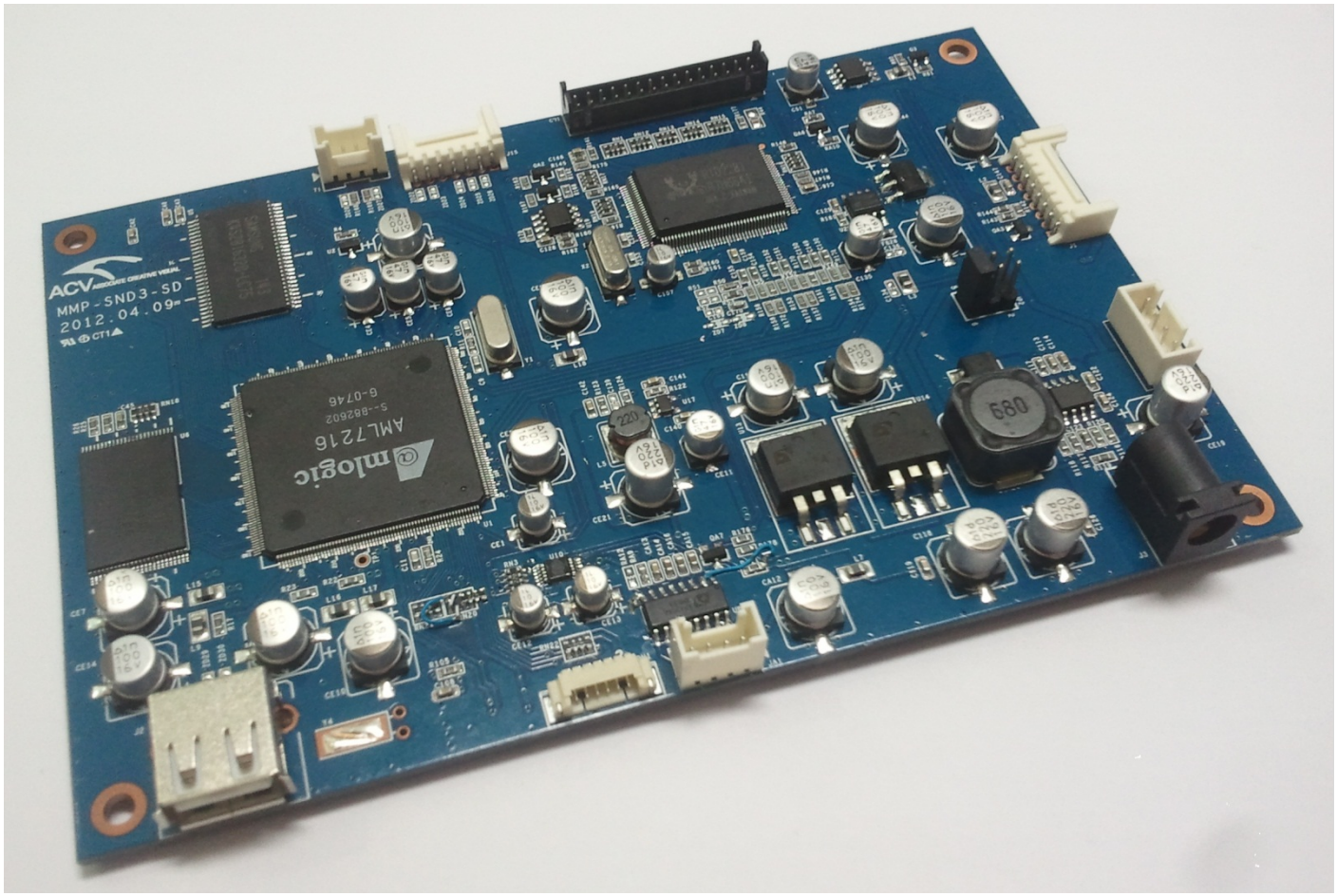
# Data Sheet




## TFT LCD Controller Multi Media Board

NT28M(RoHS Compliant)

