



# PROCELERANT®

## CE915GM COM EXPRESS MODULE

### QUICK START GUIDE

FOR USE WITH CE-AHSA ACTIVE HEATSINK



This guide describes how to install, configure, and operate a Procelerator® CE915GM COM Express system. The CR100 FlexATX carrier board is used as the sample carrier board, and the CE-AHSA active heatsink is used as the sample heatsink in this guide.

Refer to the *Procelerator CE915GM COM Express Module Product Manual* for detailed features, functionality, and specifications.

#### Where to get more product information

Visit the RadiSys web site at [www.radisys.com](http://www.radisys.com) for product information and other resources. Downloads (manuals, release notes, software, etc.) are available at [www.radisys.com/downloads](http://www.radisys.com/downloads).

#### Handling precautions

##### **WARNING!**

- Handle the Procelerator COM Express module and carrier board with care. Failure to employ adequate anti-static measures can cause partial or complete device failure, performance degradation, or reduced operating life. To avoid electrostatic discharge (ESD) damage to static-sensitive components, it is strongly recommended that you wear a grounded wrist strap or other static-dissipating device when handling this product. For further precautions and ESD information, visit [www.radisys.com/esd](http://www.radisys.com/esd).
- The battery on the carrier board must be replaced with the correct type of lithium cell battery (type CR2032). Using any other battery may damage the board.



## Check your order

Check the RadiSys product codes on the COM Express module, carrier board, and accessories to make sure you received the products you ordered.

### COM Express module product codes

[Table 1](#) lists the CE915GM modules available at the time of publication release. All modules are RoHS-, EN-, FCC-, IEC-, and UL-compliant.

Check the CE915GM product page on the RadiSys Web site or contact your sales representative for the latest information about product offerings. Note that memory modules must be purchased separately.

Table 1. CE915GM product codes

Product name	Product code	Description
CE915GMA	CE760A-0	Intel 2.2GHz Pentium M 760 BGA processor, CE915GM chipset, no memory module, RoHS
	CE738A-0	Intel 1.4GHz LV Pentium M 738 BGA processor, CE915GM chipset, no memory module, RoHS
	CE373A-0	Intel 1.0GHz ULV Celeron M 373 BGA processor, CE915GM chipset, no memory module, RoHS
	CE370A-0	Intel 1.5GHz Celeron® M 370 BGA processor, CE915GM chipset, no memory module, RoHS
	CE738A-E-512	Intel 1.4GHz LV Pentium M 738 BGA processor, CE915GM chipset, 512MB memory module, with extended temperature to -25°C to 70°C, RoHS
CE915GME	CE738B-0	Intel 1.4GHz LV Pentium M 738 BGA processor, CE915GM chipset, no memory module, RoHS

### CR100 carrier board product codes

[Table 2](#) lists the CR100 carrier boards available at the time of publication release.

Table 2. CR100 product codes

Product code	Description
CR100-2DVI	Flex ATX Carrier, Dual DVI
CR100-PCIE16	Flex ATX Carrier, PCIE x16, SVGA

## Optional components

### System memory

The CE915GM requires one memory module to operate. For information on qualified memory options that have been validated for use with the COM Express module, refer to the *Procelerant CE915GM Qualified Memory List*.

## Heatsinks

Table 3 lists the heatsinks offered by RadiSys for use with the CE915GM system. Table 4—Table 6 show a complete list of all the components in the CE-AHSA, CE-PHSA, and CE-PHS17A heatsink packages.

Table 3. Heatsink product codes

Product code	Description
CE-AHSA	Active heatsink assembly (a fan is built into the heatsink) for any COM Express module in a 2U chassis. The power connector for the CE-AHSA is ATX-compliant. Heatsink dimensions: 125 x 95 x 26.90mm Fan dimensions: 80 x 80 x 15mm Fan power supply: +5V to +13.8V (+12V recommended)
CE-PHSA	A passive heatsink for any COM Express module in a 1U chassis. A chassis fan is required with this option. Dimensions: 125 x 95 x 26.90mm
CE-PHS17A	A 17mm low-profile passive heatsink for COM Express modules CE373A or CE738A in a 6HP (ATCA) blade. An air velocity of 400 lfm [2 m/sec] is required. Use with CE738A requires a chassis fan. Dimensions: 125 x 95 x 14.94mm
CE-HSPA	Heat spreader for CE760A, solid aluminum, compliant with PICMG COM.0 COM Express specification Revision 1.0 Dimensions: 125 x 95 x 11mm
CE-TIM	Thermal compound application bar, phase change at 58°C (136°F)

Table 4. CE-AHSA heatsink contents

Product code	Description	QTY	Part number
Backer plate	41x36mm, sheet metal (supplied with four M2 flat head screws)	1	010-02709-00xx
CE-AHSA	Aluminum active heatsink, 125x94x42mm, 12V input	1	019-00352-00xx
Carrier screws	M2.5x0.45x4mm, pan head (used to tighten the carrier board and module)	5	09-0293-00xx
Heatsink screws	M2.5x0.45x16mm, pan head (used to tighten the heatsink and module)	5	009-01707-00xx
Heatsink spacer	M2.5 clear, 4.5mm outside diameter, 6mm long	1	009-01587-00xx
Module screw	M2.5x0.45x12mm, pan head (used with the heatsink spacer)	1	09-0344-00xx
Standoffs	M2.5x0.45x5mm, hex jam, 4.5mm outside diameter	5	009-01190-00xx
Washers	2.5mm inside diameter, spring lock (used with heatsink screws)	5	009-01208-00xx

Table 5. CE-PHSA heatsink contents

Product code	Description	QTY	Part number
Backer plate	41x36mm, sheet metal (supplied with four M2 flat head screws)	1	010-02709-00xx
CE-PHSA	Aluminum active heatsink, 125x94x27mm, 12V input	1	019-00352-00xx
Carrier screws	M2.5x0.45x4mm, pan head (used to tighten the carrier board and module)	5	09-0293-00xx
Heatsink screws	M2.5x0.45x16mm, pan head (used to tighten the heatsink and module)	5	009-01707-00xx
Heatsink spacer	M2.5 clear, 4.5mm outside diameter, 6mm long	1	009-01587-00xx
Module screw	M2.5x0.45x12mm, pan head (used with the heatsink spacer)	1	09-0344-00xx
Standoffs	M2.5x0.45x5mm, hex jam, 4.5mm outside diameter	5	009-01190-00xx
Washers	2.5mm inside diameter, spring lock (used with heatsink screws)	5	009-01208-00xx

Table 6. CE-PHS17A heatsink contents

Product code	Description	QTY	Part number
Backer plate	41x36mm, sheet metal (supplied with four M2 flat head screws)	1	010-02709-00xx
CE-AHSA	Aluminum active heatsink, 125x95x17mm, 12V input	1	019-00352-00xx
Carrier screws	M2.5x0.45x4mm, pan head (used to tighten the carrier board and module)	5	09-0293-00xx
Heatsink screws	M2.5x0.45x16mm, pan head (used to tighten the heatsink and module)	5	009-01707-00xx
Heatsink spacer	M2.5 clear, 4.5mm outside diameter, 6mm long	1	009-01587-00xx
Module screw	M2.5x0.45x12mm, pan head (used with the heatsink spacer)	1	09-0344-00xx
Standoffs	M2.5x0.45x5mm, hex jam, 4.5mm outside diameter	5	009-01190-00xx
Washers	2.5mm inside diameter, spring lock (used with heatsink screws)	5	009-01208-00xx

