

CM220

Updateable USB2.0 Card Reader Controller

Datasheet

Version 1.4

C-MEDIA ELECTRONICS INC.

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1. INTRODUCTION

Overview

The CM220 is a USB 2.0 High-speed controller IC compatible with the widest possible range of media card types in the market. The CM220 is also updateable in the field via a simple host driver update to enable compatibility with future media card types. The CM220 supports high speed USB 2.0 data transfer to and from media cards, but is fully backwards compatible with system configurations supporting USB 1.1 full and low speed operation.

The CM220 supports 12 different flash media card, 6 mini-size flash media cards and 6 read-only-type flash card specifications, enabling the development of 24-in-1 media card reader devices. The driver software, installed on the host PC, is updateable via Microsoft's Windows Update, which allows easy future proofing of the card reader solution.

True "single-chip" card reader solution (Patent Pending)

The CM220'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 OEMs and component manufacturers need not be concerned about stock issues relating to outdated firmware.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 (Patent Pending)

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 CM220 allows end-users online update their card readers via Window's "Automatic Update" Function

Card Manager Application software (Patent Pending)

The CM220 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.

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 24in-1 (12 specs + 6 small-size + 6 ROM-Type) card reader systems.
 - Flash media card specifications supported:
 - CompactFlash (Ver2.1) / Microdrive
 - Smart Media Card
 - xD-Picture Card (Ver 1.1, 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 6 small-size flash cards
 - miniSD / T-Flash Card/MemoryStick Duo / MemoryStick-Pro Duo
 - RS-MMC / MMCmobile (Ver4.1, 1/4/8 bit mode)
 - In addition, 6 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
- ✧ 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
- ✧ CM220L (QFP 100) or CM220F (LQFP 128) are both available
- ✧ Small footprint for CM220S (LQFP 48) which can be used in notebook or size-sensitive systems

