RF TEST REPORT

Applicant	TP-LINK TECHNOLOGIES CO.,LTD
FCC ID	TE7C5LV1
Brand	TP-LINK
Product	C5L FDD-LTE Smartphone
Model	TP601C
Report No.	RXA1511-0187RF01R3
Issue Date	February 23, 2016

TA Technology (Shanghai) Co., Ltd. tested the above equipment in accordance with the requirements in **FCC CFR47 Part 2/ FCC CFR 47 Part 22H**. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

Reviewed by: Lingling Kang/ Manager

Approved by: Kai Xu/ Director

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Summary of measurement results

No.	Test Type	Clause in FCC rules	Verdict
1	RF power output	2.1046	PASS
2	Effective Radiated Power	22.913(a)(2)	PASS
3	Occupied Bandwidth	2.1049	PASS
4	Band Edge Compliance	2.1051 / 22.917(a)	PASS
5	Peak-to-Average Power Ratio	KDB 971168 D01(5.7)	PASS
6	Frequency Stability	2.1055 / 22.355	PASS
7	Spurious Emissions at Antenna Terminals	2.1051 / 22.917(a)	PASS
8	Radiates Spurious Emission	2.1053 / 22.917 (a)	PASS
Date of Testing: November 14, 2015~ November 23, 2015			

1. Test Laboratory

1.1. Notes of the Test Report

This report shall not be reproduced in full or partial, without the written approval of **TA technology (shanghai) co., Ltd).**The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein .Measurement Uncertainties were not taken into account and are published for informational purposes only. This report is written to support regulatory compliance of the applicable standards stated above. This report must not be used by the client to claim product certification, approval, or endorsement by CNAS or any government agencies.

1.2. Test facility

CNAS (accreditation number:L2264)

TA Technology (Shanghai) Co., Ltd. has obtained the accreditation of China National Accreditation Service for Conformity Assessment (CNAS).

FCC (recognition number is 428261)

TA Technology (Shanghai) Co., Ltd. has been listed on the US Federal Communications Commission list of test facilities recognized to perform electromagnetic emissions measurements.

IC (recognition number is 8510A)

TA Technology (Shanghai) Co., Ltd. has been listed by industry Canada to perform electromagnetic emission measurement.

VCCI (recognition number is C-4595, T-2154, R-4113, G-766)

TA Technology (Shanghai) Co., Ltd. has been listed by industry Japan to perform electromagnetic emission measurement.

A2LA(Certificate Number: 3857.01)

TA Technology (Shanghai) Co., Ltd. has been listed by American Association for Laboratory Accreditation to perform electromagnetic emission measurement.

1.3. Testing Location

Company:	TA Technology (Shanghai) Co., Ltd.
Address:	No.145, Jintang Rd, Tangzhen Industry Park, Pudong
City:	Shanghai
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2. General Description of Equipment under Test

Client Information

Applicant	TP-LINK TECHNOLOGIES CO., LTD.
Applicant address	Building 24 (floors 1,3,4,5) and 28 (floors1-4) Central Science and Technology Park,Shennan Rd, Nanshan, Shenzhen,China
Manufacturer	TP-LINK TECHNOLOGIES CO., LTD.
Manufacturer address	Building 24 (floors 1,3,4,5) and 28 (floors1-4) Central Science and Technology Park,Shennan Rd, Nanshan, Shenzhen,China

Accessory Equipment Details

Name	Model	Manufacturer	Capacity	S/N
Battery	NBL-45A2000	TP-LINK TECHNOLOGIES CO., LTD.	2000mAh	B1151006100980

General Information

Model:	TP601C		
Product IMEI:	SIM 1: 868788020000379 SIM 2: 868788020001385		
Hardware Version:	P1		
Software Version:	H10S100D03B20151015R1003		
Power Supply:	Battery/AC adapter		
Antenna Type:	Internal Antenna		
Test Mode(s):	GSM 850: WCDMA Band V;		
Test Modulation:	(GSM)GMSK,8PSK; (WCDMA)QPSK		
GPRS/ EGPRS Multislot Class:	12		
HSDPA UE Category:	14		
HSUPA UE Category:	6		
DC-HSDPA UE Category:	24		
HSPA+ UE Category:	14		
Maximum E.R.P.	GSM 850: 32.63 dBm WCDMA Band V: 21.75 dBm		
Rated Power Supply Voltage:	3.8V		
Extreme Voltage:	Minimum: 3.6V Maximum: 4.35V		
Extreme Temperature:	Lowest: 0°C Highest: +45°C		
Operating Frequency Range(s)	Band	Tx (MHz)	Rx (MHz)
	GSM850	824.2 ~ 848.8	869.2 ~ 893.8
	WCDMA Band V	826.4 ~ 846.6	871.4 ~ 891.6
Note: The information of the EUT is declared by the manufacturer. Please refer to the specifications or user manual for details.			

3. Applied Standards

According to the specifications of the manufacturer, it must comply with the requirements of the following standards:

FCC CFR47 Part 2 (2014)

FCC CFR 47 Part 22H (2014)

ANSI/TIA 603-D (2010)

KDB 971168 D01 Power Meas License Digital Systems v02r02

4. Test Configuration

Radiated measurements are performed by rotating the EUT in three different orthogonal test planes. EUT stand-up position (Z axis), lie-down position (X, Y axis). Receiver antenna polarization (horizontal and vertical), the worst emission was found in position (Z axis, vertical polarization) and the worst case was recorded.

All mode and data rates and positions were investigated.
The following testing in GSM/WCDMA is set based on the maximum RF Output Power.
Test modes are chosen to be reported as the worst case configuration below:

	Test items	Modes	Modulation
Conducted Test cases	RF power output	GSM 850	GSM/GPRS/EGPRS
		WCDMA Band V	RMC/HSDPA/HSUPA/ DC-HSDPA/HSPA+
	Occupied Bandwidth	GSM 850	GSM/GPRS/EGPRS
		WCDMA Band V	RMC
	Band Edge Compliance	GSM 850	GSM/GPRS/EGPRS
		WCDMA Band V	RMC
	Peak-to-Average Power Ratio	GSM 850	GSM/GPRS/EGPRS
		WCDMA Band V	RMC
	Frequency Stability	GSM 850	GSM/GPRS/EGPRS
		WCDMA Band V	RMC
	Spurious Emissions at Antenna Terminals	GSM 850	GPRS
		WCDMA Band V	RMC
Radiated Test cases	Effective Radiated Power	GSM 850	GSM/GPRS/EGPRS
		WCDMA Band V	RMC
	Radiates Spurious Emission	GSM 850	GPRS
		WCDMA Band V	RMC

5. Test Case Results

5.1. RF Power Output

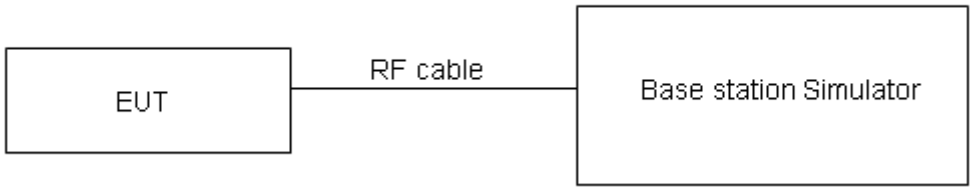
Ambient condition

Temperature	Relative humidity
21°C ~25°C	40%~60%

Methods of Measurement

During the process of the testing, The EUT is controlled by the Base Station Simulator to ensure max power transmission and proper modulation.

Test Setup



The loss between RF output port of the EUT and the input port of the tester has been taken into consideration.

Limits

No specific RF power output requirements in part 2.1046.

Measurement Uncertainty

The assessed measurement uncertainty to ensure 95% confidence level for the normal distribution is with the coverage factor k = 2, U= 0.4 dB.

Test Results

GSM 850		Conducted Power(dBm)		
		Channel 128	Channel 190	Channel 251
		824.2 (MHz)	836.6 (MHz)	848.8 (MHz)
GSM	Results	**32.59**	**32.62**	**32.63**
GPRS (GMSK)	1TXslot	**32.54**	**32.60**	**32.51**
	2TXslots	30.40	30.43	30.26
	3TXslots	29.97	28.96	29.28
	4TXslots	27.11	26.95	27.43
EGPRS (8PSK)	1TXslot	**26.54**	**26.12**	**26.26**
	2TXslots	24.14	24.07	23.78
	3TXslots	22.36	22.33	22.64
	4TXslots	21.14	21.24	21.97

Note:

1) The maximum RF Output Power numbers are marks in bold.

2) The following testing in GPRS/EGPRS is set to 1TXslot based on the maximum RF Output Power.

WCDMA Band V		Conducted Power(dBm)		
		Channel 4132	Channel 4183	Channel 4233
		826.4(MHz)	836.6(MHz)	846.6(MHz)
RMC		**21.70**	**21.66**	**21.75**
HSDPA	Sub - Test 1	21.72	21.63	21.67
	Sub - Test 2	21.59	21.69	21.75
	Sub - Test 3	21.72	21.58	21.73
	Sub - Test 4	21.71	21.59	21.68
HSUPA	Sub - Test 1	20.55	20.50	20.72
	Sub - Test 2	19.22	19.21	19.44
	Sub - Test 3	19.79	19.67	19.93
	Sub - Test 4	19.25	19.32	19.53
	Sub - Test 5	20.61	20.55	20.75
DC-HSDPA	Sub - Test 1	21.42	21.46	21.51
	Sub - Test 2	21.39	21.39	21.45
	Sub - Test 3	21.26	21.32	21.37
	Sub - Test 4	21.28	21.30	21.38
HSPA+	16QAM	20.47	20.38	20.58

Note:

1) The maximum RF Output Power numbers are marks in bold.

2) The following testing in RMC based on the maximum RF Output Power.

5.2. Effective Radiated Power

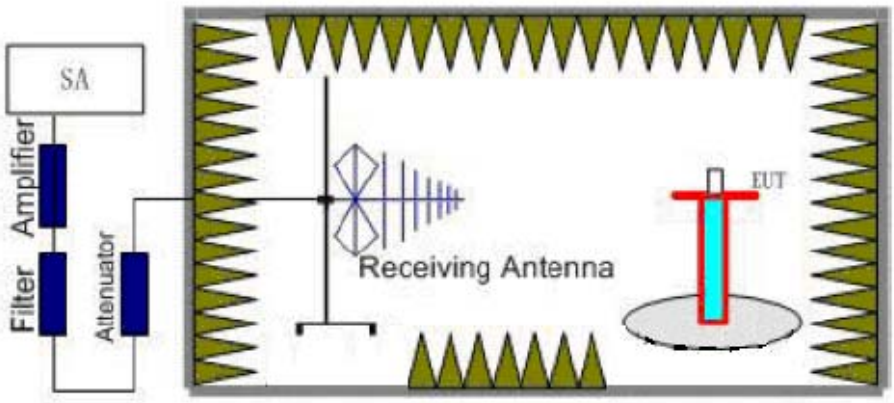
Ambient condition

Temperature	Relative humidity
21°C ~25°C	40%~60%

Methods of Measurement

The measurement procedures in ANSI/TIA 603-D are used.
1. The EUT was placed on a turntable with 1.5 meter height in a fully anechoic chamber.
2. The EUT was set at 3 meters from the receiving antenna, which was mounted on the antenna tower.
3. GSM operating modes: Set RBW= 1MHz, VBW= 3MHz, RMS detector over burst;
UMTS operating modes: Set RBW= 100 KHz, VBW= 300 KHz, RMS detector over frame, and use channel power option with bandwidth=5MHz, per section 4.0 of KDB 971168 D01.
4. The table was rotated 360 degrees to determine the position of the highest radiated power.
5. The height of the receiving antenna is adjusted to look for the maximum ERP/EIRP.
6. Taking the record of maximum ERP/EIRP.
7. A dipole antenna was substituted in place of the EUT and was driven by a signal generator.
8. The conducted power at the terminal of the dipole antenna is measured.
9. Repeat step 3 to step 5 to get the maximum ERP/EIRP of the substitution antenna.
10. ERP/EIRP = Ps + Et – Es + Gs = Ps + Rt – Rs + Gs
Ps (dBm)：Input power to substitution antenna.
Gs (dBi or dBd)：Substitution antenna Gain.
Et = Rt + AF
Es = Rs + AF
AF (dB/m)：Receive antenna factor
Rt：The highest received signal in spectrum analyzer for EUT.
Rs：The highest received signal in spectrum analyzer for substitution antenna.

Test Setup



Limits

Rule Part 22.913(a) specifies that "Mobile/portable stations are limited to 7 watts ERP".

