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## FCC Part 15 Subpart C

### 5.8 GHz Digital Transmission System (Modular Approval)

### Class II Permissive Change Test Report

**Manufacturer:** Cirronet

**Model:** WIT5811

**FCC ID:** HSW-5811M

**Rules Section:** 15.203  
15.205(a)&(b)  
15.209(a)

**Test Begin Date:** March 16, 2004

**Test End Date:** March 16, 2004

**Report Issue Date:** March 26, 2004

**ACS Report Number:** 04-0064-15PC

**Test Result:** PASS

**Prepared By:** \_\_\_\_\_

Sam Wismer

Engineering Manager

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## 1.0 GENERAL

### 1.1 Introduction

The purpose of this report is to demonstrate compliance with Part 15, Subpart C of the FCC's Code of Federal Regulations.

### 1.2 Product Description

#### 1.2.1 General

The Equipment Under Test (EUT), is the Cirronet WIT5800 Radio Module Model manufactured by Cirronet Inc. Located at the following address:

Cirronet Inc.  
5375 Oakbrook Parkway  
Norcross, GA 30093  
USA

The radio module was originally granted on October 28, 2003.

#### 1.2.2 Intended Use

The EUT is intended to be offered to OEM manufacturers for integration into their final products. These products will be limited to mobile or fixed devices as defined by the FCC.

#### 1.2.3 Antennas

Table 1.2.4-1 below gives the antennas that were originally approved on October 28, 2003. Table 1.2.4-2 gives the new antennas for which approval is being sought. Photographs and specification sheets of the new antenna are submitted separately with this filing.

**Table 1.2.4-1: List of currently approved antennas**

Manufacturer	Model	Type	Gain (dBi)	EIRP (dBm)	Intended Operation
Mobile Mark	SCR14-5725CT	Corner Reflector	14	38.0	Point-to-Point
Mobile Mark	ODN9-5725	Omni	9i	36.0	Point-to-Multipoint
Mobile Mark	PSTN5-5725	Omni	2	26.0	Point-to-Multipoint
Mobile Mark	PSWN3-5725	Omni	2	26.0	Point-to-Multipoint
Cirronet	A-7030-0492	Patch	14	38.0	Point-to-Point

**Table 1.2.4-2: Description of New Antenna**

Manufacturer	Model	Type	Gain (dBi)	EIRP (dBm)	Intended Operation
Cirronet	Proprietary	Patch	12	N or TNC	Point to Multipoint

## 2.0 LOCATION OF TEST FACILITY

All testing except for was performed at:

ACS, Inc.  
B.U. Bowman Drive  
Buford, GA 30518

## 2.1 DESCRIPTION OF TEST FACILITY

All testing was conducted at an ACS facility specifically prepared for this testing. Where applicable, all sites have been fully described and submitted to, and accepted by the FCC and Industry Canada. FCC registration number 89450 and Industry Canada Lab Code IC 4175 have been assigned in recognition of the sites.

The open area test site consists of a 40' x 66' concrete pad covered with a perforated electro-plated galvanized sheet metal. The perforations in the sheet metal are 1/8" holes that are staggered every 3/16". The individual sheets are placed to overlap each other by 1/4" and are riveted together to provide a continuous seam. Rivets are spaced every 3" in a 3 x 20 meter perimeter around the antenna mast and EUT area. Rivets in the remaining area are spaced as necessary to properly secure the ground plane and maintain the electrical continuity.

The entire ground plane extends 12' beyond the turntable edge and 16' beyond the antenna mast when set to a 10 meter measurement distance. The ground plane is grounded via 4 - 8' copper ground rods, each installed at a corner of the ground plane and bound to the ground plane using 3/4" stainless steel braided cable.

The turntable is an all aluminum 10' flush mounted table installed in an all aluminum frame. The table is remotely operated from inside the control room located 40' from the range. The turntable is electrically bonded to the surrounding ground plane via steel fingers installed on the edge of the turn table. The steel fingers make constant contact with the ground plane during operation.

