
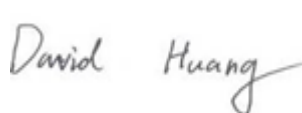



# RF TEST REPORT



Report No.: 17071365-FCC-R1

Supersede Report No.: N/A

Applicant	TECNO MOBILE LIMITED	
Product Name	Mobile phone	
Model No.	T473	
Serial No.	N/A	
Test Standard	FCC Part 22(H):2016 ;FCC Part 24(E):2016; ANSI/TIA-603-D: 2010	
Test Date	December 07 to January 03, 2018	
Issue Date	January 04, 2018	
Test Result	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail	
Equipment complied with the specification	<input checked="" type="checkbox"/>	
Equipment did not comply with the specification	<input type="checkbox"/>	
		
Aaron Liang Test Engineer	David Huang Checked By	
This test report may be reproduced in full only Test result presented in this test report is applicable to the tested sample only		

Issued by:

**SIEMIC (SHENZHEN-CHINA) LABORATORIES**

Zone A, Floor 1, Building 2 Wan Ye Long Technology Park

South Side of Zhoushi Road, Bao' an District, Shenzhen, Guangdong China 518108

Phone: +86 0755 2601 4629801 Email: [China@siemic.com.cn](mailto:China@siemic.com.cn)

## Laboratories Introduction

SIEMIC, headquartered in the heart of Silicon Valley, with superior facilities in US and Asia, is one of the leading independent testing and certification facilities providing customers with one-stop shop services for Compliance Testing and Global Certifications.



In addition to testing and certification, SIEMIC provides initial design reviews and compliance management throughout a project. Our extensive experience with China, Asia Pacific, North America, European, and International compliance requirements, assures the fastest, most cost effective way to attain regulatory compliance for the global markets.

### Accreditations for Conformity Assessment

Country/Region	Scope
USA	EMC, RF/Wireless, SAR, Telecom
Canada	EMC, RF/Wireless, SAR, Telecom
Taiwan	EMC, RF, Telecom, SAR, Safety
Hong Kong	RF/Wireless, SAR, Telecom
Australia	EMC, RF, Telecom, SAR, Safety
Korea	EMI, EMS, RF, SAR, Telecom, Safety
Japan	EMI, RF/Wireless, SAR, Telecom
Singapore	EMC, RF, SAR, Telecom
Europe	EMC, RF, SAR, Telecom, Safety

Test Report	17071365-FCC-R1
Page	3 of 64

This page has been left blank intentionally.

# CONTENTS

1. REPORT REVISION HISTORY.....	5
2. CUSTOMER INFORMATION .....	5
3. TEST SITE INFORMATION .....	5
4. EQUIPMENT UNDER TEST (EUT) INFORMATION .....	7
5. TEST SUMMARY .....	9
6. MEASUREMENTS, EXAMINATION AND DERIVED RESULTS .....	10
6.1 RF EXPOSURE (SAR) .....	10
6.2 RF OUTPUT POWER .....	11
6.3 PEAK-AVERAGE RATIO .....	18
6.4 OCCUPIED BANDWIDTH.....	21
6.5 SPURIOUS EMISSIONS AT ANTENNA TERMINALS .....	27
6.6 SPURIOUS RADIATED EMISSIONS .....	34
6.7 BAND EDGE .....	38
6.8 FREQUENCY STABILITY .....	44
ANNEX A. TEST INSTRUMENT .....	47
ANNEX B. EUT AND TEST SETUP PHOTOGRAPHS .....	49
ANNEX C. TEST SETUP AND SUPPORTING EQUIPMENT .....	60
ANNEX C.II. EUT OPERATING CONKITIONS .....	62
ANNEX D. USER MANUAL / BLOCK DIAGRAM / SCHEMATICS / PARTLIST .....	63
ANNEX E. DECLARATION OF SIMILARITY.....	64

## 1. Report Revision History

Report No.	Report Version	Description	Issue Date
17071365-FCC-R1	NONE	Original	January 04, 2018

## 2. Customer information

Applicant Name	TECNO MOBILE LIMITED
Applicant Add	ROOMS 05-15, 13A/F., SOUTH TOWER, WORLD FINANCE CENTRE, HARBOUR CITY, 17 CANTON ROAD, TSIM SHA TSUI, KOWLOON, HONG KONG
Manufacturer	SHENZHEN TECNO TECHNOLOGY CO.,LTD.
Manufacturer Add	1-4th Floor,3rd Building,Pacific Industrial Park,No.2088,Shenyan Road,Yantian District,Shenzhen,Guangdong,China

## 3. Test site information

Test Lab A:

Lab performing tests	SIEMIC (Shenzhen-China) LABORATORIES
Lab Address	Zone A, Floor 1, Building 2 Wan Ye Long Technology Park South Side of Zhoushi Road, Bao' an District, Shenzhen, Guangdong China 518108
FCC Test Site No.	535293
IC Test Site No.	4842E-1
Test Software	Radiated Emission Program-To Shenzhen v2.0

Test Lab B:

Lab performing tests	SIEMIC (Nanjing-China) Laboratories
Lab Address	2-1 Longcang Avenue Yuhua Economic and Technology Development Park, Nanjing, China
FCC Test Site No.	694825
IC Test Site No.	4842B-1



Test Report	17071365-FCC-R1
Page	6 of 64

Test Software	EZ_EMC(ver.lcp-03A1)
---------------	----------------------

Note: We just perform Radiated Spurious Emission above 18GHz in the test Lab. B.

## 4. Equipment under Test (EUT) Information

Description of EUT:	Mobile phone
Main Model:	T473
Serial Model:	N/A
Date EUT received:	December 06, 2017
Test Date(s):	December 07 to January 03, 2018
Equipment Category :	PCE
Antenna Gain:	GSM850: -0.2dBi PCS1900: 1.7dBi Bluetooth: 2.0dBi
Antenna Type:	GSM: PIFA antenna BT: PCB antenna
Type of Modulation:	GSM / GPRS: GMSK Bluetooth: GFSK, $\pi$ /4DQPSK, 8DPSK
RF Operating Frequency (ies):	GSM850 TX: 824.2 ~ 848.8 MHz; RX: 869.2 ~ 893.8 MHz PCS1900 TX: 1850.2 ~ 1909.8 MHz; RX: 1930.2 ~ 1989.8 MHz Bluetooth: 2402-2480 MHz
Maximum Conducted AV Power to Antenna:	GSM Voice:GSM850: 32.33dBm PCS1900: 29.89dBm GPRS:GSM850: 32.33dBm PCS1900: 29.95dBm EGPRS:GSM850: 32.28dBm PCS1900: 29.81dBm
ERP/EIRP:	GSM Voice:GSM850: 29.98dBm / ERP PCS1900: 31.59dBm / EIRP GPRS:GSM850: 29.98dBm / ERP PCS1900: 31.65dBm / EIRP

EGPRS:GSM850: 29.93dBm / ERP

PCS1900: 31.51dBm / EIRP

Number of Channels: GSM 850: 124CH  
PCS1900: 299CH

Port: Bluetooth: 79CH  
USB Port, Earphone Port

Input Power: Adapter:  
Model: A31-500500  
Input: AC100-240V~50/60Hz,0.2A  
Output: DC 5.0V, 500mA  
Battery:  
Model: BL-19CT  
Spec: 3.7V, 1900mAh/1850mAh, 7.03Wh/6.84Wh  
Voltage: 4.2V

Trade Name : TECNO

GPRS Multi-slot class 8/10/11/12

FCC ID: 2ADYY-T473



## 5. Test Summary

The product was tested in accordance with the following specifications.

All testing has been performed according to below product classification:

FCC Rules	Description of Test	Result
§ 1.1307; § 2.1093	RF Exposure (SAR)	Compliance
§2.1046; § 22.913(a); § 24.232(c); § 27.50(c.10) ;	RF Output Power	Compliance
§ 24.232 (d) ;	Peak-Average Ratio	Compliance
§ 2.1049; § 22.905; § 22.917; § 24.238;	99% & -26 dB Occupied Bandwidth	Compliance
§ 2.1051; § 22.917(a); § 24.238(a);	Spurious Emissions at Antenna Terminal	Compliance
§ 2.1053; § 22.917(a); § 24.238(a);	Field Strength of Spurious Radiation	Compliance
§ 22.917(a); § 24.238(a);	Out of band emission, Band Edge	Compliance
§ 2.1055; § 22.355; § 24.235;	Frequency stability vs. temperature Frequency stability vs. voltage	Compliance

Note: Testing was performed by configuring EUT to maximum output power status, the declared output power class for different

### Measurement Uncertainty

Emissions		
Test Item	Description	Uncertainty
Band Edge and Radiated Spurious Emissions	Confidence level of approximately 95% (in the case where distributions are normal), with a coverage factor of 2 (for EUTs < 0.5m X 0.5m X 0.5m)	+5.6dB/-4.5dB
-	-	-

## **6. MEASUREMENTS, EXAMINATION AND DERIVED RESULTS**

### 6.1 RF Exposure (SAR)

Test Result: Pass

The EUT is a portable device, thus requires SAR evaluation;

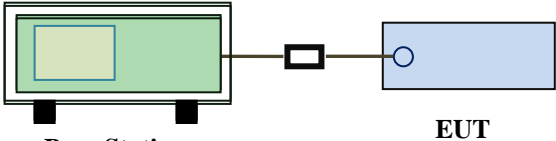
Please refer to RF Exposure Evaluation Report: 17071365-FCC-H.

## 6.2 RF Output Power

Temperature	26 °C
Relative Humidity	55%
Atmospheric Pressure	1017mbar
Test date :	December 18, 2017
Tested By :	Aaron Liang

### Requirement(s):

Spec	Item	Requirement	Applicable
§22.913 (a)	a)	ERP:38.45dBm	<input checked="" type="checkbox"/>
§24.232 (c)	b)	EIRP:33dBm	<input checked="" type="checkbox"/>

Test Setup	 <p style="text-align: center;">Base Station                      EUT</p>
------------	--------------------------------------------------------------------------------------------------------------------------------------------------------------

Test Procedure	<p>For Conducted Power:</p> <ul style="list-style-type: none"> <li>- The transmitter output port was connected to base station.</li> <li>- Set EUT at maximum power through base station.</li> <li>- Select lowest, middle, and highest channels for each band and different test mode.</li> </ul> <p>For ERP/EIRP:</p> <p>According with KDB 971168 v02r02</p> <ul style="list-style-type: none"> <li>- The transmitter was placed on a wooden turntable, and it was transmitting into a non-radiating load which was also placed on the turntable.</li> <li>- The measurement antenna was placed at a distance of 3 meters from the EUT. During the tests, the antenna height and polarization as well as EUT azimuth were varied in order to identify the maximum level of emissions from the EUT. The test was performed by placing the EUT on 3-orthogonal axis.</li> <li>- The frequency range up to tenth harmonic of the fundamental frequency was investigated.</li> </ul>
----------------	-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

	<ul style="list-style-type: none"> <li>- Remove the EUT and replace it with substitution antenna. A signal generator was connected to the substitution antenna by a non-radiating cable. The absolute levels of the spurious emissions were measured by the substitution.</li> <li>- Spurious emissions in dB = 10 log (TX power in Watts/0.001) – the absolute level</li> <li>- Spurious attenuation limit in dB = 43 + 10 Log10 (power out in Watts).</li> </ul>
Remark	
Result	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail

Test Data     Yes                       N/A  
 Test Plot     Yes (See below)             N/A

## Conducted Power

### GSM Mode:

Burst Average Power (dBm);								
Band	GSM850				PCS1900			
Channel	128	190	251	Tune up Power tolerant	512	661	810	Tune up Power tolerant
Frequency (MHz)	824.2	836.6	848.8	/	1850.2	1880	1909.8	/
GSM Voice (1 uplink),GMSK	32.31	<b>32.33</b>	32.31	32±1	29.18	29.45	<b>29.89</b>	29±1
GPRS Multi-Slot Class 8 (1 uplink),GMSK	32.31	<b>32.33</b>	32.31	32±1	29.26	29.53	<b>29.95</b>	29±1
GPRS Multi-Slot Class 10 (2 uplink) GMSK	31.24	31.26	31.25	31±1	28.15	28.36	28.86	28±1
GPRS Multi-Slot Class 11 (3 uplink) GMSK	29.23	29.18	29.09	29±1	26.18	26.33	26.73	26±1
GPRS Multi-Slot Class 12 (4 uplink) GMSK	28.21	28.22	28.17	28±1	24.89	25.21	25.63	25±1
EGPRS Multi-Slot Class 8(1 uplink),8PSK	32.24	<b>32.28</b>	32.26	32±1	29.29	29.55	<b>29.81</b>	29±1
EGPRS Multi-Slot Class10(2uplink),8PSK	31.18	31.21	31.18	31±1	28.17	28.42	28.84	28±1
EGPRS Multi-Slot Class11(3uplink),8PSK	29.24	29.16	29.08	29±1	26.18	26.31	26.77	26±1
EGPRS Multi-Slot Class12(4uplink),8PSK	29.19	28.22	28.04	28±1	24.91	25.21	25.67	25±1

Remark :

GPRS, CS1 coding scheme.