## Video adapter

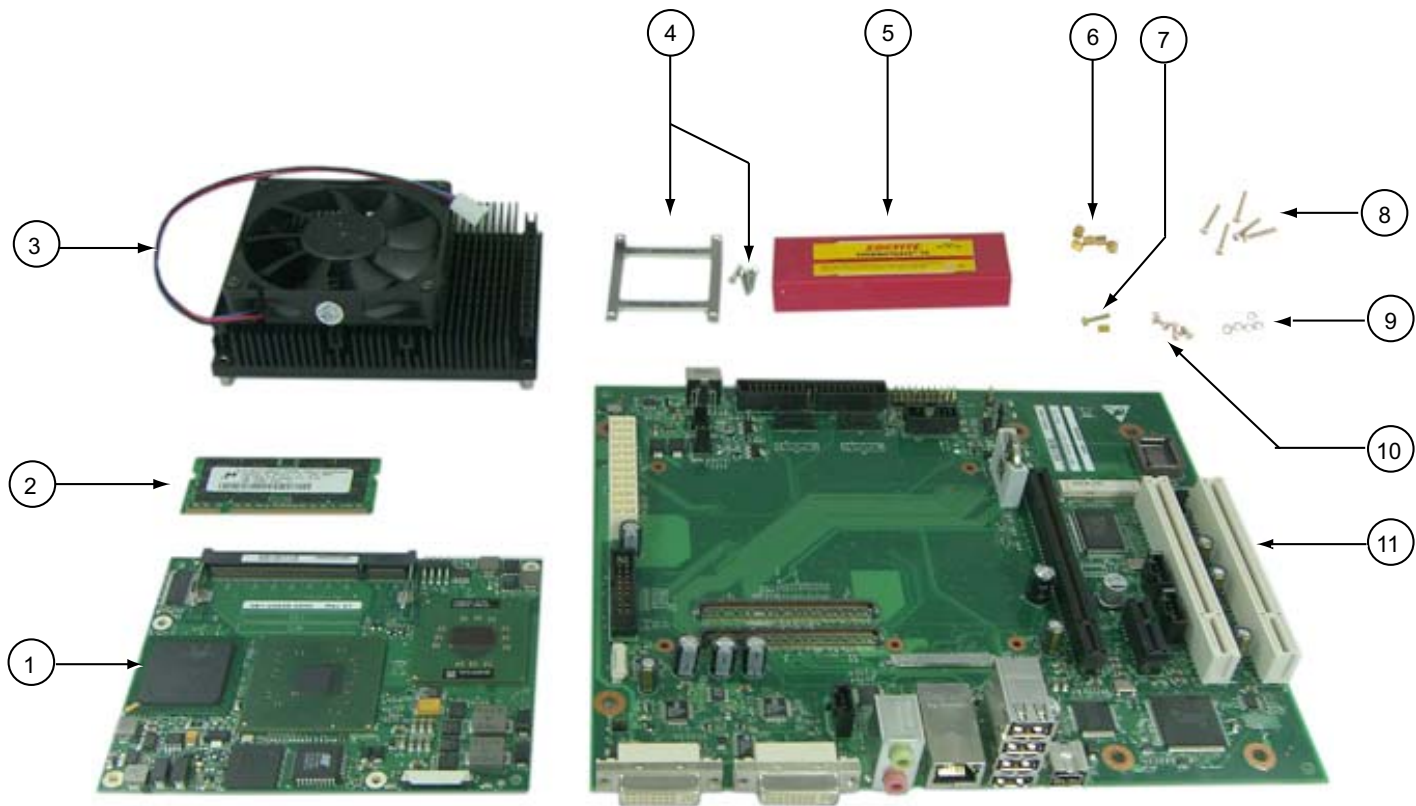
If you are using the CR100 carrier board and need to attach a VGA monitor to a DVI-I port, a DVI-to-SVGA adapter is required. Refer to [DVI and VGA Monitors on page 7](#) for further information on VGA support on DVI-I ports.

Product Code	Description
CE-DVI-VGA	DVI-to-SVGA adapter

## Prepare COM Express components

Lay out all the components on a grounded work surface as shown in [Figure 1](#) to prepare for assembly. Note that you may have different parts depending on what you ordered.

Figure 1. Basic component preparation



Item	Component description	Item	Component description
1	COM Express module	7	Heatsink spacer and module screw
2	DDR2 memory module	8	Heatsink screws
3	Active heatsink	9	Washers (use with item 8)
4	Backer plate (supplied with four M2 flat head screws)	10	Carrier screws
5	Phase-change thermal interface material, Thermstrate® TC	11	CR100 FlexATX carrier board
6	Standoffs (use with items 8 and 9)		

## Power supply

The CE915GM will work with an ATX-compliant power supply or a power supply that is compliant with *PICMG® COM.0 COM Express Specification Revision 1.0*. When selecting a power supply, be sure to consider the maximum power, AC input, frequency, input current, and DC out specifications of the power supply.

Theoretically, the CE915GM requires at least 8A on the +12V power rail. Considering the power consumption of the carrier board, though, it is best to allow a certain amount of leeway on the two power rails. For this reason, the power supply should be rated above 200 Watts with at least 12A output on the +12V power rail.

A typical power supply for the CR100 Flex ATX carrier board may have these specifications:

Type: ATX

Max Power: 350W

AC input: 100–120V AC, 200–240V AC

Frequency: 50/60Hz

Input current: 10 A @ 115 V, 6 A @ 230 V

DC output:

Voltage	+3.3V	+5V	+12V	-5V	-12V	+5V Standby with 12V power supply
Current	14A	30A	15A	0.5A	0.8A	3.0A

### Notes:

- It is recommended that you use an ATX P4 power supply with a 24-pin cable, which is typically labeled “BTX.” A 20-pin cable can also be used, in which case you would plug the 20-pin cable in on the pin #1 end of the carrier board’s ATX power supply connector and leave the two pairs of pins on the other end exposed. No adapter is required.
- When multiple fans are used, additional amperage is required. For example, if a 4U chassis with two fans has 2A surge current for each fan, 16A is required (12A + 2A + 2A).

## CD-ROM/DVD-ROM drives


A USB CD-ROM/DVD-ROM or IDE CD-ROM/DVD-ROM drive is usually required for you to install the operating system and other software.

## Hard disk

Standard computer IDE and SATA hard disks (60GB, 80GB, 120GB, etc.) can be attached to the carrier board. The CR100 carrier board contains one IDE header and two SATA headers.

## Keyboard and mouse

The CR100 carrier board supports a standard USB keyboard and USB mouse, rather than a PS/2 keyboard or mouse.



## Video devices

### DVI and VGA Monitors

The CR100-2DVI carrier board contains two DVI-I ports that comply with the Digital Video Interface (DVI) specification. Dual independent displays can be used with the appropriate drivers installed. Alternatively, you can attach a single analog VGA monitor to one of the DVI-I ports. For detailed instructions, see [Connect internal devices and set jumpers on page 19](#).

**Note:** Connection of a VGA monitor with a DB15 cable connector to the DVI port requires a VGA-to-DVI adapter (see [Video adapter on page 4](#)).

The CR100-PCIE16 carrier board is designed to use a PCI Express graphics card in the PCI Express x16 graphics slot for high-performance graphics acceleration. The two DVI-I ports on this carrier board do not support DVI monitors, but one of the ports can be used to attach a VGA monitor. For detailed instructions, see [Connect internal devices and set jumpers on page 19](#).