Adjacent to the turntable is a 7' x 7' square and 4' deep concrete pit used for support equipment if necessary. The pit is equipped with 5 - 4" PVC chases from the pit to the control room that allow for cabling to the EUT if necessary. The underside of the turntable can be accessed from the pit so cables can be supplied to the EUT from the pit. The pit is covered with 2 sheets of 1/4" diamond style re-enforced steel sheets. The sheets are painted to match the perforated steel ground plane, however the underside edges have been masked off to maintain the electrical continuity of the ground plane. All reflecting objects are located outside of the ellipse defined in ANSI C63.4.

A diagram of the Open Area Test Site is shown in Figure 2.1-1 below:

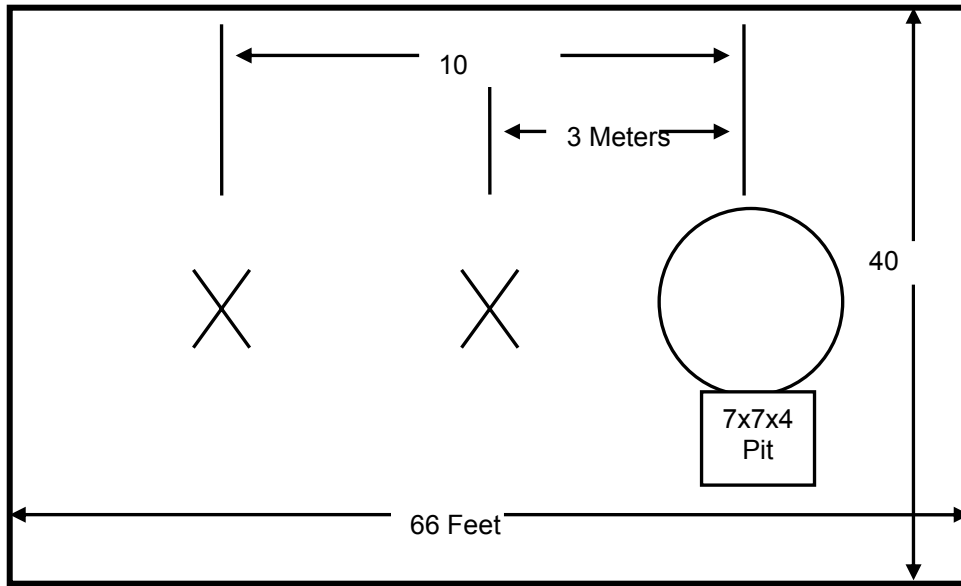


Figure 2.1-1: Open Area Test Site

**3.0 APPLICABLE STANDARD REFERENCES**

The following standards were used:

- 1 - ANSI C63.4-1992: Method of Measurements of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the 9KHz to 40GHz
- 2 - US Code of Federal Regulations (CFR): Title 47, Part 15, Subpart C: Radio Frequency Devices, Intentional Radiators (October 2002)
- 3 - FCC OET Bulletin 65 Appendix C - Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields

**4.0 LIST OF TEST EQUIPMENT**

All test equipment used for regulatory testing is calibrated yearly or according to manufacturer's specifications.

