Read-Only Transponder

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 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 2. The data are sent bit-serially as a code.
Any attempt to fake the base station with a wrong transponder will be recognized immediately.

Features

- Identification transponder in plastic cube
- Basic component: e5530 IDIC®
- Includes coil and capacitor for tuned circuit antenna
- Adjusted to 125 kHz carrier frequency

Application

- Car immobilizer
- Access control
- Alarm systems
- Other identification systems

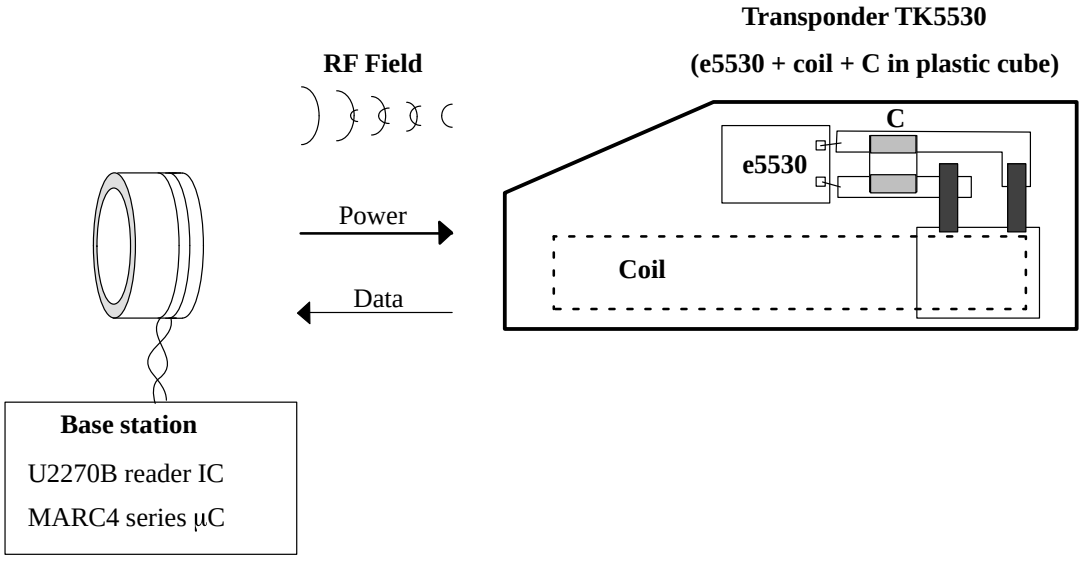


Figure 1. Transponder and reader

*) IDIC® stands for **ID**entification **I**ntegrated **C**ircuit and is a trademark of TEMIC.

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 “Figure 1: Transponder and Reader” on page 1). 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.

