



Ours Technology Inc.

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 like 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 NAND flash memory. The flash capacity can be 32M bits up to 4G bits. And these chips can be any combination. It has been optimized to support Toshiba and Samsung flash memory designs. It also supports Samsung's K9F and K9W Series flash. 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 LQFP (7mmX7mm) 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



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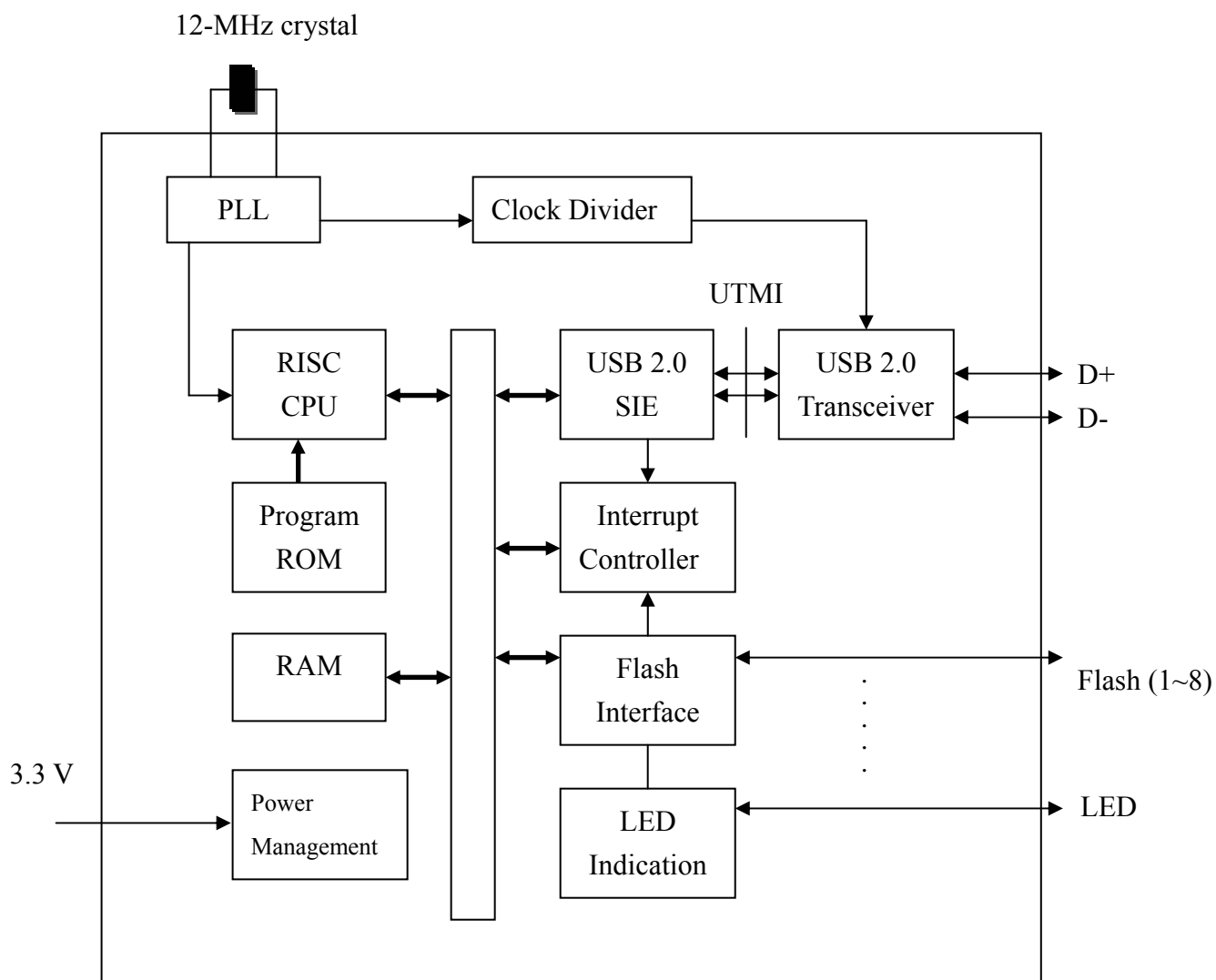
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- Integrated PLL
- Support up to 8 pieces of NAND Flash memory with write-protected ability
- Support Toshiba and Samsung's K9K series flash
- Support Samsung's K9F and K9W series flash
- Support wear-leveling algorithm
- Higher reliability: ECC on 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
- Configurable Vendor ID/Product ID (VID/PID)
- Small form factor - standard 48-pin LQFP (7mmX7mm) package



