



# AU6465R-GBF

USB2.0 SD/MMC/MS Single-LUN  
Card Reader Controller

## Technical Reference Manual



Rev. 1.03  
Dec, 2012



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Card Reader Controller**

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## **Revision History**

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July, 2012	1.00	Official Release
Aug, 2012	1.01	Update Mechanical Information Diagram
Sep, 2012	1.02	Update “5. Electrical Characteristics”
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# 1. Introduction

## 1.1 Description

The AU6465R is designed to deliver outstanding performance for data transmission between USB and compatible flash card interface. It supports USB 2.0 high-speed transferring to SD, MMC and MS. Besides, the AU6465R supports several operating systems, including MS Windows, LINUX and Mac OS.

The AU6465R integrates a high performance 8051 CPU as well as a splendidly efficient DMA hardware engine and internal 3.3V to 1.8V regulators. The AU6465R provides manufacturers not merely BOM cost saving with the minimal numbers of components needed on the PCB but also smaller circuit board with the 28-pin QFN (5×5mm) package.

In addition to high-speed 8051 CPU embedded and DMA hardware engine integrated, the AU6465R is fully compliant with USB Device Class Definition for Mass Storage and Bulk-Transport V1.0. Combination with these features, the AU6465R provides a completely ultra high performance USB2.0 card reader solution in a single chip.

AU6465R maximizes performance with the latest SD/MS card specification available from the industry. Based on the features of low pin count and high performance characteristic, AU6465R supports a wide range of flash card reader applications used to digital camera, MP3 players, cell phone, PDA, camcorder, GPS device and so on to store many types of data, such as digital map, digital photos and compressed music.

## 1.2 Features

### General

- Fully compatible with USB2.0 High Speed and backward compatible with USB1.1 specifications
- Supports single LUN
- Supports both Windows and Mac OS
  - Default Mass Storage Class driver comes from Windows ME/2000/XP/Vista/Windows 7/Windows 8 and Mac OS X
  - Windows 98 is supported by vendor driver from Alcor



- Support power management – Selective suspend, LPM
- Embedded clock source(Crystal less).
- 28-pin QFN lead-free/Halogen-free/RoHS compliant package is available

## Compliance

- Complies with USB Device Class Definition for Mass Storage and Bulk-Transport V1.0
- Complies with Secure Digital Card (SD) specification up to ver. 3.0(SDXC)
  - ◆ Support UHS (SDR-50/DDR-50) operation mode.
  - ◆ Support CPRM feature
- Complies with MultiMedia Card (MMC) specification up to ver. 4.4 and supports 8-bit data bus.
- Complies with Memory Stick (MS) specification up to ver. 1.43
- Complies with Memory Stick PRO (MS\_Pro) specification up to ver. 1.05
- Complies with Memory Stick PRO-HG (MS PRO-HG) specification up to ver. 1.03 and supports 8-bit data bus.
- Complies with Memory Stick XC(MSXC) specification up to ver. 1.00-00

