# STG-152828GHFA101

# Application Note

# Touch Panel User Guide

# (For Drive:NT11004)

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**Version: Preliminary**

## Contents

# 1. Revision History

| Date | Page | Contents | Version |
|---|---|---|---|
| 2012/11/21 | * | Preliminary | V1.0 |
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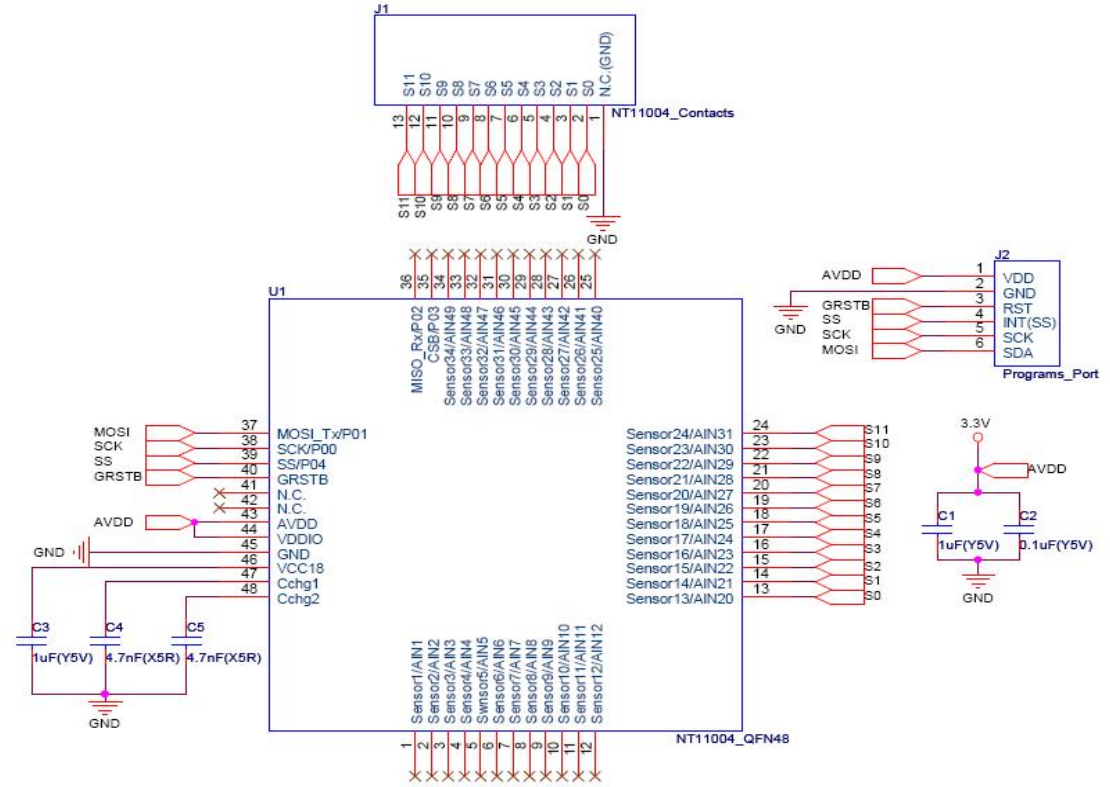
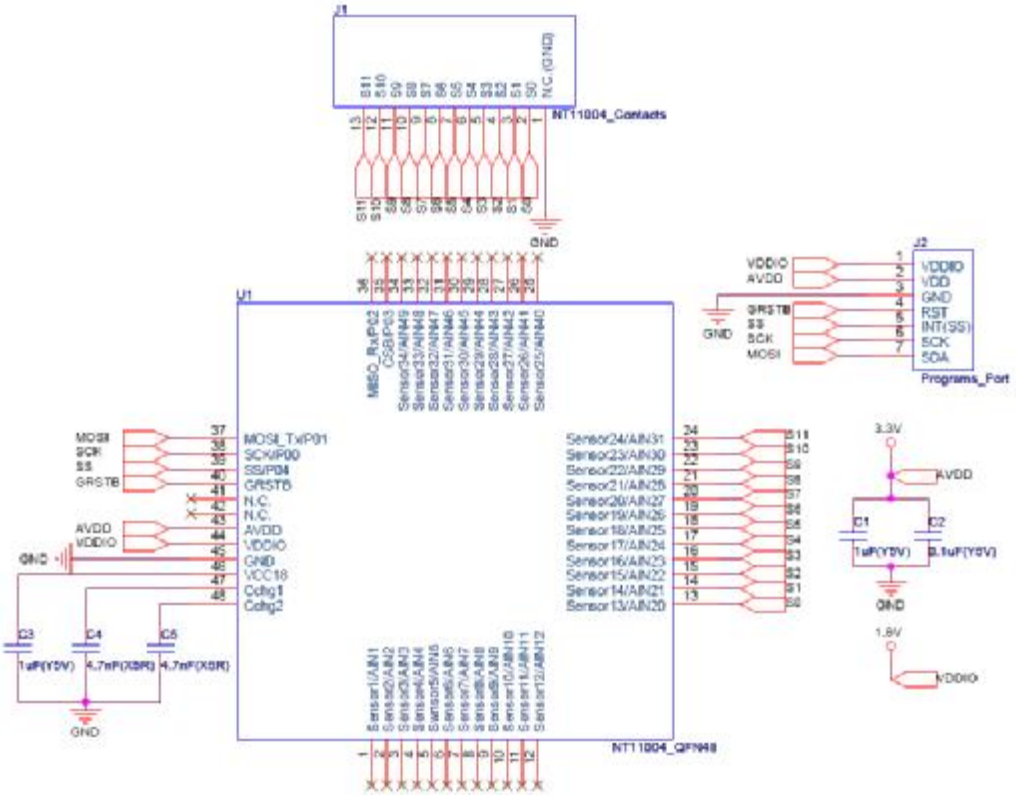
# 2. Application Circuit

