



# AU6481-GFL

USB2.0 Single-LUN Flash Card  
Reader Controller

## Technical Reference Manual



Rev. 1.00  
Dec, 2012



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Reader Controller**

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## **Revision History**

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# 1. Introduction

## 1.1 Description

The AU6481 is a single chip integrated USB 2.0 multimedia card reader controller that enables PC/DVD/Printer to read/write various types of flash media cards. Flash media cards such as CF, xD, SD, MMC, Memory Stick are widely used in digital camera, cell phone, PDA and MP3 player to store digital photos and compressed music.

Performance of AU6481 is maximized by implementing the latest and fastest card specification available from the industry.

Especially, AU6481 is designed with the high performance characteristic in flash card I/O speed. Users can easily and fast transfer the digital content among the different flash card.

## 1.2 Features

### Interface

- Support USB V2.0 specification and USB Device Class Definition for Mass Storage, Bulk-Transport V1.0

### Memory Card Type Support

- Support CompactFlash spec up to ver. 6.0 Ultra DMA mode.
- Support SD spec up to ver. 4.00
  - Support SD3.0 SDR-104, SDR-50 and DDR 50.
  - Support high capacity up to 2TB
  - Support CPRM Function
- Support MMC spec up to ver. 4.4.
- Support Memory Stick spec up to ver. 1.43.
- Support Memory Stick PRO spec up to ver. 1.05-00.
  - Support MS Formatter function
  - Support Magic Gate function.
- Support Memory Stick PRO Duo spec up to ver. 1.11-00.
- Support Memory Stick PRO-HG spec up to ver. 1.03-00.
- Support Memory Stick XC Duo Format Specification version 1.00-00
  - Support high capacity up to 2TB



- Support power class 0, 1, 2
  - Support xD Picture Card specification up to ver. 1.2.

## Others

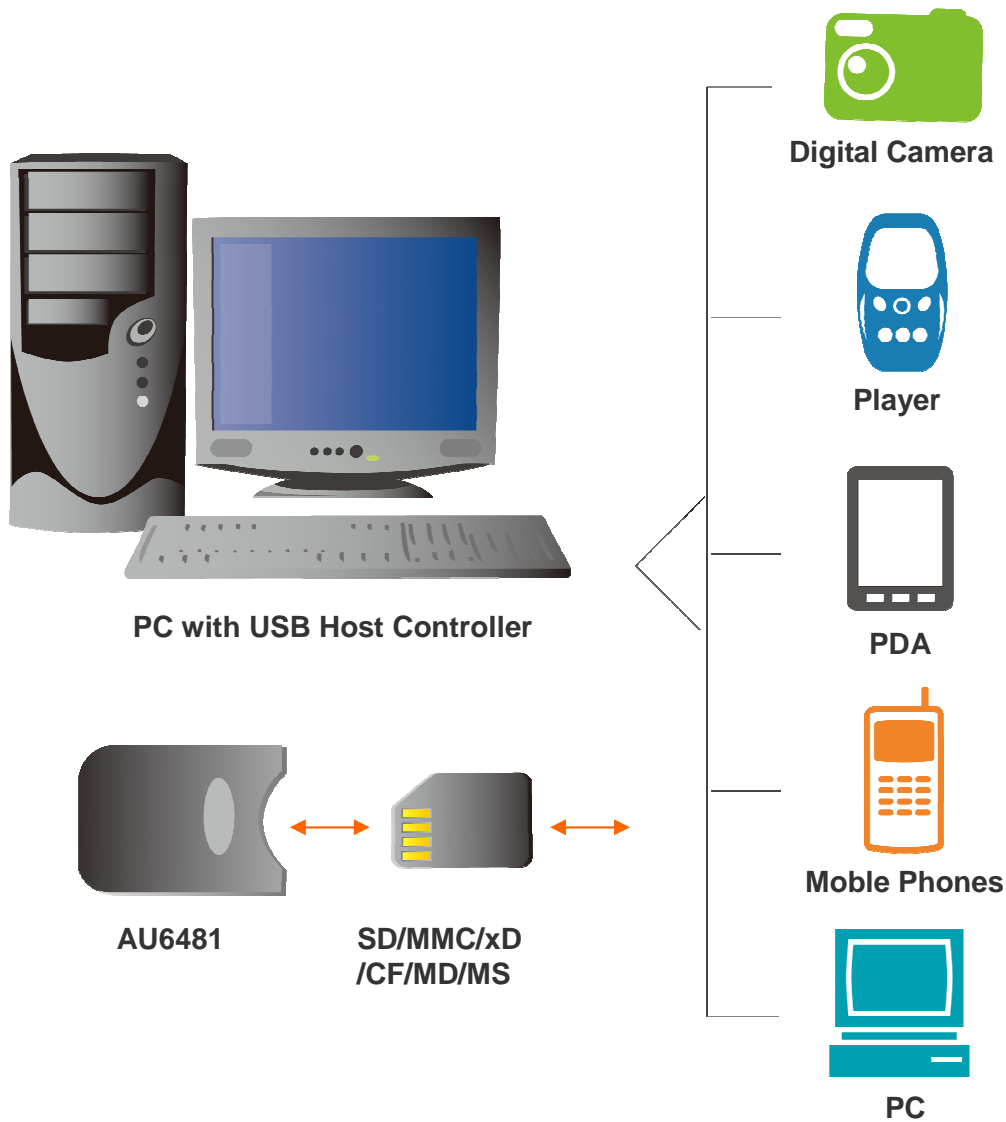
- Hardware DMA engine integrated for performance enhancement.
- Work with default driver from Windows ME/2000/XP/Vista/Windows 7 and Mac OS X; Vendor device driver from Alcor Micro are available to run under Windows 98 and Mac 10.x.
- Ping-pong FIFO implementation for concurrent bus operation
- Support multiple sectors transfer optimize performance
- Support slot-to-slot read/write operation
- Support Dynamic Icon Utility
- Support LED for bus operating indication. Blinking rate is 1Hz and 50% duty cycle
- Power switch integrated to reduce production BOM cost
- 30MHz 8051 CPU
- Built in 5V to 3.3V and 3.3V to 1.8V regulator.
- Built in resonator clock source input.
- Available in 48-pin LQFP package.



