OTi-2168
USB 2.0 FLASH DISK CONTROLLER

■ DESCRIPTION

The flash disk controller (OTi-2168) is a USB2.0 mass storage class controller used to make a linear flash device array look likes a normal disk, hiding the flash related problems with erasing.

The OTi-2168 is a controller with USB interface. The USB interface is for high speed operation (480Mb/s). It conforms to USB Specification, Version 2.0. The USB transceiver is embedded in this controller. With stable slew-rate control, the controller reduces EMI.

The OTi-2168 has a Phase Lock Loop (PLL) embedded. The PLL provides all clocks needed in this controller. It needs an externally provided clock operating in 12MHz.

The OTi-2168 can control up to 8 pieces of flash memory. It has been optimized to support Infineon flash memory designs. The controller has write-protected ability to prevent writing data to flash. The controller has one LED control pin. You can program one of the display modes - operation, suspend, and standby, through provided production program. Comprehensive application software for security function with Windows OS is also available.

This controller can operate in Win XP, Win2000, Windows Me, and Mac OS without any driver installation.

The OTi-2168 is available in cost-saving 48-pin TQFP and LQFP package.

■ FEATURES

- ♦ Mass storage class controller with Universal Serial Bus interface
- ♦ USB Specification Compliance
  - — Conforms to high-speed (480Mb/s) USB Specification, Version 2.0
  - — Meet bus power specification
- ♦ Integrated USB transceiver
  - — Dynamic feedback control
  - — Stable slew rate, independent of external loading
- ♦ Integrated USB Serial Interface Engine (SIE)

- Integrated RISC micro-controller
  - —High-performance RISC architecture
  - —Single cycle instruction execution
- 12 MHz external clock
- 3.3 V power operation
- Integrated PLL
- Support up to 8 pieces of Flash memory with write-protected ability
- Support Infineon HYF33DS5128000ATC flash
- Support wear-leveling algorithm
- Higher reliability: ECC on the fly
- Automatic bad block management
- Supported OS:

