奇岩電子股份有限公司
MOAI ELECTRONICS CORPORATION
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# MA8121A

## USB 2.0 SD/MMC Card Reader

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# A. Features

- **USB**
  - ✧ Fully compatible with USB 2.0/1.1 specification
  - ✧ Support USB 2.0 specification for 480Mbit/sec and 12Mbit/sec operation
  - ✧ USB Device Class Definition for Mass Storage , Bulk-Transport v1.0
  - ✧ USB 2.0 Bus Power device spec. compliance
  - ✧ Endpoint:
    - Endpoint 0: 64 bytes control transfer.
    - Endpoint 1: 512 bytes bulk transfer for IN transaction.
    - Endpoint 2: 512 bytes bulk transfer for OUT transaction.

- **MMC/SD card Support**
  - ✧ Support MMC 4.0/4.1/4.2 (4 bit & 8bit), RS-MMC, MMC-Mobile
  - ✧ Support SD 1.1/2.0 SDHC, Mimi SD, Micro SD card
  - ✧ Support SD/MMC High Speed Mode

- **Work with the default driver from windows 2000/XP/ME, Mac9.2, Mac OS X, Linux RedHat, Linux Fedora**
- **Integrated 5V to 3.3V/1.8V Voltage Regulator**
- **Integrated PLL with 12MHz crystal input**
- **Support package with Chip On Board (COB)**
- **28 pin SSOP package for 4 bit and 8 bit card**
- **28 pin SSOP is backward compatible with M121**
- **24 pin QFN 4x4 package for 4 bit card.**

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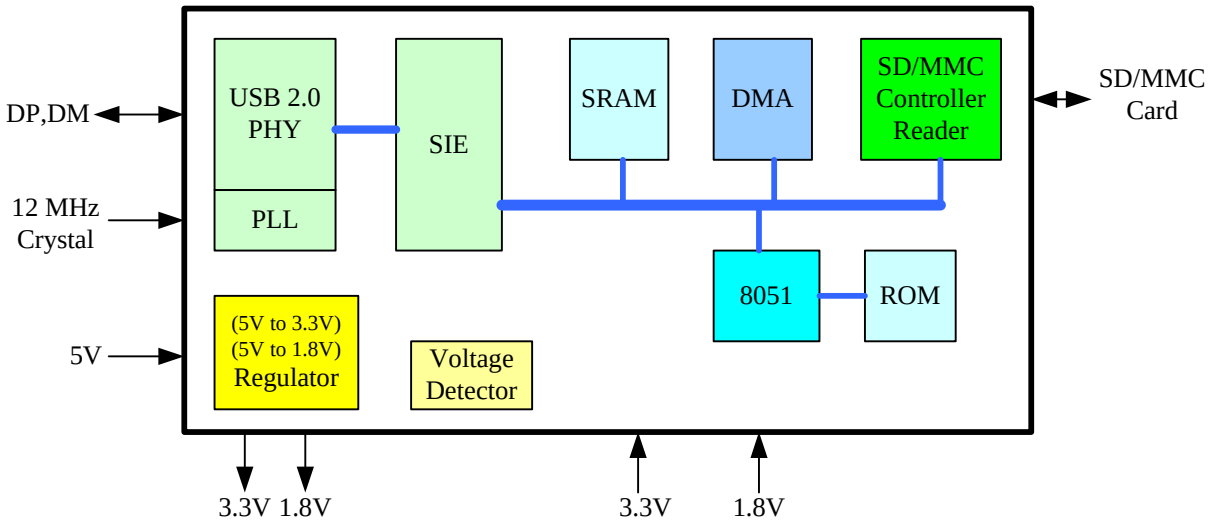
# B. Block Diagram



