Intel Desktop Computer Builds: May 2011

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1. Introduction

A motherboard chipset (chipset, for short) is a defined set of capabilities upon which a motherboard is built. Specifically, a chipset defines: 1.) the processor, memory, expansion cards, data storage devices, and peripheral devices that are compatible with a motherboard; and 2.) the additional devices (e.g., audio and ethernet) and technologies (e.g., RAID and power management) that are integrated into a motherboard. In other words, a chipset defines a motherboard's capabilities, which, in turn, defines a computer's capabilities. Therefore, when building a computer, the chipset is the most important computer component to choose wisely.

There are two types of desktop chipsets: 1.) AMD desktop chipsets, which support AMD desktop processors; and 2.) Intel desktop chipsets, which support Intel desktop processors. The current Intel desktop chipset manufacturer is Intel, which has a virtual monopoly on the Intel desktop chipset market. Past Intel desktop chipset manufacturers included ATI, NVIDIA, SiS, and VIA.

A motherboard is an implementation of a chipset. Motherboard manufacturers currently incorporating Intel desktop chipsets into their motherboards include ASRock, ASUS, BIOSTAR, ECS, EVGA, Foxconn, GIGABYTE, Intel, and MSI.

Based on chipset/processor, desktop computers are divided into two types (a.k.a., platforms): 1.) AMD desktop computers, which have an AMD desktop chipset/processor; and 2.) Intel desktop computers, which have an Intel desktop chipset/processor. Therefore, when building a desktop computer you must decide to build either an AMD desktop computer or an Intel desktop computer. This page describes Intel desktop computer builds based on user need.

1.1. Component Overlay

Component considerations that serve as an overlay for each build and this page as a whole.

i For information on desktop computer components, see Builder's Guide To Desktop Computer Components (stevestechresource.com).

- Motherboard:
  - Latest Intel desktop chipset required:
    - Intel 5 Series Chipset family: Intel Q57 Express Chipset (socket LGA1156), Intel H55 Express Chipset (socket LGA1156), Intel H57 Express Chipset (socket LGA1156), Intel P55 Express Chipset (socket LGA1156), and Intel X58 Express Chipset (socket LGA1366).
    - Intel 6 Series Chipset family: Intel B65 Express Chipset (socket LGA1155), Intel Q65 Express Chipset (socket LGA1155), Intel Q67 Express Chipset (socket LGA1155), Intel H61 Express Chipset (socket LGA1155), Intel H67 Express Chipset (socket LGA1155), Intel P67 Express Chipset (socket LGA1155), and Intel Z68 Express Chipset (socket LGA1155).

! On January 31, 2011 Intel announced that an issue had been identified with the Intel Series 6 Chipset, that shipment of the affected chipset had been stopped, and that newly manufactured, corrected versions of the chipset will start shipping in late February. For additional information, see Chipset Circuit Design Issue Identified: Update February 7, 2011 (intel.com).

The newly manufactured, corrected versions of the Intel Series 6 Chipset also include B3 stepping. To distinguish motherboards with the corrected chipset from those with the affected chipset, motherboard manufacturers are adding "B3" and/or "REV 3.0" to the naming and packaging of motherboards with the

corrected chipset. For additional information, see ASRock Brand New P67/H67 B3 Stepping Chipset Motherboard Is Ready To Go (asrock.com), Quickly And Easily Identify ASUS New B3 Revision Motherboards (event.asus.com), GIGABYTE Ships All New B3 6 Series Motherboards (gigabyte.com), and Chipset Stepping (B2/B3) Identification Of MSI's 6 Series Mainboards (event.msi.com).

- Intel 6 Series Chipset not required for Intel Desktop Computer 1 eMachine. Intel 6 Series Chipset required for Intel Desktop Computer 2 Mainstream, 3 Performance/Gaming One Add-In GPU, 4 Gaming Two Add-In GPUs, and 5 Gaming Three/Four Add-In GPUs.
- microATX form factor required for Intel Desktop Computer 1 eMachine and 2 Mainstream. microATX or ATX form factor required for Intel Desktop Computer 3 Performance/Gaming One Add-In GPU. ATX form factor required for Intel Desktop 4 Gaming Two Add-In GPUs and 5 Gaming Three/Four Add-In GPUs.
- SATA 6.0Gb/s not required for Intel Desktop Computer 1 eMachine. SATA 6.0Gb/s required for Intel Desktop Computer 2 Mainstream, 3 Performance/Gaming One Add-In GPU, 4 Gaming Two Add-In GPUs, and 5 Gaming Three/Four Add-In GPUs.
- USB 3.0 not required for Intel Desktop Computer 1 eMachine. USB 3.0 required for Intel Desktop Computer 2 Mainstream, 3 Performance/Gaming One Add-In GPU, 4 Gaming Two Add-In GPUs, and 5 Gaming Three/Four Add-In GPUs.
- Front USB and audio required. Front USB provided by connection between motherboard (internal) USB header and case I/O panel. Front audio provided by connection between motherboard (internal) audio header and case I/O panel. Front USB does not need to be USB 3.0.
- Manufacturers considered: ASRock, ASUS, GIGABYTE, Intel, and MSI.

