FCC RADIO TEST REPORT
FCC ID:2ACYS-E7

Product：	MID
Trade Name：	ZTE
Model Number：	E7+
Serial Model：	E7*(*=Q,S,H,L,C,E,F,I,G,P,+;) *For different Customers
Report No.：	NTEK-2014NT08121329F4

Prepared for

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TEST RESULT CERTIFICATION

Applicant's name.....:	Hunan ZTE ICT Technologies Co., Ltd.
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Manufacture's Name .....:	Hunan ZTE ICT Technologies Co., Ltd.
Address .....:	5F, ZTE ICT R&D Building, No.48 Cailun Rd. High-Tech Development Zone, Hengyang, China
Product name.....:	MID
Model and/or type reference ...:	E7+
Serial Model :	E7*(*=Q,S,H,L,C,E,F,I,G,P,+;)
Standards.....:	FCC Part 22H and 24E
Test procedure .....:	ANSI C63.4-2003, TIA/EIA 603D: June 24, 2010

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..... 12 Aug 2014 ~04 Sep. 2014

Date of Issue ..... 04 Sep. 2014

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

Testing Engineer : Denny Huang

Technical Manager : (Brown Lu)

Authorized Signatory : (Bill Yao)

TABLE OF CONTENTS

1. GENERAL INFORMATION....5

1. GENERAL INFORMATION....5

1.1 PRODUCT DESCRIPTION....5

1.2 RELATED SUBMITTAL(S) / GRANT (S)....7

1.3 TEST METHODOLOGY....7

1.4 TEST FACILITY....7

1.5 MEASUREMENT INSTRUMENTS....7

1.6 SPECIAL ACCESSORIES....7

1.7 EQUIPMENT MODIFICATIONS....7

2. SYSTEM TEST CONFIGURATION....8

2.1 EUT CONFIGURATION....8

2.2 EUT EXERCISE....8

2.3 GENERAL TECHNICAL REQUIREMENTS....8

2.4 CONFIGURATION OF EUT SYSTEM....9

3. SUMMARY OF TEST RESULTS....10

4. DESCRIPTION OF TEST MODES....10

5. OUTPUT POWER....11

5.1 Conducted Output Power....11

5.2 Radiated Output Power....14

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. 16

6. SPURIOUS EMISSION....17

6.1 CONDUCTED SPURIOUS EMISSION....17

6.2 Radiated Spurious Emission....19

7. FREQUENCY STABILITY....24

7.1 MEASUREMENT METHOD 24
7.2 PROVISIONS APPLICABLE 24
7.3 MEASUREMENT RESULT 25
8. BANDWIDTH 27
8.1APPLICABLE STANDARD 27
8.2 Test Procedure 27
8.3 MEASUREMENT RESULT 27
9. BAND EDGE 29
9.1 Applicable Standard 29
9.2 Test Procedure 29
9.3 MEASUREMENT RESULT 29
11. PEAK-TO-AVERAGE RATIO 30
DESCRIPTION OF THE PAR MEASUREMENT 30
11.1 MEASURING INSTRUMENTS 30
11.2 TEST PROCEDURES 30
11.3 TEST SETUP 30
11.4 TEST RESULT OF PEAK-TO-AVERAGE RATIO 31
TEST PLOTS FOR CONDUCTED SPURIOUS EMISSION 31
TEST PLOTS FOR OCCUPIED BANDWIDTH (99%) 41
EMISSION BANDWIDTH (-26DBC) 41
APPENDIX III 47
TEST PLOTS FOR BAND EDGES 47
TEST RESULT (PLOTS) OF PEAK-TO-AVERAGE RATIO 51
PHOTOGRAPHS OF TEST SETUP 56

1. GENERAL INFORMATION

1.1 PRODUCT DESCRIPTION

A major technical description of EUT is described as following:

Product Designation:	MID
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:	FPCB Antenna
Antenna gain:	1.69 dBi
Power Supply:	DC 3.7V by battery
Battery parameter:	DC 3.7V, 2600mAh
Adapter Input:	100-240V~,50/60Hz
Adapter Output:	5.0V⎓, 2A
GPRS/EDGE Class	Multi-Class12 Only 4 timeslots are used for GPRS
SIM CARD	The Phone Two SIM Card sockets
Extreme Vol. Limits:	DC3.5 V to 4.2 V (Nominal DC3.7 V)
Extreme Temp. Tolerance	-10℃ to +50℃
** Note: The High Voltage 4.2V and Low Voltage 3.5V was declared by manufacturer, The EUT couldn't be operate normally with higher or lower voltage.	

Mode	Max. Conducted Average Power (dBm)
GSM850	32.53
GPRS 850	32.63
GSM1900	29.28
GPRS 1900	29.29
UMTS BAND V	22.45

1.2 RELATED SUBMITTAL(S) / GRANT (S)

This submittal(s) (test report) is intended for **FCC ID: 2ACYS-E7** 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 603D 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
Bilogical Antenna	A.H. Systems Inc.	SAS-521-4	N/A	2015.6.26
Horn Antenna	EM	EM-AH-10180	N/A	2015.6.26

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	MID	E7+	FCC ID:**2ACYS-E7**	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	Frequency Stability		2.1055 /24.235	Pass
4	Occupied Bandwidth		2.1049 (h)(i)	Pass
5	Emission Bandwidth		22.917(b) / 24.238 (b)	Pass
6	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 850, GSM/GPRS 1900, HSDPA band V, HSUPA band V 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(GSM/GPRS 850, GSM/GPRS 1900, HSDPA band V, HSUPA band V) 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	32.53
	836.6	32.38
	848.8	32.35
GPRS850 (1 Slot)	824.2	32.63
	836.6	32.41
	848.8	32.37
GPRS850 (2 Slot)	824.2	31.84
	836.6	31.63
	848.8	31.56
GPRS850 (3 Slot)	824.2	30.16
	836.6	29.88
	848.8	29.75
GPRS850 (4 Slot)	824.2	29.06
	836.6	28.73
	848.8	28.51

PCS 1900:

Mode	**Frequency (MHz)**	Maximum Burst-Average Output Power
GSM1900	1850.2	29.28
	1880	29.04
	1909.8	28.94
GPRS1900 (1 Slot)	1850.2	29.29
	1880	29.08
	1909.8	29.02
GPRS1900 (2 Slot)	1850.2	28.52
	1880	28.39
	1909.8	28.34
GPRS1900 (3 Slot)	1850.2	26.83
	1880	26.81
	1909.8	26.87
GPRS1900 (4 Slot)	1850.2	25.72
	1880	25.75
	1909.8	25.92

UMTS BAND V

Mode	**Frequency (MHz)**	Maximum Burst-Average Output Power
WCDMA 850 RMC	826.4	22.45
	835.0	22.22
	846.6	22.43
WCDMA 850 AMR	826.4	22.18
	835.0	22.21
	846.6	22.11
HSDPA Subtest 1	826.4	21.27
	835.0	21.29
	846.6	21.59
HSDPA Subtest 2	826.4	21.29
	835.0	21.45
	846.6	21.34
HSDPA Subtest 3	826.4	21.41
	835.0	21.47
	846.6	21.23
HSDPA Subtest 4	826.4	21.28
	835.0	21.51
	846.6	21.57
HSUPA Subtest 1	826.4	21.41
	835.0	21.39
	846.6	20.97
HSUPA Subtest 2	826.4	21.32
	835.0	21.54
	846.6	20.29
HSUPA Subtest 3	826.4	21.21
	835.0	21.59
	846.6	21.38
HSUPA Subtest 4	826.4	21.48
	835.0	21.29
	846.6	21.65
HSUPA Subtest 5	826.4	21.61
	835.0	21.68
	846.6	21.42

5.2 Radiated Output Power

5.2.1 MEASUREMENT METHOD

The measurements procedures specified in TIA-603D-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 BANDV	<=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	26.29	Horizontal	Pass
	824.2	28.17	Vertical	Pass
	836.6	27.24	Horizontal	Pass
	836.6	**29.64**	Vertical	Pass
	848.8	27.54	Horizontal	Pass
	848.8	29.29	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	27.89	Horizontal	Pass
	1850.2	26.43	Vertical	Pass
	1880	**28.44**	Horizontal	Pass
	1880	26.61	Vertical	Pass
	1909.8	28.71	Horizontal	Pass
	1909.8	27.58	Vertical	Pass

Radiated Power (ERP) for GPRS 850 MHZ				
Mode	Frequency	Result		Conclusion
		Max. Peak ERP (dBm)	Polarization Of Max. ERP	
GPRS850	824.2	27.75	Horizontal	Pass
	824.2	28.68	Vertical	Pass
	836.6	28.77	Horizontal	Pass
	836.6	28.31	Vertical	Pass
	848.8	28.47	Horizontal	Pass
	848.8	27.97	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	26.61	Horizontal	Pass
	1850.2	26.86	Vertical	Pass
	1880	26.96	Horizontal	Pass
	1880	26.59	Vertical	Pass
	1909.8	26.73	Horizontal	Pass
	1909.8	26.68	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	20.47	Horizontal	Pass
	826.4	21.64	Vertical	Pass
	836.6	21.59	Horizontal	Pass
	836.6	20.73	Vertical	Pass
	846.6	20.38	Horizontal	Pass
	846.6	**21.87**	Vertical	Pass

NOTE 1: in the part, result the worst case GPRS 1slot for GSM 850 and PCS1900, and RMC 12.2kbps for 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 850 MHz	
Channel	Frequency (MHz)
128	824.2
190	836.6
251	848.8

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

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+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.

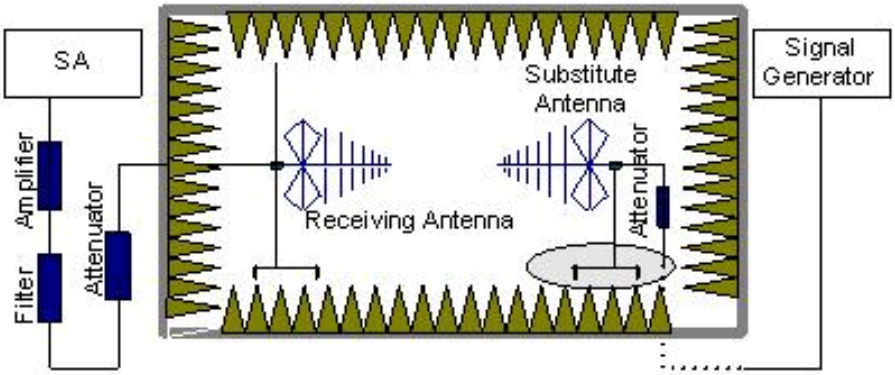
6.2 Radiated Spurious Emission

6.2.1 MEASUREMENT METHOD

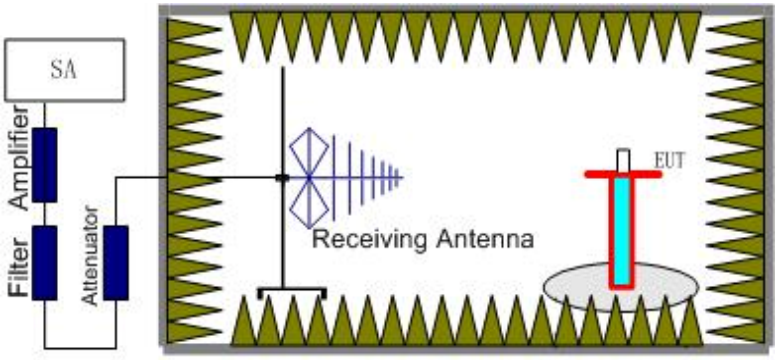
The measurements procedures specified in TIA-603D-2004 were used for testing. The spectrum was scanned from 30 MHz to the 10th harmonic of the highest frequency generated within the equipment. The resolution bandwidth is set 1MHz as outlined in Part 24.238. The measurements were performed on all modes(GPRS850, 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=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(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+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:

Test Results for Channel 128/824.2 MHz					
Frequency(MHz)	Power(dBm)	A_{Rpl} (dBm)	P_{Mea}(dBm)	Limit（dBm）	Polarity
1648.4	-22.92	7.8	-15.12	-13.00	Vertical
1648.4	-33.43	7.8	-25.63	-13.00	Horizontal
2472.6	-26.95	11	-15.95	-13.00	Vertical
2472.6	-33.13	11	-22.13	-13.00	Horizontal
3296.8	-31.89	12.3	-19.59	-13.00	Horizontal
3296.8	-35.26	12.3	-22.96	-13.00	Vertical
Test Results for Channel 190/836.6 MHz					
1673.2	-21.13	8	-13.13	-13.00	Vertical
1673.2	-35.57	8	-27.57	-13.00	Horizontal
2509.8	-20.46	11.2	-9.26	-13.00	Vertical
2509.8	-28.79	11.2	-17.59	-13.00	Horizontal
3346.4	-25.54	12.6	-12.94	-13.00	Horizontal
3346.4	-32.26	12.6	-19.66	-13.00	Vertical
Test Results for Channel 251/848.8 MHz					
1697.6	-19.89	8.1	-11.79	-13.00	Vertical
1697.6	-30.02	8.1	-21.92	-13.00	Horizontal
2546.4	-21.94	11.69	-10.25	-13.00	Vertical
2546.4	-28.31	11.69	-16.62	-13.00	Horizontal
3395.2	-26.22	12.92	-13.3	-13.00	Horizontal
3395.2	-32.12	12.92	-19.2	-13.00	Vertical

PCS 1900:

Test Results for Channel 512/1850.2MHz					
Frequency(MHz)	Power(dBm)	A_{Rpl} (dBm)	P_{Mea}(dBm)	Limit（dBm）	Polarity
3700.4	-31.14	13.42	-17.72	-13.00	Horizontal
3700.4	-37.05	13.42	-23.63	-13.00	Vertical
5550.6	-30.92	17.12	-13.8	-13.00	Vertical
5550.6	-24.47	17.12	-7.35	-13.00	Horizontal
7400.8	-31.81	19.26	-12.55	-13.00	Horizontal
7400.8	-34.26	19.26	-15	-13.00	Vertical
Test Results for Channel 661/1880.0MHz					
3760	-32.48	13.76	-18.72	-13.00	Horizontal
3760	-35.65	13.76	-21.89	-13.00	Vertical
5640	-32.46	17.56	-14.9	-13.00	Vertical
5640	-42.65	17.56	-25.09	-13.00	Horizontal
7520	-42.22	19.6	-22.62	-13.00	Horizontal
7520	-42.77	19.6	-23.17	-13.00	Vertical
Test Results for Channel 810/1909.8MHz					
3819.6	-21.15	13.87	-7.28	-13.00	Horizontal
3819.6	-32.14	13.87	-18.27	-13.00	Vertical
5729.4	-38.52	17.66	-20.86	-13.00	Vertical
5729.4	-36.69	17.66	-19.03	-13.00	Horizontal
7639.2	-37.82	19.75	-18.07	-13.00	Horizontal
7639.2	-32.45	19.75	-12.7	-13.00	Vertical

UMTS band V:

Test Results for Channel 4132/826.4MHz					
Frequency(MHz)	Power(dBm)	A_{Rpl} (dBm)	P_{Mea}(dBm)	Limit（dBm）	Polarity
1652.8	-26.11	8	-18.11	-13.00	Vertical
1652.8	-34.32	8	-26.32	-13.00	Horizontal
2479.2	-23.98	11.2	-12.78	-13.00	Horizontal
2479.2	-27.97	11.2	-16.77	-13.00	Vertical
3305.6	-31.29	12.6	-18.69	-13.00	Horizontal
3305.6	-37.86	12.6	-25.26	-13.00	Vertical
Test Results for Channel 4183/836.6MHz					
1672.8	-32.18	8	-24.18	-13.00	Vertical
1672.8	-22.88	8	-14.88	-13.00	Horizontal
2509.2	-29.18	11.2	-17.98	-13.00	Horizontal
2509.2	-23.07	11.2	-11.87	-13.00	Vertical
3345.6	-34.88	12.6	-22.28	-13.00	Horizontal
3345.6	-31.83	12.6	-19.23	-13.00	Vertical
Test Results for Channel 4233/846.6MHz					
1673.2	-23.39	8.1	-15.29	-13.00	Vertical
1673.2	-27.94	8.1	-19.84	-13.00	Horizontal
2509.8	-21.86	11.69	-10.17	-13.00	Horizontal
2509.8	-36.01	11.69	-24.32	-13.00	Vertical
3346.4	-34.95	12.92	-22.03	-13.00	Horizontal
3346.4	-40.97	12.92	-28.05	-13.00	Vertical

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℃.

