# SL3S1203_1213

## UCODE G2iL and G2iL+

Rev. 3.2 — 9 November 2010
198732

Product short data sheet
PUBLIC

## 1. General description

NXP's UCODE G2iL series transponder ICs offer leading-edge read range and support industry-first features such as a Tag Tamper Alarm, Data Transfer, Digital Switch, and advanced privacy-protection modes.

Very high chip sensitivity (−18 dBm) enables longer read ranges with simple, single-port antenna designs. When connected to a power supply, the READ as well as the WRITE range can be boosted to a sensitivity of −27 dBm. In fashion and retail the UCODE G2iL series improve read rates and provide for theft deterrence. In the electronic device market, they're ideally suited for device configuration, activation, production control, and PCB tagging. In authentication applications, they protect brands and guard against counterfeiting. They can also be used to tag containers, electronic vehicles, airline baggage, and more.

In addition to the EPC specifications the G2iL offers an integrated Product Status Flag (PSF) feature and read protection of the memory content.

On top of the G2iL features the G2iL+ offers an integrated tag tamper alarm, digital switch, external supply mode, read range reduction and data transfer mode.

## 2. Features and benefits

### 2.1 Key features

- UHF RFID Gen2 tag chip according EPCglobal v1.2.0 with 128 bit EPC memory
- Memory read protection
- Integrated Product Status Flag (PSF)
- Tag tamper alarm
- Digital switch
- Data transfer mode
- Real Read Range Reduction (Privacy Mode)
- External supply mode

#### 2.1.1 Memory

- 128-bit of EPC memory
- 64-bit Tag IDentifier (TID) including 32-bit factory locked unique serial number
- 32-bit kill password to permanently disable the tag
- 32-bit access password to allow a transition into the secured state
- Data retention: 20 years

- Broad international operating frequency: from 840 MHz to 960 MHz
- Long read/write ranges due to extremely low power design
- Reliable operation of multiple tags due to advanced anti-collision
- READ protection
- WRITE Lock
- Wide specified temperature range: –40 °C up to +85 °C

## 2.2 Key benefits

### 2.2.1 End user benefit

- Prevention of unauthorized memory access through read protection
- Indication of tag tampering attempt by use of the tag tamper alarm feature
- Electronic device configuration and / or activation by the use of the digital switch / data transfer mode
- Theft deterrence supported by the PSF feature (PSF alarm or EPC code)
- Small label sizes, long read ranges due to high chip sensitivity
- Product identification through unalterable extended TID range, including a 32-bit serial number
- Reliable operation in dense reader and noisy environments through high interference suppression

### 2.2.2 Antenna design benefits

- High sensitivity enables small and cost efficient antenna designs
- Low Q-Value eases broad band antenna design for global usage

### 2.2.3 Label manufacturer benefit

- Consistent performance on different materials due to low Q-factor
- Ease of assembly and high assembly yields through large chip input capacitance
- Fast first WRITE of the EPC memory for fast label initialization

## 2.3 Custom commands

- PSF Alarm
  Built-in PSF (Product Status Flag), enables the UHF RFID tag to be used as EAS tag (Electronic Article Surveillance) tag without the need for a back-end data base.
- Read Protect
  Protects all memory content including CRC16 from unauthorized reading.
- ChangeConfig
  Configures the additional features of the chip like external supply mode, tamper alarm, digital switch, read range reduction or data transfer.

The UCODE G2iL is equipped with a number of additional features and custom commands. Nevertheless, the chip is designed in a way standard EPCglobal READ/WRITE/ACCESS commands can be used to operate the features. No custom commands are needed to take advantage of all the features in case of unlocked EPC memory.

