STSLAB-Radio Test Report

FCC RADIO TEST REPORT

FCC ID: 2AB9N-T5T3

Of

Product Name:	**GSM mobile phone**
Brand Name:	**N/A**
Model No.:	**T5**
Series Model:	**T3**
Test Report Number:	**STS1409009F01**

Issued for

TUC INDUSTIRAL CO.,LTD

Room 2106 Block A,Huaqiangbei,Electronic Technology Building,Futian District,Shenzhen

Issued by

Shenzhen STS Test Services Co., Ltd.

1/F, Building 2, Zhuoke Science Park, Chongqing Road, Fuyong, Baoan District, Shenzhen, China

TEL: +86-755 6119 6328

FAX: +86-755 6119 6328

E-mail:sts@stsapp.com

This test report may be reproduced in full only.
All Test Data Presented in this report is only applicable to presented Test sample.

TEST RESULT CERTIFICATION

Applicant's name.....:	TUC INDUSTIRAL CO.,LTD
Address .....:	Room 2106 Block A,Huaqiangbei,Electronic Technology Building,Futian District,Shenzhen
Manufacture's Name .....:	TUC INDUSTIRAL CO.,LTD
Address .....:	Room 2106 Block A,Huaqiangbei,Electronic Technology Building,Futian District,Shenzhen
Product name .....:	GSM mobile phone
Band name .....:	N/A
Model and/or type reference .:	T5
Serial Model ..... :	T3
Standards.....:	FCC Part 22H and 24E
Test procedure..... :	ANSI C63.4-2009

This device described above has been tested by STS 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.

This report shall not be reproduced except in full, without the written approval of STS, this document may be altered or revised by STS, personal only, and shall be noted in the revision of the document.

Date of Test .....

Date (s) of performance of tests ... Sep 11, 2014 ~ Sep 18, 2014

Date of Issue..... Sep 19, 2014

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

Testing Engineer :

(Tony Liu)

Technical Manager :

(Vita Li)

Authorized Signatory :

(Bovey Yang)

TABLE OF CONTENTS

1. GENERAL INFORMATION 4

1. GENERAL INFORMATION 4

1.1 PRODUCT DESCRIPTION 4

1.2 RELATED SUBMITTAL(S) / GRANT (S) 5

1.3 TEST METHODOLOGY 5

1.4 TEST FACILITY 5

1.5 MEASUREMENT INSTRUMENTS 5

1.6 SPECIAL ACCESSORIES 5

1.7 EQUIPMENT MODIFICATIONS 5

2. SYSTEM TEST CONFIGURATION 6

2.1 EUT CONFIGURATION 6

2.2 EUT EXERCISE 6

2.3 GENERAL TECHNICAL REQUIREMENTS 6

2.4 CONFIGURATION OF EUT SYSTEM 7

3. SUMMARY OF TEST RESULTS 8

4. DESCRIPTION OF TEST MODES 8

5. OUTPUT POWER 9

5.1 CONDUCTED OUTPUT POWER 9

5.2 RADIATED OUTPUT POWER 12

6.1 CONDUCTED SPURIOUS EMISSION 15

6.2 RADIATED SPURIOUS EMISSION 17

7.1 MEASUREMENT METHOD 21

7.2 PROVISIONS APPLICABLE 21

7.3 MEASUREMENT RESULT 22

8. OCCUPIED BANDWIDTH 24

8.1 MEASUREMENT METHOD 24

8.2 PROVISIONS APPLICABLE 24

8.3 MEASUREMENT RESULT 24

9. EMISSION BANDWIDTH 26

9.1 MEASUREMENT METHOD 26

9.2 PROVISIONS APPLICABLE 26

9.3 MEASUREMENT RESULT 26

10. BAND EDGE 28

10.1 MEASUREMENT METHOD 28

10.2 PROVISIONS APPLICABLE 28

10.3 MEASUREMENT RESULT 28

APPENDIX I 29

TEST PLOTS FOR CONDUCTED SPURIOUS EMISSION 29

TEST PLOTS FOR OCCUPIED BANDWIDTH (99%) 38

EMISSION BANDWIDTH (-26DBC) 38

APPENDIX III 47

TEST PLOTS FOR BAND EDGES 47

PHOTOGRAPHS OF TEST SETUP 52

1. 53

1. GENERAL INFORMATION

1.1 PRODUCT DESCRIPTION

A major technical description of EUT is described as following:

Product Designation:	GSM mobile phone
Hardware version:	--
Software version:	--
FCC ID:	2AB9N-T5T3
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:	PIFA Antenna
Antenna gain:	850 MHz:0 dBi 1900 MHz:0 dBi
Power Supply:	DC 3.7V by battery or DC 5.0V supplied by adapter
Battery parameter:	DC 3.7V/1800mAh
Adapter Input:	AC100-240V, 50-60Hz, 100mA
Adapter Output:	DC 5.0V, 500mA
GPRS Class	Multi-Class12
Extreme Vol. Limits:	DC 3.4 V to 4.2 V (Nominal DC3.7 V)
Extreme Temp. Tolerance	-30℃ to +50℃
** Note: The High Voltage 4.2V and Low Voltage 3.4V was declared by manufacturer, The EUT couldn't be operate normally with higher or lower voltage.	

1.2 RELATED SUBMITTAL(S) / GRANT (S)

This submittal(s) (test report) is intended for **FCC ID: 2AB9N-T5T3** 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: 2009; 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:
Shenzhen STS Test Services Co., Ltd.
1/F, Building 2, Zhuoke Science Park, Chongqing Road, Fuyong, Baoan District, Shenzhen, China

The test site is constructed and calibrated to meet the FCC requirements in documents ANSI C63.4: 2003.
FCC Registration No.: 842334

1.5 MEASUREMENT INSTRUMENTS

NAME OF EQUIPMENT	MANUFACTURER	MODEL	SERIAL NUMBER	CAL. DUE
SPECTRUM ANALYZER	AGILENT	E4440A	US44300399	2015.6.26
TEST RECEIVER	R&S	ESCI	A0304218	2015.6.26
COMMUNICATION TESTER	AGILENT	8960	3104A03367	2015.7.21
COMMUNICATION TESTER	R&S	CMU200	A0304247	2015.7.21
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	2015.4.26
Horn Antenna	EM	EM-AH-10180	N/A	2015.4.26

1.6 SPECIAL ACCESSORIES

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

1.7 EQUIPMENT MODIFICATIONS

Not available for this EUT intended for grant.

2. SYSTEM TEST CONFIGURATION

2.1 EUT CONFIGURATION

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

2.2 EUT EXERCISE

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

2.3 GENERAL TECHNICAL REQUIREMENTS

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

2.4 CONFIGURATION OF EUT SYSTEM

Fig. 2-1 Configuration of EUT System

Table 2-1 Equipment Used in EUT System

Item	Equipment	Model No.	Series No:	ID or Specification	Note
1	**GSM mobile phone**	T5	N/A	FCC ID: 2AB9N-T5T3	EUT

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

3. SUMMARY OF TEST RESULTS

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

4. DESCRIPTION OF TEST MODES

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

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

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

5. OUTPUT POWER

5.1 CONDUCTED OUTPUT POWER

5.1.1 MEASUREMENT METHOD

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

5.1.2 MEASUREMENT RESULT

Conducted Output Power Limits for GSM 850 MHZ		
Mode	**Nominal Peak Power**	**Tolerance(dB)**
GSM850	32 dBm	+/- 1

Conducted Output Power Limits for PCS 1900 MHZ		
Mode	**Nominal Peak Power**	**Tolerance(dB)**
GSM1900	29 dBm	+/- 1

GSM 850:

Mode	Frequency (MHz)	Peak Power
GSM850	824.2	32.54
	836.6	32.53
	848.8	**32.71**
GPRS850 (1 Slot)	824.2	32.54
	836.6	32.43
	848.8	32.13
GPRS850 (2 Slot)	824.2	31.47
	836.6	31.33
	848.8	31.37

PCS 1900:

Mode	Frequency (MHz)	Peak Power
GSM1900	1850.2	28.34
	1880	28.56
	1909.8	**28.78**
GPRS1900 (1 Slot)	1850.2	27.88
	1880	27.89
	1909.8	27.92
GPRS1900 (2 Slot)	1850.2	26.96
	1880	26.89
	1909.8	26.42

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

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

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

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

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

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

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

5.2 RADIATED OUTPUT POWER

5.2.1 MEASUREMENT METHOD

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

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

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

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

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

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

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

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

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

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

5.2.2 PROVISIONS APPLICABLE

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

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

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	27.21	Horizontal	Pass
	824.2	29.32	Vertical	Pass
	836.6	27.34	Horizontal	Pass
	836.6	29.31	Vertical	Pass
	848.8	27.19	Horizontal	Pass
	848.8	**29.36**	Vertical	Pass

Radiated Power (ERP) for GPRS 850 MHZ				
Mode	**Frequency**	**Result**		**Conclusion**
		Max. Peak ERP (dBm)	**Polarization Of Max. ERP**	
GPRS850	824.2	26.66	Horizontal	Pass
	824.2	28.78	Vertical	Pass
	836.6	26.67	Horizontal	Pass
	836.6	28.70	Vertical	Pass
	848.8	26.70	Horizontal	Pass
	848.8	**28.81**	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	27.13	Horizontal	Pass
	1850.2	**29.18**	Vertical	Pass
	1880.0	27.12	Horizontal	Pass
	1880.0	29.14	Vertical	Pass
	1909.8	27.12	Horizontal	Pass
	1909.8	29.13	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	26.53	Horizontal	Pass
	1850.2	28.43	Vertical	Pass
	1880.0	26.56	Horizontal	Pass
	1880.0	28.12	Vertical	Pass
	1909.8	**26.83**	Horizontal	Pass
	1909.8	28.14	Vertical	Pass

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

6.1.2 PROVISIONS APPLICABLE

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

6.1.3 MEASUREMENT RESULT

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

Note: 1. Below 30MHZ no Spurious found and The GSM modes is the worst condition.
2. As no emission found in standby or receive mode, no recording in this report.

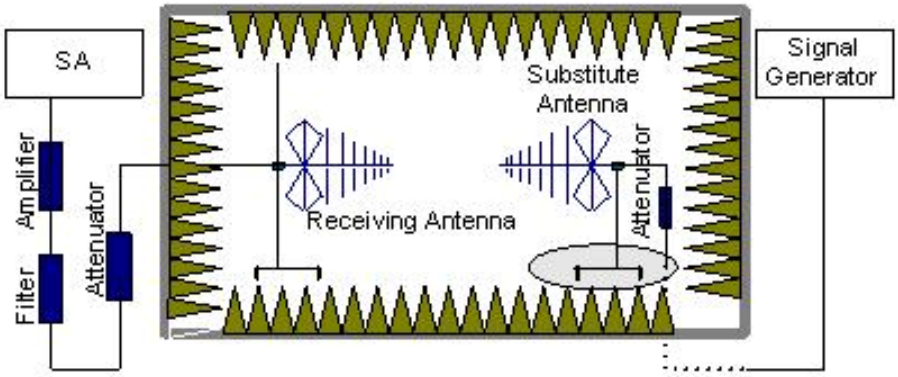
6.2 RADIATED SPURIOUS EMISSION

6.2.1 MEASUREMENT METHOD

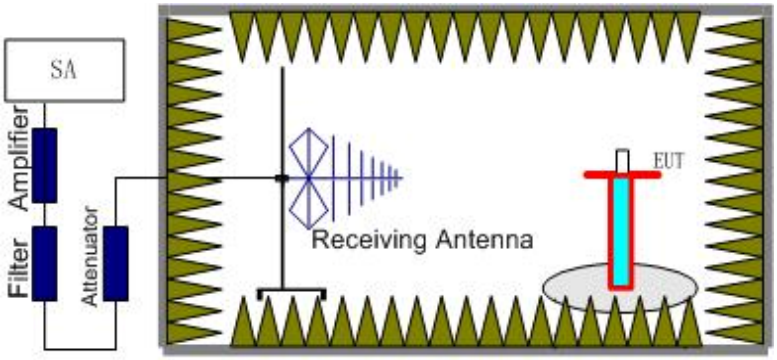
The measurements procedures specified in TIA-603C-2004 were used for testing. The spectrum was scanned from 30 MHz to the 10th harmonic of the highest frequency generated within the equipment. The resolution bandwidth is set 1MHz as outlined in Part 24.238. The measurements were performed on all modes(GPRS850,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

The procedure of radiated spurious emissions is as follows:

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



b) EUT was placed on a 1meter 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 1m. 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 V (4132 (826.4MHz), 4183(835MHz) and 4233 (846.6MHz)). It was decided that measurements at these three carrier frequencies would be sufficient to demonstrate compliance with emissions limits because it was seen that all the significant spurs occur well outside the band and no radiation was seen from a carrier in one block of any band into any of the other blocks.

