

## FCC PART 15 Subpart C TEST REPORT

Applicant : Shanghai Tigercel Communication Technologies Corp.  
Address : Room 810, building 1, No. 100 Qinzhou Road, Xuhui District, Shanghai, China P.C: 200235  
Manufacturer : Shanghai Tigercel Communication Technologies Corp.  
Address : Room 810, building 1, No. 100 Qinzhou Road, Xuhui District, Shanghai, China P.C: 200235  
Factory : Shanghai Tigercel Communication Technologies Corp.  
Address : Room 810, building 1, No. 100 Qinzhou Road, Xuhui District, Shanghai, China P.C: 200235  
E.U.T. : GSM Wireless Data Terminal  
Brand Name : N/A  
Model No. : IF862  
Measurement Standard : FCC PART 15.247  
FCC ID : 2AIGX-2016IF862  
Date of Receiver : April 29, 2016  
Date of Test : April 29, 2016 to May 11, 2016  
Date of Report : May 12, 2016

This Test Report is Issued Under the Authority of :

Prepared by

*Rose*

Rose Hu / Engineer

Approved & Authorized Signer



Sun H. Q. A. Director

Note: This test report is for the customer shown above and their specific product only. It may not be duplicated or used in part without prior written consent from Dongguan Nore Testing Center Co., Ltd. The test results referenced from this report are relevant only to the sample tested.

## Table of Contents

|                                                            |           |
|------------------------------------------------------------|-----------|
| <b>1. GENERAL INFORMATION .....</b>                        | <b>5</b>  |
| 1.1 PRODUCT DESCRIPTION FOR EQUIPMENT UNDER TEST .....     | 5         |
| 1.2 RELATED SUBMITTAL(S) / GRANT (S) .....                 | 6         |
| 1.3 TEST METHODOLOGY .....                                 | 7         |
| 1.4 EQUIPMENT MODIFICATIONS .....                          | 7         |
| 1.5 SUPPORT DEVICE .....                                   | 7         |
| 1.6 TEST FACILITY AND LOCATION .....                       | 7         |
| 1.7 SUMMARY OF TEST RESULTS .....                          | 8         |
| <b>2. SYSTEM TEST CONFIGURATION .....</b>                  | <b>9</b>  |
| 2.1 EUT CONFIGURATION .....                                | 9         |
| 2.2 SPECIAL ACCESSORIES .....                              | 9         |
| 2.3 DESCRIPTION OF TEST MODES .....                        | 9         |
| 2.4 EUT EXERCISE .....                                     | 9         |
| <b>3. CONDUCTED EMISSIONS TEST .....</b>                   | <b>10</b> |
| 3.1 TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION) .....     | 10        |
| 3.2 TEST CONDITION .....                                   | 10        |
| 3.3 MEASUREMENT RESULTS .....                              | 10        |
| <b>4. MAX. CONDUCTED OUTPUT POWER .....</b>                | <b>13</b> |
| 4.1 MEASUREMENT PROCEDURE .....                            | 13        |
| 4.2 TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION) .....     | 13        |
| 4.3 MEASUREMENT RESULTS .....                              | 13        |
| <b>5. 6DB BANDWIDTH .....</b>                              | <b>14</b> |
| 5.1 MEASUREMENT PROCEDURE .....                            | 14        |
| 5.2 TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION) .....     | 14        |
| 5.3 MEASUREMENT RESULTS .....                              | 14        |
| <b>6. POWER SPECTRAL DENSITY .....</b>                     | <b>17</b> |
| 6.1 MEASUREMENT PROCEDURE .....                            | 17        |
| 6.2 TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION) .....     | 17        |
| 6.3 MEASUREMENT RESULTS .....                              | 17        |
| <b>7. BAND EDGE AND CONDUCTED SPURIOUS EMISSIONS .....</b> | <b>20</b> |
| 7.1 REQUIREMENT AND MEASUREMENT PROCEDURE .....            | 20        |
| 7.2 TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION) .....     | 20        |
| 7.3 MEASUREMENT RESULTS .....                              | 20        |



**8. RADIATED SPURIOUS EMISSIONS AND RESTRICTED BANDS ..... 25**

8.1 TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION) ..... 25

8.2 MEASUREMENT PROCEDURE ..... 26

8.3 LIMIT ..... 27

8.4 MEASUREMENT RESULTS ..... 27

**9. ANTENNA APPLICATION ..... 31**

9.1 ANTENNA REQUIREMENT ..... 31

9.2 MEASUREMENT RESULTS ..... 31

**10. TEST EQUIPMENT LIST ..... 32**

## Revision History of This Test Report

| Report Number | Description   | Issued Date |
|---------------|---------------|-------------|
| NTC1604341F   | Initial Issue | 2016-05-12  |
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## 1. GENERAL INFORMATION

### 1.1 Product Description for Equipment under Test

|                       |                                                                                                                                                                                        |
|-----------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Product Name          | : GSM Wireless Data Terminal                                                                                                                                                           |
| Model name            | : IF682                                                                                                                                                                                |
| Model Difference      | : N/A                                                                                                                                                                                  |
| Description           |                                                                                                                                                                                        |
| Power Supply          | : Li-lithium Battery 3.8V 450mAh<br>DC 5V come from external USB Port                                                                                                                  |
| Hardware Version      | : A9188_A13                                                                                                                                                                            |
| Software Version      | : SW_A9188_S6385_L100_V165_TIGERCEL_CTA                                                                                                                                                |
| Frequency Range       | : Cellular Band: 824.2-848.8MHz (TX)<br>869.2-893.8MHz(RX)<br>PCS Band: 1850.2-1909.8MHz (TX)<br>1930.2-1989.8MHz(RX)<br>Bluetooth: 2402-2480MHz                                       |
| Modulation            | : GMSK for GSM/PCS<br>GFSK for Bluetooth                                                                                                                                               |
| GPRS Multi-slot class | : 8/10/12                                                                                                                                                                              |
| Antenna Type          | : Integral                                                                                                                                                                             |
| Antenna Gain          | : 1.4dBi for GSM850<br>2.2dBi for PCS1900<br>-5.6dBi for Bluetooth                                                                                                                     |
| Number of Channels    | : 299 for GSM850<br>124 for PCS1900<br>40 for Bluetooth                                                                                                                                |
| Note                  | : This measurement and test report only pertains to the Bluetooth portion of the EUT. For measurement and test results to the GSM functions please refer to report number NTC1604338F. |

### BLE Channel List

| Channel | Frequency MHz | Channel | Frequency MHz | Channel | Frequency MHz | Channel | Frequency MHz |
|---------|---------------|---------|---------------|---------|---------------|---------|---------------|
| 1       | 2402          | 11      | 2422          | 21      | 2442          | 31      | 2462          |
| 2       | 2404          | 12      | 2424          | 22      | 2444          | 32      | 2464          |
| 3       | 2406          | 13      | 2426          | 23      | 2446          | 33      | 2466          |
| 4       | 2408          | 14      | 2428          | 24      | 2448          | 34      | 2468          |
| 5       | 2410          | 15      | 2430          | 25      | 2450          | 35      | 2470          |
| 6       | 2412          | 16      | 2432          | 26      | 2452          | 36      | 2472          |
| 7       | 2414          | 17      | 2434          | 27      | 2454          | 37      | 2474          |
| 8       | 2416          | 18      | 2436          | 28      | 2456          | 38      | 2476          |
| 9       | 2418          | 19      | 2438          | 29      | 2458          | 39      | 2478          |
| 10      | 2420          | 20      | 2440          | 30      | 2460          | 40      | 2480          |

**Note:** According to section 15.31(m), regards to the operating frequency range over 10MHz, the Lowest, Middle, and the Highest frequency of channel were selected to perform the test. The selected frequency see below:

| Channel | Frequency MHz |
|---------|---------------|
| 1       | 2402          |
| 20      | 2440          |
| 40      | 2480          |

| Test Item                                 | Software     | Description                                     |
|-------------------------------------------|--------------|-------------------------------------------------|
| Conducted RF Testing and Radiated testing | nRFgo Studio | Set the EUT to different modulation and channel |

## 1.2 Related Submittal(s) / Grant (s)

This submittal(s) (test report) is intended for FCC ID: 2AIGX-2016IF862 filing to comply with Section 15.247 of the FCC Part 15(2016), Subpart C Rule.

## 1.3 Test Methodology

Both AC mains line-conducted and radiated emission measurements were performed according to the procedures in ANSI C63.10 (2013). Radiated emission measurement was performed in semi-anechoic chamber and conducted emission measurement was performed in shield room. For radiated emission measurement, preliminary scans were performed in the semi-anechoic chamber only to determine the worst case modes. All radiated tests were performed at an antenna to EUT distance of 3 meters. All other measurements were made in accordance with the procedures in 47 CFR part 2.

