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# TEST REPORT FOR GSM TESTING

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Report No.: SRTC2019-9004(F)-19101501(A)

Product Name: Mobile Phone

Product Model: HLTE220E

Applicant: Hisense International Co., Ltd.

Manufacturer: Hisense Communications Co., Ltd.

Specification: FCC Part 24E, Part 22H, Part 2 (2019)

FCC ID: 2ADOBHLTE220E

The State Radio\_monitoring\_center Testing Center (SRTC)

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## 1. GENERAL INFORMATION

### 1.1 Notes of the test report

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### 1.2 Information about the testing laboratory

Company:	The State Radio_monitoring_center Testing Center (SRTC)
Address:	15th Building, No.30 Shixing Street, Shijingshan District, P.R.China
City:	Beijing
Country or Region:	P.R.China
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### 1.3 Applicant's details

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Address:	Floor 22, Hisense Tower, 17 Donghai Xi Road, Qingdao, 266071, China
City:	Qingdao
Country or Region:	China
Contacted person:	Geng Ruifeng
Tel:	+86-532-80877742
Fax:	---
Email:	gengruifeng@hisense.com

### 1.4 Manufacturer's details

Company:	Hisense Communications Co., Ltd.
Address:	No.218 Qianwangang Road, Economic & Technological Development Zone, Qingdao, China
City:	Qingdao
Country or Region:	China
Contacted person:	Song Haibin
Tel:	+86-532-55753700
Fax:	---
Email:	songhaibin@hisense.com

## 1.5 Test Environment

Date of Receipt of test sample at SRTC:	2019-10-15
Testing Start Date:	2019-10-15
Testing End Date:	2019-10-31

Environmental Data:	Temperature (°C)	Humidity (%)
Ambient	25	30
Maximum Extreme	50	---
Minimum Extreme	0	---

Normal Supply Voltage (V d.c.):	3.80
Maximum Extreme Supply Voltage (V d.c.):	4.35
Minimum Extreme Supply Voltage (V d.c.):	3.50

## 2 DESCRIPTION OF THE DEVICE UNDER TEST

### 2.1 Final Equipment Build Status

Frequency Range	GSM850: Tx:824~849MHz Rx:869~894MHz PCS1900: Tx:1850~1910MHz Rx:1930~1990MHz
Modulation Type	GPRS:GMSK EDGE: GMSK/8PSK
Emission Designator	300KGXW/300KG7W
Duplex Mode	FDD
Duplex Spacing	GSM850:45MHz PCS1900:80MHz
Antenna Type	Fixed Internal Antenna
Antenna Gain	GSM850: -2.1dBi/DCS1800: -1.3dBi
Power Supply	Battery/Charger
Hardware Version	YK680--MB-V0.1
Software Version	Hisense_HLTE220E_MX02_L201.01_20190926
IMEI	863501040485537

Note: The equipments have two supplies, is different on the supplier of CTP/Earphone/Camera/Data cable.

#### Main Supply

Part Name	Model	Supplier(Brand)	Description
Camera	ST-CFKS816-5MFF-V2.0/ ST-CFKS816-30WFF-V2.0/	Union Image	Front CAM
Camera	ST-CFKS816BF-V2.0	Union Image	Rear CAM
CTP	CCF11700-6.0	Jiangxi Holitech Technology Co.,Ltd	CTP
Data cable	KLKS816AUSB	Dongguan Keling Electronic Technology Co., Ltd.	
Earphone	KLKS816A	Shenzhen Jinchuangju Electronic Technology Co.,Ltd.	

#### Secondary Supply

Part Name	Model Name	supplier	Remark
Camera	HTP1157/HTV1155	JIXIHOLITECH TECHNOLOGY CO.LTD	Front CAM
Camera	HTV1156	JIXIHOLITECH TECHNOLOGY CO.LTD	Rear CAM
CTP	Y152073B2-D-X	Dongguan Yuye Commumication Technology CO.,ted	CTP
Data cable	A106-0022-S	SHENZHEN KOAR ELECTIC CO.,LTD	
Earphone	W1G513A06S	Shenzhen Jinchuangju Electronic Technology Co.,Ltd.	

## 2.2 Support Equipment

The following support equipment was used to exercise the DUT during testing:

Equipment	Battery
Manufacturer	Shenzhen Tianjin New Energy Technology Co.,Ltd;
Model Number	KS816
Serial Number	---

Equipment	Charger
Manufacturer	Shenzhen Tianyin Electronics Co., Ltd
Model Number	TPA-97050100VU
Serial Number	---

Equipment	USB Cable1
Manufacturer	SHENZHEN KOAR ELECTIC CO.,LTD
Model Number	A106-0022-S
Serial Number	---

Equipment	USB Cable2
Manufacturer	Dongguan Keling Electronic Technology Co., Ltd.
Model Number	KLKS816AUSB
Serial Number	---

## 2.3 Summary table.

FCC Rule Part	Mode	Frequency Range (MHz)	ERP/ EIRP (dBm)	ERP/ EIRP (W)	Frequency Tolerance (ppm)	Emission Designator
22H	GSM850	824.2-848.8	32.93	1.963	0.098	252KGXW
22H	EDGE850	824.2-848.8	26.89	0.489	0.089	247KG7W
24E	GSM1900	1850.2-1909.8	31.06	1.276	-0.092	247KGXW
24E	EDGE1900	1850.2-1909.8	27.82	0.605	-0.097	252KG7W

### **3 REFERENCE SPECIFICATION**

Specification	Version	Title
2.1046	2019	Measurements required: RF power output.
2.1049	2019	Measurements required: Occupied bandwidth.
2.1051	2019	Measurements required: Spurious emissions at antenna terminals.
2.1053	2019	Measurements required: Field strength of spurious radiation.
2.1055	2019	Measurements required: Frequency stability.
22.355	2019	Frequency tolerance.
22.913	2019	Effective radiated power limits.
22.917	2019	Emission limitations for cellular equipment.
24.232	2019	Power and antenna height limits.
24.235	2019	Frequency stability.
24.238	2019	Emission limitations for Broadband PCS equipment.
ANSI C63.26	2015	American National Standard for Compliance Testing of Transmitters Used in Licensed Radio Services
KDB 971168 D01	April 9, 2018	MEASUREMENT GUIDANCE FOR CERTIFICATION OF LICENSED DIGITAL TRANSMITTERS

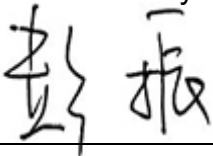

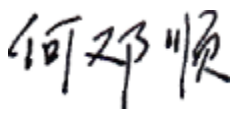
### **4 KEY TO NOTES AND RESULT CODES**

The following are the definition of the test result.

Code	Meaning
PASS	Test result shows that the requirements of the relevant specification have been met.
FAIL	Test result shows that the requirements of the relevant specification have not been met.
N/T	Test case is not tested.
NTC	Nominal voltage, Normal Temperature
HV	High voltage, Normal Temperature
LV	Low voltage, Normal Temperature
HTHV	high voltage, High Temperature
LTHV	High voltage, Low Temperature
HTLV	Low voltage, High Temperature
LTLV	Low voltage, Low Temperature

## 5 RESULT SUMMARY

No.	Test case	FCC reference	Verdict
1	RF Power Output	2.1046	Pass
2	Effective Radiated Power and Effective Isotropic Radiated Power	22.913(a)(5)/24.232(c)	Pass
3	Occupied Bandwidth	2.1049	Pass
4	Emission Bandwidth	2.1049	Pass
5	Spurious Emissions at antenna terminals	2.1051/22.917(a)/24.238(a)	Pass
6	Band Edges Compliance	2.1051/22.917(a)/24.238(a)	Pass
7	Frequency Stability	2.1055/22.355/24.235	Pass
8	Radiated Spurious Emissions	2.1053/22.917(a)/24.238(a)	Pass
9	Peak-Average Ratio	24.232(d)	Pass

This Test Report Is Issued by: Mr. Peng Zhen 	Checked by: Mr. Li Bin 
Tested by: Mr. He Dengshun 	Issued date:  20191101



## **6 TEST RESULT**

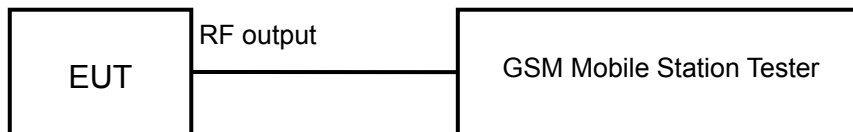
### **6.1 RF Power Output**

Rule Part(s)  
 FCC Part 2.1046

Ambient condition:

Temperature	Relative humidity	Pressure
25°C	30%	101.9kPa

Test Setup:



Test procedure:

After a radio link has been established between EUT and Tester, the output power of the cell signal of the testing equipment will be decreased until the output power of the EUT reach a maximum value. Then the test data can be read at the tester screen. The loss between RF output port of the EUT and the input port of the tester will be taken into consideration. The measurement will be conducted at three channels (Low, Middle and High channels)

Limits: No specific conduct power requirements in part 2.1046.

Test result:

The test results are shown in Appendix A.

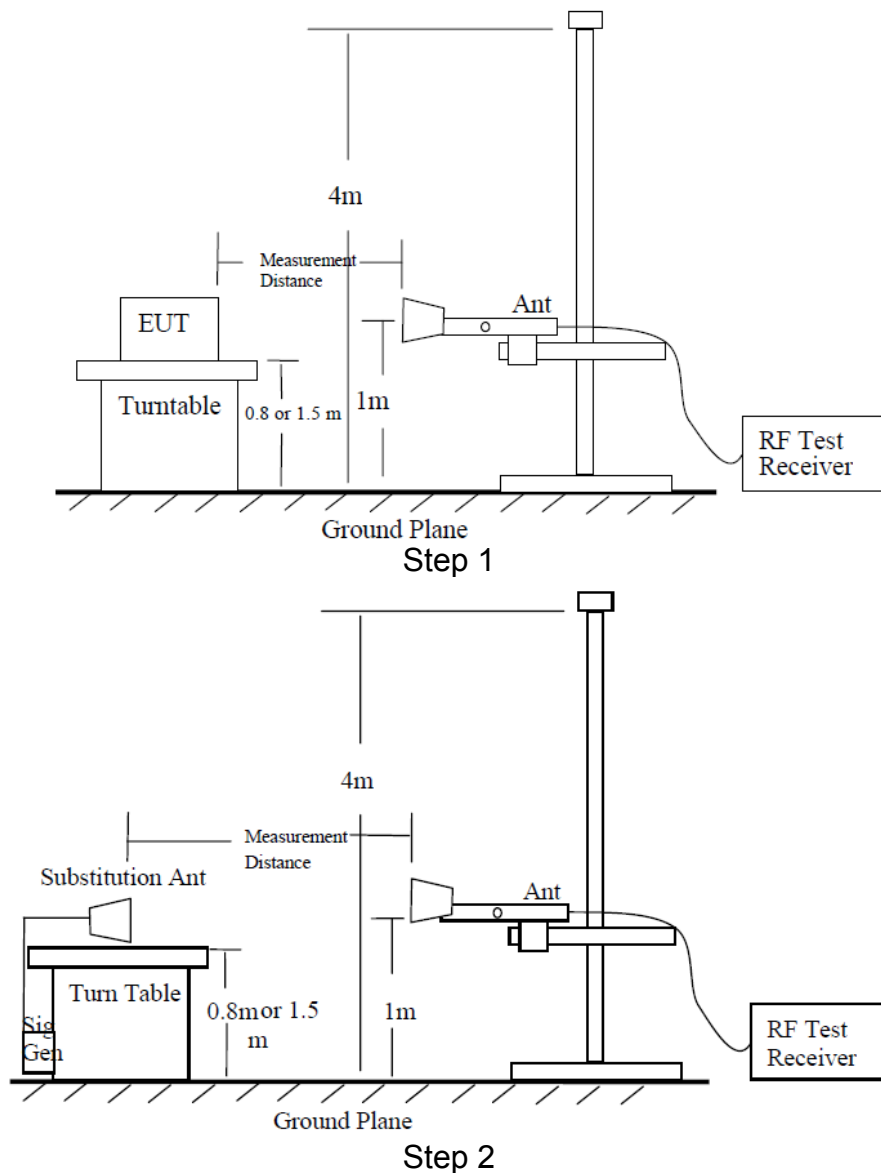
## 6.2 Effective Radiated Power

Rule Part(s)  
FCC Part 22.913(a)(5)/Part 24.232(c)

Ambient condition:

Temperature	Relative humidity	Pressure
25°C	30%	101.9kPa

Test setup:



**Test procedure:**

The measurements procedures in TIA-603-E-2016 are used.

**Step 1:**

The measurement is carried out in the fully anechoic chamber. EUT was placed on a 2.4 meters high non-conductive table at a 3 meters test distance from the test receive antenna. A receiving antenna was placed on the antenna mast 3 meters from the EUT. The height of receiving antenna is 2.4m and varies in certain range to find the maximum power value. A radio link shall be established between EUT and Tester. The output power of the cell signal of the tester will be decreased until the output power of the EUT reach a maximum value. A peak detector is used and RBW is set to 3MHz. Then the height of receive antenna shall be moved from 1 to 4 meters, and the antenna shall be performed under horizontal and vertical polarization. The turn table shall be rotated from 0 to 360 degrees for detecting the maximum power value on spectrum analyzer or receiver. And the maximum value of the receiver should be recorded as (Pr).

**Step 2:**

A log-periodic antenna or double-ridged waveguide horn antenna shall be substituted in place of the EUT. The log-periodic antenna will be driven by a signal generator. To repeat the same procedure as step1 and the level of signal generator will be adjusted till the same power value on the spectrum analyzer or receiver. The ERP/EIRP of the EUT can be calculated through the level of the signal generator, cable loss, the gain of the substitution antenna and the reading of the spectrum analyzer or receiver.

A power (Pmea) is applied to the input of the substitution antenna, and adjusts the level of the signal generator output until the value of the receiver reach the previously recorded (Pr). The power of signal source (Pmea) is recorded. The test should be performed by rotating the test item and adjusting the receiving antenna polarization.

A “reference path loss” should be calculated after test. The attenuation of “reference path loss” is the cable loss between the Signal Source with the Substitution Antenna (Pca) and the Substitution Antenna Gain (Ga).

The measurement results are obtained as described below:

$$\text{Power (EIRP)} = P_{mea} + P_{ca} + G_a$$

This value is EIRP since the measurement is calibrated using an antenna of known gain (2.15dB) and known input power. ERP can be calculated from EIRP by subtracting the gain of the dipole,  $ERP = EIRP - 2.15 \text{ (dB)}$ .