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

6.2.2 PROVISIONS APPLICABLE

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

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

6.2.3 MEASUREMENT RESULT

GSM 850:

The Worst Test Results Channel 128/824.2 MHz						
Frequency(MHz)	Power(dBm)	A_{Rpl} (dBm)	P_{Mea}(dBm)	Limit（dBm）	Margin	Polarity
1648.344	-35.43	-4.65	-40.08	-13	-27.08	Horizontal
2472.519	-36.11	-2.21	-38.32	-13	-25.32	Horizontal
3296.747	-31.13	0.21	-30.92	-13	-17.92	Horizontal
1648.409	-38.43	-4.65	-43.08	-13	-30.08	Vertical
2472.529	-41.54	-2.21	-43.75	-13	-30.75	Vertical
3296.800	-40.13	0.21	-40.34	-13	-27.34	Vertical
The Worst Test Results Channel 190/836.6 MHz						
Frequency(MHz)	Power(dBm)	A_{Rpl} (dBm)	P_{Mea}(dBm)	Limit（dBm）	Margin	Polarity
1673.122	-36.24	-4.65	-40.89	-13	-27.89	Horizontal
2509.757	-42.26	-2.21	-44.47	-13	-31.47	Horizontal
3346.332	-36.23	0.21	-36.02	-13	-23.02	Horizontal
1673.157	-37.54	-4.65	-42.19	-13	-29.19	Vertical
2509.770	-32.32	-2.21	-34.53	-13	-21.53	Vertical
3346.393	-36.12	0.21	-35.91	-13	-22.91	Vertical
The Worst Test Results Channel 251/848.8 MHz						
Frequency(MHz)	Power(dBm)	A_{Rpl} (dBm)	P_{Mea}(dBm)	Limit（dBm）	Margin	Polarity
1697.528	-35.43	-4.65	-40.08	-13	-27.08	Horizontal
2546.318	-42.24	-2.21	-44.45	-13	-31.45	Horizontal
3395.210	-45.32	0.21	-45.11	-13	-32.11	Horizontal
1697.520	-35.43	-4.65	-40.08	-13	-27.08	Vertical
2546.342	-42.23	-2.21	-44.44	-13	-31.44	Vertical
3395.207	-35.31	0.21	-35.1	-13	-22.1	Vertical

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

PCS 1900:

The Worst Test Results for Channel 512/1850.2MHz						
Frequency(MHz)	Power(dBm)	A_{Rpl} (dBm)	P_{Mea}(dBm)	Limit（dBm）	Margin	Polarity
3700.333	-36.54	0.33	-36.21	-13	-23.21	Horizontal
5550.575	-43.43	4.01	-39.42	-13	-26.42	Horizontal
7400.778	-42.32	10.7	-31.62	-13	-18.62	Horizontal
3700.344	-34.41	0.33	-34.08	-13	-21.08	Vertical
5550.584	-45.25	4.01	-41.24	-13	-28.24	Vertical
7400.815	-41.52	10.7	-30.82	-13	-17.82	Vertical
The Worst Test Results for Channel 661/1880.0MHz						
Frequency(MHz)	Power(dBm)	A_{Rpl} (dBm)	P_{Mea}(dBm)	Limit（dBm）	Margin	Polarity
3760.044	-36.62	0.33	-36.29	-13	-23.29	Horizontal
5640.210	-52.21	4.01	-48.2	-13	-35.2	Horizontal
7520.180	-43.25	10.7	-32.55	-13	-19.55	Horizontal
3760.026	-31.32	0.33	-30.99	-13	-17.99	Vertical
5640.204	-43.51	4.01	-39.5	-13	-26.5	Vertical
7520.206	-33.54	10.7	-22.84	-13	-9.84	Vertical
The Worst Test Results for Channel 810/1909.8MHz						
Frequency(MHz)	Power(dBm)	A_{Rpl} (dBm)	P_{Mea}(dBm)	Limit（dBm）	Margin	Polarity
3819.569	-32.13	0.33	-31.8	-13	-18.8	Horizontal
5729.341	-44.22	4.01	-40.21	-13	-27.21	Horizontal
7639.125	-37.34	10.7	-26.64	-13	-13.64	Horizontal
3819.537	-32.23	0.33	-31.9	-13	-18.9	Vertical
5729.409	-45.32	4.01	-41.31	-13	-28.31	Vertical
7639.192	-38.13	10.7	-27.43	-13	-14.43	Vertical

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

7. FREQUENCY STABILITY

7.1 MEASUREMENT METHOD

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

1 . Measure the carrier frequency at room temperature.

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

3 .With the EUT, powered via nominal voltage, connected to the CMU200 and in a simulated call on channel 661 for PCS 1900 band , channel 190 for GSM 850 band and channel 4183 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 3.4VDC 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	27	0.032
3.7	26	0.031
4.2	25	0.030

Frequency Error Against Temperature for GSMS850 band		
temperature(℃)	Frequency error(Hz)	Frequency error(ppm)
-30	25	0.030
-20	26	0.031
-10	26	0.031
0	31	0.037
10	28	0.033
20	28	0.033
30	-27	-0.032
40	27	0.032
50	28	0.033

Frequency Error Against Voltage for GPRS850 band		
Voltage(V)	Frequency error(Hz)	Frequency error(ppm)
3.4	26	0.031
3.7	25	0.030
4.2	-23	-0.028

Frequency Error Against Temperature for GPRS850 band		
temperature(℃)	Frequency error(Hz)	Frequency error(ppm)
30	26	0.031
-20	27	0.032
-10	-28	-0.033
0	27	0.032
10	-25	-0.030
20	24	0.029
30	-25	-0.030
40	28	0.033
50	27	0.032

Note: The EUT doesn't work below -10℃

Frequency Error Against Voltage for GSM1900 band		
Voltage(V)	Frequency error(Hz)	Frequency error(ppm)
3.4	25	0.013
3.7	-24	-0.013
4.2	-22	-0.012

Frequency Error Against Temperature for GSM1900 band		
temperature(℃)	Frequency error(Hz)	Frequency error(ppm)
-30	31	0.016
-20	27	0.014
-10	25	0.013
0	26	0.014
10	-27	-0.014
20	24	0.013
30	31	0.016

Note: The EUT doesn't work below -10℃

Frequency Error Against Voltage for GPRS1900 band		
Voltage(V)	Frequency error(Hz)	Frequency error(ppm)
3.4	26	0.014
3.7	26	0.014
4.2	28	0.015

Frequency Error Against Temperature for GPRS1900 band		
temperature(℃)	Frequency error(Hz)	Frequency error(ppm)
-10	25	0.013
0	26	0.014
10	27	0.014
20	25	0.013
30	26	0.014
40	28	0.015
50	27	0.014

Note: The EUT doesn't work below -10℃

8. OCCUPIED BANDWIDTH

8.1 MEASUREMENT METHOD

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

8.2 PROVISIONS APPLICABLE

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

8.3 MEASUREMENT RESULT

Occupied Bandwidth (99%) for GSM 850 band		
Mode	Frequency(MHz)	Occupied Bandwidth (99%)(kHz)
Low Channel	824.2	238.5283
Middle Channel	836.6	238.3818
High Channel	848.8	240.7909

Occupied Bandwidth (99%) for GPRS 850 band		
Mode	Frequency(MHz)	Occupied Bandwidth (99%)(kHz)
Low Channel	824.2	235.3027
Middle Channel	836.6	239.1105
High Channel	848.8	236.6118

Occupied Bandwidth (99%) for GSM1900 band		
Mode	Frequency(MHz)	Occupied Bandwidth (99%)(kHz)
Low Channel	1850.2	242.8318
Middle Channel	1880.0	241.4269
High Channel	1909.8	241.2132

Occupied Bandwidth (99%) for GPRS1900 band		
Mode	Frequency(MHz)	Occupied Bandwidth (99%)(kHz)
Low Channel	1850.2	242.6996
Middle Channel	1880.0	236.6568
High Channel	1909.8	240.2479

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	310.706
Middle Channel	836.6	312.642
High Channel	848.8	316.982

Emission Bandwidth (-26dBc) for GPRS850 band		
Mode	Frequency(MHz)	Emission Bandwidth (-26dBc)(kHz)
Low Channel	824.2	308.279
Middle Channel	836.6	313.050
High Channel	848.8	315.093

Emission Bandwidth (-26dBc) for GSM1900 band		
Mode	Frequency(MHz)	Emission Bandwidth (-26dBc)(kHz)
Low Channel	1850.2	318.384
Middle Channel	1880.0	313.003
High Channel	1909.8	318.068

Emission Bandwidth (-26dBc) for GPRS1900 band		
Mode	Frequency(MHz)	Emission Bandwidth (-26dBc)(kHz)
Low Channel	1850.2	318.442
Middle Channel	1880.0	321.639
High Channel	1909.8	315.252

10. BAND EDGE

10.1 MEASUREMENT METHOD

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

10.2 PROVISIONS APPLICABLE

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

10.3 MEASUREMENT RESULT

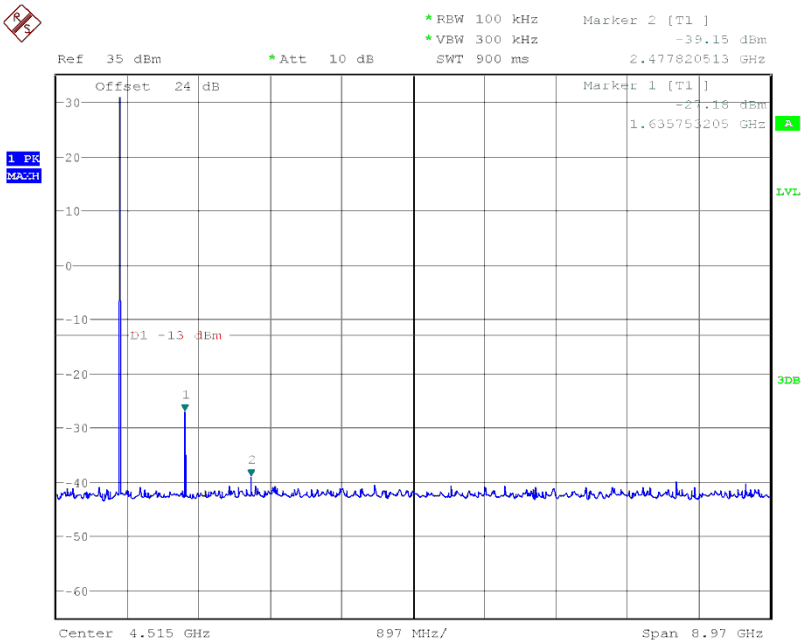
Please refers to Appendix III for compliance test plots for band edges

