TCT 通测检测 TESTING CENTRE TECHNOLOGY

TEST REPORT

FCC ID: 2AEHZCOOL2G

Product: Smart Phone

Model No.: COOL

Trade Mark: FTC

Report No.: TCT150331E019

Issued Date: Apr. 10, 2015

Issued for:

FENIX TRADING COMPANY S.A.

1410 Spain Av., La Torre Building 2nd Floor. Asuncion, Paraguay.

Issued By:

Shenzhen Tongce Testing Lab.

1F, Leinuo Watch Building, Fuyong Town, Baoan Dist, Shenzhen, China

TEL: +86-755-27673339

FAX: +86-755-27673332

Note: *This report shall not be reproduced except in full, without the written approval of Shenzhen Tongce Testing Lab. This document may be altered or revised by Shenzhen Tongce Testing Lab. personnel only, and shall be noted in the revision section of the document. The test results in the report only apply to the tested sample.*

TABLE OF CONTENTS

1. Test Certification 3
2. Test Result Summary 4
3. EUT Description 5
4. Genera Information 6
4.1. Test environment and mode 6
4.2. Test Mode 7
4.3. Description of Support Units 8
4.4. Configuration of Tested System 9
4.5. Measurement Results Explanation Example 9
5. Facilities and Accreditations 10
5.1. Facilities 10
5.2. Location 10
5.3. Measurement Uncertainty 10
6. Test Results and Measurement Data 11
6.1. Conducted Output Power Measurement 11
6.2. Peak to Average Ratio 13
6.3. 99% Occupied Bandwidth and 26dB Bandwidth Measurement 17
6.4. Band Edge and Conducted Spurious Emission Measurement 25
6.5. Test Specification 25
6.6. Effective Radiated Power and Effective Isotropic Radiated Power Measurement 42
6.7. Field Strength of Spurious Radiation Measurement 47
6.8. Frequency Stability Measurement 53

Hotline: 400-6611-140 Tel: 86-755-27673339 Fax: 86-755-27673332 http://www.tct-lab.com

1. Test Certification

Product:	Smart Phone
Model No.:	COOL
Applicant:	FENIX TRADING COMPANY S.A.
Address:	1410 Spain Av., La Torre Building 2nd Floor. Asuncion, Paraguay.
Manufacturer:	Shenzhen MOBOT Tech.Co., Ltd.
Address:	402#, Building 211, Terra Trade&Industry Park, Futian District Shenzhen, China
Date of Test:	Apr. 01 – Apr. 07, 2015
Applicable Standards:	FCC CFR Title 47 Part 2 FCC CFR Title 47 Part22 Subpart H FCC CFR Title 47 Part24 Subpart E

The above equipment has been tested by Shenzhen Tongce Testing Lab. and found compliance with the requirements set forth in the technical standards mentioned above. The results of testing in this report apply only to the product/system, which was tested. Other similar equipment will not necessarily produce the same results due to production tolerance and measurement uncertainties.

Tested By:	***SKY***	***Date:***	***Apr. 07, 2014***
Reviewed By:	***Joe Zhou***	***Date:***	***Apr. 10, 2014***
Approved By:	***Tomsin***	***Date:***	***Apr. 10, 2014***

Hotline: 400-6611-140 Tel: 86-755-27673339 Fax: 86-755-27673332 http://www.tct-lab.com

2. Test Result Summary

Requirement	CFR 47 Section	Result
Conducted Output Power	§2.1046	PASS
Peak-to-Average Ratio	§24.232(d)	PASS
Effective Radiated Power	§22.913(a)(2)	PASS
Equivalent Isotropic Radiated Power	§24.232(c)	PASS
Occupied Bandwidth	§2.1049 §22.917(b) §24.238(b)	PASS
Band Edge	§2.1051 §22.917(a) §24.238(a)	PASS
Conducted Spurious Emission	§2.1051 §22.917(a) §24.238(a)	PASS
Field Strength of Spurious Radiation	§2.1053 §22.917(a) §24.238(a)	PASS
Frequency Stability for Temperature & Voltage	§2.1055 §22.355 §24.235	PASS

Note:

1. PASS: Test item meets the requirement.

2. Fail: Test item does not meet the requirement.

3. N/A: Test case does not apply to the test object.

4. The test result judgment is decided by the limit of test standard.

Hotline: 400-6611-140 Tel: 86-755-27673339 Fax: 86-755-27673332 http://www.tct-lab.com

3. EUT Description

Product Name:	Smart Phone
Model :	COOL
Additional Model:	N/A
Trade Mark:	FTC
Tx Frequency:	GSM850: 824.2 MHz ~ 848.8 MHz GSM1900: 1850.2 MHz ~ 1909.8MHz
Rx Frequency:	GSM850: 869.2 MHz ~ 893.8 MHz GSM1900: 1930.2 MHz ~ 1989.8 MHz
Maximum Output Power to Antenna:	GSM850 : 32.82 dBm GSM1900 : 29.77 dBm
99% Occupied Bandwidth:	GSM850: 0.246MHz GSM1900: 0.248MHz
Type of Modulation:	GSM: GMSK GPRS: GMSK
Antenna Type:	PIFA Antenna
Antenna Gain:	GSM 850: -0.8dbi GSM 1900: 0dbi
Power Supply:	DC 3.7V from Rechargeable Li-ion Battery

Hotline: 400-6611-140 Tel: 86-755-27673339 Fax: 86-755-27673332 http://www.tct-lab.com

4. Genera Information

4.1. Test environment and mode

Operating Environment:	
Temperature:	24.0 °C
Humidity:	54 % RH
Atmospheric Pressure:	1010 mbar
Test Mode:	
Operation mode:	Keep the EUT in continuous transmitting with modulation

The sample was placed 0.8m above the ground plane of 3m chamber. Measurements in both horizontal and vertical polarities were performed. During the test, each emission was maximized by: having the EUT continuously working, investigated all operating modes, rotated about all 3 axis (X, Y & Z) and considered typical configuration to obtain worst position, manipulating interconnecting cables, rotating the turntable, varying antenna height from 1m to 4m in both horizontal and vertical polarizations. The emissions worst-case are shown in Test Results of the following pages.

Description Operation Frequency

GSM 850		PCS1900	
Channel:	Frequency (MHz)	Channel:	Frequency (MHz)
128	824.20	512	1850.20
129	824.40	513	1850.40
….	….	….	….
189	836.40	660	1879.80
190	836.60	661	1880.00
191	836.80	662	1880.20
…	…	…	…
250	848.60	809	1909.60
251	848.80	810	1909.80

Hotline: 400-6611-140 Tel: 86-755-27673339 Fax: 86-755-27673332 http://www.tct-lab.com

4.2. Test Mode

Antenna port conducted and radiated test items were performed according to KDB 971168 D01 Power Meas. License Digital Systems v02r02 with maximum output power.
Radiated measurements were performed with rotating EUT in different three orthogonal test planes to find the maximum emission.
Radiated emissions were investigated as following frequency range:

1. 30 MHz to 9000 MHz for GSM850.
2. 30 MHz to 19000 MHz for PCS1900.

All modes and data rates and positions were investigated.
Test modes are chosen to be reported as the worst case configuration below:

Test Mode		
Band	**Radiated TCs**	**Conducted TCs**
GSM 850	GSM Link GPRS class 8 Link	GSM Link GPRS class 8 Link
PCS 1900	GSM Link GPRS class 8 Link	GSM Link GPRS class 8 Link

Note: *The maximum power levels are chosen to test as the worst case configuration as follows:*
GSM multi-slot class 8 mode for GMSK modulation,
GPRS multi-slot class 8 mode for GMSK modulation, only these modes were used for all tests. In addition to above worst-case test, below investigating on all data rates, and all modes are compliance with each FCC test case which has specific test limits. For spurious emissions at antenna port, the EUT was investigated the band edges on low and high channels, and the unwanted spurious emissions on middle channel for all modes, the results are pass, then only the worst-results were reported in the test report. The Radiated Spurious emissions for GSM/GPRS modes were investigated on the middle channel and the passed results were not worst than those data tested from the highest power channels.

Hotline: 400-6611-140 Tel: 86-755-27673339 Fax: 86-755-27673332 http://www.tct-lab.com

Conducted Power Measurement Results:

Conducted Power (*Unit: dBm)						
Band	**GSM850**			**PCS 1900**		
Channel	128	189	251	512	661	810
Frequency(MHz)	824.2	836.4	848.8	1850.2	1880.0	1909.8
GSM	32.60	32.70	**32.82**	28.45	29.01	**29.77**
GPRS class8	32.59	32.68	32.80	28.40	28.99	29.76
GPRS class10	31.63	31.70	31.82	27.65	28.26	29.00
GPRS class11	29.91	29.92	30.04	25.91	26.53	27.33
GPRS class12	29.10	29.02	29.15	25.13	25.79	26.56

4.3. Description of Support Units

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

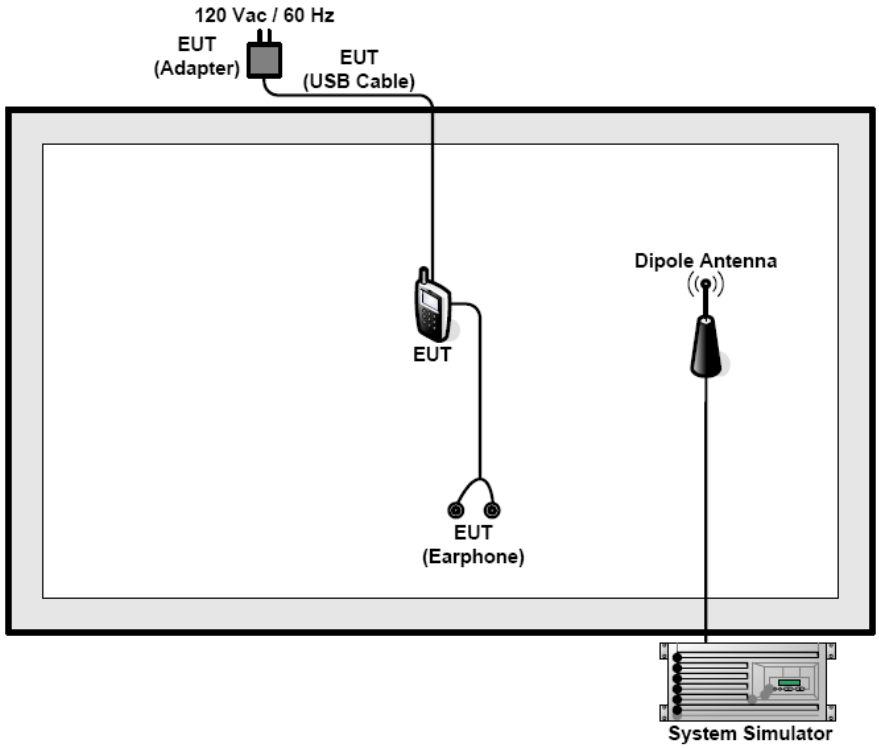
Equipment	Model No.	Serial No.	FCC ID	Trade Name

Note:

1. All the equipment/cables were placed in the worst-case configuration to maximize the emission during the test.

2. Grounding was established in accordance with the manufacturer's requirements and conditions for the intended use.

4.4. Configuration of Tested System



4.5. Measurement Results Explanation Example

For all conducted test items:

The offset level is set in the spectrum analyzer to compensate the RF cable loss and attenuator factor between RF conducted output port and spectrum analyzer. With the offset compensation, the spectrum analyzer reading level will be exactly the RF output level. The spectrum analyzer offset is derived from RF cable loss and attenuator factor.

Offset = RF cable loss + attenuator factor.

Hotline: 400-6611-140 Tel: 86-755-27673339 Fax: 86-755-27673332 http://www.tct-lab.com

5. Facilities and Accreditations

5.1. Facilities

The test facility is recognized, certified, or accredited by the following organizations:

- FCC - Registration No.: 572331

  Shenzhen Tongce Testing Lab

  The 3m Semi-anechoic chamber has been registered and fully described in a report with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files.

- IC - Registration No.: 10668A-1

  The 3m Semi-anechoic chamber of Shenzhen TCT Testing Technology Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing

- CNAS - Registration No.: CNAS L6165

  Shenzhen TCT Testing Technology Co., Ltd. is accredited to ISO/IEC 17025:2005 General Requirements for the Competence of Testing and Calibration laboratories for the competence of testing. The Registration No. is CNAS L6165.

5.2. Location

Shenzhen Tongce Testing Lab

Address: 1F, Leinuo Watch Building, Fuyong Town, Baoan Dist, Shenzhen, China

Tel: 86-755-36638142

5.3. Measurement Uncertainty

The reported uncertainty of measurement y ± U, where expended uncertainty U is based on a standard uncertainty multiplied by a coverage factor of k=2, providing a level of confidence of approximately 95 %.

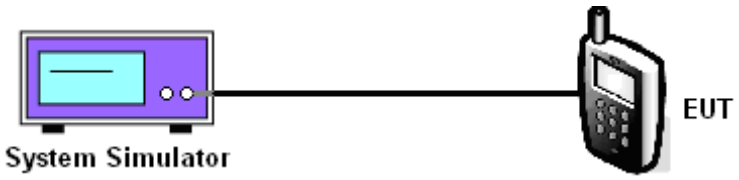
No.	Item	MU
1	Conducted Emission	±2.56dB
2	RF power, conducted	±0.12dB
3	Spurious emissions, conducted	±0.11dB
4	All emissions, radiated(<1G)	±3.92dB
5	All emissions, radiated(>1G)	±4.28dB
6	Temperature	±0.1°C
7	Humidity	±1.0%

Hotline: 400-6611-140 Tel: 86-755-27673339 Fax: 86-755-27673332 http://www.tct-lab.com

6. Test Results and Measurement Data

6.1. Conducted Output Power Measurement

6.1.1. Test Specification

Test Requirement:	FCC part 22.913(a) and FCC part 24.232(b)
Test Method:	FCC part 2.1046
Limits:	GSM 850: 7W PCS 1900: 2W
Test Setup:	
Test Procedure:	1. The transmitter output port was connected to the system simulator. 2. Set EUT at maximum power through system simulator. 3. Select lowest, middle, and highest channels for each band and different modulation. 4. Measure the maximum burst average power for GSM and maximum average power for other modulation signal.
Test Result:	PASS

6.1.2. Test Instruments

Equipment	Manufacturer	Model	Serial Number	Calibration Due
System simulator	R&S	CMU200	111382	Sep. 16, 2015

Note: *The calibration interval of the above test instruments is 12 months and the calibrations are traceable to international system unit (SI).*

6.1.3. Test data

Mode	GSM850 (GSM)			GSM850 (GPRS class 8)		
Channel	128	189	251	128	189	251
Frequency (MHz)	824.2	836.6	848.8	824.2	836.6	848.8
Conducted Power (dBm)	32.60	32.70	32.82	32.56	32.65	32.77

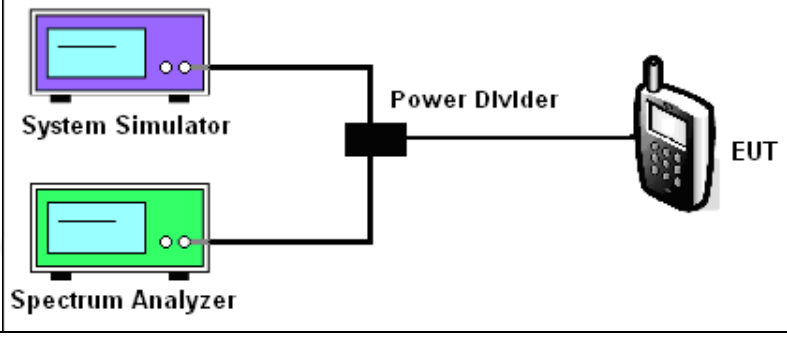
Mode	GSM 1900 (GSM)			GSM 1900 (GPRS class 8)		
Channel	512	661	810	512	661	810
Frequency (MHz)	1850.2	1880	1909.8	1850.2	1880	1909.8
Conducted Power (dBm)	28.45	29.01	29.77	28.39	28.97	29.73

Note: *Maximum Burst Average Power for GSM.*

Hotline: 400-6611-140 Tel: 86-755-27673339 Fax: 86-755-27673332 http://www.tct-lab.com

6.2. Peak to Average Ratio

6.2.1. Test Specification

Test Requirement:	FCC part 24.232(d)
Test Method:	FCC part 24.232(d)
Limit:	The peak-to-average ratio (PAR) of the transmission may not exceed 13 dB.
Test Setup:	
Test Procedure:	1. The testing follows FCC KDB 971168 v02r02 Section 5.7.1. 2. The EUT was connected to spectrum analyzer and system simulator via a power divider. 3. Set EUT to transmit at maximum output power. 4. For GSM/EGPRS operating modes, signal gating is implemented on the spectrum analyzer by triggering from the system simulator. 5. Set the CCDF (Complementary Cumulative Distribution Function) option of the spectrum analyzer. Record the maximum PAPR level associated with a probability of 0.1%.
Test Result:	PASS

6.2.2. Test Instruments

Equipment	Manufacturer	Model	Serial Number	Calibration Due
System simulator	R&S	CMU200	111382	Sep. 16, 2015
Spectrum Analyzer	Agilent	N9020A	MY49100060	Oct. 21, 2015

Note: *The calibration interval of the above test instruments is 12 months and the calibrations are traceable to international system unit (SI).*

6.2.3. Test Data

Mode	GSM850 (GSM)			GSM850 (GPRS class 8)		
Channel	128	189	251	128	189	251
Frequency (MHz)	824.2	836.6	848.8	824.2	836.6	848.8
Peak-to-Average Ratio (dB)	9.72	8.97	9.39	9.39	8.89	9.44

Mode	GSM 1900 (GSM)			GSM 1900 (GPRS class 8)		
Channel	512	661	810	512	661	810
Frequency (MHz)	1850.2	1880	1909.8	1850.2	1880	1909.8
Peak-to-Average Ratio (dB)	9.96	9.24	9.45	9.89	9.25	9.24

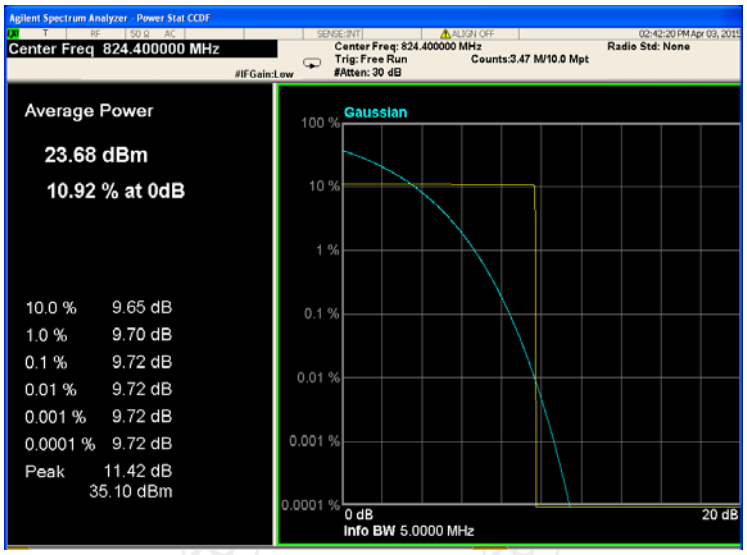
Note: *Maximum Burst Average Power for GSM.*

Test plots as follows:

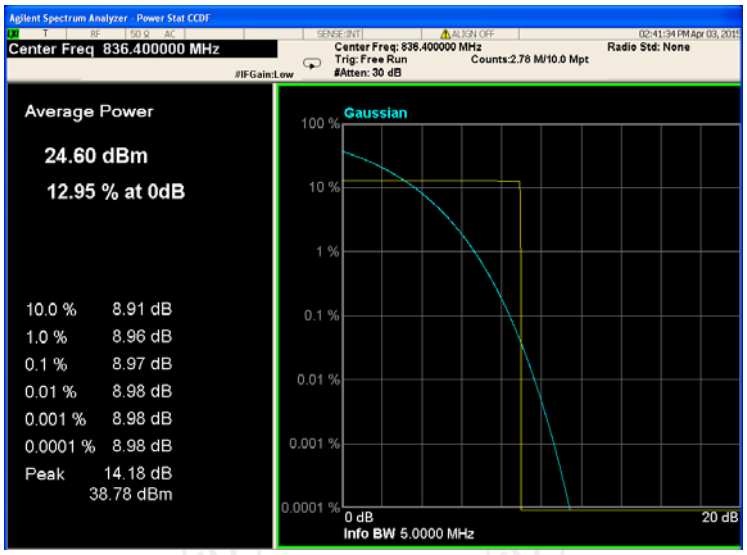
Hotline: 400-6611-140 Tel: 86-755-27673339 Fax: 86-755-27673332 http://www.tct-lab.com

