IDS-R13MP
13.56 MHz RFID Reader IC
Multi-Protocol Including ISO 14443, ISO 15693, and cool-Log™

Key Features

- Supply voltage range 2.7 to 5.5V
- Protocols: ISO/IEC 15693, ISO 14443A/B[1] and cool-Log™
- Antenna driver using OOK or ASK
- Dual receiver input providing both AM and PM demodulation avoiding communication holes
- Reception automatic gain control
- 3.3V voltage regulator providing up to 20 mA for external MCU
- High output power (100 or 200 mW) from single 5V supply
- Significant increase of PSRR through on-chip RF output supply regulator
- Reader to reader anti-collision
- Power-down, standby and active mode
- Temperature range: -40°C to 110°C

Description

The IDS-R13MP is an integrated analogue front end and data framing system for 13.56MHz RFID reader systems. The built-in programming options make it suitable for a wide range of applications both in proximity and vicinity RFID systems.

The reader configuration is achieved by selecting the desired protocol in the control registers. The direct access to all control registers also allows fine-tuning of different reader parameters if needed.
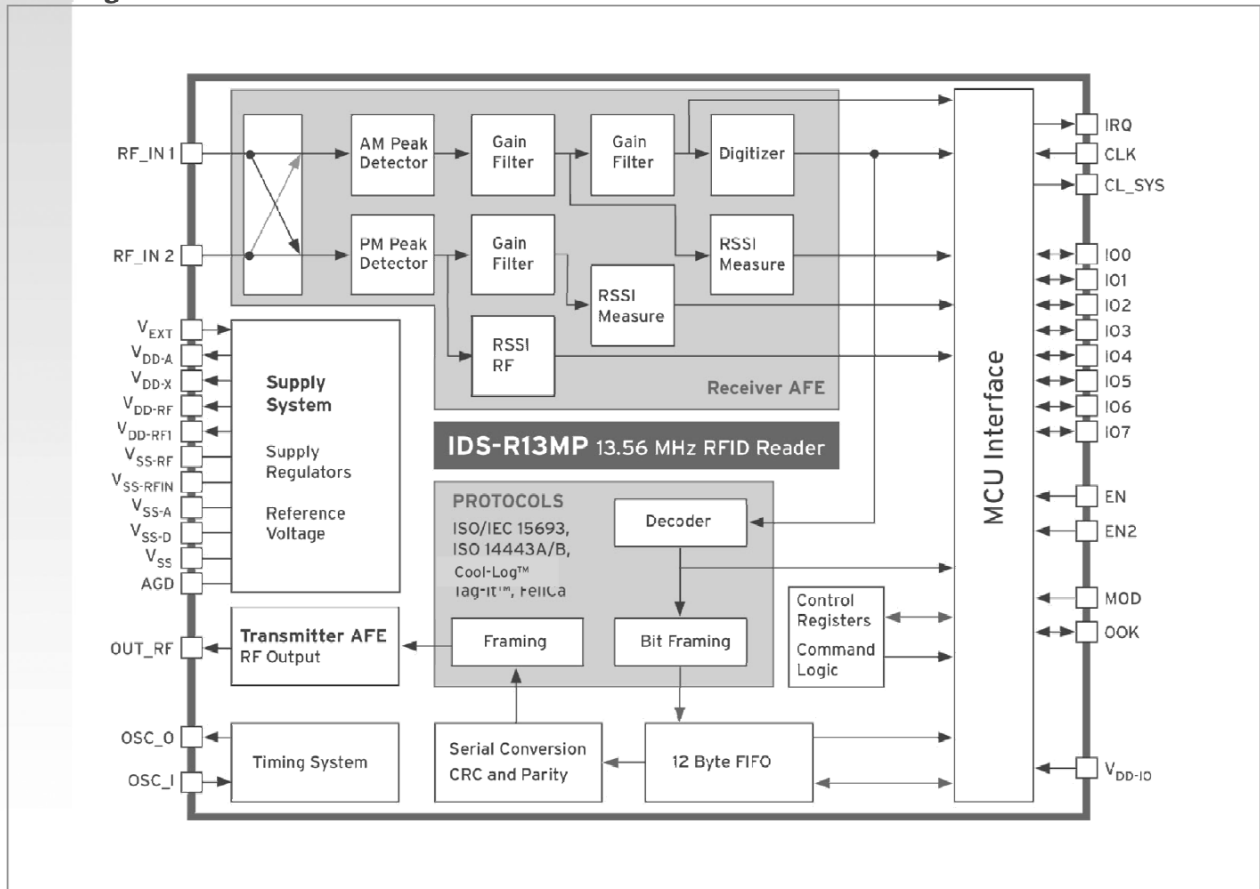
Applications

