



FCC RADIO TEST REPORT

FCC ID: 2AC3LSP-M35D

Product: Smart phone

Trade Name: MULTITECH

Model Number: SP-M35D

Serial Model: MT-MB35D, GB-35MD,S01

Report No.: NTEK-2015NT02051194F3

Prepared for

Global China Link PTE LTD

44-02, ONE RAFFLES PLACE NO. 1, RAFFLES PLACE SINGAPORE
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Prepared by

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TEST RESULT CERTIFICATION

Applicant's name: Global China Link PTE LTD
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Manufacture's Name: shenzhen hitopwave technology Co.,LTD
Address: 8F Fucheng Hi-tech Building, NanShan District, Shenzhen, China.
Product name: Smart phone
Model and/or type reference ...: SP-M35D
Serial Model: MT-MB35D, GB-35MD,S01
Standards: FCC Part 22H and 24E
Test procedure ANSI C63.4-2003, TIA/EIA 603

This device described above has been tested by NTEK, 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 05 Feb. 2015 ~28 Feb. 2015
Date of Issue 28 Feb. 2015
Test Result **Pass**

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1. GENERAL INFORMATION

1.1 PRODUCT DESCRIPTION

A major technical description of EUT is described as following:

Product Designation:	Smart phone
Hardware version:	--
Software version:	--
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
Antenna:	Integrated Antenna
Antenna gain:	1.0dBi
Power Supply:	DC 3.7V by battery or DC 5.0V supplied by adapter
Battery parameter:	DC 3.7V/1250mAh
Adapter Input:	AC 100-240V, 50-60Hz 0.15A
Adapter Output:	DC 5.0V, 0.5A
GPRS/EDGE Class	Multi-Class12 Only 4 timeslots are used for GPRS/EDGE
SIM CARD	The Phone has dual SIM Card sockets but only one of the dual SIM Card can be transmitting when the two SIM Cards are inserting the phone together. Anyone of the SIM Card socket was tested
Extreme Vol. Limits:	DC3.4 V to 4.2 V (Nominal DC3.7 V)
Extreme Temp. Tolerance	-10°C to +50°C
** 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.	

1.2 RELATED SUBMITTAL(S) / GRANT (S)

This submittal(s) (test report) is intended for **FCC ID: 2AC3LSP-M35D** 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:

NTEK 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.:238937

IC Registration No.:9270A-1,

CNAS Registration No.:L5516

1.5 MEASUREMENT INSTRUMENTS

NAME OF EQUIPMENT	MANUFACTURER	MODEL	SERIAL NUMBER	NEXT CAL. DATE
SPECTRUM ANALYZER	AGILENT	E4440A	US44300399	2015.6.26
TEST RECEIVER	R&S	ESCI	A0304218	2015.6.26
COMMUNICATION TESTER	AGILENT	8960	3104A03367	2015.6.26
COMMUNICATION TESTER	R&S	CMU200	A0304247	2015.6.26
TEST RECEIVER	R&S	FCKL1528	A0304230	2015.6.26
LISN	SCHWARZBECK	NSLK8127	A0304233	2015.6.26
CLIMATE CHAMBER	ALBATROSS	--	--	2015.6.26
Loop Antenna	Daze	ZN30900N	SEL0097	2015.6.26
Biological Antenna	A.H. Systems Inc.	SAS-521-4	N/A	2015.6.26
Horn Antenna	EM	EM-AH-10180	N/A	2015.6.26
SIGNAL GENERATOR	R&S	SMT 06	832080/007	2015.07.05
POWER METER	R&S	NRVS	100696	2015.07.05
POWER SENSOR	R&S	URV5-Z4	0395.1619.05	2015.07.05
AMPLIFIER	EM	EM-30180	060538	2015.07.05

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)
7	Peak-to-Average Ratio		24.232(d)

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	Smart phone	SP-M35D	FCC ID: 2AC3LSP-M35D	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
8	Peak-to-Average Ratio		24.232(d)	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 II, HSUPA band II modes have been tested during the test.

the worst condition (GSM850, GSM1900 RMC 12.2k) 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 II) at 3 typical channels(the Top Channel, the Middle Channel and the Bottom Channel) for each band.

5.1.2 MEASUREMENT RESULT

GSM 850:

Mode	Frequency (MHz)	Maximum Burst-Average Output Power
GSM850	824.2	32.47
	836.6	32.28
	848.8	32.65
GPRS850 (1 Slot)	824.2	31.34
	836.6	31.55
	848.8	31.26
GPRS850 (2 Slot)	824.2	30.24
	836.6	30.35
	848.8	30.48
GPRS850 (3 Slot)	824.2	29.59
	836.6	29.38
	848.8	29.64
GPRS850 (4 Slot)	824.2	28.27
	836.6	28.43
	848.8	28.69

PCS 1900:

Mode	Frequency (MHz)	Maximum Burst-Average Output Power
GSM1900	1850.2	29.79
	1880	28.64
	1909.8	29.33
GPRS1900 (1 Slot)	1850.2	28.26
	1880	28.04
	1909.8	28.78
GPRS1900 (2 Slot)	1850.2	27.84
	1880	27.66
	1909.8	27.52
GPRS1900 (3 Slot)	1850.2	27.39
	1880	27.42
	1909.8	27.64
GPRS1900 (4 Slot)	1850.2	26.58
	1880	26.46
	1909.8	26.54

EDGE 850:

Mode	Frequency (MHz)	Maximum Burst-Average Output Power
EGPRS850 (1 Slot)	824.2	29.67
	836.6	29.83
	848.8	29.82
EGPRS850 (2 Slot)	824.2	28.54
	836.6	28.65
	848.8	28.74
EGPRS850 (3 Slot)	824.2	28.48
	836.6	28.31
	848.8	28.52
EGPRS850 (4 Slot)	824.2	27.64
	836.6	27.86
	848.8	27.28

EDGE 1900:

Mode	Frequency (MHz)	Maximum Burst-Average Output Power
EGPRS1900 (1 Slot)	1850.2	26.84
	1880	26.52
	1909.8	26.53
EGPRS1900 (2 Slot)	1850.2	26.17
	1880	26.38
	1909.8	26.29
EGPRS1900 (3 Slot)	1850.2	25.74
	1880	25.68
	1909.8	25.25
EGPRS1900 (4 Slot)	1850.2	24.74
	1880	24.62
	1909.8	24.34

UMTS BAND II

Mode	Frequency (MHz)	Maximum Burst-Average Output Power
WCDMA 1900 RMC	1852.4	22.17
	1880.0	22.36
	1907.6	22.28
WCDMA 1900 AMR	1852.4	21.34
	1880.0	21.52
	1907.6	21.61
HSDPA Subtest 1	1852.4	20.55
	1880.0	20.79
	1907.6	20.84
HSDPA Subtest 2	1852.4	20.68
	1880.0	20.59
	1907.6	20.78
HSDPA Subtest 3	1852.4	20.43
	1880.0	20.62
	1907.6	20.59
HSDPA Subtest 4	1852.4	20.67
	1880.0	20.85
	1907.6	20.78
HSUPA Subtest 1	1852.4	20.26
	1880.0	20.55
	1907.6	20.73
HSUPA Subtest 2	1852.4	20.58
	1880.0	20.36
	1907.6	20.52
HSUPA Subtest 3	1852.4	20.37
	1880.0	20.85
	1907.6	20.49
HSUPA Subtest 4	1852.4	20.26
	1880.0	20.84
	1907.6	20.32
HSUPA Subtest 5	1852.4	20.12
	1880.0	20.33
	1907.6	20.24

UMTS BAND V

Mode	Frequency (MHz)	Maximum Burst-Average Output Power
WCDMA 850 RMC	826.4	22.54
	835.0	22.25
	846.6	22.64
WCDMA 850 AMR	826.4	21.53
	835.0	21.86
	846.6	21.38
HSDPA Subtest 1	826.4	20.51
	835.0	20.67
	846.6	20.24
HSDPA Subtest 2	826.4	20.32
	835.0	20.65
	846.6	20.63
HSDPA Subtest 3	826.4	20.24
	835.0	20.35
	846.6	20.38
HSDPA Subtest 4	826.4	19.17
	835.0	19.42
	846.6	20.46
HSUPA Subtest 1	826.4	20.25
	835.0	20.58
	846.6	20.67
HSUPA Subtest 2	826.4	20.65
	835.0	20.32
	846.6	20.68
HSUPA Subtest 3	826.4	20.61
	835.0	20.50
	846.6	20.34
HSUPA Subtest 4	826.4	20.12
	835.0	20.33
	846.6	20.68
HSUPA Subtest 5	826.4	20.04
	835.0	20.11
	846.6	20.28

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 (P_{in}) is applied to the input of the dipole, and the power received (P_r) 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 $AR_{pl} = P_{in} + 2.15 - P_r$. The AR_{pl} 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: $Power = P_{Mea} + AR_{pl}$
- 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 (P_{in}).
- 8 ERP can be calculated from EIRP by subtracting the gain of the dipole, $ERP = EIRP - 2.15\text{dBi}$.
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	≤ 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	28.69	Horizontal	Pass
	824.2	27.57	Vertical	Pass
	836.6	28.59	Horizontal	Pass
	836.6	28.82	Vertical	Pass
	848.8	29.53	Horizontal	Pass
	848.8	29.88	Vertical	Pass

Radiated Power (ERP) for GPRS 850 MHZ				
Mode	Frequency	Result		Conclusion
		Max. Peak ERP (dBm)	Polarization Of Max. ERP	
GPRS850	824.2	28.65	Horizontal	Pass
	824.2	27.38	Vertical	Pass
	836.6	28.34	Horizontal	Pass
	836.6	28.87	Vertical	Pass
	848.8	28.39	Horizontal	Pass
	848.8	27.56	Vertical	Pass

Radiated Power (ERP) for EDGE 850 MHZ				
Mode	Frequency	Result		Conclusion
		Max. Peak ERP (dBm)	Polarization Of Max. ERP	
EDGE850	824.2	27.37	Horizontal	Pass
	824.2	27.66	Vertical	Pass
	836.6	26.52	Horizontal	Pass
	836.6	27.43	Vertical	Pass
	848.8	28.72	Horizontal	Pass
	848.8	27.83	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	27.28	Horizontal	Pass
	1850.2	26.45	Vertical	Pass
	1880.0	27.60	Horizontal	Pass
	1880.0	26.38	Vertical	Pass
	1909.8	28.74	Horizontal	Pass
	1909.8	27.54	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	26.85	Horizontal	Pass
	1850.2	25.74	Vertical	Pass
	1880.0	26.61	Horizontal	Pass
	1880.0	25.57	Vertical	Pass
	1909.8	26.68	Horizontal	Pass
	1909.8	26.52	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	25.42	Horizontal	Pass
	1850.2	25.30	Vertical	Pass
	1880.0	24.54	Horizontal	Pass
	1880.0	25.62	Vertical	Pass
	1909.8	24.37	Horizontal	Pass
	1909.8	23.64	Vertical	Pass

Radiated Power (E.I.R.P) for UMTS band V				
Mode	Frequency	Result		Conclusion
		Max. Peak E.I.R.P.(dBm)	Polarization Of Max. E.I.R.P.	
RMC 12.2kbps	826.4	20.43	Horizontal	Pass
	826.4	19.68	Vertical	Pass
	836.6	21.52	Horizontal	Pass
	836.6	20.47	Vertical	Pass
	846.6	21.29	Horizontal	Pass
	846.6	20.84	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	19.26	Horizontal	Pass
	1852.4	19.52	Vertical	Pass
	1880.0	20.33	Horizontal	Pass
	1880.0	20.17	Vertical	Pass
	1907.6	20.25	Horizontal	Pass
	1907.6	20.62	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 and band v.

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

Typical Channels for testing of UMTS band V	
Channel	Frequency (MHz)
4132	826.4
4183	836.6
4233	846.6

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 $43+10\log(P)$ 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

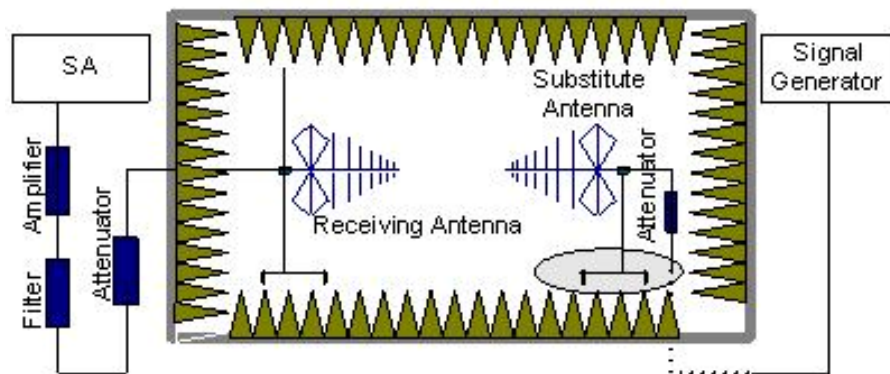
6.2.1 MEASUREMENT METHOD

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 V) at 3 typical channels(the Top Channel, the Middle Channel and the Bottom Channel) for each band.Only shown the worst data.

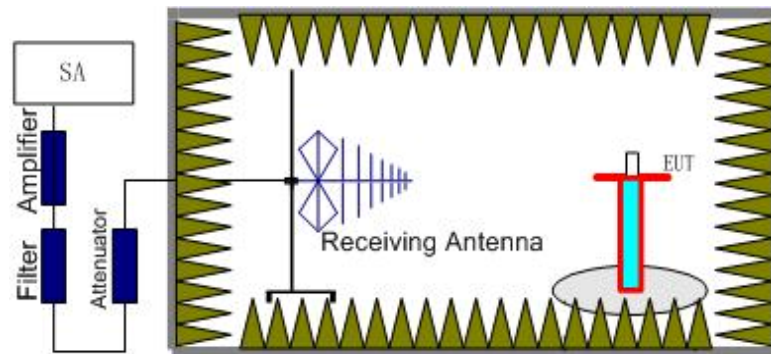
The procedure of radiated spurious emissions is as follows:

a) Pre-calibration With pre-calibration method, the Radiated Spurious Emissions(RSE) is calculated as,

$$RSE = R_x \text{ (dBuV)} + CL \text{ (dB)} + SA \text{ (dB)} + Gain \text{ (dBi)} - 107 \text{ (dBuV to dBm)}$$
 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(1852.4MHz, 1880MHz, 1907.6MHz), UMTS band V(826.4MHz, 835.0MHz, 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 $43 + 10 \log(P)$ 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:

Test Results for Channel 128/824.2 MHz					
Frequency(MHz)	Power(dBm)	A _{Rpl} (dBm)	P _{Mea} (dBm)	Limit (dBm)	Polarity
1648.4	-38.68	-4.65	-43.33	-13.00	Horizontal
1648.4	-38.59	-4.65	-43.24	-13.00	Vertical
2472.6	-26.84	-2.10	-28.94	-13.00	Vertical
2472.6	-27.56	-2.10	-29.66	-13.00	Horizontal
Test Results for Channel 128/836.6 MHz					
1673.2	-37.76	-4.97	-42.73	-13.00	Horizontal
1673.2	-36.51	-4.97	-41.48	-13.00	Vertical
2509.8	-25.30	-2.35	-27.65	-13.00	Vertical
2509.8	-24.26	-2.35	-26.61	-13.00	Horizontal
Test Results for Channel 128/848.8 MHz					
1697.6	-35.56	-4.97	-40.53	-13.00	Horizontal
1697.6	-38.70	-4.97	-43.67	-13.00	Vertical
2546.4	-25.46	-2.68	-28.14	-13.00	Vertical
2546.4	-28.82	-2.68	-31.5	-13.00	Horizontal

PCS 1900:

Test Results for Channel 661/1850.2MHz					
Frequency(MHz)	Power(dBm)	A _{Rpl} (dBm)	P _{Mea} (dBm)	Limit (dBm)	Polarity
3700.4	-34.77	13.1	-21.67	-13.00	Vertical
3700.4	-36.53	13.1	-23.43	-13.00	Horizontal
5550.6	-43.89	14.7	-29.19	-13.00	Horizontal
5550.6	-41.65	14.7	-26.95	-13.00	Vertical
Test Results for Channel 661/1880.0MHz					
3760	-30.58	13.8	-16.78	-13.00	Vertical
3760	-33.75	13.8	-19.95	-13.00	Horizontal
5640	-43.57	15.5	-28.07	-13.00	Horizontal
5640	-40.31	15.5	-24.81	-13.00	Vertical
Test Results for Channel 661/1909.8MHz					
3819.6	-32.65	12.6	-20.05	-13.00	Vertical
3819.6	-34.26	12.6	-21.66	-13.00	Horizontal
5729.4	-43.10	15.8	-27.3	-13.00	Horizontal
5729.4	-41.28	15.8	-25.48	-13.00	Vertical

UMTS band II:

Test Results for Channel 9400/1852.4MHz					
Frequency(MHz)	Power(dBm)	A _{Rpl} (dBm)	P _{Mea} (dBm)	Limit (dBm)	Polarity
1387.6	-38.58	8.6	-29.98	-13.00	Vertical
1387.6	-41.29	8.6	-32.69	-13.00	Horizontal
3704.8	-31.33	12.5	-18.83	-13.00	Horizontal
3704.8	-32.76	12.5	-20.26	-13.00	Vertical
5557.2	-37.54	14.3	-23.24	-13.00	Vertical
5557.2	-38.58	14.3	-24.28	-13.00	Horizontal
Test Results for Channel 9400/1880MHz					
1264.8	-38.62	7.5	-31.12	-13.00	Vertical
1264.8	-41.31	7.5	-33.81	-13.00	Horizontal
3760.0	-31.36	12.7	-18.66	-13.00	Horizontal
3760.0	-32.55	12.7	-19.85	-13.00	Vertical
5640.0	-39.47	14.2	-25.27	-13.00	Vertical
5640.0	-38.65	14.2	-24.45	-13.00	Horizontal
Test Results for Channel 9400/1907.6MHz					
1458.62	-38.35	9.3	-29.05	-13.00	Vertical
1458.62	-41.24	9.3	-31.94	-13.00	Horizontal
3815.2	-31.35	13.1	-18.25	-13.00	Horizontal
3815.2	-30.68	13.1	-17.58	-13.00	Vertical
5722.8	-37.42	14.8	-22.62	-13.00	Vertical
5722.8	-38.85	14.8	-24.05	-13.00	Horizontal

UMTS band V:

Test Results for Channel 4183/826.4MHz					
Frequency(MHz)	Power(dBm)	A _{Rpl} (dBm)	P _{Mea} (dBm)	Limit (dBm)	Polarity
1362.5	-38.53	8.6	-30.28	-13.00	Vertical
1362.5	-40.24	8.6	-31.92	-13.00	Horizontal
1652.8	-35.66	11.3	-22.64	-13.00	Horizontal
1652.8	-34.56	11.3	-21.56	-13.00	Vertical
2479.2	-36.31	12.4	-20.74	-13.00	Vertical
2479.2	-36.47	12.4	-22.82	-13.00	Horizontal
Test Results for Channel 4183/836.6MHz					
1380.6	-38.65	8.7	-30.28	-13.00	Vertical
1380.6	-40.78	8.7	-31.92	-13.00	Horizontal
1673.2	-35.67	11.5	-22.64	-13.00	Horizontal
1673.2	-34.62	11.5	-21.56	-13.00	Vertical
2509.8	-36.68	12.8	-20.74	-13.00	Vertical
2509.8	-35.67	12.8	-22.82	-13.00	Horizontal
Test Results for Channel 4183/846.6MHz					
1251.7	-38.64	7.6	-30.28	-13.00	Vertical
1251.7	-42.36	7.6	-31.92	-13.00	Horizontal
1693.2	-35.22	11.6	-22.64	-13.00	Horizontal
1693.2	-32.47	11.6	-21.56	-13.00	Vertical
2539.8	-36.82	13.2	-20.74	-13.00	Vertical
2539.8	-35.62	13.2	-22.82	-13.00	Horizontal

Note: Below 30MHZ no Spurious found.

