

**Test Report From:**

LGC Wireless  
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Test of:

LGCell, 800 MHz Microcellular Distributed Antenna System v4.0  
iDEN

To Part 90, Subpart I of the FCC Rules and Regulations

Test Report No:

FCC ID: NOO

**APPLICATION FOR CERTIFICATION**

## **CERTIFICATION OF ENGINEERING REPORT**

This report has been prepared by LGC Wireless to verify compliance of the device described below with the requirements of Part 90, Subpart I of the FCC rules and Regulations. This report may be reproduced in full. Partial reproduction may only be made with the written consent of LGC Wireless. The results in this report apply only to the sample tested.

Applicant: LGC Wireless

Manufacturer: LGC Wireless

Model Number: LGCell

FCC ID: NOO-DAS8-4IDEN-W

On this 2nd day of January, 2000, I, individually, and for LGC Wireless Inc., certify that the statements made in this engineering report are true, complete, and correct to the best of my knowledge, and are made in good faith.

LGC Wireless

Reviewed by:

Paul Allan

Paul Allan

Director, Engineering Operations

Tested by:

John Stevenson

RF Hardware Test Engineer

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## **SECTION 1. – EQUIPMENT UNDER TEST (EUT)**

### **1.1 Introduction**

The following data is submitted for Certification of the LGCell, in accordance with Part 90, Subpart I of FCC Rules and Regulations.

### **1.2 Description**

The LGCell SMR/iDEN 800 v4.0 system consists of a main hub, an expansion hub, and four remote antenna units. The product is specifically designed as an in-building distributed antenna system using dual mode fiber optic cable and CAT V UTP cable.

The frequency of operation is a specified channel in the SMR/iDEN 800 band channel as designated by the licensed local service provider.

The system operates with an expected 30 dB gain in either the Uplink or Downlink with a maximum power out of +10 dBm on the duplex port and 0 dB gain on the simplex ports on the downlink and with a maximum power out of -10 dBm and -30 dBm on the Uplink. Typical maximum operating levels are expected to be less than 0 dBm. SMR versions have 0 dB gain at either port.

The antenna units are powered by a DC voltage on one pair of the UTP from the expansion hub and ground is provided on another pair. The hubs are powered by 115 V AC.

The system is designed to work in the 806-824 and 851-869 MHz band.

### **1.3 Information Required for Certification**

#### **Application for Certification**

A complete FCC Form 731 accompanies this application for certification.

#### **Technical Report**

Applicant: LGC Wireless Inc.  
585 East Brokaw Rd.  
San Jose, Ca. 95112

FCC ID: NOO-DAS8-4IDEN-W

Installation/Operating Instructions: Included as an electronic attachment as part of the electronically filed application package.

#### Type or types of emission

Emission Designators:

F9W, D9W

#### Frequency Range

806-824 MHz and 851-869 MHz for iDEN

#### Power Levels

The maximum transmit power ratings are listed in the attached Instruction manual as part of this electronically filed application.

#### Maximum Power Ratings

The maximum peak transmit power is +20 dBm (measured). Results are included as part of this electronically filed application package.

#### DC Voltages and DC Currents

The only DC voltages and currents present are those powering the Remote antenna units. Those values are 12 V and approximately 600 mA.

#### Tune up procedure over the power range

The tuning procedure for the system will be sent to the FCC as an attachment as part of the electronically filed application.

#### Circuit Diagrams

Complete circuit diagrams are to be sent to the FCC as an attachment as part of the electronically filed application. The diagrams will cover the following:

- Frequency stabilization (PLL and Pilot Tone)

- Suppression of spurious radiation (Filtering)

- Modulation limiting: Not Applicable

- Power limiting (Uplink clamping circuits/ No Downlink power limiting)

Photographs/Drawings of the label

The FCC label is placed on the EUT as shown in the label drawing in Appendix 4.

Equipment Photographs

Photographs of the equipment are shown in the accompanying EMC Technologies report.

Digital Modulation Techniques

iDEN test results are included as part of this electronically filed package.

Data Required

The data required, inclusive, was measured in accordance with the proper procedures and is included as part of this electronically filed package.

**SECTION 2 - MEASUREMENT REQUIREMENTS****2.1 Introduction**

The following data is submitted for Certification of a Licensed SMR/iDEN 800Mhz system for LGC Wireless, in accordance with Part 90, Subpart I of FCC Rules and Regulations. The measurement procedures were in accordance with the requirements.

**2.2 Measurements Required**Equipment Authorization

Applicants for certification of transmitters that operate in these services must determine that the equipment complies with IEEE C95.1-1991 (ANSI/IEEE C95.1-1992), "IEEE Standards for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz." SAR measurement methods are specified in IEEE C95.3-1991, "Recommended Practice for the Measurement of Potentially Hazardous Electromagnetic Fields – RF and Microwave."

Enclosed in Appendix 3 is a statement verifying compliance to this section.

RF Power Output

For transmitters other than single sideband, independent sideband and controlled carrier radiotelephone, power output shall be measured at the RF output terminals when the

transmitter is adjusted in accordance with the tune-up procedure to give the values of current and voltage on the circuit elements specified.

#### Power and antenna height limits

Output power is less than 100 mW. Data is included as part of this electronically filed package. Antenna height limits are not applicable

#### Modulation Characteristics

The LGCell passes existing modulation, therefore, this section does not apply. Enclosed with the measurement data is the measured standard frequency deviation from the LGCell with a modulated signal.

#### Occupied Bandwidth

The occupied bandwidth, that is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power radiated by a given emission shall be measured under the following conditions:

(h) Transmitters employing digital modulation techniques – when modulated by an input signal such that its amplitude and symbol rate represent the maximum rated conditions under which the equipment will be operated. The signal shall be applied through any filter networks, pseudo-random generators, or other devices required in normal service. Additionally, the occupied bandwidth shall be shown for operation with any devices used for modifying the spectrum when such devices are optional at the discretion of the user.

