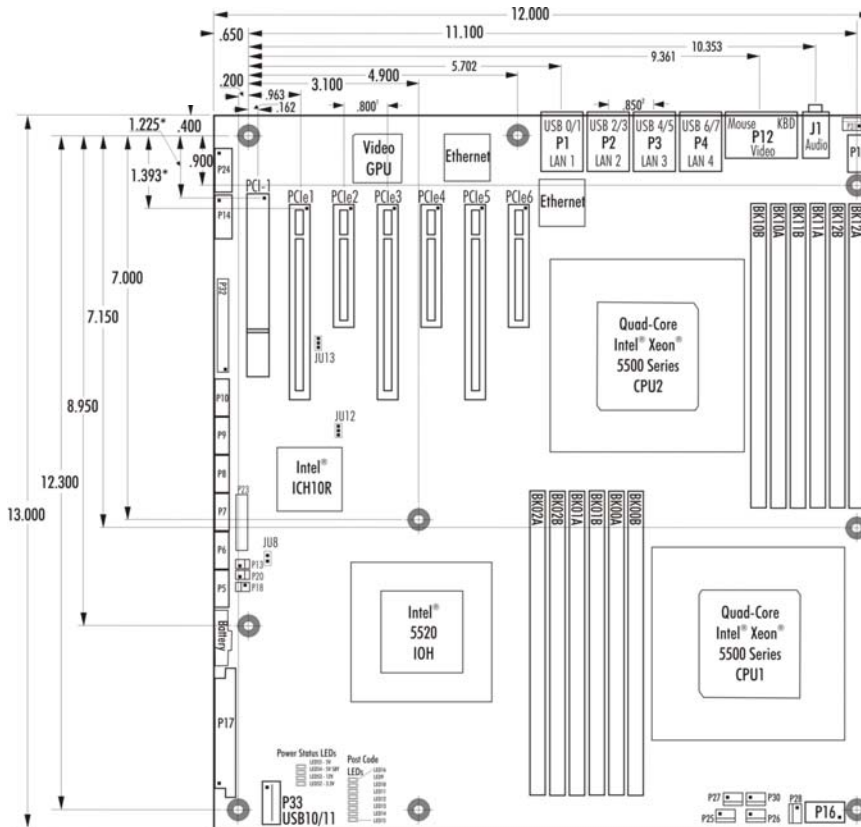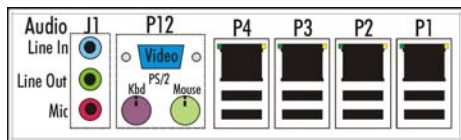## Technical Information – Jumpers, Connectors and Memory
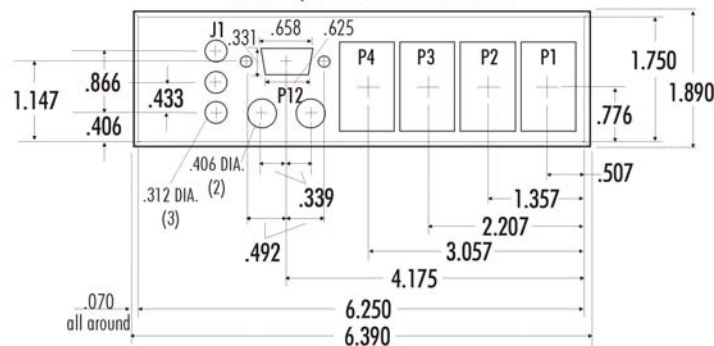## NTM6900 (6900-xxx) Server Motherboard – Nehalem
Dimension Diagram

