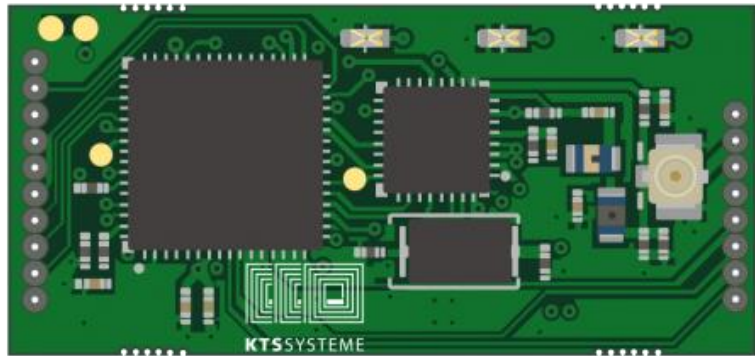**KTS**SYSTEME

RFID Plug-In Module

RFIDM1356-001

The KTS RFID Plug-In Module is a fully integrated RFID transceiver module designed for integration into existing hardware designs. The module contains a full-fledged microcontroller and a high-performance RFID transceiver IC, combined with the proven, robust KTS RFID embedded software stack – perfect for efficient implementation of RFID functionality in both existing and new applications.

The RFID transceiver includes a powerful RF front-end with up to +23dBm (200mW) of output power into a matched 50Ω antenna feed, along with a dual channel receiver for improved reading performance. The Plug-In Module supports ISO15693 and ISO14443A/B.

The Module comes with two pin-headers for THT mounting with all required connections, in addition to an optionally usable U.FL jack directly on the module itself. The Module communicates via a UART-compatible serial interface, using the standard KTS AT-Style command set.

KTS provides a substantial support package for the Plug-In Module, including EDA component files, extensive implementation information and software packages for management and configuration. We also offer design and development services for integration of the Module into existing and future projects on both hardware and software fronts.

Technical Specifications

Technical Specifications			
Product type	RFID Plug-In Module for THT Mounting		
Operating frequency	13.56 MHz		
Antenna connection	Single-ended 50Ω connection via Pin-Header or U.FL connector		
RF output power	Up to +23dBm / 200mW		
Power supply	5V DC		
Power consumption	100mA avg.		
RFID standard support	ISO 15693, ISO14443A/B		
Anticollision	Supported		
Standard host interfaces	UART w/ HW flow control		
UART Instruction set	Extensive AT-style command set for scanning, reading and writing tags as well as configuration		
THT Connectors	Standard 1.27mm pitch pin-headers with 10 and 8 pins, respectively		
UI	Signalling LEDS	Green	Run LED – Lights when reader is receiving power via USB and is on
		Yellow	Tag LED – Lights when RFID tag is detected within reading range
		Red	Data LED – Lights when data transfer to or from a tag is taking place
Product certifications	CE Certified		
Dimensions	36 x 16 x 4 mm [LxWxH] 36 x 16 x 7mm [LxWxH] including pin headers		
Weight	3.2g		
Order number	RFIDM1356-001		

Typical Applications

- Stationary reader/writer applications
- Powered reader/writer applications
- Low Volume & Prototyping

Pin Descriptions

Figure 1: Module pinout

Pin Description			
Pin	Function	Description	Parameters & Add. Info
1	VCC	Power Supply	Connect this pin to a 5V supply
2	NC	Reserved, do not connect	
3	NC	Reserved, do not connect	
4	NC	Reserved, do not connect	
5	NC	Reserved, do not connect	
6	RX	UART RX	UART serial data RX (module in)
7	TX	UART TX	UART serial data TX (module out)
8	RTS	UART RTS	UART Request-To-Send (module out) – Optional, leave floating if unused
9	CTS	UART CTS	UART Clear-To-Send (module in) – Optional, leave floating if unused
10	GND	Ground connection	Connect this pin to Ground
11	VCC	Power Supply	Connect this pin to a 5V supply
12	MUX1	Proprietary Shift Register Multiplexing Port	
13	MUX2	Proprietary Shift Register Multiplexing Port	
14	MUX3	Proprietary Shift Register Multiplexing Port	
15	MUX4	Proprietary Shift Register Multiplexing Port	
16	GND	Ground connection, RF reference	Connect this pin to Ground
17	RF	50Ω RFID Signal	Single-Ended
18	GND	Ground connection, RF reference	Connect this pin to Ground

Design & Implementation

RF Output

The Plug-In Module provides a single-ended antenna connection on Pin 17 (*RF*). Connect this pin to a impedance-controlled 50Ω trace for optimal performance. Pins 16 and 18 (RF signal reference GND pins) should always be connected to GND for optimal performance.

The RF front-end allows two different TX power output settings, which can be selected via the TX Power Config Flag.

1. The voltage supplied to the RF front-end analog section via Pin 57 (*V_IN_TRF*)

2. The programmable TX Power Config Flag

TX Power Config Flag	
High Power Mode	**Low Power Mode**
+23dBm / 200mW	+18.45dBm / 70mW

RF PCB Traces

As soon as the PCB design allows, any PCB trace connected to Pin 17 (*RF*) should be impedance controlled, ideally as close to 50Ω as possible for optimal performance. Large deviations from this recommendation can result in severely reduced RF performance as well as EMI issues.

The RF traces should be routed over an uninterrupted, unhatched ground reference such as a plane layer or, in the case of a two-layer board, a polygon pour on the opposite layer. However, due to the extremely wide traces required to achieve sufficiently low impedances on two-layer PCBs with standard thicknesses (0.5mm and thicker), as well as the likelihood of a GND polygon pour on the layer opposite the RF trace being interrupted, boards with a ground plane are highly recommended.

Differential RF Path

If very long RF traces are required or the application involves high levels of interference, it may be necessary to convert the Plug-In Module RF output from single ended to a differential signal. This can be achieved with an off-the-shelf Balun IC, or using a traditional transformer with a center tap on the secondary (differential side) winding.

Conversion from single ended to differential routing should take place as close to the Module as the layout allows, so as to reduce the likelihood of interference entering the signal chain in the single ended section.

UART

The Plug-In Module provides a full UART interface with standard 3.3V signalling and optional hardware flow control on Pins 6, 7, 8 and 9 (RX, TX, RTS and CTS, respectively). If flow control is not required, Pin 8 (*RTS*) and Pin 9 (*CTS*) can be left floating.

The UART interface implements the KTS AT-style command set. See the *AT Command Reference Guide* on http://rfid.kts-systeme.de/downloads/.