2. BLOCK DIAGRAM

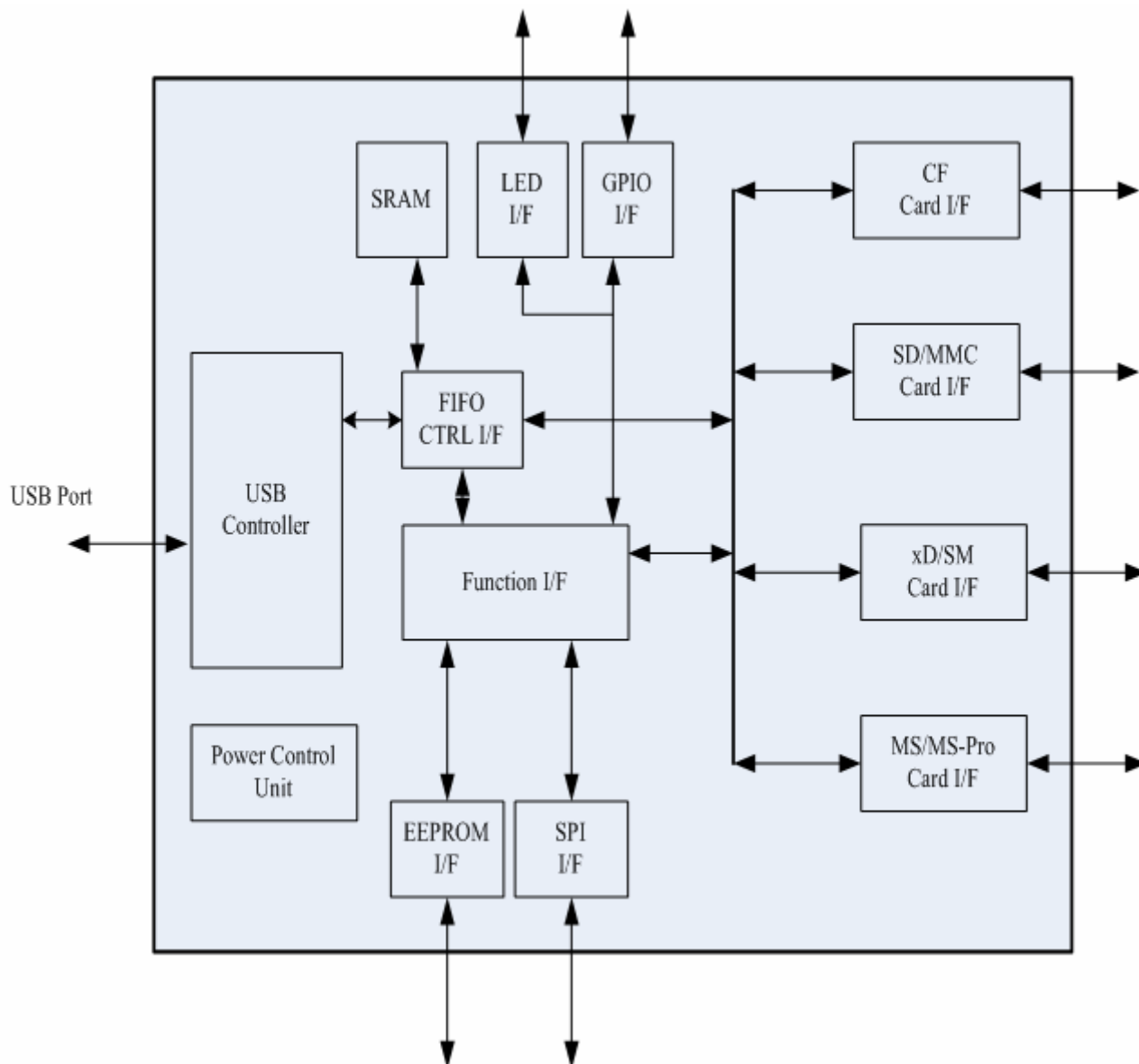


Figure 2 : Block Diagram of CM220

3. Ordering Information

Model Number	Package	Operating Ambient Temperature	Supply Range
CM220F	128-Pin LQFP	0° C to +70° C	DVdd =3.3V, AVdd = 3.3V
CM220L	100-Pin QFP	0° C to +70° C	DVdd =3.3V, AVdd = 3.3V
CM220S	48-Pin LQFP	0° C to +70° C	DVdd =3.3V, AVdd = 3.3V

Feature	CM220F	CM220L	CM220S
Package	LQFP 128	QFP 100	LQFP 48
SPI	<u>Yes</u>	No	No
EEPROM Interface (For VID/PID)	<u>Yes</u>	No	No
High Speed MMC	Yes (8bit mode, Ver4.1)	Yes (4 bit mode, Ver4.1)	Yes (4 bit mode, Ver4.1)
High Speed SD	Yes (SD Ver1.1)	Yes (SD Ver1.1)	Yes (SD Ver1.1)
GPIO	<u>Yes</u>	No	No
LED Display	<u>x5</u> , x2, x1 LED	x2, x1 LED	x1 LED
Updateable	Yes	Yes	Yes
Card Manager UI	Yes	Yes	Yes
Supported Card	All	All	SD/MMC/MS/MS-Pro