Notes:
• All dimensions are inches

• Typical PCIe pin 1 location is 0.049" from connector center

• Typical PCI pin 1 location is 0.150" from connector center

• Mounting holes have a nominal 0.156" diameter

• Italic text indicates the center dimension of a card slot or I/O connector

• Superscript 1 indicates card slot center spacing

• Superscript 2 indicated I/O connector center spacing

• The system power supply must provide +12V power to both 12V AUX power connectors (P15 and P16) for proper motherboard operation
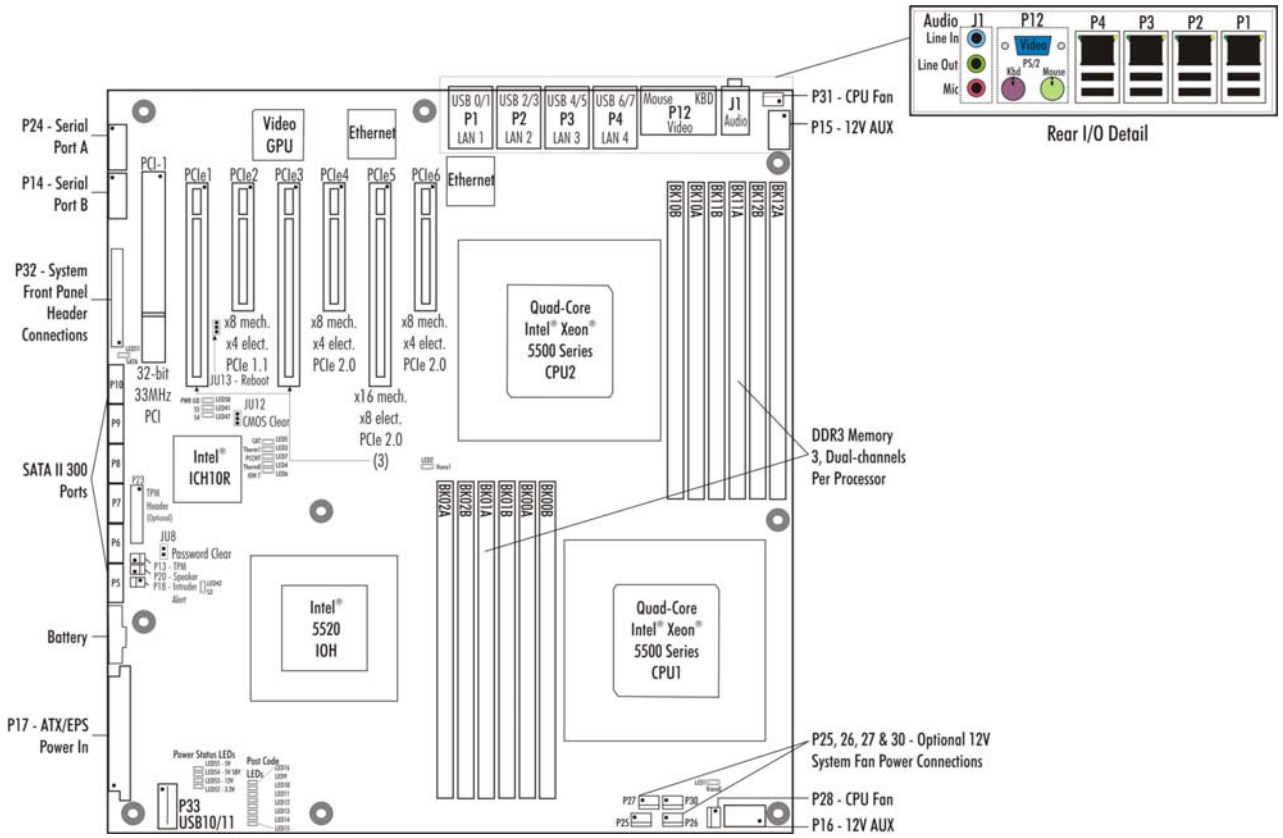
I/O Plate Detail

Rear I/O Layout

Rear I/O Plate Dimensions

Layout Diagram

Audio
Line In — J1
Line Out
Mic

P12 Video
PS/2
Kbd   Mouse

P4   P3   P2   P1

Rear I/O Detail

USB 0/1 — P1 LAN 1
USB 2/3 — P2 LAN 2
USB 4/5 — P3 LAN 3
USB 6/7 — P4 LAN 4
Mouse KBD — P12 Video
J1 Audio

