

1 June 2013

Federal Communications Commission  
Authorization and Evaluation Division  
1435 Oakland Mills Road Columbia, MD 21046  
UNITED STATES OF AMERICA

Subject: FCC ID: UIPSRN0400025A  
Single and dual antenna port variants  
Spectral efficiency

To Whom It May Concern:

**UIPSRN0400025A Single and dual antenna port variants**

With reference to the above product 4RF provides two antenna port configuration product variants, normally shipping a standard version with a single combined receive and transmit port. A second variant is provided with separate receive and transmit ports to allow the connection of external filters, multi-couplers, and/or RF combiners to facilitate the use of the equipment at shared sites where high signal levels can be expected from co-sited transmitters.

The provision of separate transmit and receive connection ports for the attachment of external filters, multi-couplers, and/or RF combiners is not required for the equipment to meet the applicable Commission rules, but rather as a convenience to our customers.

We believe that this provision, implemented by means of an additional front panel TNC style antenna connector, is simply a "variation in mechanical construction" and therefore permitted as a class I permissive change under part 2.1043(a).

Having considered the following rules:

Class II permissive changes which require resubmission to the FCC is defined in 2.1043(a)(2):

(2) A Class II permissive change includes those modifications which degrade the performance characteristics as reported to the Commission at the time of the initial certification. Such degraded performance must still meet the minimum requirements of the applicable rules. When a Class II permissive change is made by the grantee, the grantee shall supply the Commission with complete information and the results of tests of the characteristics affected by such change.

and

Class I permissive change does not require resubmission to the FCC is defined in 2.1043(a)(1):

(1) A Class I permissive change includes those modifications in the equipment which do not degrade the characteristics reported by the manufacturer and accepted by the Commission when certification is granted. No filing with the Commission is required for a Class I permissive change.

We believe that the provision of an additional antenna connector is simply a variation in construction by means of an internal passive connection and therefore permitted as a Class I permissive change. There is no measured change in the equipment performance.

### **UIPSRN0400025A Spectral efficiency**

The application is for a product designed for operation in 25 kHz channels.

The equipment is available in both 12.5 kHz and 25 kHz variants and is designed only for transmitting telemetry and other data. The 12.5 kHz variant has previously been certificated.

In regard to the Commission's rule 90.203(j)(5):

Applications for part 90 certification of transmitters designed to operate on frequencies in the 150.8-162.0125 MHz, 173.2-173.4 MHz, and/or 421-512 MHz bands, received on or after January 1, 2011, must include a certification that the equipment meets a spectrum efficiency standard of one voice channel per 6.25 kHz of channel bandwidth. Additionally, if the equipment is capable of transmitting data, has transmitter output power greater than 500 mW, and has a channel bandwidth of more than 6.25 kHz, the equipment must be capable of supporting a minimum data rate of 4800 bits per second per 6.25 kHz channel bandwidth.

The equipment is designed only for transmitting data, has an output power of 5 W and operates at 19,200 bits per second (bps) in a 25 kHz channel. The equipment only operates at this rate a lower, less efficient rate, can't be selected by the user so compliance with the above rule is unavoidable by end users. The equipment uses four level continuous phase frequency shift keying (4-CPFSK) modulation at 19,200 bps in a 25 kHz channel and so meets the requirement of a minimum data rate of 4,800 bits per second per 6.25 kHz channel bandwidth.

The 4-CPFSK modulation scheme employed operates at 9,600 symbols per second (19,200 bps) and fit inside a 25 kHz channel in all respects meeting the Commissions emission mask and technical rules. Both transmit and receive root raised cosine filters have an alpha of 0.2 and the modulation is applied to the transmit carrier using the in-phase and quadrature I/Q method. The I/Q signals are generated using digital to analog converters under control of a digital signal processing chain for a consistent transmit waveform over the entire operating frequency range.

We respectfully ask that the Commission consider these two notes in reference to the certification application for the referenced product.

Yours sincerely,

A handwritten signature in black ink, appearing to be 'S. J. X' with a large flourish.

John Yaldwyn  
**CHIEF TECHNOLOGY OFFICER**  
**DIRECTOR REGULATORY AFFAIRS**