

# USB to Flash Interface Controller, Mass Storage Class Compliant

## 1 General Description

SN11083 is a high-performance integrated circuit to bridge USB and Flash memory. It provides a flexible and cost efficient single chip solution for external storage applications that intend to utilize the convenience of USB. To help the system manufacturers to build high quality, low cost USB storage systems, several special features are implemented. The embedded translation table helps the system makers to design a high performance NAND type flash device but still keeps the cost low. The proprietary randomization algorithm effectively extends the lifetime of the flash memory, ensuring the robustness of the system. The real time ECC correction keeps the data integrity while still maintains the high data transfer rate.

The external serial EEPROM provides the possibility to customize the USB identity for each product. The OEM makers could make products for different customers by just putting the vendor/product ID and names in the EEPROM but still keep other things the same. The serial number can help the system manufacturers to track down every single device they made even when the design and the PID/VID are all the same. The USB Mass Storage Class compliance capability of SN11083 makes it a truly “plug-and-play” device without vendor drivers needed under the OS like Windows 2000/ME/XP and Mac OS 9/10. This feature not only makes the system developing faster and easier, but also reduces the cost and increases the reliability. The SN11083 also provides the capability to boot the PC. Therefore, the system manufacturers can use it to build a much faster, high capacity, reliable, and portable system to replace the legacy floppy disk easily.

With so many functions built-in and the high performance, easy to design-in architecture, SN11083 is an ideal choice for building a portable USB to Flash storage system.



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## 2 Features

- 12 MHz USB 1.1 full-speed compatible.
- USB 1.1 Mass Storage Class compliant
- USB Mass Storage Class Bulk-Only Transport 1.0 supported
- USB Mass Storage Class SCSI transparent command set supported
- 12 characters of serial number and up to 28 characters of Vendor/Product/Revision supported with external EEPROM
- Support NAND-type flash memory, from 4Mbytes to 128 Mbytes
- Real-time ECC correction circuit to ensure the data integrity and accelerate the access speed for NAND-type flash.
- Built-in SRAM to support logical-to-physical address translation for NAND-type flash to reduce cost and increase performance and reliability
- Built-in FIFO for upstream and downstream data transfer
- Data transfer rate up to 1.5 MB/s (burst), 1.1 MB/s (read average),
- LED lightening pin available.
- PC boot up capability provided (PC BIOS needs to support USB ZIP boot up) (version 2 only)
- No Driver needed under Microsoft Windows ME/2000/XP, Mac OS 9.x/10.x
- Driver support Microsoft Windows 98
- Single 3.3V operation
- 48 pin LQFP package.



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### 3 Pin Assignment

| Pin# | PAD Name | Type | Drive | Special | Description                       |
|------|----------|------|-------|---------|-----------------------------------|
| 1    | GND      | PWR  |       |         | Digital ground                    |
| 2    | FLD6     | DIO  | 8mA   | PD      | Flash data bit 6                  |
| 3    | FLD2     | DIO  | 8mA   | PD      | Flash data bit 2                  |
| 4    | FLD7     | DIO  | 8mA   | PD      | Flash data bit 7                  |
| 5    | FLD1     | DIO  | 8mA   | PD      | Flash data bit 1                  |
| 6    | FLD0     | DIO  | 8mA   | PD      | Flash data bit 0                  |
| 7    | FLWP     | DO   | 8mA   |         | Flash write protect               |
| 8    | FLRB     | DI   |       |         | Flash ready/busy                  |
| 9    | FLWE     | DIO  | 8mA   | PD      | Flash write enable                |
| 10   | FLRE     | DIO  | 8mA   | PD      | Flash read enable                 |
| 11   | FLALE    | DO   | 8mA   |         | Flash address latch enable        |
| 12   | GND      | PWR  |       |         | Digital ground                    |
| 13   | VDD      | PWR  |       |         | Digital 3.3V                      |
| 14   | FLCLE    | DO   | 8mA   |         | Flash command latch enable        |
| 15   | FLCE     | DO   | 8mA   |         | Flash chip enable                 |
| 16   | NC       |      |       |         | Not Connected                     |
| 17   | NC       |      |       |         | Not Connected                     |
| 18   | NC       |      |       |         | Not Connected                     |
| 19   | LED      | DO   | 8mA   | PD      | LED lighter                       |
| 20   | RSTN     | DI   |       | PU      | Chip reset                        |
| 21   | TEST     | DI   |       | PD      | Test pin                          |
| 22   | NC       | -    | -     |         | No Connect                        |
| 23   | XIN      | I    | -     | -       | Crystal input or oscillator input |
| 24   | XOUT     | O    | -     | -       | Crystal output or no connection   |
| 25   | NC       | -    |       | -       | No Connect                        |
| 26   | NC       | -    |       | -       | No Connect                        |
| 27   | FLPOWER  | DO   | 8mA   | OC      | Flash power control               |
| 28   | GPIO0    | DIO  | 8mA   |         | General Purpose Input/Output 0    |