Limit	≤ 7 W (38.45 dBm)

Measurement Uncertainty

The assessed measurement uncertainty to ensure 95% confidence level for the normal distribution is with the coverage factor k = 2, U= 1.19 dB

Test Results:

Mode	Polarization	Frequency (MHz)	Rt (dBm)	Rs (dBm)	Ps (dBm)	Gs (dBd)	ERP (dBm)	Conclusion
GSM 850	H	824.2	-16.910	-47.10	0	-1.09	29.10	Pass
	H	836.6	-16.450	-47.13	0	-0.91	29.77	Pass
	H	848.8	-16.420	-47.29	0	-0.77	30.10	Pass
	V	824.2	-24.470	-46.91	0	-1.09	21.35	Pass
	V	836.6	-23.600	-46.82	0	-0.91	22.31	Pass
	V	848.8	-23.750	-47.04	0	-0.77	22.52	Pass
GPRS 850	H	824.2	-16.490	-47.10	0	-1.09	29.52	Pass
	H	836.6	-17.100	-47.13	0	-0.91	29.12	Pass
	H	848.8	-16.320	-47.29	0	-0.77	30.20	Pass
	V	824.2	-25.200	-46.91	0	-1.09	20.62	Pass
	V	836.6	-24.170	-46.82	0	-0.91	21.74	Pass
	V	848.8	-24.080	-47.04	0	-0.77	22.19	Pass
EGPRS 850	H	824.2	-20.930	-47.10	0	-1.09	25.08	Pass
	H	836.6	-21.550	-47.13	0	-0.91	24.67	Pass
	H	848.8	-21.720	-47.29	0	-0.77	24.80	Pass
	V	824.2	-29.870	-46.91	0	-1.09	15.95	Pass
	V	836.6	-29.120	-46.82	0	-0.91	16.79	Pass
	V	848.8	-29.280	-47.04	0	-0.77	16.99	Pass
WCDMA Band V	H	826.4	-26.680	-47.17	0	-1.02	19.47	Pass
	H	836.6	-26.270	-47.13	0	-0.91	19.95	Pass
	H	846.6	-26.210	-47.21	0	-0.80	20.20	Pass
	V	826.4	-35.230	-46.87	0	-1.02	10.62	Pass
	V	836.6	-34.240	-46.82	0	-0.91	11.67	Pass
	V	846.6	-34.600	-46.97	0	-0.80	11.57	Pass

5.3. Occupied Bandwidth

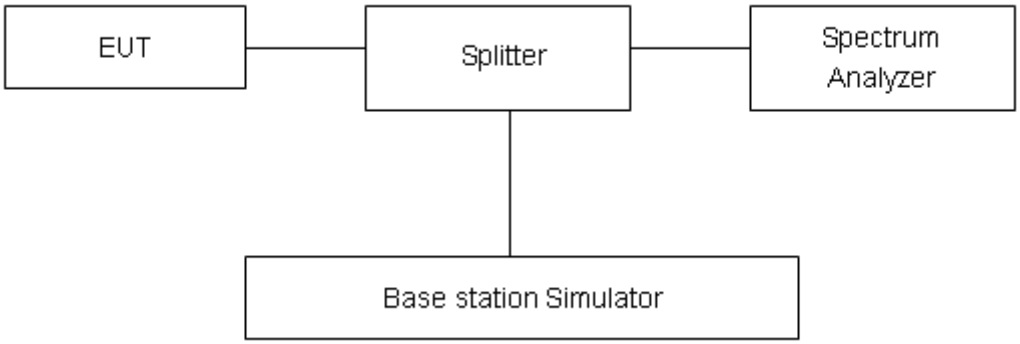
Ambient condition

Temperature	Relative humidity
21°C ~25°C	40%~60%

Method of Measurement

The EUT was connected to Spectrum Analyzer and Base Station Simulator via power Splitter. The occupied bandwidth is measured using spectrum analyzer. RBW is set to 3kHz,VBW is set to 10kHz for GSM 850 and RBW is set to 51kHz,VBW is set to 160kHz for WCDMA Band V. 99% power and -26dBc occupied bandwidths are recorded. Spectrum analyzer plots are included on the following pages.

Test Setup



Limits

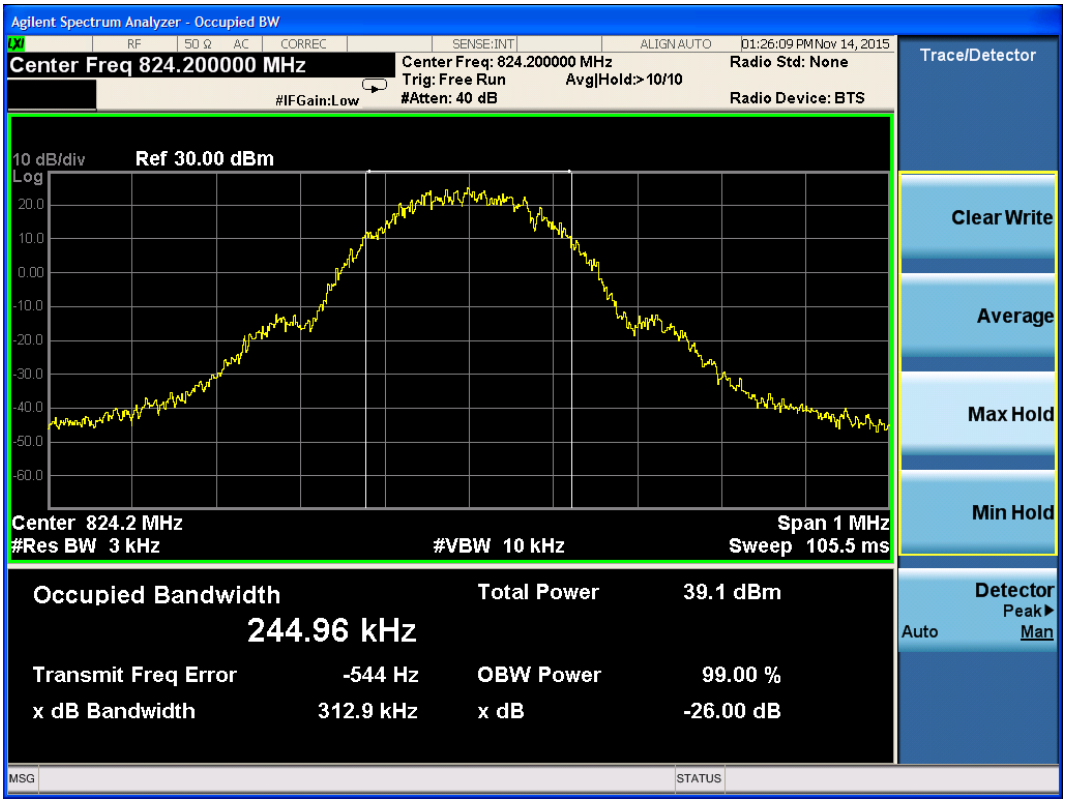
No specific occupied bandwidth requirements in part 2.1049.

Measurement Uncertainty

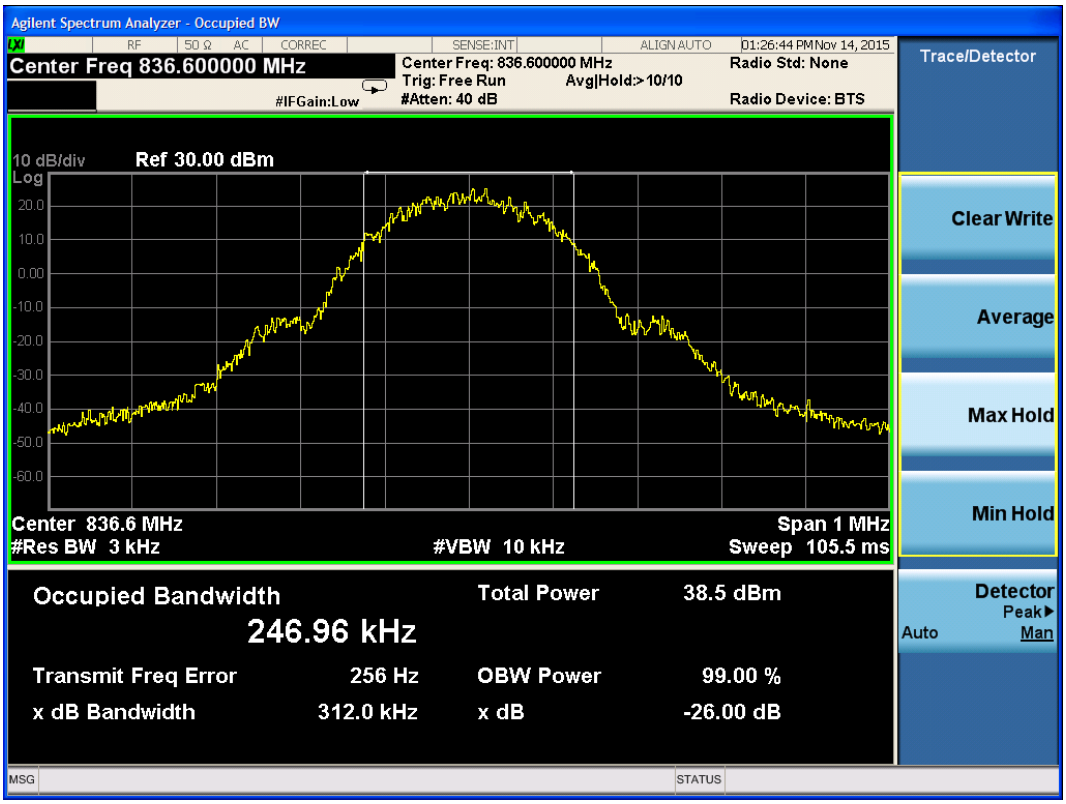
The assessed measurement uncertainty to ensure 95% confidence level for the normal distribution is with the coverage factor k = 2, U= 624Hz.

Test Result

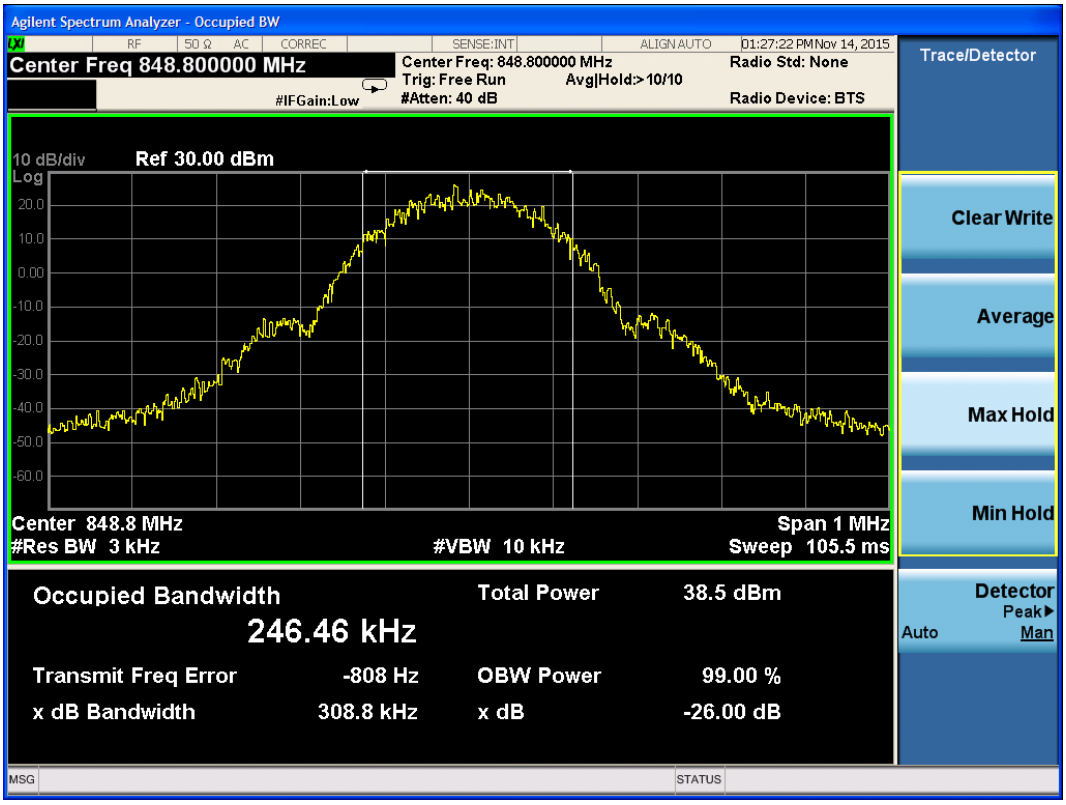
Mode	Channel	Frequency (MHz)	99% Power Bandwidth (kHz)	-26dBc Bandwidth(kHz)
GSM 850 (GSM)	128	824.2	244.96	312.9
	190	836.6	246.96	312.0
	251	848.8	246.46	308.8
GPRS 850 (GMSK)	128	824.2	246.34	311.1
	190	836.6	246.03	313.4
	251	848.8	248.06	316.8
EGPRS 850 (8-PSK)	128	824.2	244.79	303.4
	190	836.6	242.83	305.0
	251	848.8	246.64	311.2
WCDMA Band V (RMC)	4132	826.4	4137.8	4692
	4183	836.6	4144.7	4690
	4233	846.6	4135.4	4661