GSM 850

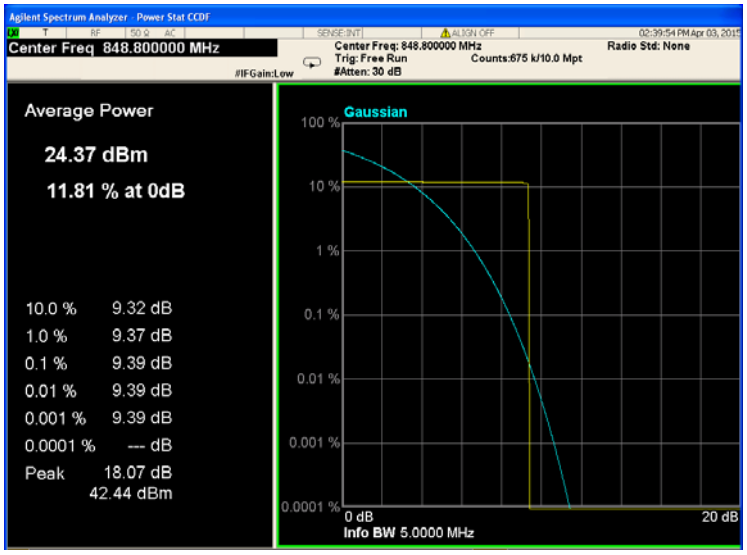
Peak-to-Average Ratio on Channel 128



Peak-to-Average Ratio on Channel 190

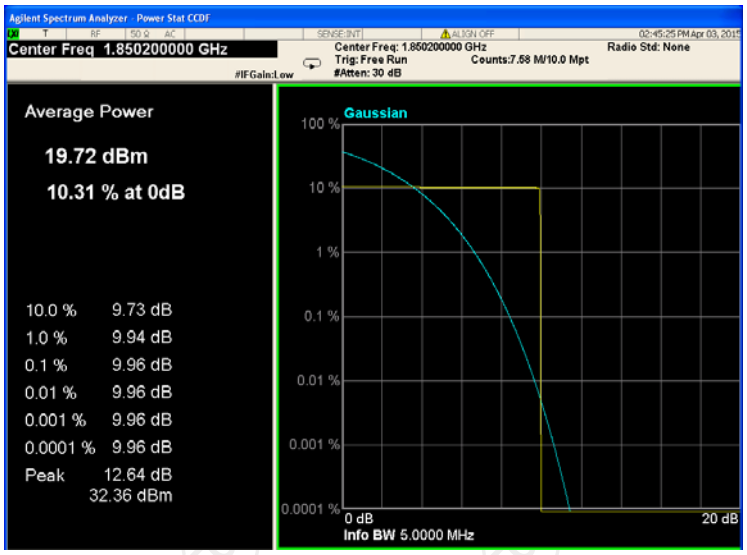


Peak-to-Average Ratio on Channel 251

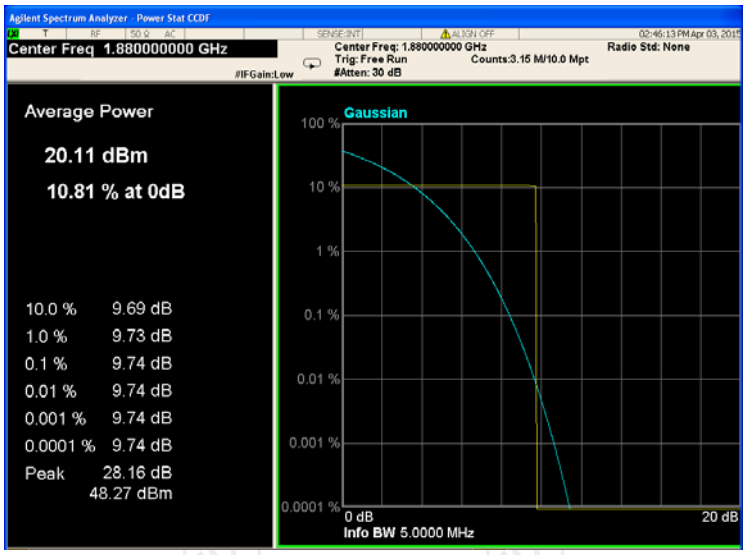


GSM 1900

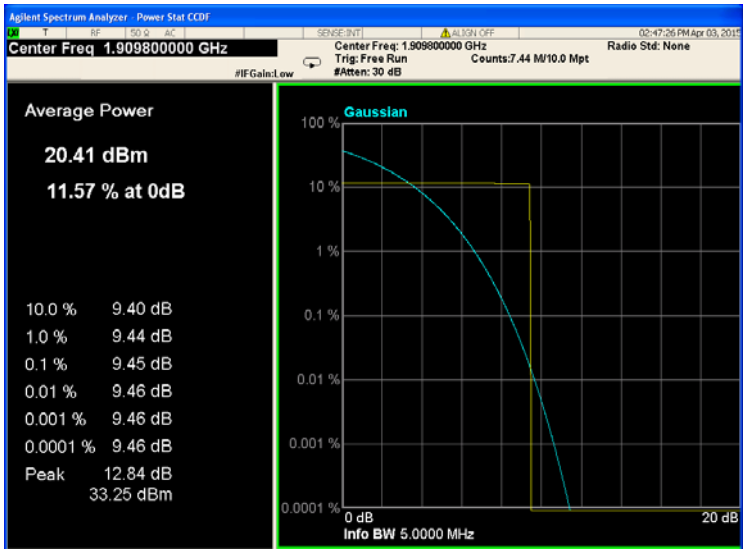
Peak-to-Average Ratio on Channel 512



Peak-to-Average Ratio on Channel 661

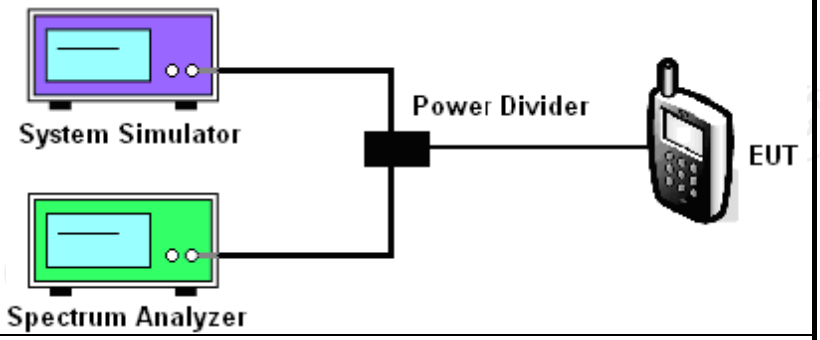


Peak-to-Average Ratio on Channel 810



6.3. 99% Occupied Bandwidth and 26dB Bandwidth Measurement

6.3.1. Test Specification

Test Requirement:	FCC part 22.913(a) and FCC part 24.232(b)
Test Method:	FCC part 2.1049
Limit:	N/A
Test Setup:	
Test Procedure:	1. The testing follows FCC KDB 971168 v02r02 Section 4.2. 2. The EUT was connected to the spectrum analyzer and system simulator via a power divider. 3. The RF output of the EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement. 4. The 99% occupied bandwidth were measured, set RBW= 1% of span, VBW= 3*RBW, sample detector, trace maximum hold. 5. The 26dB bandwidth were measured, set RBW= 1% of EBW, VBW= 3*RBW, peak detector, trace maximum hold.
Test Result:	PASS

6.3.2. Test Instruments

Equipment	Manufacturer	Model	Serial Number	Calibration Due
System simulator	R&S	CMU200	111382	Sep. 16, 2015
Spectrum Analyzer	Agilent	N9020A	MY49100060	Oct. 21, 2015

Note: *The calibration interval of the above test instruments is 12 months and the calibrations are traceable to international system unit (SI).*

6.3.3. Test data

Cellular Band						
Mode	**GSM850 (GSM)**			**GSM850 (GPRS class 8)**		
Channel	**128**	**189**	**251**	**128**	**189**	**251**
Frequency (MHz)	824.2	836.6	848.8	824.2	836.6	848.8
99% OBW (kHz)	245.24	245.79	244.24	245.11	243.60	245.58
26dB BW (kHz)	312.90	308.40	317.00	315.80	316.30	315.50

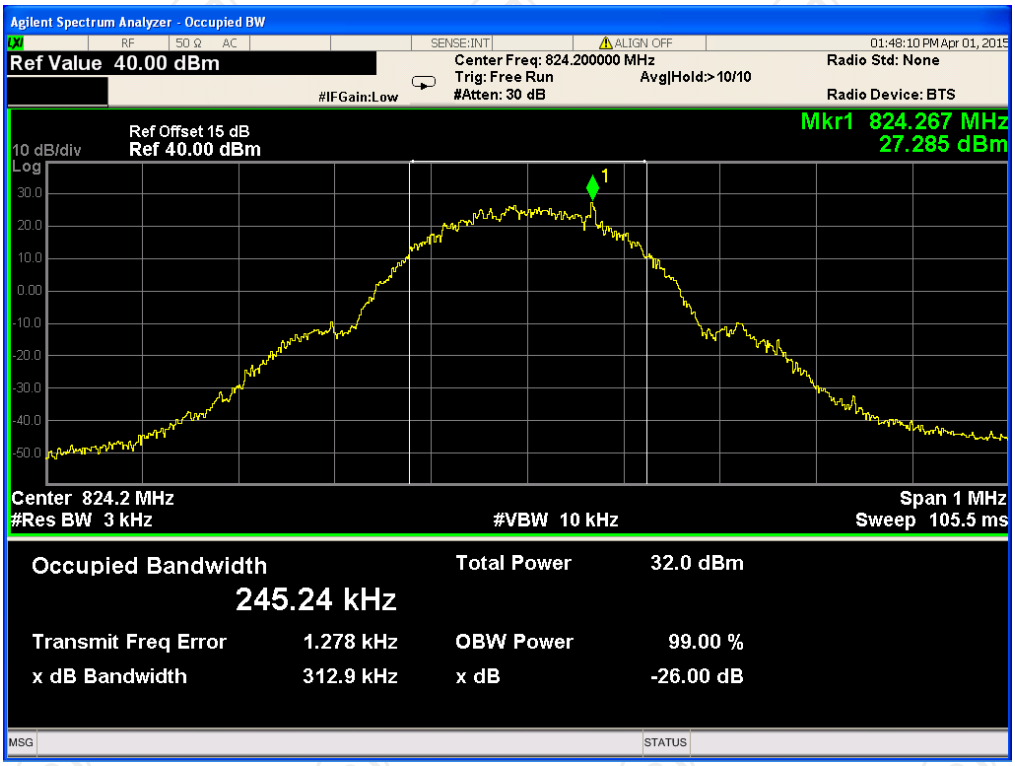
PCS Band						
Mode	**GSM 1900 (GSM)**			**GSM 1900 (GPRS class 8)**		
Channel	**512**	**661**	**810**	**512**	**661**	**810**
Frequency (MHz)	1850.2	1880	1909.8	1850.2	1880	1909.8
99% OBW (kHz)	244.09	245.56	243.78	243.42	247.61	246.38
26dB BW (kHz)	319.90	311.30	315.30	307.50	318.40	313.90

Hotline: 400-6611-140 Tel: 86-755-27673339 Fax: 86-755-27673332 http://www.tct-lab.com

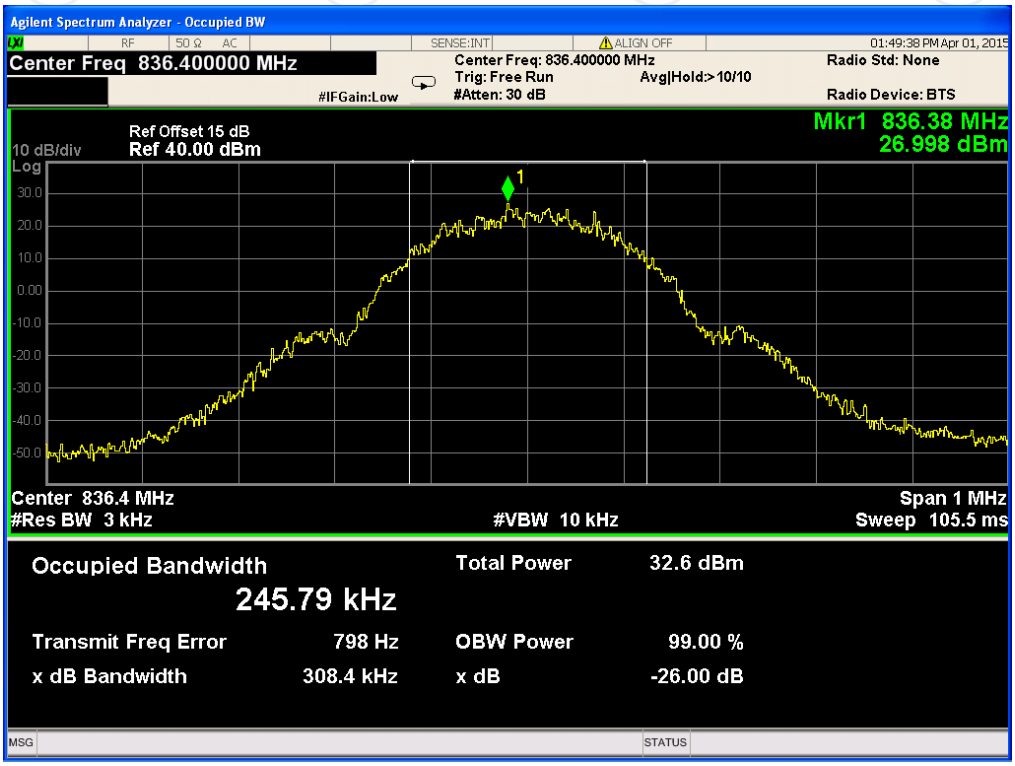
Test plots as follows:

Band:	GSM 850	Test Mode:	GSM Link (GMSK)

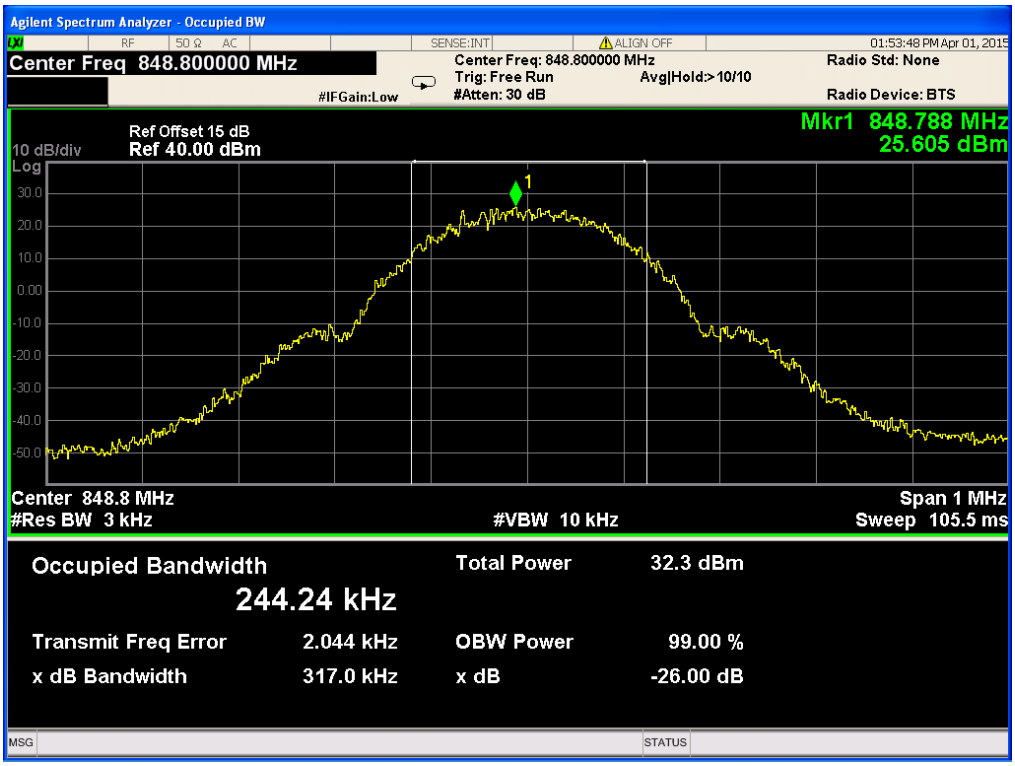
26dB&99% Occupied Bandwidth Plot on Channel 128



26dB&99% Occupied Bandwidth Plot on Channel 189

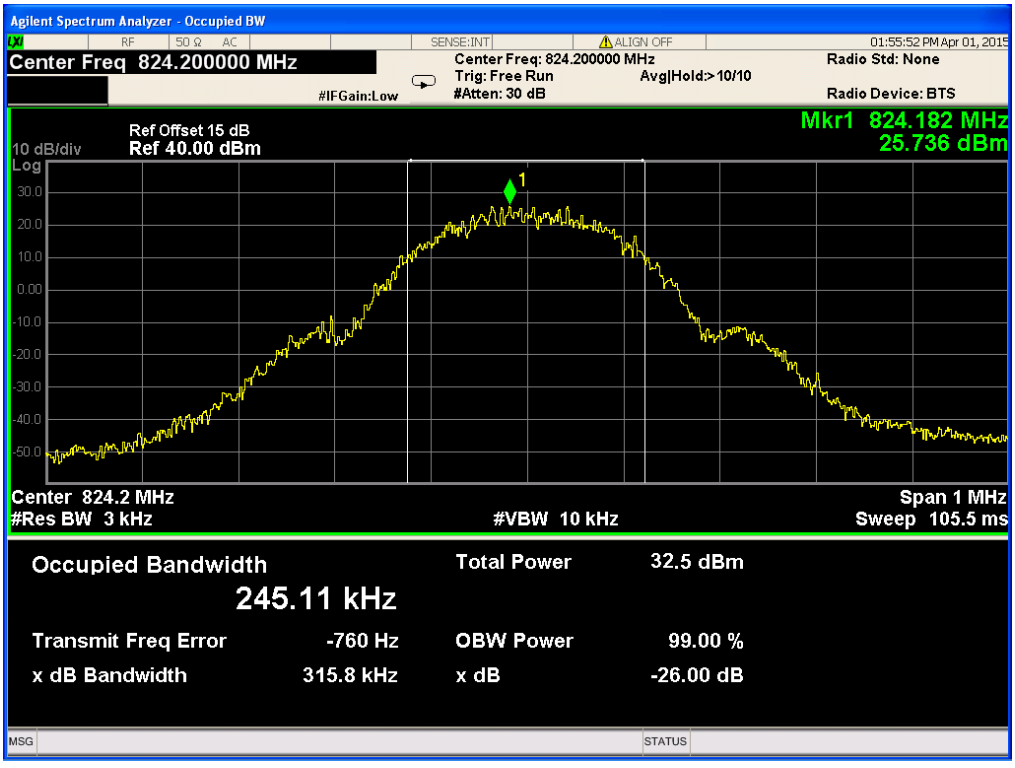


26dB&99% Occupied Bandwidth Plot on Channel 251



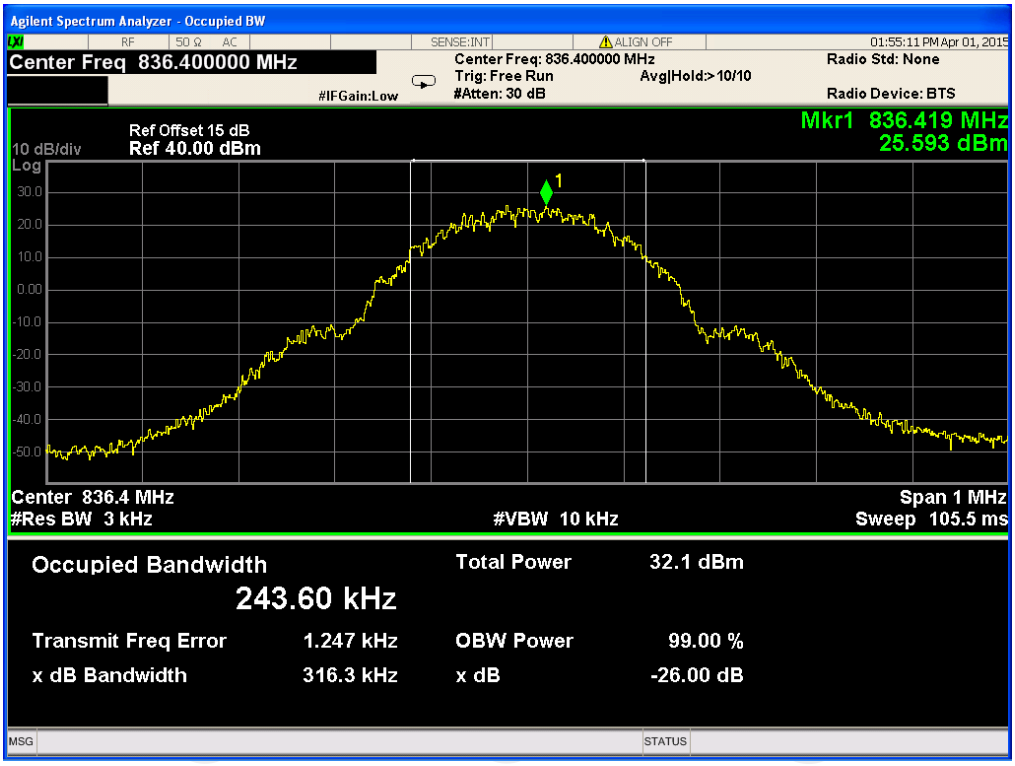
Band:	GSM 850	Test Mode:	GPRS class 8 Link (8PSK)