APPENDIX I

TEST PLOTS FOR CONDUCTED SPURIOUS EMISSION

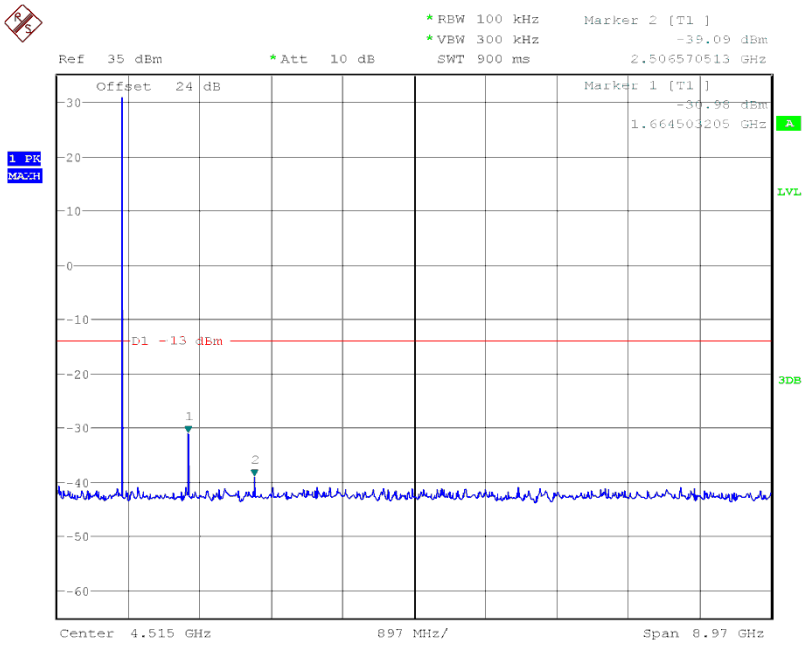
CONDUCTED EMISSION IN GSM 850 BAND

Conducted Emission Transmitting Mode CH 128 30MHz – 10GHz



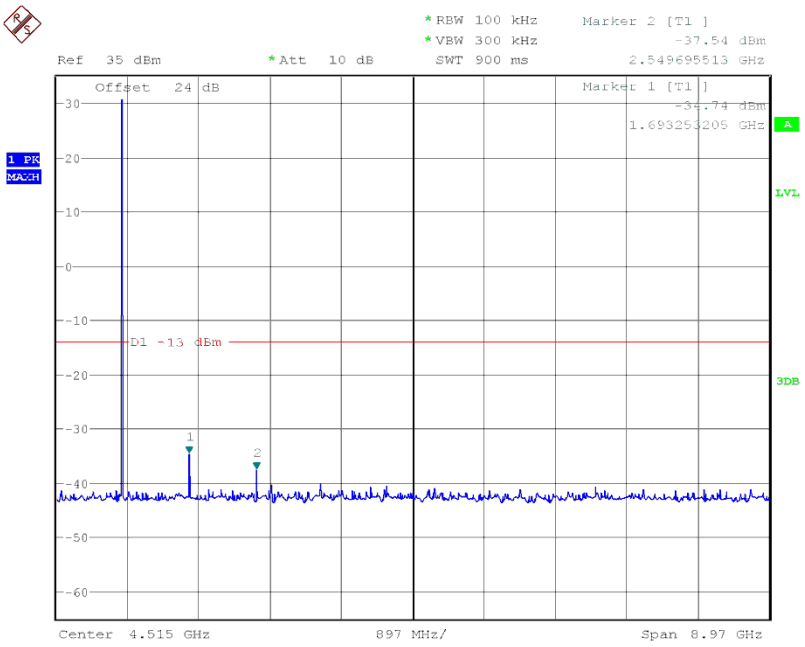
Date: 11.SEP.2014 17:21:38

Conducted Emission Transmitting Mode CH 190 30MHz – 10GHz



Date: 11.SEP.2014 17:22:48

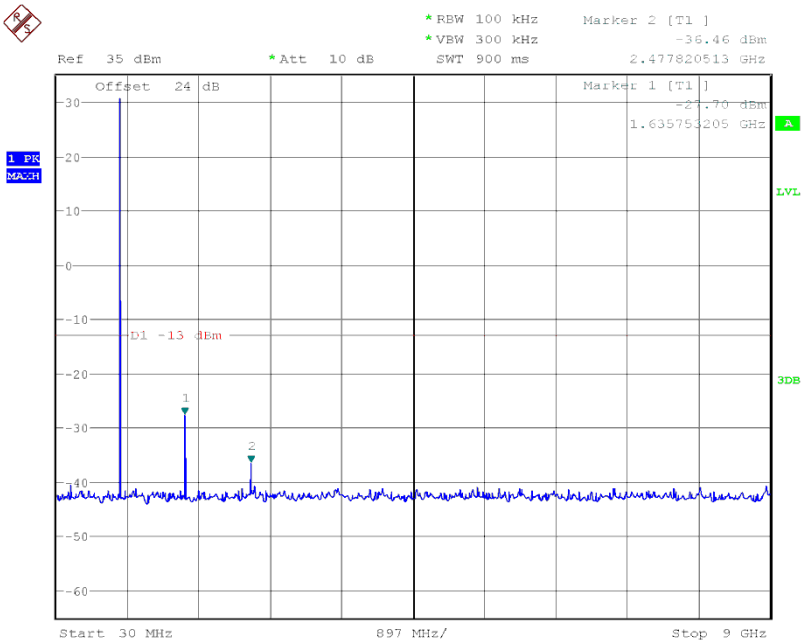
Conducted Emission Transmitting Mode CH 251 30MHz – 10GHz



Date: 11.SEP.2014 17:23:32

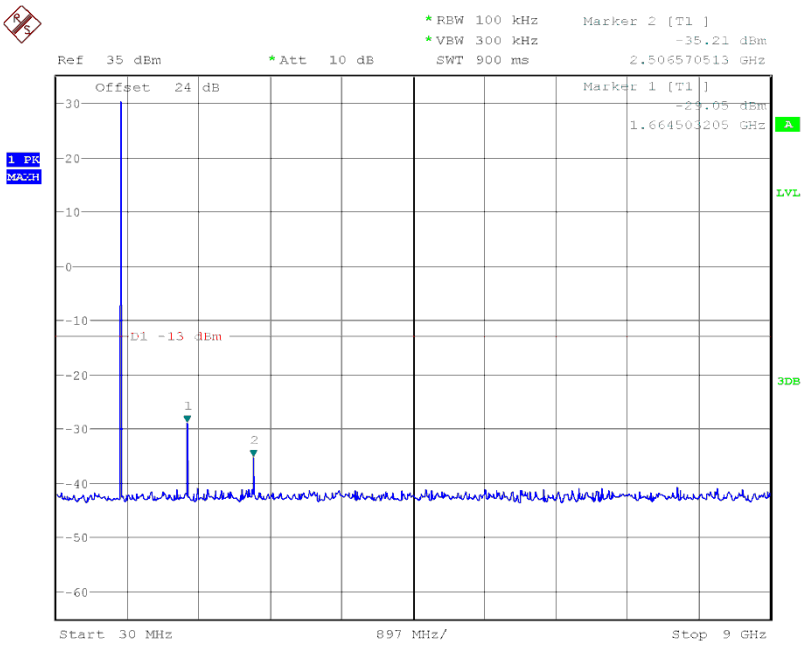
CONDUCTED EMISSION IN GPRS 850 BAND

Conducted Emission Transmitting Mode CH 128 30MHz – 10GHz



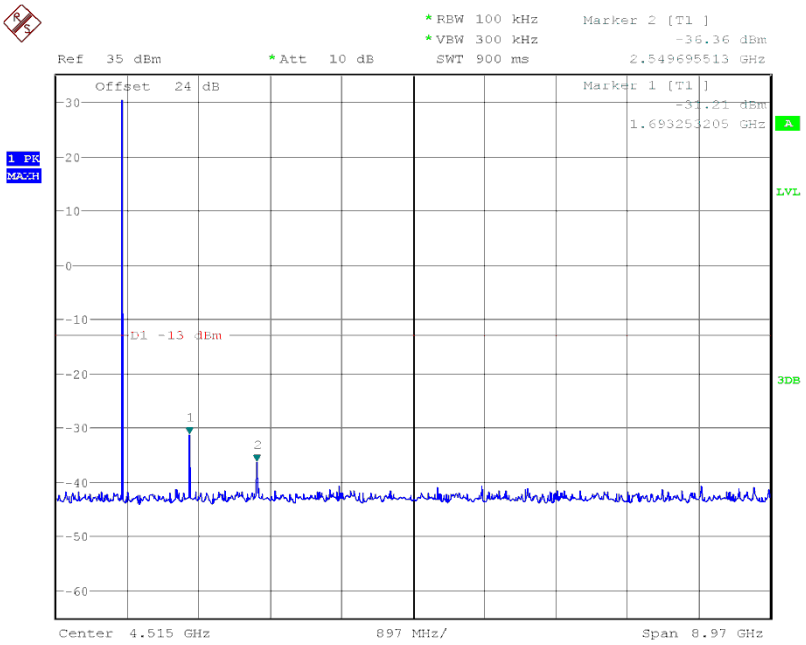
Date: 11.SEP.2014 17:18:59

Conducted Emission Transmitting Mode CH 190 30MHz – 10GHz



Date: 11.SEP.2014 17:19:46

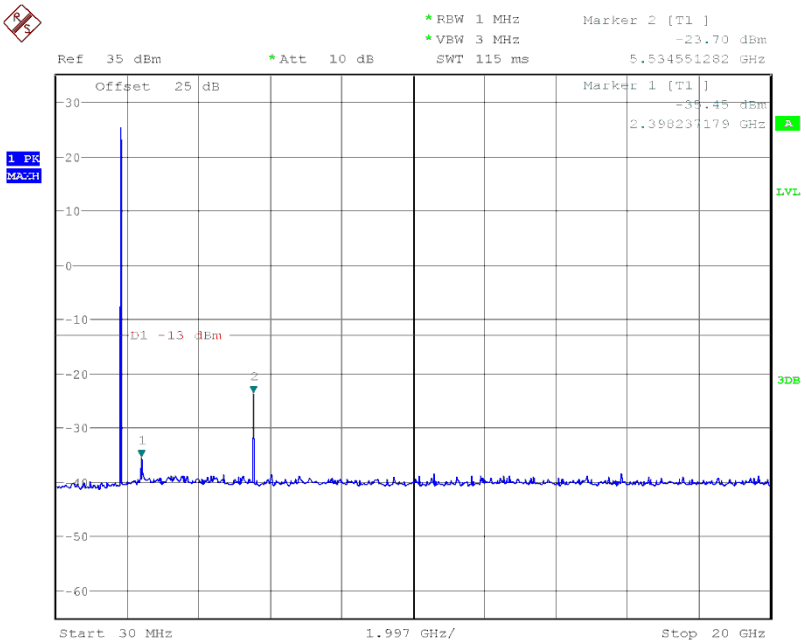
Conducted Emission Transmitting Mode CH 251 30MHz – 10GHz



