



Chipsmall Limited consists of a professional team with an average of over 10 year of expertise in the distribution of electronic components. Based in Hongkong, we have already established firm and mutual-benefit business relationships with customers from,Europe,America and south Asia,supplying obsolete and hard-to-find components to meet their specific needs.

With the principle of “Quality Parts,Customers Priority,Honest Operation,and Considerate Service”,our business mainly focus on the distribution of electronic components. Line cards we deal with include Microchip,ALPS,ROHM,Xilinx,Pulse,ON,Everlight and Freescale. Main products comprise IC,Modules,Potentiometer,IC Socket,Relay,Connector.Our parts cover such applications as commercial,industrial, and automotives areas.

We are looking forward to setting up business relationship with you and hope to provide you with the best service and solution. Let us make a better world for our industry!



## Contact us

Tel: +86-755-8981 8866 Fax: +86-755-8427 6832

Email & Skype: info@chipsmall.com Web: www.chipsmall.com

Address: A1208, Overseas Decoration Building, #122 Zhenhua RD., Futian, Shenzhen, China



# HTCICC64

## HITAG $\mu$ RO64 transponder IC

Rev. 3.2 — 20 October 2014  
176432

Product data sheet  
COMPANY PUBLIC

## 1. General description

---

The HITAG product line is well known and established in the contactless identification market.

Due to the open marketing strategy of NXP Semiconductors there are various manufacturers well established for both the transponder / cards as well as the Read/Write Devices. All of them supporting HITAG transponder IC's.

With the new HITAG  $\mu$  RO64, NXP is addressing the low end LF market, by offering a preprogrammed, read only IC variant.

The advantages of this transponder IC are:

- proven HITAG performance
- easy to assemble because of mega-bumps
- low cost manufacturing because of preprogrammed TTF code

The HITAG  $\mu$  RO64 operates in a continuous TTF mode where it modulates the reader field with it's preprogrammed 64-bit memory content.

## 2. Features and benefits

---

### 2.1 Features

- Integrated circuit for contactless identification transponders and cards
- Integrated resonance capacitor of 210 pF with  $\pm 3\%$  tolerance or 280 pF with  $\pm 5\%$  tolerance over full production
- Frequency range 100 kHz to 150 kHz
- 64-bit preprogrammed TTF response
- 10 years data retention

