



**CM320**

*Updateable USB2.0 Card Reader Controller*

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# **CM320**

## **Updateable USB2.0 Card Reader Controller**

- More Features, More Flexibility, Lowest BOM Cost

### **Datasheet**

**Version 1.0**

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**Date: 5/3/2006**  
**Version: 1.0**



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## 1. INTRODUCTION



### Overview

The CM320 is another value-added card reader controller solution derived from CM220. It preserves CM220 features:

- True "single-chip" card reader solution
- Online updateable architecture
- Card Manager Application software

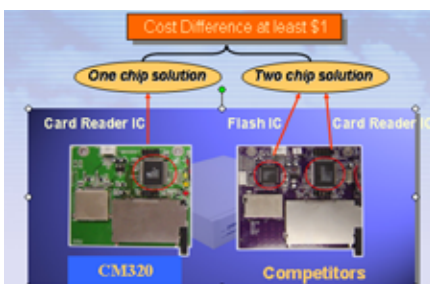
On top of that, CM320 **integrate** most of external components: **4 MOS(except MD)**, **2 regulators**, **1 Diode** and many passive devices to minimize customer BOM cost, let it be the industry highest integration card reader controller solution.

Its unique software structure makes the function easy to configure to meet the customer versatile demand.

- Flexible card configuration
- Customized smart button design

- True "single-chip" card reader solution

The CM320's patented architecture enables the widest possible compatibility and in-the-field update capability, without the need for external EEPROM or additional components, reducing parts count and costs. The driver software on the host provides all the required programmability. OEMs and component manufacturers need not be concerned about stock issues relating to outdated firmware.



Online updateable architecture

Due to the rapid change of media card specifications and the growth in capacities in every format, the future compatibility of media card reader solutions is becoming more important. C-Media's innovative CM320 allows end-users online update their card readers via Window's "Automatic Update" Function

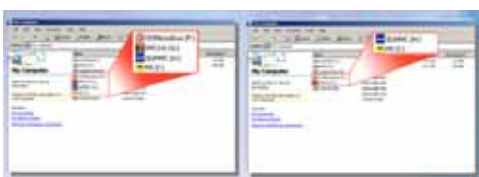

 Card Manager Application software

- ✓ File-security Function
- ✓ Private-Disk Function
- ✓ On-Line Update Hotkey
- ✓ Multiple Window

The CM320 can be optionally supplied with a special purpose application shell: the C-Media Card Manager. The C-Media Card Manager provides an easy-to-use file management and security function for all media cards.

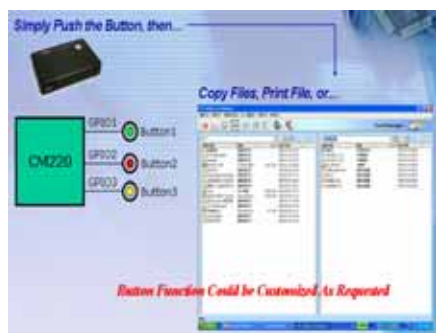

 Flexible Card Configuration

Any combination of Flash cards is possible and can be programmed by HW or SW. Card icons can also be customized as requested.



### ❑ Smart Button Design

To provide end-user friendly operation interface, just press one button, many things, ex copy file, print file, encrypt/decrypt file,...etc. could be done without the hassle. Middleware program could be provided to configure the button functions in the future.



## Application

- ✧ Internal Type Card Reader
- ◆ For Desktop PC
- ◆ For Notebook PC
- ◆ For Barebone
- ◆ For PC DIY market card reader
- ✧ External Type Card Reader
- ◆ Single Slot Design
- ◆ Two Slot Design
- ◆ Multi Slot Design
- ✧ Niche Market Card Reader
- ◆ DMA (Digital Media Adapter) or media server
- ◆ Card reader + Hub
- ◆ Card reader + VOIP Phone
- ◆ Others