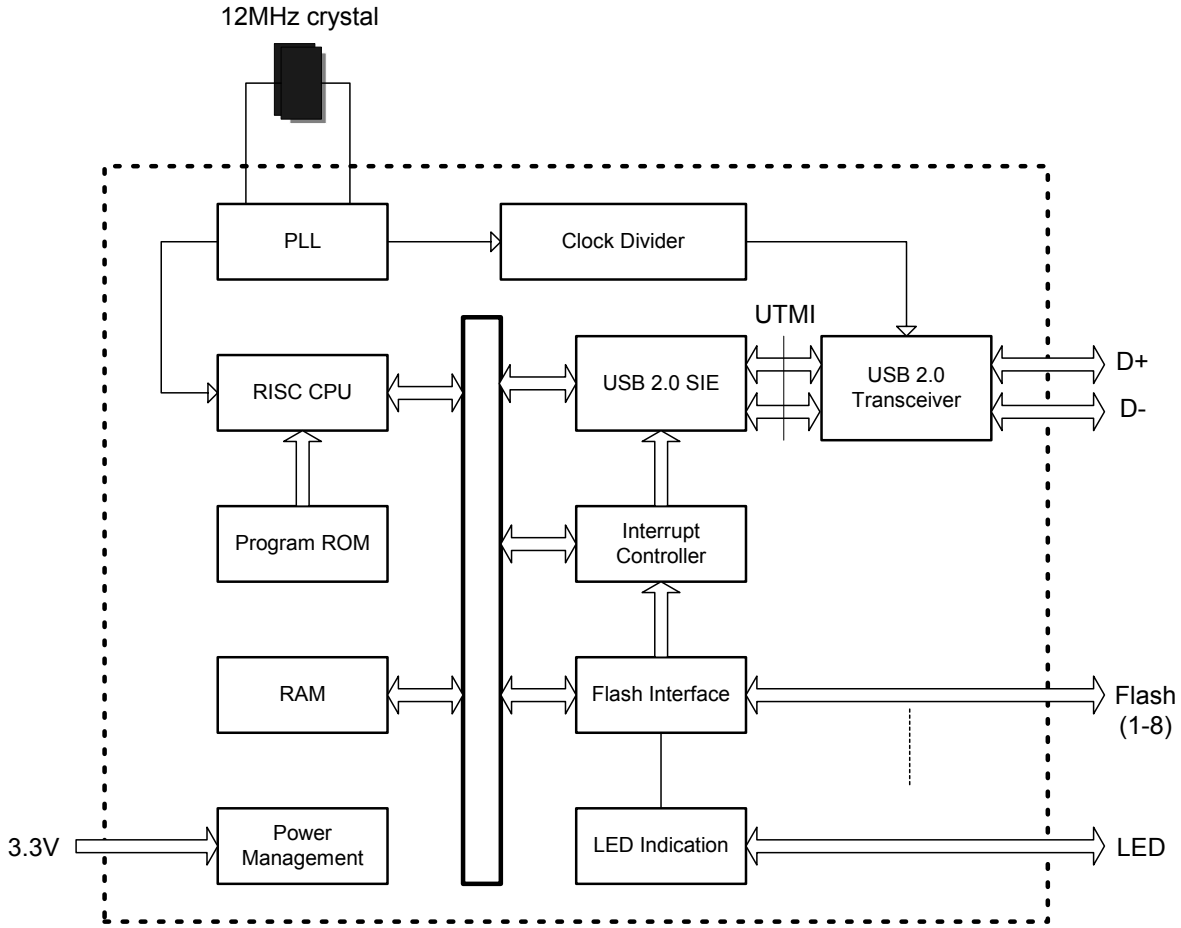
  Win XP, Win2000, Windows ME, Linux 2.4 above, and MAC OS 9.0 & higher

