FCC TEST REPORT Report No.: F462921

# **FCC TEST REPORT**

for

# 47 CFR Part 24E

Equipment : GSM/GPRS Mobile Phone

Model No. : TG9A / XG988

FCC ID : **GKRTG9A** 

Filing Type : Certification

Applicant : Compal Electronics, Inc.

No. 581, Juikuang Rd., Neihu, Taipei, (114) Taiwan,

R.O.C.

- The test result refers exclusively to the test presented test model / sample.
- Without written approval of SPORTON International Inc., the test report shall not be reproduced except in full.
- Certificate or Test Report must not be used by the applicant to claim the product in this test report endorsement by NVLAP or any agency of U.S. government.

## SPORTON International Inc.

6F, No.106, Sec. 1, Hsin Tai Wu Rd., Hsi Chih, Taipei Hsien, Taiwan, R.O.C.

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The applicant has been cautioned as to the following:

15.21 Information to User.

The users manual or instruction manual for an intentional radiator shall caution the user that changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

15.27(a) Special Accessories.

Equipment marketed to a consumer must be capable of complying with the necessary regulations in the configuration in which the equipment is marketed. Where special accessories, such as shielded cables and/or special connectors are required to enable an unintentional or intentional radiator to comply with the emission limits in this part, the equipment must be marketed with, i.e. shipped and sold with, those special accessories. However, in lieu of shipping or packaging the special accessories with the unintentional or intentional radiator, the responsible party may employ other methods of ensuring that the special accessories are provided to the consumer, without additional charge.

Information detailing any alternative method used to supply the special accessories for a grant of equipment authorization or retained in the verification records, as appropriate. The party responsible for the equipment, as detailed in § 2.909 of this chapter, shall ensure that these special accessories are provided with the equipment. The instruction manual for such devices shall include appropriate instructions on the first page of text concerned with the installation of the device that these special accessories must be used with the device. It is the responsibility of the user to use the needed special accessories supplied with the equipment.

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Required information per ISO/IEC Guide 25-1990, paragraph 13.2:

a) Test Report

b) Laboratory: Sporton International Inc.

No.52, Hwa-Ya 1<sup>st</sup> RD., Hwa Ya Technology Park, Kwei-Shan

Report No.: F462921

Hsiang, TaoYuan Hsien, Taiwan, R.O.C.

c) Report Number: F462921

d) Client: Compal Electronics, Inc.

No. 581, Juikuang Rd., Neihu, Taipie, (114) Taiwan, R.O.C.

e) Identification: Model Name: TG9A / XG988

FCC ID: GKRTG9A

Description: GSM 1900 Radio

f) EUT Condition: Not required unless specified in individual tests.

g) Report Date: July 12, 2004 EUT Received: June 30, 2004

h, j, k): As indicated in individual tests.

i) Sampling method: No sampling procedure used.

I) Uncertainty: In accordance with Sporton internal quality manual.

m) Supervised by:

Hendry Yang 01/15/2004
Hendry Yang

n) Results: The results presented in this report relate only to the item tested.

o) Reproduction: This report must not be reproduced, except in full, without written

permission from this laboratory.

Accessories Used During Testing:

**Type Model** EUT TG9A

XG988

Earpiece N/A

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#### **List of General Information Required for Certification**

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In Accordance with FCC Rules and Regulations, Volume II, Part 2 and 24E, Confidentiality

#### **Sub-Part 2.1033**

(c)(1): Name and Address of Applicant:

Compal Electronics, Inc.

No. 581, Juikuang Rd., Neihu, Taipei, (114)

Taiwan, R.O.C.

Manufacturer

Compal Electronics, Inc.

No. 581, Juikuang Rd., Neihu, Taipei, (114)

Taiwan, R.O.C.

