



# CBM4082

## USB 2.0 Memory Card Reader

### Datasheet

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# 1 Description

## ***High speed USB 2.0 memory card reader Controller with dedicated 32-bit microprocessor.***

CBM4082 is the fastest USB 2.0 memory card reader with embedded 32-bit microprocessor. It can attain 30MByte/s for read and 20MByte/s for write without speed bottleneck of memory cards.

CBM4082 supports all available hosts and the PC platforms with both USB 2.0 and 1.1 interfaces. Complied with USB 2.0 mass storage specification, CBM4082 is fully PnP (plug-and-play) without loading additional driver under Windows Vista, Windows XP, Windows 2000, and MAC 10.x. With device driver installed, it can support Windows 98/98SE as well.

CBM4082 supports SD 2.0/1.1, MMC 3.x/4.0/4.2, MS 1.43, MSPRO 1.02 specification.

# 2 Features

## ■ **USB Interface**

High-speed USB 2.0 interface; backward compatible with USB 1.1  
Integrated USB 2.0/USB1.1 PHY and controller

## ■ **Fastest data transfer rate on the market**

High speed mode: 30MB/s for Read, 20MB/s for Write, without bottleneck of memory cards

## ■ **General feature list**

Internal regulators  
Internal POR  
Internal power MOSFET for controlling card power supply  
Support multiple disk drives emulation  
Support passive crystal oscillator

## ■ **MMC card support feature**

Support MMC version 4.2/4.0/3.3  
Support high voltage mode  
Support high speed mode  
Support 1/4/8 bit bus mode  
Support high capacity card up to 32GB  
Support MMC card hot plug and removal

## ■ **SD card support feature**

Support SD version 2.0/1.1  
Support high voltage mode  
Support 1/4 bit bus mode  
Support SDHC card up to 32GB  
Support SD card write protection  
Support SD card hot plug and removal

## ■ **MS card support feature**

Support MS version 1.43  
Support 1/4 bit bus mode  
Support MS card up to 128MB  
Support MS card hot plug and removal

- **MSPRO card support feature**
  - Support MSPRO version 1.02
  - Support 1/4 bit bus mode
  - Support MSPRO card up to 32GB
  - Support MSPRO hot plug and removal
- **Proven 32-bit microprocessor**
- **Integrated dual voltage regulators**
- **LED indicator to display access status**
  - Three modes: busy, waiting, and off
- **USB suspend and resume**
- **Low power dissipation**
- **CMOS 0.16um technology**
- **Windows Vista/XP/2000/98/ME, Mac10.x and Linux compatible**