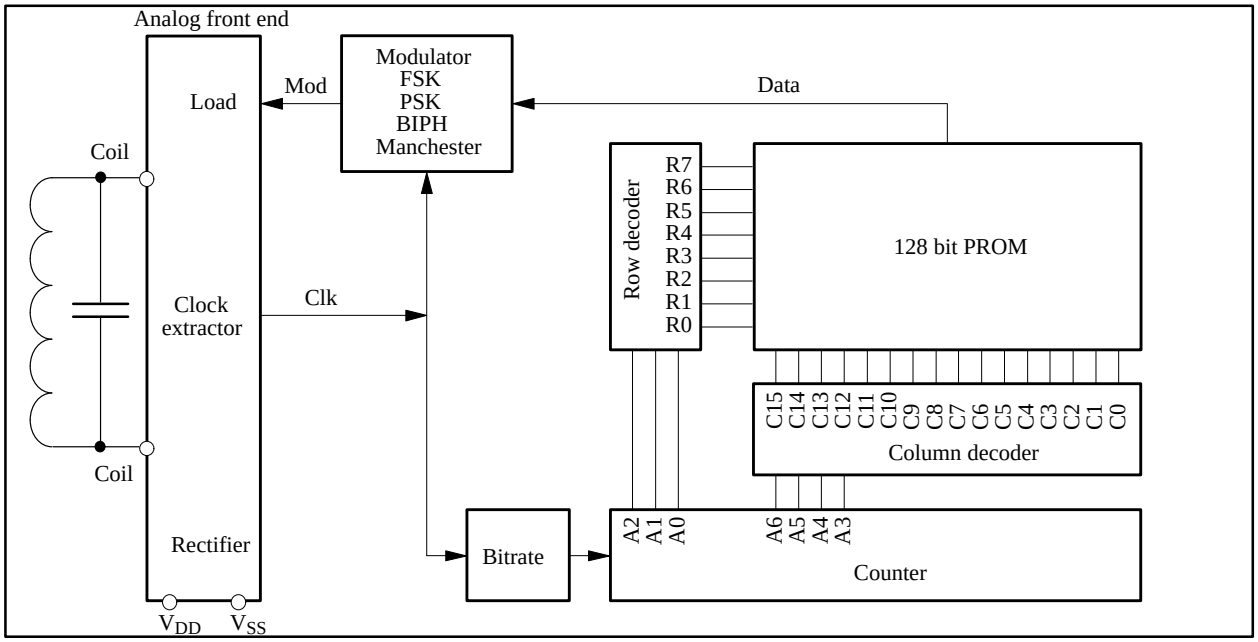


Figure 2. Block diagram

Electrical Characteristics

Absolute Maximum Ratings

Parameters	Symbol	Value	Unit
Operating temperature range	T_{amb}	–40 to +85	°C
Storage temperature range	T_{stg}	–40 to +100	°C

Operating Characteristics Transponder

T_{amb} = 25°C, f = 125 kHz if not otherwise noted

Parameters	Test Conditions / Pins	Symbol	Min.	Typ.	Max.	Unit
Temperature stability		T_{stab}			180	°C
Inductance		L		3.95		mH
DC Resistance		R		85		Ω
Resonance capacitor						
Capacitance		C_r		390		pF
LC circuit						
Resonance frequency	room temperature	f_r	121.4		129.2	kHz
Resonance frequency	T_{amb} = –40 to +85°C	f_r	120.0		131.0	kHz
