Mercury4e™
Specification Sheet

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1. Introduction

The Mercury4e™ is ThingMagic's entry in the embedded reader market, which comprises label printers, label applicators, and handheld terminals. Unlike previous members of ThingMagic's Mercury family, the Mercury4e™ readers are designed for embedded applications within a host system. They interface with a host system via asynchronous serial (TTL-level RS-232) using a packetized polled mode communication. Anti-collision capability is not provided in the initial release of the Mercury4e product.

Mercury4e™ readers have a single on-board processor, a TI 55xx series DSP. The reader operates in a single-tasking, streaming mode where tag IDs are sent back to the host processor one-at-a-time, in a mode suitable for small tag populations where reading occurs primarily when triggered by the host system. This is envisioned to occur in response to the host system's request when a label is aligned beneath the print head in a printer application.

2. Mercury4e™ Reader Specification Overview

Requirement	**Value**
Dimensions	5.5cm x 9cm x 1.5cm
RFID Tag and Protocol Support	Host-switched multi-protocol: EPC Global Class 0 (including Symbol and Impinj Class 0+ R/W) EPC Class 1 R/W (64 and 96 bit silicon) EPC Generation 2 R/W* ISO18000-6B R/W
Frequency	902-928 MHz, for FHSS use and certification in the US and Canada
RFID Tag Read and Write Rates	Read/write rate and range is protocol dependent and will vary depending on RF signal strength and other environmental factors.
Antenna Connectors	2 MMCX connectors for two antennas. Unit will tolerate 2:1 VSWR without damage, but a VSWR below 1.5:1 will be needed for best performance. Circular polarization is supported.
Module Power Supply	Fixed 5.3 VDC +/- 4% DC supply voltage, average power dependent on duty cycle. Peak power not more than 8.8W. Power supply ripple and noise must be less than 100mV pp, and the host power supply load transient response must support a dI/dT of 500kA/s with less than 100mV over/undershoot.
RF Power Output	RF power output depends on available peak supply current. RF output power is variable in 0.1dB steps from 20dBm to 24dBm. Absolute accuracy of RF output power is +/- 1dB.

Requirement	Value
Sleep Mode	The module can be put in and out of sleep mode by the host processor.
Host Communication	3.3/5V logic level, async serial according to ThingMagic's MercuryE Communication Protocol Document. The serial interface includes the settings 115.2 and 38.4 kbaud, 8,n,1, no flow control.
Firmware	Firmware is upgradeable via serial port. Unit first boots into a write-protected bootloader region, verifies CRC of the full firmware image, waits for a Go (or Firmware Upload) command from the host system, and then runs that firmware image. If a valid image is not found by the bootloader, the bootloader waits for a Firmware Upload per the Communication Protocol Document.
Temperature **Operating and Storage**	Operating ambient temp range 0C-60C. Storage temp range better than –40C to +85C.
ESD	10kV to antenna shield conductor. Recommend the use of an antenna that presents a DC short to endure 10kV- this is TBD pending testing.
Regulatory	FCC Class B (digital portion) and 15.247 (FHSS radio): Test commands for type acceptance testing will be provided.
Certification	Certification by OEM customer

3. Physical Connection and Pin-Out

The host connector is an AMP part number 4-440372-2 right angle male 1.27mm header. It mates with an AMP part number 1-440146-0 socket and 440147-1 pins.

