

DATA SHEET

HT1 DC20 S30 **HITAG™1 Stick Transponder**

Product Specification
Revision 3.0

2000 Apr 19

HITAG™1 Stick Transponder

HT1 DC20 S30

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1 FEATURES

- Complete identification transponder for use in contactless applications
- Operating frequency 125 kHz
- Data transmission and supply energy via RF link, no internal battery
- Low power EEPROM technology for writing distance that equals reading distance
- Total memory size 2048 bit
- Parts of memory can be write protected by the user
- Effective communication protocol with outstanding data integrity check
- Secure mutual authentication function
- Encrypted data transmission
- Anticollision protocol for handling of multiple transponders inside the field of the reader antenna.

2 GENERAL DESCRIPTION

The HT1 DC20 S30, based on the HITAG 1 IC, is a high performance transponder for bi-directional data transmission in half duplex mode.

Data are stored in the transponder in a non –volatile memory (EEPROM). The transponder acts as a passive device, thus not having the need for any internal power supply (battery).

It derives power from the magnetic component of the RF carrier frequency generated by the reader. Data is transmitted by modulating this carrier.

The HT1 DC20 S30 is dedicated for use in secure access systems where the transponder and the reader have to identify each other.

The EEPROM has a capacity of 2048 bits and is organised in 64 pages. Access is provided either in page mode or in block mode, where 1 block includes 4 pages.

Absorption modulation is used to transmit data from the transponder to the reader. The transponder absorbs the magnetic field which hence modulates the current in the reader antenna. Data transmission to the HT1 DC20 S30 uses binary pulse length modulation (BPLM).

The anticollision feature of the transponder allows to operate several transponders simultaneously in the field of the reader antenna. To use that feature, the reader needs to have implemented the anticollision protocol and must be able to detect bit-collisions. (e.g. the Philips HTRM800 long range reader module includes the anticollision protocol.)

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3 ORDERING INFORMATION

EXTENDED TYPE NUMBER	PACKAGE	DRAWING	TEMPERATURE RANGE (°C)
HT1 DC20 S30/F	SOT385-1	SOT385BA4	-40 to +85

4 QUICK REFERENCE DATA

PARAMETER	VALUE	UNIT
Carrier frequency	125	kHz (typical)
Data transmission mode	half-duplex	
Transfer rate		
• transponder -> reader	4.0	kbit/s
• reader -> transponder	5.2	kbit/s
Coding		
• transponder -> reader	Manchester / Biphase	
• reader -> transponder	BPLM (binary pulse length modulation)	
Modulation	ASK (amplitude shift keying)	
Memory size	2048	bit
Memory organization	64	page
Encrypted mutual authentication		
• Serial Number	32	bit
• Secret Key	32	bit

Special features	<ul style="list-style-type: none"> • user defined write protection • unique 32 bit serial number for each transponder • encrypted data transmission possible
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5 BLOCK DIAGRAM