■ BLOCK DIAGRAM





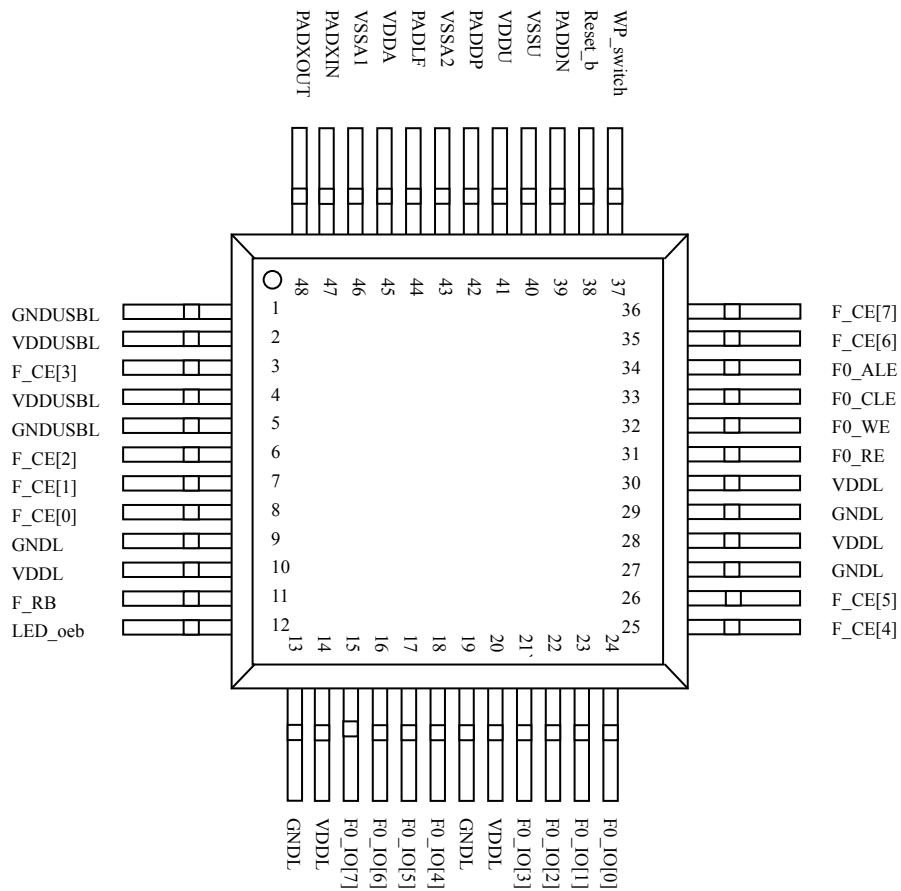
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■ PIN CONFIGURATION