26dB&99% Occupied Bandwidth Plot on Channel 128

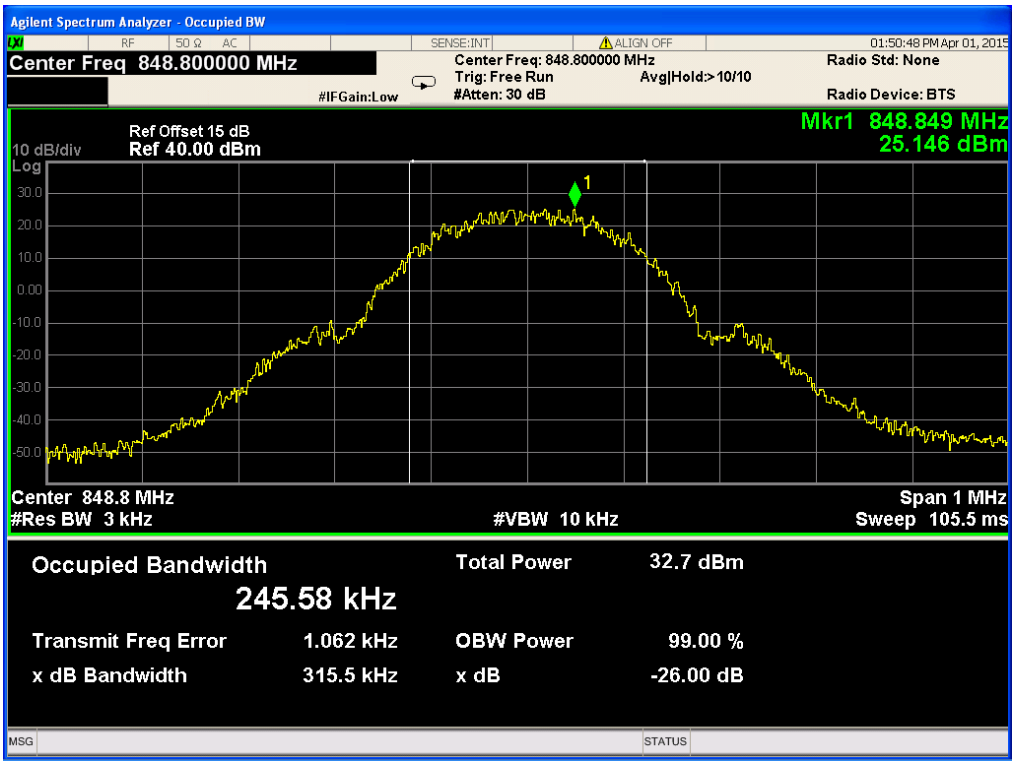


Hotline: 400-6611-140 Tel: 86-755-27673339 Fax: 86-755-27673332 http://www.tct-lab.com

26dB&99% Occupied Bandwidth Plot on Channel 189

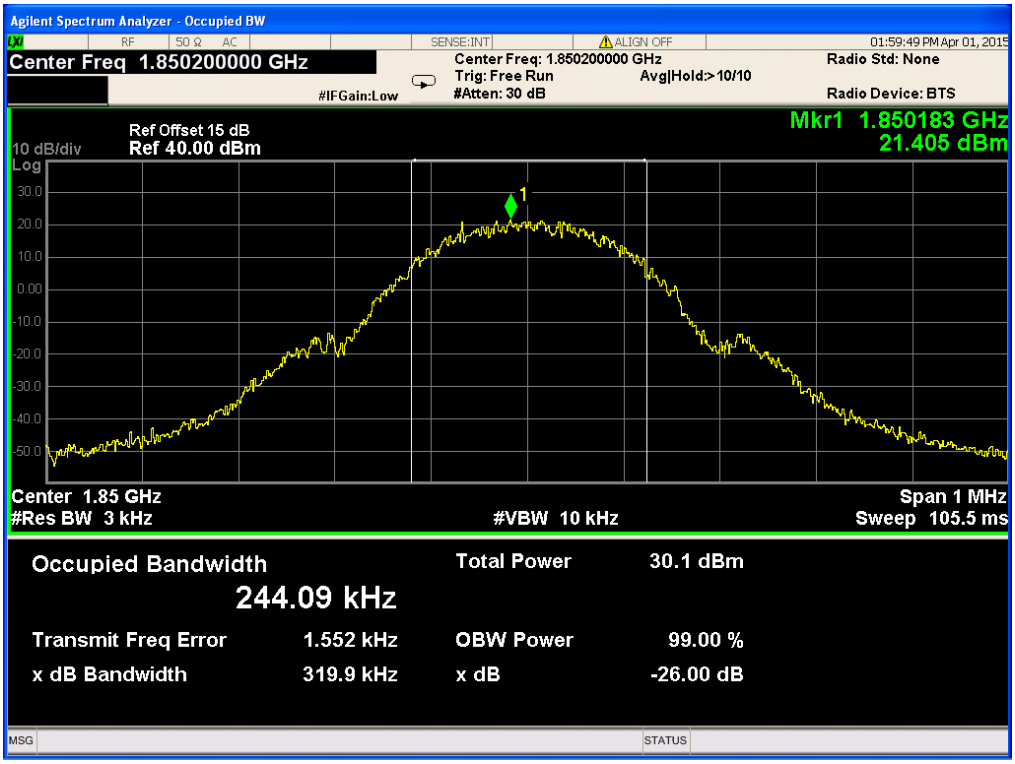


26dB&99% Occupied Bandwidth Plot on Channel 251

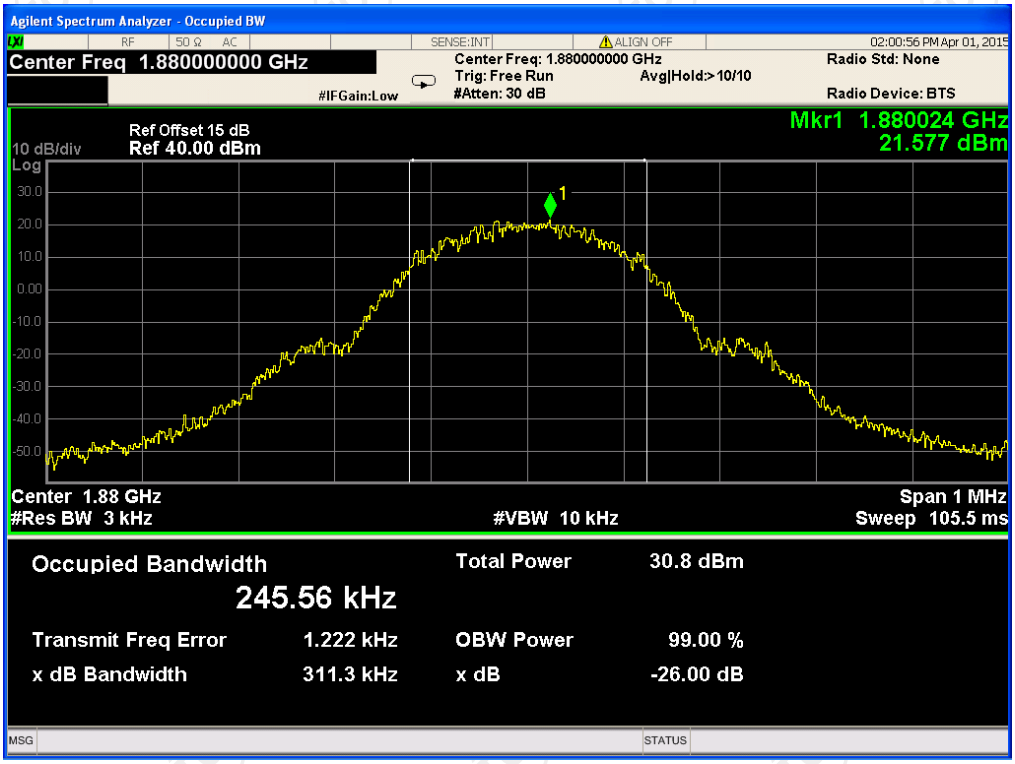


Band:	GSM 1900	Test Mode:	GSM Link (GMSK)

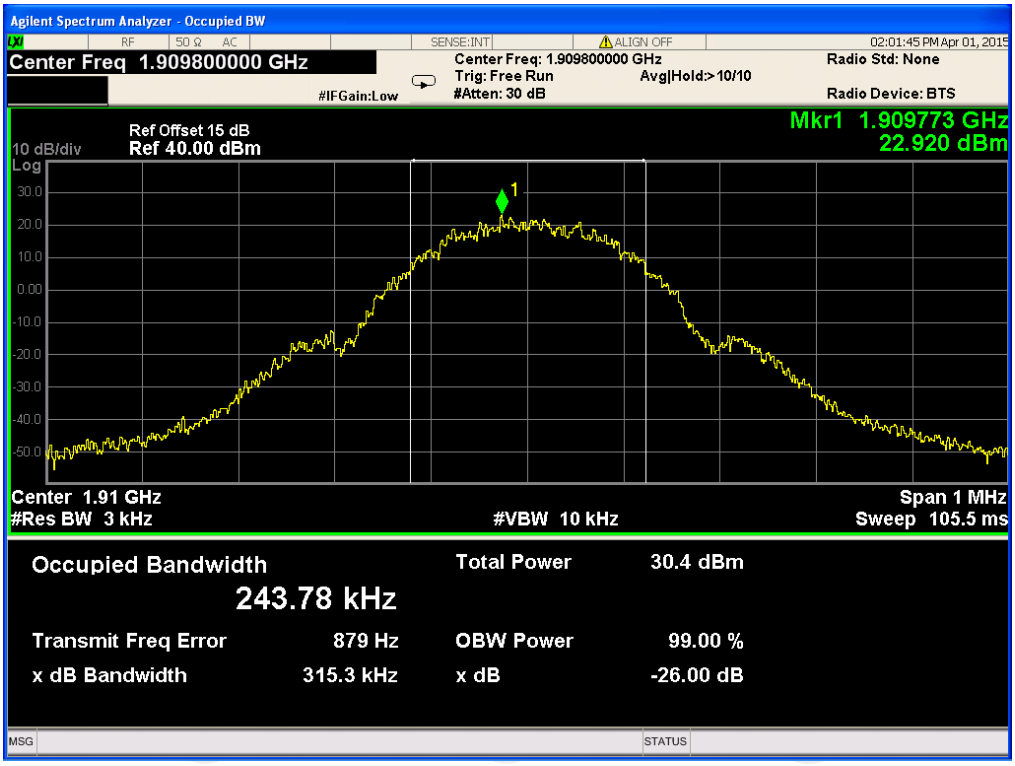
26dB&99% Occupied Bandwidth Plot on Channel 512



26dB&99% Occupied Bandwidth Plot on Channel 661

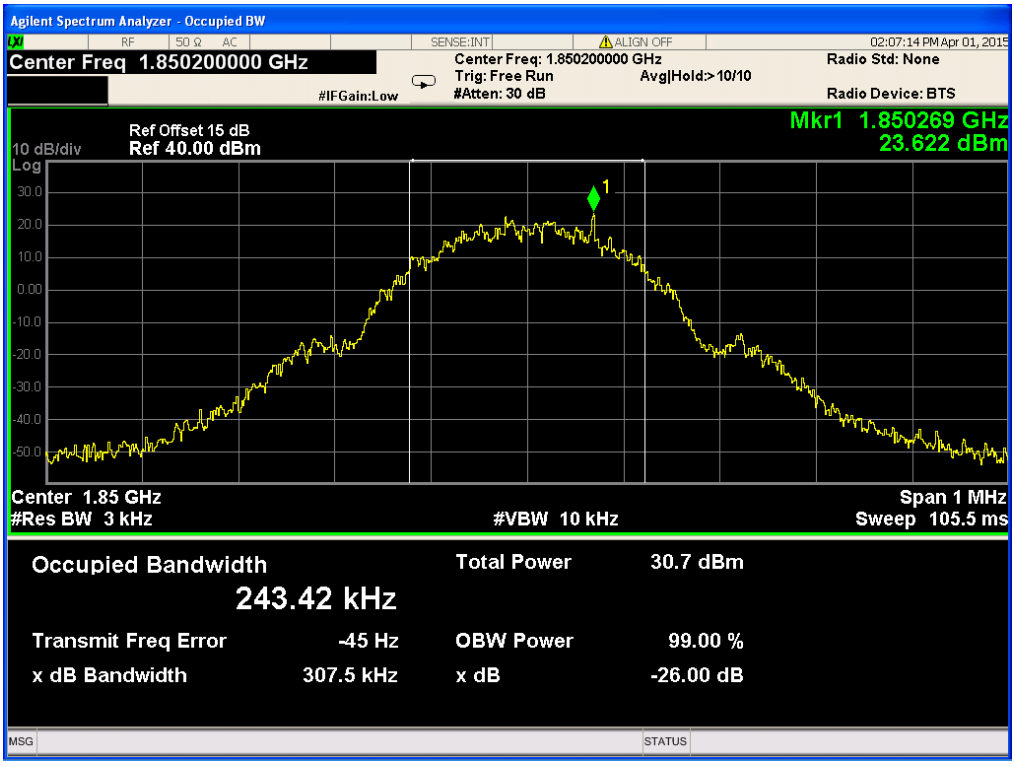


26dB&99% Occupied Bandwidth Plot on Channel 810

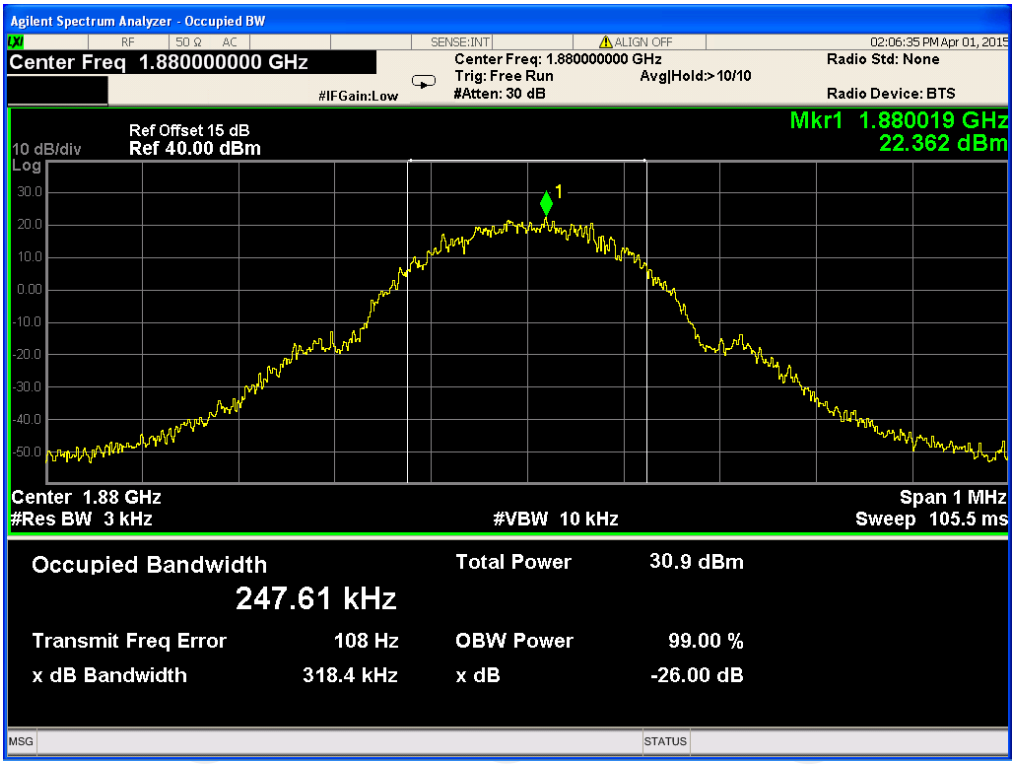


Band:	GSM 1900	Test Mode:	GPRS class 8 Link (8PSK)

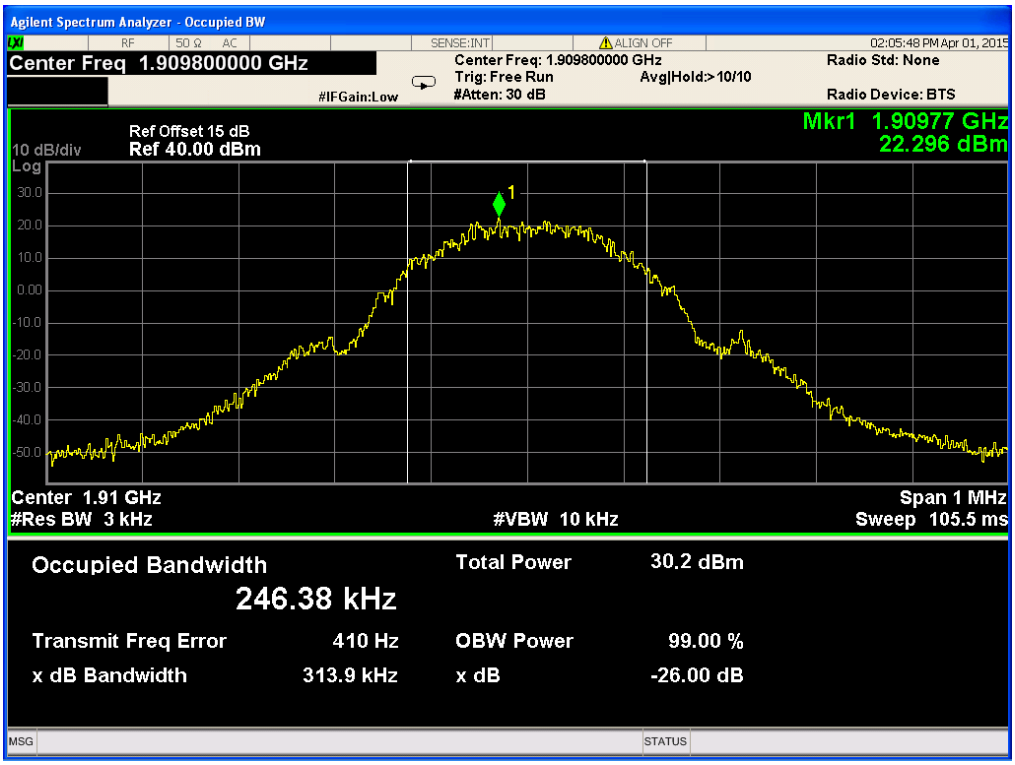
26dB&99% Occupied Bandwidth Plot on Channel 512



26dB&99% Occupied Bandwidth Plot on Channel 661

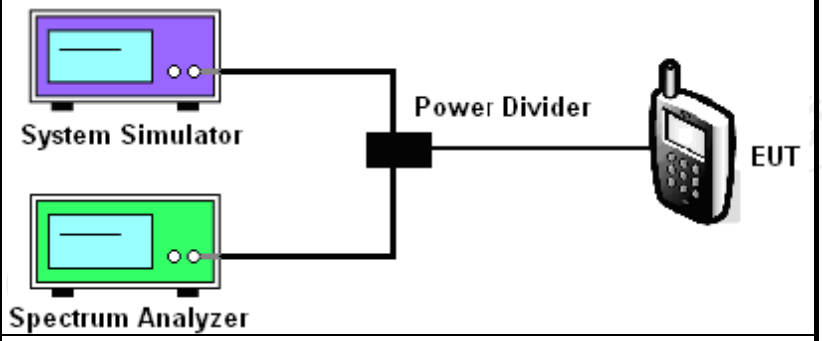


26dB&99% Occupied Bandwidth Plot on Channel 810



6.4. Band Edge and Conducted Spurious Emission Measurement

6.5. Test Specification

Test Requirement:	FCC part22.917(a) and FCC part24.238(a)
Test Method:	FCC part2.1051
Limit:	-13dBm
Test Setup:	
Test Procedure:	1. The testing follows FCC KDB 971168 v02r02 Section 6.0. 2. The EUT was connected to the spectrum analyzer and system simulator via a power divider. 3. The RF output of EUT was connected to the spectrum analyzer by an RF cable and attenuator. The path loss was compensated to the results for each measurement. 4. The band edges of low and high channels for the highest RF powers were measured. 5. The conducted spurious emission for the whole frequency range was taken. 6. The RF fundamental frequency should be excluded against the limit line in the operating frequency band. 7. The limit line is derived from 43 + 10log(P) dB below the transmitter power P(Watts) = P(W) - [43 + 10log(P)] (dB) = [30 + 10log(P)] (dBm) - [43 + 10log(P)] (dB) = -13dBm.
Test Result:	PASS

6.5.1. Test Instruments

Equipment	Manufacturer	Model	Serial Number	Calibration Due
System simulator	R&S	CMU200	111382	Sep. 16, 2015
Spectrum Analyzer	Agilent	N9020A	MY49100060	Oct. 21, 2015