Table 4-1: Test Equipment

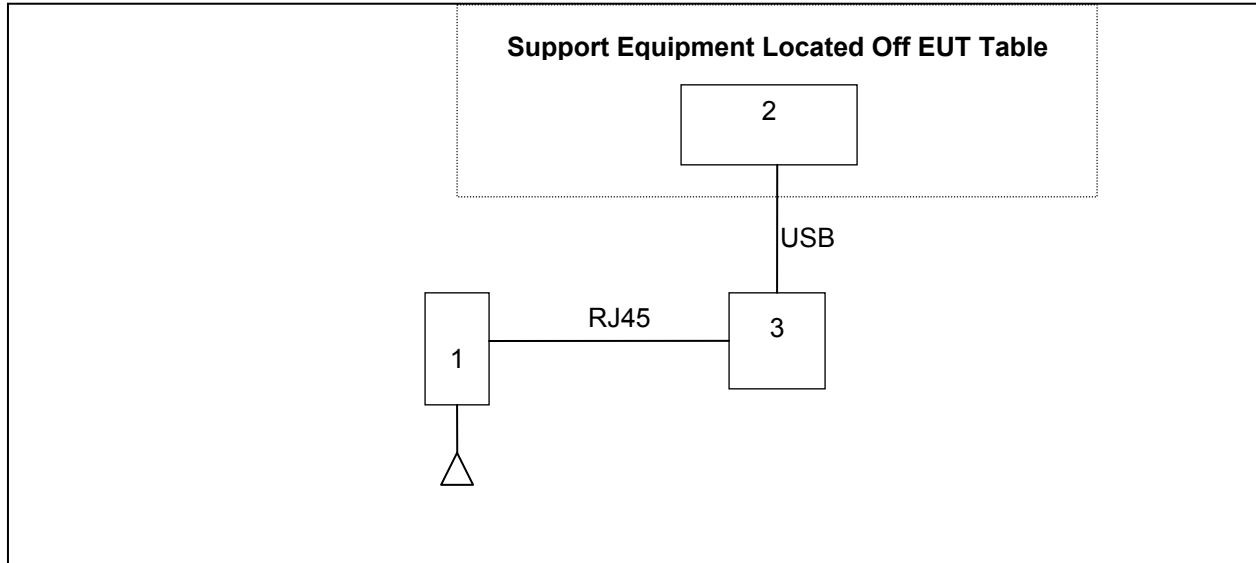
ACS ID#	MFG Name	Item Name	Model #:	Serial #	Recal Date:
---	Agilent	Spectrum Analyzer	E7402A	US40240259	11/08/04
---	Agilent	Spectrum Analyzer	8563EC	4111A01283	10/10/04
5	ACS	Cable	LL-335	None	8/20/04
6	ACS	Cable	LL-335	None	8/6/04
73	Agilent	Pre-Amplifier	8447D	272A05624	04/15/04
30	Spectrum Technologies	Horn Antenna	DRH-0118	970102	5/8/04
105	Microwave Circuits	High Pass Filter	H1G810G1	2123-01 DC0225	6/17/04

5.0 SUPPORT EQUIPMENT

Table 5.1-1: Support Equipment Description

Diagram Number	Manufacturer	Equipment Type	Model Number	Serial Number	FCC ID
1	Cirronet	Radio Module	WIT5811	None	HSW-5811M
2	DELL	PC	Optiplex GX1	O5M7D	NA
3	Cirronet	USB Adapter	NA	NA	NA

6.0 EQUIPMENT UNDER TEST SETUP BLOCK DIAGRAM



7.0 SUMMARY OF TESTS

The change to the EUT, that requires this filing, is the addition of an external antenna. Requirements affected by this change are:

- 15.203 antenna requirement
- 15.205 & 15.209 radiated spurious emissions in the restricted bands
- 15.247(b)(4) RF Exposure requirements

7.1 Antenna Requirement - FCC Section 15.203

The EUT employs an MMCX connector. According to FCC Public Notice, DA 00-2225, the MMCX qualifies as a unique antenna coupler.

