

# **ND3260**

## **A Multi-Format Flash Card Reader/Writer Controller with USB 2.0 HS Interface Specification**

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## Introduction

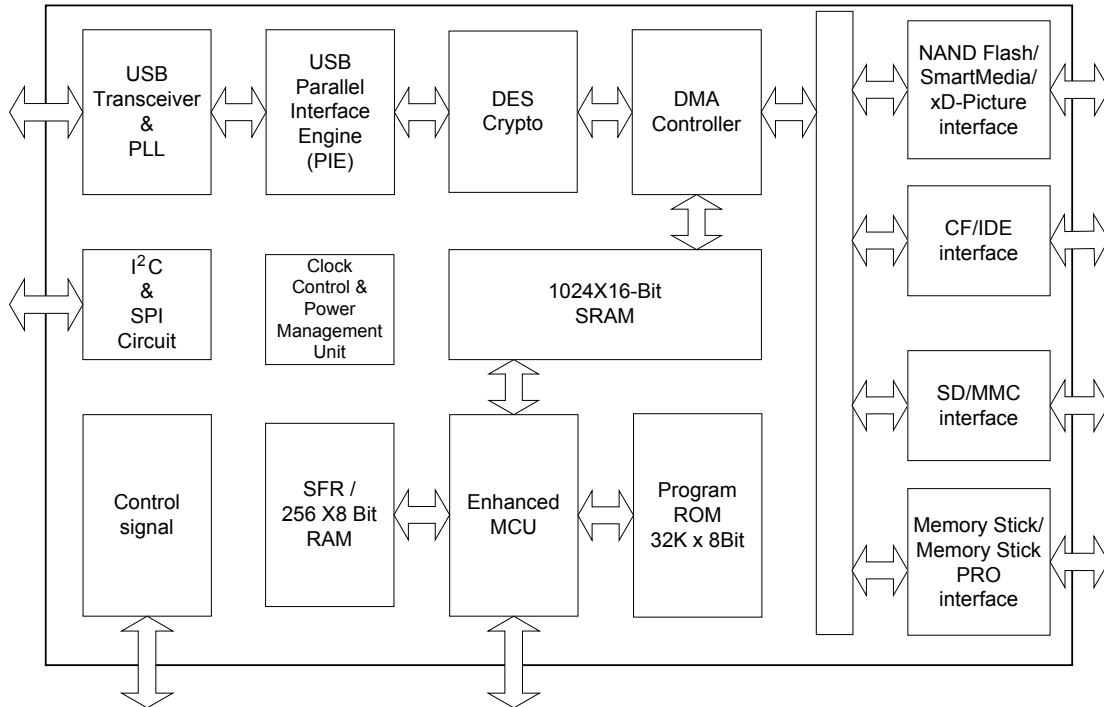
ND3260 is a highly integrated, NAND Flash/Smart Media/Memory Stick/Memory Stick PRO/Compact Flash/IBM MicroDrive/Secure Digital/MultiMedia/xD-Picture Card, USB 2.0 High Speed compatible reader/writer controller IC. It combines an internal program/data memory and a variety of peripherals on a single monolithic SOC (System-On-Chip). With an USB 2.0 HS/FS device controller supporting bus-power capability and remote wake-up function, ND3260 is able to provide up to 480 Mbps transfer rate on USB bus when accessing flash memory cards. Combining USB's plug and play function and Neodio's device driver-less solution (conforms to USB Mass Storage Class Specification), ND3260 ensures an effortless install-use experience for customers. ND3260 also supports the latest Memory Stick PRO and xD-Picture Card with hardwired parallel bus circuits to achieve maximum throughput. In Application Programming (IAP), which enables on-line software programming through USB port, makes it possible for the customers to update their flash card reader/writer functionalities on site. Both mask-ROM and IAP-enabled versions are available for a best choice of cost and performance for flash card reader/writer solution. Innovative In Device Disk (patent pending) technology provides a flexible and user-friendly function and the built in Digital Encryption System (DES) module also provides a high performance data encryption/decryption mechanism for all flash memory cards. With a 128-pin LQFP package and only a few external passive components required, ND3260 is the best solution for USB 2.0 HS flash card reader/writer applications.