## Benefit

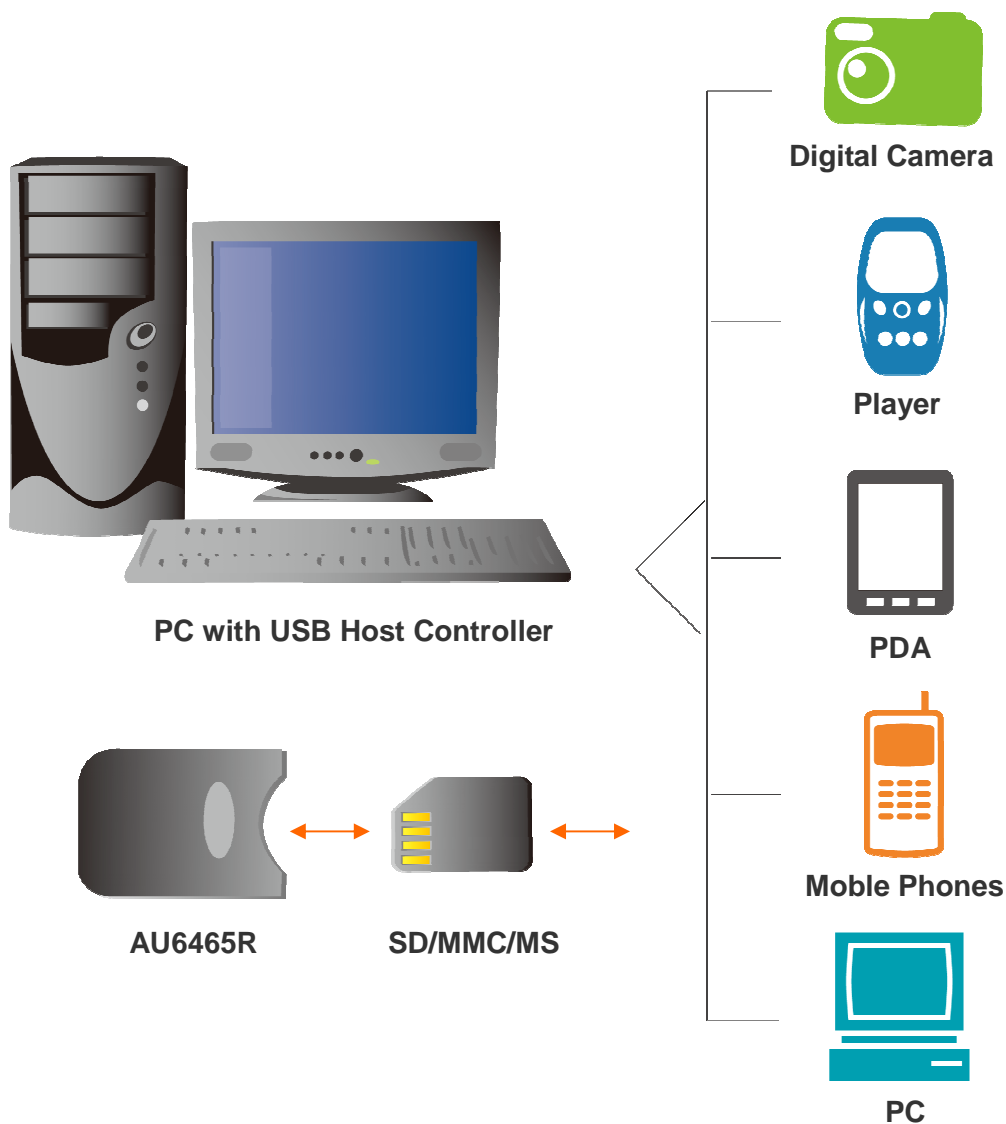
- 1K bytes of ping-pong FIFO buffs the data transmission between transmitter and receiver
- Integrated hardware DMA engine enhances overall performance of data transfers
- User-friendly Dynamic icon utility software can display icon message upon insertion/removal of compatible flash cards under Windows
- Optimizes performance via multiple sectors transfer
- Built-in 3.3V to 1.8V regulators offer customers lower BOM cost
- Built-in MOSFET with 400mA capability for card power control of all types memory cards



## 2. Application Block Diagram

Following application diagram demonstrates a typical card reader using the AU6465R chip. By connecting the card reader to a desktop or notebook PC through USB bus, the AU6465R 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.