EGPRS, MCS1 coding scheme.

Multi-Slot Class 8 , Support Max 4 downlink, 1 uplink , 5 working link



Test Report	17071365-FCC-R1
Page	14 of 64

Multi-Slot Class 10 , Support Max 4 downlink, 2 uplink , 5 working link  
Multi-Slot Class 11 , Support Max 4 downlink, 3 uplink , 5 working link  
Multi-Slot Class 12 , Support Max 4 downlink, 4 uplink , 5 working link

## ERP & EIRP

### GSM Voice

#### ERP for Cellular Band (Part 22H)

Frequency (MHz)	Substituted level (dBm)	Antenna Polarization	Antenna Gain correction (dBi)	Cable Loss (dB)	Absolute Level (dBm)	Limit (dBm)
824.2	24.39	V	6.1	0.53	29.96	38.45
824.2	23.62	H	6.1	0.53	29.19	38.45
836.6	24.31	V	6.2	0.53	<b>29.98</b>	38.45
836.6	23.01	H	6.2	0.53	28.68	38.45
848.8	24.29	V	6.2	0.53	29.96	38.45
848.8	23.3	H	6.2	0.53	28.97	38.45

#### EIRP for PCS Band (Part 24E)

Frequency (MHz)	Substituted level (dBm)	Antenna Polarization	Antenna Gain correction (dBi)	Cable Loss (dB)	Absolute Level (dBm)	Limit (dBm)
1850.2	23.72	V	7.88	0.72	30.88	33
1850.2	22.26	H	7.88	0.72	29.42	33
1880	23.99	V	7.88	0.72	31.15	33
1880	22.3	H	7.88	0.72	29.46	33
1909.8	24.45	V	7.86	0.72	<b>31.59</b>	33
1909.8	22.6	H	7.86	0.72	29.74	33

**GPRS:**

**ERP for Cellular Band (Part 22H)**

Frequency (MHz)	Substituted level (dBm)	Antenna Polarization	Antenna Gain correction (dBi)	Cable Loss (dB)	Absolute Level (dBm)	Limit (dBm)
824.2	24.39	V	6.1	0.53	29.96	38.45
824.2	22.51	H	6.1	0.53	28.08	38.45
836.6	24.31	V	6.2	0.53	<b>29.98</b>	38.45
836.6	22.88	H	6.2	0.53	28.55	38.45
848.8	24.29	V	6.2	0.53	29.96	38.45
848.8	23.19	H	6.2	0.53	28.86	38.45

**EIRP for PCS Band (Part 24E)**

Frequency (MHz)	Substituted level (dBm)	Antenna Polarization	Antenna Gain correction (dBi)	Cable Loss (dB)	Absolute Level (dBm)	Limit (dBm)
1850.2	23.8	V	7.88	0.72	30.96	33
1850.2	22.78	H	7.88	0.72	29.94	33
1880	24.07	V	7.88	0.72	31.23	33
1880	22.24	H	7.88	0.72	29.4	33
1909.8	24.51	V	7.86	0.72	<b>31.65</b>	33
1909.8	22.89	H	7.86	0.72	30.03	33

**EGPRS (MCS1):**

**ERP for Cellular Band (Part 22H)**

Frequency (MHz)	Substituted level (dBm)	Antenna Polarization	Antenna Gain correction (dBi)	Cable Loss (dB)	Absolute Level (dBm)	Limit (dBm)
824.2	24.32	V	6.1	0.53	29.89	38.45
824.2	22.53	H	6.1	0.53	28.1	38.45
836.6	24.26	V	6.2	0.53	<b>29.93</b>	38.45
836.6	23.42	H	6.2	0.53	29.09	38.45
848.8	24.24	V	6.2	0.53	29.91	38.45
848.8	22.46	H	6.2	0.53	28.13	38.45



### EIRP for PCS Band (Part 24E)

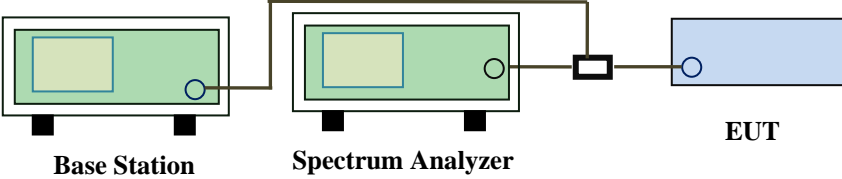
Frequency (MHz)	Substituted level (dBm)	Antenna Polarization	Antenna Gain correction (dBi)	Cable Loss (dB)	Absolute Level (dBm)	Limit (dBm)
1850.2	23.83	V	7.88	0.72	30.99	33
1850.2	22.67	H	7.88	0.72	29.83	33
1880	24.09	V	7.88	0.72	31.25	33
1880	22.16	H	7.88	0.72	29.32	33
1909.8	24.37	V	7.86	0.72	<b>31.51</b>	33
1909.8	22.71	H	7.86	0.72	29.85	33

### 6.3 Peak-Average Ratio

Temperature	26 °C
Relative Humidity	55%
Atmospheric Pressure	1017mbar
Test date :	December 18, 2017
Tested By :	Aaron Liang

Requirement(s):

Spec	Item	Requirement	Applicable
§24.232(d)	a)	The peak-to-average ratio (PAR) of the transmission may not exceed 13dB.	<input checked="" type="checkbox"/>

Test Setup	 <p>The diagram shows a test setup where a Base Station (green box) is connected to a Spectrum Analyzer (green box), which is then connected to an EUT (blue box). The connections are made via cables and a small black component.</p>
------------	----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

Test Procedure	<p><b>According with KDB 971168 v02r02</b></p> <p><b>5.7.2 Alternate procedure for PAPR</b></p> <p><b>5.1.2 Peak power measurements with a peak power meter</b></p> <p>The total peak output power may be measured using a broadband peak RF power meter. The power meter must have a video bandwidth that is greater than or equal to the emission bandwidth and utilize a fast-responding diode detector.</p> <p><b>5.2.3 Average power measurement with average power meter</b></p> <p>As an alternative to the use of a spectrum/signal analyzer or EMI receiver to perform a measurement of the total in-band average output power, a wideband RF average power meter with a thermocouple detector or equivalent can be used under certain conditions</p> <p>If the EUT can be configured to transmit continuously (i.e., the burst duty</p>
----------------	---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

	<p>cycle <math>\geq</math> 98%) and at all times the EUT is transmitting at its maximum output power level, then a conventional wide-band RF power meter can be used.</p> <p>If the EUT cannot be configured to transmit continuously (i.e., the burst duty cycle <math>&lt;</math> 98%), then there are two options for the use of an average power meter. First, a gated average power meter can be used to perform the measurement if the gating parameters can be adjusted such that the power is measured only over active transmission bursts at maximum output power levels. A conventional average power meter can also be used if the measured burst duty cycle is constant (i.e., duty cycle variations are less than <math>\pm</math> 2 percent) by performing the measurement over the on/off burst cycles and then correcting (increasing) the measured level by a factor equal to <math>10\log(1/\text{duty cycle})</math></p>
Remark	
Result	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail

**Test Data**     Yes                       N/A  
**Test Plot**     Yes (See below)             N/A

**GSM : GSM 1900 PK-AV POWER (PART 24E)**

Frequency (MHz)	Conducted power(dBm)		Peak-Average Ratio(PAR)
	Peak	Average	
1850.2	30.08	29.18	0.9
1880	30.26	29.45	0.81
1909.8	30.88	29.89	0.99

**GPRS 1900 PK-AV POWER (PART 24E)**

Frequency (MHz)	Conducted power(dBm)		Peak-Average Ratio(PAR)
	Peak	Average	
1850.2	30.13	29.26	0.87
1880	30.62	29.53	1.09
1909.8	30.96	29.95	1.01

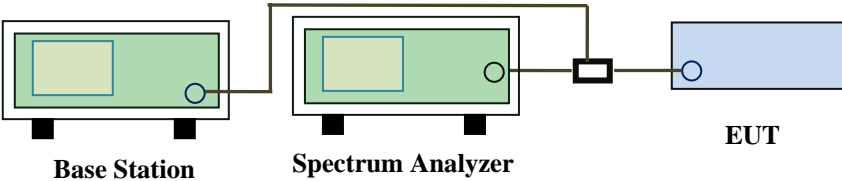
**EGPRS (MSC1) 1900 PK-AV POWER (PART 24E)**

Frequency (MHz)	Conducted power(dBm)		Peak-Average Ratio(PAR)
	Peak	Average	
1850.2	30.22	29.27	0.95
1880	30.56	29.55	1.01
1909.8	30.9	29.91	0.99

## 6.4 Occupied Bandwidth

Temperature	26 °C
Relative Humidity	57%
Atmospheric Pressure	1018mbar
Test date :	December 21, 2017
Tested By :	Aaron Liang

### Requirement(s):

Spec	Item	Requirement	Applicable
§2.1049, §22.917, §22.905 §24.238	a)	99% Occupied Bandwidth(kHz)	<input checked="" type="checkbox"/>
	b)	26 dB Bandwidth(kHz)	<input checked="" type="checkbox"/>
Test Setup	 <p style="text-align: center;">Base Station      Spectrum Analyzer      EUT</p>		
Test Procedure	<ul style="list-style-type: none"> <li>- The EUT was connected to Spectrum Analyzer and Base Station via power divider.</li> <li>- The 99% and 26 dB occupied bandwidth (BW) of the middle channel for the highest RF powers.</li> </ul>		
Remark			
Result	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail		

Test Data     Yes       N/A

Test Plot     Yes (See below)       N/A

**GSM Voice:**

**Cellular Band (Part 22H) result**

Channel	Frequency (MHz)	99% Occupied Bandwidth (kHz)	26 dB Bandwidth (kHz)
128	824.2	241.77	308.8
190	836.6	242.41	312.3
251	848.8	239.86	311.2

**PCS Band (Part 24E) result**

Channel	Frequency (MHz)	99% Occupied Bandwidth (kHz)	26 dB Bandwidth (kHz)
512	1850	242.81	306.0
661	1880	245.39	312.8
810	1910	243.65	308.4

**GPRS:**

**Cellular Band (Part 22H) result**

Channel	Frequency (MHz)	99% Occupied Bandwidth (kHz)	26 dB Bandwidth (kHz)
128	824.2	240.73	309.1
190	836.6	240.94	310.0
251	848.8	241.44	311.0

**PCS Band (Part 24E) result**

Channel	Frequency (MHz)	99% Occupied Bandwidth (kHz)	26 dB Bandwidth (kHz)
512	1850	243.90	307.0
661	1880	244.76	314.4
810	1910	246.20	311.8