### LVDS panel

On the CR100 carrier board, a low-voltage differential signaling (LVDS) interface allows the connection of one LVDS flat panel. This attachment typically requires a custom cable. Use the LVDS interface pinout chart in the *Procelerant CR100 FlexATX Carrier Board Product Manual* as a guide for obtaining a suitable cable.

### TV or other S-Video devices

Use a standard MiniDin4 male S-Video cable to connect video equipment or other S-Video compatible devices.

## Ethernet cables

Use the RJ45 Ethernet port to connect to a LAN, router, or other device via Ethernet cable. For 10/100Base-T connections, a Cat 5 cable is required. A 1000Base-T connection requires a Cat5E cable.

## Miscellaneous attachments

Additional interfaces, such as an RS-232 port, USB ports, front panel LEDs, IEEE 1394b, and backlight control, may be added to the chassis. For connector locations on the CR100 carrier board and cable selection for internal connections, refer to the carrier board's documentation.



# Identify key components

## Module layout

Figure 2—Figure 3 show the main components on the CE915GM module. For information on features and functionality of these components, refer to the *Product Manual*.

Figure 2. Module layout: top view

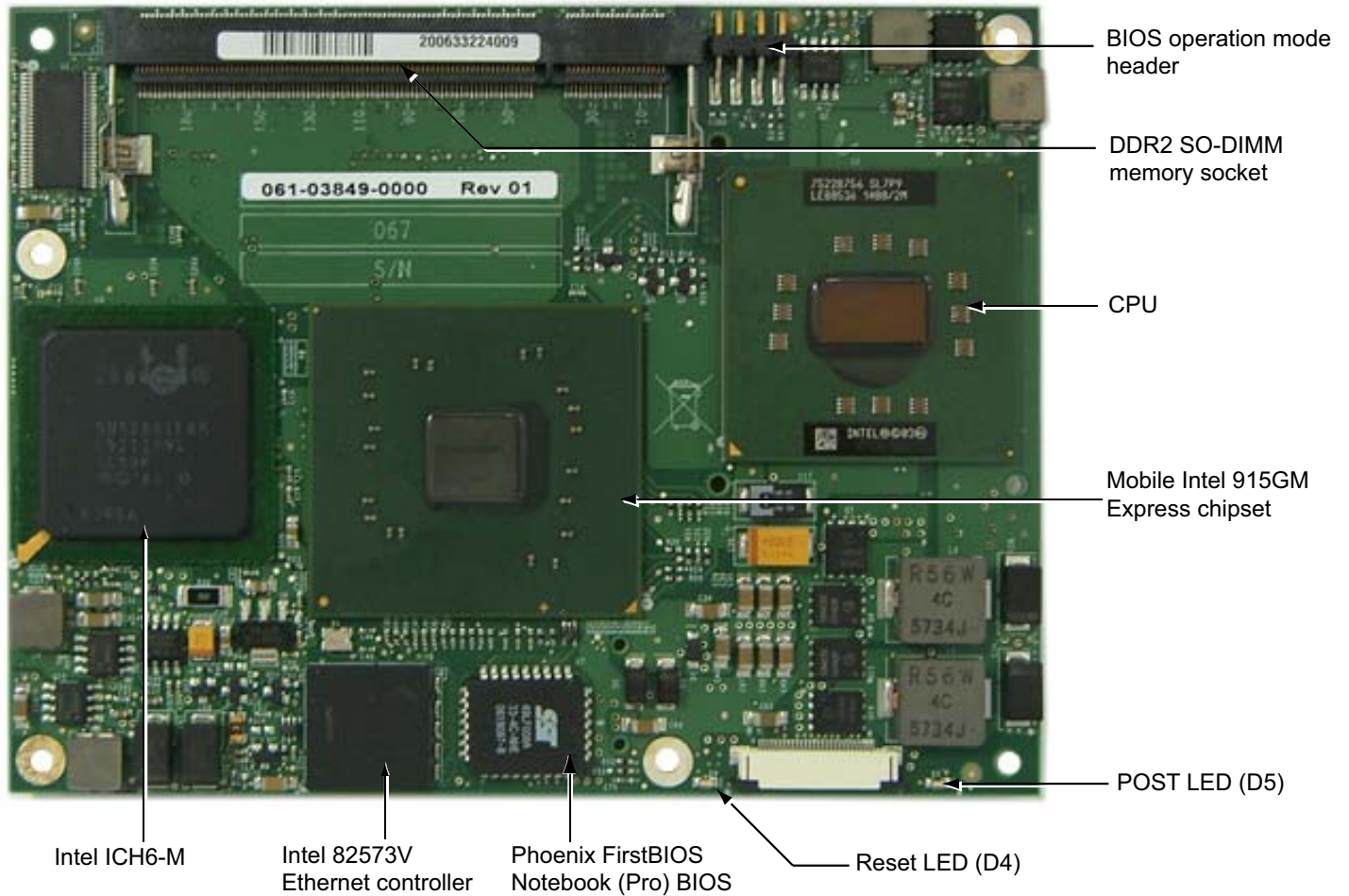
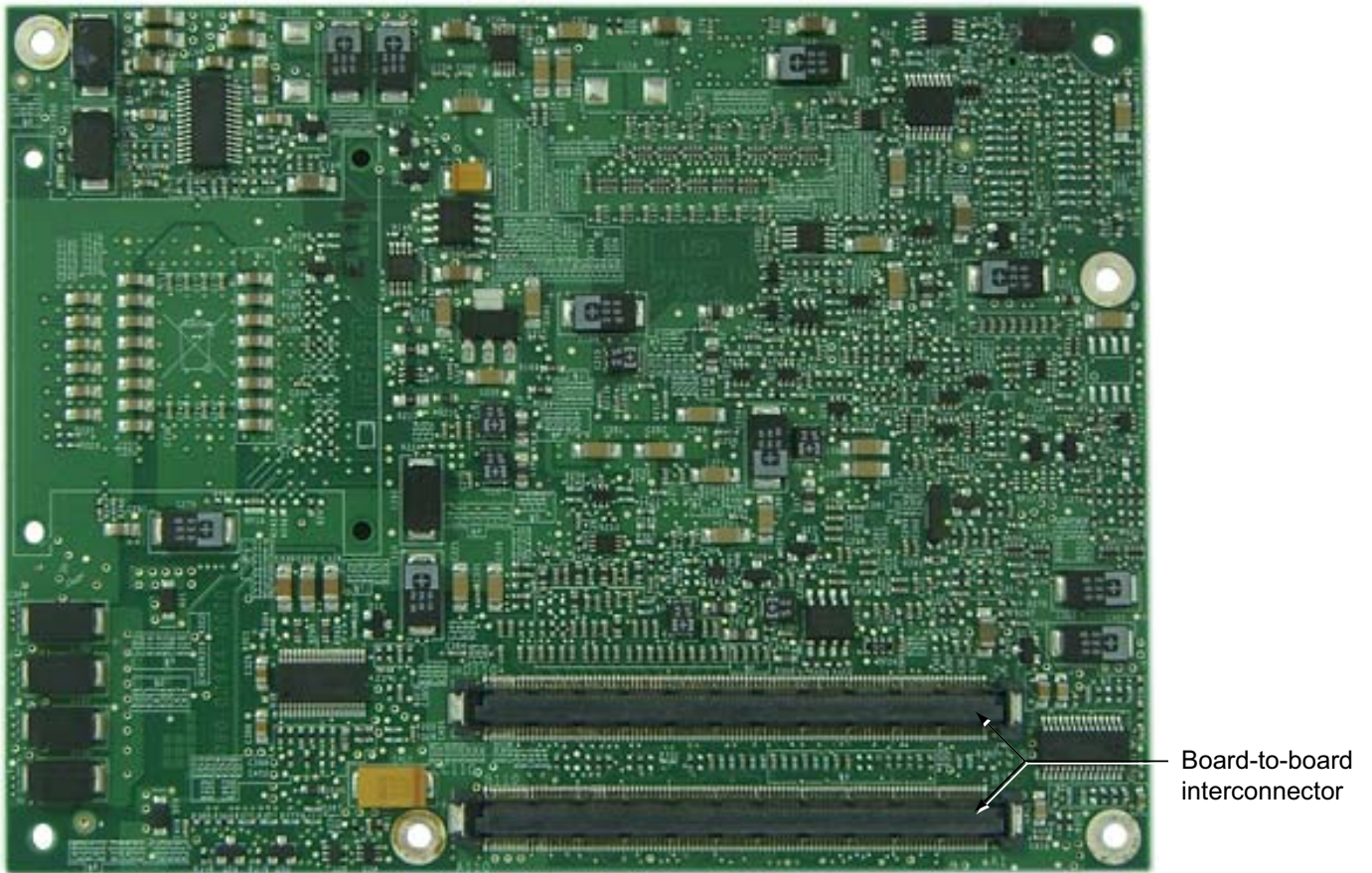