## 2. Application Block Diagram

Following application diagram demonstrates a typical card reader using the AU6481 chip. By connecting the card reader to a desktop or notebook PC through USB bus, the AU6481 becomes a bus-powered, high speed USB card reader, which can be used as a bridge for data transfer between Desktop PC and Notebook PC.

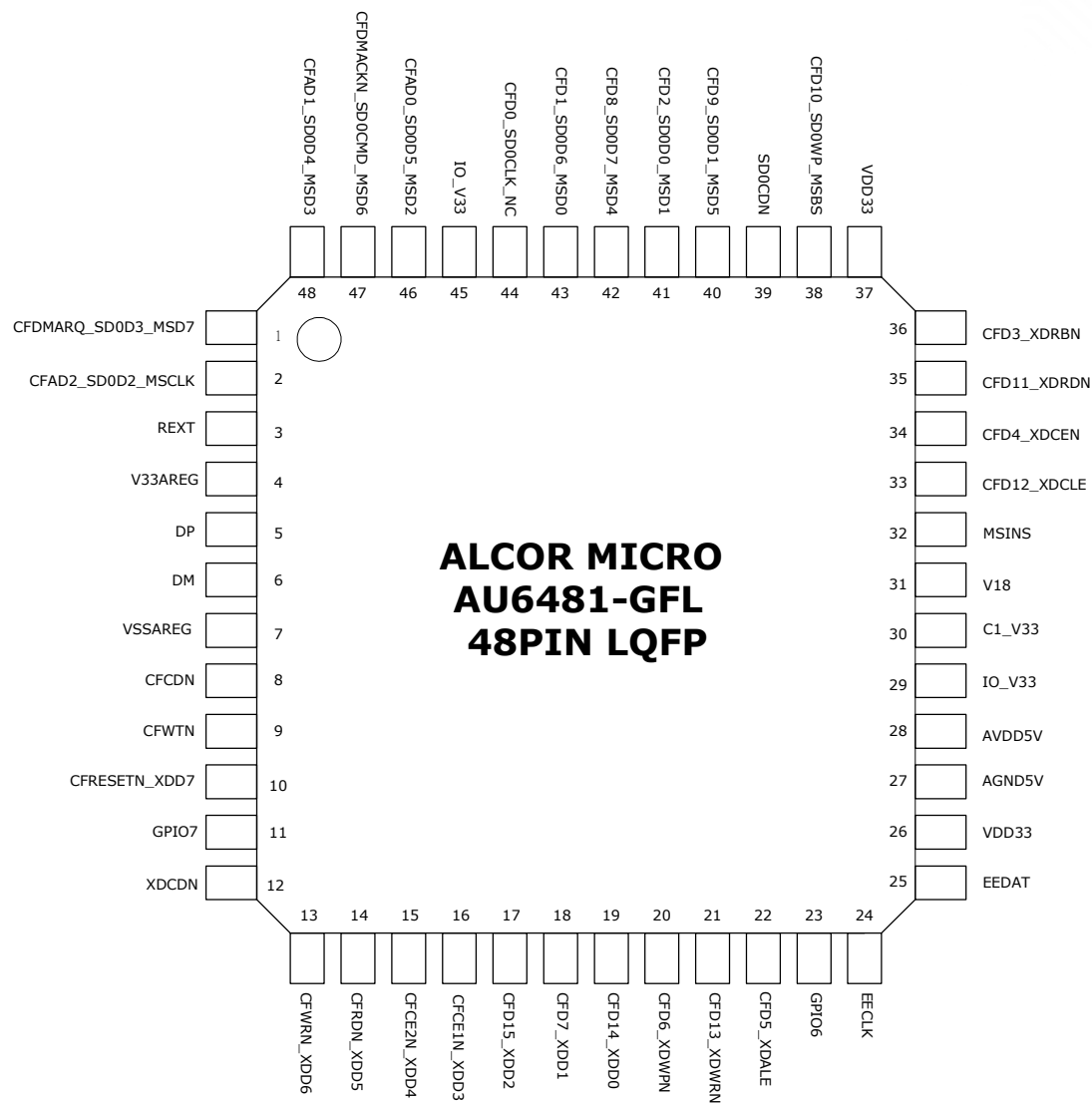
**Figure 2.1 Block Diagram**



### 3. Pin Assignment

AU6481 is available in 48-pin LQFP package. Below diagram shows signal name of each pin and table in the following page describes each pin in detail

**Figure 3.1 AU6481 Pin Assignment Diagram**



**Table 3.1 AU6481 Pin Descriptions**

Pin #	Pin Name	I/O	Description
1	CFDMARQ_SD0D3_MSD7	I/O	CF DMARQ/ SD0 DATA3/ MS DATA7
2	CFAD2_SD0D2_MSCLK	I/O	CF address2 /SD0 DATA2/ MS CLK
3	REXT	I/O	External Resistor 330 to Ground