### 2.2 Delivery types

- Sawn, megabumped wafer, 150  $\mu$ m, 8 inch, UV



### 3. Ordering information

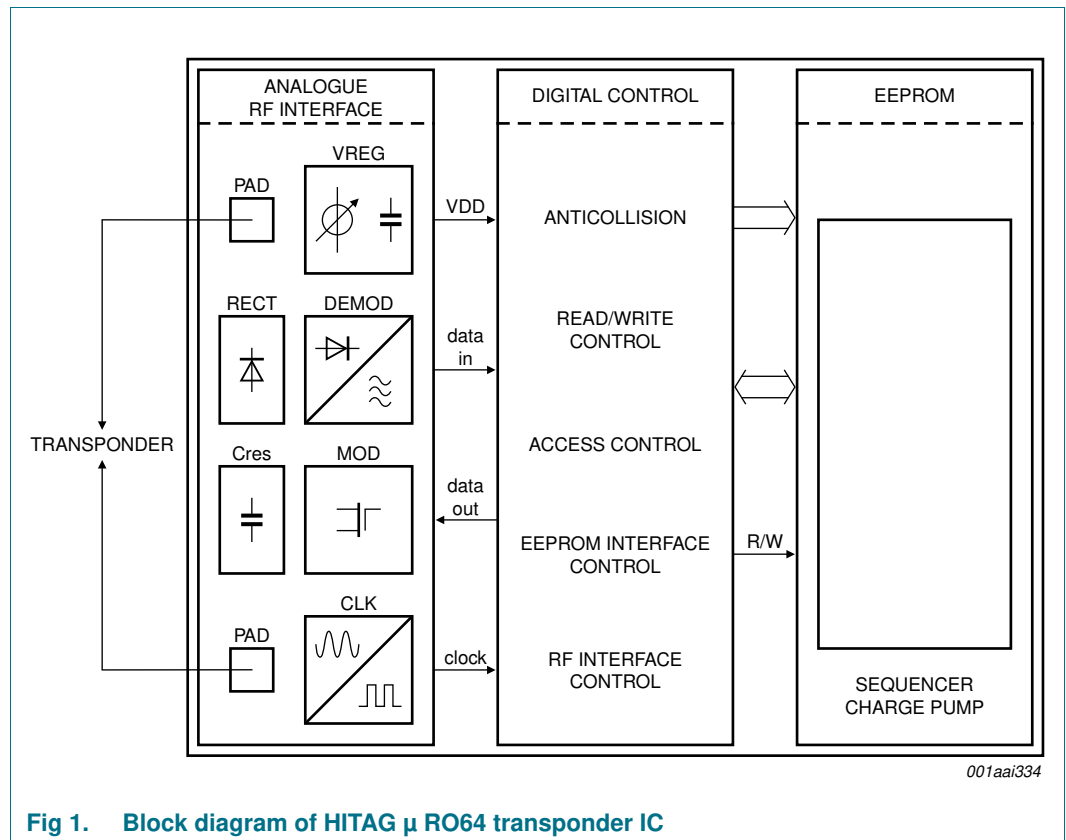
Table 1. Ordering information

Type number	Package			
	Name	Description	Type	Version
HTCICC6402FUG/AM	Wafer	sawn, megabumped wafer, 150 $\mu$ m, 8 inch, UV	HITAG $\mu$ RO64, 210 pF	-
HTCICC6403FUG/AM	Wafer	sawn, megabumped wafer, 150 $\mu$ m, 8 inch, UV	HITAG $\mu$ RO64, 280 pF	-

### 4. Block diagram

The HITAG  $\mu$  RO64 transponder IC requires no external power supply. The contactless interface generates the power supply and the system clock via the resonant circuitry by inductive coupling to the read/write device (RWD). The interface also demodulates data transmitted from the RWD to the HITAG  $\mu$  RO64 transponder IC, and modulates the magnetic field for data transmission from the HITAG  $\mu$  RO64 transponder IC to the RWD.

Data are stored in a non-volatile memory (EEPROM).