Date: 11.SEP.2014 17:20:18

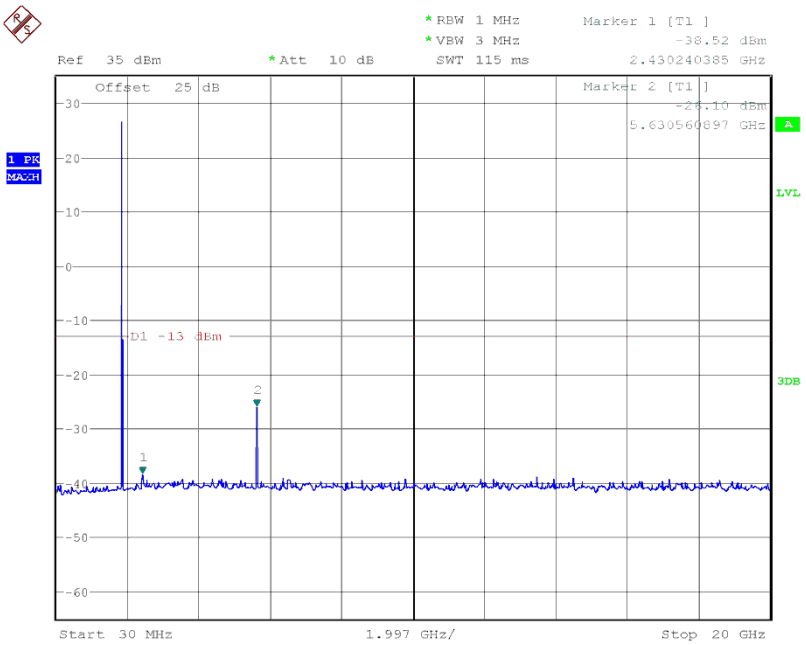
CONDUCTED EMISSION IN GSM1900 BAND

Conducted Emission Transmitting Mode CH 512 30MHz – 20GHz



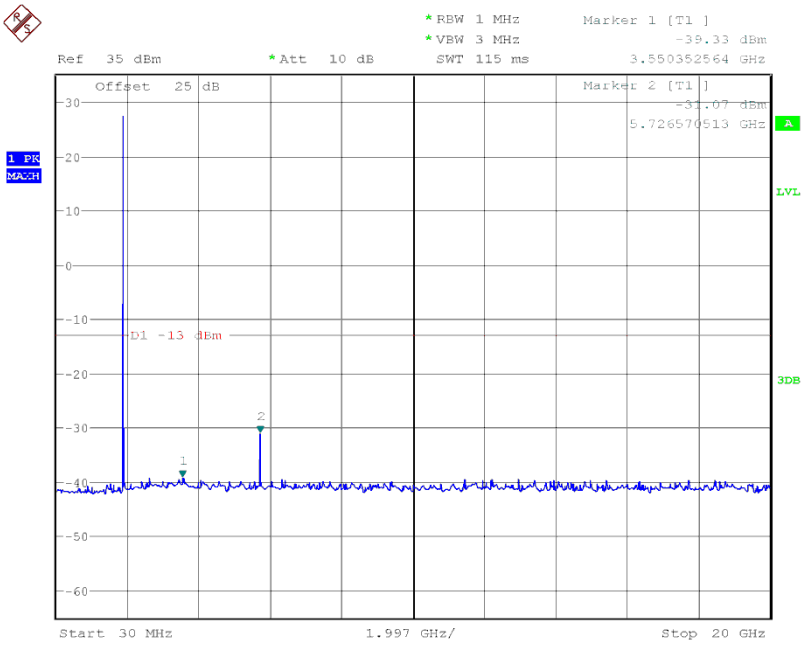
Date: 11.SEP.2014 17:12:32

Conducted Emission Transmitting Mode CH 661 30MHz – 20GHz



Date: 11.SEP.2014 17:13:53

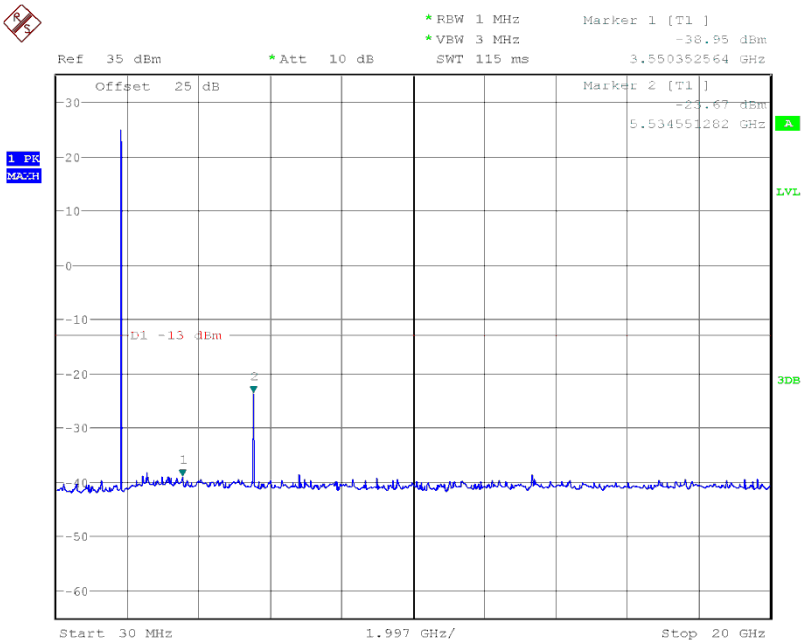
Conducted Emission Transmitting Mode CH 810 30MHz – 20GHz



Date: 11.SEP.2014 17:14:33

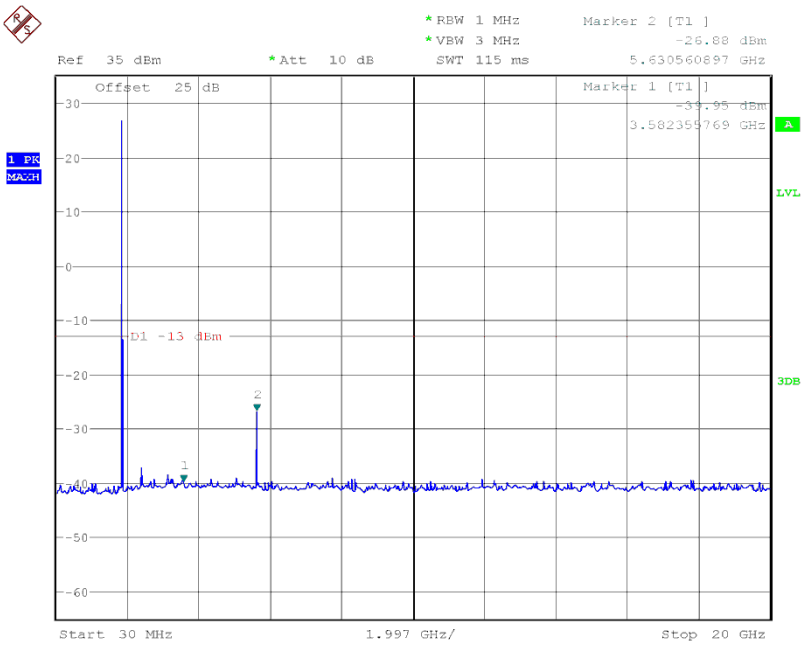
CONDUCTED EMISSION IN GPRS1900 BAND

Conducted Emission Transmitting Mode CH 512 30MHz – 20GHz



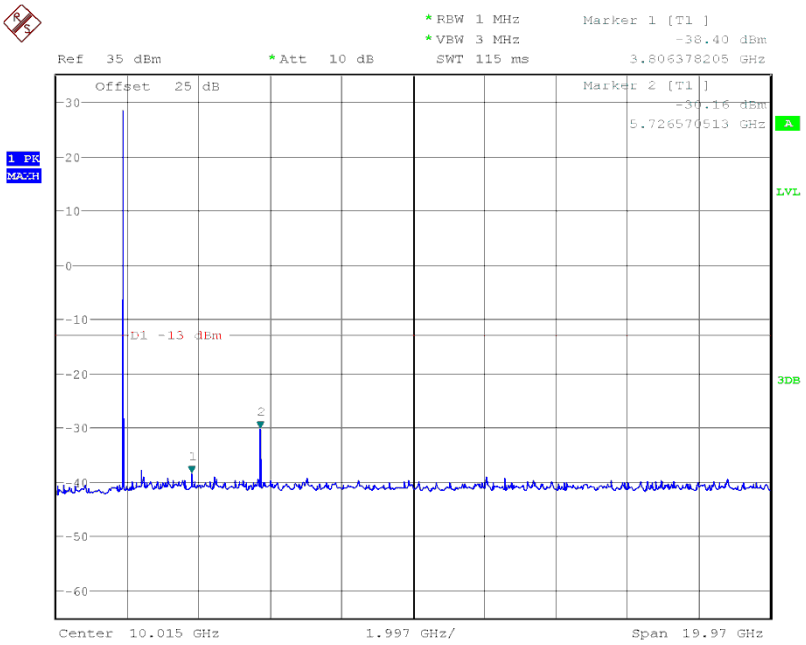
Date: 11.SEP.2014 17:15:54

Conducted Emission Transmitting Mode CH 661 30MHz – 20GHz



Date: 11.SEP.2014 17:16:36

Conducted Emission Transmitting Mode CH 810 30MHz – 20GHz



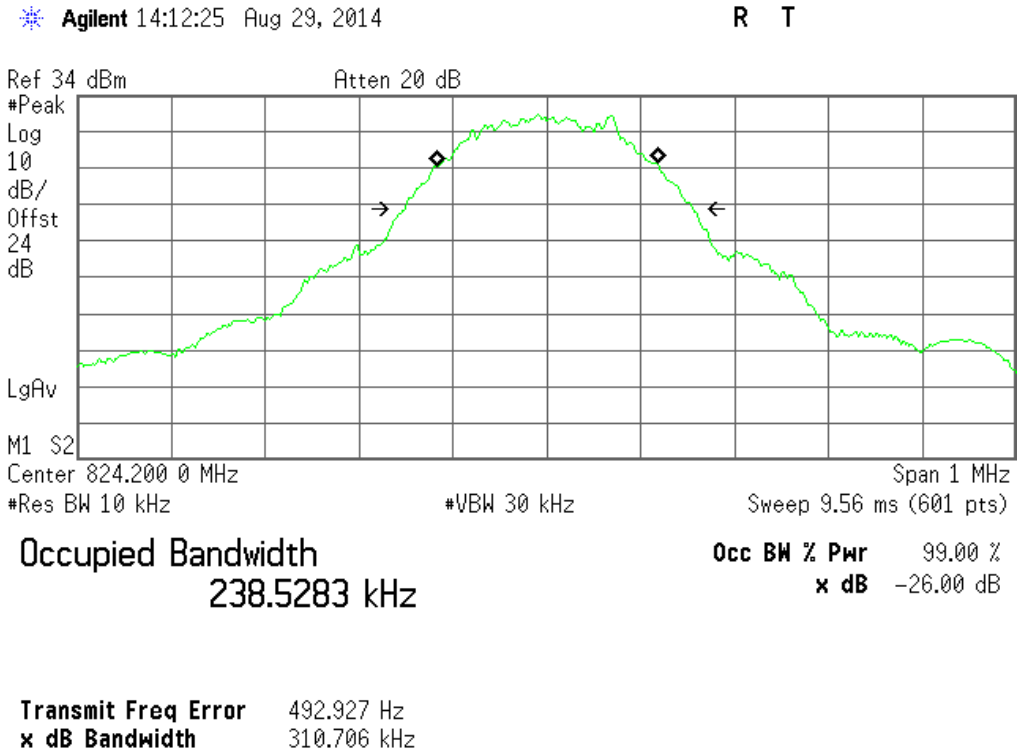
Date: 11.SEP.2014 17:17:15

APPENDIX II

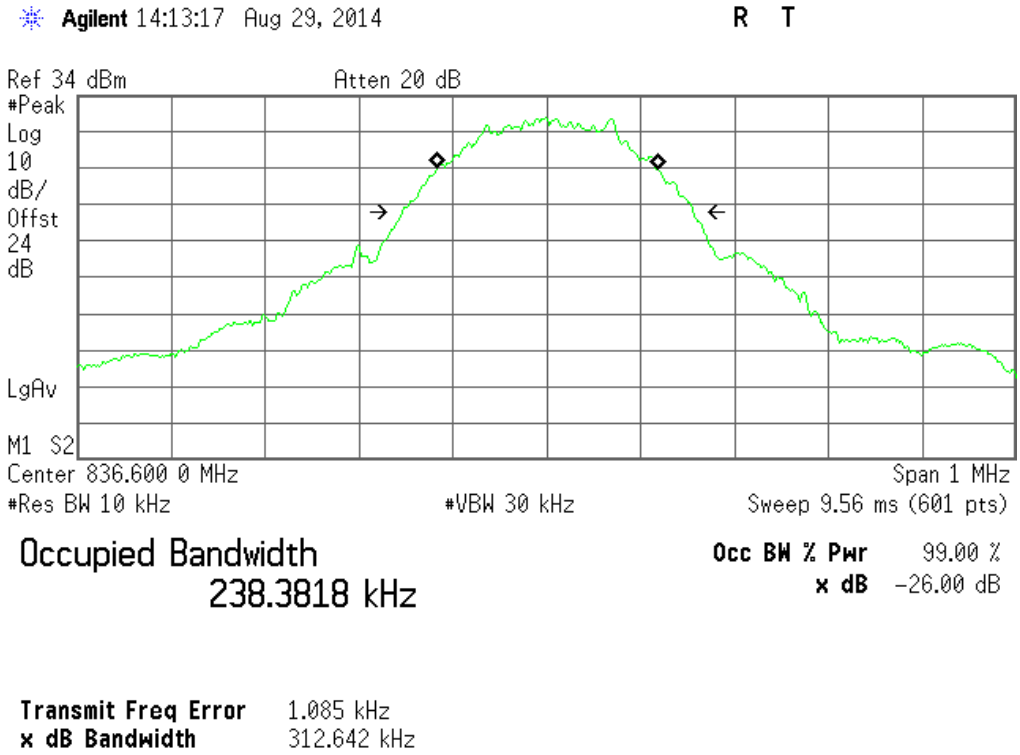
TEST PLOTS FOR OCCUPIED BANDWIDTH (99%)

EMISSION BANDWIDTH (-26dBC)

