL0097	2014.6.26
Bilogical Antenna	A.H. Systems Inc.	SAS-521-4	N/A	2015.4.26
Horn Antenna	EM	EM-AH-10180	N/A	2015.4.26

1.6 SPECIAL ACCESSORIES

The battery and the charger, earphone supplied by the applicant were used as accessories and being tested with EUT intended for FCC grant together.

1.7 EQUIPMENT MODIFICATIONS

Not available for this EUT intended for grant.

2. SYSTEM TEST CONFIGURATION

2.1 EUT CONFIGURATION

The EUT configuration for testing is installed on RF field strength measurement to meet the Commission's requirement and operating in a manner which intends to maximize its emission characteristics in a continuous normal application.

2.2 EUT EXERCISE

The Transmitter was operated in the maximum output power mode through Communication Tester. The TX frequency was fixed which was for the purpose of the measurements.

2.3 GENERAL TECHNICAL REQUIREMENTS

Item Number	Item Description		FCC Rules
1	Output Power	Conducted output power	22.913(a) / 24.232 (b)
		Radiated output power	
2	Spurious Emission	Conducted spurious emission	2.1051 / 22.917 / 24.238
		Radiated spurious emission	
3	Frequency Stability		2.1055 /24.235
4	Occupied Bandwidth		2.1049 (h)(i)
5	Emission Bandwidth		22.917(b) / 24.238 (b)
6	Band Edge		22.917(b) / 24.238 (b)

2.4 CONFIGURATION OF EUT SYSTEM

Fig. 2-1 Configuration of EUT System

Table 2-1 Equipment Used in EUT System

Item	Equipment	Model No.	ID or Specification	Note
1	MorphoBT - Morpho Biometric Terminal	E110	FCC ID: 2ACJ8E110	EUT

Note: All the accessories have been used during the test.
the following "EUT" in setup diagram means EUT system.

3. SUMMARY OF TEST RESULTS

Item Number	Item Description		FCC Rules	Result
1	Output Power	Conducted Output Power	22.913(a) / 24.232 (b)	Pass
		Radiated Output Power		
2	Spurious Emission	Conducted Spurious Emission	2.1051 / 22.917 / 24.238	Pass
		Radiated Spurious Emission		
3	Mains Conducted Emission		15.107 / 15.207	Pass
4	Frequency Stability		2.1055 /24.235	Pass
5	Occupied Bandwidth		2.1049 (h)(i)	Pass
6	Emission Bandwidth		22.917(b) / 24.238 (b)	Pass
7	Band Edge		22.917(b) / 24.238 (b)	Pass

4. DESCRIPTION OF TEST MODES

During the testing, the EUT was controlled via Rhode & Schwarz Digital Radio Communication Tester (CMU 200) to ensure max power transmission and proper modulation. Three channels (The top channel, the middle channel and the bottom channel) were chosen for testing on both GPRS850 and GPRS1900 frequency band.

Note: GSM/GPRS/EDGES850, GSM/GPRS/EDGE1900, HSDPA band V, HSUPA band V modes have been tested during the test.

the worst condition (GPRS/EDGE 850) be recorded in the test report if no other modes test data.

5. OUTPUT POWER

5.1 CONDUCTED OUTPUT POWER

5.1.1 MEASUREMENT METHOD

The EUT was setup for the max output power with pseudo random data modulation. Power was measured with Spectrum Analyzer. The measurements were performed on all modes(GPRS/EDGE850, GPRS/EDGE1900, HSDPA band V) at 3 typical channels(the Top Channel, the Middle Channel and the Bottom Channel) for each band.

5.1.2 MEASUREMENT RESULT

Conducted Output Power Limits for GSM 850 MHZ		
Mode	**Nominal Peak Power**	**Tolerance(dB)**
GSM850	31.56 dBm	+/- 1

Conducted Output Power Limits for PCS 1900 MHZ		
Mode	**Nominal Peak Power**	**Tolerance(dB)**
GSM1900	28.62 dBm	+/- 1

Conducted Output Power Limits for WCDMA band II		
Mode	**Nominal Peak Power**	**Tolerance(dB)**
WCDMA band II	22.51 dBm	+/-0.5

GSM 850:

Mode	Frequency (MHz)	Peak Power
GSM850	824.2	31.91
	836.6	31.96
	848.8	**31.98**
GPRS850 (1 Slot)	824.2	31.90
	836.6	31.94
	848.8	31.96
GPRS850 (2 Slot)	824.2	31.49
	836.6	31.52
	848.8	31.54
GPRS850 (3 Slot)	824.2	30.32
	836.6	30.39
	848.8	30.41
GPRS850 (4 Slot)	824.2	29.61
	836.6	29.64
	848.8	29.68

PCS 1900:

Mode	Frequency (MHz)	Peak Power
GSM1900	1850.2	28.99
	1880	29.10
	1909.8	29.13
GPRS1900 (1 Slot)	1850.2	28.95
	1880	**29.06**
	1909.8	29.08
GPRS1900 (2 Slot)	1850.2	28.22
	1880	28.46
	1909.8	28.39
GPRS1900 (3 Slot)	1850.2	26.75
	1880	26.81
	1909.8	26.82
GPRS1900 (4 Slot)	1850.2	25.99
	1880	26.04
	1909.8	26.06

EDGE 850:

Mode	Frequency (MHz)	Peak Power
EGPRS850 (1 Slot)	824.2	27.89
	836.6	28.03
	848.8	27.14
EGPRS850 (2 Slot)	824.2	24.70
	836.6	24.84
	848.8	23.94
EGPRS850 (3 Slot)	824.2	23.60
	836.6	23.52
	848.8	23.60
EGPRS850 (4 Slot)	824.2	22.25
	836.6	22.38
	848.8	22.49

EDGE 1900:

Mode	Frequency (MHz)	Peak Power
EGPRS1900 (1 Slot)	1850.2	26.45
	1880	25.92
	1909.8	26.72
EGPRS1900 (2 Slot)	1850.2	23.97
	1880	23.82
	1909.8	24.67
EGPRS1900 (3 Slot)	1850.2	23.02
	1880	22.75
	1909.8	23.57
EGPRS1900 (4 Slot)	1850.2	20.90
	1880	21.66
	1909.8	21.50

UMTS BAND II

Mode	Frequency (MHz)	Peak Power
WCDMA 1900 RMC	1852.4	**22.93**
	1880.0	22.71
	1907.6	22.90
HSDPA Subtest 1	1852.4	22.90
	1880.0	22.67
	1907.6	22.87
HSDPA Subtest 2	1852.4	22.30
	1880.0	22.28
	1907.6	22.31
HSDPA Subtest 3	1852.4	19.17
	1880.0	19.15
	1907.6	19.21
HSDPA Subtest 4	1852.4	18.91
	1880.0	18.78
	1907.6	18.80

According to 3GPP 25.101 sub-clause 6.2.2 , the maximum output power is allowed to be reduced by following the table.

Table 6.1aA: UE maximum output power with HS-DPCCH and E-DCH

UE Transmit Channel Configuration	CM(db)	MPR(db)
For all combinations of ,DPDCH,DPCCH HS-DPDCH,E-DPDCH and E-DPCCH	0≤ CM≤3.5	MAX(CM-1,0)
Note: CM=1 for β_c/β_d=12/15, β_{hs}/β_c=24/15.For all other combinations of DPDCH, DPCCH, HS-DPCCH, E-DPDCH and E-DPCCH the MPR is based on the relative CM difference.		

The device supports MPR to solve linearity issues (ACLR or SEM) due to the higher peak-to average ratios (PAR) of the HSUPA signal. This prevents saturating the full range of the TX DAC inside of device and provides a reduced power output to the RF transceiver chip according to the Cubic Metric (a function of the combinations of DPDCH, DPCCH, HS-DPCCH, E-DPDCH and E-DPCCH).

When E-DPDCH channels are present the beta gains on those channels are reduced firsts to try to get the power under the allowed limit. If the beta gains are lowered as far as possible, then a hard limiting is applied at the maximum allowed level.

The SW currently recalculates the cubic metric every time the beta gains on the E-DPDCH are reduced. The cubic metric will likely get lower each time this is done .However, there is no reported reduction of maximum output power in the HSUPA mode since the device also provides a compensate for the power back-off by increasing the gain of TX_AGC in the transceiver (PA) device.

The end effect is that the DUT output power is identical to the case where there is no MPR in the device.

5.2 RADIATED OUTPUT POWER

5.2.1 MEASUREMENT METHOD

The measurements procedures specified in TIA-603C-2004 were applied.

1 In an anechoic antenna test chamber, a half-wave dipole antenna for the frequency band of interest is placed at the reference centre of the chamber. An RF Signal source for the frequency band of interest is connected to the dipole with a cable that has been constructed to not interfere with the radiation pattern of the antenna. A known (measured) power (Pin) is applied to the input of the dipole, and the power received (Pr) at the chamber's probe antenna is recorded.

2 The substitution method is used. Substitution values at each frequency are measured before and saved to the test software. A "reference path loss" is established as ARpl=Pin + 2.15 - Pr. The ARpl is the attenuation of “reference path loss”, and including the gain of receive antenna, the cable loss and the air loss. The measurement results are obtained as described below: Power=PMea+ARpl

3 The EUT is substituted for the dipole at the reference centre of the chamber and a scan is performed to obtain the radiation pattern.

4 From the radiation pattern, the co-ordinates where the maximum antenna gain occurs are identified.

5 The EUT is then put into continuously transmitting mode at its maximum power level.

6 Power mode measurements are performed with the receiving antenna placed at the coordinates determined in Step 3 to determine the output power as defined in Rule 24.232 (b) and (c). The "reference path loss" from Step1 is added to this result.

7 This value is EIRP since the measurement is calibrated using a half-wave dipole antenna of known gain (2.15 dBi) and known input power (Pin).

8 ERP can be calculated from EIRP by subtracting the gain of the dipole, ERP = EIRP -2.15dBi..

9. Both horizontal and vertical antenna polarities were tested and performed pretest to three orthogonal axis. The worst case emissions were reported

5.2.2 PROVISIONS APPLICABLE

This is the test for the maximum radiated power from the EUT. Rule Part 24.232(b) specifies, “Mobile/portable stations are limited to 2 watts e.i.r.p. Peak power” and 24.232(c) specifies that "Peak transmit power must be measured over any interval of continuous transmission using instrumentation calibrated in terms of an rms-equivalent voltage.” Rule Part 22.913(a) specifies “Maximum ERP. The effective radiated power (ERP) of base transmitters and cellular repeaters must not exceed 500 Watts. The ERP of mobile transmitters and auxiliary test transmitters must not exceed 7 Watts.”

Mode	Nominal Peak Power
GSM 850	<=38.45 dBm (7W)
PCS 1900	<=33 dBm (2W)
UMTS BAND II	<=38.45 dBm (7W)

5.2.3 MEASUREMENT RESULT

Radiated Power (ERP) for GSM 850 MHZ				
Mode	Frequency	Result		Conclusion
		Max. Peak ERP (dBm)	Polarization Of Max. ERP	
GSM850	824.2	28.37	Horizontal	Pass
	824.2	28.56	Vertical	Pass
	836.6	29.38	Horizontal	Pass
	836.6	27.86	Vertical	Pass
	848.8	29.73	Horizontal	Pass
	848.8	27.98	Vertical	Pass

Radiated Power (ERP) for GPRS 850 MHZ				
Mode	Frequency	Result		Conclusion
		Max. Peak ERP (dBm)	Polarization Of Max. ERP	
GPRS850	824.2	28.75	Horizontal	Pass
	824.2	27.86	Vertical	Pass
	836.6	28.57	Horizontal	Pass
	836.6	29.65	Vertical	Pass
	848.8	29.09	Horizontal	Pass
	848.8	27.47	Vertical	Pass

Radiated Power (ERP) for EDGE 850 MHZ				
Mode	Frequency	Result		Conclusion
		Max. Peak ERP (dBm)	Polarization Of Max. ERP	
EDGE850	824.2	24.36	Horizontal	Pass
	824.2	24.63	Vertical	Pass
	836.6	25.73	Horizontal	Pass
	836.6	24.61	Vertical	Pass
	848.8	24.75	Horizontal	Pass
	848.8	24.83	Vertical	Pass

Radiated Power (E.I.R.P) for PCS 1900 MHZ				
Mode	Frequency	Result		Conclusion
		Max. Peak E.I.R.P.(dBm)	Polarization Of Max. E.I.R.P.	
PCS1900	1850.2	25.33	Horizontal	Pass
	1850.2	26.07	Vertical	Pass
	1880.0	24.86	Horizontal	Pass
	1880.0	25.73	Vertical	Pass
	1909.8	25.97	Horizontal	Pass
	1909.8	26.53	Vertical	Pass

Radiated Power (E.I.R.P) for GPRS 1900 MHZ				
Mode	Frequency	Result		Conclusion
		Max. Peak E.I.R.P.(dBm)	Polarization Of Max. E.I.R.P.	
GPRS 1900	1850.2	24.64	Horizontal	Pass
	1850.2	25.75	Vertical	Pass
	1880.0	25.64	Horizontal	Pass
	1880.0	24.63	Vertical	Pass
	1909.8	25.54	Horizontal	Pass
	1909.8	24.87	Vertical	Pass

Radiated Power (E.I.R.P) for EDGE 1900 MHZ				
Mode	Frequency	Result		Conclusion
		Max. Peak E.I.R.P.(dBm)	Polarization Of Max. E.I.R.P.	
EDGE 1900	1850.2	23.68	Horizontal	Pass
	1850.2	23.27	Vertical	Pass
	1880.0	24.67	Horizontal	Pass
	1880.0	23.74	Vertical	Pass
	1909.8	22.58	Horizontal	Pass
	1909.8	23.57	Vertical	Pass

Radiated Power (E.I.R.P) for UMTS band II				
Mode	**Frequency**	**Result**		**Conclusion**
		Max. Peak E.I.R.P.(dBm)	**Polarization Of Max. E.I.R.P.**	
RMC 12.2kbps	1852.4	20.27	Horizontal	Pass
	1880	20.74	Vertical	Pass
	1907.6	19.86	Horizontal	Pass
	1852.4	19.69	Vertical	Pass
	1880	19.35	Horizontal	Pass
	1907.6	20.97	Vertical	Pass

NOTE 1: in the part, result the worst case GPRS 1slot for GSM 850 and PCS1900, and RMC 12.2kbps for band II.

6. SPURIOUS EMISSION

6.1 CONDUCTED SPURIOUS EMISSION

6.1.1 MEASUREMENT METHOD

The following steps outline the procedure used to measure the conducted emissions from the EUT.

1, Determine frequency range for measurements: From CFR 2.1057 the spectrum should be investigated from the lowest radio frequency generated in the equipment up to at least the 10th harmonic of the carrier frequency. For the equipment of PCS1900 band, this equates to a frequency range of 30 MHz to 19.1 GHz, data taken from 30 MHz to 20 GHz. For GSM850, data taken from 30 MHz to 9 GHz.

2, Determine EUT transmit frequencies: the following typical channels were chosen to conducted emissions testing.

Typical Channels for testing of GSM/GPRS/EDGE 850 MHz	
Channel	Frequency (MHz)
128	824.2
190	836.6
251	848.8

Typical Channels for testing of PCS/ GPRS/EDGE 1900 MHz	
Channel	Frequency (MHz)
512	1850.2
661	1880.0
810	1909.8

Typical Channels for testing of UMTS band II	
Channel	Frequency (MHz)
9262	1852.4
9400	1880.0
9538	1907.6

6.1.2 PROVISIONS APPLICABLE

On any frequency outside frequency band of the USPCS spectrum, the power of any emission shall be attenuated below the transmitter power (P, in Watts) by at least 43+10Log(P) dB. For all power levels +30 dBm to 0 dBm, this becomes a constant specification limit of -13 dBm.

6.1.3 MEASUREMENT RESULT

PLEASE REFER TO：APPENDIX I TEST PLOTS FOR CONDUCTED SPURIOUS EMISSION

Note: 1. Below 30MHZ no Spurious found and The GSM modes is the worst condition.

2. As no emission found in standby or receive mode, no recording in this report.

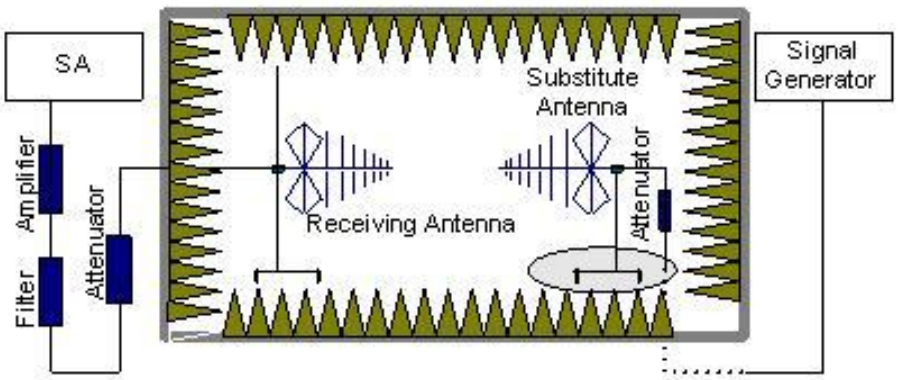
6.2 RADIATED SPURIOUS EMISSION

6.2.1 MEASUREMENT METHOD

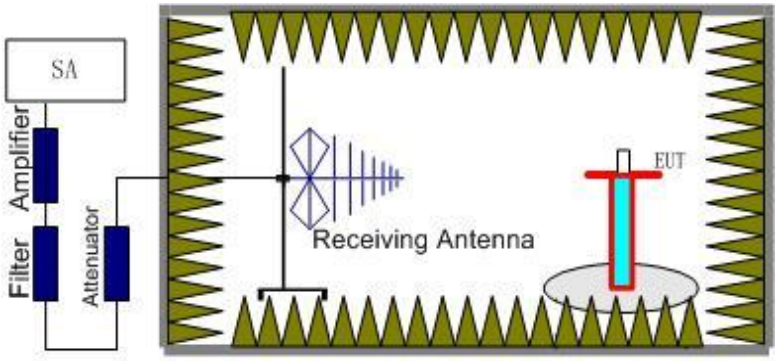
The measurements procedures specified in TIA-603C-2004 were used for testing. The spectrum was scanned from 30 MHz to the 10th harmonic of the highest frequency generated within the equipment. The resolution bandwidth is set 1MHz as outlined in Part 24.238. The measurements were performed on all modes(GPRS850, GPRS1900, HSDPA band II,) at 3 typical channels(the Top Channel, the Middle Channel and the Bottom Channel) for each band.

The procedure of radiated spurious emissions is as follows:

a) Pre-calibration With pre-calibration method, the Radiated Spurious Emissions(RSE) is calculated as, RSE=Rx（dBuV）+CL（dB）+SA（dB）+Gain（dBi）-107（dBuV to dBm）The SA is calibrated using following setup.



b) EUT was placed on a 0.8 meter high non-conductive stand at a 3 meter test distance from the receive antenna. A receiving antenna was placed on the antenna mast 3 meters from the test item for emission measurements. The height of receiving antenna is 0.8m. The test setup refers to figure below. Detected emissions were maximized at each frequency by rotating the test item and adjusting the receiving antenna polarization. The radiated emission measurements of all non-harmonic and harmonics of the transmit frequency through the 10th harmonic were measured with peak detector and 1MHz bandwidth.



Radiated emissions measurements were made only at the upper, middle, and lower carrier frequencies of the PCS 1900 band (1850.2 MHz, 1880 MHz and 1909.8 MHz) ,GSM850 band (824.2MHz, 836.6MHz, 848.8MHz), UMTS band II (9262 (826.4MHz), 9400(835MHz) and 9538 (846.6MHz)). It was decided that measurements at these three carrier frequencies would be sufficient to demonstrate compliance with emissions limits because it was seen that all the significant spurs occur well outside the band and no radiation was seen from a carrier in one block of any band into any of the other blocks.

The substitution method is used. Substitution values at each frequency are measured before and saved to the test software. A "reference path loss" is established and the A_{Rpl} is the attenuation of “reference path loss”, and including the gain of receive antenna, the gain of the preamplifier, the cable loss and the air loss. The measurement results are obtained as described below: $Power=P_{Mea}+A_{Rpl}$

6.2.2 PROVISIONS APPLICABLE

(a) On any frequency outside a licensee’s frequency block (e.g. A, D, B, etc.) within the USPCS spectrum, the power of any emission shall be attenuated below the transmitter power (P, in Watts) by at least 43+10Log(P) dB. The specification that emissions shall be attenuated below the transmitter power (P) by at least 43 + 10 log (P) dB, translates in the relevant power range (1 to 0.001 W) to -13 dBm. At 1 W the specified minimum attenuation becomes 43 dB and relative to a 30 dBm (1 W) carrier becomes a limit of -13 dBm. At 0.001 W (0 dBm) the minimum attenuation is 13 dB, which again yields a limit of -13 dBm. In this way a translation of the specification from relative to absolute terms is carried out.

Note: only result the worst condition of each test mode:

6.2.3 MEASUREMENT RESULT

GSM 850:

The Worst Test Results Channel 128/824.2 MHz					
Frequency(MHz)	Power(dBm)	A_{Rpl} (dBm)	P_{Mea}(dBm)	Limit（dBm）	Polarity
1648.379	-27.69	-4.65	-32.34	-13.00	Horizontal
2471.322	-25.67	-2.1	-27.77	-13.00	Horizontal
4118.454	-31.54	11.8	-19.74	-13.00	Horizontal
1648.379	-31.58	-4.65	-36.23	-13.00	Vertical
2471.322	-25.89	-2.1	-27.99	-13.00	Vertical
4118.454	-36.54	11.8	-24.74	-13.00	Vertical
The Worst Test Results Channel 190/836.6 MHz					
Frequency(MHz)	Power(dBm)	A_{Rpl} (dBm)	P_{Mea}(dBm)	Limit（dBm）	Polarity
1673.317	-28.68	-4.97	-33.65	-13.00	Horizontal
2506.234	-32.38	-2.1	-34.48	-13.00	Horizontal
3339.401	-31.84	3.46	-28.38	-13.00	Horizontal
1673.317	-32.47	-4.97	-37.44	-13.00	Vertical
2506.234	-34.59	-2.1	-36.69	-13.00	Vertical
3339.401	-34.59	3.46	-31.13	-13.00	Vertical
The Worst Test Results Channel 251/848.8 MHz					
Frequency(MHz)	Power(dBm)	A_{Rpl} (dBm)	P_{Mea}(dBm)	Limit（dBm）	Polarity
1698.254	-27.57	-4.94	-32.51	-13.00	Horizontal
2541.147	-31.39	-2.02	-33.41	-13.00	Horizontal
3384.835	-26.58	3.49	-23.09	-13.00	Horizontal
1698.254	-31.39	-4.94	-36.33	-13.00	Vertical
2541.147	-27.98	-2.02	-30	-13.00	Vertical
3384.835	-35.39	3.49	-31.9	-13.00	Vertical

PCS 1900:

The Worst Test Results for Channel 512/1850.2MHz					
Frequency(MHz)	Power(dBm)	A_{Rpl} (dBm)	P_{Mea}(dBm)	Limit（dBm）	Polarity
1793.017	-22.79	-3.54	-26.33	-13.00	Horizontal
3720.698	-23.45	13.01	-10.44	-13.00	Horizontal
5543.641	-29.77	14.7	-15.07	-13.00	Horizontal
1793.017	-21.83	-3.54	-25.37	-13.00	Vertical
3720.698	-32.72	13.01	-19.71	-13.00	Vertical
5543.641	-30.48	14.7	-15.78	-13.00	Vertical

The Worst Test Results for Channel 661/1880.0MHz					
Frequency(MHz)	Power(dBm)	A_{Rpl} (dBm)	P_{Mea}(dBm)	Limit（dBm）	Polarity
1822.943	-28.36	-3.48	-31.84	-13.00	Horizontal
3763.092	-30.29	13.8	-16.49	-13.00	Horizontal
5628.429	-35.47	15.4	-20.07	-13.00	Horizontal
1822.943	-30.76	-3.48	-34.24	-13.00	Vertical
3763.092	-37.69	13.8	-23.89	-13.00	Vertical
5628.429	-39.28	15.4	-23.88	-13.00	Vertical

The Worst Test Results for Channel 810/1909.8MHz					
Frequency(MHz)	Power(dBm)	A_{Rpl} (dBm)	P_{Mea}(dBm)	Limit（dBm）	Polarity
1967.581	-27.96	-3.26	-31.22	-13.00	Horizontal
3847.88	-32.35	12.4	-19.95	-13.00	Horizontal
5713.217	-36.59	15.75	-20.84	-13.00	Horizontal
1967.581	-34.57	-3.26	-37.83	-13.00	Vertical
3847.88	-42.39	12.4	-29.99	-13.00	Vertical
5713.217	-39.18	15.75	-23.43	-13.00	Vertical

UMTS band II

Channel 9262/824.6MHz					
Frequency(MHz)	Power(dBm)	A_{Rpl} (dBm)	P_{Mea}(dBm)	Limit（dBm）	Polarity
1653.367	-28.69	-5.01	-33.7	-13.00	Horizontal
2481.297	-28.17	-2.08	-30.25	-13.00	Horizontal
1653.367	-31.68	-5.01	-36.69	-13.00	Vertical
2481.297	-29.59	-2.08	-31.67	-13.00	Vertical
Channel 9400/836.6MHz					
Frequency(MHz)	Power(dBm)	A_{Rpl} (dBm)	P_{Mea}(dBm)	Limit（dBm）	Polarity
1675.329	-27.68	-4.97	-32.65	-13.00	Horizontal
2510.781	-32.69	-2.1	-34.79	-13.00	Horizontal
1675.329	-32.38	-4.97	-37.35	-13.00	Vertical
2510.781	-31.49	-2.1	-33.59	-13.00	Vertical
Channel 9538/846.6MHz					
Frequency(MHz)	Power(dBm)	A_{Rpl} (dBm)	P_{Mea}(dBm)	Limit（dBm）	Polarity
1688.279	-35.48	-4.95	-40.43	-13.00	Horizontal
2536.16	-29.49	-2.02	-31.51	-13.00	Horizontal
1688.279	-31.39	-4.95	-36.34	-13.00	Vertical
2536.16	-28.95	-2.02	-30.97	-13.00	Vertical

:

Note: Below 30MHZ no Spurious found and The GPRS/EDGE modes is the worst condition.