4	V33AREG	I	3.3V in for USB 2.0 PHY
5	DP	I/O	DP
6	DM	I/O	DM
7	VSSAREG	I	3.3V ground for USB 2.0 PHY
8	CFCDN	I	CF card detect, low active
9	CFWTN	O	CF WTN
10	CFRESETN_XDD7	O	CF reset, low active/ XD DATA7
11	GPIO7	I/O	LED for Card operating
12	XDCDN	I	xD card detect, low active
13	CFWRN_XDD6	O	CF WRN/ XD DATA6
14	CFRDN_XDD5	O	CF RDN/ XD DATA5
15	CFCE2N_XDD4	I/O	CF CE2N/ XD DATA4
16	CFCE1N_XDD3	I/O	CF CE1N / XD DATA 3
17	CFD15_XDD2	I/O	CF DATA15/ XD DATA2
18	CFD7_XDD1	I/O	CF DATA7/ XD DATA 1
19	CFD14_XDD0	I/O	CF DATA14/ XD DATA 0
20	CFD6_XDWPN	I/O	CF DATA6/ XD WPN
21	CFD13_XDWRN	I/O	CF DATA13/ XD WRN
22	CFD5_XDALE	I/O	CF DATA5/ XD ALE
23	GPIO6	I/O	Reserved
24	EECLK	O	EEPROM CLK
25	EEDAT	I/O	EEPROM DATA
26	VDD33	I	3.3V output
27	AGND5V	I	Regulator Ground
28	AVDD5V	I	Regulator 5V In
29	IO_V33	O	1.8v / 3.3v for SD pad power
30	C1_V33	O	LUN 1 3.3V card power
31	V18	O	V18 out for LDO