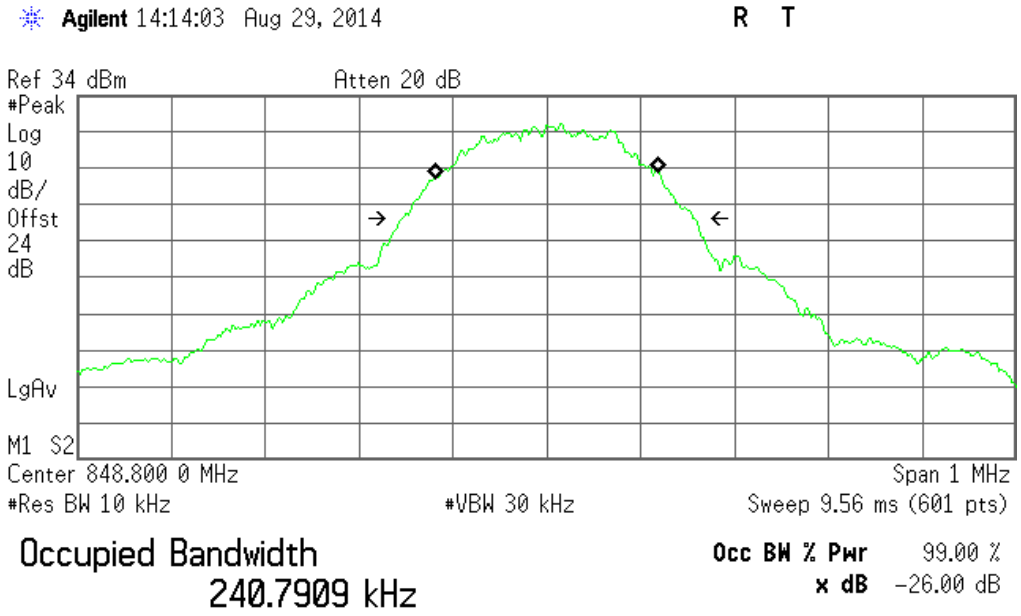
Occupied Bandwidth (99%) GSM 850 BAND CH 128



