HTCICC64

HITAG µ 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 µ 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 µ 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 ± 3% tolerance or 280 pF with ± 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 µm, 8 inch, UV

3. Ordering information

Table 1. Ordering information

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

4. Block diagram

The HITAG µ 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 µ RO64 transponder IC, and modulates the magnetic field for data transmission from the HITAG µ RO64 transponder IC to the RWD.

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

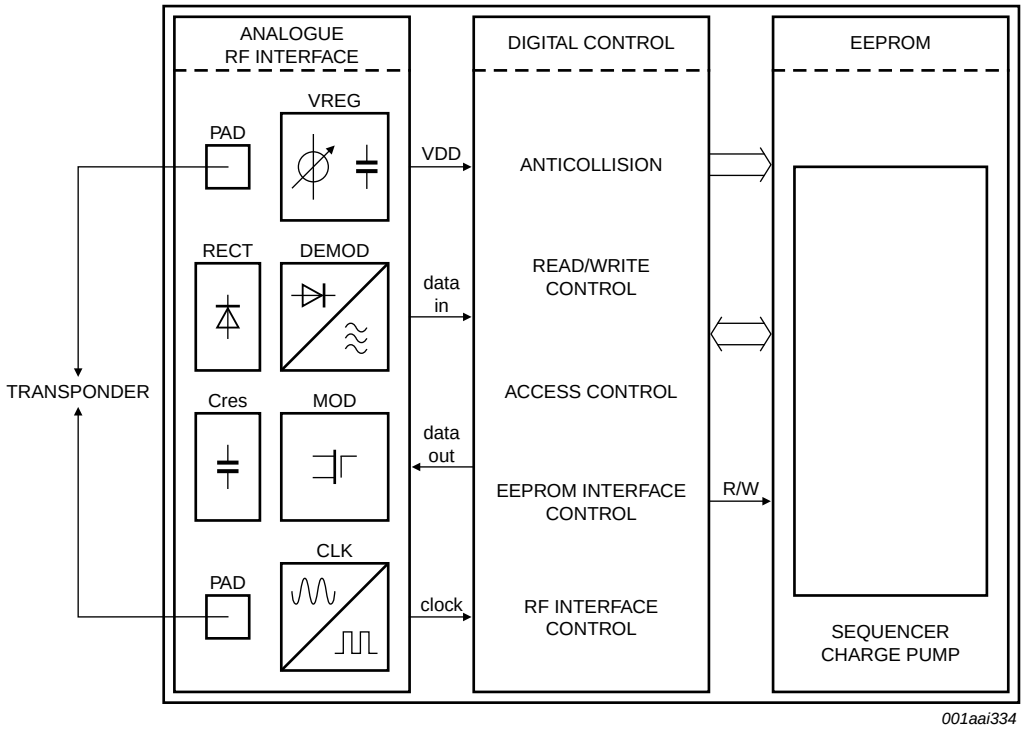

Fig 1. Block diagram of HITAG µ RO64 transponder IC

5. Pinning information

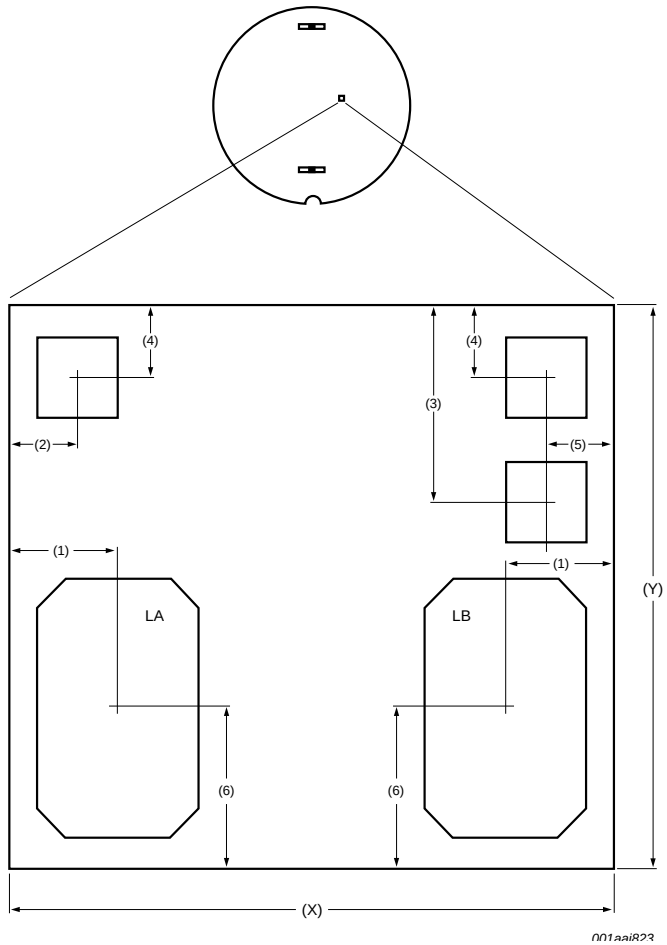

Fig 2. HITAG µ RO64 - Mega bumps bondpad locations

Table 2. HITAG µ RO64 - Mega bumps dimensions

Description	Dimension
(X) chip size	550 µm
(Y) chip size	550 µm
(1) pad center to chip edge	100.5 µm
(2) pad center to chip edge	48.708 µm
(3) pad center to chip edge	180.5 µm
(4) pad center to chip edge	55.5 µm
(5) pad center to chip edge	48.508 µm
(6) pad center to chip edge	165.5 µm
Bump Size:	
LA, LB	294 × 164 µm
Remaining pads	60 × 60 µm

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 µ RO64 transponder waiting time before transmitting data in TTF mode

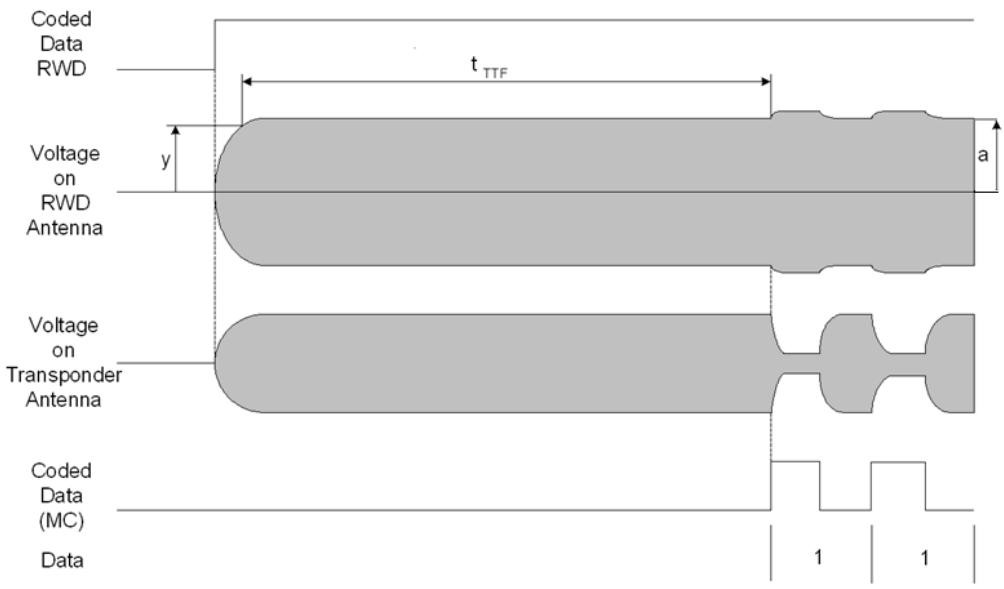

