

Features

- Identification Transponder in Plastic Cube
- Basic Component: e5530 IDIC®
- Includes Coil and Capacitor for Tuned Circuit Antenna
- Carrier Frequency: 125 kHz

Application

- Car Immobilizer
- Access Control
- Alarm Systems
- Other Identification Systems

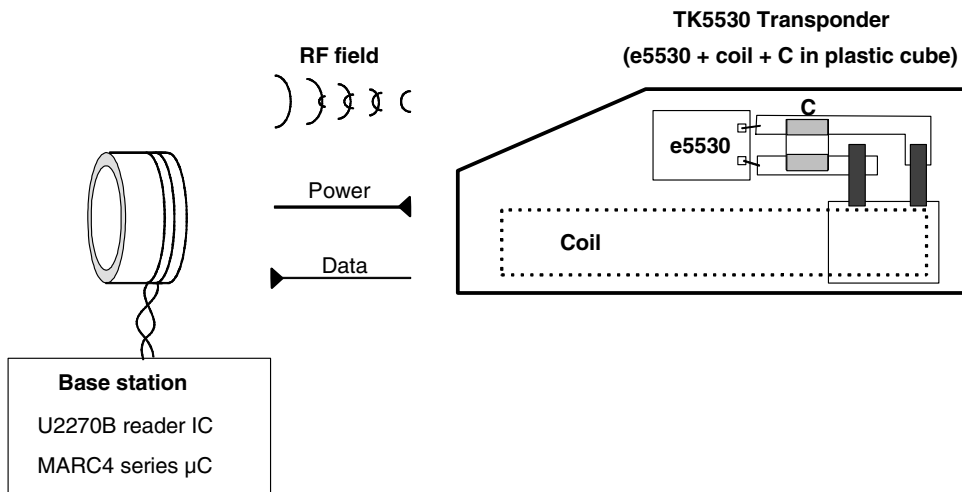
Description

The TK5530 is a complete transponder, which implements all important functions for immobilizer and identification systems. It consists of a plastic cube which accommodates the read-only **IDentification Integral Circuit (IDIC®)** e5530 and the antenna is realized by a LC-circuit.

The identifying data are stored in a 128 bit PROM on the e5530, realized as an array of laser-programmable fuses. The logic block diagram for the e5530 is shown in Figure 1. The data are sent bit-serially as a code.

Any attempt to fake the base station with a wrong transponder will be recognized immediately.

System Block Diagram



Read-only Transponder

TK5530

General

The transponder consists of a plastic cube which accommodates following components:

- Read-only IDIC[®] with ROM (e5530)
- Antenna realized as tuned LC-circuit

Read-Only IDIC[®] with ROM (e5530)

