



**austriamicrosystems AG**

**is now**

**ams AG**

The technical content of this austriamicrosystems application note is still valid.

**Contact information:**

**Headquarters:**

ams AG  
Tobelbaderstrasse 30  
8141 Unterpremstaetten, Austria  
Tel: +43 (0) 3136 500 0  
e-Mail: [ams\\_sales@ams.com](mailto:ams_sales@ams.com)

Please visit our website at [www.ams.com](http://www.ams.com)

## Product Brief

# The AS399x PICO Reference Design

### Contents

1. General Description
2. Key Features
3. Applications
4. Schematics & Dimensions
5. Contacts



## 1 General Description

The PICO UHF RFID Reader reference design from austriamicrosystems is an Ultra Low Cost EPC Class 1 Gen 2 compliant UHF RFID Reader system. Leveraging the AS399x family of UHF RFID Reader IC's, provides the industries lowest BOM cost, best in class power consumption with the least amount of complexity.

The industries lowest reader BOM enables UHF RFID markets that have previously been out of reach due to cost restraints. With regards to overall cost vs performance the PICO UHF RFID reference design is unmatched in the industry.

Using the internal PA it delivers up to 17 dBm, this is ideally suited for those applications that have tight cost constraints such as consumer or mobile applications.

The PICO reference design comes in two parts namely the analogue (RF) and digital (controller) parts. The user can separate the two boards to fully prove out their own RF and digital parts. With this set up it also means the user can evaluate the suitability of RFID in their current system.

The RF portion is designed such that it can be easily connected to a host micro via SPI. The high level of integration found on the AS399x UHF RFID Reader IC's allows for minimal code loading and quick implementation.

The reference designs come with free, fully portable code and all gerbers and schematics. These allow for a quick, trouble free design in.

You no longer have to be a RFID expert to implement RFID.

## 2 Key Features

- Interface
  - Between the Controller and Host Computer is USB
  - Between the Controller and the AS399x is SPI via a low cost pinheader connection
  - Between the RF board and the Antenna we use a U.FL (50 Ohm) SMA (Male)
- 5V power supply from USB.
- GUI
  - Adjust Output Power
  - Adjust Receive – Sensitivity
  - Adept to different frequency schemes
  - Change Gen2 specific parameters like BLF, Coding, Session Flags, ...
  - Diagnostic Features: RSSI Measurement, Reflected Power Measurement
  - Support for sending direct commands
  - Advanced Tag Manipulations: R/W to different memory banks, define passwords
  - Associate tags with other applications like media player
  - View and easily manipulate register settings with advance tool tip text.

- Power consumption of complete reader system - typical 650mW
- Compatible with both the AS3991 and AS3992 reader chips
- Fully Gen 2 compliant, ISO 18000-6b & c
- Differential Tx chip-output configuration
- Internal Power Amplifier
- Maximum output power 17 dBm scalable in 1dB steps
- Single – ended Rx chip-input configuration
- Low cost MCU: Silabs (C8051F340-GQ)
- Indicator LED

### 3 Applications

Typical applications for the MICRO reference design include;

- Embedded Consumer Applications
- Mobile Applications (Low Power Handheld, PDA's, Smart Phones)
- Embedded Industrial Applications
- Gaming
- Desk top readers
- Low/Mid powered modules

### 4 Schematics and Dimensions

RF Board

- Dimensions 27.99 x 20.83mm
- 2 layer PCB
- Single side component placement
- PCB thickness 1.6mm

Controller Board

- Dimensions 26.85 x 20.57mm
- 2 layer PCB
- Single side component placement
- PCB thickness 1.7mm