### 3 Block Diagram

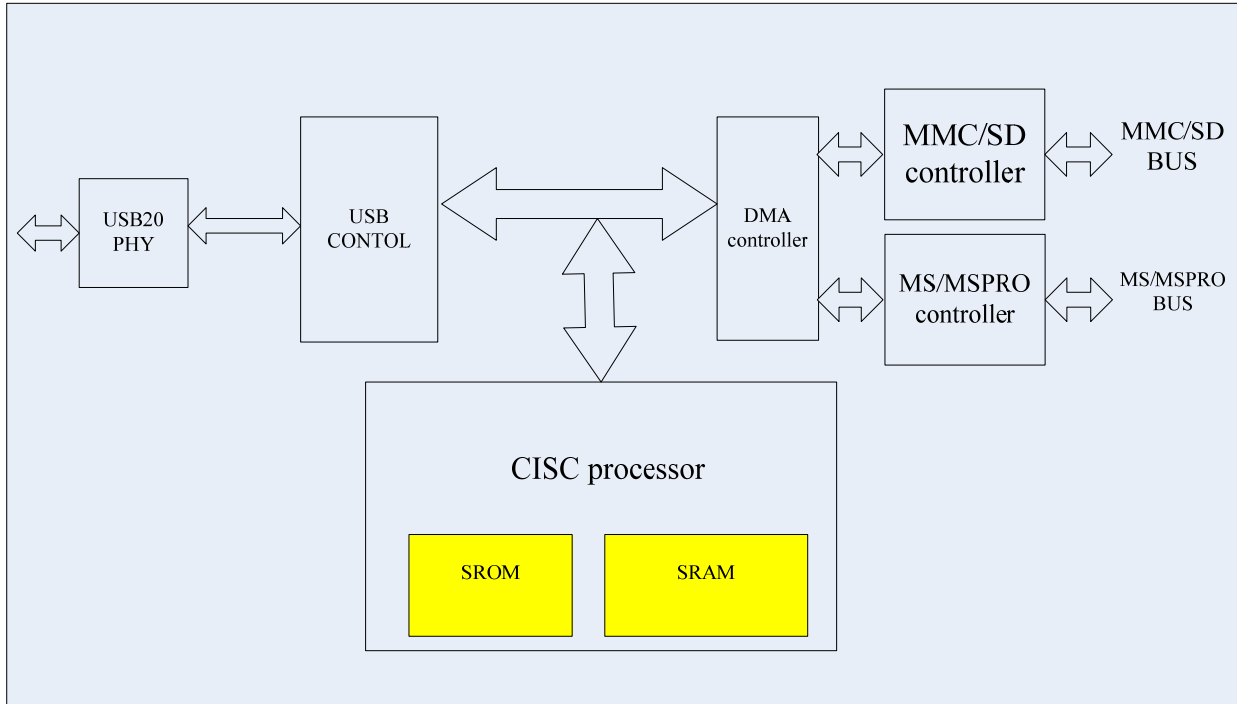


Fig1 CBM4082 block diagram

## 4 Pin Assignment

### 4.1 Die outline and PAD information

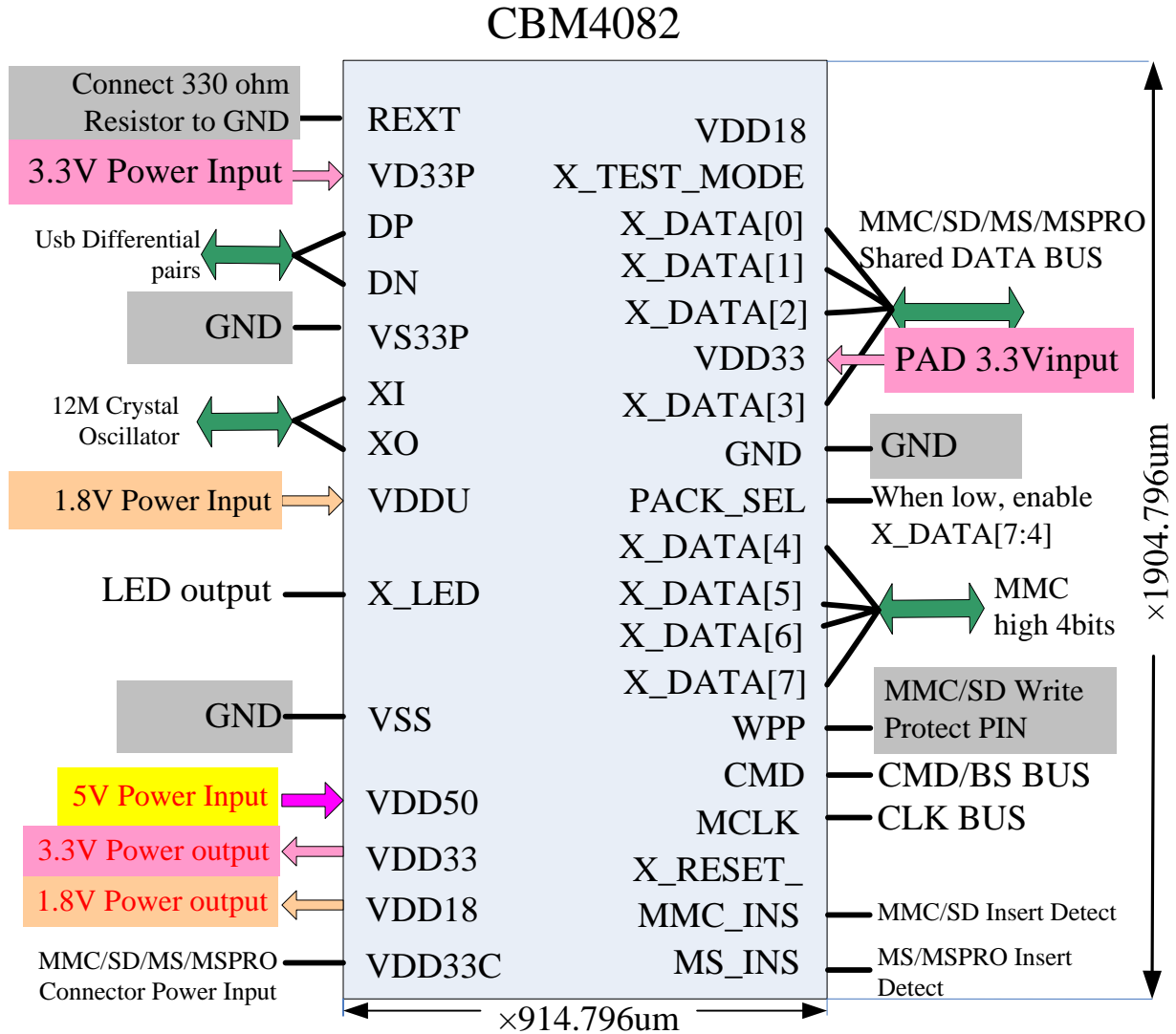


Fig2 CBM4082 Die outlines

**[DIE SIZE]**

(Width × Height): 1904.796um × 914.796um = 1742499.761616 (um × um)

