

# CFR 47 Part 22H, 24E

## TEST REPORT

Product : **Bluetooth EDGE Wireless Modem**

Trade Name : Getac

Model Number : Energy

FCC ID : QYLENERGY

Prepared for

### **Getac Technology Corporation**

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Prepared by

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#### **Remark :**

The test report consists of **56** pages in total. It shall not be reproduced except in full, without the written approval of IETC. This document may be altered or revised by IETC only, and shall be noted in the revision section of the document.

The test results in the report only to the tested sample.

# Statement of Compliance

**Applicant:** Getac Technology Corporation  
**Manufacturer:** Getac Technology (Kunshan) Co., Ltd.  
**Product:** Bluetooth EDGE Wireless Modem  
**Model No.:** Energy  
**Tested Power Supply:** 120Vac, 60Hz  
**Date of Final Test:** Nov. 05, 2009

**Configuration of Measurements and Standards Used :**

47CFR Part 22H, 24E

I HEREBY CERTIFY THAT: The data shown in this report were made in accordance with the procedures given in ANSI C63.4, and the energy emitted by the device was founded to be within the limits applicable. I assume full responsibility for accuracy and completeness of these data.

**Note:** 1. The result of the testing report relate only to the item tested.

2. The testing report shall not be reproduced expect in full, without the written approval of IETC

Report Issued: 2009/11/17

Project Engineer: Anya lee  
Anya Lee

Approved: Jerry Liu  
Jerry Liu

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## 1 General Information

### 1.1 Description of Equipment Under Test

**Product** : Bluetooth EDGE Wireless Modem

**Model Number** : Energy

**Applicant** : **Getac Technology Corporation**  
5F., Building A, No. 209, Sec. 1, Nangang Rd., Nangang Dist., Taipei  
City 11568, Taiwan, R.O.C.

**Manufacturer** : **Getac Technology (Kunshan) Co., Ltd.**  
Kunshan Export Processing Zone, 215300 Jiangsu, P.R.China

**Power Supply** : Manufacturer: CWT, M/N: CAP011051  
Input: 100-240Vac, 47-63Hz, 0.35A  
Output: 5Vdc, 2.2A  
Power cable: Non-shielded Un-detachable, 1.8m w/o core

**Sample Receive date** : Oct. 15, 2009

**Date of Test** : Oct. 15 ~ Nov. 05, 2009

## 1.2 Feature of Equipment under test

<b>Tx Frequency Range</b>	:	GSM850 (GPRS) : 824~849MHz GSM850 (Edge) : 824~849MHz PCS1900 (GPRS) : 1850~1910MHz PCS1900 (Edge) : 1850~1910MHz
<b>Rx Frequency Range</b>	:	GSM850 (GPRS) : 869~894MHz GSM850 (Edge) : 824~849MHz PCS1900 (GPRS) : 1930~1990MHz PCS1900 (Edge) : 1930~1990MHz
<b>Emission Designator</b>	:	GSM (GPRS) : 300KGXW EDGE : 300KG7W
<b>Antenna Type</b>	:	Internal Antenna: PIFA External Antenna: Dipole
<b>Digital Modulation Emission</b>	:	GSM (GPRS) : GMSK EDGE : 8PSK
<b>Device Power Class</b>	:	GSM850 (GPRS) : Class 4 GSM850 (Edge) : Class E2 PCS1900 (GPRS) : Class 1 PCS1900 (Edge) : Class E2

### 1.3 Test Facility

- Site Description** : ☒RF Test Room    ☒OATS 2
- Name of Firm** : Interocean EMC Technology Corp.
- Company web** : <http://www.ietc.com.tw>
- Site 1, 2 Location** : No.5-2, Lin 1, Tin-Fu Tsun, Lin-Kou Hsiang, Taipei County, Taiwan, R.O.C.
- Site 3, 4 Location** : No. 12, Ruei-Shu Valley, Ruei-Ping Tsun, Lin-Kou Hsiang, Taipei County, Taiwan, R.O.C.
- Site Filing** :
  - Federal Communication Commissions – USA  
Registration No.: 96399 (OATS 1 & 2)  
Registration No.: 518958 (OATS 3 & 4)  
Designation No.: TW1020
  - Voluntary Control Council for Interference by Information Technology Equipment (VCCI) – Japan  
Member No.: 1349  
Registration No. (Conducted Room): C-1094  
Registration No. (Conducted Room): T-1562  
Registration No. (OATS 1): R-1040  
Registration No. (OATS 2): R-1041
  - Industry Canada (IC)  
OUR FILE: 46405-4437 Submission: 130946  
Registration No. (OATS 1): 4437A-1  
Registration No. (OATS 2): 4437A-2  
Registration No. (OATS 3): 4437A-3  
Registration No. (OATS 4): 4437A-4
  - Japan Electrical Safety & Environment Technology Laboratories (JET)  
Registration No.: 04S03-01
- Site Accreditation** :
  - Bureau of Standards and Metrology and Inspection (BSMI) – Taiwan, R.O.C.  
Accreditation No.:  
SL2-IN-E-0026 for CNS13438 / CISPR22  
SL2-R1-E-0026 for CNS13439 / CISPR13  
SL2-R2-E-0026 for CNS13439 / CISPR13  
SL2-A1-E-0026 for CNS13783-1 / CISPR14-1
  - Taiwan Accreditation Foundation (TAF)  
Accrditation No.: 1113
  - TÜV NORD  
Certificate No: TNTW0801R-01



## 1.4 Test Equipment

Instrument	Manufacturer	Model	Serial No.	Next Cal. Date
Spectrum Analyzer	R&S	FSP30	100002	2009/12/10
Spectrum Analyzer	R&S	FSP40	100478	2010/04/15
Preamplifier	Agilent	8449B	3008A01434	2010/04/01
Horn Antenna	COM-POWER	AH-118	10081	2010/05/12
Horn Antenna	Schwarzbeck	BBHA 9120	9120D-583	2011/02/09
Horn Antenna	Schwarzbeck	BBHA 9170	213	2010/06/08
Wide Bandwidth Sensor	Anritsu	MA2491A	728133	2010/10/15
Power Meter	Anritsu	ML2495A	736010	2010/10/15
Temp & Humidity chamber	GIAN FORCE	GTH-150-40-2P-U	MAA0305-012	2011/05/07
MULTI UE TESTER	JRC	NJZ-2000	ET00184	2009/12/22

Note: The above equipments are within the valid calibration period.

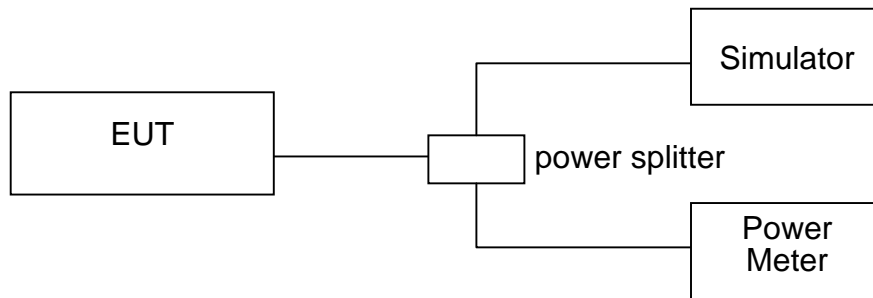
### 1.5 Summary of Measurement

Report Clause	Test Parameter	Reference Document	Results
2	RF Output Power	§2.1046	Passed
3	ERP / EIRP	§22.913 §24.232	Passed
4	Occupied Bandwidth & Band Edge Measurement	§2.1049 §22.917 §24.238 (b)	Passed
5	Conducted emission	§2.1051	Passed
6	Field strength of Spurious radiation	§2.1053	Passed
7	Frequency Stability	§2.1055 §22.355 §24.235	Passed



## 2 RF Output Power

### 2.1 Configuration of Measurement



### 2.2 Test Procedures

- 2.2.1 The transmitter output was connected to power meter and base station through power splitter.
- 2.2.2 Set EUT at maximum power through base station.
- 2.2.3 Select lowest, middle, and highest channels for each band.
- 2.2.4 The RF output power was read directly from power meter.

### 2.3 Test Result

**PASS.**

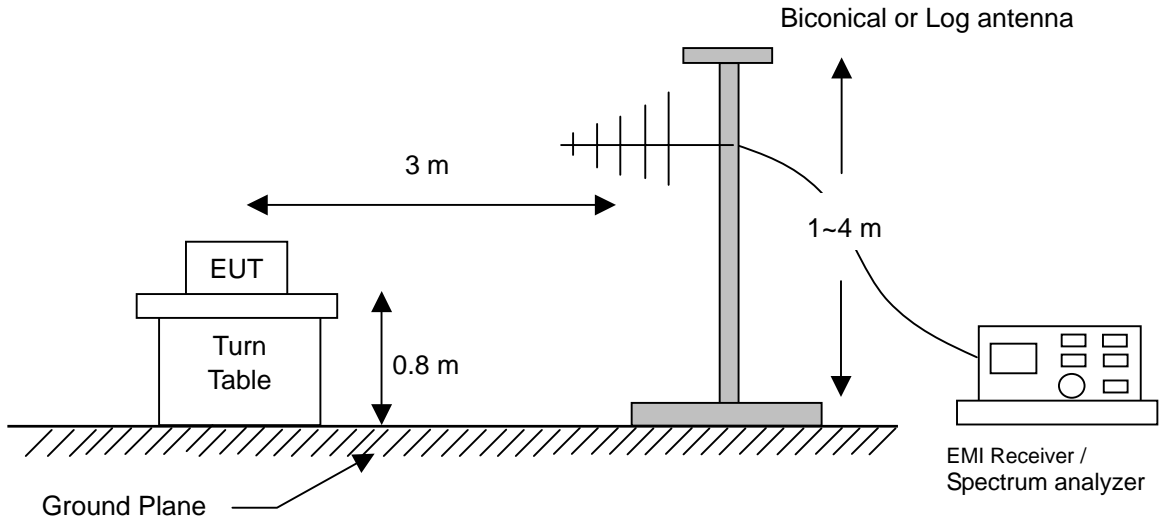
The final test data is shown as following pages.

<b>Band</b>	<b>CH</b>	<b>Frequency (MHz)</b>	<b>Output Power (dBm) PK</b>	<b>Output Power (dBm) AV</b>	<b>Limit (dBm)</b>
GSM850 (GSM)	128	824.2	32.09	32.04	38.5
	189	836.4	31.84	31.79	38.5
	251	848.8	31.67	31.61	38.5
GSM850 (EDGE)	128	824.2	29.41	25.83	38.5
	189	836.4	29.45	26.19	38.5
	251	848.8	29.09	25.63	38.5
PCS 1900 (GSM)	512	1850.2	28.37	28.27	33
	661	1880	28.89	28.80	33
	810	1909.8	28.36	28.26	33
PCS 1900 (EDGE)	512	1850.2	27.22	23.69	33
	661	1880	27.78	24.28	33
	810	1909.8	27.23	23.65	33

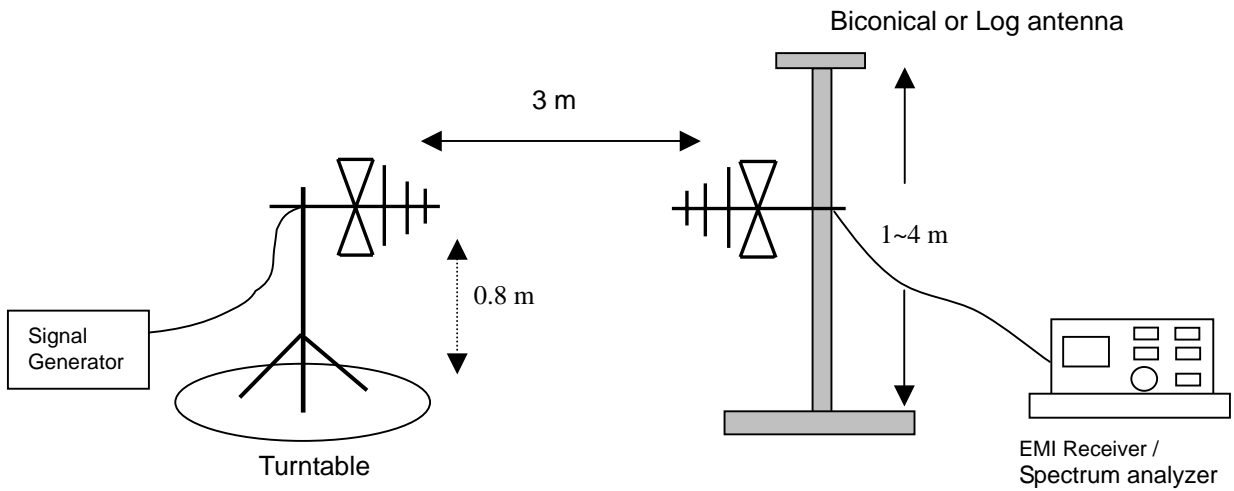
### 3 ERP / EIRP Measurement

#### 3.1 Configuration of Measurement

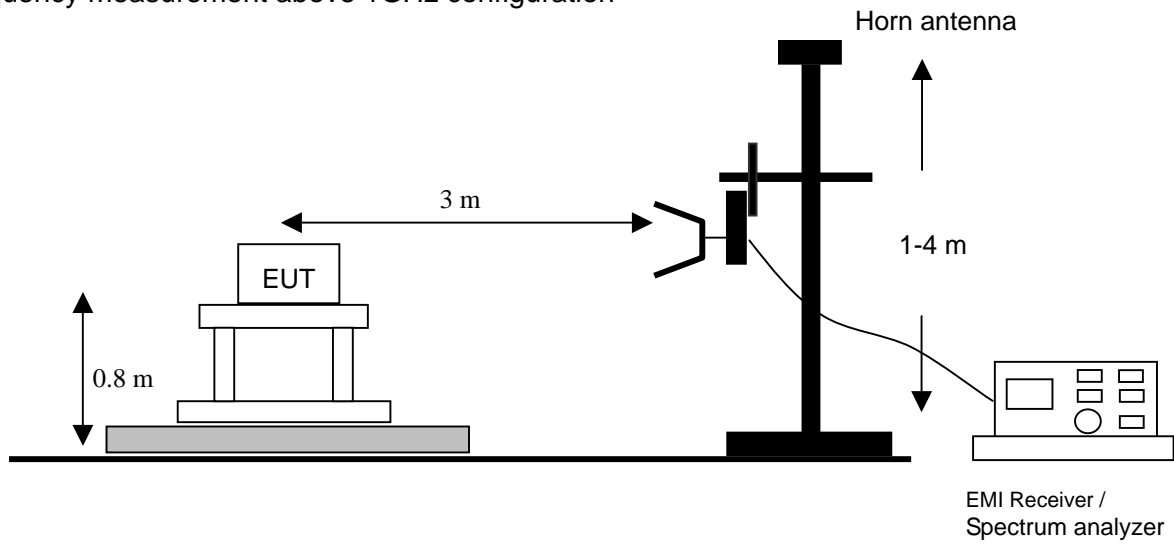
Frequency measurement below 1GHz configuration



