



深圳市晶峰达电子科技有限公司

东莞市琪芯电子有限公司

电话:13798528768,0769-81555915 传真:85338927

邮箱:info@jfd-ic.com, QQ:1873357672

网址:www.jfd-ic.com 微信:dggqxdz

Skype:jumfuyu 阿里旺旺:晶峰达电子科技

DL7713

Table of Contents

1. Revision History -----	page 2
2. Introduction	
2.1 DL7713 General Description -----	page 4
2.2 DL7713 Feature -----	page 4
3. Block Diagram -----	page 5
4. Pin Assignment	
4.1 Pin Assignment Diagram -----	page 6
4.2 Pin List in Numeric Order -----	page 7
5. Electrical Characteristics	
6.1 Absolute Maximum Rating -----	page 8
6.2 Regulator Power Supply-----	page 8
6.3 Total Power DC Characteristics -----	page 8
6. Package Dimension -----	page 9



2.1 General Description

The DL7713 is an USB 2.0 Card Reader controller by a highly integrated single chip solution designed to deliver high-speed data transmission between USB2.0 and SD, SDHC, miniSD, Micro SD(T-Flash), MMC, RC-MMC, MMC Micro, MMC Mobile, MS PRO, MS PRO Duo, MS PRO-HG, M2 flash interfaces specification. The DL7713 is offered with COB (Chip On Board) Bounding and 28SSOP package.

DL7713 complies with USB specification Rev. 2.0 and USB Mass Storage Class specification Rev. 1.0 to support Windows ME/2000/XP/Vista/Win7, Mac OS 10.x above, and Linux Kernel 2.4 above. DL7713 integrates an on-chip clock source which provides stable clock source which can be used to replace the external 12Mhz crystal oscillator. Manufacturers can effectively reduce the BOM and labor cost on PCBA. DL7713 is the SD card reader with the best C/P value.

2.2 Features

■ USB

- ◇ Fully compatible with USB 2.0/1.1 specification
- ◇ Support USB 2.0 specification for 480Mbit/sec and 12Mbit/sec operation
- ◇ USB Device Class Definition for Mass Storage , Bulk-Transport v1.0
- ◇ USB 2.0 Bus Power device spec. compliance
- ◇ Endpoint:
 - Endpoint 0: 64 bytes control transfer.
 - Endpoint 1: 512 bytes bulk transfer for IN transaction.
 - Endpoint 2: 512 bytes bulk transfer for OUT transaction.

■ Single Slot support for MMC/SD/MS card

■ MS card support

MS PRO, MS PRO Duo, MS PRO-HG, M2

■ MMC/SD card support

- ◇ Support MMC 4.0/4.1/4.2 (4 bit & 8bit), RS-MMC, MMC-Mobile
- ◇ Support SD 1.1/2.0/SDHC, Micro SD 1.1/2.0/SDHC, Mimi SD card
- ◇ Support SD/MMC High Speed Mode

■ Work with the default driver from windows 2000/XP/ME/Vista/Win7, Mac9.2, Mac OS X, Linux RedHat, Linux Fedora