The measurement will be done at three channels (Low, Middle and High channels)

**Limits for GSM850:**

Operation Mode	Power Step	E.R.P. (dBm)
GSM	5	≤38.45
GPRS	3	≤38.45
EDGE	6	≤38.45

**Limits for PCS1900:**

Operation Mode	Power Step	E.I.R.P. (dBm)
GSM	0	≤33
GPRS	3	≤33
EDGE	5	≤33

**Test result:**

The test results are shown in Appendix B.

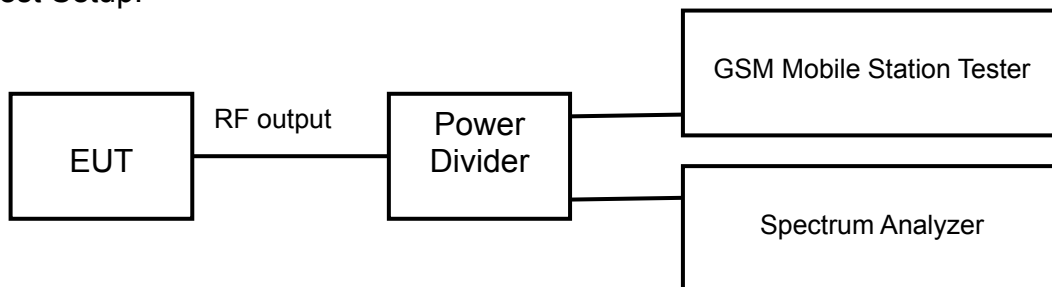
### 6.3 Occupied Bandwidth

Rule Part(s)  
Part 2.1049

Ambient condition:

Temperature	Relative humidity	Pressure
25°C	30%	101.9kPa

Test Setup:



Test procedure:

The measurement will be conducted at three channels (Low, middle and High channels)

Test Settings

1. The signal analyzer's automatic bandwidth measurement capability was used to perform the 99% occupied bandwidth and the 26dB bandwidth. The bandwidth measurement was not influenced by any intermediate power nulls in the fundamental emission.
2. RBW = 1 – 5% of the expected OBW
3. VBW ≥ 3 x RBW
4. Detector = Peak
5. Trace mode = max hold
6. Sweep = auto couple
7. The trace was allowed to stabilize
8. If necessary, steps 2 – 7 were repeated after changing the RBW such that it would be within 1 – 5% of the 99% occupied bandwidth observed in Step 7

Limits: No specific occupied bandwidth requirements in part 2.1049

Test result:

The test results are shown in Appendix A.

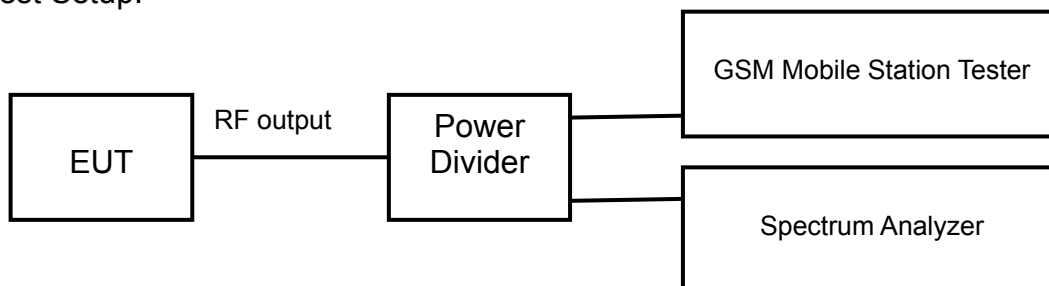
## 6.4 Emission Bandwidth-

Rule Part(s)  
Part 2.1049

Ambient condition:

Temperature	Relative humidity	Pressure
25°C	30%	101.9kPa

Test Setup:



Test procedure:

The measurement will be conducted at three channels (Low, middle and High channels)

### Test Settings

1. The signal analyzer's automatic bandwidth measurement capability was used to perform the 26dB occupied bandwidth and the 26dB bandwidth. The bandwidth measurement was not influenced by any intermediate power nulls in the fundamental emission.
2. RBW = 1 – 5% of the expected OBW
3. VBW  $\geq$  3 x RBW
4. Detector = Peak
5. Trace mode = max hold
6. Sweep = auto couple
7. The trace was allowed to stabilize
8. If necessary, steps 2 – 7 were repeated after changing the RBW such that it would be within 1 – 5% of the emission bandwidth observed in Step 7

Limits: No specific occupied bandwidth requirements in part 2.1049

Test result:

The test results are shown in Appendix A.

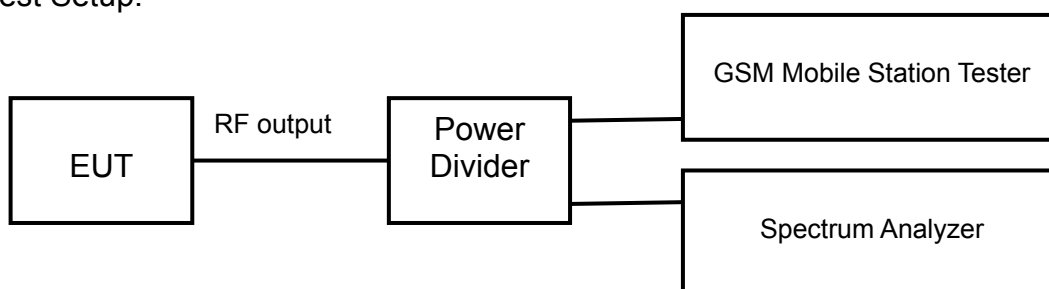
## 6.5 Spurious Emissions at antenna terminal

Rule Part(s)  
FCC Part 2.1053/22.917 (a)/ 24.238(a)

Ambient condition:

Temperature	Relative humidity	Pressure
25°C	30%	101.9kPa

Test Setup:



Test procedure:

After a radio link has been established between EUT and Tester, the output power of the cell signal of the testing equipment will be decreased until the output power of the EUT reach a maximum value. The measurement is carried out using a spectrum analyzer. The spectrum analyzer scans from 30MHz to 9GHz (higher than the 10<sup>th</sup> harmonic of the carrier). The peak detector is used and RBW is set to 1MHz on spectrum analyzer. The measurement will be conducted at middle channel.

Test Settings

1. Start frequency was set to 30MHz and stop frequency was set to 10GHz for Cell, 20GHz for PCS (separated into at least two plots per channel)
2. RBW=1MHz
3. VBW  $\geq 3 \times$  RBW
4. Detector = RMS
5. Trace mode = trace average for continuous emissions, max hold for pulse emissions
6. Sweep time = auto couple
7. The trace was allowed to stabilize

Limits:

The minimum permissible attenuation level of any spurious emission is  $43 + \log_{10}(P_{[Watts]})$ , where P is the transmitter power in Watts.

Test result:

The test results are shown in Appendix A.

## 6.6 Band Edges Compliance

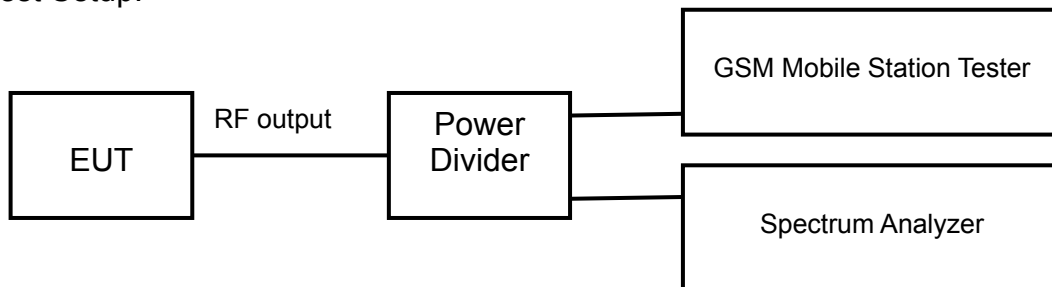
Rule Part (s)

FCC Part 2.1051/ 22.917(a) /Part 24.238(a)

Ambient condition:

Temperature	Relative humidity	Pressure
25°C	30%	101.9kPa

Test Setup:



Test procedure:

After a radio link has been established between EUT and Tester, the output power of the cell signal of the testing equipment will be decreased until the output power of the EUT reach a maximum value. The measurement is carried out using a spectrum analyzer. The peak detector is used and RBW is set to at least 1% of the emission bandwidth on spectrum analyzer.

The measurement will be conducted at two channels (Low and High channels)

Test Settings

1. Start and stop frequency were set such that the band edge would be placed in the center of the plot
2. Span was set large enough so as to capture all out of band emissions near the band edge
3. RBW > 1% of the emission bandwidth
4. VBW > 3 x RBW
5. Detector = RMS
6. Number of sweep points  $\geq 2 \times \text{Span/RBW}$
7. Trace mode = trace average for continuous emissions, max hold for pulse emissions
8. Sweep time = auto couple
9. The trace was allowed to stabilize

Limit: The minimum permissible attenuation level of any spurious emission is  $43 + \log_{10}(P_{\text{[Watts]}})$ , where P is the transmitter power in Watts.

Test result:

The test results are shown in Appendix A.

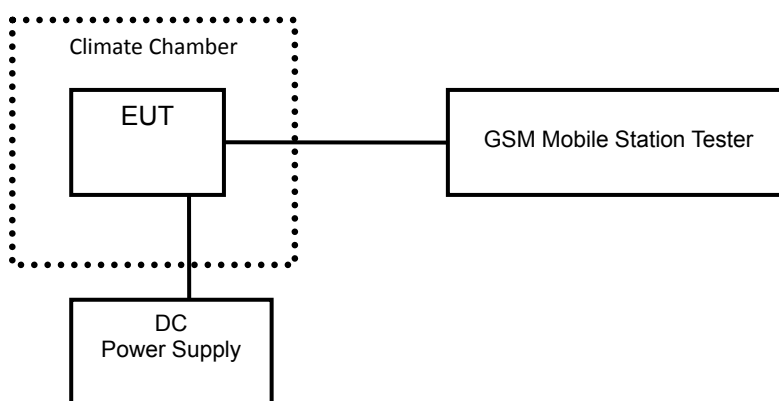
## 6.7 Frequency Stability

Rule Part(s)  
FCC Part 2.1055/22.355 /Part 24.235

Ambient condition:

Temperature	Relative humidity	Pressure
25°C	30%	101.9kPa

Test setup:



Test Procedure:

A radio link shall be established between EUT and Tester. The tester will sample the transmitter RF output signal and measure its frequency. The temperature inside the climate chamber is varied from -30 to +50°C in 10°C step size. The primary supply voltage is varied from 85% to 115% of the nominal value for non-hand-carried battery and AC powered equipment. For hand-carried, battery-powered equipment, primary supply voltage is reduced to the battery operating end point which shall be specified by the manufacturer. The measurement will be conducted at three channels (Low, middle and High channels).

Test Settings

1. The carrier frequency of the transmitter is measured at room temperature (20°C to provide a reference).
2. The equipment is turned on in a “standby” condition for fifteen minutes before applying power to the transmitter. Measurement of the carrier frequency of the transmitter is made within one minute after applying power to the transmitter.
3. Frequency measurements are made at 10°C intervals ranging from -30°C to +50°C. A period of at least one half-hour is provided to allow stabilization of the equipment at each temperature level.

Limits: For Part 22, the frequency stability of the transmitter shall be maintained within  $\pm 0.00025\%$  ( $\pm 2.5$  ppm) of the center frequency. For Part 24, the frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

Test result:

The test results are shown in Appendix A.



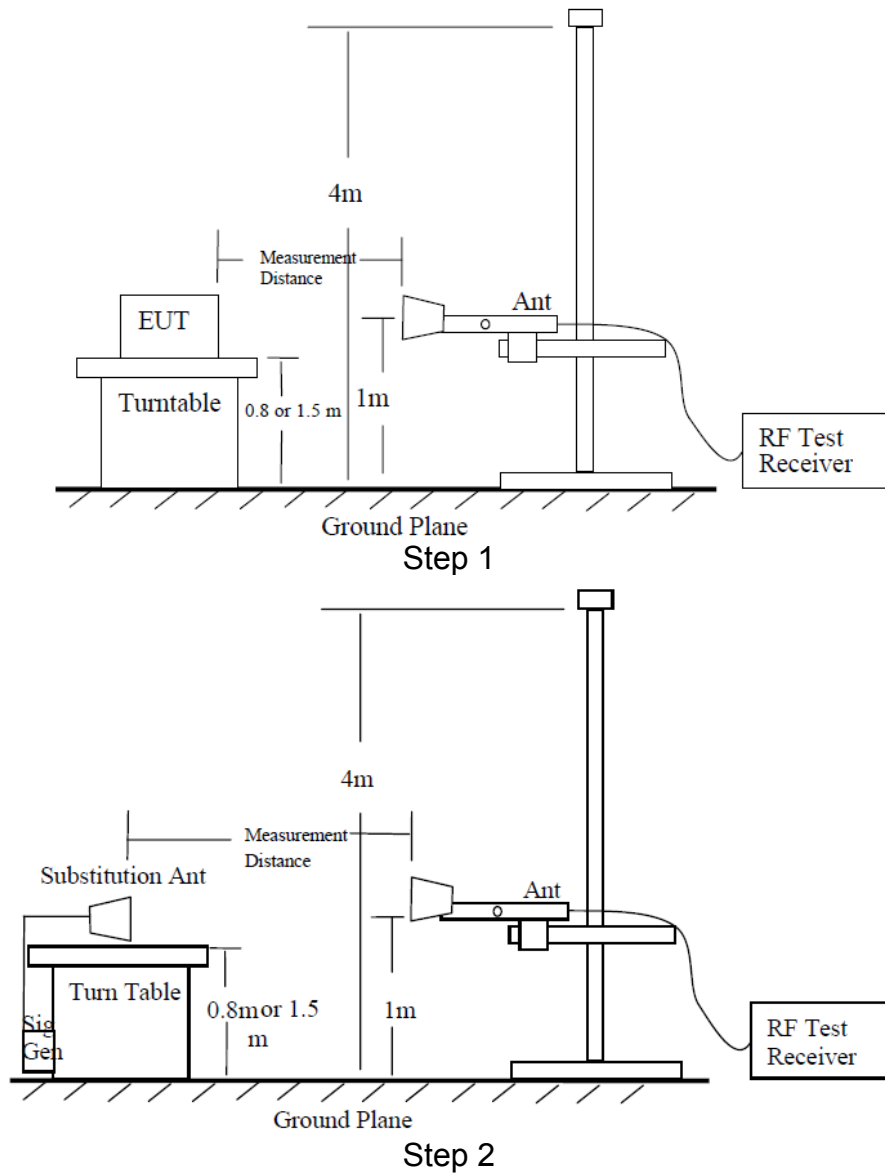
### 6.8 Radiated Spurious Emissions

Rule Part(s)  
FCC Part2.1053/ 22.917(a)/Part 24.238(a)

Ambient condition:

Temperature	Relative humidity	Pressure
25°C	30%	101.9kPa

Test Setup:



**Test procedure:**

The measurements procedures in TIA-603-E-2016 are used.