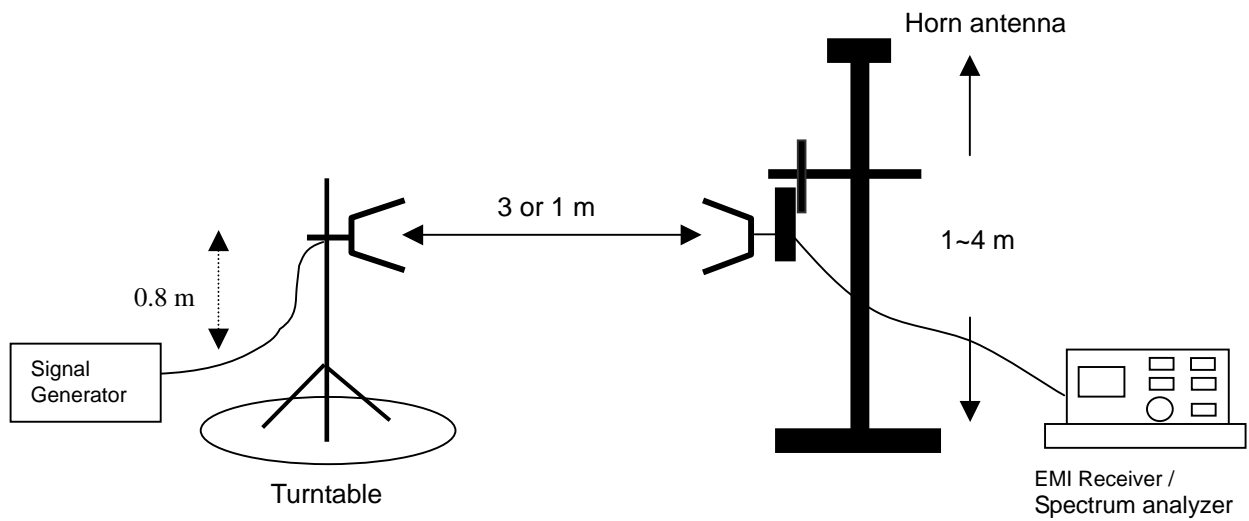
Frequency measurement below 1GHz configuration



Frequency measurement above 1GHz configuration



Frequency measurement above 1GHz configuration



## **3.2 Test Procedures**

- 3.2.1 The EUT was placed on a rotate table with 3m open area test site.
- 3.2.2 The table was rotate 360 degrees to search the highest radiated capacity of the position.
- 3.2.3 Record the maximum ERP / EIRP.
- 3.2.4 A dipole antenna was substituted in place of the EUT and was driven by a signal generator.
- 3.2.5 Measure the conducted power at the terminal of the dipole antenna.
- 3.2.6 Repeat step 3 to step 5 to find the maximum ERP/EIRP of the substitution antenna.
- 3.2.7  $ERP = SGLEVEL + Antenna\ Gain - Cable\ Loss.$

## **3.3 Test Result**

**PASS.**

The final test data is shown as following pages.

**EUT Use External Antenna:**

Horizontal Polarization							
Band	CH	SG LEVEL (dBm)	Antenna Gain (dBi)	Cable Loss (dB)	Amp.Gain (dB)	Measured Level (dBm)	Limit (dBm)
GSM850 (GSM)	128	8.26	7.4	1.70	13.10	27.06	38.5
	189	8.69	7.2	1.71	13.10	27.28	38.5
	251	8.67	7.3	1.70	13.12	27.39	38.5
GSM850 (EDGE)	128	8.16	7.4	1.70	13.10	26.96	38.5
	189	8.68	7.2	1.71	13.10	27.27	38.5
	251	8.68	7.3	1.70	13.12	27.4	38.5
PCS1900 (GSM)	512	-11.86	5.90	2.50	26.30	17.84	33
	661	-13.14	6.10	2.31	26.30	16.95	33
	810	-10.53	5.30	2.90	26.50	18.37	33
PCS1900 (EDGE)	512	-12.09	5.90	2.50	26.30	17.61	33
	661	-13.76	6.10	2.31	26.30	16.33	33
	810	-11.92	5.30	2.90	26.50	16.98	33

Vertical Polarization							
Band	CH	SG LEVEL (dBm)	Antenna Gain (dBi)	Cable Loss (dB)	Amp.Gain (dB)	Measured Level (dBm)	Limit (dBm)
GSM850 (GSM)	128	7.3	7.4	1.70	13.10	26.1	38.5
	189	7.83	7.2	1.71	13.10	26.42	38.5
	251	8.1	7.3	1.70	13.12	26.82	38.5
GSM850 (EDGE)	128	6.43	7.4	1.70	13.10	25.23	38.5
	189	7.93	7.2	1.71	13.10	26.52	38.5
	251	8.13	7.3	1.70	13.12	26.85	38.5
PCS1900 (GSM)	512	-5.8	5.90	2.50	26.3	23.9	33
	661	-5.81	6.10	2.31	26.3	24.28	33
	810	-4.72	5.30	2.90	26.5	24.18	33
PCS1900 (EDGE)	512	-5.64	5.90	2.50	26.3	24.06	33
	661	-5.95	6.10	2.31	26.3	24.14	33
	810	-4.61	5.30	2.90	26.5	24.29	33

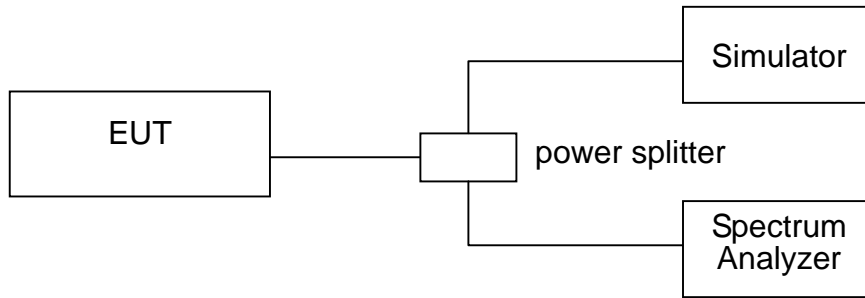
**EUT Use Internal Antenna:**

Horizontal Polarization							
Band	CH	SG LEVEL (dBm)	Antenna Gain (dBi)	Cable Loss (dB)	Amp.Gain (dB)	Measured Level (dBm)	Limit (dBm)
GSM850 (GSM)	128	8.33	7.4	1.70	13.10	27.13	38.5
	189	8.79	7.2	1.71	13.10	27.38	38.5
	251	8.76	7.3	1.70	13.12	27.48	38.5
GSM850 (EDGE)	128	8.44	7.4	1.70	13.10	27.24	38.5
	189	8.96	7.2	1.71	13.10	27.55	38.5
	251	9.13	7.3	1.70	13.12	27.85	38.5
PCS1900 (GSM)	512	-7.32	5.90	2.50	26.3	22.38	33
	661	-7.64	6.10	2.31	26.3	22.45	33
	810	-5.73	5.30	2.90	26.5	23.17	33
PCS1900 (EDGE)	512	-6.01	5.90	2.50	26.3	23.69	33
	661	-7.63	6.10	2.31	26.3	22.46	33
	810	-5.84	5.30	2.90	26.5	23.06	33

Vertical Polarization							
Band	CH	SG LEVEL (dBm)	Antenna Gain (dBi)	Cable Loss (dB)	Amp.Gain (dB)	Measured Level (dBm)	Limit (dBm)
GSM850 (GSM)	128	7.67	7.4	1.70	13.10	26.47	38.5
	189	8.23	7.2	1.71	13.10	26.82	38.5
	251	8.31	7.3	1.70	13.12	27.03	38.5
GSM850 (EDGE)	128	8.08	7.4	1.70	13.10	26.88	38.5
	189	7.92	7.2	1.71	13.10	26.51	38.5
	251	8.25	7.3	1.70	13.12	26.97	38.5
PCS1900 (GSM)	512	-6.54	5.90	2.50	26.3	23.16	33
	661	-7.63	6.10	2.31	26.3	22.46	33
	810	-7.82	5.30	2.90	26.5	21.08	33
PCS1900 (EDGE)	512	-5.82	5.90	2.50	26.3	23.88	33
	661	-7.14	6.10	2.31	26.3	22.95	33
	810	-7.87	5.30	2.90	26.5	21.03	33

## 4 Occupied bandwidth & Band Edge Measurement

### 4.1 Configuration of Measurement



### 4.2 Test Procedures

1. EUT was connected to Base Station (Simulator) via power splitter and Spectrum Analyzer.
2. 99% occupied bandwidth of middle channel were measured.
3. Band-edge of high and low channels for the highest RF powers within the transmitting frequency band were measured. Setting RBW as roughly BW/100.

### 4.3 Test Result

**PASS.**

The final test data is shown as following pages.



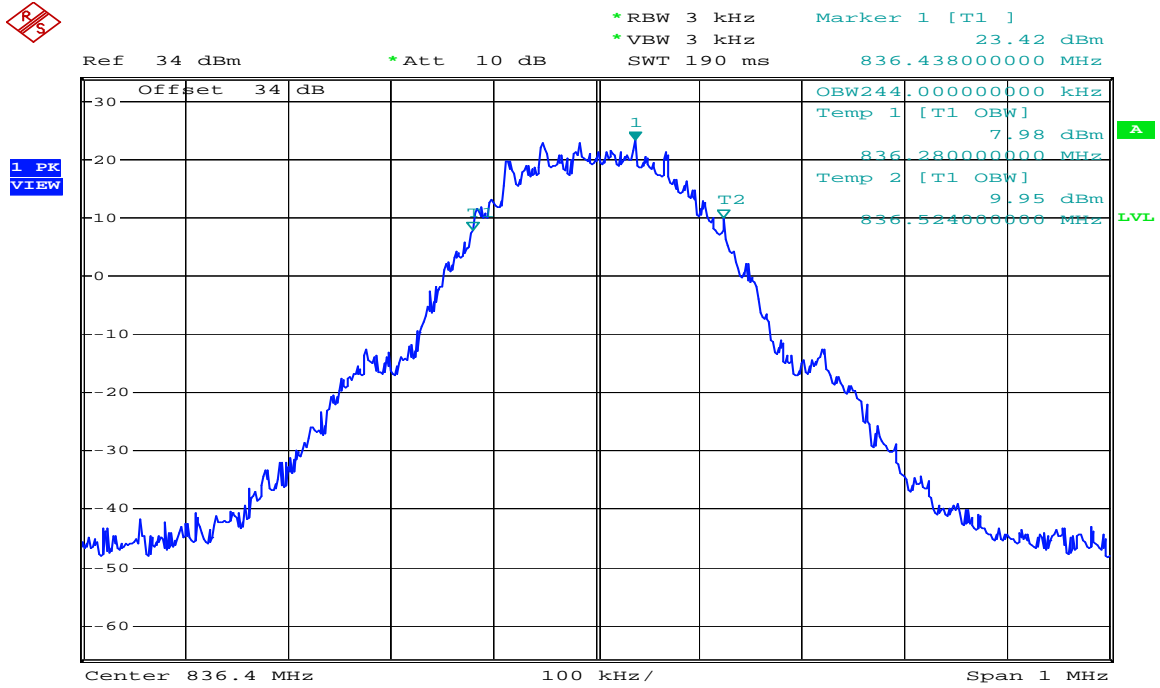
### Occupied Channel Bandwidth & Band Edge Measurement

Band	CH	Frequency (MHz)	Occupied Channel Bandwidth (kHz)
GSM850 (GSM)	189	836.4	244
GSM850 (EDGE)	189	836.4	240
PCS1900 (GSM)	661	1880	244
PCS1900 (EDGE)	661	1880	242

GSM			
Band	CH	Measured Value (dBm)	Limit (dBm)
GSM850	128	-14.42	-13
	251	-14.77	-13
PCS1900	512	-19.21	-13
	810	-18.44	-13