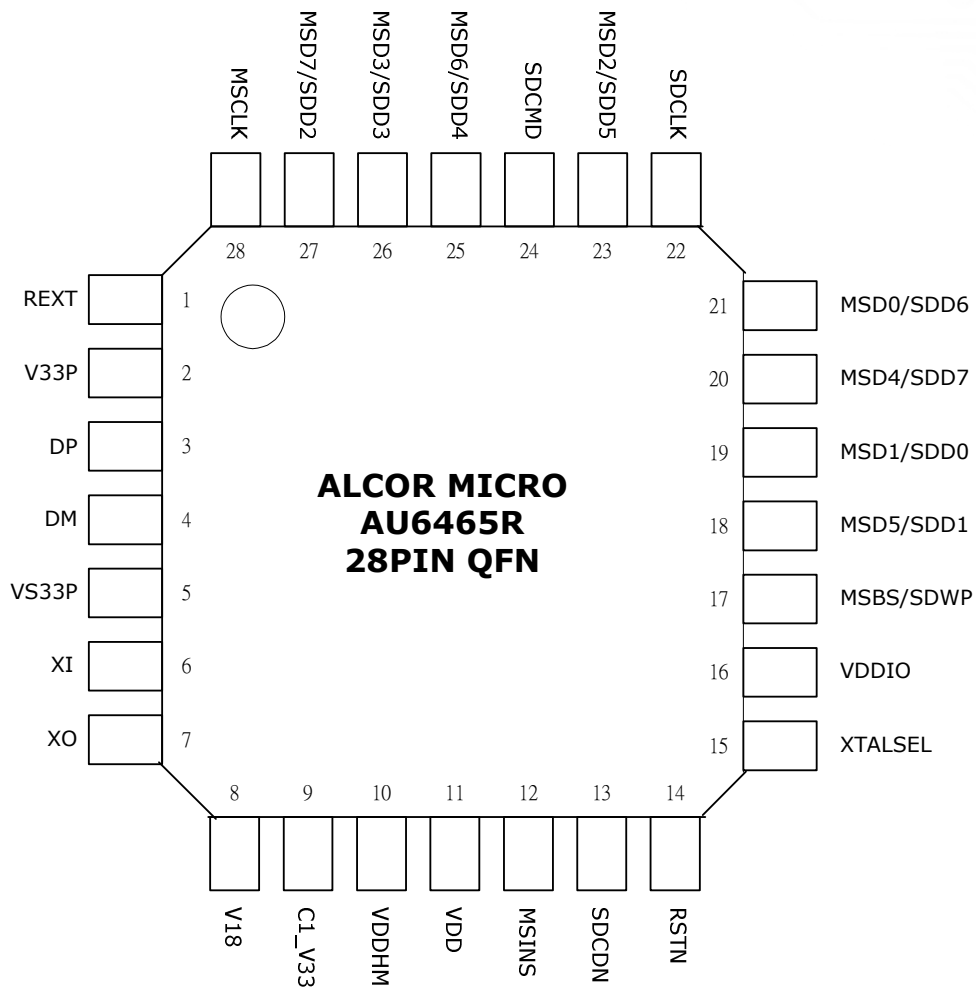
**Figure 2.1 Block Diagram**



### 3. Pin Assignment

AU6465R is available in 28-pin QFN package. Below diagram shows signal name of each pin and table in the following page describes each pin in detail