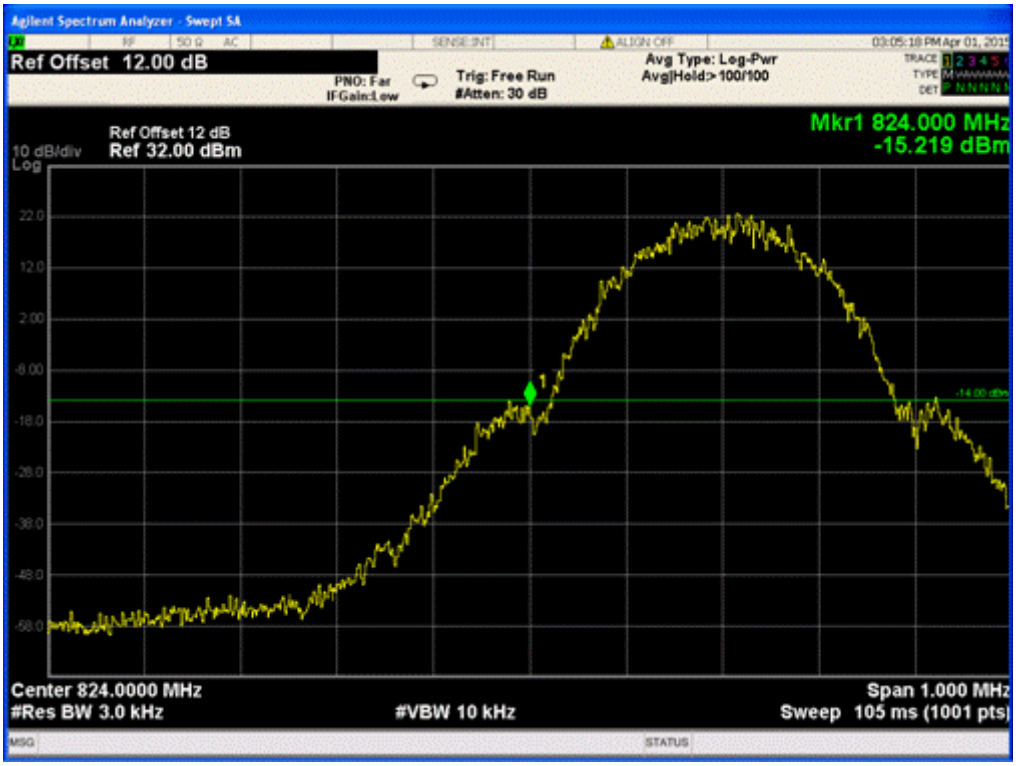
Note: *The calibration interval of the above test instruments is 12 months and the calibrations are traceable to international system unit (SI).*

6.5.2. Test data

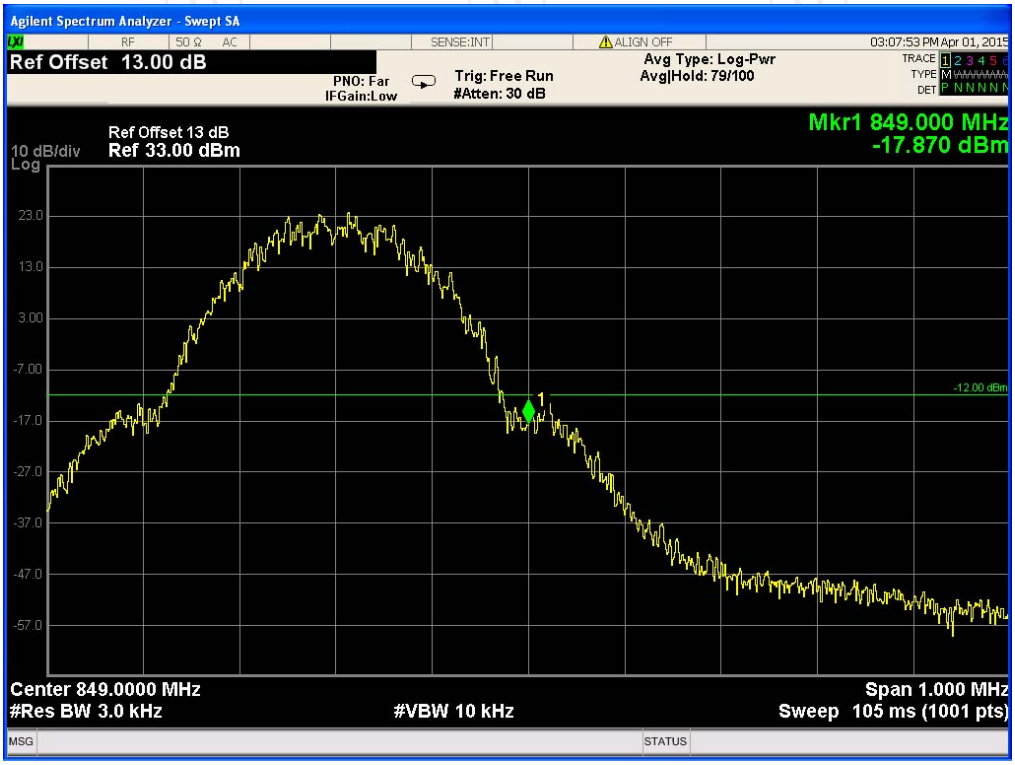
Test plots as follows:

Band:	GSM 850	Test Mode:	GSM Link (GMSK)

Lower Band Edge Plot on Channel 128

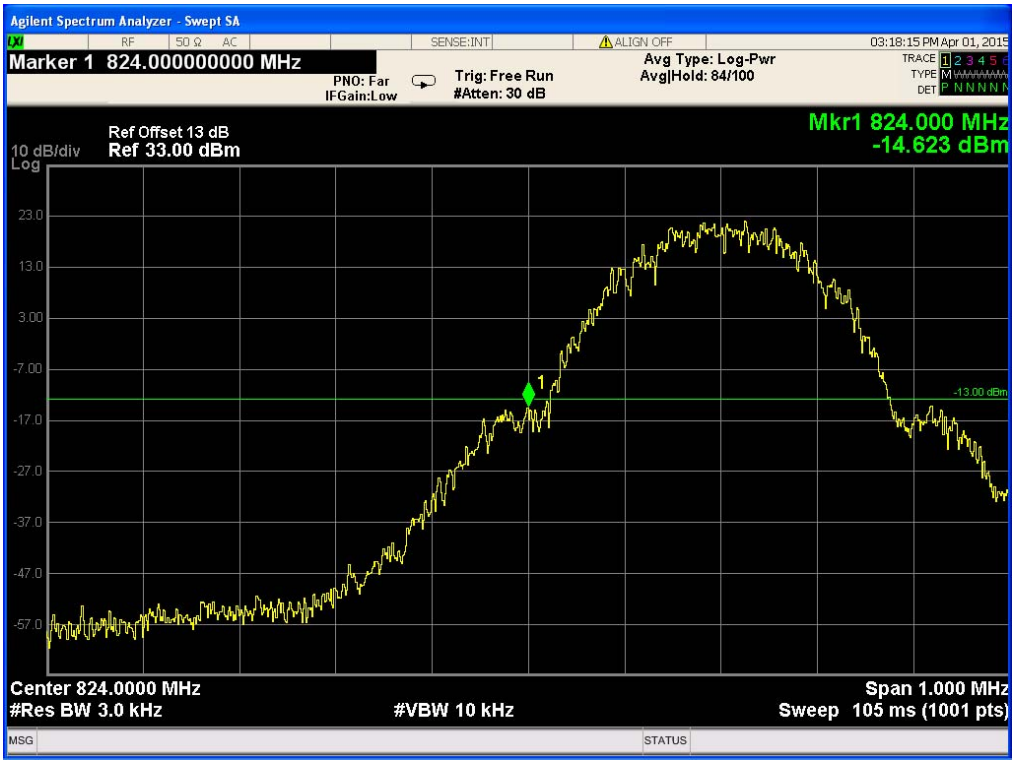


Higher Band Edge Plot on Channel 251

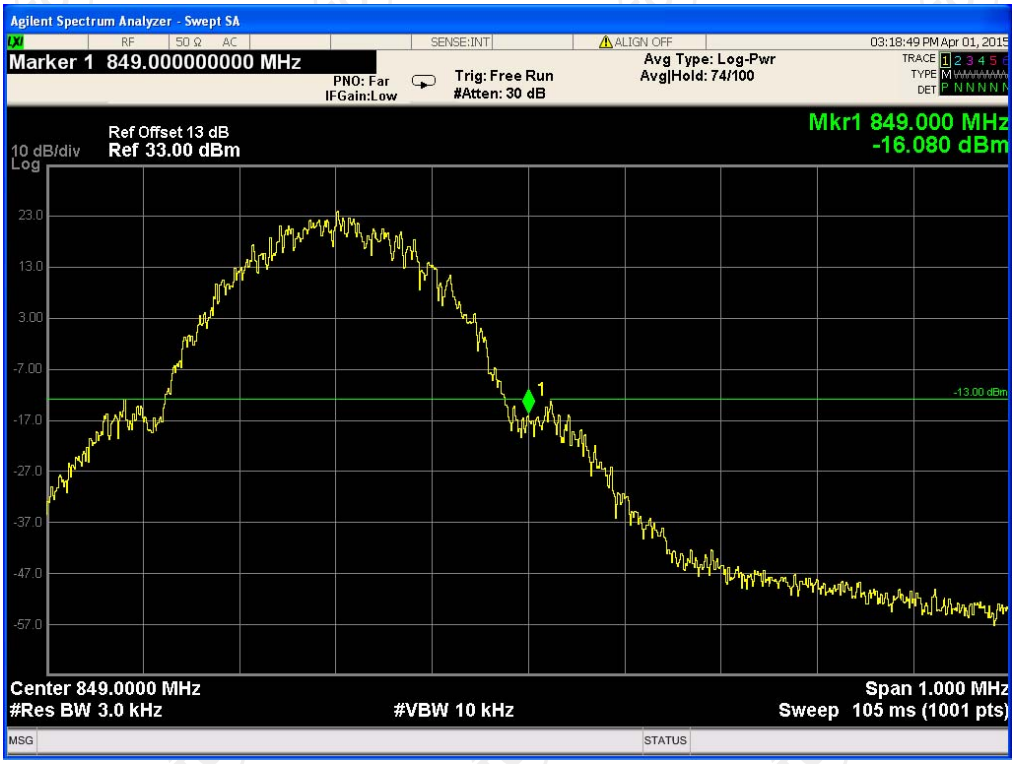


Band:	GSM 850	Test Mode:	GPRS Link

Lower Band Edge Plot on Channel 128

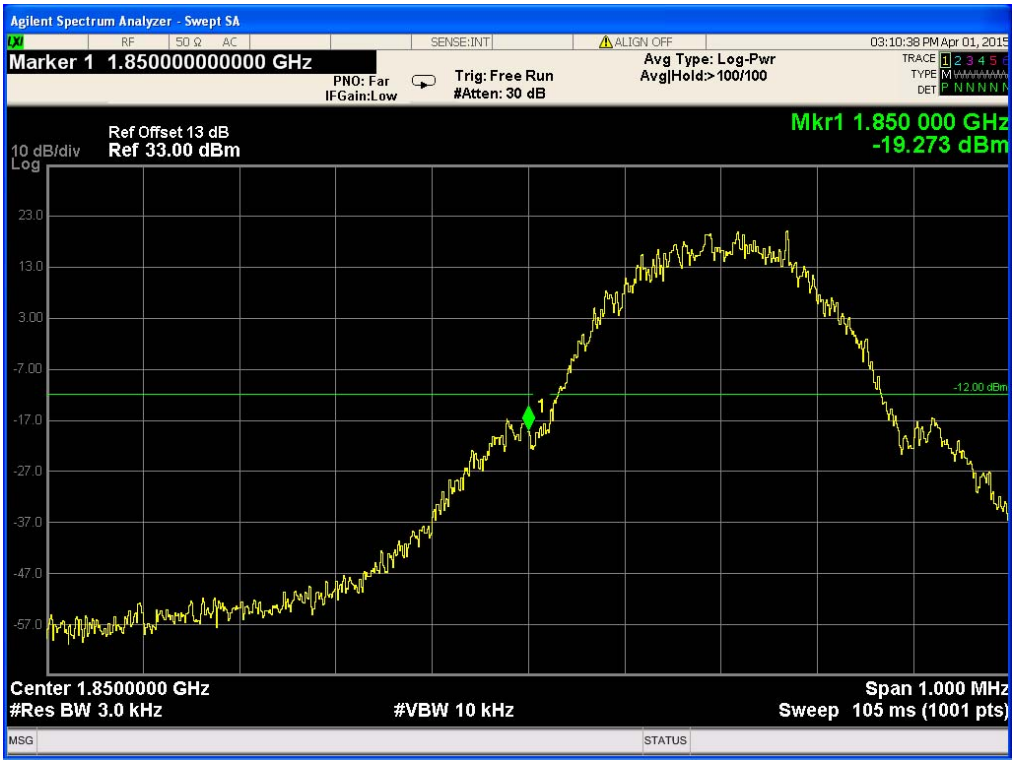


Higher Band Edge Plot on Channel 251

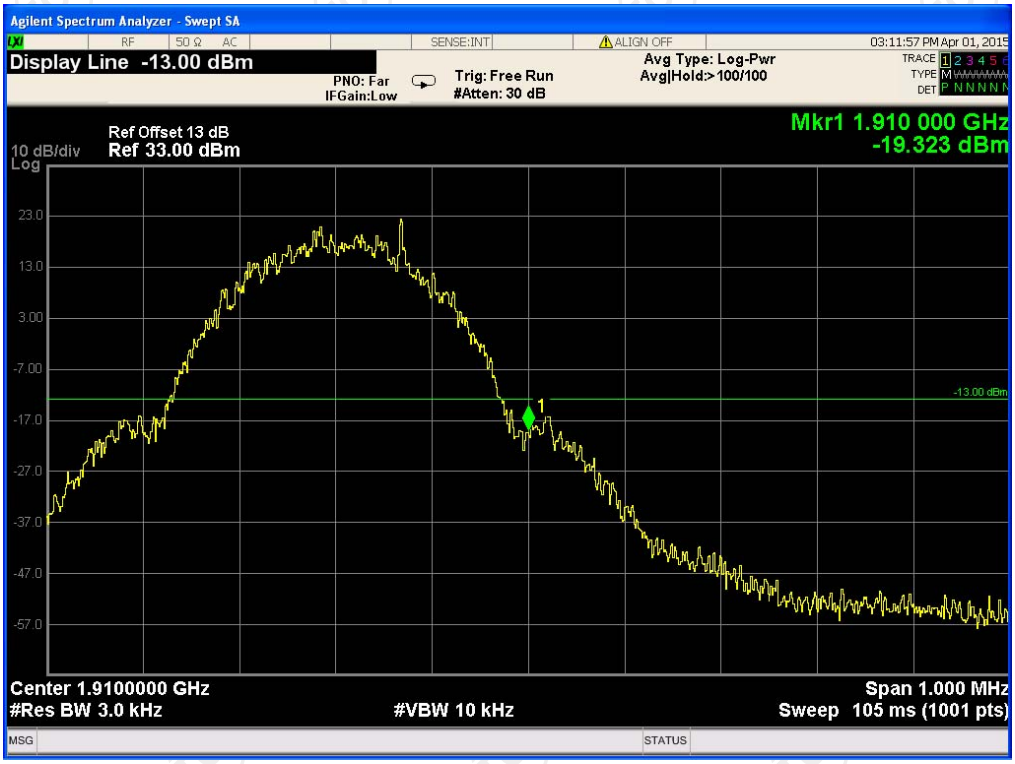


Band:	GSM 1900	Test Mode:	GSM Link (GMSK)