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°C.
- 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, channel 9400 for UMTS band II and channel 4175 for UMTS band V 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°C increments from -10°C to +50°C. 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°C.
- 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°C increments from +50°C to -10°C. 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°C 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	28	0.033
3.7	30	0.036
4.2	26	0.031

Frequency Error Against Temperature for GSM850 band		
temperature(°C)	Frequency error(Hz)	Frequency error(ppm)
-10	51	0.061
0	46	0.055
10	37	0.044
20	55	0.066
30	48	0.057
40	32	0.038
50	64	0.077

Frequency Error Against Voltage for GPRS850 band		
Voltage(V)	Frequency error(Hz)	Frequency error(ppm)
3.4	28	0.033
3.7	23	0.028
4.2	27	0.032

Frequency Error Against Temperature for GPRS850 band		
temperature(°C)	Frequency error(Hz)	Frequency error(ppm)
-10	42	0.050
0	33	0.039
10	27	0.032
20	27	0.032
30	30	0.036
40	35	0.042
50	41	0.049

Frequency Error Against Voltage for EGPRS850 band		
Voltage(V)	Frequency error(Hz)	Frequency error(ppm)
3.4	37	0.044
3.7	35	0.042
4.2	31	0.037

Frequency Error Against Temperature for EGPRS850 band		
temperature(°C)	Frequency error(Hz)	Frequency error(ppm)
-10	38	0.045
0	35	0.042
10	29	0.035
20	27	0.032
30	34	0.041
40	29	0.035
50	41	0.049

Note: The EUT doesn't work below -10°C

Frequency Error Against Voltage for GSM1900 band		
Voltage(V)	Frequency error(Hz)	Frequency error(ppm)
3.4	38	0.020
3.7	41	0.022
4.2	30	0.016

Frequency Error Against Temperature for GSM1900 band		
temperature(°C)	Frequency error(Hz)	Frequency error(ppm)
-10	26	0.014
0	45	0.024
10	48	0.026
20	62	0.033
30	40	0.021
40	13	0.007
50	26	0.014

Frequency Error Against Voltage for GPRS1900 band		
Voltage(V)	Frequency error(Hz)	Frequency error(ppm)
3.4	41	0.022
3.7	41	0.022
4.2	62	0.033

Frequency Error Against Temperature for GPRS1900 band		
temperature(°C)	Frequency error(Hz)	Frequency error(ppm)
-10	61	0.032
0	52	0.028
10	43	0.023
20	42	0.022
30	36	0.019
40	44	0.023
50	39	0.021

Frequency Error Against Voltage for EDGE1900 band		
Voltage(V)	Frequency error(Hz)	Frequency error(ppm)
3.4	44	0.023
3.7	37	0.020
4.2	48	0.026

Frequency Error Against Temperature for EDGE1900 band		
temperature(°C)	Frequency error(Hz)	Frequency error(ppm)
-10	55	0.029
0	47	0.025
10	36	0.019
20	32	0.017
30	37	0.020
40	45	0.024
50	51	0.027

Note: The EUT doesn't work below -10°C

Frequency Error Against Voltage for UMTS band II		
Voltage(V)	Frequency error(Hz)	Frequency error(ppm)
3.4	25	0.013
3.7	34	0.018
4.2	32	0.017

Frequency Error Against Temperature for UMTS band II		
temperature(°C)	Frequency error(Hz)	Frequency error(ppm)
-10	51	0.027
0	43	0.023
10	52	0.028
20	37	0.020
30	25	0.013
40	47	0.025
50	32	0.017

Frequency Error Against Voltage for UMTS band V		
Voltage(V)	Frequency error(Hz)	Frequency error(ppm)
3.4	33	0.018
3.7	26	0.014
4.2	47	0.025

Frequency Error Against Temperature for UMTS band V		
temperature(°C)	Frequency error(Hz)	Frequency error(ppm)
-10	27	0.014
0	56	0.030
10	43	0.023
20	48	0.026
30	35	0.019
40	28	0.015
50	42	0.022

Note: The EUT doesn't work below -10°C

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	247.77
Middle Channel	836.6	248.26
High Channel	848.8	254.22

Occupied Bandwidth (99%) for EDGE 850 band		
Mode	Frequency(MHz)	Occupied Bandwidth (99%)(kHz)
Low Channel	824.2	245.70
Middle Channel	836.6	245.41
High Channel	848.8	245.73

Occupied Bandwidth (99%) for GSM1900 band		
Mode	Frequency(MHz)	Occupied Bandwidth (99%)(kHz)
Low Channel	1850.2	242.29
Middle Channel	1880.0	248.63
High Channel	1909.8	246.73

Occupied Bandwidth (99%) for EDGE1900 band		
Mode	Frequency(MHz)	Occupied Bandwidth (99%)(kHz)
Low Channel	1850.2	255.46
Middle Channel	1880.0	249.71
High Channel	1909.8	260.08

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

Occupied Bandwidth (99%) for UMTS band V		
Mode	Frequency(MHz)	Occupied Bandwidth (99%)(MHz)
Low Channel	826.4	4.17
Middle Channel	835.0	4.16
High Channel	846.6	4.16

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	319.66
Middle Channel	836.6	321.63
High Channel	848.8	330.84

Emission Bandwidth (-26dBc) for EDGE850 band		
Mode	Frequency(MHz)	Emission Bandwidth (-26dBc)(kHz)
Low Channel	824.2	318.710
Middle Channel	836.6	321.693
High Channel	848.8	317.912

Emission Bandwidth (-26dBc) for GSM1900 band		
Mode	Frequency(MHz)	Emission Bandwidth (-26dBc)(kHz)
Low Channel	1850.2	310.98
Middle Channel	1880.0	318.15
High Channel	1909.8	323.63

Emission Bandwidth (-26dBc) for EDGE1900 band		
Mode	Frequency(MHz)	Emission Bandwidth (-26dBc)(kHz)
Low Channel	1850.2	327.19
Middle Channel	1880.0	322.83
High Channel	1909.8	321.33

Emission Bandwidth (-26dBc) for UMTS band II		
Mode	Frequency(MHz)	Emission Bandwidth (-26dBc)(MHz)
Low Channel	1852.4	4.74
Middle Channel	1880.0	4.73
High Channel	1907.6	4.73

Emission Bandwidth (-26dBc) for UMTS band V		
Mode	Frequency(MHz)	Emission Bandwidth (-26dBc)(MHz)
Low Channel	1852.4	4.73
Middle Channel	1880.0	4.72
High Channel	1907.6	4.72

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

11. Peak-to-Average Ratio

11.1.1 DESCRIPTION OF THE PAR MEASUREMENT

The peak-to-average ratio (PAR) of the transmission may not exceed 13 dB.

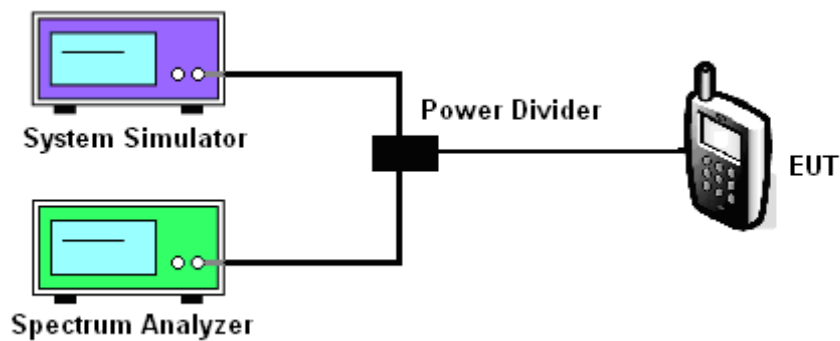
11.1.2 MEASURING INSTRUMENTS

See list of measuring instruments of this test report.

11.1.3 TEST PROCEDURES

1. The EUT was connected to Spectrum Analyzer and Base Station via power divider.
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. For GSM/EGPRS operating modes:
 - a. Set the RBW = 1MHz, VBW = 1MHz, Peak detector in spectrum analyzer.
 - b. Set EUT in maximum power output, and triggered the burst signal.
 - c. Measured respectively the Peak level and Mean level, and the deviation was recorded as Peak to Average Ratio.
4. For UMTS operating modes:
 - a. Set the CCDF (Complementary Cumulative Distribution Function) option in spectrum analyzer.
 - b. The highest RF powers were measured and recorded the maximum PAPR level associated with a probability of 0.1 %.

11.1.4 TEST SETUP



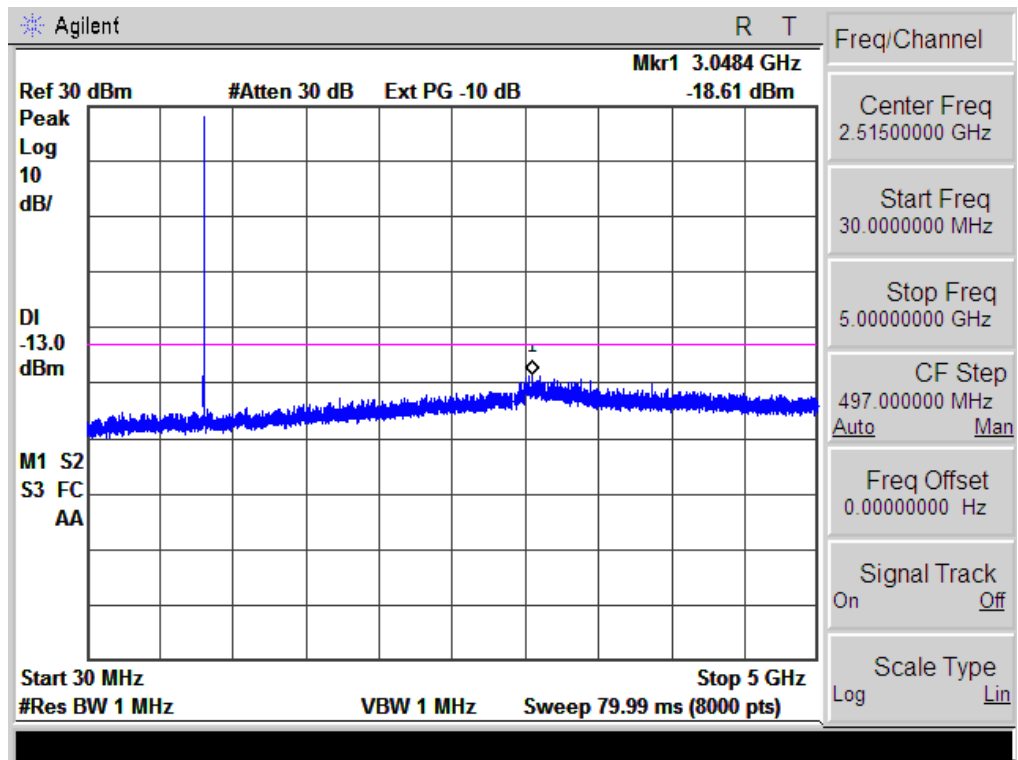
11.1.5 TEST RESULT OF PEAK-TO-AVERAGE RATIO

Cellular Band						
Modes	GSM850(GSM)			GSM1900(GSM)		
Channel	128 (Low)	190 (Mid)	251 (High)	512 (Low)	661 (Mid)	810 (High)
Frequency(MHz)	824.2	836.6	848.8	1850.2	1880	1909.8
Peak-to-Average Ratio (dB)	0.02	0.03	0.03	0.02	0.01	0.01
Cellular Band						
Modes	WCDMA Band II (RMC 12.2Kbps)			WCDMA Band V (RMC 12.2Kbps)		
Channel	9262 (Low)	9400 (Mid)	9538 (High)	4132 (Low)	4175 (Mid)	4233 (High)
Frequency(MHz)	1852.4	1880	1907.6	826.4	836.6	846.6
Peak-to-Average Ratio (dB)	3.52	3.48	3.40	3.25	3.52	3.23

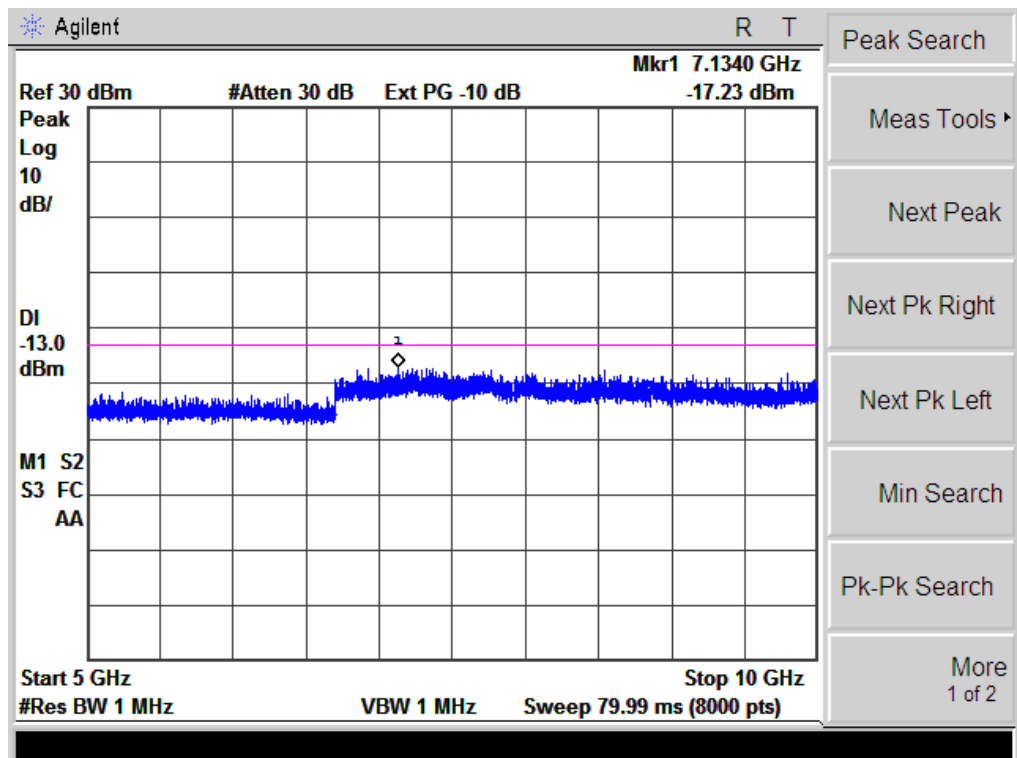
APPENDIX I

TEST PLOTS FOR CONDUCTED SPURIOUS EMISSION

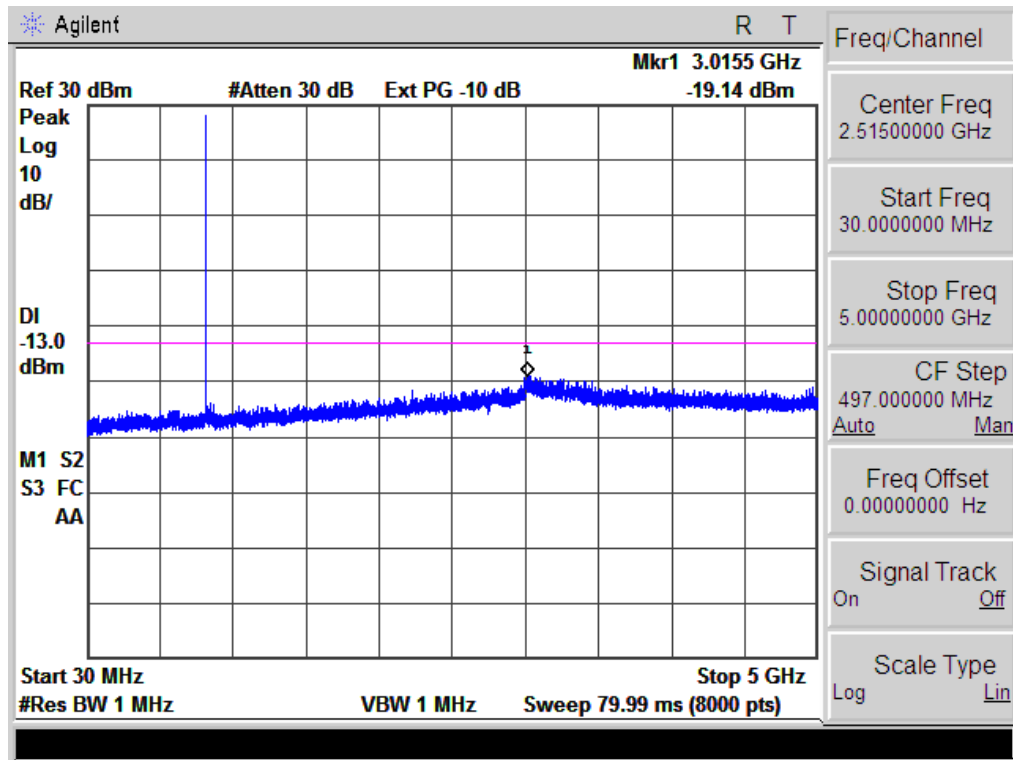
CONDUCTED EMISSION IN GSM 850 BAND
Conducted Emission Transmitting Mode CH 128 30MHz – 5GHz



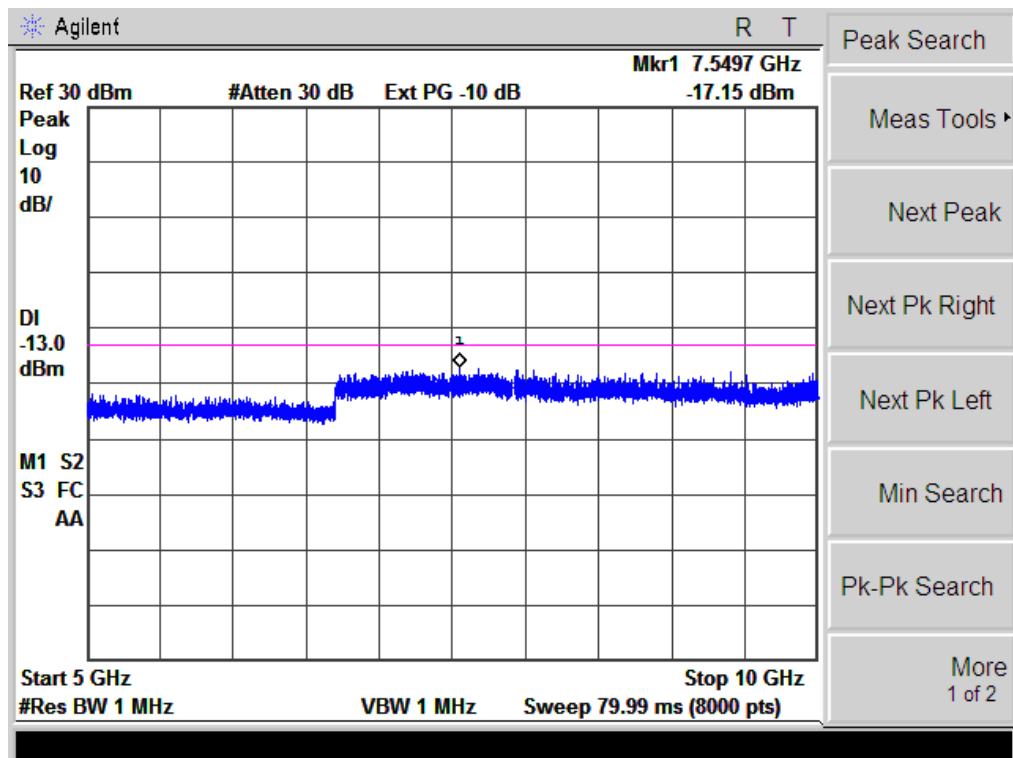
Conducted Emission Transmitting Mode CH 128 5GHz – 10GHz