## Features

- Internal maximum 32K x 8 code memory
- Hardwired Error Correction Code (ECC) function
- Two 16-bit timers/counters
- 12 vectors interrupt structure with 2 priority levels
- Built-in watchdog timer
- High performance NA-16 (Neodio Architecture-16) access for data exchange
- 480Mbps Hi-speed USB interface complies with ver. 2.0 HS standard
- Three types of USB data pipes supported: Interrupt, Control and Bulk
- USB bus power capability
- Support USB remote wake-up function
- Support USB suspend
- Resume from power down by either reset or interrupt
- Internal PLL function provides 30MHz frequency for USB operation
- Low EMI (ALE is inhibited automatically when executing internal code)
- Flash card interfaces supporting various memory storage devices: NAND Flash/Compact Flash Card/IBM MicroDrive/Smart Media Card/MultiMedia Card/Security Digital Card/Memory Stick Card/Memory Stick PRO Card and xD-Picture Card etc

- Built in hardware Digital Encryption System(DES) engine for fast encryption/decryption
- In Device Disk technology (patent pending) makes it possible to install application/driver everywhere without a disk/CD
- Device driver-less advantage when used in Windows ME/2000/XP, Mac (10.1.2 and above), and Linux (2.4.x and above)
- Support In Application Programming (IAP) through USB port
- Software configurable I<sup>2</sup>C/SPI bus for flexible peripheral circuit control
- LED indicators for card reader/writer power and access status
- Fully compatible with the USB Mass Storage Class Specification v2.0
- Only one 3.3V voltage supply required
- Build-in 2.5V regulator for low power internal core
- 128-pin LQFP package

## Block Diagram



## Pin Descriptions

Pin No.	Name	I/O	Descriptions
47	EA_N	I	When held low, the device fetches code from external code memory.
46	PSEN_N	O	The read strobe signal to external code memory.
93	RSTI_N	I	Reset input: A low on this pin for two machine cycles while the oscillator is running that resets the device. (1,2)
28,29,30,31, 89,90,91,92	D0~D7	I/O	MCU data bus
95,96,99,100 101,102,103, 104	MA0~MA7	I/O	MCU low byte address bus
32,33,34,35 36,37,38,39	MA8~MA15	I/O	MCU high byte address bus
121,122,123	MA16~MA18	I/O	MCU Extra address bus
42	MSSP	I/O	Memory Stick Card power switch
43	SMCD	I/O	Smart Media Card detect and LED control pin
44	CFCD	I/O	Compact Flash Card detect and LED control pin
45	SDCD	I/O	SD/MMC Card detect and LED control pin
113	MSCD	I/O	Memory Stick Card detect and LED control pin

114	CFSP	I/O	Compact Flash Card power switch
2	SDSP	I/O	SD/MMC Card power switch
1	XDWP	I/O	xD-Picture Card write protect control pin
15	XDCE	I/O	xD-Picture Card chip select pin
16	SMSP	I/O	Smart Media Card power switch
17	XDSP	I/O	xD-Picture Card power switch
18	CFRST	I/O	Compact Flash Card reset pin
40	SMCE	I/O	Smart Media Card chip select
41	SMWPI	I/O	Smart Media Card write protect input detect pin
107	WR_N	I/O	External memory write pin
108	RD_N	I/O	External memory read pin
21	SMXDRB	I/O	Smart Media Card and xD-Picture Card ready/Busy pin
75	CFCS0	I/O	Compact Flash Card chip select pin 0
126	CFCS1	I/O	Compact Flash Card chip select pin 1
127	XDCD	I/O	xD-Picture Card LED control pin
128	I2CSDA	I/O	I <sup>2</sup> C bus serial data input/output
3	I2CSCL	I/O	I <sup>2</sup> C bus serial clock output
4	SMWP	I/O	Smart Media Card write protect control pin
5	SDWP	I/O	SD/MMC Card write protect control pin
124	CE_N	I/O	External memory chip select
110	IOR_N	O	Compact Flash/IDE I/O read signal.
109	IOW_N	O	Compact Flash/IDE I/O write signal.
88,115,116	FA0~FA2	O	Compact Flash/IDE address bus: These bits are asserted to access a register or data port in the Compact Flash/IDE device.
6,7,8,9, 10,11,12,13, 48,49,50,51, 52,53,54,55,	FD0~FD15	I/O	Compact Flash/IDE data bus (2)
19	SALE	O	NAND-type Flash/Smart Media Card address latch enable.
20	SCLE	O	NAND-type Flash/Smart Media Card command latch enable.
118	SRE_N	O	NAND-type Flash/Smart Media Card read enable.
117	SWE_N	O	NAND-type Flash/Smart Media Card write enable.
76,77,78,79, 80,81,82,83	SD0~SD7	I/O	NAND-type Flash/Smart Media data I/O bus (2)
112	MCLK	O	SD/MMC host to card clock signal.
111	MCMD	I/O	SD/MMC command/response signal. (2)
23,24,25,26	MD0~MD3	I/O	SD/MMC data bus. (2)
119	SCLK	O	Memory Stick Card serial protocol clock signal.
120	BS	O	Memory Stick Card serial protocol bus state signal.
84,85,86,87	SDIO0~ SDIO3	I/O	Memory Stick Card serial data signal. (2)
94	TEST	I	Test input pin. These pins are used only in the IC test mode, and should be connected to GND when in normal mode.
64	DP	I/O	USB2.0 data in data positive pin terminal
63	DM	I/O	USB2.0 data in data negative pin terminal
68	DPRS	I/O	USB1.1 data in data positive pin terminal, connect to external

