IB510

Socket 7 NS Geode GX1
5.25-inch Embedded Board

USER'S MANUAL

Version 1.0

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Introduction

Product Description

The IB510 board is a high-performance multimedia using the 5.25-inch SBC form factor (Little Board). Based on the NS Geode GX1 and NS 5530A chipset, it features a Socket 7 architecture that supports NS Geode GX processors with speeds of 200MHz to 333MHz.

National Semiconductor's Geode GX processor is specially designed to power information and Internet appliances (IA) for entertainment, education, and business. The Geode GX represents a system-on-chip solution for IA applications such as thin clients, interactive set-top boxes, personal Internet access devices, and embedded systems. The device is available with a typical average power consumption ranging from 0.8 to 2.5 watts. Operating at lower voltages improves power consumption and thermal characteristics thus enabling maximum flexibility in system design.

The IB510 packs all the functions of a versatile system, including VGA, Audio, Dual Ethernet and LCD panel support. System memory is provided by one DIMM socket that accommodates up to 256MB SDRAM.

The IB510 has four RS232 serial communication ports and one PCI expansion slot. Optionally available is a FT5-CF CompactFlash daughter card that supports Compact Flash cards and the DXTN510 DSTN daughter card to support DSTN LCD panels and the FT5-TV daughter card to support TV-OUT.

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Checklist

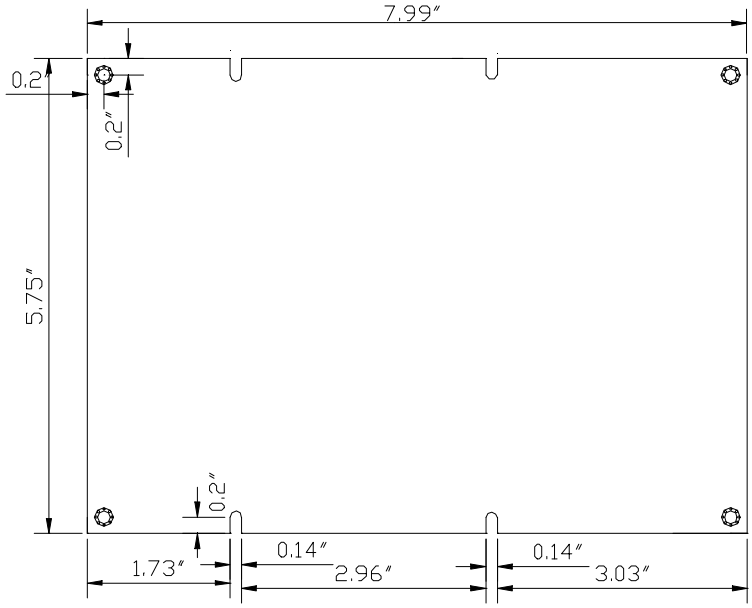
Your IB510 package should include the items listed below. Damaged or missing items should be reported to your supplier.

- The IB510 5.25-inch SBC
- This User's Manual
- One floppy diskette containing the following:
  - Chipset Patch File
  - NS Geode GX VGA Driver
  - Realtek RTL8139C Ethernet Drivers
  - NS 5530A Audio Drivers
- Optional cables such as:
  - 1 Floppy Ribbon Cable
  - 1 Audio Cable
  - 1 44-pin IDE Ribbon Cable
  - 1 COM Port Cable
  - 1 Printer Port Cable
  - 1 PS/2 Keyboard/Mouse Cable
  - 1 VGA Cable
  - 1 LAN Cable for two RJ-45 connector with IBLD-B1
  - Optional DXTN 510 DSTN daughter card
  - Optional FT5-CF CompactFlash daughter card
  - Optional FT5-TV TV-OUT daughter card