**[PITCH & SLICE]** CBM4082 pad pitch ≥ 90um; pad space ≥ 10um, pad height ≥ 66um

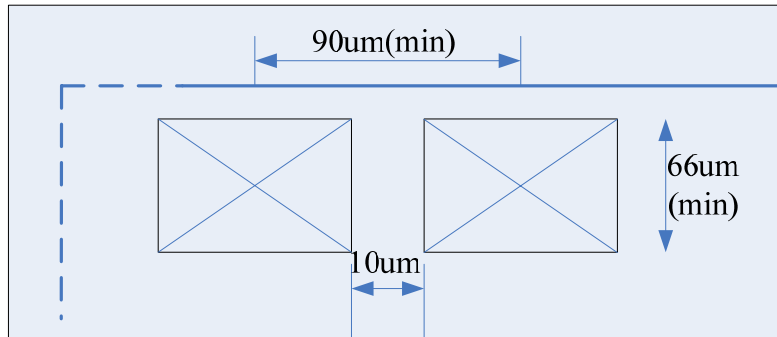


Fig3 CBM4082 PAD Information

## 4.2 PIN Description

Brief CBM4082 pin functions are shown in the following tables.

- I:** Input signal
- O:** Output signal
- I/O:** Bi-direction signal
- PWR:** Power signal
- PU:** Pull up
- PD:** Pull down
- GND:** Ground signal
- TBD:** to be defined

### CBM4082 pad description

BOTTOM BAR				
NO.	Name	Type	Description	Coordinate
1	REXT	I	To connect an external reference resistor for current source of the USB high-speed driver.	(97.585, 34.539)
2	VD33P	PWR	PHY analog 3.3V power input	(210.772, 34.539)
3	DP	I/O	USB D+	(351.608, 34.539)
4	DM	I/O	USB D-	(448.384, 34.539)
5	VS33P	GND	PHY ground	(548.174, 34.539)
6	XI	I	12MHz Crystal input	(645.087, 34.54 )
7	XO	O	12MHz Crystal output	(739.792, 34.54 )
8	VDDU	PWR	PHY digital power 1.8V input	(849.418, 34.539)
9	X_LED	I/O	LED indication①	(1045.773,30.15)
10	VSS	GND	Ground	(1232.575,30.15)
11	VDD50	PWR	Regulator 5.0V power input, chief power input PIN	(1508.479,30.15)
12	VDD33	PWR	regulator 3.3V power output	(1617.253,30.15)
13	VDD18	PWR	regulator 1.8V power output	(1698.424,30.15)
14	VDD33C	PWR	Supply 3.3V Power for SD/MMC/MS/MSPRO Card. When PACK_SEL=1 and X_DATA [6] = 0, the power will be cut down.	(1785.029,30.15)

