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ISO/IEC17025Accredited Lab.

Report No:

FCC 1412155-02

File reference No:

2014-12-23

Applicant: MADETRONICS LIMITED

Product: GSM Mobile Phone

Model No: TITAN Q7

Trademark: MADETRONICS

Test Standards: FCC Part 22H&24E requirements.

Test result: It is herewith confirmed and found to comply with the requirements set up by FCC Part 22H&24E regulations for the evaluation of electromagnetic compatibility

Approved By

Jack Chung

Jack Chung

Manager

Dated: Dec 23, 2014

**Results appearing herein relate only to the sample tested**

The technical reports is issued errors and omissions exempt and is subject to withdrawal at

**SHENZHEN TIMEWAY TECHNOLOGY CONSULTING CO LTD**

5/F,Block 4, Anhua Industrial Zone.,No.8 TaiRan Rd.CheGongMiao,FuTian District, Shenzhen,CHINA.

Tel (+86 755)8344 8688 Fax (+86 755)8344 2996 Email:info@timewaytech.com



## Special Statement:

The testing quality ability of our laboratory meet with "Quality Law of People's Republic of China" Clause 19.

The testing quality system of our laboratory meet with ISO/IEC-17025 requirements, which is approved by CNAL. This approval result is accepted by MRA of APLAC.

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

### CNAL-LAB Code: L2292

The EMC Laboratory has been assessed and in compliance with CNAL/AC01:2002 accreditation criteria for testing Laboratories (identical to ISO/IEC 17025:1999 General Requirements) for the Competence of testing Laboratories.

### FCC-Registration No.: 899988

The EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications commission. The acceptance letter from the FCC is maintained in our files. Registration No.: 899988.

### IC- Registration No.: IC5205A-02

The EMC Laboratory has been registered and fully described in a report filed with the (IC) Industry Canada. The acceptance letter from the IC is maintained in our files. Registration IC No.: 5205A-02.

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## 1.0 General Details

### 1.1 Test Lab Details

Name : SHENZHEN TIMEWAY TECHNOLOGY CONSULTING CO LTD  
Address: 5/F,Block 4, Anhua Industrial Zone, No.8 TaiRan Rd.CheGongMiao,FuTian District, Shenzhen, CHINA.  
Telephone: (755) 83448688  
Fax: (755) 83442996

Site on File with the Federal Communications Commission – United States

Registration Number: 899988

For 3m & 10 m OATS

Site Listed with Industry Canada of Ottawa, Canada

Registration Number: IC: 5205A-02

For 3m & 10 m OATS

### 1.2 Applicant Details

Applicant: MADETRONICS LIMITED  
Address: UNIT 5, 27/F., RICHMOND COMM. BLDG, 109 ARGYLE STREET, MONGKOK, KOWLOON HONG KONG  
Telephone: --  
Fax: --

### 1.3 Description of EUT

Product: GSM Mobile Phone  
Manufacturer: MADETRONICS LIMITED  
Address: UNIT 5, 27/F., RICHMOND COMM. BLDG, 109 ARGYLE STREET, MONGKOK, KOWLOON HONG KONG  
Brand Name: MADETRONICS  
Model Number: TITAN Q7  
Hardware version: X1-MB-V2.0  
Software version: X1\_K100\_V0\_4  
 GSM 850     PCS 1900 (U.S. Bands)  
 GSM 900     DCS 1800 (Non-U.S. Bands)  
Frequency Bands:  
U.S. Bands:  
     UMTS FDD Band II     UMTS FDD Band V  
Non-U.S. Bands:  
     UMTS FDD Band I     UMTS FDD Band VIII  
Antenna: PIFA Antenna  
Antenna gain(GSM): -0.6dBi(GSM 850), -0.4dBi(PCS 1900)  
Power Supply: DC 3.7V by Battery  
Adapter Power: Input: AC100-240V, 50-60Hz, 0.2A; Output: DC5.0V, 500mA  
Dual Card: Card 1: GSM Card Slot, Card 2: GSM Card Slot

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GPRS Class 12

Extreme Vol. Limits: DC3.5V to 4.25 V (Normal: DC3.7V)

Extreme Temp. Tolerance -10°C to +50°C

Note: The High Voltage DC4.25V and Low Voltage DC3.5V were declared by manufacturer. The EUT couldn't be operating normally with higher or lower voltage.

Other functions have been performed according to verification procedure except for Bluetooth and MS function. Card 1 can't transmit with Card 2 simultaneously.

1.4 Submitted Sample: 2 Samples

1.5 Test Duration

2014-11-20 to 2014-12-02

1.6 Test Uncertainty

Conducted Emissions Uncertainty =3.6dB

Radiated Emissions Uncertainty =4.7dB

1.7 Test Engineer

*Terry Tang*

The sample tested by \_\_\_\_\_

Print Name: Terry Tang

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## 2.0 Test Equipments

Instrument Type	Manufacturer	Model	Serial No.	Date of Cal.	Due Date
ESPI Test Receiver	R&S	ESPI 3	100379	2014-08-21	2015-08-20
TWO Line-V-NETW	R&S	EZH3-Z5	100294	2014-08-22	2015-08-21
TWO Line-V-NETW	R&S	EZH3-Z5	100253	2014-08-22	2015-08-21
Ultra Broadband ANT	R&S	HL562	100157	2014-08-23	2015-08-22
ESDV Test Receiver	R&S	ESDV	100008	2014-08-22	2015-08-21
Impuls-Begrenzer	R&S	ESH3-Z2	100281	2014-08-21	2015-08-20
System Controller	CT	SC100	-	--	--
Printer	EPSON	PHOTO EX3	CFNH234850	--	--
Computer	IBM	8434	1S8434KCE99B LXLO*	-	-
Loop Antenna	EMCO	6502	00042960	2014-08-22	2015-08-21
ESPI Test Receiver	R&S	ESI26	838786/013	2014-08-22	2015-08-21
3m OATS	--	--	N/A	2014-08-21	2015-08-20
Horn Antenna	R&S	BBHA 9170	BBHA9170265	2014-08-23	2015-08-22
Horn Antenna	R&S	BBHA 9120D	9120D-631	2014-08-23	2015-08-22
Power meter	Anritsu	ML2487A	6K00003613	2014-08-22	2015-08-21
Power sensor	Anritsu	MA2491A	32263	2014-08-22	2015-08-21
Bilog Antenna	Schwarebeck	VULB9163	9163/340	2014-08-23	2015-08-22
LISN	AFJ	LS16C	10010947251	2014-08-21	2015-08-20
LISN (Three Phase)	Schwarebeck	NSLK 8126	8126453	2014-08-22	2015-08-21
9*6*6 Anechoic	--	--	N/A	2014-08-21	2015-08-20
EMI Test Receiver	RS	ESCS30	100139	2014-08-22	2015-08-21
Universal Radio Communication Tester	RS	CMU200	1100.0008.02	2014-11-27	2015-11-26
Spectrum Analyzer	Agilent	E4440A	US44300286	2014-03-23	2015-03-22
RF Cable	H+S	--	--	2014-08-22	2015-08-21

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## 2.1 AUXILIARY EQUIPMENT

Name	Model No.	Serial No.	Manufacturer	Cable	FCC ID/DOC
TF Card	--	--	Kingston	--	--
Passive Earphone	--	--	--	--	--

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

This submittal(s) (test report) is intended for FCC ID: **2ADOQTITANQ7**, filing to comply with the FCC Part 22H&24E requirements.

## 2.3 TEST METHODOLOGY

The radiated emission testing was performed according to the procedures of ANSI C 63.4: 2003; TIA/EIA 603 and FCC CFR 47 Rules of 2.1046, 2.1047, 2.1049, 2.1051, 2.1053, 2.1055, 2.1057.

## 2.4 TEST FACILITY

The test site used to collect the radiated data is located at:

## 2.5 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.

## 2.6 EQUIPMENT MODIFICATIONS

Not available for this EUT intended for grant.

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### 3. SYSTEM TEST CONFIGURATION

#### 3.1 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.

#### 3.2 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.

#### 3.3 GENERAL TECHNICAL REQUIREMENTS

Item Number	Item Description		FCC Rules
1	Output Power	Conducted output power	2.1046/22.913(a) (2) / 24.232 (c)
		Radiated output power	
2	Peak-to-Average Ratio	Peak-to-Average Ratio	24.232(d)
3	Spurious Emission	Conducted spurious emission	2.1051 / 22.917 / 24.238
		Radiated spurious emission	
4	Mains Conducted Emission		15.107 / 15.207
5	Frequency Stability		2.1055/22.355 /24.235
6	Occupied Bandwidth		2.1049 (h)(i)
7	Emission Bandwidth		22.917(a)/24.238(a)
8	Band Edge		22.917(a)/24.238(a)

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### 3.4 CONFIGURATION OF EUT SYSTEM

Fig. 2-1 Configuration of EUT System

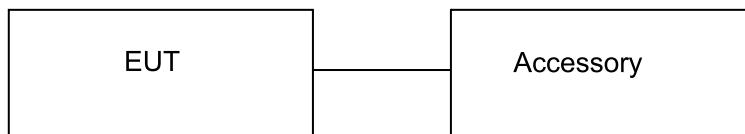


Table 2-1 Equipment Used in EUT System

Item	Equipment	Model No.	ID or Specification	Note
1	GSM Mobile Phone	TITAN Q7	FCC ID: 2ADOQTITANQ7	EUT
2	Adapter	Y-801C	DC5.0V / 500mA	Accessory
3	Battery	BL-5C	DC3.7V/ 600 mAh	Accessory
4	Earphone	TITAN Q7	N/A	Accessory
5	USB Cable	TITAN Q7	N/A	Accessory

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

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## 4. SUMMARY OF TEST RESULTS

Item Number	Item Description		FCC Rules	Result	
1	Output Power	Conducted Output Power	2.1046/22.913(a) (2) / 24.232 (c)	Pass	
		Radiated Output Power			
2	Peak-to-Average Ratio	Peak-to-Average Ratio		Pass	
3	Spurious Emission	Conducted Spurious Emission	2.1051 / 22.917 / 24.238	Pass	
		Radiated Spurious Emission			
4	Mains Conducted Emission	15.107 / 15.207		Pass	
5	Frequency Stability	2.1055/22.355/24.2 35		Pass	
6	Occupied Bandwidth	2.1049 (h)(i)		Pass	
7	Emission Bandwidth	22.917(a)/24.238(a)		Pass	
8	Band Edge	22.917(a)/24.238(a)		Pass	

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## 5. 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 GSM and PCS frequency band.

**\*\*\*Note:** GSM/GPRS850, GSM/GPRS1900 mode for each SIM Card has been tested during the test.

The worst condition was recorded in the test report if no other modes test data.

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## 6. OUTPUT POWER

### 6.1 Conducted Output Power

#### 6.1.1 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/GPRS850, GSM/GPRS1900) at 3 typical channels (the Top Channel, the Middle Channel and the Bottom Channel) for each band.

