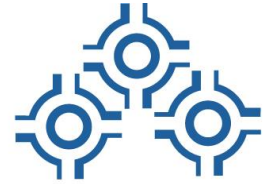


RSK 300

Evaluation System



3ALogics



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1. General information

Scope

This document explains operation of RSK300 including system connection, RF module functions and features, characteristics and specifications, reference design such as PCB Gerber file, BOM and schematic, etc...

Product outline

RSK board uses TRH033M reader chip (13.56MHz RFID Superplus Reader IC) supporting multi-protocols (ISO 14443A, 14443B, 15693, I-CODE, Tag-It, Inside, Felica, Jewel/Topaz). User can easily view 13.56MHz protocol and it's ID through embedded LCD or connecting to PC. Not only user can evaluate functionality of TRH033M but also help to understand 13.56MHz RFID various protocols. MCU includes flash memory thus user can re-program without having to have separate equipment. Also RSK300 includes firmware source so user can reduce design time and enhance understanding of RFID firmware applications.

Product Contents



- TRH033M sample chip : 3ea / RSK board
- 3ALogics TAG : ISO/IEC 14443A type 2ea , ISO/IEC 15693 type 2ea, TOPAZ tag 1ea
- SDK CD / RS 232 Serial Cable / 110V/220V AC Adaptor
- 50ohm matching antenna and balun module / RF cable
- SMA connector type Antenna

System requirements

Hardware :

- PC (Pentium 100MHz / RAM 32MB)
- RS232 Serial Port
- 200MB free hard disk space
- CD-ROM or DVD-ROM drive

Software :

- Windows 2000
- Windows XP

Features

- 13.56MHz Multi-Protocol Reader module
- Based on the TRH033M
- 5V DC power
- Supports Protocols
 - ISO/IEC 14443 A / B
 - ISO/IEC 15693
 - Tag it (Texas instrument)
 - Inside (Inside Contactless)
 - I-CODE1 (NXP)
 - Jewel (Innovision)
 - Felica (Sony)
- RS232 Serial interface
- 16 X 2 Character LCD module
- Microcontroller with 256K byte RAM, 64K byte ROM
- On board HF Antenna Coil
- 50ohm Matching Antenna system
 - Balun circuit and matching circuit

CD Manual

- RSK 100 Evaluation system document
- SDK Manual document
- SDK software
- TAG specification (Data sheet)
- Firmware Manual document
- Firmware source
- Flip software (Atmel MCU program software)

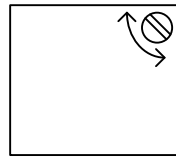
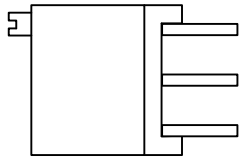
Connecting to Computer

- AC adapter connect
- LCD light Check
- RS 232 Serial Cable connect
- SDK software start (SDK Manual document reference)
- SDK software start
- Tag ID read (SDK Window / LCD module)



Caution

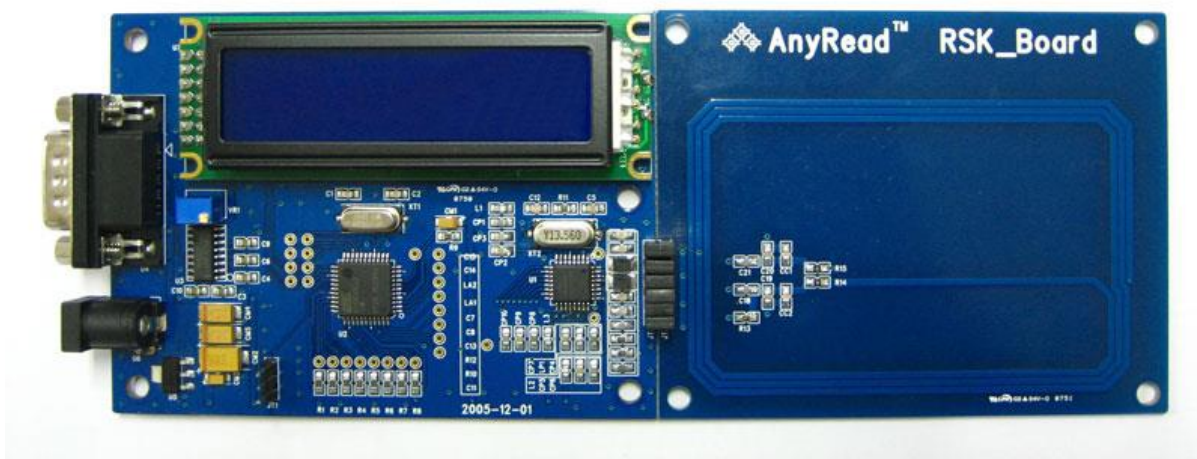
- Avoid magnetic or electric shock
 - Do not dismantle
 - Avoid water or humidity
 - Avoid vibration or shock
 - Only use power adaptor supplied with the kit
 - Avoid direct sunlight and heat
 - Do not operate on metallic object
 - Adjust resistor when LCD panel is not bright words do not appear clearly
- VR1 (Variable Resistor)
- LCD brightness adjustment