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 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℃ 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 3.5VDC 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)**
3.5	18	0.021
3.7	22	0.027
4.2	17	0.021

Frequency Error Against Temperature for GSM 850 band		
Temperature (℃)	**Frequency Error (Hz)**	**Frequency Error (ppm)**
-10	42	0.051
0	51	**0.062**
10	48	0.058
20	39	0.047
30	45	0.055
40	44	0.053
50	49	0.059

Note: The EUT doesn't work below -10℃

Frequency Error Against Voltage for GSM 1900 band		
Voltage (V)	**Frequency Error (Hz)**	**Frequency Error (ppm)**
3.5	22	0.012
3.7	25	0.014
4.2	23	0.012

Frequency Error Against Temperature for GSM 1900 band		
Temperature (℃)	**Frequency Error (Hz)**	**Frequency Error (ppm)**
-10	47	0.025
0	42	0.023
10	52	0.028
20	46	0.025
30	51	0.028
40	53	**0.029**
50	44	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)**
3.5	18	0.022
3.7	22	0.027
4.2	20	0.024

Frequency Error Against Temperature for UMTS band V		
Temperature (℃)	**Frequency Error (Hz)**	**Frequency Error (ppm)**
-10	48	0.058
0	43	0.052
10	52	**0.063**
20	46	0.056
30	41	0.050
40	45	0.054
50	47	0.057

Note: The EUT doesn't work below -10℃

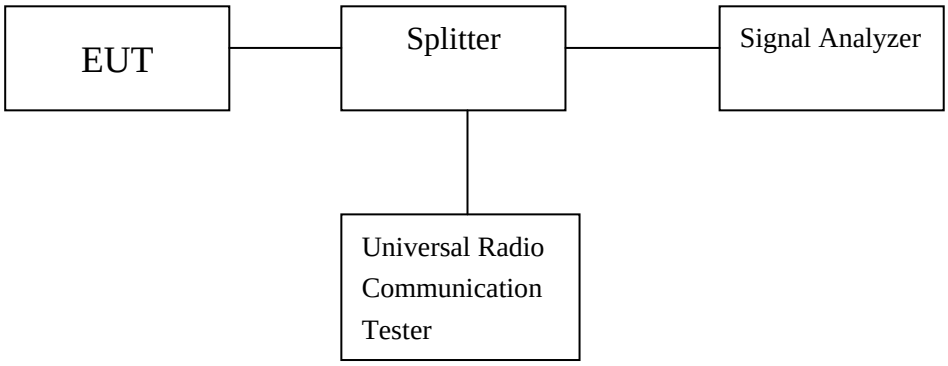
8. BANDWIDTH

8.1APPLICABLE STANDARD

FCC §2.1049, §22.917, §22.905 and §24.238.

8.2 Test Procedure

1. The EUT was connected to Spectrum Analyzer and Base Station via power divider.
2. The 99% and 26 dB occupied bandwidth (BW) of the middle channel for the highest RF powers.
3. Details according with KDB 971168 section 4.1 & 4.2.



Test Equipment List and Details

Refer a test equipment and calibration data table in this test report.

8.3 MEASUREMENT RESULT

Occupied Bandwidth (99%) for GSM 850 band		
Mode	Frequency(MHz)	Occupied Bandwidth (99%)(kHz)
Low Channel	824.2	246.854
Middle Channel	836.6	248.594
High Channel	848.8	249.659

Occupied Bandwidth (99%) for GSM1900 band		
Mode	Frequency(MHz)	Occupied Bandwidth (99%)(kHz)
Low Channel	1850.2	246.243
Middle Channel	1880.0	249.536
High Channel	1909.8	241.094

Occupied Bandwidth (99%) for UMTS band V		
Mode	Frequency(MHz)	Occupied Bandwidth (99%)(MHz)
Low Channel	826.4	4.137
Middle Channel	836.6	4.133
High Channel	846.6	4.127

Emission Bandwidth (-26dBc) for GSM850 band		
Mode	Frequency(MHz)	Emission Bandwidth (-26dBc)(kHz)
Low Channel	824.2	315.834
Middle Channel	836.6	318.150
High Channel	848.8	325.796

Emission Bandwidth (-26dBc) for GSM1900 band		
Mode	Frequency(MHz)	Emission Bandwidth (-26dBc)(kHz)
Low Channel	1850.2	319.069
Middle Channel	1880.0	318.654
High Channel	1909.8	316.144

Emission Bandwidth (-26dBc) for UMTS band V		
Mode	Frequency(MHz)	Emission Bandwidth (-26dBc)(MHz)
Low Channel	826.4	4.651
Middle Channel	836.6	4.631
High Channel	846.6	4.637

9. BAND EDGE

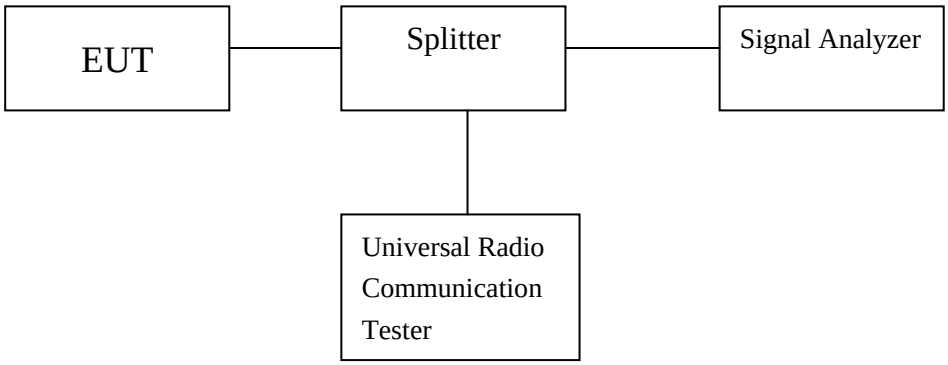
9.1 Applicable Standard

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

. According to §24.238(a), the power of any emissions outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB.

9.2 Test Procedure

1. The EUT was connected to Spectrum Analyzer and Base Station via power divider.
2. The Band Edges of low and high channels for the highest RF powers were measured. Setting RBW as roughly BW/100.
3. Details according with KDB 971168 section 6.0.



Test Equipment List and Details

Refer a test equipment and calibration data table in this test report.

9.3 MEASUREMENT RESULT

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

11. Peak-to-Average Ratio

DESCRIPTION OF THE PAR MEASUREMENT

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

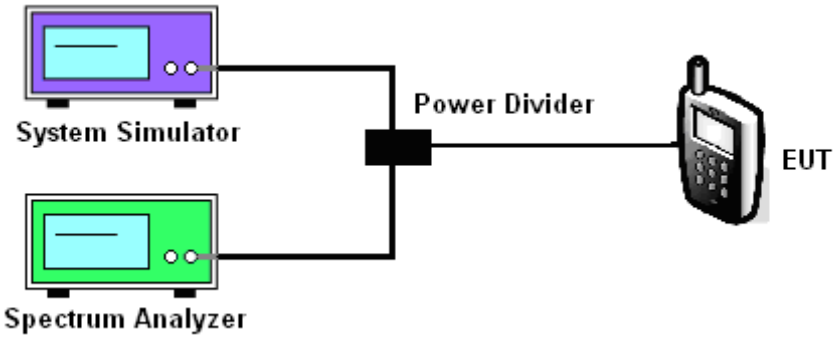
11.1 MEASURING INSTRUMENTS

See list of measuring instruments of this test report.

11.2 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 %.

11.3 TEST SETUP



11.4 TEST RESULT OF PEAK-TO-AVERAGE RATIO

Cellular Band						
Modes	**GSM850(GSM)**			**WCDMA Band V (RMC 12.2Kbps)**		
Channel	129 (Low)	190 (Mid)	251 (High)	4132 (Low)	4175 (Mid)	4233 (High)
Frequency(MHz)	824.2	836.6	848.8	826.4	835.0	846.6
Peak-to-Average Ratio (dB)	0.03	0.02	0.03	3.32	2.92	3.36

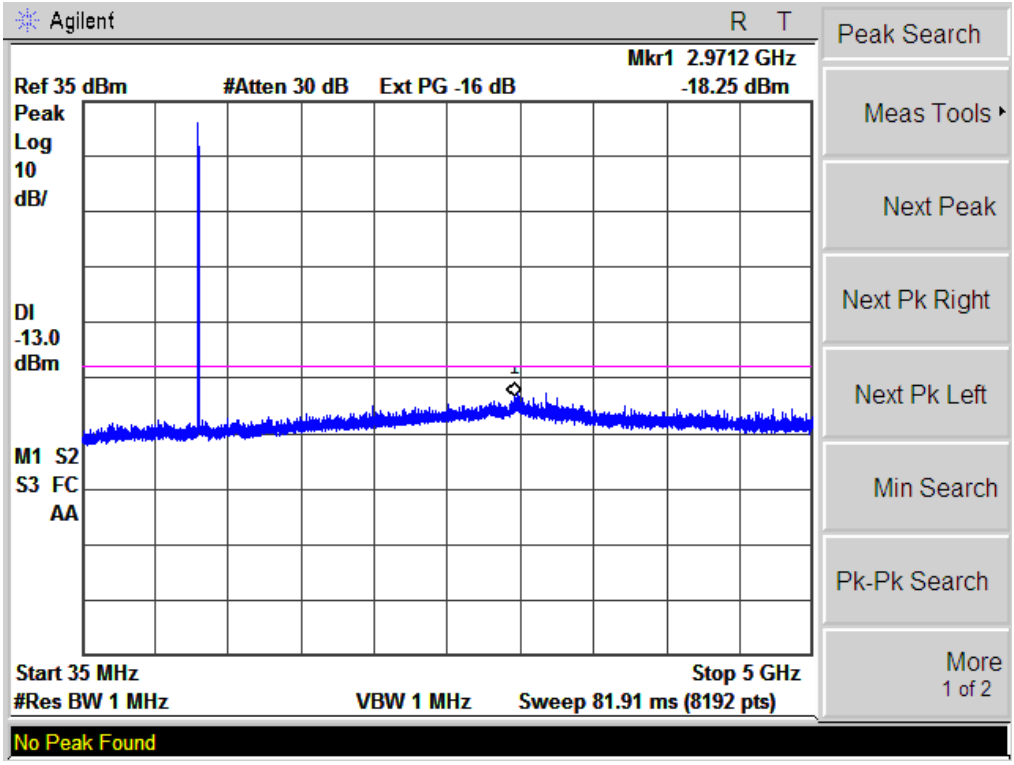
Modes	**GSM1900(GSM)**		
Channel	512 (Low)	661 (Mid)	810 (High)
Frequency(MHz)	1850.2	1880	1909.8
Peak-to-Average Ratio (dB)	0.02	0.01	0.01

APPENDIX I

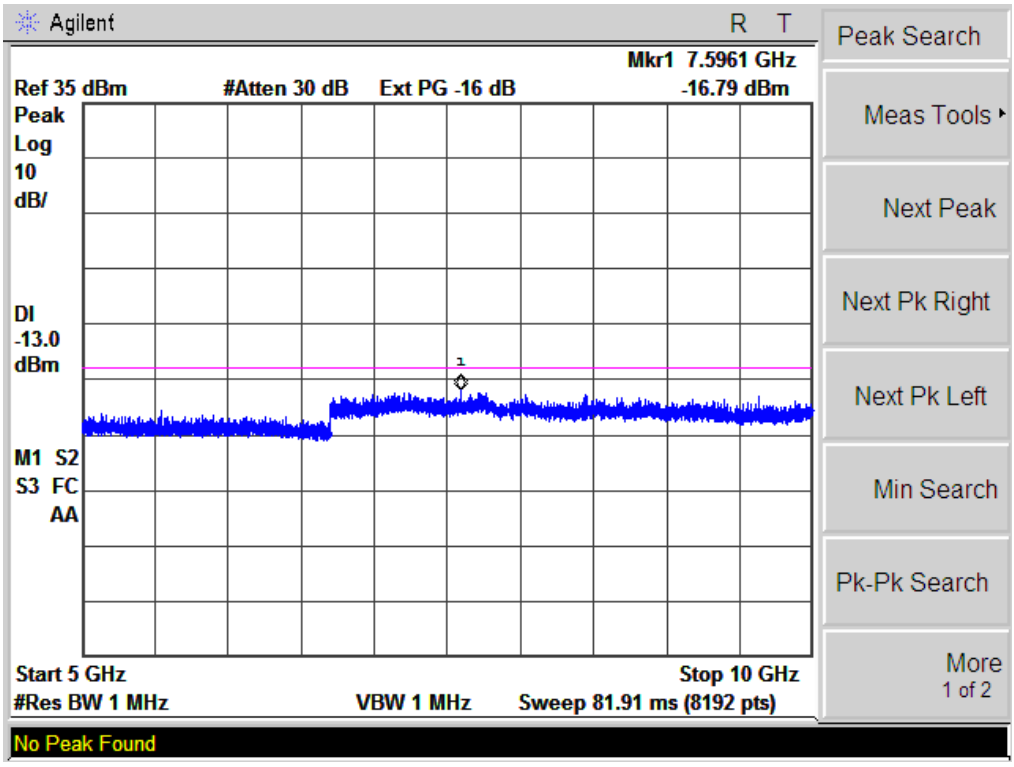
TEST PLOTS FOR CONDUCTED SPURIOUS EMISSION

CONDUCTED EMISSION IN GSM 850 BAND

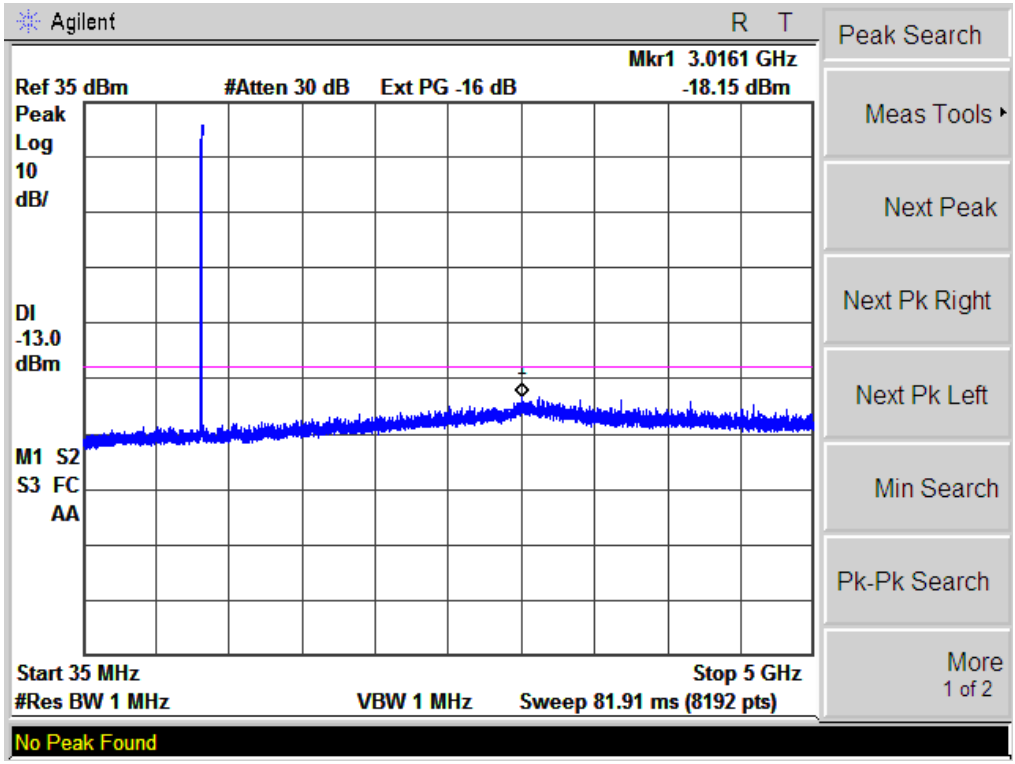
Conducted Emission Transmitting Mode CH 128 30MHz – 5GHz



