

# FCC TEST REPORT

## (PART 22)

**REPORT NO.:** RF120522C25 R1

**MODEL NO.:** U1 Lite

**FCC ID:** RLS-STAVL1213

**RECEIVED:** May 22, 2012

**TESTED:** Jul. 27 ~ Jul. 30, 2012

**ISSUED:** Aug. 21, 2012

**APPLICANT:** SYSTEMS & TECHNOLOGY CORP.

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**ISSUED BY:** Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch

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**TEST LOCATION:** No. 19, Hwa Ya 2nd Rd, Wen Hwa Tsuen, Kwei Shan Hsiang, Taoyuan Hsien 333, Taiwan, R.O.C.

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## TABLE OF CONTENTS

RELEASE CONTROL RECORD .....	3
1 CERTIFICATION .....	4
2 SUMMARY OF TEST RESULTS .....	5
2.1 MEASUREMENT UNCERTAINTY .....	5
2.2 TEST SITE AND INSTRUMENTS .....	6
3 GENERAL INFORMATION .....	7
3.1 GENERAL DESCRIPTION OF EUT .....	7
3.2 CONFIGURATION OF SYSTEM UNDER TEST .....	8
3.3 DESCRIPTION OF SUPPORT UNITS .....	8
3.4 TEST ITEM AND TEST CONFIGURATION .....	9
3.5 EUT OPERATING CONDITIONS .....	10
3.6 GENERAL DESCRIPTION OF APPLIED STANDARDS .....	10
4 TEST TYPES AND RESULTS .....	11
4.1 OUTPUT POWER MEASUREMENT .....	11
4.1.1 LIMITS OF OUTPUT POWER MEASUREMENT .....	11
4.1.2 TEST PROCEDURES .....	11
4.1.3 TEST SETUP .....	12
4.1.4 TEST RESULTS .....	13
4.2 FREQUENCY STABILITY MEASUREMENT .....	15
4.2.1 LIMITS OF FREQUENCY STABILITY MEASUREMENT .....	15
4.2.2 TEST PROCEDURE .....	15
4.2.3 TEST SETUP .....	15
4.2.4 TEST RESULTS .....	16
4.3 OCCUPIED BANDWIDTH MEASUREMENT .....	17
4.3.1 TEST PROCEDURES .....	17
4.3.2 TEST SETUP .....	17
4.3.3 TEST RESULTS .....	18
4.4 BAND EDGE MEASUREMENT .....	19
4.4.1 LIMITS OF BAND EDGE MEASUREMENT .....	19
4.4.2 TEST SETUP .....	19
4.4.3 TEST PROCEDURES .....	19
4.4.4 TEST RESULTS .....	20
4.5 CONDUCTED SPURIOUS EMISSIONS .....	21
4.5.1 LIMITS OF CONDUCTED SPURIOUS EMISSIONS MEASUREMENT .....	21
4.5.2 TEST PROCEDURE .....	21
4.5.3 TEST SETUP .....	21
4.5.4 TEST RESULTS .....	22
4.6 RADIATED EMISSION MEASUREMENT .....	28
4.6.1 LIMITS OF RADIATED EMISSION MEASUREMENT .....	28
4.6.2 TEST PROCEDURES .....	28
4.6.3 DEVIATION FROM TEST STANDARD .....	28
4.6.4 TEST SETUP .....	29
4.6.5 TEST RESULTS .....	30
5 PHOTOGRAPHS OF THE TEST CONFIGURATION .....	34
6 INFORMATION ON THE TESTING LABORATORIES .....	35
7 APPENDIX A – MODIFICATIONS RECORDERS FOR ENGINEERING CHANGES TO THE EUT BY THE LAB .....	36



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## RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
RF120522C25	Original release	Aug. 09, 2012
RF120522C25 R1	Changed model	Aug. 21, 2012



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## 1 CERTIFICATION

**PRODUCT:** GPS Vehicle Tracking Device

**MODEL:** U1 Lite

**BRAND:** CAREU

**APPLICANT:** SYSTEMS & TECHNOLOGY CORP.

**TESTED:** Jul. 27 ~ Jul. 30, 2012

**TEST SAMPLE:** Identical Prototype

**STANDARDS:** FCC PART 22, Subpart H

The above equipment (model: U1 Lite) has been tested by **Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's EMC characteristics under the conditions specified in this report.

**PREPARED BY** :  , **DATE** : Aug. 21, 2012  
Pettie Chen / Senior Specialist

**APPROVED BY** :  , **DATE** : Aug. 21, 2012  
Gary Chang / Technical Manager

## 2 SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

APPLIED STANDARD: FCC Part 22 & Part 2			
STANDARD SECTION	TEST TYPE	RESULT	REMARK
2.1046 22.913 (a)	Effective radiated power	PASS	Meet the requirement of limit.
2.1055 22.355	Frequency Stability	PASS	Meet the requirement of limit.
2.1049	Occupied Bandwidth	PASS	Meet the requirement of limit.
22.917	Band Edge Measurements	PASS	Meet the requirement of limit.
2.1051 22.917	Conducted Spurious Emissions	PASS	Meet the requirement of limit.
2.1053 22.917	Radiated Spurious Emissions	PASS	Meet the requirement of limit. Minimum passing margin is -18.61dB at 226.33MHz.

### 2.1 MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

MEASUREMENT	FREQUENCY	UNCERTAINTY
Conducted emissions	150kHz~30MHz	2.44 dB
Radiated emissions	30MHz ~ 200MHz	3.34 dB
	200MHz ~1000MHz	3.35 dB
	1GHz ~ 18GHz	2.26 dB
	18GHz ~ 40GHz	1.94 dB

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

## 2.2 TEST SITE AND INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	DATE OF CALIBRATION	DUE DATE OF CALIBRATION
Test Receiver ROHDE & SCHWARZ	ESIB7	100212	Aug. 06, 2012	Aug. 05, 2013
Spectrum Analyzer ROHDE & SCHWARZ	FSP40	100039	Feb. 03, 2012	Feb. 02, 2013
BILOG Antenna SCHWARZBECK	VULB9168	9168-160	Apr. 06, 2012	Apr. 05, 2013
HORN Antenna SCHWARZBECK	9120D	209	Aug. 25, 2011	Aug. 24, 2012
HORN Antenna SCHWARZBECK	BBHA 9170	148	Jul. 11, 2012	Jul. 10, 2013
Loop Antenna	HFH2-Z2	100070	Jan. 31, 2012	Jan. 30, 2014
Preamplifier Agilent	8447D	2944A10633	Oct. 29, 2011	Oct. 28, 2012
Preamplifier Agilent	8449B	3008A01964	Oct. 29, 2011	Oct. 28, 2012
RF signal cable HUBER+SUHNNER	SUCOFLEX 104	250723/4	Aug. 30, 2011	Aug. 29, 2012
RF signal cable HUBER+SUHNNER	SUCOFLEX 106	12738/6+309224/4	Aug. 30, 2011	Aug. 29, 2012
Software ADT.	ADT_Radiated_ V7.6.15.9.2	NA	NA	NA
Antenna Tower inn-co GmbH	MA 4000	013303	NA	NA
Antenna Tower Controller inn-co GmbH	CO2000	017303	NA	NA
Turn Table ADT.	TT100	TT93021703	NA	NA
Turn Table Controller ADT.	SC100	SC93021703	NA	NA
Standard Temperature & Humidity Chamber WIT	MHU-225AU	920409	May 24, 2012	May 23, 2013
Mini-Circuits Power Splitter	ZN2PD-9G	NA	Mar. 23, 2012	Mar. 22, 2013
JFW 20dB attenuation	50HF-020-SMA	NA	NA	NA
Communications Tester-Wireless	E5515C	MY50266653	Sep. 28, 2011	Sep. 27, 2012

- NOTE:**
1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
  2. The calibration interval of the loop antenna is 24 months and the calibrations are traceable to NML/ROC and NIST/USA.
  3. The test was performed in HwaYa Chamber 3.
  4. The horn antenna and HP preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.
  5. The FCC Site Registration No. is 988962.
  6. The IC Site Registration No. is IC 7450F-3.