- Processor:
  - Latest Intel desktop processor required:
    - Intel Pentium Processor G6950 (socket LGA1156).
    - Intel Core i3 Processor (socket LGA1156).
    - Intel Core i5 Processor (socket LGA1156).
    - Intel Core i7 Processor (socket LGA1156 or LGA1366).
    - Intel Core i7 Processor Extreme Edition (socket LGA1366).
    - 2nd Generation Intel Core i3 Processor (socket LGA1155).
    - 2nd Generation Intel Core i5 Processor (socket LGA1155).
    - 2nd Generation Intel Core i7 Processor (socket LGA1155).
  - 2nd Generation Intel Core Processor not required for Intel Desktop Computer 1 eMachine. 2nd Generation Intel Core Processor required for Intel Desktop Computer 2 Mainstream, 3 Performance/Gaming One Add-In GPU, 4 Gaming Two Add-In GPUs, and 5 Gaming Three/Four Add-In GPUs.
  - No overclocking. Therefore, no fancy processor cooling system required. Get boxed processor and use factory heat sink/fan.
- Memory:
  - No overclocking. Therefore, no fancy memory cooling system required. Get value memory that passed motherboard testing.
  - Manufacturers considered: Kingston.
- Graphics:
  - Intel HD Graphics, Intel HD Graphics 2000, and Intel HD Graphics 3000, collectively known as Intel HD Graphics (intel.com), are the latest Intel integrated GPU solutions. Intel HD Graphics is built into the latest Intel processors, not the motherboard chipset. Intel desktop processors code named Clarkdale (Intel HD Graphics) and Sandy Bridge (Intel HD Graphics 2000/3000) include Intel HD Graphics. Intel desktop processors code named Lynnfield, Bloomfield, and Gulftown do not include Intel HD Graphics. Motherboard support for Intel HD Graphics is simply providing video out connectors and an interface to the processor's integrated GPU. The Intel Q57, H55, H57, B65, Q65, Q67, H61, H67, and Z68 Express Chipsets support Intel HD Graphics. The Intel P55, X58, and P67 Express Chipsets do not support Intel HD Graphics.
  - Intel HD Graphics required for Intel Desktop Computer 1 eMachine and 2 Mainstream. PCIe Gen2 add-in GPU required for Intel Desktop Computer 3 Performance/Gaming One Add-In GPU, 4 Gaming Two Add-In GPUs, and 5 Gaming Three/Four Add-In GPUs.
  - Add-in GPU chipset manufacturers considered: AMD.
  - AMD add-in GPU manufacturers considered: Sapphire.
- Hard Drive:
  - SATA 6.0Gb/s not required for Intel Desktop Computer 1 eMachine. SATA 6.0Gb/s required for Intel Desktop Computer 2 Mainstream, 3 Performance/Gaming One Add-In GPU, 4 Gaming Two Add-In GPUs, and 5 Gaming Three/Four Add-In GPUs.
  - Manufacturers considered: Western Digital.
- CD/DVD Burner:
  - Not interested in Blu-ray support.
  - Issues with Pioneer DRV-112D and Plextor PX-740A have me interested in trying a CD/DVD burner manufacturer other than Pioneer or Plextor.

- USB:
  - USB 3.0 not required for Intel Desktop Computer 1 eMachine. USB 3.0 required for Intel Desktop Computer 2 Mainstream, 3 Performance/Gaming One Add-In GPU, 4 Gaming Two Add-In GPUs, and 5 Gaming Three/Four Add-In GPUs.
  - Front USB required. Front USB provided by connection between motherboard (internal) USB header and case I/O panel. Front USB does not need to be USB 3.0.
- Firewire (a.k.a., IEEE 1394) and eSATA:
  - Not required.
- Audio:
  - Integrated audio is sufficient.
  - Front audio required. Front audio provided by connection between motherboard (internal) audio header and case I/O panel.
- Case:
  - No neon colors, lights, see through side panels, and crazy designs for Intel Desktop Computer 1 eMachine and 2 Mainstream. Minimal neon colors, lights, see through side panels, and crazy designs for Intel Desktop Computer 3 Performance/Gaming One Add-In GPU, 4 Gaming Two Add-In GPUs, and 5 Gaming Three/Four Add-In GPUs.
  - One case mounted fan required. No overclocking. Therefore, no fancy case cooling system required and one case mounted fan is sufficient.
  - Mini tower required for Intel Desktop Computer 1 eMachine and 2 Mainstream. Mid tower or larger required for Intel Desktop Computer 3 Performance/Gaming One Add-In GPU, 4 Gaming Two Add-In GPUs, and 5 Gaming Three/Four Add-In GPUs.
  - Front USB and audio required. Front USB provided by connection between motherboard (internal) USB header and case I/O panel. Front audio provided by connection between motherboard (internal) audio header and case I/O panel.
  - Manufacturers considered: Antec, Cooler Master, Corsair, Lian Li, SilverStone, Thermaltake, XIGMATEK, and Zalman.
- Power Supply:
  - ATX12V v2.2 compliant or above required.
  - Must provide all required connectors. No mismatched connectors. No adapters.
  - CrossFireX/SLI certified required for Intel Desktop Computer 4 Gaming Two Add-In GPUs and 5 Gaming Three/Four Add-In GPUs.
  - Manufacturers considered: Antec, Cooler Master, and Thermaltake.
- Legacy Devices:
  - VGA, IDE, FDD, PCI, serial (COM) port/internal header, parallel port/internal header, PS2 keyboard, and PS2 mouse support not required.