#### 6.1.2 MEASUREMENT RESULT

Conducted Output Power Limits for GSM850 band		
Mode	Nominal Peak Power	Tolerance(dB)
GSM	32 dBm (2W)	±1
Conducted Output Power Limits for PCS1900 band		
Mode	Nominal Peak Power	Tolerance(dB)
GSM	30 dBm (1W)	±1

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### GSM 850:

#### SIM 1

Mode	Frequency (MHz)	Avg.Burst Power	Duty cycle Factor(dB)	Frame Power(dBm)
GSM850	824.2	32.15	-9	23.15
	836.6	32.13	-9	23.13
	848.8	32.22	-9	23.22
GPRS850 (1 Slot)	824.2	<b>32.29</b>	-9	23.29
	836.6	32.26	-9	23.26
	848.8	32.21	-9	23.21
GPRS850 (2 Slot)	824.2	31.19	-6	25.19
	836.6	31.21	-6	25.21
	848.8	31.17	-6	25.17
GPRS850 (3 Slot)	824.2	29.26	-4.26	25.00
	836.6	29.19	-4.26	26.93
	848.8	29.37	-4.26	25.11
GPRS850 (4 Slot)	824.2	28.75	-3	26.15
	836.6	28.73	-3	26.13
	848.8	28.81	-3	26.21

#### SIM 2

Mode	Frequency (MHz)	Avg.Burst Power	Duty cycle Factor(dB)	Frame Power(dBm)
GSM850	824.2	32.13	-9	23.13
	836.6	32.17	-9	23.17
	848.8	32.14	-9	23.14
GPRS850 (1 Slot)	824.2	32.29	-9	23.29
	836.6	<b>32.32</b>	-9	23.32
	848.8	32.17	-9	23.17
GPRS850 (2 Slot)	824.2	31.08	-6	25.08
	836.6	31.26	-6	25.26
	848.8	31.07	-6	25.07
GPRS850 (3 Slot)	824.2	29.38	-4.26	25.12
	836.6	29.32	-4.26	27.06
	848.8	29.37	-4.26	25.11
GPRS850 (4 Slot)	824.2	28.7	-3	26.1
	836.6	28.67	-3	26.07
	848.8	28.85	-3	26.25

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**PCS 1900:**

**SIM 1**

Mode	Frequency (MHz)	Avg.Burst Power	Duty cycle Factor(dB)	Frame Power(dBm)
GSM1900	1850.2	29.86	-9	20.86
	1880	29.68	-9	20.68
	1909.8	29.59	-9	20.59
GPRS1900 (1 Slot)	1850.2	29.81	-9	20.81
	1880	29.53	-9	20.53
	1909.8	29.64	-9	20.64
GPRS1900 (2 Slot)	1850.2	27.84	-6	21.84
	1880	27.65	-6	21.65
	1909.8	27.44	-6	21.44
GPRS1900 (3 Slot)	1850.2	26.93	-4.26	22.67
	1880	26.77	-4.26	22.51
	1909.8	26.58	-4.26	22.32
GPRS1900 (4 Slot)	1850.2	25.76	-3	22.76
	1880	25.55	-3	22.25
	1909.8	25.42	-3	22.42

**SIM 2**

Mode	Frequency (MHz)	Avg.Burst Power	Duty cycle Factor(dB)	Frame Power(dBm)
GSM1900	1850.2	<b>29.75</b>	-9	20.75
	1880	29.53	-9	20.53
	1909.8	29.62	-9	20.62
GPRS1900 (1 Slot)	1850.2	29.45	-9	20.45
	1880	29.57	-9	20.57
	1909.8	29.31	-9	20.31
GPRS1900 (2 Slot)	1850.2	27.78	-6	21.78
	1880	27.54	-6	21.54
	1909.8	27.12	-6	21.12
GPRS1900 (3 Slot)	1850.2	26.57	4.26	22.31
	1880	26.63	4.26	22.37
	1909.8	26.34	4.26	22.08
GPRS1900 (4 Slot)	1850.2	25.69	-3	22.69
	1880	25.42	-3	22.42
	1909.8	25.31	-3	22.31

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## 6.2 RADIATED OUTPUT POWER

### 6.2.1 MEASUREMENT METHOD

The measurements procedures specified in TIA-603C-2004 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 ( $P_{in}$ ) is applied to the input of the dipole, and the power received ( $P_r$ ) 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  $AR_{pl}=P_{in} + 2.15 - P_r$ . The  $AR_{pl}$  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:  
$$\text{Power}=PM_{ea}+AR_{pl}$$
- 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 Step 1 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 ( $P_{in}$ ).
- 8 ERP can be calculated from EIRP by subtracting the gain of the dipole,  $ERP = EIRP - 2.15\text{dBi}$ .

### 6.2.2 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)

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### 6.2.3 MEASUREMENT RESULT

Radiated Power (ERP) for GSM 850 MHZ				
Mode	Frequency	Result		Conclusion
		Max. Peak ERP (dBm)	Polarization Of Max. E.I.R.P.	
GSM850	824.2	<b>30.26</b>	Horizontal	Pass
	836.6	29.93	Horizontal	Pass
	848.8	30.07	Horizontal	Pass

Radiated Power (E.I.R.P) for PCS 1900 MHZ				
Mode	Frequency	Result		Conclusion
		Max. Peak E.I.R.P.(dBm)	Polarization Of Max. E.I.R.P.	
GSM 1900	1850.2	28.75	Horizontal	Pass
	1880.0	<b>28.78</b>	Horizontal	Pass
	1909.8	28.76	Horizontal	Pass

**Note: 1. Above is worst mode data.**

**Both of Vertical and Horizontal direction are evaluated, and only the worst results are shown in this report.**

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## 6.3. Peak-to-Average Ratio

### 6.3.1 MEASUREMENT METHOD

The following steps outline the procedure used to measure the Peak-to-Average Ratio from the EUT.

1. The EUT was connected to Spectrum Analyzer and Base Station via power divider.
2. For GSM/EGPRS operating modes:
  - a. Set the RBW = 1MHz, VBW = 1MHz, Peak detector in spectrum analyzer.
  - b. Set EUT in maximum power output, and triggered the burst signal.
  - c. Measured respectively the Peak level and Mean level, and the deviation was recorded as Peak to Average Ratio.

### 6.3.2 PROVISIONS APPLICABLE

This is the test for the Peak-to-Average Ratio from the EUT.

Power Complementary Cumulative Distribution Function (CCDF) curves provide a means for characterizing the power peaks of a digitally modulated signal on a statistical basis. A CCDF curve depicts the probability of the peak signal amplitude exceeding the average power level. Most contemporary measurement instrumentation include the capability to produce CCDF curves for an input signal provided that the instrument's resolution bandwidth can be set wide enough to accommodate the entire input signal bandwidth. 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.

### 6.3.3 MEASUREMENT RESULT

Modes	GSM850(GSM)		
Channel	128	190	251
	(Low)	(Mid)	(High)
Frequency (MHz)	824.2	836.6	848.8
Peak-To-Average Ratio (dB)	0.21	0.19	0.20

Modes	PCS 1900 (GSM)		
Channel	512	661	810
	(Low)	(Mid)	(High)
Frequency (MHz)	1850.2	1880	1909.8
Peak-To-Average Ratio (dB)	0.16	0.14	0.18

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## 7. SPURIOUS EMISSION

### 7.1 CONDUCTED SPURIOUS EMISSION

#### 7.1.1 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 19.1 GHz, data taken from 30 MHz to 20 GHz. For GSM850, data taken from 30 MHz to 9 GHz.

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

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

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

#### 7.1.2 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  $43+10\log(P)$  dB. For all power levels +30 dBm to 0 dBm, this becomes a constant specification limit of -13 dBm.

#### 7.1.3 MEASUREMENT RESULT

Please refer to Appendix A for compliance test plots for CONDUCTED SPURIOUS EMISSION.

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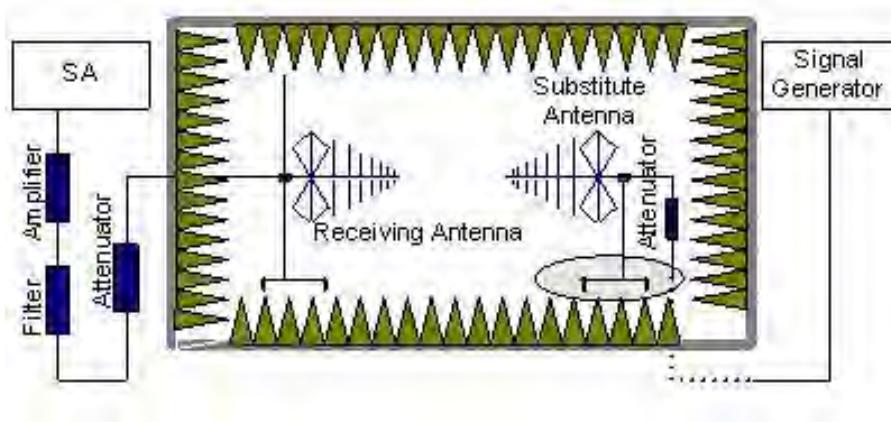
## 7.2 Radiated Spurious Emission

### 7.2.1 MEASUREMENT METHOD

The measurements procedures specified in TIA-603C-2004 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(GPRS850, 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:

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

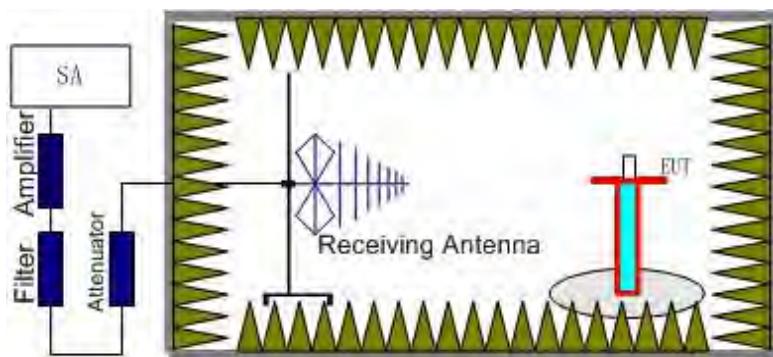


- EUT was placed on a 0.8 meter high non-conductive stand at a 3 meter test distance from the receive antenna. A receiving antenna was placed on the antenna mast 3 meters from the test item for emission measurements. The height of receiving antenna is 0.8m. The test setup refers to figure below. Detected 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.

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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:

$$\text{Power} = P_{\text{Mea}} + A_{Rpl}$$

### 7.2.2 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  $43 + 10 \log(P)$  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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### 7.2.3 MEASUREMENT RESULT

#### GSM 850:

The Worst Test Results for Channel 251/848.8 MHz					
Frequency(MHz)	Power(dBm)	ARpl (dBm)	PMea(dBm)	Limit (dBm)	Polarity
1697.60	-37.06	-3.01	-40.07	<b>-13.00</b>	<b>Horizontal</b>
1697.60	-36.03	3.46	-32.57	<b>-13.00</b>	<b>Vertical</b>
2546.40	-35.55	-2.68	-38.23	<b>-13.00</b>	<b>Horizontal</b>
2546.40	-36.41	2.69	-33.72	<b>-13.00</b>	<b>Vertical</b>

#### PCS 1900:

The Worst Test Results for Channel 810/1909.8MHz					
Frequency(MHz)	Power(dBm)	ARpl (dBm)	PMea(dBm)	Limit (dBm)	Polarity
3819.60	-37.39	-3.22	-40.61	<b>-13.00</b>	<b>Horizontal</b>
3819.60	-38.87	3.98	-34.89	<b>-13.00</b>	<b>Vertical</b>
5729.40	-39.05	-1.24	-40.29	<b>-13.00</b>	<b>Horizontal</b>
5729.40	-39.22	-2.26	-41.48	<b>-13.00</b>	<b>Vertical</b>

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

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## 8. MAINS CONDUCTED EMISSION

### 8.1 MEASUREMENT METHOD

The measurement procedure specified in ANSI C63.4-2003 was used for testing. Conducted Emission was measured with travel charger.

### 8.2 PROVISIONS APPLICABLE

Frequency of Emission (MHz)	Conducted Limit(dBuV)	
	Quasi-Peak	Average
0.15 – 0.5	66 to 56 *	56 to 46 *
0.5 – 5	56	46
5 – 30	60	50

\*Decreases with the logarithm of the frequency.  
\*The lower limit shall apply at the transition frequency.