Lower Band Edge Plot on Channel 512

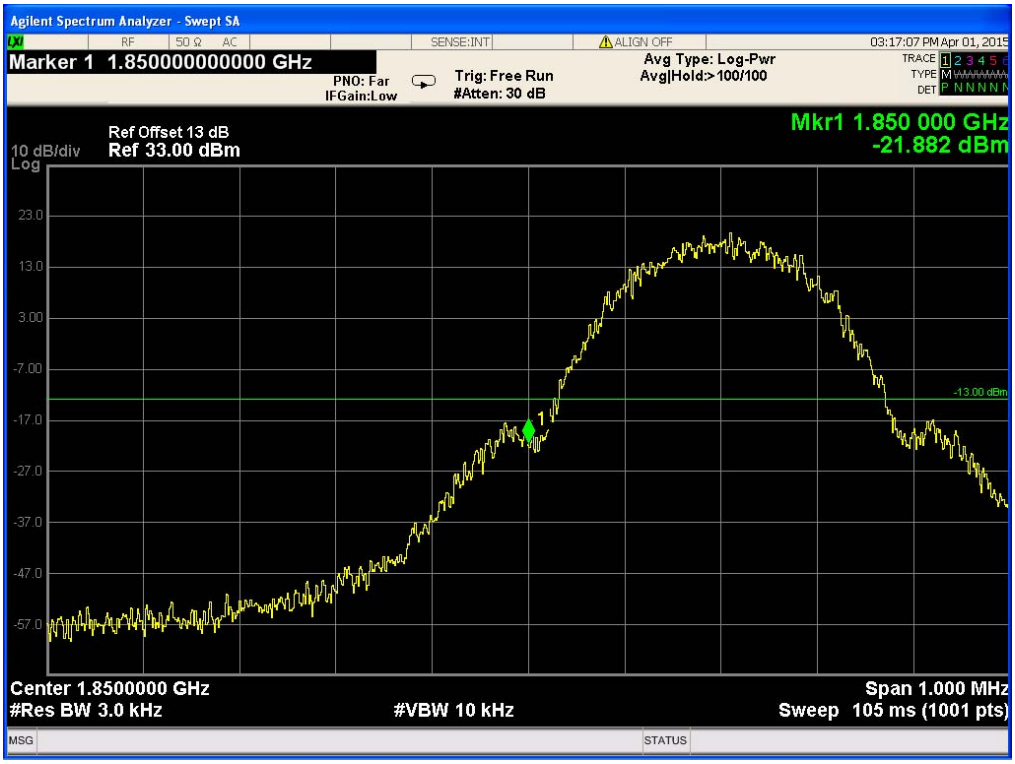


Higher Band Edge Plot on Channel 810

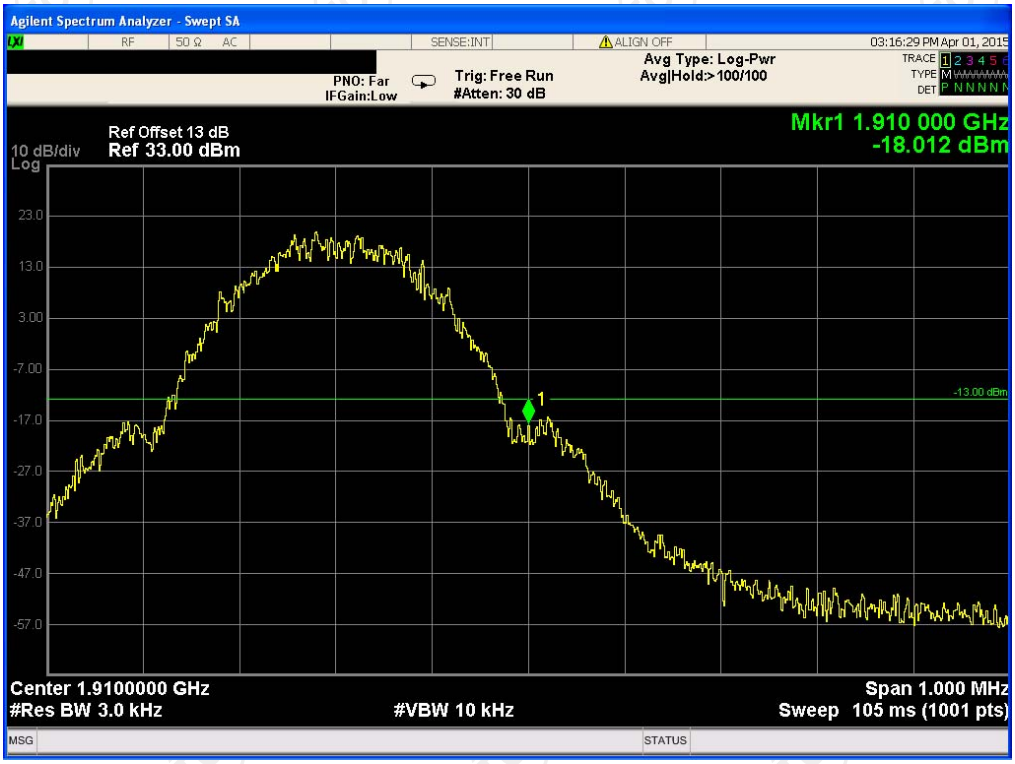


Band:	GSM 1900	Test Mode:	GPRS Link

Lower Band Edge Plot on Channel 512

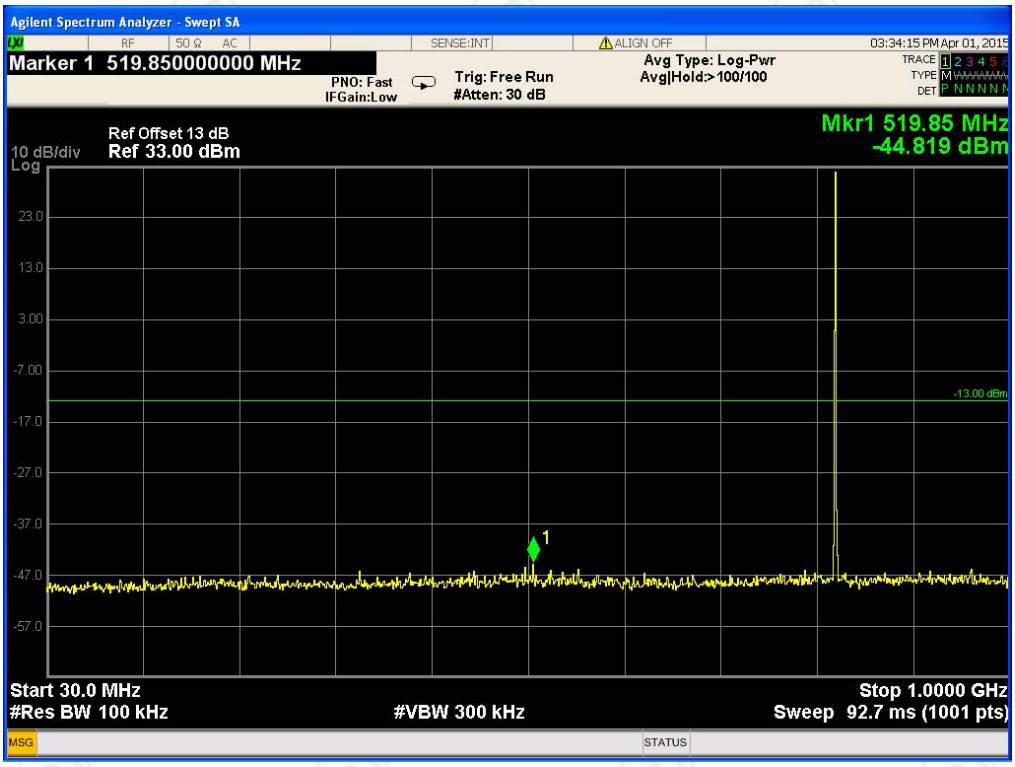


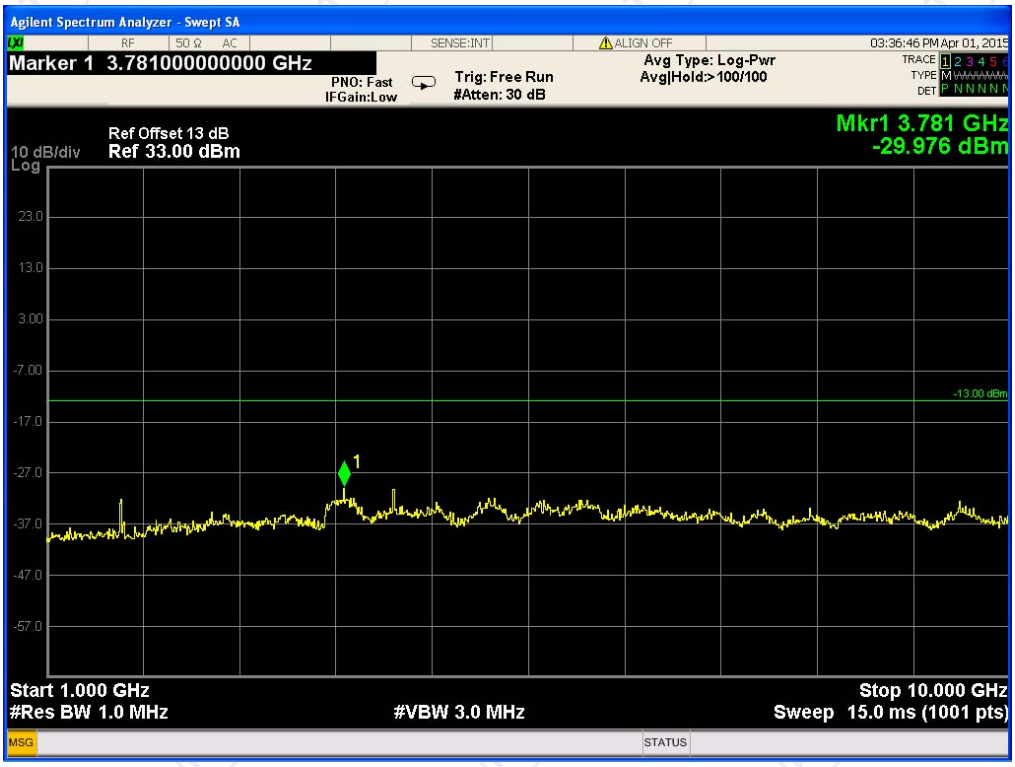
Higher Band Edge Plot on Channel 810



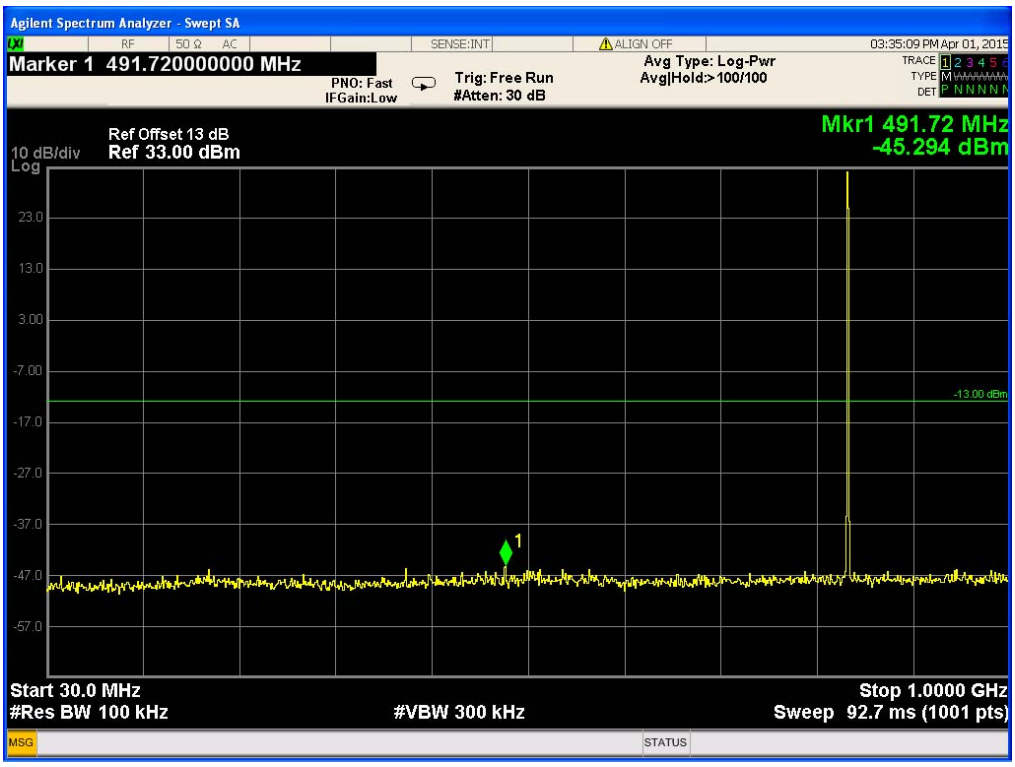
Band:	GSM 850	Test Mode:	GSM Link (GMSK)

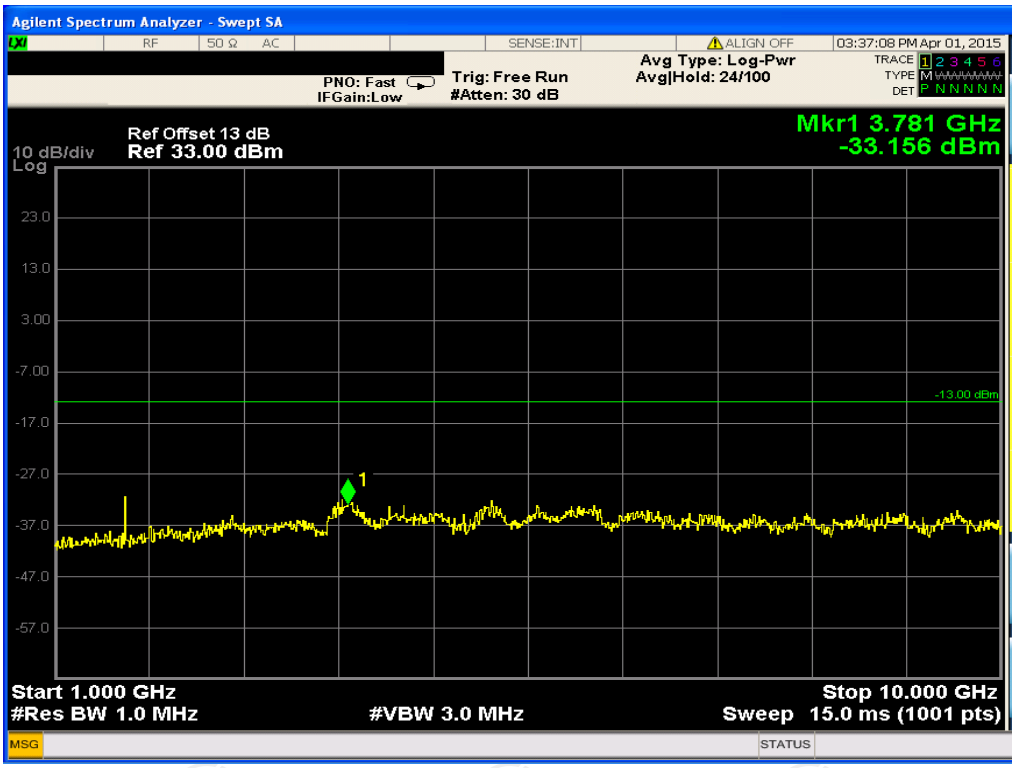
Conducted Spurious Emission on Channel 128



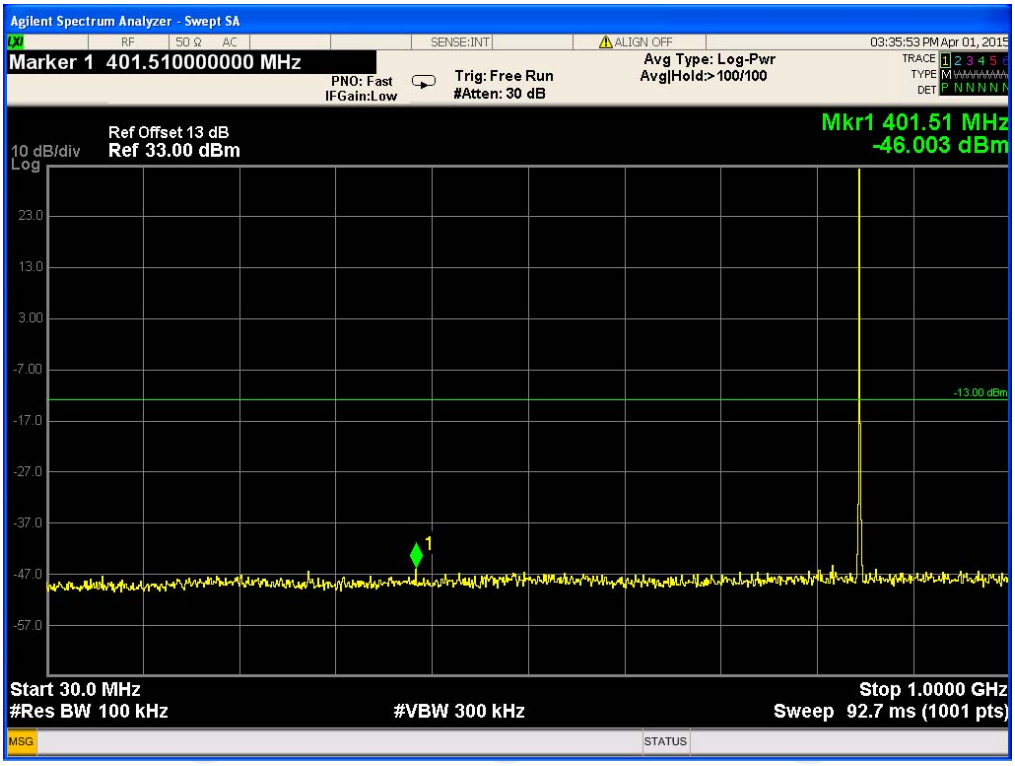


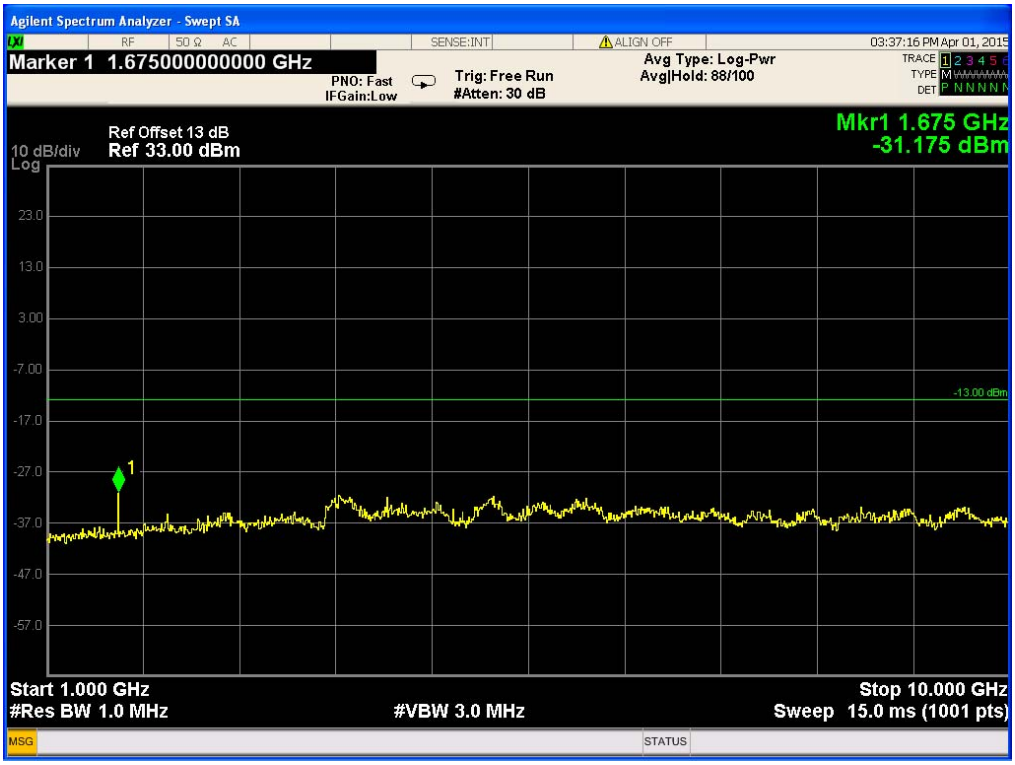
Conducted Spurious Emission on Channel 190





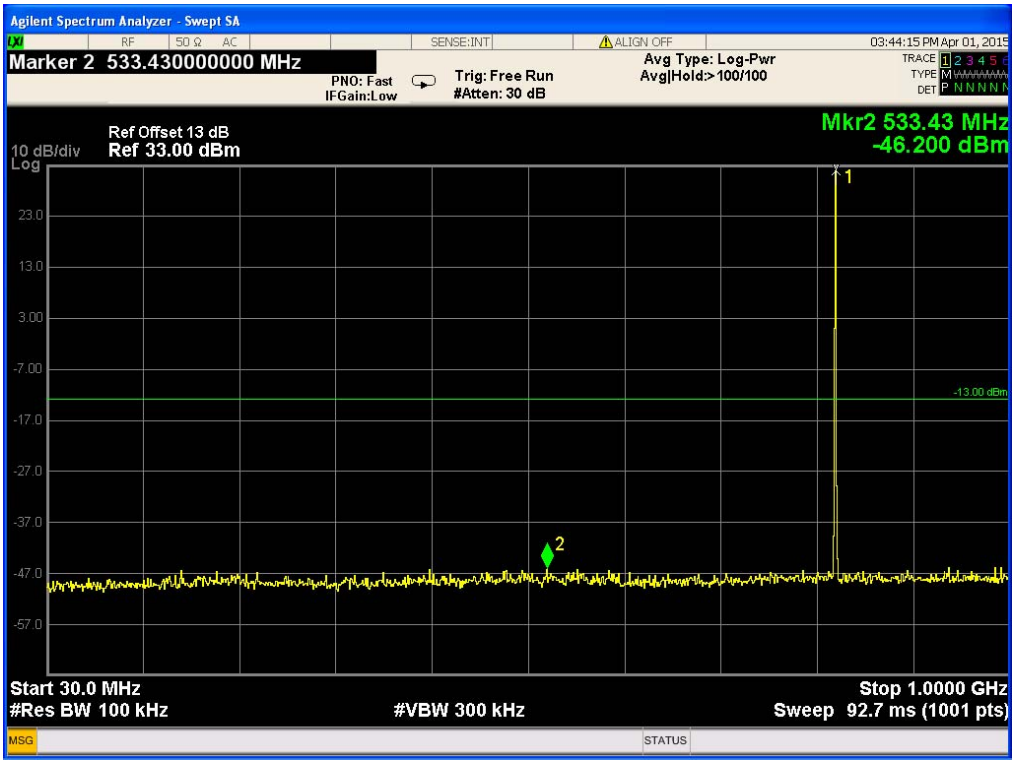
Conducted Spurious Emission on Channel 251

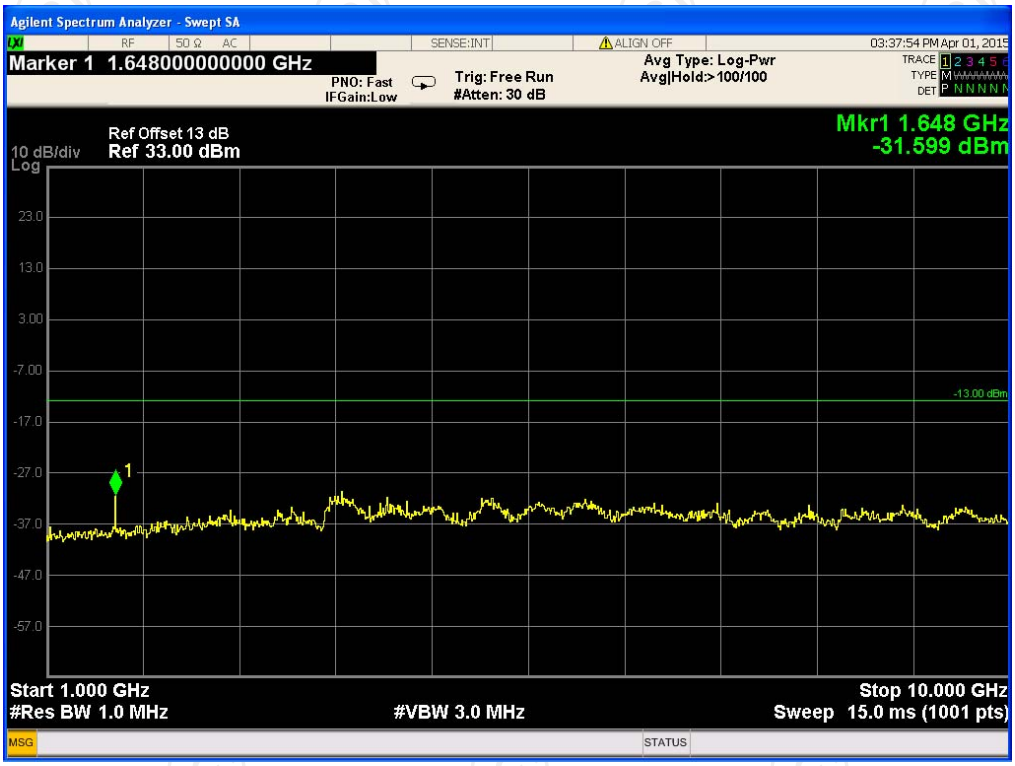




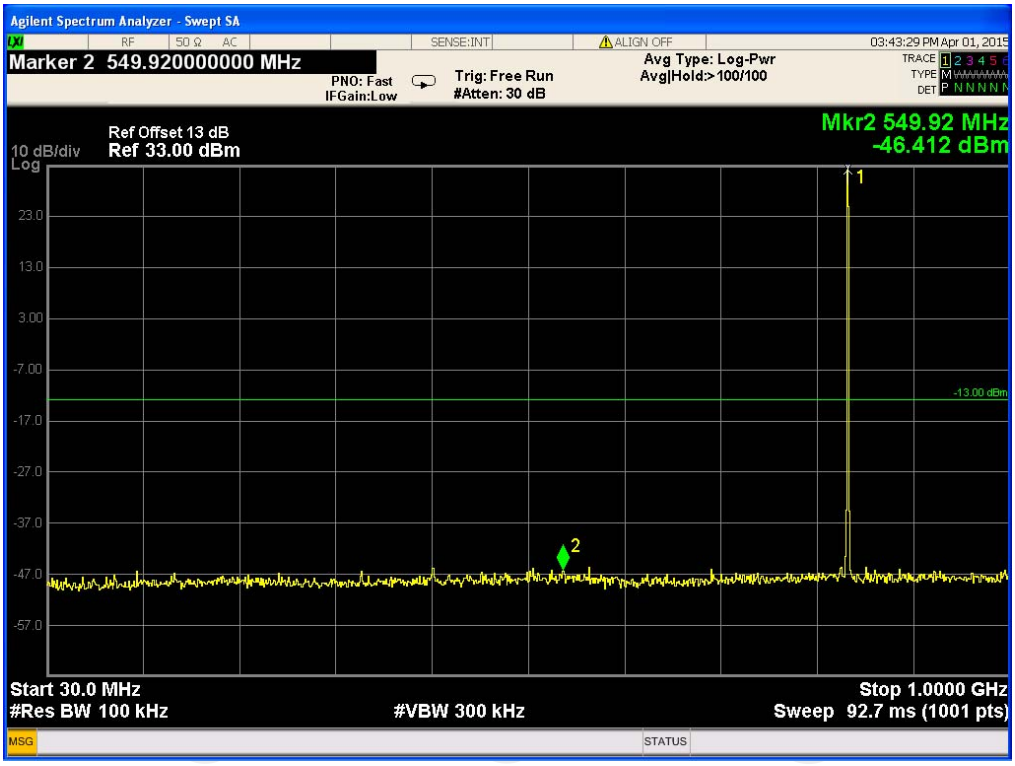
Band:	GSM 850	Test Mode:	GPRS Class 8 Link