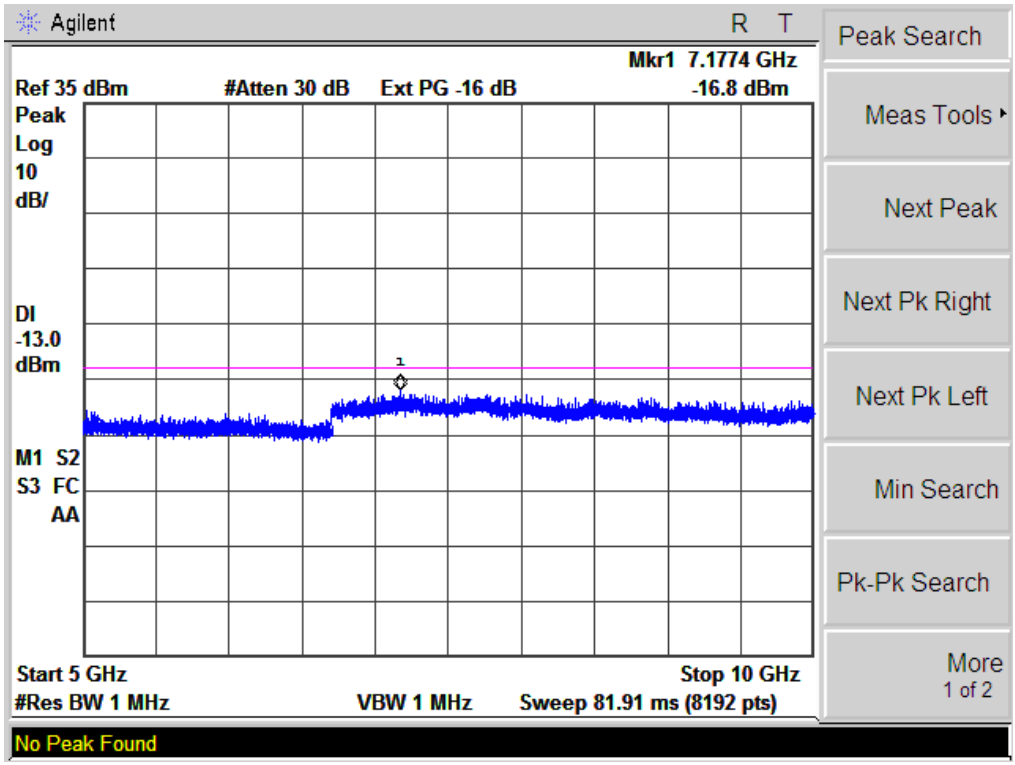
Conducted Emission Transmitting Mode CH 128 5GHz – 10GHz



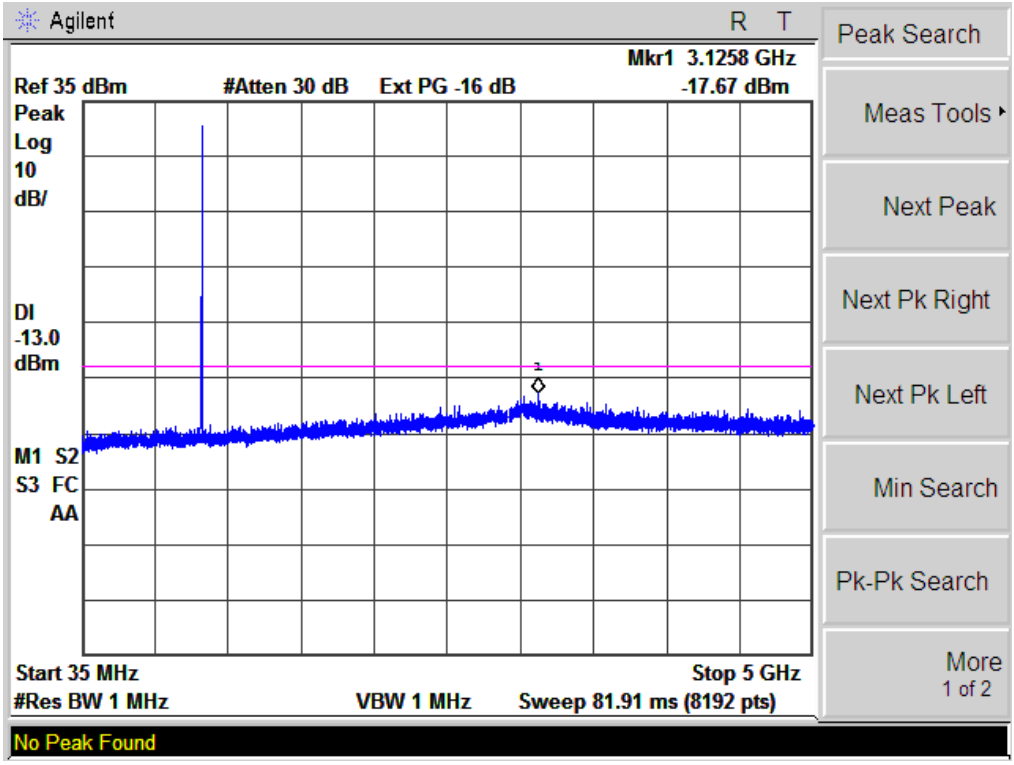
Conducted Emission Transmitting Mode CH 190 30MHz – 5GHz



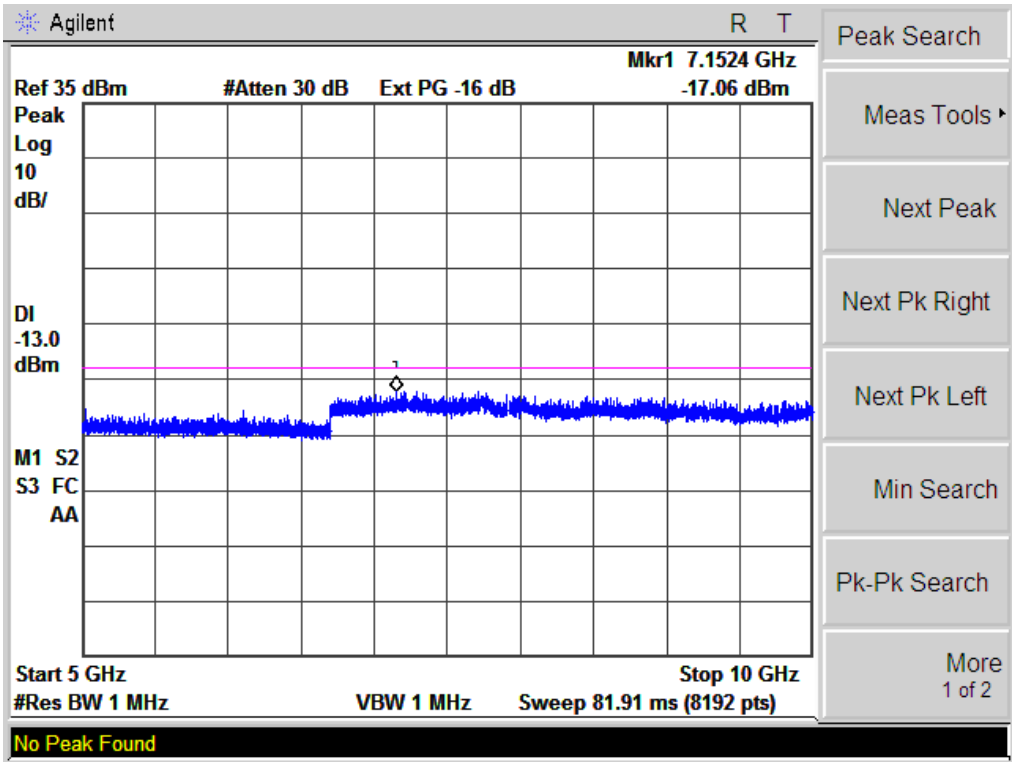
Conducted Emission Transmitting Mode CH 190 5GHz – 10GHz



Conducted Emission Transmitting Mode CH 251 30MHz – 5GHz

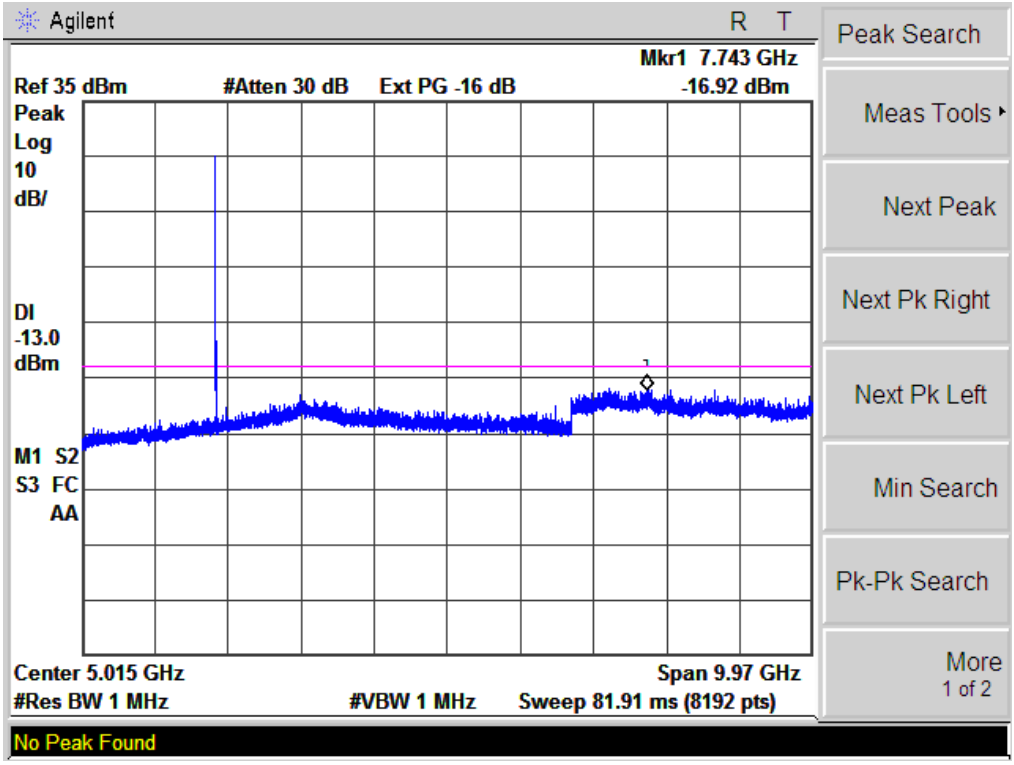


Conducted Emission Transmitting Mode CH 251 5GHz – 10GHz

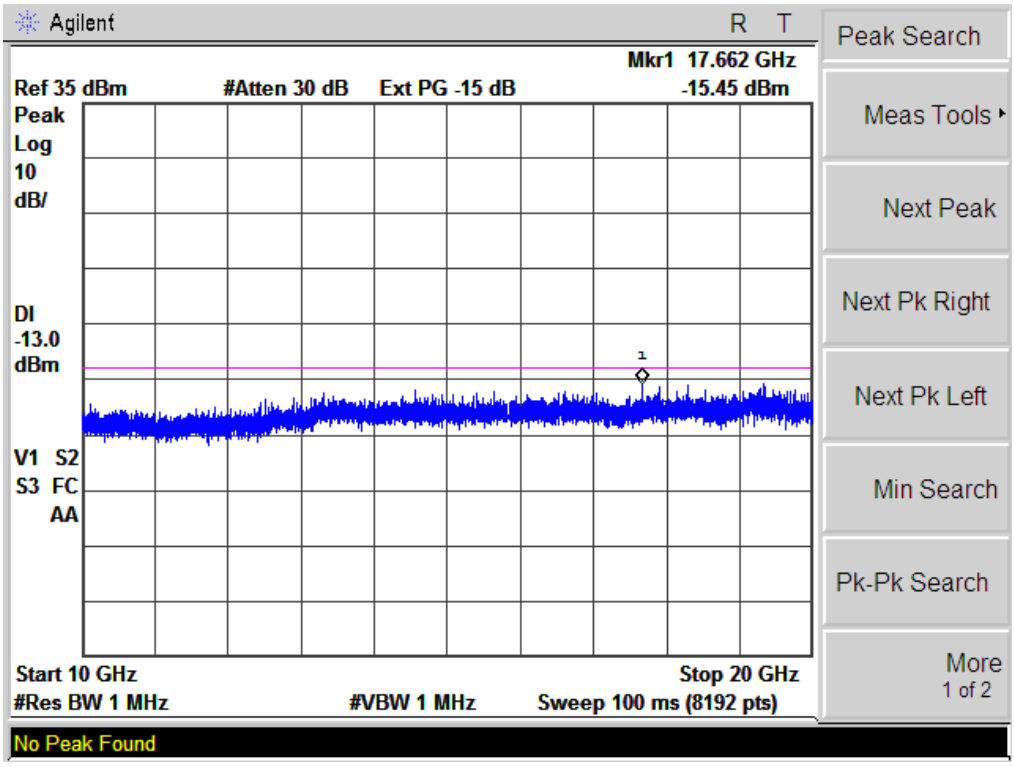


CONDUCTED EMISSION IN GSM1900 BAND

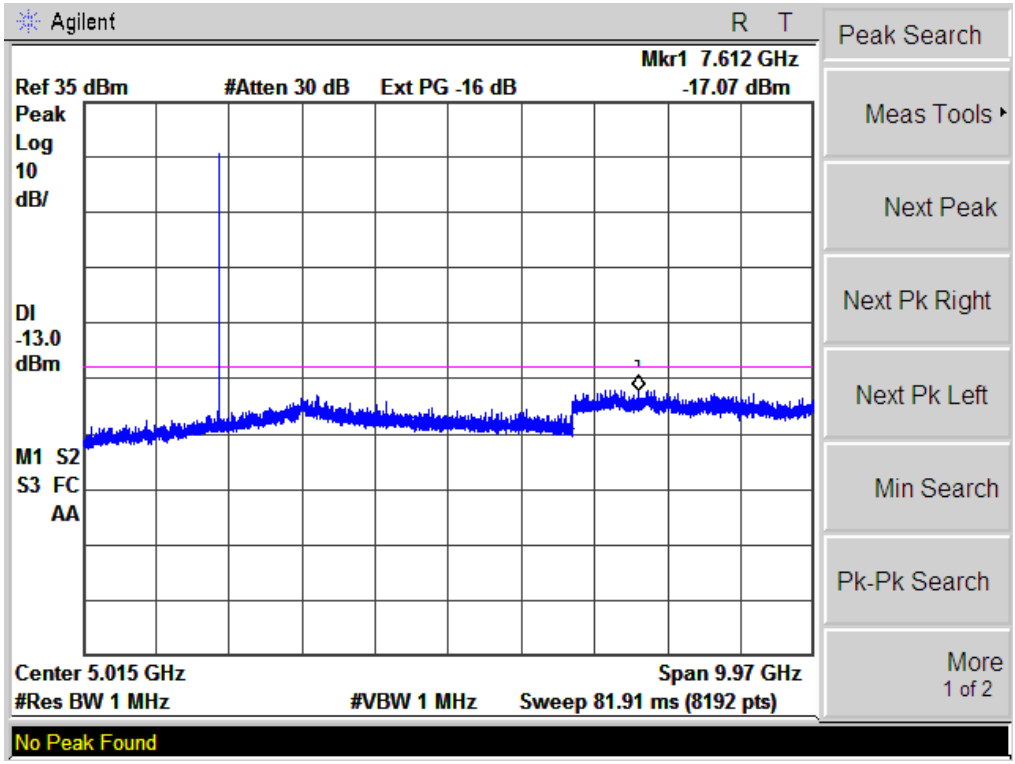
Conducted Emission Transmitting Mode CH 512 30MHz – 10GHz



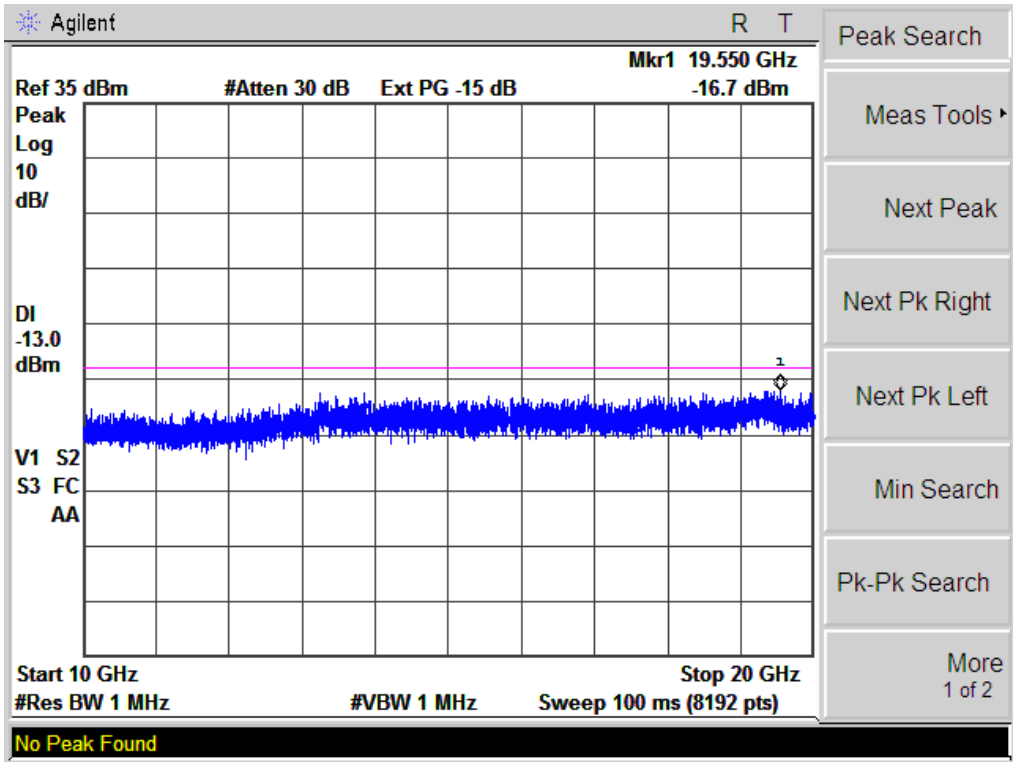
Conducted Emission Transmitting Mode CH 512 10GHz – 20GHz