P31 - CPU Fan
P15 - 12V AUX

P24 - Serial Port A
P14 - Serial Port B
P32 - System Front Panel Header Connections

PCI-1
Video GPU
Ethernet
Ethernet

PCIe1   PCIe2   PCIe3   PCIe4   PCIe5   PCIe6

x8 mech. x4 elect. PCIe 1.1   JU13 - Reboot
x8 mech. x4 elect. PCIe 2.0
x8 mech. x4 elect. PCIe 2.0
x16 mech. x8 elect. PCIe 2.0 (3)

32-bit 33MHz PCI
JU12 CMOS Clear

Intel ICH10R

PWR G2   LED08
S3   LED41
S4   LED47

CAT   LED5
Therm1   LED03
P1CHT   LED07
Therm2   LED04
IOH T   LED5N

Intel 5520 IOH

P23
TPM Header (Optional)

JU8
Password Clear
P13 - TPM
P20 - Speaker
P1B - Intruder Alert
LED42 53

BK10B BK10A BK11B BK11A BK12B BK12A

Quad-Core Intel Xeon 5500 Series CPU2

DDR3 Memory 3, Dual-channels Per Processor

BK02A BK02B BK01B BK00A BK00B

Quad-Core Intel Xeon 5500 Series CPU1

P10
P9
P8
SATA II 300 Ports
P7
P6
P5

Battery

P17 - ATX/EPS Power In

Power Status LEDs
LED03 - 5V
LED04 - 5V SBY
LED03 - 12V
LED02 - 3.3V

Post Code LEDs
LED16
LED9
LED10
LED11
LED12
LED13
LED14
LED15

P33 USB10/11

P27   P30
P25   P26

LED

P25, 26, 27 & 30 - Optional 12V System Fan Power Connections
P28 - CPU Fan
P16 - 12V AUX

Jumpers & LEDs

The setup of the configuration jumpers on the motherboard is described below. An asterisk (*) indicates the default value of each jumper.

NOTE: For the three-position jumper, "TOP" is toward the bracket end of the board; "BOTTOM" is toward the Post Code LEDs.

JU8   **Password Clear** (two position jumper)
Install for one power-up cycle to reset the password to the default (null password).
Remove for normal operation. *

JU12   **CMOS Clear** (three position jumper)
Install on the TOP to clear.
Install on the BOTTOM to operate. *

NOTE: To clear the CMOS, power down the system and install the jumper on the TOP. Wait for at least two seconds, move the jumper back to the BOTTOM and turn the power on. When AMIBIOS displays the "CMOS Settings Wrong" message, press F1 to go into the BIOS Setup Utility, where you may reenter your desired BIOS settings, load optimal defaults or load failsafe defaults.

W2,   **CPU Fan Speed Control** (two position jumper)
W4   Install to enable ACPI soft control of the CPU cooling fan
Remove to run CPU fan at full speed*

Note: W2 jumper is connected to CPU1 fan header P28 and W4 is for CPU2 fan header P31

W3,   **System Fan Speed Control** (two position jumper)
W5,   Install to enable ACPI soft control of the system cooling fan
W6,   Remove to run CPU fan at full speed*
W7

Note: The following jumpers provide the speed control capability to the system fan headers listed below; W3 – P30, W5 – P27, W6 – P26 and W7 – P25.