**EGPRS (MSC 1):**

**Cellular Band (Part 22H) result**

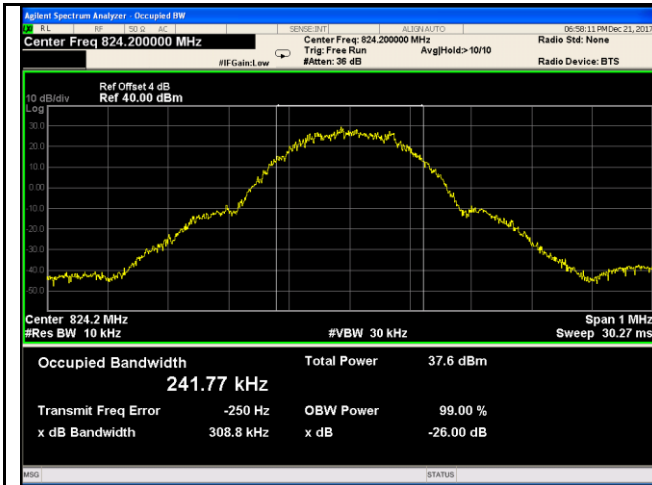
Channel	Frequency (MHz)	99% Occupied Bandwidth (kHz)	26 dB Bandwidth (kHz)
128	824.2	240.69	309.1
190	836.6	242.93	310.5
251	848.8	244.40	311.8

**PCS Band (Part 24E) result**

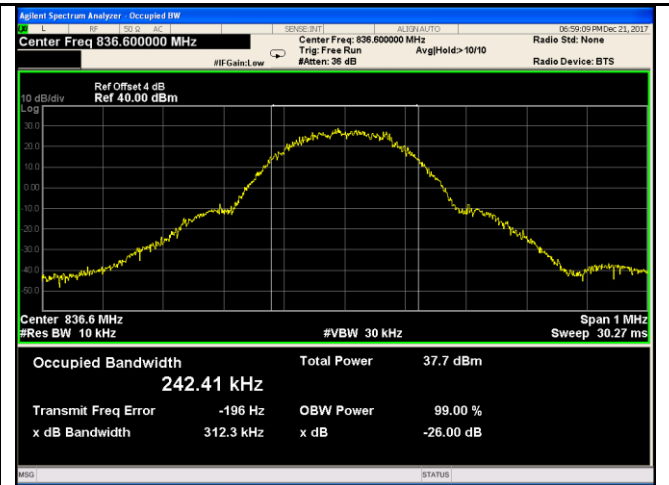
Channel	Frequency (MHz)	99% Occupied Bandwidth (kHz)	26 dB Bandwidth (kHz)
512	1850	244.16	312.0
661	1880	244.98	314.4
810	1910	243.7	312.7

Test Plots

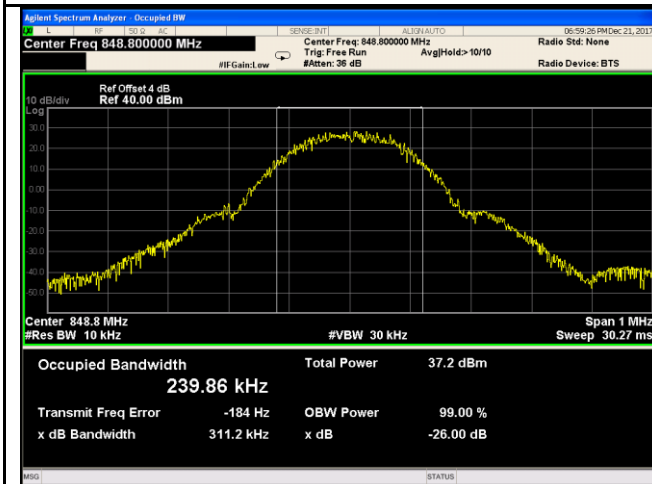
GSM Voice:



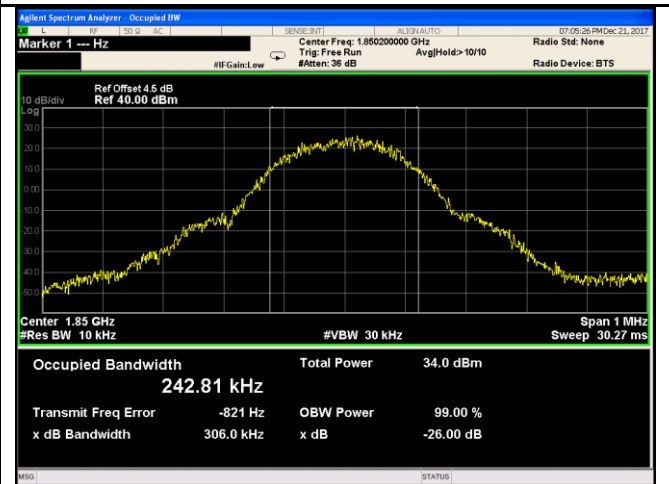
GSM 850 BW - Low CH 824.2MHz



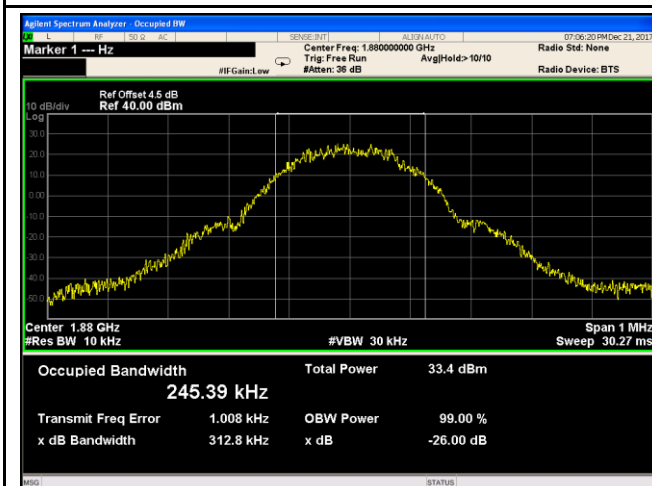
GSM 850 BW - Mid CH 836.6MHz



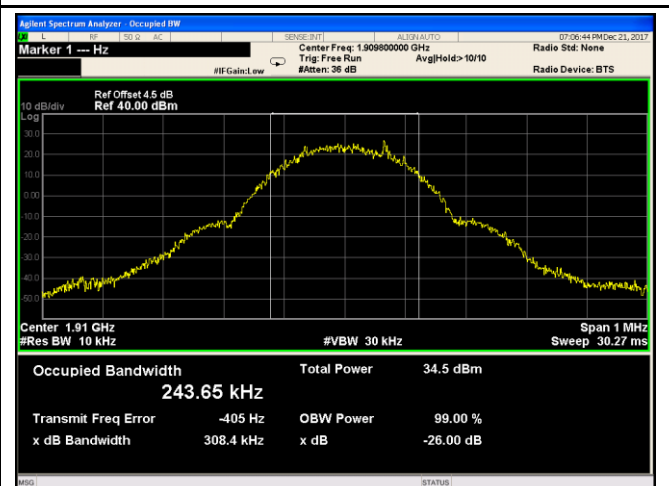
GSM 850 BW - High CH 848.8MHz



PCS 1900 BW - Low CH 1850MHz



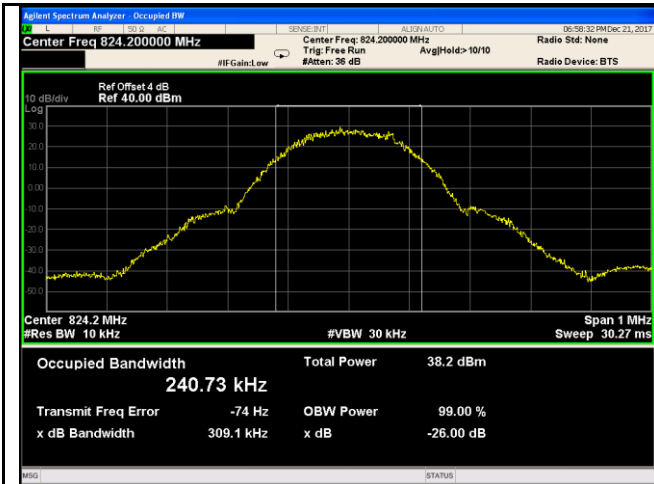
PCS 1900 BW - Mid CH 1880MHz



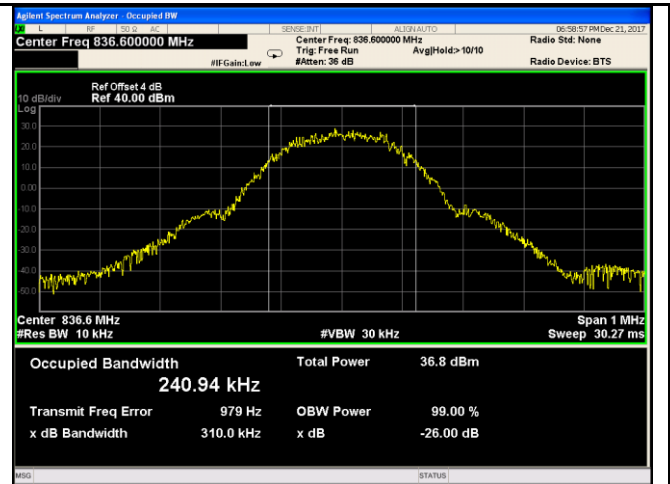
PCS 1900 BW - High CH 1910MHz



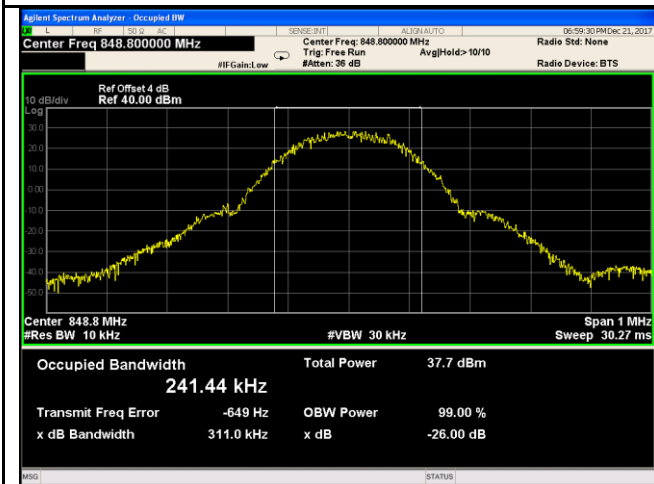
**GPRS:**



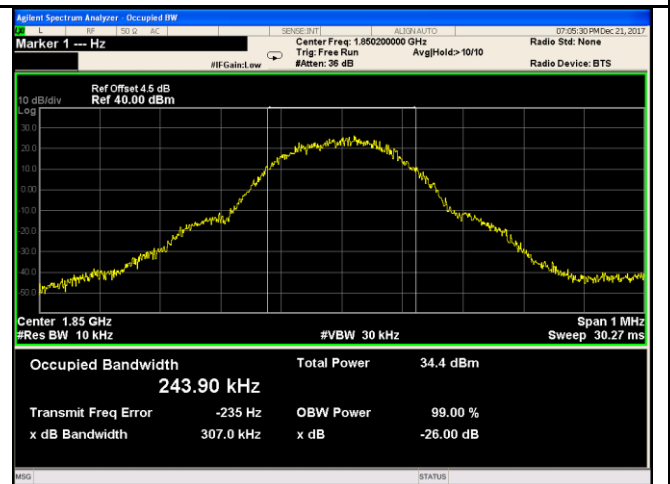
GSM 850 BW - Low CH 824.2MHz



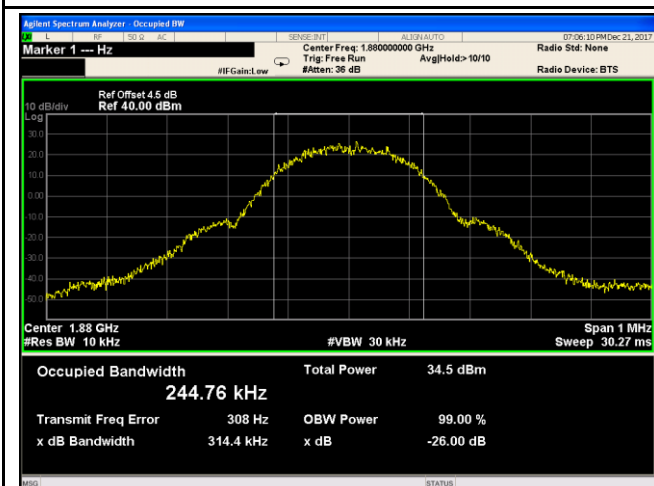
GSM 850 BW - Mid CH 836.6MHz



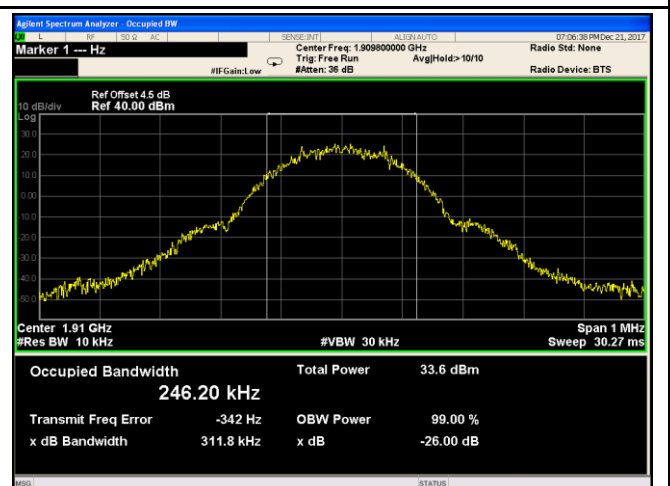
GSM 850 BW - High CH 848.8MHz



PCS 1900 BW - Low CH 1850MHz

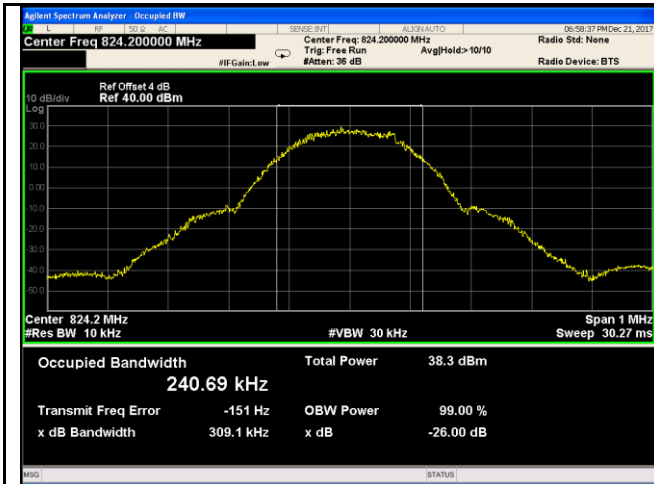


PCS 1900 BW - Mid CH 1880MHz

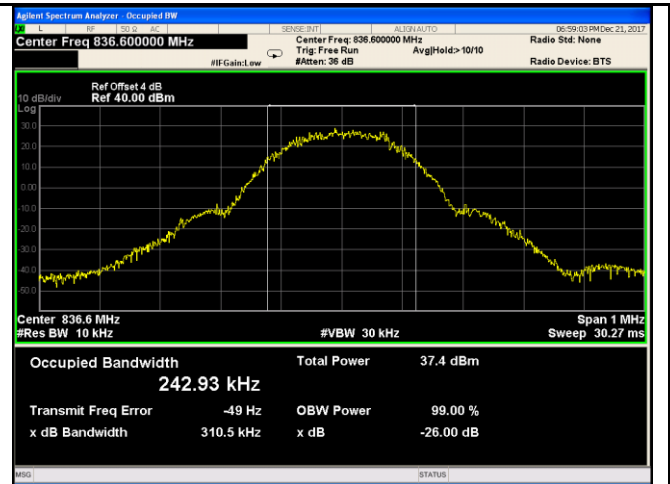


PCS 1900 BW - High CH 1910MHz

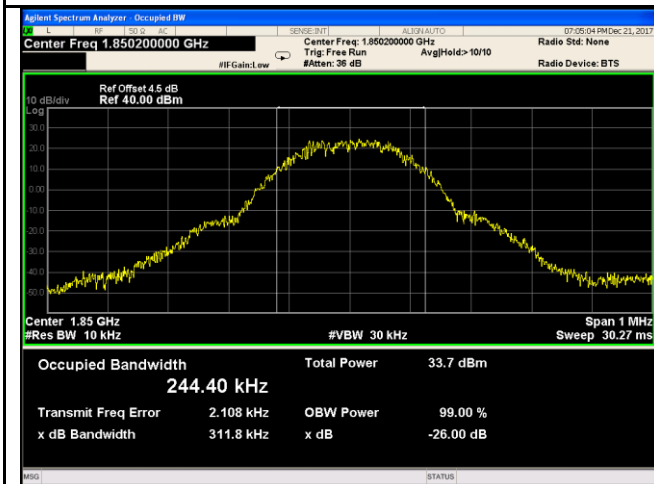
**EGPRS (MCS1):**



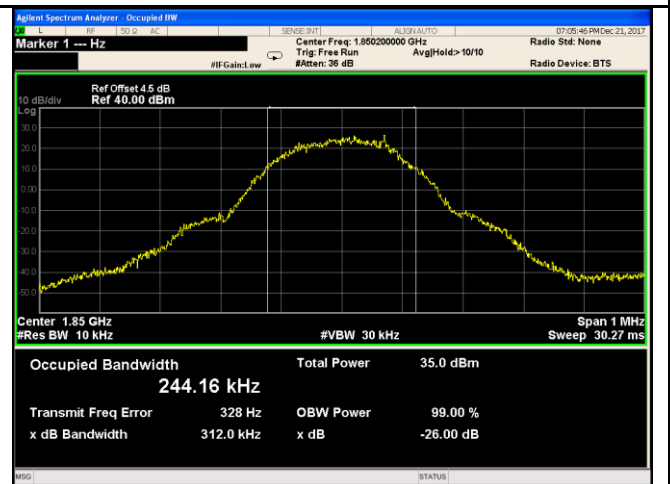
**GSM 850 BW - Low CH 824.2MHz**



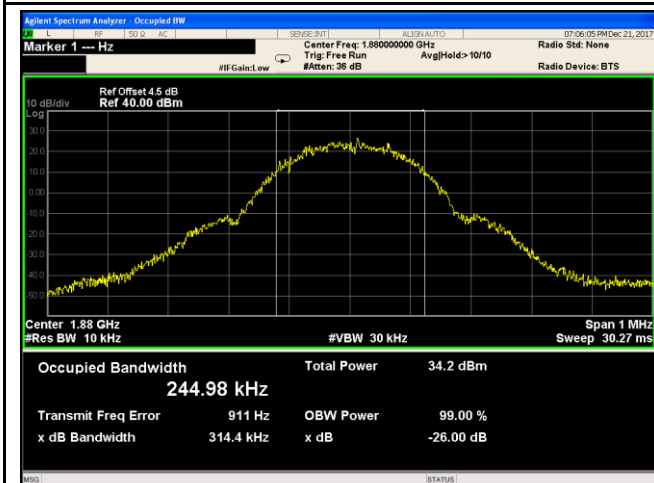
**GSM 850 BW - Mid CH 836.6MHz**



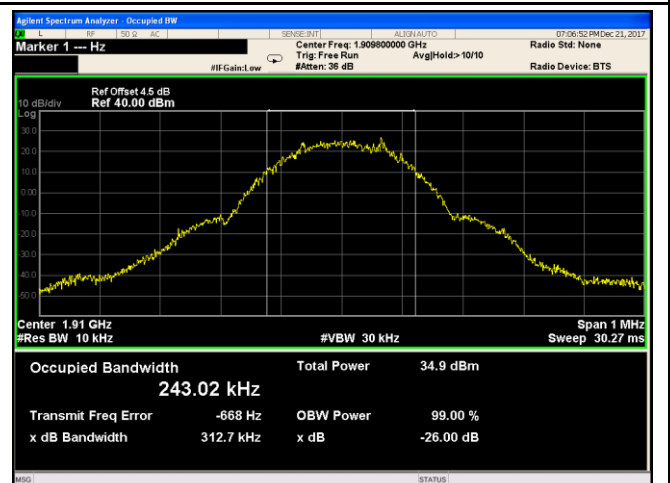
**GSM 850 BW - High CH 848.8MHz**



**PCS 1900 BW - Low CH 1850MHz**



**PCS 1900 BW - Mid CH 1880MHz**

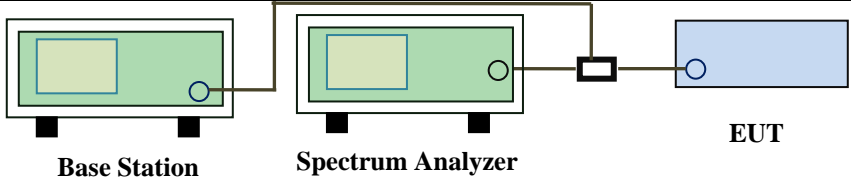