1.2. Build Changes From Intel Desktop Builds: April 2011 (stevestechresource.com)

- Intel Desktop Computer 2 Mainstream (Model: IDC2-MAI):
  - Motherboard: MSI H67MA-E35 (B3) (msi.com) $100 to $110.
  - Build Retail Price: $475 to $485.
- Intel Desktop Computer 3 Performance/Gaming Low renamed Intel Desktop Computer 3 Performance/Gaming One Add-In GPU (Model: IDC3-GA1):
  - Motherboard: Intel Q67 Express Chipset Intel DQ67SWB3 (intel.com) $140 to Intel Z68 Express Chipset ASRock Z68 Pro3-M (asrock.com) $135.
  - Build Retail Price: $915 to $910.
- Intel Desktop Computer 4 Gaming Mid renamed Intel Desktop Computer 4 Gaming Two Add-In GPUs (Model: IDC4-GA2):
  - Motherboard: Intel P67 Express Chipset GIGABYTE GA-P67X-UD3-B3 (rev. 1.0) (gigabyte.com) $160 to Intel Z68 Express Chipset GIGABYTE GA-Z68X-UD3H-B3 (rev. 1.0) (gigabyte.com) $180.
  - Processor: 2nd Generation Intel Core i7 Processor Intel Core i7-2600 Processor (ark.intel.com) $300 to 2nd Generation Intel Core i5 Processor Intel Core i5-2400 Processor (ark.intel.com) $200.
  - Case: Extended size mid tower Antec P193 V3 (antec.com) $200 to large size mid tower Lian Li PC-9F (lian-li.com) $140.
  - Build Retail Price: $1390 to $1250.
- Intel Desktop Computer 5 Gaming High renamed Intel Desktop Computer 5 Gaming Three/Four Add-In GPUs (Model: IDC5-GA3):
  - Motherboard: Socket LGA1366 supporting at least triple PCIe Gen2 add-in GPUs in 3-way CrossFireX and/or 3-way SLI at x16/x8/x8 mode ASUS Rampage III Formula (asus.com) $305 to socket LGA1155 supporting at least triple PCIe Gen2 add-in GPUs in 3-way CrossFireX and/or 3-way SLI at x16/x8/x8 mode ASUS P8P67 WS Revolution REV 3.0 (asus.com) $280.
  - Processor: Socket LGA1366 Intel Core i7-960 Processor (ark.intel.com) $300 to socket LGA1155 Intel Core i7-2600 Processor (ark.intel.com) $300.
  - Memory: 12GB triple channel kit 3 x 4GB Kingston KVR1066D3N7K3/12G (shop.kingston.com) $160 to 8GB dual channel kit 2 x 4GB Kingston KVR1333D3N9K2/8G (shop.kingston.com) $105.

- Graphics: Sapphire Radeon HD 6950 (Model: 100312SR) 3 x $300 to 3 x $290.
- Case: Antec P193 V3 (antec.com) $200 to Corsair Graphite Series 600T (corsair.com) $170.
- Build Retail Price: $2260 to $2120.

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2. Intel Desktop Computer 1 eMachine (Model: IDC1-EMA)

Intended For:

- Casual/budget user wanting a modern computer with the minimum required for a satisfactory Internet, Microsoft Office, and multimedia viewing experience.

Primary Parameters:

- Lowest or near lowest cost combination of Intel 5 Series or 6 Series Chipset, Intel socket LGA1156 or LGA1155 processor, and graphics:
  - Motherboard: Intel H55 Express Chipset (socket LGA1156), Intel B65 Express Chipset (socket LGA1155), Intel Q65 Express Chipset (socket LGA1155), or Intel H61 Express Chipset (socket LGA1155).
  - Processor: Intel Pentium Processor G6950 (socket LGA1156), Intel Core i3 Processor (socket LGA1156), or 2nd Generation Intel Core i3 Processor (socket LGA1155).
  - Graphics: Intel HD Graphics.
- Memory: 2GB.

Intel Desktop Computer 1 eMachine (Model: IDC1-EMA)			
Comp	**Spec**	**Note**	**Retail**
Mother-board	GIGABYTE GA-H55M-S2V (rev. 1.4) (gigabyte.com): • Intel H55 Express Chipset / LGA1156 / microATX (244mm x 210). • 1 x 24 pin motherboard main / 1 x 4 pin ATX 12V CPU. • Dual channel memory / 2 DIMMs / 16GB max / DDR3-1333/1066/800 SDRAM / 1.5V / Non-ECC. • Supports Intel HD Graphics. 1 x DVI-D / 1 x VGA. • 1 x PCIe Gen2 x16 (x16 mode) / 1 x PCIe x1 / 2 x PCI. Supports single PCIe Gen2 add-in GPU (single or double slot) at x16 mode. No CrossFireX/SLI support. • 6 x internal SATA 3.0Gb/s. • 12 x USB 2.0 (8 x back + 4 x via internal headers). Internal audio header. • 1 x gigabit (10/100/1000Mb/s) ethernet.	• SATA 3.0Gb/s. USB 2.0.	$85
Processor	Intel Pentium Processor G6950 (ark.intel.com): • 3MB cache / 2.8GHz / 2.5GT/s / LGA1156 / 32nm / Max TDP 73W / Clarkdale. • Dual core no Intel Hyper-Threading Technology (2C/2T). • Dual channel memory / 16GB max / DDR3-1066 SDRAM / 17.1GB/s max memory bandwidth. • Intel 64 / Intel VT-x / No Intel Turbo Boost / Intel HD Graphics.		$100
Memory	Kingston KVR1066D3N7K2/2G (shop.kingston.com): • 2GB DDR3-1066 SDRAM / CL7 / 1.5V / Non-ECC / Kit 2 x 1GB.	• 1066MT/s x 8B/T x 2 channels = 17.1GB/s, which equals the Pentium Processor G6950 max memory bandwidth.	$30
Graphics	Intel HD Graphics (intel.com): • 1 x DVI-D / 1 x VGA.		$0
Hard Drive	Western Digital WD5000AAKS (wdc.com): • Caviar Blue / 500GB / SATA 3.0Gb/s / 16MB cache / 7200rpm.	• SATA 3.0Gb/s.	$50
CD/DVD Burner	ASUS DRW-24B1ST: • SATA. 2MB cache. • 24X DVD+R/8X DVD+RW/12X DVD+R DL/24X DVD-R/6X DVD-RW/12X DVD-RAM/16X DVD-ROM/48X CD-R/32X CD-RW/48X CD-ROM.	• 4x Newegg Customer Choice Award Winner - CD/DVD Burners.	$30
Case/ Power	Cooler Master Elite 342 case with Cooler Master Elite Power 400W power supply (coolermaster-usa.com):	• Mini tower.	$70

Supply	• 352mm x 180 x 440 (H x W x L). 4kg. • Supports microATX, not ATX motherboards. • 2 x external 5.25" / 1 x external 3.5" / 5 x internal 3.5". Removable hard drive tray. • 4 x expansion. • I/O panel: Front mid / 2 x USB 2.0 / Audio. • Fans included: 1 x front 120mm 1200rpm. • Cooler Master Elite Power 400W power supply. 2 year warranty. • 400W / ATX 12V v2.31. • 1 x 20+4 pin motherboard main / 1 x 4+4 pin ATX/EPS 12V CPU / 1 x 6 pin PCIe / 4 x SATA / 3 x 4 pin peripheral / 1 x floppy.		
Intel Desktop Computer 1 eMachine (Model: IDC1-EMA)			$365

3. Intel Desktop Computer 2 Mainstream (Model: IDC2-MAI)

Intended For:

- Typical home/office user.
- User who occasionally executes multiple system resource intensive applications simultaneously.