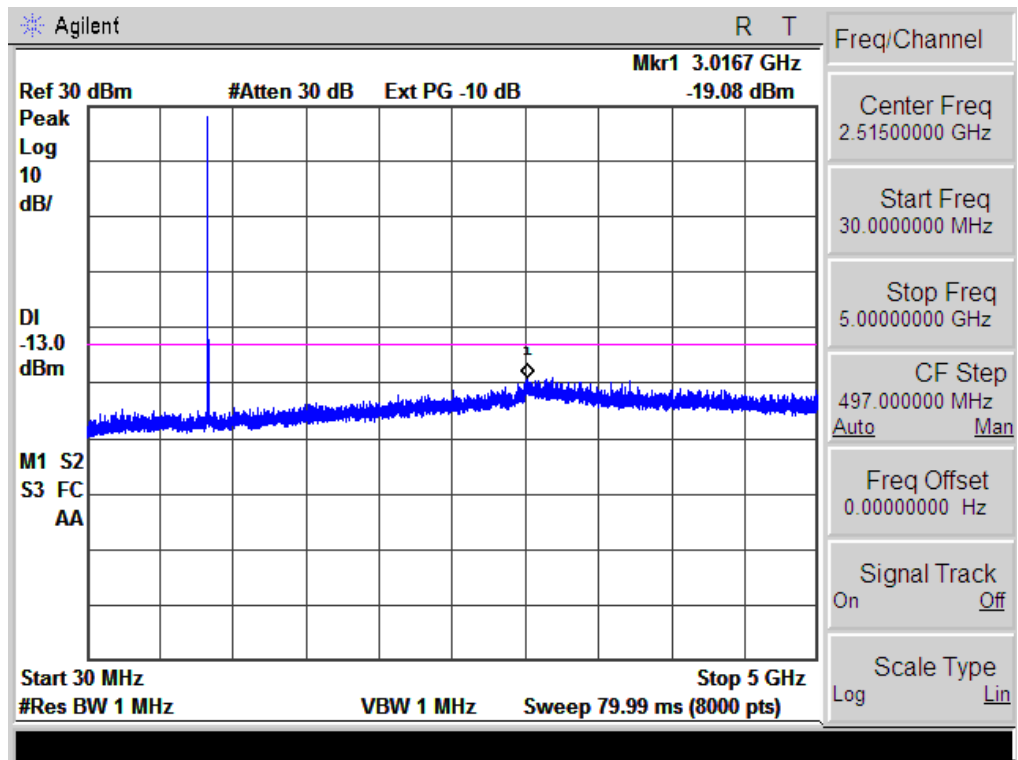
Conducted Emission Transmitting Mode CH 190 30MHz – 5GHz



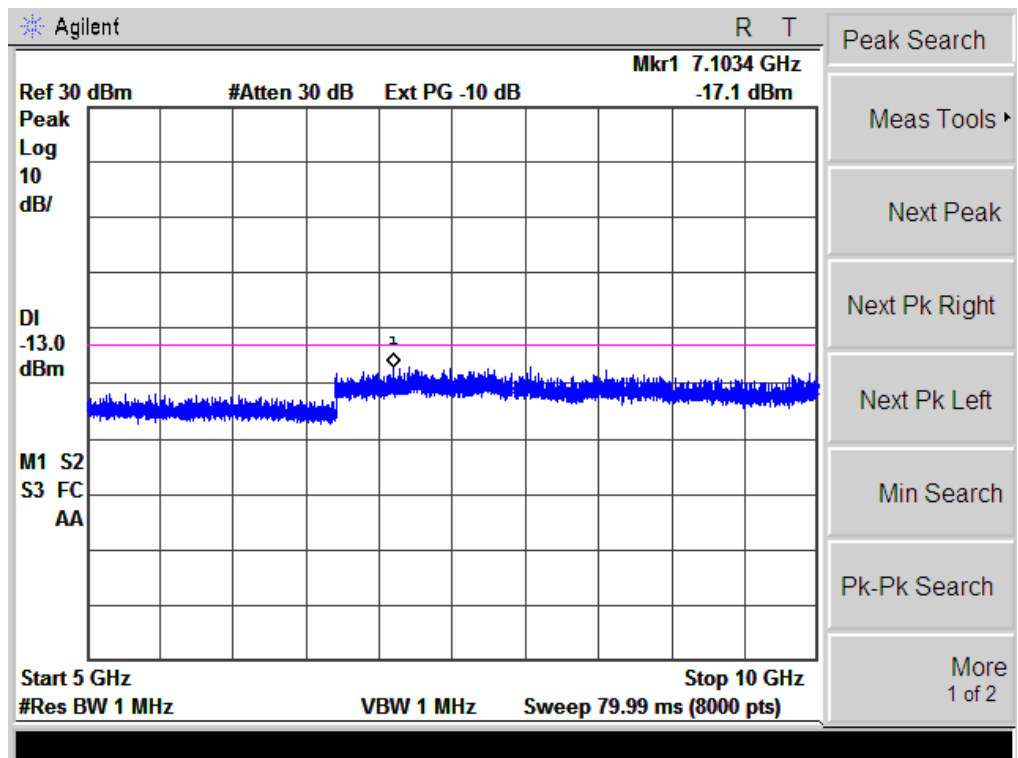
Conducted Emission Transmitting Mode CH 190 5GHz – 10GHz



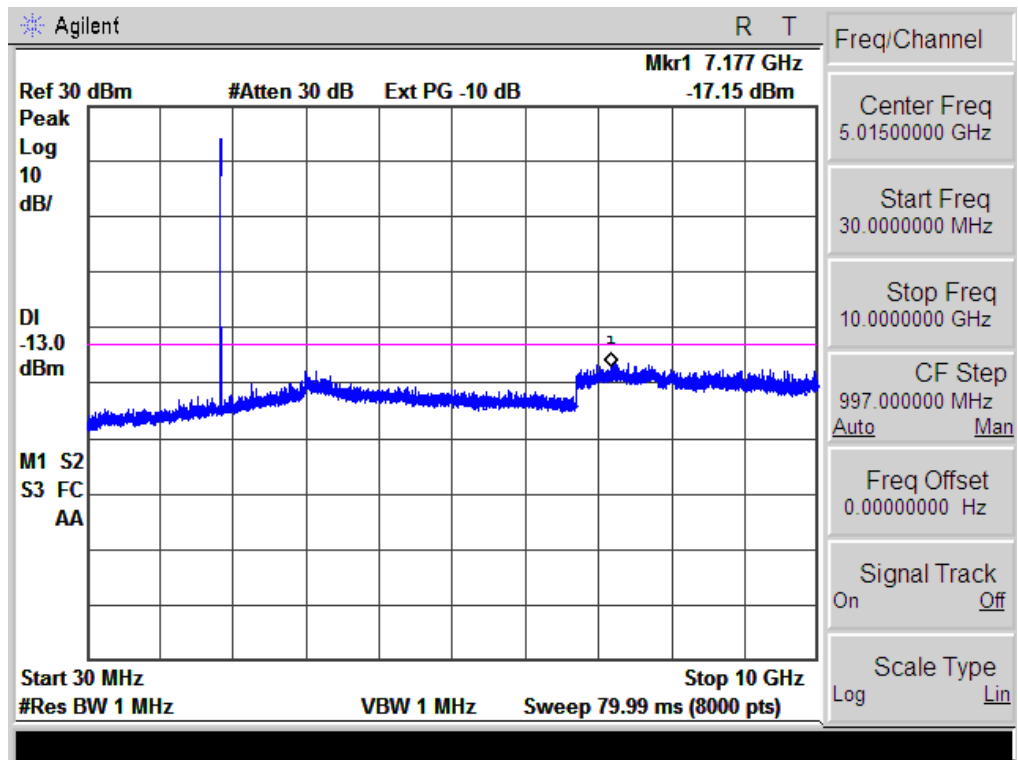
Conducted Emission Transmitting Mode CH 251 30MHz – 5GHz



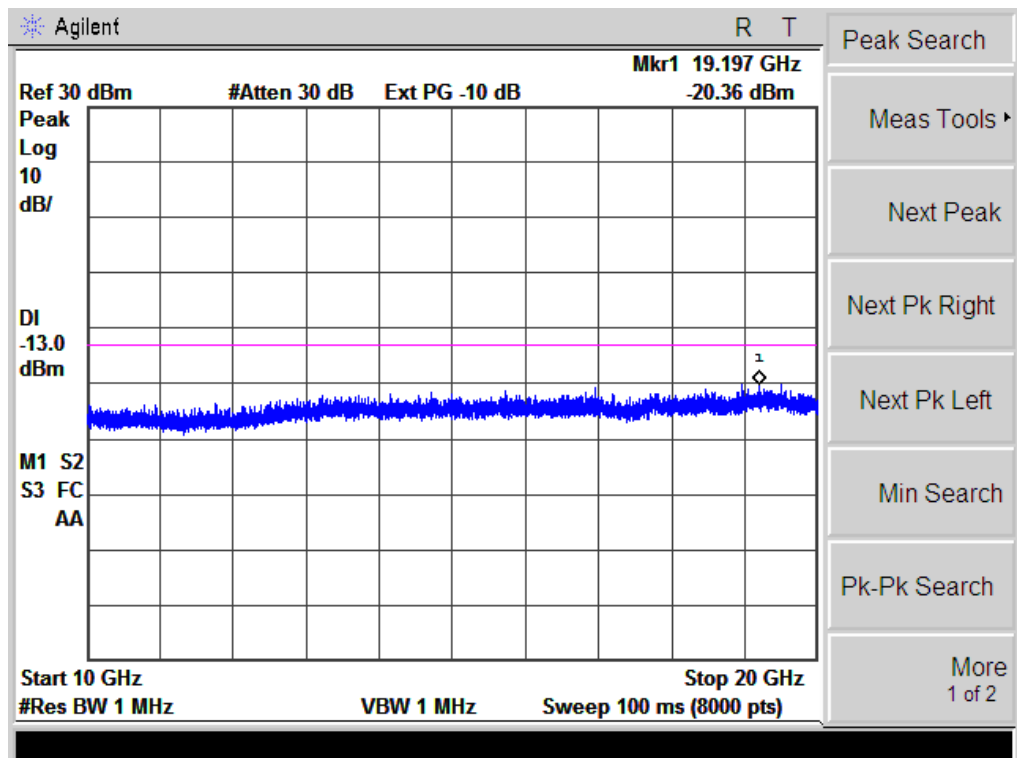
Conducted Emission Transmitting Mode CH 251 5GHz – 10GHz



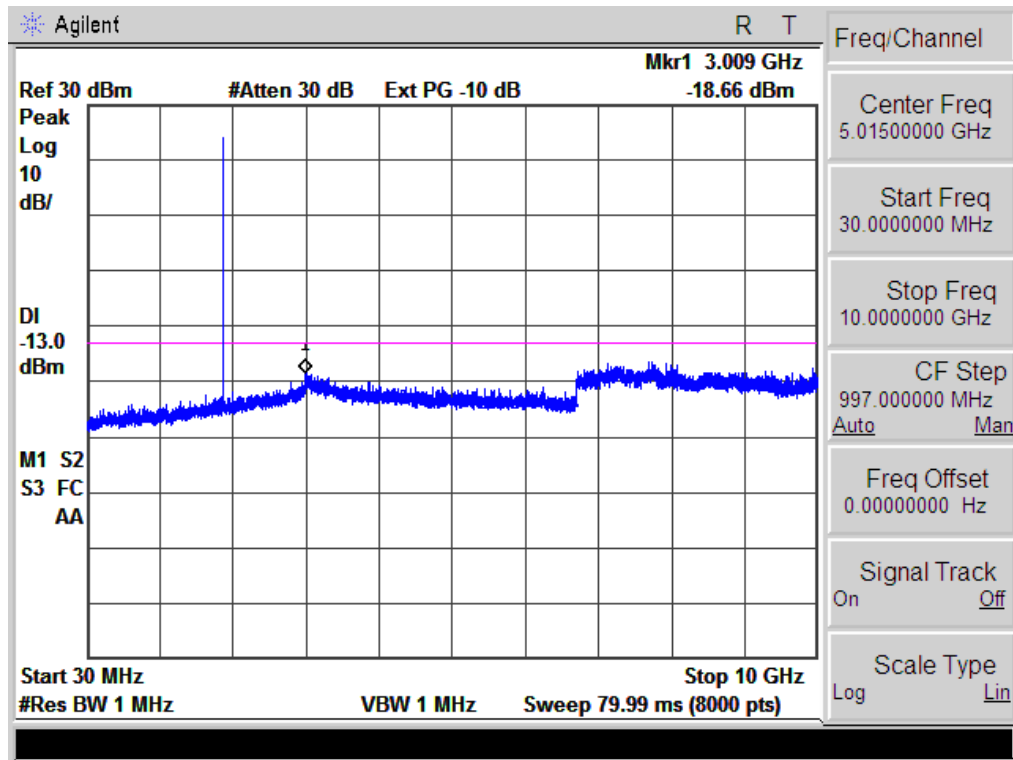
CONDUCTED EMISSION IN GSM1900 BAND
Conducted Emission Transmitting Mode CH 512 30MHz – 10GHz



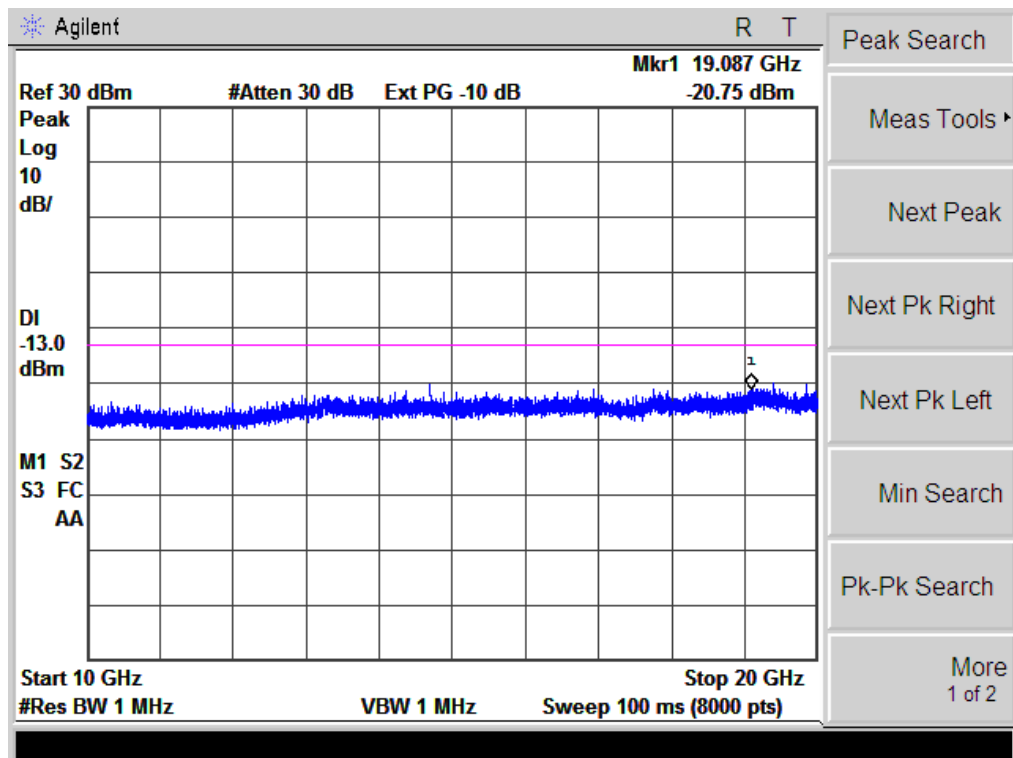
Conducted Emission Transmitting Mode CH 512 10GHz – 20GHz



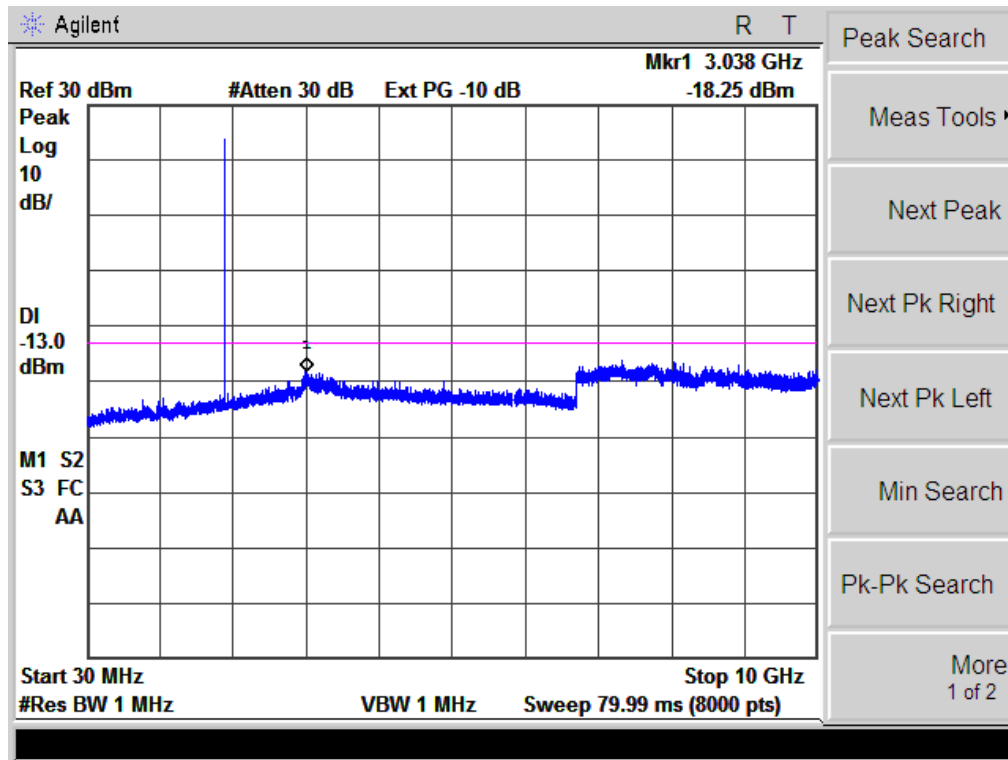
Conducted Emission Transmitting Mode CH 661 30MHz – 10GHz



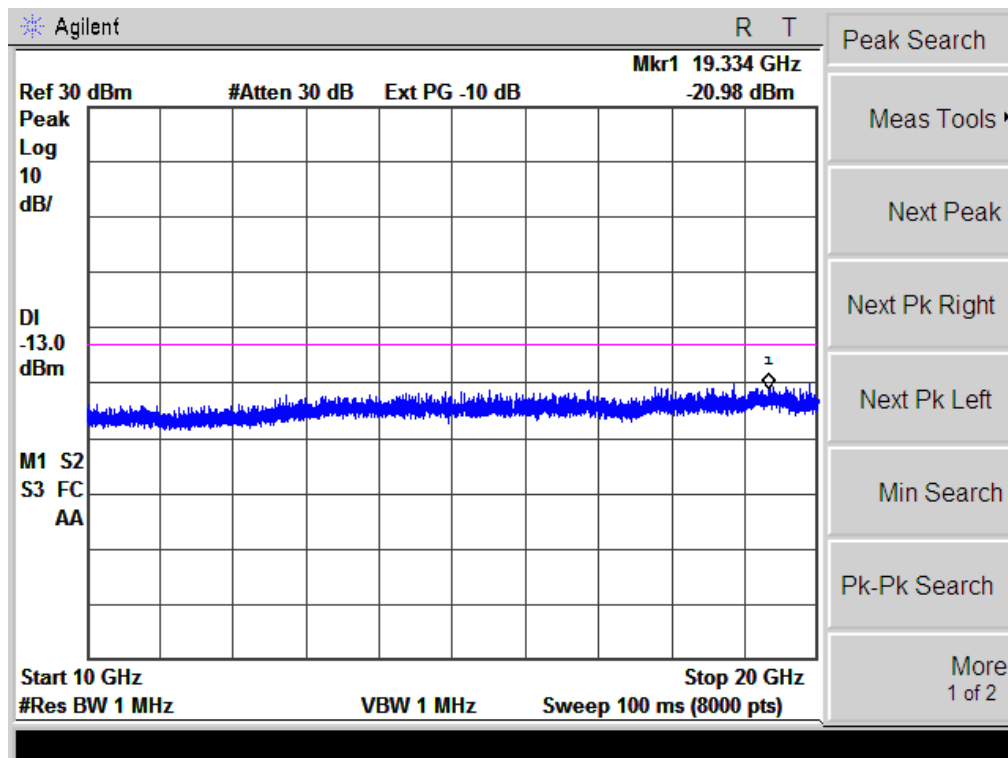
Conducted Emission Transmitting Mode CH 661 10GHz – 20GHz