## 1.4 Equipment Modifications

Not available for this EUT intended for grant.

## 1.5 Support Device

Adapter : Model: BSYC050200UW  
Input: AC100-240V 50/60Hz 0.5A  
Output: DC 5.0V 2000mA

## 1.6 Test Facility and Location

Listed by FCC, July 03, 2014  
The Certificate Registration Number is 665078.  
Listed by Industry Canada, June 18, 2014  
The Certificate Registration Number is 9743A.

Dongguan NTC Co., Ltd.  
(Full Name: Dongguan Nore Testing Center Co., Ltd.)

Building D, Gaosheng Science and Technology Park, Hongtu Road,  
Nancheng District, Dongguan City, Guangdong, China  
(Full Name: Building D, Gaosheng Science & Technology Park,  
Zhouxi Longxi Road, Nancheng District, Dongguan, Guangdong, China.

## 1.7 Summary of Test Results

| FCC Rules                   | Description Of Test                              | Result     |
|-----------------------------|--------------------------------------------------|------------|
| §15.207 (a)                 | AC Power Conducted Emission                      | Compliance |
| §15.247(b)(3)               | Max. Conducted Output Power                      | Compliance |
| §15.247(a)(2)               | 6dB Bandwidth                                    | Compliance |
| §15.247(e)                  | Power Spectral Density                           | Compliance |
| §15.247(d)                  | Band Edge and Conducted Spurious Emissions       | Compliance |
| §15.247(d),§15.209, §15.205 | Radiated Spurious Emissions and Restricted Bands | Compliance |
| §15.203                     | Antenna Requirement                              | Compliance |

Note: The full charge battery used during the test.

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## **2. System Test Configuration**

### **2.1 EUT Configuration**

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

### **2.2 Special Accessories**

Not available for this EUT intended for grant.

### **2.3 Description of test modes**

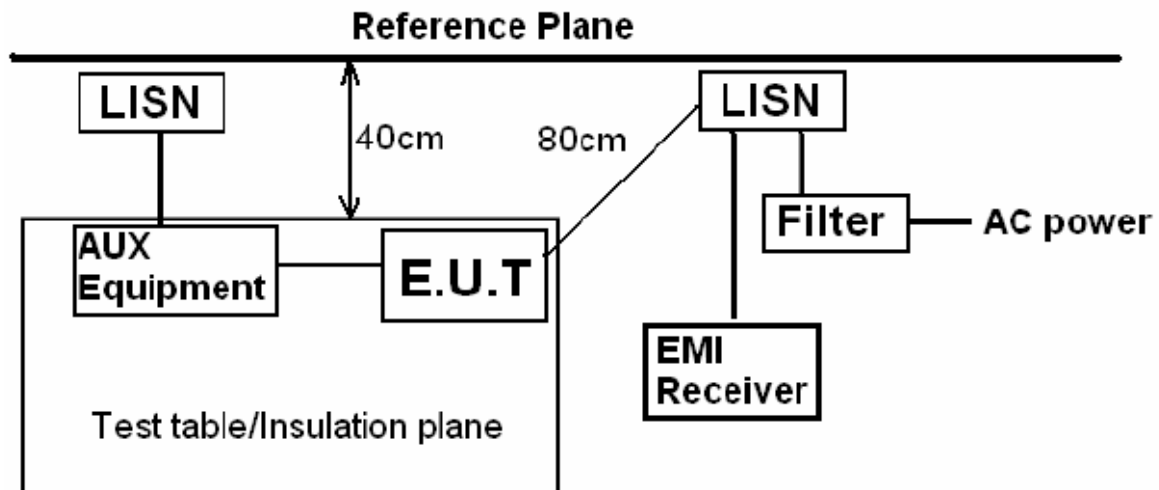
The EUT has been tested under continuous operating condition (The duty cycle >98%). Test program used to control the EUT staying in continuous transmitting mode. The Lowest, Middle and highest channel were chosen for testing, and modulation type GFSK was tested, but only the worst case data is shown in this report.

### **2.4 EUT Exercise**

The EUT was operated in the engineering mode to fix the Tx frequency that was for the purpose of the measurements.

### 3. Conducted Emissions Test

#### 3.1 Test SET-UP (Block Diagram of Configuration)



#### 3.2 Test Condition

Test Requirement: FCC Part 15.207

Frequency Range: 150KHz ~ 30MHz

Detector: RBW 9KHz, VBW 30KHz

Operation Mode: Charging+BT Mode

#### 3.3 Measurement Results

Please refer to following plots of the worst case: Lowest channel.

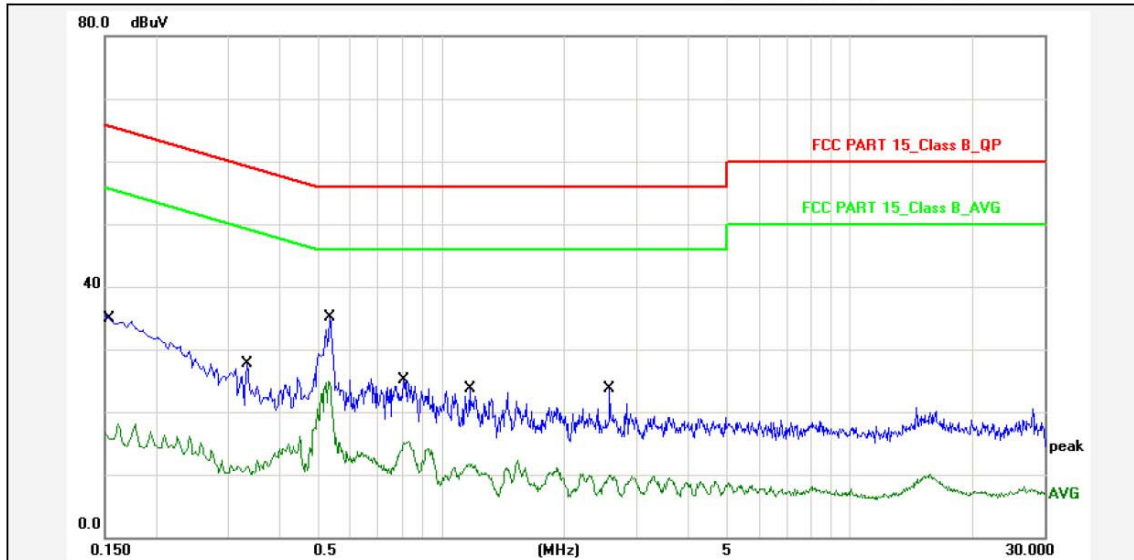
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**Dongguan NTC Co., Ltd.**  
Tel: +86-769-22022444 Fax: +86-769-22022799  
Web: [Http://www.ntc-c.com](http://www.ntc-c.com)

Site: Conduction

Test Time: 2016-5-10 14:01:55



Report No.: IF862

Test Standard: FCC PART 15\_Class B\_QP

Test item: Conducted Emission

Phase: N

Applicant: Tigercel

Temp.( )/Hum.(%): 24(C) / 54 %

Product: GSM wireless data terminal

Power Rating: DC5V(Form Adapter)

Model No.: IF862

Test Engineer: Steven

Test Mode: Charging+BT Mode

Remark:

| No. | Frequency (MHz) | Factor (dBuV) | Reading (dBuV) | Level (dBuV) | Limit (dBuV) | Margin (dB) | Detector | P/F | Remark |
|-----|-----------------|---------------|----------------|--------------|--------------|-------------|----------|-----|--------|
| 1   | 0.1556          | 10.80         | 23.79          | 34.59        | 65.69        | -31.10      | QP       | P   |        |
| 2   | 0.1556          | 10.80         | 7.35           | 18.15        | 55.69        | -37.54      | AVG      | P   |        |
| 3   | 0.3339          | 10.80         | 16.93          | 27.73        | 59.35        | -31.62      | QP       | P   |        |
| 4   | 0.3339          | 10.80         | 2.63           | 13.43        | 49.35        | -35.92      | AVG      | P   |        |
| 5   | 0.5340          | 10.80         | 24.26          | 35.06        | 56.00        | -20.94      | QP       | P   |        |
| 6   | 0.5340          | 10.80         | 14.17          | 24.97        | 46.00        | -21.03      | AVG      | P   |        |
| 7   | 0.8100          | 10.80         | 14.39          | 25.19        | 56.00        | -30.81      | QP       | P   |        |
| 8   | 0.8100          | 10.80         | 4.44           | 15.24        | 46.00        | -30.76      | AVG      | P   |        |
| 9   | 1.1740          | 10.80         | 12.85          | 23.65        | 56.00        | -32.35      | QP       | P   |        |
| 10  | 1.1740          | 10.80         | 0.93           | 11.73        | 46.00        | -34.27      | AVG      | P   |        |
| 11  | 2.5900          | 10.80         | 12.83          | 23.63        | 56.00        | -32.37      | QP       | P   |        |
| 12  | 2.5900          | 10.80         | -0.84          | 9.96         | 46.00        | -36.04      | AVG      | P   |        |

Note: Level=Reading+Factor.

