FREEWAVE WIRELESS DATA SOLUTIONS

FreeWave Technologies, Inc.
1880 S. Flatiron Court, Suite F
Boulder, CO 80301

September 4, 2002

TCB
BABT Product Service
4855 Patrick Henry Drive, Building 6
Santa Clara, CA 95054

Re: Agent Authorization Letter
FCC ID: KNY-6231812519
Model: DGR09RMS

Dear Sir or Madam:

We, FreeWave Technologies, Inc. hereby authorize TÜV Product Service (10040 M
Rim Road, San Diego, CA 92121, Tel. (619) 546-3999) to act as our agent in all
matters relating to applications for equipment authorization, including the signing o
documents relating to these matters. I further certify that the applicant nor any par
the application is subject to a denial of Federal benefits, that includes FCC benefits
pursuant to Section 5301 of the Anti-Drug Abuse Act of 1988, 21 U.S.C. Section 86

This authorization expires on 9/4/03.

Sincerely,

R&D Manager

FreeWave Technologies
Ph (303) 444-3862

FREEWAVE WIRELESS DATA SOLUTIONS

FreeWave Technologies, Inc.
1880 S. Flatiron Court, Suite F
Boulder, CO 80301

September 4, 2002

TCB
BABT Product Service
4855 Patrick Henry Drive, Building 6
Santa Clara, CA 95054

Re: Request of Confidentiality
FCC ID: KNY-6231812519
Model: DGR09RMS

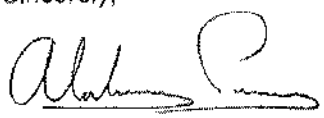
Pursuant to Sections 0.457(d)(1)(ii) and 0.459 of the Commission's Rules, the Applicant hereby requests confidential treatment of information accompanying as outlined below:

Technical Description, Schematics, Bill of Materials, Block Diagrams, ~~Cal Procedures~~, 2 E Equipment Construction and Layout.

The above materials contain trade secrets and proprietary information not customarily released to the public. The public disclosure of these matters might be harmful to the Applicant and provide unjustified benefits to its competitors.

The Applicant understands that pursuant to Rule 0.457(d)(1)(ii), disclosure of this Application and all accompanying documentation will not be made before the date of the Grant for this Application.

Sincerely,



R&D Manager

FreeWave Technologies
Ph (303) 444-3862
Fax (303) 786-9948

Name: Agent authorization letter 2_2.jpg
Dimensions: 851 x 1174 pixels

FreeWave Technologies, Inc.
1880 S. Flatiron Court, Suite F
Boulder, CO 80301

July 9, 2002

TCB
BABT Product Service
4855 Patrick Henry Drive, Building 6
Santa Clara, CA 95054

Re: FreeWave Technologies, Inc. (Grantee Code: KNY)
Request for New Equipment Identifier
Model Number DGR09RMS

Dear Sir or Madam:

Pursuant to Sections 2.1043(d) and 2.933 of the Commission's Rules, FreeWave Technologies, Inc. ("FreeWave"), hereby requests that one of our radio transceivers (model number DGR09RAS, FCC Identifier KNY21161341911919, granted August 2, 2001), which currently is limited to fixed-mounted installation on permanent outdoor structures, be reevaluated and approved as a mobile radio transceiver, using model number DGR09RMS and FCC Identifier KNY-6231812519.

FreeWave's model number DGR09RAS currently is approved for professional installation in a NEMA-type enclosure with antennas mounted on fixed outdoor structures. The instant request for a new FCC equipment identifier seeks to use an electrically identical device (FreeWave model number DGR09RMS) for mobile applications, also requiring professional installation.

FreeWave's model number DGR09RMS is electrically identical to FreeWave's previously certified model number DGR09RAS, and there are no differences in the circuitry, design, or construction of these two transceiver models. For this reason, in accordance with Sections 2.1043(d) and 2.933, FreeWave's new DGR09RMS radio transceiver does not require separate certification.

In support of the instant request for the new FCC Identifier, attached hereto is the following documentation:

- Original test data for the DGR09RAS device; and

- An exhibit providing the maximum permissible exposure calculations, demonstrating that the DGR09RMS unit meets the General Population / Uncontrolled Exposure limits specified in Section 1.1310 of the Commission's Rules if antenna(s) are installed to provide a separation distance of at least 23 cm from all persons.

FreeWave proposes that the following language appear on the equipment authorization for the new identifier:

> "The antenna(s) used for this transmitter must be installed to provide a separation distance of at least 23 cm from all persons and must not be co-located or operating in conjunction with any other antenna or transmitter. This device must be installed in NEMA enclosures. End-users and installers must be provided with antenna installation and transmitter operating conditions for satisfying RF exposure compliance. Professional installation of this product is required."