7. FREQUENCY STABILITY

7.1 MEASUREMENT METHOD

In order to measure the carrier frequency under the condition of AFC lock, it is necessary to make measurements with the EUT in a “call mode”. This is accomplished with the use of R&S CMU200 DIGITAL RADIO COMMUNICATION TESTER.

1 . Measure the carrier frequency at room temperature.

2 .Subject the EUT to overnight soak at -10℃.

3 .With the EUT, powered via nominal voltage, connected to the CMU200 and in a simulated call on channel 661 for PCS 1900 band , channel 190 for GSM 850 band and channel 9400 for UMTS band II measure the carrier frequency. These measurements should be made within 2 minutes of Powering up the EUT, to prevent significant self-warming.

4 .Repeat the above measurements at 10℃ increments from -10℃ to +50℃. Allow at least 1 1/2 hours at each temperature, unpowered, before making measurements.

5 .Re-measure carrier frequency at room temperature with nominal voltage. Vary supply voltage from minimum voltage to maximum voltage, in 0.1Volt increments re-measuring carrier frequency at each voltage. Pause at nominal voltage for 1 1/2 hours unpowered, to allow any self-heating to stabilize, before continuing.

6 .Subject the EUT to overnight soak at +50℃.

7 , With the EUT, powered via nominal voltage, connected to the CMU200 and in a simulated call on the centre channel, measure the carrier frequency. These measurements should be made within 2 minutes of Powering up the EUT, to prevent significant self-warming.

8 .Repeat the above measurements at 10℃ increments from +50℃ to -10℃. Allow at least 1 1/2 hours at each temperature, unpowered, before making measurements.

9 .At all temperature levels hold the temperature to +/- 0.5℃ during the measurement procedure.

7.2 PROVISIONS APPLICABLE

7.2.1 For Hand carried battery powered equipment

According to the JTC standard the frequency stability of the carrier shall be accurate to within 0.1 ppm of the received frequency from the base station. This accuracy is sufficient to meet Sec. 24.235, Frequency Stability. The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block. As this transceiver is considered "Hand carried, battery powered equipment" Section 2.1055(d)(2) applies. This requires that the lower voltage for frequency stability testing be specified by the manufacturer. This transceiver is specified to operate with an input voltage of between 3.4VDC and 4.2VDC, with a nominal voltage of 3.7VDC. Operation above or below these voltage limits is prohibited by transceiver software in order to prevent improper operation as well as to protect components from overstress. These voltages represent a tolerance of -10 % and +12.5 %. For the purposes of measuring frequency stability these voltage limits are to be used.

7.2.2 For equipment powered by primary supply voltage

According to the JTC standard the frequency stability of the carrier shall be accurate to within 0.1 ppm of the received frequency from the base station. This accuracy is sufficient to meet Sec. 24.235, Frequency Stability. The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block. For this EUT section 2.1055(d)(1) applies. This requires varying primary supply voltage from 85 to 115 percent of the nominal value for other than hand carried battery equipment, the normal environment temperature is 20°C.

7.3 MEASUREMENT RESULT

Frequency Error Against Voltage for GSM 850 band		
Voltage(V)	Frequency error(Hz)	Frequency error(ppm)
3.4	43	0.051
3.7	29	0.035
4.2	32	0.038

Frequency Error Against Temperature for GSMS850 band		
temperature(℃)	Frequency error(Hz)	Frequency error(ppm)
-10	28	0.033
0	24	-0.029
10	37	0.044
20	37	-0.044
30	29	-0.035
40	10	0.012
50	25	0.030

Frequency Error Against Voltage for GPRS850 band		
Voltage(V)	Frequency error(Hz)	Frequency error(ppm)
3.4	17	0.020
3.7	21	0.025
4.2	25	-0.030

Frequency Error Against Temperature for GPRS850 band		
temperature(℃)	Frequency error(Hz)	Frequency error(ppm)
-10	36	-0.043
0	12	0.014
10	14	-0.017
20	16	0.019
30	25	-0.030
40	31	0.037
50	36	0.043

Frequency Error Against Voltage for EGPRS850 band		
Voltage(V)	Frequency error(Hz)	Frequency error(ppm)
3.4	34	0.041
3.7	26	0.031
4.2	36	0.043

Frequency Error Against Temperature for EGPRS850 band		
temperature(℃)	Frequency error(Hz)	Frequency error(ppm)
-10	36	0.043
0	13	0.016
10	32	-0.038
20	26	0.031
30	21	-0.025
40	28	0.033
50	36	0.043

Note: The EUT doesn't work below -10℃

Frequency Error Against Voltage for GSM1900 band		
Voltage(V)	Frequency error(Hz)	Frequency error(ppm)
3.4	27.00	0.014
3.7	15.00	-0.008
4.2	23.00	-0.012

Frequency Error Against Temperature for GSM1900 band		
temperature(℃)	Frequency error(Hz)	Frequency error(ppm)
-10	29.00	0.015
0	23.00	0.012
10	16.00	-0.009
20	17.00	0.009
30	9.00	0.005
40	8.00	0.004
50	36.00	-0.019

Frequency Error Against Voltage for GPRS1900 band		
Voltage(V)	Frequency error(Hz)	Frequency error(ppm)
3.4	29	0.015
3.7	18	0.010
4.2	12	0.006

Frequency Error Against Temperature for GPRS1900 band		
temperature(℃)	Frequency error(Hz)	Frequency error(ppm)
-10	27	0.014
0	17	0.009
10	23	0.012
20	31	0.016
30	27	0.014
40	32	0.017
50	33	0.018

Frequency Error Against Voltage for EDGE1900 band		
Voltage(V)	Frequency error(Hz)	Frequency error(ppm)
3.4	31	0.016
3.7	28	0.015
4.2	41	0.022

Frequency Error Against Temperature for EDGE1900 band		
temperature(℃)	Frequency error(Hz)	Frequency error(ppm)
-10	33	0.018
0	21	-0.011
10	18	0.010
20	25	-0.013
30	27	0.014
40	34	0.018
50	45	0.024

Note: The EUT doesn't work below -10℃

Frequency Error Against Voltage for UMTS band V		
Voltage(V)	Frequency error(Hz)	Frequency error(ppm)
3.4	24.00	0.029
3.7	12.00	0.014
4.2	23.00	-0.028

Frequency Error Against Temperature for UMTS band V		
temperature(℃)	Frequency error(Hz)	Frequency error(ppm)
-10	26.00	0.031
0	25.00	0.030
10	10.00	0.012
20	8.00	0.010
30	15.00	0.018
40	21.00	0.025
50	25.00	0.030

Note: The EUT doesn't work below -10℃

8. OCCUPIED BANDWIDTH

8.1 MEASUREMENT METHOD

The test set up and general procedure is similar to conducted peak output power test. Only different for setting the measurement configuration of the measuring instrument of Spectrum Analyzer.

8.2 PROVISIONS APPLICABLE

The occupied bandwidth (99%) shall not exceed 300 KHz.

8.3 MEASUREMENT RESULT

Occupied Bandwidth (99%) for GSM 850 band		
Mode	Frequency(MHz)	Occupied Bandwidth (99%)(kHz)
Low Channel	824.2	243.76
Middle Channel	836.6	247.56
High Channel	848.8	247.71

Occupied Bandwidth (99%) for GPRS 850 band		
Mode	Frequency(MHz)	Occupied Bandwidth (99%)(kHz)
Low Channel	824.2	243.52
Middle Channel	836.6	242.78
High Channel	848.8	253.52

Occupied Bandwidth (99%) for EGPRS 850 band		
Mode	Frequency(MHz)	Occupied Bandwidth (99%)(kHz)
Low Channel	824.2	245.95
Middle Channel	836.6	249.11
High Channel	848.8	250.31

Occupied Bandwidth (99%) for GSM1900 band		
Mode	Frequency(MHz)	Occupied Bandwidth (99%)(kHz)
Low Channel	1850.2	234.41
Middle Channel	1880.0	234.03
High Channel	1909.8	235.22

Occupied Bandwidth (99%) for GPRS1900 band		
Mode	Frequency(MHz)	Occupied Bandwidth (99%)(kHz)
Low Channel	1850.2	236.11
Middle Channel	1880.0	234.18
High Channel	1909.8	233.70

Occupied Bandwidth (99%) for EDGE1900 band		
Mode	Frequency(MHz)	Occupied Bandwidth (99%)(kHz)
Low Channel	1850.2	235.76
Middle Channel	1880.0	236.44
High Channel	1909.8	234.49

Occupied Bandwidth (99%) for UMTS band II		
Mode	Frequency(MHz)	Occupied Bandwidth (99%)(MHz)
Low Channel	1852.4	4.16
Middle Channel	1880.0	4.16
High Channel	1907.6	4.16
Occupied Bandwidth (99%) for HSDPA band II		
Mode	Frequency(MHz)	Occupied Bandwidth (99%)(MHz)
Low Channel	1852.4	4.16
Middle Channel	1880.0	4.17
High Channel	1907.6	4.17

9. EMISSION BANDWIDTH

9.1 MEASUREMENT METHOD

The test set up and general procedure is similar to conducted peak output power test. Only different for setting the measurement configuration of the measuring instrument of Spectrum Analyzer.

9.2 PROVISIONS APPLICABLE

The emission bandwidth is defined as two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26dB below the transmitter power

9.3 MEASUREMENT RESULT

Emission Bandwidth (-26dBc) for GSM850 band		
Mode	Frequency(MHz)	Emission Bandwidth (-26dBc)(kHz)
Low Channel	824.2	319.83
Middle Channel	836.6	318.73
High Channel	848.8	314.42

Emission Bandwidth (-26dBc) for GPRS850 band		
Mode	Frequency(MHz)	Emission Bandwidth (-26dBc)(kHz)
Low Channel	824.2	315.52
Middle Channel	836.6	318.41
High Channel	848.8	320.12

Emission Bandwidth (-26dBc) for EDGE850 band		
Mode	Frequency(MHz)	Emission Bandwidth (-26dBc)(kHz)
Low Channel	824.2	299.07
Middle Channel	836.6	317.16
High Channel	848.8	313.77

Emission Bandwidth (-26dBc) for GSM1900 band		
Mode	Frequency(MHz)	Emission Bandwidth (-26dBc)(kHz)
Low Channel	1850.2	310.34
Middle Channel	1880.0	312.42
High Channel	1909.8	310.25

Emission Bandwidth (-26dBc) for GPRS1900 band		
Mode	Frequency(MHz)	Emission Bandwidth (-26dBc)(kHz)
Low Channel	1850.2	310.40
Middle Channel	1880.0	310.49
High Channel	1909.8	308.74

Emission Bandwidth (-26dBc) for EDGE1900 band		
Mode	Frequency(MHz)	Emission Bandwidth (-26dBc)(kHz)
Low Channel	1850.2	311.69
Middle Channel	1880.0	314.81
High Channel	1909.8	312.94

Emission Bandwidth (-26dBc) for UMTS band II		
Mode	Frequency(MHz)	Emission Bandwidth (-26dBc)(MHz)
Low Channel	1852.4	4.64
Middle Channel	1880.0	4.65
High Channel	1907.6	4.65
Emission Bandwidth (-26dBc) for HSDPA band II		
Mode	Frequency(MHz)	Emission Bandwidth (-26dBc)(MHz)
Low Channel	1852.4	4.65
Middle Channel	1880.0	4.64
High Channel	1907.6	4.65

10. BAND EDGE

10.1 MEASUREMENT METHOD

The test set up and general procedure is similar to conducted peak output power test. Only different for setting the measurement configuration of the measuring instrument of Spectrum Analyzer.

10.2 PROVISIONS APPLICABLE

as Specified in FCC rules of 22.917(b) and 24.238(b)

10.3 MEASUREMENT RESULT

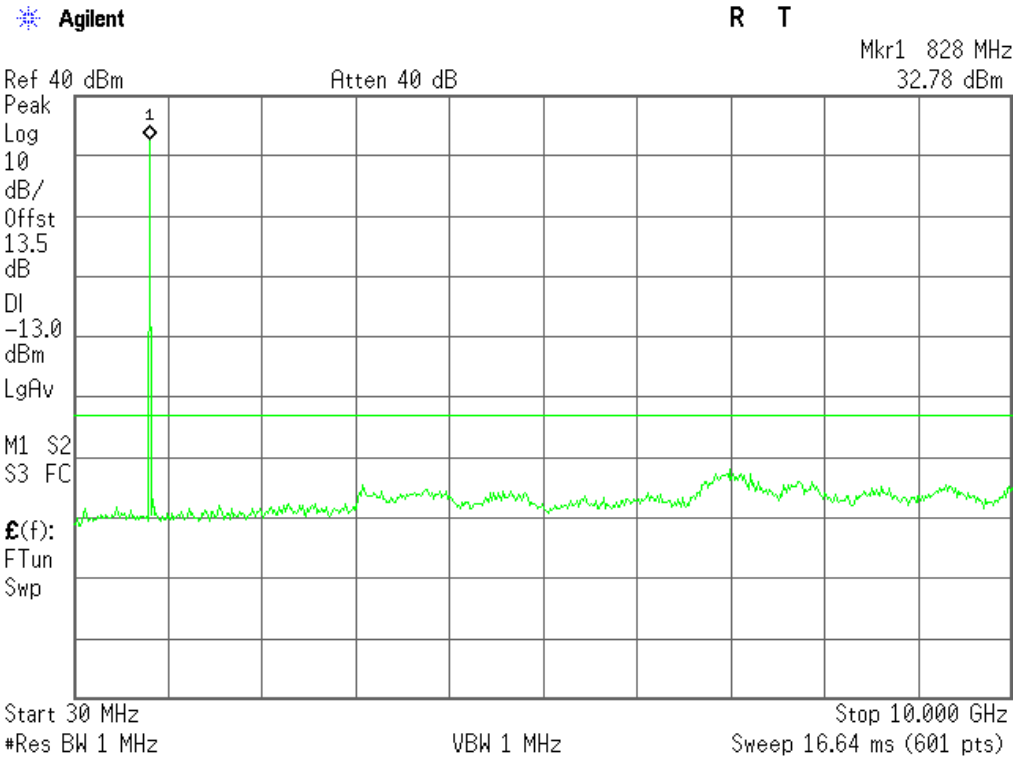
Please refers to Appendix III for compliance test plots for band edges

APPENDIX I

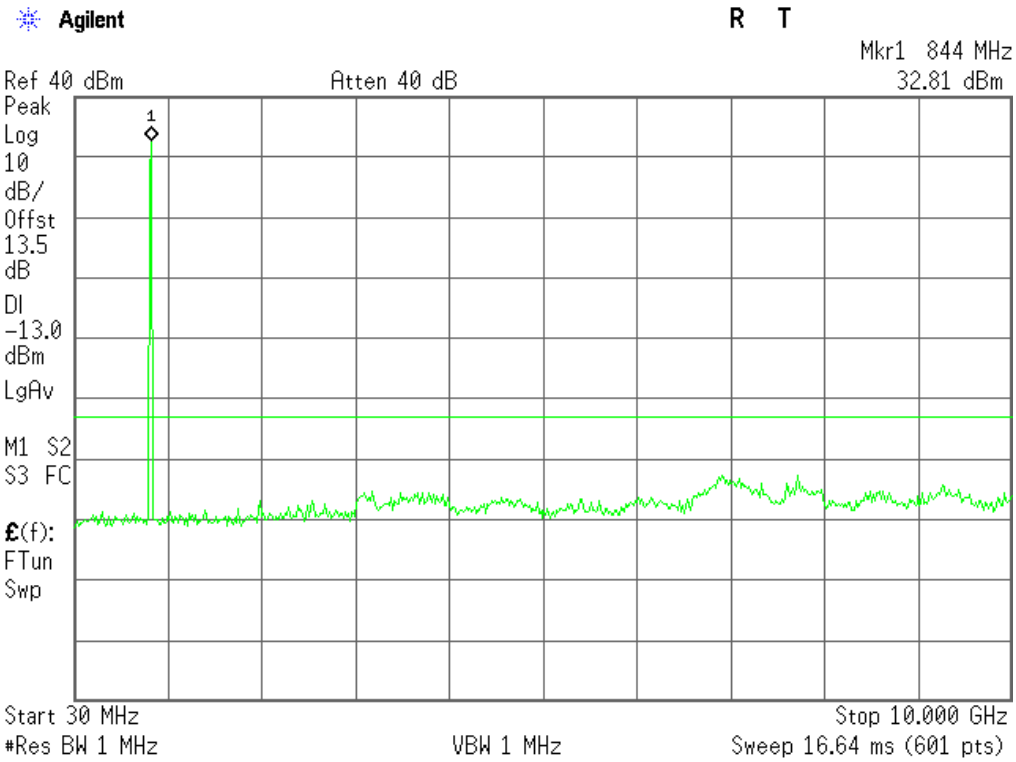
TEST PLOTS FOR CONDUCTED SPURIOUS EMISSION

CONDUCTED EMISSION IN GSM 850 BAND

Conducted Emission Transmitting Mode CH 128 30MHz – 10GHz



Conducted Emission Transmitting Mode CH 190 30MHz – 10GHz



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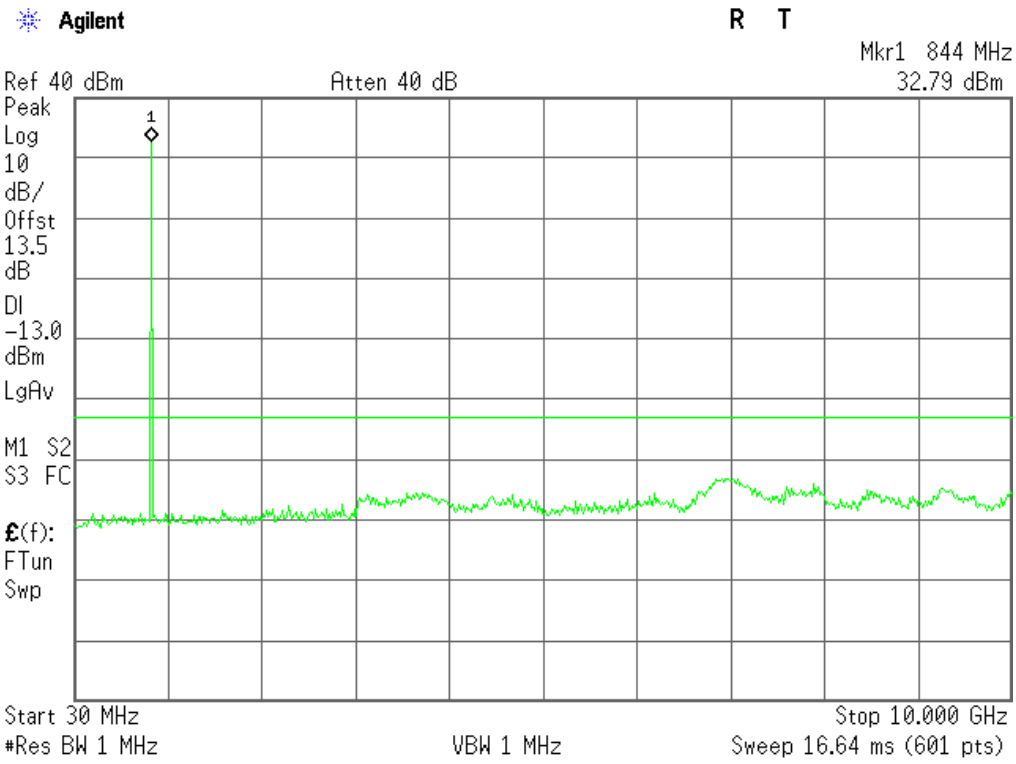
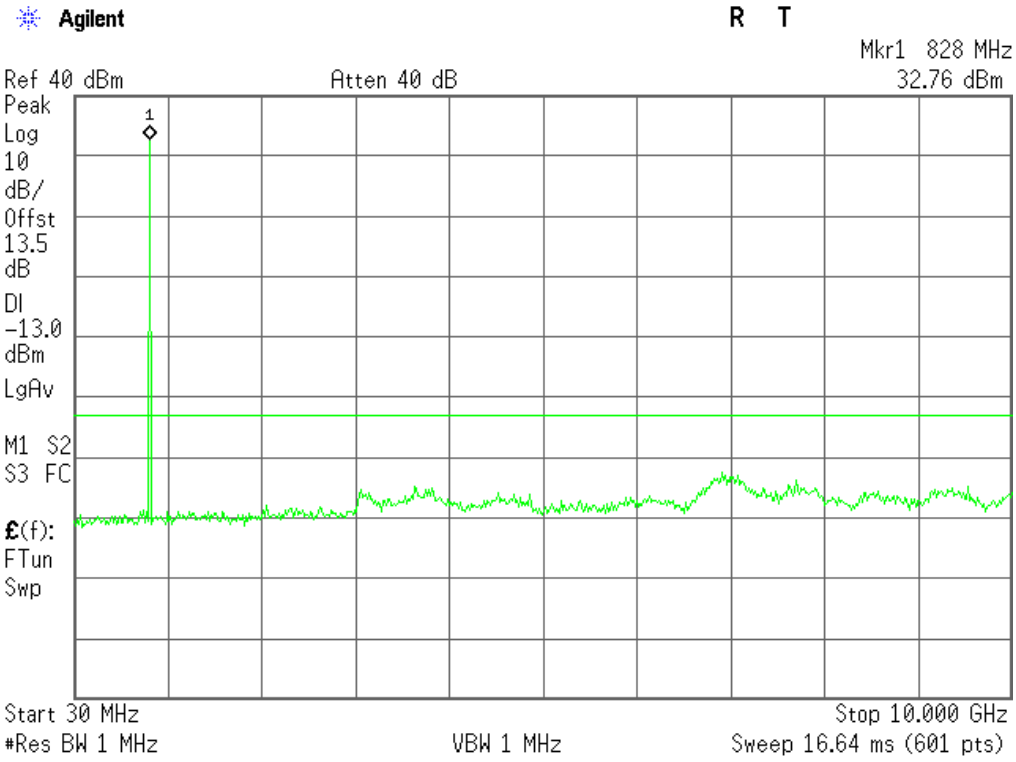
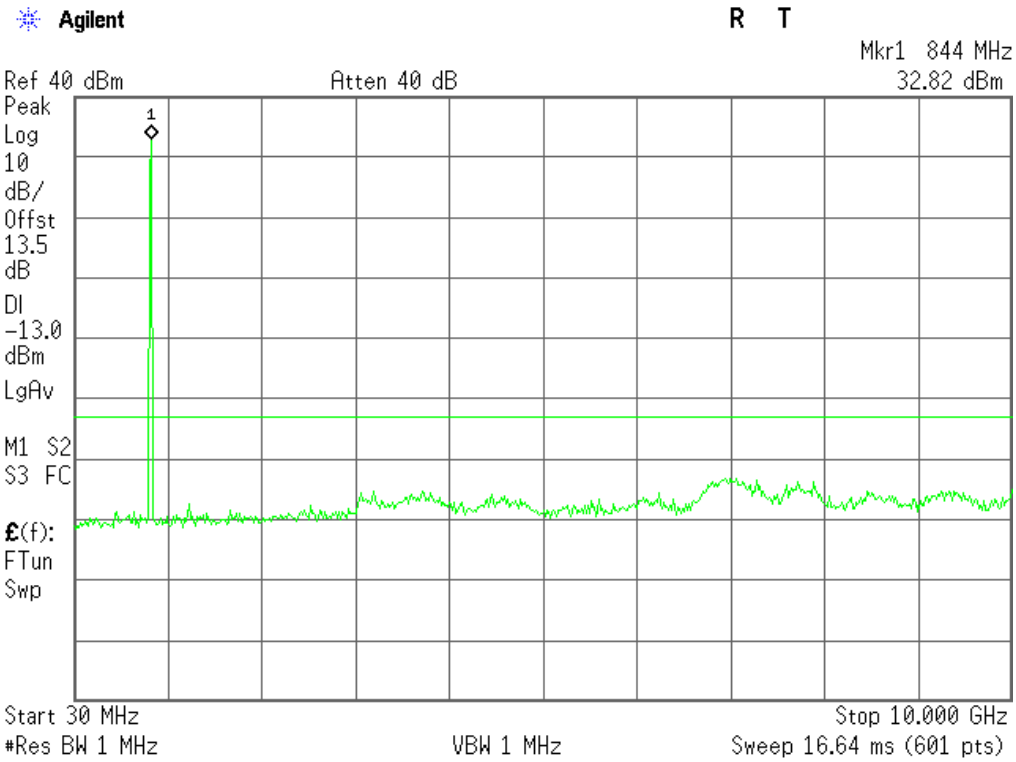


