



# **RADIO TEST REPORT**

Report No: STS1511011F01

Issued for

# UNNECTO HOLDING LIMITED

13/F HARBOUR COMMERCIAL BUILDING 122-124 CONNAUGHT ROAD CENTRAL SHEUNG WAN HK

Product Name:	2G Mobile Phone
Brand Name:	unnecto ™
Model No.:	U150
Series Model:	N/A
FCC ID:	2ADR3U150
Test Standard:	FCC Part 22H and 24E



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# **TEST RESULT CERTIFICATION**

	UNNECTO HOLDING LIMITED		
Address	13/F HARBOUR COMMERCIAL BUILDING 122-124 CONNAUGHT ROAD CENTRAL SHEUNG WAN HK		
Manufacture's Name	IMG TECHNOLOGY CO.,LTD		
Address	1108,Tower B,Tian'an High-Tech Plaza Phase 1,Tian'an Cyber Park,Futian District,ShenZhen China		
Product name:	2G Mobile Phone		
Brand name	unnecto ™		
Model and/or type reference:	U150		
Standards	FCC Part 22H and 24E		
Test procedure	. TIA 603 C		

This device described above has been tested by STS and the test results show that the equipment under test (EUT) is in compliance with the FCC requirements. And it is applicable only to the tested sample identified in the report.

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Date of Test.....

Date of performance of tests .......... 03 Nov. 2015 ~08 Nov. 2015

Date of Issue ...... 09 Nov. 2015

Test Result ..... Pass

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# **Revision History**

Rev.	Issue Date	Report NO.	Effect Page	Contents
00	09 Nov. 2015	STS1511011F01	ALL	Initial Issue



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# 1. SUMMARY OF TEST RESULTS

Test procedures according to the technical standards:

The radiated emission testing was performed according to the procedures of ansi C63.10: 2009; TIA 603 C and fcc cfr 47 rules of 2.1046, 2.1047, 2.1049, 2.1051, 2.1053, 2.1055, 2.1057

Item Number	Item Description		FCC Rules
1	Output	Conducted output power	22.042(a) / 24.222(b)
I	Power	Radiated output power	22.913(a) / 24.232 (b)
	2 Spurious Emission	Conducted	
2		spurious emission	2.1051 / 22.917 / 24.238
	ETHISSION	Radiated spurious emission	
3	Frequency S	Stability	2.1055 /24.235
4	Occupied Ba	andwidth	2.1049 (h)(i)
5	Emission Bandwidth Band Edge		22.917(b) / 24.238 (b)
6			22.917(b) / 24.238 (b)

NOTE:

(1)" N/A" denotes test is not applicable in this Test Report

# 1.1 TEST FACTORY

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CNAS Registration No.: L7649;

FCC Registration No.: 842334; IC Registration No.: 12108A-1

# **1.2 MEASUREMENT UNCERTAINTY**

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

No.	Item	Uncertainty
1	Conducted Emission (9KHz-150KHz)	±2.88dB
2	Conducted Emission (150KHz-30MHz)	±2.67dB
3	RF power, conducted	±0.70dB
4	Spurious emissions, conducted	±1.19dB
5	All emissions,radiated(<1G) 30MHz-200MHz	±2.83dB
6	All emissions,radiated(<1G) 200MHz-1000MHz	±2.94dB
7	All emissions, radiated (>1G)	±3.03dB
8	Temperature	±0.5°C
9	Humidity	±2%

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# 2. GENERAL INFORMATION

# 2.1 PRODUCT DESCRIPTION

A major technical description of EUT is described as following:

Product Designation:	2G Mobile Phone		
Hardware version:	V5.08		
Software version:	U150NA_FP1OM_1023		
FCC ID:	2ADR3U150		
Frequency Bands:	□GSM 850       □PCS 1900 (U.S. Bands)         □GSM 900       □DCS 1800 (Non-U.S. Bands)         U.S. Bands:       □UMTS FDD Band II         □UMTS FDD Bands:       □UMTS FDD Band I         □UMTS FDD Band I       □UMTS FDD Band VIII		
Max RF Output Power:	GSM850:30.21 dBm,GSM1900:27.79dBm		
Type of Emission:	GSM(850):248KGXW: GSM(1900):246KGXW GPRS(850):249KGXW; GPRS(1900):246KGXW		
Description test modes (worst case)	Support single SIM card		
Antenna:	PIFA Antenna		
Antenna gain:	0 dBi		
Power Supply:	DC 3.7V by battery or DC 5.0V supplied by adapter		
Battery parameter:	Capacitance: 800mA, Rated Voltage: 3.7V		
Adapter Input:	AC100-240V, 50-60Hz, 150mA		
Adapter Output:	DC 5.0V, 500mA		
GPRS Class	Multi-Class12		
Extreme Vol. Limits:	DC3.5V to 4.2 V (Nominal DC3.7V)		
Extreme Temp. Tolerance	ce -20℃ to +55℃		
** Note: The High Voltage 4.2V and Low Voltage 3.5V was declared by manufacturer, The EUT couldn't be operate normally with higher or lower voltage.			



# 2.2 RELATED SUBMITTAL(S) / GRANT (S)

This submittal(s) (test report) is intended for FCC ID: 2ADR3U150 filing to comply with the fcc part 22H&24E.

# 2.3 SPECIAL ACCESSORIES

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

#### 2.4 EUT CONFIGURATION

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

#### 2.5 EUT EXERCISE

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

# 2.6 CONFIGURATION OF EUT SYSTEM

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



# Table 2-1 Equipment Used in EUT System

ltem	Equipment	Model No.	ID or Specification	Note
1	2G Mobile Phone	U150	FCC ID: 2ADR3U150	EUT

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



# 2.7 MEASUREMENT INSTRUMENTS

The radiated emission testing was performed according to the procedures of ansi 2009; TIA 603C and fcc cfr 47 rules of 2.1046, 2.1047, 2.1049, 2.1051, 2.1053, 2.1055, 2.1057.

Kind of Equipment	Manufacturer	Type No.	Serial No.	Last Calibration	Calibrated Until
Spectrum Analyzer	Agilent	E4407B	MY50140340	2015.10.25	2016.10.24
Test Receiver	R&S	ESCI	101427	2015.10.25	2016.10.24
Communication Tester	Agilent	8960	MY48360751	2014.11.20	2015.11.19
Communication Tester	R&S	CMU200	112012	2015.10.25	2016.10.24
Test Receiver	R&S	ESCI	102086	2015.10.25	2016.10.24
Bilog Antenna	TESEQ	CBL6111D	34678	2014.11.25	2015.11.24
Horn Antenna	Schwarzbeck	BBHA 9120D(1201)	9120D-1343	2015.03.06	2016.03.05



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# 3. DESCRIPTION OF TEST MODES

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

Note: GSM/GPRS850, GSM/GPRS1900 modes have been tested during the test.

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



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#### 4. OUTPUT POWER

4.1 CONDUCTED OUTPUT POWER

#### 4.1.1 MEASUREMENT METHOD

The EUT was setup for the max output power with pseudo random data modulation. Power was measured with Spectrum Analyzer. The measurements were performed on all modes(GSM/GPRS 850, GSM/GPRS1900) at 3 typical channels(the Top Channel, the Middle Channel and the Bottom Channel) for each band.