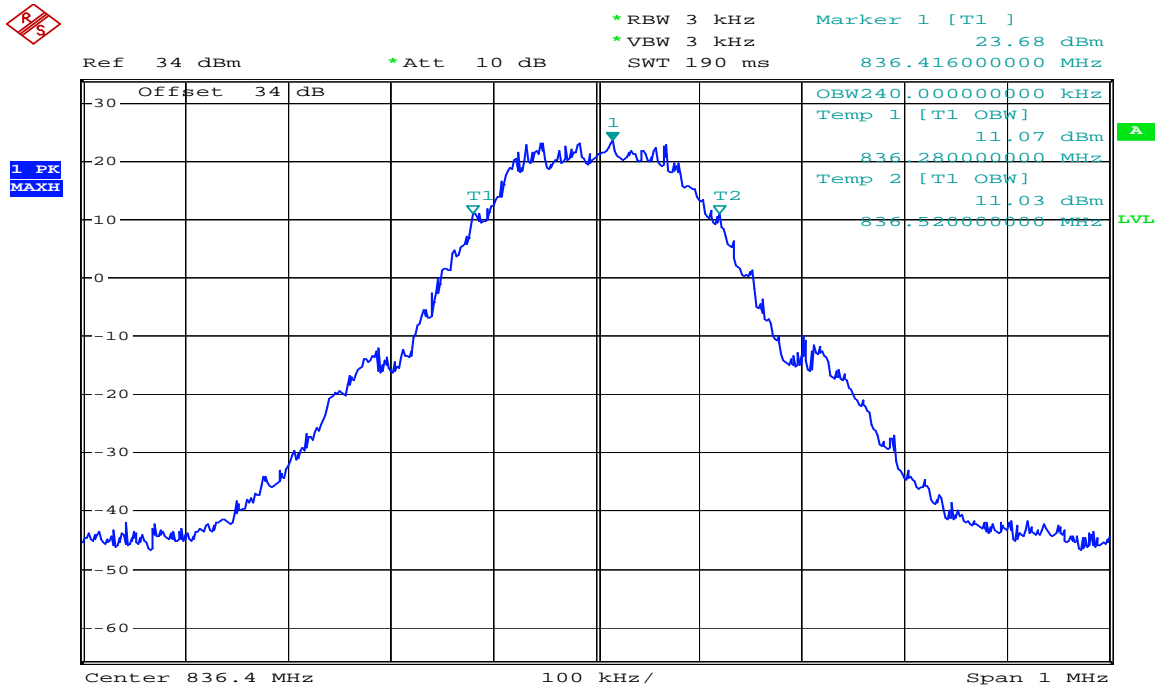
EDGE			
Band	CH	Measured Value (dBm)	Limit (dBm)
GSM850	128	-14.87	-13
	251	-13.81	-13
PCS1900	512	-21.04	-13
	810	-19.20	-13

### GSM850 (GSM) Occupied bandwidth CH189



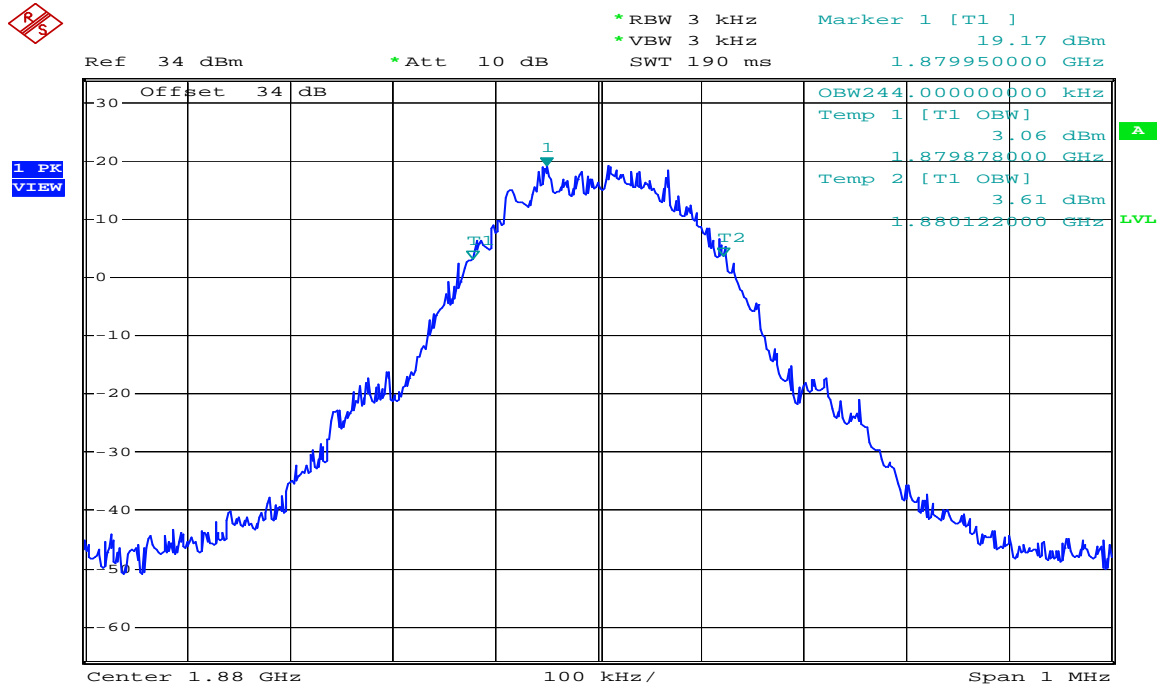
Comment: GSM850 CH189  
 Comment: OBW  
 Date: 26.OCT.2009 14:16:44

### GSM850 (EDGE) Occupied bandwidth CH189



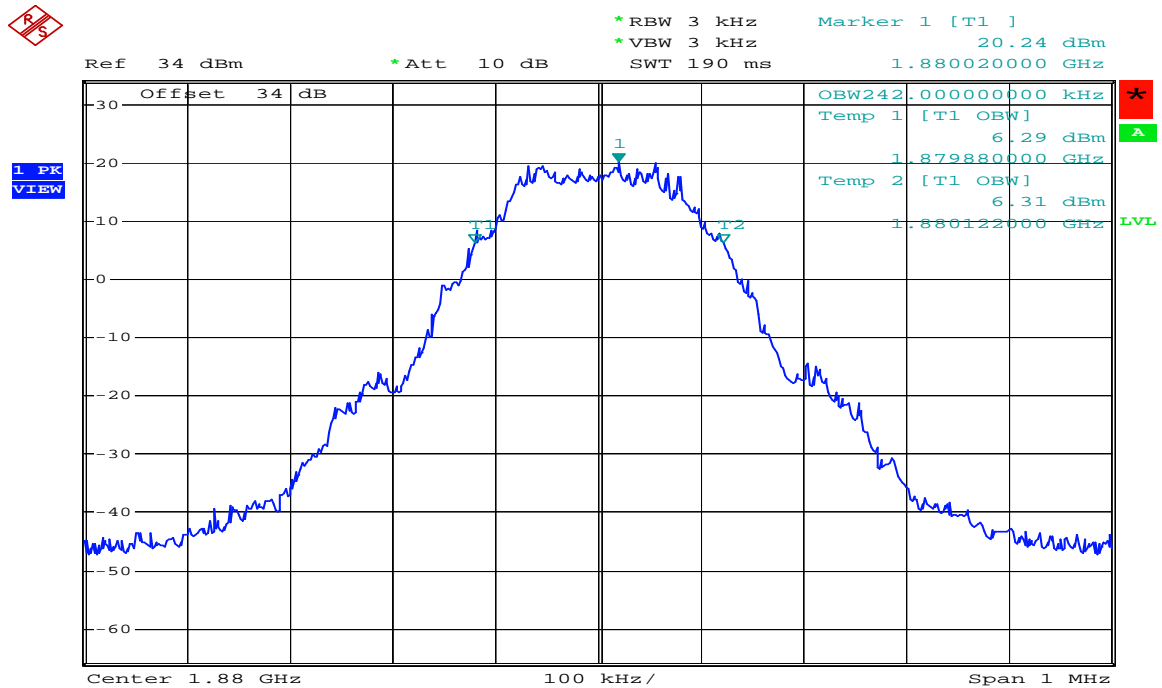
Comment: GSM850 (EDGE) CH189  
 Comment: OBW  
 Date: 26.OCT.2009 16:13:04

### PCS1900 (GSM) Occupied bandwidth CH661



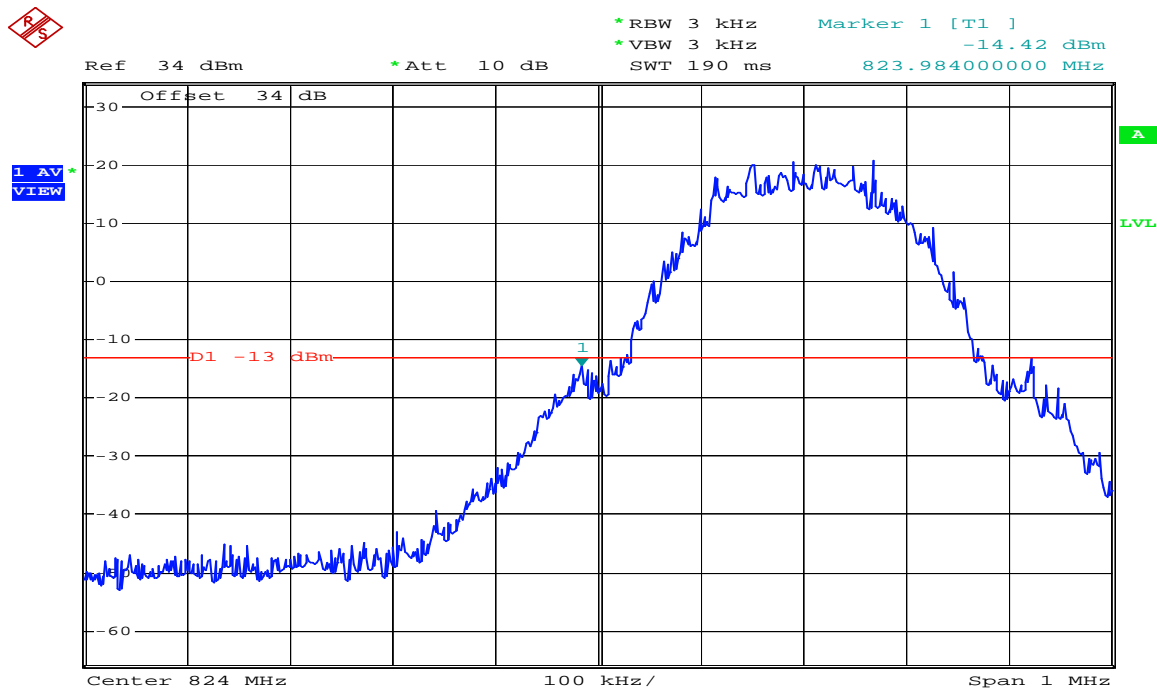
Comment: PCS1900 CH661  
 Comment: OBW  
 Date: 26.OCT.2009 15:35:31

### PCS1900 (EDGE) Occupied bandwidth CH661



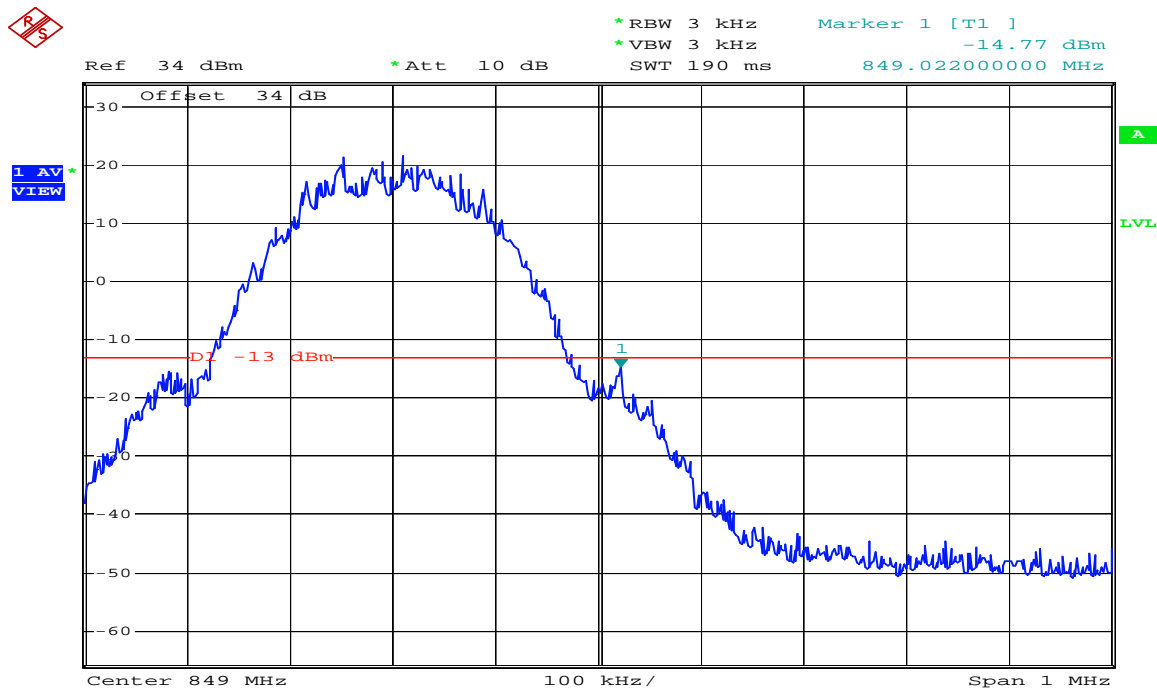
Comment: PCS1900 (EDGE) CH661  
 Comment: OBW  
 Date: 26.OCT.2009 15:57:25