  Win 98/Win98SE driver available

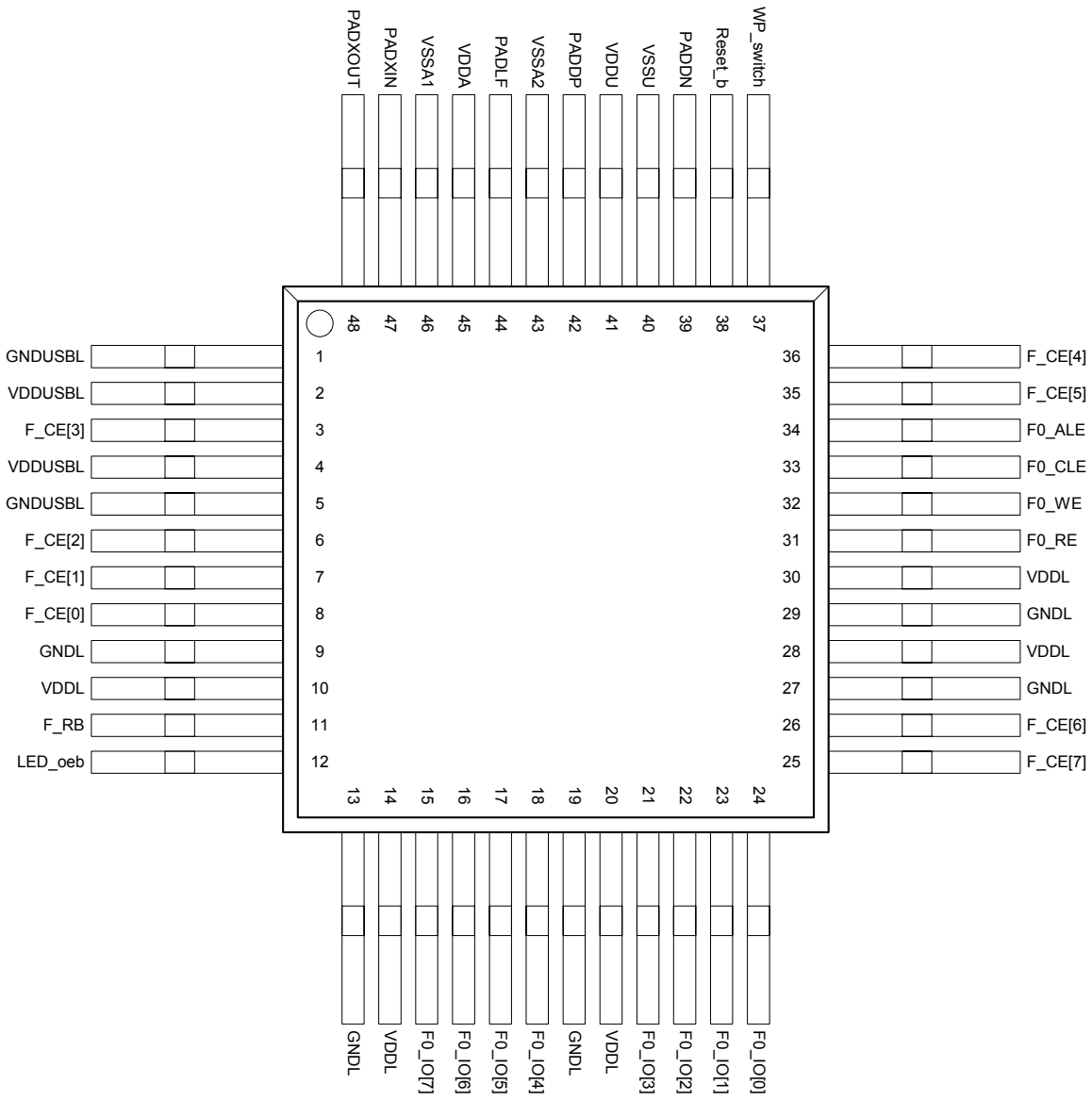
  Mac 8.6 mass storage driver available from Apple

  Multiple LUN Windows driver is available
- Support Auto-Run feature
- Configurable Vendor ID/Product ID (VID/PID)
- Small form factor - standard 48-pin TQFP and LQFP (7mmX7mm) package

■ BLOCK DIAGRAM



■ PIN CONFIGURATION



■ PIN DESCRIPTION

The OTi-2168 is available in 48-pin package to provide low-cost.

Pin #	Pin Name	Attribute	Description
1	GNDUSBL	P	USB logic ground
2	VDDUSBL	P	3.3 V USB logic power
3	F_CE[3]	O	Flash Chip Enable – Chip 3
4	VDDUSBL	P	3.3 V USB logic power
5	GNDUSBL	P	USB logic ground
6	F_CE[2]	O	Flash Chip Enable – Chip 2
7	F_CE[1]	O	Flash Chip Enable – Chip 1
8	F_CE[0]	O	Flash Chip Enable – Chip 0
9	GNDL	P	Logic ground
10	VDDL	P	3.3 Logic power input
11	F_RB	I	Flash Ready/Busy
12	LED_oeb	O	LED indication(open drain)
13	GNDL	P	Logic ground
14	VDDL	P	3.3 Logic power input
15	F0_IO[7]	I/O	Flash data bus – bit 7
16	F0_IO[6]	I/O	Flash data bus – bit 6
17	F0_IO[5]	I/O	Flash data bus – bit 5
18	F0_IO[4]	I/O	Flash data bus – bit 4
19	GNDL	P	Logic ground
20	VDDL	P	3.3 Logic power input
21	F0_IO[3]	I/O	Flash data bus – bit 3
22	F0_IO[2]	I/O	Flash data bus – bit 2
23	F0_IO[1]	I/O	Flash data bus – bit 1
24	F0_IO[0]	I/O	Flash data bus – bit 0