## 2.1 VDDIO=AVDD




## 2.2 VDDIO≠AVDD



## 3. Symbol Define

**S0~S11:** Analog input pad.

**VDDIO:** GPIO Logic Level (1.65V~3.6V).

**AVDD(VDD):** Main Power Input for Digital(2.7V~3.6V).

**GND:** Ground.

**GRSTB(RST):** NT11004 Global Reset input.

**SS(INT):** I2C request(interrupt signal).

**SCK:** Clock pad of I2C serial interface.

**MOSI(SDA):** I2C: SDA pad

**J1:** Connected to the touch sensor.

**J2:** Program firmware interface port.

## 4. DC Electrical Characteristics

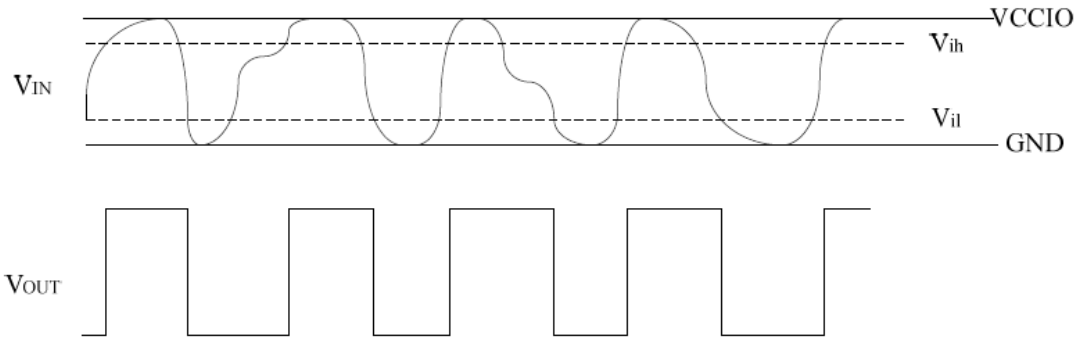
($V_{DD}$=3.0V, GND=0V, $T_A$=-20℃~85℃)