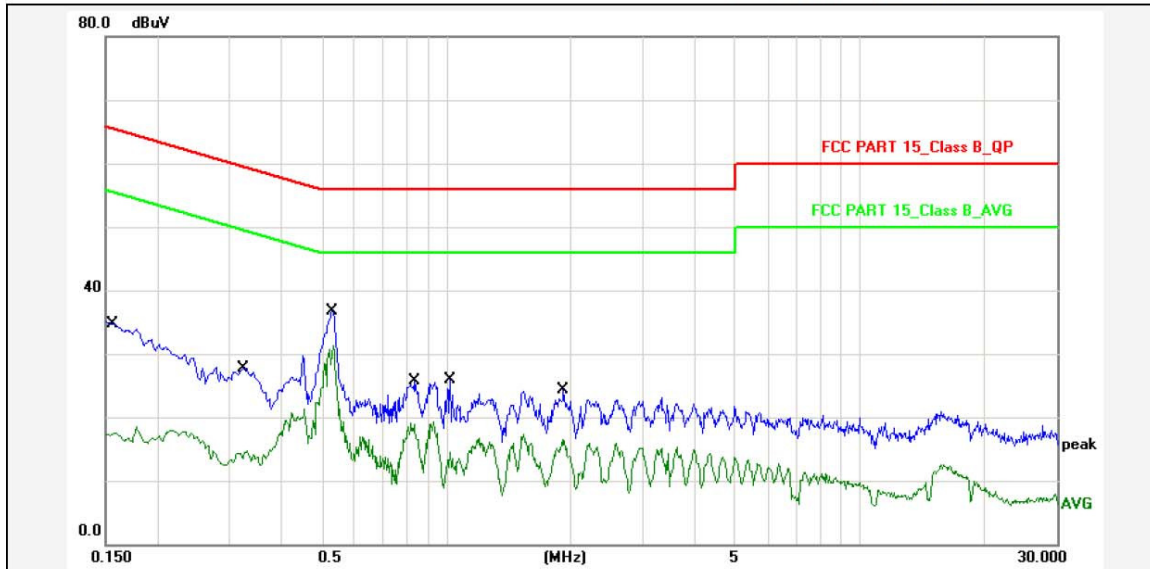
Margin=Limit-Level.



**Dongguan NTC Co., Ltd.**  
Tel: +86-769-22022444 Fax: +86-769-22022799  
Web: <http://www.ntc-c.com>

Site: Conduction

Test Time: 2016-5-10 14:07:15



Report No.: IF862

Test Standard: FCC PART 15\_Class B\_QP

Test item: Conducted Emission

Phase: L1

Applicant: Tigercl

Temp.( )/Hum.(%): 24(C) / 54 %

Product: GSM wireless data terminal

Power Rating: DC5V(Form Adapter)

Model No.: IF862

Test Engineer: Steven

Test Mode: Charging+BT Mode

Remark:

| No. | Frequency (MHz) | Factor (dBuV) | Reading (dBuV) | Level (dBuV) | Limit (dBuV) | Margin (dB) | Detector | P/F | Remark |
|-----|-----------------|---------------|----------------|--------------|--------------|-------------|----------|-----|--------|
| 1   | 0.1580          | 10.80         | 23.21          | 34.01        | 65.56        | -31.55      | QP       | P   |        |
| 2   | 0.1580          | 10.80         | 6.75           | 17.55        | 55.56        | -38.01      | AVG      | P   |        |
| 3   | 0.3220          | 10.80         | 16.98          | 27.78        | 59.65        | -31.87      | QP       | P   |        |
| 4   | 0.3220          | 10.80         | 3.92           | 14.72        | 49.65        | -34.93      | AVG      | P   |        |
| 5   | 0.5299          | 10.80         | 25.91          | 36.71        | 56.00        | -19.29      | QP       | P   |        |
| 6   | 0.5299          | 10.80         | 20.47          | 31.27        | 46.00        | -14.73      | AVG      | P   |        |
| 7   | 0.8420          | 10.80         | 14.84          | 25.64        | 56.00        | -30.36      | QP       | P   |        |
| 8   | 0.8420          | 10.80         | 8.28           | 19.08        | 46.00        | -26.92      | AVG      | P   |        |
| 9   | 1.0220          | 10.80         | 15.07          | 25.87        | 56.00        | -30.13      | QP       | P   |        |
| 10  | 1.0220          | 10.80         | 3.67           | 14.47        | 46.00        | -31.53      | AVG      | P   |        |
| 11  | 1.9260          | 10.80         | 13.58          | 24.38        | 56.00        | -31.62      | QP       | P   |        |
| 12  | 1.9260          | 10.80         | 5.65           | 16.45        | 46.00        | -29.55      | AVG      | P   |        |

Note: Level=Reading+Factor.

Margin=Limit-Level.

## 4. Max. Conducted Output Power

### 4.1 Measurement Procedure

Maximum Conducted Output power at Antenna Terminals, FCC Rules 15.247(b)(3):

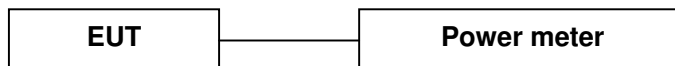
One of the following procedures may be used to determine the maximum peak conducted output power of a DTS EUT.

$RBW \geq DTS \text{ bandwidth}$

This procedure shall be used when the measurement instrument has available a resolution bandwidth than is greater than the DTS bandwidth.

1. Set the  $RBW \geq DTS \text{ bandwidth}$ ;
2. Set  $VBW \geq 3 * RBW$ ;
3. Set  $span \geq 3 * RBW$ ;
4. Sweep time = auto couple
5. Detector = peak
6. Trace mode = max hold;
7. Allow trace to fully stabilize;
8. Use peak marker function to determine the peak amplitude level.

### 4.2 Test SET-UP (Block Diagram of Configuration)



### 4.3 Measurement Results

Please refer to following table.

|               |       |             |              |
|---------------|-------|-------------|--------------|
| Modulation:   | GFSK  | Humidity :  | 49 %         |
| Temperature : | 21 °C | Test Date : | May 07, 2016 |
| Test By:      | Sance |             |              |
| Test Result:  | PASS  |             |              |

| Frequency<br>MHz     | Data Rate<br>Mbps | Peak Output<br>Power<br>dBm | Limit<br>dBm |
|----------------------|-------------------|-----------------------------|--------------|
| Low Channel: 2402    | 1                 | 1.10                        | 30           |
| Middle Channel: 2440 | 1                 | 1.37                        | 30           |
| High Channel: 2480   | 1                 | 1.82                        | 30           |

## 5. 6dB Bandwidth

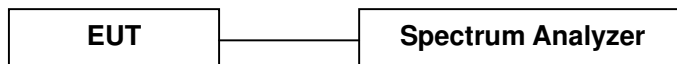
### 5.1 Measurement Procedure

DTS 6dB Channel Bandwidth, FCC Rule 15.247(a)(2):

The antenna port of the EUT was connected to the input of a spectrum analyzer. Analyzer was set as below:

1. For 6dB bandwidth, Set the RBW = 100KHz.  
For 20dB bandwidth, Set the RBW=1-5% of the OBW, not to exceed 1MHz.
2. Set the VBW  $\geq 3 \times$  RBW
3. Detector = peak.
4. Sweep time = auto couple.
5. Trace mode = max hold.
6. Allow trace to fully stabilize.
7. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