CONDUCTED EMISSION IN GPRS 850 BAND

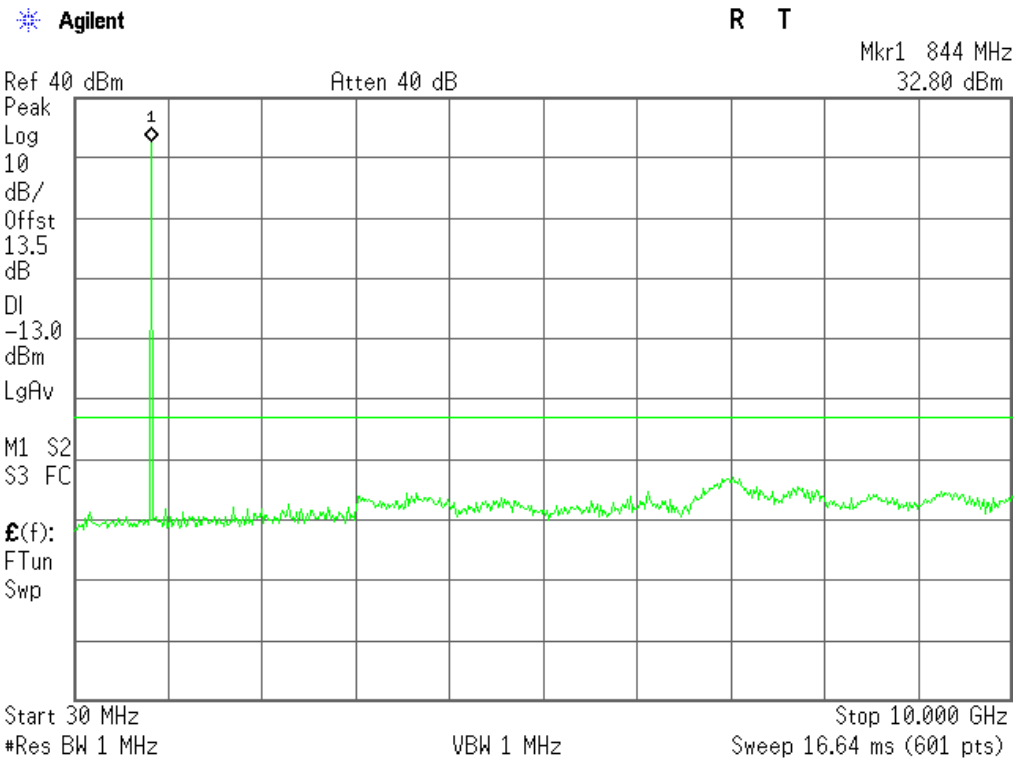
Conducted Emission Transmitting Mode CH 128 30MHz – 10GHz



Conducted Emission Transmitting Mode CH 190 30MHz – 10GHz

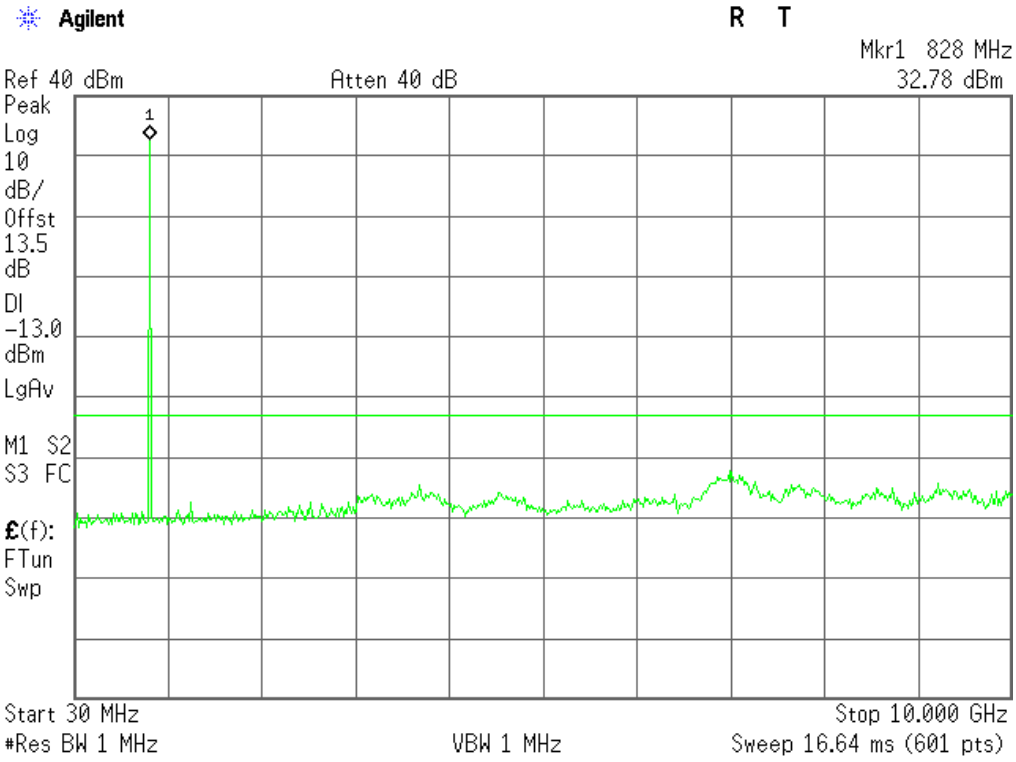


Conducted Emission Transmitting Mode CH 251 30MHz – 10GHz

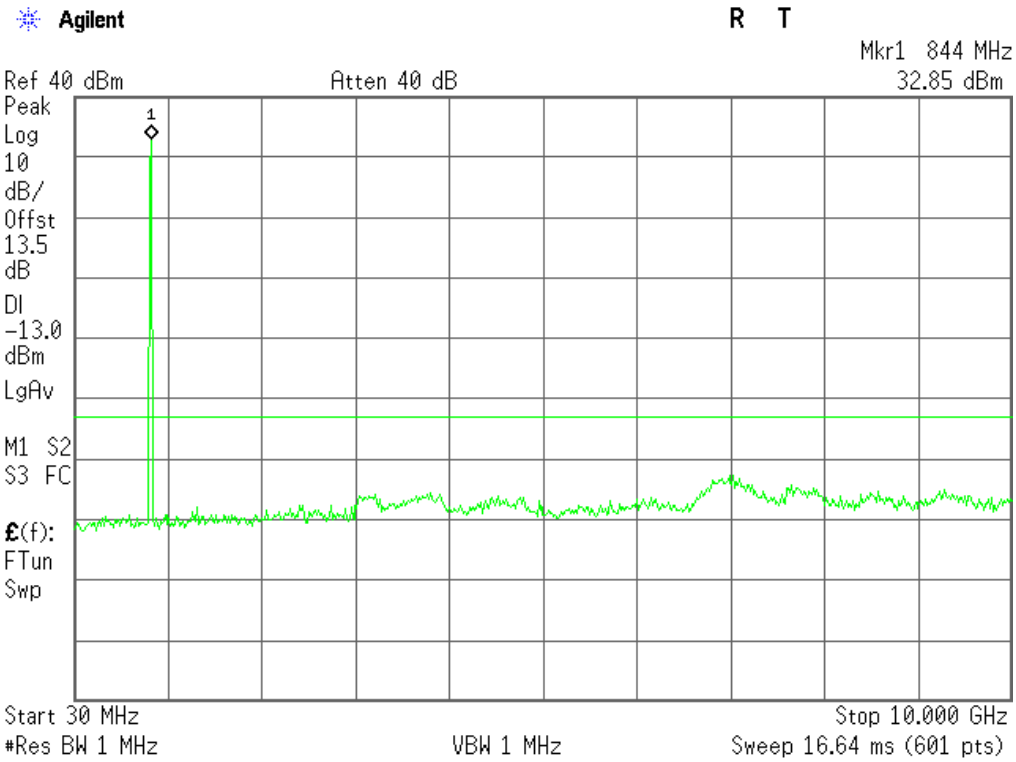


CONDUCTED EMISSION IN EGPRS 850 BAND

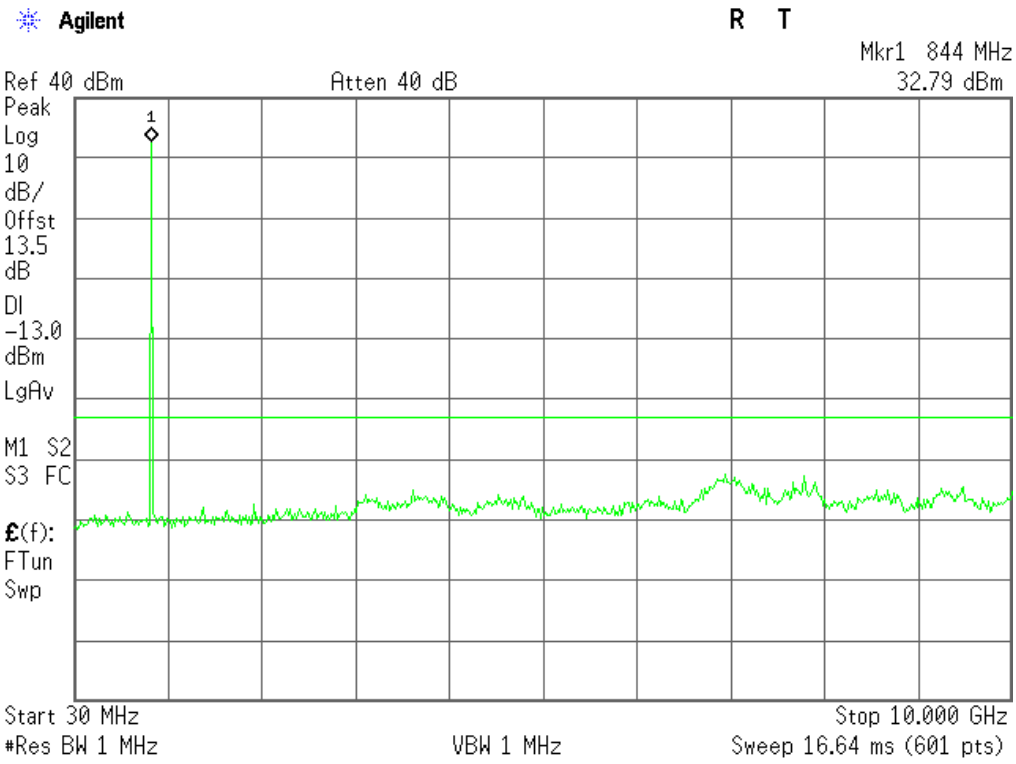
Conducted Emission Transmitting Mode CH 128 30MHz – 10GHz



Conducted Emission Transmitting Mode CH 190 30MHz – 10GHz

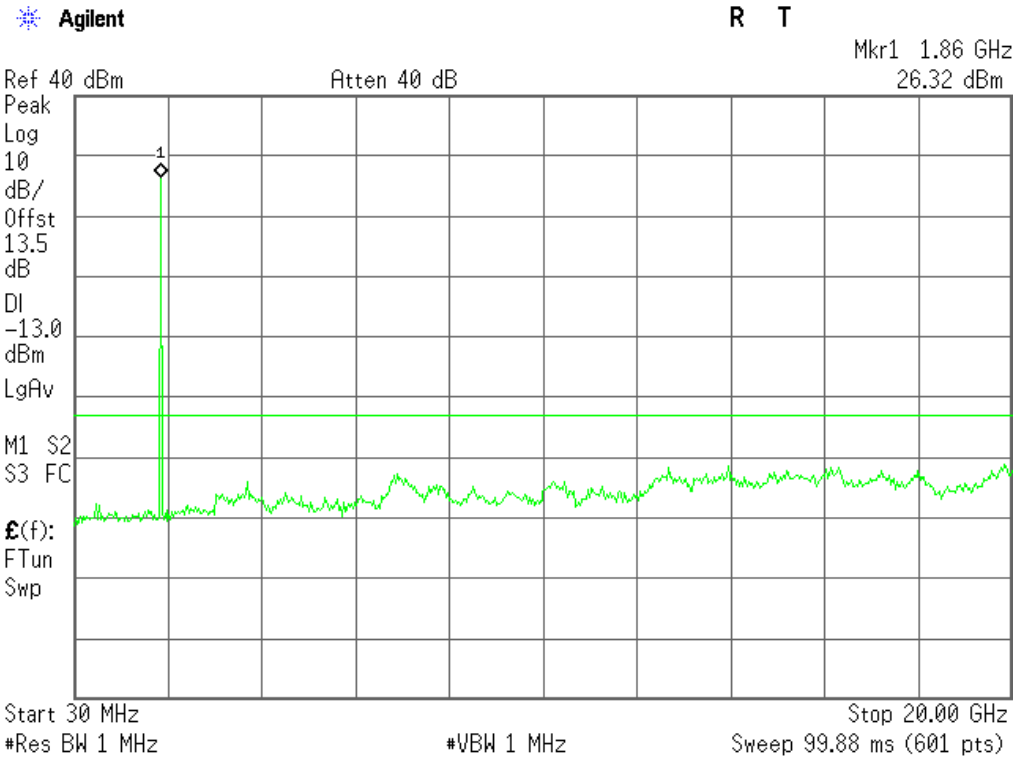


Conducted Emission Transmitting Mode CH 251 30MHz – 10GHz

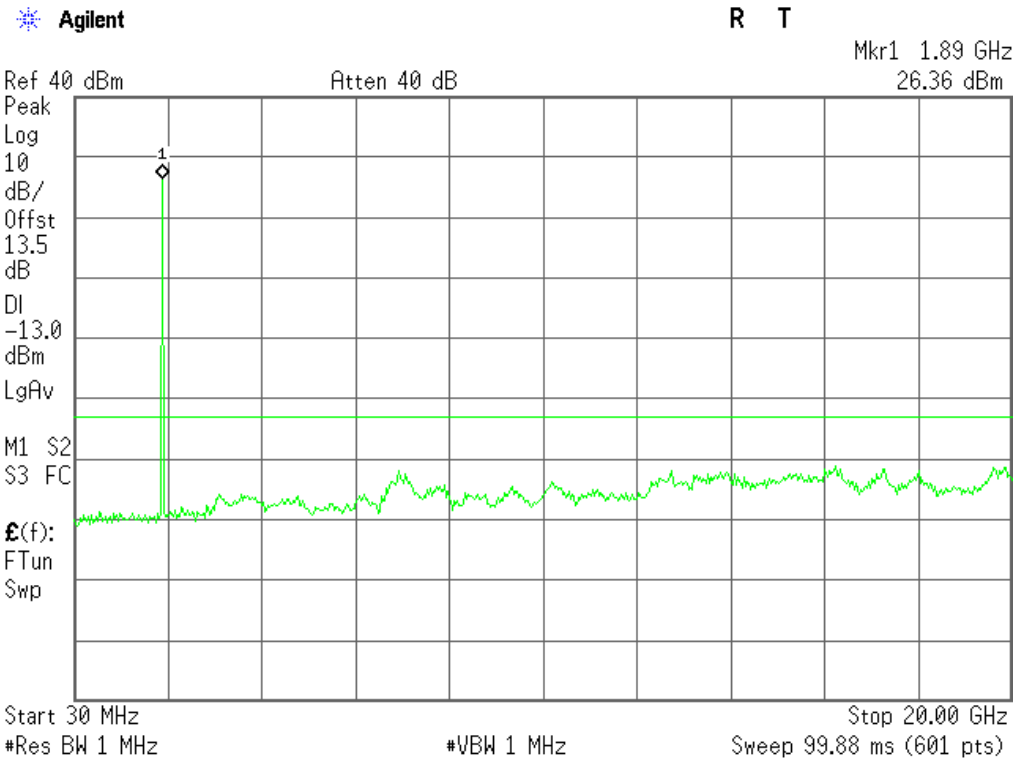


CONDUCTED EMISSION IN GSM1900 BAND

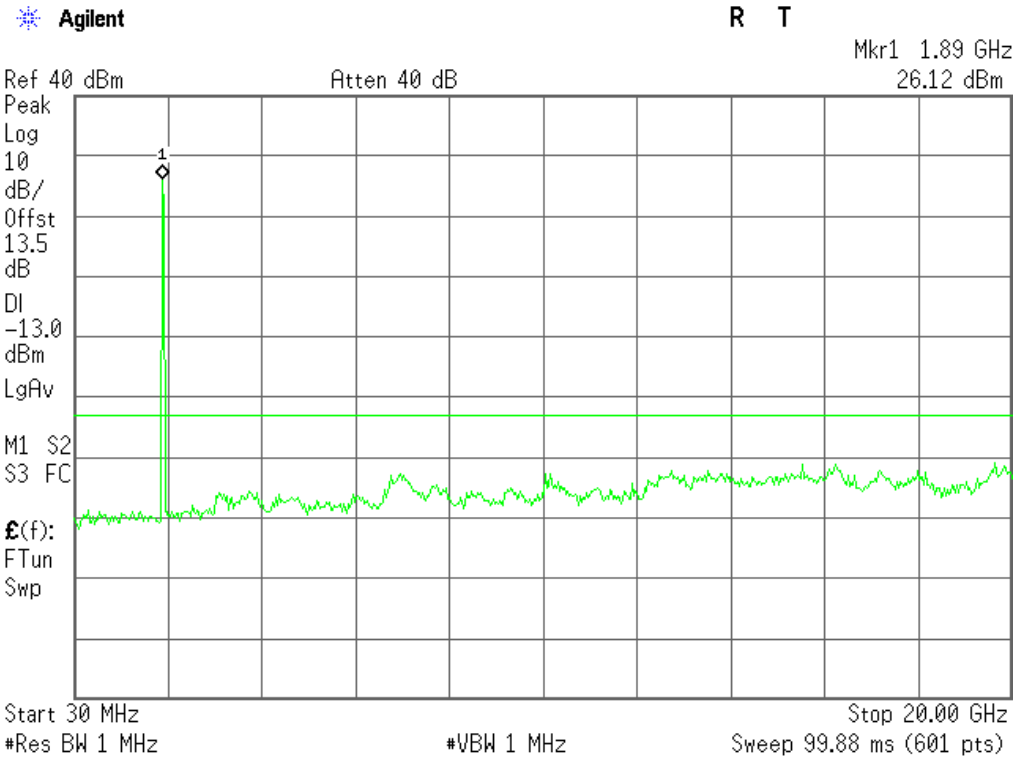
Conducted Emission Transmitting Mode CH 512 30MHz – 20GHz