### GSM850 (GSM) Lower Band Edge CH128



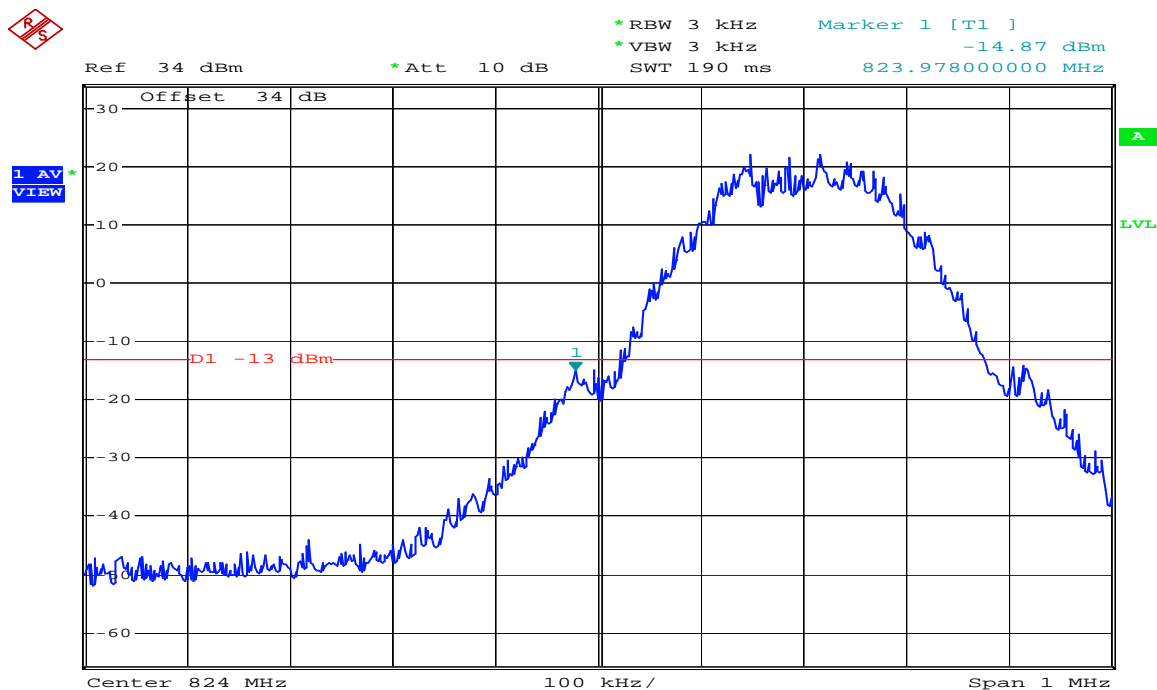
Comment: GSM850 CH128  
Comment: Band Edge  
Date: 26.OCT.2009 14:34:19

### GSM850 (GSM) High Band Edge CH251



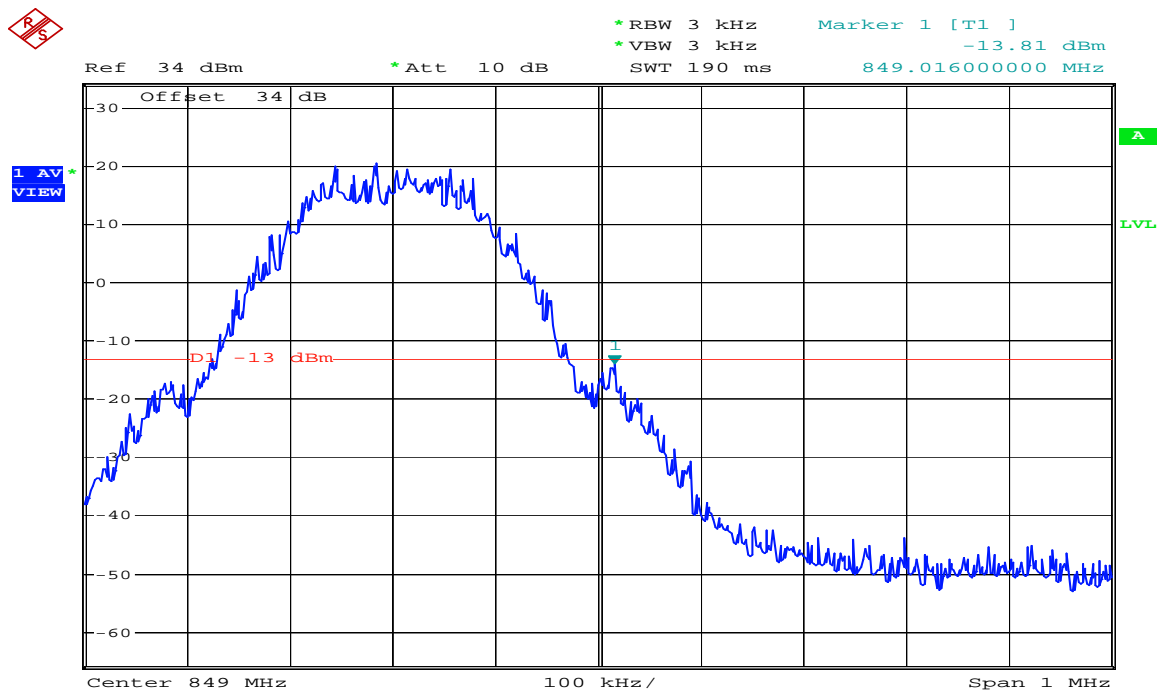
Comment: GSM850 CH251  
Comment: Band Edge  
Date: 26.OCT.2009 14:27:16

### GSM850 (EDGE) Lower Band Edge CH128



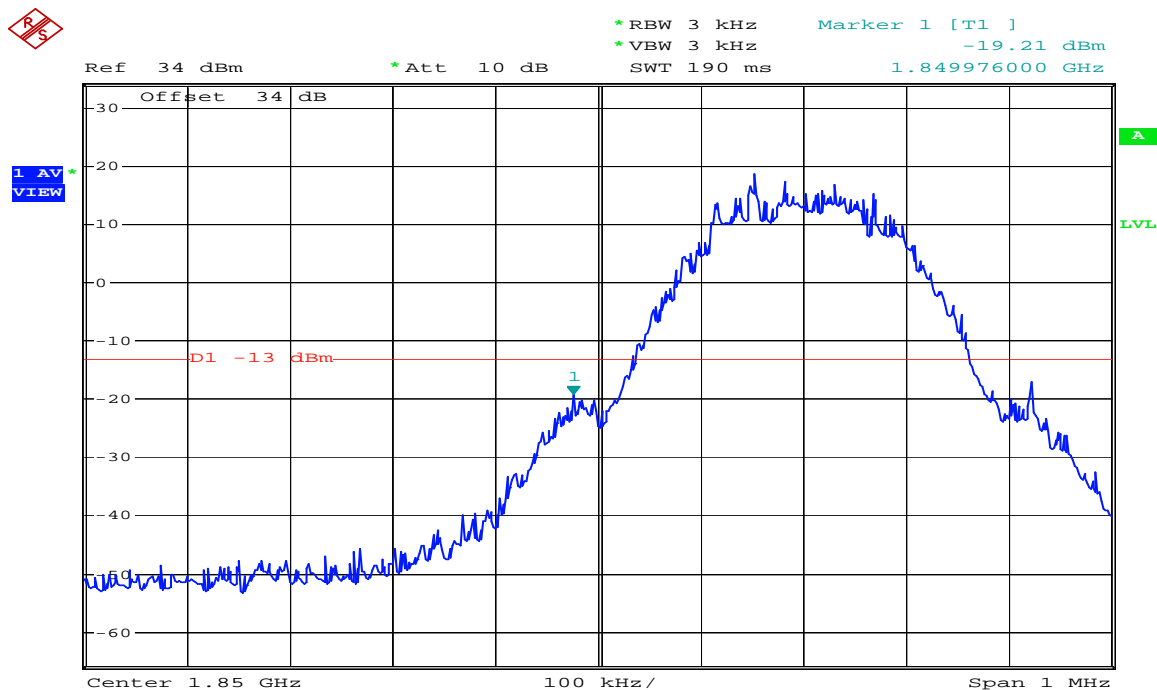
Comment: GSM850 (EDGE) CH128  
Comment: Band Edge  
Date: 26.OCT.2009 16:16:30

### GSM850 (EDGE) High Band Edge CH251



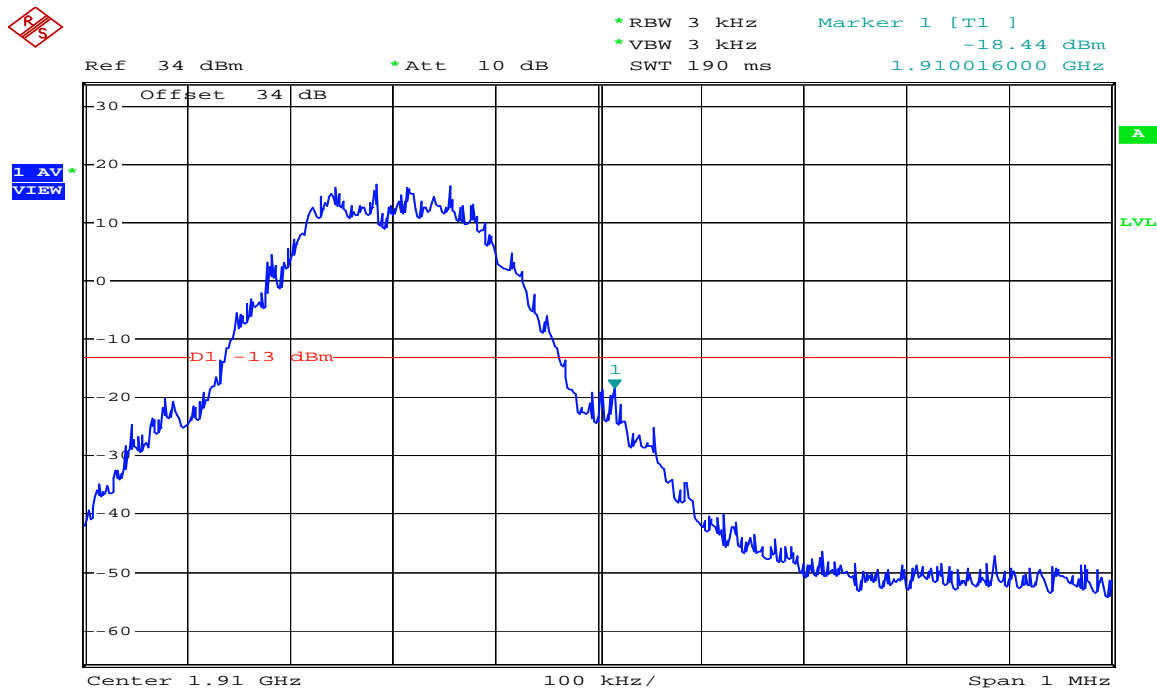
Comment: GSM850 (EDGE) CH251  
Comment: Band Edge  
Date: 26.OCT.2009 15:04:54

### PCS1900 (GSM) Lower Band Edge CH512



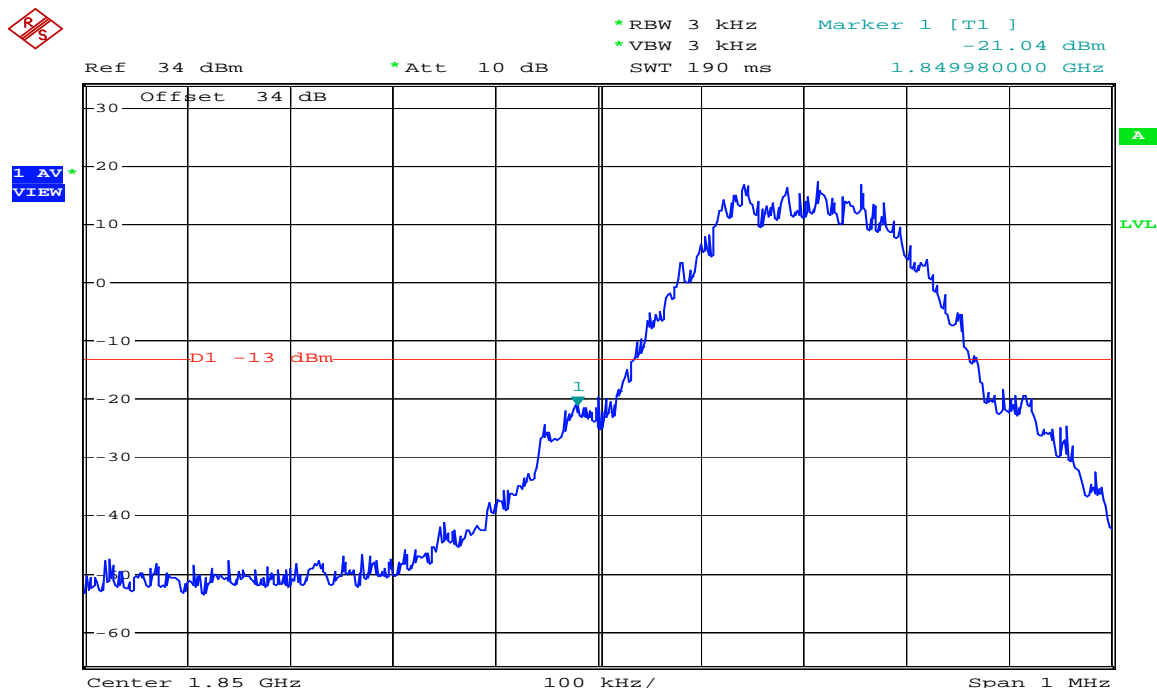
Comment: PCS1900 CH512  
Comment: Band Edge  
Date: 26.OCT.2009 15:22:16