### 5.2 Test SET-UP (Block Diagram of Configuration)



### 5.3 Measurement Results

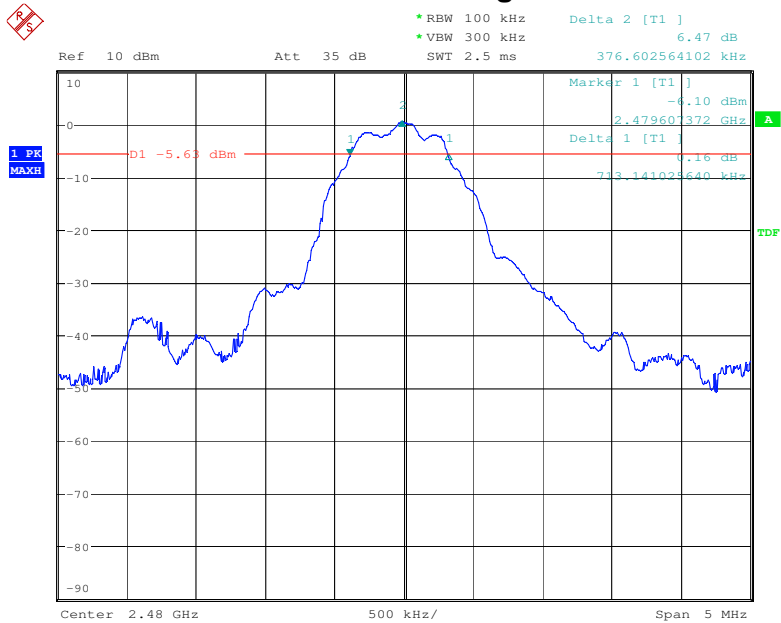
Please refer to following table and plots.

|               |       |             |              |
|---------------|-------|-------------|--------------|
| Modulation:   | GFSK  |             |              |
| Temperature : | 21 °C | Humidity :  | 49 %         |
| Test By:      | Sance | Test Date : | May 07, 2016 |
| Test Result:  | PASS  |             |              |

| Frequency<br>MHz     | Data<br>Rate<br>Mbps | 6dB<br>Bandwidth<br>KHz | Limit   |
|----------------------|----------------------|-------------------------|---------|
| Low Channel: 2402    | 1                    | 713.1                   | >500KHz |
| Middle Channel: 2440 | 1                    | 729.2                   | >500KHz |
| High Channel: 2480   | 1                    | 713.1                   | >500KHz |



6dB bandwidth High Channel



Date: 7.MAY.2016 09:01:41

## 6. Power Spectral Density

### 6.1 Measurement Procedure

DTS 6dB Channel Bandwidth, FCC Rule 15.247(a)(2):

The antenna port of the EUT was connected to the input of a spectrum analyzer. Analyzer was set as below:

1. Set analyzer center frequency to DTS channel center frequency.
2. Set the span to 1.5 times the DTS bandwidth.
3. Set the RBW to:  $3\text{ kHz} \leq \text{RBW} \leq 100\text{KHz}$
4. Set the VBW  $\geq 3 \times \text{RBW}$ .
5. Detector = peak.
6. Sweep time = auto couple.
7. Trace mode = max hold.
8. Allow trace to fully stabilize.
9. Use the peak marker function to determine the maximum amplitude level within the RBW.
10. If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

### 6.2 Test SET-UP (Block Diagram of Configuration)



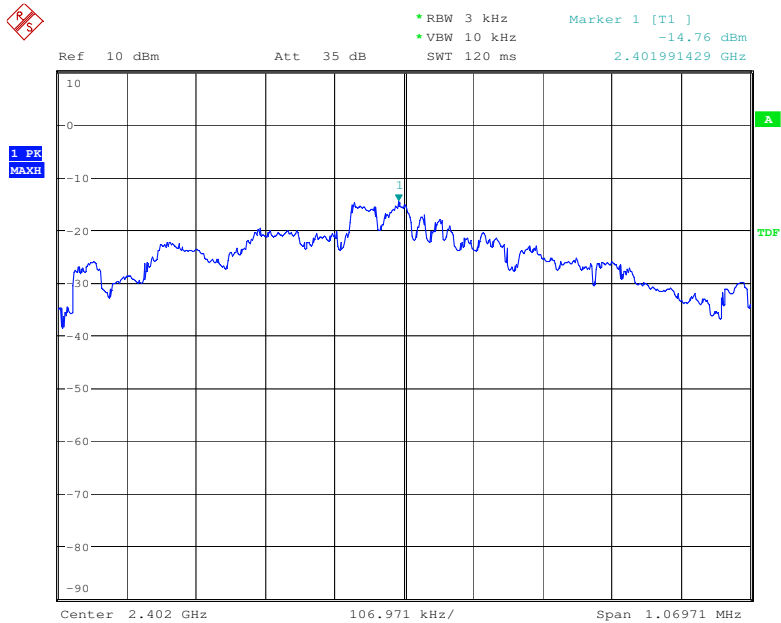
### 6.3 Measurement Results

Please refer to following table and plots.

|               |       |             |              |
|---------------|-------|-------------|--------------|
| Modulation:   | GFSK  |             |              |
| Temperature : | 21 °C | Humidity :  | 49 %         |
| Test By:      | Sance | Test Date : | May 07, 2016 |
| Test Result:  | PASS  |             |              |

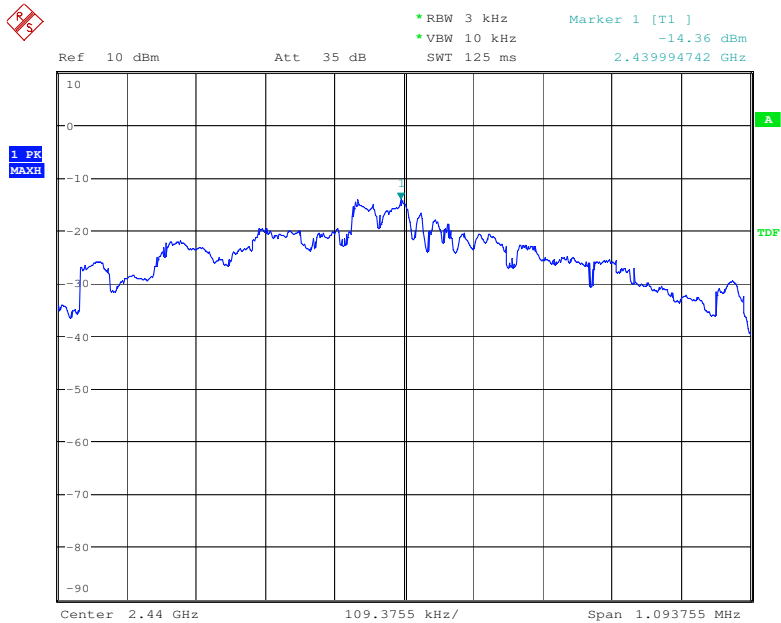
| Frequency<br>MHz     | Data Rate<br>Mbps | PSD<br>dBm/3kHz | Limit<br>dBm/3kHz |
|----------------------|-------------------|-----------------|-------------------|
| Low Channel: 2402    | 1                 | -14.76          | 8                 |
| Middle Channel: 2440 | 1                 | -14.36          | 8                 |
| High Channel: 2480   | 1                 | -13.57          | 8                 |

Low Channel



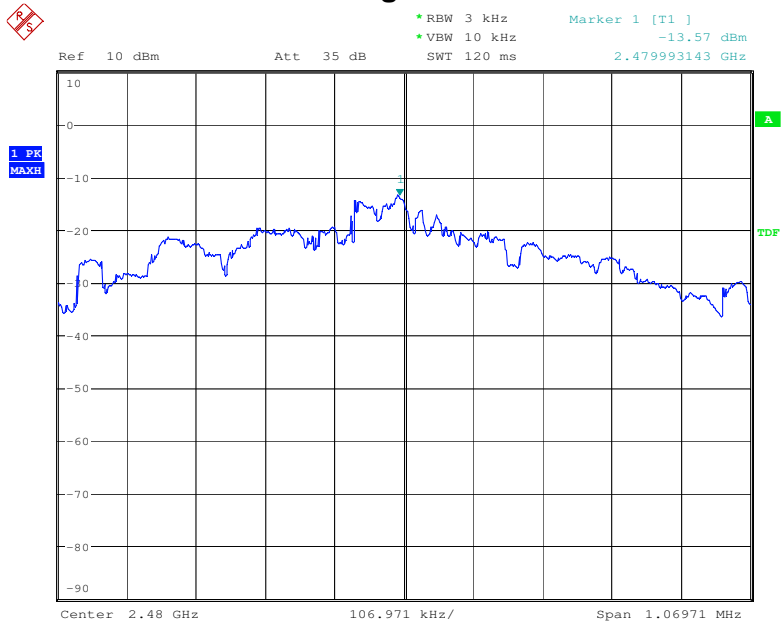
Date: 7.MAY.2016 09:05:20

Middle Channel



Date: 7.MAY.2016 09:04:36

High Channel



Date: 7.MAY.2016 09:03:43

## 7. Band Edge and Conducted Spurious Emissions

### 7.1 Requirement and Measurement Procedure

In any 100KHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100KHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement.

