DATA SHEET

ADDENDUM

HITAG™1
HT1 MOA2 S30
Contactless
Chip Card Module Specification

Product Specification
Revision 1.0
CONFIDENTIAL

May 1998

Philips
Semiconductors

PHILIPS

Addendum HT1MOA2S30
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1 GENERAL INFORMATION

1.1 Addendum

This document provides the specific information on the HITAG 1 HT1 MOA2 S30/E/3 contactless chip card module. Detailed information on the package is given in the Contactless Chip Card Module Specification.

Functionality and electrical characteristics of HITAG 1 IC are described in the document HT1 ICS30 02 Family, HITAG 1 Transponder IC.

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2 SPECIFICATIONS

2.1 Chip

Functionality and electrical characteristics of IC is given in the document HITAG 1 HT1 ICS30 02, HITAG 1 Transponder IC, Product Specification.

2.2 Temperature Range

Absolute Maximum Ratings	Symbol	min	typ	max	Comment / Conditions
Storage Temperature		-55°C		125°C	
Operation Temperature	T_A	-25°C		85°C	$R_{ThJunctionAmbient} \leq 30$ K/W @ $I_{INpeak} = 30$ mA
Processing temperature: refer to “Contactless Chip Card Module Specification“					

2.3 Electrical Characteristics

Absolute Maximum Ratings	Symbol	min	typ	max	Comment / Conditions
ESD		2 kV			MIL-STD 883D, Method 3015.7, Human Body Model
Operating Range					
Input Threshold Voltage [1) 3)]	$V_{IN,TH}$		2,8 V_p	3,9 V_p	start modulation after SETCC
Input Read Voltage [1) 3)]	$V_{IN,RD}$		3,5 V_p	4,5 V_p	read E²PROM
Input Write Voltage [1) 3)]	$V_{IN,WR}$		3,7 V_p	4,7 V_p	write E²PROM
Modulator					
R_MOD linear [3)]	R_{MODL}			4,0 kΩ	$V_{INLow} \leq 2,0$ V_p
R_MOD nonlinear [3)]	R_{MODNL}			3,6 kΩ	$V_{INLow} \geq 2,0$ V_p
Resonance Capacitor [3)]					
	$C_{ResInit}$	189 pF	210 pF	231 pF	$V_{IN} = 4,0$ V_p

1) $|V_{IN}| = |V_{IN1} - V_{IN2}|$ ... voltage between connection pads

2) V_{INHigh} input voltage before modulation
V_{INLow} input voltage during modulation
T_{MOD} duration of the modulation

3) @ $R_i = 10$ kΩ resistance of measurement equipment

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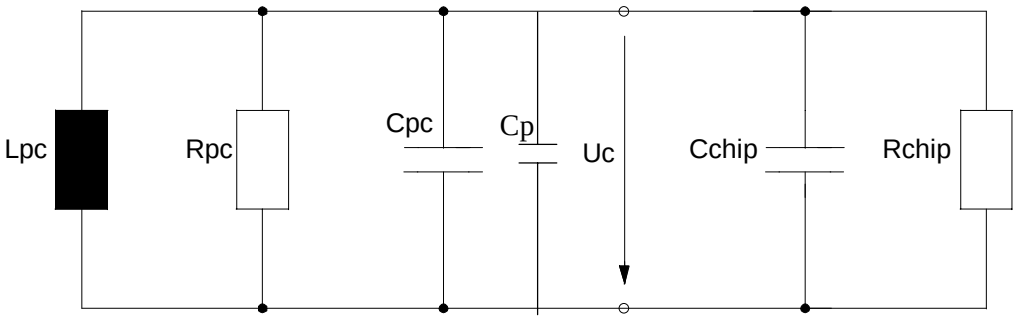
2.4 Transponder Coil Specification

The HITAG 1 chip module has to be connected to a coil whose parameters are briefly described in the following.