### PCS1900 (GSM) High Band Edge CH810



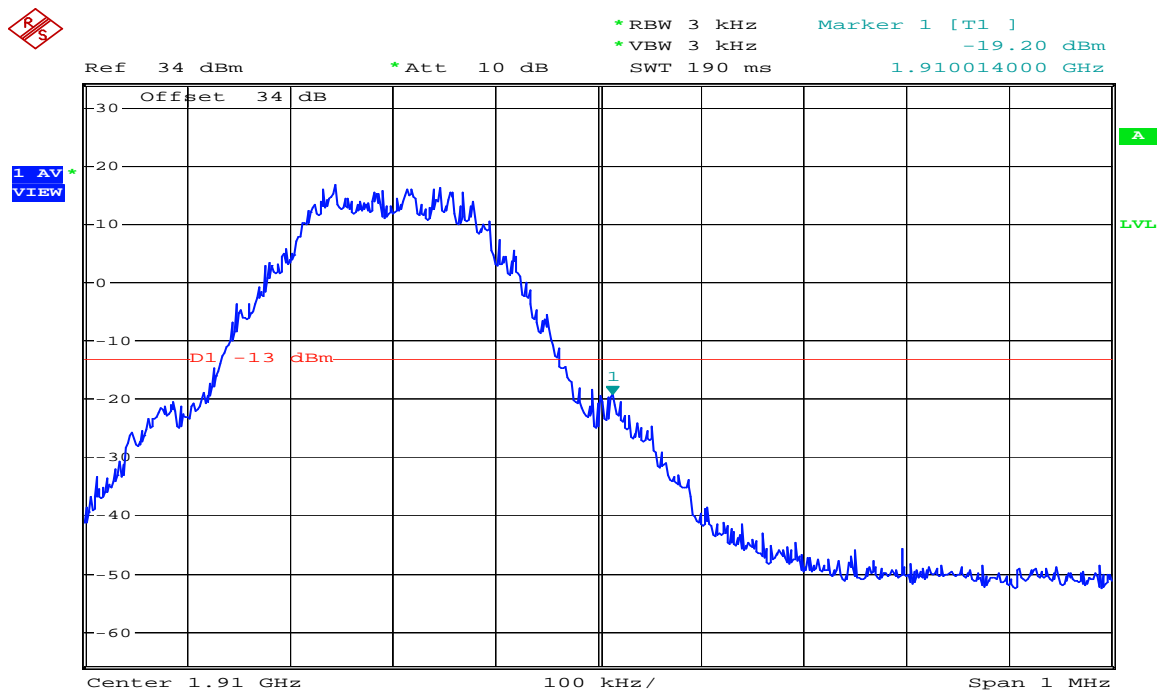
Comment: PCS1900 CH810  
Comment: Band Edge  
Date: 26.OCT.2009 15:50:29

### PCS1900 (EDGE) Lower Band Edge CH512



Comment: PCS1900 (EDGE) CH512  
Comment: Band Edge  
Date: 26.OCT.2009 16:04:31

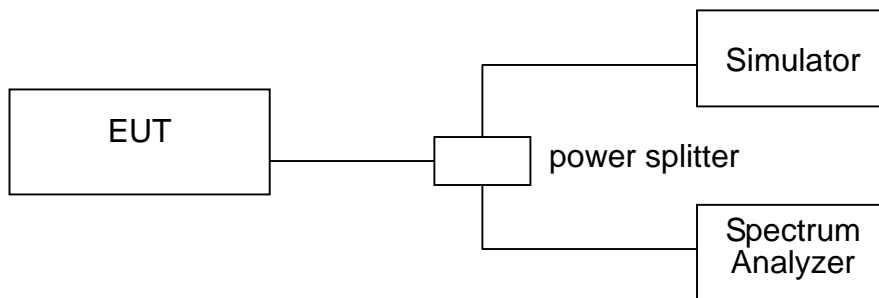
### PCS1900 (EDGE) High Band Edge CH810



Comment: PCS1900 (EDGE) CH810  
Comment: Band Edge  
Date: 26.OCT.2009 15:48:42

## 5 Conducted Emission

### 5.1 Configuration of Measurement



### 5.2 Test Procedures

1. EUT was connected to Base Station (simulator) via power splitter and Spectrum Analyzer.
2. Measured the middle channel for the highest RF power within the transmitting frequency.
3. Conducted spurious emission for the whole frequency range was taken.

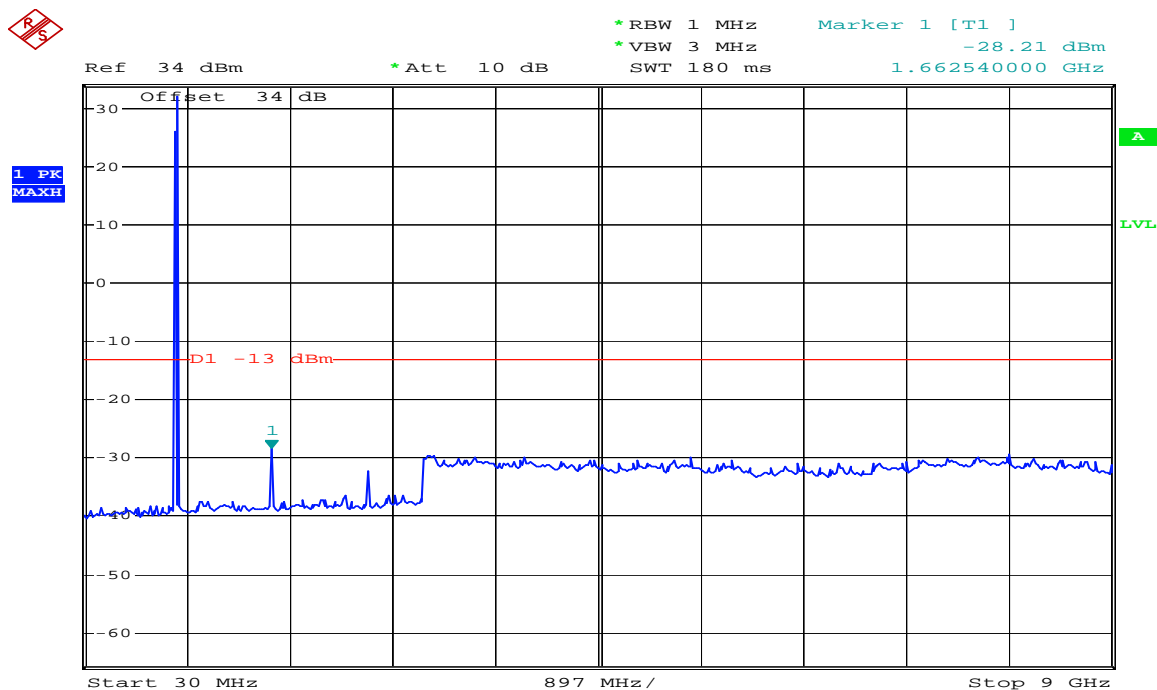
### 5.3 Test Result

**PASS.**

The final test data is shown as following pages.

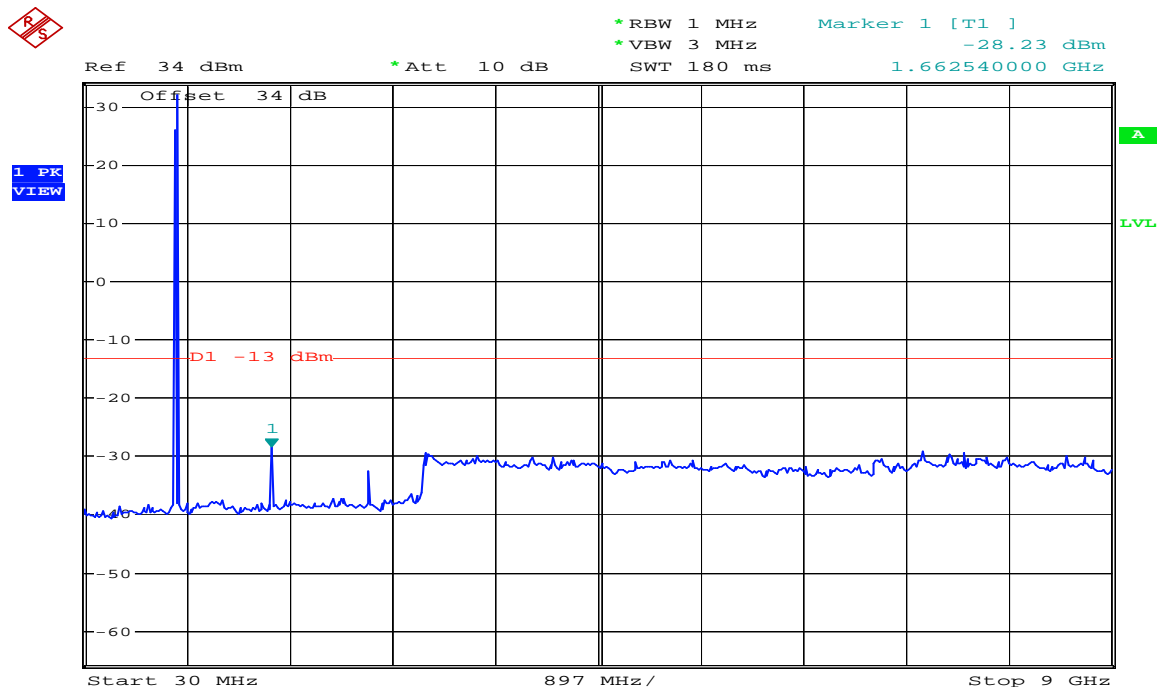


### GSM850 (GSM) conducted spurious CH189



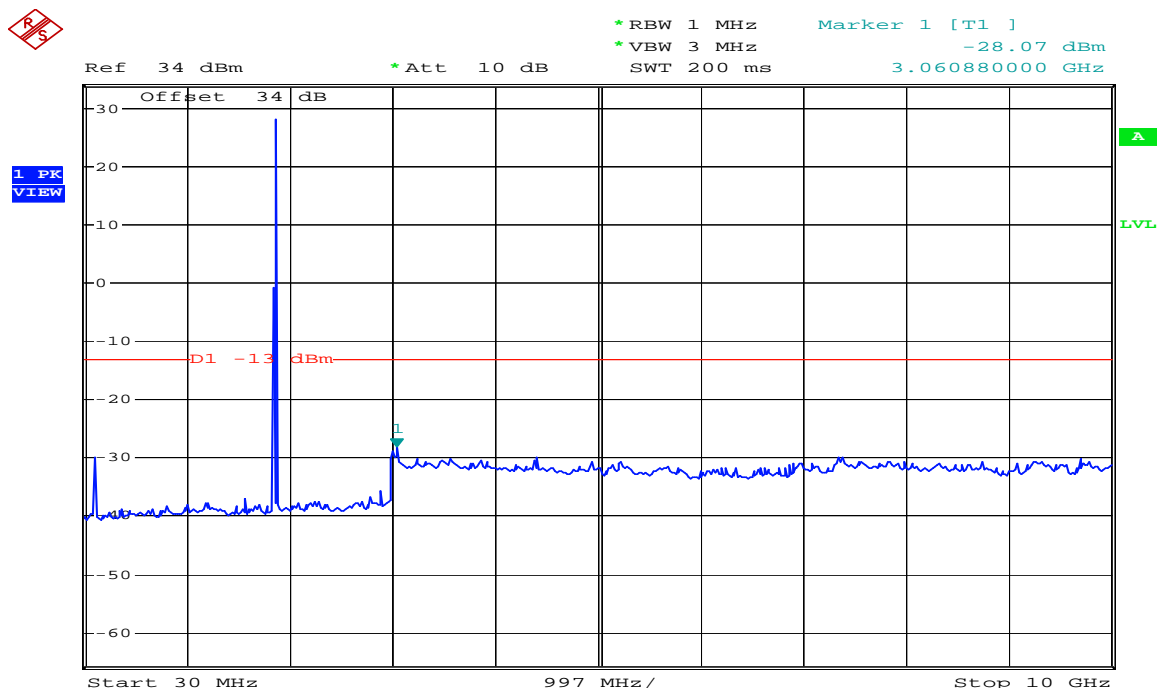
Comment: GSM850 CH189  
Comment: Conducted Spurious  
Date: 26.OCT.2009 14:45:09