■ Integrated 5V to 3.3V/1.8V Voltage Regulator

■ Support SSOP 28 package with 4bit SD and 8bit MMC

■ Support QFN24 package with 4bit SD and 4bit MMC

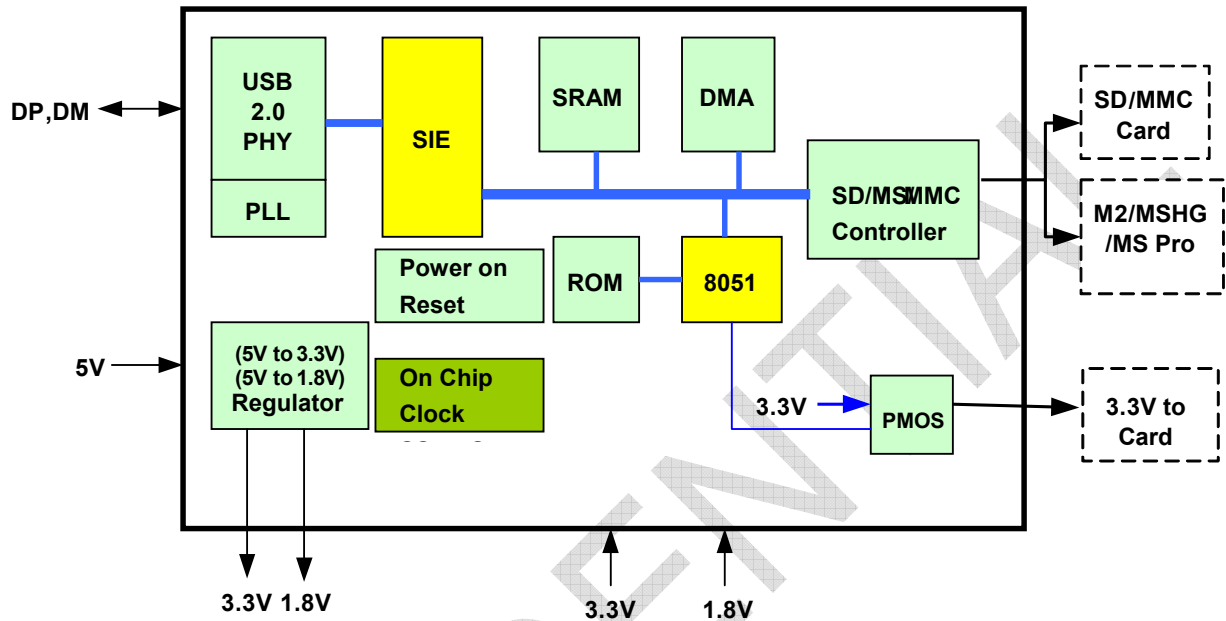
■ COB (Chip On Board) with excellent bounding yield