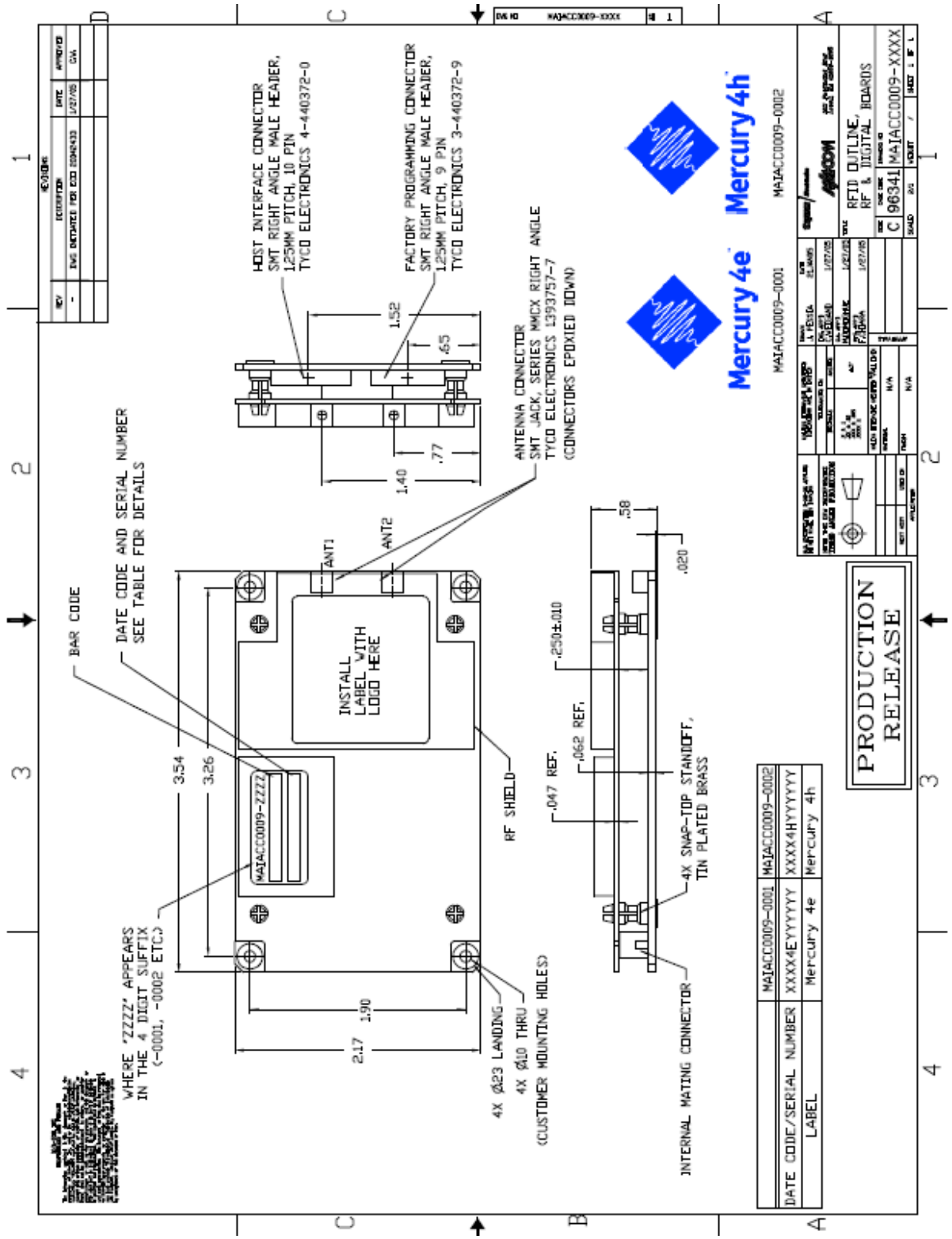
Pin Number	Function
1	5.3 VDC +/- 4%
2	5.3 VDC +/- 4%
3	Ground
4	Ground
5	Output 1 (GPIO from module)
6	Output 2 (GPIO from module)
7	Input 1 (GPIO to module)
8	Input 2 (GPIO to module)
9	Asynchronous Serial RX (from host to module)
10	Asynchronous Serial TX (from module to host)

4. Protocol Support

ThingMagic will provide the following air interface protocols and functionality. Additional protocols and their functionality will be provided on a quoted basis.

	ID Read	ID Write	Data Read	Data Write	Password Write	Lock
EPC Global Class 0 (including Symbol and Impinj Class 0+ R/W)	✓	✓	✓ (0+)	✓ (0+)		✓ (0+)
EPC Class 1 (V1)	✓	✓			✓	✓
EPC UHF Gen2	✓	✓	✓	✓	✓	✓
ISO 18000-6b			✓	✓		✓

5. Mechanical Drawing



6. Regulatory Installation Requirements

This device is intended for OEM integrators only. It is the OEM integrator's responsibility to obtain FCC modular authorization for this device. Once authorized it must be used only under the following conditions:

1) The antenna must be installed such that 20 cm is maintained between the antenna and users, and
2) The transmitter module may not be co-located with any other transmitter or antenna.

As long as the two conditions above are met, further transmitter testing will not be required. The OEM integrator is responsible for testing their end-product for any additional compliance requirements required with this module installed (for example, digital device emissions, PC peripheral requirements, etc.).

IMPORTANT NOTE: In the event that these conditions can not be met (for example certain laptop configurations or co-location with another transmitter), then the FCC authorization is no longer considered valid and the FCC ID can not be used on the final product. In these circumstances, the OEM integrator will be responsible for re-evaluating the end product (including the transmitter) and obtaining a separate FCC authorization.

The end user should not be provided any instructions on how to remove or install the device.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

7. End Product Labeling

This transmitter module is authorized only for use in devices where the antenna may be installed such that 20 cm may be maintained between the antenna and users (for example access points, routers, wireless ASDL modems, and similar equipment). The final end product must be labeled in a visible area with the following:

"Contains TX FCC ID: *<FCC ID #>*".