### 3 GENERAL INFORMATION

#### 3.1 GENERAL DESCRIPTION OF EUT

<b>EUT</b>	GPS Vehicle Tracking Device
<b>MODEL NO.</b>	U1 Lite
<b>HW Version</b>	U1-Lite Rev:A
<b>SW Version</b>	U1Lite0.9r05
<b>POWER SUPPLY</b>	3.7Vdc (battery) 24Vdc (Car battery)
<b>MODULATION TYPE</b>	<b>GSM, GPRS:</b> GMSK
<b>FREQUENCY RANGE</b>	<b>GSM, GPRS:</b> 824.2MHz ~ 848.8MHz
<b>MAX. ERP POWER</b>	<b>GSM:</b> 0.332Watts (25.21dBm) <b>GPRS:</b> 0.305Watts (24.85dBm)
<b>MULTI-SLOTS CLASS</b>	10
<b>ANTENNA TYPE</b>	Fixed External antenna with -5dBi gain
<b>I/O PORTS</b>	Refer to users' manual
<b>DATA CABLE</b>	N/A
<b>ACCESSORY DEVICES</b>	Refer to Note

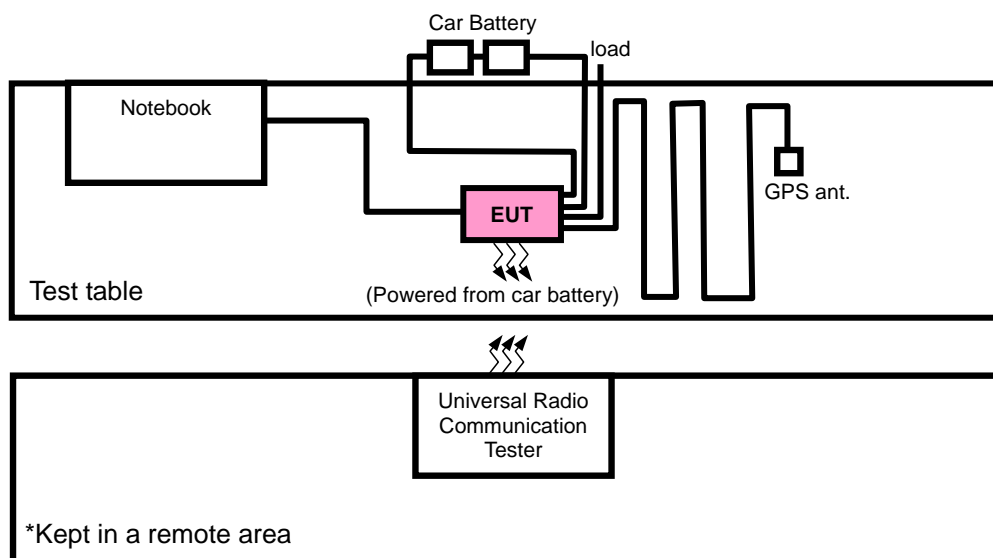
#### NOTE:

1. The EUT's accessories list as below.

Item	Brand Name	Model Name	Remark
GSM Antenna	Ever Great	ANT9091-HM	-
GPS Antenna	ACC	M827B-S	-
2G Module	u-Blox	Leon-G100	-
Battery	Wansglory	F-O-000807-KX	3.7V/1150mAh Li-ion battery pack

2. The above EUT information was declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications or User's Manual.

### 3.2 CONFIGURATION OF SYSTEM UNDER TEST



### 3.3 DESCRIPTION OF SUPPORT UNITS

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

NO.	PRODUCT	BRAND	MODEL NO.	SERIAL NO.	FCC ID
1	Notebook	DELL	E5410	1HC2XM1	FCC DoC Approved
2	Car Battery	YUASA	36B20R	NA	NA
3	Car Battery	YUASA	36B20R	NA	NA

NO.	SIGNAL CABLE DESCRIPTION OF THE ABOVE SUPPORT UNITS
1	1.8m USB cable
2	NA
3	NA

**NOTE:** All power cords of the above support units are non shielded (1.8m).

### 3.4 TEST ITEM AND TEST CONFIGURATION

Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates, XYZ axis and antenna ports. The worst case was found when positioned on Z-plane for ERP and Z-axis for radiated emission. Following channel(s) was (were) selected for the final test as listed below:

#### GSM MODE

EUT CONFIGURE MODE	TEST ITEM	AVAILABLE CHANNEL	TESTED CHANNEL	MODE
-	ERP	128 to 251	128, 189, 251	GSM, GPRS
-	FREQUENCY STABILITY	128 to 251	189	GSM
-	OCCUPIED BANDWIDTH	128 to 251	128, 189, 251	GSM, GPRS
-	BAND EDGE	128 to 251	128, 251	GSM, GPRS
-	CONDUCTED EMISSION	128 to 251	128, 189, 251	GSM, GPRS
-	RADIATED EMISSION <1G	128 to 251	189	GSM
-	RADIATED EMISSION ≥1G	128 to 251	128, 189, 251	GSM

#### TEST CONDITION:

TEST ITEM	ENVIRONMENTAL CONDITIONS	INPUT POWER	TESTED BY
ERP	25deg. C, 65%RH	24Vdc	Haru Yang
FREQUENCY STABILITY	25deg. C, 65%RH	24Vdc	Haru Yang
OCCUPIED BANDWIDTH	25deg. C, 65%RH	24Vdc	Haru Yang
BAND EDGE	25deg. C, 65%RH	24Vdc	Haru Yang
CONDUCTED EMISSION	25deg. C, 65%RH	24Vdc	Haru Yang
RADIATED EMISSION	25deg. C, 65%RH	24Vdc	Haru Yang

### **3.5 EUT OPERATING CONDITIONS**

The EUT makes a call to the communication simulator. The communication simulator station system controlled a EUT to export maximum output power under transmission mode and specific channel frequency

### **3.6 GENERAL DESCRIPTION OF APPLIED STANDARDS**

The EUT is a RF product. According to the specifications of the manufacturer, it must comply with the requirements of the following standards:

**FCC 47 CFR Part 2**

**FCC 47 CFR Part 22**

**ANSI/TIA/EIA-603-C 2004**

**NOTE:** All test items have been performed and recorded as per the above standards.

## 4 TEST TYPES AND RESULTS

### 4.1 OUTPUT POWER MEASUREMENT

#### 4.1.1 LIMITS OF OUTPUT POWER MEASUREMENT

Mobile / Portable station are limited to 7 watts e.r.p.

#### 4.1.2 TEST PROCEDURES

##### EIRP / ERP MEASUREMENT:

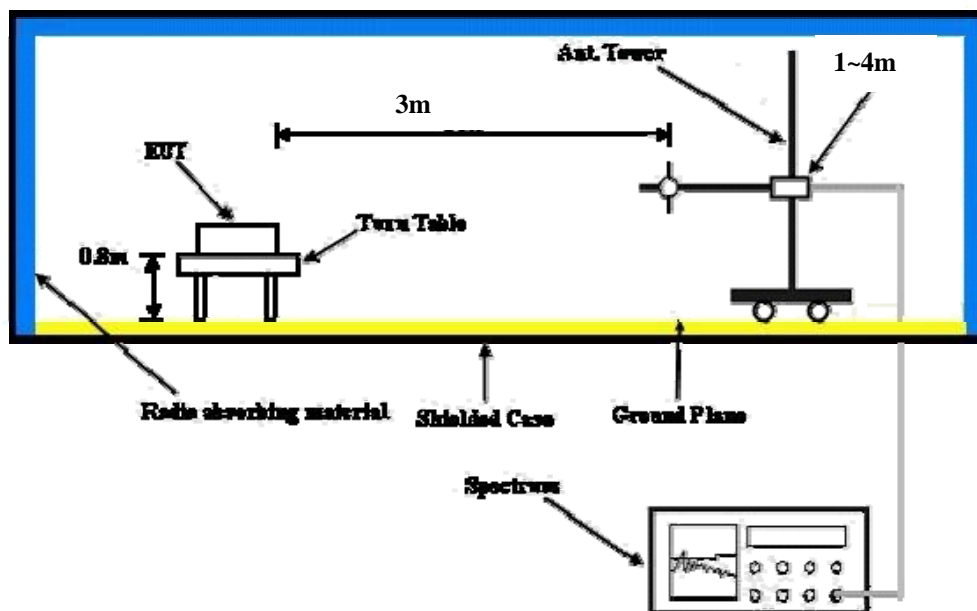
- a. All measurements were done at low, middle and high operational frequency range. RBW and VBW is 1MHz for GSM, GPRS mode.
- b. Substitution method is used for E.I.R.P measurement. In the semi-anechoic chamber, EUT placed on the 0.8m height of Turn Table, rotated the table around 360 degrees to search the maximum radiation power and receiver antenna shall be rotated vertical and horizontal polarization and moved height from 1m to 4m to find the maximum polar radiated power. The "Read Value" is the spectrum reading the maximum power value.
- c. The substitution horn antenna is substituted for EUT at the same position and signals generator export the CW signal to the substitution antenna via a tx cable. Rotated the Turn Table and moved receiving antenna to find the maximum radiation power. Adjust output power level of S.G to get a Value of spectrum reading equal to "Read Value " of step b. Record the power level of S.G
- d.  $EIRP = \text{Output power level of S.G} - \text{TX cable loss} + \text{Antenna gain of substitution horn}$ . E.R.P power can be calculated form E.I.R.P power by subtracting the gain of dipole,  $E.R.P \text{ power} = E.I.P.R \text{ power} - 2.15\text{dBi}$ .