			resistor (39 $\Omega \pm 0.1\%$ )
67	DMRS	I/O	USB1.1 data in data negative pin terminal, connect to external resistor (39 $\Omega \pm 0.1\%$ )
62	RREF	I	Connect external reference resistor (12.1k $\Omega \pm 0.1\%$ ) to Analog GND
66	RPU	I	Connect external resistor (1.5k $\Omega \pm 0.1\%$ ) to AVCC (Analog power 3.3V)
58	XSCI	I	Crystal Oscillator Input (12MHz)
59	XSCO	O	Crystal Oscillator Output (12MHz)
60,69,71	VCCA	P	Analog Power Supply. (3.3V)
57,61,65,70	AGND	P	Analog Ground.
27,73,97,125	VCC3	P	Power Supply (3.3V)
22,72,98,106	GND	P	Ground.
14,56,105	V25I	P	Digital Power Supply (2.5V)
74	V25O	P	Regulator voltage output (2.5V)

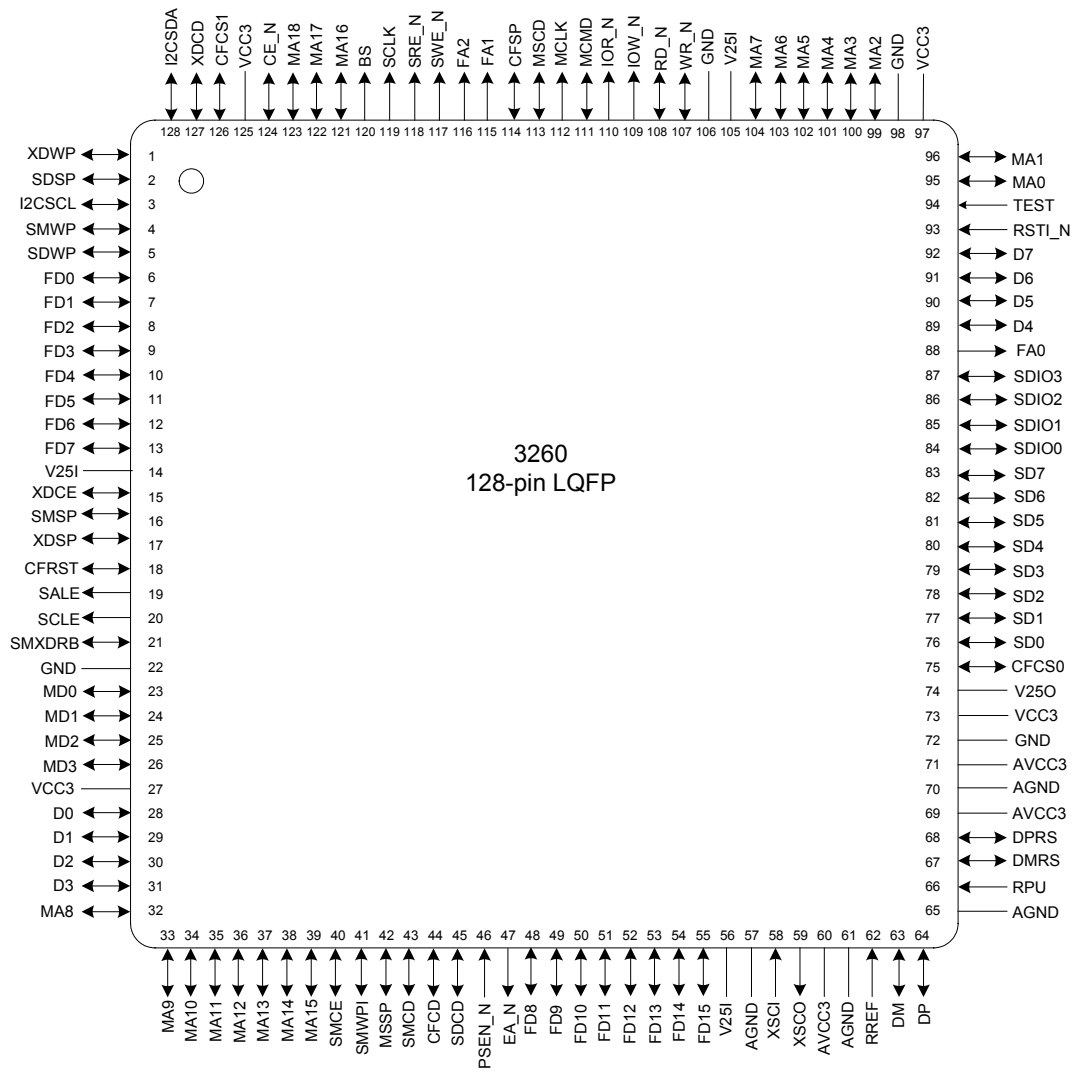
I: digital input direction; O: digital output direction; I/O: digital bi-direction;