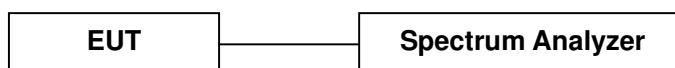
The antenna port of the EUT was connected to the input of a spectrum analyzer. Analyzer was set as below.

A Quasi-peak measurement was then made for that frequency point for below 1GHz test. PK and AV for above 1GHz emission test.

During the radiated emission test, the spectrum analyzer was set with the following configurations:

| Frequency Band (MHz) | Level   | Resolution Bandwidth | Video Bandwidth |
|----------------------|---------|----------------------|-----------------|
| 30 to 1000           | QP      | 120 kHz              | 300 kHz         |
| Above 1000           | Peak    | 1 MHz                | 3 MHz           |
|                      | Average | 1 MHz                | 10 Hz           |

### 7.2 Test SET-UP (Block Diagram of Configuration)



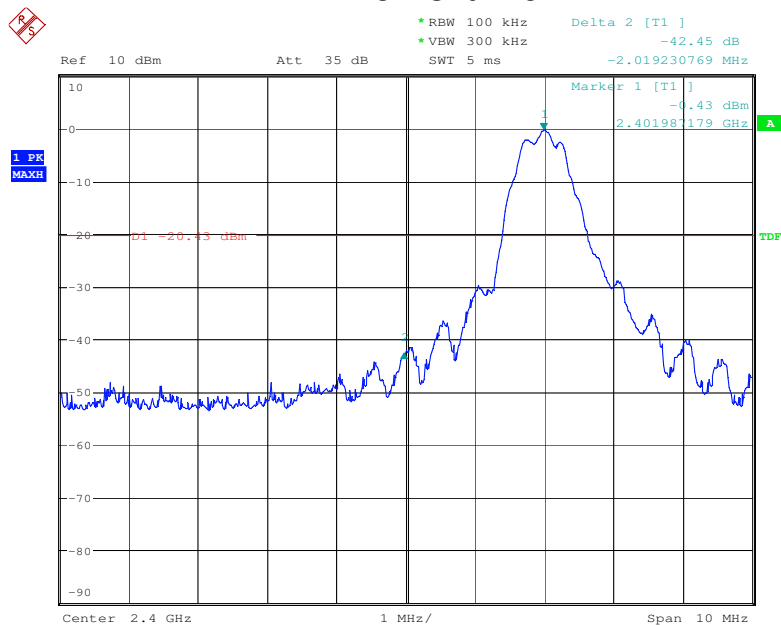
### 7.3 Measurement Results

The test plots and table showed all spurious emission and up to the tenth harmonic was measured and they were found to be at least 20dB below the highest level of the desired power in the passband. Please refer to below plots.

| Freq.<br>(MHz) | Ant.Pol.<br>(H/V) | Reading<br>Level(dBuV) |       | Factor<br>(dB/m) | Emission Level<br>(dBuV) |       | Limit 3m<br>(dBuV/m) |       | Margin<br>(dB) |        |
|----------------|-------------------|------------------------|-------|------------------|--------------------------|-------|----------------------|-------|----------------|--------|
|                |                   | PK                     | AV    |                  | PK                       | AV    | PK                   | AV    | PK             | AV     |
| 2390.000       | H                 | 40.73                  | 26.52 | 8.06             | 48.79                    | 34.58 | 74.00                | 54.00 | -25.21         | -19.42 |
| 2390.000       | V                 | 38.03                  | 22.39 | 8.06             | 46.09                    | 30.45 | 74.00                | 54.00 | -27.91         | -23.55 |
| 2483.500       | H                 | 40.79                  | 27.27 | 8.36             | 49.15                    | 35.63 | 74.00                | 54.00 | -24.85         | -18.37 |
| 2483.500       | V                 | 37.46                  | 22.66 | 8.36             | 45.82                    | 31.02 | 74.00                | 54.00 | -28.18         | -22.98 |

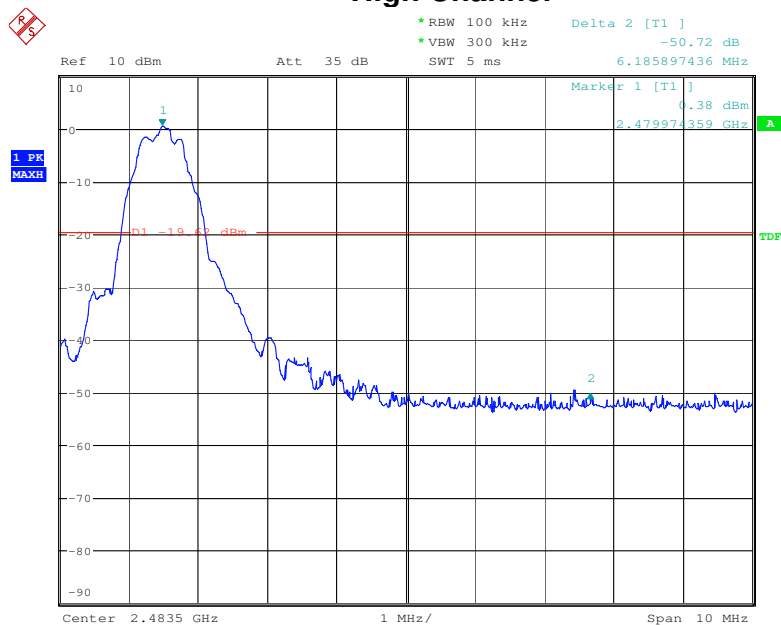
**Note:** (1) All Readings are Peak Value and AV.  
 (2) Emission Level= Reading Level+Probe Factor +Cable Loss  
 (3) Measurement uncertainty :  $\pm 3.7\text{dB}$