For the digital circuit

| Parameter | Symbol | Min. | Typ. | Max. | Unit | Conditions |
|---|---|---|---|---|---|---|
| Supply Voltage | $V_{DD}$ | 2.7 | | 3.6 | V | Digital power |
| Low Level Input Voltage (VDDIO=3.0V) | $V_{il}$ | GND | - | 0.3xVDDIO | V | Digital input pins |
| Low Level Input Voltage (VDDIO=1.8V) | | | | 0.2xVDDIO | | |
| High Level Input Voltage (VDDIO=3.0V) | $V_{ih}$ | 0.7xVDD | - | VDD | V | Digital input pins |
| High Level Input Voltage (VDDIO=1.8V) | | 0.8xVDD | | | | |
| Input Leakage Current | $I_{il}$ | - | - | ±1 | μA | Digital input pins |
| Pull-high Impedance | $R_{inh}$ | 150 | 200 | 250 | KΩ | $V_{DD}$ = 3.0V, $T_A$=25℃ |
| Pull-low Impedance | $R_{inl}$ | 150 | 200 | 250 | KΩ | $V_{DD}$ = 3.0V, $T_A$=25℃ |
| Deep Operation Current | $I_{st}$ | - | - | 30 | μA | $V_{DD}$= 3.0V, $T_A$=25℃ |
| Normal Operation Current | $I_{CC}$ | - | -- | 7 | mA | $V_{DD}$= 3.0V, $T_A$=25℃ 8~15 Bits ADC |

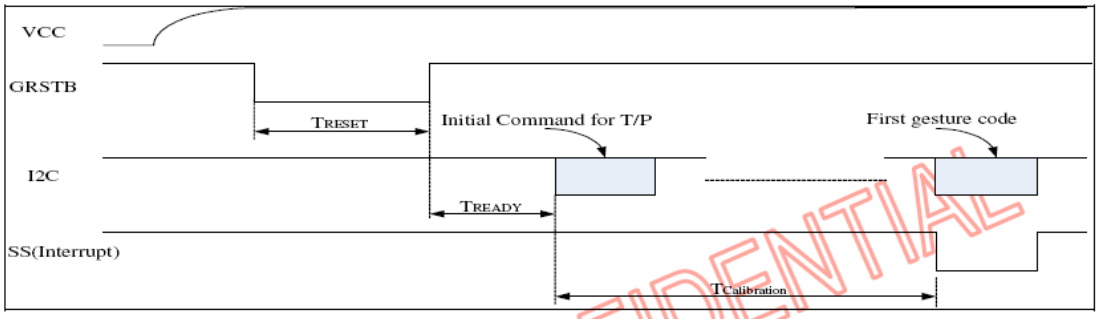


Diagram of digital input $V_{ih}$/ $V_{il}$.



# 5. Timing Characteristics

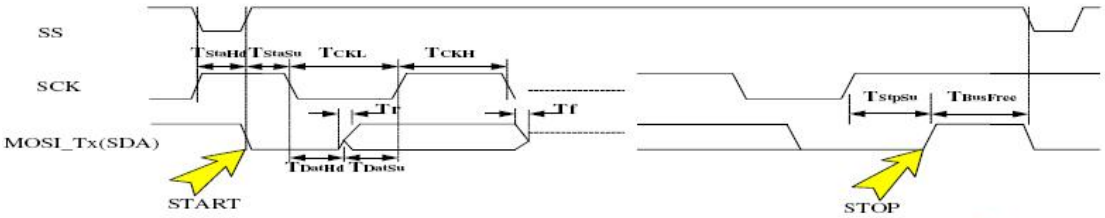
## 5.1 Power on and Reset Timing




| Symbol | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|
| $T_{RESET}$ | 2 | | | mS |
| $T_{READY}$ | 2 | | | mS |
| $T_{Calibration}$ | 500 | | | mS |