Specifications

Processor Supported	Support NS Geode GX1, 233MHz~333MHz, 33MHz Bus Speed
Chipset	NS Geode 5530A
BIOS	Award BIOS Supports ACPI, DMI, PnP
System Memory	1x DIMM socket support up to 256MB capacity 3.3V supported, ECC supported
Multi I/O Chipset	Winbond 83977F and 83877TF (keyboard controller is built-in 83977F)
I/O Features	1x FDD (up to 2.88MB, 3 Mode, LS120) 1x Parallel Port (EPP, ECP Port) 4x Serial Ports (RS232) 1x IrDA TX/RX Headers 2 ports Digital IO Pin Headers Watch dog function support
Bus Master IDE	NS 5530A built-in, Ultra DMA/33 IDE HDD 40-pin headers for primary channel 44-pin headers for secondary channel
On-board VGA	NS Geode GX Integrated VGA Support CRT & LCD Panels for TFT and DSTN Optional DXTN510 DSTN daughter card Optional FT5-TV TV-OUT daughter card On board LVDS controller 15-pin VGA connector
On-board Audio	NS 5530 integrated audio controller AC97 codec support
On-board Dual Ethernet	Two Realtek RTL8139C Single-Chip Controller 32-bit performance, PCI bus master capability Supports 10/100Mbps data transfer rates
USB	Headers for 2 USB ports
Expansion Slot	One PCI slot
CompactFlash Support	Optional through FT5-CF CompactFlash adapter card
Power Connector	(+5V, Gnd, Gnd, +12V) 4-pin connector
Keyboard/Mouse	Two 6-pin headers for PS/2 keyboard and PS/2 mouse
Power Consumption	**GX1 300MHz (Vcore = 2V) 2A max. (+5V) 250mA max. (+12V)**
Form Factor	5.25-inch SBC (Little Board)
Dimensions	203mm x 146mm (7.99” x 5.75”)

Board Dimensions



Installations

This section provides information on how to use the jumpers and connectors on the IB510 in order to set up a workable system. The topics covered are:

Installing the CPU

The IB510 5.25-inch SBC (Little Board) a Socket 7 processor socket for NS Geode GX processors.

The Socket 7 processor socket comes with a lever to secure the processor. Raise this lever to about a 90° angle to allow the insertion of the processor. Place the processor into the socket by making sure the notch on the corner of the CPU corresponds with the notch on the inside of the socket. Once the processor has slid into the socket, return the lever to the lock position.

After you have installed the processor into the socket, check if the jumpers for the CPU type and speed are correct.

***NOTE**: Ensure that the CPU heat sink and the CPU top surface are in total contact to avoid CPU overheating problem that would cause your system to hang or be unstable.*

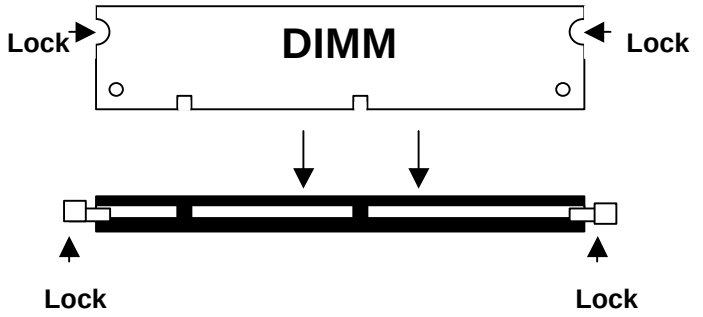
Installing the Memory (DIMM)

The IB510 5.25-inch SBC supports one 168-pin DIMM socket for a maximum total memory of 256MB in SDRAM type. The memory capacities supported are 32MB, 64MB, 128MB and 256MB.

Installing and Removing DIMMs

To install the DIMM, locate the memory slot on the little board and perform the following steps:

1. Hold the DIMM so that the two keys of the DIMM align with those on the memory slot.
2. Gently push the DIMM in an upright position until the clips of the slot close to hold the DIMM in place when the DIMM touches the bottom of the slot.
3. To remove the DIMM, press the clips with both hands.

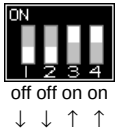


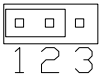
Top View of DIMM Socket

Setting the Jumpers

Jumpers are used on the IB510 to select various settings and features according to your needs and applications. Contact your supplier if you have doubts about the best configuration for your needs. The following lists the connectors on IB510 and their respective functions.

