

## Functional Description

### 1.0 Overview of Product Operation

The use of the Mat Reader device may be illustrated through an example application. A customer enters a fast serve restaurant and places an order. Typically, the customer would present a handheld transponder to the Mat Reader that would be on the counter top. The 13.56 MHz signal from the Reader “illuminates” the transponder. The transponder then transmits the Customer’s ID. If added security is needed, the Reader makes a challenge (transmission to the transponder) which forces the transponder to transmit additional information to prove that the transponder is legitimate. The Reader subsequently passes the Customer ID to a Point of Sale Controller via an RS232 port where the customer billing takes place. The 13.56 MHz signal originates in the Multi-Protocol Reader (Texas Instruments part number RI-STU-TRDB-01) which is on the M01803A002 Interface Board. Subsequently, this signal travels over the antenna cable (M02033A001) to the antenna (M01566A001) where it is radiated. The customer transponder replies at 13.56 MHz with the customer ID, once it is energized by the Reader and the proper protocol between the Reader and the transponder is established. The same antenna that transmitted the reader signal receives the transponder reply. The transponder’s reply signal is routed from the antenna to the Multi-Protocol Reader (RI-STU-TRDB-01) and then to the M01803A002 Interface Board where the signal is interpreted to determine the customer ID. The customer ID is then relayed via RS232 to a Point of Sale Controller for customer billing.

### Product Description

Marconi Commerce Systems Inc.'s product (for which this submittal is being filed) allows customers wishing to purchase products to interface directly with a Point-Of-Sale via a handheld transponder. The product is called Marconi TIRIS™ Mat Reader (TIRIS: Texas Instruments Registration and Identification System). The Marconi TIRIS™ Mat Reader transmits at 13.563MHz, which provides energy to the handheld tag. The handheld tags contain a unique and secure ID code so each customer can be identified by their individually registered tag. The high frequency antenna of the system creates a magnetic charge-up field, known as "read-zone". As soon as a tag enters the "read-zone" (the magnetic charge-up field created by the antenna) the reader receives the unique ID code.

The Marconi TIRIS™ Mat Reader (Part # C00016-XXX) is a Radio Frequency Identification Device (RFID) which is designed for use in conjunction with handheld battery-less transponders (Texas Instruments Part # RI-TRP-Series). The user carries the handheld transponder. The transmitter portion of the Marconi TIRIS™ Mat Reader operates at 13.563MHz and is subject to FCC Part 15, Subpart C, "Intentional Radiator"; paragraph 15.225 (13.553-13.567MHz).

The digital electronics portion of the Marconi TIRIS™ Mat Reader is subject to FCC Part 15, Subpart B, "Unintentional Radiator", paragraph 15.109, under the Class A limits and as such, the TIRIS™ Mat Reader is incorporated into an application that is subject to Class A limits.

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### Tested System Details

The Marconi TIRIS™ Mat Reader System is mounted into an application such as a POS terminal counter or other similar industrial applications. The system includes one Integrated RFID Gateway Board (M01803A002), one Multi-Protocol Reader board (Q13786-02), one M01787B002 mat reader assembly, which includes one 13.563MHz low 'Q' printed circuit board antenna (M01566A001) and one LCD shutter. The system also includes a 120 VAC to +12VDC Class II Wall Mounted Transformer for input power.

These components are listed in Table 1.1, and the functional relationship is provided in Figure 1: Marconi TIRIS™ Mat Reader RFID Functional Block Diagram. The 13.56 MHz transmit signal originates on the Multi-Protocol Reader board (Marconi part number Q13786-02/ Texas Instruments part number RI-STU-TRDB-01) from which the signal is sent via the Antenna Signal/Ground cable to the Mat Reader Antenna where it is intentionally radiated. These components are assembled per the drawings in TRIND Mat Reader Electrical Schematics N6SMRIR12.

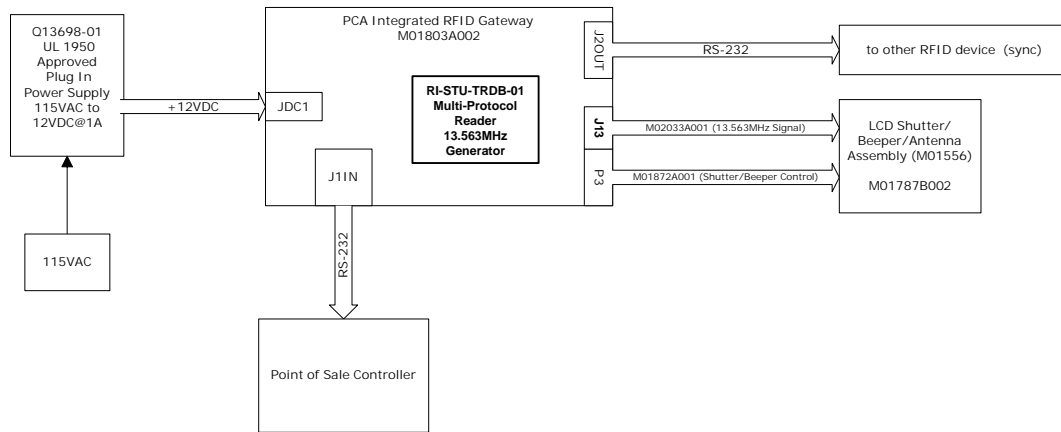
The Marconi TIRIS™ Mat Reader operates from 120VAC converted to +12VDC using a Class II step-down transformer. The +12VDC is then converted to +26VDC and +5VDC by means of a switching power supply located on the Board. The system functional block diagram is located on page 4 below.

### Circuit Board Descriptions

- The Integrated RFID Gateway Board (M01803A002) has digital interface and RS-232 conversion circuitry, a +12VDC to +26VDC boost switcher, a +12VDC to +5VDC buck switcher, and LCD drive circuitry. The Multi-Protocol Reader is also located on this board and is the origination point of the intentionally radiated 13.563MHz HF signal.
- The Multi-Protocol Reader, (Marconi Part Number Q13786-02, Texas Instruments part number RI-STU-TRDB-01), is socketed on the Integrated RFID Gateway Board Assembly. It has a serial communications interface (SCI), which supports RS-232 protocol communication and TTL data communication. It provides radio frequency (RF) 13.563MHz control functions to read and program TIRIS™ tags and works together with a 13.563MHz low 'Q' antenna; therefore, the system does not need further tuning.
- The Marconi TIRIS™ Mat Reader (M01566A001) antenna is a low 'Q' antenna that works with the Multi-Protocol Reader. The Multi-Protocol Reader energizes it at 13.563MHz. Because of its' low 'Q', it does not need to be tuned any further in this application.

**Table 1. 1**  
**TESTED**  
**HF SYSTEM COMPONENTS**

<b>Component Description</b>	<b>Marconi Part Number</b>	<b>Texas Instruments Part Number</b>
Integrated RFID Gateway Board Assembly (1)	M01803A002	NA
Multi-Protocol Reader (1) (one per M01803A002)	Q13786-02	RI-STU-TRDB-01
Marconi TIRIS™ Mat Reader Antenna (1)	M01566A001	NA



FCC ID: N6SMRIR12

Figure 1: Marconi 13.563MHz Mat Reader Radio Frequency Identification (RFID) Functional Block Diagram