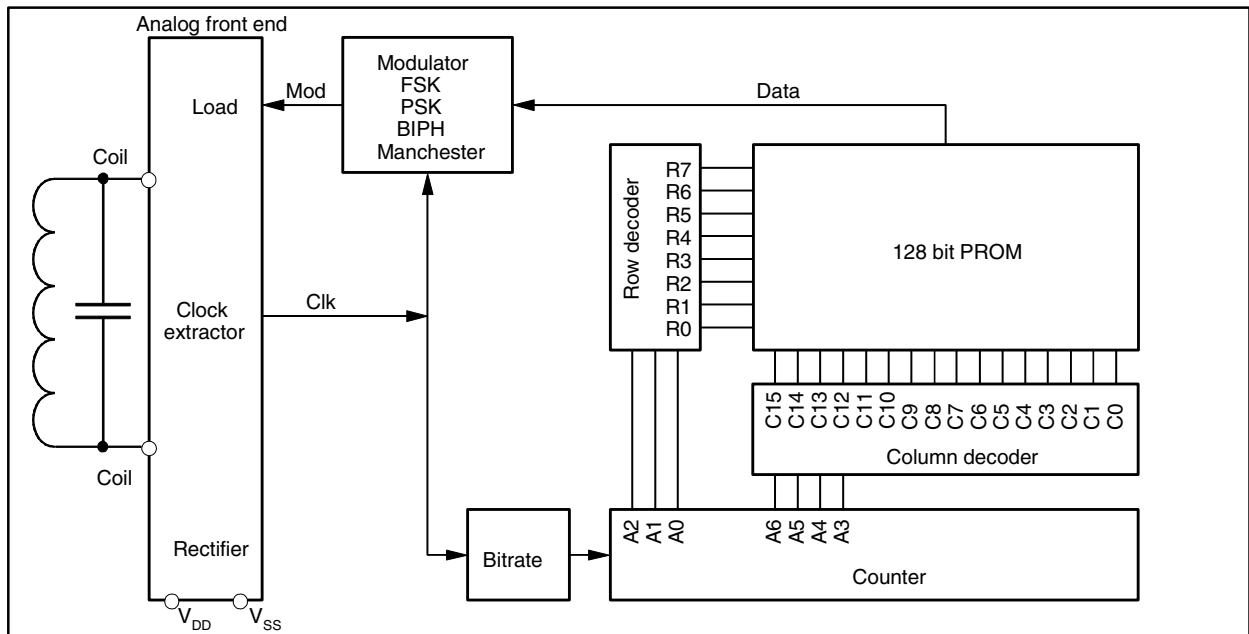
The e5530 is part of a closed coupled identification system (see 'System Block Diagram'). It receives power from a RF transmitter (reader) which is coupled inductively to the IDIC. The TK5530 transponder operates at a nominal frequency of 125 kHz. Receiving RF, the IDIC responds with a data stream by damping the incoming RF via an internal load. This damping in turn can be detected by the reader. The identifying data are stored in a 128-bit PROM on the e5530, which is factory programmed with a unique code (see specification of the e5530).

The e5530 has several possible options regarding modulation, bitrate, memory size etc.

Antenna

The antenna consists of a coil and a capacitor for tuning the circuit to the nominal carrier frequency of 125 kHz. The coil has a ferrite-core for improving the readout distance.

Figure 1. Block Diagram



Absolute Maximum Ratings

Parameter	Symbol	Value	Unit
Operating temperature range	T_{amb}	-40 to +85	°C
Storage temperature range	T_{stg}	-40 to +125	°C
Assembly temperature $t < 5$ min	T_{ass}	170	°C
Magnetic field strength at 125 kHz	H_{pp}	1000	A/m

Operating Characteristics Transponder

$T_{amb} = 25^{\circ}\text{C}$, $f = 125$ kHz unless otherwise specified

Parameters	Test Conditions	Symbol	Min.	Typ.	Max.	Unit
Inductance		L		3.95		mH
LC circuit, $H_{pp} = 20$ A/m						
Resonance frequency	Room temperature	f_r	121.4	125	129.2	kHz
Resonance frequency	$T_{amb} = -40$ to $+85^{\circ}\text{C}$	f_r	120.0		131.0	kHz
Quality factor		Q_{LC}		13		
Magnetic Field Strength (H)						
Max. field strength where tag does not modulate	No influence to other tags in the field	$H_{pp\ not}$		2		A/m
Field strength for operation	$T_{amb} = -40^{\circ}\text{C}$	$H_{pp\ -40}$		30		A/m
Field strength for operation	$T_{amb} = 25^{\circ}\text{C}$	$H_{pp\ 25}$		18		A/m
Field strength for operation	$T_{amb} = 85^{\circ}\text{C}$	$H_{pp\ 85}$		17		A/m
Maximum field strength		$H_{pp\ max}$			600	A/m
Modulation Range (see also H-DV curve)						
Modulation range	$H_{pp} = 20$ A/m $H_{pp} = 30$ A/m $H_{pp} = 50$ A/m $H_{pp} = 100$ A/m	DV		4.0 6.0 8.0 8.0		V