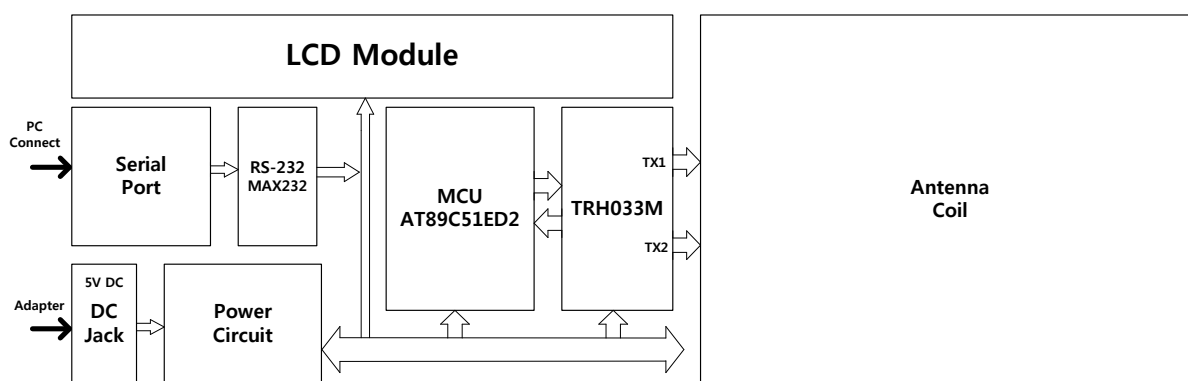
■ Please make sure product specification before use. Any damage or improper usage of the product may result in inability to return goods to manufacturer.