Primary Parameters:

- Inexpensive combination of Intel 6 Series Chipset, 2nd Generation Intel Core Processor, and graphics:
  - Motherboard: Intel Q67 Express Chipset (socket LGA1155) or Intel H67 Express Chipset (socket LGA1155).
  - Processor: 2nd Generation Intel Core i3 Processor (socket LGA1155).
  - Graphics: Intel HD Graphics 2000/3000.
- Memory: 4GB.
- Storage: SATA 6.0Gb/s and USB 3.0.

Intel Desktop Computer 2 Mainstream (Model: IDC2-MAI)			
Comp	**Spec**	**Note**	**Retail**
Mother-board	MSI H67MA-E35 (B3) (msi.com): • Intel H67 Express Chipset / LGA1155 / microATX (245mm x 215). • 1 x 24 pin motherboard main / 1 x 4 pin ATX 12V CPU. • Dual channel memory / 2 DIMMs / 16GB max / DDR3-1333/1066 SDRAM / 1.5V / Non-ECC. • Supports Intel HD Graphics 2000/3000. 1 x HDMI / 1 x DVI-D / 1 x VGA. • 1 x PCIe Gen2 x16 (x16 mode) / 2 x PCIe Gen2 x1 / 1 x PCI. Supports single PCIe Gen2 add-in GPU (single or double slot) at x16 mode. No CrossFireX/SLI support. • 2 x internal SATA 6.0Gb/s / 4 x internal SATA 3.0Gb/s. RAID. • 2 x USB 3.0 (2 x back) / 10 x USB 2.0 (4 x back + 6 x via internal headers). Internal audio header. • 1 x gigabit (10/100/1000Mb/s) ethernet.	• Alternate: ASUS P8H67-M LE REV 3.0 (asus.com) $110.	$110
Processor	Intel Core i3-2100 Processor (ark.intel.com): • 3MB cache / 3.10GHz / 5.0GT/s / LGA1155 / 32nm / Max TDP 65W / Sandy Bridge. • Dual core with Intel Hyper-Threading Technology (2C/4T). • Dual channel memory / 32GB max / DDR3-1333/1066 SDRAM / 21.3GB/s max memory bandwidth. • Intel 64 / Intel VT-x / No Intel Turbo Boost / Intel HD Graphics 2000.		$140
Memory	Kingston KVR1333D3N9K2/4G (shop.kingston.com): • 4GB DDR3-1333 SDRAM / CL9 / 1.5V / Non-ECC / Kit 2 x 2GB.	• 1333MT/s x 8B/T x 2 channels = 21.3GB/s, which equals the Intel Core i3-2100 Processor max memory bandwidth.	$55

Graphics	Intel HD Graphics 2000 (intel.com): • 1 x HDMI / 1 x DVI-D / 1 x VGA.		$0
Hard Drive	Western Digital WD10EALX (wdc.com): • Caviar Blue / 1.0TB / SATA 6.0Gb/s / 32MB cache / 7200rpm.		$80
CD/DVD Burner	ASUS DRW-24B1ST: • SATA. 2MB cache. • 24X DVD+R/8X DVD+RW/12X DVD+R DL/24X DVD-R/6X DVD-RW/12X DVD-RAM/16X DVD-ROM/48X CD-R/32X CD-RW/48X CD-ROM.	• 4x Newegg Customer Choice Award Winner - CD/DVD Burners.	$30
Case/ Power Supply	Cooler Master Elite 342 case with Cooler Master Elite Power 400W power supply (coolermaster-usa.com): • 352mm x 180 x 440 (H x W x L). 4kg. • Supports microATX, not ATX motherboards. • 2 x external 5.25" / 1 x external 3.5" / 5 x internal 3.5". Removable hard drive tray. • 4 x expansion. • I/O panel: Front mid / 2 x USB 2.0 / Audio. • Fans included: 1 x front 120mm 1200rpm. • Cooler Master Elite Power 400W power supply. 2 year warranty. • 400W / ATX 12V v2.31. • 1 x 20+4 pin motherboard main / 1 x 4+4 pin ATX/EPS 12V CPU / 1 x 6 pin PCIe / 4 x SATA / 3 x 4 pin peripheral / 1 x floppy.	• Mini tower.	$70
Intel Desktop Computer 2 Mainstream (Model: IDC2-MAI)			$485

4. Intel Desktop Computer 3 Performance/Gaming One Add-In GPU (Model: IDC3-GA1)

Intended For:

- Power user.
- User who frequently executes multiple system resource intensive applications simultaneously.
- Entry level gaming (i.e., one add-in GPU).

Primary Parameters:

- Upper mid level combination of Intel 6 Series Chipset, 2nd Generation Intel Core Processor, and graphics:
  - Motherboard: Intel Q67 Express Chipset (socket LGA1155), Intel H67 Express Chipset (socket LGA1155), Intel P67 Express Chipset (socket LGA1155), or Intel Z68 Express Chipset (socket LGA1155).
  - Processor: 2nd Generation Intel Core i5 Processor (socket LGA1155).
  - Graphics: For entry level gamer, 1 x best PCIe Gen2 add-in GPU ~$175. If not a gamer, 1 x best PCIe Gen2 add-in GPU ~$125.
- Memory: 8GB.
- Storage: SATA 6.0Gb/s and USB 3.0.