Fig 3. HITAG µ RO64 transponder waiting time before transmitting data in TTF mode

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

Symbol	Parameter	Min	Typ	Max	Unit
t_{TTF}	T_0 = 1/125 kHz = 8 µs	250	304	400	T_0

8. Limiting values

Table 4. Limiting values[1][2]

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

Symbol	Parameter	Conditions	Min	Max	Unit
T_{stg}	storage temperature		–55	+125	°C
V_{ESD}	electrostatic discharge voltage	JEDEC JESD 22-A114-AB Human Body Model	± 2	-	kV
$I_{I(max)}$	maximum input current	IN1-IN2	–	± 20	mA_{peak}
Tj	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_{oper}	operating frequency			100	125	150	kHz
I_I	input current	IN1-IN2		-	-	± 10	mA_{peak}
$V_{IN1-IN2}$	input voltage			4	5	6	V_{peak}
C_i	input capacitance between IN1-IN2	$V_{IN1-IN2}$ = 0.5 V_{rms}	[2][3]	203.7	210	216.3	pF
C_i	input capacitance between IN1-IN2	$V_{IN1-IN2}$ = 0.5 V_{rms}	[2][4]	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:	• Section 13 “Legal information”: License statement “ICs with HITAG functionality” removed			
176431	20090724	Product data sheet	-	176430
Modifications:	• Section 6.1 “Memory organization”: update Table 3			
176430	20090716	Product data sheet	-	-

13. Legal information

13.1 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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15. Tables

16. Figures

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