**Fig 1. Block diagram of HITAG  $\mu$  RO64 transponder IC**

5. Pinning information

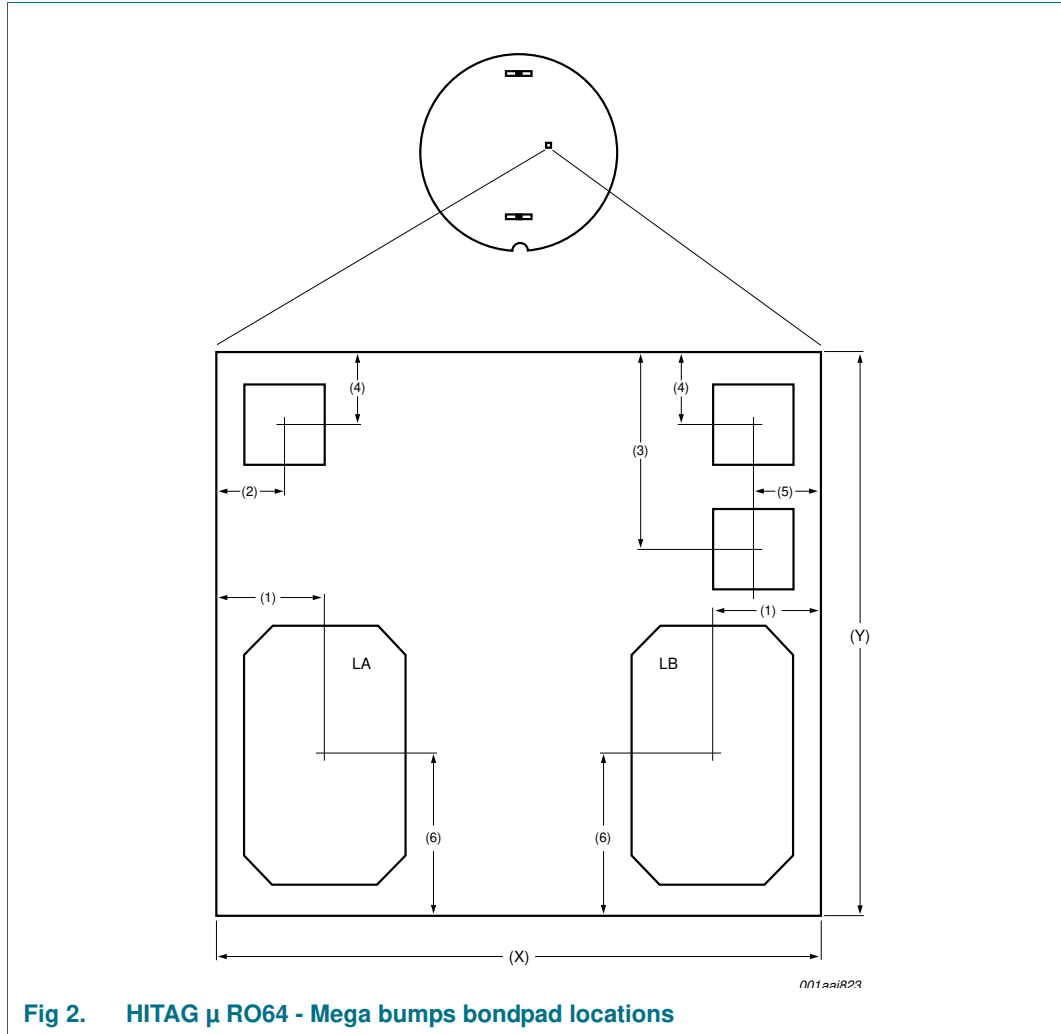


Fig 2. HITAG  $\mu$  RO64 - Mega bumps bondpad locations

Table 2. HITAG  $\mu$  RO64 - Mega bumps dimensions

Description	Dimension
(X) chip size	550 $\mu\text{m}$
(Y) chip size	550 $\mu\text{m}$
(1) pad center to chip edge	100.5 $\mu\text{m}$
(2) pad center to chip edge	48.708 $\mu\text{m}$
(3) pad center to chip edge	180.5 $\mu\text{m}$
(4) pad center to chip edge	55.5 $\mu\text{m}$
(5) pad center to chip edge	48.508 $\mu\text{m}$
(6) pad center to chip edge	165.5 $\mu\text{m}$
<b>Bump Size:</b>	
LA, LB	294 $\times$ 164 $\mu\text{m}$
Remaining pads	60 $\times$ 60 $\mu\text{m}$

**Note:** All pads except LA and LB are electrically disconnected after dicing.

## 6. Functional description

### 6.1 Memory organization

The memory is preprogrammed as shown in [Table 3](#). This data gets continuously sent back as soon as the transponder receives sufficient energy.