2. Product description

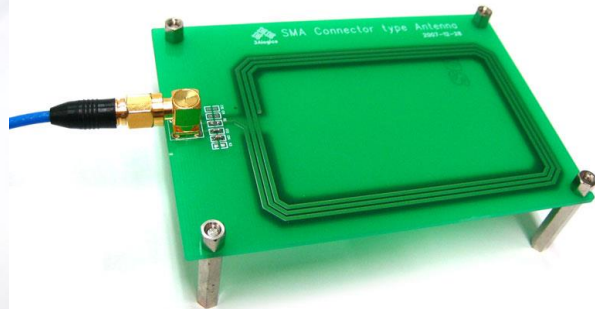
RSK board



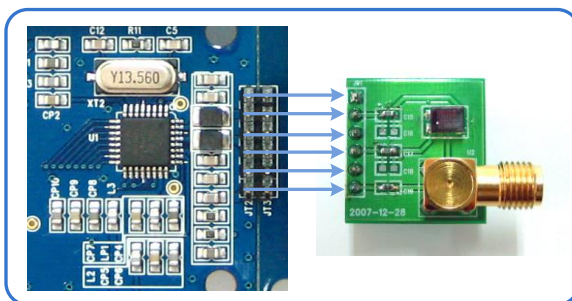
Block diagram



50ohm matching antenna system

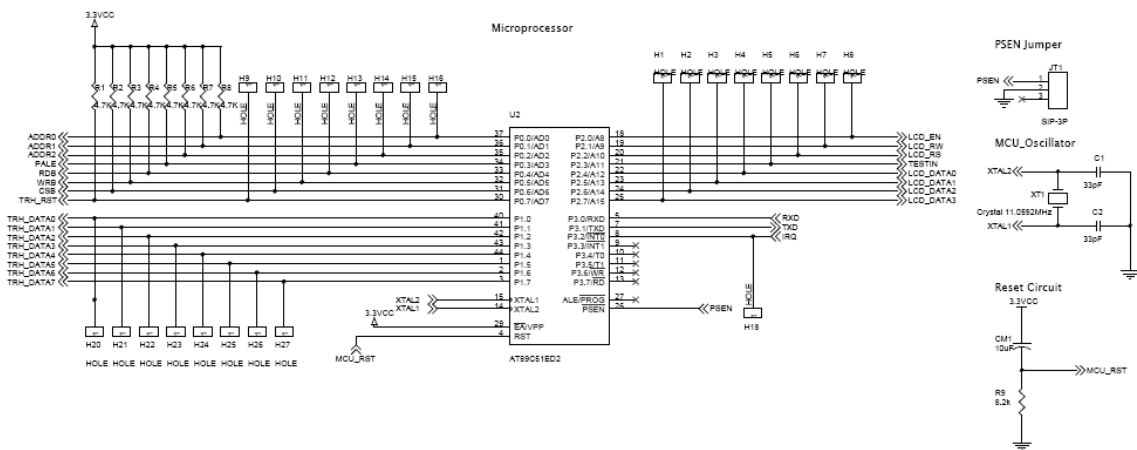


RSK board and 50ohm matching system connection