- 13.56 MHz RFID systems:
  - Proximity systems
  - Vicinity systems
  - Data logging systems
  - High bit rate proximity systems

Package

32-pin QFN (5 x 5mm) RoHS

Block Diagram

1) Purchase of IDS-R13MP does not imply any agreement with any third party patent holder or any grant of any ISO14443A or -B licenses. Customers are solely liable for any infringement of third party's rights and therefore advised to sign patent licensing agreements with all third parties! See disclaimer at end of document.

Content

Figures

1   Related Documents

Specification (full data sheet): IDS-R13MP_DS

2   Key Characteristics and Benefits

- ISO 14443, ISO 15693, Tag-it, ISO14443 high bit rates, FeliCa and cool-Log™ compatibility

- Integrated low level transmission coding (1 out of 4, 1 out of 256, modified miller 106Kb/s, NRZ 106Kb/s), Tag-it, FeliCa and cool-Log™ compatible

- Integrated sub-carrier decoders for ISO 15693, ISO14443 A and B, ISO14443 high bit rates, Tag-it, Felica and cool-Log™ protocols

- Integrated data framing for ISO 15693, ISO14443 A and B, ISO14443 high bit rates, Tag-it, FeliCa and cool-Log™ protocols.

- Integrated CRC and/or parity checking for ISO 15693, ISO14443 A and B, ISO14443 high bit rates, Tag-it, FeliCa and cool-Log™ protocols

- Parallel 8 bit or serial 4 pin SPI interface with MCU using 12 bytes FIFO

- Voltage range for communication to MCU between 1.8V and 5.5V

- Synchronization clock output selectable as RF frequency, RF/2 or RF/4 frequency

- Operating range from 2.7V to 5.5V

- Integrated supply voltage regulator (20mA) which can be used to supply MCU and other external circuitry

- Integrated supply voltage regulator for the RF output stage, providing rejection to supply noise

- High output power (100mW or 200mW) from single 5V supply

- Antenna driver using OOK or ASK modulation

- Adjustable ASK modulation range (8% to 30%)

- Dual receiver input comprising AM & PM demodulation ensuring no "communication holes"

- ISO sub-carrier receiving and decoding compatibility (212kHz, 424kHz, and 848kHz)

- Built in reception low-pass and high-pass filters having selectable corner frequencies.

- Selectable reception gain

- Reception automatic gain control

- Reception RSSI measurement for AM and PM signal (3 bit)

- Measurement of external RF fields for reader to reader anti-collision

- Self diagnostic of the system through measurement of RF input level

- Oscillator using 13.56MHz quartz

- Power down, standby and active mode

- Extended temperature range: -40°C to 110°C
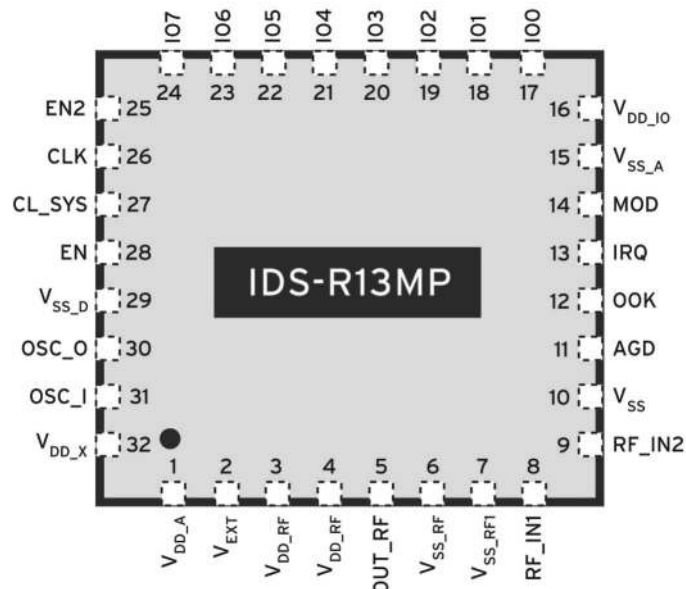
3   Pin Configuration