W8   **PSON Soft Control** (two position jumper)
Install to enable ACPI soft control of the PSON signal line*
Remove to disable PSON control

Jumpers & LEDs (continued)

P1, P2, P3 and P4 Ethernet LEDs

The I/O bracket houses the four RJ-45 network connectors for Ethernet LAN1, LAN2, LAN3 and LAN2. Each LAN interface connector has two LEDs that indicate activity status and Ethernet connection speed. Listed below are the possible LED conditions and status indications for each LAN connector:

LED/Connector	Description
Activity LED	This green LED indicates network activity. This is the LED closest to connector P12 on the LAN connector.
Off	No current network transmit or receive activity
On (flashing)	Indicates network transmit or receive activity.
Speed LED	This green/yellow LED identifies the connection speed. This is the LED farthest from connector P12 on the LAN connector.
Off	Indicates a valid link at 1000-Mb/s
On	Indicates a valid link at 100-Mb/s.
RJ-45 Network Connectors	The RJ-45 network connector requires a Connectors category 5 (CAT5) unshielded twisted-pair (UTP) 2-pair cable for a 100-Mb/s network connection or a category 3 (CAT3) or higher UTP 2-pair cable for a 10-Mb/s network connection. A category 5e (CAT5e) or higher UTP 2-pair cable is recommended for a 1000-Mb/s (Gigabit) network connection.

LED1 and LED2 - CPU Power LEDs

LED1 is located just above the P28 CPU Fan1 connector in the lower right corner of the motherboard. LED2 is located near the center of the board and just above and to the left of memory DIMM socket BK02A. These red LEDs are off during normal motherboard operations. If the LEDs are on, this indicates that the processor's VCC voltage levels are below the required levels to maintain proper CPU operations.

LED3 and LED4 - CPU Thermal Throttling LEDs

The CPU throttling LEDs for each CPU are labeled LED3 and LED4, and located to the right on the Intel ICH10 Southbridge. LED3 indicates the thermal shutdown status of CPU2 and likewise LED4 monitors the thermal of CPU1 as illustrated below:

LED Status	Description
Off	Indicates the CPU is operating within acceptable thermal levels.
On (flashing)	Indicates the CPU is throttling down to a lower operating speed due to rising CPU temperature.
On (solid orange)	Indicates the CPU has reached the thermal shutdown threshold limit. The motherboard is still operating, but a thermal shutdown may soon occur.

NOTE: When a thermal shutdown occurs, the LED will stay on in systems using non- ATX/EPS power supplies. The CPU will cease functioning, but power will still be applied to the motherboard. In systems with ATX/EPS power supplies, the LED will turn off when a thermal shutdown occurs because system power is removed via the ACPI soft control power signal S5. In this case, all motherboard LEDs will turn off; however, stand-by power will still be present.

Jumpers & LEDs (continued)

LED5 – CAT

When LED5 is illuminated this indicates that a catastrophic error has occurred in the system and the motherboard's processor(s) cannot continue to operate. The processor(s) will turn this LED on for non-recoverable machine check errors and other internal unrecoverable errors.

LED6 - IOH Thermal Throttling LEDs

The IOH throttling LEDs is located to the right on the Intel ICH10 Southbridge. LED6 indicates the thermal shutdown status of the IOH as illustrated below:

LED Status	Description
Off	Indicates the IOH is operating within acceptable thermal levels.
On (flashing)	Indicates the IOH is throttling down to a lower operating speed due to rising IOH temperature.
On (solid orange)	Indicates the IOH has reached the thermal shutdown threshold limit. The motherboard is still operating, but a thermal shutdown may soon occur.

NOTE: When a thermal shutdown occurs, the LED will stay on in systems using non- ATX/EPS power supplies. The IOH will cease functioning, but power will still be applied to the motherboard. In systems with ATX/EPS power supplies, the LED will turn off when a thermal shutdown occurs because system power is removed via the ACPI soft control power signal S5. In this case, all motherboard LEDs will turn off; however, stand-by power will still be present.

LED7 – PRCHT

This is the "Processor Hot" LED and it will turn on when a processor's temperature monitoring sensor detects that the CPU has reached its maximum safe operating temperature. This indicates that the processor's Thermal Control Circuit has been activated, if enabled.