## Features

- ✧ USB 2.0 High-Speed operation, USB1.1 Full/Low-Speed backward compatible
- ✧ Compliant with USB Mass Storage Device Class specifications
- ✧ Driver updates provided transparently via Microsoft's Windows Update service
- ✧ USB bus power and self power capability
- ✧ Single chip with integrated USB2.0 PHY
- ✧ Supports All-in-1 card reader systems.
  - Flash media card specifications supported:
    - CompactFlash (ver 3.0) / Microdrive
    - Smart Media Card
    - xD-Picture Card (Ver 1.2)
    - MultiMediaCard / MultiMediaCardplus (Ver4.1, 1/4/8 bit mode)
    - SD Card / High Speed SD Card (SD ver 1.1)
    - MemoryStick / High Speed MemoryStick / Memory Stick Pro / High Speed MemoryStick Pro
  - Also support small-size flash cards
    - miniSD / T-Flash Card (Micro-SD)/MemoryStick Duo / MemoryStick-Pro Duo
    - RS-MMC / MMCmobile (Ver4.1, 1/4/8 bit mode)
  - In addition, ROM-Type flash cards are also supported
    - MMC ROM, MMCplus ROM, MMCmobile ROM
    - MemoryStick ROM, MemoryStick Pro ROM
    - SD ROM
- ✧ SPI interface for external MCU
- ✧ EEPROM Serial Interface for customized VID/PID via USB interface
- ✧ Built-in regulators
- ✧ Built-in PMOS except for MD (Needless of external PMOS for CF)
- ✧ No external component needed for C3 Mode (NB Power Saving Mode)
- ✧ Support 1~5 LED displays to indicate operation status
- ✧ "Designed for Windows" logo certified driver with Windows Update option.
- ✧ USB IF logo qualified
- ✧ xD-Picture certified
- ✧ MS-logo certified
- ✧ CM320L (QFP 100) and CM320S (LQFP 48) are both available now.