Quality factor		Q_{LC}		13		

Magnetic field strength (H)

Parameters	Test Conditions / Pins	Symbol	Min.	Typ.	Max.	Unit
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°C	$H_{pp\ -40}$		30		A/m
Field strength for operation	T_{amb} = 25°C	$H_{pp\ 25}$		18		A/m
Field strength for operation	T_{amb} = 85°C	$H_{pp\ 85}$		17		A/m
Maximun field strength		$H_{pp\ max}$			600	A/m

Modulation range (see also H–DV curve)

Parameters	Test Conditions / Pins	Symbol	Min.	Typ.	Max.	Unit
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

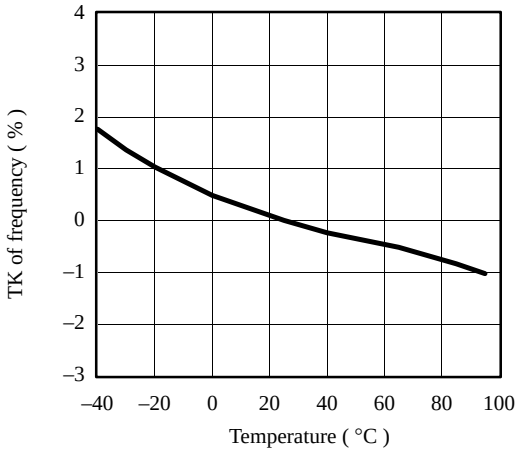


Figure 3. Typical T_K of the frequency

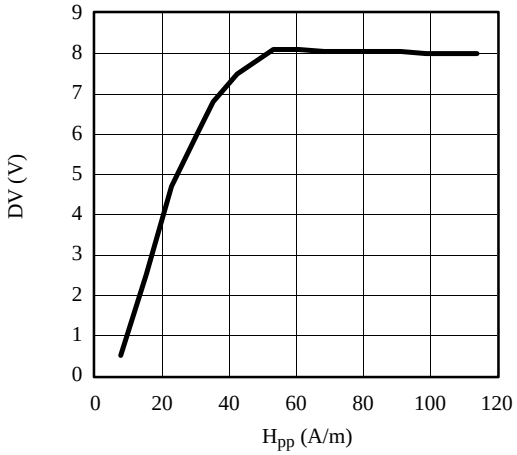
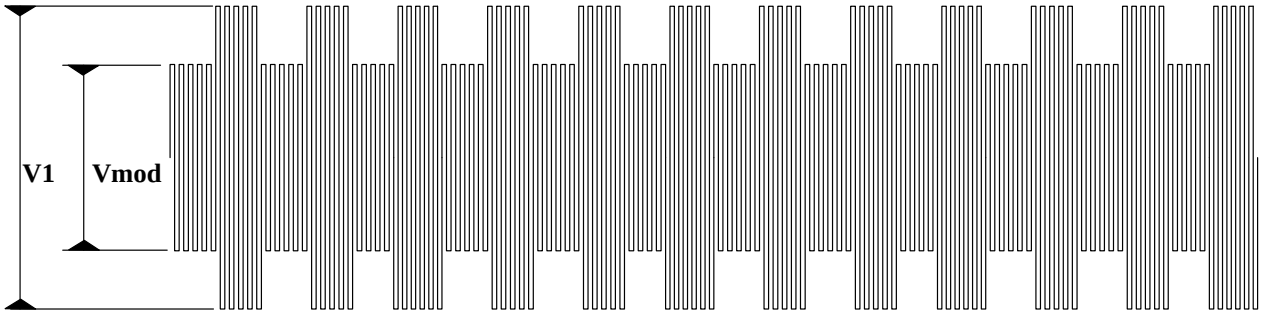