Intel Desktop Computer 3 Performance/Gaming One Add-In GPU (Model: IDC3-GA1)			
Comp	**Spec**	**Note**	**Retail**
Mother-board	ASRock Z68 Pro3-M (asrock.com): • Intel Z68 Express Chipset / LGA1155 / microATX (244mm x 244). • 1 x 24 pin motherboard main / 1 x 8 pin EPS 12V CPU. • Dual channel memory / 4 DIMMs / 32GB max / DDR3-1600/1333/1066 SDRAM / 1.5V / Non-ECC. • Supports Intel HD Graphics 2000/3000. 1 x DisplayPort / 1 x HDMI / 1 x DVI-D / 1 x VGA. • 1 x PCIe Gen2 x16 (x16 mode) / 2 x PCIe Gen2 x1 / 1 x PCI. Supports single PCIe Gen2 add-in GPU (single or double slot) at x16 mode. No CrossFireX/SLI support. • 2 x internal SATA 6.0Gb/s / 3 x internal SATA 3.0Gb/s / 1 x back eSATA 3.0Gb/s. RAID. • 2 x USB 3.0 (2 x back) / 10 x USB 2.0 (4 x back + 6 x via internal headers). Internal audio header.	• Awaiting release of additional Z68 chipset motherboards.	$135

	• 1 x gigabit (10/100/1000Mb/s) ethernet.		
Processor	Intel Core i5-2400 Processor (ark.intel.com): • 6MB cache / 3.10GHz / 5.0GT/s / LGA1155 / 32nm / Max TDP 95W / Sandy Bridge. • Quad core no Intel Hyper-Threading Technology (4C/4T). • Dual channel memory / 32GB max / DDR3-1333/1066 SDRAM / 21.3GB/s max memory bandwidth. • Intel 64 / Intel VT-x / Intel Turbo Boost 2.0 / Intel HD Graphics 2000.	• Alternate: For 8MB cache, 3.40GHz, and 4C/8T, Intel Core i7-2600 Processor (ark.intel.com) $300.	$200
Memory	Kingston KVR1333D3N9K2/8G (shop.kingston.com): • 8GB DDR3-1333 SDRAM / CL9 / 1.5V / Non-ECC / Kit 2 x 4GB.	• 1333MT/s x 8B/T x 2 channels = 21.3GB/s, which equals the Intel Core i5-2400 Processor max memory bandwidth.	$105
Graphics	1 x Sapphire Radeon HD 6850 (Model: 100315L): • PCIe Gen2 x16. • 1GB DDR5 / 256-bit / 775MHz core / 4000MHz effective memory. • 1 x DisplayPort / 1 x HDMI / 1 x dual link DVI / 1 x single link DVI-D. • DX11 / SM5.0 / AMD Eyefinity. • Supports 2-way CrossFireX. Model 100315L accessories include CrossFireX bridge interconnect cable. • Length 217mm. Double slot. • Max TDP 127W. 1 x 6 pin PCIe power connector required. 500W power supply required.	• Tom's Hardware Best Graphics Cards For the Money: April 2011 (tomshardware.com). • Alternate: To cut cost or if not a gamer, Sapphire Radeon HD 5770 (Model: 100283-3L): $130.	$185
Hard Drive	Western Digital WD1002FAEX (wdc.com): • Caviar Black / 1.0TB / SATA 6.0Gb/s / 64MB cache / 7200rpm.	• Difficult to justify ~$0.50/GB for 10,000rpm SATA 6.0Gb/s Western Digital VelociRaptor or ~$2/GB for SATA 3.0Gb/s or 6.0Gb/s SSD.	$95
CD/DVD Burner	ASUS DRW-24B1ST: • SATA. 2MB cache. • 24X DVD+R/8X DVD+RW/12X DVD+R DL/24X DVD-R/6X DVD-RW/12X DVD-RAM/16X DVD-ROM/48X CD-R/32X CD-RW/48X CD-ROM.	• 4x Newegg Customer Choice Award Winner - CD/DVD Burners.	$30
Case	Antec Two Hundred (antec.com): • 450mm x 200 x 470 (H x W x L). 6.3kg. • Supports microATX and ATX motherboards. • 3 x external 5.25" / 1 x external 3.5" / 6 x internal 3.5". No removable hard drive tray. • 7 x expansion. • I/O panel: Front top / 2 x USB 2.0 / Audio. • Fans included: 1 x top 140mm TwoCool / 1 x back 120mm TwoCool. • Max add-in card length 292mm.	• Medium size mid tower. • Internal 3.5" bays are oriented parallel to length of case. Therefore, installation of 1 x Sapphire Radeon HD 6850 (Model: 100315L) obstructs top internal 3.5" bay, not bottom five internal 3.5" bays. • Alternate: For 1 x external 2.5" instead of 1 x external 3.5", Antec Two Hundred V2 (antec.com) $75. For no obstruction and nicer case, Lian Li PC-9F (lian-li.com) $140.	$70
Power Supply	Antec High Current Gamer HCG-520 (antec.com): • 520W / ATX 12V v2.3 / EPS 12V v2.91. • 80 PLUS Bronze Certified / Active PFC / 3 year warranty. • 1 x 20+4 pin motherboard main / 1 x 4+4 pin ATX/EPS 12V CPU / 2 x 6+2 pin PCIe / 1 x 6 pin PCIe / 6 x SATA / 6 x 4 pin peripheral / 1 x floppy. • 150mm x 86 x 160 (W x H x L). 2.0kg.		$90
Intel Desktop Computer 3 Performance/Gaming One Add-In GPU (Model: IDC3-GA1)			$910

5. Intel Desktop Computer 4 Gaming Two Add-In GPUs (Model: IDC4-GA2)

Intended For:

- Mid level gaming (i.e., two add-in GPUs).