MAY, 2012

Rev. 0.1

# CONTENTS

## Revision History

| No | Description | Date | Rev. | Page |
|---|---|---|---|---|
| 1 | Preliminary Release | May. 18, 12 | 0.1 | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |

# INTRODUCTION

Designed for LCD monitor and other flat panel display application the controller provides an auto-input synchronization and easy to sue interface controller for:

- TFT LCD panels 8bit LVDS Interface Support.
- TFT LCD panels of 1024x768, 1280x768, 1366x768, 1280x1024, 1440x900, 1680x1050, 1600x1200, 1920x1080 and 1920x1200 resolutions.
- Contents Data Format of Video Format - *.avi,*.mpg,*.mpeg,*.mp4 / Audio Format - *.mp3,*.wma ,*.wav / Picture Format - *.jpg,*.jpeg,*.bmp,*.png,*.gif standard.

## HOW TO PROCEED

- Ensure that you have all parts & they are correct, refer to:
  - Connection diagram
  - Connector reference
  - Assembly notes
- Check controller switch & jumper settings (errors may damage the panel)
- Connect the parts
- Understand the operation & functions

## IMPORTANT USAGE NOTE

This equipment is for use by developers and integrators. The manufacturer accepts no liability for damage or injury caused by the use of this product. It is the responsibility of the developer, integrators or other users of this product to:

- Ensure that all necessary and appropriate safety measures are taken.
- Obtain suitable regulatory approvals as may be required.
- Check power settings to all component parts before connection.

## DISCLAIMER

There is no implied or expressed warranty regarding this material.

## GENERAL SPECIFICATION

| No. | Item | Description | | |
|---|---|---|---|---|
| 1 | Main Chip | AMLOGIC AM7216 | | |
| 2 | Display Size | TFT LCD Panel 8bit LVDS Interface Support(Max 1920*1200) | | |
| 3 | Scaler | Realtek RTD2281 | | |
| 4 | Memory Cards | Built-in NAND Flash Memory(Optional 512MB/1GB/2GB)<br>(Upload USB Memory in contents) | | |
| 5 | File System | FAT32 | | |
| 6 | Picture | Document Format | *.jpg,*.jpeg,*.bmp,*.png,*.gif | |
| | | Coding form | JPEG,BMP,PNG<br>GIF(Sees the next table in detail) | |
| 7 | Music | Document Format | *.mp3,*.wma ,*.wav | |
| | | Coding Form | MP3,WMA,WAV | |
| 8 | Video Frequency | Document Format | *.avi,*.mpg,*.mpeg,*.mp4 | |
| | | Video Frequency code | MPEG1,MPEG2,MPEG4(Divx,Xvid) | |
| | | Audio Frequency code | MP3,MPEG,WMA | |
| | | Video Size | 720 * 480 | |

## ABSOLUTE MAXIMUM RATINGS

| Parameter | Symbol | Values | | Units | Notes |
|---|---|---|---|---|---|
| | | Min | Max | | |
| Operating Temperature | $T_{OP}$ | 0 | 50 | °C | |
| Storage Temperature | $T_{ST}$ | -20 | 60 | °C | |
| Operating Ambient Humidity | $H_{OP}$ | 10 | 90 | %RH | |
| Storage Humidity | $H_{ST}$ | 10 | 90 | %RH | |

*** Note: No condensation of water**

# ELECTRICAL SPECIFICATION

## Input characteristic

| Description | Signal | Unit | Min | Typical | Max | Remarks |
|---|---|---|---|---|---|---|
| Power In (12V) | | | | | | |
| | Input | Vdc | 11.4 | 12.0 | 12.6 | |