(c)(2): FCC ID: GKRTG9A

Model Number: TG9A / XG988

(c)(3): Instruction Manual(s):

Please See Attached Exhibits

(c)(4): **Type of Emission**: 300 KGXW

(c)(5): **FREQUENCY RANGE**, **MHz**: 1850.2 to 1909.8

(c)(6): **Power Rating, Watts**: 0.776 (conducted)

0.519 (EIRP)

x Switchable Variable N/A

(c)(7): Maximum Power Rating, Watts: 1

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# Subpart 2.1033 (continued) (c)(8): Voltages & Currents in All Elements in Final RF Stage, Including Final Transistor or Solid State Device: Collector Current, A = 0.5 Collector Voltage, Vdc = 3.6 Supply Voltage, Vdc = (c)(9): Tune-Up Procedure: Please See Attached Exhibits (c)(10): Circuit Diagram/Circuit Description: Please See Attached Exhibits (c)(11): Label Information: Please See Attached Exhibits (c)(12): Photographs: Please See Attached Exhibits (c)(13): Digital Modulation Description: \_ Attached Exhibits <u>x</u> N/A (c)(14): Test and Measurement Data: **Follows**

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# Testimonial and Statement of Certification

## This is to certify that:

- 1. **That** the application was prepared either by, or under the direct supervision of, the undersigned.
- 2. **That** the technical data supplied with the application was taken under my direction and supervision.
- 3. **That** the data was obtained on representative units, randomly selected.
- 4. **That**, to the best of my knowledge and belief, the facts set forth in the application and accompanying technical data are true and correct.

Certified by:

Daniel Lee
Manager

Report No.: F462921

#### Report No.: F462921

#### Certificate of NVLAP Accreditation



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# Sub-part

# 2.1033(c)(14): Test and Measurement Data

All tests and measurement data shown were performed in accordance with FCC Rules and Regulations, Volume II; Part 2, Sub-part J, Sections 2.947, 2.1033(c), 2.1041, 2.1046, 2.1047, 2.1079, 2.1051, 2.1053, 2.1055, 2.1057 and the following individual Parts:

Report No.: F462921

22 – Public Mobile Services22 Subpart H - Cellular Radiotelephone Service

x 24 – Personal Communications Services

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# **General Information**

	Product Feature & Specification						
1.	Type of Modulation	GMSK					
2.	Number of Channels	GSM 1900 : 512 to 810					
	Face Park Mil	Tx:: 1850-1910					
3.	Frequency Band , MHz	Rx: 1805-1880					
4.	Channel Spacing	200 KHz					
5.	Maximum Output Power to Antenna	29 dBm					
6.	HW Version	1.0					
7.	SW Version	22.31.1125					
8.	Antenna Type	Fixed Internal Antenna					

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#### **Standard Test Conditions**

#### and

#### **Engineering Practices**

Except as noted herein, the following conditions and procedures were observed during the testing:

In accordance with TIA603, and unless otherwise indicated in the specific measurement results, the ambient temperature of the actual EUT was maintained within the range of  $10^{\circ}$  to  $40^{\circ}$ C ( $50^{\circ}$  to  $104^{\circ}$ F) unless the particular equipment requirements specify testing over a different temperature range. Also, unless otherwise indicated, the humidity levels were in the range of  $10^{\circ}$  to  $90^{\circ}$  relative humidity.

Prior to testing, the EUT was tuned up in accordance with the manufacturer's alignment procedures. All external gain controls were maintained at the position of maximum and/or optimum gain throughout the testing.

Measurement results, unless otherwise noted, are worst-case measurements.

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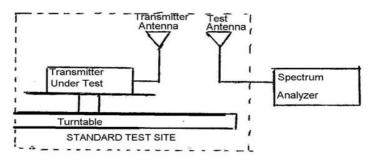
Name of Test: EIRP Carrier Power (Radiated)

**Specification**: TIA/EIA 603A (Substitution Method)

Definition: The average radiated power of device is the equivalent power required, when delivered to a substitution antenna, to produce at a distant point the same average received power as produced by the licensed device.

#### Method Of Measurement:

a) Connect the equipment as illustrated. Place the transmitter to be tested on the turntable in the standard test site.



b) Raise and lower the test antenna from 1m to 4m and rotate turntable from 0° to 360°. Record the highest received signal showed in spectrum analyzer as Rt . Calculate electric field strength in receive antenna as Et.

$$Et = Rt + AF$$

AF (dB/m): Receive Antenna Factor

c) Replace the transmitter under test with a substitution antenna. The center of the antenna should be at the same location as the transmitter under test. Connect the antenna to a signal generator with a known output power level Ps. Raise and lower the test antenna like in step b) and record the highest received signal showed in spectrum analyzer as R<sub>s</sub>. Calculate electric field strength in receive antenna as Es.

Es = Rs + AF

AF (dB/m): Receive Antenna Factor

d) Calculate radiated power as following:

EIRP = Ps + Et - Es + Gs

Ps (dBm): Input Power to Substitution Antenna

Gs (dBi): Substitution Antenna Gain

Results Attached

Tested By:

Tim Kao

SPORTON International Inc.