TOP BAR				
15	MS_INS	I(PU)	MS/MSPRO card inserted indication pin. When low, card inserted; else, no card inserted.	(1796.85,869.85)
16	MMC_INS	I(PU)	MMC/SD card inserted indication pin. When low, card inserted; else, no card inserted.	(1705.5,869.85)
17	X_RESET_	I(PU)	Globe Reset, active low <sup>②</sup>	(1614.15,869.85)
18	MCLK	O	MMC/SD/MS/MSPRO clock bus	(1522.8,869.85)
19	CMD	I/O(PU)	MMC/SD CMD bus; MS/MSPRO BS bus	(1431.45 ,869.85)
20	WPP	I(PU)	MMC/SD write protected, active low <sup>③</sup>	(1340.1,869.85)
21	X_DATA[7]	I/O(PU)	MMC data7, when PACK_SEL=1, this pin is a flag output pin. After USB HOST successfully set address for CBM4082, X_DATA [7] output high level until X_DATA [6] = 0.	(1248.75 ,869.85)
22	X_DATA[6]	I/O(PU)	MMC data6. when PACK_SEL=1, this pin is a control input pin: If X_DATA [6] =0, immediately makes X_DATA [3:0], CMD and MCLK output high-Z (release DATA/CMD/CLK BUS).	(1157.4,869.85)
23	X_DATA[5]	I/O(PU)	MMC data5, not defined if PACK_SEL=1	(1066.05 ,869.85)
24	X_DATA[4]	I/O(PU)	MMC data4, not defined if PACK_SEL=1	(974.7,869.85)
25	PACK_SEL	I(PU)	When high (default), Do NOT use X_DATA [7:4], so do NOT need to bond X_DATA [7:4] out; If user want to use X_DATA[7:4] for MMC card access, be sure this pin is bonded out and connect with GND.	(883.35,869.85)
26	GND	GND	PAD 3.3V ground	(792.0,869.85)
27	X_DATA[3]	I/O(PU)	MMC/SD/MS/MSPRO data3	(700.65,869.85)
28	VDD33	PWR	PAD 3.3V power input	(609.3,869.85)
29	X_DATA[2]	I/O(PU)	MMC/SD/MS/MSPRO data2	(517.95,869.85)
30	X_DATA[1]	I/O(PU)	MMC/SD/MS/MSPRO data1	(426.6,869.85)
31	X_DATA[0]	I/O(PU)	MMC/SD/MS/MSPRO data0	(335.16,869.85)
32	X_TEST_MODE	I(PD)	When high, chip test mode; when low , as normal mode	(243.9,869.85)
33	VDD18	PWR	Core 1.8V input <sup>④</sup>	(152.55,869.85)

**[Notes]**

- ① Inside resistor for X\_LED, no peripheral resistor needed to connect with the pin.
- ② X\_RESET pulls up by default, no need to connect a pulling up resistor to avoid unexpected reset.
- ③ WPP pulls up by default, no need to connect a pulling up resistor on PCB board.
- ④ No need to connect this PIN to the “regulator 1.8V power output” PIN.



## 5 Applications

### 5.1 SD / 8-bit-MMC / MS / MSPRO available

COB reference		
EG. INDEX	Description	NOTE
NO.1	8-bit-MMC/SD available	PACK_SEL should be bonded out and connected with GND, X_DATA [0] ~ [7] are all bonded out, totally 30 pins bonded out.

<input type="checkbox"/>	VDD18	<input type="checkbox"/>	X_TEST_MOD	<input type="checkbox"/>	E	<input type="checkbox"/>	X_DATA[0]	<input type="checkbox"/>	X_DATA[1]	<input type="checkbox"/>	X_DATA[2]	<input type="checkbox"/>	VDD33	<input type="checkbox"/>	X_DATA[3]	<input type="checkbox"/>	GND	<input type="checkbox"/>	PACK_SEL	<input type="checkbox"/>	X_DATA[4]	<input type="checkbox"/>	X_DATA[5]	<input type="checkbox"/>	X_DATA[6]	<input type="checkbox"/>	X_DATA[7]	<input type="checkbox"/>	WPP	<input type="checkbox"/>	CMD	<input type="checkbox"/>	MCLK	<input type="checkbox"/>	X_RESET_	<input type="checkbox"/>	MMC_INS	<input type="checkbox"/>	MS_INS	<input type="checkbox"/>
<input type="checkbox"/>	REXT	<input type="checkbox"/>	VD33P	<input type="checkbox"/>	DP	<input type="checkbox"/>	DN	<input type="checkbox"/>	VS33P	<input type="checkbox"/>	XI	<input type="checkbox"/>	XO	<input type="checkbox"/>	VDDU	<input type="checkbox"/>	X_LED	<input type="checkbox"/>	VSS	<input type="checkbox"/>	VDD50	<input type="checkbox"/>	VDD33	<input type="checkbox"/>	VDD18	<input type="checkbox"/>	VDD33C	<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>		

#### [Application Example]

Be care of PACK\_SEL, X\_DATA [7] ~ X\_DATA [4]!

Be sure that PACK\_SEL bonded out and connect with GND;

Be sure that X\_DATA [4] ~ X\_DATA [7] are bonded out to 15-PIN MMC Connector.