Occupied Bandwidth (99%) GSM 850 BAND CH 190

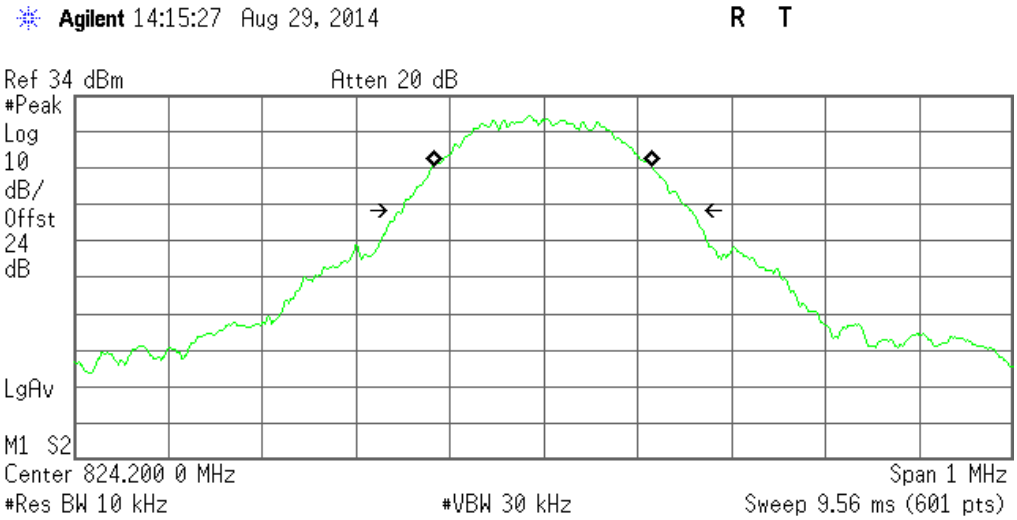


Occupied Bandwidth (99%) GSM 850 BAND CH 251



Transmit Freq Error -1.145 Hz
x dB Bandwidth 316.982 kHz

Occupied Bandwidth (99%) GRPS 850 BAND CH 128

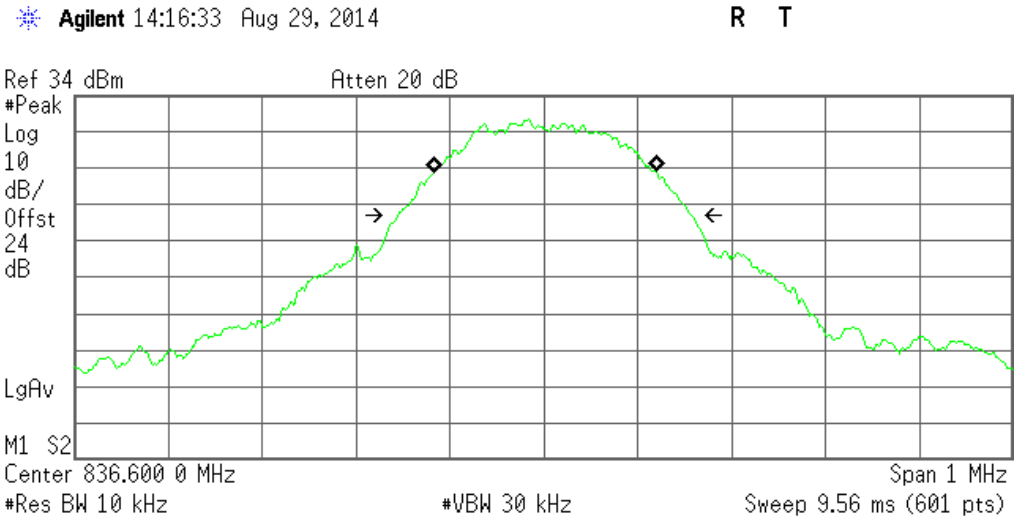


Occupied Bandwidth
235.3027 kHz

Occ BW % Pwr 99.00 %
x dB -26.00 dB

Transmit Freq Error -556.143 Hz
x dB Bandwidth 308.279 kHz

Occupied Bandwidth (99%) GRPS 850 BAND CH 190

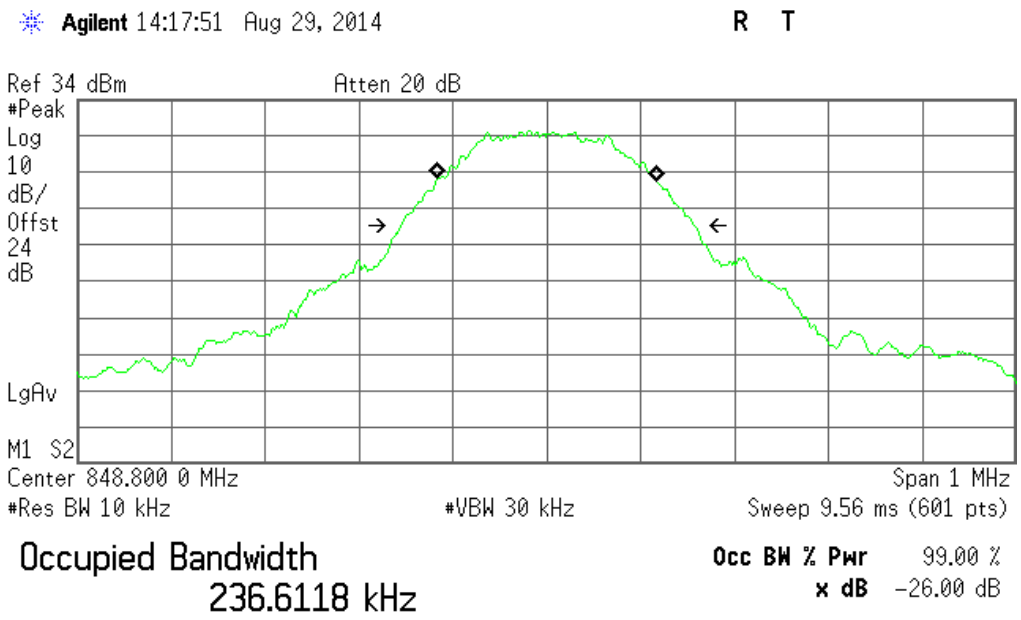


Occupied Bandwidth
239.1105 kHz

Occ BW % Pwr 99.00 %
x dB -26.00 dB

Transmit Freq Error 1.245 kHz
x dB Bandwidth 313.050 kHz

Occupied Bandwidth (99%) GRPS 850 BAND CH 251

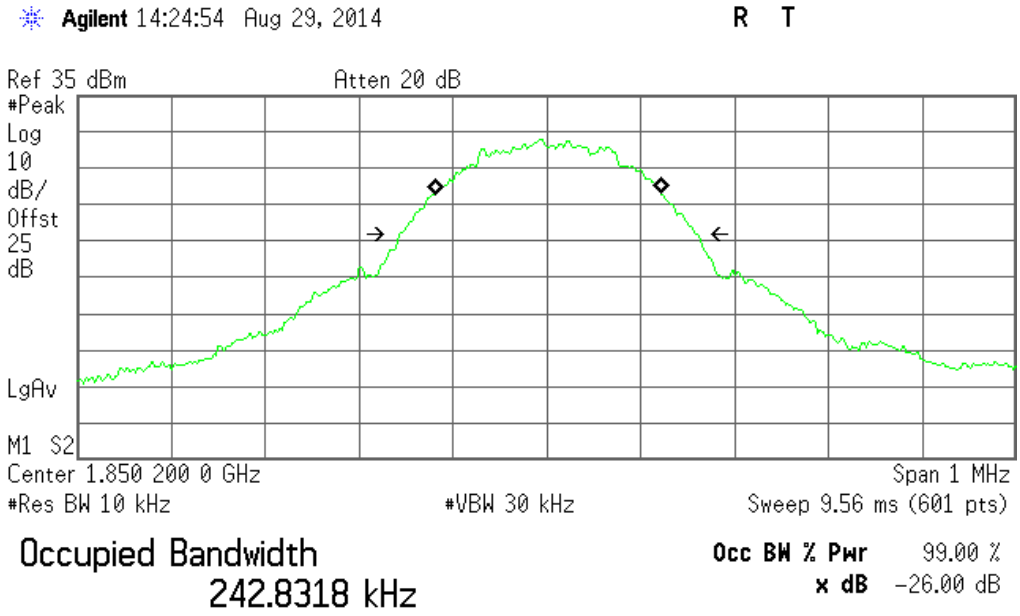


Occupied Bandwidth
236.6118 kHz

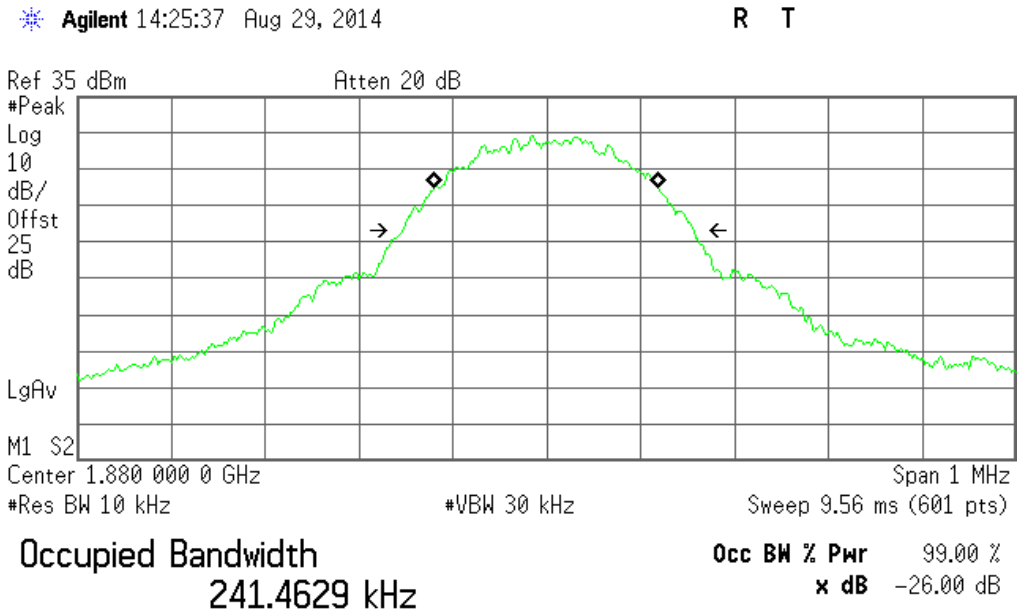
Occ BW % Pwr 99.00 %
x dB -26.00 dB

Transmit Freq Error 598.458 Hz
x dB Bandwidth 315.093 kHz

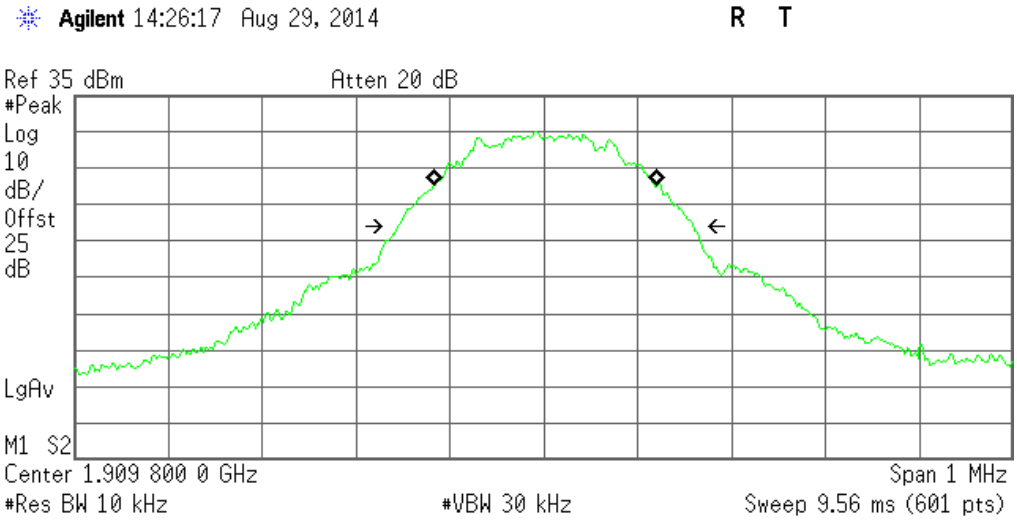
Occupied Bandwidth (99%) PCS 1900 BAND CH 512



Occupied Bandwidth (99%) PCS 1900 BAND CH 661



Occupied Bandwidth (99%) PCS 1900 BAND CH 810

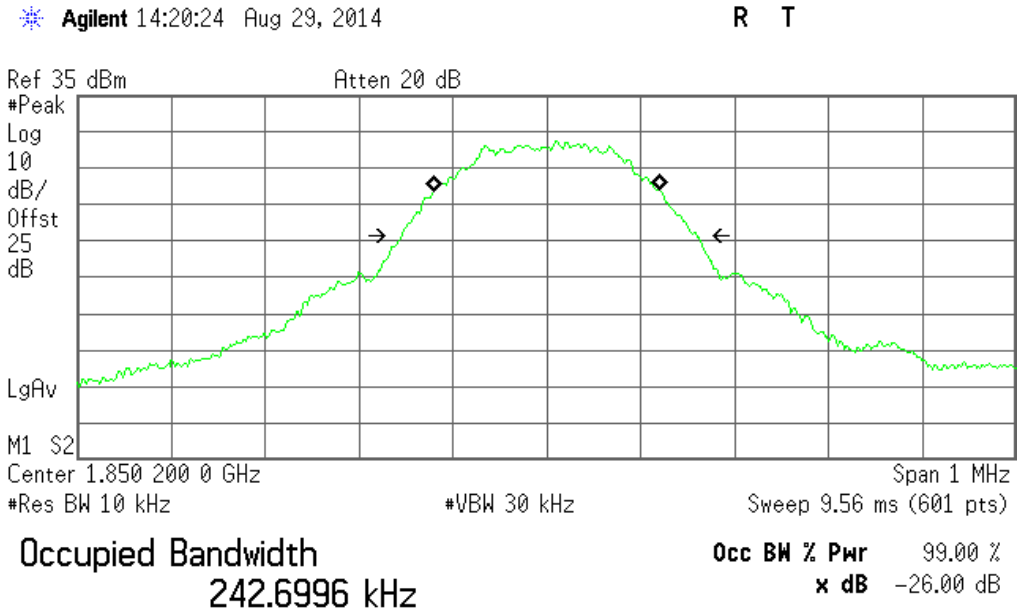


Occupied Bandwidth
241.2134 kHz

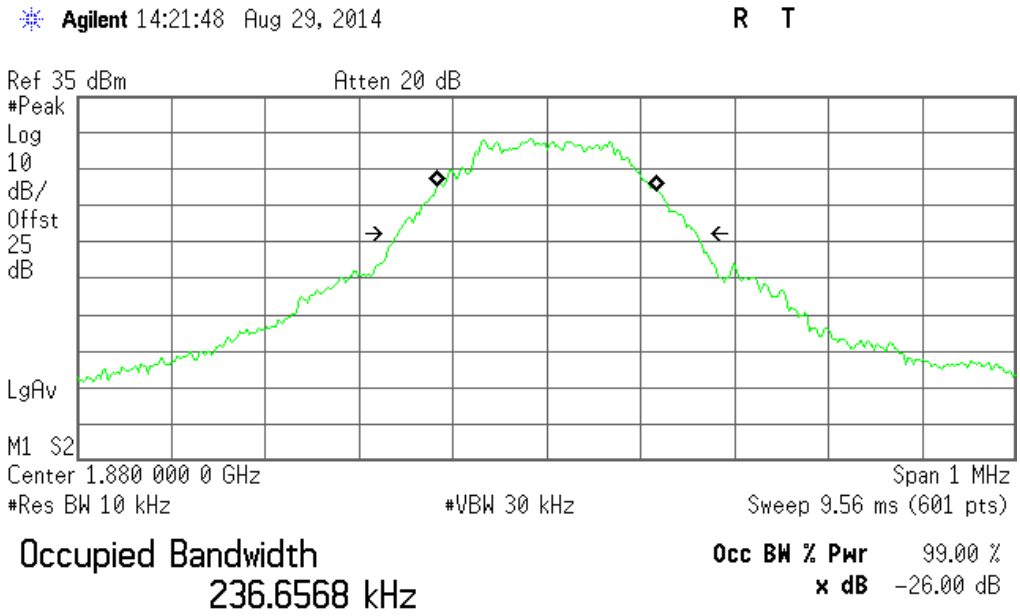
Occ BW % Pwr 99.00 %
x dB -26.00 dB

Transmit Freq Error 1.796 kHz
x dB Bandwidth 318.068 kHz

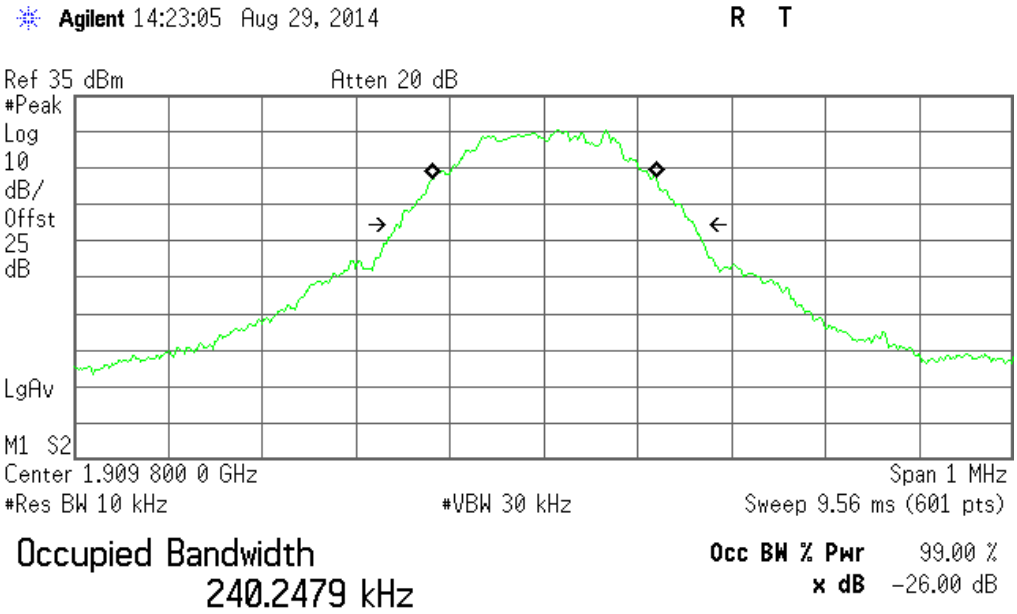
Occupied Bandwidth (99%) GPRS 1900 BAND CH 512