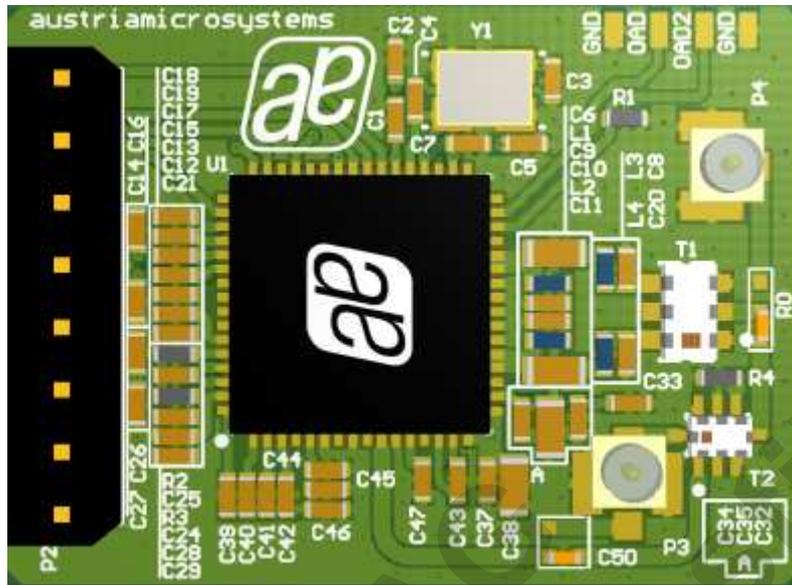


Fig 1

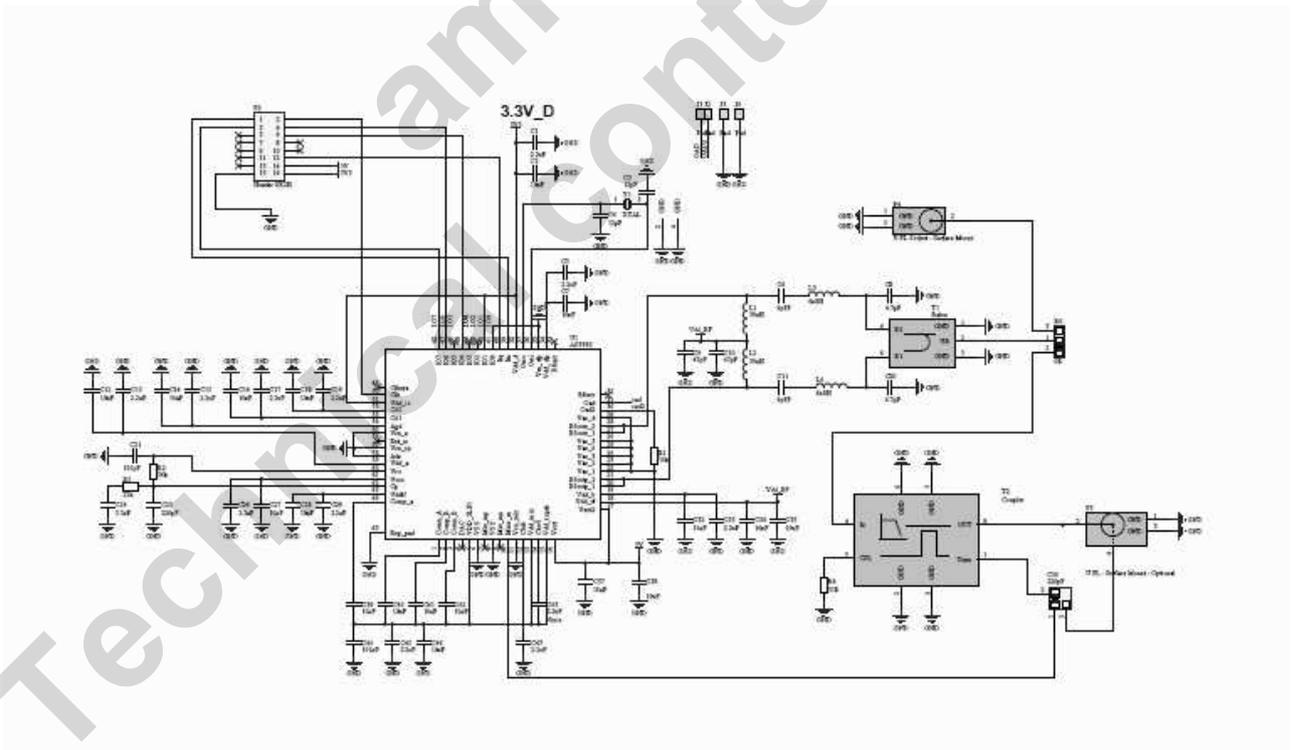


Fig 2

## 5 Contact

Mark Dickson – Marketing Manager RFID

Phone +43 3136 500 5916

Fax +43 3136 500 5692

[mark.dickson@austriamicrosystems.com](mailto:mark.dickson@austriamicrosystems.com)

ams AG  
Technical content still valid