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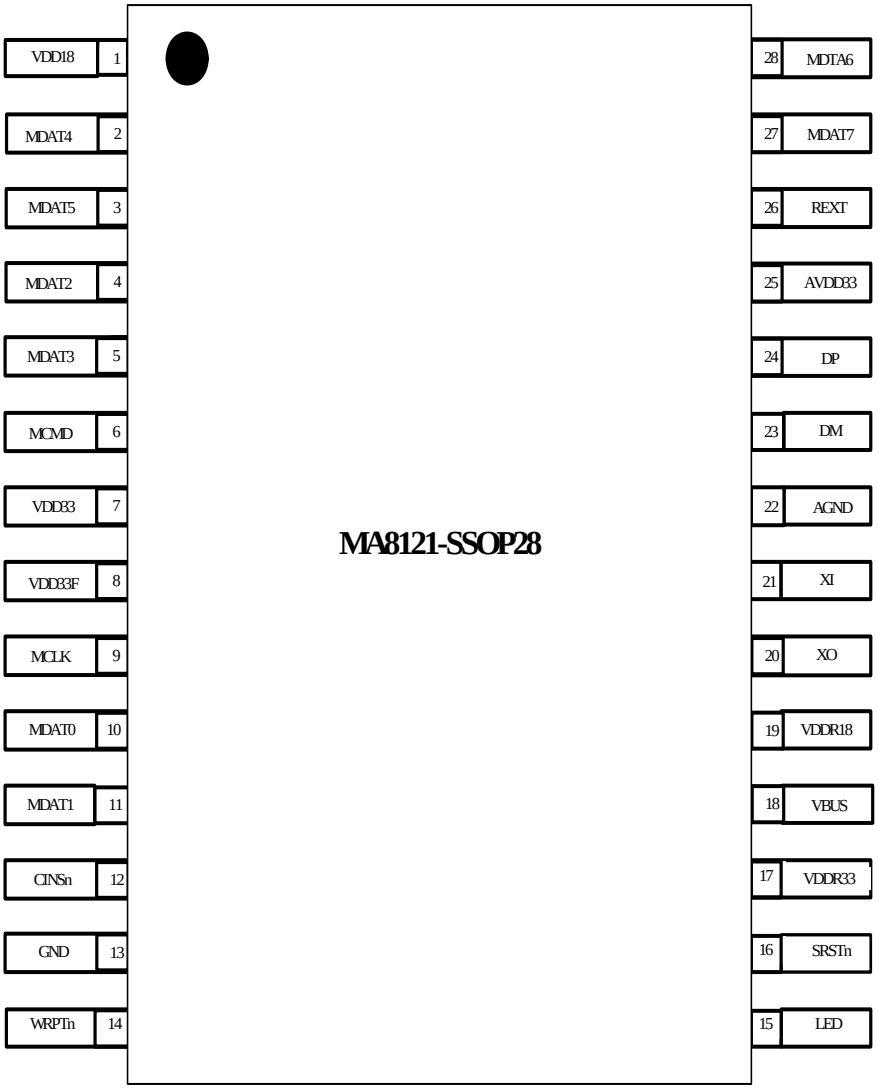
# C. Pin Diagram