7.2 Radiated Spurious Emissions(Restricted Bands) - FCC Section 15.205

7.2.1 Test Procedure

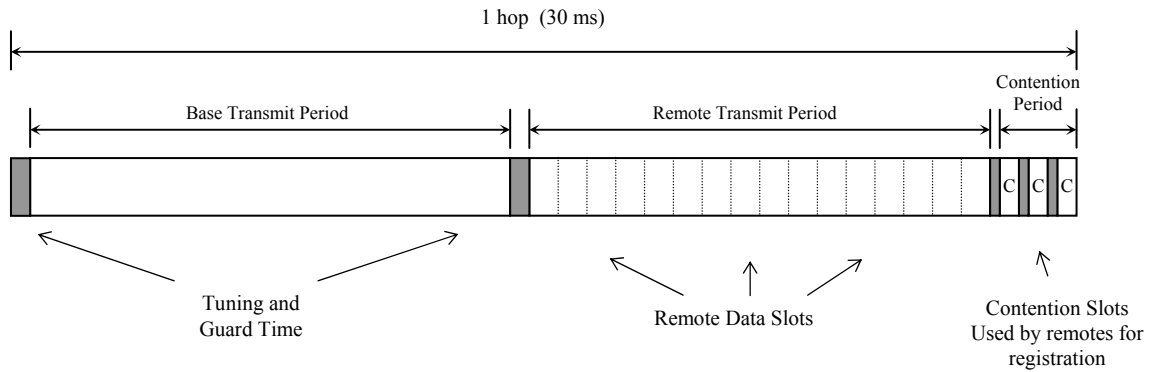
Radiated emissions tests were made over the frequency range of 30MHz to 60GHz, 10 times the highest fundamental frequency on each antenna given in section 1.2.3.

The EUT was rotated through 360° and the receive antenna height was varied from 1m to 4m so that the maximum radiated emissions level would be detected. For frequencies below 1000MHz, quasi-peak measurements were made using a resolution bandwidth(RBW) of 120kHz and a video bandwidth(VBW) of 300kHz. For frequencies above 1000MHz, average measurements were made using an RBW of 1MHz and a VBW of 10Hz and peak measurements were made with RBW of 1MHz and a VBW of 1MHz.

The EUT was caused to generate a carrier signal on the hopping channel.

**7.2.2 Duty Cycle Correction**

The diagram shown in figure 6.6.2.2-1 illustrates the duty cycle of the EUT in either its Base or Remote operational modes.



Base Transmit Guard	0.5ms
Base Transmit Period, max.	17ms
First Remote Transmit Guard	0.5ms
Successive Remote Guard	0.15ms
Contention Guard	0.15ms
Remote Transmit Period, max.	12ms (1 Remote, no contention slots)

The worst case duty cycle of the EUT is 56.5%, or 17ms of the 30ms “on-time”. Therefore, for average measurements the measured level was reduced by a factor 4.95dB to account for the duty cycle of the EUT. The duty cycle correction factor is determined using the formula:  $20\log(.565) = -4.95\text{dB}$ .

**7.2.3 Test Results**

Detectable points are reported below in table 7.6.2.4-1.

**Table 7.6.2.4-1: Radiated Spurious Emissions**

Frequency (MHz)	Level (dBuV)	Detector (P/A)	Antenna Polarity (H/V)	Turntable Position (o)	Correction Factors (dB)	Corrected Level (dBuV)	Limit (dBuV)	Margin (dB)	Final Result (Pass/Fail)
<b>Low Channel</b>									
11458	36.43	A	V	501	13.55	49.98	54.00	4.02	<b>PASS</b>
<b>Middle Channel</b>									
11550	36.43	A	V	75	13.95	50.38	54.00	3.62	<b>PASS</b>
<b>High Channel</b>									
11642	36.6	A	V	80	14.47	51.07	54.00	2.93	<b>PASS</b>

**Correction Factors = Antenna Factor + Cable Attenuation – Amplifier Gain – Duty Cycle Correction**

**Margin = Limit – Corrected Level**

**8.0 RF EXPOSURE SECTION 15.247(b)(4)**

The EUT is a module designed for integration into fixed location devices only. In accordance with FCC rules, the antennas of these devices will be located at a distance greater than 20cm for the user or the general population. Due to the intended use of this device, it was determined SAR evaluation is not required.

**9.0 CONCLUSION**

In the opinion of ACS, Inc. the WIT5811 5.8 GHz Transmission System, manufactured by Cirronet, Inc. continues to meet the requirements of FCC Part 15 subpart C with the new antenna as described in this filing.