The spectrum was scanned from 30MHz to the 10<sup>th</sup> harmonic of the highest frequency generated within the equipment.

**Step 1:**

The measurement is carried out in the fully anechoic chamber. EUT was placed on a 2.4 meter high non-conductive table at a 3 meter test distance from the test receive antenna. A receiving antenna was placed on the antenna mast 3 meters from the EUT. The height of receiving antenna is 2.4m and varies in certain range to find the maximum power value. A radio link shall be established between EUT and Tester. The output power of the cell signal of the tester will be decreased until the output power of the EUT reach a maximum value. The measurement is carried out using a spectrum analyzer or receiver. The spectrum analyzer scans from 30MHz to 20GHz (higher than the 10<sup>th</sup> harmonic of the carrier). The peak detector is used and RBW is set to 1MHz on spectrum analyzer. Then the antenna height and turn table rotation is adjusted till the maximum power value is founded on spectrum analyzer or receiver. A notch filter is necessary in the band near to the carrier frequency. A high pass filter is needed to avoid the distortion of the testing equipment in the band above the carrier frequency.

**Step 2:**

A log-periodic antenna or double-ridged waveguide horn antenna shall be substituted in place of the EUT. The log-periodic antenna will be driven by a signal generator and the level will be adjusted till the same power value on the spectrum analyzer or receiver. The level of the spurious emissions can be calculated through the level of the signal generator, cable loss, the gain of the substitution antenna and the reading of the spectrum analyzer or receiver.

A power ( $P_{mea}$ ) is applied to the input of the substitution antenna, and adjusts the level of the signal generator output until the value of the receiver reach the previously recorded ( $P_r$ ). The power of signal source ( $P_{mea}$ ) is recorded. The test should be performed by rotating the test item and adjusting the receiving antenna polarization.

A "reference path loss" should be calculated after test. The attenuation of "reference path loss" is the cable loss between the Signal Source with the Substitution Antenna ( $P_{ca}$ ) and the Substitution Antenna Gain ( $G_a$ ).

**Calculation procedure:**

The data of cable loss and antenna gain has been calibrated in full testing frequency range before the testing.

The power of the Radiated Spurious Emissions is calculated by adding the cable loss and antenna gain. The basic equation with a sample calculation is as followed:

$$\text{Power(EIRP)} = P_{mea} + P_{ca} + G_a$$

This value is EIRP since the measurement is calibrated using an antenna of known gain (2.15dB) and known input power. ERP can be calculated from EIRP by subtracting the gain of the dipole,  $\text{ERP} = \text{EIRP} - 2.15 \text{ (dB)}$ .

Assumed the power of signal source record is -20dBm. A cable loss of -30dB, and an antenna gain of 11dB are added.

$$P = P_{\text{mea}} + P_{\text{ca}} + G_a = (-20\text{dBm}) + (-30\text{dB}) + (11\text{dB}) = -39\text{dBm}$$

The measurement will be done at carrier frequencies that pertain to Low, Middle and High channels.

Test result:

The test results are shown in Appendix B.

### 6.9 Peak-Average Ratio

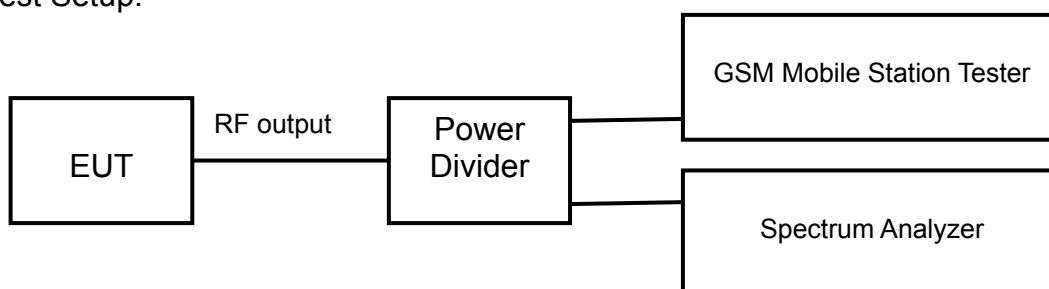
Rule Part(s)

FCC Part 24.232(d)

Ambient condition:

Temperature	Relative humidity	Pressure
25°C	30%	101.9kPa

Test Setup:



Test procedure:

1. The signal analyzer's CCDF measurement profile is enabled
2. Frequency = carrier center frequency
3. Measurement BW > Emission bandwidth of signal
4. The signal analyzer was set to collect one million samples to generate the CCDF curve
5. The measurement interval was set depending on the type of signal analyzed. For continuous signals (>98% duty cycle), the measurement interval was set to 1ms. For burst transmissions, the spectrum analyzer is set to use an internal "RF Burst" trigger that is synced with an incoming pulse and the measurement interval is set to less than the duration of the "on time" of one burst to ensure that energy is only captured during a time in which the transmitter is operating at maximum power

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

Test result:

The test results are shown in Appendix A

## 7 MEASUREMENT UNCERTAINTIES

Items	Uncertainty	
Occupied Bandwidth	3kHz	
Peak power output	0.67dB	
Band edge compliance	1.20dB	
Spurious emissions	30MHz~1GHz	2.83dB
	1GHz~12.75GHz	2.50dB
	12.75GHz~25GHz	2.75dB

## **8 TEST EQUIPMENTS**

No.	Name/Model	Manufacturer	S/N	Calibration Date	Calibration Due Date
1	E5515C(8960) Mobile Station Tester	Agilent	MY50266302	2019.08.20	2020.08.19
2	N9020A Spectrum Analyzer	Agilent	MY48010771	2019.08.20	2020.08.19
3	6007 Power Divider	Weinschel	6007-GJ-1	2019.08.20	2020.08.19
4	DC Power Supply E3645A	Agilent	MY40000741	2019.03.01	2020.02.29
5	Temperature chamber SH241	ESPEC	92013758	2019.08.20	2020.08.19
6	12.65m×8.03m×7.50m Fully-Anechoic Chamber	FRANKONIA	----	----	----
7	23.18m×16.88m×9.60m Semi-Anechoic Chamber	FRANKONIA	---	----	----
8	Turn table Diameter:1m	FRANKONIA	----	----	----
9	Turn table Diameter:5m	FRANKONIA	----	----	----
10	Antenna master FAC(MA4.0)	MATURO	----	----	----
11	Antenna master SAC(MA4.0)	MATURO	----	----	----
12	9.080m×5.255m×3.525m Shielding room	FRANKONIA	----	----	----
13	HF 907 Double-Ridged Waveguide Horn Antenna	R&S	100512	2019.08.20	2020.08.19
14	HF 907 Double-Ridged Waveguide Horn Antenna	R&S	100513	2019.08.20	2020.08.19
15	HL562 Ultra log antenna	R&S	100016	2019.08.20	2020.08.19
16	3160-09 Receive antenna	SCHWARZ-BECK	002058-002	2019.08.20	2020.08.19
17	ESI 40 EMI test receiver	R&S	100015	2019.08.20	2020.08.19
18	ESCS30 EMI test receiver	R&S	100029	2019.08.20	2020.08.19
19	HL562 Receive antenna	R&S	100167	2019.08.20	2020.08.19
20	ENV216 AMN	R&S	3560.6550.12	2019.08.20	2020.08.19

## APPENDIX A – TEST DATA OF CONDUCTED EMISSION

### RF Power Output

GSM850

GSM Measured Power:

Carrier frequency (MHz)	Channel No.	RF Power Output (dBm)
824.2	128	33.20
836.4	189	33.04
848.8	251	33.25

GPRS Measured Power:

Carrier frequency (MHz)	Channel No.	TX Mode	RF Power Output (dBm)
824.2	128	4Downlink1uplink	33.21
836.4	189		33.05
848.8	251		33.26
824.2	128	3Downlink2uplink	32.52
836.4	189		32.35
848.8	251		32.59
824.2	128	2Downlink3uplink	30.83
836.4	189		30.67
848.8	251		30.98
824.2	128	1Downlink4uplink	29.61
836.4	189		29.45
848.8	251		29.78

EGPRS (8PSK) Measured Power:

Carrier frequency (MHz)	Channel No.	TX Mode	RF Power Output (dBm)
824.2	128	8PSK 4Downlink1uplink	26.74
836.4	189		26.48
848.8	251		26.83
824.2	128	8PSK 3Downlink2uplink	25.57
836.4	189		25.64
848.8	251		25.68
824.2	128	8PSK 2Downlink3uplink	23.56
836.4	189		23.57
848.8	251		23.54
824.2	128	8PSK 1Downlink4uplink	22.35
836.4	189		22.48
848.8	251		22.53

PCS1900

GSM Measured Power:

Carrier frequency (MHz)	Channel No.	RF Power Output (dBm)
1850.2	512	26.57
1880.0	661	26.34
1909.8	810	26.37

GPRS Measured Power:

Carrier frequency (MHz)	Channel No.	TX Mode	RF Power Output (dBm)
1850.2	512	4Downlink1uplink	26.60
1880.0	661		26.36
1909.8	810		26.37
1850.2	512	3Downlink2uplink	25.56
1880.0	661		25.34
1909.8	810		25.38
1850.2	512	2Downlink3uplink	24.91
1880.0	661		24.93
1909.8	810		24.96
1850.2	512	1Downlink4uplink	23.73
1880.0	661		23.48
1909.8	810		23.54

EGPRS (8PSK) Measured Power:

Carrier frequency (MHz)	Channel No.	TX Mode	RF Power Output (dBm)
1850.2	512	8PSK 4Downlink1uplink	26.60
1880.0	661		26.37
1909.8	810		26.40
1850.2	512	8PSK 3Downlink2uplink	25.60
1880.0	661		25.32
1909.8	810		25.41
1850.2	512	8PSK 2Downlink3uplink	24.93
1880.0	661		24.92
1909.8	810		24.94
1850.2	512	8PSK 1Downlink4uplink	23.71
1880.0	661		23.47
1909.8	810		23.54

### Occupied Bandwidth

GSM850

GPRS MODE:

Carrier frequency (MHz)	Channel No.	Bandwidth of 99% Power (kHz)
824.2	128	243.99
836.4	189	252.19
848.8	251	245.06

EDGE (8PSK) MODE:

Carrier frequency (MHz)	Channel No.	Bandwidth of 99% Power (kHz)
824.2	128	243.20
836.4	189	247.01
848.8	251	243.93

PCS1900

GPRS MODE:

Carrier frequency (MHz)	Channel No.	Bandwidth of 99% Power (kHz)
1850.2	512	237.76
1880.0	661	247.46
1909.8	810	246.99

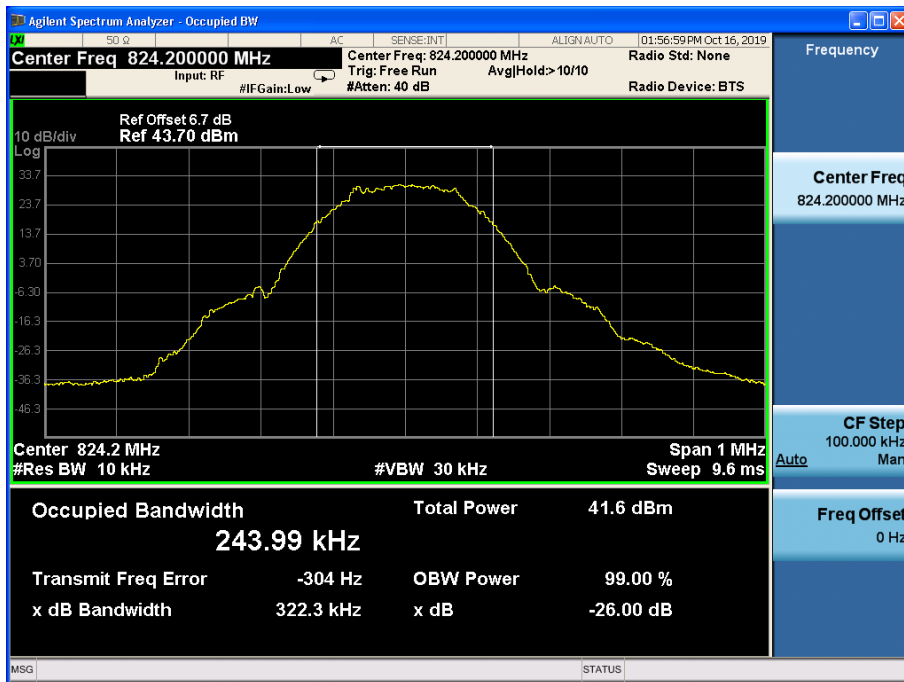
EDGE (8PSK) MODE:

Carrier frequency (MHz)	Channel No.	Bandwidth of 99% Power (kHz)
1850.2	512	247.77
1880.0	661	252.33
1909.8	810	251.86



