Passive RFID sensor solutions

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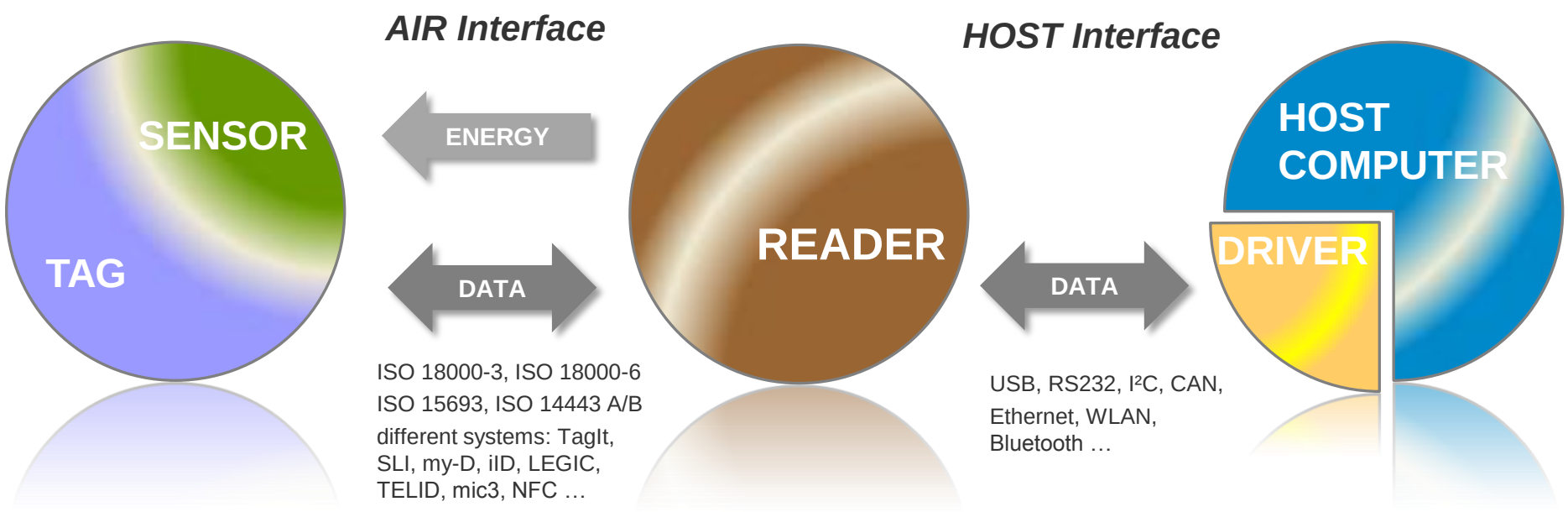
3. Choice of carrier frequencies
4. Temperature measurement
5. Pressure measurement
6. Measurement of accelerations
7. Measurement of analogue electrical signals

RFID system structure

RFID = Radio Frequency IDentification



RFID Transponder:

- TAGs, LABELs, COINs, CARDs …
- memory from 64 bit RO up to 512 kbit RW
- TELID® : RFID with integrated sensors
- HF and UHF frequency bands

RFID Read/Write Units:

- for mobile, stationary or industrial solutions
- various antenna types and sizes
- iID® PEN, DESKTOP, POCKET, Modules
- HF and UHF frequency bands

RFID Software Tools:

- for PCs, notebooks, tablets, PDAs, handhelds, mobile phones, control units
- Windows, Android
- iID® driver engine, iID® Tray Appli,
- iID® RFID DEMOsoft, TELID®soft 5.0,
- iID® POCKETmini DataLoad …

Why combine RFID and sensor technology ?

Purpose:

- contactless measurement on moving and rotating objects
- contactless measurement in closed containers / no cables, no openings
- contactless measurement in explosive areas / approvals
- reduction of wiring / system costs