POST Code LEDs

As the POST (Power On Self Test) routines are performed during boot-up, test codes are displayed on Port 80 POST Code LEDs 16, 9, 10,11,12,13,14 and 15. These LED are located in the lower left corner of the motherboard to the right of the power status LEDs. The POST Code LEDs and are numbered from top (position 1 = LED16) to bottom (position 8 – LED15). Refer to the board layout diagram for the exact location of the POST code LEDs.

These POST codes may be helpful as a diagnostic tool. Specific error codes are listed in Appendix A - BIOS Messages section of the NTM6900 Technical Reference Manual, along with a chart to interpret the LEDs into hexadecimal format.

LED41 – S5 State

This is a green LED that when it is it on indicates that the motherboard has entered the S5 or OFF state. In the S5, state the system is in a complete shutdown mode. The system/motherboard must be rebooted in order to recover from the S5 state.

Jumpers & LEDs (continued)

LED42 – S3 State

When this green LED is on it indicates that the motherboard has entered the S3 SLEEP state. Any processor instructions, cache contents or chipset instructions that were pending when the motherboard entered the S3 state are lost. System memory is retained during the S3 sleep state.

LED47 – S4 State

If this green LED is on it indicates that the motherboard has entered the S4 or HIBERNATE state. This sleep state consumes less power than the S3 state. A small amount of power is used to support writing any pending data to the system's hard drive. System memory contents are not retained in the S4 sleep state.

LED52 – 3.3V Level

LED52 is at the bottom of a group of power status LEDs located in the lower left corner of the motherboard near USB header connector P33. When this green LED is on the 3.3V level is in the proper range for the board.

LED53 – 12V Level

LED53 is just above LED52 and this green LED indicates that the 12V level is in the proper range for the board.

LED54 – 5V Standby

LED54 is just above LED53 and this green LED represents what amounts to a caution indicator. When this LED is on the 5V stand by voltage is present on the motherboard. Option cards and any other motherboard components must not be removed or installed when the LED 54 is illuminated.

CAUTION: Never remove or install option cards or any other system components while LED54 is illuminated.

LED55 – 5V Level

LED55 is just above LED54 and this green LED indicates that the 5V level is in the proper range for the board.

LED58 – Power Good

Located just below the PCIe1 card slot, when this green LED is turned on it indicates that each system power level is at the proper operating level required by the motherboard.

Connectors

NOTE:
A connectors square solder pad located on the bottom side of the PCB indicates pin 1.

P1, P2, P3, P4 - 10/100/1000Base-T Ethernet and Dual USB Combo Connectors - LAN1 + USB0/USB1, LAN2 + USB2/USB3, LAN3 + USB4/USB5, LAN4 + USB6/USB7
RJ-45/Dual USB combo connector,
Pulse #JG0-0006NL
Each individual RJ-45 connector is defined as follows:

PIN	SIGNAL	PIN	SIGNAL
1	MX0+	5	MX2-
2	MX0-	6	MX1-
3	MX1+	7	MX3+
4	MX2+	8	MX3-

Each individual USB connector is defined as follows:

PIN	SIGNAL	PIN	SIGNAL
1	+5V – USB#	3	USB#+
2	USB#-	4	GND – USB#

Notes:
1 – P1 = LAN1 + USB0/USB1, P2 = LAN2 + USB2/USB3,
   P3 = LAN3 + USB4/USB5, P4 = LAN4 + USB6/USB7
2 – LAN ports support standard CAT5 Ethernet cables
3 – USB ports support standard USB cables and devices
4 - # indicates USB port number

P5, P6, P7, P8, P9, P10 - SATA PORT II 300 Ports
7 pin vertical connector, Molex #67491-0031

PIN	SIGNAL	PIN	SIGNAL
1	Gnd	5	RX-
2	TX+	6	RX+
3	TX-	7	Gnd
4	Gnd		

Notes:
1 – P5 = SATA0 interface, P6 = SATA1 interface,
   P7 = SATA2 interface, P8 = SATA3 interface,
   P9 = SATA4 interface, P10 = SATA5 interface,
2 – SATA connectors support standard SATA II interface cables