##### CONDUCTED POWER MEASUREMENT:

The EUT was set up for the maximum power with GSM, GPRS link data modulation and link up with simulator. Set the EUT to transmit under low, middle and high channel and record the power level shown on simulator.

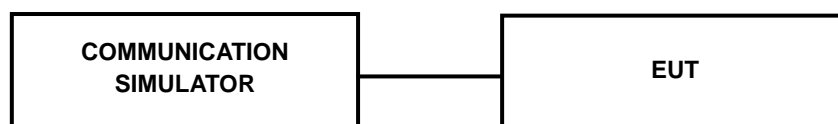
### 4.1.3 TEST SETUP

#### EIRP / ERP MEASUREMENT:



For the actual test configuration, please refer to the attached file (Test Setup Photo).

#### CONDUCTED POWER MEASUREMENT:



For the actual test configuration, please refer to the attached file (Test Setup Photo).

#### 4.1.4 TEST RESULTS

##### CONDUCTED OUTPUT POWER (dBm)

Band	GSM850		
Channel	128	189	251
Frequency (MHz)	824.2	836.4	848.8
GSM (1 Uplink)	32.16	32.25	31.98
GPRS 8 (1 Uplink)	32.14	32.22	31.93
GPRS 10 (2 Uplink)	30.82	30.83	30.43

##### ERP POWER

##### FOR GSM MODE:

MODE		TX channel 128					
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	ERP (dBm)	Limit (dBm)	Margin (dB)
1	824.20	-7.6	25.77	0	23.62	38.45	-14.83
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	ERP (dBm)	Limit (dBm)	Margin (dB)
1	824.20	-10.20	21.27	0.00	19.12	38.45	-19.33

NOTE: ERP (dBm) = S.G Power Value (dBm) + Correction Factor (dB)-2.15dB.

MODE		TX channel 189					
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	ERP (dBm)	Limit (dBm)	Margin (dB)
1	836.40	-6.20	26.54	0.00	24.39	38.45	-14.06
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	ERP (dBm)	Limit (dBm)	Margin (dB)
1	836.40	-9.50	22.77	0.00	20.62	38.45	-17.83

NOTE: ERP (dBm) = S.G Power Value (dBm) + Correction Factor (dB)-2.15dB.

MODE		TX channel 251					
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	ERP (dBm)	Limit (dBm)	Margin (dB)
1	848.80	-5.50	26.85	0.51	25.21	38.45	-13.24
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	ERP (dBm)	Limit (dBm)	Margin (dB)
1	848.80	-9.10	23.81	0.51	22.17	38.45	-16.28

NOTE: ERP (dBm) = S.G Power Value (dBm) + Correction Factor (dB)-2.15dB.

# FOR GPRS MODE:

MODE		TX channel 128					
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	ERP (dBm)	Limit (dBm)	Margin (dB)
1	824.20	-7.92	25.45	0.00	23.30	38.45	-15.15
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	ERP (dBm)	Limit (dBm)	Margin (dB)
1	824.20	-10.58	20.89	0.00	18.74	38.45	-19.71

NOTE: ERP (dBm) = S.G Power Value (dBm) + Correction Factor (dB)-2.15dB.

MODE		TX channel 189					
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	ERP (dBm)	Limit (dBm)	Margin (dB)
1	836.40	-6.52	26.22	0.00	24.07	38.45	-14.38
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	ERP (dBm)	Limit (dBm)	Margin (dB)
1	836.40	-9.91	22.36	0.00	20.21	38.45	-18.24

NOTE: ERP (dBm) = S.G Power Value (dBm) + Correction Factor (dB)-2.15dB.

MODE		TX channel 251					
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	ERP (dBm)	Limit (dBm)	Margin (dB)
1	848.80	-5.86	26.49	0.51	24.85	38.45	-13.60
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	ERP (dBm)	Limit (dBm)	Margin (dB)
1	848.80	-9.45	23.46	0.51	21.82	38.45	-16.63

NOTE: ERP (dBm) = S.G Power Value (dBm) + Correction Factor (dB)-2.15dB.

## 4.2 FREQUENCY STABILITY MEASUREMENT

### 4.2.1 LIMITS OF FREQUENCY STABILITY MEASUREMENT

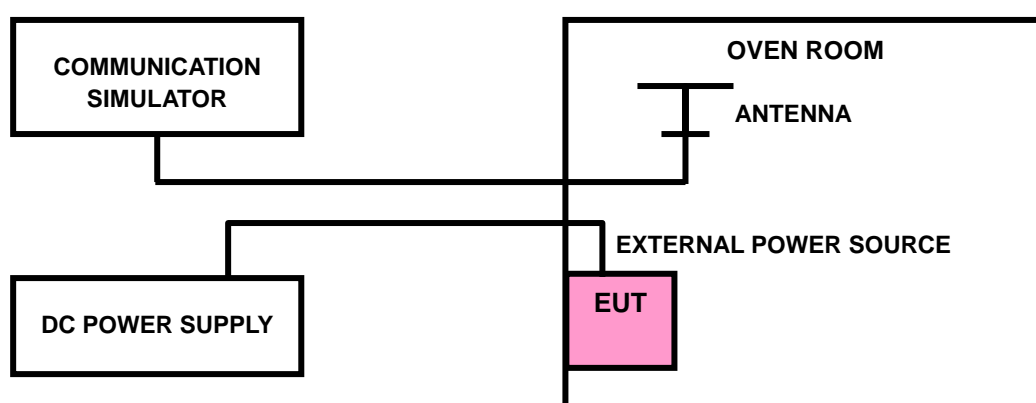
1.5 ppm is for base and fixed station. 2.5 ppm is for mobile station.

### 4.2.2 TEST PROCEDURE

- Device is placed at the oven room. The oven room could control the temperatures and humidity. Power warm up is at least 15 min and power applied should perform before recording frequency error.
- EUT is connected the external power supply to control the DC input power. The test voltage range is from minimum to maximum working voltage. Each step shall be record the frequency error rate.
- The temperature range step is 10 degrees in this test items. All temperature levels shall be hold the  $\pm 0.5^{\circ}\text{C}$  during the measurement testing. The each temperature step shall be at least 0.5 hours, consider the EUT could be test under the stability condition.