**Note:** The GSM850 mode is the worst condition and the test result as following:

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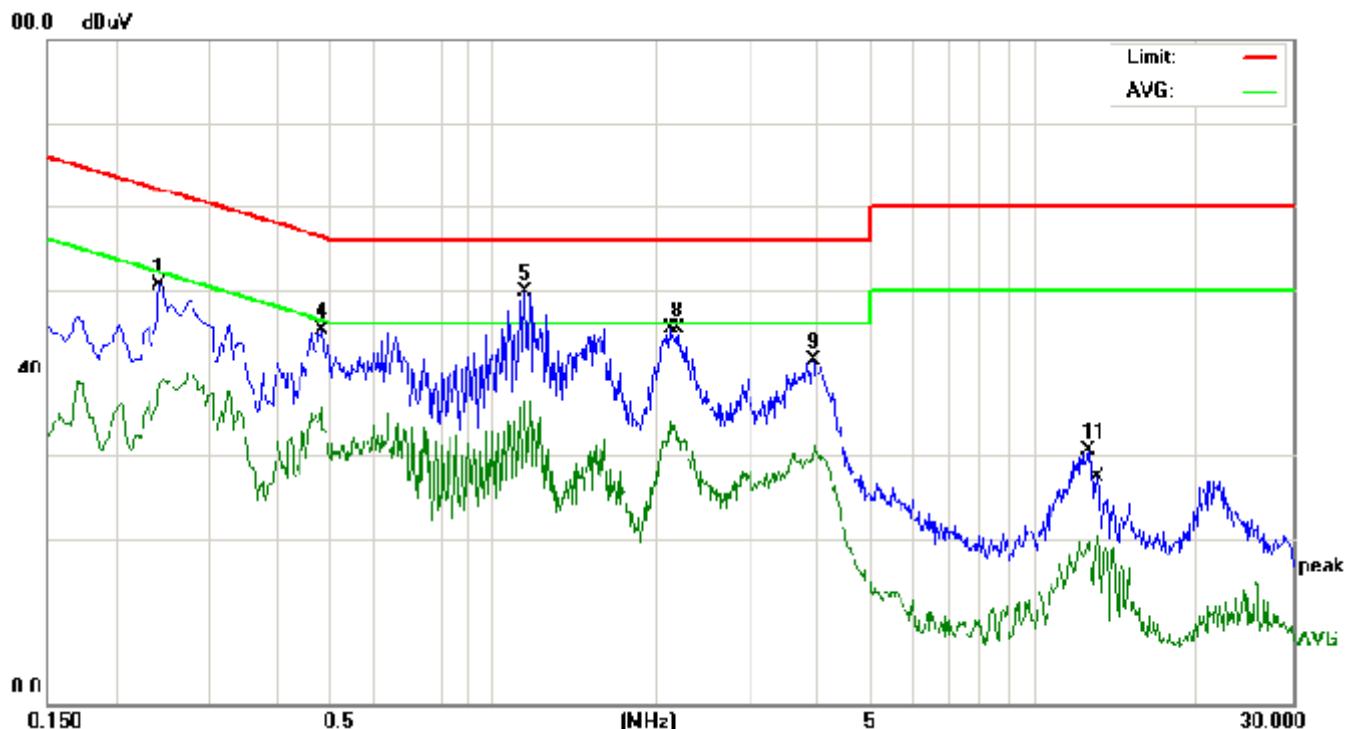
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### 8.3 MEASUREMENT RESULT

## LINE CONDUCTED EMISSION - L



No.	Mk.	Freq.	Reading	Correct	Measure-	Limit	Over	
			Level	Factor	ment		dB	Detector
		MHz	dBuV	dB	dBuV	dBuV	dB	
1		0.2420	40.06	10.45	50.51	62.02	-11.51	peak
2		0.2460	28.71	10.46	39.17	51.89	-12.72	AVG
3		0.4820	25.32	10.42	35.74	46.30	-10.56	AVG
4		0.4860	34.74	10.41	45.15	56.24	-11.09	peak
5 *		1.1420	39.03	10.74	49.77	56.00	-6.23	peak
6		1.1420	25.71	10.74	36.45	46.00	-9.55	AVG
7		2.1300	23.16	10.71	33.87	46.00	-12.13	AVG
8		2.1900	34.62	10.71	45.33	56.00	-10.67	peak
9		3.9180	30.93	10.64	41.57	56.00	-14.43	peak
10		3.9420	20.47	10.64	31.11	46.00	-14.89	AVG
11		12.5860	20.01	10.43	30.44	60.00	-29.56	peak
12		13.1140	9.82	10.43	20.25	50.00	-29.75	AVG

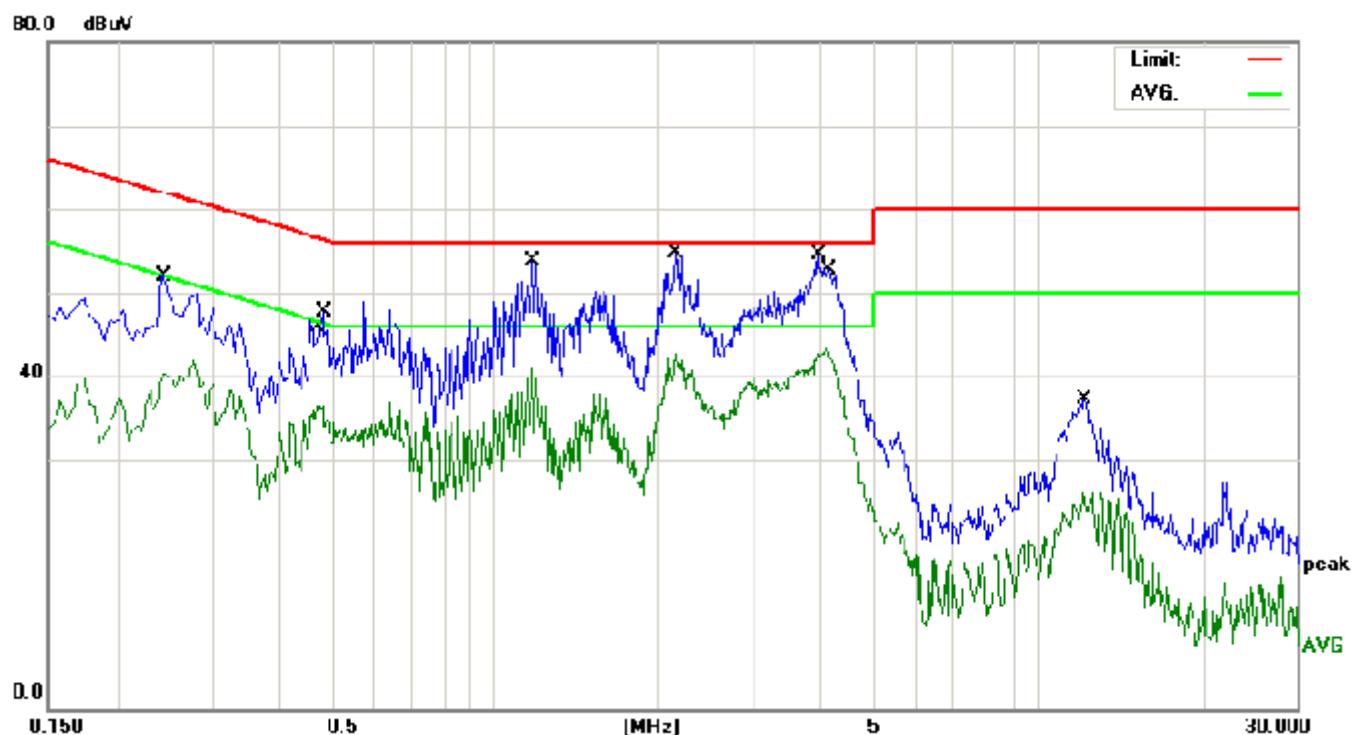
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### LINE CONDUCTED EMISSION - N



No.	Mk.	Freq.	Reading	Correct	Measure-	Limit	Over	Detector	Comment
			Level	Factor	ment				
		MHz	dBuV	dB	dBuV	dBuV	dB		
1		0.2460	41.43	10.46	51.89	61.89	-10.00	QP	
2		0.2460	29.84	10.46	40.30	51.89	-11.59	AVG	
3		0.4700	25.82	10.43	36.25	46.51	-10.26	AVG	
4		0.4820	37.25	10.42	47.67	56.30	-8.63	QP	
5		1.1700	39.51	10.74	50.25	56.00	-5.75	QP	
6		1.1700	30.19	10.74	40.93	46.00	-5.07	AVG	
7		2.1540	39.14	10.71	49.85	56.00	-6.15	QP	
8		2.1540	32.09	10.71	42.80	46.00	-3.20	AVG	
9		3.9340	38.52	10.64	49.16	56.00	-6.84	QP	
10	*	4.0780	32.58	10.63	43.21	46.00	-2.79	AVG	
11		12.1500	15.71	10.42	26.13	50.00	-23.87	AVG	
12		12.1980	26.60	10.42	37.02	60.00	-22.98	QP	

#### Note: The GSM850 mode is the worst condition.

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## 9. FREQUENCY STABILITY

### 9.1 MEASUREMENT METHOD

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 DIGITAL RADIO COMMUNICATION TESTER.

1 , Measure the carrier frequency at room temperature.

2 , Subject the EUT to overnight soak at -10°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, channel 9400 for UMTS band II and

channel 4175 for UMTS band V 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°C increments from -10°C to +50°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°C increments from +50°C to -10°C. Allow at least 1 1/2 hours at each temperature, unpowered, before making measurements.

9 , At all temperature levels hold the temperature to +/- 0.5°C during the measurement procedure.

### 9.2 PROVISIONS APPLICABLE

#### 9.2.1 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 6.3VDC and 8.5VDC, with a nominal voltage of 7.4VDC. 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.

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### 9.2.2 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 20°C.

### 9.3 MEASUREMENT RESULT (WORST)

Frequency Error Against Voltage for GSM850 band		
Voltage(V)	Frequency error(Hz)	Frequency error(ppm)
3.5	36	0.043
3.8	36	0.043
4.35	37	0.044

Frequency Error Against Temperature for GSM850 band		
temperature(°C)	Frequency error(Hz)	Frequency error(ppm)
-10	34	0.041
0	38	0.045
10	34	0.041
20	34	0.041
30	33	0.039
40	36	0.043
50	36	0.043

Note: The EUT doesn't work below -10°C.

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**Frequency Error Against Voltage for PCS1900 band**

Voltage(V)	Frequency error(Hz)	Frequency error(ppm)
3.5	37	0.020
3.8	48	0.026
4.35	46	0.024

**Frequency Error Against Temperature for PCS1900 band**

temperature(°C)	Frequency error(Hz)	Frequency error(ppm)
-10	41	0.022
0	43	0.023
10	42	0.022
20	39	0.021
30	47	0.025
40	45	0.024
50	46	0.024

**Note:** The EUT doesn't work below -10°C.

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## 10. OCCUPIED BANDWIDTH

### 10.1 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.

### 10.2 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

### 10.3 MEASUREMENT RESULT

Occupied Bandwidth (99%) for GSM850 band		
Mode	Frequency(MHz)	Occupied Bandwidth (99%)( kHz)
<b>Low Channel</b>	<b>824.2</b>	241.99
<b>Middle Channel</b>	<b>836.6</b>	246.79
<b>High Channel</b>	<b>848.8</b>	243.59

Occupied Bandwidth (99%) for PCS1900 band		
Mode	Frequency(MHz)	Occupied Bandwidth (99%)( kHz)
<b>Low Channel</b>	<b>1850.2</b>	244.39
<b>Middle Channel</b>	<b>1880.0</b>	242.79
<b>High Channel</b>	<b>1909.8</b>	245.19

Please refer to Appendix B for compliance test plots for Occupied Bandwidth (99%).