Figure 3. Module layout: bottom view



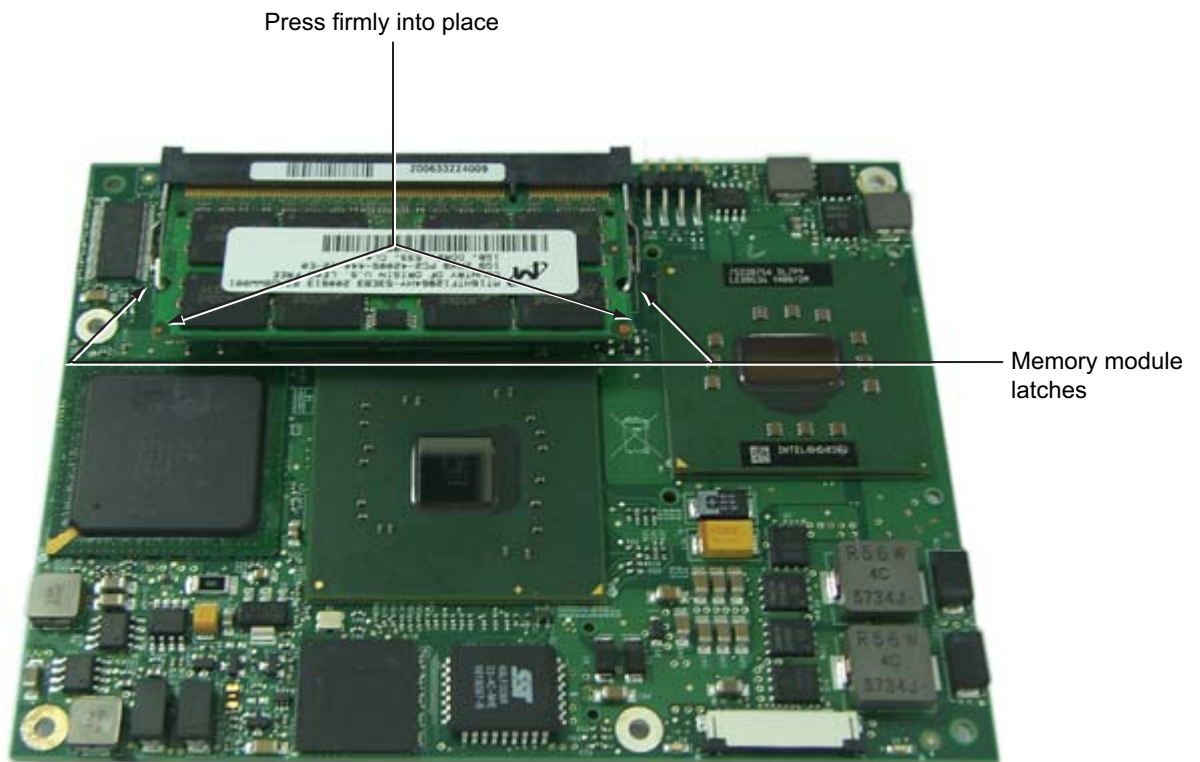
## Carrier board layout

For locations of key components on the CR100 carrier board, refer to the *Procelerant CR100 FlexATX Carrier Board Product Manual*.

## Assemble the COM Express system

### Install the memory module

1. Insert one memory module into the lower DDR2 SO-DIMM memory socket. Press down on the corners of the memory module until the latches click into place.



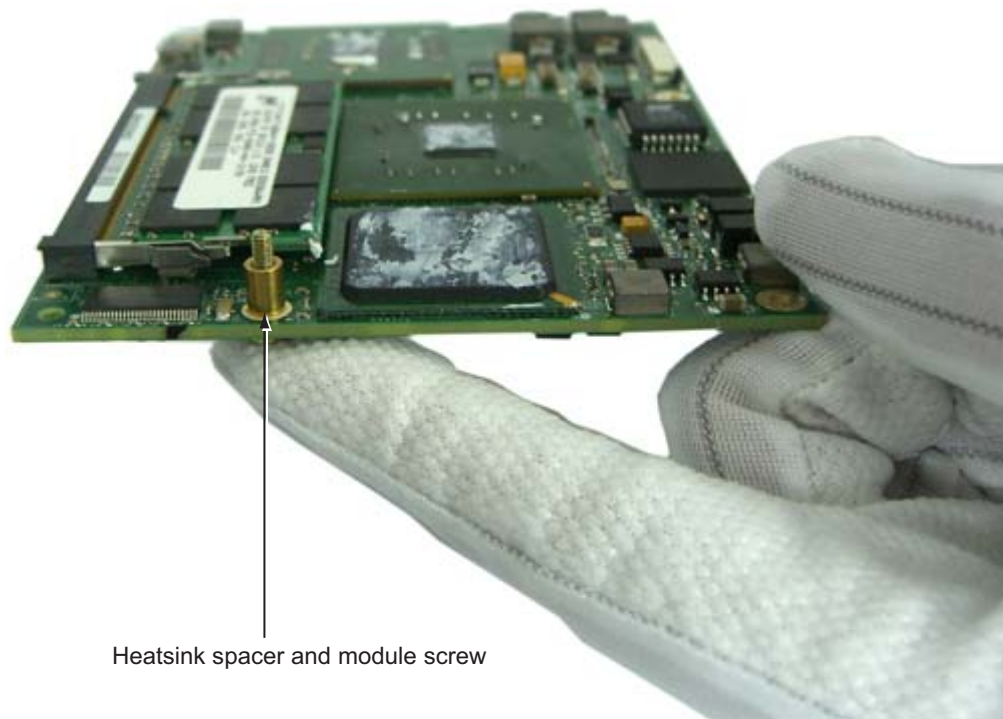
2. To remove a memory module, open the latches on both sides of the memory socket, lift the free end of the memory module, and remove it from the socket.