## Output Characteristics

| | Signal | Unit | Min | Typical | Max | Remarks |
|---|---|---|---|---|---|---|
| Panel Power | | | | | | |
| | LCD Power (12V) | Vdc | 11.4 | 12 | 12.6 | Jumper option |
| | LCD Power(5V) | Vdc | 4.75 | 5 | 5.25 | Jumper option |
| | LCD Power(3.3V) | Vdc | 3.13 | 3.3 | 3.46 | Jumper option |
| LVDS Interface | | | | | | |
| | Differential output | mVp-p | 250 | 350 | 450 | Different +/- |
| Inverter Interface | | | | | | |
| | Power out | V | 11.4 | 12 | 12.6 | |
| | On/Off control | V | 0 | | 5 | L=off, H=on |
| | Brightness control | V | 3.3 | | 0 | Option |
| | | | 0 | | 3.3 | Option |
| | | Step | 0 | | 100 | OSD Value |

## Power Consumption

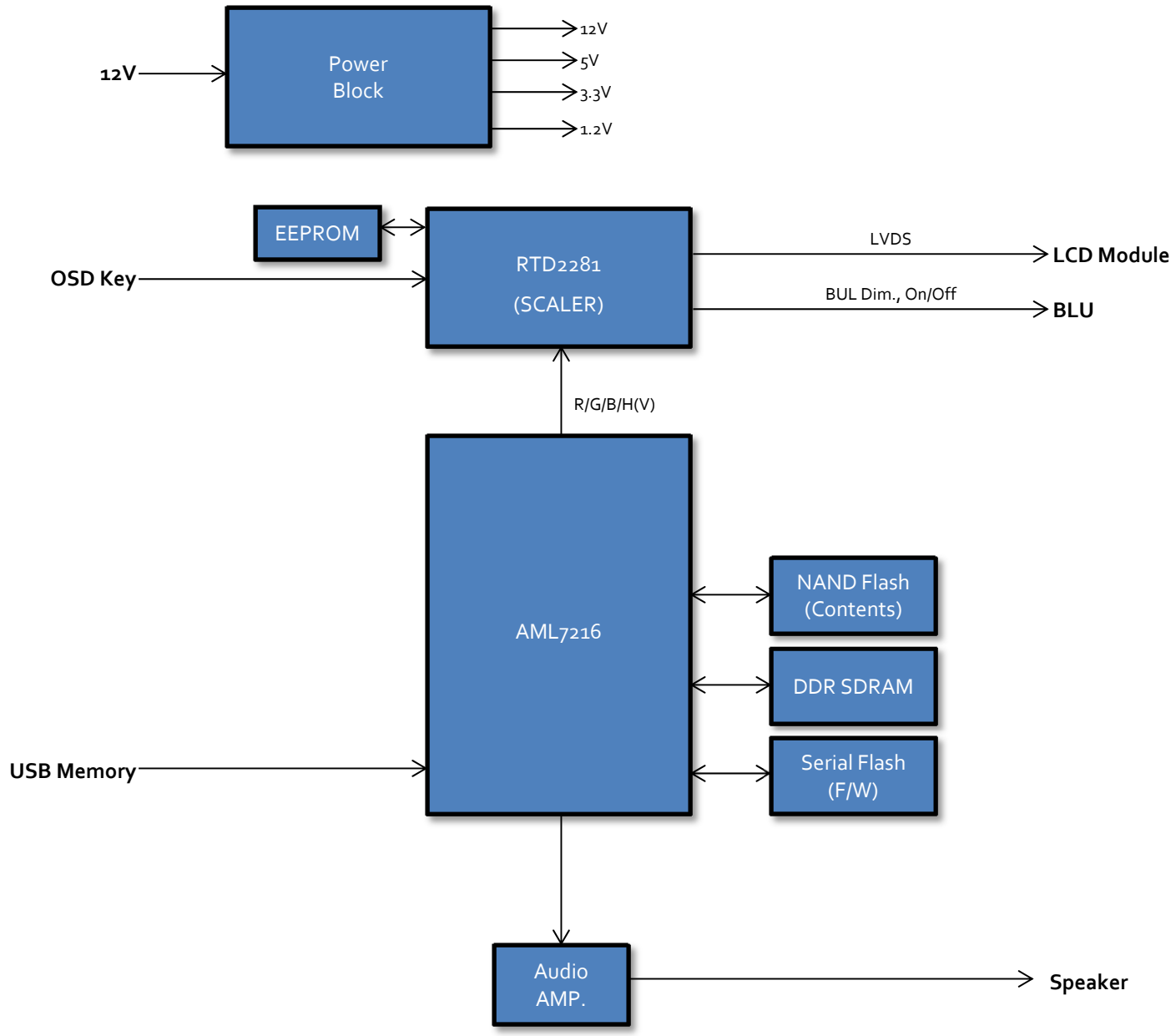
| | Input Power | Unit | Min *1 | Typical | Max | Remarks |
|---|---|---|---|---|---|---|
| Board without Panel and Inverter | | | | | | |
| | LCD Power (12V) | Watts | 0.62 | 2.05 | - | *2 |
| | | A | 0.05 | 0.17 | | |