#### 4.1.2 MEASUREMENT RESULT

GSM 850:

Mode	Frequency (MHz)	Peak Power	AVG Power
	824.2	29.90	29.52
GSM850	836.6	30.10	29.70
	848.8	30.19	29.87
	824.2	29.93	29.59
GPRS850	836.6	30.12	29.77
(1 Slot)	848.8	30.21	29.90
0000050	824.2	28.83	28.55
GPRS850	836.6	29.06	28.68
(2 Slot)	848.8	29.04	28.79
	824.2	26.64	26.29
GPRS850	836.6	26.90	26.52
(3 Slot)	848.8	27.02	26.70
0000050	824.2	25.63	25.28
GPRS850	836.6	25.73	25.36
(4 Slot)	848.8	25.87	25.58

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PCS 1900:

Mode	Frequency (MHz)	Peak Power	AVG Power
	1850.2	27.51	27.21
GSM1900	1880	27.16	27.01
	1909.8	27.79	27.47
00004000	1850.2	27.50	27.21
GPRS1900 (1 Slot)	1880	27.14	27.00
(1 300)	1909.8	27.77	27.45
00004000	1850.2	26.40	26.04
GPRS1900 (2 Slot)	1880	26.01	25.64
(2 3101)	1909.8	26.72	26.35
00004000	1850.2	24.25	23.95
GPRS1900 (3 Slot)	1880	23.94	23.71
	1909.8	24.52	24.16
00004000	1850.2	23.22	22.87
GPRS1900 (4 Slot)	1880	22.90	22.60
(+ 0101)	1909.8	23.48	23.13

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

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

UE Transmit Channel Configuration	CM(db)	MPR(db)
For all combinations of ,DPDCH,DPCCH	0≤ CM≤3.5	MAX(CM-1,0)
HS-DPDCH, E-DPDCH and E-DPCCH	02 010125.5	
HS-DPDCH,E-DPDCH and E-DPCCH		

Note: CM=1 for  $\beta_{d}/\beta_{d}=12/15$ ,  $\beta_{hs}/\beta_{c}=24/15$ . For all other combinations of DPDCH, DPCCH, HS-DPCCH, E-DPDCH and E-DPCCH the MPR is based on the relative CM difference.

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

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

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

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

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## 4.2 PEAK-TO-AVERAGE RADIO (PAR) OF TRANSMITTER

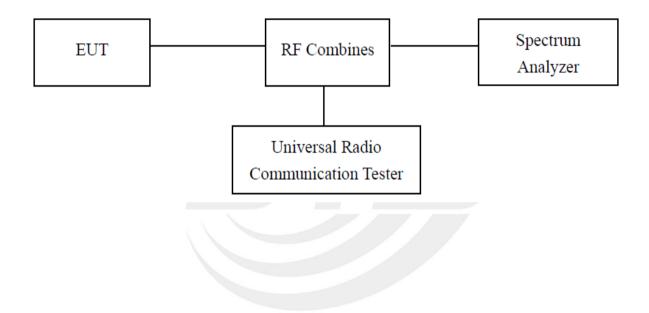
#### 4.2.1 STANDARD APPLICABLE

According to §24.232(d), Power measurements for transmissions by stations authorized under this section may be made either in accordance with a Commission-approved average power technique or in compliance with paragraph (e) of this section. In both instances, equipment employed must be authorized in accordance with the provisions of §24.51. In measuring transmissions in this band using an average power technique, the peak-to-average ratio (PAR) of the transmission may not exceed 13 dB.

#### 4.2.2 TEST PROCEDURE

The RF output terminal of the transmitter was connected to the input of the spectrum analyzer via a suitable attenuation. The RBW of the spectrum analyzer was set to 30kHz and the peak-to-average ratio (PAR) of the transmission was recorded.

Test Configuration for the emission bandwidth testing:





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# 4.2.3 SUMMARY OF TEST RESULTS

#### GSM 850:

Mode	Frequency (MHz)	Peak Power	AVG Power	PAR	Limit
	824.20	29.90	29.52	0.38	13.00
GSM850	836.60	30.10	29.70	0.40	13.00
	848.80	30.19	29.87	0.32	13.00
0000050	824.20	29.93	29.59	0.34	13.00
GPRS850 (1 Slot)	836.60	30.12	29.77	0.35	13.00
(1 000)	848.80	30.21	29.90	0.31	13.00
0000050	824.20	28.83	28.55	0.28	13.00
GPRS850 (2 Slot)	836.60	29.06	28.68	0.38	13.00
(2 300)	848.80	29.04	28.79	0.25	13.00
0000050	824.20	26.64	26.29	0.35	13.00
GPRS850 (3 Slot)	836.60	26.90	26.52	0.38	13.00
(3 300)	848.80	27.02	26.70	0.32	13.00
0000050	824.20	25.63	25.28	0.35	13.00
GPRS850 (4 Slot)	836.60	25.73	25.36	0.37	13.00
(4 300)	848.80	25.87	25.58	0.29	13.00

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#### PCS 1900:

Mode	Frequency (MHz)	Peak Power	AVG Power	PAR	Limit
	1850.20	27.51	27.21	0.30	13.00
GSM1900	1880.00	27.16	27.01	0.15	13.00
	1909.80	27.79	27.47	0.32	13.00
00004000	1850.20	27.50	27.21	0.29	13.00
GPRS1900 (1 Slot)	1880.00	27.14	27.00	0.14	13.00
(1 300)	1909.80	27.77	27.45	0.32	13.00
00004000	1850.20	26.4	26.04	0.36	13.00
GPRS1900 (2 Slot)	1880.00	26.01	25.64	0.37	13.00
(2 0101)	1909.80	26.72	26.35	0.37	13.00
00004000	1850.20	24.25	23.95	0.30	13.00
GPRS1900 (3 Slot)	1880.00	23.94	23.71	0.23	13.00
(3 3101)	1909.80	24.52	24.16	0.36	13.00
00004000	1850.20	23.22	22.87	0.35	13.00
GPRS1900 (4 Slot)	1880.00	22.90	22.60	0.30	13.00
(4 0101)	1909.80	23.48	23.13	0.35	13.00

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# 4.3 RADIATED OUTPUT POWER

#### 4.3.1 MEASUREMENT METHOD

The EUT was setup for the max output power with pseudo random data modulation. Power was measured with Spectrum Analyzer. The measurements were performed on all modes(GSM/GPRS850, GSM/GPRS1900) at 3 typical channels(the Top Channel, the Middle Channel and the Bottom Channel) for each band.

The measurements procedures specified in TIA-603C-2009 were applied.

- 1.In an anechoic antenna test chamber, a half-wave dipole antenna for the frequency band of interest is placed at the reference centre of the chamber. An RF Signal source for the frequency band of interest is connected to the dipole with a cable that has been constructed to not interfere with the radiation pattern of the antenna. A known (measured) power (Pin) is applied to the input of the dipole, and the power received (Pr) at the chamber's probe antenna is recorded.
- 2. The substitution method is used. Substitution values at each frequency are measured before and saved to the test software. A "reference path loss" is established as ARpl=Pin + 2.15 Pr. The ARpl is the attenuation of "reference path loss", and including the gain of receive antenna, the cable loss and the air loss. The measurement results are obtained as described below: Power=PMea+ARpl
- 3. The EUT is substituted for the dipole at the reference centre of the chamber and a scan is performed to obtain the radiation pattern.
- 4. From the radiation pattern, the co-ordinates where the maximum antenna gain occurs are identified.
- 5. The EUT is then put into continuously transmitting mode at its maximum power level.
- 6.Power mode measurements are performed with the receiving antenna placed at the coordinates determined in Step 3 to determine the output power as defined in Rule 24.232 (b) and (c). The "reference path loss" from Step1 is added to this result.
- 7. This value is EIRP since the measurement is calibrated using a half-wave dipole antenna of known gain (2.15 dBi) and known input power (Pin).
- 8.ERP can be calculated from EIRP by subtracting the gain of the dipole, ERP = EIRP -2.15dBi..
  9.Both Horizontal And Vertical Antenna Polarities Were Tested And Performed Pretest To Three Orthogonal Axis. The Worst Case Emissions Were Reported

#### 4.3.2 PROVISIONS APPLICABLE

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

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



# 4.3.3 MEASUREMENT RESULT

Radiated Power (ERP) for GSM 850 MHZ						
	F		sult			
Mode	Frequency	Frequency Max. Peak ERP		Conclusion		
		(dBm)	Of Max. ERP			
	824.2	24.92	Horizontal	Pass		
	824.2	26.97	Vertical	Pass		
GSM850	836.6	24.93	Horizontal	Pass		
GSIVIODU	836.6	27.06	Vertical	Pass		
-	848.8	24.92	Horizontal	Pass		
	848.8	27.01	Vertical	Pass		