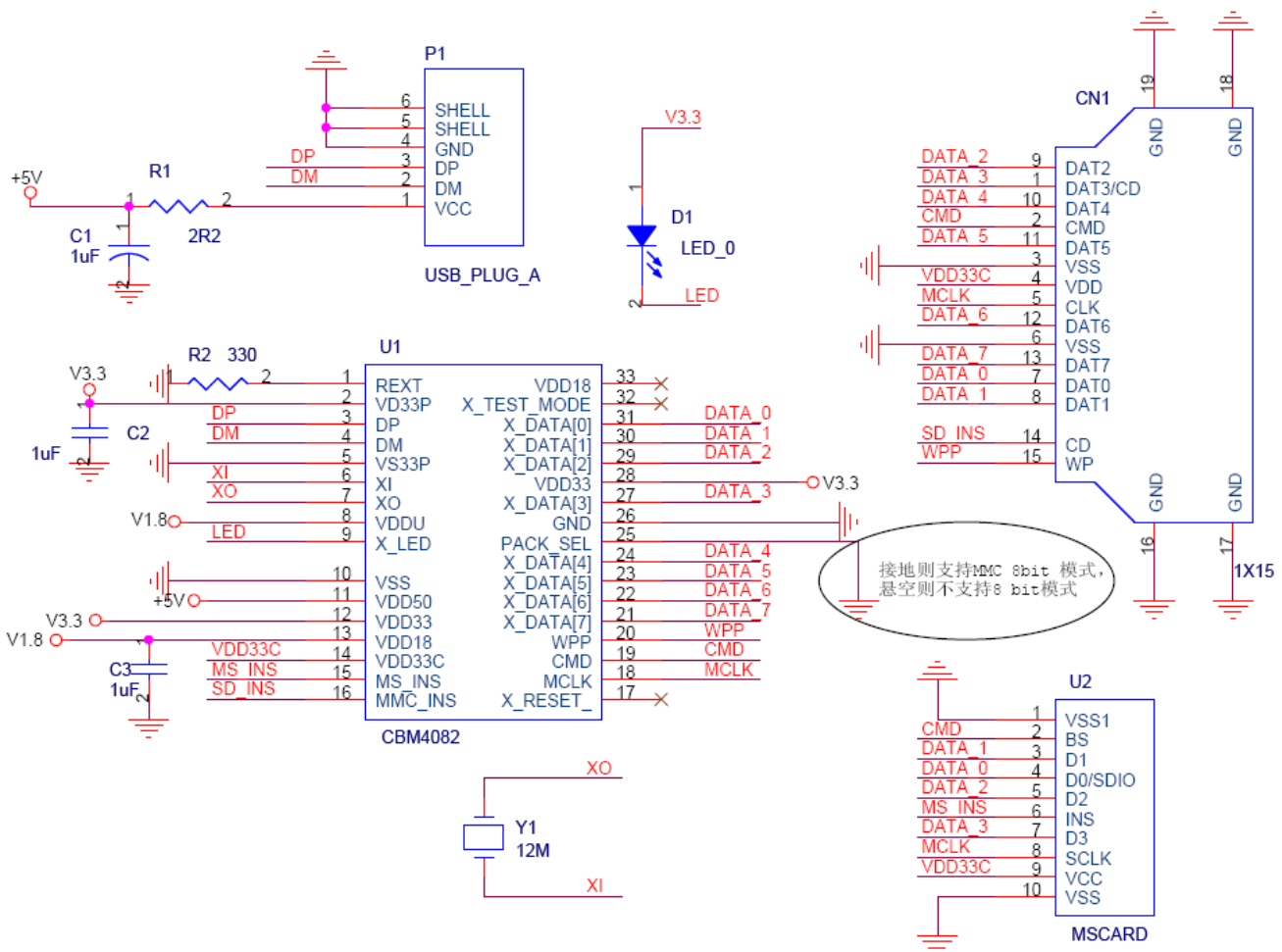


Fig5 CBM4082 Schematic

Peripheral components:

**Value select for C1/C2/C3 are recommended as follows.**

R1	recommended value: 2.2ohm	USB VBUS restraining resistor
R2	recommended value: 330ohm	USB PHY
C1	recommended value: 4.7uF	VBUS noise-bypass capacitor
C2	recommended value: 1uF	VDD33 noise-bypass capacitor
C3	recommended value: 1uF	VDD18 noise-bypass capacitor

**Users can try to use 1uF value for all of the capacitors if the board can work properly.**

LED	For signal Indicating
12MHz Crystal Oscillator	Chip clock source

Connector lists:

- USB Connector
- MMC 15PIN Connector
- MS 10PIN Connector (Replaced with other type of connectors if necessary)