LQFP 48 L





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■ **PIN DESCRIPTION**

| Pin Name | Attribute | Description | Pin # |
|----------|-----------|-----------------------------|-------|
| GNDUSBL | P | USB logic ground | 1 |
| VDDUSBL | P | 3.3 V USB logic power | 2 |
| F_CE[3] | O | Flash Chip Enable – Chip 3 | 3 |
| VDDUSBL | P | 3.3 V USB logic power | 4 |
| GNDUSBL | P | USB logic ground | 5 |
| F_CE[2] | O | Flash Chip Enable – Chip 2 | 6 |
| F_CE[1] | O | Flash Chip Enable – Chip 1 | 7 |
| F_CE[0] | O | Flash Chip Enable – Chip 0 | 8 |
| GNDL | P | Logic ground | 9 |
| VDDL | P | 3.3 Logic power input | 10 |
| F_RB | I | Flash Ready/Busy | 11 |
| LED1_oeb | O | LED1 indication(open drain) | 12 |
| GNDL | P | Logic ground | 13 |
| VDDL | P | 3.3 Logic power input | 14 |
| F0_IO[7] | I/O | Flash data bus – bit 7 | 15 |
| F0_IO[6] | I/O | Flash data bus – bit 6 | 16 |
| F0_IO[5] | I/O | Flash data bus – bit 5 | 17 |
| F0_IO[4] | I/O | Flash data bus – bit 4 | 18 |
| GNDL | P | Logic ground | 19 |
| VDDL | P | 3.3 Logic power input | 20 |
| F0_IO[3] | I/O | Flash data bus – bit 3 | 21 |
| F0_IO[2] | I/O | Flash data bus – bit 2 | 22 |
| F0_IO[1] | I/O | Flash data bus – bit 1 | 23 |
| F0_IO[0] | I/O | Flash data bus – bit 0 | 24 |
| F_CE[4] | O | Flash Chip Enable – Chip 4 | 25 |
| F_CE[5] | O | Flash Chip Enable – Chip 5 | 26 |
| GNDL | P | Logic ground | 27 |
| VDDL | P | 3.3 Logic power input | 28 |
| GNDL | P | Logic ground | 29 |
| VDDL | P | 3.3 Logic power input | 30 |
| F0_RE | O | Group 1 Flash Read Enable | 31 |



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



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■ 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 | TPllh | 0.35(2PF) | 0.4(4PF) | 0.54(8PF) | ns |
| Input falling delay | TPlhl | 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 |

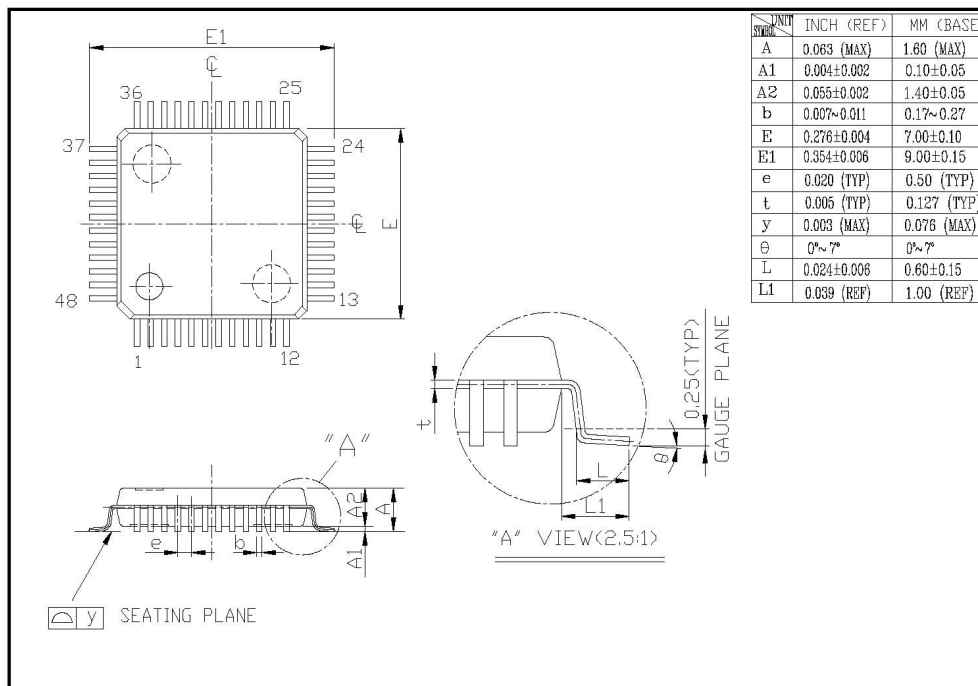


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■ PACKAGE INFORMATION



Note:

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

How to reach us:

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