# 3. Applications

## 3.1 Markets

- Fashion (Apparel and footwear)
- Retail
- Electronics
- Fast Moving Consumer Goods
- Asset management
- Electronic Vehicle Identification

## 3.2 Applications

- Supply chain management
  - Item level tagging
  - Pallet and case tracking
- Container identification
- Product authentication
- PCB tagging
- Cost efficient, low level seals
- Wireless firmware download
- Wireless product activation

# 4. Quick reference data

**Table 1. Quick reference data**

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| **EEPROM characteristics** | | | | | | |
| $t_{ret}$ | retention time | $T_{amb} \leq 55$ °C | 20 | - | - | year |
| $N_{endu(W)}$ | write endurance | | 1000 | 10000[1] | - | cycle |

[1] $T_{amb} \leq 25$ °C

# 5. Ordering information

**Table 2. Ordering information**

| Type number | Package | | |
|---|---|---|---|
| | Name | Description | Version |
| SL3S1203FUF | Wafer | bumped G2iL die on sawn 8” wafer | not applicable |
| SL3S1213FUF | Wafer | bumped G2iL+ die on sawn 8” wafer | not applicable |
| SL3S1203FTB0 | XSON6 | G2iL, plastic extremely thin small outline package; no leads; 6 terminals; body 1 x 1.45 x 0.5 mm | SOT886F1 |
| SL3S1213FTB0 | XSON6 | G2iL+, plastic extremely thin small outline package; no leads; 6 terminals; body 1 x 1.45 x 0.5 mm | SOT886F1 |

## 6. Marking

Table 3. Marking codes

| Type number | Marking code | Comment | Version |
|---|---|---|---|
| SL3S1203FTB0 | UN | UCODE G2iL | SOT886 |
| SL3S1213FTB0 | UQ | UCODE G2iL+ | SOT886 |

## 7. Block diagram

The SL3S12x3 IC consists of three major blocks:

- Analog Interface
- Digital Controller
- EEPROM

The analog part provides stable supply voltage and demodulates data received from the reader for being processed by the digital part. Further, the modulation transistor of the analog part transmits data back to the reader.

The digital section includes the state machines, processes the protocol and handles communication with the EEPROM, which contains the EPC and the user data.