Conducted Emission Transmitting Mode CH 661 30MHz – 20GHz

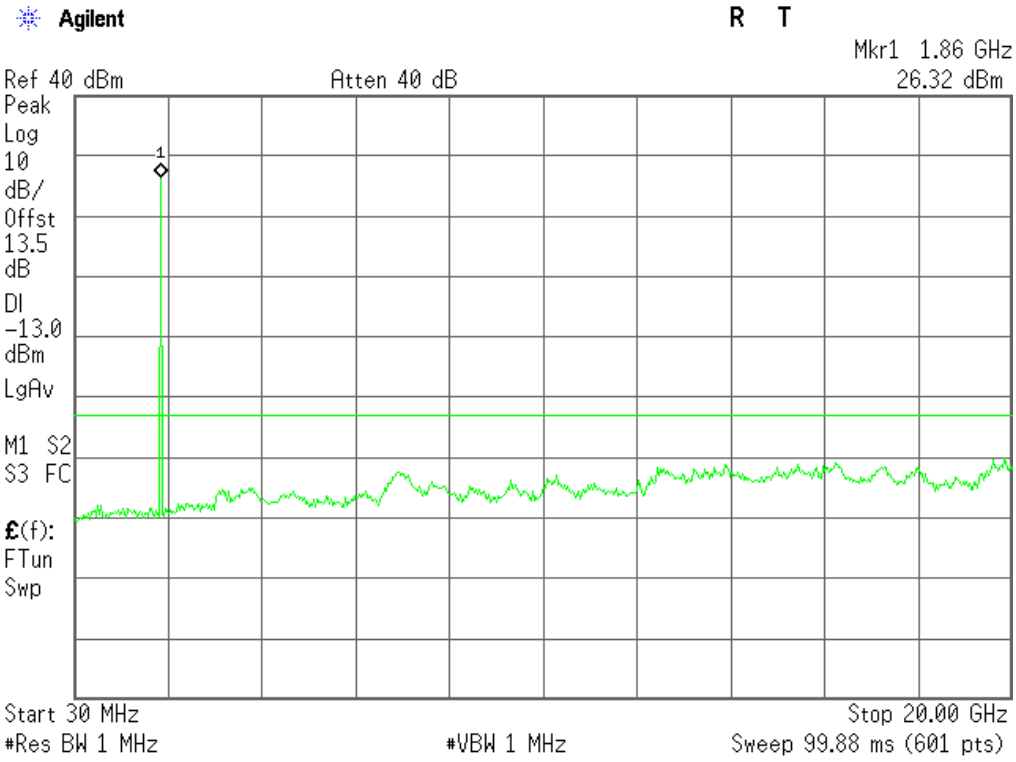


Conducted Emission Transmitting Mode CH 810 30MHz – 20GHz

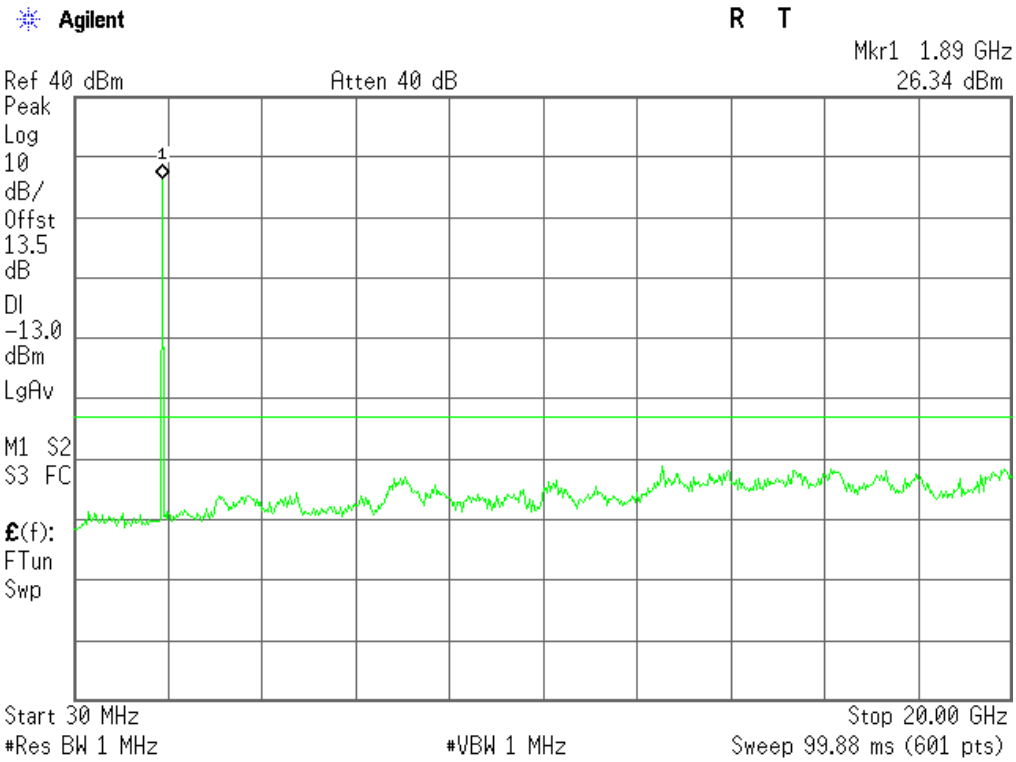


ONDUCTED EMISSION IN GPRS1900 BAND

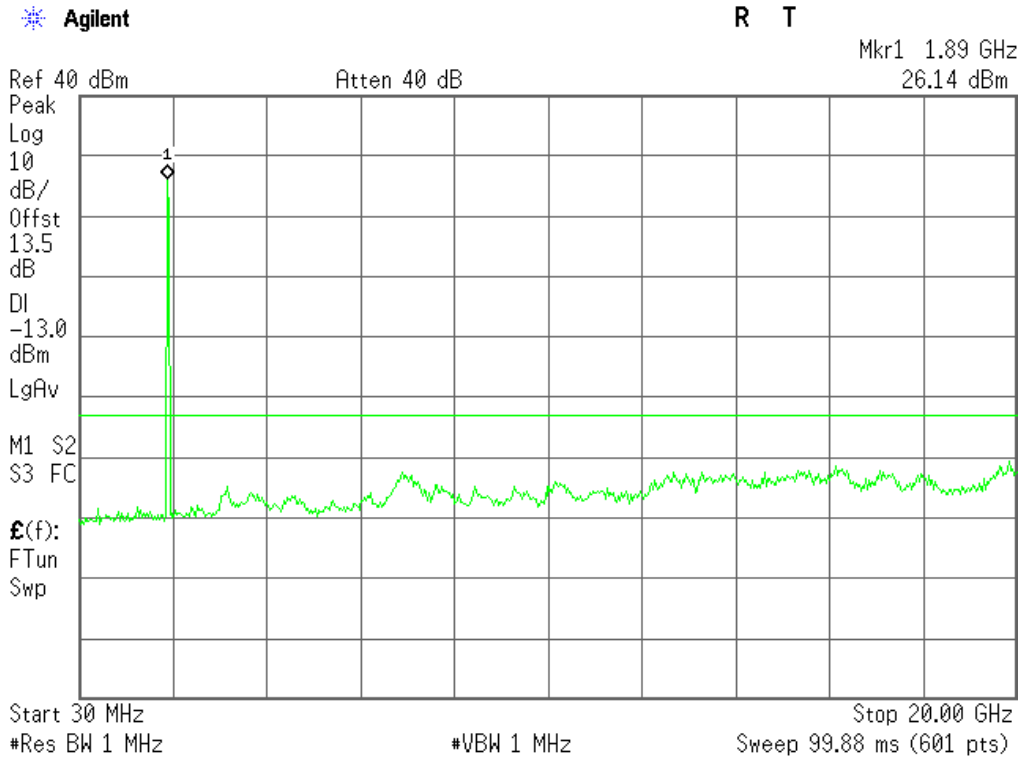
Conducted Emission Transmitting Mode CH 512 30MHz – 20GHz



Conducted Emission Transmitting Mode CH 661 30MHz – 20GHz

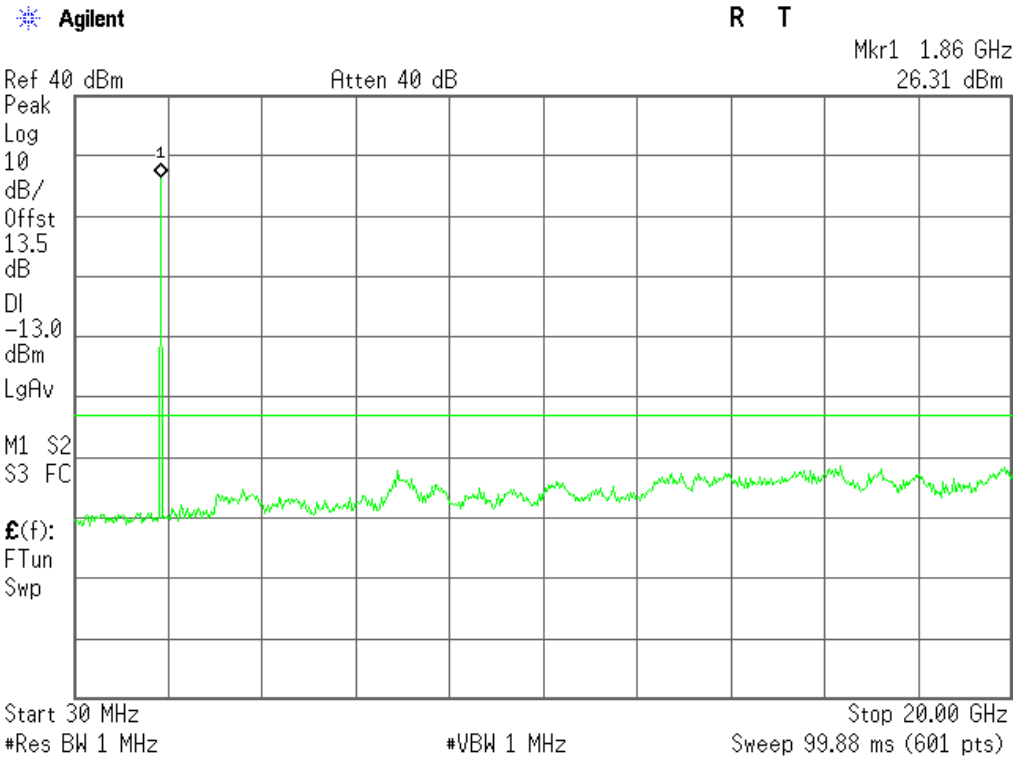


Conducted Emission Transmitting Mode CH 810 30MHz – 20GHz

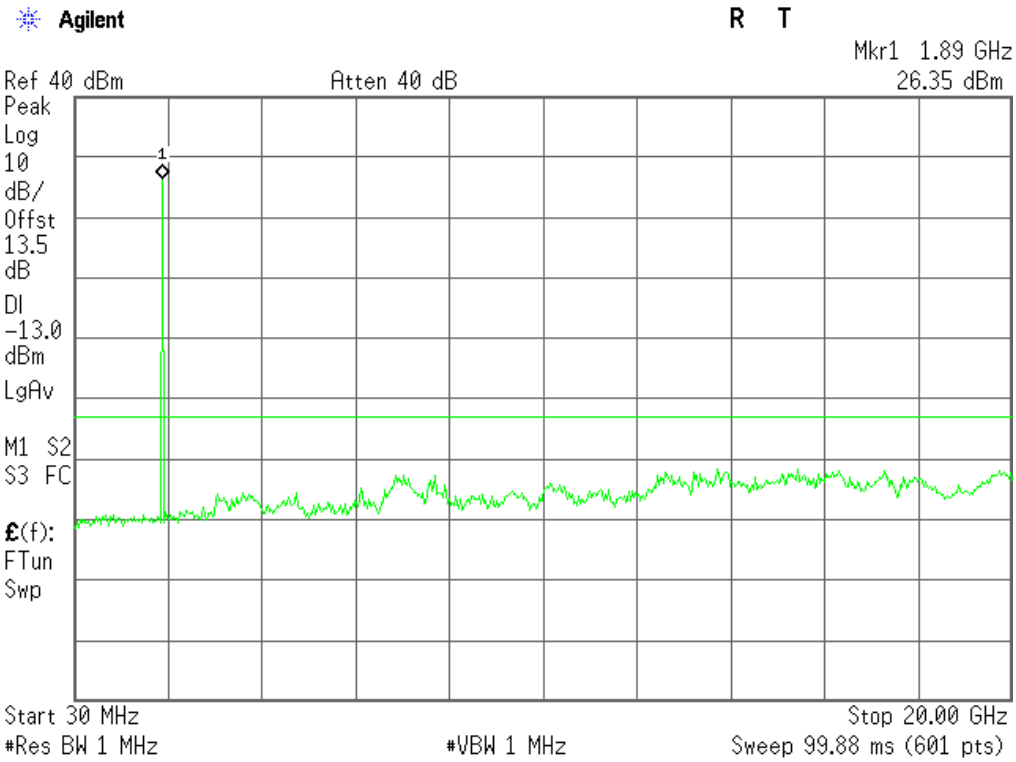


ONDUCTED EMISSION IN EGPRS1900 BAND

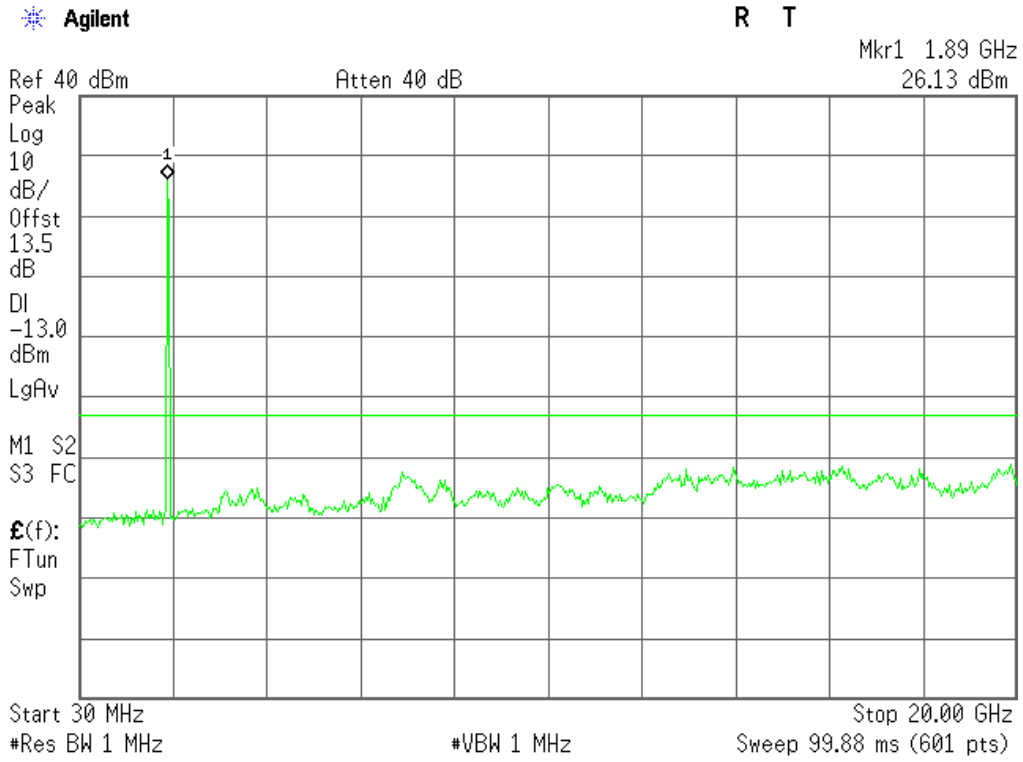
Conducted Emission Transmitting Mode CH 512 30MHz – 20GHz



Conducted Emission Transmitting Mode CH 661 30MHz – 20GHz

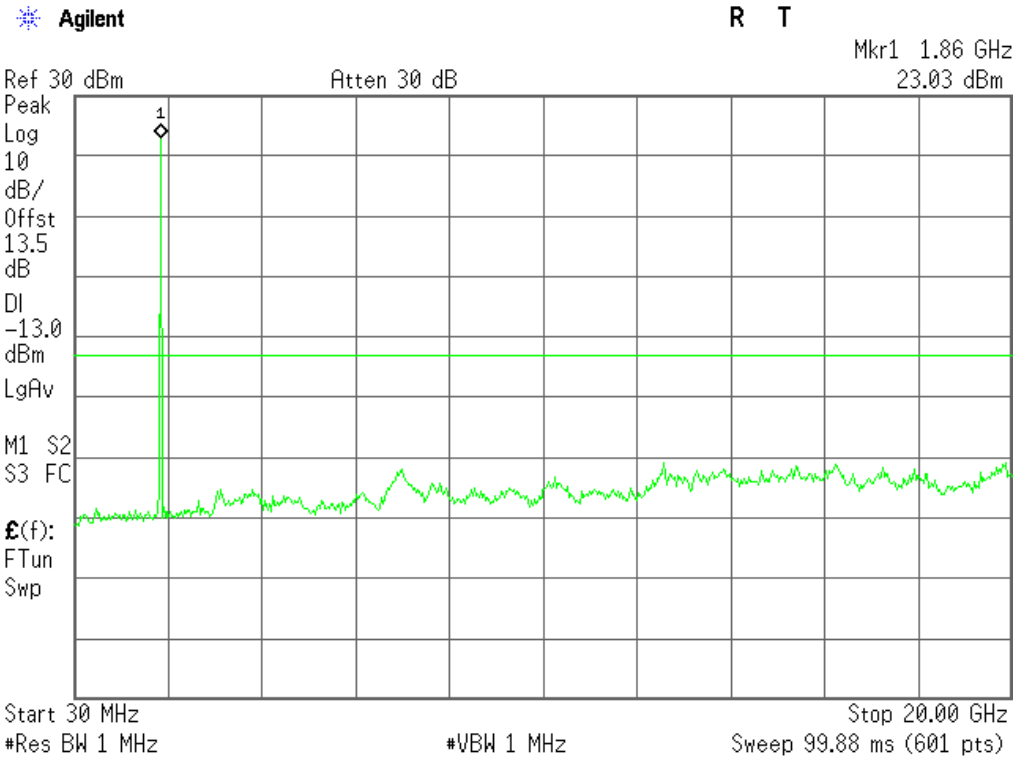


Conducted Emission Transmitting Mode CH 810 30MHz – 20GHz

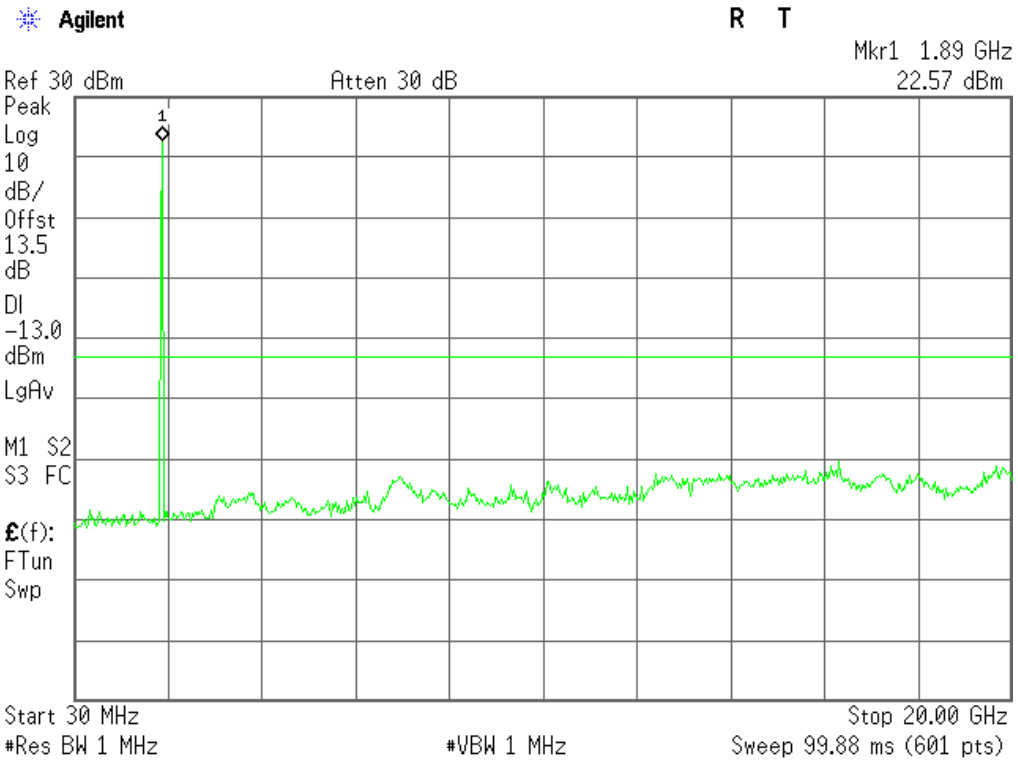


CONDUCTED EMISSION IN UMTS band II

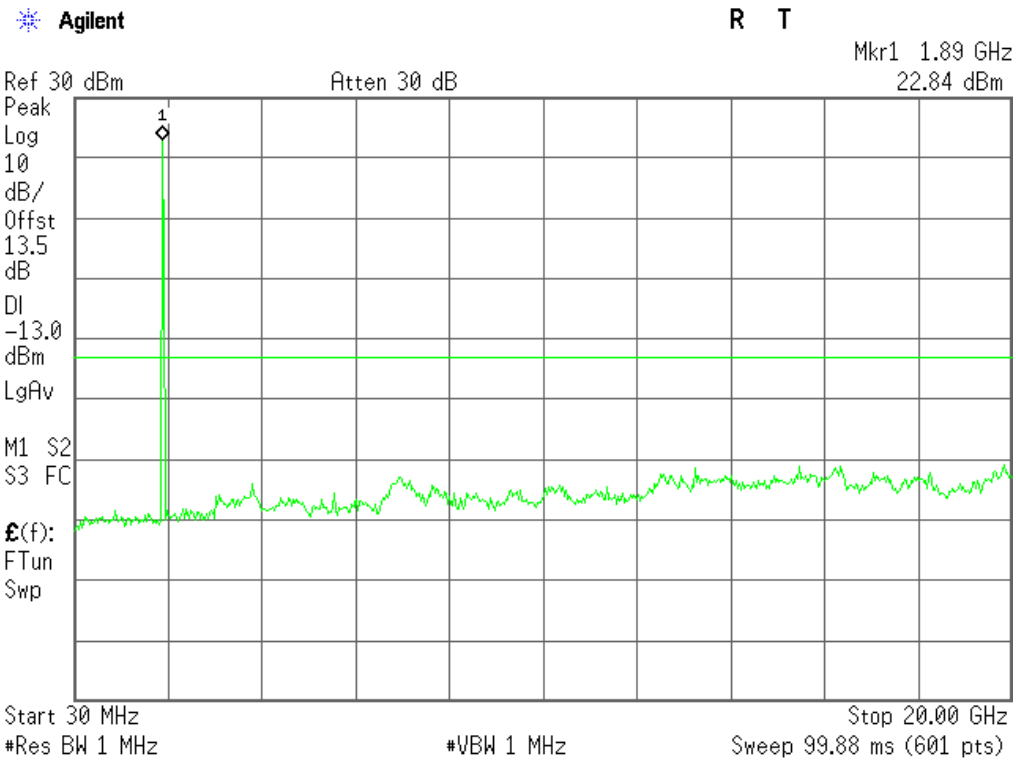
Conducted Emission Transmitting Mode 9262 30MHz – 20GHz



Conducted Emission Transmitting Mode CH 9400 30MHz – 20GHz

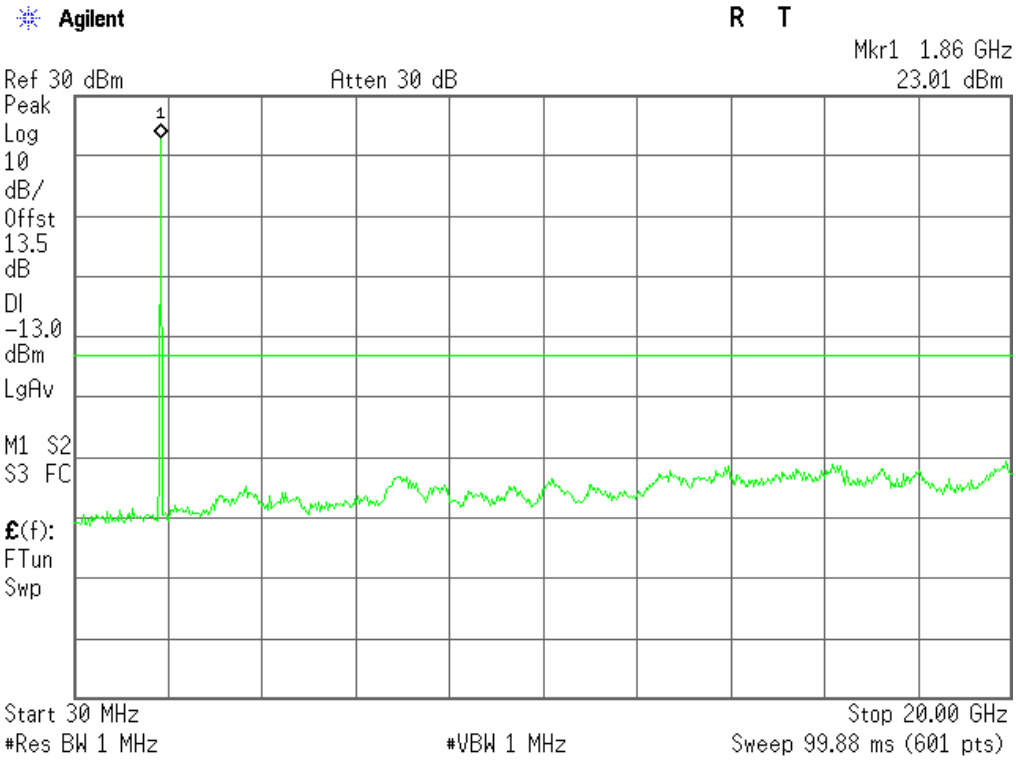


Conducted Emission Transmitting Mode CH 9538 30MHz – 20GHz

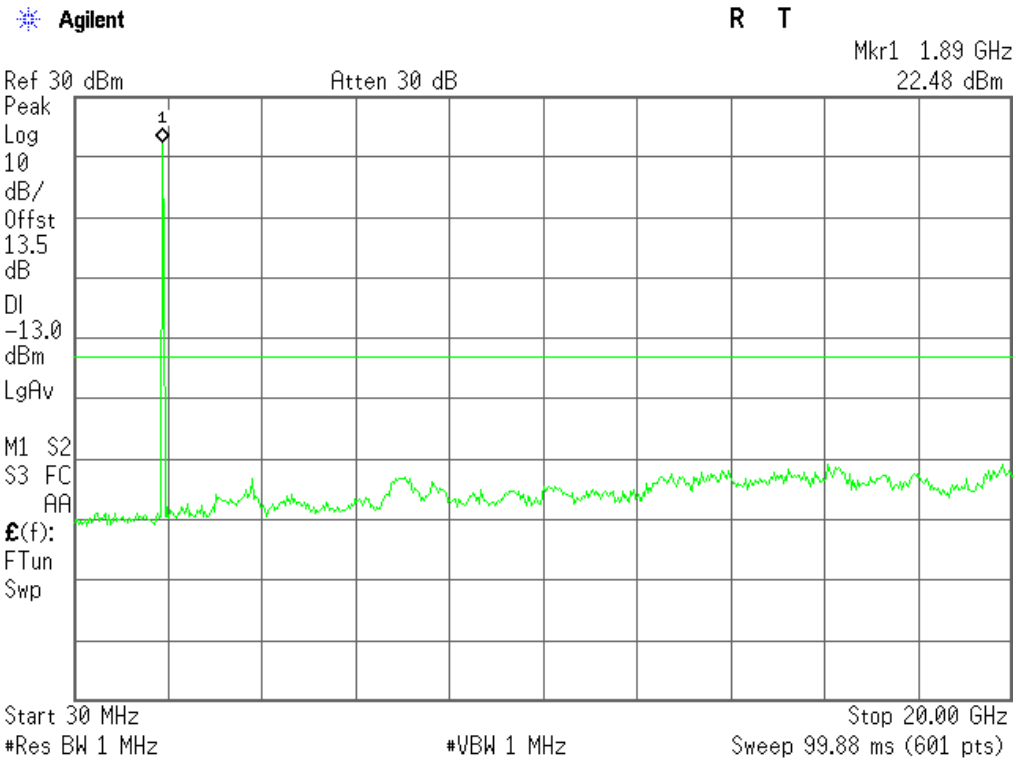


CONDUCTED EMISSION IN HSDPA band II

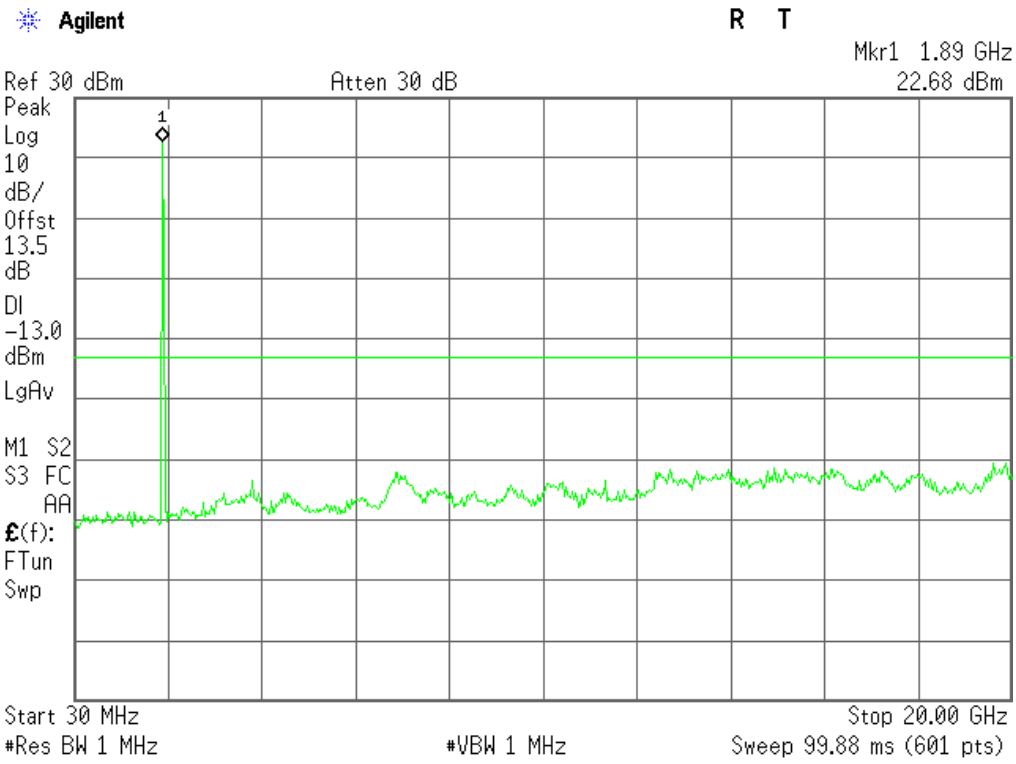
Conducted Emission Transmitting Mode 9262 30MHz – 20GHz