GSM850

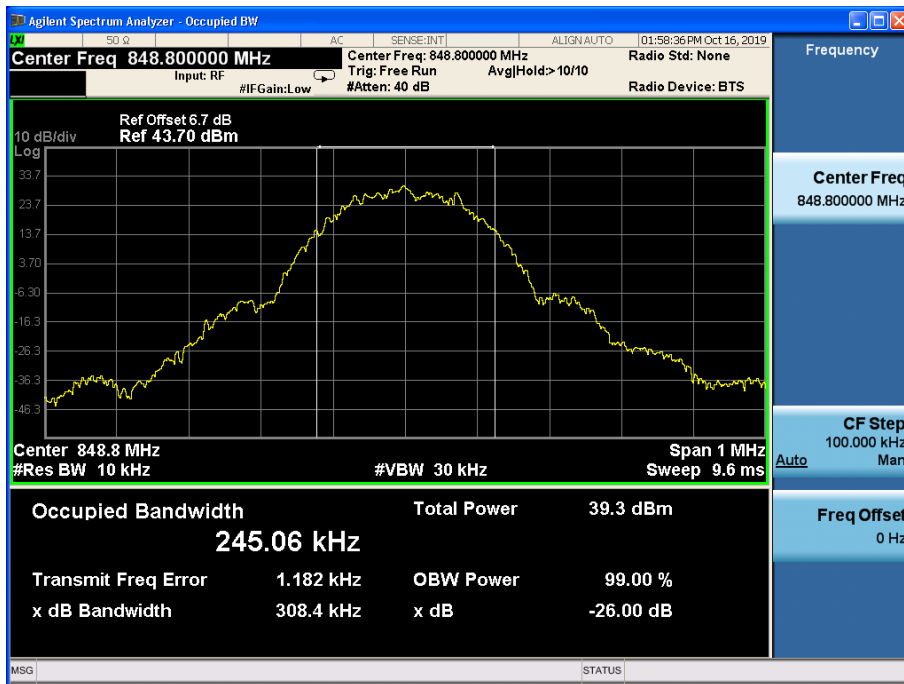
GPRS MODE:



Channel 128

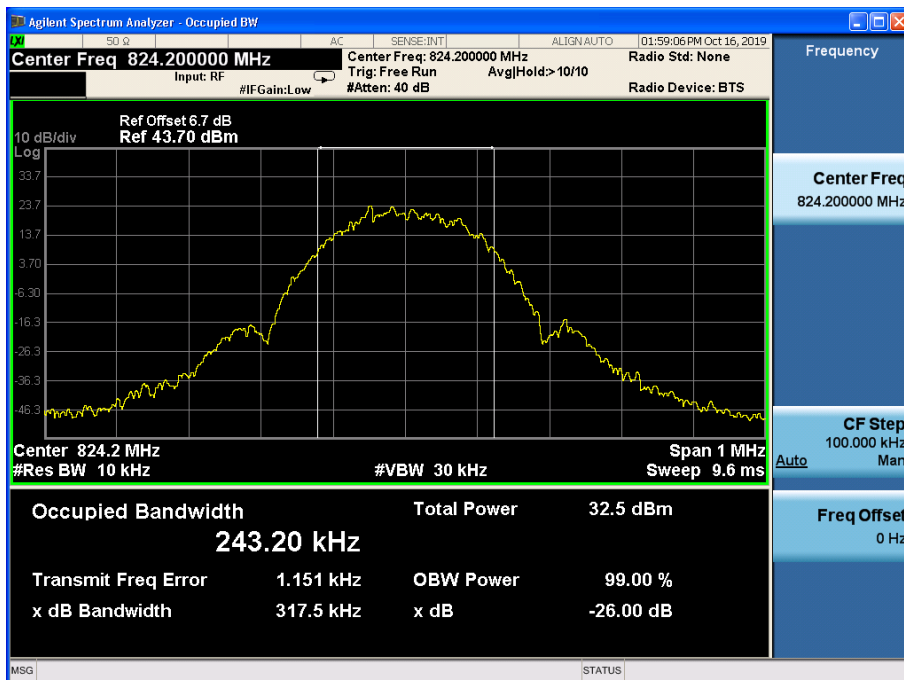


Channel 189

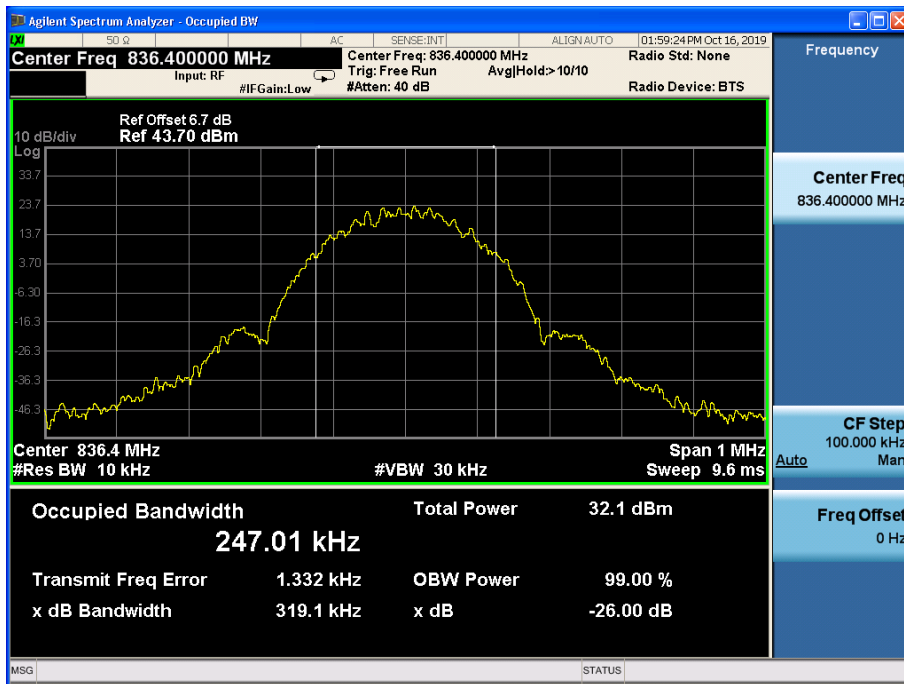


Channel 251

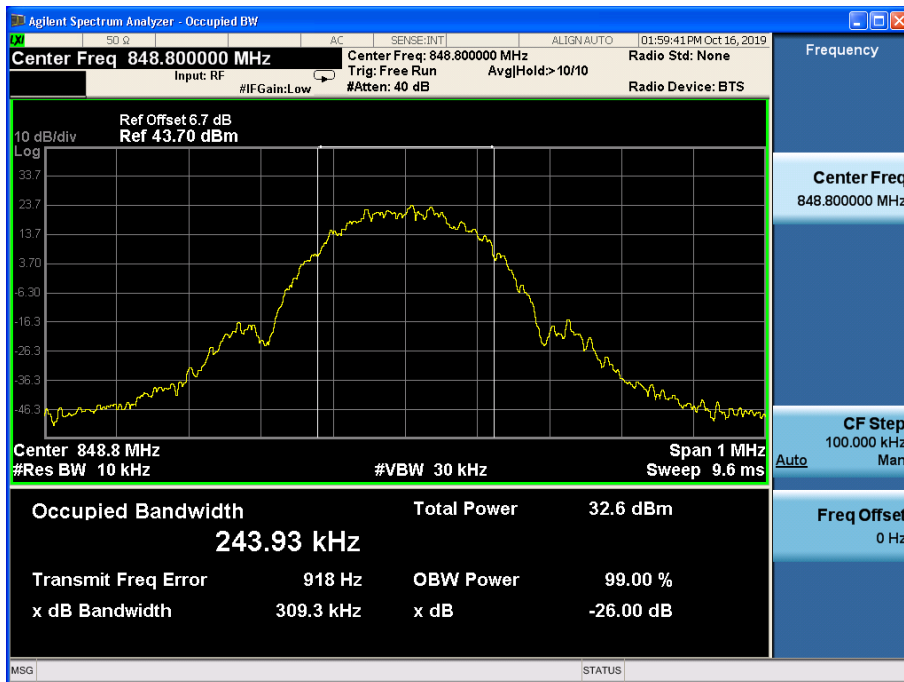
EDGE (8PSK) MODE:



Channel 128



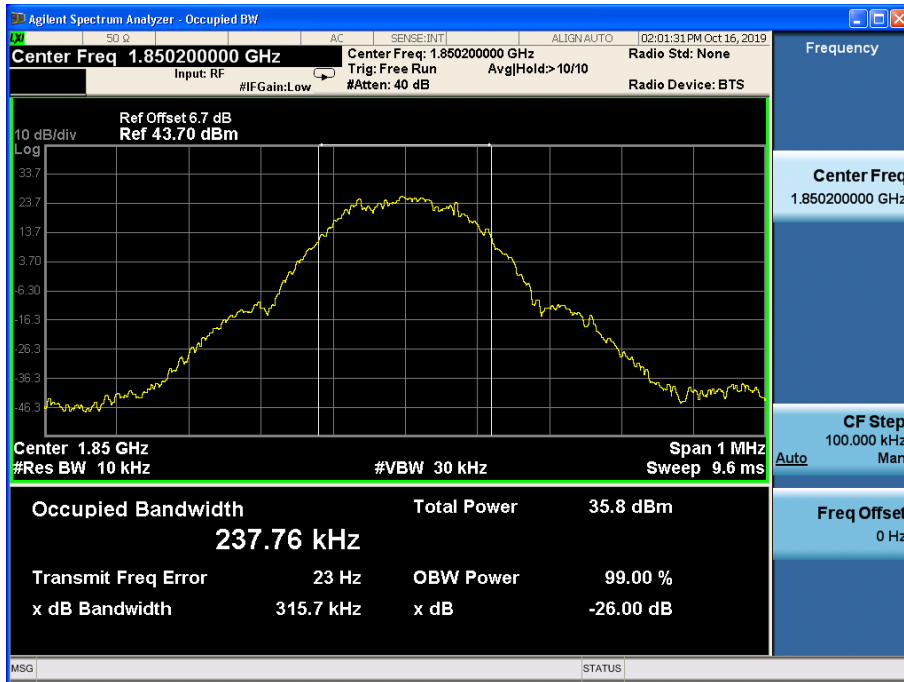
Channel 189



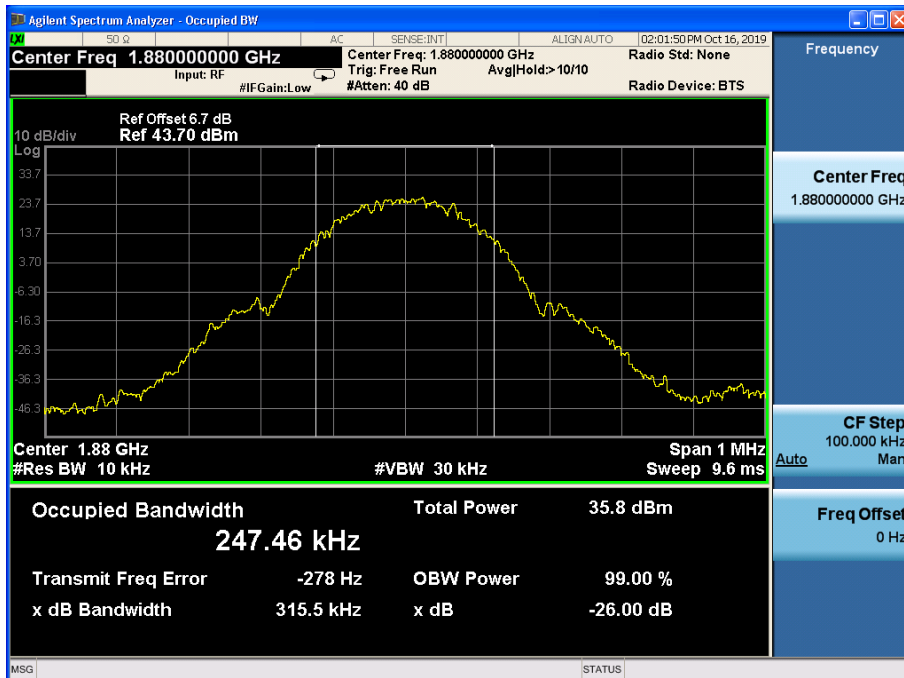
Channel 251

PCS1900

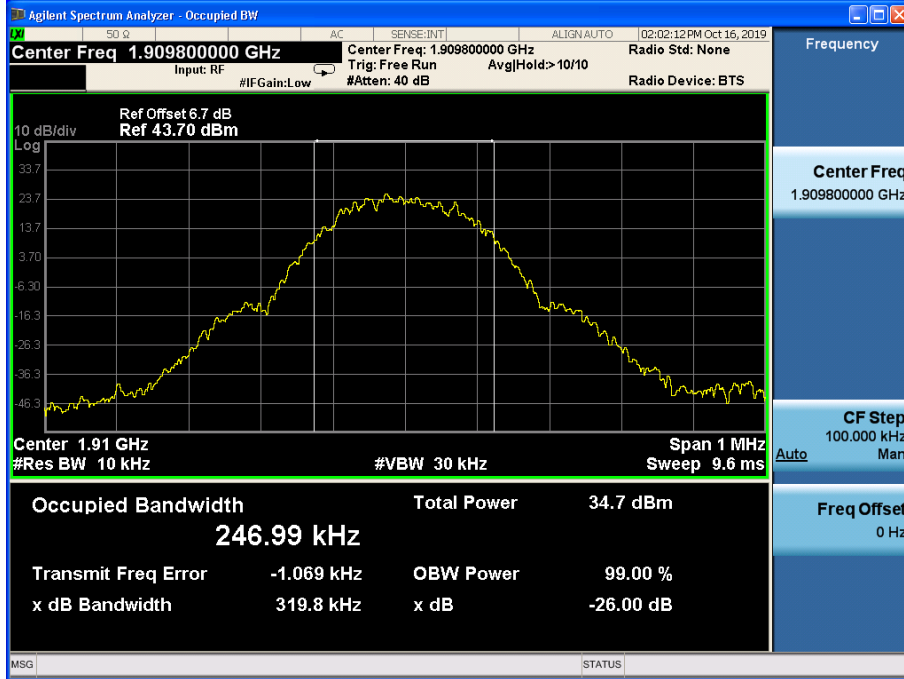
GPRS MODE:



Channel 512

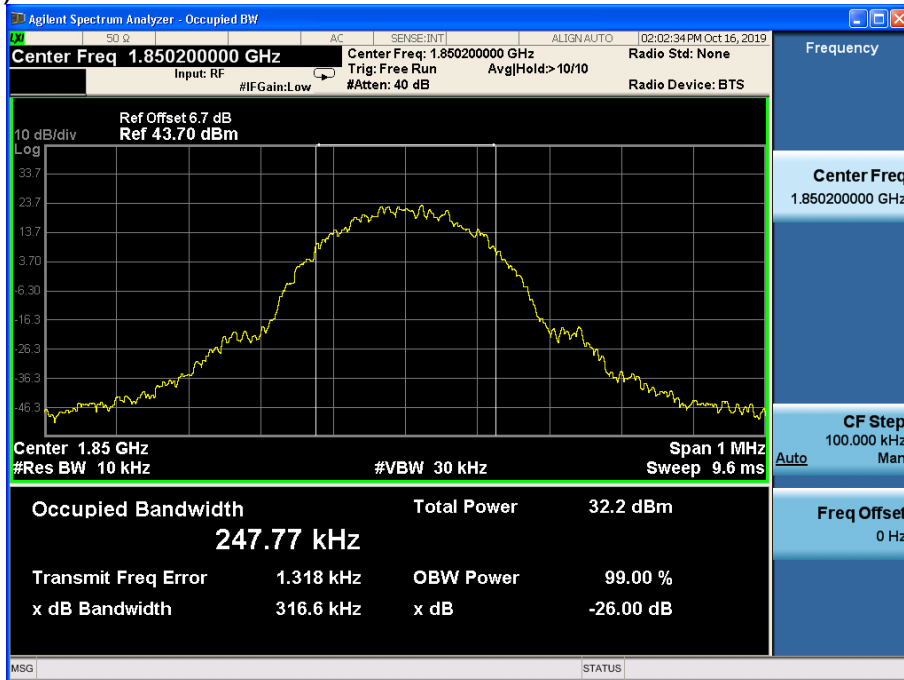


Channel 661

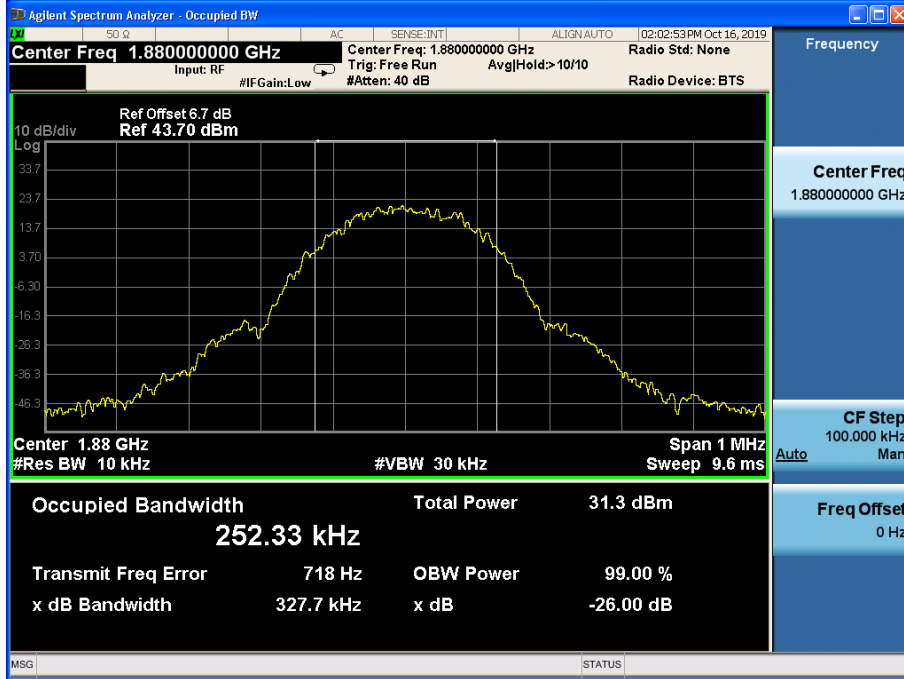


Channel 810

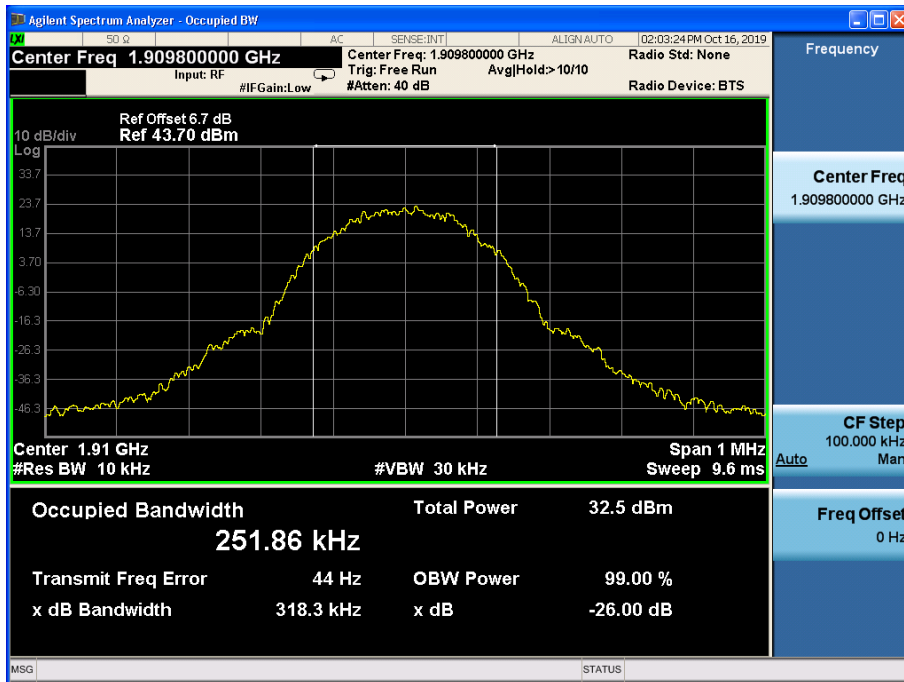
EDGE (8PSK) MODE:



Channel 512



Channel 661



Channel 810

## Emission Bandwidth

GSM850

GSM/GPRS MODE:

Carrier frequency (MHz)	Channel No.	Bandwidth of -26dB transmitter power (kHz)
824.2	128	322.3
836.4	189	313.9
848.8	251	308.4

EDGE (8PSK) MODE:

Carrier frequency (MHz)	Channel No.	Bandwidth of -26dB transmitter power (kHz)
824.2	128	317.5
836.4	189	319.1
848.8	251	309.3

PCS1900

GSM/GPRS MODE:

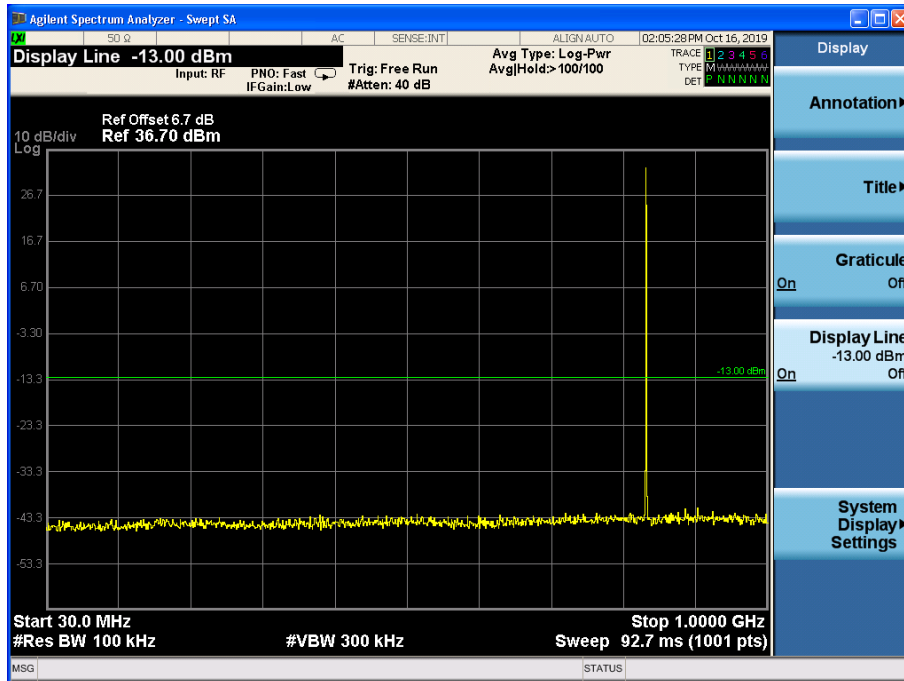
Carrier frequency (MHz)	Channel No.	Bandwidth of -26dB transmitter power (kHz)
1850.2	512	315.7
1880.0	661	315.5
1909.8	810	319.8

EDGE (8PSK) MODE:

Carrier frequency (MHz)	Channel No.	Bandwidth of -26dB transmitter power (kHz)
1850.2	512	316.6
1880.0	661	327.7
1909.8	810	318.3

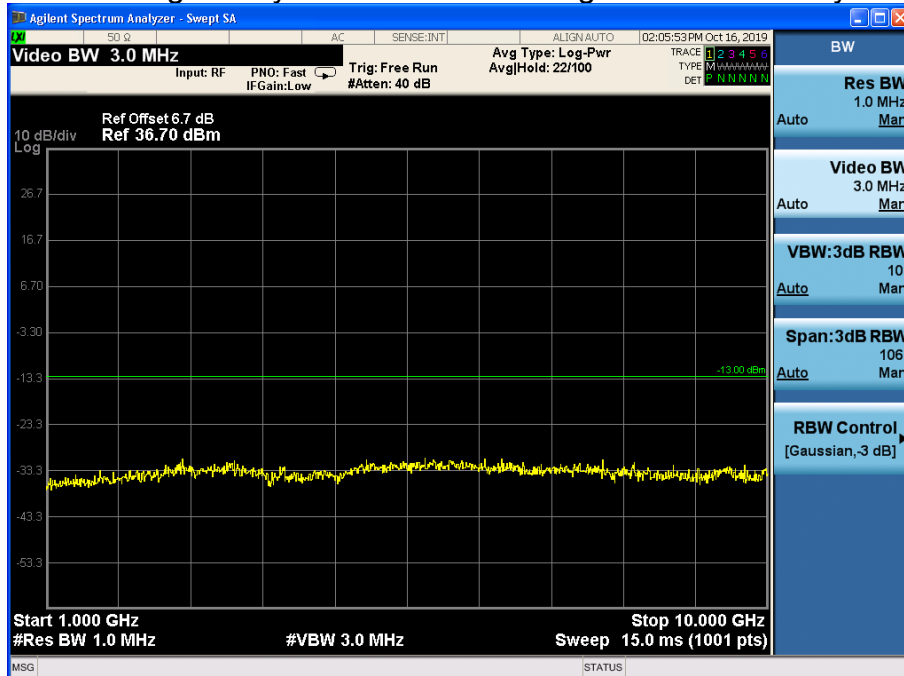
## Spurious Emissions at antenna terminal GSM850

GPRS MODE:



Channel 189, 30MHz~1GHz

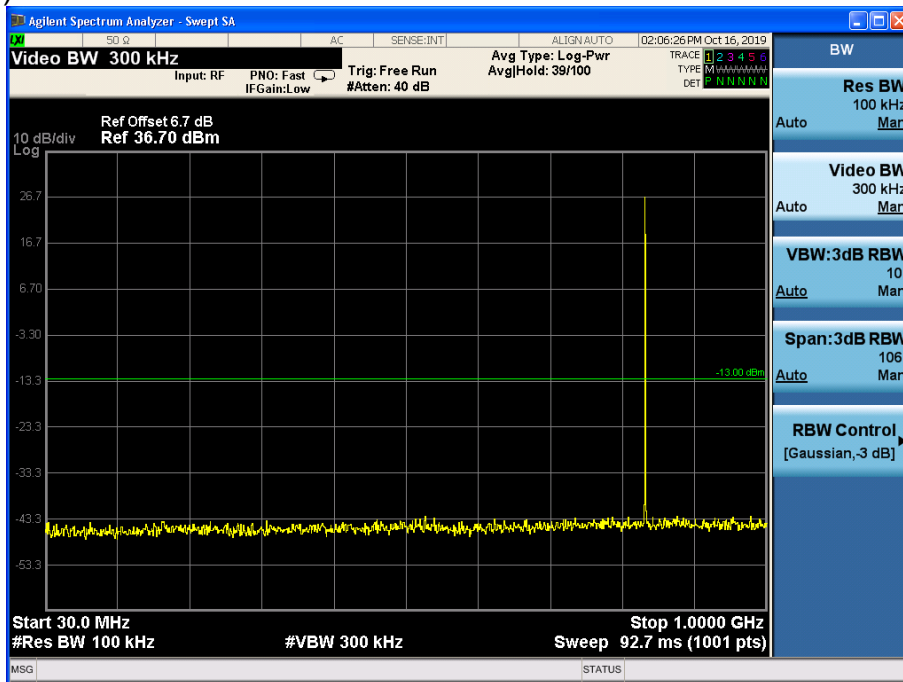
Note: The signal beyond the limit is the signal transmitted by EUT.



