i5068-Z

USB Flash Disk Controller

Data Sheet

iCreate Technologies Corporation

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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.

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1. Introduction

General description

i5068-Z is a single-chip USB flash disk controller which can handle up to four AND-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.

i5068-Z 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 SLC NAND and MLC NAND flash by firmware change in the protocol level.

For data security, i5068-Z 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 > 850K byte/s[1]
- Write speed > 500K byte/s[1]
- Write protect switch
- Ready/busy LED

Flash Control

- Support 64Mb to 1Gb AND-type flash, NAND flash is supported with i5062-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

[1] Read/Write speed depends on flash and operating environment.

2. Pin Configuration and Definition

Pin configuration

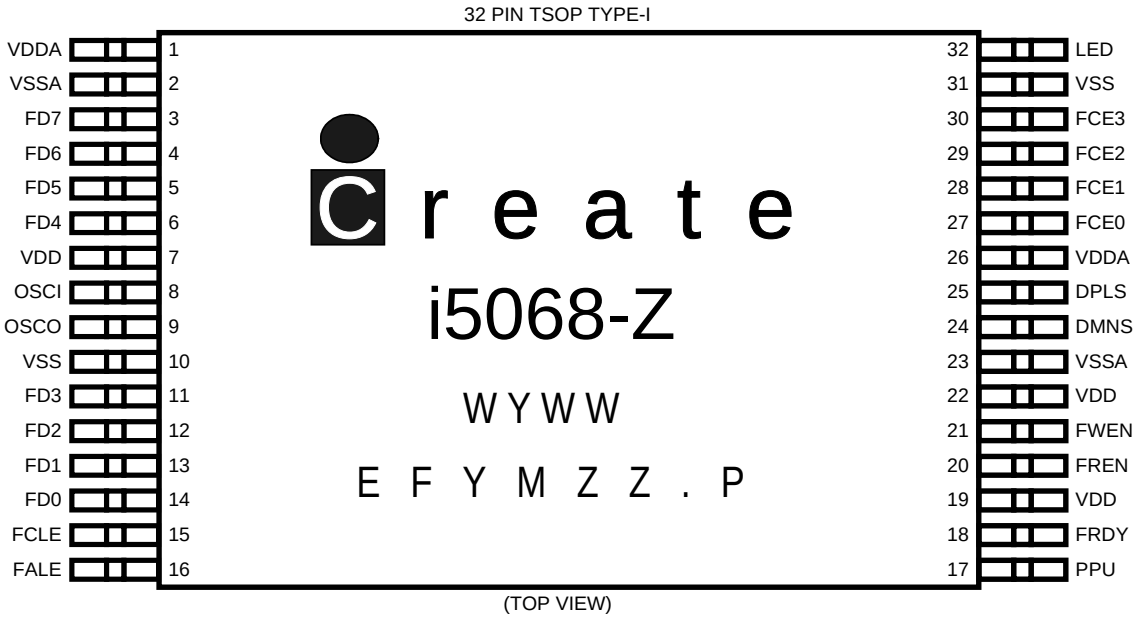


Figure 1. Pin configuration

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 AND flash.
30, 29, 28, 27	FCE3, FCE2, FCE1, FCE0	O2	Active-low chip enable signals to AND flash.
15	FCLE	O4	Command data enable (CDE#) to AND flash.
16	FALE	O4	Serial clock (SC) to AND flash.
20	FREN	O4	Active-low Output enable (OE#) to AND flash.
21	FWEN	O4	Active-low Write enable (WE#) to AND flash.
18	FRDY	I, ST, PU	Ready/Busy from AND 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

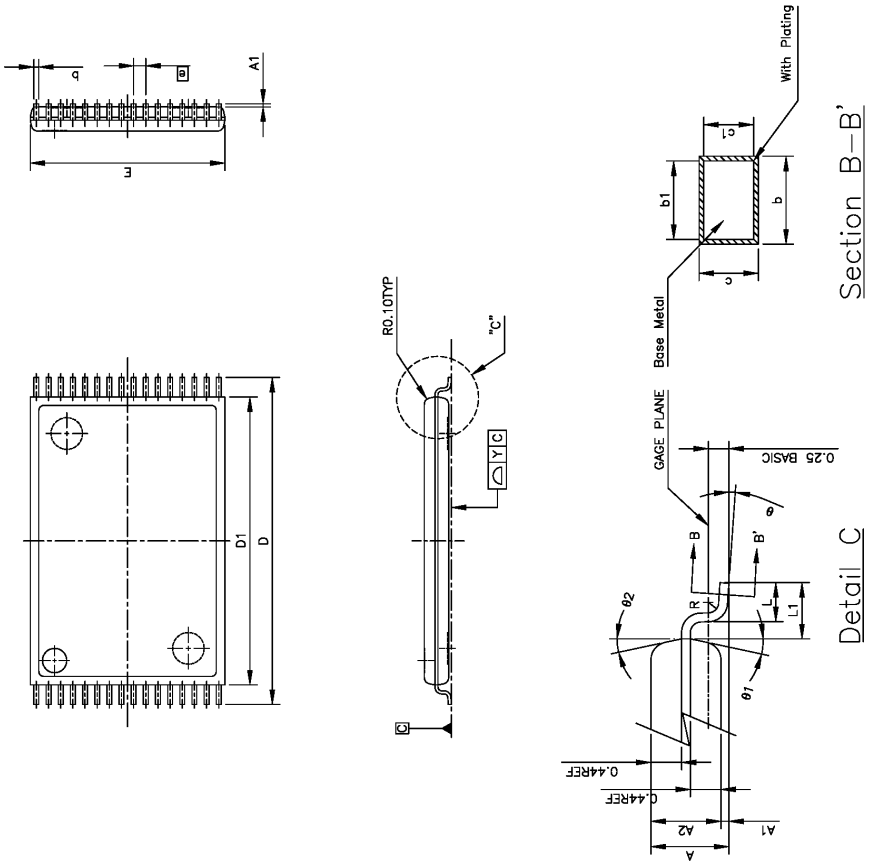
DC Characteristics

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

Renesas/Hitachi	
64Mbit (8MByte)	HN29V6411
128Mbit (16MByte)	HN29W12811, HN29V12811
256Mbit (32MByte)	HN29W25611, HN29W25611S, HN29V25611
512Mbit (64MByte)	HN29W51214, HN29V51211
1Gbit (128MByte)	HN29V102414
Mitsubishi	
128Mbit (16MByte)	M5M29F25611