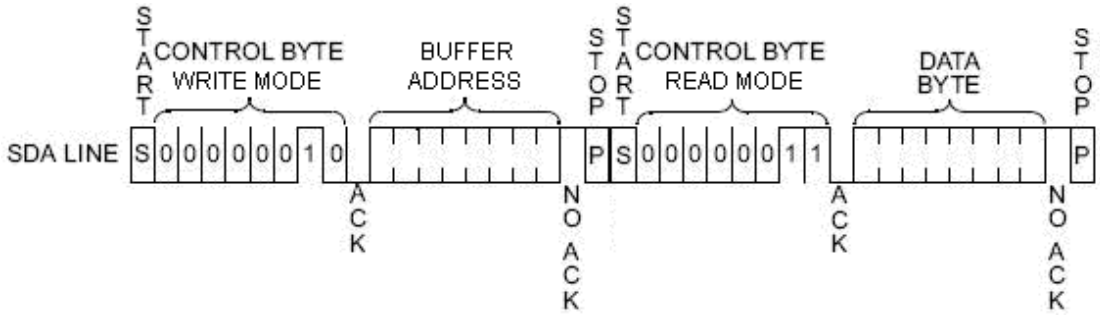
## 5.2 I2C Interface




| Parameter | Symbol | Min. | Typ. | Max. | Unit | Conditions |
|---|---|---|---|---|---|---|
| Working Frequency | Fclk | | | 400 | KHz | $V_{DD}$ =3.0V, $T_A$=25℃ |
| I²C Clock Low | $T_{CKL}$ | 1250 | | | nS | $V_{DD}$ =3.0V, $T_A$=25℃ |
| I²C Clock High | $T_{CKH}$ | 1250 | | | nS | $V_{DD}$ =3.0V, $T_A$=25℃ |
| I²C Data Rising Time | $T_r$ | | | 300 | nS | $V_{DD}$ =3.0V, $T_A$=25℃ |
| I²C Data Falling Time | $T_f$ | | | 300 | nS | $V_{DD}$ =3.0V, $T_A$=25℃ |
| I²C Data Hold Time | $T_{DatHd}$ | 0 | | | nS | $V_{DD}$ = 3.0V, $T_A$=25℃ |
| I²C Data Setup Time | $T_{DatSu}$ | 100 | | | nS | $V_{DD}$= 3.0V, $T_A$=25℃ |
| I²C Start Condition Hold Time | $T_{StaHd}$ | 600 | | | nS | $V_{DD}$= 3.0V, $T_A$=25℃ |
| I²C Start Condition Setup Time | $T_{StaSu}$ | 600 | | | nS | $V_{DD}$= 3.0V, $T_A$=25℃ |
| I²C Stop Condition Setup Time | $T_{StpSu}$ | 600 | | | nS | $V_{DD}$= 3.0V, $T_A$=25℃ |
| I²C Bus Free Time | $T_{BusFree}$ | 1300 | | | nS | $V_{DD}$= 3.0V, $T_A$=25℃ |