Conducted Emission Transmitting Mode CH 9400 30MHz – 20GHz



Conducted Emission Transmitting Mode CH 9538 30MHz – 20GHz

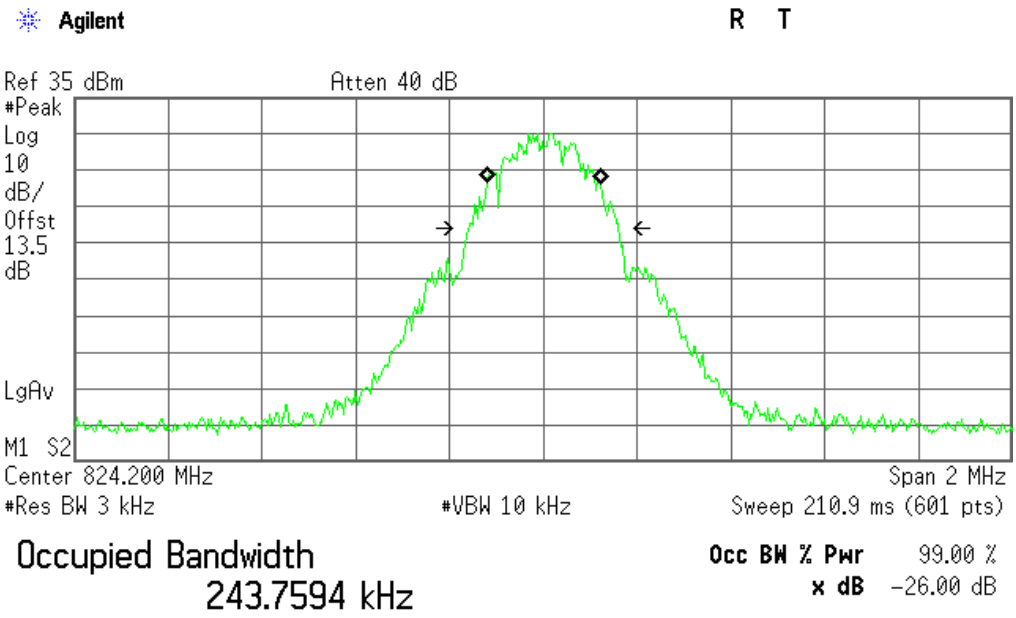


APPENDIX II

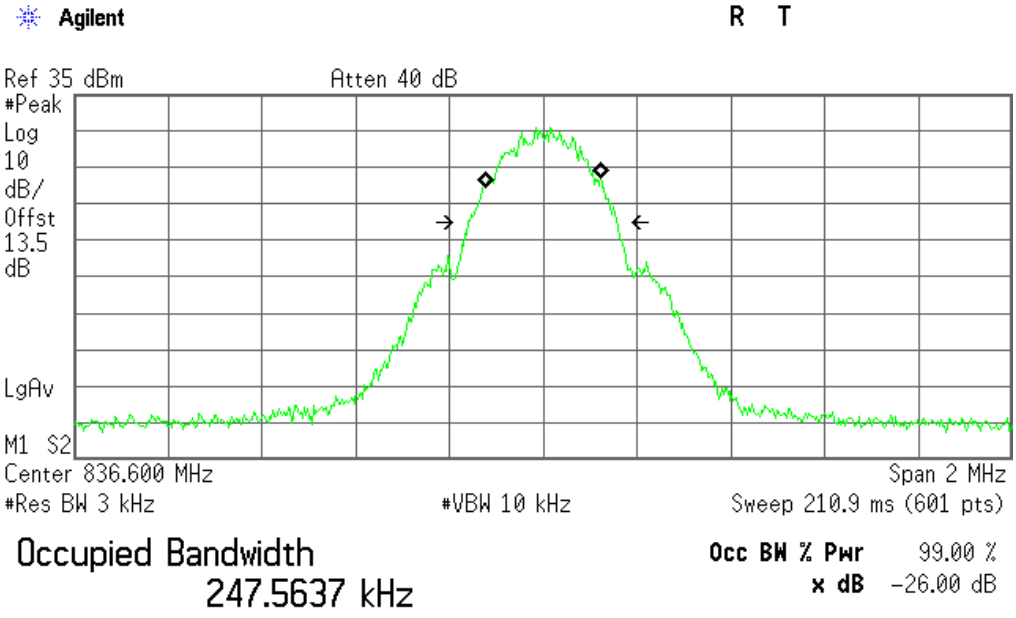
TEST PLOTS FOR OCCUPIED BANDWIDTH (99%)

EMISSION BANDWIDTH (-26dBC)

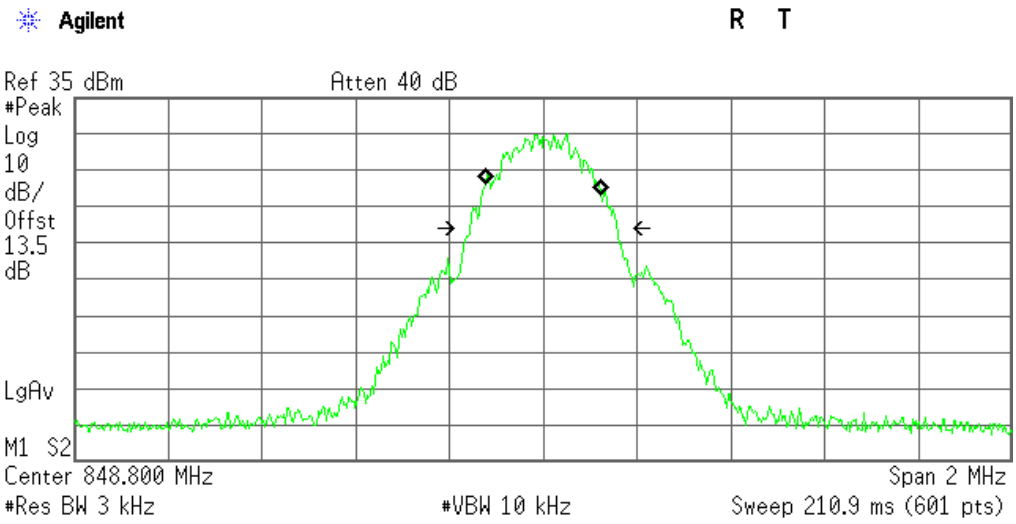
Occupied Bandwidth (99%) GSM 850 BAND CH 128



Occupied Bandwidth (99%) GSM 850 BAND CH 190



Occupied Bandwidth (99%) GSM 850 BAND CH 251

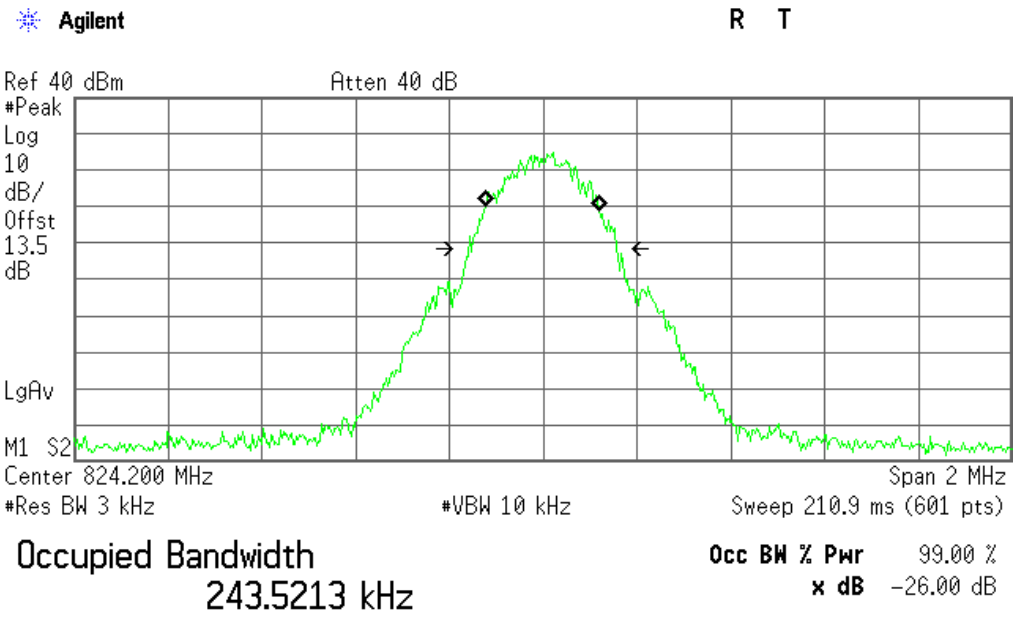


Occupied Bandwidth
247.7145 kHz

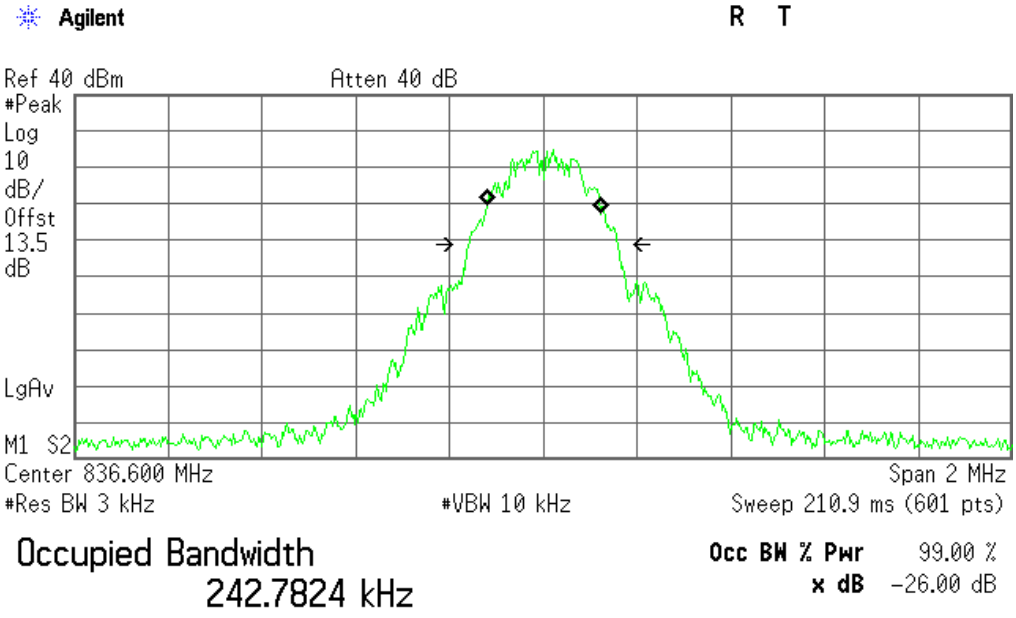
Occ BW % Pwr 99.00 %
x dB -26.00 dB

Transmit Freq Error 265.303 Hz
x dB Bandwidth 314.416 kHz

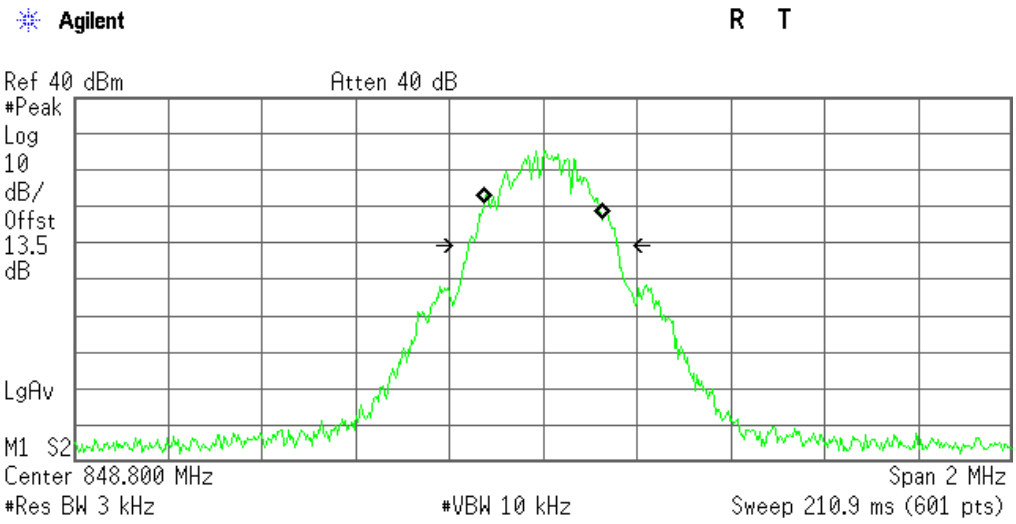
Occupied Bandwidth (99%) GRPS 850 BAND CH 128



Occupied Bandwidth (99%) GRPS 850 BAND CH 190



Occupied Bandwidth (99%) GRPS 850 BAND CH 251

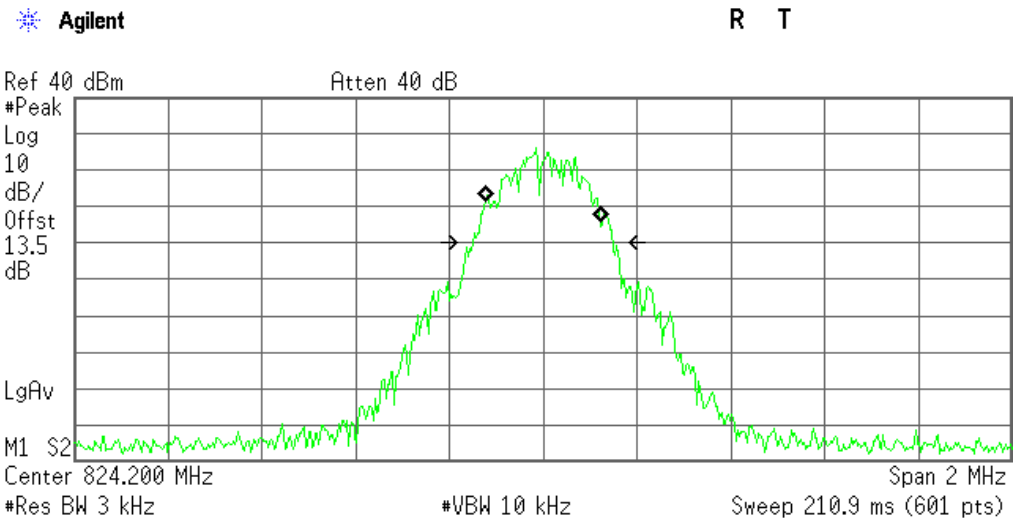


Occupied Bandwidth
253.5244 kHz

Occ BW % Pwr 99.00 %
x dB -26.00 dB

Transmit Freq Error 1.147 kHz
x dB Bandwidth 320.121 kHz

Occupied Bandwidth (99%) EGPRS 850 BAND CH 128

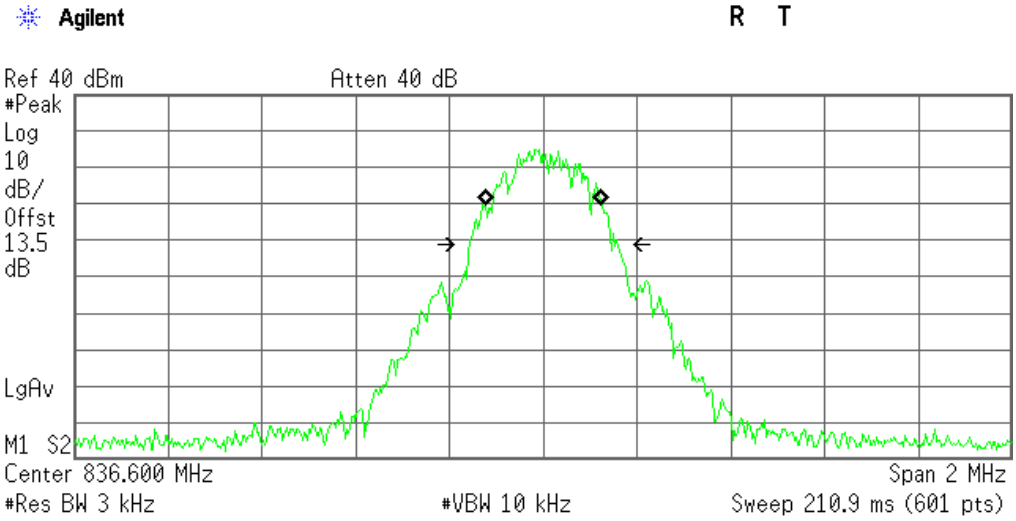


Occupied Bandwidth
245.9459 kHz

Occ BW % Pwr 99.00 %
x dB -26.00 dB

Transmit Freq Error -1.060 kHz
x dB Bandwidth 299.072 kHz

Occupied Bandwidth (99%) EGPRS 850 BAND CH 190

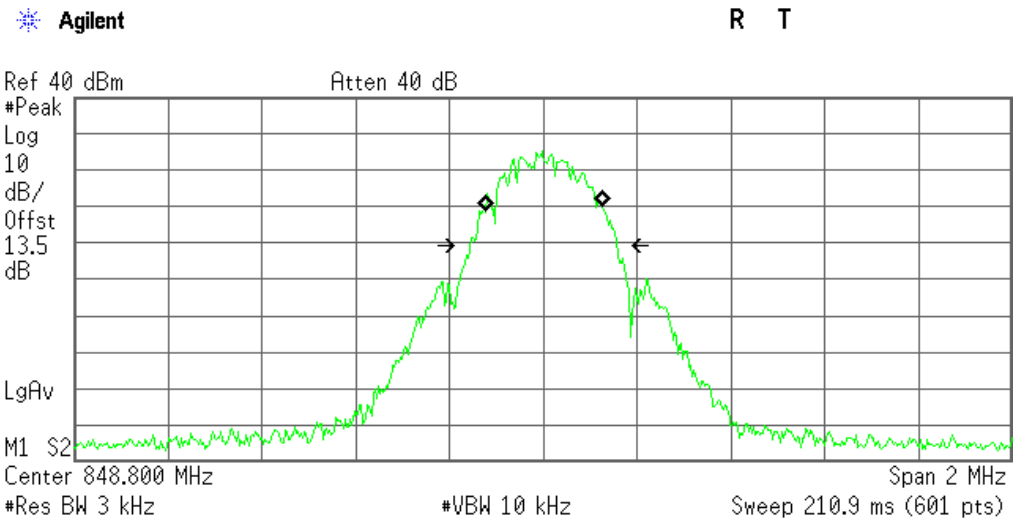


Occupied Bandwidth
249.1124 kHz

Occ BW % Pwr 99.00 %
x dB -26.00 dB

Transmit Freq Error -340.293 Hz
x dB Bandwidth 317.161 kHz

Occupied Bandwidth (99%) EGPRS 850 BAND CH 251

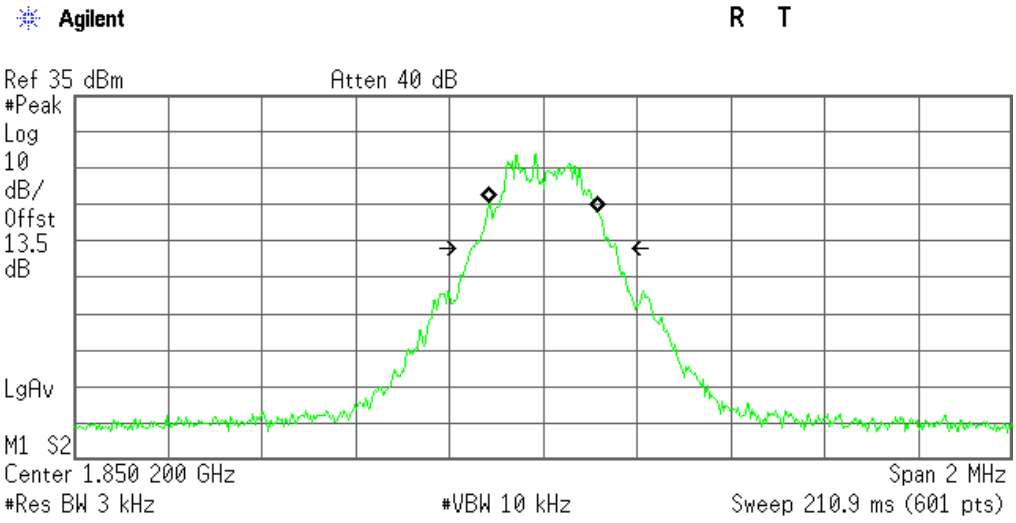


Occupied Bandwidth
250.3092 kHz

Occ BW % Pwr 99.00 %
x dB -26.00 dB

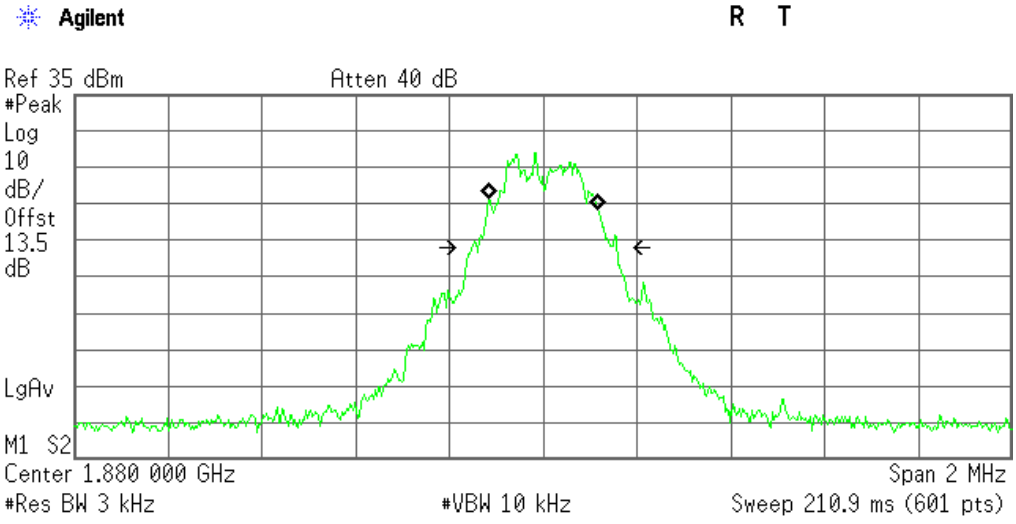
Transmit Freq Error 874.417 Hz
x dB Bandwidth 313.771 kHz