## Band Edge Low Channel



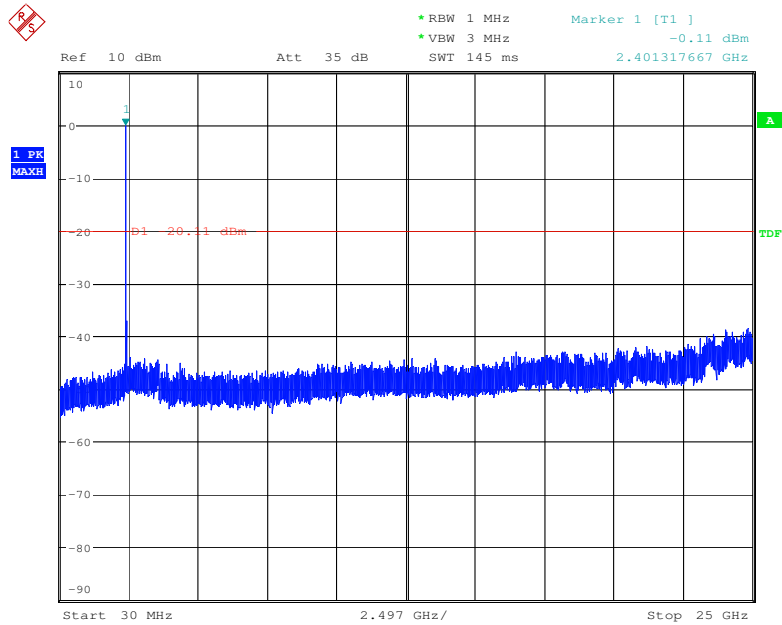
Date: 7.MAY.2016 09:06:21

## High Channel



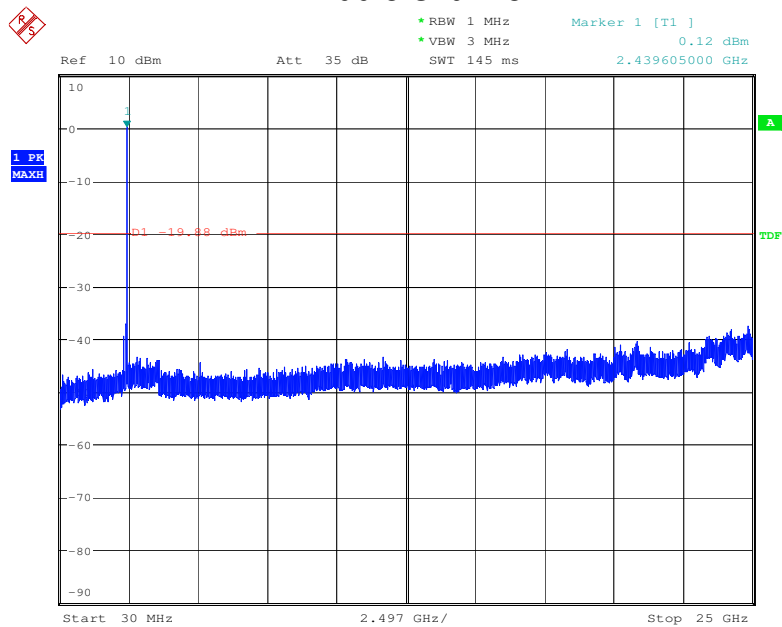
Date: 7.MAY.2016 09:07:14

Conducted Spurious Emissions  
Low Channel



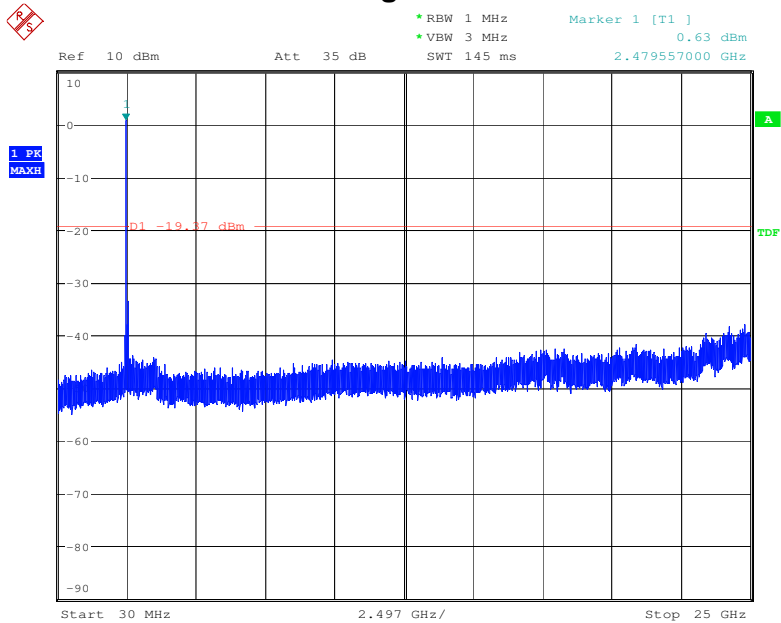
Date: 7.MAY.2016 09:08:27

Middle Channel



Date: 7.MAY.2016 09:10:27

High Channel



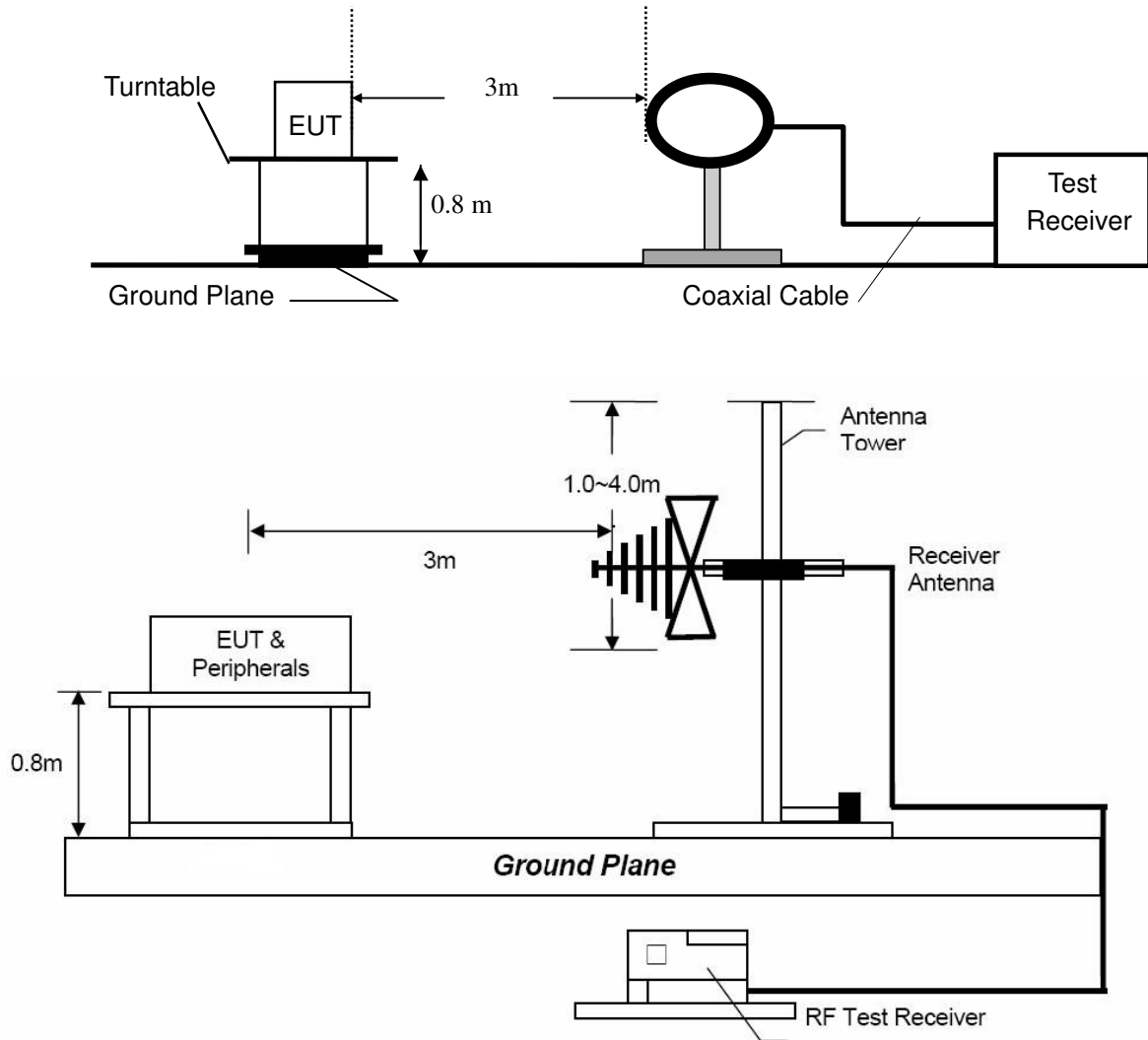
Date: 7.MAY.2016 09:11:08

Note: Sweep points=30001pts

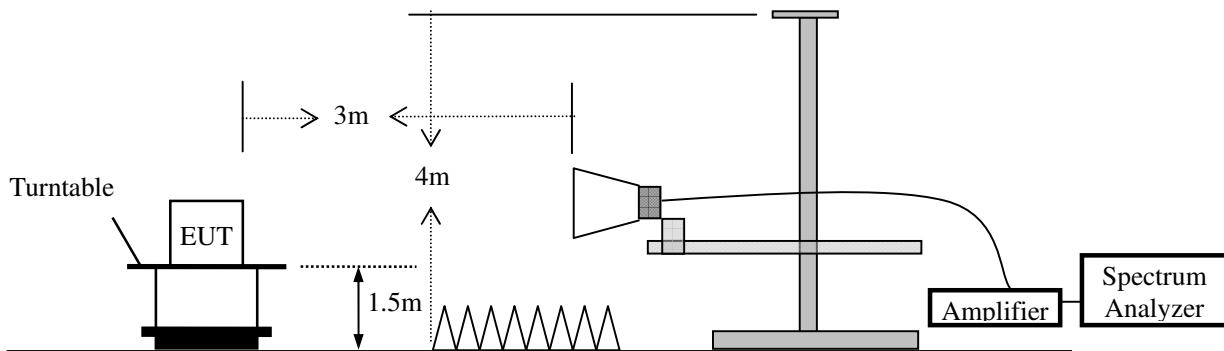
## 8. Radiated Spurious Emissions and Restricted Bands

### 8.1 Test SET-UP (Block Diagram of Configuration)

#### 8.1.1 Radiated Emission Test Set-Up, Frequency Below 30MHz



### 8.1.2 Radiated Emission Test Set-Up, Frequency above 1GHz



### 8.2 Measurement Procedure

- Blow 1GHz, the EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi- anechoic chamber room.
- For the radiated emission test above 1GHz:  
The EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter full anechoic chamber room. The table was rotated 360 degrees to determine the position of the highest radiation. Place the measurement antenna away from each area of the EUT determined to be a source of emissions at the specified measurement distance, while keeping the measurement antenna aimed at the source of emissions at each frequency of significant emissions, with polarization oriented for maximum response. The measurement antenna may have to be higher or lower than the EUT, depending on the radiation pattern of the emission and staying aimed at the emission source for receiving the maximum signal. The final measurement antenna elevation shall be that which maximizes the emissions. The measurement antenna elevation for maximum emissions shall be restricted to a range of heights of from 1 m to 4 m above the ground or reference ground plane.
- The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- The height of antenna is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading. The test-receiver system was set to peak detect function and specified bandwidth with maximum hold mode.
- A Quasi-peak measurement was then made for that frequency point for below 1GHz test. PK and AV for above 1GHz emission test.