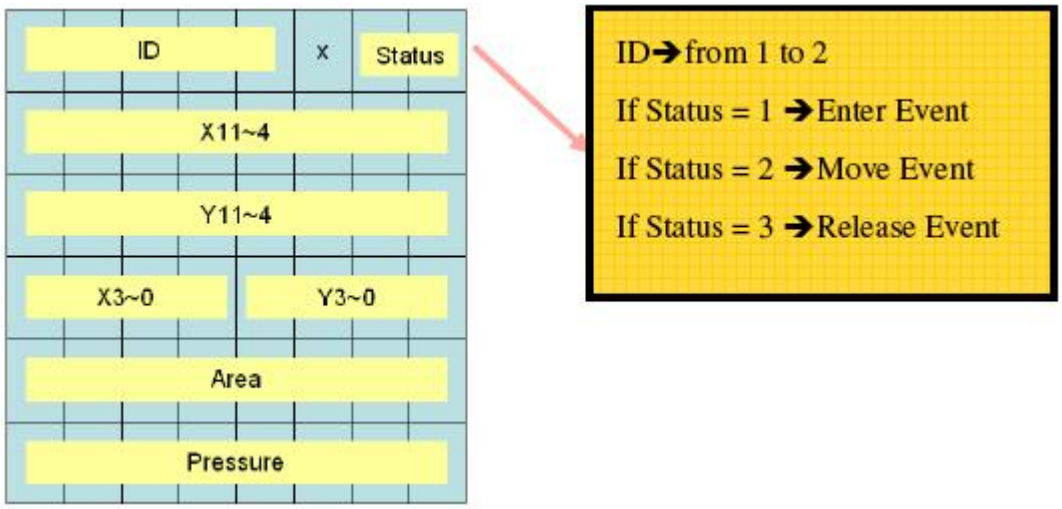


## 5.3 I2C Send Protocol



## 6. Buffer Address & Function

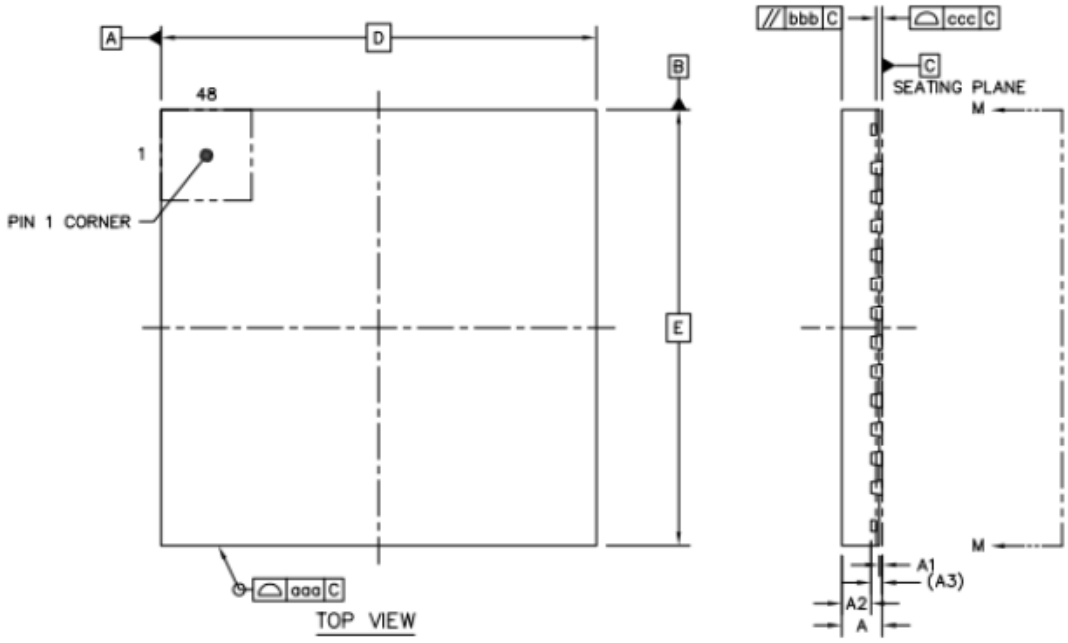
| I2C Buffer Address | Function of this I2C Buffer | Status |
|---|---|---|
| 0 H | ID & Status (TP 1) | R |
| 1 H | X[11:4] (TP 1) | R |
| 2 H | Y[11:4] (TP 1) | R |
| 3 H | X[3:0] & Y[3:0] (TP 1) | R |
| 4 H | Area (TP 1) | R |
| 5 H | Pressure (TP 1) | R |
| 6 H | ID & Status (TP 2) | R |
| 7 H | X[11:4] (TP 2) | R |
| 8 H | Y[11:4] (TP 2) | R |
| 9 H | X[3:0] & Y[3:0] (TP 2) | R |
| A H | Area (TP 2) | R |
| B H | Pressure (TP 2) | R |
| … | … | R |
| 72H | Reserved | R |
| 73H | Reserved | R |
| 74H | Reserved | R |
| 75H | Reserved | R |
| 76H | Reserved | R |
| 77H | Reserved | R |

