

Areas of Competence

- RFID and other related low data rate wireless technologies (e.g. NFC)
- Sensors (motion control, positioning, interpolation)
- Low power consumption and power management for battery-operated devices
- Excellent control of board and chip layout and parasitic elements in RF systems
- Design expertise for automotive applications
- End-user approach for competitive solutions

General

IDS is constantly extending its portfolio to include competitive and yet flexible silicon system solutions fulfilling modern market demands and emerging needs.

IDS has developed a number of ICs for RFID applications. The experience and IPs comprise systems for contactless identification via RF field from 100 kHz to 2.5 GHz. The product portfolio includes RFID tags, readers and near field communication (NFC).

IDS's developments of ICs with integrated sensors include magnetic field, capacitive sensors and photo detectors.

IDS has designed systems for use in automotive applications.

Flexible Silicon for Wireless and Sensor Systems



Embedded flexibility for emerging needs

1 Expertise in analogue and mixed signal integrated systems

A library of building blocks such as amplifiers, filters, voltage to frequency converters, rectifiers, A/D and D/A converters is available:

- Analogue cell library
- EPAC-Electrically Programmable Analogue Cell library

1.1 Analogue and mixed systems build using standard components

- High voltage generation IC
- High voltage cells for flash memories and EEPROM
- 12 bit flash DAC
- Sigma/delta converters in systems

1.2 High frequency systems

- Fast receiver/transmitter twisted pair in BiCMOS
- High bandwidth amplifiers

1.3 Systems for communication on twisted pair

- High Speed receiver-transmitter IC in CMOS
- Telephone terminals
- Single-chip telephone IC with hands-free function
- Low noise microphone amplifiers
- Amplifiers for loudspeakers

1.4 Integrated circuits with integrated sensors for magnetic field, photo detectors, and capacitive sensors

- Magnetic linear position encoder IC
- Optical position encoder IC
- Magnetic transducer IC
- Flow meter IC
- Bolometer (IR array) electronics IC
- Analogue front end for x-ray scanning equipment IC
- Absolute capacitive angle/linear measurement system IC
- Absolute magnetic angle/linear measurement system IC
- Capacitive proximity sensor/switch IC

1.5 Measurement systems for position and angle sensing, electrical current, and power/energy via magnetic field, measurement of temperature and optical signals

- Programmable encoder
- Precision encoder with programmable IF
- Universal analogue front-end for optical signals processing
- Re-timer/line driver IC

1.6 Systems for data acquisition from sensor fields

- Temperature sensor IC

1.7 Systems for contactless identification via RF field from 100 kHz to 2.5 GHz

- Tag IC for frequency range 400 MHz to 2.5 GHz
- Tag ICs 13.56 MHz
- Reader ICs 125/133 kHz RFID
- Reader IC for 13.56 MHz RFID

1.8 Design of systems for use in automotive applications

- Airbag IC
- Low-G sensor with micro-machined mechanics IC
- Wiper IC
- Car diagnostic system IC
- Steering wheel capacitive system
- Window positioning control IC
- CAN bus interface IC

2 RFID

2.1 125 kHz and 13.56 MHz

- A 13.56 MHz multi-protocol reader is in development. IDS can offer a dedicated low cost reader for custom protocol or partly ISO protocol (depending on specific application). A low cost reader could comprise AM and PM detection (on single input – no external components) in a 14-pin or 8-pin package.
- IDS provides designing of ISO compliant and customised tags with added features, e.g. temperature sensor, capacitive proximity sensor, etc.). EEPROM can be integrated as required.
- Our experience also includes 125 kHz automotive RFID readers. We could design a reader and the customer (or the foundry) could supply MCU core and CAN bus. Together with an automotive partner we could then do the complete car key system.
- We could participate in a design of key-less entry system. Our experience in automotive design, RFID and HID communication could be well used.

2.2 900 MHz and 2.5 GHz

- We have experience in tag design for UHF frequencies. To get optimal performance, a process technology comprising Schottky diodes is necessary.
- Based on our experience in UHF tags, we can offer designing of an UHF reader. In close cooperation with a customer, IDS could define the specification including definition of:
 - Target technology
 - Target output power, internal or external RF amplifier. Should the output power be changeable
 - Will the system use a directional coupler for the receive side and which coupler is intended

- Should the reader work with passive tags only or also with active tags (receive sensitivity)
- What receive bandwidth (data rate) is required. Should the receiver use mixers or envelope detector as input stage
- What amount of logic (protocols) should be integrated in the reader, or will the reader be entirely controlled by an external MCU

3 Near Field Communication (NFC)

- IDS is currently working on an IC for near field communication according to ISO/IEC 18092. Samples are expected in second half of 2005.

4 Power Management

- A hot-swap switch is under development. The main advantage of our approach is that it uses the pass transistor as current sensing element. Hence, there is no need for any measurement shunt (lower ON resistance) which again allows a very precise switching point.
- IDS also developed an ultra low power DC/DC converter (to be tested on the December MPW). This DC/DC converted is suitable for single-battery operation (1V ~ 1.6V) and the output voltage can be from 2 to 3.6V. The output current is in the range 30-50mA. The main advantage is that the standby consumption (on the output) is approximately 1.2uA (together with the internal resistor divider) which is 2-3 times better than Maxim 722. Based on this design we can also do different version of DC/DC converters.
- Furthermore, IDS can do a combined system comprising an ultra low power DC/DC converter (or even more converters for different voltages in one chip) and low drop regulator(s) providing a clean output supply voltage (conventional direct DC/DC converter output voltage has typically 30-100mV ripple which is not desirable for a precise analogue system supply).

5 Sensor ICs

Our competences in sensor systems include following:

- Interpolator chips used for post processing of position and angle sensor signals (optical, capacitive or magnetic) with output signals in sine/cosine form. IDS has interpolator by factor of 40 and lower available. We can also do an interpolator based on specific customer demands with added functions like AGC.
- We did a demonstrator chip for capacitive sensing for two-terminal measurements. The system is using external capacitors and can measure two capacitances on the same node. This makes it suitable for angular measurements, such as joy-stick x/y position sensing, linear position sensing or thickness sensing.
- IDS also developed a system for capacitance measurement to a grounded electrode (single terminal measurement) where the distance to a grounded conductive material can be measured. This system can be used for proximity measurements (proximity switches) or for liquid level measurement where the liquid changes the dielectricity of an isolated wire.
- IDS has experience in micro-machined systems where extremely small capacitances must be measured. For micro-machined systems we can provide support in mechanical modelling.
- IDS is capable of developing capacitive sensing using on-chip sensing plate (finger-prints sensors).

- IDS developed several integrated HALL sensors. These can be used for direct magnetic field sensing, for linear position sensing using external magnets, for angular sensors using external magnets, for current sensors.
- IDS also did the electronics to support external magneto-resistive sensors. The electronics comprise signal processing and sensor conditioning electronics.
- Using our experience in other areas, we can also design electronics for inductive sensors with external or integrated coils.
- Also designs with integrated optical (diode) sensors are part of our knowledge.
- During the designing of an AFE for X-Ray system we acquired a lot of know-how on extremely low (1pA) current sensing systems.

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