## Install the active heatsink

1. Apply the Thermstrate TC phase-change material to the processor, GMCH, and ICH6-M chipsets. When assembled, heat from the chips will be conducted through the thermal interfaces to the heatsink.

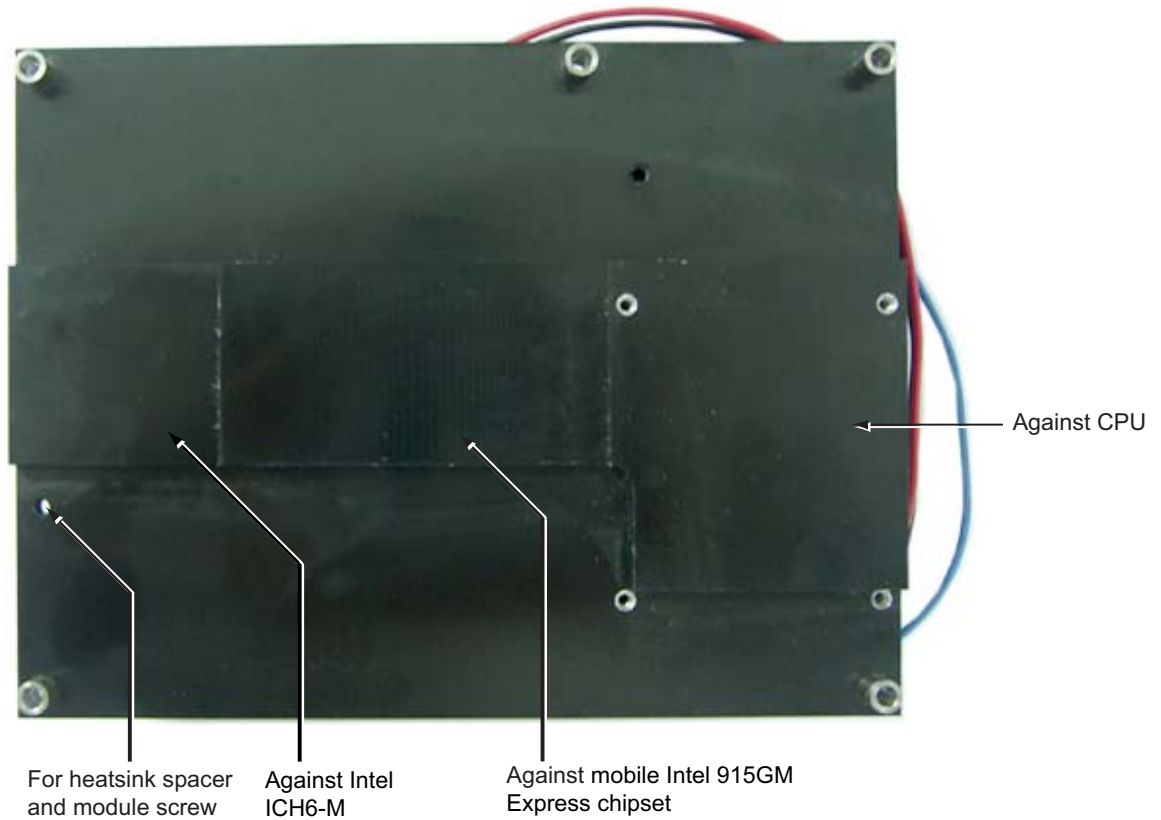


2. Install the heatsink spacer and module screw through the module as shown below. The screw will secure the heatsink.



Heatsink spacer and module screw

3. Check the bottom side of the heatsink for correct alignment against the module.



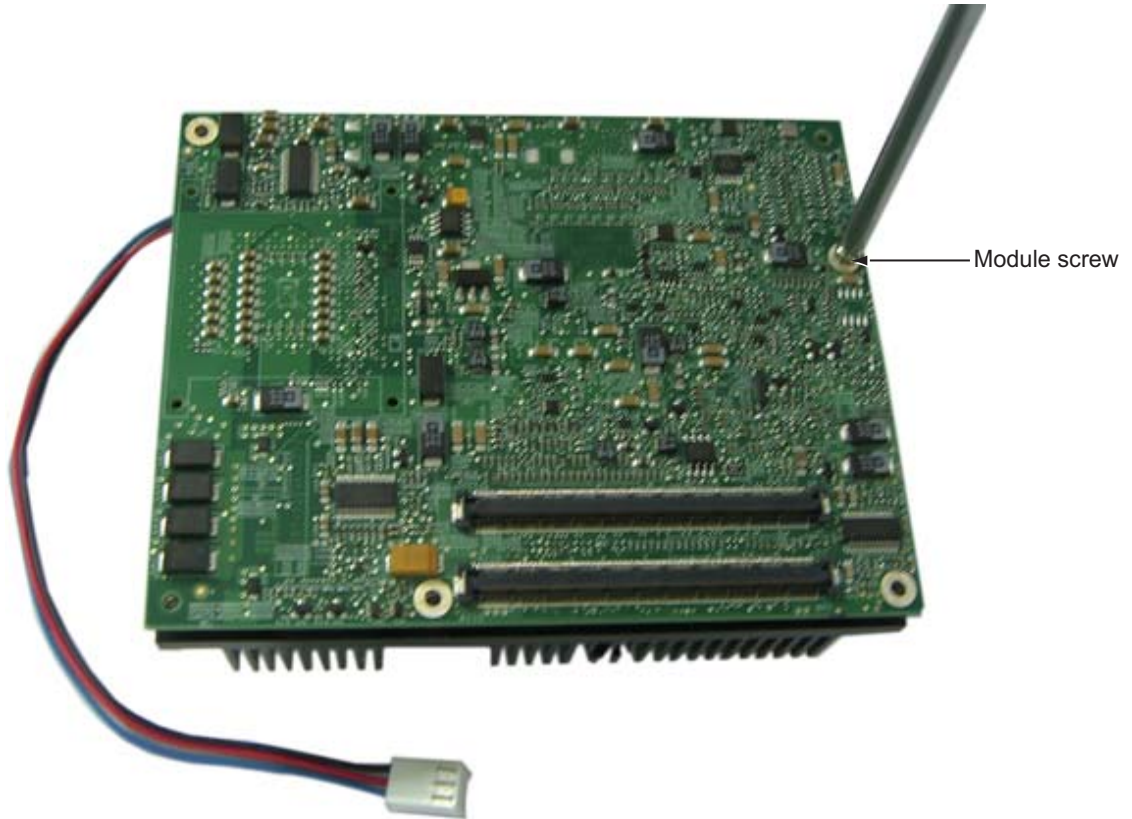


4. Place the heatsink assembly on the module as shown, lining up the standoffs on the heatsink with the screw holes in the module.



5. Hold the module and heatsink together and turn them over. Tighten the module screw to a torque value of 0.34 N·m (3 lbf·in).