**PCS 1900 BW - High CH 1910MHz**

## 6.5 Spurious Emissions at Antenna Terminals

Temperature	26 °C
Relative Humidity	57%
Atmospheric Pressure	1018mbar
Test date :	December 21, 2017
Tested By :	Aaron Liang

### Requirement(s):

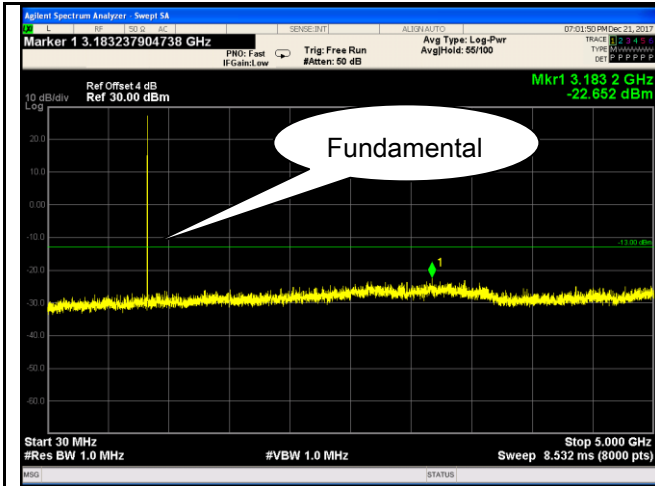
Spec	Item	Requirement	Applicable
§2.1051, §22.917(a)& §24.238(a)	a)	The power of any emission outside of the authorized operating frequency ranges must be lower than the transmitter power (P) by a factor of at least $43 + 10 \log(P)$ dB	<input checked="" type="checkbox"/>
Test Setup	 <p style="text-align: center;"> <span style="margin-right: 100px;">Base Station</span> <span style="margin-right: 100px;">Spectrum Analyzer</span> <span>EUT</span> </p>		
Test Procedure	<ul style="list-style-type: none"> <li>- The EUT was connected to Spectrum Analyzer and Base Station via power divider.</li> <li>- The Band Edges of low and high channels for the highest RF powers were measured.</li> <li>- Setting RBW as roughly BW/100.</li> </ul>		
Remark			
Result	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail		

Test Data     Yes                       N/A  
 Test Plot     Yes (See below)         N/A

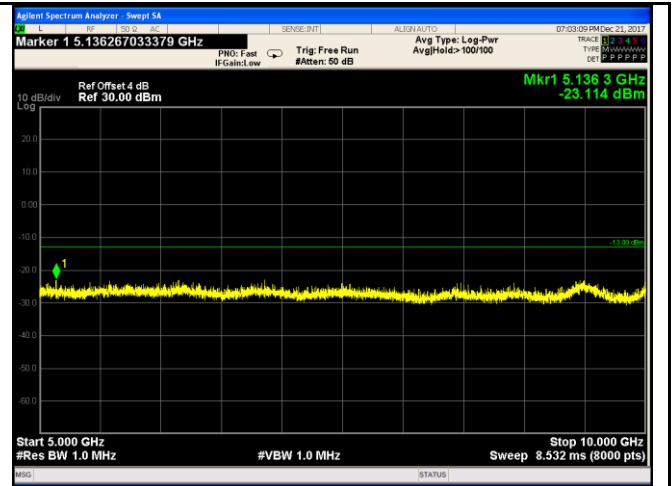
Test Plots

GSM Voice:

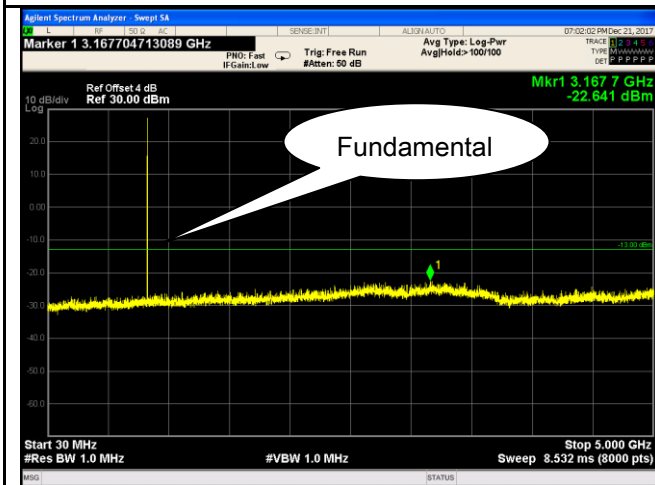
Cellular Band (Part 22H) result



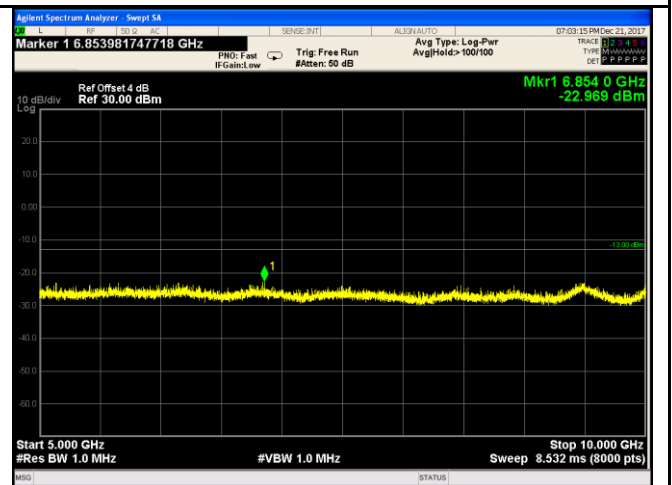
GSM 850 - Low Channel-1



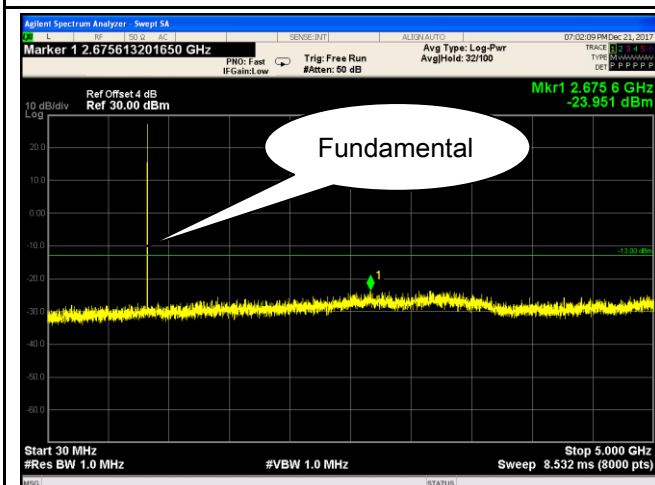
GSM 850 - Low Channel-2



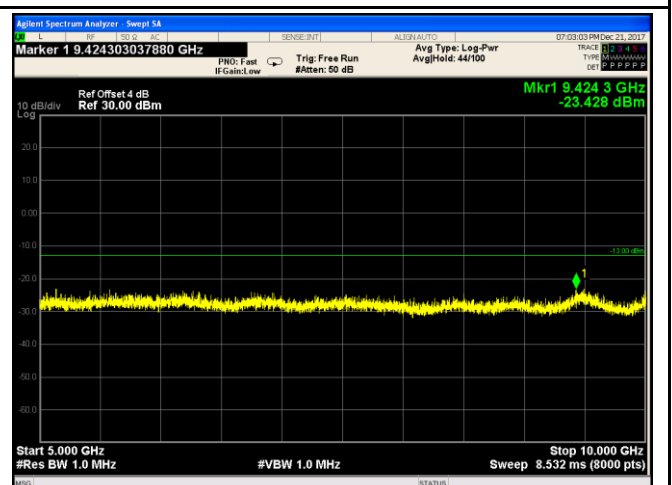
GSM 850 Middle Channel-1



GSM 850 Middle Channel-2

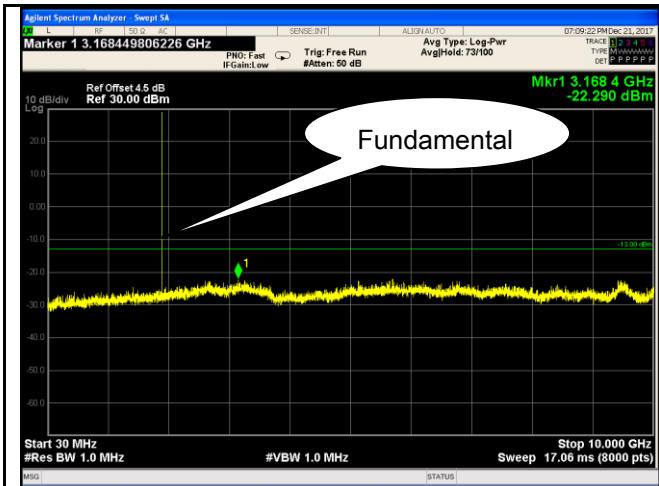


GSM 850 - High Channel-1

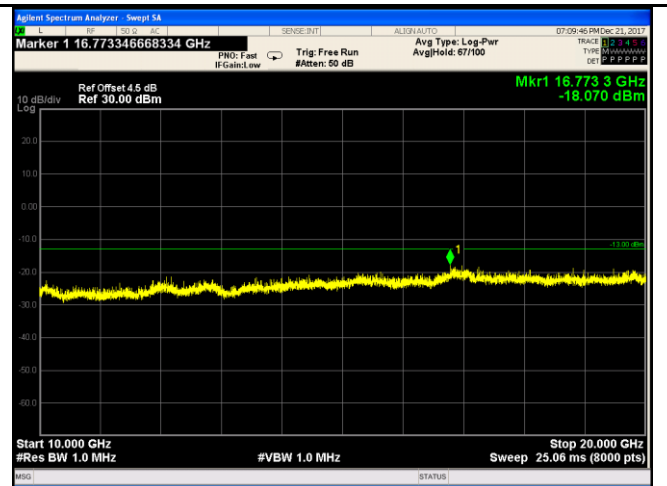


GSM 850 - High Channel-2

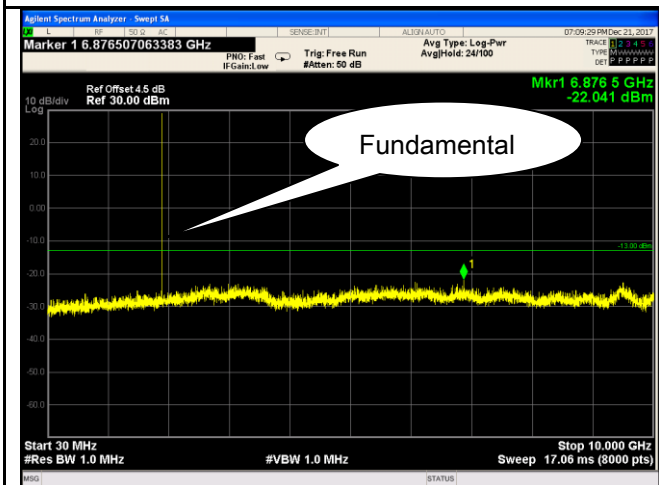
### PCS Band (Part24E) result



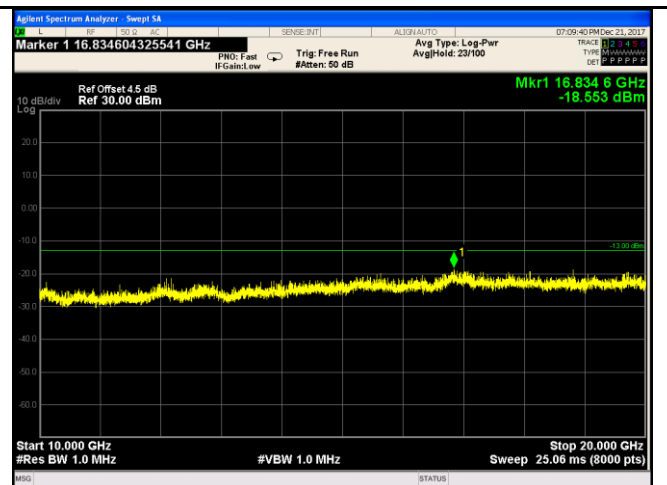
PCS1900 - Low Channel-1



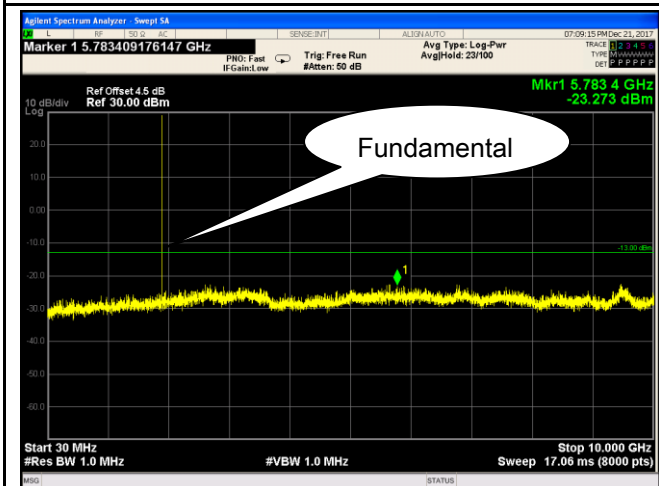
PCS 1900 - Low Channel-2



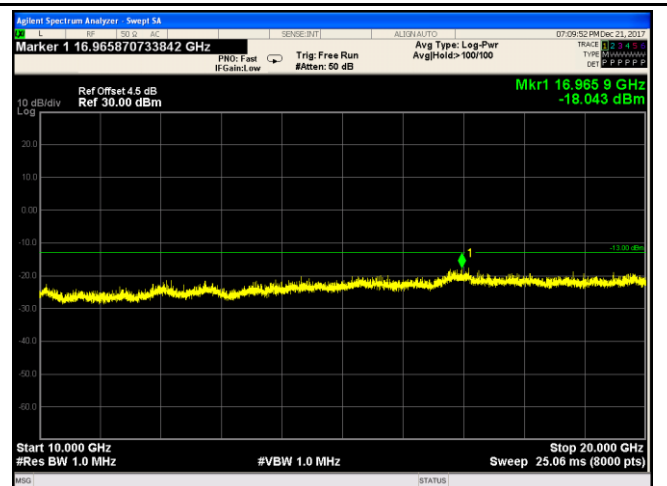
PCS1900 - Middle Channel-1



PCS 1900 - Middle Channel-2



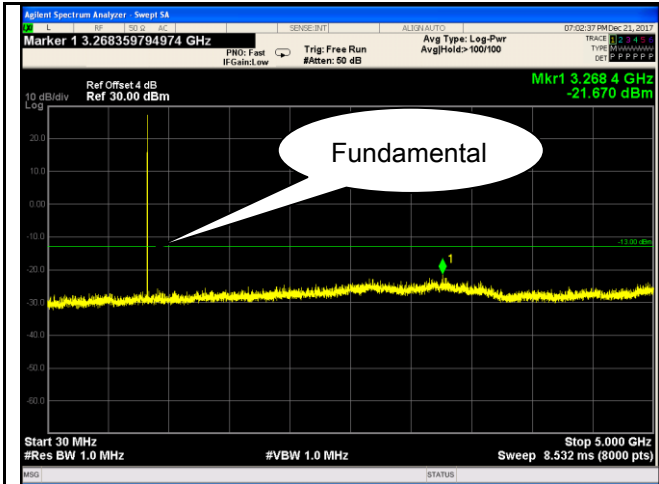
PCS1900 - High Channel-1



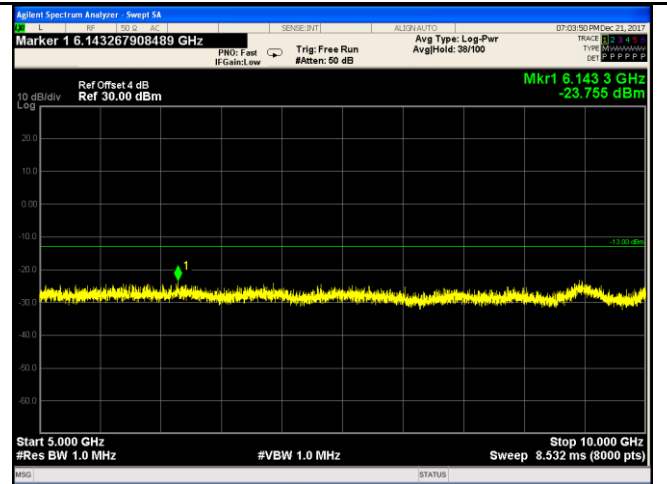
PCS 1900 - High Channel-2

GPRS:

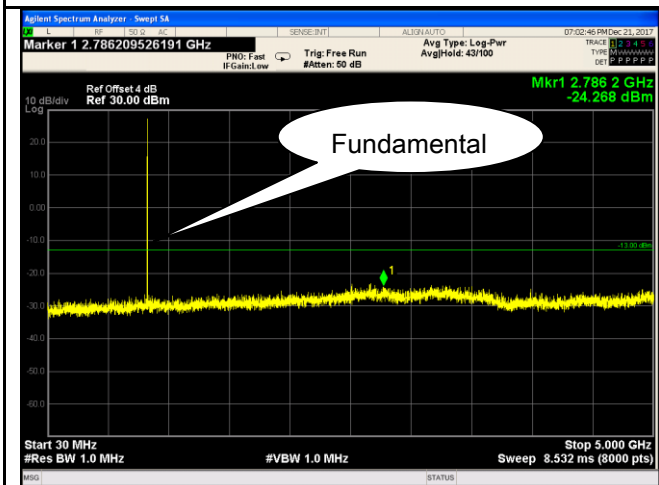
Cellular Band (Part 22H) result



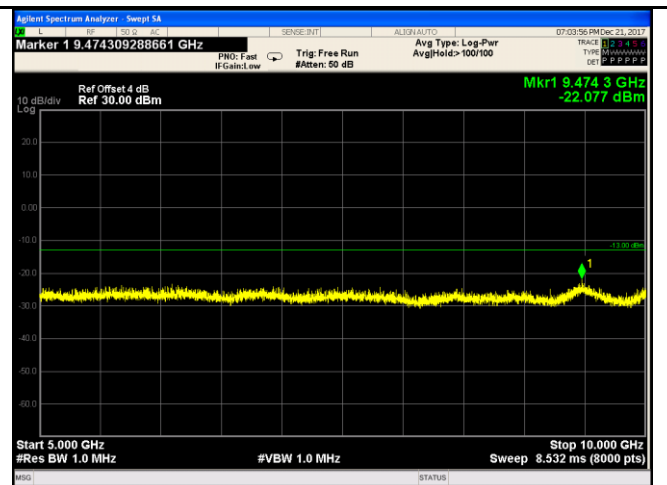
GSM 850 - Low Channel-1



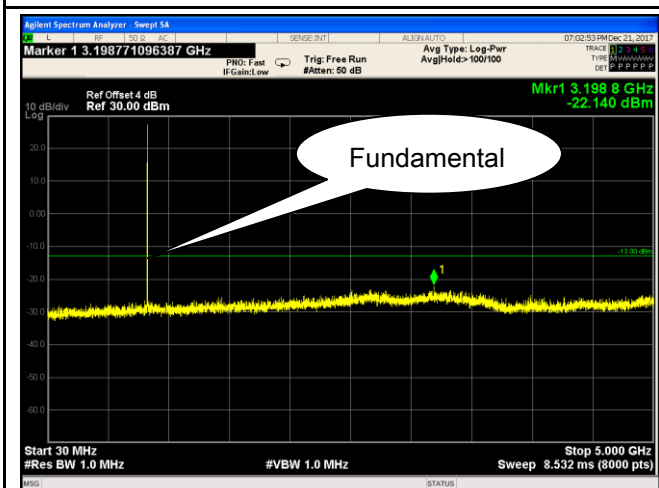
GSM 850 - Low Channel-2



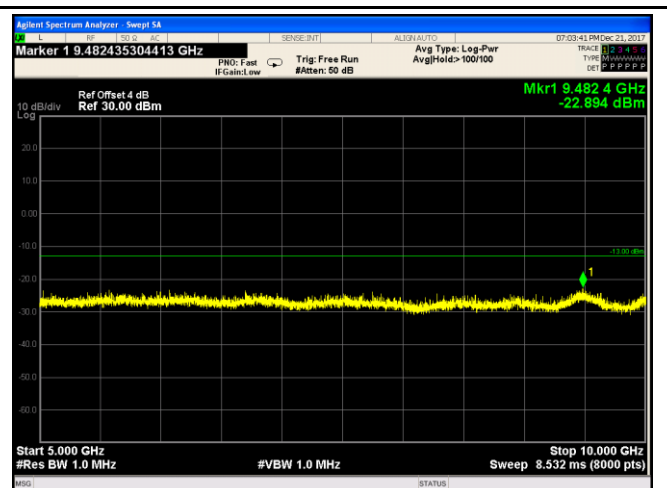
GSM 850 Middle Channel-1



GSM 850 Middle Channel-2

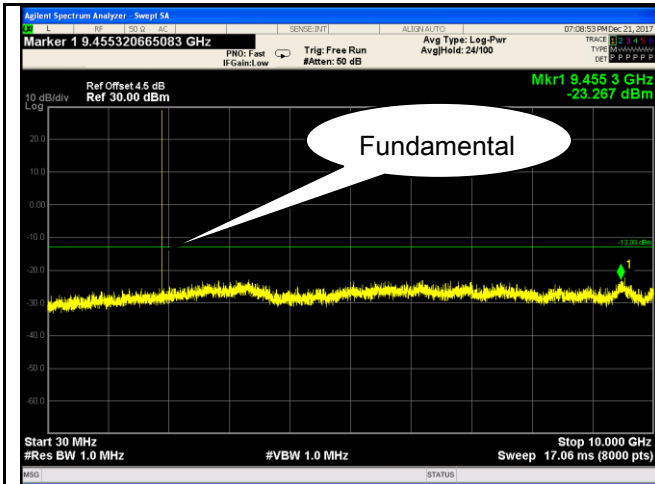


GSM 850 - High Channel-1

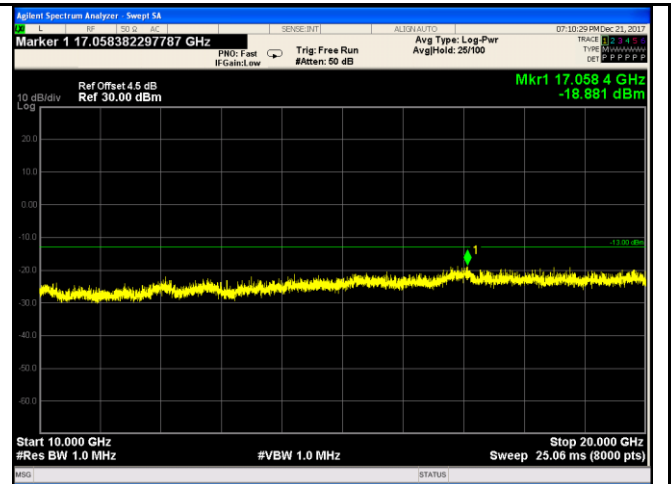


GSM 850 - High Channel-2

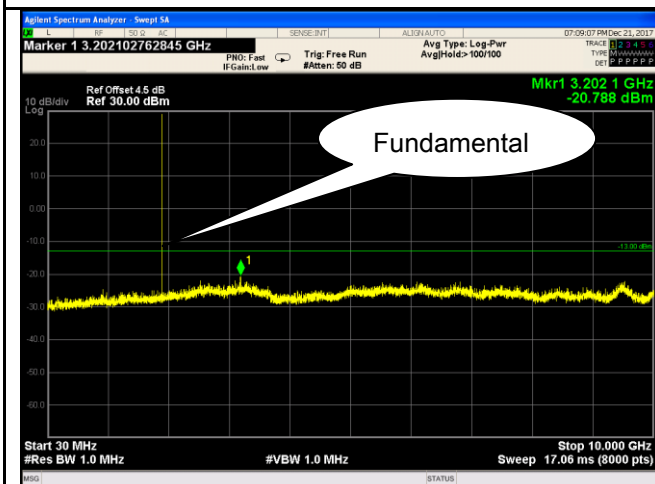
PCS Band (Part24E) result



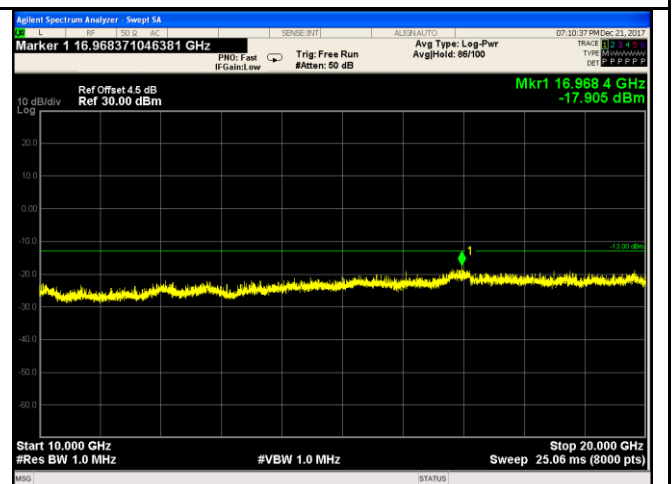
PCS1900 - Low Channel-1



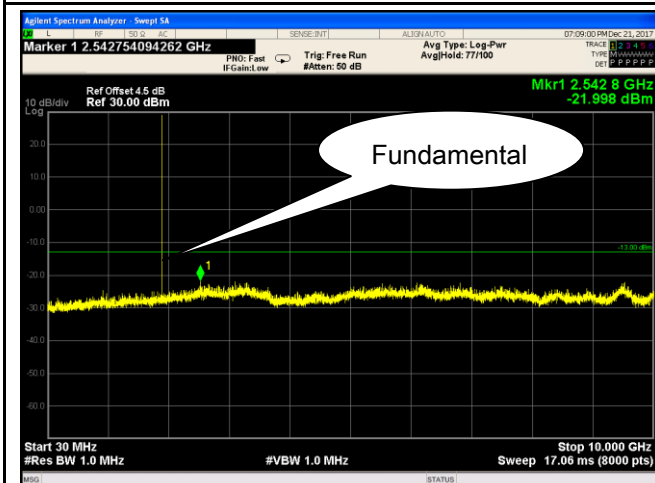
PCS 1900 - Low Channel-2



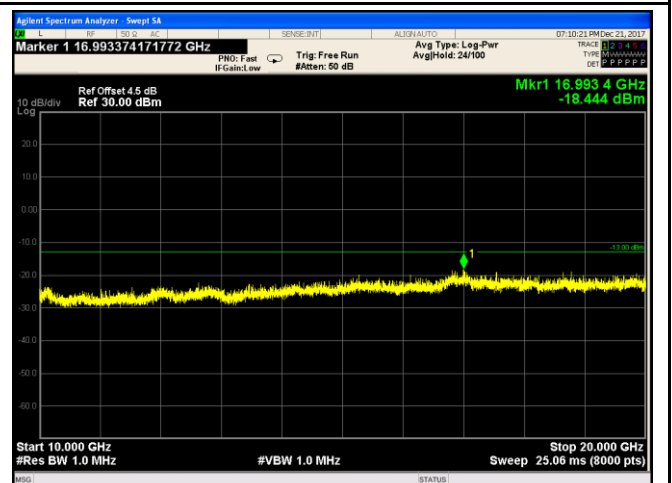
PCS1900 - Middle Channel-1



PCS 1900 - Middle Channel-2

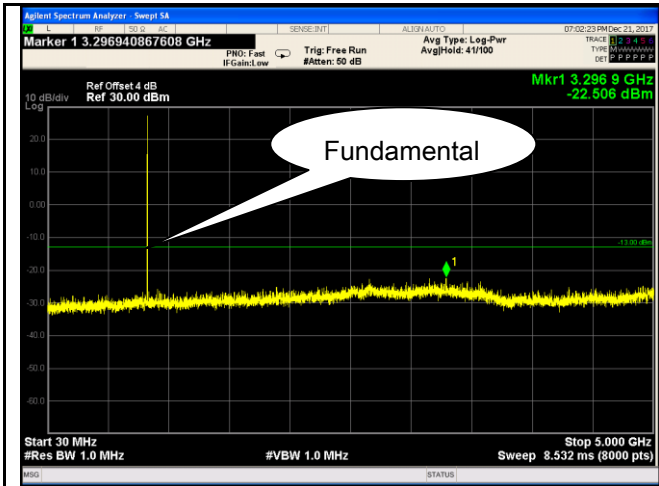


PCS1900 - High Channel-1

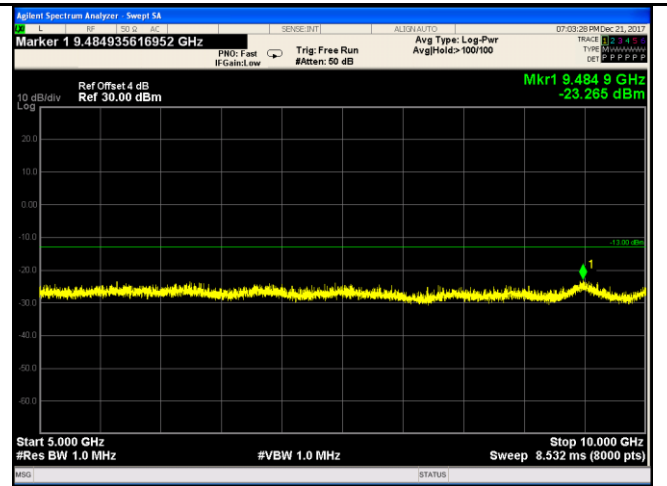


PCS 1900 - High Channel-2

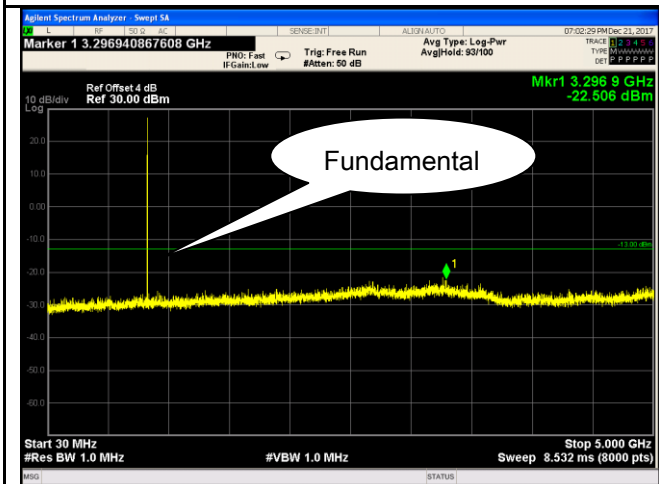
EGPRS (MSC 1):  
Cellular Band (Part 22H) result