**NOTE:** The frequency error was recorded frequency error from the communication simulator.

### 4.2.3 TEST SETUP



#### 4.2.4 TEST RESULTS

##### FREQUENCY ERROR VS. VOLTAGE

VOLTAGE (Volts)	FREQUENCY ERROR (ppm)	LIMIT (ppm)
	GSM	
4.2	-0.020	2.5
3.65	-0.019	2.5

**NOTE:** The applicant defined the normal working voltage of the battery is from 3.65Vdc to 4.2Vdc.

##### FREQUENCY ERROR vs. TEMPERATURE.

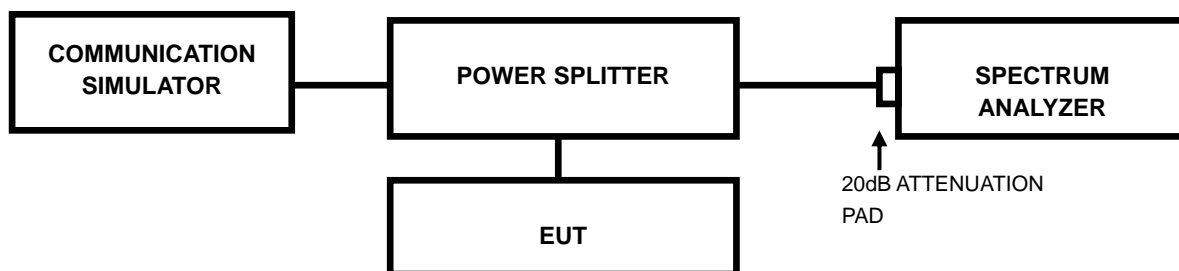
TEMP. (°C)	FREQUENCY ERROR (ppm)	LIMIT (ppm)
	GSM	
50	-0.023	2.5
40	-0.023	2.5
30	-0.022	2.5
20	-0.022	2.5
10	-0.022	2.5
0	-0.020	2.5
-10	-0.020	2.5
-20	-0.019	2.5
-30	-0.018	2.5

## 4.3 OCCUPIED BANDWIDTH MEASUREMENT

### 4.3.1 TEST PROCEDURES

The EUT makes a call to the communication simulator. All measurements were done at low, middle and high operational frequency range. The communication simulator station system controlled a EUT to export maximum output power under transmission mode and specific channel frequency. Use OBW measurement function of Spectrum analyzer to measure 99 % occupied bandwidth.

### 4.3.2 TEST SETUP

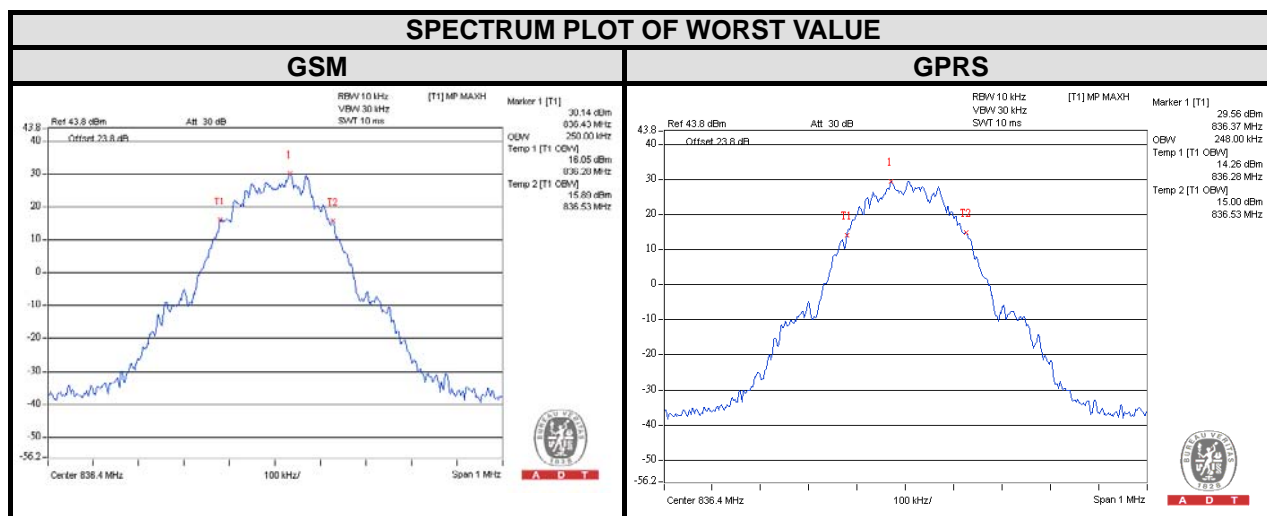




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### 4.3.3 TEST RESULTS

CHANNEL	FREQUENCY (MHz)	99% OCCUPIED BANDWIDTH (kHz)	
		GSM	GPRS
128	824.2	246.00	246.00
189	836.4	250.00	248.00
251	848.8	244.00	246.00

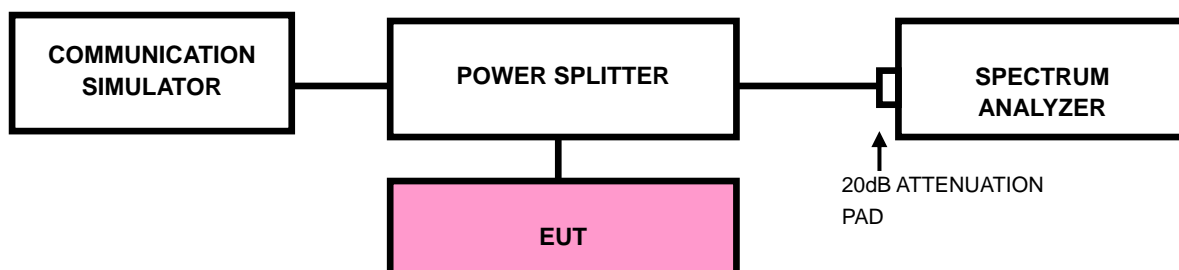


## 4.4 BAND EDGE MEASUREMENT

### 4.4.1 LIMITS OF BAND EDGE MEASUREMENT

Power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least  $43 + 10 \log(P)$  dB. In the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed.

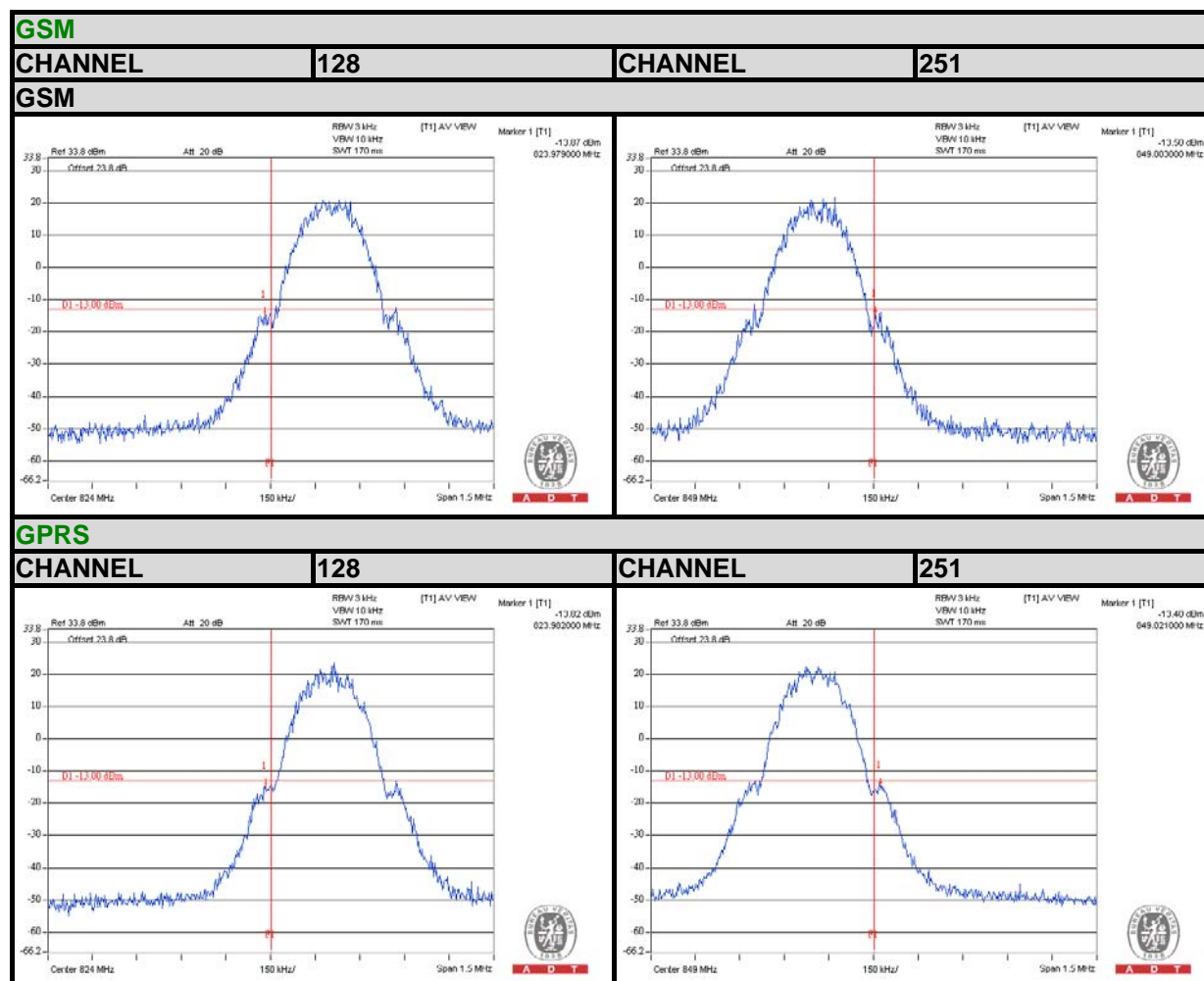
### 4.4.2 TEST SETUP



### 4.4.3 TEST PROCEDURES

- All measurements were done at low and high operational frequency range.
- The center frequency of spectrum is the band edge frequency and span is 1.5 MHz. RB of the spectrum is 3kHz and VB of the spectrum is 10kHz (GSM/GPRS).
- Record the max trace plot into the test report.