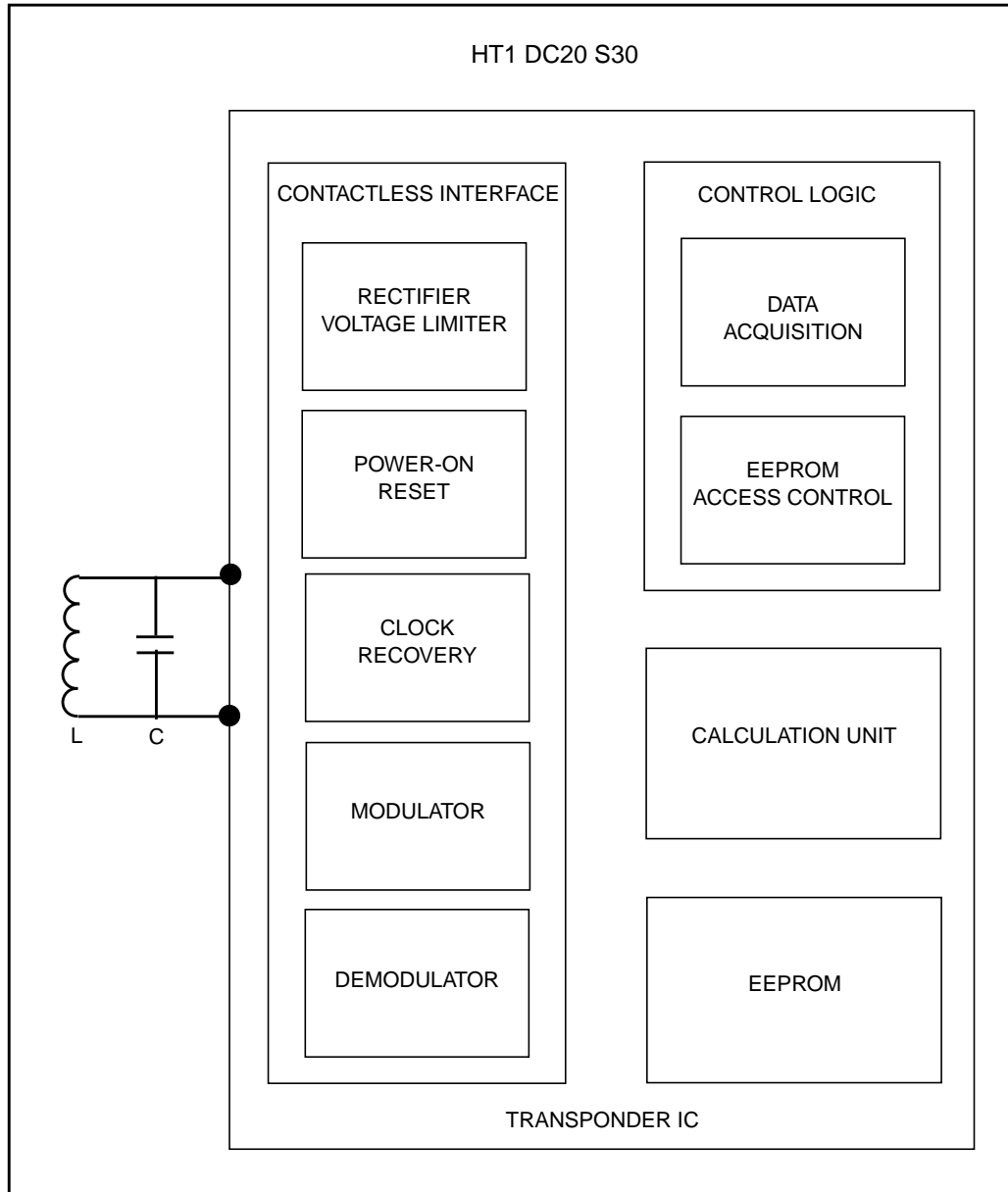


Fig.1 Blockdiagram transponder.

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6 RELATED DOCUMENTS

For additional informations on the functional description of the HT1 DC20 S30, in particular the protocol between reader and transponder please refer to the document „Data Sheet, HT1 Transponder Family, Communication Protocol Reader ↔ HITAG 1 Transponder.“

7 WRITE COMMAND - SAFETY INSTRUCTIONS

When writing to page 1 (configuration page) we strongly recommend to carefully follow the instructions in the document "HT1 Transponder Family, Communication Protocol, Reader - HITAG1 Transponder". In particular, overwriting the reserved bits in configuration page 1 may lead to reduced reading range of the HT1 DC20 S30.

8 LIMITING VALUES

All values are in accordance with the Absolute Maximum Rating System (IEC 134).

PARAMETER	CONDITION	MIN.	MAX.	UNIT
number of erase/write cycles of the EEPROM	22 °C	100000		
data retention time of the EEPROM	@ 55 °C	10		years
operating temperature range		-40	85	°C
storage temperature range		-55	125	°C
magnetic flux density (resistivity against magnetic pulses)			0.2	T
vibration	10 – 2000 Hz 3-axis IEC 68-2-6, Test Fc		10	g
shock	3-axis IEC 68-2-27, Test Ea		1500	g

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9 ELECTRICAL CHARACTERISTICS