P14, P24 – RS-232 Serial Port
10 pin vertical connector, Amp #1761602-3

PIN	SIGNAL	PIN	SIGNAL
1	Carrier Detect	6	Clear To Send
2	Data Set Ready	7	Data Terminal Ready
3	Receive Data	8	Ring Indicator
4	Request To Send	9	Signal Gnd
5	Transmit Data	10	NC

P15, P16 – +12V AUX Input Power Connector
8 pin vertical connector, Molex #39-29-3086

PIN	SIGNAL	PIN	SIGNAL
1	Gnd	5	+12V Aux Input
2	Gnd	6	+12V Aux Input
3	Gnd	7	+12V Aux Input
4	Gnd	8	+12V Aux Input

Caution: Both P15 and P16 must be connected to the system power supply to ensure proper board operation.

P17 – ATX/EPS Power Connector
24 pin vertical dual row, Molex #44206-0007

PIN	SIGNAL	PIN	SIGNAL
1	+3.3V	13	+5V
2	+3.3V	14	-12V
3	Gnd	15	Gnd
4	+5V	16	PSON
5	Gnd	17	Gnd
6	+5V	18	Gnd
7	Gnd	19	Gnd
8	PWRGD	20	-5V
9	+5V AUX	21	+5V
10	+12V	22	+5V
11	+12V	23	+5V
12	+3.3V	24	Gnd

Connectors (continued)

P12 –Video and PS/2 Mouse & Keyboard Connector
VGA/Dual PS/2 combo connector,
NORCOMP #999-H15-PS2L571
15-pin Video connector (blue):

PIN	SIGNAL	PIN	SIGNAL
1	Red	9	+5V
2	Green	10	Gnd
3	Blue	11	NC
4	NC	12	EEDI
5	Gnd	13	HSYNC
6	Gnd	14	VSYNC
7	Gnd	15	EECS
8	Gnd		

PS/2 Keyboard connector (purple):

PIN	SIGNAL	PIN	SIGNAL
1	Kbd Data	4	5V AUX
2	NC	5	Kbd CLK
3	Gnd	6	NC

PS/2 Mouse connector (green):

PIN	SIGNAL	PIN	SIGNAL
1	Mouse Data	4	5V AUX
2	NC	5	Mouse CLK
3	Gnd	6	NC

Notes:
1 – Video connector supports standard video cables
2 – PS/2 keyboard connector supports standard PS/2 keyboards
3 – PS/2 mouse connector supports standard PS/2 pointing devices

P25, P26, P27, P28, P30, P31 – System Fan & CPU Fan Power Connectors
4 pin single row header, FOXCONN #HF2704E-M1

PIN	SIGNAL	
1	Speed Control Line	P28 = CPU1 fan connector
2	+12V	P31 = CPU2 fan connector
3	Fan Tach	P25, P26, P27, P28 = optional
4	Fan PWM Sys	System fan connectors

P13 - TPM GPIO Signal Connector
2 pin single row header, Amp #640456-2

PIN	SIGNAL	PIN	SIGNAL
1	Gnd	2	Future Use

P18 – Intruder Alert Connector
2 pin single row header, Amp #640456-2

PIN	SIGNAL	PIN	SIGNAL
1	Gnd	2	Alert Signal

P20– Speaker Header
2 pin single row header, Amp #640456-2

PIN	SIGNAL	PIN	SIGNAL
1	Speaker Out	2	+5V

P23 – IPMI Header
20 pin dual row header, Molex #10-89-7202

PIN	SIGNAL	PIN	SIGNAL
1	+3.3V SBY	2	LPC_LFRAME#
3	+5V	4	LPC_LAD3
5	SYS RST#	6	LPC_LAD2
7	CLK_33_TPM	8	LPC_LAD1
9	LPC_LDRQ1#	10	LPC_LAD0
11	RST_LPC#	12	SERIRQ
13	Gnd	14	Gnd
15	SMBALRT#	16	LAN_ SMBALRT#
17	SMBDATA	18	LAN_ SMBDATA
19	SMBCLK	20	LAN_ SMBCLK