**Table 3. Memory organization HITAG μ RO64**

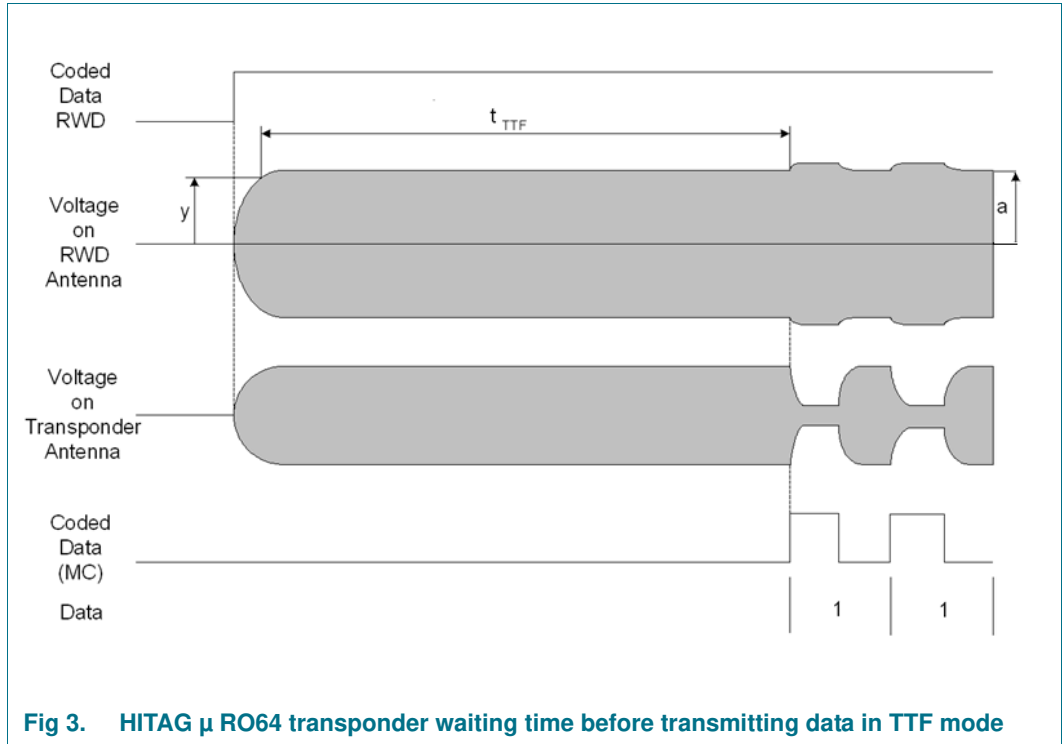
TTF ID7							
MSB							LSB
1	1	1	1	1	1	1	1
TTF ID6							
MSB							LSB
1	VBit7	VBit6	VBit5	VBit4	P VBit7-4	VBit3	VBit2
TTF ID5							
MSB							LSB
VBit 1	VBit0	P VBit3-0	DBit31	DBit30	DBit29	DBit28	P DBit31-28
TTF ID4							
MSB							LSB
DBit27	DBit26	DBit25	DBit24	P DBit27-24	DBit23	DBit22	DBit21
TTF ID3							
MSB							LSB
DBit20	P DBit23-20	DBit19	DBit18	DBit17	DBit16	P DBit19-16	DBit15
TTF ID2							
MSB							LSB
DBit14	DBit13	DBit12	P DBit15-12	DBit11	DBit10	DBit9	DBit8
TTF ID1							
MSB							LSB
P DBit11-8	DBit7	DBit6	DBit5	DBit4	P DBit7-4	DBit3	DBit2
TTF ID0							
MSB							LSB
DBit1	DBit0	PDBit3-0	PColumn0	PColumn1	PColumn2	PColumn3	Stopbit

P Column 0:	DBit31	DBit27	DBit23	DBit19	DBit15	DBit11	DBit7	DBit3
-------------	--------	--------	--------	--------	--------	--------	-------	-------

P Column 1:	DBit30	DBit26	DBit22	DBit18	DBit14	DBit10	DBit6	DBit2
P Column 2:	DBit29	DBit25	DBit21	DBit17	DBit13	DBit9	DBit5	DBit1
P Column 3:	DBit28	DBit24	DBit20	DBit16	DBit12	DBit8	DBit4	DBit0

7. Protocol timing

7.1 HITAG  $\mu$  RO64 transponder waiting time before transmitting data in TTF mode



After switching on the powering field, the HITAG  $\mu$  RO64 transponder waits a time  $t_{TTF}$  before transmitting data.

Symbol	Parameter	Min	Typ	Max	Unit
$t_{TTF}$	$T_0 = 1/125 \text{ kHz} = 8 \mu\text{s}$	250	304	400	$T_0$



## 8. Limiting values

**Table 4. Limiting values**<sup>[1][2]</sup>

In accordance with the Absolute Maximum Rating System (IEC 60134).