Figure 2. Typical T_K -range of Resonance Frequency

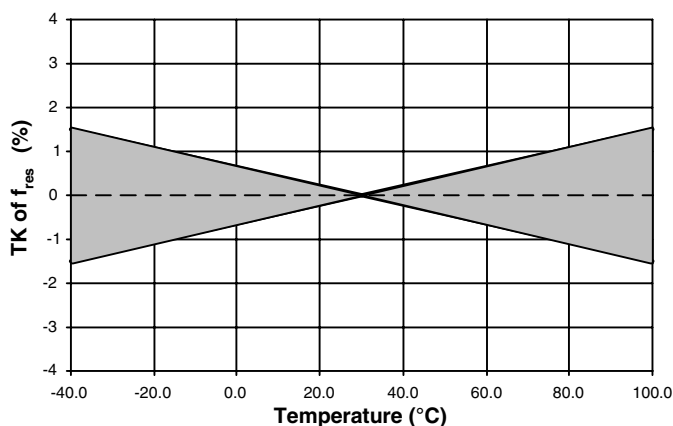


Figure 3. Typical H-DV Curve

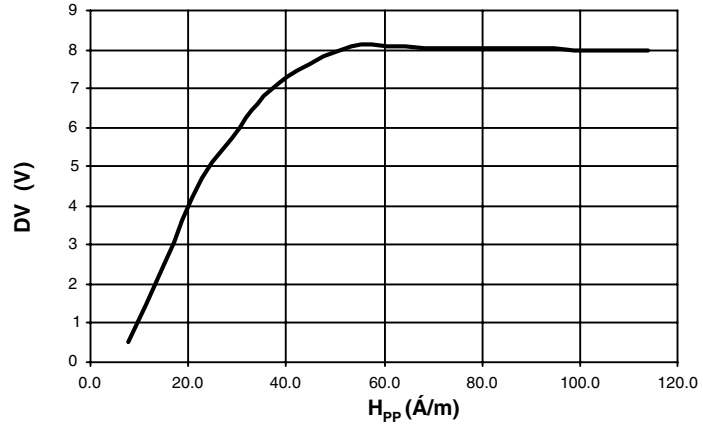
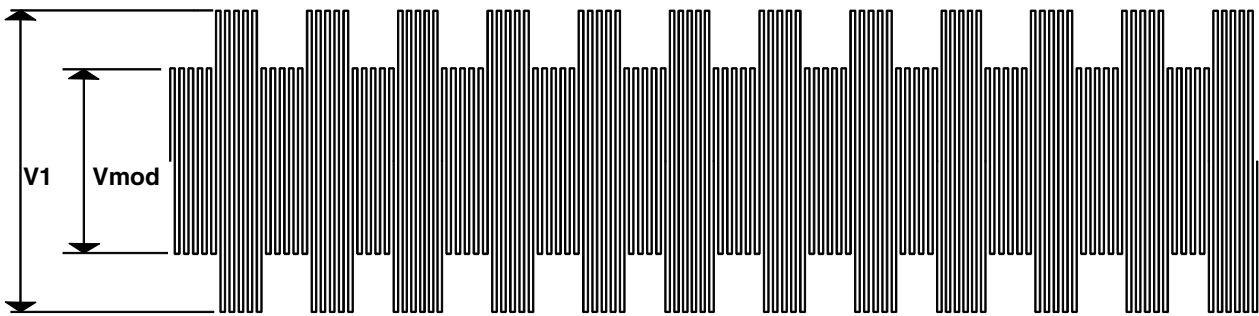


Figure 4. Measurement of the Modulation Range DV

Output voltage of the testing application (see figure 6 and 7)



$DV = V1 - V_{mod}$

Measurement Assembly

All parameters are measured in a Helmholtz-arrangement, which generates a homogeneous magnetic field (see Figure 5 and Figure 6). A function generator drives the field generating coils, so the magnetic field can be varied in frequency and field strength.