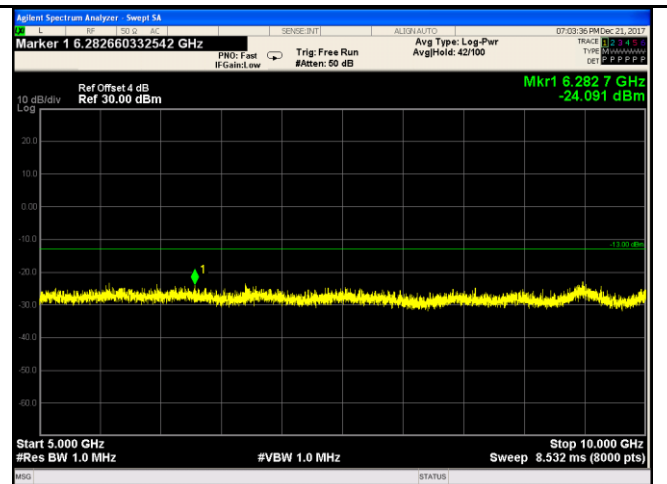
GSM 850 - Low Channel-1



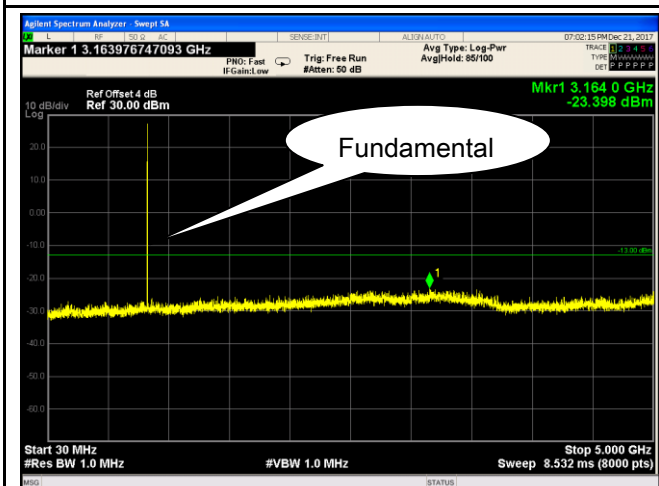
GSM 850 - Low Channel-2



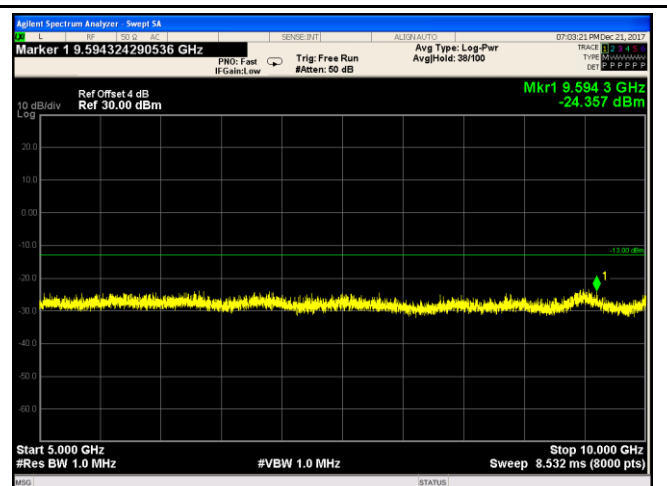
GSM 850 Middle Channel-1



GSM 850 Middle Channel-2



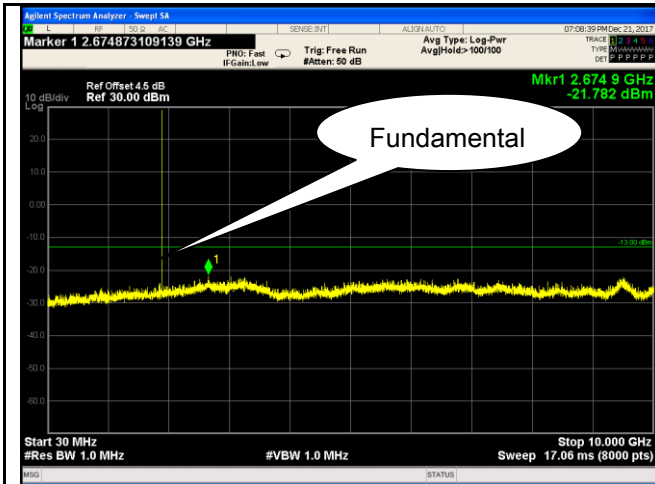
GSM 850 - High Channel-1



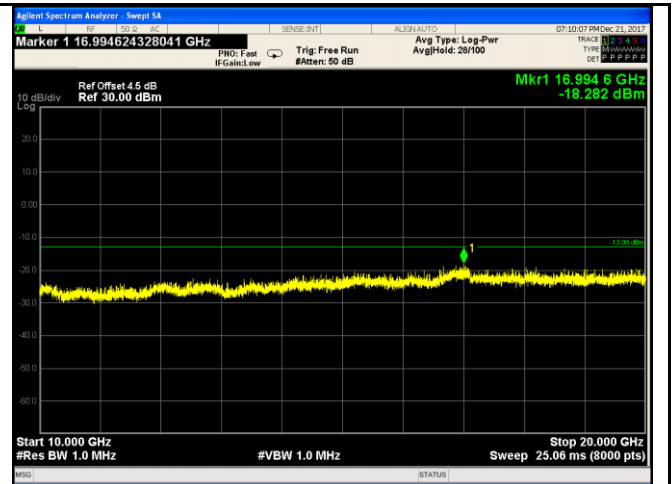
GSM 850 - High Channel-2



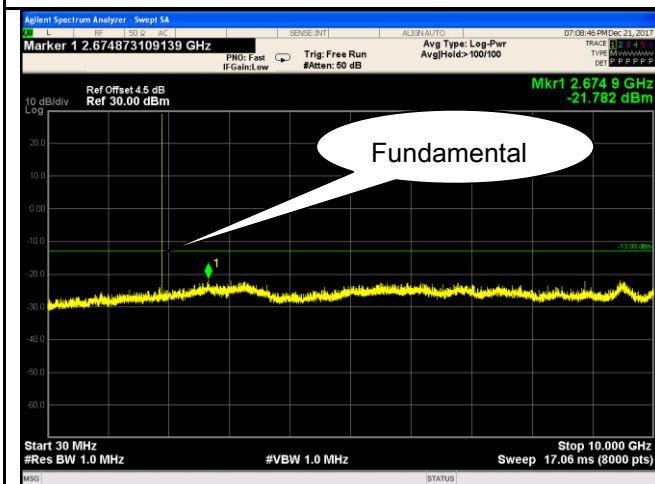
PCS Band (Part24E) result



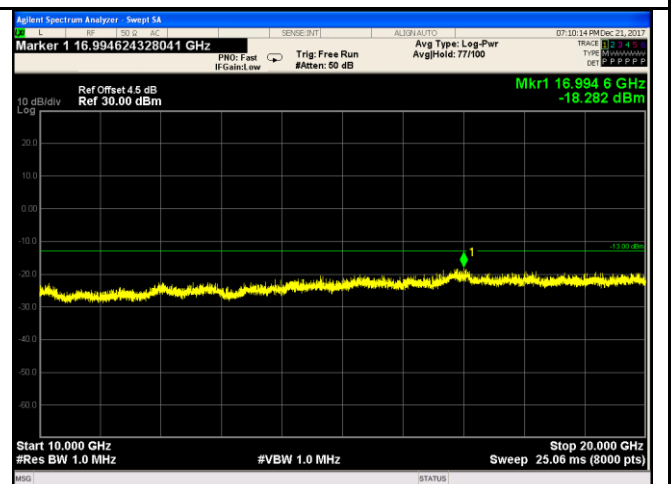
PCS1900 - Low Channel-1



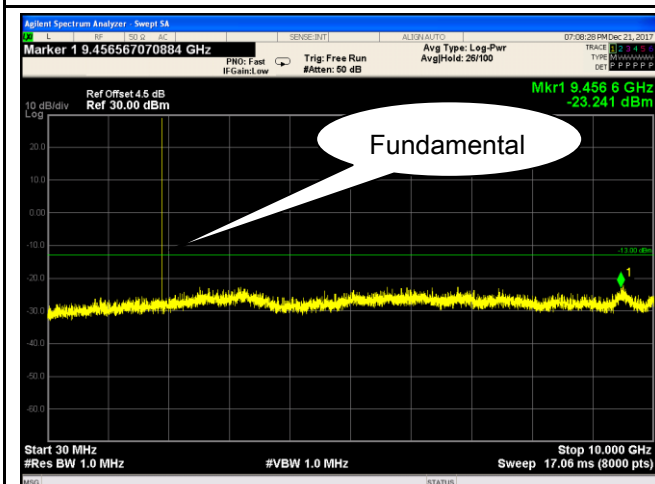
PCS 1900 - Low Channel-2



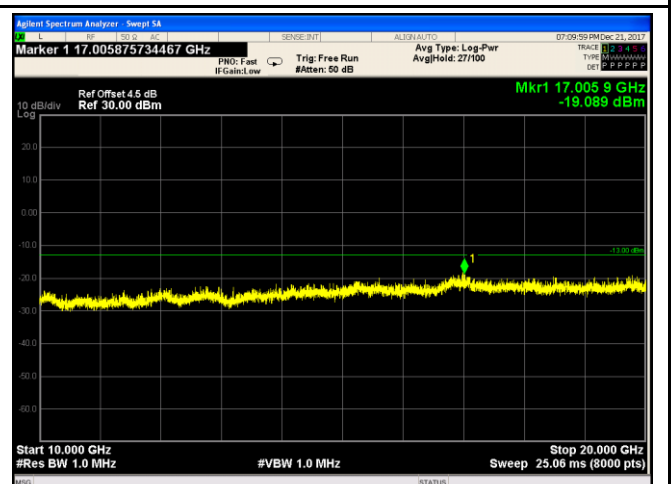
PCS1900 - Middle Channel-1



PCS 1900 - Middle Channel-2



PCS1900 - High Channel-1



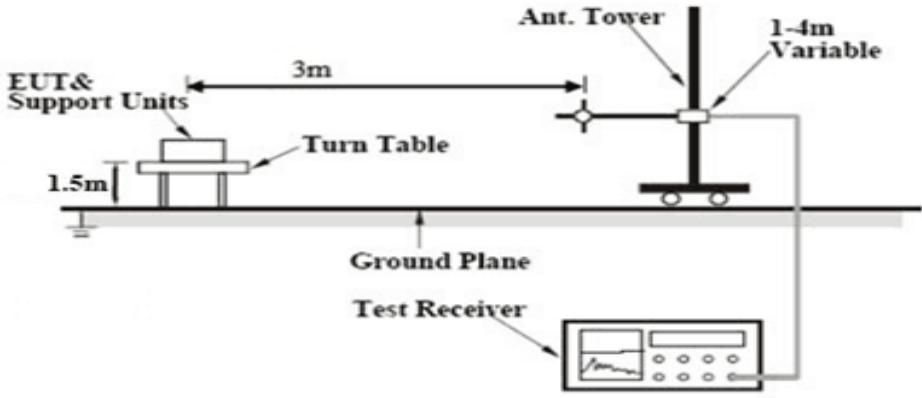
PCS 1900 - High Channel-2

## 6.6 Spurious Radiated Emissions

Temperature	26°C
Relative Humidity	55%
Atmospheric Pressure	1017mbar
Test date :	December 18, 2017
Tested By :	Aaron Liang

### Requirement(s):

Spec	Item	Requirement	Applicable
§2.1053, §22.917 & §24.238	a)	The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitter power (P) by a factor of at least $43 + 10 \log (P)$ dB. The spectrum is scanned from 30 MHz up to a frequency including its 10th harmonic.	<input checked="" type="checkbox"/>

Test setup	
------------	--------------------------------------------------------------------------------------

Test Procedure	<ol style="list-style-type: none"> <li>The transmitter was placed on a wooden turntable, and it was transmitting into a non-radiating load which was also placed on the turntable.</li> <li>The measurement antenna was placed at a distance of 3 meters from the EUT. During the tests, the antenna height and polarization as well as EUT azimuth were varied in order to identify the maximum level of emissions from the EUT. The test was performed by placing the EUT on 3-orthogonal axis.</li> <li>Remove the EUT and replace it with substitution antenna. A signal generator was connected to the substitution antenna by a non-radiating cable. The absolute levels of the spurious emissions were measured by the substitution.</li> </ol> <p>Sample Calculation:</p> <p>EUT Field Strength = Raw Amplitude (dB<math>\mu</math>V/m) – Amplifier Gain (dB) + Antenna Factor (dB) + Cable Loss (dB) + Filter Attenuation (dB, if used)</p>
----------------	------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

Remark	
Result	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail

Test Data  Yes  N/A  
 Test Plot  Yes (See below)  N/A

## Cellular Band (Part 22H) result

### Low channel

Frequency (MHz)	Substituted level (dBm)	Polarity (H/V)	Antenna Gain Correction (dB)	Cable Loss (dB)	Corrected Reading (dBm)	Limit (dBm)	Margin (dB)
1648.4	-44.18	V	7.95	0.67	-36.9	-13	-23.9
1648.4	-44.47	H	7.95	0.67	-37.19	-13	-24.19
732.48	-52.59	V	6.4	0.43	-46.62	-13	-33.62
356.46	-52.81	H	5.91	0.27	-47.17	-13	-34.17

### Middle channel

Frequency (MHz)	Substituted level (dBm)	Polarity (H/V)	Antenna Gain Correction (dB)	Cable Loss (dB)	Corrected Reading (dBm)	Limit (dBm)	Margin (dB)
1673.2	-42.86	V	7.95	0.67	-35.58	-13	-22.58
1673.2	-43.68	H	7.95	0.67	-36.4	-13	-23.4
661.57	-52.6	V	6.4	0.4	-46.6	-13	-33.6
655.22	-51.69	H	6.42	0.45	-45.72	-13	-32.72

### High channel

Frequency (MHz)	Substituted level (dBm)	Polarity (H/V)	Antenna Gain Correction (dB)	Cable Loss (dB)	Corrected Reading (dBm)	Limit (dBm)	Margin (dB)
1697.6	-44.36	V	7.95	0.68	-37.09	-13	-24.09
1697.6	-43.64	H	7.95	0.68	-36.37	-13	-23.37
554.08	-53.37	V	6.41	0.35	-47.31	-13	-34.31
650.59	-52.08	H	6.39	0.41	-46.1	-13	-33.1

#### Note:

- 1, The testing has been conformed to  $10 \times 848.8 \text{ MHz} = 8,488 \text{ MHz}$
- 2, All other emissions more than 30 dB below the limit
- 3, GSM voice, GPRS mode were investigated. The results above show only the worse cases
- 4, X-Axis, Y-Axis and Z-Axis were investigated. The results above show only the worst case.
- 5, The radiated spurious test above 18GHz is subcontracted to SIEMIC (Nanjing-China) Laboratories. and found 30dB below the limit at least.

## PCS Band (Part24E) result

### Low channel

Frequency (MHz)	Substituted level (dBm)	Polarity (H/V)	Antenna Gain Correction (dB)	Cable Loss (dB)	Corrected Reading (dBm)	Limit (dBm)	Margin (dB)
3700.4	-48.28	V	10.25	1	-39.03	-13	-26.03
3700.4	-48.34	H	10.25	1	-39.09	-13	-26.09
365.39	-53.09	V	5.92	0.3	-47.47	-13	-34.47
602.79	-54.02	H	6.4	0.36	-47.98	-13	-34.98

### Middle channel

Frequency (MHz)	Substituted level (dBm)	Polarity (H/V)	Antenna Gain Correction (dB)	Cable Loss (dB)	Corrected Reading (dBm)	Limit (dBm)	Margin (dB)
3760	-49.37	V	10.25	1.01	-40.13	-13	-27.13
3760	-49.17	H	10.25	1.01	-39.93	-13	-26.93
728.68	-53.41	V	6.4	0.44	-47.45	-13	-34.45
618.93	-53.56	H	6.35	0.38	-47.59	-13	-34.59

### High channel

Frequency (MHz)	Substituted level (dBm)	Polarity (H/V)	Antenna Gain Correction (dB)	Cable Loss (dB)	Corrected Reading (dBm)	Limit (dBm)	Margin (dB)
3819.6	-48.23	V	10.36	1.02	-38.89	-13	-25.89
3819.6	-48.9	H	10.36	1.02	-39.56	-13	-26.56
463.34	-52.87	V	6.42	0.38	-46.83	-13	-33.83
491.86	-51.75	H	6.39	0.37	-45.73	-13	-32.73

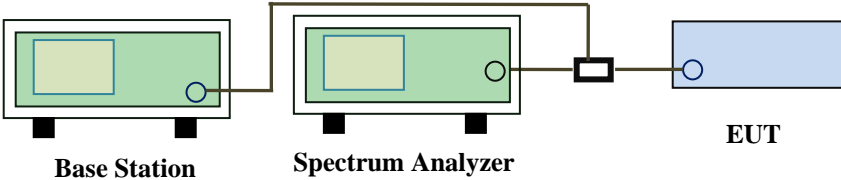
#### Note:

- 1, The testing has been conformed to  $10 \times 1909.8 \text{ MHz} = 19,098 \text{ MHz}$
- 2, All other emissions more than 30 dB below the limit
- 3, GSM voice, GPRS mode were investigated. The results above show only the worse cases
- 4, X-Axis, Y-Axis and Z-Axis were investigated. The results above show only the worst case.
- 5, The radiated spurious test above 18GHz is subcontracted to SIEMIC (Nanjing-China) Laboratories. and found 30dB below the limit at least.

## 6.7 Band Edge

Temperature	23 °C
Relative Humidity	54%
Atmospheric Pressure	1014mbar
Test date :	December 11, 2017
Tested By :	Aaron Liang

### Requirement(s):

Spec	Item	Requirement	Applicable
§22.917(a) §24.238(a)	a)	The power of any emission outside of the authorized operating frequency ranges must be lower than the transmitter power (P) by a factor of at least $43 + 10 \log (P)$ dB.	<input checked="" type="checkbox"/>
Test setup	 <p style="text-align: center;"> <span>Base Station</span>      <span>Spectrum Analyzer</span>      <span>EUT</span> </p>		
Procedure	<ul style="list-style-type: none"> <li>- The EUT was connected to Spectrum Analyzer and Base Station via power divider.</li> <li>- The Band Edges of low and high channels for the highest RF powers were measured. Setting RBW as roughly BW/100.</li> </ul>		
Remark			
Result	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail		

Test Data     Yes                       N/A  
 Test Plot     Yes (See below)             N/A

**GSM Voice:**

**Cellular Band (Part 22H) result**

Frequency (MHz)	Emission (dBm)	Limit (dBm)
823.997	-20.293	-13
849.005	-17.723	-13

**PCS Band (Part24E) result**

Frequency (MHz)	Emission (dBm)	Limit (dBm)
1849.997	-17.728	-13
1910.003	-15.532	-13

**GPRS:**

**Cellular Band (Part 22H) result**

Frequency (MHz)	Emission (dBm)	Limit (dBm)
823.992	-18.953	-13
849.012	-17.815	-13

**PCS Band (Part24E) result**

Frequency (MHz)	Emission (dBm)	Limit (dBm)
1849.997	-17.692	-13
1910.008	-15.667	-13

**EGPRS (MSC1):**

**Cellular Band (Part 22H) result**

Frequency (MHz)	Emission (dBm)	Limit (dBm)
823.997	-18.837	-13
849.003	-19.414	-13

**PCS Band (Part24E) result**

Frequency (MHz)	Emission (dBm)	Limit (dBm)
1849.996	-15.194	-13
1910.003	-15.532	-13