All digital modulation techniques were tested to an occupied bandwidth at 99% power out. The data is included as part of this electronically filed package.

#### Spurious Emissions at Antenna Terminals

The radio frequency voltage or powers generated within the equipment and appearing on a spurious frequency shall be checked at the equipment output terminal when properly loaded with a suitable artificial antenna.

All RF data is included as part of this electronically filed package.

On any frequency outside a licensee's frequency block, the power of any emission shall be attenuated below the transmitter power (P) by at least  $43 + 10 \log (P)$  dB.

The reference level for spurious emissions at the antenna terminals was taken from the measured output power (P), therefore, the spurious must be attenuated at least  $43 + 10 \log(P)$ .

All emissions outside of the  $-26$  dB emissions bandwidth were at least 26 dB down from the carrier. Data for the digital modulation technique is included as part of this electronically filed package.

### Frequency Stability

(a) The frequency stability was measured with variation of ambient temperature as follows:

(1) From 0 deg. to + 50deg centigrade.

(b) Frequency measurements were made at the extremes of the specified temperature range and at a single interval of 25 deg. centigrade through the range. A period of time sufficient to stabilize all of the components of the oscillator circuit at each temperature level shall be allowed prior to frequency measurement. The short term transient effects on the frequency of the transmitter due to keying (except for broadcast transmitters) and any heating element cycling normally occurring at each ambient temperature level also shall be shown. Only the portion or portions of the transmitter containing the frequency determining and stabilizing circuitry need be subjected to the temperature variation test.

(d) The frequency stability shall be measured with variation of primary supply voltage as follows:

The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

### Harmonics

If the equipment operates below 10 GHz, the spectrum shall be investigated to the tenth harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower.



**SECTION 3 – MEASUREMENT DATA**

The LGCell operates in 806-824 MHz and 851-869 MHz for SMR/iDEN

Data obtained was submitted as part of the electronically filed package  
Additional spurious emissions data is included.

**Appendix 1 – Test Equipment Used**

<b>Mfr/Model No</b>	<b>Description</b>	<b>Serial Number</b>	<b>Cal Date</b>
HP/8593E	Spectrum Analyzer	3547U01188	4/27/99
HP/8594E	Spectrum Analyzer	3801A05466	4/27/99
HP/8594E	Spectrum Analyzer	3801A05532	5/6/99
R&S/SMIQ 03	Signal Generator	DE23533	6/30/99
R&S/SMIQ 03	Signal Generator	DE22093	10/22/97
R&S/SMIQ 03	Signal Generator	DE22422	1/21/98

The equipment listed above is calibrated every 12 months (except the signal generators which are calibrated on a 36month interval) by an independent calibration laboratory.

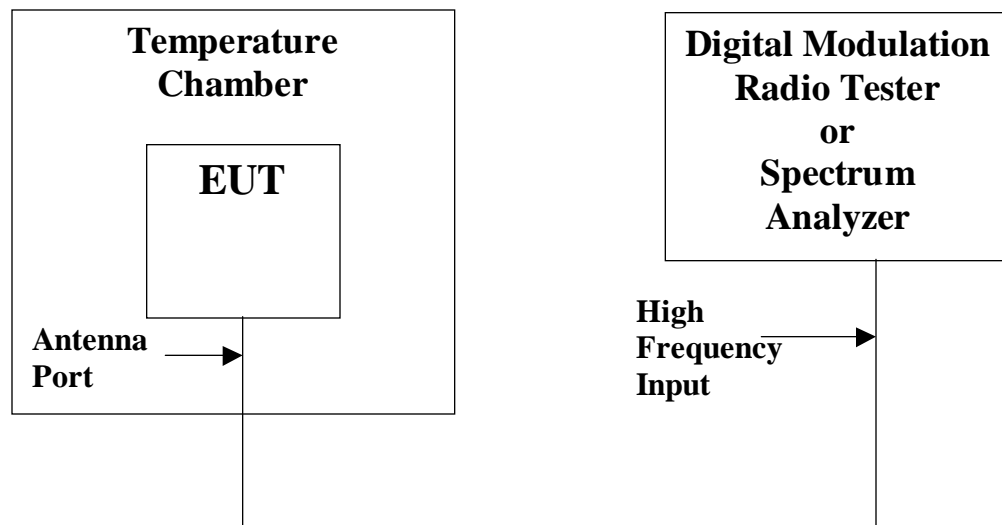
## Appendix 2 – Carrier Frequency Stability Test Procedure

### FCC Carrier Frequency Stability

The EUT was placed inside of a temperature chamber and directly connected to the spectrum analyzer via the antenna output port as shown in the block diagram below. The computer was used to control the EUT to permit it to transmit on pre-determined channels. The carrier frequency stability was measured using the spectrum analyzer or the digital modulation radio tester.

The EUT was placed inside of the temperature chamber at 25 deg. C for one hour in order to stabilize the temperature of the chamber and the EUT. This measurement was recorded as a reference for the measurements at the other temperatures and the battery voltage extremes using the modulation domain analyzer.

The modulation domain analyzer's settings were set as follows:



## **Appendix 3 - Compliance Statements**

### **Part 90**

Based on the results of our in-house testing and that of the contracted lab, EMC International Services, we believe our equipment is in compliance with the requirements of FCC CFR 47 Part 90 Subpart I.

### **SAR**

Based on the fact that our product is a low power device, is not a hand held device, and only on rare occasions be within 20 cm of an individual, we are in compliance with SAR requirements.

## **Appendix 4 - Labels**