AN11181

How to get started with UCODE for RFID in Electronics

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Application Note
COMPANY PUBLIC

Document information

Info	Content
Keywords	Getting started, interactive RFID in Electronics, hands-on experience, UCODE, G2iL, G2iM, RF, I^2C interface, bridge
Abstract	This document describes how to get started with UCODE for RFID in Electronics. It contains all the links to obtain the hardware, software and documentation for getting hands-on experience with RFID in Electronics.

Revision history

Rev	Date	Description
1.0	20130305	Initial release

Contact information

For more information, please visit: http://www.nxp.com

For sales office addresses, please send an email to: salesaddresses@nxp.com

1. Introduction

NXP provides easy access to everything you need to get started with UCODE for RFID in Electronics. This document contains links to order sample UHF tags and UHF RFID readers to read and modify the contents of the tags.

There are two kits with sample tags. The basic kit helps you to get going with "basic" RFID technology. The interactive kit allows you to explore interactive RFID, a concept that offers memory that can be "shared" between the RF interface and the I^2C interface and also provides a "wireless bridge" between an RFID reader and the hardware on a PCB (Printed Circuit Board).

Fig 1 shows an example on how to best read a tag with a rigid PCB antenna.

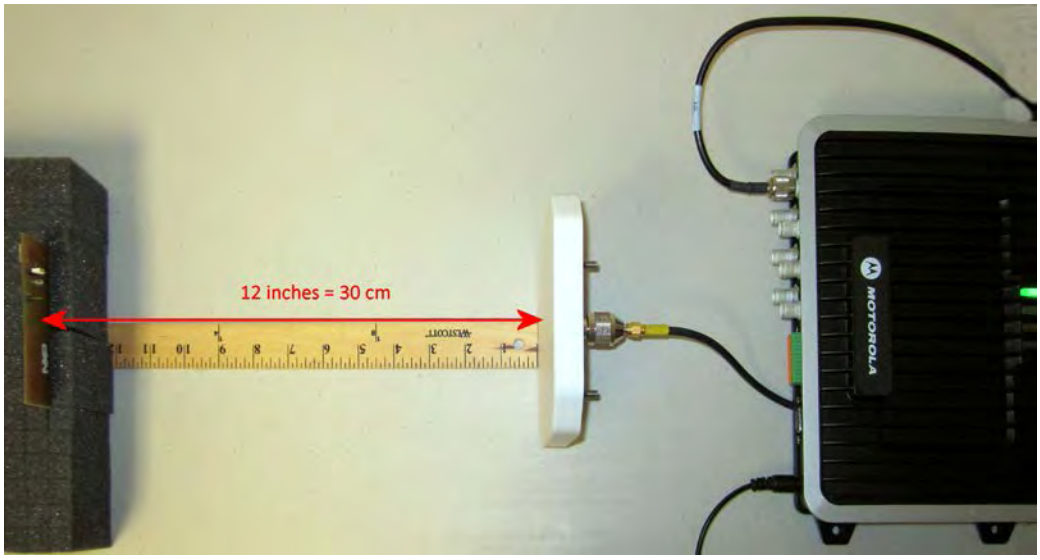


Fig 1. Example how to read a sample UHF tag

After becoming familiar with the technology you might be interested to integrate the UHF tags onto a PCB. Chapter 6 provides links to system integrators and service providers that can assist with the integration of the RFID antenna into an electronics device.

2. Basic kit for UCODE G2i

The basic UCODE G2i kit contains the following sample tags:

- 3 UCODE G2iM+ tags with small rigid PCB antenna (Fig 2)
- 3 UCODE G2iM+ tags with medium rigid PCB antenna (Fig 2)
- 3 UCODE G2iM+ tags with large rigid PCB antenna (Fig 2)
- 20 UCODE G2iL products in SOT886 package (Fig 3)
- 20 UCODE G2iM+ products in SOT886 package (Fig 3)
- 1 UCODE G2iM+ demo board (Fig 4)
- NXP leaflet with link to URL with
  Application Note AN11181; How to get started with UCODE for RFID in Electronics

Note: The UCODE G2iM+ demo board allows you to test the additional functionality of an UHF Gen2 IC, such as: EAS, Tag Tamper Alarm, Read Range Reduction, Digital Switch (externally supplied) and battery mode.