Occupied Bandwidth (99%) PCS 1900 BAND CH 512



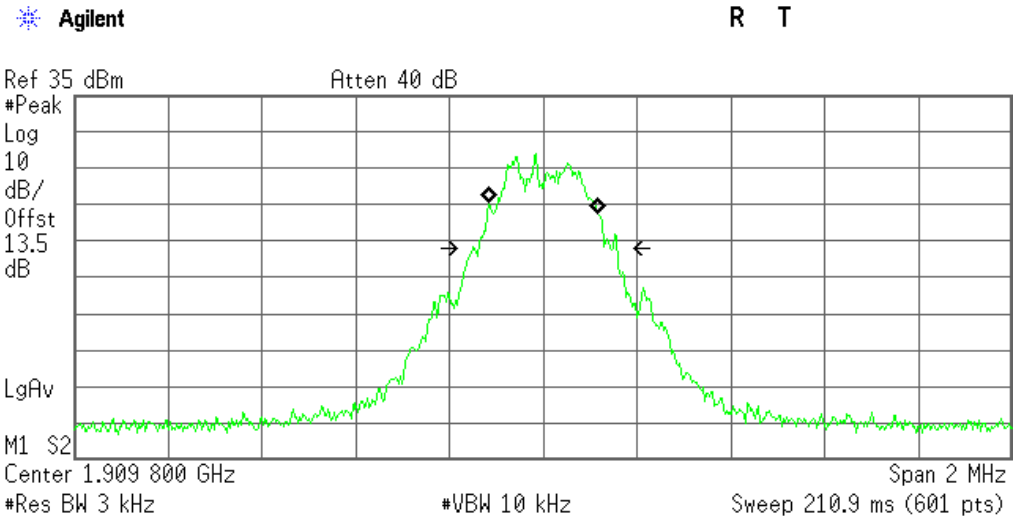
Transmit Freq Error -29.090 Hz
x dB Bandwidth 310.341 kHz

Occupied Bandwidth (99%) PCS 1900 BAND CH 661



Transmit Freq Error -42.954 Hz
x dB Bandwidth 312.421 kHz

Occupied Bandwidth (99%) PCS 1900 BAND CH 810

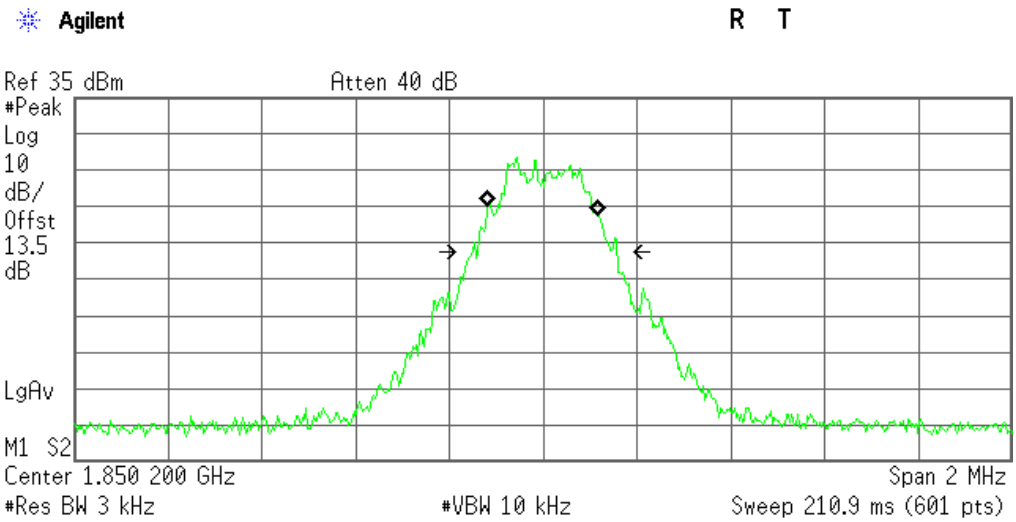


Occupied Bandwidth
235.2166 kHz

Occ BW % Pwr 99.00 %
x dB -26.00 dB

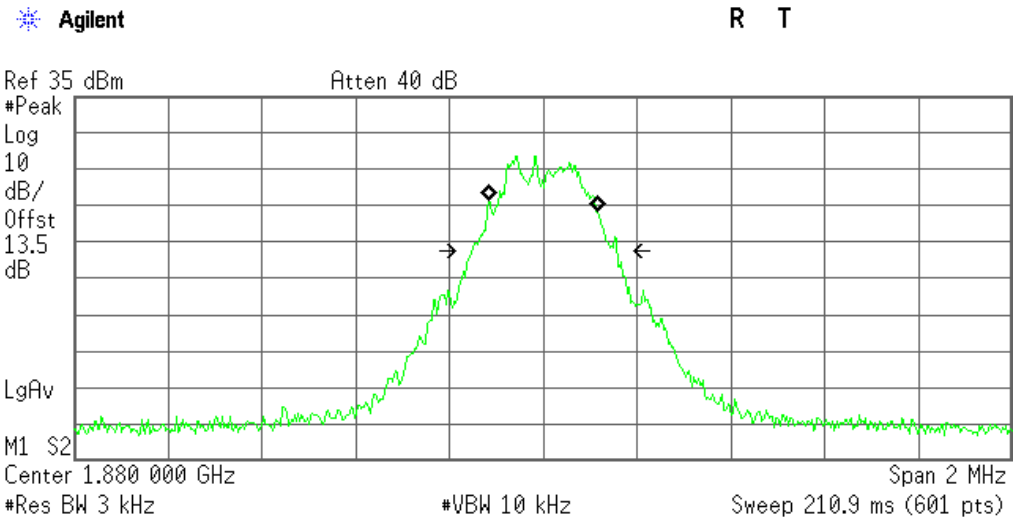
Transmit Freq Error 709.842 Hz
x dB Bandwidth 310.247 kHz

Occupied Bandwidth (99%) GPRS 1900 BAND CH 512



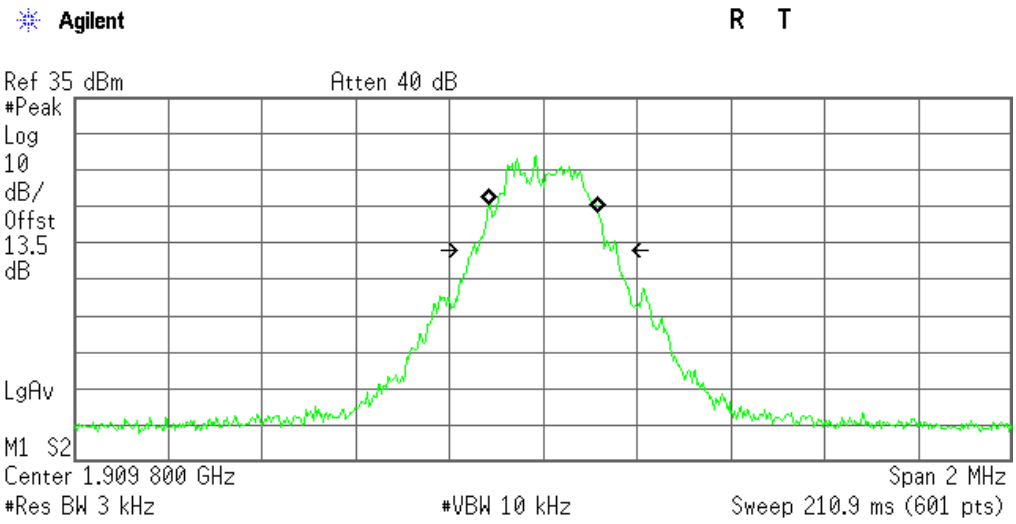
Transmit Freq Error -610.495 Hz
x dB Bandwidth 310.401 kHz

Occupied Bandwidth (99%) GPRS 1900 BAND CH 661



Transmit Freq Error -207.379 Hz
x dB Bandwidth 310.488 kHz

Occupied Bandwidth (99%) GPRS 1900 BAND CH 810

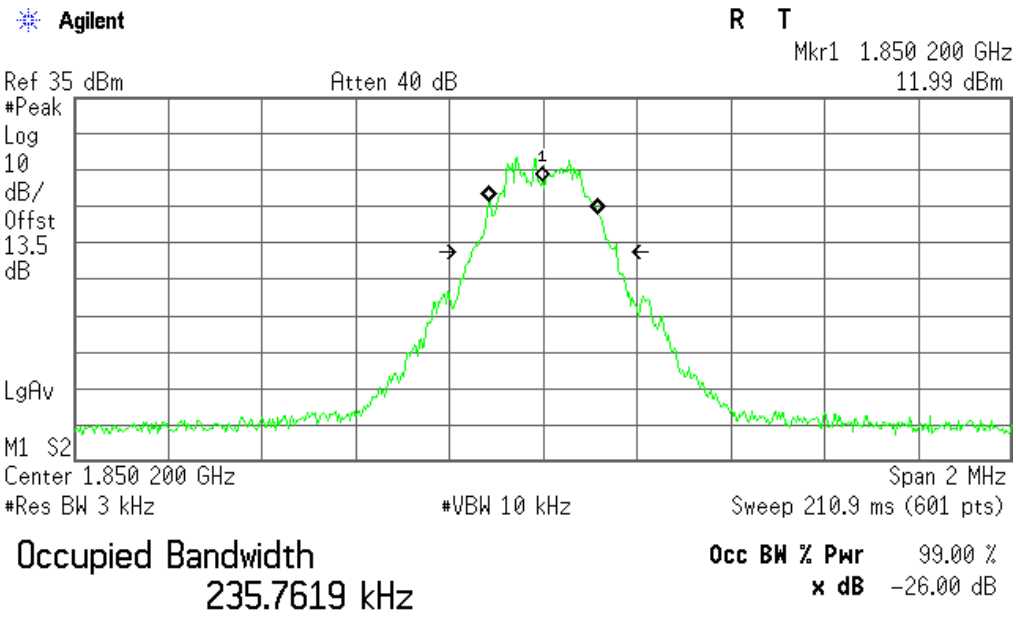


Occupied Bandwidth
233.6975 kHz

Occ BW % Pwr 99.00 %
x dB -26.00 dB

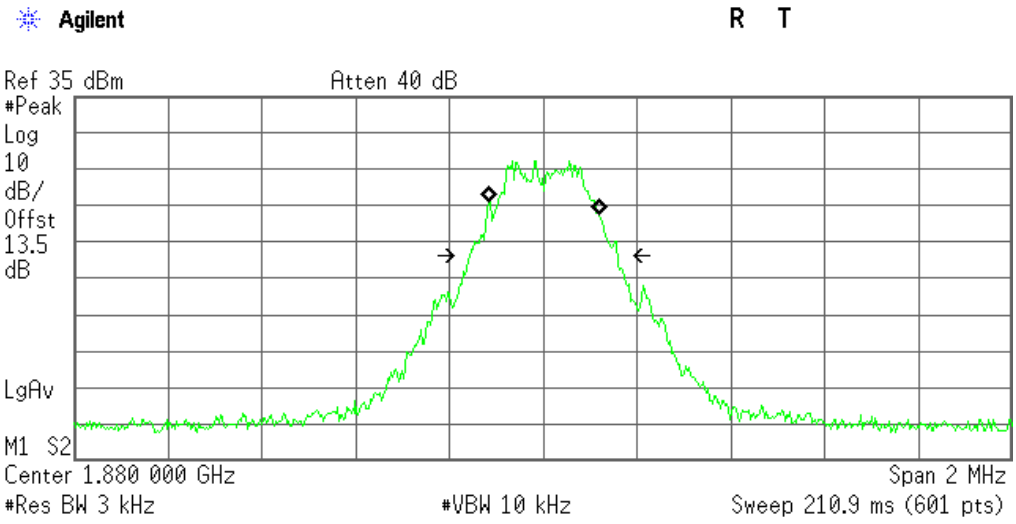
Transmit Freq Error -102.579 Hz
x dB Bandwidth 308.739 kHz

Occupied Bandwidth (99%) EGPRS 1900 BAND CH 512



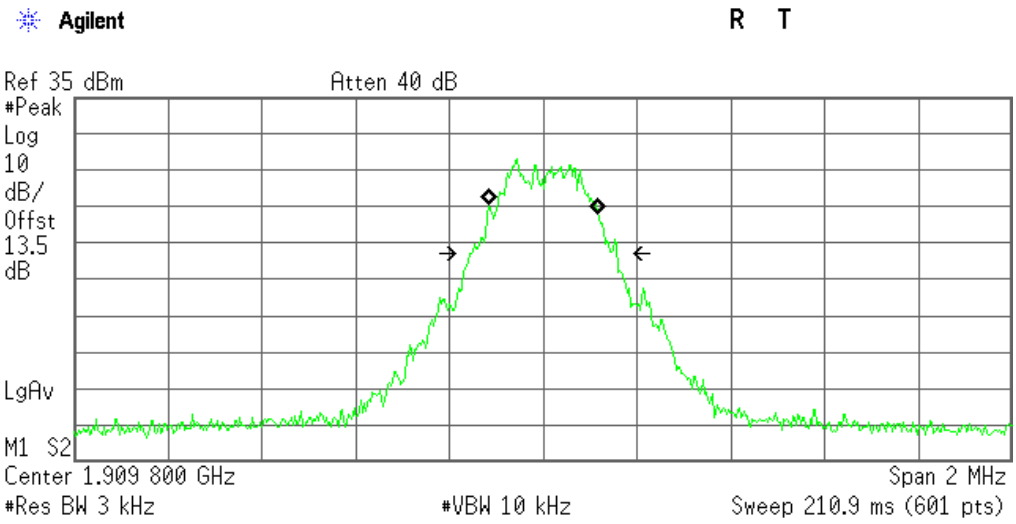
Transmit Freq Error 275.503 Hz
x dB Bandwidth 311.688 kHz

Occupied Bandwidth (99%) EGPRS 1900 BAND CH 661



Transmit Freq Error 770.388 Hz
x dB Bandwidth 314.814 kHz

Occupied Bandwidth (99%) EGPRS 1900 BAND CH 810

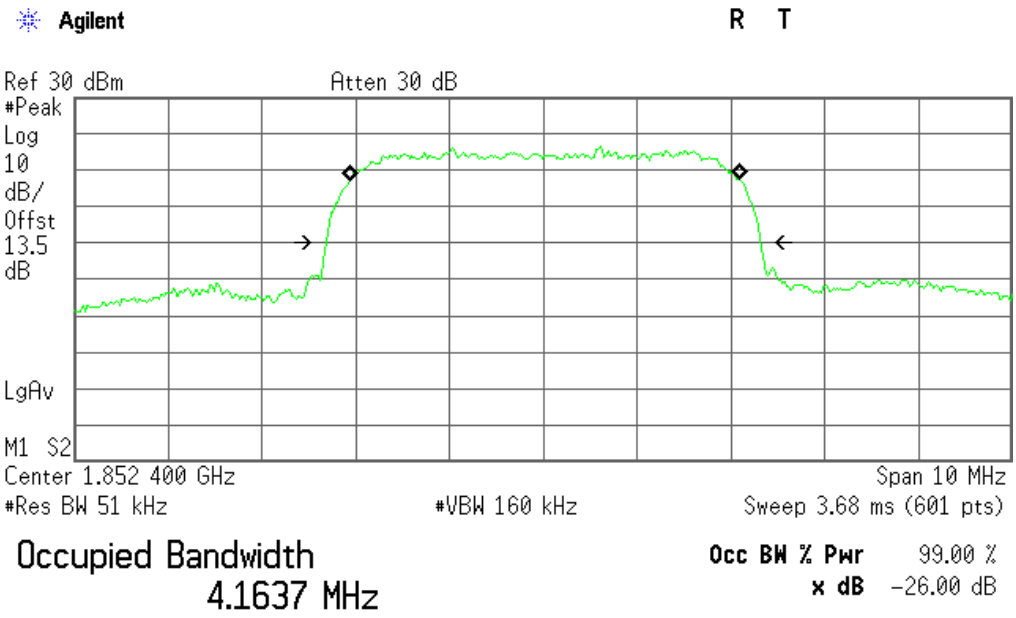


Occupied Bandwidth
234.4834 kHz

Occ BW % Pwr 99.00 %
x dB -26.00 dB

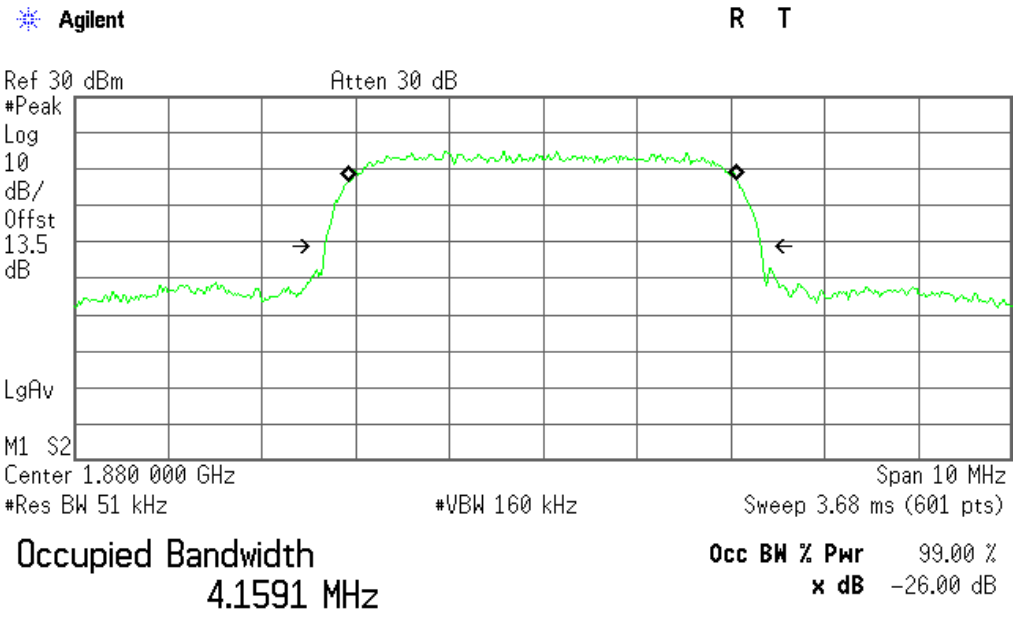
Transmit Freq Error 546.859 Hz
x dB Bandwidth 312.939 kHz

Occupied Bandwidth (99%) UMTS BAND II CH 9262



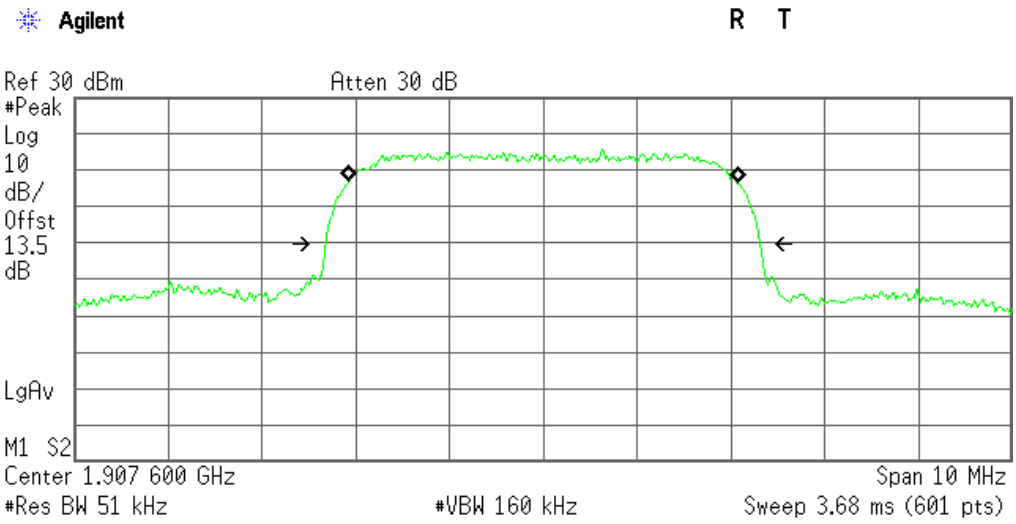
Transmit Freq Error 13.833 kHz
x dB Bandwidth 4.641 MHz

Occupied Bandwidth (99%) UMTS BAND II CH 9400



Transmit Freq Error -10.097 kHz
x dB Bandwidth 4.651 MHz

Occupied Bandwidth (99%) UMTS BAND II CH 9538

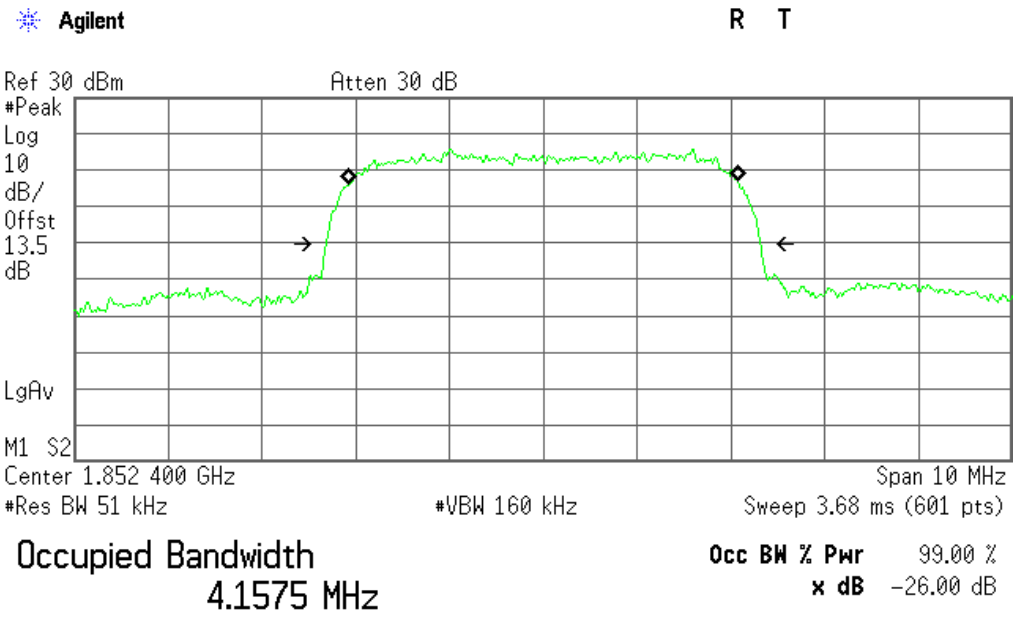


Occupied Bandwidth
4.1637 MHz

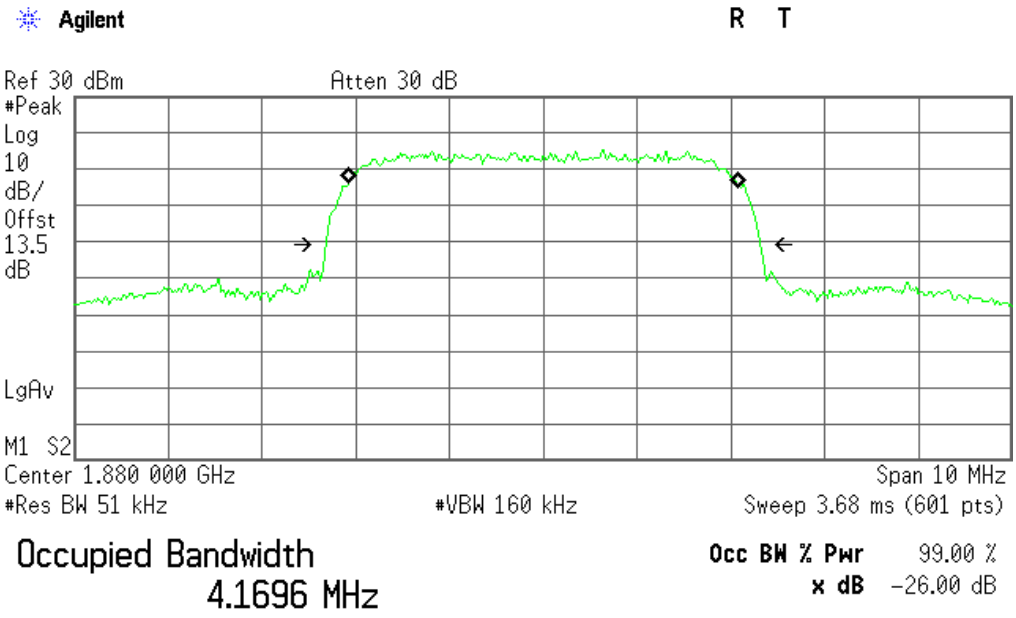
Occ BW % Pwr 99.00 %
x dB -26.00 dB

Transmit Freq Error -4.758 kHz
x dB Bandwidth 4.647 MHz

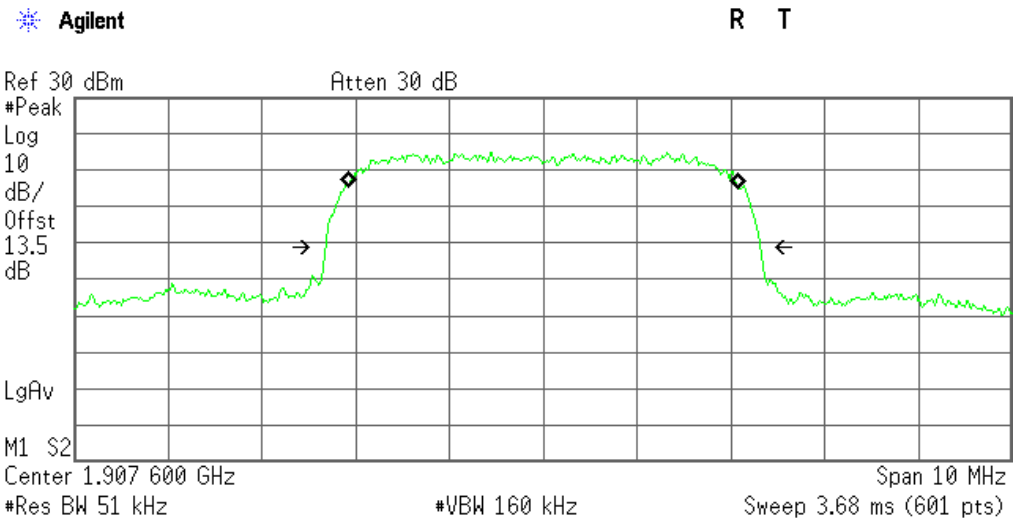
Occupied Bandwidth (99%) HSDPA BAND II CH 9262