## 2. BLOCK DIAGRAM

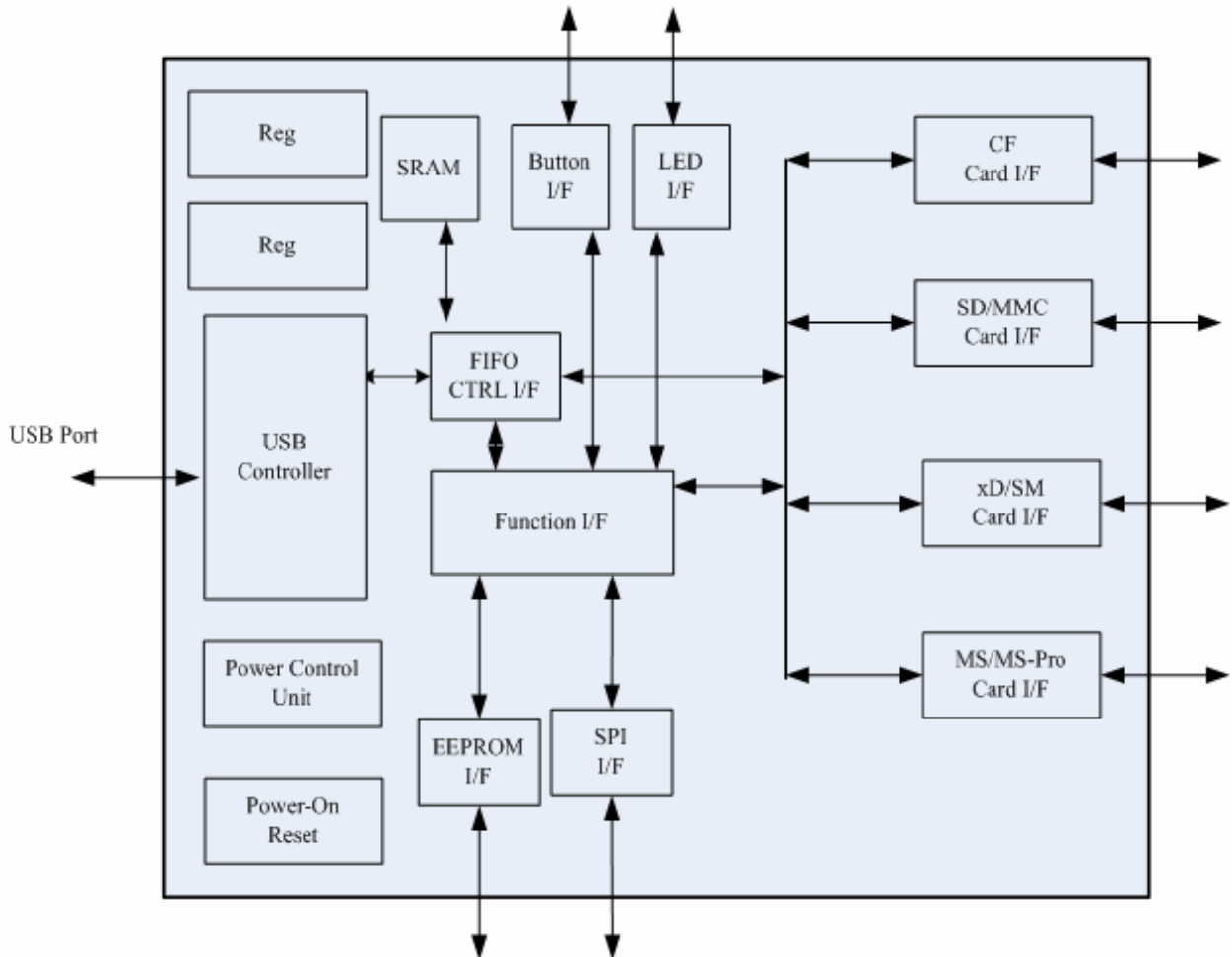
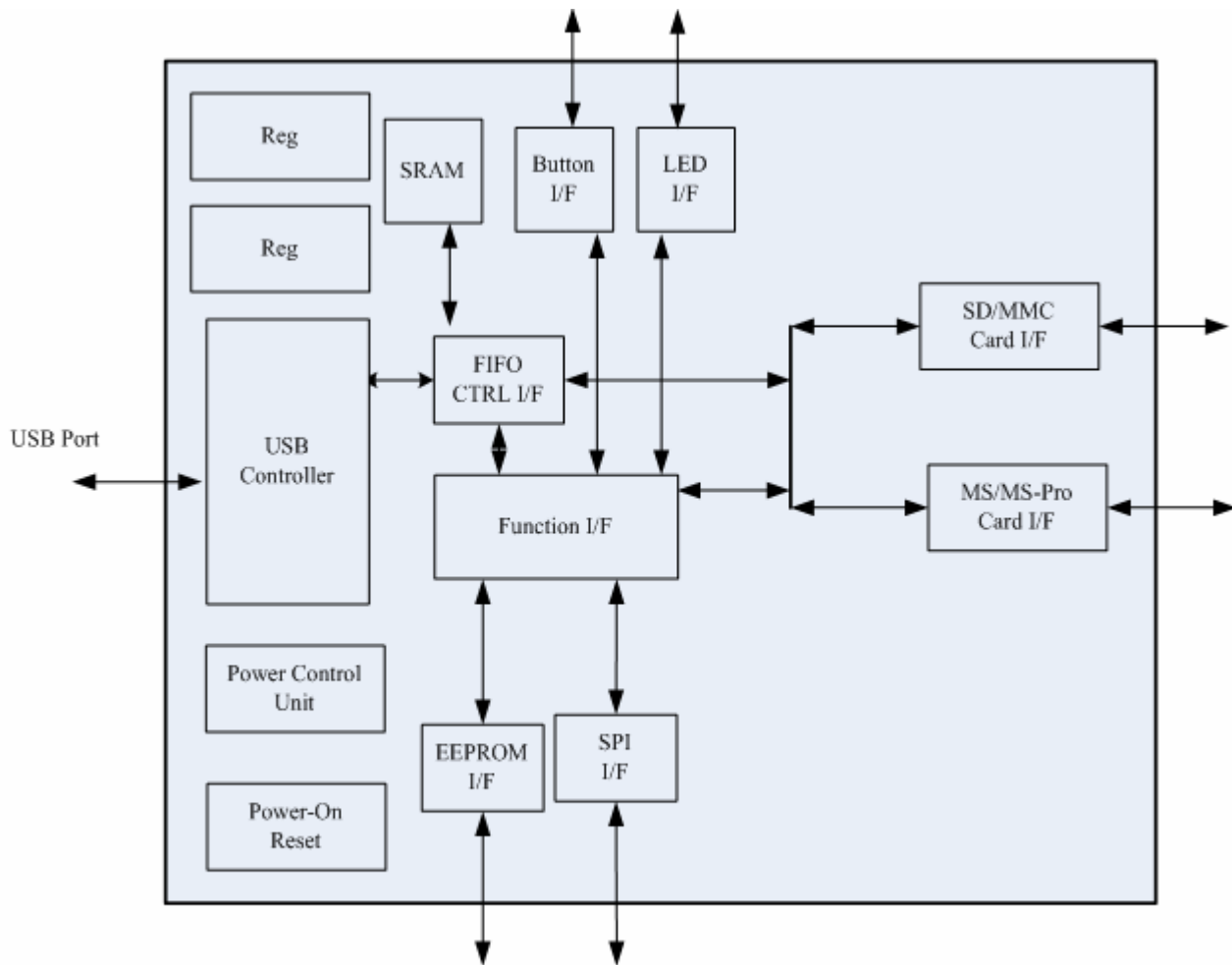


Figure 2-1: Block Diagram of CM320L+



**Figure 2-2: Block Diagram of CM320S**





<b>CM320</b>
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## Updateable USB2.0 Card Reader Controller