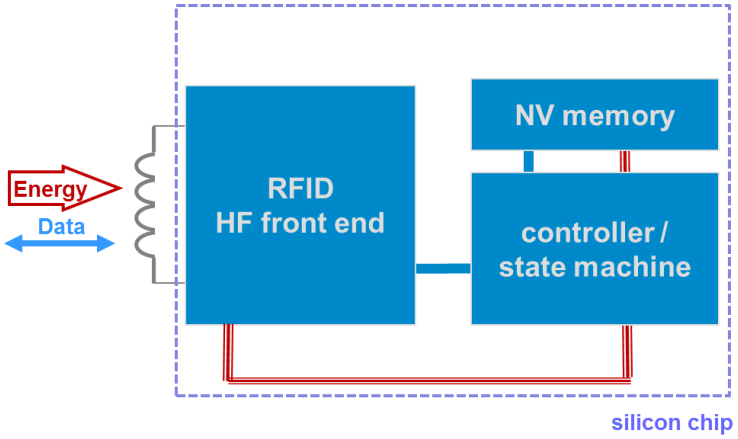
Further advantages:

- identification of the measuring point
- memory for calibration data, access data etc.
- cost effective because of RFID volume markets

Sensor requirements:

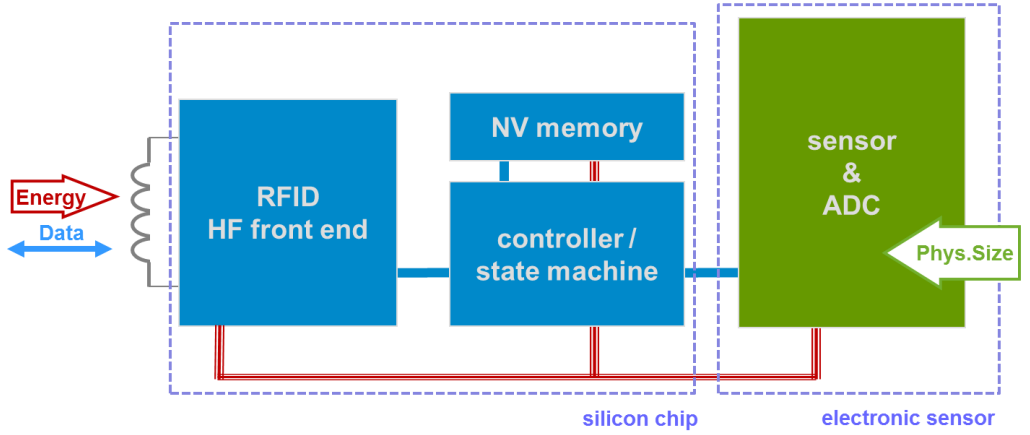
- low power / <10mW
- low voltage / <3V

How combine RFID and sensor technology ?