## 5.2 SD / 4-bit-only-MMC / MS / MSPRO Card reader

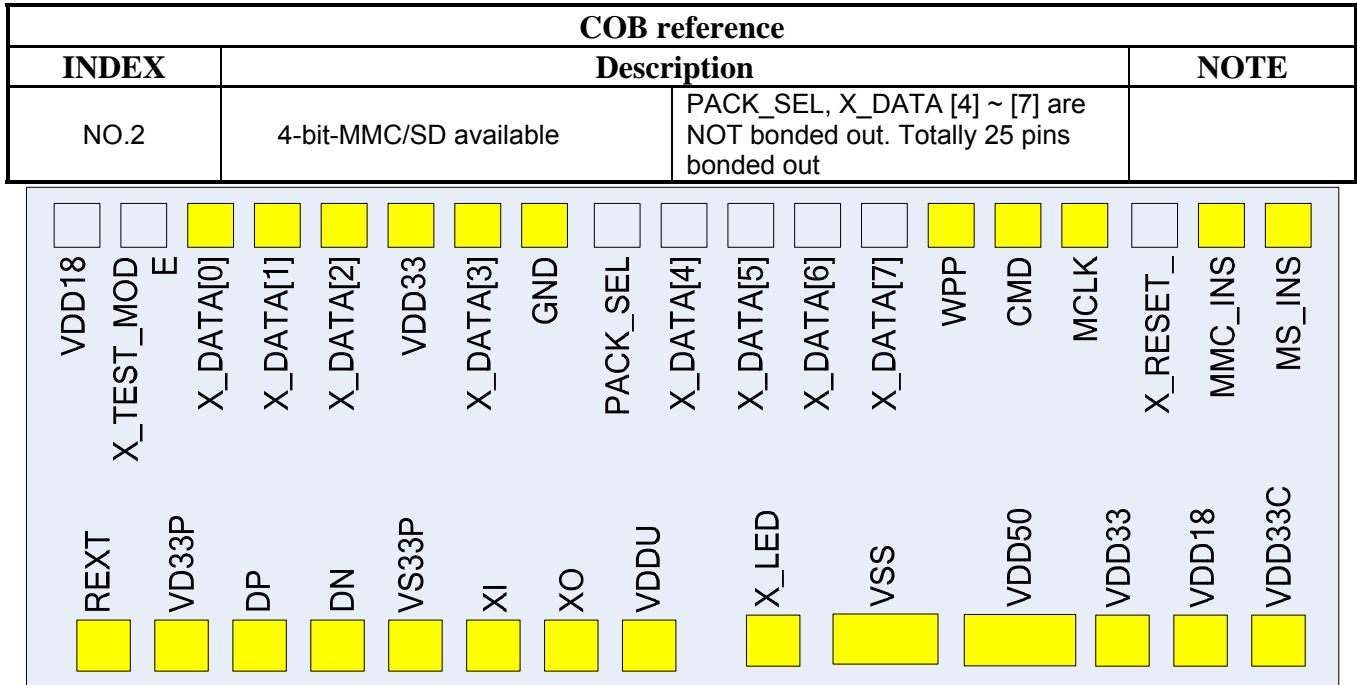


Fig4 CBM4082 COB schematic 1

### [Application Example]

Do NOT bond PACK\_SEL out.

Do NOT bond X\_DATA [4] ~X\_DATA [7] out.

Connector lists:

USB Connector

MMC/SD 11PIN Connector; for TF card reader, use TF Card Connector and connect WPP pin with GND.

MS 10PIN Connector (Replaced with other type of connectors if necessary)

## 5.3 PCB Suggestions

### 1 DP and DM

USB traces DP & DM are 480Mbps high-speed differential pairs. Please be very careful of the trace layout.