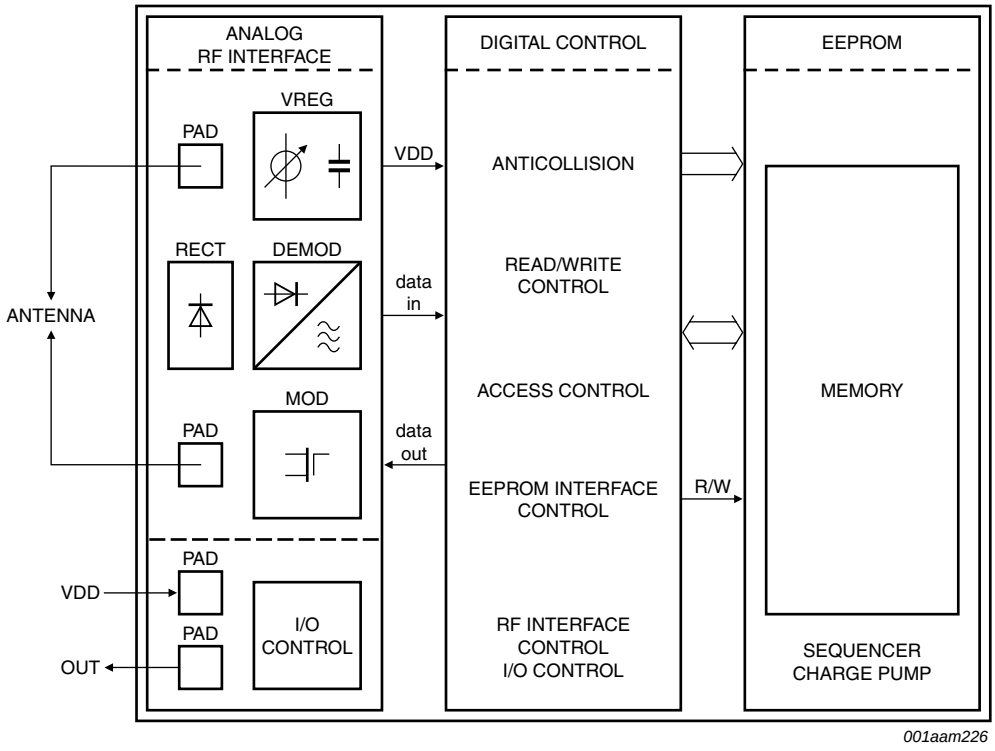



Fig 1. Block diagram of G2iL IC

# 8. Pinning information

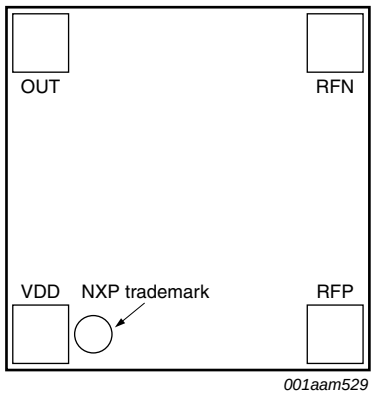
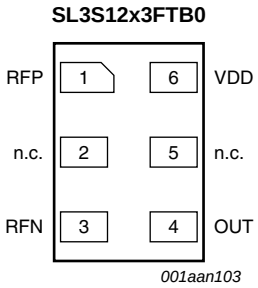



Fig 2. Pinning bare die




Transparent top view

Fig 3. Pin configuration for SOT886

## 8.1 Pin description

Table 4. Pin description bare die

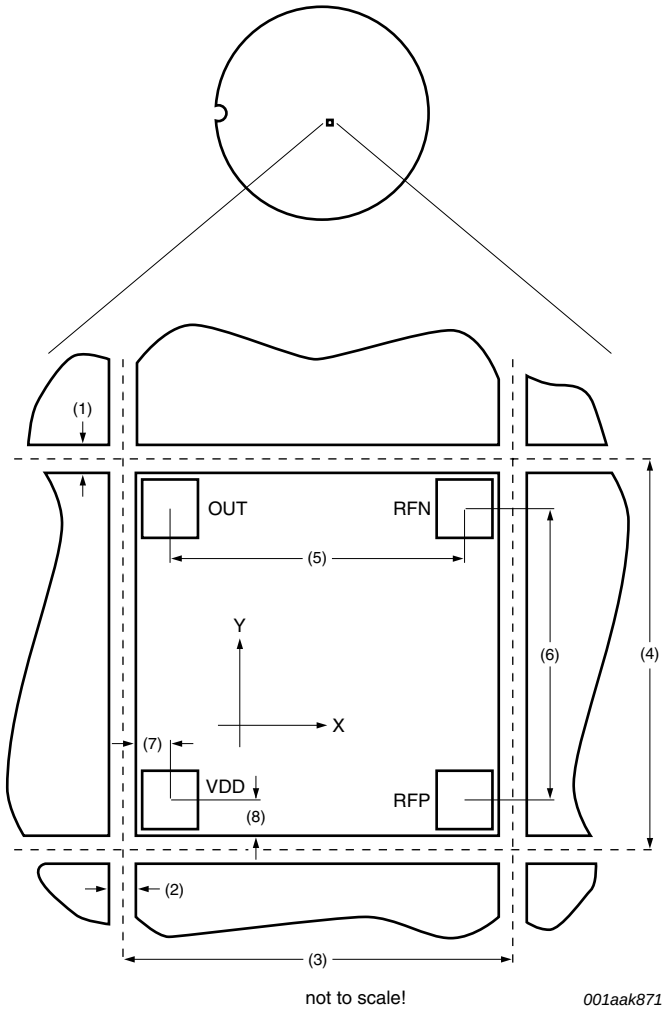
| Symbol | Description |
|---|---|
| OUT | output pin |
| RFN | grounded antenna connector |
| VDD | external supply |
| RFP | ungrounded antenna connector |

Table 5. Pin description SOT886

| Pin | Symbol | Description |
|---|---|---|
| 1 | RFP | ungrounded antenna connector |
| 2 | n.c. | not connected |
| 3 | RFN | grounded antenna connector |
| 4 | OUT | output pin |
| 5 | n.c. | not connected |
| 6 | VDD | external supply |

# 9. Wafer layout

## 9.1 Wafer layout




(1) X-scribe line width: 15 μm

(2) Y-scribe line width: 15 μm

(3) Chip step, x-length: 485 μm

(4) Chip step, y-length: 435 μm

(5) Bump to bump distance X (OUT - RFN): 383 μm

(6) Bump to bump distance Y (RFN - RFP): 333 μm

(7) Distance bump to metal sealring X: 40,3 μm (outer edge - top metal)

(8) Distance bump to metal sealring Y: 40,3 μm

Bump size X × Y: 60 μm × 60 μm

**Remark:** OUT and VDD are used with G2iL+ only

**Fig 4. G2iL wafer layout**

# 10. Mechanical specification

## 10.1 Wafer specification

See Ref. 20 “Data sheet - Delivery type description – General specification for 8” wafer on UV-tape with electronic fail die marking, BU-ID document number: 1093**”.