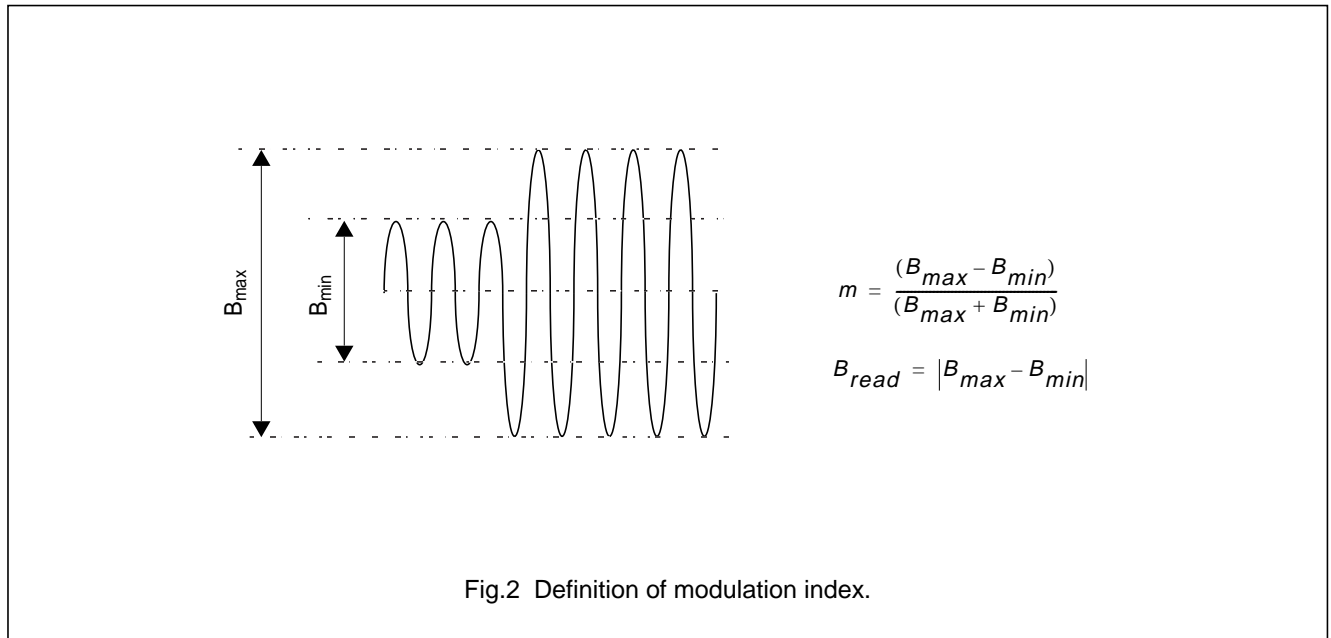
$T_0 = 8 \mu\text{s}$ (period length for $f_0 = 125 \text{ kHz}$). All parameters are guaranteed within the temperature range from $T_{\text{amb}} = -40^\circ\text{C}$ to $+85^\circ\text{C}$.

All parameters are characterized with the SCEMTEC test equipment (STM-1), available from SCEMTEC, Reichshof-Wenrath, Germany.

SYMBOL	PARAMETER	CONDITION	MIN.	MAX.	UNIT
f_{RES}	resonance frequency		120	130	kHz
B_{W}	bandwidth		2.3		kHz
B_{THR}	magnetic flux density, data transmission from transponder	$f_{\text{CARRIER}} = 125 \text{ kHz}$	50	400 ⁽¹⁾	μT_{pp}
B_{PRG}	magnetic flux density for programming the EEPROM	$m = 0.95$ $f_0 = 125 \text{ kHz}$ $t_{\text{LOW}} = 8 T_0$	50	400 ⁽¹⁾	μT_{pp}
B_{AUTH}	magnetic flux density for mutual authentication	$m = 0.95$ $f_0 = 125 \text{ kHz}$ $t_{\text{LOW}} = 8 T_0$	50	400 ⁽¹⁾	μT_{pp}
B_{READ}	field absorption due to the modulation of the transponder	$f_0 = 125 \text{ kHz}$ $B_{\text{FIELD}} = 50 \mu\text{T}_{\text{pp}}$	8		μT_{pp}
MI_{PRG}	modulation index (m) of the base station for programming and authentication	$f_0 = 125 \text{ kHz}$ $B_{\text{FIELD}} = 50 \mu\text{T}_{\text{pp}}$ $t_{\text{LOW}} = 8 T_0$	95	100	%