### 3. Ordering Information

Model Number	Package	Operating Ambient Temperature	Supply Range
<b>CM320L</b>	100-Pin QFP	0° C to +70° C	DVdd =3.3V, AVdd = 3.3V
<b>CM320S</b>	48-Pin LQFP	0° C to +70° C	DVdd =3.3V, AVdd = 3.3V

Feature	CM320L	CM320S
Package	QFP 100	LQFP 48
SPI	Yes	Yes
EEPROM Interface (For VID/PID)	Yes	Yes
High Speed MMC	Yes (8bit mode, Ver4.1)	Yes (8bit mode, Ver4.1)
High Speed SD	Yes (SD Ver1.1)	Yes (SD Ver1.1)
GPIO	Yes	Yes
LED Display	1~5 LED	x2, x1 LED
Updateable	Yes	Yes
Card Manager UI	Yes	Yes
Card Configuration	Yes	Yes
Smart Button Design	Yes	Yes
Supported Card	All	SD/MMC/MS/MS-Pro

[Note]: GPIO, LED, and Smart Button Share the same Pins



### 4. PIN DESCRIPTIONS & ASSIGNMENT

#### CM320L

100 pin #	Symbol	Type	I/O Type	Description
1	VCC3V	PWR		Digital power. Connected to 3.3 V
2	CFPWR	O		CF card power MOS
3	MSCD	I	ST	MS Card detect pin, low active
4	MSD[2]	IO	SR, ST	MS card data bus
5	MSD[0]	IO	SR, ST	MS card data bus
6	MSD[1]	IO	SR, ST	MS card data bus
7	MSBS	O	SR	MS Bus State Output
8	LED	IO	SR	Card access indicator Led, High active
9	GPIO0	IO	SR, ST	General Purpose Input Output Pin
10	XDD[7]	IO	SR, ST	XD/SM card data bus
11	XDCD	I	ST	XD Card detect pin, low active
12	SMCD	I	ST	SM Card detect pin, low active
13	GPIO1	IO	SR, ST	General Purpose Input Output Pin
14	GPIO5	IO	SR, ST	General Purpose Input Output Pin
15	SMWP	I	ST	SM card write protect, low active
16	TMODE	I	ST	Chip test mode enable, High active
17	CFCS0	O	SR	CF card select 0
18	CFCS1	O	SR	CF card select 1
19	CFIOR	O	SR	CF card read enable, low active
20	CFIOW	O	SR	CF card write enable, low active
21	CFRST	O	SR	CF card reset, low active
22	CFSA[2]	O	SR	CF card address bus
23	CFSA[1]	O	SR	CF card address bus
24	CFSA[0]	O	SR	CF card address bus
25	CFD[0]	IO	SR, ST	CF card data bus
26	CFD[1]	IO	SR, ST	CF card data bus
27	CFD[8]	IO	SR, ST	CF card data bus
28	CFD[2]	IO	SR, ST	CF card data bus
29	CFD[9]	IO	SR, ST	CF card data bus
30	CFD[10]	IO	SR, ST	CF card data bus



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## Updateable USB2.0 Card Reader Controller

31	CFCD	I	ST	CF Card detect pin, low active
32	GND	PWR		Digital Ground pin
33	VCC3V	PWR		Digital power. Connected to 3.3 V
34	SDPWR	O		SD Card power MOS
35	NC			Not Connected Pin
36	NC			Not Connected Pin
37	XSCI	I		Analog input. Crystal oscillator input 12M
38	XSCO	O		Analog output. Crystal oscillator output 12M
39	VCCHST	PWR		Analog power pin. Connected to 3.3V power
40	GND_U20	PWR		Analog ground
41	RREF	I		Analog input. Connects external reference resistor (12.1k +- 1%) to Analog GND
42	DM	IO		Bidirection pin, USB 2.0 data in data negative pin terminal
43	DP	IO		Bidirection pin, USB 2.0 data in data positive pin terminal
44	VCCA	PWR		PHY power in for analog. Connected to 3.3V
45	GND_A	PWR		Analog Ground pin
46	GND	PWR		Digital Ground pin
47	VCC5V(I)	I		5V input of 5-> 3.3V regulator
48	VCC3V(O)	O		3V output of 5-> 3.3V regulator
49				N.C.
50	VCC2.5V(O)	O		2.5V output of 3.3->2.5V regulator
51	GND(O)	PWR		Digital Ground pin
52	GND(O)	PWR		Digital Ground pin
53	CFD[3]	IO	SR, ST	CF card data bus
54	CFD[11]	IO	SR, ST	CF card data bus
55	CFD[4]	IO	SR, ST	CF card data bus
56	CFD[12]	IO	SR, ST	CF card data bus

