

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: $-40\text{ }^{\circ}\text{C}$ up to $+85\text{ }^{\circ}\text{C}$

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	$T_{amb} \leq 55\text{ °C}$	20	-	-	year
$N_{endur(W)}$	write endurance		1000	10000 ^[1]	-	cycle

[1] $T_{amb} \leq 25\text{ °C}$

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.

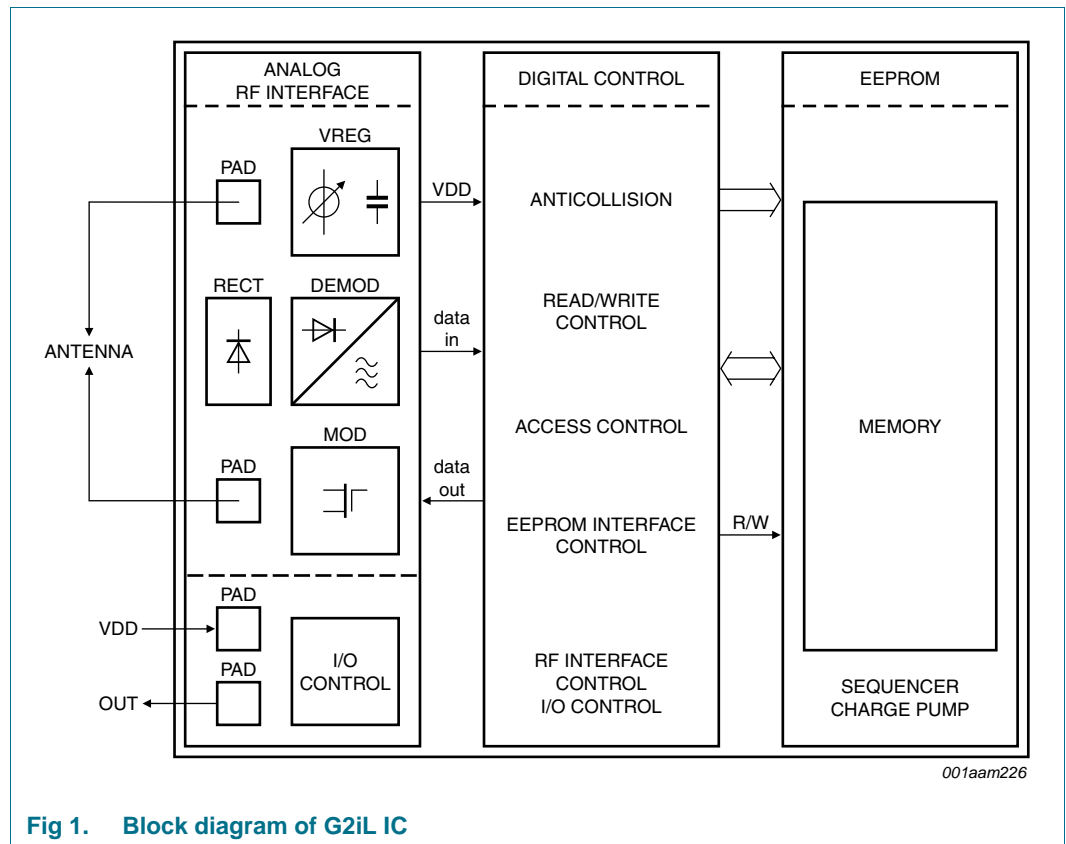
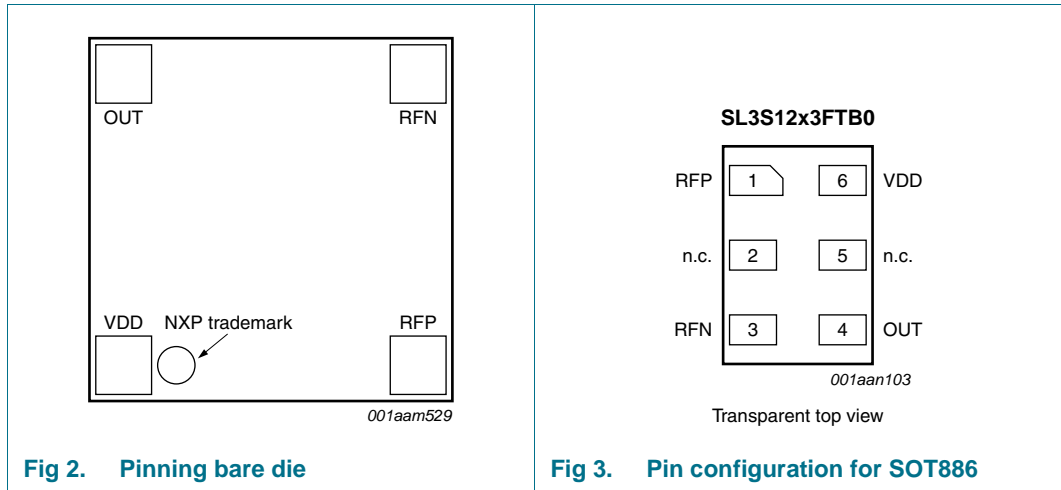