Note

1. Maximum available field strength of the test equipment. Transponder limit has not been characterized.



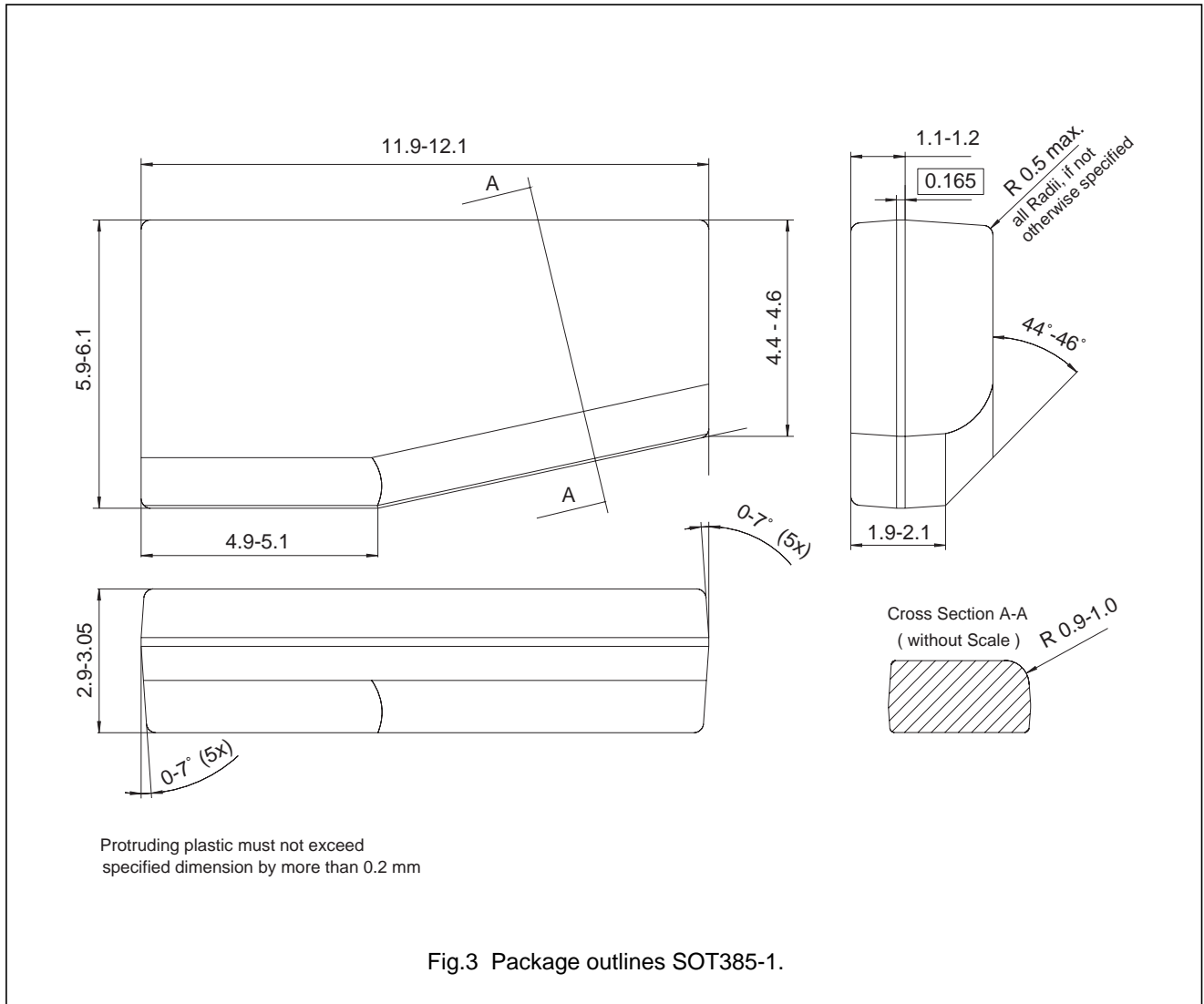
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10 MECHANICAL CHARACTERISTICS

The transponder is sealed in epoxy resin moulding compound. The outline of the package is given in Fig.3. The designation of the package is SOT385-1.

PARAMETER	VALUE	UNIT
mechanical dimensions	12 x 6 x 3	mm
protection class	IP67	
casting material	epoxy resin	



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11 DEFINITIONS

Data sheet status	
Objective specification	This data sheet contains target or goal specifications for product development.
Preliminary specification	This data sheet contains preliminary data; supplementary data may be published later.
Product specification	This data sheet contains final product specifications.
Limiting values	
Limiting values given are in accordance with the Absolute Maximum Rating System (IEC 134). Stress above one or more of the limiting values may cause permanent damage to the device. These are stress ratings only and operation of the device at these or at any other conditions above those given in the Characteristics sections of the specification is not implied. Exposure to limiting values for extended periods may affect device reliability.	
Application information	
Where application information is given, it is advisory and does not form part of the specification.	

12 LIFE SUPPORT APPLICATIONS

These products are not designed for use in life support appliances, devices, or systems where malfunction of these products can reasonably be expected to result in personal injury. Philips customers using or selling these products for use in such applications do so on their own risk and agree to fully indemnify Philips for any damages resulting from such improper use or sale.

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13 REVISION HISTORY**Table 1** HITAG™1 Stick Transponder Revision History

REVISION	DATE	CPCN	PAGE	DESCRIPTION
3.0	April 2000	-		Initial version.

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