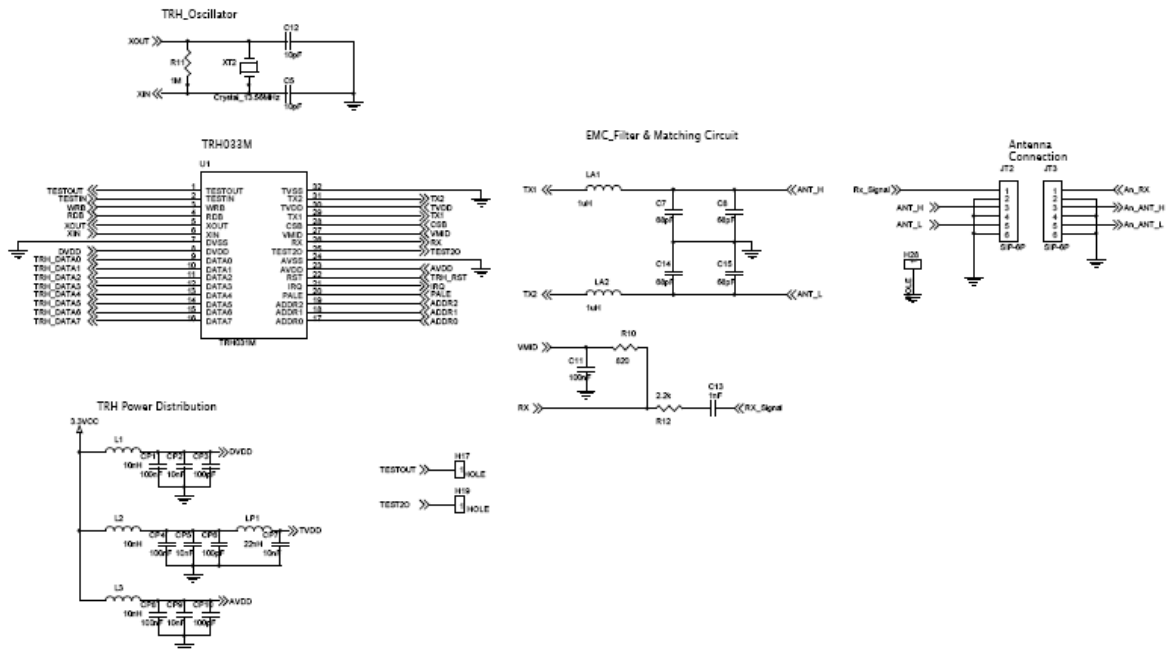


3.RSK PCB description

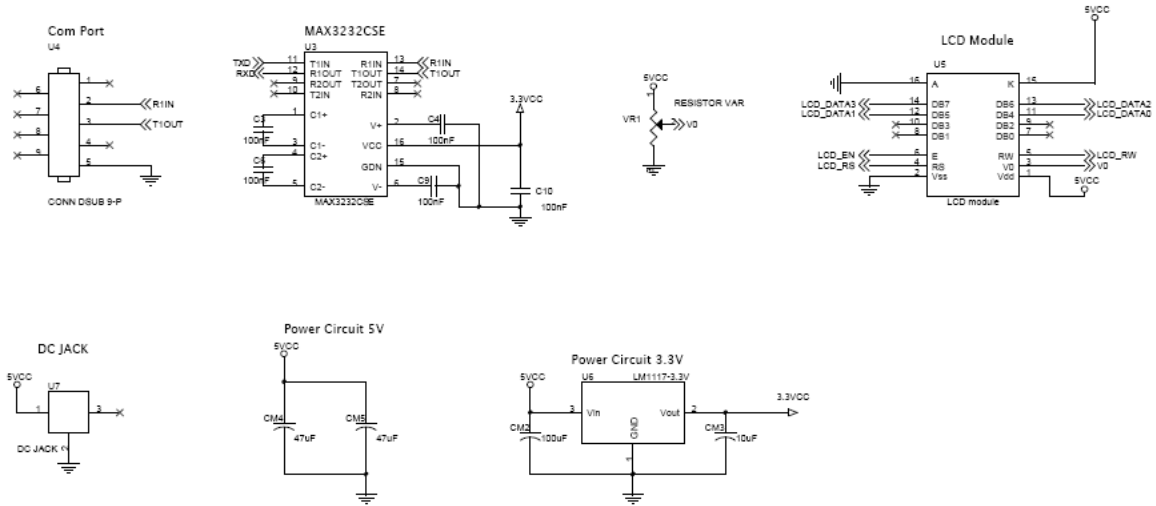
Schematic (RSK board)



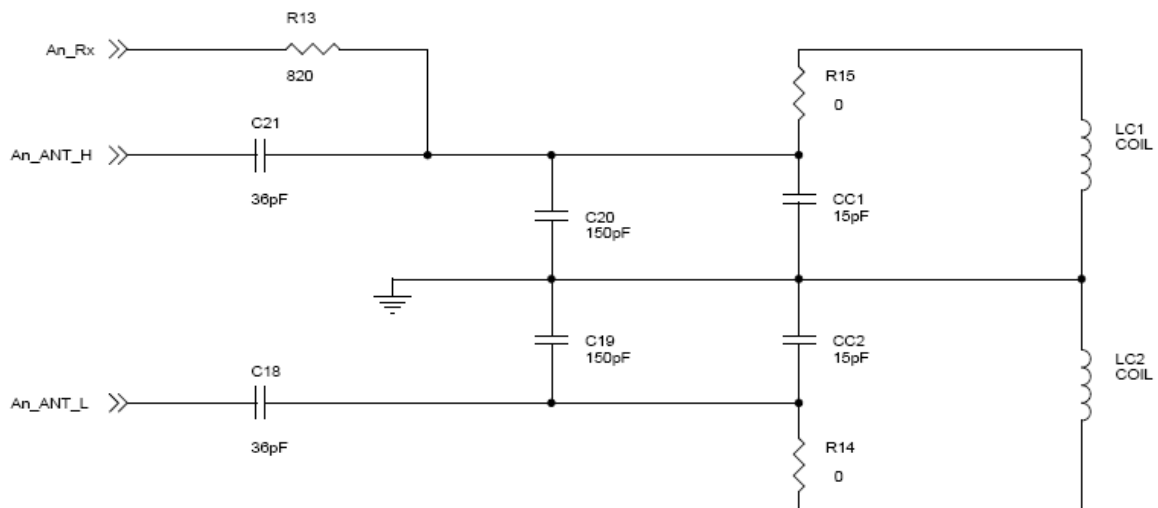
Picture 3-1 MCU (Atmel AT90C51ED2)