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|    |        |     |     |    |                                  |
|----|--------|-----|-----|----|----------------------------------|
| 29 | ROMCS  | DIO | 4mA |    | Chip select for external EEPROM  |
| 30 | GND    | PWR |     |    | Digital ground                   |
| 31 | VDD    | PWR |     |    | Digital 3.3V                     |
| 32 | ROMSK  | DIO | 4mA |    | Clock for external serial EEPROM |
| 33 | ROMDI  | DIO | 4mA |    | Serial data to external EEPROM   |
| 34 | ROMDO  | DIO | 4mA |    | Serial data from external EEPROM |
| 35 | NC     | -   | -   | -  | No Connect                       |
| 36 | FLWPSW | DI  |     | PU | Flash write protect switch       |
| 37 | AVDD   | PWR |     |    | analog 3.3V                      |
| 38 | AVSS   | PWR |     |    | analog ground                    |
| 39 | DPLUS  | AIO | -   | -  | USB D+ signal                    |
| 40 | DMINUS | AIO | -   | -  | USB D- signal                    |
| 41 | NC     |     |     |    | Not Connected                    |
| 42 | NC     |     |     |    | Not Connected                    |
| 43 | NC     |     |     |    | Not Connected                    |
| 44 | NC     |     |     |    | Not Connected                    |
| 45 | FLD4   | DIO | 8mA | PD | Flash data bit 4                 |
| 46 | FLD5   | DIO | 8mA | PD | Flash data bit 5                 |
| 47 | FLD3   | DIO | 8mA | PD | Flash data bit 3                 |
| 48 | VDD    | P   | -   | -  | Digital 3.3V                     |

- ☐ P: power pin; AI: analog input pin, AIO: analog input/output pin; DI: digital input pin; DO: digital output pin; DIO: digital input/output pin.
- ☐ TTL: TTL compatible inputpin; PD: pull down; PU: pull up.
- ☐ All pads are Schmitt triggered and with slew rate control

