Excellence in Compliance Testing

Certification Exhibit

FCC ID: HSW-2410P
IC: 4492A-2410P

FCC Rule Part: 15.247
IC Radio Standards Specification: RSS-210

ACS Report Number: 08-0020 - 15C

Manufacturer: Cirronet
Model: WIT2410P

RF Exposure

Appendix I – Operating Scenario for WIT2410P

The WIT2410P is used in a portable application. The system is set up as a star network with a number of radios, called remotes, all linked to one central base radio. These remote radios are installed in belt packs that fit around the waist of the user. Given this configuration, the remote radios will generally be closer than 2.5 cm to the user and will require a portable designation as part of the grant. The Base radio is placed at some central point, usually as high as possible, in the facility to provide better coverage to all remotes.

Any remote can communicate with any other remote by means of data packets routed back and forth through the base radio. The base radio provides synchronization for the entire system, passes messages from one remote to another, and provides broadcast messages for all remotes to hear.

The WIT2410P uses Frequency Hopping technology to mitigate the effects of fading and jamming. The dwell time for this system is set to 10 milliseconds. In any 10 ms dwell period, the following process takes place sequentially in time:

Start of dwell

1. Base broadcasts messages to all remotes,
2. Remote #1 sends its message to Base,
3. Remote #2 sends its message to Base,
4. Remote #3 sends its message to Base,
5. Remote #4 sends its message to Base,
6. Remote #5 sends its message to Base

To N… Remotes

After the last Remote sends its message to the Base, the 10 millisecond dwell time is complete and all radios hop to the next frequency channel in their hopset and the cycle is repeated.

We are asking for portable designation of the remote radios since they will be operated in close (< 2.5 cm) proximity to the user. The operation of the Base radio is already covered by our current WIT2410G grant with its 20 cm exclusion zone around the antenna

Appendix II – Calculation of Maximum Transmit Duty Cycle

As outlined in Appendix I, each remote WIT2410P can transmit only once during a dwell time. The maximum length of the transmitted packet from each remote is set by the system design and cannot be adjusted by the user. That packet length is calculated as follows:

Preamble	9 bytes
Sync and CRC	10 bytes
Data Payload	13 bytes
Maximum packet length	32 bytes

Bit time (1/460 Kbps)	2.1739 us
Byte time (bit time * 8)	17.3912 us
Maximum packet time (byte time * 32)	556.5184 us

The maximum amount of time that our Remote transmitter can operate in any 10 millisecond period is 556.5 us. Therefore, our source-averaged transmit duty cycle becomes 0.0556 (556.5 us / 10 ms). Note that this duty cycle is not dependent on our use of Frequency Hopping. We are not averaging our power over the number of hops. The above calculation is strictly based on the maximum amount of time our transmitter can transmit in any 10 ms time period – regardless of the channel the radio happens to be on at the time.

Appendix III – Calculated Average Power

The Power Threshold for 'General Population' portable designation without SAR testing is: (based on Oct 2005 TCB workshop PPT slide)

$(60 / F_{GHz})$ mW for distances < 2.5 cm

For the 2.4 GHz frequency band, this results in a limit of **25 mW**.

Note that we use the more restrictive "General Population" limit in this case even though the individuals using this product will certainly be aware of its function and would qualify under the 'occupational' category.

Given the maximum transmit duty cycle specified in Appendix II, the average transmitted power of a WIT2410P remote can be calculated as:

Maximum Pout = **63 mW** (18 dBm nominal)

Maximum Antenna Gain = **6 dBi** (for portable use)

Maximum Transmit Duty cycle (per Appendix II) = **0.0557**

Pave (Source-based average) = 0.063 * 4 * 0.0557 = **14 mW**

Conclusion:

The WIT2410P Remote meets the MPE limits for a 'Portable' device operating in the 'General Population'.

WIT2410P Portable Grant Antenna List
FCC ID: HSW-2410P

MANUFACTURER	TYPE OF ANTENNA	MODEL	GAIN dBi	TYPE OR CONNECTOR
Cirronet Corporation	Patch	PA2410	6dBi	MMCX
Cirronet Corporation	Patch	PA2400	3dBi	MMCX
ACE	Dipole	ACE-2400-NF	2dBi	Reverse SMA to MMCX via adapter cable