Figure 1: 32-Pin QFN Pinout (Top View)

4   Short Description

The IDS-R13MP is an integrated analogue front end and data framing system for a 13.56MHz RFID reader system. Built-in programming options make it suitable for a wide range of applications both in proximity and vicinity RFID systems.

The reader configuration is achieved by selecting the desired protocol in the control registers. Direct access to all control registers also allows fine-tuning of different reader parameters if needed.

Parallel or serial interface can be selected for communication between MCU and reader. When hardware coders and decoders are used (accelerators for different standards), transmission and receive function use the 12-bytes FIFO register. In case of direct transmission or reception, coders and decoders are bypassed and MCU has to service reader in real time.

The transmitter generates 100mW or 200mW output power into 50Ω load (at 5V supply) and is capable of OOK or ASK modulation. The integrated supply voltage regulators ensure supply rejection of the complete reader system.

The transmission system comprises low level coding for 1 out of 4 and 1 out of 256 for ISO15693, modified Miller for ISO14443A and high bit rate systems, Tag-it™ encoding. For all these systems the automatic generation of SOF and EOF, CRC and/or parity is supported.

The receiver system enables AM and PM demodulation using a dual input system (patent pending). The receiver also comprises automatic gain control option (also patent pending) and selectable gain and signal bandwidth to cover a range of input sub-carriers signal options. The signal strength of AM and PM modulation is measured and can be accessed in RSSI register. The receiver output is selectable between digitized sub-carrier signal and any of eleven integrated sub-carrier decoders (two for ISO 15693 high bit rate, two for ISO15693 low bit rate, two for ISO 14443, three for ISO14443 high bit rates, one for Tag-it™ system). Selected decoders deliver bit stream and data clock as outputs.

The receiver system also comprises framing system. This system performs the CRC and/or parity check, removes the EOF and SOF strings and organizes the data in bytes. Framed data is accessible to MCU through a 12-byte FIFO register and MCU interface. The framing is supported for ISO15693 and ISO14443.

To support external MCU and other circuitry a 3.3V regulated supply output and synchronization clock output are available. The regulated supply has a source current capability of 20mA.

5   Absolute Maximum Ratings

(Operating free–air temperature range, unless otherwise noted)*

Supply Voltage Range V_{EXT} (see Note 1) .... -0.3 V to 6 V

Maximum Positive Voltage - Other Pads .... V_{SUP} + 0.3V

Maximum Negative Voltage - Other Pads .... -0.3V

ESDS Rating, HBM (Human Body Model) .... 2 kV

ESDS Rating, CDM (Charged Device Model) 500V

ESDS Rating, MM (Machine Model) 200V

Maximum Operating Virtual Junction Temperature, T_J .... 140°C

Storage Temperature, T_{stg} .... -55°C to +150°C

Lead Temperature 1.6 mm from case for 10 seconds .... 300°C

*Stresses beyond those listed under »Absolute Maximum Ratings« may cause permanent damage to the device. These are stress ratings only and functional operation of the device at these or any other conditions beyond those indicated under »Operating Conditions« are not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

NOTE 1: All voltage values are with respect to substrate ground terminal V_{SS}.

6   Operating Conditions

(Operating free–air temperature range)
External Positive Supply Voltage, V_{EXT} ....2.7V to 5.5V, 5V typical
Operating virtual junction temperature range, T_J ....-40°C to +125°C
Operating ambient temperature range, T_A ....-40°C to +110°C
Input Current at Any Pin ....±100mA
Input Voltage at Analogue Input Pins ....1.5$V_{P\ (MAX)}$ (single-ended)

7   Application

Figure 2 shows a typical matching circuit for 50 ohm.