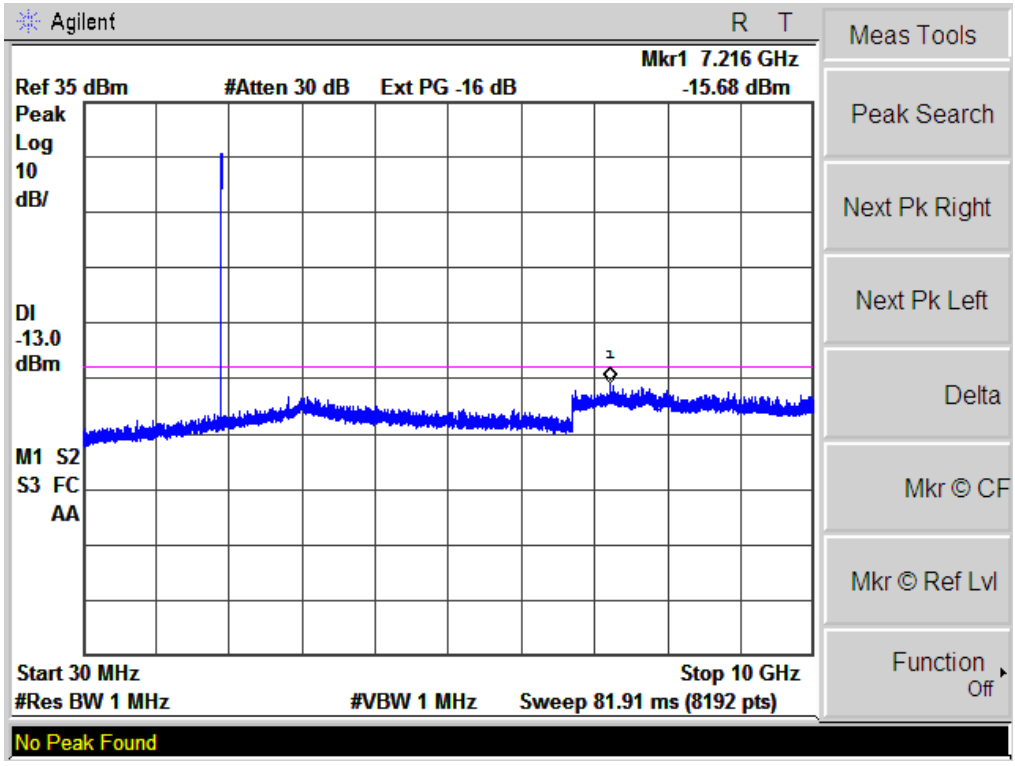
Conducted Emission Transmitting Mode CH 661 30MHz – 10GHz



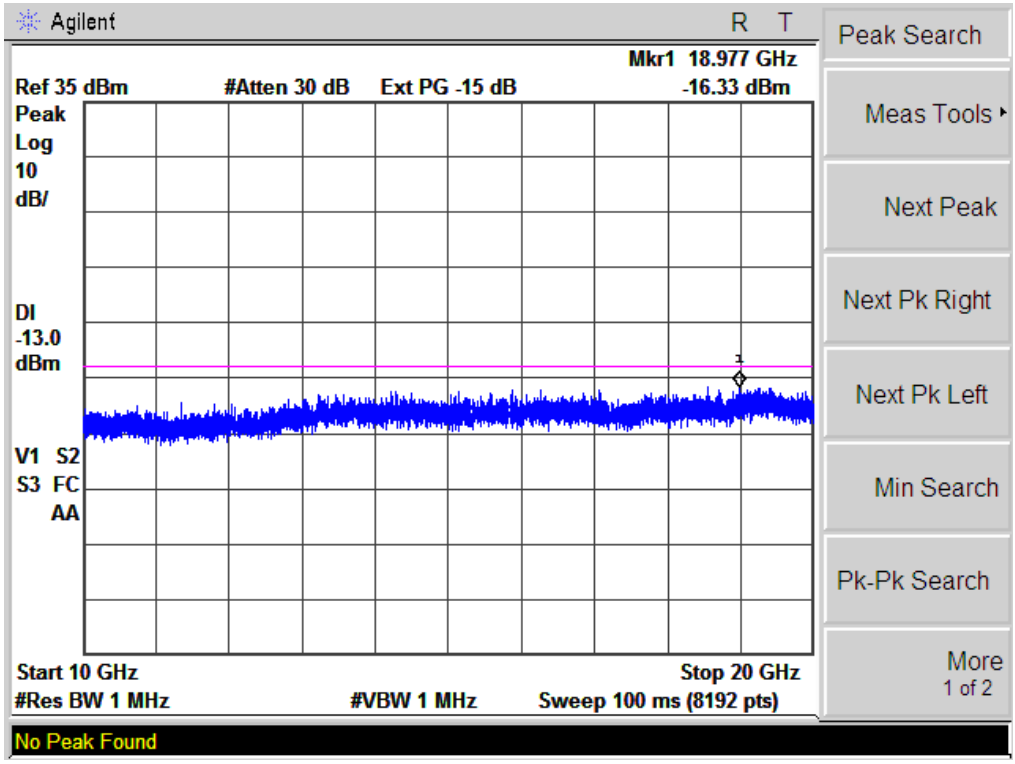
Conducted Emission Transmitting Mode CH 661 10GHz – 20GHz



Conducted Emission Transmitting Mode CH 810 30MHz – 10GHz

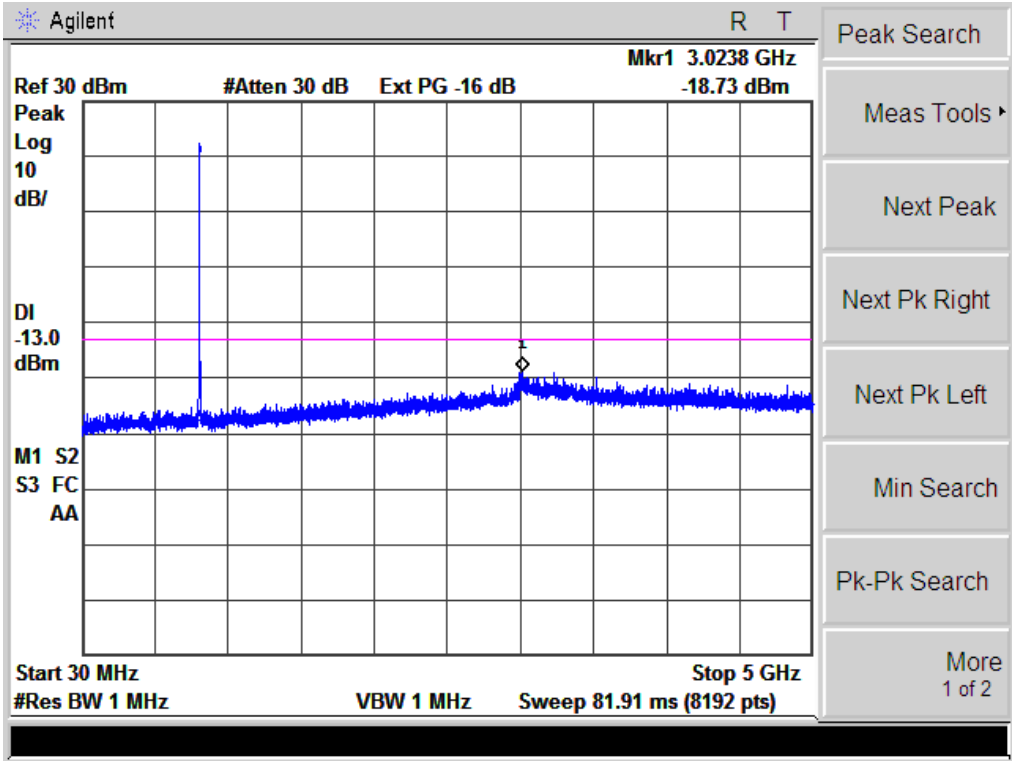


Conducted Emission Transmitting Mode CH 810 10GHz – 20GHz

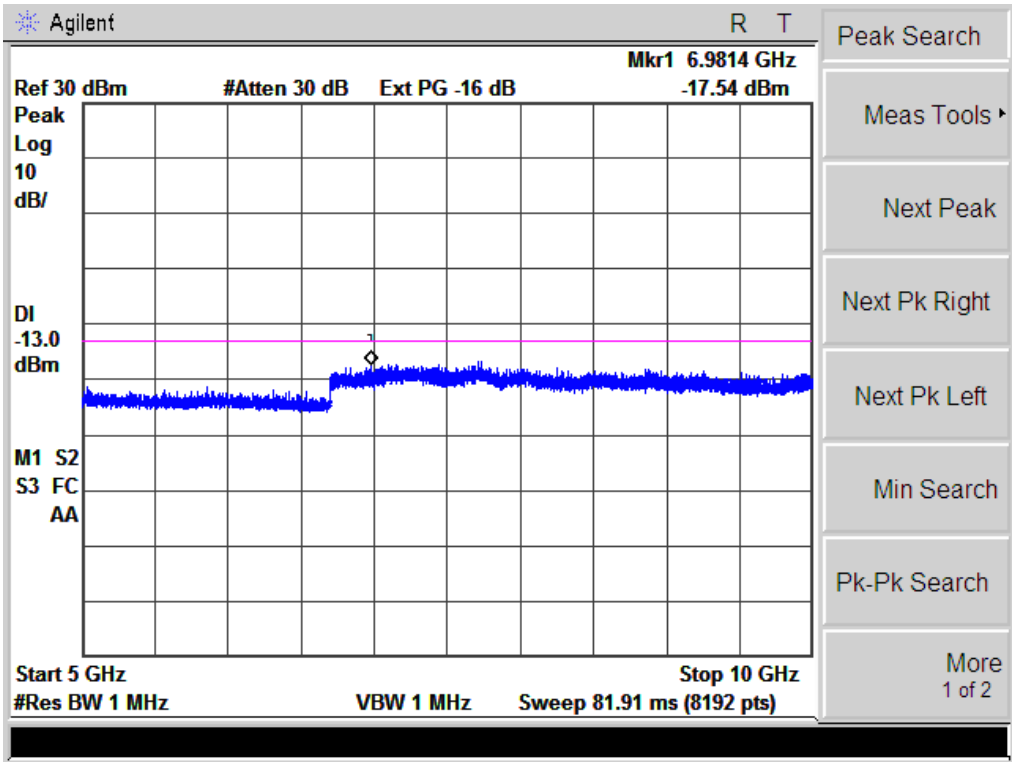


CONDUCTED EMISSION IN UMTS band V

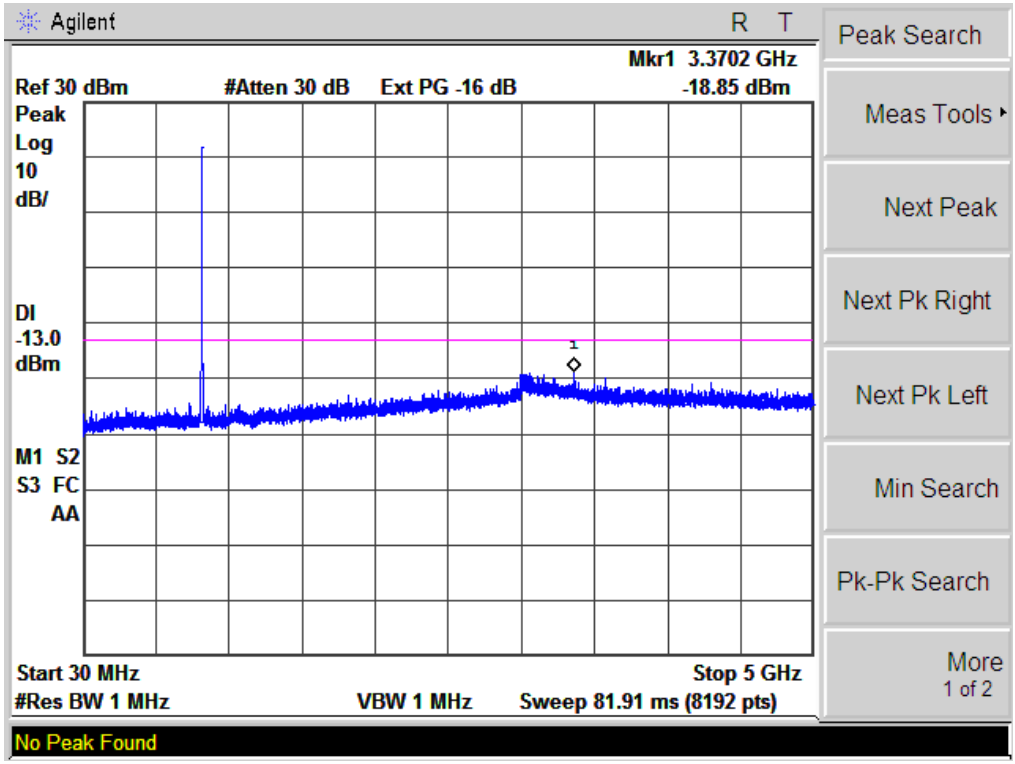
Conducted Emission Transmitting Mode CH 4132 30MHz – 5GHz



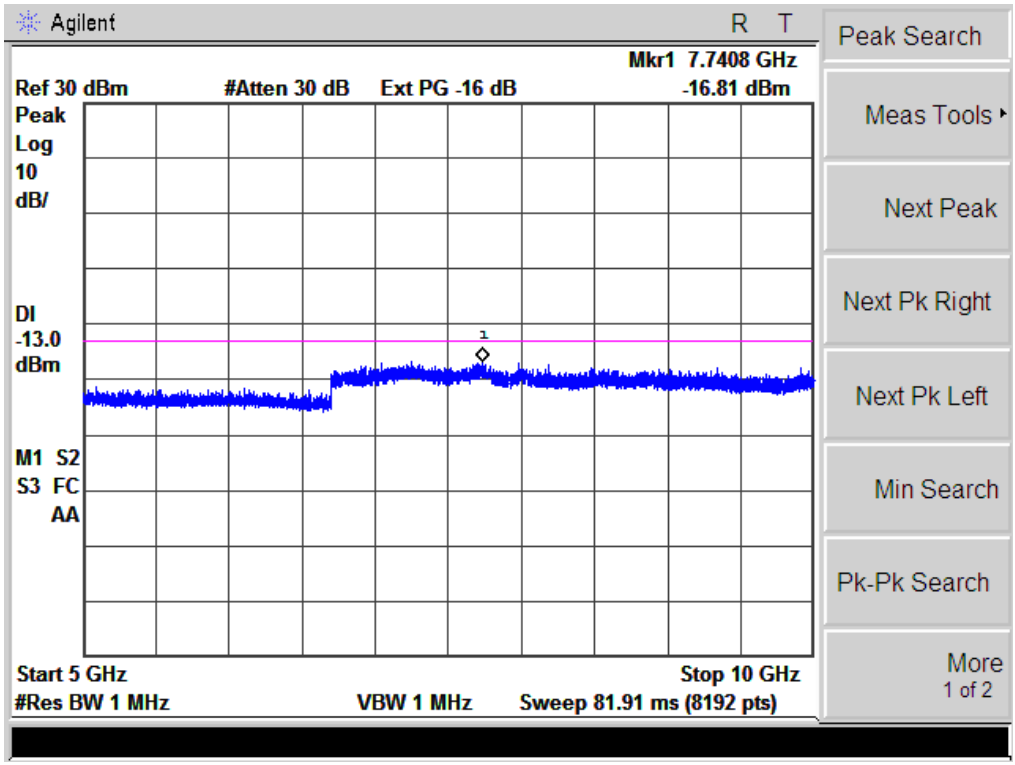
Conducted Emission Transmitting Mode CH 4132 5GHz – 10GHz