Occupied Bandwidth (99%) HSDPA BAND II CH 9400



Occupied Bandwidth (99%) HSDPA BAND II CH 9538



Occupied Bandwidth
4.1716 MHz

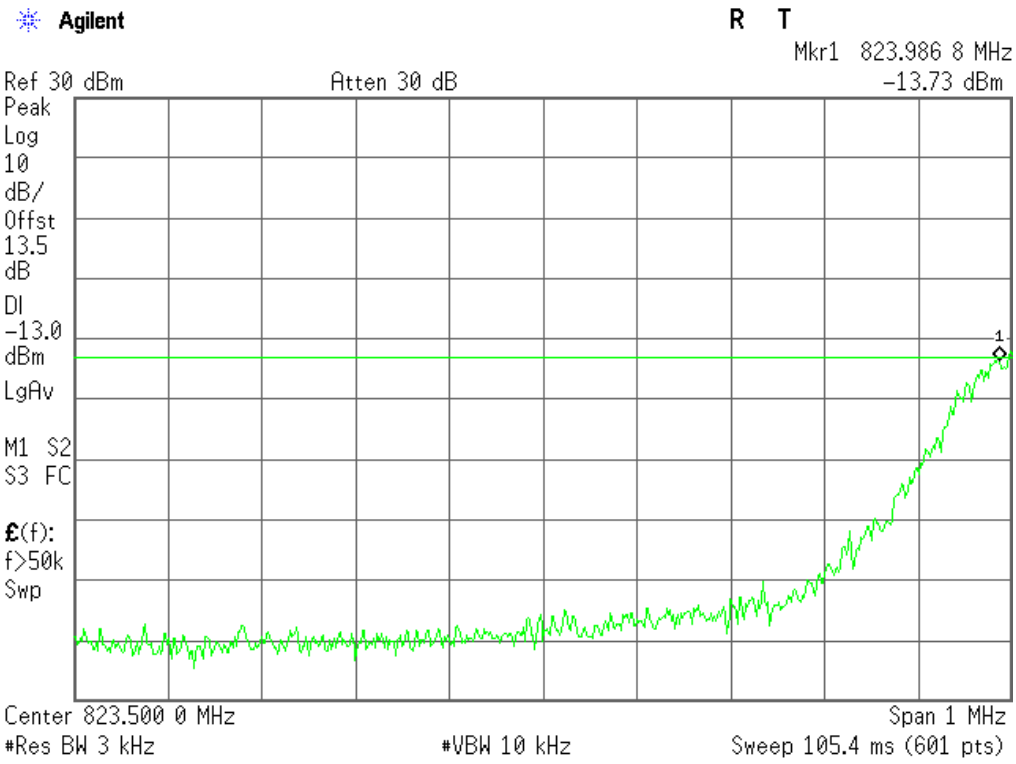
Occ BW % Pwr 99.00 %
x dB -26.00 dB

Transmit Freq Error -1.787 kHz
x dB Bandwidth 4.647 MHz

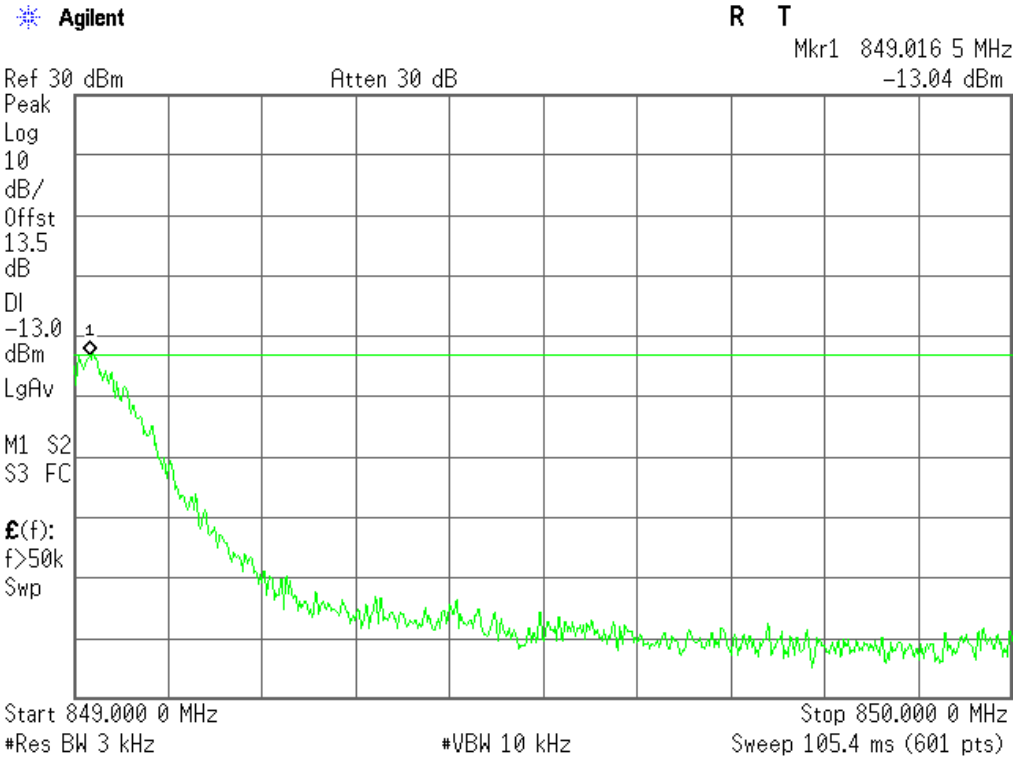
APPENDIX III

TEST PLOTS FOR BAND EDGES

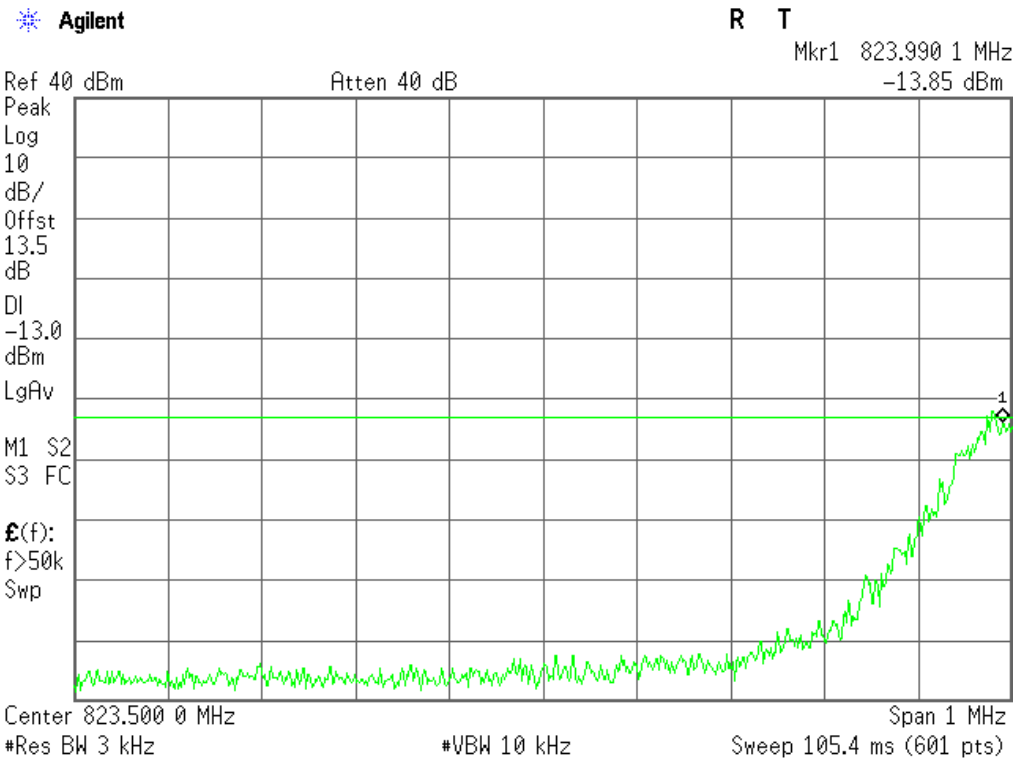
Low Band Edge GSM 850 BAND CH 128



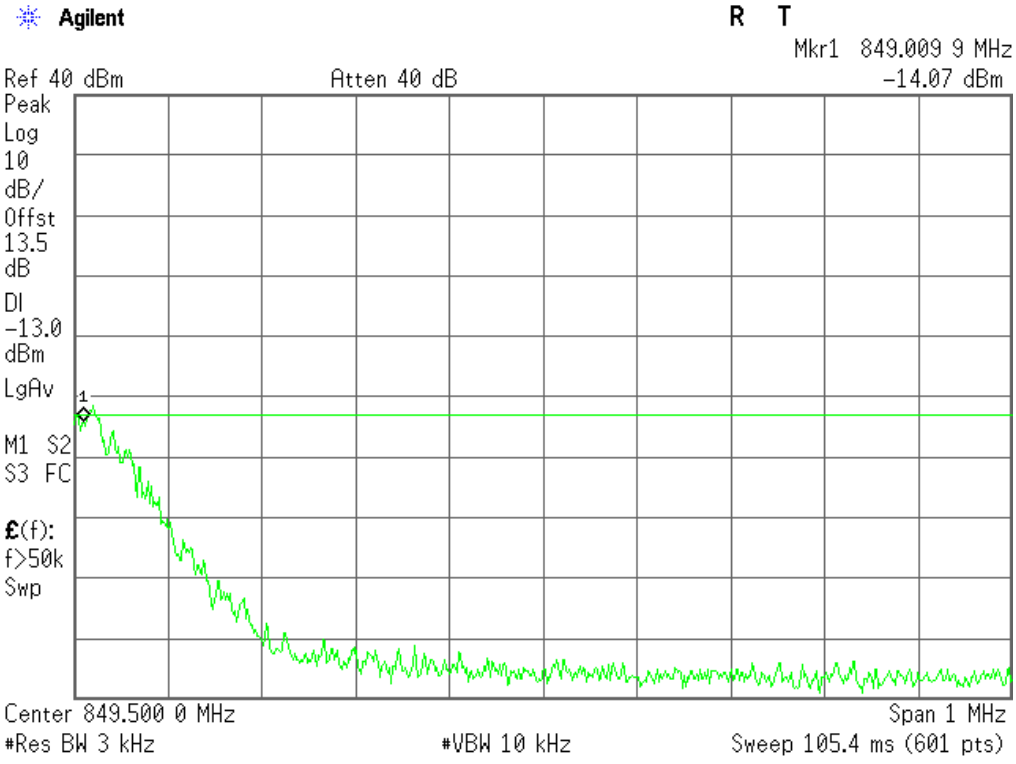
High Band Edge GSM 850 BAND CH 251



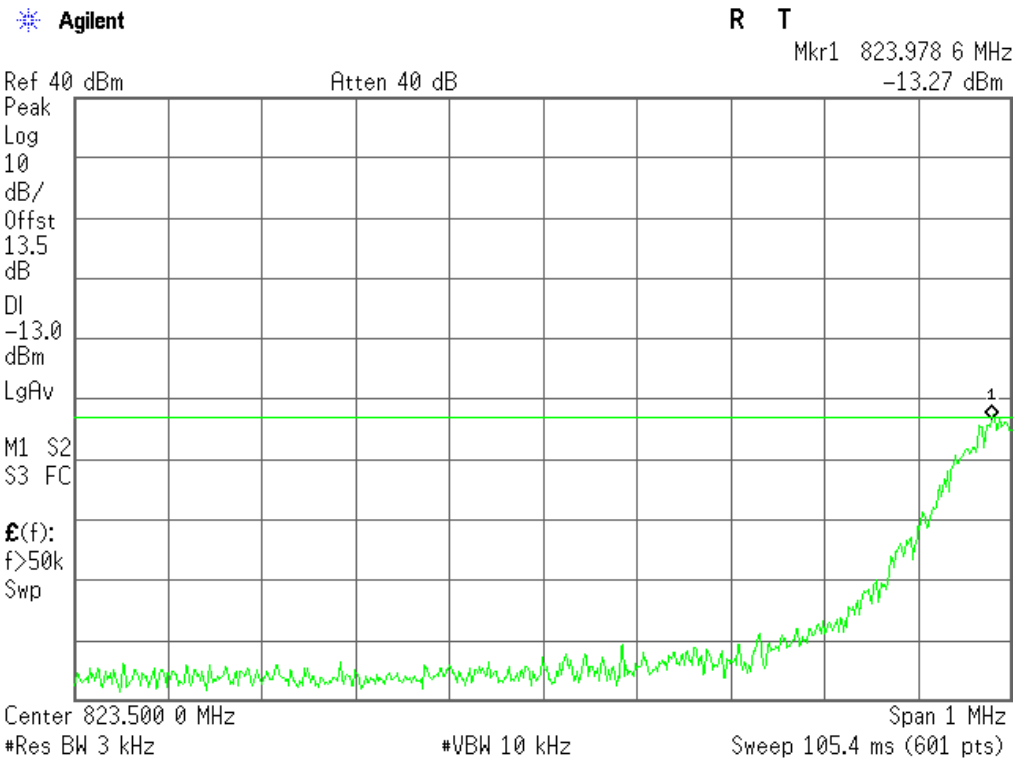
Low Band Edge GPRS 850 BAND CH 128



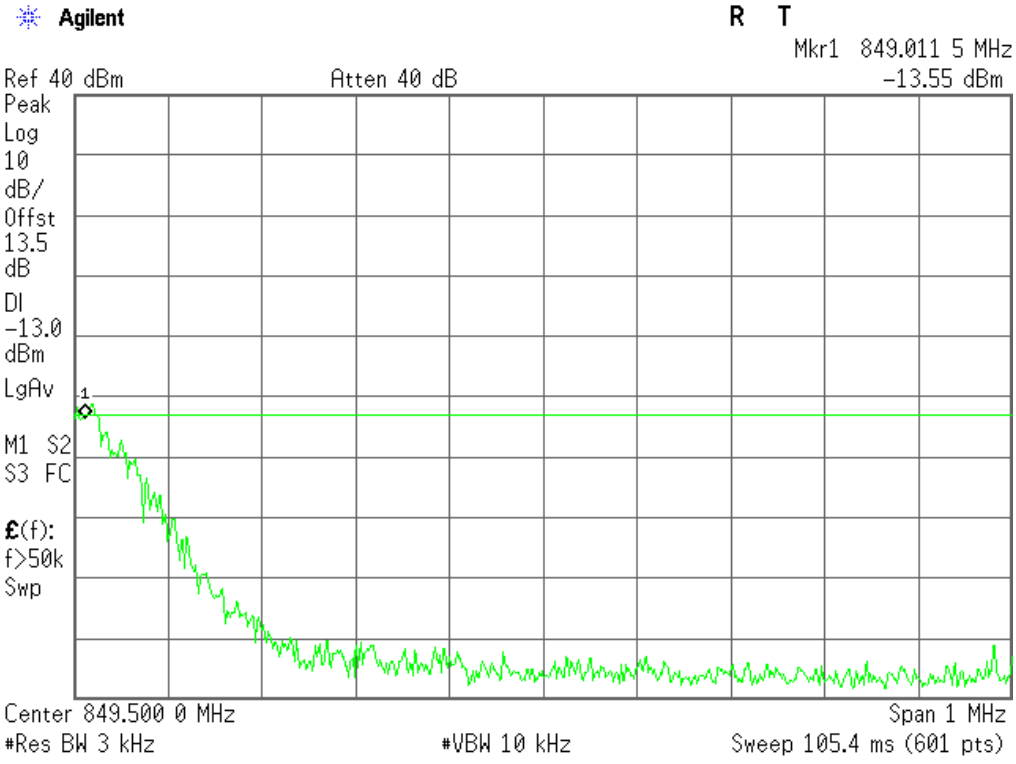
High Band Edge GPRS 850 BAND CH 251



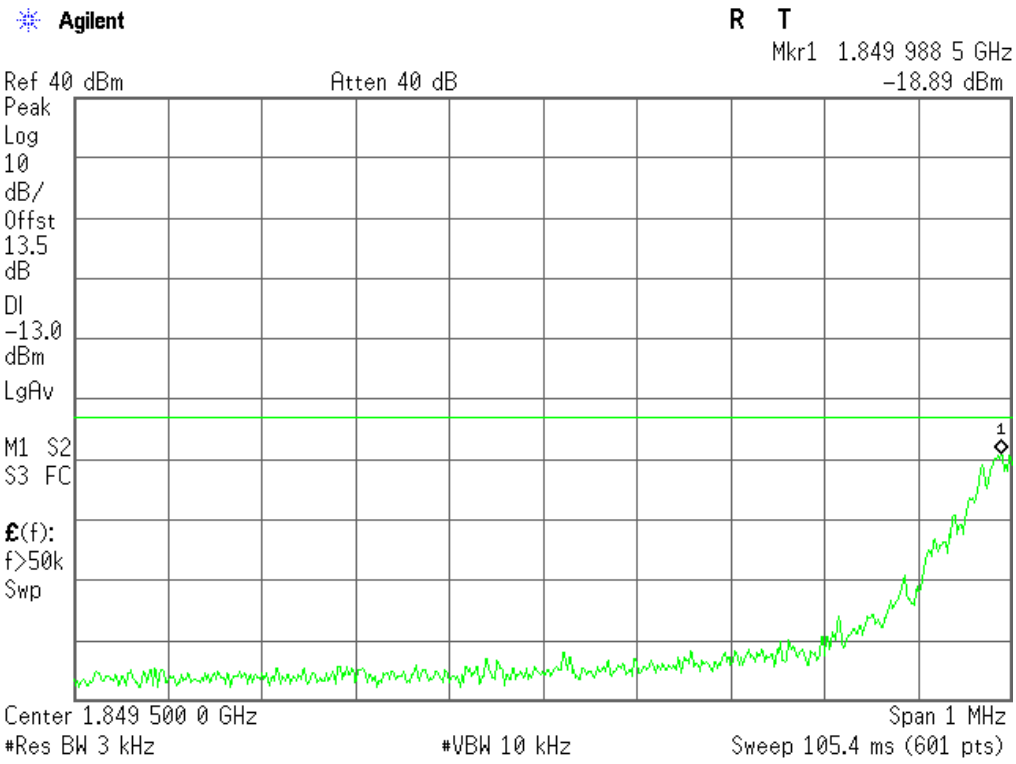
Low Band Edge EGPRS 850 BAND CH 128



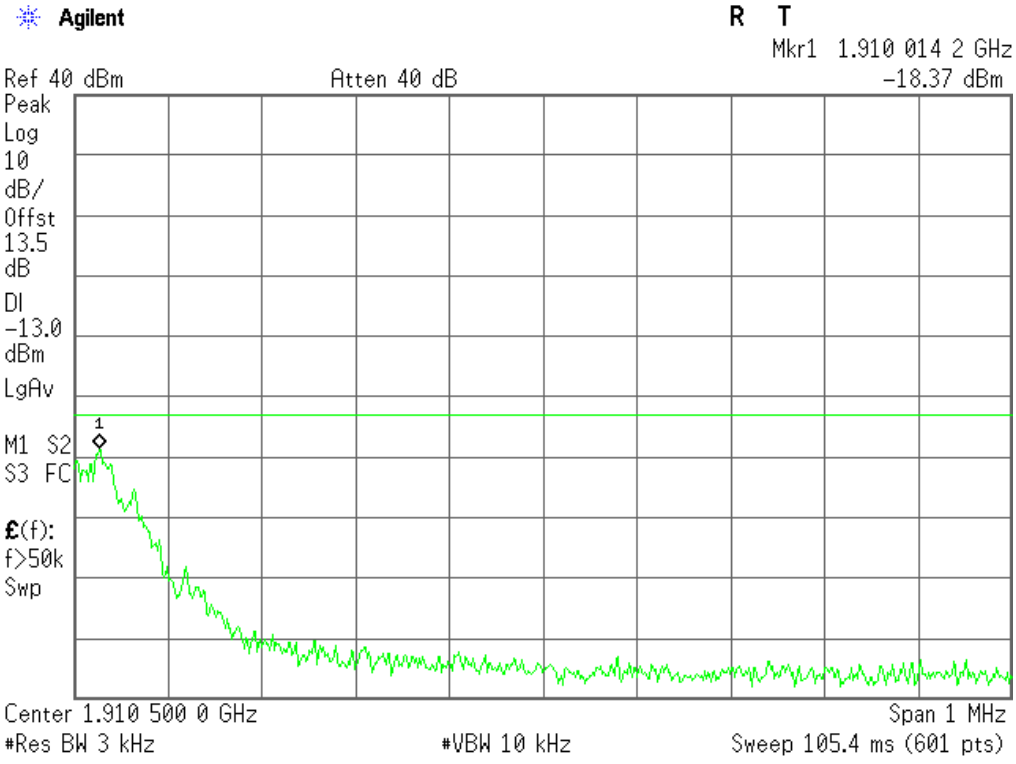
High Band Edge EGPRS 850 BAND CH 251



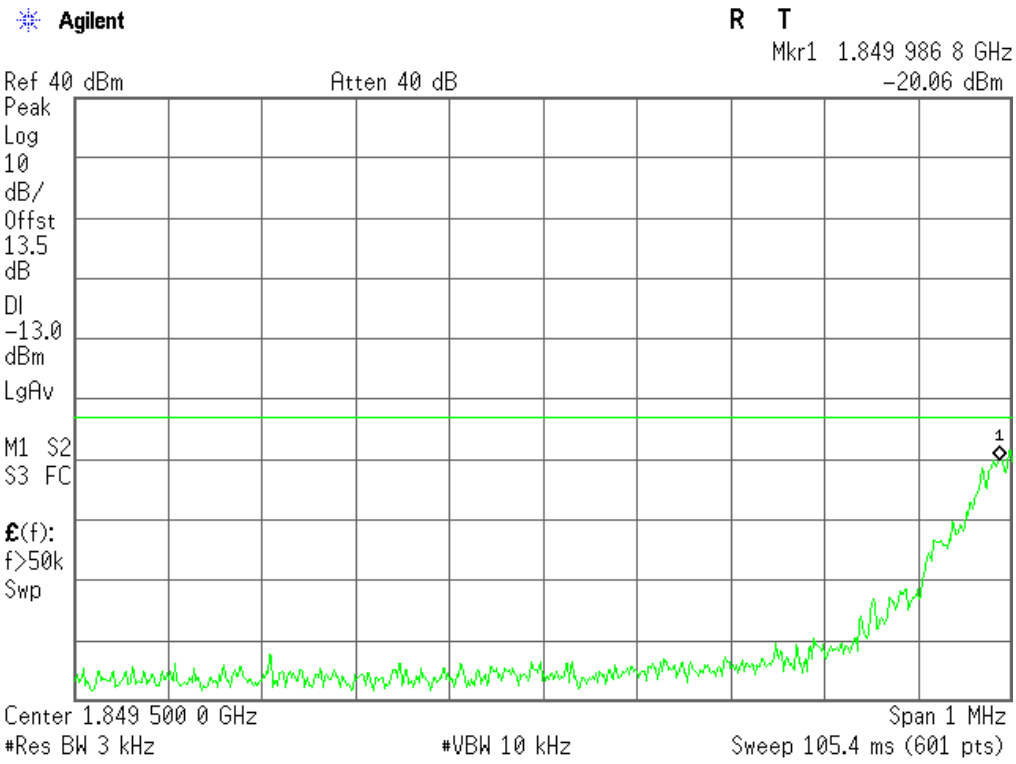