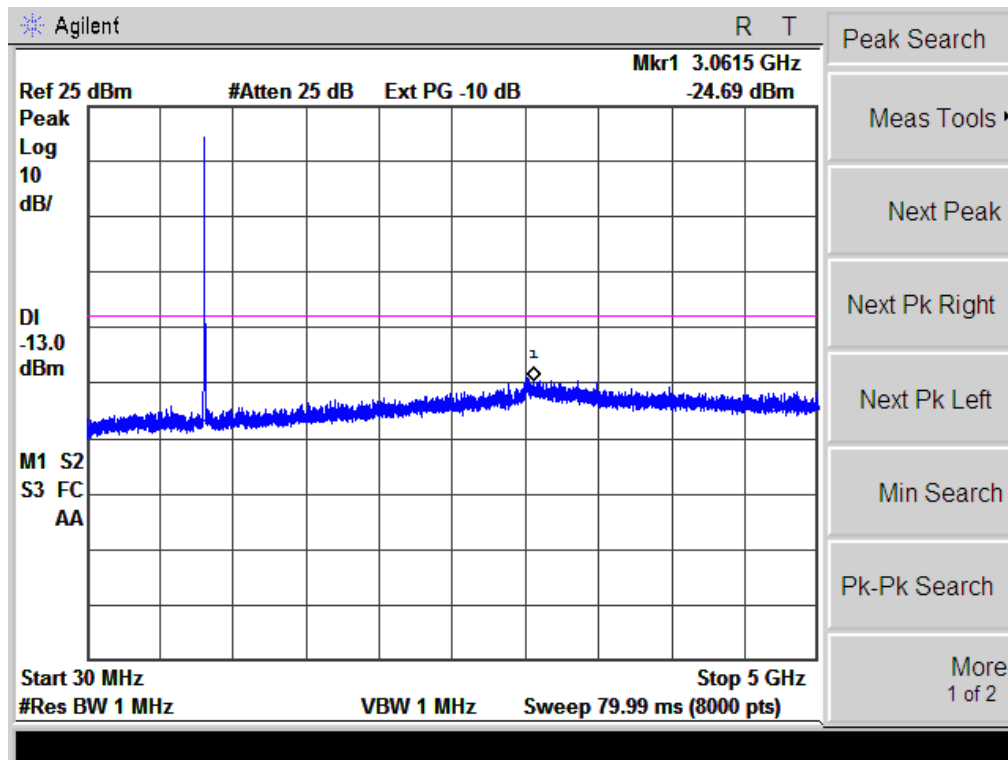
Conducted Emission Transmitting Mode CH 810 30MHz – 10GHz



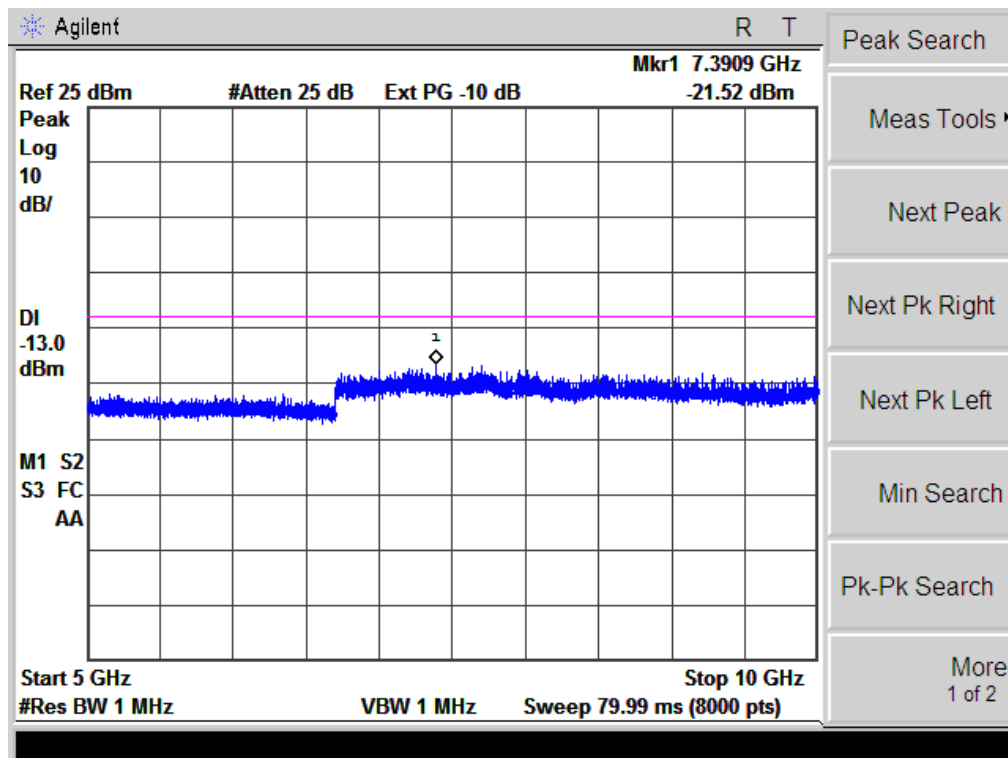
Conducted Emission Transmitting Mode CH 810 10GHz – 20GHz



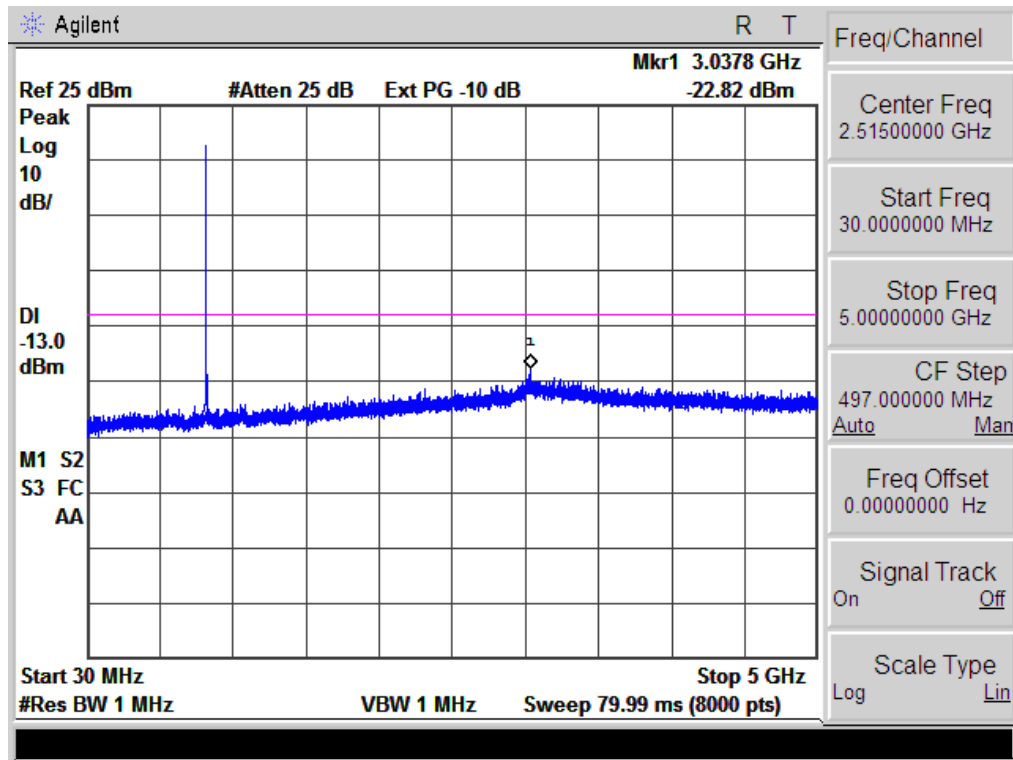
CONDUCTED EMISSION IN UMTS band V
Conducted Emission Transmitting Mode CH 4132 30MHz – 5GHz



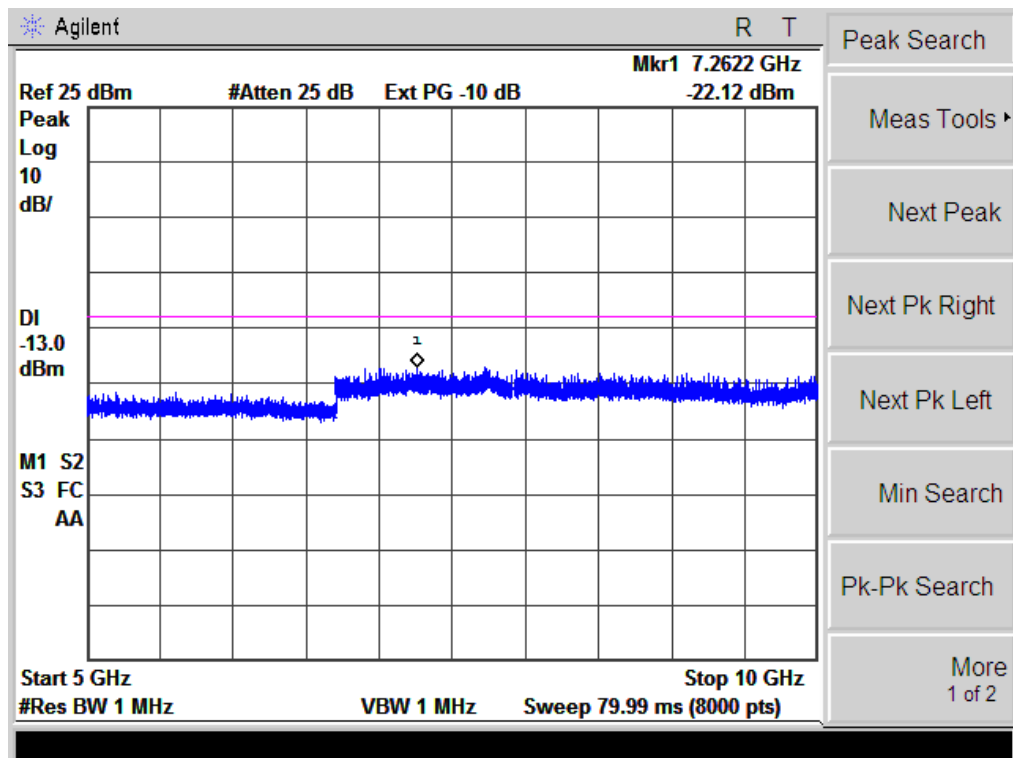
Conducted Emission Transmitting Mode CH 4132 5GHz – 10GHz



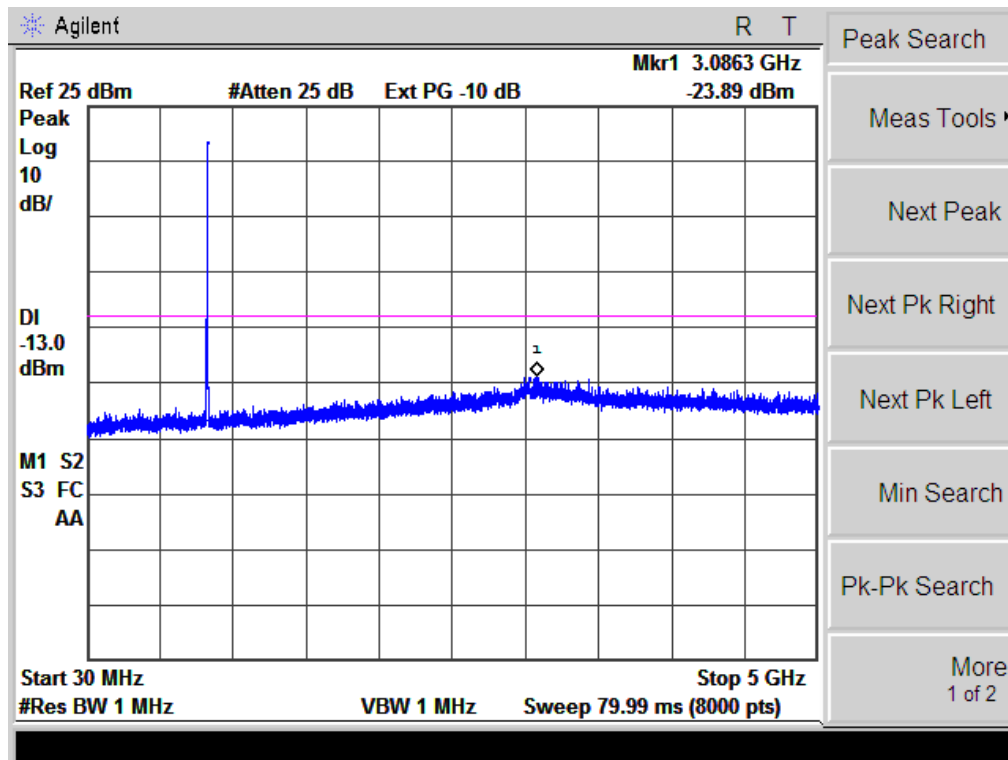
Conducted Emission Transmitting Mode CH 4183 30MHz –5GHz



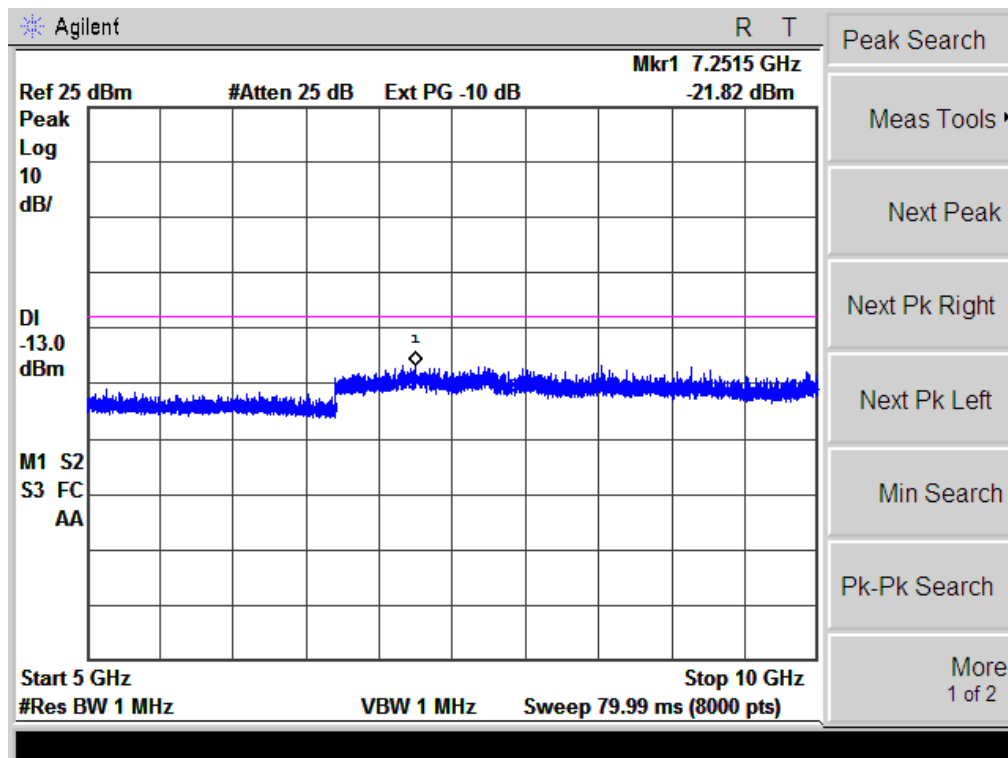
Conducted Emission Transmitting Mode CH 4183 5GHz – 10GHz



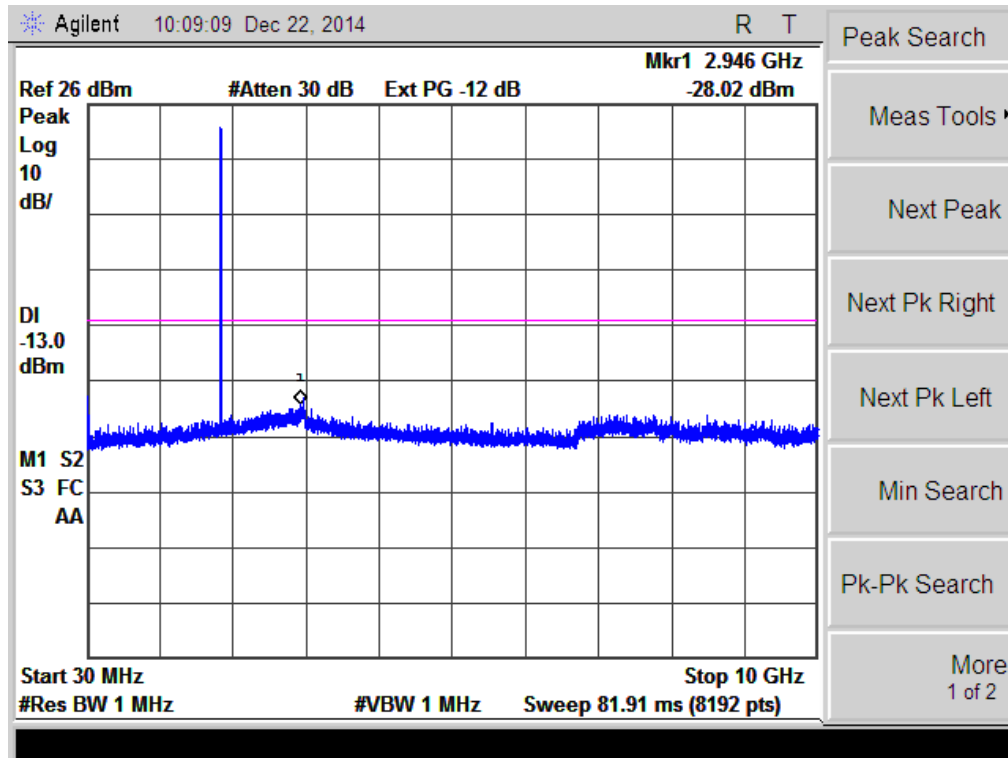
Conducted Emission Transmitting Mode CH 4233 30MHz – 5GHz



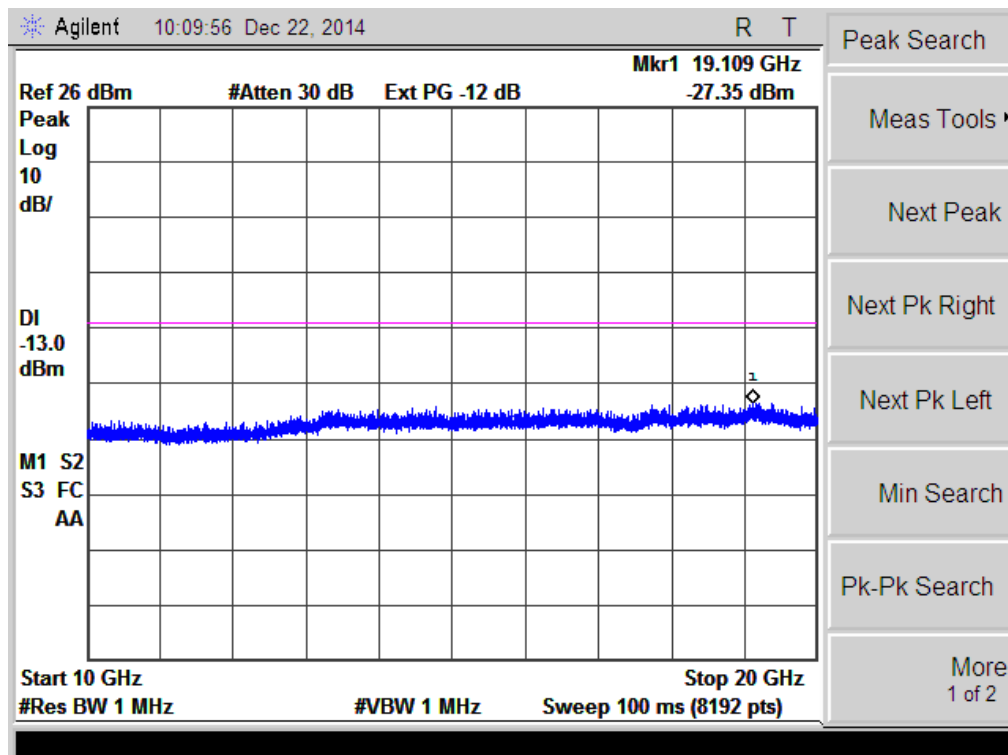
Conducted Emission Transmitting Mode CH 4233 5GHz – 10GHz