### 10.1.1 Wafer

**Table 6. Specifications**

| | |
|---|---|
| **Wafer** | |
| Designation | each wafer is scribed with batch number and wafer number |
| Diameter | 200 mm (8”) |
| Thickness | 75 μm ± 15 μm |
| Number of pads | 4 |
| Pad location | non diagonal/ placed in chip corners |
| Distance pad to pad RFN-RFP | 333.0 μm |
| Distance pad to pad OUT-RFN | 383.0 μm |
| Process | CMOS 0.14 μm |
| Batch size | 25 wafers |
| Potential good dies per wafer | 130.000 |
| **Wafer backside** | |
| Material | Si |
| Treatment | ground and stress release |
| Roughness | $R_a$ max. 0.5 μm, $R_t$ max. 5 μm |
| **Chip dimensions** | |
| Die size including scribe | 0.485 mm × 0.435 mm = 0.211 $mm^2$ |
| Scribe line width: | x-dimension = 15 μm |
| | y-dimension = 15 μm |
| **Passivation on front** | |
| Type | Sandwich structure |
| Material | PE-Nitride (on top) |
| Thickness | 1.75 μm total thickness of passivation |
| **Au bump** | |
| Bump material | > 99.9% pure Au |
| Bump hardness | 35 – 80 HV 0.005 |
| Bump shear strength | > 70 MPa |
| Bump height | 18 μm |
| Bump height uniformity | |
| within a die | ± 2 μm |
| – within a wafer | ± 3 μm |
| – wafer to wafer | ± 4 μm |
| Bump flatness | ±1.5 μm |

**Table 6. Specifications**

| | |
|---|---|
| Bump size | |
| – RFP, RFN | 60 × 60 μm |
| – OUT, VDD | 60 × 60 μm |
| Bump size variation | ± 5 μm |

### 10.1.2 Fail die identification

No inkdots are applied to the wafer.

Electronic wafer mapping (SECS II format) covers the electrical test results and additionally the results of mechanical/visual inspection.

See Ref. 20 “Data sheet - Delivery type description – General specification for 8” wafer on UV-tape with electronic fail die marking, BU-ID document number: 1093**”

### 10.1.3 Map file distribution

See Ref. 20 “Data sheet - Delivery type description – General specification for 8” wafer on UV-tape with electronic fail die marking, BU-ID document number: 1093**”

# 11. Functional description

## 11.1 Air interface standards

The UCODE G2iL fully supports all parts of the "Specification for RFID Air Interface EPCglobal, EPCTM Radio-Frequency Identity Protocols, Class-1 Generation-2 UHF RFID, Protocol for Communications at 860 MHz to 960 MHz, Version 1.2.0".

## 11.2 Power transfer

The interrogator provides an RF field that powers the tag, equipped with a UCODE G2iL. The antenna transforms the impedance of free space to the chip input impedance in order to get the maximum possible power for the G2iL on the tag. The G2iL+ can also be supplied externally.

The RF field, which is oscillating on the operating frequency provided by the interrogator, is rectified to provide a smoothed DC voltage to the analog and digital modules of the IC.

The antenna that is attached to the chip may use a DC connection between the two antenna pads. Therefore the G2iL also enables loop antenna design. Possible examples of supported antenna structures can be found in the reference antenna design guide.

## 11.3 Data transfer

### 11.3.1 Reader to tag Link

An interrogator transmits information to the UCODE G2iL by modulating an UHF RF signal. The G2iL receives both information and operating energy from this RF signal. Tags are passive, meaning that they receive all of their operating energy from the interrogator's RF waveform. In order to further improve the read range the UCODE G2iL can be externally supplied as well so the energy to operate the chip does not need to be transmitted by the reader.

An interrogator is using a fixed modulation and data rate for the duration of at least one inventory round. It communicates to the G2iL by modulating an RF carrier using DSB-ASK with PIE encoding.

For further details refer to Section 16, Ref. 1. Interrogator-to-tag (R=>T) communications.