Figure 3 shows a typical application (4 ohm) with USB interface.
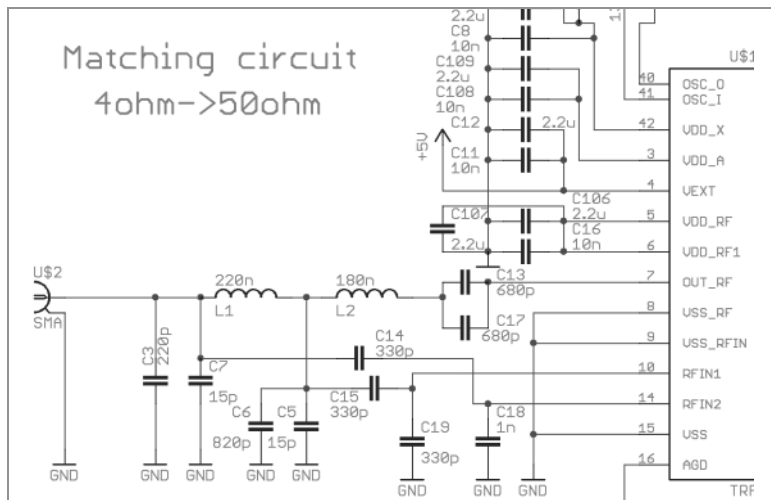
Figure 2: Matching Circuit (4 ohm to 50 ohm)
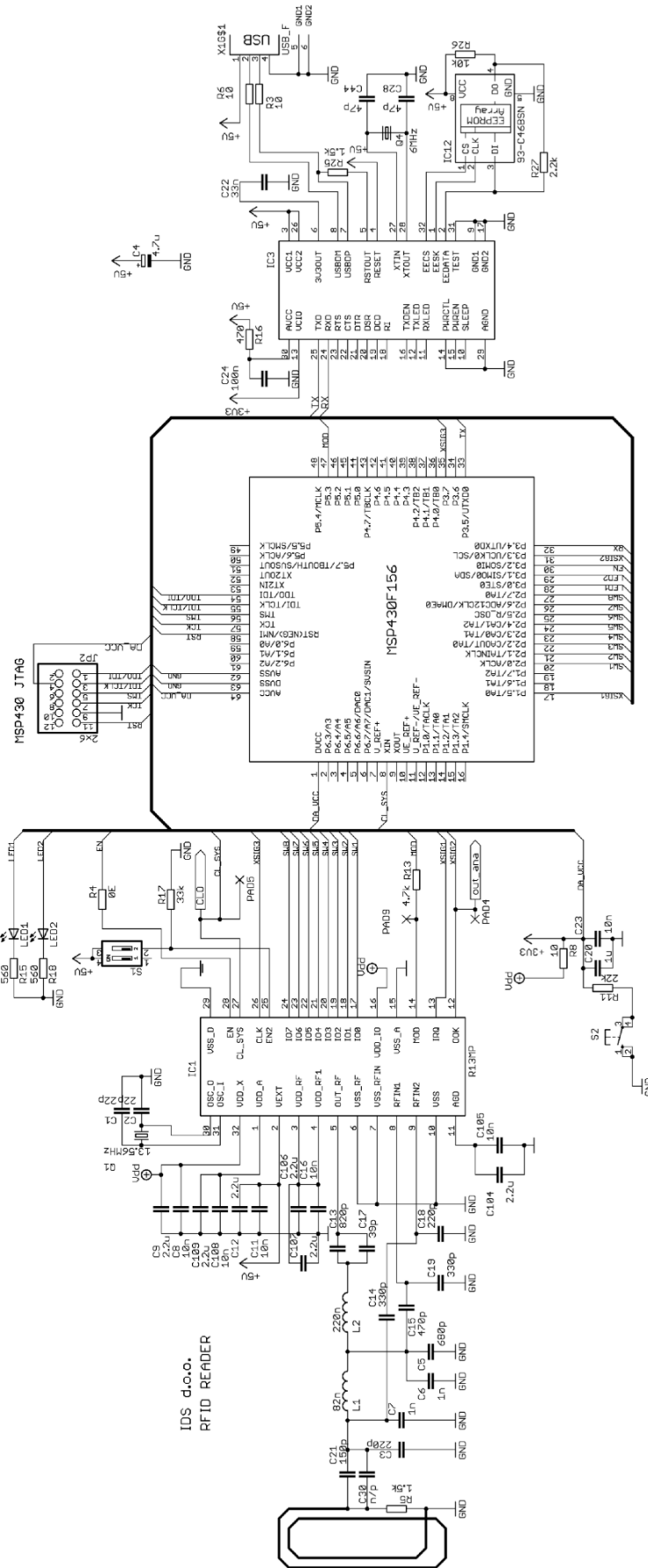
Figure 3: Typical Application