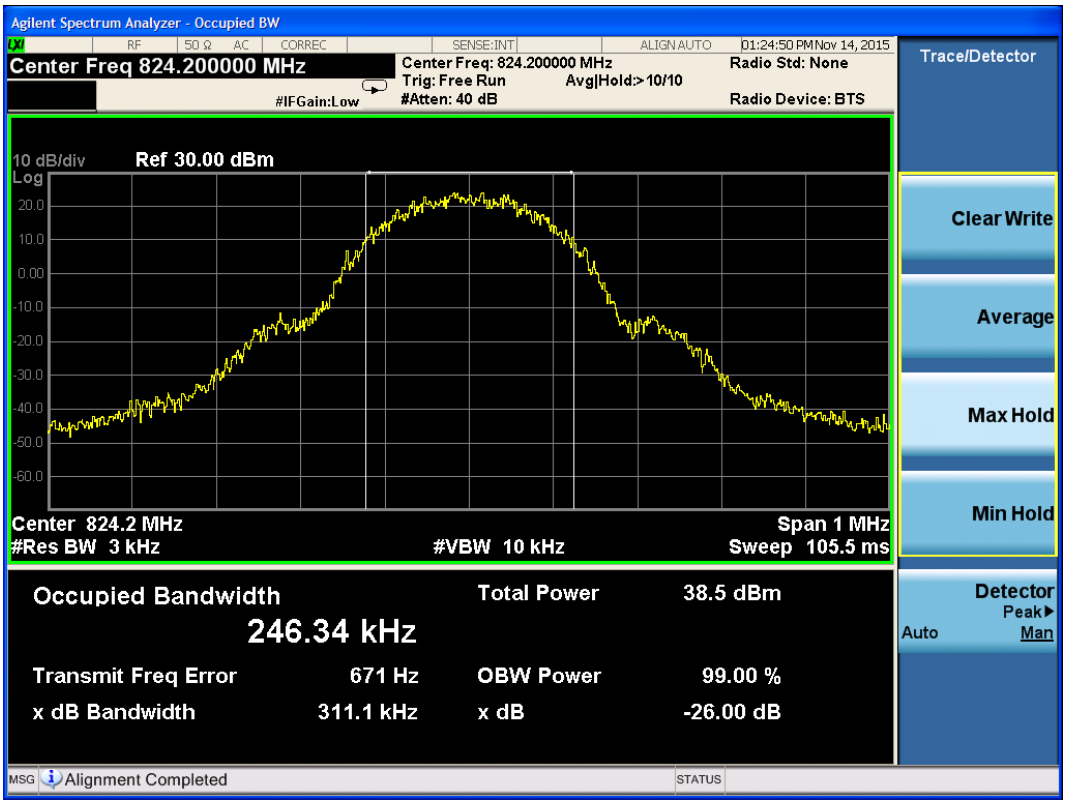
GSM 850 CH128 Occupied Bandwidth



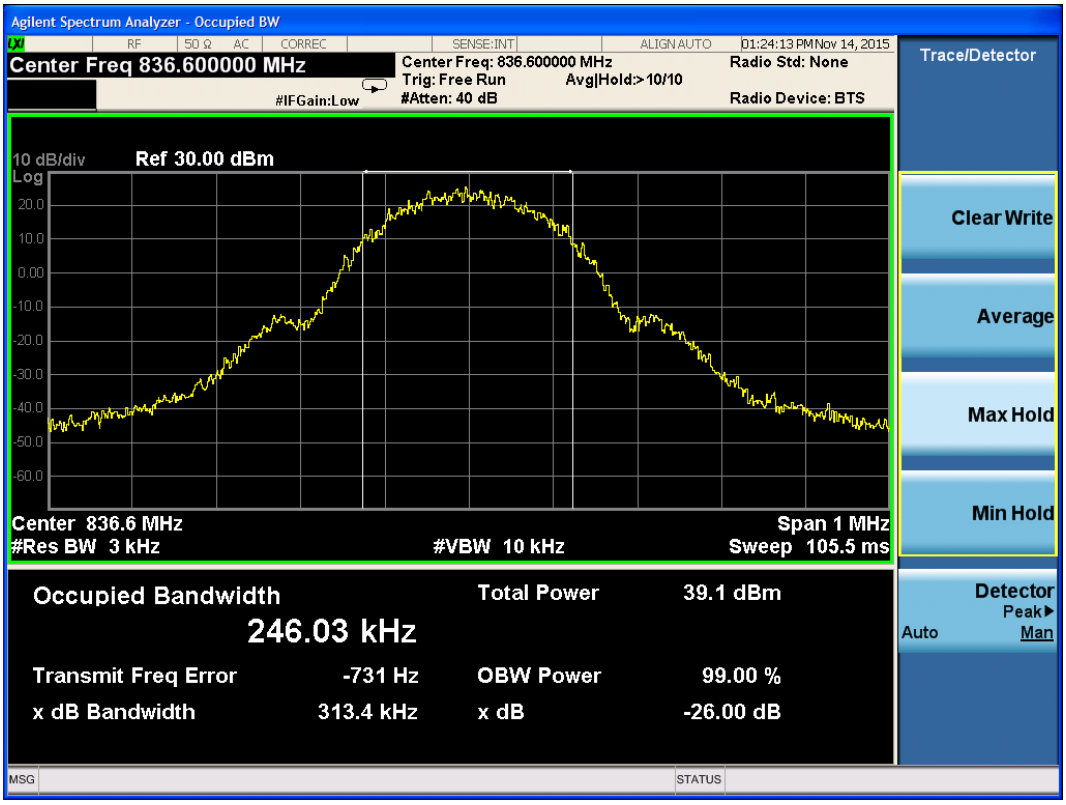
GSM 850 CH190 Occupied Bandwidth



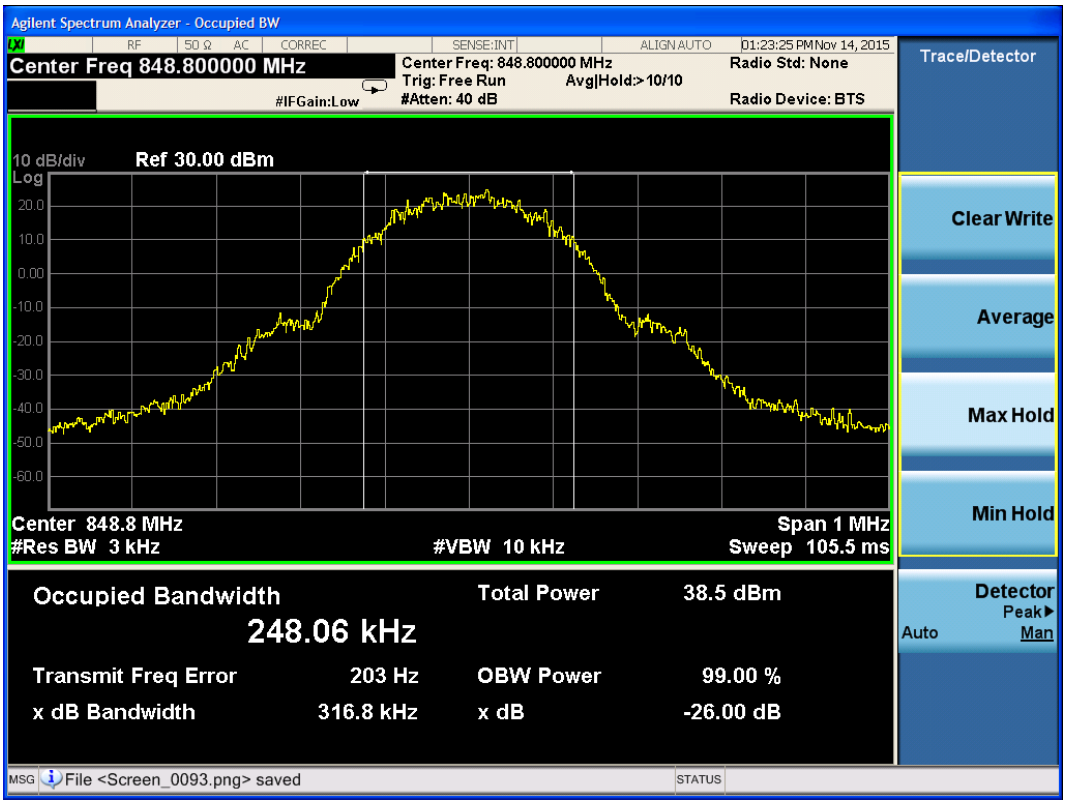
GSM 850 CH251 Occupied Bandwidth



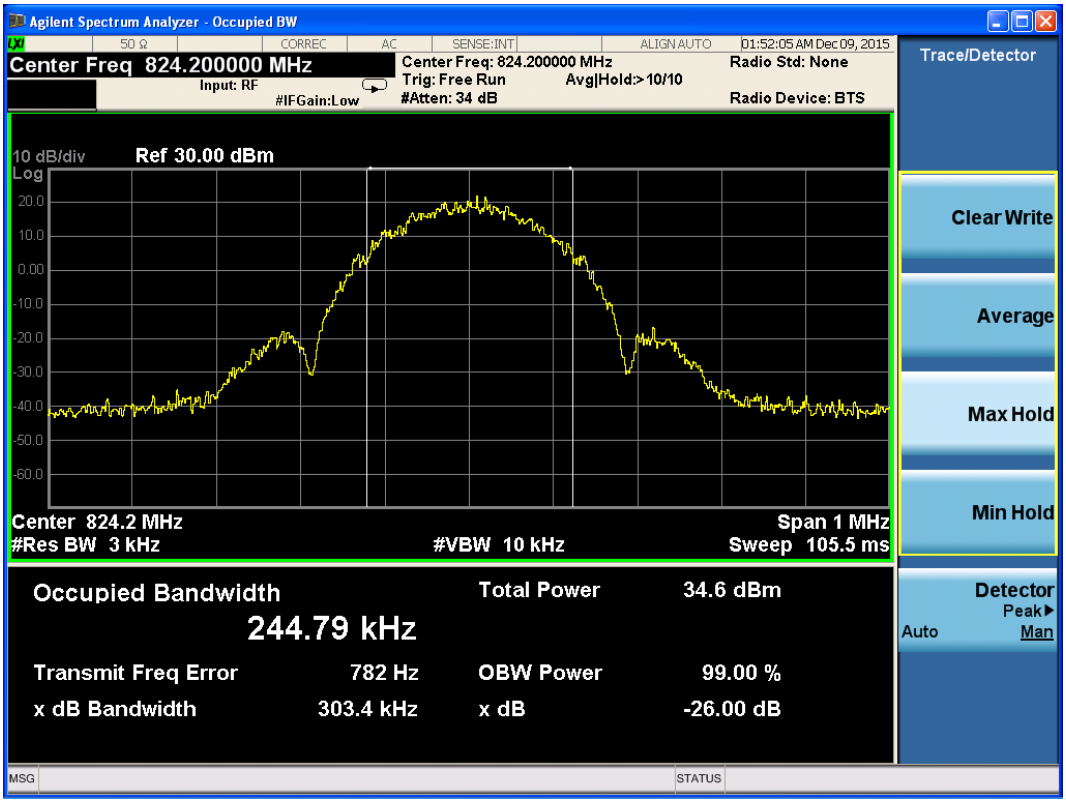
GSM 850 GPRS CH128 Occupied Bandwidth



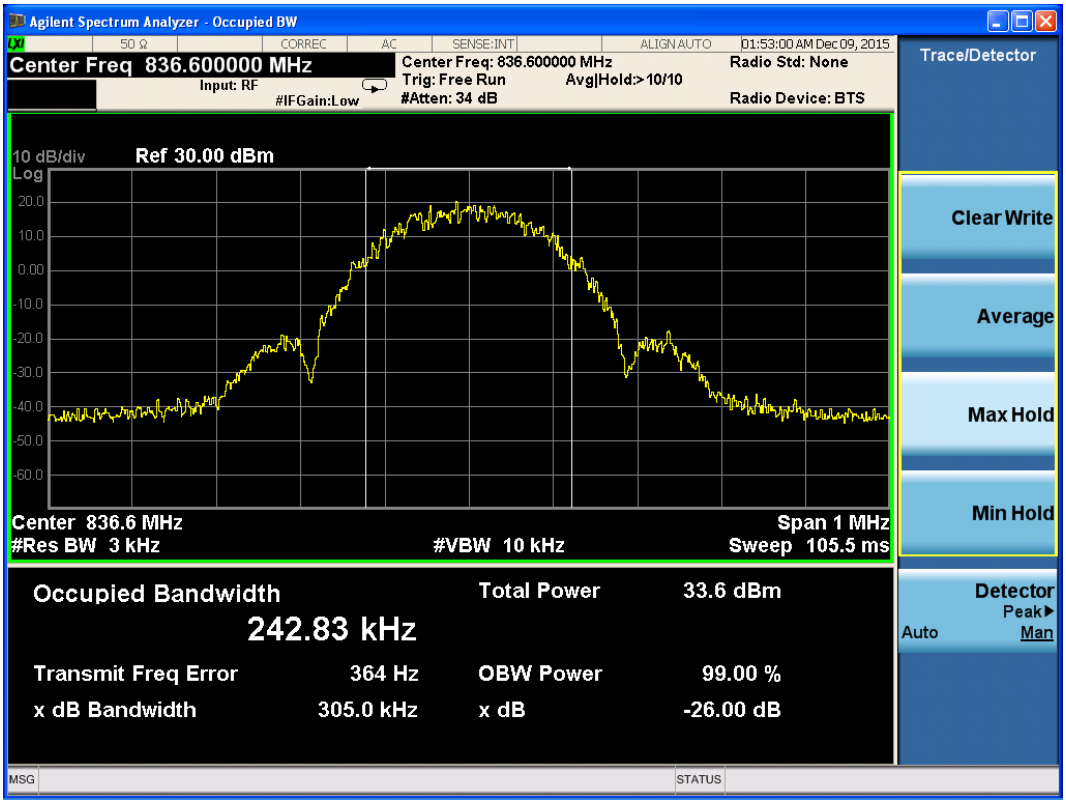
GSM 850 GPRS CH190 Occupied Bandwidth



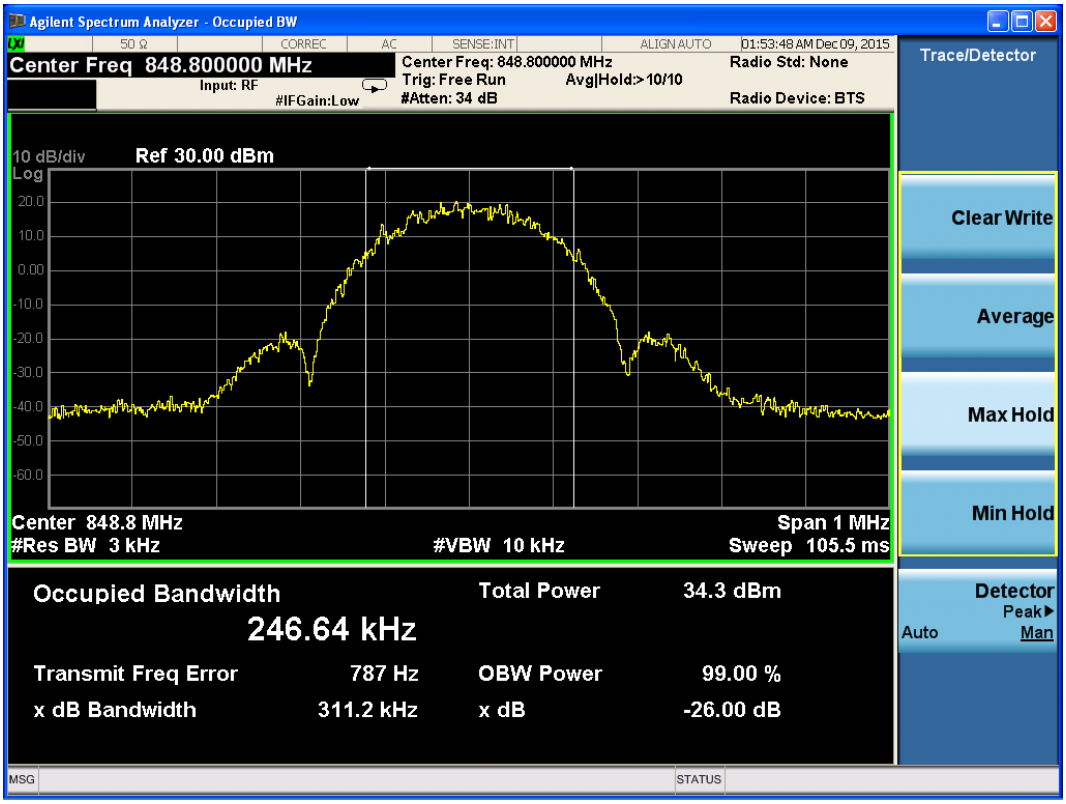
GSM 850 GPRS CH251 Occupied Bandwidth



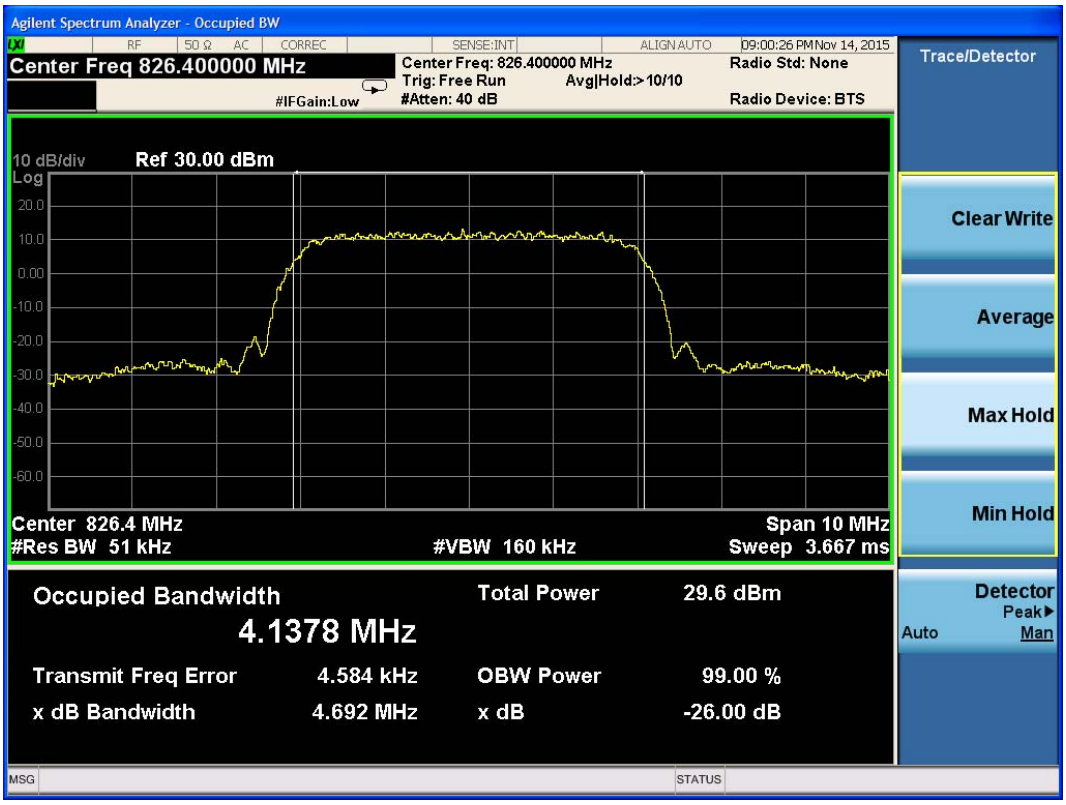
GSM 850 EGPRS CH128 Occupied Bandwidth



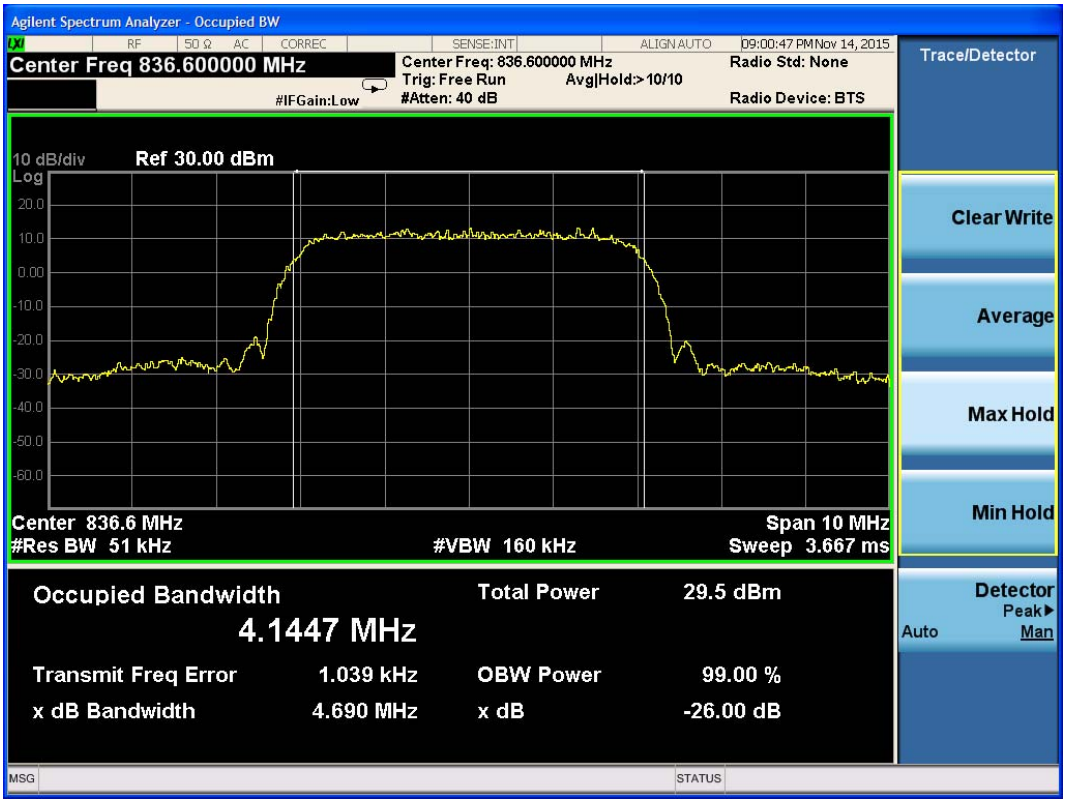
GSM 850 EGPRS CH190 Occupied Bandwidth



GSM 850 EGPRS CH251 Occupied Bandwidth



WCDMA Band V CH4132 Occupied Bandwidth



WCDMA Band V CH4183 Occupied Bandwidth

WCDMA Band V CH4233 Occupied Bandwidth

5.4. Band Edge Compliance

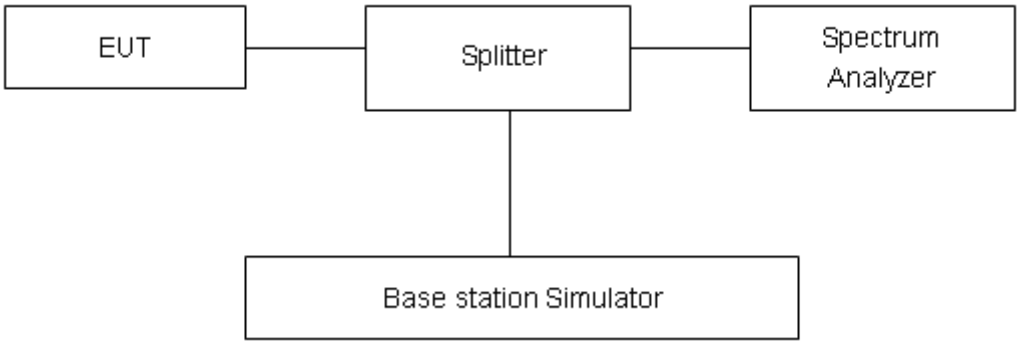