Radiated Power (ERP) for GPRS 850 MHZ						
		Res	Result			
Mode	Frequency	Frequency Max. Peak ERP		Conclusion		
		(dBm)	Of Max. ERP			
	824.2	25.04	Horizontal	Pass		
	824.2	27.04	Vertical	Pass		
GPRS850 -	836.6	24.94	Horizontal	Pass		
GFR3030	836.6	27.08	Vertical	Pass		
	848.8	24.96	Horizontal	Pass		
	848.8	26.98	Vertical	Pass		

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Radiated Power (EIRP) for PCS 1900 MHZ						
		Re				
Mode	Frequency	Frequency Max. Peak		Conclusion		
		E.I.R.P.(dBm)	Of Max. E.I.R.P.			
	1850.2	22.08	Horizontal	Pass		
	1850.2	24.23	Vertical	Pass		
PCS1900 -	1880.0	22.08	Horizontal	Pass		
PC31900	1880.0	24.13	Vertical	Pass		
-	1909.8	22.12	Horizontal	Pass		
	1909.8	24.24	Vertical	Pass		

Radiated Power (EIRP) for GPRS 1900 MHZ						
	Res		sult			
Mode	Frequency	Frequency Max. Peak		Conclusion		
		E.I.R.P.(dBm)	Of Max. E.I.R.P.			
	1850.2	22.13	Horizontal	Pass		
	1850.2	24.18	Vertical	Pass		
GPRS 1900 -	1880.0	22.12	Horizontal	Pass		
GFK3 1900	1880.0	24.05	Vertical	Pass		
	1909.8	22.01	Horizontal	Pass		
	1909.8	24.20	Vertical	Pass		



#### 5. SPURIOUS EMISSION

#### 5.1 SPURIOUS EMISSION

5.1.1 MEASUREMENT METHOD

The following steps outline the procedure used to measure the conducted emissions from the EUT. 1.Determine frequency range for measurements: From CFR 2.1057 the spectrum should be investigated from the lowest radio frequency generated in the equipment up to at least the 10th harmonic of the carrier frequency. For the equipment of PCS1900 band, this equates to a frequency range of 30 MHz to 20 GHz.

2. Determine EUT transmit frequencies: the following typical channels were chosen to conducted emissions testing.

Typical Channels for testing of GSM/GPRS 850 MHz					
Channel Frequency (MHz)					
128	824.2				
190	836.6				
251 848.8					

Typical Channels for testing of PCS/ GPRS 1900 MHz				
Channel Frequency (MHz)				
512	1850.2			
661	1880.0			
810	1909.8			

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# 5.1.2 PROVISIONS APPLICABLE

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

# 5.1.3 MEASUREMENT RESULT

PLEASE REFER TO : APPENDIX I TEST PLOTS FOR CONDUCTED SPURIOUS EMISSION Note: 1. Below 30MHZ no Spurious found and The GSM modes is the worst condition.

2. As no emission found in standby or receive mode, no recording in this report.



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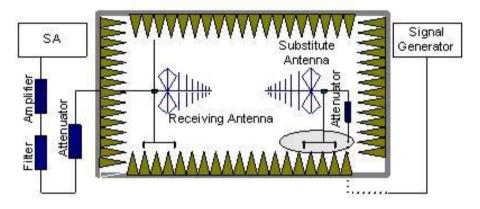


# 5.2 RADIATED SPURIOUS EMISSION 5.2.1 MEASUREMENT METHOD

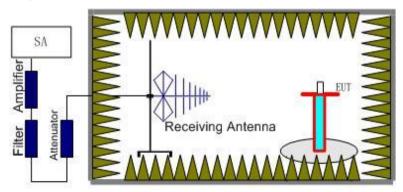
The measurements procedures specified in TIA-603C-2009 were used for testing. The spectrum was scanned from 30 MHz to the 10th harmonic of the highest frequency generated within the equipment. The resolution bandwidth is set 1MHz as outlined in Part 24.238. The measurements were performed on all modes(GSM/GPRS850, GSM/GPRS1900) at 3 typical channels(the Top Channel, the Middle Channel and the Bottom Channel) for each band.

The procedure of radiated spurious emissions is as follows:

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



b) EUT was placed on a 0.8 meter high non-conductive stand at a 3 meter test distance from the receive antenna. A receiving antenna was placed on the antenna mast 3 meters from the test item for emission measurements. The height of receiving antenna is 0.8m. The test setup refers to figure below. Detected emissions were maximized at each frequency by rotating the test item and adjusting the receiving antenna polarization. The radiated emission measurements of all non-harmonic and harmonics of the transmit frequency through the 10th harmonic were measured with peak detector and 1MHz bandwidth.



Radiated emissions measurements were made only at the upper, middle, and lower carrier frequencies of the PCS 1900 band (1850.2 MHz, 1880 MHz and 1909.8 MHz),GSM850 band (824.2MHz, 836.6MHz, 848.8MHz). It was decided that measurements at these three carrier frequencies would be sufficient to demonstrate compliance with emissions limits because it was seen that all the significant spurs occur well outside the band and no radiation was seen from a carrier in one block of any band into any of the other blocks.

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

# 5.2.2 PROVISIONS APPLICABLE

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



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# 5.2.3 MEASUREMENT RESULT

GSM 850:

	The	Worst Test R	esults Channe	el 128/824.2 MHz		
Frequency(MHz)	Power(dBm)	ARpl	Р <sub>меа</sub> (dBm)	Limit (dBm)	Margin(dBm)	Polarity
1648.521	-35.57	-4.65	-40.22	-13	-27.22	Horizontal
2472.565	-36.33	-2.21	-38.54	-13	-25.54	Horizontal
3296.676	-31.69	0.21	-31.48	-13	-18.48	Horizontal
1648.272	-38.36	-4.65	-43.01	-13	-30.01	Vertical
2472.654	-41.45	-2.21	-43.66	-13	-30.66	Vertical
3296.425	-42.34	0.21	-42.55	-13	-29.55	Vertical
	The	Worst Test R	esults Channe	el 190/836.6 MHz		
Frequency(MHz)	Power(dBm)	ARpl	Р <sub>меа</sub> (dBm)	Limit (dBm)	Margin(dBm)	Polarity
1673.331	-36.65	-4.65	-41.3	-13	-28.3	Horizontal
2509.769	-42.66	-2.21	-44.87	-13	-31.87	Horizontal
3346.357	-38.74	0.21	-38.53	-13	-25.53	Horizontal
1673.685	-37.86	-4.65	-42.51	-13	-29.51	Vertical
2509.396	-31.67	-2.21	-33.88	-13	-20.88	Vertical
3346.426	-36.79	0.21	-36.58	-13	-23.58	Vertical
	The	Worst Test R	esults Channe	el 251/848.8 MHz		
Frequency(MHz)	Power(dBm)	ARpl	Р <sub>меа</sub> (dBm)	Limit (dBm)	Margin(dBm)	Polarity
1697.665	-35.72	-4.65	-40.37	-13	-27.37	Horizontal
2546.334	-43.33	-2.21	-45.54	-13	-32.54	Horizontal
3395.378	-42.65	0.21	-42.44	-13	-29.44	Horizontal
1697.664	-35.57	-4.65	-40.22	-13	-27.22	Vertical
2546.526	-41.29	-2.21	-43.5	-13	-30.5	Vertical
3395.265	-37.95	0.21	-37.74	-13	-24.74	Vertical

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



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PCS 1900:

	The Worst Test Results for Channel 512/1850.2MHz					
Frequency(MHz)	Power(dBm)	ARpl	Р <sub>меа</sub> (dBm)	Limit (dBm)	Margin(dBm)	Polarity
3700.437	-33.41	0.33	-33.08	-13	-20.08	Horizontal
5550.687	-35.87	4.01	-31.86	-13	-18.86	Horizontal
7400.638	-42.46	10.7	-31.76	-13	-18.76	Horizontal
3700.586	-34.52	0.33	-34.19	-13	-21.19	Vertical
5550.242	-35.61	4.01	-31.6	-13	-18.6	Vertical
7400.461	-41.83	10.7	-31.13	-13	-18.13	Vertical
	The V	Vorst Test Res	sults for Chann	el 661/1880.0M	Hz	
Frequency(MHz)	Power(dBm)	ARpl	Р <sub>меа</sub> (dBm)	Limit (dBm)	Margin(dBm)	Polarity
3760.361	-36.52	0.33	-36.19	-13	-23.19	Horizontal
5640.234	-32.76	4.01	-28.75	-13	-15.75	Horizontal
7520.412	-42.62	10.7	-31.92	-13	-18.92	Horizontal
3760.637	-31.29	0.33	-30.96	-13	-17.96	Vertical
5640.422	-36.33	4.01	-32.32	-13	-19.32	Vertical
7520.694	-37.43	10.7	-26.73	-13	-13.73	Vertical
	The V	Vorst Test Res	sults for Chann	el 810/1909.8M	Hz	
Frequency(MHz)	Power(dBm)	ARpl	Р <sub>меа</sub> (dBm)	Limit (dBm)	Margin(dBm)	Polarity
3819.591	-32.37	0.33	-32.04	-13	-19.04	Horizontal
5729.646	-35.62	4.01	-31.61	-13	-18.61	Horizontal
7639.763	-37.69	10.7	-26.99	-13	-13.99	Horizontal
3819.451	-32.43	0.33	-32.1	-13	-19.1	Vertical
5729.793	-41.54	4.01	-37.53	-13	-24.53	Vertical
7639.316	-38.25	10.7	-27.55	-13	-14.55	Vertical

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



#### 6. FREQUENCY STABILITY

#### 6.1 MEASUREMENT METHOD

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

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

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

1. Measure the carrier frequency at room temperature.

2. Subject the EUT to overnight soak at -30°C.

3. With the EUT, powered via nominal voltage, connected to the CMU200 and in a simulated call on channel 661 for PCS 1900 band , channel 190 for GSM 850 band measure the carrier frequency. These measurements should be made within 2 minutes of Powering up the EUT, to prevent significant self-warming.

4. Repeat the above measurements at  $10^{\circ}$ C increments from  $-20^{\circ}$ C to  $+50^{\circ}$ C. Allow at least 1 1/2 hours at each temperature, unpowered, before making measurements.

5. Re-measure carrier frequency at room temperature with nominal voltage. Vary supply voltage from minimum voltage to maximum voltage, in 0.1Volt increments re-measuring carrier frequency at each voltage. Pause at nominal voltage for 1 1/2 hours unpowered, to allow any self-heating to stabilize, before continuing.

6. Subject the EUT to overnight soak at +50 °C.

7. With the EUT, powered via nominal voltage, connected to the CMU200 and in a simulated call on the centre channel, measure the carrier frequency. These measurements should be made within 2 minutes of Powering up the EUT, to prevent significant self-warming.

8. Repeat the above measurements at  $10^{\circ}$  increments from  $+50^{\circ}$  to  $-30^{\circ}$ . Allow at least 1 1/2 hours at each temperature, unpowered, before making measurements.

.At all temperature levels hold the temperature to +/-  $0.5^{\circ}$ C during the measurement procedure.





## 6.2 PROVISIONS APPLICABLE

#### 6.2.1 FOR HAND CARRIED BATTERY POWERED EQUIPMENT

According to the JTC standard the frequency stability of the carrier shall be accurate to within 0.1 ppm of the received frequency from the base station. This accuracy is sufficient to meet Sec. 24.235, Frequency Stability. The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block. As this transceiver is considered "Hand carried, battery powered equipment" Section 2.1055(d)(2) applies. This requires that the lower voltage for frequency stability testing be specified by the manufacturer. This transceiver is specified to operate with an input voltage of between 3.3VDC and 4.2VDC, with a nominal voltage of 3.7VDC. Operation above or below these voltage limits is prohibited by transceiver software in order to prevent improper operation as well as to protect components from overstress. These voltages represent a tolerance of -10 % and +12.5 %. For the purposes of measuring frequency stability these voltage limits are to be used.

# 6.2.2 FOR EQUIPMENT POWERED BY PRIMARY SUPPLY VOLTAGE

According to the JTC standard the frequency stability of the carrier shall be accurate to within 0.1 ppm of the received frequency from the base station. This accuracy is sufficient to meet Sec. 24.235, Frequency Stability. The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block. For this EUT section 2.1055(d)(1) applies. This requires varying primary supply voltage from 85 to 115 percent of the nominal value for other than hand carried battery equipment, the normal environment temperature is 200C.



#### 6.3 MEASUREMENT RESULT

According to the JTC standard the frequency stability of the carrier shall be accurate to within 0.1 ppm of the received frequency from the base station. This accuracy is sufficient to meet Sec. 24.235, Frequency Stability. The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block. For this EUT section 2.1055(d)(1) applies. This requires varying primary supply voltage from 85 to 115 percent of the nominal value for other than hand carried battery equipment, the normal environment temperature is  $20^{\circ}C$ 

Frequency Error Against Voltage for GSM 850 band			
Voltage(V)	Frequency error(Hz)	Frequency error(ppm)	
3.4	-21	-0.025	
3.7	34	0.041	
4.2	27	0.032	

Frequency Error Against Temperature for GSM 850 band			
temperature(°C)	Frequency error(Hz)	Frequency error(ppm)	
-30	19	0.023	
-20	-13	-0.016	
-10	-35	-0.042	
0	33	0.039	
10	-16	-0.019	
20	17	0.020	
30	-26	-0.031	
40	28	0.033	
50	27	0.032	

Frequency Error Against Voltage for GPRS850 band			
Voltage(V)	Frequency error(Hz)	Frequency error(ppm)	
3.4	-11	-0.013	
3.7	25	0.030	
4.2	27	0.032	



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Frequency Error Against Temperature for GPRS850 band			
temperature(°C)	Frequency error(Hz)	Frequency error(ppm)	
-30	-11	-0.013	
-20	31	0.037	
-10	-13	-0.016	
0	-27	-0.032	
10	16	0.019	
20	11	0.013	
30	-28	-0.033	
40	28	0.033	
50	19	0.023	

Frequency Error Against Voltage for GSM1900 band			
Voltage(V)	Frequency error(Hz)	Frequency error(ppm)	
3.4	21	0.011	
3.7	27	0.014	
4.2	17	0.009	

Frequency Error Against Temperature for GSM1900 band			
temperature(°C)	Frequency error(Hz)	Frequency error(ppm)	
-30	-17	-0.009	
-20	-23	-0.012	
-10	19	0.010	
0	26	0.014	
10	23	0.012	
20	22	0.012	
30	33	0.018	
40	-14	-0.007	
50	-22	-0.012	

Frequency Error Against Voltage for GPRS1900 band			
Voltage(V)	Frequency error(Hz)	Frequency error(ppm)	
3.4	31	0.016	
3.7	-17	-0.009	
4.2	24	0.013	

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# 7. OCCUPIED BANDWIDTH

## 7.1 MEASUREMENT METHOD

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

## 7.2 PROVISIONS APPLICABLE

Limits applicated report test result only.

#### 7.3 MEASUREMENT RESULT

Occupied Bandwidth (99%) for GSM 850 band					
Mode	Frequency(MHz)	Occupied Bandwidth (99%)( kHz)			
Low Channel	824.2	244.89			
Middle Channel	836.6	248.04			
High Channel	848.8	244.02			
Oc	Occupied Bandwidth (99%) for GPRS 850 band				
Mode	Frequency(MHz)	Occupied Bandwidth (99%)( kHz)			
Low Channel	824.2	247.22			
Middle Channel	836.6	248.02			
High Channel	848.8	249.44			

Occupied Bandwidth (99%) for GSM1900 band					
Mode	Frequency(MHz)	Occupied Bandwidth (99%)( kHz)			
Low Channel	1850.2	245.76			
Middle Channel	1880.0	242.94			
High Channel	1909.8	245.84			
Oce	Occupied Bandwidth (99%) for GPRS1900 band				
Mode	Mode Frequency(MHz) Occupied Bandwidth (99%)( kHz)				
Low Channel	1850.2	245.66			
Middle Channel	1880.0	244.92			
High Channel	1909.8	245.78			



#### 8. EMISSION BANDWIDTH

#### 8.1 MEASUREMENT METHOD

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

#### 8.2 PROVISIONS APPLICABLE

The emission bandwidth is defined as two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26dB below the transmitter power