### GSM850 (EDGE) conducted spurious CH189



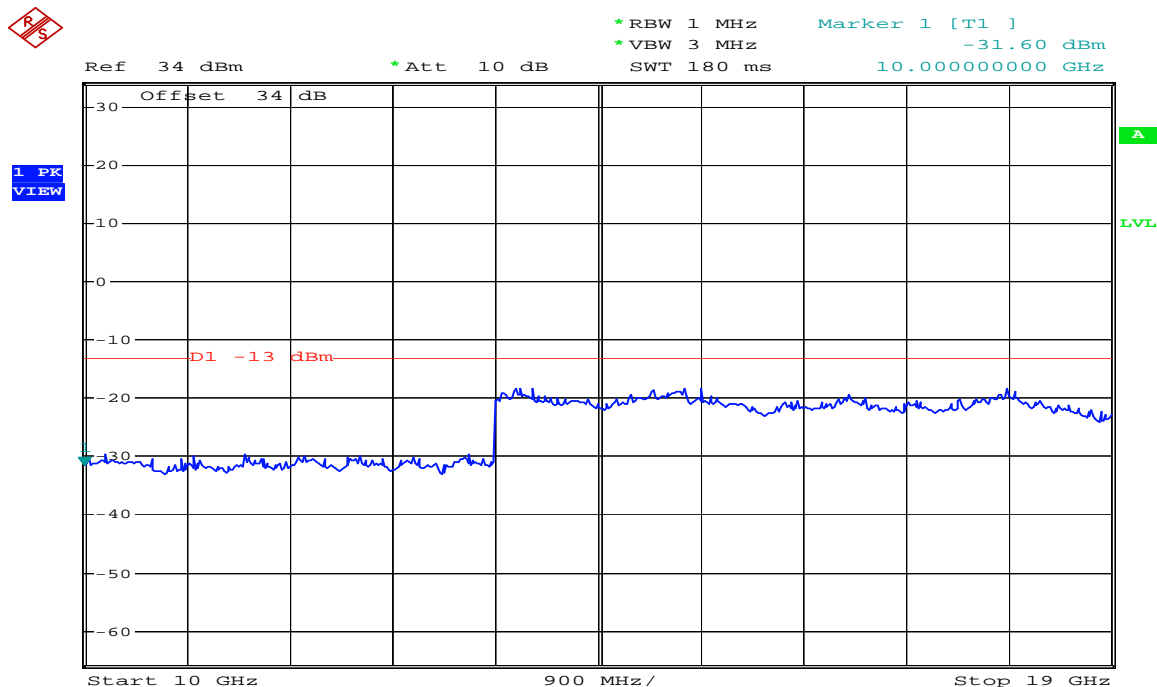
Comment: GSM850(EDGE) CH189  
Comment: Conducted Spurious  
Date: 26.OCT.2009 14:52:32

### PCS1900 (GSM) conducted spurious CH661 (30MHz~10GHz)



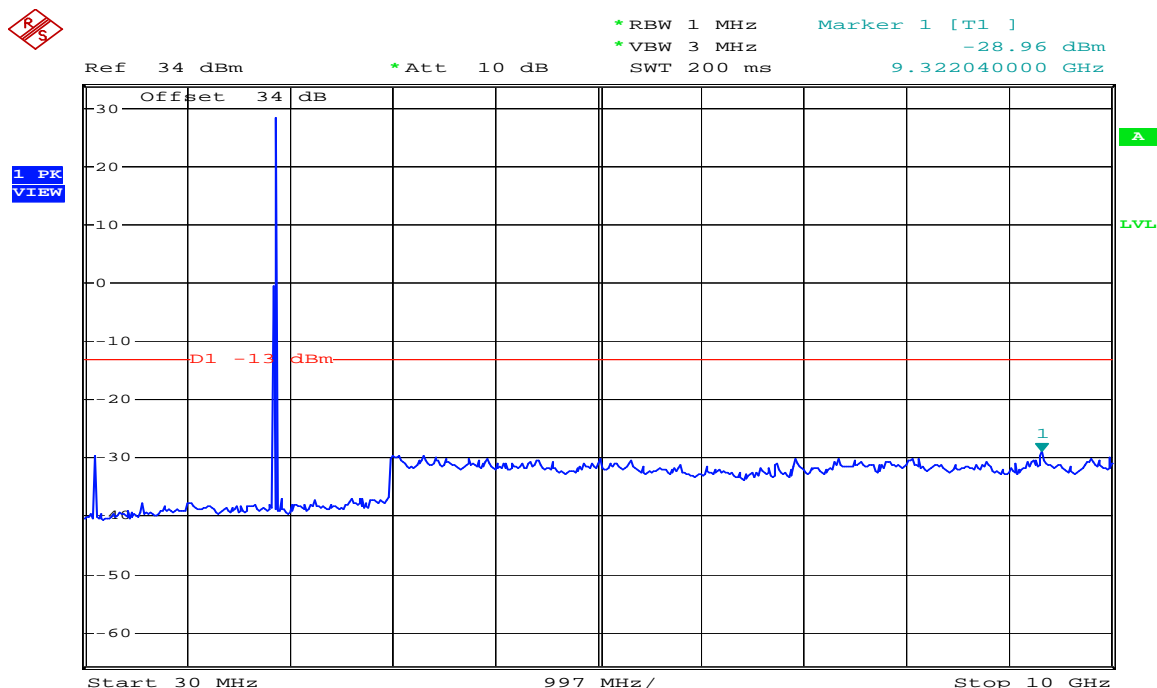
Comment: PCS1900 CH661  
Comment: Conducted Spurious  
Date: 26.OCT.2009 15:31:48

### PCS1900 (GSM) conducted spurious CH661 (10GHz~19GHz)



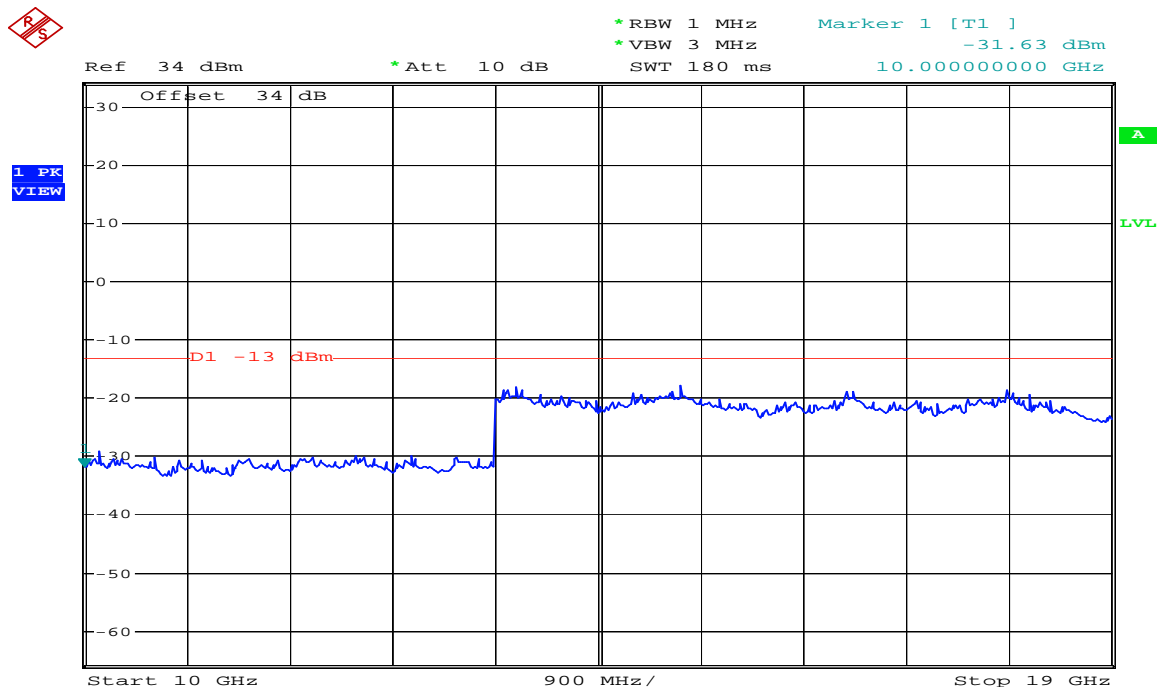
Comment: PCS1900 CH661  
Comment: Conducted Spurious  
Date: 26.OCT.2009 15:33:58

### PCS1900 (EDGE) conducted spurious CH661 (30MHz~10GHz)



Comment: PCS1900 (EDGE) CH661  
Comment: Conducted Spurious  
Date: 26.OCT.2009 15:59:30

### PCS1900 (EDGE) conducted spurious CH661 (10GHz~19GHz)

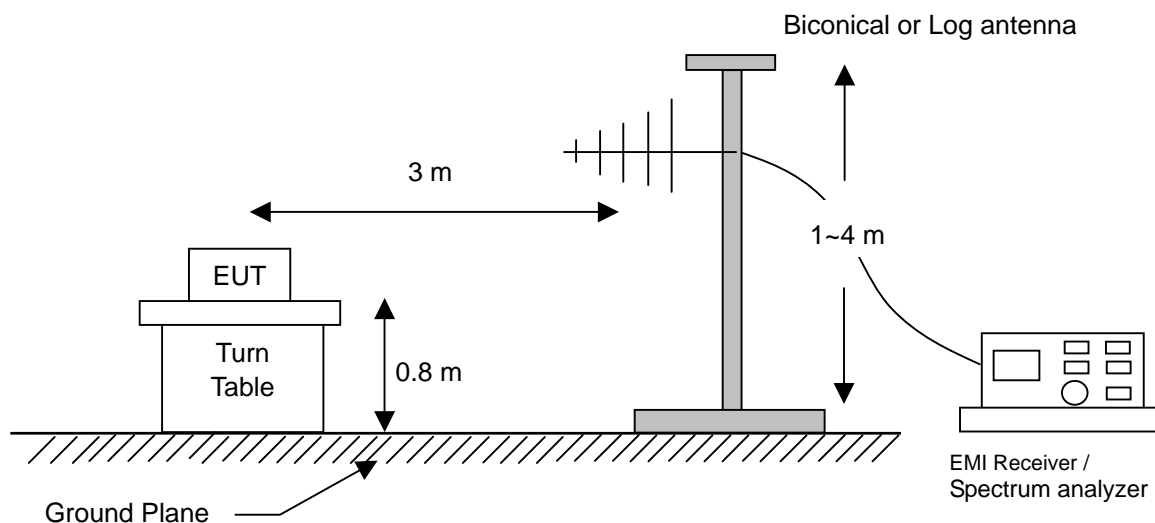


Comment: PCS1900 (EDGE) CH661  
Comment: Conducted Spurious  
Date: 26.OCT.2009 16:00:20

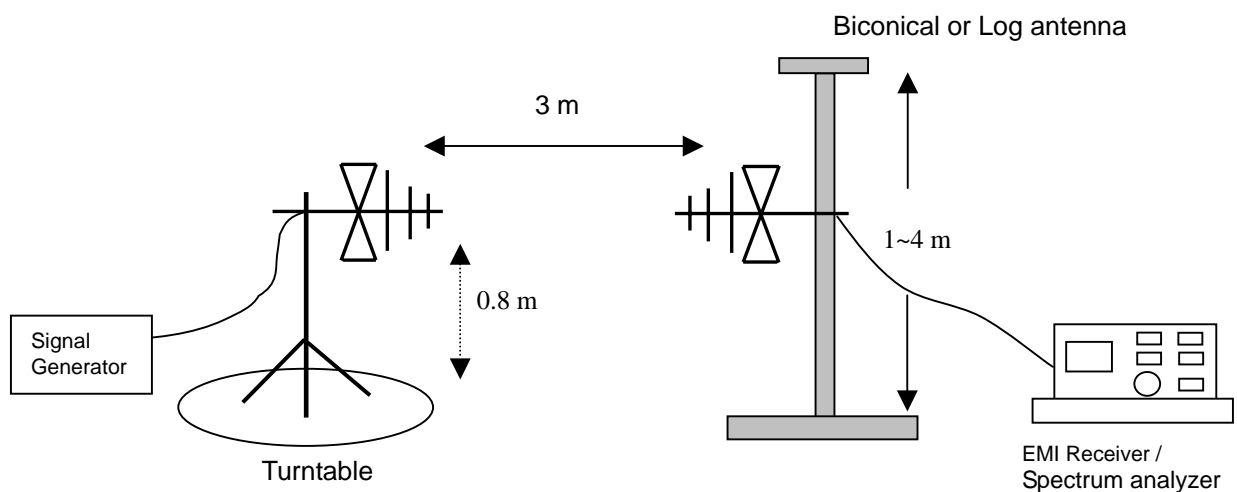
## 6 Field Strength of Spurious Radiation

### 6.1 Configuration of Measurement

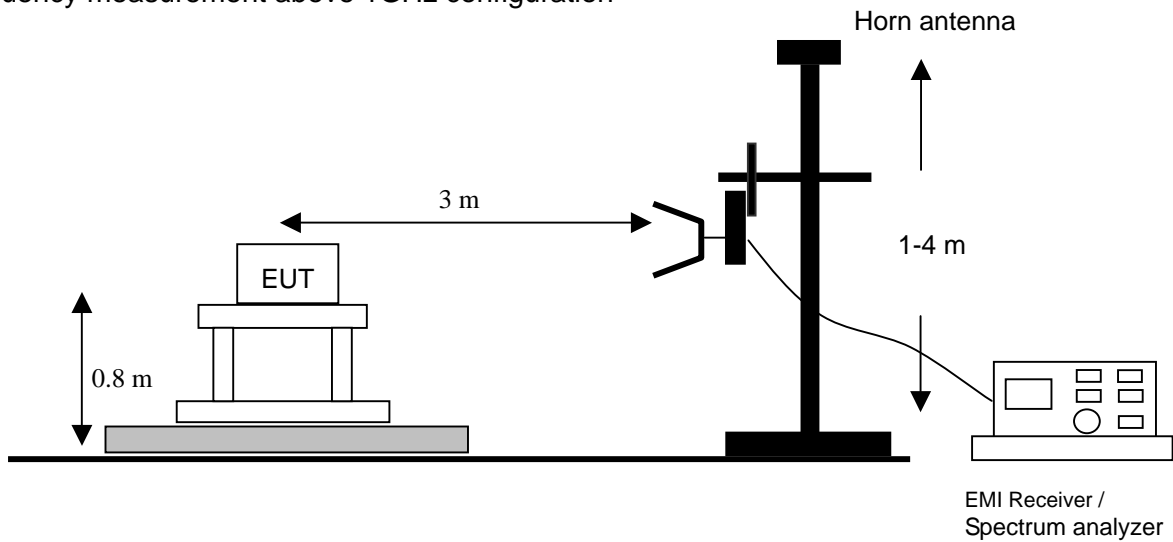
Frequency measurement below 1GHz configuration