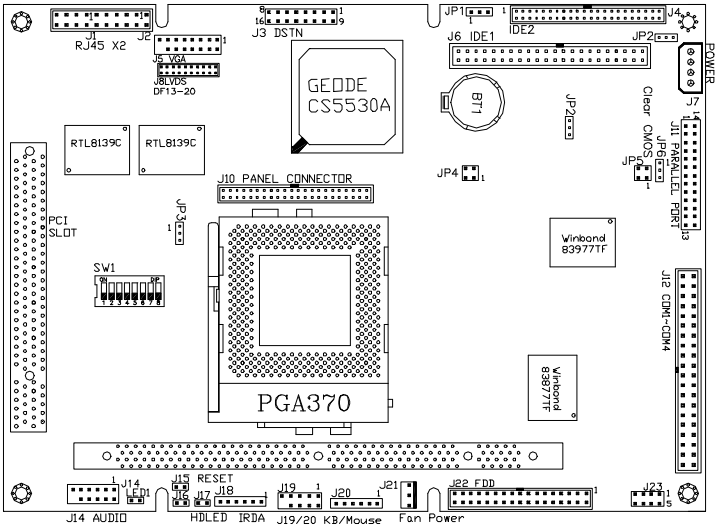
The following conventions are used in this section:





Pin 1-2
Short/Closed

Jumper Locations on IB510



SW2(3): CPU Clock Speed Selector

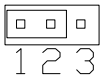
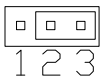
CPU Clock	SW2(1-3)	CPU Clock	SW2(1-3)
333MHz	 off on on xx xx xx xx xx	300MHz	 on off on xx xx xx xx xx
266MHz	 off off off xx xx xx xx xx	233MHz	 on off off xx xx xx xx xx
200MHz	 off on off xx xx xx xx xx		

SW2(4-8): CPU Frequency Selector

The table below shows the correct setting to match the CPU frequency.

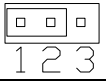
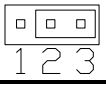
Vcore	SW2(4-8)				
	4	5	6	7	8
1.6V	On	Off	On	Off	On
1.8V	Off	On	Off	On	On
2.0V	Off	On	On	On	On
2.2V	Off	On	Off	Off	Off
2.5V	On	Off	On	Off	Off
2.9V	On	Off	Off	On	Off

JP1: 5V Voltage Setting

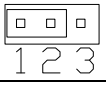
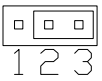
JP1	Setting	Function
 1 2 3	Pin 1-2 Short/Closed	No Connect (Default)
 1 2 3	Pin 2-3 Short/Closed	5V

**** Warning:** The 5V voltage is connected to pin 20 of the primary IDE channel. Setting JP1 to **2-3 short** could damage the hard disk in the primary IDE channel.*

JP3: Panel Voltage

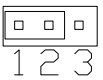
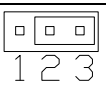
JP3	Setting	Function
	Pin 1-2 Short/Closed	3.3V (default)
	Pin 2-3 Short/Closed	5V

JP6: Clear CMOS

JP6	Setting	Function
	Pin 1-2 Short/Closed	Clear CMOS Content
	Pin 2-3 Short/Closed	Normal Operation

***Note:** To clear CMOS contents, remove the jumper from pin 1-2 and place it on pin 2-3 for about 5 seconds, and then return the jumper to pin 1-2.*