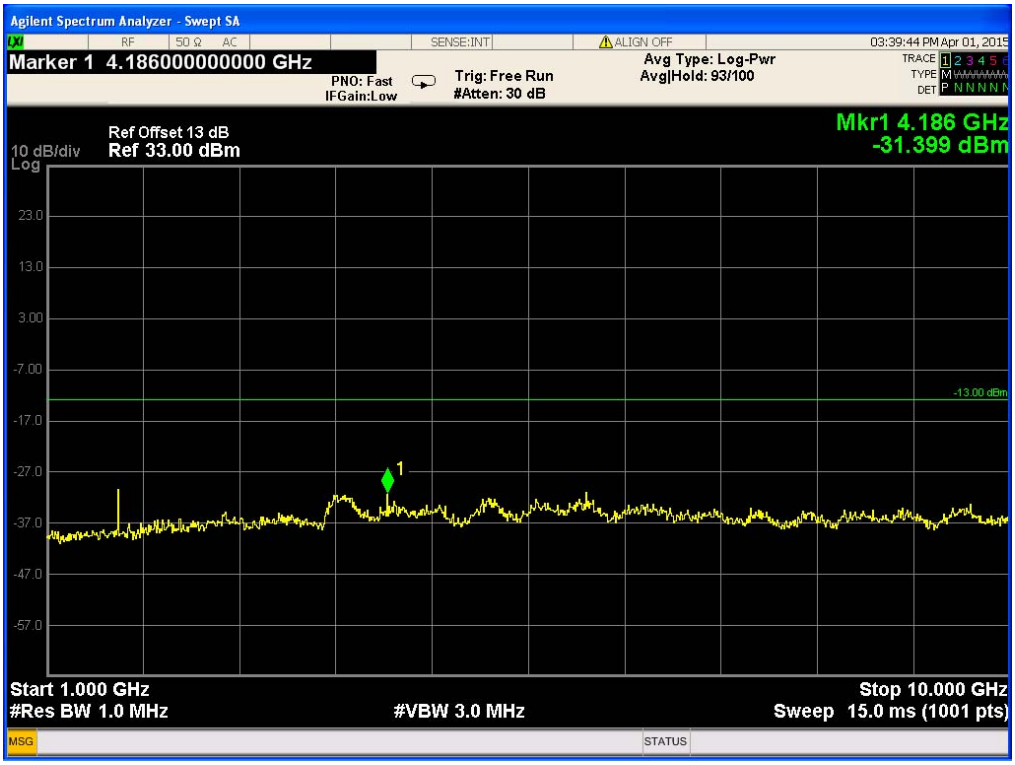
Conducted Spurious Emission on Channel 128



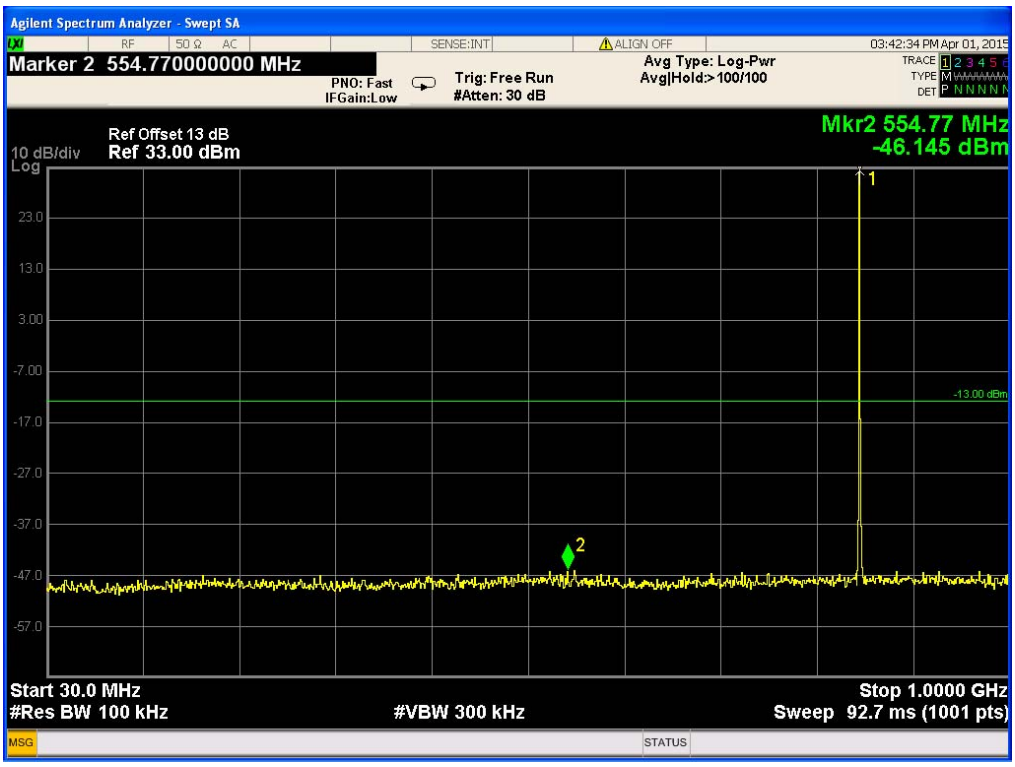


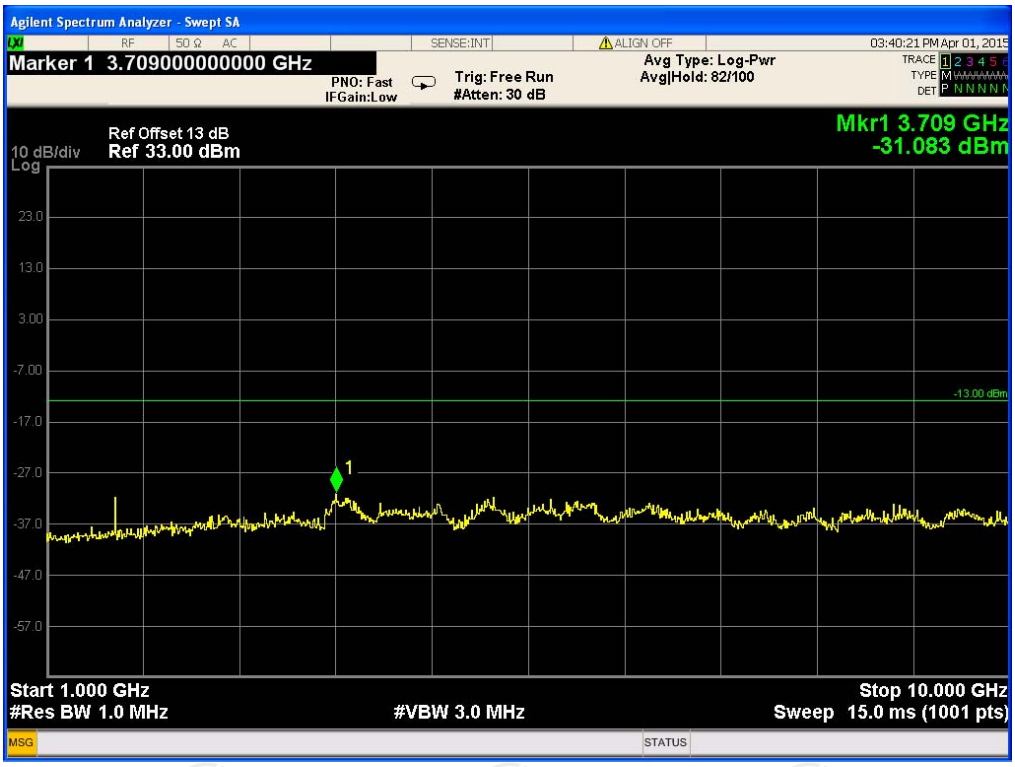
Conducted Spurious Emission on Channel 190





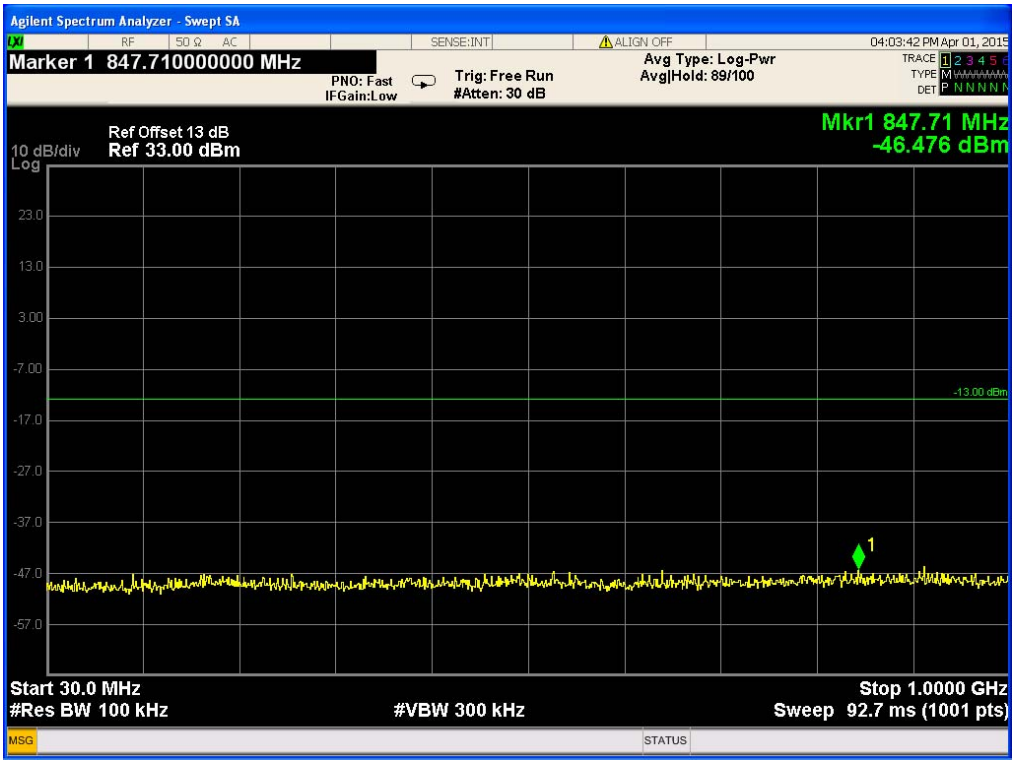
Conducted Spurious Emission on Channel 251

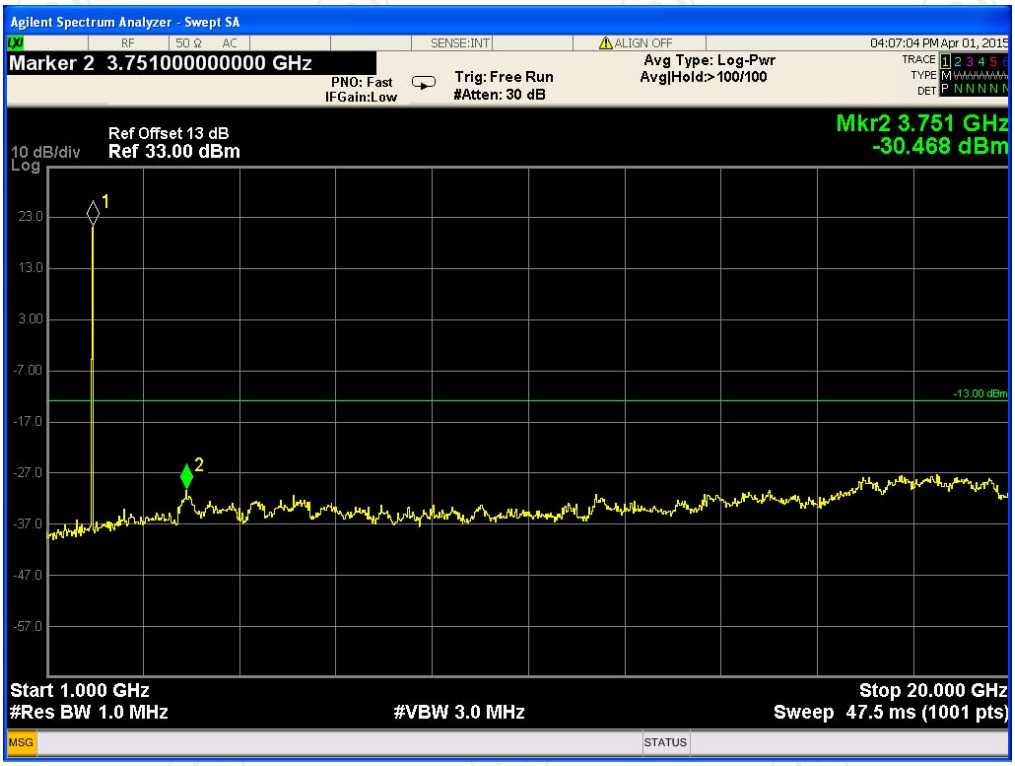




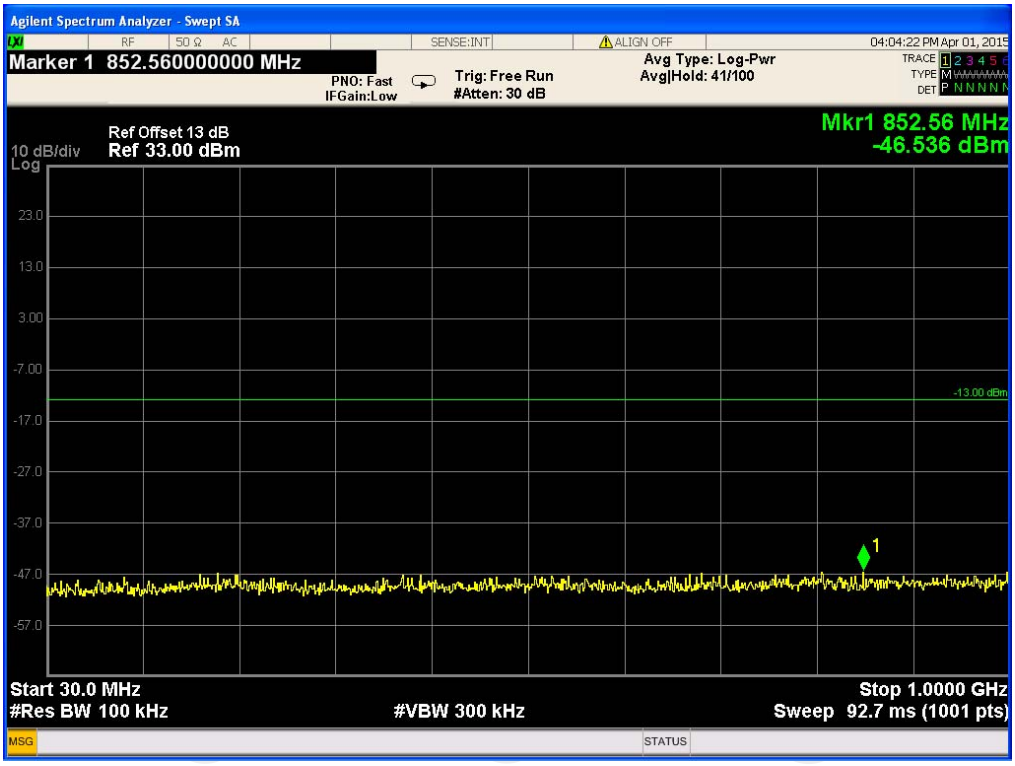
Band:	GSM 1900	Test Mode:	GSM Link (GMSK)

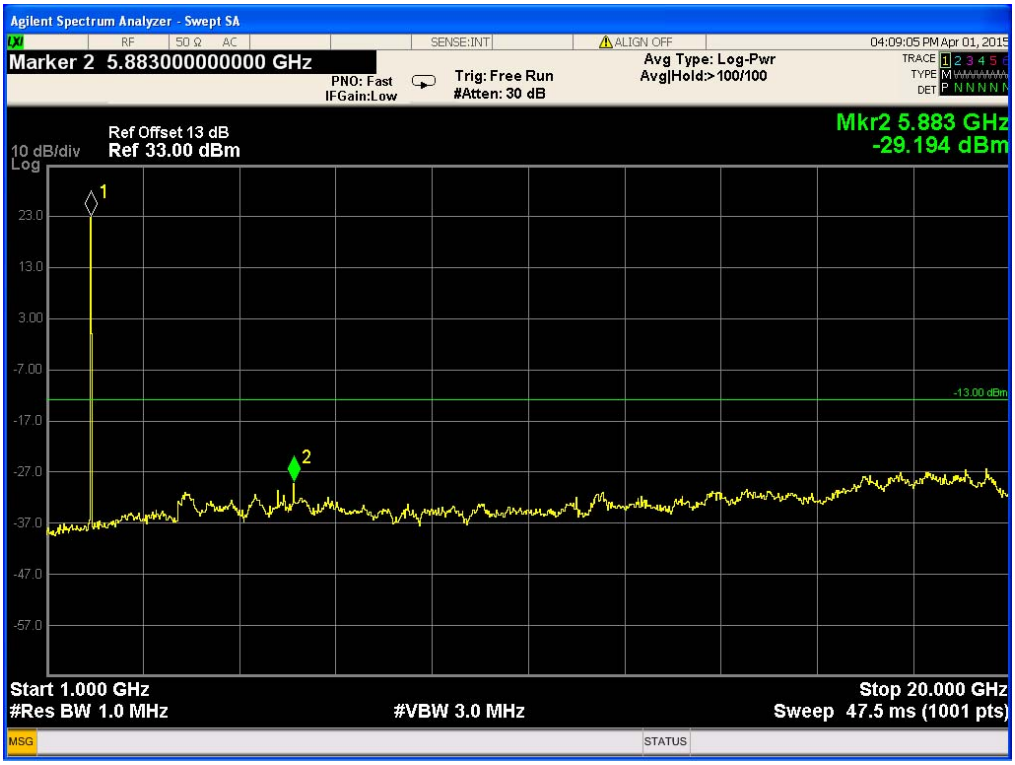
Conducted Spurious Emission on Channel 512