Connectors (continued)

P32 – Front Panel Header Connector

34 pin dual row header, Molex #10-89-7342

PIN	SIGNAL	PIN	SIGNAL
1	+3.3V	2	+5V Stand By
3	NC	4	+5V Stand By
5	Gnd	6	NC
7	+3.3V	8	NC
9	LED HDD Activity	10	NC
11	PWRBTN	12	L1 ACTV#
13	Gnd	14	L1 LINK#
15	System RESET	16	SMB DATA
17	Gnd	18	SMB CLK
19	NC	20	ICH Intruder#
21	NC	22	L2 ACTV#
23	NC	24	L2 LINK#
25	NC	26	NC
27	NC	28	NC
29	NC	30	NC
31	L4 ACTV#	32	L3 ACTV#
33	L4 LINK#	34	L3 LINK#

J1 – Audio Connector

3 position audio, FOXCONN #JA33331-H119-4F

Socket Color	SIGNAL
Light Blue	Line In
Lime	Line Out
Pink	Mic

J1 audio jacks support standard audio cables

Memory

Each processor on the motherboard supports three, dual-channel, DDR3-1333 memory interfaces. There are twelve DIMM sockets on the board and each one can support up to 12GB DIMMs for a total possible DDR3 system memory capacity of 144GB. DDR3 memory capacities of 2GB, 4GB and 8GB are more common in today's market; thereby, making the maximum practical limit of system memory supported 96GB. The memory channel transfer rates is 1333MHz when using PC3-10600 (i.e. DDR3-1333) DIMMs. Each of the channels (BK##A and BK##B) terminates with two dual in-line memory module (DIMM) sockets. The System BIOS automatically detects memory type, size and speed.

The motherboard uses industry standard gold finger memory modules, which must be PC3-10600, PC3-8500 or PC3-6400 compliant and have the following features:
- Gold-plated contacts
- ECC registered (72-bit) DDR3 memory
- 240-pin

The following DIMM sizes are supported:

MT/s	DIMM Type	Rank	Component Density
1333	PC3-10600	Single, Dual, Quad	1GB, 2GB, 4GB, 8GB, 12GB
1066	PC3-8500	Single, Dual, Quad	1GB, 2GB, 4GB, 8GB, 12GB
800	PC3-6400	Single, Dual, Quad	256MB, 512MB, 1GB, 2GB

NOTE 1: To maximize memory interface speed, populate each memory channel with DDR3 DIMMs having the same interface speed. The motherboard will support DIMMs with different speeds, but the memory channel interface will operate speed of the slowest DIMM.

NOTE 2: Low voltage (DDR3L) DIMMs are not supported.

NOTE 3: PC3-10600 DIMMs (DDR3-1333) are supported when one DIMM per channel is populated. If two PC3-10600 DIMMs are installed in the same channel then the BIOS will log an error and operate the memory channel at 1066 MT/s.

NOTE 4: Populating the memory channels with DIMMs having different speeds is supported on the motherboard; however, the overall memory interface speed will run at the speed of the slowest DIMM.

NOTE 5: If populating a memory channel with a Quad-rank and a Single- or Dual-rank DIMM place the Quad-rank DIMM farthest from the processor.

NOTE 6: Populate the memory channels starting with the DIMM socket farthest from the CPU. Work you way toward the processor populating the DIMM sockets labeled with an "A" first followed by the "B" labeled sockets as illustrated in the chart below:

Population order	CPU1	CPU2
1	BK02A	BK12A
2	BK01A	BK11A
3	BK00A	BK10A
4	BK02B	BK12B
5	BK01B	BK11B
6	BK00B	BK10B

If populating a memory channel with a Quad-rank and a Single- or Dual-rank DIMM place the Quad-rank DIMM farthest from the processor.

NTM6900 Product Detail.