#### 8.3 MEASUREMENT RESULT

Emission Bandwidth (-26dBc) for GSM850 band				
Mode	Frequency(MHz)	Emission Bandwidth (-26dBc)( kHz)		
Low Channel	824.2	314.4		
Middle Channel	836.6	314.9		
High Channel	848.8	313.3		
Emi	Emission Bandwidth (-26dBc) for GPRS850 band			
Mode	Frequency(MHz)	Emission Bandwidth (-26dBc)( kHz)		
Low Channel	824.2	313.8		
Middle Channel	836.6	318.6		
High Channel	848.8	321.6		

Emission Bandwidth (-26dBc) for GSM1900 band					
Mode	Frequency(MHz)	Emission Bandwidth (-26dBc)( kHz)			
Low Channel	1850.2	319.6			
Middle Channel	1880.0	313.3			
High Channel	1909.8	310.0			
Emis	Emission Bandwidth (-26dBc) for GPRS1900 band				
Mode	Frequency(MHz)	Emission Bandwidth (-26dBc)( kHz)			
Low Channel	1850.2	314.7			
Middle Channel	1880.0	315.6			
High Channel	1909.8	315.6			

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# 9. BAND EDGE

9.1 MEASUREMENT METHOD

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

## 9.2 PROVISIONS APPLICABLE

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

## 9.3 MEASUREMENT RESULT

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



Shenzhen STS Test Services Co., Ltd.



# **APPENDIX I**

# **TEST PLOTS FOR CONDUCTED SPURIOUS EMISSION**

CONDUCTED EMISSION IN GSM 850 BAND

Conducted Emission Transmitting Mode CH 128 30MHz - 9GHz

Agilent Spectr											
VI RL Preamp	RF Gain 0.				ISE:INT		ALIGN AUTO : Log-Pwr	TRAC	MNov 04, 2015 E 1 2 3 4 5 6	External Gain	
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14.0										0.00 dB	
4.00											
-6.00									-13.00 dBm	BTS	
-26.0			_			<u>^2</u>				0.00 dB	
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-46.0											
-56.0											
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8 9 10											
11											
12											
MSG					_		STATUS				

Conducted Emission Transmitting Mode CH 190 30MHz - 9GHz

			· · · · · · · · · · · · · · · · · · ·							
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Shenzhen STS Test Services Co., Ltd.

1/F., Building B, Zhuoke Science Park, No.190, Chongqing Road, Fuyong Street, Bao'an District, Shenzhen, Guangdong, China Tel: 0755-36886288 Fax: 0755-36886277 Http://www.stsapp.com E-mail: sts@stsapp.com



۱L.		DΩ AC		SENSE:		ALIGN AUTO		1Nov 04, 2015	Frequency
nter F	req 4.515	000000 GHz PNO: IFGair		Trig: Free Ru #Atten: 36 dE	n <sup>–</sup>	Type: Log-Pwr	TYPE	123456 MWWWWW PPPPPP	Auto Tun
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#### Conducted Emission Transmitting Mode CH 251 30MHz - 9GHz

Shenzhen STS Test Services Co., Ltd.

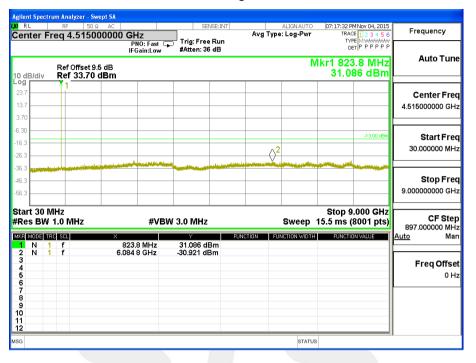
1/F., Building B, Zhuoke Science Park, No.190,Chongqing Road, Fuyong Street, Bao'an District, Shenzhen, Guangdong,China Tel: 0755-36886288 Fax: 0755-36886277 Http://www.stsapp.com E-mail: sts@stsapp.com



#### CONDUCTED EMISSION IN GPRS 850 BAND

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#### Conducted Emission Transmitting Mode CH 128 30MHz - 9GHz



# Conducted Emission Transmitting Mode CH 190 30MHz - 9GHz

	rum Analyzer -									
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897.000000 I Auto	CTION VALUE		UNCTION WIDTH	ICTION	FL	Y		×			MODE
						31.447 d	.5 MHz 5 GHz			1	NN
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#### Conducted Emission Transmitting Mode CH 251 30MHz - 9GHz



Shenzhen STS Test Services Co., Ltd.

1/F., Building B, Zhuoke Science Park, No.190,Chongqing Road, Fuyong Street, Bao'an District, Shenzhen, Guangdong,China Tel: 0755-36886288 Fax: 0755-36886277 Http://www.stsapp.com E-mail: sts@stsapp.com



#### CONDUCTED EMISSION IN GSM1900 BAND

#### Conducted Emission Transmitting Mode CH 512 30MHz - 20GHz

Allenings A. ( 20 L RF 502 AC | Marker 1 1.850936250000 GHz PN0: Fast IFGain:Low 21 PM Nov 04, 2015 TRACE 1 2 3 4 5 6 TYPE M WWWWW DET P P P P P Marker Avg Type: Log-Pwr Avg|Hold>100/100 Trig: Free Run #Atten: 36 dB Select Marker Mkr1 1.850 9 GHz 26.204 dBm 1 Ref Offset 9.8 dB Ref 34.00 dBm 10 dB/div Log 24.0 Norma 14 f 4.00 -6.00 -13.00 d  $\langle \rangle^2$ -16.0 Delta 26.0 36.1 46.0 Fixed 56.C Start 30 MHz #Res BW 1.0 MHz Stop 12.000 GHz #VBW 3.0 MHz Sweep 20.3 ms (8001 pts) Off 
 #Resolution
 Tecl Solution

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 FUNCTION FUNCTION WIDTH CUNCTION 1.850 9 GHz 5.551 2 GHz 26.204 dBm -18.676 dBm Properties► More 1 of 2 STATUS SG

RL		ΩAC		SENS	SE:INT		LIGNAUTO		M Nov 04, 2015	Frequency
enter F	req 16.000	PN	HZ 10: Fast 🕞 jain:Low	Trig: Free F #Atten: 36	Run	Avg Type:	Log-Pwr	TYP	CE 1 2 3 4 5 6 PE M WWWWW ET P P P P P P	
) dB/div	Ref Offset 9 Ref 33.70						MI		47 GHz 58 dBm	Auto Tui
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3.7										16.00000000 G
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	000 GHz							Stop 20	000 GHz	
art 12.0	000 GHz / 1.0 MHz		#VBW	/ 3.0 MHz			Sweep 2		.000 GHz 8001 pts)	20.000000000 G
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art 12.0 tes BW N N	/ 1.0 MHz RC SCL		7 GHz	/ 3.0 MHz -24.858 dBi -27.654 dBi	m		· ·	20.3 ms (	8001 pts)	20.00000000 G CF St 800.000000 M <u>Auto</u> N
art 12.0 tes BW N N N N	/ 1.0 MHz 160 Set	16.647	7 GHz	Y -24.858 dBi	m		· ·	20.3 ms (	8001 pts)	20.00000000 G CF St 800.000000 M <u>Auto</u> N Freq Offs
art 12.4 Res BW E M009 N 2 N 3 4 5 5	/ 1.0 MHz 160 Set	16.647	7 GHz	Y -24.858 dBi	m		· ·	20.3 ms (	8001 pts)	20.00000000 G CF St 800.000000 M <u>Auto</u> Freq Offs
art 12.0 Res BW R MODE N 2 N 3 4 5 5 5 7 7 3	/ 1.0 MHz 160 Set	16.647	7 GHz	Y -24.858 dBi	m		· ·	20.3 ms (	8001 pts)	20.00000000 G CF St 800.000000 M <u>Auto</u> M Freq Offs
Res BW	/ 1.0 MHz 160 Set	16.647	7 GHz	Y -24.858 dBi	m		· ·	20.3 ms (	8001 pts)	20.00000000 G CF Sto 800.000000 M