Symbol	Parameter	Conditions	Min	Max	Unit
T <sub>stg</sub>	storage temperature		-55	+125	°C
V <sub>ESD</sub>	electrostatic discharge voltage	JEDEC JESD 22-A114-AB Human Body Model	± 2	-	kV
I <sub>I(max)</sub>	maximum input current	IN1-IN2	-	± 20	mA <sub>peak</sub>
T <sub>j</sub>	junction temperature		-40	+85	°C

- [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 should be taken to avoid applying values greater than the rated maxima

## 9. Characteristics

**Table 5. Characteristics**

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
f <sub>oper</sub>	operating frequency		100	125	150	kHz
I <sub>I</sub>	input current	IN1-IN2	-	-	± 10	mA <sub>peak</sub>
V <sub>IN1-IN2</sub>	input voltage		4	5	6	V <sub>peak</sub>
C <sub>i</sub>	input capacitance between IN1-IN2	V <sub>IN1-IN2</sub> = 0.5 V <sub>rms</sub>	<sup>[2][3]</sup> 203.7	210	216.3	pF
C <sub>i</sub>	input capacitance between IN1-IN2	V <sub>IN1-IN2</sub> = 0.5 V <sub>rms</sub>	<sup>[2][4]</sup> 266	280	294	pF

- [1] Typical ratings are not guaranteed. Values are at 25°C.
- [2] Measured with an HP4285A LCR meter at 125 kHz/room temperature (25 °C)
- [3] Integrated Resonance Capacitor: 210 pF ± 3 %
- [4] Integrated Resonance Capacitor: 280 pF ± 5%

## 10. Abbreviations

Table 6. Abbreviations

Abbreviation	Definition
AC	Anticollision Code
ASK	Amplitude Shift Keying
BC	Bi-phase Code
BPLC	Binary Pulse Length Coding
CRC	Cyclic Redundancy Check
DSFID	Data Storage Format Identifier
EEPROM	Electrically Erasable Programmable Memory
EOF	End Of Frame
ICR	Integrated Circuit Reference number
LSB	Least Significant Bit
LSByte	Least Significant Byte
m	Modulation Index
MC	Manchester Code
MFC	integrated circuit Manufacturer Code
MSB	Most Significant Bit
MSByte	Most Significant Byte
MSN	Manufacturer Serial Number
NA	No Access
NOB	Number Of Block
NOP	Number Of Pages
NOS	Number Of Slots
NSS	Number Of Sensors
OTP	One Time Programmable
PID	Product Identifier
PWD	Password
RFU	Reserved for Future Use
RND	Random Number
RO	Read Only
RTF	Reader Talks First
R/W	Read/Write
RWD	Read/Write Device
SOF	Start of Frame
TTF	Transponder Talks First
UID	Unique Identifier

## 11. References

---

- [1] **Application note** — AN10214, HITAG Coil Design Guide, Transponder IC  
BU-ID Doc.No.: 0814\*\*1

---

1. \*\* ... BU ID document version number

## 12. Revision history

Table 7: Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
HTCICC64 v. 3.2	20141020	Product data sheet	-	176431
Modifications:	<ul style="list-style-type: none"><li><a href="#">Section 13 "Legal information"</a>: License statement "ICs with HITAG functionality" removed</li></ul>			
176431	20090724	Product data sheet	-	176430
Modifications:	<ul style="list-style-type: none"><li><a href="#">Section 6.1 "Memory organization"</a>: update Table 3</li></ul>			
176430	20090716	Product data sheet	-	-

## 13. Legal information

### 13.1 Data sheet status

Document status <sup>[1][2]</sup>	Product status <sup>[3]</sup>	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>.

### 13.2 Definitions

**Draft** — The document is a draft version only. The content is still under internal review and subject to formal approval, which may result in modifications or additions. NXP Semiconductors does not give any representations or warranties as to the accuracy or completeness of information included herein and shall have no liability for the consequences of use of such information.

**Short data sheet** — A short data sheet is an extract from a full data sheet with the same product type number(s) and title. A short data sheet is intended for quick reference only and should not be relied upon to contain detailed and full information. For detailed and full information see the relevant full data sheet, which is available on request via the local NXP Semiconductors sales office. In case of any inconsistency or conflict with the short data sheet, the full data sheet shall prevail.

**Product specification** — The information and data provided in a Product data sheet shall define the specification of the product as agreed between NXP Semiconductors and its customer, unless NXP Semiconductors and customer have explicitly agreed otherwise in writing. In no event however, shall an agreement be valid in which the NXP Semiconductors product is deemed to offer functions and qualities beyond those described in the Product data sheet.