## ● SSOP-28 Pin Out



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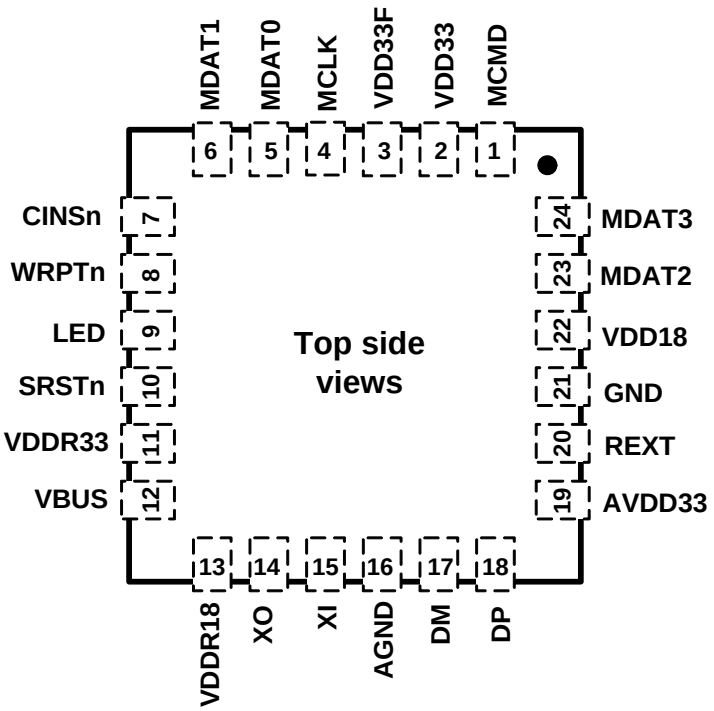
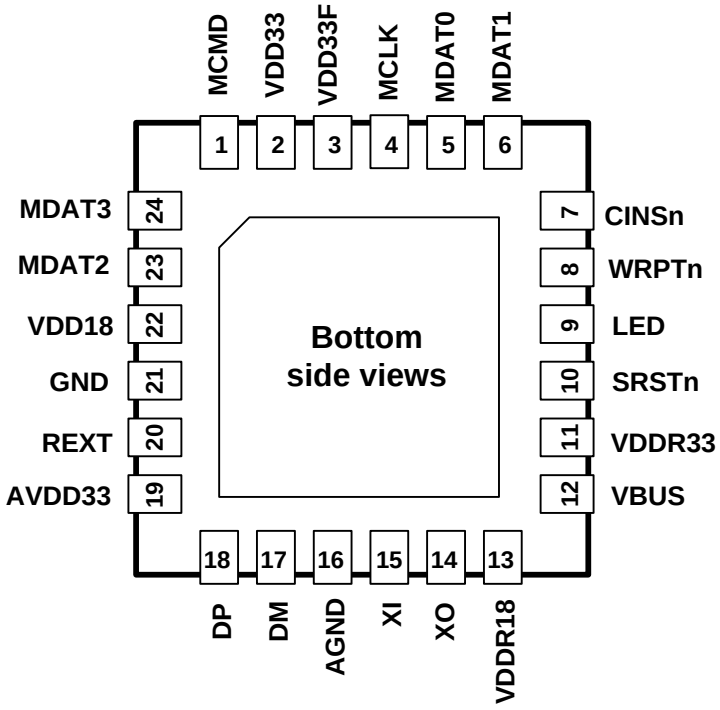
- **QFN 4x4 pin out**



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# D. Pin Description

## ● SSOP-28 Pin Out Description

### Power Pins

| Symbol | Pin No. | Type | Description |
|---|---|---|---|
| VBUS | 18 | P | 5V Bus Power Input to Internal Regulator |
| VDDR18 | 19 | P | Output 1.8V from Internal Regulator |
| VDDR33 | 17 | P | Output 3.3V from Internal Regulator |
| AVDD33 | 25 | P | PHY 3.3V Power Input |
| VDD18 | 1 | P | Logical Power 1.8V Input |
| VDD33 | 7 | P | Logical Power 3.3V Input |
| VDD33F | 8 | P | Output 3.3V Power Source for SD/MMC Card (Controlled On/Off by Internal Firmware |
| GND,AGND | 13,22 | P | Logical ground pin<br>USB PHY ground pin |

### Analog and Others Pins

| Symbol | Pin No. | Type | Description |
|---|---|---|---|
| DM | 23 | A | USB D- for high/full speed |
| DP | 24 | A | USB D+ for high/full speed |
| XI | 21 | A | 12 MHz crystal input |
| XO | 20 | A | 12 MHz crystal output |
| REXT | 26 | I | To connect an external reference resistor for current source of the USB high-speed driver.<br>The resistor with the range 330~400Ω |
| SRSTn | 16 | I | Chip Reset. |
| LED | 15 | O | LED for operation status indicator |