4. PIN DESCRIPTIONS & ASSIGNMENT

48 Pin#	100 pin #	128 pin #	Symbol	I/O Type	Description
NC	2	1	XD CD	DI, PU	XD Card detect pin, low active
NC	3	2	SM CD	DI, PU	SM Card detect pin, low active
NC	4	3	SM CEB	DO	SM card enable, low active
10	5	4	SM WP	DI, PU	SM card write protect, low active
11	6	5	TMODE	DI, PD	Chip test mode enable, High active
NC	NC	6	GPIO1	DI	General Purpose Input Output
NC	NC	7	CF LED	DO	CF Card access indicator Led, High active
NC	NC	8	VCC3V(O)		Digital power. Connected to 3.3 V
NC	NC	9	GND(O)		Digital Ground pin
NC	7	10	CF PWR	DO	CF Card power control, low active
NC	8	11	CFD[3]	DIO, PD	CF card data bus
NC	9	12	CFD[11]	DIO, PD	CF card data bus
NC	10	13	CFD[4]	DIO, PD	CF card data bus
NC	11	14	CFD[12]	DIO, PD	CF card data bus
NC	12	15	CFD[5]	DIO, PD	CF card data bus
NC	13	16	CFD[13]	DIO, PD	CF card data bus
NC	14	17	CFD[6]	DIO, PD	CF card data bus
NC	15	18	CFD[14]	DIO, PD	CF card data bus
NC	16	19	CFD[7]	DIO, PD	CF card data bus
12	17	20	VCC3V(O)		Digital power. Connected to 3.3 V
NC	18	21	GND(O)		Digital Ground pin
NC	19	22	CFD[15]	DIO, PD	CF card data bus
NC	20	23	CFCS0	DO,	CF card select 0
NC	21	24	CFCS1	DO,	CF card select 1
NC	22	25	CFIOR	DO,	CF card read enable, low active
NC	23	26	CFIOW	DO,	CF card write enable, low active
NC	24	27	CFRST	DO,	CF card reset, low active
NC	25	28	CFSA[2]	DO,	CF card address bus
NC	26	29	CFSA[1]	DO,	CF card address bus
NC	27	30	CFSA[0]	DO,	CF card address bus
NC	28	31	CFD[0]	DIO, PD	CF card data bus

NC	29	32	VCC3V(O)		Digital power. Connected to 3.3 V
NC	29	32	VCC3V(I)		Digital power. Connected to 3.3 V
NC	30	33	CFD[1]	DIO, PD	CF card data bus
NC	31	34	CFD[8]	DIO, PD	CF card data bus
NC	32	35	CFD[2]	DIO, PD	CF card data bus
NC	33	36	CFD[9]	DIO, PD	CF card data bus
NC	34	37	CFD[10]	DIO, PD	CF card data bus
NC	35	38	CFCD	DI, PU	CF Card detect pin, low active
NC	36	39	GND(O)		Digital Ground pin
13	37	45	VCC(CORE)		Digital power. Connected to 2.5 V
14	38	47	VDDH		Digital power. Connected to 3.3 V (Regulator input)
15	39	49	GND(CORE)		Digital Ground pin
16	40	56	VCC_U20		Digital power pin. Connected to 2.5V power
17	41	57	GND_U20		Analog ground
18	42	58	XSCI		Analog input. Crystal oscillator input 12M
19	43	59	XSCO		Analog output. Crystal oscillator output 12M
20	44	60	VCC3O_U20		Analog power pin. Connected to 3.3V power
20	44	60	VCCHSR		Analog power pin. Connected to 3.3V power
20	44	60	VCCHST		Analog power pin. Connected to 3.3V power
21	45	61	GND_U20		Analog ground
22	46	62	RREF		Analog input. Connects external reference resistor (12.1k +- 1%) to Analog GND
23	47	63	DM		Bidirection pin, USB 2.0 data in data negative pin terminal
24	48	64	DP		Bidirection pin, USB 2.0 data in data positive pin terminal
25	49	65	GND_U20		Analog ground
26	50	66	RPU		Connects external register (1.5K+- 1.5%) to analog 3.3V
27	51	67	DMRS		USB 1.1 data in data negative pin terminal
28	52	68	DPRS		USB 1.1 data in data positive pin terminal
29	53	69	VCC3I_U20		Analog power pin. Connected to 3.3V power
29	53	69	VCC3O_U20		Analog power pin. Connected to 3.3V power
30	54	70	GND_U20		Analog ground
31	55	71	VCCA		PHY power in for analog. Connected to 3.3V
NC	56	72	GND(O)		Digital Ground pin