FreeWave certifies that the information contained in this letter and the attachments hereto accurately describes the device for which a new equipment Identifier is requested. In accordance with Section 2.1043(b)(2), FreeWave confirms that the DGR09RMS radio transceiver will not be marketed with the changes requested herein prior to the grant of this request.

Please direct any questions concerning this request to the undersigned or to counsel for FreeWave, Henry Goldberg, Esq., at (202) 429-4900.

Respectfully submitted,

Aleksey Pozhidaev
Engineer, FreeWave Technologies, Inc.
Phone: (303) 444-3862
Fax: (303) 786-9948

24 September, 2002

FreeWave Technologies, Inc.
1880 S. Flatiron Court, Suite F
Boulder, CO 80301

TUV America Inc.
10040 Mesa Rim Road
San Diego, CA 92121

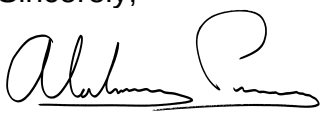
FCC ID # KNY-6231812519, model # DGR09RMS

Re: FCC Rules and Regulations Part 15.203 requirements confirmation

With this letter FreeWave Technologies as a manufacturer of the DGR09RMS radio transceivers would like to confirm that the DGR09RMS radio transceivers will be sold by the FreeWave Technologies sales department to be used by industrial/commercial customers and will not be available for the general public, will not be sold retail or by mail order.

The DGR09RMS transceiver is aimed at applications where customers needed an embedded product providing high speed RS232/RS422/RS485 asynchronous data communications. Potential applications include remote monitoring and data gathering, Internet access, and differential GPS.

Sincerely,



Aleksey Pozhidaev
R&D Manager
Phone (303) 444-3862
Fax (303) 786-9948

April 24, 2001

Federal Communications Commission
Equipment Authorization Division
7435 Oakland Mills Road
Columbia, MD 21046

FCC ID: KNY21161341911919

Dear Mr. Dichoso:

This letter is to respond to the Correspondence Reference Number 18731 regarding our spread spectrum radio transceiver DGRO9RAS (FCC ID: KNY21161341911919, EA99651).

The DGR09RAS transceiver is a derivative of the DGR09 device, which was submitted to the FCC and approved as a module in November 2000 (FCC ID # KNY-1931852313419). FreeWave Technologies manufactures wireless data transceivers for applications such as gathering SCADA information from remote oil/gas pumping stations at a central site. Because of the specifics of the application, each wireless modem in such a system will be installed professionally. The customer's telemetry equipment, along with the radio, are typically installed in a NEMA weather tight enclosure. For this reason, a modular approval is appropriate for the radio.
RESPONSE TO QUESTION 4.
However, the use of a non standard RF connector along with the inability to disconnect antennas makes such use of a module impracticable. In consultation with Richard Fabina, we were told to seek a modular approval with a professional installation limitation. This will allow us to use standard connectors and antenna connections. Indeed, this has been approved by the FCC for other manufacturers (For example, "Microhard Systems" Inc., FCC ID # NS900P3 has such an approval).

Following advice from Mr. Richard Fabina, we have modified the DGR09 radio transceiver module with the straight SMA connector and to submitted this modified transceiver to the FCC for a new approval as a different device (DGR09RAS) with no changes in any documentation or submittal folder. The letters, which we received from you regarding this submittal (correspondence #18187 and #18731), indicate that you have concerns about the type of SMA connector, which somehow disagree with the suggestions of Mr. Fabina. Please, advise us on this issue.

RESPONSE TO QUESTION 1
Per correspondence #18731 the RF safety exhibit provided for the DGR09RAS radio transceiver does not comply with the FCC requirements in regard to the limits used for the maximum permissible exposure (MPE) distance calculations. The RF safety exhibit document is based on a draft provided by the FCC particularly for the DGR09 radio data transceiver submittal and was verified and approved by the FCC a few months ago. As mentioned above, the DGR09RAS data transceiver is not different from the DGR09 device from the RF safety standpoint. Therefore, we used the MPE distance limits suggested by the FCC and confirmed by you during our phone conversation regarding correspondence #18187. The same limit may be derived from the Part 1.1310 of the FCC Rules, Table 1, General Population/Uncontrolled Exposure section, 900 MHz frequency band. Please, advise us on this issue.

The rest of this letter will address issues regarding our submittal in the order they were addressed in the Correspondence Reference Number 18731.

1. Please, advise us on this issue as made above.

RESPONSE TO QUESTION 2.