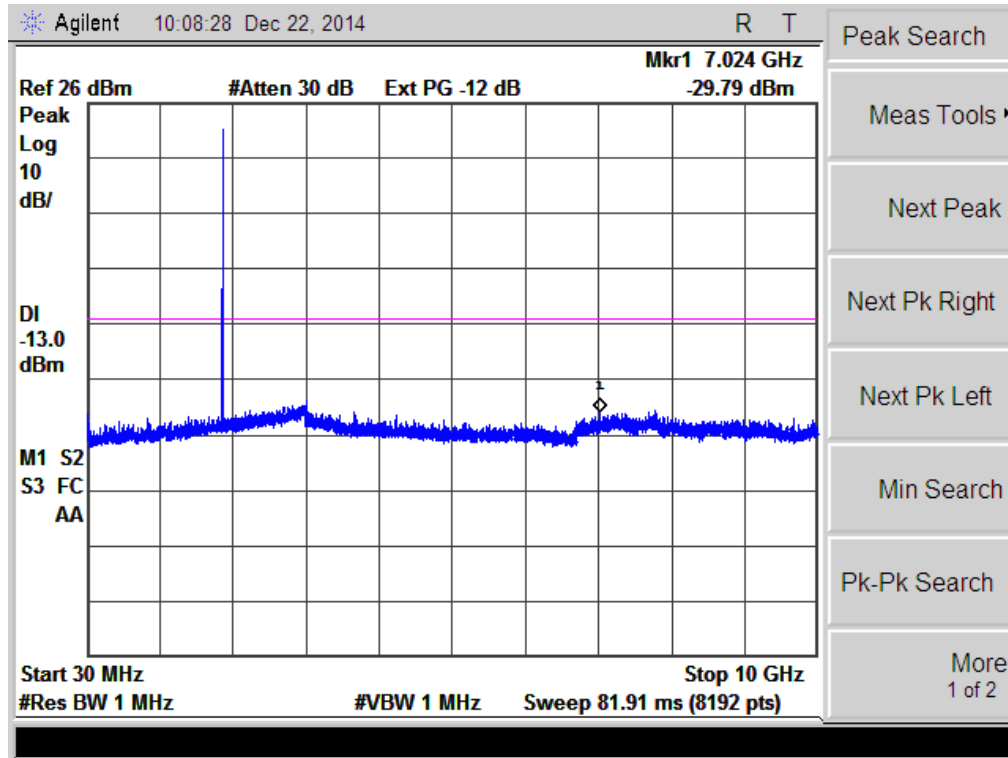
CONDUCTED EMISSION IN UMTS band II
Conducted Emission Transmitting Mode CH 9262 30MHz – 10GHz



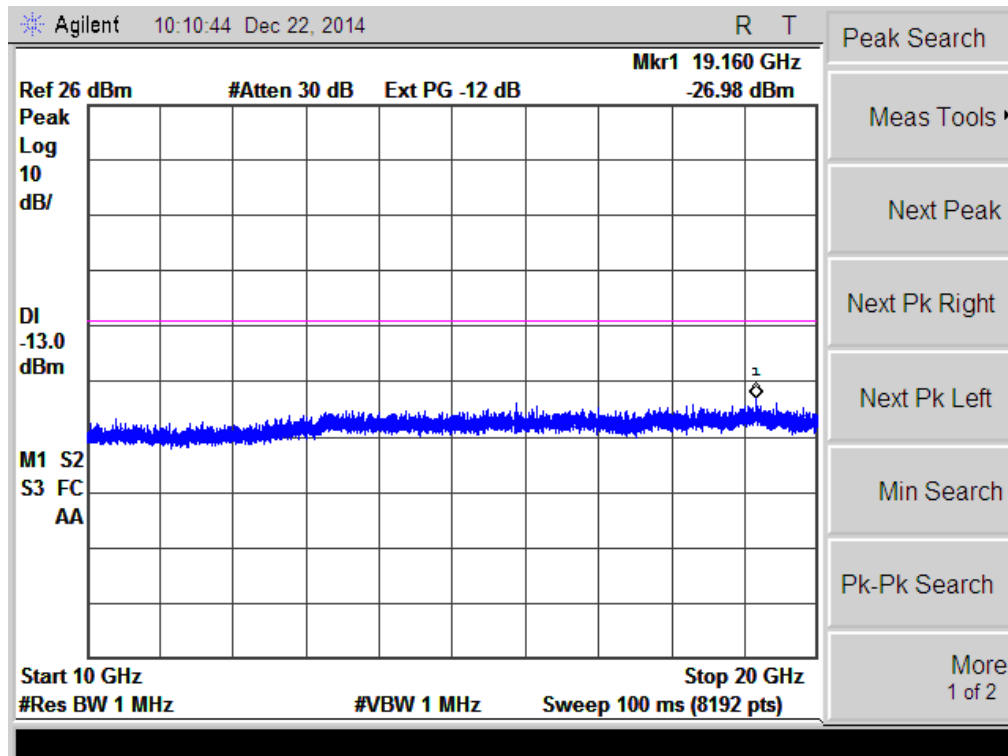
Conducted Emission Transmitting Mode CH 9262 10GHz – 20GHz



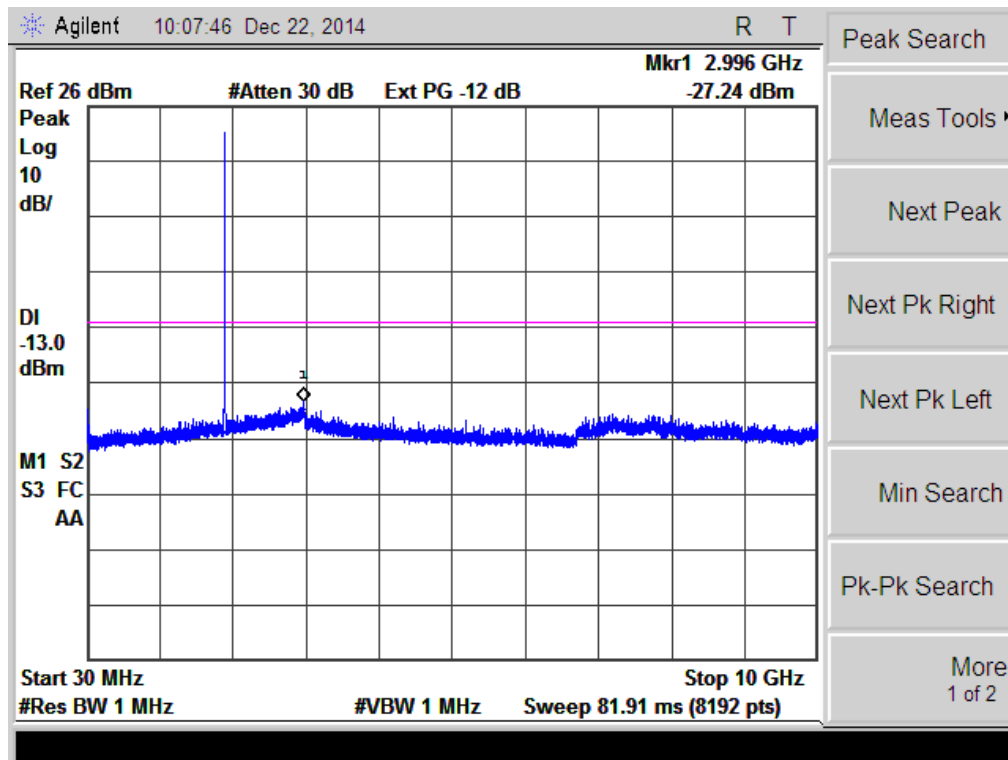
Conducted Emission Transmitting Mode CH 9400 30MHz – 10GHz



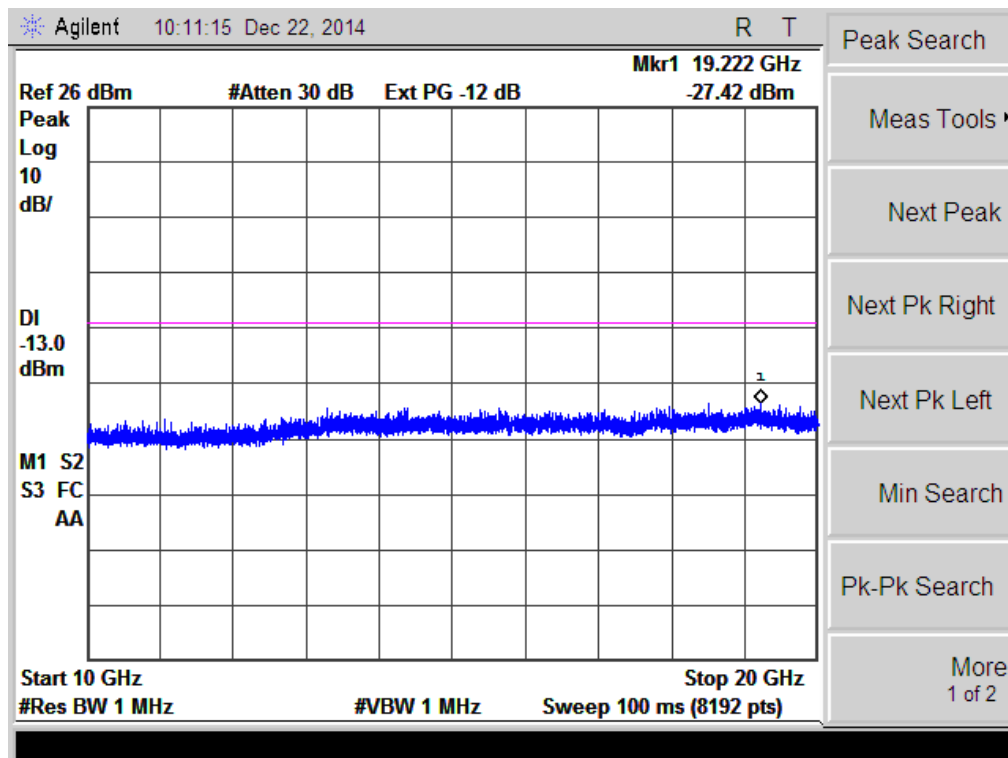
Conducted Emission Transmitting Mode CH 9400 10GHz – 20GHz



Conducted Emission Transmitting Mode CH 9538 30MHz – 10GHz



Conducted Emission Transmitting Mode CH 9538 10GHz – 20GHz

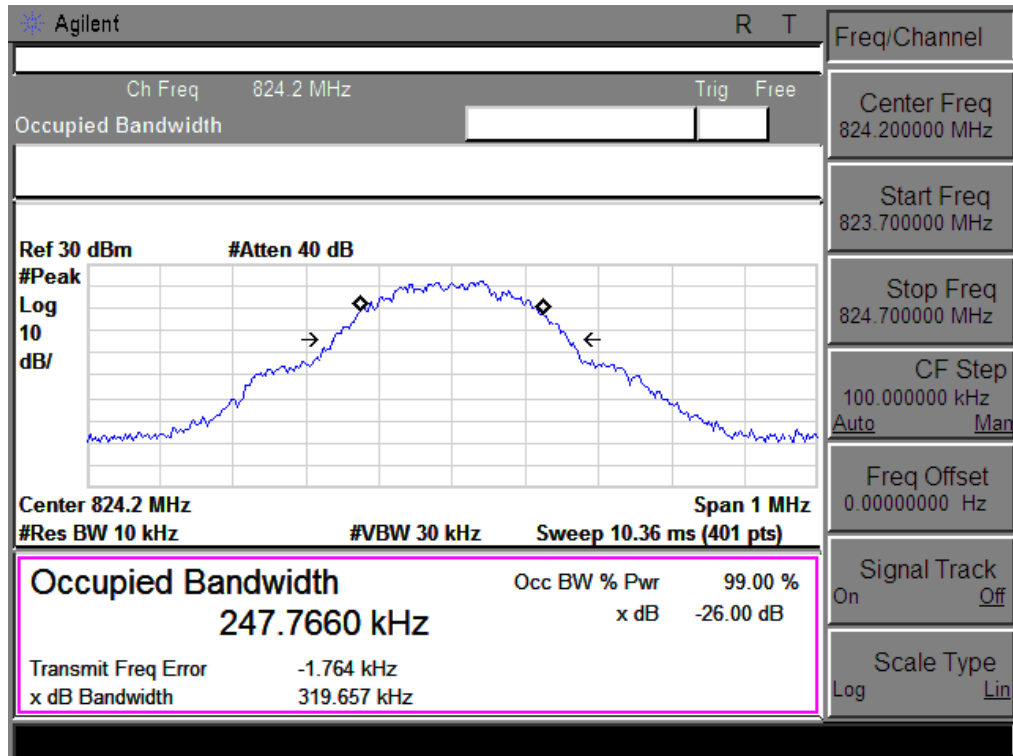


APPENDIX II

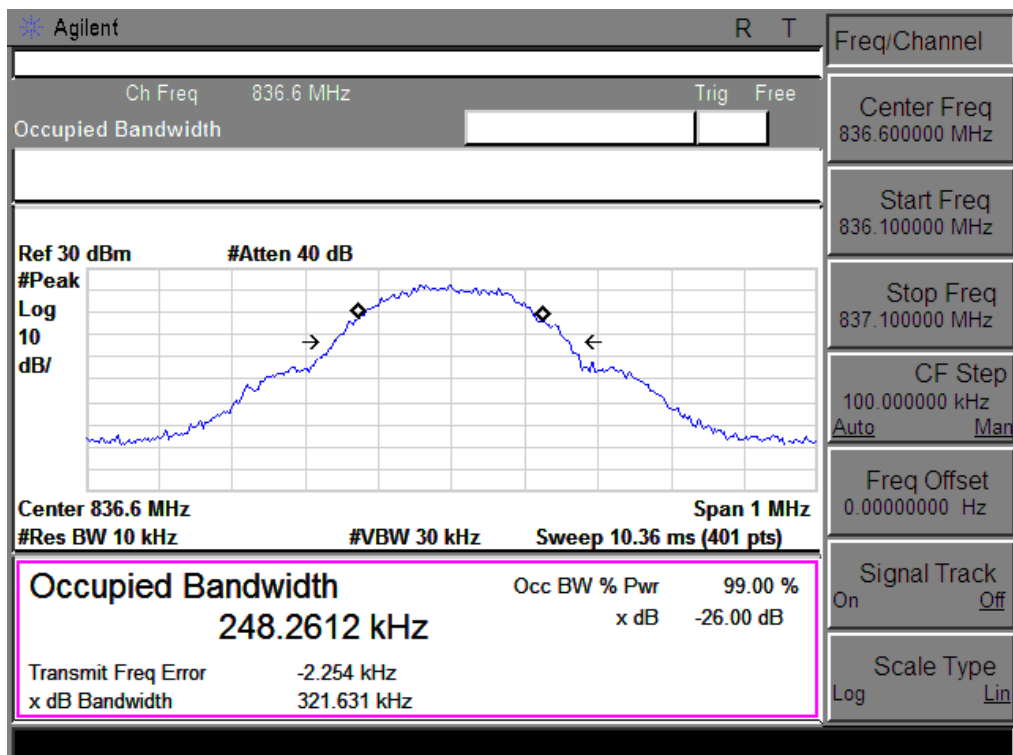
TEST PLOTS FOR OCCUPIED BANDWIDTH (99%)

EMISSION BANDWIDTH (-26dBC)

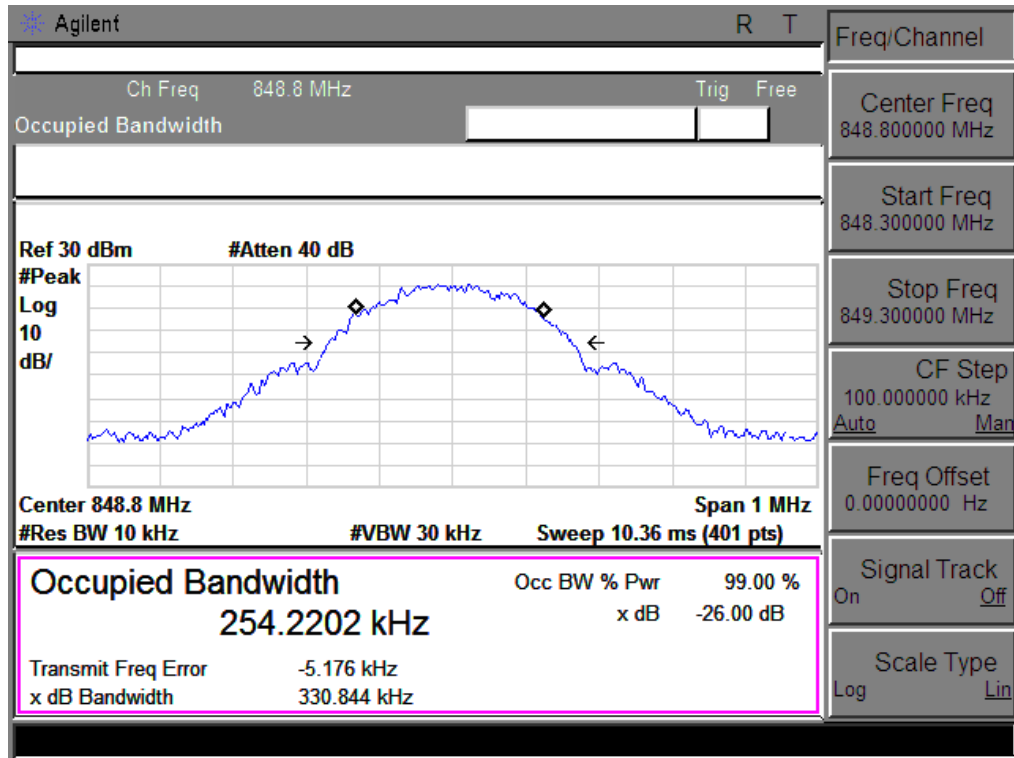
Occupied Bandwidth (99%) GSM 850 BAND CH 128



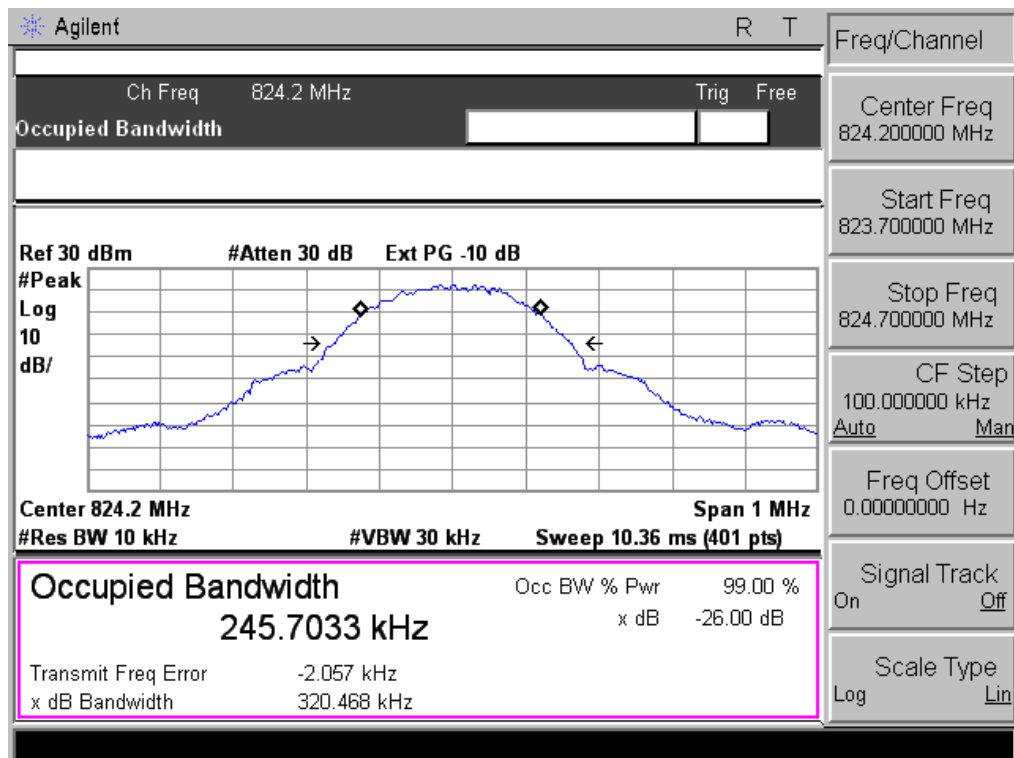
Occupied Bandwidth (99%) GSM 850 BAND CH 190