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57	CFD[5]	IO	SR, ST	CF card data bus
58	CFD[13]	IO	SR, ST	CF card data bus
59	CFD[6]	IO	SR, ST	CF card data bus
60	CFD[14]	IO	SR, ST	CF card data bus
61	CFD[7]	IO	SR, ST	CF card data bus
62	CFD[15]	IO	SR, ST	CF card data bus
63	GPIO3	IO	SR, ST	General Purpose Input Output Pin
64	GPIO4	IO	SR, ST	General Purpose Input Output Pin
65	SDD[2]	IO	SR, ST	SD card data bus
66	SDD[3]	IO	SR, ST	SD card data bus
67	SDO	IO	SR, ST	SPI - Data Output EEPROM – DI SD - SDD[4]
68	SDCMD	IO	SR, ST	SD card command bus
69	SDI	IO	SR, ST	SPI - Data Input EEPROM – DO SD - SDD[5]
70	SDCLK	O	SR	SD card clock
71	GND	PWR		Digital Ground pin
72	VCC3V	PWR		Digital power. Connected to 3.3 V
73	MSPWR	O		MS Card power MOS
74	SMPWR	O		SM/xD Card power MOS
75	VCC3V	PWR		Digital power. Connected to 3.3 V
76	SCLK	IO	SR, ST	SPI - Clock Output EEPROM – SK SD – SDD[6]
77	SCEB	IO	SR, ST	SPI – CEB EEPROM – CS SD – SDD[7]
78	SDD[0]	IO	SR, ST	SD card data bus
79	SDD[1]	IO	SR, ST	SD card data bus
80	SDCD	I	ST	SD Card detect pin, low active
81	SDWP	I	ST	SD card write protect, low active
82	RSTB	I	ST	System Reset, Low active
83	XDRDY	I	SR	XD card ready/busy status

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84	XDREB	O	SR	Read enable, low active
85	XDCEB	O	SR	Card enable, low active
86	XDCLE	O	SR	Command latch enable, high active
87	XDALE	O	SR	Address latch enable, high active
88	XDWEB	O	SR	Write enable, low active
89	XDWPB	O	SR	
90	GPIO2	IO	SR, ST	General Purpose Input Output Pin
91	XDD[0]	IO	SR, ST	XD/SM card data bus
92	XDD[1]	IO	SR, ST	XD/SM card data bus
93	XDD[2]	IO	SR, ST	XD/SM card data bus
94	XDD[3]	IO	SR, ST	XD/SM card data bus
95	XDD[4]	IO	SR, ST	XD/SM card data bus
96	XDD[5]	IO	SR, ST	XD/SM card data bus
97	XDD[6]	IO	SR, ST	XD/SM card data bus
98	MSCLK	O	SR	MS Clock Output
99	MSD[3]	IO	SR, ST	MS card data bus
100	GND	PWR		Digital Ground pin

**CM320S**

48 pin #	Symbol	Type	I/O Type	Description
1	MSCD	I	ST	MS Card detect pin, low active
2	MSD[2]	IO	SR, ST	MS card data bus
3	MSD[0]	IO	SR, ST	MS card data bus
4	MSD[1]	IO	SR, ST	MS card data bus
5	MSBS	O	SR	MS Bus State Output
6	LED	IO	SR	Card access indicator Led, High active
7	GPIO0	IO	SR, ST	General Purpose Input Output Pin
8	TMODE	I	ST	Chip test mode enable, High active
9	GND	PWR		Digital Ground pin
10	VCC3V	PWR		Digital power. Connected to 3.3 V
11	SDPWR	O		SD Card power MOS
12	NC			Not Connected Pin
13	NC			Not Connected Pin

**Date: 5/3/2006****Version: 1.0**



## Updateable USB2.0 Card Reader Controller

14	XSCI	I		Analog input. Crystal oscillator input 12M
15	XSCO	O		Analog output. Crystal oscillator output 12M
16	VCCHST	PWR		Analog power pin. Connected to 3.3V power
17	GND_U20	PWR		Analog ground
18	RREF	I		Analog input. Connects external reference resistor (12.1k +/- 1%) to Analog GND
19	DM	IO		Bidirection pin, USB 2.0 data in data negative pin terminal
20	DP	IO		Bidirection pin, USB 2.0 data in data positive pin terminal
21	VCCA	PWR		PHY power in for analog. Connected to 3.3V
22	GNDA	PWR		Analog Ground pin
23	GND	PWR		Digital Ground pin
24	VCC5V(I)	I		5V input of 5-> 3.3V regulator
25	VCC3V(O)	O		3V output of 5-> 3.3V regulator
26	VCC2.5V(O)	O		2.5V output of 3.3->2.5V regulator
27	GND(O)	PWR		Digital Ground pin
28	SDD[2]	IO	SR, ST	SD card data bus
29	SDD[3]	IO	SR, ST	SD card data bus
30	SDO	IO	SR, ST	SPI - Data Output EEPROM - DI SD - SDD[4]
31	SDCMD	IO	SR, ST	SD card command bus
32	SDI	IO	SR, ST	SPI - Data Input EEPROM - DO SD - SDD[5]
33	SDCLK	O	SR	SD card clock
34	GPIO13	IO	ST	Bonding option
35	VCC3V	PWR		Digital power. Connected to 3.3 V