A: analog signal; P: power/ground

Note (1) Schmitt triggered input buffer

Note (2) 5V tolerant input (bi-directional) buffer

### Pin Assignment



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**Electrical Specification:**
**Absolute Maximum Rating**

SYMBOL	PARAMETER	MIN	MAX	UNIT
V <sub>CC</sub>	Power Supply	-0.3	3.6	V
V <sub>IN</sub>	Input Voltage of 3.3V I/O with 5V Tolerance	-0.3	5.5	V
T <sub>STG</sub>	Storage temperature range	-40	150	°C

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**Recommended Operating Conditions**

SYMBOL	PARAMETER	MIN	TYP	MAX	UNIT
V <sub>CCK</sub>	Core Power Supply	2.25	2.5	2.75	V
V <sub>CC3V</sub>	Power Supply of 3.3V I/O	3.0	3.3	3.6	V
V <sub>IN</sub>	Input Voltage of 3.3V I/O with 5V Tolerance	0.0	3.3	5.25	V
T <sub>j</sub>	Commercial junction operating temperature	0		115	°C

**DC Characteristics**

 (Measured under the recommended operation conditions V<sub>CC</sub>=3.0V~3.6V, T<sub>j</sub>=0 °C ~115 °C)

SYMBOL	PARAMETER	CONDITION	MIN	TYP	MAX	UNIT
V <sub>25</sub>	Regulator output voltage	V <sub>CC</sub> =3.3V	2.37	2.5	2.63	V
V <sub>25</sub> I <sub>load</sub>	Regulator driving current	V <sub>CC</sub> =3.3V			150	mA
I <sub>IL</sub>	Input leakage current	w/o pull-up/down	-10		10	uA
I <sub>oZ</sub>	Tri-state leakage current		-10		10	uA
C <sub>IN</sub>	Input capacitance			3.1		pF
C <sub>OUT</sub>	Output capacitance			3.1		pF
C <sub>BID</sub>	Bi-direction buffer capacitance			3.1		pF
V <sub>IL</sub>	Input low voltage				0.8	V
V <sub>IH</sub>	Input high voltage		2.0			V
V <sub>t-</sub>	Schmitt trigger negative going threshold voltage		0.8	1.1		V
V <sub>t+</sub>	Schmitt trigger positive going threshold voltage			1.6	2.0	V
V <sub>OL</sub>	Output low voltage	I <sub>OL</sub> =4mA			0.4	V
V <sub>OH</sub>	Output high voltage	I <sub>OH</sub> =4mA	2.4			V
R <sub>pu</sub>	Input Pull-Down Resistance		40	75	190	KOhm
R <sub>pd</sub>	Input Pull-Up Resistance		40	75	190	KOhm
I <sub>OP</sub>	Operating current	(1)		60		mA
I <sub>PWD</sub>	Power down current	(1)		TBD		uA