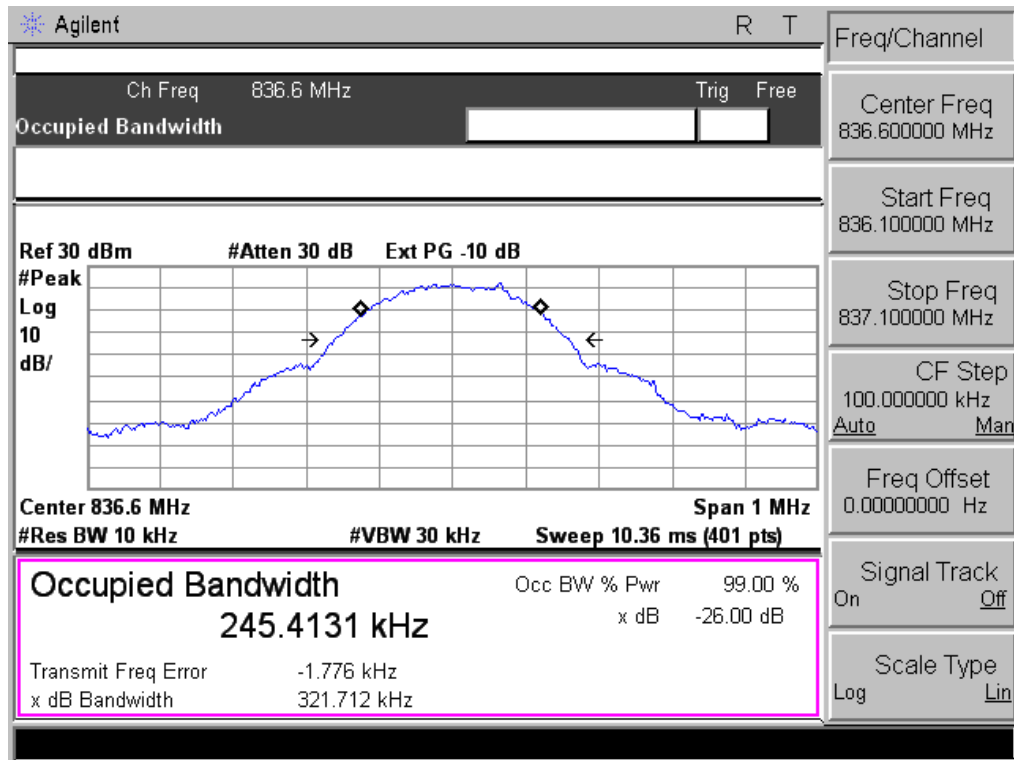
Occupied Bandwidth (99%) GSM 850 BAND CH 251



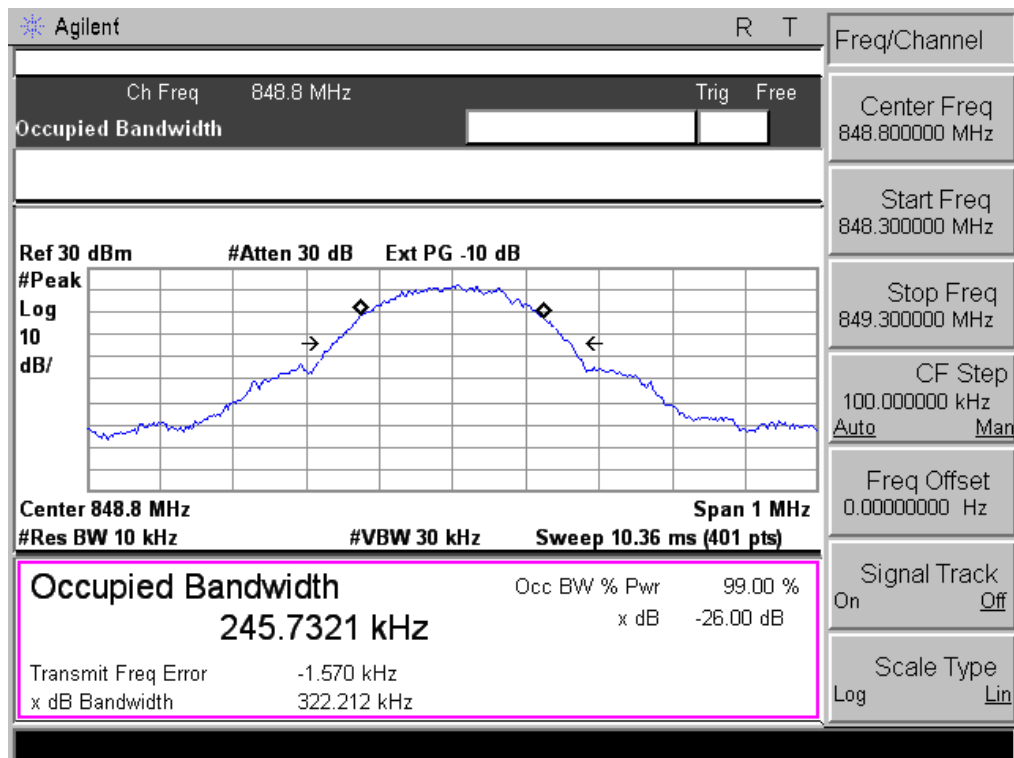
Occupied Bandwidth (99%) EDGE 850 BAND CH 128



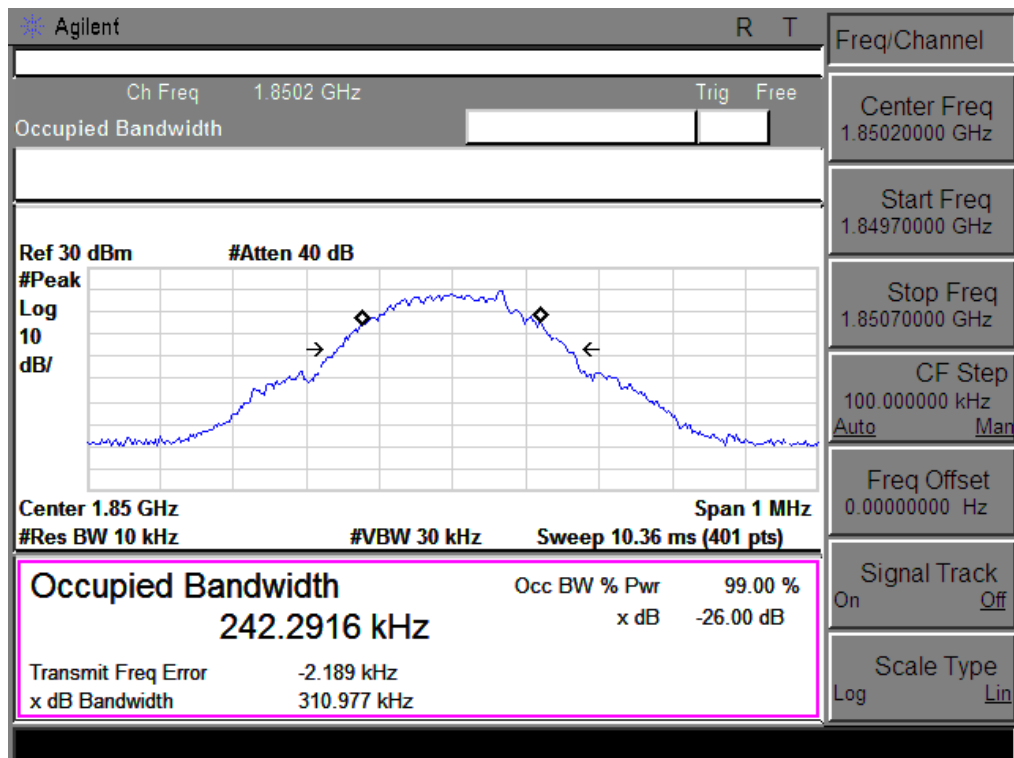
Occupied Bandwidth (99%) EDGE 850 BAND CH 190



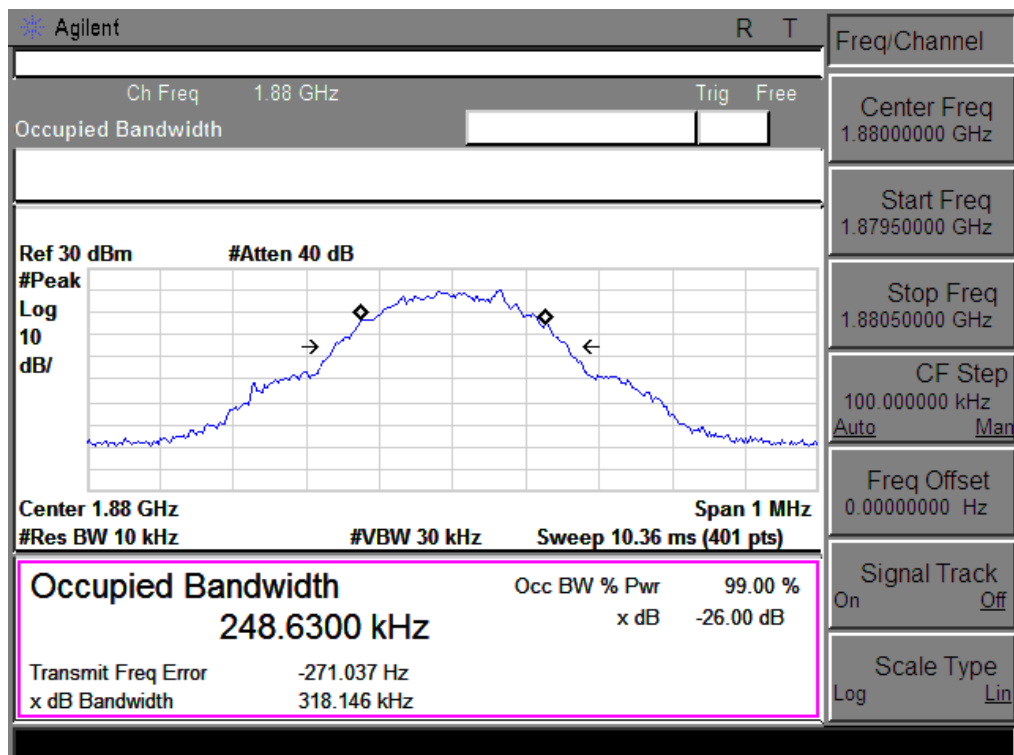
Occupied Bandwidth (99%) EDGE 850 BAND CH 251



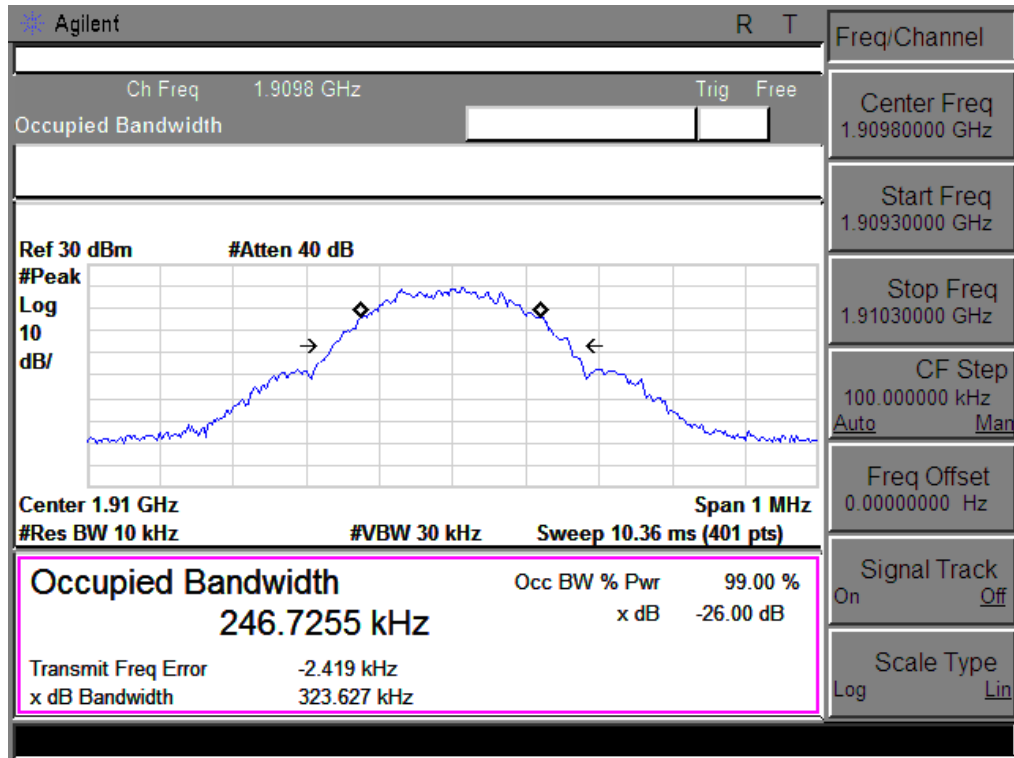
Occupied Bandwidth (99%) PCS 1900 BAND CH 512



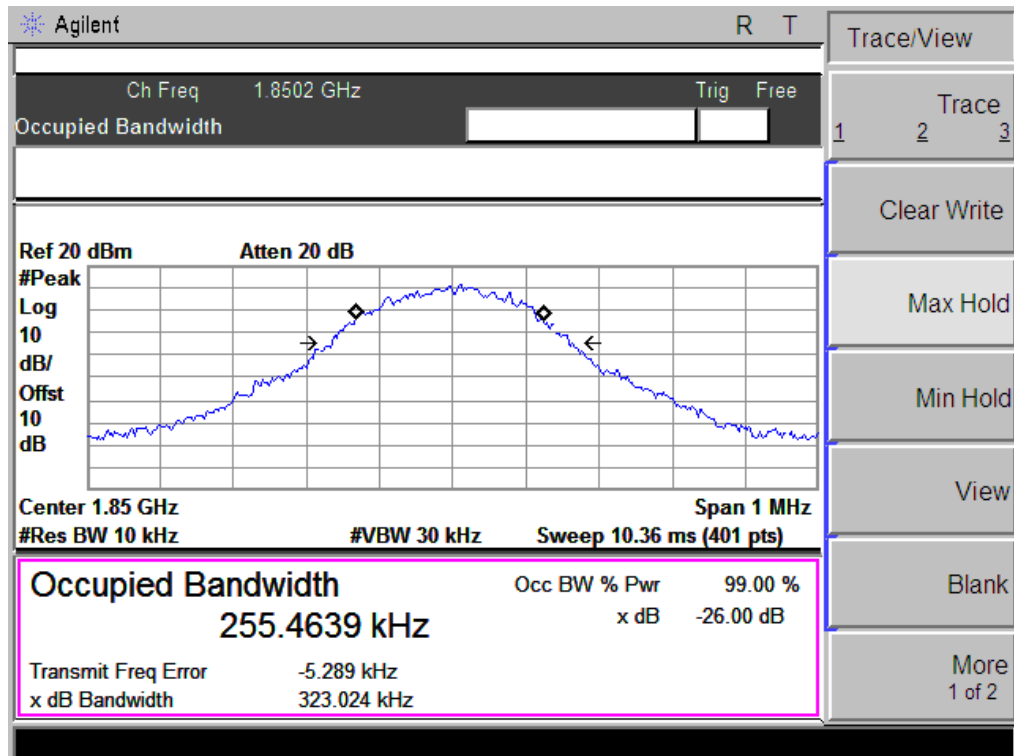
Occupied Bandwidth (99%) PCS 1900 BAND CH 661



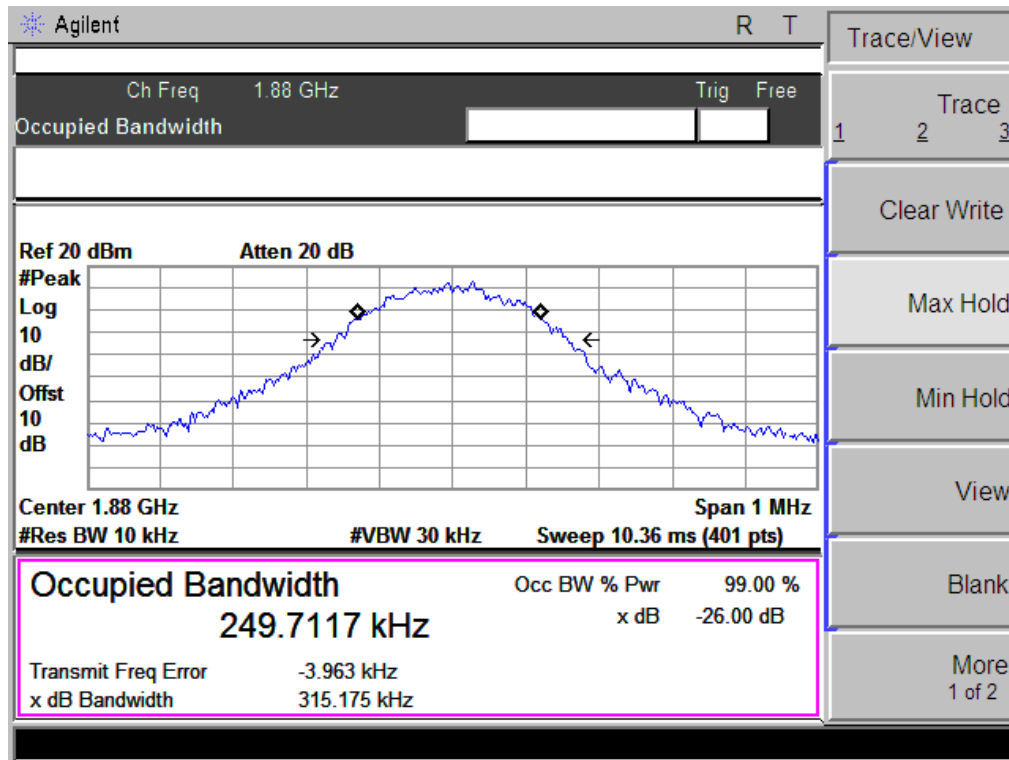
Occupied Bandwidth (99%) PCS 1900 BAND CH 810



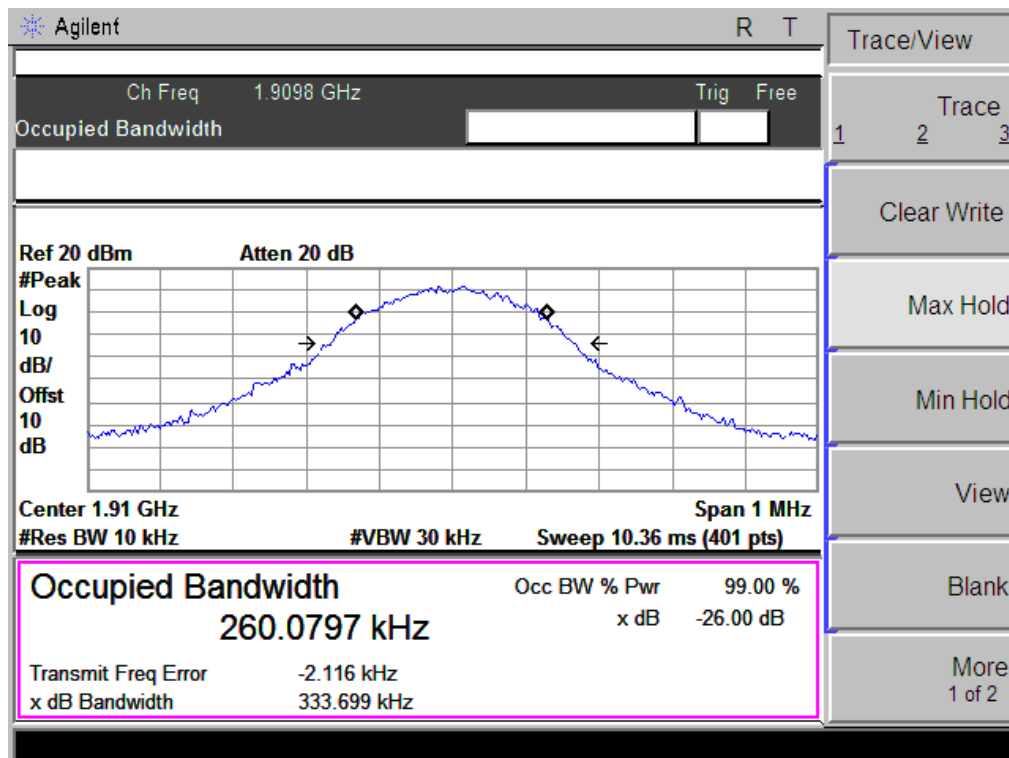
Occupied Bandwidth (99%) EDGE 1900 BAND CH 512