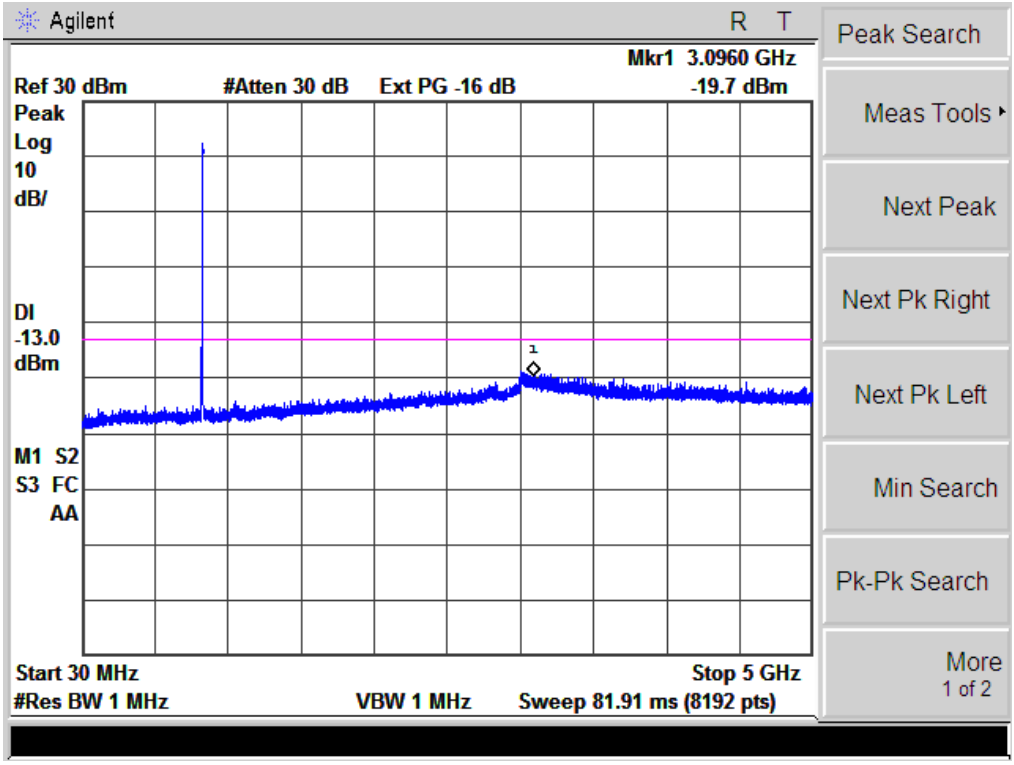
Conducted Emission Transmitting Mode CH 4183 30MHz –5GHz



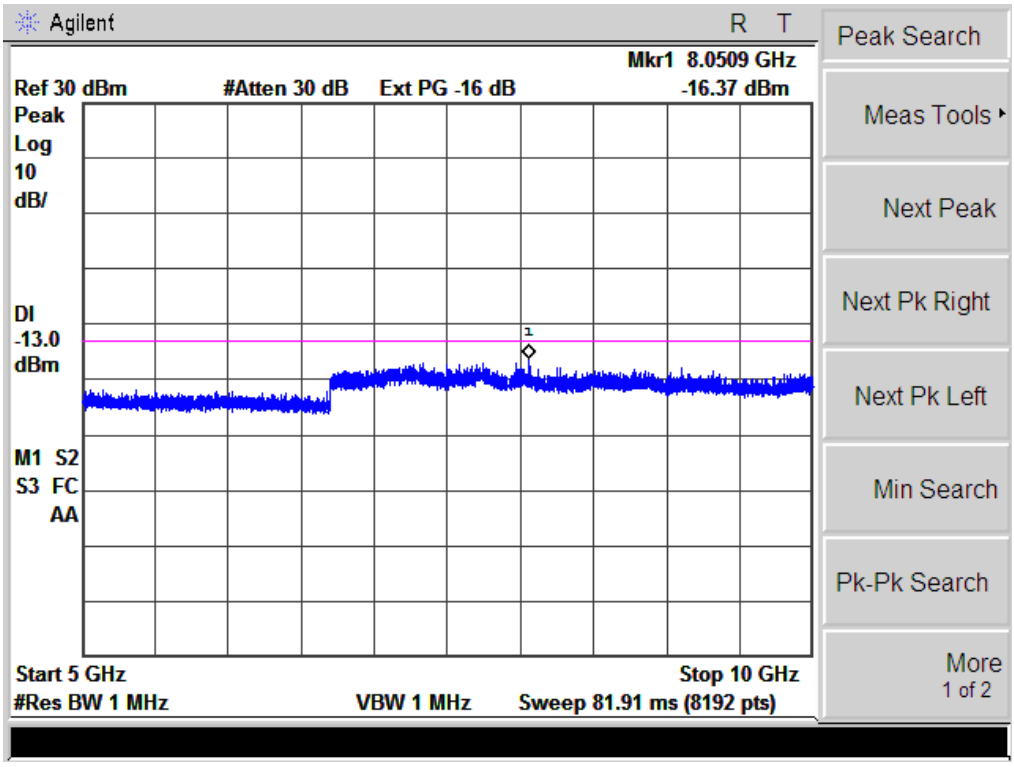
Conducted Emission Transmitting Mode CH 4183 5GHz – 10GHz



Conducted Emission Transmitting Mode CH 4233 30MHz – 5GHz



Conducted Emission Transmitting Mode CH 4233 5GHz – 10GHz

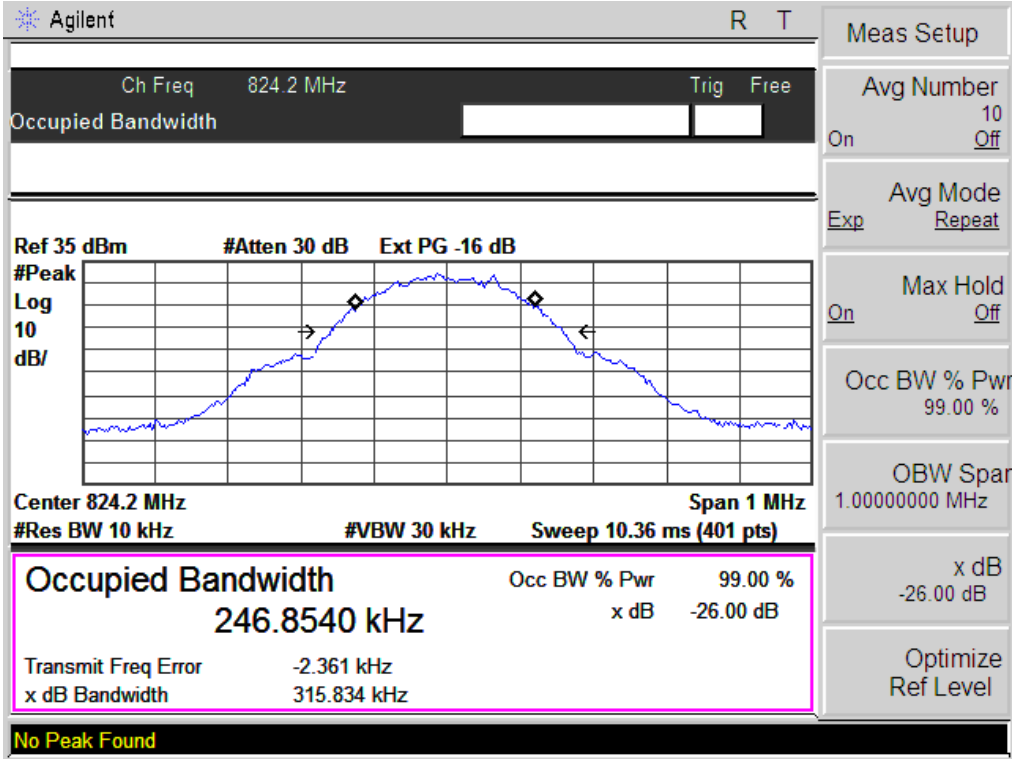


APPENDIX II

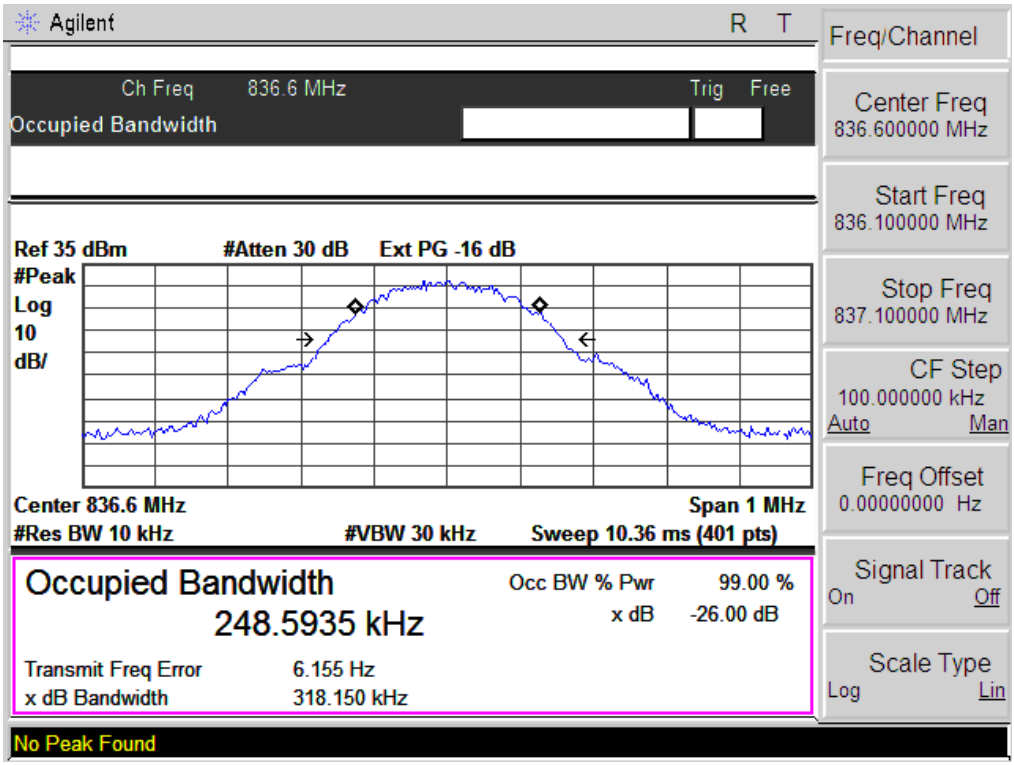
TEST PLOTS FOR OCCUPIED BANDWIDTH (99%)

EMISSION BANDWIDTH (-26dBC)

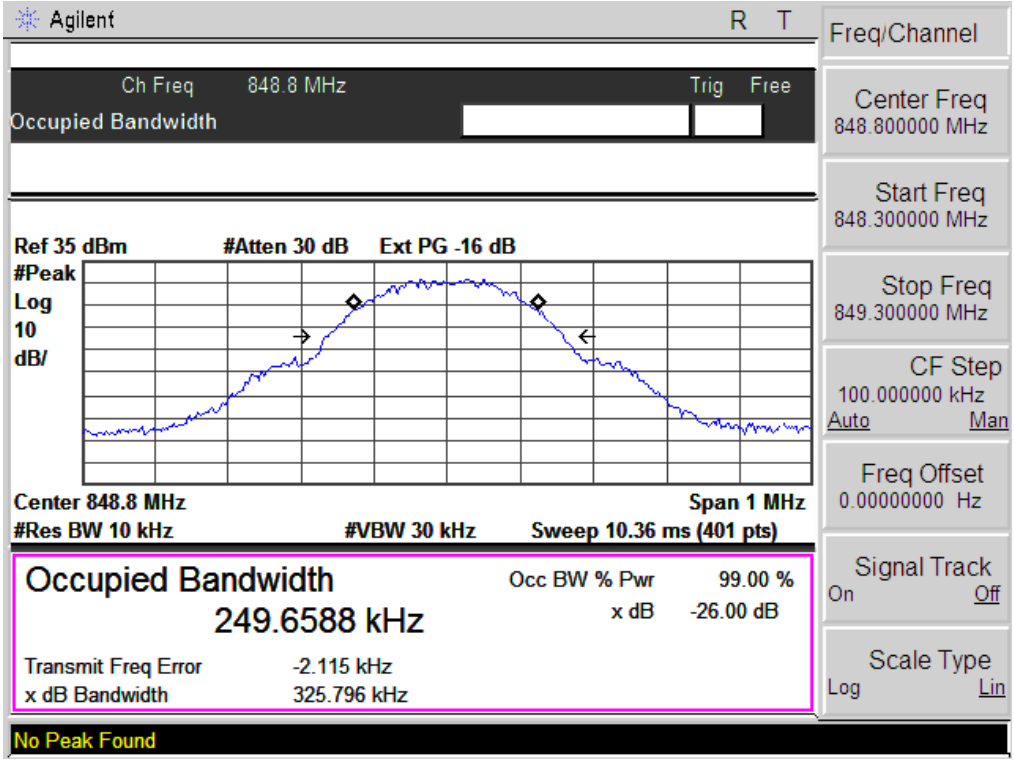
Occupied Bandwidth (99%) GSM 850 BAND CH 128



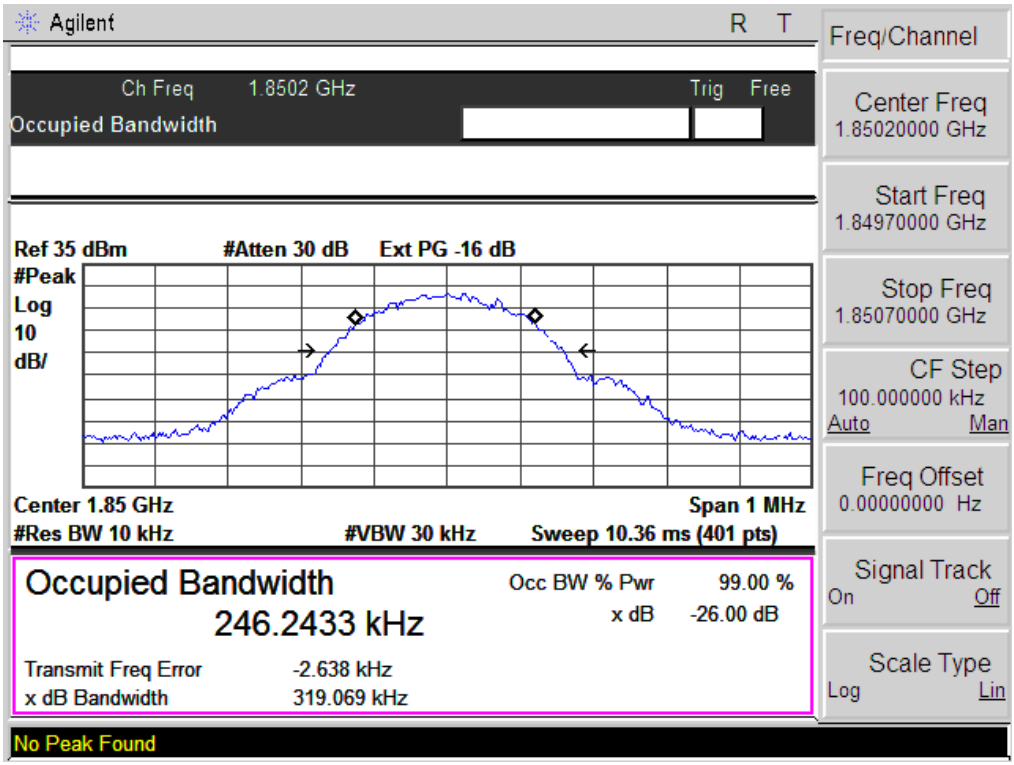
Occupied Bandwidth (99%) GSM 850 BAND CH 190