Fig 1. Block diagram of G2iL IC

8. Pinning information



8.1 Pin description

Table 4. Pin description bare die

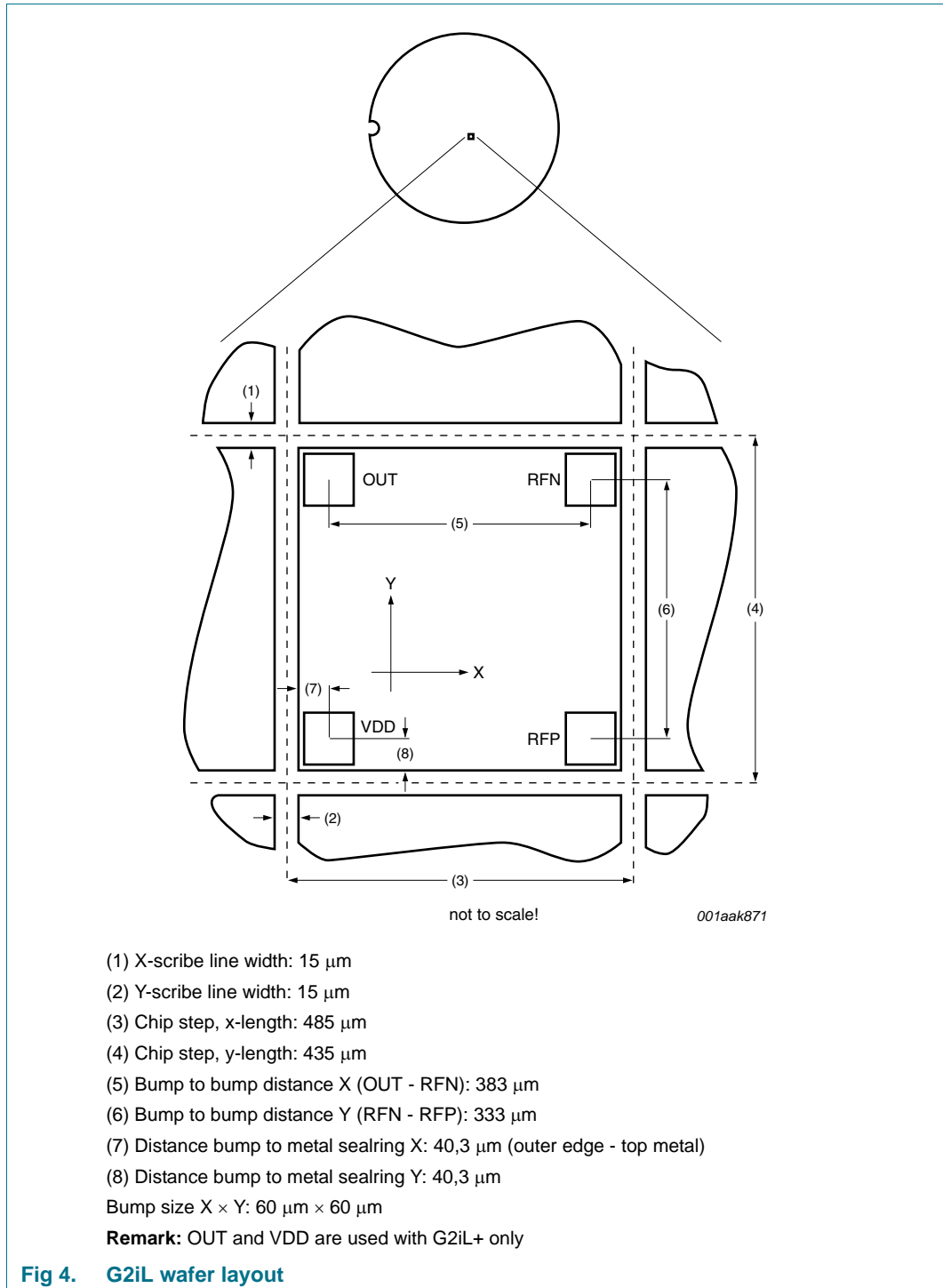
Symbol	Description
OUT	output pin
RFN	grounded antenna connector
VDD	external supply
RFP	ungrounded antenna connector

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



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 $\mu\text{m} \pm 15 \mu\text{m}$
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 \times 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	$\pm 2 \mu\text{m}$
– within a wafer	$\pm 3 \mu\text{m}$
– wafer to wafer	$\pm 4 \mu\text{m}$
Bump flatness	$\pm 1.5 \mu\text{m}$

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	I _{sink} = 1mA	-	-	100	mV
V _{OH}	HIGH-level output voltage	V _{DD} = 1.8 V; I _{source} = -100μA	1.5	-	-	V
VDD/OUT pin characteristics						
C _L	load capacitance	V _{DD} - 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} ≤ 55 °C	20	-	-	year
N _{endu(W)}	write endurance		1000	10000 ^[1]	-	cycle

[1] T_{amb} ≤ 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:		<ul style="list-style-type: none">• Version SOT886F1 added• 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>.

18.2 Definitions

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Date of release: 9 November 2010
198732