ThingMagic Nano Firmware v1.3.2 Release Notes

These release notes describe features and characteristics of ThingMagic Nano module firmware (FW) version 1.3.2. This firmware is not supported on any other ThingMagic module.

This is the first firmware release for the GA (Generally Available) version of Nano hardware. Any previous versions of Nano firmware that were distributed as part of design verification process are no longer supported.

Nano firmware version 1.3.2 must be used in conjunction with version 1.25.0.113 of the API. Previous versions of the API will not recognize the module and will not interact with it correctly. Consult the release notes for future versions of the API to determine if they are compatible with this version of Nano firmware.

Topics covered in these release notes are:

For full information about the ThingMagic Nano product, please consult the Nano Design Guide, which can be found at:

http://www.thingmagic.com/manuals-firmware

Features in This Release

The ThingMagic Nano module is the smallest module in the ThingMagic product line, but shares many of the features and capabilities of the larger modules. These features include:

- Small size: 22 mm x 26 mm x 3 mm
- Single RF port supporting an RF output level range of 0 to +27 dBm
- World-wide regional support in a single SKU, including FCC, EU, India, Korea, Japan, Australia, and China.
- Data interface speeds up to 921.6 kbps
- Wide DC input voltage range: 3.3 to 5.5 VDC
- Extremely low power consumption when idle: as low as .015 W in sleep mode and .00025 W in shutdown mode.
- Maximum power consumption is typical for a module of this size. It can be reduced, if desired, lowering the RF output level. Long term power consumption can be lowered by adjusting the transmit duty cycle, which often can be accomplished without noticeable impact to desired performance.
- Gen2 settings are supported which allow the Nano to achieve read speeds of up to 240 tags per second and receive sensitivity levels as low as -60 dBm.

Differences from Other Modules

This is the first GA release of firmware for the ThingMagic Nano module. For customers of our existing M6e and Micro product lines, we offer the following list of differences between the Nano module and those product families.

Hardware Differences

1. There are 4 bi-directional GPIO lines supported, like the M6e, which is two more than is supported with the Micro. They are inputs by default and if unconnected, they are pulled down by internal resistors.

2. The maximum current that the module's on-board regulator allows it to draw is 1.0 A. When designing your reader, make sure that the module does not draw 1.0 A when transmitting. No error messages will be sent by the module if this occurs, but the actual output RF level may be lower than the value set. This is most likely to occur for RF output level settings above 25 dBm and input Voltage levels below 3.8 VDC. Consult the ThingMagic Nano Design Guide for further information.

3. The North American region has been compressed into a band from 917 to 928 MHz and is named "NA2". The required 50 channels have been achieved by narrowing the spacing between channels from 500 kHz to 200 kHz. This should allow use of an antenna that is half the size of a normal FCC-band antenna without loss of performance. The closer spacing of the channels may result in increased reader-to-reader interference in dense reader environments, so performance should be monitored if many readers are within range of a shared population of tags.

4. The Nano is designed for solder-down applications only, with no physical connectors for either power, control or RF cabling. It is distributed in tape-and-reel packaging to support pick-and-place manufacturing systems. A Nano module on a carrier board, with the same dimensions and connectors as an M6e module, is available for testing and for use in applications where a solder-down module is not feasible.

5. There is no native USB port on the Nano module. It supports a TTL UART interface only. As for our other modules, the Nano's UART interface can operate from 9600 bps up to 921.6 kbps.

6. The M6e and Micro modules have a "Reset" line that serves the dual function of optionally keeping the module in bootloader mode when it starts up, as well as indicating if the module falls back into bootloader mode once it is operational. This line is not available from the Nano module.

7. Like the Micro, the Nano does not support antenna detection through passing a small amount of DC current through the antenna.

8. Like the Micro, the Nano has an Enable/Shutdown line that activates the module when high. (The “Shutdown” line on the M6e activates the module when low.)

9. The Nano supports the Gen2/18000-6C protocol (and future enhancement to that protocol). It does not have a licensing option to run other protocols, such as IP-X and ISO 18000-6B, which are supported by the M6e and Micro.

10. Only one Gen2 BLF value is supported (250 kHz) with “M” values of 2, 4, and 8. The only supported TARI value is 25 usec.

Firmware Differences

The following features are not supported in this version of Nano firmware, but are supported in Micro firmware version 1.5.0 or M6e firmware version 1.13.1.

1. No Save/Restore of settings

2. No Autonomous Operation

3. Limited support for Embedded TagOPs, as indicated in the following table:

Function	As Embedded TagOPs	As Stand-alone TagOPs
Gen2 Read Data	Yes	Yes
Gen2 Write Tag	No	Yes
Gen2 Write Data	No	Yes
Gen2 Lock Tag	No	Yes
Gen2 Block Write	No	Yes
Gen2 Block Erase	No	Yes
Gen2 Block Perma-lock	No	Yes
Gen2 Read Data	No	Yes

4. Limited support for tag vendor extensions to the Gen2 protocol. Commands not supported include:

   - Higgs 2 FullLoadImage
   - Higgs 3 PartialLoadImage

- Higgs 3 FastLoadImage
- Higgs 3 LoadImage
- Higgs 3 BlockReadLock
- NXP G2X and G2i Set/Reset ReadProtect
- NXP G2X and G2i Change EAS and EAS Alarm
- NXP G2X and G2i Calibrate
- NXP G2i ChangeConfig
- Monza 4QT ReadWrite
- AMS/IDS SL900A Sendor Commands

5. Reporting of meta-data with tag reads is supported, but there is no periodic statistics reporting, which usually supports reporting of:
   - RF On-time
   - Noise Floor
   - Noise Floor with Transmit On
   - Frequency
   - Temperature
   - Antenna Ports
   - Current Protocol