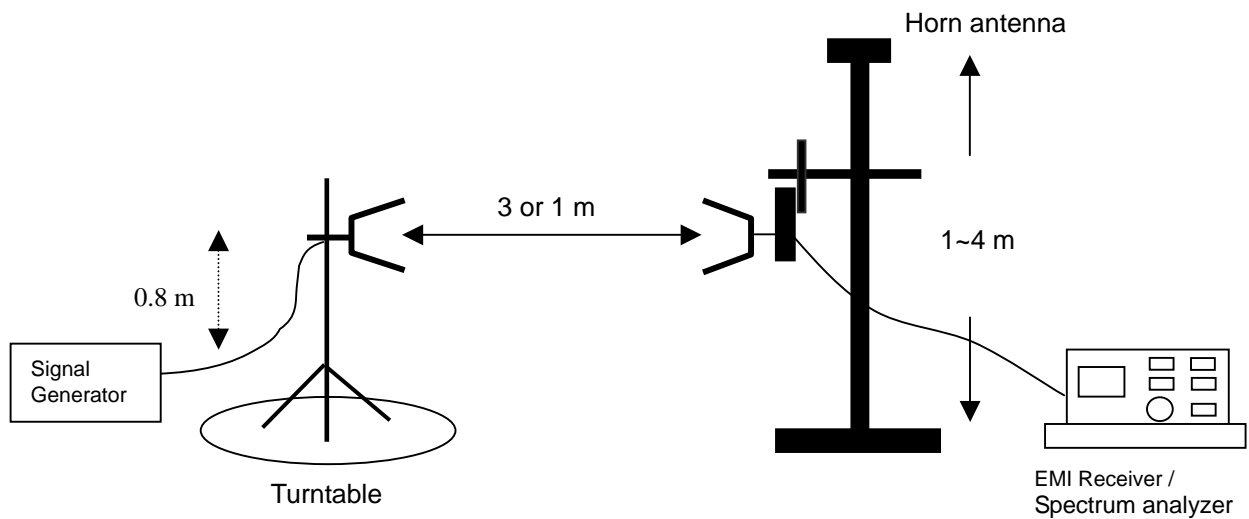
Frequency measurement below 1GHz configuration



Frequency measurement above 1GHz configuration



Frequency measurement above 1GHz configuration



## 6.2 Test Procedures

1. EUT was placed 0.8 meter about ground on a turntable wooden table.
2. EUT was set receiving bilog antenna for frequency below 1GHz and set horn antenna for frequency above 1 GHz.
3. Table was rotated 360 degrees to arrive the position of the highest spurious emission.
4. The height of the receiving antenna is varied between 1 meter and 4 meter to determine the maximum spurious emission for both vertical and horizontal polarizations.
5. Record the signal generator to the same emission level with EUT maximum spurious emission.
6. Horn or Bilog antenna was substituted in place of the EUT and was driven by a signal generator.
7. Tune the output power of signal generator to the same emission level with EUT maximum spurious emission.
8. Record the output power at antenna port.
9. Repeat step 7 to step 8 for other polarization.
10. Formula: SG level + substitution Gain - Cable Loss = Emission level (dBm).

## 6.3 Test Result

**PASS.**

The final test data is shown as following pages.

**Below 1GHz**

**EUT Use External Antenna:**

Test Mode: Worst Case GSM 850 CH128						
Frequency	Antenna	SG LEVEL	Antenna Gain	Cable Loss	Measurel	Limit
(MHz)	Polarization	(dBm)	(dBm)	(dB)	Level (dBm)	(dBm)
34.85	H	-43.96	-15.6	0.4	-59.99	-13
177.93	H	-49.17	-0.6	0.7	-50.47	-13
871.48	H	-48.06	-7.3	1.9	-57.26	-13
883.60	H	-49.33	-7.5	1.9	-58.75	-13
97.90	V	-50.23	-1.0	0.7	-51.93	-13
177.93	V	-48.14	-0.6	0.7	-49.44	-13
871.48	V	-45.60	-7.3	1.9	-54.80	-13
886.40	V	-44.27	-7.4	1.9	-53.57	-13

Test Mode: Worst Case EDGE 850 CH128						
Frequency	Antenna	SG LEVEL	Antenna Gain	Cable Loss	Measurel	Limit
(MHz)	Polarization	(dBm)	(dBm)	(dB)	Level (dBm)	(dBm)
34.85	H	-44.59	-15.6	0.4	-60.62	-13
177.93	H	-48.67	-0.6	0.7	-49.97	-13
793.88	H	-52.99	-7.4	1.7	-62.09	-13
871.48	H	-47.91	-7.5	1.9	-57.33	-13
95.48	V	-51.88	-1.0	0.7	-53.58	-13
177.93	V	-47.30	-0.6	0.7	-48.60	-13
871.48	V	-46.60	-7.3	1.9	-55.80	-13
883.60	V	-44.18	-7.4	1.9	-53.48	-13

Test Mode: Worst Case GSM 1900 CH512						
Frequency	Antenna	SG LEVEL (dBm)	Antenna Gain (dBm)	Cable Loss (dB)	Measurel Level (dBm)	Limit (dBm)
(MHz)	Polarization					
34.85	H	-42.28	-15.6	0.4	-58.31	-13
80.93	H	-51.20	-2.0	0.5	-53.70	-13
793.88	H	-41.44	-7.4	1.7	-50.54	-13
975.75	H	-48.66	-7.6	2.0	-58.26	-13
97.90	V	-51.19	-1.0	0.7	-52.89	-13
110.03	V	-60.18	-0.2	0.6	-60.98	-13
177.93	V	-59.25	-0.6	0.7	-60.55	-13
985.45	V	-51.17	-7.4	2.0	-60.57	-13

Test Mode: Worst Case EDGE 1900 CH512						
Frequency	Antenna	SG LEVEL (dBm)	Antenna Gain (dBm)	Cable Loss (dB)	Measurel Level (dBm)	Limit (dBm)
(MHz)	Polarization					
34.85	H	-43.18	-15.6	0.4	-59.21	-13
558.65	H	-44.94	-6.9	1.3	-53.14	-13
791.45	H	-44.41	-7.6	1.7	-53.71	-13
975.75	H	-49.30	-7.6	2.0	-58.90	-13
95.48	V	-50.68	-1.0	0.7	-52.38	-13
168.23	V	-61.76	-0.5	0.8	-63.06	-13
478.63	V	-55.72	-6.7	1.2	-63.62	-13
961.20	V	-52.18	-7.9	1.9	-61.98	-13



**Below 1GHz**

**EUT Use Internal Antenna:**

Test Mode: Worst Case GSM 850 CH128						
Frequency	Antenna	SG LEVEL	Antenna Gain	Cable Loss	Measurel	Limit
(MHz)	Polarization	(dBm)	(dBm)	(dB)	Level (dBm)	(dBm)
34.85	H	-43.55	-15.6	0.4	-59.58	-13
214.30	H	-49.61	-0.4	0.7	-50.71	-13
641.10	H	-48.44	-7.0	1.5	-56.94	-13
791.45	H	-53.16	-7.6	1.7	-62.46	-13
76.08	V	-46.24	-1.9	0.6	-48.74	-13
95.48	V	-47.32	-1.0	0.7	-49.02	-13
883.60	V	-46.93	-7.5	1.9	-56.35	-13
895.73	V	-42.78	-7.5	1.9	-52.18	-13

Test Mode: Worst Case EDGE 850 CH128						
Frequency	Antenna	SG LEVEL	Antenna Gain	Cable Loss	Measurel	Limit
(MHz)	Polarization	(dBm)	(dBm)	(dB)	Level (dBm)	(dBm)
34.85	H	-44.52	-15.6	0.4	-60.55	-13
177.93	H	-51.56	-0.6	0.7	-52.86	-13
648.38	H	-54.63	-7.0	1.5	-63.13	-13
939.38	H	-52.20	-7.9	1.9	-62.00	-13
71.23	V	-47.89	-1.2	0.6	-49.69	-13
93.05	V	-48.39	-1.4	0.7	-50.49	-13
97.90	V	-51.71	-1.0	0.6	-53.31	-13
883.60	V	-47.65	-7.5	1.9	-57.07	-13

Test Mode: Worst Case GSM 1900 CH512						
Frequency	Antenna	SG LEVEL (dBm)	Antenna Gain (dBm)	Cable Loss (dB)	Measurel Level (dBm)	Limit (dBm)
(MHz)	Polarization					
34.85	H	-43.91	-15.6	0.4	-59.94	-13
439.83	H	-44.70	-6.7	1.3	-52.70	-13
793.88	H	-37.62	-7.4	1.7	-46.72	-13
878.75	H	-45.23	-7.4	1.9	-54.53	-13
66.38	V	-44.90	-0.3	0.5	-45.70	-13
95.48	V	-49.97	-1.0	0.7	-51.67	-13
105.18	V	-55.16	-0.4	0.6	-56.16	-13
793.88	V	-49.29	-7.4	1.7	-58.39	-13

Test Mode: Worst Case EDGE 1900 CH512						
Frequency	Antenna	SG LEVEL (dBm)	Antenna Gain (dBm)	Cable Loss (dB)	Measurel Level (dBm)	Limit (dBm)
(MHz)	Polarization					
34.85	H	-43.06	-15.6	0.4	-59.06	-13
439.83	H	-45.29	-6.7	1.3	-53.29	-13
793.88	H	-38.25	-7.4	1.7	-47.35	-13
878.75	H	-45.28	-7.4	1.9	-54.58	-13
66.38	V	-46.76	-0.3	0.5	-47.56	-13
95.48	V	-51.22	-1.0	0.7	-52.92	-13
563.50	V	-44.56	-6.9	1.3	-52.76	-13
575.63	V	-44.78	-6.9	1.5	-53.18	-13

**Above 1GHz**

**EUT Use External Antenna:**

Test Mode: GSM 850 CH128						
Frequency	Antenna	SG LEVEL (dBm)	Antenna Gain (dBm)	Cable Loss (dB)	Measurel Level (dBm)	Limit (dBm)
(MHz)	Polarization					
1648	H	-62.23	6.3	2.3	-58.23	-13
2473	H	-39.12	8.3	3.2	-34.02	-13
1648	V	-62.09	6.3	2.3	-58.09	-13
2473	V	-32.80	8.3	3.2	-27.70	-13

Test Mode: GSM 850 CH189						
Frequency	Antenna	SG LEVEL (dBm)	Antenna Gain (dBm)	Cable Loss (dB)	Measurel Level (dBm)	Limit (dBm)
(MHz)	Polarization					
1673	H	-61.42	6.3	2.3	-57.42	-13
2509	H	-59.65	8.3	3.2	-54.55	-13
1673	V	-61.97	6.3	2.3	-57.97	-13
2509	V	-58.12	8.3	3.2	-53.02	-13

Test Mode: GSM 850 CH251						
Frequency	Antenna	SG LEVEL (dBm)	Antenna Gain (dBm)	Cable Loss (dB)	Measurel Level (dBm)	Limit (dBm)
(MHz)	Polarization					
1698	H	-61.95	6.5	2.5	-57.95	-13
2546	H	-59.36	8.4	3.4	-54.36	-13
1698	V	-61.82	6.5	2.5	-57.82	-13
2546	V	-56.20	8.4	3.4	-51.20	-13

Test Mode: EDGE 850 CH128						
Frequency	Antenna	SG LEVEL (dBm)	Antenna Gain (dBm)	Cable Loss (dB)	Measurel Level (dBm)	Limit (dBm)
(MHz)	Polarization					
1648	H	-61.11	6.3	2.3	-57.11	-13
2473	H	-57.51	8.3	3.2	-52.41	-13
1648	V	-61.82	6.3	2.3	-57.82	-13
2473	V	-56.42	8.3	3.2	-51.32	-13

Test Mode: EDGE 850 CH189						
Frequency	Antenna	SG LEVEL (dBm)	Antenna Gain (dBm)	Cable Loss (dB)	Measurel Level (dBm)	Limit (dBm)
(MHz)	Polarization					
1673	H	-60.14	6.3	2.3	-56.14	-13
2509	H	-58.27	8.3	3.2	-53.17	-13
1673	V	-60.44	6.3	2.3	-56.44	-13
2509	V	-56.57	8.3	3.2	-51.47	-13

Test Mode: EDGE 850 CH251						
Frequency	Antenna	SG LEVEL (dBm)	Antenna Gain (dBm)	Cable Loss (dB)	Measurel Level (dBm)	Limit (dBm)
(MHz)	Polarization					
1698	H	-59.47	6.5	2.5	-55.47	-13
2546	H	-57.14	8.4	3.4	-52.14	-13
1698	V	-60.53	6.5	2.5	-56.53	-13
2546	V	-57.61	8.4	3.4	-52.61	-13

Test Mode: GSM 1900 CH512						
Frequency	Antenna	SG LEVEL (dBm)	Antenna Gain (dBm)	Cable Loss (dB)	Measurel Level (dBm)	Limit (dBm)
(MHz)	Polarization					
3700	H	-58.86	10.5	4.8	-53.16	-13
5551	H	-57.00	11.4	4.6	-50.20	-13
3700	V	-59.42	10.5	4.8	-53.72	-13
5551	V	-57.58	11.4	4.6	-50.78	-13