### 13.3 Disclaimers

**Limited warranty and liability** — Information in this document is believed to be accurate and reliable. However, NXP Semiconductors does not give any representations or warranties, expressed or implied, as to the accuracy or completeness of such information and shall have no liability for the consequences of use of such information. NXP Semiconductors takes no responsibility for the content in this document if provided by an information source outside of NXP Semiconductors.

In no event shall NXP Semiconductors be liable for any indirect, incidental, punitive, special or consequential damages (including - without limitation - lost profits, lost savings, business interruption, costs related to the removal or replacement of any products or rework charges) whether or not such damages are based on tort (including negligence), warranty, breach of contract or any other legal theory.

Notwithstanding any damages that customer might incur for any reason whatsoever, NXP Semiconductors' aggregate and cumulative liability towards customer for the products described herein shall be limited in accordance with the *Terms and conditions of commercial sale* of NXP Semiconductors.

**Right to make changes** — NXP Semiconductors reserves the right to make changes to information published in this document, including without limitation specifications and product descriptions, at any time and without notice. This document supersedes and replaces all information supplied prior to the publication hereof.

**Suitability for use** — NXP Semiconductors products are not designed, authorized or warranted to be suitable for use in life support, life-critical or safety-critical systems or equipment, nor in applications where failure or malfunction of an NXP Semiconductors product can reasonably be expected to result in personal injury, death or severe property or environmental damage. NXP Semiconductors and its suppliers accept no liability for inclusion and/or use of NXP Semiconductors products in such equipment or applications and therefore such inclusion and/or use is at the customer's own risk.

**Applications** — Applications that are described herein for any of these products are for illustrative purposes only. NXP Semiconductors makes no representation or warranty that such applications will be suitable for the specified use without further testing or modification.

Customers are responsible for the design and operation of their applications and products using NXP Semiconductors products, and NXP Semiconductors accepts no liability for any assistance with applications or customer product design. It is customer's sole responsibility to determine whether the NXP Semiconductors product is suitable and fit for the customer's applications and products planned, as well as for the planned application and use of customer's third party customer(s). Customers should provide appropriate design and operating safeguards to minimize the risks associated with their applications and products.

NXP Semiconductors does not accept any liability related to any default, damage, costs or problem which is based on any weakness or default in the customer's applications or products, or the application or use by customer's third party customer(s). Customer is responsible for doing all necessary testing for the customer's applications and products using NXP Semiconductors products in order to avoid a default of the applications and the products or of the application or use by customer's third party customer(s). NXP does not accept any liability in this respect.

**Limiting values** — Stress above one or more limiting values (as defined in the Absolute Maximum Ratings System of IEC 60134) will cause permanent damage to the device. Limiting values are stress ratings only and (proper) operation of the device at these or any other conditions above those given in the Recommended operating conditions section (if present) or the Characteristics sections of this document is not warranted. Constant or repeated exposure to limiting values will permanently and irreversibly affect the quality and reliability of the device.

**Terms and conditions of commercial sale** — NXP Semiconductors products are sold subject to the general terms and conditions of commercial sale, as published at <http://www.nxp.com/profile/terms>, unless otherwise agreed in a valid written individual agreement. In case an individual agreement is concluded only the terms and conditions of the respective agreement shall apply. NXP Semiconductors hereby expressly objects to applying the customer's general terms and conditions with regard to the purchase of NXP Semiconductors products by customer.

**No offer to sell or license** — Nothing in this document may be interpreted or construed as an offer to sell products that is open for acceptance or the grant, conveyance or implication of any license under any copyrights, patents or other industrial or intellectual property rights.

**Export control** — This document as well as the item(s) described herein may be subject to export control regulations. Export might require a prior authorization from competent authorities.

**Quick reference data** — The Quick reference data is an extract of the product data given in the Limiting values and Characteristics sections of this document, and as such is not complete, exhaustive or legally binding.

**Non-automotive qualified products** — Unless this data sheet expressly states that this specific NXP Semiconductors product is automotive qualified, the product is not suitable for automotive use. It is neither qualified nor tested in accordance with automotive testing or application requirements. NXP Semiconductors accepts no liability for inclusion and/or use of non-automotive qualified products in automotive equipment or applications.