25	F_CE[7]	O	Flash Chip Enable – Chip 7
26	F_CE[6]	O	Flash Chip Enable – Chip 6
27	GNDL	P	Logic ground
28	VDDL	P	3.3 Logic power input
29	GNDL	P	Logic ground
30	VDDL	P	3.3 Logic power input
31	F0_RE	O	Group 1 Flash Read Enable
32	F0_WE	O	Flash Write Enable
33	F0_CLE	O	Flash Command Latch Enable
34	F0_ALE	O	Flash Address Latch Enable
35	F_CE[5]	O	Flash Chip Enable – Chip 5
36	F_CE[4]	O	Flash Chip Enable – Chip 4
37	WP_switch	I	Write protect switch input
38	Reset_b	I	Power on Reset input
39	PADDN	I/O	USB D-
40	VSSU	P	Analog Ground
41	VDDU	P	Analog Power
42	PADDP	I/O	USB D+
43	VSSA2	P	Analog ground 2
44	PADLF	I/O	Reserved
45	VDDA	P	Analog power
46	VSSA1	P	Analog ground
47	PADXIN	I	Crystal input (12 MHz)
48	PADXOUT	O	Crystal output

■ D.C. CHARACTERS

DC Characteristics-1 (Ta=0 °C to +70 °C, Vcc = 3.3V ±10%)

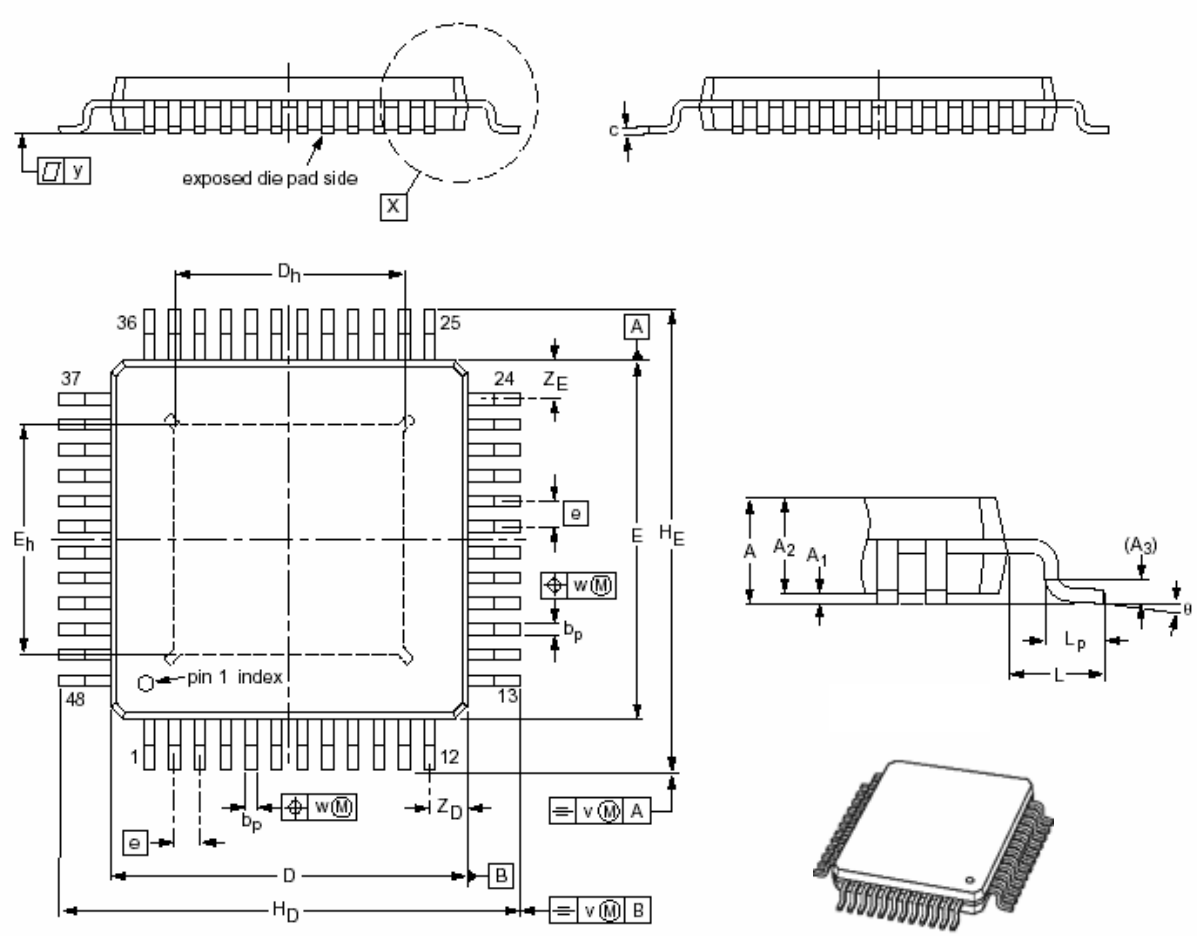
Parameter	Symbol	MIN	TYP	MAX	Unit
Power Supply	VDD	3	3.3	3.6	V
Input Voltage	VIH	0.9x VDD	--	5	V
	VIL	-0.3	--	0.2 x VDD	V
Output Voltage	VOH	VDD-0.4	--	--	V
	VOL	--	--	0.4	V
Input leakage current	ILK	-1	--	1	uA
Working Current	IRW	--		--	mA
Operating Temperature	Ta	0		70	°C
Storage Temperature	Ts	-55		+150	°C
IO output current	IOH	--	4	--	mA
	IOL	--	4	--	mA