Ambient condition

Temperature	Relative humidity
21°C ~25°C	40%~60%

Method of Measurement

The EUT was connected to Spectrum Analyzer and Base Station Simulator via power Splitter. The band edge of the lowest and highest channels were measured. The average detector is used. RBW is set to 3kHz, VBW is set to 10kHz for GSM 850 and RBW is set to 51kHz,VBW is set to 160kHz for WCDMA Band V. Spectrum analyzer plots are included on the following pages.

Test Setup



Limits

Rule Part 22.917(a) specifies that “The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB.”

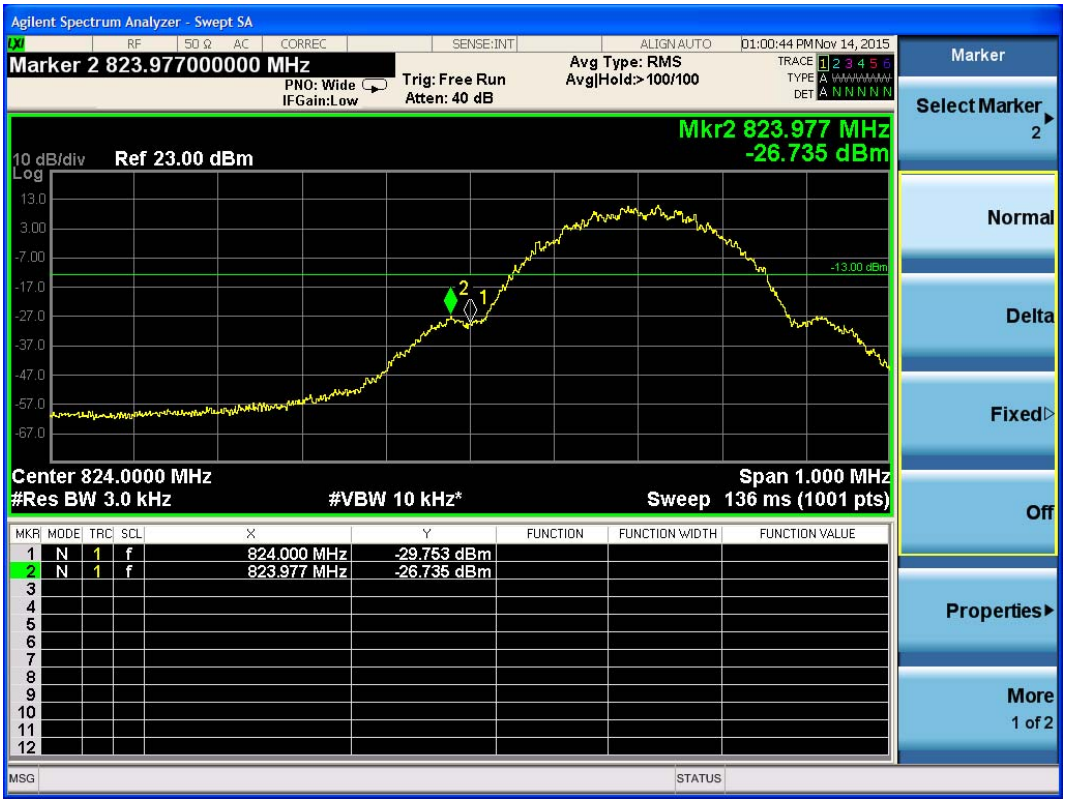
Limit	-13 dBm

Measurement Uncertainty

The assessed measurement uncertainty to ensure 95% confidence level for the normal distribution is with the coverage factor k = 1.96, U=0.684dB.

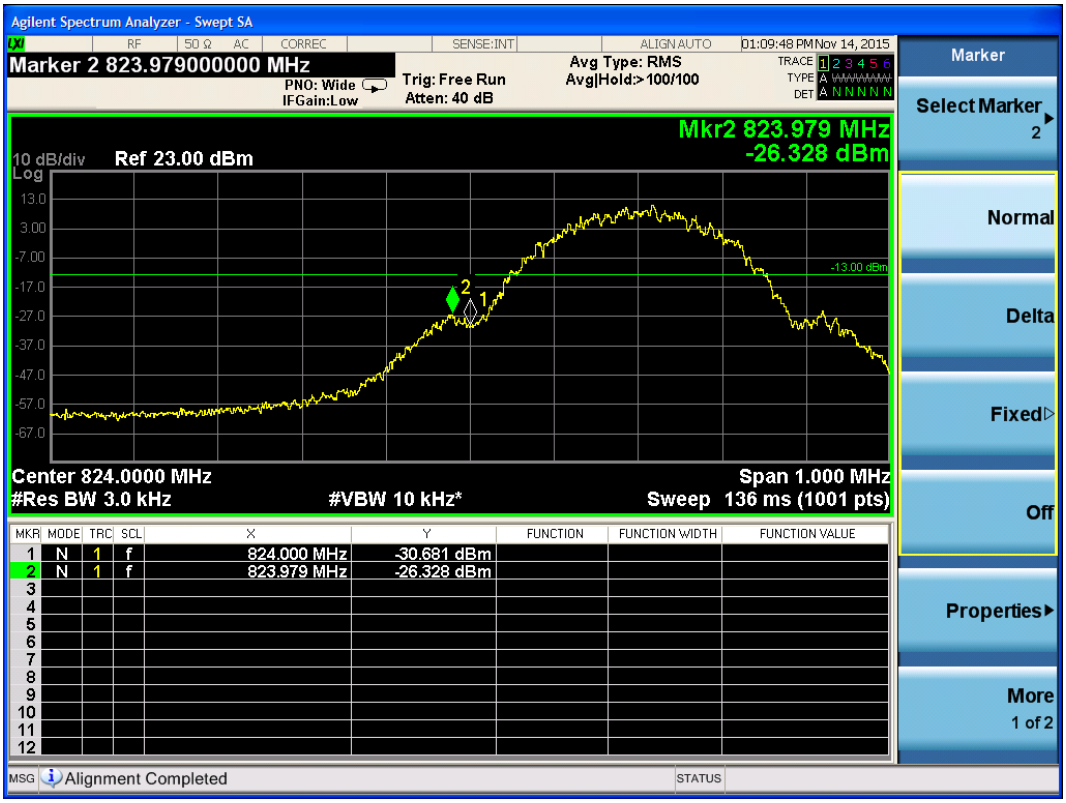
Test Result:

Mode	Carrier frequency (MHz)	Reference value (dBm)	Limit (dBm)	Conclusion
GSM 850 (GSM)	824.0	-26.735	-13	PASS
	849.0	-26.051	-13	PASS
GPRS 850 (GMSK)	824.0	-26.328	-13	PASS
	849.0	-27.806	-13	PASS
EGPRS 850 (8-PSK)	824.0	-34.726	-13	PASS
	849.0	-37.643	-13	PASS
WCDMA Band V RMC	824.0	-29.140	-13	PASS
	849.0	-29.238	-13	PASS

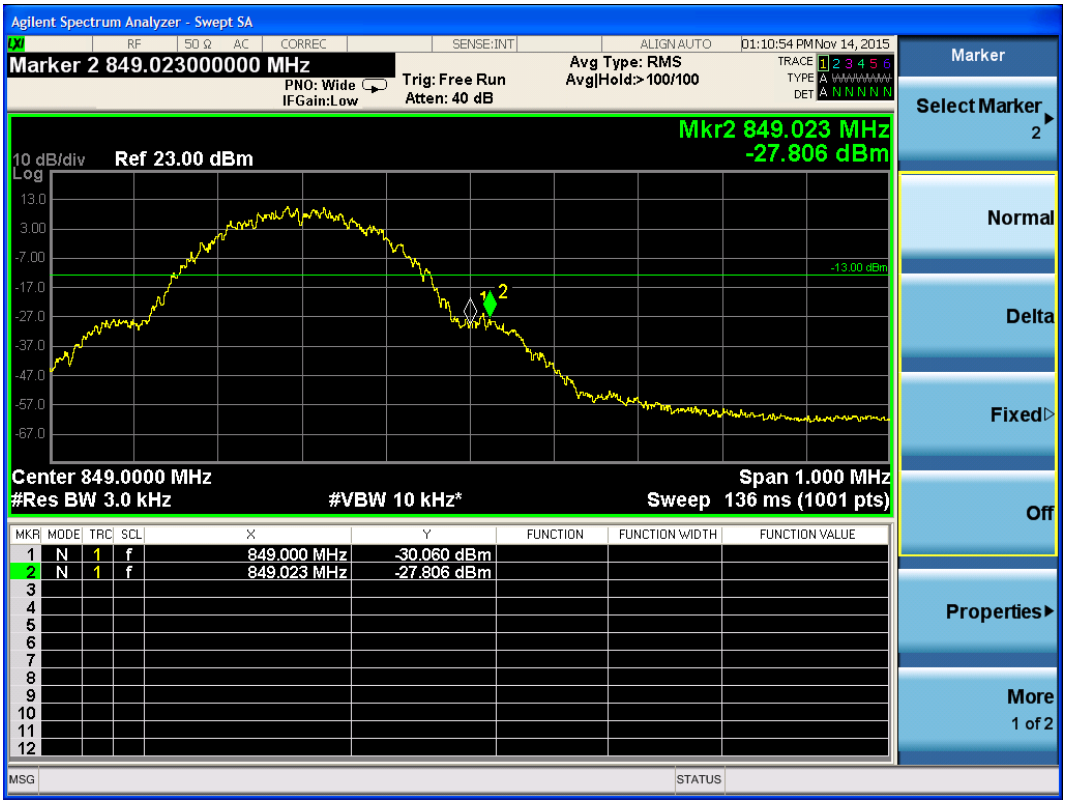


GSM 850 Channel 128

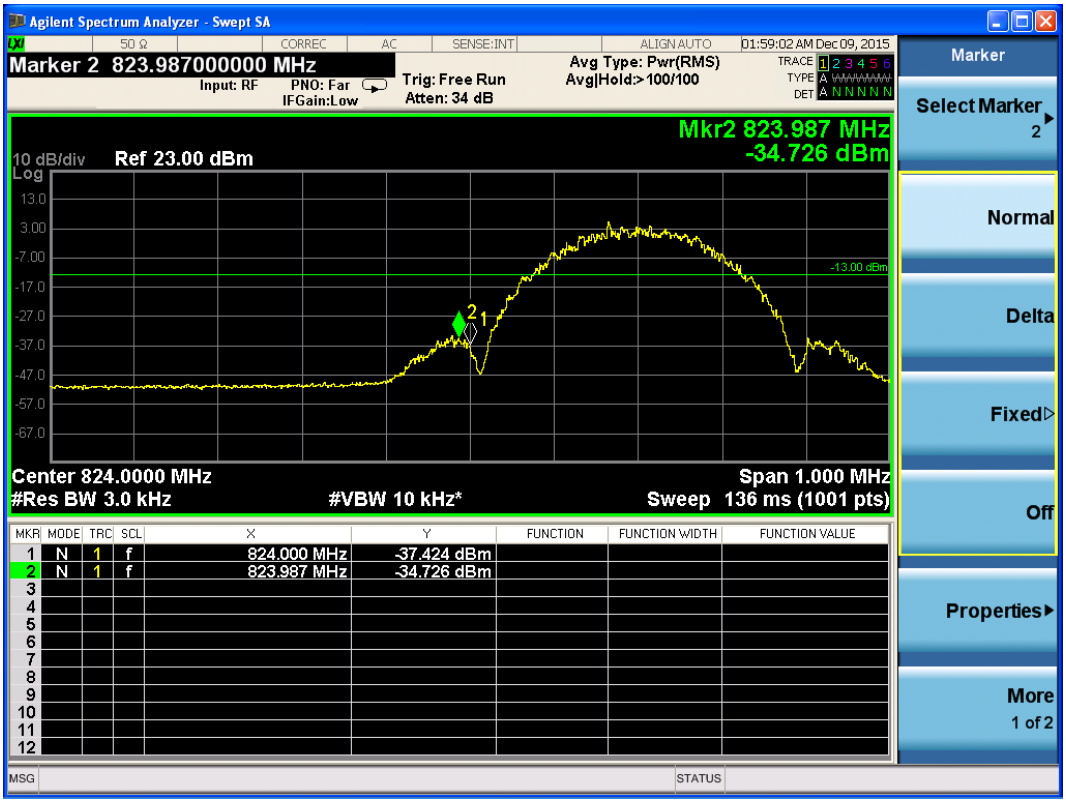
GSM 850 Channel 251



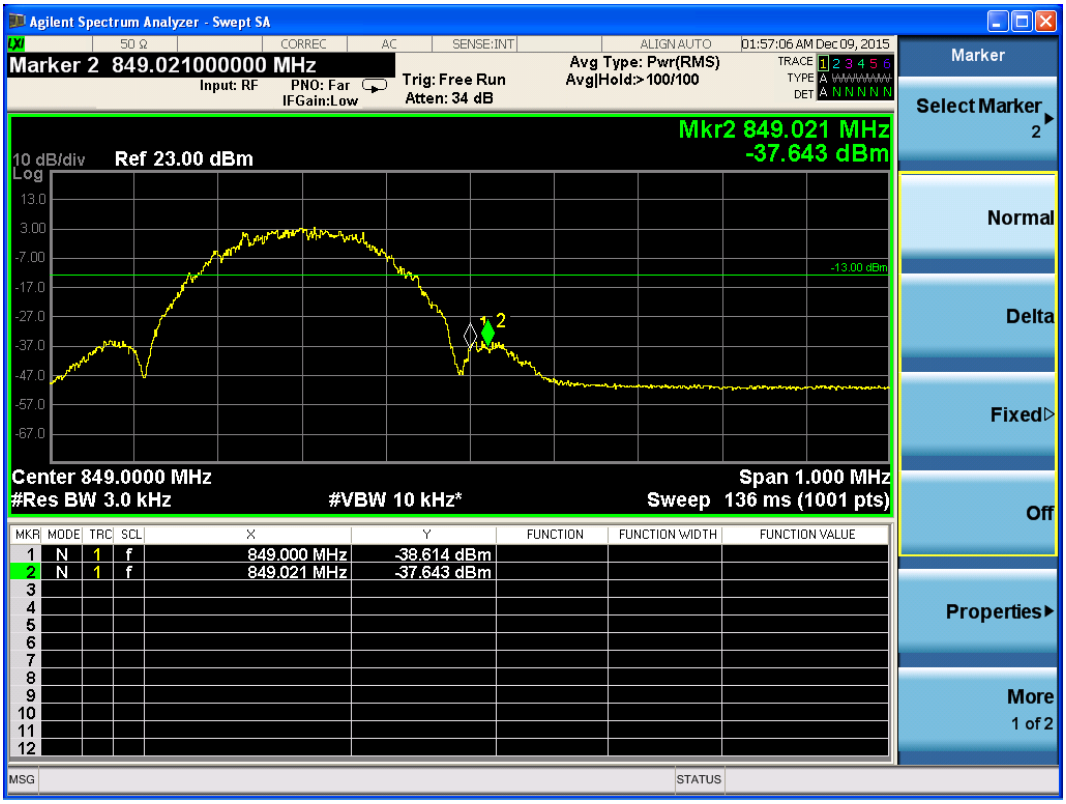
GSM 850 GPRS Channel 128



GSM 850 GPRS Channel 251



GSM 850 EGPRS Channel 128



GSM 850 EGPRS Channel 251

WCDMA Band V Channel 4132

WCDMA Band V Channel 4233

5.5. Peak-to-Average Power Ratio (PAPR)

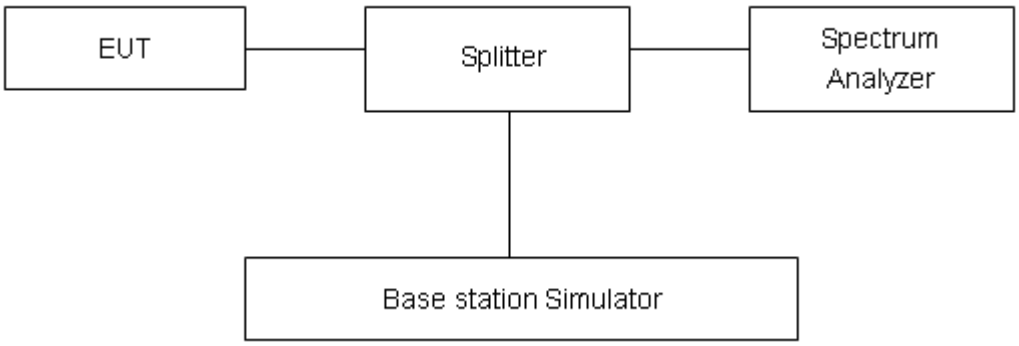
Ambient condition

Temperature	Relative humidity
21°C ~25°C	40%~60%

Methods of Measurement

Measure the total peak power and record as P_{Pk}. And measure the total average power and record as P_{Avg}. Both the peak and average power levels must be expressed in the same logarithmic units (*e.g.*, dBm). Determine the PAPR from:
PAPR (dB) = P_{Pk} (dBm) - P_{Avg} (dBm).

Test Setup



Limits

No specific Peak-to-Average Ratio requirements in KDB 971168.

Measurement Uncertainty

The assessed measurement uncertainty to ensure 95% confidence level for the normal distribution is with the coverage factor k = 2, U= 0.4 dB.

Test Results

Mode	Channel	Frequency (MHz)	Peak (dBm)	Avg (dBm)	PAPR (dB)
GSM 850 (GSM)	128	824.2	32.629	32.59	0.039
	190	836.6	32.642	32.62	0.022
	251	848.8	32.646	32.63	0.016
GPRS 850 (GMSK)	128	824.2	32.553	32.54	0.013
	190	836.6	32.642	32.6	0.042
	251	848.8	32.521	32.51	0.011
EGPRS 850 (8-PSK)	128	824.2	26.549	26.54	0.009
	190	836.6	26.175	26.12	0.055
	251	848.8	26.346	26.26	0.086
WCDMA Band V (RMC)	4132	826.4	26.24	21.7	4.54
	4183	836.6	26.09	21.66	4.43
	4233	846.6	26.46	21.75	4.71

5.6. Frequency Stability

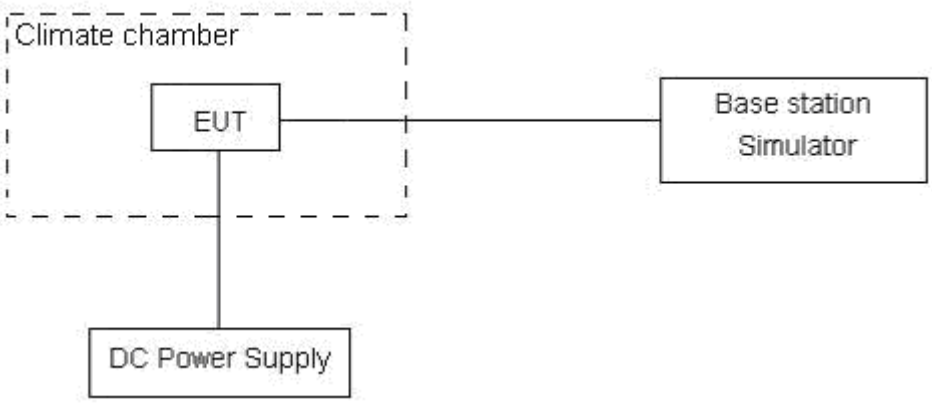
Ambient condition

Temperature	Relative humidity
21°C ~25°C	40%~60%

Method of Measurement

1. Frequency Stability (Temperature Variation)
   The temperature inside the climate chamber is varied from 0°C to +45°C in 10°C step size,
   (1) With all power removed, the temperature was decreased to 0°C and permitted to stabilize for three hours.
   (2) Measure the carrier frequency with the test equipment in a “call mode”. These measurements should be made within 1 minute of powering up the mobile station, to prevent significant self warming.
   (3) Repeat the above measurements at 10°C increments from 0°C to +45°C. Allow at least 1.5 hours at each temperature, un-powered, before making measurements.
2. Frequency Stability (Voltage Variation)
   The frequency stability shall be measured with variation of primary supply voltage as follows:
   (1) Vary primary supply voltage from 85 to 115 percent of the nominal value for other than hand carried battery equipment.
   (2) For hand carried, battery powered equipment, reduce primary supply voltage to the battery-operating end point which shall be specified by the manufacturer.
   This transceiver is specified to operate with an input voltage of between 3.6 V and 4.35 V, with a nominal voltage of 3.8V.