### 11.3.2 Tag to reader Link

An interrogator receives information from a G2iL by transmitting an unmodulated RF carrier and listening for a backscattered reply. The G2iL backscatters by switching the reflection coefficient of its antenna between two states in accordance with the data being sent. For further details refer to Section 16, Ref. 1, chapter 6.3.1.3.

The UCODE G2iL communicates information by backscatter-modulating the amplitude and/or phase of the RF carrier. Interrogators shall be capable of demodulating either demodulation type.

The encoding format, selected in response to interrogator commands, is either FM0 baseband or Miller-modulated subcarrier.

## 11.4 G2iL and G2iL+ differences

The UCODE G2iL is tailored for application where mainly EPC or TID number space is needed. The G2iL+ in addition provides functionality such as tag tamper alarm, external supply operation to further boost read/write range (external supply mode), a Privacy mode reducing the read range or I/O functionality (data transfer to externally connected devices) required.

The following table provides an overview of G2iL, G2iL+ special features.

**Table 7. Overview of G2iL and G2iL+ features**

| Features | G2iL | G2iL+ |
|---|---|---|
| Read protection (bankwise) | yes | yes |
| PSF (Built-in Product Status Flag) | yes | yes |
| Backscatter strength reduction | yes | yes |
| Tag tamper alarm | - | yes |
| Digital switch / Digital input | - | yes |
| External supply mode | - | yes |
| Data transfer | - | yes |
| Real read range reduction | - | yes |

## 11.5 Supported commands

The G2iL supports all **mandatory** EPCglobal V1.2.0 commands.

In addition the G2iL supports the following **optional** commands:

- ACCESS

The G2iL features the following **custom** commands described more in detail later:

- ResetReadProtect (backward compatible to G2X)
- ReadProtect (backward compatible to G2X)
- ChangeEAS (backward compatible to G2X)
- EAS_Alarm (backward compatible to G2X)
- ChangeConfig (new with G2iL)

## 11.6 G2iL, G2iL+ memory

The G2iL, G2iL+ memory is implemented according EPCglobal Class1Gen2 and organized in three sections:

**Table 8. G2iL memory sections**

| Name | Size | Bank |
|---|---|---|
| Reserved memory (32 bit ACCESS and 32 bit KILL password) | 64 bit | 00b |
| EPC (excluding 16 bit CRC-16 and 16 bit PC) | 128 bit | 01b |
| G2iL Configuration Word | 16 bit | 01b |
| TID (including permalocked unique 32 bit serial number) | 64 bit | 10b |

The logical address of all memory banks begin at zero (00h).

In addition to the three memory banks one configuration word to handle the G2iL specific features is available at EPC bank 01 address 200h.

Memory pages (16 bit words) pre-programmed to zero will not execute an erase cycle before writing data to it. This approach accelerates initialization of the chip and enables faster programming of the memory.

## 12. Limiting values

**Table 9. Limiting values[1][2]**

*In accordance with the Absolute Maximum Rating System (IEC 60134). Voltages are referenced to RFN*

| Symbol | Parameter | Conditions | | Min | Max | Unit |
|---|---|---|---|---|---|---|
| **Bare die and SOT886 limitations** | | | | | | |
| $T_{stg}$ | storage temperature | | | –55 | +125 | °C |
| $T_{amb}$ | ambient temperature | | | –40 | +85 | °C |
| $V_{ESD}$ | electrostatic discharge voltage | Human body model | [3] | - | ± 2 | kV |
| **Pad limitations** | | | | | | |
| $V_i$ | input voltage | absolute limits, VDD-OUT pad | | –0.5 | +2.5 | V |
| $I_o$ | output current | absolute limits input/output current, VDD-OUT pad | | –0.5 | +0.5 | mA |
| $P_i$ | input power | maximum power dissipation, RFP pad | | - | 100 | mW |

[1] Stresses above those listed under Absolute Maximum Ratings may cause permanent damage to the device. This is a stress rating only and functional operation of the device at these or any conditions other than those described in the Operating Conditions and Electrical Characteristics section of this specification is not implied.

[2] This product includes circuitry specifically designed for the protection of its internal devices from the damaging effects of excessive static charge. Nonetheless, it is suggested that conventional precautions be taken to avoid applying greater than the rated maxima.

[3] For ESD measurement, the die chip has been mounted into a CDIP20 package.