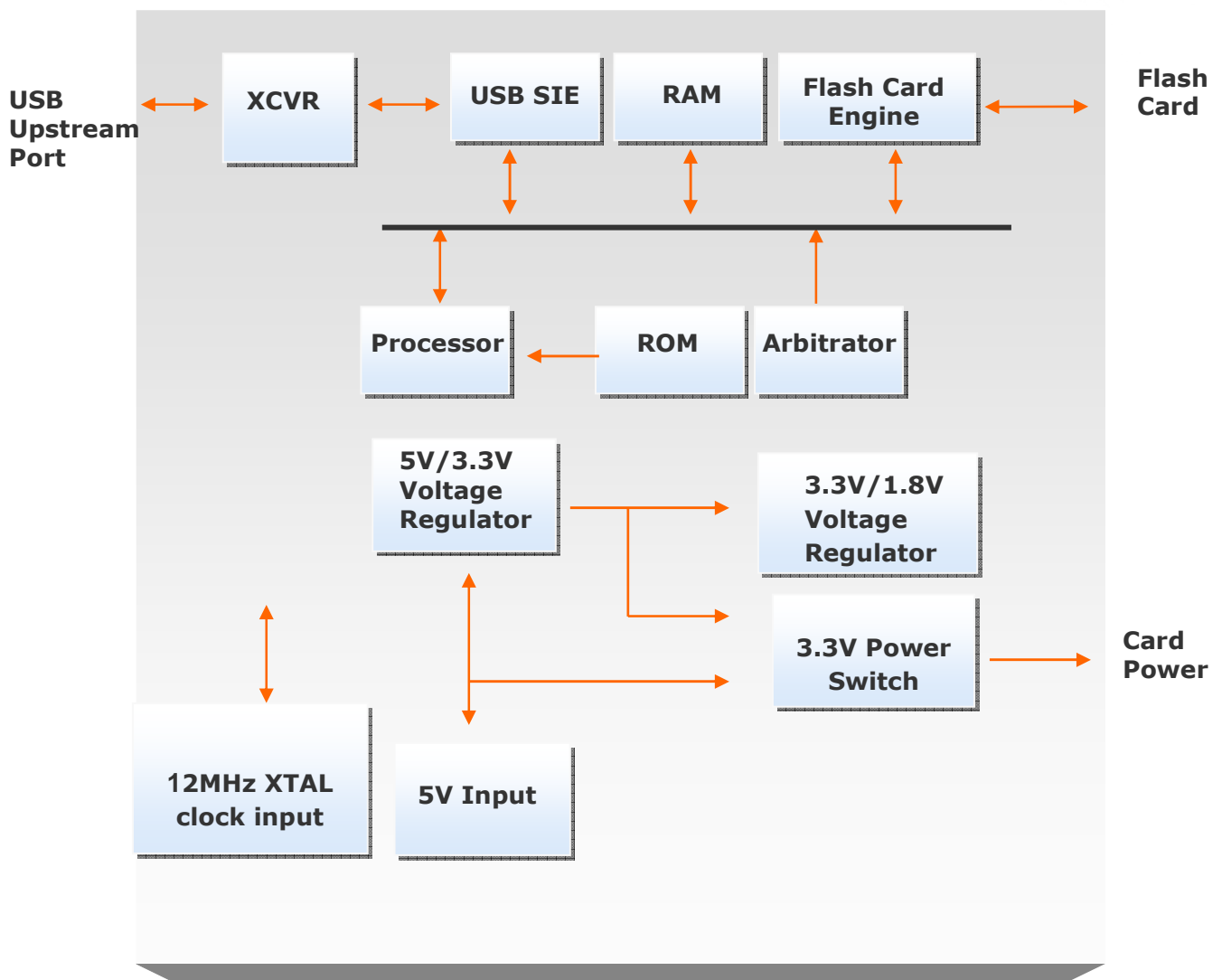


Pin #	Pin Name	I/O	Description
32	MSINS	I	MS card detect, low active.
33	CFD12_XDCLE	I/O	CF DATA12/ XD CLE
34	CFD4_XDCEN	I/O	CF DATA4/ XD CEN
35	CFD11_XDRDN	I/O	CF DATA11/ XD RDN
36	CFD3_XDRBN	O	CF DATA3/ XD RBN
37	VDD33	I	Pad 3.3V power
38	CFD10_SD0WP_MSBS	I	CF DATA10/SD0WP/ MS BS
39	SD0CDN	I	SD card detect, low active
40	CFD9_SD0D1_MSD5	I/O	CF DATA9/ SD0 DATA1/ MS DATA5
41	CFD2_SD0D0_MSD1	I/O	CF DATA2/SD0 DATA0/ MS DATA1
42	CFD8_SD0D7_MSD4	I/O	CF DATA8/SD0 DATA7/ MS DATA4
43	CFD1_SD0D6_MSD0	I/O	CF DATA1/SD0 DATA6/ MS DATA0
44	CFD0_SD0CLK_NC	O	CF DATA0/SD0 CLK/ NC
45	IO_V33	I	SD pad power 1.8v/3.3v
46	CFAD0_SD0D5_MSD2	I/O	CF address0/SD0 DATA5/ MS DATA2
47	CFDMACKN_SD0CMD_MSD6	I/O	CF DMACKN/SD0 CMD/ MS DATA6
48	CFAD1_SD0D4_MSD3	I/O	CF address1/SD0 DATA4/ MS DATA3