Test Mode: GSM 1900 CH661						
Frequency	Antenna	SG LEVEL (dBm)	Antenna Gain (dBm)	Cable Loss (dB)	Measurel Level (dBm)	Limit (dBm)
(MHz)	Polarization					
3760	H	-59.02	10.5	4.8	-53.32	-13
5640	H	-56.21	11.4	4.6	-49.41	-13
3760	V	-58.03	10.5	4.8	-52.33	-13
5640	V	-56.99	11.4	4.6	-50.19	-13

Test Mode: GSM 1900 CH810						
Frequency	Antenna	SG LEVEL (dBm)	Antenna Gain (dBm)	Cable Loss (dB)	Measurel Level (dBm)	Limit (dBm)
(MHz)	Polarization					
3820	H	-57.67	10.8	5.3	-52.17	-13
5729	H	-57.03	11.3	4.6	-50.33	-13
3820	V	-58.91	10.8	5.3	-53.41	-13
5729	V	-56.30	11.3	4.6	-49.60	-13

Test Mode: EDGE 1900 CH512						
Frequency	Antenna	SG LEVEL (dBm)	Antenna Gain (dBm)	Cable Loss (dB)	Measurel Level (dBm)	Limit (dBm)
(MHz)	Polarization					
3700	H	-56.87	10.5	4.8	-51.17	-13
5551	H	-57.38	11.4	4.6	-50.58	-13
3700	V	-59.17	10.5	4.8	-53.47	-13
5551	V	-56.77	11.4	4.6	-49.97	-13

Test Mode: EDGE 1900 CH661						
Frequency	Antenna	SG LEVEL (dBm)	Antenna Gain (dBm)	Cable Loss (dB)	Measurel Level (dBm)	Limit (dBm)
(MHz)	Polarization					
3760	H	-58.13	10.5	4.8	-52.43	-13
5640	H	-57.19	11.4	4.6	-50.39	-13
3760	V	-58.92	10.5	4.8	-53.22	-13
5640	V	-58.27	11.4	4.6	-51.47	-13

Test Mode: EDGE 1900 CH810						
Frequency	Antenna	SG LEVEL (dBm)	Antenna Gain (dBm)	Cable Loss (dB)	Measurel Level (dBm)	Limit (dBm)
(MHz)	Polarization					
3820	H	-55.69	10.8	5.3	-50.19	-13
5729	H	-56.03	11.3	4.6	-49.33	-13
3820	V	-56.08	10.8	5.3	-50.58	-13
5729	V	-57.44	11.3	4.6	-50.74	-13

**Above 1GHz**

**EUT Use Internal Antenna:**

Test Mode: GSM 850 CH128						
Frequency	Antenna	SG LEVEL (dBm)	Antenna Gain (dBm)	Cable Loss (dB)	Measurel Level (dBm)	Limit (dBm)
(MHz)	Polarization					
1648	H	-61.08	6.3	2.3	-57.08	-13
2473	H	-52.39	8.3	3.2	-47.29	-13
1648	V	-54.44	6.3	2.3	-50.44	-13
2473	V	-48.64	8.3	3.2	-43.54	-13

Test Mode: GSM 850 CH189						
Frequency	Antenna	SG LEVEL (dBm)	Antenna Gain (dBm)	Cable Loss (dB)	Measurel Level (dBm)	Limit (dBm)
(MHz)	Polarization					
1673	H	-60.92	6.3	2.3	-56.92	-13
2509	H	-55.20	8.3	3.2	-50.10	-13
1673	V	-59.12	6.3	2.3	-55.12	-13
2509	V	-50.26	8.3	3.2	-45.16	-13

Test Mode: GSM 850 CH251						
Frequency	Antenna	SG LEVEL (dBm)	Antenna Gain (dBm)	Cable Loss (dB)	Measurel Level (dBm)	Limit (dBm)
(MHz)	Polarization					
1698	H	-53.89	6.5	2.5	-49.89	-13
2546	H	-61.87	8.4	3.4	-56.87	-13
1698	V	-57.16	6.5	2.5	-53.16	-13
2546	V	-57.66	8.4	3.4	-52.66	-13

Test Mode: EDGE 850 CH128						
Frequency	Antenna	SG LEVEL (dBm)	Antenna Gain (dBm)	Cable Loss (dB)	Measurel Level (dBm)	Limit (dBm)
(MHz)	Polarization					
1648	H	-57.51	6.3	2.3	-53.51	-13
2473	H	-43.27	8.3	3.2	-38.17	-13
1648	V	-58.78	6.3	2.3	-54.78	-13
2473	V	-50.63	8.3	3.2	-45.53	-13

Test Mode: EDGE 850 CH189						
Frequency	Antenna	SG LEVEL (dBm)	Antenna Gain (dBm)	Cable Loss (dB)	Measurel Level (dBm)	Limit (dBm)
(MHz)	Polarization					
1673	H	-56.45	6.3	2.3	-52.45	-13
2509	H	-54.08	8.3	3.2	-48.98	-13
1673	V	-57.24	6.3	2.3	-53.24	-13
2509	V	-57.15	8.3	3.2	-52.05	-13

Test Mode: EDGE 850 CH251						
Frequency	Antenna	SG LEVEL (dBm)	Antenna Gain (dBm)	Cable Loss (dB)	Measurel Level (dBm)	Limit (dBm)
(MHz)	Polarization					
1698	H	-54.38	6.5	2.5	-50.38	-13
2546	H	-59.05	8.4	3.4	-54.05	-13
1698	V	-58.28	6.5	2.5	-54.28	-13
2546	V	-52.25	8.4	3.4	-47.25	-13



Test Mode: GSM 1900 CH512						
Frequency	Antenna	SG LEVEL (dBm)	Antenna Gain (dBm)	Cable Loss (dB)	Measurel Level (dBm)	Limit (dBm)
(MHz)	Polarization					
3700	H	-50.40	10.5	4.8	-44.70	-13
3700	V	-46.33	10.5	4.8	-40.63	-13

Test Mode: GSM 1900 CH661						
Frequency	Antenna	SG LEVEL (dBm)	Antenna Gain (dBm)	Cable Loss (dB)	Measurel Level (dBm)	Limit (dBm)
(MHz)	Polarization					
3760	H	-51.59	10.5	4.8	-45.89	-13
3760	V	-47.00	10.5	4.8	-41.30	-13

Test Mode: GSM 1900 CH810						
Frequency	Antenna	SG LEVEL (dBm)	Antenna Gain (dBm)	Cable Loss (dB)	Measurel Level (dBm)	Limit (dBm)
(MHz)	Polarization					
3820	H	-57.71	10.8	5.3	-52.21	-13
3820	V	-53.77	10.8	5.3	-48.27	-13
5729	V	-56.14	11.3	4.6	-49.44	-13

Test Mode: EDGE 1900 CH512						
Frequency	Antenna	SG LEVEL (dBm)	Antenna Gain (dBm)	Cable Loss (dB)	Measurel Level (dBm)	Limit (dBm)
(MHz)	Polarization					
3700	H	-51.83	10.5	4.8	-46.13	-13
3700	V	-40.40	10.5	4.8	-34.70	-13

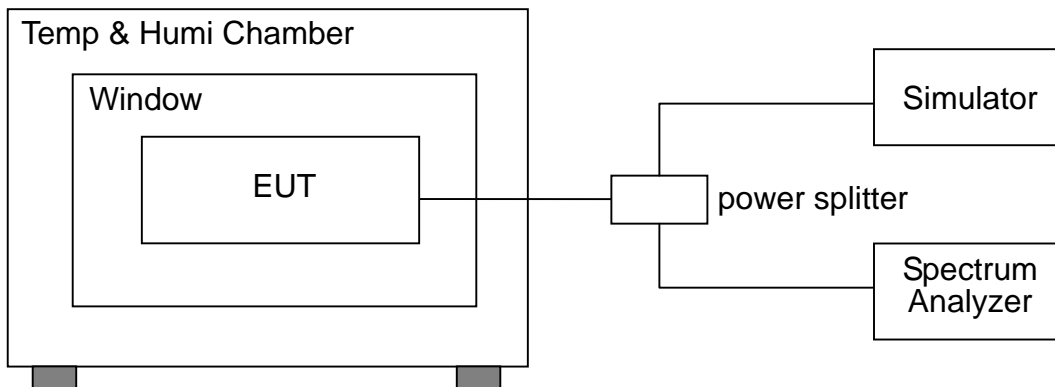
Test Mode: EDGE 1900 CH661						
Frequency	Antenna	SG LEVEL (dBm)	Antenna Gain (dBm)	Cable Loss (dB)	Measurel Level (dBm)	Limit (dBm)
(MHz)	Polarization					
3760	H	-52.36	10.5	4.8	-46.66	-13
3760	V	-45.48	10.5	4.8	-39.78	-13

Test Mode: EDGE 1900 CH810						
Frequency	Antenna	SG LEVEL (dBm)	Antenna Gain (dBm)	Cable Loss (dB)	Measurel Level (dBm)	Limit (dBm)
(MHz)	Polarization					
3820	H	-58.54	10.8	5.3	-53.04	-13
3820	V	-56.73	10.8	5.3	-51.23	-13

## 7 Frequency Stability

### 7.1 Configuration of Measurement

Frequency Stability test



### 7.2 Test Procedures

#### (Temperature Variation)

1. The EUT and test equipment were set up as following.
2. Removed all power, the temperature was decreased to  $-30^{\circ}\text{C}$  and permitted to stabilize for 3 hours. Power was applied and the maximum change in frequency was note within one minute.
3. Power OFF, the temperature was raised in  $10^{\circ}\text{C}$  steps. The sample was permitted to stabilize at each step for at least 1.5 hour. Power was applied and the maximum frequency change as noted within 1 minute.
4. After temperature tests were performed for the worst case.
5. Recorded the test data.

#### (Voltage Variation)

1. The EUT was placed in a  $20^{\circ}\text{C}$  temperature chamber and connected as the following.
2. The power supply voltage to the EUT was varied from 85% to 115% of the nominal value.
3. Measured the worst case of the variation in frequency.

### 7.3 Test Result

**PASS.**

The final test data is shown as following pages.

## Frequency Stability

Test Mode: GSM 850 CH 189		Nominal Freq. (MHz)	Measurement Freq. (MHz)	ppm	Limit (dBm)	Result
Temp. (°C)	Voltage (V)					
-30	120	836.40	836.400	-0.60	±2.5	Pass
-20	120	836.40	836.401	1.20	±2.5	Pass
-10	120	836.40	836.402	1.79	±2.5	Pass
0	120	836.40	836.399	-1.20	±2.5	Pass
10	120	836.40	836.401	1.20	±2.5	Pass
20	102	836.40	836.400	-0.60	±2.5	Pass
	120	836.40	836.400	0.00	±2.5	Pass
	138	836.40	836.399	-1.79	±2.5	Pass
30	120	836.40	836.402	2.39	±2.5	Pass
40	120	836.40	836.401	1.20	±2.5	Pass
50	120	836.40	836.402	2.39	±2.5	Pass

Test Mode: EDGE 850 CH 189		Nominal Freq. (MHz)	Measurement Freq. (MHz)	ppm	Limit (dBm)	Result
Temp. (°C)	Voltage (V)					
-30	120	836.4	836.400	0.00	±2.5	Pass
-20	120	836.4	836.400	0.00	±2.5	Pass
-10	120	836.4	836.401	1.20	±2.5	Pass
0	120	836.4	836.400	0.00	±2.5	Pass
10	120	836.4	836.400	0.00	±2.5	Pass
20	102	836.4	836.400	-0.60	±2.5	Pass
	120	836.4	836.401	1.20	±2.5	Pass
	138	836.4	836.400	-0.60	±2.5	Pass
30	120	836.4	836.402	2.39	±2.5	Pass
40	120	836.4	836.401	1.20	±2.5	Pass
50	120	836.4	836.400	0.00	±2.5	Pass

Test Mode: GSM 1900 CH 661		Nominal Freq. (MHz)	Measurement Freq. (MHz)	ppm	Limit (dBm)	Result
Temp. (°C)	Voltage (V)					
-30	120	1880	1880.001	0.53	±2.5	Pass
-20	120	1880	1880.002	1.06	±2.5	Pass
-10	120	1880	1880.000	0.00	±2.5	Pass
0	120	1880	1880.001	0.53	±2.5	Pass
10	120	1880	1880.001	0.53	±2.5	Pass
20	102	1880	1879.999	-0.80	±2.5	Pass
	120	1880	1880.002	1.06	±2.5	Pass
	138	1880	1880.000	-0.27	±2.5	Pass
30	120	1880	1880.001	0.53	±2.5	Pass
40	120	1880	1880.002	1.06	±2.5	Pass
50	120	1880	1880.002	1.06	±2.5	Pass

Test Mode: EDGE 1900 CH 661		Nominal Freq. (MHz)	Measurement Freq. (MHz)	ppm	Limit (dBm)	Result
Temp. (°C)	Voltage (V)					
-30	120	836.4	836.400	0.00	±2.5	Pass
-30	120	1880	1880.001	0.53	±2.5	Pass
-20	120	1880	1880.000	0.00	±2.5	Pass
-10	120	1880	1880.001	0.53	±2.5	Pass
0	120	1880	1880.001	0.53	±2.5	Pass
10 20	120	1880	1879.999	-0.53	±2.5	Pass
	102	1880	1879.998	-1.06	±2.5	Pass
	120	1880	1880.000	0.00	±2.5	Pass
	138	1880	1879.999	-0.80	±2.5	Pass
30	120	1880	1880.001	0.53	±2.5	Pass
40	120	1880	1880.001	0.53	±2.5	Pass