***1: Power saving mode**

*** 2: Controller board only, disconnected with LCD and Inverter.**

**System power consumption should be different value with different type of LCD and Inverter.**

## BLOCK DIAGRAM

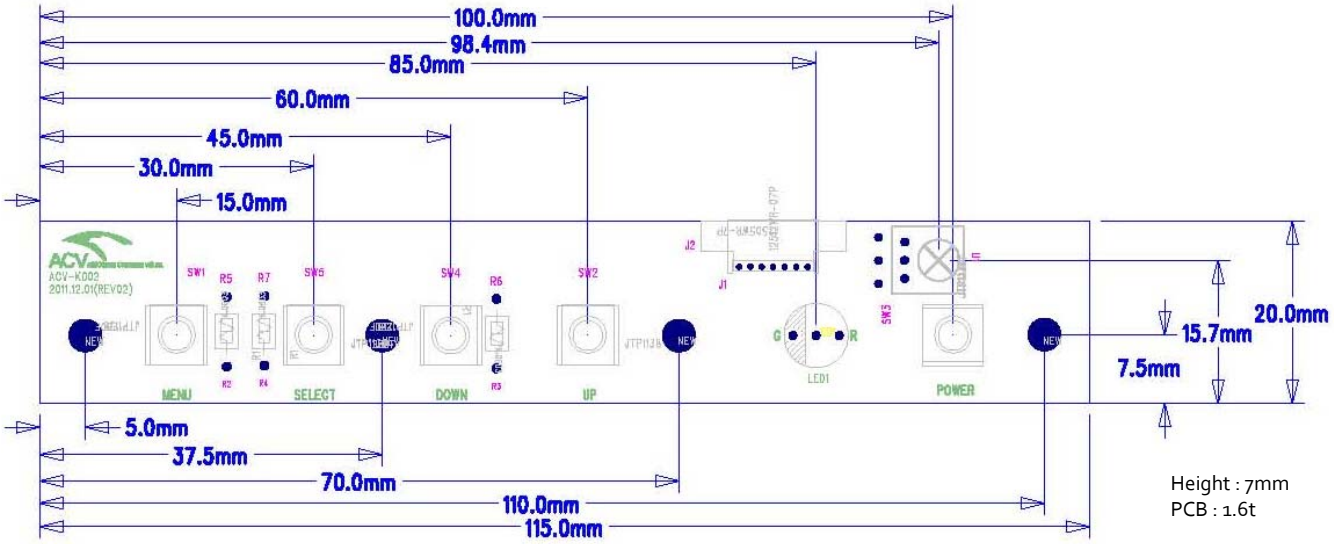


# OSD CONTROL BOARD

The OSD (On Screen Display) provides certain functions to have clear image and others. This board supports 5 buttons OSD operation as a standard. The control functions defined on OSD operation are as below. (unit: mm)

