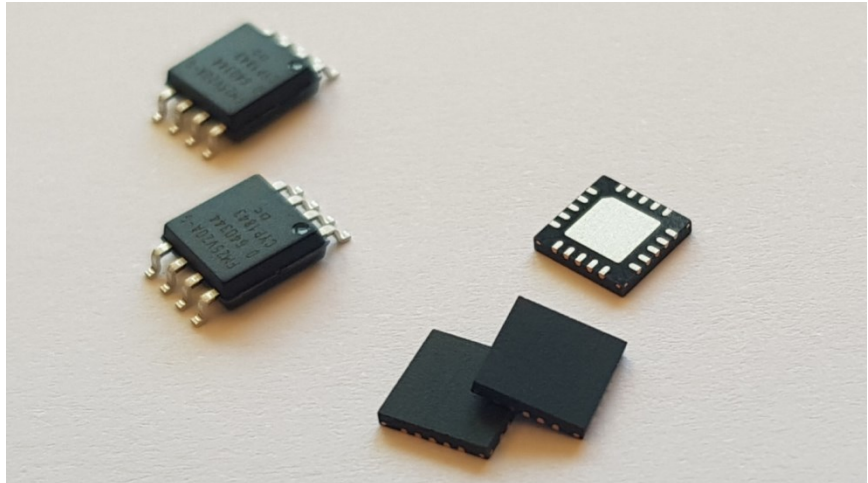# Transponder ASIC HF18

Description

Fraunhofer IMS has developed the new ISO 15693 (long-range) HF-transponder ASIC **HF18** for use in logistics and wireless sensing applications**.**

Its power-efficient frontend enables it to connect various types of **sensors** or **FRAM memories over a high speed SPI** interface and enables the transponder to act as a transparent HF-interface. The

Depicted are three RFID ASICs developed by Fraunhofer IMS and two FRAM memories

battery-less operation makes it ideally suited for industrial data logging applications and its ability to power and control connected sensors enables new wireless sensing applications. Security functions like encryption, support for connected memories, an integrated unique hardware identifier, or hardware accelerated communication encryption can be implemented.

Industry 4.0 & Industrial Applications

An enabler for emerging topics like agile production processes, condition monitoring, and digital twin in **Industry 4.0** is the tracking of items through the processes and the online collection and analysis of process parameters. For example, one might record the temperature while drying the paint of a sprayed body frame and send this information to the **cloud** where powerful AI can evaluate the temperature transient and regulate it for an **optimal result**. This makes it possible to **predict malfunctions** and **avoid unwanted down-time.** Fraunhofers IMS **HF18** has an SPI master interface fully accessible through the RF link. This allows for **plug&play connection of SPI components** to enable various types of data collection.

For tracking and marking of pre-products in an assembly line HF18 has **FLASH memory integrated** which is read- & programmable in the field with a large amount of cycles (100.000) and long data retention (> 7 years[1]). If more memory is required, it is possible to connect external FRAM memories over SPI to HF18. However, commercially available **FRAMs** do have special requirements for power-up and power-down sequences otherwise memoryloss might occur. **Fraunhofer IMS RFID-ASIC HF18 fulfills those types of specification.**

Custom development

HF18 is open for customer specific extensions For example, **physical unclonable functions (PUFs)** enable hardware-based security for data **encryption** or **IP protection**. A **low-power RISC V microprocessor** can also be implemented to perform local, **AI-based analysis** on sensor data. Proprietary protocol extension can also be provided for a full-custom transponder ASIC.

[1] Depends on temperature profile

Transponder ASIC HF18

Parameter	Value
Frequency	13.56 MHz
Operational Temperature Range	-25 °C to +125 °C
Regulated Supply for Sensors	2.5 V & 1.8 V
Supply Current for Sensor	up to 8 mA (2.5 V Rail) & up to 1 mA (1.8 V Rail)
Controlled Power-Up and Shut-Down Ramps for FRAMs	YES (only 2.5 V Rail)
Internal FLASH Memory	8 Bit x 32 (256 Bit Total) Free-Use
Digital I/O Voltage Level	2.5 V
External Components required	two storage capacitors for rectified and regulated supply (typ. 1 µF + 100 nF)

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Features

- On-Chip FLASH memory
- FRAM compatible
- SPI Interface and regulated voltage for external sensors
- Low-Power Analog Front-End
- For ISO18000/ISO15963
- Robust voltage limiter for use with High Power Readers
- Customized versions on request, e.g.
    - PUF based Crypto Functions
    - Low-Power RISC Processors
    - Proprietary Protocol extension
- Antenna and Interposer Design services on request