The report refers only to the sample tested and does not apply to the bulk.

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## 11. EMISSION BANDWIDTH

### 11.1 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.

### 11.2 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

### 11.3 MEASUREMENT RESULT

Emission Bandwidth (-26dBc) for GSM850 band		
Mode	Frequency(MHz)	Emission Bandwidth (-26dBc)( kHz)
<b>Low Channel</b>	<b>824.2</b>	315.71
<b>Middle Channel</b>	<b>836.6</b>	312.50
<b>High Channel</b>	<b>848.8</b>	309.29

Emission Bandwidth (-26dBc) for PCS1900 band		
Mode	Frequency(MHz)	Emission Bandwidth (-26dBc)( kHz)
<b>Low Channel</b>	<b>1850.2</b>	315.71
<b>Middle Channel</b>	<b>1880.0</b>	312.50
<b>High Channel</b>	<b>1909.8</b>	318.11

Please refer to Appendix C for compliance test plots for Emission Bandwidth(-26dBc).

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## 12. BAND EDGE

### 12.1 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.

### 12.2 PROVISIONS APPLICABLE

As Specified in FCC rules of 22.917(a) and 24.238(a)

### 12.3 MEASUREMENT RESULT

Please refer to Appendix D for compliance test plots for band edges.

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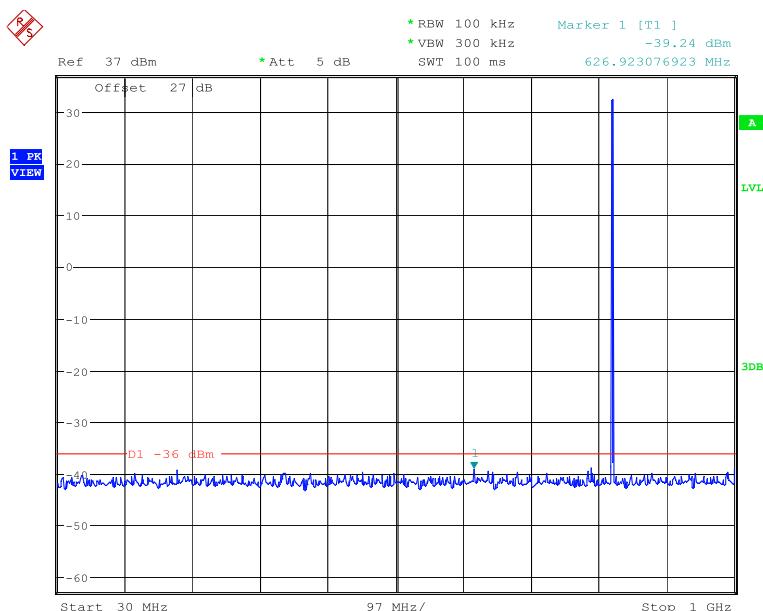
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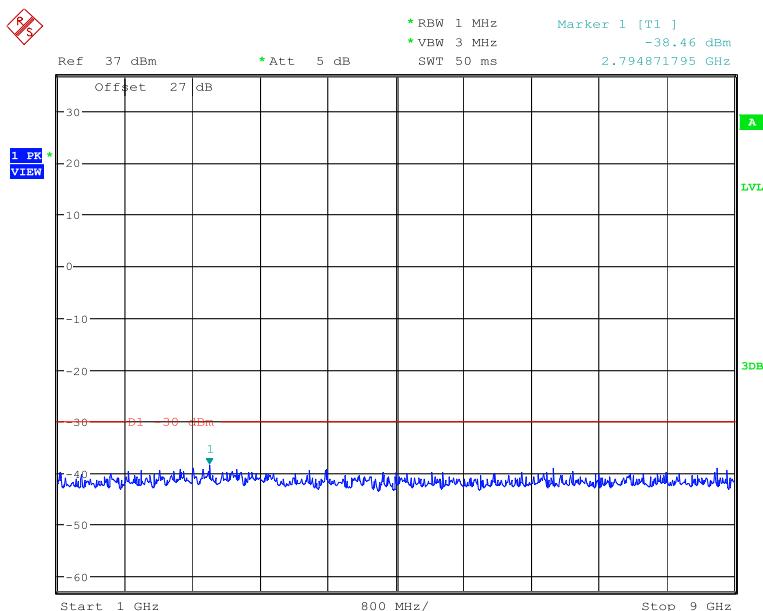
## APPENDIX A:

### CONDUCTED SPURIOUS EMISSION IN GSM850 BAND

#### Conducted Emission Transmitting Mode CH 128 30MHz – 1GHz



#### Conducted Emission Transmitting Mode CH 128 1GHz – 9GHz



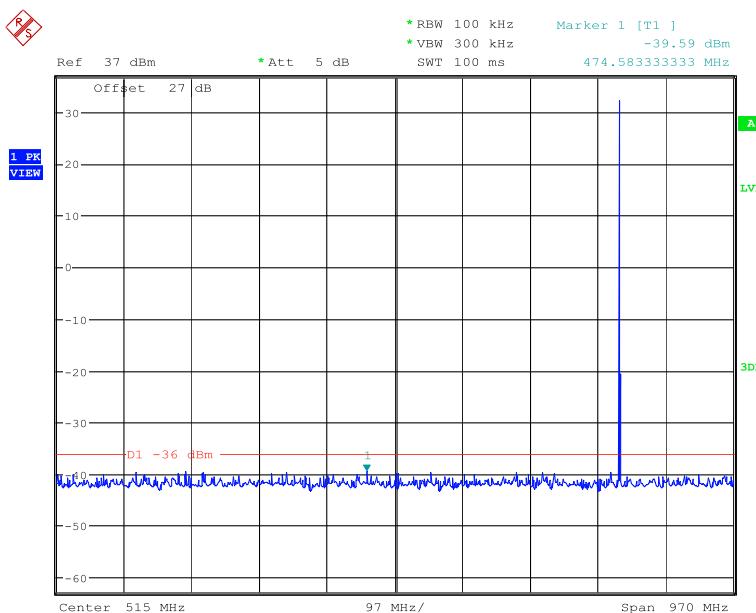
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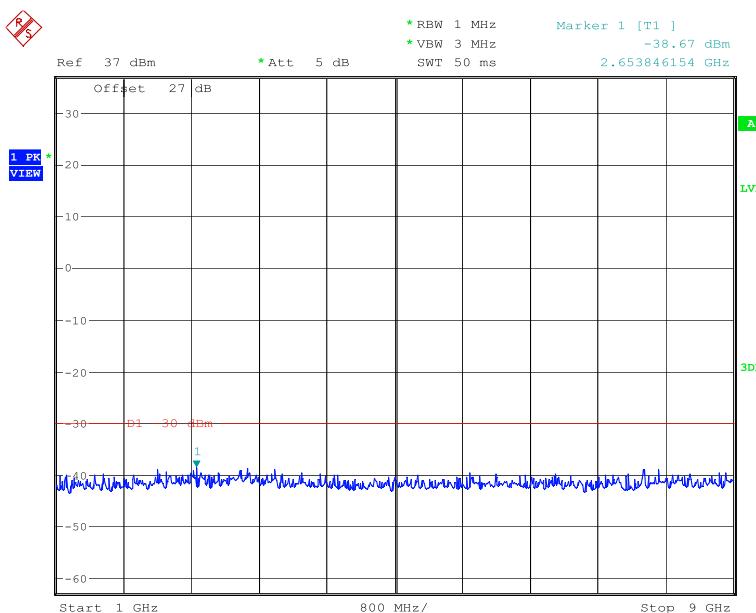
In the event of the improper use of the report. The Shenzhen Timeway Technology Consulting co .,Ltd reserves the rights to withdraw it and to adopt any other remedies which may be appropriate.



### Conducted Emission Transmitting Mode CH 190 30MHz – 1GHz



### Conducted Emission Transmitting Mode CH 190 1GHz – 9GHz



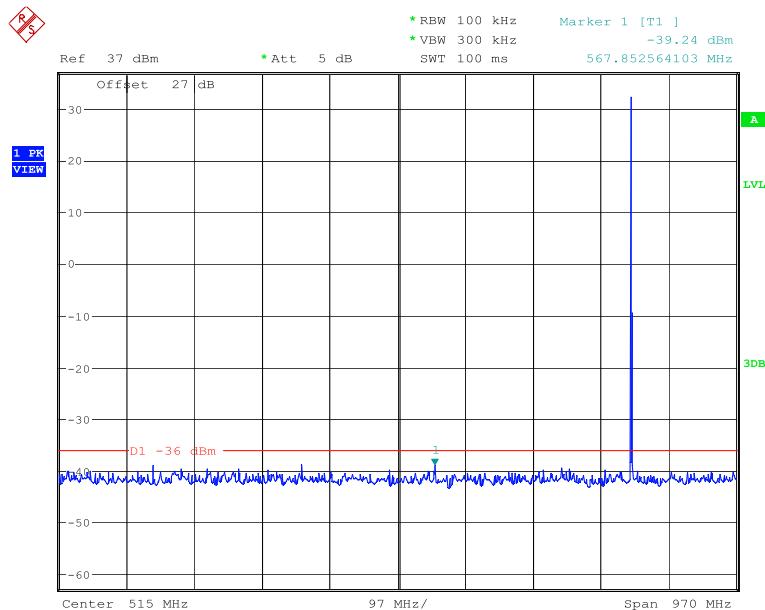
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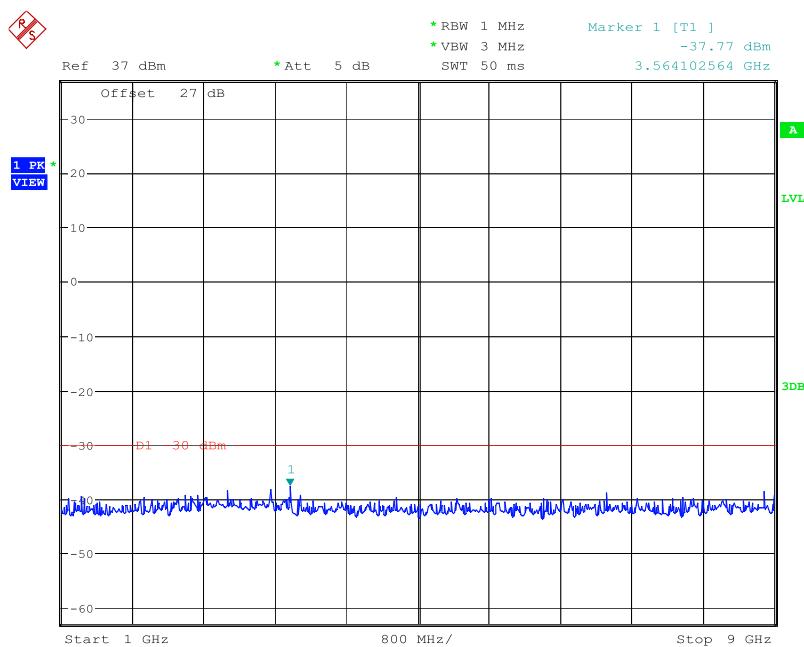
In the event of the improper use of the report. The Shenzhen Timeway Technology Consulting co .,Ltd reserves the rights to withdraw it and to adopt any other remedies which may be appropriate.



### Conducted Emission Transmitting Mode CH 251 30MHz – 1GHz



### Conducted Emission Transmitting Mode CH 251 1GHz – 9GHz



The report refers only to the sample tested and does not apply to the bulk.