JP8: TVCLK for TV-Out

JP8	Setting	Function
	Short	TVCLK Not Available (default)
	Open	TVCLK Available

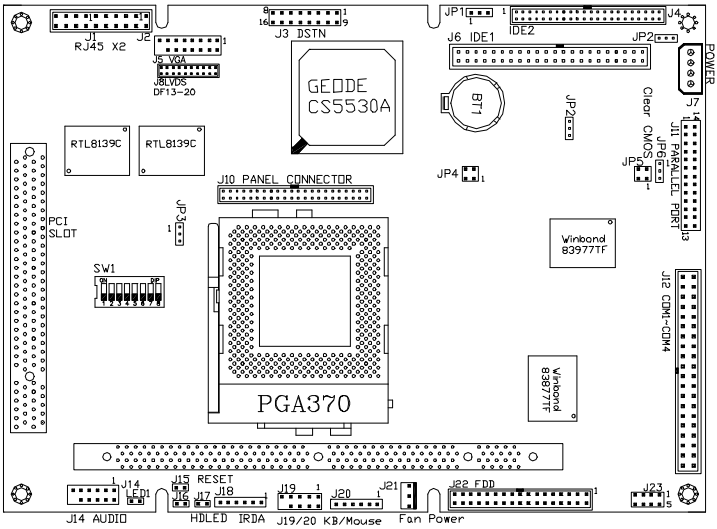
SW1: DSTN Resolution Setting for DXTN510 Card

SW1	1	2	3	4
640x480 16bit DSTN color	Off	Off	On	On
800x600 16bit DSTN color	Off	Off	Off	On
1024x768 24bit DSTN color	Off	On	Off	On

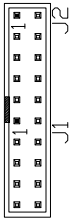
Connectors on IB510

The connectors on IB510 allows you to connect external devices such as keyboard, floppy disk drives, hard disk drives, printers, etc. The following table lists the connectors on IB510 and their respective functions.

Connector Locations on IB510



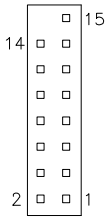
J2: Primary and Secondary LAN Connector



Signal Name	Pin #	Pin #	Signal Name
Vcc	1	2	LED01
RX0+	3	4	RX0-
LED02	5	6	GND
Vcc	7	8	GND
TX0+	9	10	TX0-
Vcc	11	12	LED12
RX1+	13	14	RX1-
LED11	15	16	GND
Vcc	17	18	GND
TX1+	19	20	TX1-

J5: VGA CRT Connector

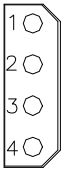
J5 is a 15-pin header for an external VGA CRT female connector.



Signal Name	Pin	Pin	Signal Name
Red	1	2	Vcc
Green	3	4	N.C.
Blue	5	6	N.C.
N.C.	7	8	DOCSDA
Ground	9	10	H-Sync
Ground	11	12	V-Sync
Ground	13	14	DOCSCL
Ground	15	16	N.C.

J7: Main Power Connector

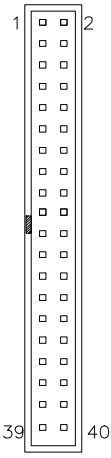
The J7 main power connector has the following pin assignments.



Pin #	Signal Name
1	+5V
2	Ground
3	Ground
4	+12V

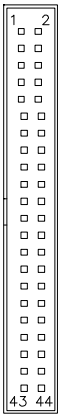
J6, J4: EIDE Connectors

J6 is the *primary* IDE connector. J4 is the *secondary* IDE connector.



J6: IDE1

Signal Name	Pin #	Pin #	Signal Name
Reset IDE	1	2	Ground
Host data 7	3	4	Host data 8
Host data 6	5	6	Host data 9
Host data 5	7	8	Host data 10
Host data 4	9	10	Host data 11
Host data 3	11	12	Host data 12
Host data 2	13	14	Host data 13
Host data 1	15	16	Host data 14
Host data 0	17	18	Host data 15
Ground	19	20	N.C.
DRQ0	21	22	Ground
Host IOW	23	24	Ground
Host IOR	25	26	Ground
IOCHRDY	27	28	Host ALE
DACK0	29	30	Ground
IRQ14	31	32	No connect
Address 1	33	34	No connect
Address 0	35	36	Address 2
Chip select 0	37	38	Chip select 1
Activity	39	40	Ground

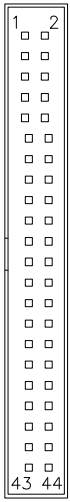


J4: IDE2

Signal Name	Pin #	Pin #	Signal Name
Reset IDE	1	2	Ground
Host data 7	3	4	Host data 8
Host data 6	5	6	Host data 9
Host data 5	7	8	Host data 10
Host data 4	9	10	Host data 11
Host data 3	11	12	Host data 12
Host data 2	13	14	Host data 13
Host data 1	15	16	Host data 14
Host data 0	17	18	Host data 15
Ground	19	20	N.C.
DRQ0	21	22	Ground
Host IOW	23	24	Ground
Host IOR	25	26	Ground
IOCHRDY	27	28	Host ALE
DACK1	29	30	Ground
MIRQ0	31	32	No connect
Address 1	33	34	No connect
Address 0	35	36	Address 2
Chip select 0	37	38	Chip select 1
Activity	39	40	Ground
Vcc	41	42	Vcc
Ground	43	44	N.C.