■ PCBA Backward compatible with MA8125A

■ On-Chip Clock Source to replace external 12Mhz external crystal



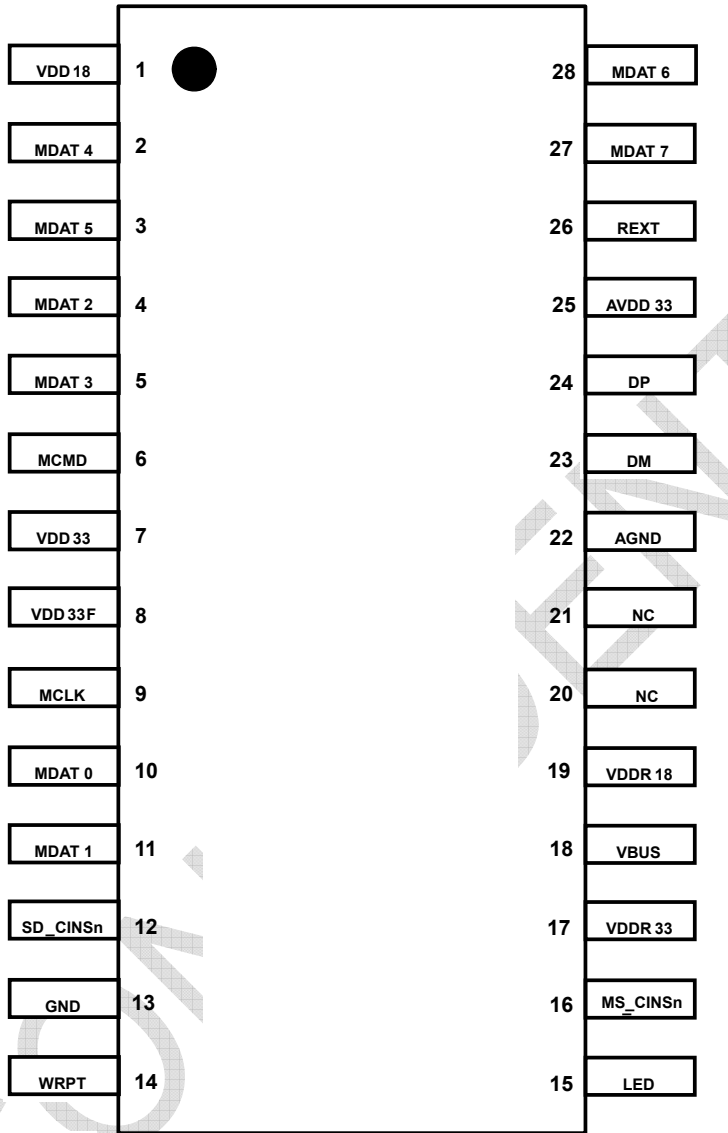
3. Block Diagram





4.1 Pin Assignment Diagram

- SSOP28 pin out



- COB Bounding Guideline

Please reference the COB AP Note



4.2 Pin Description

● SSOP 28 Pin Out Description

Power Pins

Symbol	Pin No.	Type	Description
VBUS	18	P	5V Bus Power Input to Internal Regulator
VDDR18	19	P	Output 1.8V from Internal Regulator
VDDR33	17	P	Output 3.3V from Internal Regulator
AVDD33	25	P	PHY 3.3V Power Input
VDD18	1	P	Logical Power 1.8V Input
VDD33	7	P	Logical Power 3.3V Input
VDD33F	8	P	Output 3.3V Power Source for SD/MMC Card
GND,AGND	13, 22	P	Logical ground pin USB PHY ground pin

Analog and Others Pins

Symbol	Pin No.	Type	Description
DM	23	A	USB D- for high/full speed
DP	24	A	USB D+ for high/full speed
NC	21	A	For backward compatible pin XI
NC	20	A	For backward compatible pin XO
REXT	26	I	For backward compatible pin
LED	15	O	LED for operation status indicator

SD/MMC/MS Interface

Symbol	Pin No.	Type	Description
MDAT [0:3]	10,11,4,5	I/O	SD/MMC/MS Pro-HG data pin
MDAT [4:7]	2,3,27,28	I/O	MMC/MS Pro HG data pin
MCMD	6	O	SD/MMC command response or M2/MS Pro HG BS pin
MCLK	9	O	SD/MMC/MS clock output
WRPT	14	I	SD/MMC/MS card write protect High= write protect, Low=normal Internal with pull high resistor
SD_CINSn	12	I	SD/MMC card insert detect Low= card insert with pull up resistor
MS_CINSn	16	I	M2/MS Pro/MSHG card detect pin Low = insert pin Low = insert with internal pull up resistor



5. Electrical Characteristics

● Regulator

Parameter	Value
VBUS (5 volts input)	Min.=4.5 volts , Max.=5.5 volts
VDDR33 (3.3 volts output)	3.3 volts \pm 10 %
VDDR18 (1.8 volts output)	1.8 volts \pm 10 %
Maximum current	150 mA

● DC Characteristics and Operating Conditions

Symbol.	Parameter	Rating			Unit
		Min.	Typ.	Max.	
VDD	5V Power Supply Voltage	4.5		5.5	V
VDDR33	3.3V Power Supply Voltage	3.0		3.6	V
VDDR18	1.8V Power Supply Voltage	1.62		1.98	V
V _{IH}	High level input voltage	0.7VDDR33			V
V _{IL}	Low level input voltage			0.3VDDR33	V
V _{OH}	High level output voltage	0.8VDDR33			V
V _{OL}	Low level output voltage			0.2VDDR33	V
I _{OH}	High level output current	6			mA
I _{OL}	Low level output current (V _{OL} =0.4V)	6			mA

● Analog and Digital power

Parameter	Value
AVDD33 (analog supply voltage)	3.3 volts \pm 10 %
VDD33 (Digital supply voltage)	3.3 volts \pm 10 %
VDD33F (Card power supply)	3.3 volts \pm 10 % ; Max. current=150mA
VDD18 (Digital supply voltage)	1.8 volts \pm 10 %