Equivalent circuit of the transponder



$$f_{res} = \frac{1}{2\pi\sqrt{(C_{chip} + C_{pc} + C_p).L_{pc}}} = 125\ \text{kHz} \Rightarrow L_{pc} = \frac{1}{(2\pi f_{res})^2 (C_{chip} + C_{pc} + C_p)}$$

U_c	...	voltage at the connection pads	C_{chip}	=	210 pF ± 10 %
f_{res}	...	resonant frequency of the transponder	f_{resc}	...	self resonant frequency of the coil
L_{pc}	...	parallel inductivity of the coil (f = 125 kHz)	R_{chip}	...	resistance of the chip
R_{pc}	...	parallel resistance of the coil (f = 125 kHz)	R_{pc}	>	45 kΩ ... to encrease Q_{coil}
C_p	...	parasitic capacitance of the package	Q_{coil}	>	7,5 ... quality factor of transponder coil at 125 kHz
C_{pc}	...	parasitic capacitance of the coil			
C_{chip}	...	capacitance of the chip (U_c > 4 Vpp)	L_{pc}	>	6.5 mH ... to ensure resonant frequency near 125 kHz

Note: The parasitic capacitance of the package (C_p) must be considered.

Typical values for C_p
molded tags: C_p = 6.0 pF

For a rough estimation (± 10 %) of the number of coil windings following formula can be used. It is assumed that the winding is done in circular form.

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$$N = \frac{\sqrt[1,85]{\frac{L}{2\,U\,\ln(\frac{u}{d})}}}{}$$

N ... number of windings
L ... inductance [nH]
U ... average coil circumference [cm]
d ... copper diameter [mm]
u ... average coil circumference [mm]

For fine tuning a measurement of the inductance and an according adjustment of the number of windings is necessary. This process always needs some iterations.

2.5 Ordering Information

Ordering Name	Option Description
HT1 MOA2 S30 /E/3	12 NC: 9352 607 71118

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3 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 section 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.	

4 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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NOTES

Philips Semiconductors - a worldwide company

Argentina: see South America
Australia: 34 Waterloo Road, NORTHRYDE, NSW 2113,
Tel. +612 9805 4455, Fax. +612 9805 4466
Austria: Computerstraße 6, A-1101 WIEN, P.O.Box 213,
Tel. +431 60 101, Fax. +431 30 101 1210
Belarus: Hotel Minsk Business Centre, Bld. 3, r.1211, Volodarski Str. 6,
220050 MINSK, Tel. +375172 200 733, Fax. +375172 200 773
Belgium: see The Netherlands
Brazil: see South America
Bulgaria: Philips Bulgaria Ltd., Energoproject, 15th floor,
51 James Bourchier Blvd., 1407 SOFIA
Tel. +3592 689 211, Fax. +3592 689 102
Canada: Philips Semiconductors/Components,
Tel. +1800 234 7381
China/Hong Kong: 501 Hong Kong Industrial Technology Centre,
72 Tat Chee Avenue, Kowloon Tong, HONG KONG,
Tel. +85223 19 7888, Fax. +85223 19 7700
Colombia: see South America
Czech Republic: see Austria
Denmark: Prags Boulevard 80, PB 1919, DK-2300 COPENHAGEN S,
Tel. +4532 88 2636, Fax. +4531 57 1949
Finland: Sinikalliontie 3, FIN-02630 ESPOO,
Tel. +3589 61 5800, Fax. +3589 61 580/xxx
France: 4 Rue du Port-aux-Vins, BP 317, 92156 SURESNES Cedex,
Tel. +331 40 99 6161, Fax. +331 40 99 6427
Germany: Hammerbrookstraße 69, D-20097 HAMBURG,
Tel. +4940 23 53 60, Fax. +4940 23 536 300
Greece: No. 15, 25th March Street, GR 17778 TAVROS/ATHENS,
Tel. +301 4894 339/239, Fax. +301 4814 240
Hungary: see Austria
India: Philips INDIA Ltd., Shivsagar Estate, A Block, Dr. Annie Besant Rd.
Worli, MUMBAI 400018, Tel. +9122 4938 541, Fax. +9122 4938 722
Indonesia: see Singapore
Ireland: Newstead, Clonskeagh, DUBLIN 14,
Tel. +3531 7640 000, Fax. +3531 7640 200
Israel: RAPAC Electronics, 7 Kehilat Saloniki St., TEL AVIV 61180,
Tel. +9723 645 0444, Fax. +9723 649 1007
Italy: Philips Semiconductors, Piazza IV Novembre 3,
20124 MILANO, Tel. +392 6752 2531, Fax. +392 6752 2557
Japan: Philips Bldg. 13-37, Kohnan 2-chome, Minato-ku, TOKYO 108,
Tel. +813 3740 5130,Fax. +813 3740 5077
Korea: Philips House, 260-199, Itaewon-dong, Yonsan-ku, SEOUL,
Tel. +822 709 1412, Fax. +822 709 1415
Malaysia: No. 76 Jalan Universiti, 46200 PETALING JAYA, Selangor,
Tel. +60 3750 5214, Fax. +603 757 4880
Mexico: 5900 Gateway East, Suite 200, EL PASO, Texas 79905,
Tel. +9 5800 234 7381
Middle East: see Italy