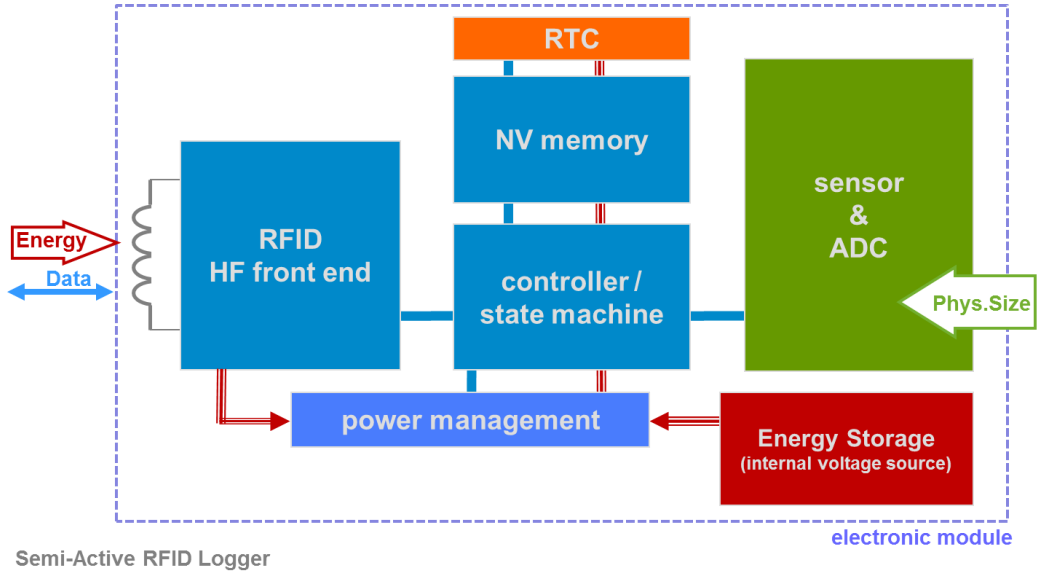


Passive RFID Transponder

identify
and
measure



Passive Sensor Transponder

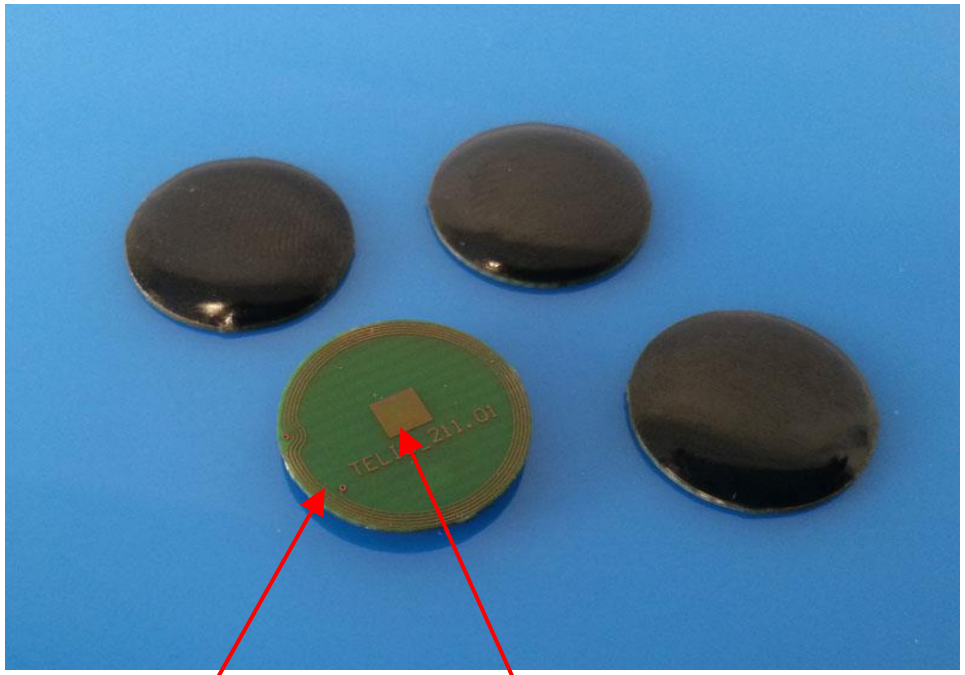


Semi-Active RFID Logger

Choice of carrier frequencies

RFID Frequency	ISO / IEC	Coupling	Reading distance	Data rate	Influence of metal	Influence of water	Sensor integration
<135 kHz (LF)	18000-2 11784 11785	inductive	5-100cm	1…4 kbaud	middle	no	marginal (power)
13.56 MHz (HF)	18000-3 14443 15693	inductive	1-50cm	25…848 kbaud	great	small	passive and semi-passive
820-960 MHz (UHF)	18000-6 EPC	em. wave	0.5-8m	40…640 kbaud	great	great	passive and semi-passive
2.45 GHz (micro wave)	18000-4	em. wave	>5m	25…100 kbaud	great	great	marginal (market)

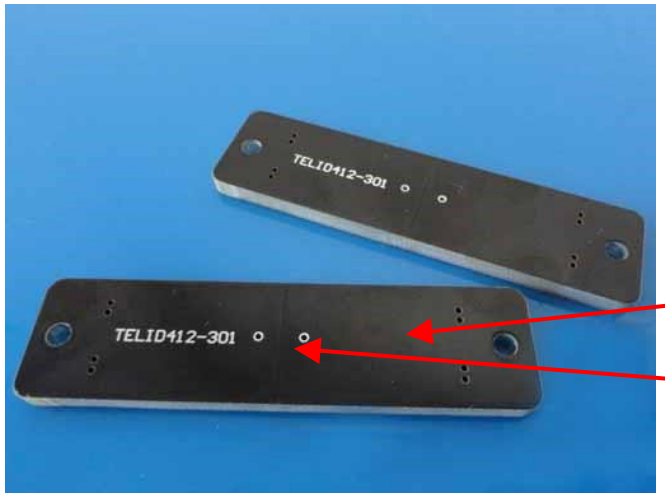
Temperature measurement / HF



TELID®211.01

function:	passive temperature transponder
assembly:	COB, SMD
temperature sensor:	PN junction
measuring range:	-40…+125°C (+180°C)
measuring accuracy:	+/-1°C
data memory:	up to 256kbit
size:	Ø14mm / thickness 1.5mm
mounting:	gluing
application:	probe management electric motors and pumps

