

**i5062-ZD**

**USB Flash Disk Controller**

**Data Sheet**

iCreate Technologies Corporation

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## 1. Introduction

### General description

i5062-ZD is a single-chip USB flash disk controller which can handle up to four NAND-type flash memory chips. It is compatible with USB 1.1 and also compliant with USB 2.0. The features of USB-boot-up and driver-less make the flash disk very convenient for end-users.

i5062-ZD is designed with iCreate flash interface technology to provide wear-leveling and on-the-fly error-correction coding, which enhance the life time of the disk. The flexibility of the interface design also ensures supporting to AND flash by firmware change and MLC NAND flash in the protocol level.

For data security, i5062-ZD supports multi-level protection mechanism. In the non-protection level, data in the disk is fully accessible. In low protection level, disk is read-only to protect from virus and accidental file removal. In high protection level, the disk data cannot be accessed.

User-programmable device name based on USB Mass Storage protocol (SCSI) is also provided. The end-users can change the device name that appears in Windows.

### Features

#### System Function

- ◆ USB 1.1 compatible and USB 2.0 compliant
- ◆ USB-ZIP/USB-HDD boot-up
- ◆ Support multi-disk
- ◆ Multi-level security protection
- ◆ Support Read-only privilege
- ◆ Compatible with Windows 98/Me/2K/XP, MacOS 9+, and Linux kernel 2.4+
- ◆ Configurable Removable or Fixed drive type under Windows
- ◆ Support unique serial number for each disk
- ◆ Configurable USB vendor/product ID
- ◆ Support customized disk ID by end-user
- ◆ Read speed > 1000K byte/s
- ◆ Write speed > 800K byte/s
- ◆ Write protect switch
- ◆ Ready/busy LED

#### Flash Control

- ◆ Support 128Mb to 8Gb NAND-type flash, AND flash is supported with i5068-Z.
- ◆ Connect up to four flash chips
- ◆ Wear-leveling extends product life time
- ◆ Defect block concealment and dynamic defect block handling
- ◆ On-the-fly ECC enhances reliability

#### Chip Hardware

- ◆ On-chip voltage detector for power-on-reset
- ◆ Single 3.3V voltage supply
- ◆ 6MHz external clock for low EMI
- ◆ 32 pin TSOP Type I package