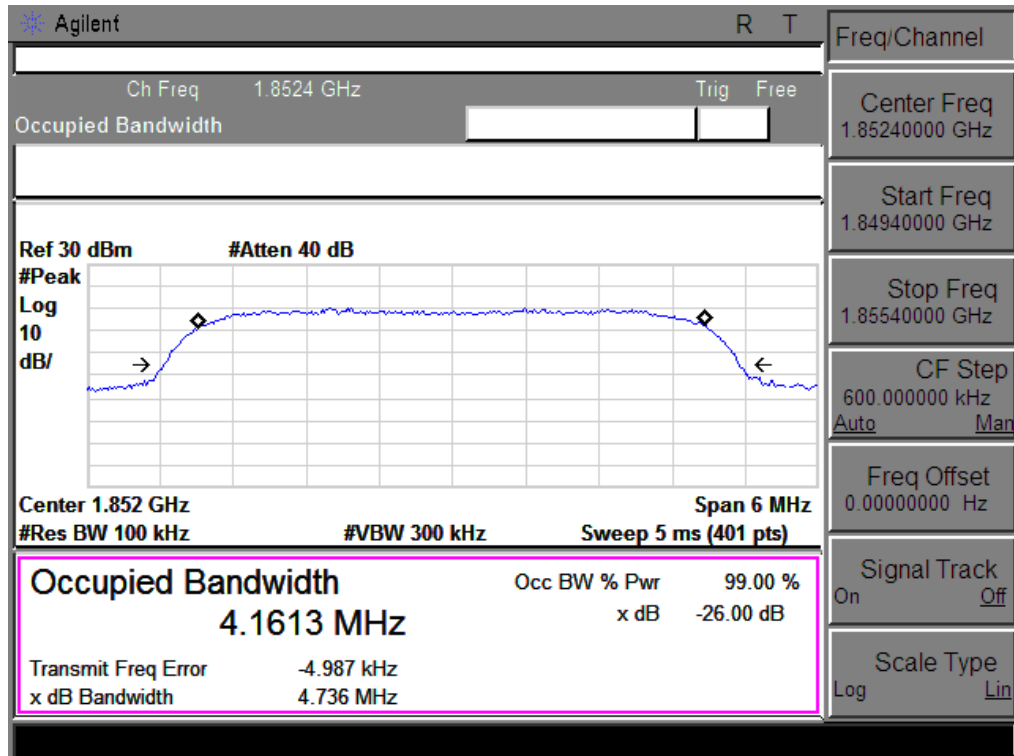
Occupied Bandwidth (99%) EDGE 1900 BAND CH 661



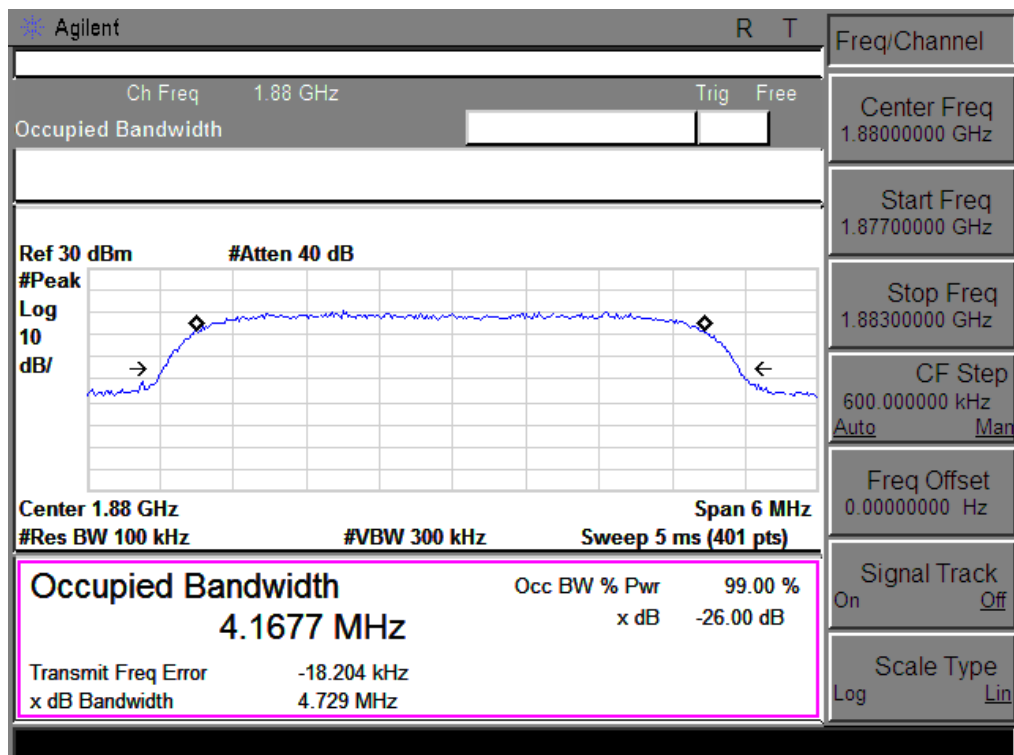
Occupied Bandwidth (99%) EDGE 1900 BAND CH 810



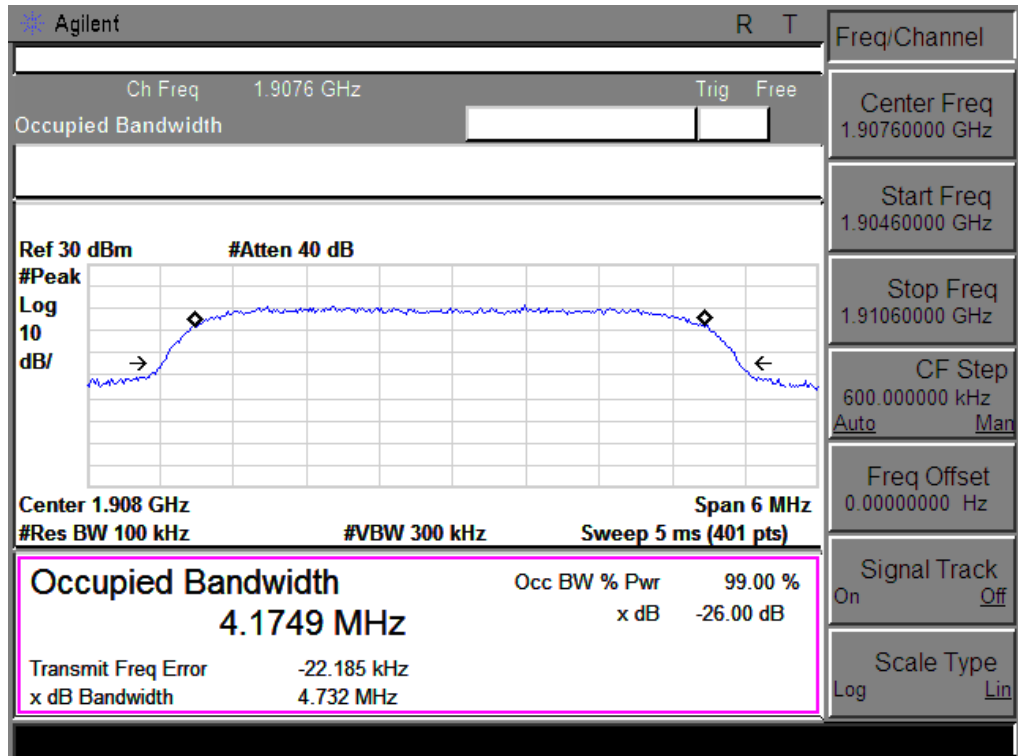
Occupied Bandwidth (99%) UMTS band II CH 9262



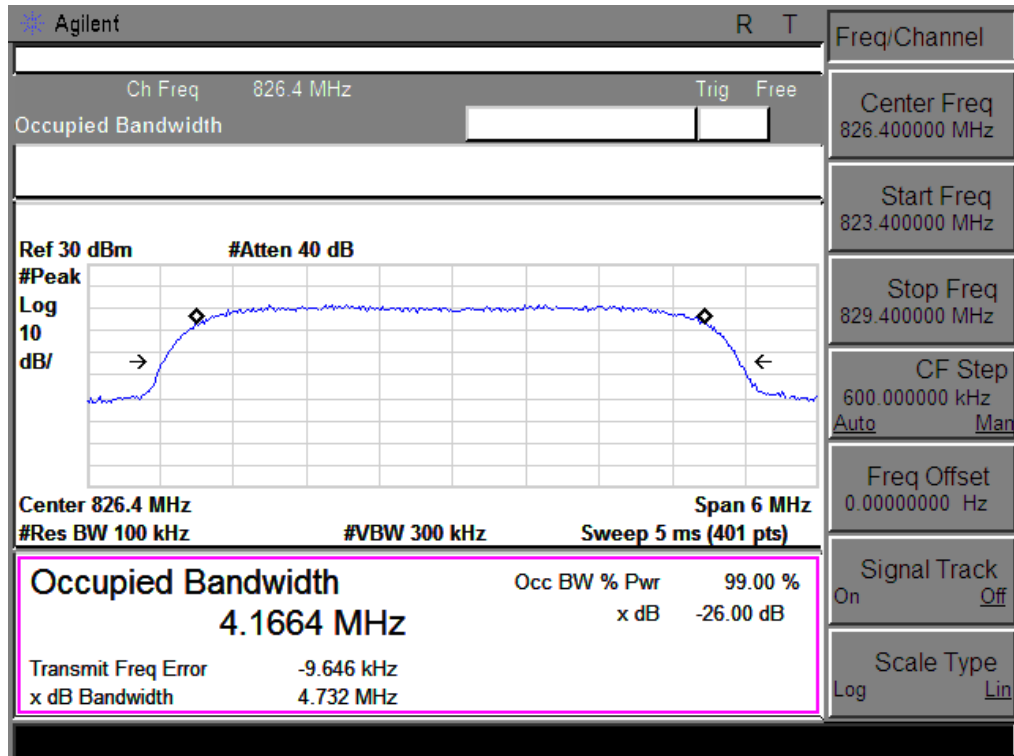
Occupied Bandwidth (99%) UMTS band II CH 9400



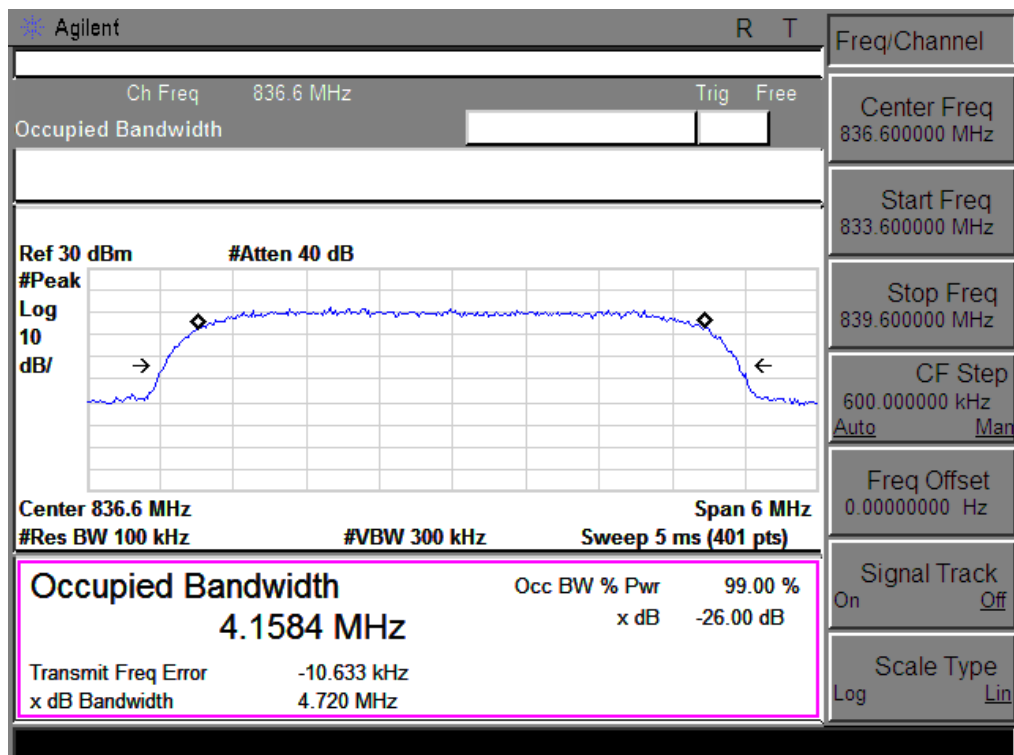
Occupied Bandwidth (99%) UMTS band II CH 9538



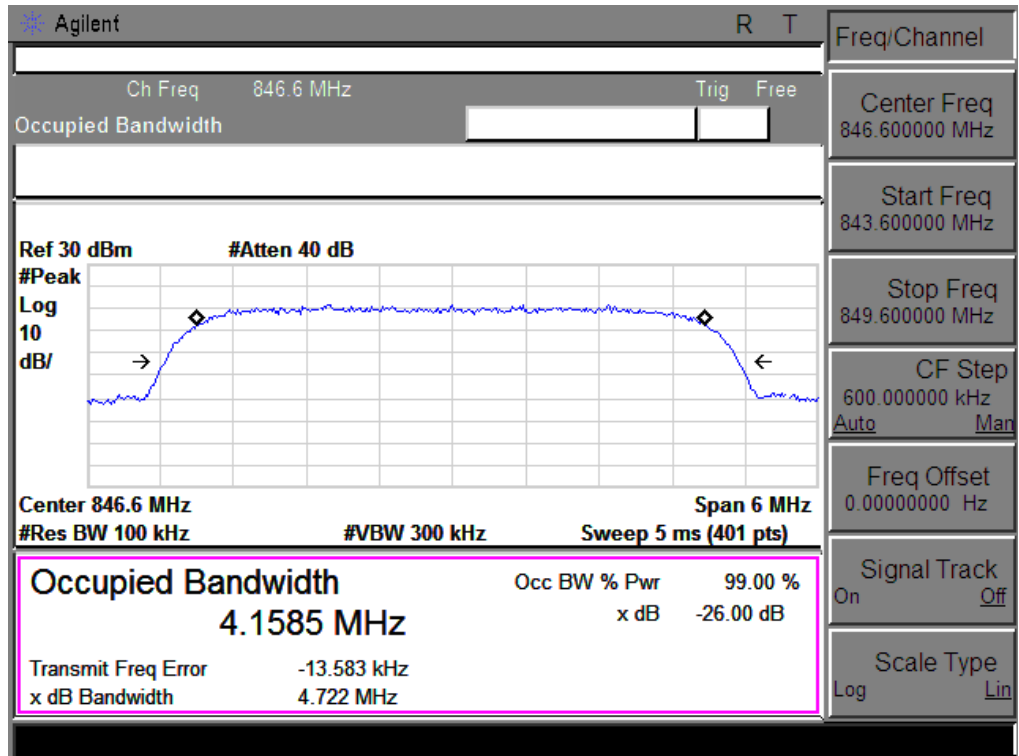
Occupied Bandwidth (99%) UMTS band V CH 4132



Occupied Bandwidth (99%) UMTS band V CH 4183



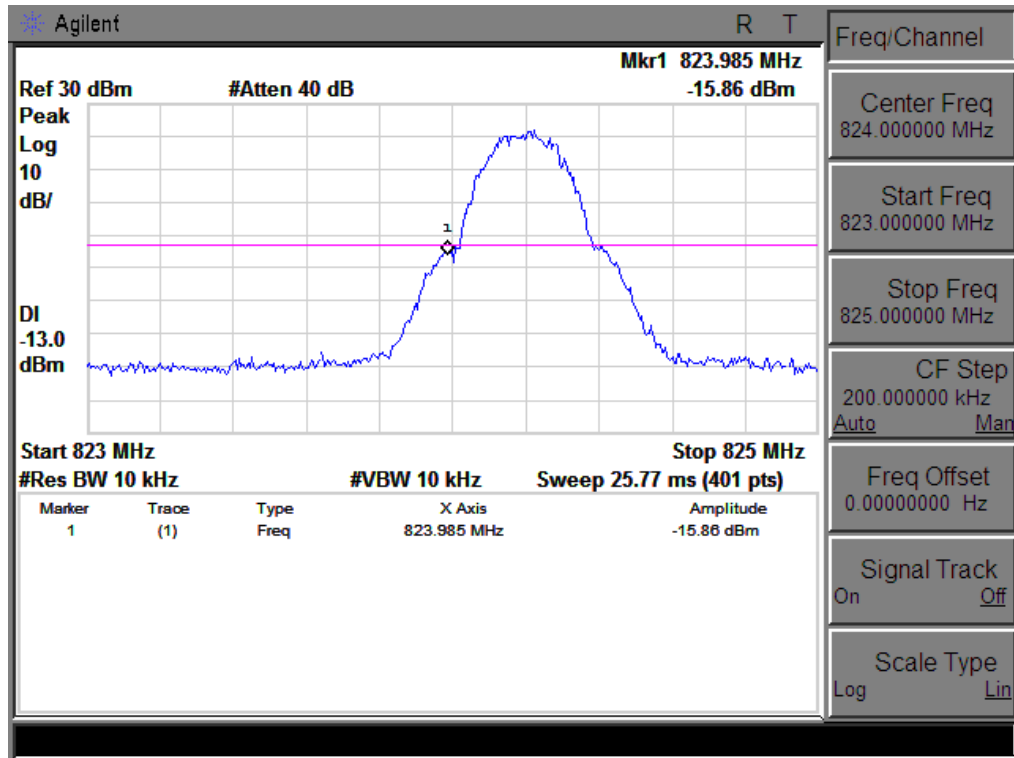
Occupied Bandwidth (99%) UMTS band V CH 4233