**Figure 3.1 AU6465R Pin Assignment Diagram**



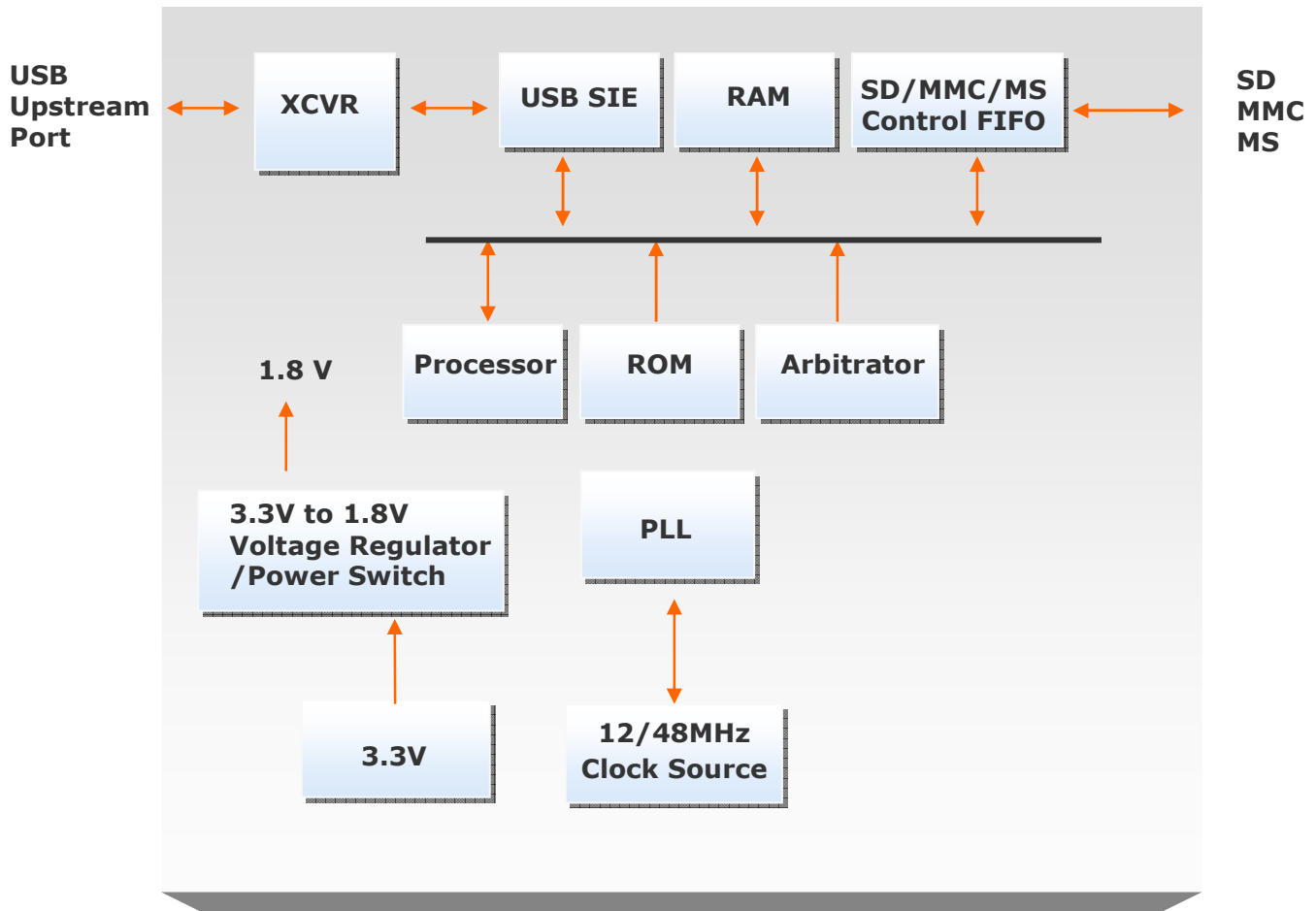
**Table 3.1 AU6465R Pin Descriptions**

Pin #	Pin Name	I/O	Description
1	REXT	I	Reference Resistor
2	V33P	I	UTMI 3.3V power
3	DP	I/O	USB D+
4	DM	I/O	USB D-
5	VS33P	I	Ground
6	XI	I	NC, Reserve for external 12/48 MHz input
7	XO	O	NC, Reserve for external 12/48 MHz output
8	V18	O	Regulator 1.8V output
9	C1_V33	O	Card power output
10	VDDHM	I	IO 3.3V input
11	VDD	I	Core 1.8V Power
12	MSINS	I	MS card detect ("0":Detected; "1":Undetected)
13	SDCDN	I	SD card detect ("0":Detected; "1":Undetected)
14	RSTN	I	Chip Reset (Low Active,Internal pull up)
15	XTALSEL	I	NC, Default in internal clock mode. Reserve for external clock source select '0' 12MHz '1' 48MHz
16	VDDIO	I	IO Power
17	MSBS/SDWP	I	SDWP/MS BS
18	MSD5/SDD1	I/O	SD/MMC DATA1, MS DATA5
19	MSD1/SDD0	I/O	SD/MMC DATA0, MS DATA1
20	MSD4/SDD7	I/O	MMC DATA7, MS DATA4
21	MSD0/SDD6	I/O	MMC DATA6, MS DATA0
22	SDCLK	I/O	SD Clock
23	MSD2/SDD5	I/O	MMC DATA5, MS DATA2
24	SDCMD	I/O	SD Command
25	MSD6/SDD4	I/O	MMC DATA4, MS DATA6
26	MSD3/SDD3	I/O	SD/MMC DATA3, MS DATA3
27	MSD7/SDD2	I/O	SD/MMC DATA2, MS DATA7
28	MSCLK	I/O	MS Clock
DiePad	GND		Ground