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<u>Test Results For</u>: EIRP Carrier Power (Radiated)

**Conducted Power** 

Bands	Channel	Frequency (MHz)	Conducted Power (dBm)	Conducted Power (Watts)
	512	1850.2 (Low)	28.9	0.776
GSM 1900	661	1880.0 (Mid)	28.7	0.741
	810	1909.8 (High)	28.3	0.676

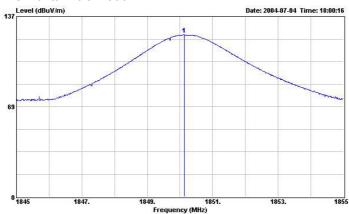
# **EIRP**

Freq MHz	Pol	Substitution Antenna Input Power (dBm)	Substitution Antenna Gain (dBi)	Ŀt	Es (dBuV/m)	Et - Es (dB)	Radiated Power (dBm)	Radiated Power (Watts)
1850.27	Н	-3.76	6.64	123.05	101.70	21.35	24.24	0.265
1880.07	Н	-3.78	6.65	123.65	101.64	22.01	24.88	0.308
1909.87	Н	-3.81	6.66	121.98	101.58	20.40	23.25	0.212
1850.15	V	-3.76	6.64	125.97	101.70	24.27	27.16	0.519
1879.90	V	-3.78	6.65	124.91	101.64	23.27	26.14	0.411
1909.83	V	-3.81	6.66	122.28	101.58	20.70	23.55	0.227

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#### GSM 1900 CH512 Horizontal Polarization



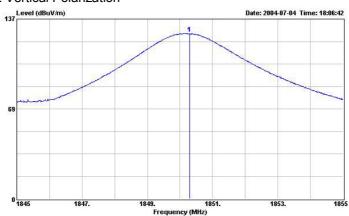
Site : 03CH03-HY
Condition : 3m HORN-ANT-6821 HORIZONTAL
EUT : GSM\GPRS Dual Band Handset

: 120Vac\60Hz : TG9A Power Model

: PCS Link Mode; CH 512

	Freq	Level		Limit Line						Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB	dB	dB		- cm	deg
.1	1850.140	123.05			95.03	26.53	1.49	0.00	Peak		

#### GSM 1900 CH512 Vertical Polarization



Site : 03CH03-HY
Condition : 3m HORN-ANT-6821 VERTICAL
EUT : GSM\GPRS Dual Band Handset

Power Model : 120Vac\60Hz

TG9A

PCS Link Mode; CH 512

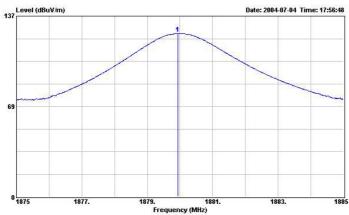
	Freq		0ver	Limit Line						Ant Pos	Table Pos
-	MHz	dBuV/m	dB	dBuV/m	dBu∀	dB	dB	dB		CIN.	deg
1	1850 300	125 97			97 95	26 53	1 49	0.00	Dook	220	1200

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#### GSM 1900 CH661 Horizontal Polarization



: 03CH03-HY

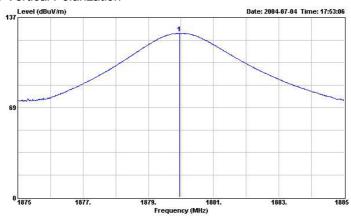
Condition: 3m HORN-ANT-6821 HORIZONTAL EUT: GSM\GPRS Dual Band Handset

Power : 120Vac\60Hz

Model : TG9A : PCS Link Mode; CH 661 Memo

Over Limit Read Probe Cable Preamp Freq Level Limit Line Level Factor Loss Factor Remark MHz dBuV/m dB dBuV/m dBuV dB dB cm deg 1 1879.940 123.65 ----- 95.49 26.66 1.50 0.00 Peak

#### GSM 1900 CH661 Vertical Polarization



: 03CH03-HY

Site : 03CH03-HY
Condition : 3m HORN-ANT-6821 VERTICAL
EUT : GSM/GPRS Dual Band Handset
Power : 120Vac\60Hz