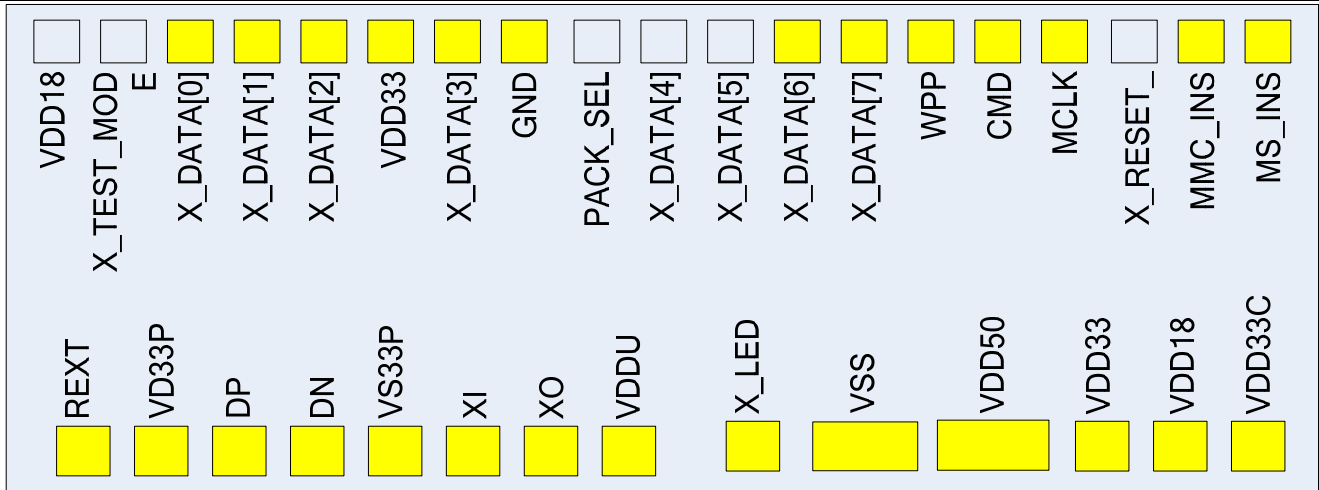
- 1) Avoid trace-across or routing the differential traces under crystals, if at all possible.
- 2) Do the best to use a minimum of vias and corners for the traces, all angles of corners should be greater than 45 degree.
- 3) Trace width of DP & DM should be greater than 8mil.
- 4) Trace lengths on board should be as short as possible.

### 2 Power and Ground lines

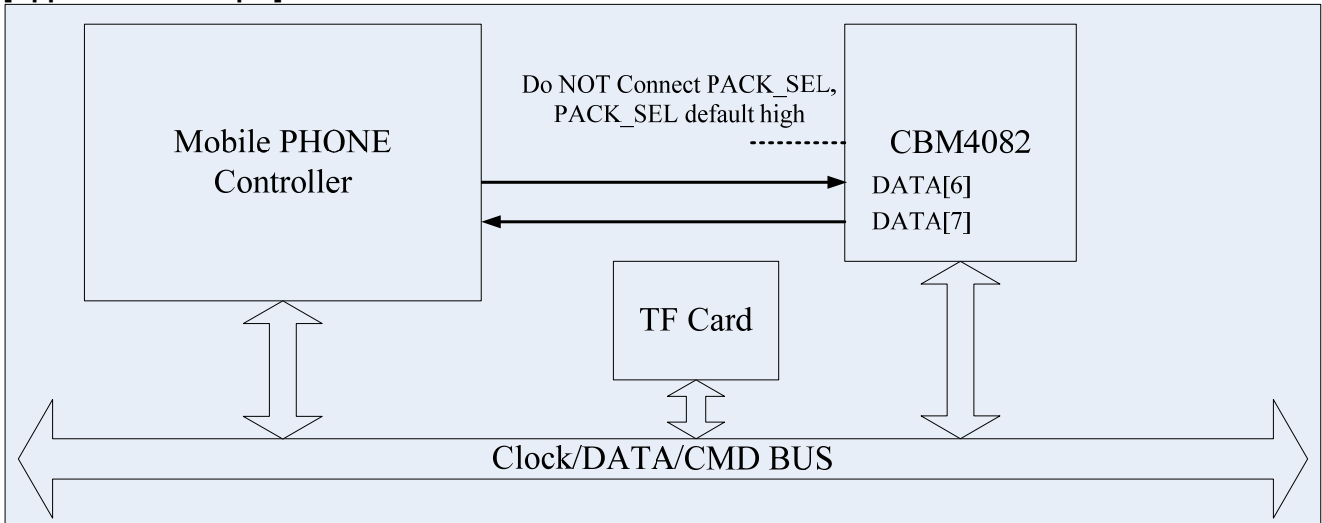
- 1) Be sure that trace width of Ground is greater than that of Power, and trace width of Power is at least once greater than that of Signal Buses.
- 2) Make sure noise-bypass capacitors are as close as possible to connect with "Regulator 5.0V input / 3.3V output / 1.8Voutput" pins.
- 3) Diameter length of vias should be greater than 24mil to avoid current choke.

## 5.4 Embedded for Mobile Phone

COB reference			NOTE
EG. INDEX	Description		NOTE
NO.3	4-bit-MMC/SD available	X_DATA [6]/X_DATA [7] are both bonded out.	



### [Application Example]



Description: In this case, PACK\_SEL should not be bonded out.

When input high level to X\_DATA [6], CBM4082 will release Clock/DATA/CMD BUS and output high-Z on BUS; otherwise, CBM4082 will work normally after emulation as a USB Device.