## 4.4.4 TEST RESULTS



## 4.5 CONDUCTED SPURIOUS EMISSIONS

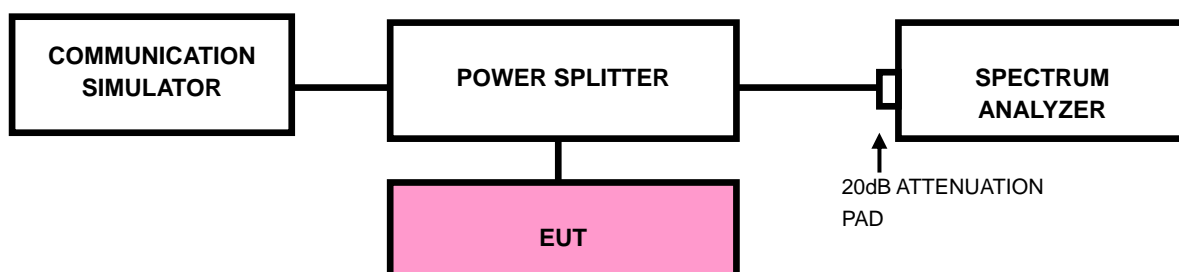
### 4.5.1 LIMITS OF CONDUCTED SPURIOUS EMISSIONS MEASUREMENT

The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least  $43 + 10 \log(P)$  dB. The emission limit equal to  $-13\text{dBm}$ .

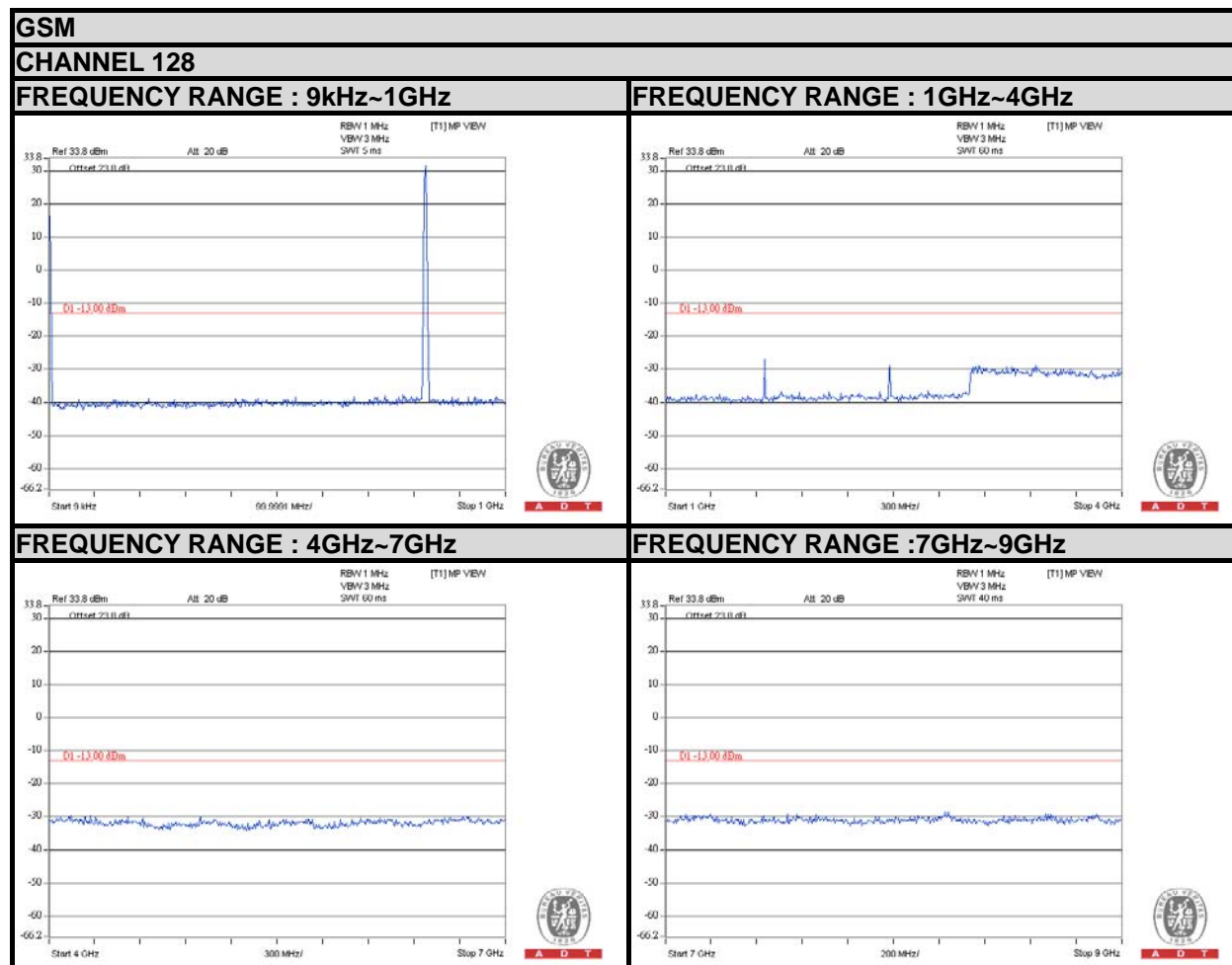
### 4.5.2 TEST PROCEDURE

- The EUT makes a phone call to the communication simulator. All measurements were done at low, middle and high operational frequency range.
- Measuring frequency range is from 9 kHz to 9GHz. 20dB attenuation pad is connected with spectrum. RBW=1MHz and VBW=3MHz is used for conducted emission measurement.