Figure 5. Testing Application

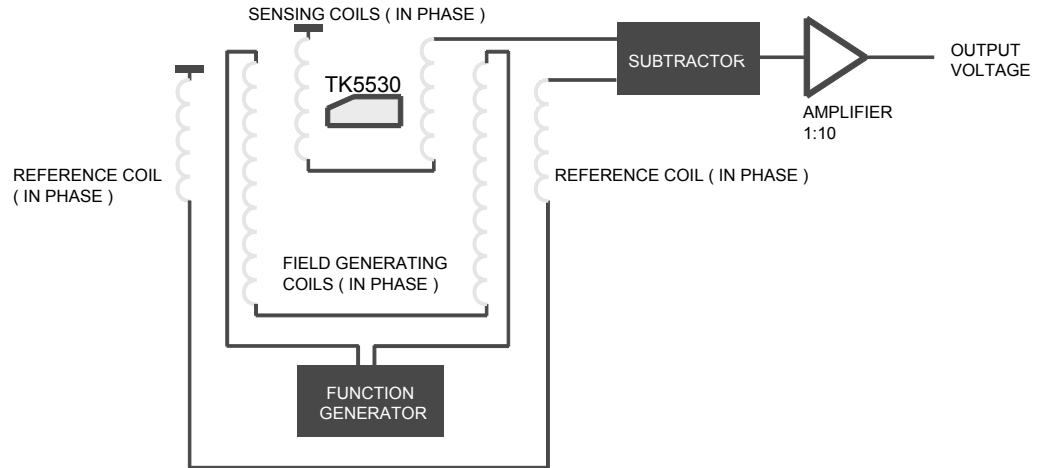
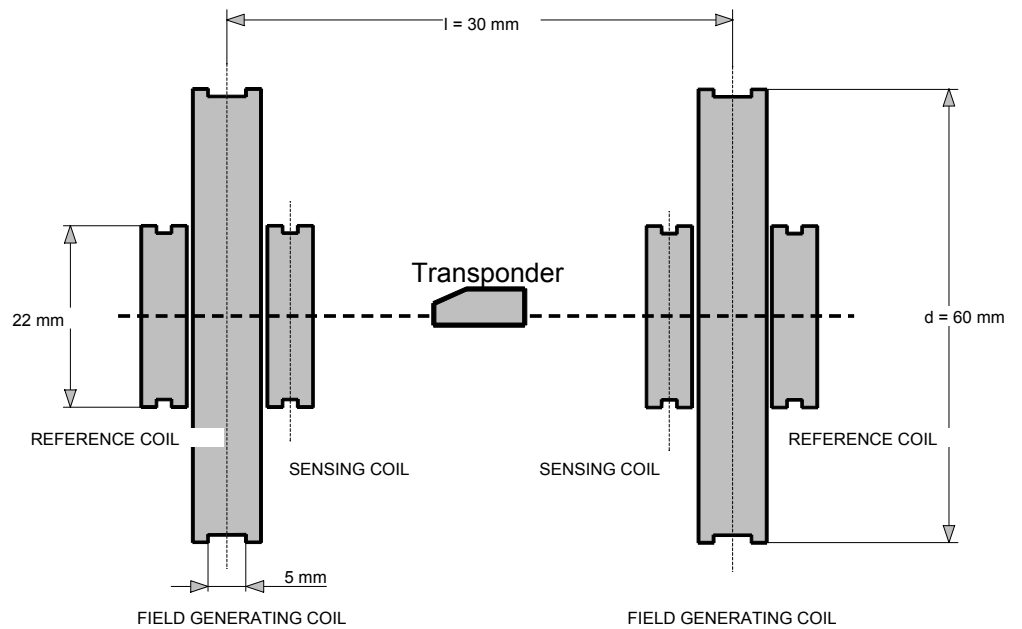