Picture 3-2 HF RFID Reader IC (TRH033M)

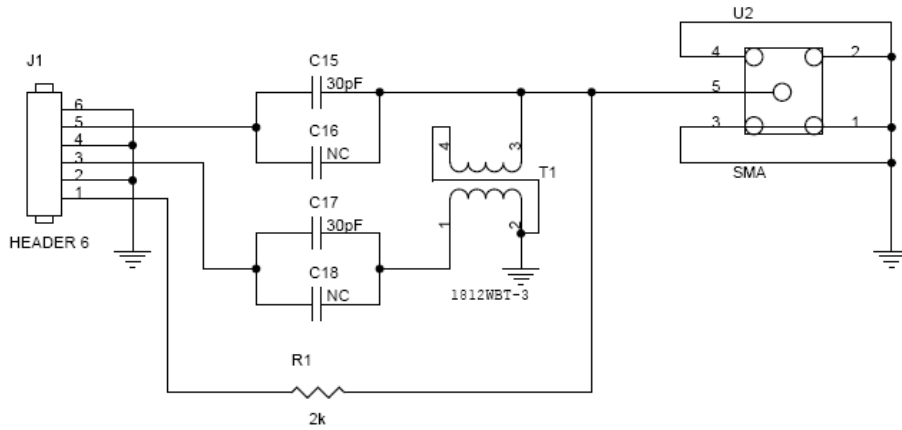


Picture 3-3 Power Circuit & Serial port & LCD module

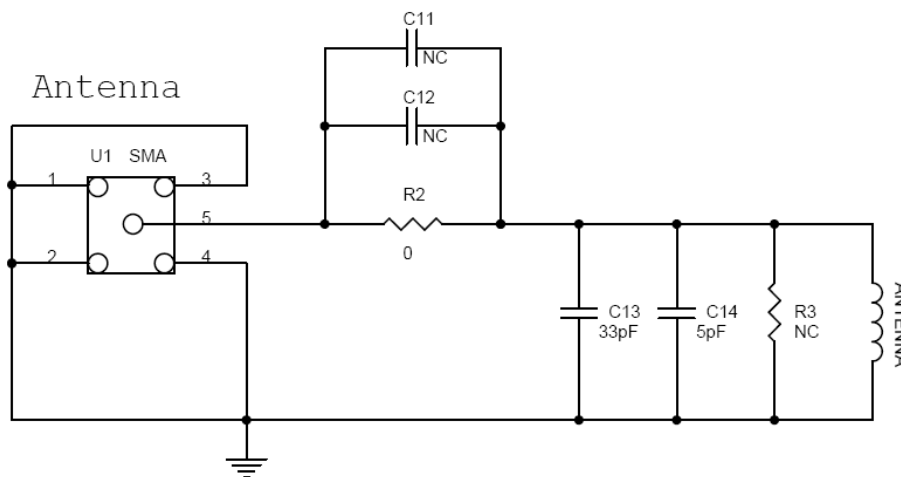


Picture 3-4 Antenna Coil

Schematic (50Ω matching system board)