### 4.5.3 TEST SETUP



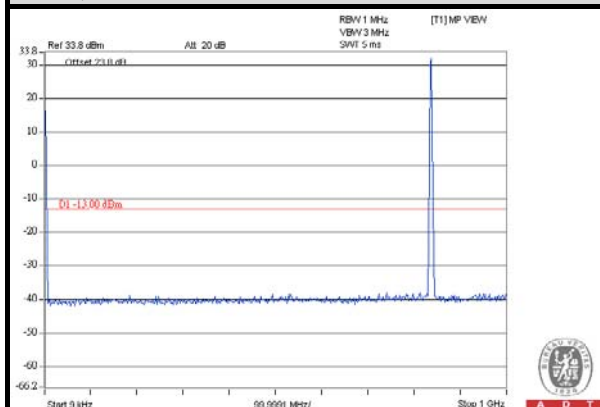
## 4.5.4 TEST RESULTS



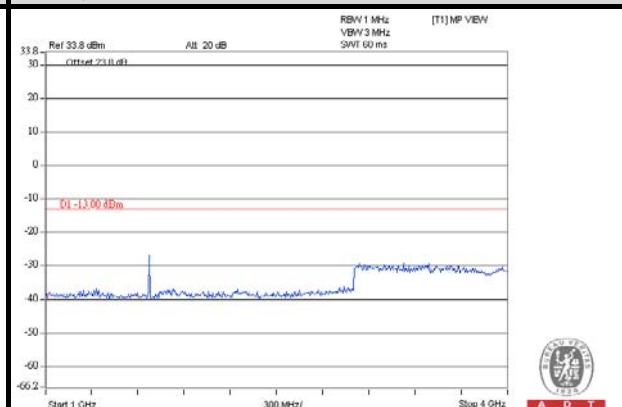
# GSM

## CHANNEL 189

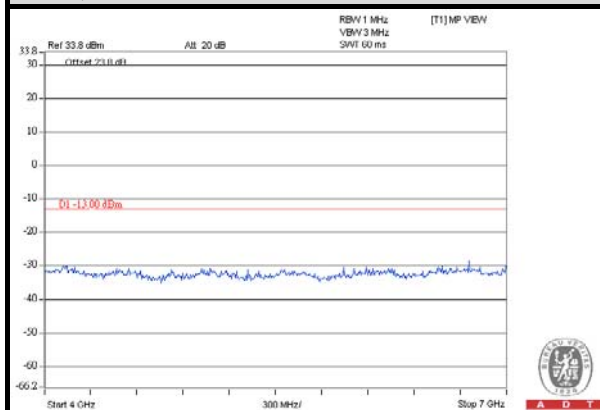
### FREQUENCY RANGE : 9kHz~1GHz



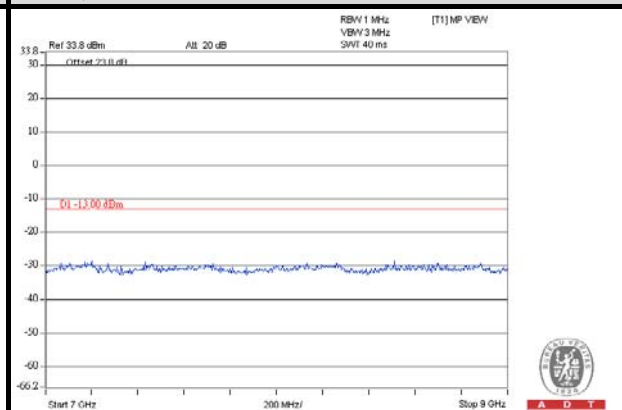
### FREQUENCY RANGE : 1GHz~4GHz



### FREQUENCY RANGE : 4GHz~7GHz



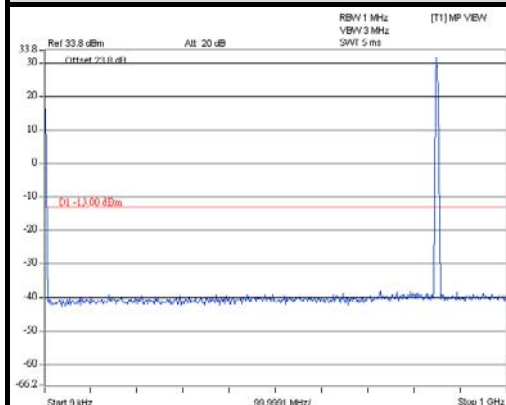
### FREQUENCY RANGE : 7GHz~9GHz



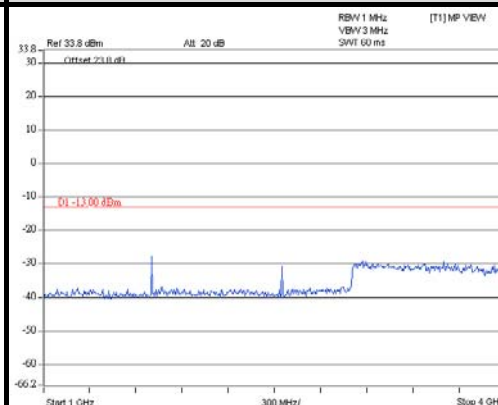
# GSM

## CHANNEL 251

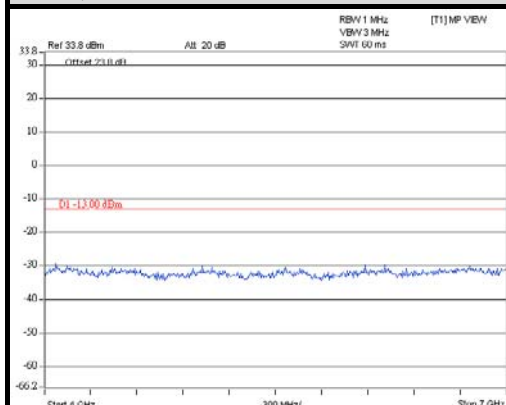
### FREQUENCY RANGE : 9kHz~1GHz



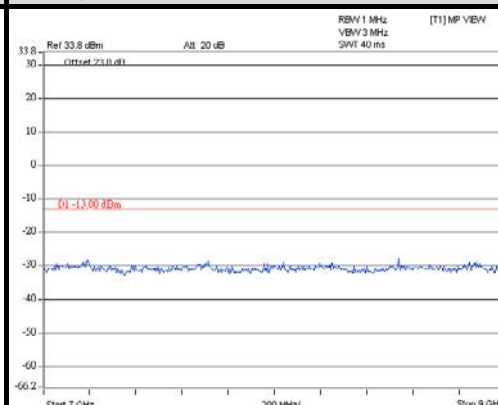
### FREQUENCY RANGE : 1GHz~4GHz



### FREQUENCY RANGE : 4GHz~7GHz



### FREQUENCY RANGE : 7GHz~9GHz



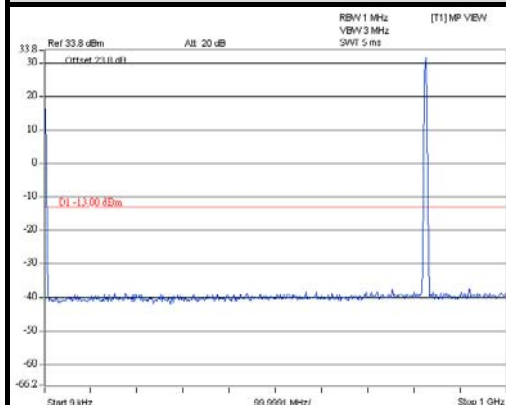


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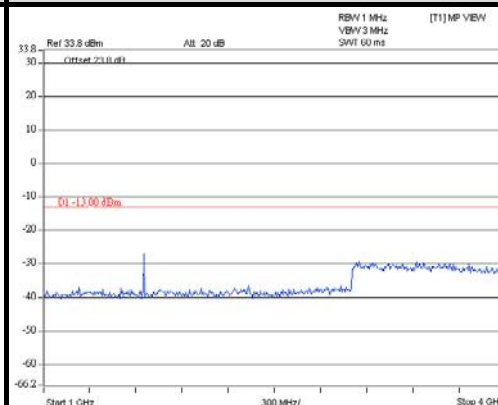
## GPRS