Information to order the basic kit with sample UHF tags and packaged UCODE products can be found at:

http://www.nxp.com/products/identification_and_security/smart_label_and_tag_ics/ucode/series/SL3S4011_4021.html#documentation

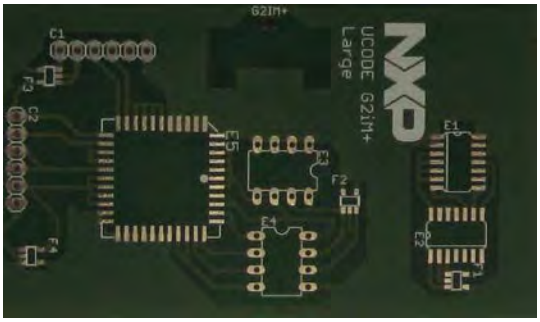


Fig 2. UCODE G2iM+ tag, rigid PCB antenna

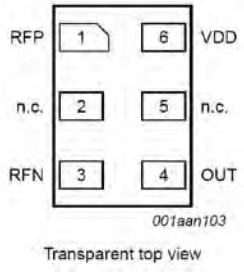


Fig 3. SOT886 package UCODE G2iL and G2iM

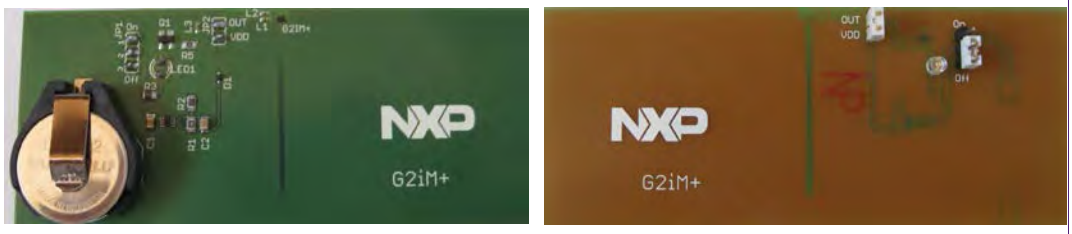


Fig 4. UCODE G2iM+ demo board, front and back

3. Interactive kit for UCODE I²C with rigid PCB antennas

This UCODE I²C kit contains the following sample tags:

- 1 UCODE I²C tag with small antenna (Fig 5)
- 1 UCODE I²C tag with medium PCB antenna (Fig 5)
- 1 UCODE I²C tag with large PCB antenna (Fig 5)
- 1 UCODE I²C to "I²C–Bird" interface board (Fig 6)
  Note: The I²C interface board is necessary to connect the I²C interface of the UCODE I²C IC with the I²C-Bird. See section 5 for more details.
- 20 UCODE I²C products in SOT902-3 package (Fig 7)
- NXP leaflet with link to
  Application Note AN11181; How to get started with UCODE for RFID in Electronics

Information to order the kit with sample UCODE I²C tags for interactive RFID can be found at:

http://www.nxp.com/products/identification_and_security/smart_label_and_tag_ics/ucode/series/SL3S4011_4021.html#documentation

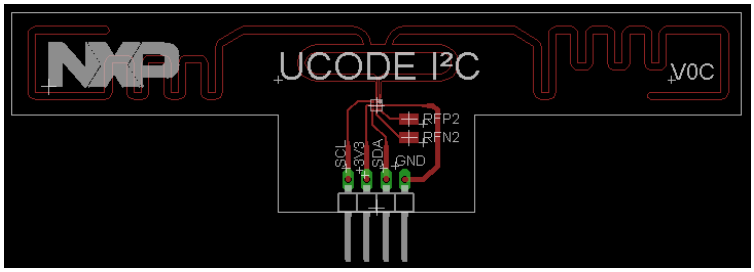
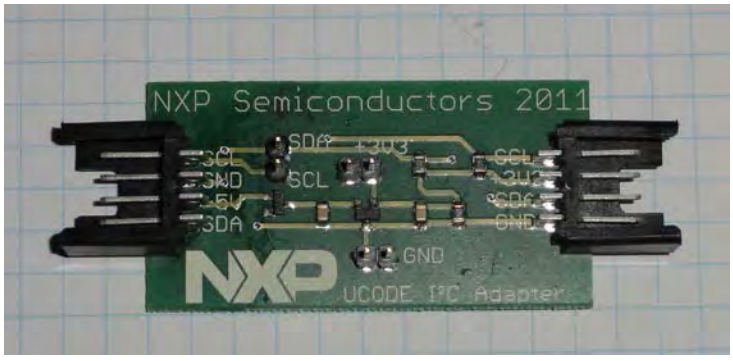