#### Agilent Spectrum Anatyse U L RF SO Q AC Marker 1 1.880861250000 GHz PNO: Fast Cp IF Gain: Low 30:24 PM Nov 04, 2015 TRACE 1 2 3 4 5 6 TYPE M WWWWW DET P P P P P P SENSE:INT ALIGNAUTC Avg Type: Log-Pwr Avg|Hold:>100/100 Marker Trig: Free Run #Atten: 36 dB Select Marker Mkr1 1.880 9 GHz 28.069 dBm 1 Ref Offset 9.8 dB Ref 34.00 dBm 10 dB/div Log 24.0 Norma 14.0 4.00 -6.00 Delta -16.0 -26.0 -36.0 -46 F Fixed -56.0 Start 30 MHz #Res BW 1.0 MHz Stop 12.000 GHz Sweep 20.3 ms (8001 pts) #VBW 3.0 MHz Off Mrcs JW 1.0 fr. Scut 1 N f 2 N 1 3 f 4 5 6 7 8 9 10 11 FUNCTION FUNCTION WIDTH 28.069 dBm -18.289 dBm 1.880 9 GHz 5.639 7 GHz **Properties** More 1 of 2 STATUS SG

### Conducted Emission Transmitting Mode CH 661 30MHz - 20GHz

38 of 55

Marker	46 PM Nov 04, 2015 RACE 1 2 3 4 5 6	TRA	ALIGNAUTO : Log-Pwr	Avg Ty			SHz	AC 000000		rer 1 16.	R L ark
Select Marker	DET PPPPP	C				Trig: Free F #Atten: 36	NO: Fast 😱 Gain:Low	PI IFC			
1	6.531 GHz .662 dBm	(r1 16.) -23.6	Mł						f Offset 9.8 f 34.00 (		
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Del	-13.00 dBm				1						0
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c	20.000 GHz s (8001 pts)		Sweep 2			3.0 MHz	#VBW			: 12.000 ( BW 1.0	
	CTION VALUE	FUNCT	NCTION WIDTH	TION F	FUNC	-23.662 dB	1 GHz	× 16.53	-	IODE TRC SO	
						-27.122 dBi	8 GHz			N 1 f	
Propertie											
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1/F., Building B, Zhuoke Science Park, No.190, Chongqing Road, Fuyong Street, Bao'an District, Shenzhen, Guangdong, China Tel: 0755-36886288 Fax: 0755-36886277 Http://www.stsapp.com E-mail: sts@stsapp.com



#### Aglient Spectrum Analyse W L RF SOΩ AC Marker 1 1.909290000000 GHz PNO: Fast C→ IFGain:Low 5:21 PM Nov 04, 2015 TRACE 1 2 3 4 5 6 TYPE M WWWW DET P P P P P P SENSE:INT ALIGNAUTC Avg Type: Log-Pwr Avg|Hold:>100/100 Marker Trig: Free Run #Atten: 36 dB Select Marker Mkr1 1.909 3 GHz 26.593 dBm 1 Ref Offset 9.8 dB Ref 35.80 dBm 10 dB/div Log Norma 5.8 -4.20 -14.7 Delta $\langle \rangle$ -24.2 -34.0 -44 0 Fixed -54.2 Start 30 MHz #Res BW 1.0 MHz Stop 12.000 GHz Sweep 20.3 ms (8001 pts) #VBW 3.0 MHz Off Mrcs JW 1.0 fr. Scut 1 N f 2 N 1 3 f 4 5 6 7 8 9 10 11 FUNCTION FUNCTION WIDTH 26.593 dBm -22.011 dBm 1.909 3 GHz 5.729 2 GHz **Properties** More 1 of 2 STATUS SG

### Conducted Emission Transmitting Mode CH 810 30MHz - 20GHz

39 of 55

Report No.: STS1511011F01

							Swept SA	Analyzer - S	nt Spectrur
Frequency	07:33:36 PM Nov 04, 2015 TRACE 1 2 3 4 5 6 TYPE M WWWWWW	ALIGNAUTO e: Log-Pwr	Avg Ty		Trig: Free	PNO: Fast 😱	Ω AC 000000		ter Fre
Auto Tur	r1 16.979 GHz -25.233 dBm	Mk		38	#Atten: 36	IFGain:Low		ef Offset 9 ef 35.80	
Center Fre 16.00000000 GH									
<b>Start Fre</b> 12.000000000 Gł	-13.00 dBm		↓1						
<b>Stop Fre</b> 20.000000000 Gł									
CF Ste 800.000000 Mi Auto Mi	Stop 20.000 GHz 20.3 ms (8001 pts)	Sweep 2	ICTION	73 111	3.0 MHz	#VBW	×	MHz	rt 12.00 s BW 1
Freq Offs 0 H				n	25.233 dB 25.581 dB		1		N 1
		STATUS							



### CONDUCTED EMISSION IN GPRS1900 BAND

#### Conducted Emission Transmitting Mode CH 512 30MHz - 20GHz

103 PM Nov 04, 2015 TRACE 1 2 3 4 5 6 TYPE MWWWW DET P P P P P P Frequency Start Freq 30.000000 MHz Avg Type: Log-Pwr Avg|Hold>100/100 PNO: Fast 😱 IFGain:Low Trig: Free Run #Atten: 36 dB Mkr1 1.850 9 GHz 26.665 dBm Auto Tune Ref Offset 9.8 dB Ref 34.00 dBm 10 dB/div Log 24.0 **Center Freq** 14 f 6.015000000 GHz 4.00 -6.00 Start Freq  $\triangle^2$ -16 C 30.000000 MHz 26.0 36.1 Stop Freq 46.0 12.000000000 GHz 56.0 Start 30 MHz #Res BW 1.0 MHz Stop 12.000 GHz **CF Step** 1.197000000 GHz <u>uto</u> Man #VBW 3.0 MHz Sweep 20.3 ms (8001 pts) 
 Preces
 BW 1.0 M

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 FUNCTION FUNCTION WIDTH CUNCTION Auto 1.850 9 GHz 5.551 2 GHz 26.665 dBm -19.221 dBm Freq Offset 0 Hz STATUS SG

Frequency	MNov 04, 2015 CE 1 2 3 4 5 6		ALIGN AUTO		SE:INT	SEM			RF 50		۹L .
	ET P P P P P P	TYP	e: Log-Pwr	Avgi		Trig: Free #Atten: 36	GHZ NO: Fast G Gain:Low		16.000	er Fre	nte
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16.00000000 0											
Start F	-13.00 dBm										
12.000000000 G					<b>⊘</b> <sup>1</sup>						
						فالإمتان والمعالم المساحية	-	, <sup>tana</sup> telejabete		<u>مامدانامی</u>	
Stop Fi 20.00000000 0											
	.000 GHz	Stop 20							GHz	12.000	 1.rt 1
CF St 800.000000 M	8001 pts)		· ·			3.0 MHz	#VBV			BW 1.	_
Auto M	DN VALUE	FUNCTIO	NCTION WIDTH	TION	m	-24.973 dE	19 GHz				N
Freq Off 0					m	-28.190 dE	12 GHz	16.5		1	N



Agilent Spectrum Analyzer - Swept SA					
KF 50 Ω AC     Start Freq 30.000000 MH	z		e: Log-Pwr	TRACE 1 2 3 4 5 6	Frequency
	PNO: East 🕞 Trig: F	reeRun Avg Hold :36 dB	l:>100/100	DET PPPPP	Auto Tune
10 dB/div Ref Offset 9.8 dB				880 9 GHz 6.570 dBm	Auto Tulle
24.0					Center Freq
4.00					6.015000000 GHz
-6.00		2		-13.00 dBm	Otort From
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	and the second				
-46.0					<b>Stop Freq</b> 12.00000000 GHz
Start 30 MHz			Ctor	12.000 GHz	
#Res BW 1.0 MHz	#VBW 3.0 MI	Hz	Sweep 20.3 n		<b>CF Step</b> 1.197000000 GHz
	.880 9 GHz 26.570	) dBm	JNCTION WIDTH FU	NCTION VALUE	<u>Auto</u> Man
2 N 1 f 5 3 4	5.639 4 GHz -19.789	) dBm			Freq Offset
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10 11					
12 MSG			STATUS		