Test setup



Limits

According to the Sec. 22.355, the frequency stability of the carrier shall be accurate to within 2.5 ppm of the received frequency for mobile stations.

Limits	≤ 2.5 ppm

Measurement Uncertainty

The assessed measurement uncertainty to ensure 99.75% confidence level for the normal distribution is with the coverage factor k = 3,U= 0.01ppm.

Test Result

Mode	Test status	Test Results (ppm)			Conclusion
		GSM(GMSK)	GPRS(GMSK)	EGPRS(8PSK)	
GSM 850 Channel 190	0°C/3.8 V	0.018133	0.010184	-0.001805	PASS
	10°C/3.8 V	0.008821	0.009718	-0.001112	PASS
	20°C/3.8 V	-0.00687	0.013531	-0.002666	PASS
	30°C/3.8 V	0.000406	0.014475	-0.000777	PASS
	40°C/3.8 V	0.00147	0.015563	0.002367	PASS
	50°C/3.8 V	0.009969	0.017009	0.001578	PASS
	20°C/3.6 V	-0.00803	0.015862	0.004160	PASS
	20°C/4.35 V	0.017224	0.007507	0.003084	PASS
/	/	RMC			/
WCDMA Band V Channel 4183	0°C/3.8 V	-0.000840			PASS
	10°C/3.8 V	-0.001610			PASS
	20°C/3.8 V	-0.002260			PASS
	30°C/3.8 V	0.000753			PASS
	40°C/3.8 V	-0.001450			PASS
	50°C/3.8 V	-0.002210			PASS
	20°C/3.6 V	-0.001710			PASS
	20°C/4.35 V	0.000765			PASS

5.7. Spurious Emissions at Antenna Terminals

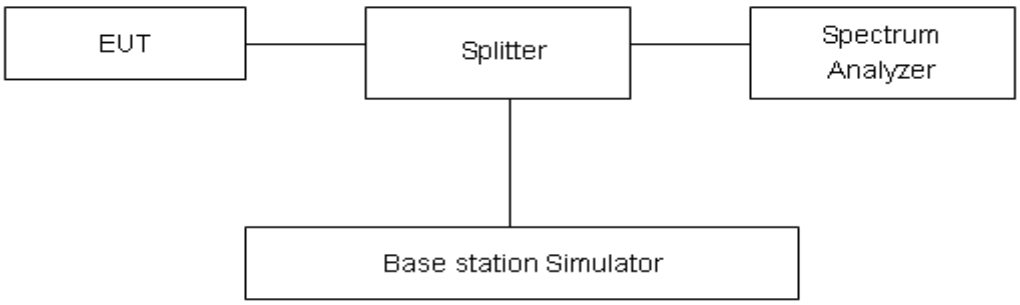
Ambient condition

Temperature	Relative humidity
21°C ~25°C	40%~60%

Method of Measurement

The EUT was connected to Spectrum Analyzer and Base Station Simulator via power Splitter. The measurement is carried out using a spectrum analyzer. The spectrum analyzer scans from 30MHz to the 10th harmonic of the carrier. The peak detector is used. For GSM 850,RBW and VBW are set to 100 kHz, Sweep is set to ATUO.For WCDMA Band V, RBW and VBW are set to 100 kHz for the carrier frequency, or RBW and VBW are set to 1MHz(other frequency), Sweep is set to ATUO.

Test setup



Limits

Rule Part 22.917(a) specifies that “The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log (P) dB.”

Limit	-13 dBm

Measurement Uncertainty

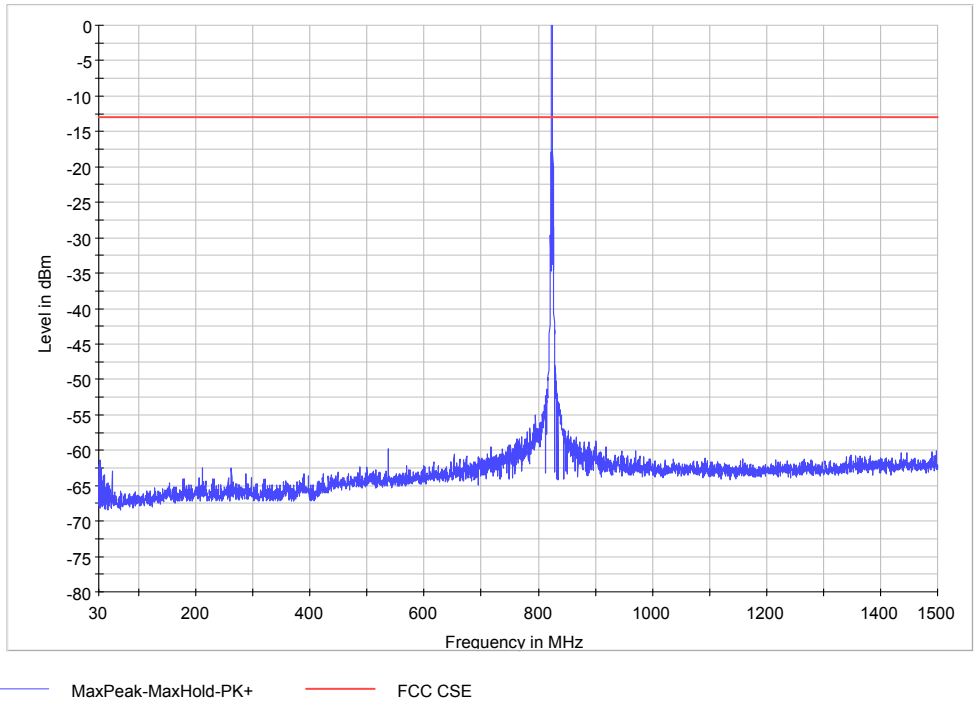
The assessed measurement uncertainty to ensure 99.75% confidence level for the normal distribution is with the coverage factor k = 1.96.

Frequency	Uncertainty
100kHz-2GHz	0.684 dB
2GHz-12.75GHz	1.407 dB

Test Result

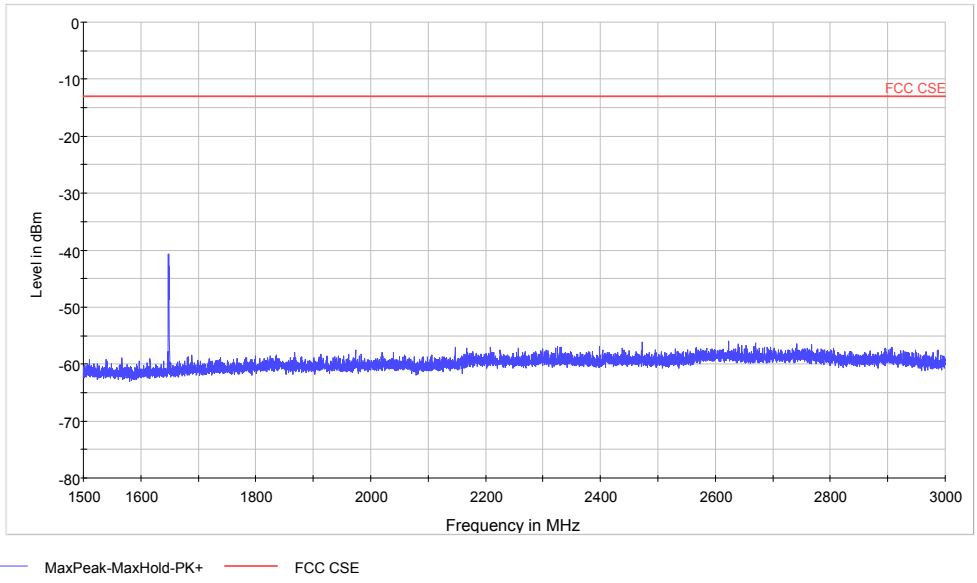
If disturbances were found more than 20dB below limit line, the mark is not required for the EUT.

GSM 850 CH128

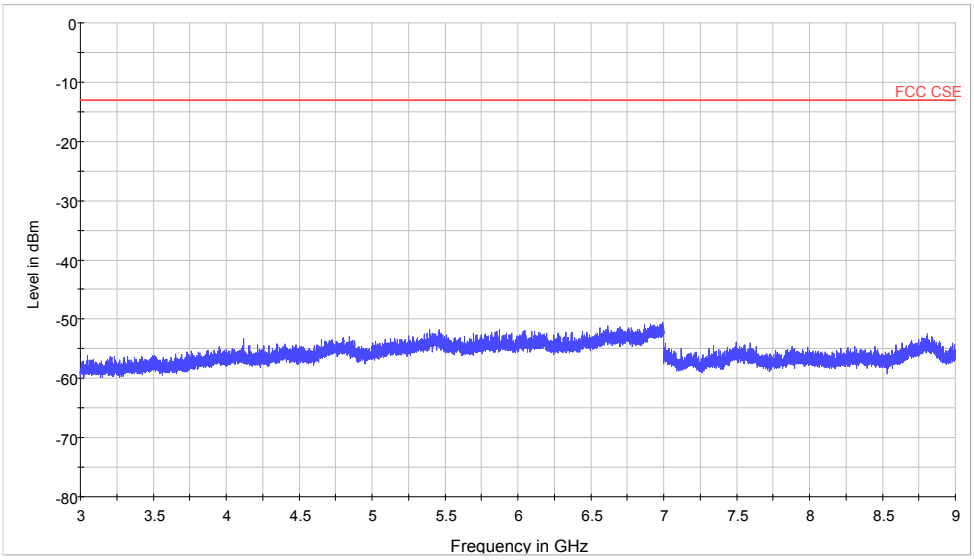


Note: The signal beyond the limit is carrier

Spurious conducted emissions from 30MHz~1.5GHz

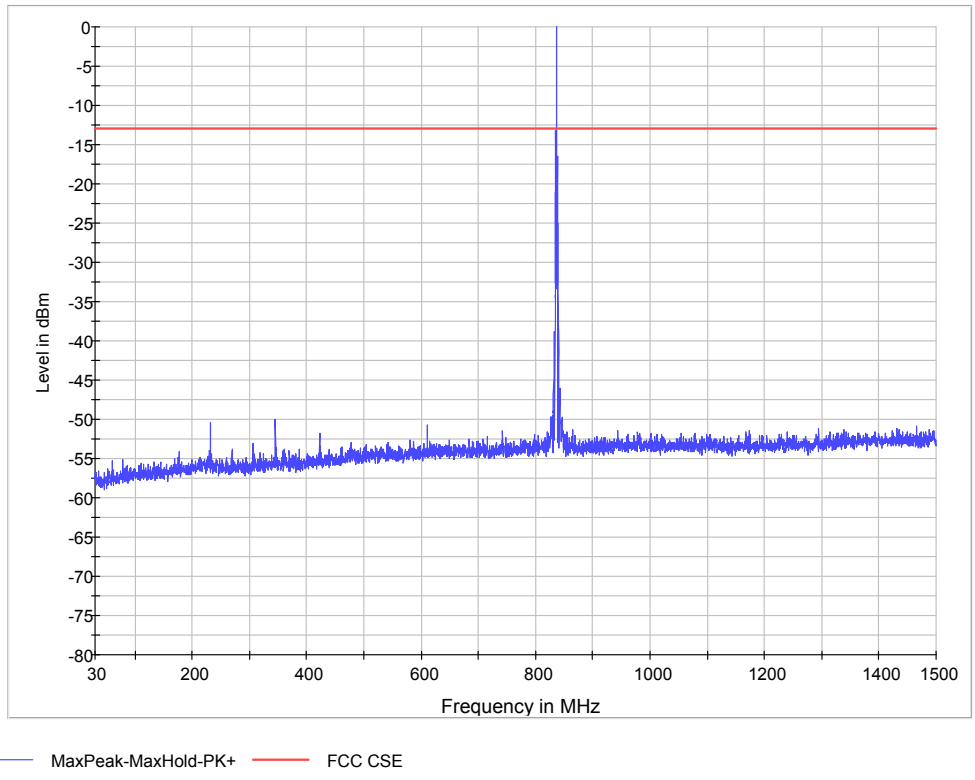


Spurious conducted emissions from 1.5GHz~3GHz



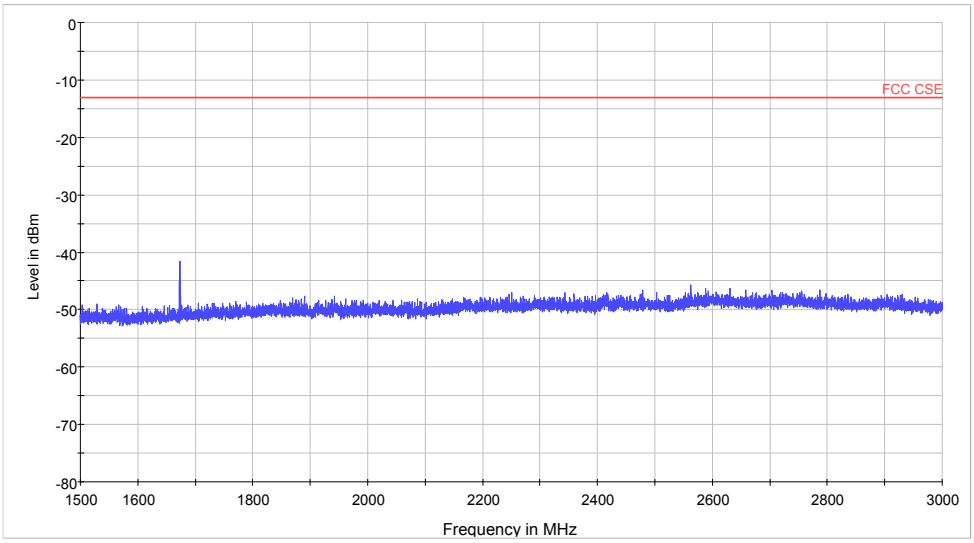
Spurious conducted emissions from 3GHz~9GHz