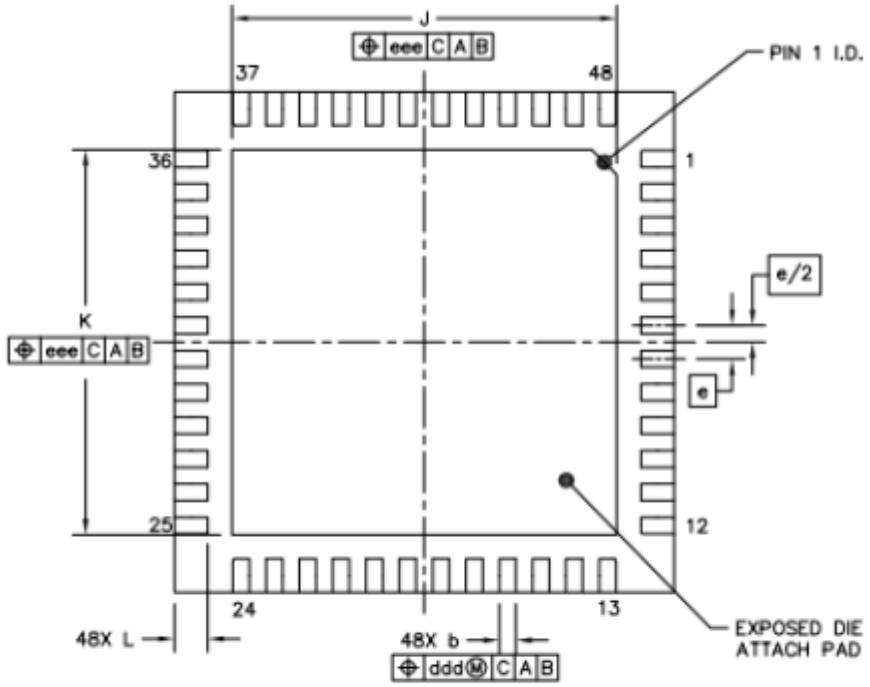



**※TP1: First finger**

**※TP2: Second finger**

## 7. Package Outline of QFN48




BOTTOM VIEW
VIEW M–M

| | | SYMBOL | MIN | NOM | MAX |
|---|---|---|---|---|---|
| TOTAL THICKNESS | | A | 0.5 | 0.55 | 0.6 |
| STAND OFF | | A1 | 0 | 0.035 | 0.05 |
| MOLD THICKNESS | | A2 | --- | 0.4 | 0.425 |
| L/F THICKNESS | | A3 | | 0.152 REF | |
| LEAD WIDTH | | b | 0.15 | 0.2 | 0.25 |