### Conducted Emission Transmitting Mode CH 661 30MHz – 20GHz

41 of 55

		1.10						
RL	RF	zer - Swept SA 50 Ω AC 000000000	GHz	SENSE	Av	ALIGN AUTO g Type: Log-Pwr	TRACE 1 2 3 4	5 6 Frequency
			PNO: Fast G IFGain:Low	Trig: Free Ru #Atten: 36 dE		M		PP Auto Tun
) dB/div		ffset 9.8 dB 34.00 dBm					-25.038 dE	
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16.0 56.0								Stop Fre 20.000000000 GH
tart 12.0							Stop 20.000 G	
Res BW			#VB	N 3.0 MHz			20.3 ms (8001 p	800.000000 MH
Krimode ti <mark>1</mark> N 1 2 N 1	f		6.621 GHz 7.032 GHz	-25.038 dBm -28.558 dBm		FUNCTION WIDTH	H FUNCTION VALUE	Auto Ma
3		•	1.002 0112	-20.000 4211				Freq Offs
2 N 1 3 4 5 6 7 8 9								0 H
0 1 2								
G						STATU	IS	



L	um Analyzer - S			SENSE:INT	A	LIGNAUTO	07:45:49 PM N	ov 04. 2015	
art Fre	q 30.0000				Avg Type:		TRACE 1	23456	Frequency
	•		PNO: Fast G IFGain:Low	Trig: Free Run #Atten: 36 dB	Avg Hold≫	100/100	DET P	PPPPP	
dB/div	Ref Offset 9 Ref 35.80					Mk	r1 1.909 3 26.610		Auto Tu
g .8	<b>∲</b> 1								Center Fr
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art 30 N	ЛНz						Stop 12.0	00 GHz	
es BW	1.0 MHz		#VB\	N 3.0 MHz	:	Sweep 🕽	20.3 ms (80		CF St 1.197000000 G
NODE TR	RC SCL	×	909 3 GHz	Y 26.610 dBm	FUNCTION FUNC	CTION WIDTH	FUNCTION V	ALUE	<u>Auto</u> N
N 1	f		729 2 GHz	-22.480 dBm					
									Freq Offs 0
									0
						STATUS			

### Conducted Emission Transmitting Mode CH 810 30MHz - 20GHz

42 of 55

		12								
		er - Swept SA								
N RL	RF	50 Ω AC		SENSE		Ανα Τνρε	ALIGNAUTO E: Log-Pwr		MNov 04, 2015	Frequency
Perifer I	164 10.	00000000	PNO: Fast G	Trig: Free R #Atten: 36 d	un			TYP	TPPPPP	
0 dB/div		set 9.8 dB 5.80 dBm					М		73 GHz 23 dBm	Auto Tun
.og										
25.8										Center Fre
15.8										16.00000000 GH
5.80										
4.20										Start Fre
14.2					1				-13.00 dBm	12.000000000 GH
24.2					<u></u>			daman data.		12.00000000 GF
34.2 <b></b>	-	No. of Concession, Name	and the second secon	A second s		and a state of the				
44.2										Stop Fre
54.2										20.00000000 GH
tart 12. Res BW			#VBN	V 3.0 MHz			Sweep	Stop 20 20.3 ms (	.000 GHz 8001 pts)	CF Ste 800.000000 MH
IKR MODE T		×		Y	FUNCTIO	N FU	NCTION WIDTH	FUNCTIO	IN VALUE	Auto Ma
1 N 2 N	1 f 1 f		5.473 GHz 5.472 GHz	-24.623 dBn -26.602 dBn						
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G							STATUS			

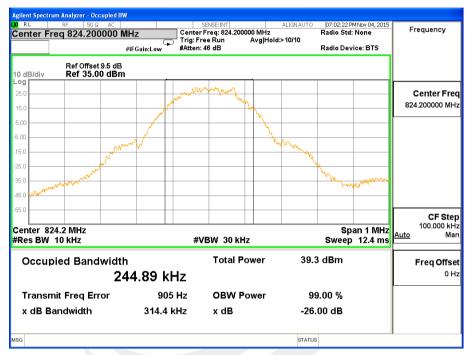


# **APPENDIX II**

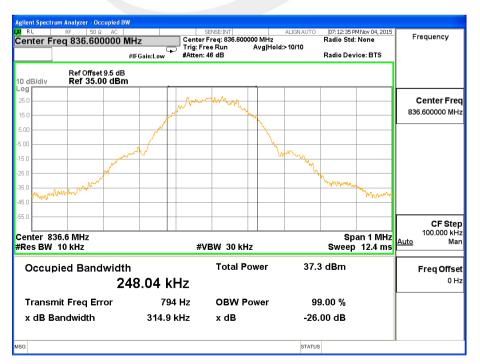
# **TEST PLOTS FOR OCCUPIED BANDWIDTH (99%)**

# **EMISSION BANDWIDTH (-26dBC)**

Occupied Bandwidth (99%) GSM 850 BAND CH 128



### Occupied Bandwidth (99%) GSM 850 BAND CH 190



### Shenzhen STS Test Services Co., Ltd.

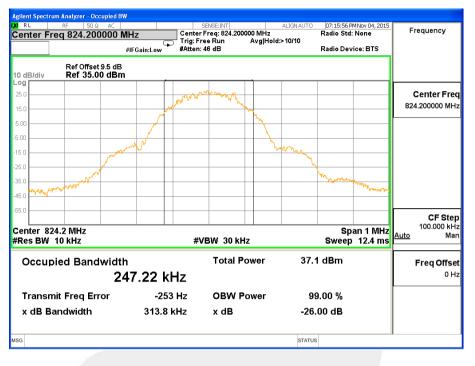
1/F., Building B, Zhuoke Science Park, No.190,Chongqing Road, Fuyong Street, Bao'an District, Shenzhen, Guangdong,China Tel: 0755-36886288 Fax: 0755-36886277 Http://www.stsapp.com E-mail: sts@stsapp.com



Agilent Spectrum Analyzer - Occupied BW X/ RL RF 50 Q AC		SENSE:INT	ALIGN AUTO 07:13:09 PM Nov 0	4, 2015 Frequency
Center Freq 848.800000 MI	Hz Center Trig: Fr IFGain:Low #Atten:		Radio Std: None d:>10/10 Radio Device: B <sup>*</sup>	
Ref Offset 9.5 dB 10 dB/div Ref 35.00 dBm				
25.0		mm h		Center Freq 848.800000 MHz
5.00				
15.0	nn		Monora May	
25.0 35.0 Mrunder Martine Ma			and the second of the second o	wert
5.0				
enter 848.8 MHz Res BW 10 kHz	#V	/BW 30 kHz	Span 1 Sweep 12.4	
Occupied Bandwidth	4.02 kHz	Total Power	37.8 dBm	Freq Offse 0 H
Transmit Freq Error	855 Hz	OBW Power	99.00 %	
x dB Bandwidth	313.3 kHz	x dB	-26.00 dB	
SG			STATUS	

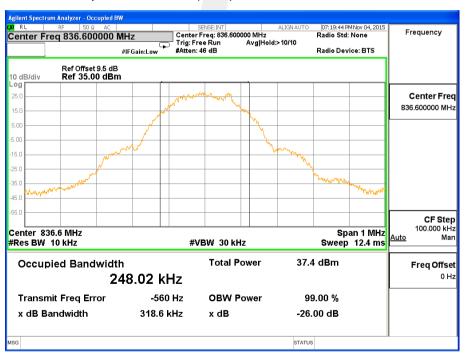
# Occupied Bandwidth (99%) GSM 850 BAND CH 251