GSM 850 CH190

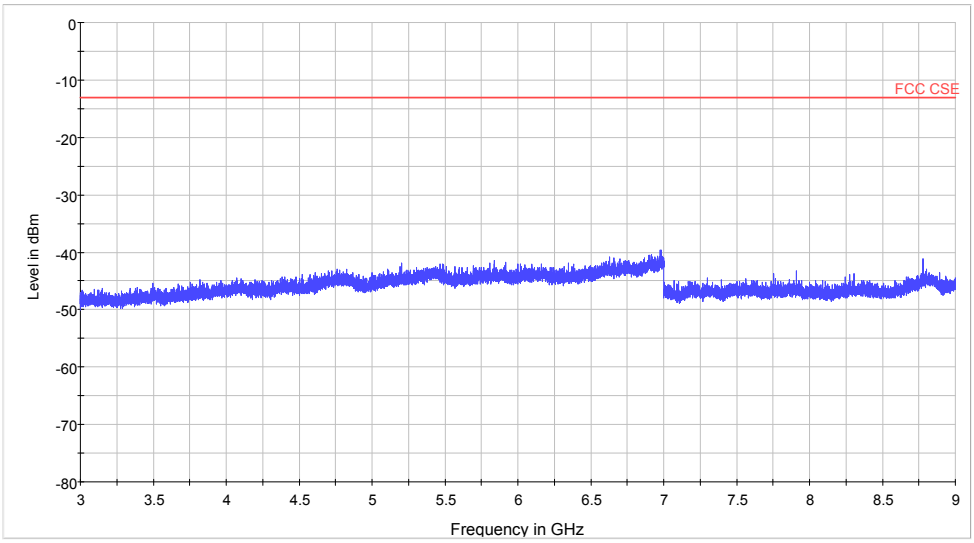


Note: The signal beyond the limit is carrier

Spurious conducted emissions from 30MHz~1.5GHz



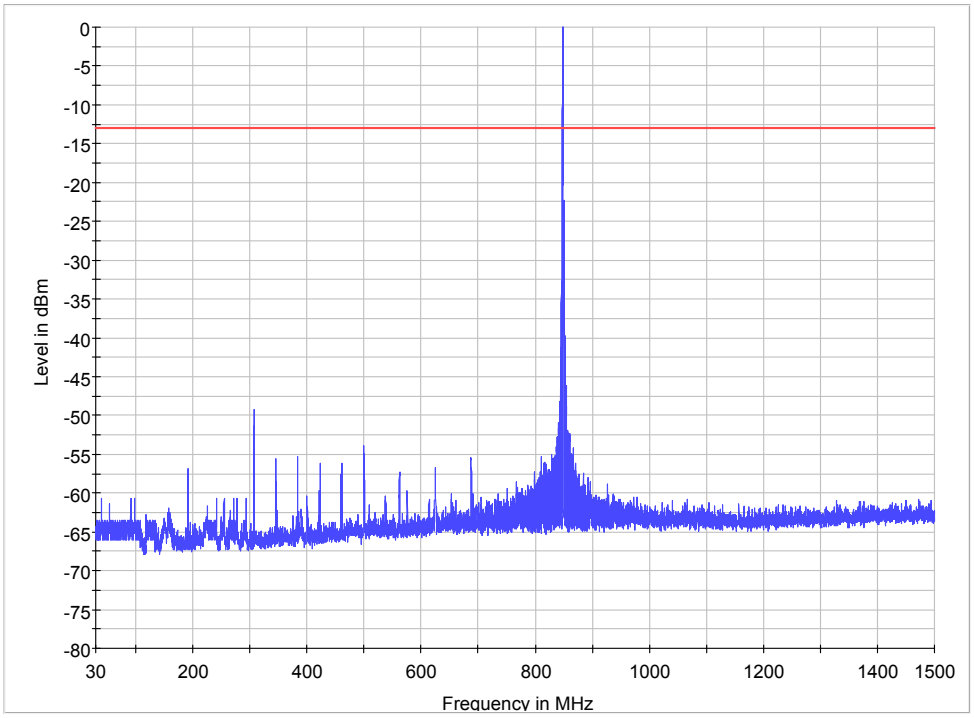
Spurious conducted emissions from 1.5GHz~3GHz



Note: The signal beyond the limit is carrier

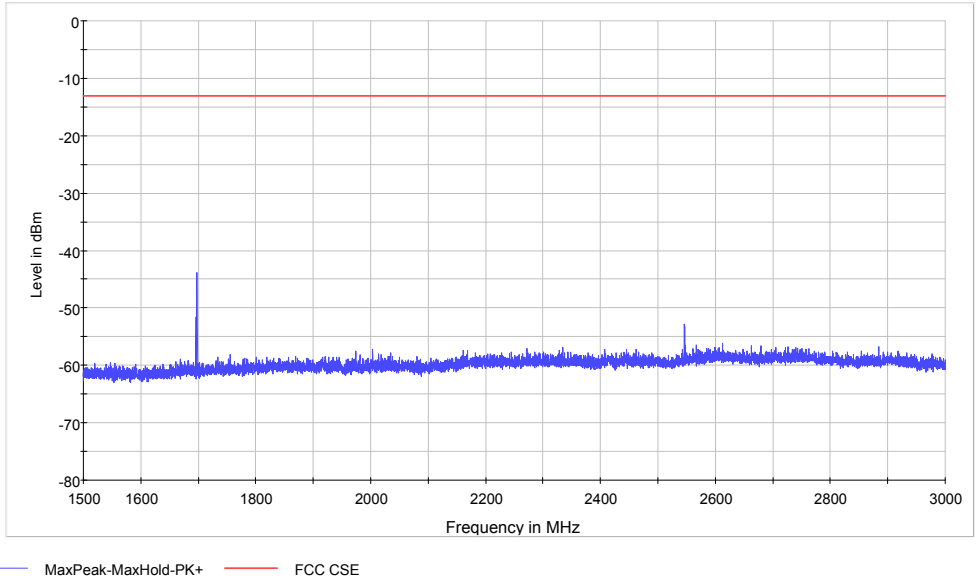
Spurious conducted emissions from 3GHz~9GHz

GSM 850 CH251

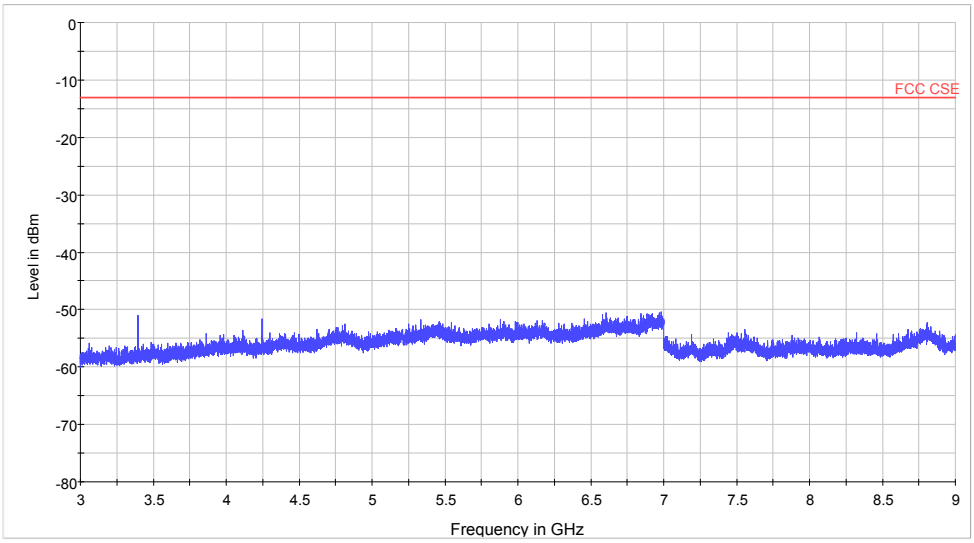


Note: The signal beyond the limit is carrier

Spurious conducted emissions from 30MHz~1.5GHz

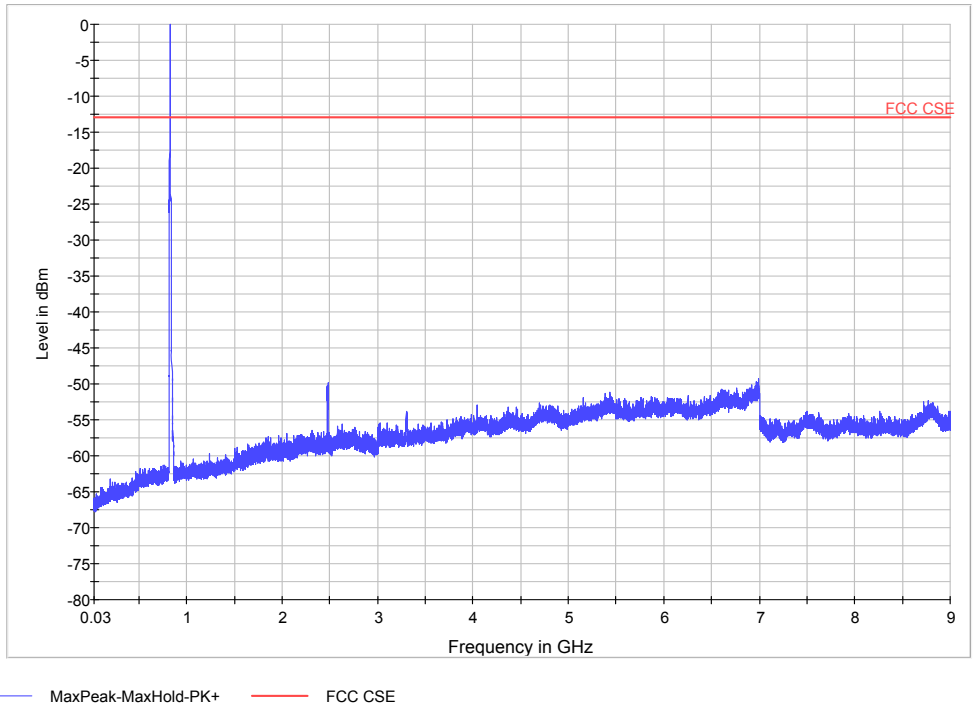


Spurious conducted emissions from 1.5GHz~3GHz



Spurious conducted emissions from 3GHz~9GHz

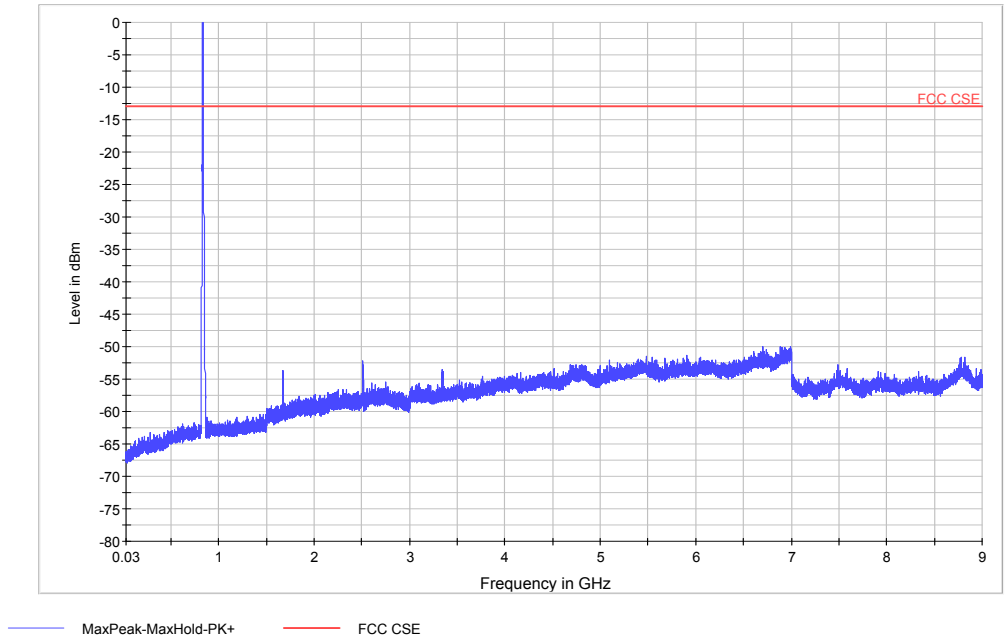
WCDMA Band V CH4132



Note: The signal beyond the limit is carrier

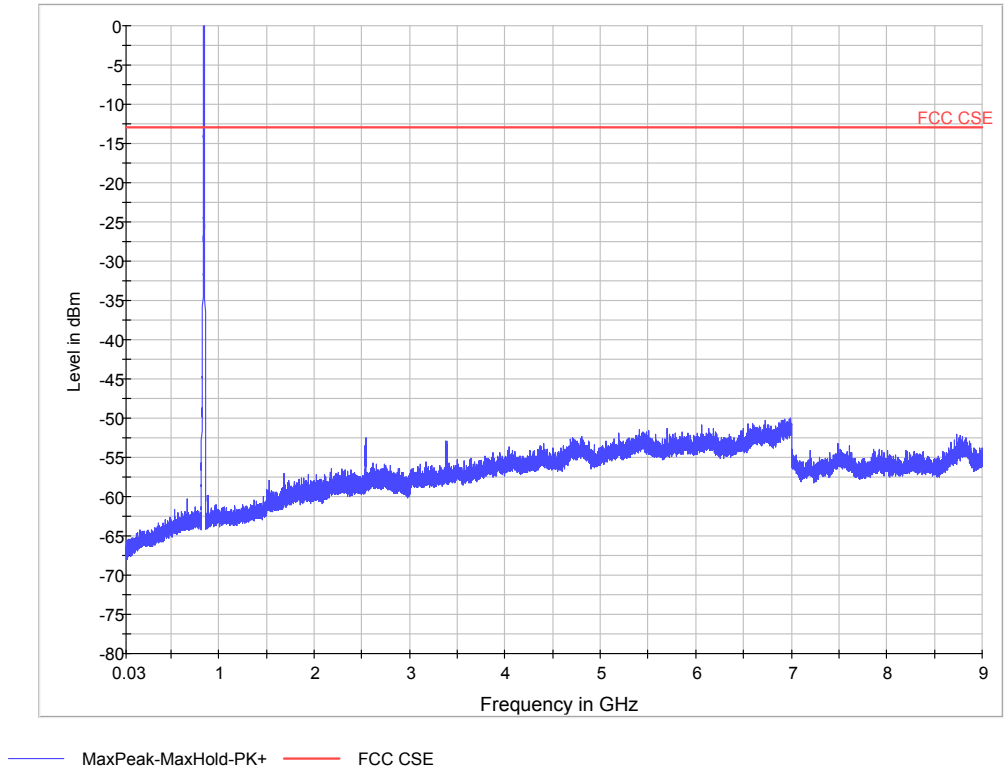
Spurious conducted emissions from 30MHz~9GHz