Temperature measurement / UHF



dipole antenna

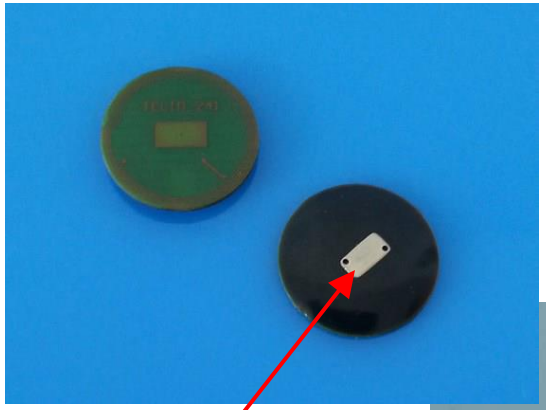
sensor

reading distance:
up to 0.5m

TELID®412

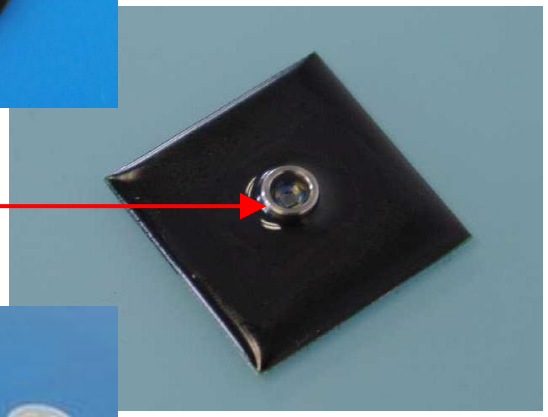
function:	passive temperature transponder
assembly:	Flip-Chip, SMD
temperature sensor:	PN junction
measuring range:	-40…+125°C (180°C)
measuring accuracy:	+/-1°C
data memory:	4 kbit
size:	72mm x 18mm x 2mm
mounting:	gluing, screwing
application:	asphalt core temperature gearbox bearings

Pressure measurement / HF



TELID241
size: Ø14mm

sensor



TELID242
size: 33mm x 33mm

TELID243
for industrial application

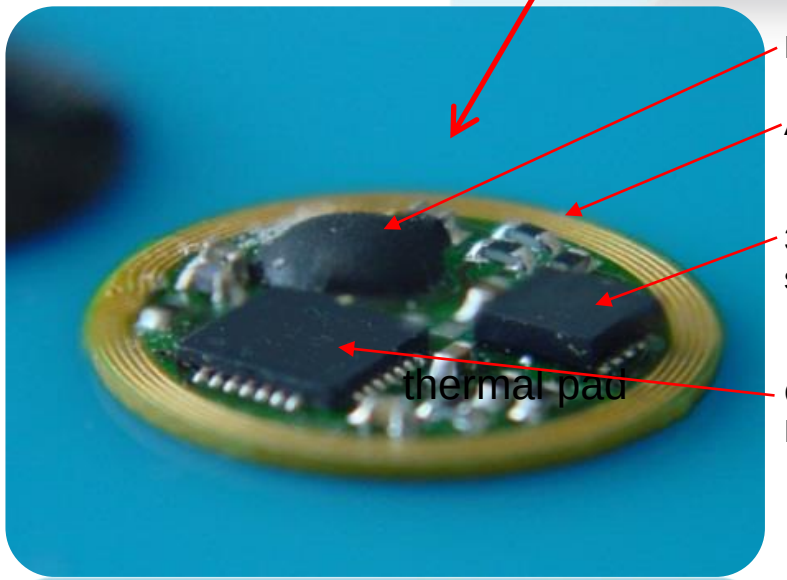
TELID®241 / 242 / 243

function:	passive pressure transponder
assembly:	COB, SMD
pressure sensor:	piezo-resistive
temperature sensor:	for calibration
measuring range:	1bar / 14bar / up to 1,000bar
data memory:	up to 256kbit
ambient media:	air / water / oil
application:	closed containers pipelines

Measurement of accelerations / HF

TELID283
size: Ø14mm

TELID283
without
encapsulation



TELID®28x

function:	passive acceleration transponder
acceleration sensor:	MEMS
measuring range:	+/-2g | +/-4g | +/-8g
data memory:	up to 256kbit
size:	Ø14mm / thickness 2.5mm
weight:	0.5g
application:	vibration measurement on electric motors and pumps