TG9A

PCS Link Mode; CH 661

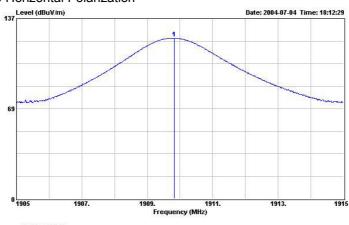
Over Limit Read Probe Cable Preamp Ant Table
Freq Level Limit Line Level Factor Loss Factor Remark Pos Pos MHz dBuV/m dB dBuV/m dBuV dB dB dB deg 1 1879.950 124.91 ----- 96.75 26.66 1.50 0.00 Peak

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#### GSM 1900 CH810 Horizontal Polarization



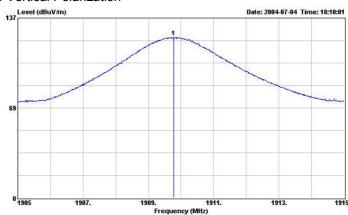
Site : 03CH03-HY Condition : 3m HORN-ANT-6821 HORIZONTAL EUT GSM\GPRS Dual Band Handset

Power Model : 120Vac\60Hz : TG9A

: PCS Link Mode; CH 810

Over Limit Read Probe Cable Preamp Freq Level Limit Line Level Factor Loss Factor Remark MHz dBuV/m dB dBuV/m dBuV dB 1 1909.830 121.98 ----- 93.70 26.78 1.50 0.00 Peak

#### GSM 1900 CH810 Vertical Polarization



Site : 03CH03-HY
Condition : 3m HORN-ANT-6821 VERTICAL
EUT : GSM\GPRS Dual Band Handset

Power Model : 120Vac\60Hz

TG9A

PCS Link Mode; CH 810

Over Limit Read Probe Cable Preamp Freq Level Limit Line Level Factor Loss Factor Remark dB dBuV/m dBuV dB dB MHz dBuV/m CM. 1 1909.780 122.28 ----- 94.00 26.78 1.50 0.00 Peak

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Name of Test: Transmitter Conducted Measurements

Specification: 47 CFR 2.1051: Unwanted (spurious) Emissions

2.1049(c), 24.238(b): Occupied Bandwidth

24: Emissions at Band Edges

Test Equipment: As per attached page

#### **Measurement Procedure**

- 1. The EUT and test equipment were set up as shown on the following page with the Spectrum Analyzer connected.
- 2. The low and high channels for all RF powers within the transmitting frequency band were measured.
- 3. Measurement Results: Attached

Tested By: Tim Kao

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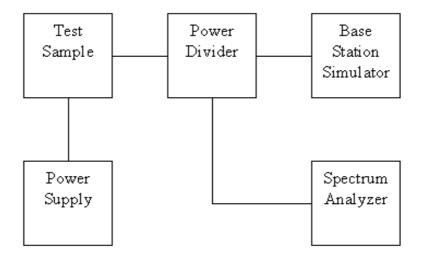
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# **Transmitter Spurious Emission**

Test A. Occupied Bandwidth (In-Band Spurious)

Test B. Out-of-Band Spurious

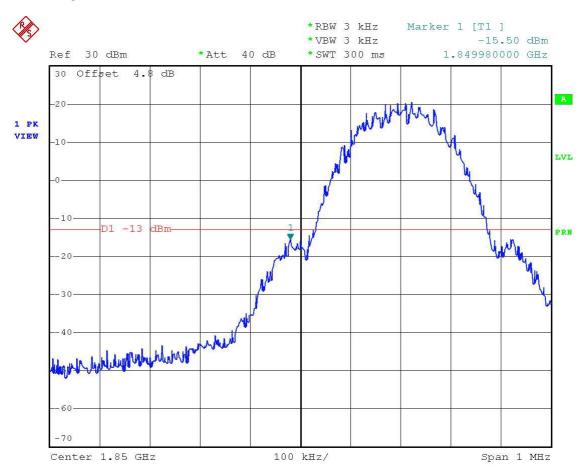


Asset	Model Name	S/N
Base Station Simulator	CMU200	102278
Base Station Simulator	E5515C	GB43460754
Spectrum Analyzer	FSP30	838858/014
AC/DC Power Source	HPA-500W	HPA0100024

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Name of Test: Emission Masks (Occupied Bandwidth) State 2:High Power