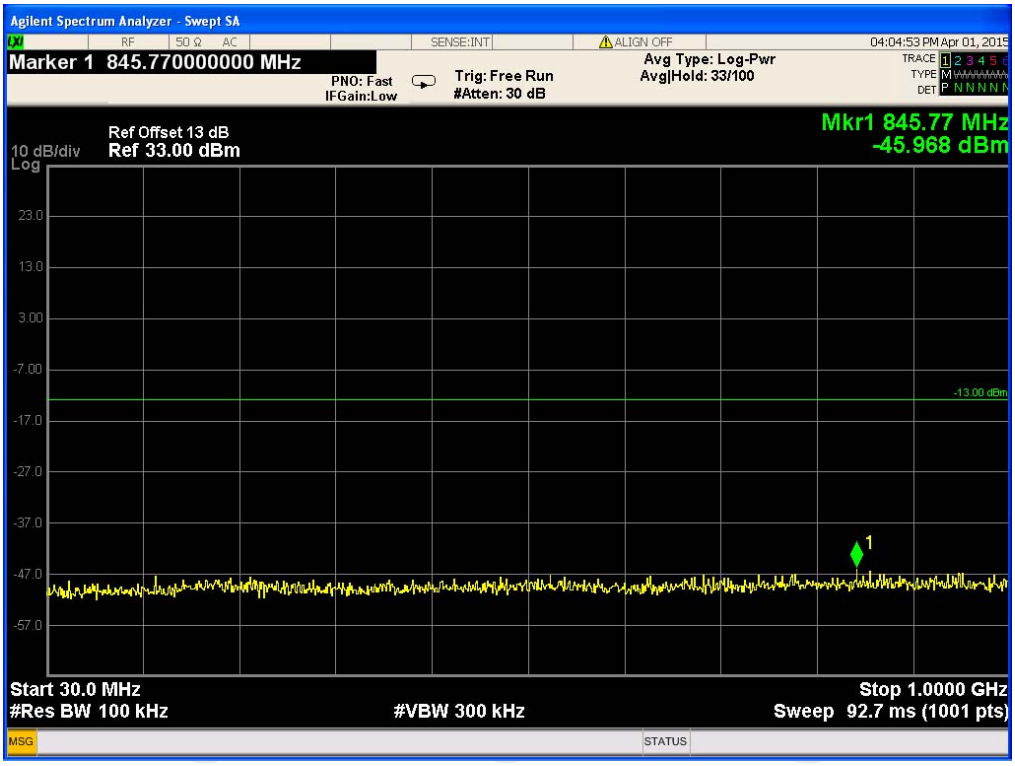


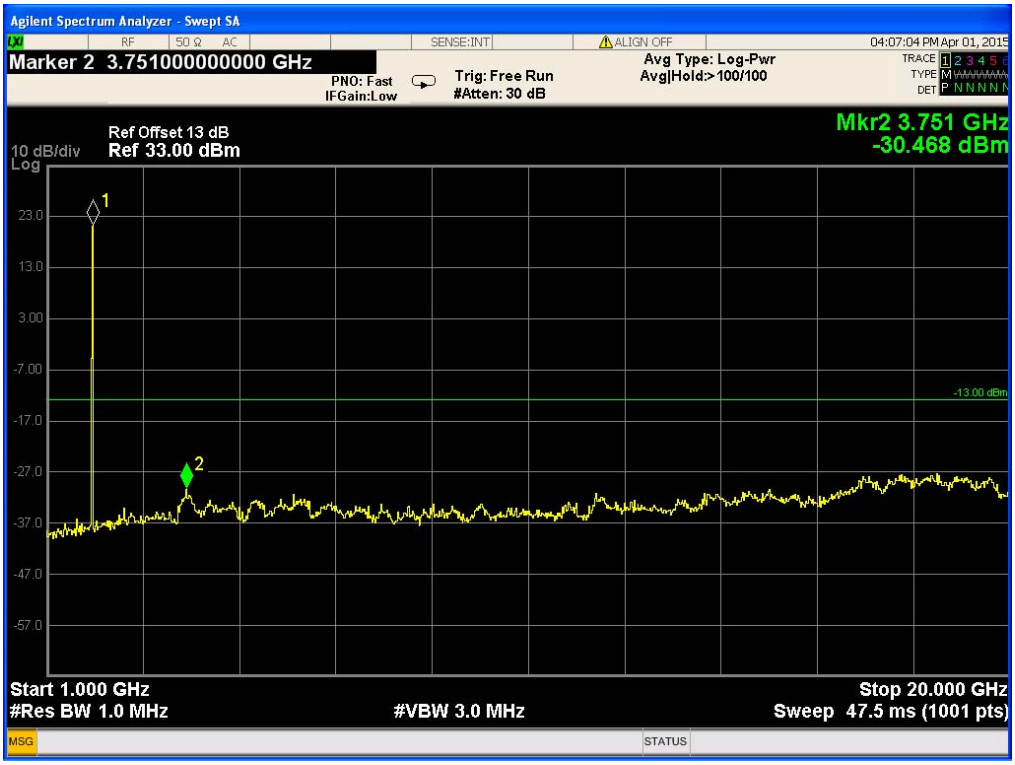
Conducted Spurious Emission on Channel 661





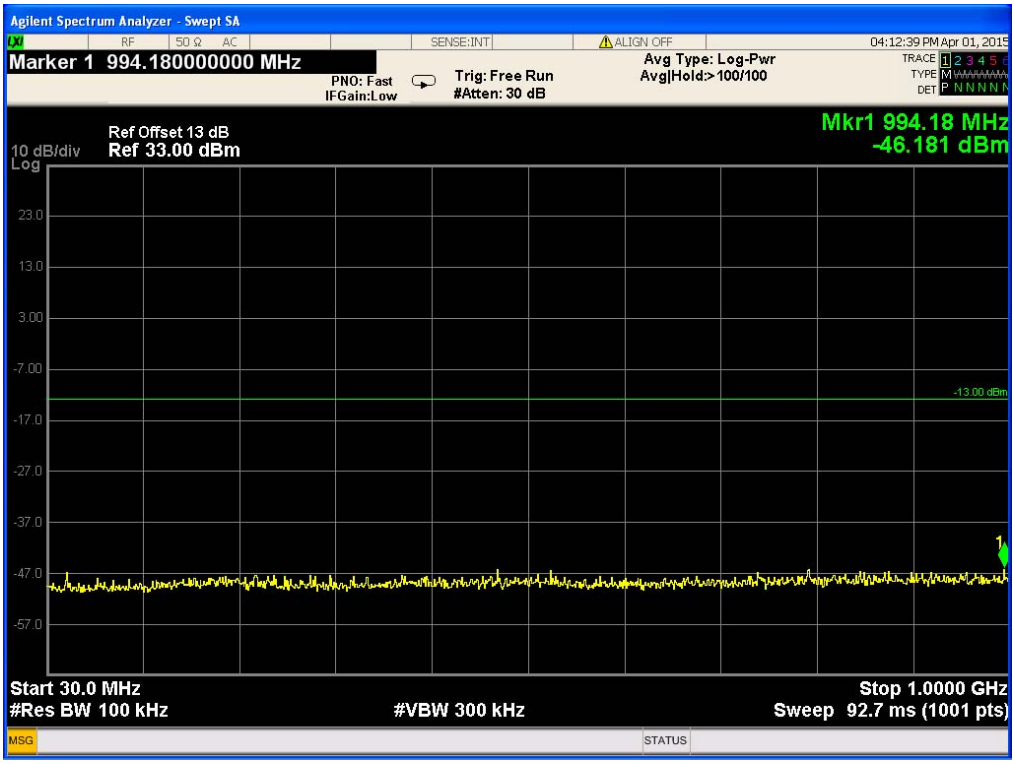
Conducted Spurious Emission on Channel 810

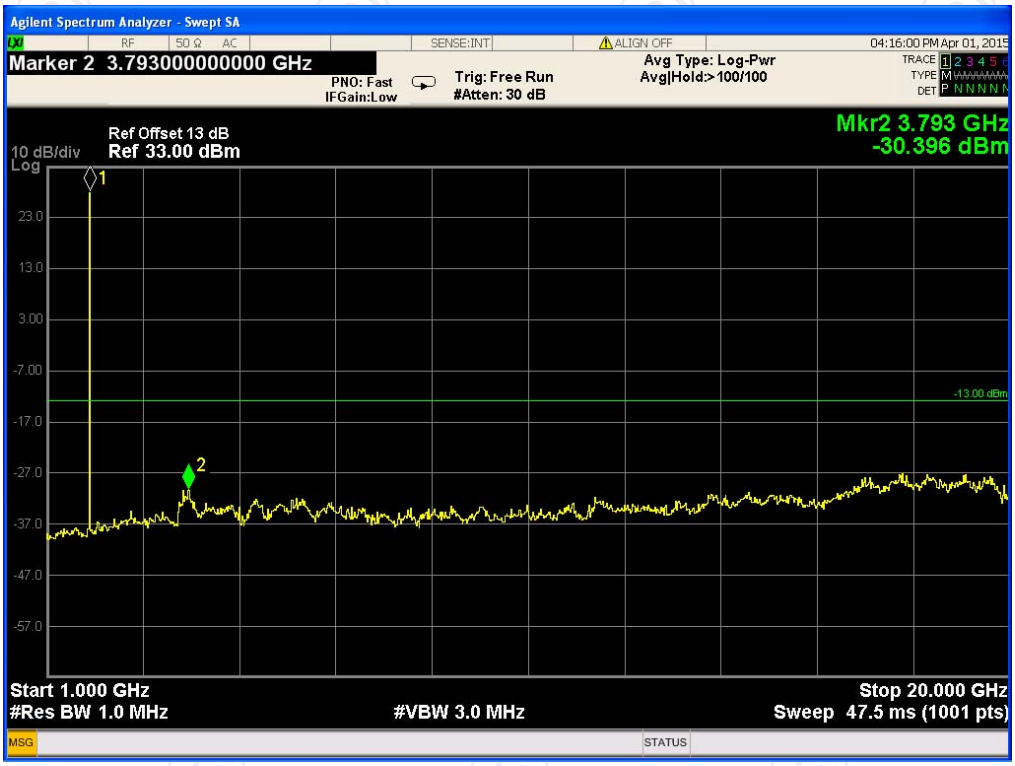




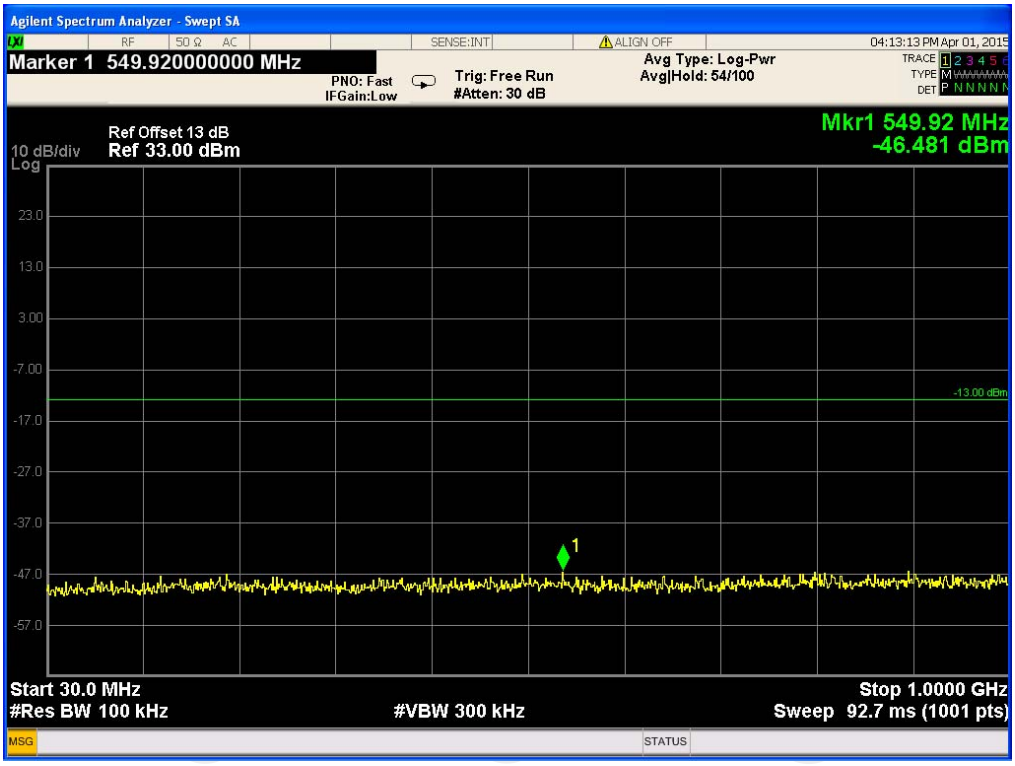
Band:	GSM 1900	Test Mode:	GPRS Class 8 Link

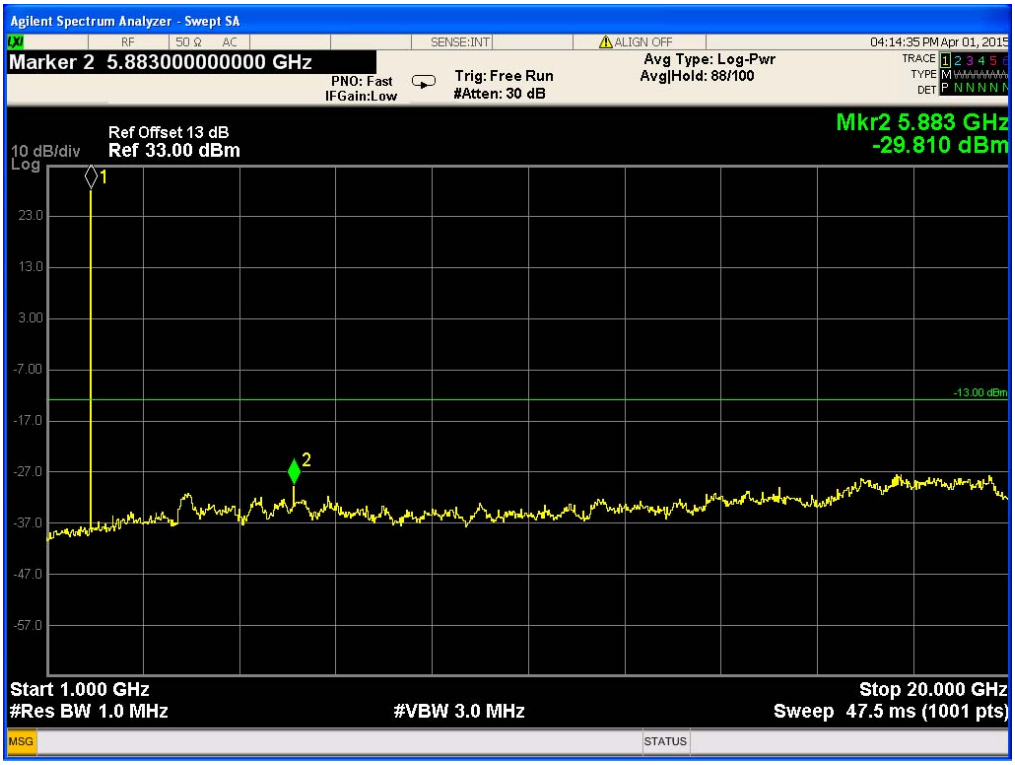
Conducted Spurious Emission on Channel 512



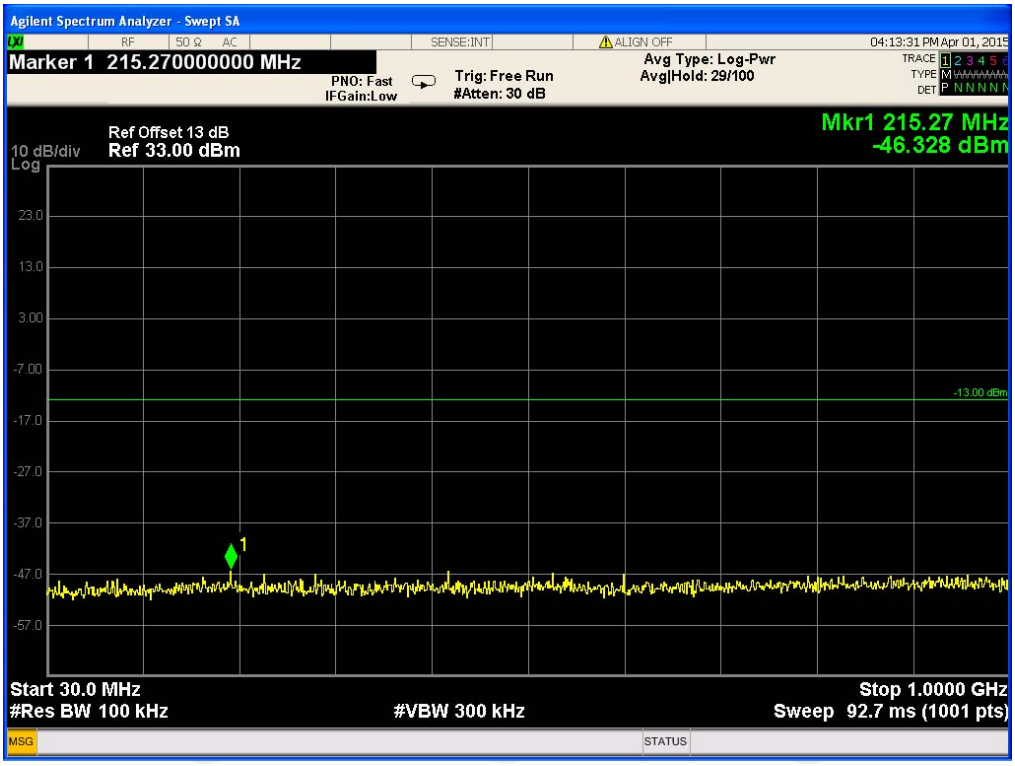


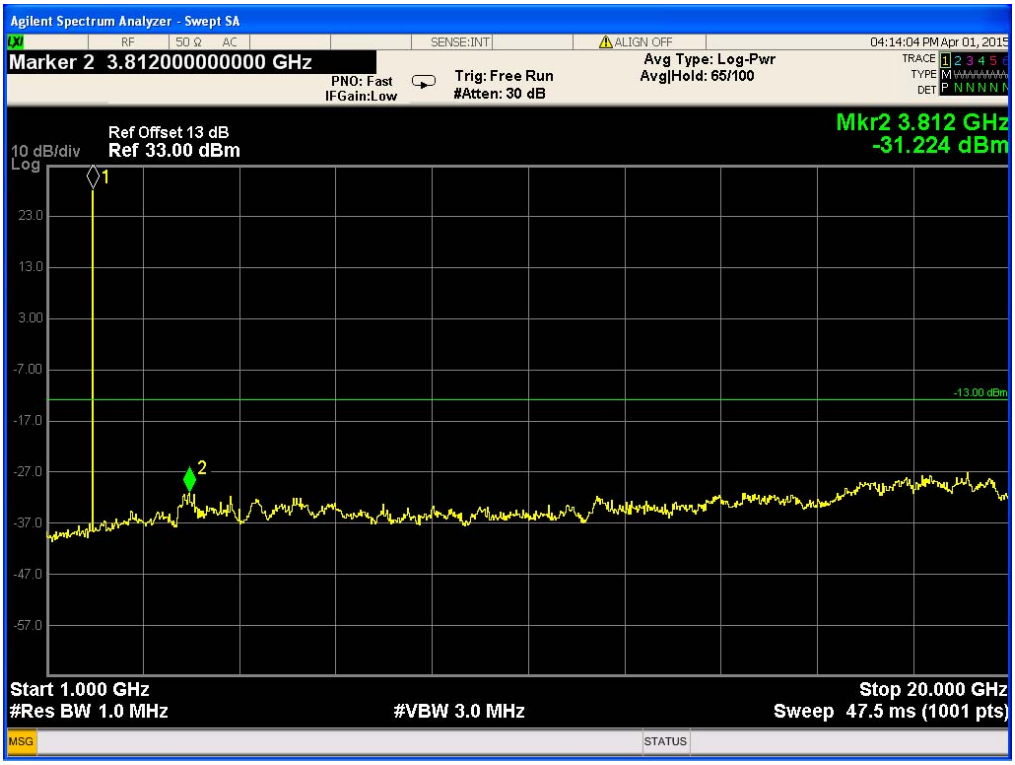
Conducted Spurious Emission on Channel 661





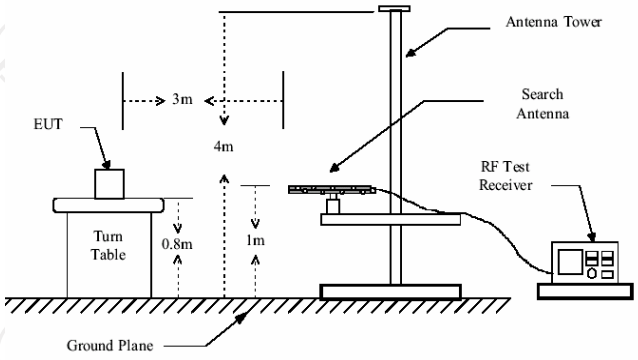
Conducted Spurious Emission on Channel 810

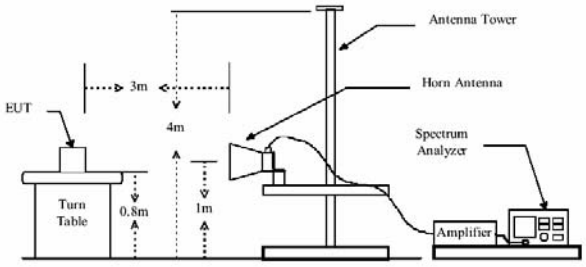




6.6. Effective Radiated Power and Effective Isotropic Radiated Power Measurement

6.6.1. Test Specification

<table>
<tr><td>Test Requirement:</td><td>FCC part 22.913(a) and FCC part 24.232(b)</td></tr>
<tr><td>Test Method:</td><td>FCC part 2.1046</td></tr>
<tr><td>Receiver Setup:</td><td>
<table>
<tr><td></td><td>GSM/GPRS/GPRS</td><td>WCDMA/HSPA</td></tr>
<tr><td>SPAN</td><td>500kHz</td><td>10MHz</td></tr>
<tr><td>RBW</td><td>10kHz</td><td>100kHz</td></tr>
<tr><td>VBW</td><td>30kHz</td><td>300kHz</td></tr>
<tr><td>Detector</td><td>RMS</td><td>RMS</td></tr>
<tr><td>Trace</td><td>Average</td><td>Average</td></tr>
<tr><td>Average Type</td><td>Power</td><td>Power</td></tr>
<tr><td>Sweep Count</td><td>100</td><td>100</td></tr>
</table>
</td></tr>
<tr><td>Limit:</td><td>GSM850: 7W ERP
PCS1900: 2W EIRP</td></tr>
<tr><td>Test setup:</td><td>For ERP
 