NC	NC	73	SCEB	DO, PU DO, PU DIO, PU	SPI – CEB EEPROM – CS SD – SDD[7]
NC	NC	74	SCLK	DO, PU DO, PU DIO, PU	SPI - Clock Output EEPROM – SK SD – SDD[6]
NC	NC	75	SDO	DO, PU DO, PU DIO, PU	SPI - Data Output EEPROM – DI SD - SDD[4]
NC	NC	76	SDI	DI, PU DI, PU DIO, PU	SPI - Data Input EEPROM – DO SD - SDD[5]
32	57	77	RSTB	DI	System Reset, Low active
33	58	78	SDWP	DI, PU	SD card write protect, low active
NC	59	79	VCC3V(O)		Digital power. Connected to 3.3 V
34	60	80	SDD[1]	DIO, PU	SD card data bus
35	61	81	SDD[0]	DIO, PU	SD card data bus
36	62	82	SDCLK	DO	SD card clock
37	63	83	SDCMD	DIO, PU	SD card command bus
38	64	84	SDD[3]	DIO, PU	SD card data bus
39	65	85	SDD[2]	DIO, PU	SD card data bus
NC	66	86	USBLED	DO	USB configuration indicator Led, High active
NC	NC	87	SDLED	DO	SD Card access indicator Led, High active
40	67	88	SDPWR	DO	SD Card power control, low active
41	68	89	SDCD	DI, PU	SD Card detect pin, low active
NC	NC	90	GPIO3	DIO	General Purpose Input Output
42	69	91	GND(CORE)		Digital Ground pin
42	69	91	GND(O)		Digital Ground pin
42	69	91	GND(I)		Digital Ground pin
43	70	92	VCC3V(O)		Digital power. Connected to 3.3 V
43	70	92	VCC3V(I)		Digital power. Connected to 3.3 V
44	71	93	MSCLK	DO	MS Clock Output
45	72	94	MSD[3]	DIO, PD	MS card data bus
46	73	95	MSD[2]	DIO, PD	MS card data bus
47	74	96	MSD[0]	DIO, PD	MS card data bus
48	75	97	MSD[1]	DIO, PD	MS card data bus
1	76	98	MSBS	DO	MS Bus State Output
2	77	99	MSCD	DI, PU	MS Card detect pin, low active
3	78	100	MSPWR	DO	MS Card power control, low active
NC	NC	101	GND(O)		Digital Ground pin

NC	NC	102	VCC3V(O)		Digital power. Connected to 3.3 V
NC	NC	103	MSLED	DO	MS Card access indicator Led, High active
NC	NC	104	GPIO2	DIO	General Purpose Input Output
NC	79	105	SMWPB	DO	SM write protect, low active
NC	80	106	XDRDY	DI	XD card ready/busy status
NC	81	107	XDREB	DO	Read enable, low active
NC	82	108	XDCEB	DO	Card enable, low active
NC	83	109	XDCLE	DO	Command latch enable, high active
4	84	110	XDALE	DO	Address latch enable, high active
5	85	111	XDWEB	DO	Write enable, low active
6	86	112	GND(O)		Digital Ground pin
7	87	113	VCC3V(O)		Digital power. Connected to 3.3 V
NC	88	114	XDWPB	DO	XD write protect, low active
NC	89	115	XDD[0]	DIO, PD	XD/SM card data bus
NC	90	116	XDD[1]	DIO, PD	XD/SM card data bus
NC	91	117	XDD[2]	DIO, PD	XD/SM card data bus
NC	92	118	XDD[3]	DIO, PD	XD/SM card data bus
NC	93	119	XDD[4]	DIO, PD	XD/SM card data bus
NC	94	120	XDD[5]	DIO, PD	XD/SM card data bus
NC	95	121	XDD[6]	DIO, PD	XD/SM card data bus
NC	96	122	XDD[7]	DIO, PD	XD/SM card data bus
NC	97	123	VCC3V(O)		Digital power. Connected to 3.3 V
NC	98	124	GND(O)		Digital Ground pin
NC	98	124	GND(I)		Digital Ground pin
NC	99	125	SMPWR	DO	SM Card power control, low active
8	100	126	SMLLED	DO	SM Card access indicator Led, High active
9	1	128	UDPS	DI	0: 500mA 1: 100mA