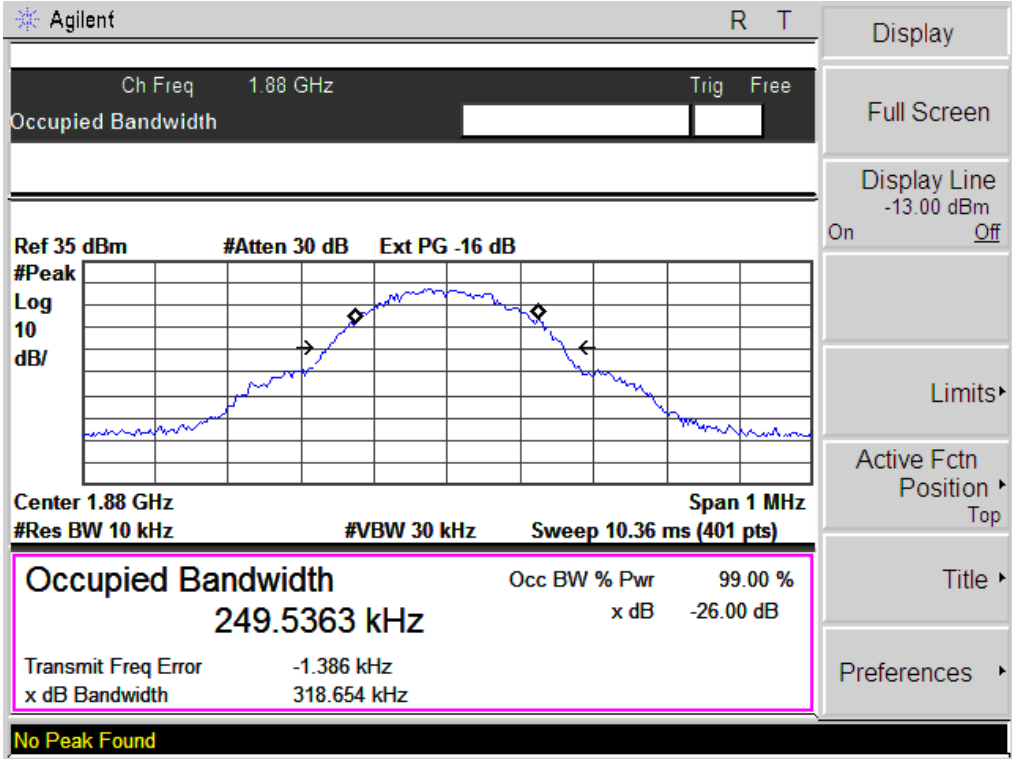
Occupied Bandwidth (99%) GSM 850 BAND CH 251



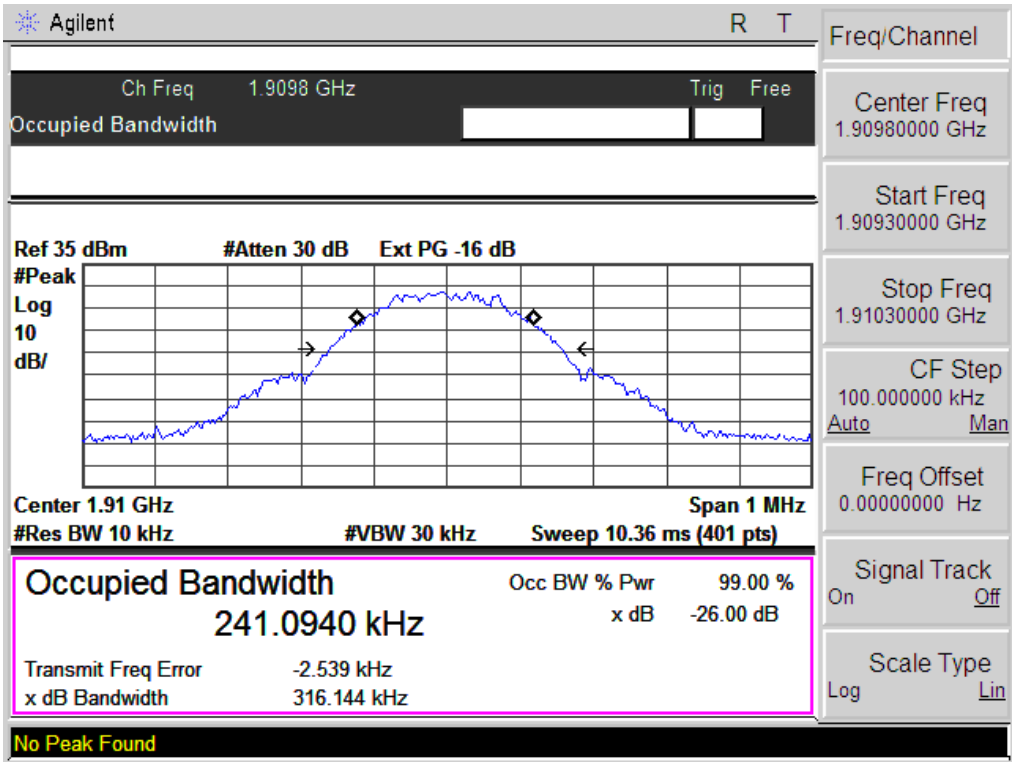
Occupied Bandwidth (99%) PCS 1900 BAND CH 512



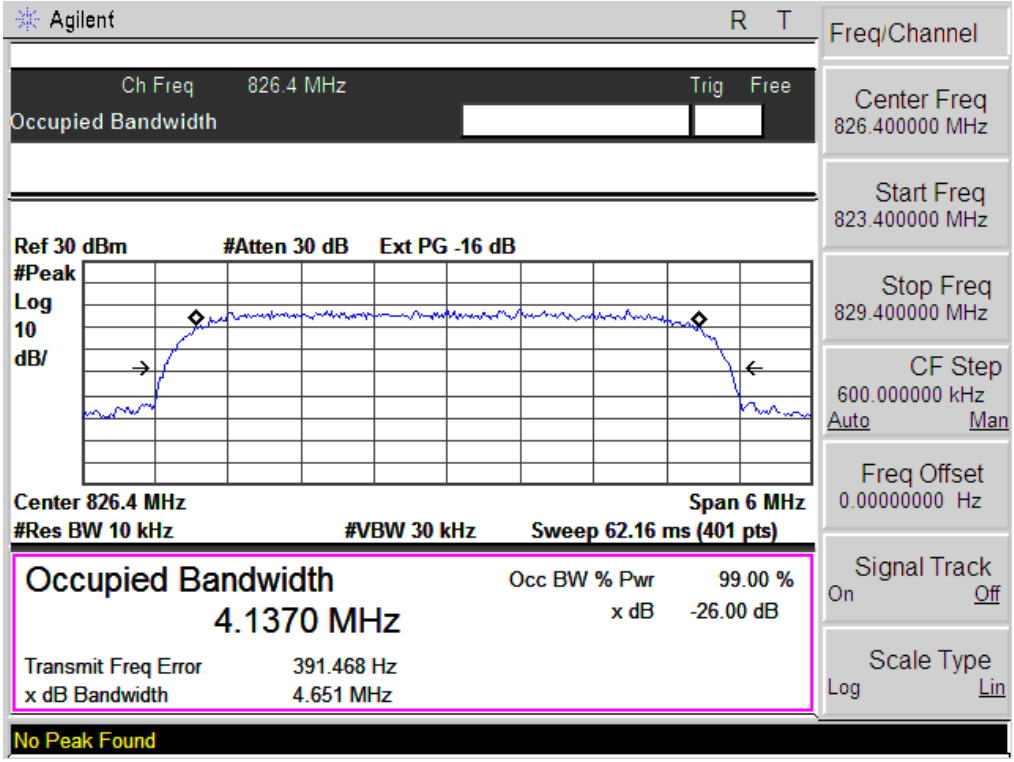
Occupied Bandwidth (99%) PCS 1900 BAND CH 661



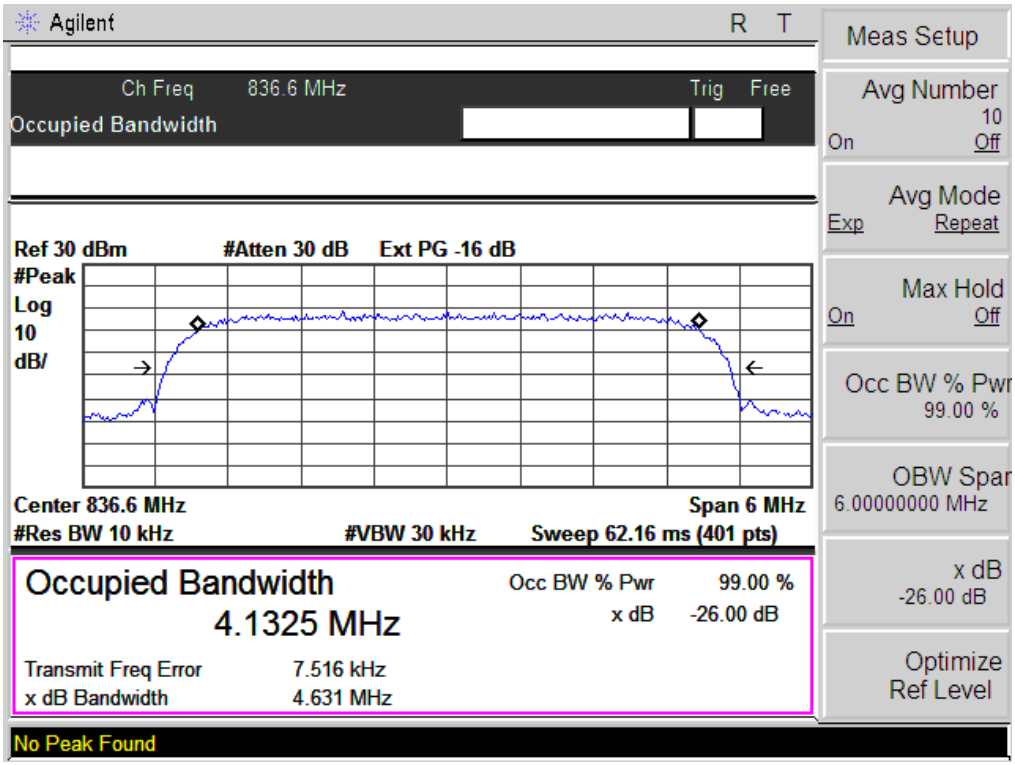
Occupied Bandwidth (99%) PCS 1900 BAND CH 810



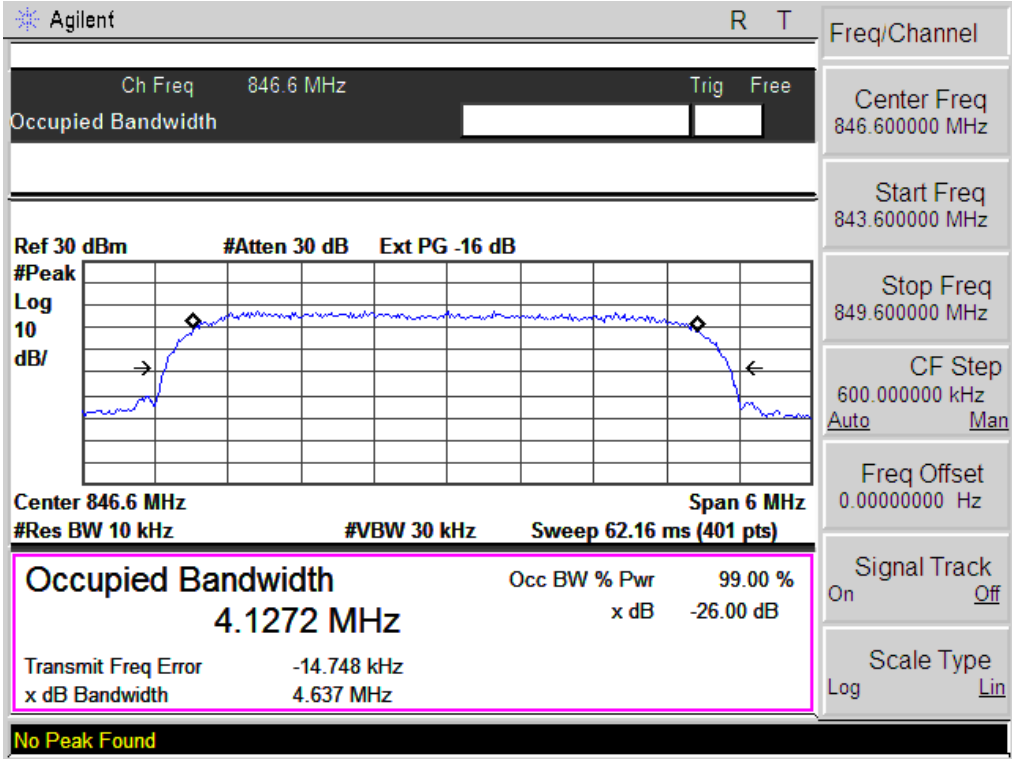
Occupied Bandwidth (99%) UMTS band V CH 4132



Occupied Bandwidth (99%) UMTS band V CH 4183



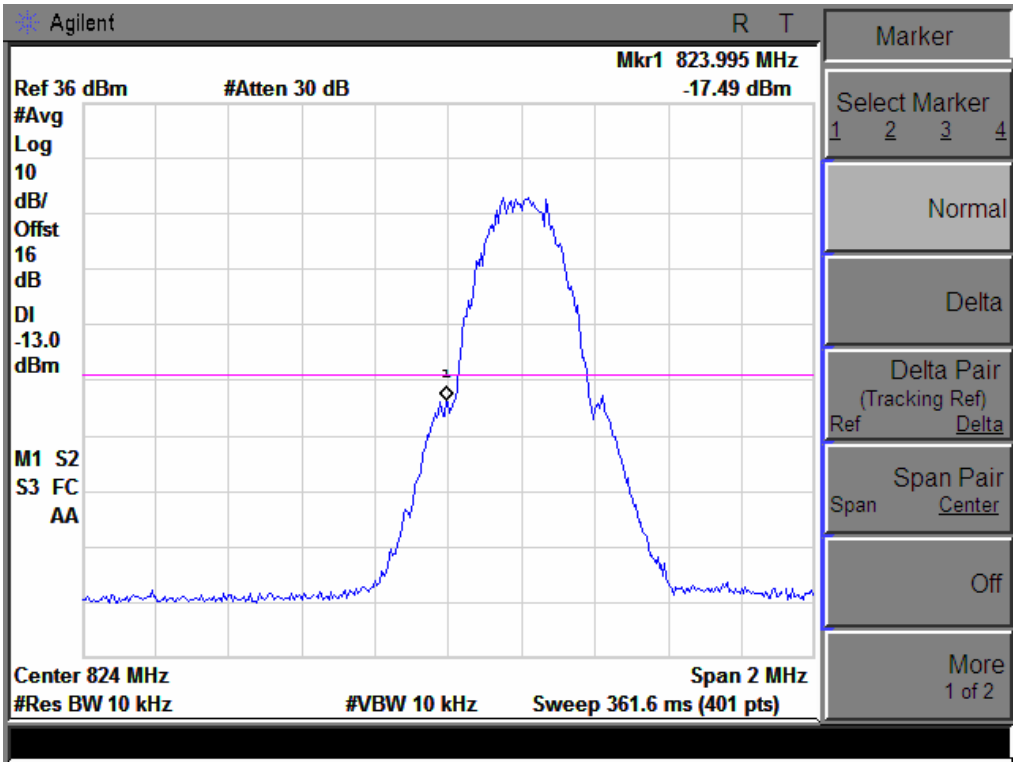
Occupied Bandwidth (99%) UMTS band V CH 4233