Occupied Bandwidth (99%) GPRS 1900 BAND CH 661



Occupied Bandwidth (99%) GPRS 1900 BAND CH 810



Occupied Bandwidth
240.2479 kHz

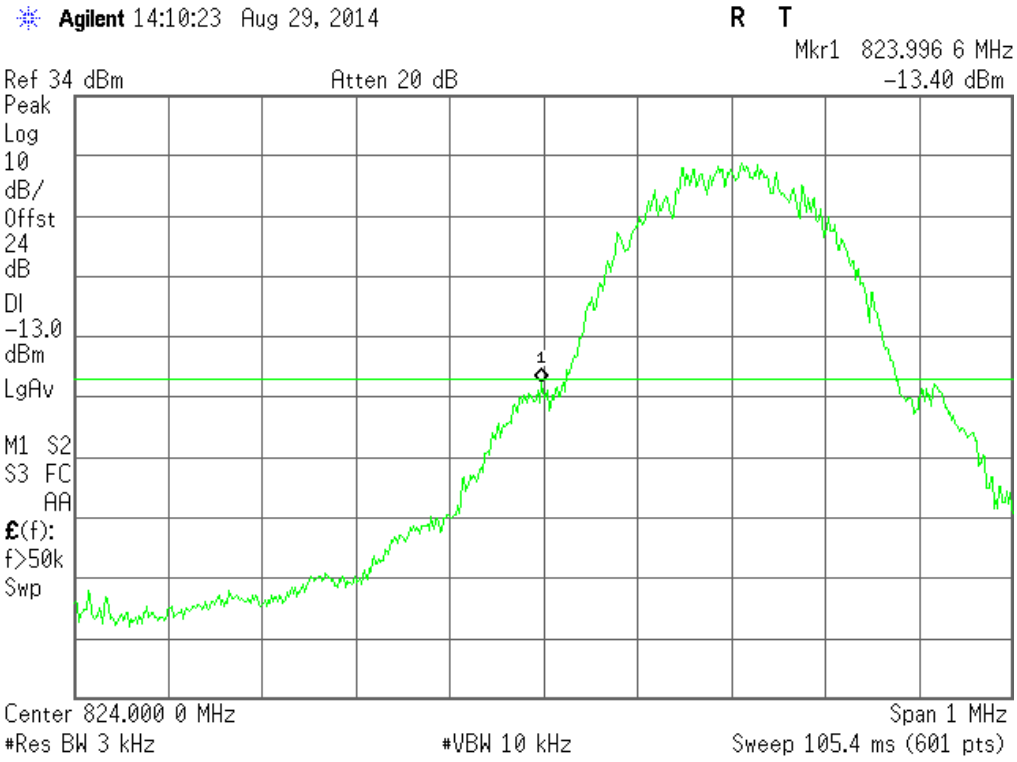
Occ BW % Pwr 99.00 %
x dB -26.00 dB

Transmit Freq Error 897.340 Hz
x dB Bandwidth 315.252 kHz

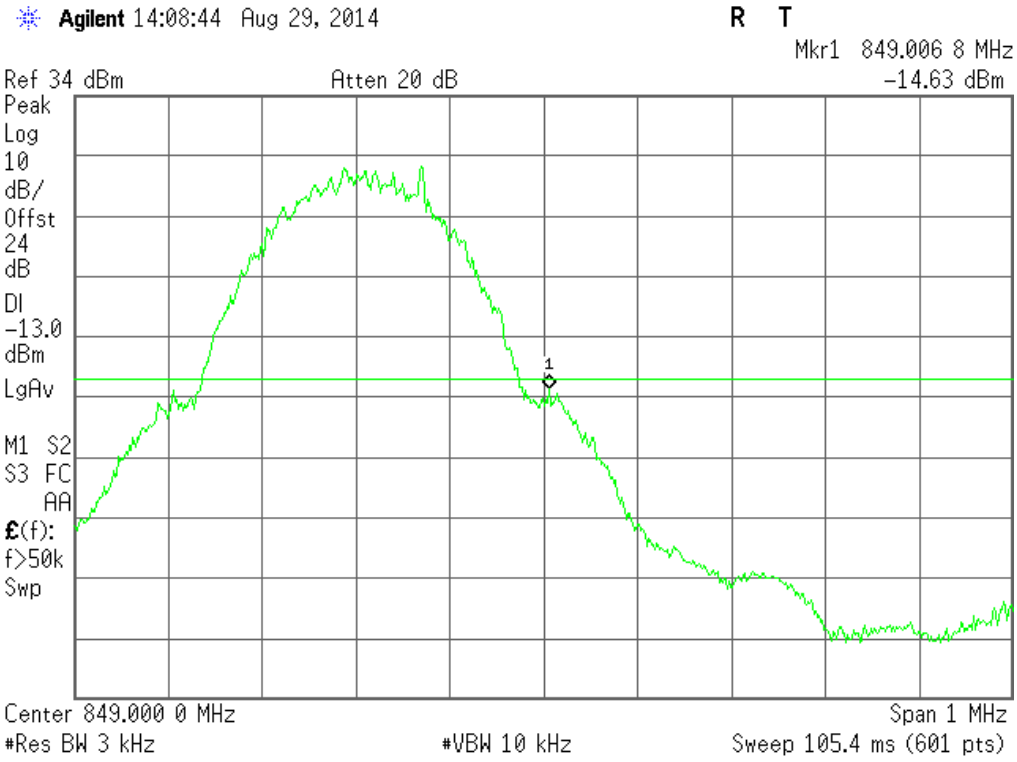
APPENDIX III

TEST PLOTS FOR BAND EDGES

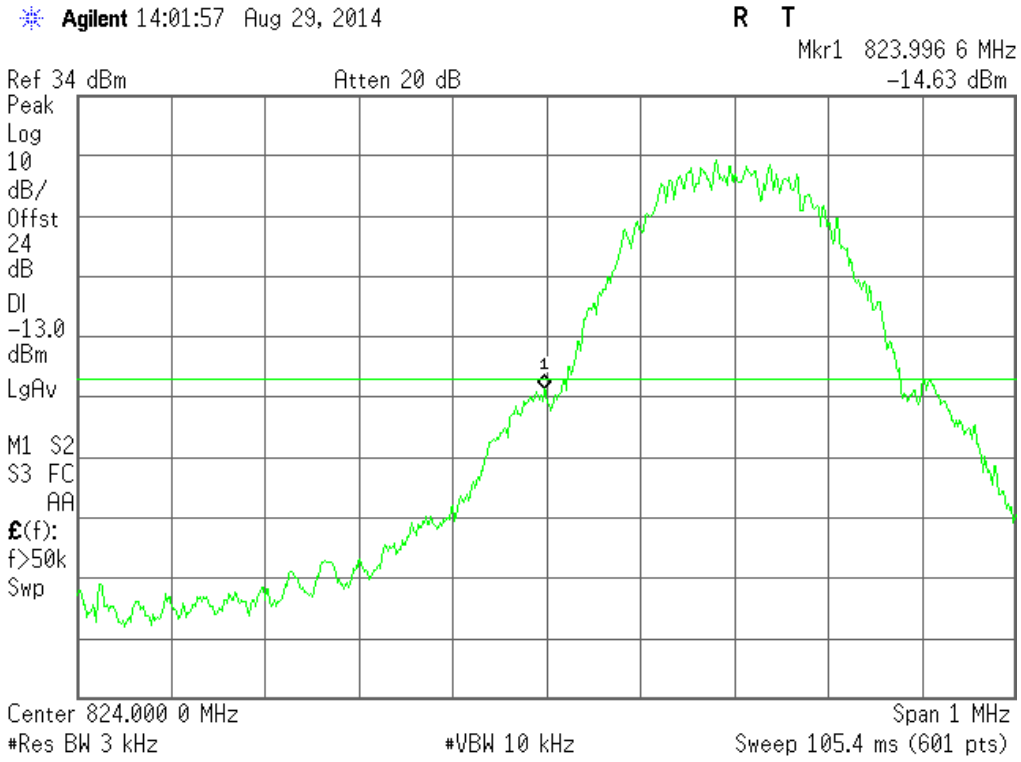
Low Band Edge GSM 850 BAND CH 128



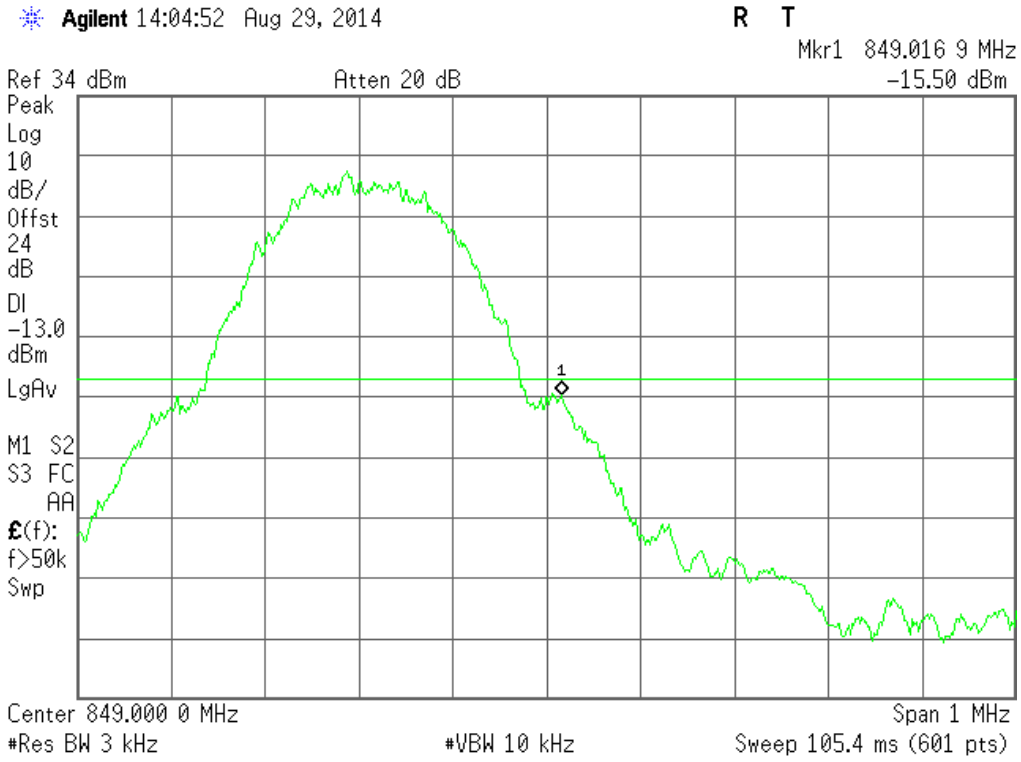
High Band Edge GSM 850 BAND CH 251



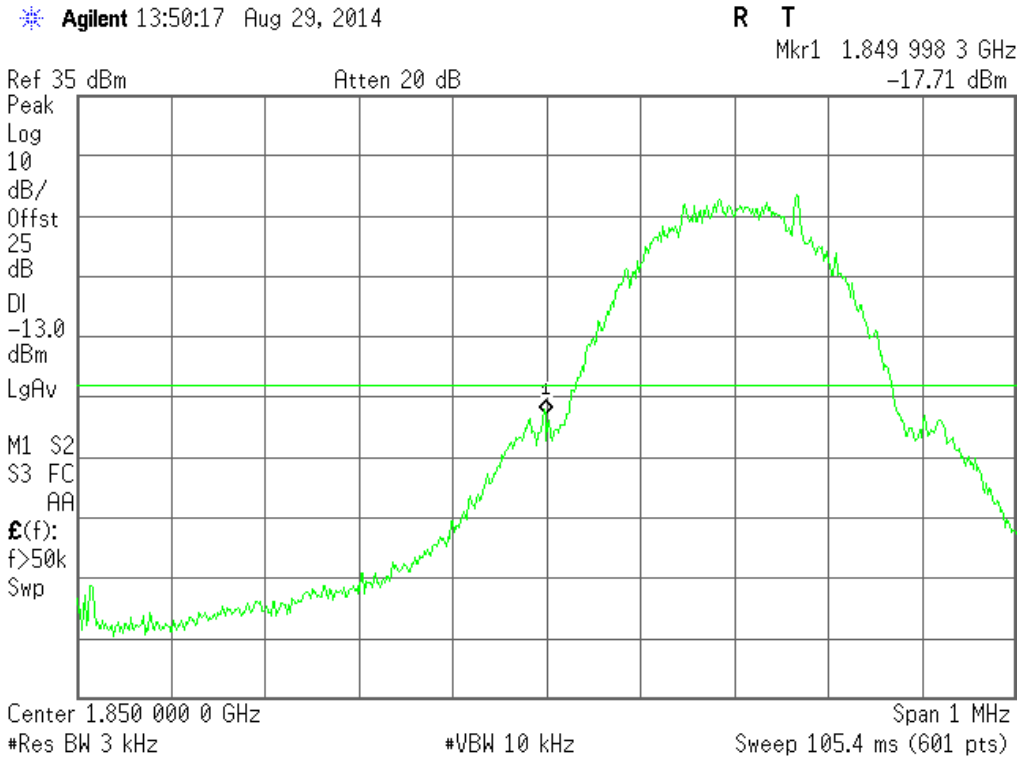
Low Band Edge GPRS 850 BAND CH 128