Note

1. DO ==> output
2. DI ==> input
3. DIO ==> Bi-direction
4. PD == > Internal pull low
5. PU == > Internal pull high

5.ELECTRICAL CHARACTERISTICS

◆Absolute Maximum Ratings

SYMBOL	PARAMETER	RATING	UNITS
VCC	Power Supply	-0.3 to VCC+0.3	V
V _{IN3}	Input Voltage of 3.3V I/O	-0.3 to VCC3I+0.3	V
	Input Voltage of 3.3V I/O with 5V Tolerance	-0.3 to 5.5	V
T _{STG}	Storage Temperature	-40 to 150	°C

◆Recommended Operating Conditions

SYMBOL	PARAMETER	MIN	TYP	MAX	UNITS
V _{CK}	Core Power Supply	2.25	2.5	2.75	V
V _{CC3V}	Power Supply 3.3V I/O	3.0	3.3	3.6	V
V _{IN}	Input Voltage of 3.3V I/O with 5V Tolerance	0	3.3	5.25	V
T _j	Commercial Junction Operating Temperature	0		115	°C

◆DC Characteristics of 3.3V I/O cells

SYMBOL	PARAMETER	CONDITIONS	MIN	TYP	MAX	UNITS
V ₂₅	Regulator output voltage	VCC=3.3V	2.2	2.5	2.7	V
V _{25Iload}	Regulator driving current	VCC=3.3V			150	mA
V _{IL}	Input Low Voltage	LVTTL			0.8	V
V _{IH}	Input High Voltage		2.0			V
V _{t-}	Schmitt Trigger Negative Going Threshold Voltage	LVTTL	0.8	1.1		V
V _{t+}	Schmitt Trigger Positive Going Threshold Voltage			1.6	2.0	V
V _{OL}	Output Low Voltage	I _{OL} = 2 ~ 16mA			0.4	V
V _{OH}	Output High Voltage	I _{OH} = 2 ~ 16mA	2.4			V
R _{pu}	Input Pull-Up Resistance	PU=high,PD=low	40	75	190	KΩ
R _{pd}	Input Pull-Down Resistance	PU=low,PD=high	40	75	190	KΩ
I _{IL}	Input Leakage Current	Vin=VCC3I or 0	-10	±1	10	μA