WCDMA Band V CH4183



Note: The signal beyond the limit is carrier
Spurious conducted emissions from 30MHz~9GHz

WCDMA Band V CH4233



Note: The signal beyond the limit is carrier
Spurious conducted emissions from 30MHz~9GHz

5.8. Radiates Spurious Emission

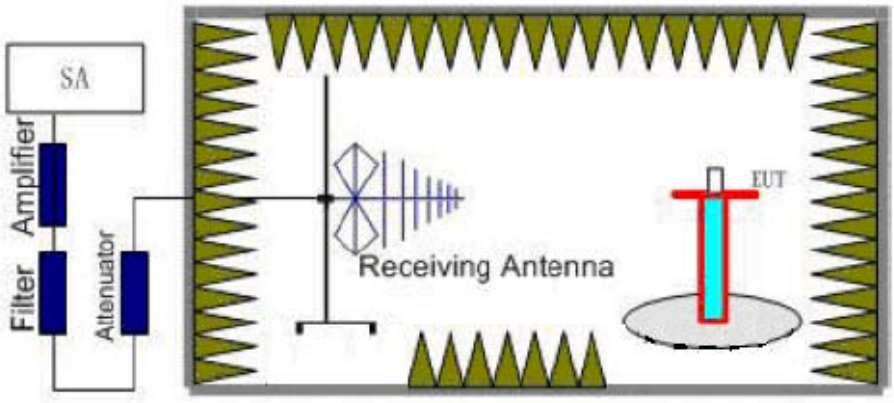
Ambient condition

Temperature	Relative humidity
21°C ~25°C	40%~60%

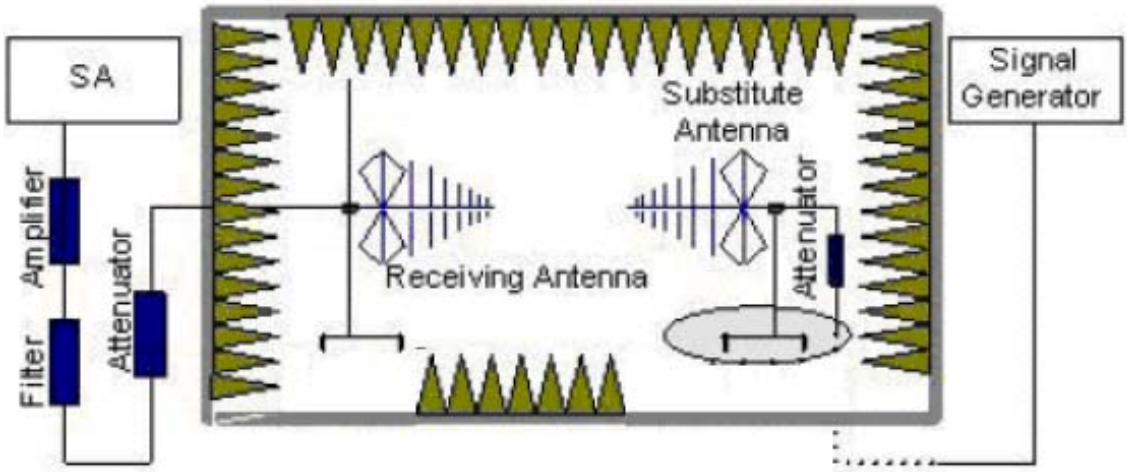
Method of Measurement

The measurements procedures in ANSI/TIA 603-D are used.
The spectrum was scanned from 30 MHz to the 10th harmonic of the highest frequency generated within the equipment.
The emissions less than 20 dB below the permissible value are reported.

The procedure of Radiates Spurious Emission is as follows:
Step 1:
The measurement is carried out in the semi-anechoic chamber. EUT was placed on a 1.5 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. 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 while RBW and VBW are both set to 3MHz. During the measurement, the highest emission was recorded from analyzer power level (LVL) from the 360 degrees rotation of the turntable and the test antenna moved up and down over a range from 1 to 4 meters in both horizontally and vertically polarized orientations. The test setup refers to figure below.



Step 2:
A dipole antenna shall be substituted in place of the EUT. The antenna will be driven by a signal generator with a adjustable S.G. applied through a Tx cable. Adjust the level of the signal generator output until the value of the receiver reach the previously recorded analyzer power level (LVL).Then The E.R.P. /E.I.R.P. of the EUT can be calculated through the level of the signal generator, Tx cable loss and the gain of the substitution antenna. The test setup refers to figure below.



E.R.P（peak power）=S.G. - Tx Cable loss + Substitution antenna gain – 2.15.
EIRP= E.R.P+2.15

Limits

Rule Part 22.917(a) specifies that “The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB.”

Limit	-13 dBm

Measurement Uncertainty

The assessed measurement uncertainty to ensure 95％ confidence level for the normal distribution is with the coverage factor *k* = 1.96, *U*= 3.55 dB.

Test Result

Receiver antenna polarization (horizontal and vertical), the worst emission was found in vertical polarization，and the worst case in vertical polarization was recorded.

GSM 850 CH128

Harmonic	Frequency (MHz)	SG (dBm)	Cable Loss (dB)	Gain (dBi)	Antenna Polarization	ERP Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (deg)
2	1648	-61.73	2	10.15	Vertical	-53.58	-13.00	40.58	0
3	2473	-55.74	2.51	11.35	Vertical	-46.90	-13.00	33.90	180
4	3297	-63.6	4.2	10.85	Vertical	-56.95	-13.00	43.95	0
5	4121	-59.38	5.2	11.35	Vertical	-53.23	-13.00	40.23	45
6	4945	-60.46	5.5	11.95	Vertical	-54.51	-13.00	41.51	180
7	5769	-61.34	5.7	13.55	Vertical	-53.49	-13.00	40.49	90
8	6594	-59.39	6.3	13.75	Vertical	-51.94	-13.00	38.94	225
9	7418	-59.32	6.8	13.85	Vertical	-52.27	-13.00	39.27	270
10	8242	-58.87	6.9	14.25	Vertical	-51.52	-13.00	38.52	180

Note: 1.The other Spurious RF Radiated emissions level is no more than noise floor.

GSM 850 CH190

Harmonic	Frequency (MHz)	SG (dBm)	Cable Loss (dB)	Gain (dBi)	Antenna Polarization	ERP Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (deg)
2	1673	-61.15	2	10.75	Vertical	-52.40	-13.00	39.40	90
3	2498	-53.93	2.51	11.05	Vertical	-45.39	-13.00	32.39	225
4	3346	-63.07	4.2	11.15	Vertical	-56.12	-13.00	43.12	135
5	4183	-60.26	5.2	11.15	Vertical	-54.31	-13.00	41.31	0
6	5020	-59.56	5.5	11.95	Vertical	-53.11	-13.00	40.11	45
7	5856	-61.66	5.7	13.55	Vertical	-53.81	-13.00	40.81	90
8	6693	-59.50	6.3	13.75	Vertical	-52.05	-13.00	39.05	180
9	7529	-60.82	6.8	13.85	Vertical	-53.77	-13.00	40.77	90
10	8366	-60.08	6.9	14.25	Vertical	-52.73	-13.00	39.73	225

Note: 1.The other Spurious RF Radiated emissions level is no more than noise floor.

GSM 850 CH251

Harmonic	Frequency (MHz)	SG (dBm)	Cable Loss (dB)	Gain (dBi)	Antenna Polarization	ERP Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (deg)
2	1698	-61.58	2	10.15	Vertical	-53.43	-13.00	40.43	270
3	2546	-54.12	2.51	11.05	Vertical	-45.58	-13.00	32.58	135
4	3395	-62.81	4.2	11.15	Vertical	-55.86	-13.00	42.86	270
5	4244	-61.27	5.2	11.15	Vertical	-55.32	-13.00	42.32	0
6	5093	-60.76	5.5	11.95	Vertical	-54.31	-13.00	41.31	180
7	5942	-60.86	5.7	13.55	Vertical	-53.01	-13.00	40.01	90
8	6790	-60.86	6.3	13.75	Vertical	-53.41	-13.00	40.41	225
9	7639	-61.48	6.8	13.85	Vertical	-54.43	-13.00	41.43	270
10	8488	-61.09	6.9	14.25	Vertical	-53.74	-13.00	40.74	135

Note: 1.The other Spurious RF Radiated emissions level is no more than noise floor.

WCDMA Band V CH4357

Harmonic	Frequency (MHz)	SG (dBm)	Cable Loss (dB)	Gain (dBi)	Antenna Polarization	ERP Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (deg)
2	1653	-60.99	2	10.15	Vertical	-52.84	-13.00	39.84	180
3	2479	-56.09	2.51	11.35	Vertical	-47.25	-13.00	34.25	90
4	3306	-61.77	4.2	10.85	Vertical	-55.12	-13.00	42.12	0
5	4132	-61.15	5.2	11.35	Vertical	-55.00	-13.00	42.00	270
6	4958	-61.3	5.5	11.95	Vertical	-54.85	-13.00	41.85	315
7	5785	-61.23	5.7	13.55	Vertical	-53.38	-13.00	40.38	180
8	6611	-59.38	6.3	13.75	Vertical	-51.93	-13.00	38.93	270
9	7438	-59.52	6.8	13.85	Vertical	-52.47	-13.00	39.47	135
10	8264	-58.78	6.9	14.25	Vertical	-51.43	-13.00	38.43	45

Note: 1.The other Spurious RF Radiated emissions level is no more than noise floor.

WCDMA Band V CH4408

Harmonic	Frequency (MHz)	SG (dBm)	Cable Loss (dB)	Gain (dBi)	Antenna Polarization	ERP Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (deg)
2	1673	-62.07	2	10.75	Vertical	-53.32	-13.00	40.32	225
3	2510	-58.9	2.51	11.05	Vertical	-50.36	-13.00	37.36	270
4	3346	-63.38	4.2	11.15	Vertical	-56.43	-13.00	43.43	0
5	4183	-59.09	5.2	11.15	Vertical	-53.14	-13.00	40.14	270
6	5020	-61.55	5.5	11.95	Vertical	-55.10	-13.00	42.10	315
7	5856	-61.01	5.7	13.55	Vertical	-53.16	-13.00	40.16	225
8	6693	-59.19	6.3	13.75	Vertical	-51.74	-13.00	38.74	135
9	8366	-61.06	6.8	13.85	Vertical	-54.01	-13.00	41.01	270
10	3346	-63.78	6.9	14.25	Vertical	-56.43	-13.00	43.43	0

Note: 1.The other Spurious RF Radiated emissions level is no more than noise floor.

WCDMA Band V CH4458

Harmonic	Frequency (MHz)	SG (dBm)	Cable Loss (dB)	Gain (dBi)	Antenna Polarization	ERP Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (deg)
2	1693	-60.63	2	10.15	Vertical	-52.25	-13.00	39.25	135
3	2540	-56.6	2.51	11.05	Vertical	-49.71	-13.00	36.71	45
4	3386	-64.16	4.2	11.15	Vertical	-53.40	-13.00	40.40	0
5	4233	-61.50	5.2	11.15	Vertical	-55.16	-13.00	42.16	135
6	5080	-62.89	5.5	11.95	Vertical	-53.67	-13.00	40.67	0
7	5926	-63.04	5.7	13.55	Vertical	-53.51	-13.00	40.51	45
8	6773	-60.84	6.3	13.75	Vertical	-52.97	-13.00	39.97	180
9	7619	-60.52	6.8	13.85	Vertical	-51.12	-13.00	38.12	90
10	8466	-62.22	6.9	14.25	Vertical	-53.05	-13.00	40.05	225

Note: 1.The other Spurious RF Radiated emissions level is no more than noise floor.

6. Main Test Instruments

Name	Type	Manufacturer	Serial Number	Calibration Date	Expiration Time
Base Station Simulator	CMU200	R&S	118133	2015-05-22	2016-05-21
Power Splitter	SHX-GF2-2-13	Hua Xiang	10120101	NA	NA
Spectrum Analyzer	E4445A	Agilent	MY46181146	2015-05-22	2016-05-21
Spectrum Analyzer	N9010A	Agilent	MY47191109	2015-05-22	2016-05-21
Universal Radio Communication Tester	E5515C	Agilent	MY48367192	2013-12-18	2015-12-17
Signal Analyzer	FSV30	R&S	100815	2014-12-18	2015-12-17
Signal generator	SMB 100A	R&S	102594	2015-05-22	2016-05-21
EMI Test Receiver	ESCI	R&S	100948	2015-05-22	2016-05-21
Trilog Antenna	VUBL 9163	SCHWARZBECK	9163-201	2014-12-06	2017-12-05
Trilog Antenna	VUBL 9163	SCHWARZBECK	9163-391	2014-12-06	2017-12-05
Horn Antenna	HF907	R&S	100126	2014-12-06	2017-12-05
Horn Antenna	HF907	R&S	100125	2014-12-06	2017-12-05
Climatic Chamber	PT-30B	Re Ce	20101891	2015-07-18	2018-07-17
RF Cable	SMA 15cm	Agilent	0001	2015-11-09	2016-01-08

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

ANNEX A: EUT Appearance and Test Setup

A.1 EUT Appearance

Front Side

Back Side

a: EUT

b: Battery

Picture 1 EUT and Auxiliary

A.2 Test Setup

Picture 2: Radiated Spurious Emissions Test setup