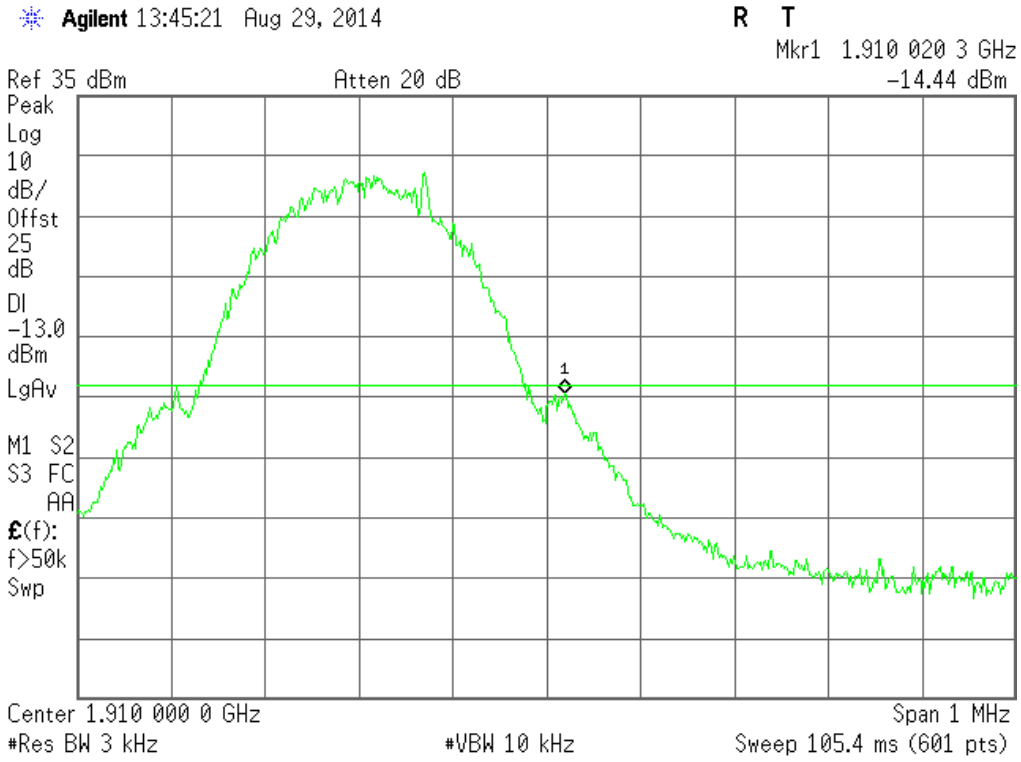
High Band Edge GPRS 850 BAND CH 251



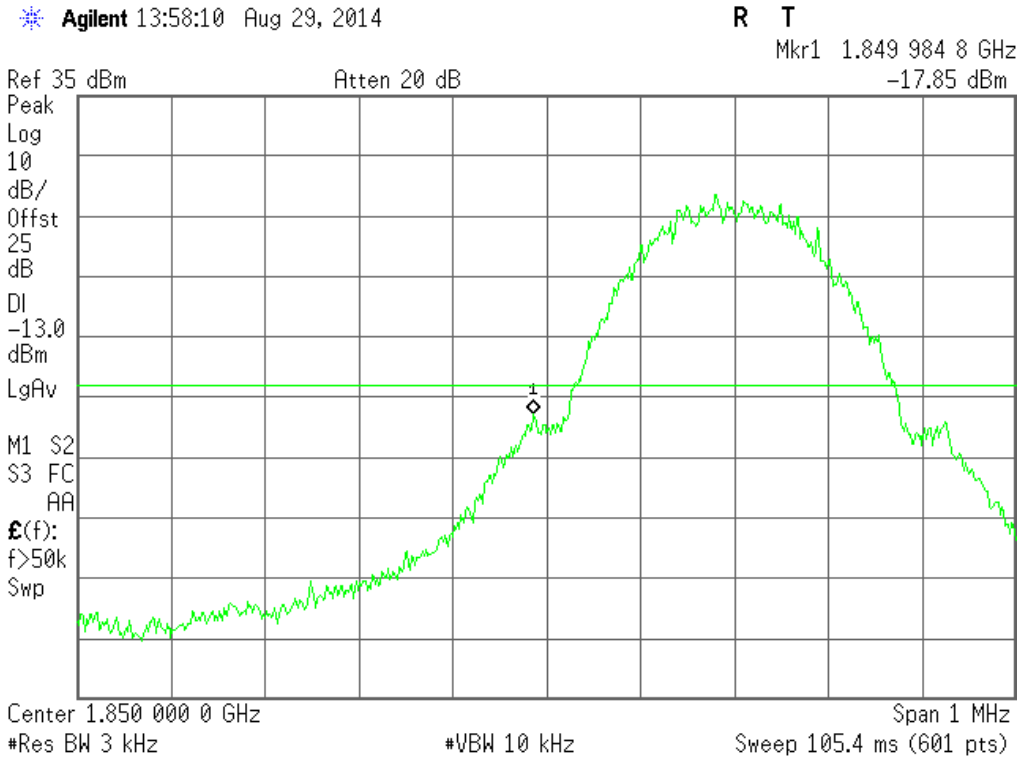
Low Band Edge PCS 1900 BAND CH 512



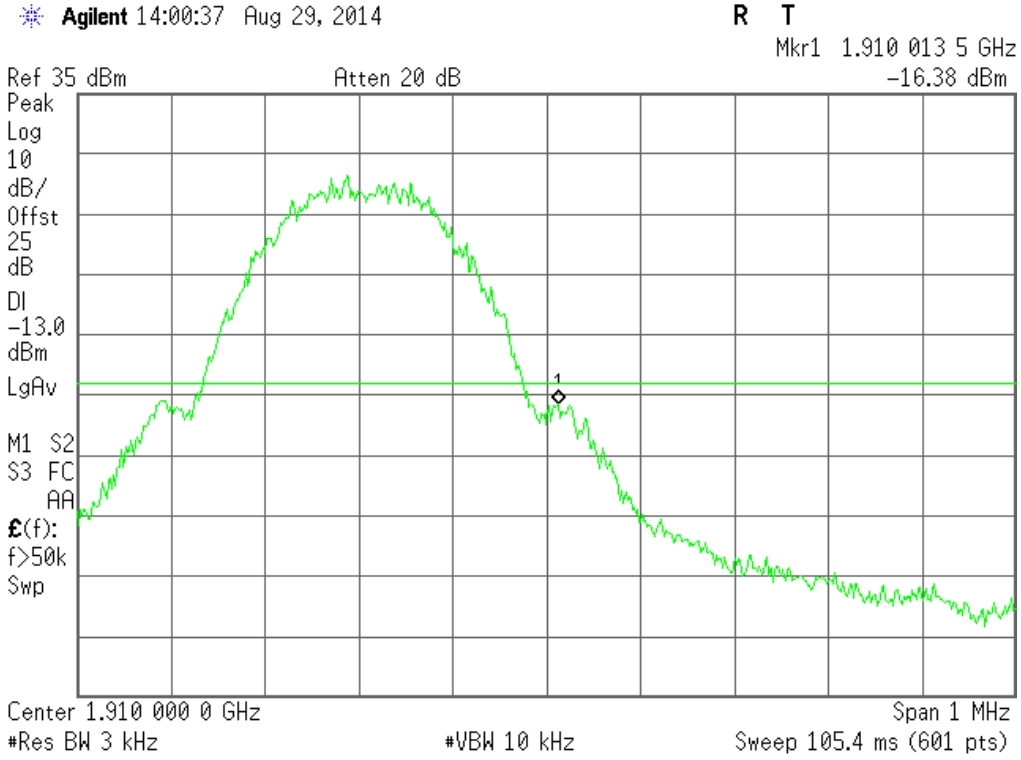
High Band Edge PCS 1900 BAND CH 810



Low Band Edge GPRS 1900 BAND CH 512



High Band Edge GPRS 1900 BAND CH 810

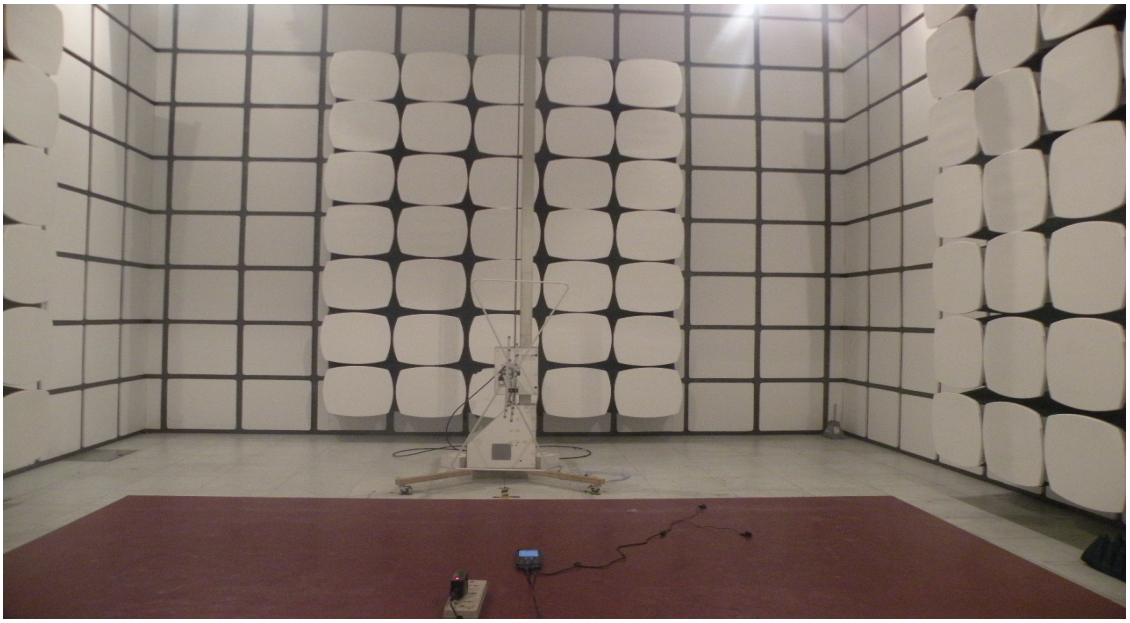


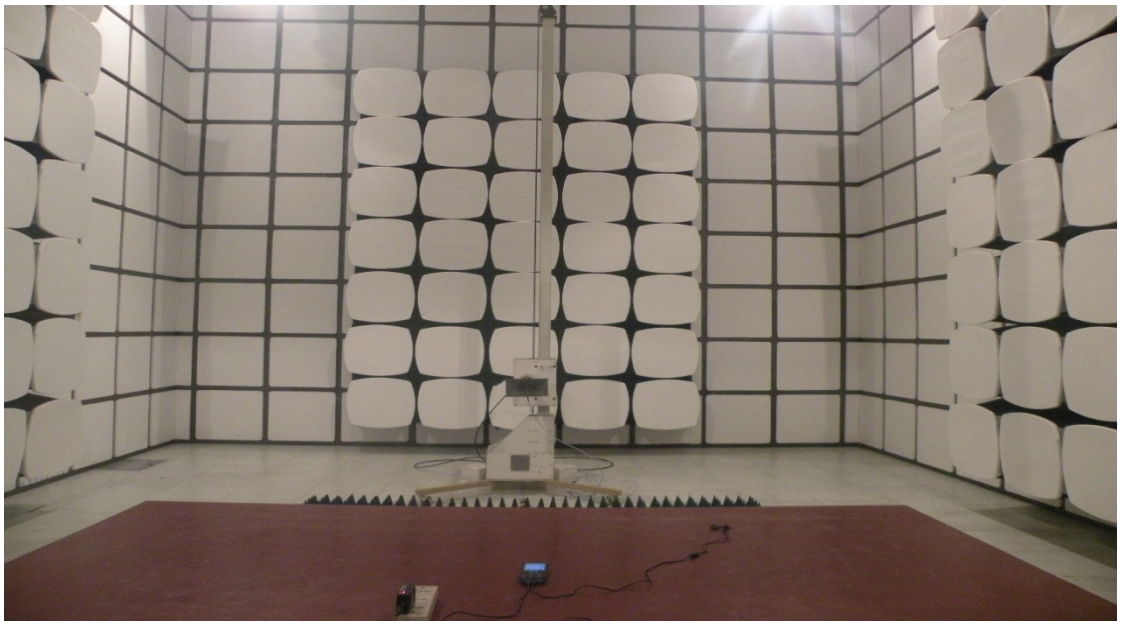
APPENDIX IV

PHOTOGRAPHS OF TEST SETUP

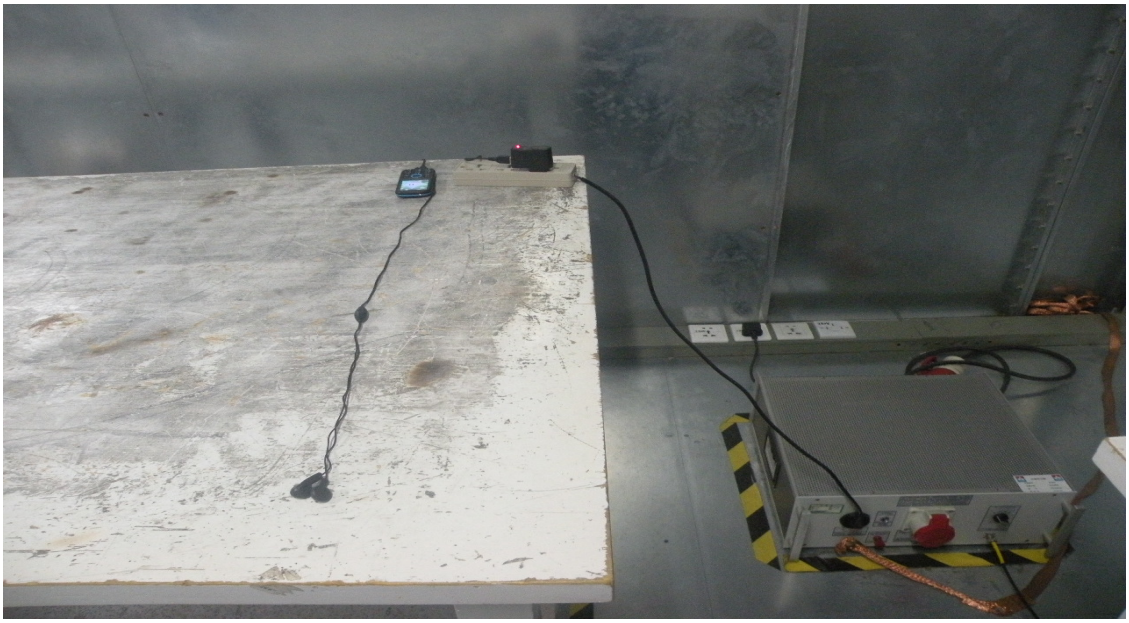
RADIATED SPURIOUS EMISSION

Radiated Measurement Photos





Conducted Measurement Photos



1.

----END OF REPORT----