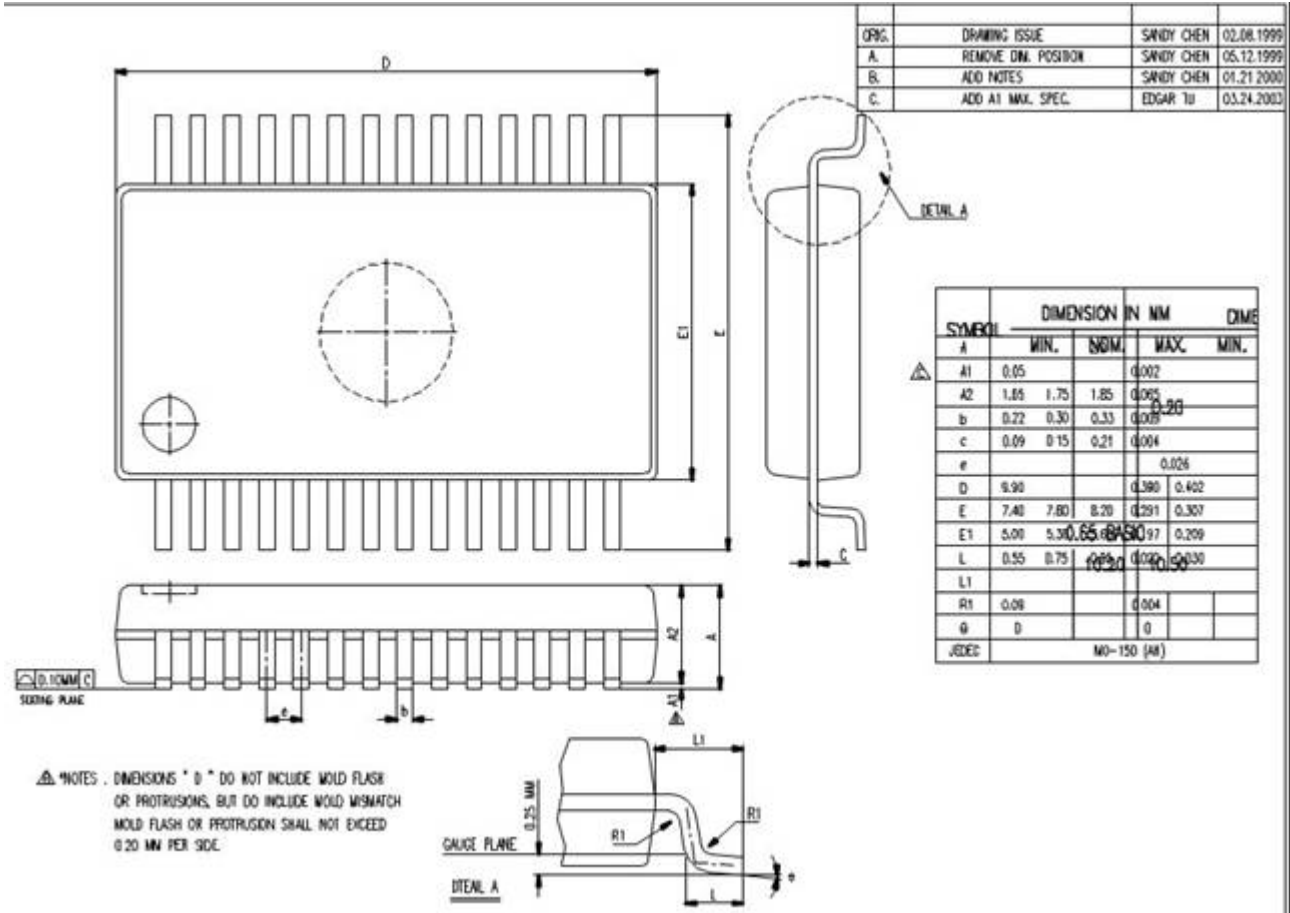
● Power consumption

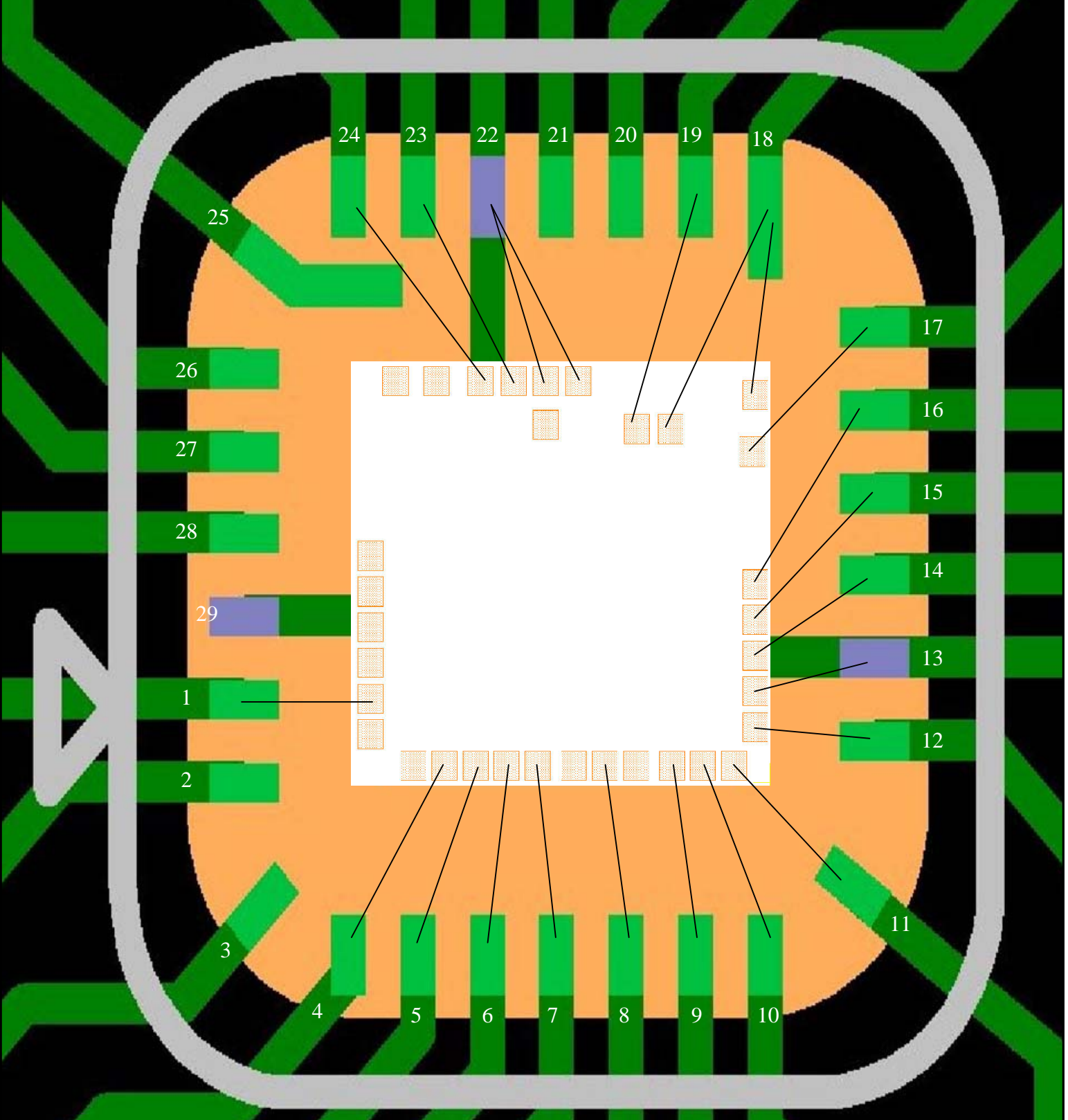
Parameter	Value	Note
Operation current	Max. =120mA	With Sandisk 8G class 10 SD card
Suspend current	Max.= 350 uA	With Sandisk 8G class 10 SD card
Chip idle with card current	Max = 65mA	With Sandisk 8G class 10 SD card
Chip idle without card current	Max = 49mA	With Sandisk 8G class 10 SD card