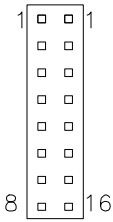
J10, J3: LCD Panel Connector

J10 is the pin header for TFT flat panel LCD displays. To support DTSN displays, the DXTN510 daughter card must be connected to J10 and J3 (10-pin header).



J10

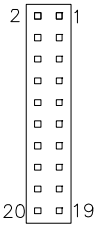
Signal Name	Pin #	Pin #	Signal Name
+12V	1	2	+12V
Ground	3	4	Ground
5V/3.3V	5	6	5V/3.3V
SCL	7	8	Ground
SDA	9	10	TVCLK
B0	11	12	B1
B2	13	14	B3
B4	15	16	B5
CRTHSYNC	17	18	CRTVSYNC
G0	19	20	G1
G2	21	22	G3
G4	23	24	G5
N.C.	25	26	N.C.
R0	27	28	R1
R2	29	30	R3
R4	31	32	R5
Ground	33	34	Ground
SHFCLK	35	36	FLM(VSYNC)
DISPENA(MDE)	37	38	LP(HSYNC)
Ground	39	40	ENABKL
Ground	41	42	N.C.
DNAVDD	43	44	5V/3.3V



J3

Signal Name	Pin #	Pin #	Signal Name
3.3V	1	9	PCIRSTX
3.3V	2	10	DSTNSCS
3.3V	3	11	DSTNSDO
Ground	4	12	DSTNSDI
Ground	5	13	DSTNSCLK
Ground	6	14	Vcc
Ground	7	15	Vcc
Ground	8	16	Vcc

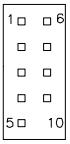
J8: 18-Bit LVDS Connector (DF13-20)



Signal Name	Pin #	Pin #	Signal Name
TX0-	2	1	TX0+
Ground	4	3	Ground
TX1-	6	5	TX1+
5V/3.3V	8	7	Ground
NC	10	9	NC
TX2-	12	11	TX2+
Ground	14	13	Ground
TXC-	16	15	TXC+
5V/3.3V	18	17	ENABKL
+12V	20	19	+12V

JP9: Digital I/O Connector

This 10-pin Digital I/O connector supports TTL levels and is used to control external devices requiring ON/OFF circuitry.



Signal Name	Pin #	Pin #	Signal Name
DI0	1	6	Vcc
DI1	2	7	DO0
No Connect	3	8	Ground
No Connect	4	9	DO1
Ground	5	10	+12V

SPECIFICATIONS:

Digital Input

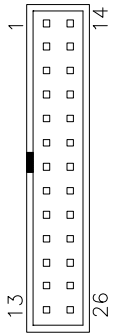
Input channels: 2 bits
Input Voltage: High: 2.0V (min)
Low: 0.8V (max)
Input Load: High: 0.05mA max at 2.7V
Low: 0.4mA max at 0.5V
Register Address: 240H
Register Format: BIT: D1 D0
Value: DI1 DI0

Digital Output

Output channels: 2 bits
Output voltage: High: Source -0.4mA at 2.4V min
Low: Sink 8mA at 0.5V max
Register Address: 240H (Write)
Register Format: BIT: D1 D0
Value: DO1 DO0

J11: Parallel Port Connector

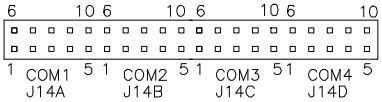
The following table describes the pin out assignments of this connector.