Figure 6. Testing Geometry





IDIC® (Reference Data Sheet e5530)

Memory size maximum	128 Bit (details see “Coding”)
Memory type	ROM
Programming	Laser cutting
Data rate	RF/32 - RF/64
Encoding	Manchester or Bi-phase
Modulation	AM
Maximum coil voltage (internally limited) V_{pp} (I = 5 mA)	16 V

Coding

The memory of the TK5530 can be selected to be a 64- or 128-bit rolling code. In the non-standard version, the first 8 bits are a customer-specific pattern. This can be selected by the customer, provided that Atmel agrees to the customer’s proposal. This pattern is unique within the serial rolling code data stream. The ID code and further bit informations following the 8-bit header can also be defined within the customer’s specification.

The set-up of a suitable coding scheme can be provided on customer’s request.

Read Distance

The maximum distance between the base station and the TK5530 mainly depends on the base station, the coil geometries and the modulation options chosen (see U2270B Antenna Design Hints and the U2270B data sheet). When generating an appropriate field with a suitable reader technique, a distance of 10 cm and more can be obtained. When using the Atmel U2270B demo board, the typical distances in the range of 0 to 5 cm can be achieved. Maximum distance values which are generally valid can not be given in this data sheet. The exact measuring of the maximum distance should be carried out with the TK5530 being integrated into the specific application.

Ordering Information

Extended Type Number	Modul.	Data Rate	Con-figuration	Check-sum	Header	ID Code	SPQ (Minimum Volume)	Minimum Order Volume
TK5530HM-232-PP	Manch.	RF/32	64 bit	no check-sum	E6	fixed and unique code	10 kpcs	>1 kpcs (per order, from stock)
TK5530HM-zzz-PP	defined by customer							> 300 kpcs p.a.

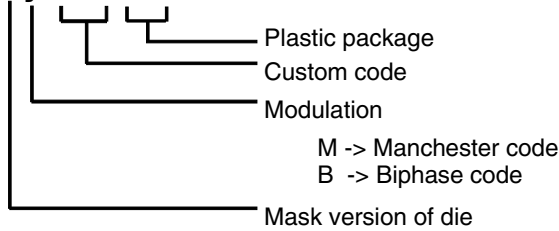
- Note:
- 1) Definition of customized part number basing on orders for first year volume (300 kpcs)
 - 2) Definition of header, ID code, checksum etc. according to customers data base
 - 3) 8.000 US\$ initial cost for metal mask
 - 4) Lead time 5 month
 - 5) Low volume customized application can be covered by TK5550F-PP programming, for identical application, as TK5530H-zzz-PP.