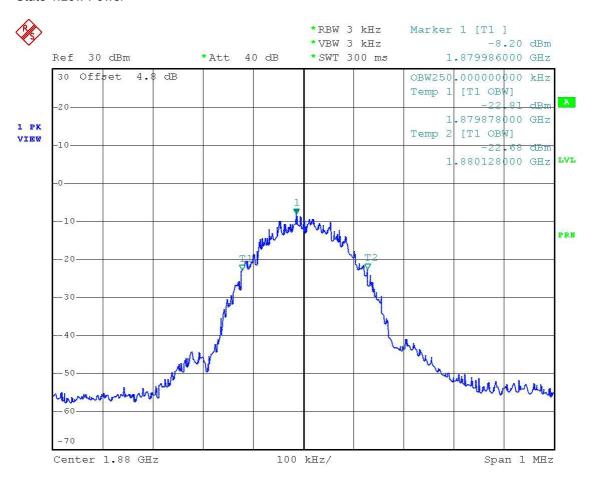
Power: HIGH Modulation: GSM 1900

LOWER BAND EDGE

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Name of Test: Emission Masks (Occupied Bandwidth) State 1:Low Power

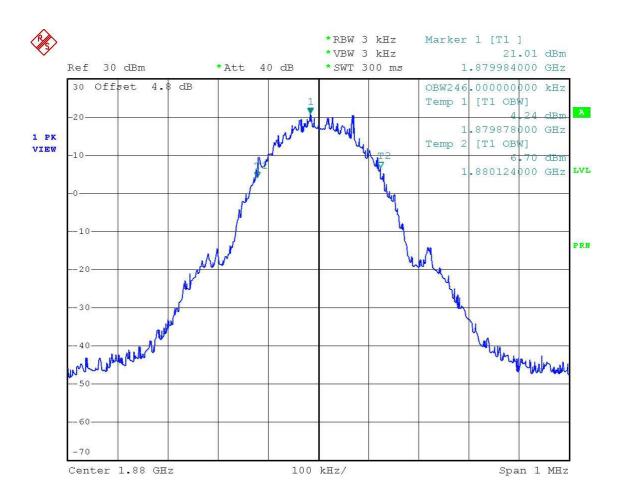


Power: LOW Modulation: GSM 1900

99% BANDWIDTH

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Name of Test: Emission Masks (Occupied Bandwidth) State 2:High Power