In the event that customer uses the product for design-in and use in automotive applications to automotive specifications and standards, customer (a) shall use the product without NXP Semiconductors' warranty of the product for such automotive applications, use and specifications, and (b)

whenever customer uses the product for automotive applications beyond NXP Semiconductors' specifications such use shall be solely at customer's own risk, and (c) customer fully indemnifies NXP Semiconductors for any liability, damages or failed product claims resulting from customer design and use of the product for automotive applications beyond NXP Semiconductors' standard warranty and NXP Semiconductors' product specifications.

**Translations** — A non-English (translated) version of a document is for reference only. The English version shall prevail in case of any discrepancy between the translated and English versions.

## 13.4 Trademarks

Notice: All referenced brands, product names, service names and trademarks are the property of their respective owners.

**HITAG** — is a trademark of NXP Semiconductors N.V.

## 14. Contact information

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

For sales office addresses, please send an email to: [salesaddresses@nxp.com](mailto:salesaddresses@nxp.com)

## 15. Tables

Table 1. Ordering information . . . . .	2	Table 5. Characteristics . . . . .	8
Table 2. HITAG $\mu$ RO64 - Mega bumps dimensions . . . . .	4	Table 6. Abbreviations . . . . .	9
Table 3. Memory organization HITAG $\mu$ RO64 . . . . .	5	Table 7: Revision history . . . . .	11
Table 4. Limiting values <sup>[1][2]</sup> . . . . .	8		

## 16. Figures

Fig 1. Block diagram of HITAG $\mu$ RO64 transponder IC . . . . .	3	Fig 3. HITAG $\mu$ RO64 transponder waiting time before transmitting data in TTF mode . . . . .	7
Fig 2. HITAG $\mu$ RO64 - Mega bumps bondpad locations . . . . .	4		

## 17. Contents

<b>1</b>	<b>General description . . . . .</b>	<b>1</b>
<b>2</b>	<b>Features and benefits . . . . .</b>	<b>1</b>
2.1	Features . . . . .	1
2.2	Delivery types . . . . .	1
<b>3</b>	<b>Ordering information . . . . .</b>	<b>2</b>
<b>4</b>	<b>Block diagram . . . . .</b>	<b>3</b>
<b>5</b>	<b>Pinning information . . . . .</b>	<b>4</b>
<b>6</b>	<b>Functional description . . . . .</b>	<b>5</b>
6.1	Memory organization . . . . .	5
<b>7</b>	<b>Protocol timing . . . . .</b>	<b>7</b>
7.1	HITAG $\mu$ RO64 transponder waiting time before transmitting data in TTF mode . . . . .	7
<b>8</b>	<b>Limiting values . . . . .</b>	<b>8</b>
<b>9</b>	<b>Characteristics . . . . .</b>	<b>8</b>
<b>10</b>	<b>Abbreviations . . . . .</b>	<b>9</b>
<b>11</b>	<b>References . . . . .</b>	<b>10</b>
<b>12</b>	<b>Revision history . . . . .</b>	<b>11</b>
<b>13</b>	<b>Legal information . . . . .</b>	<b>12</b>
13.1	Data sheet status . . . . .	12
13.2	Definitions . . . . .	12
13.3	Disclaimers . . . . .	12
13.4	Trademarks . . . . .	13
<b>14</b>	<b>Contact information . . . . .</b>	<b>13</b>
<b>15</b>	<b>Tables . . . . .</b>	<b>14</b>
<b>16</b>	<b>Figures . . . . .</b>	<b>14</b>
<b>17</b>	<b>Contents . . . . .</b>	<b>14</b>

Please be aware that important notices concerning this document and the product(s) described herein, have been included in section 'Legal information'.

© NXP Semiconductors N.V. 2014. All rights reserved.

For more information, please visit: <http://www.nxp.com>  
For sales office addresses, please send an email to: [salesaddresses@nxp.com](mailto:salesaddresses@nxp.com)

Date of release: 20 October 2014  
176432