ThingMagic Micro Family FAQs

The ThingMagic® Micro and Micro-LTE UHF RFID modules are designed to meet the demands of high performance RFID handheld, mobile, and stationary readers. These modules offer two antenna ports and support the ability to transmit up to +30 dBm for demanding applications. Edge connections for signals, power, and RF allow the module to be soldered directly to a motherboard as a standard component. The on-board connectors allow the module to be mated to a motherboard as an add-on option.

Q. What applications is the Micro family best suited for?

A. Examples of applications that the Micro and Micro-LTE were designed for include:

- Hand held devices and scanners
- RFID label printers – desktop and portable
- Point of sales devices
- Smartphone accessories
- Small USB dongles

Q: What are the differences between the Micro and Micro-LTE?

The Micro-LTE joins the ThingMagic Micro to create a family of the smallest, 2-port, high-performance of RFID modules on the market. The Micro is designed for applications with medium to large tag populations, while the Micro-LTE is optimized for small tag populations (LTE stands for Low Tag-read Enabled). Both the Micro and Micro-LTE implement market leading high-performance features including high data acquisition rates with every tag read and rapid adaptation to changing tag populations. Coupling these capabilities with read performance optimized for small tag populations makes the Micro-LTE ideal for use cases that require reading small numbers of tags rapidly and accurately, such as access control, consumables authentication, process control, and race timing. The low power consumption of the Micro-LTE fits battery operated applications and wide RF output range (-5 dBm to +30 dBm) is a key requirement for RFID enabled printers, tag commissioning stations, and point of sales readers.

The Micro and Micro-LTE are both designed for high-volume production environments and supports both traditional board-to-board mounting and solder down surface mounting, reducing component and assembly costs for equipment manufacturers.

Q: What are the differences between the Micro family and other ThingMagic modules?

The Micro family is the most recent addition to ThingMagic's embedded UHF RFID module offerings and designed for applications requiring a very small form factor, multiple antenna ports, and high performance.   See the chart below for the primary differences related to module form factor and performance:

	Mercury6e Series			Mercury5e Series	
	M6e	Micro	Micro-LTE	M5e	M5e-Compact
Size (L x W x H mm)	69 x 43 x 7.5	46 x 26 x 4	46 x 26 x 4	82 x 54 x 5	56 x 36 x 5
Antenna Ports	4	2	2	2	1
Interface	UART USB	UART USB	UART USB	UART	UART
Power (dBm)	31.5	30	30	30	23
Read Rate (tags/sec)	750*	750*	50	200	200
Protocol Support	Multiprotocol	Multiprotocol	Multiprotocol	Gen2	Gen2

* Using high-performance settings

Q. What are the most important and competitive features of the Micro and Micro-LTE?

A. A combination of the key features listed below and their corresponding benefits make the Micro and Micro-LTE the value leader for embedded RFID modules in this size class:

- Small form factor: High performance RFID can now be designed into the latest smaller form factor mobile and handheld products and stationary readers where size is important.
- RF Power output adjustable up to 30 dBm: Results in tag read distance over 30 feet which is valuable for many hand held scanner applications.
- Two external antenna ports: Provides more flexibility than modules of comparable size resulting in increased read area and increased percentage of successful reads.
- Read rate: the Micro supports up to 750 tags per second using high performance settings and the Micro-LTE supports 50 tags per second and is optimized for applications with small tag populations.
- Read speed: Speed is important in many hand held applications as well as in high performance fixed reader designs. Faster read speeds also permit shorter transmit times, resulting in power savings for battery-powered devices.
- Flexible mounting options: The Micro and Micro-LTE are designed for both solder-down and mating to a mother board, providing superior design flexibility for developers integrating UHF RFID into their products.

Q. What regions are the Micro and Micro-LTE certified for?

A. The Micro and Micro-LTE are pre-configured for FCC (North America & South America) in the 902-928 MHz band and ETSI (EU and India) in the 865.6-867.6 MHz band. Subsets of these bands support operation in other regions, including Korea, Australia, and P.R. China.

Q. I've written code for the M6e and other ThingMagic modules. What software engineering is required to use that code on the Micro or Micro-LTE?

A. The ThingMagic API supports all ThingMagic products. In this case, you will simply need to recompile your code using the latest version of the ThingMagic API.

Q. Do the Micro and Micro-LTE support bi-static operation?

A. No, the Micro and Micro-LTE are monostatic only.

Q: What is the lowest temperature that the Micro and Micro-LTE can operate in?

A. The Micro and Micro-LTE meet all its specifications to temperatures as low as -20 C. If necessary, ThingMagic will assist customers with determining what specifications change at temperatures below -20 C.

Q: Is the Micro family of RFID modules lead free?

A. Yes, the Micro and Micro-LTE are ROHS compliant.

Q. For a battery-powered device, do the Micro or Micro-LTE consume less power than the M6e?

A. Yes, the Micro and Micro-LTE consume around 0.5 W less than the M6e when both are set to +30 dBm. As the RF output power is reduced, the difference becomes more significant. Below +20 dBm, the Micro and Micro-LTE consume around 2 W of DC power whereas the M6e consumes just over 4 W. When not transmitting, these modules consume a similar level of DC power.