## 2. Pin Configuration and Definition

### Pin configuration

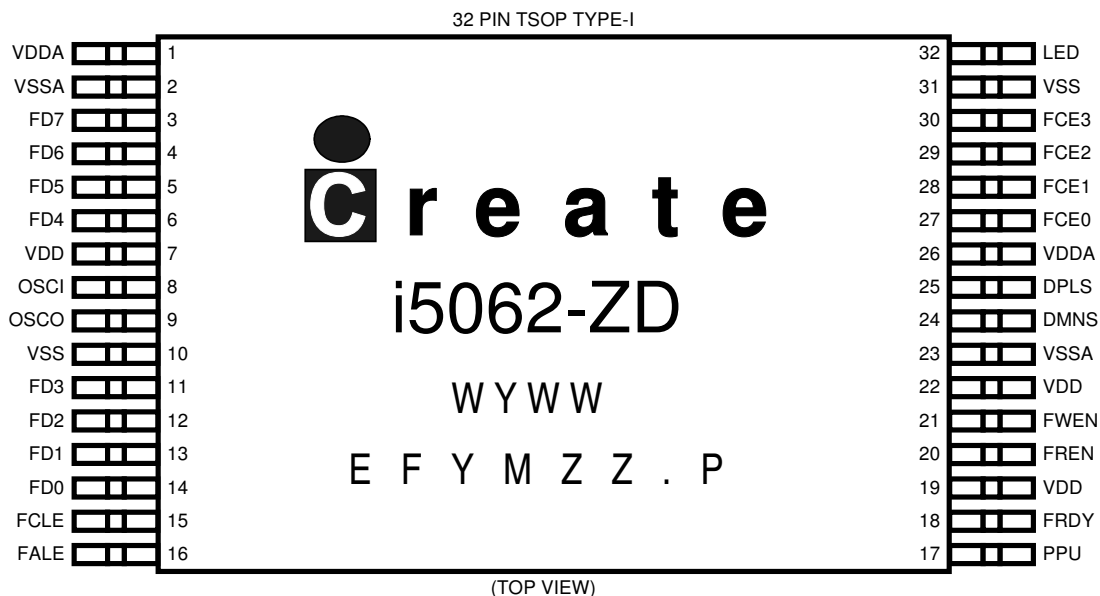


Figure 1. Pin configuration

### Pin definition

Pin Number	Name	IO Type	Function
<b>USB (2 pins)</b>			
25	DPLS	Analog	USB bus D+.
24	DMNS	Analog	USB bus D-.
<b>Clock (2 pins)</b>			
8	OSCI	Clock In	6MHz crystal input.
9	OSCO	Clock Out	6MHz crystal output.
<b>Flash (17 pins)</b>			
3, 4, 5, 6, 11, 12, 13, 14	FD7, FD6, FD5, FD4, FD3, FD2, FD1, FD0	IO4	Bi-directional data bus signals to NAND flash.
30, 29, 28, 27	FCE3, FCE2, FCE1, FCE0	O2	Active-low chip enable signals to NAND flash.
15	FCLE	O4	Command latch enable (CLE) of NAND flash.
16	FALE	O4	Address latch enable (ALE) of NAND flash.
20	FREN	O4	Active-low read enable signal to NAND flash.
21	FWEN	O4	Active-low write enable signal to NAND flash.
18	FRDY	I, ST, PU	Ready/Busy from NAND flash.

System Control (2 pins)			
17	PPU	IO4	This pin controls programmable pull-up of DPLS, and is connected to DPLS through 1.5 K $\Omega$ resistor.
32	LED	O8	This pin controls LED. LED blinks when operating and dark when idle.
Power and Ground (9 pins)			
7, 19, 22	VDD	Power	3.3V Power
10, 31	VSS	Ground	Ground
1, 26	VDDA	Power	3.3V Analog Power
2, 23	VSSA	Ground	Analog Ground

### Function of I/O types

I	Input
ST	Input with Schmitt trigger
PU	Input with internal pull-up
O2	Output buffer with 2mA driving capability
O4	Output buffer with 4mA driving capability
O8	Output buffer with 8mA driving capability
IO4	I/O buffer with 4mA driving capability

## 3. Electrical Specifications

### Recommended Operating Condition

Symbol	Parameter	Min	Typ	Max	Units
V <sub>DD</sub>	V <sub>DD</sub> Voltage	3.0	3.3	3.6	V
T <sub>OPR</sub>	Operating temperature	0		70	°C

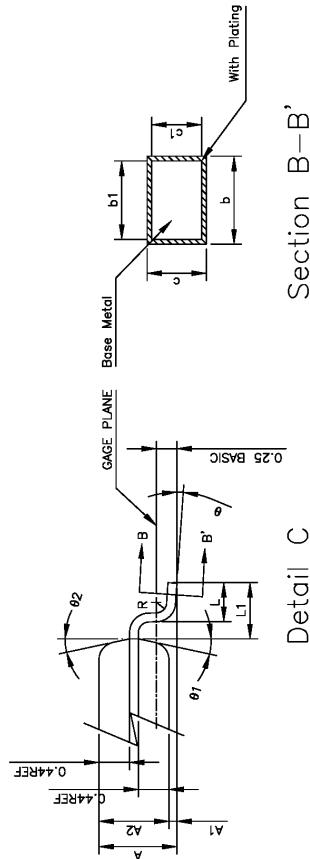
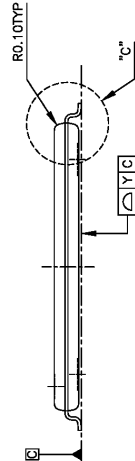
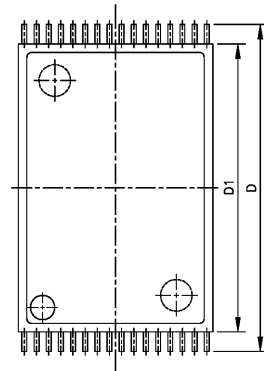
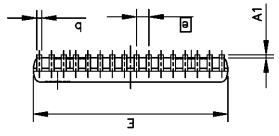
### DC Characteristics

Symbol	Parameter	Min	Typ	Max	Units
V <sub>IL</sub>	Input LOW voltage			0.3*V <sub>DD</sub>	V
V <sub>IH</sub>	Input HIGH voltage	2.0			V
V <sub>OL</sub>	Output LOW voltage			0.4	V
V <sub>OH</sub>	Output HIGH voltage	2.4			V

## 4. Package Dimensions

SYM.	DIMENSION (MM)			DIMENSION (MIL)		
	MIN.	NOM.	MAX.	MIN.	NOM.	MAX.
A	—	—	1.20	—	—	47
A1	0.05	—	0.15	2	—	6
A2	0.95	1.00	1.05	37	39	41
b	0.17	0.22	0.27	7	9	11
b1	0.17	0.20	0.23	7	8	9
c	0.10	—	0.21	4	—	8
c1	0.10	—	0.16	4	—	6
D	13.20	13.40	13.60	520	528	535
$\bar{e}$	0.5 BSC			20 BSC		
D1	11.60	11.80	12.00	457	465	472
E	7.80	8.00	8.20	307	315	323
L	0.50	0.60	0.70	20	24	28
L1	0.80 REF			31 REF		
R	—	—	0.08	—	—	3
$\theta$	0	3°	5°	0	3°	5°
$\theta 1$	15° REF			15° REF		
$\theta 2$	15° REF			15° REF		

1. REFER TO JEDEC STD. MO-142
2. DIMENSION D1 AND E DO NOT INCLUDE MOLD PROTRUSION. ALLOWABLE PROTRUSION IS 0.25mm PER SIDE. D1 AND E ARE MAXIMUM PLASTIC BODY SIZE DIMENSIONS WHICH INCLUDE MOLD MIS-MATCH.
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
4. ALL DIMENSIONS ARE IN MILLIMETERS.