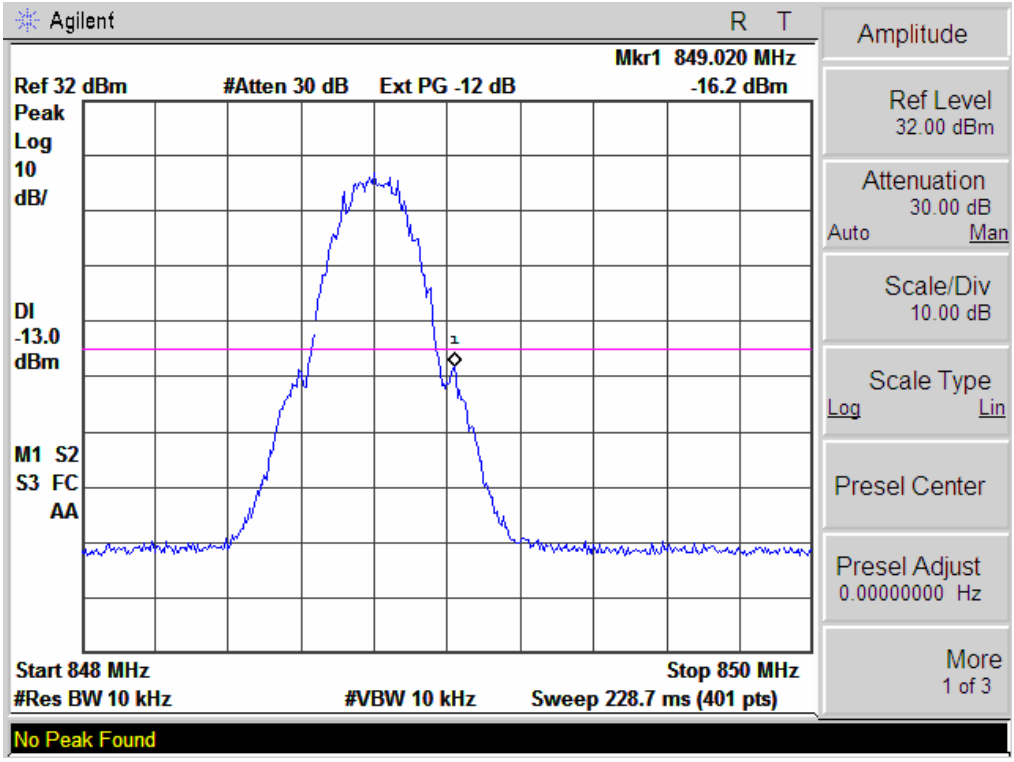
APPENDIX III

TEST PLOTS FOR BAND EDGES

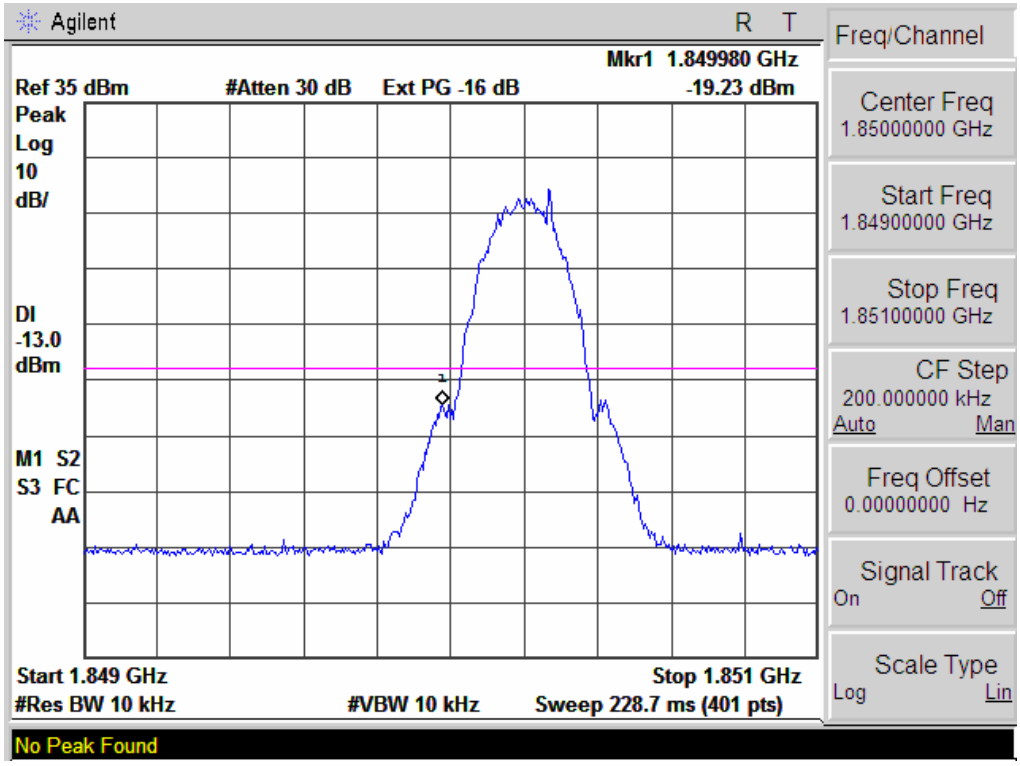
Low Band Edge GSM 850 BAND CH 128



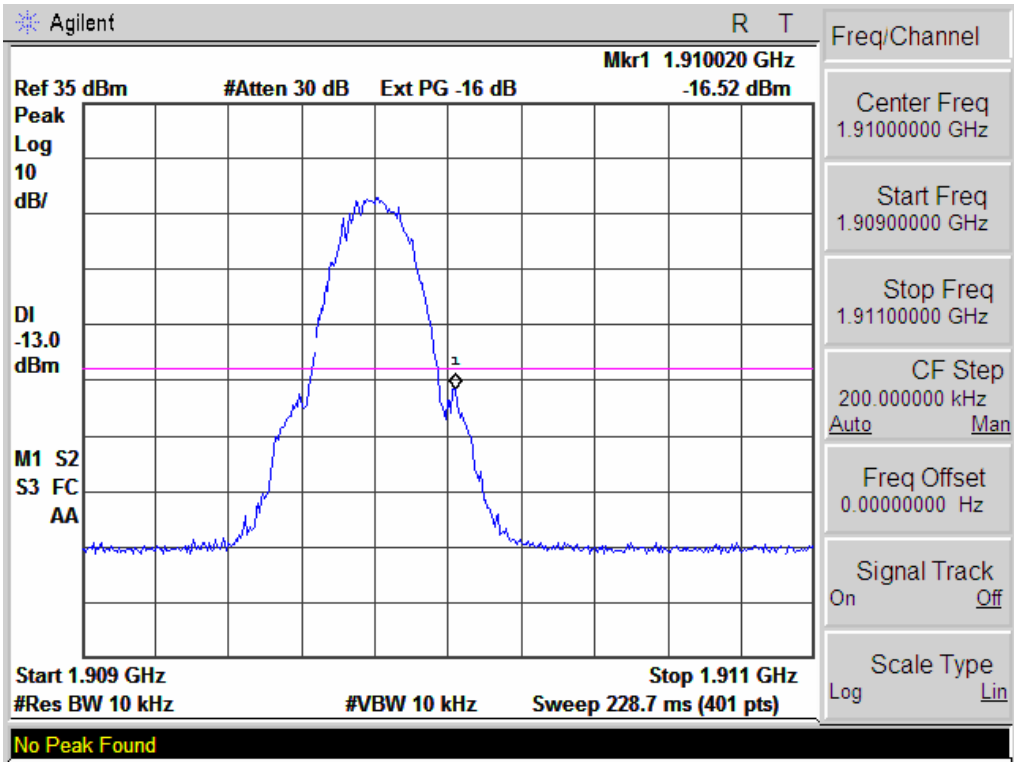
High Band Edge GSM 850 BAND CH 251



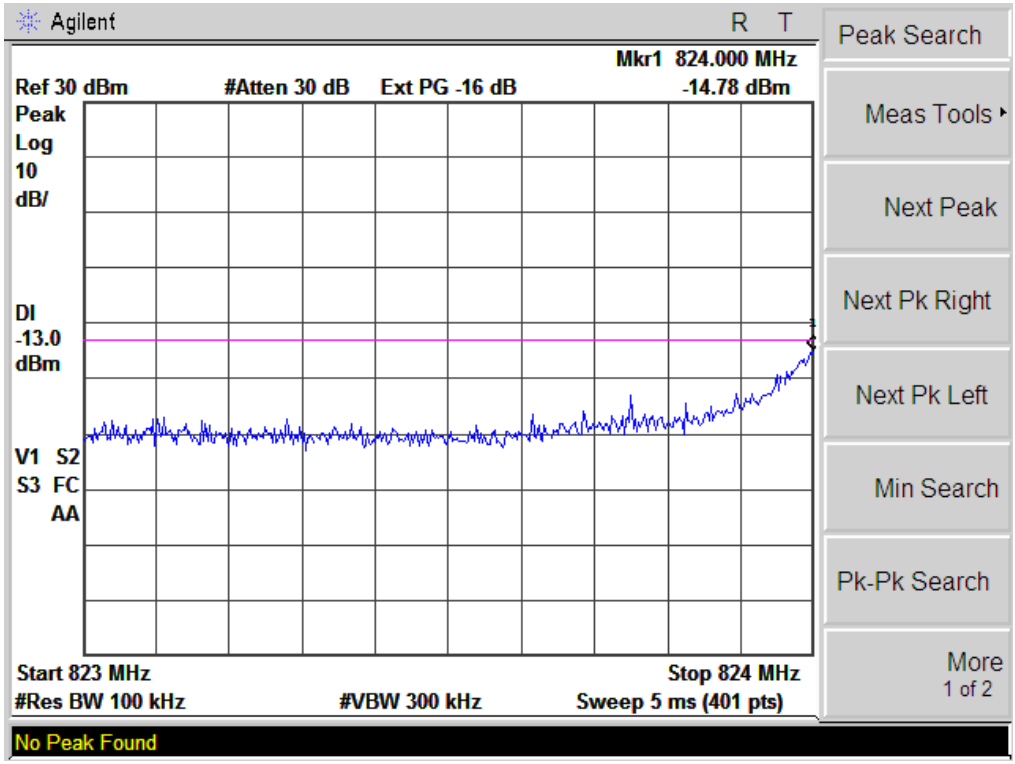
Low Band Edge PCS 1900 BAND CH 512



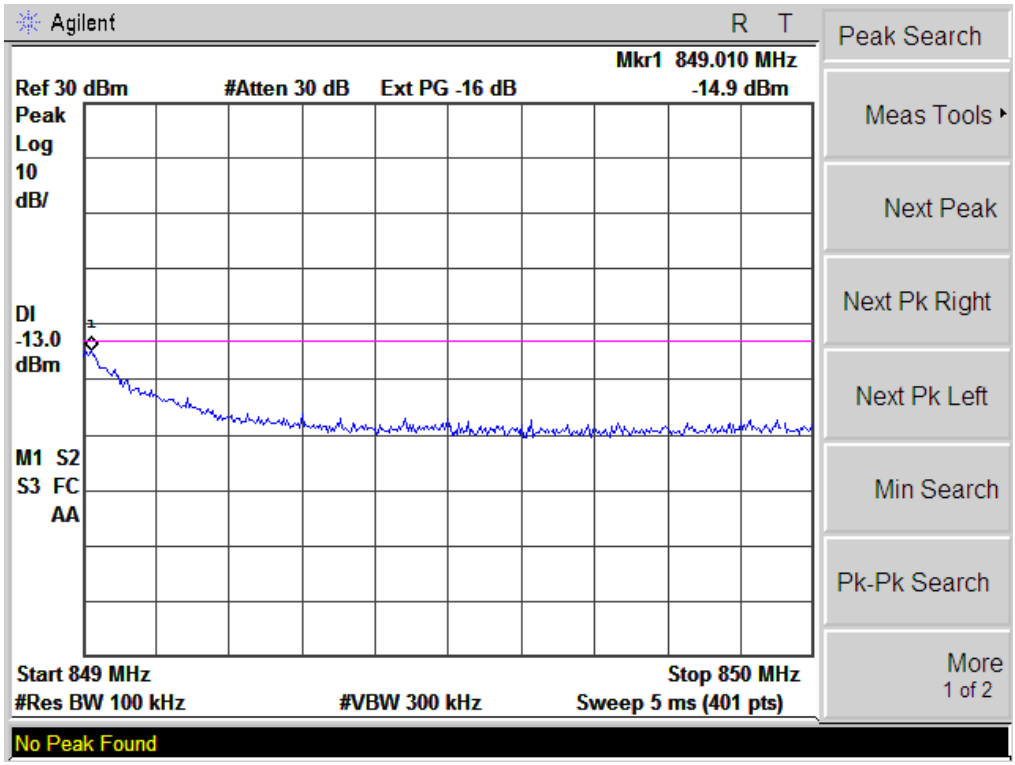
High Band Edge PCS 1900 BAND CH 810



Low Band Edge UMTS BAND V CH 4132



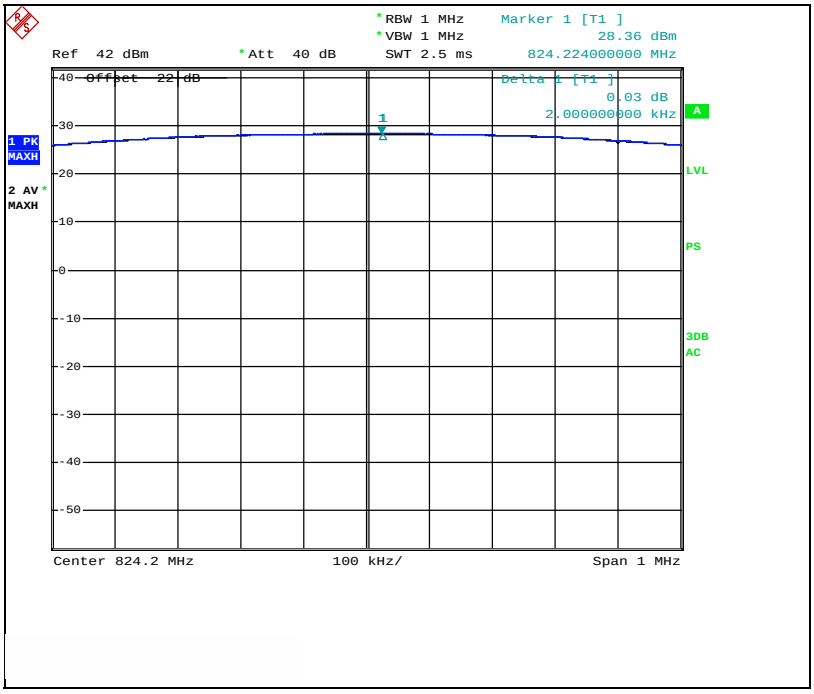
High Band Edge UMTS BAND V CH 4233



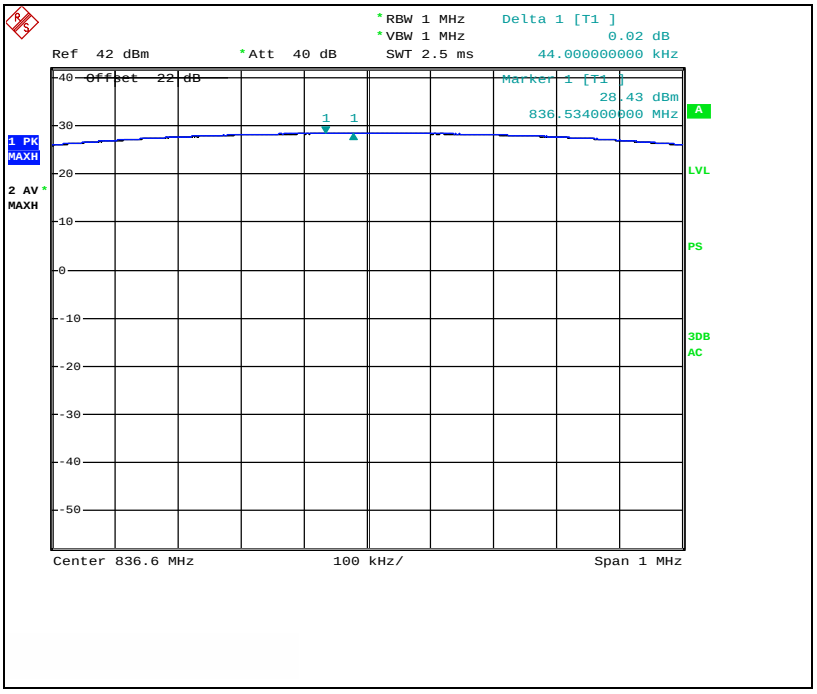
Test Result (Plots) of Peak-to-Average Ratio