> *i* The Intel Desktop Computer 4 Gaming Two Add-In GPUs is designed to support dual add-in GPUs in 2-way CrossFireX/SLI, and, therefore, many of its components are exorbitant if dual add-in GPUs are not installed. In other words, if you are interested in building a high performance Intel desktop computer with a single add-in GPU, the Intel Desktop Computer 3 Performance/Gaming One Add-In GPU (above) is more appropriate and likely more than sufficient.

Primary Parameters:

- Intel 6 Series Chipset supporting dual PCIe Gen2 add-in GPUs in 2-way CrossFireX and/or 2-way SLI at x8/x8 mode, mid level 2nd Generation Intel Core Processor, and 2 x upper mid level PCIe Gen2 add-in GPUs:
  - Motherboard: Intel P67 Express Chipset (socket LGA1155) or Intel Z68 Express Chipset (socket LGA1155).

    > *i* Not all P67 and Z68 chipset motherboards support 2-way CrossFireX/SLI at x8/x8 mode.

  - Processor: 2nd Generation Intel Core i5 Processor (socket LGA1155).
  - Graphics: 2 x best PCIe Gen2 add-in GPUs ~$175 each.
- Memory: 8GB.
- Storage: SATA 6.0Gb/s and USB 3.0.

Intel Desktop Computer 4 Gaming Two Add-In GPUs (Model: IDC4-GA2)			
Comp	**Spec**	**Note**	**Retail**
Mother-board	GIGABYTE GA-Z68X-UD3H-B3 (rev. 1.0) (gigabyte.com): • Intel Z68 Express Chipset / LGA1155 / ATX (305mm x 244). • 1 x 24 pin motherboard main / 1 x 8 pin EPS 12V CPU. • Dual channel memory / 4 DIMMs / 32GB max / DDR3-1600/1333/1066 SDRAM / 1.5V / Non-ECC. • Supports Intel HD Graphics 2000/3000. 1 x DisplayPort / 1 x HDMI / 1 x DVI-D / 1 x VGA. • 1 x PCIe Gen2 x16 (x16 mode) / 1 x PCIe Gen2 x16 (x8 mode) / 3 x PCIe Gen2 x1 / 2 x PCI. Supports single PCIe Gen2 add-in GPU (single or double slot) at x16 mode. Supports dual PCIe Gen2 add-in GPUs (single or double slot) in 2-way CrossFireX and 2-way SLI at x8/x8 mode. • 4 x internal SATA 6.0Gb/s / 3 x internal SATA 3.0Gb/s / 1 x back eSATA 3.0Gb/s. RAID. • 4 x USB 3.0 (2 x back + 2 x via internal header) / 12 x USB 2.0 (4 x back + 8 x via internal headers). Internal audio header. • 1 x gigabit (10/100/1000Mb/s) ethernet.	• Installing double slot card in second x16 slot does not require 8 expansion slot case. • Awaiting release of additional Z68 chipset motherboards.	$180
Processor	Intel Core i5-2400 Processor (ark.intel.com): • 6MB cache / 3.10GHz / 5.0GT/s / LGA1155 / 32nm / Max TDP 95W / Sandy Bridge. • Quad core no Intel Hyper-Threading Technology (4C/4T). • Dual channel memory / 32GB max / DDR3-1333/1066 SDRAM / 21.3GB/s max memory bandwidth. • Intel 64 / Intel VT-x / Intel Turbo Boost 2.0 / Intel HD Graphics 2000.	• Alternate: For 8MB cache, 3.40GHz, and 4C/8T, Intel Core i7-2600 Processor (ark.intel.com) $300.	$200
Memory	Kingston KVR1333D3N9K2/8G (shop.kingston.com): • 8GB DDR3-1333 SDRAM / CL9 / 1.5V / Non-ECC / Kit 2 x 4GB.	• 1333MT/s x 8B/T x 2 channels = 21.3GB/s, which equals the Intel Core i5-2400 Processor max memory bandwidth.	$105
Graphics	2 x Sapphire Radeon HD 6850 (Model: 100315L): • PCIe Gen2 x16. • 1GB DDR5 / 256-bit / 775MHz core / 4000MHz effective memory. • 1 x DisplayPort / 1 x HDMI / 1 x dual link DVI / 1 x single link DVI-D. • DX11 / SM5.0 / AMD Eyefinity. • Supports 2-way CrossFireX. Model 100315L accessories include CrossFireX bridge interconnect cable.	• Tom's Hardware Best Graphics Cards For the Money: April 2011 (tomshardware.com). • Alternate: To cut cost, 2 x Sapphire Radeon HD 5770 (Model: 100283-3L): 2 x $130.	2 x $185

