

**Curtis-Straus LLC**  
**Attn: Jon Curtis/Barry Quinlan**  
**527 Great Road**  
**Littleton, MA 01460**

**October 1, 2001**

**FCC ID: PXDGI00111092001**

**Applicant: Guardian Instruments (FRN:0005-0107-15)**

**Test Laboratory: TDK RF Solutions Inc. (formerly EMC Automation, a TDK Group Company)**

**Reference: TDKRFS Purchase Order - 875**

Gentlemen:

TDK RF Solutions (formerly EMC Automation, a TDK Group Company) is making a Form 731 filing on behalf of Guardian Instruments. The Data Radio is to be certified as a modular transmitter. Our justification for this is as follows:

*1. The modular transmitter must have its own RF shielding. This is intended to ensure that the module does not have to rely upon the shielding provided by the device into which it is installed in order for all modular transmitter emissions to comply with Part 15 limits. It is also intended to prevent coupling between the RF circuitry of the module and any wires or circuits in the device into which the module is installed. Such coupling may result in non-compliant operation.*

The Data Radio uses either the RFM TR1000 or TR1004 Hybrid Transmitter. The hybrid is encased in a metal can. Testing of the Data Radio did not detect any non-compliant emissions.

*2. The modular transmitter must have buffered modulation/data inputs (if such inputs are provided) to ensure that the module will comply with Part 15 requirements under conditions of excessive data rates or over-modulation.*

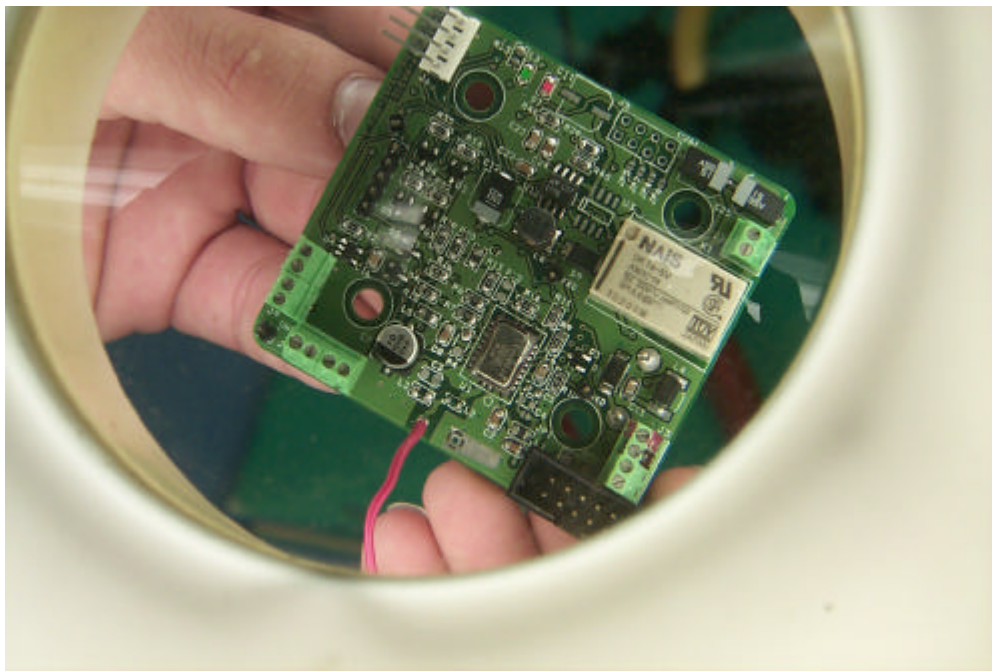
The modular transmitter module has an on-board microcontroller with buffered I/O. The schematic is included in this submittal.

*3. The modular transmitter must have its own power supply regulation. This is intended to ensure that the module will comply with Part 15 requirements regardless of the design of the power supplying circuitry in the device into which the module is installed.*

The RFM hybrids require a supply voltage requirement of 2.7-3.5 Vdc. This is supplied by a power supply regulator circuit built around the LM2936 micropower regulator. This circuit provides the necessary regulation and also protects the module against transients.