Appearance

NK05A




| Button | Function | Status | HOT Key |
|---|---|---|---|
| LED | Indicates operation status | Green : Normal State<br>Red : Off Mode<br>Amber : DPMS Mode | |
| POWER | Power on/off | | |
| MENU | Enable MENU Window<br>Disable MENU Window<br>Exit from Sub function | | |
| SELECT | Select function | | No OSD Window,<br>Input Source Change |
| DOWN | Move to Down or Left | | No OSD Window,<br>Auto Color |
| UP | Move to Up or Right | | No OSD Window,<br>Auto Configuration |

# OSD FUNCTION

The chosen OSD settings will be stored in memory. The OSD menu can be cleared from the screen by pressing the **MENU** button otherwise it will be automatically cleared after a few second of non-use.

## OSD GUI Control Table

| MAIN MENU | SUB MENU | CONTROL | |
|---|---|---|---|
| Picture | Brightness | 50(0~100) | |
| | Contrast | 50(0~100) | |
| | Sharpness | 2( 0 ~ 4) | |
| | H Position | 50(0~100) | |
| | V Position | 50(0~100) | |
| | Clock | 50(0~100) | |
| | Phase | 30(0~100) | |
| Color | Color Status Management | User(User, Warm, Normal, Cool) | |
| | Red | 50(0~100) | |
| | Green | 50(0~100) | |
| | Blue | 50(0~100) | |
| | Auto Color | To Start | |
| OSD | Language | Korean(English, Korean) | |
| | H Position | 50(0~100) | |
| | V Position | 50(0~100) | |
| | Transparency | 33 (0~100) | |
| | OSD Time | 10(3~30) | |
| SETUP | Factory reset | To Start | |

# CONNECTOR, PINOUT

## Summary

| Reference | Item | Description | Type | Manufacture |
|---|---|---|---|---|
| J1 | Connector | Backlight Inverter Connector | SMW200-08 | YEONHO |
| J2 | Jack | USB Host Type A | | |
| J3 | Jack | 12V Input Dc power Jack | KPJ-4S-S | - |
| J15 | Connector | OSD Board Connector | SMW200-07 | YEONHO |
| JA1 | Connector | Speaker Connector | SMW200-04 | YEONHO |
| CON1 | Connector | AMLOGIC Debugging Connector | 12505WR-06 | |
| CN1 | Connector | LCD Interface connector(2Ch LVDS) | YDW200-30 | YEONHO |
| CN3 | Connector | External 12V Power Input | SMW250-04 | YEONHO |
| T1 | Connector | Scaler Debugging Connector | SMW200-04 | YEONHO |

**J1 : Backlight Inverter Connector**

| Pin No. | Symbol | Description |
|---|---|---|
| 1 | DIM-ADJ | DIM-adjustment analog dimming control signal<br>* make sure inverter specification |
| 2 | ON/OFF | Inverter digital ON(3.3V)/OFF(0V) signal |
| 3,4,5 | GND | Ground |
| 6,7,8 | VCC | 12V |

**J2 : USB Host Type A Jack**

| Pin No. | Symbol | Description |
|---|---|---|
| 1 | Vcc | +5V |
| 2 | Data- | Data - |
| 3 | Data+ | Data + |
| 4 | GND | Ground |

**J3 : 12V Power Input Jack**

| Pin No. | Symbol | Description |
|---|---|---|
| 2,3 | GND | Ground |
| 1 | Vcc | 12V |

**J15 : OSD Board connector**

| Pin No. | Symbol | Description |
|---|---|---|
| 1 | Vcc | +5V power for IR sensor |
| 2 | IRQ | Infrared rays signal line. |
| 3 | LED1 | Green LED |
| 4 | LED2 | Red LED |
| 5 | GND | Ground |
| 6 | ADC-IN0 | Menu, Up |
| 7 | ADC-IN1 | Power, Down, Up |