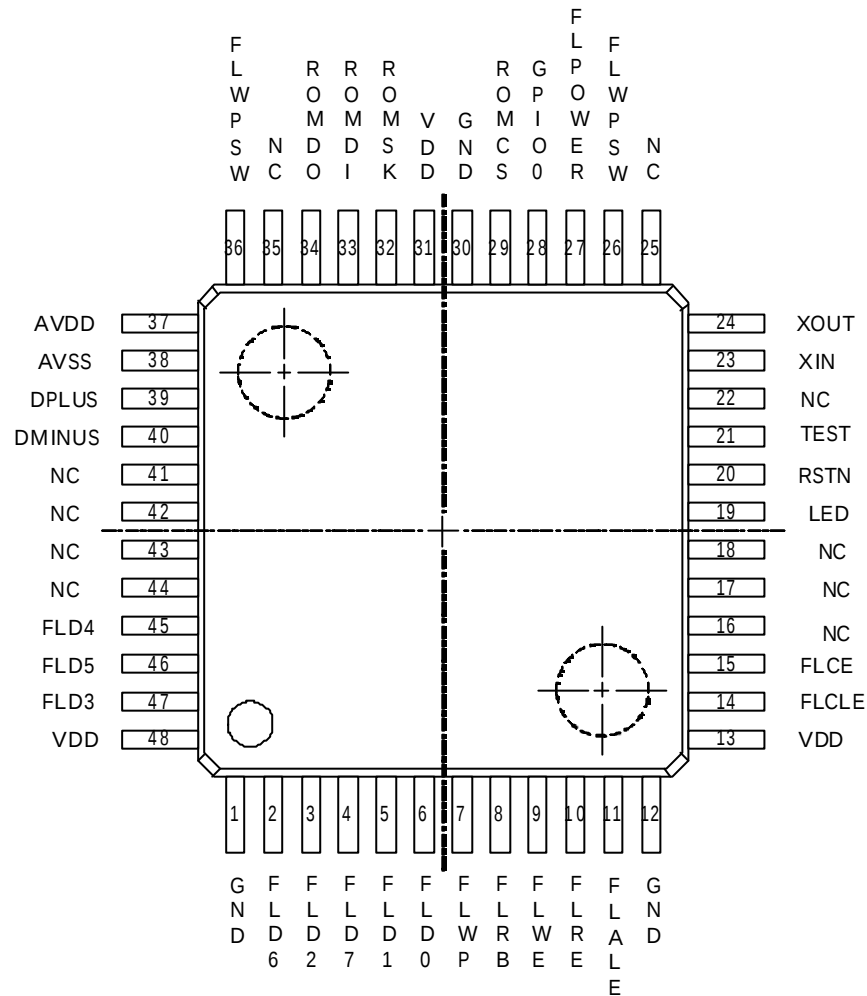


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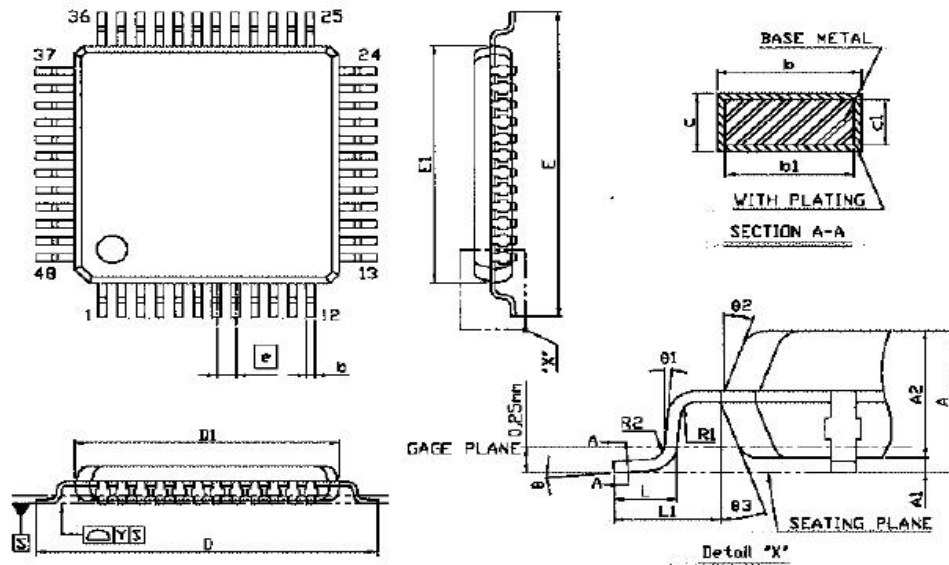
## 4 Package diagram

LQPF 48 Package



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| SYMBOL | DIMENSION (MM) |      |       | DIMENSION (MIL) |      |      |
|--------|----------------|------|-------|-----------------|------|------|
|        | MIN.           | NOM. | MAX.  | MIN.            | NOM. | MAX. |
| A      |                |      | 1.60  |                 |      | 63   |
| A1     | 0.05           |      | 0.15  | 2               |      | 6    |
| A2     | 1.35           | 1.40 | 1.45  | 53              | 55   | 57   |
| b      | 0.17           | 0.22 | 0.27  | 7               | 9    | 11   |
| b1     | 0.17           | 0.20 | 0.23  | 7               | 8    | 12   |
| c      | 0.09           |      | 0.20  | 4               |      | 8    |
| c1     | 0.09           |      | 0.16  | 4               |      | 6    |
| D      | 9.00 BSC       |      |       | 354 BSC         |      |      |
| D1     | 7.00 BSC       |      |       | 276 BSC         |      |      |
| E      | 9.00 BSC       |      |       | 354 BSC         |      |      |
| E1     | 7.00 BSC       |      |       | 276 BSC         |      |      |
| [e]    | 0.50 BSC       |      |       | 20 BSC          |      |      |
| L      | 0.45           | 0.60 | 0.75  | 18              | 24   | 30   |
| L1     | 1.00 REF       |      |       | 39 REF          |      |      |
| R1     | 0.08           |      |       | 3               |      |      |
| R2     | 0.08           |      | 0.20  | 3               |      | 8    |
| Y      |                |      | 0.075 |                 |      | 3    |
| theta  | 0°             | 3.5° | 7°    | 0°              | 3.5° | 7°   |
| theta1 | 0°             |      |       | 0°              |      |      |
| theta2 | 11°            | 12°  | 13°   | 11°             | 12°  | 13°  |
| theta3 | 11°            | 12°  | 13°   | 11°             | 12°  | 13°  |

**NOTE:**

1. REFER TO JEDEC MS-026/BBC

2. DIMENSION D1 AND E1 DO NOT INCLUDE MOLD PROTRUSION.

ALLOWABLE PROTRUSION IS 0.25mm PER SIDE D1 AND E1 ARE

MAXIMUM PLASTIC BODY SIZE DIMENSION INCLUDING MOLD MISMATCH.

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 IN MILLIMETERS.



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## 5 Version Control

Draft May-20-2002

0.1 June-17-2002

0.2 June-25-2002

add new feature of version 002