6. Package Information

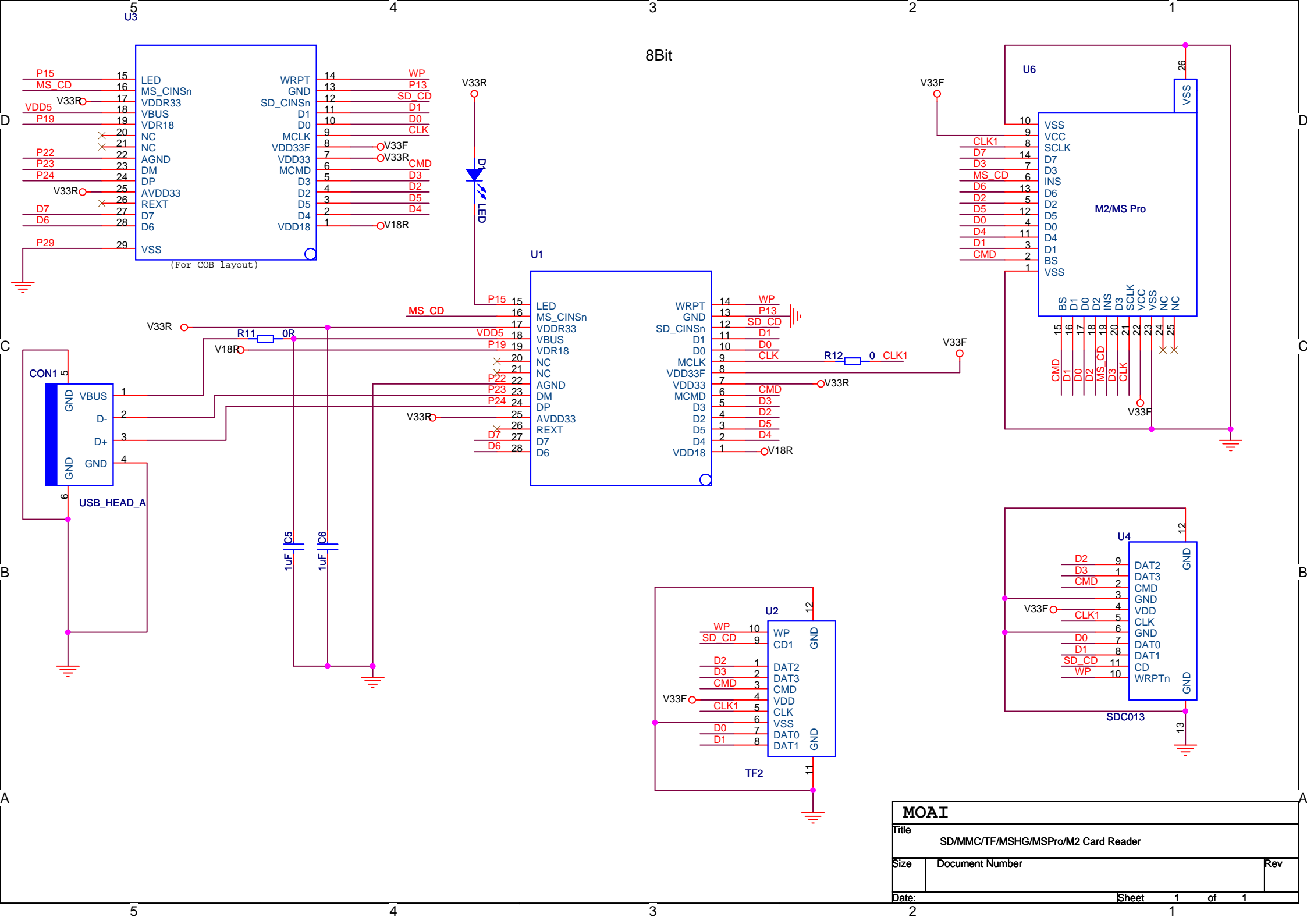
- SSOP 28 (150mil) package Information





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COB information

pad NO.	Text Name	SSOP28 pin no.	X-axis	Y-axis
1	VDD	1	40.5	739.35
2	DATA2	4	40.5	651.15
3	DATA3	5	40.5	562.95
4	CTRL1	6	40.5	474.75
5	VD33	7	40.5	386.55
6	PWR0	8	40.5	286.29
7	CTRL0	9	40.5	190.35
8	DATA0	10	40.5	102.15
9	DATA1	11	130.05	40.5
10	SDCDN	12	218.25	40.5
11	VSS	13	306.45	40.5
12	CTRL2	14	394.65	40.5
13	LED	15	482.85	40.5
14	MSCDN	16	571.05	40.5
15	VD33P	17	656.785	40.5
16	VDD5	18	560.5	172.66
17	VDD5	18	656.785	172.85
18	VS33P:	22	657.0	276.26
19	VS33P:	22	657.0	368.06
20	DM	23	657.0	456.26
21	DP	24	657.0	544.46
22	VD33P:	25	657.0	693.0
23	REXT		657.0	781.2