Picture 3-5 Balun (Transformer) Circuit



Picture 3-6 50Ω Matching Antenna Schematic

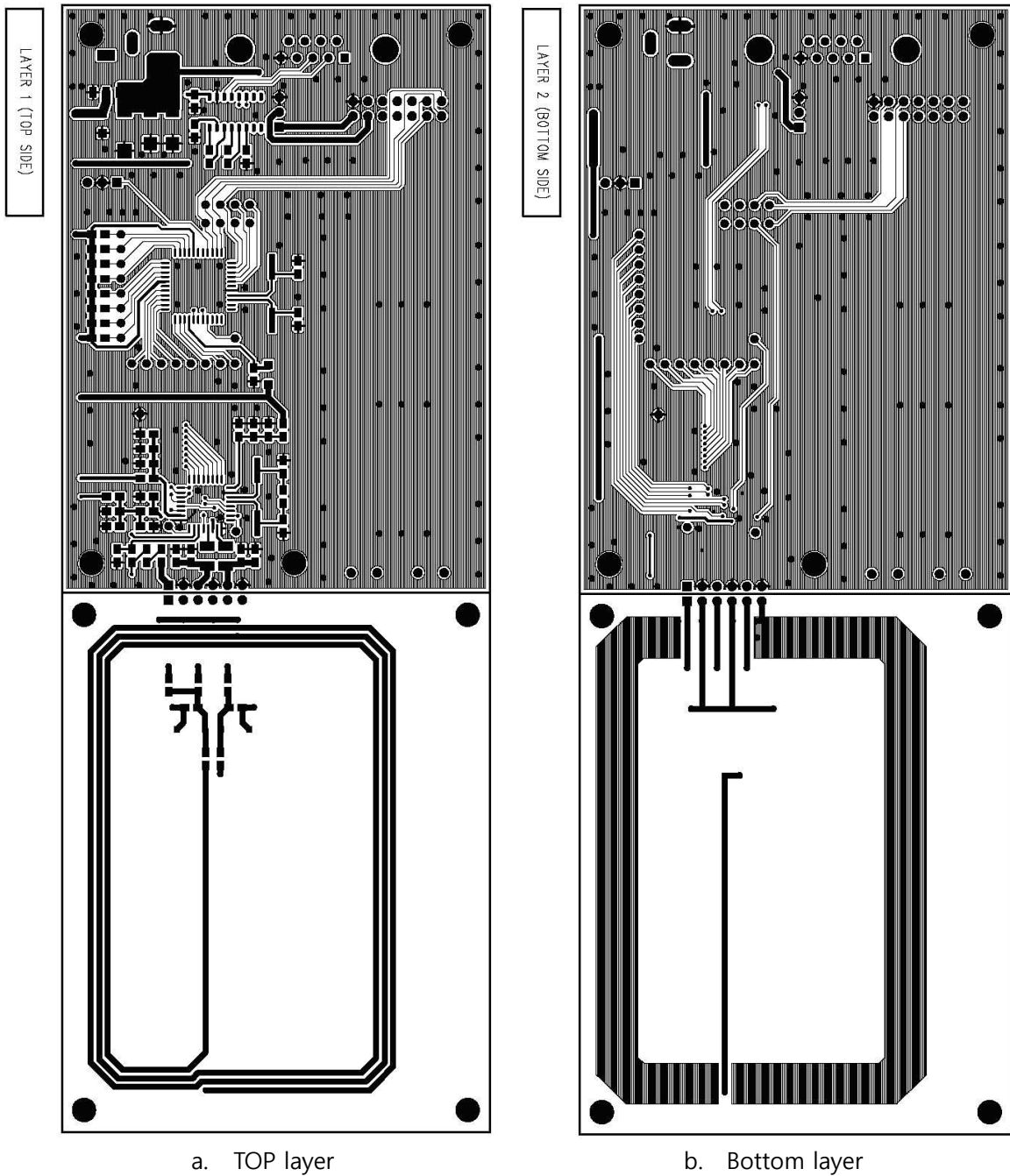
Part list (BOM, RSK board)