### CHANNEL 128

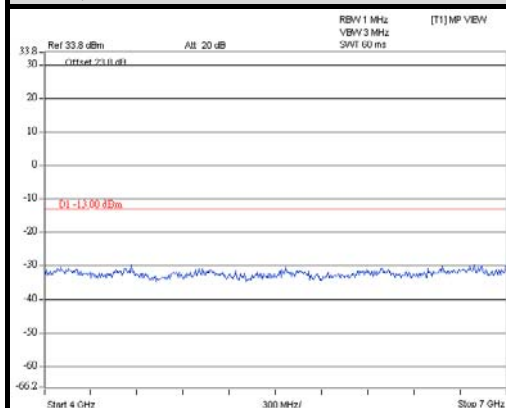
#### FREQUENCY RANGE : 9kHz~1GHz



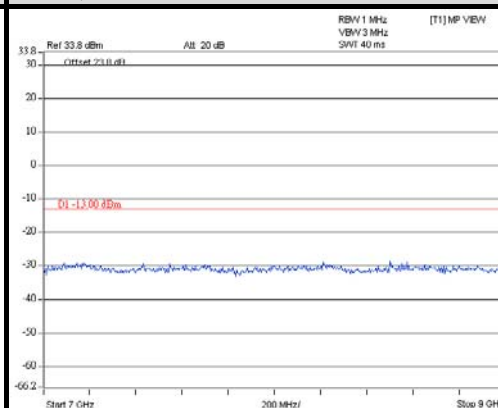
#### FREQUENCY RANGE : 1GHz~4GHz



#### FREQUENCY RANGE : 4GHz~7GHz



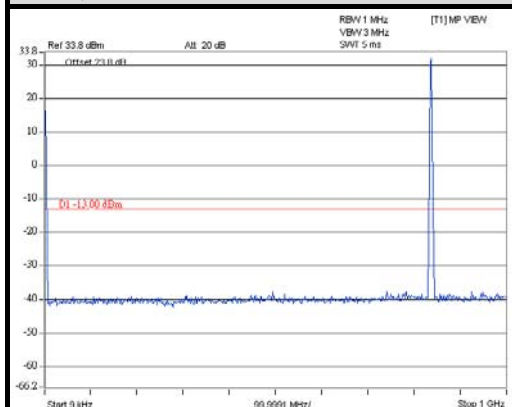
#### FREQUENCY RANGE : 7GHz~9GHz



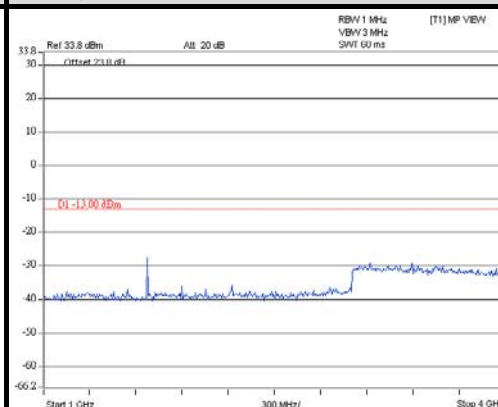
# GPRS

## CHANNEL 189

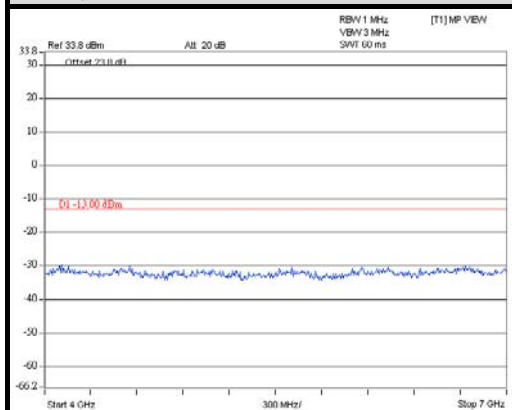
### FREQUENCY RANGE : 9kHz~1GHz



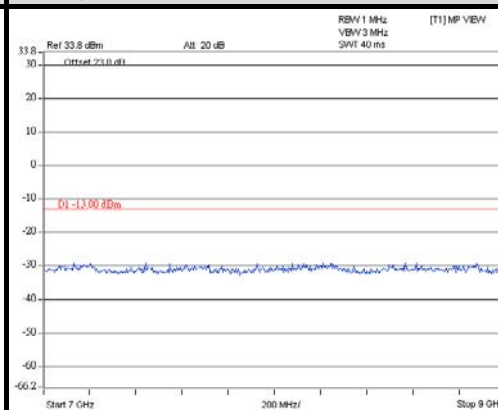
### FREQUENCY RANGE : 1GHz~4GHz



### FREQUENCY RANGE : 4GHz~7GHz



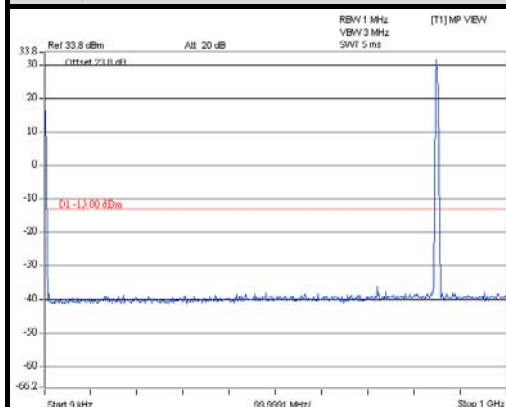
### FREQUENCY RANGE : 7GHz~9GHz



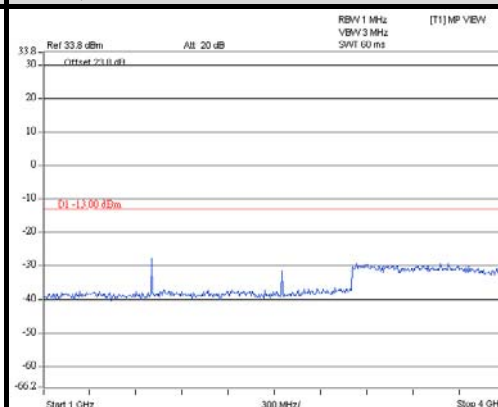
# GPRS

## CHANNEL 251

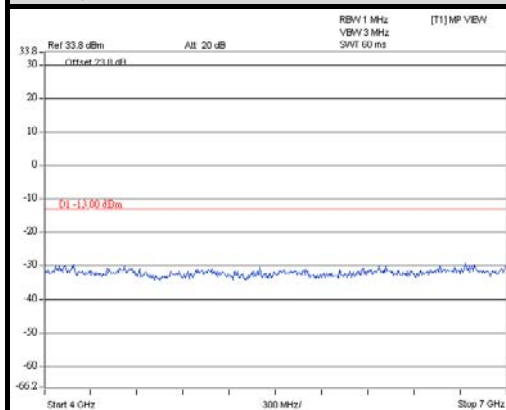
### FREQUENCY RANGE : 9kHz~1GHz



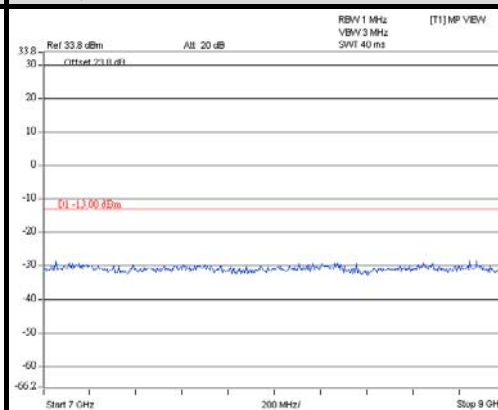
### FREQUENCY RANGE : 1GHz~4GHz



### FREQUENCY RANGE : 4GHz~7GHz



### FREQUENCY RANGE : 7GHz~9GHz



## 4.6 RADIATED EMISSION MEASUREMENT

### 4.6.1 LIMITS OF RADIATED EMISSION MEASUREMENT

The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least  $43 + 10 \log(P)$  dB. The emission limit equal to  $-13\text{dBm}$ .

### 4.6.2 TEST PROCEDURES

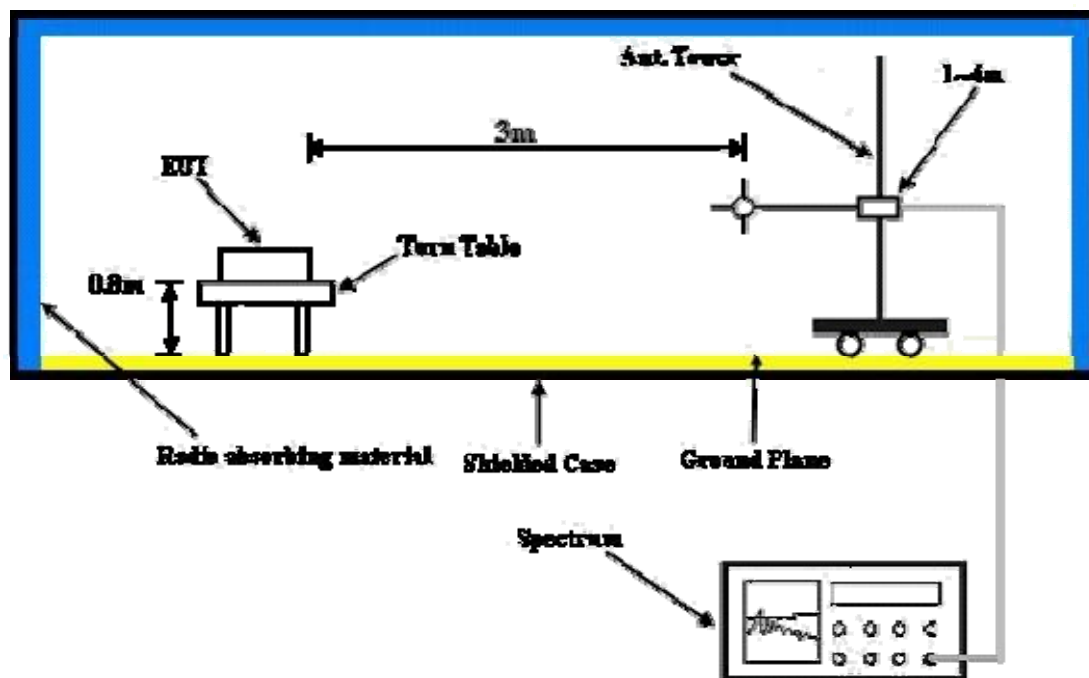
- a. Substitution method is used for E.I.R.P measurement. In the semi-anechoic chamber, EUT placed on the 0.8m height of Turn Table, rotated the table around 360 degrees to search the maximum radiation power and receiver antenna shall be rotated vertical and horizontal polarization and moved height from 1m to 4m to find the maximum polar radiated power. The “Read Value” is the spectrum reading the maximum power value.
- b. The substitution horn antenna is substituted for EUT at the same position and signals generator export the CW signal to the substitution antenna via a TX cable. Rotated the Turn Table and moved receiving antenna to find the maximum radiation power. Adjust output power level of S.G to get a Value of spectrum reading equal to “Read Value” of step a. Record the power level of S.G
- c.  $\text{EIRP} = \text{Output power level of S.G} - \text{TX cable loss} + \text{Antenna gain of substitution horn}.$
- d. E.R.P power can be calculated form E.I.R.P power by subtracting the gain of dipole,  
 $\text{E.R.P power} = \text{E.I.P.R power} - 2.15\text{dBi}.$