## Updateable USB2.0 Card Reader Controller

36	MSPWR	O		MS Card power MOS
37	SCLK	IO	SR, ST	SPI - Clock Output EEPROM – SK SD – SDD[6]
38	SCEB	IO	SR, ST	SPI – CEB EEPROM – CS SD – SDD[7]
39	SDD[0]	IO	SR, ST	SD card data bus
40	SDD[1]	IO	SR, ST	SD card data bus
41	SDCD	I	ST	SD Card detect pin, low active
42	SDWP	I	ST	SD card write protect, low active
43	RSTB	I	ST	System Reset, Low active
44	GPIO2	IO	SR, ST	General Purpose Input Output Pin
45	MSCLK	O	SR	MS Clock Output
46	MSD[3]	IO	SR, ST	MS card data bus
47	GND	PWR		Digital Ground pin
48	VCC3V	PWR		Digital power. Connected to 3.3 V

Output driving Capability is 8mA

### Note

1. I: input
2. O: output
3. PWR: power/ground pin
4. SR: Slew Rate control
5. ST: Smith Trigger



## 5. ELECTRICAL CHARACTERISTICS

### ◆ Absolute Maximum Ratings

SYMBOL	PARAMETER	RATING	UNITS
VCC	Power Supply	-0.3 to VCC+0.3	V
V <sub>IN3</sub>	Input Voltage of 3.3V I/O	-0.3 to 4.0	V
T <sub>STG</sub>	Storage Temperature	-40 to 150	°C

### ◆ Recommended Operating Conditions

SYMBOL	PARAMETER	MIN	TYP	MAX	UNITS
V <sub>CK</sub>	Core Power Supply	2.25	2.5	2.75	V
V <sub>CC3V</sub>	Power Supply 3.3V I/O	3.0	3.3	3.6	V
V <sub>IN</sub>	Input Voltage of 3.3V I/O	0	3.3	3.6	V
T <sub>j</sub>	Commercial Junction Operating Temperature	0		115	°C

### ◆ DC Characteristics of 3.3V I/O cells

SYMBOL	PARAMETER	CONDITIONS	MIN	TYP	MAX	UNITS
V <sub>25</sub>	Regulator output voltage	VCC=3.3V	2.2	2.5	2.7	V
V <sub>25Iload</sub>	Regulator driving current	VCC=3.3V			150	mA
V <sub>IL</sub>	Input Low Voltage	LVTTL			0.8	V
V <sub>IH</sub>	Input High Voltage		2.0			V
V <sub>t-</sub>	Schmitt Trigger Negative Going Threshold Voltage	LVTTL	0.8	1.1		V
V <sub>t+</sub>	Schmitt Trigger Positive Going Threshold Voltage			1.6	2.0	V
V <sub>OL</sub>	Output Low Voltage	I <sub>OL</sub>   = 2 ~ 16mA			0.4	V
V <sub>OH</sub>	Output High Voltage	I <sub>OH</sub>   = 2 ~ 16mA	2.4			V
R <sub>pu</sub>	Input Pull-Up Resistance	PU=high, PD=low	40	75	190	KΩ
R <sub>pd</sub>	Input Pull-Down Resistance	PU=low, PD=high	40	75	190	KΩ
I <sub>IL</sub>	Input Leakage Current	V <sub>in</sub> =VCC3I or 0	-10	±1	10	μA
I <sub>oz</sub>	Tri-state Out Leakage Current		-10	±1	10	μA
I <sub>OP</sub>	Operating current (without card)			48		mA
I <sub>STBY</sub>	Standby current			320		μA