When emulation successful, CBM4082 will output a flag signal through X\_DATA [7] pin. Mobile PHONE Controller can check this pin to find if CBM4082 is running or not.

## 5.5 Used as Single Slot Card Reader

COB reference		
EG. INDEX	Description	NOTE
NO.4	MMC/SD only Card Reader	Do NOT bond MS_INS pin out. For MMC 4bit-only case, do NOT bond PACK_SEL, X_DATA [4] ~ [7] out.
NO.5	MS/MSPRO only Card Reader	Do NOT bond MMC_INS pin out.

VDD18	X_TEST_MOD	X_DATA[0]	X_DATA[1]	X_DATA[2]	VDD33	X_DATA[3]	GND	PACK_SEL	X_DATA[4]	X_DATA[5]	X_DATA[6]	X_DATA[7]	WPP	CMD	MCLK	X_RESET_	MMC_INS	MS_INS
REXT	VD33P	DP	DN	VS33P	XI	XO	VDDU	X_LED	VSS	VDD50	VDD33	VDD18	VDD33C					

## 6 Electrical Characteristics

### 6.1 Absolute maximum ratings

In accordance with the Absolute Maximum Rating System (IEC 60134)

symbol	parameter	conditions	min	max	unit
VCCA	analog supply voltage		-0.5	5.5	v
VCCD	digital supply voltage		-0.5	4.5	v
VI	input voltage		-0.5	5.5	v
Vesd	electrical static discharge voltage[1]	ILI < 1 A DP, DM and GND pins, SD/MMC bus	-4000	+4000	v
		other pins	-2000	+2000	
Tstg	storage temperature		-40	+125	°C

[1] Equivalent to discharging a 100 pf capacitor via a 1.5 K ohm resistor (Human Body Model).

## 6.2 Recommended operating conditions

symbol	Parameter	conditions	min	typ	max	Unit
VDD50	USB supply voltage		4.5	5.0	5.5	V
VI	input voltage		0	-	VDD50	V
Tamb	ambient temperature		0	-	+70	°C

## 6.3 Static characteristics

All parameters are measured at VCCA = VCCD = 3.0 to 3.6 V; VAGND = VDGND = 0 V; Tamb = 40 ~ 85°C;

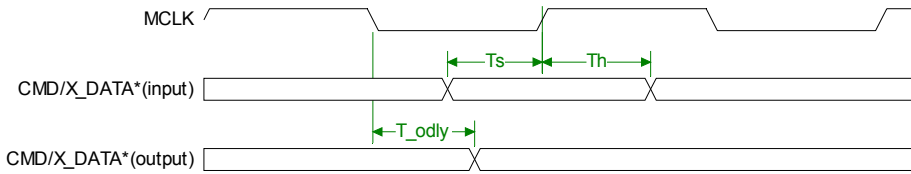
Symbol	Parameter	conditions	min	typ	max	Unit
ICC	operating supply current	Full-speed transmitting and receiving;	-	29.5	-	mA
		high-speed transmitting and receiving	-	50		
ICC(susp)	suspend supply current	when suspend, disconnect current card	-	500		uA

## 6.4 Dynamic characteristics

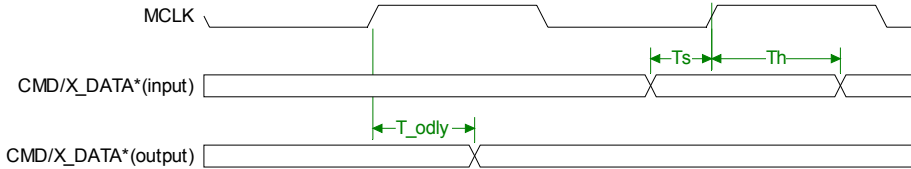
Symbol	Parameter	conditions	min	typ	max	Unit
fpp[1]	MCLK freq in TRANS Mode		0		50	MHz
fOD	MCLK freq in IDENT Mode		0		300	KHz
Ts(CMD/X_DATA*)	CMD/X_DATA[7:0] setup time relative to MCLK		6			ns
Th(CMD/X_DATA*)	CMD/X_DATA[7:0] hold time relative to MCLK		3			ns
Tody(CMD/X_DATA*)	CMD/X_DATA[7:0] output delay relative to MCLK				14(TRANS mode);	ns
					50(IDENT mode)	

[1] For different card, the maximum frequency differs.

**Timing diagram for SD/MMC normal speed read/write operation**



**Timing diagram for SD/MMC high speed read/write operation**



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