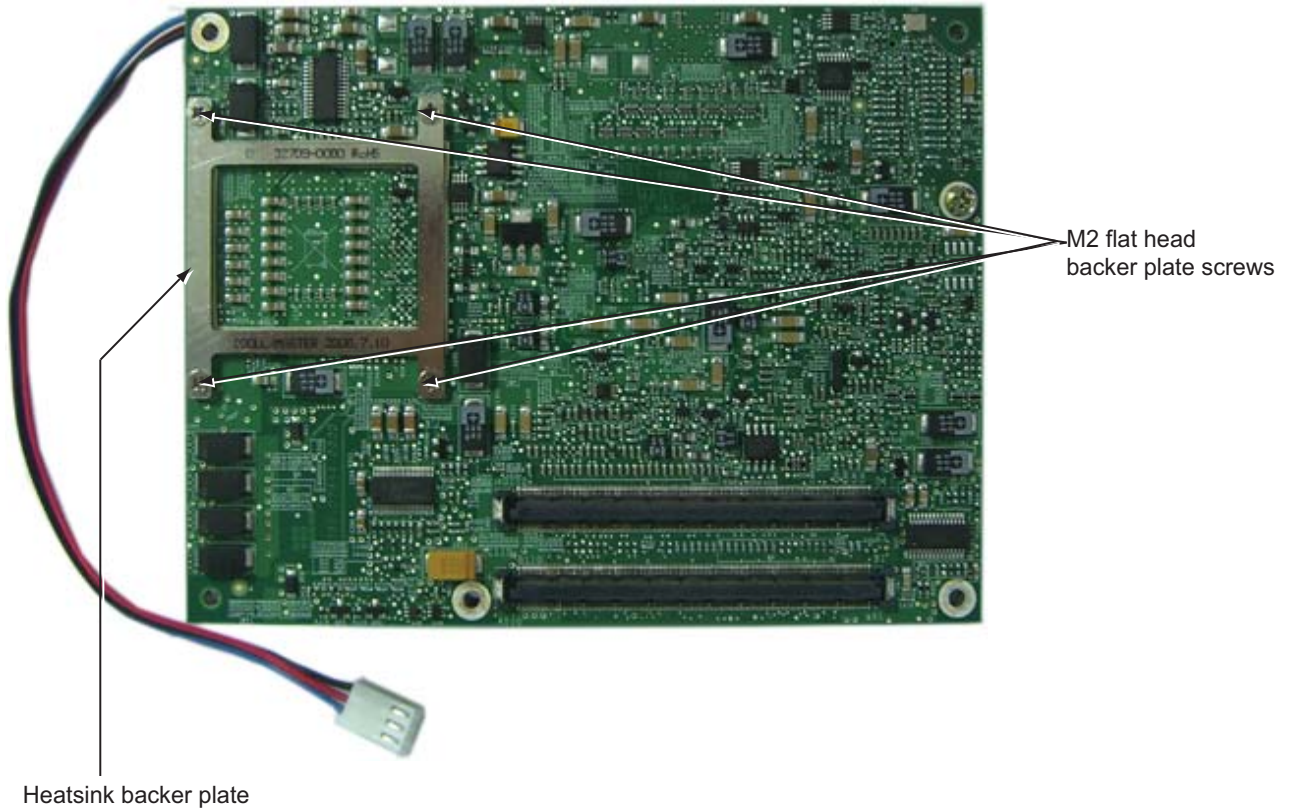
**WARNING!** To avoid damaging the module, be careful not to overtighten the screws.



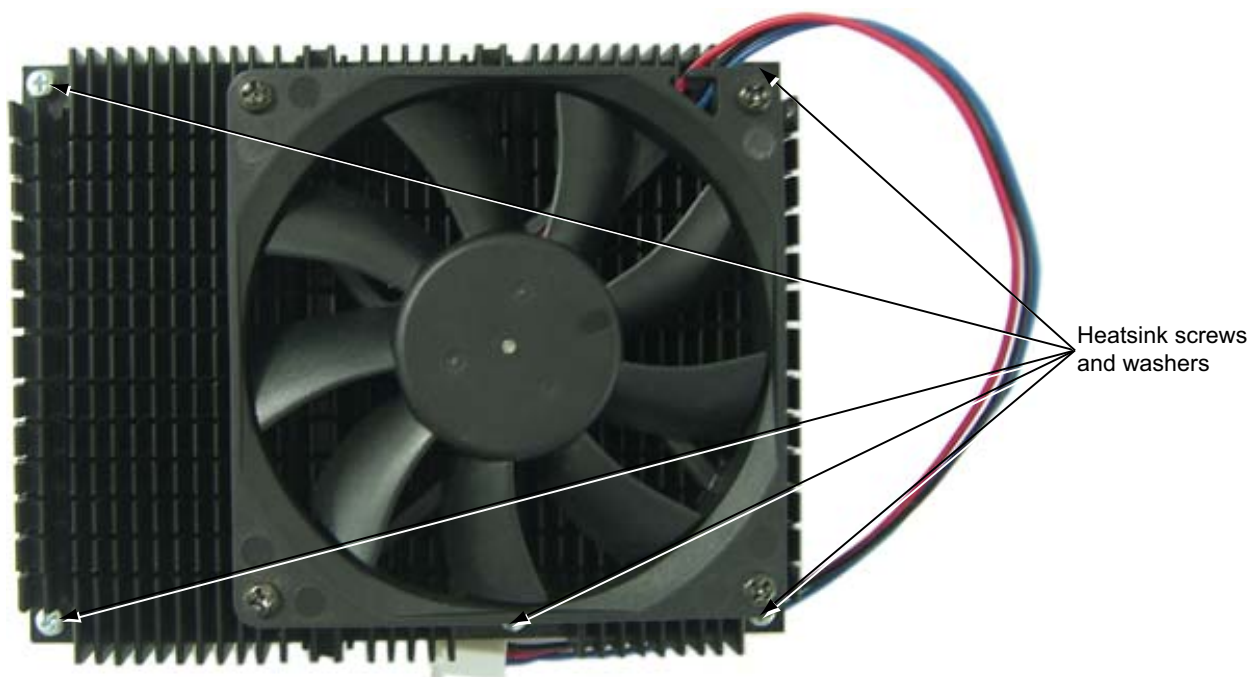


6. Place the heatsink backer plate on the module as shown. Tighten the supplied backer plate screws until they reach the PCB, and then back off 1/2 turn.