Ordering Number for Standard Version

TK5530HM-232-PP

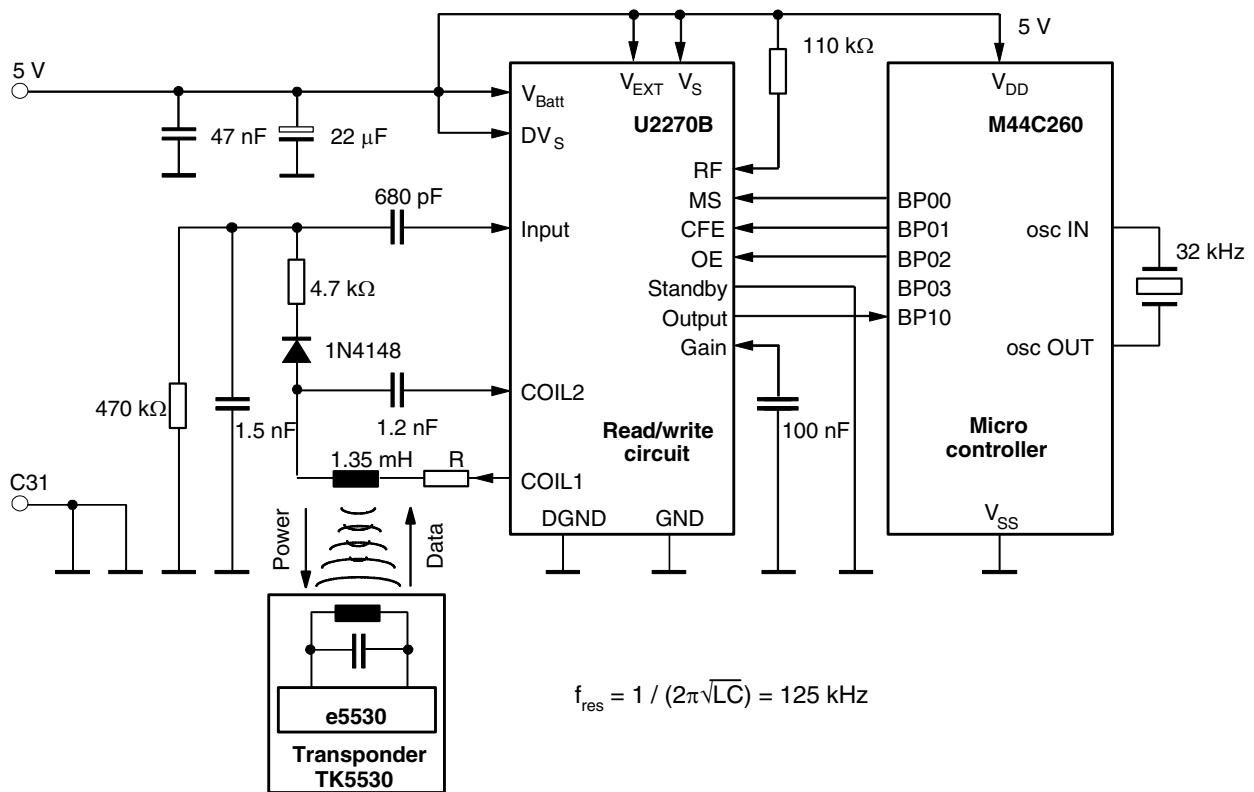
Ordering Number for Customized Version

TK5530xy-zzz-PP



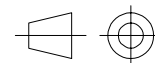
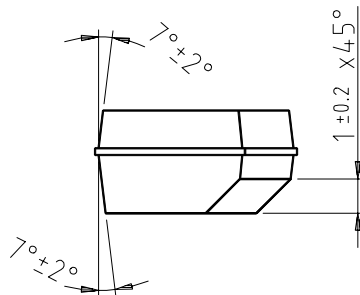
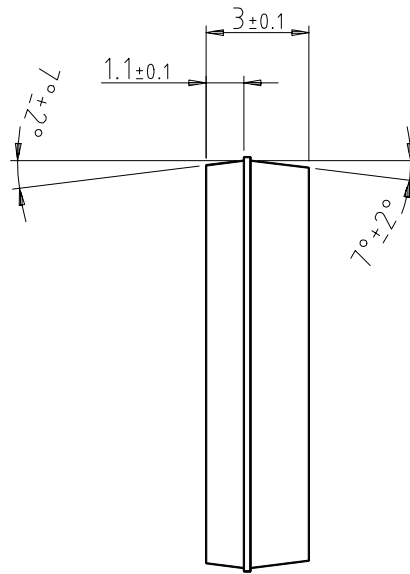
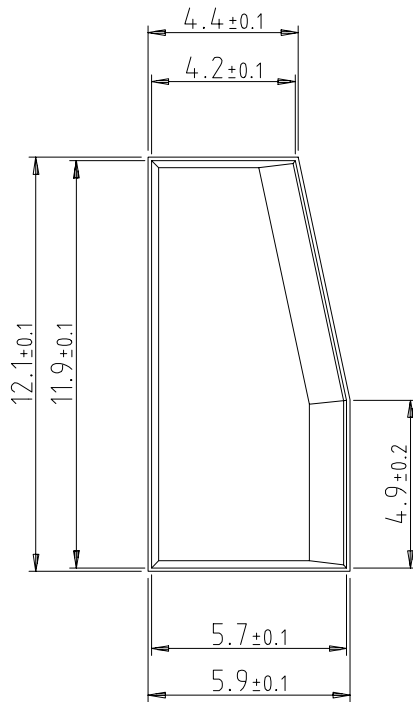
Application

