i5062-ZD

USB Flash Disk Controller

Data Sheet

iCreate Technologies Corporation

Release date: 03/10/2005

Data sheet marking

iCreate uses various markings in the data sheet to designate each document phase as it relates to the product development stage.

Marking	Description
Objective Specification	The objective specification contains data for new product development.
Advance Information	The information is on products in the design phase. Your designs should not be finalized with this information.
Preliminary	This is preliminary information on new products but not yet fully characterized. The specifications in these data sheets are subject to change in any manner without notice.
No Marking	Information contained in the data sheet is on products in full production.

For more information, please contact:

iCreate Technologies Corporation

2F, No. 26, R&D 2nd Rd.,

Hsinchu Science Park,

Hsinchu, Taiwan 300

Phone +886-3-579-0000

Fax +886-3-579-0077

E-Mail support@icreate.com.tw

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

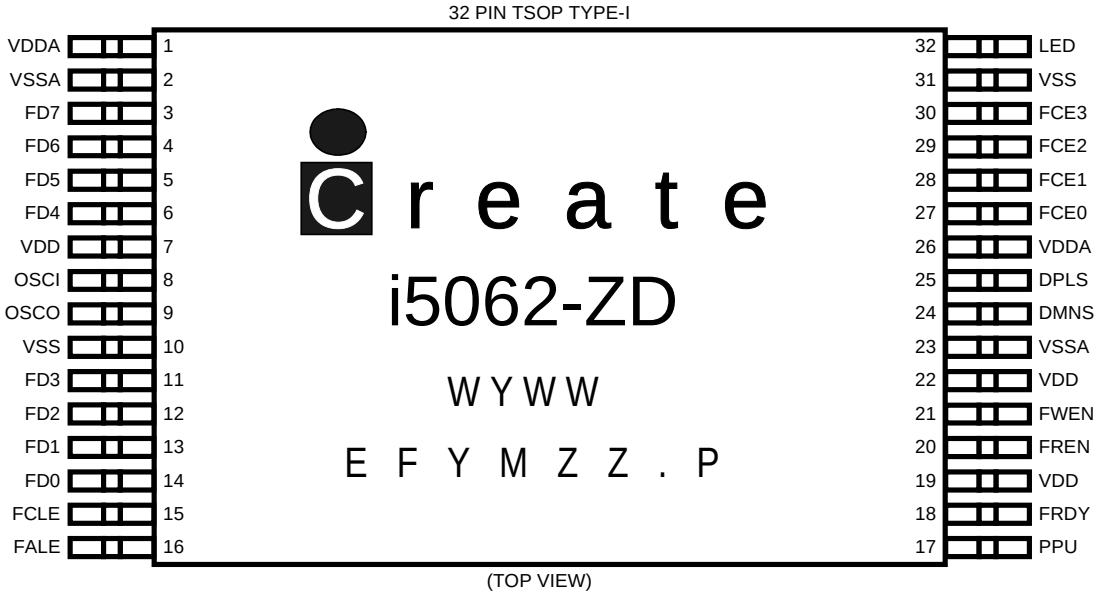


Figure 1. Pin configuration

Pin definition

Pin Number	Name	IO Type	Function
USB (2 pins)			
25	DPLS	Analog	USB bus D+.
24	DMNS	Analog	USB bus D-.
Clock (2 pins)			
8	OSCI	Clock In	6MHz crystal input.
9	OSCO	Clock Out	6MHz crystal output.
Flash (17 pins)			
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 KΩ 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_{DD}	V_{DD} Voltage	3.0	3.3	3.6	V
T_{OPR}	Operating temperature	0		70	^{o}C