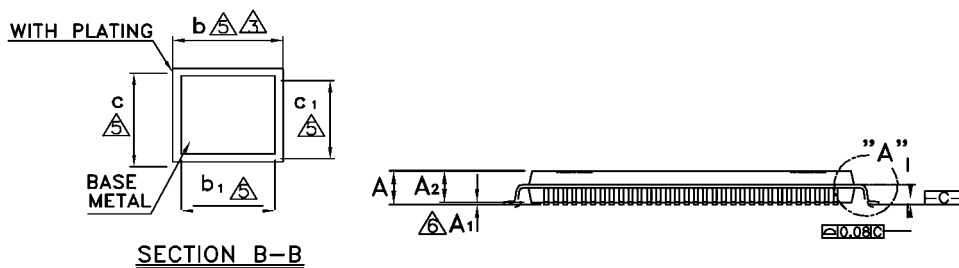
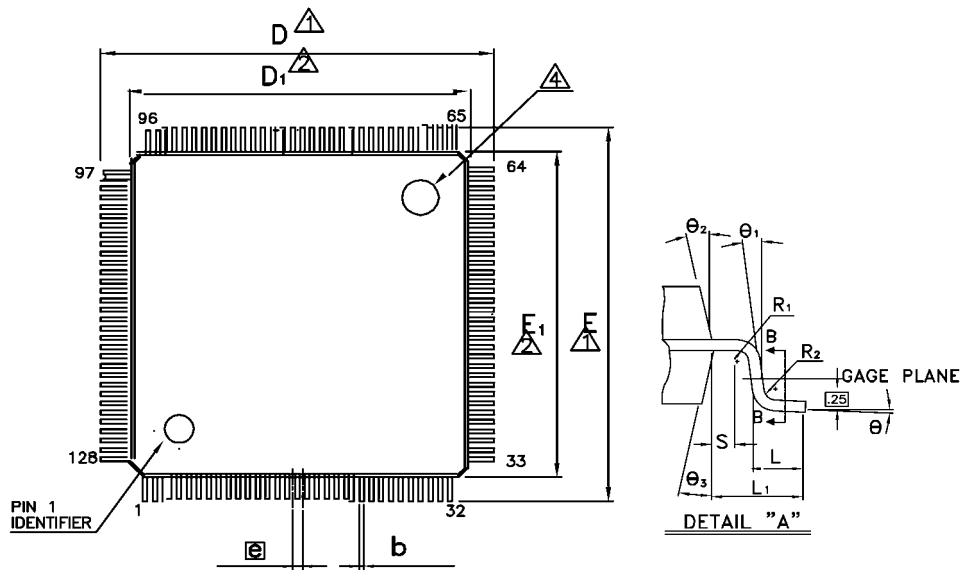
Note (1) Measured within the assembled application circuits operating at 12MHz frequency.

AC Characteristics

TBD.

PACKAGE

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Symbol	Dimension in mm			Dimension in inch		
	Min	Nom	Max	Min	Nom	Max
A	--	--	1.60	--	--	0.063
A1	0.05	--	--	0.002	--	--
A2	1.35	1.40	1.45	0.053	0.055	0.057
b	0.13	0.18	0.23	0.005	0.007	0.009
b1	0.13	0.16	0.19	0.005	0.006	0.007
c	0.09	--	0.20	0.004	--	0.008
c1	0.09	--	0.16	0.004	--	0.006
D	15.85	16.00	16.15	0.624	0.630	0.636
D1	13.90	14.00	14.10	0.547	0.551	0.555
E	15.85	16.00	16.15	0.624	0.630	0.636
E1	13.90	14.00	14.10	0.547	0.551	0.555
$\text{[e]}$	0.40 BSC			0.016 BSC		
L	0.45	0.60	0.75	0.018	0.024	0.030
L1	1.00 REF			0.039 REF		

R <sub>1</sub>	0.08	--	--	0.003	--	--
R <sub>2</sub>	0.08	--	0.20	0.003	--	0.008
S	0.20	--	-	0.008	--	--
$\theta$	0°	3.5°	7°	0°	3.5°	7°
$\theta_1$	0°	--	--	0°	--	--
$\theta_2$	12° TYP			12° TYP		
$\theta_3$	12° TYP			12° TYP		