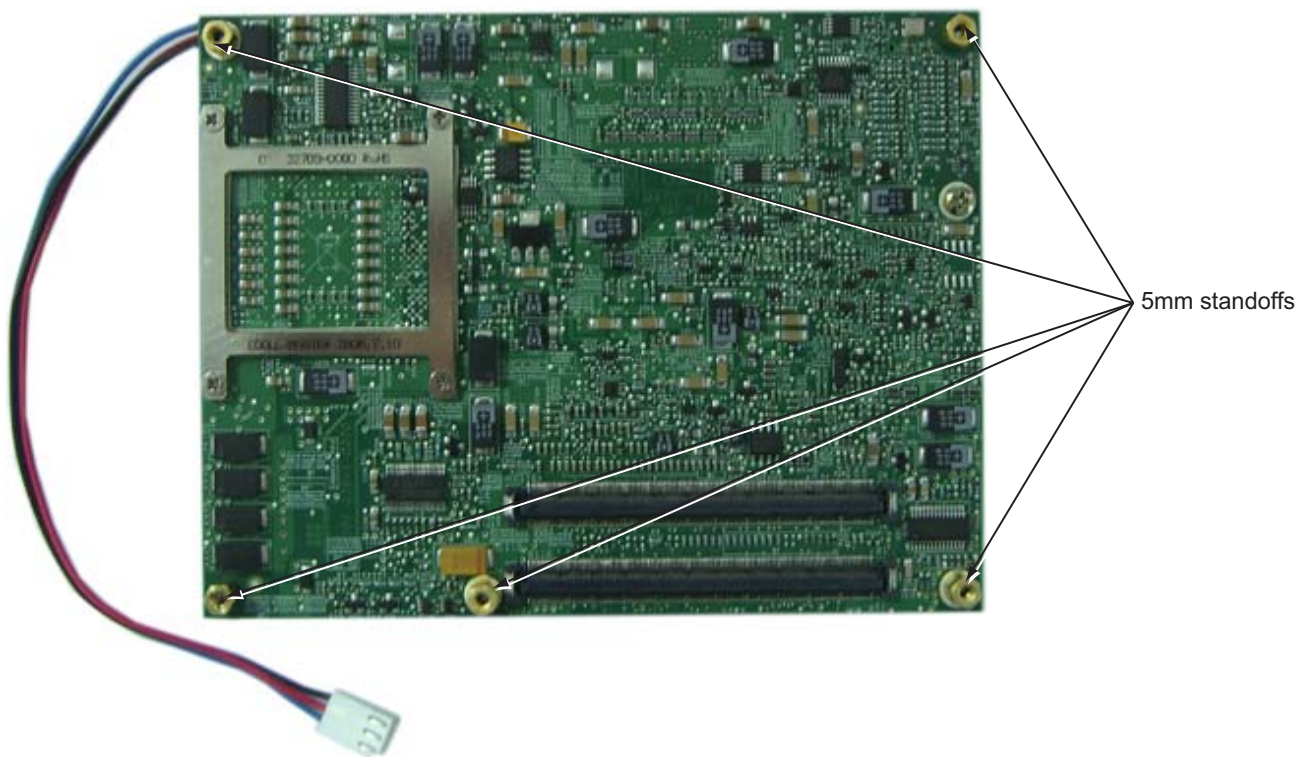
**WARNING!** To avoid damaging the module, be careful not to overtighten the screws.



7. Turn the assembly over again, and insert the five heatsink screws through their washers and into the holes at the locations shown.



8. The heatsink screws will protrude through the module. Use the five 5mm standoffs shown, and tighten the screws to a torque value of 0.34 N·m (3 lbf·in).



9. RadiSys recommends you place the assembly in a temperature chamber at a temperature of 60°C for 10 minutes to allow the thermal interface material to phase change and conform to an optimal shape between the chips and heatsink.

As an alternative to using a temperature chamber, you can perform this step immediately after assembling the system by temporarily covering the heatsink to trap heat and elevate the temperature. To verify that the temperature reaches 60°C, enter the BIOS Setup utility by pressing F2 during system boot, and navigate to the Information > System Monitors submenu. After 10 minutes of operation at 60°C, be sure to uncover the heatsink before using the system further.

**WARNING!** The CPU may be damaged if this step is not performed prior to operating the system.

This completes the assembly of the module and heatsink.

## Install the module and heatsink assembly onto the carrier board

1. Line up the board-to-board-carrier interconnectors on the module and the CR100 carrier board, then press the connectors firmly into place. When the module is fully seated, its five standoffs should be touching the CR100 carrier board.

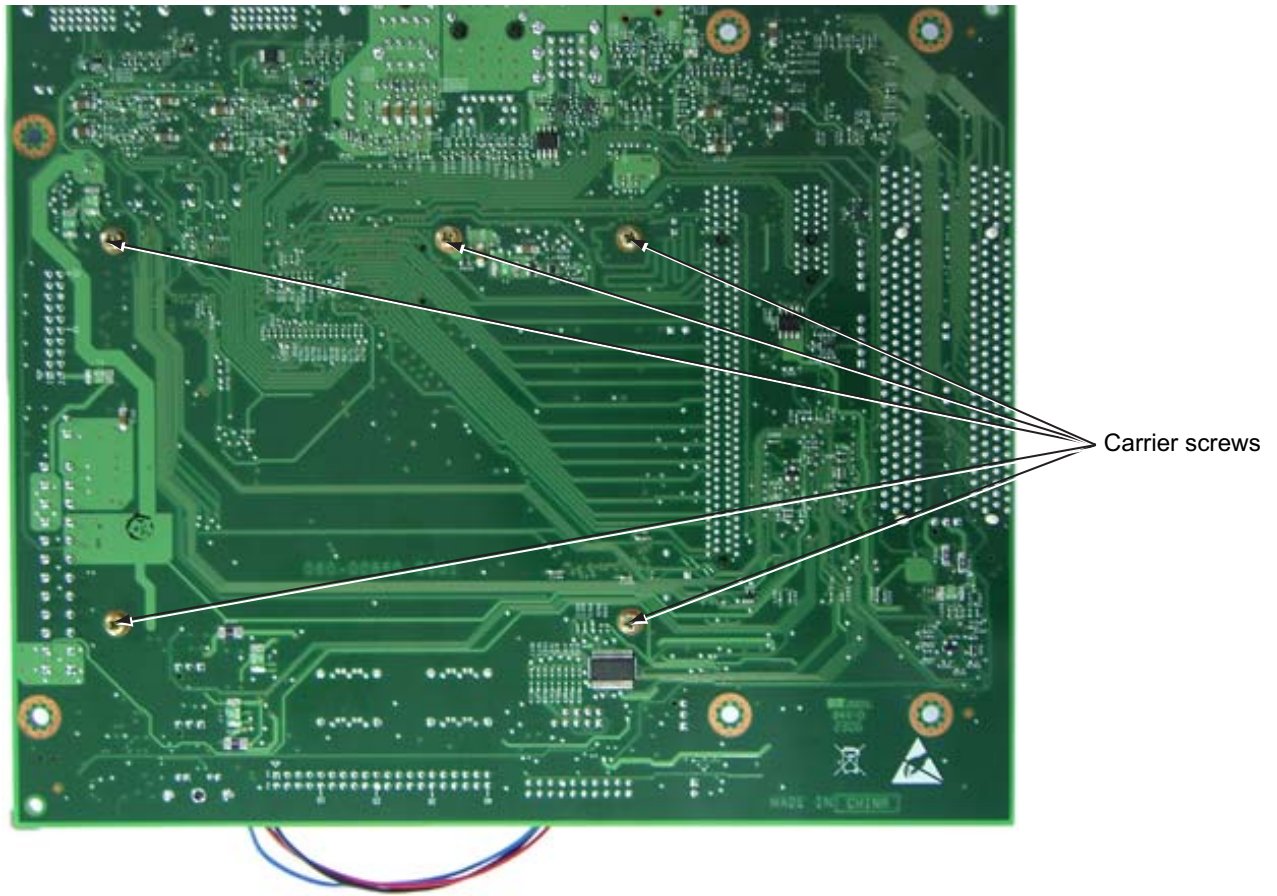
**WARNING!** To avoid damaging any component, make sure the COM Express module is firmly seated in the CR100 board's interconnectors before using screws to complete the assembly.





2. Plug the fan's 3-wire cable into the processor fan connector on the CR100 carrier board.
3. Insert the five carrier screws through the back of the CR100 carrier board at the locations shown, then tighten the screws to a torque value of 0.3136N·m (2.78 lbf·in).

**WARNING!** Do not overtighten the screws, or the CR100 carrier board may be damaged.



## Install the COM Express assembly into the chassis

1. Prepare a chassis designed to accept a standard FlexATX-sized board.
2. Remove any I/O shielding included with the chassis, and replace it with the CR100 carrier board's I/O shielding from RadiSys.
3. Fit the module and carrier board assembly into the chassis and snap the carrier board's rear I/O panel into the I/O shielding.