Fig 5. UCODE I²C tag, rigid PCB antenna



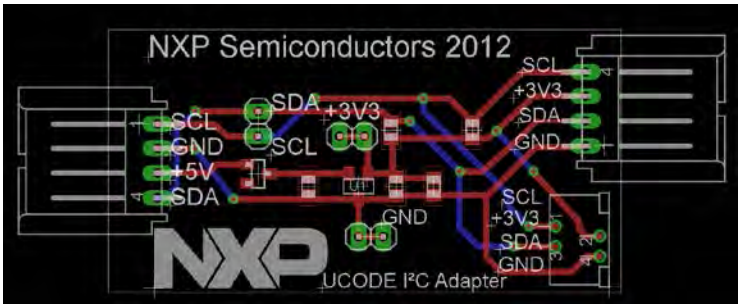


Fig 6. I²C–Bird" interface board

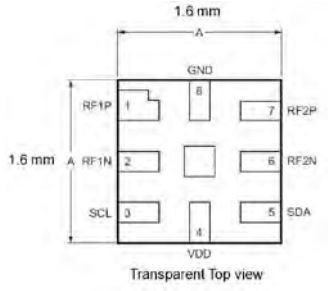


Fig 7. SOT902-3 package

4. UHF RFID readers

This section describes several UHF readers that have been tested and will work with the all the sample tags. For initial explorations with the development kit a lower powered reader with short read distances might be acceptable. However, for best development results NXP strongly recommends a full-powered, high sensitivity reader with high performance characteristics like the Motorola FX-9500 reader in section 4.5.

In general the demo software that comes with the reader allows you to read and modify the memory content of the tags in the sample kit.

4.1 MTI RFID ME USB Dongle

Fig 8. MTI RFID ME USB Dongle

This device can de ordered at:

http://www.nxp.com/redirect/mti/products/52

For the US this device can also be ordered at Amazon:

http://www.nxp.com/redirect/amazon/RFID-ME-USB-Dongle-Reader

The MTI RFID ME GUI demo software for MTI ME USB Dongle is available at:
http://www.nxp.com/redirect/mtigroup.com/rfidme

4.2 Beta-Layout UHF RFID Starter Kit Basic

Fig 9. Beta-Layout UHF RFID Starter Kit Basic

This device is available at:

http://www.nxp.com/redirect/reflow-kit.com/rkuk/order_product_details/266

4.3 Kathrein RK-10240 UHF RFID Starter Kit Pro

Fig 10. Kathrein RK-10240 UHF RFID Starter Kit Pro

This device is available at:

http://www.nxp.com/redirect/reflow-kit/rkuk/order_product_details/267

4.4 Thinkify TR-200 Desktop RFID reader

Fig 11. Thinkify TR-200 Desktop RFID reader (Only for use in North America)

Information about this device is available at:

http://www.nxp.com/redirect/thinkifyit

4.5 Motorola FX-7400 and FX-9500 Fixed RFID Readers

Fig 12. Motorola FX-7400 and FX-9500 Fixed RFID Readers full-powered, high sensitivity, high performance characteristics

Information about these devices is available at:

http://www.nxp.com/redirect/motorola/RFID_Readers

These readers are available at:

RFID Supply Chain
Phone: 800-966-RFID (7343) x706
Email: karenr@rfidsupplychain.com
http://www.nxp.com/redirect/rfidsupplychain.com/

5. USB - I²C interface for connecting PC to I²C

The interactive RFID samples have, next to the RFID interface, also an I²C interface to access the memory on the tag and exchange information. The USB / I²C interface, also known as "I²C bird" can be used as a connection between the UCODE I²C demo board and a USB port on a personal computer.