Band :	GSM 850	Test Mode :	GSM Link

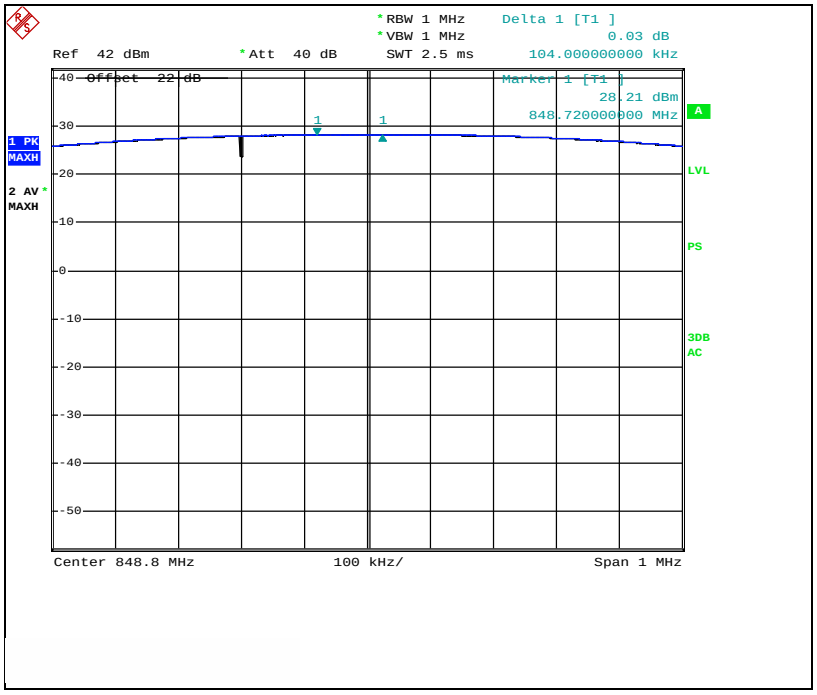
Peak-to-Average Ratio on Channel 129



Peak-to-Average Ratio on Channel 190

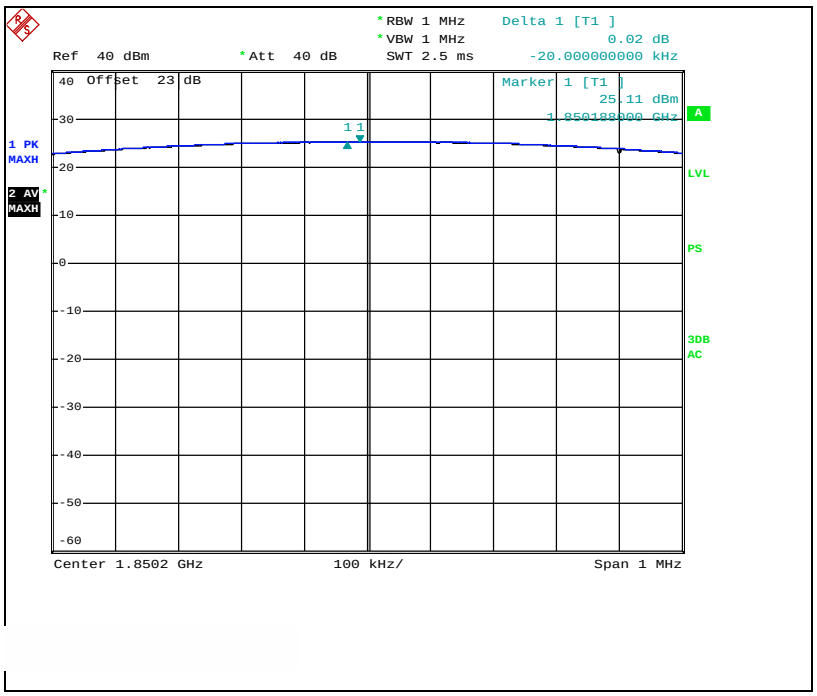


Peak-to-Average Ratio on Channel 251

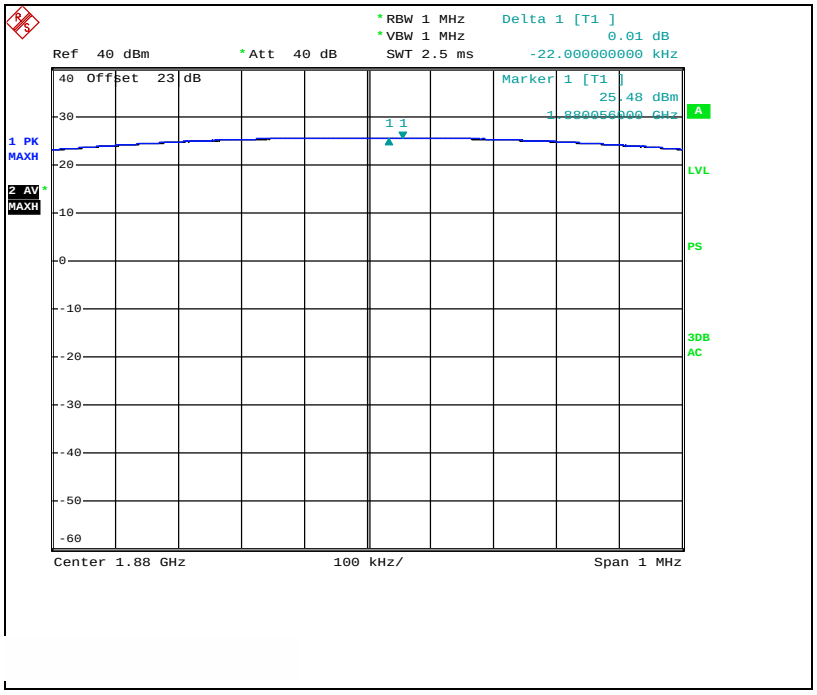


Band :	GSM 1900	Test Mode :	GSM Link

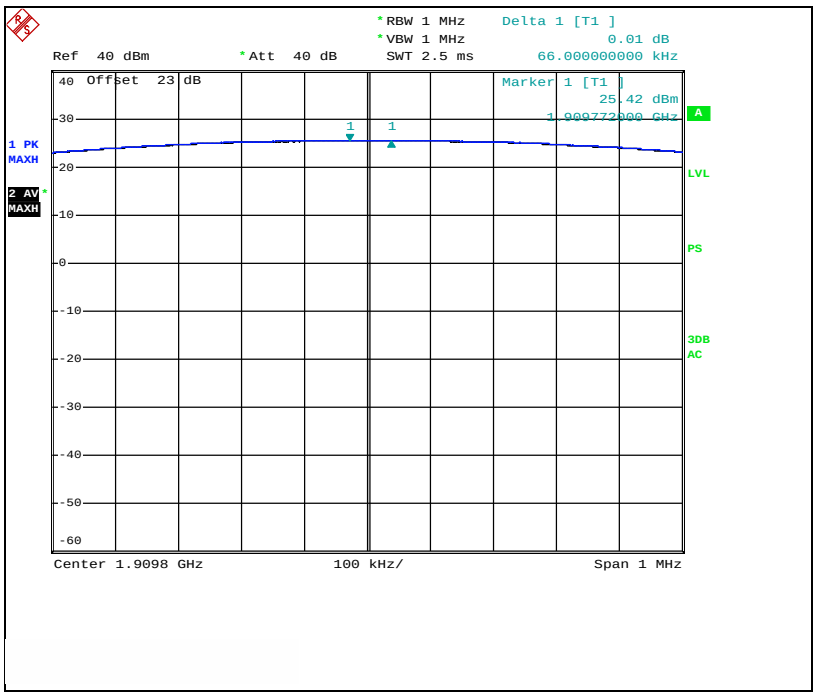
Peak-to-Average Ratio on Channel 512



Peak-to-Average Ratio on Channel 661

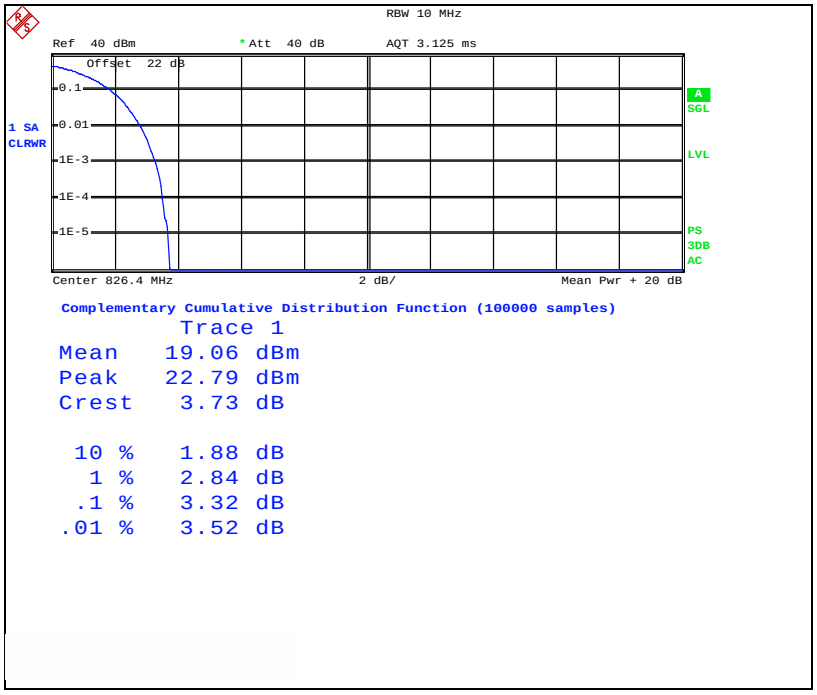


Peak-to-Average Ratio on Channel 810

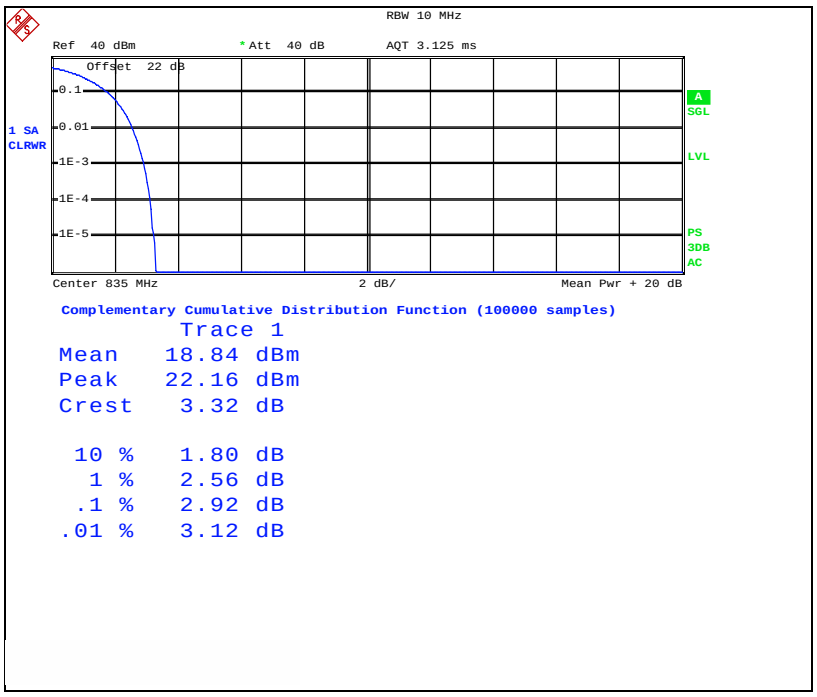


Band :	WCDMA Band V	Test Mode :	RMC 12.2Kbps Link

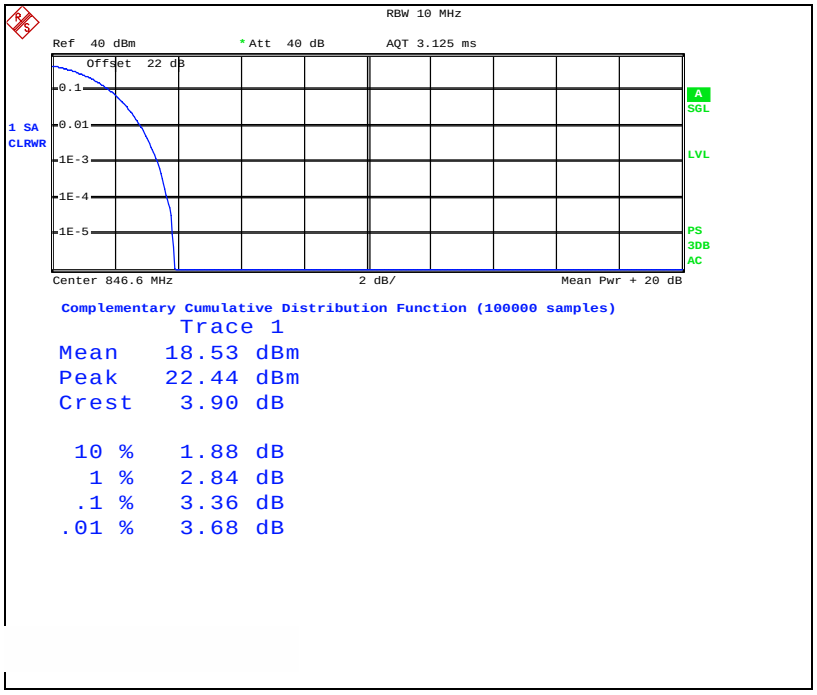
Peak-to-Average Ratio on Channel 4132



Peak-to-Average Ratio on Channel 4175



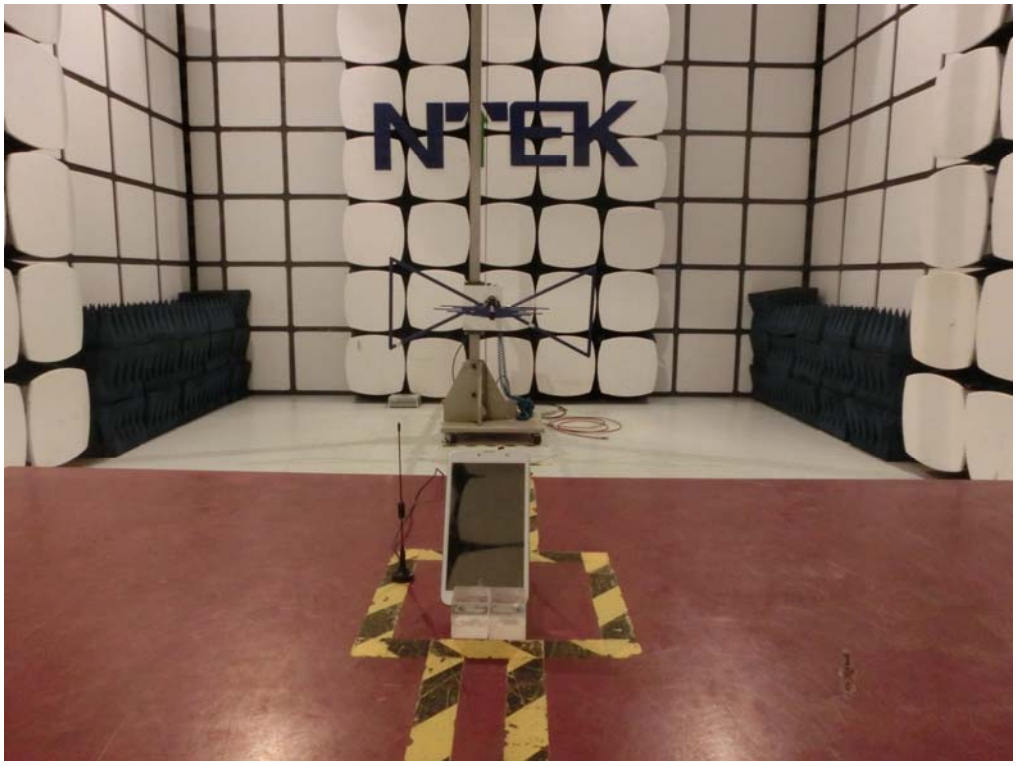
Peak-to-Average Ratio on Channel 4233

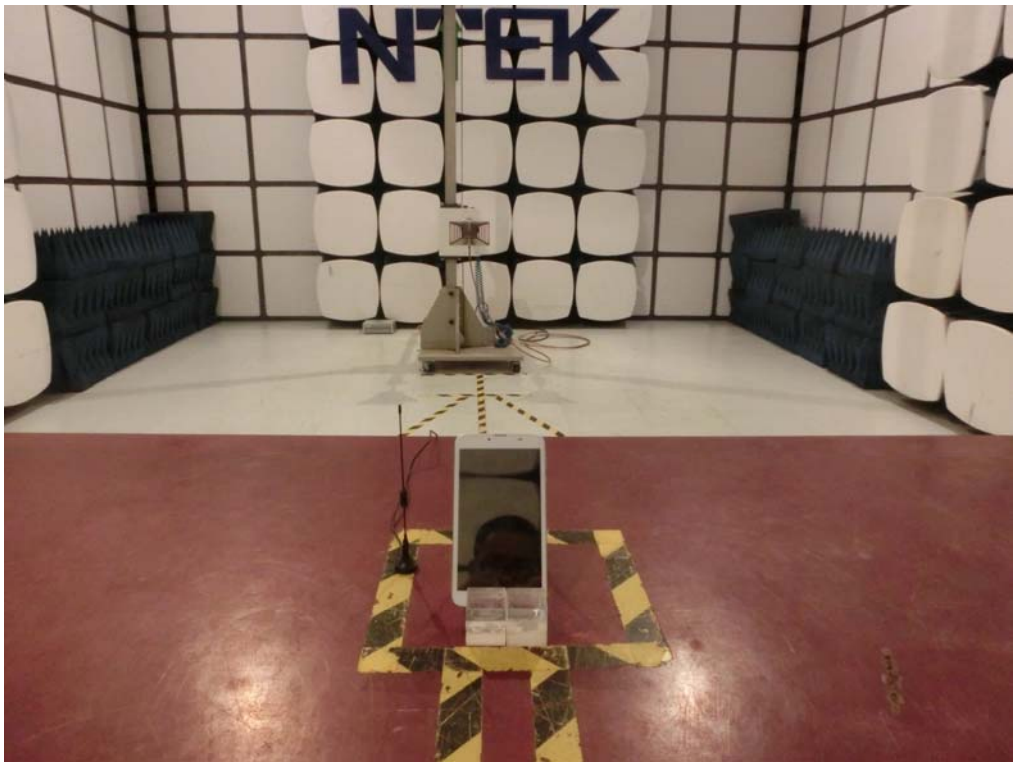


APPENDIX IV

PHOTOGRAPHS OF TEST SETUP

RADIATED SPURIOUS EMISSION





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