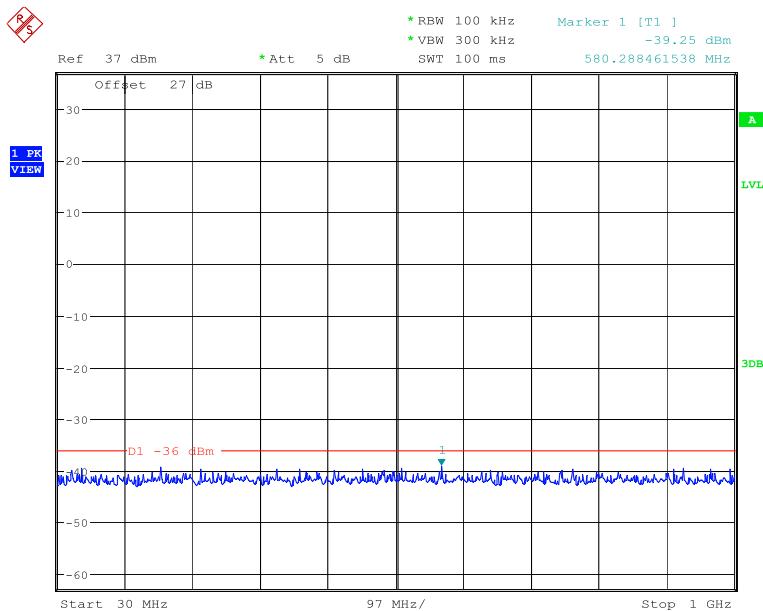
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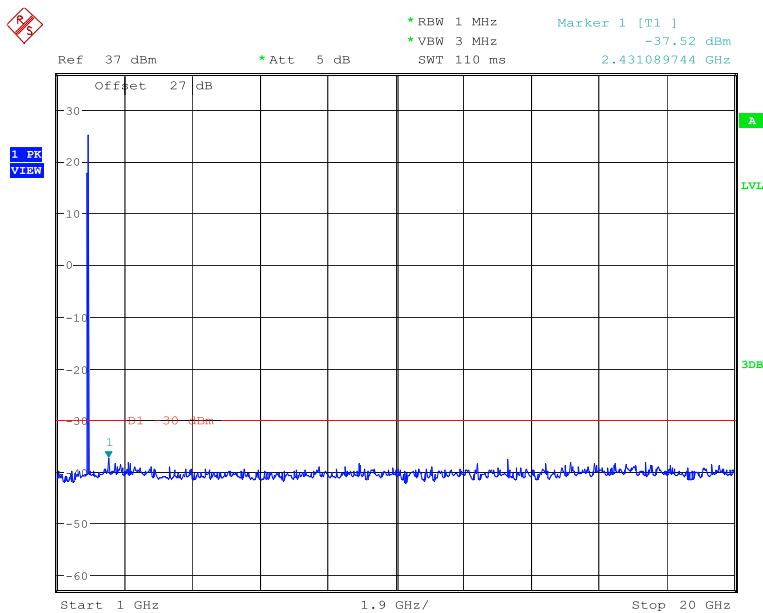


### CONDUCTED EMISSION IN PCS1900 BAND

Conducted Emission Transmitting Mode CH 512 30MHz – 1GHz



Conducted Emission Transmitting Mode CH 512 1GHz – 20GHz



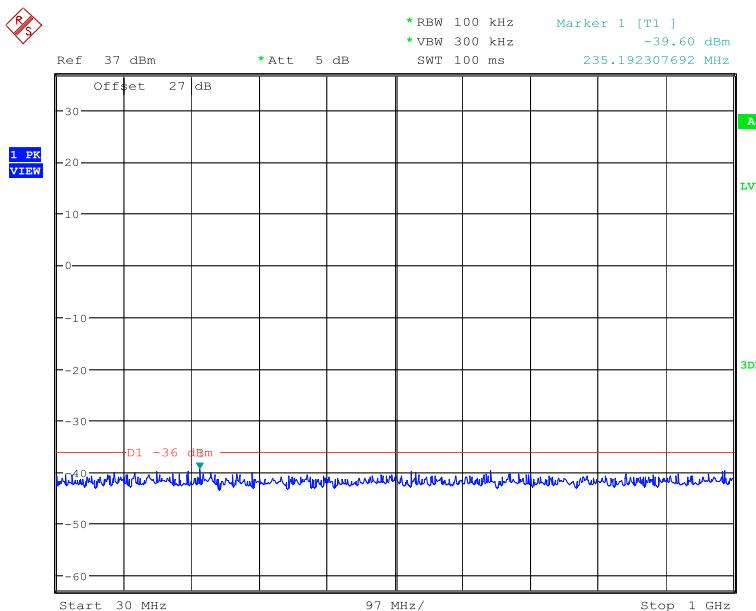
The report refers only to the sample tested and does not apply to the bulk.

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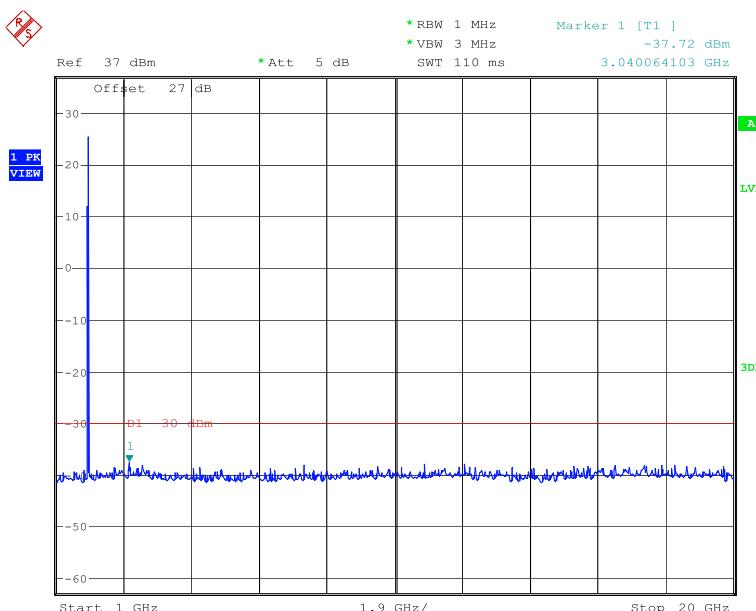
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### Conducted Emission Transmitting Mode CH 661 30MHz – 1GHz



### Conducted Emission Transmitting Mode CH 661 1GHz – 20GHz



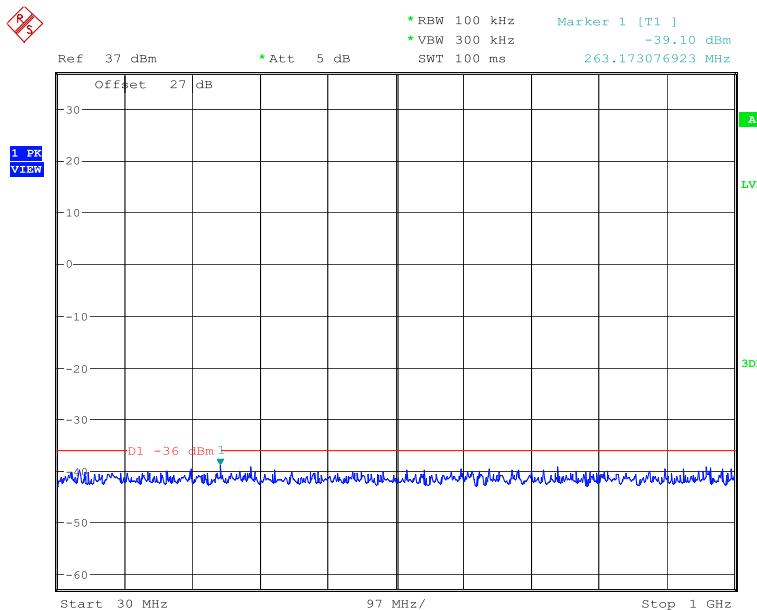
The report refers only to the sample tested and does not apply to the bulk.

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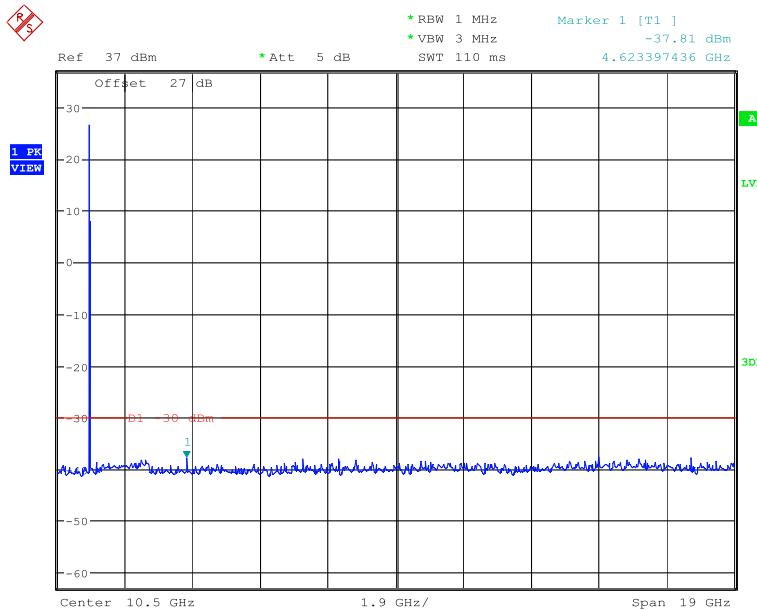
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### Conducted Emission Transmitting Mode CH 810 30MHz – 1GHz



### Conducted Emission Transmitting Mode CH 810 1GHz – 20GHz



**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.**

The report refers only to the sample tested and does not apply to the bulk.

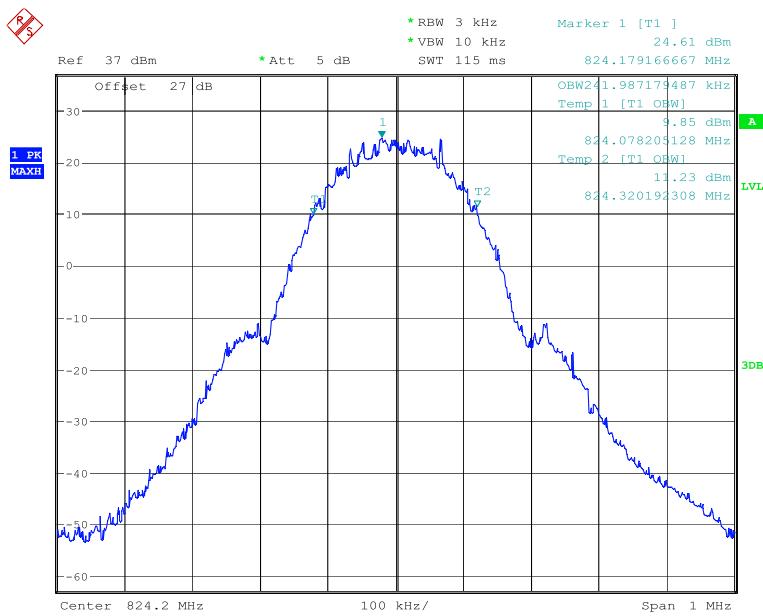
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## APPENDIX B: TEST PLOTS FOR OCCUPIED BANDWIDTH (99%)