	• Length 217mm. Double slot. • Max TDP 127W each. 1 x 6 pin PCIe power connector required each.		
Hard Drive	Western Digital WD1002FAEX (wdc.com): • Caviar Black / 1.0TB / SATA 6.0Gb/s / 64MB cache / 7200rpm.	• Difficult to justify ~$0.50/GB for 10,000rpm SATA 6.0Gb/s Western Digital VelociRaptor or ~$2/GB for SATA 3.0Gb/s or 6.0Gb/s SSD.	$95
CD/DVD Burner	ASUS DRW-24B1ST: • SATA. 2MB cache. • 24X DVD+R/8X DVD+RW/12X DVD+R DL/24X DVD-R/6X DVD-RW/12X DVD-RAM/16X DVD-ROM/48X CD-R/32X CD-RW/48X CD-ROM.	• 4x Newegg Customer Choice Award Winner - CD/DVD Burners.	$30
Case	Lian Li PC-9F (lian-li.com): • 473mm x 210 x 498 (H x W x L). 6kg. • Supports microATX and ATX motherboards. • 3 x external 5.25" (one with 5.25" to 3.5" adapter) / 6 x internal 3.5". Removable hard drive tray. • 8 x expansion. • I/O panel: Top front / 2 x USB 3.0 / 1 x eSATA / Audio. • Fans included: 2 x front 120mm / 1 x back 120mm. • Max add-in card length 285mm.	• Large size mid tower. • Internal 3.5" bays are oriented perpendicular to length of case. Therefore, installation of 2 x Sapphire Radeon HD 6850 (Model: 100315L) does not obstruct access to internal 3.5" bays. • Available in black (PC-9FB) or silver (PC-9FA).	$140
Power Supply	Thermaltake Toughpower XT 675W (TPX-675M) (thermaltakeusa.com): • 675W / ATX 12V v2.3 / EPS 12V v2.91. • 80 PLUS Bronze Certified / CrossFireX Certified / SLI Certified / Active PFC / 5 year warranty. • 1 x 24 pin motherboard main / 1 x 4+4 pin ATX/EPS 12V CPU / 1 x 8 pin EPS 12V CPU / 2 x 6+2 pin PCIe / 2 x 6 pin PCIe / 8 x SATA / 6 x 4 pin peripheral / 1 x floppy. Modular cable management. • 150mm x 86 x 160 (W x H x L).		$130
Intel Desktop Computer 4 Gaming Two Add-In GPUs (Model: IDC4-GA2)			$1250

6. Intel Desktop Computer 5 Gaming Three/Four Add-In GPUs (Model: IDC5-GA3)

Intended For:

- Extreme gaming (i.e., at least three add-in GPUs).

> *i* The Intel Desktop Computer 5 Gaming Three/Four Add-In GPUs is designed to support at least triple add-in GPUs in 3-way CrossFireX/SLI, and, therefore, many of its components are exorbitant if at least triple add-in GPUs are not installed. In other words, if you are interested in building a high performance Intel desktop computer with a single add-in GPU, the Intel Desktop Computer 3 Performance/Gaming One Add-In One GPU (above) is more appropriate and likely more than sufficient.

Primary Parameters:

- Intel 6 Series Chipset supporting at least triple PCIe Gen2 add-in GPUs in 3-way CrossFireX and/or 3-way SLI at x16/x8/x8 mode, high end 2nd Generation Intel Core Processor, and at least 3 x high end PCIe Gen2 add-in GPUs:
  - Motherboard: Intel P67 Express Chipset (socket LGA1155) plus NVIDIA NF200 or Lucid LT22102 chip or Intel Z68 Express Chipset (socket LGA1155) plus NVIDIA NF200 or Lucid LT22102 chip.
  - Processor: 2nd Generation Intel Core i7 Processor (socket LGA1155).
  - Graphics: 3 x best PCIe Gen2 add-in GPUs ~$300 each.
- Memory: 8GB.
- Storage: SATA 6.0Gb/s and USB 3.0.

Intel Desktop Computer 5 Gaming Three/Four Add-In GPUs (Model: IDC5-GA3)			
Comp	**Spec**	**Note**	**Retail**
Mother-board	ASUS P8P67 WS Revolution REV 3.0 (asus.com): • Intel P67 Express Chipset plus NVIDIA NF200 / LGA1155 / ATX (305mm x 245). • 1 x 24 pin motherboard main / 1 x 8 pin EPS 12V CPU. • Dual channel memory / 4 DIMMs / 32GB max /	• Installing double slot card in fourth x16 slot requires 8 expansion slot case. • Awaiting release of additional Z68 chipset motherboards and selecting a Z68, not P67, chipset motherboard	$280

	DDR3-1600/1333/1066 SDRAM / < 1.65V / Non-ECC. • No Intel HD Graphics support. Add-in GPU required. • 2 x PCIe Gen2 x16 (x16 mode) / 2 x PCIe Gen2 x16 (x8 mode) / 3 x PCIe Gen2 x1. Supports single PCIe Gen2 add-in GPU (single or double slot) at x16 mode. Supports dual PCIe Gen2 add-in GPUs (single or double slot) in 2-way CrossFireX and 2-way SLI at x16/x16 mode. Supports triple PCIe Gen2 add-in GPUs (single or double slot) in 3-way CrossFireX and 3-way SLI at x16/x8/x8 mode. Supports quad PCIe Gen2 add-in GPUs (single or double slot) in 4-way CrossFireX, not 4-way SLI, at x8/x8/x8/x8 mode. • 4 x internal SATA 6.0Gb/s / 4 x internal SATA 3.0Gb/s. RAID. • 2 x USB 3.0 (2 x back) / 14 x USB 2.0 (8 x back + 6 x via internal headers). Internal audio header. • 2 x gigabit (10/100/1000Mb/s) ethernet.	plus NVIDIA NF200 or Lucid LT22102 chip.	
Processor	Intel Core i7-2600 Processor (ark.intel.com): • 8MB cache / 3.40GHz / 5.0GT/s / LGA1155 / 32nm / Max TDP 95W / Sandy Bridge. • Quad core with Intel Hyper-Threading Technology (4C/8T). • Dual channel memory / 32GB max / DDR3-1333/1066 SDRAM / 21.3GB/s max memory bandwidth. • Intel 64 / Intel VT-x / Intel Turbo Boost 2.0 / Intel HD Graphics 2000.	• Alternate: To cut cost, Intel Core i5-2400 Processor (ark.intel.com) $200.	$300
Memory	Kingston KVR1333D3N9K2/8G (shop.kingston.com): • 8GB DDR3-1333 SDRAM / CL9 / 1.5V / Non-ECC / Kit 2 x 4GB.	• 1333MT/s x 8B/T x 2 channels = 21.3GB/s, which equals the Intel Core i7-2600 Processor max memory bandwidth.	$105
Graphics	3 x Sapphire Radeon HD 6950 (Model: 100312SR): • PCIe Gen2 x16. • 2GB DDR5 / 256-bit / 800MHz core / 5000MHz effective memory. • 2 x mini DisplayPort / 1 x HDMI / 1 x dual link DVI / 1 x single link DVI-D. • DX11 / SM5.0 / AMD Eyefinity. • Supports 2-way, 3-way, and 4-way CrossFireX. Model 100312SR accessories include CrossFireX bridge interconnect cable. • Length ~280mm. Double slot. • Max TDP 200W each. 2 x 6 pin PCIe power connector required each.	• Tom's Hardware Best Graphics Cards For the Money: April 2011 (tomshardware.com). • Difficult to justify 4-way CrossFireX/SLI. Nonetheless, for 4-way CrossFireX, add 1 x Sapphire Radeon HD 6950 (Model: 100312SR) $290.	3 x $290
Hard Drive	Western Digital WD1002FAEX (wdc.com): • Caviar Black / 1.0TB / SATA 6.0Gb/s / 64MB cache / 7200rpm.	• Difficult to justify ~$0.50/GB for 10,000rpm SATA 6.0Gb/s Western Digital VelociRaptor or ~$2/GB for SATA 3.0Gb/s or 6.0Gb/s SSD.	$95
CD/DVD Burner	ASUS DRW-24B1ST: • SATA. 2MB cache. • 24X DVD+R/8X DVD+RW/12X DVD+R DL/24X DVD-R/6X DVD-RW/12X DVD-RAM/16X DVD-ROM/48X CD-R/32X CD-RW/48X CD-ROM.	• 4x Newegg Customer Choice Award Winner - CD/DVD Burners.	$30
Case	Corsair Graphite Series 600T (corsair.com): • 507mm x 265 x 592 (H x W x L). • Supports microATX and ATX motherboards. • 4 x external 5.25" / 6 x internal 3.5". Two removable hard drive trays. • 8 x expansion. • I/O panel: Top front / 1 x USB 3.0 / 4 x USB 2.0 / Audio. • Fans included: 1 x top 200mm with white LED / 1 x front 200mm with white LED / 1 x back 120mm. • More than sufficient space for 3 x Sapphire Radeon HD 6950 (Model: 100312SR).	• Extended size mid tower. • Internal 3.5" bays are oriented perpendicular to length of case. Therefore, installation of 3 x Sapphire Radeon HD 6950 (Model: 100312SR) does not obstruct access to internal 3.5" bays.	$170