Low Band Edge PCS 1900 BAND CH 512



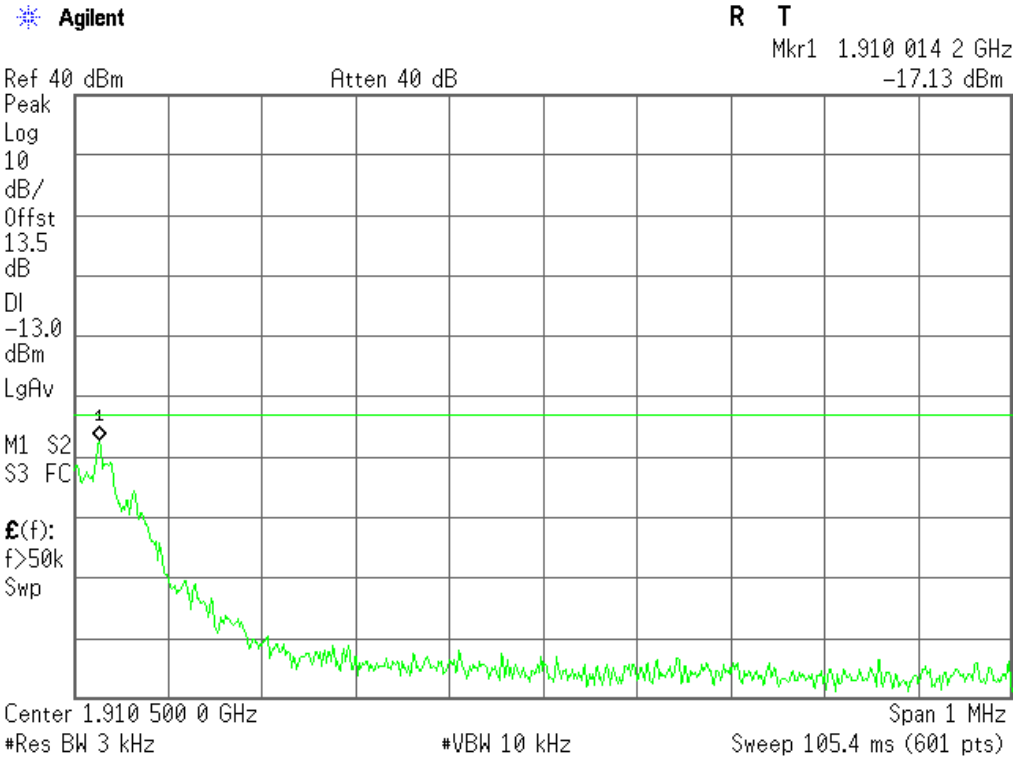
High Band Edge PCS 1900 BAND CH 810



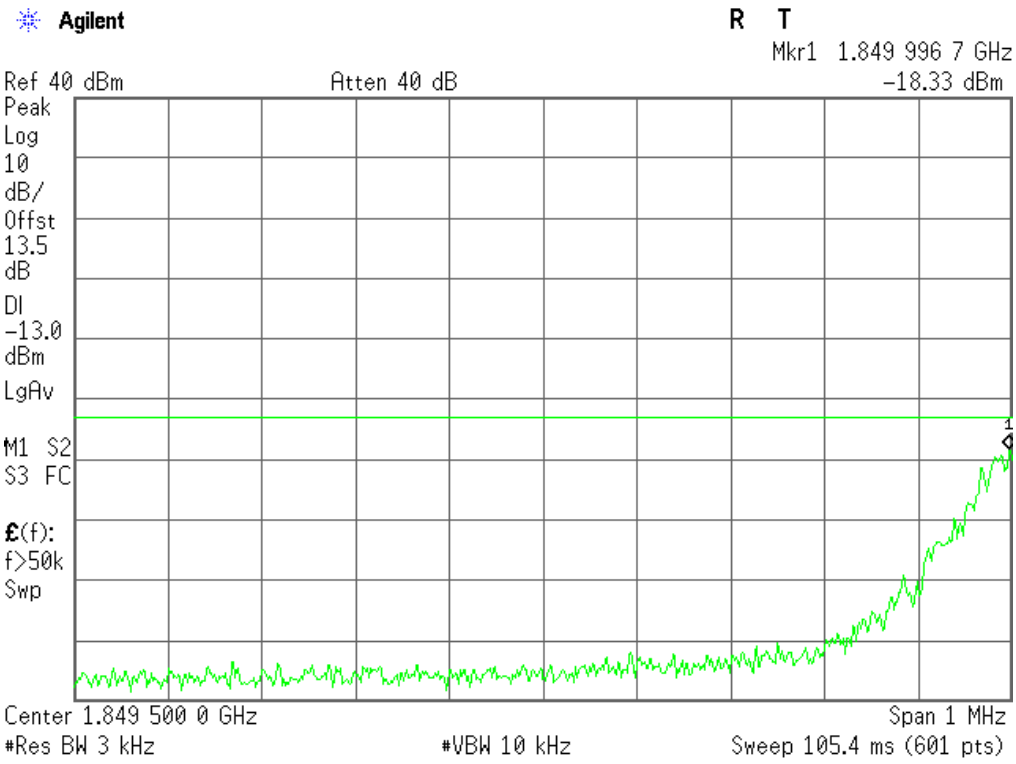
Low Band Edge GPRS 1900 BAND CH 512



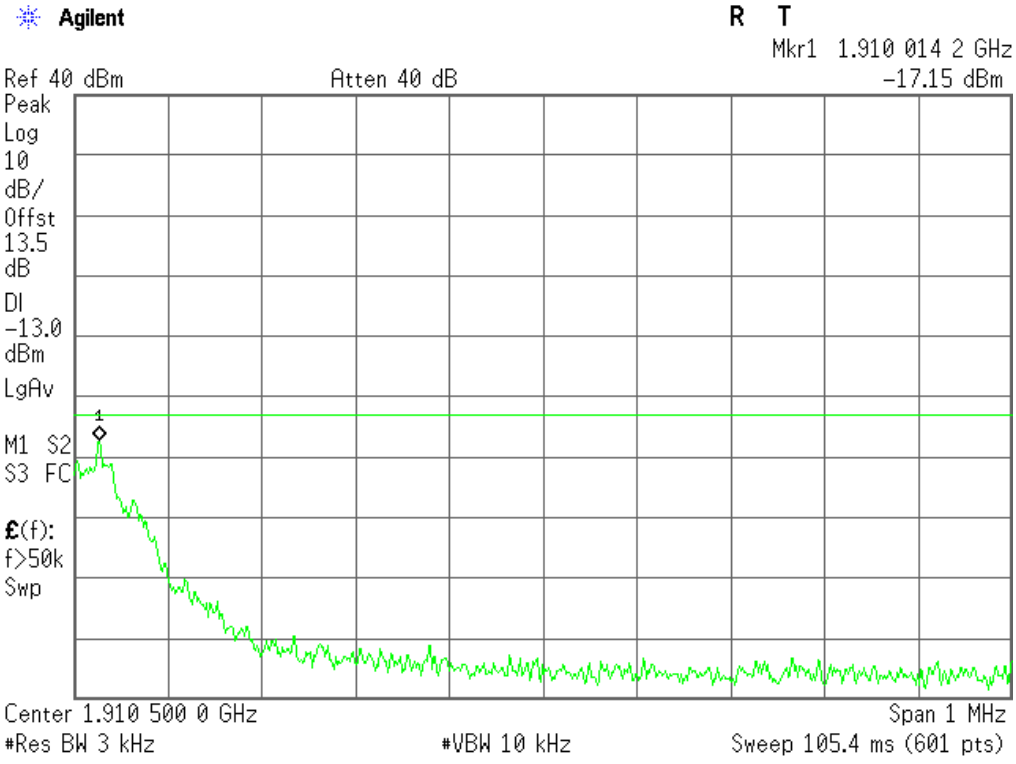
High Band Edge GPRS 1900 BAND CH 810



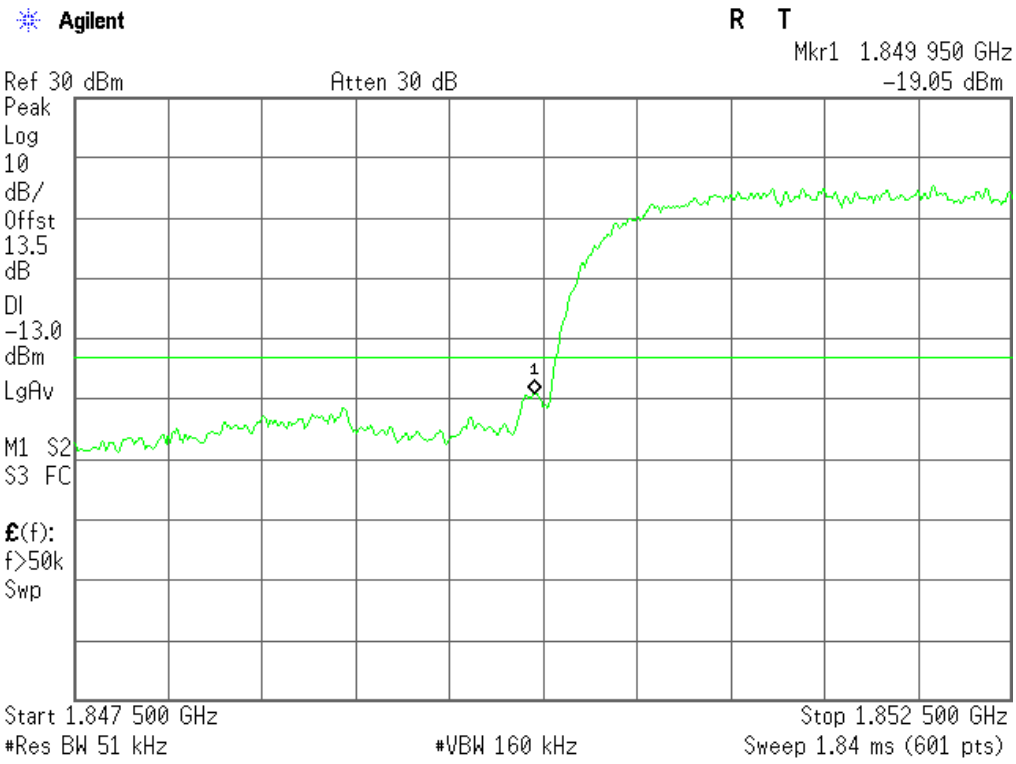
Low Band Edge EGPRS 1900 BAND CH 512



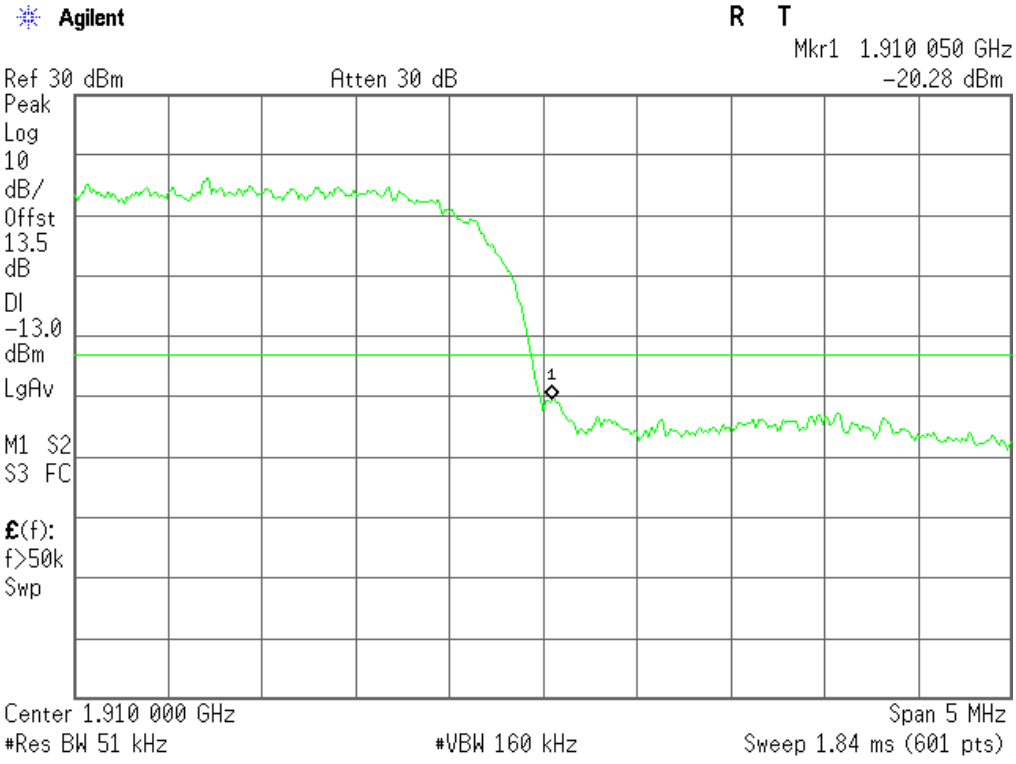
High Band Edge EGPRS 1900 BAND CH 810



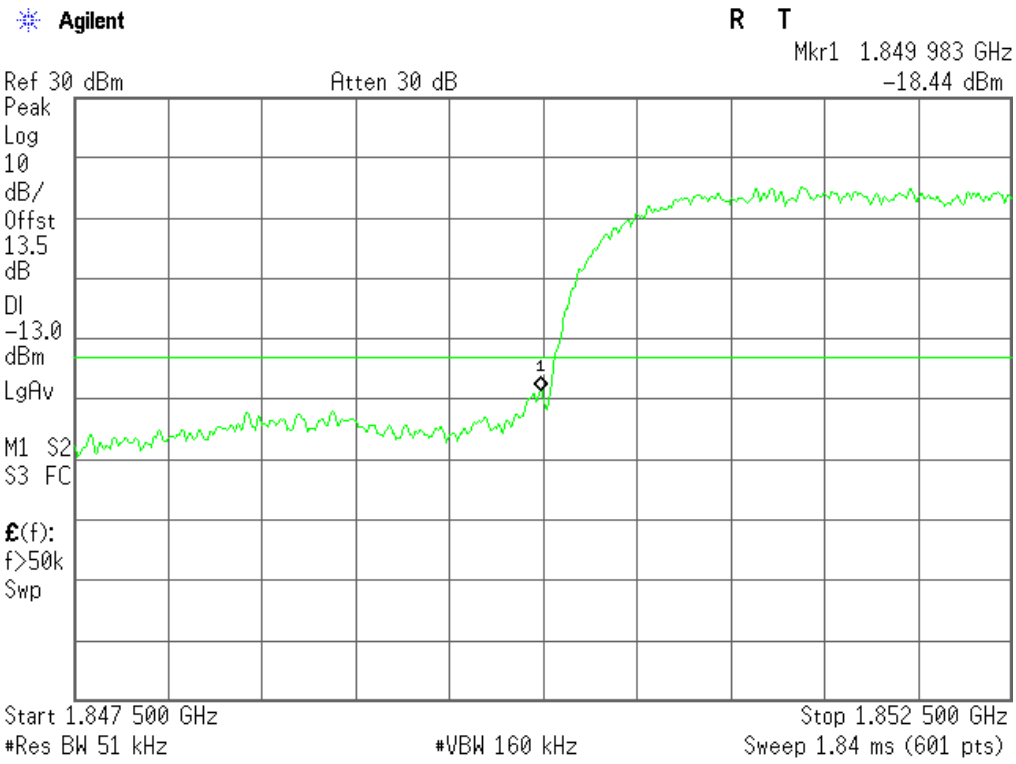
Low Band Edge UMTS BAND II CH 9262



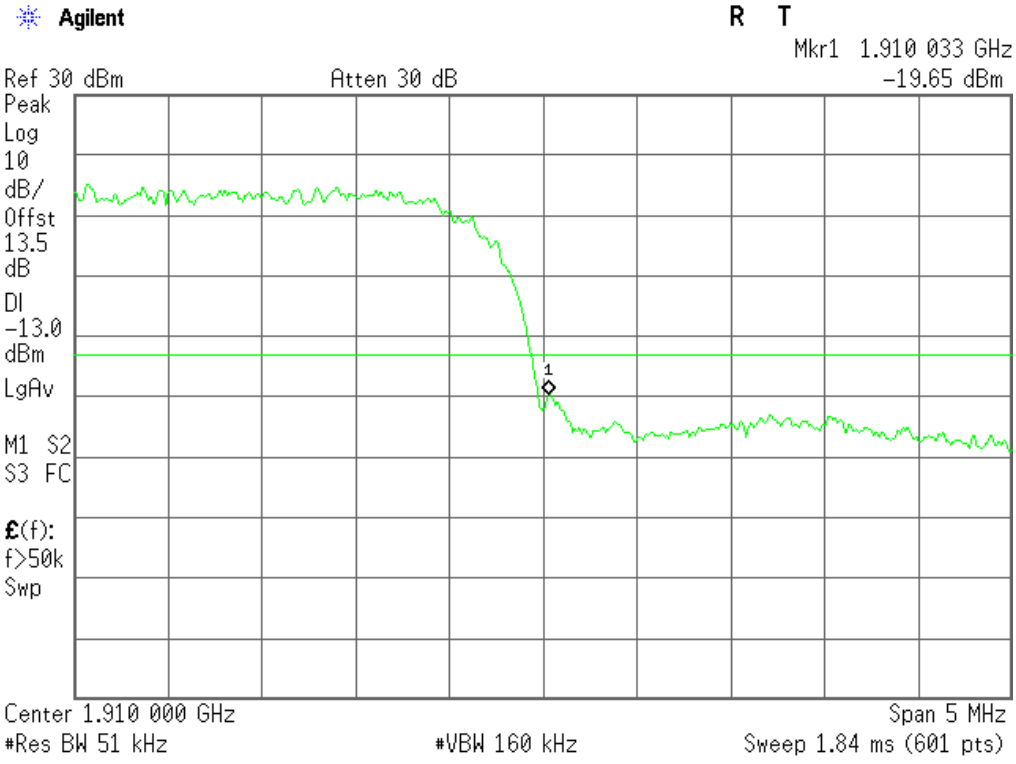
High Band Edge UMTS BAND II CH 9538



Low Band Edge HSDPA BAND II CH 9262



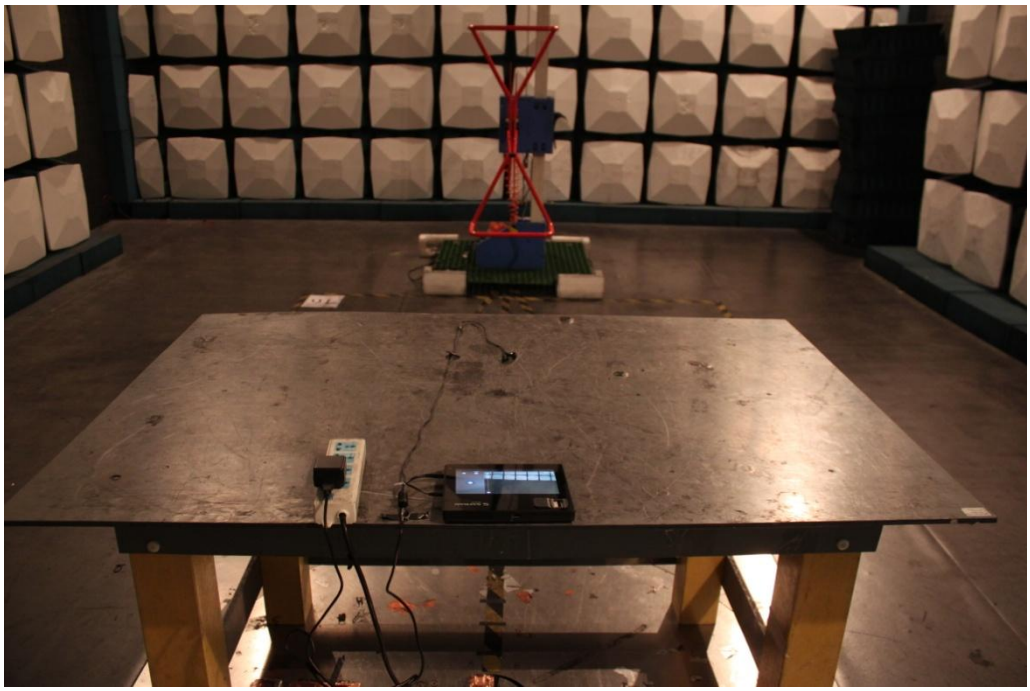
High Band Edge HSDPA BAND II CH 9538

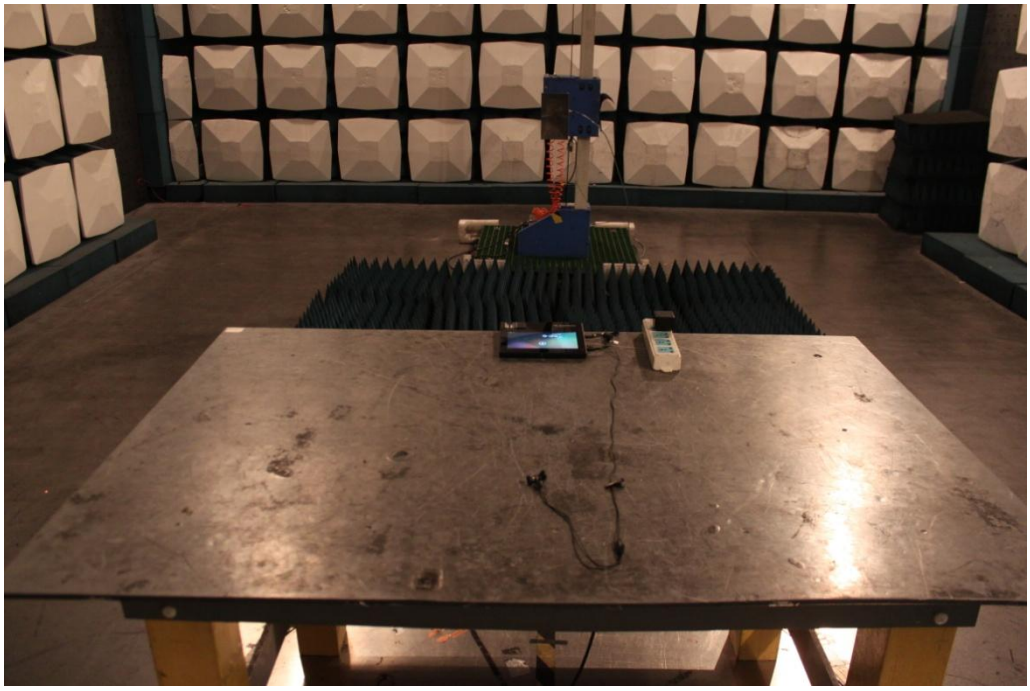


APPENDIX IV

PHOTOGRAPHS OF TEST SETUP

RADIATED SPURIOUS EMISSION





----END OF REPORT----