For EIRP
 
</td></tr>
<tr><td>Test Procedure:</td><td>1. The testing follows FCC KDB 971168 v02r02 Section 5.2.1. (for CDMA/WCDMA), Section 5.2.2.2 (for GSM/GPRS/GPRS) and ANSI / TIA-603-C-2004 Section 2.2.17.
2. The EUT was placed on a non-conductive rotating</td></tr>
</table>

	platform 0.8 meters high in a semi-anechoic chamber. The radiated emission at the fundamental frequency was measured at 3 m with a test antenna and a spectrum analyzer with RMS detector per section 5. of KDB 971168 D01. 3. During the measurement, the system simulator parameters were set to force the EUT transmitting at maximum output power. The maximum emission was recorded from analyzer power level (LVL) from the 360 degrees rotation of the turntable and the test antenna raised and lowered over a range from 1 to 4 meters in both horizontally and vertically polarized orientations. 4. Effective Isotropic Radiated Power (EIRP) was measured by substitution method according to TIA/EIA-603-C. The EUT was replaced by dipole antenna (substitution antenna) at the same location, and then a known power from S.G. was applied into the dipole antenna through a Tx cable, and then recorded the maximum Analyzer reading through raised and lowered the test antenna. The correction factor (in dB) = S.G. - Tx Cable loss + Substitution antenna gain - Analyzer reading. Then the EUT's EIRP was calculated with the correction factor, EIRP= LVL + Correction factor and ERP = EIRP – 2.15 .
Test results:	PASS

6.6.2. Test Instruments

Radiated Emission Test Site (966)				
Name of Equipment	**Manufacturer**	**Model**	**Serial Number**	**Calibration Due**
ESPI Test Receiver	ROHDE&SCHWARZ	ESVD	100008	Sep.16 , 2015
Spectrum Analyzer	ROHDE&SCHWARZ	FSEM	848597/001	Sep.16 , 2015
Broadband Antenna	Schwarzbeck	VULB9163	340	Sep.16 , 2015
Horn Antenna	Schwarzbeck	BBHA 9120D	631	Sep.16 , 2015
Broadband Antenna	Schwarzbeck	VULB9163	412	Sep.16 , 2015
Horn Antenna	Schwarzbeck	BBHA 9120D	813	Sep.16 , 2015
Coax cable	TCT	N/A	N/A	Sep.15 , 2015
Coax cable	TCT	N/A	N/A	Sep.15 , 2015
Coax cable	TCT	N/A	N/A	Sep.15 , 2015

Coax cable	TCT	N/A	N/A	Sep.15 , 2015
EMI Test Software	Shurple Technology	EZ-EMC	N/A	N/A

Note: *The calibration interval of the above test instruments is 12 months and the calibrations are traceable to international system unit (SI).*

6.6.3. Test Data

Test Result of ERP

GSM850 (GSM) Radiated Power ERP				
Horizontal Polarization				
Frequency (MHz)	**LVL (dBm)**	**Correction Factor (dB)**	**ERP (dBm)**	**ERP (W)**
824.40	10.47	21.66	29.98	1.00
836.40	10.08	21.54	29.47	0.89
848.80	11.19	21.46	30.50	1.10
Vertical Polarization				
Frequency (MHz)	**LVL (dBm)**	**Correction Factor (dB)**	**ERP (dBm)**	**ERP (W)**
824.40	7.36	21.66	26.87	0.49
836.40	7.15	21.54	26.54	0.45
848.80	6.16	21.46	25.47	0.35

** ERP = LVL (dBm) + Correction Factor (dB) – 2.15*
Correction Factor= S.G. Power - Cable loss + Antenna Gain- SPA. Reading

GSM850 (GPRS class 8) Radiated Power ERP				
Horizontal Polarization				
Frequency (MHz)	**LVL (dBm)**	**Correction Factor (dB)**	**ERP (dBm)**	**ERP (W)**
824.40	7.84	21.66	27.35	0.54
836.40	8.03	21.54	27.42	0.55
848.80	8.58	21.46	27.89	0.62
Vertical Polarization				
Frequency (MHz)	**LVL (dBm)**	**Correction Factor (dB)**	**ERP (dBm)**	**ERP (W)**
824.40	4.74	21.66	24.25	0.27
836.40	4.00	21.54	23.39	0.22
848.80	5.41	21.46	24.72	0.30

** ERP = LVL (dBm) + Correction Factor (dB) – 2.15*
Correction Factor= S.G. Power - Cable loss + Antenna Gain- SPA. Reading

Test Result of EIRP

GSM1900 (GSM) Radiated Power EIRP				
Horizontal Polarization				
Frequency (MHz)	**LVL (dBm)**	**Correction Factor (dB)**	**ERP (dBm)**	**ERP (W)**
1850.20	15.62	11.25	26.87	0.49
1880.00	14.85	11.69	26.54	0.45
1909.80	16.39	11.46	27.85	0.61
Vertical Polarization				
Frequency (MHz)	**LVL (dBm)**	**Correction Factor (dB)**	**ERP (dBm)**	**ERP (W)**
1850.20	17.07	11.25	28.32	0.68
1880.00	17.20	11.69	28.89	0.77
1909.80	17.56	11.46	29.02	0.80

EIRP = LVL (dBm) + Correction Factor (dB)
Correction Factor= S.G. Power - Cable loss + Antenna Gain- SPA. Reading

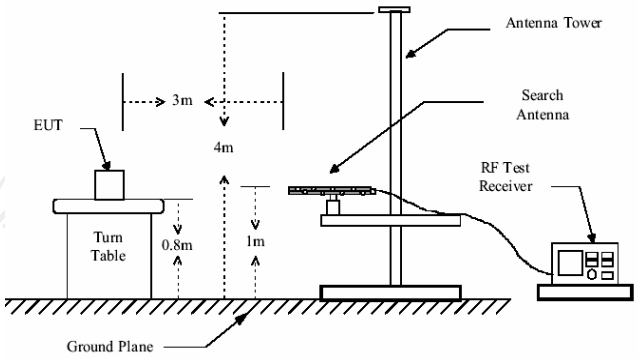
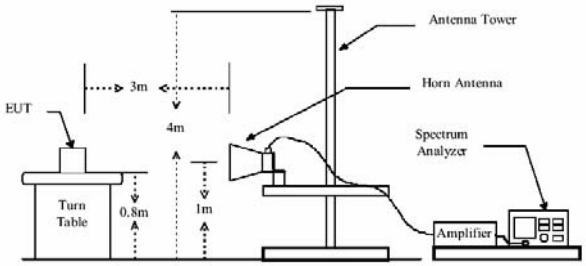
GSM1900 (GPRS class 8) Radiated Power EIRP				
Horizontal Polarization				
Frequency (MHz)	**LVL (dBm)**	**Correction Factor (dB)**	**ERP (dBm)**	**ERP (W)**
1850.20	12.11	11.25	23.36	0.22
1880.00	12.52	11.69	24.21	0.26
1909.80	12.74	11.46	24.20	0.26
Vertical Polarization				
Frequency (MHz)	**LVL (dBm)**	**Correction Factor (dB)**	**ERP (dBm)**	**ERP (W)**
1850.20	15.34	11.25	26.59	0.46
1880.00	15.05	11.69	26.74	0.47
1909.80	15.55	11.46	27.01	0.50

** EIRP = LVL (dBm) + Correction Factor (dB)*
Correction Factor= S.G. Power - Cable loss + Antenna Gain- SPA. Reading

Hotline: 400-6611-140 Tel: 86-755-27673339 Fax: 86-755-27673332 http://www.tct-lab.com

6.7. Field Strength of Spurious Radiation Measurement

6.7.1. Test Specification

Test Requirement:	FCC part 22.917(a) and FCC part 24.238(a)
Test Method:	FCC part 2.1053
Limit:	-13dBm
Test setup:	For 30MHz~1GHz  Above 1GHz 
Test Procedure:	1. The testing follows FCC KDB 971168 v02r02 Section 5.8 and ANSI / TIA-603-C-2004 Section 2.2.12. 2. The EUT was placed on a rotatable wooden table 0.8 meters above the ground. 3. The EUT was set 3 meters from the receiving antenna, which was mounted on the antenna tower. 4. The table was rotated 360 degrees to determine the position of the highest spurious emission. 5. The height of the receiving antenna is varied between one meter and four meters to search for the maximum spurious emission for both horizontal and vertical polarizations. 6. Make the measurement with the spectrum analyzer's RBW = 1MHz, VBW = 3MHz, taking record of maximum spurious emission. 7. A horn antenna was substituted in place of the EUT and was driven by a signal generator. 8. Tune the output power of signal generator to the

	same emission level with EUT maximum spurious emission. 9. Taking the record of output power at antenna port. 10. Repeat step 7 to step 8 for another polarization. 11. EIRP (dBm) = S.G. Power – Tx Cable Loss + Tx Antenna Gain 12. ERP (dBm) = EIRP - 2.15 13. The RF fundamental frequency should be excluded against the limit line in the operating frequency band. 14. The limit line is derived from 43 + 10log(P) dB below the transmitter power P(Watts) = P(W) - [43 + 10log(P)] (dB) = [30 + 10log(P)] (dBm) - [43 + 10log(P)] (dB) = -13dBm.
Test results:	PASS

6.7.2. Test Instruments

Radiated Emission Test Site (966)				
Name of Equipment	**Manufacturer**	**Model**	**Serial Number**	**Calibration Due**
ESPI Test Receiver	ROHDE&SCHWARZ	ESVD	100008	Sep.16 , 2015
Spectrum Analyzer	ROHDE&SCHWARZ	FSEM	848597/001	Sep.16 , 2015
Broadband Antenna	Schwarzbeck	VULB9163	340	Sep.16 , 2015
Pre-Amplifier	HP	8447D	2727A05017	Sep.16 , 2015
Pre-Amplifier	EM Electronics Corporation CO.,LTD	EM30265	07032613	Sep.16 , 2015
Horn Antenna	Schwarzbeck	BBHA 9120D	631	Sep.16 , 2015
Coax cable	TCT	N/A	N/A	Sep.15 , 2015
Coax cable	TCT	N/A	N/A	Sep.15 , 2015
Coax cable	TCT	N/A	N/A	Sep.15 , 2015
Coax cable	TCT	N/A	N/A	Sep.15 , 2015
EMI Test Software	Shurple Technology	EZ-EMC	N/A	N/A

Note: *The calibration interval of the above test instruments is 12 months and the calibrations are traceable to international system unit (SI).*

6.7.3. Test Data

Band	GSM850		Test channel:	Lowest
Test mode:	GSM Link		Temperature :	23~24°C
			Relative Humidity:	46~48%
Note:	Spurious emissions within 30-1000MHz were found more than 20dB below limit line.			
Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
	Polarization	Level (dBm)		
1648.40	Vertical	-43.51	-13.00	PASS
2472.60	V	-40.28		
3296.80	V	-48.10		
1648.40	Horizontal	-43.41		
2472.60	H	-35.43		
3296.80	H	-48.71		
Test mode:	GSM850		Test channel:	Middle
Test mode:	GSM Link		Temperature :	23~24°C
			Relative Humidity:	46~48%
Note:	Spurious emissions within 30-1000MHz were found more than 20dB below limit line.			
Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
	Polarization	Level (dBm)		
1673.20	Vertical	-41.84	-13.00	PASS
2509.80	V	-44.85		
3346.40	V	-47.12		
1673.20	Horizontal	-41.32		
2509.80	H	-36.86		
3346.40	H	-47.84		
Test mode:	GSM850		Test channel:	Highest
Test mode:	GSM Link		Temperature :	23~24°C
			Relative Humidity:	46~48%
Note:	Spurious emissions within 30-1000MHz were found more than 20dB below limit line.			
Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
	Polarization	Level (dBm)		
1697.60	Vertical	-41.76	-13.00	PASS
2546.40	V	-44.96		
3395.20	V	-56.32		
1697.60	Horizontal	-41.69		
2546.40	H	-45.86		
3395.20	H	-53.84		

Hotline: 400-6611-140 Tel: 86-755-27673339 Fax: 86-755-27673332 http://www.tct-lab.com

Band	GSM850		Test channel:	Lowest
Test mode:	GPRS class 8 Link		Temperature :	23~24°C
			Relative Humidity:	46~48%
Note:	Spurious emissions within 30-1000MHz were found more than 20dB below limit line.			
Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
	Polarization	Level (dBm)		
1648.40	Vertical	-43.51	-13.00	PASS
2472.60	V	-49.89		
3296.80	V	-49.38		
1648.40	Horizontal	-44.59		
2472.60	H	-49.43		
3296.80	H	-50.34		
Test mode:	GSM850		Test channel:	Middle
Test mode:	GPRS class 8 Link		Temperature :	23~24°C
			Relative Humidity:	46~48%
Note:	Spurious emissions within 30-1000MHz were found more than 20dB below limit line.			
Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
	Polarization	Level (dBm)		
1673.20	Vertical	-43.89	-13.00	PASS
2509.80	V	-48.72		
3346.40	V	-48.53		
1673.20	Horizontal	-43.65		
2509.80	H	-46.63		
3346.40	H	-47.84		
Test mode:	GSM850		Test channel:	Highest
Test mode:	GPRS class 8 Link		Temperature :	23~24°C
			Relative Humidity:	46~48%
Note:	Spurious emissions within 30-1000MHz were found more than 20dB below limit line.			
Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
	Polarization	Level (dBm)		
1697.60	Vertical	-42.85	-13.00	PASS
2546.40	V	-46.87		
3395.20	V	-52.43		
1697.60	Horizontal	-43.63		
2546.40	H	-46.63		
3395.20	H	-56.84		

Hotline: 400-6611-140 Tel: 86-755-27673339 Fax: 86-755-27673332 http://www.tct-lab.com

Band	GSM 1900		Test channel:	Lowest
Test mode:	GSM Link		Temperature :	23~24°C
			Relative Humidity:	46~48%
Note:	Spurious emissions within 30-1000MHz were found more than 20dB below limit line.			
Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
	Polarization	Level (dBm)		
3700.40	Vertical	-52.79	-13.00	PASS
5550.60	V	-54.82		
7400.80	V	-58.65		
3700.40	Horizontal	-52.65		
5550.60	H	-55.96		
7400.80	H	-56.26		
Test mode:	GSM 1900		Test channel:	Middle
Test mode:	GSM Link		Temperature :	23~24°C
			Relative Humidity:	46~48%
Note:	Spurious emissions within 30-1000MHz were found more than 20dB below limit line.			
Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
	Polarization	Level (dBm)		
3760.00	Vertical	-59.65	-13.00	PASS
5640.00	V	-53.45		
7520.00	V	-57.32		
3760.00	Horizontal	-55.62		
5640.00	H	-58.86		
7520.00	H	-58.84		
Test mode:	GSM 1900		Test channel:	Highest
Test mode:	GSM Link		Temperature :	23~24°C
			Relative Humidity:	46~48%
Note:	Spurious emissions within 30-1000MHz were found more than 20dB below limit line.			
Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
	Polarization	Level (dBm)		
3819.60	Vertical	-51.84	-13.00	PASS
5729.40	V	-54.75		
7639.20	V	-57.42		
3819.60	Horizontal	-51.22		
5729.40	H	-56.66		
7639.20	H	-57.74		

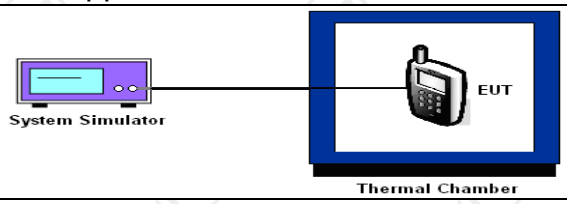
Hotline: 400-6611-140 Tel: 86-755-27673339 Fax: 86-755-27673332 http://www.tct-lab.com

Band	GSM 1900		Test channel:	Lowest
Test mode:	GPRS class 8 Link		Temperature :	23~24°C
			Relative Humidity:	46~48%
Note:	Spurious emissions within 30-1000MHz were found more than 20dB below limit line.			
Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
	Polarization	Level (dBm)		
3700.40	Vertical	-52.41	-13.00	PASS
5550.60	V	-53.32		
7400.80	V	-59.42		
3700.40	Horizontal	-52.41		
5550.60	H	-51.53		
7400.80	H	-53.64		
Test mode:	GSM 1900		Test channel:	Middle
Test mode:	GPRS class 8 Link		Temperature :	23~24°C
			Relative Humidity:	46~48%
Note:	Spurious emissions within 30-1000MHz were found more than 20dB below limit line.			
Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
	Polarization	Level (dBm)		
3760.00	Vertical	-54.34	-13.00	PASS
5640.00	V	-55.85		
7520.00	V	-56.32		
3760.00	Horizontal	-54.78		
5640.00	H	-54.96		
7520.00	H	-57.84		
Test mode:	GSM 1900		Test channel:	Highest
Test mode:	GPRS class 8 Link		Temperature :	23~24°C
			Relative Humidity:	46~48%
Note:	Spurious emissions within 30-1000MHz were found more than 20dB below limit line.			
Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
	Polarization	Level (dBm)		
3819.60	Vertical	-52.64	-13.00	PASS
5729.40	V	-53.76		
7639.20	V	-54.41		
3819.60	Horizontal	-53.82		
5729.40	H	-52.77		
7639.20	H	-55.44		

Hotline: 400-6611-140 Tel: 86-755-27673339 Fax: 86-755-27673332 http://www.tct-lab.com

6.8. Frequency Stability Measurement

6.8.1. Test Specification

Test Requirement:	FCC Part 2.1055(a)(1)(b)
Test Method:	FCC Part 2.1055(a)(1)(b)
Limit:	±2.5 ppm
Test Setup:	
Test Procedure:	**Test Procedures for Temperature Variation** 1. The testing follows FCC KDB 971168 v02r02 Section 9.0. 2. The EUT was set up in the thermal chamber and connected with the system simulator. 3. With power OFF, the temperature was decreased to -30°C and the EUT was stabilized before testing. Power was applied and the maximum change in frequency was recorded within one minute. 4. With power OFF, the temperature was raised in 10°C steps up to 50°C. The EUT was stabilized at each step for at least half an hour. Power was applied and the maximum frequency change was recorded within one minute. **Test Procedures for Voltage Variation** 1. The testing follows FCC KDB 971168 v02r02 Section 9.0. 2. The EUT was placed in a temperature chamber at 25±5° C and connected with the system simulator. 3. The power supply voltage to the EUT was varied from BEP to 115% of the nominal value measured at the input to the EUT. 4. The variation in frequency was measured for the worst case.
Test Result:	PASS

6.8.2. Test Instruments

Equipment	Manufacturer	Model	Serial Number	Calibration Due
System simulator	R&S	CMU200	111382	Sep. 16, 2015
Spectrum Analyzer	Agilent	N9020A	MY49100060	Oct. 21, 2015

Note: *The calibration interval of the above test instruments is 12 months and the calibrations are traceable to international system unit (SI).*

6.8.3. Test Data

Test Result of Temperature Variation

Band :	GSM 850	Channel:	189
Limit (ppm) :	2.5ppm	Frequency:	836.6

Temperature (°C)	GSM Deviation (ppm)	GPRS Class8 Deviation (ppm)	Result
50	+0.011	+0.009	PASS
40	+0.013	+0.013	
30	+0.012	+0.011	
20	+0.009	+0.011	
10	+0.011	+0.010	
0	+0.012	+0.013	
-10	+0.008	+0.010	
-20	+0.009	+0.012	
-30	+0.011	+0.013	

Band :	GSM 1900	Channel:	661
Limit (ppm) :	2.5ppm	Frequency:	1880

Temperature (°C)	GSM Deviation (ppm)	GPRS Class8 Deviation (ppm)	Result
50	+0.023	+0.012	PASS
40	+0.021	+0.018	
30	+0.019	+0.015	
20	+0.018	+0.016	
10	+0.022	+0.013	
0	+0.023	+0.016	
-10	+0.018	+0.016	
-20	+0.017	+0.014	
-30	+0.022	+0.018	

Note: *The frequency fundamental emissions stay within the authorized frequency block based on the frequency deviation measured is small.*

Hotline: 400-6611-140 Tel: 86-755-27673339 Fax: 86-755-27673332 http://www.tct-lab.com

Test Result of Voltage Variation

Band & Channel	Mode	Voltage (Volt)	Deviation (ppm)	Limit (ppm)	Result
GSM 850 CH189	GSM	4.2	+0.011	2.5	PASS
		3.8	+0.009		
		BEP	+0.012		
	GPRS class 8	4.2	+0.027		
		3.8	+0.029		
		BEP	+0.031		
GSM 1900 CH661	GSM	4.2	+0.022	(Note 3.)	
		3.8	+0.021		
		BEP	+0.023		
	GPRS class 8	4.2	+0.024		
		3.8	+0.024		
		BEP	+0.025		

Note:

1. *Normal Voltage = 3.7V.*
2. *Battery End Point (BEP) = 3.40 V.*
3. *The frequency fundamental emissions stay within the authorized frequency block based on the frequency deviation measured is small.*

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

Hotline: 400-6611-140 Tel: 86-755-27673339 Fax: 86-755-27673332 http://www.tct-lab.com