| Num | Quantity | Part | Value |
|-----|----------|----------------------------------|--------------------|
| 1 | 2 | CC2,CC1 | 15pF |
| 2 | 2 | CM3,CM1 | 10uF |
| 3 | 1 | CM2 | 100uF |
| 4 | 2 | CM4,CM5 | 47uF |
| 5 | 9 | CP1,C3,CP4,C4,C6,CP8,C9, C10,C11 | 100nF |
| 6 | 4 | CP2,CP5,CP7,CP9 | 10nF |
| 7 | 3 | CP3,CP6,CP10 | 100pF |
| 8 | 2 | C2,C1 | 33pF |
| 9 | 2 | C5,C12 | 10pF |
| 10 | 4 | C7,C8,C14,C15 | 68pF |
| 11 | 1 | C13 | 1nF |
| 12 | 2 | C21,C18 | 36pF |
| 13 | 2 | C20,C19 | 150pF |
| 14 | 1 | H1 | Hole |
| 15 | 1 | JT1 | SIP-3P |
| 16 | 2 | JT2,JT3 | SIP-6P |
| 17 | 2 | LA2,LA1 | 1uH |
| 18 | 2 | LC1,LC2 | COIL |
| 19 | 1 | LP1 | 22nH |
| 20 | 3 | L1,L2,L3 | 10nH |
| 21 | 8 | R1,R2,R3,R4,R5,R6,R7,R8 | 4.7K |
| 22 | 1 | R9 | 8.2k |
| 23 | 2 | R13,R10 | 820 |
| 24 | 1 | R11 | 1M |
| 25 | 1 | R12 | 2.2k |
| 26 | 2 | R15,R14 | 0 |
| 27 | 1 | U1 | TRH033M |
| 28 | 1 | U2 | AT89C51ED2 |
| 29 | 1 | U3 | MAX3232CSE |
| 30 | 1 | U4 | CONN DSUB 9-P |
| 31 | 1 | U5 | LCD module |
| 32 | 1 | U6 | LM1117-3.3V |
| 33 | 1 | U7 | DC JACK |
| 34 | 1 | VR1 | RESISTOR VAR |
| 35 | 1 | XT1 | Crystal 11.0592MHz |
| 36 | 1 | XT2 | Crystal_13.56MHz |

Part list (BOM, 50Ω matching system board)

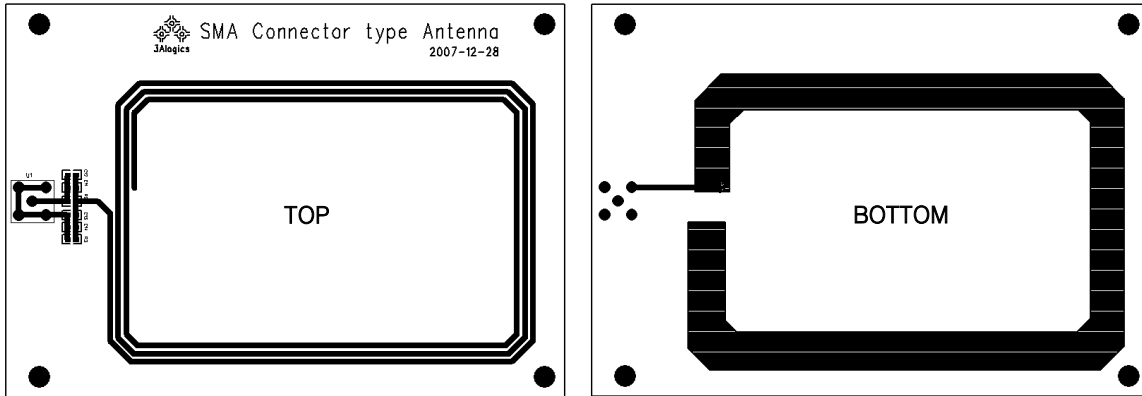
| Num | Quantity | Part | Value |
|-----|----------|---------|-----------|
| 1 | 2 | U1,U2 | SMA |
| 2 | 1 | J1 | SIP-6P |
| 3 | 2 | C15,C17 | 30pF |
| 4 | 2 | C16,C18 | NC |
| 5 | 2 | C11,C12 | NC |
| 6 | 1 | R2 | 0 |
| 7 | 1 | R3 | NC |
| 8 | 1 | C13 | 33pF |
| 9 | 1 | C14 | 5pF |
| 10 | 1 | ANTENNA | Coil |
| 11 | 1 | T1 | 1812WBT-3 |