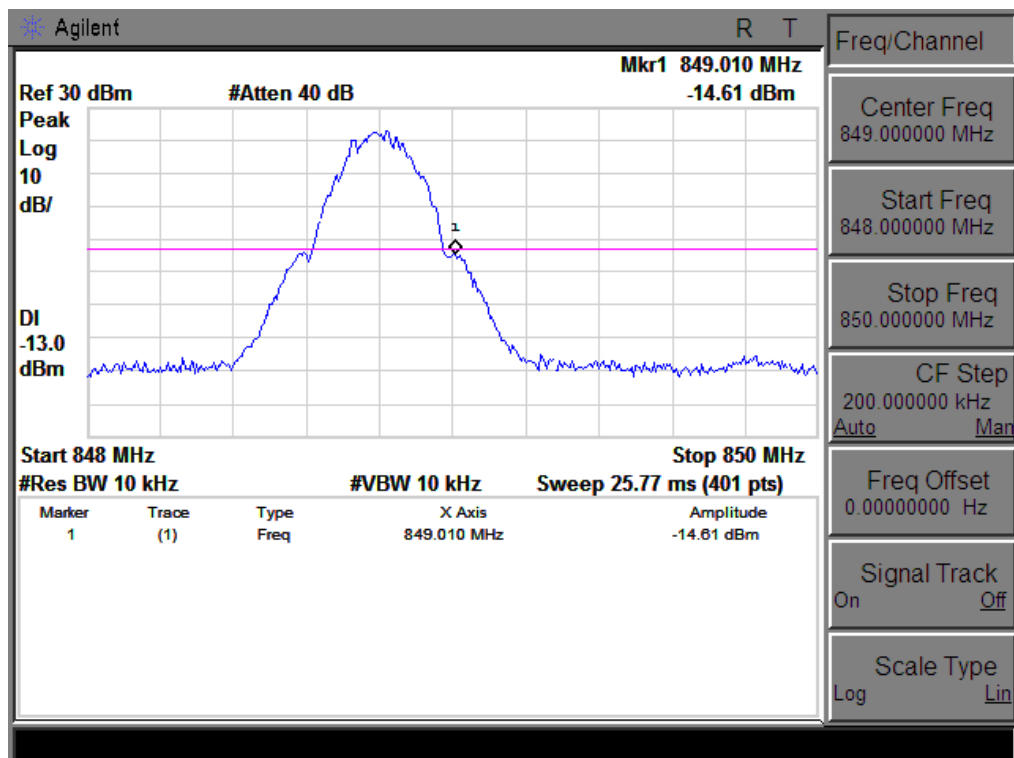
APPENDIX III

TEST PLOTS FOR BAND EDGES

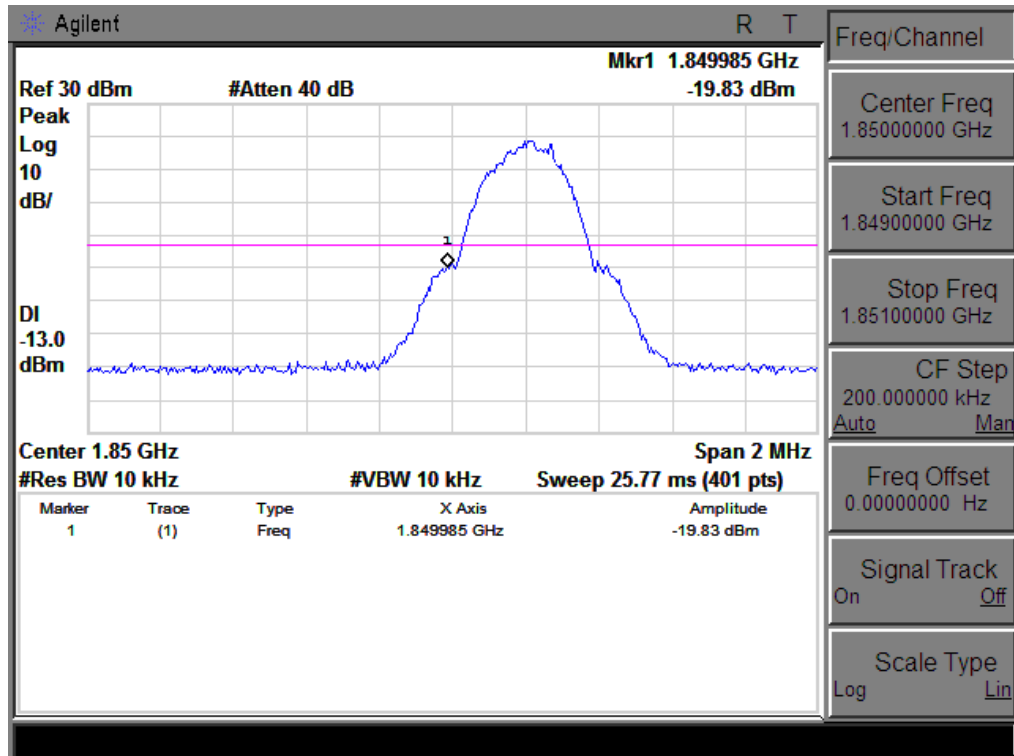
Low Band Edge GSM 850 BAND CH 128



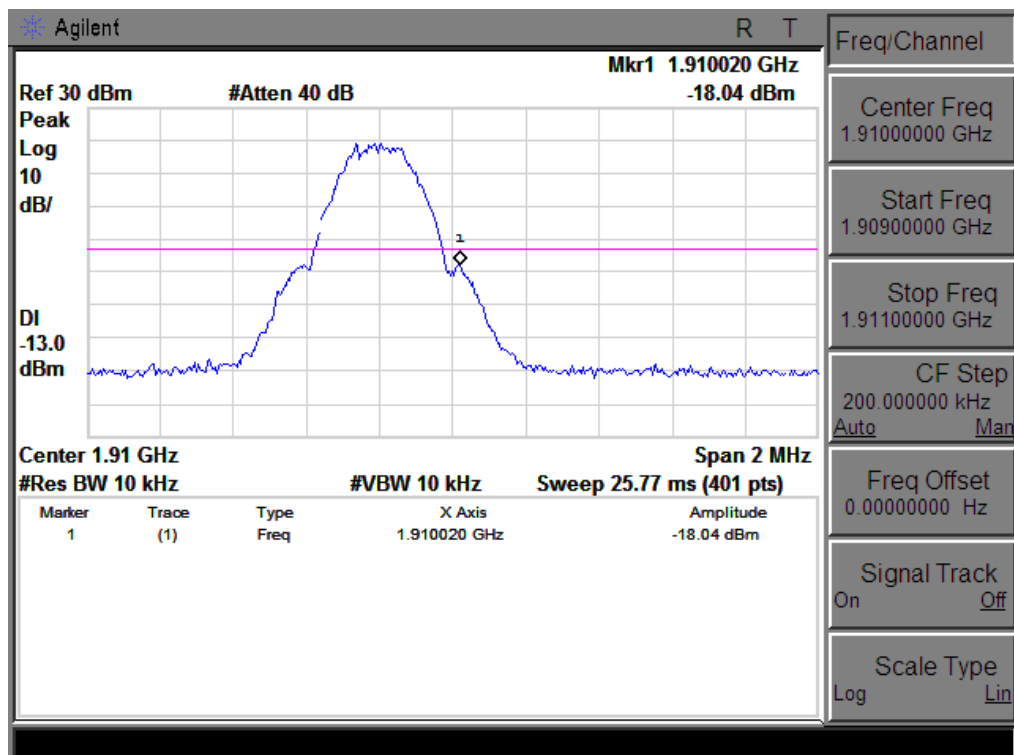
High Band Edge GSM 850 BAND CH 251



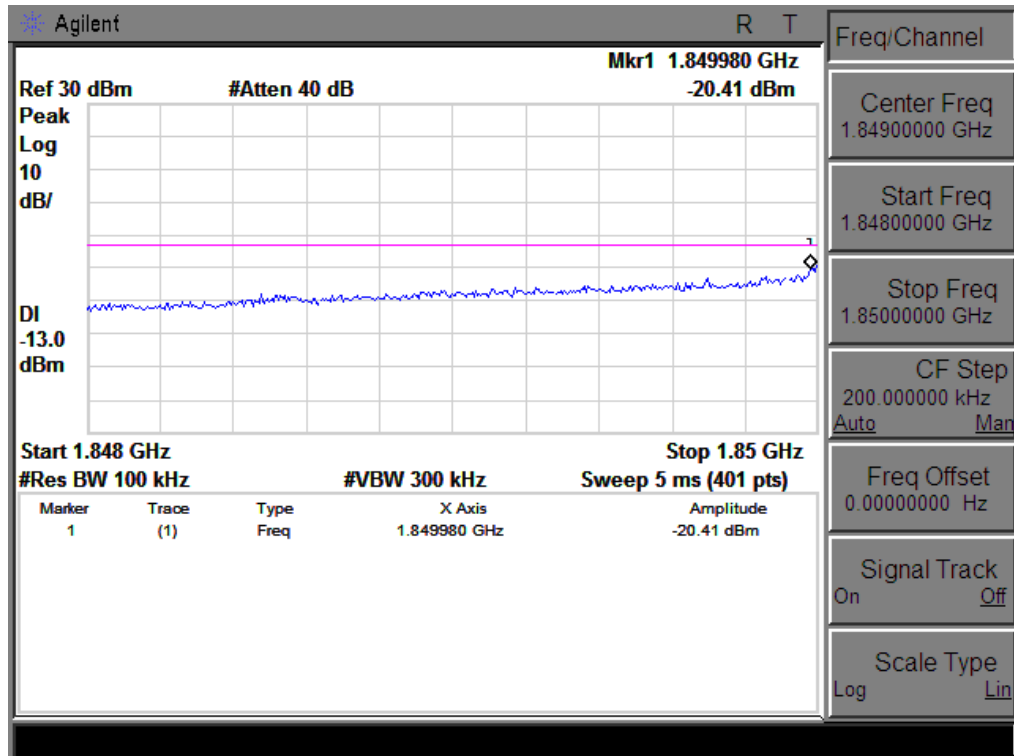
Low Band Edge PCS 1900 BAND CH 512



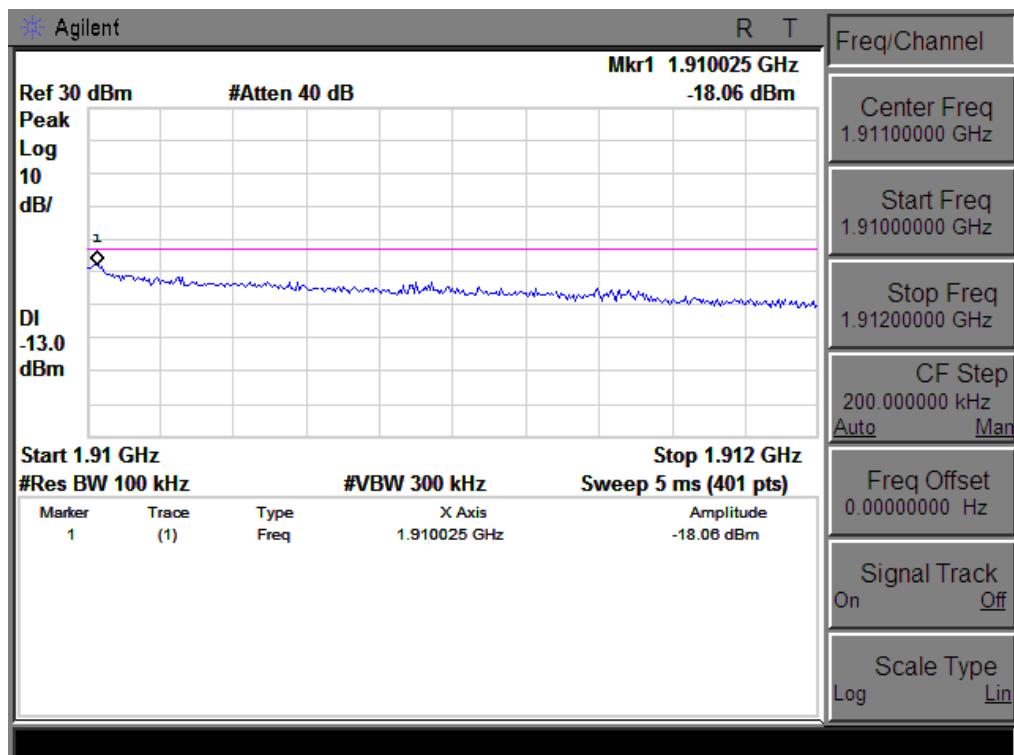
High Band Edge PCS 1900 BAND CH 810



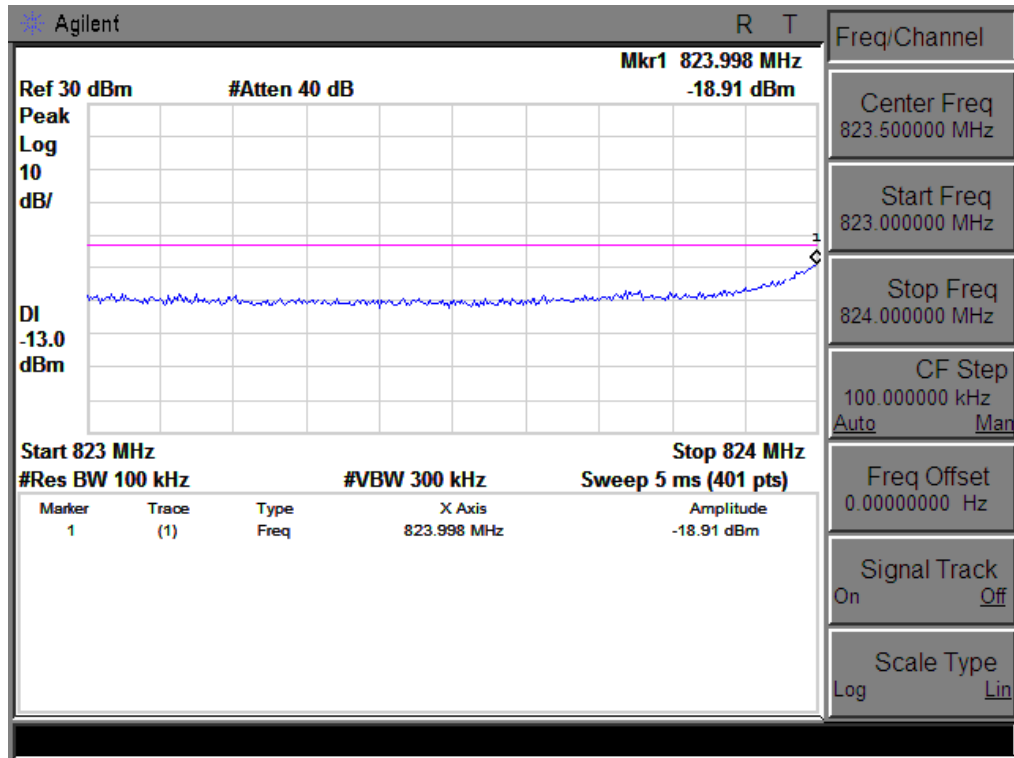
Low Band Edge UMTS BAND II CH 9262



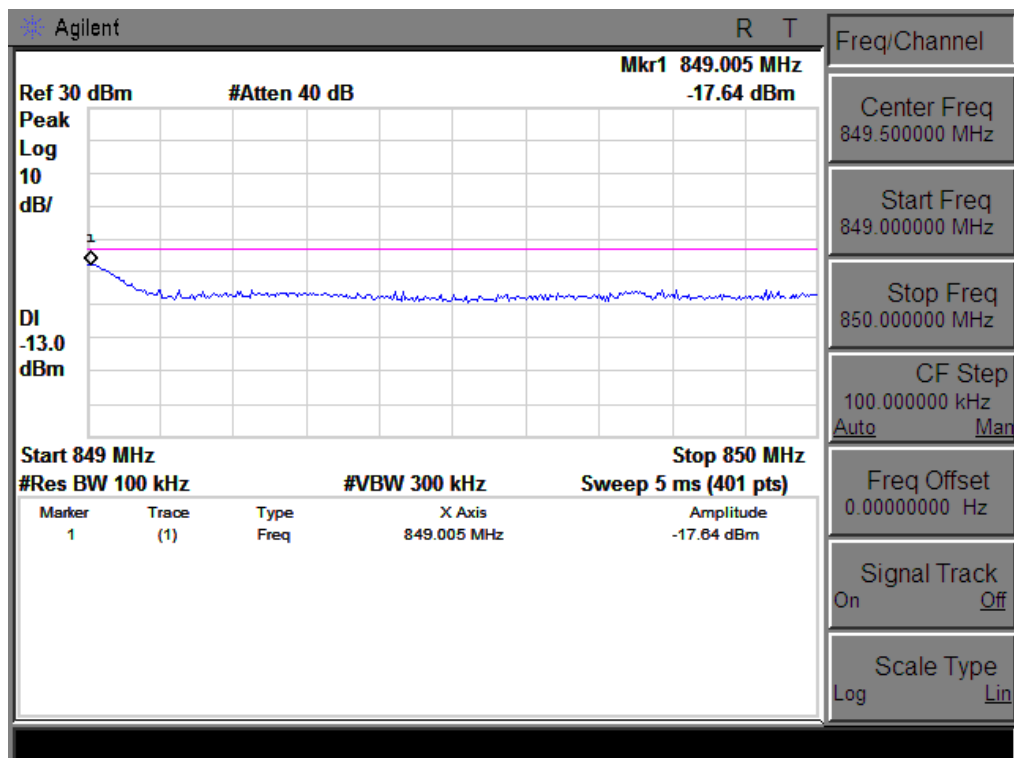
High Band Edge UMTS BAND II CH 9538



Low Band Edge UMTS BAND V CH 4132



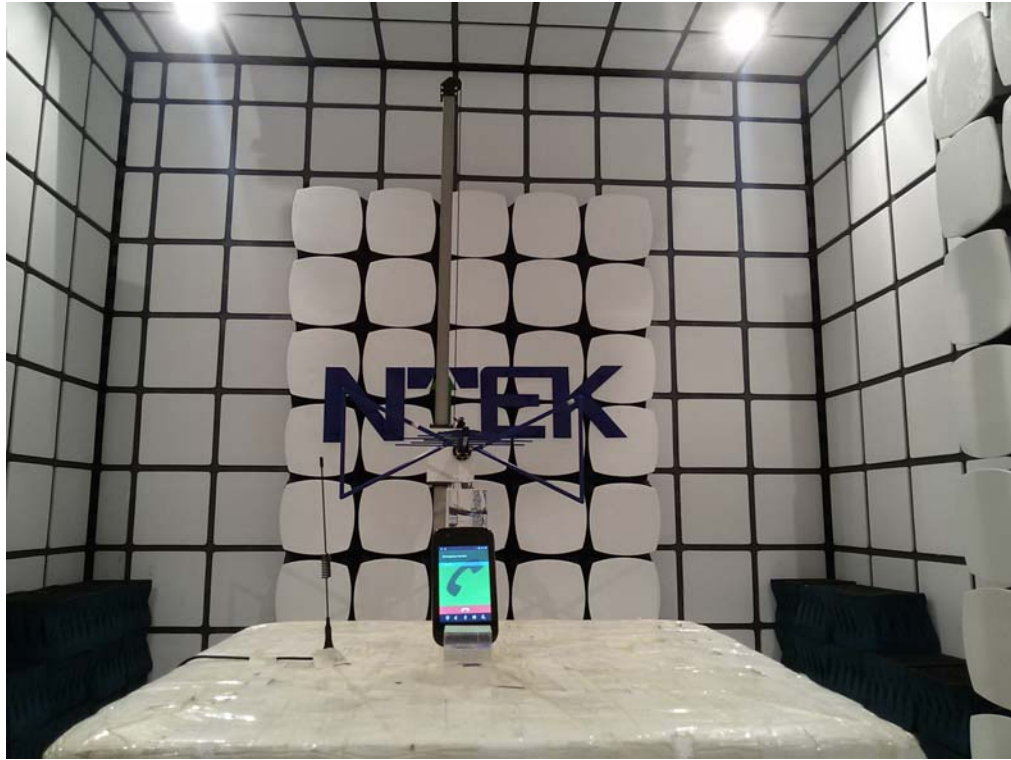
High Band Edge UMTS BAND II CH 4233

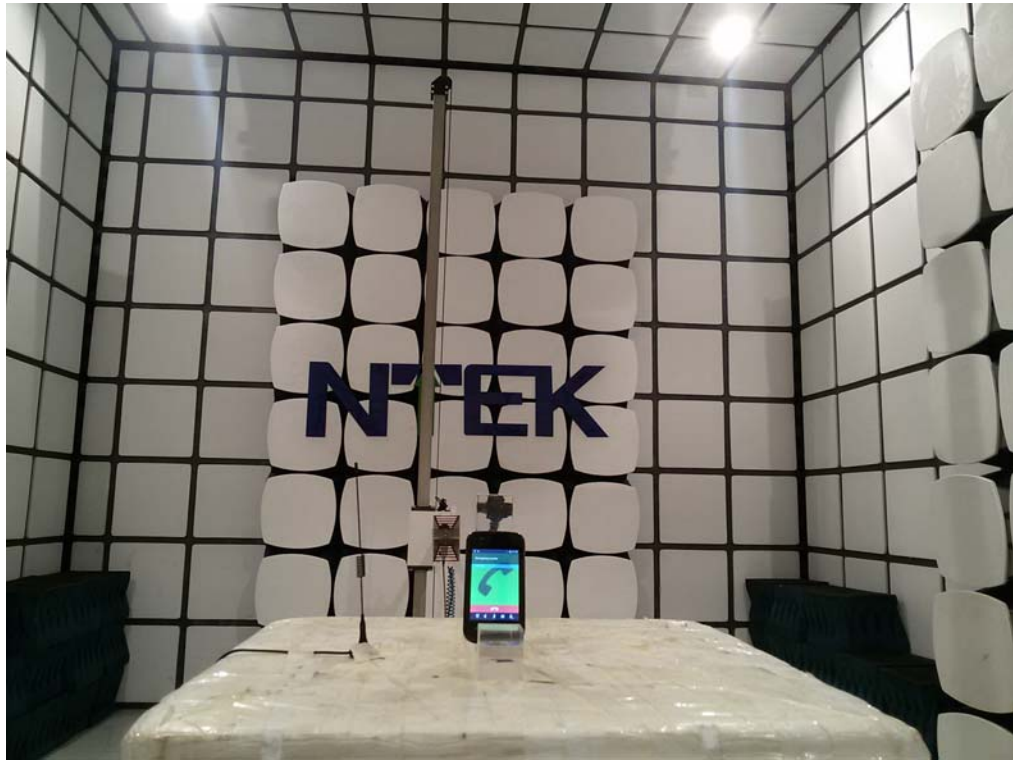


APPENDIX IV

PHOTOGRAPHS OF TEST SETUP

RADIATED SPURIOUS EMISSION





----END OF REPORT----