**NOTE:** The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 1MHz/3MHz.

### 4.6.3 DEVIATION FROM TEST STANDARD

No deviation

#### 4.6.4 TEST SETUP



For the actual test configuration, please refer to the attached file (Test Setup Photo).

## 4.6.5 TEST RESULTS

### Below 1GHz

#### GSM:

<b>FREQUENCY RANGE</b>	Below 1000MHz	<b>INPUT POWER</b>	120Vac, 60 Hz
<b>ENVIRONMENTAL CONDITIONS</b>	25deg. C, 65%RH	<b>TESTED BY</b>	Haru Yang

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	ERP (dBm)	Limit (dBm)	Margin (dB)
1	41.66	-40.27	-45.08	4.81	-42.42	-13.00	-29.42
2	119.42	-38.41	-42.90	4.49	-40.56	-13.00	-27.56
3	226.33	-29.46	-33.66	4.20	-31.61	-13.00	-18.61
4	405.17	-42.94	-46.76	3.82	-45.09	-13.00	-32.09
5	525.69	-48.01	-51.62	3.61	-50.16	-13.00	-37.16
6	836.71	-51.31	-54.47	3.16	-53.46	-13.00	-40.46
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	ERP (dBm)	Limit (dBm)	Margin (dB)
1	30.00	-27.49	-39.72	4.87	-37.00	-13.00	-24.00
2	76.65	-33.93	-43.76	4.66	-41.25	-13.00	-28.25
3	224.39	-34.88	-41.58	4.20	-39.53	-13.00	-26.53
4	364.35	-42.91	-47.17	3.89	-45.43	-13.00	-32.43
5	537.35	-49.47	-50.76	3.59	-49.32	-13.00	-36.32
6	836.71	-52.72	-48.08	3.16	-47.07	-13.00	-34.07

#### REMARKS:

1. Power Value (dBm) = S.G Power Value (dBm) + Correction Factor (dB).
2. Correction Factor (dB) = Substitution Antenna Gain (dB) + Cable Loss (dB).



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**Above 1GHz****GSM:**

<b>MODE</b>	Channel 128	<b>FREQUENCY RANGE</b>	Above 1000MHz
<b>INPUT POWER</b>	120Vac, 60 Hz	<b>ENVIRONMENTAL CONDITIONS</b>	25deg. C, 65%RH
<b>TESTED BY</b>	Haru Yang		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	ERP (dBm)	Limit (dBm)	Margin (dB)
1	1648.40	-55.3	-55.88	5.48	-52.55	-13.00	-39.55
2	2472.60	-67.4	-65.21	6.43	-60.93	-13.00	-47.93
3	3296.80	-67.1	-63.34	6.87	-58.62	-13.00	-45.62
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	ERP (dBm)	Limit (dBm)	Margin (dB)
1	1648.40	-56.10	-58.62	5.48	-55.29	-13.00	-42.29
2	2472.60	-67.10	-64.75	6.43	-60.47	-13.00	-47.47
3	3296.80	-67.80	-64.44	6.87	-59.72	-13.00	-46.72

**REMARKS:**

1.  $ERP(dBm) = S.G \text{ Power Value (dBm)} + \text{Correction Factor (dB)}$ .
2.  $\text{Correction Factor} = \text{gain of substitution antenna} + \text{cable loss}$



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MODE	Channel 189	FREQUENCY RANGE	Above 1000MHz
INPUT POWER	120Vac, 60 Hz	ENVIRONMENTAL CONDITIONS	25deg. C, 65%RH
TESTED BY	Haru Yang		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	ERP (dBm)	Limit (dBm)	Margin (dB)
1	1672.80	-55.00	-55.68	5.54	-52.29	-13.00	-39.29
2	2509.20	-67.10	-64.75	6.45	-60.45	-13.00	-47.45
3	3345.60	-66.80	-63.13	6.94	-58.34	-13.00	-45.34
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	ERP (dBm)	Limit (dBm)	Margin (dB)
1	1672.80	-55.80	-58.28	5.54	-54.89	-13.00	-41.89
2	2509.20	-66.80	-64.42	6.45	-60.12	-13.00	-47.12
3	3345.60	-67.40	-63.98	6.94	-59.19	-13.00	-46.19

**REMARKS:**

1. ERP(dBm) = S.G Power Value (dBm) + Correction Factor (dB).
2. Correction Factor = gain of substitution antenna + cable loss



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MODE	Channel 251	FREQUENCY RANGE	Above 1000MHz
INPUT POWER	120Vac, 60 Hz	ENVIRONMENTAL CONDITIONS	25deg. C, 65%RH
TESTED BY	Haru Yang		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	ERP (dBm)	Limit (dBm)	Margin (dB)
1	1697.60	-54.60	-55.38	5.59	-51.94	-13.00	-38.94
2	2546.40	-66.50	-63.89	6.44	-59.60	-13.00	-46.60
3	3395.20	-66.10	-62.52	7.02	-57.65	-13.00	-44.65
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	ERP (dBm)	Limit (dBm)	Margin (dB)
1	1697.60	-55.20	-57.64	5.59	-54.20	-13.00	-41.20
2	2546.40	-66.50	-64.20	6.44	-59.91	-13.00	-46.91
3	3395.20	-67.10	-63.63	7.02	-58.76	-13.00	-45.76

**REMARKS:**

1.  $ERP(dBm) = S.G \text{ Power Value (dBm)} + \text{Correction Factor (dB)}$ .
2.  $\text{Correction Factor} = \text{gain of substitution antenna} + \text{cable loss}$



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## 5 PHOTOGRAPHS OF THE TEST CONFIGURATION

Please refer to the attached file (Test Setup Photo).



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## 6 INFORMATION ON THE TESTING LABORATORIES

We, Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch, were founded in 1988 to provide our best service in EMC, Radio, Telecom and Safety consultation. Our laboratories are accredited and approved according to ISO/IEC 17025.

If you have any comments, please feel free to contact us at the following:

**Linko EMC/RF Lab:**

Tel: 886-2-26052180

Fax: 886-2-26051924

**Hsin Chu EMC/RF Lab:**

Tel: 886-3-5935343

Fax: 886-3-5935342

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**Email:** [service.adt@tw.bureauveritas.com](mailto:service.adt@tw.bureauveritas.com)

**Web Site:** [www.adt.com.tw](http://www.adt.com.tw)

The address and road map of all our labs can be found in our web site also.



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## **7 APPENDIX A – MODIFICATIONS RECORDERS FOR ENGINEERING CHANGES TO THE EUT BY THE LAB**

No any modifications are made to the EUT by the lab during the test.

**---END---**