**JA1 : Speaker Connector**

| Pin No. | Symbol | Description |
|---|---|---|
| 1 | Audio_R- | Audio Output Right- |
| 2 | Audio_R+ | Audio Output Right+ |
| 3 | Audio_L+ | Audio Output Left+ |
| 4 | Audio_L- | Audio Output Left- |

**CON1 : AMLOGIC Debugging Connector**

| Pin No. | Symbol | Description |
|---|---|---|
| 1 | Vcc | 3.3Vdc |
| 2 | GND | |
| 3 | TMS | |
| 4 | TCK | |
| 5 | TDO | |
| 6 | TDI | |

**CN1 : LCD Interface connector**

| Pin No. | Symbol | Description |
|---|---|---|
| 1 | MOD_PWR | LCD_VCC(3.3V,5V,12V Select) |
| 2 | MOD_PWR | LCD_VCC(3.3V,5V,12V Select) |
| 3 | MOD_PWR | LCD_VCC(3.3V,5V,12V Select) |
| 4 | MOD_PWR | LCD_VCC(3.3V,5V,12V Select) |
| 5 | NC | NC |
| 6 | Option | High/Low for LCD Option |
| 7 | GND | Ground |
| 8 | GND | Ground |
| 9 | Y3P-EVEN | Positive(+) LVDS differential first 4 data |
| 10 | Y3N- EVEN | Negative(-) LVDS differential first 4 data |
| 11 | YCP- EVEN | Positive (+) LVDS differential first 3 data |
| 12 | YCN- EVEN | Negative (-) LVDS differential first 3 data |
| 13 | Y2P- EVEN | Positive (+) LVDS differential first Clock |
| 14 | Y2N- EVEN | Negative (-) LVDS differential first Clock |
| 15 | Y1P- EVEN | Positive (+) LVDS differential first 2 data |
| 16 | Y1N- EVEN | Negative (-) LVDS differential first 2 data |
| 17 | Y0P- EVEN | Positive (+) LVDS differential first 1 data |
| 18 | Y0N- EVEN | Negative (-) LVDS differential first 1 data |
| 19 | GND | Ground |
| 20 | GND | Ground |
| 21 | Y3P-ODD | Positive (+) LVDS differential first 0 data |
| 22 | Y3N-ODD | Negative (-) LVDS differential first 0 data |
| 23 | YCP-ODD | Positive (+) LVDS differential second 4 data |
| 24 | YCN-ODD | Negative(-) LVDS differential second 4 data |
| 25 | Y2N-ODD | Positive (+) LVDS differential second 3 data |
| 26 | Y2P-ODD | Negative (-) LVDS differential second 3 data |
| 27 | Y1P-ODD | Positive (+) LVDS differential second Clock |
| 28 | Y1N-ODD | Negative (-) LVDS differential second Clock |
| 29 | Y0P-ODD | Positive(-) LVDS differential second 2 data |
| 30 | Y0N-ODD | Negative(+) LVDS differential second 2 data |