2. The DGR09RAS transceiver (device) complies with the module requirements pursuant to the Public Notice DA00-147 on modular approval of Part 15 devices:
   (a) The device is a complete RF transceiver and has its own RF shielding.
   (b) The data input to the device is buffered.
   (c) The device has its own input power regulation circuitry.
   (d) The device is applied for a professional type of installation. The device complies with the antenna requirements of the Section 15.203 and 15.204(c). The device may be used in a combination with different antennas. During the initial part of the submittal process, the device was tested in a combination with some of possible antennas, which were chosen as a worst case scenario from the level of radiation standpoint.
   (e) During the initial part of the submittal process the device was tested in a stand-alone configuration. The DC power lines and data input/output lines of the device do not contain ferrites. The device complies with the AC line conducted requirements found in Section 15.207. All of the accessories connected to the device during the testing are unmodified and commercially available.
   (f) The device is labeled with its own FCC ID number and the FCC ID number label is easily visible.
   (g) The special power output setting instructions depending on the antenna type and the cable loss to assure device's compliance with the FCC Rules provided in the Installation Manual.
   (h) The device complies with the applicable RF exposure requirements.

3. The device has capability of supporting a few different types of network. But, in any case the radio transceivers in the network all hop to the same frequency on the same hop pattern at the same time and they change this frequency all together. So, a one given network will occupy just one frequency channel at a time, but not the whole frequency band or a significant portion of it.

4. Please, advise us on this issue. (SEE PARAGRAPH 1)

RESPONSE TO QUESTION 5.

5. The User Manual has a list of antennas with the total EIRP for each one of them (please, refer to pages 37-38). In addition to this table, the Installation Manual contains a table, which shows the required power output settings on the radio depending on the type of antenna used and cable loss along with the instruction of how the RF transmit power should be setup.

RESPONSE TO QUESTION 6.

6. The User Manual does not have instruction of how to adjust the output power on the transceiver.

Sincerely,

Aleksey Pozhidaev
Engineer

CC Mr. Richard Fabina

February 27, 2001

Federal Communications Commission
Equipment Authorization Division
7435 Oakland Mills Road
Columbia, MD 21046

FCC ID: KNY21161341911919

Dear Mr. Dichoso:

This letter is to respond to the Correspondence Reference Number 18187 regarding our spread spectrum radio transceiver DGRO9RAS (FCC ID: KNY21161341911919, EA99651).

This letter will address issues regarding our submittal in the order they were addressed in the Correspondence Reference Number 18187.

1. The MPE distance calculations were reviewed and corrected. Please, refer to the new "Technical Description".

2. The center frequency of the lowest channel is 902.2464 MHz, the center frequency of the highest channel is 927.8208 MHz.

3. The DGRO9RAS transceiver complies with the module requirements pursuant to the Public Notice DA00-1407 on modular approval of Part 15 devices.

4. The submitted device is a Class A computer peripheral and is a subject for further verification.

5. The DGRO9RAS transceiver coordinate its hopping sequence with the hopping sequence of other transmitters for the communication purpose, but not to avoid an interference with other transceivers.

   When two or more radio transceivers are combined into a communication network, they use the same hopping pattern. There is always a master radio in the network. The master radio provides a network synchronization and coordinate transmissions from the rest of the radios in the network in a synchronized Aloha without reservation or TDMA manner depending on the network configuration chosen by the user.

6. To comply with the Section 15.203 of FCC Rules, the DGRO9RAS transceiver will be manufactured and supplied to customers with the reverse thread SMA connector.

7. To derive the pseudo-random hopping sequences we used a software written on PowerBasic programming language. This software functionality based on using a random numbers generator function from a programming language build-in library.

   All of the hopping patterns available for the transceiver are loaded into transceiver's read-only-memory. The example of one of the pseudo-random hopping sequences is given in the "Technical description".

8. DGRO9RAS transceivers use the frequency channels from its hopping pattern sequentially and regardless of whether user's data is ready to be sent or not. The RF section of the transceiver is

synchronized to master radio synch pulses in the communication network and totally asynchronous to the RS232 input data of the device. So, the frequency channel to be used by the transceiver to transmit user's data determined by the time when user's data is ready to be sent and by the current frequency channel from the frequency hopping pattern used at that time.

9. The total receiver's input bandwidth defined by the narrowest filter stage in the receiver and in our case is 200 kHz, which matches the occupied bandwidth of the transceiver. The transceiver's front-end bandwidth is 26 MHz, which assures that the radio will be able operate within 902-928 MHz frequency band.

10. The rest of the antenna photos are attached.

11. The list of antennas provided by the FreeWave Technologies with the antenna manufacturers, antenna types and antenna gains is given in the "User Manual". The instructions of how to adjust the output power of the transceiver according to the cable loss and antenna gain are given in the "Installation Manual".

12. The User Manual has been corrected so there is no instruction of how to change transceiver's RF transmit power. However, the Installation Manual has detailed instruction of how to do so. That way we assure that the RF output power will be adjusted once during the installation and this adjustment will be done professionally.

13. The User Manual, RF safety exhibit and the Technical Description refer to the same MPE distance requirements.

Sincerely,

Aleksey Pozhidaev
Engineer