8 Package Outline

32-Pin QFN
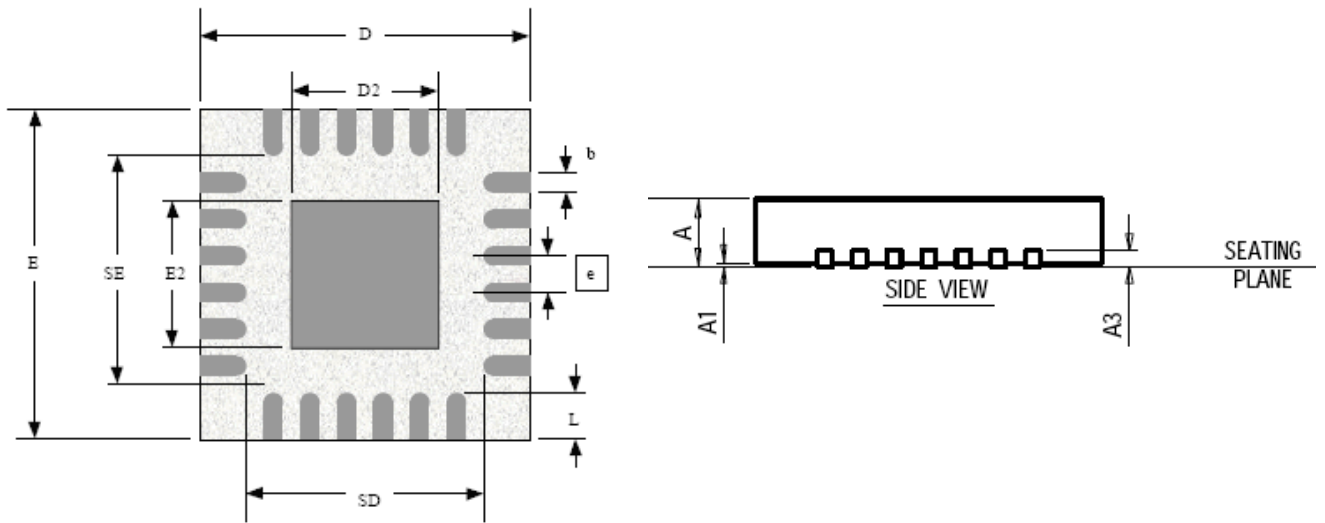
All dimensions are in millimetres.

Description	Package Size		Lead Pitch	Lead Width				Overall Height	Stand-Off	Lead Height
Legend	D	E	e	b	L	D2	E2	A	A1	A3
Nom.	5.00	5.00	0.50	0.25	0.40	3.45	3.45	0.90	0.02	0.20
Min.				0.18	0.30	3.30	3.30	0.80	0.00	
Max.				0.30	0.50	3.55	3.55	1.00	0.05	

9 Ordering Information

Ordering Code	Description	Operating Temperature Range	Package Type	Device Marking	Shipping Form
IDS-R13MP	13.56 MHz Multi-Protocol RFID Reader IC	-40°C to 110°C	QFN32 (5 x 5 mm) RoHS*	IDS R13MP	Mini Tape & Reel (250/reel)

*) Pb-Free (RoHS compatible), and free of Bromine (Br) and Antimony (Sb) based flame retardants (Br or Sb do not exceed 0.1% by weight in homogeneous material).

Order quantities should be a multiple of shipping form.

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