Q. The Micro has a higher tag/second read rate than the ThingMagic Mercury5e Series of modules. Why is this?

The Mercury6e Series (M6e, Micro, and Micro-LTE) represent ThingMagic's newest additions to our embedded RFID module family. As such, these modules offer the most recent advancements relative to form factor, efficiency and performance. Several performance optimizations available with the M6e and Micro deliver an improved base read rate, and when coupled with application specific capabilities such as ThingMagic's *Fast Search* algorithm, result in market leading performance. The Micro-LTE leverages these same advancements, but has been optimized to read applications with small tag populations. We feel the differing characteristics of our module family – including tag read rate - provides customers with the greatest number of options when considering embedded RFID for their products and services.

Q: Can the Micro or Micro-LTE be used for near-field and/or NFC applications?

A. NFC products operate in the 13.56 MHz frequency band which is a different technology than the products ThingMagic offers. As such, Micro and Micro-LTE do not work with NFC tags. However, near-field UHF tags are supported and the high power level of the Micro will help read smaller populations of UHF tags at a greater distance.

Q. Do I have to handle compliance requirements with the FCC? For example, if we use the Micro or Micro-LTE in a mobile unit, do the mobile unit and reader have to be recertified with the FCC?

A. One of the benefits of using the Micro, Micro-LTE and other ThingMagic embedded RFID modules is that we do most of this work for you. OEM customers don't have to be compliance experts and can leverage ThingMagic's expertise in this area. The Micro and Micro-LTE are FCC certified with high-gain antennas. As long as you certify your product with antennas of the same gain or lower, you can use ThingMagic's FCC Modular Approval license for your finished product, including the Transmitter Module FCC ID. If you use an antenna that does not fall under ThingMagic's certification, you will need to get a permissive change for your product. ThingMagic can assist with this process. For more information, see the ThingMagic module hardware manuals found at http://www.thingmagic.com/support-overview

Q. Do I need to be an RFID expert to add RFID to my products?

A. No. As with FCC compliance, OEM customers can leverage ThingMagic's expertise in RFID to help develop your product quickly and cost effectively. Using a ThingMagic embedded module and software support tools will result in considerable time to market and cost savings compared to designing in RFID on your own. For more information, see our whitepaper *Getting a Read on Embedded UHF RFID: Why RFID Modules are the Smart Choice for Developing Next-Generation Solutions* at:
http://rfid.thingmagic.com/application-notes/

Q. What are the interface ports available on the Micro and Micro-LTE?

A. The interface ports available on the Micro and Micro-LTE include USB, UART, and two (2) U.fl ports. The board-to-board connectors include power and interface connectivity.

Q: What types of RF connectors does the Micro and Micro-LTE have?

A. The Micro and Micro-LTE include U.FL (also known as IPX) RF connectors.

Q. How does the antenna protection on the Micro and Micro-LTE compare to the M6e?

A. Both the Micro family and M6e modules monitor the PA current and will cease transmission if the PA could be damaged by transmitting into a broken connection or an antenna which has been severely detuned by a metallic surface being brought near it.

Q: Does ThingMagic plan to introduce any custom small form-factor antennas to work with the Micro or Micro-LTE?

A. Not at this time. There are antennas on the market that are suitable for many applications. If you can't find what you are looking for, ThingMagic may be able assist by introducing you to an appropriate antenna manufacturer.

Q. My antenna is currently connected by a cable and a connector to the module. Do I have to use a solder-down or board-to-board connector for the antenna, or can I connect to the module directly?

A. You can connect to the module directly. Even if the data and signals use the solder-down connection, the RF can be connected by a cable. If you are using a board-to-board connector for the data and power, the RF connector will be facing the board, but there is enough clearance to attach a U.FL connector to the module underneath.

Q. Can I control the Micro or Micro-LTE with a PIC processor? What are the minimum processor resources needed to control the Micro family?

A The Mercury C API is designed to be ported and run on a wide variety of runtime environments, ranging from full host operating systems to bare-metal embedded platforms. In order to best support embedded systems it avoids large memory buffers and dynamic memory allocation (where possible, interfaces are created so that if dynamic allocation is available, the user can take advantage of it without difficulty), and has several memory saving features including the ability to build only a subset of the API (strip out unused protocols, advanced features, etc.).

Q: Do the Micro or Micro-LTE support the battery assisted tag encoding and reading?

A. Yes. For the most part, the existence of a battery in the tag is transparent to the reader, but in some cases battery status information is available and the Micro and Micro-LTE are capable of retrieving it.

Q: Are there any characteristics of the Micro or Micro-LTE that would prevent a hand held device in which the module is installed from being certified intrinsically safe?

A. There is nothing specific to the Micro or Micro-LTE itself that prevents an OEM from designing a complete handheld unit that is intrinsically safe. If you are manufacturing a handheld unit, we suggest you incorporate the Micro or Micro-LTE module and get an intrinsically safe rating for the entire unit.

Q Do you offer volume discounts for the Micro family?

A. Yes, volume discounts are available. Please contact ThingMagic for more information.

Q. Where can I buy the Micro and Micro-LTE?

A. The Micro, Micro-LTE and all other ThingMagic UHF RFID modules can be purchased directly from ThingMagic by contacting sales@thingmagic.com or calling Toll Free: 1-866-833-4069 (International Callers: +1-617-499-4090).