*4. The modular transmitter must comply with the antenna requirements of Section 15.203 and 15.204(c). The antenna must either be permanently attached or employ a “unique” antenna coupler (at all connections between the module and the antenna, including the cable). Any antenna used with the module must be approved with the module, either at the time of initial authorization or through a Class II permissive change. The “professional installation” provision of Section 15.203 may not be applied to modules.*

The Data Radio has an antenna soldered to its PCB. A photo is provided below. The actual antenna is the red wire sticking out of the circuit board.



*5. The modular transmitter must be tested in a stand-alone configuration, i.e., the module must not be inside another device during testing. This is intended to demonstrate that the module is capable of complying with Part 15 emission limits regardless of the device into which it is eventually installed. Unless the transmitter module will be battery powered, it must comply with the AC line conducted requirements found in Section 15.207. AC or DC power lines and data input/output lines connected to the module must not contain ferrites, unless they will be marketed with the module (see Section 15.27(a)). The length of these lines shall be length typical of actual use or, if that length is unknown, at least 10 centimeters to insure that there is no coupling between the case of the module and supporting equipment. Any accessories, peripherals, or support equipment connected to the module during testing*

*shall be unmodified or commercially available (see Section 15.31(i)).*

Scans of the device were made using module in a stand-alone configuration. In its normal operation, the Data Radio will be battery-operated.

*6. The modular transmitter must be labeled with its own FCC ID number, and, if the FCC ID is not visible when the module is installed inside another device, then the outside of the device into which the module is installed must also display a label referring to the enclosed module. This exterior label can use wording such as the following: “Contains Transmitter Module FCC ID: XYZMODEL1” or “Contains FCC ID: XYZMODEL1.” Any similar wording that expresses the same meaning may be used. The Grantee may either provide such a label, an example of which must be included in the application for equipment authorization, or, must provide adequate instructions along with the module which explain this requirement. In the latter case, a copy of these instructions must be included in the application for equipment authorization.*

Information on the label is included in this submittal.

*7. The modular transmitter must comply with any specific rule or operating requirements applicable to the transmitter and the manufacturer must provide adequate instructions along with the module to explain any such requirements. A copy of these instructions must be included in the application for equipment authorization. For example, there are very strict operational and timing requirements that must be met before a transmitter is authorized for operation under Section 15.231. For instance, data transmission is prohibited, except for operation under Section 15.231(e), in which case there are separate field strength level and timing requirements. Compliance with these requirements must be assured.*

This device is designed for operation per requirements of Part 15.249 not Part 15.231. The hybrid transmitter itself has been specifically designed for 15.249. The operator's manual has been sent with this submittal.

*8. The modular transmitter must comply with any applicable RF exposure requirements. For example, FCC Rules in Sections 2.1091, 2.1093 and specific Sections of Part 15, including 15.319(i), 15.407(f), 15.253(f) and 15.255(g), require that Unlicensed PCS, UNII and millimeter wave devices perform routine environmental evaluation for RF Exposure to demonstrate compliance. In addition, spread spectrum transmitters operating under Section 15.247 are required to address RF Exposure compliance in accordance with Section 15.247(b)(4). Modular transmitters approved under other Sections of Part 15, when necessary, may also need to address certain RF Exposure concerns, typically by providing specific installation and operating instructions for users, installers and other interested parties to ensure compliance.*



The transmitter is low-power, the peak is 0.75mW. Further the intended application of this module (construction equipment instrumentation) does not involve close proximity to human body (i.e. like a cellular phone). Therefore SAR testing is not necessary.

Guardian Instruments requests that you keep the schematics and block diagram confidential. If you have any questions, do not hesitate to contact me.

Sincerely,

A handwritten signature in blue ink that reads "Michael E. Hill". The signature is written in a cursive style and is positioned to the left of a vertical line.

Michael E. Hill, NCE  
Test Facility Manager