





Inductors

Transponder coils
Selection guide, General

Date: October 2008

Transponder coils

Selection guide

Design	Dimensions Length x width x height (mm)	Type	Features	Rated inductance mH	Sensitivity mV/ μ T
	7.8 × 2.7 × 2.7	B82450A*E	XY coil Molded	1 ... 7.0	10 ... 28
	11.4 × 3.5 × 2.4	B82450A*A	XY coil Molded	1 ... 7.0	16 ... 51
	7.7 × 7.5 × 2.65	B82451N	Z coil	4.75	16

Transponder coils

General

1 General

SMT transponder coils are components forming part of a radio-frequency identification (RFID) system. These systems allow contactless identification without direct line of sight. RFID systems are used in very different applications calling for wireless and contactless data transmission within a range of a few meters, e.g.

- Automobile industry (immobilizer, passive keyless entry/go, tire pressure monitoring systems)
- Logistics
- Security systems
- Agriculture
- Medical engineering

2 RFID principle

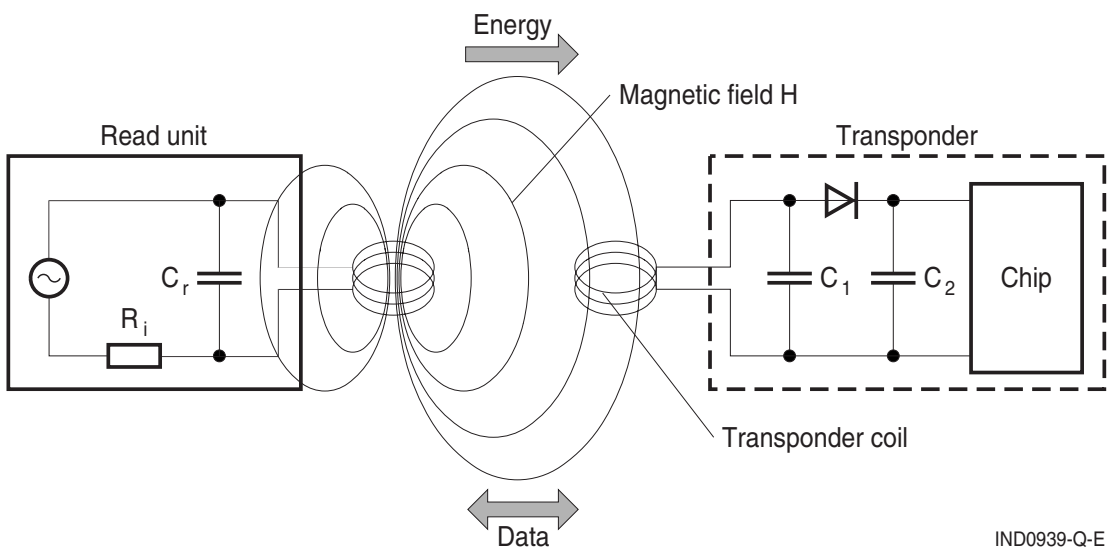


Figure 1 Principle of an RFID system

The low-frequency region about 125 kHz allows inductive coupling of the transmitter and receiver unit, also called H-field coupling. Here the firmly installed reader emits an electromagnetic field that induces a voltage in the transponder coil similar to the case with a transformer. This is rectified and serves to supply an integrated circuit connected to the transponder coil.

A data sequence is transmitted from the IC to the transponder coil and by inductive coupling back to the reader. The received bit sequence triggers an appropriate action. In this way the ignition, door locks, the fuel pump or the injection system could be enabled, or the received tire pressure evaluated.

3 Manufacture

EPCOS transponder coils are manufactured in two different technologies: molded transponder coils (XY receiving direction) and Z transponder coils, each optimized for the high demands of the automobile industry.

Transponder coils

General

XY transponder coils achieve high and stable product quality through fully automated manufacture based on a carrier band principle. The parts are wound with varnished copper wire, and a welded joint ensures reliable connection to the pins. Strain relief before the molding process additionally protects the wire against damage. Then the component is encapsulated with LCP (liquid crystal polymer) for high mechanical stability.

Manufacture of Z transponder coils is based on experience with our SMT power inductors, and was specially optimized for the mechanical and electrical demands of RFID.