Fig 13. I²C bird

5.1 I²C bird

This device is available at:

ASCOT GmbH
Hindenburgstraße 24, D-27616 Beverstedt, Germany
Tel: +49 (4747) 931172
Email: info@ascot-gmbh.de

The I²C Bird USB Driver is available at:
http://www.nxp-rfid.com/download

5.2 I2CWin32 demo software

The I²CWin32 demo software allows you to read and write the memory content of the tags in the sample kit via the I²C interface. It works for works both for 32-bit and 64-bit Windows, including Windows 7. The software is available at:
http://www.nxp-rfid.com/download

5.3 Getting started with I²C Bird and UCODE I²C

Application note: AN11234; UCODE I²C Getting started guide describes the necessary steps to install and configure the UCODE I²C demo kit hardware and software. See section 7.2 for the link to download a copy.

6. System integrators and service providers

NXP has several partners that can assist with the integration of the RFID antenna onto a PCB or into the housing of a tablet or an electronic device. This chapter provides a list of potential system integrators or service providers.

NXP is a member of "The RFID Value Creators" consortium that is put together to assist the customer in during all phases of the product development process. phases.

For more information go to:

http://www.nxp.com/redirect/rfid-valuecreators

6.1 Beta LAYOUT GmbH

Beta LAYOUT GmbH was founded in 1989. With 160 employees worldwide they are a leading manufacturer and distributor of printed circuit board prototypes and small series, as well as a provider of 3D printing services. They sell their products via the internet, co-operation partners, and international branch offices that are located in Shannon/Ireland, Tulette/France, Cape Town/South Africa and Vacaville/USA..

Contact information:

Beta LAYOUT GmbH
Im Aartal 14
65326 Aarbergen
Germany
Phone: +49 6120 907010
Fax: +49 6120 907014
Email: info@pcb-pool.com
Web: http://www.nxp.com/redirect/pcb-pool

6.2 Brooks Automation Germany GmbH

Brooks Automation GmbH is a global supplier of automation solutions headquartered in the US state of Massachusetts. They have approximately 2400 employees worldwide, with locations in North America, Asia and Europe. The German RFID Division provides premium RFID system solutions for procedural improvement in logistic, manufacturing and quality control operations.

Contact information:

Brooks Automation Germany GmbH
Gartenstraße 19
95490 Mistelgau
Germany
Phone: +49 9279 991 550
Fax: +49 9279 991 501
Email: info.brooks@brooks.com
Web: http://www.nxp.com/redirect/brooks-rfid

6.3 Enso Detego GmbH

Enso Detego provides intelligent RFID solutions, expert technology consulting and successful project implementation based on proven software products.

Visibility in the supply chain, efficient replenishment based on maximum inventory accuracy, acceleration and preventing of mistakes in stock taking processes, anti-theft and anti-counterfeiting are some examples of themes Enso Detego works on. As developer of a powerful RFID Middleware and supported solutions modules the company aims at creating added value for its customers and partners.

Contact information:

Hans Resel Gasse 17a
8020 Graz
Austria
Phone: +43 316 711 111
Fax: +43 316 711 111 900
Email: detego@enso-detego.com
Web: http://www.nxp.com/redirect/enso-detego

6.4 KATHREIN RFID

Kathrein RFID has been active in the field of RFID for over 25 years and possess comprehensive knowledge and experience in the area of UHF antennas, as well as in the processing and distribution of analogue and digital signals.

Kathrein have applied their comprehensive know-how gained in the field of automobile and mobile communications technology for quick and efficient development of OEM specific RFID antennas and reader solutions. A 3-D field simulation enables calculation and optimization of complex antenna alignments with their respective tags.

Contact information:

KATHREIN RFID
Am Kroit 25 – 27
D-83123 Amerang
Germany
Phone: +49 8075 914 933 0
Email: rfid-sales@kathrein-sachsen.de
Web: http://www.nxp.com/redirect/kathrein-rfid

6.5 Murata Electronics Europe B.V.

Murata's MAGICSTRAP® is the latest in UHF RFID chip development, designed to be placed on the printed circuit board (PCB). The integrated module makes it easy to incorporate RFID into their project. By following some basic and simple guidelines, the antenna is designed into the PCB's ground plane. This represents a permanent and cost effective antenna solution. Placement of MAGICSTRAP® is done using any commercial pick and place equipment. Once mounted, information can be stored and retrieved on MAGICSTRAP® using any EPC global compatible UHF Reader/Writer.

