

INTERTEK TESTING SERVICES NA INC.

2.0 Description of the Product

2.1 Brief Description and Received Condition

The transmitter measures the weak electrical signal generated on the surface of the user's skin by the beating of the heart, amplifies the weak signal, transforms this information into a digital format and transmits the data to the receiver watch. A special auto power-on circuit ensures that the transmitter is only active while it is placed on a chest, so as to conserve power. The receiver receives the transmitted radio signal, decodes it and displays the measured heart rate value on the LCD screen of the watch.

The system uses an FSK-based (Frequency Shift Keying) simplex data communication scheme. The data communications rate is 1024 baud. The transmitter is operating with a carrier frequency of 139.25 kHz with a mark frequency of 137.5 kHz and a space frequency of 141.01 kHz.

The system is specified to work up to a maximum distance of 120cm between chest strap and watch receiver in air. Individual samples may work up to 180cm. However, the HRM range is dependent on the relative orientation between the receiver and the transmitter.

The peak range should be at least 120cm, and the minimum range (the "null") will be around 70cm. The scale is in db's. The deepest null is about 35 dB below the signal peak.

The M821 HRM transmitter uses a standard MC68HC05 Hourglass 2 microcontroller to measure the heartbeat, encode this information and transmit it to the M818 HRM receiver. An ECG sensor circuit senses each heartbeat by measuring the voltage potential off the user's chest. A so-called auto power-on circuit allows the M821 device to conserve power by ensuring that it is only powered up when the device is placed on a chest.

Three back-end circuits allow the microcontroller to transmit information to the M818 receiver, a modulator circuit modulates the information to generate the required FSK signal; a pulse shaper circuit prepares the signal for transmission and an antenna driver circuit handles the actual transmission.

A prototype version of the sample was received on March 31, 1999 in good condition.