Figure 4. Typical H–DV curve

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



DV = V1–Vmod

Figure 5. Measurement of the modulation range DV

Measurement Assembly

All parameters are measured in a Helmholtz-arrangement, which generates a homogenous magnetic field (see figure 6 and 7). A function generator drives the field generating coils, so the magnetic field can be varied in frequency and field strength.

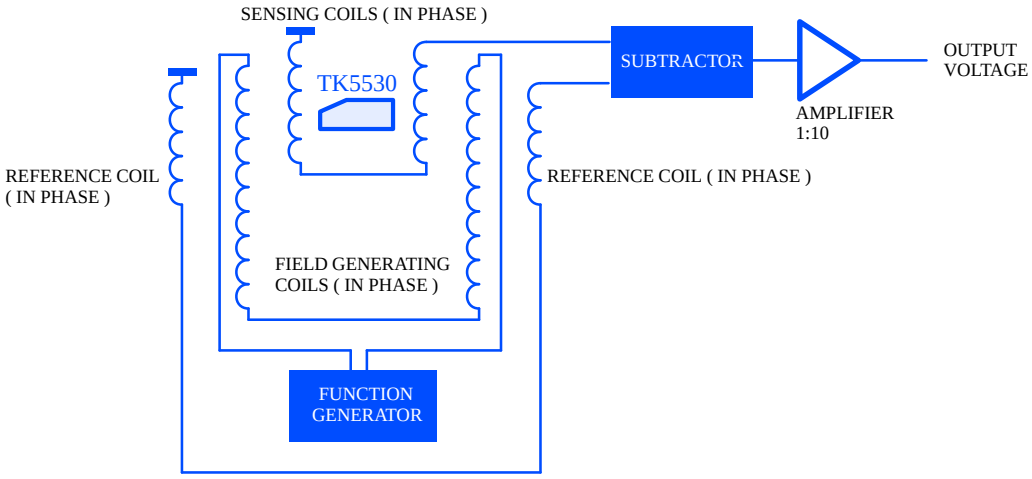


Figure 6. Testing application

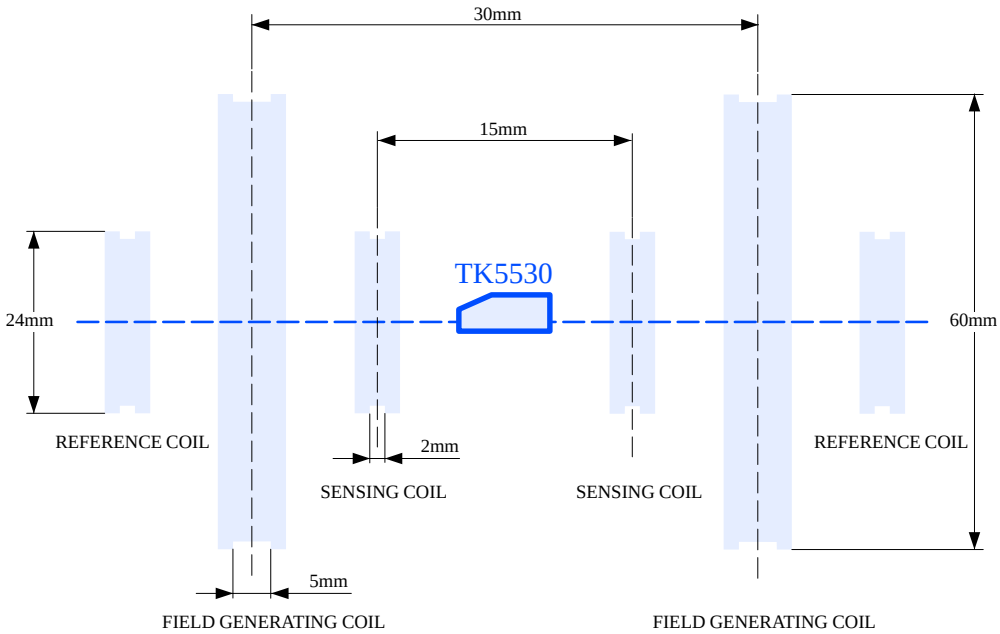


Figure 7. Testing geometry

IDIC® (Reference Data Sheet e5530)

Memory size maximum	128 Bit (details see ”Coding”)
Memory type	ROM
Programming	Laser cutting
Datarate	RF/32 – RF/64
Encoding	Manchester or Biphase
Modulation	AM
Maximum coil voltage (internal limited) V_{pp} (I = 5 mA)	16 V

Coding

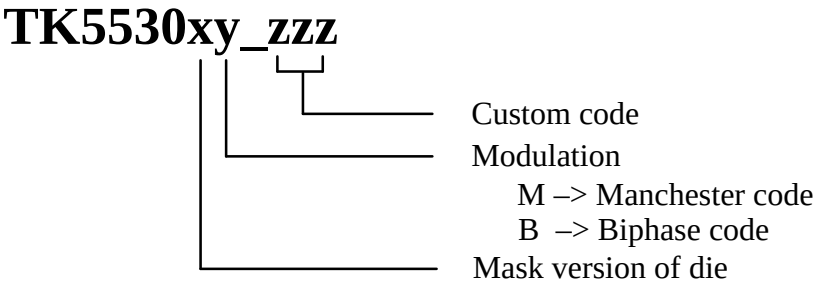
The memory of the TK5530 can be selected to be 64 or 128 bit rolling code. The first 8 bits are a customer specific pattern which is negotiated between the customer and TEMIC TELEFUNKEN Semiconductors. This pattern is unique within the serial rolling code data stream. All other bits can be used as desired.

Setting up a suitable coding scheme can be provided on customers request.

Read Distance

The maximum distance between reader unit and depends mainly on the reader, the coil geometries and the modulation options chosen. Typical distances are 0 . . 3 cm. A general maximum distance value can not be given. A convenient way is to measure the within its environment. Rules for correct reader design can be provided on request.