Gerber (Layout) : RSK board

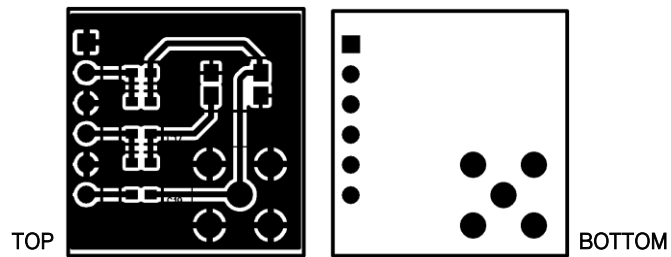


Picture 3-7 RSK Board Layout

Gerber (Layout) : 50ohm matching system board



a. 50Ω matching antenna



b. Balun circuit

Picture 5-8 50Ω matching circuit layout

4. Electrical characteristics

Operating condition

| Parameter | MIN | MAX | UNIT |
|-----------------|-----|-----|------|
| Temperature | -20 | 85 | °C |
| DC Power supply | 4.5 | 5.5 | V |

Current consumption

| Parameter | Conditions | MIN | TYP | MAX | UNIT |
|---------------------|--------------------|-----|-----|-----|------|
| Current Consumption | Operating | - | 150 | - | mA |
| | Only MCU Operating | - | 29 | - | mA |

Operating distance

| Parameter | MIN | TYP | MAX | UNIT |
|-----------------------------------|-----|-----|-----|------|
| Operating Distance | - | 7 | - | cm |
| 50ohm matching Operating Distance | - | 7 | - | cm |

Serial interface characteristic

| Parameter | VALUE | UNIT |
|--------------|-------|------|
| Baud-rate | 9600 | baud |
| Cable length | 2.0 | m |

1:1 Transformer (Balun) characteristic

| Parameter | VALUE | UNIT |
|-----------------|-------|---------|
| Frequency range | 50 | MHz |
| Inductance | 1.25 | μ H |
| Insertion loss | <1 | dB |
| I_{DC} | 500 | mA |

RF Coaxial Cable characteristic

| Parameter | VALUE | UNIT |
|-----------------|------------|------|
| Frequency range | 0.1 ~ 2000 | MHz |
| Cable length | 1.0 | m |
| Connector type | SMA | - |

5.Revision history

| Date | Version | Content |
|--------------|---------|---------------------|
| 2008. 04. 11 | 0.1 | Preliminary release |
| 2008. 04. 16 | 1.0 | 1.0 Version release |
| | | |
| | | |
| | | |

6.Customer support

Warranty

1 year limited warranty.

The warranty does not cover the repair or exchange of a Machine resulting from misuse, accident, modification, unsuitable physical or operating environment, improper maintenance by you, or failure caused by a product for 3ALogics is not responsible. The warranty is voided by removal or alteration of board or parts identification labels.

Contents

1. General introduction
2. Product description
3. RSK PCB description
4. Electrical characteristics
5. Revision history
6. Customer support

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- is a trademark of 3ALogics.

RSK Board physical dimension

FR4 / 2layer / 1.6T

RF module size :

110mm X 73.5mm

Antenna Coil size :

80mm X 53mm

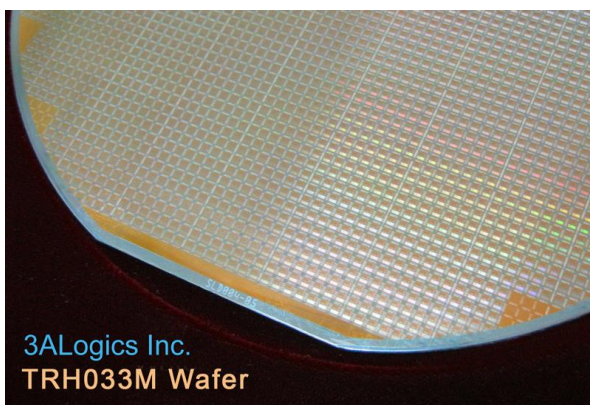
LCD module size :

82mm X 29mm (height: 12.5mm)

Balun module size :

20mm X 20mm

3ALogics 13.56MHz RFID reader Evaluation system RSK 300 Quick Guide



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MEMO

A large, empty rectangular box with a dotted border, intended for writing a memo.

It's RFID

RFID & Mobile SoC for Ubiquitous Technology