# 13. Characteristics

## 13.1 UCODE G2iL, G2iL+ bare die characteristics

**Table 10. G2iL, G2iL+ RF interface characteristics (RFN, RFP)**

| Symbol | Parameter | Conditions | | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|---|
| $f_i$ | input frequency | | | 840 | - | 960 | MHz |
| **Normal mode - no external supply, read range reduction OFF** | | | | | | | |
| $P_{i(min)}$ | minimum input power | READ sensitivity | [1][2][7] | - | –18 | - | dBm |
| $P_{i(min)}$ | minimum input power | WRITE sensitivity, (write range/read range - ratio) | | - | 30 | - | % |
| $C_i$ | input capacitance | parallel | [3] | - | 0.77 | - | pF |
| Q | quality factor | 915 MHz | [3] | - | 9.7 | - | - |
| Z | impedance | 866 MHz | [3] | - | 25 – j237 | - | Ω |
| | | 915 MHz | [3] | - | 23 – j224 | - | Ω |
| | | 953MHz | [3] | - | 21 – j216 | - | Ω |
| **External supply mode - VDD pad supplied, read range reduction OFF** | | | | | | | |
| $P_{i(min)}$ | minimum input power | Ext. supplied READ | [1][2] | - | –27 | - | dBm |
| | | Ext. supplied WRITE | [2] | - | –27 | - | dBm |
| Z | impedance | externally supplied, 915 MHz | [3] | - | 7 – j230 | - | Ω |
| **Read range reduction ON - no external supply** | | | | | | | |
| $P_{i(min)}$ | minimum input power | 4R on READ | [1][2][4] | - | +12 | - | dBm |
| | | 4R on WRITE | [2][4] | - | +12 | - | dBm |
| Z | impedance | 4R on, 915 MHz | [3] | - | 18 – j2 | - | Ω |
| **Modulation resistance** | | | | | | | |
| R | resistance | modulation resistance, max. backscatter = off | [5] | - | 170 | - | Ω |
| | | modulation resistance, max. backscatter = on | [6] | - | 55 | - | Ω |

[1] Power to process a Query command.

[2] Measured with a 50 Ω source impedance.

[3] At minimum operating power.

[4] It has to be assured the reader (system) is capable of providing enough field strength to give +12 dBm at the chip otherwise communication with the chip will not be possible.

[5] Enables tag designs to be within ETSI limits for return link data rates of e.g. 320 kHz/M4.

[6] Will result in up to 10 dB higher tag backscatter power at high field strength.

[7] Results in approx. –18.5 dBm tag sensitivity on a 2 dBi gain antenna.

**Table 11. VDD pin characteristics**

| Symbol | Parameter | Conditions | | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|---|
| **Minimum supply voltage/current - without assisted EEPROM WRITE** | | | [1][3][4] | | | | |
| $V_{DD}$ | input voltage | minimum voltage | | - | - | 1.8 | V |
| $I_{DD}$ | supply current | minimum current, $I_{out}$ = 0 µA | | - | - | 7 | µA |
| | | $I_{out}$ = 100 µA | | - | - | 110 | µA |
| **Minimum supply voltage/current - assisted EEPROM READ and WRITE** | | | [2][3][4] | | | | |
| $V_{DD}$ | input voltage | minimum voltage, $I_{out}$ = 0 µA | | - | 1.8 | 1.85 | V |
| | | $I_{out}$ = 100 µA | | - | - | 1.95 | V |
| $I_{DD}$ | supply current | minimum current, $I_{out}$ = 0 µA | | - | - | 125 | µA |
| | | $I_{out}$ = 100 µA | | - | - | 265 | µA |
| **Maximum supply voltage/current** | | | [3][5] | | | | |
| $V_{DD}$ | input voltage | absolute maximum voltage | | 2.2 | - | - | V |
| $I_{i(max)}$ | maximum input current | absolute maximum current | | 280 | - | - | µA |

[1] Activates Digital Output (OUT pin), increases read range (external supplied).

[2] Activates Digital Output (OUT pin), increases read and write range (external supplied).

[3] Operating the chip outside the specified voltage range may lead to undefined behaviour.1925.

[4] Either the voltage or the current needs to be above given values to guarantee specified functionality.

[5] No proper operation is guaranteed if both, voltage and current, limits are exceeded.