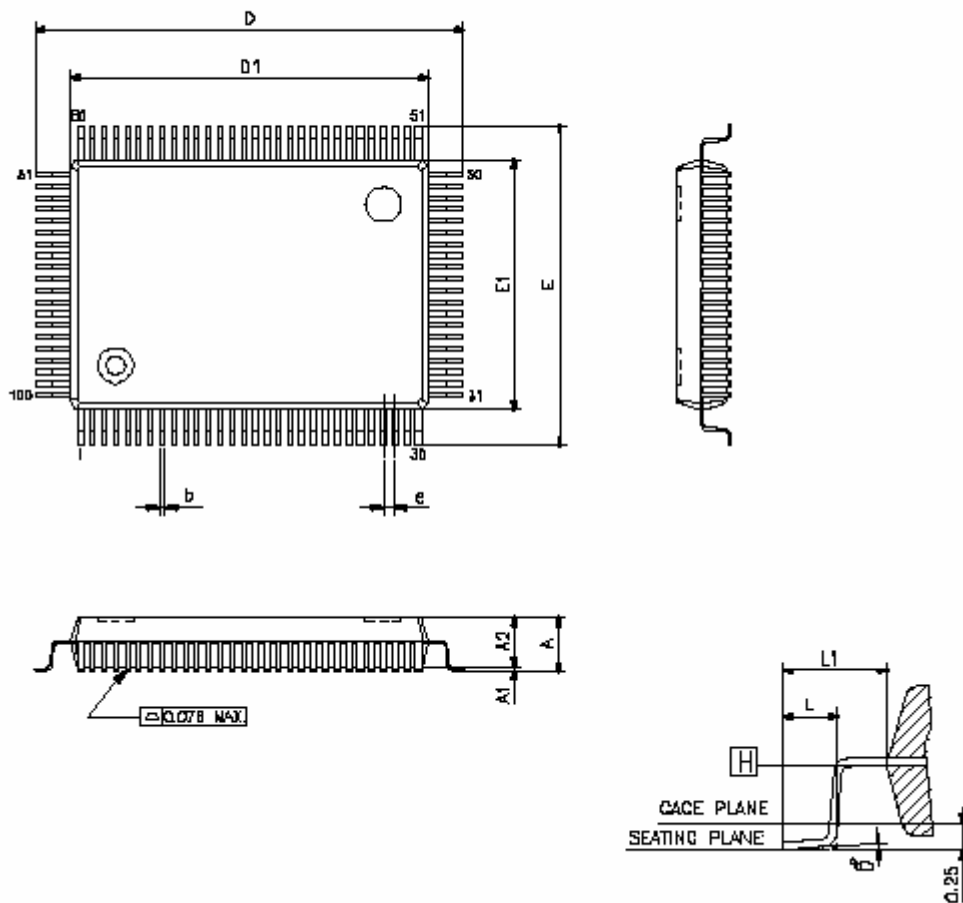


## 6. MECHANICAL DIMENSIONS

### Outline of Dimensions

Dimensions shown in inches and mm

#### ◆100 Pin QFP for CM320L



## Updateable USB2.0 Card Reader Controller

SYMBOLS	MIN.	NOM	MAX.
A	—	—	3.30
A1	0.25	—	—
A2	2.68	2.80	2.92
b	0.20	0.30	0.40
D	24.49	24.80	25.10
D1	19.90	20.00	20.10
e	0.50	0.65	0.8
E	18.48	18.80	19.10
E1	13.90	14.00	14.10
L	1.00	1.20	1.40
L1	2.21	2.40	2.59
$\theta^{\circ}$	0	—	12