Figure 7. Complete Transponder System with the Read/Write Base-station IC U2270B



Package Information

Dimensions in mm



technical drawings according to DIN specifications



Atmel Headquarters

Corporate Headquarters

2325 Orchard Parkway
San Jose, CA 95131
TEL 1(408) 441-0311
FAX 1(408) 487-2600

Europe

Atmel Sarl
Route des Arsenaux 41
Case Postale 80
CH-1705 Fribourg
Switzerland
TEL (41) 26-426-5555
FAX (41) 26-426-5500

Asia

Room 1219
Chinachem Golden Plaza
77 Mody Road Tsimhatsui
East Kowloon
Hong Kong
TEL (852) 2721-9778
FAX (852) 2722-1369

Japan

9F, Tonetsu Shinkawa Bldg.
1-24-8 Shinkawa
Chuo-ku, Tokyo 104-0033
Japan
TEL (81) 3-3523-3551
FAX (81) 3-3523-7581

Atmel Operations

Memory

2325 Orchard Parkway
San Jose, CA 95131
TEL 1(408) 441-0311
FAX 1(408) 436-4314

Microcontrollers

2325 Orchard Parkway
San Jose, CA 95131
TEL 1(408) 441-0311
FAX 1(408) 436-4314

La Chantrerie
BP 70602
44306 Nantes Cedex 3, France
TEL (33) 2-40-18-18-18
FAX (33) 2-40-18-19-60

ASIC/ASSP/Smart Cards

Zone Industrielle
13106 Rousset Cedex, France
TEL (33) 4-42-53-60-00
FAX (33) 4-42-53-60-01

1150 East Cheyenne Mtn. Blvd.
Colorado Springs, CO 80906
TEL 1(719) 576-3300
FAX 1(719) 540-1759

Scottish Enterprise Technology Park
Maxwell Building
East Kilbride G75 0QR, Scotland
TEL (44) 1355-803-000
FAX (44) 1355-242-743

RF/Automotive

Theresienstrasse 2
Postfach 3535
74025 Heilbronn, Germany
TEL (49) 71-31-67-0
FAX (49) 71-31-67-2340

1150 East Cheyenne Mtn. Blvd.
Colorado Springs, CO 80906
TEL 1(719) 576-3300
FAX 1(719) 540-1759

Biometrics/Imaging/Hi-Rel MPU/ High Speed Converters/RF Datacom

Avenue de Rochepleine
BP 123
38521 Saint-Egreve Cedex, France
TEL (33) 4-76-58-30-00
FAX (33) 4-76-58-34-80

e-mail

literature@atmel.com

Web Site

<http://www.atmel.com>

© Atmel Corporation 2003.

Atmel Corporation makes no warranty for the use of its products, other than those expressly contained in the Company's standard warranty which is detailed in Atmel's Terms and Conditions located on the Company's web site. The Company assumes no responsibility for any errors which may appear in this document, reserves the right to change devices or specifications detailed herein at any time without notice, and does not make any commitment to update the information contained herein. No licenses to patents or other intellectual property of Atmel are granted by the Company in connection with the sale of Atmel products, expressly or by implication. Atmel's products are not authorized for use as critical components in life support devices or systems.

Atmel® is the registered trademark of Atmel.

IDIC® stands for IDentification Integrated Circuit and is a trademark of Atmel Germany GmbH.

Other terms and product names may be the trademarks of others.



Printed on recycled paper.