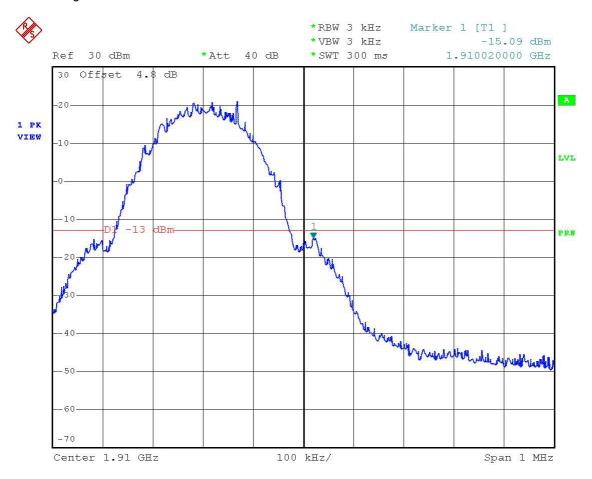


Power: HIGH Modulation: GSM 1900

99% BANDWIDTH

TEL: 886-2-2696-2468 FAX: 886-2-2696-2255

Name of Test: Emission Masks (Occupied Bandwidth) State 2:High Power

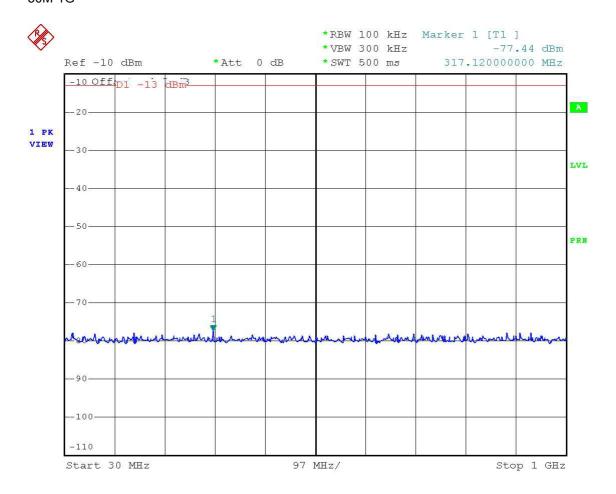


Power: HIGH Modulation: GSM 1900

UPPER BAND EDGE

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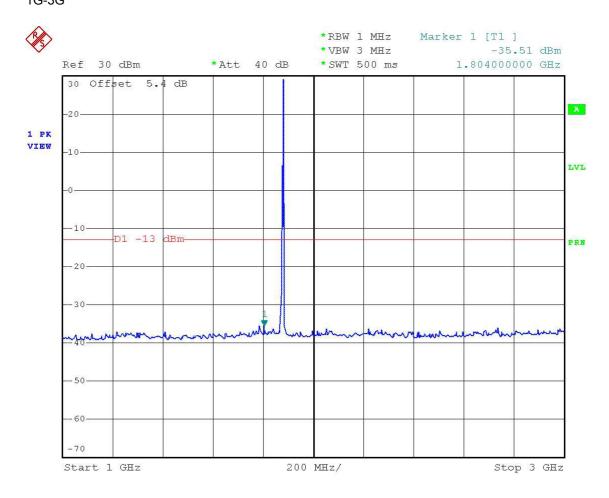
Name of Test: Conducted Spurious Emission 30M-1G



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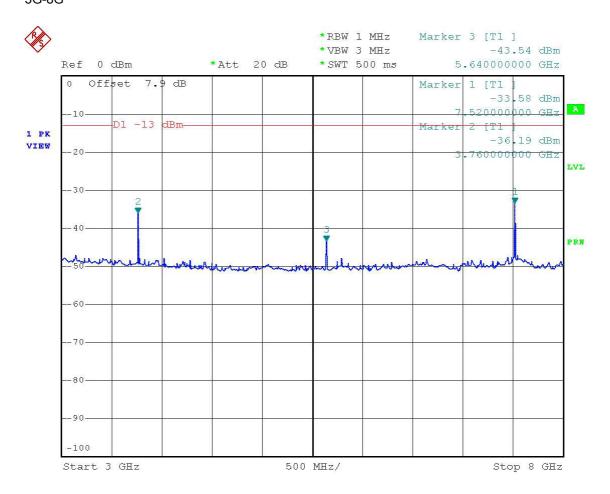
FCC ID

## Name of Test: Conducted Spurious Emission 1G-3G



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# **Name of Test**: Conducted Spurious Emission 3G-8G

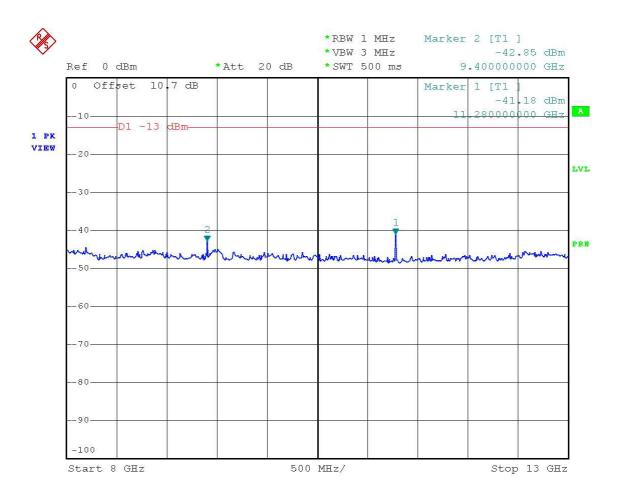


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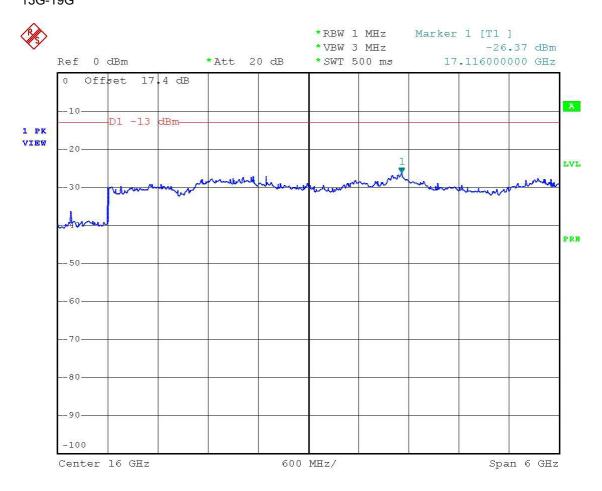
Name of Test: Conducted Spurious Emission