#### Occupied Bandwidth (99%) GPRS 850 BAND CH 128

#### Occupied Bandwidth (99%) GPRS 850 BAND CH 190





RL	RF 50 Ω AC	MILL-	SENSE:	NT 848.800000 MHz	ALIGN AUTO	07:20:19 F Radio Std	MNov 04, 2015	Frequency
	req 848.800000	#IFGain:Low	Trig: Free Ru #Atten: 46 dB	n Avg Ho	ld:>10/10	Radio Dev		
) dB/div	Ref Offset 9.5 di Ref 35.00 dB							
<b>9</b> 5.0 5.0			and the second	why have				Center Free 848.800000 MH
00		and the second s			Lonn .			
i.0 i.0						haven		
.0	Maria						When when the	
	48.8 MHz 10 kHz		#VBW	30 kHz			an 1 MHz 12.4 ms	CF Ste 100.000 kH Auto Ma
Occu	pied Bandwid 2	<sup>th</sup> 249.44 k	-	otal Power	37.2	2 dBm		Freq Offse 0 H
Transı	nit Freq Error	-644	Hz O	BW Power	99	9.00 %		
x dB E	Bandwidth	321.6	kHz x	dB	-26.	.00 dB		

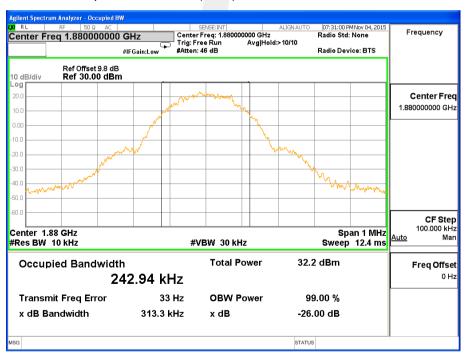
# Occupied Bandwidth (99%) GRPS 850 BAND CH 251





#### Occupied Bandwidth (99%) PCS 1900 BAND CH 512

#### Occupied Bandwidth (99%) PCS 1900 BAND CH 661





m Analyzer - Occupied B 
 Xi
 RL
 RF
 SD Q
 AC

 Center Freq 1.909800000 GHz

 SENSE.INT
 ALIGNAUTO

 GHz
 Center Freg: 1.909800000 GHz
 Trig: Freg Run

 Trig: Freg Run
 Avg|Hold>10/10

 #/IFGain:Low
 #Atten: 46 dB
 07:31:35 PM Nov 04, 2015 Radio Std: None Frequency Radio Device: BTS Ref Offset 9.8 dB Ref 30.00 dBm 10 dB/div Log **Center Freq** 1.909800000 GHz on. 30 4N CF Step 100.000 kHz Man Center 1.91 GHz #Res BW 10 kHz Span 1 MHz Sweep 12.4 ms Auto #VBW 30 kHz **Occupied Bandwidth** Total Power 32.4 dBm Freq Offset 245.84 kHz 0 Hz Transmit Freg Error 893 Hz **OBW Power** 99.00 % x dB Bandwidth 310.0 kHz x dB -26.00 dB STATUS

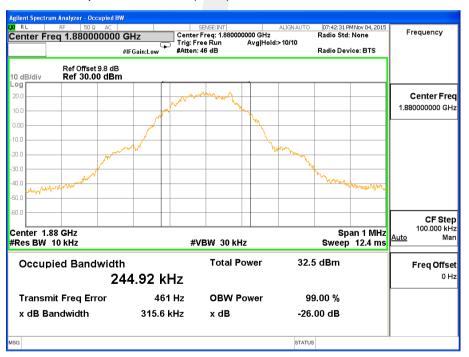
# Occupied Bandwidth (99%) PCS 1900 BAND CH 810





#### Occupied Bandwidth (99%) GPRS 1900 BAND CH 512

# Occupied Bandwidth (99%) GPRS 1900 BAND CH 661





um Analyzer - Occupied BV Aglentspest minimut, are 50 Ω AC Center Freq 1.909800000 GHz 
 SENSE.INT
 ALIGNAUTO

 GHz
 Center Freg: 1.909800000 GHz
 Trig: Freg Run

 Trig: Freg Run
 Avg|Hold>10/10

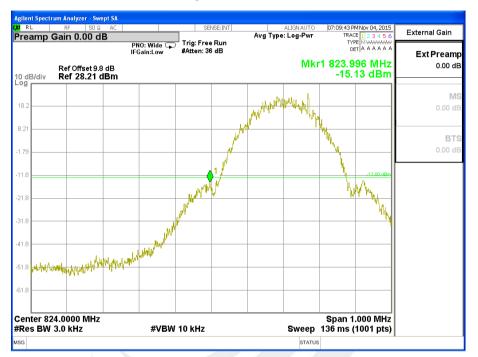
 #/IFGain:Low
 #Atten: 46 dB
 07:43:06 PM Nov 04, 2015 Radio Std: None Frequency Radio Device: BTS Ref Offset 9.8 dB Ref 30.00 dBm 10 dB/div Log **Center Freq** 1.909800000 GHz 30 40 CF Step 100.000 kHz Man Center 1.91 GHz #Res BW 10 kHz Span 1 MHz Sweep 12.4 ms Auto #VBW 30 kHz **Occupied Bandwidth** Total Power 34.9 dBm Freq Offset 245.78 kHz 0 Hz Transmit Freg Error -650 Hz **OBW Power** 99.00 % x dB Bandwidth 315.6 kHz x dB -26.00 dB STATUS

# Occupied Bandwidth (99%) GPRS 1900 BAND CH 810



# **APPENDIX III**

# **TEST PLOTS FOR BAND EDGES**



Low Band Edge GSM 850 BAND CH 128

Note:Offset=Cable loss(9.5)+10log(3.2/3)=9.5+0.3=9.8 dB

#### High Band Edge GSM 850 BAND CH 251



Note:Offset=Cable loss(9.5)+10log(3.2/3)=9.5+0.3=9.8 dB

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#### Low Band Edge GPRS 850 BAND CH 128

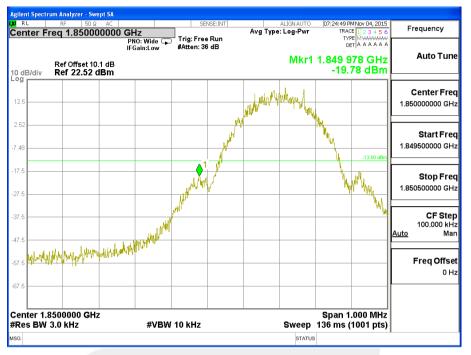
Note:Offset=Cable loss(9.5)+10log(3.2/3)=9.5+0.3=9.8 dB

#### High Band Edge GPRS 850 BAND CH 251



Note:Offset=Cable loss(9.5)+10log(3.2/3)=9.5+0.3=9.8 dB





#### Low Band Edge PCS 1900 BAND CH 512

Note:Offset=Cable loss(9.8)+10log(3.2/3)=9.8+0.3=10.1 dB

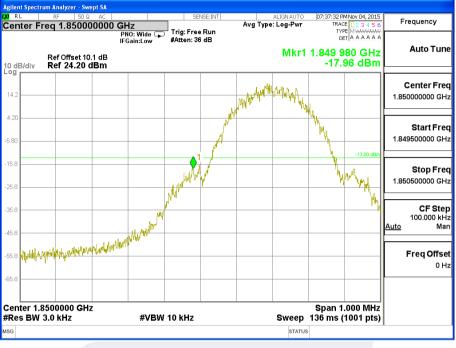
#### High Band Edge PCS 1900 BAND CH 810



Note:Offset=Cable loss(9.8)+10log(3.2/3)=9.8+0.3=10.1 dB







### Low Band Edge GPRS 1900 BAND CH 512

Note:Offset=Cable loss(9.8)+10log(3.2/3)=9.8+0.3=10.1 dB

#### High Band Edge GPRS 1900 BAND CH 810



Note:Offset=Cable loss(9.8)+10log(3.2/3)=9.8+0.3=10.1 dB



# **APPENDIX IV**

# PHOTOS OF TEST SETUP

RADIATED SPURIOUS EMISSION





\* \* \* \* \* END OF THE REPORT \* \* \* \* \*

Shenzhen STS Test Services Co., Ltd.

1/F., Building B, Zhuoke Science Park, No.190, Chongqing Road, Fuyong Street, Bao'an District, Shenzhen, Guangdong, China Tel: 0755-36886288 Fax: 0755-36886277 Http://www.stsapp.com E-mail: sts@stsapp.com