

## **Zebra ZM4e Operation & Description**

The Zebra ZM4e is a RFID reader that can read and encode RFID smart labels. Smart labels carry embedded ultra-thin UHF RFID transponders. Transponders contain thin antennas and integrated circuits that can be read, programmed, and reprogrammed using non-contact radio waves. RFID smart labels allow for non-line of sight reading of the data contained in the IC and feature anti-collision technology, which allows RFID readers to scan and identify several objects simultaneously, such as totes of supplies.

The RFID subsystem is comprised of a ThingMagic Mercury4e multi protocol UHF RFID reader, a strip-line coupler/antenna connected to the reader via a coaxial cable and an adaptor PCB that provides the operating voltage and communications to the RFID reader.

The RFID reader powers and communicates with RFID smart labels via the coupler/antenna. The reader contains a digital processor and analog signal conditioning circuitry. Instructions from the host computer system to encode/read a smart label are sent to the RFID reader via a serial communication link on the adapter PCB. The reader responds to the host with data read and/or a status message. The UHF RF signals generated by the reader are turned on only during a host commanded read or encode operation. The RF signal is an amplitude-modulated frequency-hopping carrier operating between 902MHz and 928MHz. The modulation pattern is governed by the selected UHF RFID protocol. The Multi-protocol reader supports EPC Class 1, EPC Class 0, Matrics Class 0+, Impinj Class 0 and ISO 18000-6B UHF RFID protocols presently, and may support more protocols in the future via firmware download upgrade.

The coupler/antenna is located in close proximity to the RFID transponder when the smart label is in the rest position prior to printing. The coupler/antenna is a single or dual strip-line transmission line fabricated on a two-sided printed circuit board with one side acting as a ground plane. The coupler/antenna is orientated with the ground-plane side down, roughly parallel to the base of the printer. The reader's transmitter and receiver are both connected directly to the coupler/antenna via the coaxial cable. Backscatter signals from the transponder are received via the same coupler/antenna as is used to transmit to the transponder.

The adapter PCB provides the correct operating voltage to the RFID reader and serves as a communications interface between host and RFID reader. The adapter PCB down converts the host's voltage, 18 to 30Vdc, to 5.3V nominal at 1Amp steady state current. The adapter pcb also buffers, both directions, the host and RFID readers RS232 TTL level receive and transmit lines. The adapter PCB provides power and com to the RFID reader though a single discrete cable assembly. The host connects to the adapter PCB via two discrete wire cable assemblies, one for power the other for com.