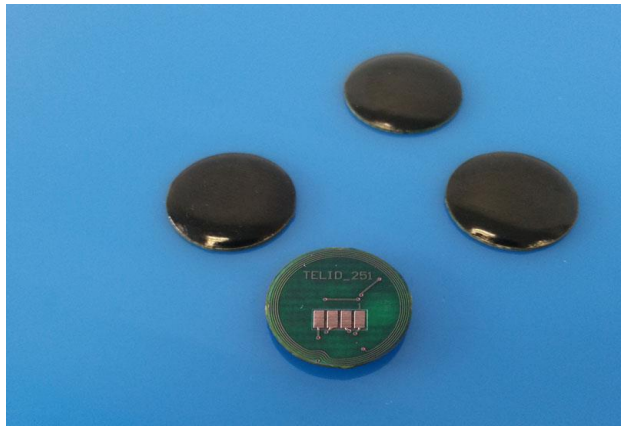
TELID®282i

function:	3D tilt sensor
size:	43mm x 27mm
accuracy:	+/-0,5°

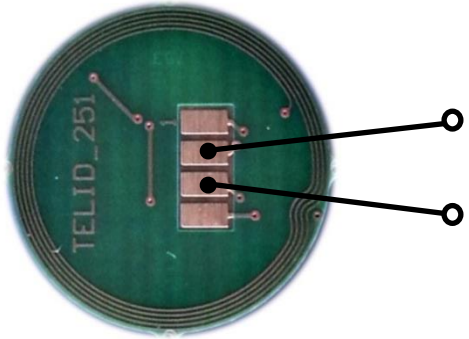
Measurement of analogue electrical signals / HF

TELID®251

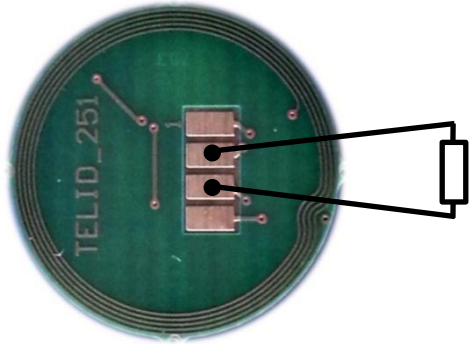
function:	passive voltage transponder
circuitry:	op-amp, A/D converter
ADC resolution:	16 bit
data memory:	256 bit
size:	Ø14mm / thickness 2mm



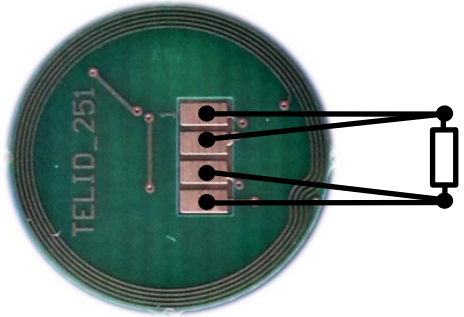
TELID251.adc :



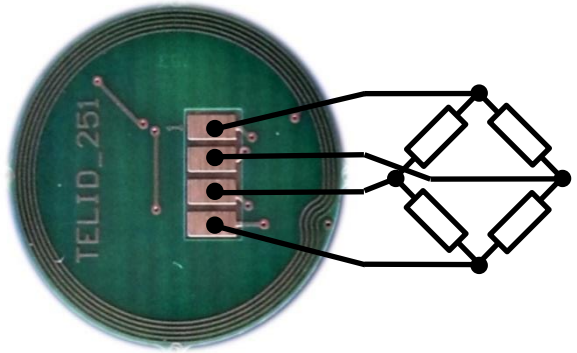
TELID251.r2 :



TELID251.r4 :



TELID251.full-bridge :



Advantages of the RFID technology for the contactless sensor measurement

- Cost effective manufacturing of sensor modules because of the existing volume market for RFID chips
- Standardized interfaces and thus existing infrastructure
- High data transmission rate
- High data safety through already implemented checksum tests
- Availability of a non-volatile memory for additional information like ID number of the sensor module or the measuring point, calibration parameters and ownership marking
- Possibility for encryption of the data transmission to prevent unauthorized use
- ground-free measurement because of the inductive coupling
- Possibility to assembly miniaturized modules because of the availability of ASICs

Passive RFID sensor solutions

Thank you VERY MUCH
for your attention

Vielen Dank für Ihre
Aufmerksamkeit

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