Section B-B'

Detail C

## 5. Flash Support List

<b>Actrans</b>	
512Mbit (64MByte)	AC79LV512B
<b>Fujitsu</b>	
128Mbit (16MByte)	MBM30LV0128
<b>Hynix</b>	
128Mbit (16MByte)	HY27US08281
256Mbit (32MByte)	HY27US08561
512Mbit (64MByte)	HY27US08121
1Gbit (128MByte)	HY27UA081G1, HY27UA081G4
2Gbit (256MByte)	HY27UB082G4
1Gbit (128MByte) Large Block	HY27UF081G2
2Gbit (256MByte) Large Block	HY27UG082G2, HY27UF082G2
4Gbit (512MByte) Large Block	HY27UH084G2
<b>Infineon</b>	
256Mbit (32MByte)	HYF33DS256800ATC
512Mbit (64MByte)	HYF33DS512800ATC
1Gbit (128MByte)	HYF33DS1G800ATC
<b>Micron</b>	
2Gbit (256MByte) Large Block	MT29F2G08AA
<b>Samsung</b>	
128Mbit (16MByte)	KM29U128, K9K2808U0, K9F2808U0
256Mbit (32MByte)	K9K5608U0, K9F5608U
512Mbit (64MByte)	K9K1208U0, K9F1208U
1Gbit (128MByte)	K9K1G08U0, K9T1G08U0
2Gbit (256MByte)	K9E2G08U0
1Gbit (128MByte) Large Block	K9F1G08U0
2Gbit (256MByte) Large Block	K9K2G08U0, K9F2G08U0
4Gbit (512MByte) Large Block	K9K4G08U0, K9W4G08U1
8Gbit (1GByte) Large Block	K9W8G08U1
<b>Sandisk</b>	
128Mbit (16MByte)	SDTNFAH-128, SDTNGAHE0-128
256Mbit (32MByte)	SDTNFAH-256, SDTNGAHE0-256
512Mbit (64MByte)	SDTNFAH-512, SDTNGAHE0-512
1Gbit (128MByte)	SDTNFBH-1024, SDTNGBHE0-1024
2Gbit (256MByte)	SDTNGBHE0-2048
512Mbit (64MByte) 4LC	SDTNFCH-512, SDTNGCHE0-512
1Gbit (128MByte) 4LC	SDTNFCH-1024, SDTNGCHE0-1024
2Gbit (256MByte) 4LC	SDTNFDH-2048, SDTNGDHE0-2048, SDTNGCHE0-2048
4Gbit (512MByte) 4LC	SDTNGDHE0-4096
1Gbit (128MByte) Big Block	SDTNGEHE0-1024
2Gbit (256MByte) Big Block	SDTNGFHE0-2048
<b>ST</b>	

128Mbit (16MByte)	NAND128W3A
256Mbit (32MByte)	NAND256W3A
512Mbit (64MByte)	NAND512W3A
1Gbit (128MByte)	NAND1GW3A
1Gbit (128MByte) Big Block	NAND1GW3B
2Gbit (256MByte) Big Block	NAND2GW3B
4Gbit (512MByte) Big Block	NAND4GW3B
<b>Toshiba</b>	
128Mbit (16MByte)	TC58128FT, TC58DVAM72AF1FT
256Mbit (32MByte)	TC58256FT, TC58DVAM82AF1FT
512Mbit (64MByte)	TH58512FT, TC58512FT, TC58512TG, TC58DVM92A1FT
1Gbit (128MByte)	TH58100FT, TC58DVG02A1FT
2Gbit (256MByte)	TH58DVG12A1TGK0
512Mbit (64MByte) 4LC	TC58005FT, TC58DVM94B1FT
1Gbit (128MByte) 4LC	TC58010FT, TC58DVG04B1FT
2Gbit (256MByte) 4LC	TH58020FT, TC58DVG14B1FT , TH58DVG14B1FT
4Gbit (512MByte) 4LC	TH58DVG24B1FT
1Gbit (128MByte) Big Block	TC58NVG0S3AFT
2Gbit (256MByte) Big Block	TH58NVG1S3AFT