Occupied Bandwidth (99%) GSM 850 BAND CH 128



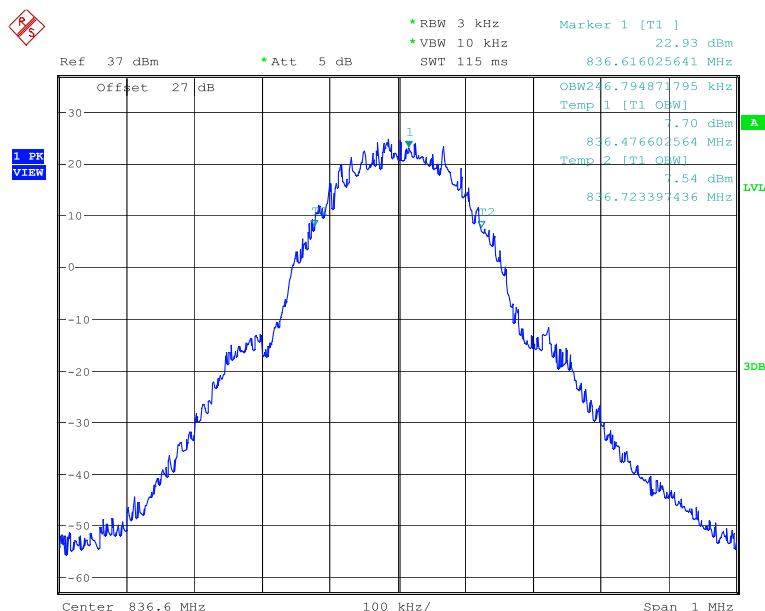
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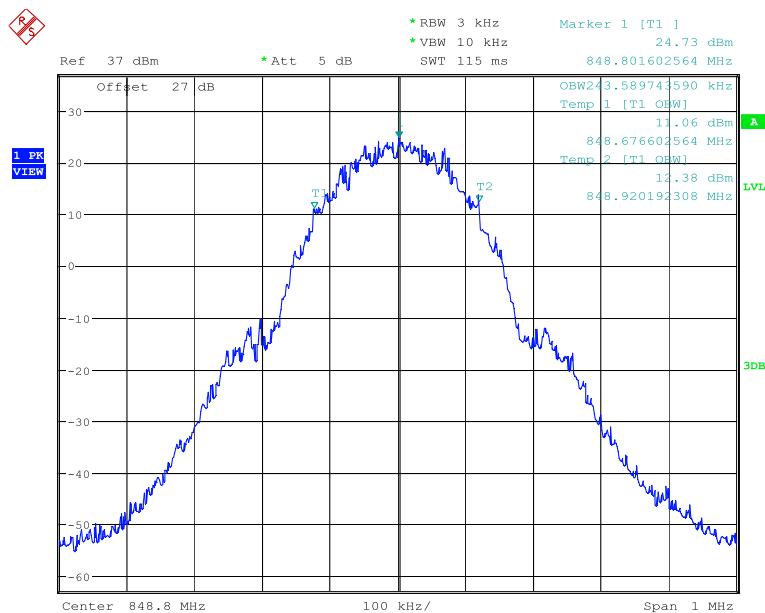
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### Occupied Bandwidth (99%) GSM 850 BAND CH 190



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



The report refers only to the sample tested and does not apply to the bulk.

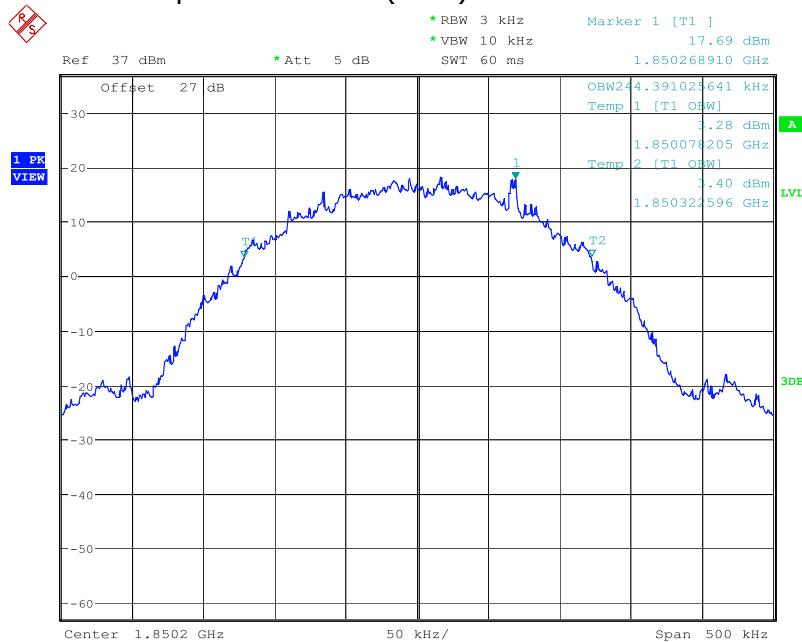
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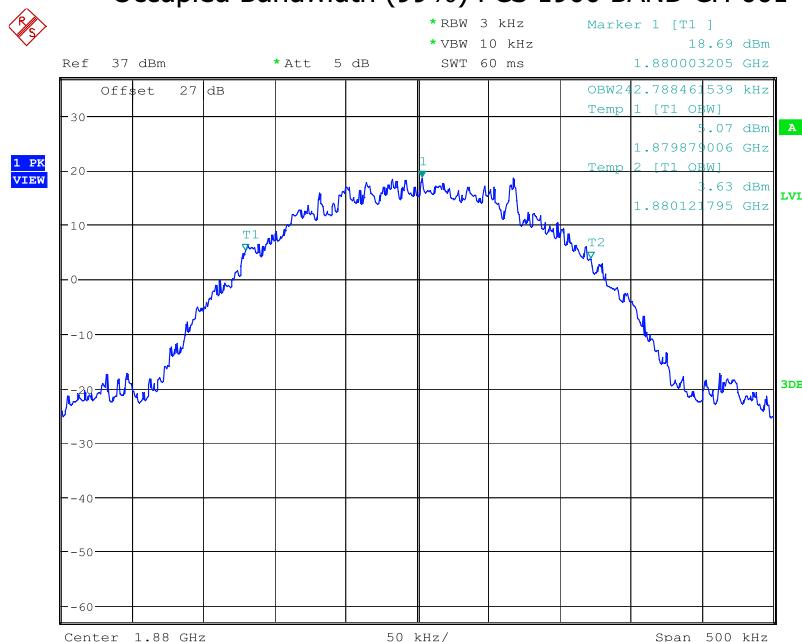
Date: 2014-12-23



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



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



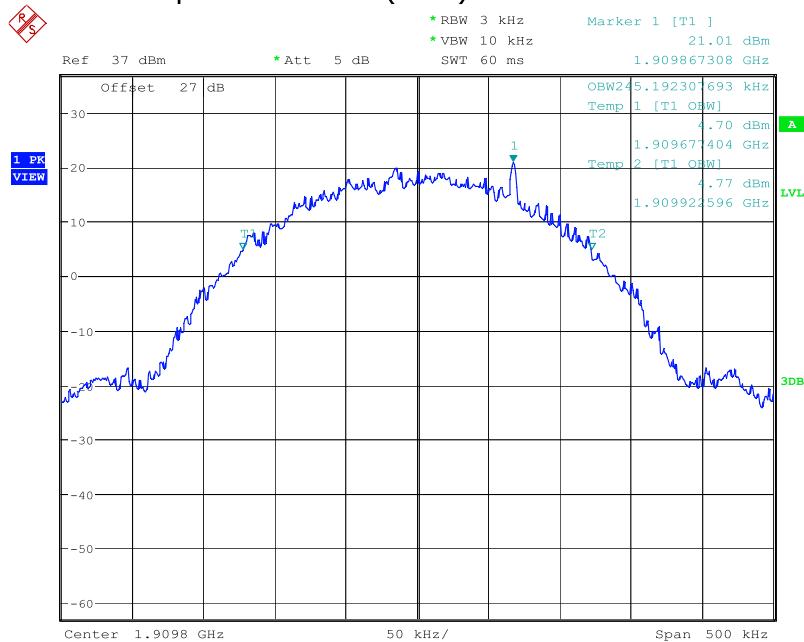
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## Occupied Bandwidth (99%) PCS 1900 BAND CH 810



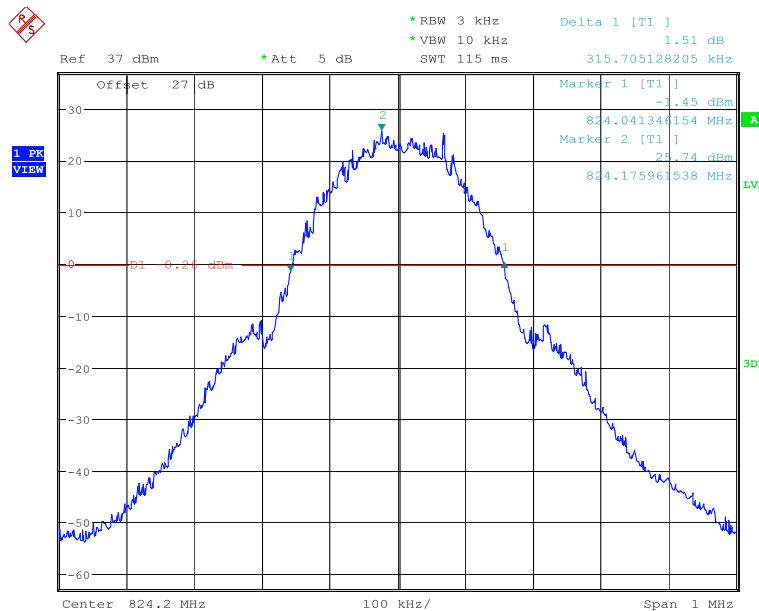
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## APPENDIX C: TEST PLOTS FOR EMISSION BANDWIDTH (-26dBc) Occupied Bandwidth (-26dBc) GSM 850 BAND CH 128



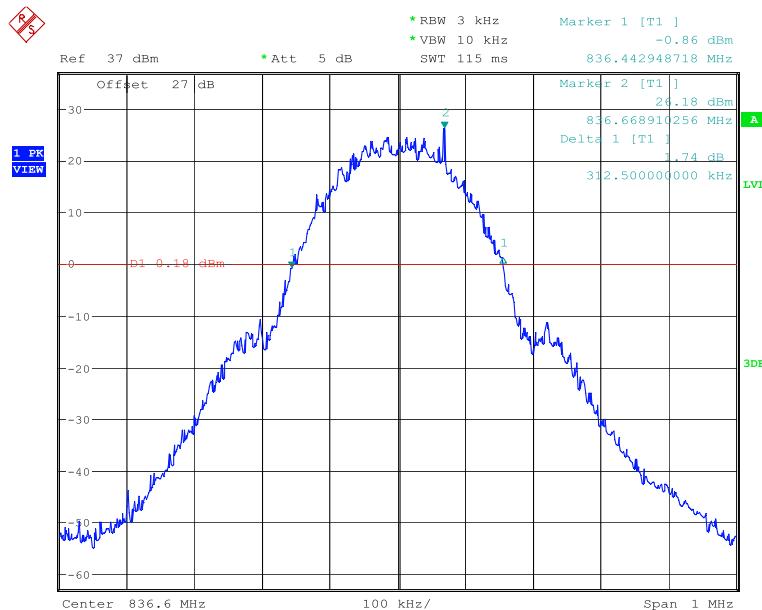
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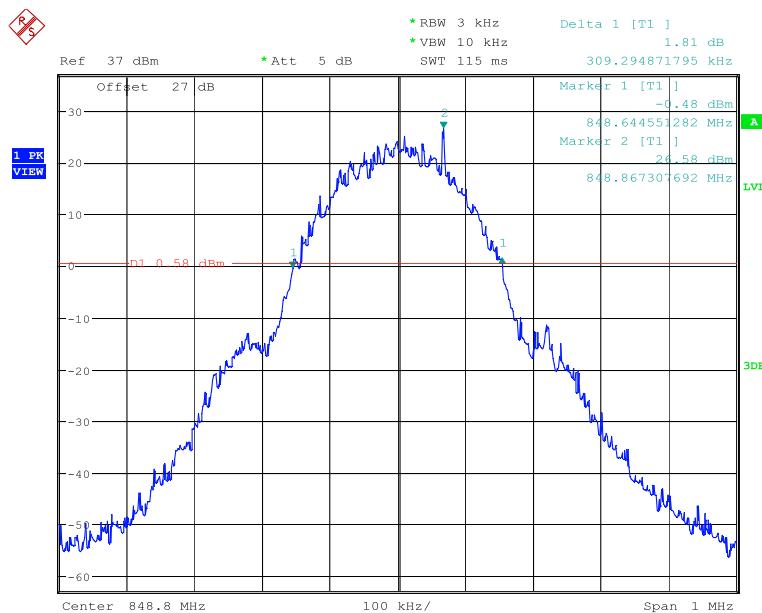
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### Occupied Bandwidth (-26dBc) GSM 850 BAND CH 190



### Occupied Bandwidth (-26dBc) GSM 850 BAND CH 251



The report refers only to the sample tested and does not apply to the bulk.

