

# USB to SM/Flash Interface Controller, Mass Storage Class Compliant

## 1 General Description

SN11012 is a high-performance integrated circuit to bridge USB and SM/Flash compliance devices. 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. SN11012 can be easily configured to access SM and/or NAND type flash devices. With supporting flash memory capability, the combo system which supports both card reader and thumb drive can be built without any special effort. The embedded translation table help the system makers to design a high performance SM card or NAND type flash accessing device but still keeps the cost low. The proprietary randomization algorithm effectively extends the lifetime of the SM card and 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 SN11012 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 SN11012 even 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, SN11012 is an ideal choice for building a portable USB to SM/Flash storage system.

## 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 string supported with external EEPROM
- Support 3.3V, 4Mbytes to 128 Mbytes SSFDC(SmartMedia Card)
- 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 SmartMedia/NAND-type flash.
- Built-in SRAM to support logical-to-physical address translation for SmartMedia/NAND-type flash to reduce cost and increase performance and reliability
- Supports Hot-Swapping among flash memory and SM card without un-plug USB.
- 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	SMD6	DIO	8mA	PD	SM/Flash data bit 6
3	SMD2	DIO	8mA	PD	SM/Flash data bit 2
4	SMD7	DIO	8mA	PD	SM/Flash data bit 7
5	SMD1	DIO	8mA	PD	SM/Flash data bit 1
6	SMD0	DIO	8mA	PD	SM/Flash data bit 0
7	SMWP	DO	8mA		SM/Flash write protect
8	SMRB	DI			SM/Flash ready/busy
9	SMWE	DIO	8mA	PD	SM/Flash write enable
10	SMRE	DIO	8mA	PD	SM/Flash read enable
11	SMALE	DO	8mA		SM/Flash address latch enable
12	GND	PWR			Digital ground
13	VDD	PWR			Digital 3.3V
14	SMCLE	DO	8mA		SM/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	SMCE	DO	8mA		SM chip enable
23	XIN	I	-	-	Crystal input or oscillator input
24	XOUT	O	-	-	Crystal output or no connection
25	SMCDET	DI		PU	SM card detect
26	SMWPSW	DI		PU	SM write protect switch



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27	SMPOWER	DO	8mA	OC	SM/Flash power control
28	GPIO0	DIO	8mA		General Purpose Input/Output 0
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	FLCDET	DI			Flash card detect
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	SMD4	DIO	8mA	PD	SM/Flash data bit 4
46	SMD5	DIO	8mA	PD	SM/Flash data bit 5
47	SMD3	DIO	8mA	PD	SM/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 input pin; PD: pull down; PU: pull up.
- All pads are Schmitt triggered and with slew rate control

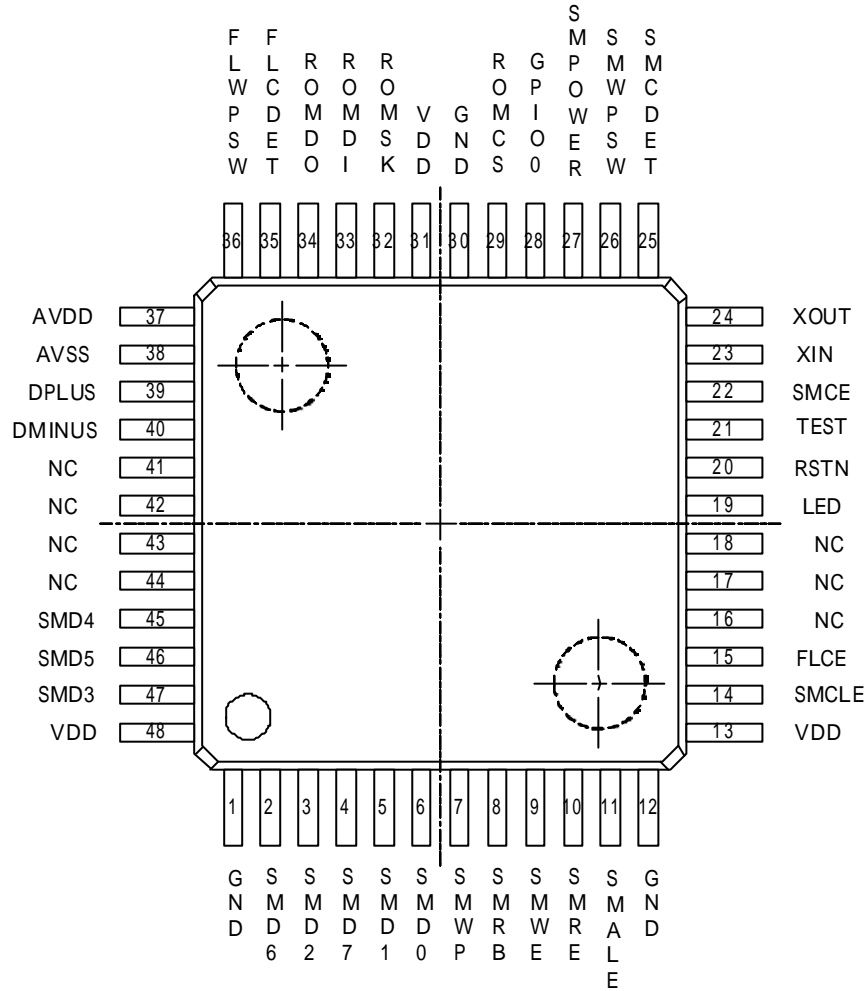


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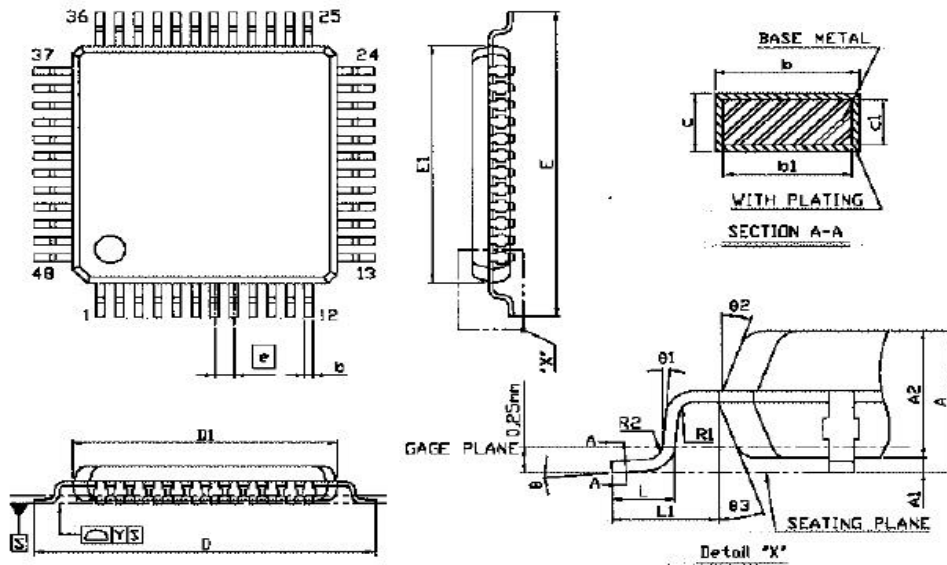
### 4 Package diagram

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
θ	0°	3.5°	7°	0°	3.5°	7°
θ1	0°			0°		
θ2	11°	12°	13°	11°	12°	13°
θ3	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 for version 002