### SD/MMC Interface

| Symbol | Pin No. | Type | Description |
|---|---|---|---|
| MDAT [0:7] | [10,11,4,5,2,3,28,27] | I/O | SD/MMC data pin |
| MCMD | 6 | O | SD/MMC command response |
| MCLK | 9 | O | SD/MMC clock output |
| WRPTn | 14 | I | SD/MMC card write protect<br>High= write protect, Low=normal<br>Internal with pull high resistor |
| CINSn | 12 | I | SD/MMC card insert detect<br>Low= card insert<br>Internal with pull up resistor |

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# ● QFN-24 Pin Out Description

## Power Pins

| Symbol | Pin No. | Type | Description |
|---|---|---|---|
| VBUS | 12 | P | 5V Bus Power Input to Internal Regulator |
| VDDR18 | 13 | P | Output 1.8V from Internal Regulator |
| VDDR33 | 11 | P | Output 3.3V from Internal Regulator |
| AVDD33 | 19 | P | PHY 3.3V Power Input |
| VDD18 | 22 | P | Logical Power 1.8V Input |
| VDD33 | 2 | P | Logical Power 3.3V Input |
| VDD33F | 3 | P | Output 3.3V Power Source for SD/MMC Card (Controlled On/Off by Internal Firmware |
| GND,AGND | 21, 16 | P | Logical ground pin<br>USB PHY ground pin |

## Analog and Others Pins

| Symbol | Pin No. | Type | Description |
|---|---|---|---|
| DM | 17 | A | USB D- for high/full speed |
| DP | 18 | A | USB D+ for high/full speed |
| XI | 15 | A | 12 MHz crystal input |
| XO | 14 | A | 12 MHz crystal output |
| REXT | 20 | I | To connect an external reference resistor for current source of the USB high-speed driver.<br>The resistor with the range 330~400Ω |
| SRSTn | 10 | I | Chip Reset. |
| LED | 9 | O | LED for operation status indicator |

## SD/MMC Interface

| Symbol | Pin No. | Type | Description |
|---|---|---|---|
| MDAT [0:3] | 5,6,23,24 | I/O | SD/MMC data pin |
| MCMD | 1 | O | SD/MMC command response |
| MCLK | 4 | O | SD/MMC clock output |
| WRPTn | 8 | I | SD/MMC card write protect<br>High= write protect, Low=normal<br>Internal with pull high resistor |
| CINSn | 7 | I | SD/MMC card insert detect<br>Low= card insert<br>Internal with pull up resistor |

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# E. Electrical Characteristics

## ● Regulator

| Parameter | Value |
|---|---|
| VBUS (5 volts input) | Min.=4.2 volts , Max.=5.8 volts |
| VDDR33 (3.3 volts output ) | 3.3 volts ± 10 % |
| VDDR18 (1.8 volts output ) | 1.8 volts ± 10 % |
| Maximum current | 120 mA |

## ● Analog and Digital power

| Parameter | Value |
|---|---|
| AVDD33 (analog supply voltage) | 3.3 volts ± 10 % |
| VDD33 (Digital supply voltage ) | 3.3 volts ± 10 % |
| VDD33F (Card power supply) | 3.3 volts ± 10 % ; Max. current=100mA |
| VDD18 (Digital supply voltage ) | 1.8 volts ± 10 % |

## ● Power consumption

| Parameter | Value | Note |
|---|---|---|
| Normal operation | Max. =120mA | With Sandisk 4G SD card |
| Suspend current | Max.= 450 uA | With Sandisk 4G SD card |

## ● DP,DM characteristics

| Parameter | Description |
|---|---|
| Eye diagram test | Pass the USB eye-diagram test, so the DP,DM electrical characteristics such as eye-diagram, signal rate, rise time, fall time are met the specification. |

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# F. Package Information

- ## SSOP-28

  Please contact MOAI sales for the SSOP package information

- ## COB Information

  Please contact MOAI sales for the COB package information

- ## QFN-24 (4x4) package Information

  Please contact MOAI sales for the QFN-24 package information

# G. Revision History

| Revision | Release date | Description |
|---|---|---|
| Rev 1.0 | 2007.5.1 | Formal release |