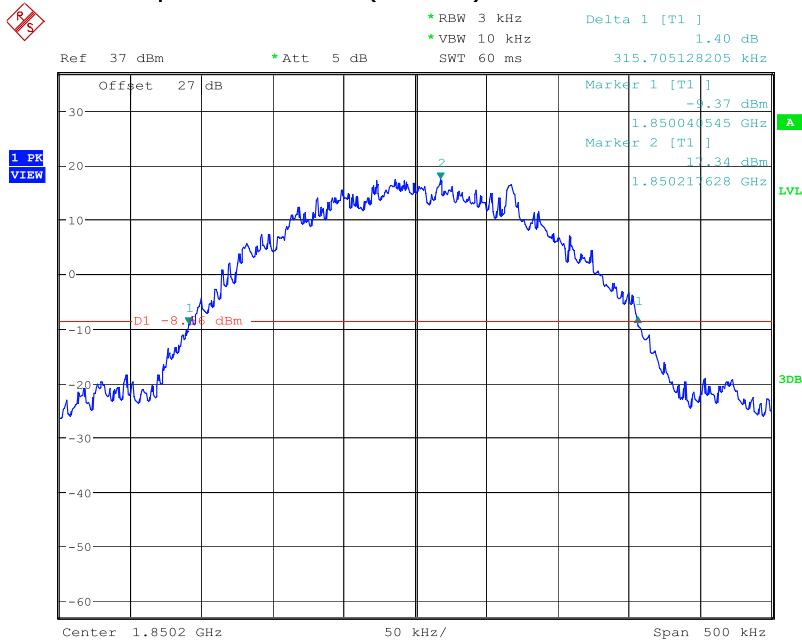
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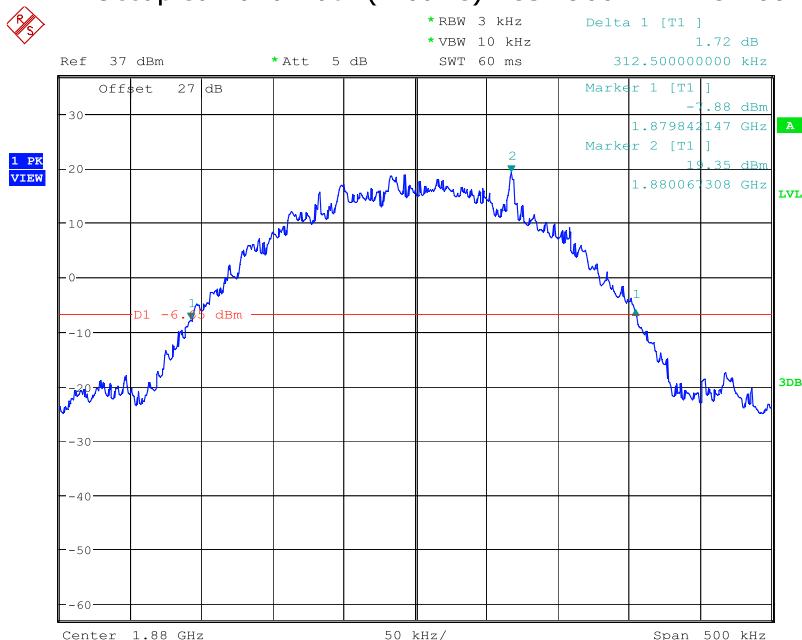
Date: 2014-09-09



## Occupied Bandwidth (-26dBc) PCS 1900 BAND CH 512



## Occupied Bandwidth (-26dBc) PCS 1900 BAND CH 661



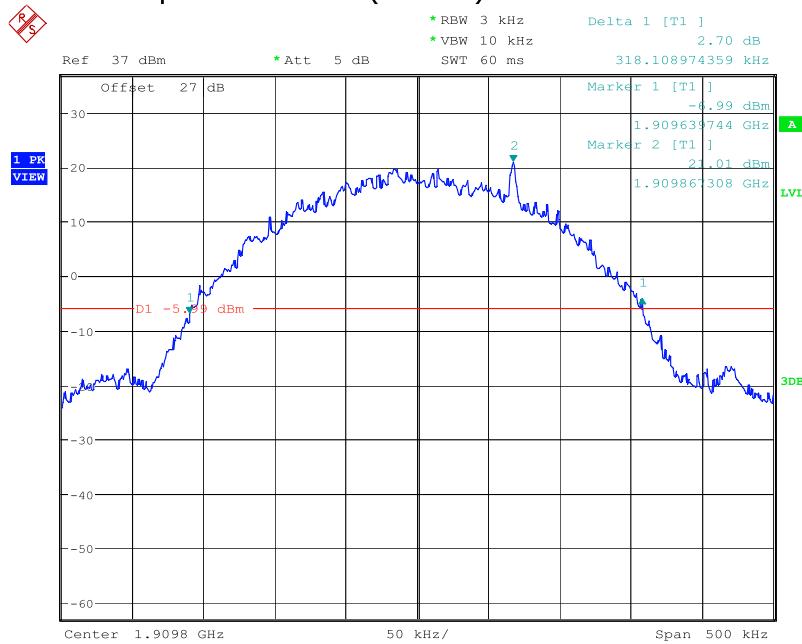
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## Occupied Bandwidth (-26dBc) PCS 1900 BAND CH 810



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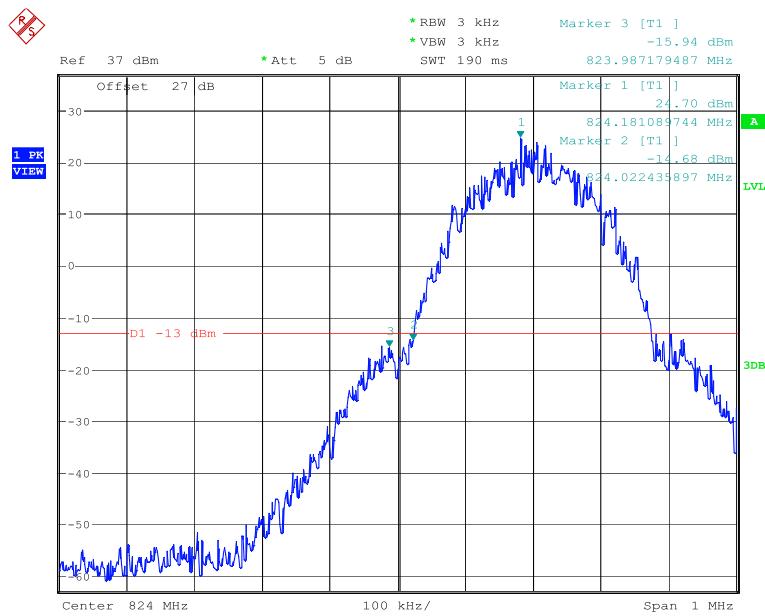
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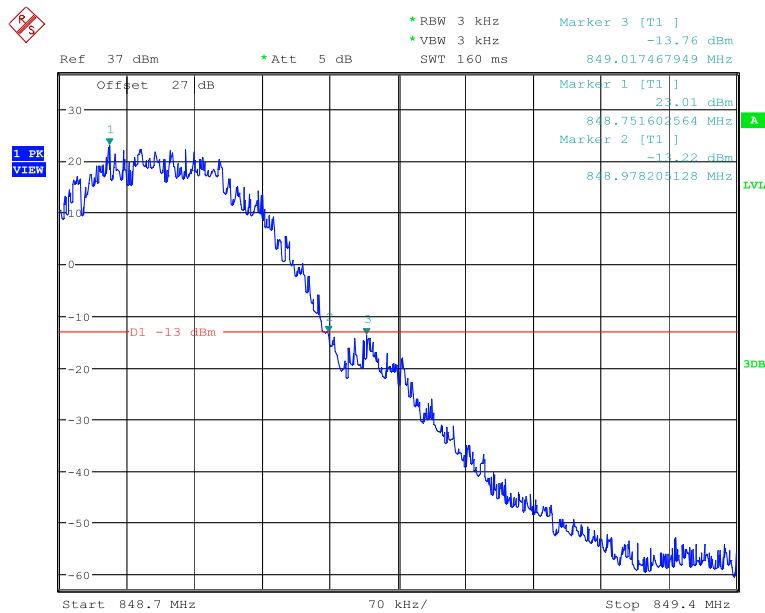


## APPENDIX D: TEST PLOTS FOR BAND EDGES

### Low Band Edge GSM 850 BAND CH 128



### High Band Edge GSM 850 BAND CH 251



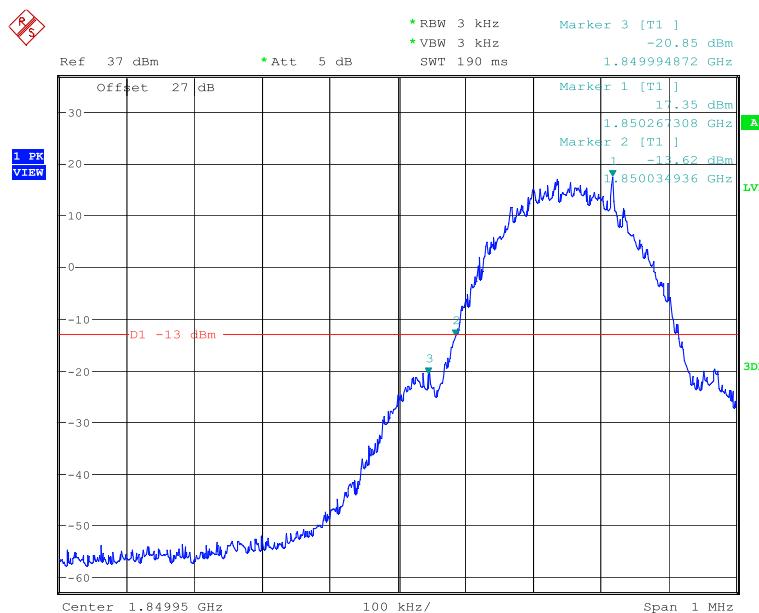
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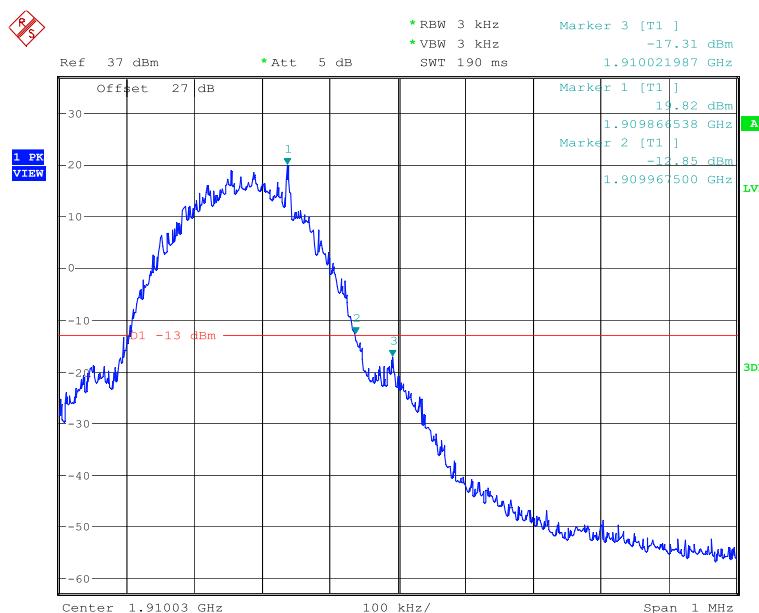
In the event of the improper use of the report. The Shenzhen Timeway Technology Consulting co .,Ltd reserves the rights to withdraw it and to adopt any other remedies which may be appropriate.