Power Supply	Thermaltake Toughpower Grand 1050W (TPG-1050M) (thermaltakeusa.com): • 1050W / ATX 12V v2.3 / EPS 12V v2.92. • 80 PLUS Gold Certified / CrossFireX Certified / SLI Certified / Active PFC / 7 year warranty. • 1 x 24 pin motherboard main / 1 x 4+4 pin ATX/EPS 12V CPU / 1 x 8 pin EPS 12V CPU / 8 x 6+2 pin PCIe / 12 x SATA / 8 x 4 pin peripheral / 1 x floppy. Modular cable management. • 150mm x 86 x 180 (W x H x L).	• Difficult to justify 4-way CrossFireX/SLI. Nonetheless, for 4-way CrossFireX/SLI, Antec High Current Pro HCP-1200 (antec.com) $300 or Thermaltake Toughpower Grand 1200W (TPG-1200M) (thermaltakeusa.com) $310.	$270
Intel Desktop Computer 5 Gaming Three/Four Add-In GPUs (Model: IDC5-GA3)			$2120

7. Additional Reading

- Intel Technologies Demonstrated (intel.com)
- Intel Graphics Technology (intel.com)
- Intel HD Graphics (intel.com)
- Quick Reference Guide To Intel HD Graphics (software.intel.com)
- Intel Core i3 Desktop Processors That Contain Intel HD Graphics (intel.com)
- Intel Core i5 Desktop Processors That Contain Intel HD Graphics (intel.com)
- Intel Core i7 Desktop Processors That Contain Intel HD Graphics (intel.com)
- Intel Chipsets (intel.com)
- Intel Desktop Chipsets (intel.com)
- Intel 5 Series Chipset (intel.com)
- Intel Q57 Express Chipset (intel.com)
- Intel H55 Express Chipset (intel.com)
- Intel H57 Express Chipset (intel.com)
- Intel P55 Express Chipset (intel.com)
- Intel X58 Express Chipset (intel.com)
- Intel 6 Series Chipset (intel.com)
- Intel B65 Express Chipset (intel.com)
- Intel Q65 Express Chipset (intel.com)
- Intel Q67 Express Chipset (intel.com)
- Intel H61 Express Chipset (intel.com)
- Intel H67 Express Chipset (intel.com)
- Intel P67 Express Chipset (intel.com)
- Intel Z68 Express Chipset (intel.com)
- Intel Processors (intel.com)
- Intel Desktop Processors (intel.com)
- Intel Pentium Processor (intel.com)
- Intel Pentium Processor G6950 (ark.intel.com)
- Intel Core i3 Processor (intel.com)
- Intel Core i5 Processor (intel.com)
- Intel Core i7 Processor (intel.com)
- Intel Core i7 Processor Extreme Edition (intel.com)
- ASRock Motherboard Series (asrock.com)
- ASUS Motherboards (asus.com)
- Gigabyte Motherboards (gigabyte.com)
- Intel Motherboards (intel.com)
- MSI Motherboards (msi.com)
- Kingston (kingston.com)
- AMD Radeon Graphics For Desktop PCs (amd.com)
- Sapphire (sapphiretech.com)
- Sapphire: Radeon Specifications Matrix (sapphiretech.com) (.xls)
- Western Digital: Desktop Hard Drives: WD Caviar Blue (wdc.com)
- Western Digital: Desktop Hard Drives: WD Caviar Black (wdc.com)
- Antec (antec.com)
- Cooler Master (coolermaster.com)
- Corsair (corsair.com)
- Lian Li (lian-li.com)
- Thermaltake (thermaltakeusa.com)
- Tom's Hardware (tomshardware.com)
- Newegg (newegg.com)