# 4. System Architecture and Reference Design

## 4.1 AU6481 Block Diagram

Figure 4.1 AU6481 Block Diagram



## 5. Electrical Characteristics

### 5.1 Power Switch Feature

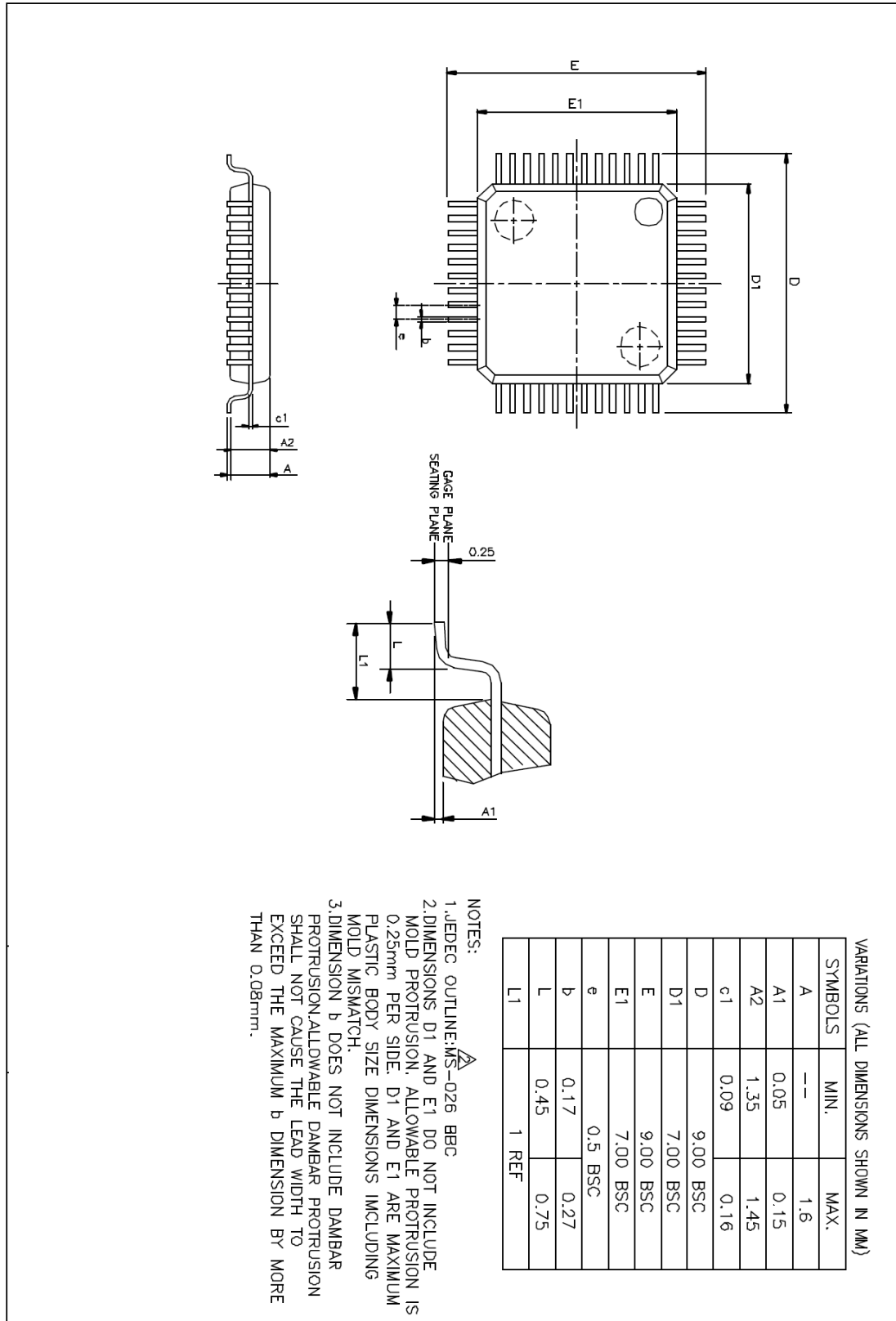
**Table 5.1 Card Power Output Capacity**

LUN	Max. Iout	Min. Vout	Reference	Note
SD	400mA	3.14V	SD spec. 3.01 MMC spec. 4.4	Only support SD/MMC with default power class
MS	400mA	3.14V	MS-Pro spec. 1.03	Only support power class 0
CF	500mA	3.14V	CF spec. 6.0	
xD	100mA	3.14V	xD spec. 6.0	
uSD/M2	400mA	3.14V	SD spec. 3.01/ MS-Pro spec. 1.03	



## 6. Mechanical Information

Figure 6.1 Mechanical Information Diagram



## 7. Abbreviations

In this chapter some of the terms and abbreviations used throughout the technical reference manual are listed as follows.

<b>SIE</b>	Serial Interface Engine
<b>xD</b>	xD-Picture Card
<b>CF</b>	Compact Flash
<b>MD</b>	Micro Drive
<b>MS</b>	Memory Stick
<b>SD</b>	Secure Digital
<b>MMC</b>	Multimedia Card
<b>UTMI</b>	USB Transceiver Macrocell Interface

### About Alcor Micro, Corp.

Alcor Micro, Corp. designs, develops and markets highly integrated and advanced peripheral semiconductor, and software driver solutions for the personal computer and consumer electronics markets worldwide. We specialize in USB solutions and focus on emerging technology such as USB and IEEE 1394. The company offers a range of semiconductors including controllers for USB hub, integrated keyboard/USB hub and USB Flash memory card reader...etc. Alcor Micro, Corp. is based in Taipei, Taiwan, with sales offices in Taipei, Japan, Korea and California. Alcor Micro is distinguished by its ability to provide innovative solutions for spec-driven products. Innovations like single chip solutions for traditional multiple chip products and on-board voltage regulators enable the company to provide cost-efficiency solutions for the computer peripheral device OEM customers worldwide.