

Description of Access Control Reader System & its Components

System Overview

The Tag-it™ ISO system is comprised of a badge (or tags) and potted reader(s). The reader can be host driven such as PC, a larger computer, or some other kind of intelligent device (for example a card printer or controller) through RS-232/RS-485 converter and can operate in self run mode connected to data collection device such as access control controller. RF functionality operates per ISO/IEC 15693 and ISO/IEC 14443A UID air interface and protocols.

During a transaction, the badge (tag) is permanently powered by the signal sent by the reader. This signal also provides the clock frequency to the transponder. It is amplitude modulated to transmit requests from the reader to the transponder (tag). In order to transmit responses to the reader, the transponder (tag) derives the operating energy and the clock from the reader's power signal to generate the sub-carrier frequencies.

ISO 15693 parameters are configurable for: 1) modulation depth (10% or 100%), 2) data coding (1/4 or 1/256), 3) sub-carrier load modulation (ASK or FSK) and 4) anti-collision rate (FAST or Slow). This reader is set for worst case FCC conditions (100% FSK, ¼ and Fast anti-collision). ISO1443A parameters are 100% ASK, Modified Miller coding at 106 kbits/s. Read distance is influenced by the coupling factor between the reader's antenna (size and efficiency) and card size, and thus by the distance between them. The emissions from transponders (tags) was not measurable and well above the regulated limit. The passive tag does not required to be FCC certified.

S6400 ISO Reader (TI PN RI-H4R-S#H3-00)

A typical reader consists of electronic board, solder antenna, lens, plastic housing enclosure and wiring harness potted as shown in Figure 1. Electronics board includes 5 V_{DC} regulator, microprocessor (digital), RF ASIC (analog), 13.56 MHz crystal, buzzer, LED, RS-485 communication interface and antenna connection as shown in Figure 2. The reader can be powered with 12 V_{DC} typically (9-14) by either battery or DC source. Maximum current during tag read is 300 mA and gives 49" read distance with low Q antenna. The data is transmitted through the RS-485 interface or Wiegand lines connected to its host or controller. It sends energy and commands to, and receives signals from the transponder through the antenna (aerial). Encrypted firmware can be downloaded through RS-485 point-to-point communication and ISO parameters remained at its previous setting.

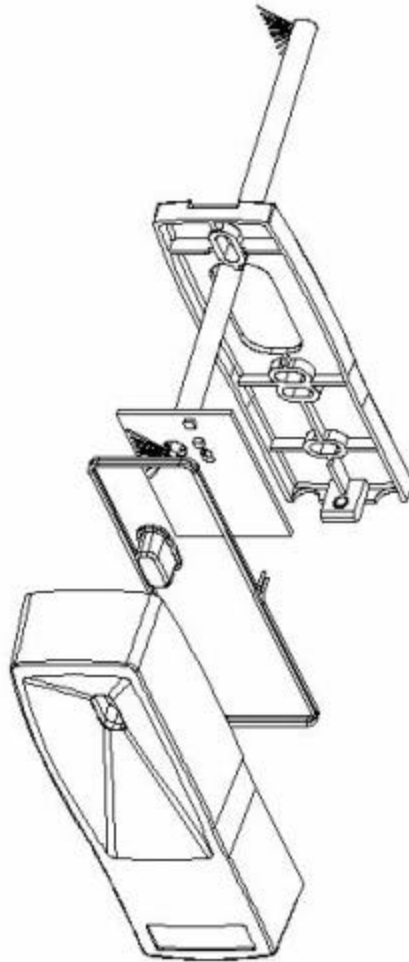


Figure 1: Components of Reader System

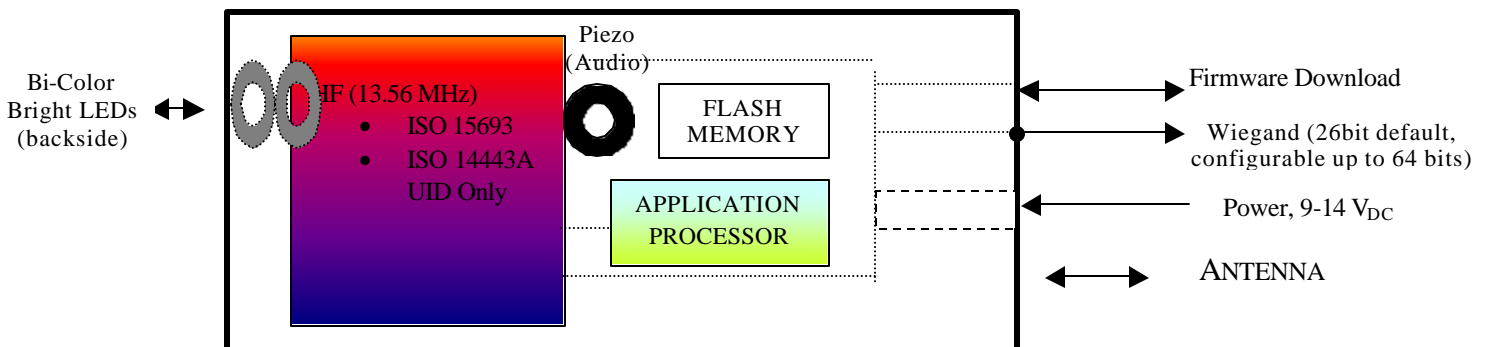


Figure 2: Block Diagram of Reader's Electronics

Badge (Tag)

A badge (tag inlay) comprises a flexible foil antenna, a resonance capacitor and an integrated circuit. The tag inlay can be packaged in different formats such as pressure sensitive labels and plastic cards. The transponder's IC is powered by the electromagnetic field generated by the reader's antenna, this is generally described as a passive transponder.

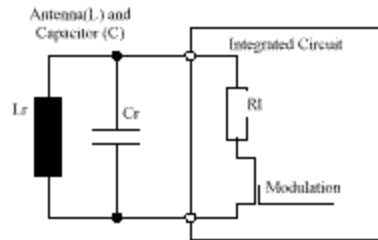


Figure 3: Block Diagram of the Badge

The IC is flip chip mounted onto the antenna. The electrical parameters of the components: the antenna (including its inductance) and the resonance capacitor; and the layout of the antenna loops all have an effect on the transponder's performance. The L_r/C_r resonance circuit is trimmed to the required target frequency to achieve optimal performance.

The tag uses one or two sub-carrier AM modulation frequencies for sending its data to the Reader (up-link). The data are encoded in Manchester code by alternating between both sub-carrier frequencies, such generating an ASK or FSK modulation scheme. The emissions from transponders (tags) was not measurable and well above the regulated limit. The passive tag does not required to be FCC certified.