### Low Band Edge PCS 1900 BAND CH 512



### High Band Edge PCS 1900 BAND CH 810



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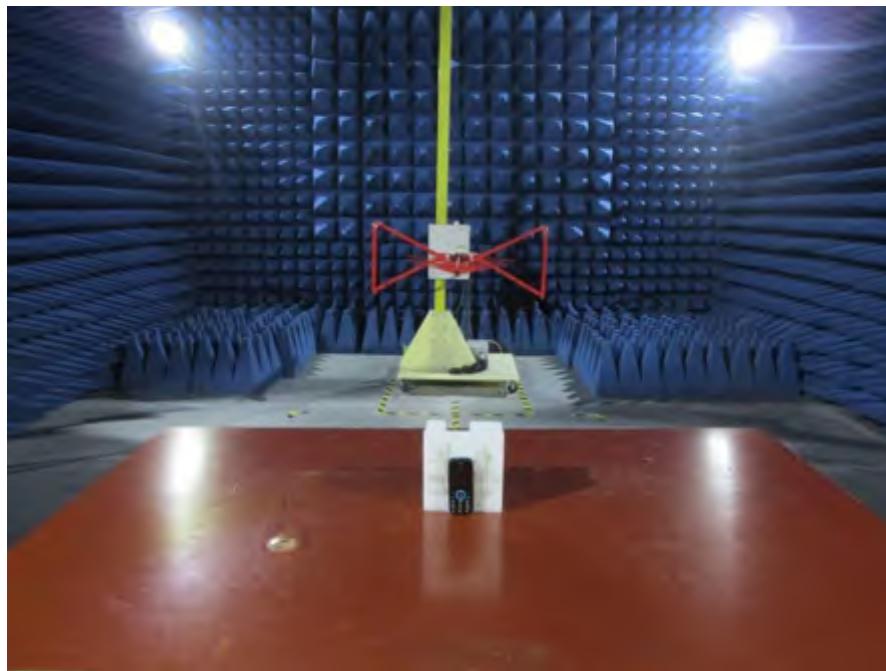
In the event of the improper use of the report. The Shenzhen Timeway Technology Consulting co .,Ltd reserves the rights to withdraw it and to adopt any other remedies which may be appropriate.

## APPENDIX E: PHOTOGRAPHS OF TEST SETUP

### CONDUCTED EMISSION TEST



### RADIATED EMISSION TEST



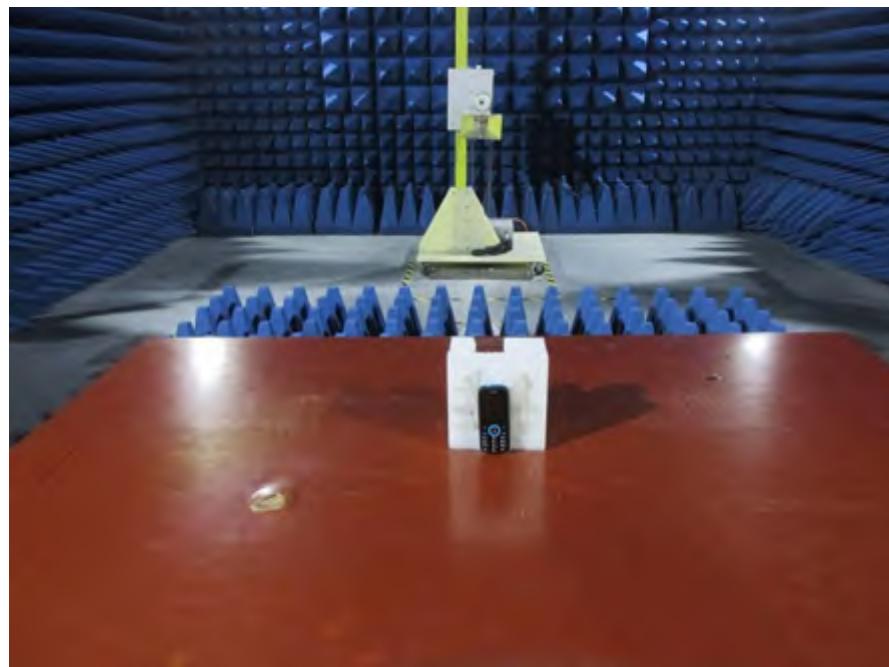
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RADIATED EMISSION TEST



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## APPENDIX F: PHOTOGRAPHS OF EUT

Appearance photograph of EUT



Appearance photograph of EUT



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Appearance photograph of EUT



Appearance photograph of EUT



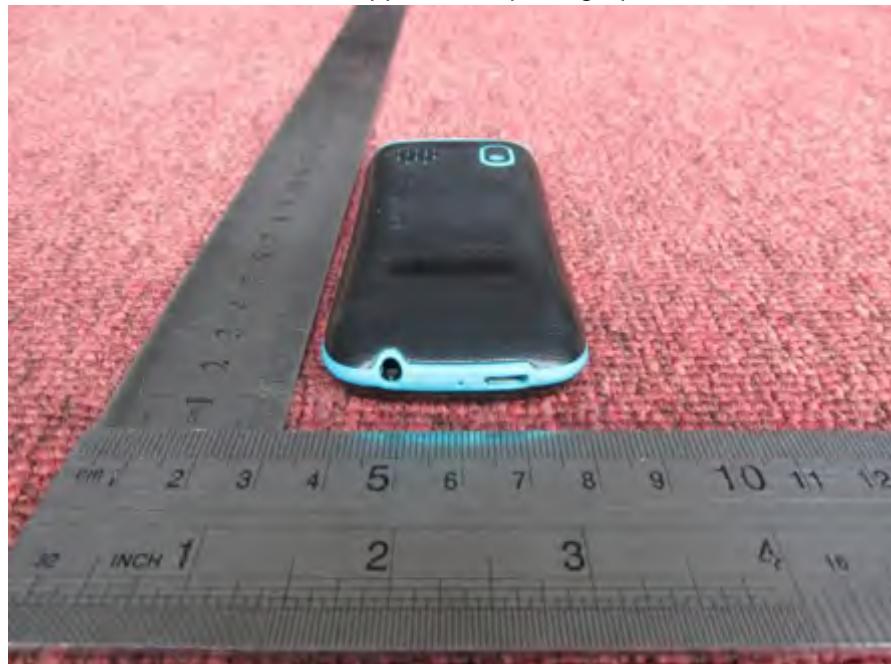
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Internal photograph of EUT



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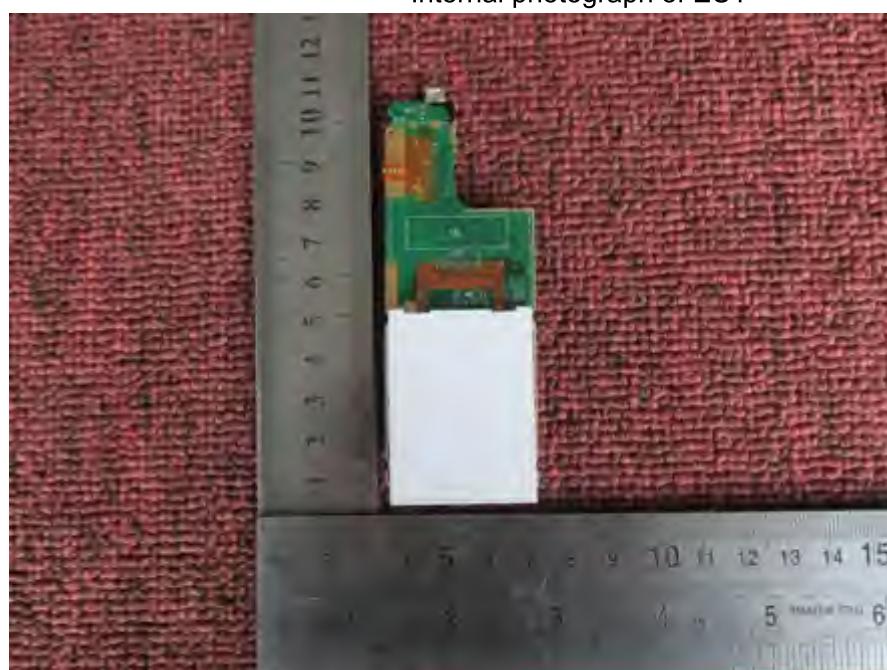
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Internal photograph of EUT



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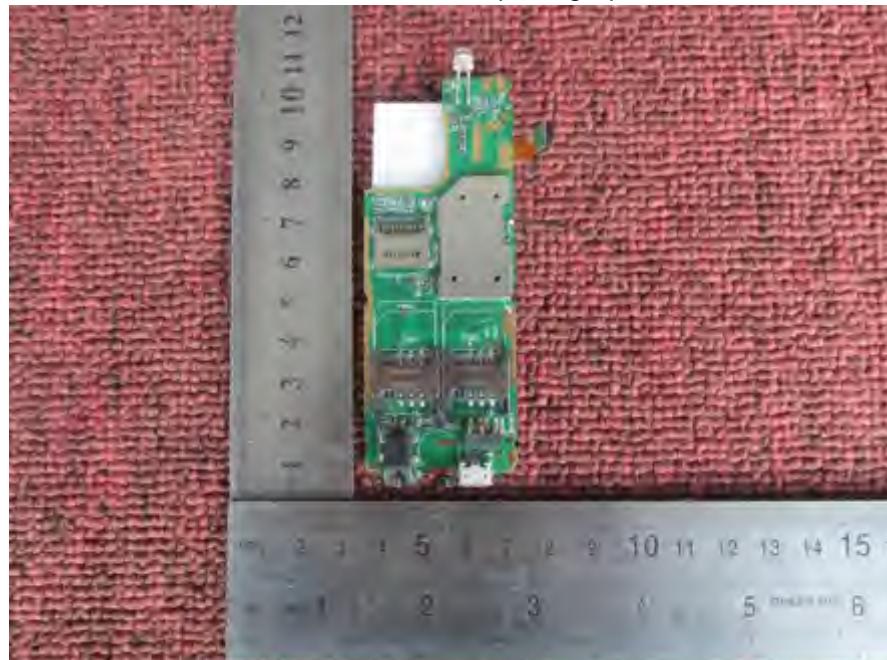


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—END OF REPORT—

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