**Table 12. G2iL, G2iL+ VDD and OUT pin characteristics**

| Symbol | Parameter | Conditions | | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|---|
| **OUT pin characteristics** | | | | | | | |
| $V_{OL}$ | Low-level output voltage | Isink = 1mA | | - | - | 100 | mV |
| $V_{OH}$ | HIGH-level output voltage | VDD = 1.8 V; Isource = –100µA | | 1.5 | - | - | V |
| **VDD/OUT pin characteristics** | | | | | | | |
| $C_L$ | load capacitance | VDD - OUT pin max. | [1] | - | - | 5 | pF |
| $V_o$ | output voltage | maximum RF peak voltage on VDD-OUT pins | [2] | - | - | 500 | mV |
| **VDD/OUT pin tamper alarm characteristics** | | | [3] | | | | |
| $R_{L(max)}$ | maximum load resistance | resistance range high | [4] | - | - | <2 | MΩ |
| $R_{L(min)}$ | minimum load resistance | resistance range low | [5] | >20 | - | - | MΩ |

[1] Is the sum of the allowed capacitance of the VDD and OUT pin referenced to RFN.

[2] Is the maximum allowed RF input voltage coupling to the VDD/OUT pin to guarantee undisturbed chip functionality.

[3] Resistance between VDD and OUT pin in checked during power up only.

[4] Resistance range to achieve tamper alarm flag = 1.

[5] Resistance range to achieve tamper alarm flag = 0:

For further reading we recommend application note “FAQ UCODE G2iL+“ (Ref. 22) describing the output characteristics more in detail. An example schematic is available in application note “UCODE G2iL+ Demoboard Manual“ (Ref. 23). The documents are available at NXP Document Control or at the website www.nxp.com.

**Table 13. G2iL, G2iL+ memory characteristics**

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| **EEPROM characteristics** | | | | | | |
| $t_{ret}$ | retention time | $T_{amb} \leq 55$ °C | 20 | - | - | year |
| $N_{endu(W)}$ | write endurance | | 1000 | 10000[1] | - | cycle |

[1] $T_{amb} \leq 25$ °C

## 13.2 UCODE G2iL, G2iL+ SOT886 characteristics

**Table 14. G2iL, G2iL+ RF interface characteristics (RFN, RFP)**

| Symbol | Parameter | Conditions | | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|---|
| **Normal mode - no external supply, read range reduction OFF** | | | | | | | |
| $P_{i(min)}$ | minimum input power | READ sensitivity | [1][2] | - | –17.6 | - | dBm |
| Z | impedance | 915 MHz | [3] | - | 21 -j199 | - | Ω |

[1] Power to process a Query command.

[2] Measured with a 50 Ω source impedance.

[3] At minimum operating power.

**Remark:** For DC and memory characteristics refer to Table 11, Table 12 and Table 13.

# 14. Packing information

## 14.1 Wafer

See Ref. 20 “Data sheet - Delivery type description – General specification for 8” wafer on UV-tape with electronic fail die marking, BU-ID document number: 1093**”

## 14.2 SOT886

Part orientation T1. For details please refer to http://www.standardics.nxp.com/packaging/packing/pdf/sot886.t1.t4.pdf.

# 15. Abbreviations

**Table 15. Abbreviations**

| Acronym | Description |
|---|---|
| CRC | Cyclic Redundancy Check |
| DC | Direct Current |
| EAS | Electronic Article Surveillance |
| EEPROM | Electrically Erasable Programmable Read Only Memory |
| EPC | Electronic Product Code (containing Header, Domain Manager, Object Class and Serial Number) |
| FM0 | Bi phase space modulation |
| G2 | Generation 2 |
| IC | Integrated Circuit |
| PSF | Product Status Flag |
| RF | Radio Frequency |
| UHF | Ultra High Frequency |
| TID | Tag IDentifier |

## 16. References

[1] EPCglobal: EPC Radio-Frequency Identity Protocols Class-1 Generation-2 UHF RFID Protocol for Communications at 860 MHz – 960 MHz, Version 1.1.0 (December 17, 2005)

[2] EPCglobal: EPC Tag Data Standards

[3] EPCglobal (2004): FMCG RFID Physical Requirements Document (draft)

[4] EPCglobal (2004): Class-1 Generation-2 UHF RFID Implementation Reference (draft)