During the radiated emission test, the spectrum analyzer was set with the following configurations:

| Frequency Band (MHz) | Level   | Resolution Bandwidth | Video Bandwidth |
|----------------------|---------|----------------------|-----------------|
| 30 to 1000           | QP      | 120 kHz              | 300 kHz         |
| Above 1000           | Peak    | 1 MHz                | 3 MHz           |
|                      | Average | 1 MHz                | 10 Hz           |

### 8.3 Limit

| Frequency range MHz | Distance Meters | Field Strengths Limit (15.209) |
|---------------------|-----------------|--------------------------------|
|                     |                 | $\mu\text{V/m}$                |
| 0.009 ~ 0.490       | 300             | $2400/F(\text{kHz})$           |
| 0.490 ~ 1.705       | 30              | $24000/F(\text{kHz})$          |
| 1.705 ~ 30          | 30              | 30                             |
| 30 ~ 88             | 3               | 100                            |
| 88 ~ 216            | 3               | 150                            |
| 216 ~ 960           | 3               | 200                            |
| Above 960           | 3               | 500                            |

- Remark :
- (1) Emission level (dB) $\mu\text{V}$  = 20 log Emission level  $\mu\text{V/m}$
  - (2) The smaller limit shall apply at the cross point between two frequency bands.
  - (3) As shown in 15.35(b), for frequencies above 1000MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20dB under any condition of modulation.
  - (4) The frequency range scanned is from the lowest radio frequency signal generated in the device which is greater than 9 kHz to the tenth harmonic of the highest fundamental frequency or 40 GHz, whichever is lower.
  - (5) §15.247(d) specifies that emissions which fall in the restricted bands, as defined in §15.205 comply with radiated emission limits specified in §15.209.

### 8.4 Measurement Results

Please refer to following plots of the worst case: Lowest channel.

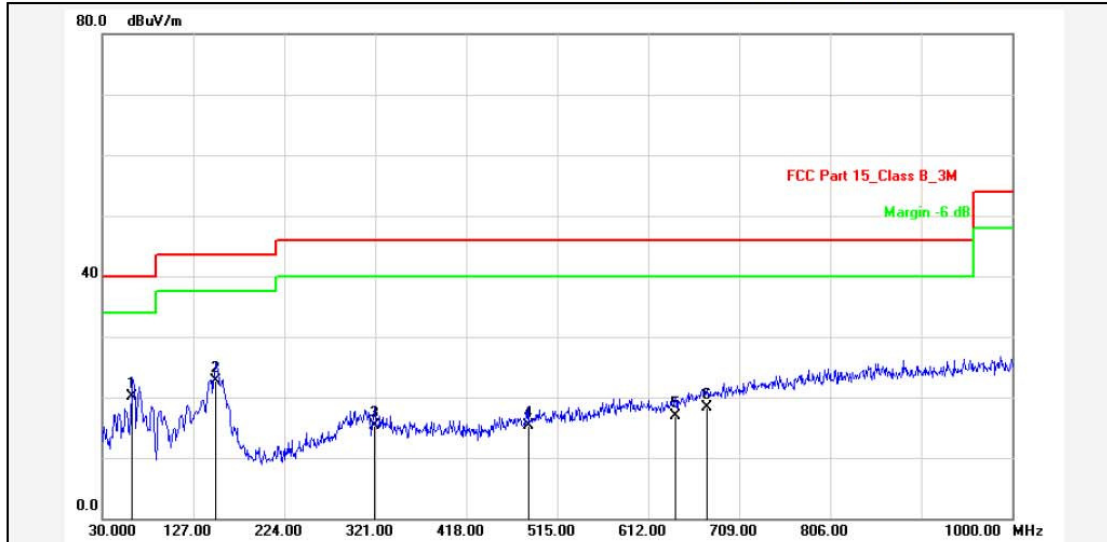
.



**Dongguan NTC Co., Ltd.**  
Tel: +86-769-22022444 Fax: +86-769-22022799  
Web: <http://www.ntc-c.com>

Site: Radiation

Test Time: 2016-5-10 15:44:34



Report No.: IF862

Test Standard: FCC Part 15\_Class B\_3M

Test item: Radiation Emission

Applicant: Tigercel

Product: GSM wireless data terminal

Model No.: IF862

Test Distance: 3m

Ant. Polarization: Vertical

Temp.(C)/Hum.(%): 22(C) / 54 %

Power Rating: DC5V(From Adapter)

Test Engineer: Steven

Test Mode: Charging+BT Mode

Remark:

| No. | Frequency (MHz) | Factor (dB/m) | Reading (dBuV) | Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector | Height (cm) | Azimuth (deg.) | P/F | Remark |
|-----|-----------------|---------------|----------------|----------------|----------------|-------------|----------|-------------|----------------|-----|--------|
| 1   | 62.0100         | -14.84        | 34.94          | 20.10          | 40.00          | -19.90      | QP       |             |                | P   |        |
| 2   | 151.2500        | -18.47        | 41.17          | 22.70          | 43.50          | -20.80      | QP       |             |                | P   |        |
| 3   | 320.0300        | -11.93        | 27.23          | 15.30          | 46.00          | -30.70      | QP       |             |                | P   |        |
| 4   | 483.9600        | -9.12         | 24.52          | 15.40          | 46.00          | -30.60      | QP       |             |                | P   |        |
| 5   | 641.1000        | -6.11         | 23.11          | 17.00          | 46.00          | -29.00      | QP       |             |                | P   |        |
| 6   | 674.0800        | -4.51         | 22.91          | 18.40          | 46.00          | -27.60      | QP       |             |                | P   |        |

Note: Level=Reading+Factor.

Margin=Limit-Level.

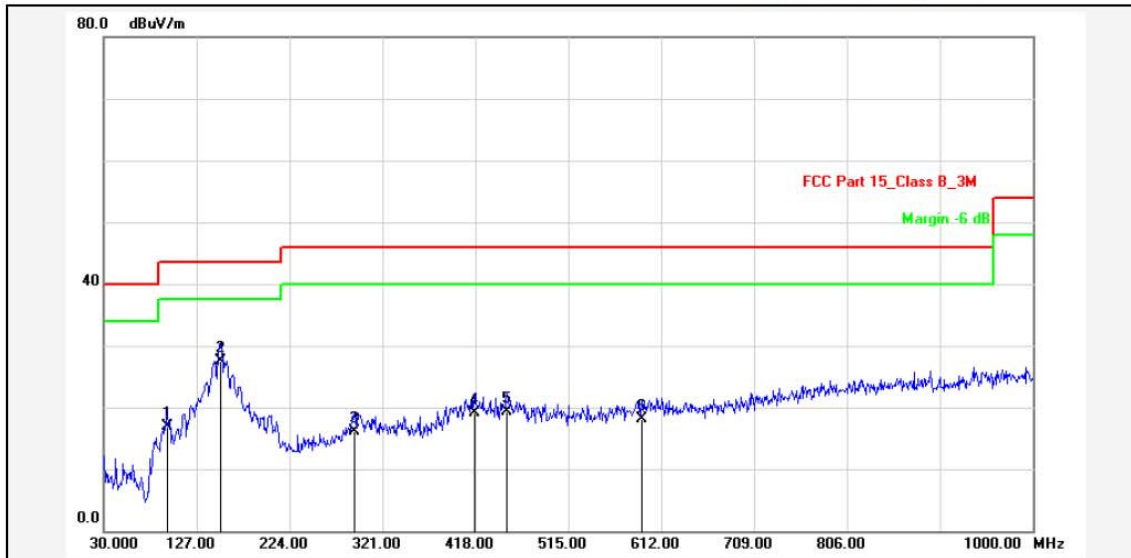
**Note: Below 30MHz, the emissions are lower than 20dB below the allowable limit.**



**Dongguan NTC Co., Ltd.**  
Tel: +86-769-22022444 Fax: +86-769-22022799  
Web: [Http://www.ntc-c.com](http://www.ntc-c.com)