Ordering Information



Application

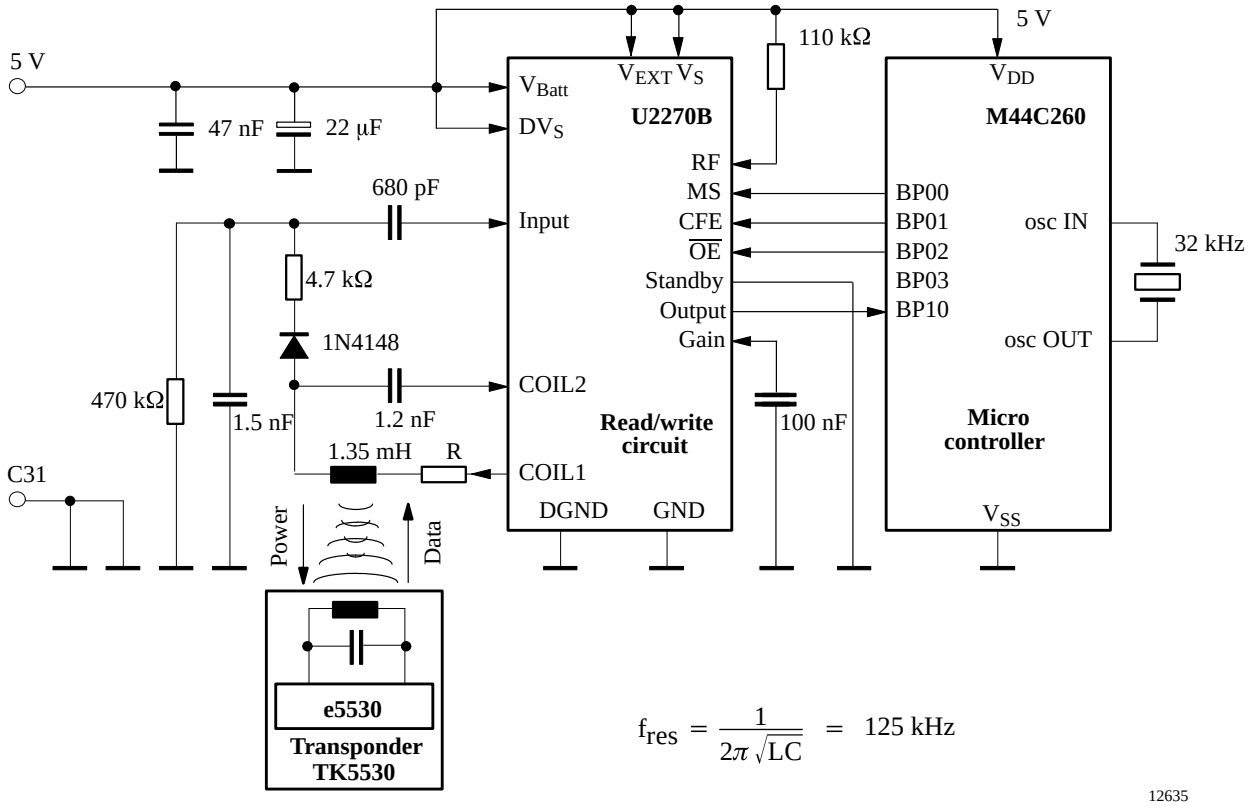


Figure 8. Complete transponder system with the read/write IC U2270B

Mechanical Specification

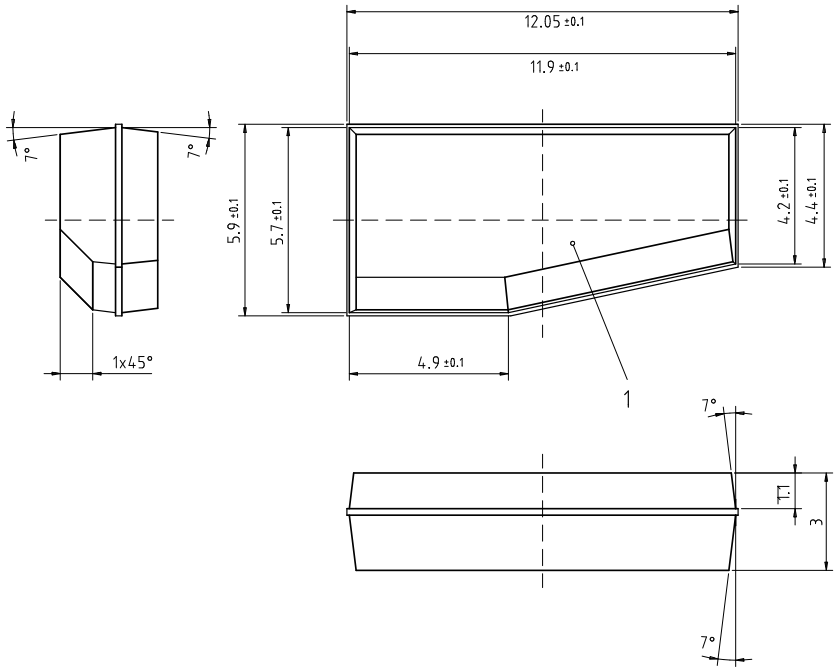


Figure 9. Mechanical drawing of transponder

Ozone Depleting Substances Policy Statement

It is the policy of **TEMIC TELEFUNKEN microelectronic GmbH** to

1. Meet all present and future national and international statutory requirements.

2. Regularly and continuously improve the performance of our products, processes, distribution and operating systems with respect to their impact on the health and safety of our employees and the public, as well as their impact on the environment.

It is particular concern to control or eliminate releases of those substances into the atmosphere which are known as ozone depleting substances (ODSs).

The Montreal Protocol (1987) and its London Amendments (1990) intend to severely restrict the use of ODSs and forbid their use within the next ten years. Various national and international initiatives are pressing for an earlier ban on these substances.

TEMIC TELEFUNKEN microelectronic GmbH semiconductor division has been able to use its policy of continuous improvements to eliminate the use of ODSs listed in the following documents.

1. Annex A, B and list of transitional substances of the Montreal Protocol and the London Amendments respectively

2. Class I and II ozone depleting substances in the Clean Air Act Amendments of 1990 by the Environmental Protection Agency (EPA) in the USA

3. Council Decision 88/540/EEC and 91/690/EEC Annex A, B and C (transitional substances) respectively.

TEMIC can certify that our semiconductors are not manufactured with ozone depleting substances and do not contain such substances.

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