# 4. System Architecture and Reference Design

## 4.1 AU6465R Block Diagram

Figure 4.1 AU6465R Block Diagram



## 5. Electrical Characteristics

### 5.1 Absolute Maximum Ratings

Table 5.1 Absolute Maximum Ratings

SYMBOL	PARAMETER	RATING	UNITS
$V_{CC33}$	Power supply	-1 to 4V	V
$V_{IN}$	Input Signal Voltage	-0.3 to $V_{CC33}+0.3V$	V
$T_{STG}$	Storage Temperature	-40 to 150	$^{\circ}C$

### 5.2 Recommended Operating Conditions

Table 5.2 Recommended Operating Conditions

SYMBOL	PARAMETER	MIN	TYP	MAX	UNITS
$V_{33}$	3.3V Power Supply	3.00	3.3	3.6	V
$T_{OPR}$	Operating Temperature	0		85	$^{\circ}C$

### 5.3 DC Electrical Characteristics of 3.3V I/O Cells

Table 5.3 DC Electrical Characteristics of 3.3V I/O Cells

SYMBOL	PARAMETER	CONDITIONS	Limits			UNIT
			MIN	TYP	MAX	
$V_{D33P}$	Power supply	3.3V I/O	3.0	3.3	3.6	V
$V_{il}$	Input low voltage	LVTTTL			0.8	V
$V_{ih}$	Input high voltage		2.0			V
$V_{ol}$	Output low voltage	$ I_{ol}  = 2\sim 16mA$			0.4	V
$V_{oh}$	Output high voltage	$ I_{oh}  = 2\sim 16mA$	2.4			V
$R_{pu}$	Input pull-up resistance	PU=high, PD=low	55	75	90	$K\Omega$
$R_{pd}$	Input pull-down resistance	PU=low, PD=high	40	75	100	$K\Omega$
$I_{in}$	Input leakage current	$V_{in} = V_{D33P}$ or 0	-10	$\pm 1$	10	$\mu A$

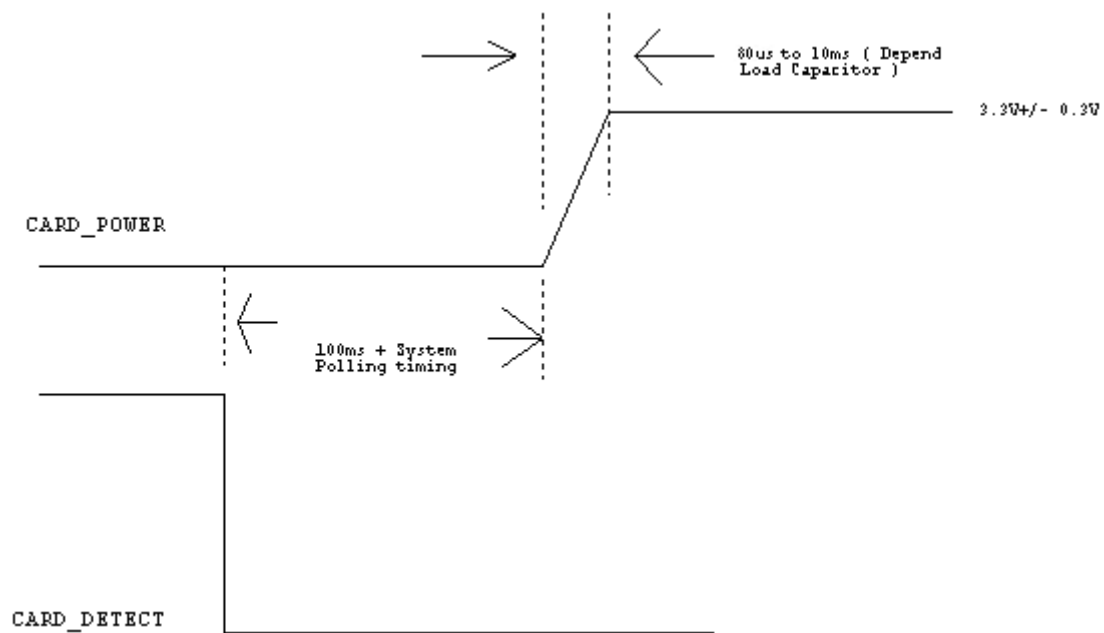
## 5.4 USB Transceiver Characteristics

Table 5.4 Electrical characteristics

SYMBOL	PARAMETER	CONDITIONS	Limits			UNIT
			MIN	TYP	MAX	
$V_{D33P}$	Analog supply Voltage		3.0	3.3	3.6	V
$V_{DD}$ $V_{18}$	Digital supply Voltage		1.62	1.8	1.98	V