| BODY SIZE | X | D | | 6 BSC | |
| | Y | E | | 6 BSC | |
| LEAD PITCH | | e | | 0.4 BSC | |
| EP SIZE | X | J | 4.52 | 4.62 | 4.72 |
| | Y | K | 4.52 | 4.62 | 4.72 |
| LEAD LENGTH | | L | 0.35 | 0.4 | 0.45 |
| PACKAGE EDGE TOLERANCE | | aaa | | 0.1 | |
| MOLD FLATNESS | | bbb | | 0.1 | |
| COPLANARITY | | ccc | | 0.08 | |
| LEAD OFFSET | | ddd | | 0.1 | |
| EXPOSED PAD OFFSET | | eee | | 0.1 | |
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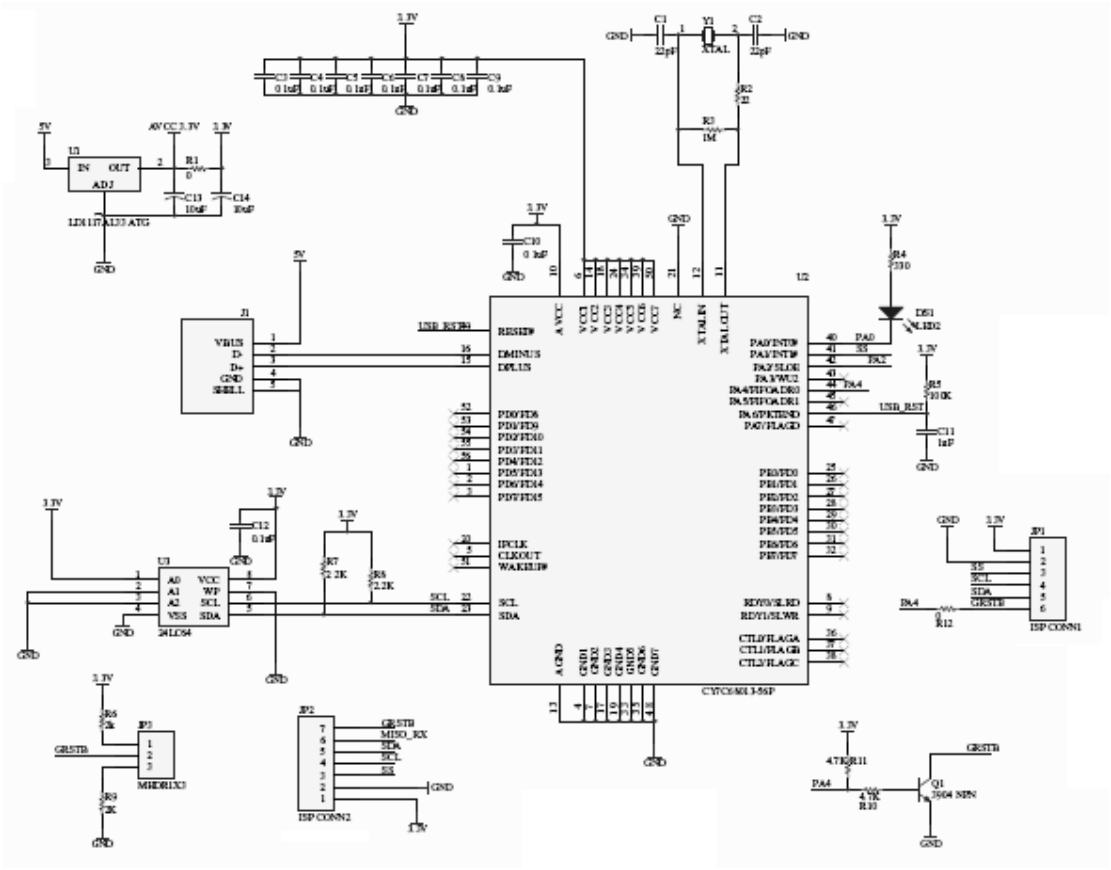
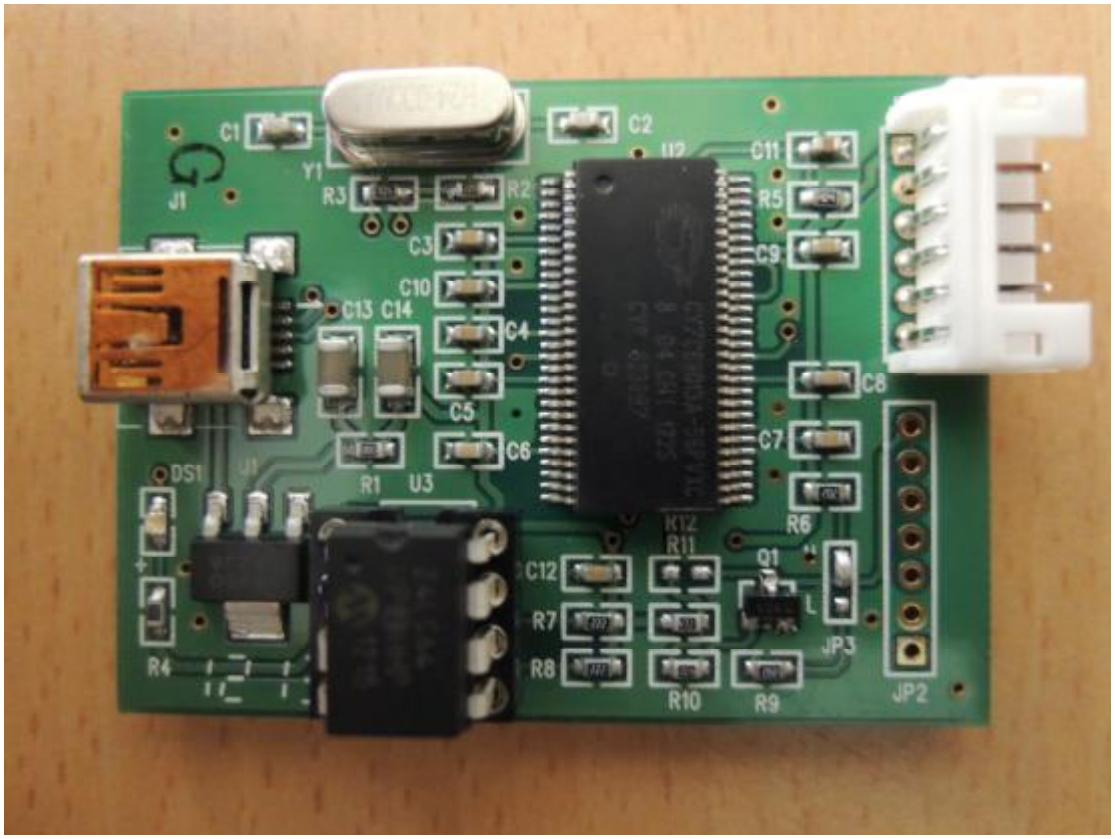
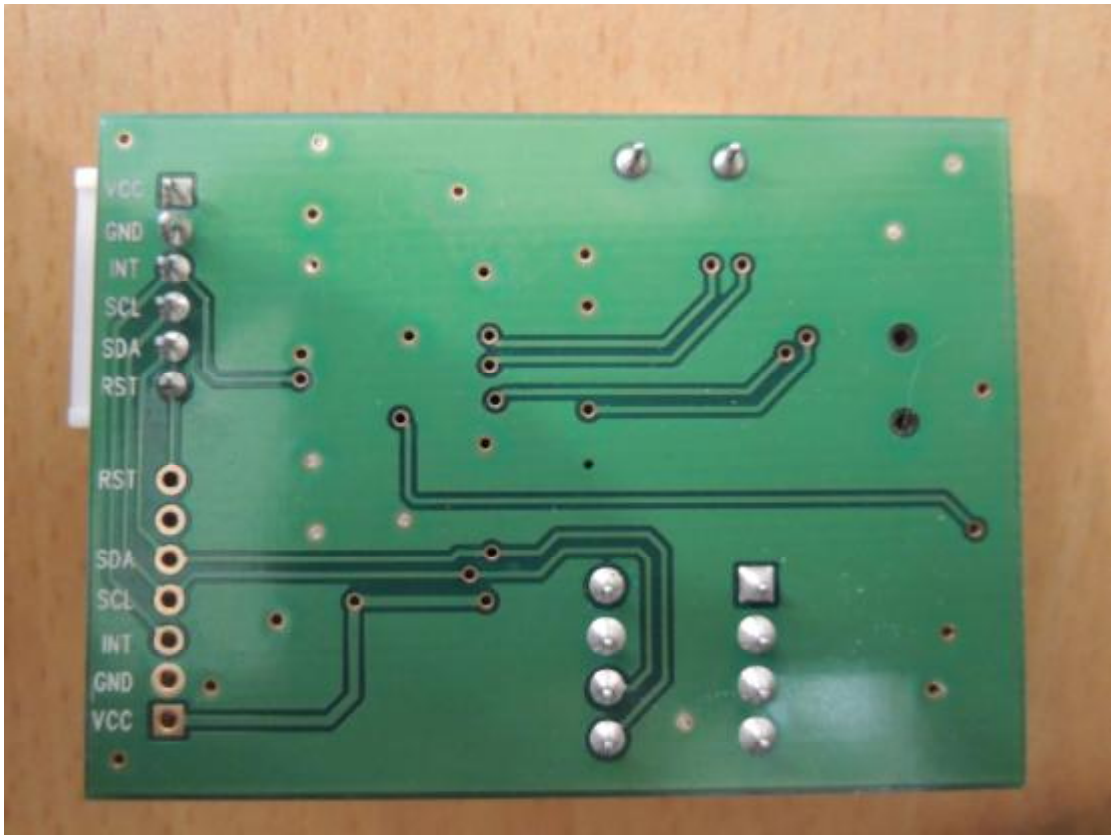
# 8. Program Firmware Bridge Board

## 8.1 Schematic




C1
Y1
C2
J1
R3
R2
C11
R5
C3
C9
C10
C13
C14
C4
C8
C5
C7
C6
DS1
J1
R1
U3
R6
R11
C12
Q1
R7
JP3
R4
R8
R10
R9
JP2


VCC
GND
INT
SCL
SDA
RST
RST
SDA
SCL
INT
GND
VCC

## 9. Program Firmware Tools