Contact information:

Murata Electronics Europe B.V.
Daalmeerstraat 4
2131 HC Hoofddorp
The Netherlands
Phone: +31 65 2 64 00 35
Email: info@murata.nl
Web: http://www.nxp.com/redirect/murata/rfid

6.6 Thinkify, LLC

Thinkify is a wireless technology company specializing in RFID hardware and software products. They focus on embedded RFID applications; applications to enable common objects, devices and whole environments to become aware of the world around them. This capability opens up new ways for people and objects to interact, allowing real-time visibility of the physical world from the virtual.

Contact information:

Thinkify LLC, attn: Curt Carrender
18450 Technology Drive, Suite E1
Morgan Hill, CA 95037
USA
Phone: +1 408.782.7111
Email: curt@thinkifyit.com
Web: http://www.nxp.com/redirect/thinkifyit

6.7 Vilant Systems Oy

Vilant Systems Oy was founded in 2002 in Finland with a vision to improve industrial process efficiency with RFID. Specializing in turnkey RFID information systems for manufacturing and logistics companies, Vilant is one of the rare suppliers that is able to provide the entire RFID system package.

Vilant provides a comprehensive offering that includes RFID software, RFID hardware and related services such as process and system consulting, implementation and integration to customer ERP, installation and ramp-up and 24/7 support.

Contact information:

Tietäjäntie 2
02130 Espoo
Finland
Phone: +358 9 8561 9900
Fax: +358 9 8561 9901
Email: info-finland@vilant.com
Web: http://www.nxp.com/redirect/vilant

7. Reference documentation

NXP provides several documents to support the development of customized antennas.

Datasheet and Application Notes are available at:

http://www.nxp.com/products/identification_and_security/smart_label_and_tag_ics/ucode/series/SL3S4011_4021.html#documentation

Note: Some of the documents are classified as NXP company confidential and require authorization with a username and password before they can be opened. Customers can obtain a password by filling out a registration form and returning a signed copy to the NXP documentation control officer. The password will then be received by email and can be used for all confidential classified documents. This exercise needs to be executed only once.

7.1 Datasheets

NXP provides the following datasheets:

- Data sheet: SL3S1203_1213; UCODE G2iL and G2iL+
- Data sheet: SL3S1003_1013; UCODE G2iM and G2iM+,
- Short data sheet: SL3S4001_SDS; UCODE I²C
- Data sheet: SL3S4021_SDS; UCODE I²C

7.2 Application notes

NXP provides the following Application Notes:

- Application note: AN10940; FAQs on UCODE G2i
- Application note: AN11215; UCODE G2i PCB Reference Antenna Designs
- Application note: AN11237; UCODE G2iM+ demo board documentation
- Application note: AN11180; UCODE I^2C PCB antenna reference designs
- Application note: AN11234; UCODE I²C Getting started guide
- Application note: AN11235; FAQ on UCODE I²C

7.3 User manuals

NXP provides the following user manual:

- NXP User Manual, UM10204 - I^2C-bus specification and user manual Rev. 5 http://www.nxp.com/documents/user_manual/UM10204.pdf

7.4 NXP product portfolio for tags and labels

General information about the NXP RFID product portfolio for tags and labels is available on the website:

http://www.nxp.com/products/identification_and_security/smart_label_and_tag_ics/ucode/#products

7.5 GS1 EPCglobal RFID standards

NXP's UHF products are compliant with the GS1 EPCglobal Air Interface standard:

EPC™ Radio-Frequency Identity Protocols, Class-1 Generation-2 *UHF RFID, Protocol for Communications at 860 MHz – 960 MHz, Version 1.2.0; EPCglobal™ Inc.* http://www.nxp.com/redirect/gs1.org/gsmp/kc/epcglobal/uhfc1g2

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RFID Me — is a trademark of Microelectronics Technology Inc.

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