[5] European Telecommunications Standards Institute (ETSI), EN 302 208: Electromagnetic compatibility and radio spectrum matters (ERM) – Radio-frequency identification equipment operating in the band 865 MHz to 868 MHz with power levels up to 2 W, Part 1 – Technical characteristics and test methods

[6] European Telecommunications Standards Institute (ETSI), EN 302 208: Electromagnetic compatibility and radio spectrum matters (ERM) – Radio-frequency identification equipment operating in the band 865 MHz to 868 MHz with power levels up to 2 W, Part 2 – Harmonized EN under article 3.2 of the R&TTE directive

[7] [CEPT1]: CEPT REC 70-03 Annex 1

[8] [ETSI1]: ETSI EN 330 220-1, 2

[9] [ETSI3]: ETSI EN 302 208-1, 2 V<1.1.1> (2004-09-Electromagnetic compatibility And Radio spectrum Matters (ERM) Radio Frequency Identification Equipment operating in the band 865 - MHz to 868 MHz with power levels up to 2 W Part 1: Technical characteristics and test methods.

[10] [FCC1]: FCC 47 Part 15 Section 247

[11] ISO/IEC Directives, Part 2: Rules for the structure and drafting of International Standards

[12] ISO/IEC 3309: Information technology – Telecommunications and information exchange between systems – High-level data link control (HDLC) procedures – Frame structure

[13] ISO/IEC 15961: Information technology, Automatic identification and data capture – Radio frequency identification (RFID) for item management – Data protocol: application interface

[14] ISO/IEC 15962: Information technology, Automatic identification and data capture techniques – Radio frequency identification (RFID) for item management – Data protocol: data encoding rules and logical memory functions

[15] ISO/IEC 15963: Information technology — Radio frequency identification for item management — Unique identification for RF tags

[16] ISO/IEC 18000-1: Information technology — Radio frequency identification for item management — Part 1: Reference architecture and definition of parameters to be standardized

[17] ISO/IEC 18000-6: Information technology automatic identification and data capture techniques — Radio frequency identification for item management air interface — Part 6: Parameters for air interface communications at 860–960 MHz

[18] ISO/IEC 19762: Information technology AIDC techniques – Harmonized vocabulary – Part 3: radio-frequency identification (RFID)

[19] U.S. Code of Federal Regulations (CFR), Title 47, Chapter I, Part 15: Radio-frequency devices, U.S. Federal Communications Commission.

[20] Data sheet - Delivery type description – General specification for 8” wafer on UV-tape with electronic fail die marking, BU-ID document number: 1093**[1]

[21] Data sheet - Flip chip strap - FCS2, General packing specification, BU-ID document number: 1738**

[22] Application note - FAQ UCODE G2iL+, BU-ID document number: 1925**

[23] Application note - UCODE G2iL+ Demoboard Manual, BU-ID document number: 1915**

[24] Data sheet - SL3S1203_1213, UCODE G2iL and G2iL+, BU-ID document number: 1788**

1. ** ... document version number

# 17. Revision history

**Table 16. Revision history**

| Document ID | Release date | Data sheet status | Change notice | Supersedes |
|---|---|---|---|---|
| SL3S1203_1213_SDS v.3.2 | 20101109 | Product short data sheet | - | SL3S1203_1213_SDS v.3.1 |
| Modifications: | • Version SOT886F1 added<br>• Section 6 “Marking” and Section 14 “Packing information”: added | | | |
| SL3S1203_1213_SDS v.3.1 | 20101006 | Product short data sheet | - | - |

# 18. Legal information

## 18.1 Data sheet status

| Document status[1][2] | Product status[3] | Definition |
|---|---|---|
| Objective [short] data sheet | Development | This document contains data from the objective specification for product development. |
| Preliminary [short] data sheet | Qualification | This document contains data from the preliminary specification. |
| Product [short] data sheet | Production | This document contains the product specification. |

[1] Please consult the most recently issued document before initiating or completing a design.

[2] The term 'short data sheet' is explained in section "Definitions".

[3] The product status of device(s) described in this document may have changed since this document was published and may differ in case of multiple devices. The latest product status information is available on the Internet at URL http://www.nxp.com.

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## 20. Tables



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**Date of release: 9 November 2010**
**198732**