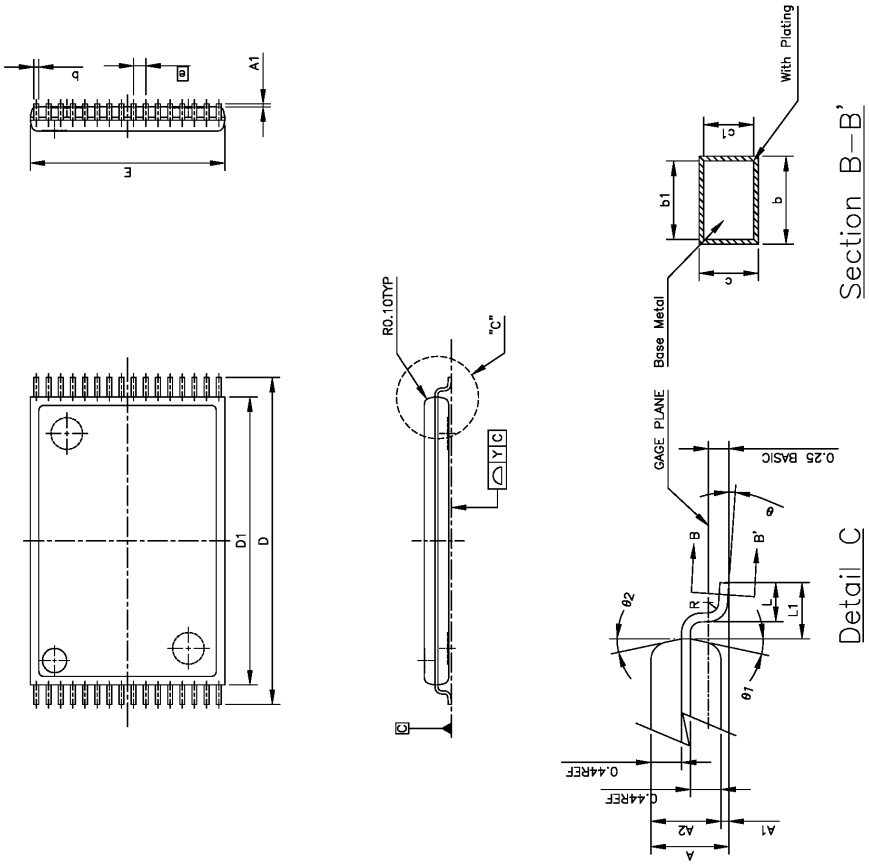
DC Characteristics

Symbol	Parameter	Min	Typ	Max	Units
V_{IL}	Input LOW voltage			0.3*V_{DD}	V
V_{IH}	Input HIGH voltage	2.0			V
V_{OL}	Output LOW voltage			0.4	V
V_{OH}	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
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
θ	0	3°	5°	0	3°	5°
θ1		15° REF			15° REF	
θ2		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.



5. Flash Support List

Actrans	
512Mbit (64MByte)	AC79LV512B
Fujitsu	
128Mbit (16MByte)	MBM30LV0128
Hynix	
256Mbit (32MByte)	HY27US08561M
512Mbit (64MByte)	HY27US08121M
1Gbit (128MByte)	HY27UA081G1M, HY27UA081G4M
2Gbit (256MByte)	HY27UB082G4M
1Gbit (128MByte) Large Block	HY27UF081G2M
Infineon	
256Mbit (32MByte)	HYF33DS256800ATC
512Mbit (64MByte)	HYF33DS512800ATC
1Gbit (128MByte)	HYF33DS1G800ATC
Micron	
2Gbit (256MByte) Large Block	MT29F2G08AAA
Samsung	
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, K9W4G08U0
8Gbit (1GByte) Large Block	K9W8G08U0
Sandisk	
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
1Gbit (128MByte) Big Block	SDTNGEHE0-1024
2Gbit (256MByte) Big Block	SDTNGFHE0-2048
ST	
128Mbit (16MByte)	NAND128W3A
256Mbit (32MByte)	NAND256W3A
512Mbit (64MByte)	NAND512W3A
1Gbit (128MByte)	NAND1GW3A

1Gbit (128MByte) Big Block	NAND1GW3B
Toshiba	
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
1Gbit (128MByte) Big Block	TC58NVG0S3AFT
2Gbit (256MByte) Big Block	TH58NVG1S3AFT