**Note:** To avoid electromagnetic interference, ensure that the springs on the I/O shielding are in full contact with the CR100 carrier board's rear I/O panel.

4. Use the screws and standoffs supplied with the chassis to mount the carrier board. Torque values vary according to the size and material of the screws used. Check with your chassis manufacturer for the recommended torque values of any screws they provide.

## Connect internal devices and set jumpers

This section gives the procedure for connecting internal devices to the CR100 carrier board, such as disk drives and LAN cards, and configuring jumper settings.

1. Connect the following internal devices to connectors on the carrier board as needed. The installation order is not important. For further information about attaching devices, refer to the *Procelerator CR100 FlexATX Carrier Board Product Manual*.

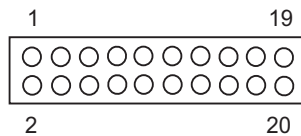
CR100 connector	Device to connect	Cable type
Internal USB headers	Up to two internal USB devices	Standard 5-pin USB cable
PCI Express x1 slot	PCI Express x1 device, such as a LAN card	N/A
IDE header	One IDE device, such as a CD-ROM drive or hard disk drive	Standard IDE cable, complies with the ATAPI industrial specification
SATA connectors	Up to two SATA devices, such as hard disk drives	Standard SATA cable, compliant with SATA specification 1.0
LVDS flat panel connector	One LVDS flat panel	Standard 30-pin LVDS cable
Backlight control connector	One backlight control connector for the LVDS flat panel	Custom; attaches to 7-pin 1.25mm header

2. If you have a CR100-2DVI carrier board, you may need to specify which DVI-I connector will output VGA signals with the 2-pin DVI output selection header. For instructions on connecting a DVI digital video monitor or analog VGA monitor, see [Connect external I/O devices and chassis components on page 20](#).
  - Pins 1 and 2 jumpered (default)—Obtains analog VGA output from the secondary DVI-I port J2
  - Pins 1 and 2 open—Obtains VGA output from the primary DVI-I port J1
3. If you have a CR100-PCIe16 carrier board, insert a PCI Express graphics card into the PCI Express x16 graphics slot.
4. The 2-pin boot BIOS selection header specifies whether the system will use the BIOS on the carrier board or the BIOS on the module when booting:
  - Pins 1 and 2 open (default)—The system will boot from the COM Express module BIOS, which is based on the Phoenix® FirstBIOS™ Notebook (Pro) BIOS with RadiSys extensions.
  - Pins 1 and 2 jumpered—The system will boot from the carrier board BIOS.

**Note:** Refer to *Procelerator CR100 FlexATX Carrier Board Product Manual* if you plan to install a BIOS chip on the CR100 carrier board.
5. Connect the power supply to the 24-pin ATX PSU connector on the CR100 carrier board. The power supply connector must be a 24-pin or 20-pin<sup>1</sup> connector that complies with *ATX Specification Version 2.2*.

<sup>1</sup> If a 20-pin cable is used, plug the 20-pin cable in to the pin #1 end of the connector, and leave the two pairs of pins on the other end exposed. No adaptor is required. Pin #1 is marked by an asterisk (\*) on the CR100 carrier board.

- Connect the power switch and LED indicator cables to the front panel I/O header. Pin #1 is marked with an asterisk (\*) on the CR100 carrier board.



Function	Cable setting
Hard disk drive LED	Pins 1 and 3: <ul style="list-style-type: none"> <li>1: HDD LED cathode (to VCC, typically white in two-wire cables)</li> <li>3: HDD LED anode (from HD_ACT#)</li> </ul>
Reset switch	Pins 5 and 7
Power-on switch	Pins 6 and 8
Speaker	Pins 10 through 16: <ul style="list-style-type: none"> <li>10: 5V supply</li> <li>12: Audio signal (speaker)</li> <li>14: Not connected</li> <li>16: Audio signal (speaker)</li> </ul>

**Note:** The CR100 carrier board does not support the power LED indicator. If you have a custom carrier board that supports this function, make sure that you connect the cathode and anode of the power LED cable correctly.

## Connect external I/O devices and chassis components

Connect external devices to the connectors on the rear I/O panel of the CR100 carrier board.

- Connect the keyboard and mouse to any of the USB ports.
- If you have a CR100-2DVI carrier board, connect one or two monitors according to your needs. Assuming you have left the jumper in the DVI output selection header to enable VGA output on the secondary DVI-I connector:
  - Connect a digital video monitor to the primary DVI-I connector.
  - Connect a VGA monitor to the secondary DVI-I connector. If the VGA monitor cable has a DB15 connector, you will need a DVI-to-VGA adaptor as shown below (RadiSys product code CE-DVI-VGA).




DVI side of adaptor



VGA side of adaptor

- If you have a CR100-PCIExpress16 carrier board, connect one or more displays to the PCI Express graphics card according to the instructions provided with the graphics card.



- 
4. Connect the following devices to external ports on the rear I/O panel as needed. The installation order is not important. For additional information, refer to the *Product Manual* and the *Procelerant CR100 FlexATX Carrier Board Product Manual*.

CR100 connector	Device to connect	Cable type
S-Video output port (located on front of CR100 carrier board)	TV or other S-Video-compatible device	Standard MiniDin4 male S-Video cable
Ethernet port	LAN, router, or other Ethernet device	For 10/100Base-T connections, a Cat5 cable is required; for 1000Base-T, a Cat5E cable is required.
Audio jacks	Microphone and speaker	Standard audio cables with 3.5mm male connectors

**Note:** The CR100 carrier does not provide an onboard PC speaker. It is recommended that you connect an external speaker to the front panel I/O header in order to hear diagnostic sounds during system boot.

## Power on the system

1. If an LVDS flat panel is attached and requires an external power supply, power it up before powering up the system. Otherwise, the panel's power supply will be provided by the CR100 carrier board via the backlight control connector.
2. Plug in the power supply. The system should automatically power on the first time the power supply is connected, but you may have to press the power button on the chassis (if connected) or the power button on the CR100 carrier board.

## Check the BIOS settings

It is a good idea to check the BIOS settings before installing the operating system to make sure the default settings are appropriate for devices you have installed. To enter the BIOS Setup utility, press F2 during system boot.

After installing the operating system, you may also want to change the boot order in the BIOS, so that the hard disk is checked first.

If problems are encountered during boot up, error messages may be displayed on the monitor. You can also use a POST card to determine where the system encountered problems.

Online help is provided in the BIOS setup to explain options. For further information, refer to the *Product Manual*.

## Install the operating system and drivers

The CE915GM supports Microsoft® Windows® XP, Windows XP Embedded, and Red Hat® Desktop Linux® (version 4.0 or later). Contact RadiSys to verify support of other operating systems.

Install the operating system using a bootable CD-ROM/DVD-ROM drive or hard disk drive. Follow the installation instructions provided with the operating system.

Drivers are available for download from the RadiSys Web site, [www.radisys.com](http://www.radisys.com). The following are required drivers for your operating system.

- Microsoft Windows XP and Windows XP Embedded — Install the Intel chipset drivers first. Other drivers can be installed in any order, and include the following:
  - Intel 915GM/915GME graphics driver
  - HDA for STAC9200 audio driver
  - 10/100/1000M Base-T Ethernet device driver
  - Dual-DVI driver (optional, for dual-DVI output)
- Red Hat Desktop Linux
  - Intel 915GM/915GME video card driver (does not support 3D graphics)
  - HDA for STAC9200 audio driver
  - Intel Gigabit network driver