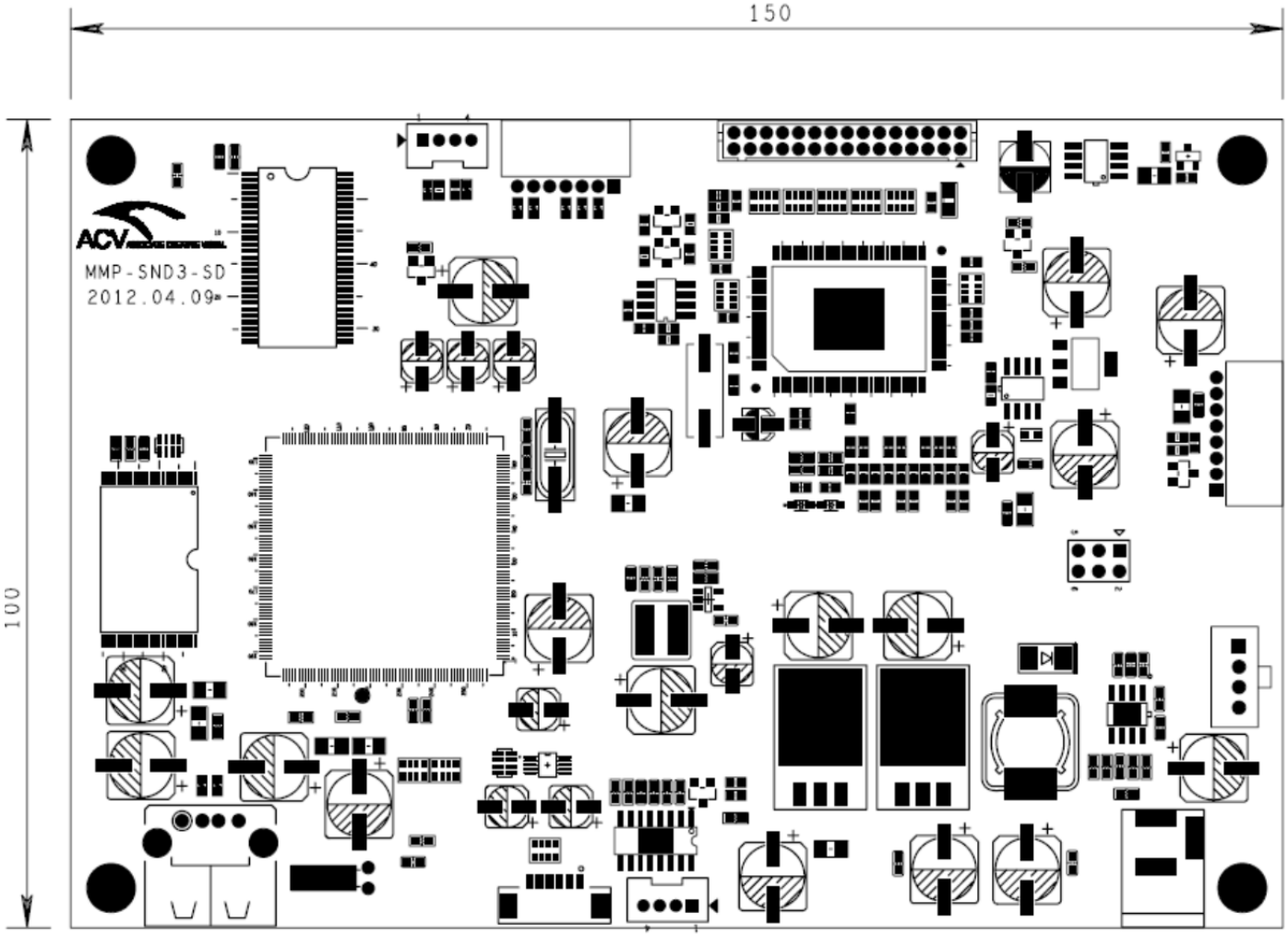
**CN3 : 12V Power Input**

| Pin No. | Symbol | Description |
|---|---|---|
| 1 | Gnd | Ground |
| 2 | Gnd | Ground |
| 3 | Vcc | 12V |
| 4 | Vcc | 12V |

**T1 : AMLOGIC Debugging Connector**

| Pin No. | Symbol | Description |
|---|---|---|
| 1 | GND | |
| 2 | SDA | Data |
| 3 | SCL | Clock |
| 4 | GND | |
| | | |
| | | |

## CONTROLLER DIMENSIONS



**ICS Components Co., Ltd.**

Yong-Dong Techno Tower 310, 300-4 Sungsu-dong 2-ga, Sungdong-gu, Seoul, 133-120, R.o.Korea

TEL +82 (0)2-701-4144~6 | FAX +82 (0)2-701-4147

www.icsco.kr