Netherlands: Postbus 90050, 5600 PB EINDHOVEN, Bldg. VB,
Tel. +3140 27 82785, Fax +3140 27 88399
New Zealand: 2 Wagener Place, C.P.O. Box 1041, AUCKLAND,
Tel. +649 849 4160, Fax. +649 849 7811
Norway: Box 1, Manglerud 0612, OSLO,
Tel. +4722 74 8000, Fax. +4722 74 8341
Philippines: Philips Semiconductors Philippines Inc.,
106 Valero St. Salcedo Village, P.O.Box 2108 MCC, MAKATI,
Metro MANILA, Tel. +632 816 6380, Fax. +632 817 3474
Poland: Ul. Lukiska 10, PL 04-123 WARSZWA,
Tel. +4822 612 2831, Fax. +4822 612 2327
Portugal: see Spain
Romania: see Italy
Russia: Philips Russia, Ul. Usatcheva 35A, 119048 MOSCOW,
Tel. +7095 247 9145, Fax. +7095 247 9144
Singapore: Lorong 1, Toa Payoh, SINGAPORE 1231,
Tel. +65350 2538, Fax. +65251 6500
Slovakia: see Austria
Slovenia: see Italy
South Africa: S.A. Philips Pty Ltd., 195-215 Main Road Martindale,
2092 JOHANNESBURG, P.O.Box 7430 Johannesburg 2000,
Tel. +2711 470 5911, Fax. +2711 470 5494
South America: Rua do Rocio 220, 5th floor, Suite 51,
04552-903 Sao Paulo, SAO PAULO - SP, Brazil,
Tel. +5511 821 2333, Fax. +5511 829 1849
Spain: Balmes 22, 08007 BARCELONA,
Tel. +343 301 6312, Fax. +343 301 4107
Sweden: Kottbygatan 7, Akalla, S-16485 STOCKHOLM,
Tel. +468 632 2000, Fax. +468 632 2745
Switzerland: Allmendstraße 140, CH-8027 ZÜRICH,
Tel. +411 488 2686, Fax. +411 481 7730
Taiwan: Philips Taiwan Ltd., 2330F, 66,
Chung Hsiao West Road, Sec. 1, P.O.Box 22978,
TAIPEI 100, Tel. +8862 382 4443, Fax. +8862 382 4444
Thailand: Philips Electronics (Thailand) Ltd.,
209/2 Sanpavuth-Bangna Road Prakanong, BANGKOK 10260,
Tel. +662 745 4090, Fax. +662 398 0793
Turkey: Talapasa Cad. No. 5, 80640 GÜLTEPE/ISTANBUL,
Tel. +90212 279 2770, Fax. +90212 282 6707
Ukraine: Philips Ukraine, 4 Patrice Lumumba Str., Building B, Floor 7,
252042 KIEV, Tel. +38044 264 2776, Fax. +38044 268 0461
United Kingdom: Philips Semiconductors Ltd., 276 Bath Road, Hayes,
MIDDLESEX UM3 5BX, Tel. +44181 730 5000, Fax. +44181 754 8421
United States: 811 Argues Avenue, SUNNYVALE, CA94088-3409,
Tel. +1800 234 7381
Uruguay: see South America
Vietnam: see Singapore
Yugoslavia: Philips, Trg N. Pasica 5/v, 11000 BEOGRAD,
Tel. +38111 625 344, Fax. +38111 635 777

Published by:
Philips Semiconductors Gratkorn GmbH, Mikron-Weg 1, A-8101 Gratkorn, Austria Fax: +43 3124 299 - 270

For all other countries apply to: Philips Semiconductors, Marketing & Sales Communications,
Building BE-p, P.O.Box 218, 5600 MD EINDHOVEN, The Netherlands, Fax: +3140 27 24825
Internet: http://www.semiconductors.philips.com

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