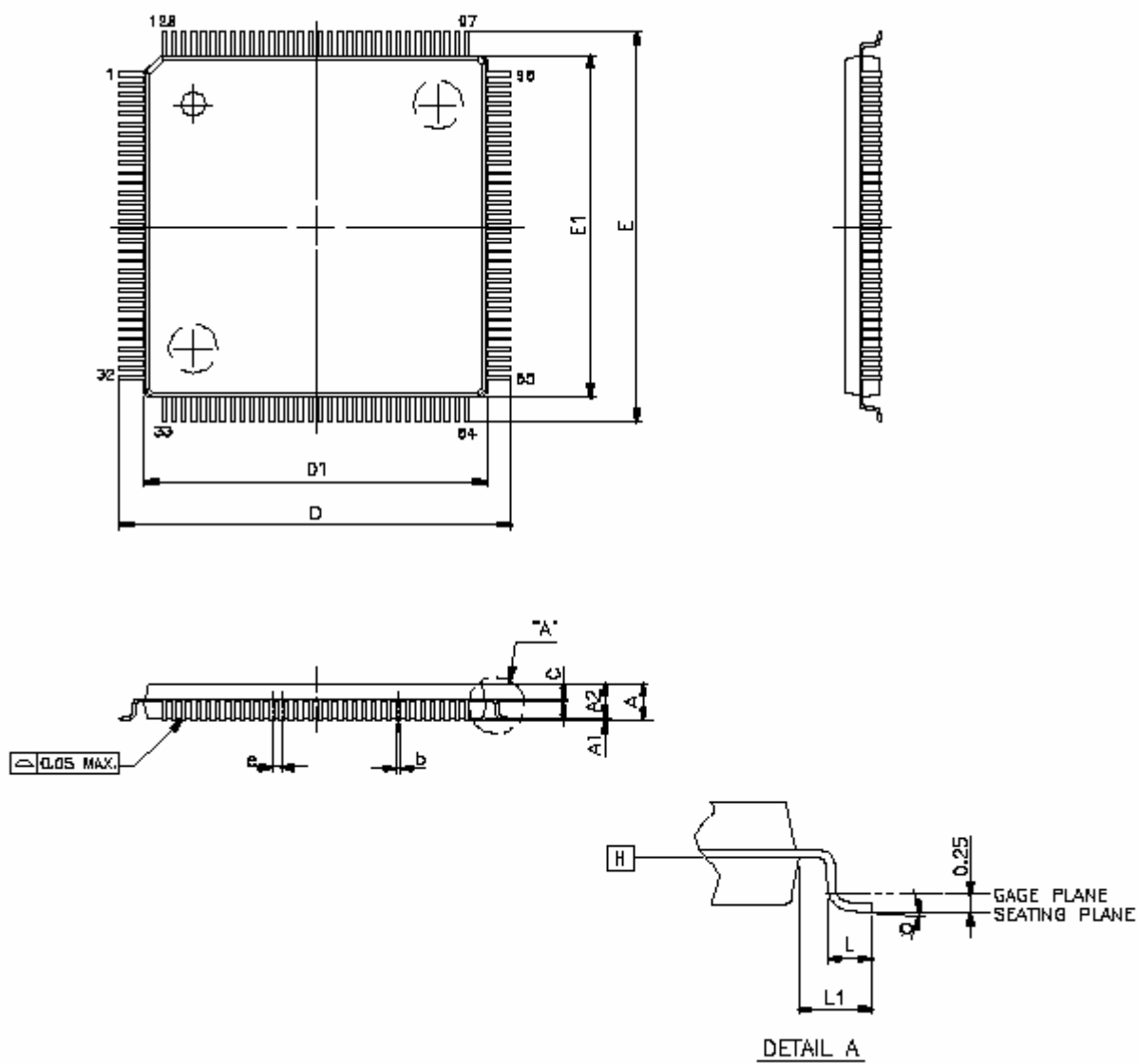
I _{oz}	Tri-state Out Leakage Current		-10	±1	10	μA
I _{op}	Operating current				80	mA
I _{STBY}	Standby current				250	μA

6. MECHANICAL DIMENSIONS

Outline of Dimensions

Dimensions shown in inches and mm

◆128 Pin LQFP for CM220F



VARIATIONS (ALL DIMENSIONS SHOWN IN MM)

SYMBOLS	MIN.	NOM.	MAX.
A	--	--	1.60
A1	0.05	--	0.15
A2	1.35	1.40	1.45
b	0.13	0.18	0.23
c	0.09	--	0.20
D	16.00 BSC		
D1	14.00 BSC		
E	16.00 BSC		
E1	14.00 BSC		
e	0.40 BSC		
L	0.45	0.60	0.75
L1	1.00 REF		
⌀	0"	3.5"	7"

NOTES:

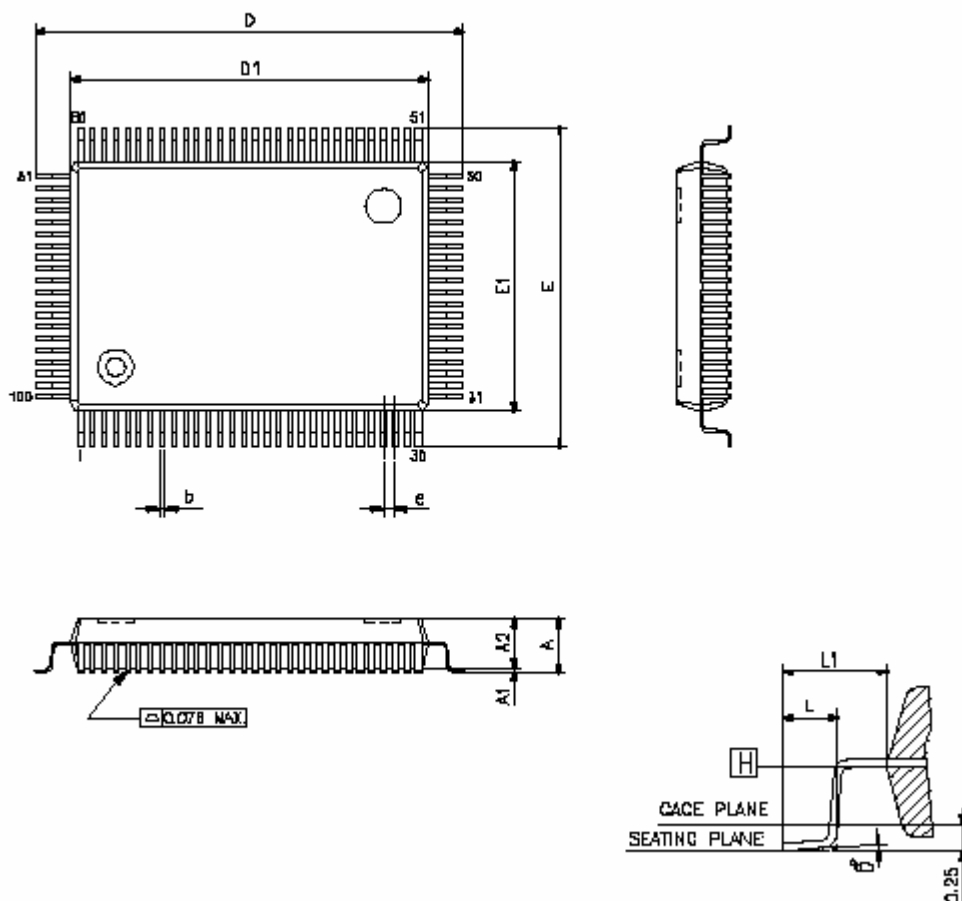
1.DATUM PLANE [H] IS LOCATED AT THE BOTTOM OF THE MOLD PARTING LINE COINCIDENT WITH WHERE THE LEAD EXITS THE BODY.

2.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].

3.DIMENSION b DOES NOT INCLUDE DAMBAR PROTRUSION.

Figure 6-1 : Mechanical Dimension of CM220F (LQFP128)

◆100 Pin QFP for CM220L



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
θ	0	—	12

UNIT : mm

NOTES:

1. JEDEC OUTLINE: MO-112 CC-1

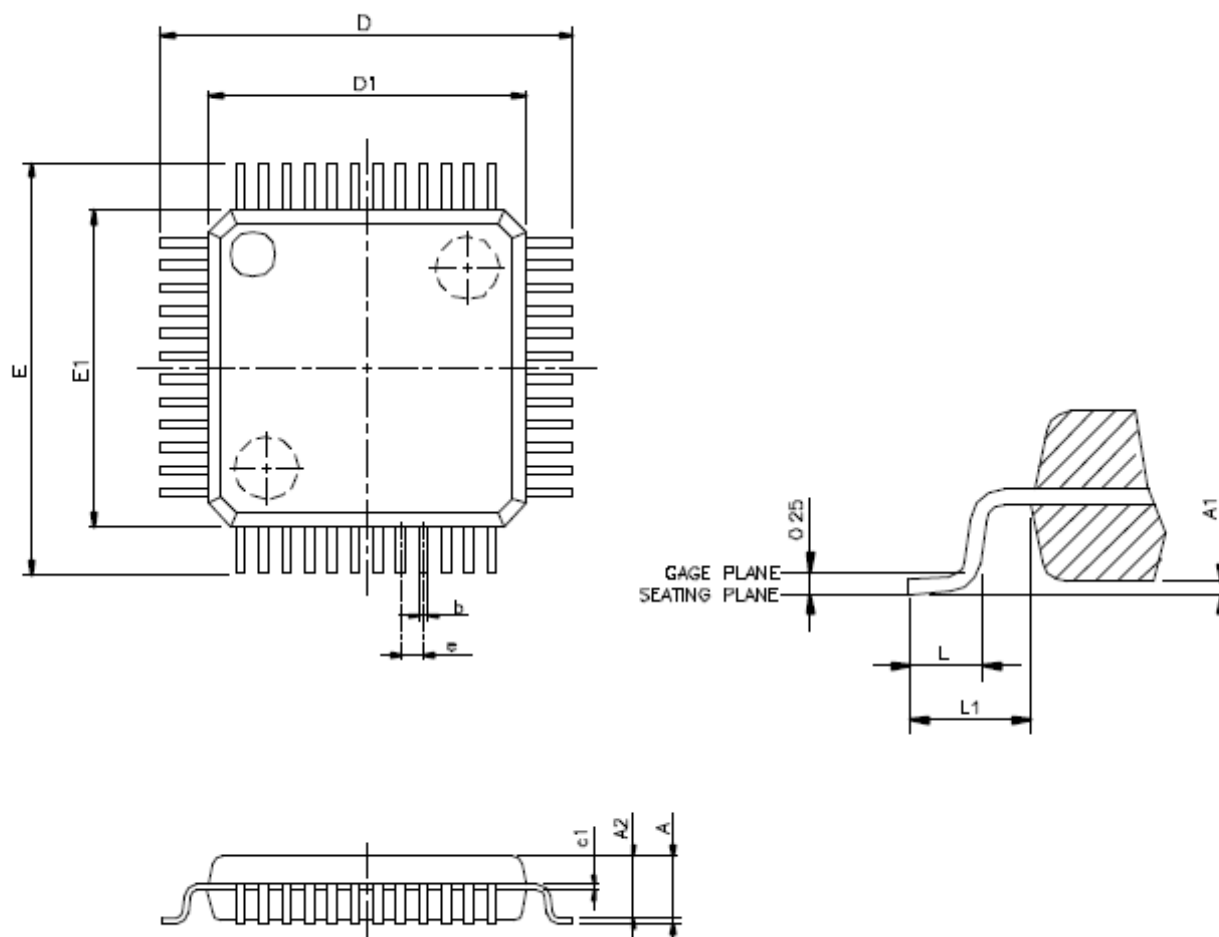
2. DATUM PLANE [H] IS LOCATED AT THE BOTTOM OF THE MOLD PARTING LINE COINCIDENT WITH WHERE THE LEAD EXITS THE BODY.

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 6-2 : Mechanical Dimension of CM220L (QFP100)

◆48 Pin LQFP for CM220S



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: 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 6-3 : Mechanical Dimension of CM220S (LQFP48)

7. ERRATA

Revision History

2004.6.25 Version 0.90 Preliminary version
2004.7.15 Version 1.00 1st version for release
2004.9.23 Version 1.02
2004.11.11 Version 1.03 Pin Modification
2005.3.8 Version 1.2 Add CM220S LQFP 64
2005.5.13 Version 1.3 Modify wording
2005.8.1 Version 1.4 Shrink CM220S Pin Count to LQFP 48

— End of Documentation —

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