Signal Name	Pin #	Pin #	Signal Name
Line printer strobe	1	14	AutoFeed
PD0, parallel data 0	2	15	Error
PD1, parallel data 1	3	16	Initialize
PD2, parallel data 2	4	17	Select
PD3, parallel data 3	5	18	Ground
PD4, parallel data 4	6	19	Ground
PD5, parallel data 5	7	20	Ground
PD6, parallel data 6	8	21	Ground
PD7, parallel data 7	9	22	Ground
ACK, acknowledge	10	23	Ground
Busy	11	24	Ground
Paper empty	12	25	Ground
Select	13	N/A	N/A

J12: Four COM Ports Connector

J12A (COM1), J12B (COM2), J12C (COM3) and J12D (COM4) are the onboard serial ports on IB510.



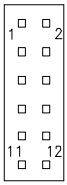
Pin #	Signal Name (RS-232)
1	DCD, Data carrier detect
2	RXD, Receive data
3	TXD, Transmit data
4	DTR, Data terminal ready
5	Ground
6	DSR, Data set ready
7	RTS, Request to send
8	CTS, Clear to send
9	RI, Ring indicator
10	No Connect.

JP4, JP5: Voltage Pins for CF Card Adapter

IB-510 offers an optional CF card adapter (for Compact Flash cards) that connects to the IDE1 connector and JP4/JP5 voltage pins.

J14: Audio Connector

J14, a 12-pin header connector, supports an optional external connector supporting 3 sockets for Line Out, Line In and Mic functions. The following table shows the pin assignments of this connector.



Signal Name	Pin #	Pin #	Signal Name
Line Out R	1	2	Line Out L
Ground	3	4	Ground
Line In R	5	6	Line In R
Ground	7	8	Ground
Mic	9	10	BIAS
Ground	11	12	NC

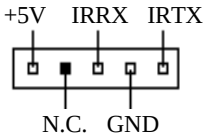
LED1: Power LED

J15: Reset Switch 2-pin Header

J16, J17: IDE LED

J18: IrDA Connector

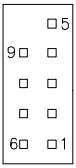
J18 is the IrDA connector used to connect to an IrDA interface that can be made to communicate with wireless devices (or other computers). These devices come with instruction on the necessary BIOS settings (UART Mode) and installation procedure.



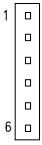
Pin #	Signal Name
1	+5V
2	No Connect
3	Ir RX
4	Ground
5	Ir TX

J19, J20: PS/2 Keyboard/Mouse Connector

J19, a 10-pin header connector, has functions for both keyboard and mouse. J20 is a 6-pin header that supports both keyboard and mouse.



Signal Name	Pin #	Pin #	Signal Name
N.C.	10	5	N.C.
KB clock	9	4	Mouse clock
KB data	8	3	Mouse data
Vcc	7	2	Vcc
Ground	6	1	Ground



Pin #	Signal Name
1	KB data
2	MS data
3	Ground
4	Vcc
5	KB clock
6	MS clock

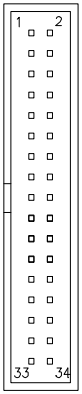
J21: Fan Power Connector

J21 is a 3-pin header for a CPU fan. The fan must be a 12V fan.

Pin #	Signal Name
1	N.C.
2	+12V
3	Ground

J22: Floppy Drive Connector

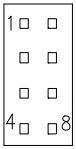
J22 of the IB510 is a 34-pin header and will support up to 2.88MB floppy drives.



Signal Name	Pin #	Pin #	Signal Name
Ground	1	2	RM/LC
Ground	3	4	No connect
Ground	5	6	No connect
Ground	7	8	Index
Ground	9	10	Motor enable 0
Ground	11	12	Drive select 1
Ground	13	14	Drive select 0
Ground	15	16	Motor enable 1
Ground	17	18	Direction
Ground	19	20	Step
Ground	21	22	Write data
Ground	23	24	Write gate
Ground	25	26	Track 00
Ground	27	28	Write protect
Ground	29	30	Read data
Ground	31	32	Side 1 select
Ground	33	34	Diskette change

J23: USB Connector

J23 is the onboard USB pin-header that supports an external USB connector with two ports.



Pin #		Signal Name
1	5	Vcc
2	6	USB-
3	7	USB+
4	8	Ground