8G-13G



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# Name of Test: Conducted Spurious Emission 13G-19G



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Name of Test: Field Strength of Spurious Radiation

Specification: 47 CFR 2.1053(a)

Guide: ANSI/TIA/EIA-603-1992/2001, Paragraph 1.2.12 and Table 16

#### **Measurement Procedure**

1.2.12.1 Definition: Radiated spurious emissions are emissions

from the equipment when transmitting into a non-radiating load on a frequency

or frequencies which are outside an occupied band sufficient to ensure

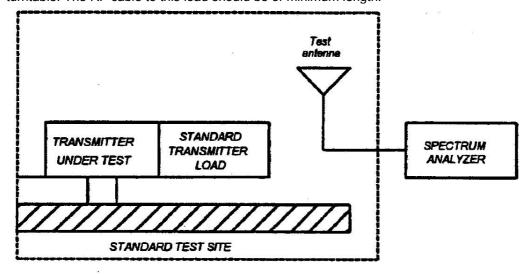
transmission of information of required quality for the class of communications

desired.

#### 1.2.12.2 Method of Measurement

A) Connect the equipment as illustrated

- B) Adjust the spectrum analyzer for the following settings:
  - 1) Resolution Bandwidth 100 kHz (<1 GHZ), 1 MHZ (> 1GHz).
  - 2) Video Bandwidth ≥ 3 times Resolution Bandwidth
  - 3) Sweep Speed ≤2000 Hz/second
  - 4) Detector Mode = Mean or Average Power
- C) Place the transmitter to be tested on the turntable in the standard test site. If the antenna is detatchable, The transmitter is transmitting into a non-radiating load which is placed on the turntable. The RF cable to this load should be of minimum length.



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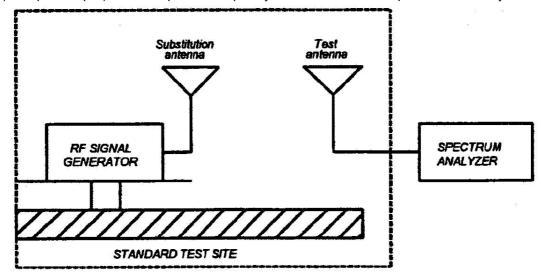
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Name of Test: Field Strength of Spurious Radiation (Cont.)

- D) For each spurious measurement the test antenna should cover the measured frequency. Measurements shall be made from the lowest radio frequency generated in the equipment to the tenth harmonic of the carrier, except for the region close to the carrier equal to ± the test bandwidth (see section 1.3.4.4).
- E) For each spurious frequency, raise and lower the test antenna from 1 m to 4 m to obtain a maximum reading on the spectrum analyzer with the test antenna at horizontal polarity. Repeat this procedure to obtain the highest possible reading. Record this maximum reading.
- F) Repeat step E) for each spurious frequency with the test antenna polarized vertically.



- G) Reconnect the equipment as illustrated.
- H) Keep the spectrum analyzer adjusted as in step B).
- Remove the transmitter and replace it with a substitution antenna. The center of the substitution antenna should be approximately at the same location as the center of the transmitter. At lower frequencies, where the substitution antenna is very long, this will be impossible to achieve when the antenna is polarized vertically. In such case the lower end of the antenna should be 0.3 m above the ground.

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Name of Test: Field Strength of Spurious Radiation (Cont.)

- Feed the substitution antenna at the transmitter end with a signal generator connected to the antenna by means of a non-radiating cable. With the antennas at both ends horizontally polarized and with the signal generator tuned to a particular spurious frequency, raise and lower the test antenna to obtain a maximum reading at the spectrum analyzer. Adjust the level of the signal generator output until the previously recorded maximum reading for this set of conditions is obtained. This should be done carefully repeating the adjustment of the test antenna and generator output.
- K) Repeat step J) with both antennas vertically polarized for each spurious frequency.
- L) Calculate power in dBm into a reference ideal half-wave dipole antenna by reducing the readings obtained in steps J) and K) by the power loss in the cable between the generator and the antenna and further corrected for the gain of the substitution antenna used relative to an ideal half-wave dipole antenna.

NOTE: It is permissible that other antennas provided can be referenced to a dipole.

Tested By:

Tim Kao

Report No.: F462921

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