Site: Radiation

Test Time: 2016-5-10 15:38:30



|                |                            |                    |                    |
|----------------|----------------------------|--------------------|--------------------|
| Report No.:    | IF862                      | Test Distance:     | 3m                 |
| Test Standard: | FCC Part 15_Class B_3M     | Ant. Polarization: | Horizontal         |
| Test item:     | Radiation Emission         | Temp.(C)/Hum.(%):  | 22(C) / 54 %       |
| Applicant:     | Tigercel                   | Power Rating:      | DC5V(From Adapter) |
| Product:       | GSM wireless data terminal | Test Engineer:     | Steven             |
| Model No.:     | IF862                      |                    |                    |
| Test Mode:     | Charging+BT Mode           |                    |                    |
| Remark:        |                            |                    |                    |

| No. | Frequency (MHz) | Factor (dB/m) | Reading (dBuV) | Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector | Height (cm) | Azimuth (deg.) | P/F | Remark |
|-----|-----------------|---------------|----------------|----------------|----------------|-------------|----------|-------------|----------------|-----|--------|
| 1   | 95.9600         | -12.65        | 29.65          | 17.00          | 43.50          | -26.50      | QP       |             |                | P   |        |
| 2   | 152.2200        | -15.43        | 42.93          | 27.50          | 43.50          | -16.00      | QP       |             |                | P   |        |
| 3   | 291.9000        | -10.70        | 26.90          | 16.20          | 46.00          | -29.80      | QP       |             |                | P   |        |
| 4   | 417.0300        | -8.71         | 27.91          | 19.20          | 46.00          | -26.80      | QP       |             |                | P   |        |
| 5   | 450.9800        | -7.93         | 27.33          | 19.40          | 46.00          | -26.60      | QP       |             |                | P   |        |
| 6   | 591.6300        | -5.23         | 23.43          | 18.20          | 46.00          | -27.80      | QP       |             |                | P   |        |

Note: Level=Reading+Factor.

Margin=Limit-Level.

**Note: Below 30MHz, the emissions are lower than 20dB below the allowable limit.**

|                    |         |               |              |
|--------------------|---------|---------------|--------------|
| Modulation:        | GFSK    | Test Date :   | May 07, 2016 |
| Frequency Range:   | 1-25GHz | Temperature : | 21 °C        |
| Test Result:       | PASS    | Humidity :    | 49 %         |
| Measured Distance: | 3m      |               |              |
| Test By:           | Sance   |               |              |

| Freq.<br>(MHz)                 | Ant.Pol.<br>(H/V) | Reading<br>Level(dBuV) |       | Factor<br>(dB/m) | Emission Level<br>(dBuV) |       | Limit 3m<br>(dBuV/m) |       | Margin<br>(dB) |        |
|--------------------------------|-------------------|------------------------|-------|------------------|--------------------------|-------|----------------------|-------|----------------|--------|
|                                |                   | PK                     | AV    |                  | PK                       | AV    | PK                   | AV    | PK             | AV     |
| Operation Mode: TX Mode (Low)  |                   |                        |       |                  |                          |       |                      |       |                |        |
| 4804                           | V                 | 32.35                  | 21.29 | 14.63            | 46.98                    | 35.92 | 74.00                | 54.00 | -27.02         | -18.08 |
| 7206                           | V                 | 31.50                  | 18.76 | 20.68            | 52.18                    | 39.44 | 74.00                | 54.00 | -21.82         | -14.56 |
| ---                            |                   |                        |       |                  |                          |       |                      |       |                |        |
| 4804                           | H                 | 30.73                  | 19.66 | 14.63            | 45.36                    | 34.29 | 74.00                | 54.00 | -28.64         | -19.71 |
| 7206                           | H                 | 30.19                  | 19.43 | 20.68            | 50.87                    | 40.11 | 74.00                | 54.00 | -23.13         | -13.89 |
| ---                            |                   |                        |       |                  |                          |       |                      |       |                |        |
| Operation Mode: TX Mode (Mid)  |                   |                        |       |                  |                          |       |                      |       |                |        |
| 4884                           | V                 | 33.01                  | 21.87 | 14.98            | 47.99                    | 36.85 | 74.00                | 54.00 | -26.01         | -17.15 |
| 7326                           | V                 | 30.09                  | 19.83 | 20.93            | 51.02                    | 40.76 | 74.00                | 54.00 | -22.98         | -13.24 |
| ---                            |                   |                        |       |                  |                          |       |                      |       |                |        |
| 4884                           | H                 | 31.15                  | 21.12 | 14.98            | 46.13                    | 36.10 | 74.00                | 54.00 | -27.87         | -17.90 |
| 7326                           | H                 | 32.03                  | 20.84 | 20.93            | 52.96                    | 41.77 | 74.00                | 54.00 | -21.04         | -12.23 |
| ---                            |                   |                        |       |                  |                          |       |                      |       |                |        |
| Operation Mode: TX Mode (High) |                   |                        |       |                  |                          |       |                      |       |                |        |
| 4960                           | V                 | 33.08                  | 24.03 | 15.30            | 48.38                    | 39.33 | 74.00                | 54.00 | -25.62         | -14.67 |
| 7440                           | V                 | 30.45                  | 19.80 | 21.16            | 51.61                    | 40.96 | 74.00                | 54.00 | -22.39         | -13.04 |
| ---                            |                   |                        |       |                  |                          |       |                      |       |                |        |
| 4960                           | H                 | 32.02                  | 21.82 | 15.30            | 47.32                    | 37.12 | 74.00                | 54.00 | -26.68         | -16.88 |
| 7440                           | H                 | 30.33                  | 19.88 | 21.16            | 51.49                    | 41.04 | 74.00                | 54.00 | -22.51         | -12.96 |
| ---                            |                   |                        |       |                  |                          |       |                      |       |                |        |

**Other harmonics emissions are lower than 10dB below the allowable limit.**

- Note:**
- (1) All Readings are Peak Value and AV.
  - (2) Emission Level= Reading Level + Factor
  - (3) Factor= Antenna Gain + Cable Loss – Amplifier Gain
  - (4) Data of measurement within this frequency range shown “ --- ” in the table above means the reading of emissions are attenuated more than 10dB below the permissible limits.
  - (5) Measurement uncertainty :  $\pm 3.7\text{dB}$ .
  - (6) Horn antenna used for the emission over 1000MHz.

---

## 9. Antenna Application

### 9.1 Antenna requirement

According to of FCC part 15C section 15.203 and 15.240:

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

Systems operating in the 2400-2483.5MHz band that are used exclusively for fixed, point-to-point operations may employ transmitting antennas with directional gain greater than 6dBi provided the maximum peak output power of the intentional radiator is reduced by 1dB for every 3dB that the directional gain of the antenna exceeds 6dBi.

### 9.2 Measurement Results

The antenna is integral antenna and no consideration of replacement, and the best case gain of the antenna is -5.6dBi. So, the antenna is consider meet the requirement.

## 10. Test Equipment List

| Description                 | Manufacturer    | Model Number | Serial Number | Calibration Date | Calibration Due Date |
|-----------------------------|-----------------|--------------|---------------|------------------|----------------------|
| Test Receiver               | Rohde & Schwarz | ESCI7        | 100837        | Nov. 23, 2015    | Nov. 22, 2016        |
| Antenna                     | Schwarzbeck     | VULB9162     | 9162-010      | Nov. 26, 2015    | Nov. 25, 2016        |
| Cable                       | Huber+Suhner    | CBL2-NN-1M   | 22390001      | Nov. 07, 2015    | Nov. 06, 2016        |
| Power Amplifier             | HP              | HP 8447D     | 1145A00203    | Nov. 07, 2015    | Nov. 06, 2016        |
| Horn Antenna                | Schwarzbeck     | BBHA9170     | 9170-372      | Oct. 23, 2015    | Oct. 22, 2016        |
| Horn Antenna                | Com-Power       | AH-118       | 071078        | Nov. 05, 2015    | Nov. 04, 2016        |
| Spectrum Analyzer           | Rohde & Schwarz | FSU26        | 200409/026    | Sep. 01, 2015    | Aug. 31, 2016        |
| Pre-Amplifier               | Agilent         | 8449B        | 3008A02964    | Nov. 03, 2015    | Nov. 02, 2016        |
| Temporary antenna connector | TESCOM          | SS402        | N/A           | N/A              | N/A                  |
| Power Meter                 | Anritsu         | ML2495A      | 1139001       | Nov. 05, 2015    | Nov. 04, 2016        |
| Power Sensor                | Anritsu         | MA2411B      | 100345        | Nov. 05, 2015    | Nov. 04, 2016        |
| L.I.S.N.                    | Rohde & Schwarz | ENV 216      | 101317        | Nov. 07, 2015    | Nov. 06, 2016        |
| Loop antenna                | Daze            | ZA30900A     | 0708          | Oct.10, 2015     | Oct.09, 2016         |

Note: The temporary antenna connector is soldered on the PCB board in order to perform conducted tests and this temporary antenna connector is listed in the equipment list.

---End---