4 Automotive applications

Important features of transponder coils in automotive applications are

- High mechanical stability
- Suitable sensitivity

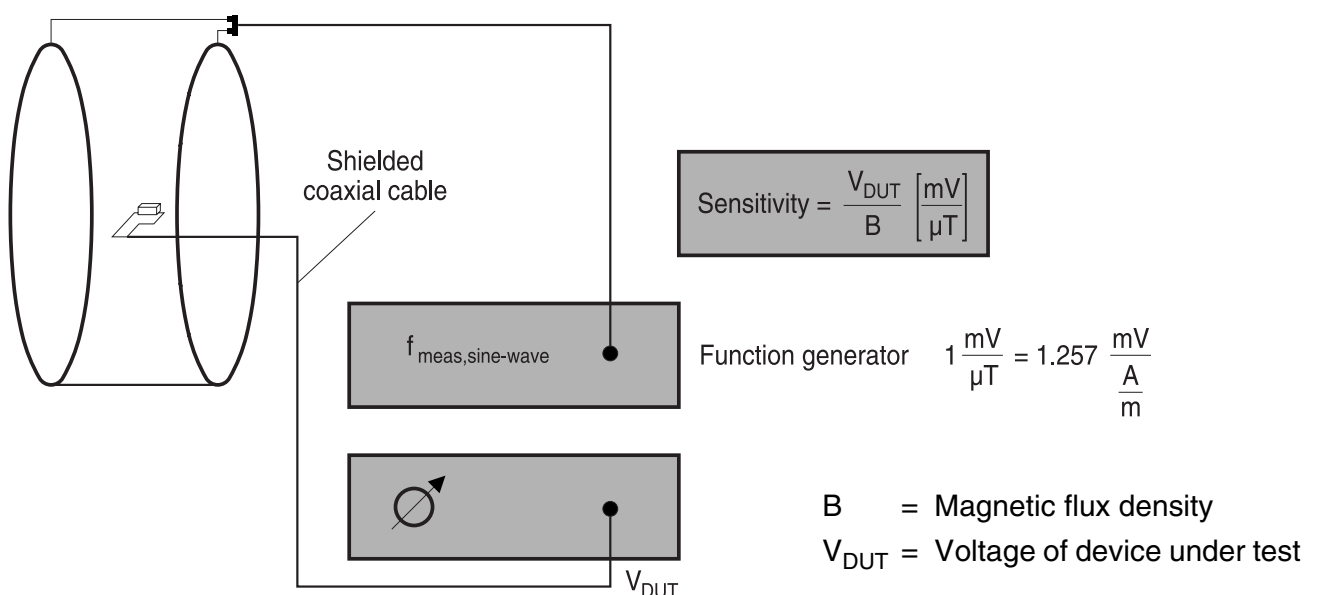
4.1 Mechanical stability

In addition to AEC-Q200 qualification, the following tests were performed to demonstrate the mechanical stability of EPCOS transponder coils:

- Shock test with 3000 G/0.2 ms
- Drop test 1000 × 1 m in key housing onto concrete floor
- Bending test 10 × 10 mm on circuit board

4.2 Suitable sensitivity

Sensitivity is a vital characteristic for the signal range of a transponder coil. This states in mV/μT how high the open-circuit voltage induced in the transponder coil will be for a given magnetic field. To verify the necessary range of transponder systems in the application, the sensitivity of transponder coils is first examined in test setups at EPCOS.



IND0940-W-E

Figure 2 Test setup for measurement

Transponder coils

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If a coil is integrated into an application with a resonant circuit, the sensitivity of the circuit is determined by the quality of the resonant circuit, the attenuation by further components – such as the impedance of the IC input – and the tolerances of the electrical parameters of the components used. There are differences between measurement of the discrete component and of the entire application.

Sensitivity is proportional to the inductance of the transponder, so it can be matched to the application.

5 Marking

Marking of transponder coils is composed of the following.

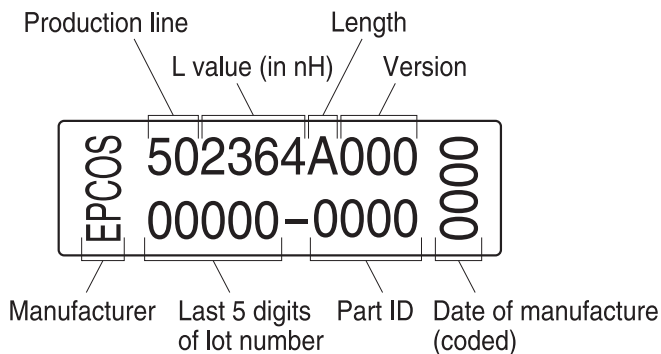
XY coils:

Manufacturer

Production line: 50

L value: Coding in nH ($2364 = 236 \times 10^4$ nH)

Version (length): A = 11 mm, E = 8 mm



IND0879-R-E

Z coils:

L value: Coding in nH ($4754 = 475 \times 10^4$ nH)

Date of manufacture:

Example: 8032

8 = calendar year 2008

03 = calendar week 03

2 = 2nd day (Tuesday)