Channel 189, 1GHz~10GHz

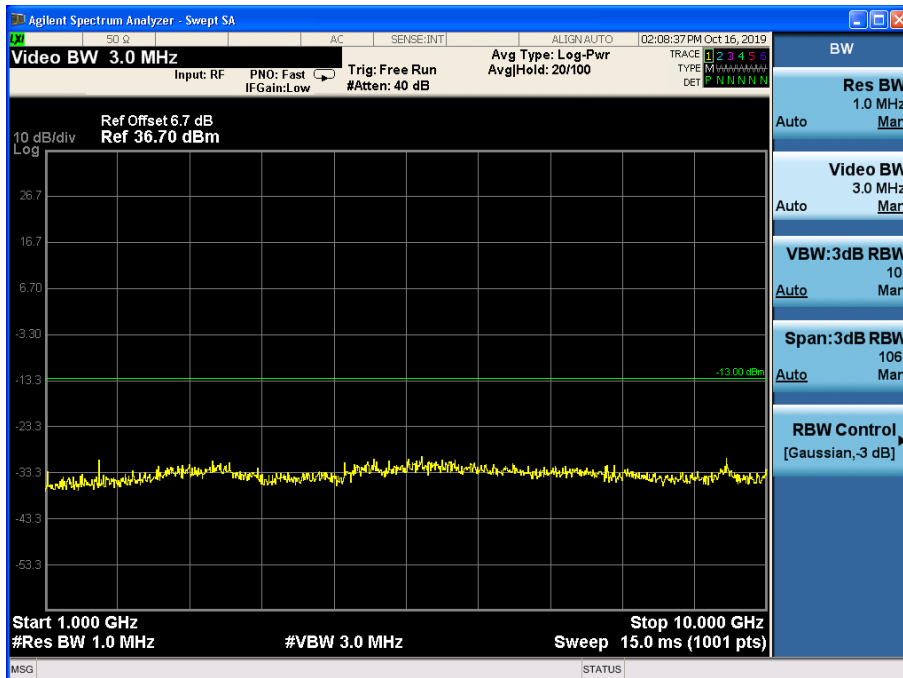


EDGE (8PSK) MODE:



Channel 189, 30MHz~1GHz

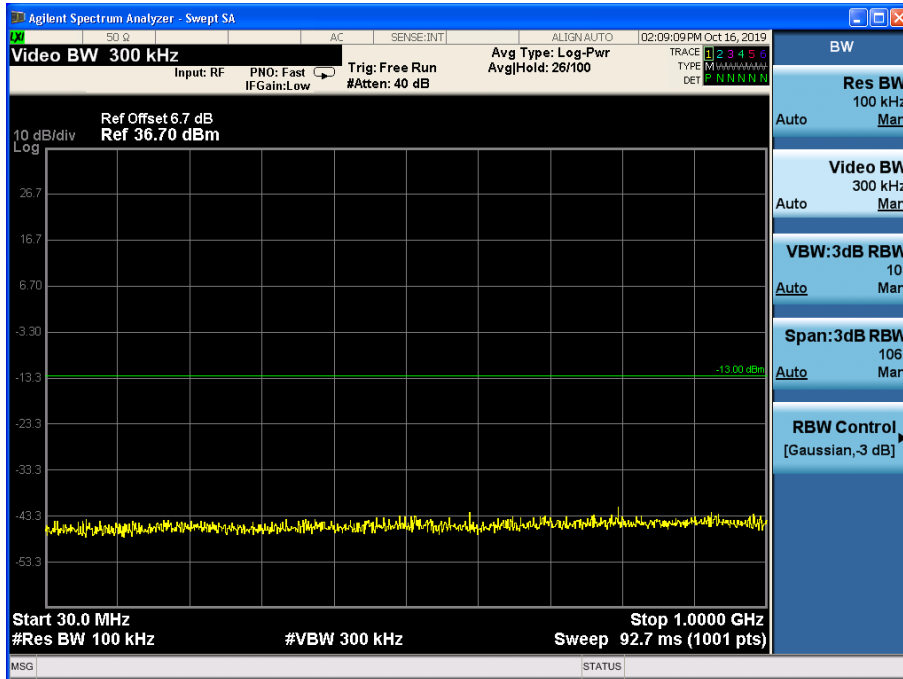
Note: The signal beyond the limit is the signal transmitted by EUT.



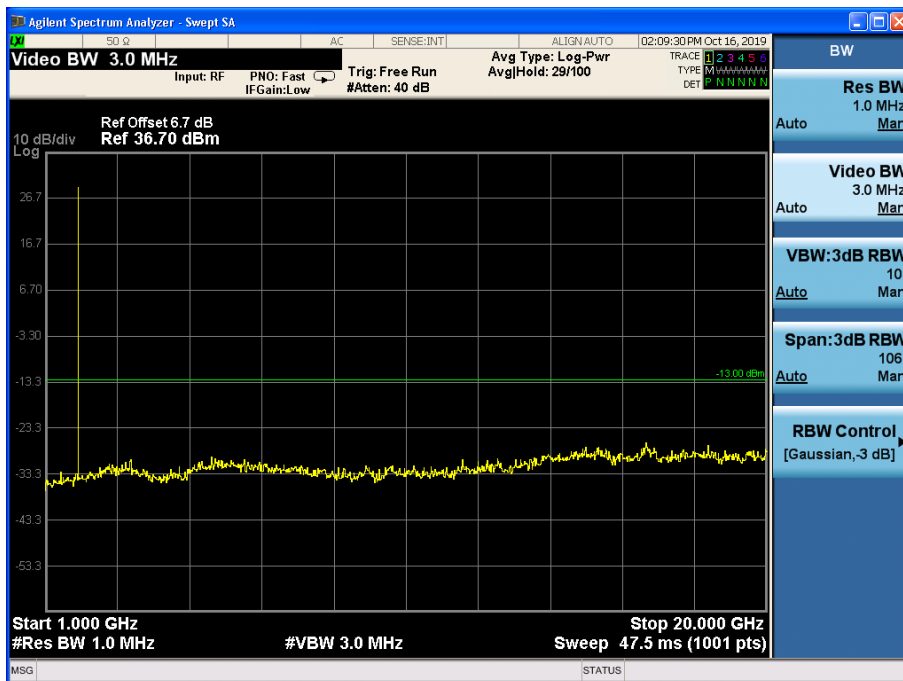
Channel 189, 1GHz~10GHz

PCS1900

GPRS MODE:



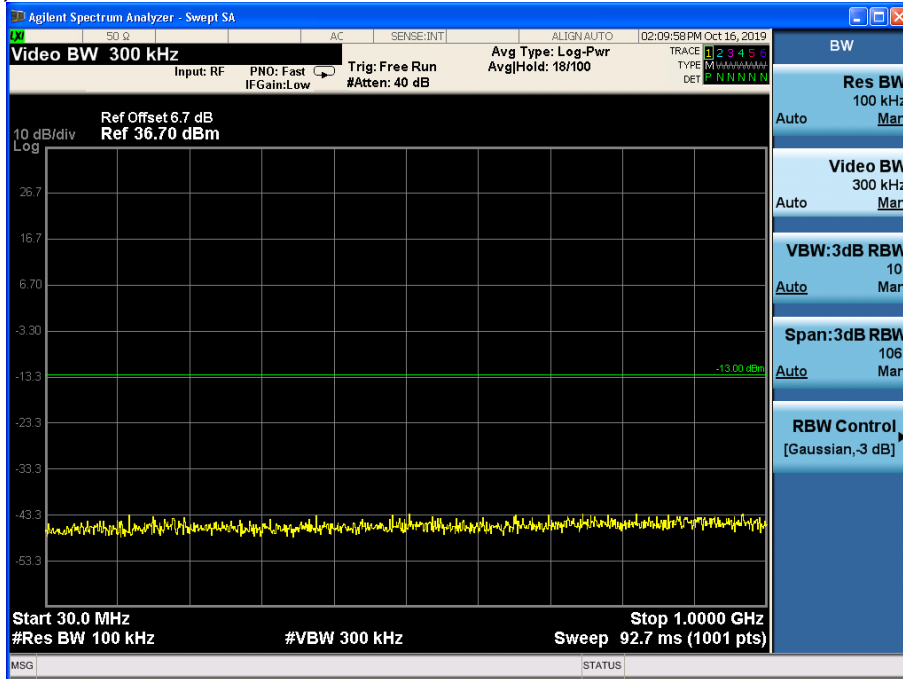
Channel 661, 30MHz~1GHz



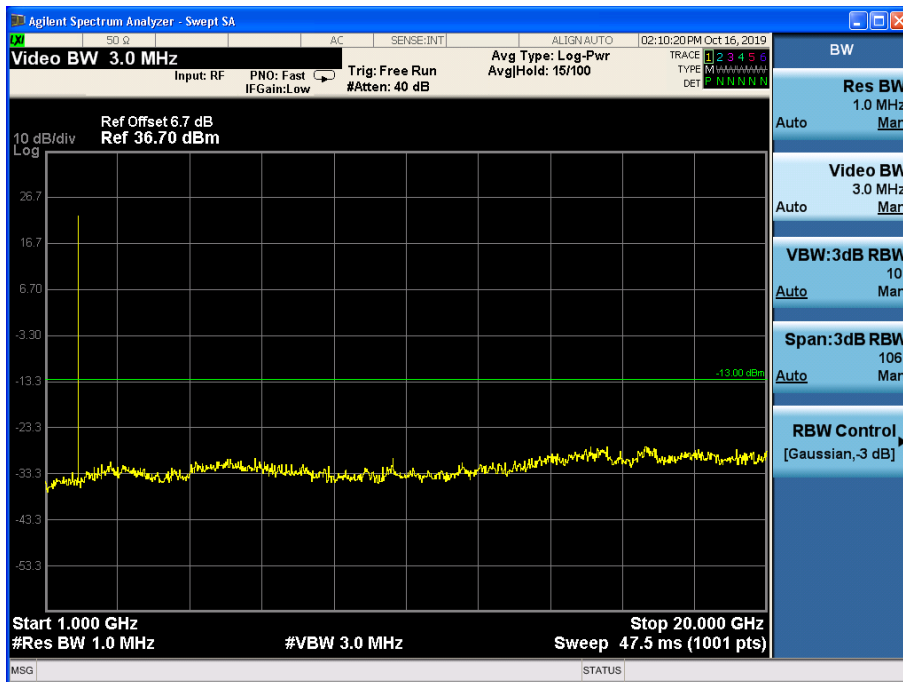
Channel 661, 1GHz~20GHz

Note: The signal beyond the limit is the signal transmitted by EUT.

EDGE (8PSK) MODE:



Channel 661, 30MHz~1GHz



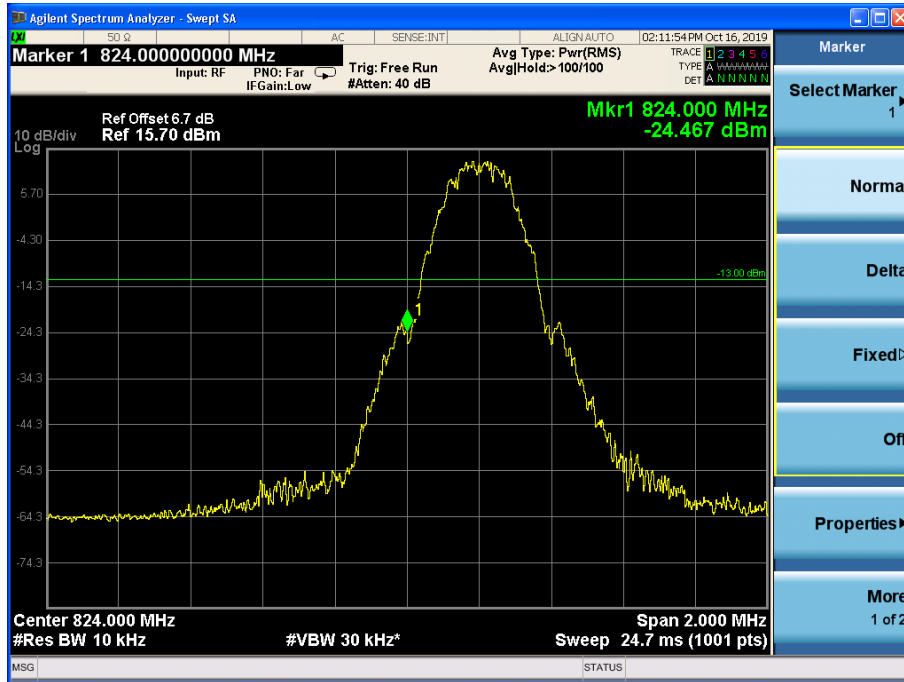
Channel 661, 1GHz~20GHz

Note: The signal beyond the limit is the signal transmitted by EUT.

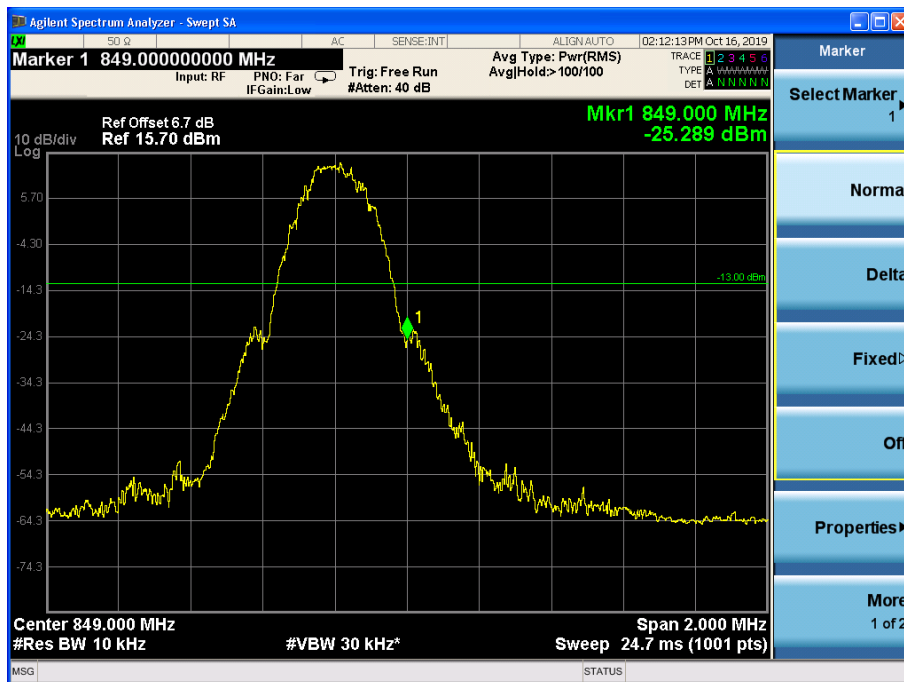
## Band Edges Compliance

GSM850

GPRS MODE:

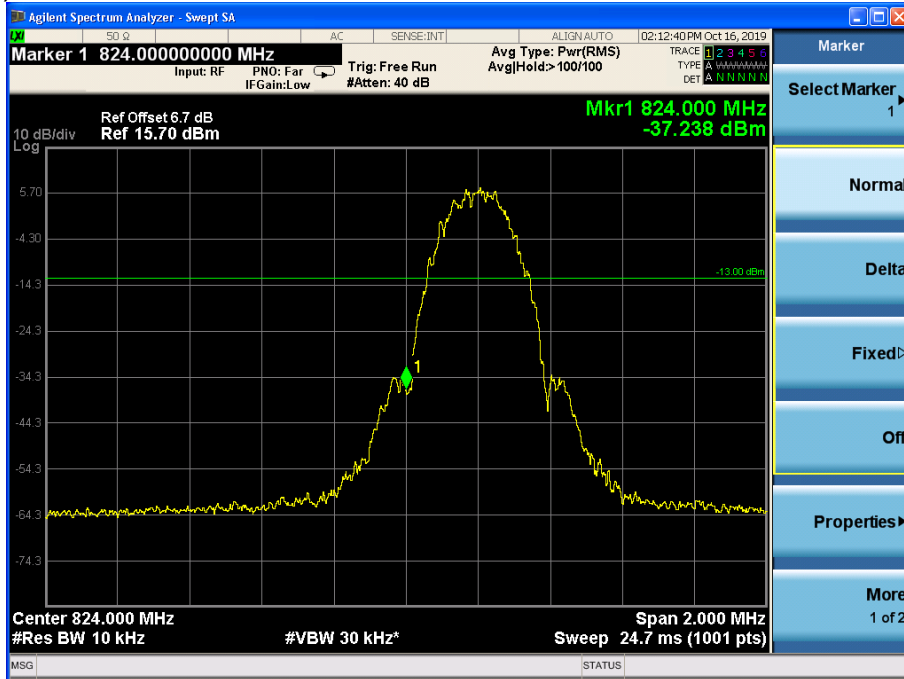


Channel 128

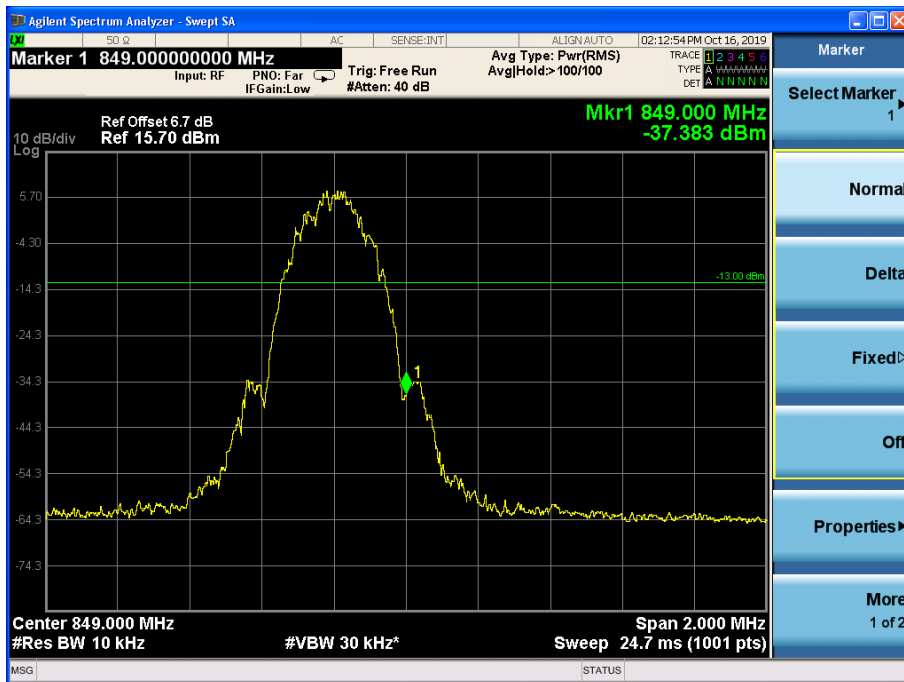


Channel 251

EDGE (8PSK) MODE:



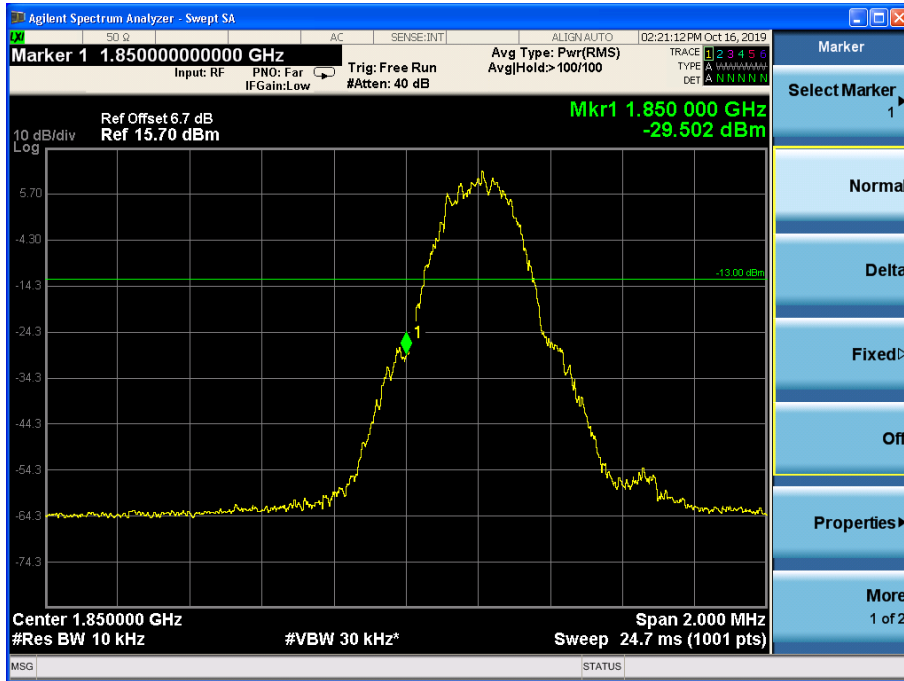
Channel 128



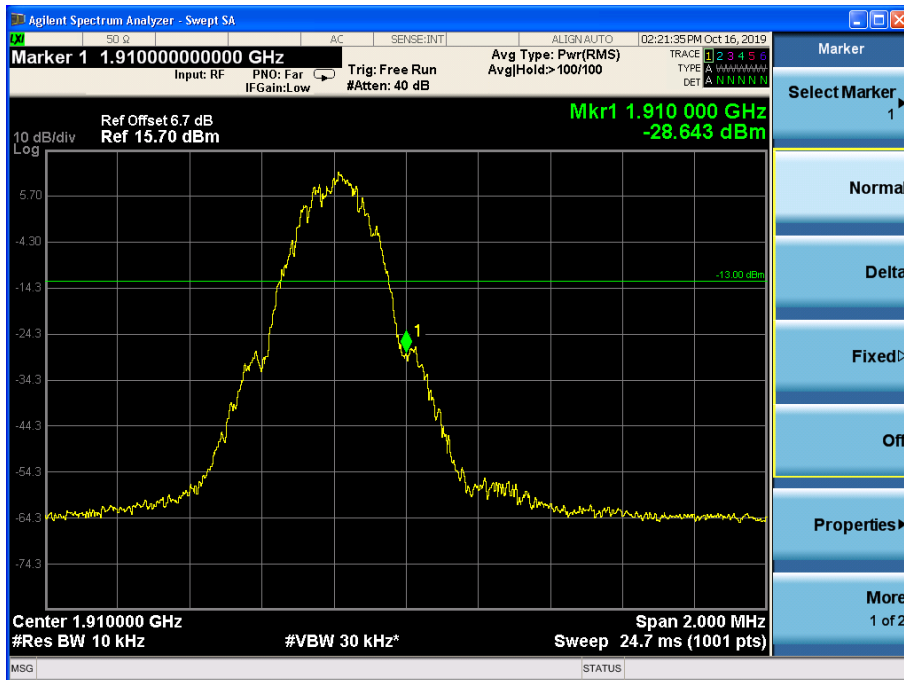
Channel 251

PCS1900

GPRS MODE:

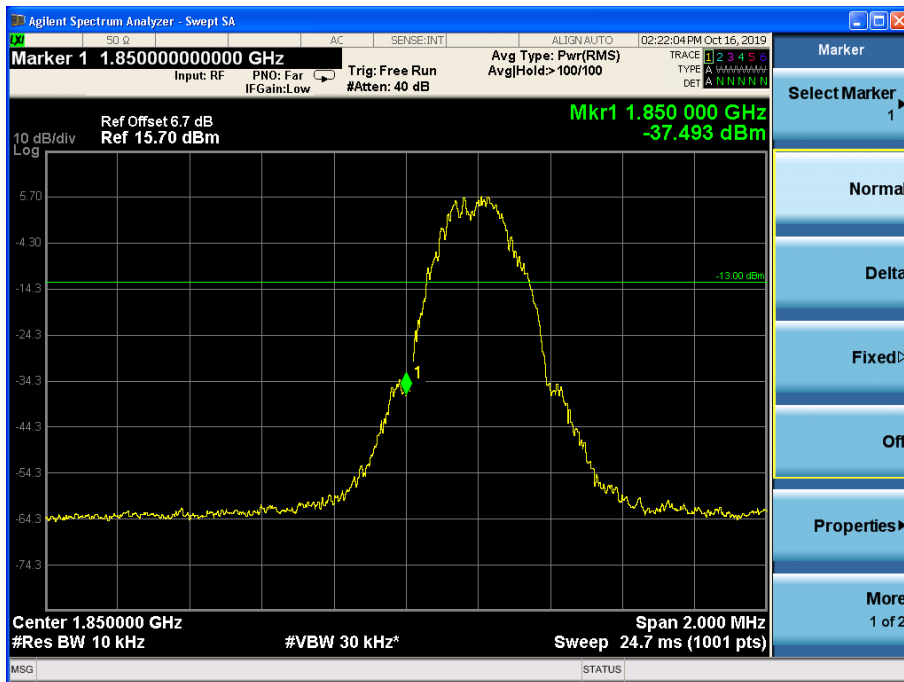


Channel 512

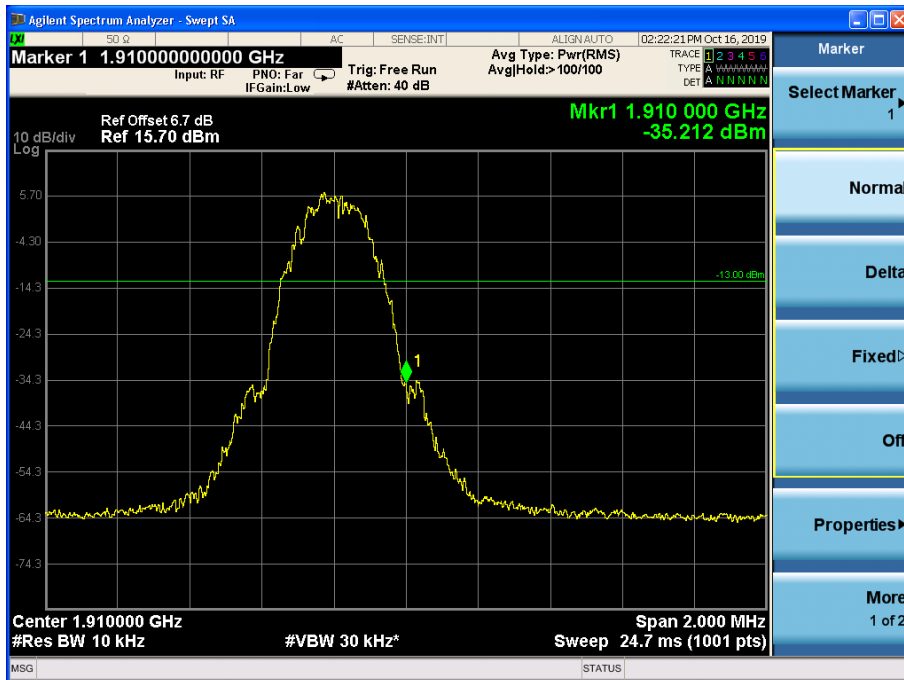


Channel 810

EDGE (8PSK) MODE:



Channel 512



Channel 810

### Frequency Stability

GSM850

GPRS MODE:

Temperature(°C)	Test Result (ppm)@NV		
	Channel 128	Channel 189	Channel 251
0	-0.046	-0.094	0.048
+10	-0.001	-0.073	0.055
+20	0.076	-0.003	-0.071
+30	0.052	0.080	0.041
+40	-0.028	-0.094	0.069
+50	0.005	-0.041	-0.056
Voltage	Test Result (ppm)@NT		
	Channel 128	Channel 189	Channel 251
LV	0.098	0.021	0.065
HV	0.038	0.081	0.020

EDGE (8PSK) MODE:

Temperature(°C)	Test Result (ppm)@NV		
	Channel 128	Channel 189	Channel 251
0	0.075	0.056	0.038
+10	0.028	-0.097	0.089
+20	0.069	-0.061	0.075
+30	-0.071	-0.018	-0.098
+40	-0.013	0.019	-0.071
+50	0.058	-0.009	-0.012
Voltage	Test Result (ppm)@NT		
	Channel 128	Channel 189	Channel 251
LV	-0.048	0.063	0.005
HV	0.062	-0.050	0.100



PCS1900

GPRS MODE:

Temperature(°C)	Test Result (ppm)@NV		
	Channel 512	Channel 661	Channel 810
0	-0.086	0.014	-0.006
+10	-0.027	-0.027	-0.011
+20	0.002	-0.092	0.062
+30	0.031	-0.007	-0.013
+40	0.035	-0.004	0.025
+50	-0.006	0.033	-0.047
Voltage	Test Result (ppm)@NT		
	Channel 512	Channel 661	Channel 810
LV	-0.012	0.051	0.027
HV	0.068	-0.023	0.043

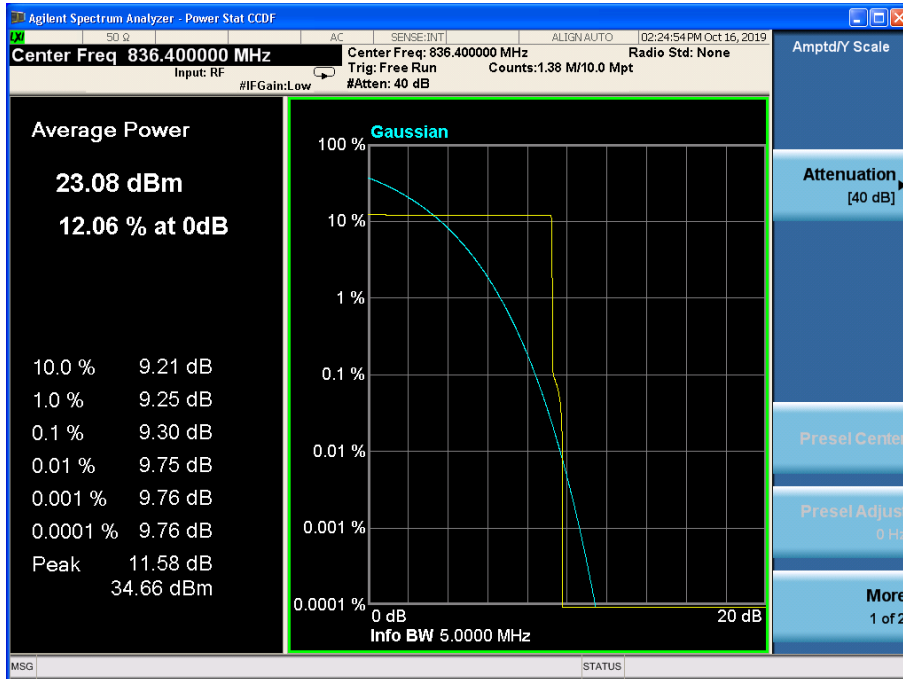
EDGE (8PSK) MODE:

Temperature(°C)	Test Result (ppm)@NV		
	Channel 512	Channel 661	Channel 810
0	0.090	0.041	0.071
+10	0.004	-0.005	0.020
+20	-0.026	-0.015	0.033
+30	-0.094	0.078	0.078
+40	0.076	-0.011	0.062
+50	0.018	-0.097	-0.032
Voltage	Test Result (ppm)@NT		
	Channel 512	Channel 661	Channel 810
LV	-0.063	-0.041	0.009
HV	-0.056	0.041	-0.050

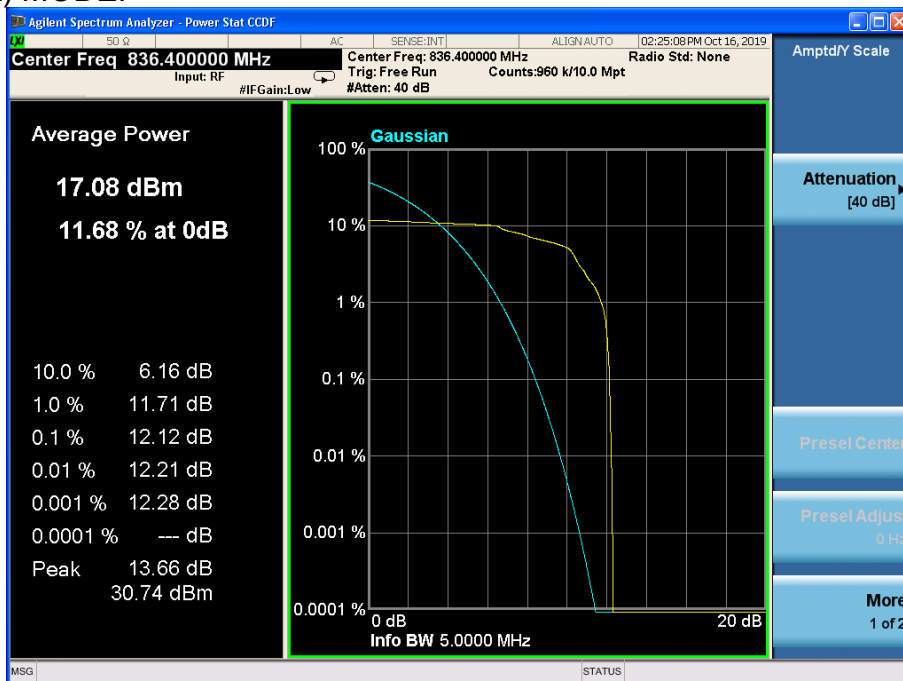
## Peak-Average Ratio

GSM850

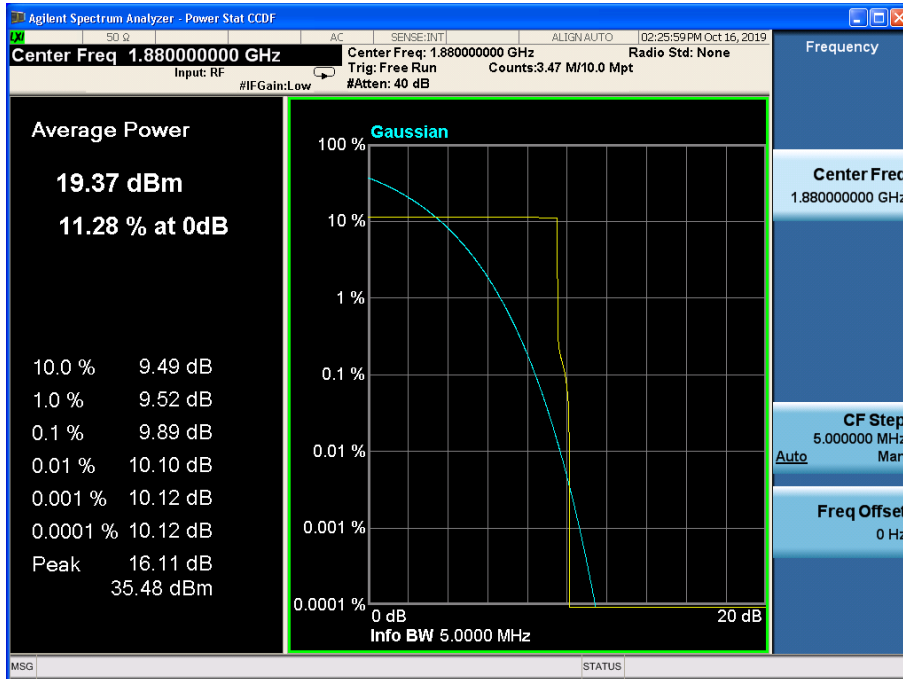
GPRS MODE:



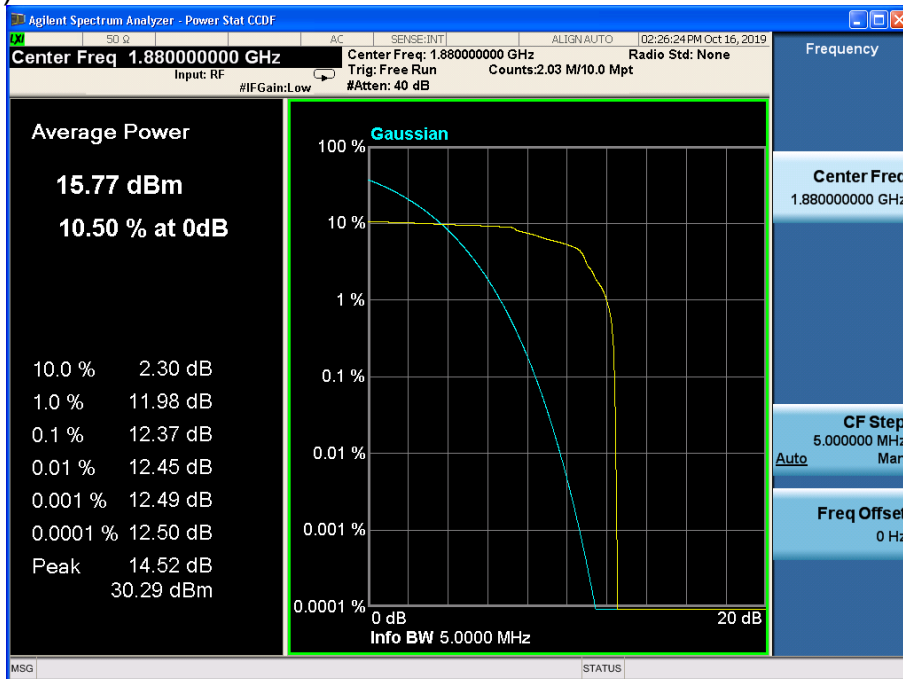
EDGE (8PSK) MODE:



PCS1900  
GPRS MODE:



EDGE (8PSK) MODE:



## APPENDIX B – TEST DATA OF RADIATED EMISSION

### 850 Test result:

The measurement results are obtained as described below:

Peak ERP = Pmea + Pca Cable loss+ Ga Antenna Gain- Correction

Sample calculation: (32.93 dBm) = (30.18 dBm) + (-3.4 dB) + (8.3 dB)- (2.15 dB), the corresponding frequency is 824.2MHz.

Frequency (MHz)	Power step	Peak ERP (dBm)	Pca Cable loss(dB)	Ga Antenna Gain (dB)	Correction (dB)	Pmea (dBm)	Polarization
824.2	5	32.93	-3.4	8.3	2.15	30.18	Vertical

### GSM/GPRS MODE:

Frequency (MHz)	Power step	Peak ERP (dBm)	Pca Cable loss(dB)	Ga Antenna Gain (dB)	Correction (dB)	Pmea (dBm)	Polarization
824.2	5	32.93	-3.4	8.3	2.15	30.18	Vertical
836.6	5	32.42	-3.4	8.3	2.15	29.67	Vertical
848.8	5	32.58	-3.4	8.3	2.15	29.83	Vertical

### EDGE MODE:

Frequency (MHz)	Power step	Peak ERP (dBm)	Pca Cable loss(dB)	Ga Antenna Gain (dB)	Correction (dB)	Pmea (dBm)	Polarization
824.2	5	26.05	-3.4	8.3	2.15	23.30	Vertical
836.6	5	26.44	-3.4	8.3	2.15	23.69	Vertical
848.8	5	26.89	-3.4	8.3	2.15	24.14	Vertical

Test result:  
GSM/GPRS MODE Channel 128:

Frequency (MHz)	Power (dBm)	Limited (dBm)	Polarization
1647.65	-53.12	-13	Vertical
1667.73	-51.26	-13	Vertical
2534.35	-43.94	-13	Vertical
2576.09	-44.32	-13	Vertical
8964.00	-39.16	-13	Vertical
9973.33	-36.01	-13	Vertical

EDGE (8PSK) MODE Channel 128:

Frequency (MHz)	Power (dBm)	Limited (dBm)	Polarization
1648.41	-52.93	-13	Vertical
1667.61	-51.65	-13	Vertical
2533.60	-44.06	-13	Vertical
2577.03	-44.08	-13	Vertical
8961.00	-39.73	-13	Vertical
9972.92	-35.92	-13	Vertical

GSM/GPRS MODE Channel 189:

Frequency (MHz)	Power (dBm)	Limited (dBm)	Polarization
1649.97	-53.34	-13	Vertical
1668.23	-51.25	-13	Vertical
2532.76	-44.46	-13	Vertical
2576.44	-44.08	-13	Vertical
8962.94	-39.75	-13	Vertical
9973.33	-36.80	-13	Vertical

EDGE (8PSK) MODE Channel 189:

Frequency (MHz)	Power (dBm)	Limited (dBm)	Polarization
1648.44	-52.60	-13	Vertical
1664.78	-51.46	-13	Vertical
2535.33	-44.01	-13	Vertical
2575.31	-44.22	-13	Vertical
8963.41	-39.48	-13	Vertical
9973.61	-36.54	-13	Vertical

GSM/GPRS MODE Channel 251:

Frequency (MHz)	Power (dBm)	Limited (dBm)	Polarization
1650.01	-53.14	-13	Vertical
1665.79	-50.85	-13	Vertical
2533.46	-43.98	-13	Vertical
2578.90	-44.19	-13	Vertical
8963.13	-39.39	-13	Vertical
9970.02	-36.32	-13	Vertical

EDGE (8PSK) MODE Channel 251:

Frequency (MHz)	Power (dBm)	Limited (dBm)	Polarization
1648.76	-52.86	-13	Vertical
1668.13	-51.48	-13	Vertical
2535.66	-44.41	-13	Vertical
2577.08	-44.38	-13	Vertical
8964.43	-39.12	-13	Vertical
9973.24	-36.70	-13	Vertical

**1900 Test result:**

GSM/GPRS MODE:

Frequency (MHz)	Power step	Peak EIRP(dBm)	Pca Cable loss(dB)	Ga Antenna Gain (dB)	Pmea (dBm)	Polarization
1850.2	0	31.06	-3.8	8.6	26.26	Vertical
1880.0	0	30.46	-3.8	8.6	25.66	Vertical
1909.8	0	30.40	-3.8	8.6	25.60	Vertical

EDGE MODE:

Frequency (MHz)	Power step	Peak EIRP(dBm)	Pca Cable loss(dB)	Ga Antenna Gain (dB)	Pmea (dBm)	Polarization
1850.2	0	27.82	-3.8	8.6	23.02	Vertical
1880.0	0	27.49	-3.8	8.6	22.69	Vertical
1909.8	0	27.15	-3.8	8.6	22.35	Vertical

Test result:

GSM/GPRS MODE Channel 512

Frequency (MHz)	Power (dBm)	Limited (dBm)	Polarization
2457.66	-48.52	-13	Vertical
2781.26	-47.27	-13	Vertical
3727.12	-41.29	-13	Vertical
6677.32	-39.23	-13	Vertical
9961.22	-37.17	-13	Vertical
17820.52	-33.56	-13	Vertical

EDGE (8PSK) MODE Channel 512:

Frequency (MHz)	Power (dBm)	Limited (dBm)	Polarization
2460.07	-48.68	-13	Vertical
2781.21	-46.93	-13	Vertical
3726.08	-41.20	-13	Vertical
6675.10	-39.82	-13	Vertical
9959.85	-37.55	-13	Vertical
17818.41	-33.53	-13	Vertical

GSM/GPRS MODE Channel 661:

Frequency (MHz)	Power (dBm)	Limited (dBm)	Polarization
2459.56	-48.73	-13	Vertical
2781.86	-47.26	-13	Vertical
3725.52	-40.63	-13	Vertical
6676.56	-39.46	-13	Vertical
9962.67	-37.50	-13	Vertical
17819.68	-33.62	-13	Vertical

EDGE (8PSK) MODE Channel 661:

Frequency (MHz)	Power (dBm)	Limited (dBm)	Polarization
2457.88	-49.41	-13	Vertical
2780.27	-47.79	-13	Vertical
3726.96	-40.67	-13	Vertical
6678.61	-39.91	-13	Vertical
9961.78	-37.74	-13	Vertical
17818.71	-34.08	-13	Vertical

GSM/GPRS MODE Channel 810:

Frequency (MHz)	Power (dBm)	Limited (dBm)	Polarization
2459.68	-48.84	-13	Vertical
2780.01	-47.56	-13	Vertical
3724.93	-40.84	-13	Vertical
6678.71	-39.31	-13	Vertical
9961.77	-37.32	-13	Vertical
17819.12	-34.31	-13	Vertical

EDGE (8PSK) MODE Channel 810:

Frequency (MHz)	Power (dBm)	Limited (dBm)	Polarization
2459.23	-49.22	-13	Vertical
2779.51	-47.48	-13	Vertical
3728.14	-40.81	-13	Vertical
6678.31	-39.18	-13	Vertical
9959.74	-37.51	-13	Vertical
17818.38	-33.68	-13	Vertical

Test with secondary supply:

GSM850 GSM/GPRS MODE Channel 251 is selected as the worst point for RSE.

GSM/GPRS MODE Channel 251:

Frequency (MHz)	Power (dBm)	Limited (dBm)	Polarization
1647.49	-53.08	-13	Vertical
1665.92	-50.83	-13	Vertical
2533.17	-43.84	-13	Vertical
2576.36	-44.60	-13	Vertical
8961.96	-39.61	-13	Vertical
9970.87	-36.06	-13	Vertical

---End of Test Report---