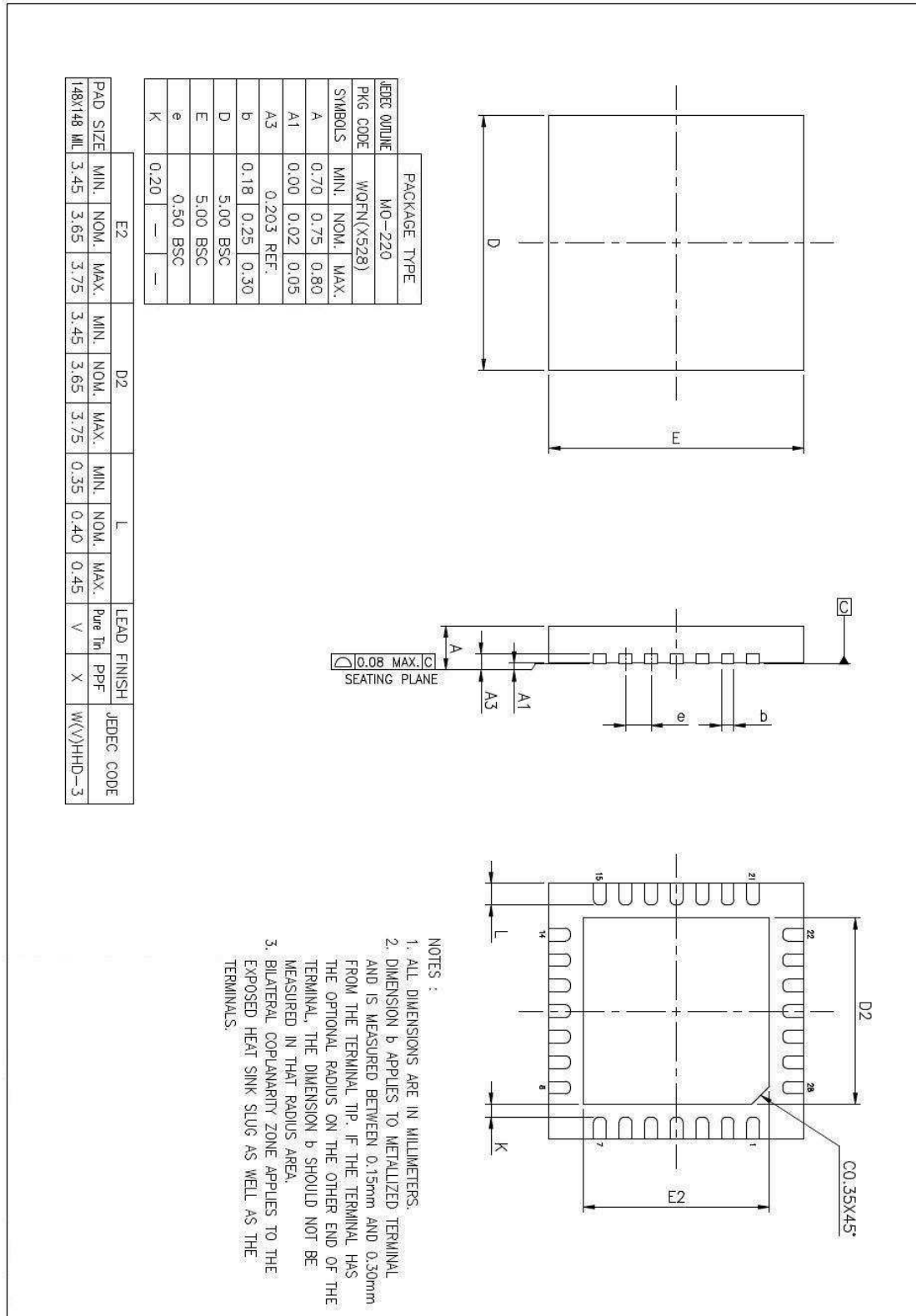
## 5.5 Detect Power-in Timing

Figure 5.1 Card Detect Power-in Timing



## 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>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.

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