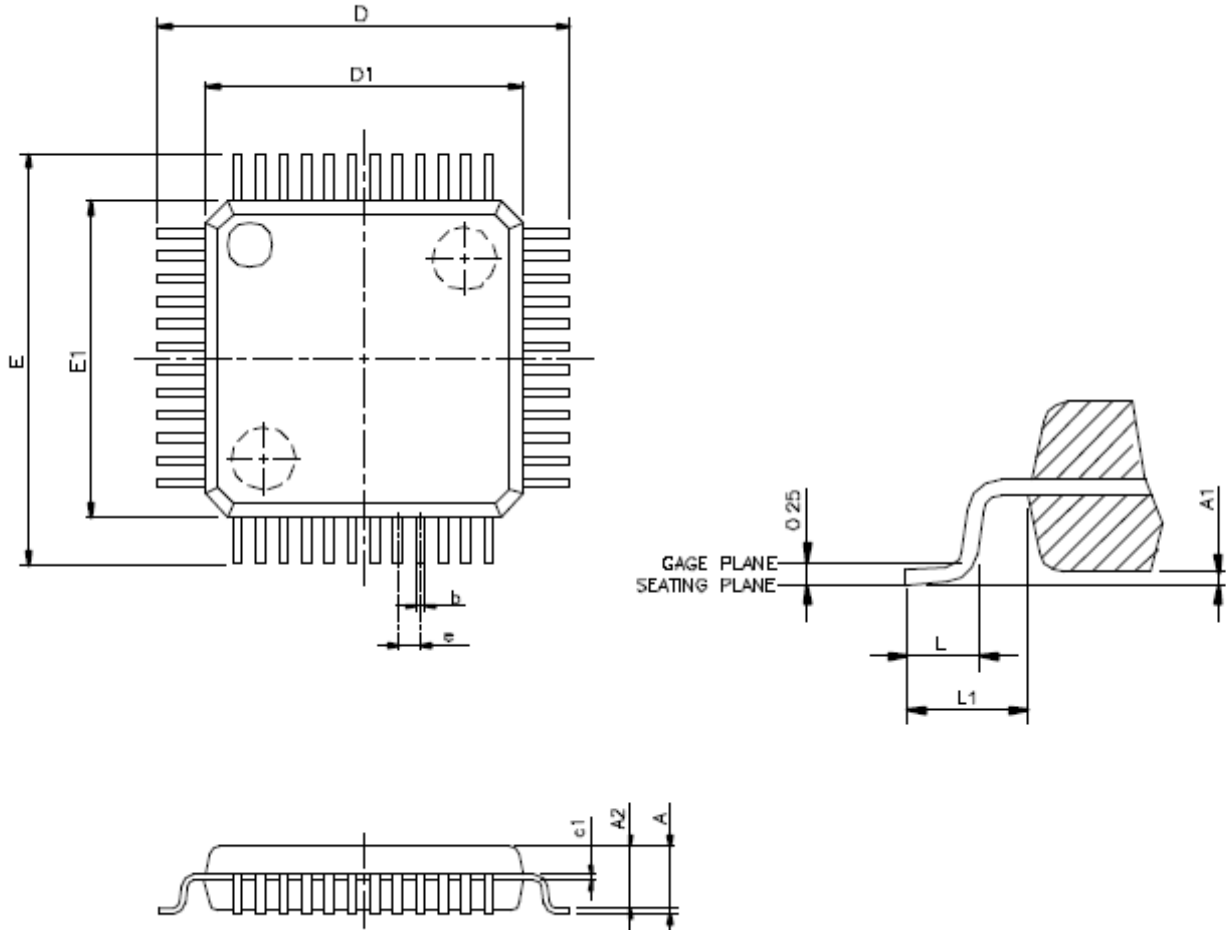
UNIT : mm

## NOTES:

1. JEDEC OUTLINE: MO-112 CC-1
2. DATUM PLANE [H] IS LOCATED AT THE BOTTOM OF THE MOLD PARTING LINE COINCIDENT WITH WHERE THE LEAD EXITS THE BODY.
3. DIMENSIONS D1 AND E1 DO NOT INCLUDE MOLD PROTRUSION. ALLOWABLE PROTRUSION IS 0.25 mm PER SIDE. DIMENSIONS D1 AND E1 DO INCLUDE MOLD MISMATCH AND ARE DETERMINED AT DATUM PLANE [H].
4. DIMENSION b DOES NOT INCLUDE DAMBAR PROTRUSION .

**Figure 6-1 : Mechanical Dimension of CM320L (QFP100)**

◆48 Pin LQFP for CM320S



## VARIATIONS (ALL DIMENSIONS SHOWN IN MM)

SYMBOLS	MIN.	MAX.
A	--	1.6
A1	0.05	0.15
A2	1.35	1.45
c1	0.09	0.16
D	9.00 BSC	
D1	7.00 BSC	
E	9.00 BSC	
E1	7.00 BSC	
e	0.5 BSC	
b	0.17	0.27
L	0.45	0.75
L1	1 REF	

## NOTES:

1. JEDEC OUTLINE:  $\triangle$ MS-026 BBC
2. DIMENSIONS D1 AND E1 DO NOT INCLUDE MOLD PROTRUSION. ALLOWABLE PROTRUSION IS 0.25mm PER SIDE. D1 AND E1 ARE MAXIMUM PLASTIC BODY SIZE DIMENSIONS INCLUDING MOLD MISMATCH.
3. DIMENSION b DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL NOT CAUSE THE LEAD WIDTH TO EXCEED THE MAXIMUM b DIMENSION BY MORE THAN 0.08mm.

**Figure 6-2 : Mechanical Dimension of CM320S (LQFP48)**



## 7. ERRATA

### Revision History

- 2005.1.13 Version 0.90 Preliminary version
- 2005.5.3 Add Operating and Standby current

— End of Documentation —

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