■ A.C. CHARACTERS

Parameter	Symbol	MIN	TYP	MAX	Unit
Input rising delay	TPIlh	0.35(2PF)	0.4(4PF)	0.54(8PF)	ns
Input falling delay	TPIhl	0.46(2PF)	0.53(4PF)	0.64(8PF)	ns
Output rising delay	TPOlh	1.35(10PF)	1.97(30PF)	2.59(50pF)	ns
Output falling delay	TPOhl	1.61(10PF)	2.41(30PF)	3.21(50pF)	ns

■ PACKAGE INFORMATION

TQFP-48 : plastic thermal enhanced thin quad flat package ; 48 leads ;body 7 x 7 x 1 mm ; exposed die pad



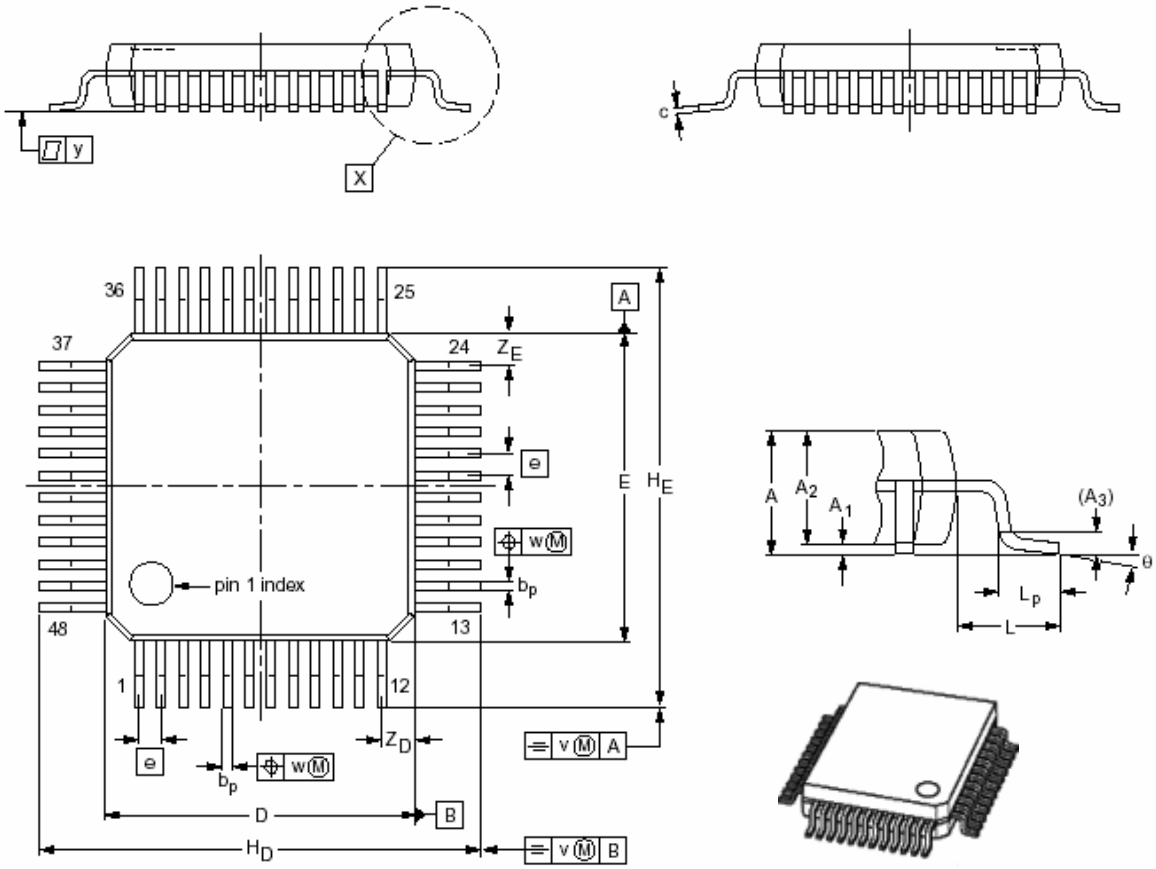
DIMENSIONS (mm are the original dimensions)

UNIT	A Max.	A_1	A_2	A_3	b_p	c	$D^{(1)}$	D_h	$E^{(1)}$	E_h	e	H_D	H_E	L	Lp	v	W	y	$Z_D^{(10)}$	$Z_E^{(1)}$	θ
m m	1 . 2	0.15 0.05	1.05 0.95	0.25	0.27 0.17	0.20 0.09	7 BSC	4.6 4.4	7 BSC	4.6 4.4	0 . 5 BSC	9 BSC	9 BSC	1 REF	0.5 0.7	0.2	0.08	0.08	0.89 0.61	0.89 0.61	1° 5°

Note

1. Plastic or metal protrusions of 0.25 mm maximum per side are not included.

LQFP-48: plastic low profile quad flat package; 48 leads; body 7 x 7 x 1.4 mm



DIMENSIONS (mm are the original dimensions)

UNIT	A Max.	A_1	A_2	A_3	bp	c	$D^{(1)}$	$E^{(1)}$	e	H_D	H_E	L	Lp	v	W	y	$Z_D^{(10)}$	$Z_E^{(1)}$	θ
mm	1.6	0.20 0.05	1.45 1.35	0.25	0.27 0.17	0.18 0.12	7.1 6.9	7.1 6.9	0.5	9.15 8.85	9.15 8.85	1	0.75 0.45	0.2	0.12	0.1	0.95 0.55	0.95 0.55	7° 0°

Note:

1. Plastic or metal protrusions of 0.25 mm maximum per side are not included.

Note:

OTI reserves the right to make any changes without further notice to any products herein.

How to reach us:

OURS TECHNOLOGY INC. 1F, No. 85, Kung-Ming 6th Rd., Jubei City, sin-Chu Hsien, Taiwan, R.O.C.

TEL: +886-3-553-7511 FAX: +886-3-555-5804